

## Harriet Bravo Pipeline Pigging Operations 2019

Bridging Document to the Varanus Island Hub Operations Bridging Document Summary

<b>PROJECT / FACILITY</b>	Varanus Island Hub
<b>REVIEW INTERVAL (MONTHS)</b>	No Review Required
<b>SAFETY CRITICAL DOCUMENT</b>	NO

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- Appendix A: Chemical Disclosure**
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## 1 Introduction

### 1.1 Purpose

Santos WA submits this bridging document (BD) under the *Varanus Island Hub Operations Environment Plan* (VI Hub Ops EP) (EA-60-RI-186), Revision 6, in accordance with the Petroleum (Submerged Lands) (Environment) Regulations 2012 for pigging operations on the Harriet Bravo pipeline. Although pigging operations are described in sections 3.2.1 and 3.10 of the VI Hub Ops EP, the required volume of treated seawater has not been disclosed in the EP. In accordance with DMIRS' Chemical Disclosure Guideline, this BD has been prepared as there is a greater than 5% change in volume compared to the original EP. The chemical planned for use is already disclosed in the accepted VI Hub Ops EP.

### 1.2 Santos Acquisition of Quadrant Energy

On 27 November 2018, Santos completed its acquisition of Quadrant Energy. This has the effect that Santos Limited is now the ultimate holding company of Quadrant Energy Holdings Pty Ltd and its subsidiaries (which includes the operator in respect of this bridging document, Quadrant Energy Australia Limited). It has also resulted in most of the Quadrant group of entities changing their name. Quadrant Energy Australia Limited has changed its name to Santos WA Energy Limited (Santos WA). Its ABN (ABN 39 009 301 964) has remained the same. Santos WA (as operator in respect of this bridging document (BD) and associated environment plan (EP)) will be responsible for all commitments and obligations in this BD.

Over the coming months, Santos will develop a transition plan to integrate the Quadrant assets into Santos' management systems. As this has not been completed yet, this BD reflects the existing Quadrant policies, management systems, contracts and arrangements.

### 1.3 Compliance

The Harriet Bravo Pipeline Pigging Operations 2019 BD (SO-91-RI-20026) was prepared to meet the requirements of Regulation 11(1) of the *Petroleum (Submerged Lands) (Environment) Regulations 2012* (P(SL)(E) Regulations). The pigging activities will be conducted in accordance with all applicable legislation and regulations and specifically to meet the requirements of the Petroleum (Submerged Lands) Act 1982 (WA) and its regulations.

The proposed chemical disclosure will be managed in accordance with the accepted Varanus Island Hub Operations EP (EA-60-RI-186) and the Harriet Bravo Pipeline Pigging Operations 2019 BD (SO-91-RI-20026) as they cover the expected environmental risks and control measures to be undertaken.

## 2 Activity Description

Pigging is planned on the 8" Harriet Bravo production pipeline. As pipeline operational pressure does not allow for significant pig control for the nominated intelligent pig, a pumping spread is required on the platform to drive the pig(s) using seawater medium dosed with a corrosion inhibitor. The treated seawater will be pumped into the 8" pipeline to push the cleaning/intelligent pig tools from the pig launcher at the Harriet Bravo platform to the pig receiver at Varanus Island (VI).

As outlined in Section 3.10 of the VI Hub Ops EP, a pumping spread will be mobilised to the Harriet Bravo platform. The pigging medium / flushing liquids will be returned to VI for treatment/injection as per normal process in accordance with the EP.

There will be no planned discharges of production fluids and/or chemically treated seawater to the marine environment.

## 2.1 Schedule

The work is scheduled to commence on 18th September 2019, dependent upon a suitable weather window and availability of equipment and personnel, and the intelligent pigging campaign is expected to take approximately 7 days to allow for preparation, pigging runs, pigging data analysis and completion of flushing to VI, although contingency has been allowed for of up to 12 days. The flushing activity is targeted to be completed by 30th September 2019.

## 2.2 Location

The Harriet Bravo monopod is situated in Production Licence area TL/1, approximately 4 km from Quadrant Energy's Harriet Alpha platform, 10 km from VI and 80 km from the mainland. Co-ordinates are provided in **Table 2-1** and the location of the monopod is shown in **Figure 2-1**.

**Table 2-1: Location of Harriet Bravo Platform**

Latitude	Longitude
20° 34' 30.798" S	115° 38' 15.26" E

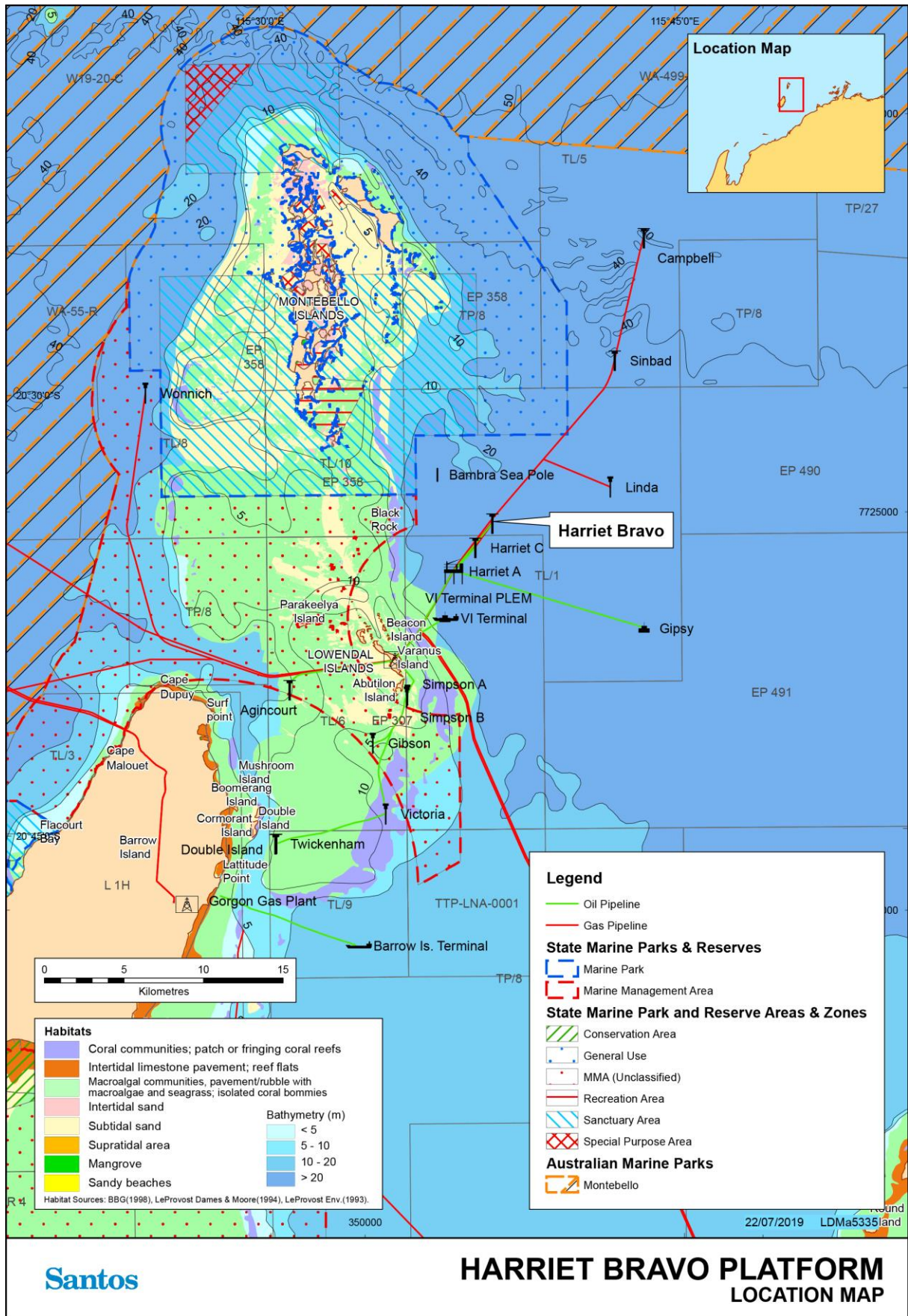


Figure 2-1: Harriet Bravo Platform Location

## 3 Description of the Environment

### 3.1 Physical and biological environment

VI is located in the North-West Marine Region (DEWHA, 2008) which lies primarily on the continental shelf between North West Cape and Cape Bougainville. The area has a dynamic oceanographic environment, influenced by strong tides, cyclonic storms, long-period swell and internal tides. Regional surveys on the NWS indicate the seafloor composition is uniform throughout the area, but with spatial variation in the grain size and origin of the surface sediments. Regionally, the seafloor tends to be flat, unconsolidated and sedimentary with occasional calcarenite rock outcrops.

### 3.2 Potential environmental impacts

Given that the end fate of the biocide chemical is downhole into depleted oil/gas reservoirs via injection wells, there are no expected environmental or socio-economic impacts identified for this process. No discharges to State waters or land will occur during this activity.

## 4 Chemical Disclosure

Pigging of the 8" Harriet Bravo production pipeline will be completed with seawater dosed with Baker Hughes CRW24830 corrosion inhibitor at 700 ppm. CRW24830 Corrosion Inhibitor is a mixture of corrosion inhibitor, oxygen scavenger and biocide used to treat seawater for the pipeline flushing/preservation to prevent corrosion and bacterial growth within the pipeline.

The volume flushed will be approximately 1.2 times the pipeline volume (360 m<sup>3</sup>), although some contingency has been included in the chemical disclosure in **Appendix A** to allow for multiple pig runs (if required) up to a maximum of 3 times the pipeline volume (900 m<sup>3</sup>). The most recent Safety Data Sheet (SDS) for CRW24830 is included in **Appendix B**.

The proposed volume of biocide and water allowed for in this activity are provided in the table below (both the proposed 1.2 times pipeline volume, and maximum volumes).

**Table 4-1: Proposed and Maximum Volumes**

Chemical	1.2 x Line Volume (m <sup>3</sup> )	3 x Line Volume (m <sup>3</sup> )
Corrosion Inhibitor (700 ppm)	0.25	0.63
Seawater	359.75	899.37
Total (Biocide and Seawater)	360	900

Upon returning the fluids to VI, the flushing fluid will be co-mingled with produced water fluid in tank T201/202 prior to re-injection down hole (at Tanami and Alkimos disposal wells). Given that the disposal of treated seawater will be into depleted oil/gas reservoirs via injection wells, there are no expected environmental or socio-economic impacts identified for this process. No planned discharges to State waters will occur during this activity. All chemicals have been accurately disclosed in **Appendix A**.

## 5 Environmental Management

Harriet Bravo pigging activities will be managed under Santos WA's safety management system and the *VI Hub Operations EP* (EA-60-RI-00186) Revision 6.

The proposed activities are not considered a significant modification to the operational details described within the *VI Hub Operations EP* (EA-60-RI-00186) Revision 6 as they pose no significant new risks or significant increase in existing risks.

As per Section 6.8.4 of the VI Hub Ops EP, the maximum concentration of the corrosion inhibitor (CRW24380) will be 700 ppm. Although this management control relates to breaking containment, for this planned pigging/flushing activity there is no planned discharge of production fluids and/or chemically treated seawater to the marine environment, the control referred to relates to the biocide concentration only.

In the unlikely event that a chemical or hydrocarbon spill occurs during activities, Santos WA's emergency response procedures are in place to cover such an occurrence. These include:

- + Varanus Island Hub Operations Oil Spill Contingency Plan (OSCP; EA-60-RI-186.2);
- + Varanus Island Hub Incident response plan (QE-00-ZF-00044);
- + Incident Command and Management Manual (QE-00-ZF-00025.01);
- + NWS Operations Consolidated Cyclone Response Plan (AE-91-IF-010); and
- + Emergency response reported as per the Incident Reporting and Investigation Procedure (QE-91-IF-00002).

## 6 Stakeholder Consultation

Stakeholders are regularly updated on activities at the VI Hub through Santos WA's Quarterly Consultation Updates. These regular, non-project oriented updates detail Santos WA's ongoing and proposed activities on the north-west shelf, looking out three to six months, including operating facilities. Information provided in this way is intended to afford stakeholders an opportunity to request additional information on specific activities or elements that may be of interest to them, and voice any concerns. Should stakeholders request additional information this can then be incorporated into the relevant documentation, and dialogue with Santos WA can continue should the concerns or issues require further consultation.

No additional consultation was undertaken for this BD as the activity is not significantly different from Santos WA's day to day activities on VI.

## 7 Reporting and Recording

DMIRS will also be notified of the flushing commencement and cessation dates.

If incidents do occur during the proposed activities they will be reported to DMIRS under established recording and reporting requirements as documented in the VI Hub Operations EP.

In addition, the volumes of chemicals used and any exceedances will be reported to DMIRS.

## 8 Contact details

Further information about the flushing activities can be obtained from Santos WA's Consultation adviser on (08) 6218 7100 or email [offshore.consultation@santos.com](mailto:offshore.consultation@santos.com).

## Appendix A: Chemical Disclosure

### A: System Details

<b>OPERATOR:</b>	Santos WA
<b>PROJECT / WELL:</b>	Harriet Bravo
<b>SYSTEM:</b>	Harriet Bravo Pipeline Pigging/Flushing – Treated Seawater (Biocide)
<b>TOTAL VOLUME OF SYSTEM:</b>	900 m <sup>3</sup>

### B: Product List

Trade name	Supplier	Purpose	Product in system fluid (%)	Toxicity & Ecotoxicity Info	SDS attached
<b>Treated seawater</b>					
Seawater	N/A	Carrier fluid	99.9300	N/A	N/A
CRW24830	Baker Hughes	Corrosion Inhibitor	0.07	<p><u>Acute Mammalian Toxicity</u></p> <p><b>Component 1 (30-60% concentration)</b> Natural component – exempted under Chemical Disclosure Guidelines</p> <p><b>Component 2 (10-30% concentration)</b> No scientific data or research available for this component</p> <p><b>Component 3 (10-30% concentration)</b> OSPAR PLONOR Listed</p> <p><b>Component 4 (5-10% concentration)</b> LD<sub>50</sub> (Oral) Rat 4500 mg/kg LD<sub>50</sub> (Dermal) Rabbit 2700 mg/kg</p> <p><b>Component 5 (5-10% concentration)</b> LD<sub>50</sub> (Oral) Rat 426 mg/kg</p> <p><b>Component 6 (5-10% concentration)</b> LC<sub>50</sub> (Inhalation Vapour) Rat &gt; 2.5 mg/L (6 hours) LD<sub>50</sub> (Dermal) Mouse &gt; 3500 mg/kg</p> <p><b>Component 7 (&lt;1% concentration)</b> LD<sub>50</sub> (oral) Rat 6720 mg/kg</p> <p><u>Aquatic Toxicity</u></p> <p><b>Component 1 (30-60% concentration)</b> Natural product – exempted under the Chemical Disclosure Guidelines</p> <p><b>Component 2 (10-30% concentration)</b> EC<sub>50</sub> (72 hours) 0.15 mg/L <i>Skeletonema costatum</i> LC<sub>50</sub> (48 hours) 1.1 mg/L <i>Acartia tonsa</i> LC<sub>50</sub> (96 hours) &gt;0.1 mg/L <i>Cyprinodon variegatus</i> LC<sub>50</sub> (10 days) 2723 mg/L <i>Corophium volutator</i></p> <p><b>Component 3 (10-30% concentration)</b> OSPAR PLONOR Listed</p>	Yes

Trade name	Supplier	Purpose	Product in system fluid (%)	Toxicity & Ecotoxicity Info	SDS attached
				<p><b>Component 4 (5-10% concentration)</b>            EC<sub>50</sub> (48 hours) 500-5000 mg/L <i>Skeletonema costatum</i>            LC<sub>50</sub> (48 hours) 2850 mg/L <i>Daphnia magna</i>            LC<sub>50</sub> (96 hours) 1300 mg/L <i>Lepomis macrochirus</i></p> <p><b>Component 5 (5-10% concentration)</b>            No scientific data or research is available for an algal species            LC<sub>50</sub> (48 hours) 0.08 mg/L <i>Daphnia magna</i>            LC<sub>50</sub> (96 hours) 0.66 mg/L <i>Pimephales promelas</i></p> <p><b>Component 6 (5-10% concentration)</b>            OSPAR PLONOR Listed            EC<sub>50</sub> (72 hours) 6500 to 13000 mg/L Freshwater algae            EC<sub>50</sub> (48 hours) &gt;100 mg/L <i>Daphnia magna</i>            LC<sub>50</sub> (48 hours) 100 mg/L <i>Crangon crangon</i>            LC<sub>50</sub> (48 hours) 10000 mg/L <i>Daphnia magna</i>            LC<sub>50</sub> (96 hours) 72860 mg/L Freshwater fish            LC<sub>50</sub> (96 hours) 10000 mg/L <i>Pimephales promelas</i></p> <p><b>Component 7 (&lt;1% concentration)</b>            EC<sub>50</sub> (48 hours) &gt;10 mg/L <i>Chlorella sp.</i>            LC<sub>50</sub> (48 hours) 337 mg/L <i>Daphnia pulex</i>            LC<sub>50</sub> (96 hours) 423 mg/L <i>Scophthalmus maximus</i></p> <p><u>Chronic Toxicity</u>            No known carcinogenic (R40, R45, R49), chronic (R33, R39, R48, R68), mutagenic (R46) or reproductive (R60, R61, R62, R63, R64) effects, for any components in this product.</p> <p><u>Biodegradation / bioaccumulation</u>  <b>Ready Biodegradability Test (seawater OECD 306)</b></p> <p><b>Component 1 (30-60% concentration)</b>            Natural product – exempted under the Chemical Disclosure Guidelines</p> <p><b>Component 2 (10-30% concentration)</b>            Biodegradability (28 days) 39%</p> <p><b>Component 3 (10-30% concentration)</b>            OSPAR PLONOR Listed</p> <p><b>Component 4 (5-10% concentration)</b>            Biodegradability (28 days) 75%</p> <p><b>Component 5 (5-10% concentration)</b>            No scientific data or research available for this component</p>	

Trade name	Supplier	Purpose	Product in system fluid (%)	Toxicity & Ecotoxicity Info	SDS attached
				<p><b>Component 6 (5-10% concentration)</b> OSPAR PLONOR Listed</p> <p><b>Component 7 (&lt;1% concentration)</b> No scientific data or research is available for this component</p> <p><b>Octanol/Water Partition Coefficient (OECD 117)</b></p> <p><b>Component 1 (30-60% concentration)</b> Natural product – exempted under the Chemical Disclosure Guidelines</p> <p><b>Component 2 (10-30% concentration)</b> Non-bioaccumulative, molecular weight (MW) &gt; 700</p> <p><b>Component 3 (10-30% concentration)</b> OSPAR PLONOR Listed</p> <p><b>Component 4 (5-10% concentration)</b> Log Pow 0.2</p> <p><b>Component 5 (5-10% concentration)</b> Not applicable to surfactants</p> <p><b>Component 6 (5-10% concentration)</b> Log Pow -1.36</p> <p><b>Component 7 (&lt;1% concentration)</b> Log Pow 3.35</p>	

## C. Chemical List

Chemicals within Products in Part B	CAS number	Mass fraction (%)
Water	7732-18-5	99.93630
Amine, N-Tallow Alkyltrimethylenedi-, ethoxylated	61790-85-0	0.02100
Ammonium bisulphite	10192-30-0	0.02100
2-(2-butoxyethoxy)ethanol	112-34-5	0.00700
C12-16 alkylbenzyltrimethylammonium chloride	68424-85-1	0.00700
Ethenediol	107-21-1	0.00700
Fluorescein sodium salt	518-47-8	0.00070
<b>Total</b>		<b>~100%</b>

**Appendix B: Safety Data Sheets**

CRW24830

## 1. Identification of the material and supplier

<b>Product identifier</b>	: CRW24830
<b>Product code</b>	: CRW24830
<b>ADG</b>	: AMINES, LIQUID, CORROSIVE, N.O.S. (contains oxyalkylated amine)
<b>Product type</b>	: Liquid.
<b>Identified uses</b>	: Hydrotest Corrosion Inhibitor
<b>Supplier's details</b>	: Baker Hughes, Australia 5 Walker Street, Braeside, Victoria 3195, Australia  Tel: +613 9580 9004 Fax: +613 9580 6004
<b>Emergency telephone number</b>	: CHEMTREC Emergency Telephone Numbers (Australasia Geomarket): - Australia: (02) 9037 2994 - New Zealand: 9801 0034 - PNG: +(61) 2 9037 2994 ----- - UK: +(44) 870-820-0418 - USA: +(1) 703-527-3887 (CHEMTREC International 24 hour)

## 2. Hazards identification

<b>Classification of the substance or mixture</b>	: ACUTE TOXICITY (oral) - Category 4 SKIN CORROSION/IRRITATION - Category 1B ACUTE AQUATIC HAZARD - Category 1 LONG-TERM AQUATIC HAZARD - Category 2
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### GHS label elements

#### **Hazard pictograms**



#### **Signal word**

: DANGER

#### **Hazard statements**

: H302 - Harmful if swallowed.  
H314 - Causes severe skin burns and eye damage.  
H400 - Very toxic to aquatic life.  
H411 - Toxic to aquatic life with long lasting effects.

### Precautionary statements

#### **Prevention**

: Wear protective gloves: > 8 hours (breakthrough time): Rubber gloves.. Wear eye or face protection. Wear protective clothing. Avoid release to the environment.

#### **Response**

: IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Immediately call a POISON CENTER or physician. IF SWALLOWED: Immediately call a POISON CENTER or physician. Do NOT induce vomiting. IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower. Immediately call a POISON CENTER or physician. IF IN EYES: Immediately call a POISON CENTER or physician.

#### **Storage**

: Store locked up.

#### **Disposal**

: Dispose of contents and container in accordance with all local, regional, national and international regulations.

## 2. Hazards identification

**Precautionary statements (Code)** : P280, P273, P304 + P340 + P310, P301 + P310 + P331, P303 + P361 + P353 + P310, P305 + P310, P405, P501

**Supplemental label elements** : Not applicable.

**Other hazards which do not result in classification** : None known.

## 3. Composition/information on ingredients

**Substance/mixture** : Mixture

Ingredient name	% (w/w)	CAS number
Amines, N-tallow alkyltrimethylenedi-, ethoxylated	10 - 30	61790-85-0
ammonium hydrogensulphite	10 - 30	10192-30-0
2-(2-butoxyethoxy)ethanol	5 - 10	112-34-5
Quaternary ammonium compounds, benzyl-C12-14-alkyldimethyl, chlorides	5 - 10	.68424-85-1 (outside EU)
ethanediol	5 - 10	107-21-1

**There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.**

**Occupational exposure limits, if available, are listed in Section 8.**

## 4. First aid measures

### Description of necessary first aid measures

**Eye contact** : Get medical attention immediately. Call a poison center or physician. Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Chemical burns must be treated promptly by a physician.

**Inhalation** : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

**Skin contact** : Get medical attention immediately. Call a poison center or physician. Wash affected area with soap and mild detergent for at least 20 - 60 minutes. Remove contaminated clothing and shoes. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Chemical burns must be treated promptly by a physician. Wash clothing before reuse. Clean shoes thoroughly before reuse.

**Ingestion** : Call a poison center or physician. Wash out mouth with water. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Chemical burns must be treated promptly by a physician. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway.

### Most important symptoms/effects, acute and delayed

#### Potential acute health effects

**Eye contact** : Causes serious eye damage.

**Inhalation** : No known significant effects or critical hazards.

**Skin contact** : Causes severe burns.

**Ingestion** : Harmful if swallowed.

## 4 . First aid measures

### Over-exposure signs/symptoms

- Eye contact** : pain, watering, redness
- Inhalation** : No specific data.
- Skin contact** : pain or irritation, redness, blistering may occur
- Ingestion** : stomach pains

### Indication of immediate medical attention and special treatment needed, if necessary

- Notes to physician** : In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.
- Specific treatments** : No specific treatment.
- Protection of first-aiders** : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

See toxicological information (Section 11)

## 5 . Firefighting measures

### Extinguishing media

- Suitable extinguishing media** : Use an extinguishing agent suitable for the surrounding fire.
- Unsuitable extinguishing media** : None known.

**Specific hazards arising from the chemical** : In a fire or if heated, a pressure increase will occur and the container may burst. This material is very toxic to aquatic life. This material is toxic to aquatic life with long lasting effects. Fire water contaminated with this material must be contained and prevented from being discharged to any waterway, sewer or drain.

**Special protective actions for fire-fighters** : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training.

**Special protective equipment for fire-fighters** : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

**Hazardous thermal decomposition products** : carbon dioxide, carbon monoxide, nitrogen oxides, sulfur oxides

**Hazchem code** : 2X

## 6 . Accidental release measures

### Personal precautions, protective equipment and emergency procedures

- For non-emergency personnel** : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilt material. Do not breathe vapour or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.
- For emergency responders** : If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

## 6 . Accidental release measures

**Environmental precautions** : Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air). Water polluting material. May be harmful to the environment if released in large quantities. Collect spillage.

### Methods and material for containment and cleaning up

**Small spill** : Stop leak if without risk. Move containers from spill area. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

**Large spill** : Stop leak if without risk. Move containers from spill area. Approach the release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilt product. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

## 7 . Handling and storage

### Precautions for safe handling

**Protective measures** : Put on appropriate personal protective equipment (see Section 8). Do not get in eyes or on skin or clothing. Do not breathe vapour or mist. Do not ingest. Avoid release to the environment. If during normal use the material presents a respiratory hazard, use only with adequate ventilation or wear appropriate respirator. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Empty containers retain product residue and can be hazardous. Do not reuse container.

**Advice on general occupational hygiene** : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

**Conditions for safe storage, including any incompatibilities** : Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Store locked up. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabelled containers. Use appropriate containment to avoid environmental contamination.

## 8 . Exposure controls/personal protection

The information in this section contains generic advice and guidance. Information is provided based on typical anticipated uses of the product. Additional measures might be required for bulk handling or other uses that could significantly increase worker exposure or environmental releases.

### Control parameters

#### Occupational exposure limits

Ingredient name	Exposure limits
2-(2-butoxyethoxy)ethanol  ethanediol	<b>ACGIH TLV (United States, 3/2016).</b> TWA: 10 ppm 8 hours. Form: Inhalable fraction and vapor <b>Safe Work Australia (Australia, 1/2014).</b> <b>Absorbed through skin.</b> TWA: 10 mg/m <sup>3</sup> 8 hours. Form: Particulate STEL: 104 mg/m <sup>3</sup> 15 minutes. Form: Vapour

## 8 . Exposure controls/personal protection

TWA: 52 mg/m<sup>3</sup> 8 hours. Form: Vapour  
 TWA: 20 ppm 8 hours. Form: Vapour  
 STEL: 40 ppm 15 minutes. Form: Vapour

- Appropriate engineering controls** : If user operations generate dust, fumes, gas, vapour or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.
- Environmental exposure controls** : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.
- Individual protection measures**
- Hygiene measures** : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing.
- Eye/face protection** : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles and/or face shield. If inhalation hazards exist, a full-face respirator may be required instead.
- Skin protection**
- Hand protection** : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated. Recommended: > 8 hours (breakthrough time): Rubber gloves.
- Body protection** : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
- Other skin protection** : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
- Respiratory protection** : Based on the hazard and potential for exposure, select a respirator that meets the appropriate standard or certification. Respirators must be used according to a respiratory protection program to ensure proper fitting, training, and other important aspects of use.

## 9 . Physical and chemical properties

### Appearance

- Physical state** : Liquid.
- Colour** : Brown. With yellow/green tinge.
- Odour** : Mild.
- Odour threshold** : Not available.
- pH** : 5 to 7 [Conc. (% w/w): 100%]
- Melting point** : Not available.
- Boiling point** : Not available.
- Flash point** : Closed cup: Not applicable.
- Evaporation rate** : Not available.
- Flammability (solid, gas)** : Not available.

## 9 . Physical and chemical properties

<b>Lower and upper explosive (flammable) limits</b>	: Not available.
<b>Vapour pressure</b>	: Not available.
<b>Vapour density</b>	: Not available.
<b>Relative density</b>	: 1.08 (20°C)
<b>Solubility</b>	: Easily soluble in the following materials: cold water.
<b>Partition coefficient: n-octanol/water</b>	: Not available.
<b>Auto-ignition temperature</b>	: Not available.
<b>Decomposition temperature</b>	: Not available.
<b>Viscosity</b>	: Not available.

## 10 . Stability and reactivity

<b>Reactivity</b>	: No specific test data related to reactivity available for this product or its ingredients.
<b>Chemical stability</b>	: The product is stable.
<b>Possibility of hazardous reactions</b>	: Under normal conditions of storage and use, hazardous reactions will not occur.
<b>Conditions to avoid</b>	: No specific data.
<b>Incompatible materials</b>	: Not available.
<b>Hazardous decomposition products</b>	: Under normal conditions of storage and use, hazardous decomposition products should not be produced.

## 11 . Toxicological information

### Information on toxicological effects

#### Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
2-(2-butoxyethoxy)ethanol	LD50 Dermal	Rabbit	2700 mg/kg	-
	LD50 Oral	Rat	4500 mg/kg	-
Quaternary ammonium compounds, benzyl-C12-14-alkyldimethyl, chlorides ethanediol	LD50 Oral	Rat	426 mg/kg	-
	LC50 Inhalation Vapour	Rat	>2.5 mg/l	6 hours
	LD50 Dermal	Mouse	>3500 mg/kg	-

**Conclusion/Summary** : May be harmful if ingested. Can cause target organ damage.

#### Irritation/Corrosion

Product/ingredient name	Result	Species	Score	Exposure	Observation
2-(2-butoxyethoxy)ethanol	Eyes - Moderate irritant	Rabbit	-	24 hours 20 milligrams	-
	Eyes - Severe irritant	Rabbit	-	20 milligrams	-
Quaternary ammonium compounds, benzyl-C12-14-alkyldimethyl, chlorides ethanediol	Skin - Severe irritant	Rabbit	-	25 milligrams	-
	Eyes - Mild irritant	Rabbit	-	24 hours 500 milligrams	-
	Eyes - Mild irritant	Rabbit	-	1 hours 100 milligrams	-
	Eyes - Moderate irritant	Rabbit	-	6 hours 1440 milligrams	-
	Skin - Mild irritant	Rabbit	-	555 milligrams	-

#### Conclusion/Summary

**Skin** : Causes pain and burns in contact with skin. May cause permanent skin damage.

## 11 . Toxicological information

**Eyes** : Risk of serious damage to eyes. May cause eye burns and permanent eye injury.

**Respiratory** : No known significant effects or critical hazards.

### Sensitisation

#### Conclusion/Summary

**Skin** : No known significant effects or critical hazards.

**Respiratory** : No known significant effects or critical hazards.

### Mutagenicity

**Conclusion/Summary** : No known significant effects or critical hazards.

### Carcinogenicity

**Conclusion/Summary** : No known significant effects or critical hazards.

### Reproductive toxicity

**Conclusion/Summary** : No known significant effects or critical hazards.

### Teratogenicity

**Conclusion/Summary** : Not available.

### Specific target organ toxicity (single exposure)

Name	Category	Route of exposure	Target organs
Not available.			

### Specific target organ toxicity (repeated exposure)

Name	Category	Route of exposure	Target organs
Not available.			

### Aspiration hazard

Name	Result
Not available.	

**Information on likely routes of exposure** : Not available.

### Potential acute health effects

**Eye contact** : Causes serious eye damage.

**Inhalation** : No known significant effects or critical hazards.

**Skin contact** : Causes severe burns.

**Ingestion** : Harmful if swallowed.

### Symptoms related to the physical, chemical and toxicological characteristics

**Eye contact** : pain, watering, redness

**Inhalation** : No specific data.

**Skin contact** : pain or irritation, redness, blistering may occur

**Ingestion** : stomach pains

### Delayed and immediate effects as well as chronic effects from short and long-term exposure

#### Short term exposure

**Potential immediate effects** : Not available.

**Potential delayed effects** : Not available.

#### Long term exposure

## 11 . Toxicological information

**Potential immediate effects** : Not available.

**Potential delayed effects** : Not available.

### Potential chronic health effects

**General** : No known significant effects or critical hazards.

**Carcinogenicity** : No known significant effects or critical hazards.

**Mutagenicity** : No known significant effects or critical hazards.

**Teratogenicity** : No known significant effects or critical hazards.

**Developmental effects** : No known significant effects or critical hazards.

**Fertility effects** : No known significant effects or critical hazards.

## 12 . Ecological information

**Toxicity** : Very toxic to aquatic organisms. Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Product/ingredient name	Result	Species	Exposure
Amines, N-tallow alkyltrimethylenedi-, ethoxylated 2-(2-butoxyethoxy)ethanol ethanediol; ethylene glycol	Acute LC50 2723 mg/l Marine water	Crustaceans - Corophium Volutator	10 days
	Acute LC50 1300000 µg/l Fresh water	Fish - Lepomis macrochirus	96 hours
	Acute EC50 6500 to 13000 mg/l Fresh water	Algae	72 hours
	Acute EC50 >100 mg/l Fresh water	Daphnia	48 hours
	Acute LC50 >100000 µg/l Marine water	Crustaceans - Crangon crangon - Adult	48 hours
	Acute LC50 10000000 µg/l Fresh water	Daphnia - Daphnia magna	48 hours
	Acute LC50 72860 mg/l Fresh water Acute LC50 10000000 µg/l Fresh water	Fish Fish - Pimephales promelas	96 hours 96 hours

### Persistence and degradability

Product/ingredient name	Aquatic half-life	Photolysis	Biodegradability
Quaternary ammonium compounds, benzyl-C12-14-alkyldimethyl, chlorides ethanediol; ethylene glycol	-	-	Readily
	-	-	Readily

### Bioaccumulative potential

Product/ingredient name	LogP <sub>ow</sub>	BCF	Potential
2-(2-butoxyethoxy)ethanol ethanediol	1	-	low
	-1.36	-	low





**Other adverse effects** : No known significant effects or critical hazards.

## 13 . Disposal considerations

**Disposal methods** : Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers.

## 14 . Transport information

### International transport regulations

Regulatory information	UN number	Proper shipping name	Transport hazard class(es)	PG*	Label
ADR/RID	UN2735	AMINES, LIQUID, CORROSIVE, N.O.S. (contains oxyalkylated amine)	8	III	
ADG	UN2735	AMINES, LIQUID, CORROSIVE, N.O.S. (contains oxyalkylated amine)	8	III	
IMDG	UN2735	AMINES, LIQUID, CORROSIVE, N.O.S. (contains oxyalkylated amine)	8	III	
IATA	UN2735	AMINES, LIQUID, CORROSIVE, N.O.S. (contains oxyalkylated amine)	8	III	

PG\* : Packing group

Regulatory information	Environmental hazards	Additional information**
ADR/RID Class	Yes.	The environmentally hazardous substance mark is not required when transported in sizes of ≤5 L or ≤5 kg.  <b>Hazchem code</b> 2X
ADG Class	No.	<b>Hazchem code</b> 2X
IMDG Class	Yes.	-
IATA Class	No.	-

Additional information\*\*: A • in the Hazchem code indicates that Alcohol Resistant Foam is the preferred extinguishing medium. If not available, use the extinguishing medium indicated by the number in the Hazchem code.

**Special precautions for user** : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

**Transport in bulk according to Annex II of Marpol and the IBC Code** : Not available.

## 15 . Regulatory information

### Standard Uniform Schedule of Medicine and Poisons

5

### Model Work Health and Safety Regulations - Scheduled Substances

**Australia inventory (AICS)** : All components are listed or exempted.

## 15 . Regulatory information

**References** : National Code of Practice for the Control of Workplace Hazardous Substances. National Code of Practice for the Labelling of Workplace Substances. National Code of Practice for the Preparation of Material Safety Data Sheets. Approved Criteria for Classifying Hazardous Substances.

### International regulations

#### Chemical Weapon Convention List Schedules I, II & III Chemicals

Not listed.

#### Montreal Protocol (Annexes A, B, C, E)

Not listed.

#### Stockholm Convention on Persistent Organic Pollutants

Not listed.

#### Rotterdam Convention on Prior Inform Consent (PIC)

Not listed.

#### UNECE Aarhus Protocol on POPs and Heavy Metals

Not listed.

## 16 . Other information

### History

**Date of printing** : 6 August 2017.  
**Date of issue/Date of revision** : 6 August 2017  
**Date of previous issue** : 13 April 2014  
**Version** : 3

**Key to abbreviations** : ADG = Australian Dangerous Goods  
ATE = Acute Toxicity Estimate  
BCF = Bioconcentration Factor  
GHS = Globally Harmonized System of Classification and Labelling of Chemicals  
IATA = International Air Transport Association  
IBC = Intermediate Bulk Container  
IMDG = International Maritime Dangerous Goods  
LogPow = logarithm of the octanol/water partition coefficient  
MARPOL = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)  
NOHSC = National Occupational Health and Safety Commission  
SUSMP = Standard Uniform Schedule of Medicine and Poisons  
UN = United Nations

### Procedure used to derive the classification

Classification	Justification
Acute Tox. 4, H302 Skin Corr. 1B, H314 Aquatic Acute 1, H400 Aquatic Chronic 2, H411	Calculation method Calculation method Calculation method Calculation method

**References** : Not available.

✔ Indicates information that has changed from previously issued version.

### Disclaimer

## 16 . Other information

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.

Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.