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1 GLOSSARY

AOD - Above Ordnance Datum
Aquifer - A permeable rock which can store or transmit water
BAT - Best Available Technique
BCF - Billion Cubic Feet
BGL - Below Ground Level
Bit - The tool used to drill through the rock
BOP - Blow Out Preventer
BS - British Standard
BSOR - Borehole Sites and Operations Regulations 1995
Cap/Seal Rock - An impermeable rock that prevents the migration of fluids
CDR - Offshore Installations and Wells (Design and Construction, etc) Regulations 1996
Cut and Fill - Where topography dictates, soil is cut from the higher end of the site and moved to the lower end to fill and create a level working area
DEFRA - Department for Environment, Food and Rural Affairs
DST - Drill Stem Test
EIA - Environmental Impact Assessment
Flaring - Should gas be discovered then a controlled flow will be performed which is ignited and allows the potential gas and reservoir characteristics to be determined
HDPE - High Density Polyethylene
HGV - Heavy Goods Vehicle
HSE - Health and Safety Executive
JMLP - Joint Minerals Local Plan
km - Kilometres
Lithology - The different geology and characteristics of the rock
Logging - Electrical recordings in the well bore which measures the physical characteristics by correlating rock strata
LVIA - Landscape and Visual Impact Assessment
MAFF - Ministry of Agriculture, Forestry and Fisheries
MMscfpd - Million Standard Cubic Feet per Day
MPA - Mineral Planning Authority

Mud Logging - The recording of information derived from the examination and analysis of drill cuttings as well as gas monitoring

NGR - National Grid Reference

NPPF - National Planning Policy Framework

OBM - Oil Based Mud

Offset Well - A previously drilled well close to the proposed well, that can provide beneficial information on its characteristics by correlating rock strata

Perforation - This creates a communication between the reservoir rock holding petroleum and the well bore

PON - Petroleum Operations Notice

PPG - Planning Policy Guidance

PPS - Planning Policy Statement

Prospect - An area where petroleum is predicted to be located

Reservoir - A porous and permeable rock in which oil or gas may be present

Source Rock - A rock containing organic material that is capable of producing petroleum

Spud - The point at which drilling commences and the bit begins drilling through the strata

Strata - Different layers of rock

Surface Conductor - The first string of casing run to prevent surface losses and or washouts below the celler base in addition to isolating any aquifers

Tubing - Tubing is hung inside the casing and petroleum is flowed through it to the surface

TVD - True Vertical Depth

TVDss - True Vertical Depth Sub Sea

WBM - Water Based Mud

Well Bore - The inside of the borehole which has been drilled through the different lithologies

Wellhead - The equipment installed at the top of the wellbore from which casing and tubing strings are suspended

WHO - World Health Organisation

Xmas Tree - A system of valves that control pressure from a production well
2 INTRODUCTION

Petroleum Safety Services Limited (PSSL) has been commissioned by Rathlin Energy Limited to provide additional information, to support a planning application which was recently submitted to the Department of the Environment.

The Department of the Environment has requested additional information in relation to the proposed operations including details on daily workings, equipment, vehicles and fluids and chemicals which may be used during the operations.

2.1 RATHLIN ENERGY LIMITED

Rathlin Energy Limited (Rathlin) is a wholly owned subsidiary of Connaught Oil & Gas Ltd, a private company with its head office in Calgary, Canada.

Connaught Oil & Gas Ltd is an international petroleum exploration, development and production company with operations in Western Canada and the United Kingdom. The experienced senior management team has an average of 30 years of direct operating experience in Canada and internationally.

The United Kingdom operations are conducted through Rathlin Energy (UK) Limited and Rathlin Energy Limited and are directed from the Rathlin office in London.

The Applicant is engaged in the exploration and production of petroleum onshore United Kingdom and holds a 100% interest in Petroleum Licence (PL) 3-10. This licence was awarded to Rathlin by the Department of Energy Trade and Industry in 2012, which covers an area of the Rathlin Basin stretching from Ballycastle, Limavady and Ballymoney.

The licence provides Rathlin with the exclusive right to search for subsurface petroleum by physical means within the licence boundaries.

Rathlin is an experienced oil and gas field operator and through its parent company, Connaught Oil & Gas Ltd, has drilled numerous exploration and development wells in Canada. This has been achieved to the complete satisfaction of all stakeholders and governmental regulatory authorities, which have the responsibility to monitor and supervise all petroleum drilling operations.

Rathlin Energy Limited participated in the drilling of an onshore exploration well during 2008, Ballinlea 1, which was completed in full compliance with all regulatory and stakeholder agreements.

Rathlin is committed to safe, compliant and environmentally conscious operations for the benefit of employees, contractors, shareholders, stakeholders and the communities in which Rathlin works.

2.2 THE DEVELOPMENT

Rathlin Energy Limited has applied to the Department of the Environment to construct a temporary wellsite, drill a vertical borehole and undertake a period of well testing. In summary this will consist of four principle phases:
This development will allow Rathlin to search for indigenous petroleum resources that can be used to maintain the UK’s security of supply. The Applicant proposes to drill a single borehole to a target depth of 2,700m (8,858 ft) and test the prospect for commercial quantities of petroleum.

If the drilling is unsuccessful in proving commercial quantities of petroleum, then the well will be plugged and abandoned in accordance with Oil and Gas UK guidance. If the well is successful in proving commercial quantities of petroleum, then Rathlin may apply to the Department of the Environment for permission to produce petroleum.

2.3 SCOPE

The Department of the Environment has requested additional information and clarification on the proposed operations in support of the Ballinlea 2 planning application. This document provides a summary of each phase and includes a breakdown of the operations. It summarises the associated vehicle movements and the equipment which will be required to complete each phase of the operations.

Whilst this document provides an overview of the proposed operations, some areas are subject to change. This could be due to availability of equipment, progress whilst drilling and any technical difficulties during drilling.
3 THE DEVELOPMENT

The development consists of four principle phases, they are:

1. Wellsite Construction
2. Drilling
3. Extended Well Test
4. Restoration and Aftercare

The following chapter sets out the proposed development and discusses the operations in detail. Appendix 1 contains a project plan, which identifies the various phases and the timings associated with each aspect.

3.1 WELLSITE CONSTRUCTION

3.1.1 Highway Improvements

There is an existing access point to the proposed site location immediately adjacent to the public highway. To allow the safe movement of vehicles in and out of the site, the current access point and wellsite access will require upgrading. The upgraded entrance will consist of precast concrete kerbs and channels, tarmac at surface and surface water drainage similar to the entrance shown in Figure 1.

![Figure 1. Typical Wellsite Entrance](image)

There will also be a requirement to protect a number of verges along the proposed access route, to prevent damage to the highway and verges. These works will be completed under relevant agreement with the Highway Authority.
3.1.2 Wellsite Entrance

Topsoil will be excavated within the entrance and stored in the earth bunds on the western boundary of the site. The entrance will be constructed from tarmac with a fall into the wellsite, ensuring that it does not drain onto the public highway. The access has been designed to allow two HGV’s to pass. By using tarmac, this will ensure that vehicles can safely drive onto the public highway and minimise debris being carried onto the road. Thermoplastic line marking paint will be applied to the tarmac surface in order to delineate the highway boundary and encourage vehicles exiting the site to stop and give way.

3.1.3 Site Preparation

In preparing the site to ensure it is suitable for the proposed operations, the top soil will be removed. Soil handling will be carried out with reference to guidelines set out by DEFRA “Construction Code of Practice for the Sustainable Use of Soils on Construction Sites” (2009) and MAFF “Good Practice Guide for Handling Soils” (2000). In accordance with this guidance, the handling of the soils will be minimised as far as reasonably practicable. To undertake this work, a range of typical construction vehicles will be required including an excavator, dump truck, grader and a compactor.

The topsoil will be removed from the development area and stored in an earth bund along the western boundary of the site, as shown in Figure 2. This is the most suitable area to form additional visual screening of the site and provide noise attenuation during the operations. A topographical survey of the site has confirmed that the site has a cross fall of approximately five meters; therefore in order to ensure a level working platform the subsoil will need to be cut and filled to an approximate depth of two and a half meters, as shown in Figure 3 and Figure 4. Any surplus subsoil will be stored in an earth bund, separate to the topsoil bund. As this proposal is for a temporary exploration site, it is not considered necessary to seed the soil bunds.

Figure 2. Topsoil Strip and Formation of Earth Bund
Figure 3. Typical Cut and Fill Operation

Figure 4. Typical Cut and Fill Operation

3.1.4 Liner, Drainage and Working Surface

Once the topsoil has been removed from the site and the cut to fill completed, an impermeable membrane will be laid across the site and heat welded to ensure integrity. The membrane is similar to the liners used for landfills and is typically made from High Density Polyethylene (HDPE). The membrane will cover the footprint of the development site and is protected above and below by a non-woven geotextile. Special care is taken when laying the
membrane and protective geotextile, as shown in Figure 5. Once the liner has been laid, it is then tested to confirm it has formed a containment area. Rathlin will be issued with a certificate confirming its integrity by the specialist contractor.

Figure 5. Impermeable Liner Installation

A drainage ditch will be constructed around the perimeter of the site and any surface water directed to the ditch prior to collection. The ditch will be lined with the membrane, to ensure the containment of fluids, as shown in Figure 6. In order to access and egress the wellsite, the ditch to the north will have a twin wall perforated plastic pipe placed within it before being covered with clean aggregates back to surface, as shown in Figure 7. Any surface water captured in the drainage ditch will be collected by a licensed waste carrier for disposal.

Figure 6. Impermeable Liner Across Site and Within the Perimeter Containment Ditch
A layer of geo-grid will be laid above the non-woven geotextile, to assist with ground loading associated with the drilling equipment and vehicle movements. MOT Type 1 stone will be imported, levelled and compacted in suitable layers. This will create a stable and compact working surface suitable for the drilling operations, as shown in Figure 8.
3.1.5 Cess Tank Installation

A large cess tank is to be installed below ground for the containment of effluent. Subsoil removed prior to placement of the tank is stored within the onsite storage bund. The cess tank is typically located to the rear of the drilling operative’s camp and assists in reducing the volume of vehicles required to remove effluent from the site during drilling operations.

The cess tank will be installed following guidance set out in PPG 4.

3.1.6 Drilling Cellar

Within the centre of the site a cellar will be constructed. This forms a containment area from which the well can be drilled, whilst also housing the wellhead. The cellar is constructed from precast concrete rings, approximately 2700mm nominal diameter, as shown in Figure 9. The impermeable membrane is incorporated into the cellar construction to maintain the integrity of the site. Once the cellar has been constructed, an integrity test is carried out to confirm that it provides suitable containment.

A reinforced concrete slab is to be formed and constructed around the surface of the drilling cellar. This will ensure a level working platform for the sub-base of the drilling rig as well as provide additional load support, as shown in Figure 10.

Figure 9. Construction of Drilling Cellar
3.1.7 Utilities and Security

A fence will be erected around the perimeter of the wellsite and a set of gates erected across the wellsite entrance. The perimeter fencing and access gates will be constructed from wood and will ensure no unauthorised access to the site during the operations.

All utilities required for the site will be provided by mobile facilities. This will include the use of acoustically clad generators and storage tanks for potable and non-potable water.

3.1.8 Surface Conductor

Upon completion of the site construction and prior to the start of the main drilling operations, a small waterwell drilling rig will be mobilised to site, similar to the one shown in Figure 11. Figure 12 shows a similar drilling operating at night. This rig will drill the initial borehole from surface, through the Basalt to a depth of approximately 200m.

This section will be drilled with air; however, there may be a requirement for minimal water to aid the drilling. Once the target depth has been reached, the waterwell drilling rig will be demobilised and the site left ready to accept the main drilling rig.

Air drilling uses compressed air to cool the drill bit and lifts cuttings back to surface. It is an efficient method which is used through hard rock formations. Figure 13 shows a drill bit which would be used to create the hole.
Figure 11. Typical Drilling Rig used to Drill the Surface Conductor

Figure 12. Small Drilling Rig Operating at Night

Figure 13. Drill Bit and Steel Casing
3.1.9 Equipment and Materials
As detailed above the following equipment will be required onsite during the construction phase of the operations:

- Construction Plant & Equipment
- Impermeable Membrane, Non-Woven Geotextile & Geo-grid
- Precast Concrete Cellar
- Twin wall Plastic Pipes
- Hard-core Type 1
- Access Gates
- Perimeter Fencing
- Site Office
- Welfare Unit
- Fire Water Tank
- Surface Conductor
- Storage Container

All of this equipment will remain onsite throughout the operations.

3.1.10 Fuels, Lubricants and Chemicals
Until such time as the site is constructed, all fuels and lubricants used during the construction phase will be stored in portable bunded containers within a dedicated location on the site. Containment trays will be available on site to capture any minor spills during refuelling on the construction equipment and emergency spill kits will be on hand, in the unlikely event that a minor spill occurred.

Once the site is constructed, the impermeable HDPE membrane provides an environmental protection for all subsequent operations, including the surface conductor setting operation.

3.1.11 Vehicle Movements and Personnel
Site construction will be carried out over a period of eight (8) weeks and will require approximately 12 personnel. A parking area will be made available onsite for all vehicles associated with the operations. The construction work will be carried out during the hours stated in Table 1. The conductor setting operations will also be performed during these hours, but subject to conditions whilst drilling it may be necessary to drill 24 hours.
### Table 1. Construction phase working hours

<table>
<thead>
<tr>
<th>Day</th>
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<tr>
<td>Monday to Friday</td>
<td>07:00 to 18:00</td>
</tr>
<tr>
<td>Saturday</td>
<td>07:00 to 13:00</td>
</tr>
<tr>
<td>Sunday and Bank Holidays</td>
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Throughout the construction period, there will be a number of HGV movements associated with a typical construction operation. Table 2 provides an estimate of the average number of vehicle movements per week, throughout the construction phase. Appendix 4 provides a breakdown of the types of vehicles and equipment being delivered to site during this phase.

### Table 2. Predicted vehicle movements per week during site construction

<table>
<thead>
<tr>
<th>Week Number</th>
<th>Operational Movements</th>
<th>HGV Vehicles</th>
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<tr>
<td>Week 1</td>
<td>Mobilise welfare facility, plant and equipment. Delivery of materials for the construction of highway improvement works.</td>
<td>15</td>
</tr>
<tr>
<td>Week 2</td>
<td>Mobilise heavy plant to commence bulk earthworks. Delivery of tarmac surfacing to wellsite entrance and highway improvement works.</td>
<td>16</td>
</tr>
<tr>
<td>Week 3</td>
<td>Delivery of geo-membranes, perimeter ditch pipework and drilling cellar materials.</td>
<td>15</td>
</tr>
<tr>
<td>Week 4</td>
<td>HDPE membrane installation. Delivery of stone aggregates to cover membrane and form working platform.</td>
<td>117</td>
</tr>
<tr>
<td>Week 5</td>
<td>Delivery of stone aggregates to cover membrane and form working platform. Pipe ditches and stone fill.</td>
<td>135</td>
</tr>
<tr>
<td>Week 6</td>
<td>Delivery of stone aggregates to cover membrane and form working platform. Construct drilling cellar, deliveries of concrete. Delivery and erection of perimeter fencing and wellsite access gates.</td>
<td>140</td>
</tr>
<tr>
<td>Week 7</td>
<td>Complete working platform. Install cess tank. Construct concrete slab around surface of drilling cellar. Demobilise plant and equipment.</td>
<td>120</td>
</tr>
<tr>
<td>Week 8</td>
<td>Mobilise waterwell rig. Drill Surface hole. De-Mobilise waterwell rig.</td>
<td>40</td>
</tr>
</tbody>
</table>

Table 2. Predicted vehicle movements per week during site construction

Table 3 details the average number of vehicles per day which will be associated with the construction phase.

### Table 3. Predicted Vehicle Movements Per Day During Construction Phase

<table>
<thead>
<tr>
<th>Day</th>
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<tbody>
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<td>Cars</td>
<td>15</td>
</tr>
<tr>
<td>HGVs</td>
<td>14</td>
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Table 3. Predicted Vehicle Movements Per Day During Construction Phase
3.2 DRILLING

Once the site has been constructed the drilling phase can commence, this consists of three principle phases:

- Mobilisation and Demobilisation
- Drilling
- Drill Stem Testing

3.2.1 Mobilisation and Demobilisation

Once the site construction has been completed and the surface conductor set, the main drilling rig and associated equipment will be mobilised to the temporary wellsite. This part of the operation is carefully planned to ensure that the equipment arrives in the order it is needed to be constructed onsite. As the equipment is delivered to site, it is laid out in the required areas. The drilling rig is then rigged up, as shown in Figure 14, Figure 15 and Figure 16. This will be performed over a two week period. Appendix 4 contains details on the equipment which will be delivered to site. The demobilisation will be the reverse of the mobilisation, which will occur on completion of the drilling operation and will take approximately two (2) weeks.

Figure 14. Rigging up Sub-Base
3.2.2 Drilling Operation

Prior to spudding the well Rathlin will be required to obtain approval from DETI and notify the HSE of the proposed drilling operations 21 days in advance of the drilling operation commencing.
Rathlin is proposing to drill a single vertical borehole to a target depth of 2,700m (8,858 ft). This will entail the drilling of a borehole to and through the primary target reservoir. It is anticipated that the drilling operation will be completed within nine (9) to twelve (12) weeks. This timeframe is dependent on a number of factors, including progress through the different strata and whether petroleum is identified in the target zone.

Petroleum wells are typically drilled using rotary drilling. This is an efficient method which employs a vertical “derrick”, inside which is suspended a column of hollow steel pipe, known as a “drill string” and a drill bit fitted to its lower end, shown in Figure 17. The “string” is rotated and the bit cuts downward through the rock strata.

![Figure 17. Drill Bit](image)

During drilling, a dense fluid known as “mud” is pumped down the inside of the drill string. The mud lubricates the drill bit and returns to the surface fragments of rock which are analysed, to identify and correlate the strata through which the bit is passing and for signs of any gas within any reservoir rocks encountered. A fundamental aspect of safety is provided by the hydrostatic weight of the column of mud providing primary pressure control, which is designed to exceed any underground pressures thereby containing them and maintaining the safety of the drilling operation. The rig is also fitted with valves known as "Blow Out Preventers" which act as secondary well control measures and can be closed immediately if an unexpected increase in pressure occurs.

As the depth of the well increases, drilling must stop periodically so that new lengths of pipe can be added to the drill string. When the drill bit becomes worn, the whole string must be pulled out and a new bit fitted. This is known as “round tripping”, or “pulling out” and “running in”.

At pre-determined stages in the drilling of a well, the walls of the borehole are supported by steel casing which is cemented into place. This provides additional safety measures, by preventing the collapse of the borehole and the ingress of groundwater under pressure. It is essential that drilling continues throughout the day and night to sustain an open hole and maintain control for both safety and operational reasons.
“Well logging” is used to obtain information both on the borehole itself (including its precise depth and direction at any time) and on the rock strata through which it passes. These tests can be either geophysical, using instruments lowered into the well as it is drilled, or can involve analysis of chipping’s brought to the surface in the mud stream. “Coring” is the recovery of rock samples which may be required from particular strata. This procedure involves the use of a special core bit to cut a cylindrical core of rock. The core is then brought to the surface for testing and analysis.

Upon completion of the drilling and preliminary testing, the drilling rig will be demobilised. It is in the Applicant’s best interest, both from an environmental and commercial point of view, to minimise the period of time the drilling rig is on site and to reduce the duration of any flow testing periods. The Applicant will strive at all times, therefore, to minimise the overall duration of the appraisal activity. The drilling rig will be demobilised over two weeks.

3.2.3 Drilling Rig

The drilling rig proposed in the Ballinlea 2 planning application is the KCA Deutag T-61; further details are included in Appendix 3. The rig has been identified as being capable of drilling to the proposed target depth. Whilst this drilling rig has been identified as being suitable for the operation, it may not be the one used to drill the well. This is due to a number of factors, principally due to availability. Once Rathlin is in receipt of the necessary permissions to undertake the proposed work then they will try to secure a drilling rig.

The KCA Deutag T-61 drilling rig is indicative of the rig that will drill the Ballinlea 2 well and is the largest rig which may be used for the proposed operations. Furthermore, it has been assessed for its suitability to drill to the target depth of 2,700m (8,858 ft) and the associated equipment required in reaching these depths. KCA Deutag T-61 is a conventional drilling rig. It has worked in a range of locations, most recently for the Applicant in the East Riding of Yorkshire. Figure 18, Figure 19 and Figure 20 provide some images of the rig onsite in the East Riding of Yorkshire. The rig has a derrick height of approximately 50m which is latticed, as can be seen in Figure 18.

Figure 18. KCA T-61 Drilling Rig
3.2.4 Drilling Mud’s and Water

The drilling mud system is important and specifically designed to confine formation pressure, so as to prevent formation fluid flowing into the well bore. It also provides well bore stability and lubricates the bit whilst drilling. The drilling mud system will be monitored constantly and maintained to the required specifications.

The drilling rig will drill the initial sections using a bentonite and polymer mud system. This typically consists of water and bentonite, which is a naturally forming clay. The final mud mix will be dependent on the approved well plan and the programme recommended by the mud engineers. By using a bentonite polymer through these sections, it will ensure the protection of any groundwater.
Water will be required to make up drilling fluids while drilling the well and for any emergency contingencies. The supply of water will be subject to discussions with the appropriate Water Authority or from a private source.

Estimated quantities are:

(a) Initial requirements - c. 20,000 gallons  
(b) Daily operations - c. 10,000 gallons  
(c) Potable water - c. 1,000 gallons per week

3.2.5 Drilling Waste and Cuttings

During the drilling operations a number of wastes will be generated. As the drill bit cuts through the rock, cuttings will be lifted to surface in the drilling fluid. The cuttings are then removed from the drilling fluid by being passed over shakers. These carry cuttings into a skip, to then allow them to be disposed of, as shown in Figure 21. Where possible this waste is recycled or composted as the cuttings are just fragments of rock which has been drilled through.

![Figure 21. Cuttings Collected in Waste Skip](image)

During the operations there will also be a requirement to dispose of the drilling fluids. This will be water based mud containing bentonite and polymers or salt saturated drilling fluid. This will be removed by road tanker and disposed of at a licenced waste facility.
3.3 Casing

At set intervals during the drilling operation, steel casing is run to isolate the new formation which has been drilled. This casing, in association with the cement, creates a number of barriers between the well and the formation. Each string of casing and cement will be pressure tested to confirm its integrity and will ensure fluids cannot transfer between the well bore and the surrounding strata.

Specialist contractors are brought to site to run and make up the casing due to the specialised nature of the work.

Once the well has been drilled and all the casing run, it is considered that there is sufficient protection from fluids from other deeper geological formations contaminating potential aquifers.

The well schematic overleaf shows the different hole sizes which will be drilled and the casing that will be run inside. It demonstrates the number of barriers which will be in place once the well has been drilled.
13 3/8” Conductor @200 m MD

17 12” hole

9 5/8” Surface @ 800 m MD

12 1/4” hole

7” Intermediate @ +/- 1690 m

8 1/2” hole

TD @ 2700 m (est)

6” hole

4 1/2” production @ 2700 m
3.4 Cementing

Once casing has been run into the borehole, it is then cemented in place. A specialist contractor with a pump truck (Figure 22) is brought to site to complete this operation. Cement is pumped through the bottom of the casing and circulates back up the outside of the casing, between the steel and the formation. Cement is pumped back to surface or to at least 500ft inside the last casing point. Figure 23 shows the equipment required for a cementing operation, including pump truck, bulkers and mix tanks.

Once the cementing operation has been completed a period of time is left for the cement to harden. A number of pressure tests are then conducted to confirm the integrity of the borehole and that there is a sufficient and competent barrier between the wellbore and the formation. Firstly a pressure test is completed on the casing. The rig will then drill out the cement shoe and a short way into the new formation. A formation integrity test is then completed, which confirms that there is sufficient cement around the base of the casing and there it is competent to withstand the downhole pressures expected whilst drilling the next hole section.

Figure 22. Cement Pump Truck

Figure 23. Associated Cementing Equipment
3.4.1 Fuels, Lubricants and Chemicals

Drilling mud is made up of a number of additives to provide the correct weight and viscosity for the specific hole section being drilled. These additives are segregated and stored on site in accordance with the manufacturers recommendations.

In addition, diesel fuel, lubricants (engine oil), and hydraulic oil are used within the drilling rig's engines and mechanical systems, with replenishment stock also segregated and stored on site.

A full inventory of fuels, lubricants and chemicals used in a typical drilling operation is included in Appendix 5, together with their respective Material Safety Data Sheet (MSDS).

Diesel will be required during the operations, which will be supplied by road tanker. This will be stored onsite in bunded storage tanks, in accordance with the Control of Pollution (Oil Storage) Regulations (NI) 2010.

Site construction provides for an impermeable HDPE membrane and perimeter ditch to create a fully bunded wellsite. Such provision mitigates any potential accidental spill on site. In addition, fully bunded stores are provided on site for the storage of and fuels, lubricants or chemicals which represent an increased risk during their storage as a concentrate on site (prior to dilution and use).

3.4.2 Drill Stem Testing

A Drill Stem Test (DST) maybe carried out with the drilling rig on site. A DST has the objective of confirming the existence of petroleum whilst also establishing flow characteristics from the reservoir. The DST will attempt to flow petroleum to surface, prior to setting a last string of casing. Due to the time and expense of setting and perforating casing, it is beneficial to carry out a DST in case there is any doubt over the well's commerciality. A drill stem test will be of short duration, typically up to a maximum of 12 hours of flow.

3.4.3 Equipment and Materials

During the drilling operation the following equipment will be required onsite to perform the operation:

- Drilling Rig and associated equipment
- Casing
- Drill Pipe
- Site Office
- Supervisors Office and Accommodation
- Toolpushers Accommodation
- Mud Engineers Accommodation
- Mud Logging Unit
- Contractors Offices
• Welfare Unit
• Security Office
• Telehandler
• Skips and Waste Collection
• Curtain Sider
• Storage Tanks
• Bunded Fuel Tanks

3.4.4 Vehicle Movements and Personnel

The operation will commence with the mobilisation of the drilling rig, which in this case of the Ballinlea 2 planning application is proposing the KCA Deutag T-61. During the mobilisation of the drilling rig, there will be approximately 75 vehicles associated with the KCA Deutag T-61, as set out in Appendix 4. Two cranes will also be required during the mobilisation and rig up, to erect the equipment on site. Due to the nature of the drilling operations it is necessary to continue 24 hours a day to maintain well bore stability and permit safe operations, as shown in Table 4.

<table>
<thead>
<tr>
<th>Day</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday to Sunday</td>
<td>24 Hours</td>
</tr>
</tbody>
</table>

Table 4. Drilling Phase Working Hours

Once this equipment has been mobilised to site, there will be reduced HGV movements during the drilling operations. Additional light vehicle movements will be required for staff and rig crew changes, plus support service personnel. The average number of vehicle movements is contained in Table 5.

<table>
<thead>
<tr>
<th>Vehicle</th>
<th>Single Movement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Car</td>
<td>15</td>
</tr>
<tr>
<td>HGV</td>
<td>6</td>
</tr>
</tbody>
</table>

Table 5. Predicted Vehicle Movements Per Day During Drilling

Table 6 provides an estimate of the average number of vehicle movements per week, throughout the drilling phase.
Week Number | Operational Summary | Operational Movements | HGV Vehicles
--- | --- | --- | ---
1 | Mobilisation | Mobilisation of drilling rig and associated equipment | 55
2 | Finish mobilisation and rig up. Complete drilling of 17 ½" hole, run 13 ⅜" casing and cement | Mobilisation of drilling rig and associated equipment | 45
3 | Drill 12 ¼" hole, run 9 ¾" casing and cement | Various deliveries and collections including waste, fuel, water, casing, equipment | 43
4 | Drill 8 ½" hole, run 7" casing and cement | Various deliveries and collections including waste, fuel, water, casing, equipment | 31
5 | Drill 8 ½" hole, run 7" casing and cement | Various deliveries and collections including waste, fuel, water, casing, equipment | 24
6 | Drill/core 6" hole and run 4 ½" liner | Various deliveries and collections including waste, fuel, water, casing, equipment | 20
7 | Drill/core 6" hole and run 4 ½" liner | Various deliveries and collections including waste, fuel, water, casing, equipment | 18
8 | De-Mobilisation | De-mobilisation of drilling rig and associated equipment | 60
9 | De-Mobilisation | De-mobilisation of drilling rig and associated equipment | 40

Table 6. Predicted Vehicle Movements Per Week During Drilling

3.5 EXTENDED WELL TEST
If the drilling and preliminary tests demonstrate positive results, Rathlin may wish to undertake an Extended Well Test (EWT) to gain a better understanding of the reservoir.

3.5.1 Mobilisation/Demobilisation
As with the drilling rig, the equipment required to undertake the EWT will be mobilised to site at the start of this phase. All equipment is expected to be delivered to site over a period of 2 – 3 days. Following completion of the EWT, all equipment will be demobilised from the site.

3.5.2 Extended Well Test
An EWT may take place immediately after completing drilling operations following removal of the drilling equipment. The EWT takes place after casing has been set across a productive reservoir and, if necessary, perforated to allow petroleum to flow. A string of production tubing is also run in the cased hole, through which fluids may flow. A completion is run inside the tubing to allow the fluid or gas to flow to surface.
This phase of the operations will require well test equipment to be brought onsite and operated for up to ninety (90) days. The objective is to provide additional data on the extent and quality of the reservoir, as well as providing samples of the produced petroleum for detailed analysis. Typically the EWT will be undertaken over 12 hour periods. Although testing maybe performed for 24 hour periods to allow certain information on the reservoir and well characteristics to be gathered. 24 hour testing will be for limited periods during the 90 day period.

Nominal equipment is required during a well test, principally beam pump, pipework, tanks, separator and a ground flare. In addition, there will be some basic monitoring and control systems in place to allow Rathlin to monitor the operations and gather data. Depending on whether gas or oil is discovered will determine what well test equipment is required. This is discussed in further detail below.

A number of methods can be used to initiate the flow of petroleum to surface, in the event that it is not able to flow naturally. These methods are described below and provide a range of options that will allow Rathlin to understand whether the reservoir is commercial. Whilst a description of the methods is provided, at this stage it cannot be determined whether there will be a requirement to use some or none of these methods. This will only be fully understood once the well has been drilled and some initial tests completed.

**Mini Fall Off Test**

A mini fall-off test is a short duration formation test, which establishes the injectivity pressure of the formation and analyses how the residual pressure remaining in the wellbore permeates through the formation over a given period of time (usually 14 days).

In order to establish communication between the formation and the wellbore, perforating guns will be run into the wellbore and fired, providing a direct pathway from the formation to the wellbore. A retrievable packer will then be lowered into the wellbore, immediately above the perforations.

KCl fluid is pumped into the wellbore until injectivity occurs, which is anticipated to be between 5m³ and 10m³. When injectivity occurs, the residual pressure within the tubing is shut in and monitored for 14 days, to analyse how the residual pressure permeates through the formation.

On completion of the mini fall-off test, any remaining pressure within the tubing will be released and flowed back to surface. Any KCI injected into the formation during the mini fall-off test is unlikely to return (no flow back).

This test is not used to flow any petroleum to surface, only to gather additional information on the rock mechanics.

**Acid Wash and Squeeze**

Carbonate formations are heterogenerous with significant variations in porosity and permeability. To improve the flow of petroleum within a carbonate formation, an acid, most commonly hydrochloric acid is applied to the formation through the wellbore. The acid reacts with the calcite or dolomite through dissolution resulting in high permeability channels through which the petroleum can flow.

The interval where this work is to be conducted will be perforated, to allow communication between the reservoir and the wellbore.
An acid wash or acid soak is applied using low pressure and can be used to clean out the natural fractures, having potentially been blocked as a result of the initial drilling operation. An acid squeeze is applying the acid to the formation under pressure not exceeding the fracture pressure of the formation, resulting in the acid being squeezed through the natural fractures within the formation.

The proposed dilution of hydrochloric acid is 15%, which is circulated across the perforations using 1m$^3$ of HCl per single stage wash. The process of washing the perforations is repeated a further four times. Following the washing of the perforations, HCl is then selectively squeezed into the formation at 1m$^3$ of HCl per metre of perforation.

The reaction of the acid with the carbonate formation results in calcium chloride, carbon dioxide and water being produced (spent acid), which is reverse circulated out of the formation for recovery at surface. It is anticipated that between 6m$^3$ to 11m$^3$ of HCl will be pumped into the formation during the operation, with all spent acid being recovered to surface.

If more than one interval within the reservoir is to be tested, the operation will be repeated.

**Conventional Hydraulic Fracture Stimulation**

Should the well have poor permeability, it may be necessary to conduct a conventional hydraulic fracture stimulation to enable any petroleum contained in the reservoir rock to flow into the wellbore. Conventional hydraulic fracture stimulation is designed to improve the permeability (connectivity) of pores within the reservoir.

Equipment required to perform a conventional hydraulic fracture stimulation will include two to three pump trucks, two silos (to store sand), three fluid storage tanks, nitrogen tanks and a batch mixer.

Initially, the interval where the work is to be conducted will be perforated to provide communication between the reservoir and the wellbore.

The stimulation fluid will be mixed together on surface, which will include approximately 41 ton of sand (proppant), 115 m$^3$ of stimulation fluid and 9,600 m$^3$ of nitrogen. This is then pumped down the wellbore and through the perforations into the formation. The stimulation fluid is pumped into the formation at a pressure exceeding the fracture gradient, which allows the natural fractures to open. After a period of time the pressure is released and the fluid allowed to flow back to surface. The proppant will remain in the formation to ensure the fractures remain open, thereby allowing any petroleum to flow into the wellbore.

If more than one interval within the reservoir is to be tested, the operation will be repeated.

**3.5.3 Flow Test**

Should oil or gas be flowed to surface either naturally or after any of the methods described above have been used, then a short to medium test will be conducted to measure the flow rates and composition of the petroleum. Depending on whether gas, oil or a combination of both is flowed to surface, will determine the equipment and methods required to test the well. These different requirements are summarised in more detail below.
**Natural Gas**

In the event of gas being discovered, well test equipment will be mobilised to site. A well test programme will be followed to allow the characteristics of the reservoir and potential quantities of gas in place to be understood. Equipment required to complete these tests will include a wireline truck and flare stack. Gas will be flowed to surface through the tubing, pipework and separator. Any gas will be burnt through a flare. Gas is likely to be flared for up to 7 days. The well would then be shut in for a short period before the well is either flared again or suspended. Figure 24 shows some of the equipment required for a gas well test, whilst Figure 25 shows a well being flared.

![Figure 24. Example of Gas Testing Equipment](image1)

![Figure 25. Gas Being Flared During a Well Test](image2)

In the event of a successful gas test, it would be expected to test at 5,000 mcf/day. The following production rates would be expected:

- 5,000 mcf/d of gas
o 50 bbl/d of natural gas liquids (most of which will be burned by the flare) assuming 10 bbl/mmcf liquid yield.

o 5 bbl/d of produced water (assuming a 1 bbl/mmcf)

**Total Test Volumes**

<table>
<thead>
<tr>
<th>Component</th>
<th>Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gas (mcf)</td>
<td>35,000</td>
</tr>
<tr>
<td>NGLs (bbl)</td>
<td>350</td>
</tr>
<tr>
<td>Water (bbl)</td>
<td>35</td>
</tr>
</tbody>
</table>

**Oil**

In the event that oil is discovered it is likely that it will need to be artificially lifted to surface. To enable this, a beam is installed over the well which allows the production to be lifted. This then flows into storage tanks onsite. A separator will then be used to separate any water which has been produced with the oil.

Some reservoirs produce gas as well as oil, in this event a flare will also be required to allow the gas to be tested.

Figure 26 and Figure 27 provide some images of beam pumps and tanks, similar to what will be required during a well test.
In the event of a successful gas test, it would be expected to test at 250bbl/day. The following production rates would be expected:

- 250 bbl/d of oil
- 62.5 bbl/d of produced water (assuming a 20% water cut)
- 250 mcf/d of gas (assuming a GOR of 1000 scf/bbl)

<table>
<thead>
<tr>
<th>Total Test Volumes</th>
<th>5 day test</th>
<th>10 day test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil (bbl)</td>
<td>1,250</td>
<td>2,500</td>
</tr>
<tr>
<td>Water (bbl)</td>
<td>312.5</td>
<td>625</td>
</tr>
<tr>
<td>Gas (mcf)</td>
<td>1,250</td>
<td>2,500</td>
</tr>
</tbody>
</table>

During the well test, any water and oil produced will be removed from site by road tanker. At this stage it is difficult to estimate the number of vehicles which may be required, as we do not know if there will be petroleum present and if there are the potential quantities.

3.5.4 Equipment and Materials

During this phase of the operation the following equipment will be required onsite:

- Production Tree
- Beam Pump
- Production Tanks
- Pipework
- Storage Tanks
- Ground Flare
- Wireline Truck
- Separator
- Generator
- Site Office
- Welfare Unit

All equipment is of a temporary nature and is typically skid mounted for easy movement and setup.

3.5.5 Vehicle Movements and Personnel

The EWT operation will typically be performed 12 hours a day with personnel supervising the operations. On occasions certain tests will be required to run 24 hours with personnel onsite during this time. This allows Rathlin to undertake a number of different tests to establish the commerciality of the reservoir. Table 7 states the hours personnel will typically be onsite.

<table>
<thead>
<tr>
<th>Day</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday to Friday</td>
<td>07:00 to 18:00</td>
</tr>
<tr>
<td>Saturday</td>
<td>07:00 to 13:00</td>
</tr>
<tr>
<td>Sunday and Bank Holidays</td>
<td>N/A</td>
</tr>
</tbody>
</table>

**Table 7. Testing phase working hours**

Vehicle movements during the EWT will be limited to deliveries of equipment necessary to perform and aid the well test and tankers removing any produced fluid. The Applicant has estimated the average number of vehicle movements per day during the EWT in Table 8.

<table>
<thead>
<tr>
<th>Vehicle</th>
<th>Single Movement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Car</td>
<td>5</td>
</tr>
<tr>
<td>HGV</td>
<td>4</td>
</tr>
</tbody>
</table>

**Table 8. Predicted vehicle movements per day during EWT**

3.6 RESTORATION AND AFTERCARE

On completion of the drilling operations or following a period of testing, Rathlin will make a decision as to whether the prospect is commercially viable. If a successful production test is achieved, further development will be dependent on a planning application being submitted to the MPA for permission to produce gas.

If the well is not commercially viable, then the well will be abandoned and the site restored to its previous condition. Figure 28 provides an overview of the proposed operations and the decision process which will determine the next steps.
Should a decision be made to plug and abandon the well, then this will consist of three principle phases.

**Abandonment**

The well will be abandoned in accordance with industry best practice and Oil and Gas UK guidance. Mechanical plugs and cement plugs will be set in the well bore and within the steel
casing. The casing will then be cut at approximately 1.5 metres below ground level and a steel plate welded to the remaining casing stub.

**Restoration**

The restoration phase will be the reverse of the construction phase. The work will be carried out Monday to Saturday, 07:00 to 18:00. All equipment will be removed from the site and the area will be reinstated. Where possible, waste will be recycled, however where this is not possible waste will be disposed of at a licensed waste disposal facility.

The restoration will include the replacement of the soils, which will have been stored in earth bunds around the perimeter of the site. This will be carried out in accordance with best practice guidance. A restoration plan is included in Appendix 6.

**Aftercare**

Following completion of the restoration phase, the MPA will be invited to inspect the site operations to ensure that the work meets with their approval. An aftercare programme will be undertaken over a period of five years. This will ensure the successful restoration of the land to its previous condition.

**3.6.1 Equipment and Materials**

During the restoration of the wellsite

The following equipment will be required for this phase of the operations:

- Construction Plant & Equipment
- Site Office
- Welfare Unit

During the restoration phase, all equipment and material that was installed to create the wellsite will be removed.

Where possible and in accordance with the waste hierarchy, waste will be recycled.

**3.6.2 Vehicle Movements and Personnel**

Site restoration will be carried out over a period of six (6) weeks and will require approximately 10 personnel. A parking area will be made available onsite for all vehicles associated with the operations. The restoration work will be carried out during the hours stated in Table 9.

<table>
<thead>
<tr>
<th>Day</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday to Friday</td>
<td>07:00 to 18:00</td>
</tr>
<tr>
<td>Saturday</td>
<td>07:00 to 13:00</td>
</tr>
<tr>
<td>Sunday and Bank Holidays</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Table 9. Restoration phase working hours
Throughout the restoration period, there will be a number of HGV movements similar to those which have occurred during the construction of the wellsite, Table 10. This will include up to 340 lorries to remove the stone which was brought to site during the original site construction.

Throughout the construction period, there will be a number of HGV movements associated with a typical construction operation.

<table>
<thead>
<tr>
<th>Week Number</th>
<th>Operational Movements</th>
<th>HGV Vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 1</td>
<td>Mobilise welfare facility, plant and equipment. Commence removal of working platform. Remove cess tank. Break out concrete slab around surface of drilling cellar.</td>
<td>120</td>
</tr>
<tr>
<td>Week 2</td>
<td>Continue removing stone aggregates form working platform. Break out drilling cellar. Removal of perimeter fencing and wellsite access gates.</td>
<td>140</td>
</tr>
<tr>
<td>Week 3</td>
<td>Removal of stone aggregates from working platform area. Removal of pipe work in perimeter ditches.</td>
<td>135</td>
</tr>
<tr>
<td>Week 4</td>
<td>Lift and dispose of HDPE membrane installation. Removal of stone aggregates which cover membrane and form working platform.</td>
<td>117</td>
</tr>
<tr>
<td>Week 5</td>
<td>Lift and dispose of geo-membranes, perimeter ditch pipework and drilling cellar materials. Cut cellar casing down. Commence regarding and spreading soils stored in bunds.</td>
<td>31</td>
</tr>
<tr>
<td>Week 6</td>
<td>Reinstatement of soils and grading back to original topography. Demobilise plant and equipment.</td>
<td>15</td>
</tr>
</tbody>
</table>

Table 10. Predicted vehicle movements per week during site restoration

Table 11 provides an estimate of the average number of vehicle movements per day, throughout the construction phase.

<table>
<thead>
<tr>
<th>Vehicle</th>
<th>Single Movement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Car</td>
<td>10</td>
</tr>
<tr>
<td>HGV</td>
<td>16</td>
</tr>
</tbody>
</table>

Table 11. Predicted vehicle movements per day during site construction

4 REGULATORY FRAMEWORK

The oil and gas industry is heavily regulated, with a number of review processes and permissions required before any operations can commence. Obtaining planning permission is only one requirement, with other organisations including the Health and Safety Executive,
Environment Agency, Coal Authority, DECC and an independent well examiner, required to review the proposed operations. These requirements are discussed in more detail over the following paragraphs.

**Borehole Sites and Operations Regulations (NI) 1995**

The above regulation specifies the minimum requirements which must be complied with when drilling boreholes. Specifically, obligations are placed upon the Applicant to:

**Regulation 6:**

*Notify the Health and Safety Executive not less than 21 days in advance of the drilling or well operations commencing. The purpose of the notification is to inform the Health and Safety Executive of the intention to carry out a borehole operation and in particular the method by which the well operation will be carried out. The 21 day notification period is necessary to allow the Health and Safety Executive sufficient time to review the proposed borehole operation and intervene if it deems necessary.*

**Regulation 7:**

*Prepare and hold on site a ‘health and safety document’, which is required to demonstrate that the risk to which persons at the borehole site are exposed whilst they are at work have been assessed in accordance with Regulation 3 of the Management of Health and Safety at Work Regulation and the prevention of specific hazards associated with petroleum borehole operations.*

Prior to commencing any operations, the Applicant will be required to ensure that the necessary notifications and documentation have been completed.

**Water (NI) Order 1999**

This order regulates water resources, quality and pollution. Part of its requirements relate specifically to drilling, by ensuring the protection of any groundwater sources.

The order requires the Applicant to submit details of the proposed well design, including casing and drilling fluid specifications. This is then reviewed and evaluated by the Environment Agency, who may wish to issue a Notice to Conserve Water resources, which sets out the Environment Agency’s requirements in order to protect groundwater.

**The Offshore Installations and Wells (Design and Construction, etc.) Regulations (NI) 1996**

This regulation is applicable to all onshore drilling operations. In summary, it places obligations on the well-operator to:

**Regulation 13:**

*Ensure that a well is designed, modified, commissioned, constructed, equipped, operated, maintained, suspended and abandoned such that there is no unplanned escape of fluids from the well and that the risks to the health and safety of person from it or anything in it, or in strata to which it is connected, are as low as is reasonably practicable.*
Regulation 18:

To make and put into effect arrangements in writing for independent examination by a competent person before the design of the well is commenced. This independent examination is intended to provide the Well-Operator that the well is designed and constructed properly and is maintained adequately. Specific emphasis is given to the impartiality and independence of those responsible for carrying out independent examinations.

These regulations ensure the protection of the environment and persons through careful design. Following a number of internal reviews, the operations are reviewed by an independent competent third party. This process ensures that the well is designed and planned to the highest standards.

Coal Authority Notification

Any activity which intersects, disturbs or enters any of the Coal Authority’s interests requires written consent. This requires the Applicant to submit details of the proposed drilling operations and consider any risks which may be presented by drilling through coal seams. Following a review of the submitted information, the Coal Authority will authorise the applicant to drill through coal seams.
5 SUMMARY

This document has been produced to provide additional clarification to the Department of the Environment following the submission of a planning application.

Rathlin is proposing to drill a vertical exploratory borehole to a depth of 2,700m and undertake a period of testing. It is anticipated that the drilling operation will be completed within nine (9) to twelve (12) weeks. This timeframe is dependent on a number of factors, including progress through the different strata and whether petroleum is identified in any of the target zones.

The drilling is targeting conventional petroleum bearing formations and therefore a typical oilfield drilling rig will be used. Drilling rig availability is not known at this early stage of the planning process, consequently it is not possible to definitively determine which rig may be used; however, the approximate height of the drilling rig suitable for drilling to this depth is 50m.

If there are positive results during the drilling, then the Applicant will undertake an extended well test, during which time they will flow petroleum to surface for a period of ninety (90) days. This will allow them to gain a further understanding on the characteristics of the reservoir and evaluate its potential as a commercial prospect.

If at any stage Rathlin decides the prospect is not commercial, then a decision will be made to plug and abandon the well in accordance with industry best practice. The site will be subsequently restored to its existing condition and a period of aftercare carried out to ensure its successful restoration. Should Rathlin decide that this prospect is commercial and wish to produce gas from the site, they will request restoration is deferred pending the submission and a decision on a planning application to produce gas.
APPENDIX 1 – PROJECT PLAN
APPENDIX 2 – SITE DRAWINGS

Site Drawings included under separate cover
APPENDIX 3 – DRILLING RIG SPECIFICATION
### T-61
### WIRTH GH 1250 EG-DC

#### TECHNICAL OVERVIEW

| Rating          | 1,250 HP | 933 kW |
| Hook load       | 640,000 lbs @ 10 lines | 290 t |
| Drilling depth  | 15,000 ft | 4,570 m |
| theoretical     | Upgrade 2005 |

#### MAST

| Type             | Dreco M 13616-700 Bootstrap, vertical erection |
| Height           | 136 ft | 41.5 m |
| Base             | 16 ft | 4.9 m |
| Total height (incl. substr.) | 162 ft | 49.4 m |
| N.G.C.           | 700,000 lbs | 318 t |

#### SUBSTRUCTURE

| Type             | Dreco slingshot |
| Height           | 22 ft | 6.7 m |
| Casing load      | 640,000 lbs | 290 t |
| Setback load     | 442,000 lbs | 200 t |

#### DRAWWORKS

| Type             | Wirth GH 1250 EG-DC |
| Horsepower rating | 1,250 HP | 933 kW |
| Max. line pull    | 71,270 lbs | 32.3 t |
| Drilling line diameter | 1 ¼" | 32 mm |
| Auxiliary brake   | Baylor Elmagco Mod. 6032 |

#### TOP DRIVE

| Type             | Varco TDS-9S |
| Capacity         | 800,000 lbs | 363 t |
| Torque           | 32,500 ft.lbs | 44,050 Nm |

#### ROTARY TABLE

| Type             | National C-275 |
| Table opening    | 27 ½" | 692.5 mm |

#### BOP EQUIPMENT

| Annular          | 13 5/8" – 5,000 psi |
| Double ram       | 13 5/8" – 10,000 psi |
| Single ram       | 13 5/8" – 10,000 psi |

#### DRIVE GROUP

| Engine type       | MWM TBD 620 V 16 |
| Horsepower rating | 2 x 2,330 HP |
| Engine type       | MWM TCD 2020 V16 G3 |
| Horsepower rating | 2,360 HP |
| Generator type    | Piller NKT 2500-4S |
| Generator rating  | 3 x 2,500 kVA |
| SCR Unit          | Bentec SCR |

#### MUD SYSTEM

| Mud pump          | Continental Emsco FB-1600 |
| Horsepower        | 2 x 1,600 HP |
| Standpipe pressure| 5,000 psi | 350 bar |
| Active mud system | 820 bbl | 130 m³ |
| Reserve mud system| 4 silos, 940 bbl | 150 m³ |
| Shale shaker type | 2 x Thule VSM 300 elliptical |

#### IRON ROUGHNECK

| Type             | Blohm & Voss “Floorhand” |

#### ADDITIONAL EQUIPMENT

| Soundproofed Equipment |
| Rig floor, fingerboard, pumps, generators |
| Drawworks |
| Disc brake with 4-Quadrant (4-Q) and joystick operation via drillers house, automatic driller system, automated drawworks control system (ADCS) |
| Additional Fingerboard |
| Belly board for small diameter pipes |
| Power Supply |
| Via generator sets (SCR) or alternative from main grid and transformer/SCR system |
| Anti Collision System (ACS) |
APPENDIX 4 – TRANSPORTATION LOADS
<table>
<thead>
<tr>
<th>Description</th>
<th>Area to Cover</th>
<th>Roll Length</th>
<th>Roll Width</th>
<th>No. per Truck</th>
<th>No. Trucks</th>
<th>Truck Type</th>
<th>Weight (kg)</th>
<th>Week</th>
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**Facilities**

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<th>Registration</th>
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<tbody>
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## CHEMICAL INVENTORY - EXPLORATORY OPERATIONS (DRILLING & TESTING)

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<thead>
<tr>
<th>PRODUCT NAME</th>
<th>UNIT SIZE</th>
<th>QTY</th>
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<th>MAX TONNES</th>
<th>UN NO</th>
<th>CLASSIFICATIONS</th>
<th>HAZARD</th>
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<td><strong>FLUID ADDITIVES - DRILLING MUDS</strong></td>
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<tr>
<td>Bentonite Ooma</td>
<td>25 kg</td>
<td>500</td>
<td>12.500 kg</td>
<td>12.5</td>
<td>N/A</td>
<td>Xn;R20</td>
<td>Inhalation</td>
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<td>Caustic Soda</td>
<td>13 kg Can</td>
<td>75</td>
<td>975 kg</td>
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<td>1823</td>
<td>C;R35, S26, S45, S37/39</td>
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<td>25 kg Sack</td>
<td>80</td>
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<td>N/A</td>
<td>Xl;R36.</td>
<td>Irritant</td>
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<td>Conprox 404NS</td>
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<td>Duro-Vis</td>
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<td>EMI-2224</td>
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<td>40 ltr Sack</td>
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<td>3,200 ltrs</td>
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<td>3,200 ltrs</td>
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<td>Lime</td>
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<td>120</td>
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<td>3</td>
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<td>Xl;R36/38</td>
<td>Irritant</td>
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<tr>
<td>M1 Bante</td>
<td>25 kg Sack</td>
<td>600</td>
<td>15,000 kg</td>
<td>15</td>
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<td>R46</td>
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<td>Bulk Tanker</td>
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<td>5,000 kg</td>
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<td>Pot Chi KCL Big Bag</td>
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<td>30</td>
<td>30 MT</td>
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<tr>
<td>Potassium Chloride</td>
<td>25 kg Sack</td>
<td>300</td>
<td>7,500 kg</td>
<td>7.5</td>
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<tr>
<td>Safe-Carb 40</td>
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<td>400</td>
<td>10,000 kg</td>
<td>10</td>
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<td>Xn;R20</td>
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<td>Safe-Carb 250</td>
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<td>4,000 kg</td>
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<td>Xn;R20</td>
<td>Inhalation</td>
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<td>Safe-Carb 500</td>
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<td>4,000 kg</td>
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<td>Xn;R20</td>
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<td>3,000 kg</td>
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<td>Xn;R20</td>
<td>Inhalation</td>
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<td>600 kg</td>
<td>0.6</td>
<td>2810</td>
<td>Cat 6.1 T;TR23. Xn;R20/22/23;R34 R38/37;R43</td>
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<tr>
<td>Safe-Core</td>
<td>200 ltr Drum</td>
<td>8</td>
<td>1,600 ltrs</td>
<td>1.664</td>
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<td>Xl;R36/38, R43, Xn;R22, R43,R52.</td>
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<td>Safe-Scav HSB</td>
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<td>32</td>
<td>800 ltrs</td>
<td>0.88</td>
<td>2810</td>
<td>T;R23, Xn;R22, R43.</td>
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<td>25 ltr Can</td>
<td>6</td>
<td>150 ltrs</td>
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<td>Salt PVD - Sodium Chloride</td>
<td>1 MT Bag</td>
<td>40</td>
<td>40 MT</td>
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<td>Not Classified</td>
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<td>Salt PVD - Sodium Chloride</td>
<td>25 kg Sack</td>
<td>500</td>
<td>12,500 kg</td>
<td>12.5</td>
<td>N/A</td>
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<td>SAPP</td>
<td>25 kg Sack</td>
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<td>2,000 kg</td>
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<td>Soda Ash</td>
<td>25 kg Sack</td>
<td>40</td>
<td>1,000 kg</td>
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<td>N/A</td>
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<td>Sodium Bicarbonate</td>
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## DIESEL FUEL - DRILLING RIG

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<th>PRODUCT NAME</th>
<th>UNIT SIZE</th>
<th>QTY</th>
<th>TOTAL VOLUME</th>
<th>MAX TONNES</th>
<th>UN NO</th>
<th>CLASSIFICATIONS</th>
<th>HAZARD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Portable Fuel Caddy</td>
<td>107 Litres</td>
<td>1</td>
<td>107 ltr</td>
<td>0.1</td>
<td>1202</td>
<td>Cat3 Xn, N R40, R65, R66, R51/53</td>
<td>Harmful En</td>
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<tr>
<td>Rig Fuel Tank 1</td>
<td>30000 Liters</td>
<td>1</td>
<td>30,000 ltrs</td>
<td>26</td>
<td>1202</td>
<td>Cat3 Xn, N R40, R65, R66, R51/53</td>
<td>Harmful En</td>
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<tr>
<td>Rig Fuel Tank 2</td>
<td>200000 Liters</td>
<td>1</td>
<td>20,000 ltrs</td>
<td>17.4</td>
<td>1202</td>
<td>Cat3 Xn, N R40, R65, R66, R51/53</td>
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## GASES - DRILLING RIG STOCK

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<th>TOTAL VOLUME</th>
<th>MAX TONNES</th>
<th>UN NO</th>
<th>CLASSIFICATIONS</th>
<th>HAZARD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetylene</td>
<td>97 kg Bottle</td>
<td>3</td>
<td>291 kg</td>
<td>0.291</td>
<td>1001</td>
<td>Cat2 2 F+R12, R5, R6</td>
<td>Ex Fl Exp</td>
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<tr>
<td>Argon</td>
<td>50 ltr Bottle</td>
<td>7</td>
<td>350 ltr</td>
<td>0.49</td>
<td>1006</td>
<td>Cat2</td>
<td>Asphyxiant</td>
</tr>
<tr>
<td>Hydrogen</td>
<td>50 ltr Bottle</td>
<td>2</td>
<td>100 ltr</td>
<td>0.09</td>
<td>1049</td>
<td>Cat2</td>
<td>Asphyxiant</td>
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<td>Nitrogen</td>
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<td>425 kg</td>
<td>0.425</td>
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<td>Cat2</td>
<td>Asphyxiant</td>
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<tr>
<td>ZOP Accumulator (Pre Charged Nitrogen)</td>
<td>144 ltr Bottle</td>
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<td>144 ltr</td>
<td>1</td>
<td>1066</td>
<td>Cat2</td>
<td>Asphyxiant</td>
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<tr>
<td>Oxygen</td>
<td>50 kg Bottle</td>
<td>3</td>
<td>240 kg</td>
<td>0.24</td>
<td>1072</td>
<td>Cat2 O; R8</td>
<td>Oxidising</td>
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## OILS - DRILLING RIG ACTIVE SYSTEM

<table>
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<th>UNIT SIZE</th>
<th>QTY</th>
<th>TOTAL VOLUME</th>
<th>MAX TONNES</th>
<th>UN NO</th>
<th>CLASSIFICATIONS</th>
<th>HAZARD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engine Oil 15W40</td>
<td>System 1</td>
<td>1</td>
<td>440.5 ltr</td>
<td>0.389</td>
<td>1268</td>
<td>Not Classified R38,R41, R51/53</td>
<td>Tox Aq</td>
</tr>
<tr>
<td>PRODUCT NAME</td>
<td>UNIT SIZE</td>
<td>QTY</td>
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<td>MAX TONNES</td>
<td>UN NO</td>
<td>CLASSIFICATIONS</td>
<td>HAZARD</td>
</tr>
<tr>
<td>--------------</td>
<td>-----------</td>
<td>-----</td>
<td>--------------</td>
<td>------------</td>
<td>-------</td>
<td>-----------------</td>
<td>--------</td>
</tr>
<tr>
<td>Hydraulic Oil Shell Tullus 32</td>
<td>System</td>
<td>1</td>
<td>3,275 ltr</td>
<td>2.866</td>
<td>N/A</td>
<td>Not Classified</td>
<td>Highly refined mineral oil contains &lt;3% (w/w) DMSO-extract, according to IP 346</td>
</tr>
<tr>
<td>Shell Omala 220 Gear Lub</td>
<td>System</td>
<td>1</td>
<td>606 ltr</td>
<td>0.545</td>
<td>N/A</td>
<td>NC R22 R41 R43 R51 R53</td>
<td>Fl Tox Aq Amine Phosphate 0.10-0.50%</td>
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<td>Shell Omala 52 G 100 Gear Lub</td>
<td>System</td>
<td>1</td>
<td>425 ltr</td>
<td>0.379</td>
<td>N/A</td>
<td>NC R22 R41 R43 R51 R53</td>
<td>Fl, Ac Tox Amine Phosphate 0.10-0.50%</td>
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<td>OILS - DRILLING RIG REPLENISHMENT STOCK</td>
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<td></td>
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<td></td>
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<td>Engine Oil 15W40</td>
<td>200 ltr Drum</td>
<td>6</td>
<td>1,200 ltr</td>
<td>1.06</td>
<td>1288</td>
<td>Not Classified R38 R41 R51/53</td>
<td>Tox Aq Zinc alkyl diisophosphate 1-2.4% interchangeable low viscosity base oil 0-90%</td>
</tr>
<tr>
<td>Hydraulic Oil Shell Tullus 32</td>
<td>200 ltr Drum</td>
<td>5</td>
<td>1,000 ltr</td>
<td>0.875</td>
<td>N/A</td>
<td>Not Classified</td>
<td>Highly refined mineral oil contains &lt;3% (w/w) DMSO-extract, according to IP 346</td>
</tr>
<tr>
<td>Shell Omala 220 Gear Lub</td>
<td>200 ltr Drum</td>
<td>3</td>
<td>600 ltr</td>
<td>0.539</td>
<td>N/A</td>
<td>NC R22 R41 R43 R51 R53</td>
<td>Fl, Ac Tox Amine Phosphate 0.10-0.50%</td>
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<tr>
<td>PERFORATING GUNS - ON SITE AD HOC - IF TUBING CONVEYED</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Cord, detonating - XHV, HMX, 80gr Det cord</td>
<td>5.2g</td>
<td>31</td>
<td>1560g</td>
<td>0.0018</td>
<td>0065</td>
<td>1.1D</td>
<td>Explosive CAS no 78-11-6</td>
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<td>Components, Explosive, Train, N.O.3</td>
<td>0.7g</td>
<td>30</td>
<td>21g</td>
<td>0.000021</td>
<td>0384</td>
<td>1.4S</td>
<td>Explosive CAS no 78-11-5</td>
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<td>Detonators, Non-Electric, for blasting</td>
<td>0.48g</td>
<td>13</td>
<td>6.3g</td>
<td>0.000006</td>
<td>0455</td>
<td>1.4S</td>
<td>Explosive CAS no 78-11-6, 121-8-24, 13424-46-9, 15245-44-0, 1314-41-6, 7722-84-7</td>
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<td>PERFORATING GUNS - ON SITE AD HOC - IF WIRELINE CONVEYED</td>
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<td></td>
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<td></td>
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<tr>
<td>Detonators, electric for blasting - RP800 EBW</td>
<td>0.2g</td>
<td>5</td>
<td>1g</td>
<td>0.000001</td>
<td>0456</td>
<td>1.4S</td>
<td>Explosive CAS no 78-11-6, 121-8-24, 13424-46-9, 15245-44-0, 1314-41-6, 7722-84-7</td>
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<td>Detonators, electric for blasting - RP880 EBW Fluid Detonator</td>
<td>0.66g</td>
<td>5</td>
<td>3.3g</td>
<td>0.000003</td>
<td>0255</td>
<td>1.4B</td>
<td>Explosive CAS no 78-11-5, 121-8-24, 13424-46-9, 15245-44-0, 1314-41-6, 7722-84-7</td>
</tr>
<tr>
<td>Cord, detonating - XHV, HMX, 80gr Det cord</td>
<td>5.2g</td>
<td>500</td>
<td>2,600g</td>
<td>0.0026</td>
<td>0065</td>
<td>1.1D</td>
<td>Explosive CAS no 78-11-6</td>
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<td>Cord, detonating - HMX 40gr Det cord</td>
<td>2.6g</td>
<td>500</td>
<td>1,300g</td>
<td>0.0013</td>
<td>0065</td>
<td>1.1D</td>
<td>Explosive CAS no 78-11-5</td>
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<tr>
<td>Detonators, electric for blasting - SQ-80 Igniter</td>
<td>0.5g</td>
<td>5</td>
<td>2.5g</td>
<td>0.000003</td>
<td>0456</td>
<td>1.4S</td>
<td>Explosive CAS no 78-11-5, 121-8-24, 13424-46-9, 15245-44-0, 1314-41-6, 7722-84-7</td>
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<tr>
<td>Articles, explosives, nos - Booster</td>
<td>0.6g</td>
<td>20</td>
<td>12g</td>
<td>0.000012</td>
<td>0349</td>
<td>1.4S</td>
<td>Explosive CAS no 0021-62-4, 02614-41-0, 20062-22-0, 08062-98-2, 07428-90-5, 07439-89-6, 07782-42-5, 07440-50-8, 07439-92-1, 07440-33-7, 07440-66-8</td>
</tr>
<tr>
<td>Igniters - Baker Secondary</td>
<td>10g</td>
<td>5</td>
<td>50g</td>
<td>0.00005</td>
<td>0454</td>
<td>1.4S</td>
<td>Explosive CAS no 10294-40-3, 7439-95-4</td>
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<tr>
<td>Cartridge, power device - #20 Baker power charge slow burn</td>
<td>570g</td>
<td>5</td>
<td>2,850g</td>
<td>0.00285</td>
<td>0323</td>
<td>1.4S</td>
<td>Explosive CAS no 7439-89-6, 7440-50-8, 7440-66-6, 9004-70-0, 55-63-0, 84-74-2, 15245-44-0</td>
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<tr>
<td>Charges, shaped - 2-00'&quot; Tubing Punch Charge</td>
<td>6.5</td>
<td>50</td>
<td>325g</td>
<td>0.000325</td>
<td>0441</td>
<td>1.4S</td>
<td>Explosive CAS no 0021-62-4, 02614-41-0, 20062-22-0, 08062-98-2, 07428-90-5, 07439-89-6, 07782-42-5, 07440-50-8, 07439-92-1, 07440-33-7, 07440-66-6</td>
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<td>LUBRICANTS</td>
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<td></td>
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</tr>
<tr>
<td>OKS 611</td>
<td>500 ml</td>
<td>10</td>
<td>5 ltr</td>
<td>0.0035</td>
<td>1950</td>
<td>R12 R53-66 Xn R65</td>
<td>F+ Naphtha (petroleum) heavy alkylate 25-50%. Propane liquefied 10-25%. Isobutene 10-25%. Butane, pure 2.5-5% 2-butoxyethanol ≤ 2.5%</td>
</tr>
<tr>
<td>RADIOACTIVE SOURCES - ON SITE AD HOC</td>
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<tr>
<td>Cesium 137</td>
<td>63.0GBq</td>
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<td>63.0GBq</td>
<td>3332</td>
<td>Class 7 R10 S2</td>
<td>Radioactive Cesium Chloride</td>
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<tr>
<td>Americium 241 Beryllium</td>
<td>592GBq</td>
<td>1</td>
<td>592GBq</td>
<td>3332</td>
<td>Class 7 R10 S2</td>
<td>Radioactive Americium oxide with Beryllium metal</td>
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<td>CEMENT ADDITIVES - DRILLING</td>
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<tr>
<td>Tuned Light XLE</td>
<td>Bulker MT</td>
<td>150</td>
<td>150 MT</td>
<td>150</td>
<td>N/A</td>
<td>Xi R37/38 R41, R43</td>
<td>Irritant Portland cement 60-100% Crystalline silica, quartz 1-5%</td>
</tr>
<tr>
<td>Calcium Chloride Liquid</td>
<td>ltrs</td>
<td>4,341</td>
<td>4,341 ltrs</td>
<td>4.902</td>
<td>N/A</td>
<td>Xi R36 S2 S22 S24</td>
<td>Irritant Calcium Chloride 30-60%</td>
</tr>
<tr>
<td>NF-6</td>
<td>ltrs</td>
<td>250</td>
<td>250 ltr</td>
<td>0.193</td>
<td>N/A</td>
<td>Not Classified</td>
<td>Vegetable oil 60-100%. Aluminum stearate 1-5%</td>
</tr>
<tr>
<td>Lafarge G</td>
<td>Bulker MT</td>
<td>50</td>
<td>50 MT</td>
<td>50</td>
<td>N/A</td>
<td>Xi R43 R35/38</td>
<td>Irritant Portland cement 60-100%, Crystalline silica, quartz &lt; 3%</td>
</tr>
<tr>
<td>Bentonite (Included in Fluid Additives - Drilling Muds)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>N/A</td>
<td>Not Classified</td>
<td></td>
<td></td>
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<tr>
<td>PRODUCT NAME</td>
<td>UNIT SIZE</td>
<td>QTY</td>
<td>TOTAL VOLUME</td>
<td>MAX TONNES</td>
<td>UN NO</td>
<td>CLASSIFICATIONS</td>
<td>HAZARD</td>
</tr>
<tr>
<td>--------------</td>
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<td>--------</td>
</tr>
<tr>
<td>CFR-8L</td>
<td>ltrs</td>
<td>168.35 ltrs</td>
<td>0.162</td>
<td>N/A</td>
<td>Not Classified</td>
<td>Sodium hydroxide 30-60%</td>
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<td>Halid-300L NS</td>
<td>ltrs</td>
<td>4,500 ltrs</td>
<td>3.866</td>
<td>N/A</td>
<td>Not Classified</td>
<td>Mixture 60-100%</td>
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<td>HR-4L</td>
<td>ltrs</td>
<td>1,370 ltrs</td>
<td>1.349</td>
<td>N/A</td>
<td>Not Classified</td>
<td>Silica, amorphous-fumed, 30-60%</td>
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<tr>
<td>Silicate Liquid</td>
<td>ltrs</td>
<td>37,974 ltrs</td>
<td>44.209</td>
<td>N/A</td>
<td>Not Classified</td>
<td>Bentonite 60-100%, Crystalline silica, tridymite 0-1%, Crystalline silica, cristobalite 0.1%. Crystalline silica quartz 1-5%</td>
<td></td>
</tr>
<tr>
<td>Tuned Spacer E+</td>
<td>ltrs</td>
<td>19,793 ltrs</td>
<td>1.973</td>
<td>N/A</td>
<td>Not Classified</td>
<td>Sodium hydroxide 1-5%</td>
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<tr>
<td>Gasstop-L</td>
<td>ltrs</td>
<td>7,562 ltrs</td>
<td>6.414</td>
<td>N/A</td>
<td>Xi R36/38 S26 S45 S37/39</td>
<td>Irritant</td>
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<td>CFM-1</td>
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<td></td>
<td>Not Classified</td>
<td>Sodium acid pyrophosphate 60-100%</td>
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</tr>
<tr>
<td>Tuned Spacer E+</td>
<td>ltrs</td>
<td>5,457 ltrs</td>
<td>0.544</td>
<td>N/A</td>
<td>Not Classified</td>
<td>Bentonite 60-100%, Crystalline silica, tridymite 0-1%, Crystalline silica, cristobalite 0.1%. Crystalline silica quartz 1-5%</td>
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<tr>
<td>SCR-100L</td>
<td>ltrs</td>
<td>820 ltrs</td>
<td>0.789</td>
<td>N/A</td>
<td>Not Classified</td>
<td>Modified Lignosulfonate 30-60%</td>
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<td>Microcem 650SR</td>
<td>ltrs</td>
<td>60 ltrs</td>
<td>0.046</td>
<td>N/A</td>
<td>Not Classified</td>
<td>Vegetable oil 60-100%, Aluminum stearate 1-5%</td>
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<td>HR-4L</td>
<td>ltrs</td>
<td>228 ltrs</td>
<td>0.224</td>
<td>N/A</td>
<td>Not Classified</td>
<td>Modified Lignosulfonate 30-60%</td>
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<tr>
<td>CFR-8L</td>
<td>ltrs</td>
<td>820 ltrs</td>
<td>0.789</td>
<td>N/A</td>
<td>Not Classified</td>
<td>Sulfonated organic polymer 30-60%</td>
<td></td>
</tr>
<tr>
<td>Gasstop-L</td>
<td>ltrs</td>
<td>3,413 ltrs</td>
<td>2.895</td>
<td>N/A</td>
<td>Xi R36/38 S26 S45 S37/39</td>
<td>Irritant Sodium hydroxide 1-5%</td>
<td></td>
</tr>
<tr>
<td>Microbond HT</td>
<td>ltrs</td>
<td>1,202 ltrs</td>
<td>0.084</td>
<td>N/A</td>
<td>Not Classified</td>
<td>Calcium sulphate dihydrate 60-100%. Calcium aluminate 10-30%.</td>
<td></td>
</tr>
<tr>
<td>Silicate Liquid</td>
<td>ltrs</td>
<td>717 ltrs</td>
<td>0.848</td>
<td>N/A</td>
<td>Not Classified</td>
<td>Silica, amorphous-fumed, 30-60%</td>
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</tr>
<tr>
<td>Laflage G</td>
<td>Bulker MT</td>
<td>25 MT</td>
<td>25 N/A</td>
<td>Xi R43 R35/38</td>
<td>Irritant</td>
<td>Portland cement 60-100%, Crystalline silica, quartz &lt; 3%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Rig Fuel Tank</td>
<td>Ltr Sack</td>
<td>1202 ltrs</td>
<td>0.49</td>
<td>Cat3, N, R40, R65, R66, R51/53</td>
<td>Harmful En Petroleum Hydrocarbons &gt;99%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bunded Fuel Tank</td>
<td>Ltr Sack</td>
<td>1202 ltrs</td>
<td>0.49</td>
<td>Cat3, N, R40, R65, R66, R51/53</td>
<td>Harmful En Petroleum Hydrocarbons &gt;99%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engine Oil 15W40</td>
<td>Ltr Drum</td>
<td>1200 ltrs</td>
<td>0.18</td>
<td>Not Classified R38, R41, R51/53</td>
<td>Acid WW, DMSO-extract,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydraulic Oil Shell Tullus 32</td>
<td>Ltr Drum</td>
<td>1200 ltrs</td>
<td>0.18</td>
<td>Not Classified</td>
<td>Highly refined mineral oil contains &lt;3% (w/w) DMSO-extract,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water</td>
<td>Tanker</td>
<td>112.7 ltrs</td>
<td>112.7</td>
<td>N/A</td>
<td>For Information Only.</td>
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<td></td>
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<tr>
<td>ICI (Clay Control)</td>
<td>MT Bag</td>
<td>5 MT</td>
<td>5 N/A</td>
<td>Not Classified</td>
<td>Potassium Chloride 90-100%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GasPerm (Surfactant)</td>
<td>Ltrs</td>
<td>1.27 ltrs</td>
<td>0.0012</td>
<td>1219</td>
<td>Cat3, N, R40, R65, R66, R51/53, S2, S7, S16, S26, S37, S60, S61</td>
<td>Fl, Irritant Citric Extract 5-10%, Isoproponol 10-30%</td>
<td></td>
</tr>
<tr>
<td>LGC-15 (Gelling Agent)</td>
<td>Ltrs</td>
<td>101.6 ltrs</td>
<td>0.0986</td>
<td>N/A</td>
<td>Not Classified</td>
<td>Guan Gum 35-45%</td>
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</tr>
<tr>
<td>BC-140 (Crosslinker)</td>
<td>Ltrs</td>
<td>25.41 ltrs</td>
<td>0.0295</td>
<td>N/A</td>
<td>Not Classified</td>
<td>Monooctanoinamine Borate 30-60%</td>
<td></td>
</tr>
<tr>
<td>SP Breaker (Breaker)</td>
<td>Ltrs</td>
<td>5.07 ltrs</td>
<td>0.0125</td>
<td>150S</td>
<td>Cat3, O, R8, R22, R36/37/38, R42/43</td>
<td>Oxidizing, Harmful Sodium Persulfate 60-100%</td>
<td></td>
</tr>
</tbody>
</table>
SECTION 1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1 Product Identifier

Material Name : Shell Rimula R4 L 15W-40
Product Code : 001C4590

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

Product Use : Engine oil.
Uses Advised Against : This product must not be used in applications other than those recommended in Section 1, without first seeking the advice of the supplier.

1.3 Details of the Supplier of the safety data sheet

Manufacturer/Supplier : Shell Deutschland Oil GmbH
                     Suhrenkamp 71-77
                     D-22335 Hamburg
Telephone : (+49) 40 6324-6255
Fax : (+49) 40 6321-051
Email Contact for Safety Data Sheet : If you have any enquiries about the content of this SDS please email lubricantSDS@shell.com

1.4 Emergency Telephone Number

: (+49) 30 3068 6790 (Giftnotruf Berlin)

SECTION 2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

<table>
<thead>
<tr>
<th>1999/45/EC</th>
<th>Hazard Characteristics</th>
<th>R-phrase(s)</th>
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</thead>
<tbody>
<tr>
<td>Not classified as dangerous under EC criteria.</td>
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</tr>
</tbody>
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2.2 Label Elements

Labeling according to Directive 1999/45/EC

Print Date 19.12.2012
000000008136
MSDS_DE
Safety Data Sheet

EC Symbols : No Hazard Symbol required

EC Classification : Not classified as dangerous under EC criteria.
EC Risk Phrases : Not classified.
EC Safety Phrases : Not classified.

2.3 Other Hazards

Health Hazards : Not expected to be a health hazard when used under normal conditions. Prolonged or repeated skin contact without proper cleaning can clog the pores of the skin resulting in disorders such as oil acne/folliculitis. Used oil may contain harmful impurities.

Safety Hazards : Not classified as flammable but will burn.

Environmental Hazards : Not classified as dangerous for the environment.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substance

Material Name : Not applicable.

3.2 Mixtures

Mixture Description : Highly refined mineral oils and additives.

Hazardous Components

Classification of components according to Regulation (EC) No 1272/2008

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS No.</th>
<th>EC Number</th>
<th>REACH Registration No.</th>
<th>Conc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zinc alkyl dithiophosphate</td>
<td>68649-42-3</td>
<td>272-028-3</td>
<td>Not available / Not applicable.</td>
<td>1,00 - 2,40%</td>
</tr>
<tr>
<td>Interchangeable low viscosity base oil (&lt;20,5 cSt @40°C) *</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>0,00 - 90,00%</td>
</tr>
</tbody>
</table>

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MSDS_DE
**Safety Data Sheet**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Hazard Class &amp; Category</th>
<th>Hazard Statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zinc alkyl dithiophosphate</td>
<td>Skin Corr., 2; Eye Dam., 1; Aquatic Chronic, 2;</td>
<td>H315; H318; H411;</td>
</tr>
<tr>
<td>Interchangeable low viscosity base oil (&lt;20,5 cSt @40°C) *</td>
<td>Asp. Tox., 1;</td>
<td>H304;</td>
</tr>
</tbody>
</table>

**Classification of components according to 67/548/EEC**

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS No.</th>
<th>EC Number</th>
<th>REACH Registration No.</th>
<th>Symbol(s)</th>
<th>R-phrase(s)</th>
<th>Conc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zinc alkyl dithiophosphate</td>
<td>68649-42-3</td>
<td>272-028-3</td>
<td>Not available / Not applicable</td>
<td>Xi, N</td>
<td>R38; R41; R51/53</td>
<td>1,00 - 2,40%</td>
</tr>
</tbody>
</table>

**Additional Information**

- The highly refined mineral oil contains <3% (w/w) DMSO-extract, according to IP346.

Refer to Ch 16 for full text of R- and H- phrases.

* contains one or more of the following CAS-numbers (REACH registration numbers): 64742-53-6 (01-2119480375-34), 64742-54-7 (01-2119484627-25), 64742-55-8 (01-2119487077-29), 64742-56-9 (01-2119480132-48), 64742-65-0 (01-2119471299-27), 68037-01-4 (01-2119486452-34), 72623-86-0 (01-2119474878-16), 72623-87-1 (01-2119474889-13), 8042-47-5 (01-2119487078-27), 648301-69-9 (01-0000020164-80).

This mixture does not contain any REACH registered substances that are assessed to be a PBT or a vPvB.

**SECTION 4. FIRST AID MEASURES**

**4.1 Description of First Aid Measures**

<table>
<thead>
<tr>
<th>General Information</th>
<th>Inhalation</th>
<th>Skin Contact</th>
<th>Eye Contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not expected to be a health hazard when used under normal conditions.</td>
<td>No treatment necessary under normal conditions of use. If symptoms persist, obtain medical advice.</td>
<td>Remove contaminated clothing. Flush exposed area with water and follow by washing with soap if available. If persistent irritation occurs, obtain medical attention.</td>
<td>Flush eye with copious quantities of water. If persistent</td>
</tr>
</tbody>
</table>
Safety Data Sheet

Ingestion

: Irritation occurs, obtain medical attention.

Self-protection of the first aider

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

4.2 Most important symptoms and effects, both acute and delayed

: Oil acne/folliculitis signs and symptoms may include formation of black pustules and spots on the skin of exposed areas. Ingestion may result in nausea, vomiting and/or diarrhoea.

4.3 Indication of any immediate medical attention and special treatment needed

: Notes to doctor/physician:

Treat symptomatically.

SECTION 5. FIRE FIGHTING MEASURES

Clear fire area of all non-emergency personnel.

5.1 Extinguishing Media

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

Unsuitable Extinguishing Media

: Do not use water in a jet.

5.2 Special hazards arising from the substance or mixture

: Hazardous combustion products may include: A complex mixture of airborne solid and liquid particulates and gases (smoke). Carbon monoxide. Unidentified organic and inorganic compounds.

5.3 Advice for firefighters

: Proper protective equipment including chemical resistant gloves are to be worn; chemical resistant suit is indicated if large contact with spilled product is expected. Self-Contained Breathing Apparatus must be worn when approaching a fire in a confined space. Select fire fighter's clothing approved to relevant Standards (e.g. Europe: EN469).

SECTION 6. ACCIDENTAL RELEASE MEASURES

Avoid contact with spilled or released material. For guidance on selection of personal protective equipment see Chapter 8 of this Material Safety Data Sheet. Observe the relevant local and international regulations.

6.1 Personal Precautions, Protective Equipment and Emergency Procedures

: 6.1.1 For non emergency personnel: Avoid contact with skin and eyes.

: 6.1.2 For emergency responders: Avoid contact with skin and eyes.
Safety Data Sheet

6.2 Environmental Precautions: Use appropriate containment to avoid environmental contamination. Prevent from spreading or entering drains, ditches or rivers by using sand, earth, or other appropriate barriers.

6.3 Methods and Material for Containment and Cleaning Up: Slippery when spilt. Avoid accidents, clean up immediately. Prevent from spreading by making a barrier with sand, earth or other containment material. Reclaim liquid directly or in an absorbent. Soak up residue with an absorbent such as clay, sand or other suitable material and dispose of properly.

Additional Advice: Local authorities should be advised if significant spillages cannot be contained.

6.4 Reference to other sections: For guidance on selection of personal protective equipment see Chapter 8 of this Material Safety Data Sheet. For guidance on disposal of spilled material see Chapter 13 of this Material Safety Data Sheet.

SECTION 7. HANDLING AND STORAGE

General Precautions: Use local exhaust ventilation if there is risk of inhalation of vapours, mists or aerosols. Use the information in this data sheet as input to a risk assessment of local circumstances to help determine appropriate controls for safe handling, storage and disposal of this material.

7.1 Precautions for Safe Handling: Avoid prolonged or repeated contact with skin. Avoid inhaling vapour and/or mists. When handling product in drums, safety footwear should be worn and proper handling equipment should be used. Properly dispose of any contaminated rags or cleaning materials in order to prevent fires. Keep container tightly closed and in a cool, well-ventilated place. Use properly labelled and closeable containers.

Product Transfer: This material has the potential to be a static accumulator. Proper grounding and bonding procedures should be used during all bulk transfer operations.

7.2 Conditions for safe storage, including any incompatibilities: Store at ambient temperature.

Recommended Materials: For containers or container linings, use mild steel or high density polyethylene.

Unsuitable Materials: PVC.

7.3 Specific end use(s): Not applicable

Additional Information: Polyethylene containers should not be exposed to high temperatures because of possible risk of distortion.

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SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

If the American Conference of Governmental Industrial Hygienists (ACGIH) value is provided on this document, it is provided for information only.

8.1 Control Parameters

Occupational Exposure Limits

<table>
<thead>
<tr>
<th>Material</th>
<th>Source</th>
<th>Type</th>
<th>ppm</th>
<th>mg/m3</th>
<th>Notation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil mist, mineral</td>
<td>ACGIH</td>
<td>TWA(Inhalable fraction.)</td>
<td>5</td>
<td>mg/m3</td>
<td></td>
</tr>
</tbody>
</table>

Biological Exposure Index (BEI)
No biological limit allocated.

PNEC related information : Data not available

Monitoring Methods : Monitoring of the concentration of substances in the breathing zone of workers or in the general workplace may be required to confirm compliance with an OEL and adequacy of exposure controls. For some substances biological monitoring may also be appropriate. Validated exposure measurement methods should be applied by a competent person and samples analysed by an accredited laboratory. Examples of sources of recommended exposure measurement methods are given below or contact the supplier. Further national methods may be available.


Occupational Safety and Health Administration (OSHA), USA: Sampling and Analytical Methods http://www.osha.gov/

Health and Safety Executive (HSE), UK: Methods for the
Safety Data Sheet

Determination of Hazardous Substances
http://www.hse.gov.uk/

Institut für Arbeitsschutz Deutschen Gesetzlichen
Unfallversicherung (IFA), Germany.
http://www.dguv.de/inhalt/index.jsp

L'Institut National de Recherche et de Securité, (INRS), France
http://www.inrs.fr/accueil

8.2 Exposure Controls
General Information
The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Select controls based on a risk assessment of local circumstances. Appropriate measures include: Adequate ventilation to control airborne concentrations. Where material is heated, sprayed or mist formed, there is greater potential for airborne concentrations to be generated.

Define procedures for safe handling and maintenance of controls. Educate and train workers in the hazards and control measures relevant to normal activities associated with this product. Ensure appropriate selection, testing and maintenance of equipment used to control exposure, e.g. personal protective equipment, local exhaust ventilation. Drain down system prior to equipment break-in or maintenance. Retain drain downs in sealed storage pending disposal or for subsequent recycle. Always observe good personal hygiene measures, such as washing hands after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Discard contaminated clothing and footwear that cannot be cleaned. Practice good housekeeping.

Occupational Exposure Controls

Personal Protective Equipment
The provided information is made in consideration of the PPE directive (Council Directive 89/686/EEC) and the CEN European Committee for Standardisation (CEN) standards. Personal protective equipment (PPE) should meet recommended national standards. Check with PPE suppliers.

Eye Protection
Wear safety glasses or full face shield if splashes are likely to occur. Approved to EU Standard EN166.
Safety Data Sheet

Hand Protection: Where hand contact with the product may occur the use of gloves approved to relevant standards (e.g. Europe: EN374, US: F739) made from the following materials may provide suitable chemical protection: PVC, neoprene or nitrile rubber gloves. Suitability and durability of a glove is dependent on usage, e.g. frequency and duration of contact, chemical resistance of glove material, dexterity. Always seek advice from glove suppliers. Contaminated gloves should be replaced. Personal hygiene is a key element of effective hand care. Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturizer is recommended.

For continuous contact we recommend gloves with breakthrough time of more than 240 minutes with preference for > 480 minutes where suitable gloves can be identified. For short-term/spash protection we recommend the same, but recognise that suitable gloves offering this level of protection may not be available and in this case a lower breakthrough time may be acceptable so long as appropriate maintenance and replacement regimes are followed. Glove thickness is not a good predictor of glove resistance to a chemical as it is dependent on the exact composition of the glove material.

Body protection: Skin protection not ordinarily required beyond standard issue work clothes.

Respiratory Protection: No respiratory protection is ordinarily required under normal conditions of use. In accordance with good industrial hygiene practices, precautions should be taken to avoid breathing of material. If engineering controls do not maintain airborne concentrations to a level which is adequate to protect worker health, select respiratory protection equipment suitable for the specific conditions of use and meeting relevant legislation. Check with respiratory protective equipment suppliers. Where air-filtering respirators are suitable, select an appropriate combination of mask and filter. Select a filter suitable for combined particulate/organic gases and vapours [boiling point >65 °C (149 °F)] meeting EN14387.

Thermal Hazards: Not applicable.

Environmental Exposure Controls

Environmental exposure control measures: Minimise release to the environment. An environmental assessment must be made to ensure compliance with local environmental legislation. Information on accidental release measures are to be found in section 6.
SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Appearance : Amber. Liquid at room temperature.
Odour : Slight hydrocarbon.
Odour threshold : Data not available
pH : Not applicable.
Initial Boiling Point and Boiling Range : > 280 °C / 536 °F estimated value(s)
Pour point : Typical -33 °C / -27 °F
Flash point : Typical 227 °C / 441 °F (COC)
Upper / lower Flammability or Explosion limits : Typical 1 - 10 %(V) (based on mineral oil)
Auto-ignition temperature : > 320 °C / 608 °F
Vapour pressure : < 0,5 Pa at 20 °C / 68 °F (estimated value(s))
Relative Density : Typical 0,883 at 15 °C / 59 °F
Density : Typical 883 kg/m³ at 15 °C / 59 °F
Water solubility : Negligible.
Solubility in other solvents : Data not available
n-octanol/water partition coefficient (log Pow) : > 6 (based on information on similar products)
Dynamic viscosity : Data not available
Kinematic viscosity : Typical 118 mm²/s at 40 °C / 104 °F
Typical 15,5 mm²/s at 100 °C / 212 °F
Vapour density (air=1) : > 1 (estimated value(s))
Evaporation rate (nBuAc=1) : Data not available
Decomposition : Data not available
Temperature : Data not available
Flammability : Data not available
Oxidizing Properties : Data not available
Explosive Properties : Not classified

9.2 Other Information

Electrical conductivity : This material is not expected to be a static accumulator.
Other Information : not a VOC
Volatile organic compound : 0 %
Safety Data Sheet

SECTION 10. STABILITY AND REACTIVITY

10.1 Reactivity : The product does not pose any further reactivity hazards in addition to those listed in the following sub-paragraph.
10.2 Chemical stability : No hazardous reaction is expected when handled and stored according to provisions.
10.3 Possibility of Hazardous Reactions : Reacts with strong oxidising agents.
10.4 Conditions to Avoid : Extremes of temperature and direct sunlight.
10.5 Incompatible Materials : Strong oxidising agents.
10.6 Hazardous Decomposition Products : Hazardous decomposition products are not expected to form during normal storage.

SECTION 11. TOXICOLOGICAL INFORMATION

11.1 Information on Toxicological effects

Basis for Assessment : Information given is based on data on the components and the toxicology of similar products. Unless indicated otherwise, the data presented is representative of the product as a whole, rather than for individual component(s).
Likely Routes of Exposure : Skin and eye contact are the primary routes of exposure although exposure may occur following accidental ingestion.
Acute Oral Toxicity : Expected to be of low toxicity: LD50 > 5000 mg/kg, Rat
Acute Dermal Toxicity : Expected to be of low toxicity: LD50 > 5000 mg/kg, Rabbit
Acute Inhalation Toxicity : Not considered to be an inhalation hazard under normal conditions of use.
Skin corrosion/irritation : Expected to be slightly irritating. Prolonged or repeated skin contact without proper cleaning can clog the pores of the skin resulting in disorders such as oil acne/folliculitis.
Serious eye damage/irritation : Expected to be slightly irritating.
Respiratory Irritation : Inhalation of vapours or mists may cause irritation.
Respiratory or skin sensitisation : For respiratory and skin sensitisation: Not expected to be a sensitiser.
Aspiration Hazard : Not considered an aspiration hazard.
Germ cell mutagenicity : Not considered a mutagenic hazard.
Carcinogenicity : Not expected to be carcinogenic. Product contains mineral oils of types shown to be non-carcinogenic in animal skin-painting.
studies. Highly refined mineral oils are not classified as carcinogenic by the International Agency for Research on Cancer (IARC).

<table>
<thead>
<tr>
<th>Material</th>
<th>Carcinogenicity Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highly refined mineral oil (IP346 &lt;3%)</td>
<td>ACGIH Group A4: Not classifiable as a human carcinogen.</td>
</tr>
<tr>
<td>Highly refined mineral oil (IP346 &lt;3%)</td>
<td>IARC 3: Not classifiable as to carcinogenicity to humans.</td>
</tr>
<tr>
<td>Highly refined mineral oil (IP346 &lt;3%)</td>
<td>GHS / CLP: No carcinogenicity classification</td>
</tr>
</tbody>
</table>

Reproductive and Developmental Toxicity: Not expected to be a hazard.

Summary on evaluation of the CMR properties:

- **Carcinogenicity**: This product does not meet the criteria for classification in categories 1A/1B.
- **Mutagenicity**: This product does not meet the criteria for classification in categories 1A/1B.
- **Reproductive Toxicity (fertility)**: This product does not meet the criteria for classification in categories 1A/1B.

- **Specific target organ toxicity - single exposure**: Not expected to be a hazard.
- **Specific target organ toxicity - repeated exposure**: Not expected to be a hazard.

**Additional Information**: Used oils may contain harmful impurities that have accumulated during use. The concentration of such impurities will depend on use and they may present risks to health and the environment on disposal. ALL used oil should be handled with caution and skin contact avoided as far as possible. Continuous contact with used engine oils has caused skin cancer in animal tests. Classifications by other authorities under varying regulatory frameworks may exist.

**SECTION 12. ECOLOGICAL INFORMATION**

**Basis for Assessment**: Ecotoxicological data have not been determined specifically for this product. Information given is based on a knowledge of the components and the ecotoxicology of similar products. Unless indicated otherwise, the data presented is representative of the
Safety Data Sheet

12.1 Toxicity
Acute Toxicity: Poorly soluble mixture. May cause physical fouling of aquatic organisms. Expected to be practically non toxic: LL/EL/IL50 > 100 mg/l (to aquatic organisms) LL/EL50 expressed as the nominal amount of product required to prepare aqueous test extract. Mineral oil is not expected to cause any chronic effects to aquatic organisms at concentrations less than 1 mg/l.

12.2 Persistence and degradability: Expected to be not readily biodegradable. Major constituents are expected to be inherently biodegradable, but the product contains components that may persist in the environment.

12.3 Bioaccumulative Potential: Contains components with the potential to bioaccumulate.

12.4 Mobility in Soil: Liquid under most environmental conditions. If it enters soil, it will adsorb to soil particles and will not be mobile. Floats on water.

12.5 Result of PBT and vPvB assessment: This mixture does not contain any REACH registered substances that are assessed to be a PBT or a vPvB.

12.6 Other Adverse Effects: Product is a mixture of non-volatile components, which are not expected to be released to air in any significant quantities. Not expected to have ozone depletion potential, photochemical ozone creation potential or global warming potential.

SECTION 13. DISPOSAL CONSIDERATIONS

13.1 Waste Treatment Methods

Material Disposal: Recover or recycle if possible. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste classification and disposal methods in compliance with applicable regulations. Do not dispose into the environment, in drains or in water courses.

Container Disposal: Dispose in accordance with prevailing regulations, preferably to a recognised collector or contractor. The competence of the collector or contractor should be established beforehand.

Local Legislation: Disposal should be in accordance with applicable regional, national, and local laws and regulations.
SECTION 14. TRANSPORT INFORMATION

Land transport (ADR/RID):

ADR
This product is not classified as dangerous for this mode of transport. Therefore 14.1 UN Number, 14.2 UN Proper Shipping name, 14.3 Transport hazard class(es), 14.4 Packing group, 14.5 Environmental hazards, 14.6 Special precautions for user do not apply.

RID
This product is not classified as dangerous for this mode of transport. Therefore 14.1 UN Number, 14.2 UN Proper Shipping name, 14.3 Transport hazard class(es), 14.4 Packing group, 14.5 Environmental hazards, 14.6 Special precautions for user do not apply.

Inland waterways transport (ADN):
This product is not classified as dangerous for this mode of transport. Therefore 14.1 UN Number, 14.2 UN Proper Shipping name, 14.3 Transport hazard class(es), 14.4 Packing group, 14.5 Environmental hazards, 14.6 Special precautions for user do not apply.
CDNI Inland Water Waste Agreement:

Sea transport (IMDG Code):
This product is not classified as dangerous for this mode of transport. Therefore 14.1 UN Number, 14.2 UN Proper Shipping name, 14.3 Transport hazard class(es), 14.4 Packing group, 14.5 Environmental hazards, 14.6 Special precautions for user do not apply.

Air transport (IATA):
This product is not classified as dangerous for this mode of transport. Therefore 14.1 UN Number, 14.2 UN Proper Shipping name, 14.3 Transport hazard class(es), 14.4 Packing group, 14.5 Environmental hazards, 14.6 Special precautions for user do not apply.

14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Pollution Category : Not applicable.
Ship Type : Not applicable.
Product Name : Not applicable.
Special Precaution : Not applicable.

Additional Information : MARPOL Annex 1 rules apply for bulk shipments by sea.
SECTION 15. REGULATORY INFORMATION

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

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

Other regulatory Information
Authorisations and/or restrictions on use : Product is not subject to Authorisation under REACh.

Recommended Restrictions on Use (Advice Against) : This product must not be used in applications other than those recommended in Section 1, without first seeking the advice of the supplier.

Chemical Inventory Status

EINECS : All components listed or polymer exempt.
TSCA : All components listed.

National Legislation

Water Pollution Class : WGK 2 - hazard to waters (appendix 2, VwVwS, preparations).

Other Information : Technische Anleitung Luft: Product not listed by name.
Observe section 5.2.5 in connection with section 5.4.9

15.2 Chemical Safety Assessment : No Chemical Safety Assessment has been carried out for this substance/mixture by the supplier.

SECTION 16. OTHER INFORMATION

R-phrase(s)

R38 : Not classified. Irritating to skin.
R41 : Risk of serious damage to eyes.
R51/53 : Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
Safety Data Sheet

CLP Hazard Statements
H304 May be fatal if swallowed and enters airways.
H315 Causes skin irritation.
H318 Causes serious eye damage.
H411 Toxic to aquatic life with long lasting effects.

Additional Information
No Exposure Scenario annex is attached to this safety data sheet. It is a non-classified mixture containing hazardous substances as detailed in Section 3; relevant information from Exposure Scenarios for the hazardous substances contained have been integrated into the core sections 1-16 of this SDS.

Other Information

Abbreviations and Acronyms
Acute Tox. = Acute toxicity
Asp. Tox. = Aspiration hazard
Aquatic Acute = Acute hazards to the aquatic environment
Aquatic Chronic = Hazardous to the aquatic environment - Long-term Hazard
Eye Dam. = Serious eye damage/eye irritation
Flam. Liq. = Flammable liquids
Skin Corr. = Skin corrosion/irritation
Skin Sens. = Skin sensitizer
STOT SE = Specific target organ toxicity - single exposure
STOT RE = Specific target organ toxicity - repeated exposure

The standard abbreviations and acronyms used in this document can be looked up in reference literature (e.g. scientific dictionaries) and/or websites.

ADN = European Agreement concerning the international carriage of dangerous goods by inland waterways (ADN)
DFG = Federal Institute of Hydrology
EG = European Community
EN = European Norm
IBC = Intermediate Bulk Container
ISO = International Standards Organisation
MAK = Maximum workplace concentration
OECD = Organisation for economic cooperation and development
OEL = Occupational Exposure Limits
PSA = Personal protective equipment
TRGS = Technical rules for hazardous substances
Safety Data Sheet

VO = Regulation
VOC = Volatile Organic Compounds
VvVwS = Water administrative pollutants
WGK = Water Hazard Class

ACGIH = American Conference of Governmental Industrial Hygienists
ADR = European Agreement concerning the International Carriage of Dangerous Goods by Road
AICS = Australian Inventory of Chemical Substances
ASTM = American Society for Testing and Materials
BEL = Biological exposure limits
BTEX = Benzene, Toluene, Ethylbenzene, Xylenes
CAS = Chemical Abstracts Service
CEFIC = European Chemical Industry Council
CLP = Classification Packaging and Labelling
COC = Cleveland Open-Cup
DIN = Deutsches Institut für Normung
DMEL = Derived Minimal Effect Level
DNEL = Derived No Effect Level
DSL = Canada Domestic Substance List
EC = European Commission
EC50 = Effective Concentration fifty
ECETOC = European Center on Ecotoxicology and Toxicology Of Chemicals
ECHA = European Chemicals Agency
EINECS = The European Inventory of Existing Commercial Chemical Substances
EL50 = Effective Loading fifty
ENCS = Japanese Existing and New Chemical Substances Inventory
EWC = European Waste Code
GHS = Globally Harmonised System of Classification and Labelling of Chemicals
IARC = International Agency for Research on Cancer
IATA = International Air Transport Association
IC50 = Inhibitory Concentration fifty
IL50 = Inhibitory Level fifty
IMDG = International Maritime Dangerous Goods
INV = Chinese Chemicals Inventory
IP346 = Institute of Petroleum test method N° 346 for the determination of polycyclic aromatics DMSO-extractables
KECI = Korea Existing Chemicals Inventory
LC50 = Lethal Concentration fifty
Safety Data Sheet

LD50 = Lethal Dose fifty per cent.
LL/EL/IL = Lethal Loading/Effective Loading/Inhibitory loading
LL50 = Lethal Loading fifty
MARPOL = International Convention for the Prevention of Pollution From Ships
NOEC/NOEL = No Observed Effect Concentration / No Observed Effect Level
OE_HPV = Occupational Exposure - High Production Volume
PBT = Persistent, Bioaccumulative and Toxic
PICCS = Philippine Inventory of Chemicals and Chemical Substances
PNEC = Predicted No Effect Concentration
REACH = Registration Evaluation And Authorisation Of Chemicals
RID = Regulations Relating to International Carriage of Dangerous Goods by Rail
SKIN_DES = Skin Designation
STEL = Short term exposure limit
TRA = Targeted Risk Assessment
TSCA = US Toxic Substances Control Act
TWA = Time-Weighted Average
vPvB = very Persistent and very Bioaccumulative

SDS Distribution : The information in this document should be made available to all who may handle the product.
SDS Version Number : 2.0
SDS Effective Date : 17.12.2012
SDS Revisions : A vertical bar (|) in the left margin indicates an amendment from the previous version.
SDS Regulation : Regulation 1907/2006/EC as amended by Regulation (EU) 453/2010
Disclaimer : This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.
1. Identification of the Substance/Preparation and of the Company Undertaking

Name of the product: DIESEL (UK)
Other products concerned: DERV, ULTRA LOW SULPHUR DERV, GAS OIL CI, ULTRA LOW SULPHUR GAS OIL, MARINE GAS OIL, MARINE DIESEL OIL.
Product application: Fuel for diesel engines and combustion turbines
Supplier: Rix Petroleum Limited
Witham House
45 Spyvee Street
Hull
HU8 7JR
Telephone No: (Hull) 01482 224422

Poisons Advice Centre: NHS Direct: 0845 46 47 / Textphone: 0845 606 46 47
Burns Units: NHS Direct: 0845 46 47 / Textphone: 0845 606 46 47
See local details at end of sheet:
2. Composition/Information on Ingredients

PREPARATION

Chemical nature: Substance composed of paraffin hydrocarbons, naphthenic, aromatic and olefin hydrocarbons, with mainly hydrocarbons from C9 to C20 (CAS: 68334-30-5).

Contains also:
- Vegetable oil esters such as methyl ester from rapeseed oil =<5% vol (in certain cases =< 30% vol)
- Multi-purposes additives to boost performance.

Substances presenting a health hazard

<table>
<thead>
<tr>
<th>Substance</th>
<th>EC No.</th>
<th>CAS No.</th>
<th>Content</th>
<th>Symbol(s)</th>
<th>R-phrases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gasoil</td>
<td></td>
<td>68334-30-5</td>
<td>&gt;90 %</td>
<td>Xn ,N</td>
<td>R-40, 65, 66, 51/53</td>
</tr>
</tbody>
</table>

See section 16 for explanations of R-phrases:

Additives:
1. Middle distillate flow improvers (various) up to 1000ppm. (Dispersion of Ethylene vinyl acetate in an organic solvent). CAS No. 24937-78-8.
2. Cetane improvers (Alkyl Nitrates) - up to 500ppm. CAS No. 27247-96-7 EINECS No. 269-822-7.
3. May contain Dye and Chemical Marker - Gas Oil Marker Concentrate. CAS No. 68334-30-5.
4. Antistatic Additive 1-3ppm
5. May contain a multifunctional detergent
6. Fatty Acid Methyl Ester (FAME) ≤ 5% CAS No. 67762-39-3, EINECS No. 267-015-4

3. Hazards Identification

Health effects: Prolonged or repeated contact with skin destroys the lipoacid skin layer and may cause dermatitis.
Vapours or mists are irritating for mucous membranes, notably in the eyes.
If swallowed accidentally, the product may enter the lungs due to its low viscosity and lead to the rapid development of very serious inhalation pulmonary lesions (medical survey during 48 hours).

Environmental impact: Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Product classification: Category 3 carcinogen
Harmful: may cause lung damage if swallowed.
Dangerous for the environment.
## 4. FIRST AID MEASURES

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General</strong></td>
<td>IN CASE OF SERIOUS OR PERSISTENT CONDITIONS, CONSULT A DOCTOR OR CALL FOR EMERGENCY MEDICAL AID.</td>
</tr>
<tr>
<td><strong>Inhalation</strong></td>
<td>In case of exposure to intense concentrations of vapours, fumes or spray, transport the person away from the contaminated zone, keep warm and allow to rest. Possible irritation of the respiratory tract and the mucous membranes. If breathing has stopped, apply artificial respiration.</td>
</tr>
<tr>
<td><strong>Ingestion</strong></td>
<td>Consult a doctor. Do not induce vomiting to avoid the risk of aspiration into the respiratory tract. Allow the person to rest. Possible risk of vomiting and diarrhoea.</td>
</tr>
<tr>
<td><strong>Skin contact</strong></td>
<td>Immediately remove all soiled or stained clothing. Wash immediately and abundantly with soap and water. If the skin is exposed to high-pressure spray, the product may enter the human body. In all such cases the affected person must be taken to hospital, even if no sign of injury can be detected.</td>
</tr>
<tr>
<td><strong>Eye contact</strong></td>
<td>Wash immediately in copious amounts of water, keeping eyelids apart for at least 15 minutes and consult a specialist.</td>
</tr>
<tr>
<td><strong>Aspiration</strong></td>
<td>Aspiration of the liquid into the lungs is extremely dangerous (acute lung conditions). If the product is believed to have entered the lungs (in case of vomiting, for example), take the person to hospital for immediate care.</td>
</tr>
</tbody>
</table>
5. FIRE FIGHTING MEASURES

Flash point: see heading 9 - "Physical and chemical properties"

Extinguishing media: - suitable:
Foam, CO₂, powder, possibly water spray (preferably water containing a wetting agent).
- not recommended:
Solid water streams are prohibited as they could help to spread the flames. Simultaneous use of foam and water on the same surface is to be avoided as water destroys the foam.

Specific fire-fighting methods: Cool down any tanks and surfaces exposed to fire by spraying abundantly with water.
Isolate the source of the combustible product; allow to burn out under supervision or use appropriate fire extinguishers, as applicable.

Specific hazards: Incomplete combustion and thermolysis may produce gases of varying toxicity such as carbon monoxide, carbon dioxide, various hydrocarbons, aldehydes and soot. These may be highly dangerous if inhaled.

Protective measures for firefighters:
Use water curtains to protect the personnel.
Insulated breathing apparatus must be worn in confined premises with heavy concentrations of fumes and gases.

6. ACCIDENTAL RELEASE MEASURES

Personal protection: As applicable in view of the risk of exposure, wear hydrocarbon-resistant protective clothing, a mask (if inhaling vapours is a risk), gloves, goggles, and boots (see also section 8).

After spillage / leakage: Do not allow to penetrate into sewers, rivers and ground water.
Cover discharges with foam in order to reduce the risks of ignition.
In case of spillage, contact the competent authorities if the situation cannot be brought under control rapidly and efficiently.

Spill cleanup methods: - Recovery:
Use mechanical means such as pumps, skimmers and absorbent materials.
Never use dispersing agents.
Contain and collect the spilled product with sand or any other inert absorbent material.
Preserve the waste in closed and sealed recipients.
- Elimination:
Hand over contaminated materials to an approved collector - see also section 13.
Do not discard to sewers.

Prevention of secondary risks: Remove all sources of ignition.
### 7. HANDLING AND STORAGE

#### HANDLING:

**Prevention of user exposure:**
- Prevent the formation of vapours, mist and aerosols.
- Handle in well-ventilated premises.
- Keep the product away from food and beverages.
- Operations involving the inspection, cleaning and maintenance of storage containers require the application of strict procedures and must be entrusted to qualified specialist personnel only.
  - DO NOT SMOKE.
  - AVOID INHALING VAPOURS.
  - AVOID CONTACT WITH THE SKIN AND MUCOUS MEMBRANES.
  - NEVER ATTEMPT TO PRIME THE CONTAINER SIPHON BY SUCKING WITH THE MOUTH.
  - WEAR SUITABLE PROTECTION AND PROTECTIVE CLOTHING.
- Never weld, drill, grind, cut or saw any empty container.

**Prevention of fire and explosion:**
- Arrange machinery and equipment so as to prevent the sheet of burning product from spreading (retention pits and basins, syphons in the water drainage system).
- Handle away from any source of ignition (open flame and sparks) and heat (hot manifolds or casings).
- Do not use compressed oxygen or air when transferring or pouring the products.
- OPERATE ONLY ON COLD AND DEGASSED RESERVOIRS IN VENTILATED PREMISES (TO AVOID RISK OF EXPLOSION).

**Precautions:**
- Loading and unloading must be carried out at ambient temperature. To prevent risks related to static electricity build-up, ensure that the machinery, equipment and tanks are properly earthed, prohibit splash loading and ensure that the product is poured slowly, particularly at the beginning of the operation.
- Avoid extended and repeated contact with the skin as this may cause skin conditions, which may also be aggravated by minor injuries or by contact with soiled clothing.
- Remove any soiled or splashed clothing immediately.
- After contact with skin, wash immediately with plenty of water and soap.
- Avoid breathing in vapours, fumes or mists.
- Do not eat or drink or smoke during use.
- Avoid contact with strong oxidising agents.
- Use only hydrocarbon-resistant containers, joints, pipes etc...

#### STORAGE:

**Technical measures:**
- Prevent any build-up of static electricity.
- Make the necessary arrangements to prevent water and soil pollution.
- Don’t withdraw the danger labels of the containers (even if they are empty).

**Storage precautions:**
- Suitable:
  - Store packaged product (drums, samples, cans...) in well-ventilated areas.
  - STORE AT AMBIENT TEMPERATURE, away from water, moisture, heat, and any source of ignition.
- To be avoided:
  - Do not store exposed to the elements.

**Incompatible products:**
- Dangerous reaction when in contact with strong oxidizers (herbicides etc...). 

**Packaging materials:**
- Recommended:
  - Use only hydrocarbon-resistant containers, joints, pipes, etc.
8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Technical measures: Use the product in a properly ventilated atmosphere. When working in confined spaces (tanks, containers, etc.), ensure that there is a supply of air suitable for breathing and wear the recommended equipment.

Occupational exposure limit: . oil mist : 10mg/m³, for 15 minutes . oil mist : 5mg/m³, for 8 hours

Respiratory protection: In confined premises, protective respiratory equipment may need to be used.

Hand protection: Impermeable hydrocarbon-proof gloves.
- In case of splashes or limited contact:
  Recommended materials: neoprene > 0,5 mm, PVC > 0,2 mm of liquid-proof material / > 60 minutes (EN 374-3).
- In case of prolonged or repeated contact:
  Recommended materials: Fluoro polymer, PVA, all layer thickness, Nitrile > 0,3 mm, neoprene / > 480 minutes (EN 374-3).
For more precise details about the choice of appropriate protective glove, please contact the manufacturer.

Eye protection: Goggles, in case of risk of splashing. (EN166)

Skin and body (other than the hands) protection: Face mask, hydrocarbon-proof clothing, safety boots, as applicable.

Hygienic work practices: Avoid contact with the skin. If the product comes into contact with the skin, wash the affected area immediately and copiously with soap and water. In case of contact with eyes, wash immediately in copious amounts of water while keeping eyelids spread apart for at least 15 minutes and consult a specialist.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Liquid

Colour: Yellow.

Odour: Characteristic.

Density/specific gravity: 820 - 875 kg/m³ Temperature (°C) 15

Flash point: > 55 °C (NF EN ISO 22719)

Auto Ignition Temperature: > = 250 °C (ASTM E 659)

Comments on autoignition temperature: This value may be significantly lower in the case of contact with potentially catalytic materials (metals like copper, strongly divided materials)

Flammability limit - lower(%): 0,5

Flammability limit - upper(%): 5

Comments on explosivity: Explosive mixtures may form in contact with air.

Temperatures at phase change:

- Initial distillation point: >= 150 °C
- Distillation range within: ~ 150-380 °C

Vapour density: > 5 (air=1)

Vapour pressure: < 100 kPa / 10 kPa Temperature (°C) 100 / 40

Solubility:
- in water: Practically immiscible
- in organic solvents: Soluble in many common solvents.

Partition coefficient (log Pow): Log Pow = 3,9 - 6

Viscosity: < 7 mm²/s à 40°C

Further information: - pH: not applicable
10. STABILITY AND REACTIVITY

| Stability: | The product is stable at normal storage, handling and use temperatures. |
| Conditions to avoid: | Heat, sparks, ignition points, flames, static electricity. |
| Materials to avoid: | Strong oxidising agents. |
| Hazardous decomp. products: | Incomplete combustion and thermolysis produces potentially toxic gases such as carbon monoxide, carbon dioxide, various hydrocarbons, aldehydes and soot. |

11. TOXICOLOGICAL INFORMATION

Acute toxicity / Local effect:

- **Inhalation, comments:** Strong concentrations of vapour, mist or spray may be irritating for the respiratory tract and for mucous membranes.
- **Skin contact, comments:** Not classified.
- **Eye contact, comments:** Not classified as irritating, but may cause a burning feeling and temporary reddening.
- **Ingestion, comments:** Harmful: If swallowed accidentally, the product may enter the lungs due to its low viscosity and lead to the rapid development of very serious pulmonary lesions (medical survey for 48 hours min).

**CHRONIC TOXICITY OR LONG-TERM TOXICITY:**

- **Skin contact:** Prolonged or repeated contact with the skin destroys the lipoacid skin layer and may cause dermatitis with the risk of secondary allergies.
- **Sensitization:** Not classified as allergenic.
- **Carcinogenicity:** Possible risks of irreversible effects. Certain tests on animals have shown a development of malignant skin tumours.

12. ECOLOGICAL INFORMATION

- **Comments about ecotoxicity:** Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment (CONCAWE recommendation).
- **Mobility:**
  - **Air:** Having low volatility at room temperature, the product evaporates in the atmosphere and disperses to a degree, depending on local conditions.
  - **Soil:** The product may infiltrate the ground.
  - **Water:** The product spreads on the surface of the water. A small amount may dissolve.
- **Bioaccumulation:** The potential for bioaccumulation of the product in the environment is very low.
- **Persistence and degradability:** The majority of the components of the product are intrinsically biodegradable.
13. DISPOSAL CONSIDERATIONS

Waste disposal: The recommended method is recycling or incineration at an approved installation.

Disposal of contaminated packaging:
Empty packagings may contain flammable or explosive vapours.
Disposal via an authorised waste contractor.

14. TRANSPORT INFORMATION

UN Number: 1202
Proper shipping name (national): DIESEL FUEL
Proper shipping name (international): DIESEL FUEL
Label for conveyance: 

Road (ADR) / Rail (RID):
Class: 3
Code de classification: F1
Hazard Label(s): 3
Hazard identification number: 30
Packing Group: III
Transport by barge (ADNR):
Class: 3
Code de classification: F1
Hazard Label(s): 3
Packing Group: III
Marine (IMO-IMDG):
Class: 3
Hazard Label(s): 3
Safety card: F-E, S-E
Packing Group: III
Special provisions: - ADR / RID / ADNR : 640L
UK Road Transport Class: 3
HAZCHEM code: 3/Y
15. REGULATORY INFORMATION

Symbol(s):

Xn Harmful N Dangerous for the environment.

Contains:
Gasoil

Risk phrases:
R-40 Limited evidence of a carcinogenic effect.
R-65 Harmful: may cause lung damage if swallowed.
R-66 Repeated exposure may cause skin dryness or cracking.
R-51/53 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety phrases:
S-36/37 Wear suitable protective clothing and gloves.
S-62 If swallowed, do not induce vomiting: seek medical advice immediately and show the container or label.
S-61 Avoid release to the environment. Refer to special instructions/Safety Data Sheets.
S-29 Do not empty into drains.
S-2 Keep out of reach of children.

EU directives:

16. OTHER INFORMATION

HSE Infoline: 08701 545500 / Minicom: 02920 808537
This sheet is in compliance with the standards defined by the directives 91/155/CEE, 93/112/CEE, 2001/58/CE and the article 14 of the directive 1999/45/EC.

Explanations of R-phrases in section 2:
R-40 Limited evidence of a carcinogenic effect.
R-65 Harmful: may cause lung damage if swallowed.
R-66 Repeated exposure may cause skin dryness or cracking.
R-51/53 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

RECOMMENDED USES AND RESTRICTIONS ON USE:
The product is to be used exclusively for the production as fuel for diesel engines and combustion turbines

Revision date: 2007-08-07
Supersedes the data sheet of: 2005-12-07
* Information revised since the previous version of the SDS:
Safety Data Sheet status: Approved.

This safety data sheet serves to complete but not to replace the technical product sheets. The information contained herein is given in good faith and is accurate to the best of knowledge at the date indicated above. It is understood by the user that any use of the product for purposes other than those for which it was designed entails potential risk. The information given herein in no way dispenses the user from knowing and applying all provisions regulating his activity. The user bears sole liability for the precautions required when using the product. The regulatory texts indicated herein are intended to aid the user to fulfil his obligations. This list is not to be considered complete and exhaustive. It is the user’s responsibility to ensure that he is subject to no other obligations than those mentioned.
SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier
Product name
Acetylene, dissolved.

EC No (from EINECS): 200-816-9
CAS No: 74-86-2
Index-Nr. 601-015-00-0
Chemical formula C2H2
REACH Registration number 01-2119457406-36-0015

1.2. Relevant identified uses of the substance or mixture and uses advised against
Relevant identified uses
Industrial and professional. Perform risk assessment prior to use.

Uses advised against
Consumer use.

1.3. Details of the supplier of the safety data sheet
Company identification
Linde AG, Linde Gas Division, Seitnerstraße 70, D-82049 Pullach
E-Mail Address info@de.linde-gas.com

1.4. Emergency telephone number
Emergency phone numbers (24h): 089-7446-0

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture
Classification acc. to Regulation (EC) No 1272/2008/EC (CLP/GHS)
Press. Gas (Dissolved gas) - Contains gas under pressure; may explode if heated.
Flam. Gas 1 - Extremely flammable gas.
EUH006 Explosive with or without contact with air.

F+, R12, R5, R6
Heating may cause an explosion.
Explosive with or without contact with air.
Extremely flammable.

Risk advice to man and the environment
Dissolved gas.

2.2. Label elements
- Labelling Pictograms

- Signal word
Danger

- Hazard Statements
H280 Contains gas under pressure; may explode if heated.
H220 Extremely flammable gas.
EUH006 Explosive with or without contact with air.

- Precautionary Statements
Precautionary Statement Prevention
P210 Keep away from heat/sparks/open flames/hot surfaces. - No smoking.

Precautionary Statement Response
P377 Leaking gas fire: Do not extinguish, unless leak can be stopped safely.
P381 Eliminate all ignition sources if safe to do so.

Precautionary Statement Storage
P403 Store in a well-ventilated place.

Precautionary Statement Disposal
P501 Dispose of cylinder via gas supplier only; Cylinder contains a porous material which in some cases contains asbestos.

2.3. Other hazards
For safety reasons, the acetylene is dissolved in acetone or dimethylformamide in the gas receptacle. Vapour of the solvent is carried away as impurity when the acetylene is extracted from the gas receptacle. The concentration of the solvent vapour in the gas is lower than the concentration limits to change the classification of the acetylene.

SECTION 3: Composition/information on ingredients

Substance / Mixture: Substance.

3.1. Substances
Acetylene, dissolved.
CAS No: 74-86-2
Index-Nr.: 601-015-00-0
EC No (from EINECS): 200-816-9
REACH Registration number 01-2119457406-36-0015
Contains no other components or impurities which will influence the classification of the product.

3.2. Mixtures
Not applicable.

SECTION 4: First aid measures
4.1. Description of first aid measures

First Aid General Information:
Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.

First Aid Inhalation:
Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.

First Aid Skin / Eye:
Adverse effects not expected from this product.

First Aid Ingestion:
Ingestion is not considered a potential route of exposure.

4.2. Most important symptoms and effects, both acute and delayed
In high concentrations may cause asphyxiation. Symptoms may include loss of mobility/consciousness. Victim may not be aware of asphyxiation. In low concentrations may cause narcotic effects. Symptoms may include dizziness, headache, nausea and loss of co-ordination.

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

SECTION 5: Fire fighting measures

5.1. Extinguishing media
Suitable extinguishing media
Water. Dry powder. Foam. Use water spray or fog to control fire fumes.

Unsuitable extinguishing media
Carbon dioxide.

5.2. Special hazards arising from the substance or mixture
Specific hazards
Exposure to fire may cause containers to rupture/explode.

Hazardous combustion products
If involved in a fire the following toxic and/or corrosive fumes may be produced by thermal decomposition:
Carbon monoxide.

5.3. Advice for fire-fighters
Specific methods
If possible, stop flow of product. Do not extinguish a leaking gas flame unless absolutely necessary. Spontaneous/explosive re-ignition may occur. Extinguish any other fire. Move container away or cool with water from a protected position. Continue water spray from protected position until container stays cool. Prevent water used in emergency cases from entering sewers and drainage systems.

Special protective equipment for fire-fighters
Clothing for fire-fighters conforming to EN 469 will provide a basic level of protection from chemical incidents.

Guideline:

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures
Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe. Evacuate area. Ensure adequate air ventilation. Eliminate ignition sources. Consider the risk of potentially explosive atmospheres. EN 137 Respiratory protective devices — Self-contained open-circuit compressed air breathing apparatus with full face mask — Requirements, testing, marking.

6.2. Environmental precautions
Try to stop release.

6.3. Methods and material for containment and cleaning up
Ventilate area.

6.4. Reference to other sections
See also sections 8 and 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling
Ensure equipment is adequately earthed. Suck back of water into the container must be prevented. Purge air from system before introducing gas. Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Contact your gas supplier if in doubt. Keep away from ignition sources (including static discharges). Refer to supplier’s handling instructions. The substance must be handled in accordance with good industrial hygiene and safety procedures. Avoid contact with pure copper, mercury, silver and brass with greater than 65% copper. Avoid suckback of water, acid and alkalis. Solvent may accumulate in piping systems. For maintenance use appropriate resistant gloves (specify for DMF or acetone), goggles. Purge system with dry inert gas (e.g. helium or nitrogen) before gas is introduced and when system is placed out of service. Consider the use of only non-sparking tools. Do not allow backfeed into the container. Do not smoke while handling product. Only experienced and properly instructed persons should handle gases under pressure. Protect containers from physical damage; do not drag, roll, slide or drop. Never use direct flame or electrical heating devices to raise the pressure of a container. Do not remove or deface labels provided by the supplier for the identification of the container contents. When moving containers, even for short distances, use appropriate equipment (eg. trolley, hand truck, fork truck etc. Leave valve protection caps in place until the container has been secured against either a wall or bench or placed in a container stand and is ready for use. Ensure the complete gas system has been (or is regularly) checked for leaks before use. If user experiences any difficulty operating container valve discontinue use and contact supplier. Close container valve after each use and when empty, even if still connected to equipment. Never attempt to repair or modify container valves or safety relief devices. Damaged valves should be returned immediately to the supplier. Replace valve outlet caps or plugs and container caps where supplied as soon as container is disconnected from equipment. Keep container valve outlets clean and free from contaminates particularly oil and water. Never attempt to transfer gases from one container to another. Assess the risk of a potentially explosive atmosphere and the need for explosion-proof equipment. Do not use...
alloys containing more than 43% silver. For further information on safe use refer to EIGA "Code of Practice: Acetylene" IGC Doc 123.

7.2. Conditions for safe storage, including any incompatibilities
Secure cylinders to prevent them from falling. Keep container below 50°C in a well ventilated place. Segregate from oxidant gases and other oxidants in store. Observe all regulations and local requirements regarding storage of containers. Containers should not be stored in conditions likely to encourage corrosion. Cylinders should be stored in the vertical position and properly secured to prevent falling over. Stored containers should be periodically checked for general conditions and leakage. Container valve guards or caps should be in place. Store containers in location free from fire risk and away from sources of heat and ignition. Keep away from combustible materials. All electrical equipment in the storage areas should be compatible with the risk of potentially explosive atmosphere. Acetylene cylinders should be stored vertically. If a cylinder has been transported horizontally, it should be stood upright for a minimum of 1 hour prior to use. This will allow the acetone to evenly re-distribute within the cylinder and prevent acetone being carried into the flame during use causing a ‘flame thrower’ effect. Observe “Technische Regeln Druckgase (TRG) 280 Ziffer 5”.

7.3. Specific end use(s)
None.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters
No occupational exposure limit.
PNEC not available.

<table>
<thead>
<tr>
<th>Derived No Effect Levels</th>
<th>Type</th>
<th>Exposure</th>
<th>Value</th>
<th>Population</th>
<th>Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>DNEL</td>
<td>Long term inhalation</td>
<td>2.675</td>
<td>mg/m³</td>
<td>Workers</td>
<td>Systemic</td>
</tr>
<tr>
<td>DNEL</td>
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</tr>
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<td>2.675</td>
<td>mg/m³</td>
<td>Workers</td>
<td>Local</td>
</tr>
</tbody>
</table>

8.2. Exposure controls

Appropriate engineering controls
A risk assessment should be conducted and documented in each work area to assess the risks related to the use of the product and to select the PPE that matches the relevant risk. The following recommendations should be considered. Product to be handled in a closed system. Gas detectors should be used when quantities of flammable gases/vapours may be released. Keep concentrations well below lower explosion limits.

The substance must be handled in accordance with good industrial hygiene and safety procedures. Consider work permit system e.g. for maintenance activities. Systems under pressure should be regularly checked for leakages. Provide adequate general or local ventilation. The substance is not classified for human health hazards or for environment effects and it is not PBT or vPvB so that no exposure assessment or risk characterisation is required. For tasks where the intervention of workers is required, the substance must be handled in accordance with good industrial hygiene and safety procedures.

Personal protective equipment

Eye and face protection
Wear eye protection to EN 166 when using gases.

Skin protection

Hand protection
Advice: Wear working gloves and safety shoes while handling containers.
Guideline: EN 12477 Protective gloves for welders

Other protection

Wear suitable hand, body and head protection. Wear goggles with suitable filter lenses when use is cutting/welding. Wear flame resistant/retardant clothing. Take precautionary measures against static discharges. Wear working gloves and safety shoes while handling containers. EN ISO 20345 Personal protective equipment - Safety footwear.

Respiratory protection

Not required

Thermal hazards

Not required

Environmental Exposure Controls

Specific risk management measures are not required beyond good industrial hygiene and safety procedures. Refer to local regulations for restriction of emissions to the atmosphere. See section 13 for specific methods for waste gas treatment.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

General information

Appearance/Colour: Colourless gas.
Odour: Garlic like. Poor warning properties at low concentrations.
Odour threshold: Odour threshold is subjective and inadequate to warn for over exposure.

Melting point: -80,8 °C

Flash point: Not applicable for gases and gas mixtures.

Flammability range: 2,3 %(V) - 88 %(V)

Vapour Pressure 20 °C: 44 bar

Relative density, gas (Air=1): 0,9

Solubility in water: 1185 mg/l

Partition coefficient: n-Octanol/water: 0,37 logPow

Autoignition temperature: 305 °C

Thermal decomposition: 635 °C

Viscosity: Dynamic: 0,011 mPa.s

Explosive properties:

Explosive acc. EU legislation: Not explosive.
Explosive acc. transp. reg.: Not explosive.

Oxidising properties: Not applicable.

Molecular weight: 26 g/mol

Sublimation point: -84 °C

Critical temperature: 35,2 °C

Relative density, liquid (Water=1): Not applicable.

9.2. Other information
Even at concentrations above 88%, all the way up to 100%, acetylene is still a significant hazard because it can explosively decompose even at these high concentrations. Minimum ignition energy: 0.019 mJ. Explosion group: IIC.

SECTION 10: Stability and reactivity

10.1. Reactivity
Forms explosive acetylides with copper, silver and mercury. Do not use alloys containing more than 65% copper.

10.2. Chemical stability
Dissolved in a solvent supported in a porous mass., Stable under normal conditions.

10.3. Possibility of hazardous reactions
May react violently with oxidants., Can form potentially explosive atmosphere in air.

10.4. Conditions to avoid
Keep away from heat/sparks/open flames/hot surfaces. - No smoking. May decompose violently at high temperature and/or pressure or in the presence of a catalyst High pressure. High temperature.

10.5. Incompatible materials
Forms explosive acetylides with copper, silver and mercury. Do not use alloys containing more than 65% copper. Oxidising agents. Air, Oxidiser. For material compatibility see latest version of ISO-11114.

10.6. Hazardous decomposition products
Under normal conditions of storage and use, hazardous decomposition products should not be produced. If involved in a fire the following toxic and/or corrosive fumes may be produced by thermal decomposition: Carbon monoxide.

SECTION 11: Toxicological information

11.1. Information on toxicological effects
Acute inhalation toxicity
Acetylene has low inhalation toxicity, the LOAEC for mild intoxication in humans with no residual effects is 100,000 ppm (107,000 mg/m3)

Value: LC30
Species: Rat
Exposure time: 4 h
Value in non-standard unit: 780000 - 900000 ppm

Repeated dose toxicity
Species: Rat
Route of application: Inhalation
Value type: NOAEC
Value: 80000 ppm

Species: Rat
Value type: LOAEC
Value: 28700 ppm

Genetic toxicity in vitro
No known effects from this product.

Assessment carcinogenicity
No evidence of carcinogenic effects.

SECTION 12: Ecological information

12.1. Toxicity
No ecological damage caused by this product.

Acute and prolonged toxicity fish
Species: Various (Freshwater)
Exposure time: 96 h
Value type: LC50
Value in standard unit mg/l: 545 mg/l

Acute toxicity aquatic invertebrates
Species: Water flea (Daphnia magna)
Exposure time: 48 h
Value type: LC50
Value in standard unit mg/l: 242 mg/l

Toxicity aquatic plants
Species: Algae
Exposure time: 96 h
Value type: EC50
Value in standard unit mg/l: 57 mg/l

12.2. Persistence and degradability
Not readily biodegradable.

Photo degradation
This product can be degraded by abiotic (eg. Chemical or photolytic) processes.

Stability in water
Will not undergo hydrolysis.

12.3. Bioaccumulative potential
Because of the low log Kow, accumulation in organisms is not to be expected.

12.4. Mobility in soil
Because of its high volatility, the product is unlikely to cause ground or water pollution.

12.5. Results of PBT and vPvB assessment
Not classified as PBT or vPvB.

12.6. Other adverse effects
No known effects from this product.

SECTION 13: Disposal considerations

13.1. Waste treatment methods
Do not discharge into areas where there is a risk of forming an explosive mixture with air. Waste gas should be flared through a suitable burner with flash back arrester. Do not discharge into any place where its accumulation could be dangerous. Contact supplier if guidance is required. Dispose of cylinder via gas supplier only; Cylinder contains a porous material which in some cases contains asbestos. Refer to the EIGA code of practice (Doc.30 "Disposal of Gases", downloadable at http://www.eiga.org) for more guidance on suitable disposal methods. Gases in pressure containers (including halons) containing dangerous substances.
## EWC Nr. 16 05 04*

### SECTION 14: Transport information

#### ADR/RID

14.1. UN number
1001

14.2. UN proper shipping name
Acetylene, dissolved

14.3. Transport hazard class(es)
Class: 2
Classification Code: 4F
Labels: 2.1
Hazard number: 239
Tunnel restriction code: (B/D)

14.4. Packing group (Packing Instruction)
P200

14.5. Environmental hazards
None.

14.6. Special precautions for user
None.

#### IMDG

14.1. UN number
1001

14.2. UN proper shipping name
Acetylene, dissolved

14.3. Transport hazard class(es)
Class: 2.1
Labels: 2.1
EmS: F-D, S-U

14.4. Packing group (Packing Instruction)
P200

14.5. Environmental hazards
None.

14.6. Special precautions for user
None.

### Other transport information

Avoid transport on vehicles where the load space is not separated from the driver's compartment. Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency. Before transporting product containers ensure that they are firmly secured. Ensure that the container valve is closed and not leaking. Ensure that the valve outlet cap nut or plug (where provided) is correctly fitted. Ensure that the valve protection device (where provided) is correctly fitted. Ensure adequate ventilation. Ensure compliance with applicable regulations.

### SECTION 15: Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture
Seveso Directive 96/82/EC: Listed

#### Other regulations

Pressure Vessel Regulation

Gefahrstoffverordnung (GefStoffV)

Technische Regeln für Gefahrstoffe (TRGS)


Directive 94/9/EC on equipment and protective systems intended for use in potentially explosive atmospheres (ATEX)

Directive 89/686/EEC on personal protective equipment


Directive 1999/45/EC concerning the approximation of the laws, regulations and administrative provisions of the Member States relating to the classification, packaging and labelling of dangerous preparations


#### Further national regulations

Not classified according to TA-Luft.

#### Water pollution class

Not polluting to waters according to VwWwS from 17.05.99.

TA-Luft

Not classified according to TA-Luft.

15.2. Chemical safety assessment
A CSA does not need to be carried out for this product.

SECTION 16: Other information

Ensure all national/local regulations are observed. Ensure operators understand the flammability hazard. The hazard of asphyxiation is often overlooked and must be stressed during operator training. Before using this product in any new process or experiment, a thorough material compatibility and safety study should be carried out.

Advice

Whilst proper care has been taken in the preparation of this document, no liability for injury or damage resulting from its use can be accepted. Details given in this document are believed to be correct at the time of going to press.

Further information

References

Various sources of data have been used in the compilation of this SDS, they include but are not exclusive to:

Agency for Toxic Substances and Diseases Registry (ATSDR) (http://www.atsdr.cdc.gov/)

EH40 (as ammended) Workplace exposure limits.

European Chemical Agency: Guidance on the Compilation of Safety Data Sheets.


European Industrial Gases Association (EIGA) Doc. 169/11 Classification and Labelling guide.

ISO 10156:2010 Gases and gas mixtures -- Determination of fire potential and oxidising ability for the selection of cylinder valve outlets.

International Programme on Chemical Safety (http://www.inchem.org/)


National Institute for Standards and Technology (NIST) Standard Reference Database Number 69

Substance specific information from suppliers.

The ESIS (European chemical Substances 5 Information System) platform of the former European Chemicals Bureau (ECB) ESIS (http://ecb.jrc.ec.europa.eu/esis/).

The European Chemical Industry Council (CEFIC) ERICards.


Linde safety advice

No. 2 Handling of gas cylinders at and after fire / heat exposure

No. 3 Oxygen deficiency

No. 7 Safe handling of gas cylinders and cylinder bundles

No. 10 Handling of acetylene

No. 11 Transport of gas receptacles in vehicles

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

1.1. Product identifier
Product name
Argon, compressed

EC No (from EINECS): 231-147-0
CAS No: 7440-37-1
Index-Nr.
Chemical formula Ar
REACH Registration number:

1.2. Relevant identified uses of the substance or mixture and uses advised against
Relevant identified uses
Industrial and professional. Perform risk assessment prior to use.

Uses advised against
Consumer use.

1.3. Details of the supplier of the safety data sheet
Company identification
Linde AG, Linde Gas Division, Setnnerstraße 70, D-82049 Pullach
E-Mail Address
info@de.linde-gas.com

1.4. Emergency telephone number
Emergency phone numbers (24h): 089-7446-0

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture
Classification acc. to Regulation (EC) No 1272/2008/EC (CLP/GHS)
Press. Gas (Compressed gas) - Contains gas under pressure; may explode if heated.

Classification acc. to Directive 67/548/EEC & 1999/45/EC: Proposed by the industry
Not classified as dangerous substance.
Asphyxiant in high concentrations.
Risk advice to man and the environment
Compressed gas.

2.2. Label elements
- Labelling Pictograms

- Signal word
Warning

- Hazard Statements
H280 Contains gas under pressure; may explode if heated.

EIGA-As Asphyxiant in high concentrations.

- Precautionary Statements

Precautionary Statement Prevention
None.

Precautionary Statement Response
None.

Precautionary Statement Storage
P403 Store in a well-ventilated place.

Precautionary Statement Disposal
None.

2.3. Other hazards
None.

SECTION 3: Composition/information on ingredients

Substance / Mixture: Substance.

3.1. Substances
Argon, compressed
CAS No: 7440-37-1
Index-Nr.: EC No (from EINECS):
Not classified as dangerous substance.
Contains no other components or impurities which will influence the classification of the product.

3.2. Mixtures
Not applicable.

SECTION 4: First aid measures

4.1. Description of first aid measures
First Aid General Information:
Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.

First Aid Inhalation:
Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.

First Aid Skin / Eye:
Adverse effects not expected from this product.

First Aid Ingestion:
Ingestion is not considered a potential route of exposure.

4.2. Most important symptoms and effects, both acute and delayed
In high concentrations may cause asphyxiation. Symptoms may include loss of mobility/consciousness. Victim may not be aware of asphyxiation.
4.3. Indication of any immediate medical attention and special treatment needed
None.

SECTION 5: Fire fighting measures

5.1. Extinguishing media
Suitable extinguishing media
All known extinguishants can be used.

5.2. Special hazards arising from the substance or mixture
Specific hazards
Exposure to fire may cause containers to rupture/explode.

Hazardous combustion products
None.

5.3. Advice for fire-fighters
Specific methods
If possible, stop flow of product. Move container away or cool with water from a protected position.

Special protective equipment for fire-fighters
In confined space use self-contained breathing apparatus.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures
Evacuate area. Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe. Ensure adequate air ventilation. Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous.

6.2. Environmental precautions
Try to stop release.

6.3. Methods and material for containment and cleaning up
Ventilate area.

6.4. Reference to other sections
See also sections 8 and 13.

SECTION 7: Handling and storage

7.1. Precautions for safe handling
Suck back of water into the container must be prevented. Do not allow backfeed into the container. Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Contact your gas supplier if in doubt. Refer to supplier’s handling instructions. Only experienced and properly instructed persons should handle gases under pressure. Protect containers from physical damage; do not drag, roll, slide or drop. Do not remove or deface labels provided by the supplier for the identification of the container contents. When moving containers, even for short distances, use appropriate equipment e.g. trolley, hand truck, fork truck etc. Leave valve protection caps in place until the container has been secured against either a wall or bench or placed in a container stand and is ready for use. Ensure the complete gas system has been (or is regularly) checked for leaks before use. If user experiences any difficulty operating container valve discontinue use and contact supplier. Close container valve after each use and when empty, even if still connected to equipment. Never attempt to repair or modify container valves or safety relief devices. Damaged valves should be reported immediately to the supplier. Replace valve outlet caps or plugs and container caps where supplied as soon as container is disconnected from equipment. Keep container valve outlets clean and free from contaminates particularly oil and water. Never attempt to transfer gases from one container to another. Do not smoke while handling product. The substance must be handled in accordance with good industrial hygiene and safety procedures. Never use direct flame or electrical heating devices to raise the pressure of a container.

7.2. Conditions for safe storage, including any incompatibilities
Secure cylinders to prevent them from falling. Keep container below 50°C in a well ventilated place. Observe all regulations and local requirements regarding storage of containers. Containers should not be stored in conditions likely to encourage corrosion. Cylinders should be stored in the vertical position and properly secured to prevent falling over. Stored containers should be periodically checked for general conditions and leakage. Container valve guards or caps should be in place. Store containers in location free from fire risk and away from sources of heat and ignition. Keep away from ignition sources (including static discharges). Keep away from combustible materials. Observe *Technische Regeln Druckgase (TRG) 280 Ziffer 5*

7.3. Specific end use(s)
None.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters
No occupational exposure limit.

8.2. Exposure controls
Appropriate engineering controls
Product to be handled in a closed system. Oxygen detectors should be used when asphyxiating gases may be released. The substance must be handled in accordance with good industrial hygiene and safety procedures. Consider work permit system e.g. for maintenance activities. Systems under pressure should be regularly checked for leakages. Provide adequate general or local ventilation.

Personal protective equipment
Eye and face protection
Wear eye protection to EN 166 when using gases.

Skin protection
Hand protection
Advice: Wear working gloves and safety shoes while handling containers.

Other protection
Wear working gloves and safety shoes while handling containers. EN ISO 20345 Personal protective equipment - Safety footwear.

Respiratory protection
Not required
Thermal hazards
Not required

Environmental Exposure Controls
Specific risk management measures are not required beyond good industrial hygiene and safety procedures. Refer to local regulations for
restriction of emissions to the atmosphere. See section 13 for specific methods for waste gas treatment.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties
General information
Appearance/Colour: Colourless gas.
Odour: No odour warning properties.
Melting point: -189 °C
Boiling point: -186 °C
Flash point: Not applicable for gases and gas mixtures.
Flammability range: Non flammable.
Vapour Pressure 20 °C: Not applicable.
Relative density, gas (Air=1): 1,38, Heavier than air.
Solubility in water: 61 mg/l
Autoignition temperature: Not applicable.
Explosive properties:
Explosive acc. EU legislation: Not explosive.
Explosive acc. transp. reg.: Not explosive.
Oxidising properties: Not applicable.
Molecular weight: 40 g/mol
Critical temperature: -122,3 °C
Relative density, liquid (Water=1): 1,4

9.2. Other information
Gas/vapour heavier than air. May accumulate in confined spaces, particularly at or below ground level.

SECTION 10: Stability and reactivity

10.1. Reactivity
Unreactive under normal conditions.

10.2. Chemical stability
Stable under normal conditions.

10.3. Possibility of hazardous reactions
None.

10.4. Conditions to avoid
None.

10.5. Incompatible materials
No reaction with any common materials in dry or wet conditions.

10.6. Hazardous decomposition products
Under normal conditions of storage and use, hazardous decomposition products should not be produced.

SECTION 11: Toxicological information

11.1. Information on toxicological effects
General
No known toxicological effects from this product.

SECTION 12: Ecological information

12.1. Toxicity
No known ecological damage caused by this product.

12.2. Persistence and degradability
Not applicable.

12.3. Bioaccumulative potential
Not applicable.

12.4. Mobility in soil
The substance is a gas, not applicable.

12.5. Results of PBT and vPvB assessment
Not classified as PBT or vPvB.

12.6. Other adverse effects
Not applicable.

SECTION 13: Disposal considerations

13.1. Waste treatment methods
Do not discharge into any place where its accumulation could be dangerous. Vent to atmosphere in a well ventilated place. Contact supplier if guidance is required.
EWC Nr. 16 05 05

SECTION 14: Transport information

ADR/RID

14.1. UN number
1006

14.2. UN proper shipping name
Argon, compressed

14.3. Transport hazard class(es)
Class: 2
Classification Code: 1A
Labels: 2.2
Hazard number: 20
Tunnel restriction code: (E)
Emergency Action Code: 2T

14.4. Packing group (Packing Instruction)
P200

14.5. Environmental hazards
None.

14.6. Special precautions for user
None.

IMDG
14.1. UN number
1006

14.2. UN proper shipping name
Argon, compressed

14.3. Transport hazard class(es)
Class: 2.2
Labels: 2.2
EmS: F-C, S-V

14.4. Packing group (Packing Instruction)
P200

14.5. Environmental hazards
None.

14.6. Special precautions for user
None.

14.7. Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code
Not applicable.

IATA

14.1. UN number
1006

14.2. UN proper shipping name
Argon, compressed

14.3. Transport hazard class(es)
Class: 2.2
Labels: 2.2

14.4. Packing group (Packing Instruction)
P200

14.5. Environmental hazards
None.

14.6. Special precautions for user
None.

Other transport information
Avoid transport on vehicles where the load space is not separated from the driver’s compartment. Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency. Before transporting product containers ensure that they are firmly secured. Ensure that the container valve is closed and not leaking. Ensure that the valve outlet cap nut or plug (where provided) is correctly fitted. Ensure that the valve protection device (where provided) is correctly fitted. Ensure adequate ventilation. Ensure compliance with applicable regulations.

SECTION 15: Regulatory information

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture
Seveso Directive 96/82/EC: Not covered.

Other regulations
Pressure Vessel Regulation
Regulations for the prevention of industrial accidents
Gefahrstoffverordnung (GefStoffV)
Technische Regeln für Gefahrstoffe (TRGS)

Further national regulations
Not classified according to TA-Luft.

Water pollution class
Not polluting to waters according to VwVwS from 27.07.2005.

TA-Luft
Not classified according to TA-Luft.

15.2. Chemical safety assessment
A CSA does not need to be carried out for this product.

SECTION 16: Other information

Ensure all national/local regulations are observed. The hazard of asphyxiation is often overlooked and must be stressed during operator training. Before using this product in any new process or experiment, a thorough material compatibility and safety study should be carried out.

Advice
Whilst proper care has been taken in the preparation of this document, no liability for injury or damage resulting from its use can be accepted. Details given in this document are believed to be correct at the time of going to press.

Further information
Kühn-Birett: Merkblätter gefährliche Arbeitsstoffe, Hommel: Handbook of dangerous goods
Linde safety advice
No. 3 Oxygen deficiency
No. 7 Safe handling of gas cylinders and cylinder bundles
No. 11 Transport of gas receptacles in vehicles

End of document
1 IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY

Product name
Nitrogen, compressed.

EC No (from EINECS): 231-783-9

CAS No: 7727-37-9

Index-Nr. -

Chemical formula
N2

REACH Registration number

Known uses
Not known.

Company identification
Linde AG, Linde Gas Division, Seitnerstraße 70, D-82049 Pullach

E-Mail Address
info@de.linde-gas.com

Emergency phone numbers (24h):
089-7446-0

2 HAZARDS IDENTIFICATION

Classification of the substance or mixture

Classification acc. to Regulation (EC) No 1272/2008/EC (CLP/GHS)
Press. Gas (Compressed gas) - Contains gas under pressure; may explode if heated.

Classification acc. to Directive 67/548/EEC & 1999/45/EC:
Proposed by the industry
Not classified as dangerous substance.

Asphyxiant in high concentrations.

Risk advice to man and the environment
Compressed gas.

Label Elements
- Labelling Pictograms
- Signal word
  Warning
- Hazard Statements
  H280 Contains gas under pressure; may explode if heated.
  EIGA-As Asphyxiant in high concentrations.

- Precautionary Statements

Precautionary Statement Prevention
None.

Precautionary Statement Response
None.

Precautionary Statement Storage
P403 Store in a well-ventilated place.

Precautionary Statement Disposal
None.

3 COMPOSITION/INFORMATION ON INGREDIENTS

Substance/Preparation: Substance.
Components/Impurities
Nitrogen, compressed.
CAS No: 7727-37-9
Index-Nr.: -

EC No (from EINECS): 231-783-9

REACH Registration number:
Contains no other components or impurities which will influence the classification of the product.

4 FIRST AID MEASURES

Inhalation
In high concentrations may cause asphyxiation. Symptoms may include loss of mobility/consciousness. Victim may not be aware of asphyxiation. Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.

Ingestion
Ingestion is not considered a potential route of exposure.

5 FIRE FIGHTING MEASURES

Specific hazards
Exposure to fire may cause containers to rupture/explode. Non flammable.

Hazardous combustion products
None.

Suitable extinguishing media
All known extinguishants can be used.

Specific methods
If possible, stop flow of product. Move container away or cool with water from a protected position.

Special protective equipment for fire-fighters
In confined space use self-contained breathing apparatus.

6 ACCIDENTAL RELEASE MEASURES

Personal precautions
Evacuate area. Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe. Ensure adequate air ventilation. Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous.

Environmental precautions
Try to stop release.

Clean up methods
Ventilate area.

7 HANDLING AND STORAGE

Handling
Suck back of water into the container must be prevented. Do not allow backfeed into the container. Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Contact your gas supplier if in doubt. Refer to supplier’s handling instructions. Only experienced and properly instructed persons should handle gases under pressure. Protect containers from physical damage; do not drag, roll, slide or drop. Never use direct flame or electrical heating devices to raise the pressure of a container. Do not remove or deface labels provided by the supplier for the identification of the container contents. When moving containers, even for short distances, use appropriate
equipment eg. trolley, hand truck, fork truck etc. Leave valve protection caps in place until the container has been secured against either a wall or bench or placed in a container stand and is ready for use. Ensure the complete gas system has been (or is regularly) checked for leaks before use. If user experiences any difficulty operating container valve discontinue use and contact supplier. Close container valve after each use and when empty, even if still connected to equipment. Never attempt to repair or modify container valves or safety relief devices. Damaged valves should be reported immediately to the supplier. Replace valve outlet caps or plugs and container caps where supplied as soon as container is disconnected from equipment. Never attempt to transfer gases from one container to another. Do not smoke while handling product. The substance must be handled in accordance with good industrial hygiene and safety procedures. Storage
Secure cylinders to prevent them from falling. Keep container below 50°C in a well ventilated place. Observe all regulations and local requirements regarding storage of containers. Containers should not be stored in conditions likely to encourage corrosion. Cylinders should be stored in the vertical position and properly secured to prevent falling over. Stored containers should be periodically checked for general conditions and leakage. Container valve guards or caps should be in place. Store containers in location free from fire risk and away from sources of heat and ignition. Keep away from ignition sources (including static discharges). Keep away from combustible materials. Orient "Technische Regeln Druckgase (TRG) 280 Ziffer 5"

8 EXPOSURE CONTROLS/PERSOAL PROTECTION
Exposure limit value
Value type value Note
Respiratory protection Not required
Hand protection Advice Wear working gloves and safety shoes while handling containers.
Personal protection Ensure adequate ventilation. Wear working gloves and safety shoes while handling containers.

9 PHYSICAL AND CHEMICAL PROPERTIES
General information
Appearance/Colour: Colourless gas.
Odour: None.
Important information on environment, health and safety
Molecular weight: 28 g/mol
Melting point: -210 °C
Boiling point: -196 °C
Critical temperature: -147 °C
Flash point: Not applicable for gases and gas mixtures.
Autoignition temperature: Not applicable.
Flammability range: Non flammable.
Relative density, gas (Air=1): 0.97
Relative density, liquid (Water=1): 0.8
Vapour Pressure 20 °C: Not applicable.
Solubility in water: 20 mg/l
Maximum filling pressure (bar): 300 bar
Other data
None.

10 STABILITY AND REACTIVITY
Stability and reactivity
Stable under normal conditions.
Hazardous decomposition products
Statements on decomposition
Under normal conditions of storage and use, hazardous decomposition products should not be produced.

11 TOXICOLOGICAL INFORMATION
General
No known toxicological effects from this product.
Acute toxicity

12 ECOLOGICAL INFORMATION
General
No ecological damage caused by this product.

13 DISPOSAL CONSIDERATIONS
General
Do not discharge into any place where its accumulation could be dangerous. Vent to atmosphere in a well ventilated place. Contact supplier if guidance is required.

14 TRANSPORT INFORMATION
ADR/RID
Class 2 Classification Code 1A
UN number and proper shipping name
UN 1066 Nitrogen, compressed
UN 1066 Nitrogen, compressed
Labels 2.2 Hazard number 20
Packing Instruction P200

IMDG
Class 2.2
UN number and proper shipping name
UN 1066 Nitrogen, compressed
Labels 2.2
Packing Instruction P200
EmS F-C

IATA
Class 2.2
UN number and proper shipping name
UN 1066 Nitrogen, compressed
Labels 2.2
Packing Instruction P200

Other transport information
Avoid transport on vehicles where the load space is not separated from the driver's compartment. Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency. Before transporting product containers ensure that they are firmly secured. Ensure that the container valve is closed and not leaking. Ensure that the valve outlet cap or nut or plug (where provided) is correctly fitted. Ensure that the valve protection device (where provided) is correctly fitted. Ensure adequate ventilation. Ensure compliance with applicable regulations.
15 REGULATORY INFORMATION

Water pollution class
Not polluting to waters according to VwVwS from 17.05.99.

TA-Luft
Not classified according to TA-Luft.

16 OTHER INFORMATION

Ensure all national/local regulations are observed. The hazard of asphyxiation is often overlooked and must be stressed during operator training. Before using this product in any new process or experiment, a thorough material compatibility and safety study should be carried out.

Advice
Whilst proper care has been taken in the preparation of this document, no liability for injury or damage resulting from its use can be accepted. Details given in this document are believed to be correct at the time of going to press.

Further information
Hommel: Handbook of dangerous goods
Linde safety advice
No. 3 Oxygen deficiency
No. 7 Safe handling of gas cylinders and cylinder bundles
No. 11 Transport of gas receptacles in vehicles

End of document
1 IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY

Product name
Oxygen, compressed

EC No (from EINECS): 231-956-9

CAS No: 7782-44-7

Index-Nr.: 008-001-00-8

Chemical formula: O2

REACH Registration number:

Known uses
Not known.

Company identification
Linde AG, Linde Gas Division, Seitenstraße 70, D-82049 Pullach

E-Mail Address: info@de.linde-gas.com

Emergency phone numbers (24h): 089-7446-0

2 HAZARDS IDENTIFICATION

Classification of the substance or mixture
Press. Gas (Compressed gas) - Contains gas under pressure; may explode if heated.
Ox. Gas 1 - May cause or intensify fire; oxidiser.

O; R8
Contact with combustible material may cause fire.

Risk advice to man and the environment
Compressed gas.

Label Elements
- Labelling Pictograms

- Signal word
Danger

- Hazard Statements
H280 Contains gas under pressure; may explode if heated.
H270 May cause or intensify fire; oxidiser.

- Precautionary Statements
Precautionary Statement Prevention
P220 Keep away from combustible materials.
P244 Keep valves and fittings free from oil and grease.

Precautionary Statement Response
P370 + P376 In case of fire: Stop leak if safe to do so.

Precautionary Statement Storage
P403 Store in a well-ventilated place.

Precautionary Statement Disposal
None.

3 COMPOSITION/INFORMATION ON INGREDIENTS
Substance/Preparation: Substance.

Components/Impurities
Oxygen, compressed

CAS No: 7782-44-7

EC No (from EINECS): 231-956-9

REACH Registration number:

Contains no other components or impurities which will influence the classification of the product.

4 FIRST AID MEASURES

Inhalation
Continuous inhalation of concentrations higher than 75% may cause nausea, dizziness, respiratory difficulty and convulsion. Remove victim to uncontaminated area. Keep victim warm and rested. Obtain medical assistance. Apply artificial respiration if breathing stopped.

Ingestion
Ingestion is not considered a potential route of exposure.

5 FIRE FIGHTING MEASURES

Specific hazards
Supports combustion. Exposure to fire may cause containers to rupture/explode. Non flammable.

Hazardous combustion products
None.

Suitable extinguishing media
All known extinguishants can be used.

Specific methods
If possible, stop flow of product. Move container away or cool with water from a protected position.

Special protective equipment for fire-fighters
Clothing for fire-fighters conforming to EN 469 will provide a basic level of protection from chemical incidents. EN 469:2005: Protective clothing for firefighters. Performance requirements for protective clothing for firefighting. EN 15090 Footwear for firefighters. EN 443 Helmets for fire fighting in buildings and other structures. EN 659 Protective gloves for firefighters. EN 137 Respiratory protective devices — Self-contained open-circuit compressed air breathing apparatus with full face mask — Requirements, testing, marking.

6 ACCIDENTAL RELEASE MEASURES

Personal precautions
Evacuate area. Ensure adequate air ventilation. Eliminate ignition sources. Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous. Monitor concentration of released product.

Environmental precautions
Try to stop release.

Clean up methods
Ventilate area.

7 HANDLING AND STORAGE

Handling
Use no oil or grease. Suck back of water into the container must be prevented. Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Contact your
Safety data sheet
Oxygen, compressed

8 EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure limit value
Value type  value  Note

Respiratory protection
Not required

Hand protection
Advice
Wear working gloves and safety shoes while handling containers.

Personal protection
Do not smoke while handling product. Wear suitable hand, body and head protection. Wear goggles with suitable filter lenses when use is cutting/welding. Avoid oxygen rich (>23%) atmospheres. Ensure adequate ventilation.

9 PHYSICAL AND CHEMICAL PROPERTIES

General information

Appearance/Colour: Colourless gas.
Odour: None.

Important information on environment, health and safety

Molecular weight: 32 g/mol
Melting point: -219 °C
Boiling point: -183 °C
Critical temperature: -118 °C
Flash point: Not applicable for gases and gas mixtures.
Autoignition temperature: Not applicable.
Flammability range: Non flammable.
Relative density, gas (Air=1): 1,1
Relative density, liquid (Water=1): 1,1
Vapour Pressure 20 °C: Not applicable.
Solubility in water: 39 mg/l

Other data
Gas/vapour heavier than air. May accumulate in confined spaces, particularly at or below ground level.

10 STABILITY AND REACTIVITY

Stability and reactivity
May react violently with combustible materials. May react violently with reducing agents. Violently oxidises organic material.

Hazardous decomposition products

Statements on decomposition
Under normal conditions of storage and use, hazardous decomposition products should not be produced.

11 TOXICOLOGICAL INFORMATION

General
No known toxicological effects from this product.
Acute toxicity
No known toxicological effects from this product.

12 ECOLOGICAL INFORMATION

General
No ecological damage caused by this product.

13 DISPOSAL CONSIDERATIONS

General
Vent to atmosphere in a well ventilated place. Do not discharge into any place where its accumulation could be dangerous. Contact supplier if guidance is required.

EWC Nr. 16 05 04*

14 TRANSPORT INFORMATION

ADR/RID
Class 2
Classification Code 10

UN number and proper shipping name
UN 1072 Oxygen, compressed

UN 1072 Oxygen, compressed

Labels
2,2,5,1

Hazard number 25

Packing Instruction P200

8340/2 / EDV / 02.02.2012
Safety data sheet
Oxygen, compressed

Creation date: 28.01.2005
Revision date: 07.02.2012
Version: 2.1
DE / E
SDS No.: 8340/2

IMDG
Class: 2.2
UN number and proper shipping name
UN 1072 Oxygen, compressed
Labels: 2.2, 5.1
Packing Instruction: P200
EmS: F-C

IATA
Class: 2.2
UN number and proper shipping name
UN 1072 Oxygen, compressed
Labels: 2.2, 5.1
Packing Instruction: P200

Other transport information
Avoid transport on vehicles where the load space is not separated from the driver's compartment. Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency. Before transporting product containers ensure that they are firmly secured. Ensure that the container valve is closed and not leaking. Ensure that the valve outlet cap nut or plug (where provided) is correctly fitted. Ensure that the valve protection device (where provided) is correctly fitted. Ensure adequate ventilation. Ensure compliance with applicable regulations.

15 REGULATORY INFORMATION

Further national regulations
Directive 94/9/EC on equipment and protective systems intended for use in potentially explosive atmospheres (ATEX)
Directive 89/686/EEC on personal protective equipment

Water pollution class
Not polluting to waters according to VwVwS from 17.05.99.

TA-Luft
Not classified according to TA-Luft.

16 OTHER INFORMATION

Ensure all national/local regulations are observed. Ensure operators understand the hazard of oxygen enrichment. Before using this product in any new process or experiment, a thorough material compatibility and safety study should be carried out.

Advice
Whilst proper care has been taken in the preparation of this document, no liability for injury or damage resulting from its use can be accepted. Details given in this document are believed to be correct at the time of going to press.

Further information
Kühn-Birett: Merkblätter gefährliche Arbeitsstoffe

End of document
1 Identification of the substance/mixture and of the company/undertaking

- 1.1 Product identifier
  - Trade name: OKS 611
- 1.2 Relevant identified uses of the substance or mixture and uses advised against
  - No further relevant information available.
- 1.3 Details of the supplier of the safety data sheet
  - Manufacturer/Supplier: OKS Spezialschmierstoffe GmbH
    Ganghoferstr. 47
    D-82216 Maisach
    Tel. +49 8142 3051 500
    Fax. +49 8142 3051 599
    E-Mail: mcm@oks-germany.com
  - Informing department: MCM departement
- 1.4 Emergency telephone number: (+49) 8142-3051 517

2 Hazards identification

- 2.1 Classification of the substance or mixture
  - Classification according to Directive 67/548/EEC or Directive 1999/45/EC
    - F+: Extremely flammable
    - R12: Extremely flammable.
    - R53-66: May cause long-term adverse effects in the aquatic environment. Repeated exposure may cause skin dryness or cracking.

- Information concerning particular hazards for human and environment:
  - The product has to be labelled due to the calculation procedure of the "General Classification guideline for preparations of the EU" in the latest valid version.
  - At long or repeated contact with skin it may cause dermatitis due to the degreasing effect of the solvent.
  - Warning! Pressurized container.

- Classification system:
  - The classification is in line with current EC lists. It is expanded, however, by information from technical literature and by information furnished by supplier companies.

- 2.2 Label elements
  - Labelling according to EU guidelines:
    - The product has been labelled in accordance with EC Directives / relevant national laws.
  - Code letter and hazard designation of product:
    - F+ Extremely flammable

- Risk phrases:
  - 12 Extremely flammable.
  - 53 May cause long-term adverse effects in the aquatic environment.
  - 66 Repeated exposure may cause skin dryness or cracking.

- Safety phrases:
  - 2 Keep out of the reach of children.
  - 9 Keep container in a well-ventilated place.
  - 16 Keep away from sources of ignition - No smoking.
Trade name: OKS 611

23 Do not breathe spray.
51 Use only in well-ventilated areas.
60 This material and its container must be disposed of as hazardous waste.

- Special labelling of certain preparations:
  Pressurized container: protect from sunlight and do not expose to temperatures exceeding 50°C.
  Do not pierce or burn, even after use.
  Do not spray on a naked flame or any incandescent material.
  Buildup of explosive mixtures possible without sufficient ventilation.
- 2.3 Other hazards
- Results of PBT and vPvB assessment
  - PBT: Not applicable.
  - vPvB: Not applicable.

3 Composition/information on ingredients

- 3.2 Chemical characterization: Mixtures
  - Description:
    Mixture of the substances listed below with harmless additions.
    Preparation of solid lubricants in mineral oil and solvents,
    with propellant in spray cans.
  - Dangerous components:
    - CAS: 64741-65-7 Naphtha (petroleum), heavy alkylate 25-50%
      EINECS: 265-067-2 Xn R65
      R53-66
      Carc. Cat. 2, Muta. Cat. 2
      Flam. Liq. 3, H226; Carc. 1B, H350; Asp. Tox. 1, H304
    - CAS: 74-98-6 propane liquefied 10-25%
      EINECS: 200-827-9 F+ R12
      Flam. Gas 1, H220; Press. Gas, H280
    - CAS: 75-28-5 isobutane 10-25%
      EINECS: 200-857-2 F+ R12
      Flam. Gas 1, H220; Press. Gas, H280
    - CAS: 106-97-8 butane, pure 2.5-5%
      EINECS: 203-448-7 F+ R12
      Flam. Gas 1, H220; Press. Gas, H280
    - CAS: 111-76-2 2-butoxyethanol ≤ 2.5%
      EINECS: 203-905-0 Xn R20/21/22; Xi R36/38
      Acute Tox. 4, H302; Acute Tox. 4, H312; Acute Tox. 4, H332; Skin Irrit. 2, H315; Eye Irrit. 2, H319

- Additional information For the wording of the listed risk phrases refer to section 16.

4 First aid measures

- 4.1 Description of first aid measures
  - General information Instantly remove any clothing soiled by the product.
  - After inhalation Supply fresh air; consult doctor in case of symptoms.
  - After skin contact Wash with water and soap and rinse thoroughly.
  - After eye contact Rinse opened eye for several minutes under running water. If symptoms persist, consult doctor.
35.0.6 After swallowing Do not induce vomiting; instantly call for medical help.

4.2 Most important symptoms and effects, both acute and delayed
No further relevant information available.

4.3 Indication of any immediate medical attention and special treatment needed
No further relevant information available.

5 Firefighting measures

5.1 Extinguishing media
Suitable extinguishing agents CO2, extinguishing powder or water jet. Fight larger fires with water jet or alcohol-resistant foam.

For safety reasons unsuitable extinguishing agents Water with a full water jet.

5.2 Special hazards arising from the substance or mixture
Can be released in case of fire
Carbon monoxide (CO) and carbon dioxide (CO2)
Can form explosive gas-air mixtures.
Formation of toxic gases is possible during heating or in case of fire.

5.3 Advice for firefighters
Protective equipment:
Wear self-contained breathing apparatus.
Do not inhale explosion gases or combustion gases.
Wear full protective suit.

Additional information Cool endangered containers with water spray jet.

6 Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures
Wear protective equipment. Keep unprotected persons away.
Ensure adequate ventilation
Keep away from ignition sources

6.2 Environmental precautions:
Do not allow to enter drainage system, surface or ground water.
Do not allow to enter the ground/soil.

6.3 Methods and material for containment and cleaning up:
Ensure adequate ventilation.
Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust).
Dispose of contaminated material as waste according to item 13.

6.4 Reference to other sections
See Section 8 for information on personal protection equipment.

7 Handling and storage

7.1 Precautions for safe handling
Ensure good ventilation/exhaustion at the workplace.
Keep away from heat and direct sunlight.
Use only in well ventilated areas.

Information about protection against explosions and fires:
Beware: Container is pressurized. Keep away from direct sun exposure and temperatures over 50°C. Do not open by force or throw into fire even after use.
Fumes can combine with air to form an explosive mixture.
Keep ignition sources away - Do not smoke.
Do not spray on flames or red-hot objects.
7.2 Conditions for safe storage, including any incompatibilities

Storage

Requirements to be met by storerooms and containers:
Store in cool location.
Observe official regulations on storing packagings with pressurized containers.

Information about storage in one common storage facility: Not required.

Further information about storage conditions:
Protect from heat and direct sunlight.
Store in a cool place. Heat will increase pressure and may lead to the container exploding.

7.3 Specific end use(s) No further relevant information available.

8 Exposure controls/personal protection

Additional information about design of technical systems: No further data; see item 7.

8.1 Control parameters

Components with critical values that require monitoring at the workplace:

106-97-8 butane, pure
WEL () Short-term value: 1810 mg/m³, 750 ppm
Long-term value: 1450 mg/m³, 600 ppm
Carc (if more than 0.1% of buta-1.3-diene)

111-76-2 2-butoxyethanol
WEL () Short-term value: 50 ppm
Long-term value: 25 ppm
Sk

Additional information:
The currently valid safety information database was used to compile this data sheet.

8.2 Exposure controls

Personal protective equipment

General protective and hygienic measures
Wash hands during breaks and at the end of the work.
Instantly remove any soiled and impregnated garments.
Avoid contact with the eyes and skin.
Do not eat, drink or smoke while working.

Breathing equipment: Not necessary if room is well-ventilated.

Protection of hands: Protective gloves.

Material of gloves Nitrile rubber, NBR

Penetration time of glove material
The exact break trough time has to be found out by the manufacturer of the protective gloves and has to be observed.

Eye protection: Tightly sealed safety glasses.

9 Physical and chemical properties

9.1 Information on basic physical and chemical properties

General Information

Appearance:
Form: Aerosol
Colour: Yellowish
Smell: Solvent-like
Trade name: OKS 611

- Odour threshold: Not determined.
- pH-value: Not determined.
- Change in condition
  - Melting point/Melting range: Not applicable, as aerosol
  - Boiling point/Boiling range: Not applicable, as aerosol
- Flash point: ~ -80°C (ISO 2592)
- Inflammability (solid, gaseous) Not applicable.
- Ignition temperature: > 200°C (DIN 51794)
- Decomposition temperature: Not determined.
- Self-inflammability: Product is not self igniting.
- Danger of explosion: Not determined.
- Critical values for explosion:
  - Lower: Not determined.
  - Upper: Not determined.
- Vapor pressure: Not determined.
- Density at 20°C 0.69 g/cm³
- Relative density: Not determined.
- Vapour density: Not determined.
- Evaporation rate: Not applicable.
- Solubility in / Miscibility with Water: Not miscible or difficult to mix
- Partition coefficient (n-octanol/water): Not determined.
- Viscosity:
  - dynamic: Not determined.
  - kinematic: Not determined.
- 9.2 Other information No further relevant information available.

10 Stability and reactivity

- 10.1 Reactivity
- 10.2 Chemical stability
  - Thermal decomposition / conditions to be avoided:
    No decomposition if used according to specifications.
- 10.3 Possibility of hazardous reactions
  - Danger of bursting
  - Reacts with oxidizing agents
  - Forms explosive gases / fumes
- 10.4 Conditions to avoid No further relevant information available.
- 10.5 Incompatible materials: No further relevant information available.
- 10.6 Hazardous decomposition products:
  - Carbon monoxide and carbon dioxide
  - Aldehyde
11 Toxicological information

- 11.1 Information on toxicological effects
  - Acute toxicity:
    - LD/LC50 values that are relevant for classification:
      64741-65-7 Naphtha (petroleum), heavy alkylate
      Oral LD50 6000 mg/kg (rat)
      Dermal LD50 3000 mg/kg (rab)
      Inhalative LC50/4 h 7.8 mg/l (rat)
  - Primary irritant effect:
    - on the skin: No irritant effect.
    - on the eye: No irritant effect.
  - Sensitization: No sensitizing effect known.

12 Ecological information

- 12.1 Toxicity
  - Aquatic toxicity: No further relevant information available.
- 12.2 Persistence and degradability No further relevant information available.
- 12.3 Bioaccumulative potential No further relevant information available.
- 12.4 Mobility in soil No further relevant information available.
- Additional ecological information:
  - General notes: Water hazard class 1 (Self-assessment): slightly hazardous for water.
- 12.5 Results of PBT and vPvB assessment
  - PBT: Not applicable.
  - vPvB: Not applicable.
- 12.6 Other adverse effects No further relevant information available.

13 Disposal considerations

- 13.1 Waste treatment methods
  - Recommendation
    Must not be disposed of together with household garbage. Do not allow product to reach sewage system.
  - European waste catalogue
    16 05 04 gases in pressure containers (including halons) containing dangerous substances
- Uncleaned packagings:
  - Recommendation: Disposal must be made according to official regulations.

14 Transport information

- 14.1 UN-Number
  - ADR, IMDG, IATA 1950
- 14.2 UN proper shipping name
  - ADR 1950 AEROSOLS
  - IMDG AEROSOLS
  - IATA AEROSOLS, flammable

(Contd. on page 7)
Safety data sheet
according to 1907/2006/EC, Article 31

Version number 56

Trade name: OKS 611

14.3 Transport hazard class(es)
- ADR
  - Class 2
  - Label 5F Gases.
- IMDG, IATA
  - Class 2.1
  - Label 2.1
- 14.4 Packing group
  - ADR, IMDG, IATA
  - Class 2.1
  - Label 2.1
- 14.5 Environmental hazards:
  - Marine pollutant: No
  - 14.6 Special precautions for user
  - Warning: Gases.
  - Kemler Number: -
  - EMS Number: F-D,S-U
- 14.7 Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code
  - Not applicable.
- Transport/Additional information:
  - ADR
  - Tunnel restriction code D

15 Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture
- Water hazard class: Water hazard class 1 (Self-assessment): slightly hazardous for water.

15.2 Chemical safety assessment:
A Chemical Safety Assessment has not been carried out.

16 Other information
This data is based on our present knowledge. However, it shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

- Relevant phrases
  - H220 Extremely flammable gas.
  - H226 Flammable liquid and vapour.
  - H280 Contains gas under pressure; may explode if heated.
  - H302 Harmful if swallowed.
  - H304 May be fatal if swallowed and enters airways.
  - H312 Harmful in contact with skin.
  - H315 Causes skin irritation.
  - H319 Causes serious eye irritation.
  - H332 Harmful if inhaled.
  - H350 May cause cancer.
  - R12 Extremely flammable.
  - R20/21/22 Harmful by inhalation, in contact with skin and if swallowed.
  - R36/38 Irritating to eyes and skin.
  - R53 May cause long-term adverse effects in the aquatic environment.
  - R65 Harmful; may cause lung damage if swallowed.
  - R66 Repeated exposure may cause skin dryness or cracking.

- Department issuing data specification sheet: Technical departement
<table>
<thead>
<tr>
<th>Trade name: OKS 611</th>
</tr>
</thead>
<tbody>
<tr>
<td>· <strong>Contact</strong>: Technical</td>
</tr>
<tr>
<td>· <em>Data compared to the previous version altered.</em></td>
</tr>
</tbody>
</table>
SECTION 1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE
COMPANY/UNDERTAKING

1.1 Product Identifier

Material Name : Shell Omala S2 G 100
Product Code : 001D7835

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

Product Use : Gear lubricant.
Uses Advised Against : This product must not be used in applications other than those recommended in Section 1, without first seeking the advice of the supplier.

1.3 Details of the Supplier of the safety data sheet

Manufacturer/Supplier : Shell Deutschland Oil GmbH
Suhrenkamp 71-77
D-22335 Hamburg

Telephone : (+49) 40 6324-6255
Fax : (+49) 40 6321-051
Email Contact for Safety Data Sheet : If you have any enquiries about the content of this SDS please email lubricantSDS@shell.com

1.4 Emergency Telephone Number

: (+49) 30 3068 6790 (Giftnotruf Berlin)

SECTION 2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

<table>
<thead>
<tr>
<th>1999/45/EC Hazard Characteristics</th>
<th>R-phrase(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not classified as dangerous under EC criteria.</td>
<td></td>
</tr>
</tbody>
</table>

Sensitiser not sufficient to classify : Contains amine phosphate. May produce an allergic reaction.

2.2 Label Elements
Safety Data Sheet

Labeling according to Directive 1999/45/EC

EC Symbols : No Hazard Symbol required
EC Classification : Not classified as dangerous under EC criteria.
EC Risk Phrases : Not classified.
EC Safety Phrases : Not classified.

2.3 Other Hazards

Health Hazards : Not expected to be a health hazard when used under normal conditions. Prolonged or repeated skin contact without proper cleaning can clog the pores of the skin resulting in disorders such as oil acne/folliculitis. Used oil may contain harmful impurities.
Safety Hazards : Not classified as flammable but will burn.
Environmental Hazards : Not classified as dangerous for the environment.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substance

Material Name : Not applicable.

3.2 Mixtures

Mixture Description : Highly refined mineral oils and additives.

Hazardous Components

Classification of components according to Regulation (EC) No 1272/2008

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS No.</th>
<th>EC Number</th>
<th>REACH Registration No.</th>
<th>Conc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amine phosphate</td>
<td>91745-46-9</td>
<td>294-716-2</td>
<td>01-2119493620-38</td>
<td>0,10 - 0,50%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Hazard Class &amp; Category</th>
<th>Hazard Statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amine phosphate</td>
<td>Flam. Liq., 3; Acute Tox., 4; Eye Dam.,</td>
<td>H226; H302; H318; H317;</td>
</tr>
</tbody>
</table>
Safety Data Sheet

Classification of components according to 67/548/EEC

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS No.</th>
<th>EC Number</th>
<th>REACH Registration No.</th>
<th>Symbol(s)</th>
<th>R-phrase(s)</th>
<th>Conc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amine phosphate</td>
<td>91745-46-9</td>
<td>294-716-2</td>
<td>01-2119493620-38</td>
<td>Xn, Xi, N</td>
<td>R22; R41; R43; R51/53</td>
<td>0,10 - 0,50%</td>
</tr>
</tbody>
</table>

Additional Information: The highly refined mineral oil contains <3% (w/w) DMSO-extract, according to IP346. Refer to Ch 16 for full text of R- and H-phrases. This mixture does not contain any REACH registered substances that are assessed to be a PBT or a vPvB.

SECTION 4. FIRST AID MEASURES

4.1 Description of First Aid Measures

General Information: Not expected to be a health hazard when used under normal conditions.

Inhalation: No treatment necessary under normal conditions of use. If symptoms persist, obtain medical advice.

Skin Contact: Remove contaminated clothing. Flush exposed area with water and follow by washing with soap if available. If persistent irritation occurs, obtain medical attention.

Eye Contact: Flush eye with copious quantities of water. If persistent irritation occurs, obtain medical attention.

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

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

4.2 Most important symptoms and effects, both acute and delayed: Oil acne/folliculitis signs and symptoms may include formation of black pustules and spots on the skin of exposed areas. Ingestion may result in nausea, vomiting and/or diarrhoea.

4.3 Indication of any immediate medical attention and special treatment needed: Notes to doctor/physician: Treat symptomatically.
Safety Data Sheet

SECTION 5. FIRE FIGHTING MEASURES

Clear fire area of all non-emergency personnel.

5.1 Extinguishing Media: Foam, water spray or fog. Dry chemical powder, carbon dioxide, sand or earth may be used for small fires only.

5.2 Special hazards arising from the substance or mixture: Hazardous combustion products may include: A complex mixture of airborne solid and liquid particulates and gases (smoke). Carbon monoxide. Unidentified organic and inorganic compounds.

5.3 Advice for firefighters: Proper protective equipment including chemical resistant gloves are to be worn; chemical resistant suit is indicated if large contact with spilled product is expected. Self-Contained Breathing Apparatus must be worn when approaching a fire in a confined space. Select fire fighter's clothing approved to relevant Standards (e.g. Europe: EN469).

SECTION 6. ACCIDENTAL RELEASE MEASURES

Avoid contact with spilled or released material. For guidance on selection of personal protective equipment see Chapter 8 of this Material Safety Data Sheet. Observe the relevant local and international regulations.

6.1 Personal Precautions, Protective Equipment and Emergency Procedures:

6.1.1 For non emergency personnel: Avoid contact with skin and eyes.

6.1.2 For emergency responders: Avoid contact with skin and eyes.

6.2 Environmental Precautions: Use appropriate containment to avoid environmental contamination. Prevent from spreading or entering drains, ditches or rivers by using sand, earth, or other appropriate barriers.

6.3 Methods and Material for Containment and Cleaning Up: Slippery when spilt. Avoid accidents, clean up immediately. Prevent from spreading by making a barrier with sand, earth or other containment material. Reclaim liquid directly or in an absorbent. Soak up residue with an absorbent such as clay, sand or other suitable material and dispose of properly.

Additional Advice: Local authorities should be advised if significant spillages cannot be contained.

6.4 Reference to other sections: For guidance on selection of personal protective equipment see Chapter 8 of this Material Safety Data Sheet. For guidance...
on disposal of spilled material see Chapter 13 of this Material Safety Data Sheet.

SECTION 7. HANDLING AND STORAGE

General Precautions: Use local exhaust ventilation if there is risk of inhalation of vapours, mists or aerosols. Use the information in this data sheet as input to a risk assessment of local circumstances to help determine appropriate controls for safe handling, storage and disposal of this material.

7.1 Precautions for Safe Handling:
Avoid prolonged or repeated contact with skin. Avoid inhaling vapour and/or mists. When handling product in drums, safety footwear should be worn and proper handling equipment should be used. Properly dispose of any contaminated rags or cleaning materials in order to prevent fires. Keep container tightly closed and in a cool, well-ventilated place. Use properly labelled and closeable containers.

Product Transfer:
This material has the potential to be a static accumulator. Proper grounding and bonding procedures should be used during all bulk transfer operations.

7.2 Conditions for safe storage, including any incompatibilities:
Store at ambient temperature.

Recommended Materials:
For containers or container linings, use mild steel or high density polyethylene.

Unsuitable Materials:
PVC.

7.3 Specific end use(s):
Not applicable

Additional Information:
Polyethylene containers should not be exposed to high temperatures because of possible risk of distortion.

Storage class according to TRGS 510: 10
Fire hazard classification: B

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

If the American Conference of Governmental Industrial Hygienists (ACGIH) value is provided on this document, it is provided for information only.

8.1 Control Parameters

Occupational Exposure Limits

<table>
<thead>
<tr>
<th>Material</th>
<th>Source</th>
<th>Type</th>
<th>ppm</th>
<th>mg/m3</th>
<th>Notation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5/17</td>
</tr>
</tbody>
</table>

Print Date 26.12.2012

000000019494

MSDS_DE
### Safety Data Sheet

**Oil mist, mineral** | **ACGIH** | **TWA(Inhalable fraction.)** | **5 mg/m³**
--- | --- | --- | ---

#### Biological Exposure Index (BEI)
No biological limit allocated.

**PNEC related information** : Data not available

**Monitoring Methods** : Monitoring of the concentration of substances in the breathing zone of workers or in the general workplace may be required to confirm compliance with an OEL and adequacy of exposure controls. For some substances biological monitoring may also be appropriate. Validated exposure measurement methods should be applied by a competent person and samples analysed by an accredited laboratory. Examples of sources of recommended exposure measurement methods are given below or contact the supplier. Further national methods may be available.

- Institut für Arbeitsschutz Deutschen Gesetzlichen Unfallversicherung (IFA), Germany. [http://www.dguv.de/inhalt/index.jsp](http://www.dguv.de/inhalt/index.jsp)
- L'Institut National de Recherche et de Sécurité (INRS), France [http://www.inrs.fr/accueil](http://www.inrs.fr/accueil)

#### 8.2 Exposure Controls
**General Information** : The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Select controls
based on a risk assessment of local circumstances. Appropriate measures include: Adequate ventilation to control airborne concentrations. Where material is heated, sprayed or mist formed, there is greater potential for airborne concentrations to be generated.

Define procedures for safe handling and maintenance of controls. Educate and train workers in the hazards and control measures relevant to normal activities associated with this product. Ensure appropriate selection, testing and maintenance of equipment used to control exposure, e.g. personal protective equipment, local exhaust ventilation. Drain down system prior to equipment break-in or maintenance. Retain drain downs in sealed storage pending disposal or for subsequent recycle. Always observe good personal hygiene measures, such as washing hands after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Discard contaminated clothing and footwear that cannot be cleaned. Practice good housekeeping.

**Occupational Exposure Controls**

**Personal Protective Equipment**

The provided information is made in consideration of the PPE directive (Council Directive 89/686/EEC) and the CEN European Committee for Standardisation (CEN) standards. Personal protective equipment (PPE) should meet recommended national standards. Check with PPE suppliers.

**Eye Protection**

Wear safety glasses or full face shield if splashes are likely to occur. Approved to EU Standard EN166.

**Hand Protection**

Where hand contact with the product may occur the use of gloves approved to relevant standards (e.g. Europe: EN374, US: F739) made from the following materials may provide suitable chemical protection: PVC, neoprene or nitrile rubber gloves. Suitability and durability of a glove is dependent on usage, e.g. frequency and duration of contact, chemical resistance of glove material, dexterity. Always seek advice from glove suppliers. Contaminated gloves should be replaced. Personal hygiene is a key element of effective hand care. Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturizer is recommended. For continuous contact we recommend gloves with breakthrough time of more than 240 minutes with preference
Safety Data Sheet

for > 480 minutes where suitable gloves can be identified. For short-term/splash protection we recommend the same, but recognise that suitable gloves offering this level of protection may not be available and in this case a lower breakthrough time may be acceptable so long as appropriate maintenance and replacement regimes are followed. Glove thickness is not a good predictor of glove resistance to a chemical as it is dependent on the exact composition of the glove material.

Body protection : Skin protection not ordinarily required beyond standard issue work clothes.

Respiratory Protection : No respiratory protection is ordinarily required under normal conditions of use. In accordance with good industrial hygiene practices, precautions should be taken to avoid breathing of material. If engineering controls do not maintain airborne concentrations to a level which is adequate to protect worker health, select respiratory protection equipment suitable for the specific conditions of use and meeting relevant legislation. Check with respiratory protective equipment suppliers. Where air-filtering respirators are suitable, select an appropriate combination of mask and filter. Select a filter suitable for combined particulate/organic gases and vapours [boiling point >65 °C (149 °F)] meeting EN14387.

Thermal Hazards : Not applicable.

Environmental Exposure Controls
Environmental exposure control measures : Minimise release to the environment. An environmental assessment must be made to ensure compliance with local environmental legislation. Information on accidental release measures are to be found in section 6.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>Brown. Liquid at room temperature.</td>
</tr>
<tr>
<td>Odour</td>
<td>Slight hydrocarbon.</td>
</tr>
<tr>
<td>Odour threshold</td>
<td>Data not available</td>
</tr>
<tr>
<td>pH</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>Initial Boiling Point and Boiling Range</td>
<td>&gt; 280 °C / 536 °F estimated value(s)</td>
</tr>
<tr>
<td>Pour point</td>
<td>Typical -24 °C / -11 °F</td>
</tr>
<tr>
<td>Flash point</td>
<td>Typical 240 °C / 464 °F (COC)</td>
</tr>
<tr>
<td>Upper / lower Flammability or Explosion limits</td>
<td>Typical 1 - 10 % (V) (based on mineral oil)</td>
</tr>
</tbody>
</table>
Safety Data Sheet

Auto-ignition temperature : > 320 °C / 608 °F  
Vapour pressure : < 0,5 Pa at 20 °C / 68 °F (estimated value(s))  
Relative Density : Typical 0,891 at 15 °C / 59 °F  
Density : Typical 891 kg/m³ at 15 °C / 59 °F  
Water solubility : Negligible.  
Solubility in other solvents : Data not available  
n-octanol/water partition coefficient (log Pow) : > 6 (based on information on similar products)  
Dynamic viscosity : Data not available  
Kinematic viscosity : Typical 100 mm²/s at 40 °C / 104 °F  
Vapour density (air=1) : > 1 (estimated value(s))  
Evaporation rate (nBuAc=1) : Data not available  
Decomposition : Data not available  
Temperature : Data not available  
Flammability : Data not available  
Oxidizing Properties : Data not available  
Explosive Properties : Not classified  

9.2 Other Information  
Electrical conductivity : This material is not expected to be a static accumulator.  
Other Information : not a VOC  
Volatile organic compound : 0 %  

SECTION 10. STABILITY AND REACTIVITY  

10.1 Reactivity : The product does not pose any further reactivity hazards in addition to those listed in the following sub-paragraph.  
10.2 Chemical stability : No hazardous reaction is expected when handled and stored according to provisions.  
10.3 Possibility of Hazardous Reactions : Reacts with strong oxidising agents.  
10.4 Conditions to Avoid : Extremes of temperature and direct sunlight.  
10.5 Incompatible Materials : Strong oxidising agents.  
10.6 Hazardous Decomposition Products : Hazardous decomposition products are not expected to form during normal storage.  

SECTION 11. TOXICOLOGICAL INFORMATION
11.1 Information on Toxicological effects

**Basis for Assessment**: Information given is based on data on the components and the toxicology of similar products. Unless indicated otherwise, the data presented is representative of the product as a whole, rather than for individual component(s).

**Likely Routes of Exposure**: Skin and eye contact are the primary routes of exposure although exposure may occur following accidental ingestion.

**Acute Oral Toxicity**: Expected to be of low toxicity: LD50 > 5000 mg/kg, Rat

**Acute Dermal Toxicity**: Expected to be of low toxicity: LD50 > 5000 mg/kg, Rabbit

**Acute Inhalation Toxicity**: Not considered to be an inhalation hazard under normal conditions of use.

**Skin corrosion/irritation**: Expected to be slightly irritating.

**Serious eye damage/irritation**: Expected to be slightly irritating.

**Respiratory Irritation**: Inhalation of vapours or mists may cause irritation.

**Respiratory or skin sensitisation**: For respiratory and skin sensitisation: Not expected to be a sensitisier.

**Aspiration Hazard**: Not considered an aspiration hazard.

**Germ cell mutagenicity**: Not considered a mutagenic hazard.

**Carcinogenicity**: Not expected to be carcinogenic. Product contains mineral oils of types shown to be non-carcinogenic in animal skin-painting studies. Highly refined mineral oils are not classified as carcinogenic by the International Agency for Research on Cancer (IARC).

<table>
<thead>
<tr>
<th>Material</th>
<th>Carcinogenicity Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highly refined mineral oil (IP346 &lt;3%)</td>
<td>ACGIH Group A4: Not classifiable as a human carcinogen.</td>
</tr>
<tr>
<td>Highly refined mineral oil (IP346 &lt;3%)</td>
<td>IARC 3: Not classifiable as to carcinogenicity to humans.</td>
</tr>
<tr>
<td>Highly refined mineral oil (IP346 &lt;3%)</td>
<td>GHS / CLP: No carcinogenicity classification</td>
</tr>
</tbody>
</table>

**Reproductive and Developmental Toxicity**: Not expected to be a hazard.

**Summary on evaluation of the CMR properties**

**Carcinogenicity**: This product does not meet the criteria for classification in categories 1A/1B.

**Mutagenicity**: This product does not meet the criteria for classification in categories 1A/1B.
Reproductive Toxicity (fertility): This product does not meet the criteria for classification in categories 1A/1B.

Specific target organ toxicity - single exposure: Not expected to be a hazard.
Specific target organ toxicity - repeated exposure: Not expected to be a hazard.

Additional Information: Used oils may contain harmful impurities that have accumulated during use. The concentration of such impurities will depend on use and they may present risks to health and the environment on disposal. ALL used oil should be handled with caution and skin contact avoided as far as possible. Classifications by other authorities under varying regulatory frameworks may exist.

SECTION 12. ECOLOGICAL INFORMATION

Basis for Assessment: Ecotoxicological data have not been determined specifically for this product. Information given is based on a knowledge of the components and the ecotoxicology of similar products. Unless indicated otherwise, the data presented is representative of the product as a whole, rather than for individual component(s).

12.1 Toxicity
   Acute Toxicity: Poorly soluble mixture. May cause physical fouling of aquatic organisms. Expected to be practically non toxic: LL/EL/IL50 > 100 mg/l (to aquatic organisms) LL/EL50 expressed as the nominal amount of product required to prepare aqueous test extract. Mineral oil is not expected to cause any chronic effects to aquatic organisms at concentrations less than 1 mg/l.

12.2 Persistence and degradability: Expected to be not readily biodegradable. Major constituents are expected to be inherently biodegradable, but the product contains components that may persist in the environment.

12.3 Bioaccumulative Potential: Contains components with the potential to bioaccumulate.

12.4 Mobility in Soil: Liquid under most environmental conditions. If it enters soil, it will adsorb to soil particles and will not be mobile. Floats on water.

12.5 Result of PBT and vPvB assessment: This mixture does not contain any REACH registered substances that are assessed to be a PBT or a vPvB.
12.6 Other Adverse Effects: Product is a mixture of non-volatile components, which are not expected to be released to air in any significant quantities. Not expected to have ozone depletion potential, photochemical ozone creation potential or global warming potential.

SECTION 13. DISPOSAL CONSIDERATIONS

13.1 Waste Treatment Methods

Material Disposal: Recover or recycle if possible. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste classification and disposal methods in compliance with applicable regulations. Do not dispose into the environment, in drains or in water courses.

Container Disposal: Dispose in accordance with prevailing regulations, preferably to a recognised collector or contractor. The competence of the collector or contractor should be established beforehand.

Local Legislation: Disposal should be in accordance with applicable regional, national, and local laws and regulations. EU Waste Disposal Code (EWC): 13 02 05 mineral-based non-chlorinated engine, gear and lubricating oils. Classification of waste is always the responsibility of the end user.

SECTION 14. TRANSPORT INFORMATION

Land transport (ADR/RID):

ADR
This product is not classified as dangerous for this mode of transport. Therefore 14.1 UN Number, 14.2 UN Proper Shipping name, 14.3 Transport hazard class(es), 14.4 Packing group, 14.5 Environmental hazards, 14.6 Special precautions for user do not apply.

RID
This product is not classified as dangerous for this mode of transport. Therefore 14.1 UN Number, 14.2 UN Proper Shipping name, 14.3 Transport hazard class(es), 14.4 Packing group, 14.5 Environmental hazards, 14.6 Special precautions for user do not apply.

Inland waterways transport (ADN):
This product is not classified as dangerous for this mode of transport. Therefore 14.1 UN Number, 14.2 UN Proper Shipping name, 14.3 Transport hazard class(es), 14.4 Packing group, 14.5 Environmental hazards, 14.6 Special precautions for user do not apply.
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CDNI Inland Water Waste : NST 3411 Mineral Lubricanting Oils Agreement

Sea transport (IMDG Code):
This product is not classified as dangerous for this mode of transport. Therefore 14.1 UN Number, 14.2 UN Proper Shipping name, 14.3 Transport hazard class(es), 14.4 Packing group, 14.5 Environmental hazards, 14.6 Special precautions for user do not apply.

Air transport (IATA):
This product is not classified as dangerous for this mode of transport. Therefore 14.1 UN Number, 14.2 UN Proper Shipping name, 14.3 Transport hazard class(es), 14.4 Packing group, 14.5 Environmental hazards, 14.6 Special precautions for user do not apply.

14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code
Pollution Category : Not applicable.
Ship Type : Not applicable.
Product Name : Not applicable.
Special Precaution : Not applicable.

Additional Information : MARPOL Annex 1 rules apply for bulk shipments by sea.

SECTION 15. REGULATORY INFORMATION

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

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

Other regulatory Information
Authorisations and/or restrictions on use : Product is not subject to Authorisation under REACh.

Recommended Restrictions on Use (Advice Against) : This product must not be used in applications other than those recommended in Section 1, without first seeking the advice of the supplier.

Chemical Inventory Status

EINECS : All components listed or polymer exempt.
TSCA : All components listed.
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National Legislation

Water Pollution Class : WGK 1 - low hazard to waters (appendix 4, VwVwS, preparations).

Other Information : Technische Anleitung Luft: Product not listed by name. Observe section 5.2.5 in connection with section 5.4.9

15.2 Chemical Safety Assessment : No Chemical Safety Assessment has been carried out for this substance/mixture by the supplier.

SECTION 16. OTHER INFORMATION

R-phrase(s)

R22 Harmful if swallowed.
R41 Risk of serious damage to eyes.
R43 May cause sensitisation by skin contact.
R51/53 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

CLP Hazard Statements

H226 Flammable liquid and vapour.
H302 Harmful if swallowed.
H317 May cause an allergic skin reaction.
H318 Causes serious eye damage.
H411 Toxic to aquatic life with long lasting effects.

Additional Information : No Exposure Scenario annex is attached to this safety data sheet. It is a non-classified mixture containing hazardous substances as detailed in Section 3; relevant information from Exposure Scenarios for the hazardous substances contained have been integrated into the core sections 1-16 of this SDS.

Other Information

Abbreviations and Acronyms : Acute Tox. = Acute toxicity
Asp. Tox. = Aspiration hazard
Aquatic Acute = Acute hazards to the aquatic environment
Aquatic Chronic = Hazardous to the aquatic environment - Long-term Hazard
Eye Dam. = Serious eye damage/eye irritation
Flam. Liq. = Flammable liquids
Safety Data Sheet

Skin Corr. = Skin corrosion/irritation
Skin Sens. = Skin sensitizer
STOT SE = Specific target organ toxicity - single exposure
STOT RE = Specific target organ toxicity - repeated exposure

The standard abbreviations and acronyms used in this document can be looked up in reference literature (e.g. scientific dictionaries) and/or websites.

ADN = European Agreement concerning the international carriage of dangerous goods by inland waterways (ADN)
DFG = Federal Institute of Hydrology
EG = European Community
EN = European Norm
IBC = Intermediate Bulk Container
ISO = International Standards Organisation
MAK = Maximum workplace concentration
OECD = Organisation for economic cooperation and development
OEL = Occupational Exposure Limits
PSA = Personal protective equipment
TRGS = Technical rules for hazardous substances
VO = Regulation
VOC = Volatile Organic Compounds
VwVwS = Water administrative pollutants
WGK = Water Hazard Class

ACGIH = American Conference of Governmental Industrial Hygienists
ADR = European Agreement concerning the International Carriage of Dangerous Goods by Road
AICS = Australian Inventory of Chemical Substances
ASTM = American Society for Testing and Materials
BEL = Biological exposure limits
BTEX = Benzene, Toluene, Ethylbenzene, Xylenes
CAS = Chemical Abstracts Service
CEFIC = European Chemical Industry Council
CLP = Classification Packaging and Labelling
COC = Cleveland Open-Cup
DIN = Deutsches Institut fur Normung
DMEL = Derived Minimal Effect Level
DNEL = Derived No Effect Level
DSL = Canada Domestic Substance List
EC = European Commission
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EC50 = Effective Concentration fifty
ECETOC = European Center on Ecotoxicology and Toxicology
Of Chemicals
ECHA = European Chemicals Agency
EINECS = The European Inventory of Existing Commercial
Chemical Substances
EL50 = Effective Loading fifty
ENCS = Japanese Existing and New Chemical Substances
Inventory
EWC = European Waste Code
GHS = Globally Harmonised System of Classification and
Labelling of Chemicals
IARC = International Agency for Research on Cancer
IATA = International Air Transport Association
IC50 = Inhibitory Concentration fifty
IL50 = Inhibitory Level fifty
IMDG = International Maritime Dangerous Goods
INV = Chinese Chemicals Inventory
IP346 = Institute of Petroleum test method N° 346 for the
determination of polycyclic aromatics DMSO-extractables
KECI = Korea Existing Chemicals Inventory
LC50 = Lethal Concentration fifty
LD50 = Lethal Dose fifty per cent.
LL/EL/IL = Lethal Loading/Effective Loading/Inhibitory loading
LL50 = Lethal Loading fifty
MARPOL = International Convention for the Prevention of
Pollution From Ships
NOEC/NOEL = No Observed Effect Concentration / No
Observed Effect Level
OE_HPV = Occupational Exposure - High Production Volume
PBT = Persistent, Bioaccumulative and Toxic
PICCS = Philippine Inventory of Chemicals and Chemical
Substances
PNEC = Predicted No Effect Concentration
REACH = Registration Evaluation And Authorisation Of
Chemicals
RID = Regulations Relating to International Carriage of
Dangerous Goods by Rail
SKIN_DES = Skin Designation
STEL = Short term exposure limit
TRA = Targeted Risk Assessment
TSCA = US Toxic Substances Control Act
TWA = Time-Weighted Average
vPvB = very Persistent and very Bioaccumulative
## Safety Data Sheet

<table>
<thead>
<tr>
<th>SDS Distribution</th>
<th>The information in this document should be made available to all who may handle the product.</th>
</tr>
</thead>
<tbody>
<tr>
<td>SDS Version Number</td>
<td>2.0</td>
</tr>
<tr>
<td>SDS Effective Date</td>
<td>04.12.2012</td>
</tr>
<tr>
<td>SDS Revisions</td>
<td>A vertical bar (</td>
</tr>
<tr>
<td>SDS Regulation</td>
<td>Regulation 1907/2006/EC as amended by Regulation (EU) 453/2010</td>
</tr>
<tr>
<td>Disclaimer</td>
<td>This information is based on our current knowledge and intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.</td>
</tr>
</tbody>
</table>
Safety Data Sheet

SECTION 1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1 Product Identifier

Material Name : Shell Omala S2 G 220
Product Code : 001D7837

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

Product Use : Gear lubricant.
Uses Advised Against : This product must not be used in applications other than those recommended in Section 1, without first seeking the advice of the supplier.

1.3 Details of the Supplier of the safety data sheet

Manufacturer/Supplier : Shell Deutschland Oil GmbH
Suhrenkamp 71-77
D-22335 Hamburg
Telephone : (+49) 40 6324-6255
Fax : (+49) 40 6321-051
Email Contact for Safety Data Sheet : If you have any enquiries about the content of this SDS please email lubricantSDS@shell.com

1.4 Emergency Telephone Number

: +49 (0)40 6324-5110

SECTION 2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

1999/45/EC

<table>
<thead>
<tr>
<th>Hazard Characteristics</th>
<th>R-phrase(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not classified as dangerous under EC criteria. ;</td>
<td></td>
</tr>
</tbody>
</table>

Sensitiser not sufficient to classify : Contains amine phosphate. May produce an allergic reaction.

2.2 Label Elements
Safety Data Sheet

Labeling according to Directive 1999/45/EC

EC Symbols : No Hazard Symbol required

EC Classification : Not classified as dangerous under EC criteria.
EC Risk Phrases : Not classified.
EC Safety Phrases : Not classified.

2.3 Other Hazards

Health Hazards : Not expected to be a health hazard when used under normal conditions. Prolonged or repeated skin contact without proper cleaning can clog the pores of the skin resulting in disorders such as oil acne/folliculitis. Used oil may contain harmful impurities.

Safety Hazards : Not classified as flammable but will burn.

Environmental Hazards : Not classified as dangerous for the environment.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substance

Material Name : Not applicable.

3.2 Mixtures

Mixture Description : Highly refined mineral oils and additives.

Hazardous Components

Classification of components according to Regulation (EC) No 1272/2008

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS No.</th>
<th>EC Number</th>
<th>REACH Registration No.</th>
<th>Conc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amine phosphate</td>
<td>91745-46-9</td>
<td>294-716-2</td>
<td>01-2119493620-38</td>
<td>0,10 - 0,50%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Hazard Class &amp; Category</th>
<th>Hazard Statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amine phosphate</td>
<td>Flam. Liq., 3; Acute Tox., 4; Eye Dam.,</td>
<td>H226; H302; H318; H317;</td>
</tr>
</tbody>
</table>
Safety Data Sheet

Classification of components according to 67/548/EEC

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS No.</th>
<th>EC Number</th>
<th>REACH Registration No.</th>
<th>Symbol(s)</th>
<th>R-phrase(s)</th>
<th>Conc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amine phosphate</td>
<td>91745-46-9</td>
<td>294-716-2</td>
<td>01-2119493620-38</td>
<td>Xn, Xi, N</td>
<td>R22; R41; R43; R51/53</td>
<td>0,10 - 0,50%</td>
</tr>
</tbody>
</table>

Additional Information: The highly refined mineral oil contains <3% (w/w) DMSO-extract, according to IP346.

Refer to Ch 16 for full text of R- and H-phrases.

This mixture does not contain any REACH registered substances that are assessed to be a PBT or a vPvB.

SECTION 4. FIRST AID MEASURES

4.1 Description of First Aid Measures

General Information: Not expected to be a health hazard when used under normal conditions.

Inhalation: No treatment necessary under normal conditions of use. If symptoms persist, obtain medical advice.

Skin Contact: Remove contaminated clothing. Flush exposed area with water and follow by washing with soap if available. If persistent irritation occurs, obtain medical attention.

Eye Contact: Flush eye with copious quantities of water. If persistent irritation occurs, obtain medical attention.

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

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

4.2 Most important symptoms and effects, both acute and delayed: Oil acne/folliculitis signs and symptoms may include formation of black pustules and spots on the skin of exposed areas. Ingestion may result in nausea, vomiting and/or diarrhoea.

4.3 Indication of any immediate medical attention and special treatment needed: Notes to doctor/physician: Treat symptomatically.
SECTION 5. FIRE FIGHTING MEASURES

Clear fire area of all non-emergency personnel.

5.1 Extinguishing Media: Foam, water spray or fog. Dry chemical powder, carbon dioxide, sand or earth may be used for small fires only.

Unsuitable Extinguishing Media: Do not use water in a jet.

5.2 Special hazards arising from the substance or mixture: Hazardous combustion products may include: A complex mixture of airborne solid and liquid particulates and gases (smoke). Carbon monoxide. Unidentified organic and inorganic compounds.

5.3 Advice for firefighters: Proper protective equipment including chemical resistant gloves are to be worn; chemical resistant suit is indicated if large contact with spilled product is expected. Self-Contained Breathing Apparatus must be worn when approaching a fire in a confined space. Select fire fighter's clothing approved to relevant Standards (e.g. Europe: EN469).

SECTION 6. ACCIDENTAL RELEASE MEASURES

Avoid contact with spilled or released material. For guidance on selection of personal protective equipment see Chapter 8 of this Material Safety Data Sheet. Observe the relevant local and international regulations.

6.1 Personal Precautions, Protective Equipment and Emergency Procedures: 6.1.1 For non emergency personnel: Avoid contact with skin and eyes.

6.1.2 For emergency responders: Avoid contact with skin and eyes.

6.2 Environmental Precautions: Use appropriate containment to avoid environmental contamination. Prevent from spreading or entering drains, ditches or rivers by using sand, earth, or other appropriate barriers.

6.3 Methods and Material for Containment and Cleaning Up: Slippery when spilt. Avoid accidents, clean up immediately. Prevent from spreading by making a barrier with sand, earth or other containment material. Reclaim liquid directly or in an absorbent. Soak up residue with an absorbent such as clay, sand or other suitable material and dispose of properly.

Additional Advice: Local authorities should be advised if significant spillages cannot be contained.

6.4 Reference to other sections: For guidance on selection of personal protective equipment see Chapter 8 of this Material Safety Data Sheet. For guidance
on disposal of spilled material see Chapter 13 of this Material Safety Data Sheet.

SECTION 7. HANDLING AND STORAGE

General Precautions : Use local exhaust ventilation if there is risk of inhalation of vapours, mists or aerosols. Use the information in this data sheet as input to a risk assessment of local circumstances to help determine appropriate controls for safe handling, storage and disposal of this material.

7.1 Precautions for Safe Handling : Avoid prolonged or repeated contact with skin. Avoid inhaling vapour and/or mists. When handling product in drums, safety footwear should be worn and proper handling equipment should be used. Properly dispose of any contaminated rags or cleaning materials in order to prevent fires. Keep container tightly closed and in a cool, well-ventilated place. Use properly labelled and closeable containers.

Product Transfer : This material has the potential to be a static accumulator. Proper grounding and bonding procedures should be used during all bulk transfer operations.

7.2 Conditions for safe storage, including any incompatibilities : Store at ambient temperature.

Recommended Materials : For containers or container linings, use mild steel or high density polyethylene.

Unsuitable Materials : PVC.

7.3 Specific end use(s) : Not applicable

Additional Information : Polyethylene containers should not be exposed to high temperatures because of possible risk of distortion.

Storage class according to TRGS 510: 10

Fire hazard classification: B

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

If the American Conference of Governmental Industrial Hygienists (ACGIH) value is provided on this document, it is provided for information only.

8.1 Control Parameters

Occupational Exposure Limits

<table>
<thead>
<tr>
<th>Material</th>
<th>Source</th>
<th>Type</th>
<th>ppm</th>
<th>mg/m3</th>
<th>Notation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Print Date 26.12.2012

000000019496

MSDS_DE
Safety Data Sheet

Oil mist, mineral | ACGIH | TWA (Inhalable fraction.) | 5 mg/m³

Biological Exposure Index (BEI)
No biological limit allocated.

**PNEC related information**: Data not available

**Monitoring Methods**: Monitoring of the concentration of substances in the breathing zone of workers or in the general workplace may be required to confirm compliance with an OEL and adequacy of exposure controls. For some substances biological monitoring may also be appropriate. Validated exposure measurement methods should be applied by a competent person and samples analysed by an accredited laboratory. Examples of sources of recommended exposure measurement methods are given below or contact the supplier. Further national methods may be available.

- Occupational Safety and Health Administration (OSHA), USA: Sampling and Analytical Methods http://www.osha.gov/
- Institut für Arbeitsschutz Deutschen Gesetzlichen Unfallversicherung (IFA), Germany. http://www.dguv.de/inhalt/index.jsp
- L'Institut National de Recherche et de Sécurité, (INRS), France http://www.inrs.fr/accueil

**8.2 Exposure Controls**

**General Information**: The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Select controls
based on a risk assessment of local circumstances. Appropriate measures include: Adequate ventilation to control airborne concentrations. Where material is heated, sprayed or mist formed, there is greater potential for airborne concentrations to be generated.

Define procedures for safe handling and maintenance of controls. Educate and train workers in the hazards and control measures relevant to normal activities associated with this product. Ensure appropriate selection, testing and maintenance of equipment used to control exposure, e.g. personal protective equipment, local exhaust ventilation. Drain down system prior to equipment break-in or maintenance. Retain drain downs in sealed storage pending disposal or for subsequent recycle. Always observe good personal hygiene measures, such as washing hands after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Discard contaminated clothing and footwear that cannot be cleaned. Practice good housekeeping.

Occupational Exposure Controls

Personal Protective Equipment: The provided information is made in consideration of the PPE directive (Council Directive 89/686/EEC) and the CEN European Committee for Standardisation (CEN) standards. Personal protective equipment (PPE) should meet recommended national standards. Check with PPE suppliers.

Eye Protection: Wear safety glasses or full face shield if splashes are likely to occur. Approved to EU Standard EN166.

Hand Protection: Where hand contact with the product may occur the use of gloves approved to relevant standards (e.g. Europe: EN374, US: F739) made from the following materials may provide suitable chemical protection: PVC, neoprene or nitrile rubber gloves. Suitability and durability of a glove is dependent on usage, e.g. frequency and duration of contact, chemical resistance of glove material, dexterity. Always seek advice from glove suppliers. Contaminated gloves should be replaced. Personal hygiene is a key element of effective hand care. Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturizer is recommended. For continuous contact we recommend gloves with breakthrough time of more than 240 minutes with preference...
for > 480 minutes where suitable gloves can be identified. For short-term/splash protection we recommend the same, but recognise that suitable gloves offering this level of protection may not be available and in this case a lower breakthrough time may be acceptable so long as appropriate maintenance and replacement regimes are followed. Glove thickness is not a good predictor of glove resistance to a chemical as it is dependent on the exact composition of the glove material.

Body protection: Skin protection not ordinarily required beyond standard issue work clothes.

Respiratory Protection: No respiratory protection is ordinarily required under normal conditions of use. In accordance with good industrial hygiene practices, precautions should be taken to avoid breathing of material. If engineering controls do not maintain airborne concentrations to a level which is adequate to protect worker health, select respiratory protection equipment suitable for the specific conditions of use and meeting relevant legislation. Check with respiratory protective equipment suppliers. Where air-filtering respirators are suitable, select an appropriate combination of mask and filter. Select a filter suitable for combined particulate/organic gases and vapours [boiling point >65 °C (149 °F)] meeting EN14387.

Thermal Hazards: Not applicable.

Environmental Exposure Controls
Environmental exposure control measures: Minimise release to the environment. An environmental assessment must be made to ensure compliance with local environmental legislation. Information on accidental release measures are to be found in section 6.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>Brown. Liquid at room temperature.</td>
</tr>
<tr>
<td>Odour</td>
<td>Slight hydrocarbon.</td>
</tr>
<tr>
<td>Odour threshold</td>
<td>Data not available</td>
</tr>
<tr>
<td>pH</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>Initial Boiling Point and</td>
<td>&gt; 280 °C / 536 °F estimated value(s)</td>
</tr>
<tr>
<td>Boiling Range</td>
<td></td>
</tr>
<tr>
<td>Pour point</td>
<td>Typical -18 °C / 0 °F</td>
</tr>
<tr>
<td>Flash point</td>
<td>Typical 240 °C / 464 °F (COC)</td>
</tr>
<tr>
<td>Upper / lower Flammability or</td>
<td>Typical 1 - 10 % (V) (based on mineral oil)</td>
</tr>
</tbody>
</table>
Safety Data Sheet

Auto-ignition temperature : > 320 °C / 608 °F
Vapour pressure : < 0.5 Pa at 20 °C / 68 °F (estimated value(s))
Relative Density : Typical 0.899 at 15 °C / 59 °F
Density : Typical 899 kg/m3 at 15 °C / 59 °F
Water solubility : Negligible.
Solubility in other solvents : Data not available

n-octanol/water partition coefficient (log Pow) : > 6 (based on information on similar products)
Dynamic viscosity : Data not available
Kinematic viscosity : Typical 220 mm²/s at 40 °C / 104 °F
Vapour density (air=1) : > 1 (estimated value(s))
Evaporation rate (nBuAc=1) : Data not available
Decomposition : Data not available
Temperature : Data not available
Flammability : Data not available
Oxidizing Properties : Data not available
Explosive Properties : Not classified

9.2 Other Information
Electrical conductivity : This material is not expected to be a static accumulator.
Other Information : not a VOC
Volatile organic compound : 0 %

SECTION 10. STABILITY AND REACTIVITY

10.1 Reactivity : The product does not pose any further reactivity hazards in addition to those listed in the following sub-paragraph.
10.2 Chemical stability : No hazardous reaction is expected when handled and stored according to provisions.
10.3 Possibility of Hazardous Reactions : Reacts with strong oxidising agents.
10.4 Conditions to Avoid : Extremes of temperature and direct sunlight.
10.5 Incompatible Materials : Strong oxidising agents.
10.6 Hazardous Decomposition Products : Hazardous decomposition products are not expected to form during normal storage.

SECTION 11. TOXICOLOGICAL INFORMATION

9/17
11.1 Information on Toxicological effects

Basis for Assessment: Information given is based on data on the components and the toxicology of similar products. Unless indicated otherwise, the data presented is representative of the product as a whole, rather than for individual component(s).

Likely Routes of Exposure: Skin and eye contact are the primary routes of exposure although exposure may occur following accidental ingestion.

Acute Oral Toxicity: Expected to be of low toxicity: LD50 > 5000 mg/kg, Rat

Acute Dermal Toxicity: Expected to be of low toxicity: LD50 > 5000 mg/kg, Rabbit

Acute Inhalation Toxicity: Not considered to be an inhalation hazard under normal conditions of use.

Skin corrosion/irritation: Expected to be slightly irritating.

Serious eye damage/irritation: Expected to be slightly irritating.

Respiratory irritation: Inhalation of vapours or mists may cause irritation.

Respiratory or skin sensitisation: For respiratory and skin sensitisation: Not expected to be a sensitiser.

Aspiration Hazard: Not considered an aspiration hazard.

Germ cell mutagenicity: Not considered a mutagenic hazard.

Carcinogenicity: Not expected to be a hazard.

Material: Carcinogenicity Classification

Highly refined mineral oil (IP346 <3%): ACGIH Group A4: Not classifiable as a human carcinogen.

Highly refined mineral oil (IP346 <3%): IARC 3: Not classifiable as to carcinogenicity to humans.

Highly refined mineral oil (IP346 <3%): GHS / CLP: No carcinogenicity classification

Reproductive and Developmental Toxicity: Not expected to be a hazard.

Summary on evaluation of the CMR properties

Carcinogenicity: This product does not meet the criteria for classification in categories 1A/1B.

Mutagenicity: This product does not meet the criteria for classification in categories 1A/1B.
Safety Data Sheet

**Reproductive Toxicity (fertility):** This product does not meet the criteria for classification in categories 1A/1B.

**Specific target organ toxicity - single exposure:** Not expected to be a hazard.

**Specific target organ toxicity - repeated exposure:** Not expected to be a hazard.

**Additional Information:** Used oils may contain harmful impurities that have accumulated during use. The concentration of such impurities will depend on use and they may present risks to health and the environment on disposal. ALL used oil should be handled with caution and skin contact avoided as far as possible. Classifications by other authorities under varying regulatory frameworks may exist.

**SECTION 12. ECOLOGICAL INFORMATION**

**Basis for Assessment:** Ecotoxicological data have not been determined specifically for this product. Information given is based on a knowledge of the components and the ecotoxicology of similar products. Unless indicated otherwise, the data presented is representative of the product as a whole, rather than for individual component(s).

**12.1 Toxicity**

**Acute Toxicity:** Poorly soluble mixture. May cause physical fouling of aquatic organisms. Expected to be practically non toxic: LL/EL/IL50 > 100 mg/l (to aquatic organisms) LL/EL50 expressed as the nominal amount of product required to prepare aqueous test extract. Mineral oil is not expected to cause any chronic effects to aquatic organisms at concentrations less than 1 mg/l.

**12.2 Persistence and degradability:** Expected to be not readily biodegradable. Major constituents are expected to be inherently biodegradable, but the product contains components that may persist in the environment.

**12.3 Bioaccumulative Potential:** Contains components with the potential to bioaccumulate.

**12.4 Mobility in Soil:** Liquid under most environmental conditions. If it enters soil, it will adsorb to soil particles and will not be mobile. Floats on water.

**12.5 Result of PBT and vPvB assessment:** This mixture does not contain any REACH registered substances that are assessed to be a PBT or a vPvB.
12.6 Other Adverse Effects: Product is a mixture of non-volatile components, which are not expected to be released to air in any significant quantities. Not expected to have ozone depletion potential, photochemical ozone creation potential or global warming potential.

SECTION 13. DISPOSAL CONSIDERATIONS

13.1 Waste Treatment Methods

Material Disposal: Recover or recycle if possible. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste classification and disposal methods in compliance with applicable regulations. Do not dispose into the environment, in drains or in water courses.

Container Disposal: Dispose in accordance with prevailing regulations, preferably to a recognised collector or contractor. The competence of the collector or contractor should be established beforehand.

Local Legislation: Disposal should be in accordance with applicable regional, national, and local laws and regulations.

EU Waste Disposal Code (EWC): 13 02 05 mineral-based non-chlorinated engine, gear and lubricating oils. Classification of waste is always the responsibility of the end user.

SECTION 14. TRANSPORT INFORMATION

Land transport (ADR/RID):

ADR
This product is not classified as dangerous for this mode of transport. Therefore 14.1 UN Number, 14.2 UN Proper Shipping name, 14.3 Transport hazard class(es), 14.4 Packing group, 14.5 Environmental hazards, 14.6 Special precautions for user do not apply.

RID
This product is not classified as dangerous for this mode of transport. Therefore 14.1 UN Number, 14.2 UN Proper Shipping name, 14.3 Transport hazard class(es), 14.4 Packing group, 14.5 Environmental hazards, 14.6 Special precautions for user do not apply.

Inland waterways transport (ADN):
This product is not classified as dangerous for this mode of transport. Therefore 14.1 UN Number, 14.2 UN Proper Shipping name, 14.3 Transport hazard class(es), 14.4 Packing group, 14.5 Environmental hazards, 14.6 Special precautions for user do not apply.
Safety Data Sheet

CDNI Inland Water Waste Agreement: NST 3411 Mineral Lubricating Oils

Sea transport (IMDG Code):
This product is not classified as dangerous for this mode of transport. Therefore 14.1 UN Number, 14.2 UN Proper Shipping name, 14.3 Transport hazard class(es), 14.4 Packing group, 14.5 Environmental hazards, 14.6 Special precautions for user do not apply.

Air transport (IATA):
This product is not classified as dangerous for this mode of transport. Therefore 14.1 UN Number, 14.2 UN Proper Shipping name, 14.3 Transport hazard class(es), 14.4 Packing group, 14.5 Environmental hazards, 14.6 Special precautions for user do not apply.

14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code
Pollution Category: Not applicable.
Ship Type: Not applicable.
Product Name: Not applicable.
Special Precaution: Not applicable.

Additional Information: MARPOL Annex 1 rules apply for bulk shipments by sea.

SECTION 15. REGULATORY INFORMATION

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

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

Other regulatory Information
Authorisations and/or restrictions on use: Product is not subject to Authorisation under REACh.

Recommended Restrictions on Use (Advice Against): This product must not be used in applications other than those recommended in Section 1, without first seeking the advice of the supplier.

Chemical Inventory Status

EINECS: All components listed or polymer exempt.
TSCA: All components listed.
Safety Data Sheet

National Legislation

Water Pollution Class : WGK 1 - low hazard to waters (appendix 4, VwVwS, preparations).

Other Information : Technische Anleitung Luft: Product not listed by name.
Observe section 5.2.5 in connection with section 5.4.9

15.2 Chemical Safety Assessment : No Chemical Safety Assessment has been carried out for this substance/mixture by the supplier.

SECTION 16. OTHER INFORMATION

R-phrase(s) Not classified.
R22 Harmful if swallowed.
R41 Risk of serious damage to eyes.
R43 May cause sensitisation by skin contact.
R51/53 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

CLP Hazard Statements
H226 Flammable liquid and vapour.
H302 Harmful if swallowed.
H317 May cause an allergic skin reaction.
H318 Causes serious eye damage.
H411 Toxic to aquatic life with long lasting effects.

Additional Information : No Exposure Scenario annex is attached to this safety data sheet. It is a non-classified mixture containing hazardous substances as detailed in Section 3; relevant information from Exposure Scenarios for the hazardous substances contained have been integrated into the core sections 1-16 of this SDS.

Other Information

Abbreviations and Acronyms : Acute Tox. = Acute toxicity
Asp. Tox. = Aspiration hazard
Aquatic Acute = Acute hazards to the aquatic environment
Aquatic Chronic = Hazardous to the aquatic environment - Long-term Hazard
Eye Dam. = Serious eye damage/eye irritation
Flam. Liq. = Flammable liquids
Safety Data Sheet

Skin Corr. = Skin corrosion/irritation
Skin Sens. = Skin sensitizer
STOT SE = Specific target organ toxicity - single exposure
STOT RE = Specific target organ toxicity - repeated exposure

The standard abbreviations and acronyms used in this document can be looked up in reference literature (e.g. scientific dictionaries) and/or websites.

ADN = European Agreement concerning the international carriage of dangerous goods by inland waterways (ADN)
DFG = Federal Institute of Hydrology
EG = European Community
EN = European Norm
IBC = Intermediate Bulk Container
ISO = International Standards Organisation
MAK = Maximum workplace concentration
OECD = Organisation for economic cooperation and development
OEL = Occupational Exposure Limits
PSA = Personal protective equipment
TRGS = Technical rules for hazardous substances
VO = Regulation
VOC = Volatile Organic Compounds
VwVwS = Water administrative pollutants
WGK = Water Hazard Class

ACGIH = American Conference of Governmental Industrial Hygienists
ADR = European Agreement concerning the International Carriage of Dangerous Goods by Road
AICS = Australian Inventory of Chemical Substances
ASTM = American Society for Testing and Materials
BEL = Biological exposure limits
BTEX = Benzene, Toluene, Ethylbenzene, Xylenes
CAS = Chemical Abstracts Service
CEFIC = European Chemical Industry Council
CLP = Classification Packaging and Labelling
COC = Cleveland Open-Cup
DIN = Deutsches Institut für Normung
DMEL = Derived Minimal Effect Level
DNEL = Derived No Effect Level
DSL = Canada Domestic Substance List
EC = European Commission
Safety Data Sheet

EC50 = Effective Concentration fifty
ECETOC = European Center on Ecotoxicology and Toxicology Of Chemicals
ECHA = European Chemicals Agency
EINECS = The European Inventory of Existing Commercial Chemical Substances
EL50 = Effective Loading fifty
ENCS = Japanese Existing and New Chemical Substances Inventory
EWC = European Waste Code
GHS = Globally Harmonised System of Classification and Labelling of Chemicals
IARC = International Agency for Research on Cancer
IATA = International Air Transport Association
IC50 = Inhibitory Concentration fifty
IL50 = Inhibitory Level fifty
IMDG = International Maritime Dangerous Goods
INV = Chinese Chemicals Inventory
IP346 = Institute of Petroleum test method N° 346 for the determination of polycyclic aromatics DMSO-extractables
KECI = Korea Existing Chemicals Inventory
LC50 = Lethal Concentration fifty
LD50 = Lethal Dose fifty per cent.
LL/EL/IL = Lethal Loading/Effective Loading/Inhibitory loading
LL50 = Lethal Loading fifty
MARPOL = International Convention for the Prevention of Pollution From Ships
NOEC/NOEL = No Observed Effect Concentration / No Observed Effect Level
OE_HPV = Occupational Exposure - High Production Volume
PBT = Persistent, Bioaccumulative and Toxic
PICCS = Philippine Inventory of Chemicals and Chemical Substances
PNEC = Predicted No Effect Concentration
REACH = Registration Evaluation And Authorisation Of Chemicals
RID = Regulations Relating to International Carriage of Dangerous Goods by Rail
SKIN_DES = Skin Designation
STEL = Short term exposure limit
TRA = Targeted Risk Assessment
TSCA = US Toxic Substances Control Act
TWA = Time-Weighted Average
vPvB = very Persistent and very Bioaccumulative
**Safety Data Sheet**

<table>
<thead>
<tr>
<th>SDS Distribution</th>
<th>The information in this document should be made available to all who may handle the product.</th>
</tr>
</thead>
<tbody>
<tr>
<td>SDS Version Number</td>
<td>2.0</td>
</tr>
<tr>
<td>SDS Effective Date</td>
<td>04.12.2012</td>
</tr>
<tr>
<td>SDS Revisions</td>
<td>A vertical bar (</td>
</tr>
<tr>
<td>SDS Regulation</td>
<td>Regulation 1907/2006/EC as amended by Regulation (EU) 453/2010</td>
</tr>
<tr>
<td>Disclaimer</td>
<td>This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.</td>
</tr>
</tbody>
</table>
SECTION 1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1 Product Identifier

Material Name : Shell Omala S4 GX 220  
Product Code : 001D7851

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

Product Use : Gear lubricant.
Uses Advised Against : This product must not be used in applications other than those recommended in Section 1, without first seeking the advice of the supplier.

1.3 Details of the Supplier of the safety data sheet

Manufacturer/Supplier : Shell Deutschland Oil GmbH  
Suhrenkamp 71-77  
D-22335 Hamburg
Telephone : (+49) 40 6324-6255  
Fax : (+49) 40 6321-051  
Email Contact for Safety Data Sheet : If you have any enquiries about the content of this SDS please email lubricantSDS@shell.com

1.4 Emergency Telephone Number

: (+49) 30 3068 6790 (Giftnotruf Berlin)

SECTION 2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

1999/45/EC

Hazard Characteristics | R-phrase(s)
--- | ---
Not classified as dangerous under EC criteria. | 

Sensitiser not sufficient to classify : Contains alkylamine. May produce an allergic reaction.

2.2 Label Elements
Safety Data Sheet

Labeling according to Directive 1999/45/EC

EC Symbols : No Hazard Symbol required

EC Classification : Not classified as dangerous under EC criteria.
EC Risk Phrases : Not classified.
EC Safety Phrases : Not classified.

2.3 Other Hazards

Health Hazards : Not expected to be a health hazard when used under normal conditions. Prolonged or repeated skin contact without proper cleaning can clog the pores of the skin resulting in disorders such as oil acne/folliculitis. Used oil may contain harmful impurities.

Safety Hazards : Not classified as flammable but will burn.

Environmental Hazards : Not classified as dangerous for the environment.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substance

Material Name : Not applicable.

3.2 Mixtures

Mixture Description : Blend of polyolefins and additives.

Hazardous Components

Classification of components according to Regulation (EC) No 1272/2008

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS No.</th>
<th>EC Number</th>
<th>REACH Registration No.</th>
<th>Conc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long-chain alkyl amine</td>
<td>Not available</td>
<td>Not available</td>
<td>Not available / Not applicable.</td>
<td>0,10 - 0,24%</td>
</tr>
</tbody>
</table>
Safety Data Sheet

### Chemical Name Hazard Class & Category Hazard Statement

| Long-chain alkyl amine | Acute Tox., 4; Acute Tox., 3; Acute Tox., 3; Skin Corr., 1B; Skin Sens., 1; STOT RE, 2; Aquatic Chronic, 1; | H302; H331; H311; H314; H317; H373; H410; |

### Classification of components according to 67/548/EEC

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS No.</th>
<th>EC Number</th>
<th>REACH Registration No.</th>
<th>Symbol(s)</th>
<th>R-phrase(s)</th>
<th>Conc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long-chain alkyl amine</td>
<td>Not available</td>
<td>Not available</td>
<td>Not available / Not applicable.</td>
<td>T, C, N</td>
<td>R22; R23/24; R34; R43; R48/20; R50/53</td>
<td>0,10 - 0,24%</td>
</tr>
</tbody>
</table>

### Additional Information

Refer to Ch 16 for full text of R- and H- phrases.

This mixture does not contain any REACH registered substances that are assessed to be a PBT or a vPvB.

### SECTION 4. FIRST AID MEASURES

#### 4.1 Description of First Aid Measures

**General Information**

Not expected to be a health hazard when used under normal conditions.

**Inhalation**

No treatment necessary under normal conditions of use. If symptoms persist, obtain medical advice.

**Skin Contact**

Remove contaminated clothing. Flush exposed area with water and follow by washing with soap if available. If persistent irritation occurs, obtain medical attention.

**Eye Contact**

Flush eye with copious quantities of water. If persistent irritation occurs, obtain medical attention.

**Ingestion**

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

**Self-protection of the first aider**

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

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

Oil acne/folliculitis signs and symptoms may include formation of black pustules and spots on the skin of exposed areas. Ingestion may result in nausea, vomiting and/or diarrhoea.

**4.3 Indication of any immediate medical attention and special**

Notes to doctor/physician:

Treat symptomatically.
SECTION 5. FIRE FIGHTING MEASURES

Clear fire area of all non-emergency personnel.

5.1 Extinguishing Media: Foam, water spray or fog. Dry chemical powder, carbon dioxide, sand or earth may be used for small fires only.

Unsuitable Extinguishing Media: Do not use water in a jet.

5.2 Special hazards arising from the substance or mixture: Hazardous combustion products may include: A complex mixture of airborne solid and liquid particulates and gases (smoke). Carbon monoxide. Unidentified organic and inorganic compounds.

5.3 Advice for firefighters: Proper protective equipment including chemical resistant gloves are to be worn; chemical resistant suit is indicated if large contact with spilled product is expected. Self-Contained Breathing Apparatus must be worn when approaching a fire in a confined space. Select fire fighter's clothing approved to relevant Standards (e.g. Europe: EN469).

SECTION 6. ACCIDENTAL RELEASE MEASURES

Avoid contact with spilled or released material. For guidance on selection of personal protective equipment see Chapter 8 of this Material Safety Data Sheet. Observe the relevant local and international regulations.

6.1 Personal Precautions, Protective Equipment and Emergency Procedures

6.1.1 For non emergency personnel: Avoid contact with skin and eyes.

6.1.2 For emergency responders: Avoid contact with skin and eyes.

6.2 Environmental Precautions: Use appropriate containment to avoid environmental contamination. Prevent from spreading or entering drains, ditches or rivers by using sand, earth, or other appropriate barriers.

6.3 Methods and Material for Containment and Cleaning Up

Slippery when spilt. Avoid accidents, clean up immediately. Prevent from spreading by making a barrier with sand, earth or other containment material. Reclaim liquid directly or in an absorbent. Soak up residue with an absorbent such as clay, sand or other suitable material and dispose of properly.

Additional Advice: Local authorities should be advised if significant spillages cannot be contained.

6.4 Reference to other: For guidance on selection of personal protective equipment
Safety Data Sheet

sections

see Chapter 8 of this Material Safety Data Sheet. For guidance on disposal of spilled material see Chapter 13 of this Material Safety Data Sheet.

SECTION 7. HANDLING AND STORAGE

General Precautions

Use local exhaust ventilation if there is risk of inhalation of vapours, mists or aerosols. Use the information in this data sheet as input to a risk assessment of local circumstances to help determine appropriate controls for safe handling, storage and disposal of this material.

7.1 Precautions for Safe Handling

Avoid prolonged or repeated contact with skin. Avoid inhaling vapour and/or mists. When handling product in drums, safety footwear should be worn and proper handling equipment should be used. Properly dispose of any contaminated rags or cleaning materials in order to prevent fires. Keep container tightly closed and in a cool, well-ventilated place. Use properly labelled and closeable containers.

7.2 Conditions for safe storage, including any incompatibilities

Store at ambient temperature. Refer to section 15 for any additional specific legislation covering the packaging and storage of this product.

Recommended Materials

For containers or container linings, use mild steel or high density polyethylene.

Unsuitable Materials

PVC.

7.3 Specific end use(s)

Not applicable

Additional Information

Polyethylene containers should not be exposed to high temperatures because of possible risk of distortion.

Storage class according to TRGS 510: 10

Fire hazard classification: B

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

If the American Conference of Governmental Industrial Hygienists (ACGIH) value is provided on this document, it is provided for information only.

8.1 Control Parameters

Occupational Exposure Limits

Biological Exposure Index (BEI)

<table>
<thead>
<tr>
<th>Biological Exposure Index (BEI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5/17</td>
</tr>
</tbody>
</table>

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MSDS_DE
Safety Data Sheet

No biological limit allocated.

**PNEC related information**: Data not available

**Monitoring Methods**: Monitoring of the concentration of substances in the breathing zone of workers or in the general workplace may be required to confirm compliance with an OEL and adequacy of exposure controls. For some substances biological monitoring may also be appropriate. Validated exposure measurement methods should be applied by a competent person and samples analysed by an accredited laboratory. Examples of sources of recommended exposure measurement methods are given below or contact the supplier. Further national methods may be available.

- Institut für Arbeitsschutz Deutschen Gesetzlichen Unfallversicherung (IFA), Germany. [http://www.dguv.de/inhalt/index.jsp](http://www.dguv.de/inhalt/index.jsp)

**8.2 Exposure Controls General Information**: The level of protection and types of controls necessary will vary depending upon potential exposure conditions. Select controls based on a risk assessment of local circumstances. Appropriate measures include: Adequate ventilation to control airborne concentrations. Where material is heated, sprayed or mist formed, there is greater potential for airborne concentrations to be generated.

Define procedures for safe handling and maintenance of
controls. Educate and train workers in the hazards and control measures relevant to normal activities associated with this product. Ensure appropriate selection, testing and maintenance of equipment used to control exposure, e.g. personal protective equipment, local exhaust ventilation. Drain down system prior to equipment break-in or maintenance. Retain drain downs in sealed storage pending disposal or for subsequent recycle. Always observe good personal hygiene measures, such as washing hands after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Discard contaminated clothing and footwear that cannot be cleaned. Practice good housekeeping.

### Occupational Exposure Controls

**Personal Protective Equipment**: The provided information is made in consideration of the PPE directive (Council Directive 89/686/EEC) and the CEN European Committee for Standardisation (CEN) standards. Personal protective equipment (PPE) should meet recommended national standards. Check with PPE suppliers.

**Eye Protection**: Wear safety glasses or full face shield if splashes are likely to occur. Approved to EU Standard EN166.

**Hand Protection**: Where hand contact with the product may occur the use of gloves approved to relevant standards (e.g. Europe: EN374, US: F739) made from the following materials may provide suitable chemical protection: PVC, neoprene or nitrile rubber gloves. Suitability and durability of a glove is dependent on usage, e.g. frequency and duration of contact, chemical resistance of glove material, dexterity. Always seek advice from glove suppliers. Contaminated gloves should be replaced. Personal hygiene is a key element of effective hand care. Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturizer is recommended.

For continuous contact we recommend gloves with breakthrough time of more than 240 minutes with preference for > 480 minutes where suitable gloves can be identified. For short-term/splash protection we recommend the same, but recognise that suitable gloves offering this level of protection may not be available and in this case a lower breakthrough time may be acceptable so long as appropriate maintenance and replacement regimes are followed. Glove thickness is not a good predictor of glove resistance to a chemical as it is
Safety Data Sheet

Body protection: Skin protection not ordinarily required beyond standard issue work clothes.

Respiratory Protection: No respiratory protection is ordinarily required under normal conditions of use. In accordance with good industrial hygiene practices, precautions should be taken to avoid breathing of material. If engineering controls do not maintain airborne concentrations to a level which is adequate to protect worker health, select respiratory protection equipment suitable for the specific conditions of use and meeting relevant legislation. Check with respiratory protective equipment suppliers. Where air-filtering respirators are suitable, select an appropriate combination of mask and filter. Select a filter suitable for combined particulate/organic gases and vapours [boiling point >65 °C (149 °F)] meeting EN14387.

Thermal Hazards: Not applicable.

Environmental Exposure Controls
Environmental exposure control measures: Minimise release to the environment. An environmental assessment must be made to ensure compliance with local environmental legislation. Information on accidental release measures are to be found in section 6.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Appearance: Amber. Liquid at room temperature.
Odour: Slight hydrocarbon.
Odour threshold: Data not available
pH: Not applicable.
Initial Boiling Point and Boiling Range: > 280 °C / 536 °F estimated value(s)
Pour point: Typical -45 °C / -49 °F
Flash point: Typical 250 °C / 482 °F (COC)
Upper / lower Flammability or Explosion limits: Typical 1 - 10 %(V)
Auto-ignition temperature: > 320 °C / 608 °F
Vapour pressure: < 0,5 Pa at 20 °C / 68 °F (estimated value(s))
Relative Density: Typical 0,881 at 15 °C / 59 °F
Density: Typical 881 kg/m3 at 15 °C / 59 °F
Water solubility: Negligible.
Solubility in other solvents: Data not available
Safety Data Sheet

n-octanol/water partition coefficient (log Pow) : > 6 (based on information on similar products)
Dynamic viscosity : Data not available
Kinematic viscosity : Typical 229.4 mm²/s at 40 °C / 104 °F
Vapour density (air=1) : > 1 (estimated value(s))
Evaporation rate (nBuAc=1) : Data not available
Decomposition : Data not available
Temperature Flammability : Data not available
Oxidizing Properties : Data not available
Explosive Properties : Not classified

9.2 Other Information
Electrical conductivity : This material is not expected to be a static accumulator.
Other Information : not a VOC
Volatile organic compound : 0 %

SECTION 10. STABILITY AND REACTIVITY

10.1 Reactivity : The product does not pose any further reactivity hazards in addition to those listed in the following sub-paragraph.
10.2 Chemical stability : No hazardous reaction is expected when handled and stored according to provisions.
10.3 Possibility of Hazardous Reactions Reacts with strong oxidising agents.
10.4 Conditions to Avoid : Extremes of temperature and direct sunlight.
10.5 Incompatible Materials : Strong oxidising agents.
10.6 Hazardous Decomposition Products : Hazardous decomposition products are not expected to form during normal storage.

SECTION 11. TOXICOLOGICAL INFORMATION

11.1 Information on Toxicological effects
Basis for Assessment : Information given is based on data on the components and the toxicology of similar products. Unless indicated otherwise, the data presented is representative of the product as a whole, rather than for individual component(s).
Safety Data Sheet

Likely Routes of Exposure: Skin and eye contact are the primary routes of exposure although exposure may occur following accidental ingestion.

Acute Oral Toxicity: Expected to be of low toxicity: LD50 > 5000 mg/kg, Rat

Acute Dermal Toxicity: Expected to be of low toxicity: LD50 > 5000 mg/kg, Rabbit

Acute Inhalation Toxicity: Not considered to be an inhalation hazard under normal conditions of use.

Skin corrosion/irritation: Expected to be slightly irritating. Prolonged or repeated skin contact without proper cleaning can clog the pores of the skin resulting in disorders such as oil acne/folliculitis.

Serious eye damage/irritation: Expected to be slightly irritating.

Respiratory Irritation: Inhalation of vapours or mists may cause irritation.

Respiratory or skin sensitisation: For respiratory and skin sensitisation: Not expected to be a sensitiser.

Aspiration Hazard: Not considered an aspiration hazard.

Germ cell mutagenicity: Not considered a mutagenic hazard.

Carcinogenicity: Not expected to be carcinogenic.

Reproductive and Developmental Toxicity: Not expected to be a hazard.

Summary on evaluation of the CMR properties

Carcinogenicity: This product does not meet the criteria for classification in categories 1A/1B.

Mutagenicity: This product does not meet the criteria for classification in categories 1A/1B.

Reproductive Toxicity (fertility): This product does not meet the criteria for classification in categories 1A/1B.

Specific target organ toxicity - single exposure: Not expected to be a hazard.

Specific target organ toxicity - repeated exposure: Not expected to be a hazard.

Additional Information: Used oils may contain harmful impurities that have accumulated during use. The concentration of such impurities will depend on use and they may present risks to health and the environment on disposal. ALL used oil should be handled with caution and skin contact avoided as far as possible. Classifications by other authorities under varying regulatory frameworks may exist.
SECTION 12. ECOLOGICAL INFORMATION

Basis for Assessment: Ecotoxicological data have not been determined specifically for this product. Information given is based on a knowledge of the components and the ecotoxicology of similar products. Unless indicated otherwise, the data presented is representative of the product as a whole, rather than for individual component(s).

12.1 Toxicity
Acute Toxicity: Poorly soluble mixture. May cause physical fouling of aquatic organisms. Expected to be practically non toxic: LL/EL/IL50 > 100 mg/l (to aquatic organisms) LL/EL50 expressed as the nominal amount of product required to prepare aqueous test extract.

12.2 Persistence and degradability: Expected to be not readily biodegradable. Major constituents are expected to be inherently biodegradable, but the product contains components that may persist in the environment.

12.3 Bioaccumulative Potential: Contains components with the potential to bioaccumulate.

12.4 Mobility in Soil: Liquid under most environmental conditions. If it enters soil, it will adsorb to soil particles and will not be mobile. Floats on water.

12.5 Result of PBT and vPvB assessment: This mixture does not contain any REACH registered substances that are assessed to be a PBT or a vPvB.

12.6 Other Adverse Effects: Product is a mixture of non-volatile components, which are not expected to be released to air in any significant quantities. Not expected to have ozone depletion potential, photochemical ozone creation potential or global warming potential.

SECTION 13. DISPOSAL CONSIDERATIONS

13.1 Waste Treatment Methods

Material Disposal: Recover or recycle if possible. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste classification and disposal methods in compliance with
Safety Data Sheet

Container Disposal: Dispose in accordance with prevailing regulations, preferably to a recognised collector or contractor. The competence of the collector or contractor should be established beforehand.

Local Legislation: Disposal should be in accordance with applicable regional, national, and local laws and regulations. EU Waste Disposal Code (EWC): 13 02 06 synthetic engine, gear and lubricating oils. Classification of waste is always the responsibility of the end user.

SECTION 14. TRANSPORT INFORMATION

Land transport (ADR/RID):

ADR
This product is not classified as dangerous for this mode of transport. Therefore 14.1 UN Number, 14.2 UN Proper Shipping name, 14.3 Transport hazard class(es), 14.4 Packing group, 14.5 Environmental hazards, 14.6 Special precautions for user do not apply.

RID
This product is not classified as dangerous for this mode of transport. Therefore 14.1 UN Number, 14.2 UN Proper Shipping name, 14.3 Transport hazard class(es), 14.4 Packing group, 14.5 Environmental hazards, 14.6 Special precautions for user do not apply.

Inland waterways transport (ADN):
This product is not classified as dangerous for this mode of transport. Therefore 14.1 UN Number, 14.2 UN Proper Shipping name, 14.3 Transport hazard class(es), 14.4 Packing group, 14.5 Environmental hazards, 14.6 Special precautions for user do not apply.

CDNI Inland Water Waste : NST 3411 Mineral Lubricating Oils Agreement

Sea transport (IMDG Code):
This product is not classified as dangerous for this mode of transport. Therefore 14.1 UN Number, 14.2 UN Proper Shipping name, 14.3 Transport hazard class(es), 14.4 Packing group, 14.5 Environmental hazards, 14.6 Special precautions for user do not apply.

Air transport (IATA):
This product is not classified as dangerous for this mode of transport. Therefore 14.1 UN Number, 14.2 UN Proper Shipping name, 14.3 Transport hazard class(es), 14.4 Packing group, 14.5 Environmental hazards, 14.6 Special precautions for user do not apply.

14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code
Pollution Category : Not applicable.
Ship Type : Not applicable.
Shell Omala S4 GX 220  
Version 2.0  
Effective Date 04.12.2012  
Regulation 1907/2006/EC  

Safety Data Sheet  

Product Name : Not applicable.  
Special Precaution : Not applicable.  
Additional Information : MARPOL Annex 1 rules apply for bulk shipments by sea.  

SECTION 15. REGULATORY INFORMATION  

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

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

Other regulatory Information Authorisations and/or restrictions on use : Product is not subject to Authorisation under REACh.  
Recommended Restrictions on Use (Advice Against) : This product must not be used in applications other than those recommended in Section 1, without first seeking the advice of the supplier.  

Chemical Inventory Status  

EINECS : All components listed or polymer exempt.  
TSCA : All components listed.  

National Legislation  

Water Pollution Class : WGK 1 - low hazard to waters (appendix 4, VwVwS, preparations).  
Other Information : Technische Anleitung Luft: Product not listed by name. Observe section 5.2.5 in connection with section 5.4.9  

15.2 Chemical Safety Assessment : No Chemical Safety Assessment has been carried out for this substance/mixture by the supplier.  

SECTION 16. OTHER INFORMATION  

R-phrase(s)  

Print Date 26.12.2012  
000000019340  
MSDS_DE
Safety Data Sheet

Not classified.

R22  Harmful if swallowed.
R23/24  Toxic by inhalation and in contact with skin.
R34  Causes burns.
R43  May cause sensitisation by skin contact.
R48/20  Harmful: danger of serious damage to health by prolonged exposure through inhalation.
R50/53  Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

CLP Hazard Statements
H302  Harmful if swallowed.
H311  Toxic in contact with skin.
H314  Causes severe skin burns and eye damage.
H317  May cause an allergic skin reaction.
H331  Toxic if inhaled.
H373  May cause damage to organs or organ systems through prolonged or repeated exposure.
H410  Very toxic to aquatic life with long lasting effects.

Additional Information  : No Exposure Scenario annex is attached to this safety data sheet. It is a non-classified mixture containing hazardous substances as detailed in Section 3; relevant information from Exposure Scenarios for the hazardous substances contained have been integrated into the core sections 1-16 of this SDS.

Other Information

Abbreviations and Acronyms  :
Acute Tox. = Acute toxicity
Asp. Tox. = Aspiration hazard
Aquatic Acute = Acute hazards to the aquatic environment
Aquatic Chronic = Hazardous to the aquatic environment - Long-term Hazard
Eye Dam. = Serious eye damage/eye irritation
Flam. Liq. = Flammable liquids
Skin Corr. = Skin corrosion/irritation
Skin Sens. = Skin sensitizer
STOT SE = Specific target organ toxicity - single exposure
STOT RE = Specific target organ toxicity - repeated exposure

The standard abbreviations and acronyms used in this document can be looked up in reference literature (e.g. scientific dictionaries) and/or websites.
Safety Data Sheet

ADN = European Agreement concerning the international carriage of dangerous goods by inland waterways (ADN)
DFG = Federal Institute of Hydrology
EG = European Community
EN = European Norm
IBC = Intermediate Bulk Container
ISO = International Standards Organisation
MAK = Maximum workplace concentration
OECD = Organisation for economic cooperation and development
OEL = Occupational Exposure Limits
PSA = Personal protective equipment
TRGS = Technical rules for hazardous substances
VO = Regulation
VOC = Volatile Organic Compounds
VwVwS = Water administrative pollutants
WGK = Water Hazard Class

ACGIH = American Conference of Governmental Industrial Hygienists
ADR = European Agreement concerning the International Carriage of Dangerous Goods by Road
AICS = Australian Inventory of Chemical Substances
ASTM = American Society for Testing and Materials
BEL = Biological exposure limits
BTEX = Benzene, Toluene, Ethylbenzene, Xylenes
CAS = Chemical Abstracts Service
CEFIC = European Chemical Industry Council
CLP = Classification Packaging and Labelling
COC = Cleveland Open-Cup
DIN = Deutsches Institut fur Normung
DMEL = Derived Minimal Effect Level
DNEL = Derived No Effect Level
DSL = Canada Domestic Substance List
EC = European Commission
EC50 = Effective Concentration fifty
ETOC = European Center on Ecotoxicology and Toxicology Of Chemicals
ECHA = European Chemicals Agency
EINECS = The European Inventory of Existing Commercial Chemical Substances
EL50 = Effective Loading fifty
ENCS = Japanese Existing and New Chemical Substances Inventory
Safety Data Sheet

EWC = European Waste Code
GHS = Globally Harmonised System of Classification and Labelling of Chemicals
IARC = International Agency for Research on Cancer
IATA = International Air Transport Association
IC50 = Inhibitory Concentration fifty
IL50 = Inhibitory Level fifty
IMDG = International Maritime Dangerous Goods
INV = Chinese Chemicals Inventory
IP346 = Institute of Petroleum test method N° 346 for the determination of polycyclic aromatics DMSO-extractables
KECI = Korea Existing Chemicals Inventory
LC50 = Lethal Concentration fifty
LD50 = Lethal Dose fifty per cent.
LL/EL/IL = Lethal Loading/Effective Loading/Inhibitory loading
LL50 = Lethal Loading fifty
MARPOL = International Convention for the Prevention of Pollution From Ships
NOEC/NOEL = No Observed Effect Concentration / No Observed Effect Level
OE_HPV = Occupational Exposure - High Production Volume
PBT = Persistent, Bioaccumulative and Toxic
PICCS = Philippine Inventory of Chemicals and Chemical Substances
PNEC = Predicted No Effect Concentration
REACH = Registration Evaluation And Authorisation Of Chemicals
RID = Regulations Relating to International Carriage of Dangerous Goods by Rail
SKIN_DES = Skin Designation
STEL = Short term exposure limit
TRA = Targeted Risk Assessment
TSCA = US Toxic Substances Control Act
TWA = Time-Weighted Average
vPvB = very Persistent and very Bioaccumulative

SDS Distribution : The information in this document should be made available to all who may handle the product.
SDS Version Number : 2.0
SDS Effective Date : 04.12.2012
SDS Revisions : A vertical bar (|) in the left margin indicates an amendment from the previous version.
## SDS Regulation
Regulation 1907/2006/EC as amended by Regulation (EU) 453/2010

## Disclaimer
This information is based on our current knowledge and is intended to describe the product for the purposes of health, safety and environmental requirements only. It should not therefore be construed as guaranteeing any specific property of the product.
Safety Data Sheet
Shell Tellus Oil 32

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND COMPANY/UNDERTAKING

Product Code 001B0667
InfoSafe No. ACKQ4 AU/Eng/C
Issued Date 29/01/2004
Product Type/Use Hydraulic oil.

Other Names
Name Shell Tellus Oil 32
Code 140001010638

Supplier
Shell Company of Australia Ltd.
Level 2, 8 Redfern Road,
Hawthorn East, Victoria 3123
(ABN 46 004 610 459)
AUSTRALIA

Telephone Numbers
Emergency Tel.
1800 651 818
Telephone/Fax Number
Tel: 03 9666 5444 Fax: 03 8823 4800

2. COMPOSITION/INFORMATION ON INGREDIENTS

Preparation Description
Highly refined mineral oils and additives. The highly refined mineral oil contains <3% (w/w) DMSO-extract, according to IP346.

3. HAZARDS IDENTIFICATION

Hazards Identification
NON-HAZARDOUS SUBSTANCE.
NON-DANGEROUS GOODS.
Hazard classification according to the criteria of NOHSC.
Dangerous goods classification according to the Australia Dangerous Goods Code.

Human Health Hazards
No specific hazards under normal use conditions. Prolonged or repeated exposure may give rise to dermatitis. Used oil may contain harmful impurities.

Safety Hazards
Not classified as flammable, but will burn.

Environmental Hazards
Not classified as dangerous for the environment.
4. FIRST AID MEASURES

Symptoms and Effects
Not expected to give rise to an acute hazard under normal conditions of use.

Inhalation
In the unlikely event of dizziness or nausea, remove casualty to fresh air. If symptoms persist, obtain medical attention.

Skin
Remove contaminated clothing and wash affected skin with soap and water. If persistent irritation occurs, obtain medical attention. When using high pressure equipment, injection of product under the skin can occur. If high pressure injuries occur, the casualty should be sent immediately to a hospital. Do not wait for symptoms to develop.

Eye
Flush eye with copious quantities of water. If persistent irritation occurs, obtain medical attention.

Ingestion
Wash out mouth with water and obtain medical attention. Do not induce vomiting.

Advice to Doctor
Treat symptomatically. Aspiration into the lungs may result in chemical pneumonitis. Dermatitis may result from prolonged or repeated exposure. High pressure injection injuries require prompt surgical intervention and possibly steroid therapy, to minimise tissue damage and loss of function.

5. FIRE FIGHTING MEASURES

Specific Hazards
Combustion is likely to give rise to a complex mixture of airborne solid and liquid particulates and gases, including carbon monoxide, oxides of sulphur, and unidentified organic and inorganic compounds.

Extinguishing Media
Foam and dry chemical powder. Carbon dioxide, sand or earth may be used for small fires only.

Unsuitable Extinguishing Media
Water in jet. Use of halon extinguishers should be avoided for environmental reasons.

Protective Equipment
Proper protective equipment including breathing apparatus must be worn when approaching a fire in a confined space.

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions
Avoid contact with skin and eyes. Wear PVC, Neoprene or nitrile rubber gloves. Wear rubber knee length safety boots and PVC Jacket and Trousers. Wear safety glasses or full face shield if splashes are likely to occur.

Environmental Precautions
Prevent from spreading or entering into drains, ditches or rivers by using sand, earth, or other appropriate barriers. Inform local authorities if this cannot be prevented.

Clean-up Methods - Small Spillages
Absorb liquid with sand or earth. Sweep up and remove to a suitable, clearly marked container for disposal in accordance with local regulations.
**Clean-up Methods - Large Spillages**
Prevent from spreading by making a barrier with sand, earth or other containment material. Reclaim liquid directly or in an absorbent. Dispose of as for small spills.

**7. HANDLING AND STORAGE**

**Handling**
Use local exhaust ventilation if there is risk of inhalation of vapours, mists or aerosols. Avoid prolonged or repeated contact with skin. When handling product in drums, safety footwear should be worn and proper handling equipment should be used. Prevent spillages. Cloth, paper and other materials that are used to absorb spills present a fire hazard. Avoid their accumulation by disposing of them safely and immediately. In addition to any specific recommendations given for controls of risks to health, safety and the environment, an assessment of risks must be made to help determine controls appropriate to local circumstances.

**Storage**
Keep in a cool, dry, well-ventilated place. Use properly labelled and closeable containers. Avoid direct sunlight, heat sources, and strong oxidizing agents.

**Storage Temperatures**
0°C Minimum. 50°C Maximum.

**Recommended Materials**
For containers or container linings, use mild steel or high density polyethylene.

**Unsuitable Materials**
For containers or container linings, avoid PVC.

**Other Information**
Polyethylene containers should not be exposed to high temperatures because of possible risk of distortion.

**8. EXPOSURE CONTROLS, PERSONAL PROTECTION**

<table>
<thead>
<tr>
<th>Substance</th>
<th>Regulations</th>
<th>Exposure Duration</th>
<th>Exposure Limit</th>
<th>Units</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil mist, mineral</td>
<td>NOHSC:1003</td>
<td>TWA</td>
<td>5</td>
<td>mg/m³</td>
<td></td>
</tr>
<tr>
<td></td>
<td>NOHSC:1003</td>
<td>STEL</td>
<td>10</td>
<td>mg/m³</td>
<td></td>
</tr>
</tbody>
</table>


**Exposure Controls**
Use local exhaust ventilation if there is a risk of inhalation of vapours, mists or aerosols.

**Respiratory Protection**
Not normally required. If oil mist cannot be controlled, a respirator fitted with an organic vapour cartridge combined with a particulate pre-filter should be used.

**Hand Protection**
PVC or nitrile rubber gloves.

**Eye Protection**
Wear safety glasses or full face shield if splashes are likely to occur.

**Body Protection**
Minimise all forms of skin contact. Overalls and shoes with oil resistant soles should be worn. Launder overalls and undergarments regularly.
Environmental Exposure Controls
Minimise release to the environment. An environmental assessment must be made to ensure compliance with local environmental legislation.

9. PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colour</td>
<td>Light brown.</td>
</tr>
<tr>
<td>Physical State</td>
<td>Liquid at ambient temperature.</td>
</tr>
<tr>
<td>Odour</td>
<td>Characteristic mineral oil.</td>
</tr>
<tr>
<td>pH Value</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>Vapour Pressure</td>
<td>Expected to be less than 0.5 Pa at 20°C.</td>
</tr>
<tr>
<td>Initial Boiling Point</td>
<td>Expected to be above 280°C.</td>
</tr>
<tr>
<td>Solubility in Water</td>
<td>Negligible.</td>
</tr>
<tr>
<td>Density</td>
<td>875 kg/m3 at 15°C.</td>
</tr>
<tr>
<td>Flash Point</td>
<td>209°C (PMCC).</td>
</tr>
<tr>
<td>Flammable Limits - Upper</td>
<td>10%(V/V) (typical).</td>
</tr>
<tr>
<td>Flammable Limits - Lower</td>
<td>1%(V/V) (typical).</td>
</tr>
<tr>
<td>Auto-Ignition Temperature</td>
<td>Expected to be above 320°C.</td>
</tr>
<tr>
<td>Kinematic Viscosity</td>
<td>32 mm²/s at 40°C.</td>
</tr>
<tr>
<td>Vapour Density (Air=1)</td>
<td>Greater than 1.</td>
</tr>
<tr>
<td>Partition co-efficient, n-octanol/water</td>
<td>Log Pow expected to be greater than 6.</td>
</tr>
<tr>
<td>Pour Point</td>
<td>-30°C.</td>
</tr>
</tbody>
</table>

10. STABILITY AND REACTIVITY

Stability
Stable.

Conditions to Avoid
Extremes of temperature and direct sunlight.

Materials to Avoid
Strong oxidizing agents.

Hazardous Decomposition Products
Hazardous decomposition products are not expected to form during normal storage.

11. TOXICOLOGICAL INFORMATION

Basis for Assessment
Toxicological data have not been determined specifically for this product. Information given is based on knowledge of the components and the toxicology of similar products.

Acute Toxicity - Oral
LD50 expected to be > 2000 mg/kg.

Acute Toxicity - Dermal
LD50 expected to be > 2000 mg/kg.

Acute Toxicity - Inhalation
Not considered to be an inhalation hazard under normal conditions of use.

Eye Irritation
Expected to be slightly irritating.
Skin Irritation
Expected to be slightly irritating.

Respiratory Irritation
If mists are inhaled, slight irritation of the respiratory tract may occur.

Skin Sensitisation
Not expected to be a skin sensitizer.

Carcinogenicity
Product is based on mineral oils of types shown to be non-carcinogenic in animal skin-painting studies. Other components are not known to be associated with carcinogenic effects.

Mutagenicity
Not considered to be a mutagenic hazard.

Reproductive Toxicity
Not considered to be toxic to reproduction.

Other Information
Prolonged and/or repeated contact with this product can result in defatting of the skin, particularly at elevated temperatures. This can lead to irritation and possibly dermatitis, especially under conditions of poor personal hygiene. Skin contact should be minimised. High pressure injection of product into the skin may lead to local necrosis if the product is not surgically removed. Used oils may contain harmful impurities that have accumulated during use. The concentration of such impurities will depend on use and they may present risks to health and the environment on disposal. ALL used oil should be handled with caution and skin contact avoided as far as possible.

12. ECOLOGICAL INFORMATION

Basis for Assessment
Ecotoxicological data have not been determined specifically for this product. Information given is based on a knowledge of the components and the ecotoxicology of similar products.

Mobility
Liquid under most environmental conditions. Floats on water. If it enters soil, it will adsorb to soil particles and will not be mobile.

Persistence / Degradability
Not expected to be readily biodegradable. Major constituents are expected to be inherently biodegradable, but the product contains components that may persist in the environment.

Bioaccumulation
Contains components with the potential to bioaccumulate.

Ecotoxicity
Poorly soluble mixture. May cause physical fouling of aquatic organisms. Product is expected to be practically non-toxic to aquatic organisms, LL50 >100 mg/l. (LL50 expressed as the nominal amount of product required to prepare aqueous test extract). Mineral oil is not expected to cause any chronic effects to aquatic organisms at concentrations less than 1 mg/l.

Other Adverse Effects
Not expected to have ozone depletion potential, photochemical ozone creation potential or global warming potential.
Product is a mixture of non-volatile components, which are not expected to be released to air in any significant quantities.
13. DISPOSAL CONSIDERATIONS

Waste Disposal
Recycle or dispose of in accordance with prevailing regulations. By a recognised collector or contractor. The competence of the contractor to deal satisfactorily with this type of product should be established beforehand. Do not pollute the soil, water or environment with the waste product.

Product Disposal
As for waste disposal.

Container Disposal
Recycle or dispose of in accordance with the legislation in force with a recognised collector or contractor.

14. TRANSPORT INFORMATION

Transport Information
Not dangerous for transport under ADG, IMO and IATA/ICAO regulations.

ADG UN Class
None Allocated

ADG Packing Group
None Allocated

ADG Hazchem Code
None Allocated

IMDG Hazard Class
None Allocated

IMDG Packing Group
None Allocated

15. REGULATORY INFORMATION

| EC Symbols | None.                       |
| EC Risk Phrase | Not classified.             |
| EC Safety Phrase | Not classified.             |
| EINECS      | All components listed or polymer exempt. |

AICS (Australia)
All components listed.

National Legislation
National Code of Practice for the Preparation of Material Safety Data Sheets [NOHSC:2011]
List of Designated Hazardous Substances [NOHSC:10005].
Approved Criteria for Classifying Hazardous Substances [NOHSC:1008].
Adopted National Exposure Standards for Atmospheric Contaminants in the Occupational Environment [NOHSC:1003].
Australian Dangerous Goods Code.
Standard Uniform Scheduling of Drugs and Poisons.

Packaging & Labelling
Safety data sheet available for professional user on request.
16. OTHER INFORMATION

References
For detailed advice on Personal Protective equipment, refer to the following Australian Standards :-
AS/NZS 1337 Eye protectors for industrial applications.
AS/NZS 1715 Selection, use and maintenance of respiratory protective devices.
AS/NZS 1716 Respiratory protective devices.

Poisons Schedule
NS.

Restrictions
This product must not be used in applications other than recommended without first seeking the advice of the
SHELL technical department.

Technical Contact Numbers
(03) 9666 5444.

Further Information
This information is based on our current knowledge and is intended to describe the product for the purposes
of health, safety and environmental requirements only. It does not constitute a guarantee for any specific
property of the product.
... End Of SDS ...
1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Trade Name: BARITE
Chemical Family: Mixture
Product Use: Oil well drilling fluid additive.
Emergency Telephone (24 hr.): 281-561-1600

Supplied by: M-I L.L.C.
P.O. Box 42842
Houston, TX 77242
www.miswaco.com

Telephone Number: 281-561-1511
Contact Person: Catherine Miller, Product Safety Specialist

Revision Number: 3

HMIS Rating
Health: 1* Flammability: 0 Physical Hazard: 0 PPE: E

HMIS Key: 4=Severe, 3=Serious, 2=Moderate, 1=Slight, 0=Minimal Hazard. *Chronic effects - See Section 11. See Section 8 for Personal Protective Equipment recommendations.

2. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>CAS No.</th>
<th>Wt. %</th>
<th>Comments:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barite</td>
<td>7727-43-7</td>
<td>91 - 93</td>
<td>No comments.</td>
</tr>
<tr>
<td>Silica, crystalline, quartz</td>
<td>14808-60-7</td>
<td>1 - 11</td>
<td>No comments.</td>
</tr>
<tr>
<td>Mica</td>
<td>12001-26-2</td>
<td>1 - 5</td>
<td>No comments.</td>
</tr>
</tbody>
</table>

3. HAZARDS IDENTIFICATION

Emergency Overview: Caution! May cause eye, skin, and respiratory tract irritation. Long term inhalation of particulates may cause lung damage. Cancer hazard. Contains crystalline silica which may cause cancer.

Canadian Classification:
UN PIN No: Not regulated
WHMIS Class: D2A

Physical State: Powder Odor: Odorless Color: Tan to grey

Potential Health Effects:

Acute Effects

Eye Contact: May cause mechanical irritation
Skin Contact: May cause mechanical irritation.
Inhalation: May cause mechanical irritation.
Ingestion: May cause gastric distress, nausea and vomiting if ingested.

Carcinogenicity & Chronic Effects:

See Section 11 - Toxicological Information.
MATERIAL SAFETY DATA SHEET  
Trade Name: BARITE  
Revision Date: 09/02/2004  
Page 2/6

Routes of Exposure: Eyes. Dermal (skin) contact. Inhalation.  
Target Organs/Medical Conditions Aggravated by Overexposure: Eyes. Skin. Respiratory System.

4. FIRST AID MEASURES

Eye Contact: Promptly wash eyes with lots of water while lifting eye lids. Continue to rinse for at least 15 minutes. Get medical attention if any discomfort continues.

Skin Contact: Wash skin thoroughly with soap and water. Remove contaminated clothing and launder before reuse. Get medical attention if any discomfort continues.

Inhalation: Move person to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Ingestion: Dilute with 2 - 3 glasses of water or milk, if conscious. Never give anything by mouth to an unconscious person. If signs of irritation or toxicity occur seek medical attention.

General Notes: Persons seeking medical attention should carry a copy of this MSDS with them.

5. FIRE FIGHTING MEASURES

Flammable Properties

Flash Point: F (C): NA
Flammable Limits in Air - Lower (%): ND
Flammable Limits in Air - Upper (%): ND
Autoignition Temperature: F(C): ND
Flammability Class: NA
Other Flammable Properties: ND
Extinguishing Media: This material is not combustible. Use extinguishing media appropriate for surrounding fire.

Protection Of Fire-Fighters:

Special Fire-Fighting Procedures: Do not enter fire area without proper personal protective equipment, including NIOSH/MSHA approved self-contained breathing apparatus. Evacuate area and fight fire from a safe distance. Water spray may be used to keep fire-exposed containers cool. Keep water run off out of sewers and waterways.

Hazardous Combustion Products: Not determined.

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions: Use personal protective equipment identified in Section 8.

Spill Procedures: Evacuate surrounding area, if necessary. Contain spilled material. Avoid the generation of dust. Sweep, vacuum, or shovel and place into closable container for disposal.

Environmental Precautions: Do not allow to enter sewer or surface and subsurface waters. Waste must be disposed of in accordance with federal, state and local laws.

7. HANDLING AND STORAGE

Handling: Put on appropriate personal protective equipment. Avoid contact with skin and eyes. Avoid generating or breathing dust. Use only in a well ventilated area. Wash thoroughly after handling.

Storage: Store in dry, well-ventilated area. Keep container closed. Store away from incompatibles. Follow safe warehousing practices regarding palletizing, banding, shrink-wrapping and/or stacking.
### 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>CAS No.</th>
<th>Wt. %</th>
<th>ACGIH TLV</th>
<th>OSHA PEL</th>
<th>Other</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barite</td>
<td>7727-43-7</td>
<td>91 - 93</td>
<td>10 mg/m³</td>
<td>15 mg/m³ (total); 5 mg/m³ (resp)</td>
<td>NA</td>
<td>None</td>
</tr>
<tr>
<td>Silica, crystalline, quartz</td>
<td>14808-60-7</td>
<td>1 - 11</td>
<td>0.05 mg/m³</td>
<td>see Table Z-3</td>
<td>NIOSH: 0.05 mg/m³ TWA (10H day/40H wk) (R)</td>
<td></td>
</tr>
<tr>
<td>Mica</td>
<td>12001-26-2</td>
<td>1 - 5</td>
<td>3 mg/m³</td>
<td>see Table Z-3</td>
<td>NA</td>
<td>None</td>
</tr>
</tbody>
</table>

**Notes**

(R) Respirable fraction (ACGIH);

Table Z-3: PEL for Mineral Dusts containing crystalline silica are 10 mg/m³ / (%SiO₂+2) for quartz and 1/2 the calculated quartz value for cristobalite and tridymite.

**Engineering Controls:** Use appropriate engineering controls such as, exhaust ventilation and process enclosure, to ensure air contamination and keep workers exposure below the applicable limits.

**Personal Protection Equipment**

**Eye/Face Protection:** Dust resistant safety goggles.

**Skin Protection:** Wear appropriate clothing to prevent repeated or prolonged skin contact. Chemical resistant gloves recommended for prolonged or repeated contact. Use protective gloves made of: Neoprene. Nitrile.

**Respiratory Protection:** Use at least a NIOSH-approved N95 half-mask disposable or reusable particulate respirator (dusk mask).

In work environments containing oil mist/aerosol, use at least NIOSH-approved P95 half-mask disposable or reusable particulate respirator.

For exposure exceeding 10 x PEL use a NIOSH-approved N100 Particulate Respirator.

**General Hygiene Considerations:** Work clothes should be washed separately at the end of each work day. Disposable clothing should be discarded, if contaminated with product.

### 9. PHYSICAL AND CHEMICAL PROPERTIES

**Color:** Tan to grey

**Odor:** Odorless

**Physical State:** Powder

**pH:** ND

**Specific Gravity (H₂O = 1):** 4.20 - 4.25 at 68F (20C)

**Solubility (Water):** Insoluble

**Melting/Freezing Point:** 2876F (1580C)

**Boiling Point:** ND

**Vapor Pressure:** ND

**Vapor Density (Air=1):** ND

**Evaporation Rate:** ND

**Odor Threshold(s):** ND
10. STABILITY AND REACTIVITY

Chemical Stability: Stable
Conditions to Avoid: Keep away from heat, sparks and flame.
Materials to Avoid: Not determined.
Hazardous Decomposition Products: None known
Hazardous Polymerization: Will not occur

11. TOXICOLOGICAL INFORMATION

Component Toxicological Data: Any adverse component toxicological effects are listed below. If no effects are listed, no such data were found.

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Component Toxicological Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silica, crystalline, quartz</td>
<td>Crystalline silica is the most widely occurring of all minerals. The most common form of silica is sand. The International Agency for Research on Cancer (IARC) has designated crystalline silica in the form of quartz or cristobalite a Group 1 (carcinogenic to humans). This designation was based on an increased risk of lung cancer among crystalline silica exposed workers. IARC did note that carcinogenicity of crystalline silica in humans was not detected in all industrial circumstances studied. Further, carcinogenicity of crystalline silica may be dependent on inherent characteristics of the crystalline silica or external factors affecting its biological activity or distribution of polymorphs. (IARC Vol. 68, 1997, p. 41). The National Toxicology Program (NTP) classifies crystalline silica as &quot;reasonably anticipated to cause cancer in humans&quot; (6th Annual Report on Carcinogens, 1991). Long term inhalation of crystalline silica can also result in the lung disease, silicosis. Symptoms of this disease include coughing and shortness of breath. (NJ HSFS, January 1996)</td>
</tr>
<tr>
<td>Mica</td>
<td>Studies of workers with long term exposure to mica dust indicated a higher incidence of pneumoconiosis (&quot;dusty lung&quot; disease). Symptoms of pneumoconiosis may include chronic cough, dyspnea (shortness of breath) and fatigue. (HSDB)</td>
</tr>
</tbody>
</table>

Product Toxicological Information:
Long term inhalation of particulate can cause irritation, inflammation and/or permanent injury to the lungs. Illnesses such as pneumoconiosis ("dusty lung"), pulmonary fibrosis, chronic bronchitis, emphysema and bronchial asthma may develop.

12. ECOLOGICAL INFORMATION

Product Ecotoxicity Data: Contact M-I Environmental Affairs Department for available product ecotoxicity data.

Biodegradation: ND
Bioaccumulation: ND
Octanol/Water Partition Coefficient: ND

13. DISPOSAL CONSIDERATIONS

Waste Classification: ND
Waste Management: Under U.S. Environmental Protection Agency (EPA) Resource Conservation and Recovery Act (RCRA), it is the responsibility of the user to determine at the time of disposal, whether the product meets RCRA criteria for the hazardous waste. This is because product uses, transformations, mixtures, processes, etc., may render the resulting materials hazardous. Empty containers retain residues. All labeled precautions must be observed.
14. TRANSPORT INFORMATION

U.S. DOT Shipping Description: Not regulated for transportation by DOT, TDG, IMDG, ICAO/IATA.

Canada TDG Shipping Description: Not regulated.
UN PIN No: Not regulated

IMDG Shipping Description: Not regulated.

ICAO/IATA Shipping Description: Not regulated.

15. REGULATORY INFORMATION

U.S. Federal and State Regulations

SARA 311/312 Hazard Categories: Delayed (chronic) health hazard.

SARA 302/304, 313; CERCLA RQ, California Proposition 65: Note: If no components are listed below, this product is not subject to the referenced SARA and CERCLA regulations and is not known to contain a Proposition 65 listed chemical at a level that is expected to pose a significant risk under anticipated use conditions.

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>SARA 302 / TPQs</th>
<th>SARA 313</th>
<th>CERCLA RQ</th>
<th>CA 65 Cancer</th>
<th>CA 65 Dev. Tox.</th>
<th>CA 65 Repro. F</th>
<th>CA 65 Repro. M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silica, crystalline, quartz</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>X</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
</tbody>
</table>

International Chemical Inventories

Australia AICS - Components are listed or exempt from listing.
Canada DSL - Components are listed or exempt from listing.
China Inventory - Components are listed or exempt from listing.
European Union EINECS - Components are listed or exempt from listing.
Japan METI ENCS - Components are listed or exempt from listing.
Korea TCCL ECL - Components are listed or exempt from listing.
Philippine PICCS - Components are listed or exempt from listing.
U.S. TSCA - Components are listed or exempt from listing.
U.S. TSCA - No components are subject to TSCA 12(b) export notification requirements.

Canadian Classification:

Controlled Products Regulations Statement: This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

WHMIS Class: D2A

16. OTHER INFORMATION

The following sections have been revised: 1, 3, 5, 9, 10, 11, 12, 14, 15, 16

NA - Not Applicable, ND - Not Determined.
Disclaimer:
MSDS furnished independent of product sale. While every effort has been made to accurately describe this product, some of the data are obtained from sources beyond our direct supervision. We can not make any assertions as to its reliability or completeness; therefore, user may rely on it only at user’s risk. We have made no effort to censor or conceal deleterious aspects of this product. Since we cannot anticipate or control the conditions under which this information and product may be used, we make no guarantee that the precautions we have suggested will be adequate for all individuals and/or situations. It is the obligation of each user of this product to comply with the requirements of all applicable laws regarding use and disposal of this product. Additional information will be furnished upon request to assist the user; however, no warranty, either expressed or implied, nor liability of any nature with respect to this product or to the data herein is made or incurred hereunder.
SAFETY DATA SHEET
BENTONITE

1 IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND COMPANY/UNDERTAKING

PRODUCT NAME BENTONITE
APPLICATION Viscosifier.
SUPPLIER M-I Drilling Fluids UK Ltd, Pocra Quay, Footdee, Aberdeen, AB11 5DQ
T -44 (0)1224-584336
F -44 (0)1224-576119

EMERGENCY TELEPHONE +44(0)208 762 8322

2 COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Name</th>
<th>EC No.</th>
<th>CAS-No.</th>
<th>Content</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>BENTONITE</td>
<td>215-108-5</td>
<td>1302-78-9</td>
<td>80 - 95%</td>
<td>-</td>
</tr>
<tr>
<td>QUARTZ, CRYSTALLINE SILICA</td>
<td>238-878-4</td>
<td>14808-60-7</td>
<td>2 - 15%</td>
<td>Xn;R20.</td>
</tr>
</tbody>
</table>

The Full Text for all R-Phrases are Displayed in Section 16

COMPOSITION COMMENTS
This material is a naturally occurring mineral. The Data Shown is in accordance with the latest EC Directives. This product contains a small quantity of quartz, crystalline silica. Prolonged and repeated exposure to concentrations of crystalline silica exceeding the maximum exposure limit may lead to chronic lung disease such as silicosis.

3 HAZARDS IDENTIFICATION
Not regarded as a health or environmental hazard under current legislation.

HUMAN HEALTH
This product contains a small quantity of quartz. IARC Monographs, Vol.68, 1997, concludes that there is sufficient evidence that inhaled crystalline silica in the form of quartz or cristobalite from occupational sources causes cancer in humans. IARC classification Group 1.

4 FIRST-AID MEASURES

INHALATION
Move the exposed person to fresh air at once. Get medical attention if any discomfort continues.

INGESTION
First aid is not normally required. Rinse mouth thoroughly. Drink plenty of water.

SKIN CONTACT
Wash skin thoroughly with soap and water. Remove contaminated clothing. Get medical attention if any discomfort continues.

EYE CONTACT
Promptly wash eyes with plenty of water while lifting the eye lids. Continue to rinse for at least 15 minutes. Get medical attention if any discomfort continues.

5 FIRE-FIGHTING MEASURES

EXTINGUISHING MEDIA
The product is non-combustible. Use fire-extinguishing media appropriate for surrounding materials.

UNUSUAL FIRE & EXPLOSION HAZARDS
No unusual fire or explosion hazards noted.

PROTECTIVE MEASURES IN FIRE
Self contained breathing apparatus and full protective clothing must be worn in case of fire.

6 ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS
Wear protective clothing as described in Section 8 of this safety data sheet.

ENVIRONMENTAL PRECAUTIONS
Do not allow to enter drains, sewers or watercourses.
BENTONITE

SPILL CLEAN UP METHODS
Shovel into dry containers. Cover and move the containers. Flush the area with water. May be slippery when wet.

7 HANDLING AND STORAGE

USAGE PRECAUTIONS
Avoid handling which leads to dust formation. Provide good ventilation. Mechanical ventilation or local exhaust ventilation may be required.

STORAGE PRECAUTIONS
Store at moderate temperatures in dry, well ventilated area.

8 EXPOSURE CONTROLS/PERSONAL PROTECTION

<table>
<thead>
<tr>
<th>Name</th>
<th>Std</th>
<th>LT - ppm</th>
<th>LT - mg/m³</th>
<th>ST - ppm</th>
<th>ST - mg/m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>QUARTZ, CRYSTALLINE SILICA</td>
<td>WEL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BENTONITE</td>
<td></td>
<td></td>
<td>0.3 mg/m³ resp. dust</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4 mg/m³ resp. dust</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

INGREDIENT COMMENTS
WEL = Workplace Exposure Limits * OSHA PELs for Mineral Dusts containing crystalline silica are 10 mg/m³ / (%SiO₂+2) for quartz and 1/2 the calculated quartz value for cristobalite and tridymite. NUI = Nuisance Dust. WEL TWA 4mg/m³ respirable dust, 10mg/m³ total dust.

ENGINEERING MEASURES
Provide adequate general and local exhaust ventilation.

RESPIRATORY EQUIPMENT
Respiratory protection must be used if air contamination exceeds acceptable level. Dust filter P3 (for especially fine dust/powder).

HAND PROTECTION
No specific hand protection noted, but gloves may still be advisable. For prolonged or repeated skin contact use suitable protective gloves. Rubber or plastic.

EYE PROTECTION
Wear dust resistant safety goggles where there is danger of eye contact.

OTHER PROTECTION
Wear appropriate clothing to prevent repeated or prolonged skin contact. Provide eyewash station.

9 PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>APPEARANCE</th>
<th>Powder, dust</th>
</tr>
</thead>
<tbody>
<tr>
<td>COLOUR</td>
<td>Cream to Grey</td>
</tr>
<tr>
<td>ODOUR</td>
<td>Odourless</td>
</tr>
<tr>
<td>SOLUBILITY</td>
<td>Insoluble in water</td>
</tr>
<tr>
<td>RELATIVE DENSITY</td>
<td>2.3 - 2.6 20</td>
</tr>
<tr>
<td>pH-VALUE, CONC. SOLUTION</td>
<td>9 - 10</td>
</tr>
</tbody>
</table>

10 STABILITY AND REACTIVITY

STABILITY
Stable under normal temperature conditions.

CONDITIONS TO AVOID
Avoid wet and humid conditions.

MATERIALS TO AVOID
No incompatible materials noted.

HAZARDOUS DECOMPOSITION PRODUCTS
No specific hazardous decomposition products noted.

11 TOXICOLOGICAL INFORMATION

INHALATION
Dust may irritate respiratory system or lungs. Harmful: danger of serious damage to health by prolonged exposure through inhalation.

INGESTION
May cause discomfort if swallowed.
SKIN CONTACT
Powder may irritate skin.

EYE CONTACT
Particles in the eyes may cause irritation and smarting.

HEALTH WARNINGS
This product contains small quantities of quartz. Prolonged inhalation of high concentrations may damage respiratory system. Because of quantity and composition, the health hazard is small.

12 ECOLOGICAL INFORMATION

ECOTOXICITY
Not regarded as dangerous for the environment. Contact M-I Swaco's QHSE Department for ecological information.

13 DISPOSAL CONSIDERATIONS

DISPOSAL METHODS
Recover and reclaim or recycle, if practical. Dispose of waste and residues in accordance with local authority requirements.

14 TRANSPORT INFORMATION

GENERAL
The product is not covered by international regulation on the transport of dangerous goods (IMDG, IATA, ADR/RID).

15 REGULATORY INFORMATION

RISK PHRASES
NC Not classified.

SAFETY PHRASES
NC Not classified.

UK REGULATORY REFERENCES

EU DIRECTIVES

GUIDANCE NOTES
Workplace Exposure Limits EH40.

16 OTHER INFORMATION

GENERAL INFORMATION
HMIS Health - 1 HMIS Flammability - 1 HMIS Physical Hazard - 0 E - Safety glasses, Gloves, Dust Respirator

INFORMATION SOURCES

REVISION COMMENTS
The following sections have been revised: 5, 6, 7, 8, 13, 14, 15 and 16. Revised by Bill Cameron

ISSUED BY
Sam Hoskin

REVISION DATE 23-09-05

REV. NO./REPL. SDS GENERATED 2

SDS NO. 10609

RISK PHRASES IN FULL
R20 Harmful by inhalation.

DISCLAIMER
MSDS furnished independent of product sale. While every effort has been made to accurately describe this product, some of the data are obtained from sources beyond our direct supervision. We cannot make any assertions as to its reliability or completeness; therefore, user may rely only at user's risk. We have made no effort to censor or conceal deleterious aspects of this product. Since we cannot anticipate or control the conditions under which this information and product may be used, we make no guarantee that the precautions we have suggested will be adequate for all individuals and/or situations. It is the obligation of each user of this product to comply with the requirements of all applicable laws regarding use and disposal of this product. Additional information will be furnished upon request to assist the user; however, no warranty, either expressed or implied, nor liability of any nature with respect to this product or to the data herein is made or incurred hereunder.
SAFETY DATA SHEET
CAUSTIC SODA SOLID

1 IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND COMPANY/UNDERTAKING

PRODUCT NAME CAUSTIC SODA SOLID
SYNONYMS, TRADE NAMES SODIUM HYDROXIDE SOLID
APPLICATION pH modifier.
SUPPLIER M-I Drilling Fluids UK Ltd,
Pocra Quay,
Footdee,
Aberdeen. AB11 5DQ
T -44 (0)1224-584336
F -44 (0)1224-576119
EMERGENCY TELEPHONE +44(0)208 762 8322

2 COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Name</th>
<th>EC No.</th>
<th>CAS-No.</th>
<th>Content</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>SODIUM HYDROXIDE SOLID</td>
<td>215-185-5</td>
<td>1310-73-2</td>
<td>60-100%</td>
<td>C;R35</td>
</tr>
</tbody>
</table>

The Full Text for all R-Phrases are Displayed in Section 16

COMPOSITION COMMENTS
The Data Shown is in accordance with the latest EC Directives.

3 HAZARDS IDENTIFICATION

Causes severe burns.
CLASSIFICATION C;R35.

4 FIRST-AID MEASURES

INHALATION
Move the exposed person to fresh air at once. Perform artificial respiration if breathing has stopped. Keep the affected person warm and at rest. Get prompt medical attention.

INGESTION
DO NOT INDUCE VOMITING! Promptly get affected person to drink large volumes of water to dilute the swallowed chemical. Get medical attention immediately!

SKIN CONTACT
Remove contaminated clothing immediately and wash skin with soap and water. Get medical attention promptly if symptoms occur after washing.

EYE CONTACT
Important! Immediately rinse with water for at least 15 minutes. Hold eyelids apart. Get medical attention immediately. Continue to rinse.

5 FIRE-FIGHTING MEASURES

EXTINGUISHING MEDIA
DO NOT use water if avoidable. Use fire-extinguishing media appropriate for surrounding materials.

UNUSUAL FIRE & EXPLOSION HAZARDS
May develop highly toxic or corrosive fumes if heated.

PROTECTIVE MEASURES IN FIRE
Self contained breathing apparatus and full protective clothing must be worn in case of fire.

6 ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS
Wear protective clothing as described in Section 8 of this safety data sheet.

ENVIRONMENTAL PRECAUTIONS
Do not allow to enter drains, sewers or watercourses.

SPILL CLEAN UP METHODS
Shovel into dry containers. Cover and move the containers. Flush the area with water.
CAUSTIC SODA SOLID

7 HANDLING AND STORAGE

USAGE PRECAUTIONS
Do not use contact lenses. Provide good ventilation. Avoid spilling, skin and eye contact. Avoid spread of dust.

STORAGE PRECAUTIONS
Store in tightly closed original container in a cool, dry well-ventilated place. Empty containers retain residues. All labeled precautions must be observed.

8 EXPOSURE CONTROLS/PERSONAL PROTECTION

<table>
<thead>
<tr>
<th>Name</th>
<th>Std</th>
<th>LT - ppm</th>
<th>LT - mg/m³</th>
<th>ST - ppm</th>
<th>ST - mg/m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>SODIUM HYDROXIDE SOLID</td>
<td>WEL</td>
<td></td>
<td></td>
<td>2 mg/m³</td>
<td></td>
</tr>
</tbody>
</table>

INGREDIENT COMMENTS
WEL = Workplace Exposure Limits

PROTECTIVE EQUIPMENT

ENGINEERING MEASURES
Provide adequate general and local exhaust ventilation.

RESPIRATORY EQUIPMENT
No specific recommendation made, but respiratory protection must be used if the general level exceeds the Recommended Workplace Exposure Limit. Dust filter P2 (for fine dust).

HAND PROTECTION
Use protective gloves made of: Impermeable material. such as, Rubber, neoprene or PVC.

EYE PROTECTION
Contact lenses should not be worn when working with this chemical! Wear dust resistant safety goggles where there is danger of eye contact. Face shield for protection of facial skin is also recommended.

OTHER PROTECTION
Chemical resistant clothing or aprons must be worn to prevent any risk of skin contact. Provide eyewash station.

9 PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE
Pellets or Solid.

COLOUR
White

ODOUR
Odourless

MOL. WEIGHT
40.01

BOILING POINT (°C)
~139

RELATIVE DENSITY
2.13 @ 25°C

SOLUBILITY VALUE (g/100g H2O @ 20°C)
50.0

10 STABILITY AND REACTIVITY

STABILITY
Unstable. Hygroscopic. May generate heat and boil over when in contact with water.

CONDITIONS TO AVOID
Long storage & large quantities. and Water, moisture.

MATERIALS TO AVOID
Strong acids. Hydrocarbons - halogenated, and Flammable/combustible material. Aluminium, brass, tin and zinc are readily attacked by caustic soda. Can also react violently or explosively with many organic chemicals, particularly chlorinated hydrocarbons.

11 TOXICOLOGICAL INFORMATION

TOXIC DOSE 1 - LD 50
500 mg/kg (oral-rbt)

INHALATION
Severely irritating to the respiratory tract if inhaled. Higher exposures may cause pulmonary oedema.

INGESTION
May cause burns in mucous membranes, throat, oesophagus and stomach. Lethal dose for a man is approx. 5g.

SKIN CONTACT
Contact with concentrated chemical may cause severe skin damage.

EYE CONTACT
May cause chemical eye burns. Contact with concentrated chemical may very rapidly cause severe eye damage, possibly loss of sight.
CAUSTIC SODA SOLID

12 ECOLOGICAL INFORMATION

ECOTOXICITY
Contact M-I Swaco's QHSE Department for ecological information.

13 DISPOSAL CONSIDERATIONS

DISPOSAL METHODS
Recover and reclaim or recycle, if practical. Dispose of waste and residues in accordance with local authority requirements. This material and its container must be disposed of as hazardous waste.

14 TRANSPORT INFORMATION

UK ROAD CLASS 8
PROPER SHIPPING NAME SODIUM HYDROXIDE, SOLID
UN NO. ROAD 1823 UK ROAD PACK GR. II
ADR CLASS NO. 8 ADR CLASS Class 8: Corrosive substances.
ADR PACK GROUP II HAZARD No. (ADR) 80
HAZCHEM CODE 2W CEFIC TEC(R) NO. 80GC6-II+III
RID CLASS NO. 8 RID PACK GROUP II
UN NO. SEA 1823 IMDG CLASS 8
EMS F-A, S-B MARINE POLLUTANT No.
UN NO. AIR 1823 ICAO CLASS 8
AIR PACK GR. II

15 REGULATORY INFORMATION

LABELLING
CONTAINS SODIUM HYDROXIDE SOLID
RISK PHRASES R35 Causes severe burns.
SAFETY PHRASES S24/25 Avoid contact with skin and eyes.
S26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S36/37/39 Wear suitable protective clothing, gloves and eye/face protection.
S45 In case of accident or if you feel unwell, seek medical advice immediately (show label where possible).
S60 This material and its container must be disposed of as hazardous waste.

UK REGULATORY REFERENCES
Chemicals (Hazard Information & Packaging) Regulations. The Control of Substances Hazardous to Health Regulations
EU DIRECTIVES

GUIDANCE NOTES
Workplace Exposure Limits EH40.

16 OTHER INFORMATION

GENERAL INFORMATION
HMIS Health - 3 HMIS Flammability - 0 HMIS Physical Hazard - 1
INFORMATION SOURCES
CAUSTIC SODA SOLID

REVISION COMMENTS
The following sections have been revised: 4, 5, 6, 7, 8, 10, 11, 12, 13 14, 15 and 16. Revised by Bill Cameron

ISSUED BY
Sam Hoskin

REVISION DATE 13-10-05

REV. NO./REPL. SDS GENERATED 2

SDS NO. 10927

RISK PHRASES IN FULL
R35 Causes severe burns.

DISCLAIMER

MSDS furnished independent of product sale. While every effort has been made to accurately describe this product, some of the data are obtained from sources beyond our direct supervision. We cannot make any assertions as to its reliability or completeness; therefore, user may rely only at user's risk. We have made no effort to censor or conceal deleterious aspects of this product. Since we cannot anticipate or control the conditions under which this information and product may be used, we make no guarantee that the precautions we have suggested will be adequate for all individuals and/or situations. It is the obligation of each user of this product to comply with the requirements of all applicable laws regarding use and disposal of this product. Additional information will be furnished upon request to assist the user; however, no warranty, either expressed or implied, nor liability of any nature with respect to this product or to the data herein is made or incurred hereunder.
SAFETY DATA SHEET
CITRIC ACID

1 IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND COMPANY/UNDERTAKING

PRODUCT NAME: CITRIC ACID
APPLICATION: Oil well drilling fluid additive, pH modifier.
SUPPLIER: M-I Drilling Fluids UK Ltd,
Pocra Quay,
Footdee,
Aberdeen. AB11 5DQ
T -44 (0)1224-584336
F -44 (0)1224-576119
EMERGENCY TELEPHONE: +44(0)208 762 8322

2 COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Name</th>
<th>EC No.</th>
<th>CAS-No.</th>
<th>Content</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>CITRIC ACID</td>
<td>201-069-1</td>
<td>77-92-9</td>
<td>60-100%</td>
<td>Xi;R36.</td>
</tr>
</tbody>
</table>

The Full Text for all R-Phrases are Displayed in Section 16

COMPOSITION COMMENTS
The data shown is in accordance with the latest EC Directives.

3 HAZARDS IDENTIFICATION

Irritating to eyes.
CLASSIFICATION: Xi;R36.

4 FIRST-AID MEASURES

INHALATION
Move the exposed person to fresh air at once. Get medical attention if any discomfort continues.

INGESTION
First aid is not normally required. Rinse mouth thoroughly. Drink plenty of water.

SKIN CONTACT
Remove contaminated clothing immediately and wash skin with soap and water. Get medical attention promptly if symptoms occur after washing.

EYE CONTACT
Promptly wash eyes with plenty of water while lifting the eye lids. Continue to rinse for at least 15 minutes and get medical attention.

5 FIRE-FIGHTING MEASURES

EXTINGUISHING MEDIA
Water spray, foam, dry powder or carbon dioxide.

UNUSUAL FIRE & EXPLOSION HAZARDS
High concentrations of dust may form explosive mixture with air.

SPECIFIC HAZARDS
Fire or high temperatures create: Carbon dioxide (CO2). and Carbon monoxide (CO).

PROTECTIVE MEASURES IN FIRE
Self contained breathing apparatus and full protective clothing must be worn in case of fire.
6 ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS
Wear protective clothing as described in Section 8 of this safety data sheet.

ENVIRONMENTAL PRECAUTIONS
Do not allow to enter drains, sewers or watercourses.

SPILL CLEAN UP METHODS
Shovel into dry containers. Cover and move the containers. Flush the area with water.

7 HANDLING AND STORAGE

USAGE PRECAUTIONS
Do not use contact lenses. Provide good ventilation. Mechanical ventilation or local exhaust ventilation may be required. Avoid handling which leads to dust formation.

STORAGE PRECAUTIONS
Store in tightly closed original container in a dry and cool place.

8 EXPOSURE CONTROLS/PERSONAL PROTECTION

<table>
<thead>
<tr>
<th>Name</th>
<th>Std</th>
<th>LT - ppm</th>
<th>LT - mg/m³</th>
<th>ST - ppm</th>
<th>ST - mg/m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>CITRIC ACID</td>
<td>WEL</td>
<td>4 mg/m³</td>
<td>resp.dust</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

INGREDIENT COMMENTS
WEL = Workplace Exposure Limits NUI = Nuisance dust, WEL TWA 4mg/m³ Respirable Dust, 10 mg/m³ Total Dust.

PROTECTIVE EQUIPMENT

ENGINEERING MEASURES
Provide adequate general and local exhaust ventilation.

RESPIRATORY EQUIPMENT
Respiratory protection must be used if air contamination exceeds acceptable level. Dust filter P2 (for fine dust).

HAND PROTECTION
Use protective gloves made of: Butyl rubber. or Polyvinyl chloride (PVC).

EYE PROTECTION
Wear dust resistant safety goggles where there is danger of eye contact.

OTHER PROTECTION
Wear appropriate clothing to prevent repeated or prolonged skin contact. Provide eyewash station.

9 PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE  Crystals or crystalline
COLOUR      White
ODOUR       Odourless
SOLUBILITY  Completely soluble in water
MELTING POINT (°C)  ~135°C
BULK DENSITY 850 kg/m³

10 STABILITY AND REACTIVITY

STABILITY
Stable under normal temperature conditions.
CITRIC ACID

MATERIALS TO AVOID
Strong alkalis and Strong oxidising agents.

HAZARDOUS DECOMPOSITION PRODUCTS
Fire or high temperatures create: Carbon dioxide (CO2) and Carbon monoxide (CO).

11 TOXICOLOGICAL INFORMATION

INHALATION
Dust may irritate respiratory system or lungs.

INGESTION
May cause discomfort if swallowed.

SKIN CONTACT
Powder may irritate skin.

EYE CONTACT
Particles in the eyes may cause irritation and smarting. May cause severe irritation to eyes.

12 ECOLOGICAL INFORMATION

ECOTOXICITY
Contact M-I Swaco's QHSE Department for ecological information.

13 DISPOSAL CONSIDERATIONS

DISPOSAL METHODS
Recover and reclaim or recycle, if practical. Dispose of waste and residues in accordance with local authority requirements.

14 TRANSPORT INFORMATION

GENERAL
The product is not covered by international regulation on the transport of dangerous goods (IMDG, IATA, ADR/RID).

15 REGULATORY INFORMATION

LABELLING

RISK PHRASES
R36 Irritating to eyes.

SAFETY PHRASES
S24/25 Avoid contact with skin and eyes.

UK REGULATORY REFERENCES
Chemicals (Hazard Information & Packaging) Regulations. The Control of Substances Hazardous to Health Regulations

EU DIRECTIVES

GUIDANCE NOTES
Workplace Exposure Limits EH40.

16 OTHER INFORMATION

GENERAL INFORMATION
HMIS Health - 2 HMIS Flammability - 1 HMIS Physical Hazard - 0 E - Safety glasses, Gloves, Dust Respirator
INFORMATION SOURCES
Material Safety Data Sheet, Misc. manufacturers. Product information provided by the commercial vendor(s).

REVISION COMMENTS
General revision. Revised by Bill Cameron

ISSUED BY
Dr. Kirsty Walker

REVISION DATE 27-09-06
REV. NO./REPL. SDS GENERATED 3
SDS NO. 10910

RISK PHRASES IN FULL
R36 Irritating to eyes.

DISCLAIMER
MSDS furnished independent of product sale. While every effort has been made to accurately describe this product, some of the data are obtained from sources beyond our direct supervision. We cannot make any assertions as to its reliability or completeness; therefore, user may rely only at user’s risk. We have made no effort to censor or conceal deleterious aspects of this product. Since we cannot anticipate or control the conditions under which this information and product may be used, we make no guarantee that the precautions we have suggested will be adequate for all individuals and/or situations. It is the obligation of each user of this product to comply with the requirements of all applicable laws regarding use and disposal of this product. Additional information will be furnished upon request to assist the user; however, no warranty, either expressed or implied, nor liability of any nature with respect to this product or to the data herein is made or incurred hereunder.
SAFETY DATA SHEET
CONQOR 404 NS

1 IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING

APPLICATION
Corrosion inhibitor

SUPPLIER
M-I SWACO
A Schlumberger Company
Endeavour Drive
Arnhall Business Park, Westhill
Aberdeen AB32 6UF
Scotland UK
T = +44 (0)1224-742200
F = +44 (0)1224-742288
E-mail = MBXMSDS-EH@miswaco.slb.com

EMERGENCY TELEPHONE
(24 Hour) Europe +44 (0) 1235 239 670, Asia Pacific +65 3158 1074, China +86 10 5100 3039, Middle East and Africa +44 (0) 1235 239 671, Australia +61 2801 44558.

2 HAZARDS IDENTIFICATION

Not regarded as a health or environmental hazard under current legislation.

CLASSIFICATION (1999/45)
Not classified.

3 COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Name</th>
<th>EC No.</th>
<th>CAS-No.</th>
<th>Content %</th>
<th>Classification (67/548/EEC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SALTS OF PHOSPHATE ESTERS IN WATER</td>
<td></td>
<td></td>
<td>60-100%</td>
<td>-</td>
</tr>
</tbody>
</table>

The Full Text for all R-Phrases is Displayed in Section 16

COMPOSITION COMMENTS
The data shown is in accordance with the latest EC Directives.

4 FIRST-AID MEASURES

INHALATION
Move the exposed person to fresh air at once. If respiratory problems, artificial respiration/oxygen. Get medical attention if any discomfort continues.

INGESTION
Immediately give a couple of glasses of water or milk, provided the victim is fully conscious. Get medical attention if any discomfort continues.

SKIN CONTACT
Remove contaminated clothing immediately and wash skin with soap and water. Get medical attention promptly if symptoms occur after washing.

EYE CONTACT
Make sure to remove any contact lenses from the eyes before rinsing. Promptly wash eyes with plenty of water while lifting the eye lids. Continue to rinse for at least 15 minutes. Get medical attention if any discomfort continues.

5 FIRE-FIGHTING MEASURES

EXTINGUISHING MEDIA
Foam, carbon dioxide or dry powder.

SPECIAL FIRE FIGHTING PROCEDURES
Containers close to fire should be removed immediately or cooled with water.

SPECIFIC HAZARDS

PROTECTIVE MEASURES IN FIRE
Self contained breathing apparatus and full protective clothing must be worn in case of fire.
6 ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS
Wear protective clothing as described in Section 8 of this safety data sheet.

ENVIRONMENTAL PRECAUTIONS
Do not allow to enter drains, sewers or watercourses.

SPILL CLEAN UP METHODS
Stop leak if possible without risk. Dike far ahead of larger spills for later disposal. Absorb spillage with suitable absorbent material. Shovel into dry containers. Cover and move the containers. Flush the area with water.

7 HANDLING AND STORAGE

USAGE PRECAUTIONS
Avoid spilling, skin and eye contact.

STORAGE PRECAUTIONS
Store in tightly closed original container in a dry, cool and well-ventilated place.

8 EXPOSURE CONTROLS/PERS ONAL PROTECTION

INGREDIENT COMMENTS
No exposure limits noted for ingredient(s).

PROTECTIVE EQUIPMENT

ENGINEERING MEASURES
Provide adequate general and local exhaust ventilation.

RESPIRATORY EQUIPMENT
No specific recommendation made, but respiratory protection may still be required under exceptional circumstances when excessive air contamination exists. Chemical respirator with organic vapour cartridge.

HAND PROTECTION
For prolonged or repeated skin contact use suitable protective gloves. Neoprene or Nitrile gloves are recommended.

EYE PROTECTION
Wear approved chemical safety goggles where eye exposure is reasonably probable.

OTHER PROTECTION
Wear appropriate clothing to prevent any possibility of skin contact. Provide eyewash station.

9 PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE Liquid
COLOUR Clear Yellow
ODOUR Odourless
SOLUBILITY Soluble in water.
RELATIVE DENSITY 1.384 - 1.396 s.g @ 60°F
BULK DENSITY 11.53 - 11.63 lbs/gal
VAPOUR DENSITY (air=1) > 1
pH-VALUE, CONC. SOLUTION 7 - 8.5
VISCOSITY 19 - 21 @ 38 °c
FLASH POINT (°C) >93.3°C (200°F)
POUR POINT (°C) -20°C (-4°F)

10 STABILITY AND REACTIVITY

STABILITY
Stable under normal temperature conditions and recommended use.

CONDITIONS TO AVOID
Avoid heat, flames and other sources of ignition.

MATERIALS TO AVOID
Avoid contact with: Strong oxidising agents.
HAZARDOUS DECOMPOSITION PRODUCTS

11 TOXICOLOGICAL INFORMATION

INHALATION
Gas or vapour in high concentrations may irritate respiratory system.

INGESTION
May cause discomfort if swallowed.

SKIN CONTACT
Prolonged and frequent contact may cause redness and irritation.

EYE CONTACT
Spray and vapour in the eyes may cause irritation and smarting.

12 ECOLOGICAL INFORMATION

ECOTOXICITY
Contact M-I SWACO's QHSE Department for ecological information at env@miswaco.com.

13 DISPOSAL CONSIDERATIONS

DISPOSAL METHODS
Recover and reclaim or recycle, if practical. Dispose of waste and residues in accordance with local authority requirements.

14 TRANSPORT INFORMATION

GENERAL
The product is not covered by international regulation on the transport of dangerous goods (IMDG, IATA, ADR/RID).

15 REGULATORY INFORMATION

RISK PHRASES
NC Not classified.

SAFETY PHRASES
NC Not classified.

UK REGULATORY REFERENCES
Chemicals (Hazard Information & Packaging) Regulations. Control of Substances Hazardous to Health Regulations 2002 (as amended)
Workplace Exposure Limits EH40.

EU DIRECTIVES

INTERNATIONAL CHEMICAL INVENTORIES
Contact REACH@miswaco.com for REACH information. Complies with the following national/regional chemical inventory requirements: EINECS / ELINCS.

16 OTHER INFORMATION

INFORMATION SOURCES
Product information provided by the commercial vendor(s). Material Safety Data Sheet, Misc. manufacturers. LOLI. European Chemicals Bureau - ESIS (European Chemical Substances Information).

REVISION COMMENTS
General revision. Compiled or revised by Sandra McWilliam

ISSUED BY
Bill Cameron

REV. NO./REPL. SDS GENERATED 6
SDS NO. 10195

RISK PHRASES IN FULL
NC Not classified.
DISCLAIMER

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SAFETY DATA SHEET
CONQOR 404

1 IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND COMPANY/UNDERTAKING

PRODUCT NAME CONQOR 404
APPLICATION Corrosion inhibitor
SUPPLIER M-I Drilling Fluids UK Ltd,
Pocra Quay,
Fooldee,
Aberdeen. AB11 5DQ
T -44 (0)1224-584336
F -44 (0)1224-576119
EMERGENCY TELEPHONE +44(0)208 762 8322

2 COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Name</th>
<th>EC No.</th>
<th>CAS-No.</th>
<th>Content</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>SALTS OF PHOSPHATE ESTERS IN WATER</td>
<td></td>
<td></td>
<td>60-100%</td>
<td>-</td>
</tr>
</tbody>
</table>

The Full Text for all R-Phrases are Displayed in Section 16

COMPOSITION COMMENTS
This product is classified as containing no hazardous ingredients according to the EC Directives.

3 HAZARDS IDENTIFICATION

Not regarded as a health or environmental hazard under current legislation.

4 FIRST-AID MEASURES

INHALATION
Remove victim immediately from source of exposure. If respiratory problems, artificial respiration/oxygen. Get medical attention if any discomfort continues.

INGESTION
Do not induce vomiting. Immediately give a couple of glasses of water or milk, provided the victim is fully conscious. Get medical attention

SKIN CONTACT
Remove contaminated clothing immediately and wash skin with soap and water. Get medical attention promptly if symptoms occur after washing.

EYE CONTACT
Promptly wash eyes with plenty of water while lifting the eye lids. Continue to rinse for at least 15 minutes and get medical attention.

5 FIRE-FIGHTING MEASURES

EXTINGUISHING MEDIA
The product is non-combustible. Use fire-extinguishing media appropriate for surrounding materials.

SPECIFIC HAZARDS
Fire or high temperatures create: Vapours/gases/fumes of: Carbon dioxide (CO2). Carbon monoxide (CO). and Oxides of: Phosphorus.

PROTECTIVE MEASURES IN FIRE
Self contained breathing apparatus and full protective clothing must be worn in case of fire.

6 ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS
Wear protective clothing as described in Section 8 of this safety data sheet.

ENVIRONMENTAL PRECAUTIONS
Do not allow to enter drains, sewers or watercourses.
SPILL CLEAN UP METHODS
Dike far ahead of larger spills for later disposal. Absorb spillage with suitable absorbent material. Shovel into dry containers. Cover and move the containers. Flush the area with water.

7 HANDLING AND STORAGE

USAGE PRECAUTIONS
Avoid spilling, skin and eye contact. Provide good ventilation. Do not use contact lenses.

STORAGE PRECAUTIONS
Store in tightly closed original container in a cool, dry well-ventilated place.

8 EXPOSURE CONTROLS/PERSONAL PROTECTION

PROTECTIVE EQUIPMENT

ENGINEERING MEASURES
Provide adequate general and local exhaust ventilation.

RESPIRATORY EQUIPMENT
No specific recommendation made, but respiratory protection may still be required under exceptional circumstances when excessive air contamination exists. Wear mask supplied with: Gas cartridge suitable for organic substances.

HAND PROTECTION
Use protective gloves made of: Rubber, neoprene or PVC.

EYE PROTECTION
Wear approved chemical safety goggles where eye exposure is reasonably probable.

OTHER PROTECTION
Wear appropriate clothing to prevent repeated or prolonged skin contact. Provide eyewash station.

9 PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>PROPERTY</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>APPEARANCE</td>
<td>Liquid</td>
</tr>
<tr>
<td>COLOUR</td>
<td>Yellow Brown</td>
</tr>
<tr>
<td>ODOUR</td>
<td>No characteristic odour.</td>
</tr>
<tr>
<td>SOLUBILITY</td>
<td>Soluble in water.</td>
</tr>
<tr>
<td>MELTING POINT (°C)</td>
<td>&lt; -10</td>
</tr>
<tr>
<td>VAPOUR PRESSURE</td>
<td>25 mbar @ 20°C</td>
</tr>
<tr>
<td>VISCOSITY</td>
<td>&lt; 10 cSt @ 38 °C</td>
</tr>
<tr>
<td>RELATIVE DENSITY</td>
<td>1.3 - 1.4</td>
</tr>
<tr>
<td>pH-VALUE, DILUTED SOLUTION</td>
<td>7.0 50g/l water</td>
</tr>
</tbody>
</table>

10 STABILITY AND REACTIVITY

STABILITY
No particular stability concerns.

HAZARDOUS POLYMERISATION
Will not polymerise.

MATERIALS TO AVOID
Strong oxidising agents.

HAZARDOUS DECOMPOSITION PRODUCTS
Fire or high temperatures create: Vapours/gases/fumes of: and Oxides of: Phosphorus.

11 TOXICOLOGICAL INFORMATION

INHALATION
Gas or vapour in high concentrations may irritate respiratory system.

INGESTION
May cause gastric distress, nausea and vomiting if ingested.

SKIN CONTACT
Prolonged contact may cause dryness of the skin. May be irritating to the skin.
EYE CONTACT
Spray and vapour in the eyes may cause irritation and smarting.

12 ECOLOGICAL INFORMATION

ECOTOXICITY
Contact M-I Swaco's QHSE Department for ecological information.

13 DISPOSAL CONSIDERATIONS

DISPOSAL METHODS
Recover and reclaim or recycle, if practical. Dispose of waste and residues in accordance with local authority requirements.

14 TRANSPORT INFORMATION

GENERAL
The product is not covered by international regulation on the transport of dangerous goods (IMDG, IATA, ADR/RID).

15 REGULATORY INFORMATION

RISK PHRASES
NC Not classified.

SAFETY PHRASES
NC Not classified.

UK REGULATORY REFERENCES
The Control of Substances Hazardous to Health Regulations Chemicals (Hazard Information & Packaging) Regulations.

EU DIRECTIVES

GUIDANCE NOTES
Workplace Exposure Limits EH40.

16 OTHER INFORMATION

GENERAL INFORMATION
HMIS Health - 1 HMIS Flammability - 1 HMIS Physical Hazard - 0 J - Splash Goggles, Gloves, Synthetic Apron, Dust and Vapor Respirator.

INFORMATION SOURCES
Material Safety Data Sheet, Misc. manufacturers. Product information provided by the commercial vendor(s).

REVISION COMMENTS
General revision. Revised by Bill Cameron

ISSUED BY
Bill Cameron

REVISION DATE 16-02-06

REV. NO./REPL. SDS GENERATED 4

SDS NO. 10195

DISCLAIMER

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SAFETY DATA SHEET
DRILLING STARCH

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND COMPANY/UNDERTAKING

PRODUCT NAME: DRILLING STARCH
APPLICATIONS: Fluid Loss reducer
SUPPLIER: M-I Drilling Fluids UK Ltd,
Pocra Quay,
Footdee,
Aberdeen, AB11 5DQ
Tel: 44 (0)1224 - 584336
Fax: 44 (0)1224 - 576119

EMERGENCY TELEPHONES:
001 281 561 1600 (USA)

2. COMPOSITION/INFORMATION ON INGREDIENTS

GROSS FORMULA: Potato starch
COMPOSITION COMMENTS: This product is classified as containing no hazardous ingredients according to the EC Directives.

3. HAZARDS IDENTIFICATION

Not regarded as a health hazard under current legislation.

4. FIRST AID MEASURES

INHALATION: Move the exposed person to fresh air at once. Get medical attention if any discomfort continues.

INGESTION: First aid is not normally required. Rinse mouth thoroughly. Drink plenty of water.

SKIN: Wash skin thoroughly with soap and water. Remove contaminated clothing. Get medical attention if any discomfort continues.

EYES: Promptly wash eyes with plenty of water while lifting the eye lids. Get medical attention if any discomfort continues.

5. FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA: Carbon dioxide (CO2). Dry chemicals. Foam. Water spray, fog or mist.
**SPECIAL FIRE FIGHTING PROCEDURES:**
Use supplied air respirator if substance is involved in a fire.

**UNUSUAL FIRE & EXPLOSION HAZARDS:**
High concentrations of dust may form explosive mixture with air.

**HAZARDOUS COMBUSTION PRODUCTS:**
Asphyxiating gases/vapors/fumes of: Carbon dioxide (CO2), Carbon monoxide (CO).

### 6. ACCIDENTAL RELEASE MEASURES

**SPILL CLEANUP METHODS:**
Collect in containers and seal securely. Flush clean with lots of water. Be aware of potential for surfaces to become slippery. Avoid generation and spreading of dust. Wear necessary protective equipment.

### 7. HANDLING AND STORAGE

**USAGE PRECAUTIONS:**
Avoid handling which leads to dust formation. Provide good ventilation.

**STORAGE PRECAUTIONS:**
Store at moderate temperatures in dry, well ventilated area.

### 8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

**INGREDIENT COMMENTS:**
This material is considered a nuisance dust, OES TWA 4mg/m3 Respirable Dust, 10 mg/m3 Total Dust.

**PROTECTIVE EQUIPMENT:**

- **VENTILATION:** Provide adequate general and local exhaust ventilation.
- **RESPIRATORS:** Respiratory protection must be used if air concentration exceeds acceptable level. Dust filter P2 (for fine dust).
- **PROTECTIVE GLOVES:** No specific hand protection noted, but gloves may still be advisable. For prolonged or repeated skin contact use suitable protective gloves. Rubber or plastic.
- **EYE PROTECTION:** Wear dust resistant safety goggles where there is danger of eye contact.
- **OTHER PROTECTION:** Wear appropriate clothing to prevent repeated or prolonged skin contact. Provide eyewash station.

### 9. PHYSICAL AND CHEMICAL PROPERTIES

**APPEARANCE:** Powder, dust.

**COLOUR:** Off-white.

**ODOUR/TASTE:** No characteristic odour.
10308 - DRILLING STARCH

BULK DENSITY: 0.3 - 0.7 g/cm³

pH-VALUE, DILUTED SOLUTION: 6.0 - 8.0  Concentration %M: 1%

SOLUBILITY DESCRIPTION: Soluble in water. Forms a paste at concentrations greater than 5%.

DECOMPOSITION TEMP. (°C): 300

AUTO IGNITION TEMP. (°C): 430

10. STABILITY AND REACTIVITY

STABILITY: Normally stable.

CONDITIONS TO AVOID: Avoid wet and humid conditions.

MATERIALS TO AVOID: Strong oxidizing agents.

HAZARDOUS DECOMP. PRODUCTS: Fire or high temperatures create: Asphyxiating gases/vapours/fumes of: Carbon dioxide (CO₂). Carbon monoxide (CO).

11. TOXICOLOGICAL INFORMATION

INHALATION: Dust may irritate respiratory system or lungs.

INGESTION: May cause discomfort if swallowed.

SKIN: Powder may irritate skin.

EYES: Particles in the eyes may cause irritation and smarting.

12. ECOLOGICAL INFORMATION

ECOLOGICAL INFORMATION: Not regarded as dangerous for the environment.

13. DISPOSAL CONSIDERATIONS

DISPOSAL METHODS: Recover and reclaim or recycle, if practical. Dispose of on site landfill area. Dispose of in accordance with Local Authority requirements.

14. TRANSPORT INFORMATION

ROAD TRANSPORT NOTES: Not classified for road transport.

RAIL TRANSPORT NOTES: Not classified for rail transport.

SEA TRANSPORT NOTES: Not classified for sea transport.

AIR TRANSPORT NOTES: Not classified for air transport.
15. REGULATORY INFORMATION

RISK PHRASES: Not classified.
SAFETY PHRASES: Not classified.

16. OTHER INFORMATION


ISSUED BY: Sarah Glover
REVISION DATE: 02-04-03
REV. No./REPL. SDS GENERATED: 1
PRINTING DATE: 2003-04-02

DISCLAIMER: MSDS furnished independent of product sale. While every effort has been made to accurately describe this product, some of the data are obtained from sources beyond our direct supervision. We cannot make any assertions as to its reliability or completeness; therefore, user may rely on it only at user's risk. We have made no effort to censor or conceal deleterious aspects of this product. Since we cannot anticipate or control the conditions under which this information and product may be used, we make no guarantee that the precautions we have suggested will be adequate for all individuals and/or situations. It is the obligation of each user of this product to comply with the requirements of all applicable laws regarding use and disposal of this product. Additional information will be furnished upon request to assist the user; however, no warranty, either expressed or implied, nor liability of any nature with respect to this product or to the data herein is made or incurred hereunder.
1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Trade Name: DUO-VIS*
Chemical Family: Mixture
Product Use: Oil well drilling fluid additive.
Emergency Telephone (24 hr.): 281-561-1600

Supplied by: M-I L.L.C.
P.O. Box 42842
Houston, TX 77242
www.miswaco.com

Telephone Number: 281-561-1511
Contact Person: Catherine Miller, Product Safety Specialist

Revision Number: 3

HMIS Rating
Health: 2 Flammability: 1 Physical Hazard: 0 PPE: E

HMIS Key: 4=Severe, 3=Serious, 2=Moderate, 1=Slight, 0=Minimal Hazard. *Chronic effects - See Section 11. See Section 8 for Personal Protective Equipment recommendations.

2. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>CAS No.</th>
<th>Wt. %</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Xanthan gum</td>
<td>11138-66-2</td>
<td>99 - 99.9</td>
<td>No comments.</td>
</tr>
<tr>
<td>Glyoxal</td>
<td>107-22-2</td>
<td>0.1 - 1</td>
<td>No comments.</td>
</tr>
</tbody>
</table>

3. HAZARDS IDENTIFICATION

Emergency Overview: Warning! May cause eye, skin, and respiratory tract irritation. May cause skin sensitization, an allergic reaction, on repeated exposure. Long term inhalation of particulates may cause lung damage.

Canadian Classification: UN PIN No: Not regulated WHMIS Class: D2B


Potential Health Effects:

Acute Effects

Eye Contact: May irritate eyes.
Skin Contact: May be irritating to the skin. May cause skin sensitization, an allergic reaction, on repeated exposure.
Inhalation: May be irritating to the respiratory tract. Long term inhalation of particulate may cause lung damage.
Ingestion: May cause gastric distress, nausea and vomiting if ingested.
4. FIRST AID MEASURES

Eye Contact: Promptly wash eyes with lots of water while lifting eye lids. Continue to rinse for at least 15 minutes. Get medical attention if any discomfort continues.

Skin Contact: Wash skin thoroughly with soap and water. Remove contaminated clothing and launder before reuse. Get medical attention if any discomfort continues.

Inhalation: Move person to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Ingestion: Dilute with 2 - 3 glasses of water or milk, if conscious. Never give anything by mouth to an unconscious person. If signs of irritation or toxicity occur seek medical attention.

General Notes: Persons seeking medical attention should carry a copy of this MSDS with them.

5. FIRE FIGHTING MEASURES

Flammable Properties

Flash Point: F (C): NA
Flammable Limits in Air - Lower (%): ND
Flammable Limits in Air - Upper (%): ND
Autoignition Temperature: F(C): ND
Flammability Class: ND
Other Flammable Properties: Particulate may accumulate static electricity. Dusts at sufficient concentrations can form explosive mixtures with air.

Extinguishing Media: Use extinguishing media appropriate for surrounding fire.

Protection Of Fire-Fighters:

Special Fire-Fighting Procedures: Do not enter fire area without proper personal protective equipment, including NIOSH/MSHA approved self-contained breathing apparatus. Evacuate area and fight fire from a safe distance. Water spray may be used to keep fire-exposed containers cool. Keep water run off out of sewers and waterways.


6. ACCIDENTAL RELEASE MEASURES

Personal Precautions: Use personal protective equipment identified in Section 8.

Spill Procedures: Evacuate surrounding area, if necessary. Contain spilled material. Avoid the generation of dust. Sweep, vacuum, or shovel and place into closable container for disposal.

Environmental Precautions: Do not allow to enter sewer or surface and subsurface waters. Waste must be disposed of in accordance with federal, state and local laws.

7. HANDLING AND STORAGE

Handling: Put on appropriate personal protective equipment. Avoid contact with skin and eyes. Avoid generating or breathing dust. Product is slippery if wet. Use only with adequate ventilation. Wash thoroughly after handling.
8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure Limits (TLV & PEL - 8H TWA):

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>CAS No.</th>
<th>Wt. %</th>
<th>ACGIH TLV</th>
<th>OSHA PEL</th>
<th>Other</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Xanthan gum</td>
<td>11138-66-2</td>
<td>99 - 99.9</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>(1)</td>
</tr>
<tr>
<td>Glyoxal</td>
<td>107-22-2</td>
<td>0.1 - 1</td>
<td>0.1 mg/m³ (Sens)</td>
<td>NA</td>
<td>NA</td>
<td>None</td>
</tr>
</tbody>
</table>

Notes
(1) Control as an ACGIH particulate not otherwise specified (PNOS): 10 mg/m³ (Inhalable); 3 mg/m³ (Respirable) and an OSHA particulate not otherwise regulated (PNOR): 15 mg/m³ (Total); 5 mg/m³ (Respirable).

Engineering Controls: Use appropriate engineering controls such as, exhaust ventilation and process enclosure, to ensure air contamination and keep workers exposure below the applicable limits.

Personal Protection Equipment

Eye/Face Protection: Dust resistant safety goggles.

Skin Protection: Wear appropriate clothing to prevent repeated or prolonged skin contact. Chemical resistant gloves recommended for prolonged or repeated contact. Use protective gloves made of: Neoprene, Nitrile.

Respiratory Protection: Use at least a NIOSH-approved N95 half-mask disposable or reuseable particulate respirator (dusk mask).
In work environments containing oil mist/aerosol, use at least NIOSH-approved P95 half-mask disposable or reuseable particulate respirator.
For exposure exceeding 10 x PEL use a NIOSH-approved N100 Particulate Respirator.

General Hygiene Considerations: Wash promptly with soap and water if skin becomes contaminated. Change work clothing daily if there is any possibility of contamination.

9. PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color:</td>
<td>White to Tan.</td>
</tr>
<tr>
<td>Odor:</td>
<td>Slight.</td>
</tr>
<tr>
<td>Physical State:</td>
<td>Powder</td>
</tr>
<tr>
<td>pH:</td>
<td>5.4 - 8.6</td>
</tr>
<tr>
<td>Specific Gravity (H2O = 1):</td>
<td>1.5 g/cc</td>
</tr>
<tr>
<td>Solubility (Water):</td>
<td>Soluble.</td>
</tr>
<tr>
<td>Melting/Freezing Point:</td>
<td>ND</td>
</tr>
<tr>
<td>Boiling Point:</td>
<td>ND</td>
</tr>
<tr>
<td>Vapor Pressure:</td>
<td>NA</td>
</tr>
<tr>
<td>Vapor Density (Air=1):</td>
<td>NA</td>
</tr>
<tr>
<td>Evaporation Rate:</td>
<td>ND</td>
</tr>
<tr>
<td>Odor Threshold(s):</td>
<td>ND</td>
</tr>
</tbody>
</table>

10. STABILITY AND REACTIVITY

Chemical Stability: Stable
Conditions to Avoid: Keep away from heat, sparks and flame.
Materials to Avoid: Strong oxidizing agents.
Hazardous Decomposition Products: For thermal decomposition products, see Section 5.

Hazardous Polymerization: Will not occur

11. TOXICOLOGICAL INFORMATION

Component Toxicological Data: Any adverse component toxicological effects are listed below. If no effects are listed, no such data were found.

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>CAS No.</th>
<th>Acute Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Xanthan gum</td>
<td>11138-66-2</td>
<td>Oral LD50: &gt; 5,000 mg/kg (rat)</td>
</tr>
<tr>
<td>Glyoxal</td>
<td>107-22-2</td>
<td>Oral LD50: 200 mg/kg (rat); Dermal LD50: 10 ml/kg (rabbit)</td>
</tr>
</tbody>
</table>

Product Toxicological Information:
No toxicological data is available for this product.

12. ECOLOGICAL INFORMATION

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>CAS No.</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Xanthan gum</td>
<td>11138-66-2</td>
<td>LC50 96H: 490 mg/l (rainbow trout); LC50 48H: 980 mg/l (Daphnia magna)</td>
</tr>
<tr>
<td>Glyoxal</td>
<td>107-22-2</td>
<td>LC50 96H static: 215,000 ug/l (Pimephales promelas (fathead minnow)); EC50 96H static: 66,480 - 148,960 ug/l (Selenastrum capricornutum (green algae))</td>
</tr>
</tbody>
</table>

Product Ecotoxicity Data: Contact M-I Environmental Affairs Department for available product ecotoxicity data.

Biodegradation: ND
Bioaccumulation: ND
Octanol/Water Partition Coefficient: ND

13. DISPOSAL CONSIDERATIONS

Waste Classification: This product does not meet the criteria of a hazardous waste if discarded in its purchased form.

Waste Management: Under U.S. Environmental Protection Agency (EPA) Resource Conservation and Recovery Act (RCRA), it is the responsibility of the user to determine at the time of disposal, whether the product meets RCRA criteria for the hazardous waste. This is because product uses, transformations, mixtures, processes, etc., may render the resulting materials hazardous. Empty containers retain residues. All labeled precautions must be observed.

Disposal Method: Recover and reclaim or recycle, if practical. Should this product become a waste, dispose of in a permitted industrial landfill. Ensure that the containers are empty by the RCRA criteria prior to disposal in a permitted industrial landfill.

14. TRANSPORT INFORMATION

U.S. DOT Shipping Description: Not regulated for transportation by DOT, TDG, IMDG, ICAO/IATA.

Canada TDG Shipping Description: Not regulated.
UN PIN No: Not regulated
IMDG Shipping Description: Not regulated.
15. REGULATORY INFORMATION

U.S. Federal and State Regulations

SARA 311/312 Hazard Categories: Immediate (acute) health hazard.

SARA 302/304, 313; CERCLA RQ, Note: If no components are listed below, this product is not subject to the referenced SARA and CERCLA regulations and is not known to contain a Proposition 65 listed chemical at a level that is expected to pose a significant risk under anticipated use conditions.

California Proposition 65:

International Chemical Inventories

Australia AICS - Components are listed or exempt from listing.
Canada DSL - Components are listed or exempt from listing.
China Inventory - Components are listed or exempt from listing.
European Union EINECS - Components are listed or exempt from listing.
Japan METI ENCS - Components are listed or exempt from listing.
Korea TCCL ECL - Components are listed or exempt from listing.
Philippine PICCS - Components are listed or exempt from listing.
U.S. TSCA - Components are listed or exempt from listing.
U.S. TSCA - No components are subject to TSCA 12(b) export notification requirements.

Canadian Classification:

Controlled Products Regulations Statement: This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

WHMIS Class: D2B

16. OTHER INFORMATION

The following sections have been revised: 1, 3, 10, 14, 15, 16

NA - Not Applicable, ND - Not Determined.

*A mark of M-I L.L.C.

Disclaimer:

MSDS furnished independent of product sale. While every effort has been made to accurately describe this product, some of the data are obtained from sources beyond our direct supervision. We can not make any assertions as to its reliability or completeness; therefore, user may rely on it only at user’s risk. We have made no effort to censor or conceal deleterious aspects of this product. Since we cannot anticipate or control the conditions under which this information and product may be used, we make no guarantee that the precautions we have suggested will be adequate for all individuals and/or situations. It is the obligation of each user of this product to comply with the requirements of all applicable laws regarding use and disposal of this product. Additional information will be furnished upon request to assist the user; however, no warranty, either expressed or implied, nor liability of any nature with respect to this product or to the data herein is made or incurred hereunder.
Material Safety Data Sheet

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

DYNARED™ (Seepage Control Fiber)

Product Use: Drilling Fluid Additive
Product Number(s): 0001016829, 0001016828, 0001016830
Synonyms: DYNARED™ Fine; DYNARED™ Medium; DYNARED™ Coarse
Product CAS No.: Mixture

Company Identification:
Chevron Phillips Chemical Company LP
Drilling Specialties Company
10001 Six Pines Drive
The Woodlands, TX 77380

Chevron Phillips Chemicals International N.V.
Brusselsesteenweg 355
B-3090 Overijse
Belgium

Product Information:
MSDS Requests: (800) 852-5530
Technical Information: (800) 221-1956
Responsible Party: Product Safety Group
Email: msds@cpchem.com

24-Hour Emergency Telephone Numbers
HEALTH: Chevron Phillips Emergency Information Center 866.442.9628 (North America) and 1.832.813.4984 (International)
TRANSPORTATION: North America: CHEMTREC 800.424.9300 or 703.527.3887
ASIA: +1.703.527.3887
EUROPE: BIG .32.14.584545 (phone) or .32.14.583516 (telefax)
SOUTH AMERICA SOS-Cotec Inside Brazil: 0800.111.767
Outside Brazil: 55.19.3467.1600

SECTION 2 HAZARDS IDENTIFICATION

***************

EMERGENCY OVERVIEW
Reddish-brown powder with mild, earthy odor.
NFPA RATINGS: Health: 0 Flammability: 0 Reactivity: 0

GHS Classification and Labeling:
Not hazardous. No hazards have been determined using GHS criteria.

EU Classification:
Safety Phrases:
S22: Do not breathe dust.

**************************************************************************************************************
IMMEDIATE HEALTH EFFECTS:
Eye: Not expected to cause prolonged or significant eye irritation. Material is dusty and may scratch the surface of the eye.
Skin: Contact with the skin is not expected to cause prolonged or significant irritation. Not expected to be harmful to internal organs if absorbed through the skin.
Ingestion: Not expected to be harmful if swallowed.
Inhalation: The dust from this material may cause respiratory irritation.

SECTION 3 COMPOSITION/ INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>CAS NUMBER</th>
<th>AMOUNT</th>
<th>EINECS / ELINCS</th>
<th>SYM</th>
<th>R-PHRASES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proprietary</td>
<td></td>
<td>100 % weight</td>
<td>Exempt</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

Occupational Exposure Limits:

<table>
<thead>
<tr>
<th>Component</th>
<th>Limit</th>
<th>TWA</th>
<th>STEL</th>
<th>Ceiling / Peak</th>
<th>Notation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proprietary</td>
<td>CPCHEM</td>
<td>Not Established</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

SECTION 4 FIRST AID MEASURES

Eye: Flush eyes with running water immediately while holding the eyelids open. Remove contact lenses, if worn, after initial flushing, and continue flushing for at least 15 minutes. Get immediate medical attention.
Skin: To remove the material from skin, use soap and water. Discard contaminated clothing and shoes or thoroughly clean before reuse. Get medical attention if any symptoms develop.
Ingestion: If swallowed, do not induce vomiting. Give the person a glass of water or milk to drink and get immediate medical attention. Never give anything by mouth to an unconscious person.
Inhalation: Move the exposed person to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention if breathing difficulties continue.

SECTION 5 FIRE FIGHTING MEASURES

FIRE CLASSIFICATION:
Classification (29 CFR 1910.1200): Not flammable or combustible. This material will burn although it is not easily ignited.
NFPA RATINGS: Health: 0 Flammability: 0 Reactivity: 0
FLAMMABLE PROPERTIES:
Flashpoint: NA
Autoignition: NA
Flammability (Explosive) Limits (% by volume in air): Lower: NA Upper: NA
EXTINGUISHING MEDIA: Use water fog, foam, dry chemical or carbon dioxide (CO2) to extinguish flames.

PROTECTION OF FIRE FIGHTERS:
Fire Fighting Instructions: Material will not burn unless preheated. Clear fire area of all non-emergency personnel. Only enter confined fire space with full gear, including a positive pressure, NIOSH-approved,
self-contained breathing apparatus. Cool surrounding equipment, fire-exposed containers and structures with water. Container areas exposed to direct flame contact should be cooled with large quantities of water (500 gallons water per minute flame impingement exposure) to prevent weakening of container structure.

**Combustion Products:** No data available.

### SECTION 6  ACCIDENTAL RELEASE MEASURES

**Protective Measures:** Wear appropriate personal protective equipment when cleaning up spills. Refer to Section 8.

**Spill Management:** Reduce airborne dust and prevent scattering by moistening with water.

**Reporting:** U.S.A. regulations may require reporting spills of this material that could reach any surface waters. Report spills to local authorities and/or the National Response Center at (800) 424-8802 as appropriate or required.

### SECTION 7  HANDLING AND STORAGE

**READ AND OBSERVE ALL PRECAUTIONS ON PRODUCT LABEL . REFER TO PRODUCT LABEL OR MANUFACTURERS TECHNICAL BULLETINS FOR THE PROPER USE AND HANDLING OF THIS MATERIAL .**

**Precautionary Measures:** Use caution to avoid creation of dusts and to prevent inhalation of product dust (fines). Avoid contact with product dust. Airborne dust concentrations above 20 mg/L may create a dust explosion hazard. Avoid breathing vapors or fumes which may be released during thermal processing. Do not breathe dust at levels above the recommended exposure limits. Avoid breathing material. Keep container closed. Use only with adequate ventilation. Avoid contact with eyes, skin and clothing. Discard contaminated clothing and shoes or thoroughly clean before reuse. Do not breathe dust. Keep out of the reach of children.

**Static Hazard:** Electrostatic charge may accumulate and create a hazardous condition when handling this material. To minimize this hazard, bonding and grounding may be necessary but may not, by themselves, be sufficient. Review all operations, which have the potential of generating an accumulation of electrostatic charge and/or a flammable atmosphere (including tank and container filling, splash filling, tank cleaning, sampling, gauging, switch loading, filtering, mixing, agitation, and vacuum truck operations) and use appropriate mitigating procedures. For more information, refer to OSHA Standard 29 CFR 1910.106, ‘Flammable and Combustible Liquids, National Fire Protection Association (NFPA 77), Recommended Practice on Static Electricity’ (liquids, powders and dusts), and/or the American Petroleum Institute (API) Recommended Practice 2003, ‘Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents’ (liquids).

**General Storage Information:** Treat as a solid that can burn. Store away from oxidizing materials, in a cool, dry place with adequate ventilation. Bond and ground transfer equipment. DO NOT USE OR STORE near heat, sparks or open flames. USE AND STORE ONLY IN WELL VENTILATED AREA. Keep container closed when not in use.

**Container Warnings:** Containers, even those that have been emptied, can contain residues of dusts or solid particulates which may create both health and fire/explosion hazards.

### SECTION 8  EXPOSURE CONTROLS/PERSONAL PROTECTION

**GENERAL CONSIDERATIONS:**
Consider the potential hazards of this material (see Section 3), applicable exposure limits, job activities, and other substances in the work place when designing engineering controls and selecting personal protective equipment. If engineering controls or work practices are not adequate to prevent exposure to harmful levels of this material, the personal protective equipment listed below is recommended. The user should read and understand all instructions and limitations supplied with the equipment since protection is usually provided for a limited time or under certain circumstances.
ENGINEERING CONTROLS:
If heated material generates vapor or fumes, use process enclosures, local exhaust ventilation, or other engineering controls to control exposure.

PERSONAL PROTECTIVE EQUIPMENT:
Eye/Face Protection: Wear eye protection such as safety glasses, chemical goggles, or faceshields if engineering controls or work practices are not adequate to prevent eye contact. No special eye protection is normally required. If operating conditions create dust that is not adequately controlled, wear appropriate goggles.
Skin Protection: Wear impervious protective clothing to prevent skin contact. Selection of protective clothing may include gloves, apron, boots, and complete facial protection depending on operations conducted. Users should determine acceptable performance characteristics of protective clothing. Consider physical requirements and other substances present when selecting protective clothing.
Suggested materials for protective gloves include: Nitrile
Respiratory Protection: If user operations generate harmful levels of airborne material that is not adequately controlled by ventilation, wear a NIOSH approved respirator that provides adequate protection. Use the following elements for air-purifying respirators: Air-Purifying Respirator for Particulates (HEPA)

Occupational Exposure Limits:

<table>
<thead>
<tr>
<th>Component</th>
<th>Limit</th>
<th>TWA</th>
<th>STEL</th>
<th>Ceiling/Peak</th>
<th>Notation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proprietary</td>
<td>CPCHEM</td>
<td>Not Established</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Appearance and Odor: Reddish-brown powder with mild, earthy odor.
Autoignition: NA
Boiling Point: NA
Evaporation Rate: NDA
Flammability (Explosive) Limits (% by volume in air): Lower: NA Upper: NA
Flashpoint: NA
Molecular Formula: NA
Molecular Weight: NDA
Melting Point: NA
Octanol / Water Partition Coefficient: log-Kow: NDA
pH: NA
Pour Point: NA
Solubility (in water): Slight
Vapor Pressure: NA
Vapor Density (AIR=1): NA
Viscosity: NA
Percent Volatile: NDA

SECTION 10 STABILITY AND REACTIVITY

Chemical Stability: This material is considered stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.
Conditions to Avoid: Not Applicable
Incompatibility With Other Materials: No data available
Hazardous Decomposition Products: None.
Hazardous Polymerization: Hazardous polymerization will not occur.

SECTION 11 TOXICOLOGICAL INFORMATION

IMMEDIATE HEALTH EFFECTS:

Acute Oral Toxicity: LD50 / not known
Acute Dermal Toxicity: LD50 / not known
Acute Inhalation Toxicity: LC50 / not known

Eye Irritation: This material is not expected to be irritating to the eyes.
Skin Irritation: This material is not expected to be irritating to the skin.

ADDITIONAL TOXICOLOGY INFORMATION:
The toxicological properties of this product have not been tested or have not been tested completely and its handling or use may be hazardous. EXERCISE DUE CARE.

Long-term exposure to high dust concentrations may cause non-debilitating lung changes.

SECTION 12 ECOLOGICAL INFORMATION

ECOTOXICITY:
This material is not expected to be harmful to aquatic organisms.

ENVIRONMENTAL FATE:
This material is expected to be readily biodegradable.

SECTION 13 DISPOSAL CONSIDERATIONS

Use material for its intended purpose or recycle if possible. This material, if it must be discarded, may meet the criteria of a hazardous waste as defined by US EPA under RCRA (40 CFR 261) or other State and local regulations. Measurement of certain physical properties and analysis for regulated components may be necessary to make a correct determination. If this material is classified as a hazardous waste, federal law requires disposal at a licensed hazardous waste disposal facility.

SECTION 14 TRANSPORT INFORMATION

The shipping descriptions shown here are for bulk shipments only, and may not apply to shipments in non-bulk packages (see regulatory definition). Consult the appropriate domestic or international mode-specific and quantity-specific Dangerous Goods Regulations for additional shipping description requirements (e.g., technical name or names, etc.) Therefore, the information shown here, may not always agree with the bill of lading shipping description for the material. Flashpoints for the material may vary slightly between the MSDS and the bill of lading.

Shipping Descriptions per regulatory authority.

US DOT
NOT REGULATED AS A HAZARDOUS MATERIAL OR DANGEROUS GOODS FOR TRANSPORTATION

ICAO / IATA
NOT REGULATED AS A HAZARDOUS MATERIAL OR DANGEROUS GOODS FOR TRANSPORTATION

IMO / IMDG
NOT REGULATED AS A HAZARDOUS MATERIAL OR DANGEROUS GOODS FOR TRANSPORTATION

RID / ADR
NOT REGULATED AS A HAZARDOUS MATERIAL OR DANGEROUS GOODS FOR TRANSPORTATION

SECTION 15 REGULATORY INFORMATION

SARA 311/312 CATEGORIES:
1. Immediate (Acute) Health Effects: NO
2. Delayed (Chronic) Health Effects: NO
3. Fire Hazard: NO
4. Sudden Release of Pressure Hazard: NO
5. Reactivity Hazard: NO

REGULATORY LISTS SEARCHED:
01 = CA Prop 65 17 = FDA 178 33 = RCRA Waste Appendix VIII
02 = LA RTK 18 = FDA 179 34 = RCRA Waste D-List
03 = MA RTK 19 = FDA 180 35 = RCRA Waste P-List
04 = MN Hazardous Substance 20 = FDA 181 36 = RCRA Waste U-List
05 = NJ RTK 21 = FDA 182 37 = SARA Section 302
06 = PA RTK 22 = FDA 184 38 = SARA Section 313
07 = CAA Section 112 HAPs 23 = FDA 186 39 = TSCA 12 (b)
08 = CWA Section 307 24 = FDA 189 40 = TSCA Section 4
09 = CWA Section 311 25 = IARC Group 1 41 = TSCA Section 5(a)
10 = DOT Marine Pollutant 26 = IARC Group 2A 42 = TSCA Section 8(a) CAIR
11 = FDA 172 27 = IARC Group 2B 43 = TSCA Section 8(a) PAIR
12 = FDA 173 28 = IARC Group 3 44 = TSCA Section 8(d)
13 = FDA 174 29 = IARC Group 4 45 = WHIMS - IDL
14 = FDA 175 30 = NTP Carcinogen 46 = Germany D TAL
15 = FDA 176 31 = OSHA Carcinogen 47 = Germany WKG
16 = FDA 177 32 = OSHA Highly Hazardous 48 = DEA List 1
                          49 = DEA List 2

No components of this material were found on the regulatory lists above.

CHEMICAL INVENTORY LISTINGS:
AUSTRALIA YES (AUS)
CANADA YES (DSL)
CHINA YES (IECSC)
EUROPEAN UNION YES (EINECS)
JAPAN YES (ENCS)
KOREA YES (ECL)
PHILIPPINES YES (PICCS)
UNITED STATES YES (TSCA)

EU LABELING:

Revision Number: 3.00  Revision Date: 05/14/2008  DYNARED™ (Seepage Control Fiber)  MSDS : 647920
Risk and Safety Phrases:
S22: Do not breathe dust.

SECTION 16 OTHER INFORMATION

NFPA RATINGS: Health: 0 Flammability: 0 Reactivity: 0 Special: NA

(0-Least, 1-Slight, 2-Moderate, 3-High, 4-Extreme, PPE:- Personal Protection Equipment Index recommendation, -* Chronic Effect Indicator). These values are obtained using the guidelines or published evaluations prepared by the National Fire Protection Association (NFPA).

REVISION STATEMENT: This MSDS was updated to include a GHS review.

ABBREVIATIONS THAT MAY HAVE BEEN USED IN THIS DOCUMENT:

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>TLV</td>
<td>Threshold Limit Value</td>
</tr>
<tr>
<td>STEL</td>
<td>Short-term Exposure Limit</td>
</tr>
<tr>
<td>ACGIH</td>
<td>American Conference of Government Industrial Hygienists</td>
</tr>
<tr>
<td>NIOSH</td>
<td>National Institute for Occupational Safety &amp; Health</td>
</tr>
<tr>
<td>WHMIS</td>
<td>Workplace Hazardous Materials Information System</td>
</tr>
<tr>
<td>EINECS</td>
<td>European Inventory of existing Commercial Chemical Substances</td>
</tr>
<tr>
<td>SARA</td>
<td>Superfund Amendments and Reauthorization Act</td>
</tr>
<tr>
<td>EC50</td>
<td>Effective Concentration</td>
</tr>
<tr>
<td>LD50</td>
<td>Lethal Dose</td>
</tr>
<tr>
<td>NDA</td>
<td>No Data Available</td>
</tr>
<tr>
<td>CNS</td>
<td>Central Nervous System</td>
</tr>
<tr>
<td>TWA</td>
<td>Time Weighted Average</td>
</tr>
<tr>
<td>PEL</td>
<td>Permissible Exposure Limit</td>
</tr>
<tr>
<td>OSHA</td>
<td>Occupational Safety &amp; Health Administration</td>
</tr>
<tr>
<td>NFPA</td>
<td>National Fire Protection Agency</td>
</tr>
<tr>
<td>IARC</td>
<td>Intl. Agency for Research on Cancer</td>
</tr>
<tr>
<td>RCRA</td>
<td>Resource Conservation Recovery Act</td>
</tr>
<tr>
<td>TSCA</td>
<td>Toxic Substance Control Act</td>
</tr>
<tr>
<td>CAS</td>
<td>Chemical Abstract Service</td>
</tr>
<tr>
<td>MAK</td>
<td>Germany Maximum Concentration Values</td>
</tr>
<tr>
<td>LC50</td>
<td>Lethal Concentration</td>
</tr>
<tr>
<td>NA</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>&gt;=</td>
<td>Greater Than or Equal To</td>
</tr>
<tr>
<td>&lt;=</td>
<td>Less Than or Equal To</td>
</tr>
</tbody>
</table>

This data sheet is prepared according to the latest adaptation of the EEC Guideline 67/548. This data sheet is prepared according to the OSHA Hazard Communication Standard (29 CFR 1910.1200). This data sheet is prepared according to the ANSI MSDS Standard (Z400.1). This data sheet was prepared by EHS Product Stewardship Group, Chevron Phillips Chemical Company LP, 10001 Six Pines Drive, The Woodlands, TX 77380. This data sheet is prepared according to the Globally Harmonized System (GHS). The above information is based on the data of which we are aware and is believed to be correct as of the date hereof. Since this information may be applied under conditions beyond our control and with which we may be unfamiliar and since data made available subsequent to the date hereof may suggest modifications of the information, we do not assume any responsibility for the results of its use. This information is furnished upon condition that the person receiving it shall make his own determination of the suitability of the material for his particular purpose.

Revision Number: 3.00  Revision Date: 05/14/2008  DYNARED™ (Seepage Control Fiber)  MSDS: 647920
SAFETY DATA SHEET
EMI-2224

1 IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING

PRODUCT NAME                  EMI-2224
APPLICATION                   Defoamer.
SUPPLIER                      M-I SWACO.
                             Endeavour Drive
                             Amhall Business Park
                             Westhill
                             Aberdeen AB32 6UF
                             Scotland UK
                             T = +44 (0)1224-742200
                             F = +44 (0)1224-742288
                             E-mail =
                             MBXMSDS-EH@miswaco.com

EMERGENCY TELEPHONE           (24 Hour) Europe +44 (0) 1235 239 670, Asia Pacific +65 3158 1074, China +86 10 5100 3039, Middle
                             East and Africa +44 (0) 1235 239 671.

2 HAZARDS IDENTIFICATION

Not regarded as a health or environmental hazard under current legislation.

3 COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Name</th>
<th>EC No.</th>
<th>CAS-No.</th>
<th>Content</th>
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The Full Text for all R-Phrases are Displayed in Section 16

COMPOSITION COMMENTS
The data shown is in accordance with the latest EC Directives.

4 FIRST-AID MEASURES

INHALATION
Move the exposed person to fresh air at once. If respiratory problems, artificial respiration/oxygen. Get medical attention if any discomfort continues.

INGESTION
Immediately give a couple of glasses of water or milk, provided the victim is fully conscious. Get medical attention if any discomfort continues.

SKIN CONTACT
Remove contaminated clothing immediately and wash skin with soap and water. Get medical attention promptly if symptoms occur after washing.

EYE CONTACT
Make sure to remove any contact lenses from the eyes before rinsing. Promptly wash eyes with plenty of water while lifting the eye lids. Continue to rinse for at least 15 minutes. Get medical attention if any discomfort continues.

5 FIRE-FIGHTING MEASURES

EXTINGUISHING MEDIA
Water spray, foam, dry powder or carbon dioxide.

SPECIAL FIRE FIGHTING PROCEDURES
Containers close to fire should be removed immediately or cooled with water.

PROTECTIVE MEASURES IN FIRE
Self contained breathing apparatus and full protective clothing must be worn in case of fire.

6 ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS
Wear protective clothing as described in Section 8 of this safety data sheet.
ENVIRONMENTAL PRECAUTIONS
Do not allow to enter drains, sewers or watercourses.

SPILL CLEAN UP METHODS
Stop leak if possible without risk. Dike far ahead of larger spills for later disposal. Absorb spillage with suitable absorbent material. Shovel into dry containers. Cover and move the containers. Flush the area with water.

7 HANDLING AND STORAGE

USAGE PRECAUTIONS
Avoid spilling, skin and eye contact.

STORAGE PRECAUTIONS
Store in tightly closed original container in a dry, cool and well-ventilated place.

8 EXPOSURE CONTROLS/PERSONAL PROTECTION

INGREDIENT COMMENTS
No exposure limits noted for ingredient(s).

PROTECTIVE EQUIPMENT
ENGINEERING MEASURES
Provide adequate general and local exhaust ventilation.

RESPIRATORY EQUIPMENT
No specific recommendation made, but respiratory protection may still be required under exceptional circumstances when excessive air contamination exists.

HAND PROTECTION
For prolonged or repeated skin contact use suitable protective gloves. Use protective gloves made of: Nitrile. or Neoprene.

EYE PROTECTION
Wear approved chemical safety goggles where eye exposure is reasonably probable.

OTHER PROTECTION
Wear appropriate clothing to prevent any possibility of skin contact. Provide eyewash station.

9 PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE Liquid

COLOUR Light (or pale) Amber

ODOUR Slight odour

SOLUBILITY Insoluble in water

RELATIVE DENSITY ~ 0.96 FLASH POINT (°C) >130°C

10 STABILITY AND REACTIVITY

STABILITY
Stable under normal temperature conditions and recommended use.

11 TOXICOLOGICAL INFORMATION

INHALATION
Gas or vapour in high concentrations may irritate respiratory system.

INGESTION
May cause discomfort if swallowed.

SKIN CONTACT
Prolonged and frequent contact may cause redness and irritation.

EYE CONTACT
Spray and vapour in the eyes may cause irritation and smarting.

12 ECOLOGICAL INFORMATION
ECOTOXICITY
Contact M-I SWACO's QHSE Department for ecological information at env@miswaco.com.

13 DISPOSAL CONSIDERATIONS

DISPOSAL METHODS
Recover and reclaim or recycle, if practical. Dispose of waste and residues in accordance with local authority requirements.

14 TRANSPORT INFORMATION

GENERAL
The product is not covered by international regulation on the transport of dangerous goods (IMDG, IATA, ADR/RID).

15 REGULATORY INFORMATION

RISK PHRASES
NC Not classified.

SAFETY PHRASES
NC Not classified.

UK REGULATORY REFERENCES

EU DIRECTIVES

INTERNATIONAL CHEMICAL INVENTORIES
Contact REACH@miswaco.com for REACH information. Complies with the following national/regional chemical inventory requirements: AICS, DSL/NDSL, IECSC, EINECS / ELINCS, TCCL ECL, NZIoC, TSCA

16 OTHER INFORMATION

INFORMATION SOURCES
Product information provided by the commercial vendor(s). Material Safety Data Sheet, Misc. manufacturers. Micromedex. European Chemicals Bureau - ESIS (European Chemical Substances Information).

REVISION COMMENTS
This is first issue. Compiled or revised by Laura McDonald

ISSUED BY
Bill Cameron

REVISION DATE 15-03-10
REV. NO./REPL. SDS GENERATED 0
SDS NO. 13518

RISK PHRASES IN FULL
NC Not classified.

DISCLAIMER
MSDS furnished independent of product sale. While every effort has been made to accurately describe this product, some of the data are obtained from sources beyond our direct supervision. We cannot make any assertions as to its reliability or completeness; therefore, user may rely only at user's risk. We have made no effort to censor or conceal deleterious aspects of this product. Since we cannot anticipate or control the conditions under which this information and product may be used, we make no guarantee that the precautions we have suggested will be adequate for all individuals and/or situations. It is the obligation of each user of this product to comply with the requirements of all applicable laws regarding use and disposal of this product. Additional information will be furnished upon request to assist the user; however, no warranty, either expressed or implied, nor liability of any nature with respect to this product or to the data herein is made or incurred hereunder.
SAFETY DATA SHEET
KWIK-SEAL - All Grades

1 IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND COMPANY/UNDERTAKING

PRODUCT NAME
KWIK-SEAL - All Grades

APPLICATION
Lost circulation material.

SUPPLIER
M-I Drilling Fluids UK Ltd,
Pocra Quay,
Footdee,
Aberdeen. AB11 5DQ
T -44 (0)1224-584336
F -44 (0)1224-576119

EMERGENCY TELEPHONE
+44(0)208 762 8322

2 COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Name</th>
<th>EC No.</th>
<th>CAS-No.</th>
<th>Content</th>
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<tr>
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The Full Text for all R-Phrases are Displayed in Section 16

COMPOSITION COMMENTS
The Data Shown is in accordance with the latest EC Directives.

3 HAZARDS IDENTIFICATION

Not regarded as a health or environmental hazard under current legislation.

4 FIRST-AID MEASURES

INHALATION
Move the exposed person to fresh air at once. Get medical attention if any discomfort continues.

INGESTION
First aid is not normally required. Rinse mouth thoroughly. Drink plenty of water.

SKIN CONTACT
Remove contaminated clothing immediately and wash skin with soap and water. Get medical attention if irritation persists after washing.

EYE CONTACT
Promptly wash eyes with plenty of water while lifting the eye lids. Continue to rinse for at least 15 minutes. Get medical attention if any discomfort continues.

5 FIRE-FIGHTING MEASURES

EXTINGUISHING MEDIA
Water spray, foam, dry powder or carbon dioxide.

UNUSUAL FIRE & EXPLOSION HAZARDS
High concentrations of dust may form explosive mixture with air.

SPECIFIC HAZARDS
Fire creates: Carbon dioxide (CO2). and Carbon monoxide (CO).

PROTECTIVE MEASURES IN FIRE
Self contained breathing apparatus and full protective clothing must be worn in case of fire.

6 ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS
Wear protective clothing as described in Section 8 of this safety data sheet.

ENVIRONMENTAL PRECAUTIONS
Do not allow to enter drains, sewers or watercourses.
SPILL CLEAN UP METHODS
Avoid generation and spreading of dust. Collect in containers and seal securely. Remove containers and flush area with water.

7 HANDLING AND STORAGE

USAGE PRECAUTIONS
Provide good ventilation. Do not use contact lenses. Avoid handling which leads to dust formation. Avoid contact with skin and eyes.

STORAGE PRECAUTIONS
Store in tightly closed original container in a cool, dry well-ventilated place.

8 EXPOSURE CONTROLS/PERSONAL PROTECTION

<table>
<thead>
<tr>
<th>Name</th>
<th>Std</th>
<th>LT - ppm</th>
<th>LT - mg/m3</th>
<th>ST - ppm</th>
<th>ST - mg/m3</th>
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INGREDIENT COMMENTS
NUI = Nuisance dust, WEL TWA 4mg/m3 Respirable Dust, 10 mg/m3 Total Dust.

PROTECTIVE EQUIPMENT

ENGINEERING MEASURES
Provide adequate general and local exhaust ventilation.

RESPIRATORY EQUIPMENT
Respiratory protection must be used if air contamination exceeds acceptable level. Dust filter P2 (for fine dust).

HAND PROTECTION
Use protective gloves made of: Rubber or plastic.

EYE PROTECTION
Wear dust resistant safety goggles where there is danger of eye contact.

OTHER PROTECTION
Wear appropriate clothing to prevent repeated or prolonged skin contact. Provide eyewash station.

9 PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE        Fibrous Flakes or Granular
COLOUR            Brownish Yellow
ODOUR             Slight odour
SOLUBILITY        Insoluble in water
RELATIVE DENSITY  0.9 - 1.2

10 STABILITY AND REACTIVITY

STABILITY
Stable under normal temperature conditions.

CONDITIONS TO AVOID
Avoid contact with: naked flame

MATERIALS TO AVOID
None known.

11 TOXICOLOGICAL INFORMATION

INHALATION
Dust may irritate respiratory system or lungs.

INGESTION
May cause discomfort if swallowed.

SKIN CONTACT
Powder may irritate skin.

EYE CONTACT
Particles in the eyes may cause irritation and smarting.
12 ECOLOGICAL INFORMATION

ECOTOXICITY
Contact M-I Swaco's QHSE Department for ecological information.

13 DISPOSAL CONSIDERATIONS

DISPOSAL METHODS
Recover and reclaim or recycle, if practical. Dispose of waste and residues in accordance with local authority requirements.

14 TRANSPORT INFORMATION

GENERAL
The product is not covered by international regulation on the transport of dangerous goods (IMDG, IATA, ADR/RID).

15 REGULATORY INFORMATION

RISK PHRASES
NC Not classified.

SAFETY PHRASES
NC Not classified.

UK REGULATORY REFERENCES
Chemicals (Hazard Information & Packaging) Regulations. The Control of Substances Hazardous to Health Regulations

EU DIRECTIVES

GUIDANCE NOTES
Workplace Exposure Limits EH40.

16 OTHER INFORMATION

INFORMATION SOURCES
Material Safety Data Sheet, Misc. manufacturers. Product information provided by the commercial vendor(s).

REVISION COMMENTS
The following sections have been revised: 3, 5, 6, 13, 14, 15 and 16. Revised by Bill Cameron

ISSUED BY
Dr. Kirsty Walker

REVISION DATE 07-12-05

REV. NO./REPL. SDS GENERATED 2

SDS NO. 10879

RISK PHRASES IN FULL
NC Not classified.

DISCLAIMER
MSDS furnished independent of product sale. While every effort has been made to accurately describe this product, some of the data are obtained from sources beyond our direct supervision. We cannot make any assertions as to its reliability or completeness; therefore, user may rely only at user's risk. We have made no effort to censor or conceal deleterious aspects of this product. Since we cannot anticipate or control the conditions under which this information and product may be used, we make no guarantee that the precautions we have suggested will be adequate for all individuals and/or situations. It is the obligation of each user of this product to comply with the requirements of all applicable laws regarding use and disposal of this product. Additional information will be furnished upon request to assist the user; however, no warranty, either expressed or implied, nor liability of any nature with respect to this product or to the data herein is made or incurred hereunder.
SAFETY DATA SHEET
LIME (CALCIUM HYDROXIDE)

1 IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND COMPANY/UNDERTAKING

PRODUCT NAME: LIME (CALCIUM HYDROXIDE)
SYNONYMS, TRADE NAMES: CALCIUM HYDROXIDE
APPLICATION: pH modifier.
SUPPLIER: M-I Drilling Fluids UK Ltd,
Pocra Quay,
Footdee,
Aberdeen. AB11 5DQ
T -44 (0)1224-584336
F -44 (0)1224-576119

EMERGENCY TELEPHONE: +44(0)208 762 8322

2 COMPOSITION/INFORMATION ON INGREDIENTS

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<thead>
<tr>
<th>Name</th>
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<th>CAS-No.</th>
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The Full Text for all R-Phrases are Displayed in Section 16

COMPOSITION COMMENTS
The Data Shown is in accordance with the latest EC Directives.

3 HAZARDS IDENTIFICATION

Irritating to eyes and skin.
CLASSIFICATION: Xi;R36/38.

4 FIRST-AID MEASURES

INHALATION
Move the exposed person to fresh air at once. For breathing difficulties oxygen may be necessary. Get medical attention.

INGESTION
DO NOT INDUCE VOMITING! Rinse mouth thoroughly with water and give large amounts of milk or water to people not unconscious. Provide rest, warmth and fresh air. Get medical attention immediately!

SKIN CONTACT
Remove contaminated clothing immediately and wash skin with soap and water. Get medical attention if any discomfort continues.

EYE CONTACT
Promptly wash eyes with plenty of water while lifting the eye lids. Continue to rinse for at least 15 minutes and get medical attention.

5 FIRE-FIGHTING MEASURES

EXTinguISHING MEDIA
Use fire-extinguishing media appropriate for surrounding materials.

SPECIAL FIRE FIGHTING PROCEDURES
Keep run-off water out of sewers and water sources. Dike for water control.

UNUSUAL FIRE & EXPLOSION HAZARDS
High concentrations of dust may form explosive mixture with air.

PROTECTIVE MEASURES IN FIRE
Self contained breathing apparatus and full protective clothing must be worn in case of fire.

6 ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS
Wear protective clothing as described in Section 8 of this safety data sheet.

ENVIRONMENTAL PRECAUTIONS
Do not allow to enter drains, sewers or watercourses.
LIME (CALCIUM HYDROXIDE)

7 HANDLING AND STORAGE

SPILL CLEAN UP METHODS
Avoid generation and spreading of dust. Ventilate well. Collect in containers and seal securely. Remove containers and flush area with water.

USAGE PRECAUTIONS
Avoid spilling, skin and eye contact. Avoid handling which leads to dust formation. Do not use contact lenses.

STOREAGE PRECAUTIONS
Store in tightly closed original container in a cool, dry well-ventilated place. Keep in original container.

8 EXPOSURE CONTROLS/PERSONAL PROTECTION

<table>
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<tr>
<th>Name</th>
<th>Std</th>
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INGREDIENT COMMENTS
WEL = Workplace Exposure Limits

PROTECTIVE EQUIPMENT

ENGINEERING MEASURES
Provide sufficient ventilation for operations causing dust formation.

RESPIRATORY EQUIPMENT
If ventilation is insufficient, suitable respiratory protection must be provided. Dust mask/respirator. Dust filter P2 (for fine dust).

HAND PROTECTION
Use protective gloves made of: Impermeable material. Rubber, neoprene or PVC.

EYE PROTECTION
Contact lenses should not be worn when working with this chemical! Wear dust resistant safety goggles where there is danger of eye contact.

OTHER PROTECTION
Wear appropriate clothing to prevent repeated or prolonged skin contact. Provide eyewash station and safety shower.

HYGIENE MEASURES
Wash contaminated clothing before reuse.

9 PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE Powder, dust
COLOUR White / off-white
ODOUR Odourless
SOLUBILITY Slightly soluble in water.
MOL. WEIGHT 74
RELATIVE DENSITY 2.34 @ 20 ºC
PARTICLE SIZE (Micron) <500
MELTING POINT (°C) 580
BULK DENSITY 2.24 g/cm³
pH-VALUE, CONC. SOLUTION 12.4
SOLUBILITY VALUE (g/100g H2O@20ºC) 1.7

10 STABILITY AND REACTIVITY

STABILITY
Stable under normal temperature conditions.

CONDITIONS TO AVOID
Avoid contact with: Water, moisture, and Creation of dust clouds.

MATERIALS TO AVOID

11 TOXICOLOGICAL INFORMATION

TOXIC DOSE 1 - LD 50 7340 mg/kg (oral rat)

INHALATION
May cause irritation to the respiratory system. Symptoms may include sore throat, coughing, shortness of breath and difficulty breathing.

INGESTION
May cause burns in mucous membranes, throat, oesophagus and stomach.
LIME (CALCIUM HYDROXIDE)

SKIN CONTACT
Irritating to skin. Prolonged or repeated exposure may cause severe irritation.

EYE CONTACT
Irritating to eyes. Repeated exposure may cause chronic eye irritation. Extreme irritation of eyes and mucous membranes, including burning and tearing.

12 ECOLOGICAL INFORMATION

ECOTOXICITY
Contact M-I Swaco's QHSE Department for ecological information.

13 DISPOSAL CONSIDERATIONS

DISPOSAL METHODS
Recover and reclaim or recycle, if practical. Dispose of waste and residues in accordance with local authority requirements.

14 TRANSPORT INFORMATION

GENERAL
The product is not covered by international regulation on the transport of dangerous goods (IMDG, IATA, ADR/RID).

15 REGULATORY INFORMATION

LABELLING

Irritant

RISK PHRASES
R36/38 Irritating to eyes and skin.

SAFETY PHRASES
S24/25 Avoid contact with skin and eyes.
S26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S37 Wear suitable gloves.

UK REGULATORY REFERENCES
Chemicals (Hazard Information & Packaging) Regulations. The Control of Substances Hazardous to Health Regulations
EU DIRECTIVES
GUIDANCE NOTES
Workplace Exposure Limits EH40.

16 OTHER INFORMATION

GENERAL INFORMATION
HMIS Health - 2 HMIS Flammability - 0 HMIS Physical Hazard - 0
INFORMATION SOURCES
REVISION COMMENTS
The following sections have been revised: 2, 5, 6, 7, 8, 10, 14, 15 and 16. Revised by Bill Cameron
ISSUED BY
Sam Hoskin
REVISION DATE 12-10-05
REV. NO./REPL. SDS GENERATED 3
SDS NO. 10290
RISK PHRASES IN FULL
R36/38 Irritating to eyes and skin.
LIME (CALCIUM HYDROXIDE)

DISCLAIMER

MSDS furnished independent of product sale. While every effort has been made to accurately describe this product, some of the data are obtained from sources beyond our direct supervision. We cannot make any assertions as to its reliability or completeness; therefore, user may rely only at user's risk. We have made no effort to censor or conceal deleterious aspects of this product. Since we cannot anticipate or control the conditions under which this information and product may be used, we make no guarantee that the precautions we have suggested will be adequate for all individuals and/or situations. It is the obligation of each user of this product to comply with the requirements of all applicable laws regarding use and disposal of this product. Additional information will be furnished upon request to assist the user; however, no warranty, either expressed or implied, nor liability of any nature with respect to this product or to the data herein is made or incurred hereunder.
SAFETY DATA SHEET
POLYPAC (All Grades)

1 IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND COMPANY/UNDERTAKING

PRODUCT NAME: POLYPAC (All Grades)
SYNONYMS, TRADE NAMES: Polypac ELV, Polypac R, Polypac Supreme R, Polypac Supreme UL and Polypac UL.
APPLICATION: Fluid loss control
SUPPLIER: M-I Drilling Fluids UK Ltd,
Pocra Quay,
Footdee,
Aberdeen, AB11 5DQ
T -44 (0)1224-584336
F -44 (0)1224-576119

EMERGENCY TELEPHONE: 001 281 561 1600 (USA)

2 COMPOSITION/INFORMATION ON INGREDIENTS

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The Full Text for all R-Phrases are Displayed in Section 16

CAS-NO. 9004-32-4

COMPOSITION COMMENTS
The Data Shown is in accordance with the latest EC Directives.

3 HAZARDS IDENTIFICATION

Not regarded as a health or environmental hazard under current legislation.

4 FIRST-AID MEASURES

INHALATION
Move the exposed person to fresh air at once. Get medical attention if any discomfort continues.

INGESTION
First aid is not normally required. Rinse mouth thoroughly. Drink plenty of water.

SKIN CONTACT
Wash skin thoroughly with soap and water. Remove contaminated clothing. Get medical attention if any discomfort continues.

EYE CONTACT
Promptly wash eyes with plenty of water while lifting the eye lids. Get medical attention if any discomfort continues.

5 FIRE-FIGHTING MEASURES

EXTINGUISHING MEDIA
Carbon dioxide (CO2). Dry chemicals. Foam. Water spray, fog or mist.

SPECIAL FIRE FIGHTING PROCEDURES
In case of spills, beware of slippery floors and surfaces.

UNUSUAL FIRE & EXPLOSION HAZARDS
High concentrations of dust may form explosive mixture with air.

SPECIFIC HAZARDS
Asphyxiating gases/vapours/fumes of: Carbon dioxide (CO2). Carbon monoxide (CO).

PROTECTIVE MEASURES IN FIRE
Self contained breathing apparatus and full protective clothing must be worn in case of fire.

6 ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS
Wear protective clothing as described in Section 8 of this safety data sheet.

ENVIRONMENTAL PRECAUTIONS
Avoid discharge into drains.
POLYPAC (All Grades)

7 HANDLING AND STORAGE

SPILL CLEAN UP METHODS
Collect in containers and seal securely. Flush area clean with lots of water. Be aware of potential for surfaces to become slippery. Avoid generation and spreading of dust.

8 EXPOSURE CONTROLS/PERSONAL PROTECTION

INGREDIENT COMMENTS
NUI = Nuisance dust, OES TWA 4mg/m3 Respirable Dust, 10 mg/m3 Total Dust.

9 PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE
Granular Powder, dust

COLOUR
White to White / off-white

ODOUR
No characteristic odour.

SOLUBILITY
Completely soluble in water

RELATIVE DENSITY
1.5 - 1.6 @ 25 °C

BULK DENSITY
400 - 800 kg/m3

pH-VALUE, DILUTED SOLUTION
6.5 - 8.5 @ 1 %

DECOMPOSITION TEMPERATURE
( >= 230 °C)

10 STABILITY AND REACTIVITY

STABILITY
Stable under normal temperature conditions.

CONDITIONS TO AVOID
Hygroscopic.

HAZARDOUS POLYMERISATION
Will not polymerise.

MATERIALS TO AVOID
Strong oxidising substances.

HAZARDOUS DECOMPOSITION PRODUCTS
Fire or high temperatures create: Asphyxiating gases/vapours/fumes of: Oxides of: Sodium. Carbon dioxide (CO2). Carbon monoxide (CO).

11 TOXICOLOGICAL INFORMATION

TOXIC DOSE 1 - LD 50
27 000 mg/kg (oral rat)

INHALATION
Dust may irritate respiratory system or lungs.

INGESTION
May cause discomfort if swallowed.
SKIN CONTACT
Powder may irritate skin.

EYE CONTACT
Particles in the eyes may cause irritation and smarting.

12 ECOLOGICAL INFORMATION

ECOTOXICITY
Contact M-I Swaco's QHSE Department for ecological information.

13 DISPOSAL CONSIDERATIONS

DISPOSAL METHODS
Recover and reclaim or recycle, if practical. Dispose of waste and residues in accordance with local authority requirements.

14 TRANSPORT INFORMATION

GENERAL
The product is not covered by international regulation on the transport of dangerous goods (IMDG, IATA, ADR/RID).

15 REGULATORY INFORMATION

RISK PHRASES
NC Not classified.

SAFETY PHRASES
NC Not classified.

EU DIRECTIVES

STATUTORY INSTRUMENTS
Chemicals (Hazard Information and Packaging) Regulations. Control of Substances Hazardous to Health.

GUIDANCE NOTES
Workplace Exposure Limits EH40.

16 OTHER INFORMATION

GENERAL INFORMATION
HMIS Health - 1 HMIS Flammability - 1 HMIS Physical Hazard - 0 E - Safety glasses, Gloves, Dust Respirator

INFORMATION SOURCES

REVISION COMMENTS
Classification updated. Revised by Silvia Smart.

ISSUED BY
Sam Hoskin

REVISION DATE
20-Jul-05

REV. NO./REPL. SDS GENERATED
3

SDS NO.
10844

RISK PHRASES IN FULL
NC Not classified.

DISCLAIMER
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SAFETY DATA SHEET
POTASSIUM CHLORIDE BRINE

1 IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND COMPANY/UNDERTAKING

PRODUCT NAME POTASSIUM CHLORIDE BRINE
APPLICATION Oil well completion fluid.
SUPPLIER M-I Drilling Fluids UK Ltd, Pocra Quay, Footdee, Aberdeen. AB11 5DQ
T -44 (0)1224-584336
F -44 (0)1224-576119
EMERGENCY TELEPHONE +44(0)208 762 8322

2 COMPOSITION/INFORMATION ON INGREDIENTS

<table>
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<tr>
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<th>EC No.</th>
<th>CAS-No.</th>
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<td>WATER</td>
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The Full Text for all R-Phrases are Displayed in Section 16

COMPOSITION COMMENTS
This product formulation is not classified as hazardous in accordance with the EC Directives.

3 HAZARDS IDENTIFICATION

Not regarded as a health or environmental hazard under current legislation.

4 FIRST-AID MEASURES

INHALATION
Provide rest, warmth and fresh air. Get medical attention if any discomfort continues.

INGESTION
Rinse mouth thoroughly with water and give large amounts of milk or water to people not unconscious. Get medical attention if any discomfort continues.

SKIN CONTACT
Remove contaminated clothing immediately and wash skin with soap and water. Get medical attention promptly if symptoms occur after washing.

EYE CONTACT
Promptly wash eyes with plenty of water while lifting the eye lids. Continue to rinse for at least 15 minutes. Get medical attention if any discomfort continues.

5 FIRE-FIGHTING MEASURES

EXTINGUISHING MEDIA
The product is non-combustible. Use fire-extinguishing media appropriate for surrounding materials.

SPECIFIC HAZARDS
Fire or high temperatures create: Oxides of: Potassium.

PROTECTIVE MEASURES IN FIRE
Self contained breathing apparatus and full protective clothing must be worn in case of fire.

6 ACCIDENTAL RELEASE MEASURES
PERSONAL PRECAUTIONS
Wear protective clothing as described in Section 8 of this safety data sheet.

ENVIRONMENTAL PRECAUTIONS
Do not allow to enter drains, sewers or watercourses.

SPILL CLEAN UP METHODS
Stop leak if possible without risk. Dike far ahead of spill for later disposal. Absorb spillage with suitable absorbent material. Shovel into dry containers. Cover and move the containers. Flush the area with water.

7 HANDLING AND STORAGE

USAGE PRECAUTIONS
Do not use contact lenses. Avoid spilling, skin and eye contact. Avoid inhalation of vapours.

STORAGE PRECAUTIONS
Store in tightly closed original container in a dry and cool place.

8 EXPOSURE CONTROLS/PERSONAL PROTECTION

<table>
<thead>
<tr>
<th>Name</th>
<th>Std</th>
<th>LT - ppm</th>
<th>LT - mg/m³</th>
<th>ST - ppm</th>
<th>ST - mg/m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>POTASSIUM CHLORIDE</td>
<td>WEL</td>
<td></td>
<td>4 mg/m³</td>
<td>resp.dust</td>
<td></td>
</tr>
</tbody>
</table>

INGREDIENT COMMENTS
Because this product is a liquid, the dust-related WEL’S (workplace exposure limits) for the components do not apply.

PROTECTIVE EQUIPMENT

ENGINEERING MEASURES
Provide adequate general and local exhaust ventilation.

RESPIRATORY EQUIPMENT
Respiratory protection not required.

HAND PROTECTION
Use protective gloves made of: Impermeable material. Rubber or plastic.

EYE PROTECTION
Wear splash-proof eye goggles to prevent any possibility of eye contact.

OTHER PROTECTION
Wear appropriate clothing to prevent repeated or prolonged skin contact. Provide eyewash station.

9 PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>APPEARANCE</th>
<th>Clear Liquid</th>
</tr>
</thead>
<tbody>
<tr>
<td>COLOUR</td>
<td>Colourless</td>
</tr>
<tr>
<td>ODOUR</td>
<td>Odourless</td>
</tr>
<tr>
<td>SOLUBILITY</td>
<td>Soluble in water</td>
</tr>
<tr>
<td>BOILING POINT (°C)</td>
<td>102°C</td>
</tr>
<tr>
<td>RELATIVE DENSITY</td>
<td>1.17 @ 15 °C</td>
</tr>
<tr>
<td>MELTING POINT (°C)</td>
<td>-7°C</td>
</tr>
<tr>
<td>pH-VALUE, CONC. SOLUTION</td>
<td>~ 7</td>
</tr>
</tbody>
</table>

10 STABILITY AND REACTIVITY

STABILITY
Stable under normal temperature conditions.

MATERIALS TO AVOID
Sulphuric acid (H2SO4). Strong oxidising substances.
HAZARDOUS DECOMPOSITION PRODUCTS
Fire or high temperatures create: Oxides of: Potassium.

11 TOXICOLOGICAL INFORMATION

INHALATION
May cause irritation to the respiratory system.

INGESTION
May cause discomfort if swallowed.

SKIN CONTACT
Prolonged and frequent contact may cause redness and irritation.

EYE CONTACT
Spray and vapour in the eyes may cause irritation and smarting.

12 ECOLOGICAL INFORMATION

ECOTOXICITY
Contact M-I Swaco's QHSE Department for ecological information.

13 DISPOSAL CONSIDERATIONS

DISPOSAL METHODS
Recover and reclaim or recycle, if practical. Dispose of waste and residues in accordance with local authority requirements.

14 TRANSPORT INFORMATION

GENERAL
The product is not covered by international regulation on the transport of dangerous goods (IMDG, IATA, ADR/RID). The product has been assessed and contained in Chapters 17 and 18 of the IBC Code and the latest MEPC.2/Circular and is permitted to be carried under Annex II of MARPOL and resolution A.673 (16) Offshore Supply Vessel Code.

15 REGULATORY INFORMATION

RISK PHRASES
NC Not classified.

SAFETY PHRASES
NC Not classified.

UK REGULATORY REFERENCES
Chemicals (Hazard Information & Packaging) Regulations. Control of Substances Hazardous to Health.

EU DIRECTIVES

GUIDANCE NOTES
Workplace Exposure Limits EH40.

16 OTHER INFORMATION

GENERAL INFORMATION
HMIS Health - 1 HMIS Flammability - 0 HMIS Physical Hazard - 0

INFORMATION SOURCES

REVISION COMMENTS
General revision. Revised by Bill Cameron

ISSUED BY
Dr. Kirsty Walker
POTASSIUM CHLORIDE BRINE

RISK PHRASES IN FULL
NC Not classified.

DISCLAIMER
MSDS furnished independent of product sale. While every effort has been made to accurately describe this product, some of the data are obtained from sources beyond our direct supervision. We cannot make any assertions as to its reliability or completeness; therefore, user may rely only at user’s risk. We have made no effort to censor or conceal deleterious aspects of this product. Since we cannot anticipate or control the conditions under which this information and product may be used, we make no guarantee that the precautions we have suggested will be adequate for all individuals and/or situations. It is the obligation of each user of this product to comply with the requirements of all applicable laws regarding use and disposal of this product. Additional information will be furnished upon request to assist the user; however, no warranty, either expressed or implied, nor liability of any nature with respect to this product or to the data herein is made or incurred hereunder.
SAFETY DATA SHEET
Potassium Chloride

1 IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND COMPANY/UNDERTAKING

PRODUCT NAME Potassium Chloride
APPLICATION Oil well drilling fluid additive. Oil well completion fluid additive.
SUPPLIER M-I Drilling Fluids UK Ltd,
Pocra Quay, Footdee, Aberdeen, AB11 5DQ
T +44 (0)1224-584336
F +44 (0)1224-576119

EMERGENCY TELEPHONE +44(0)208 762 8322

2 COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Name</th>
<th>EC No.</th>
<th>CAS-No.</th>
<th>Content</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>POTASSIUM CHLORIDE</td>
<td>231-211-8</td>
<td>7447-40-7</td>
<td>90-100%</td>
<td>-</td>
</tr>
</tbody>
</table>

The Full Text for all R-Phrases are Displayed in Section 16
EU INDEX NO. 000-000-00-0
EC (EINECS) NO. 231-211-8
CAS-NO. 7447-40-7
COMPOSITION COMMENTS
The Data Shown is in accordance with the latest EC Directives.

3 HAZARDS IDENTIFICATION

Not regarded as a health or environmental hazard under current legislation.

4 FIRST-AID MEASURES

INHALATION
Move the exposed person to fresh air at once. Get medical attention if any discomfort continues.

INGESTION
First aid is not normally required. Rinse mouth thoroughly. Drink plenty of water.

SKIN CONTACT
Remove contaminated clothing. Wash skin thoroughly with soap and water. Get medical attention promptly if symptoms occur after washing.

EYE CONTACT
Promptly wash eyes with plenty of water while lifting the eye lids. Continue to rinse for at least 15 minutes. Get medical attention if any discomfort continues.

5 FIRE-FIGHTING MEASURES

EXTINGUISHING MEDIA
Water spray, foam, dry powder or carbon dioxide.

SPECIFIC HAZARDS
Fire or high temperatures create: Asphyxiating gases/vapours/fumes of: Chlorides.

PROTECTIVE MEASURES IN FIRE
Self contained breathing apparatus and full protective clothing must be worn in case of fire.

6 ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS
Wear protective clothing as described in Section 8 of this safety data sheet.

SPILL CLEAN UP METHODS
Shovel into dry containers. Cover and move the containers. Flush the area with water.

7 HANDLING AND STORAGE
Potassium Chloride

USAGE PRECAUTIONS
Avoid handling which leads to dust formation. Provide good ventilation.

STORAGE PRECAUTIONS
Store in tightly closed original container in a well-ventilated place.

8 EXPOSURE CONTROLS/PERSONAL PROTECTION

INGREDIENT COMMENTS
NUI = Nuisance dust, WEL TWA 4mg/m³ Respirable Dust, 10 mg/m³ Total Dust.

PROTECTIVE EQUIPMENT

ENGINEERING MEASURES
Provide adequate ventilation. Observe Workplace Exposure Limits and minimise the risk of inhalation of dust.

RESPIRATORY EQUIPMENT
If ventilation is insufficient, suitable respiratory protection must be provided. Use respiratory equipment with particle filter, type P2.

HAND PROTECTION
For prolonged or repeated skin contact use suitable protective gloves. Rubber gloves are recommended.

EYE PROTECTION
Wear dust resistant safety goggles where there is danger of eye contact.

OTHER PROTECTION
Wear appropriate clothing to prevent repeated or prolonged skin contact. Provide eyewash station.

9 PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE  Powder, dust
COLOUR        White
ODOUR         Odourless
SOLUBILITY    Soluble in water
RELATIVE DENSITY  1.98 20
PARTITION COEFFICIENT -3.0  (N-Octanol/Water)
  pH-VALUE, DILUTED SOLUTION  ~7 1%
  SOLUBILITY VALUE  (g/100g H₂O@ 20°C)  37

10 STABILITY AND REACTIVITY

STABILITY
Stable under normal temperature conditions and recommended use.

CONDITIONS TO AVOID
Avoid wet and humid conditions.

MATERIALS TO AVOID
Strong oxidising substances.

HAZARDOUS DECOMPOSITION PRODUCTS
Fire or high temperatures create: Toxic gases/vapours/fumes of: Chlorides.

11 TOXICOLOGICAL INFORMATION

TOXIC DOSE 1 - LD 50  2600 mg/kg (oral rat)

INHALATION
Dust may irritate respiratory system or lungs.

INGESTION
May cause gastric distress, nausea and vomiting if ingested.

SKIN CONTACT
Powder may irritate skin.

EYE CONTACT
Particles in the eyes may cause irritation and smarting.

12 ECOLOGICAL INFORMATION

ECOTOXICITY
Contact M-I Swaco's QHSE Department for ecological information. OSPAR have defined this chemical as PLONOR. Not regarded as dangerous for the environment. This material is a naturally occurring mineral.
13 DISPOSAL CONSIDERATIONS

DISPOSAL METHODS
Recover and reclaim or recycle, if practical. Dispose of waste and residues in accordance with local authority requirements.

14 TRANSPORT INFORMATION

GENERAL
The product is not covered by international regulation on the transport of dangerous goods (IMDG, IATA, ADR/RID).

15 REGULATORY INFORMATION

RISK PHRASES
NC Not classified.

SAFETY PHRASES
NC Not classified.

UK REGULATORY REFERENCES
Chemicals (Hazard Information & Packaging) Regulations. The Control of Substances Hazardous to Health Regulations
EU DIRECTIVES

GUIDANCE NOTES
Workplace Exposure Limits EH40.

16 OTHER INFORMATION

GENERAL INFORMATION
HMIS Health - 1 HMIS Flammability - 0 HMIS Physical Hazard - 0 E - Safety glasses, Gloves, Dust Respirator

INFORMATION SOURCES

REVISION COMMENTS
The following sections have been revised: 4, 5, 6, 7, 8, 11, 12, 13, 14, 15 and 16. Revised by Bill Cameron

ISSUED BY
Sam Hoskin

REVISION DATE 09-09-05

REV. NO./REPL. SDS GENERATED 1

SDS NO. 10857

RISK PHRASES IN FULL
NC Not classified.

DISCLAIMER
MSDS furnished independent of product sale. While every effort has been made to accurately describe this product, some of the data are obtained from sources beyond our direct supervision. We cannot make any assertions as to its reliability or completeness; therefore, user may rely only at user’s risk. We have made no effort to censor or conceal deleterious aspects of this product. Since we cannot anticipate or control the conditions under which this information and product may be used, we make no guarantee that the precautions we have suggested will be adequate for all individuals and/or situations. It is the obligation of each user of this product to comply with the requirements of all applicable laws regarding use and disposal of this product. Additional information will be furnished upon request to assist the user; however, no warranty, either expressed or implied, nor liability of any nature with respect to this product or to the data herein is made or incurred hereunder.
SAFETY DATA SHEET
SAFE-CARB (All Grades)

1 IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND COMPANY/UNDERTAKING

PRODUCT NAME
SAFE-CARB (All Grades)

APPLICATION
Weighting agent. Lost circulation material. Bridging material.

SUPPLIER
M-I Drilling Fluids UK Ltd,
Pocra Quay,
Footdee,
Aberdeen. AB11 5DQ
T -44 (0)1224-584336
F -44 (0)1224-576119

EMERGENCY TELEPHONE
+44(0)208 762 8322

2 COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Name</th>
<th>EC No.</th>
<th>CAS-No.</th>
<th>Content</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>CALCIUM CARBONATE</td>
<td>207-439-9</td>
<td>471-34-1</td>
<td>60-100%</td>
<td></td>
</tr>
<tr>
<td>QUARTZ, CRYSTALLINE SILICA</td>
<td>238-878-4</td>
<td>14808-60-7</td>
<td>&lt;1%</td>
<td>Xn;R20</td>
</tr>
</tbody>
</table>

The Full Text for all R-Phrases are Displayed in Section 16

COMPOSITION COMMENTS
This product contains a small quantity of quartz, crystalline silica. Prolonged and repeated exposure to concentrations of crystalline silica exceeding the maximum exposure limit may lead to chronic lung disease such as silicosis. Because of quantity and composition, the health hazard is small. The data shown is in accordance with the latest EC Directives.

3 HAZARDS IDENTIFICATION

Not regarded as a health or environmental hazard under current legislation.

4 FIRST-AID MEASURES

INHALATION
Move the exposed person to fresh air at once. Get medical attention if any discomfort continues.

INGESTION
First aid is not normally required. Rinse mouth thoroughly. Drink plenty of water.

SKIN CONTACT
Remove contaminated clothing immediately and wash skin with soap and water. Get medical attention if any discomfort continues.

EYE CONTACT
Promptly wash eyes with plenty of water while lifting the eye lids. Continue to rinse for at least 15 minutes and get medical attention.

5 FIRE-FIGHTING MEASURES

EXTINGUISHING MEDIA
Use fire-extinguishing media appropriate for surrounding materials.

UNUSUAL FIRE & EXPLOSION HAZARDS
High concentrations of dust may form explosive mixture with air.

SPECIFIC HAZARDS
The product is non-combustible. If heated, toxic vapours may be formed. such as, Carbon monoxide (CO). and Carbon dioxide (CO2).

PROTECTIVE MEASURES IN FIRE
Self contained breathing apparatus and full protective clothing must be worn in case of fire.
SAFE-CARB (All Grades)

6 ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS
Wear protective clothing as described in Section 8 of this safety data sheet.

ENVIRONMENTAL PRECAUTIONS
Do not allow to enter drains, sewers or watercourses.

SPILL CLEAN UP METHODS
Avoid generation and spreading of dust. Shovel into dry containers. Cover and move the containers. Flush the area with water.

7 HANDLING AND STORAGE

USAGE PRECAUTIONS
Do not use contact lenses. Provide good ventilation. Avoid handling which leads to dust formation.

STORAGE PRECAUTIONS
Store in tightly closed original container in a dry and cool place.

8 EXPOSURE CONTROLS/PERSONAL PROTECTION

<table>
<thead>
<tr>
<th>Name</th>
<th>Std</th>
<th>LT - ppm</th>
<th>LT - mg/m³</th>
<th>ST - ppm</th>
<th>ST - mg/m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>CALCIUM CARBONATE</td>
<td>WEL</td>
<td></td>
<td>4 mg/m³</td>
<td></td>
<td>resp. dust</td>
</tr>
<tr>
<td>QUARTZ, CRYSTALLINE SILICA</td>
<td>WEL</td>
<td></td>
<td>0.3 mg/m³</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

INGREDIENT COMMENTS
WEL = Workplace Exposure Limits NUI = Nuisance dust, WEL TWA 4mg/m³ Respirable Dust, 10 mg/m³ Total Dust. The quartz component of this product is currently being reviewed by the (UK) HSE. As a result they have issued Chemical Hazard Alert Notice 35. It states that although the present limit is set at 0.3mg/m³ (8-hour TWA) employers should aim to control exposure to 0.1mg/m³ (8-hour TWA) or below, until the new guidelines are issued.

PROTECTIVE EQUIPMENT

ENGINEERING MEASURES
Provide adequate general and local exhaust ventilation.

RESPIRATORY EQUIPMENT
Respiratory protection must be used if air contamination exceeds acceptable level. Dust filter P3 (for especially fine dust/powder).

HAND PROTECTION
Use protective gloves made of: Rubber or plastic.

EYE PROTECTION
Wear dust resistant safety goggles where there is danger of eye contact.

OTHER PROTECTION
Wear appropriate clothing to prevent repeated or prolonged skin contact. Provide eyewash station.

9 PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>PROPERTY</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>APPEARANCE</td>
<td>Powder, dust</td>
</tr>
<tr>
<td>COLOUR</td>
<td>White / off-white</td>
</tr>
<tr>
<td>ODOUR</td>
<td>Odourless</td>
</tr>
<tr>
<td>SOLUBILITY</td>
<td>Insoluble in water</td>
</tr>
<tr>
<td>RELATIVE DENSITY</td>
<td>2.9 g/cm³</td>
</tr>
<tr>
<td>pH-VALUE, DILUTED SOLUTION</td>
<td>8.5-9.5 100g/l @ 20°C</td>
</tr>
<tr>
<td>DECOMPOSITION TEMPERATURE (°C)</td>
<td>825°C</td>
</tr>
</tbody>
</table>
10 STABILITY AND REACTIVITY

STABILITY
Stable under normal temperature conditions.

MATERIALS TO AVOID
Strong acids.

HAZARDOUS DECOMPOSITION PRODUCTS
The product is non-combustible. If heated, toxic vapours may be formed such as, Carbon monoxide (CO) and Carbon dioxide (CO2).

11 TOXICOLOGICAL INFORMATION

INHALATION
Dust may irritate respiratory system or lungs.

INGESTION
May cause discomfort if swallowed.

SKIN CONTACT
Powder may irritate skin.

EYE CONTACT
Particles in the eyes may cause irritation and smarting.

HEALTH WARNINGS
This product contains a small quantity of quartz. Prolonged and repeated exposure by inhalation to concentrations of crystalline silica exceeding the maximum exposure limit may lead to chronic lung disease such as silicosis. Because of quantity and composition, the health hazard is small.

12 ECOLOGICAL INFORMATION

ECOTOXICITY
Contact M-I Swaco's QHSE Department for ecological information.

13 DISPOSAL CONSIDERATIONS

DISPOSAL METHODS
Recover and reclaim or recycle, if practical. Dispose of waste and residues in accordance with local authority requirements.

14 TRANSPORT INFORMATION

GENERAL
The product is not covered by international regulation on the transport of dangerous goods (IMDG, IATA, ADR/RID).

15 REGULATORY INFORMATION

RISK PHRASES
NC Not classified.

SAFETY PHRASES
NC Not classified.

UK REGULATORY REFERENCES
Chemicals (Hazard Information & Packaging) Regulations, The Control of Substances Hazardous to Health Regulations

EU DIRECTIVES

GUIDANCE NOTES

16 OTHER INFORMATION
SAFE-CARB (All Grades)

GENERAL INFORMATION
HMIS Health - 1 HMIS Flammability - 0 HMIS Physical Hazard - 0 E - Safety glasses, Gloves, Dust Respirator

INFORMATION SOURCES
Material Safety Data Sheet, Misc. manufacturers. Product information provided by the commercial vendor(s). European Chemicals Bureau - ESIS (European Chemical Substances Information System).

REVISION COMMENTS
General revision. Revised by Bill Cameron

ISSUED BY
Dr. Kirsty Walker

REVISION DATE 29-09-06
REV. NO./REPL. SDS GENERATED 3
SDS NO. 10755

RISK PHRASES IN FULL
R20 Harmful by inhalation.

DISCLAIMER
MSDS furnished independent of product sale. While every effort has been made to accurately describe this product, some of the data are obtained from sources beyond our direct supervision. We cannot make any assertions as to its reliability or completeness; therefore, user may rely only at user’s risk. We have made no effort to censor or conceal deleterious aspects of this product. Since we cannot anticipate or control the conditions under which this information and product may be used, we make no guarantee that the precautions we have suggested will be adequate for all individuals and/or situations. It is the obligation of each user of this product to comply with the requirements of all applicable laws regarding use and disposal of this product. Additional information will be furnished upon request to assist the user; however, no warranty, either expressed or implied, nor liability of any nature with respect to this product or to the data herein is made or incurred hereunder.
MATERIAL SAFETY DATA SHEET
SAFE-CIDE

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

TRADE NAME: SAFE-CIDE
APPLICATIONS: Oil well completion fluid additive.
EMERGENCY TELEPHONE: 281-561-1600
SUPPLIER: Supplied by a Business Unit of M-I L.L.C.
P.O. Box 42842, Houston, Texas 77242-2842
See cover sheet for local supplier.
TELEPHONE: 281-561-1509
FAX: 281-561-7240
CONTACT PERSON: Sam Hoskin - Manager, Occupational Health

2. COMPOSITION, INFORMATION ON INGREDIENTS

INGREDIENT NAME: 
1,3,5-Triazine-1,3,5(2H,4H,6H)-triethanol CAS No.: 4719-04-4 CONTENTS: 50-100 % EPA RQ: TPQ: 
Glycine, N,N'-1,2-ethanediylbis[N-(carboxymethyl)-, tetrasodium salt 64-02-8 1-5 %

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW:
WARNING! HARMFUL IF SWALLOWED

Do not take internally. Wash Thoroughly after handling. This product is a Clear, colorless liquid Dike and contain spills. Keep out of sewers and waterways. Skin and eye irritant.

May cause sensitization by skin contact.

ACUTE EFFECTS:
INHALATION: May be irritating to the respiratory tract if inhaled.

INGESTION: Harmful if swallowed.

SKIN: Irritating to skin. May cause sensitisation by skin contact.

EYES: Severely irritating to the eyes.

CHRONIC EFFECTS:
SENSITIZATION: May cause sensitization, an allergic reaction, which becomes evident on reexposure to this chemical.

CARCINOGENICITY:
ROUTE OF ENTRY:
Inhalation. Skin and/or eye contact.

TARGET ORGANS:
Respiratory system, lungs. Skin. Eyes.

4. FIRST AID MEASURES

GENERAL:
Persons seeking medical attention should carry a copy of this MSDS with them.

INHALATION:
Move the exposed person to fresh air at once. Perform artificial respiration if breathing has stopped. Get medical attention.

INGESTION:
Drink a couple of glasses water or milk. Do NOT induce vomiting unless directed to do so by a physician. Never give anything by mouth to an unconscious person. Get medical attention.

SKIN:
Immediately remove contaminated clothing. Wash skin thoroughly with soap and water.

EYES:
Immediately rinse with water for several minutes. Continue to rinse for at least 15 minutes and get medical attention.

5. FIRE FIGHTING MEASURES

FLASH POINT (°F):
>212

METHOD: PM Closed cup.

AUTO IGNITION TEMP. (°F):
N/D

FLAMMABILITY LIMIT - LOWER(%):
N/D

FLAMMABILITY LIMIT - UPPER(%):
N/D

EXTINGUISHING MEDIA:
Carbon dioxide (CO2). Dry chemicals. Foam. Water spray, fog or mist.

SPECIAL FIRE FIGHTING PROCEDURES:
Wear positive-pressure, self-contained breathing apparatus (SCBA) and protective fire fighting clothing (including fire fighting helmet, coat, pants, boots, and gloves). If protective equipment is not available or not used, fight fire from a protected location or safe distance.

UNUSUAL FIRE & EXPLOSION HAZARDS:
No unusual fire or explosion hazards noted.

HAZARDOUS COMBUSTION PRODUCTS:

6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS:
Wear proper personal protective equipment (see MSDS Section 8).

SPILL CLEAN-UP PROCEDURES:
Absorb in vermiculite, dry sand or earth and place into containers. Rinse area with water. Dike far ahead of larger spills for later disposal. Do not contaminate drainage or waterways.

7. HANDLING AND STORAGE
HANDLING PRECAUTIONS:
Ventilate well, avoid breathing vapors. Use approved respirator if air contamination is above accepted level. Wear full protective clothing for prolonged exposure and/or high concentrations. Eye wash and emergency shower must be available at the work place. Wash hands often and change clothing when needed.

STORAGE PRECAUTIONS:
Store at moderate temperatures in dry, well ventilated area. Keep in original container.

8. EXPOSURE CONTROLS, PERSONAL PROTECTION

<table>
<thead>
<tr>
<th>INGREDIENT NAME</th>
<th>CAS No.</th>
<th>OSHA PEL</th>
<th>ACGIH TLV</th>
<th>OTHER</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,3,5-Triazine-1,3,5(2H,4H,6H)-triethanol</td>
<td>4719-04-4</td>
<td>TWA:</td>
<td>STEL:</td>
<td>No std.</td>
</tr>
<tr>
<td>Glycine, N,N'-1,2-ethanediylbis[N-(carboxymethyl)-tetrasodium salt</td>
<td>64-02-8</td>
<td>TWA:</td>
<td>STEL:</td>
<td>No std.</td>
</tr>
</tbody>
</table>

INGREDIENT COMMENTS:
This product is regulated as nuisance particulates (dust/mist/aerosol). TLV: 3 mg/m³ resp. dust; PEL: 5 mg/m³ resp. dust.

PROTECTIVE EQUIPMENT:

ENGINEERING CONTROLS:
Use appropriate engineering controls such as, exhaust ventilation and process enclosure, to reduce air contamination and keep worker exposure below the applicable limits.

VENTILATION:
Supply natural or mechanical ventilation adequate to exhaust airborne product and keep exposures below the applicable limits.

RESPIRATORS:
If exposed to particulates/aerosols:
Use at least a NIOSH-approved N95 half-mask disposable or reusable particulate respirator. In work environments containing oil mist/aerosol use at least a NIOSH-approved P95 half-mask disposable or reusable particulate respirator.
If exposed to organic vapors:
Use a NIOSH/MSHA-approved organic vapor respirator. CCROV: CCR with organic vapor cartridge.

PROTECTIVE GLOVES:
Chemical resistant gloves required for prolonged or repeated contact. Use protective gloves made of: Impermeable material. Such as, Neoprene, nitrile, polyethylene or PVC.

EYE PROTECTION:
Wear chemical safety goggles where eye exposure is reasonably probable.

PROTECTIVE CLOTHING:
Wear appropriate clothing to prevent repeated or prolonged skin contact.

HYGIENIC WORK PRACTICES:
Wash promptly with soap and water if skin becomes contaminated. Change work clothing daily if there is any possibility of contamination.

9. PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>APPEARANCE/PHYSICAL STATE</th>
<th>COLOR</th>
<th>ODOR</th>
<th>SOLUBILITY DESCRIPTION</th>
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</thead>
</table>
10. STABILITY AND REACTIVITY

STABILITY: Normally stable.

CONDITIONS TO AVOID: N/D.

HAZARDOUS POLYMERIZATION: Will not polymerize.

POLYMERIZATION DESCRIPTION: Not relevant.

MATERIALS TO AVOID: Nitrites. Strong acids and oxidizers. On contact with acid, releases formaldehyde.


11. TOXICOLOGICAL INFORMATION

TOXICOLOGICAL INFORMATION:
Toxicological data for major component(s):
Component: 1,3,5-Triazine-1,3,5(2H,4H,6H)-triethanol

TOXIC DOSE - LD 50: 763 mg/kg (oral rat)

12. ECOLOGICAL INFORMATION

ECOLOGICAL INFORMATION:
No ecological information is available for this product.

13. DISPOSAL CONSIDERATIONS

WASTE MANAGEMENT:
This product does not meet the criteria of a hazardous waste if discarded in its purchased form. Under RCRA, it is the responsibility of the user of the product to determine at the time of disposal, whether the product meets RCRA criteria for hazardous waste. This is because product uses, transformations, mixtures, processes, etc., may render the resulting materials hazardous. Empty containers retain residues. All labeled precautions must be observed.

DISPOSAL METHODS:
Recover and reclaim or recycle, if practical. Should this product become a waste, dispose of in a permitted industrial landfill. Ensure that containers are empty by RCRA criteria prior to disposal in a permitted industrial landfill.

14. TRANSPORT INFORMATION
PRODUCT RQ: N/A


CANADIAN TRANSPORT: TDGR CLASS: Not regulated.

SEA TRANSPORT: IMDG CLASS: Not regulated.

AIR TRANSPORT: ICAO CLASS: Not regulated.

15. REGULATORY INFORMATION

REGULATORY STATUS OF INGREDIENTS:

<table>
<thead>
<tr>
<th>NAME</th>
<th>CAS No</th>
<th>TSCA</th>
<th>CERCLA</th>
<th>SARA 302</th>
<th>SARA 313</th>
<th>DSL(CAN)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,3,5-Triazine-1,3,5(2H,4H,6H)-triethanol</td>
<td>4719-04-4</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Glycine, N,N'-1,2-ethanediylbis[N-(carboxymethyl)-, tetrasodium salt</td>
<td>64-02-8</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

US FEDERAL REGULATIONS:

REGULATORY STATUS:
This Product or its components, if a mixture, is subject to following regulations (Not meant to be all inclusive - selected regulations represented):

SECTION 313: This product does not contain toxic chemical subject to the reporting requirements of Section 313 of Title III of the Superfund Amendment and Reauthorization Act of 1986 and 40 CFR Part 372.

SARA 311 Categories:
1: Immediate (Acute) Health Effects.

The components of this product are listed on or are exempt from the following international chemical registries:
TSCA (U.S.)

STATE REGULATIONS:
STATE REGULATORY STATUS: This product or its components, if a mixture, is subject to following regulations (Not meant to be all inclusive - selected regulations represented):
None.

PROPOSITION 65: This product does not contain chemicals considered by the State of California's Safe Drinking Water and Toxic Enforcement Act of 1986 as causing cancer or reproductive toxicity, and for which warnings are now required.

CANADIAN REGULATIONS:
LABELS FOR SUPPLY:

REGULATORY STATUS: This Material Safety Data Sheet has been prepared in compliance with the Controled Product Regulations.

Canadian WHMIS Classification: D2B - Other Toxic Effects: Toxic Material
### 16. OTHER INFORMATION

<table>
<thead>
<tr>
<th>NPCA HMIS HAZARD INDEX:</th>
<th>2 Moderate Hazard</th>
</tr>
</thead>
<tbody>
<tr>
<td>FLAMMABILITY:</td>
<td>0 Minimal Hazard</td>
</tr>
<tr>
<td>REACTIVITY:</td>
<td>0 Minimal Hazard</td>
</tr>
<tr>
<td>NPCA HMIS PERS. PROTECT. INDEX:</td>
<td>J - Splash Goggles, Gloves, Synthetic Apron, Dust and Vapor Respirator.</td>
</tr>
</tbody>
</table>

**USER NOTES:**

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

**INFORMATION SOURCES:**


ACGIH Threshold Limit Values and Biological Exposure Indices for Chemical Substances and Physical Agents (latest edition).


Product information provided by the commercial vendor(s).

**PREPARED BY:**

Sam Hoskin/bb

**REVISION No./Repl. MSDS of:**

1/August 16, 2000

**MSDS STATUS:**

Approved.

**DATE:**

October 6, 2000

**DISCLAIMER:**

MSDS furnished independent of product sale. While every effort has been made to accurately describe this product, some of the data are obtained from sources beyond our direct supervision. We cannot make any assertions as to its reliability or completeness; therefore, user may rely on it only at user's risk. We have made no effort to censor or conceal deleterious aspects of this product. Since we cannot anticipate or control the conditions under which this information and product may be used, we make no guarantee that the precautions we have suggested will be adequate for all individuals an/or situations. It is the obligation of each user of this product to comply with the requirements of all applicable laws regarding use and disposal of this product. Additional information will be furnished upon request to assist the user; however, no warranty, either expressed or implied, nor liability of any nature with respect to this product or to the data herein is made or incurred hereunder.
SECTION 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1. Product identifier

Product name: SAFE-COR* EN

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

Identified uses: Corrosion inhibitor.

1.3. Details of the supplier of the safety data sheet

Supplier: M-I SWACO
A Schlumberger Company
Woodlands Drive
Kirkhill Industrial Estate
Dyce, Aberdeen AB21 0GW
Scotland UK
T=+44(0)1224-246600
F=+11(0)1224-246699
Email - MISDS@slb.com

1.4. Emergency telephone number

(24 Hour) Australia +61 2801 44558, Asia Pacific +65 3158 1074, China +86 10 5100 3039, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, New Zealand +64 929 1483, USA 001 281 561 1600.

SECTION 2: HAZARDS IDENTIFICATION

2.1. Classification of the substance or mixture


2.2. Label elements

Contains: FORMALDEHYDE, REACTION PRODUCTS WITH ETHANOLAMINE

Labelling: Irritant

Risk Phrases: R36/38 Irritating to eyes and skin.
R43 May cause sensitisation by skin contact.

Safety Phrases: S24/25 Avoid contact with skin and eyes.
S26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S37 Wear suitable gloves.
S60 This material and its container must be disposed of as hazardous waste.

2.3. Other hazards

Not Classified as PBT/vPvB by current EU criteria.

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.2. Mixtures
FORMALDEHYDE, REACTION PRODUCTS WITH ETHANOLAMINE 10-30%

CAS-No.: 85186-27-2  EC No.: 286-011-3

Classification (EC 1272/2008)  Classification (67/548/EEC)
Acute Tox. 4 - H302  Xn; R22.
Skin Irrit. 2 - H315  Xi; R36/38.
Eye Irrit. 2 - H319  R43, R52.
Skin Sens. 1 - H317

The Full Text for all R-Phrases and Hazard Statements are Displayed in Section 16.

Composition Comments
The data shown is in accordance with the latest EC Directives.

SECTION 4: FIRST AID MEASURES

4.1. Description of first aid measures

**Inhalation**
Move the exposed person to fresh air at once. If respiratory problems, artificial respiration/oxygen. Get medical attention if any discomfort continues.

**Ingestion**
Do not induce vomiting. Immediately give a couple of glasses of water or milk, provided the victim is fully conscious. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs. Get medical attention if any discomfort continues.

**Skin contact**
Remove contaminated clothing immediately and wash skin with soap and water. Get medical attention promptly if symptoms occur after washing.

**Eye contact**
Make sure to remove any contact lenses from the eyes before rinsing. Promptly wash eyes with plenty of water while lifting the eye lids. Continue to rinse for at least 15 minutes. Get medical attention if any discomfort continues.

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

**General information**
The severity of the symptoms described will vary dependant of the concentration and the length of exposure. If adverse symptoms develop as described the casualty should be transferred to hospital as soon as possible. For further information, please refer to section 11.

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

SECTION 5: FIREFIGHTING MEASURES

5.1. Extinguishing media

**Extinguishing media**
Water spray, foam, dry powder or carbon dioxide.

5.2. Special hazards arising from the substance or mixture

**Hazardous combustion products**
Fire or high temperatures create: Carbon monoxide (CO). Carbon dioxide (CO2). Nitrous gases (NOx).

5.3. Advice for firefighters

**Special Fire Fighting Procedures**
Containers close to fire should be removed immediately or cooled with water.

**Protective equipment for fire-fighters**
Self contained breathing apparatus and full protective clothing must be worn in case of fire.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures
Wear protective clothing as described in Section 8 of this safety data sheet.

6.2. Environmental precautions
Do not allow to enter drains, sewers or watercourses.
6.3. Methods and material for containment and cleaning up

Stop leak if possible without risk. Dike far ahead of larger spills for later disposal. Absorb spillage with suitable absorbent material. Shovel into dry containers. Cover and move the containers. Flush the area with water.

6.4. Reference to other sections

Wear protective clothing as described in Section 8 of this safety data sheet.

SECTION 7: HANDLING AND STORAGE

7.1. Precautions for safe handling

Avoid spilling, skin and eye contact. Avoid inhalation of vapours and spray mists. May cause sensitisation by skin contact. Persons susceptible to allergic reactions should not handle this product.

7.2. Conditions for safe storage, including any incompatibilities

Store in tightly closed original container in a dry, cool and well-ventilated place. Avoid contact with acids and oxidising substances.

Storage Class
Chemical storage.

7.3. Specific end use(s)

The identified uses for this product are detailed in Section 1.2.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1. Control parameters

Ingredient Comments
No exposure limits noted for ingredient(s).

8.2. Exposure controls

Protective equipment

Process conditions
All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

Engineering measures
Provide adequate general and local exhaust ventilation.

Respiratory equipment
If ventilation is insufficient, suitable respiratory protection must be provided. Use respiratory equipment with combination filter, type A2/P3. At work in confined or poorly ventilated spaces, respiratory protection with air supply must be used.

Hand protection
Use suitable protective gloves if risk of skin contact. Nitrile. or Neoprene gloves are recommended. Be aware that the liquid may penetrate the gloves. Frequent change is advisable.

Eye protection
Wear approved safety goggles.

Other Protection
Wear appropriate clothing to prevent any possibility of skin contact. Provide eyewash station.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on basic physical and chemical properties

Appearance
Liquid

Colour
Dark brown.

Odour
Amine.
Solubility
Soluble in water.

Melting point (°C)
-8°C

Relative density
1.05 g/cm³ @ 20°C

pH-Value, Conc. Solution
10.6

Viscosity
5.7 cP @ 20°C

Flash point (°C)
>70°C CC (Closed cup).

Partition Coefficient
(N-Octanol/Water)<0

9.2. Other information
Not relevant

SECTION 10: STABILITY AND REACTIVITY

10.1. Reactivity
There are no known reactivity hazards associated with this product.

10.2. Chemical stability
Stable under normal temperature conditions and recommended use.

10.3. Possibility of hazardous reactions
Not known.

10.4. Conditions to avoid
Not known.

10.5. Incompatible materials

Materials To Avoid
Avoid contact with acids and oxidising substances.

10.6. Hazardous decomposition products

Fire or high temperatures create: Carbon monoxide (CO). Carbon dioxide (CO₂). Nitrous gases (NOx).

SECTION 11: TOXICOLOGICAL INFORMATION

11.1. Information on toxicological effects

Aspiration hazard:
Not anticipated to present an aspiration hazard based on chemical structure.

General information
Risk of sensitisation or allergic reactions among sensitive individuals.

Inhalation
Gas or vapour in high concentrations may irritate respiratory system.

Ingestion
Harmful if swallowed.

Skin contact
Irritating to skin. May cause sensitisation by skin contact.

Eye contact
Irritating to eyes. Spray and vapour in the eyes may cause irritation andsmarting.

Route of entry
Skin and/or eye contact.

Target Organs
Skin Eyes
SECTION 12: ECOLOGICAL INFORMATION

Ecotoxicity
Contact M-I SWACO’s QHSE Department for ecological information at env@miswaco.slb.com.

12.1. Toxicity

Acute Fish Toxicity
Harmful to aquatic organisms.
IC 50, 72 Hrs, Algae, mg/l 1 - 10*
*Based on components

12.2. Persistence and degradability

Degradability
The product is biodegradable.
Biodegradation >60%

12.3. Bioaccumulative potential

Bioaccumulative potential
The product is not bioaccumulating.
Partition coefficient <0

12.4. Mobility in soil

Mobility:
The product is soluble in water.

12.5. Results of PBT and vPvB assessment

Not Classified as PBT/vPvB by current EU criteria.

12.6. Other adverse effects

The product may affect the acidity (pH-factor) in water with risk of harmful effects to aquatic organisms.

SECTION 13: DISPOSAL CONSIDERATIONS

13.1. Waste treatment methods

Recover and reclaim or recycle, if practical. Dispose of waste and residues in accordance with local authority requirements.

Waste Class
The definitive European Waste code for this product will depend upon the final use that is made of this material. EWC-code: 07 01 04. Waste number: 7152. Organic waste without halogen.

SECTION 14: TRANSPORT INFORMATION

General
The product is not covered by international regulation on the transport of dangerous goods (IMDG, IATA, ADR/RID).

14.1. UN number

Not applicable.

14.2. UN proper shipping name

Not applicable.

14.3. Transport hazard class(es)

Not applicable.

14.4. Packing group

Not applicable.

14.5. Environmental hazards

Environmentally Hazardous Substance/Marine Pollutant
No.
14.6. Special precautions for user
Not applicable.

14.7. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code
Not applicable. Please contact MISDS@slb.com for info regarding transport in Bulk.

SECTION 15: REGULATORY INFORMATION

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

UK Regulatory References

EU Legislation

15.2. Chemical Safety Assessment

International Chemical Inventories
Contact REACH@miswaco.slb.com for REACH information. Complies with the following national/regional chemical inventory requirements: Europe (EINECS / ELINCS).

SECTION 16: OTHER INFORMATION

Abbreviations and acronyms used in the safety data sheet
*a mark of M-I L.L.C.

Information Sources
Product information provided by the commercial vendor(s). Material Safety Data Sheet, Misc. manufacturers. Lولي. European Chemicals Bureau - ESIS (European Chemical Substances Information).

Revision Comments
General revision. Updated according to REACH Annex II.

Issued By
Sandra McWilliam

Revision Date
05-Mar-13

Revision
1

Supersedes date
10-Jan-11

SDS No.
14392

Safety Data Sheet Status
Temporarily approved for use for 3 months.

Date
05-Mar-13

Signature
Ewan McLeod

Signature 2
Nina Øvrehus

Risk Phrases In Full
R22 Harmful if swallowed.
R52 Harmful to aquatic organisms.
R36/38 Irritating to eyes and skin.
R43 May cause sensitisation by skin contact.

Hazard Statements In Full
H302 Harmful if swallowed.
H315 Causes skin irritation.
H317 May cause an allergic skin reaction.
H319 Causes serious eye irritation.

Disclaimer
MSDS furnished independent of product sale. While every effort has been made to accurately describe this product, some of the data are obtained from sources beyond our direct supervision. We cannot make any assertions as to its reliability or completeness; therefore, user may rely only at user's risk. We have made no effort to censor or conceal deleterious aspects of this product. Since we cannot anticipate or control the conditions under which this information and product may be used, we make no guarantee that the precautions we have suggested will be adequate for all individuals and/or situations is the obligation of each user of this product to comply with the requirements of all applicable laws regarding use and disposal of this product. Additional information will be furnished upon request to assist the user; however, no warranty, either expressed or implied, nor liability of any nature with respect to the product or to the data herein is made or incurred hereunder.
SAFETY DATA SHEET
SAFE-SCAV HS

1 IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND COMPANY/UNDERTAKING

PRODUCT NAME SAFE-SCAV HS
APPLICATION Hydrogen sulphide scavenger.
SUPPLIER M-I Drilling Fluids UK Ltd,
Pocra Quay,
Footdee,
Aberdeen. AB11 5DQ
T -44 (0)1224-584336
F -44 (0)1224-576119
EMERGENCY TELEPHONE +44(0)208 762 8322

2 COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Name</th>
<th>EC No.</th>
<th>CAS-No.</th>
<th>Content</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>HYDROXYALKYL TRIAZINE</td>
<td></td>
<td>231-791-2</td>
<td>60-100%</td>
<td>Xn;R20/21/22. Xi;R36/38.</td>
</tr>
<tr>
<td>WATER</td>
<td></td>
<td>7732-18-5</td>
<td>30-60%</td>
<td>-</td>
</tr>
</tbody>
</table>

The Full Text for all R-Phrases are Displayed in Section 16

COMPOSITION COMMENTS
This product is classified as harmful in accordance with the EU Directives.

3 HAZARDS IDENTIFICATION
Harmful by inhalation, in contact with skin and if swallowed.
Irritating to eyes and skin.
CLASSIFICATION Xn;R20/21/22. Xi;R36/38.

4 FIRST-AID MEASURES

INHALATION
Move the exposed person to fresh air at once. If respiratory problems, artificial respiration/oxygen. Get medical attention if any discomfort continues.

INGESTION
Do not induce vomiting. Rinse mouth thoroughly with water and give large amounts of milk or water to people not unconscious. Get medical attention if any discomfort continues.

SKIN CONTACT
Remove contaminated clothing immediately and wash skin with soap and water. Get medical attention if any discomfort continues.

EYE CONTACT
Promptly wash eyes with plenty of water while lifting the eye lids. Continue to rinse for at least 15 minutes. Get medical attention promptly if symptoms occur after washing.

5 FIRE-FIGHTING MEASURES

EXTINGUISHING MEDIA
Water spray, foam, dry powder or carbon dioxide.

SPECIAL FIRE FIGHTING PROCEDURES
Cool containers exposed to flames with water until well after the fire is out.

SPECIFIC HAZARDS

PROTECTIVE MEASURES IN FIRE
Self contained breathing apparatus and full protective clothing must be worn in case of fire.
6 ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS
Wear proper personal protective equipment (see MSDS Section 8).

ENVIRONMENTAL PRECAUTIONS
Do not allow to enter drains, sewers or watercourses.

SPILL CLEAN UP METHODS
Stop leak if possible without risk. Absorb spillage with suitable absorbent material. Collect in containers and seal securely. Remove containers and flush area with water.

7 HANDLING AND STORAGE

USAGE PRECAUTIONS
Avoid spilling, skin and eye contact. Avoid inhalation of vapours. Do not use contact lenses.

STORAGE PRECAUTIONS
Store in tightly closed original container in a cool, dry well-ventilated place.

8 EXPOSURE CONTROLS/PERSONAL PROTECTION

INGREDIENT COMMENTS
No exposure limits noted for ingredient(s).

PROTECTIVE EQUIPMENT

ENGINEERING MEASURES
Provide adequate general and local exhaust ventilation.

RESPIRATORY EQUIPMENT
If ventilation is insufficient, suitable respiratory protection must be provided. Gas cartridge suitable for organic substances.

HAND PROTECTION
Use protective gloves made of: Neoprene, nitrile, polyethylene or PVC.

EYE PROTECTION
Wear splash-proof eye goggles to prevent any possibility of eye contact.

OTHER PROTECTION
Wear appropriate clothing to prevent repeated or prolonged skin contact. Provide eyewash station.

9 PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE
Liquid

COLOUR
Amber Yellow

ODOUR
Amine.

SOLUBILITY
Soluble in water

MELTING POINT (°C)
< - 20

RELATIVE DENSITY
1.065 - 1.135 @ 16 °c

VISCOSITY
< 10 cSt @ 38 °c

FLASH POINT (°C)
> 100 PM Closed cup.

PARTITION COEFFICIENT
- 1.5 to 0.2
(N-Octanol/Water)

10 STABILITY AND REACTIVITY

STABILITY
Stable under normal temperature conditions.

HAZARDOUS POLYMERISATION
Will not polymerise.

MATERIALS TO AVOID
Strong oxidising substances.

HAZARDOUS DECOMPOSITION PRODUCTS
Fire or high temperatures create: Carbon dioxide (CO2). Carbon monoxide (CO). and Oxides of: Nitrogen.

11 TOXICOLOGICAL INFORMATION
SAFE-SCAV HS

TOXIC DOSE 1 - LD 50 1620 mg/kg (oral rat)

INHALATION
Harmful by inhalation. In high concentrations, vapours are anaesthetic and may cause headache, fatigue, dizziness and central nervous system effects.

INGESTION
Harmful if swallowed. May cause gastric distress, nausea and vomiting if ingested.

SKIN CONTACT
Harmful in contact with skin. Liquid may irritate skin. Can cause a rash when short time exposure. Repeated and prolonged exposure can cause burns.

EYE CONTACT
Irritating to eyes. Contact with eyes may cause moderate to severe irritation.

12 ECOLOGICAL INFORMATION

ECOTOXICITY
Contact M-I Swaco's QHSE Department for ecological information.

13 DISPOSAL CONSIDERATIONS

DISPOSAL METHODS
Recover and reclaim or recycle, if practical. Dispose of waste and residues in accordance with local authority requirements.

14 TRANSPORT INFORMATION

GENERAL
The product is not covered by international regulation on the transport of dangerous goods (IMDG, IATA, ADR/RID).

15 REGULATORY INFORMATION

LABELLING

![Harmful symbol]

Harmful

RISK PHRASES

R20/21/22  Harmful by inhalation, in contact with skin and if swallowed.
R36/38  Irritating to eyes and skin.

SAFETY PHRASES

S26  In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S24/25  Avoid contact with skin and eyes.
S36/37  Wear suitable protective clothing and gloves.

UK REGULATORY REFERENCES

Chemicals (Hazard Information & Packaging) Regulations. The Control of Substances Hazardous to Health Regulations

EU DIRECTIVES


GUIDANCE NOTES

Workplace Exposure Limits EH40.

16 OTHER INFORMATION

GENERAL INFORMATION

HMIS Health - 2 HMIS Flammability - 1 HMIS Physical Hazard - 0

INFORMATION SOURCES


REVISION COMMENTS

The following sections have been revised: 5, 8, 10, 12, 14, 15 and 16. Revised by Bill Cameron

ISSUED BY

Dr. Kirsty Walker

REVISION DATE 19-01-06
SAFE-SCAV HS

RISK PHRASES IN FULL
R20/21/22  Harmful by inhalation, in contact with skin and if swallowed.
R36/38   Irritating to eyes and skin.

DISCLAIMER

MSDS furnished independent of product sale. While every effort has been made to accurately describe this product, some of the data are obtained from sources beyond our direct supervision. We cannot make any assertions as to its reliability or completeness; therefore, user may rely only at user’s risk. We have made no effort to censor or conceal deleterious aspects of this product. Since we cannot anticipate or control the conditions under which this information and product may be used, we make no guarantee that the precautions we have suggested will be adequate for all individuals and/or situations. It is the obligation of each user of this product to comply with the requirements of all applicable laws regarding use and disposal of this product. Additional information will be furnished upon request to assist the user; however, no warranty, either expressed or implied, nor liability of any nature with respect to this product or to the data herein is made or incurred hereunder.
SAFETY DATA SHEET
SAFE-SCAV* HSB

SECTION 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1. Product identifier

Product name
SAFE-SCAV* HSB

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

Identified uses
Hydrogen sulphide scavenger.

1.3. Details of the supplier of the safety data sheet

Supplier
M-I SWACO
A Schlumberger Company
Woodlands Drive
Kirkhill Industrial Estate
Dyce, Aberdeen AB21 0GW
Scotland UK
T=+44(0)1224-246600
F=+11(0)1224-246699
Email - MISDS@slb.com

Manufacturer
SMI Oilfield Technology & Products FZE
P.O.Box 17120
Jebel Ali
Dubai
UAE
+97 14 8833100
+97 14 8837197

1.4. Emergency telephone number

(24 Hour) Australia +61 2801 44558, Asia Pacific +65 3158 1074, China +86 10 5100 3039, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, New Zealand +64 9929 1483, USA 001 281 561 1600.
National Emergency Telephone Number
+31 (0)30-2748888 Only for the purpose of informing medical personnel in cases of acute intoxications in the Netherlands.

SECTION 2: HAZARDS IDENTIFICATION

2.1. Classification of the substance or mixture

Classification (EC 1272/2008)

Physical and Chemical Hazards
Not classified.

Human health
Acute Tox. 4 - H302; Acute Tox. 2 - H330; Skin Sens. 1 - H317

Environment
Not classified.

Classification (1999/45/EEC)

T;R23. Xn;R22. R43.

The Full Text for all R-Phrases and Hazard Statements are Displayed in Section 16.

2.2. Label elements

Contains
2,2',2''-(HEXAHYDRO-1,3,5-TRIAZINE-1,3,5-TRIYL)TRIETHANOL

Label In Accordance With (EC) No. 1272/2008
SAFE-SCAV® HSB

**Signal Word**
Danger

**Hazard Statements**
- H302 Harmful if swallowed.
- H317 May cause an allergic skin reaction.
- H330 Fatal if inhaled.

**Precautionary Statements**
- P280 Wear protective gloves/protective clothing/eye protection/face protection.
- P310 Immediately call a POISON CENTER or doctor/physician.
- P363 Wash contaminated clothing before reuse.
- P501A Dispose of waste and residues in accordance with local authority requirements. This material and its container must be disposed of as a hazardous waste.

**Supplementary Precautionary Statements**
- P261 Avoid breathing vapour/spray.

**2.3. Other hazards**
Not Classified as PBT/vPvB by current EU criteria.

### SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

#### 3.2. Mixtures

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
<th>CAS-No.</th>
<th>EC No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,2',2''-(HEXAHYDRO-1,3,5-TRIAZINE-1,3,5-TRIYL)TRIETHANOL</td>
<td>30-60%</td>
<td>4719-04-4</td>
<td>225-208-0</td>
</tr>
</tbody>
</table>

**Classification (EC 1272/2008)**
- Acute Tox. 4 - H302
- Acute Tox. 2 - H330
- Skin Sens. 1 - H317

**Classification (67/548/EEC)**
- T;R23.
- Xn;R22.
- R43.

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
<th>CAS-No.</th>
<th>EC No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>WATER</td>
<td>30-60%</td>
<td>7732-18-5</td>
<td>231-791-2</td>
</tr>
</tbody>
</table>

**Classification (EC 1272/2008)**
- Not classified.

**Classification (67/548/EEC)**
- Not classified.

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
<th>CAS-No.</th>
<th>EC No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-AMINOETHANOL</td>
<td>1-5%</td>
<td>141-43-5</td>
<td>205-483-3</td>
</tr>
</tbody>
</table>

**Classification (EC 1272/2008)**
- Acute Tox. 4 - H302
- Acute Tox. 4 - H312
- Acute Tox. 4 - H332
- Skin Corr. 1B - H314
- STOT SE 3 - H335

**Classification (67/548/EEC)**
- C;R34
- Xn;R20/21/22

The Full Text for all R-Phrases and Hazard Statements are Displayed in Section 16.

### Composition Comments
The data shown is in accordance with the latest EC Directives.

**SECTION 4: FIRST AID MEASURES**

#### 4.1. Description of first aid measures

**Inhalation**
Move the exposed person to fresh air at once. If respiratory problems, artificial respiration/oxygen. Get medical attention immediately!
**Ingestion**
Immediately give a couple of glasses of water or milk, provided the victim is fully conscious. Do not induce vomiting. Get medical attention immediately!

**Skin contact**
Remove contaminated clothing immediately and wash skin with soap and water. Get medical attention promptly if symptoms occur after washing.

**Eye contact**
Make sure to remove any contact lenses from the eyes before rinsing. Promptly wash eyes with plenty of water while lifting the eye lids. Continue to rinse for at least 15 minutes. Get medical attention if any discomfort continues.

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

**General information**
The severity of the symptoms described will vary dependant of the concentration and the length of exposure. If adverse symptoms develop as described the casualty should be transferred to hospital as soon as possible. For further information, please refer to section 11.

**Inhalation**
Toxic by inhalation.

**Ingestion**
Harmful if swallowed.

**Skin contact**
May cause sensitisation by skin contact.

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

Treat Symptomatically.

---

**SECTION 5: FIREFIGHTING MEASURES**

### 5.1. Extinguishing media

**Extinguishing media**
Water spray, foam, dry powder or carbon dioxide.

### 5.2. Special hazards arising from the substance or mixture

**Hazardous combustion products**
Fire or high temperatures create: Vapours/gases/fumes of: Carbon monoxide (CO). Carbon dioxide (CO2). Nitrous gases (NOx).

### 5.3. Advice for firefighters

**Special Fire Fighting Procedures**
Containers close to fire should be removed immediately or cooled with water.

**Protective equipment for fire-fighters**
Self contained breathing apparatus and full protective clothing must be worn in case of fire.

---

**SECTION 6: ACCIDENTAL RELEASE MEASURES**

### 6.1. Personal precautions, protective equipment and emergency procedures

Wear protective clothing as described in Section 8 of this safety data sheet.

### 6.2. Environmental precautions

Do not allow to enter drains, sewers or watercourses.

### 6.3. Methods and material for containment and cleaning up

Stop leak if possible without risk. Dike far ahead of larger spills for later disposal. Absorb spillage with suitable absorbent material. Shovel into dry containers. Cover and move the containers. Flush the area with water.

### 6.4. Reference to other sections

For waste disposal, see section 13.

---

**SECTION 7: HANDLING AND STORAGE**

### 7.1. Precautions for safe handling

Avoid spilling, skin and eye contact. Avoid inhalation of vapours and spray mists.

### 7.2. Conditions for safe storage, including any incompatibilities

Store in tightly closed original container in a dry, cool and well-ventilated place.
7.3. Specific end use(s)

The identified uses for this product are detailed in Section 1.2.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

### 8.1. Control parameters

<table>
<thead>
<tr>
<th>Name</th>
<th>STD</th>
<th>TWA - 8 Hrs</th>
<th>STEL - 15 Min</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-AMINOETHANOL</td>
<td>WEL</td>
<td>1 ppm</td>
<td>2.5 mg/m³</td>
<td>Sk</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3 ppm</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>7.6 mg/m³</td>
<td></td>
</tr>
</tbody>
</table>

WEL = Workplace Exposure Limit.
Sk = Can be absorbed through skin.

**2,2',2''-(HEXAHYDRO-1,3,5-TRIAZINE-1,3,5-TRIYL)TRIETHANOL (CAS: 4719-04-4)**

**DNEL**

- **Inhalation.**
  - Long Term Systemic Effects: 19 mg/m³

**PNEC**

- **Freshwater:** 0.006mg/L
- **Marinewater:** 0.00066mg/L
- **Soil:** 0.00219mg/kg
- **STP:** 5.5mg/L
- **Sediment (Freshwater):** 0.0172mg/kg
- **Sediment (Marinewater):** 0.00172mg/kg
- **Intermittent release:** 0.66mg/L

### 8.2. Exposure controls

**Protective equipment**

**Process conditions**

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

**Engineering measures**

- Provide adequate general and local exhaust ventilation.

**Respiratory equipment**

- Wear suitable respiratory protection. Chemical respirator with organic vapour cartridge.

**Hand protection**

- For prolonged or repeated skin contact use suitable protective gloves. Use protective gloves made of: Nitrile. or Neoprene.

**Eye protection**

- Wear approved chemical safety goggles where eye exposure is reasonably probable.

**Other Protection**

- Wear appropriate clothing to prevent any possibility of skin contact. Provide eyewash station.

**Hygiene measures**

- Wash hands at the end of each work shift and before eating, smoking and using the toilet. Wash hands after handling. Promptly remove any clothing that becomes wet or contaminated.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

### 9.1. Information on basic physical and chemical properties

**Appearance**

- Liquid

**Colour**

- Amber.

**Odour**

- Amine.

**Solubility**

- Soluble in water.

**Melting point (°C)**

- <-20°C

**Relative density**

- 1.065-1.135 @16°C
9.2. Other information

Not relevant

SECTION 10: STABILITY AND REACTIVITY

10.1. Reactivity

There are no known reactivity hazards associated with this product.

10.2. Chemical stability

Stable under normal temperature conditions and recommended use.

10.3. Possibility of hazardous reactions

Hazardous Polymerisation

Will not polymerise.

10.4. Conditions to avoid

Not known.

10.5. Incompatible materials

Materials To Avoid

Strong oxidising substances.

10.6. Hazardous decomposition products

Carbon monoxide (CO). Carbon dioxide (CO2). Nitrous gases (NOx).

SECTION 11: TOXICOLOGICAL INFORMATION

11.1. Information on toxicological effects

Aspiration hazard:

Toxic by inhalation.

Inhalation

Toxic by inhalation.

Ingestion

Harmful if swallowed. May cause stomach pain or vomiting.

Skin contact

May cause sensitisation by skin contact.

Eye contact

Spray and vapour in the eyes may cause irritation and smarting.

Route of entry

No route of entry noted.

Target Organs

No specific target organs noted

SECTION 12: ECOLOGICAL INFORMATION

Ecotoxicity

Contact M-I SWACO’s QHSE Department for ecological information at env@miswaco.slb.com.

12.1. Toxicity
**Acute Fish Toxicity**
Not considered toxic to fish.

**12.2. Persistence and degradability**

**Degradability**
There are no data on the degradability of this product.

**12.3. Bioaccumulative potential**

**Partition coefficient**
-1.5 - 0.2

**12.4. Mobility in soil**

**Mobility:**
The product is soluble in water.

**12.5. Results of PBT and vPvB assessment**

Not classified as PBT/vPvB by current EU criteria.

**12.6. Other adverse effects**

None known.

---

**SECTION 13: DISPOSAL CONSIDERATIONS**

**13.1. Waste treatment methods**

Recover and reclaim or recycle, if practical. Dispose of waste and residues in accordance with local authority requirements. This material and its container must be disposed of as hazardous waste.

---

**SECTION 14: TRANSPORT INFORMATION**

**14.1. UN number**

**UN No. (ADR/RID/ADN)** 2810
**UN No. (IMDG)** 2810
**UN No. (ICAO)** 2810

**14.2. UN proper shipping name**

**Proper Shipping Name**
TOXIC LIQUID, ORGANIC, N.O.S. 2, 2', 2"-(hexahydro-1, 3, 5-triazine-1, 3, 5-triy1) triethanol

**14.3. Transport hazard class(es)**

**ADR/RID/ADN Class** 6.1
**ADR/RID/ADN Class** Class 6.1: Toxic substances.
**IMDG Class** 6.1
**ICAO Class/DIVISION** 6.1

**Transport Labels**

![TOXIC]

**14.4. Packing group**

**ADR/RID/ADN Packing group** II
**IMDG Packing group** II
**ICAO Packing group** II

**14.5. Environmental hazards**
**SAFE-SCAV** HSB

Environmentally Hazardous Substance/ Marine Pollutant

No.

### 14.6. Special precautions for user

**EMS**

F-A, S-A

**Emergency Action Code**

2X

**Hazard No. (ADR)**

60

**Tunnel Restriction Code**

(D/E)

### 14.7. Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable.

## SECTION 15: REGULATORY INFORMATION

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

**Uk Regulatory References**

Chemicals (Hazard Information & Packaging) Regulations. Control of Substances Hazardous to Health Regulations 2002 (as amended)

**EU Legislation**


**National Regulations**

In accordance with Dutch Mining Regulation 9.2 and ARBO regulation Chapter 4.

**Water hazard classification**

WGK 1

### 15.2. Chemical Safety Assessment

**International Chemical Inventories**

Contact REACH@miswaco.slb.com for REACH information. Complies with the following national/regional chemical inventory requirements: Australia (AICS), Canada (DSL / NDSL), China (IECSC), Europe (EINECS / ELINCS), Japan (METI / ENCS), Korea (TCCL / ECL), New Zealand (NZIoC), Philippines (PICCS), United States (TSCA).

## SECTION 16: OTHER INFORMATION

**Abbreviations and acronyms used in the safety data sheet**

*a* mark of M-I L.L.C.

**Information Sources**

Product information provided by the commercial vendor(s). Material Safety Data Sheet, Misc. manufacturers. LOLI. European Chemicals Bureau - ESIS (European Chemical Substances Information).

**Revision Comments**

Classification updated. Compiled or Revised by Ewan MacLeod

**Issued By**

Bill Cameron

**Revision Date**

24-05-11

**Revision**

1

**Supersedes date**

11-06-09

**SDS No.**

12673

**Risk Phrases In Full**

R34 Causes burns.

R20/21/22 Harmful by inhalation, in contact with skin and if swallowed.

R22 Harmful if swallowed.

R37 Irritating to respiratory system.

R43 May cause sensitisation by skin contact.

R23 Toxic by inhalation.
SAFE-SCAV* HSB

Hazard Statements In Full
H314 Causes severe skin burns and eye damage.
H330 Fatal if inhaled.
H332 Harmful if inhaled.
H302 Harmful if swallowed.
H312 Harmful in contact with skin.
H317 May cause an allergic skin reaction.
H335 May cause respiratory irritation.

Disclaimer
MSDS furnished independent of product sale. While every effort has been made to accurately describe this product, some of the data are obtained from sources beyond our direct supervision. We cannot make any assertions as to its reliability or completeness; therefore, user may rely only at user's risk. We have made no effort to censor or conceal deleterious aspects of this product. Since we cannot anticipate or control the conditions under which this information and product may be used, we make no guarantee that the precautions we have suggested will be adequate for all individuals and/or situations. It is the obligation of each user of this product to comply with the requirements of all applicable laws regarding use and disposal of this product. Additional information will be furnished upon request to assist the user; however, no warranty, either expressed or implied, nor liability of any nature with respect to this product or to the data herein is made or incurred hereunder.
SECTION 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1. Product identifier

Product name
SAFE-SCAV* HSN

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

Identified uses
Hydrogen sulphide scavenger.

1.3. Details of the supplier of the safety data sheet

Supplier
M-I SWACO
A Schlumberger Company
Woodlands Drive
Kirkhill Industrial Estate
Dyce, Aberdeen AB21 0GW
Scotland UK
T=+44(0)1224-246600
F=+11(0)1224-246699
Email - MISDS@slb.com

1.4. Emergency telephone number

(24 Hour) Australia +61 2801 44558, Asia Pacific +65 3158 1074, China +86 10 5100 3039, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, New Zealand +64 9929 1483, USA 001 281 561 1600.

SECTION 2: HAZARDS IDENTIFICATION

2.1. Classification of the substance or mixture

Classification (EC 1272/2008)

Physical and Chemical Hazards Not classified.
Human health Acute Tox. 4 - H302; Acute Tox. 2 - H330; Skin Sens. 1 - H317
Environment Not classified.

Classification (1999/45/EEC)

T;R23. Xn;R22. R43.

The Full Text for all R-Phrases and Hazard Statements are Displayed in Section 16.

2.2. Label elements

Contains
2,2';2''-(HEXAHYDRO-1,3,5-TRIAZINE-1,3,5-TRIYL)TRIETHANOL

Label In Accordance With (EC) No. 1272/2008

Signal Word
Danger

Hazard Statements
H302 Harmful if swallowed.
H317 May cause an allergic skin reaction.
H330 Fatal if inhaled.

Precautionary Statements

P280 Wear protective gloves/protective clothing/eye protection/face protection.
P261 Avoid breathing vapour/spray.
P310 Immediately call a POISON CENTER or doctor/physician.
P363 Wash contaminated clothing before reuse.
P501A Dispose of waste and residues in accordance with local authority requirements.
This material and its container must be disposed of as a hazardous waste.
2.3. Other hazards
Not Classified as PBT/vPvB by current EU criteria.

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.2. Mixtures

<table>
<thead>
<tr>
<th>2,2',2''-(HEXAHYDRO-1,3,5-TRIAZINE-1,3,5-TRIYL)TRIETHANOL</th>
<th>40-60%</th>
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<tbody>
<tr>
<td>CAS-No.: 4719-04-4</td>
<td>EC No.: 225-208-0</td>
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<tr>
<td>Classification (EC 1272/2008)</td>
<td>Classification (67/548/EEC)</td>
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<td>Acute Tox. 4 - H302</td>
<td>T:R23.</td>
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<tr>
<td>Acute Tox. 2 - H330</td>
<td>Xn:R22.</td>
</tr>
<tr>
<td>Skin Sens. 1 - H317</td>
<td>R43.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WATER</th>
<th>30-60%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classification (EC 1272/2008)</td>
<td>Classification (67/548/EEC)</td>
</tr>
<tr>
<td>Not classified.</td>
<td>Not classified.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2-AMINOETHANOL</th>
<th>1-5%</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAS-No.: 141-43-5</td>
<td>EC No.: 205-483-3</td>
</tr>
<tr>
<td>Classification (EC 1272/2008)</td>
<td>Classification (67/548/EEC)</td>
</tr>
<tr>
<td>Acute Tox. 4 - H302</td>
<td>C:R34</td>
</tr>
<tr>
<td>Acute Tox. 4 - H312</td>
<td>Xn:R20/21/22</td>
</tr>
<tr>
<td>Acute Tox. 4 - H332</td>
<td></td>
</tr>
<tr>
<td>Skin Corr. 1B - H314</td>
<td></td>
</tr>
<tr>
<td>STOT SE 3 - H335</td>
<td></td>
</tr>
</tbody>
</table>

The Full Text for all R-Phrases and Hazard Statements are Displayed in Section 16.

Composition Comments
The data shown is in accordance with the latest EC Directives.

SECTION 4: FIRST AID MEASURES

4.1. Description of first aid measures

Inhalation
Move the exposed person to fresh air at once. If respiratory problems, artificial respiration/oxygen. Get medical attention if any discomfort continues.

Ingestion
Do not induce vomiting. Immediately give a couple of glasses of water or milk, provided the victim is fully conscious. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs. Get medical attention.

Skin contact
Remove contaminated clothing. Wash skin thoroughly with soap and water. Wash contaminated clothing before reuse. Get medical attention promptly if symptoms occur after washing.

Eye contact
Make sure to remove any contact lenses from the eyes before rinsing. Promptly wash eyes with plenty of water while lifting the eye lids. Continue to rinse for at least 15 minutes and get medical attention.

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

Inhalation.
Toxic by inhalation.

Ingestion
Harmful if swallowed.
Skin contact
May cause sensitisation by skin contact.

Eye contact
May cause temporary eye irritation.

4.3. Indication of any immediate medical attention and special treatment needed
Get medical attention if any discomfort continues.

SECTION 5: FIREFIGHTING MEASURES

5.1. Extinguishing media
Extinguishing media
Water spray, foam, dry powder or carbon dioxide.

5.2. Special hazards arising from the substance or mixture
Hazardous combustion products

5.3. Advice for firefighters
Special Fire Fighting Procedures
Containers close to fire should be removed immediately or cooled with water.
Protective equipment for fire-fighters
Self contained breathing apparatus and full protective clothing must be worn in case of fire.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures
Wear protective clothing as described in Section 8 of this safety data sheet.

6.2. Environmental precautions
Do not allow to enter drains, sewers or watercourses.

6.3. Methods and material for containment and cleaning up
Stop leak if possible without risk. Dike far ahead of larger spills for later disposal. Absorb spillage with suitable absorbent material. Shovel into dry containers. Cover and move the containers. Flush the area with water.

6.4. Reference to other sections
Wear protective clothing as described in Section 8 of this safety data sheet.

SECTION 7: HANDLING AND STORAGE

7.1. Precautions for safe handling
Persons susceptible to allergic reactions should not handle this product. Avoid inhalation of vapours/spray and contact with skin and eyes. All handling to take place in well-ventilated area.

7.2. Conditions for safe storage, including any incompatibilities
Store in tightly closed original container in a dry, cool and well-ventilated place.

Storage Class
Toxic storage.

7.3. Specific end use(s)
The identified uses for this product are detailed in Section 1.2.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1. Control parameters

<table>
<thead>
<tr>
<th>Name</th>
<th>STD</th>
<th>TWA - 8 Hrs</th>
<th>STEL - 15 Min</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-AMINOETHANOL</td>
<td>WEL</td>
<td>1 ppm</td>
<td>2,5 mg/m3</td>
<td>3 ppm</td>
</tr>
</tbody>
</table>

WEL = Workplace Exposure Limit.
Sk = Can be absorbed through skin.
SAFE-SCAV* HSN

2,2',2''-(HEXAHYDRO-1,3,5-TRIAZINE-1,3,5-TRIYL)TRIETHANOL (CAS: 4719-04-4)

**DNEL**
Inhalation. Long Term Systemic Effects 19 mg/m³

**PNEC**
- Freshwater: 0.006mg/L
- Marine water: 0.00066mg/L
- Soil: 0.00219mg/kg
- STP: 5.5mg/L
- Sediment (Freshwater): 0.0172mg/kg
- Sediment (Marine water): 0.00172mg/kg
- Intermittent release: 0.66mg/L

**8.2. Exposure controls**

**Protective equipment**

**Process conditions**
All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

**Engineering measures**
Provide adequate general and local exhaust ventilation.

**Respiratory equipment**
Wear suitable respiratory protection. A minimum of a chemical respirator with organic vapour cartridge should be worn. If there are conditions in which this triazine containing product produces a vapor, a chemical respirator with A1 +Formaldehyde and P2 particulate pre-filter combination would be required.

**Hand protection**
Chemical resistant gloves required for prolonged or repeated contact. Use protective gloves made of: Nitrile. or Neoprene. Be aware that the liquid may penetrate the gloves. Frequent change is advisable.

**Eye protection**
Wear approved chemical safety goggles where eye exposure is reasonably probable.

**Other Protection**
Wear appropriate clothing to prevent any possibility of skin contact. Provide eyewash station.

**SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES**

**9.1. Information on basic physical and chemical properties**

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>Liquid</td>
</tr>
<tr>
<td>Colour</td>
<td>Colourless to pale yellow.</td>
</tr>
<tr>
<td>Odour</td>
<td>Amine.</td>
</tr>
<tr>
<td>Solubility</td>
<td>Soluble in water.</td>
</tr>
<tr>
<td>Melting point (°C)</td>
<td>&lt;-20°C</td>
</tr>
<tr>
<td>Relative density</td>
<td>1.1g/ml 25°C</td>
</tr>
<tr>
<td>pH-Value, Conc. Solution</td>
<td>10.2-11.3</td>
</tr>
<tr>
<td>pH-Value, Diluted Solution</td>
<td>9.9-10.9 1% solution</td>
</tr>
<tr>
<td>Viscosity</td>
<td>&lt;40 cps 20°C</td>
</tr>
<tr>
<td>Flash point</td>
<td>&gt;70°C Sh CC (Setaflash closed cup).</td>
</tr>
</tbody>
</table>

**9.2. Other information**
Not relevant

**SECTION 10: STABILITY AND REACTIVITY**

**10.1. Reactivity**
There are no known reactivity hazards associated with this product.

**10.2. Chemical stability**
Stable under normal temperature conditions and recommended use.
10.3. Possibility of hazardous reactions

Not known.

10.4. Conditions to avoid

Avoid excessive heat for prolonged periods of time.

10.5. Incompatible materials

**Materials To Avoid**

Avoid contact with acids and oxidising substances. Bases.

10.6. Hazardous decomposition products


### SECTION 11: TOXICOLOGICAL INFORMATION

11.1. Information on toxicological effects

**Toxicological information**

This product may contain or release trace amounts of formaldehyde. The International Agency for Research on Cancer (IARC) has classified formaldehyde as a Group 1 carcinogen (limited evidence in humans, sufficient evidence in animals). Exposure to formaldehyde has been linked to adverse reproductive effects in some human and animal studies. In other reproductive studies, however, no adverse effects were noted. (Meditex). Formaldehyde may also cause skin and respiratory sensitisation (allergic reaction).

**Acute toxicity:**

- **Acute Toxicity (Oral LD50)**
  
  763 mg/kg Rat

- **Acute Toxicity (Inhalation LC50)**
  
  0.371 mg/l (vapours) Rat

**Aspiration hazard:**

Not anticipated to present an aspiration hazard based on chemical structure.

**Inhalation**

Toxic by inhalation.

**Ingestion**

Harmful if swallowed.

**Skin contact**

May cause sensitisation by skin contact.

**Eye contact**

Irritating to eyes.

**Route of entry**

No route of entry noted.

**Target Organs**

No specific target organs noted

### SECTION 12: ECOLOGICAL INFORMATION

**Ecotoxicity**

Contact M-I SWACO’s QHSE Department for ecological information at env@miswaco.slb.com.

12.1. Toxicity

**Acute Fish Toxicity**

The product may affect the acidity (pH-factor) in water with risk of harmful effects to aquatic organisms.

12.2. Persistence and degradability

**Degradability**

The product is biodegradable.
12.3. Bioaccumulative potential

Bioaccumulative potential
The product is not bioaccumulating.

12.4. Mobility in soil

Mobility:
The product is soluble in water.

12.5. Results of PBT and vPvB assessment

Not classified as PBT/vPvB by current EU criteria.

12.6. Other adverse effects

None known.

SECTION 13: DISPOSAL CONSIDERATIONS

13.1. Waste treatment methods

Recover and reclaim or recycle, if practical. Dispose of waste and residues in accordance with local authority requirements. This material and its container must be disposed of as hazardous waste.

Waste Class
The definitive European Waste code for this product will depend upon the final use that is made of this material. EWC-code: 07 01 04. Organic waste without halogen.

SECTION 14: TRANSPORT INFORMATION

14.1. UN number

UN No. (ADR/RID/ADN) 2810
UN No. (IMDG) 2810
UN No. (ICAO) 2810

14.2. UN proper shipping name

Proper Shipping Name TOXIC LIQUID, ORGANIC, N.O.S. (2, 2’, 2”-(hexahydro-1, 3, 5-triazine -1, 3, 5-triyl) triethanol)

14.3. Transport hazard class(es)

ADR/RID/ADN Class 6.1
ADR/RID/ADN Class Class 6.1: Toxic substances.
IMDG Class 6.1
ICAO Class/Division 6.1

Transport Labels

14.4. Packing group

ADR/RID/ADN Packing group II
IMDG Packing group II
ICAO Packing group II

14.5. Environmental hazards

Environmentally Hazardous Substance/Marine Pollutant No.
SAFE-SCAV* HSN

14.6. Special precautions for user

EMS
F-A, S-A

Emergency Action Code
2X

Hazard No. (ADR)
60

Tunnel Restriction Code
(D/E)

14.7. Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code

Not applicable.

SECTION 15: REGULATORY INFORMATION

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

UK Regulatory References
Chemicals (Hazard Information & Packaging) Regulations. Control of Substances Hazardous to Health Regulations 2002 (as amended)
Workplace Exposure Limits EH40.

EU Legislation

Water hazard classification
WGK 1

15.2. Chemical Safety Assessment

International Chemical Inventories
Contact REACH@miswaco.slb.com for REACH information. Complies with the following national/regional chemical inventory requirements:
Australia (AICS), Canada (DSL / NDSL), China (IECSC), Europe (EINECS / ELINCS), Japan (METI / ENCS), Korea (TCCL / ECL), New Zealand (NZIoC), Phillipines (PICCS), United States (TSCA).

SECTION 16: OTHER INFORMATION

Abbreviations and acronyms used in the safety data sheet
*a mark of M-I L.L.C.

Information Sources
Product information provided by the commercial vendor(s). Material Safety Data Sheet, Misc. manufacturers. LOLI. European Chemicals Bureau - ESIS (European Chemical Substances Information).

Revision Comments
The following sections have been revised: 2 Compiled or revised by Sandra McWilliam

Issued By
Bill Cameron

Revision Date
27-Nov-12

Revision
1

Supersedes date
11-Aug-11

SDS No.
15009

Risk Phrases in Full

R34
Causes burns.

R20/21/22
Harmful by inhalation, in contact with skin and if swallowed.

R22
Harmful if swallowed.

R37
Irritating to respiratory system.

R43
May cause sensitisation by skin contact.

R23
Toxic by inhalation.

Hazard Statements in Full

H302
Harmful if swallowed.

H312
Harmful in contact with skin.

H314
Causes severe skin burns and eye damage.

H317
May cause an allergic skin reaction.

H330
Fatal if inhaled.

H332
Harmful if inhaled.

H335
May cause respiratory irritation.
Disclaimer

MSDS furnished independent of product sale. While every effort has been made to accurately describe this product, some of the data are obtained from sources beyond our direct supervision. We cannot make any assertions as to its reliability or completeness; therefore, user may rely only at user's risk. We have made no effort to censor or conceal deleterious aspects of this product. Since we cannot anticipate or control the conditions under which this information and product may be used, we make no guarantee that the precautions we have suggested will be adequate for all individuals and/or situations is the obligation of each user of this product to comply with the requirements of all applicable laws regarding use and disposal of this product. Additional information will be furnished upon request to assist the user; however, no warranty, either expressed or implied, nor liability of any nature with respect to this product or to the data herein is made or incurred hereunder.
SECTION 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1. Product identifier

Product name
SAFE-SCAV* NA

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

Identified uses
Oxygen Scavenger

1.3. Details of the supplier of the safety data sheet

Supplier
M-I SWACO
A Schlumberger Company
Woodlands Drive
Kirkhill Industrial Estate
Dyce, Aberdeen AB21 0GW
Scotland UK
T=+44(0)1224-246600
F=+11(0)1224-246699
Email - MISDS@slb.com

Manufacturer
SMI Oilfield Technology & Products FZE
P.O.Box 17120
Jebel Ali
Dubai
UAE
+97 14 8833100
+97 14 8837197

1.4. Emergency telephone number

(24 Hour) Australia +61 2801 44558, Asia Pacific +65 3158 1074, China +86 10 5100 3039, Europe +44 (0) 1235 239 670, Middle East and Africa +44 (0) 1235 239 671, New Zealand +64 9929 1483, USA 001 281 561 1600.

National Emergency Telephone Number
+31 (0)30-2748888 Only for the purpose of informing medical personnel in cases of acute intoxications in the Netherlands.

SECTION 2: HAZARDS IDENTIFICATION

2.1. Classification of the substance or mixture

Classification (EC 1272/2008)
Physical and Chemical Hazards Not classified.
Human health EUH031; Eye Irrit. 2 - H319
Environment Not classified.

Classification (67/548/EEC)
Xi;R36. R31.
The Full Text for all R-Phrases and Hazard Statements are Displayed in Section 16.

2.2. Label elements

Label In Accordance With (EC) No. 1272/2008

Signal Word
Warning
Hazard Statements
H319 Causes serious eye irritation.

Precautionary Statements
P305+351+338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P313 Get medical advice/attention.

Supplementary Precautionary Statements
P280 Wear protective gloves/protective clothing/eye protection/face protection.

Supplemental label information
EUH031 Contact with acids liberates toxic gas.

2.3. Other hazards
Not Classified as PBT/vPvB by current EU criteria.

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.1. Substances

<table>
<thead>
<tr>
<th>Substance</th>
<th>CAS-No.:</th>
<th>EC No.:</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMMONIUM BISULPHITE</td>
<td>10192-30-0</td>
<td>233-469-7</td>
</tr>
<tr>
<td>WATER</td>
<td>7732-18-5</td>
<td>231-791-2</td>
</tr>
</tbody>
</table>

Classification (EC 1272/2008)
- EUH031
- Eye Irrit. 2 - H319

Classification (67/548/EEC)
- Xi;R36.
- R31.

The Full Text for all R-Phrases and Hazard Statements are Displayed in Section 16.

Composition Comments
The data shown is in accordance with the latest EC Directives.

SECTION 4: FIRST AID MEASURES

4.1. Description of first aid measures

Inhalation
Move the exposed person to fresh air at once. If respiratory problems, artificial respiration/oxygen. Get medical attention if any discomfort continues.

Ingestion
Immediately give a couple of glasses of water or milk, provided the victim is fully conscious. Get medical attention if any discomfort continues.

Skin contact
Remove contaminated clothing immediately and wash skin with soap and water. Get medical attention promptly if symptoms occur after washing.

Eye contact
Make sure to remove any contact lenses from the eyes before rinsing. Promptly wash eyes with plenty of water while lifting the eye lids. Continue to rinse for at least 15 minutes. Get medical attention if any discomfort continues.

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

General information
The severity of the symptoms described will vary dependant of the concentration and the length of exposure. If adverse symptoms develop as described the casualty should be transferred to hospital as soon as possible. For further information, please refer to section 11.

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

Treat Symptomatically.
SECTION 5: FIREFIGHTING MEASURES

5.1. Extinguishing media

Extinguishing media
Water spray, foam, dry powder or carbon dioxide.

5.2. Special hazards arising from the substance or mixture

Hazardous combustion products
When heated, vapours/gases hazardous to health may be formed.
Specific hazards
Fire or high temperatures create: Oxides of: Sulphur. Ammonia or amines. and Nitrous gases (NOx).

5.3. Advice for firefighters

Special Fire Fighting Procedures
Containers close to fire should be removed immediately or cooled with water.
Protective equipment for fire-fighters
Self contained breathing apparatus and full protective clothing must be worn in case of fire.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures

Wear protective clothing as described in Section 8 of this safety data sheet.

6.2. Environmental precautions

Do not allow to enter drains, sewers or watercourses.

6.3. Methods and material for containment and cleaning up

Stop leak if possible without risk. Dike far ahead of larger spills for later disposal. Absorb spillage with suitable absorbent material. Shovel into dry containers. Cover and move the containers. Flush the area with water.

6.4. Reference to other sections

For waste disposal, see section 13.

SECTION 7: HANDLING AND STORAGE

7.1. Precautions for safe handling

This product slowly releases sulphur dioxide in contact with air. Ventilate well, avoid breathing vapours. Use approved respirator if air contamination is above accepted level. Avoid spilling, skin and eye contact.

7.2. Conditions for safe storage, including any incompatibilities

Store in a cool and well-ventilated place. Store in closed original container at temperatures between 5°C and 30°C.

7.3. Specific end use(s)

The identified uses for this product are detailed in Section 1.2.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1. Control parameters

<table>
<thead>
<tr>
<th>Name</th>
<th>STD</th>
<th>TWA - 8 Hrs</th>
<th>STEL - 15 Min</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>SULPHUR DIOXIDE</td>
<td>WEL</td>
<td>1 ppm</td>
<td>2.6 mg/m3</td>
<td>1 ppm</td>
</tr>
</tbody>
</table>

WEL = Workplace Exposure Limit.

Ingredient Comments
Exposure Limit noted above is for decomposition product Sulphur Dioxide.

8.2. Exposure controls

Protective equipment
Process conditions
All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazard present and the risk of exposure to those hazards. The PPE recommendations below are based on an assessment of the chemical hazards associated with this product. Where this product is used in a mixture with other products or fluids, additional hazards may be created and as such further assessment of risk may be required. The risk of exposure and need of respiratory protection will vary from workplace to workplace and should be assessed by the user in each situation.

Engineering measures
Provide adequate general and local exhaust ventilation.

Respiratory equipment
Respiratory protection must be used if air contamination exceeds acceptable level. Use respiratory equipment with gas filter, type K.

Hand protection
Use protective gloves made of: Butyl rubber. Neoprene. or Nitrile.

Eye protection
Wear approved chemical safety goggles where eye exposure is reasonably probable.

Other Protection
Wear appropriate clothing to prevent any possibility of skin contact. Provide eyewash station.

Hygiene measures
Wash hands at the end of each work shift and before eating, smoking and using the toilet. Wash hands after handling. Promptly remove any clothing that becomes wet or contaminated.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on basic physical and chemical properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>Liquid</td>
</tr>
<tr>
<td>Colour</td>
<td>Colourless to pale yellow.</td>
</tr>
<tr>
<td>Odour</td>
<td>Pungent. Sulphur.</td>
</tr>
<tr>
<td>Solubility</td>
<td>Miscible with water</td>
</tr>
<tr>
<td>Initial boiling point and boiling range</td>
<td>105°C</td>
</tr>
<tr>
<td>Relative density</td>
<td>1.27 - 1.39 @ 20°C</td>
</tr>
<tr>
<td>Vapour density (air=1)</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Vapour pressure</td>
<td>18 mmHg 20°C</td>
</tr>
<tr>
<td>pH-Value, Conc. Solution</td>
<td>4.5 - 5.5 @ 20°C</td>
</tr>
<tr>
<td>Flash point (°C)</td>
<td>N/A</td>
</tr>
</tbody>
</table>

9.2. Other information
Not relevant

SECTION 10: STABILITY AND REACTIVITY

10.1. Reactivity
Reacts violently with strong oxidising substances. Reaction with: Acids.

10.2. Chemical stability
Stable under normal temperature conditions and recommended use.

10.3. Possibility of hazardous reactions
Generates toxic gas in contact with acid.

10.4. Conditions to avoid
Avoid exposing to heat and contact with strong oxidising substances. Avoid contact with acids.

10.5. Incompatible materials
10.6. Hazardous decomposition products
Sulphurous gases (SOX). Nitrous gases (NOX).

SECTION 11: TOXICOLOGICAL INFORMATION

11.1. Information on toxicological effects

Other Health Effects
Bisulfites may cause skin sensitization in sulfite sensitive persons. Bisulfites may also cause respiratory sensitization in asthmatics and sulfite sensitive persons.

Acute toxicity:
Acute Toxicity (Oral LD50)
> 2000 mg/kg Rat

Aspiration hazard:
Not anticipated to present an aspiration hazard based on chemical structure.

Inhalation
Gas or vapour may irritate respiratory system.

Ingestion
May irritate and cause stomach pain, vomiting and diarrhoea.

Skin contact
Irritating and may cause redness and pain.

Eye contact
Irritating to eyes. Spray and vapour in the eyes may cause irritation and smarting.

Route of entry
No route of entry noted.

Target Organs
No specific target organs noted

SECTION 12: ECOLOGICAL INFORMATION

Ecotoxicity
Contact M-I SWACO’s QHSE Department for ecological information at env@miswaco.slb.com.

12.1. Toxicity

Acute Fish Toxicity
Do not empty into river: may cause impoverishment of oxygen and ammonia increase.

12.2. Persistence and degradability

Degradability
The product is biodegradable.

12.3. Bioaccumulative potential

Bioaccumulative potential
The product does not contain any substances expected to be bioaccumulating.

12.4. Mobility in soil

Mobility:
Mobile.

12.5. Results of PBT and vPvB assessment

Not Classified as PBT/vPvB by current EU criteria.

12.6. Other adverse effects
SECTION 13: DISPOSAL CONSIDERATIONS

13.1. Waste treatment methods
Recover and reclaim or recycle, if practical. Dispose of waste and residues in accordance with local authority requirements.

SECTION 14: TRANSPORT INFORMATION

General
The product is not covered by international regulation on the transport of dangerous goods (IMDG, IATA, ADR/RID).

14.1. UN number
Not applicable.

14.2. UN proper shipping name
Not applicable.

14.3. Transport hazard class(es)
Not applicable.

14.4. Packing group
Not applicable.

14.5. Environmental hazards
Environmentally Hazardous Substance/Marine Pollutant
No.

14.6. Special precautions for user
Not applicable.

14.7. Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code
Not applicable.

SECTION 15: REGULATORY INFORMATION

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

UK Regulatory References
Chemicals (Hazard Information & Packaging) Regulations. Control of Substances Hazardous to Health Regulations 2002 (as amended)
Workplace Exposure Limits EH40.

EU Legislation

National Regulations
In accordance with Dutch Mining Regulation 9.2 and ARBO regulation Chapter 4.

Water hazard classification
WGK 3

15.2. Chemical Safety Assessment

International Chemical Inventories
Contact REACH@miswaco.slb.com for REACH information. Complies with the following national/regional chemical inventory requirements:
Australia (AICS), Canada (DSL / NDSL), China (IECSC), Europe (EINECS / ELINCS), Japan (METI / ENCS), Korea (TCCL / ECL), New Zealand (NZIoC), Philippines (PICCS), United States (TSCA).

SECTION 16: OTHER INFORMATION
**Abbreviations and acronyms used in the safety data sheet**
*a* mark of M-I L.L.C.

**General information**
HMIS Health - 3 HMIS Flammability - 0 HMIS Physical Hazard - 1

**Information Sources**
Product information provided by the commercial vendor(s), Material Safety Data Sheet, Misc. manufacturers. LOLI. European Chemicals Bureau - ESIS (European Chemical Substances Information).

**Revision Comments**
Classification updated. Compiled or Revised by Ewan MacLeod

**Issued By** Bill Cameron

**Revision Date** 23-06-11

**Revision** 7

**Supersedes date** 16-05-11

**SDS No.** 11326

**Risk Phrases In Full**
R31 Contact with acids liberates toxic gas.

R36 Irritating to eyes.

**Hazard Statements In Full**
H319 Causes serious eye irritation.

EUH031 Contact with acids liberates toxic gas.

**Disclaimer**
MSDS furnished independent of product sale. While every effort has been made to accurately describe this product, some of the data are obtained from sources beyond our direct supervision. We cannot make any assertions as to its reliability or completeness; therefore, user may rely only at user's risk. We have made no effort to censor or conceal deleterious aspects of this product. Since we cannot anticipate or control the conditions under which this information and product may be used, we make no guarantee that the precautions we have suggested will be adequate for all individuals and/or situations. It is the obligation of each user of this product to comply with the requirements of all applicable laws regarding use and disposal of this product. Additional information will be furnished upon request to assist the user; however, no warranty, either expressed or implied, nor liability of any nature with respect to this product or to the data herein is made or incurred hereunder.
SAFETY DATA SHEET
SAPP

1 IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND COMPANY/UNDERTAKING

PRODUCT NAME
SAPP

APPLICATION
Oil well drilling fluid additive. Dispersant Thinner.

SUPPLIER
M-I Drilling Fluids UK Ltd,
Pocra Quay,
Footdee,
Aberdeen, AB11 5DQ
T -44 (0)1224-584336
F -44 (0)1224-576119

EMERGENCY TELEPHONE
001 281 561 1600 (USA)

2 COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Name</th>
<th>EC No.</th>
<th>CAS-No.</th>
<th>Content</th>
<th>Classification</th>
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</thead>
<tbody>
<tr>
<td>SODIUM ACID PYROPHOSPHATE</td>
<td></td>
<td>7758-16-9</td>
<td>60-100%</td>
<td>-</td>
</tr>
</tbody>
</table>

The Full Text for all R-Phrases are Displayed in Section 16

EU INDEX NO.
2-318-35-0

CAS-NO.
7758-16-9

COMPOSITION COMMENTS
This product formulation is not classified as hazardous in accordance with the EU Directives.

3 HAZARDS IDENTIFICATION

Not regarded as a health or environmental hazard under current legislation.

4 FIRST-AID MEASURES

INHALATION
Move the exposed person to fresh air at once. Get medical attention if any discomfort continues.

INGESTION
Rinse mouth thoroughly. Drink plenty of water. Get medical attention if any discomfort continues.

SKIN CONTACT
Wash skin thoroughly with soap and water. Remove contaminated clothing. Get medical attention if any discomfort continues.

EYE CONTACT
Promptly wash eyes with plenty of water while lifting the eye lids. Continue to rinse for at least 15 minutes. Get medical attention if any discomfort continues.

5 FIRE-FIGHTING MEASURES

EXTINGUISHING MEDIA
Carbon dioxide (CO2). Dry chemicals. Foam. Water spray, fog or mist.

SPECIAL FIRE FIGHTING PROCEDURES
In the event of a fire involving this material, wear full protective clothing and SCBA (self contained breathing apparatus) operated in positive pressure mode.

UNUSUAL FIRE & EXPLOSION HAZARDS
No unusual fire or explosion hazards noted.

SPECIFIC HAZARDS
Fire or high temperatures create: Oxides of: Sodium. Phosphorus.

6 ACCIDENTAL RELEASE MEASURES

SPILL CLEAN UP METHODS
Wear necessary protective equipment. Shovel into dry containers. Cover and move the containers. Flush the area with water.

7 HANDLING AND STORAGE
8 EXPOSURE CONTROLS/PERSOAL PROTECTION

INGREDIENT COMMENTS
NUI = Nuisance dust, WEL TWA 4mg/m3 Respirable Dust, 10 mg/m3 Total Dust.

PROTECTIVE EQUIPMENT

ENGINEERING MEASURES
Provide adequate general and local exhaust ventilation.

RESPIRATORY EQUIPMENT
If ventilation is insufficient, suitable respiratory protection must be provided. Dust filter P2 (for fine dust).

HAND PROTECTION
No specific hand protection noted, but gloves may still be advisable. For prolonged or repeated skin contact use suitable protective gloves. Rubber or plastic.

EYE PROTECTION
Wear dust resistant safety goggles where there is danger of eye contact.

OTHER PROTECTION
Wear appropriate clothing to prevent repeated or prolonged skin contact. Provide eyewash station.

9 PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE Powder, dust
COLOUR White
ODOUR Odourless
SOLUBILITY Soluble in water
MELTING POINT (°C) 220
RELATIVE DENSITY 1.862 @ 20 °c
BULK DENSITY 0.8-0.9 kg/m3
SOLUBILITY VALUE (g/100g H2O@ 13% @25°C 13% @25°C 20°C)

10 STABILITY AND REACTIVITY

STABILITY
Stable under normal temperature conditions.

CONDITIONS TO AVOID
Avoid wet and humid conditions.

MATERIALS TO AVOID
Bases, alkalis (inorganic). Strong acids.

HAZARDOUS DECOMPOSITION PRODUCTS
Fire or high temperatures create: Oxides of: Sodium. Phosphorus.

11 TOXICOLOGICAL INFORMATION

TOXIC DOSE 1 - LD 50 2650 mg/kg (oral-mouse)

INHALATION
Dust may irritate respiratory system or lungs.

INGESTION
May cause gastric distress, nausea and vomiting if ingested.

SKIN CONTACT
Powder may irritate skin.

EYE CONTACT
Particles in the eyes may cause irritation and smarting.

12 ECOLOGICAL INFORMATION

ECOTOXICITY
Not regarded as dangerous for the environment. OSPAR have defined this chemical as PLONOR.
13 DISPOSAL CONSIDERATIONS

DISPOSAL METHODS
Recover and reclaim or recycle, if practical. Dispose of waste and residues in accordance with local authority requirements.

14 TRANSPORT INFORMATION

GENERAL
The product is not covered by international regulation on the transport of dangerous goods (IMDG, IATA, ADR/RID).

15 REGULATORY INFORMATION

RISK PHRASES
NC Not classified.

SAFETY PHRASES
NC Not classified.

EU DIRECTIVES

STATUTORY INSTRUMENTS
Control of Substances Hazardous to Health.

GUIDANCE NOTES
Workplace Exposure Limits EH40.

16 OTHER INFORMATION

GENERAL INFORMATION
HMIS Health - 1 HMIS Flammability - 0 HMIS Physical Hazard - 0 E - Safety glasses, Gloves, Dust Respirator

INFORMATION SOURCES

REVISION COMMENTS
The following sections have been revised: 7, 8, 9, 10, 13 and 14 Revised by Bill Cameron

ISSUED BY
Sam Hoskin

REVISION DATE 03-08-05

REV. NO./REPL. SDS GENERATED 4

SDS NO. 10350

DISCLAIMER

MSDS furnished independent of product sale. While every effort has been made to accurately describe this product, some of the data are obtained from sources beyond our direct supervision. We cannot make any assertions as to its reliability or completeness; therefore, user may rely only at user's risk. We have made no effort to censor or conceal deleterious aspects of this product. Since we cannot anticipate or control the conditions under which this information and product may be used, we make no guarantee that the precautions we have suggested will be adequate for all individuals and/or situations. It is the obligation of each user of this product to comply with the requirements of all applicable laws regarding use and disposal of this product. Additional information will be furnished upon request to assist the user; however, no warranty, either expressed or implied, nor liability of any nature with respect to this product or to the data herein is made or incurred hereunder.
SAFETY DATA SHEET
SODA ASH

1 IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND COMPANY/UNDERTAKING

PRODUCT NAME SODA ASH
SYNONYMS, TRADE NAMES SODIUM CARBONATE
APPLICATION pH modifier.
SUPPLIER M-I Drilling Fluids UK Ltd,
Pocra Quay,
Footdee,
Aberdeen. AB11 5DQ
T -44 (0)1224-584336
F -44 (0)1224-576119
EMERGENCY TELEPHONE +44(0)208 762 8322

2 COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Name</th>
<th>EC No.</th>
<th>CAS-No.</th>
<th>Content</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>SODIUM CARBONATE</td>
<td>207-838-8</td>
<td>497-19-8</td>
<td>60-100%</td>
<td>Xi;R36</td>
</tr>
</tbody>
</table>

The Full Text for all R-Phrases are Displayed in Section 16

COMPOSITION COMMENTS
The data shown is in accordance with the latest EC Directives.

3 HAZARDS IDENTIFICATION

Irritating to eyes.
CLASSIFICATION Xi;R36.

4 FIRST-AID MEASURES

INHALATION
Move the exposed person to fresh air at once. If respiratory problems, artificial respiration/oxygen. Get medical attention if any discomfort continues.

INGESTION
Rinse mouth thoroughly with water and give large amounts of milk or water to people not unconscious. DO NOT induce vomiting. Get medical attention immediately.

SKIN CONTACT
Remove contaminated clothing immediately and wash skin with soap and water. Get medical attention if irritation persists after washing.

EYE CONTACT
Promptly wash eyes with plenty of water while lifting the eye lids. Continue to rinse for at least 15 minutes. Get medical attention if any discomfort continues.

5 FIRE-FIGHTING MEASURES

EXTINGUISHING MEDIA
Use fire-extinguishing media appropriate for surrounding materials.

SPECIAL FIRE FIGHTING PROCEDURES
No specific fire fighting procedure given.

SPECIFIC HAZARDS
Fire or high temperatures create: Carbon dioxide (CO2).

PROTECTIVE MEASURES IN FIRE
Self contained breathing apparatus and full protective clothing must be worn in case of fire.

6 ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS
Wear protective clothing as described in Section 8 of this safety data sheet.

ENVIRONMENTAL PRECAUTIONS
Do not allow to enter drains, sewers or watercourses.
**SPILL CLEAN UP METHODS**
Collect in containers and seal securely. Remove containers and flush area with water.

**7 HANDLING AND STORAGE**

**USAGE PRECAUTIONS**
Do not use contact lenses. Avoid spilling, skin and eye contact. Avoid spread of dust. Use mechanical ventilation in case of handling which causes formation of dust.

**STORAGE PRECAUTIONS**
Store in tightly closed original container in a cool, dry well-ventilated place.

**8 EXPOSURE CONTROLS/PERSONAL PROTECTION**

<table>
<thead>
<tr>
<th>Name</th>
<th>Std</th>
<th>LT - ppm</th>
<th>LT - mg/m³</th>
<th>ST - ppm</th>
<th>ST - mg/m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>SODIUM CARBONATE</td>
<td>WEL</td>
<td></td>
<td>4 mg/m³ resp. dust</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**INGREDIENT COMMENTS**
WEL = Workplace Exposure Limits WEL TWA 4mg/m³ respirable dust, 10mg/m³ total dust.

**PROTECTIVE EQUIPMENT**

**ENGINEERING MEASURES**
Provide adequate general and local exhaust ventilation.

**RESPIRATORY EQUIPMENT**
No specific recommendation made, but respiratory protection must be used if the general level exceeds the Recommended Workplace Exposure Limit. Use specified dust masks. Dust filter P2 (for fine dust).

**HAND PROTECTION**
Use protective gloves made of: Neoprene, nitrile, polyethylene or PVC.

**EYE PROTECTION**
Wear dust resistant safety goggles where there is danger of eye contact.

**OTHER PROTECTION**
Wear appropriate clothing to prevent repeated or prolonged skin contact. Provide eyewash station.

**9 PHYSICAL AND CHEMICAL PROPERTIES**

**APPEARANCE**
Granular Powder, dust

**COLOUR**
White

**ODOUR**
No characteristic odour.

**SOLUBILITY**
Completely soluble in water

**MELTING POINT (°C)**
851°C

**RELATIVE DENSITY**
2.53 @ 20°C

**pH-VALUE, CONC. SOLUTION**
11.6

**SOLUBILITY VALUE (g/100g H₂O @ 20°C)**
22g/100ml.

**10 STABILITY AND REACTIVITY**

**STABILITY**
Stable under normal temperature conditions.

**CONDITIONS TO AVOID**
Avoid contact with acids and oxidising substances.

**HAZARDOUS DECOMPOSITION PRODUCTS**
Fire or high temperatures create: Carbon dioxide (CO₂).

**11 TOXICOLOGICAL INFORMATION**

**INHALATION**
Gas or vapour in high concentrations may irritate respiratory system.

**INGESTION**
May cause gastric distress, nausea and vomiting if ingested.

**SKIN CONTACT**
Prolonged or repeated exposure may cause severe irritation.

**EYE CONTACT**
Irritating to eyes. Repeated exposure may cause chronic eye irritation.
12 ECOLOGICAL INFORMATION

ECOTOXICITY
OSPAR have defined this chemical as PLONOR. Contact M-I Swaco's QHSE Department for ecological information.

13 DISPOSAL CONSIDERATIONS

DISPOSAL METHODS
Recover and reclaim or recycle, if practical. Dispose of waste and residues in accordance with local authority requirements.

14 TRANSPORT INFORMATION

GENERAL
The product is not covered by international regulation on the transport of dangerous goods (IMDG, IATA, ADR/RID).

15 REGULATORY INFORMATION

LABELLING

Irritant

RISK PHRASES
R36 Irritating to eyes.

SAFETY PHRASES
S22 Do not breathe dust.
S25 Avoid contact with eyes.
S26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

UK REGULATORY REFERENCES
Chemicals (Hazard Information & Packaging) Regulations. The Control of Substances Hazardous to Health Regulations

EU DIRECTIVES

GUIDANCE NOTES
Workplace Exposure Limits EH40.

16 OTHER INFORMATION

GENERAL INFORMATION
HMIS Health - 1 HMIS Flammability - 1 HMIS Physical Hazard - 0 E - Safety glasses, Gloves, Dust Respirator

INFORMATION SOURCES
Product information provided by the commercial vendor(s). Material Safety Data Sheet. Misc. manufacturers. Sax's Dangerous Properties of Industrial Materials, 10th ed., Lewis, R.J. Sr., (ed.).

REVISION COMMENTS
The following sections have been revised: 4, 5, 6, 7, 8, 10, 12, 14, 15 and 16. Revised by Bill Cameron

ISSUED BY
Sam Hoskin

REVISION DATE
13-10-05

REV. NO./REPL. SDS GENERATED
1

SDS NO.
10926

RISK PHRASES IN FULL
R36 Irritating to eyes.

DISCLAIMER
MSDS furnished independent of product sale. While every effort has been made to accurately describe this product, some of the data are obtained from sources beyond our direct supervision. We cannot make any assertions as to its reliability or completeness; therefore, user may rely only at user's risk. We have made no effort to censor or conceal deleterious aspects of this product. Since we cannot anticipate or control the conditions under which this information and product may be used, we make no guarantee that the precautions we have suggested will be adequate for all individuals and/or situations. It is the obligation of each user of this product to comply with the requirements of all applicable laws regarding use and disposal of this product. Additional information will be furnished upon request to assist the user; however, no warranty, either expressed or implied, nor liability of any nature with respect to this product or to the data herein is made or incurred hereunder.
# SAFETY DATA SHEET
## SODIUM BICARBONATE

### 1 IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND COMPANY/UNDERTAKING

<table>
<thead>
<tr>
<th>PRODUCT NAME</th>
<th>SODIUM BICARBONATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>APPLICATION</td>
<td>Oil well drilling fluid additive.</td>
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<tr>
<td>SUPPLIER</td>
<td>M-I Drilling Fluids UK Ltd, Pocra Quay, Footdee, Aberdeen. AB11 5DQ</td>
</tr>
<tr>
<td></td>
<td>T -44 (0)1224-584336</td>
</tr>
<tr>
<td></td>
<td>F -44 (0)1224-576119</td>
</tr>
<tr>
<td>EMERGENCY TELEPHONE</td>
<td>Europe only: +44(0)208 762 8322</td>
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### 2 COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
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<th>EU INDEX NO.</th>
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<tr>
<td>CAS-NO.</td>
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</table>

COMPOSITION COMMENTS
This product formulation is not classified as hazardous in accordance with the EU Directives.

### 3 HAZARDS IDENTIFICATION

Not regarded as a health hazard under current legislation.

CLASSIFICATION
-

### 4 FIRST-AID MEASURES

INHALATION
Move the exposed person to fresh air at once. Get medical attention if any discomfort continues.

INGESTION
First aid is not normally required. Rinse mouth thoroughly. Drink plenty of water.

SKIN CONTACT
Remove contaminated clothing. Wash skin with soap and water. Get medical attention if any discomfort continues.

EYE CONTACT
Promptly wash eyes with plenty of water while lifting the eye lids. Continue to rinse for at least 15 minutes. Get medical attention if any discomfort continues.

### 5 FIRE-FIGHTING MEASURES

EXTINGUISHING MEDIA
Water spray, foam, dry powder or carbon dioxide.

UNUSUAL FIRE & EXPLOSION HAZARDS
Dust may form explosive mixture with air.

SPECIFIC HAZARDS
Fire or high temperatures create: Oxides of: Carbon.

PROTECTIVE MEASURES IN FIRE
Self contained breathing apparatus and full protective clothing must be worn in case of fire.

### 6 ACCIDENTAL RELEASE MEASURES


SODIUM BICARBONATE

PERSONAL PRECAUTIONS
Wear protective clothing as described in Section 8 of this safety data sheet.

ENVIRONMENTAL PRECAUTIONS
Do not allow to enter drains, sewers or watercourses.

SPILL CLEAN UP METHODS
Shovel into dry containers. Cover and move the containers. Flush the area with water.

7 HANDLING AND STORAGE

USAGE PRECAUTIONS
Avoid handling which leads to dust formation. Provide good ventilation. Do not use contact lenses.

STORAGE PRECAUTIONS
Store in tightly closed original container in a cool, dry well-ventilated place.

8 EXPOSURE CONTROLS/PERSONAL PROTECTION

<table>
<thead>
<tr>
<th>Name</th>
<th>Std</th>
<th>LT - ppm</th>
<th>LT - mg/m³</th>
<th>ST - ppm</th>
<th>ST - mg/m³</th>
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<tr>
<td>SODIUM BICARBONATE</td>
<td>WEL</td>
<td></td>
<td>4 mg/m³ resp. dust</td>
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</table>

INGREDIENT COMMENTS
NUI = Nuisance dust, WEL TWA 4mg/m³ Respirable Dust, 10 mg/m³ Total Dust.

PROTECTIVE EQUIPMENT

ENGINEERING MEASURES
Provide adequate general and local exhaust ventilation.

RESPIRATORY EQUIPMENT
If ventilation is insufficient, suitable respiratory protection must be provided. Dust filter P2 (for fine dust).

HAND PROTECTION
Use protective gloves made of: Rubber or plastic.

EYE PROTECTION
Wear dust resistant safety goggles where there is danger of eye contact.

OTHER PROTECTION
Wear appropriate clothing to prevent repeated or prolonged skin contact. Provide eyewash station.

9 PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE Powder, dust
COLOUR White
ODOUR Odourless No characteristic odour.
SOLUBILITY Soluble in water.
MELTING POINT (°C) 270
BULK DENSITY 801-1089 kg/m³
SOLUBILITY VALUE (g/100g H₂O@20°C) 9.6

10 STABILITY AND REACTIVITY

STABILITY
Stable under normal temperature conditions.
SODIUM BICARBONATE

CONDITIONS TO AVOID
Avoid wet and humid conditions.

MATERIALS TO AVOID
Strong acids.

HAZARDOUS DECOMPOSITION PRODUCTS
Fire or high temperatures create: Oxides of: Carbon.

11 TOXICOLOGICAL INFORMATION

TOXIC DOSE 1 - LD 50
4220 mg/kg (oral rat)

INHALATION
Dust may irritate respiratory system or lungs.

INGESTION
May cause gastric distress, nausea and vomiting if ingested.

SKIN CONTACT
Powder may irritate skin.

EYE CONTACT
Particles in the eyes may cause irritation and smarting.

12 ECOLOGICAL INFORMATION

ECOTOXICITY
Contact M-I Swaco's QHSE Department for ecological information. Not regarded as dangerous for the environment.

13 DISPOSAL CONSIDERATIONS

DISPOSAL METHODS
Recover and reclaim or recycle, if practical. Dispose of waste and residues in accordance with local authority requirements.

14 TRANSPORT INFORMATION

GENERAL
The product is not covered by international regulation on the transport of dangerous goods (IMDG, IATA, ADR/RID).

15 REGULATORY INFORMATION

RISK PHRASES
NC Not classified.

SAFETY PHRASES
NC Not classified.

UK REGULATORY REFERENCES
Chemicals (Hazard Information & Packaging) Regulations. The Control of Substances Hazardous to Health Regulations

EU DIRECTIVES

GUIDANCE NOTES
Workplace Exposure Limits EH40.

16 OTHER INFORMATION

GENERAL INFORMATION
HMIS Health - 1 HMIS Flammability - 0 HMIS Physical Hazard - 0 E - Safety glasses, Gloves, Dust Respirator

INFORMATION SOURCES

REVISION COMMENTS
The following sections have been revised: 4, 5, 6, 7, 8, 12, 13, 14, 15 and 16. Revised by Bill Cameron
SODIUM BICARBONATE

ISSUED BY
Sam Hoskin

REVISION DATE 12-09-05
REV. NO./REPL. SDS GENERATED 3
SDS NO. 20117

DISCLAIMER
MSDS furnished independent of product sale. While every effort has been made to accurately describe this product, some of the data are obtained from sources beyond our direct supervision. We cannot make any assertions as to its reliability or completeness; therefore, user may rely only at user’s risk. We have made no effort to censor or conceal deleterious aspects of this product. Since we cannot anticipate or control the conditions under which this information and product may be used, we make no guarantee that the precautions we have suggested will be adequate for all individuals and/or situations. It is the obligation of each user of this product to comply with the requirements of all applicable laws regarding use and disposal of this product. Additional information will be furnished upon request to assist the user; however, no warranty, either expressed or implied, nor liability of any nature with respect to this product or to the data herein is made or incurred hereunder.
SAFETY DATA SHEET
SODIUM CHLORIDE BRINE

1 IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND COMPANY/UNDERTAKING

PRODUCT NAME: SODIUM CHLORIDE BRINE
APPLICATION: Oil well completion fluid.
SUPPLIER: M-I Drilling Fluids UK Ltd,
Pocra Quay,
Footdee,
Aberdeen. AB11 5DQ
T: +44 (0)1224-584336
F: +44 (0)1224-576119
EMERGENCY TELEPHONE: +44(0)208 762 8322

2 COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Name</th>
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<th>CAS-No.</th>
<th>Content</th>
<th>Classification</th>
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<td>7647-14-5</td>
<td>10-30%</td>
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<tr>
<td>WATER</td>
<td>231-791-2</td>
<td>7732-18-5</td>
<td>60-100%</td>
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</table>

The Full Text for all R-Phrases are Displayed in Section 16

COMPOSITION COMMENTS
The data shown is in accordance with the latest EC Directives.

3 HAZARDS IDENTIFICATION

Not regarded as a health or environmental hazard under current legislation.

4 FIRST-AID MEASURES

INHALATION
Move the exposed person to fresh air at once. Get medical attention if any discomfort continues.

INGESTION
Rinse mouth thoroughly with water and give large amounts of milk or water to people not unconscious. Get medical attention if any discomfort continues.

SKIN CONTACT
Remove contaminated clothing immediately and wash skin with soap and water. Get medical attention promptly if symptoms occur after washing.

EYE CONTACT
Promptly wash eyes with plenty of water while lifting the eye lids. Continue to rinse for at least 15 minutes. Get medical attention if any discomfort continues.

5 FIRE-FIGHTING MEASURES

EXTINGUISHING MEDIA
The product is non-combustible. Use fire-extinguishing media appropriate for surrounding materials.

SPECIFIC HAZARDS
By heating and fire, toxic vapours/gases may be formed.

PROTECTIVE MEASURES IN FIRE
Self contained breathing apparatus and full protective clothing must be worn in case of fire.

6 ACCIDENTAL RELEASE MEASURES


SODIUM CHLORIDE BRINE

PERSONAL PRECAUTIONS
Wear protective clothing as described in Section 8 of this safety data sheet.

ENVIRONMENTAL PRECAUTIONS
Do not allow to enter drains, sewers or watercourses.

SPILL CLEAN UP METHODS
Stop leak if possible without risk. Dike far ahead of spill for later disposal. Absorb spillage with suitable absorbent material. Shovel into dry containers. Cover and move the containers. Flush the area with water.

7 HANDLING AND STORAGE

USAGE PRECAUTIONS
Do not use contact lenses. Avoid spilling, skin and eye contact. Avoid inhalation of vapours.

STORAGE PRECAUTIONS
Store in tightly closed original container in a dry and cool place.

8 EXPOSURE CONTROLS/PERSOAL PROTECTION

PROTECTIVE EQUIPMENT

ENGINEERING MEASURES
Provide adequate general and local exhaust ventilation.

RESPIRATORY EQUIPMENT
Respiratory protection not required.

HAND PROTECTION
Chemical resistant gloves required for prolonged or repeated contact. such as, Butyl rubber. or Polyvinyl chloride (PVC).

EYE PROTECTION
Wear splash-proof eye goggles to prevent any possibility of eye contact.

OTHER PROTECTION
Wear appropriate clothing to prevent repeated or prolonged skin contact. Provide eyewash station.

9 PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE
Liquid

COLOUR
Colourless

ODOUR
Odourless

SOLUBILITY
Soluble in water

BOILING POINT (°C)
106°C

MELTING POINT (°C)
-5

RELATIVE DENSITY
1.2 @ 20 °C

pH-VALUE, CONC. SOLUTION
8.5

10 STABILITY AND REACTIVITY

STABILITY
Stable under normal temperature conditions.

MATERIALS TO AVOID
Strong oxidising substances.

HAZARDOUS DECOMPOSITION PRODUCTS
By heating and fire, toxic vapours/gases may be formed.

11 TOXICOLOGICAL INFORMATION
INHALATION
May cause irritation to the respiratory system.

INGESTION
May cause discomfort if swallowed.

SKIN CONTACT
Prolonged and frequent contact may cause redness and irritation.

EYE CONTACT
Spray and vapour in the eyes may cause irritation and smarting.

12 ECOTOXICITY
Contact M-I Swaco's QHSE Department for ecological information.

13 DISPOSAL CONSIDERATIONS
DISPOSAL METHODS
Recover and reclaim or recycle, if practical. Dispose of waste and residues in accordance with local authority requirements.

14 TRANSPORT INFORMATION
GENERAL
The product is not covered by international regulation on the transport of dangerous goods (IMDG, IATA, ADR/RID). The product has been assessed and contained in Chapters 17 and 18 of the IBC Code and the latest MEPC Circular and is permitted to be carried under Annex II of MARPOL and resolution A.673 (16) Offshore Supply Vessel Code.

15 REGULATORY INFORMATION
RISK PHRASES
NC Not classified.

SAFETY PHRASES
NC Not classified.

UK REGULATORY REFERENCES
Chemicals (Hazard Information & Packaging) Regulations. Control of Substances Hazardous to Health.

EU DIRECTIVES

GUIDANCE NOTES
Workplace Exposure Limits EH40.

16 OTHER INFORMATION
GENERAL INFORMATION
HMIS Health - 1 HMIS Flammability - 0 HMIS Physical Hazard - 0 J - Splash Goggles, Gloves, Synthetic Apron, Dust and Vapor Respirator.

INFORMATION SOURCES

REVISED COMMENTS
General revision. Revised by Bill Cameron

ISSUED BY
Dr. Kirsty Walker

REVISION DATE 03-11-06

REV. NO./REPL. SDS GENERATED 1

SDS NO. 11115
SODIUM CHLORIDE BRINE

RISK PHRASES IN FULL

NC Not classified.

DISCLAIMER

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SAFETY DATA SHEET
SODIUM CHLORIDE

1 IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND COMPANY/UNDERTAKING

PRODUCT NAME SODIUM CHLORIDE
SYNONYMS, TRADE NAMES Salt, PVD Salt, NaCl
APPLICATION Oil well drilling fluid additive. Oil well completion fluid additive.
SUPPLIER M-I Drilling Fluids UK Ltd,
Pocra Quay,
Footdee,
Aberdeen, AB11 5DQ
T: 44 (0)1224-584336
F: 44 (0)1224-576119
EMERGENCY TELEPHONE +44(0)208 762 8322

2 COMPOSITION/INFORMATION ON INGREDIENTS

EU INDEX NO. 000-000-00-0
EC (EINECS) NO. 231-598-3
CAS-NO. 7647-14-5
COMPOSITION COMMENTS The data shown is in accordance with the latest EC Directives.

3 HAZARDS IDENTIFICATION

Not regarded as a health hazard under current legislation.
CLASSIFICATION -

4 FIRST-AID MEASURES

INHALATION Move the exposed person to fresh air at once. Get medical attention if any discomfort continues.

INGESTION Rinse mouth thoroughly. Drink plenty of water. Contact physician if larger quantity has been consumed. Do not induce vomiting.

SKIN CONTACT Wash skin thoroughly with soap and water. Remove contaminated clothing. Get medical attention if any discomfort continues.

EYE CONTACT Promptly wash eyes with plenty of water while lifting the eye lids. Continue to rinse for at least 15 minutes. Get medical attention if any discomfort continues.

5 FIRE-FIGHTING MEASURES

EXTINGUISHING MEDIA This material is not combustible. Use fire-extinguishing media appropriate for surrounding materials.

UNUSUAL FIRE & EXPLOSION HAZARDS No unusual fire or explosion hazards noted.

SPECIFIC HAZARDS Fire or high temperatures create: Chlorine. Oxides of: Sodium. Chlorides.

PROTECTIVE MEASURES IN FIRE Self contained breathing apparatus and full protective clothing must be worn in case of fire.

6 ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS Wear protective clothing as described in Section 8 of this safety data sheet.
**SODIUM CHLORIDE**

**ENVIRONMENTAL PRECAUTIONS**
Do not discharge into drains, water courses or onto the ground.

**SPILL CLEAN UP METHODS**
Shovel into dry containers. Cover and move the containers. Flush the area with water. Be aware of potential for surfaces to become slippery when wet.

### 7 HANDLING AND STORAGE

**USAGE PRECAUTIONS**
Avoid spilling, skin and eye contact. Avoid handling which leads to dust formation. Provide good ventilation.

**STORAGE PRECAUTIONS**
Store at moderate temperatures in dry, well ventilated area. Keep containers tightly closed. Corrosive to most metals.

### 8 EXPOSURE CONTROLS/PERSONAL PROTECTION

**INGREDIENT COMMENTS**
NUI = Nuisance dust, WEL TWA 4mg/m3 Respirable Dust, 10 mg/m3 Total Dust.

**PROTECTIVE EQUIPMENT**

**ENGINEERING MEASURES**
Provide adequate general and local exhaust ventilation.

**RESPIRATORY EQUIPMENT**
If ventilation is insufficient, suitable respiratory protection must be provided. Dust filter P2 (for fine dust).

**HAND PROTECTION**
No specific hand protection noted, but gloves may still be advisable. Rubber or plastic.

**EYE PROTECTION**
Wear dust resistant safety goggles where there is danger of eye contact.

**OTHER PROTECTION**
Wear appropriate clothing to prevent repeated or prolonged skin contact. Provide eyewash station.

### 9 PHYSICAL AND CHEMICAL PROPERTIES

**APPEARANCE**
Crystals or Crystalline powder

**COLOUR**
White

**ODOUR**
Odourless No characteristic odour.

**SOLUBILITY**
Soluble in water.

**MELTING POINT (°C)**
801 °C

**RELATIVE DENSITY**
2.165 20° C

**BULK DENSITY**
2169 kg/m3

**SOLUBILITY VALUE (g/100g H2O@20°C)**
35.7

**pH-VALUE, DILUTED SOLUTION**
~ 7 1

### 10 STABILITY AND REACTIVITY

**STABILITY**
Stable under normal temperature conditions.

**CONDITIONS TO AVOID**
Avoid wet and humid conditions. Hygroscopic. Corrosive to metals.

**MATERIALS TO AVOID**
Strong oxidising substances. Strong acids.

**HAZARDOUS DECOMPOSITION PRODUCTS**
Fire or high temperatures create: Chlorine. Oxides of: Sodium. Chlorides.

### 11 TOXICOLOGICAL INFORMATION

**TOXIC DOSE 1 - LD 50**
3000 mg/kg (oral rat)
INHALATION
Dust may irritate respiratory system or lungs.

INGESTION
May cause gastric distress, nausea and vomiting if ingested.

SKIN CONTACT
Powder may irritate skin.

EYE CONTACT
Particles in the eyes may cause irritation and smarting.

HEALTH WARNINGS
INGESTION. This product has low toxicity. Only large volumes may have adverse impact on human health.

12 ECOLOGICAL INFORMATION

ECOTOXICITY
Contact M-I Swaco’s QHSE Department for ecological information. Not regarded as dangerous for the environment. OSPAR have defined this chemical as PLONOR.

13 DISPOSAL CONSIDERATIONS

DISPOSAL METHODS
Recover and reclaim or recycle, if practical. Dispose of waste and residues in accordance with local authority requirements.

14 TRANSPORT INFORMATION

GENERAL
The product is not covered by international regulation on the transport of dangerous goods (IMDG, IATA, ADR/RID).

15 REGULATORY INFORMATION

RISK PHRASES
NC Not classified.

SAFETY PHRASES
NC Not classified.

UK REGULATORY REFERENCES
Chemicals (Hazard Information & Packaging) Regulations.

EU DIRECTIVES

GUIDANCE NOTES
Workplace Exposure Limits EH40.

16 OTHER INFORMATION

GENERAL INFORMATION
HMIS Health - 1 HMIS Flammability - 0 HMIS Physical Hazard - 0 E - Safety glasses, Gloves, Dust Respirator

INFORMATION SOURCES
Micromedex. Material Safety Data Sheet, Misc. manufacturers.

REVISION COMMENTS
Revised by Silvia Smart. The following sections have been revised: 2, 4, 5, 6, 7, 8, 10, 13, 15, 16.

ISSUED BY
Dr. Kirsty Walker

REVISION DATE 21-06-06

REV. NO./REPL. SDS GENERATED 3

SDS NO. 20036
SODIUM CHLORIDE

DISCLAIMER

MSDS furnished independent of product sale. While every effort has been made to accurately describe this product, some of the data are obtained from sources beyond our direct supervision. We cannot make any assertions as to its reliability or completeness; therefore, user may rely only at user's risk. We have made no effort to censor or conceal deleterious aspects of this product. Since we cannot anticipate or control the conditions under which this information and product may be used, we make no guarantee that the precautions we have suggested will be adequate for all individuals and/or situations. It is the obligation of each user of this product to comply with the requirements of all applicable laws regarding use and disposal of this product. Additional information will be furnished upon request to assist the user; however, no warranty, either expressed or implied, nor liability of any nature with respect to this product or to the data herein is made or incurred hereunder.
SAFETY DATA SHEET
SUGAR

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND COMPANY/UNDERTAKING

PRODUCT NAME: SUGAR
APPLICATIONS: Cement additive.
SUPPLIER: M-I Drilling Fluids UK Ltd, Pocra Quay, Footdee, Aberdeen, AB11 5DQ
Tel: 44 (0)1224 - 584336
Fax: 44 (0)1224 - 576119
EMERGENCY TELEPHONES: 001 281 561 1600 (USA)

2. COMPOSITION/INFORMATION ON INGREDIENTS

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<th>EINECS Nr.:</th>
<th>CAS No.:</th>
<th>CLASSIFICATION</th>
<th>CONTENT</th>
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<td>- Not classified.</td>
<td>100 %</td>
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The Full Text for all R-Phrases are Displayed in Section 16

COMPOSITION COMMENTS: This product is classified as containing no hazardous ingredients according to the EC Directives.

3. HAZARDS IDENTIFICATION

Not regarded as a health hazard under current legislation.

4. FIRST AID MEASURES

INHALATION: Move the exposed person to fresh air at once. Get medical attention if any discomfort continues.

INGESTION: First aid is not normally required. Rinse mouth thoroughly. Drink plenty of water.

SKIN: Wash skin thoroughly with soap and water. Remove contaminated clothing. Get medical attention if any discomfort continues.

EYES: Promptly wash eyes with plenty of water while lifting the eye lids. Get medical attention if any discomfort continues.
5. FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA: Use extinguishing media appropriate for surrounding fire.

SPECIAL FIRE FIGHTING PROCEDURES: No specific fire fighting procedure given.

HAZARDOUS COMBUSTION PRODUCTS: It may emit noxious fumes.

6. ACCIDENTAL RELEASE MEASURES

SPILL CLEANUP METHODS: Shovel into dry containers. Cover and move the containers. Flush the area with water. Wear necessary protective equipment.

7. HANDLING AND STORAGE

USAGE PRECAUTIONS: Avoid handling which leads to dust formation. Provide good ventilation.

STORAGE PRECAUTIONS: Store at moderate temperatures in dry, well ventilated area.

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

INGREDIENT COMMENTS: This material is considered a nuisance dust, OES TWA 4mg/m3 Respirable Dust, 10 mg/m3 Total Dust.

PROTECTIVE EQUIPMENT:

VENTILATION: Provide adequate general and local exhaust ventilation.

RESPIRATORS: Respiratory protection must be used if air concentration exceeds acceptable level. Dust filter P2 (for fine dust).

PROTECTIVE GLOVES: No specific hand protection noted, but gloves may still be advisable. For prolonged or repeated skin contact use suitable protective gloves. Rubber or plastic.

EYE PROTECTION: Wear dust resistant safety goggles where there is danger of eye contact.

OTHER PROTECTION: Wear appropriate clothing to prevent repeated or prolonged skin contact. Provide eyewash station.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Crystals.
COLOUR: White.

ODOUR/TASTE: Sweet.

MELT./FREEZ. POINT (°C, interval): 170 - 180

DENSITY/SPECIFIC GRAVITY (g/ml): 1.587

PARTICLE SIZE (micron): < 2000

SOLUBILITY DESCRIPTION: Very soluble in water.

SOLUBILITY VALUE (g/100g H2O 20°C): 2 kg/l

10. STABILITY AND REACTIVITY

STABILITY: Normally stable.

CONDITIONS TO AVOID: Not known.

HAZARDOUS DECOMP. PRODUCTS: It may emit noxious fumes.

11. TOXICOLOGICAL INFORMATION

INHALATION: Dust may irritate respiratory system or lungs.

INGESTION: No specific health warnings noted.

SKIN: No specific health warnings noted.

EYES: Particles in the eyes may cause irritation and smarting.

12. ECOLOGICAL INFORMATION

ECOLOGICAL INFORMATION: Not regarded as dangerous for the environment.

MOBILITY: Completely soluble in water.

DEGRADABILITY: Readily biodegradable.

13. DISPOSAL CONSIDERATIONS

DISPOSAL METHODS: Recover and reclaim or recycle, if practical. Dispose of on site landfill area. Dispose of in accordance with Local Authority requirements.

14. TRANSPORT INFORMATION

ROAD TRANSPORT NOTES: Not classified for road transport.

RAIL TRANSPORT NOTES: Not classified for rail transport.
SEA TRANSPORT NOTES: Not classified for sea transport.
AIR TRANSPORT NOTES: Not classified for air transport.

15. REGULATORY INFORMATION

RISK PHRASES: Not classified.
SAFETY PHRASES: Not classified.

16. OTHER INFORMATION


ISSUED BY: Sarah Glover

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R-PHRASES (Full Text): Not classified.

DISCLAIMER: MSDS furnished independent of product sale. While every effort has been made to accurately describe this product, some of the data are obtained from sources beyond our direct supervision. We cannot make any assertions as to its reliability or completeness; therefore, user may rely on it only at user’s risk. We have made no effort to censor or conceal deleterious aspects of this product. Since we cannot anticipate or control the conditions under which this information and product may be used, we make no guarantee that the precautions we have suggested will be adequate for all individuals and/or situations. It is the obligation of each user of this product to comply with the requirements of all applicable laws regarding use and disposal of this product. Additional information will be furnished upon request to assist the user; however, no warranty, either expressed or implied, nor liability of any nature with respect to this product or to the data herein is made or incurred hereunder.
APPENDIX 6 – RESTORATION PLAN
1. **Introduction**

Rathlin Energy Limited has submitting an application to Department of the Environment for permission to drill an exploratory borehole. In support of the planning application a scheme for site restoration has been produced, which makes provision for the capping or plugging of the borehole to the satisfaction of the Planning Authority (PA).

2. **Restoration scheme background**

The aim of the restoration scheme is to return the site to agriculture in a condition as close as practically possible to its original state. The sub-soil and top-soil should be in an uncompacted state, such that the growth of crop roots is unimpeded and drainage water can percolate down through the profile relatively freely either to the piped drainage system or to naturally permeable strata.

The scheme will be agreed in writing by the PA, approved by the HSE, DECC and the Landowner.

The cultivation of sub-soil and the replacement/cultivation of top-soil is weather dependant and often subject to conditions imposed by the Mineral Planning Authority. Timescales, when given, are estimated assuming both the sub-soil and top-soil are in a suitably dry non-plastic state such that damage to its structure shall be avoided.

3. **Reinstatement operations**

When the decision is made to restore the site to if former usage the well(s) will be plugged, hydrostatically tested, and abandoned with an agreed programme or method approved by the HSE and the DECC.

3.1 **Pre restoration site clearance**

The wellhead and Christmas-Tree will be removed and the well casing cut off not less than 1.5 metres (5 feet) below the finished ground level, a metal plate welded on top, and a concrete slab placed on top of the plate.

All plant, equipment, buildings, security fencing, and surface installations, will be dismantled and removed from the site, either to a re-location or to storage.

The site ditches, sump(s), cellar(s), and cess tank(s), will be drained and any contaminated materials removed from the site, such waste will be disposed of at approved locations, in accordance with prevailing legislation of the time.

All pipes, cables, ducting, and items above the impermeable lining will be disconnected, excavated, and removed from the site for disposal.

All uncontaminated hardcore and stone will be removed, with a flat bladed grader or bucket, for re-use or disposal. Concrete installations will be broken up and removed, the geotextile membrane (Terram), sand and impermeable linings will then be removed, with disposal to an approved location.
Any installations, cables, and pipes, below the linings level will then be excavated and removed from the site.

The cellar, sump and ditching voids will be in-filled with any sub-soil stored on the site, in layers of not more than 200mm thickness, ready for the site area to be then re-graded to the original contour levels.

Any header drains installed will be rodded to check their integrity prior to their retention as part of the reinstatement scheme.

3.2 Sub-soil cultivation

The sub-soil will be deep tine cultivated in strips, using a low ground pressure bulldozer drawing a winged, straight legged tine cultivator to a depth of 600mm at 1000mm centres. After each strip is deep tine cultivated, top-soil will be back-tipped onto the loosened strip and graded out either with the bucket of the 360° excavator or with a low ground pressure bulldozer. The deep tine cultivated sub-soil will not be traversed by any machinery.

3.3 Replacement of soil-sub

Any weed growth on any subsoil stockpiles will be eliminated by non-persistent, contact weed killer such as “Roundup”, prior to the re-grading of the sub-soil to reform the falls and gradients which existed prior to the occupation of the site and to the original site contours. After each strip of sub-soil is deep tine cultivated, previously excavated sub-soil will be back-tipped onto the loosened strips in as thicker layer as possible and graded out either with the bucket of the 360° excavator or with a low ground pressure bulldozer. The deep tine cultivated sub-soil will not be traversed by any machinery.

3.4 Replacement of top-soil

Any weed growth on the topsoil stockpiles will be eliminated by non-persistent, contact weed killer such as “Roundup”. Topsoil will be back-tipped from the stockpile onto the loosened strips and graded out either with the bucket of the 360° excavator or with a low ground pressure bulldozer to a uniform depth (the original depth before excavation), and will be levelled to avoid the formation of depressions which could hold water.

All topsoil areas within the site, including areas not affected by construction will be ploughed and cultivated to ensure that all stones, rubble, vegetation and other extraneous material larger than 75mm in any direction are removed from the site to a suitable tip.

The topsoil will be worked to a fine tilth by rotovator or harrowing to not less than 100mm depth.

If it should prove necessary to import top soil into the site, disease and pest free material to British Standard 3882 (General Purpose Grade) will be used.
3.5 **Removal of site boundary fence**

The boundary fencing will normally be dismantled and removed prior to site restoration works. If however, the land surrounding the site is used for grazing livestock, the boundary fence will be dismantled and removed on completion of the restoration works, as it will be required to protect the restoration area from the animals.

3.6 **Reinstatement of fences and gates**

Any fences and gates removed during the use of the site will be replaced with new materials which match closely as practicable those previously existing on site.

3.7 **Reinstatement of hedgerows**

Any hawthorn hedge removed will be replanted with good nursery stock plants spaced in a double row 9 inches apart, individually guarded in plastic tubes to increase protection and growth and to create a ‘greenhouse’ affect. A tannalised timber post and four rail fence with livestock and rabbit proof netting will be constructed on either side of the newly planted hedge. Any fence to protect a hedgerow planting will be maintained for a period of two years.

**Subsequent Management**

**Year 1**
1. Initial treatment will be carried out as described above.
   
   Apply ‘Herbicide’ twice a year to give the soil enough resistance to control weeds and helps establish the plants.

**Year 2**
1. Apply ‘Herbicide’ twice a year to give the soil enough resistance to control weeds and helps establish plants.

**Year 3**
1. Annual inspection.

**Year 4**
1. Annual inspection.

**Year 5**
1. Annual inspection.

4. **New field drainage**

If necessary, a scheme of field drainage in the site will be prepared and agreed with the Landowner and for works to be carried out by a specialist land drainage contractor in year two or earlier if appropriate.

Any construction of header drains installed to intercept the field drains will be retained; these will be rodded to check their integrity prior to their incorporation as part of the drainage reinstatement scheme.

Perforated plastic pipe of minimum diameter, 110mm, will be laid at the bottom of the trench surrounded by backfill with clean washed 10 to 20mm pea-gravel (depending on the drainage machine to be used), and will be backfilled to within 225mm of surface allowing for settlement for the gravel. Drains will be laid to the maximum available falls and, at depths not less than 660mm cover.
Any outfall of the drainage system will consist of 2m lengths of frost resistant plastic pipe set into a suitable headwall (concrete or gabion) with a splash plate, discharging at water level into the ditches.

If it is not possible to lay drains at a depth of at least 600mm of cover, the Landowner will be consulted and his written approval will be sought to an amended specification.

5. Management and aftercare

The whole former operation site will be returned to agriculture after completion of the works, subject to the Landowner’s agreement. Annual inspections will be made in August/September of each year, for a period of five years, with the Landowner or his Agent, to review the progress and crop productivity of the restoration area.

5.1 Subsequent Management if subject to grass planting

Year 1  1. Initial treatment will be carried out as described above.

2. The site will be rolled with a light, grassland roller and spread with a compound fertiliser as recommended by soil sample analysis.

3. The grass will be gut for silage or hay May/June and subsequently grazed.

4. Any weeds will be sprayed with an appropriate weed killer.

5. All stock/cattle will be removed in adverse weather conditions to prevent poaching.

Year 2  1. Annual inspection.

2. Carry out additional restoration (if required) and compensate the owner or the land user for any loss.

Year 3  1. Annual inspection.

2. Carry out additional restoration (if required) and compensate the owner or the land user for any loss.

Year 4  1. Annual inspection.

2. Carry out additional restoration (if required) and compensate the owner or the land user for any loss.

Year 5  1. Annual inspection.

2. Carry out additional restoration (if required) and compensate the owner or the land user for any loss.

5.2 Subsequent management if subject to arable planting

Year 1  1. Initial treatment will be carried out as described above

2. ...
2. The crop will be assessed prior to harvest with regard to production levels and compared to production levels from adjoining undisturbed land.

Year 2
1. Annual inspection.
2. Further sub-soiling or comprehensive filed drainage scheme will be considered (if required).
3. Compensate the owner or land user for any loss or disturbance if required.

Year 3
1. Annual inspection.
2. Compensate the owner or land user for any loss or disturbance (if required).

Year 4
1. Annual inspection.
2. Compensate the owner or land user for any loss or disturbance (if required).

Year 5
1. Annual inspection.
2. Compensate the owner or land user for any loss or disturbance (if required).