Ungani Production Facility Commissioning and Operations Environment Plan: Ungani North Intervention Summary Document

Document number	Revision	Date of Revision
HSE-SUM-050	1	26/06/2018

1. INTRODUCTION

Buru Energy Limited (Company) is an Australian ASX listed company engaged in oil and gas exploration and production in the Kimberley region of Western Australia, in an area known in geological terms as the Canning Basin.

The Company has developed the *Ungani Production Facility Commissioning and Operations Environment Plan* (HSE-PLN-037) (Environment Plan) for the management of environmental aspects associated with the Company's commissioning and production operations at the Ungani Facility. The *Ungani North Well Intervention Bridging Document* (L3251) has been developed to describe the planned intervention operations (the Activity) and provide revised chemical disclosure. The revised chemical disclosure is provided as while chemicals disclosed in the Environment Plan will be used, they will be used in different concentrations (in accordance with the *Chemical Disclosure Guideline* (DMP 2013)).

This Summary Document summarises the operations and mitigation and management measures in the Environment Plan and provides the chemical disclosure.

1.1. Contact Details

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2. OVERVIEW OF THE ACTIVITY

The characteristics of the wells are provided in Table 1. The Ungani 1 ST1 and Ungani 2 petroleum wells are both located on the Ungani Central well site, while the Ungani 3 and Ungani 5 wells are both located on the Ungani 3 well site.

Table 1: Characteristics of the Ungani Production Facility wells.

Well	Date Drilled	Location		Depth
		Easting	Northing	
Ungani 1 ST1	August – September 2011	517,375 mE	8,010,864 mN	3,593 m
Ungani 2	November – January 2012	517,365 mE	8,010,848 mN	2,800 m
Ungani 3	January – March 2014	518,470 mE	8,011,035 mN	2,284 m
Ungani 4	October – November 2017	517,096 mE	8,010,450 mN	2,249 m
Ungani 5	December 2017	518,495 mE	8,011,035 mN	2,239 m
Ungani Far West 1	November 2015 – February 2016	514,225 mE	8,008,842 mN	2,400 m
Ungani North 1	July – December 2012	517,415 mE	8,017,229 mN	3,701 m

The well sites are located within petroleum production licence areas L 20 and L 21, located approximately 100 km east of Broome and 86 km southwest of Derby on Yakka Munga pastoral station.

2.1. Existing Infrastructure

In addition to the wells, the existing infrastructure at the Ungani Facility includes:

- bunded three phase (oil, produced water and gas) production separator;
- various storage tanks;
- impermeable lined turkeys nest;
- road tanker load out facility;
- plant processing and well control systems;
- produced water injection equipment;
- other equipment including generators, lighting towers, reverse osmosis plant and office; and
- camp site including accommodation and kitchen.

2.2. Stages and Timing

Production operations at the Ungani Production Facility are ongoing. The Activity is planned to be undertaken in the 2018 dry season.

2.3. Mobilisation

During mobilisation, equipment, personnel and supplies required for the Activity will be mobilised to the Activity area using dedicated vehicles. All travel will be in accordance with State road legislation and the Company *Travel Management Procedure* (HSE-PRO-002).

2.4. Commissioning Process

The general steps of commissioning are:

- Pre-commissioning checks: safety and process checks to ensure operational components are ready for commissioning.
- Leak testing: use of water to test for leaks prior to introduction of hydrocarbons.
- Commissioning: production wells are flowed and the system inspected for leaks and function.

If production does not commence immediately following commissioning, the Facility will be shut-in and subject to ongoing inspections and maintenance.

2.5. Production Process

The oil-water mix will flow from the production wells through the production separator. Depending on reservoir status, reservoir fluids may flow freely to surface, or downhole pumps will be used as artificial lift. The separated oil then flows to stock tanks. Produced water flows to the segregation tank and then water storage tanks, or straight to the water storage tanks. The limited gas given off during the separation process is released via the cold vent system.

The storage of the oil in the stock tanks allows further water separation which is transferred to the water storage tanks. Guided Wave Radar is used to determine the oil-water levels in the tanks. Also any remaining gas in the crude oil is vented from each tank. The oil is then pumped to the load out facility.

2.5.1. Produced Water Management

Produced water will consist of up to approximately 30% of the oil-water mix produced from the Ungani wells. The primary method for disposal of produced water will be via reinjection into the Ungani Far West 1 well. The Ungani Central turkeys nest may also be used for storage of produced water.

All chemicals within the produced water reinjected have been fully disclosed in accordance with Regulation 15(9) of the *Petroleum and Geothermal Energy Resources (Environment) Regulations 2012* and Chemical Disclosure Guideline published by DMP, in Appendix A.

2.6. Inspection and Maintenance

The Ungani Facility is manned during production and daily inspections will be undertaken. This includes collecting process data, monitoring tank and turkeys nest levels and system integrity checks.

Maintenance operations include, but are not limited to, routine operations such as water injection filter changes, and greasing and topping up oil on rotating equipment (pumps). Maintenance of the Ungani access track will be through a scheduled proactive program dependant on traffic loads. Similar maintenance may be required on the well sites.

Wellhead maintenance operations may be undertaken which include wellhead maintenance, safety valve leak testing and well monitoring. The Company may also undertake wireline, slickline or e-line operations.

The operations planned for Ungani North include perforation of additional zones within the Ungani dolomite formation, well bore circulation to clean up the existing and additional perforations of potential restrictions, and swabbing of the well to test the success of the operations.

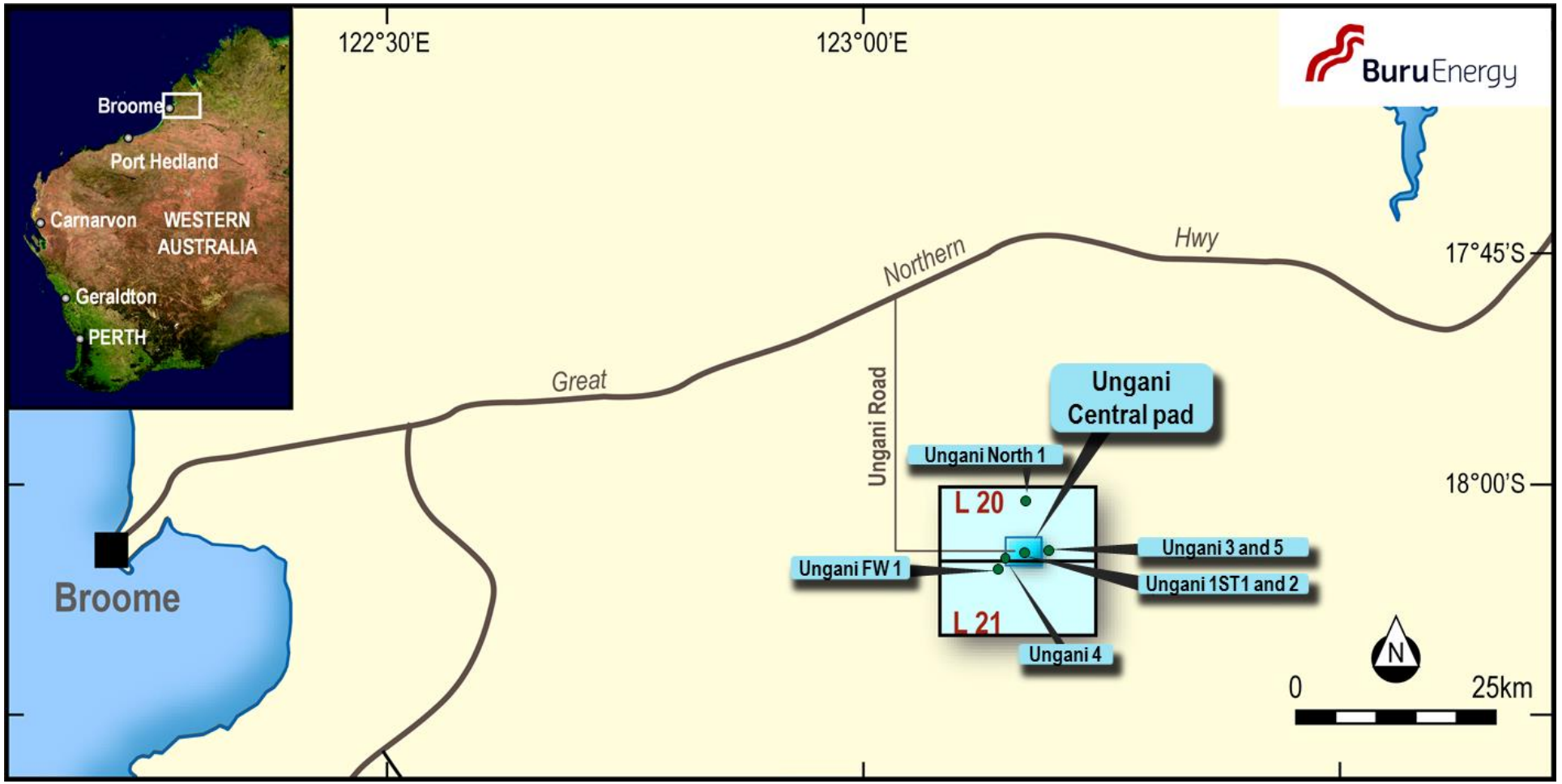


Figure 1: Location of the Ungani Facility.

2.7. Waste

All putrescible wastes will be stored in lidded skips/bins which remain closed to prevent fauna access and litter generation. Inert recyclable and industrial waste will be stored in skips. All waste types (putrescible, inert, recyclable and industrial) will be removed for disposal in accordance with regulatory requirements.

Sewage and grey water will be treated by an Aerated Wastewater Treatment System. Following treatment, effluent will be discharged into a fenced area.

Waste oil that has been contaminated with solids and is unsuitable for recovery or other hydrocarbon contaminated materials will be stored in bins prior to disposal in accordance with regulatory requirements.

2.8. Demobilisation and Rehabilitation

Following completion of the commissioning phase, all Activity specific machinery and equipment will be removed from the Activity area. No demobilisation of production equipment is planned as a part of the Activity.

If some of the infrastructure at the Ungani Facility is no longer required then progressive decommissioning and remediation will be implemented. Alternatively, if the Company determines that production from the Ungani Facility will be permanently ceased, a decommissioning and rehabilitation plan will be developed for DMIRS' approval and in consultation with all relevant stakeholders.

3. ENVIRONMENTAL IMPACTS AND MANAGEMENT MEASURES

The Activity will be confined to the existing Ungani Facility. A summary of the existing environmental characteristics of surrounding the Activity area, potential impacts that could result from the Activity and the risk of these potential impacts occurring is provided in Table 2. Included in this table are also the management and mitigation measures that form part of the implementation strategy to minimise environmental risk.

Table 2: Summary of the existing environment, potential impacts and management approach associated with the Activity.

Environmental Characteristic	Description	Potential Impact	Key Management Measures	Risk	Implementation Strategy
Surface water	The Fitzroy River, located 53 km from the Ungani Facility, is the largest water course in the vicinity of the Activity area. The closest drainage area to the Activity area is a small drainage depression about 9 km north. No permanent water bodies are located in the close vicinity of the Activity area and drainage lines are internally draining, only flowing to the Fitzroy River under flood conditions. During the wet season, sheet flow can occur due to the low lying topography of the Activity area and surrounds.	• Contamination of surface water.	• Leak testing will be undertaken on clean (free of crude) components only. • Leak test water will be contained and pumped to Ungani Far West 1. • Vehicles limited to the Activity area, travel in accordance with the *Travel Management Procedure* (HSE-PRO-002). • Operations with spill risks will be undertaken in bunded areas or over drip trays. • The Facility will be shut in if maximum capacity of oil and water storage is reached. • Implementation of the *Waste Management Procedure* (HSE-PRO-005). • Dangerous and hazardous goods will be stored within bunded areas. • Dangerous goods labelled in accordance with regulations and MSDS. • Refuelling of vehicles in accordance with the *Refuelling Procedure* (HSE-PRO-011). • Well maintained machinery, vehicles and equipment. • Inspections of the Activity area and equipment (including daily and weekly inspections). • Containment, clean-up and remediation if required of a spill in accordance with the *Canning Basin Spill Response Plan* (HSE-ER-015). • 500 mm freeboard will be maintained in turkeys nest. • Guided Wave Radar installed on storage tanks to meter water levels. • Following high rainfall events, bunds will be inspected for the presence of contaminated water and then (if appropriate) discharged. Any will be managed to prevent erosion. • Periodic well integrity testing and inspection and appropriate maintenance/rectification procedures (Leak Off Testing, Formation Integrity Testing etc.). • Bureau of Meteorology forecasts and warnings monitored.	Given the mitigation and management measures that will be implemented, contamination of surface water is unlikely.	• Person In Charge (PIC) to ensure no personnel or vehicle access outside of the Activity area. • PIC to ensure wastes are appropriately stored prior to disposal. • PIC to complete weekly operational checklist. • PIC to ensure all physical containment measures are well maintained. • PIC to ensure well maintained machinery, vehicles and equipment. • Supervision of relevant operations by personnel with well control certification. • Quarterly groundwater sampling. • Internal environmental audit. • Flowlines inspected daily when operational for leaks.
Geology, Landforms and Soil	The area around the existing Activity area is comprised of a series of sand sheets intersected by alluvial flood plains that are either no longer active or not frequently inundated.	• Soil erosion, sedimentation or compaction. • Contamination of soil.		Given the mitigation and management measures that will be implemented, soil contamination and erosion is unlikely.	
Groundwater	The major aquifer used in the vicinity of the Activity area is the Wallal Sandstone which is located between 130 m and 200 m below ground level. The bore at the Ungani Facility extracts groundwater from this aquifer at 140 m BGL. The nearest water bore operated by a third party is approximately 11 km west.	• Contamination of groundwater.		Given the mitigation and management measures that will be implemented, groundwater contamination is considered unlikely.	
Vegetation and Flora	Surrounding the Activity area, the vegetation has been described as pindan on sand plains. Pindan is “grassland wooded by a sparse upper layer of trees and a dense, thicket-forming middle layer of unarmed, phyllodal *Acacia*”. Two priority three flora species have been recorded in the vicinity of the Activity area, *Goodenia byrnesii* and *G. crenata*.	• Loss of a local population of a conservation significant flora species. • Loss of native flora. • Invasive weed species competing with native flora. • Loss of conservation significant fauna habitat	• No clearing of vegetation is required. • Vehicle and personnel access will be limited to the Activity area. • Earthmoving machinery and equipment will be inspected and cleaned. • Externally sourced gravel will be weed free. • Vehicles and machinery will be regularly maintained and undergo a pre-start check. • Inspections of the Activity area and equipment (including daily and weekly inspections). • Fire detection equipment and lightning detection system installed. • Firebreak will be inspected and maintained. • Smoking restricted to designated smoking areas. • Firefighting equipment located at camp site and operational personnel trained in its use. • The Company will notify DMIRS of any decommissioning planned and develop a decommissioning and rehabilitation plan.	Given that no clearing is required and through the implementation of management measures, it is unlikely that the Activity will have a significant impact on flora and vegetation.	• PIC to ensure well maintained firebreaks and firefighting equipment, regular servicing of machinery and equipment, and limiting smoking to designated areas. • PIC to ensure no access outside of the Activity area. • PIC to ensure all earthmoving machinery/ equipment is checked prior to entering the Activity area. • PIC to ensure gravel is weed free. • Weekly inspection of the Activity area.
Environmentally Sensitive Areas (ESAs)	The nearest ESA is Taylors Lagoon, approximately 30 km to the northwest of the Ungani Facility. Ungani Far West 1 is located within the Edgar Range Red Book area.	• Loss of environmental values associated with ESA.		Given the distance to the closest ESA and scope of the planned Activities, it is unlikely ESAs will be impacted.	
Fauna	The only of fauna of conservation significance sighted during surveys in the vicinity of the Activity area were the Australian Bustard (*Ardeotis australis*) and Grey Falcon (*Falco hypoleucos*).	• Loss of a local population of a conservation significant fauna species. • Death or injury of fauna.	• Vehicles comply with the *Travel Management Procedure* (HSE-PRO-002). • Lighting kept to a minimum required for safe operations with lighting faces inwards. • Well maintained and muffled equipment and machinery. • Egress path in the turkeys nest visually inspected and repaired as required.	Given the mitigation and management measures that will be implemented, it is unlikely that the Activity will have a significant impact on fauna species.	• PIC to ensure lighting is minimum required for safe operation. • Weekly inspection of fauna egress paths and fencing. • Weekly inspections for impacts outside of the Activity area.
Social	Land use surrounding the Activity area is dominated by open range pasture grazing of beef stock. The townships of Derby 90 km to the northeast and Broome 100 km to the west are the largest population centres in the vicinity of the Activity. The nearest Homestead is Yakka Munga approximately 30 km east of the Activity area.	• Disturbance of livestock. • Disturbance of local landholders. • Impact on local air quality.	• On-going consultation with stakeholders. • Vehicles will comply with the Travel Management Procedure (HSE-PRO-002). • Bore water sourced from existing water bores or turkeys nest for dust suppression. • Experience and modelling have determined that any reduction in air quality will be restricted to the immediate vicinity (approx. 2 m) of the gas vents. • The Company will review gas management methods (e.g. venting vs. flaring) as part of any upgrade to the Facility capacity. • Night time operations limited to inspection and tanker loading (i.e. majority of operations are during daylight hours). • Any demobilisation will be undertaken in accordance with the *Demobilisation Procedure* (HSE-PRO-021).	Through the implementation of management measures, it is unlikely that the Activity will have an impact on local amenity including land owners.	• PIC to ensure no disturbance outside of Activity area. • Weekly inspection for impacts outside of the Activity area.
Cultural	The Activity will be confined to the existing heritage cleared Ungani Facility. The nearest known culturally important area is Blue Hills, approximately 2 km to the east of the Activity area, and the nearest listed Department of Aboriginal Affairs listed site is approximately 30 km northwest of the Activity area.	• Damage to cultural heritage site/s or object/s.	• Vehicle and personnel activity will be limited to the Activity area. • No clearing as part of the Activity. • Land access agreements have been signed with relevant Traditional Owner groups for the Ungani Production Facility. • Given the large number of exploration activities undertaken in the Ungani area, numerous heritage surveys have been completed.	Given that no clearing is required and through the management measures, it is unlikely that the Activity will impact cultural heritage site/s or object/s.	• PIC to ensure no disturbance outside of Activity area. • Weekly inspection of the Activity area for impacts outside of the Activity area.

4. COMMUNICATION

The Company has engaged in communication and consultation with relevant stakeholders as summarised in the Environment Plan. As the Activity area is located within a sparsely populated region with limited settlement, transport or communications infrastructure, relevant stakeholders are limited to government departments, traditional owners and pastoralists. The stakeholders consulted with to date include:

- Department of Environment Regulation;
- Yakka Munga Station;
- Roebuck Plains Station;
- Yawuru Traditional Owners;
- Nyikina Mangala Traditional Owners;
- Karajarri Yanja Traditional Owners;
- Department of Fire and Emergency Services;
- Department of Water; and
- Broome and Derby Police.

These stakeholders have been consulted via phone, written notices and face-to-face meetings.

No issues have been raised in relation to the Activity through the consultation process. The Company will continue to communicate with stakeholders and consult during all phases of the Activity, on a formal and informal basis, and by email, letter, face-to-face and telephone.

Appendix A
Chemical Disclosure and Relevant MSDS

A. SYSTEM DETAILS:

OPERATOR:	**Buru Energy**
PROJECT / WELL:	**Ungani**
SYSTEM:	**Produced Water Disposal**
TOTAL VOLUME OF SYSTEM:	**98,000 L/day**

B. PRODUCT LIST:

Product Name	Supplier	Purpose	Toxicity, Ecotoxicity & Biodegradability data**	% Product in system fluid	MSDS
CRW24006	BHI	Corrosion Inhibitor	This product contains organic components. **AQUATIC TOXICOLOGY** • **COMPONENT 1 (30 – 60% concentration)** Natural product – exempt under the Chemical Disclosure Guidelines • **COMPONENT 2 (10 – 30% concentration)** o *Skeletonema costatum* (Marine algae) EC50 72 hrs: 0.08 mg/L o *Acartia tonsa* (Marine invertebrate) LC50 48 hrs: 5.00 mg/L o Sheepshead Minnow (Marine fish) LC50 96 hrs: 2.30 mg/L • **COMPONENT 3 (10 – 30% concentration)** o *Desmodesmus subspicatus* (Freshwater algae) EC50 96 hrs > 100 mg/L o *Daphnia magna* (Freshwater invertebrate) EC50, 48 hrs: > 100 mg/L o Bluegill Sunfish (Freshwater fish) LC50 96 hrs: 2.30 mg/L • **COMPONENT 4 (5 – 10% concentration)** o *Chlorococcales* (Freshwater algae) EC50: 105 mg/L o *Daphnia magna* (Freshwater invertebrate) EC50: 65.0 mg/L o *Oncorhynchus mykiss* (Freshwater fish) LC50 96 hrs: > 300.82 mg/L • **COMPONENT 5 (1 – 5% concentration)** No data available for this component. Data presented for comparable product. o *Skeletonema costatum* (Marine algae) EC50 72 hrs: 0.20 mg/L o *Acartia tonsa* (Marine invertebrate) LC50 48 hrs: 0.30 mg/L o Sheepshead Minnow (Marine fish) LC50 96 hrs: 1.30 mg/L • **COMPONENT 6 (1 – 5% concentration)** o *Pseudokirchnerella subcapitata* (Freshwater algae) EC50 72hrs: 27.0 mg/L o *Daphnia magna* (Freshwater invertebrate) EC50 48 hrs: 38.0 mg/L o *Oncorhynchus mykiss* (Freshwater fish) LC50 96 hrs: > 100 mg/L • **COMPONENT 7 (0.1 – 1% concentration)** o *Scenedesmus quadricauda* (Freshwater algae) Toxicity threshold, 7	~ 0.0031	Yes

Product Name	Supplier	Purpose	Toxicity, Ecotoxicity & Biodegradability data**	% Product in system fluid	MSDS
			days: 1,800 mg/L o *Daphnia magna* (Freshwater invertebrate) LC50 24 hrs: >10,000 mg/L o *Pimephales promelas* (Freshwater fish) LC50 96 hrs: 9,640 mg/L • **COMPONENT 8 (0.1 – 1% concentration)** o *Pseudokirchnerella subcapitata* (freshwater algae) EC50 72 hrs: 1,164 mg/L o *Daphnia magna* (freshwater invertebrate) EC50 48 hrs: 64.6 mg/L o *Poecilia reticulata* (freshwater fish) LC50 96 hrs: 430 mg/L **CHEMICAL FATE** **Octanol/Water Partition Coefficient** • **COMPONENT 1 (30 – 60% concentration)** Natural product – exempt under the Chemical Disclosure Guidelines • **COMPONENT 2 (10 – 30% concentration)** Log Pow 1.87 – 4.47 • **COMPONENT 3 (10 – 30% concentration)** Log Pow 1.0 • **COMPONENT 4 (5 – 10% concentration)** Log Pow -0.17 • **COMPONENT 5 (1 – 5% concentration)** No data available for this component. Data presented for comparable product. Log Pow -0.85 – 1.35 • **COMPONENT 6 (1 – 5% concentration)** Log Pow -2.99 • **COMPONENT 7 (0.1 – 1% concentration)** Log Pow < 1.0 • **COMPONENT 8 (0.1 – 1% concentration)** Log Pow -1.58 at pH > 12, -5.58 at pH 7 **ENVIRONMENTAL FATE** **Ready Biodegradability** • **COMPONENT 1 (30 – 60% concentration)** Natural product – exempt under the Chemical Disclosure Guidelines • **COMPONENT 2 (10 – 30% concentration)** Biodegradability, 28 days: 45% • **COMPONENT 3 (10 – 30% concentration)** Biodegradability, 28 days: 85% • **COMPONENT 4 (5 – 10% concentration)**		

Product Name	Supplier	Purpose	Toxicity, Ecotoxicity & Biodegradability data**	% Product in system fluid	MSDS
			Biodegradability, 28 days: 72% • **COMPONENT 5 (1 – 5% concentration)** No data available for this component. Data presented for comparable product. Biodegradability, 14 days: 100% • **COMPONENT 6 (1 – 5% concentration)** Biodegradability, 28 days: 67% • **COMPONENT 7 (0.1 – 1% concentration)** Biodegradability, 28 days: 76% • **COMPONENT 8 (0.1 – 1% concentration)** Biodegradability, 21 days: 87% **ACUTE MAMMALIAN TOXICITY** • **COMPONENT 1 (30 – 60% concentration)** Natural product – exempt under the Chemical Disclosure Guidelines • **COMPONENT 2 (10 – 30% concentration)** Rat LD50 (oral): > 4,000 mg/kg • **COMPONENT 3 (10 – 30% concentration)** Mouse (fasted animals) LD50 (oral): 2,410 mg/kg • **COMPONENT 4 (5 – 10% concentration)** Rat LD50 (oral): 3,310 mg/kg • **COMPONENT 5 (1 – 5% concentration)** Mouse LD50 (oral): 150 – 340 mg/kg • **COMPONENT 6 (1 – 5% concentration)** Rat LD50 (oral): 73 mg/kg • **COMPONENT 7 (0.1 – 1% concentration)** Rat LD50 (oral): 5,840 mg/kg • **COMPONENT 8 (0.1 – 1% concentration)** Rat LD50 (oral): 1,553 mg/kg **CHRONIC TOXICITY** No known carcinogenic, chronic, mutagenic or reproductive effects.		
TRETOLITE™ DMO24900	BHI	Demulsifier	This product contains organic components. **AQUATIC TOXICOLOGY** • **COMPONENT 1 (30 – 60% concentration)** No data available for this component. Data presented for comparable product. ○ *Skeletonema costatum* (Marine algae) EC50 72 hrs: 67.1 mg/L ○ *Acartia tonsa* (Marine invertebrate) LC50 48 hrs: 161 mg/L	~ 0.0071	Yes

Product Name	Supplier	Purpose	Toxicity, Ecotoxicity & Biodegradability data**	% Product in system fluid	MSDS
			○ *Pimephales promelas* (Freshwater fish) LC50 96 hrs: < 10 mg/L • **COMPONENT 2 (10 – 30% concentration)** ○ *Skeletonema costatum* (Marine algae) EC50 72 hrs: 6.30 mg/L ○ *Acartia tonsa* (Marine invertebrate) LC50 48 hrs: 23.5 mg/L ○ *Cyprinodon variegatus* (Marine fish) LC50 96 hrs: 1,024 mg/L • **COMPONENT 3 (10 – 30% concentration)** ○ *Skeletonema costatum* (Marine algae) EC50 72 hrs: 19.8 mg/L ○ *Acartia tonsa* (Marine invertebrate) LC50 48 hrs: 35.4 mg/L ○ *Cyprinodon variegatus* (Marine fish) LC50 96 hrs: 324 mg/L • **COMPONENT 4 (5 – 10% concentration)** ○ *Desmodesmus subspicatus* (Freshwater algae) EC50 72 hrs: 16.6 mg/L ○ *Daphnia magna* (Freshwater invertebrate) LC50 48 hrs: 39.0 mg/L ○ *Pimephales promelas* (Freshwater fish) LC50 96 hrs: 28.2 mg/L • **COMPONENT 5 (1 – 5% concentration)** ○ *Skeletonema costatum* (Marine algae) EC50 72 hrs: 3.40 mg/L ○ *Acartia tonsa* (Marine invertebrate) LC50 48 hrs: 9.00 mg/L ○ *Cyprinodon variegatus* (Marine fish) LC50 96 hrs: > 1,000 mg/L • **COMPONENT 6 (1 – 5% concentration)** ○ *Chlorococcales* (Freshwater algae) EC50 24 hrs: 100 mg/L ○ *Daphnia magna* (Freshwater invertebrate) LC50 24 hrs: 150 mg/L ○ *Pimephales promelas* (Freshwater fish) LC50 96 hrs: 42.0 mg/L • **COMPONENT 7 (1 – 5% concentration)** ○ *Skeletonema costatum* (Marine algae) EC50 72 hrs: 0.85 mg/L ○ *Chironomus riparius* (Freshwater invertebrate) LC50 96 hrs: 6.50 mg/L ○ *Lepomis macrochirus* (Freshwater fish) LC50 96 hrs: 1.67 mg/L **CHEMICAL FATE** **Octanol/Water Partition Coefficient** • **COMPONENT 1 (30 – 60% concentration)** No data available for this component. Data presented for comparable product. Log Pow 2.66 – 4.90 • **COMPONENT 2 (10 – 30% concentration)** Not applicable to surfactants • **COMPONENT 3 (10 – 30% concentration)** Not applicable to surfactants • **COMPONENT 4 (5 – 10% concentration)** Log Pow 2.8		

Product Name	Supplier	Purpose	Toxicity, Ecotoxicity & Biodegradability data**	% Product in system fluid	MSDS
			• **COMPONENT 5 (1 – 5% concentration)** Not applicable to surfactants • **COMPONENT 6 (1 – 5% concentration)** Log Pow 3.2 – 3.5 • **COMPONENT 7 (1 – 5% concentration)** Log Pow 2.28 **ENVIRONMENTAL FATE** **Ready Biodegradability** • **COMPONENT 1 (30 – 60% concentration)** No data available for this component. Data presented for comparable product. Biodegradability 28 days: 62% • **COMPONENT 2 (10 – 30% concentration)** Biodegradability 28 days: 17% • **COMPONENT 3 (10 – 30% concentration)** Biodegradability 28 days: 27% • **COMPONENT 4 (5 – 10% concentration)** Biodegradability 28 days: 99% • **COMPONENT 5 (1 – 5% concentration)** Biodegradability 28 days: 5% • **COMPONENT 6 (1 – 5% concentration)** Biodegradability 28 days: 73% • **COMPONENT 7 (1 – 5% concentration)** Biodegradability 28 days: 100% **ACUTE MAMMALIAN TOXICITY** • **COMPONENT 1 (30 – 60% concentration)** No data available for this component. Data presented for comparable product. Rat LD50 (oral): 7,050 mg/kg • **COMPONENT 2 (10 – 30% concentration)** No data available for this component. Data presented for comparable product. Rat LD50 (inhalation): 147 mg/m^3 • **COMPONENT 3 (10 – 30% concentration)** No scientific data or research is available for this component. • **COMPONENT 4 (5 – 10% concentration)** Rat LD50 (oral): 2,047 mg/kg • **COMPONENT 5 (1 – 5% concentration)** No data available for this component. Data presented for comparable		

Product Name	Supplier	Purpose	Toxicity, Ecotoxicity & Biodegradability data**	% Product in system fluid	MSDS
			product. Mouse LD50 (oral): 1,600 mg/kg • **COMPONENT 6 (1 – 5% concentration)** Rat LD50 (oral): 4,300 mg/kg • **COMPONENT 7 (1 – 5% concentration)** Rat LD50 (oral): 1,470 mg/kg **CHRONIC TOXICITY** • This product carries the following classification: o R40 – Limited evidence of a carcinogenic effect • No other known carcinogenic, chronic, mutagenic or reproductive effects.		
TRETOLITE™ DMO86318	BHI	Demulsifier	This product is organic. **AQUATIC TOXICOLOGY** • **COMPONENT 1 (60 – 100% concentration)** **Static Acute Toxicity** o *Skeletonema costatum* (marine algae) EC50 72 hrs: 71 mg/L o *Acartia tonsa* (marine invertebrate) LC50 48 hrs: 20 mg/L o *Scolphthalmus maximus* (marine fish) LC50 96 hrs: > 21.4 mg/L • **COMPONENT 2 (10 – 30% concentration)** **Static Acute Toxicity** o *Skeletonema costatum* (marine algae) EC50 72 hrs: 67.1 mg/L o *Acartia tonsa* (marine invertebrate) LC50 48 hrs: 161 mg/L o *Scolphthalmus maximus* (marine fish) LC50 96 hrs: > 67.1 mg/L • **COMPONENT 3 (10 – 30% concentration)** **Static Acute Toxicity** o *Skeletonema costatum* (marine algae) EC50 72 hrs: 32.1 mg/L o *Acartia tonsa* (marine invertebrate) LC50 48 hrs: 159 mg/L o *Cyprinodon variegatus* (marine fish) LC50 96 hrs: 20 mg/L • **COMPONENT 4 (5 – 10% concentration)** No data available for this component. Data are presented for a similar compound. **Static Acute Toxicity** o *Skeletonema costatum* (marine algae) EC50 72 hrs: 31 mg/L o *Acartia tonsa* (marine invertebrate) LC50 48 hrs: 44 mg/L o *Cyprinodon variegatus* (marine fish) LC50 96 hrs: 15 mg/L • **COMPONENT 5 (0.1 – 1.0% concentration)** **Static Acute Toxicity** o *Skeletonema costatum* (marine algae) EC50 72 hrs: 0.85 mg/L	~ 0.0071 (Contingency)	Yes

Product Name	Supplier	Purpose	Toxicity, Ecotoxicity & Biodegradability data**	% Product in system fluid	MSDS
			○ *Acartia tonsa* (marine invertebrate) LC50 48 hrs: 2.70 mg/L ○ *Lepomis macrochirus* (freshwater fish) LC50 96 hrs: 1.67 mg/L **CHEMICAL FATE** **Octanol/Water Partition Coefficient** • **COMPONENT 1 (60 – 100% concentration)** Log (Pow) 3.56 – 5.23 (weighted average: 4.73) • **COMPONENT 2 (10 – 30% concentration)** Log (Pow) 3.43 - 4.78 (weighted average: 4.31) • **COMPONENT 3 (10 – 30% concentration)** No scientific data or research is available for this component. • **COMPONENT 4 (5 – 10% concentration)** No scientific data or research is available for this component. • **COMPONENT 5 (0.1 – 1.0% concentration)** Not applicable to surfactants **ENVIRONMENTAL FATE** **Ready Biodegradability** • **COMPONENT 1 (60 – 100% concentration)** Biodegradability 28 days: 29% • **COMPONENT 2 (10 – 30% concentration)** Biodegradability 28 days: 62% • **COMPONENT 3 (10 – 30% concentration)** Biodegradability 28 days: 31% • **COMPONENT 4 (5 – 10% concentration)** Biodegradability 28 days: 14% • **COMPONENT 5 (0.1 – 1.0% concentration)** Biodegradability 28 days: 85% **ACUTE MAMMALIAN TOXICITY** • **COMPONENT 1 (60 – 10% concentration)** No scientific data or research is available for this component. • **COMPONENT 2 (10 – 30% concentration)** No scientific data or research is available for this component. • **COMPONENT 3 (10 – 30% concentration)** No scientific data or research is available for this component. • **COMPONENT 4 (5 – 10% concentration)** No scientific data or research is available for this component. • **COMPONENT 5 (0.1 – 1.0% concentration)**		

Product Name	Supplier	Purpose	Toxicity, Ecotoxicity & Biodegradability data**	% Product in system fluid	MSDS
			Rat LD50 (oral): 1,470 mg/kg **CHRONIC TOXICITY** A component of this product has shown "Limited evidence of carcinogenic effect". No other known carcinogenic, chronic, mutagenic or other reproductive effects.		
OSW24514	BHI	Oxygen Scavenger	**AQUATIC TOXICOLOGY** **Static Acute Freshwater Toxicity** o *Ceriodaphnia dubia* EC50 24 hrs: 234 mg/L; EC50 48 hrs: 170 mg/L; LC50 24 hrs: 259 mg/L; LC50 48 hrs: 165 mg/L; NOEC 48 hrs: < 117 mg/L o *Daphnia magna* EC50 24 hrs: 210 mg/L; EC50 48 hrs: 125 mg/L; LC50 24 hrs: 288 mg/L; LC50 48 hrs: 151 mg/L; NOEC 48 hrs: < 117 mg/L **Static Acute Renewal Freshwater Toxicity** o Fathead Minnow (*Pimephales promelas)* EC50 48 hrs: 298 mg/L; EC50 96 hrs: 259 mg/L; LC50 48 hrs: 639 mg/L; LC50 96 hrs: 639 mg/L; NOEC 96 hrs: 117 mg/L **Static Acute Saltwater Toxicity** o Threespine stickleback (*Gasterosteus aculeatus)* LC50 96 hr: 206 mg/L Comment: Algal toxicity data are not available for this product. **ENVIRONMENTAL FATE** Not applicable to inorganic compounds. **ACUTE MAMMALIAN TOXICITY** Not applicable to inorganic compounds. **ACUTE MAMMALIAN TOXICITY** Rat LD50 (oral) 14 days: ~ 2,610 mg/kg No data available for this active. Data are presented for a similar chemistry. **CHRONIC TOXICITY** No known carcinogenic, chronic, mutagenic or reproductive effects.	~ 0.0031	
TRETOLITE™ RBW24136	BHI	Water Clarifier	This product contains organic components. **AQUATIC TOXICOLOGY** **Static Acute Saltwater Toxicity** o *Acartia tonsa* LC10 48 hrs: 2.16 mg/L; LC50, 48 hrs: 3.40 mg/L; LC90, 48 hrs: 11.2 mg/L; NOEC, 48 hrs: 0.80 mg/L o *Skeletonema costatum* EC50 Biomass 48 hrs: 2.00 mg/L; EC50, Growth Rate, 48 hrs: 2.20 mg/L; EC50, Biomass, 72 hrs: 2.00 mg/L; EC50, Growth Rate, 72 hrs: 3.20 mg/L o *Corophium volutator* LC50 10 days: 1,150 mg/L o *Photobacterium phosphoreum* EC50 15 minutes: 1,176 mg/L; EC50 5	~ 0.001	Yes

Product Name	Supplier	Purpose	Toxicity, Ecotoxicity & Biodegradability data**	% Product in system fluid	MSDS
			minutes: 916 mg/L ○ *Scophthalmus maximus* LC50 24 hrs: 776 mg/L; LC50, 48 hrs: 776 mg/L; LC50, 72 hrs: 716 mg/L; LC50 96 hrs: 716 mg/L; NOEC 96 hrs: 632 mg/L **CHEMICAL FATE** Log Pow Calculated: 2.6 Log Pow Range: 0 to 3.9 Log Pow < 0 95.0% 3 < Log Pow < 4 5.00% **ENVIRONMENTAL FATE** ○ Test Concentration: 5 mg/L; Reference: Sodium Acetate; Reference Concentration: 2 mg/L; Biodegradability 5 days: 0% (reference = 64%); Biodegradability 13 days: 14% (reference = 71%); Biodegradability 20 days: 21% (reference = 83%); Biodegradability 28 days: 14% (reference = 83%) ○ Test Concentration: 9.8 mg/L; Reference: Sodium Benzoate; Reference Concentration: 2.5 mg/L; Biodegradability 5 days: 31% (reference=68%, inhibitory action=44%); Biodegradability 15 days: 20% (reference=81%, inhibitory action=44%); Biodegradability 28 days: 29% (reference=82%, inhibitory action=51%) **ACUTE MAMMALIAN TOXICITY** Rat LD50 (oral): 273 mg/kg Acute oral toxicity of a component of this product. Acute mammalian toxicity studies on this product have not been conducted. **CHRONIC TOXICITY** No known carcinogenic, chronic, mutagenic or reproductive effects.		
SCW24457	BHI	Scale Inhibitor	This product contains organic components. **AQUATIC TOXICOLOGY** **Static Acute Renewal Saltwater Toxicity** ○ *Scophthalmus maximus* LC50 96 hrs: 8,667 mg/L; NOEC 96 hrs: 3,889 mg/L **Static Acute Saltwater Toxicity** ○ *Acartia tonsa* LC50 48 hrs: 2,800 mg/L; NOEC 48 hrs: 1,556 mg/L ○ *Skeletonema costatum* EC50 Biomass 72 hrs: 400 mg/L; NOEC Biomass 72 hrs: 111 mg/L **CHEMICAL FATE** Log Pow: -2.84; Comment: Determined by calculation using the method of Hansch & Leo, based on the fragment method of Rekker.	~ 0.002	Yes

Product Name	Supplier	Purpose	Toxicity, Ecotoxicity & Biodegradability data**	% Product in system fluid	MSDS
			ENVIRONMENTAL FATE Test Concentration: 5 mg/L; Reference: Sodium Acetate; Reference Concentration: 2 mg/L; Biodegradability 5 days: 0% (reference = 64%); Biodegradability 13 days: 8% (reference = 71%); Biodegradability 20 days: 32% (reference = 83%); Biodegradability 28 days: 24% (reference = 83%) **ACUTE MAMMALIAN TOXICITY** Rat LD50 (oral) 14 days: > 5,838 mg/kg; Comment: LD50 > 5,838 as active salt **CHRONIC TOXICITY** No known carcinogenic, chronic, mutagenic or reproductive effects.		
XC24380	BHI	Biocide	This product contains organic components. **AQUATIC TOXICOLOGY** **Static Acute Freshwater Toxicity** o *Daphnia magna* LC50 48 hrs: 19.4 mg/L o Bluegill Sunfish (*Lepomis macrochirus)* LC50 96 hrs: 93.0 mg/L o Rainbow trout (*Oncorhynchus mykiss)* LC50 96 hrs: 119 mg/L **Static Acute Renewal Freshwater Toxicity** o Fathead Minnow (*Pimephales promelas)* LC50 24 hrs: > 26.6 mg/L; LC50 48 hrs: 15.1 mg/L; LC50 72 hrs: 4.90 mg/L; LC50 96 hrs: 2.90 mg/L; NOEC 96 hrs: 0.80 mg/L **Static Acute Renewal Saltwater Toxicity** o Mysid shrimp (*Americamysis bahia)* LC50 48 hrs: 2.82 mg/L; LC50 96 hrs: 1.06 mg/L; LOEC (7day survival): 1.25 mg/L; LOEC (7day growth): > 0.63 mg/L; LOEC 48 hrs: 2.50 mg/L; LOEC 96 hrs: 1.25 mg/L; NOEC (7day survival): 0.63 mg/L; NOEC (7day growth): 0.63 mg/L; NOEC 48 hrs: 1.25 mg/L; NOEC 96 hrs: 0.63 mg/L o *Scophthalmus maximus* LC50 96 hrs: 72.5 mg/L; NOEC 96 hrs: 41.0 mg/L **Static Acute Saltwater Toxicity** o Mysid shrimp (*Americamysis bahia)* LC50 48 hrs: 16.0 mg/L; NOAEC, 48 hrs: 5.80 mg/L o Inland Silverside (*Menidia beryllina)* LC50 48 hrs: 97.5 mg/L; NOAEC 48 hrs: 29.2 mg/L o *Skeletonema costatum* EC50 72 hrs: 0.16 mg/L o *Acartia tonsa* LC50 48 hrs: 0.60 mg/L; LC100 48 hrs: 0.85 mg/L; NOEC 48 hrs: 0.20 mg/L o *Corophium volutator* LC50 10 days: 2,174 mg/L **CHEMICAL FATE** Log Pow < 0 100%	~ 0.0031	Yes

Product Name	Supplier	Purpose	Toxicity, Ecotoxicity & Biodegradability data**	% Product in system fluid	MSDS
			ENVIRONMENTAL FATE Biodegradability 7 days: 60% Comment: Study evaluated the aerobic metabolism of ^{14}C labelled THPS. Test results are expressed as DT (Disappearance Time) i.e. 60% of THPS had disappeared in 7 days. **ACUTE MAMMALIAN TOXICITY** o Rat LC50 (inhalation) 14 days: 0.59 mg/L o Rat LD50 (oral) 14 days: 248 mg/kg **CHRONIC TOXICITY** No known carcinogenic, chronic or mutagenic phrases. This product does carry an R61 "May cause harm to the unborn child" warning.		
TRETOLITE™ RBW24122	BHI	Water Clarifier	This product contains organic components. **AQUATIC TOXICOLOGY** • **COMPONENT 1 (60 – 100% concentration)** Natural product – exempted under the Chemical Disclosure Guidelines. • **COMPONENT 2 (30 – 60% concentration)** **Static Acute Saltwater Toxicity** o *Acartia tonsa* (Crustacean) LC50 48 hrs: 3,420 mg/L o *Skeletonema costatum* (Algae) EC50 96 hour: 1,813 mg/L o *Cyprinodon variegatus* (Fish) LC50 96 hour: 13,230 mg/L **CHEMICAL FATE** **Octanol/Water Partition Coefficient** • **COMPONENT 1 (60 – 100% concentration)** Natural product – exempted under the Chemical Disclosure Guidelines. • **COMPONENT 2 (30 – 60% concentration)** Log Pow < 0 **ENVIRONMENTAL FATE** **Ready Biodegradability** • **COMPONENT 1 (60 – 100% concentration)** Natural product – exempted under the Chemical Disclosure Guidelines. • **COMPONENT 2 (30 – 60% concentration)** Biodegradability 28 days: 3% **ACUTE MAMMALIAN TOXICITY** • **COMPONENT 1 (60 – 100% concentration)** Natural product – exempted under the Chemical Disclosure Guidelines. • **COMPONENT 2 (30 – 60% concentration)**	~ 0.0051 (Contingency)	Yes

Product Name	Supplier	Purpose	Toxicity, Ecotoxicity & Biodegradability data**	% Product in system fluid	MSDS
			Rat LD50 (oral): > 5,000 mg/kg **CHRONIC TOXICITY** No known carcinogenic, chronic and mutagenic effects for any components.		
TRETOLITE™ RBW24365	BHI	Water Clarifier	This product contains organic components **AQUATIC TOXICOLOGY** • **COMPONENT 1 (60 - 100% concentration)** Natural product - exempted under the Chemical Disclosure Guidelines. • **COMPONENT 2 (10 - 30% concentration)** **Static Acute Freshwater Toxicity** o *Daphnia magna* (Crustacean) LC50 48 hrs: 38 mg/L o *Pseudokirchnerella subcapitata* (Algae) EC50 96 hrs: 14 mg/L o *Danio rerio* (Fish) LC50 96 hrs: > 1,000 mg/L • **COMPONENT 3 (5 – 10% concentration)** **Static Acute Toxicity** o *Daphnia magna* (Crustacean) LC50 48 hrs: 0.14 mg/L o *Skeletonema costatum* (Marine Algae) EC50 96 hrs: 0.6 mg/L o *Pimephales promelas* (Fish) LC50 96 hrs: 0.4 mg/L • **COMPONENT 4 (<0.1% concentration)** **Static Acute Freshwater Toxicity** o *Daphnia magna* (Crustacean) LC50 48 hrs: 41,100 mg/L o *Pseudokirchnerella subcapitata*(Algae) EC50 96 hr >6,500-13,000 mg/L o *Pimephales promelas* (Fish) LC50 96 hrs: 72,860 mg/L • **COMPONENT 5 (<0.1% concentration)** **Static Acute Toxicity** o *Daphnia magna* (Crustacean) LC50 48 hrs: 0.33 mg/L o *Skeletonema costatum* (Marine Algae) EC50 96 hrs: 0.15 mg/L o *Pimephales promelas* (Fish) LC50 96 hrs: 0.1 mg/L • **COMPONENT 6 (<0.1% concentration)** No data available for this component. Data presented for a similar ingredient. **Static Acute Freshwater Toxicity** o *Daphnia magna* (Crustacean) EC50 48 hrs: 230 mg/L o *Pseudokirchnerella subcapitata* (Algae) EC50% 72 hrs: > 100 mg/L o *Oncorhynchus mykiss* (Fish) LC50 96 hrs: 770 mg/L • **COMPONENT 7 (<0.1% concentration)**	~ 0.00306 (Contingency)	Yes

Product Name	Supplier	Purpose	Toxicity, Ecotoxicity & Biodegradability data**	% Product in system fluid	MSDS
			Static Acute Freshwater Toxicity ○ *Daphnia magna* (Crustacean) LC50 48 hrs: 0.08 mg/L ○ *Skeletonema costatum (*Marine Algae) EC50 72 hrs: 0.08 mg/L ○ *Pimephales promelas* (Fish) LC50 96 hrs: 0.35 mg/L • **COMPONENT 8 (<0.1% concentration)** **Static Acute Saltwater Toxicity** ○ *Acartia tonsa* (Crustacean) LC50 48 hrs: 27 mg/L ○ *Skeletonema costatum* (Algae) EC50 72 hrs: 62 mg/L ○ *Cyprinodon variegatus* (Fish) LC50 96 hrs: 45 mg/L • **COMPONENT 9 (<0.1% concentration)** **Static Acute Freshwater Toxicity** ○ *Daphnia magna* (Crustacean) LC50 48 hrs: >1,000 mg/L ○ *Scenedesmus quadricauda* (Algae) EC50 7days: 1,800 mg/L ○ *Pimephales promelas* (Fish) LC50 96 hrs: 9,640 mg/L • **COMPONENT 10 (<0.1% concentration)** **Static Acute Freshwater Toxicity** ○ *Ceriodaphnia dubia* (Crustacean) LC50 48 hrs: 5,012 mg/L ○ *Chlorella vulgaris* (Algae) EC50 4 days: 675 mg/L ○ *Pimephales promelas* (Fish) LC50 96 hrs: 14,200 mg/L **CHEMICAL FATE** • **COMPONENT 1 (60 - 100% concentration)** Natural product - exempted under the Chemical Disclosure Guidelines. • **COMPONENT 2 (10 – 30% concentration)** Not Applicable to inorganic compounds. • **COMPONENT 3 (5 – 10% concentration)** Not Applicable to surfactants. Molecular weight > 700 • **COMPONENT 4 (< 0.1% concentration)** Log Pow < 0 • **COMPONENT 5 (< 0.1% concentration)** Not Applicable to surfactants. Molecular weight > 700 • **COMPONENT 6 (< 0.1% concentration)** Not Applicable to inorganic compounds. • **COMPONENT 7 (< 0.1% concentration)** Not Applicable to surfactants. • **COMPONENT 8 (< 0.1% concentration)** Not Applicable. Molecular weight > 700		

Product Name	Supplier	Purpose	Toxicity, Ecotoxicity & Biodegradability data**	% Product in system fluid	MSDS
			• **COMPONENT 9 (< 0.1% concentration)** Log Pow <1.0 • **COMPONENT 10 (< 0.1% concentration)** Log Pow -0.35 **ENVIRONMENTAL FATE** • **COMPONENT 1 (60 - 100% concentration)** Natural product - exempted under the Chemical Disclosure Guidelines • **COMPONENT 2 (10 - 30% concentration)** Not Applicable to inorganic compounds. • **COMPONENT 3 (5 - 10% concentration)** Biodegradability 28 days: 13% • **COMPONENT 4 (< 0.1% concentration)** Biodegradability 10 days: 90 - 100% • **COMPONENT 5 (< 0.1% concentration)** Biodegradability 28 days: 39% • **COMPONENT 6 (< 0.1% concentration)** Not Applicable to inorganic compounds. • **COMPONENT 7 (< 0.1% concentration)** Biodegradability 28 days: 96% • **COMPONENT 8 (< 0.1% concentration)** Biodegradability 28 days: 74% • **COMPONENT 9 (< 0.1% concentration)** Biodegradability 28 days: 76% • **COMPONENT 10 (< 0.1% concentration)** Biodegradability 20 days: 84% **ACUTE MAMMALIAN TOXICITY*** • **COMPONENT 1 (60 - 100% concentration)** Natural product - exempted under the Chemical Disclosure Guidelines • **COMPONENT 2 (10 – 30% concentration)** Rat LD50 (oral): >2,000 mg/kg bw • **COMPONENT 3 (5 – 10% concentration)** Rat LD50 (oral): >2,000 mg/kg bw • **COMPONENT 4 (< 0.1% concentration)** Rat LD 50% (oral): 5,500 mg/kg bw • **COMPONENT 5 (< 0.1% concentration)** Rat LD50 (oral): 1,970 mg/kg bw		

Product Name	Supplier	Purpose	Toxicity, Ecotoxicity & Biodegradability data**	% Product in system fluid	MSDS
			• **COMPONENT 6 (< 0.1% concentration)** Rat LD50 (oral): > 5,000 mg/kg bw • **COMPONENT 7 (< 0.1% concentration)** Rat LD50 (oral): 426 mg/kg bw • **COMPONENT 8 (< 0.1% concentration)** Rat LD50 (oral): >6,400 mg/kg bw • **COMPONENT 9 (< 0.1% concentration)** Rat LD50 (oral): 5,840 mg/kg bw • **COMPONENT 10 (< 0.1% concentration)** Rat LD50 (oral): 10,470 mg/kg bw *** All mammalian toxicity values are based upon 100% active material** **CHRONIC TOXICITY** No known carcinogenic, chronic, mutagenic or reproductive effects.		
XC24102	BHI	Biocide	This product contains organic components. **AQUATIC TOXICOLOGY** • **COMPONENT 1 (60 - 100% concentration)** Natural product - exempted under the Chemical Disclosure Guidelines. • **COMPONENT 2 (10 – 30% concentration)** **Static Acute Freshwater Toxicity** o *Daphnia magna* (Crustacean) LC50 48 hrs: 29.7 mg/L o *Scenedesmus subspicatus* (Algae) EC50 96 hrs: 1.2 mg/L o *Lepomis macrochirus* (Fish) LC50 96 hrs: 13 mg/L • **COMPONENT 3 (0.1– 1% concentration)** **Static Acute Freshwater Toxicity** o *Daphnia magna* (Crustacean) LC50 96 hrs: 18,260 mg/L o *Selenastrum capricornutum* (Algae) EC50 96 hrs: 22,000 mg/L o *Lepomis macrochirus* (Fish) LC50 96 hrs: 15,400 mg/L **CHEMICAL FATE** **Octanol/Water Partition Coefficient** • **COMPONENT 1 (60 - 100% concentration)** Natural product - exempted under the Chemical Disclosure Guidelines. • **COMPONENT 2 (10 – 30% concentration)** Log Pow < 0 • **COMPONENT 3 (0.1– 1 % concentration)** Log Pow -0.77 **ENVIRONMENTAL FATE**	~ 0.00204 (Contingency)	Yes

Product Name	Supplier	Purpose	Toxicity, Ecotoxicity & Biodegradability data**	% Product in system fluid	MSDS
			Ready Biodegradability • **COMPONENT 1 (60 - 100% concentration)** Natural product - exempted under the Chemical Disclosure Guidelines. • **COMPONENT 2 (10- 30% concentration)** Biodegradability 28 days: 73% • **COMPONENT 3 (0.1– 1% concentration)** Biodegradability 20 days: 95% **ACUTE MAMMALIAN TOXICITY *** • **COMPONENT 1 (60 - 100% concentration)** Natural product - exempted under the Chemical Disclosure Guidelines. • **COMPONENT 2 (10 - 30% concentration)** Mouse Oral LD50 14 days: 158 mg/kg bw. • **COMPONENT 3 (0.1 - 1% concentration)** Rat Oral LD50 14 days: > 2,528mg/kg bw. **CHRONIC TOXICITY** No known carcinogenic, chronic, mutagenic or reproductive effects.		
Water	-	Water	-	~ 99.98	N/A
TOTAL				**100%**	
Hydrochloric acid	Coogee Chemicals	pH Control	*Constituent 1 as an ingredient 32%* **Acute Toxicity:** EC50 (72 h) 0.73 mg/L (non-neutralized) *Chlorella vulgaris* (freshwater algae). LC50 (48 h) 0.44 mg/L (non-neutralized) *Daphnia magna* (freshwater invertebrate). LC50 (96 h) 20.5 mg/L (non-neutralized) *Lepomis macrochirus* (freshwater fish) LD50 (oral) 238 – 277 mg/kg (Non-neutralized) Rat **Chronic Toxicity:** No known carcinogenic, chronic, mutagenic or reproductive effects for this product. **Biodegradation/bioaccumulation:** Not applicable to inorganic compounds *Constituent 2 as an ingredient 68%* Water	Contingency, <0.1%	Yes
Acetic acid	Halliburton	Chelating agent	**Acute Toxicity:** EC50 (72h) 55.22 mg/L *Anabaena* (algae) LC50 (96h) 75 mg/L *Lepomis macrochirus* (fish) LC50 (96h) 251 mg/L *Gambusia affinis* (fish)	Contingency, ~0.003%	Yes

Product Name	Supplier	Purpose	Toxicity, Ecotoxicity & Biodegradability data**	% Product in system fluid	MSDS
			EC50 (48h) 65 mg/L *Daphnia magna* (freshwater invertebrate) **Chronic Toxicity:** No known carcinogenic, chronic, mutagenic or reproductive effects for this product. **Biodegradation/bioaccumulation:** Readily biodegradable (99% @ 7d). Log Kow -0.17 The product is not known to be Bioaccumulative.		
Citric acid	Halliburton	Chelating agent	**Acute Toxicity:** Acute Fish Toxicity 96h LC50: >440-760 mg/L (Leuciscus idus) Acute Crustacean Toxicity 72h EC50: 120 mg/L (Daphnia magna) Acute Toxicity 7d EC3: 640 mg/L (Scenedesmus quadrucauda) Source: IUCLID 2000 **Chronic Toxicity:** No known carcinogenic, chronic, mutagenic or reproductive effects for this product. **Biodegradation/bioaccumulation:** Citric Acid is extract of Citrus and rapidly biodegradable. BOD30/COD = 90%. Rapidly biodegradable in water and soil. The product is not known to be Bioaccumulative.	Contingency, ~0.0006%	Yes
Soda Ash	Halliburton	pH control	**Toxicology Data:** LD50 Oral: 4090 mg/kg (Rat); 2800 mg/kg (Rat)LD50 Dermal: 2210 mg/kg (Mouse); >2000 mg/kg (Rabbit)LC50 Inhalation: 2.3 mg/L (Rat) 2h Substance Ecotoxicity Data Toxicity to Algae - EC50 242 mg/L (Nitzschia) Toxicity to Fish – TLM24 385 mg/L (Lepomis macrochirus); LC50 310-1220 mg/L (Pimephales promelas); LC50 (96h) 300 mg/L (Lepomis macrochirus) Toxicity to Microorganisms - No information available Toxicity to Invertibrates – EC50 265 mg/L (Daphnia magna); EC50 (48h) 200 – 227 mg/L (Ceriodaphnia sp.) **Biodegradation/bioaccumulation:** Soda Ash is an inorganic (Sodium Carbonate), naturally occurring salt and partially biodegradable. Soda Ash is fully water soluble and highly mobile in soil. Biodegradability does not pertain to inorganic substances. Does not bioaccumulate. Dissociates into ions.	Contingency, <0.1%	Yes
Rodine 85	Henkel	Acid inhibitor	**Toxicology Data:** **Component 1 (<10%)** LC50 (96h) 4.6 mg/L *Leuciscus idus* (fish)	Contingency, <0.0005%	Yes

Product Name	Supplier	Purpose	Toxicity, Ecotoxicity & Biodegradability data**	% Product in system fluid	MSDS
			EC50 (24h) 11 mg/L *Daphnia magna* (freshwater invertebrate) EC50 (8d) >18 mg/L *Scenedesmus quadricauda* (algae) **Component 2 (<5%)** EC50 (48h) 56 mg/L *Daphnia magna* (freshwater invertebrate) **Component 3 (<30%)** No data available. Data presented for a similar compound LC50 (96h) *P. promelas* 24 mg/L (fish) LC50 (96h) *B. rerio* 41 mg/L (fish) EC50 (48h) *Daphnia magna* ~2 mg/L (freshwater invertebrate) **Component 4 (60%)** Water **Biodegradation/bioaccumulation:** Degradability: Component 1 37%, Component 2 3%, Component 3 97% Bioaccumulative potential: Comp. 1 Log Kow -0.35, Comp. 2 LogKow 0.57, Comp. 3 LogPow <1		
Sodium Bicarbonate	Halliburton	pH control	**Toxicology Data** LD50 Oral: No data available LD50 Dermal: No data available LC50 Inhalation: No data available **Substance Ecotoxicity Data** Toxicity to Algae - EC50 (5d): 650 mg/l (Nitzschia linearis) Toxicity to Fish – LC50 (96h): 7550 mg/l (Gambusia affinis) Toxicity to Invertebrates – EC50 (48h): 2350 mg/l (Daphnia magna) Source: IUCLID 2000 **Biodegradation/bioaccumulation:** Sodium Bicarbonate is an inorganic, naturally occurring salt and partially biodegradable. Sodium Bicarbonate is fully water soluble and highly mobile in soil. The product is not known to be Bioaccumulative.	Contingency, <0.1%	Yes
EC2211A	Nalco Champion	Emulsion Breaker	This product contains organic components. **AQUATIC TOXICOLOGY** • **COMPONENT 1 (10 – 30% concentration)** o *Skeletonema costatum* (Marine algae) EC50 72 hrs: 0.5 mg/L o *Acartia tonsa* (Marine invertebrate) LC50 48 hrs: 119 mg/L o *Scophthalmus maximus* (Marine fish) LC50 96 hrs: 148 mg/L • **COMPONENT 2 (30 – 60% concentration)** o *Skeletonema costatum* (Marine algae) EC50 72 hrs: 165 mg/L o *Acartia tonsa* (Marine invertebrate) LC50 48 hrs: 360 mg/L o *Scophthalmus maximus* (Marine fish) LC50 96 hrs: 811 mg/L • **COMPONENT 3 (5 – 10% concentration)**	0.0042%	Yes

Product Name	Supplier	Purpose	Toxicity, Ecotoxicity & Biodegradability data**	% Product in system fluid	MSDS
			○ *Skeletonema costatum* (Marine algae) EC50 72 hrs: 610 mg/L ○ *Acartia tonsa* (Marine invertebrate) LC50 48 hrs: 534 mg/L ○ *Cyprinodon variegatus (sheepshead minnow)* (Marine fish) LC50 96 hrs: 550 mg/L **CHEMICAL FATE** **Octanol/Water Partition Coefficient** • **COMPONENT 1 (10 – 30% concentration)** Log Pow 4.7 • **COMPONENT 2 (30 – 60% concentration)** Log Pow 4.66 • **COMPONENT 3 (5 – 10% concentration)** Log Pow 4.3 **ENVIRONMENTAL FATE** • **COMPONENT 1 (10 – 30% concentration)** Biodegradability, 28 days: 21% • **COMPONENT 2 (30 – 60% concentration)** Biodegradability, 28 days: 70% • **COMPONENT 3 (5 – 10% concentration)** Biodegradability, 28 days: 11% **ACUTE MAMMALIAN TOXICITY** • **COMPONENT 1 (10 – 30% concentration)** Rat LD50 (oral): 490 mg/kg • **COMPONENT 2 (30 – 60% concentration)** Rat LD50 (oral): >5,000 mg/kg • **COMPONENT 3 (5 – 10% concentration)** Rat LD50 (oral): 5,000 mg/kg **CHRONIC TOXICITY** • **COMPONENT 1 (10 – 30% concentration)** Suspected carcinogen. • **COMPONENT 2 (30 – 60% concentration)** Suspected of causing cancer. • **COMPONENT 3 (5 – 10% concentration)**		

Product Name	Supplier	Purpose	Toxicity, Ecotoxicity & Biodegradability data**	% Product in system fluid	MSDS
			Not a listed carcinogen.		
HDW24106	Baker Hughes	Tracer	**AQUATIC TOXICOLOGY** • **COMPONENT 1 (60 – 10% concentration)** Natural product - exempted under the Chemical Disclosure Guidelines • **COMPONENT 2 (10– 30% concentration)** Static Acute Toxicity o Specie: Pseudokirchneriella subcapitata. (freshwater algae) EC50, 48 hours: 500 – 800 mg/L o Specie: Ceriodaphnia sp (freshwater invertebrate) LC50, 48 hours: 200 – 227 mg/L o Specie: Lepomis macrochirus (freshwater fish) LC50, 96 hours: 200 - 300 mg/L • **COMPONENT 3 (10 – 30% concentration)** Static Acute Toxicity o Specie: Skeletonema costatum. (marine algae) EC50, 48 hours: 77 mg/L o Specie: Daphnia pulex (freshwater invertebrate) LC50, 48 hours: 230 – 330 mg/L o Specie: Oncorhynchus mykiss (freshwater fish) LC50, 96 hours: > 1000 mg/L **CHEMICAL FATE** Octanol/Water Partition Coefficient • **COMPONENT 1 (60 – 100% concentration)** Natural product - exempted under the Chemical Disclosure Guidelines • **COMPONENT 2 (10 – 30% concentration)** Not Applicable to inorganic compounds. • **COMPONENT 3 (10 – 30% concentration)** Method: OECD 117 (HPLC). log(Pow): < 0 to 1.76 **ENVIRONMENTAL FATE** Ready Biodegradability • **COMPONENT 1 (60 – 100% concentration)** Natural product - exempted under the Chemical Disclosure Guidelines. • **COMPONENT 2 (10 – 30% concentration)** Not Applicable to inorganic compounds • **COMPONENT 3 (10 – 30% concentration)** Method: OECD 301D. Biodegradability 28 days: < 10% **ACUTE MAMMALIAN TOXICITY** • **COMPONENT 1 (60 – 100% concentration)**	0.01%	Yes

Product Name	Supplier	Purpose	Toxicity, Ecotoxicity & Biodegradability data**	% Product in system fluid	MSDS
			Natural product - exempted under the Chemical Disclosure Guidelines • **COMPONENT 2 (10 – 30% concentration)** Specie: rat. LD50 (oral): 4090 mg/kg • **COMPONENT 3 (10 – 30% concentration)** Specie: rat. LD50 (oral): > 4000mg/kg **CHRONIC TOXICITY** No known carcinogenic (H350, H351), chronic (H341, H370, H371, H373), mutagenic (H340) or reproductive (H360, H361, H362) effects for this product.		
XC24040	Baker Hughes	Biocide	**AQUATIC TOXICOLOGY** • **COMPONENT 1 (60 – 100% concentration)** Static Acute Toxicity Natural product - exempted under the Chemical Disclosure Guidelines • **COMPONENT 2 (30 – 60% concentration)** Static Acute Toxicity o Specie: Skeletonema costatum (marine algae) EC50, 72 hours: 0.16 mg/l o Specie: Acartia tonsa (marine invertebrate) LC50, 48 hours: 0.6 mg/L o Specie: Pimephales promelas (freshwater fish) LC50, 96 hours: 2.9 mg/L **CHEMICAL FATE** Octanol/Water Partition Coefficient • **COMPONENT 1 (60 – 100% concentration)** Natural product - exempted under the Chemical Disclosure Guidelines • **COMPONENT 2 (30 – 60% concentration)** Method: OECD 117 (HPLC). Log (Pow): <0 **ENVIRONMENTAL FATE** Ready Biodegradability • **COMPONENT 1 (60 – 100% concentration)** Natural product - exempted under the Chemical Disclosure Guidelines • **COMPONENT 2 (30 – 60% concentration)** Method: OPPTS.4300: Biodegradability 7 days: 60% **ACUTE MAMMALIAN TOXICITY** • **COMPONENT 1 (60 – 100% concentration)** Natural product - exempted under the Chemical Disclosure Guidelines	0.002%	Yes

Product Name	Supplier	Purpose	Toxicity, Ecotoxicity & Biodegradability data**	% Product in system fluid	MSDS
			• **COMPONENT 2 (30 – 60% concentration)** Specie: Rat. LD50 (oral): 575 mg/kg **CHRONIC TOXICITY** A component of this product does carry the following Hazard statement: H361 - Suspected of damaging the unborn child No known carcinogenic (H350, H351), chronic (H341, H370, H371, H373), mutagenic (H340) or reproductive (H360, H362) effects for this product.		
Gyptron IT-109	Nalco Champion	Scale Inhibitor	This product contains organic components. **AQUATIC TOXICOLOGY** • **COMPONENT 1 (60 – 100% concentration)** Natural product – exempt under the Chemical Disclosure Guidelines • **COMPONENT 2 (1 – 5% concentration)** o *Daphnia magna* (Marine invertebrate) EC50 48 hrs: 24* mg/L o *Onchorhynchus mykiss* (Marine fish) LC50 96 hrs: 0.53* mg/L • **COMPONENT 3 (5 – 10% concentration)** o *Skeletonema costatum* (Marine algae) EC50 72 hrs: 163 mg/L o *Acartia tonsa* (Marine invertebrate) LC50 48 hrs: 258 mg/L o *Scophthalmus maximus* (Marine fish) LC50 96 hrs: 550 mg/L • **COMPONENT 4 (5 – 10% concentration)** o *Skeletonema costatum* (Marine algae) EC50 72 hrs: 163* mg/L o *Acartia tonsa* (Marine invertebrate) LC50 48 hrs: 258* mg/L o *Scophthalmus maximus* (Marine fish) LC50 96 hrs: 550* mg/L **Estimated data based on structural analogue* • **COMPONENT 5 (1 – 5% concentration)** o *Skeletonema costatum* (Marine algae) EC50 72 hrs: 163* mg/L o *Acartia tonsa* (Marine invertebrate) LC50 48 hrs: 258* mg/L o *Scophthalmus maximus* (Marine fish) LC50 96 hrs: 550* mg/L **Estimated data based on structural analogue* **CHEMICAL FATE** • **COMPONENT 1 (60 – 100% concentration)** Natural product – exempt under the Chemical Disclosure Guidelines • **COMPONENT 2 (1 – 5% concentration)** Log Pow <3*	0.0010%	Yes

Product Name	Supplier	Purpose	Toxicity, Ecotoxicity & Biodegradability data**	% Product in system fluid	MSDS
			*Literature data from HSNO CCID • **COMPONENT 3 (5 – 10% concentration)** Log Pow <0 • **COMPONENT 4 (5 – 10% concentration)** Log Pow <0* *Estimated data based on structural analogue • **COMPONENT 5 (1 – 5% concentration)** Log Pow <0* *Estimated data based on structural analogue **ENVIRONMENTAL FATE** • **COMPONENT 1 (60 – 100% concentration)** Natural product – exempt under the Chemical Disclosure Guidelines • **COMPONENT 2 (1 – 5% concentration)** Biodegrability, 28 days: >60%* *Literature data from HSNO CCID • **COMPONENT 3 (5 – 10% concentration)** Biodegradability, 28 days: 12% • **COMPONENT 4 (5 – 10% concentration)** Biodegradability, 28 days: 12*% *Estimated data based on structural analogue • **COMPONENT 5 (1 – 5% concentration)** Biodegradability, 28 days: 12*% *Estimated data based on structural analogue **ACUTE MAMMALIAN TOXICITY** • **COMPONENT 1 (60 – 100% concentration)** Natural product – exempt under the Chemical Disclosure Guidelines • **COMPONENT 2 (1 – 5% concentration)** Rat LD50 (oral): 350 mg/kg Rat LC50 (inhalation) 4h: 1.4 mg/L • **COMPONENT 3 (5 – 10% concentration)** Rat LD50 (oral): 4164 mg/kg • **COMPONENT 4 (5 – 10% concentration)**		

Product Name	Supplier	Purpose	Toxicity, Ecotoxicity & Biodegradability data**	% Product in system fluid	MSDS
			No scientific data or research is available for this component. • **COMPONENT 5 (1 – 5% concentration)** No scientific data or research is available for this component. **CHRONIC TOXICITY** No known carcinogenic, chronic, mutagenic or reproductive effects.		
EC1477A	Nalco Champion	Corrosion Inhibitor	This product contains organic components. **AQUATIC TOXICOLOGY** • **COMPONENT 1 (60 – 100% concentration)** Natural product – exempt under the Chemical Disclosure Guidelines • **COMPONENT 2 (0 – 1% concentration)** o *Daphnia magna* (Marine invertebrate) EC50 48 hrs: 65 mg/L o *Pimephales promelas (fathead minnow)* (Marine fish) LC50 96 hrs: 88 mg/L • **COMPONENT 3 (1 – 10% concentration)** o *Skeletonema costatum* (Marine algae) EC50 96 hrs: 93 mg/L o *Acartia tonsa* (Marine invertebrate) LC50 48 hrs: 70 mg/L o *Scophthalmus maximus* (Marine fish) LC50 96 hrs: 252 mg/L • **COMPONENT 4 (1 – 10% concentration)** o *Skeletonema costatum* (Marine algae) EC50 96 hrs: 0.5 mg/L o *Acartia tonsa* (Marine invertebrate) LC50 48 hrs: 1.2 mg/L o *Scophthalmus maximus* (Marine fish) LC50 96 hrs: 3.4 mg/L • **COMPONENT 5 (1 – 10% concentration)** o *Skeletonema costatum* (Marine algae) EC50 96 hrs: 0.26* mg/L o *Acartia tonsa* (Marine invertebrate) LC50 48 hrs: 0.4* mg/L o *Cyprinodon variegatus (sheepshead minnow)* (Marine fish) LC50 96 hrs: 1.7* mg/L **Estimated data based on structural analogue* **CHEMICAL FATE** • **COMPONENT 1 (60 – 100% concentration)** Natural product – exempt under the Chemical Disclosure Guidelines • **COMPONENT 2 (0 – 1% concentration)** Log Pow <3 • **COMPONENT 3 (1 – 10% concentration)**	0.0030%	Yes

Product Name	Supplier	Purpose	Toxicity, Ecotoxicity & Biodegradability data**	% Product in system fluid	MSDS
			Log Pow 0.059 • **COMPONENT 4 (1 – 10% concentration)** Log Pow 2.3 • **COMPONENT 5 (1 – 10% concentration)** Log Pow 2.28 (theoretical) **ENVIRONMENTAL FATE** • **COMPONENT 1 (60 – 100% concentration)** Natural product – exempt under the Chemical Disclosure Guidelines • **COMPONENT 2 (0 – 1% concentration)** Biodegradability 28 days: >60% • **COMPONENT 3 (1 – 10% concentration)** Biodegradability, 28 days: 64% • **COMPONENT 4 (1 – 10% concentration)** Biodegradability, 28 days: 8% • **COMPONENT 5 (1 – 10% concentration)** Biodegradability, 28 days: 34% **ACUTE MAMMALIAN TOXICITY** • **COMPONENT 1 (60 – 100% concentration)** Natural product – exempt under the Chemical Disclosure Guidelines • **COMPONENT 2 (0 – 1% concentration)** Rat LD50 (oral): 3310 mg/kg Rabbit LD50 (dermal): 1060 mg/kg • **COMPONENT 3 (1 – 10% concentration)** No scientific data or research is available for this component. • **COMPONENT 4 (1 – 10% concentration)** Rat LD50 (oral): >2500 mg/kg • **COMPONENT 5 (1 – 10% concentration)** Rat LD50 (oral): 344 mg/kg Rabbit LD50 (dermal): 3340 mg/kg Rat LC50 (inhalation) 4h: >0.054 mg/L **CHRONIC TOXICITY**		

Product Name	Supplier	Purpose	Toxicity, Ecotoxicity & Biodegradability data**	% Product in system fluid	MSDS
			• **COMPONENT 1 (60 – 100% concentration)** Natural product – exempt under the Chemical Disclosure Guidelines • **COMPONENT 2 (0 – 1% concentration)** No known carcinogenic, chronic, mutagenic or reproductive effects. • **COMPONENT 3 (1 – 10% concentration)** No known carcinogenic, chronic, mutagenic or reproductive effects. • **COMPONENT 4 (1 – 10% concentration)** Skin sensitizer. • **COMPONENT 5 (1 – 10% concentration)** No known carcinogenic, chronic, mutagenic or reproductive effects.		
EC6733A	Nalco Champion	Biocide	This product contains organic components. **AQUATIC TOXICOLOGY** • **COMPONENT 1 (10 – 30% concentration)** o *Skeletonema costatum* (Marine algae) EC50 72 hrs: 0.26 mg/L o *Acartia tonsa* (Marine invertebrate) LC50 48 hrs: 0.4 mg/L o *Cyprinodon variegatus (sheepshead minnow)* (Marine fish) LC50 96 hrs: 1.7 mg/L • **COMPONENT 2 (60 – 100% concentration)** o *Skeletonema costatum* (Marine algae) EC50 72 hrs: 0.16 mg/L o *Acartia tonsa* (Marine invertebrate) LC50 48 hrs: 0.6 mg/L o *Scophthalmus maximus* (Marine fish) LC50 96 hrs: 72 mg/L • **COMPONENT 3 (0 – 1% concentration)** o *Skeletonema costatum* (Marine algae) EC50 72 hrs: 4.1 mg/L o *Acartia tonsa* (Marine invertebrate) LC50 48 hrs: 38 mg/L o *Scophthalmus maximus* (Marine fish) LC50 96 hrs: 611 mg/L **CHEMICAL FATE** • **COMPONENT 1 (10 – 30% concentration)** Log Pow 2.28 (theoretical) • **COMPONENT 2 (60 – 100% concentration)** Log Pow 0 • **COMPONENT 3 (0 – 1% concentration)** Log Pow <0 **ENVIRONMENTAL FATE**	0.0011%	Yes

Product Name	Supplier	Purpose	Toxicity, Ecotoxicity & Biodegradability data**	% Product in system fluid	MSDS
			• **COMPONENT 1 (10 – 30% concentration)** Biodegradability, 28 days: 34% • **COMPONENT 2 (60 – 100% concentration)** Biodegradability, 28 days: 61% • **COMPONENT 3 (0 – 1% concentration)** Biodegradability, 28 days: 83% **ACUTE MAMMALIAN TOXICITY** • **COMPONENT 1 (10 – 30% concentration)** Rat LD50 (oral): 344 mg/kg Rabbit LD50 (dermal): 3340 mg/kg Rat LC50 (inhalation) 4h: >0.054 mg/L • **COMPONENT 2 (60 – 100% concentration)** Rat LD50 (oral): 575 mg/kg (75% active ingredient in water) Rat LD50 (dermal): >2000 mg/kg (75% active ingredient in water) Rat LC50 (inhalation) 4h: 0.591 mg/l (75% active ingredient in water) • **COMPONENT 3 (0 – 1% concentration)** Guinea pig LD50 (oral): 260* mg/kg Rabbit LD50 (dermal): 270* mg/kg Mouse LC50 (inhalation) 4 hr: 497* mg/kg **Literature data from HSNO CCID* **CHRONIC TOXICITY** • **COMPONENT 1 (10 – 30% concentration)** No known carcinogenic, chronic, mutagenic or reproductive effects. • **COMPONENT 2 (60 – 100% concentration)** Skin sensitizer. Reproductive toxicant to rabbits/rats at 50mg/kg/day. • **COMPONENT 3 (0 – 1% concentration)** Skin sensitizer. May cause cancer, IARC Group 1 Carcinogen.		
NALMET® 1689	Nalco Champion	Heavy Metal Remover	This product contains organic components. **AQUATIC TOXICOLOGY** • **COMPONENT 1 (60 – 100% concentration)** Natural product – exempt under the Chemical Disclosure Guidelines • **COMPONENT 2 (1 – 5% concentration)** o *Daphnia magna* (Marine invertebrate) LC50 48 hrs: 1.661 mg/L	0.0025%	Yes

Product Name	Supplier	Purpose	Toxicity, Ecotoxicity & Biodegradability data**	% Product in system fluid	MSDS
			○ *Pimephales promelas (fathead minnow)* (Marine fish) NOEC 7 d: 4.0 mg/L • **COMPONENT 3 (1 – 5% concentration)** ○ *Chlorella pyrenoidosa* (Marine algae) EC50 96 hrs: 7.5* mg/L ○ *Metapenaeus monoceros* (Marine invertebrate) LC50 48 hrs: 0.0087* mg/L ○ *Luxilus cornutus* (Marine fish) LC50 96 hrs: 1.64* mg/L **Literature data from HSNO CCID* • **COMPONENT 4 (30 – 60% concentration)** ○ *Skeletonema costatum* (Marine algae) EC50 72 hrs: 0.3 mg/L ○ *Acartia tonsa* (Marine invertebrate) LC50 48 hrs: 2.4 mg/L ○ *Cyprinodon variegatus (sheepshead minnow)* (Marine fish) LC50 96 hrs: >1000 mg/L **CHEMICAL FATE** • **COMPONENT 1 (60 – 100% concentration)** Natural product – exempt under the Chemical Disclosure Guidelines • **COMPONENT 2 (1 – 5% concentration)** Not applicable to inorganic compounds. • **COMPONENT 3 (1 – 5% concentration)** Not applicable to inorganic compounds. • **COMPONENT 4 (30 – 60% concentration)** Log Pow 2.4 **ENVIRONMENTAL FATE** • **COMPONENT 1 (60 – 100% concentration)** Natural product – exempt under the Chemical Disclosure Guidelines • **COMPONENT 2 (1 – 5% concentration)** Not applicable to inorganic compounds. • **COMPONENT 3 (1 – 5% concentration)** Not applicable to inorganic compounds. • **COMPONENT 4 (30 – 60% concentration)** Biodegradability, 28 days: 13% **ACUTE MAMMALIAN TOXICITY** • **COMPONENT 1 (60 – 100% concentration)**		

Product Name	Supplier	Purpose	Toxicity, Ecotoxicity & Biodegradability data**	% Product in system fluid	MSDS
			Natural product – exempt under the Chemical Disclosure Guidelines • **COMPONENT 2 (1 – 5% concentration)** Rat LD50 (oral): 3000 mg/kg Rabbit LD50 (dermal): >10000 mg/kg • **COMPONENT 3 (1 – 5% concentration)** Rat LD50 (oral): 205* mg/kg Rabbit LD50 (dermal): <340* mg/kg **Literature data from HSNO CCID* • **COMPONENT 4 (30 – 60% concentration)** No scientific data or research is available for this component. **CHRONIC TOXICITY** No known carcinogenic, chronic, mutagenic or reproductive effects.		
EC2034A	Nalco Champion	Emulsion Breaker	This product contains organic components. **AQUATIC TOXICOLOGY** • **COMPONENT 1 (30 – 60% concentration)** o *Scophthalmus maximus* (Marine fish) LC50 96 hrs: >1000* mg/L **Estimated data based on structural analogue* • **COMPONENT 2 (10 – 30% concentration)** o *Daphnia magna* (Marine invertebrate) EC50 48 hrs: 24500 mg/L o *Oncorhynchus mykiss (rainbow trout)* (Marine fish) LC50 96 hrs: 19000 mg/L • **COMPONENT 3 (10 – 30% concentration)** o *Skeletonema costatum* (Marine algae) EC50 72 hrs: 114 mg/L o *Acartia tonsa* (Marine invertebrate) LC50 48 hrs: 29.2 mg/L o *Cyprinodon variegatus (sheepshead minnow)* (Marine fish) LC50 96 hrs: >1000 mg/L • **COMPONENT 4 (5 – 10% concentration)** o *Skeletonema costatum* (Marine algae) EC50 72 hrs: 165 mg/L o *Acartia tonsa* (Marine invertebrate) LC50 48 hrs: 360 mg/L o *Scophthalmus maximus* (Marine fish) LC50 96 hrs: 811 mg/L • **COMPONENT 5 (5 – 10% concentration)** o *Skeletonema costatum* (Marine algae) EC50 72 hrs: 0.5 mg/L o *Acartia tonsa* (Marine invertebrate) LC50 48 hrs: 119 mg/L	0.0042%	Yes

Product Name	Supplier	Purpose	Toxicity, Ecotoxicity & Biodegradability data**	% Product in system fluid	MSDS
			○ *Scophthalmus maximus* (Marine fish) LC50 96 hrs: 148 mg/L **CHEMICAL FATE** • **COMPONENT 1 (30 – 60% concentration)** Log Pow 4.4 • **COMPONENT 2 (10 – 30% concentration)** Log Pow <1 • **COMPONENT 3 (10 – 30% concentration)** Log Pow 3.5 – 5.1 • **COMPONENT 4 (5 – 10% concentration)** Log Pow 4.66 • **COMPONENT 5 (5 – 10% concentration)** Log Pow 4.7 **ENVIRONMENTAL FATE** • **COMPONENT 1 (30 – 60% concentration)** Biodegradability, 28 days: 15% • **COMPONENT 2 (10 – 30% concentration)** Biodegradability, 3 days: 83-91% • **COMPONENT 3 (10 – 30% concentration)** Biodegradability, 28 days: 29% • **COMPONENT 4 (5 – 10% concentration)** Biodegradability, 28 days: 70% • **COMPONENT 5 (5 – 10% concentration)** Biodegradability, 28 days: 21% **ACUTE MAMMALIAN TOXICITY** • **COMPONENT 1 (30 – 60% concentration)** No scientific data or research is available for this component. • **COMPONENT 2 (10 – 30% concentration)** Rat LD50 (oral): 5628 mg/kg Rabbit LD50 (dermal): 15800* mg/kg Rat LC50 (inhalation) 4 hr: 64000 ppm • **COMPONENT 3 (10 – 30% concentration)** Rat LD50 (oral): >5000 mg/kg		

Product Name	Supplier	Purpose	Toxicity, Ecotoxicity & Biodegradability data**	% Product in system fluid	MSDS
			Rabbit LD50 (dermal): >2000 mg/kg Rat LC50 (inhalation) 4h: >5 mg/L • **COMPONENT 4 (5 – 10% concentration)** Rat LD50 (oral): >5000 mg/kg • **COMPONENT 5 (5 – 10% concentration)** No scientific data or research is available for this component. **CHRONIC TOXICITY** • **COMPONENT 1 (30 – 60% concentration)** No known carcinogenic, chronic, mutagenic or reproductive effects. • **COMPONENT 2 (10 – 30% concentration)** No known carcinogenic, chronic, mutagenic or reproductive effects. • **COMPONENT 3 (10 – 30% concentration)** May cause genetic defects. May cause cancer. • **COMPONENT 4 (5 – 10% concentration)** Suspected of causing cancer. • **COMPONENT 5 (5 – 10% concentration)** No known carcinogenic, chronic, mutagenic or reproductive effects.		
EC3019A	Nalco Champion	Antifoulant	This product contains organic components. **AQUATIC TOXICOLOGY** • **COMPONENT 1 (30 –60% concentration)** o *Skeletonema costatum* (Marine algae) EC50 72 hrs: 165 mg/L o *Acartia tonsa* (Marine invertebrate) LC50 48 hrs: 360 mg/L o *Scophthalmus maximus* (Marine fish) LC50 96 hrs: 811 mg/L • **COMPONENT 2 (10 –30% concentration)** o *Skeletonema costatum* (Marine algae) EC50 72 hrs: >1000 mg/L o *Acartia tonsa* (Marine invertebrate) LC50 48 hrs: 2205 mg/L o *Cyprinodon variegatus (sheepshead minnow)* LC50 96 hrs: >1000 mg/ • **COMPONENT 3 (10 –30% concentration)** o *Skeletonema costatum* (Marine algae) EC50 72 hrs: >1000 mg/L o *Acartia tonsa* (Marine invertebrate) LC50 48 hrs: 5157 mg/L o *Cyprinodon variegatus (sheepshead minnow)* LC50 96 hrs: >1000 mg/	0.0050%	Yes

Product Name	Supplier	Purpose	Toxicity, Ecotoxicity & Biodegradability data**	% Product in system fluid	MSDS
			CHEMICAL FATE • **COMPONENT 1 (30 –60% concentration)** Log Pow 4.66 • **COMPONENT 2 (10 –30% concentration)** Log Pow 2.81 • **COMPONENT 3 (10 –30% concentration)** Log Pow 2.81 **ENVIRONMENTAL FATE** • **COMPONENT 1 (30 –60% concentration)** Biodegradability, 28 days: 70% • **COMPONENT 2 (10 –30% concentration)** Biodegradability, 28 days: 83% • **COMPONENT 3 (10 –30% concentration)** Biodegradability, 28 days: 47% **ACUTE MAMMALIAN TOXICITY** • **COMPONENT 1 (30 –60% concentration)** Rat LD50 (oral): >5000 mg/kg • **COMPONENT 2 (10 –30% concentration)** Rat LD50 (oral): >5000 mg/kg Rabbit LD50 (dermal): >5000 mg/kg • **COMPONENT 3 (10 –30% concentration)** No scientific data or research is available for this component. **CHRONIC TOXICITY** • **COMPONENT 1 (30 –60% concentration)** Suspected of causing cancer. • **COMPONENT 2 (10 –30% concentration)** No known carcinogenic, chronic, mutagenic or reproductive effects. • **COMPONENT 3 (10 –30% concentration)** No known carcinogenic, chronic, mutagenic or reproductive effects.		

** With reference to biodegradation, where a Product is organic than Contractor must state as such in this column

C. CHEMICAL LIST

Chemical List (Chemicals within fluid system identified in the table above)

Chemicals Name	CAS Number	Mass Fraction (%)
WATER	7732-18-5	99.976 %
ALKYL (C3-5) BENZENES	64742-94-5	0.00673 %
TETRAKIS(HYDROXYMETHYL)PHOSPHONIUM SULPHATE	55566-30-8	0.00323 %
AMMONIUM BISULPHITE	10192-30-0	0.00219 %
FORMALDEHYDE, POLYMER WITH 4-(1,1-DIMETHYLETHYL)PHENOL, 4-NONYLPHENOL AND OXIRANE	68171-44-8	0.00206 %
2-PROPENOIC ACID, HOMOPOLYMER, SODIUM SALT	9003-04-7	0.00155 %
OXIRANE/METHYLOXIRANE COPOLYMER	9003-11-6	0.00143 %
FORMALDEHYDE, POLYMER WITH METHYLOXIRANE, 4-NONYLPHENOL AND OXIRANE	63428-92-2	0.00101 %
POLYALUMINIUM CHLORIDE	1327-41-9	0.00078 %
FATTY ACIDS, TALL OIL, REACTION PRODUCTS WITH DIETHYLENETRIAMINE	61790-69-0	0.00061 %
GLUTARALDEHYDE	111-30-8	0.00054 %
2-(2-BUTOXYETHOXY)ETHANOL	112-34-5	0.00039 %
ETHYL HEXANOL	104-76-7	0.00038 %
FORMALDEHYDE, POLYMER WITH 4-(1,1-DIMETHYLPROPYL)PHENOL AND OXIRANE	63428-93-3	0.00038 %
OXYALKYLATED AMINES	67939-72-4	0.00033 %
DITHIOCARBAMATE	204079-86-7	0.00022 %
CATIONIC RESIN	42751-79-1	0.00019 %
PHOSPHONIC ACID, SODIUM SALT	22042-96-2	0.00019 %
ACETIC ACID	64-19-7	0.00018 %
XYLENE	1330-20-7	0.00017 %
QUATERNARY AMMONIUM COMPOUND	68391-01-5	0.00012 %
BENZENESULFONIC ACID, 4-C10-13-SEC-ALKYL DERIVATIVES	85536-14-7	0.00010 %
THIOGLYCOLIC ACID	68-11-1	0.00008 %
MESITYLENE	108-67-8	0.00003 %
POTASSIUM HYDROXIDE	1310-58-3	0.00003 %
ISOPROPANOL	67-63-0	0.00003 %
BENZENESULFONIC ACID, MONO-C10-16-ALKYL DERIVATIVES, SODIUM SALTS	68081-81-2	< 0.00001 %
DIETHYLENETRIAMINE	111-40-0	< 0.00001 %
ETHANEDIOL	107-21-1	< 0.00001 %
AMINES, N-TALLOW ALKYLTRIMETHYLENEDI-, ETHOXYLATED	61790-85-0	< 0.00001 %
SODIUM THIOSULPHATE	10102-17-7	< 0.00001 %
ETHYLBENZENE	100-41-4	< 0.00001 %

Chemicals Name	CAS Number	Mass Fraction (%)
C12-16 ALKYLBENZYLDIMETHYLAMMONIUM CHLORIDE	68424-85-1	< 0.00001 %
SODIUM HYDROXIDE	1310-73-2	< 0.00001 %
ETHOXYLATED TALL OIL	61791-00-2	< 0.00001 %
ETHANOL	64-17-5	< 0.00001 %
TOTAL	**-**	**100%**
HYDROCHLORIC ACID	7647-01-0	Contingency, <0.1%
ACETIC ACID	64-19-7	Contingency, ~0.003%
CITRIC ACID	77-92-9	Contingency, ~0.0006%
SODIUM CARBONATE	497-19-8	Contingency, ~0.0016%
PROP-2-YN-1-OL	107-19-7	Contingency, <0.00005%
1,3-DIETHYL-2-THIOUREA	105-55-5	Contingency, <0.000025%
FORMALDEHYDE REACTION PRODUCTS WITH O-TOLUIDINE	68411-63-2	Contingency, <0.00015%
SODIUM BICARBONATE	144-55-8	Contingency, <0.1 %
ALKYL (C3-5) BENZENES	64742-94-5	Contingency, ~0.001 %
NAPHTHALENE	91-20-3	Contingency, ~0.00063 %
1,2,4-TRIMETHYLBENZENE	95-63-6	Contingency, ~0.00040 %
2,5-FURANDIONE, POLYMER WITH METHYLOXIRANE AND OXIRANE	34937-03-6	Contingency, ~0.00041 %
FLUORESCEIN SODIUM SALT	518-47-8	Contingency, ~0.00125 %
TETRAKIS(HYDROXYMETHYL)PHOSPHONIUM SULPHATE	55566-30-8	Contingency, ~0.001 %
WATER	7732-18-5	Contingency, ~0.00529 %
OXIRANE, METHYL-, POLYMER WITH 1,3-DIISOCYANATOMETHYLBENZENE AND OXIRANE	9052-50-0	Contingency, ~0.00160 %
FORMALDEHYDE, POLYMER WITH METHYLOXIRANE, 4-NONYLPHENOL AND OXIRANE	63428-92-2	Contingency, ~0.00158 %
POLYOLEFIN ESTER	103650-95-9	Contingency, ~0.00110 %
HYDROTREATED HEAVY NAPHTHA	64742-48-9	Contingency, ~0.00108 %
HYDROTREATED HEAVY PARAFFINIC DISTILLATE	64742-54-7	Contingency, ~0.00090 %
ETHYLENE DICHLORIDE-AMMONIA POLYMER, REACTION PROD WITH CARBON DISULFIDE AND SODIUM	428833-03-8	Contingency, ~0.00077 %
METHANOL	67-56-1	Contingency, ~0.00050 %
FORMALDEHYDE, POLYMER WITH 4-(1,1-DIMETHYLETHYL)PHENOL, METHYLOXIRANE AND OXIRANE	30704-64-4	Contingency, ~0.00022 %
C12-16 ALKYLBENZYLDIMETHYLAMMONIUM CHLORIDE	68424-85-1	Contingency, ~0.00019 %
1H-IMIDAZOLE-1-ETHANAMINE, 4,5-DIHYDRO-, 2-NORTALL-OIL ALKYL DERIVS., ACETATES	68140-11-4	Contingency, ~0.00017 %
ETHYLBENZENE	100-41-4	Contingency, ~0.00013 %
SODIUM CHLORIDE	7647-14-5	Contingency, ~0.00012 %
PHOSPHONIC ACID, ^^(PHOSPHONOMETHYL)IMINO]BIS^6,1-HEXANEDIYLNITRILOBIS(METHYLENE)]]TETRAKIS-,	35657-77-3	Contingency, ~0.00010 %
PHOSPHONIC ACID, [(PHOSPHONOMETHYL)IMINO]BIS[6,1-HEXANEDIYLNITRILOBIS(METHYLENE)]TETRAKIS-	34690-00-1	Contingency, ~0.00009 %

Chemicals Name	CAS Number	Mass Fraction (%)
THIOGLYCOLIC ACID	68-11-1	Contingency, ~0.00007 %
XYLENE	1330-20-7	Contingency, ~0.00006 %
SODIUM SULFIDE	1313-82-2	Contingency, ~0.00003 %
TOLUENE	108-88-3	Contingency, ~0.00001 %
SODIUM HYDROXIDE	1310-73-2	Contingency, ~0.00001 %
AMMONIUM HYDROXIDE	1336-21-6	Contingency, ~0.00001 %
FORMALDEHYDE	50-00-0	Contingency, <0.00001 %
ACETIC ACID, POTASSIUM SALT	127-08-2	Contingency, <0.00001 %

A. SYSTEM DETAILS	
OPERATOR:	Buru Energy
PROJECT / WELL:	Ungani North Clean Up
SYSTEM:	Circulation Fluid
TOTAL VOLUME OF SYSTEM (m^3):	Approximately 150 bbl (24 kL)

B. PRODUCT LIST

Trade name	Supplier	Purpose	Product in system (%)	Toxicity & Ecotoxicity Info	MSDS Attached
Fresh water	Onsite bore	Mix water	59.3495%	N/A	N/A
Hydrochloric Acid	Coogee Chemicals	pH Control	34.8902%	**Constituent 1 as an ingredient 15%** **Acute Toxicity:** EC50 (72 h) 0.73 mg/L (non-neutralized) Chlorella vulgaris (freshwater algae). LC50 (48 h) 0.44 mg/L (non-neutralized) Daphnia magna (freshwater invertebrate). LC50 (96 h) 20.5 mg/L (non-neutralized) Lepomis macrochirus (freshwater fish) LD50 (oral) 238 – 277 mg/kg (Non-neutralized) Rat **Chronic Toxicity:** No known carcinogenic, chronic, mutagenic or reproductive effects for this product. **Biodegradation/bioaccumulation:** Not applicable to inorganic compounds **Constituent 2 as an ingredient 85%** Water	Yes
Acetic acid	Halliburton	Chelating agent	0.111%	**Acute Toxicity:** EC50 (72h) 55.22 mg/L *Anabaena* (algae) LC50 (96h) 75 mg/L *Lepomis macrochirus* (fish) LC50 (96h) 251 mg/L *Gambusia affinis* (fish) EC50 (48h) 65 mg/L *Daphnia magna* (freshwater invertebrate) **Chronic Toxicity:** No known carcinogenic, chronic, mutagenic or reproductive effects for this product. **Biodegradation/bioaccumulation:** Readily biodegradable (99% @ 7d). Log Kow -0.17 The product is not known to be Bioaccumulative.	Yes
Rodine 85	Henkel	Acid inhibitor	0.01843%	**Toxicology Data:** **Component 1 (<10%)** LC50 (96h) 4.6 mg/L *Leuciscus idus* (fish) EC50 (24h) 11 mg/L *Daphnia magna* (freshwater invertebrate) EC50 (8d) >18 mg/L *Scenedesmus quadricauda* (algae) **Component 2 (<5%)** EC50 (48h) 56 mg/L *Daphnia magna* (freshwater invertebrate) **Component 3 (<30%)** No data available. Data presented for a similar compound	Yes

Trade name	Supplier	Purpose	Product in system (%)	Toxicity & Ecotoxicity Info	MSDS Attached
				LC50 (96h) *P. promelas* 24 mg/L (fish) LC50 (96h) *B. rerio* 41 mg/L (fish) EC50 (48h) *Daphnia magna* ~2 mg/L (freshwater invertebrate) **Component 4 (60%)** Water **Biodegradation/bioaccumulation:** Degradability: Component 1 37%, Component 2 3%, Component 3 97% Bioaccumulative potential: Comp. 1 Log Kow -0.35, Comp. 2 LogKow 0.57, Comp. 3 LogPow <1	
Citric Acid	Halliburton	pH control	1.843%	Acute Fish Toxicity 96h LC50: >440-760 mg/l (Leuciscus idus)Acute Crustacean Toxicity 72h EC50: 120 mg/l (Daphnia magna)Acute Toxicity 7d EC3: 640 mg/l (Scenedesmus quadrucauda)Source: IUCLID 2000 **Biodegradation/bioaccumulation:** Citric Acid is extract of Citrus and rapidly biodegradable. BOD30/COD = 90%. Rapidly biodegradable in water and soil. The product is not known to be Bioaccumulative.	Yes
EC6733A	Nalco Champion	Biocide	3.788%	This product contains organic components. **AQUATIC TOXICOLOGY** **COMPONENT 1 (10 – 30% concentration)** o *Skeletonema costatum* (Marine algae) EC50 72 hrs: 0.26 mg/L o *Acartia tonsa* (Marine invertebrate) LC50 48 hrs: 0.4 mg/L o *Cyprinodon variegatus (sheepshead minnow)* (Marine fish) LC50 96 hrs: 1.7 mg/L **COMPONENT 2 (60 – 100% concentration)** o *Skeletonema costatum* (Marine algae) EC50 72 hrs: 0.16 mg/L o *Acartia tonsa* (Marine invertebrate) LC50 48 hrs: 0.6 mg/L o *Scophthalmus maximus* (Marine fish) LC50 96 hrs: 72 mg/L **COMPONENT 3 (0 – 1% concentration)** o *Skeletonema costatum* (Marine algae) EC50 72 hrs: 4.1 mg/L o *Acartia tonsa* (Marine invertebrate) LC50 48 hrs: 38 mg/L o *Scophthalmus maximus* (Marine fish) LC50 96 hrs: 611 mg/L **CHEMICAL FATE** **COMPONENT 1 (10 – 30% concentration)** Log Pow 2.28 (theoretical) **COMPONENT 2 (60 – 100% concentration)** Log Pow 0 **COMPONENT 3 (0 – 1% concentration)** Log Pow <0 **ENVIRONMENTAL FATE** **COMPONENT 1 (10 – 30% concentration)** Biodegradability, 28 days: 34% **COMPONENT 2 (60 – 100% concentration)** Biodegradability, 28 days: 61% **COMPONENT 3 (0 – 1% concentration)** Biodegradability, 28 days: 83% **ACUTE MAMMALIAN TOXICITY** **COMPONENT 1 (10 – 30% concentration)** Rat LD50 (oral): 344 mg/kg Rabbit LD50 (dermal): 3340 mg/kg Rat LC50 (inhalation) 4h: >0.054 mg/L	Yes

Trade name	Supplier	Purpose	Product in system (%)	Toxicity & Ecotoxicity Info	MSDS Attached
				COMPONENT 2 (60 – 100% concentration) Rat LD50 (oral): 575 mg/kg (75% active ingredient in water) Rat LD50 (dermal): >2000 mg/kg (75% active ingredient in water) Rat LC50 (inhalation) 4h: 0.591 mg/l (75% active ingredient in water) **COMPONENT 3 (0 – 1% concentration)** Guinea pig LD50 (oral): 260* mg/kg Rabbit LD50 (dermal): 270* mg/kg Mouse LC50 (inhalation) 4 hr: 497* mg/kg **Literature data from HSNO CCID* **CHRONIC TOXICITY** **COMPONENT 1 (10 – 30% concentration)** No known carcinogenic, chronic, mutagenic or reproductive effects. **COMPONENT 2 (60 – 100% concentration)** Skin sensitizer. Reproductive toxicant to rabbits/rats at 50mg/kg/day. **COMPONENT 3 (0 – 1% concentration)** Skin sensitizer. May cause cancer, IARC Group 1 Carcinogen.	
		Total	100%		
Soda Ash	Halliburton	pH control	0.0500%	**Toxicology Data** LD50 Oral: 4090 mg/kg (Rat); 2800 mg/kg (Rat)LD50 Dermal: 2210 mg/kg (Mouse); >2000 mg/kg (Rabbit)LC50 Inhalation: 2.3 mg/L (Rat) 2h **Substance Ecotoxicity Data** Toxicity to Algae - EC50 242 mg/L (Nitzschia)Toxicity to Fish – TLM24 385 mg/L (Lepomis macrochirus); LC50 310-1220 mg/L (Pimephales promelas); LC50 (96h) 300 mg/L (Lepomis macrochirus)Toxicity to Microorganisms - No information availableToxicity to Invertibrates – EC50 265 mg/L (Daphnia magna); EC50 (48h) 200 – 227 mg/L (Ceriodaphnia sp.) **Biodegradation/bioaccumulation:** Soda Ash is an inorganic (Sodium Carbonate), naturally occurring salt and partially biodegradable. Soda Ash is fully water soluble and highly mobile in soil. Biodegradability does not pertain to inorganic substances. Does not bioaccumulate. Dissociates into ions.	Yes
Sodium Bicarbonate	Halliburton	pH control	0.0500%	**Toxicology Data for Components** LD50 Oral: No data availableLD50 Dermal: No data availableLC50 Inhalation: No data available **Substance Ecotoxicity Data** Toxicity to Algae - No information available - EC50 (5d): 650 mg/l (Nitzschia linearis)Toxicity to Fish – No information available - LC50 (96h): 7550 mg/l (Gambusia affinis)Toxicity to Microorganisms - No information availableToxicity to Invertibrates – No information available - EC50 (48h): 2350 mg/l (Daphnia magna)Source: IUCLID 2000 **Biodegradation/bioaccumulation:** Sodium Bicarbonate is an inorganic, naturally occurring salt and partially biodegradable. Sodium Bicarbonate is fully water soluble and highly mobile in soil. The product is not known to be Bioaccumulative.	Yes

C. CHEMICAL LIST

Chemicals within products in Part B	CAS #	Maximum Mass fraction in System (%)
water	N/A	89.0062%
Hydrochloric acid	7647-01-0	5.23353%
Acetic acid	64-19-7	0.111%
Citric Acid	77-92-9	1.8415%
Prop-2-yn-1-ol	107-19-7	0.002%
1,3-diethyl-2-thiourea	105-55-5	0.001%
Formaldehyde reaction products with o-toluidine	68411-63-2	0.006%
Tetrakis(hydroxymethyl) phosphonium sulfate	55566-30-8	3.3713%
Benzyl-(C12-C16 Linear Alkyl)-Dimethyl-Ammonium Chloride	68424-85-1	0.3788%
Formaldehyde	50-00-0	0.0379%
	Total	100%
Sodium Carbonate	497-19-8	Contingency, 0.050000%
Sodium Bicarbonate	144-55-8	Contingency, 0.050000%

Product Name **HYDROCHLORIC ACID 32% (COOGEE CHEMICALS)**

1. IDENTIFICATION OF THE MATERIAL AND SUPPLIER

Supplier Name	**COOGEE CHEMICALS**
Address	Cnr of Patterson and Kwinana Beach Roads, Kwinana, WA, AUSTRALIA, 6167
Telephone	(08) 9439 8200
Fax	(08) 9439 8300
Emergency	1800 800 655
Email	businessrelations@coogee.com.au
Web Site	http://www.coogee.com.au
Synonym(s)	9178 - PRODUCT CODE • COOGEE HYDROCHLORIC ACID 32% • HCL • HYDROCHLORIC ACID 32% • HYDROCHLORIC ACID 32% (NUFARM) (FORMERLY) • MURIATIC ACID • SPIRITS OF SALTS
Use(s)	ACIDIFIER • CHEMICAL INTERMEDIATE • LABORATORY REAGENT • PICKLING AND ANODISING METALS • SCALE REMOVER

2. HAZARDS IDENTIFICATION

CLASSIFIED AS HAZARDOUS ACCORDING TO ASCC CRITERIA

RISK PHRASES

R34	Causes burns.
R37	Irritating to respiratory system.

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
S36/37/39	Wear suitable protective clothing, gloves and eye/face protection.
S45	In case of accident or if you feel unwell seek medical advice immediately (show the label where possible).
S9	Keep container in a well ventilated place.

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

UN No.	1789	**DG Class**	8	**Subsidiary Risk(s)**	None Allocated
Packing Group	II	**Hazchem Code**	2R	**EPG**	8A1

3. COMPOSITION/ INFORMATION ON INGREDIENTS

Ingredient	Formula	CAS No.	Content
HYDROCHLORIC ACID	H-Cl	7647-01-0	32%
WATER	H2O	7732-18-5	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. To protect rescuer, use a Full-face Type B (Inorganic and acid gas) respirator or an Air-line respirator (in poorly ventilated areas). 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). If swallowed, do not induce vomiting.
Advice to Doctor	CORROSIVE POISONING TREATMENT: Immediate treatment preferably in a hospital is mandatory. It is also important to attempt to discover the chemical substances ingested. In treating corrosive poisoning, DO NOT INDUCE VOMITING; DO NOT ATTEMPT GASTRIC LAVAGE; and DO NOT ATTEMPT TO NEUTRALISE THE CORROSIVE SUBSTANCE. Vomiting will increase the severity of damage to the oesophagus as the corrosive substance will again come in contact with it. Attempting gastric lavage may result in perforating either the oesophagus or stomach.

Immediately dilute the corrosive substance by having the patient drink milk or water. If the trachea has been damaged tracheostamy may be required. For oesophageal burns begin broad-spectrum antibiotics and corticosteroid therapy. Intravenous fluids will be required if oesophageal or gastric damage prevents ingestion of liquids. Long-range therapy will be directed toward preventing or treating oesophageal scars and strictures.

First Aid Facilities Eye wash facilities and safety shower should be available.

5. FIRE FIGHTING MEASURES

Flammability Non flammable. May evolve toxic gases (chlorides) when heated to decomposition. May evolve flammable hydrogen gas when in contact with some metals.

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 2R

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 sodium bicarbonate or 50 -50 mixture of sodium carbonate and calcium hydroxide. Collect for complete neutralisation and appropriate disposal.

7. STORAGE AND HANDLING

Storage Store in secured, cool, dry, well ventilated area, removed from oxidising agents, alkalis, most metals, alcohols, acids, dinitroaniline, cyanides, sulphides, heat or ignition sources and foodstuffs. Ensure containers are 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. Also store removed from amines.

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

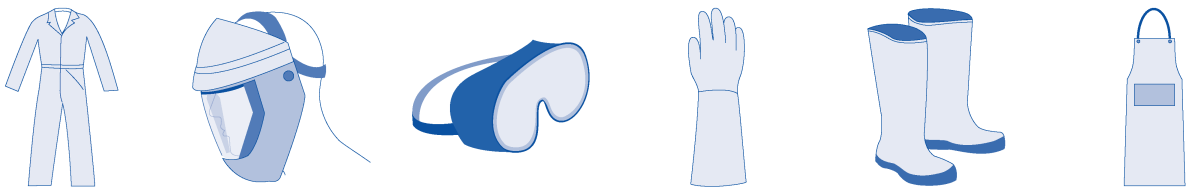
Exposure Stds

Ingredient	Reference	TWA		STEL	
		ppm	mg/m3	ppm	mg/m3
Hydrogen chloride (Hydrochloric acid)	ASCC (AUS)	5.0	7.5	--	--

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 vapour levels below the recommended exposure standard.

PPE Wear splash-proof goggles, a PVC apron, rubber boots, full-length rubber or full-length PVC gloves, a faceshield and coveralls. Wear full-length PVC or full-length rubber gloves, splash-proof goggles, a PVC apron, rubber boots, full PVC coveralls (or better) and a faceshield. Where an inhalation risk exists, wear: a Full-face Type B (Inorganic and Acid gas) or an Air-line respirator.



9. PHYSICAL AND CHEMICAL PROPERTIES

Product Name **HYDROCHLORIC ACID 32% (COOGEE CHEMICALS)**

Appearance	COLOURLESS TO SLIGHTLY YELLOW LIQUID	**Solubility (Water)**	SOLUBLE
Odour	PUNGENT ODOUR	**Specific Gravity**	1.161
pH	< 1	**% Volatiles**	100 %
Vapour Pressure	18 mm Hg @ 20°C	**Flammability**	NON FLAMMABLE
Vapour Density	1.3 (Air = 1)	**Flash Point**	NOT RELEVANT
Boiling Point	109°C	**Upper Explosion Limit**	NOT RELEVANT
Melting Point	< -20°C	**Lower Explosion Limit**	NOT RELEVANT
Evaporation Rate	AS FOR 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), alkalis (eg. hydroxides), most metals, acids (eg. nitric acid), alcohols, dinitroanilines, cyanides, sulphides and heat sources. Corrodes most materials when moist. Also incompatible with amines.

Decomposition May evolve toxic gases (chlorides) when 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 skin, eye and respiratory burns with permanent lung and tissue damage. Upon dilution, the potential for adverse health effects may be reduced.

Eye Highly corrosive. Contact may result in irritation, lacrimation, pain, redness, conjunctivitis and corneal burns with possible permanent damage.

Inhalation Toxic - corrosive. Over exposure may result in irritation of the nose and throat, 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 Highly corrosive. Contact may result in irritation, redness, pain, rash, dermatitis, blistering and severe burns. May cause discolouration of the skin. Effects may be delayed.

Ingestion Highly corrosive. Ingestion may result in burns to the mouth and throat, nausea, vomiting, abdominal pain and diarrhoea. Ingestion of large quantities may result in ulceration, unconsciousness, convulsions and death.

Toxicity Data HYDROCHLORIC ACID (7647-01-0)
LC50 (Inhalation): 1108ppm/1 hour (human - respiratory irritation)
LCLo (Inhalation): 1300 ppm/30 minutes (human)
LD50 (Ingestion): 900 mg/kg (rabbit)
LDLo (Ingestion): 81 mg/kg (man)
TCLo (Inhalation): 450 mg/m3/1 hour (pregnant rat - teratogenic effects)

12. ECOLOGICAL INFORMATION

Environment If hydrochloric acid is spilled on soil, it will infiltrate. During its transport through soil, the acid will dissolve some of the soil material, in particular carbonates, and will be neutralised to some degree. However, significant amounts of acid are expected to remain for transport down to groundwater. Toxic to aquatic invertebrates at low levels (LC50: 1.21 ppm/96 hours).

13. DISPOSAL CONSIDERATIONS

Waste Disposal Wearing the protective equipment detailed above, neutralise to pH 6-8 by SLOW addition to a saturated sodium bicarbonate solution or similar basic solution. Dilute with excess water and flush to drain. Waste disposal should only be undertaken in a well ventilated area.

Legislation Dispose of in accordance with relevant local legislation.

Product Name **HYDROCHLORIC ACID 32% (COOGEE CHEMICALS)**

14. TRANSPORT INFORMATION

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

Shipping Name	HYDROCHLORIC ACID				
UN No.	1789	**DG Class**	8	**Subsidiary Risk(s)**	None Allocated
Packing Group	II	**Hazchem Code**	2R	**EPG**	8A1

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.

ACIDS: When mixing acids with water (diluting), caution must be taken as heat will be generated which causes violent spattering. Always add a small volume of acid to a large volume of water, NEVER the reverse.

ABBREVIATIONS:
ADB - Air-Dry Basis.
BEI - Biological Exposure Indice(s)
CAS# - Chemical Abstract Service number - used to uniquely identify chemical compounds.
CNS - Central Nervous System.
EINECS - European INventory of Existing Commercial chemical Substances.
IARC - International Agency for Research on Cancer.
M - moles per litre, a unit of concentration.
mg/m3 - Milligrams per cubic metre.
NOS - Not Otherwise Specified.
NTP - National Toxicology Program.
OSHA - Occupational Safety and Health Administration.
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.
TWA/ES - Time Weighted Average or Exposure Standard.

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.

COLOUR RATING SYSTEM: RMT has assigned all Chem Alert reports a colour rating of Green, Amber or Red for the sole purpose of providing users with a quick and easy means of determining the hazardous nature of a product. Safe handling recommendations are provided in all Chem Alert reports so as to clearly identify how users

Product Name **HYDROCHLORIC ACID 32% (COOGEE CHEMICALS)**

can control the hazards and thereby reduce the risk (or likelihood) of adverse effects. As a general guideline, a Green colour rating indicates a low hazard, an Amber colour rating indicates a moderate hazard and a Red colour rating indicates a high hazard.

While all due care has been taken by RMT in the preparation of the Colour Rating System, it is intended as a guide only and RMT does not provide any warranty in relation to the accuracy of the Colour Rating System. As far as is lawfully possible, RMT accepts no liability or responsibility whatsoever for the actions or omissions of any person in reliance on the Colour Rating System.

Report Status

This Chem Alert report has been independently compiled by RMT's scientific department utilising the original Material Safety Data Sheet ('MSDS') 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.

This Chem Alert report does not constitute the manufacturer's original MSDS and is not intended to be a replacement for same. It is provided to subscribers of Chem Alert 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 Chem Alert 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 Chem Alert report.

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Last Reviewed: 16 Jul 2010

Date Printed: 19 Jul 2010

End of Report

Safety Data Sheet

BONDERITE S-AD 85 ACID INHIBITOR ADDITIVE known as RODINE 85 20LT

MSDS-No. : 319615
V001.4
Date of issue: 07.07.2015

Section 1. Identification of the substance/preparation and of the company/undertaking

Product name: BONDERITE S-AD 85 ACID INHIBITOR ADDITIVE known as RODINE 85 20LT

Intended use: Acid inhibitor additive

Supplier:
Henkel Australia Pty Ltd
135-141 Canterbury Road
Kilsyth, Victoria, 3137
Australia

Phone: +61 (3) 9724 6444

Emergency information: 24 HOUR EMERGENCY CONTACT NUMBER: 1800 032 379

Section 2. Hazards identification

Classification of the substance or mixture
Hazardous according to the criteria of Safe Work Australia.

GHS Classification:

Hazard Class	Hazard Category	Route of Exposure
Acute toxicity	Category 4	Oral
Skin corrosion	Category 1	
Serious eye damage/eye irritation	Category 1	
Skin sensitizer	Category 1	
Carcinogenicity	Category 2	
Chronic hazards to the aquatic environment	Category 3	

Hazard pictogram:

Signal word: Danger

Hazard statement(s):	H302 Harmful if swallowed. H314 Causes severe skin burns and eye damage. H317 May cause an allergic skin reaction. H351 Suspected of causing cancer. H412 Harmful to aquatic life with long lasting effects.
Precautionary Statement(s):	
Prevention:	P280 Wear eye protection/face protection. P280 Wear protective gloves. P261 Avoid breathing dust/fume/gas/mist/vapours/spray. P264 Wash hands thoroughly after handling. P272 Contaminated work clothing should not be allowed out of the workplace. P202 Do not handle until all safety precautions have been read and understood. P281 Use personal protective equipment as required. P201 Obtain special instructions before use.
Response:	P301+P330+P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting. P301+P312 IF SWALLOWED: Call a POISON CENTER/doctor if you feel unwell. P303+P361+P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. P304+P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing. P305+P351+P338+P315 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to remove. Continue rinsing. Get immediate medical advice/attention. P308+P313 IF exposed or concerned: Get medical advice/attention. P333+P313 If skin irritation or rash occurs: Get medical advice/attention. P363 Wash contaminated clothing before reuse.
Storage:	P405 Store locked up.
Disposal:	P501 Dispose of contents/container to an appropriate treatment and disposal facility in accordance with applicable laws and regulations.

Classification of material C - Corrosive Xi - Irritant Xn - Harmful

Risk phrases:
R20/21/22 Harmful by inhalation, in contact with skin and if swallowed.
R40 Limited evidence of a carcinogenic effect.
R41 Risk of serious damage to eyes.
R34 Causes burns.
R43 May cause sensitisation by skin contact.

Safety phrases:
S23 Do not breathe vapour.
S24/25 Avoid contact with skin and eyes.
S26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S27/28 After contact with skin, take off immediately all contaminated clothing, and wash the skin immediately with plenty of water and soap.
S36/37/39 Wear suitable protective clothing, gloves and eye/face protection.
S45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
S60 This material and its container must be disposed of as hazardous waste.
S7/9 Keep container tightly closed and in a well-ventilated place.

Dangerous Goods information:
Classified as Dangerous Goods according to the criteria of the Australian Code for the Transport of Dangerous Goods by Road and Rail (ADG Code).

Signal word:
HAZARDOUS

Section 3. Composition / information on ingredients

General chemical description: Mixture

Identity of ingredients:

Chemical ingredients	CAS-No.	Proportion
Prop-2-yn-1-ol	107-19-7	< 10 %
1,3-Diethyl-2-thiourea	105-55-5	< 5 %
	68411-63-2	10- <= 30 %
Remainder not hazardous including water~		60 %

Section 4. First aid measures

Ingestion: Do not induce vomiting.
Call a physician immediately.

Skin: In case of contact, immediately remove contaminated clothing and flush skin with copious amounts of water.
Seek medical advice.

Eyes: Immediately flush eyes with water for at least 15 minutes, while holding eyelids open.
Seek medical attention at once.

Inhalation: Move to fresh air, consult doctor if complaint persists.

First Aid facilities: Eye wash and safety shower

Medical attention and special treatment: Treat symptomatically.

Section 5. Fire fighting measures

Suitable extinguishing media: Water fog.
Dry chemical.
Carbon dioxide.

Decomposition products in case of fire:: In case of fire toxic gases can be released.
Chlorine.
Oxides of nitrogen.
Oxides of sulfur.

Special protective equipment for fire-fighters: Wear self-contained breathing apparatus and full protective clothing, such as turn-out gear.

Hazchem code: 2X

Section 6. Accidental release measures

Personal precautions: See advice in section 8
Avoid skin and eye contact.

Environmental precautions: Do not empty into drains / surface water / ground water.

Clean-up methods: Remove with liquid-absorbing material (sand, peat, sawdust).
Scrape up spilled material and place in a closed container for disposal.

Dispose of contaminated material as waste according to Section 13.

Section 7. Handling and storage

Precautions for safe handling: See advice in section 8
Ensure that workrooms are adequately ventilated.
Avoid breathing vapors or mists of this product.

Conditions for safe storage: Store in a cool, dry, well-ventilated area.
Keep away from heat and direct sunlight.
Must be stored in the facility for the dangerous goods

Section 8. Exposure controls / personal protection

National exposure standards:

Ingredient [Regulated substance]	form of exposure	TWA (ppm)	TWA (mg/m3)	Peak Limit. (ppm)	Peak Limit. (mg/m3)	STEL (ppm)	STEL (mg/m3)
PROPARGYL ALCOHOL 107-19-7		1	2.3	-	-	-	-

Engineering controls: Provide local and general exhaust ventilation to effectively remove and prevent buildup of any vapors or mists generated from the handling of this product.

Eye protection: Wear chemical goggles and face shield.

Skin protection: Use of protective coveralls and long sleeves is recommended.
Recommended gloves include butyl rubber and neoprene.

Respiratory protection: If inhalation risk exists, wear a respirator or air supplied mask complying with the requirements of AS/NZS 1715 and AS/NZS 1716.

Section 9. Physical and chemical properties

Appearance: Red-brown
dark
Odor: characteristic
pH: 0.3
Density: 1.05 - 1.06 g/cm3
Solubility in water: Miscible

Section 10. Stability and reactivity

Stability: Stable under normal conditions of temperature and pressure.

Conditions to avoid: Heat, flames, sparks and other sources of ignition.

Incompatible materials:
Alkalis.
Alkali metals.
Fluorine.
Organic materials.
Oxidizing agents.

Hazardous decomposition products:
In case of fire toxic gases can be released.

Chlorine.
Oxides of nitrogen.
Oxides of sulfur.

Section 11. Toxicological information

Health Effects:

Ingestion:
If ingested, severe burns of the mouth and throat may occur, as well as perforation of the esophagus and the stomach.
Ingestion can cause gastrointestinal irritation, nausea, vomiting and diarrhea.

Skin:
Causes burns.
May cause skin sensitization.

Eyes:
Contact with the eyes can cause severe burns and permanent eye damage.

Inhalation:
May cause respiratory tract irritation.
Excessive inhalation of this material causes headache, dizziness, nausea and incoordination.

Aggrevated med. condition:
Pre-existing skin disorders.

Toxicity data:
No data available.

Section 12. Ecological information

General ecological information:
Do not empty into drains / surface water / ground water., Harmful to aquatic organisms., May cause long-term adverse effects in the aquatic environment.

Toxicity:

Hazardous components CAS-No.	Value type	Value	Acute Toxicity Study	Exposure time	Species	Method
Prop-2-yn-1-ol 107-19-7	LC50	4.6 mg/l	Fish	96 h	Leuciscus idus	DIN 38412-15
Prop-2-yn-1-ol 107-19-7	EC50	11 mg/l	Daphnia	24 h	Daphnia magna	OECD Guideline 202 (Daphnia sp. Acute Immobilisation Test)
Prop-2-yn-1-ol 107-19-7	EC50	> 18 mg/l	Algae	8 d	Scenedesmus quadricauda	OECD Guideline 201 (Alga, Growth Inhibition Test)
Prop-2-yn-1-ol 107-19-7	EC0	< 18 mg/l	Algae	8 d	Scenedesmus quadricauda	OECD Guideline 201 (Alga, Growth Inhibition Test)
1,3-Diethyl-2-thiourea 105-55-5	EC50	56 mg/l	Daphnia	48 h	Daphnia magna	OECD Guideline 202 (Daphnia sp. Acute Immobilisation Test)

Persistence and degradability:

Hazardous components CAS-No.	Result	Route of application	Degradability	Method
Prop-2-yn-1-ol 107-19-7		aerobic	37 %	EU Method C.4-E (Determination of the "Ready" BiodegradabilityClosed Bottle Test)
1,3-Diethyl-2-thiourea 105-55-5		aerobic	3 %	OECD Guideline 301 D (Ready Biodegradability: Closed Bottle Test)

Bioaccumulative potential / Mobility in soil:

Hazardous components CAS-No.	LogKow	Bioconcentration factor (BCF)	Exposure time	Species	Temperature	Method
Prop-2-yn-1-ol 107-19-7	-0.35				25 °C	OECD Guideline 107 (Partition Coefficient (n-octanol / water), Shake Flask Method)
1,3-Diethyl-2-thiourea 105-55-5	0.57					OECD Guideline 107 (Partition Coefficient (n-octanol / water), Shake Flask Method)

Section 13. Disposal considerations

Waste disposal of product: Collection and delivery to recycling enterprise or other registered elimination institution.

Recommended cleanser: Clean the packaging with water.

Disposal for uncleaned package: Packaging that cannot be cleaned are to be disposed of in the same manner as the product.

Section 14. Transport information

Road and Rail Transport:

Dangerous Goods information:	Classified as Dangerous Goods according to the criteria of the Australian Code for the Transport of Dangerous Goods by Road and Rail (ADG Code).
UN no.:	3265
Proper shipping name:	CORROSIVE LIQUID, ACIDIC, ORGANIC, N.O.S. (Propargyl alcohol)
Class or division:	8
Packing group:	III
Hazchem code:	2X
Emergency information:	Refer to the Dangerous Goods - Initial Emergency Response Guide HB 76.

Marine transport IMDG:

UN no.:	3265
Proper shipping name:	CORROSIVE LIQUID, ACIDIC, ORGANIC, N.O.S. (Propargyl alcohol)
Class or division:	8
Packing group:	III
EmS:	F-A ,S-B
Seawater pollutant:	-

Air transport IATA:

UN no.:	3265
Proper shipping name:	Corrosive liquid, acidic, organic, n.o.s. (Propargyl alcohol)
Class or division:	8
Packing group:	III
Packing instructions (passenger)	852
Packing instructions (cargo)	856

Section 15. Regulatory information

SUSMP Poisons Schedule None

Section 16. Other information

Abbreviations/acronyms:

ADGC - Australian Dangerous Goods Code
STEL - Short term exposure limit
TWA - Time weighted average

Reason for issue: Reviewed MSDS. Reissued with new date. involved chapters: 2,3,9,11,16

Date of previous issue: 04.07.2014

Disclaimer:

The percentage weight (% w/w) of ingredients is not to be taken as a specification guaranteed by Henkel Australia Pty. Limited, but only as an approximate guide to the content of hazardous ingredients in the material. The information contained herein does not constitute a guarantee by Henkel Australia Pty. Limited concerning the properties of the material. The information contained in the Safety Data Sheet is offered in good faith and has been developed from what is believed to be accurate and reliable sources. The information is offered without warranty, representation, inducement or licence and Henkel Australia Pty. Limited assumes no legal responsibility for reliance upon same. Henkel Australia Pty. Limited disclaims any liability for loss, injury or damage incurred in connection with the use of the material or its associated Safety Data Sheet. This information is not to be construed as a representation that the material is suitable for any particular purpose or use except those conditions and warranties implied by either Commonwealth or State statutes. Customers are encouraged to make their own enquiries as to the material's characteristics and, where appropriate, to conduct their own tests in the specific context of the material's intended use.

HALLIBURTON

SAFETY DATA SHEET

Product Trade Name: **ACETIC ACID**

Revision Date: 04-Oct-2016 **Revision Number:** 30

1. Identification

1.1. Product Identifier

Product Trade Name: ACETIC ACID
Synonyms None
Chemical Family: Organic acid
Internal ID Code HM001728

1.2 Recommended use and restrictions on use

Application: Acid
Uses advised against No information available

1.3 Manufacturer's Name and Contact Details

Manufacturer/Supplier
Halliburton Energy Services Inc.
P.O. Box 1431
Duncan, Oklahoma 73536-0431
Emergency Telephone: 1-866-519-4752 (US, Canada, Mexico) or 1-760-476-3962
Halliburton Energy Services
645 - 7th Ave SW Suite 1800
Calgary, AB
T2P 4G8
Canada

Prepared By Chemical Stewardship
Telephone: 1-281-871-6107
e-mail: fdunexchem@halliburton.com

1.4. Emergency telephone number

Emergency Telephone Number: 1-866-519-4752 or 1-760-476-3962

2. Hazard Identification

2.1 Classification of the substance or mixture

Skin Corrosion / Irritation	Category 1 - H314
Serious Eye Damage/Irritation	Category 1 - H318
Specific Target Organ Toxicity - (Single Exposure)	Category 3 - H335
Flammable liquids.	Category 3 - H226

2.2. Label Elements

Hazard Pictograms

Signal Word: Danger

Hazard Statements

H226 - Flammable liquid and vapor
H314 - Causes severe skin burns and eye damage
H318 - Causes serious eye damage
H335 - May cause respiratory irritation

Precautionary Statements

Prevention

P210 - Keep away from heat/sparks/open flames/hot surfaces. - No smoking
P233 - Keep container tightly closed
P240 - Ground/Bond container and receiving equipment
P241 - Use explosion-proof electrical/ventilating/lighting/equipment
P242 - Use only non-sparking tools
P243 - Take precautionary measures against static discharge
P260 - Do not breathe dust/fume/gas/mist/vapors/spray
P264 - Wash face, hands and any exposed skin thoroughly after handling
P271 - Use only outdoors or in a well-ventilated area
P280 - Wear protective gloves/eye protection/face protection

Response

P301 + P330 + P331 - IF SWALLOWED: rinse mouth. Do NOT induce vomiting
P303 + P361 + P353 - IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower
P363 - Wash contaminated clothing before reuse
P304 + P340 - IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
P310 - Immediately call a POISON CENTER or doctor/physician
P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P370 + P378 - In case of fire: Use water spray for extinction

Storage

P403 + P233 - Store in a well-ventilated place. Keep container tightly closed
P403 + P235 - Store in a well-ventilated place. Keep cool
P405 - Store locked up

Disposal

P501 - Dispose of contents/container in accordance with local/regional/national/international regulations

2.3 Other hazards which do not result in classification

None known

3. Composition/information on Ingredients

Substances	CAS Number	PERCENT (w/w)	GHS Classification - Canada	HMIRA Registry Number	Filing Date	Decision Granted Date
Acetic acid	64-19-7	30 - 40%	Skin Corr. 1A (H314)	Not applicable	Not	Not

			Eye Corr. 1 (H318) STOT SE 3 (H335) Flam. Liq. 3 (H226)		applicable	applicable

4. First aid measures

4.1. Description of first aid measures

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Eyes Immediately flush eyes with large amounts of water for at least 30 minutes. Seek prompt medical attention.

Skin In case of contact, immediately flush skin with plenty of soap and water for at least 30 minutes and remove contaminated clothing, shoes and leather goods immediately. Get medical attention immediately. Remove contaminated clothing and launder before reuse.

Ingestion Do NOT induce vomiting. Give nothing by mouth. Obtain immediate medical attention.

4.2 Most important symptoms/effects, acute and delayed

Causes severe eye irritation which may damage tissue. Causes severe skin irritation with tissue destruction. May cause respiratory irritation.

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

Notes to Physician Treat symptomatically.

5. Fire-fighting measures

5.1. Extinguishing media

Suitable Extinguishing Media

Water fog, carbon dioxide, foam, dry chemical.

Extinguishing media which must not be used for safety reasons

None known.

5.2 Specific hazards arising from the substance or mixture

Special exposure hazards in a fire

Use water spray to cool fire exposed surfaces. Decomposition in fire may produce harmful gases. Do not allow runoff to enter waterways.

5.3 Special protective equipment and precautions for fire-fighters

Special protective equipment for firefighters

Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

6. Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Remove sources of ignition. Use appropriate protective equipment. Avoid contact with skin, eyes and clothing. Avoid breathing vapors. Ensure adequate ventilation. Evacuate all persons from the area.
See Section 8 for additional information

6.2. Environmental precautions

Prevent from entering sewers, waterways, or low areas. Consult local authorities.

6.3. Methods and material for containment and cleaning up

Isolate spill and stop leak where safe. Neutralize with lime slurry, limestone, or soda ash. Contain spill with sand or other inert materials. Scoop up and remove.

7. Handling and Storage

7.1. Precautions for safe handling

Handling Precautions

Remove sources of ignition. Avoid contact with eyes, skin, or clothing. Avoid breathing vapors. Ensure adequate ventilation. Wash hands after use. Launder contaminated clothing before reuse. Use appropriate protective equipment.

Hygiene Measures

Handle in accordance with good industrial hygiene and safety practice.

7.2. Conditions for safe storage, including any incompatibilities

Storage Information

Store away from alkalis. Store away from oxidizers. Store in a cool well ventilated area. Keep container closed when not in use.

8. Exposure Controls/Personal Protection

8.1 Occupational Exposure Limits

Substances	CAS Number	OSHA PEL-TWA	ACGIH TLV-TWA
Acetic acid	64-19-7	TWA: 10 ppm	TWA: 10 ppm STEL: 15 ppm

8.2 Appropriate engineering controls

Engineering Controls Use in a well ventilated area. Local exhaust ventilation should be used in areas without good cross ventilation.

8.3 Individual protection measures, such as personal protective equipment

Personal Protective Equipment If engineering controls and work practices cannot prevent excessive exposures, the selection and proper use of personal protective equipment should be determined by an industrial hygienist or other qualified professional based on the specific application of this product.

Respiratory Protection If engineering controls and work practices cannot keep exposure below occupational exposure limits or if exposure is unknown, wear a NIOSH certified, European Standard EN 149, AS/NZS 1715:2009, or equivalent respirator when using this product. Selection of and instruction on using all personal protective equipment, including respirators, should be performed by an Industrial Hygienist or other qualified professional.

Hand Protection Chemical-resistant protective gloves (EN 374) Suitable materials for longer, direct contact (recommended: protection index 6, corresponding to > 480 minutes permeation time as per EN 374): Nitrile gloves. (>= 0.35 mm thickness)
This information is based on literature references and on information provided by glove manufacturers, or is derived by analogy with similar substances. Please note that in practice the working life of chemical-resistant protective gloves may be considerably shorter than the permeation time determined in accordance with EN 374 as a result of the many influencing factors (e.g. temperature). If signs of wear and tear are noticed then the gloves should be replaced. Manufacturer's directions for use should be observed because of great diversity of types.

Skin Protection Full protective chemical resistant clothing.

Eye Protection Chemical goggles; also wear a face shield if splashing hazard exists.

Other Precautions Eyewash fountains and safety showers must be easily accessible.

9. Physical and Chemical Properties

9.1. Information on basic physical and chemical properties

Physical State:	Liquid	**Color**	Clear
Odor:	Acrid	**Odor Threshold:**	No information available

Property Remarks/ - Method	Values
pH:	2.9
Freezing Point / Range	16 °C / 62 °F
Melting Point / Range	No data available
Boiling Point / Range	117 °C / 244 °F
Flash Point	42 °C / 109 °F PMCC
Flammability (solid, gas)	No data available
Upper flammability limit	16%
Lower flammability limit	5.4%
Evaporation rate	No data available
Vapor Pressure	11.7 mmHg @ 20 C
Vapor Density	No data available
Specific Gravity	1.05
Water Solubility	Soluble in water
Solubility in other solvents	No data available
Partition coefficient: n-octanol/water	No data available
Autoignition Temperature	No data available
Decomposition Temperature	No data available
Viscosity	No data available
Explosive Properties	No information available
Oxidizing Properties	No information available

9.2. Other information

Molecular Weight	60.6 (g/mole)
VOC Content (%)	No data available

10. Stability and Reactivity

10.1. Reactivity
Not expected to be reactive.

10.2. Chemical stability
Stable

10.3. Possibility of hazardous reactions
Will Not Occur

10.4. Conditions to avoid
Keep away from heat, sparks and flame.

10.5. Incompatible materials
Strong alkalis.

10.6. Hazardous decomposition products
Toxic fumes. Carbon monoxide and carbon dioxide.

11. Toxicological Information

11.1 Information on likely routes of exposure
Principle Route of Exposure Eye or skin contact, inhalation.

11.2 Symptoms related to the physical, chemical and toxicological characteristics
Acute Toxicity

Inhalation	Causes severe respiratory irritation.
Eye Contact	Causes severe eye burns.
Skin Contact	Causes severe burns.
Ingestion	Causes burns of the mouth, throat and stomach.

Chronic Effects/Carcinogenicity Prolonged, excessive exposure may cause erosion of the teeth.

11.3 Toxicity data

Toxicology data for the components

Substances	CAS Number	LD50 Oral	LD50 Dermal	LC50 Inhalation
Acetic acid	64-19-7	No data available	1060 mg/kg-bw (rabbit)	11.4 mg/L (rat, 4 h, vapor)

Substances	CAS Number	Skin corrosion/irritation
Acetic acid	64-19-7	Corrosive to skin Extremely corrosive and destructive to tissue Skin, rabbit:

Substances	CAS Number	Serious eye damage/irritation
Acetic acid	64-19-7	Corrosive to eyes Eye, rabbit: Causes serious eye damage

Substances	CAS Number	Skin Sensitization
Acetic acid	64-19-7	Not regarded as a sensitizer.

Substances	CAS Number	Respiratory Sensitization
Acetic acid	64-19-7	No information available

Substances	CAS Number	Mutagenic Effects
Acetic acid	64-19-7	In vivo tests did not show mutagenic effects. In vitro tests did not show mutagenic effects.

Substances	CAS Number	Carcinogenic Effects
Acetic acid	64-19-7	Did not show carcinogenic effects in animal experiments

Substances	CAS Number	Reproductive toxicity
Acetic acid	64-19-7	Did not show teratogenic effects in animal experiments. Animal testing did not show any effects on fertility.

Substances	CAS Number	STOT - single exposure
Acetic acid	64-19-7	May cause respiratory irritation.

Substances	CAS Number	STOT - repeated exposure
Acetic acid	64-19-7	Not applicable due to corrosivity of the substance.

Substances	CAS Number	Aspiration hazard
Acetic acid	64-19-7	Not applicable

12. Ecological Information

12.1. Toxicity

Ecotoxicity effects

Product is not classified as hazardous to the environment.

Product Ecotoxicity Data

No data available

Substance Ecotoxicity Data

Substances	CAS Number	Toxicity to Algae	Toxicity to Fish	Toxicity to Microorganisms	Toxicity to Invertebrates
Acetic acid	64-19-7	EC50 (72 h) =55.22 mg/L (Anabaena) (Effect concentrations in the aquatic environment are attributable to a	LC50 (96 h) =75 mg/L (Lepomis macrochirus) LC50 (96 h) =251 mg/L (Gambusia affinis) (Effect concentrations in	NOAEC (16 h) =1150 mg/L (Pseudomonas putida)	EC50 (48 h) =65 mg/L (Daphnia magna) (Effect concentrations in the aquatic environment are attributable to a

		change in pH value.)	the aquatic environment are attributable to a change in pH value.)		change in pH value.)

12.2. Persistence and degradability

Substances	CAS Number	Persistence and Degradability
Acetic acid	64-19-7	Readily biodegradable (99% @ 7d)

12.3. Bioaccumulative potential

Substances	CAS Number	Log Pow
Acetic acid	64-19-7	Log Kow =-0.17

12.4. Mobility in soil

Substances	CAS Number	Mobility
Acetic acid	64-19-7	No information available

12.5 Other adverse effects

No information available

13. Disposal Considerations

13.1. Waste treatment methods

Disposal methods Disposal should be made in accordance with federal, state, and local regulations.
Contaminated Packaging Follow all applicable national or local regulations.

14. Transport Information

Canadian TDG

UN Number UN2790
UN proper shipping name: Acetic Acid Solution
Transport Hazard Class(es): 8 (3)
Packing Group: III
Environmental Hazards: Not applicable

US DOT

UN Number UN2790
UN proper shipping name: Acetic Acid Solution
Transport Hazard Class(es): 8 (3)
Packing Group: III
Environmental Hazards: Not applicable
Reportable Quantity: RQ (Acetic Acid - 5683 kg.)
NAERG: NAERG 153

IMDG/IMO

UN Number UN2790
UN proper shipping name: Acetic Acid Solution
Transport Hazard Class(es): 8 (3)
Packing Group: III
Environmental Hazards: Not applicable
Reportable Quantity: RQ (Acetic Acid - 5683 kg.)
EMS: EmS F-A, S-B

IATA/ICAO

UN Number UN2790

UN proper shipping name: Acetic Acid Solution
Transport Hazard Class(es): 8 (3)
Packing Group: III
Environmental Hazards: Not applicable
Reportable Quantity: RQ (Acetic Acid - 5683 kg.)

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code Not applicable
Special Precautions for User None

15. Regulatory Information

Canadian Regulations

Canadian Domestic Substances List (DSL) All components listed on inventory or are exempt.

US Regulations

US TSCA Inventory All components listed on inventory or are exempt.

TSCA Significant New Use Rules - S5A2

Substances	CAS Number	TSCA Significant New Use Rules - S5A2
Acetic acid	64-19-7	Not applicable

EPA SARA Title III Extremely Hazardous Substances

Substances	CAS Number	EPA SARA Title III Extremely Hazardous Substances
Acetic acid	64-19-7	Not applicable

EPA SARA (311,312) Hazard Class

Acute Health Hazard
Fire Hazard

EPA SARA (313) Chemicals

Substances	CAS Number	Toxic Release Inventory (TRI) - Group I	Toxic Release Inventory (TRI) - Group II
Acetic acid	64-19-7	Not applicable	Not applicable

EPA CERCLA/Superfund Reportable Spill Quantity

Substances	CAS Number	CERCLA RQ
Acetic acid	64-19-7	5000 lb 2270 kg

EPA RCRA Hazardous Waste Classification

If product becomes a waste, it does meet the criteria of a hazardous waste as defined by the US EPA, because of:

Ignitability D001

NFPA Ratings: Health 2, Flammability 2, Reactivity 0
HMIS Ratings: Health 2, Flammability 2, Reactivity 0

16. Other information

Preparation Information

Prepared By Chemical Stewardship
Telephone: 1-281-871-6107
e-mail: fdunexchem@halliburton.com

Revision Date:	04-Oct-2016
Reason for Revision	SDS sections updated: 2

Additional information
For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Safety Data Sheet for this or other Halliburton products, contact Chemical Stewardship at 1-580-251-4335.

Key or legend to abbreviations and acronyms used in the safety data sheet
bw – body weight
CAS – Chemical Abstracts Service
EC50 – Effective Concentration 50%
ErC50 – Effective Concentration growth rate 50%
LC50 – Lethal Concentration 50%
LD50 – Lethal Dose 50%
LL50 – Lethal Loading 50%
mg/kg – milligram/kilogram
mg/L – milligram/liter
NIOSH – National Institute for Occupational Safety and Health
NTP – National Toxicology Program
OEL – Occupational Exposure Limit
PEL – Permissible Exposure Limit
ppm – parts per million
STEL – Short Term Exposure Limit
TWA – Time-Weighted Average
UN – United Nations
h - hour
mg/m^3 - milligram/cubic meter
mm - millimeter
mmHg - millimeter mercury
w/w - weight/weight
d - day

Key literature references and sources for data
www.ChemADVISOR.com/

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End of Safety Data Sheet

HALLIBURTON

SAFETY DATA SHEET

CITRIC ACID

Revision Date: 14-May-2015 **Revision Number:** 33

1. Product and Company Identification

Product Name
Product Trade Name: CITRIC ACID

Other Names
Synonyms: None
Product Code: HM004421

Recommended Use
Recommended Use Scale Remover; pH Control
Uses Advised Against No information available

Company Name, Address and Contact Details
Manufacturer/Supplier Halliburton New Zealand
1 Paraite Rd,
Bell Block, New Plymouth
New Zealand Registration No.: 824207

E-Mail address: fdunexchem@halliburton.com

Emergency Telephone Number +64-6-7559274

New Zealand National Poisons Centre 0800 764 766 (24 hours)

2. Hazard(s) Identification

Statement of Hazardous Nature
Classified as hazardous according to criteria in the Hazardous Substances (Minimum Degrees of Hazard) Regulation 2001; Not Classified as dangerous good according to NZS 5433:2012, UN, IMDG or IATA

Classification
6.1E (Inhalation) Acutely Toxic Substances
6.3B Mildly irritating to the skin
8.3A Corrosive to ocular tissue

Hazard and Precautionary Statements

Hazard Pictograms

Signal Word Danger

Hazard Statements
H316 - Causes mild skin irritation
H318 - Causes serious eye damage
H333 - May be harmful if inhaled

Precautionary Statements

Prevention P101 - If medical advice is needed, have product container or label at hand

P102 - Keep out of reach of children
P103 - Read label before use
P104 - Read Safety Data Sheet before use.
P280 - Wear eye protection/face protection

Response

P304 + P312 - IF INHALED: Call a POISON CENTER or doctor/physician if you feel unwell
P331 - Do NOT induce vomiting
P332 + P313 - If skin irritation occurs: Get medical advice/attention
P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P310 - Immediately call a POISON CENTER or doctor/physician

Storage

None

Disposal

P501 - Dispose of contents/container in accordance with local/regional/national/international regulations

Contains

Substances	CAS Number	Substance HSNO Classification
Citric acid	77-92-9	6.1E (Inhalation) 6.3B 8.3A

2.3. Other Hazards

This substance is not considered to be persistent, bioaccumulating nor toxic (PBT).
This substance is not considered to be very persistent nor very bioaccumulating (vPvB).

3. Composition and Information on Ingredients

Substances	CAS Number	PERCENT (w/w)
Citric acid	77-92-9	60 - 100%

4. First-Aid Measures

Requirements for First Aid or Medical Care

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Eyes Immediately flush eyes with large amounts of water for at least 15 minutes. Get immediate medical attention.

Skin For skin contact, wipe away excess material with dry towel. Then wash affected areas with plenty of water, and soap if available, for several minutes. Get medical attention if irritation occurs.

Ingestion Do NOT induce vomiting. Give nothing by mouth. Obtain immediate medical attention.

Workplace Facilities Required

None

Relation to Health Effect

Most Important Symptoms/Effects

Causes eye irritation. Causes eye irritation

Medical Attention and Special Treatment

Notes to Physician

Treat symptomatically

5. Fire-fighting measures

Type of Hazard

Flammability Hazard

Combustible dust when in finely divided and highly suspended state.

5.1. Extinguishing media

Suitable Extinguishing Media

Water fog, carbon dioxide, foam, dry chemical.

Extinguishing media which must not be used for safety reasons
None known.

HAZCHEM Code
Hazchem Code: None Allocated

Special Protective Equipment and Precautions for Fire Fighters
Special Protective Equipment for Fire-Fighters
Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.
Special Exposure Hazards
Decomposition in fire may produce harmful gases. Organic dust in the presence of an ignition source can be explosive in high concentrations. Good housekeeping practices are required to minimize this potential.

6. Spillage, Accidental Release Measures

6.1. Personal precautions, protective equipment and emergency procedures
Use appropriate protective equipment. Avoid creating and breathing dust. Avoid contact with skin, eyes and clothing. Ensure adequate ventilation.
See Section 8 for additional information

6.2. Environmental precautions
Prevent from entering sewers, waterways, or low areas.

6.3. Methods and material for containment and cleaning up
Scoop up and remove.

6.4. Reference to other sections
See Section 8 and 13 for additional information.

7. Handling and storage

7.1. Precautions for Safe Handling
Handling Precautions
Avoid contact with eyes, skin, or clothing. Avoid creating or inhaling dust. Ensure adequate ventilation. Wash hands after use. Launder contaminated clothing before reuse. Use appropriate protective equipment.

Handling Practices
Hygiene Measures
Handle in accordance with good industrial hygiene and safety practice.

Approved Handlers
This product does NOT require an approved handler.

7.2. Conditions for safe storage, including any incompatibilities
Store in a cool, dry location. Product has a shelf life of 60 months.

Store Site Requirements
No special controls required

Packaging
No special packaging required

8. Exposure Controls and Personal Protection

Workplace Exposure Standards
Exposure Limits

Substances	CAS Number	New Zealand WES	ACGIH TLV-TWA
Citric acid	77-92-9	Not applicable	Not applicable

Engineering Controls
Engineering Controls Use in a well ventilated area.

Personal Protective Equipment (PPE)
Respiratory Protection If engineering controls and work practices cannot keep exposure below occupational exposure limits or if exposure is unknown, wear a NIOSH certified, European Standard

	EN 149, AS/NZS 1715:2009, or equivalent respirator when using this product. Selection of and instruction on using all personal protective equipment, including respirators, should be performed by an Industrial Hygienist or other qualified professional. Dust/mist respirator. (N95, P2/P3)
Hand Protection	Chemical-resistant protective gloves (EN 374) Suitable materials for longer, direct contact (recommended: protection index 6, corresponding to > 480 minutes permeation time as per EN 374): Nitrile gloves. (>= 0.35 mm thickness) This information is based on literature references and on information provided by glove manufacturers, or is derived by analogy with similar substances. Please note that in practice the working life of chemical-resistant protective gloves may be considerably shorter than the permeation time determined in accordance with EN 374 as a result of the many influencing factors (e.g. temperature). If signs of wear and tear are noticed then the gloves should be replaced. Manufacturer's directions for use should be observed because of great diversity of types.
Skin Protection	Normal work coveralls.
Eye Protection	Chemical goggles; also wear a face shield if splashing hazard exists.
Other Precautions	None known.
Hygiene Measures	Handle in accordance with good industrial hygiene and safety practice.

9. Physical and Chemical Properties

9.1. Information on basic physical and chemical properties

Physical State:	Solid	**Color:**	White
Odor:	Odorless	**Odor Threshold:**	No information available

Property Remarks/ - Method	Values
pH:	1.8
Freezing Point/Range	No data available
Melting Point/Range	153 °C / 307.4 °F
Boiling Point/Range	Decomposes
Flash Point	345 °C / 653 °F
upper flammability limit	65
lower flammability limit	%
Evaporation rate	No data available
Vapor Pressure	0.00000221 Pa
Vapor Density	No data available
Specific Gravity	1.66
Water Solubility	Soluble in water
Solubility in other solvents	No data available
Partition coefficient: n-octanol/water	-1.61 to -1.80
Autoignition Temperature	1010 °C / 1832 °F
Decomposition Temperature	No data available
Viscosity	No data available
Explosive Properties	No information available
Oxidizing Properties	No information available

9.2. Other information

Molecular Weight	192.12
VOC Content (%)	No data available

10. Stability and Reactivity

10.2. Chemical Stability
Stable

10.4. Conditions to Avoid
None anticipated

10.5. Incompatible Materials
Strong alkalis.

10.6. Hazardous Decomposition Products
Carbon monoxide and carbon dioxide.

Hazardous Reactions

Hazardous Polymerization: Will Not Occur

11. Toxicological Information

Health Effect from Likely Routes of Exposure
Acute Toxicity

Inhalation May cause mild respiratory irritation.
Eye Contact Causes eye irritation.
Skin Contact May cause mild skin irritation.
Ingestion Irritation of the mouth, throat, and stomach. May cause abdominal pain, vomiting, nausea, and diarrhea.

Chronic Effects/Carcinogenicity No data available to indicate product or components present at greater than 0.1% are chronic health hazards.

Toxicity Data

Toxicology data for the components

Substances	CAS Number	LD50 Oral	LD50 Dermal	LC50 Inhalation
Citric acid	77-92-9	5400 mg/kg (Rat) 5790 mg/kg (Mouse) 11,700 mg/kg (Rat)	> 2000 mg/kg	No data available

Substances	CAS Number	Skin corrosion/irritation
Citric acid	77-92-9	Not irritating to skin in rabbits.

Substances	CAS Number	Eye damage/irritation
Citric acid	77-92-9	Causes severe eye irritation.

Substances	CAS Number	Skin Sensitization
Citric acid	77-92-9	Patch test on human volunteers did not demonstrate sensitization properties

Substances	CAS Number	Respiratory Sensitization
Citric acid	77-92-9	No information available

Substances	CAS Number	Mutagenic Effects
Citric acid	77-92-9	Did not show mutagenic effects in animal experiments

Substances	CAS Number	Carcinogenic Effects
Citric acid	77-92-9	Did not show carcinogenic effects in animal experiments

Substances	CAS Number	Reproductive toxicity
Citric acid	77-92-9	Animal testing did not show any effects on fertility. Did not show teratogenic effects in animal experiments.

Substances	CAS Number	STOT - single exposure
Citric acid	77-92-9	No data of sufficient quality are available.

Substances	CAS Number	STOT - repeated exposure
Citric acid	77-92-9	No significant toxicity observed in animal studies at concentration requiring classification.

Substances	CAS Number	Aspiration hazard
Citric acid	77-92-9	No adverse health effects are expected from swallowing.

12. Ecological Information

12.1. Toxicity

Ecotoxicity Effects

Product Ecotoxicity Data

No data available

Substance Ecotoxicity Data

Substances	CAS Number	Toxicity to Algae	Toxicity to Fish	Toxicity to Microorganisms	Toxicity to Invertebrates
Citric acid	77-92-9	NOEC (8d) 425 mg/L (cell density) (Scenedesmus quadricauda) LOEC (8d) >80 mg/L (Microcystis aeruginosa)	LC50 (96h) 1516 mg/L (Lepomis macrochirus) LC50 (48h) 440 mg/L (Leuciscus idus melanotus) LC50 (96h) >100 mg/L (Pimephales promelas)	TT (72h) 485 mg/L (Entosiphon sulcatum)	TLM96 100-330 ppm (Crangon crangon) EC50 (24h) 1535 mg/L (Daphnia magna) LC50 (48h) 160 mg/L (Daphnia magna) EC50 (48h) >50 mg/L (Daphnia magna)

12.2. Persistence and degradability

Substances	CAS Number	Persistence and Degradability
Citric acid	77-92-9	Readily biodegradable (97% @ 28d)

12.3. Bioaccumulative potential

Substances	CAS Number	Log Pow
Citric acid	77-92-9	-1.61 to -1.80

12.4. Mobility in soil

Substances	CAS Number	Mobility
Citric acid	77-92-9	No information available

Ecotoxicity Hazard Statements

None known

12.6. Other adverse effects

Endocrine Disruptor Information

This product does not contain any known or suspected endocrine disruptors

13. Disposal Considerations

13.1. Waste treatment methods

Disposal Method Bury in a licensed landfill according to federal, state, and local regulations.

Contaminated Packaging Follow all applicable national or local regulations. Contaminated packaging may be disposed of by: rendering packaging incapable of containing any substance, or treating packaging to remove residual contents, or treating packaging to make sure the residual contents are no longer hazardous, or by disposing of packaging into commercial waste collection.

14. Transport Information

IMDG/IMO

UN Number: Not restricted
UN Proper Shipping Name: Not restricted
Transport Hazard Class(es): Not applicable
Packing Group: Not applicable
Environmental Hazards: Not applicable

NZ 5433.1999

UN Number: Not restricted
UN Proper Shipping Name: Not restricted
Transport Hazard Class(es): Not applicable
Packing Group: Not applicable

IATA/ICAO

UN Number:	Not restricted
UN Proper Shipping Name:	Not restricted
Transport Hazard Class(es):	Not applicable
Packing Group:	Not applicable

Special Precautions for User: None
Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code: Not applicable

15. Regulatory Information

New Zealand Inventory of Chemicals All components listed on inventory or are exempt.

Group Name Not Applicable
ERMA Register Approval Number HSR003138

HSNO Controls Refer to the NZ EPA website for more information: http://www.epa.govt.nz

Approved Handlers Not Applicable

Poisons Schedule: None Allocated

16. Other information

The following sections have been revised since the last issue of this SDS
Not applicable

Additional information For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Safety Data Sheet for this or other Halliburton products, contact Chemical Stewardship at 1-580-251-4335.

Key literature references and sources for data
www.ChemADVISOR.com/
OSHA
ECHA C&L
NZ CCID

Revision Date: 14-May-2015
Revision Note Revision Note
SDS sections updated:
2

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End of Safety Data Sheet

NALCO Champion
An Ecolab Company

SAFETY DATA SHEET

NALCO® EC6733A

Section: 1. PRODUCT AND COMPANY IDENTIFICATION

Product name	:	NALCO® EC6733A
Other means of identification	:	Not applicable.
Recommended use	:	BIOCIDE
Restrictions on use	:	Refer to available product literature or ask your local Sales Representative for restrictions on use and dose limits.
Company	:	ECOLAB PTY LTD 2 Drake Avenue Macquarie Park NSW 2113 Australia A.B.N. 59 000 449 990 TEL: 1300 654 224 FAX: +61 2 8870 8680
Emergency telephone number	:	1800 205 506 International: +64 7 958 2372
Issuing date	:	24.06.2016

Section: 2. HAZARDS IDENTIFICATION

GHS Classification

Flammable liquids	:	Category 4
Acute toxicity (Oral)	:	Category 4
Acute toxicity (Inhalation)	:	Category 2
Skin corrosion/irritation	:	Category 1B
Serious eye damage/eye irritation	:	Category 1
Skin sensitization	:	Category 1
Carcinogenicity	:	Category 1A
Reproductive toxicity	:	Category 2

GHS Label element

Hazard pictograms :

Signal Word : Danger

Hazard Statements : Combustible liquid
Harmful if swallowed.
Causes severe skin burns and eye damage.
May cause an allergic skin reaction.
Fatal if inhaled.
May cause cancer.
Suspected of damaging fertility or the unborn child.

Precautionary Statements : **Prevention:**
Keep away from heat/sparks/open flames/hot surfaces. - No smoking. Do not breathe dust/fume/gas/mist/vapours/spray. Wear protective gloves/ protective clothing/ eye protection/ face protection. Use personal protective equipment as required. Wear respiratory protection.

Response:
IF SWALLOWED: Call a POISON CENTER or doctor/ physician if you feel unwell. Rinse mouth.IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Immediately call a POISON CENTER or doctor/ physician.IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER or doctor/ physician.

Other hazards : None known.

Section: 3. COMPOSITION/INFORMATION ON INGREDIENTS

Pure substance/mixture : Mixture

Chemical Name	CAS-No.	Concentration: (%)
Tetrakis(hydroxymethyl) phosphonium sulfate	55566-30-8	60 - 100
Benzyl-(C12-C16 Linear Alkyl)-Dimethyl-Ammonium Chloride	68424-85-1	5 - 10
Formaldehyde	50-00-0	0.1 - 1

Section: 4. FIRST AID MEASURES

In case of eye contact : Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention immediately.

In case of skin contact : Wash off immediately with plenty of water for at least 15 minutes. Use a mild soap if available. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

If swallowed : Contact the Poison's Information Centre (eg Australia 13 1126; New Zealand 0800 764 766).

Rinse mouth with water. Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Get medical attention immediately.

If inhaled : Remove to fresh air. Treat symptomatically. Get medical attention immediately.

Protection of first-aiders : In event of emergency assess the danger before taking action. Do not put yourself at risk of injury. If in doubt, contact emergency responders. Use personal protective equipment as required.

Notes to physician : Treat symptomatically.

Most important symptoms and effects, both acute and delayed : See Section 11 for more detailed information on health effects and symptoms.

Section: 5. FIREFIGHTING MEASURES

Suitable extinguishing media : Foam
Carbon dioxide
Dry powder
Other extinguishing agent suitable for Class B fires
For large fires, use water spray or fog, thoroughly drenching the burning material.

Unsuitable extinguishing media	:	None known.
Specific hazards during firefighting	:	Fire Hazard Keep away from heat and sources of ignition. Flash back possible over considerable distance.
Hazardous combustion products	:	Decomposition products may include the following materials: Carbon oxides nitrogen oxides (NOx) Sulphur oxides Oxides of phosphorus
Special protective equipment for firefighters	:	Use personal protective equipment.
Specific extinguishing methods	:	Collect contaminated fire extinguishing water separately. This must not be discharged into drains. Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations. In the event of fire and/or explosion do not breathe fumes.
Hazchem Code	:	2X

Section: 6. ACCIDENTAL RELEASE MEASURES

Initial Emergency Response Guide No	:	36
Personal precautions, protective equipment and emergency procedures	:	Ensure adequate ventilation. Remove all sources of ignition. Keep people away from and upwind of spill/leak. Avoid inhalation, ingestion and contact with skin and eyes. When workers are facing concentrations above the exposure limit they must use appropriate certified respirators. Ensure clean-up is conducted by trained personnel only. Refer to protective measures listed in sections 7 and 8.
Environmental precautions	:	Do not allow contact with soil, surface or ground water.
Methods and materials for containment and cleaning up	:	Eliminate all ignition sources if safe to do so. Stop leak if safe to do so. Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13). Flush away traces with water. For large spills, dike spilled material or otherwise contain material to ensure runoff does not reach a waterway.

Section: 7. HANDLING AND STORAGE

Advice on safe handling	:	Take necessary action to avoid static electricity discharge (which might cause ignition of organic vapours). Do not ingest. Keep away from fire, sparks and heated surfaces. Do not breathe dust/fume/gas/mist/vapours/spray. Do not get in eyes, on skin, or on clothing. Wash hands thoroughly after handling. Use only with adequate ventilation.
Conditions for safe storage	:	Keep away from heat and sources of ignition. Keep away from oxidizing agents. Keep out of reach of children. Keep container tightly closed. Store in suitable labeled containers.
Suitable material	:	Keep in properly labelled containers.
Unsuitable material	:	not determined

Section: 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components	CAS-No.	Form of exposure	Permissible concentration	Basis
Tetrakis(hydroxymethyl) phosphonium sulfate	55566-30-8	TWA	2 mg/m3	ACGIH
Formaldehyde	50-00-0	TWA	1 ppm 1.2 mg/m3	AU OEL
		VLE	2 ppm 2.5 mg/m3	AU OEL
Formaldehyde	50-00-0	WES-TWA	0.5 ppm	NZ OEL
		WES-TWA	0.33 ppm	NZ OEL
		WES-Ceiling	1 ppm	NZ OEL
Formaldehyde	50-00-0	Ceiling	0.3 ppm	ACGIH
		TWA	0.016 ppm	NIOSH REL
		Ceiling	0.1 ppm	NIOSH REL
		PEL	0.75 ppm	OSHA CARC
		STEL	2 ppm	OSHA CARC

Engineering measures : Effective exhaust ventilation system. Maintain air concentrations below occupational exposure standards.

Personal protective equipment

Eye protection : Safety goggles
Face-shield

Hand protection : Wear the following personal protective equipment:
Standard glove type.
Gloves should be discarded and replaced if there is any indication of degradation or chemical breakthrough.

Skin protection : Personal protective equipment comprising: suitable protective gloves, safety goggles and protective clothing

Respiratory protection : When workers are facing concentrations above the exposure limit they must use appropriate certified respirators.

Hygiene measures : Handle in accordance with good industrial hygiene and safety practice. Remove and wash contaminated clothing before re-use. Wash face, hands and any exposed skin thoroughly after handling. Provide suitable facilities for quick drenching or flushing of the eyes and body in case of contact or splash hazard.

Section: 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance : Liquid

Colour : clear

Odour : Pungent

Flash point : 74 °C

pH : 4.0 - 4.5, 100 %

Odour Threshold : no data available

Melting point/freezing point : no data available

Initial boiling point and boiling range : 105 °C

Evaporation rate : no data available

Flammability (solid, gas)	:	no data available
Upper explosion limit	:	no data available
Lower explosion limit	:	no data available
Vapour pressure	:	17 kPa, (37.8 °C),
Relative vapour density	:	no data available
Relative density	:	1.32, (19 °C),
Density	:	10.3 lb/gal
Water solubility	:	completely soluble
Solubility in other solvents	:	no data available
Partition coefficient: n-octanol/water	:	no data available
Auto-ignition temperature	:	no data available
Thermal decomposition temperature	:	no data available
Viscosity, dynamic	:	33 mPa.s (19 °C)
Viscosity, kinematic	:	no data available
Molecular weight	:	no data available
VOC	:	no data available

Section: 10. STABILITY AND REACTIVITY

Chemical stability	:	Stable under normal conditions.
Possibility of hazardous reactions	:	No dangerous reaction known under conditions of normal use.
Conditions to avoid	:	Heat, flames and sparks.
Incompatible materials	:	Contact with strong oxidizers (e.g. chlorine, peroxides, chromates, nitric acid, perchlorate, concentrated oxygen, permanganate) may generate heat, fires, explosions and/or toxic vapors. Strong acids Strong Bases Reducing agents
Hazardous decomposition products	:	Decomposition products may include the following materials: Carbon oxides nitrogen oxides (NOx) Sulphur oxides Oxides of phosphorus

Section: 11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure	:	Inhalation, Eye contact, Skin contact

Potential Health Effects

Eyes	:	Causes serious eye damage.
Skin	:	Causes severe skin burns. May cause allergic skin reaction.

Ingestion	:	Harmful if swallowed. Causes digestive tract burns.
Inhalation	:	Fatal if inhaled. May cause nose, throat, and lung irritation.
Chronic Exposure	:	May cause cancer. Suspected of damaging fertility or the unborn child.

Experience with human exposure

Eye contact	:	Redness, Pain, Corrosion
Skin contact	:	Redness, Pain, Irritation, Corrosion, Allergic reactions
Ingestion	:	Corrosion, Abdominal pain
Inhalation	:	Respiratory irritation, Cough

Toxicity

Product

Acute oral toxicity	:	LD50 rat: 575 mg/kg Test substance: 75% Active Ingredient
Acute inhalation toxicity	:	LC50 rat: 0.591 mg/l Exposure time: 4 hrs Test substance: 75% Active Ingredient
Acute dermal toxicity	:	LD50 rat: > 2,000 mg/kg Test substance: 75% Active Ingredient
Skin corrosion/irritation	:	no data available
Serious eye damage/eye irritation	:	no data available
Respiratory or skin sensitization	:	no data available
Carcinogenicity	:	No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
Reproductive effects	:	Suspected of damaging fertility or the unborn child.
Germ cell mutagenicity	:	Contains no ingredient listed as a mutagen
Teratogenicity	:	no data available
STOT - single exposure	:	no data available
STOT - repeated exposure	:	no data available
Aspiration toxicity	:	No aspiration toxicity classification

Human Hazard Characterization

Based on our hazard characterization, the potential human hazard is: High

Section: 12. ECOLOGICAL INFORMATION

Ecotoxicity

Environmental Effects	:	This product has no known ecotoxicological effects.

Product

Toxicity to fish	:	LC50 Lepomis macrochirus (Bluegill sunfish): 93 mg/l Exposure time: 96 hrs Test substance: 75% Active Ingredient LC50 Oncorhynchus mykiss (rainbow trout): 119 mg/l Exposure time: 96 hrs Test substance: 75% Active Ingredient
Toxicity to daphnia and other aquatic invertebrates	:	EC50 Daphnia magna (Water flea): 19.4 mg/l Exposure time: 48 hrs Test substance: 75% Active Ingredient
Toxicity to algae	:	LC50 Green Algae (Pseudokirchneriella subcapitata, previously Selenastrum capricornutum): 0.20 mg/l Exposure time: 96 hrs Test substance: 75% Active Ingredient
Toxicity to bacteria	:	EC50 Bacteria: 24 mg/l Exposure time: 3 hrs Test substance: 75% Active Ingredient

Components

Toxicity to fish (Chronic toxicity)	:	Formaldehyde LC50: 21 mg/l Exposure time: 96 h

Persistence and degradability

The organic portion of this preparation is expected to be readily biodegradable.

Mobility

The environmental fate was estimated using a level III fugacity model embedded in the EPI (estimation program interface) Suite TM, provided by the US EPA. The model assumes a steady state condition between the total input and output. The level III model does not require equilibrium between the defined media. The information provided is intended to give the user a general estimate of the environmental fate of this product under the defined conditions of the models.
If released into the environment this material is expected to distribute to the air, water and soil/sediment in the approximate respective percentages;

Air	:	<5%
Water	:	30 - 50%
Soil	:	50 - 70%

The portion in water is expected to be soluble or dispersible.

Bioaccumulative potential

This preparation or material is not expected to bioaccumulate.

Other information

no data available

ENVIRONMENTAL HAZARD AND EXPOSURE CHARACTERIZATION
Based on our hazard characterization, the potential environmental hazard is: Low

Section: 13. DISPOSAL CONSIDERATIONS

Disposal methods	:	The product should not be allowed to enter drains, water courses or the soil. Where possible recycling is preferred to disposal or incineration. If recycling is not practicable, dispose of in compliance with local regulations. Dispose of wastes in an approved waste disposal facility.
Disposal considerations	:	Dispose of as unused product. Empty containers should be taken to an approved waste handling site for recycling or disposal. Do not re-use empty containers.

Section: 14. TRANSPORT INFORMATION

The shipper/consignor/sender is responsible to ensure that the packaging, labeling, and markings are in compliance with the selected mode of transport.

Land transport

Proper shipping name	:	TOXIC LIQUID, ORGANIC, N.O.S.
Technical name(s):	:	Tetrakis(hydroxymethyl) phosphonium sulfate
UN/ID No.	:	UN 2810
Transport hazard class(es)	:	6.1
Packing group	:	III
IERG No	:	36
Hazchem Code	:	2X
Special precautions for user	:	Dangerous goods of Class 6 (Toxic and Infectious Substances) and fire risk substances and combustible liquids are incompatible in a placard load of the following: Class 1 Explosives Class 3 Nitromethane only Class 5.1 Oxidising agents Class 5.2 Organic peroxides and are incompatible with food or food packaging in any quantity.

Air transport (IATA)

UN/ID No.	:	UN 2810
Proper shipping name	:	TOXIC LIQUID, ORGANIC, N.O.S.
Technical name(s)	:	Tetrakis(hydroxymethyl) phosphonium sulfate
Transport hazard class(es)	:	6.1
Packing group	:	III

Sea transport (IMDG/IMO)

UN/ID No.	:	UN 2810
Proper shipping name	:	TOXIC LIQUID, ORGANIC, N.O.S.
Technical name(s)	:	Tetrakis(hydroxymethyl) phosphonium sulfate
Transport hazard class(es)	:	6.1
Packing group	:	III
Marine pollutant	:	Benzyl-(C12-C16 Linear Alkyl)-Dimethyl-Ammonium Chloride

Section: 15. REGULATORY INFORMATION

Standard for the Uniform Scheduling of Medicines and Poisons	:	Schedule 6

INTERNATIONAL CHEMICAL CONTROL LAWS :

TOXIC SUBSTANCES CONTROL ACT (TSCA)
This product has not been evaluated for Chemical Inventory regulations and may contain substances not found on Inventory Lists such as TSCA, EINECS, DSL, etc.. This product should be used under the applicable Research and Development provisions of local notification regulations.

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA)
This product contains substance(s) which are found on the Non-Domestic Substances List (NDSL), or are not in compliance with other Canadian Acts.

AUSTRALIA
All substances in this product comply with the National Industrial Chemicals Notification & Assessment Scheme (NICNAS).

CHINA
All substances in this product comply with the Provisions on the Environmental Administration of New Chemical Substances and are listed on or exempt from the Inventory of Existing Chemical Substances China (IECSC).

JAPAN
All substances in this product comply with the Law Regulating the Manufacture and Importation Of Chemical Substances and are listed on the Existing and New Chemical Substances list (ENCS).

KOREA
All substances in this product comply with the Chemical Control Act (CCA) and are listed on the Existing Chemicals List (ECL)

PHILIPPINES
All substances in this product comply with the Republic Act 6969 (RA 6969) and are listed on the Philippines Inventory of Chemicals & Chemical Substances (PICCS).

Section: 16. OTHER INFORMATION

REFERENCES

Hazardous Substances Data Bank, National Library of Medicine, Bethesda, Maryland (TOMES CPS™ CD-ROM Version), Micromedex, Inc., Englewood, CO.

IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man, Geneva: World Health Organization, International Agency for Research on Cancer.

Integrated Risk Information System, U.S. Environmental Protection Agency, Washington, D.C. (TOMES CPS™ CD-ROM Version),
Micromedex, Inc., Englewood, CO.

Annual Report on Carcinogens, National Toxicology Program, U.S. Department of Health and Human Services, Public Health Service.

Registry of Toxic Effects of Chemical Substances, National Institute for Occupational Safety and Health, Cincinnati, OH,
(TOMES CPS™ CD-ROM Version), Micromedex, Inc., Englewood, CO.

The Teratogen Information System, University of Washington, Seattle, WA (TOMES CPS™ CD-ROM Version), Micromedex, Inc., Englewood, CO.

Revision Date	:	24.06.2016
Date of first issue	:	24.06.2016
Version Number	:	1.0
Prepared By	:	Regulatory Affairs

REVISED INFORMATION: Significant changes to regulatory or health information for this revision is indicated by a bar in the left-hand margin of the SDS.

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

HALLIBURTON

SAFETY DATA SHEET

SODA ASH F.G.

Revision Date: 27-Jun-2016 **Revision Number:** 23

1. Product Identifier & Identity for the Chemical

Statement of Hazardous Nature Hazardous according to the criteria of the 3rd Revised Edition of the Globally Harmonised System of Classification and Labelling of Chemicals (GHS), Non-Dangerous Goods according to the criteria of ADG.

1.1. Product Identifier

Product Name SODA ASH F.G.

Other means of Identification

Synonyms None

Hazardous Material Number: HM003760

Recommended use of the chemical and restrictions on use

Recommended Use pH Control

Uses advised against No information available

Supplier's name, address and phone number

Manufacturer/Supplier

Halliburton/Baroid Australia Pty. Ltd.
15 Marriott Road
Jandakot
WA 6164
Australia

ACN Number: 009 000 775
Telephone Number: 61 (08) 9455 8300
Fax Number: 61 (08) 9455 5300

Product Emergency Telephone
Australia: + 61 1 800 686 951
Papua New Guinea: + 61 1 800 686 951
NewZealand: +64 800 451719

Fire, Police & Ambulance - Emergency Telephone
Australia: 000
Papua New Guinea: 000
New Zealand: 111

E-mail Address fdunexchem@halliburton.com

Emergency phone number

+ 61 1 800 686 951

Australian Poisons Information Centre
24 Hour Service: - 13 11 26
Police or Fire Brigade: - 000 (exchange): - 1100

2. Hazard Identification

Statement of Hazardous Nature Hazardous according to the criteria of the 3rd Revised Edition of the Globally Harmonised System of Classification and Labelling of Chemicals (GHS), Non-Dangerous Goods according to the criteria of ADG.

Classification of the hazardous chemical

Serious Eye Damage/Irritation	Category 2 - H319

Label elements, including precautionary statements

Hazard pictograms

Signal Word Warning

Hazard Statements: H319 - Causes serious eye irritation

Precautionary Statements

Prevention P264 - Wash face, hands and any exposed skin thoroughly after handling
P280 - Wear eye protection/face protection

Response P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P337 + P313 - If eye irritation persists: Get medical advice/attention

Storage None

Disposal None

Contains

Substances	**CAS Number**
Sodium carbonate	497-19-8

Other hazards which do not result in classification

This substance is not considered to be persistent, bioaccumulating nor toxic (PBT).
This substance is not considered to be very persistent nor very bioaccumulating (vPvB).

For the full text of the H-phrases mentioned in this Section, see Section 16

3. Composition/information on Ingredients

Substances	CAS Number	PERCENT (w/w)	GHS Classification - Australia
Sodium carbonate	497-19-8	60 - 100%	Eye Irrit. 2 (H319)

4. First aid measures

Description of necessary first aid measures

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Eyes In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.

Skin Wash with soap and water. Get medical attention if irritation persists.

Ingestion Do NOT induce vomiting. Give nothing by mouth. Obtain immediate medical attention.

Symptoms caused by exposure

Causes eye irritation

Medical Attention and Special Treatment
Notes to Physician Treat symptomatically

5. Fire Fighting Measures

Suitable extinguishing equipment
Suitable Extinguishing Media
Water fog, carbon dioxide, foam, dry chemical.
Extinguishing media which must not be used for safety reasons
None known.

Specific hazards arising from the chemical
Special exposure hazards in a fire
Decomposition in fire may produce harmful gases.

Special protective equipment and precautions for fire fighters
Special protective equipment for firefighters
Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

6. Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures
Use appropriate protective equipment. Avoid creating and breathing dust. Ensure adequate ventilation. Avoid contact with skin, eyes and clothing.

6.2. Environmental precautions
Prevent from entering sewers, waterways, or low areas.

6.3. Methods and material for containment and cleaning up
Scoop up and remove.

7. Handling and storage

7.1. Precautions for safe handling
Handling Precautions
Avoid contact with eyes, skin, or clothing. Avoid creating or inhaling dust. Ensure adequate ventilation. Wash hands after use. Launder contaminated clothing before reuse. Use appropriate protective equipment.
Hygiene Measures
Handle in accordance with good industrial hygiene and safety practice.

7.2. Conditions for safe storage, including any incompatibilities
Storage Information
Store away from acids. Store in a cool, dry location. Product has a shelf life of 36 months.
Other Guidelines
No information available

8. Exposure Controls/Personal Protection

Control parameters - exposure standards, biological monitoring
Exposure Limits

Substances	CAS Number	Australia NOHSC	ACGIH TLV-TWA
Sodium carbonate	497-19-8	Not applicable	Not applicable

Appropriate engineering controls
Engineering Controls Use in a well ventilated area. Localized ventilation should be used to control dust levels.

Personal protective equipment (PPE)

Personal Protective Equipment	If engineering controls and work practices cannot prevent excessive exposures, the selection and proper use of personal protective equipment should be determined by an industrial hygienist or other qualified professional based on the specific application of this product.
Respiratory Protection	If engineering controls and work practices cannot keep exposure below occupational exposure limits or if exposure is unknown, wear a NIOSH certified, European Standard EN 149, AS/NZS 1715:2009, or equivalent respirator when using this product. Selection of and instruction on using all personal protective equipment, including respirators, should be performed by an Industrial Hygienist or other qualified professional. Dust/mist respirator. (N95, P2/P3)
Hand Protection	Normal work gloves.
Skin Protection	Normal work coveralls.
Eye Protection	Dust proof goggles.
Other Precautions	None known.
Environmental Exposure Controls	Do not allow material to contaminate ground water system

9. Physical and Chemical Properties

9.1. Information on basic physical and chemical properties

Physical State:	Powder	**Color**	White to off white
Odor:	Odorless	**Odor Threshold:**	No information available

Property Remarks/ - Method	Values
pH:	11.5
Freezing Point / Range	No data available
Melting Point / Range	No data available
Boiling Point / Range	No data available
Flash Point	No data available
Evaporation rate	No data available
Vapor Pressure	No data available
Vapor Density	No data available
Specific Gravity	2.5
Water Solubility	Partly soluble
Solubility in other solvents	No data available
Partition coefficient: n-octanol/water	No data available
Autoignition Temperature	No data available
Decomposition Temperature	No data available
Viscosity	No data available
Explosive Properties	No information available
Oxidizing Properties	No information available

9.2. Other information

Molecular Weight	105.99 g/mol
VOC Content (%)	No data available

10. Stability and Reactivity

10.1. Reactivity
Not expected to be reactive.
10.2. Chemical stability
Stable
10.3. Possibility of hazardous reactions
Will Not Occur
10.4. Conditions to avoid
None anticipated
10.5. Incompatible materials
Strong acids.
10.6. Hazardous decomposition products
Carbon monoxide and carbon dioxide.

11. Toxicological Information

Information on routes of exposure
Principle Route of Exposure Eye or skin contact, inhalation.

Symptoms related to exposure
Most Important Symptoms/Effects
Causes eye irritation

Numerical measures of toxicity

Toxicology data for the components

Substances	CAS Number	LD50 Oral	LD50 Dermal	LC50 Inhalation
Sodium carbonate	497-19-8	4090 mg/kg (Rat) 2800 mg/kg (Rat)	2210 mg/kg (Mouse) > 2000 mg/kg (Rabbit)	2.3 mg/L (Rat) 2h

Immediate, delayed and chronic health effects from exposure
Inhalation None known.
Eye Contact May cause eye irritation.
Skin Contact None known.
Ingestion Irritation of the mouth, throat, and stomach.

Chronic Effects/Carcinogenicity No data available to indicate product or components present at greater than 0.1% are chronic health hazards.

Exposure Levels
No data available

Interactive effects
None known.

Data limitations
No data available

Substances	CAS Number	Skin corrosion/irritation
Sodium carbonate	497-19-8	Non-irritating to the skin

Substances	CAS Number	Serious eye damage/irritation
Sodium carbonate	497-19-8	Irritating to eyes

Substances	CAS Number	Skin Sensitization
Sodium carbonate	497-19-8	Not classified

Substances	CAS Number	Respiratory Sensitization
Sodium carbonate	497-19-8	No information available

Substances	CAS Number	Mutagenic Effects
Sodium carbonate	497-19-8	In vivo tests did not show mutagenic effects.

Substances	CAS Number	Carcinogenic Effects
Sodium carbonate	497-19-8	No information available

Substances	CAS Number	Reproductive toxicity
Sodium carbonate	497-19-8	Did not show teratogenic effects in animal experiments.

Substances	CAS Number	STOT - single exposure
Sodium carbonate	497-19-8	No significant toxicity observed in animal studies at concentration requiring classification.

Substances	CAS Number	STOT - repeated exposure
Sodium carbonate	497-19-8	No significant toxicity observed in animal studies at concentration requiring classification.

Substances	CAS Number	Aspiration hazard
Sodium carbonate	497-19-8	Not applicable

12. Ecological Information

Ecotoxicity

Product Ecotoxicity Data

No data available

Substance Ecotoxicity Data

Substances	CAS Number	Toxicity to Algae	Toxicity to Fish	Toxicity to Microorganisms	Toxicity to Invertebrates
Sodium carbonate	497-19-8	EC50 242 mg/L (Nitzschia)	TLM24 385 mg/L (Lepomis macrochirus) LC50 310-1220 mg/L (Pimephales promelas) LC50 (96h) 300 mg/L (Lepomis macrochirus)	No information available	EC50 265 mg/L (Daphnia magna) EC50 (48h) 200 – 227 mg/L (Ceriodaphnia sp.)

12.2. Persistence and degradability

Substances	CAS Number	Persistence and Degradability
Sodium carbonate	497-19-8	The methods for determining biodegradability are not applicable to inorganic substances.

12.3. Bioaccumulative potential

Substances	CAS Number	Log Pow
Sodium carbonate	497-19-8	No information available

12.4. Mobility in soil

Substances	CAS Number	Mobility
Sodium carbonate	497-19-8	No information available

12.6. Other adverse effects

Endocrine Disruptor Information

This product does not contain any known or suspected endocrine disruptors

13. Disposal Considerations

Safe handling and disposal methods

Bury in a licensed landfill according to federal, state, and local regulations.

Disposal of any contaminated packaging

Follow all applicable national or local regulations.

Environmental regulations

Not applicable

14. Transport Information

Transportation Information

UN Number Not restricted
UN proper shipping name: Not restricted
Transport Hazard Class(es): Not applicable
Packing Group: Not applicable
Environmental Hazards: Not applicable

Special precautions during transport
None

HazChem Code
None Allocated

15. Regulatory Information

Safety, health and environmental regulations specific for the product

International Inventories

Australian AICS Inventory	All components are listed on the AICS or are subject to a relevant exemption, permit, or assessment certificate.
New Zealand Inventory of Chemicals	All components are listed on the NZIoC or are subject to a relevant exemption, permit, or assessment certificate.
EINECS (European Inventory of Existing Chemical Substances)	This product, and all its components, complies with EINECS
US TSCA Inventory	All components listed on inventory or are exempt.
Canadian Domestic Substances List (DSL)	All components listed on inventory or are exempt.

Poisons Schedule number
None Allocated

International Agreements

Montreal Protocol - Ozone Depleting Substances:	Does not apply
Stolkhom Convention - Persistent Organic Pollutants:	Does not apply
Rotterdam Convention - Prior Informed Consent:	Does not apply
Basel Convention - Hazardous Waste:	Does not apply

16. Other information

Date of preparation or review

Revision Date: 27-Jun-2016

Revision Note
SDS sections updated: 2

Full text of H-Statements referred to under sections 2 and 3
H319 - Causes serious eye irritation

Additional information For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Safety Data Sheet for this or other Halliburton products, contact Chemical Stewardship at 1-580-251-4335.

Key abreviations or acronyms used
bw – body weight
CAS – Chemical Abstracts Service
EC50 – Effective Concentration 50%
LC50 – Lethal Concentration 50%
LD50 – Lethal Dose 50%
LL50 – Lethal Loading 50%
mg/kg – milligram/kilogram
mg/L – milligram/liter
NOEC – No Observed Effect Concentration
OEL – Occupational Exposure Limit
PBT – Persistent Bioaccumulative and Toxic

ppm – parts per million
STEL – Short Term Exposure Limit
TWA – Time-Weighted Average
vPvB – very Persistent and very Bioaccumulative
h - hour
mg/m^3 - milligram/cubic meter
mm - millimeter
mmHg - millimeter mercury
w/w - weight/weight
d - day

Key literature references and sources for data
www.ChemADVISOR.com/
NZ CCID

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End of Safety Data Sheet

HALLIBURTON

SAFETY DATA SHEET

SODIUM BICARBONATE

Revision Date: 22-Sep-2015 **Revision Number:** 26

1. Product Identifier & Identity for the Chemical

Statement of Hazardous Nature Non-Hazardous according to the criteria of the 3rd Revised Edition of the Globally Harmonised System of Classification and Labelling of Chemicals (GHS), Non-Dangerous Goods according to the criteria of ADG.

1.1. Product Identifier

Product Name SODIUM BICARBONATE

Other means of Identification

Synonyms: None

Product Code: HM001824

Recommended use of the chemical and restrictions on use

Recommended Use Buffer

Uses Advised Against No information available

Supplier's name, address and phone number

Manufacturer/Supplier Halliburton Australia Pty. Ltd.
15 Marriott Road
Jandakot
WA 6164
Australia

ACN Number: 009 000 775
Telephone Number: + 61 1 800 686 951
Fax Number: 61 (08) 9455 5300

E-Mail address: fdunexchem@halliburton.com

Emergency phone number

+ 61 1 800 686 951

Australian Poisons Information Centre

24 Hour Service: - 13 11 26

Police or Fire Brigade: - 000 (exchange): - 1100

2. Hazard Identification

Statement of Hazardous Nature Non-Hazardous according to the criteria of the 3rd Revised Edition of the Globally Harmonised System of Classification and Labelling of Chemicals (GHS), Non-Dangerous Goods according to the criteria of ADG.

Classification of the hazardous chemical

Not classified

Label elements, including precautionary statements

Hazard Pictograms

Signal Word Not Hazardous

Hazard Statements Not Classified

Precautionary Statements

Prevention None

Response None

Storage None

Disposal None

Contains

Substances	**CAS Number**
Contains no hazardous substances in concentrations above cut-off values according to the competent authority	NA

Other hazards which do not result in classification
This substance is not considered to be persistent, bioaccumulating nor toxic (PBT).
This substance is not considered to be very persistent nor very bioaccumulating (vPvB).

Australia Classification
For the full text of the H-phrases mentioned in this Section, see Section 16

Classification Not Classified
Risk Phrases None

3. Composition/information on Ingredients

Substances	CAS Number	PERCENT (w/w)	GHS Classification - Australia
Contains no hazardous substances in concentrations above cut-off values according to the competent authority	NA	60 - 100%	Not Applicable

4. First aid measures

Description of necessary first aid measures

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Eyes In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.

Skin Wash with soap and water. Get medical attention if irritation persists.

Ingestion Under normal conditions, first aid procedures are not required.

Symptoms caused by exposure
No significant hazards expected.

Medical Attention and Special Treatment
Notes to Physician Treat symptomatically

5. Fire Fighting Measures

Suitable extinguishing equipment
Suitable Extinguishing Media
All standard fire fighting media
Extinguishing media which must not be used for safety reasons
None known.

Specific hazards arising from the chemical
Special Exposure Hazards
Not applicable.

Special protective equipment and precautions for fire fighters
Special Protective Equipment for Fire-Fighters
Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

6. Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures
Use appropriate protective equipment. Avoid creating and breathing dust. Ensure adequate ventilation. Avoid contact with skin, eyes and clothing.

6.2. Environmental precautions
Prevent from entering sewers, waterways, or low areas.

6.3. Methods and material for containment and cleaning up
Scoop up and remove.

7. Handling and storage

7.1. Precautions for Safe Handling
Handling Precautions
Avoid creating or inhaling dust. Avoid contact with eyes, skin, or clothing. Ensure adequate ventilation. Wash hands after use. Launder contaminated clothing before reuse. Use appropriate protective equipment.
Hygiene Measures
Handle in accordance with good industrial hygiene and safety practice.

7.2. Conditions for safe storage, including any incompatibilities
Storage Information
Store away from acids. Store in a dry location.
Other Guidelines
No information available

8. Exposure Controls/Personal Protection

Control parameters - exposure standards, biological monitoring
Exposure Limits

Substances	CAS Number	Australia NOHSC	ACGIH TLV-TWA
Contains no hazardous substances in concentrations above cut-off values according to the competent authority	NA	Not applicable	Not applicable

Appropriate engineering controls
Engineering Controls A well ventilated area to control dust levels. Local exhaust ventilation should be used in areas without good cross ventilation.

Personal protective equipment (PPE)
Respiratory Protection Not normally needed. But if significant exposures are possible then the following respirator is recommended:
Dust/mist respirator. (N95, P2/P3)
Hand Protection Normal work gloves.
Skin Protection Normal work coveralls.
Eye Protection Wear safety glasses or goggles to protect against exposure.
Other Precautions None known.
Environmental Exposure Controls Do not allow material to contaminate ground water system

9. Physical and Chemical Properties

9.1. Information on basic physical and chemical properties

Physical State: Solid
Color: White
Odor: Odorless
Odor Threshold: No information available

Property Remarks/ - Method	Values
pH:	8
Freezing Point/Range	No data available
Melting Point/Range	No data available
Boiling Point/Range	No data available
Flash Point	No data available
Evaporation rate	No data available
Vapor Pressure	No data available
Vapor Density	No data available
Specific Gravity	2.16
Water Solubility	Soluble in water
Solubility in other solvents	No data available
Partition coefficient: n-octanol/water	No data available
Autoignition Temperature	No data available
Decomposition Temperature	No data available
Viscosity	No data available
Explosive Properties	No information available
Oxidizing Properties	No information available

9.2. Other information

VOC Content (%) No data available

10. Stability and Reactivity

10.1. Reactivity
Not expected to be reactive.
10.2. Chemical Stability
Stable
10.3. Possibility of Hazardous Reactions
Will Not Occur
10.4. Conditions to Avoid
None anticipated
10.5. Incompatible Materials
Strong acids.
10.6. Hazardous Decomposition Products
Carbon monoxide and carbon dioxide.

11. Toxicological Information

Information on routes of exposure
Principle Route of Exposure Eye or skin contact, inhalation.

Sympotoms related to exposure
Most Important Symptoms/Effects
No significant hazards expected.

Numerical measures of toxicity

Toxicology data for the components

Substances	CAS Number	LD50 Oral	LD50 Dermal	LC50 Inhalation
Contains no hazardous substances in concentrations above	NA	No data available	No data available	No data available

cut-off values according to the competent authority				

Immediate, delayed and chronic health effects from exposure

Inhalation May cause mild respiratory irritation.
Eye Contact May cause mild eye irritation.
Skin Contact May cause mild skin irritation.
Ingestion None known.

Chronic Effects/Carcinogenicity No data available to indicate product or components present at greater than 0.1% are chronic health hazards.

Exposure Levels
No data available

Interactive effects
None known.

Data limitations
No data available

Substances	CAS Number	Skin corrosion/irritation
Contains no hazardous substances in concentrations above cut-off values according to the competent authority	NA	Not applicable.

Substances	CAS Number	Eye damage/irritation
Contains no hazardous substances in concentrations above cut-off values according to the competent authority	NA	Not applicable.

Substances	CAS Number	Skin Sensitization
Contains no hazardous substances in concentrations above cut-off values according to the competent authority	NA	Not applicable

Substances	CAS Number	Respiratory Sensitization
Contains no hazardous substances in concentrations above cut-off values according to the competent authority	NA	Not applicable

Substances	CAS Number	Mutagenic Effects
Contains no hazardous substances in concentrations above cut-off values according to the competent authority	NA	Not applicable

Substances	CAS Number	Carcinogenic Effects
Contains no hazardous substances in concentrations above cut-off values according to the competent authority	NA	Not applicable

Substances	CAS Number	Reproductive toxicity

Contains no hazardous substances in concentrations above cut-off values according to the competent authority	NA	Not applicable

Substances	CAS Number	STOT - single exposure
Contains no hazardous substances in concentrations above cut-off values according to the competent authority	NA	Not applicable

Substances	CAS Number	STOT - repeated exposure
Contains no hazardous substances in concentrations above cut-off values according to the competent authority	NA	Not applicable

Substances	CAS Number	Aspiration hazard
Contains no hazardous substances in concentrations above cut-off values according to the competent authority	NA	Not applicable

12. Ecological Information

Ecotoxicity

Product Ecotoxicity Data

No data available

Substance Ecotoxicity Data

Substances	CAS Number	Toxicity to Algae	Toxicity to Fish	Toxicity to Microorganisms	Toxicity to Invertebrates
Contains no hazardous substances in concentrations above cut-off values according to the competent authority	NA	No information available	No information available	No information available	No information available

12.2. Persistence and degradability

Substances	CAS Number	Persistence and Degradability
Contains no hazardous substances in concentrations above cut-off values according to the competent authority	NA	No information available

12.3. Bioaccumulative potential

Substances	CAS Number	Log Pow
Contains no hazardous substances in concentrations above cut-off values according to the competent authority	NA	No information available

12.4. Mobility in soil

Substances	CAS Number	Mobility
Contains no hazardous substances in concentrations above cut-off values according to the competent authority	NA	No information available

12.6. Other adverse effects

Endocrine Disruptor Information
This product does not contain any known or suspected endocrine disruptors

13. Disposal Considerations

Safe handling and disposal methods
Bury in a licensed landfill according to federal, state, and local regulations.

Disposal of any contaminated packaging
Follow all applicable national or local regulations.

Environmental regulations
Not applicable

14. Transport Information

Transportation Information

UN Number:	Not restricted
UN Proper Shipping Name:	Not restricted
Transport Hazard Class(es):	Not applicable
Packing Group:	Not applicable
Environmental Hazards:	Not applicable

Special precautions during transport
None

HazChem Code
None Allocated

15. Regulatory Information

Safety, health and environmental regulations specific for the product

International Inventories

Australian AICS Inventory	All components listed on inventory or are exempt.
New Zealand Inventory of Chemicals	All components listed on inventory or are exempt.
EINECS Inventory	This product, and all its components, complies with EINECS
US TSCA Inventory	All components listed on inventory or are exempt.
Canadian DSL Inventory	All components listed on inventory or are exempt.

Poisons Schedule number
None Allocated

16. Other information

Date of preparation or review

Revision Date: 22-Sep-2015

Revision Note
SDS sections updated: 2

Full text of R-phrases referred to under Sections 2 and 3
None

Full text of H-Statements referred to under sections 2 and 3
None

Additional information

For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Safety Data Sheet for this or other Halliburton products, contact Chemical Stewardship at 1-580-251-4335.

Key abreviations or acronyms used

bw – body weight CAS – Chemical Abstracts Service EC50 – Effective Concentration 50% LC50 – Lethal Concentration 50% LD50 – Lethal Dose 50% LL50 – Lethal Loading 50% mg/kg – milligram/kilogram mg/L – milligram/liter NOEC – No Observed Effect Concentration OEL – Occupational Exposure Limit PBT – Persistent Bioaccumulative and Toxic ppm – parts per million STEL – Short Term Exposure Limit TWA – Time-Weighted Average vPvB – very Persistent and very Bioaccumulative h - hour mg/m^3 - milligram/cubic meter mm - millimeter mmHg - millimeter mercury w/w - weight/weight d - day

Key literature references and sources for data

www.ChemADVISOR.com/
NZ CCID

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End of Safety Data Sheet