KEY PETROLEUM (AUSTRALIA) PTY LTD

ENVIRONMENT PLAN SUMMARY

WYE KNOT-1
EXPLORATION PERMIT 437 (EP437)

Document number	Revision	Date of revision
EP437/EPSWK1200604-KPA	**4**	**04/06/20**

Approval details

Approvals	Name	Signature	Date
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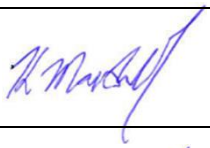
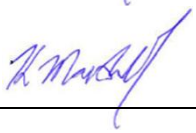
Custodian	Kane Marshall **Managing Director**		04/06/20
Approver	Kane Marshall **Managing Director**		04/06/20

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ACRONYMS

ADWR	Allanooka-Dongara Water Reserve
ALARP	As Low As Reasonably Practical
APPEA	Australian Petroleum Production and Exploration Association
CAWS	Country Areas Water Supply Act 1947
DAA	Department of Aboriginal Affairs
DMIRS	Department of Mines, Industry Regulation and Safety
DPAW	Department of Parks and Wildlife
DRF	Declared Rare Flora
DWER	Department of Water and Environment Regulation
EP	Environment Plan
EP437	Exploration Permit 437
EPA	Environmental Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
ESA	Environmentally Sensitive Area
ERA	Environmental Risk Assessment
ERP	Emergency Response Plan
HAZID	Hazard Identification
HSE	Health, Safety and Environment
Key	Key Petroleum (Australia) Pty Ltd
MSDS	Material Safety Data Sheets
NGERA	National Greenhouse and Energy Reporting Act 2007
OSCP	Oil Spill Contingency Plan
PDWSA	Public Drinking Water Source Area
PIC	Person in Charge
SES	State Emergency Services

Record of Revision It is certified that the amendments listed below have been incorporated in this copy of the publication		
REV NO.	**SECTION**	**DESCRIPTION OF CHANGES**
0	N/A	Creation of Document
1	N/A	Resubmission of document
2	N/A	Resubmission of document
3	N/A	Resubmission of document
4	N/A	Resubmission of document

1. OVERVIEW

Key Petroleum (Australia) Pty Ltd ("Key" or "the Company") proposes to conduct the Wye Knot-1 Drilling Operation ("DO") as outlined in the Environment Plan ("EP") within Exploration Permit 437 ("EP437"). Key operates EP437.

This EP has been developed in accordance with the Petroleum and Geothermal Energy Resources (Environment) Regulations 2012 (PGER(E) Regulations), administered by the Department of Mines, Industry Regulation and Safety ("DMIRS"). This EP has also been developed to support APPEA's Code of Environmental Practice. Further, this EP provides Key with a practical environmental performance tool for this activity.

The DO activities covered by this EP include:

- Upgrade and maintenance of access tracks;
- Clearing of vegetation at the access track and well pad locations;
- Construction of well pad;
- Establishment of a temporary site office and associated facilities;
- Construction of firebreak around well pad.
- Drilling the well with a rotary drilling rig, using recirculated water-based mud;
- Conducting wireline logging of the pilot hole together with contingent drill stem testing;
- Cementing the well casings; and
- Abandoning or completing the well.

This EP will be in place to cover all activities related to the DO. The proposed commencement date of activities is 15 March 2020 and following the approval of all regulatory submissions pertinent to the proposed activities contained in this EP.

The Operator is Key Petroleum (Australia) Pty Ltd who is a wholly owned subsidiary of Key Petroleum Limited. Their corporate office is located at Suite 8 331-335 Hay Street, Subiaco, 6008 Western Australia. Tel: +61 8 6389 0322, Fax: +61 8 6389 0697. Email: admin@keypetroleum.com.au. Further information on the company can be obtained from their website, www.keypetroleum.com.au.

2. LOCATION AND TENURE

EP437 is located on the southern margin of the Greenough Shelf, onshore North Perth Basin, Western Australia. It comprises thirteen graticular blocks, eight of which are bound by the coastal margin, covering an area of 736.96 square kilometres and is situated 2 kilometres north-northwest of the town of Dongara (Figure 1).

Access to the Wye Knot-1 well pad is via Mount Horner Road West.

The Wye Knot-1 exploration well is located on a subdivided, existing freehold pastoral land. The nearest sensitive receptor (residence) is located 1525 metres to the west of Wye Knot-1 (Figure 2). The surrounding properties are used primarily for agricultural uses for the land, cropping and grazing. The well is located approximate 330 m southwest of Wye-1.

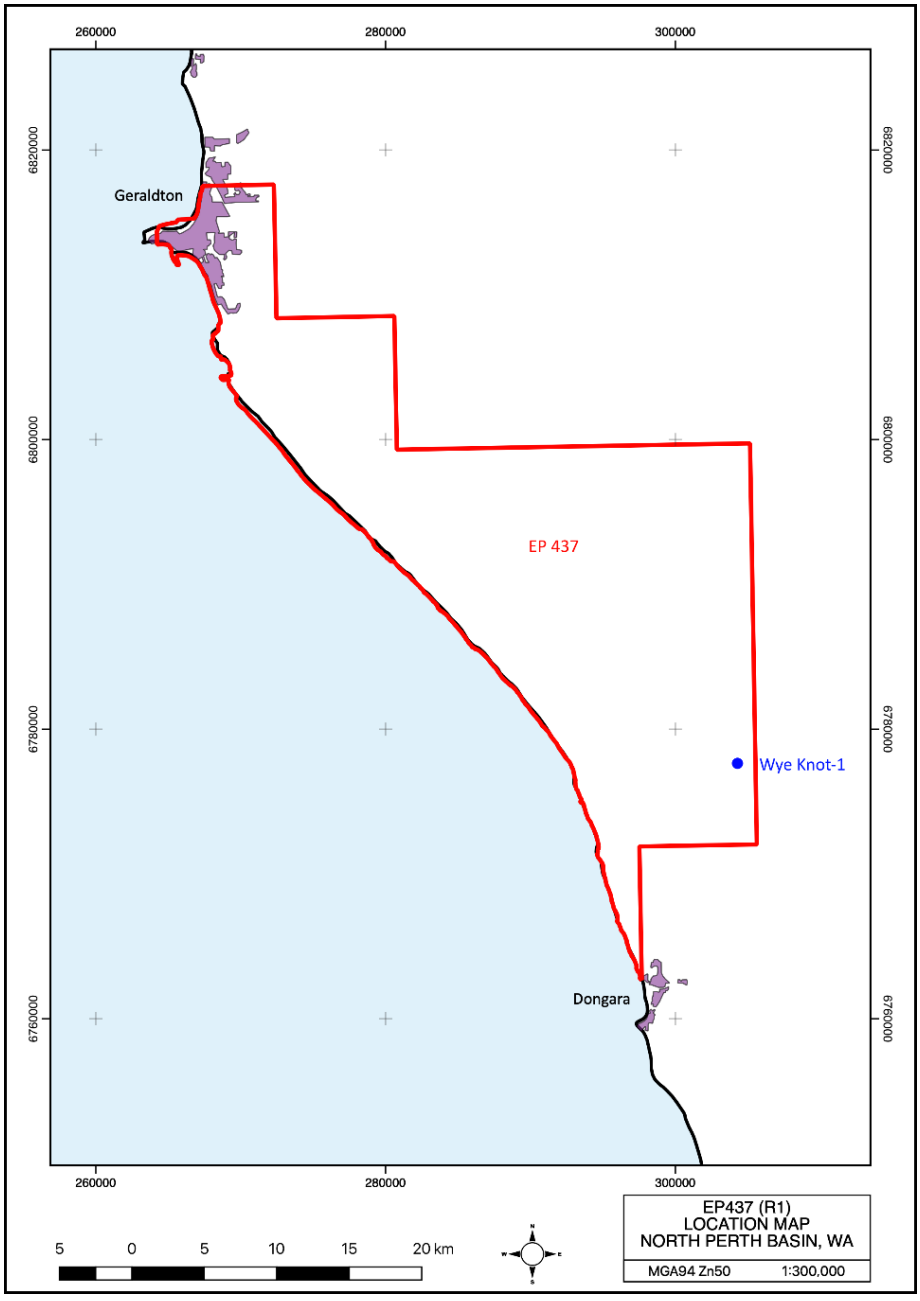

Figure 1: Location of EP437 and Wye Knot-1, Perth Basin, WA.

Figure 2. Nearest Sensitive Receptor to Wye Knot-1

3. DESCRIPTION OF THE ACTIVITY

Wye Knot-1 is proposed to test the oil-bearing potential of the Lower Triassic, Bookara Sandstone and test the hydrocarbon potential of the Early Permian. The well will be drilled to a proposed total depth of ~740 mSS and will target a potential 1.4 mmstbbl OOIP (P50) in the Bookara Sandstone.

The Wye Knot prospect is positioned to step out a distance sufficient enough to investigate the potential for an oil leg below the gas pay encountered in Wye-1. This step-out location is at a distance which suggests the gas cap does not extend outward from Wye-1 at a depth greater than 650 mSS.

This EP relates to the activities associated with the proposed Drilling Operations ("DO"). The DO activities covered by this EP include:

- Upgrade and maintenance of access tracks;
- Clearing of vegetation at the access track and well pad locations;
- Construction of well pad;
- Establishment of a temporary site office and associated facilities;
- Construction of firebreak around well pad.
- Drilling the well with a rotary drilling rig, using recirculated water-based mud;
- Conducting wireline logging of the pilot hole together with contingent drill stem testing;
- Cementing the well casings; and
- Abandoning or completing the well.

3.1 CONSTRUCTION

Construction activities that will be undertaken for the exploration drilling program include:

- Upgrade and maintenance of access tracks;

- Clearing of vegetation at the access track and well pad locations;
- Establishment of a temporary site office and associated facilities;
- Construction of well pad; and
- Construction of firebreak around well pad.

The table below summarises the extent of the land disturbance required for the exploration drilling program.

Project Infrastructure	Area for Construction (ha)	Details
Access tracks	0.09	In total, approximately 180m of a 5m wide access track will be constructed.
Drill pad	1	The drill pad will be 100m x 100m and will contain the following infrastructure: drilling rig, site office, diesel generators, diesel fuel storage tanks, refuelling area, lined earthen cuttings and mud sump, flare pit, chemical storage area and water bore.
Firebreaks	0.4	Firebreaks will surround the drill pad and will be 3m wide.
Total	**1.49**	

Table 1. Wye Knot-1 Total Land Disturbance

3.2 DRILLING

The Wye Knot-1 well will be drilled using standard onshore petroleum drilling techniques. Specifically, drilling will involve the following key stages:

- Drilling the well with a rotary drilling rig, using recirculated water-based mud;
- Conducting wireline logging of the pilot hole together with contingent drill stem testing;
- Cementing the well casings; and
- Abandoning or completing the well.

The exploration drilling program is consistent with the Petroleum Onshore Regulations. Should oil be found then the production casing will be run and cemented to Total Depth. Key has a 7” inch production casing if it is required in the event of finding oil.

The exploration well will be drilled with a water-based mud (primarily bentonite and potassium chloride-polymer). Muds and cuttings produced during drilling will be disposed of into earthen bund with a plastic 2.5mm thick liner. Fencing will be installed around the perimeter of the drill muds and cuttings sump and a fauna egress ramp installed.

In accordance with the schedule, Key will notify the relevant authorities including DMIRS, FESA, Shire of Irwin and the surrounding landholders if flaring is expected to occur.

The Chemical Disclosure Statement for downhole fluids in detailed in Appendix B. The MSDS related to those fluids are located in Appendix C.

3.3 DEMOBILISATION AND REHABILITATION

Should there be significant indications of hydrocarbons on wireline logs and if it is decided to complete the well as a producer, an appropriate completion plan will be submitted to DMIRS for approval and execution. In this case, the well would be cased, completed and suspended until suitable short and long-term production strategies are developed.

Casing depths and type of completion would depend on the commercial discovery (e.g. gas or oil, depth of production zone, permeability, pressure regime, flow characteristics).

Should there be no significant hydrocarbon indications, the well will be abandoned.

The pad and water bore will be offered to the landowner if requested or fully rehabilitated.

3.4 MONITORING

Key will implement a monitoring program after the completion of the exploration drilling program. The principle aim of the monitoring program will be to assess the effectiveness of rehabilitation, ensure vegetation recolonisation is effective, and there are no impacts to soil or groundwater quality from the drilling operation. Monitoring will continue for three (3) years after decommissioning of the well, well pad and access track.

4. DESCRIPTION OF THE ENVIRONMENT

This section is a review of the existing environment in the broader project area and surrounds, including the physical environment, biological environment, heritage and conservation environment and socioeconomic environment through the use of historical data and desktop research.

The DO location is within existing private land where there are no identified Cultural Heritage sites. There are no European Heritage sites, threatened flora or fauna or any direct impact on an ESA or EPP Lake within the Wye Knot-1 location.

4.1 CLIMATE

EP437 is located in in the Perth Basin, situated approximately 350km north of Perth. The region has a Mediterranean-type climate characterised by seasonal patterns of hot, dry summers and mild, wet winters. The area is subject to high wind speeds, dust storms, lightning storms, high summer temperatures and low winter night temperatures. The nearest Bureau of Meteorology stations are at Geraldton and Mingenew.

Summer maximum temperatures are warm/hot with 9 or 10 days per month in January and February exceeding 35°C and about 3 days in each of these months exceeding 40°C. Winter maximum temperatures are generally mild and average about 20°C. Minimum temperatures range from an average of about 19°C in February to 9°C in.

Annual rainfall averages approximately 465 mm near the coast but tapers off to around 335 mm 100 km inland. Generally, 55% of annual rainfall occurs between April and September with the wetter months being June and July. Monthly rainfall ranges from 5 to 10 mm in December - January and 85 to 110 mm in June. During the summer months rain occurs rarely resulting in seasonal droughts, lasting approximately four months. Summer months may record scattered and irregular thunderstorm rain or the infrequent influence of a decaying tropical cyclone. Thunderstorm days total about 10-15 per annum.

The wind speeds average about 15-20 km/h at 9am and 3pm in the cooler months although in the October-March period average wind speeds increase from about 20 km/h at 9am to 25-30 km/h at 3pm as a result of the sea breeze. On and close to the coast the sea breeze is even stronger.

EP437 lies at the southern edge of the cyclone belt and may be expected in the November-April each year.

Seismic activity in the area is considered very low as per AS1170 (Part 4). Tremors are occasionally felt in the area, but there has been no large seismic activity. There are no active faults in the area.

The area is occasionally affected by lightning strikes. These generally occur in the summer months.

A prohibited burning period (generally between October-April inclusive) occurs every summer season. Either side of this prohibited burning period is a prescribed burning period when permits are obtained from FESA on advice by the Irwin Shire Council.

4.2 LANDFORM AND SOILS

Generally, soils within the Perth Basin are light and sandy and well drained. Beard (1976) described the soils as “calcareous sand soils of minimal development”. The soils consist of calcareous and siliceous sand underlain by

aeolianite, which is often exposed. Two broad soil-landscape systems are present in L7: the Tamala system (yellow, red and black sands on limestone) and the Irwin system (alluvial valley systems). The Tamala system is developed upon a series of low shore parallel dunes/hills located immediately inland of the Quindalup system. Soils comprise well-drained calcareous black sands, neutral reddish-brown sands and neutral yellow sands. The Irwin system occurs on level to gently inclined alluvial flats and terraces of the Irwin and Lockier Rivers. Soils comprise imperfectly drained alkaline grey clays and loamy gradational and duplex soils.

4.3 SURFACE AND GROUNDWATER SYSTEMS

The Wye Knot-1 well is located in the northern part of the Perth Basin, within 10km of the Western Australian coastline. The area in which the exploration drilling program is located is generally devoid of any significant permanent surface water features. The porous and permeable coastal limestone and dune systems tend to allow rainwater to infiltrate to the water table rather than running off the land surface, resulting in a lack of defined major watercourses in the area.

The most significant surface water features in the vicinity of the exploration well are the Irwin and Greenough Rivers. The Irwin River flows in an east-west direction, approximately 160km from Canna to Arurine Bay near Dongara. The Irwin River is approximately 13km south of the exploration well site at its closest point (DEC, 2010a). The Greenough River lies approximately 20km north of the proposed exploration well site at its closest point. The Greenough River flows approximately 300km south-west from Jingemarra Station to Cape Burney, 9 km south of Geraldton (DEC, 2010a).

The nearest Proclaimed Surface Water Area (as proclaimed under the Rights in Water and Irrigation Act (1914) is the Greenough River and Tributaries Proclaimed Surface Water Area, which is located approximately 25km north of the exploration drilling program (DoW, 2010).

There are several small wetlands present within the Perth Basin. These wetlands are a surface expression of the relatively shallow water table that occurs in the northern parts of the Yarragadee Formation aquifer. The nearest wetland to the exploration drilling program, Allanooka Swamp, is located approximately 9.5km to the north-east of the exploration well.

No direct physical impacts to rivers, creeks, springs, wetlands or soaks will occur as a result of the proposed exploration wells.

The Wye Knot-1 well overlies the Yarragadee Formation aquifer – the largest aquifer in the Perth Basin. Geologically, the aquifer is comprised mainly of sand with minor interbedded shale and siltstone. The aquifer ranges in thickness from several hundred metres in the Allanooka area to about 3,000m in the Badgingarra area (DoF, 2004) and flows in a south-westerly direction through the proposed drill pad location, discharging into the Irwin River. In the Allanooka area, near where the exploration well is located, the water table is as shallow as 12 m below ground level. In this area the aquifer is considered moderately to highly vulnerable to contamination due to the relatively shallow water table and its unconfined nature (WRC, 2002).

Groundwater salinity in the Yarragadee Formation aquifer ranges from fresh to brackish (500mg/L to 1,300mg/L total dissolved solids) (WRC, 2002), with salinity increasing with groundwater depth and proximity to the coast (WRC, 2002).

The Wye Knot-1 well is also located within close proximity to the Allanooka-Dongara Water Reserve, is located approximately 1km east of the Wye Knot-1 exploration well. The water reserve contains Water Corporation bores that supply water from the Yarragadee aquifer to the townships of Geraldton, Dongara, Port Denison, Walkaway and Narngulu. The Allanooka-Dongara Water Reserve is managed by the DoW under the *Country Areas Water Supply Act 1974* (WRC, 2004).

The exploration drilling program is not expected to impact any reserves, watercourses or aquifers.

4.4 VEGETATION AND FLORA

A desktop flora and vegetation assessment, in the form of a literature review and database search, was conducted over the entire permit area EP, with particular focus of the Wye Knot-1 well site location. Consistent with EPA Guidance Statement 51 (EPA, 2004a), this level of assessment is considered adequate given that the land is located on freehold land.

The DO lies within the Irwin Botanical District of the South West Botanical Province (Beard, 1990) and the Lesueur Sandplain subregion of the Geraldton Sandplain bioregion as defined by IBRA (Desmond & Chant, 2001). The vegetation of the Geraldton Sandplain bioregion is broadly described as consisting of mainly proteaceous scrub heaths, rich in endemics, over a sandy, undulating, lateritic sandplain. Extensive York Gum and Jam Acacia woodlands occur on outwash plains associated drainage (Desmond & Chant, 2001).

Seventy-nine Priority Flora species, 42 DRF species, and one other species at risk (as gazetted under the *Wildlife Conservation Act 1950*) have been recorded within the Lesueur Sandplain subregion (Desmond & Chant, 2001).

Searches of the DPAW Threatened Flora Species Database and the Western Australian Herbarium Database (DEC, 2010b; DEC, 2010c) identified two DRF and two Priority Flora species surrounding the MHOF.

4.5 THREATENED AND PRIORITY ECOLOGICAL COMMUNITIES

Ecological communities are naturally occurring biological assemblages associated with a particular type of habitat. At a national level, Threatened Ecological Communities (TECs) are protected under the EPBC Act and may be categorised into one of three sub-categories:

Critically endangered, if it is facing an extremely high risk of extinction in the wild in the immediate future;

Endangered, if it is not critically endangered and is facing a very high risk of extinction in the wild in the near future; and

Vulnerable, if it is not critically endangered or endangered, and is facing a high risk of extinction in the wild in the medium-term future.

The Western Australian DPAW maintains a list of TECs which are further categorised into three subcategories which replicate those of the EPBC Act. Within the Western Australian classification, an ecological community will be listed as Vulnerable "when it has been adequately surveyed and is not Critically Endangered or Endangered but is facing a high risk of total destruction or significant modification in the medium to long-term future."

The DPAW also maintains a list of Priority Ecological Communities (PECs), categorised from Priority 1 through to Priority 4. PECs include potential TECs that do not meet survey criteria, or that are not adequately defined.

The exploration well does not overlap with any known occurrences of threatened or priority ecological communities, or their buffers (Desmond and Chant, 2001).

The well site and is located on freehold land. There will be clearing of sparse Acacia rostellifera required for the drilling program or when accessing the site. The exploration drilling program is not located within, or likely to impact, an ESA or DRF.

A search of the EPBC Act Protected Matters Database (DEWHA, 2010) identified no nationally threatened animals and plant species within the exploration area.

No other matters of National Environmental Significance were identified within the exploration area and the exploration drilling program is not required to be referred for assessment under the EPBC Act.

4.6 ENVIRONMENTALLY SENSITIVE AREAS

The DO is located within the Lesueur Sandplain subregion, which consists mainly of dryland agriculture (69.34%). Conservation in the subregion is concentrated in western areas (Desmond and Chant, 2001), with the most significant conservation areas being south of Dongara.

The closest conservation area, the Burma Road Nature Reserve, is approximately 25km northeast of the site. The Burma Road Nature Reserve is vested with the Western Australian Conservation Commission and is classified as an 'A' class nature reserve for the conservation of flora and fauna.

The exploration well site is not located within Commonwealth lands or reserves and will not impact on areas of conservation significance.

4.7 FAUNA

A fauna desktop assessment of the area surrounding the MHOF was conducted. The DPAW Threatened Fauna Database (DEC, 2010d), the DSEWPaC (formerly DEWHA), EPBC Act, Protected Matters Database, and other published documents were interrogated during the desktop survey. Consistent with EPA Guidance Statement 56 (EPA, 2004b), this level of survey is considered adequate given the lack of vegetation and therefore habitat within the proposed impact area, and also due to the fact that the scale and nature of impact associated with the DO program was assessed to be low.

A number of the species listed in the table are under pressure from feral animals either directly through predation (e.g. from foxes and cats) or indirectly through habitat destruction or alteration (e.g. by rabbits and goats).

Feral animals that are known to be present within the Lesueur Sandplain subregion include:

- Goats (*Capra hircus*);
- Rabbits (*Oryctolagus cuniculus*);
- Pigs (*Sus scrofa*);
- European Red Foxes (*Vulpes vulpes*);
- Rats (*Rattus rattus*); and
- Cats (*Felis catus*).

The area surrounding Wye Knot-1 is farming land, and broad-acre cropping and sheep grazing predominate (Desmond & Chant, 2001).

Western Grey Kangaroos, which are widespread within the region, may also occur in the general vicinity of the well site.

4.8 SOCIAL ENVIRONMENT

The DO is located within a sparsely populated region with limited settlement, transport or communications infrastructure. The region is relatively undeveloped, comprising of small coastal settlements that are economically dependent on fishing, agriculture, tourism, mining and natural gas production. The townships of Dongara and Port Denison to the south west are the largest population centres in the vicinity of Wye Knot-1. Dongara/Port Denison is a rock lobster fishing port and the region is the centre for Western Australia's rock lobster industry. There is one private landowner in EP437 directly affected by DO activities and commercial arrangements are in place. Land use within the surrounding region is pastoral, consisting of wheat, sheep and cattle farming, harvesting. Nomadic Aboriginal people no longer reside in the area, although some maintain their links to the area.

4.9 CULTURAL ENVIRONMENT

A Non-Indigenous heritage desktop assessment of EP437 was carried out. A search of the Australian Heritage Database identified no heritage sites of significance located near to exploration the well site (AHD, 2010).

The exploration drilling program will not impact on areas or sites of non-indigenous heritage significance.

Native Title does not exist over the freehold land on which the exploration wells will be located. Under the Native Title Act 1993, Native Title is extinguished on freehold land that has been granted on or before 23 December 1996.

The Aboriginal Heritage Inquiry System, maintained by the Western Australian Department of Indigenous Affairs, was referred to for Indigenous sites of archaeological and ethnographical significance within the exploration area and surrounds (DIA, 2010). There are no Indigenous heritage sites that overlap with the exploration drilling program, with the nearest being 7km away from Wye Knot-1 well.

The primary potential impact to Indigenous heritage is the disturbance of unknown Indigenous heritage sites of archaeological and/or ethnographic significance, through ground disturbance of the proposed exploration well site. As the well site is located within existing cleared land which has been utilized for farming and grazing activities for many years, it is unlikely that such a disturbance will occur.

4.10 ECONOMIC ENVIRONMENT

The significant economic activities in the region include oil, gas and mineral exploration and production, and broad hectare cropping and grazing activities. Other activities in the area include aquaculture and olive growth and production. Early settlement in the Dongara region was by pastoralists, however mining and agriculture are now important components of the regional economy.

4.11 AIR QUALITY AND NOISE

Air quality and noise emissions within EP437 and surrounds are expected to be slightly above natural ambient levels due to pastoral and industrial activities. The ambient air quality and noise level in EP437 is likely to be influenced by the following regional sources of air and noise emissions:

- Gypsum mining;
- Oil production facilities (Jingemia, Beharra, Hovea, Eremia, Xyris and Arrowsmith);
- CMS gas plant;
- Cockburn Cement plant;
- Rural plant and machinery use;
- Commercial and recreational vessels;
- Trains;
- Dongara Airport;
- Activities within the town of Dongara;
- Road traffic; and
- Wind-raised dust from bare sand dunes and cropping land.

These sources of emissions have a relatively low impact on the overall ambient air quality and noise levels in the area. Activities associated with the DO program are similar to rural plant and machinery use activities. The nearest sensitive receptors (landholder residences) are located approximately 1.5 kilometres west of Wye Knot-1.

The overall impact during the drilling program is expected to be low given the distance to the nearest sensitive receptor, the use of noise suppressed machinery. The piece of equipment which will generate the most noise will be the rig and will run at approximately 85db at a distance of 3m, this will be contained within the drill pad and given the remoteness, it is expected that these activities will not impact on nearby receptors. Noise monitoring will be conducted weekly throughout the exploration drilling program and will also be undertaken should a noise complaint be received.

5. ENVIRONMENTAL HAZARDS AND CONTROLS

Key has undertaken a comprehensive environmental risk assessment to identify the risks for the drilling activities. Appropriate management measures and control measures have been identified and applied to minimise the risk of adverse environmental impact. The perceived level of risk presented for each activity is reflective of the likelihood and consequence of identified impacts.

When an environmental risk and impact is identified, the following process is undertaken:

- Environmental risks are assessed by utilising the risk assessment process;
- Whenever possible, steps are taken to eliminate any risk to the environment. If the risk cannot be eliminated, then controls are identified, and treatments are established to manage and further reduce any risk;
- Identified treatments are implemented and monitored to assist in reducing or removing any risk; and
- Ongoing monitoring and review of the Environmental Risk Assessment Register.

An extract from the environmental risk register listing is detailed in Appendix A.

6. MANAGEMENT APPROACH

The EP outlines the proposed strategies that Key will implement to manage the potential environmental impacts associated with the drilling activities and to meet its legal and corporate obligations. Key's commitment to conduct activities in an environmentally responsible manner and implement systems and procedures to support this is demonstrated through the Environmental Corporate Policy. This outlines the environmental objectives and targets and provides a framework for Key activities and is provided to all personnel including employees, contractors and subcontractors.

Awareness of the requirements of the EP will be provided to all Key personnel and contractors. Personnel will be informed of their obligations and the specific environmental aspects, impacts and their control measures through familiarisation with the EP prior to attendance at site.

An HSE inspection will be conducted during the drilling activities, however no formal audits will be conducted under the EP.

7. STAKEHOLDER CONSULTATION

A stakeholder consultation program is being implemented and will continue after approval of this EP. The aim of the consultation program is to inform stakeholders and to identify any concerns, management strategies and positive benefits.

The consultation may include the registered landowner, Department of Mines, Industry Regulation and Safety, Department of Water and Environment Regulation, Shire of Irwin.

Upon approval of this EP, Key will continue further consultation with stakeholders providing the proposed dates of specific DO activities and other logistical information pertaining to mobilisation, acquisition and demobilisation, when finalised.

Table 2 provides a summary of the stakeholder consultation that has been undertaken to date.

Table 2: Stakeholder Consultation Register

Date	Stakeholder	Personnel	Method	Topic Covered	Outcomes
Mar-18 Dec-18	Landowner	Director	Multiple	Land access	Ongoing negotiations
09-Jun-17	Shire of Irwin	Personnel	Telephone	DA approval process and application requirements	Application details and methodology provided
11-Aug-17	DMIRS	Director	Meeting	Land access. Data availability	Key to continue access negotiations
28-Sep-17	DMIRS	Director	Letter	Application for Suspension and Extension of Permit Term	Suspension and Extension granted
16-Nov-19	DMIRS	Director	Letter	Application for Suspension and Extension of Permit Term	Suspension and Extension granted
12-Dec-18	Landowner	Director	Meeting	Land access	Ongoing discussions
23-Aug-19	Landowner	Director	Letter	Land access	Notification of landowner agreement
09-Sep-19	DWER	Director	Application	Application to Construct Water Bore Application to Take Groundwater	Awaiting review
11-Sep-19	DWER	Director	Email	Approval of Application to Construct Water Bore and Application to Take Groundwater	Approval granted. Proceed with proposed activity
30-Oct-19	DMIRS	Personnel	Email	Request for further information for EP	Key to provide response by 04-Dec-19
08-Nov-19	DMIRS	Multiple	Meeting	Update on EP437 matters and delays associated with access, regulatory	Key to incorporate biodiversity survey results

				approvals and impact of these on meeting compliance of the Title conditions. New commencement for Wye Knot-1 operations in February 2020.	into EP, submit revision in due course
02-Dec-19	DMIRS	Director	Online	Resubmission of EP	Awaiting review
17-Jan-20	DMIRS	Director	Email	Request for further information for EP	Key to provide response by 17-Feb-20
14-Feb-20	DMIRS	Director	Telephone	Request for extension of EP submission	EP submission extension granted to 02-Feb-20
02-Mar-20	DMIRS	Director	Online	Resubmission of EP	Awaiting Review
08-Apr-20	DMIRS	Director	Email	Request for further information for EP	Key to provide response by 08-May-20
15-Apr-20	DMIRS	Personnel	Phone	Call from DMIRS to Key stating if there are any queries related to request for information to call	Key acknowledged and will contact if required
21-Apr-20	DMIRS	Director	Online	Resubmission of EP	Awaiting Review
03-Jun-20	DMIRS	Director	Email	Request for further information for EP	Key to provide response by 06-Jul-20
16-Jun-20	DMIRS	Director	Online	Resubmission of EP	Awaiting Review

8. IMPLEMENTATION STRATEGY

Environmental management is an integral part of the Key DO activities to ensure that the environmental impacts and risks are reduced, and environmental management is undertaken.

Key's is committed to conduct activities in an environmentally responsible manner and implement systems and procedures to support this.

Key environmental management systems ensure a risk assessment is conducted to identify any potential environmental hazards associated with the planned activity. The risk assessment outcomes assist with the development of clearly stated environmental objectives. Practical procedures are then developed to ensure that activities are conducted in a manner, which achieve the environmental objectives.

There are clearly defined responsibilities for personnel to indicate their obligations regarding environmental management, with appropriate inductions and training of personnel. The EP ensures ongoing assessment of compliance with procedures and the achievement of objectives including a system of reporting for recording of data, performance monitoring and notification of relevant personnel.

The environmental management systems are supported by ongoing consultation and communication to seek input from, and to inform, all parties of relevant issues.

Appendix A: Environmental Risk Assessment

Location:	EP437	**Date:**	11/11/2019
Project:	Wye Knot-1	**Facilitated By:**	Key Petroleum (Australia) Pty Ltd

No.	Hazard	Event	Consequence	Pre-Treatment			Existing RRMs	Residual		
				C	L	R		C	L	R
STAKEHOLDER AND ACCESS										
1	Disruption to landholders and third parties	General site presence of operations personnel	Third party complaint Unauthorised third party encroachment	2	3	L	Consultation record for stakeholders Notice of commencement/cessation dates of activity Leave gates as found Personnel on site for security presence	1	3	N
		Mobilisation and demobiliation of personnel and machinery	Recordable incident related to vehicular/machinery movement	3	3	I	Journey Management Plan Driving Safely Procedure All vehicles and mobile equipment serviced and maintained per manufacturer's instructions Personnel licenced and competant Speed limits as legally mandated and/or signposted	3	2	L
SOIL MANAGEMENT										
2	Land degradation	Movement of vehicles and machinery	Loss of topsoil and vegetation Soil compaction	2	4	L	Utilisation of designated roads and tracks All vehicles and mobile equipment serviced and maintained per manufacturer's instructions Personnel licenced and competant Speed limits as legally mandated and/or signposted	2	3	L
		Heavy rainfall	Erosion/washout events Loss of soil stability	2	4	L	Regular inspections Expedited close out of identified erosion/washout events Signs	2	4	L
		Soil sampling	Loss of soil stability	2	2	N	Soil Sampling Procedure Excess soil replaced at source of sample	1	2	N
		Track Washout	Erosion Soil compaction	2	4	L	Regular inspections to identify areas requiring maintenance Grading to be performed by licenced and competant personnel Imported gravel sourced and distributed from/by local suppliers Soil Management Procedure	2	3	L
		Track/wellpad maintenance Stockpiling and handling topsoil materials	Erosion Introduction of weeds Dust	2	4	L	Soil Management Procedure Track Maintenance Procedure Stockpiling on cleared land only and away from drainage lines Stockpiles do not exceed 2 metres in height Stockpile extents physically demarcated Regular inspections	1	3	N
FIRE MANAGEMENT										
3	Fire	Natural causes (lightning)	Bushfire Electrical fault Loss of fauna, and flora/fauna habitat	3	2	L	Training and awareness Fire extinguishers Emergency Response Plan Fire breaks and cleared areas Personnel regularly on site	2	2	N
		Ignition source from equipment (spark, hot exhaust)	Bushfire Loss of fauna, and flora/fauna habitat	3	3	I	Training and awareness Fire extinguishers Emergency Response Plan Diesel vehicles All vehicles and mobile equipment serviced and maintained per manufacturer's instructions	2	3	L
		Ignition source from equipment (wellhead)	Bushfire Loss of fauna, and flora/fauna habitat Loss of well control	4	3	H	Training and awareness Fire extinguishers Emergency Response Plan Blowout preventer installed per program All equipment serviced and maintained per manufacturer's instructions	3	2	L
		Personnel (smoking)	Bushfire Loss of fauna, and flora/fauna habitat	2	2	N	Designated smoking areas Training and awareness Fire extinguishers	1	2	N
		Inappropriate handling/storage/disposal of chemicals	Ignition of flammable chemicals Bushfire Loss of fauna, and flora/fauna habitat	4	3	H	Emergency Response Plan Oil Spill Contingency Plan Site within designated cleared areas MSDS available Fire Extinguishers Spill kits Refuelling Register Chemicals stored in sealed containers within bunded areas	3	2	L
		Loss of flare containment during flaring	Bushfire Loss of fauna, and flora/fauna habitat Damage to equipment	3	3	I	Emergency Response Plan Minimum 20 m distance from pit to well Minimum 100 m distance from pit to public road Fire break	2	3	L

No.	Hazard	Event	Consequence	Pre-Treatment			Existing RRMs	Residual		
				C	L	R		C	L	R
WASTE AND HAZARDOUS MATERIALS MANAGEMENT AND WATER MANAGEMENT										
4	Spills or emissions	Rupture of storage vessel	Degradation to soil, surface water and/or groundwater Degradation to flora, and/or fauna habitat Damage to equipment	3	3	I	All vehicles and mobile equipment serviced and maintained per manufacturer's instructions Regular inspections Personnel licenced and competent Oil Spill Contingency Plan MSDS available Lined and bunded area	2	3	L
		Inappropriate handling of chemicals and wastes	Degradation to soil, surface water and/or groundwater Degradation to flora, and/or fauna habitat Damage to equipment	2	3	L	MSDS available Training and awareness Waste generated will be segregated and stored in sealed/labelled containers Lined and bunded area Bentonite layer in flare pit	2	2	N
		Inappropriate disposal of chemicals and wastes	Degradation to soil, surface water and/or groundwater Degradation to flora, and/or fauna habitat Damage to equipment	3	2	L	Waste Disposal Register MSDS available Training and awareness Waste generated will be segregated and stored in sealed/labelled containers Removal of all consumable waste from site at cessation of operations Disposal at an approved facility	2	2	N
		Loss of well control	Degradation to soil, surface water and/or groundwater Degradation to flora, and/or fauna habitat Well blowout	3	2	L	Well quipment serviced and maintained per manufacturer's instructions Training and Awareness Regular inspections	2	2	N
5	Potentially contaminated soil	Spread of contaminated soil	Degradation to soil, surface water and/or groundwater Degradation to flora, and/or fauna habitat	2	3	L	Waste Disposal Register Oil Spill Contingency Plan Disposal at an approved facility Disposal records	2	2	N
6	Subsurface impacts during drilling	Aquifer contamination by drilling fluids	Degradation to groundwater quality	3	3	I	Casing set over Yarragadee aquifer Correct drilling muds/weight used to establish filter cake to limit potential for invasion of fluids into aquifer during drilling MSDS available Personnel licenced and competent	2	3	L
VEGETATION, FLORA AND WEED MANAGEMENT										
7	Physical disturbance of vegetation	Movement of vehicles and machinery Mobilisation and demobiliation of personnel and machinery	Loss/damage to flora	2	4	L	Speed limits as legally mandated and/or signposted Utilisation of designated roads and tracks Vegetation Disturbance Register Vegetation Clearing Procedure	2	3	L
8	Weeds and pathogens	Movement of vehicles and machinery Mobilisation and demobiliation of personnel and machinery	Introduction of weeds and pathogens Contamination/degradation of environment (loss of flora/fauna habitat)	2	3	L	Utilisation of designated roads and tracks Vehicle Inspection Register and pre-start checks Training and awareness Weed Management Procedure Vehicle Hygiene Records	2	2	N
		Importation of material for track/wellpad construction	Introduction of weeds and pathogens Contamination/degradation of environment (loss of flora/fauna habitat)	2	3	L	Utilisation of designated roads and tracks Regular inspections Training and awareness Weed Management Procedure	2	2	N

No.	Hazard	Event	Consequence	Pre-Treatment			Existing RRMs	Residual		
				C	L	R		C	L	R
FAUNA MANAGEMENT										
9	Physical disturbance (removal or damage) of fauna habitat	Movement of vehicles and machinery Mobilisation and demobiliation of personnel and machinery	Loss/damage to flora Displacement of fauna	2	4	L	Speed limits as legally mandated and/or signposted Utilisation of designated roads and tracks Vegetation Disturbance Register	2	2	N
10	Direct impact on fauna by vehicle interaction	Movement of vehicles and machinery Mobilisation and demobiliation of personnel and machinery	Death or injury of fauna Damage to property	3	3	I	Driving Safely Procedure Fauna Interaction Procedure Training and awareness Speed limits as legally mandated and/or signposted Utilisation of designated roads and tracks	3	2	L
11	Direct impact on fauna by established infrastructure	Trapping/impedence of fauna movements	Death of fauna Damage to property	2	3	L	Fences and gates installed Fauna ingress/egress installed Regular inspections	2	2	N
DUST AND AIR EMISSIONS										
12	Greenhouse gas emissions	Movement of vehicles and machinery Mobilisation and demobiliation of personnel and machinery	Degradation of air quality impacting personnel, landholders, flora and fauna	2	3	L	All vehicles and mobile equipment serviced and maintained per manufacturer's instructions Personnel licenced and competant Speed limits as legally mandated and/or signposted Fuel use records for determining emissions	2	2	N
13	Dust disturbance	Movement of vehicles and machinery Mobilisation and demobiliation of personnel and machinery Track/pad construction activities	Degradation of air quality impacting personnel, landholders, flora and fauna	1	3	N	All vehicles and mobile equipment serviced and maintained per manufacturer's instructions Personnel licenced and competant Speed limits as legally mandated and/or signposted Dust Monitoring Procedure Soil Management Procedure Water spraying	1	2	N
NOISE										
14	Noise	Movement of vehicles and machinery Mobilisation and demobiliation of personnel and machinery	Disturbance to landholders Third party complaint	2	3	N	Consultation record for stakeholders Notice of commencement/cessation dates of activity Noise Procedure All vehicles and mobile equipment serviced and maintained per manufacturer's instructions Personnel licenced and competant Speed limits as legally mandated and/or signposted	1	2	N
		Movement of vehicles and machinery Mobilisation and demobiliation of personnel and machinery	Disturbance to stock and fauna	2	3	L	Noise Procedure All vehicles and mobile equipment serviced and maintained per manufacturer's instructions Personnel licenced and competant Speed limits as legally mandated and/or signposted	1	3	N
CULTURAL HERITAGE MANAGEMENT										
15	Impacts to Aboriginal and historic heritage sites	Movement of vehicles and machinery Mobilisation and demobiliation of personnel and machinery	Damage to Aboriginal and historic heritage sites	3	2	L	Nil sites of Aboriginal or cultural heritage in operational area	1	2	N

No.	Hazard	Event	Consequence	Pre-Treatment			Existing RRMs	Residual		
				C	L	R		C	L	R
REHABILITATION										
16	Rehabilitation and reinstatement	Erosion resulting in washout of surface sediments	Loss of topsoil and vegetation Loss of stability	2	3	L	Removal of infrastructure, pad and access track after decommissioning Respread of topsoil and native vegetation stockpiles Reinstatement and Rehabilitation Procedure Three-year monitoring period with six-monthly inspection intervals	2	2	N
		Contamination of soil from activities	Degradation to soil, surface water and/or groundwater Degradation to flora, and/or fauna habitat	3	3	I	Activities are short term (up to 2 years) No chemicals stored on site unattended for long periods Soil sampling of mud sump, chemical storage bunds, well location, flare pit for contamination Removal of infrastructure, pad and access track after decommissioning Reinstatement and Rehabilitation Procedure	2	3	L
		Contamination of groundwater from activities	Degradation to groundwater Degradation to flora, and/or fauna habitat	3	3	I	Activities are short term (up to 2 years) No chemicals stored on site unattended for long periods Water sampling from bore for monitoring prior to commencement and at conclusion of activities Three-year monitoring period with six-monthly surveillance water sampling intervals Removal of infrastructure, pad and access track after decommissioning Reinstatement and Rehabilitation Procedure	2	3	L
		Failure of vegetation recolonisation and/or habitat post-decommissioning	Loss/damage to flora	2	4	L	Small footprint of disturbance within paddock Removal of infrastructure, pad and access track after decommissioning Respread of topsoil and native vegetation stockpiles Reinstatement and Rehabilitation Procedure Three-year monitoring period with six-monthly inspection intervals	2	3	L
		Introduction of weed and pathogen infestations	Contamination/degradation of environment (loss of flora/fauna habitat)	2	3	L	Reinstatement and Rehabilitation Procedure Three-year monitoring period with six-monthly inspection intervals	2	2	N
		Persistent disturbance to fauna habitat	Displacement of fauna Death or injury of fauna	2	4	L	Small footprint of disturbance within paddock Removal of infrastructure, pad and access track after decommissioning Reinstatement and Rehabilitation Procedure Three-year monitoring period with six-monthly inspection intervals	2	2	N
		Ineffective rehabilitation resulting in remedial rehabilitation requirement	Financial impact on Company	2	3	L	Reinstatement and Rehabilitation Procedure Commitment to undertake remedial rehabilitation works in accordance with an EP revision, if required	2	2	N

Appendix B: Chemical Disclosure Statement

WYE KNOT-1 EXPLORATION WELL

Down-hole Chemical Disclosure Information (10/11/2019)

Project/Well	**Wye Knot-1**
System	**Drilling Fluid**
Total Volume (All Wells)	**288.67 bbl (45,894.3 L)**

Product	Supplier Name	Purpose of Use	Ingredient	Maximum ingredient Concentration in Product (% weight of volume)	Maximum ingredient Concentration in total fluid used (%)	MSDS Provided	Ecotoxicity Information (summary)
API Bentonite	Rheochem	Clay used to build viscosity	Bentonite, an aluminium phyllosilicate consisting of Sodium Montmorillonite (Chemically it is hydrated sodium calcium aluminium magnesium silicate hydroxide (Na,Ca)0.33(Al,Mg)2(Si4O10)(OH)2·nH2O)	100%	1.72%	Yes	Acute Toxicity: Fish Toxicity 96h LC50: 8-19 g/L (Salmo gairdneri) Chronic Toxicity: Silicosis: Excessive inhalation of respirable crystalline silica dust may cause a progressive, disabling, and sometimes-fatal lung disease called silicosis. Symptoms include cough, shortness of breath, wheezing, non-specific chest illness, and reduced pulmonary function. Individuals with silicosis are predisposed to develop tuberculosis. Biodegradation/bioaccumulation: The product is insoluble in water and can be removed by filtration and so is not expected to present a hazard.
Barite	Rheochem	Weighting Agent used to maintain mud weight and ensure primary well control	Barium Sulphate Quartz Water (Remainder)	89% 3% 8%	7.25%	Yes	Acute Toxicity: Oral Toxicity LD50: >15,000 mg/kg (Rat) Fish Toxicity TLM96: 7,500 ppm (Oncorhynchus mykiss) Chronic Toxicity: Silicosis: Excessive inhalation of respirable crystalline silica dust may cause a progressive, disabling, and sometimes-fatal lung disease called silicosis. Symptoms include cough, shortness of breath, wheezing, non-specific chest illness, and reduced pulmonary function. Individuals with silicosis are predisposed to develop tuberculosis. Biodegradation/bioaccumulation: Barium sulphate (major ingredient of barite) is insoluble in water and not biodegradable.
Caustic Soda	Rheochem	Used to maintain pH to prevent bacteria and corrosion	Sodium Hydroxide Silica, Amorphous Water (Remainder)	98% 0.003 % 1.997%	0.08%	Yes	Acute Toxicity: Oral Toxicity LD50: 140-340 mg/kg (Rat) Dermal Toxicity LD50: 1350 mg/kg (Rabbit) Fish Toxicity TLM96: 730 ppm (Oncorhynchus mykiss) Chronic Toxicity: Prolonged, excessive exposure may cause erosion of the teeth. The presence of NaOH had an adverse effect on the survival rate, growth and fecundity, as well as the quality of the progeny of the guppy. Upon prolonged exposure concentrations of 25 to 100 mg/l produced significant changes in the biology of guppy. Biodegradation/bioaccumulation: Environmental processes (such as oxidation and the presence of acids or bases) may transform insoluble metals to more soluble ionic forms. Will degrade to stable salts if released to formation. Water: If released to waterways, alkaline products may change the pH of the waterway. Fish will die if the pH reaches 10-11 (goldfish 10.9, bluegill 10.5). SOIL: May leach to groundwater with toxic effects on aquatic life as above. Atmosphere: Not expected to reside in the atmosphere. Drops or particles released to atmosphere should be removed by gravity and/or be rained out.
Citric Acid	Rheochem	pH Buffer	Citric Acid, Anhydrous Water (Remainder)	>99% (<1%)	0.01%	Yes	Acute Toxicity: Oral Toxicity LD50: 3,000 mg/kg (Rat) Fish Toxicity 96h LC50: >440-760 mg/L (Leuciscus idus) Crustacean Toxicity 72h EC50: 120 mg/L (Daphnia magna) Algae Toxicity 7d EC3: 640 mg/L (Scenedesmus quadricauda) Chronic Toxicity: No data available to indicate product or components present at greater than 1% are chronic health hazards. Biodegradation/bioaccumulation: BOD30/COD = 90%. Rapidly biodegradable in water and soil.
Idcide-20	Rheochem	Biocide/Prevents bacterial contamination of the mud and corrosion of casing	Tetrakis (Hydroxymethyl) Phosphonium Sulphate Water	18-25% 75-82%	0.14%	Yes	Acute Toxicity: 75% Tetrakis (hydroxymethyl) Phosphonium Sulphate (55566-30-8): LC50 (Rainbow Trout) = 119 mg/L/96 hr LC50(Bluegill Sunfish) = 93 mg/L/ 96 hr EC50 (Daphnia Magna) = 19 mg/L/48 hr LC50 (Brown Shrimp) = 340 mg/L/96 hr LC50 (Mysid Shrimp) = 9.5 mg/L/96 hr LC50 (Sheepshead Minnow) = 94 mg/L/96 hr LC50 (Jevenile Plaice) = 86 mg/L/96 hr Waste Water management EC50 (Activated Sludge) = 24mg/L/3 hr. Biodegradation/bioaccumulation: No specific studies undertaken to date.

Potassim Chloride	Rheochem	Used as an inhibitor to prevent the swelling of smectite and illite clays.	Potassium Chloride Water (Remainder)	<97% (3%)	5.0%	Yes	Acute Toxicity Oral Toxicity LD50: > 5,000 mg/kg (Rat) Crustaceans Toxicity TLM96: 100-330 ppm (Crangon crangon) Fish Toxicity LC50 (24 hr): 950 mg/l, LC50 (48 hr): 910 mg/l, LC50 (96 hr): 880 mg/l (Pimephales Promelas) Chronic Toxicity: No data available to indicate product or components present at greater than 1% are chronic health hazards. Aquatic Invertebrates EC50 (21d): 130 mg/l, LOEC (21d): 101 mg/l (16 % reproduction impairment)(Daphnia magna) Biodegradation/bioaccumulation: In water, potassium chloride is highly water soluble, and readily undergoes dissociation. Potassium chloride as an inorganic salt is not subjected to further biodegradation processes.

Product	Supplier Name	Purpose of Use	Ingredient	Maximum ingredient Concentration in Product (% weight of volume)	Maximum ingredient Concentration in total fluid used (%)	MSDS Provided	Ecotoxicity Information (summary)
Rheopac LV	Rheochem	Fluid Loss	Sodium Carboxmethyl Water Sodium Chloride Sodium Glycolate	98% 10% 1.4% 0.7%	0.12%	Yes	Acute Toxicity: Aquatic toxicity: LC50 (Fresh Water Trout) > 21,000 ppm/96hrs. LC50 (Salt Water Stickel Back) > 56,000 ppm/96hrs. Biodegradation/bioaccumulation: This product is not anticipated to cause adverse effects to animal or plant life if released to the environment in small quantities. Not expected to bioaccumulate.
Soda Ash	Rheochem	pH/hardness control	Sodium Carbonate Water (Remainder)	>97% (3%)	0.09%	Yes	Acute Toxicity: Oral Toxicity LD50: 4,220 mg/kg (Rat) Fish Toxicity TLM24: 385 mg/l (Lepomis macrochirus) Chronic Toxicity: Substance is not classified as carcinogenic under ACGIH, IARC, NTP or OSHA. Biodegradation/bioaccumulation: Biodegradability does not pertain to inorganic substances. Does not bioaccumulate. Dissociates into ions. Water: If released to waterways, alkaline products may change the pH of the waterway. Fish will die if the pH reaches 10-11 (goldfish 10.9, bluegill 10.5). Soil: May leach to groundwater with toxic effects on aquatic life as above. Atmosphere: Not expected to reside in the atmosphere. Drops or particles released to atmosphere should be removed by gravity and/or be rained out. Biodegradation: Not applicable given inorganic.
Sodium Bicarbonate	Rheochem	pH Buffer, Contamination Treatment	Sodim Bicarbonate Water (Remainder)	>99% (1%)	0.14%	Yes	Acute Toxicity: This product is not anticipated to cause adverse effects to animal or plant life if released to the environment in small quantities. Draize test, rabbit, eye: 100 mg/30S Mild; Oral, mouse: LD50 = 3360 mg/kg; Oral, rat: LD50 = 4220 mg/kg; Biodegradation/bioaccumulation: Not expected to bioaccumulate.
Sodium Chloride	Rheochem	Weighting Agent used to maintain mud weight and ensure primary well control	Sodium Chloride	100%	11.1%	Yes	Acute Toxicity: Oral Toxicity LD50: 3000 mg/kg (Rat) Oral Toxicity LD50: 4,000 mg/kg (Mouse) Dermal Toxicity LD50: >10,000 mg/kg (Rabbit) Chronic Toxicity: Not listed as a carcinogen. No data available to indicate product or components present at greater than 1% are chronic health hazards. Biodegradation/bioaccumulation: Low bioaccumulation in water/soil. High mobility.
Xanthan Gum (P)	Rheochem	Viscofier in drilling muds	Xanthan Gum Water (Remainder)	>90% (10%)	0.55%	Yes	Acute Toxicity: LD50 (Oral): >1000 mg/kg (mouse) LD50 (Intraperitoneal): >50 mg/kg (mouse) LD50 (Intravenous): 100-250 mg/kg (mouse) LD50 (Oral): >45,000 mg/kg (rat) LD50 (Oral): >20,000 mg/kg (dog). Biodegradation/bioaccumulation: This product is not anticipated to cause adverse effects to animal or plant life if released to the environment in small quantities. Not expected to bioaccumulate.
Water	Bore water from location	Base fluid	Water	100%	73.80%	N/A	N/A Water returning to source No hazard

Drilling Fluid System Chemical List

Chemicals Name	CAS Number	Mass Fraction (%)
Bentonite	1302-78-9	1.72%
Barium Sulphate	7727-43-7	6.45%
Quartz	14808-60-7	0.218%
Sodium Hydroxide	1310-73-2	0.078%
Citric Acid	77-92-9	0.010%
Tetrakis (Hydroxymethyl) Phosphonium Sulphate	55566-30-8	0.028%
Potassium Chloride	7447-40-7	4.850%
Sodium Carboxmethyl	9004-32-4	0.118%
Sodium Chloride	7647-14-5	11.102%
Sodium Glycolate	2836-32-0	0.001%
Sodium Carbonate	497-19-8	0.087%
Sodium Bicarbonate	7757-83-7	0.139%
Xanthum Gum	11138-66-2	0.495%
Water	7732-18-5	74.699%
	TOTAL	**100.00%**

System	Drilling Fluid Contingency

Product	Supplier Name	Purpose of Use	Ingredient	Maximum ingredient Concentration in Product (% weight of volume)	Maximum ingredient Concentration in total contingency used (%)	MSDS Provided	Ecotoxicity Information (summary)
API Bentonite	Rheochem	Clay used to build viscosity	Bentonite, an aluminium phyllosilicate consisting of Sodium Montmorillonite (Chemically it is hydrated sodium calcium aluminium magnesium silicate hydroxide (Na,Ca)0.33(Al,Mg)2(Si4O10)(OH)2·nH2O)	100%	1.72%	Yes	Acute Toxicity: Fish Toxicity 96h LC50: 8-19 g/L (Salmo gairdneri) Chronic Toxicity: Silicosis: Excessive inhalation of respirable crystalline silica dust may cause a progressive, disabling, and sometimes-fatal lung disease called silicosis. Symptoms include cough, shortness of breath, wheezing, non-specific chest illness, and reduced pulmonary function. Individuals with silicosis are predisposed to develop tuberculosis. Biodegradation/bioaccumulation: The product is insoluble in water and can be removed by filtration and so is not expected to present a hazard.
Barite	Rheochem	Weighting Agent used to maintain mud weight and ensure primary well control	Barium Sulphate Quartz Water (Remainder)	>89% <3% (8%)	9.25%	Yes	Acute Toxicity: Oral Toxicity LD50: >15,000 mg/kg (Rat) Fish Toxicity TLM96: 7,500 ppm (Oncorhynchus mykiss) Chronic Toxicity: Silicosis: Excessive inhalation of respirable crystalline silica dust may cause a progressive, disabling, and sometimes-fatal lung disease called silicosis. Symptoms include cough, shortness of breath, wheezing, non-specific chest illness, and reduced pulmonary function. Individuals with silicosis are predisposed to develop tuberculosis. Biodegradation/bioaccumulation: Barium sulphate (major ingredient of barite) is insoluble in water and not biodegradable.
Kwikseal	Rheochem	Used to bridge fractures or zones of high permeability. Different sizes help to bridge areas then smaller sizes will plug off and seal of the area.	Cellophane Nut Hulls Wood Fibre	30-60% 30-60% 30-60%	4.03%	Yes	Acute Toxicity: Cellulose (9004-34-6) LC50 (inhalation) > 5800 mg/m³/4 hours (rat) LD50 (ingestion) > 5000 mg/kg (rat) LD50 (intraperitoneal) > 31600 mg/kg (rat) LD50 (skin) > 2000 mg/kg (rabbit) Biodegradation/bioaccumulation: Main ingredient is Cellulose, an organic material which is readily biodegradable.
Water	Bore water from location	Base fluid	Water	100%	85.00%	N/A	N/A Water returning to source No hazard

Drilling Fluid Contingency System Chemical List

Chemicals Name	CAS Number	Mass Fraction (%)
Bentonite	1302-78-9	1.72%
Barium Sulphate	7727-43-7	8.23%
Quartz	14808-60-7	0.278%
Cellophane	9005-81-6	1.343%
Nut Hulls	N/A	1.343%
Wood Fibre	N/A	1.343%
Water	7732-18-5	85.740%
	TOTAL	**100.00%**

WYE KNOT-1 EXPLORATION WELL

Down-hole Chemical Disclosure Information (10/11/2019)

Project/Well	**Wye Knot-1**
System	**Cement**
Total Volume (All Wells)	**288.67 bbl (45,894.3 L)**

Product	Supplier Name	Purpose of Use	Ingredient	Maximum ingredient Concentration in Product (% weight of volume)	Maximum ingredient Concentration in total fluid used (%)	MSDS Provided	Ecotoxicity Information (summary)
Class G HSR (Portland Cement)	Adelaide Cement Company	Cement for setting plugs to isolate reservoirs from surface and aquifers	Cement (taken from analogous MSDS) Tri-Calcium Silicate 40% Di-Clacium Silicate 30% Tetra-Calcium-Alumino-Ferrite 7.5% Calcium Sulfate 8% Tri-Calcium Aluminate 8% Calcium Carbonate 2.5% Magnesium Oxide 2% Calcium Oxide 0-0.02% Crystalline Silica 0-0.005%	 20-70 10-60 5-15 2-10 1-15 0-5 0-4 0-0.2 0-0.2	42.600%	Yes	Toxicity - Constituent 1 (60100%) 42.12% Yes Fish Toxicity LC50 (96h): 41.2 mg/L (Oreochromis niloticus) Toxicity - Constituent 2 (3060%) 96h LL0: 10,000 mg/L (Branchdanio rerio) Crustacean Toxicity 24h EL50: >10,000 mg/L (Daphnia magna) Na-Al silicates: Fish Toxicity 96h LL0: 10,000 mg/L (Branchdaniorerio); Algae Toxicity 72h NOEL:10,000 mg/L (Scenedesmus subspicatus) Source: IUCLID 2000 Addition of large amounts of cement to water may, however cause a rise in pH and may, therefore be toxic to aquatic life under certain circumstances. Toxicity - Constituent 3 (5%) LD50 (Ingestion): > 5000 mg/kg (rat) Toxicity - Constituent 4 (10%) TCLo (Inhalation): 194 g/m³/10 years intermittently (human) TDLo (Ingestion): 450 mg/kg/3 weeks intermittently (rat) Toxicity - Constituent 5 (5%) LD50 (Ingestion): 3160 mg/kg (rat). Chronic Toxicity: Silicosis: Excessive inhalation of respirable crystalline silica dust may cause a progressive, disabling, and sometimes-fatal lung disease called silicosis. Symptoms include cough, shortness of breath, wheezing, non-specific chest illness, and reduced pulmonary function. Individuals with silicosis are predisposed to develop tuberculosis. Biodegradation/bioaccumulation: Biodegradation not applicable as cement is intended to remain long term in well and will be inert.
CD-31L	Baker Hughes	Dispersant	Sodium Napthalene Sulphonate Water	20 80	1.120%	Yes	Toxicity- Constituent 1 (20%) LC50: 135 ppm for Daphnia Magna Straus waterflea LD50: 2000mg/kg(Rat) Biodegradation/bioaccumulation: Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise. These products are sulfur oxides (SO2, SO3...), some metallic oxides. Water: (80%) Natural product
FP-9L	Baker Hughes	Antifoaming agent	Isononanol Water	60 40	0.340%	Yes	Toxicity- Constituent 1 (60%) Isononanol LD50 oral rat: 3950 mg/kg LC0 Rat(male/female): > 0.21 mg/l / 7 h / vapour LD50 Rat(male/female): > 4000 mg/kg dermal Biodegradation/bioaccumulation: Aerobic, Inoculum: Activated sludge Exposure time: 28 d Result: 79 % Readily biodegradable. Method: (CO2; modif. Sturm test - 92/69/EEC part C.4-C) Bioconcentration factor (BCF): 15.2 Significant concentrations do not accumulate. The data are derived from the evaluations or test results achieved with similar products (conclusion by analogy). logKOC: 2.17 (Soil) Method: OECD TG 121 Water: (40%) Natural product

Product	Supplier Name	Purpose of Use	Ingredient	Maximum ingredient Concentration in Product (% weight of volume)	Maximum ingredient Concentration in total fluid used (%)	MSDS Provided	Ecotoxicity Information (summary)
R21L	Baker Hughes	Cement retardant	Sodium lignosulphonate Water	45 55	0.110%	Yes	Toxicity- Constituent 1 (45%) LD50 oral rat >4,000 mg/Kg LC50 Rainbow Trouts 7300 ppm/48 h LD50 oral rat >2,000 mg/Kg Biodegradation/bioaccumulation: Material is expected to biodegrade only very slowly (in the environment). Fails to pass OECD/EEC tests for ready biodegradability. Water: (55%) Natural product
Calcium Chloride	Newpark	Weighting Agent	Calcium Chloride Anhydrous Sodium Chloride Water	94-97 1-5 1	0.090%	Yes	Acute Toxicity: CALCIUM CHLORIDE ANHYDROUS as an ingredient (10043-52-4): LD50 (Ingestion): 1000 mg/kg (rat) LD50 (Intraperitoneal): 210 mg/kg (mouse) LD50 (Intravenous): 42 mg/kg (mouse) LD50 (Subcutaneous): 823 mg/kg (mouse) LDLo (Ingestion): 1384 mg/kg (rabbit) LDLo (Intravenous): 150 mg/kg (guinea pig) LDLo (Subcutaneous): 249 mg/kg (cat) TDLo (Intravenous): 20 mg/kg/1 hour (woman) SODIUM CHLORIDE (7647-14-5): LC50 (Inhalation): > 42000 mg/m3/1 hour (rat) LD50 (Ingestion): 3000 mg/kg (rat) LD50 (Intraperitoneal): 2602 mg/kg (mouse) LD50 (Intravenous): 645 mg/kg (mouse) LD50 (Skin): > 10000 mg/kg (rabbit) LD50 (Subcutaneous): 3000 mg/kg (mouse) LDLo (Ingestion): 8000 mg/kg (rabbit) LDLo (Intravenous): 300 mg/kg (guinea pig) LDLo (Subcutaneous): 2160 mg/kg (guinea pig) TDLo (Ingestion): 12357 mg/kg (human) Biodegradation/bioaccumulation: Biodegradability does not pertain to inorganic substances. This product does not bioaccumulate:\
Water	Bore water from location	Base fluid	Water	100%	55.740%	N/A	N/A Water returning to source

Cement System Chemical List

Chemicals Name	CAS Number	Mass Fraction (%)
Water	7732-18-5	56.83%
Portland Cement	65997-15-1	42.60%
Sodium Napthalene Sulphonate	130-14-3	0.224%
Isononanol	27458-94-2	0.204%
Sodium lignosulphonate	8061-51-6	0.050%
Calcium Chloride Anhydrous	10043-52-4	0.086%
Sodium Chloride	7647-14-5	0.003%
TOTAL		100.00%

Appendix C: MSDS

RHEOCHEM

MATERIAL SAFETY DATA SHEET

Product Name **API BENTONITE**

1. IDENTIFICATION OF THE MATERIAL AND SUPPLIER

Supplier Name	**RHEOCHEM LTD**
Address	11 Alacrity Place, Henderson, WA, AUSTRALIA, 6166
Telephone	+61 8 9410 8200
Fax	+61 8 9410 8299
Emergency	1800 127 406 (Australia); 011 64 3 3530199 (International)
Web Site	http://www.rheochem.com.au/
Synonym(s)	SODIUM BENTONITE • SODIUM MONTMORILLONITE
Use(s)	DRILLING AID
SDS Date	01 Nov 2010

2. HAZARDS IDENTIFICATION

NOT CLASSIFIED AS HAZARDOUS ACCORDING TO SAFE WORK AUSTRALIA CRITERIA

NOT CLASSIFIED AS A DANGEROUS GOOD BY THE CRITERIA OF THE ADG CODE

UN No.	None Allocated	**DG Class**	None Allocated	**Subsidiary Risk(s)**	None Allocated
Packing Group	None Allocated	**Hazchem Code**	None Allocated		

3. COMPOSITION/ INFORMATION ON INGREDIENTS

Ingredient	Formula	CAS No.	Content
SODIUM MONTMORILLONITE	Not Available	Not Available	100%

4. FIRST AID MEASURES

Eye	If in eyes, hold eyelids apart and flush continuously with running water. Continue flushing until advised to stop by a Poisons Information Centre, a doctor, or for at least 15 minutes.
Inhalation	If inhaled, remove from contaminated area. Apply artificial respiration if not breathing.
Skin	If skin or hair contact occurs, remove contaminated clothing and flush skin and hair with running water.
Ingestion	For advice, contact a Poison Information Centre on 13 11 26 (Australia Wide) or a doctor (at once). Due to product form and application, ingestion is considered unlikely.
Advice to Doctor	Treat symptomatically.
First Aid Facilities	Eye wash facilities and safety shower should be available.

5. FIRE FIGHTING MEASURES

Flammability	Non flammable. May evolve toxic gases if strongly heated.
Fire and Explosion	Treat as per requirements for Surrounding Fires: Evacuate area and contact emergency services. Remain upwind and notify those downwind of hazard. Wear full protective equipment including Self Contained Breathing Apparatus (SCBA) when combating fire. Use waterfog to cool intact containers and nearby storage areas.
Extinguishing	Prevent contamination of drains or waterways.
Hazchem Code	None Allocated

6. ACCIDENTAL RELEASE MEASURES

Spillage If spilt (bulk), use personal protective equipment. Moisten with water to prevent a dust hazard and place in sealable containers for disposal.

7. STORAGE AND HANDLING

Storage Store in a cool, dry, well ventilated area, removed from hydrofluoric acid, strong alkalis and foodstuffs.

Handling Before use carefully read the product label. Use of safe work practices are recommended to avoid eye or skin contact and inhalation. Observe good personal hygiene, including washing hands before eating. Prohibit eating, drinking and smoking in contaminated areas.

8. EXPOSURE CONTROLS/ PERSONAL PROTECTION

Exposure Stds No exposure standard(s) allocated.

Biological Limits No Biological Limit Value allocated.

Engineering Controls Avoid inhalation. Use in well ventilated areas. Where an inhalation risk exists, mechanical extraction ventilation is recommended.

PPE Wear dust-proof goggles and PVC or rubber gloves. When using large quantities or where heavy contamination is likely, wear: coveralls. Where an inhalation risk exists, wear: a Class P1 (Particulate) respirator.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	BROWN POWDER	**Solubility (water)**	INSOLUBLE
Odour	SLIGHT ODOUR	**Specific Gravity**	NOT AVAILABLE
pH	NOT AVAILABLE	**% Volatiles**	NOT AVAILABLE
Vapour Pressure	NOT AVAILABLE	**Flammability**	NON FLAMMABLE
Vapour Density	NOT AVAILABLE	**Flash Point**	NOT RELEVANT
Boiling Point	NOT AVAILABLE	**Upper Explosion Limit**	NOT RELEVANT
Melting Point	1100°C to 1200°C (Fusion Point)	**Lower Explosion Limit**	NOT RELEVANT
Evaporation Rate	NOT AVAILABLE		

10. STABILITY AND REACTIVITY

Chemical Stability Stable under recommended conditions of storage.

Conditions to Avoid Avoid heat, sparks, open flames and other ignition sources.

Material to Avoid Incompatible with acids (eg. nitric acid) and alkalis (eg. hydroxides).

Hazardous Decomposition Products May evolve toxic gases if heated to decomposition.

Hazardous Reactions Polymerization is not expected to occur.

11. TOXICOLOGICAL INFORMATION

Health Hazard Summary Low toxicity - low irritant. Use safe work practices to avoid eye or skin contact and inhalation. May contain low levels of crystalline silica, which may result in lung fibrosis (silicosis) and is classified as carcinogenic to humans (IARC Group 1). Chronic exposure to crystalline silica may result in lung fibrosis (silicosis). Crystalline silica is classified as carcinogenic to humans (IARC Group 1).

Eye Low irritant. Contact may result in irritation, lacrimation and redness.

Inhalation Low irritant. Over exposure may result in irritation of the nose and throat, with coughing. Chronic exposure to respirable silica may result in pulmonary fibrosis (silicosis). However, given the low levels present, over exposure is not anticipated.

Skin Low irritant. Prolonged or repeated contact may result in mild irritation.

Ingestion Low toxicity. Ingestion of large quantities may result in nausea, vomiting and gastrointestinal irritation.

Product Name **API BENTONITE**

Toxicity Data No LD50 data available for this product.

12. ECOLOGICAL INFORMATION

Environment The main component/s of this product are not anticipated to cause any adverse effects to plants or animals.

13. DISPOSAL CONSIDERATIONS

Waste Disposal Reuse where possible. No special precautions are required for this product.

Legislation Dispose of in accordance with relevant local legislation.

14. TRANSPORT INFORMATION

NOT CLASSIFIED AS A DANGEROUS GOOD BY THE CRITERIA OF THE ADG CODE

Shipping Name	None Allocated				
UN No.	None Allocated	**DG Class**	None Allocated	**Subsidiary Risk(s)**	None Allocated
Packing Group	None Allocated	**Hazchem Code**	None Allocated		

15. REGULATORY INFORMATION

Poison Schedule A poison schedule number has not been allocated to this product using the criteria in the Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP).

AICS All chemicals listed on the Australian Inventory of Chemical Substances (AICS).

16. OTHER INFORMATION

Additional Information

RESPIRATORS: In general the use of respirators should be limited and engineering controls employed to avoid exposure. If respiratory equipment must be worn ensure correct respirator selection and training is undertaken. Remember that some respirators may be extremely uncomfortable when used for long periods. The use of air powered or air supplied respirators should be considered where prolonged or repeated use is necessary.

EXPOSURE STANDARDS - TIME WEIGHTED AVERAGES: Exposure standards are established on the premise of an 8 hour work period of normal intensity, under normal climatic conditions and where a 16 hour break between shifts exists to enable the body to eliminate absorbed contaminants. In the following circumstances, exposure standards must be reduced: strenuous work conditions; hot, humid climates; high altitude conditions; extended shifts (which increase the exposure period and shorten the period of recuperation).

ABBREVIATIONS:
ACGIH - American Conference of Industrial Hygienists.
ADG - Australian Dangerous Goods.
BEI - Biological Exposure Indice(s).
CAS# - Chemical Abstract Service number - used to uniquely identify chemical compounds.
CNS - Central Nervous System.
EC No - European Community Number.
HSNO - Hazardous Substances and New Organisms.
IARC - International Agency for Research on Cancer.
mg/m3 - Milligrams per Cubic Metre.
NOS - Not Otherwise Specified.
pH - relates to hydrogen ion concentration using a scale of 0 (high acidic) to 14 (highly alkaline).
ppm - Parts Per Million.
RTECS - Registry of Toxic Effects of Chemical Substances.
STEL - Short Term Exposure Limit.
SWA - Safe Work Australia.
TWA - Time Weighted Average.

HEALTH EFFECTS FROM EXPOSURE:
It should be noted that the effects from exposure to this product will depend on several factors including: frequency and duration of use; quantity used; effectiveness of control measures; protective equipment used and method of application. Given that it is impractical to prepare a Chem Alert report which would encompass all possible scenarios, it is anticipated that users will assess the risks and apply control methods where appropriate.

PERSONAL PROTECTIVE EQUIPMENT GUIDELINES:
The recommendation for protective equipment contained within this Chem Alert report is provided as a guide only. Factors such as method of application, working environment, quantity used, product concentration and the availability of engineering controls should be considered before final selection of personal protective equipment is

made.

Report Status

This document has been compiled by RMT on behalf of the manufacturer of the product and serves as the manufacturer's Safety Data Sheet ('SDS').

It is based on information concerning the product which has been provided to RMT by the manufacturer or obtained from third party sources and is believed to represent the current state of knowledge as to the appropriate safety and handling precautions for the product at the time of issue. Further clarification regarding any aspect of the product should be obtained directly from the manufacturer.

While RMT has taken all due care to include accurate and up-to-date information in this SDS, it does not provide any warranty as to accuracy or completeness. As far as lawfully possible, RMT accepts no liability for any loss, injury or damage (including consequential loss) which may be suffered or incurred by any person as a consequence of their reliance on the information contained in this SDS.

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SDS Date 01 Nov 2010

End of Report

RHEOCHEM
A Newpark Company

SAFETY DATA SHEET

Product Name **BARITE**

1. IDENTIFICATION OF THE MATERIAL AND SUPPLIER

Supplier Name	**RHEOCHEM LTD**
Address	11 Alacrity Place, Henderson, WA, AUSTRALIA, 6166
Telephone	+61 8 9410 8200
Fax	+61 8 9410 8299
Emergency	1800 127 406 (Australia); 011 64 3 3530199 (International)
Web Site	http://www.rheochem.com.au/
Synonym(s)	BARIUM SULPHATE · RHEOCHEM BARITE, RHEOBAR
Use(s)	DRILLING FLUID ADDITIVE · WEIGHTING AGENT
SDS Date	07 September 2012

2. HAZARDS IDENTIFICATION

NOT CLASSIFIED AS HAZARDOUS ACCORDING TO SAFE WORK AUSTRALIA CRITERIA

RISK PHRASES

None allocated

SAFETY PHRASES

None allocated

NOT CLASSIFIED AS A DANGEROUS GOOD BY THE CRITERIA OF THE ADG CODE

UN Number	None Allocated	**DG Class**	None Allocated
Packing Group	None Allocated	**Subsidiary Risk(s)**	None Allocated
Hazchem Code	None Allocated		

3. COMPOSITION/ INFORMATION ON INGREDIENTS

Ingredient	Identification	Classification	Content
QUARTZ (SILICA CRYSTALLINE)	CAS: 14808-60-7 EC: 238-878-4	Not Available	<3%
BARIUM SULPHATE	CAS: 7727-43-7 EC: 231-784-4	Not Available	>89%

4. FIRST AID MEASURES

Eye	If in eyes, hold eyelids apart and flush continuously with running water. Continue flushing until advised to stop by a Poisons Information Centre, a doctor, or for at least 15 minutes.
Inhalation	If inhaled, remove from contaminated area. Apply artificial respiration if not breathing.
Skin	If skin or hair contact occurs, remove contaminated clothing and flush skin and hair with running water. Continue flushing with water until advised to stop by a Poisons Information Centre or a doctor.
Ingestion	For advice, contact a Poison Information Centre on 13 11 26 (Australia Wide) or a doctor (at once).
Advice to Doctor	Treat symptomatically.
First Aid Facilities	Eye wash facilities should be available.

5. FIRE FIGHTING MEASURES

Flammability Non flammable. May evolve toxic gases (sulphur oxides) when heated to decomposition.

Fire and Explosion Evacuate area and contact emergency services. Toxic gases may be evolved in a fire situation. Remain upwind and notify those downwind of hazard. Wear full protective equipment including Self Contained Breathing Apparatus (SCBA) when combating fire. Use waterfog to cool intact containers and nearby storage areas.

Extinguishing Prevent contamination of drains or waterways.

Hazchem Code None Allocated

6. ACCIDENTAL RELEASE MEASURES

Spillage If spilt (bulk), use personal protective equipment. Contain spillage, then cover / absorb spill with non-combustible absorbent material (vermiculite, sand, or similar), collect and place in suitable containers for disposal.

7. STORAGE AND HANDLING

Storage Store in a cool, dry, well ventilated area, removed from foodstuffs. Ensure containers are adequately labelled, protected from physical damage and sealed when not in use.

Handling Before use carefully read the product label. Use of safe work practices are recommended to avoid eye or skin contact and inhalation. Observe good personal hygiene, including washing hands before eating. Prohibit eating, drinking and smoking in contaminated areas.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Standards

Ingredient	Reference	TWA		STEL	
		ppm	mg/m³	ppm	mg/m³
Barium sulphate	SWA (AUS)	--	10	--	--
Silica, Crystalline Quartz	SWA (AUS)	--	0.1	--	--

Biological Limits No Biological Limit Value allocated.

Engineering Controls Avoid inhalation. Use in well ventilated areas. Where an inhalation risk exists, mechanical extraction ventilation is recommended.

PPE

Eye / Face Wear dust-proof goggles.

Hands Wear PVC or rubber gloves.

Body When using large quantities or where heavy contamination is likely, wear coveralls.

Respiratory Where an inhalation risk exists, wear a Class P1 (Particulate) respirator.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance OFF-WHITE POWDER
Odour ODOURLESS
Flammability NON FLAMMABLE
Flash point NOT RELEVANT
Boiling point NOT RELEVANT
Melting point > 1300°C
Evaporation rate NOT AVAILABLE
pH 8.2 (20% Slurry)
Vapour density NOT AVAILABLE

Specific gravity	4.20
Solubility (water)	INSOLUBLE
Vapour pressure	NOT RELEVANT
Upper explosion limit	NOT RELEVANT
Lower explosion limit	NOT RELEVANT
Autoignition temperature	NOT AVAILABLE
Decomposition temperature	NOT AVAILABLE
Viscosity	NOT AVAILABLE
Partition coefficient	NOT AVAILABLE
% Volatiles	NOT AVAILABLE

10. STABILITY AND REACTIVITY

Chemical Stability	Stable under recommended conditions of storage.
Conditions to Avoid	Avoid heat, sparks, open flames and other ignition sources.
Material to Avoid	Compatible with most commonly used materials.
Hazardous Decomposition Products	May evolve toxic gases (sulphur oxides) when heated to decomposition.
Hazardous Reactions	Polymerization is not expected to occur.

11. TOXICOLOGICAL INFORMATION

Health Hazard Summary	Low toxicity. Under normal conditions of use, adverse health effects are not anticipated. Chronic exposure to crystalline silica may result in lung fibrosis (silicosis). However, due to the low levels of crystalline silica, chronic health effects are not anticipated with normal use. Crystalline silica is classified as carcinogenic to humans (IARC Group 1).
Eye	Low to moderate irritant. Contact may result in irritation, lacrimation, pain and redness.
Inhalation	Irritant. Over exposure to dust may result in mucous membrane irritation of the respiratory tract. Chronic exposure to crystalline silica may result in silicosis (lung fibrosis). Crystalline silica is classified as carcinogenic to humans (IARC Group 1).
Skin	Low irritant. Prolonged or repeated exposure to dust may result in irritation and dermatitis.
Ingestion	Low toxicity. Ingestion of large quantities may result in nausea, vomiting and gastrointestinal irritation.
Toxicity Data	QUARTZ (SILICA CRYSTALLINE) (14808-60-7) LCLo (inhalation) 300 ug/m³/10 years (human) TCLo (inhalation) 16 000 000 particles/ft3/8 hours/17.9 years (human-fibrosis)

12. ECOLOGICAL INFORMATION

Environment	This product is not anticipated to cause adverse effects to animal or plant life if released to the environment in small quantities. Fish toxicity: LC50 (Rainbow trout) = 7500 ppm/96 hour.

13. DISPOSAL CONSIDERATIONS

Waste Disposal	Dispose of to an approved landfill site. Contact the manufacturer for additional information.
Legislation	Dispose of in accordance with relevant local legislation.

14. TRANSPORT INFORMATION

NOT CLASSIFIED AS A DANGEROUS GOOD BY THE CRITERIA OF THE ADG CODE

	LAND TRANSPORT (ADG)	SEA TRANSPORT (IMDG / IMO)	AIR TRANSPORT (IATA / ICAO)
UN Number	None Allocated	None Allocated	None Allocated
Proper Shipping Name	None Allocated	None Allocated	None Allocated
DG Class/ Division	None Allocated	None Allocated	None Allocated
Subsidiary Risk(s)	None Allocated	None Allocated	None Allocated

Packing Group	None Allocated	None Allocated	None Allocated
Hazchem Code	None Allocated		

15. REGULATORY INFORMATION

Poison Schedule A poison schedule number has not been allocated to this product using the criteria in the Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP)

Inventory Listing(s) **AUSTRALIA: AICS (Australian Inventory of Chemical Substances)**
All components are listed on AICS, or are exempt.

16. OTHER INFORMATION

Additional Information

RESPIRATORS: In general the use of respirators should be limited and engineering controls employed to avoid exposure. If respiratory equipment must be worn ensure correct respirator selection and training is undertaken. Remember that some respirators may be extremely uncomfortable when used for long periods. The use of air powered or air supplied respirators should be considered where prolonged or repeated use is necessary.

PERSONAL PROTECTIVE EQUIPMENT GUIDELINES:
The recommendation for protective equipment contained within this ChemAlert report is provided as a guide only. Factors such as method of application, working environment, quantity used, product concentration and the availability of engineering controls should be considered before final selection of personal protective equipment is made.

HEALTH EFFECTS FROM EXPOSURE:
It should be noted that the effects from exposure to this product will depend on several factors including: frequency and duration of use; quantity used; effectiveness of control measures; protective equipment used and method of application. Given that it is impractical to prepare a ChemAlert report which would encompass all possible scenarios, it is anticipated that users will assess the risks and apply control methods where appropriate.

Abbreviations

ACGIH	American Conference of Governmental Industrial Hygienists
CAS #	Chemical Abstract Service number - used to uniquely identify chemical compounds
CNS	Central Nervous System
EC No.	EC No - European Community Number
GHS	Globally Harmonized System
IARC	International Agency for Research on Cancer
LD50	Lethal Dose, 50% / Median Lethal Dose
mg/m^3	Milligrams per Cubic Metre
PEL	Permissible Exposure Limit
pH	relates to hydrogen ion concentration using a scale of 0 (high acidic) to 14 (highly alkaline).
ppm	Parts Per Million
REACH	Regulation on Registration, Evaluation, Authorisation and Restriction of Chemicals
STOT-RE	Specific target organ toxicity (repeated exposure)
STOT-SE	Specific target organ toxicity (single exposure)
SUSMP	Standard for the Uniform Scheduling of Medicines and Poisons
TLV	Threshold Limit Value
TWA/OEL	Time Weighted Average or Occupational Exposure Limit

Revision History

Revision	Description
1.1	Standard SDS Review
1.0	Initial SDS creation

Report Status

This document has been compiled by RMT on behalf of the manufacturer of the product and serves as the manufacturer's Safety Data Sheet ('SDS').

It is based on information concerning the product which has been provided to RMT by the manufacturer or obtained from third party sources and is believed to represent the current state of knowledge as to the appropriate safety and handling precautions for the product at the time of issue. Further clarification regarding any aspect of the product should be obtained directly from the manufacturer.

While RMT has taken all due care to include accurate and up-to-date information in this SDS, it does not provide any warranty as to accuracy or completeness. As far as lawfully possible, RMT accepts no liability for any loss, injury or damage (including consequential loss) which may be suffered or incurred by any person as a consequence of their reliance on the information contained in this SDS.

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Revision: 1.1
SDS Date: 07 September 2012

End of SDS

RHEOCHEM

MATERIAL SAFETY DATA SHEET

Product Name **CAUSTIC SODA**

1. IDENTIFICATION OF THE MATERIAL AND SUPPLIER

Supplier Name	**RHEOCHEM LTD**
Address	11 Alacrity Place, Henderson, WA, AUSTRALIA, 6166
Telephone	+61 8 9410 8200
Fax	+61 8 9410 8299
Emergency	1800 127 406 (Australia); 011 64 3 3530199 (International)
Web Site	http://www.rheochem.com.au/
Synonym(s)	CAUSTIC SODA • SODA LYE • SODIUM HYDROXIDE SOLID
Use(s)	MANUFACTURE OF CHEMICALS • REAGENT • SCRUBBING AGENT
SDS Date	01 Nov 2010

2. HAZARDS IDENTIFICATION

CLASSIFIED AS HAZARDOUS ACCORDING TO SAFE WORK AUSTRALIA CRITERIA

RISK PHRASES

R35 Causes severe burns.

SAFETY PHRASES

S1/2 Keep locked up and out of reach of children.

S26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice

S37/39 Wear suitable gloves and eye/face protection.

S45 In case of accident or if you feel unwell seek medical advice immediately (show the label where possible).

CLASSIFIED AS A DANGEROUS GOOD BY THE CRITERIA OF THE ADG CODE

UN No.	1823	**DG Class**	8	**Subsidiary Risk(s)**	None Allocated
Packing Group	II	**Hazchem Code**	2X		

3. COMPOSITION/ INFORMATION ON INGREDIENTS

Ingredient	Formula	CAS No.	Content
SODIUM HYDROXIDE	Na-OH	1310-73-2	>98%
SILICA, AMORPHOUS	Si-O2	7631-86-9	0.0030%

4. FIRST AID MEASURES

Eye If in eyes, hold eyelids apart and flush continuously with running water. Continue flushing until advised to stop by a Poisons Information Centre, a doctor, or for at least 15 minutes.

Inhalation If inhaled, remove from contaminated area. To protect rescuer, use an Air-line respirator where an inhalation risk exists. Apply artificial respiration if not breathing.

Skin If skin or hair contact occurs, remove contaminated clothing and flush skin and hair with running water. Continue flushing with water until advised to stop by a Poisons Information Centre or a doctor.

Ingestion For advice, contact a Poison Information Centre on 13 11 26 (Australia Wide) or a doctor (at once). If swallowed, do not induce vomiting.

Advice to Doctor Treat symptomatically.

5. FIRE FIGHTING MEASURES

Flammability Non flammable. May evolve toxic gases if strongly heated. May evolve flammable hydrogen gas in contact with some metals.

Fire and Explosion Treat as per requirements for Surrounding Fires: Evacuate area and contact emergency services. Remain upwind and notify those downwind of hazard. Wear full protective equipment including Self Contained Breathing Apparatus (SCBA) when combating fire. Use waterfog to cool intact containers and nearby storage areas.

Extinguishing Prevent contamination of drains or waterways.

Hazchem Code 2X

6. ACCIDENTAL RELEASE MEASURES

Spillage If spilt (bulk), notify local authorities where appropriate. Collect and reuse where possible. Use personal protective equipment. Contain spillage, then collect and place in suitable containers for disposal. Clean spill site with soap solution.

7. STORAGE AND HANDLING

Storage Store in a cool, dry, well ventilated area, removed from oxidising agents, acids, metals, heat or ignition sources and foodstuffs. Ensure containers are adequately labelled, protected from physical damage and sealed when not in use. Check regularly for leaks or spills. Large storage areas should have appropriate ventilation systems. It is recommended that the storage temperature be maintained between 15 and 25°C. Unsuitable storage containers: aluminium, tin or zinc.

Handling Before use carefully read the product label. Use of safe work practices are recommended to avoid eye or skin contact and inhalation. Observe good personal hygiene, including washing hands before eating. Prohibit eating, drinking and smoking in contaminated areas.

8. EXPOSURE CONTROLS/ PERSONAL PROTECTION

Exposure Stds

Ingredient	Reference	TWA		STEL	
Fumed silica (respirable dust)	SWA (AUS)	--	2 mg/m3	--	--
Sodium hydroxide (peak limitation)	SWA (AUS)	--	2 mg/m3	--	--

Biological Limits No biological limit allocated.

Engineering Controls Avoid inhalation. Use in well ventilated areas. Where an inhalation risk exists, mechanical extraction ventilation is recommended. Maintain dust levels below the recommended exposure standard.

PPE Wear dust-proof goggles, a PVC apron, rubber boots, rubber or PVC gloves, a faceshield and coveralls. At high dust levels, wear: a Full-face Class P3 (Particulate) or an Air-line respirator. Where an inhalation risk exists, wear: a Class P1 (Particulate) respirator.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	WHITE DELIQUESCENT PEARLS	**Solubility (water)**	1110 kg/m3 @ 20°C
Odour	ODOURLESS	**Specific Gravity**	2.12
pH	13.5 (1 % solution)	**% Volatiles**	NOT AVAILABLE
Vapour Pressure	NOT AVAILABLE	**Flammability**	NON FLAMMABLE
Vapour Density	NOT AVAILABLE	**Flash Point**	NOT RELEVANT
Boiling Point	1390°C	**Upper Explosion Limit**	NOT RELEVANT
Melting Point	318°C	**Lower Explosion Limit**	NOT RELEVANT
Evaporation Rate	NOT AVAILABLE		

10. STABILITY AND REACTIVITY

Chemical Stability	Stable under recommended conditions of storage.
Conditions to Avoid	Avoid heat, sparks, open flames and other ignition sources.
Material to Avoid	Incompatible with oxidising agents, acids (eg. nitric acid), metals, heat and ignition sources.
Hazardous Decomposition Products	May evolve toxic gases if heated to decomposition.
Hazardous Reactions	Polymerization is not expected to occur.

11. TOXICOLOGICAL INFORMATION

Health Hazard Summary	Highly corrosive. This product has the potential to cause serious adverse health effects. Use safe work practices to avoid eye or skin contact and inhalation. Over exposure may result in severe burns with corrosive tissue damage. Upon dilution, the potential for corrosive effects may be reduced.
Eye	Highly corrosive. Contact may result in irritation, lacrimation, pain, redness, conjunctivitis and corneal burns with possible permanent damage.
Inhalation	Corrosive. Over exposure to dust may result in mucous membrane irritation of the respiratory tract, coughing and bronchitis. High level exposure may result in intense thirst, ulceration, lung tissue damage, chemical pneumonitis and pulmonary oedema. Effects may be delayed.
Skin	Corrosive. Contact may result in irritation, redness, pain, rash, dermatitis and possible burns. Effects may be delayed.
Ingestion	Highly corrosive - toxic. Ingestion may result in burns to the mouth and throat, nausea, vomiting, ulceration of the gastrointestinal tract, oedema, rapid pulse, shock, unconsciousness, convulsions and death.
Toxicity Data	SODIUM HYDROXIDE (1310-73-2) LD50 (Intraperitoneal): 40 mg/kg (mouse) LDLo (Ingestion): 1.57 mg/kg (human) SILICA, AMORPHOUS (7631-86-9) LD50 (Ingestion): 3160 mg/kg (rat)

12. ECOLOGICAL INFORMATION

Environment	WATER: If released to waterways, alkaline products may change the pH of the waterway. Fish will die if the pH reaches 10-11 (goldfish 10.9, bluegill 10.5). SOIL: May leach to groundwater with toxic effects on aquatic life as above. ATMOSPHERE: Not expected to reside in the atmosphere. Drops or particles released to atmosphere should be removed by gravity and/or be rained out.

13. DISPOSAL CONSIDERATIONS

Waste Disposal	Add to large quantity of water and neutralise (to pH 6-8) by SLOW addition of 6 mol/L hydrochloric acid (HCl). Discharge neutral solutions to drain or sewer with excess water. Contact the manufacturer for additional information.
Legislation	Dispose of in accordance with relevant local legislation.

14. TRANSPORT INFORMATION

CLASSIFIED AS A DANGEROUS GOOD BY THE CRITERIA OF THE ADG CODE

Shipping Name	SODIUM HYDROXIDE, SOLID				
UN No.	1823	**DG Class**	8	**Subsidiary Risk(s)**	None Allocated
Packing Group	II	**Hazchem Code**	2X	**GTEPG**	8A1

Product Name **CAUSTIC SODA**

IATA

Shipping Name	SODIUM HYDROXIDE, SOLID				
UN No.	1823	**DG Class**	8	**Subsidiary Risk(s)**	None Allocated
Packing Group	II				

IMDG

Shipping Name	SODIUM HYDROXIDE, SOLID				
UN No.	1823	**DG Class**	8	**Subsidiary Risk(s)**	None Allocated
Packing Group	II				

15. REGULATORY INFORMATION

Poison Schedule Classified as a Schedule 6 (S6) Poison using the criteria in the Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP).

AICS All chemicals listed on the Australian Inventory of Chemical Substances (AICS).

16. OTHER INFORMATION

Additional Information

RESPIRATORS: In general the use of respirators should be limited and engineering controls employed to avoid exposure. If respiratory equipment must be worn ensure correct respirator selection and training is undertaken. Remember that some respirators may be extremely uncomfortable when used for long periods. The use of air powered or air supplied respirators should be considered where prolonged or repeated use is necessary.

EXPOSURE STANDARDS - TIME WEIGHTED AVERAGE (TWA) or WES (WORKPLACE EXPOSURE STANDARD) (NZ): Exposure standards are established on the premise of an 8 hour work period of normal intensity, under normal climatic conditions and where a 16 hour break between shifts exists to enable the body to eliminate absorbed contaminants. In the following circumstances, exposure standards must be reduced: strenuous work conditions; hot, humid climates; high altitude conditions; extended shifts (which increase the exposure period and shorten the period of recuperation).

ABBREVIATIONS:
ACGIH - American Conference of Industrial Hygienists.
ADG - Australian Dangerous Goods.
BEI - Biological Exposure Indice(s).
CAS# - Chemical Abstract Service number - used to uniquely identify chemical compounds.
CNS - Central Nervous System.
EC No - European Community Number.
HSNO - Hazardous Substances and New Organisms.
IARC - International Agency for Research on Cancer.
mg/m3 - Milligrams per Cubic Metre.
NOS - Not Otherwise Specified.
pH - relates to hydrogen ion concentration using a scale of 0 (high acidic) to 14 (highly alkaline).
ppm - Parts Per Million.
RTECS - Registry of Toxic Effects of Chemical Substances.
STEL - Short Term Exposure Limit.
SWA - Safe Work Australia.
TWA - Time Weighted Average.

HEALTH EFFECTS FROM EXPOSURE:
It should be noted that the effects from exposure to this product will depend on several factors including: frequency and duration of use; quantity used; effectiveness of control measures; protective equipment used and method of application. Given that it is impractical to prepare a Chem Alert report which would encompass all possible scenarios, it is anticipated that users will assess the risks and apply control methods where appropriate.

PERSONAL PROTECTIVE EQUIPMENT GUIDELINES:
The recommendation for protective equipment contained within this Chem Alert report is provided as a guide only. Factors such as method of application, working environment, quantity used, product concentration and the availability of engineering controls should be considered before final selection of personal protective equipment is made.

Report Status This document has been compiled by RMT on behalf of the manufacturer of the product and serves as the manufacturer's Safety Data Sheet ('SDS').

It is based on information concerning the product which has been provided to RMT by the manufacturer or obtained from third party sources and is believed to represent the current state of knowledge as to the appropriate

safety and handling precautions for the product at the time of issue. Further clarification regarding any aspect of the product should be obtained directly from the manufacturer.

While RMT has taken all due care to include accurate and up-to-date information in this SDS, it does not provide any warranty as to accuracy or completeness. As far as lawfully possible, RMT accepts no liability for any loss, injury or damage (including consequential loss) which may be suffered or incurred by any person as a consequence of their reliance on the information contained in this SDS.

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Email: info@rmt.com.au
Web: www.rmt.com.au

SDS Date 01 Nov 2010

End of Report

RHEOCHEM

MATERIAL SAFETY DATA SHEET

Product Name **CITRIC ACID**

1. IDENTIFICATION OF THE MATERIAL AND SUPPLIER

Supplier Name	**RHEOCHEM LTD**
Address	11 Alacrity Place, Henderson, WA, AUSTRALIA, 6166
Telephone	+61 8 9410 8200
Fax	+61 8 9410 8299
Emergency	1800 127 406 (Australia); 011 64 3 3530199 (International)
Web Site	http://www.rheochem.com.au/
Synonym(s)	2-HYDROXY-1,2,3-PROPANETRICARBOXYLIC ACID • CITRIC ACID ANHYDROUS • CITRIC ACID MONOHYDRATE
Use(s)	INDUSTRIAL APPLICATIONS
SDS Date	01 Nov 2010

2. HAZARDS IDENTIFICATION

CLASSIFIED AS HAZARDOUS ACCORDING TO SAFE WORK AUSTRALIA CRITERIA

RISK PHRASES

R36/37/38 Irritating to eyes, respiratory system and skin.

SAFETY PHRASES

S26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice

S37/39 Wear suitable gloves and eye/face protection.

NOT CLASSIFIED AS A DANGEROUS GOOD BY THE CRITERIA OF THE ADG CODE

UN No.	None Allocated	**DG Class**	None Allocated	**Subsidiary Risk(s)**	None Allocated
Packing Group	None Allocated	**Hazchem Code**	None Allocated		

3. COMPOSITION/ INFORMATION ON INGREDIENTS

Ingredient	Formula	CAS No.	Content
CITRIC ACID, ANHYDROUS	C6-H8-O7	77-92-9	>99%
WATER	H2O	7732-18-5	<1%

4. FIRST AID MEASURES

Eye	If in eyes, hold eyelids apart and flush continuously with running water. Continue flushing until advised to stop by a Poisons Information Centre, a doctor, or for at least 15 minutes.
Inhalation	If inhaled, remove from contaminated area. Apply artificial respiration if not breathing.
Skin	If skin or hair contact occurs, remove contaminated clothing and flush skin and hair with running water. Continue flushing with water until advised to stop by a Poisons Information Centre or a doctor.
Ingestion	For advice, contact a Poison Information Centre on 13 11 26 (Australia Wide) or a doctor (at once). If swallowed, do not induce vomiting.
Advice to Doctor	Treat symptomatically.

5. FIRE FIGHTING MEASURES

Flammability Combustible. May evolve toxic gases (carbon oxides, hydrocarbons) when heated to decomposition.

Fire and Explosion Evacuate area and contact emergency services. Toxic gases may be evolved in a fire situation. Remain upwind and notify those downwind of hazard. Wear full protective equipment including Self Contained Breathing Apparatus (SCBA) when combating fire. Use waterfog to cool intact containers and nearby storage areas.

Extinguishing Dry agent, carbon dioxide, foam or water fog. Prevent contamination of drains or waterways.

Hazchem Code None Allocated

6. ACCIDENTAL RELEASE MEASURES

Spillage If spilt (bulk), use personal protective equipment. Ventilate area where possible. Contain spillage, then collect and place in suitable containers for disposal. Avoid generating dust.

7. STORAGE AND HANDLING

Storage Store in a cool, dry, well ventilated area, removed from moisture, oxidising agents and foodstuffs. Ensure containers are adequately labelled, protected from physical damage and sealed when not in use.

Handling Before use carefully read the product label. Use of safe work practices are recommended to avoid eye or skin contact and inhalation. Observe good personal hygiene, including washing hands before eating. Prohibit eating, drinking and smoking in contaminated areas.

8. EXPOSURE CONTROLS/ PERSONAL PROTECTION

Exposure Stds No exposure standard(s) allocated.

Biological Limits No Biological Limit Value allocated.

Engineering Controls Avoid inhalation. Use in well ventilated areas. Where an inhalation risk exists, mechanical extraction ventilation is recommended. Maintain dust levels below the recommended exposure standard.

PPE Wear dust-proof goggles and PVC or rubber gloves. When using large quantities or where heavy contamination is likely, wear: coveralls. At high dust levels, wear: a Class P1 (Particulate) respirator.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	WHITE CRYSTALLINE POWDER	**Solubility (water)**	1330 kg/m3 @ 20°C
Odour	ODOURLESS	**Specific Gravity**	1.665
pH	2.2 (0.1M Solution)	**% Volatiles**	NOT AVAILABLE
Vapour Pressure	NOT AVAILABLE	**Flammability**	COMBUSTIBLE
Vapour Density	NOT AVAILABLE	**Flash Point**	174°C
Boiling Point	175°C (Decomposes)	**Upper Explosion Limit**	NOT AVAILABLE
Melting Point	153°C	**Lower Explosion Limit**	NOT AVAILABLE
Evaporation Rate	NOT AVAILABLE		
Autoignition Temperature	345°C		

10. STABILITY AND REACTIVITY

Chemical Stability Stable under recommended conditions of storage.

Conditions to Avoid Avoid heat, sparks, open flames and other ignition sources.

Material to Avoid Incompatible with oxidising agents (eg. hypochlorites).

Hazardous Decomposition Products May evolve toxic gases (carbon oxides, hydrocarbons) when heated to decomposition.

Hazardous Reactions Polymerization is not expected to occur.

11. TOXICOLOGICAL INFORMATION

Health Hazard Summary Low toxicity - slightly corrosive. Citric acid is not anticipated to present adverse health effects in industrial applications. Use safe work practices to avoid eye or skin contact and inhalation. Citric acid has the potential to cause allergic effects.

Eye Slightly corrosive - irritant. Contact may result in irritation, lacrimation, pain, redness, conjunctivitis and possible burns.

Inhalation Irritant. Over exposure to dust may result in irritation of the nose and throat, with coughing.

Skin Slightly corrosive. Contact may result in irritation, redness, pain, rash, dermatitis and possible burns. May cause sensitisation by skin contact.

Ingestion Slightly corrosive. Ingestion may result in ulceration and burns to the mouth and throat, nausea, vomiting, abdominal pain and diarrhoea.

Toxicity Data CITRIC ACID, ANHYDROUS (77-92-9)
LD50 (Ingestion): 3000 mg/kg (rat)
LD50 (Intraperitoneal): 290 mg/kg (rat)
LD50 (Intravenous): 42 mg/kg (mouse)
LDLo (Ingestion): 7000 mg/kg (rabbit)

12. ECOLOGICAL INFORMATION

Environment WATER: If citric acid is released to water, it is expected to biodegrade rapidly. May be toxic to fish at moderately high levels (120 ppm is fatal to daphnia; 894 ppm with pH 4 is fatal to goldfish) due to acidic nature. Fairly high biological oxygen demand (BOD) which may cause oxygen depletion in large spills. Citric acid occurs naturally in many plants.

13. DISPOSAL CONSIDERATIONS

Waste Disposal Neutralise with lime, anion exchanger or similar. For small amounts absorb with sand or similar and dispose of to an approved landfill site. Contact the manufacturer for additional information.

Legislation Dispose of in accordance with relevant local legislation.

14. TRANSPORT INFORMATION

NOT CLASSIFIED AS A DANGEROUS GOOD BY THE CRITERIA OF THE ADG CODE

Shipping Name	None Allocated				
UN No.	None Allocated	**DG Class**	None Allocated	**Subsidiary Risk(s)**	None Allocated
Packing Group	None Allocated	**Hazchem Code**	None Allocated		

15. REGULATORY INFORMATION

Poison Schedule A poison schedule number has not been allocated to this product using the criteria in the Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP).

AICS All chemicals listed on the Australian Inventory of Chemical Substances (AICS).

16. OTHER INFORMATION

Additional Information EXPOSURE STANDARDS - TIME WEIGHTED AVERAGES: Exposure standards are established on the premise of an 8 hour work period of normal intensity, under normal climatic conditions and where a 16 hour break between shifts exists to enable the body to eliminate absorbed contaminants. In the following circumstances, exposure standards must be reduced: strenuous work conditions; hot, humid climates; high altitude conditions; extended shifts (which increase the exposure period and shorten the period of recuperation).

ABBREVIATIONS:
ACGIH - American Conference of Industrial Hygienists.
ADG - Australian Dangerous Goods.
BEI - Biological Exposure Indice(s).
CAS# - Chemical Abstract Service number - used to uniquely identify chemical compounds.
CNS - Central Nervous System.
EC No - European Community Number.
HSNO - Hazardous Substances and New Organisms.
IARC - International Agency for Research on Cancer.
mg/m3 - Milligrams per Cubic Metre.
NOS - Not Otherwise Specified.
pH - relates to hydrogen ion concentration using a scale of 0 (high acidic) to 14 (highly alkaline).

ppm - Parts Per Million.
RTECS - Registry of Toxic Effects of Chemical Substances.
STEL - Short Term Exposure Limit.
SWA - Safe Work Australia.
TWA - Time Weighted Average.

HEALTH EFFECTS FROM EXPOSURE:
It should be noted that the effects from exposure to this product will depend on several factors including: frequency and duration of use; quantity used; effectiveness of control measures; protective equipment used and method of application. Given that it is impractical to prepare a Chem Alert report which would encompass all possible scenarios, it is anticipated that users will assess the risks and apply control methods where appropriate.

PERSONAL PROTECTIVE EQUIPMENT GUIDELINES:
The recommendation for protective equipment contained within this Chem Alert report is provided as a guide only. Factors such as method of application, working environment, quantity used, product concentration and the availability of engineering controls should be considered before final selection of personal protective equipment is made.

Report Status

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SDS Date 01 Nov 2010

End of Report

RHEOCHEM
A Newpark Company

SAFETY DATA SHEET

Product Name **IDCIDE-20**

1. IDENTIFICATION OF THE MATERIAL AND SUPPLIER

Supplier Name	**RHEOCHEM LTD**
Address	11 Alacrity Place, Henderson, WA, AUSTRALIA, 6166
Telephone	+61 8 9410 8200
Fax	+61 8 9410 8299
Emergency	1800 127 406 (Australia); 011 64 3 3530199 (International)
Web Site	http://www.rheochem.com.au/
Synonym(s)	IDCIDE 20
Use(s)	BIOCIDE · DRILLING FLUID ADDITIVE · WATER TREATMENT
SDS Date	11 October 2012

2. HAZARDS IDENTIFICATION

CLASSIFIED AS HAZARDOUS ACCORDING TO SAFE WORK AUSTRALIA CRITERIA

RISK PHRASES

R36/38	Irritating to eyes and skin.
R43	May cause sensitisation by skin contact.

SAFETY PHRASES

S23	Do not breathe gas/fumes/vapour/spray (where applicable).
S24/25	Avoid contact with skin and eyes.
S36	Wear suitable protective clothing.

NOT CLASSIFIED AS A DANGEROUS GOOD BY THE CRITERIA OF THE ADG CODE

UN Number	None Allocated	**DG Class**	None Allocated
Packing Group	None Allocated	**Subsidiary Risk(s)**	None Allocated
Hazchem Code	None Allocated		

3. COMPOSITION/ INFORMATION ON INGREDIENTS

Ingredient	Identification	Classification	Content
TETRAKIS(HYDROXYMETHYL)PHOSPHONIUM SULPHATE	CAS: 55566-30-8 EC: 259-709-0	Not Available	18 - 25%
WATER	CAS: 7732-18-5 EC: 231-791-2	Not Available	Remainder

4. FIRST AID MEASURES

Eye	If in eyes, hold eyelids apart and flush continuously with running water. Continue flushing until advised to stop by a Poisons Information Centre, a doctor, or for at least 15 minutes.
Inhalation	If inhaled, remove from contaminated area. Apply artificial respiration if not breathing.
Skin	If skin or hair contact occurs, remove contaminated clothing and flush skin and hair with running water. Continue flushing with water until advised to stop by a Poisons Information Centre or a doctor.
Ingestion	For advice, contact a Poison Information Centre on 13 11 26 (Australia Wide) or a doctor (at once). If swallowed, do not induce vomiting.

Advice to Doctor	Treat symptomatically.
First Aid Facilities	Eye wash facilities should be available.

5. FIRE FIGHTING MEASURES

Flammability	Non flammable. May evolve toxic gases if strongly heated. May evolve carbon oxides, sulphur oxides and phosphates when heated to decomposition.
Fire and Explosion	Treat as per requirements for surrounding fires. Evacuate area and contact emergency services. Remain upwind and notify those downwind of hazard. Wear full protective equipment including Self Contained Breathing Apparatus (SCBA) when combating fire. Use waterfog to cool intact containers and nearby storage areas.
Extinguishing	Use an extinguishing agent suitable for the surrounding fire.
Hazchem Code	None Allocated

6. ACCIDENTAL RELEASE MEASURES

Spillage	Contact emergency services where appropriate. Use personal protective equipment. Clear area of all unprotected personnel. Ventilate area where possible. Contain spillage, then cover / absorb spill with non-combustible absorbent material (vermiculite, sand, or similar), collect and place in suitable containers for disposal.

7. STORAGE AND HANDLING

Storage	Store in a cool, dry, well ventilated area, removed from oxidising agents, acids and foodstuffs. Ensure containers are adequately labelled, protected from physical damage and sealed when not in use.
Handling	Before use carefully read the product label. Use of safe work practices are recommended to avoid eye or skin contact and inhalation. Observe good personal hygiene, including washing hands before eating. Prohibit eating, drinking and smoking in contaminated areas.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Standards	No exposure standard(s) allocated.
Biological Limits	No biological limit allocated.
Engineering Controls	Avoid inhalation. Use in well ventilated areas. Where an inhalation risk exists, mechanical extraction ventilation is recommended.

PPE

Eye / Face	Wear splash-proof goggles.
Hands	Wear PVC or rubber gloves.
Body	When using large quantities or where heavy contamination is likely, wear coveralls.
Respiratory	Where an inhalation risk exists, wear a Type A (Organic vapour) respirator.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	COLOURLESS TO PALE YELLOW LIQUID
Odour	SLIGHT ODOUR
Flammability	NON FLAMMABLE
Flash point	NOT RELEVANT
Boiling point	> 100°C
Melting point	< 0°C
Evaporation rate	AS FOR WATER
pH	3.0 to 3.5

Vapour density	NOT AVAILABLE
Specific gravity	1.08
Solubility (water)	SOLUBLE
Vapour pressure	18 mm Hg @ 20°C
Upper explosion limit	NOT RELEVANT
Lower explosion limit	NOT RELEVANT
Autoignition temperature	NOT AVAILABLE
Decomposition temperature	NOT AVAILABLE
Viscosity	NOT AVAILABLE
Partition coefficient	NOT AVAILABLE
% Volatiles	> 60 % (Water)

10. STABILITY AND REACTIVITY

Chemical Stability	Stable under recommended conditions of storage.
Conditions to Avoid	Avoid heat, sparks, open flames and other ignition sources.
Material to Avoid	Incompatible with oxidising agents (eg. hypochlorites) and acids (eg. nitric acid).
Hazardous Decomposition Products	May evolve carbon oxides, sulphur oxides and phosphates when heated to decomposition.
Hazardous Reactions	Polymerization is not expected to occur.

11. TOXICOLOGICAL INFORMATION

Health Hazard Summary	Low to moderate toxicity - irritant. This product has the potential to cause adverse health effects with over exposure. Upon dilution, the potential for adverse health effects may be reduced.
Eye	Severe irritant. Contact may result in irritation, lacrimation, pain, redness and blurring or dimness of vision. Prolonged contact may result in corneal burns and possible permanent damage.
Inhalation	Low irritant. Over exposure to vapours may result in irritation of the nose and throat, with coughing. High level exposure may result in dizziness, nausea and headache. Due to the low vapour pressure, an inhalation hazard is not anticipated with normal use.
Skin	Irritant. Contact may result in irritation, redness, rash and dermatitis. Prolonged or repeated contact may result in burns. May be absorbed through skin with harmful effects. May cause sensitisation by skin contact.
Ingestion	Low to moderate toxicity. Ingestion may result in gastrointestinal irritation, nausea, vomiting, abdominal pain and diarrhoea.
Toxicity Data	TETRAKIS(HYDROXYMETHYL)PHOSPHONIUM SULPHATE (55566-30-8) LD50 (ingestion) 248 mg/kg (rat) TDLo (ingestion) 650 mg/kg/13 weeks - intermittent (rat)

12. ECOLOGICAL INFORMATION

Environment	Limited ecotoxicity data was available for this product at the time this report was prepared. Ensure appropriate measures are taken to prevent this product from entering the environment.
Ecotoxicity	75% TETRAKIS(HYDROXYMETHYL)PHOSPHONIUM SULPHATE (55566-30-8): LC50 (Rainbow Trout) = 119 mg/L/96 hr LC50(Bluegill Sunfish) = 93 mg/L/ 96 hr EC50 (Daphnia Magna) = 19 mg/L/48 hr LC50 (Brown Shrimp) = 340 mg/L/96 hr LC50 (Mysid Shrimp) = 9.5 mg/L/96 hr LC50 (Sheepshead Minnow) = 94 mg/L/96 hr LC50 (Jevenile Plaice) = 86 mg/L/96 hr Waste Water management EC50 (Activated Sludge) = 24 mg/L/3 hr
Persistence/Degradability	This product is readily biodegradable.

13. DISPOSAL CONSIDERATIONS

Waste Disposal	For small amounts, absorb with sand, vermiculite or similar and dispose of to an approved landfill site. For larger amounts, contact the manufacturer for additional information. Prevent contamination of drains or waterways as aquatic life may be threatened and environmental damage may result.

Legislation Dispose of in accordance with relevant local legislation.

14. TRANSPORT INFORMATION

NOT CLASSIFIED AS A DANGEROUS GOOD BY THE CRITERIA OF THE ADG CODE

	LAND TRANSPORT (ADG)	SEA TRANSPORT (IMDG / IMO)	AIR TRANSPORT (IATA / ICAO)
UN Number	None Allocated	None Allocated	None Allocated
Proper Shipping Name	None Allocated	None Allocated	None Allocated
DG Class/ Division	None Allocated	None Allocated	None Allocated
Subsidiary Risk(s)	None Allocated	None Allocated	None Allocated
Packing Group	None Allocated	None Allocated	None Allocated
Hazchem Code	None Allocated		

15. REGULATORY INFORMATION

Poison Schedule A poison schedule number has not been allocated to this product using the criteria in the Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP)

Inventory Listing(s) **AUSTRALIA: AICS (Australian Inventory of Chemical Substances)**
All components are listed on AICS, or are exempt.

16. OTHER INFORMATION

Additional Information

EXPOSURE CONTROL: If utilised in a closed system the potential for over exposure is reduced. If not used in a closed system, local exhaust ventilation is recommended to control exposure. Provide eye wash and safety shower in close proximity to points of potential exposure. Where the potential for an inhalation risk exists, an approved respirator may be required. Do not eat, store, consume food, tobacco or drink in areas where product is used.

RESPIRATORS: In general the use of respirators should be limited and engineering controls employed to avoid exposure. If respiratory equipment must be worn ensure correct respirator selection and training is undertaken. Remember that some respirators may be extremely uncomfortable when used for long periods. The use of air powered or air supplied respirators should be considered where prolonged or repeated use is necessary.

PERSONAL PROTECTIVE EQUIPMENT GUIDELINES:
The recommendation for protective equipment contained within this ChemAlert report is provided as a guide only. Factors such as method of application, working environment, quantity used, product concentration and the availability of engineering controls should be considered before final selection of personal protective equipment is made.

HEALTH EFFECTS FROM EXPOSURE:
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Abbreviations

ACGIH	American Conference of Governmental Industrial Hygienists
CAS #	Chemical Abstract Service number - used to uniquely identify chemical compounds
CNS	Central Nervous System
EC No.	EC No - European Community Number
GHS	Globally Harmonized System
IARC	International Agency for Research on Cancer
LD50	Lethal Dose, 50% / Median Lethal Dose
mg/m^3	Milligrams per Cubic Metre
PEL	Permissible Exposure Limit
pH	relates to hydrogen ion concentration using a scale of 0 (high acidic) to 14 (highly alkaline).
ppm	Parts Per Million
REACH	Regulation on Registration, Evaluation, Authorisation and Restriction of Chemicals
STOT-RE	Specific target organ toxicity (repeated exposure)
STOT-SE	Specific target organ toxicity (single exposure)
SUSMP	Standard for the Uniform Scheduling of Medicines and Poisons
TLV	Threshold Limit Value
TWA/OEL	Time Weighted Average or Occupational Exposure Limit

Revision History

Revision	Description
1.3	Standard SDS Review
1.2	Standard SDS Review
1.1	Standard SDS Review
1.0	Initial SDS creation

Report Status

This document has been compiled by RMT on behalf of the manufacturer, importer or supplier of the product and serves as their Safety Data Sheet ('SDS').

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Prepared By

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Web: www.rmt.com.au

Revision: 1.3
SDS Date: 11 October 2012

End of SDS

RHEOCHEM

MATERIAL SAFETY DATA SHEET

Product Name **KWIKSEAL (FINE/MED/COARSE)**

1. IDENTIFICATION OF THE MATERIAL AND SUPPLIER

Supplier Name	**RHEOCHEM LTD**
Address	11 Alacrity Place, Henderson, WA, AUSTRALIA, 6166
Telephone	+61 8 9410 8200
Fax	+61 8 9410 8299
Emergency	1800 127 406 (Australia); 011 64 3 3530199 (International)
Web Site	http://www.rheochem.com.au/
Synonym(s)	KWIK SEAL (FORMERLY) • MEDIUM KWIKSEAL
Use(s)	DRILLING FLUID ADDITIVE
SDS Date	01 Nov 2010

2. HAZARDS IDENTIFICATION

NOT CLASSIFIED AS HAZARDOUS ACCORDING TO SAFE WORK AUSTRALIA CRITERIA

NOT CLASSIFIED AS A DANGEROUS GOOD BY THE CRITERIA OF THE ADG CODE

UN No.	None Allocated	**DG Class**	None Allocated	**Subsidiary Risk(s)**	None Allocated
Packing Group	None Allocated	**Hazchem Code**	None Allocated		

3. COMPOSITION/ INFORMATION ON INGREDIENTS

Ingredient	Formula	CAS No.	Content
CELLOPHANE	Not Available	9005-81-6	30-60%
NUT HULLS	Not Available	Not Available	30-60%
WOOD FIBRE	Not Available	Not Available	30-60%

4. FIRST AID MEASURES

Eye	If in eyes, hold eyelids apart and flush continuously with running water. Continue flushing until advised to stop by a Poisons Information Centre, a doctor, or for at least 15 minutes.
Inhalation	If inhaled, remove from contaminated area. Apply artificial respiration if not breathing.
Skin	If skin or hair contact occurs, remove contaminated clothing and flush skin and hair with running water. Continue flushing with water until advised to stop by a Poisons Information Centre or a doctor.
Ingestion	For advice, contact a Poison Information Centre on 13 11 26 (Australia Wide) or a doctor (at once). If swallowed, do not induce vomiting.
Advice to Doctor	Treat symptomatically.

5. FIRE FIGHTING MEASURES

Flammability	Non flammable. May evolve toxic gases if strongly heated.
Fire and Explosion	No fire or explosion hazard exists.
Extinguishing	Prevent contamination of drains or waterways.

Product Name **KWIKSEAL (FINE/MED/COARSE)**

Hazchem Code None Allocated

6. ACCIDENTAL RELEASE MEASURES

Spillage If spilt (bulk), use personal protective equipment. Ventilate area where possible. Contain spillage, then collect and place in suitable containers for disposal. Avoid generating dust.

7. STORAGE AND HANDLING

Storage Store in a cool, dry, well ventilated area, removed from foodstuffs. Ensure containers are adequately labelled, protected from physical damage and sealed when not in use.

Handling Before use carefully read the product label. Use of safe work practices are recommended to avoid eye or skin contact and inhalation. Observe good personal hygiene, including washing hands before eating. Prohibit eating, drinking and smoking in contaminated areas.

8. EXPOSURE CONTROLS/ PERSONAL PROTECTION

Exposure Stds No exposure standard(s) allocated.

Biological Limits No biological limit allocated.

Engineering Controls Avoid inhalation. Use in well ventilated areas. Maintain dust levels below the recommended exposure standard.

PPE Wear dust-proof goggles and PVC or rubber gloves. When using large quantities or where heavy contamination is likely, wear: coveralls. At high dust levels, wear: a Class P1 (Particulate) respirator.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	WOODY BROWN SOLID	**Solubility (water)**	INSOLUBLE
Odour	ODOURLESS	**Specific Gravity**	0.24 - 0.36
pH	NOT AVAILABLE	**% Volatiles**	NOT AVAILABLE
Vapour Pressure	NOT AVAILABLE	**Flammability**	NON FLAMMABLE
Vapour Density	NOT AVAILABLE	**Flash Point**	NOT RELEVANT
Boiling Point	NOT AVAILABLE	**Upper Explosion Limit**	NOT RELEVANT
Melting Point	NOT AVAILABLE	**Lower Explosion Limit**	NOT RELEVANT
Evaporation Rate	NOT AVAILABLE		

10. STABILITY AND REACTIVITY

Chemical Stability Stable under recommended conditions of storage.

Conditions to Avoid Avoid contact with incompatible substances.

Material to Avoid Compatible with most commonly used materials.

Hazardous Decomposition Products May evolve toxic gases if heated to decomposition.

Hazardous Reactions Polymerization is not expected to occur.

11. TOXICOLOGICAL INFORMATION

Health Hazard Summary Low toxicity. Under normal conditions of use, adverse health effects are not anticipated. This product is generally considered to be of low toxicity. Use safe work practices to avoid eye contact, prolonged skin contact and dust generation - inhalation.

Eye Low to moderate irritant. Contact may result in irritation, lacrimation, pain and redness.

Inhalation Low irritant. Over exposure may result in irritation of the nose and throat, with coughing.

Skin Low irritant. Prolonged or repeated exposure to dust may result in irritation and dermatitis.

Ingestion Low toxicity. Ingestion from hand to mouth contamination may result in gastrointestinal irritation and nausea.

Product Name **KWIKSEAL (FINE/MED/COARSE)**

Toxicity Data No LD50 data available for this product.

12. ECOLOGICAL INFORMATION

Environment This product is not anticipated to cause adverse effects to animal or plant life if released to the environment in small quantities. Not expected to bioaccumulate.

13. DISPOSAL CONSIDERATIONS

Waste Disposal Ensure product is covered with moist soil to prevent dust generation and dispose of to approved Council landfill. Contact the manufacturer if additional information is required.

Legislation Dispose of in accordance with relevant local legislation.

14. TRANSPORT INFORMATION

NOT CLASSIFIED AS A DANGEROUS GOOD BY THE CRITERIA OF THE ADG CODE

Shipping Name	None Allocated				
UN No.	None Allocated	**DG Class**	None Allocated	**Subsidiary Risk(s)**	None Allocated
Packing Group	None Allocated	**Hazchem Code**	None Allocated		

15. REGULATORY INFORMATION

Poison Schedule A poison schedule number has not been allocated to this product using the criteria in the Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP).

AICS All chemicals listed on the Australian Inventory of Chemical Substances (AICS).

16. OTHER INFORMATION

Additional Information This product also contains nut hulls.

RESPIRATORS: In general the use of respirators should be limited and engineering controls employed to avoid exposure. If respiratory equipment must be worn ensure correct respirator selection and training is undertaken. Remember that some respirators may be extremely uncomfortable when used for long periods. The use of air powered or air supplied respirators should be considered where prolonged or repeated use is necessary.

ABBREVIATIONS:
ACGIH - American Conference of Industrial Hygienists.
ADG - Australian Dangerous Goods.
BEI - Biological Exposure Indice(s).
CAS# - Chemical Abstract Service number - used to uniquely identify chemical compounds.
CNS - Central Nervous System.
EC No - European Community Number.
HSNO - Hazardous Substances and New Organisms.
IARC - International Agency for Research on Cancer.
mg/m3 - Milligrams per Cubic Metre.
NOS - Not Otherwise Specified.
pH - relates to hydrogen ion concentration using a scale of 0 (high acidic) to 14 (highly alkaline).
ppm - Parts Per Million.
RTECS - Registry of Toxic Effects of Chemical Substances.
STEL - Short Term Exposure Limit.
SWA - Safe Work Australia.
TWA - Time Weighted Average.

HEALTH EFFECTS FROM EXPOSURE:
It should be noted that the effects from exposure to this product will depend on several factors including: frequency and duration of use; quantity used; effectiveness of control measures; protective equipment used and method of application. Given that it is impractical to prepare a Chem Alert report which would encompass all possible scenarios, it is anticipated that users will assess the risks and apply control methods where appropriate.

PERSONAL PROTECTIVE EQUIPMENT GUIDELINES:
The recommendation for protective equipment contained within this Chem Alert report is provided as a guide only. Factors such as method of application, working environment, quantity used, product concentration and the availability of engineering controls should be considered before final selection of personal protective equipment is made.

Product Name **KWIKSEAL (FINE/MED/COARSE)**

Report Status

This document has been compiled by RMT on behalf of the manufacturer of the product and serves as the manufacturer's Safety Data Sheet ('SDS').

It is based on information concerning the product which has been provided to RMT by the manufacturer or obtained from third party sources and is believed to represent the current state of knowledge as to the appropriate safety and handling precautions for the product at the time of issue. Further clarification regarding any aspect of the product should be obtained directly from the manufacturer.

While RMT has taken all due care to include accurate and up-to-date information in this SDS, it does not provide any warranty as to accuracy or completeness. As far as lawfully possible, RMT accepts no liability for any loss, injury or damage (including consequential loss) which may be suffered or incurred by any person as a consequence of their reliance on the information contained in this SDS.

Prepared By

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SDS Date 01 Nov 2010

End of Report

RHEOCHEM

MATERIAL SAFETY DATA SHEET

Product Name **POTASSIUM CHLORIDE (RHEOCHEM)**

1. IDENTIFICATION OF THE MATERIAL AND SUPPLIER

Supplier Name	**RHEOCHEM LTD**
Address	11 Alacrity Place, Henderson, WA, AUSTRALIA, 6166
Telephone	+61 8 9410 8200
Fax	+61 8 9410 8299
Emergency	1800 127 406 (Australia); 011 64 3 3530199 (International)
Web Site	http://www.rheochem.com.au/
Synonym(s)	KCL • MURIATE OF POTASH • POTASH • SYLVITE
Use(s)	DRILLING FLUID ADDITIVE • FERTILISER • INHIBITOR
SDS Date	01 Nov 2010

2. HAZARDS IDENTIFICATION

NOT CLASSIFIED AS HAZARDOUS ACCORDING TO SAFE WORK AUSTRALIA CRITERIA

NOT CLASSIFIED AS A DANGEROUS GOOD BY THE CRITERIA OF THE ADG CODE

UN No.	None Allocated	**DG Class**	None Allocated	**Subsidiary Risk(s)**	None Allocated
Packing Group	None Allocated	**Hazchem Code**	None Allocated		

3. COMPOSITION/ INFORMATION ON INGREDIENTS

Ingredient	Formula	CAS No.	Content
POTASSIUM CHLORIDE	KCl	7447-40-7	>97%

4. FIRST AID MEASURES

Eye	If in eyes, hold eyelids apart and flush continuously with running water. Continue flushing until advised to stop by a Poisons Information Centre, a doctor, or for at least 15 minutes.
Inhalation	If inhaled, remove from contaminated area. Apply artificial respiration if not breathing.
Skin	If skin or hair contact occurs, remove contaminated clothing and flush skin and hair with running water. Continue flushing with water until advised to stop by a Poisons Information Centre or a doctor.
Ingestion	For advice, contact a Poison Information Centre on 13 11 26 (Australia Wide) or a doctor (at once). If swallowed, do not induce vomiting.
Advice to Doctor	Treat symptomatically.

5. FIRE FIGHTING MEASURES

Flammability	Non flammable. May evolve toxic gases (potassium oxides, chlorides) when heated to decomposition.
Fire and Explosion	Evacuate area and contact emergency services. Toxic gases may be evolved in a fire situation. Remain upwind and notify those downwind of hazard. Wear full protective equipment including Self Contained Breathing Apparatus (SCBA) when combating fire. Use waterfog to cool intact containers and nearby storage areas.
Extinguishing	Prevent contamination of drains or waterways.
Hazchem Code	None Allocated

6. ACCIDENTAL RELEASE MEASURES

Spillage If spilt (bulk), use personal protective equipment. Contain spillage, then collect and place in suitable containers for disposal. Avoid generating dust.

7. STORAGE AND HANDLING

Storage Store in a cool, dry, well ventilated area, removed from oxidising agents and foodstuffs. Ensure containers are adequately labelled, protected from physical damage and sealed when not in use.

Handling Before use carefully read the product label. Use of safe work practices are recommended to avoid eye or skin contact and inhalation. Observe good personal hygiene, including washing hands before eating. Prohibit eating, drinking and smoking in contaminated areas.

8. EXPOSURE CONTROLS/ PERSONAL PROTECTION

Exposure Stds No exposure standard(s) allocated.

Biological Limits No biological limit allocated.

Engineering Controls Avoid inhalation. Use in well ventilated areas. Where an inhalation risk exists, mechanical extraction ventilation is recommended.

PPE Personal Protective Equipment is not required under normal conditions of use.At high dust levels, wear: dust-proof goggles and a Class P1 (Particulate) respirator. With prolonged use, wear: rubber or cotton or PVC gloves and coveralls.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	WHITE SOLID	**Solubility (water)**	340 g/L @ 20°C
Odour	ODOURLESS	**Specific Gravity**	2.0
pH	NOT AVAILABLE	**% Volatiles**	NOT AVAILABLE
Vapour Pressure	NOT AVAILABLE	**Flammability**	NON FLAMMABLE
Vapour Density	NOT AVAILABLE	**Flash Point**	NOT RELEVANT
Boiling Point	1413°C	**Upper Explosion Limit**	NOT RELEVANT
Melting Point	773°C	**Lower Explosion Limit**	NOT RELEVANT
Evaporation Rate	NOT AVAILABLE		

10. STABILITY AND REACTIVITY

Chemical Stability Stable under recommended conditions of storage.

Conditions to Avoid Avoid heat, sparks, open flames and other ignition sources.

Material to Avoid Incompatible (potentially explosive) with oxidising agents (eg. hypochlorites).

Hazardous Decomposition Products May evolve toxic gases (potassium oxides, chlorides) when heated to decomposition.

Hazardous Reactions Polymerization will not occur.

11. TOXICOLOGICAL INFORMATION

Health Hazard Summary Low toxicity. Use safe work practices to avoid eye or skin contact and inhalation. Acute potassium poisoning via ingestion is rare as a large single dose usually induces vomiting, and potassium is rapidly excreted by the body, however this product does have the potential to cause cardiovascular disorders.

Eye Low to moderate irritant. Contact may result in irritation, lacrimation, pain and redness.

Inhalation Low irritant. Over exposure may result in irritation of the nose and throat, with coughing.

Skin Low irritant. Prolonged or repeated contact may result in mild irritation, rash and dermatitis.

Ingestion Low toxicity. Ingestion may result in gastrointestinal irritation, nausea, vomiting, abdominal pain and diarrhoea. Ingestion of large quantities may result in blood clotting changes, cardiac arrhythmias, increased respiration, muscle weakness, convulsions and coma.

Toxicity Data POTASSIUM CHLORIDE (7447-40-7)
LD50 (Ingestion): 1500 mg/kg (mouse)
LD50 (Intraperitoneal): 620 mg/kg (mouse)

LD50 (Intravenous): 117 mg/kg (mouse)
LDLo (Ingestion): 20 mg/kg (man)
LDLo (Intraperitoneal): 900 mg/kg (guinea pig)
LDLo (Intravenous): 77 mg/kg (guinea pig)
LDLo (Subcutaneous): 2120 mg/kg (frog)
TDLo (Ingestion): 60 mg/kg/days (woman)

12. ECOLOGICAL INFORMATION

Environment Limited ecotoxicity data was available for this product at the time this report was prepared. Ensure appropriate measures are taken to prevent this product from entering the environment.

13. DISPOSAL CONSIDERATIONS

Waste Disposal Collect and place in sealable containers and dispose of to an approved landfill site. Contact the manufacturer for additional information.

Legislation Dispose of in accordance with relevant local legislation.

14. TRANSPORT INFORMATION

NOT CLASSIFIED AS A DANGEROUS GOOD BY THE CRITERIA OF THE ADG CODE

Shipping Name	None Allocated				
UN No.	None Allocated	**DG Class**	None Allocated	**Subsidiary Risk(s)**	None Allocated
Packing Group	None Allocated	**Hazchem Code**	None Allocated		

15. REGULATORY INFORMATION

Poison Schedule A poison schedule number has not been allocated to this product using the criteria in the Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP).

AICS All chemicals listed on the Australian Inventory of Chemical Substances (AICS).

16. OTHER INFORMATION

Additional Information RESPIRATORS: In general the use of respirators should be limited and engineering controls employed to avoid exposure. If respiratory equipment must be worn ensure correct respirator selection and training is undertaken. Remember that some respirators may be extremely uncomfortable when used for long periods. The use of air powered or air supplied respirators should be considered where prolonged or repeated use is necessary.

ABBREVIATIONS:
ACGIH - American Conference of Industrial Hygienists.
ADG - Australian Dangerous Goods.
BEI - Biological Exposure Indice(s).
CAS# - Chemical Abstract Service number - used to uniquely identify chemical compounds.
CNS - Central Nervous System.
EC No - European Community Number.
HSNO - Hazardous Substances and New Organisms.
IARC - International Agency for Research on Cancer.
mg/m3 - Milligrams per Cubic Metre.
NOS - Not Otherwise Specified.
pH - relates to hydrogen ion concentration using a scale of 0 (high acidic) to 14 (highly alkaline).
ppm - Parts Per Million.
RTECS - Registry of Toxic Effects of Chemical Substances.
STEL - Short Term Exposure Limit.
SWA - Safe Work Australia.
TWA - Time Weighted Average.

HEALTH EFFECTS FROM EXPOSURE:
It should be noted that the effects from exposure to this product will depend on several factors including: frequency and duration of use; quantity used; effectiveness of control measures; protective equipment used and method of application. Given that it is impractical to prepare a Chem Alert report which would encompass all possible scenarios, it is anticipated that users will assess the risks and apply control methods where appropriate.

PERSONAL PROTECTIVE EQUIPMENT GUIDELINES:
The recommendation for protective equipment contained within this Chem Alert report is provided as a guide only. Factors such as method of application, working environment, quantity used, product concentration and the availability of engineering controls should be considered before final selection of personal protective equipment is

made.

Report Status

This document has been compiled by RMT on behalf of the manufacturer of the product and serves as the manufacturer's Safety Data Sheet ('SDS').

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Web: www.rmt.com.au

SDS Date 01 Nov 2010

End of Report

RHEOCHEM

MATERIAL SAFETY DATA SHEET

Product Name **RHEOPAC R/LV/UL/RD/LVD**

1. IDENTIFICATION OF THE MATERIAL AND SUPPLIER

Supplier Name	**RHEOCHEM LTD**
Address	11 Alacrity Place, Henderson, WA, AUSTRALIA, 6166
Telephone	+61 8 9410 8200
Fax	+61 8 9410 8299
Emergency	1800 127 406 (Australia); 011 64 3 3530199 (International)
Web Site	http://www.rheochem.com.au/
Synonym(s)	RHEOPAC LV • RHEOPAC R • RHEOPAC UL
Use(s)	DRILLING FLUID ADDITIVE
SDS Date	01 Nov 2010

2. HAZARDS IDENTIFICATION

NOT CLASSIFIED AS HAZARDOUS ACCORDING TO SAFE WORK AUSTRALIA CRITERIA

NOT CLASSIFIED AS A DANGEROUS GOOD BY THE CRITERIA OF THE ADG CODE

UN No.	None Allocated	**DG Class**	None Allocated	**Subsidiary Risk(s)**	None Allocated
Packing Group	None Allocated	**Hazchem Code**	None Allocated		

3. COMPOSITION/ INFORMATION ON INGREDIENTS

Ingredient	Formula	CAS No.	Content
SODIUM CARBOXYMETHYL CELLULOSE	C28-H30-O27.Na8	9004-32-4	98%
WATER	H2O	7732-18-5	10%
SODIUM CHLORIDE	Na-Cl	7647-14-5	1.4%
SODIUM GLYCOLATE	C2-H3-O3.Na	2836-32-0	0.7%

4. FIRST AID MEASURES

Eye	If in eyes, hold eyelids apart and flush continuously with running water. Continue flushing until advised to stop by a Poisons Information Centre, a doctor, or for at least 15 minutes.
Inhalation	If inhaled, remove from contaminated area. Apply artificial respiration if not breathing.
Skin	If skin or hair contact occurs, remove contaminated clothing and flush skin and hair with running water. Continue flushing with water until advised to stop by a Poisons Information Centre or a doctor.
Ingestion	For advice, contact a Poison Information Centre on 13 11 26 (Australia Wide) or a doctor (at once). If swallowed, do not induce vomiting. Ingestion is considered unlikely due to product form.
Advice to Doctor	Treat symptomatically.

5. FIRE FIGHTING MEASURES

Flammability Combustible. May evolve toxic gases (carbon oxides, hydrocarbons) when heated to decomposition. Finely divided dust may form explosive mixtures with air.

Fire and Explosion Evacuate area and contact emergency services. Toxic gases may be evolved in a fire situation. Remain upwind and notify those downwind of hazard. Wear full protective equipment including Self Contained Breathing Apparatus (SCBA) when combating fire. Use waterfog to cool intact containers and nearby storage areas.

Extinguishing Dry agent, carbon dioxide, foam or water fog. Prevent contamination of drains or waterways.

Hazchem Code None Allocated

6. ACCIDENTAL RELEASE MEASURES

Spillage Contact emergency services where appropriate. Use personal protective equipment. Clear area of all unprotected personnel. Prevent spill entering drains or waterways. Contain spillage, then collect and place in suitable containers for reuse or disposal. Avoid generating dust.

7. STORAGE AND HANDLING

Storage Store in a cool, dry, well ventilated area, removed from oxidising agents, acids and foodstuffs. Ensure containers are adequately labelled.

Handling Before use carefully read the product label. Use of safe work practices are recommended to avoid eye or skin contact and inhalation. Observe good personal hygiene, including washing hands before eating. Prohibit eating, drinking and smoking in contaminated areas.

8. EXPOSURE CONTROLS/ PERSONAL PROTECTION

Exposure Stds No exposure standard(s) allocated.

Biological Limits No biological limit allocated.

Engineering Controls Avoid inhalation. Use in well ventilated areas. Maintain dust levels below the recommended exposure standard.

PPE Wear dust-proof goggles and PVC or rubber gloves. When using large quantities or where heavy contamination is likely, wear: coveralls. Where an inhalation risk exists, wear: a Class P1 (Particulate) respirator.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	WHITE OR YELLOWISH POWDER/GRANULES	**Solubility (water)**	SOLUBLE
Odour	SLIGHT ODOUR	**Specific Gravity**	NOT AVAILABLE
pH	6.0 - 8.5 (1 % solution)	**% Volatiles**	NOT AVAILABLE
Vapour Pressure	NOT AVAILABLE	**Flammability**	COMBUSTIBLE
Vapour Density	NOT AVAILABLE	**Flash Point**	NOT AVAILABLE
Boiling Point	NOT AVAILABLE	**Upper Explosion Limit**	NOT AVAILABLE
Melting Point	NOT AVAILABLE	**Lower Explosion Limit**	NOT AVAILABLE
Evaporation Rate	NOT AVAILABLE		

10. STABILITY AND REACTIVITY

Chemical Stability Stable under recommended conditions of storage.

Conditions to Avoid Avoid heat, sparks, open flames and other ignition sources.

Material to Avoid Incompatible with oxidising agents and acids (eg. nitric acid).

Hazardous Decomposition Products May evolve toxic gases (carbon oxides, hydrocarbons) when heated to decomposition.

Hazardous Reactions Polymerization is not expected to occur.

11. TOXICOLOGICAL INFORMATION

Health Hazard Summary Low toxicity. Under normal conditions of use, adverse health effects are not anticipated. This product is generally considered to be of low toxicity. Use safe work practices to avoid eye contact, prolonged skin contact and dust generation - inhalation.

Eye Low to moderate irritant. Contact may result in irritation, lacrimation, pain and redness.

Inhalation Low irritant. Over exposure may result in irritation of the nose and throat, with coughing.

Skin Low irritant. Prolonged or repeated contact may result in mild irritation.

Ingestion Low toxicity. Ingestion may result in gastrointestinal irritation. However, due to product form ingestion is considered unlikely. Maintain good personal hygiene standards.

Toxicity Data

SODIUM CARBOXYMETHYL CELLULOSE (9004-32-4)
- LD50 (Ingestion): 16000 mg/kg (guinea pig)
- LD50 (Skin): > 2000 mg/kg (rabbit)
- TDLo (Ingestion): 140 mg/kg (rat)

SODIUM CHLORIDE (7647-14-5)
- LC50 (Inhalation): > 42000 mg/m3/1 hour (rat)
- LD50 (Ingestion): 3000 mg/kg (rat)
- LD50 (Intraperitoneal): 2602 mg/kg (mouse)
- LD50 (Intravenous): 645 mg/kg (mouse)
- LD50 (Skin): > 10000 mg/kg (rabbit)
- LD50 (Subcutaneous): 3000 mg/kg (mouse)
- LDLo (Ingestion): 8000 mg/kg (rabbit)
- LDLo (Intravenous): 300 mg/kg (guinea pig)
- LDLo (Subcutaneous): 2160 mg/kg (guinea pig)
- TDLo (Ingestion): 12357 mg/kg (human)

SODIUM GLYCOLATE (2836-32-0)
- LD50 (Ingestion): 6700 mg/kg (mouse)
- LDLo (Ingestion): 500 mg/kg (cat)

12. ECOLOGICAL INFORMATION

Environment This product is not anticipated to cause adverse effects to animal or plant life if released to the environment in small quantities. Not expected to bioaccumulate.

Ecotoxicity Aquatic toxicity: LC50 (Fresh Water Trout) > 21,000 ppm/96hrs. LC50 (Salt Water Stickel Back) > 56,000 ppm/96hrs.

13. DISPOSAL CONSIDERATIONS

Waste Disposal Ensure product is covered with moist soil to prevent dust generation and dispose of to approved Council landfill. Contact the manufacturer if additional information is required.

Legislation Dispose of in accordance with relevant local legislation.

14. TRANSPORT INFORMATION

NOT CLASSIFIED AS A DANGEROUS GOOD BY THE CRITERIA OF THE ADG CODE

Shipping Name	None Allocated				
UN No.	None Allocated	**DG Class**	None Allocated	**Subsidiary Risk(s)**	None Allocated
Packing Group	None Allocated	**Hazchem Code**	None Allocated		

15. REGULATORY INFORMATION

Poison Schedule A poison schedule number has not been allocated to this product using the criteria in the Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP).

AICS All chemicals listed on the Australian Inventory of Chemical Substances (AICS).

16. OTHER INFORMATION

Additional Information RESPIRATORS: In general the use of respirators should be limited and engineering controls employed to avoid exposure. If respiratory equipment must be worn ensure correct respirator selection and training is undertaken. Remember that some respirators may be extremely uncomfortable when used for long periods. The use of air powered or air supplied respirators should be considered where prolonged or repeated use is necessary.

ABBREVIATIONS:

ACGIH - American Conference of Industrial Hygienists.
ADG - Australian Dangerous Goods.
BEI - Biological Exposure Indice(s).
CAS# - Chemical Abstract Service number - used to uniquely identify chemical compounds.
CNS - Central Nervous System.
EC No - European Community Number.
HSNO - Hazardous Substances and New Organisms.
IARC - International Agency for Research on Cancer.
mg/m3 - Milligrams per Cubic Metre.
NOS - Not Otherwise Specified.
pH - relates to hydrogen ion concentration using a scale of 0 (high acidic) to 14 (highly alkaline).
ppm - Parts Per Million.
RTECS - Registry of Toxic Effects of Chemical Substances.
STEL - Short Term Exposure Limit.
SWA - Safe Work Australia.
TWA - Time Weighted Average.

HEALTH EFFECTS FROM EXPOSURE:
It should be noted that the effects from exposure to this product will depend on several factors including: frequency and duration of use; quantity used; effectiveness of control measures; protective equipment used and method of application. Given that it is impractical to prepare a Chem Alert report which would encompass all possible scenarios, it is anticipated that users will assess the risks and apply control methods where appropriate.

PERSONAL PROTECTIVE EQUIPMENT GUIDELINES:
The recommendation for protective equipment contained within this Chem Alert report is provided as a guide only. Factors such as method of application, working environment, quantity used, product concentration and the availability of engineering controls should be considered before final selection of personal protective equipment is made.

Report Status

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Web: www.rmt.com.au

SDS Date 01 Nov 2010

End of Report

RHEOCHEM

MATERIAL SAFETY DATA SHEET

Product Name **SODA ASH (RHEOCHEM)**

1. IDENTIFICATION OF THE MATERIAL AND SUPPLIER

Supplier Name	**RHEOCHEM LTD**
Address	11 Alacrity Place, Henderson, WA, AUSTRALIA, 6166
Telephone	+61 8 9410 8200
Fax	+61 8 9410 8299
Emergency	1800 127 406 (Australia); 011 64 3 3530199 (International)
Web Site	http://www.rheochem.com.au/
Synonym(s)	SODA ASH DENSE • SODIUM CARBONATE
Use(s)	DRILLING AID
SDS Date	01 Nov 2010

2. HAZARDS IDENTIFICATION

CLASSIFIED AS HAZARDOUS ACCORDING TO SAFE WORK AUSTRALIA CRITERIA

RISK PHRASES

R36 Irritating to eyes.

SAFETY PHRASES

S22 Do not breathe dust.

S26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice

NOT CLASSIFIED AS A DANGEROUS GOOD BY THE CRITERIA OF THE ADG CODE

UN No.	None Allocated	**DG Class**	None Allocated	**Subsidiary Risk(s)**	None Allocated
Packing Group	None Allocated	**Hazchem Code**	None Allocated		

3. COMPOSITION/ INFORMATION ON INGREDIENTS

Ingredient	Formula	CAS No.	Content
SODIUM CARBONATE	Na2-C-O3	497-19-8	>97%

4. FIRST AID MEASURES

Eye	If in eyes, hold eyelids apart and flush continuously with running water. Continue flushing until advised to stop by a Poisons Information Centre, a doctor, or for at least 15 minutes.
Inhalation	If inhaled, remove from contaminated area. Apply artificial respiration if not breathing.
Skin	If skin or hair contact occurs, remove contaminated clothing and flush skin and hair with running water. Continue flushing with water until advised to stop by a Poisons Information Centre or a doctor.
Ingestion	For advice, contact a Poison Information Centre on 13 11 26 (Australia Wide) or a doctor (at once). If swallowed, do not induce vomiting.
Advice to Doctor	Treat symptomatically.
First Aid Facilities	Eye wash facilities should be available.

5. FIRE FIGHTING MEASURES

Flammability Non flammable. May evolve toxic gases (sodium oxides) when heated to decomposition.

Fire and Explosion Treat as per requirements for Surrounding Fires: Evacuate area and contact emergency services. Remain upwind and notify those downwind of hazard. Wear full protective equipment including Self Contained Breathing Apparatus (SCBA) when combating fire. Use waterfog to cool intact containers and nearby storage areas.

Extinguishing Prevent contamination of drains or waterways.

Hazchem Code None Allocated

6. ACCIDENTAL RELEASE MEASURES

Spillage Contact emergency services where appropriate. Use personal protective equipment. Clear area of all unprotected personnel. Prevent spill entering drains or waterways. Contain spillage, then collect and place in suitable containers for reuse or disposal. Avoid generating dust.

7. STORAGE AND HANDLING

Storage Store in a cool, dry, well ventilated area, removed from oxidising agents, acids and foodstuffs. Ensure containers are adequately labelled, protected from physical damage and sealed when not in use.

Handling Before use carefully read the product label. Use of safe work practices are recommended to avoid eye or skin contact and inhalation. Observe good personal hygiene, including washing hands before eating. Prohibit eating, drinking and smoking in contaminated areas.

8. EXPOSURE CONTROLS/ PERSONAL PROTECTION

Exposure Stds

Ingredient	Reference	TWA		STEL	
Sodium Carbonate (total dust)	SWA (AUS)	--	10 mg/m3	--	--

Biological Limits No biological limit allocated.

Engineering Controls Avoid inhalation. Use in well ventilated areas. Where an inhalation risk exists, mechanical extraction ventilation is recommended.

PPE Wear dust-proof goggles and PVC or rubber gloves. When using large quantities or where heavy contamination is likely, wear: coveralls. Where an inhalation risk exists, wear: a Class P1 (Particulate) respirator.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	WHITE POWDER	**Solubility (water)**	170 g/L
Odour	ODOURLESS	**Specific Gravity**	2.533
pH	NOT AVAILABLE	**% Volatiles**	NOT AVAILABLE
Vapour Pressure	NOT AVAILABLE	**Flammability**	NON FLAMMABLE
Vapour Density	NOT AVAILABLE	**Flash Point**	NOT RELEVANT
Boiling Point	NOT AVAILABLE	**Upper Explosion Limit**	NOT RELEVANT
Melting Point	854°C	**Lower Explosion Limit**	NOT RELEVANT
Evaporation Rate	NOT AVAILABLE		

10. STABILITY AND REACTIVITY

Chemical Stability Stable under recommended conditions of storage.

Conditions to Avoid Avoid heat, sparks, open flames and other ignition sources.

Material to Avoid Incompatible with oxidising agents and acids (eg. nitric acid).

Hazardous Decomposition Products May evolve toxic gases (sodium oxides) when heated to decomposition.

Hazardous Reactions Polymerization is not expected to occur.

11. TOXICOLOGICAL INFORMATION

Health Hazard Summary Slightly corrosive - irritant. This product has the potential to cause adverse health effects with over exposure. Use safe work practices to avoid eye or skin contact and inhalation.

Eye Slightly corrosive - irritant. Contact may result in irritation, lacrimation, pain, redness, conjunctivitis and possible burns.

Inhalation Slightly corrosive - irritant. Over exposure may result in irritation of the nose and throat, with coughing.

Skin Slightly corrosive. Contact may result in irritation, redness, pain, rash, dermatitis and possible burns.

Ingestion Slightly corrosive. Ingestion may result in burns to the mouth and throat, nausea, vomiting and abdominal pain. Ingestion is considered unlikely due to product form.

Toxicity Data SODIUM CARBONATE (497-19-8)
LC50 (Inhalation): 800 mg/m3/2 hours (guinea pig)
LD50 (Ingestion): 4090 mg/kg (rat)
LD50 (Intraperitoneal): 117 mg/kg (mouse)
LD50 (Subcutaneous): 2210 mg/kg (mouse)

12. ECOLOGICAL INFORMATION

Environment WATER: If released to waterways, alkaline products may change the pH of the waterway. Fish will die if the pH reaches 10-11 (goldfish 10.9, bluegill 10.5). SOIL: May leach to groundwater with toxic effects on aquatic life as above. ATMOSPHERE: Not expected to reside in the atmosphere. Drops or particles released to atmosphere should be removed by gravity and/or be rained out.

13. DISPOSAL CONSIDERATIONS

Waste Disposal Neutralise with dilute acid (eg. 3 mol/L hydrochloric acid) or similar. For small amounts absorb with sand or similar and dispose of to an approved landfill site. Contact the manufacturer for additional information.

Legislation Dispose of in accordance with relevant local legislation.

14. TRANSPORT INFORMATION

NOT CLASSIFIED AS A DANGEROUS GOOD BY THE CRITERIA OF THE ADG CODE

Shipping Name	None Allocated				
UN No.	None Allocated	**DG Class**	None Allocated	**Subsidiary Risk(s)**	None Allocated
Packing Group	None Allocated	**Hazchem Code**	None Allocated		

15. REGULATORY INFORMATION

Poison Schedule A poison schedule number has not been allocated to this product using the criteria in the Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP).

AICS All chemicals listed on the Australian Inventory of Chemical Substances (AICS).

16. OTHER INFORMATION

Additional Information RESPIRATORS: In general the use of respirators should be limited and engineering controls employed to avoid exposure. If respiratory equipment must be worn ensure correct respirator selection and training is undertaken. Remember that some respirators may be extremely uncomfortable when used for long periods. The use of air powered or air supplied respirators should be considered where prolonged or repeated use is necessary.

ABBREVIATIONS:
ACGIH - American Conference of Industrial Hygienists.
ADG - Australian Dangerous Goods.
BEI - Biological Exposure Indice(s).
CAS# - Chemical Abstract Service number - used to uniquely identify chemical compounds.
CNS - Central Nervous System.
EC No - European Community Number.
HSNO - Hazardous Substances and New Organisms.
IARC - International Agency for Research on Cancer.
mg/m3 - Milligrams per Cubic Metre.
NOS - Not Otherwise Specified.
pH - relates to hydrogen ion concentration using a scale of 0 (high acidic) to 14 (highly alkaline).
ppm - Parts Per Million.

RTECS - Registry of Toxic Effects of Chemical Substances.
STEL - Short Term Exposure Limit.
SWA - Safe Work Australia.
TWA - Time Weighted Average.

HEALTH EFFECTS FROM EXPOSURE:
It should be noted that the effects from exposure to this product will depend on several factors including: frequency and duration of use; quantity used; effectiveness of control measures; protective equipment used and method of application. Given that it is impractical to prepare a Chem Alert report which would encompass all possible scenarios, it is anticipated that users will assess the risks and apply control methods where appropriate.

PERSONAL PROTECTIVE EQUIPMENT GUIDELINES:
The recommendation for protective equipment contained within this Chem Alert report is provided as a guide only. Factors such as method of application, working environment, quantity used, product concentration and the availability of engineering controls should be considered before final selection of personal protective equipment is made.

Report Status

This document has been compiled by RMT on behalf of the manufacturer of the product and serves as the manufacturer's Safety Data Sheet ('SDS').

It is based on information concerning the product which has been provided to RMT by the manufacturer or obtained from third party sources and is believed to represent the current state of knowledge as to the appropriate safety and handling precautions for the product at the time of issue. Further clarification regarding any aspect of the product should be obtained directly from the manufacturer.

While RMT has taken all due care to include accurate and up-to-date information in this SDS, it does not provide any warranty as to accuracy or completeness. As far as lawfully possible, RMT accepts no liability for any loss, injury or damage (including consequential loss) which may be suffered or incurred by any person as a consequence of their reliance on the information contained in this SDS.

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SDS Date 01 Nov 2010

End of Report

RHEOCHEM

MATERIAL SAFETY DATA SHEET

Product Name **SODIUM BICARBONATE (RHEOCHEM)**

1. IDENTIFICATION OF THE MATERIAL AND SUPPLIER

Supplier Name	**RHEOCHEM LTD**
Address	11 Alacrity Place, Henderson, WA, AUSTRALIA, 6166
Telephone	+61 8 9410 8200
Fax	+61 8 9410 8299
Emergency	1800 127 406 (Australia); 011 64 3 3530199 (International)
Web Site	http://www.rheochem.com.au/
Synonym(s)	BAKING SODA • BICARBONATE OF SODA • CARBONIC ACID, MONOSODIUM SALT • MONOSODIUM CARBONATE • SODIUM ACID CARBONATE • SODIUM HYDROGEN CARBONATE
Use(s)	PH CONTROL
SDS Date	01 Nov 2010

2. HAZARDS IDENTIFICATION

NOT CLASSIFIED AS HAZARDOUS ACCORDING TO SAFE WORK AUSTRALIA CRITERIA

NOT CLASSIFIED AS A DANGEROUS GOOD BY THE CRITERIA OF THE ADG CODE

UN No.	None Allocated	**DG Class**	None Allocated	**Subsidiary Risk(s)**	None Allocated
Packing Group	None Allocated	**Hazchem Code**	None Allocated		

3. COMPOSITION/ INFORMATION ON INGREDIENTS

Ingredient	Formula	CAS No.	Content
SODIUM BICARBONATE	C-H-O3.Na	144-55-8	>99%

4. FIRST AID MEASURES

Eye	If in eyes, hold eyelids apart and flush continuously with running water. Continue flushing until advised to stop by a Poisons Information Centre, a doctor, or for at least 15 minutes.
Inhalation	If inhaled, remove from contaminated area. Apply artificial respiration if not breathing.
Skin	If skin or hair contact occurs, remove contaminated clothing and flush skin and hair with running water.
Ingestion	For advice, contact a Poison Information Centre on 13 11 26 (Australia Wide) or a doctor (at once).
Advice to Doctor	Treat symptomatically.
First Aid Facilities	Eye wash facilities and safety shower are recommended.

5. FIRE FIGHTING MEASURES

Flammability	Non flammable. May evolve toxic gases (carbon oxides, hydrocarbons) when heated to decomposition.
Fire and Explosion	Treat as per requirements for Surrounding Fires: Evacuate area and contact emergency services. Remain upwind and notify those downwind of hazard. Wear full protective equipment including Self Contained Breathing Apparatus (SCBA) when combating fire. Use waterfog to cool intact containers and nearby storage areas.
Extinguishing	Prevent contamination of drains or waterways.
Hazchem Code	None Allocated

6. ACCIDENTAL RELEASE MEASURES

Spillage If spilt (bulk), use personal protective equipment. Contain spillage, then collect and place in suitable containers for disposal. Avoid generating dust.

7. STORAGE AND HANDLING

Storage Store in a cool, dry, well ventilated area, removed from acids. Ensure packages are adequately labelled, protected from physical damage and sealed when not in use.

Handling Before use carefully read the product label. Use of safe work practices are recommended to avoid eye or skin contact and inhalation. Observe good personal hygiene, including washing hands before eating. Prohibit eating, drinking and smoking in contaminated areas.

8. EXPOSURE CONTROLS/ PERSONAL PROTECTION

Exposure Stds

Ingredient	Reference	TWA		STEL	
SODIUM BICARBONATE (total dust)	SWA (AUS)	--	10 mg/m3	--	--

Biological Limits No biological limit allocated.

Engineering Controls Avoid inhalation. Use in well ventilated areas. Where an inhalation risk exists, mechanical extraction ventilation is recommended.

PPE Personal Protective Equipment is not required under normal conditions of use.When using large quantities or where heavy contamination is likely, wear: dust-proof goggles and rubber or PVC gloves. Where an inhalation risk exists, wear: a Class P1 (Particulate) respirator.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	WHITE POWDER	**Solubility (water)**	170 g/L @ 25°C
Odour	ODOURLESS	**Specific Gravity**	2.533
pH	8 (1% Solution)	**% Volatiles**	NOT AVAILABLE
Vapour Pressure	NOT AVAILABLE	**Flammability**	NON FLAMMABLE
Vapour Density	NOT AVAILABLE	**Flash Point**	NOT RELEVANT
Boiling Point	NOT AVAILABLE	**Upper Explosion Limit**	NOT RELEVANT
Melting Point	854°C	**Lower Explosion Limit**	NOT RELEVANT
Evaporation Rate	NOT AVAILABLE		

10. STABILITY AND REACTIVITY

Chemical Stability Stable under recommended conditions of storage.

Conditions to Avoid Avoid heat, sparks, open flames and other ignition sources.

Material to Avoid Incompatible with acids (eg. nitric acid).

Hazardous Decomposition Products May evolve toxic gases (carbon oxides, hydrocarbons) when heated to decomposition.

Hazardous Reactions Polymerization is not expected to occur.

11. TOXICOLOGICAL INFORMATION

Health Hazard Summary Low toxicity - low irritant. Use safe work practices to avoid eye or skin contact and inhalation.

Eye Low to moderate irritant. Contact may result in irritation, lacrimation, pain and redness.

Inhalation Low irritant. Over exposure may result in irritation of the nose and throat, with coughing.

Skin Low irritant. Prolonged or repeated contact may result in mild irritation.

Ingestion Low toxicity. Ingestion of large quantities may result in nausea, vomiting and gastrointestinal irritation. Sodium bicarbonate can neutralise the gastric juices in the stomach. During neutralisation, carbon dioxide gas is evolved and may cause stretching of the stomach, and with very large doses possible damage or rupture.

Toxicity Data SODIUM BICARBONATE (144-55-8)

LD50 (Ingestion): 4220 mg/kg (rat)
TDLo (Ingestion): 1260 mg/kg (infant - lungs, kidney)

12. ECOLOGICAL INFORMATION

Environment This product is not anticipated to cause adverse effects to animal or plant life if released to the environment in small quantities. Not expected to bioaccumulate.

13. DISPOSAL CONSIDERATIONS

Waste Disposal Dispose of to an approved landfill site. Contact the manufacturer for additional information.

Legislation Dispose of in accordance with relevant local legislation.

14. TRANSPORT INFORMATION

NOT CLASSIFIED AS A DANGEROUS GOOD BY THE CRITERIA OF THE ADG CODE

Shipping Name	None Allocated				
UN No.	None Allocated	**DG Class**	None Allocated	**Subsidiary Risk(s)**	None Allocated
Packing Group	None Allocated	**Hazchem Code**	None Allocated		

15. REGULATORY INFORMATION

Poison Schedule A poison schedule number has not been allocated to this product using the criteria in the Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP).

AICS All chemicals listed on the Australian Inventory of Chemical Substances (AICS).

16. OTHER INFORMATION

Additional Information

ABBREVIATIONS:
ACGIH - American Conference of Industrial Hygienists.
ADG - Australian Dangerous Goods.
BEI - Biological Exposure Indice(s).
CAS# - Chemical Abstract Service number - used to uniquely identify chemical compounds.
CNS - Central Nervous System.
EC No - European Community Number.
HSNO - Hazardous Substances and New Organisms.
IARC - International Agency for Research on Cancer.
mg/m3 - Milligrams per Cubic Metre.
NOS - Not Otherwise Specified.
pH - relates to hydrogen ion concentration using a scale of 0 (high acidic) to 14 (highly alkaline).
ppm - Parts Per Million.
RTECS - Registry of Toxic Effects of Chemical Substances.
STEL - Short Term Exposure Limit.
SWA - Safe Work Australia.
TWA - Time Weighted Average.

HEALTH EFFECTS FROM EXPOSURE:
It should be noted that the effects from exposure to this product will depend on several factors including: frequency and duration of use; quantity used; effectiveness of control measures; protective equipment used and method of application. Given that it is impractical to prepare a Chem Alert report which would encompass all possible scenarios, it is anticipated that users will assess the risks and apply control methods where appropriate.

PERSONAL PROTECTIVE EQUIPMENT GUIDELINES:
The recommendation for protective equipment contained within this Chem Alert report is provided as a guide only. Factors such as method of application, working environment, quantity used, product concentration and the availability of engineering controls should be considered before final selection of personal protective equipment is made.

Report Status This document has been compiled by RMT on behalf of the manufacturer of the product and serves as the manufacturer's Safety Data Sheet ('SDS').

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Product Name **SODIUM BICARBONATE (RHEOCHEM)**

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Web: www.rmt.com.au

SDS Date 01 Nov 2010

End of Report

RHEOCHEM

MATERIAL SAFETY DATA SHEET

Product Name **SALT**

1. IDENTIFICATION OF THE MATERIAL AND SUPPLIER

Supplier Name	**RHEOCHEM LTD**
Address	11 Alacrity Place, Henderson, WA, AUSTRALIA, 6166
Telephone	+61 8 9410 8200
Fax	+61 8 9410 8299
Emergency	1800 127 406 (Australia); 011 64 3 3530199 (International)
Web Site	http://www.rheochem.com.au/
Synonym(s)	FLOSSY SALT • HALITE • NACL • SALT • SODIUM CHLORIDE
Use(s)	CHLORIDE SOURCE • DRILLING FLUID ADDITIVE
SDS Date	01 Nov 2010

2. HAZARDS IDENTIFICATION

NOT CLASSIFIED AS HAZARDOUS ACCORDING TO SAFE WORK AUSTRALIA CRITERIA

NOT CLASSIFIED AS A DANGEROUS GOOD BY THE CRITERIA OF THE ADG CODE

UN No.	None Allocated	**DG Class**	None Allocated	**Subsidiary Risk(s)**	None Allocated
Packing Group	None Allocated	**Hazchem Code**	None Allocated		

3. COMPOSITION/ INFORMATION ON INGREDIENTS

Ingredient	Formula	CAS No.	Content
SODIUM CHLORIDE	Na-Cl	7647-14-5	>98%
INORGANIC SALTS	Not Available	Not Available	<0.8%
WATER	H2O	7732-18-5	<0.8%

4. FIRST AID MEASURES

Eye	If in eyes, hold eyelids apart and flush continuously with running water. Continue flushing until advised to stop by a Poisons Information Centre, a doctor, or for at least 15 minutes.
Inhalation	Due to product form / nature of use, an inhalation hazard is not anticipated.
Skin	Exposure is considered unlikely. Skin irritation is not anticipated.
Ingestion	For advice, contact a Poison Information Centre on 13 11 26 (Australia Wide) or a doctor (at once). If swallowed, do not induce vomiting.
Advice to Doctor	Treat symptomatically.

5. FIRE FIGHTING MEASURES

Flammability	Non flammable.
Fire and Explosion	No fire or explosion hazard exists.
Extinguishing	Prevent contamination of drains or waterways.
Hazchem Code	None Allocated

6. ACCIDENTAL RELEASE MEASURES

Spillage If spilt/ packages damaged, collect for later disposal or reuse.

7. STORAGE AND HANDLING

Storage Store in a cool, dry, well ventilated area, removed from oxidising agents, heat or ignition sources and foodstuffs. Ensure containers are adequately labelled, protected from physical damage and sealed when not in use. Check regularly for leaks or spills.

Handling Before use carefully read the product label. Use of safe work practices are recommended to avoid eye or skin contact and inhalation. Observe good personal hygiene, including washing hands before eating. Prohibit eating, drinking and smoking in contaminated areas.

8. EXPOSURE CONTROLS/ PERSONAL PROTECTION

Exposure Stds No exposure standard(s) allocated.

Biological Limits No biological limit allocated.

Engineering Controls Avoid inhalation. Use in well ventilated areas.

PPE Personal Protective Equipment is not required under normal conditions of use.When using large quantities or where heavy contamination is likely, wear: dust-proof goggles and rubber or PVC gloves. At high dust levels, wear: a Class P1 (Particulate) respirator.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	TRANSLUCENT TO WHITE GRANULES OR POWDER	**Solubility (water)**	357 g/L
Odour	SLIGHT ODOUR	**Specific Gravity**	2.163
pH	7 (1% Solution)	**% Volatiles**	NOT AVAILABLE
Vapour Pressure	NOT AVAILABLE	**Flammability**	NON FLAMMABLE
Vapour Density	NOT AVAILABLE	**Flash Point**	NOT RELEVANT
Boiling Point	1413°C	**Upper Explosion Limit**	NOT RELEVANT
Melting Point	801°C	**Lower Explosion Limit**	NOT RELEVANT
Evaporation Rate	NOT AVAILABLE		

10. STABILITY AND REACTIVITY

Chemical Stability Stable under recommended conditions of storage.

Conditions to Avoid Avoid heat, sparks, open flames and other ignition sources.

Material to Avoid Incompatible with oxidising agents (eg. hypochlorites). Avoid contact with strong oxidising agents, bromium trifluoride, lithium and acids.

Hazardous Decomposition Products May evolve toxic gases if heated to decomposition.

Hazardous Reactions Polymerization is not expected to occur.

11. TOXICOLOGICAL INFORMATION

Health Hazard Summary Non toxic. Under normal conditions of use, adverse health effects are not anticipated. This product is used in trace amounts as a food additive, however the concentrated product is not suitable for ingestion.

Eye Low irritant. Contact may result in irritation, lacrimation and redness.

Inhalation Low irritant. Over exposure to dust may result in irritation of the nose and throat, coughing, nausea and headache.

Skin Low irritant. Prolonged or repeated contact may result in mild irritation.

Ingestion Non toxic when used as a food additive. However, the concentrate should not be consumed undiluted. Ingestion may result in gastrointestinal irritation, nausea and vomiting.

Toxicity Data SODIUM CHLORIDE (7647-14-5)
LC50 (Inhalation): > 42000 mg/m3/1 hour (rat)
LD50 (Ingestion): 3000 mg/kg (rat)
LD50 (Intraperitoneal): 2602 mg/kg (mouse)

LD50 (Intravenous): 645 mg/kg (mouse)
LD50 (Skin): > 10000 mg/kg (rabbit)
LD50 (Subcutaneous): 3000 mg/kg (mouse)
LDLo (Ingestion): 8000 mg/kg (rabbit)
LDLo (Intravenous): 300 mg/kg (guinea pig)
LDLo (Subcutaneous): 2160 mg/kg (guinea pig)
TDLo (Ingestion): 12357 mg/kg (human)

12. ECOLOGICAL INFORMATION

Environment This product is not anticipated to cause adverse effects to animal or plant life if released to the environment in small quantities. Not expected to bioaccumulate.

13. DISPOSAL CONSIDERATIONS

Waste Disposal No special precautions are required for the disposal of this product.

Legislation Dispose of in accordance with relevant local legislation.

14. TRANSPORT INFORMATION

NOT CLASSIFIED AS A DANGEROUS GOOD BY THE CRITERIA OF THE ADG CODE

Shipping Name	None Allocated				
UN No.	None Allocated	**DG Class**	None Allocated	**Subsidiary Risk(s)**	None Allocated
Packing Group	None Allocated	**Hazchem Code**	None Allocated		

15. REGULATORY INFORMATION

Poison Schedule A poison schedule number has not been allocated to this product using the criteria in the Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP).

AICS All chemicals listed on the Australian Inventory of Chemical Substances (AICS).

16. OTHER INFORMATION

Additional Information

ABBREVIATIONS:
ACGIH - American Conference of Industrial Hygienists.
ADG - Australian Dangerous Goods.
BEI - Biological Exposure Indice(s).
CAS# - Chemical Abstract Service number - used to uniquely identify chemical compounds.
CNS - Central Nervous System.
EC No - European Community Number.
HSNO - Hazardous Substances and New Organisms.
IARC - International Agency for Research on Cancer.
mg/m3 - Milligrams per Cubic Metre.
NOS - Not Otherwise Specified.
pH - relates to hydrogen ion concentration using a scale of 0 (high acidic) to 14 (highly alkaline).
ppm - Parts Per Million.
RTECS - Registry of Toxic Effects of Chemical Substances.
STEL - Short Term Exposure Limit.
SWA - Safe Work Australia.
TWA - Time Weighted Average.

HEALTH EFFECTS FROM EXPOSURE:
It should be noted that the effects from exposure to this product will depend on several factors including: frequency and duration of use; quantity used; effectiveness of control measures; protective equipment used and method of application. Given that it is impractical to prepare a Chem Alert report which would encompass all possible scenarios, it is anticipated that users will assess the risks and apply control methods where appropriate.

PERSONAL PROTECTIVE EQUIPMENT GUIDELINES:
The recommendation for protective equipment contained within this Chem Alert report is provided as a guide only. Factors such as method of application, working environment, quantity used, product concentration and the availability of engineering controls should be considered before final selection of personal protective equipment is made.

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SDS Date 01 Nov 2010

End of Report

RHEOCHEM

MATERIAL SAFETY DATA SHEET

Product Name **XANTHAN GUM (P)**

1. IDENTIFICATION OF THE MATERIAL AND SUPPLIER

Supplier Name	**RHEOCHEM LTD**
Address	11 Alacrity Place, Henderson, WA, AUSTRALIA, 6166
Telephone	+61 8 9410 8200
Fax	+61 8 9410 8299
Emergency	1800 127 406 (Australia); 011 64 3 3530199 (International)
Web Site	http://www.rheochem.com.au/
Synonym(s)	XANTHAN GUM (BIOPOLYMER)
Use(s)	DRILLING FLUID ADDITIVE • VISCOSITY MODIFIER
SDS Date	01 Nov 2010

2. HAZARDS IDENTIFICATION

NOT CLASSIFIED AS HAZARDOUS ACCORDING TO SAFE WORK AUSTRALIA CRITERIA

NOT CLASSIFIED AS A DANGEROUS GOOD BY THE CRITERIA OF THE ADG CODE

UN No.	None Allocated	**DG Class**	None Allocated	**Subsidiary Risk(s)**	None Allocated
Packing Group	None Allocated	**Hazchem Code**	None Allocated		

3. COMPOSITION/ INFORMATION ON INGREDIENTS

Ingredient	Formula	CAS No.	Content
XANTHAN GUM	Not Available	11138-66-2	>90%

4. FIRST AID MEASURES

Eye	If in eyes, hold eyelids apart and flush continuously with running water. Continue flushing until advised to stop by a Poisons Information Centre, a doctor, or for at least 15 minutes.
Inhalation	If inhaled, remove from contaminated area. Apply artificial respiration if not breathing.
Skin	If skin or hair contact occurs, remove contaminated clothing and flush skin and hair with running water. Continue flushing with water until advised to stop by a Poisons Information Centre or a doctor.
Ingestion	For advice, contact a Poison Information Centre on 13 11 26 (Australia Wide) or a doctor (at once). If swallowed, do not induce vomiting. Ingestion is considered unlikely due to product form.
Advice to Doctor	Treat symptomatically.
First Aid Facilities	Eye wash facilities and safety shower should be available.

5. FIRE FIGHTING MEASURES

Flammability	Combustible. May evolve toxic gases (carbon oxides, hydrocarbons) when heated to decomposition. Finely divided dust may form explosive mixtures with air.
Fire and Explosion	Evacuate area and contact emergency services. Toxic gases may be evolved in a fire situation. Remain upwind and notify those downwind of hazard. Wear full protective equipment including Self Contained Breathing Apparatus (SCBA) when combating fire. Use waterfog to cool intact containers and nearby storage areas.
Extinguishing	Dry agent, carbon dioxide, foam or water fog. Prevent contamination of drains or waterways.

6. ACCIDENTAL RELEASE MEASURES

Spillage Contact emergency services where appropriate. Use personal protective equipment. Clear area of all unprotected personnel. Prevent spill entering drains or waterways. Contain spillage, then collect and place in suitable containers for reuse or disposal. Avoid generating dust.

7. STORAGE AND HANDLING

Storage Store in a cool, dry, well ventilated area, removed from oxidising agents, acids and foodstuffs. Ensure containers are adequately labelled.

Handling Before use carefully read the product label. Use of safe work practices are recommended to avoid eye or skin contact and inhalation. Observe good personal hygiene, including washing hands before eating. Prohibit eating, drinking and smoking in contaminated areas.

8. EXPOSURE CONTROLS/ PERSONAL PROTECTION

Exposure Stds No exposure standard(s) allocated.

Biological Limits No biological limit allocated.

Engineering Controls Avoid inhalation. Use in well ventilated areas.

PPE Wear dust-proof goggles, PVC or rubber gloves and a Class P1 (Particulate) respirator. When using large quantities or where heavy contamination is likely, wear: coveralls.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	LIGHT BEIGE POWDER	**Solubility (water)**	MISCIBLE
Odour	SLIGHT ODOUR	**Specific Gravity**	1.5
pH	NOT AVAILABLE	**% Volatiles**	NOT AVAILABLE
Vapour Pressure	NOT AVAILABLE	**Flammability**	COMBUSTIBLE
Vapour Density	NOT AVAILABLE	**Flash Point**	NOT RELEVANT
Boiling Point	NOT AVAILABLE	**Upper Explosion Limit**	NOT RELEVANT
Melting Point	NOT AVAILABLE	**Lower Explosion Limit**	NOT RELEVANT
Evaporation Rate	NOT AVAILABLE		

10. STABILITY AND REACTIVITY

Chemical Stability Stable under recommended conditions of storage.

Conditions to Avoid Avoid heat, sparks, open flames and other ignition sources.

Material to Avoid Incompatible with oxidising agents and acids (eg. nitric acid).

Hazardous Decomposition Products May evolve toxic gases (carbon oxides, hydrocarbons) when heated to decomposition.

Hazardous Reactions Polymerization is not expected to occur.

11. TOXICOLOGICAL INFORMATION

Health Hazard Summary Low toxicity. Under normal conditions of use, adverse health effects are not anticipated. This product is generally considered to be of low toxicity. Use safe work practices to avoid eye contact, prolonged skin contact and dust generation - inhalation.

Eye Low to moderate irritant. Contact may result in irritation, lacrimation, pain and redness.

Inhalation Low irritant. Over exposure may result in irritation of the nose and throat, with coughing.

Skin Low irritant. Prolonged or repeated contact may result in mild irritation.

Ingestion Low toxicity. Ingestion may result in gastrointestinal irritation. However, due to product form ingestion is considered unlikely. Maintain good personal hygiene standards.

Toxicity Data No LD50 data available for this product.

12. ECOLOGICAL INFORMATION

Environment This product is not anticipated to cause adverse effects to animal or plant life if released to the environment in small quantities. Not expected to bioaccumulate.

13. DISPOSAL CONSIDERATIONS

Waste Disposal Ensure product is covered with moist soil to prevent dust generation and dispose of to approved Council landfill. Contact the manufacturer if additional information is required.

Legislation Dispose of in accordance with relevant local legislation.

14. TRANSPORT INFORMATION

NOT CLASSIFIED AS A DANGEROUS GOOD BY THE CRITERIA OF THE ADG CODE

Shipping Name	None Allocated				
UN No.	None Allocated	**DG Class**	None Allocated	**Subsidiary Risk(s)**	None Allocated
Packing Group	None Allocated	**Hazchem Code**	None Allocated		

15. REGULATORY INFORMATION

Poison Schedule A poison schedule number has not been allocated to this product using the criteria in the Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP).

AICS All chemicals listed on the Australian Inventory of Chemical Substances (AICS).

16. OTHER INFORMATION

Additional Information RESPIRATORS: In general the use of respirators should be limited and engineering controls employed to avoid exposure. If respiratory equipment must be worn ensure correct respirator selection and training is undertaken. Remember that some respirators may be extremely uncomfortable when used for long periods. The use of air powered or air supplied respirators should be considered where prolonged or repeated use is necessary.

ABBREVIATIONS:
ACGIH - American Conference of Industrial Hygienists.
ADG - Australian Dangerous Goods.
BEI - Biological Exposure Indice(s).
CAS# - Chemical Abstract Service number - used to uniquely identify chemical compounds.
CNS - Central Nervous System.
EC No - European Community Number.
HSNO - Hazardous Substances and New Organisms.
IARC - International Agency for Research on Cancer.
mg/m3 - Milligrams per Cubic Metre.
NOS - Not Otherwise Specified.
pH - relates to hydrogen ion concentration using a scale of 0 (high acidic) to 14 (highly alkaline).
ppm - Parts Per Million.
RTECS - Registry of Toxic Effects of Chemical Substances.
STEL - Short Term Exposure Limit.
SWA - Safe Work Australia.
TWA - Time Weighted Average.

HEALTH EFFECTS FROM EXPOSURE:
It should be noted that the effects from exposure to this product will depend on several factors including: frequency

and duration of use; quantity used; effectiveness of control measures; protective equipment used and method of application. Given that it is impractical to prepare a Chem Alert report which would encompass all possible scenarios, it is anticipated that users will assess the risks and apply control methods where appropriate.

PERSONAL PROTECTIVE EQUIPMENT GUIDELINES:
The recommendation for protective equipment contained within this Chem Alert report is provided as a guide only. Factors such as method of application, working environment, quantity used, product concentration and the availability of engineering controls should be considered before final selection of personal protective equipment is made.

Report Status

This document has been compiled by RMT on behalf of the manufacturer of the product and serves as the manufacturer's Safety Data Sheet ('SDS').

It is based on information concerning the product which has been provided to RMT by the manufacturer or obtained from third party sources and is believed to represent the current state of knowledge as to the appropriate safety and handling precautions for the product at the time of issue. Further clarification regarding any aspect of the product should be obtained directly from the manufacturer.

While RMT has taken all due care to include accurate and up-to-date information in this SDS, it does not provide any warranty as to accuracy or completeness. As far as lawfully possible, RMT accepts no liability for any loss, injury or damage (including consequential loss) which may be suffered or incurred by any person as a consequence of their reliance on the information contained in this SDS.

Prepared By

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Web: www.rmt.com.au

SDS Date 01 Nov 2010

End of Report

Abbreviations

ACGIH	American Conference of Governmental Industrial Hygienists
CAS #	Chemical Abstract Service number - used to uniquely identify chemical compounds
CNS	Central Nervous System
EC No.	EC No - European Community Number
GHS	Globally Harmonized System
IARC	International Agency for Research on Cancer
LD50	Lethal Dose, 50% / Median Lethal Dose
mg/m^3	Milligrams per Cubic Metre
PEL	Permissible Exposure Limit
pH	relates to hydrogen ion concentration using a scale of 0 (high acidic) to 14 (highly alkaline).
ppm	Parts Per Million
REACH	Regulation on Registration, Evaluation, Authorisation and Restriction of Chemicals
STOT-RE	Specific target organ toxicity (repeated exposure)
STOT-SE	Specific target organ toxicity (single exposure)
SUSMP	Standard for the Uniform Scheduling of Medicines and Poisons
TLV	Threshold Limit Value
TWA/OEL	Time Weighted Average or Occupational Exposure Limit

Revision History

Revision	Description
1.3	Standard SDS Review
1.2	Standard SDS Review
1.1	Standard SDS Review
1.0	Initial SDS creation

Report Status

This document has been compiled by RMT on behalf of the manufacturer, importer or supplier of the product and serves as their Safety Data Sheet ('SDS').

It is based on information concerning the product which has been provided to RMT by the manufacturer, importer or supplier or obtained from third party sources and is believed to represent the current state of knowledge as to the appropriate safety and handling precautions for the product at the time of issue. Further clarification regarding any aspect of the product should be obtained directly from the manufacturer, importer or supplier.

While RMT has taken all due care to include accurate and up-to-date information in this SDS, it does not provide any warranty as to accuracy or completeness. As far as lawfully possible, RMT accepts no liability for any loss, injury or damage (including consequential loss) which may be suffered or incurred by any person as a consequence of their reliance on the information contained in this SDS.

Prepared By

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Web: www.rmt.com.au

Revision: 1.3
SDS Date: 11 October 2012

End of SDS

LAFARGE NORTH AMERICA

MSDS

Revised February 15, 2002

Material Safety Data Sheet

PRODUCT NAME: PORTLAND CEMENT

1. CHEMICAL PRODUCT & COMPANY IDENTIFICATION

Supplier

Name: Lafarge North America Inc.
Address: 12950 Worldgate Drive, Suite 500
Herndon, VA 20170
Telephone: 703-480-3600

Product Identifier

Hydraulic Cement, Oil Well Cement, White Cement, Portland Cement Type I, IA, II, IIA, II L.A., III, IIIA, IV, IVA, V, VA, 10, 20, 30, 40, 50, OWH, OWG Cement, OW Class G HSR

Note: This MSDS covers many products. Individual composition of hazardous constituents will vary.

WHMIS Classification: D2A, E

Emergency Telephone Numbers

Health & Transportation: CHEMTREC 1-800-424-9300 or 703-527-3887

2. INFORMATION ON COMPONENTS

Component Name	%	CAS No.
Tri-Calcium Silicate	20 - 70	12168-85-3
Di-Calcium Silicate	10 - 60	10034-77-2
Tetra-Calcium- Alumino-Ferrite	5 - 15	12068-35-8
Calcium Sulfate	2 - 10	Various
Tri-Calcium Aluminate	1 - 15	12042-78-3
Calcium Carbonate	0 - 5	1317-65-3
Magnesium Oxide	0 - 4	1309-48-4
Calcium Oxide	0 - 0.2	1305-78-8
Crystalline Silica	0 - 0.2	14808-60-7
Chromates	0 - 0.005	Various

Component Name	EXPOSURE LIMITS OSHA PEL TWA	ACGIH TLV TWA
Portland Cement (CAS 65997-15-1)*		
(Respirable Dust)	5 mg/m^3	
(Total Dust)	15 mg/m^3	10 mg/m^3
Calcium Sulfate		
(Respirable Dust)	5 mg/m^3	
(Total Dust)	15 mg/m^3	10 mg/m^3
Calcium Carbonate		
(Respirable dust)	5 mg/ m^3	
(Total Dust)	15 mg/m^3	10 mg/m^3
Magnesium Oxide	15 mg/m^3	10 mg/m^3
Calcium Oxide	5 mg/m^3	2 mg/m^3
Crystalline Silica Quartz		0.05 mg/m^3
Quartz (Respirable)	10 mg/ m^3/ (%SiO_2+2)	
Quartz (Total Dust)	30 mg/ m^3/ (%SiO_2+2)	
Chromates	0.1 mg(CrO_3)/ m^3	0.05 mg(Cr)/m^3
Nuisance Dust		
(Respirable)	5 mg/m^3	3 mg/m^3
(Total / Inhalable)	15 mg/m^3	10 mg/m^3

*This value is for particulate matter containing no asbestos and < 1% crystalline silica.

3. HAZARD IDENTIFICATION

Emergency Overview

Solid; grey powder; odorless.

Potential Health Effects

INHALATION (acute): Breathing dust may cause nose, throat or lung irritation and choking. The described effect depends on the degree of exposure.

INHALATION (chronic): Prolonged or repeated exposure may cause lung injury including silicosis. This product may contain crystalline silica. Crystalline silica has been classified by IARC as a known human carcinogen. Some human studies indicate potential for lung cancer from crystalline silica exposure. Risk of injury depends on duration and level of exposure. Long term exposures which result in silicosis may result in additional health effects.

EYE CONTACT (acute/chronic): May cause eye irritation, severe burns and damage to cornea.

SKIN CONTACT (acute/chronic): May cause dry skin, redness, discomfort, irritation or severe burns. May produce allergic reaction potentially associated with hexavalent chromium. Thickening of the skin (scleroderma) may be associated with exposure to high levels of crystalline silica.

INGESTION (acute/chronic): Ingestion of large amounts may cause intestinal distress.

4. FIRST AID MEASURES

INHALATION: Move person to fresh air. Seek medical attention for discomfort.

EYE CONTACT: Rinse thoroughly with water. Seek medical attention for abrasions.

SKIN CONTACT: Wash with soap and water. Use moisturizing creams for irritated skin. Seek medical attention for burns.

INGESTION: Do not induce vomiting, but drink plenty of water. Seek medical attention for discomfort.

5. FIREFIGHTING MEASURES

Flashpoint and Method: None.
Flammable Limits: Not combustible.
Autoignition Temperature: None.
General Hazard: Avoid breathing dust.
Firefighting Instructions: Treat adjacent material.
Firefighting Equipment: This product is not a fire hazard. Self contained breathing apparatus is recommended to limit exposures to smoke from any combustion source.
Hazardous Combustion Products: None.

6. ACCIDENTAL RELEASE MEASURES

General: Wind blown dust may cause the hazards identified in Section 3. Remove spilled material to limit potential harm.
Land Spill Clean up spilled material.
Water Spill: Clean up spilled material.

7. HANDLING AND STORAGE

General: Avoid accidental release. Store dry and away from water.
Storage Temperature: Unlimited.
Storage Pressure: Unlimited.
Empty Containers: Dispose of containers in an approved landfill or incinerator.

8. EXPOSURE CONTROL & PERSONAL PROTECTION

Engineering Controls
Use exhaust ventilation to maintain dust levels below exposure limits in workplaces with poor ventilation and dusty conditions.
Personal Protection
RESPIRATORY PROTECTION: Under ordinary conditions no respiratory protection is required. Wear a NIOSH approved respirator when exposed to dust above exposure limits.
EYE PROTECTION: Wear glasses or safety goggles to prevent contact with eyes. Wearing contact lenses when using this product under dusty conditions is not recommended.
SKIN PROTECITON: Wear impervious gloves, shoes and protective clothing to prevent skin contact.

9. PHYSICAL AND CHEMICAL PROPERTIES

Vapor Pressure:	Not measurable
Vapor Density:	Not measurable
Specific Gravity:	3.2
Solubility in Water:	Slight (0.1 - 1.0%)
Evaporation Rate:	Not measurable
pH (in water):	12 - 13
Boiling Point:	>1000º C
Freezing Point:	None, solid
Viscosity:	None, solid

10. STABILITY AND REACTIVITY

General: Product is stable but must be kept dry. Reacts with water forming polymerized silicates and calcium oxide.
Incompatible Materials and Conditions to Avoid: Must be kept dry. Dissolves in hydrofluoric acid producing corrosive silicon tetrafluoride gas. Silicates react with powerful oxidizers such as fluorine, chlorine trifluoride and oxygen difluoride.
Hazardous Decomposition: None, powdered solid.

11. MSDS PREPARATION AND TOXICOLOGICAL INFORMATION

For detailed toxicological information contact:
Environment, Health & Safety and Public Affairs
Lafarge North America
12950 Worldgate Drive, Suite 500
Herndon, VA 20170
(703) 480-3600

12. ECOLOGICAL INFORMATION

For detailed ecological information: See Section 11 above.

13. DISPOSAL CONSIDERATIONS

Dispose in landfill in accordance with all applicable regulations. Any disposal practice must be in compliance with local, provincial, state and federal laws and regulations. Contact local environmental agency for specific rules.

14. REQUIRED TRANSPORT INFORMATION

Not a hazardous material for DOT or TDG shipping.

15. REGULATORY INFORMATION

This product has been classified ni accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all the information required by the Controlled Products Regulations.

OSHA Hazard Communication Rule, 29 CFR 1910.1200:
This product is considered by OSHA to be a hazardous chemical and should be included in the employer's hazard communication program.

CERCLA/SUPERFUND, 40 CFR 117,302: Not listed.

SARA TITLE III, Sections 311-312 Hazard Category:
This product has been reviewed according to the EPA Hazard Categories promulgated under Sections 311 and 312 of the Superfund Amendment and Reauthorization Act of 1986 and is considered a hazardous chemical and a delayed health hazard.

SARA Section 313 Information:
This product contains NONE of the substances subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

Toxic Substance Control Act (TSCA):
Some constituents identified in this product are listed on the TSCA Inventory.

California Proposition 65:
CHRYSTALLINE SILICA (CAS - 14808-60-7) is considered to be a carcinogen by the state of California.

WHMIS Information
This product contains substances considered to be hazardous by Health Canada and is a controlled product. Consult local authorities for acceptable exposure limits. WHMIS http://www.hc-sc.gc.ca/whmis

16. OTHER INFORMATION

Abbreviations:

CAS No	Chemical Abstract Service number
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit
ACGIH	American Conference of Governmental Industrial Hygienists
TLV	Threshold Limit Value
TWA	Time Weighted Average (8 hour)
CL	Ceiling Limit
mg/m^3	milligrams per cubic meter
IARC	International Agency for Research on Cancer
NIOSH	National Institute for Occupational Safety and Health
pH	negative log of hydrogen ion
>	greater than
DOT	U.S. Department of Transportation
TDG	Transportation of Dangerous Goods
CFR	Code for Federal Regulations
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
SARA	Superfund Amendments and Reauthorization Act
WHMIS	Workplace Hazardous Materials Information System

Information in this MSDS is believed to be current and accurate at the time provided. It is the user's obligation to determine the conditions of safe use of this product.

1. IDENTIFICATION OF THE MATERIAL AND SUPPLIER

1.1 Product identifier

Product name **CALCIUM CHLORIDE POWDER 94-97%**
Synonym(s) CALCIUM CHLORIDE ANHYDRATE

1.2 Uses and uses advised against

Use(s) CONCRETE CONDITIONER • DESICCANT • DUST CONTROL AGENT • FOOD ADDITIVE • INDUSTRIAL APPLICATIONS

1.3 Details of the supplier of the safety data sheet

Supplier name **NEWPARK DRILLING FLUIDS (AUSTRALIA) LTD**
Address 11 Alacrity Place, Henderson, WA, Australia, 6166
Telephone +61 8 9410 8200
Fax +61 8 9410 8299
Email Not supplied
Website http://www.newpark.com

1.4 Emergency telephone number(s)

Emergency 1800 127 406 (Australia); +64 3 3530199 (International)

2. HAZARDS IDENTIFICATION

CLASSIFIED AS HAZARDOUS ACCORDING TO SAFE WORK AUSTRALIA CRITERIA

Risk phrases

R36 Irritating to eyes.

Safety phrases

S22 Do not breathe dust.
S24 Avoid contact with skin.

Other Hazards

No information provided.

3. COMPOSITION/ INFORMATION ON INGREDIENTS

3.1 Substances / Mixtures

Ingredient	CAS number	EC number	Content
CALCIUM CHLORIDE ANHYDROUS	10043-52-4	233-140-8	94 - 97%
SODIUM CHLORIDE	7647-14-5	231-598-3	1 - 5%
WATER	7732-18-5	231-791-2	1%

4. FIRST AID MEASURES

4.1 Description of first aid measures

Eye If in eyes, hold eyelids apart and flush continuously with running water. Continue flushing until advised to stop by a Poisons Information Centre, a doctor, or for at least 15 minutes.
Inhalation If inhaled, remove from contaminated area. Apply artificial respiration if not breathing.
Skin If skin or hair contact occurs, remove contaminated clothing and flush skin and hair with running water. Continue flushing with water until advised to stop by a Poisons Information Centre or a doctor.
Ingestion For advice, contact a Poison Information Centre on 13 11 26 (Australia Wide) or a doctor (at once). If swallowed, do not induce vomiting.
First aid facilities Eye wash facilities and safety shower should be available.

4.2 Most important symptoms and effects, both acute and delayed

Irritating to the eyes and skin.

4.3 Immediate medical attention and special treatment needed

Treat symptomatically.

Product name **CALCIUM CHLORIDE POWDER 94-97%**

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Use an extinguishing agent suitable for the surrounding fire.

5.2 Special hazards arising from the substance or mixture

Non flammable. May evolve toxic gases (chlorides) when heated to decomposition.

5.3 Advice for firefighters

Treat as per requirements for surrounding fires. Evacuate area and contact emergency services. Remain upwind and notify those downwind of hazard. Wear full protective equipment including Self Contained Breathing Apparatus (SCBA) when combating fire. Use waterfog to cool intact containers and nearby storage areas.

5.4 Hazchem code

None allocated

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Wear Personal Protective Equipment (PPE) as detailed in section 8 of the SDS. Clear area of all unprotected personnel. Contact emergency services where appropriate.

6.2 Environmental precautions

Prevent product from entering drains and waterways.

6.3 Methods of cleaning up

Contain spillage, then collect and place in suitable containers for reuse or disposal. Avoid generating dust.

6.4 Reference to other sections

See Sections 8 and 13 for exposure controls and disposal.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Before use carefully read the product label. Use of safe work practices are recommended to avoid eye or skin contact and inhalation. Observe good personal hygiene, including washing hands before eating. Prohibit eating, drinking and smoking in contaminated areas.

7.2 Conditions for safe storage, including any incompatibilities

Store in a cool, dry, well ventilated area, removed from incompatible substances, heat or ignition sources and foodstuffs. Ensure containers are adequately labelled, protected from physical damage and sealed when not in use.

7.3 Specific end use(s)

No information provided.

8. EXPOSURE CONTROLS/ PERSONAL PROTECTION

8.1 Control parameters

Exposure standards

No exposure standards have been entered for this product.

Biological limits No Biological Limit Value allocated.

8.2 Exposure controls

Engineering Controls Avoid inhalation. Use in well ventilated areas. Where an inhalation risk exists, mechanical extraction ventilation is recommended. Maintain dust levels below the recommended exposure standard.

PPE

Product name **CALCIUM CHLORIDE POWDER 94-97%**

Eye/Face	Wear dust-proof goggles.
Hand	Wear PVC or rubber gloves.
Body	When using large quantities or where heavy contamination is likely, wear coveralls.
Respiratory	Where an inhalation risk exists, wear a Class P1 (Particulate) respirator.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Appearance	WHITE POWDER
Odour	ODOURLESS
Odour Threshold	NOT AVAILABLE
pH	7.0 to 9.0
Melting Point	772°C
Boiling Point	> 1600°C
Flash Point	NOT RELEVANT
Evaporation Rate	NOT RELEVANT
Flammability	NON FLAMMABLE
Upper Explosion Limit	NOT RELEVANT
Lower Explosion Limit	NOT RELEVANT
Vapour Pressure	NOT AVAILABLE
Vapour Density	NOT AVAILABLE
Solubility (water)	590 kg/m³ (Approximately)
Partition Coefficient	NOT AVAILABLE
Autoignition Temperature	NOT AVAILABLE
Decomposition Temperature	NOT AVAILABLE
Viscosity	NOT AVAILABLE
Explosive Properties	NOT AVAILABLE
Oxidising Properties	NOT AVAILABLE
Specific Gravity	2.15

9.2 Other information

% Volatiles	NOT AVAILABLE

10. STABILITY AND REACTIVITY

10.1 Reactivity

Carefully review all information in sections 10.2 to 10.6.

10.2 Chemical stability

Stable under recommended conditions of storage.

10.3 Possibility of hazardous reactions

Polymerization is not expected to occur.

10.4 Conditions to avoid

Avoid contact with incompatible substances.

10.5 Incompatible materials

Incompatible with acids (e.g. nitric acid), methyl vinyl ether, zinc/ galvanised metals, bromine trifluoride, boron oxide and calcium oxide. May react exothermically with water (i.e. releasing heat).

10.6 Hazardous decomposition products

Product name **CALCIUM CHLORIDE POWDER 94-97%**

May evolve toxic gases (chlorides) when heated to decomposition.

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity

Based on available data, the classification criteria are not met. Toxicity Data available for the ingredients:
CALCIUM CHLORIDE ANHYDROUS (10043-52-4):
LD50 (Ingestion): 1000 mg/kg (rat)
LD50 (Intraperitoneal): 210 mg/kg (mouse)
LD50 (Intravenous): 42 mg/kg (mouse)
LD50 (Subcutaneous): 823 mg/kg (mouse)
LDLo (Ingestion): 1384 mg/kg (rabbit)
LDLo (Intravenous): 150 mg/kg (guinea pig)
LDLo (Subcutaneous): 249 mg/kg (cat)
TDLo (Intravenous): 20 mg/kg/1 hour (woman)
SODIUM CHLORIDE (7647-14-5):
LC50 (Inhalation): > 42000 mg/m3/1 hour (rat)
LD50 (Ingestion): 3000 mg/kg (rat)
LD50 (Intraperitoneal): 2602 mg/kg (mouse)
LD50 (Intravenous): 645 mg/kg (mouse)
LD50 (Skin): > 10000 mg/kg (rabbit)
LD50 (Subcutaneous): 3000 mg/kg (mouse)
LDLo (Ingestion): 8000 mg/kg (rabbit)
LDLo (Intravenous): 300 mg/kg (guinea pig)
LDLo (Subcutaneous): 2160 mg/kg (guinea pig)
TDLo (Ingestion): 12357 mg/kg (human)

Skin Not classified as a skin irritant. Contact may result in mechanical irritation, redness and rash.

Eye Irritating to the eyes. Contact may result in irritation, lacrimation, pain and redness.

Mutagenicity Insufficient data available to classify as a mutagen.

Carcinogenicity Insufficient data available to classify as a carcinogen.

Reproductive Insufficient data available to classify as a reproductive toxin.

STOT - single exposure Not classified as causing organ effects from single exposure.

STOT - repeated exposure Not classified as causing organ damage from repeated exposure.

Aspiration This product does not present an aspiration hazard.

Sensitisation Not classified as causing skin or respiratory sensitisation.

Product name **CALCIUM CHLORIDE POWDER 94-97%**

12. ECOLOGICAL INFORMATION

12.1 Toxicity

No information provided.

12.2 Persistence and degradability

Biodegradability does not pertain to inorganic substances.

12.3 Bioaccumulative potential

This product does not bioaccumulate.

12.4 Mobility in soil

No information provided.

12.5 Results of PBT and vPvB assessment

No information provided.

12.6 Other adverse effects

No information provided.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Waste disposal Ensure product is covered with moist soil to prevent dust generation and dispose of to approved Council landfill. Contact the manufacturer/supplier for additional information (if required).

Legislation Dispose of in accordance with relevant local legislation.

14. TRANSPORT INFORMATION

NOT CLASSIFIED AS A DANGEROUS GOOD BY THE CRITERIA OF THE ADG CODE, IMDG OR IATA

	Land Transport (ADG)	Sea Transport (IMDG/IMO)	Air Transport (IATA/ICAO)
14.1 UN number	None Allocated	None Allocated	None Allocated
14.2 UN proper shipping name	None Allocated	None Allocated	None Allocated
14.3 Transport hazard classes			
DG Class	None Allocated	None Allocated	None Allocated
Subsidiary risk(s)	None Allocated	None Allocated	None Allocated
14.4 Packing group	None Allocated	None Allocated	None Allocated
14.5 Environmental hazards		None Allocated	
14.6 Special precautions for user			
Hazchem Code	None Allocated		

15. REGULATORY INFORMATION

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

Poison schedule A poison schedule number has not been allocated to this product using the criteria in the Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP).

Classifications Xi - Irritant

Inventory listing(s) **AUSTRALIA: AICS (Australian Inventory of Chemical Substances)**
All components are listed on AICS, or are exempt.

15.2 Chemical safety assessment

No information provided.

Product name **CALCIUM CHLORIDE POWDER 94-97%**

16. OTHER INFORMATION

Additional information

RESPIRATORS: In general the use of respirators should be limited and engineering controls employed to avoid exposure. If respiratory equipment must be worn ensure correct respirator selection and training is undertaken. Remember that some respirators may be extremely uncomfortable when used for long periods. The use of air powered or air supplied respirators should be considered where prolonged or repeated use is necessary.

HEALTH EFFECTS FROM EXPOSURE:
It should be noted that the effects from exposure to this product will depend on several factors including: frequency and duration of use; quantity used; effectiveness of control measures; protective equipment used and method of application. Given that it is impractical to prepare a ChemAlert report which would encompass all possible scenarios, it is anticipated that users will assess the risks and apply control methods where appropriate.

PERSONAL PROTECTIVE EQUIPMENT GUIDELINES:
The recommendation for protective equipment contained within this report is provided as a guide only. Factors such as method of application, working environment, quantity used, product concentration and the availability of engineering controls should be considered before final selection of personal protective equipment is made.

Abbreviations

ACGIH	American Conference of Governmental Industrial Hygienists
CAS #	Chemical Abstract Service number - used to uniquely identify chemical compounds
CNS	Central Nervous System
EC No.	EC No - European Community Number
EMS	Emergency Schedules (Emergency Procedures for Ships Carrying Dangerous Goods)
GHS	Globally Harmonized System
GTEPG	Group Text Emergency Procedure Guide
IARC	International Agency for Research on Cancer
LC50	Lethal Concentration, 50% / Median Lethal Concentration
LD50	Lethal Dose, 50% / Median Lethal Dose
mg/m³	Milligrams per Cubic Metre
OEL	Occupational Exposure Limit
pH	relates to hydrogen ion concentration using a scale of 0 (high acidic) to 14 (highly alkaline).
ppm	Parts Per Million
STEL	Short-Term Exposure Limit
STOT-RE	Specific target organ toxicity (repeated exposure)
STOT-SE	Specific target organ toxicity (single exposure)
SUSMP	Standard for the Uniform Scheduling of Medicines and Poisons
SWA	Safe Work Australia
TLV	Threshold Limit Value
TWA	Time Weighted Average

Report Status

This ChemAlert report has been independently compiled by RMT's scientific department utilising the original Safety Data Sheet ('SDS') for the product provided to RMT by the manufacturer. The information is based on the latest chemical and toxicological research and is believed to represent the current state of knowledge as to the appropriate safety and handling precautions for the product at the time of issue. It is an independent collation by RMT of information obtained from the original SDS for this product. Its content has not been authorised or verified by the manufacturer / distributor of the chemical to which it relates.

This ChemAlert report does not constitute the manufacturer's original SDS and is not intended to be a replacement for same. It is provided to subscribers of ChemAlert as a reference tool only, is not all-inclusive and does not represent any guarantee as to the properties of the product. Further clarification regarding any aspect of the product should be obtained directly from the manufacturer.

Product name **CALCIUM CHLORIDE POWDER 94-97%**

Prepared By

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Last Reviewed: 17 Apr 2015
Date Printed: 29 Jul 2016
Based on SDS dated: 17 Apr 2015

End of Report

1. IDENTIFICATION OF THE MATERIAL AND SUPPLIER

1.1 Product identifier

Product name **CD-31LS**
Synonym(s) 100291 - ITEM NUMBER • 31L CD • 424011 - PRODUCT CODE • BHI CD-31L • CD 31L

1.2 Uses and uses advised against

Use(s) CEMENT ADDITIVE • DISPERSANT

1.3 Details of the supplier of the safety data sheet

Supplier name **BAKER HUGHES PRESSURE PUMPING**
Address 108 Poole st, Welshpool, WA, Australia, 6106
Telephone +61 8 9350 3800
Fax +61 8 9350 5453
Email Not supplied
Website http://www.bakerhughes.com

1.4 Emergency telephone number(s)

Emergency 1800 988 778

2. HAZARDS IDENTIFICATION

CLASSIFIED AS HAZARDOUS ACCORDING TO SAFE WORK AUSTRALIA CRITERIA

Risk phrases

R36/38 Irritating to eyes and skin.

Safety phrases

S23 Do not breathe gas/fumes/vapour/spray (where applicable).
S24/25 Avoid contact with skin and eyes.
S36/37/39 Wear suitable protective clothing, gloves and eye/face protection.

Other Hazards

No information provided.

3. COMPOSITION/ INFORMATION ON INGREDIENTS

3.1 Substances / Mixtures

Ingredient	CAS number	EC number	Content
WATER	7732-18-5	231-791-2	Not Available
SODIUM NAPHTHALENE SULPHONATE	Not Available	Not Available	Not Available

4. FIRST AID MEASURES

4.1 Description of first aid measures

Eye If in eyes, hold eyelids apart and flush continuously with running water. Continue flushing until advised to stop by a Poisons Information Centre, a doctor, or for at least 15 minutes.
Inhalation If inhaled, remove from contaminated area. Apply artificial respiration if not breathing.
Skin If skin or hair contact occurs, remove contaminated clothing and flush skin and hair with running water.
Ingestion For advice, contact a Poison Information Centre on 13 11 26 (Australia Wide) or a doctor (at once).
First aid facilities Eye wash facilities should be available.

4.2 Most important symptoms and effects, both acute and delayed

No information provided.

4.3 Immediate medical attention and special treatment needed

Treat symptomatically.

Product name **CD-31LS**

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Use an extinguishing agent suitable for the surrounding fire.

5.2 Special hazards arising from the substance or mixture

Non flammable. May evolve carbon oxides and hydrocarbons when heated to decomposition.

5.3 Advice for firefighters

Treat as per requirements for surrounding fires. Evacuate area and contact emergency services. Remain upwind and notify those downwind of hazard. Wear full protective equipment including Self Contained Breathing Apparatus (SCBA) when combating fire. Use waterfog to cool intact containers and nearby storage areas.

5.4 Hazchem code

None allocated

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Wear Personal Protective Equipment (PPE) as detailed in section 8 of the SDS.

6.2 Environmental precautions

Prevent product from entering drains and waterways.

6.3 Methods of cleaning up

Contain spillage, then cover / absorb spill with non-combustible absorbent material (vermiculite, sand, or similar), collect and place in suitable containers for disposal.

6.4 Reference to other sections

See Sections 8 and 13 for exposure controls and disposal.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Before use carefully read the product label. Use of safe work practices are recommended to avoid eye or skin contact and inhalation. Observe good personal hygiene, including washing hands before eating. Prohibit eating, drinking and smoking in contaminated areas.

7.2 Conditions for safe storage, including any incompatibilities

Store in a cool, dry, well ventilated area, removed from incompatible substances and foodstuffs. Ensure containers are adequately labelled, protected from physical damage and sealed when not in use. Store below 4.4°C.

7.3 Specific end use(s)

No information provided.

8. EXPOSURE CONTROLS/ PERSONAL PROTECTION

8.1 Control parameters

Exposure standards

No exposure standards have been entered for this product.

Biological limits

No biological limit values have been entered for this product.

8.2 Exposure controls

Engineering Controls Avoid inhalation. Use in well ventilated areas.

PPE

Product name **CD-31LS**

Eye/Face	Wear splash-proof goggles.
Hand	Wear PVC or rubber gloves.
Body	When using large quantities or where heavy contamination is likely, wear coveralls.
Respiratory	No PPE specified.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Appearance	CLEAR DARK BROWN LIQUID
Odour	SLIGHT MOTH-BALL ODOUR
Odour Threshold	NOT AVAILABLE
pH	8 to 10
Melting Point	0°C (Approximately)
Boiling Point	NOT AVAILABLE
Flash Point	NOT RELEVANT
Evaporation Rate	AS FOR WATER
Flammability	NON FLAMMABLE
Upper Explosion Limit	NOT RELEVANT
Lower Explosion Limit	NOT RELEVANT
Vapour Pressure	18 mm Hg @ 20°C
Vapour Density	NOT AVAILABLE
Solubility (water)	SOLUBLE
Partition Coefficient	NOT AVAILABLE
Autoignition Temperature	NOT AVAILABLE
Decomposition Temperature	NOT AVAILABLE
Viscosity	NOT AVAILABLE
Explosive Properties	NOT AVAILABLE
Oxidising Properties	NOT AVAILABLE
Specific Gravity	1.16 to 1.22

9.2 Other information

No information provided.

10. STABILITY AND REACTIVITY

10.1 Reactivity

Carefully review all information in sections 10.2 to 10.6.

10.2 Chemical stability

Stable under recommended conditions of storage.

10.3 Possibility of hazardous reactions

Polymerization will not occur.

10.4 Conditions to avoid

Avoid heat, sparks, open flames and other ignition sources.

10.5 Incompatible materials

Incompatible with oxidising agents (e.g. hypochlorites) and acids (e.g. nitric acid).

10.6 Hazardous decomposition products

May evolve carbon oxides and hydrocarbons when heated to decomposition.

Product name **CD-31LS**

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity	Based on available data, the classification criteria are not met.
Skin	Irritating to the skin. Contact may result in irritation, redness, rash and dermatitis.
Eye	Irritating to the eyes. Contact may result in irritation, lacrimation, pain and redness.
Mutagenicity	Not classified as a mutagen.
Carcinogenicity	Not classified as a carcinogen.
Reproductive	Not classified as a reproductive toxin.
STOT - single exposure	Not classified as causing organ damage from single exposure. However, over exposure may result in mild irritation of the nose and throat, with coughing.
STOT - repeated exposure	Not classified as causing organ damage from repeated exposure.
Aspiration	Not classified as causing aspiration.
Sensitisation	Not classified as causing skin or respiratory sensitisation.

12. ECOLOGICAL INFORMATION

12.1 Toxicity

No information provided.

12.2 Persistence and degradability

No information provided.

12.3 Bioaccumulative potential

No information provided.

12.4 Mobility in soil

No information provided.

12.5 Results of PBT and vPvB assessment

No information provided.

12.6 Other adverse effects

No information provided.

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Waste disposal	For small amounts, absorb with sand, vermiculite or similar and dispose of to an approved landfill site. For large quantities, contact the manufacturer/supplier for additional information. Prevent contamination of drains and waterways as aquatic life may be threatened and environmental damage may result.
Legislation	Dispose of in accordance with relevant local legislation.

14. TRANSPORT INFORMATION

NOT CLASSIFIED AS A DANGEROUS GOOD BY THE CRITERIA OF THE ADG CODE, IMDG OR IATA

Product name **CD-31LS**

	Land Transport (ADG)	Sea Transport (IMDG/IMO)	Air Transport (IATA/ICAO)
14.1 UN number	None Allocated	None Allocated	None Allocated
14.2 UN proper shipping name	None Allocated	None Allocated	None Allocated
14.3 Transport hazard classes			
DG Class	None Allocated	None Allocated	None Allocated
Subsidiary risk(s)	None Allocated	None Allocated	None Allocated
14.4 Packing group	None Allocated	None Allocated	None Allocated
14.5 Environmental hazards		None Allocated	
14.6 Special precautions for user			
Hazchem Code	None Allocated		

15. REGULATORY INFORMATION

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

Poison schedule A poison schedule number has not been allocated to this product using the criteria in the Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP).

Classifications Xi - Irritant

Inventory listing(s) **AUSTRALIA: AICS (Australian Inventory of Chemical Substances)**
All components are listed on AICS, or are exempt.

15.2 Chemical safety assessment

No information provided.

16. OTHER INFORMATION

Additional information

HEALTH EFFECTS FROM EXPOSURE:
It should be noted that the effects from exposure to this product will depend on several factors including: frequency and duration of use; quantity used; effectiveness of control measures; protective equipment used and method of application. Given that it is impractical to prepare a ChemAlert report which would encompass all possible scenarios, it is anticipated that users will assess the risks and apply control methods where appropriate.

PERSONAL PROTECTIVE EQUIPMENT GUIDELINES:
The recommendation for protective equipment contained within this report is provided as a guide only. Factors such as method of application, working environment, quantity used, product concentration and the availability of engineering controls should be considered before final selection of personal protective equipment is made.

Abbreviations

ACGIH	American Conference of Governmental Industrial Hygienists
CAS #	Chemical Abstract Service number - used to uniquely identify chemical compounds
CNS	Central Nervous System
EC No.	EC No - European Community Number
EMS	Emergency Schedules (Emergency Procedures for Ships Carrying Dangerous Goods)
GHS	Globally Harmonized System
GTEPG	Group Text Emergency Procedure Guide
IARC	International Agency for Research on Cancer
LC50	Lethal Concentration, 50% / Median Lethal Concentration
LD50	Lethal Dose, 50% / Median Lethal Dose
mg/m³	Milligrams per Cubic Metre
OEL	Occupational Exposure Limit
pH	relates to hydrogen ion concentration using a scale of 0 (high acidic) to 14 (highly alkaline).

Product name **CD-31LS**

ppm	Parts Per Million
STEL	Short-Term Exposure Limit
STOT-RE	Specific target organ toxicity (repeated exposure)
STOT-SE	Specific target organ toxicity (single exposure)
SUSMP	Standard for the Uniform Scheduling of Medicines and Poisons
SWA	Safe Work Australia
TLV	Threshold Limit Value
TWA	Time Weighted Average

Report Status

This ChemAlert report has been independently compiled by RMT's scientific department utilising the original Safety Data Sheet ('SDS') for the product provided to RMT by the manufacturer. The information is based on the latest chemical and toxicological research and is believed to represent the current state of knowledge as to the appropriate safety and handling precautions for the product at the time of issue. It is an independent collation by RMT of information obtained from the original SDS for this product. Its content has not been authorised or verified by the manufacturer / distributor of the chemical to which it relates.

This ChemAlert report does not constitute the manufacturer's original SDS and is not intended to be a replacement for same. It is provided to subscribers of ChemAlert as a reference tool only, is not all-inclusive and does not represent any guarantee as to the properties of the product. Further clarification regarding any aspect of the product should be obtained directly from the manufacturer.

While RMT has taken all due care to include accurate and up-to-date information in this ChemAlert report, it does not provide any warranty as to accuracy or completeness. As far as lawfully possible, RMT accepts no liability for any loss, injury or damage (including consequential loss) which may be suffered or incurred by any person as a consequence of their reliance on the information contained in this ChemAlert report.

Prepared By

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Last Reviewed: 26 Nov 2014
Date Printed: 03 Aug 2016
Based on SDS dated: 19 Feb 2014

End of Report

SAFETY DATA SHEET

Product Name **FP-9L**

1. IDENTIFICATION OF THE MATERIAL AND SUPPLIER

Supplier Name	**BAKER HUGHES PRESSURE PUMPING**
Address	108 Poole st , Welshpool , WA, AUSTRALIA, 6106
Telephone	+61 8 9350 3800
Fax	+61 8 9350 5453
Emergency	1800 988 778
Web Site	http://www.bakerhughes.com
Synonym(s)	BAKER HUGHES FP-9L • FP 9L
Use(s)	ANTIFOAMING AGENT
SDS Date	17 May 2011

2. HAZARDS IDENTIFICATION

CLASSIFIED AS HAZARDOUS ACCORDING TO SAFE WORK AUSTRALIA CRITERIA

RISK PHRASES

R36/37/38 Irritating to eyes, respiratory system and skin.

SAFETY PHRASES

S36/37 Wear suitable protective clothing and gloves.

S46 If swallowed, contact a doctor or Poisons Information Centre immediately and show container or label.

NOT CLASSIFIED AS A DANGEROUS GOOD BY THE CRITERIA OF THE ADG CODE

UN No.	None Allocated	**DG Class**	None Allocated	**Subsidiary Risk(s)**	None Allocated
Packing Group	None Allocated	**Hazchem Code**	None Allocated		

3. COMPOSITION/ INFORMATION ON INGREDIENTS

Ingredient	Formula	CAS No.	Content
ISONONANOL	C9-H20-O	27458-94-2	>60%

4. FIRST AID MEASURES

Eye	If in eyes, hold eyelids apart and flush continuously with running water. Continue flushing until advised to stop by a Poisons Information Centre, a doctor, or for at least 15 minutes.
Inhalation	If inhaled, remove from contaminated area. Apply artificial respiration if not breathing.
Skin	If skin or hair contact occurs, remove contaminated clothing and flush skin and hair with running water. Continue flushing with water until advised to stop by a Poisons Information Centre or a doctor.
Ingestion	For advice, contact a Poison Information Centre on 13 11 26 (Australia Wide) or a doctor (at once). If swallowed, do not induce vomiting.
Advice to Doctor	Treat symptomatically.
First Aid Facilities	Eye wash facilities and safety shower should be available.

5. FIRE FIGHTING MEASURES

Flammability Combustible. May evolve toxic gases (carbon oxides, hydrocarbons) when heated to decomposition.

Fire and Explosion Evacuate area and contact emergency services. Toxic gases may be evolved in a fire situation. Remain upwind and notify those downwind of hazard. Wear full protective equipment including Self Contained Breathing Apparatus (SCBA) when combating fire. Use waterfog to cool intact containers and nearby storage areas.

Extinguishing Dry agent, carbon dioxide or foam. Prevent contamination of drains or waterways.

Hazchem Code None Allocated

6. ACCIDENTAL RELEASE MEASURES

Spillage Use personal protective equipment. Contain spillage, then cover / absorb spill with non-combustible absorbent material (vermiculite, sand, or similar), collect and place in suitable containers for disposal. CAUTION: Spill site may be slippery.

7. STORAGE AND HANDLING

Storage Store in a cool, dry, well ventilated area, removed from oxidising agents, acids, heat or ignition sources and foodstuffs. Ensure containers are adequately labelled, protected from physical damage and sealed when not in use. Large storage areas should have appropriate ventilation systems. Store as a Class C1 Combustible Liquid (AS1940).

Handling Before use carefully read the product label. Use of safe work practices are recommended to avoid eye or skin contact and inhalation. Observe good personal hygiene, including washing hands before eating. Prohibit eating, drinking and smoking in contaminated areas.

8. EXPOSURE CONTROLS/ PERSONAL PROTECTION

Exposure Stds No exposure standard(s) allocated.

Biological Limits No biological limit allocated.

Engineering Controls Avoid inhalation. Use in well ventilated areas. Where an inhalation risk exists, mechanical extraction ventilation is recommended.

PPE Wear splash-proof goggles and rubber or PVC gloves. When using large quantities or where heavy contamination is likely, wear: coveralls. Where an inhalation risk exists, wear: a Type A (Organic vapour) respirator.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	CLEAR COLOURLESS TO LIGHT AMBER COLOURED LIQUID	**Solubility (water)**	INSOLUBLE
Odour	MILD ODOUR	**Specific Gravity**	0.98 to 1.0
pH	NOT AVAILABLE	**% Volatiles**	NOT AVAILABLE
Vapour Pressure	NOT AVAILABLE	**Flammability**	CLASS C1 COMBUSTIBLE
Vapour Density	NOT AVAILABLE	**Flash Point**	105°C
Boiling Point	> 200°C	**Upper Explosion Limit**	6.0 %
Melting Point	NOT AVAILABLE	**Lower Explosion Limit**	0.9 %
Evaporation Rate	NOT AVAILABLE		
Autoignition Temperature	NOT AVAILABLE	**Decomposition Temperature**	NOT AVAILABLE
Partition Coefficient	NOT AVAILABLE	**Viscosity**	NOT AVAILABLE

10. STABILITY AND REACTIVITY

Chemical Stability	Stable under recommended conditions of storage.
Conditions to Avoid	Avoid heat, sparks, open flames and other ignition sources.
Material to Avoid	Incompatible with oxidising agents (eg. hypochlorites), acids (eg. nitric acid), heat and ignition sources.
Hazardous Decomposition Products	May evolve toxic gases (carbon oxides, hydrocarbons) when heated to decomposition.
Hazardous Reactions	Polymerization is not expected to occur.

11. TOXICOLOGICAL INFORMATION

Health Hazard Summary	Low to moderate toxicity - irritant. This product has the potential to cause adverse health effects with over exposure. Use safe work practices to avoid eye or skin contact and inhalation. Over exposure may result in central nervous system (CNS) effects.
Eye	Irritant. Contact may result in irritation, lacrimation, pain, redness and conjunctivitis. May result in burns with prolonged contact.
Inhalation	Irritant. Over exposure may result in irritation of the nose and throat, coughing and headache. High level exposure may result in nausea, dizziness and drowsiness.
Skin	Irritant. Contact may result in drying and defatting of the skin, rash and dermatitis. May be absorbed through skin with harmful effects.
Ingestion	Low to moderate toxicity. Ingestion may result in nausea, vomiting, abdominal pain, diarrhoea, dizziness and drowsiness. Aspiration may result in chemical pneumonitis and pulmonary oedema.
Toxicity Data	No LD50 data available for this product.

12. ECOLOGICAL INFORMATION

Environment	Limited ecotoxicity data was available for this product at the time this report was prepared. Ensure appropriate measures are taken to prevent this product from entering the environment.

13. DISPOSAL CONSIDERATIONS

Waste Disposal	For small amounts absorb with sand, vermiculite or similar and dispose of to an approved landfill site. Contact the manufacturer for additional information if larger amounts are involved. Prevent contamination of drains and waterways as aquatic life may be threatened and environmental damage may result.
Legislation	Dispose of in accordance with relevant local legislation.

14. TRANSPORT INFORMATION

NOT CLASSIFIED AS A DANGEROUS GOOD BY THE CRITERIA OF THE ADG CODE

Shipping Name	None Allocated				
UN No.	None Allocated	**DG Class**	None Allocated	**Subsidiary Risk(s)**	None Allocated
Packing Group	None Allocated	**Hazchem Code**	None Allocated		

15. REGULATORY INFORMATION

Poison Schedule	A poison schedule number has not been allocated to this product using the criteria in the Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP).
AICS	All chemicals listed on the Australian Inventory of Chemical Substances (AICS).

16. OTHER INFORMATION

Additional Information

National Industrial Chemicals Notification and Assessment (NICNAS) Registration number: 2475.

RESPIRATORS: In general the use of respirators should be limited and engineering controls employed to avoid exposure. If respiratory equipment must be worn ensure correct respirator selection and training is undertaken. Remember that some respirators may be extremely uncomfortable when used for long periods. The use of air powered or air supplied respirators should be considered where prolonged or repeated use is necessary.

WORK PRACTICES - SOLVENTS: Organic solvents may present both a health and flammability hazard. It is recommended that engineering controls should be adopted to reduce exposure where practicable (for example, if using indoors, ensure explosion proof extraction ventilation is available). Flammable or combustible liquids with

explosive limits have the potential for ignition from static discharge. Refer to AS 1020 (The control of undesirable static electricity) and AS 1940 (The storage and handling of flammable and combustible liquids) for control procedures.

ABBREVIATIONS:
ACGIH - American Conference of Industrial Hygienists.
ADG - Australian Dangerous Goods.
BEI - Biological Exposure Indice(s).
CAS# - Chemical Abstract Service number - used to uniquely identify chemical compounds.
CNS - Central Nervous System.
EC No - European Community Number.
HSNO - Hazardous Substances and New Organisms.
IARC - International Agency for Research on Cancer.
mg/m³ - Milligrams per Cubic Metre.
NOS - Not Otherwise Specified.
pH - relates to hydrogen ion concentration using a scale of 0 (high acidic) to 14 (highly alkaline).
ppm - Parts Per Million.
RTECS - Registry of Toxic Effects of Chemical Substances.
STEL - Short Term Exposure Limit.
SWA - Safe Work Australia.
TWA - Time Weighted Average.

HEALTH EFFECTS FROM EXPOSURE:
It should be noted that the effects from exposure to this product will depend on several factors including: frequency and duration of use; quantity used; effectiveness of control measures; protective equipment used and method of application. Given that it is impractical to prepare a ChemAlert report which would encompass all possible scenarios, it is anticipated that users will assess the risks and apply control methods where appropriate.

PERSONAL PROTECTIVE EQUIPMENT GUIDELINES:
The recommendation for protective equipment contained within this ChemAlert report is provided as a guide only. Factors such as method of application, working environment, quantity used, product concentration and the availability of engineering controls should be considered before final selection of personal protective equipment is made.

Report Status

This document has been compiled by RMT on behalf of the manufacturer of the product and serves as the manufacturer's Safety Data Sheet ('SDS').

It is based on information concerning the product which has been provided to RMT by the manufacturer or obtained from third party sources and is believed to represent the current state of knowledge as to the appropriate safety and handling precautions for the product at the time of issue. Further clarification regarding any aspect of the product should be obtained directly from the manufacturer.

While RMT has taken all due care to include accurate and up-to-date information in this SDS, it does not provide any warranty as to accuracy or completeness. As far as lawfully possible, RMT accepts no liability for any loss, injury or damage (including consequential loss) which may be suffered or incurred by any person as a consequence of their reliance on the information contained in this SDS.

Prepared By

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SDS Date 17 May 2011

End of Report

SAFETY DATA SHEET

Product Name **R-21L**

1. IDENTIFICATION OF THE MATERIAL AND SUPPLIER

Supplier Name	**BAKER HUGHES PRESSURE PUMPING**
Address	108 Poole st , Welshpool , WA, AUSTRALIA, 6106
Telephone	+61 8 9350 3800
Fax	+61 8 9350 5453
Emergency	1800 988 778
Web Site	http://www.bakerhughes.com
Synonym(s)	21L R • 488066 - ITEM NUMBER • BJ SERVICES R-21L • R 21L
Use(s)	RETARDANT
SDS Date	31 May 2011

2. HAZARDS IDENTIFICATION

NOT CLASSIFIED AS HAZARDOUS ACCORDING TO SAFE WORK AUSTRALIA CRITERIA

NOT CLASSIFIED AS A DANGEROUS GOOD BY THE CRITERIA OF THE ADG CODE

UN No.	None Allocated	**DG Class**	None Allocated	**Subsidiary Risk(s)**	None Allocated
Packing Group	None Allocated	**Hazchem Code**	None Allocated		

3. COMPOSITION/ INFORMATION ON INGREDIENTS

Ingredient	Formula	CAS No.	Content
WATER	H2O	7732-18-5	>60%
SODIUM LIGNOSULPHONATE	Not Available	Not Available	Not Available

4. FIRST AID MEASURES

Eye	If in eyes, hold eyelids apart and flush continuously with running water. Continue flushing until advised to stop by a Poisons Information Centre, a doctor, or for at least 15 minutes.
Inhalation	If inhaled, remove from contaminated area. Apply artificial respiration if not breathing.
Skin	If skin or hair contact occurs, remove contaminated clothing and flush skin and hair with running water. Continue flushing with water until advised to stop by a Poisons Information Centre or a doctor.
Ingestion	For advice, contact a Poison Information Centre on 13 11 26 (Australia Wide) or a doctor (at once). If swallowed, do not induce vomiting.
Advice to Doctor	Treat symptomatically.
First Aid Facilities	Eye wash facilities should be available.

5. FIRE FIGHTING MEASURES

Flammability	Non flammable. May evolve toxic gases if strongly heated. May evolve carbon oxides and sulphur oxides when heated to decomposition.
Fire and Explosion	Treat as per requirements for Surrounding Fires: Evacuate area and contact emergency services. Remain upwind and notify those downwind of hazard. Wear full protective equipment including Self Contained Breathing Apparatus (SCBA) when combating fire. Use waterfog to cool intact containers and nearby storage areas.

Extinguishing Prevent contamination of drains or waterways.

Hazchem Code None Allocated

6. ACCIDENTAL RELEASE MEASURES

Spillage Use personal protective equipment. Contain spillage, then cover / absorb spill with non-combustible absorbent material (vermiculite, sand, or similar), collect and place in suitable containers for disposal. CAUTION: Spill site may be slippery.

7. STORAGE AND HANDLING

Storage Store in a cool, dry, well ventilated area, removed from oxidising agents, acids and foodstuffs. Ensure containers are adequately labelled, protected from physical damage and sealed when not in use. Check regularly for leaks or spills.

Handling Before use carefully read the product label. Use of safe work practices are recommended to avoid eye or skin contact and inhalation. Observe good personal hygiene, including washing hands before eating. Prohibit eating, drinking and smoking in contaminated areas.

8. EXPOSURE CONTROLS/ PERSONAL PROTECTION

Exposure Stds No exposure standard(s) allocated.

Biological Limits No biological limit allocated.

Engineering Controls Avoid inhalation. Use in well ventilated areas.

PPE Wear splash-proof goggles and PVC or rubber gloves. When using large quantities or where heavy contamination is likely, wear: coveralls.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	BROWN LIQUID	**Solubility (water)**	SOLUBLE
Odour	SLIGHT ODOUR	**Specific Gravity**	1.296
pH	9.5 to 10.5 (3% solution)	**% Volatiles**	NOT AVAILABLE
Vapour Pressure	NOT AVAILABLE	**Flammability**	NON FLAMMABLE
Vapour Density	1.21 (Air = 1)	**Flash Point**	NOT RELEVANT
Boiling Point	101.7°C	**Upper Explosion Limit**	NOT RELEVANT
Melting Point	-1.1°C	**Lower Explosion Limit**	NOT RELEVANT
Evaporation Rate	AS FOR WATER		
Autoignition Temperature	NOT AVAILABLE	**Decomposition Temperature**	NOT AVAILABLE
Partition Coefficient	NOT AVAILABLE	**Viscosity**	NOT AVAILABLE

10. STABILITY AND REACTIVITY

Chemical Stability Stable under recommended conditions of storage.

Conditions to Avoid Avoid heat, sparks, open flames and other ignition sources.

Material to Avoid Incompatible with oxidising agents and acids (eg. nitric acid).

Hazardous Decomposition Products May evolve carbon oxides and sulphur oxides when heated to decomposition.

Hazardous Reactions Polymerization is not expected to occur.

11. TOXICOLOGICAL INFORMATION

Health Hazard Summary Low toxicity - irritant. Use safe work practices to avoid eye or skin contact and inhalation. Over exposure may result in irritation.

Eye Irritant. Contact may result in irritation, lacrimation, pain, redness and conjunctivitis. May result in burns with prolonged contact.

Inhalation Low irritant. Over exposure may result in irritation of the nose and throat, with coughing.

Skin Irritant. Contact may result in irritation, redness, rash and dermatitis. Prolonged or repeated contact may result in burns.

Ingestion Low toxicity. Ingestion of large quantities may result in nausea, vomiting and gastrointestinal irritation.

Toxicity Data No LD50 data available for this product.

12. ECOLOGICAL INFORMATION

Environment Limited ecotoxicity data was available for this product at the time this report was prepared. Ensure appropriate measures are taken to prevent this product from entering the environment.

13. DISPOSAL CONSIDERATIONS

Waste Disposal For small amounts absorb with sand, vermiculite or similar and dispose of to an approved landfill site. Contact the manufacturer for additional information if larger amounts are involved. Prevent contamination of drains and waterways as aquatic life may be threatened and environmental damage may result.

Legislation Dispose of in accordance with relevant local legislation.

14. TRANSPORT INFORMATION

NOT CLASSIFIED AS A DANGEROUS GOOD BY THE CRITERIA OF THE ADG CODE

Shipping Name	None Allocated				
UN No.	None Allocated	**DG Class**	None Allocated	**Subsidiary Risk(s)**	None Allocated
Packing Group	None Allocated	**Hazchem Code**	None Allocated		

15. REGULATORY INFORMATION

Poison Schedule A poison schedule number has not been allocated to this product using the criteria in the Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP).

AICS All chemicals listed on the Australian Inventory of Chemical Substances (AICS).

16. OTHER INFORMATION

Additional Information RESPIRATORS: In general the use of respirators should be limited and engineering controls employed to avoid exposure. If respiratory equipment must be worn ensure correct respirator selection and training is undertaken. Remember that some respirators may be extremely uncomfortable when used for long periods. The use of air powered or air supplied respirators should be considered where prolonged or repeated use is necessary.

EXPOSURE STANDARDS - TIME WEIGHTED AVERAGES: Exposure standards are established on the premise of an 8 hour work period of normal intensity, under normal climatic conditions and where a 16 hour break between shifts exists to enable the body to eliminate absorbed contaminants. In the following circumstances, exposure standards must be reduced: strenuous work conditions; hot, humid climates; high altitude conditions; extended shifts (which increase the exposure period and shorten the period of recuperation).

ABBREVIATIONS:
ACGIH - American Conference of Industrial Hygienists.
ADG - Australian Dangerous Goods.
BEI - Biological Exposure Indice(s).
CAS# - Chemical Abstract Service number - used to uniquely identify chemical compounds.
CNS - Central Nervous System.
EC No - European Community Number.
HSNO - Hazardous Substances and New Organisms.
IARC - International Agency for Research on Cancer.
mg/m³ - Milligrams per Cubic Metre.
NOS - Not Otherwise Specified.
pH - relates to hydrogen ion concentration using a scale of 0 (high acidic) to 14 (highly alkaline).
ppm - Parts Per Million.

RTECS - Registry of Toxic Effects of Chemical Substances.
STEL - Short Term Exposure Limit.
SWA - Safe Work Australia.
TWA - Time Weighted Average.

HEALTH EFFECTS FROM EXPOSURE:
It should be noted that the effects from exposure to this product will depend on several factors including: frequency and duration of use; quantity used; effectiveness of control measures; protective equipment used and method of application. Given that it is impractical to prepare a ChemAlert report which would encompass all possible scenarios, it is anticipated that users will assess the risks and apply control methods where appropriate.

PERSONAL PROTECTIVE EQUIPMENT GUIDELINES:
The recommendation for protective equipment contained within this ChemAlert report is provided as a guide only. Factors such as method of application, working environment, quantity used, product concentration and the availability of engineering controls should be considered before final selection of personal protective equipment is made.

Report Status

This document has been compiled by RMT on behalf of the manufacturer of the product and serves as the manufacturer's Safety Data Sheet ('SDS').

It is based on information concerning the product which has been provided to RMT by the manufacturer or obtained from third party sources and is believed to represent the current state of knowledge as to the appropriate safety and handling precautions for the product at the time of issue. Further clarification regarding any aspect of the product should be obtained directly from the manufacturer.

While RMT has taken all due care to include accurate and up-to-date information in this SDS, it does not provide any warranty as to accuracy or completeness. As far as lawfully possible, RMT accepts no liability for any loss, injury or damage (including consequential loss) which may be suffered or incurred by any person as a consequence of their reliance on the information contained in this SDS.

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End of Report