DOCUMENT NO	REVISION	DATE OF REVISION
HSE-E-110	0	09 AUGUST 2016

Waitsia-01 and Senecio-03 WIA Environmental Summary Document

Permit: L1

DISTRIBUTION

Paper copies

Name	Position	Company	Copy #
Karin Scheepens	Information Coordinator	AWE Perth Pty Ltd	1
Nina Hagias	Petroleum Engineer	AWE Perth Pty Ltd	2
Adrian Halliday	Well Service Engineer	Upstream Production Solutions	3
Michelle McAuley	HSEC Coordinator	AWE Perth Pty Ltd	4

Electronic copies

Name	Position	Company
Jane Aberdeen	Production Engineering Manager	AWE Perth Pty Ltd
Matthew McKenna	Environmental Advisor	AWE Perth Pty Ltd
Aaron Anthony	Petroleum Engineer	AWE Perth Pty Ltd
Michelle McAuley	HSEC Coordinator	AWE Perth Pty Ltd

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ATTACHMENTS

1.0 CONTACT DETAILS

Regulatory and Community Affairs Manager
AWE Perth Pty Limited
Level 3, 1101 Hay Street
WEST PERTH WA 6005
Phone: 08 9480 1300

2.0 PURPOSE

The purpose of this document is to provide an Environmental Bridging Document for the proposed Senecio-03 and Waitsia-01 well intervention activity. Note, this document should be read in conjunction with the Onshore North Perth Basin Well Intervention Activities Environment Plan (EP) [HSE-E-75] Rev E approved 16 December 2013.

3.0 ACTIVITY LOCATION

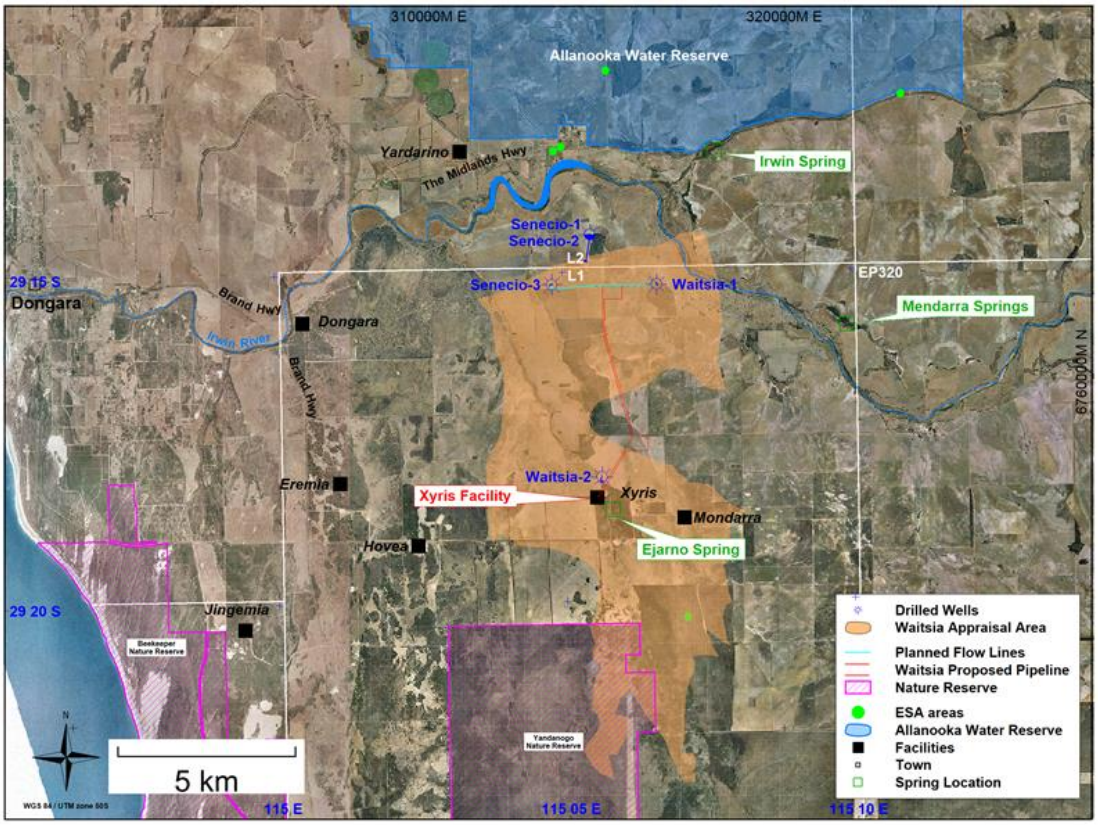
The proposed well intervention activity is located at the Waitsia-01 and Senecio-03 well, the well sites are located 15 km (Senecio-03) and 17 km (Waitsia-01) east of the township of Dongara (Figure 1).

Both wells are located within Production Licence L1, the surface co-ordinates for each are provided in the following table:

Table 1 Co-ordinates of surface locations

Location	Easting	Northing
Senecio-03 well	313,415 mE	6,762,447 mN
Waitsia-01 well	316,398 mE	6,762,370 mN

Figure 1 Well locations in relation to local environmental sensitivities



4.0 GENERAL DESCRIPTION OF EXISTING ENVIRONMENT

A description of the existing natural and socio-economic environment within the L1 permit area is included above Table 2 presents a summary of the receiving environment surrounding the well locations.

Table 2 Description of the Environment

Aspect	Detail
Climate	Mediterranean climate characterised by seasonal patterns of hot, dry summers and mild, wet winters
Soils	Sandy, well drained soils consisting of calcareous and siliceous sand underlain by aeolianite, which is often exposed
Surface water	Irwin River (1 km north Waitsia-01, 2 km north Senecio-03)
Groundwater	Groundwater level is approximately 10 m below ground surface The nearest Groundwater Dependent Ecosystem (GDE) is located >10km SE of the well sites.
Conservation Areas	Wells are not located in the vicinity of conservation estate (Redbook Area, Environmental Sensitive Area (ESA) or Nature Reserve)
Vegetation	No ecological communities of national or state significance are known to occur within the area
Fauna	Sheep and cattle grazing predominates. Introduced mammals (black rat, rabbits, foxes, feral cats). Also various bird species found within area, Western Grey Kangaroos may also occur in the area.

Aspect	Detail
Aboriginal Heritage	No areas of cultural heritage significance within close proximity of wells.
European Heritage	No areas of European heritage significance within close proximity of the wells.
Socio-economic	Agricultural land use. No major settlement within ~4.0 km of well sites.
Distance to sensitive receivers	• Private Property Buildings: >2 km from well sites • Towns: Dongara is located approximately >15 km west of the well sites. • Yardanogo Nature Reserve: >10 km south of well sites.

5.0 DESCRIPTION OF THE ACTIVITY

Senecio-03 and Waitsia-01, are gas producing wells, both located in Production Licence L1 >15 km from the township of Dongara, in the Perth Basin, Western Australia.

The wells are being prepared for production as part of the Stage 1A production test and will be produced via flow line and pipeline to the Xyris Production Facility.

Down hole gauges are being installed at Waitsia-01 and Senecio-03 to obtain data throughout the production test, technical issues (hydrates and ice) have been encountered during the installation of the gauge at the Senecio-03 well, the proposed remedial measure is to inject methanol and glycol down hole which act as an antifreeze allowing the wireline unit to successfully run and set the gauge in hole.

A wireline work over unit (or similar) and AWE WIA equipment will be utilised to undertake the following:

1. Change out swab valve and wing valve on production tree and pressure test (Senecio-03 only).
2. Mobilise wireline unit, rig up and pressure test PCE.
3. Drift well. Tag nipple profile.
4. Conduct static gradient survey.
5. Install downhole gauges in well.
6. Rig down and demobilise wireline unit.

The WIA program will be managed in accordance with the commitments outlined in the Onshore North Perth Basin Well Intervention Activities Environment Plan (EP) [HSE-E-075]. For the purposed WIA; there are no additional risks or impacts above or beyond the accepted EP [HSE-E-75] issued December 16th 2013.

5.1 Site preparation and earthwork

No clearing or earthworks are required for the proposed activity.

5.2 Chemical storage and handling

Chemicals required for the intended WIA would be storage and handled as follows:

- A PIG® Lease Liner (polypropylene composite) (Liner thickness: 97 mil = 2.54mm) (minimum infiltration rate: 10^{-9} m/s) would be in place for each well and used as a means of secondary containment for the returned fluids expected as part of the well suspension activity and chemical storage. The PIG® Lease Liner is four times more puncture resistant than commonly used HDPE liners, and its nonslip surface helps prevent slips and falls. The liner is a three layer Polypropylene composite consists of three barrier films sandwiched by double layers of needle punched geotextile with heat fused surfaces.
- Returned fluids would be stored within 280 bbl tanks (or similar) to provide sufficient capacity for the fluids. A tanker would remove fluid from the onsite storage to the disposal location as per Section 5.3.
- The WIA fluids will be mixed onsite within a water cart or storage vessel with secondary containment (PIG® Lease Liner) to capture any spillage should it occur. The chemicals will be stored within the portable bunded chemical storage as described above. The process of mixing chemicals on site will be supervised by onsite personnel. Chemical and fluid transfer activities will be manned at all times.
- Liquid chemical products (i.e. lubricants) would be storage within bunded pallets or 20ft internally bunded Dangerous Goods container designed to contain not less than 110% of the volume of the largest storage vessel.

5.3 Products, additives, chemicals and other substances disclosure

The objective of this Bridging Document is to disclose products, additives, chemicals and other substances required under the Petroleum and Geothermal Energy Resources (Environment) Regulations 2012.

AWE Limited confirms that all chemicals and substances have been accurately disclosed in Table 5 for its Waitsia-01/Senecio-03 WIA program. Note that for contingency purposes; a total volume around 3 x 1000 L IBC's of MEG and 200 L of methanol liquid will be available at the surface well site location. Any excess liquid left over at the end of the well intervention activities will be disposed of into an approved means of water disposal by approved means as per Section 5.3 or stored for future use.

The SDS's for the proposed chemicals are located within the well site in possession of the AWE Wellsite supervisor.

5.4 Water disposal

Returned fluids are not expected as part of this activity, however in the case excess water is generated. The excess water (returned fluids) is pumped out of onsite storage tanks into a tanker. It is then transported by road to disposal location. Excess water will be disposed of either to an approved water disposal well (Eremia-04/Dongara WDW) or an approved evaporation pond (Hovea Evaporation Pond). AWE estimate that approximately 100 bbl of fluid will be generated for disposal during the well bore suspension activity. If it is disposed into well then hoses are rigged up from tanker to well via a pump. It is then pumped into the well. If water is to be disposed of at an evaporation pond then a hose will rigged up unloaded directly into the pond.

Where fluid transfers occur (either between onsite storage tanks or into the evaporation pond/disposal well) a spill tray or secondary containment will be in place to capture any potential spillage during transfer.

5.5 Site rehabilitation

Not part of proposed activity scope.

5.6 Impacts and risks of activity

The risks and impacts associated with by the activity are assessed within Section 6.0 of the accepted EP [HSE-E-75] Rev E.

The major risks associated with this activity are:

- Introduction of weeds (risk analysis ranked this risk as low)
- Disruption of agricultural activities (risk analysis ranked this risk as medium)
- Fuel, oil or chemical spills (risk analysis ranked this risk as low)
- Disposal of waste (risk analysis ranked this risk as low)
- Groundwater contamination (risk analysis ranked this risk as low).

The WIA program will be managed in accordance with the commitments outlined in the Onshore North Perth Basin Well Intervention Activities Environment Plan (EP) [HSE-E-075]. For the purposed WIA; there are no additional risks or impacts above or beyond the accepted EP [HSE-E-75] issued December 16th 2013.

6.0 MANAGEMENT APPROACH

The implementation strategy outlined in the accepted EP [HSE-E-75] Rev E Section 8.0 is applicable to the proposed activity. The aspects include:

Systems, practices and procedures

- Roles and responsibilities of personnel
- Training and competencies
- Monitoring, auditing, management of non-conformance and review
- Emergency response (including oil spill contingency plan)
- Record keeping
- Reporting

The WIA program will be managed in accordance with the commitments outlined in the AWE Onshore North Perth Basin Well Intervention Activities Environment Plan (EP) [HSE-E-75] Rev E. For the purposed WIA; there are no additional risks or impacts above or beyond the accepted EP [HSE-E-75] Rev E approved December 16th 2013.

The objective of this Environmental Bridging Document is to disclose products, additives, chemicals and other substances (Table 5 A-C) required under the Petroleum and Geothermal Energy Resources (Environment) Regulations 2012.

7.0 CONSULTATION

Consultation for the proposed WIA is outlined in Table 4.

Table 4 Consultation Record

Stakeholders	Issues and resolution
DMP (Petroleum Branch)	Activity captured under relevant Well Management Plan submitted to DMP Petroleum Branch.
DMP (Environmental Branch)	Acceptance of the AWE Onshore North Perth Basin Well Intervention Activities Environment Plan (EP) [HSE-E-75], Rev E December 16th 2013.
	Discussion regarding proposed activity and Environmental Bridging Document timing.
Landowner/Lessee	Both well locations are within land leased by AWE, the activities are accounted for within access agreements. The lessee is notified of activities prior to commencement.

AWE has a website specifically covering its Perth Basin activities (www.awemidwest.com.au). The website includes project specific pages as well as blogs highlighting updates and responding to particular topics of interest to our stakeholders. It also includes an option to subscribe to news feeds and to contact AWE for additional information.

8.0 CHEMICAL DISCLOSURE

Table 5 Products, additives, chemicals and other substances (Fluids)

Table 5.A System Details

Operator	AWE Perth Pty Ltd
Project/Well	Senecio-03/Waitsia-01
System	Methanol treatment
Total Volume of System (each well)	*3200 L

* Includes 100% Contingency volume

Table 5.B Product List

Product Name	Supplier	Purpose	Toxicity, Ecotoxicity & Biodegradability data	% Product in system fluid	SDS Attached
MEG	Newpark	Antifreeze/Dehydrator	Acute Toxicity: Ecotoxicity LC50 (Aquatic species) : >100mg/L/96hrs. Nonhazardous to aquatic organisms. Ethylene glycol will mainly exist in the vapour phase in the ambient atmosphere where it will be degraded by reaction with hydroxyl radicals. Expected to be very highly mobile in soil. Not anticipated to volatilise from moist soil or water surfaces. Biodegradation/bioaccumulation: Biodegradation in both soil and water is expected to be a major fate process for this compound. Not expected to bioconcentrate in aquatic organisms.	100%	Yes
Methanol	Recochem/ NewPark	Antifreeze/Dehydrator	Acute Toxicity: LDLo Oral (human) = 143 mg/kg LD50 Oral (rat) > 2000mg/kg Methanol in fresh or salt water may have serious effects on aquatic life. A study on methanol's toxic effects on sewage sludge bacteria reported little effect on digestion at 0.1% while 0.5% methanol retarded digestion. Methanol will be broken down into carbon dioxide and water. Biodegradation/bioaccumulation: Biodegrades easily in water. Methanol does not concentrate or accumulate in fish.	100%	Yes
Total				100.00%	

Table 5.C Chemical List

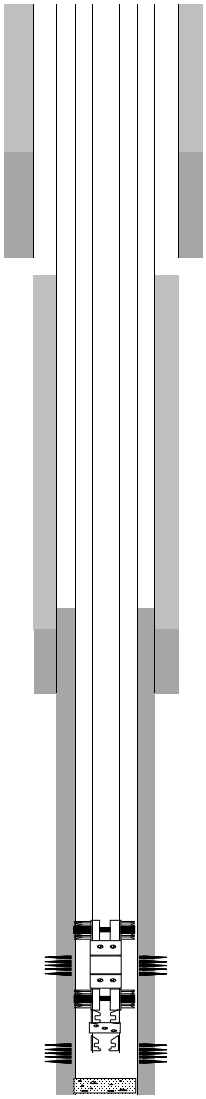
Chemicals Name	CAS number	Mass fraction (%)
Ethylene Glycol	107-21-1	100%
Methanol	67-56-1	100%
Note: Grey highlighted denotes contingent chemicals	**TOTAL:**	100.00%

ATTACHMENTS

Attachment 1
Well Schematic

AWE

Well Name:	Waitsia-01	**Pick Up:**	~25 mT	**RT-AMSL:**	81.0
Well Type:	Gas	**Slack Off:**	~ 25 mT	**GL-AMSL:**	74.4
Supervisor:	R Cibura / A Halliday.	**Block Wt:**	1.9 mT	**RT-GL:**	6.60
Current Status:	Completed.	**Dev at Pkr:**	Vertical	**RT-WH:**	6.30
Created by:	R Cibura	**TD:**	3507m	**RIH Date:**	29-Sep-15
Revision #:	6	**TVD:**	3506m		
Revision Date:	14/04/2016	**PBTD:**	~ 3447m		
Revised by:	RC				



Casing Description

Size	String	Thread	Weight / Grade / Range	Depth (m)	Remarks
13 3/8"	Surface	BTC	68# L80 R3	850	
9 5/8"	Intermediat	BTC	47# L-80 R3	2400	
5 1/2"	Production VA	SuperiorHCET	23# P110 R3	3502	

Perforations

Zone	Interval	Type	Remarks
Kingia Formation	3333-3348	3 3/8" 6 SPF TCP	Drop bar firing head, shot U/B - 1625psi.
High Cliff Sandstone	3382-3405.5	3 3/8" 6 SPF TCP	Drop bar firing head, shot U/B - 1625psi.

Tubing String Details (Number from bottom up)

Size/Weight/Grade	73mm (2 7/8"), 9.52 kg/m (6.4ppf), 13CR80, JFE Fox				
No	**Description**	**Length m**	**Depth m RT**	**Max OD mm / in**	**Min ID mm / in**	**Drift ID mm / in**
	5 1/8" SL TBG HGR WEIR. 2 7/8" EUE x Bear. 2.5" H BPV 17-4PHSS, 6A-PU-CC/FF-0.5-3-1	0.138	6.301	**127.38 / 5.015**	**61.09 / 2.405**	-
	2 7/8" 6.4# 13CR85 JFE Bear Pup Joint	0.997	6.439	83.74 / 3.297	61.54 / 2.423	59.62 / 2.347
	2 7/8" 6.4# 13CR85 JFE Bear Space Out Pup Joints (3 Pups)	6.250	7.436	83.74 / 3.297	61.54 / 2.423	59.62 / 2.347
	2 7/8" 6.4# 13CR85 JFE Bear x JFE FOX Xover Pup Joint	1.132	13.686	83.74 / 3.297	61.54 / 2.423	59.62 / 2.347
	2 7/8" 6.4# 13CR85 FOX Tubing (340 Jts)	3271.566	14.818	83.74 / 3.297	61.54 / 2.423	59.62 / 2.347
	E-line Correction (+ 1.369) + Compression (-0.61) RA Pip Tag = > 3287.27	0.759	3286.384	-	-	-
	2 7/8" 6.4# FOX Box x JFE Bear Pin Xover 13CR w/RA Pip Tag	0.577	3287.143	83.92 / 3.304	62 / 2.441	59.62 / 2.347
	2 7/8" 6.4# 13CR80 Bear Tubing (2 Jts)	17.909	3287.720	83.92 / 3.304	62 / 2.441	59.62 / 2.347
	2 7/8" 6.4# 13Cr-80 JFE Bear 6' Pup Joint	1.836	3305.629	83.92 / 3.304	62 / 2.441	59.62 / 2.347
	5 1/2"x2 7/8" Hydaulic Set Packer 13CRSS, JFE Bear Box x Pin	**1.912**	**3307.465**	**114.3 / 4.5**	**60.3 / 2.375**	-
	2 7/8" 6.4# 13Cr-80 JFE Bear 6' Pup Joint	1.849	3309.377	83.92 / 3.304	62 / 2.441	59.62 / 2.347
	2 7/8" 13CR80 JFE Bear Sliding Sleeve, Open Down w/2.188" R Profile.	**0.976**	**3311.226**	**101.3 / 3.99**	**55.6 / 2.188**	-
	2 7/8" 6.4# 13Cr-80 JFE Bear 4' Pup Joint	1.238	3312.202	83.92 / 3.304	62 / 2.441	59.62 / 2.347
	2 7/8" 6.4# 13CR80 Bear Tubing (2 Jts)	17.912	3313.440	83.92 / 3.304	62 / 2.441	59.62 / 2.347
	2 7/8" 6.4# 13CR80 JFE Bear Blast Joints (6 Jts)	**17.932**	**3331.352**	**87 / 3.425**	**60.3 / 2.376**	**59.62 / 2.347**
	2 7/8" 6.4# 13Cr-80 JFE Bear 4' Pup Joint	1.225	3349.284	83.92 / 3.304	62 / 2.441	59.62 / 2.347
	2 7/8" 13CR80 JFE Bear Sliding Sleeve, Open Down w/2.188" R Profile.	**0.975**	**3350.509**	**101.3 / 3.99**	**55.6 / 2.188**	-
	2 7/8" 6.4# 13Cr-80 JFE Bear 4' Pup Joint	1.224	3351.484	83.92 / 3.304	62 / 2.441	59.62 / 2.347
	5 1/2"x2 7/8" Hydaulic Set Packer 13CRSS, JFE Bear Box x Pin	**1.913**	**3352.708**	**114.3 / 4.5**	**60.3 / 2.375**	-
	2 7/8" 6.4# 13CR80 FOX 4' Pup Joint	1.250	3354.621	83.92 / 3.304	62 / 2.441	59.62 / 2.347
	Xover, 2 7/8"-6.4# JFE Bear Box x 2 3/8"-4.6# JFE Fox Pin 13CR80	0.250	3355.871	83.92 / 3.304	50.66 / 1.995	48.3 / 1.901
	2 3/8" 4.6# 13CR85 FOX Tubing Joint (1 Jt)	9.618	3356.121	69 / 2.723	50.66 / 1.995	48.3 / 1.901
	2 3/8" 4.6# 13CR85 FOX 6' Pup Joint	1.822	3365.739	69 / 2.723	50.66 / 1.995	48.3 / 1.901
	2 3/8" 6.4# JFE Fox Box x 2 3/8" 4.6# JFE Bear Pin Xover 13CR	0.323	3367.561	69 / 2.723	50.66 / 1.995	48.3 / 1.901
	1.875" R Landing Nipple. 2.375" 4.6 ppf JFE Fox Box X 2.375" Eue Pin, 13 CR Material	**0.256**	**3367.884**	**77.8 / 3.063**	**47.6 / 1.875**	-
	2 3/8" 4.7# L/N80 EUE 6' Pup Joint	1.869	3368.140	77.8 / 3.062	50.6 / 1.992	48.3 / 1.901
	2 3/8" 4.7# L/N80 EUE 10' Pup Joint	3.076	3370.009	77.8 / 3.062	50.6 / 1.992	48.3 / 1.901
	2 3/8" Single Ceramic Disc Sub L-80 EUE Connections (dual cone)	0.415	3373.085	77.8 / 3.062	50.6 / 1.992	-
	2 3/8" 4.7# L/N80 EUE 10' Perforated Pup Joint	**3.078**	**3373.500**	**77.8 / 3.062**	**50.6 / 1.992**	**48.3 / 1.901**
	2 3/8" 4.7# RN 1.875", 1.716" No-Go. 13CR EUE BxP.	**0.290**	**3376.578**	**77.8 / 3.063**	**43.6 / 1.716**	-
	2 3/8" 4.7# L/N80 EUE 10' Pup Joint	3.071	3376.868	77.8 / 3.062	50.6 / 1.992	48.3 / 1.901
	2 3/8" 4.7# L/N80 EUE Wireline Re-entry Guide	0.125	3379.939	77.8 / 3.062	50.6 / 1.992	48.3 / 1.901
	EOT		**3380.064**			

Notes:

General Comments

Max tubing / pup OD is given as coupling OD if coupling is fitted.

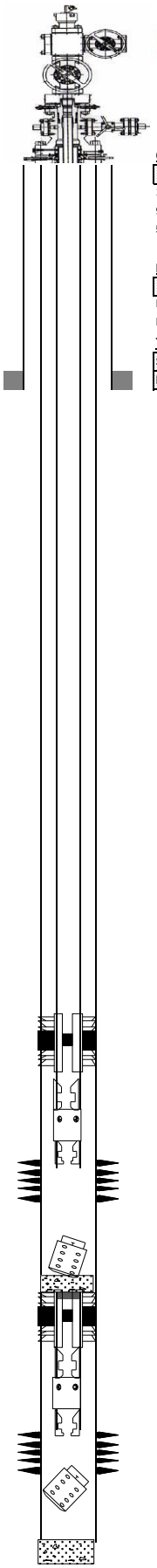
PBTD tagged at 3447m MDRT with 4.5" drift.

Hydraulic Packers: 90-80-90 HNBR, 48klbs shear release. Lower Pkr set w/ neutral weight, Upper Pkr w/10klbs compression.

SSD -> Mid-key 0.15m from Top (i.e. 3,311.38 & 3,350.66 for upper and lower sleeve respectively)

RN -> 0.27m No-Go Shoulder from Top (i.e no-go shoulder at 3,376.85m)

BPV installed, sliding side door accessing the Kingia is closed and tubing open to HCSS formation.



AWE

Well Name:	Senecio-03
Well Type:	Gas
Supervisor:	R. Cibura
Current Status:	Completed.
Created by:	R Cibura
Revision #:	3
Revision Date:	15/10/2015
Revised by:	RC

Pick Up:	~22 mT	**RT-AMSL:**	75.3
Slack Off:	~ 22 mT	**GL-AMSL:**	68.6
Block Wt:	~ 1.5 mT	**RT-GL:**	6.70
Dev at Pkr:	Vertical	**RT-WH:**	6.30
TD:	3370m	**RIH Date:**	5-Mar-15
TVD:	3369m		
PBTD:	3198m*		

Casing Description

Size	String	Thread	Weight / Grade / Range	Depth (m)	Remarks
13 3/8"	Conductor	BTC		52	
9 5/8"	Surface	BTC	47# N-80 R3	1170	
5 1/2"	Production	VASuperiorHC ET	23# P110 R3	3367	

Perforations

Zone	Interval	Type	Remarks
High Cliff Sandstone	3254-3259	3 3/8" 6 SPF TCP 25g Owen Hero-HR HMX	Auto-release drop bar firing head, shot ~ 1500psi underbalanced.
Kingia Fm	3172.3-3183.3	3 3/8" 6 SPF TCP 25g Owen Hero-HR HMX	Auto-release drop bar firing head, shot ~ 1500psi underbalanced.

Tubing String Details (Number from bottom up)

Size/Weight/Grade	73mm (2 7/8"), 9.52 kg/m (6.4ppf), 13CR80, JFE Bear

No	Description	Length m	Depth m RT	Max OD mm / in	Min ID mm / in	Drift ID mm / in
	5 1/8" SL TBG HGR WEIR. 2 7/8" EUE x Bear. 2.5" H BPV 17-4PHSS, 6A-PU-CC/FF-0.5-3-1	**0.197**	**6.3**	**127.38 / 5.015**	**61.09 / 2.405**	**-**
	2 7/8" 6.4# 13CR80 JFE Bear 4' Pup Joint	1.068	6.50	83.92 / 3.304	62 / 2.441	59.62 / 2.347
	2 7/8" 6.4# 13CR80 JFE Bear Space Out Pup	1.227	7.57	83.92 / 3.304	62 / 2.441	59.62 / 2.347
	2 7/8" 6.4# JFE Bear Box x 2 7/8" 6.4# Fox Pin Xover 13CR	1.347	8.79	83.92 / 3.305	62 / 2.441	59.62 / 2.347
	2 7/8" 6.4# 13CR85 JFE Fox Tubing (5 Jts)	48.159	10.14	84 / 3.297	62 / 2.441	59.62 / 2.347
	2 7/8" 6.4# JFE Fox Box x 2 7/8" 6.4# Bear Pin Xover 13CR	1.333	58.30	84 / 3.297	62 / 2.441	59.62 / 2.347
	2 7/8" 6.4# 13CR80 JFE Bear Tubing (321 Jts)	3053.593	59.63	83.92 / 3.304	62 / 2.441	59.62 / 2.347
	E-Line correction (-3.154) + Compression (-0.2).	-3.354	3113.22	-	-	-
	2 7/8" 6.4# 13CR80 JFE Bear 6' Marker Pup Joint w/RA Pip Tag	**1.830**	**3109.87**	**83.92 / 3.304**	**62 / 2.441**	**59.62 / 2.347**
	2 7/8" 6.4# 13CR80 JFE Bear Tubing (2 Jt)	19.244	3111.70	83.92 / 3.304	62 / 2.441	59.62 / 2.347
	2 7/8" 6.4# 13CR80 JFE Bear 6' Pup Joint	1.830	3130.94	83.92 / 3.304	62 / 2.441	59.62 / 2.347
	2 7/8" 6.4# JFE Bear Box x 2 3/8" 4.6# Bear Pin Xover 13CR	0.400	3132.77	83.92 / 3.304	50.66 / 1.995	-
	5 1/2"x2 3/8" Tryton TX-10 Mech. 10K Packer. 13CR.Bear BxP	**2.244**	**3133.17**	**114.3 / 4.5**	**50.8 / 1.938**	**-**
	2 3/8" 4.6# JFE Bear Box x 2 3/8" 4.6# JFE Fox Pin Xover 13CR	0.490	3135.42	69 / 2.723	50.66 / 1.995	48.3 / 1.901
	2 3/8" 4.6# 13CR85 FOX 4' Pup Joint	1.381	3135.91	69 / 2.723	50.66 / 1.995	48.3 / 1.901
	2 3/8" 4.6# 13CR85 FOX Tubing Joint (1 Jt)	9.601	3137.29	69 / 2.723	50.66 / 1.995	48.3 / 1.901
	2 3/8" 4.6# 13CR85 FOX 6' Pup Joint	1.820	3146.89	69 / 2.723	50.66 / 1.995	48.3 / 1.901
	2 3/8" 6.4# JFE Fox Box x 2 3/8" 4.6# JFE Bear Pin Xover 13CR	0.395	3148.71	69 / 2.723	50.66 / 1.995	48.3 / 1.901
	1.875" R Landing Nipple. 2.375" 4.6 ppf JFE Fox Box X 2.375" Eue Pin, 13 CR Material	**0.255**	**3149.11**	**77.8 / 3.063**	**47.6 / 1.875**	-
	2 3/8" Kobe Sub, Eue Box X Pin, L-80 Material	0.125	3149.36	77.8 / 3.063	50.6 / 1.992	-
	2 3/8" 4.7# L/N80 EUE 4' Pup Joint	1.276	3149.49	77.8 / 3.062	50.6 / 1.992	48.3 / 1.901
	2 3/8" 4.7# L80 EUE Tubing Joint (1 Jt)	9.549	3150.76	77.8 / 3.062	50.6 / 1.992	48.3 / 1.901
	2 3/8" Single Ceramic Disc Sub / Flow Sub L-80 EUE Connections (cone down)	0.306	3160.31	77.8 / 3.062	-	-
	2 3/8" 4.7# L/N80 EUE 10' Perforated Pup Joint	**3.096**	**3160.62**	**77.8 / 3.062**	**50.6 / 1.992**	**48.3 / 1.901**
	2 3/8" 4.7# RN 1.875", 1.716" No-Go. 13CR EUE BxP.	**0.285**	**3163.71**	**77.8 / 3.063**	**43.6 / 1.716**	**-**
	2 3/8" 4.7# L/N80 EUE 10' Pup Joint	3.096	3164.00	77.8 / 3.062	50.6 / 1.992	48.3 / 1.901
	2 3/8" 4.7# L/N80 EUE 10' Pup Joint	3.063	3167.09	77.8 / 3.062	50.6 / 1.992	48.3 / 1.901
	Auto Release Top Sub.	0.300	3170.16	77.8 / 3.062	50.6 / 1.992	48.3 / 1.901
	EOT		3170.46			
	FISH					
	1" x 10' Drop Bar	3.000	3198.31	25.4 / 1	-	-
	Automtic Release Btm Sub w/Mech Firing Head	0.660	3201.31	86.73 / 3.375	-	-
	Safety Spacer	1.780	3201.97	86.73 / 3.375	-	-
	3 3/8" 6SPF TCP guns loaded w/ HMX HERO HR 25g	11.000	3203.75	86.73 / 3.375	-	-
	Bot shot to Det Sub	0.250	3214.75	86.73 / 3.375	-	-
	Det Sub	0.082	3215.00	86.73 / 3.375	-	-
	Pressure Activated Time Delay Redundant FH (6500psi)	1.415	3215.09	86.73 / 3.375	-	-
	End of FISH		3216.50			
	SAND PLUG	15.130	3216.5	-	-	-
	2 3/8" Tryton TL On-Off Unit c/w 1.875" R Profile. LHR. 2 3/8" JFE Bear Box x Pin 13 CR	0.590	3231.63	114.3 / 4.5	47.6 / 1.875	-
	2.688" Tryton PermaPac Latch Seal Assembly, 2 3/8" Bear Box	0.960	3232.22	114.3 / 4.5	49.23 / 1.938	-
	Seal Overlap	-0.650	3233.18	-	-	
	5 1/2" Tryton 'PermaPac' Pkr c/w 2.688" SB. HNBR. 13CR flow wet, outer ENC L-80.	0.600	3232.53	112.7 / 4.437	49.23 / 1.938	-
	PermaPac Seal Bore Adaptor to 2 3/8"-4.6# Bear Pin	0.230	3233.13	112.7 / 4.437	49.23 / 1.938	-
	2 3/8" 6.4# JFE Bear Box x 2 3/8" 4.6# JFE Fox Pin Xover 13CR	0.490	3233.36	69 / 2.723	50.66 / 1.995	48.3 / 1.901
	2 3/8" 4.6# 13CR85 FOX 4' Pup Joint	1.400	3233.85	69 / 2.723	50.66 / 1.995	48.3 / 1.901
	2 3/8" 4.6# 13CR85 FOX 6' Pup Joint	1.820	3235.25	69 / 2.723	50.66 / 1.995	48.3 / 1.901
	2 3/8" 4.6# 13CR85 FOX 6' Pup Joint	1.830	3237.07	69 / 2.723	50.66 / 1.995	48.3 / 1.901
	2 3/8" 6.4# JFE Fox Box x 2 3/8" 4.6# JFE Bear Pin Xover 13CR	0.400	3238.90	69 / 2.723	50.66 / 1.995	48.3 / 1.901
	1.875" R Landing Nipple. 2.375" 4.6 ppf JFE Bear Box X 2.375" Eue Pin, 13 CR Material	0.255	3239.30	77.8 / 3.063	47.6 / 1.875	-
	2 3/8" 4.7# L/N80 EUE 10' Perforated Pup Joint	3.095	3239.56	77.8 / 3.062	50.66 / 1.995	48.3 / 1.901
	2 3/8" Debris barrier / Flow Sub L-80 EUE Connections	0.161	3242.65	77.8 / 3.062	50.66 / 1.995	-
	2 3/8" 4.7# L/N80 EUE 10' Pup Joint	3.085	3242.81	77.8 / 3.062	50.6 / 1.992	48.3 / 1.901
	2 3/8" 4.7# RN 1.875", 1.716" No-Go. 13CR EUE BxP.	0.290	3245.90	77.8 / 3.063	43.6 / 1.716	-
	2 3/8" 4.7# L/N80 EUE 10' Pup Joint	3.095	3246.19	77.8 / 3.062	50.6 / 1.992	48.3 / 1.901
	2 3/8" 4.7# L/N80 EUE 10' Pup Joint	3.065	3249.28	77.8 / 3.062	50.6 / 1.992	48.3 / 1.901
	Auto Release Top Sub.	0.300	3252.35	77.8 / 3.062	50.6 / 1.992	48.3 / 1.901
	End of HCSS Isolation Assembly		3252.65			
	FISH					
	1" x 10' Drop Bar	3.000	3258.50	25.4 / 1	-	-
	Automtic Release Btm Sub w/Mech Firing Head	0.660	3261.50	86.73 / 3.375	-	-
	Safety Spacer	1.275	3262.16	86.73 / 3.375	-	-
	3 3/8" 6SPF TCP guns loaded w/ Owen Hero HR 25g HMX	5.030	3263.44	86.73 / 3.375	-	-
	Bot shot to Det Sub	0.260	3268.47	86.73 / 3.375	-	-
	Det Sub	0.095	3268.73	86.73 / 3.375	-	-
	Pressure Activated Time Delay Redundant FH (6500psi)	1.935	3268.82	86.73 / 3.375	-	-
	End of FISH		3270.8			

Notes:

General Comments
Max tubing / pup OD is given as coupling OD if coupling is fitted.
Sand plug top at 3216.5m MDRT. 1.875" R Plug set in lower HCSS suspension packer at 3231m.
Packer setting depth & guns correlated to first wire-line run (GSLAM), PIP TAG at 3111.7m MDRT. Packer left with 2-3klbs compression, 25klbs overpull used to set.
* PBTD in header = Expected top of dropped Kingia guns & drop bar. Actual top has not been tagged and may be higher.

Attachment 2
Safety Data Sheets

SAFETY DATA SHEET

SECTION 1 IDENTIFICATION: PRODUCT IDENTIFIER AND CHEMICAL IDENTITY

Product Identifier **METHANOL**

Other Names Methyl alcohol, wood alcohol, woodspirit, carbinol

Manufacturer's Product Code 16230

Recommended Use Solvent, general chemical

Details of Supplier/Manufacturer

Company:	Recochem Inc. ABN: 69 010 485 999
Address:	1809 Lytton Road, Lytton, Queensland 4178
Phone:	(07) 3308 5200 Fax: (07) 3308 5201
Website:	www.recochem.com.au

Emergency Telephone Numbers

Business Hours:	(07) 3308 5200
After Hours:	1300 131 001
Poisons Information:	Australia: 13 11 26 New Zealand: 0800 764 766

SECTION 2 HAZARDS IDENTIFICATION

Hazardous chemical	*according to classification by Safe Work Australia*
Dangerous goods	*according to the Australian Code for the Transport of Dangerous Goods by Road and Rail*

Signal Word	**DANGER**

GHS Classification	Pictogram	Hazard statement
Flammable Liquids, Category 2	 FLAME	H225 Highly flammable liquid and vapour
Acute Toxicity - Oral, Category 3	 SKULL AND CROSSBONES	H301 Toxic if swallowed
Acute Toxicity - Dermal, Category 3		H311 Toxic in contact with skin
Acute Toxicity - Inhalation, Category 3		H331 Toxic if inhaled

Specific Target Organ Toxicity (Single exposure), Category 1	 HEALTH HAZARD	H370 Causes damage to organs through inhalation, in contact with skin and if swallowed

Precautionary statements:

GENERAL	
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
PREVENTATIVE	
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/ventilation/lighting equipment
P242	Use only non-sparking tools
P243	Take precautionary measures against static discharge
P260	Do not breathe mist/vapours/spray
P261	Avoid breathing mist/vapours/spray
P264	Wash thoroughly after handling
P270	Do not eat drink or smoke when using this product
P271	Use only outdoors or in a well-ventilated area
P280	Wear protective gloves/eye protection/face protection
RESPONSE	
P301 + P310	IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician
P302 + P352	IF ON SKIN: Wash with plenty of soap and water
P303 + P361 + P353	IF ON SKIN (or hair): Take off contaminated clothing and wash before reuse. Rinse skin with water/shower
P304 + P340	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
P307 + P311	IF exposed: Call a POISON CENTER or doctor/physician
P311	Call a POISON CENTER or doctor/physician
P312	Call a POISON CENTER or doctor/physician if you feel unwell
P330	Rinse mouth
P361	Remove/Take off immediately all contaminated clothing
P363	Wash contaminated clothing before reuse
P370 + P378	In case of fire: Use foam/water spray/fog 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 regulations

SECTION 3 COMPOSITION AND INFORMATION ON INGREDIENTS

Ingredients Names and Proportions

Chemical Entity	CAS Number	Proportion (%)
Methanol	67-56-1	> 99

SECTION 4 FIRST AID MEASURES

Description of necessary first aid measures

Inhalation:	Keep victim calm and remove to fresh air if safe to do so. If rapid recovery does not occur, transport to nearest medical facility for additional treatment. Remove contaminated clothing.
Skin Contact:	If skin contact occurs, remove contaminated clothing and immediately flush skin thoroughly with large amounts of water and follow by washing with soap if available. Transport to nearest medical facility for additional treatment if necessary.
Eye Contact:	If in eyes, hold eyes open, flood with large amounts of water for at least 15 minutes. Transport to nearest medical facility for additional treatment if necessary.
Ingestion:	If swallowed, do NOT induce vomiting. Rinse mouth with water. Obtain medical treatment immediately. If vomiting occurs spontaneously, keep head below hips to prevent aspiration.

Symptoms caused by exposure

Inhalation:	Inhalation of vapours can result in headaches, dizziness, and possible nausea. Inhalation of higher concentrations can produce central nervous system depression and unconsciousness.
Skin:	May include burning sensation and/or a dried cracked appearance.
Eye:	May include burning sensation, redness, swelling and/or blurred vision.
Ingestion:	Effects of a small intake may include excitation, euphoria, headache, dizziness, drowsiness, blurred vision, and fatigue. Ingestion of a large amount may lead to severe acute intoxication, tremours, convulsion, loss of consciousness, coma, respiratory arrest and death. Aspiration in to lung may cause pneumonitis

Medical attention and special treatment

Treat symptomatically.

SECTION 5 FIRE FIGHTING MEASURES

Suitable extinguishing equipment

Alcohol stable foam, water spray or fog. Dry chemical powder, carbon dioxide for small fires only. Do not use water in a jet.

Specific hazards arising from the chemical

Carbon monoxide and/or Carbon dioxide may be evolved.

Special protective equipment and precautions for fire fighters

Wear full protective clothing and self-contained breathing apparatus. Hazchem code ●2WE.

SECTION 6 ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Avoid contact with spilled or released material. Shut off leaks, if possible without personal risks. Isolate hazard area and deny entry to unnecessary or unprotected personnel. Remove all sources of ignition in the surrounding area. Take precautionary measure against static discharge. Ensure electrical continuity by bonding and earthing all equipment.

Environmental precautions

Use appropriate containment to avoid environmental contamination. Prevent from spreading and entering waterway using sand, earth or other appropriate barriers. Attempt to disperse the vapour or to direct its flow to a safe location for example by using fog sprays. Ventilate contaminated area thoroughly.

Methods and materials for containment and cleaning up

For small spills (< 1 drum), transfer by mechanical means to a labelled, sealable container for product recovery or safe disposal. Allow any residues to evaporate or use an appropriate absorbent material and dispose of safely.

For larger spills (> 1 drum), transfer by means such as a vacuum truck to a salvage tank for recovery or disposal. Do not flush residues with water. Retain as contaminated waste. Allow any residues to evaporate or use an appropriate absorbent material and dispose of safely.

SECTION 7 HANDLING AND STORAGE

Precautions for safe handling

Highly flammable product. Avoid breathing vapours. Handle and open containers with care in a well-ventilated area. Ensure that the workplace is ventilated such that the Occupational Exposure limit is not exceeded. Avoid contact with skin, eyes and clothing. Wash thoroughly after handling. Do not eat, drink or smoke in contaminated areas. Electrostatic charges may be generated during transfer. Electrostatic discharge may cause fire. Ensure electrical continuity by earthing all equipment. Flameproof equipment necessary in area where chemical is being used. Vapours may accumulate in low or confined areas.

Conditions for safe storage, including any incompatibilities

Bulk storage tanks should be bunded. Store in a well-ventilated area, away from sunlight, ignition sources and other sources of heat. Do not store near strong oxidants.

SECTION 8 EXPOSURE CONTROLS AND PERSONAL PROTECTION

Exposure control measures

From National Occupational Health & Safety Commission (NOHSC) Worksafe Australia -
Methanol: 262mg/m3 (200ppm) TWA (8hr), 328/ m3 (250ppm) STEL

Biological monitoring

No biological limit allocated.

Engineering controls

Ensure that adequate ventilation is provided. Maintain air concentrations below recommended exposure standards. Avoid generating and inhaling mists and vapours. Keep containers closed when not in use.

Individual protection measures

Eye and face protection:	Wear safety goggles.
Skin protection:	Use solvent resistant gloves, nitrile for longer term protection or PVC and neoprene for incidental splashes.
Respiratory protection:	If work practices do not maintain airborne level below the exposure standard, use appropriate respiratory protection equipment. When using respirators, select an appropriate combination of mask and filter. Select a filter for organic gases and vapours (boiling point > 65°C). Respirators should comply with AS1716 or an equivalent approved by a state/territory authority.
Thermal hazards:	Not applicable.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	Colourless clear liquid
Odour:	Alcoholic
Odour threshold (ppm):	Data not available
pH:	Data not available
Melting point/freezing point (°C):	-98
Initial boiling point and boiling range (°C):	64.5

Flash point (°C):	11
Evaporation rate (Butyl acetate = 1):	Data not available
Flammability:	Highly flammable
Upper/lower flammability or explosive limits (%):	6 - 36
Vapour pressure (mmHg @ 20°C):	100
Vapour density (air = 1, @ 15°C):	1.1
Density (g/ml @ 15°C):	0.79
Solubility (kg/m^3):	Miscible
Partition coefficient: n-octanol/water:	Data not available
Auto-ignition temperature (°C):	385
Decomposition temperature (°C):	Data not available
Kinematic viscosity (mm^2/s @ 20°C):	Data not available

SECTION 10 STABILITY AND REACTIVITY

Reactivity
Stable under normal conditions of use.

Chemical stability
Stable under normal conditions of use.

Possibility of hazardous reactions
Stable under normal conditions of use.

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

Incompatible materials
Oxidising agents.

Hazardous decomposition products
Burning can produce carbon monoxide and/or carbon dioxide.

SECTION 11 TOXICOLOGICAL INFORMATION

Acute toxicity:	LDLo Oral (human) = 143 mg/kg LD50 Oral (rat) > 2000mg/kg
Skin corrosion/irritation:	Mild irritant. Prolonged contact may cause defatting of skin which can lead to dermatitis. Can be absorbed through the skin with resultant toxic effects
Serious eye damage/irritation:	Vapours may irritate the eyes. Liquid or mists may severely irritate or damage the eyes
Respiratory or skin sensitisation:	Not expected to be a sensitiser
Germ cell mutagenicity:	Not a mutagen
Carcinogenicity:	Not a carcinogen
Reproductive toxicity:	Not expected to impair fertility

Specific Target Organ Toxicity (STOT) – single exposure:	Inhalation of vapours can result in headaches, dizziness, and possible nausea. Inhalation of higher concentrations can produce central nervous system depression and unconsciousness.
Specific Target Organ Toxicity (STOT) – repeated exposure:	Chronic exposure to concentrations greater than 1000ppm can result in permanent blindness and metabolic acidosis.
Aspiration hazard:	Not considered an aspiration hazard

SECTION 12 ECOLOGICAL INFORMATION

Ecotoxicity

Acute toxicity:

Fish –	Low toxicity: LC/EC/IC50 > 1000mg/l
Aquatic invertebrate –	Low toxicity: LC/EC/IC50 > 1000mg/l
Algae –	Low toxicity: LC/EC/IC50 > 1000mg/l
Microorganisms –	Data not available

Chronic toxicity:

Fish –	Data not available
Aquatic invertebrate –	Data not available
Algae –	Data not available
Microorganisms –	Data not available

Persistence and degradability

Biodegradable.

Bioaccumulative potential

Does not bioaccumulate significantly.

Mobility in soil

Miscible with water.

Other adverse effects

Data not available.

SECTION 13 DISPOSAL CONSIDERATIONS

Ensure waste disposal conforms to local waste disposal regulations.

SECTION 14 TRANSPORT INFORMATION

UN number:	1230
Proper shipping name:	Methanol
Australian Dangerous Goods class:	3 (sub-risk 6.1)
Australian Dangerous Goods packing group:	II
Hazchem code:	●2WE

SECTION 15 REGULATORY INFORMATION

Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP), Poisons Schedule:	6
Australian Inventory of Chemical Substances (AICS):	Listed
Dangerous Goods Initial Emergency Response Guide (SAA/SNZ HB76):	16

SECTION 16 OTHER INFORMATION

Date of preparation:	10/12/2014
Revision number:	6
Changes in this revision:	Update to GHS SDS standard

RHEOCHEM

MATERIAL SAFETY DATA SHEET

Product Name **MEG**

1. IDENTIFICATION OF THE MATERIAL AND SUPPLIER

Supplier Name	**RHEOCHEM LTD**
Address	11 Alacrity Place, Henderson, WA, AUSTRALIA, 6166
Telephone	+61 8 9410 8200
Fax	+61 8 9410 8299
Emergency	1800 127 406 (Australia); 011 64 3 3530199 (International)
Web Site	http://www.rheochem.com.au/
Synonym(s)	1,2-DIHYDROXYETHANE • 1,2-ETHANEDIOL • ETHYLENE GLYCOL • MONOETHYLENE GLYCOL
Use(s)	ANTIFREEZE • BRAKE FLUID • FOAM • HEAT TRANSFER MEDIUM • HUMECTANT • LEATHER INDUSTRY • PAINT • SOLVENT • TEXTILE CHEMICAL
SDS Date	01 Nov 2010

2. HAZARDS IDENTIFICATION

CLASSIFIED AS HAZARDOUS ACCORDING TO SAFE WORK AUSTRALIA CRITERIA

RISK PHRASES

R22 Harmful if swallowed.

SAFETY PHRASES

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

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

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

3. COMPOSITION/ INFORMATION ON INGREDIENTS

Ingredient	Formula	CAS No.	Content
ETHYLENE GLYCOL	C2-H6-O2	107-21-1	100%

4. FIRST AID MEASURES

Eye	If in eyes, hold eyelids apart and flush continuously with running water. Continue flushing until advised to stop by a Poisons Information Centre, a doctor, or for at least 15 minutes.
Inhalation	If inhaled, remove from contaminated area. To protect rescuer, use a Type A (Organic vapour) 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. Continue flushing with water until advised to stop by a Poisons Information Centre or a doctor.
Ingestion	For advice, contact a Poison Information Centre on 13 11 26 (Australia Wide) or a doctor (at once).
Advice to Doctor	Treat symptomatically.
First Aid Facilities	Eye wash facilities and safety shower are recommended.

5. FIRE FIGHTING MEASURES

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

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

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

Hazchem Code None Allocated

6. ACCIDENTAL RELEASE MEASURES

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

7. STORAGE AND HANDLING

Storage Store in a cool, dry, well ventilated area, removed from oxidising agents, acids, phosphorus pentasulphide, sodium hydroxide, heat or ignition sources and foodstuffs. Ensure containers are adequately labelled, protected from physical damage and sealed when not in use. Check regularly for leaks or spills. Store as a Class C1 Combustible Liquid (AS1940).

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

8. EXPOSURE CONTROLS/ PERSONAL PROTECTION

Exposure Stds

Ingredient	Reference	TWA		STEL	
Ethylene glycol (vapour)	SWA (AUS)	20 ppm	52 mg/m3	40 ppm	104 mg/m3

Biological Limits No biological limit allocated.

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

PPE Wear splash-proof goggles, neoprene or butyl or rubber gloves and coveralls. Where an inhalation risk exists, wear: a Type A (Organic vapour) respirator. If spraying, wear: a Type A-Class P1 (Organic gases/vapours and Particulate) respirator.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	VISCOUS CLEAR COLOURLESS LIQUID	**Solubility (water)**	SOLUBLE
Odour	ODOURLESS	**Specific Gravity**	1.12
pH	NOT AVAILABLE	**% Volatiles**	NOT AVAILABLE
Vapour Pressure	0.05 mm Hg @ 20°C	**Flammability**	CLASS C1 COMBUSTIBLE
Vapour Density	2.2 (Air =1)	**Flash Point**	110°C (cc)
Boiling Point	197°C	**Upper Explosion Limit**	12.8 %
Melting Point	-13°C	**Lower Explosion Limit**	3.2 %
Evaporation Rate	NOT AVAILABLE		
Autoignition Temperature	314°C		

10. STABILITY AND REACTIVITY

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

11. TOXICOLOGICAL INFORMATION

Health Hazard Summary	Moderate toxicity. This product has the potential to cause adverse health effects with over exposure. Use safe work practices to avoid eye or skin contact and inhalation. At room temperature ethylene glycol has a low vapour pressure and therefore an inhalation hazard is not anticipated unless heated or sprayed. Chronic exposure may result in kidney and central nervous system (CNS) damage.
Eye	Low to moderate irritant. Contact may result in irritation, lacrimation, pain and redness.
Inhalation	Low irritant. Over exposure may result in mild respiratory irritation. High level exposure may result in headache, nausea, dizziness and central nervous system (CNS) depression. Due to the low vapour pressure, an inhalation hazard is not anticipated with normal use.
Skin	Irritant. Contact may result in drying and defatting of the skin, rash and dermatitis.
Ingestion	Moderate toxicity. Ingestion may result in nausea, vomiting, abdominal pain, diarrhoea, drowsiness and unconsciousness. Chronic exposure may result in kidney damage. Aspiration may result in chemical pneumonitis and pulmonary oedema.
Toxicity Data	ETHYLENE GLYCOL (107-21-1) LC50 (Inhalation): 10 876 mg/kg (rat) LD50 (Ingestion): 1650 mg/kg (cat) LD50 (Skin): 9530 ug/kg (rabbit) LDLo (Ingestion): 398 mg/kg (human) TCLo (Inhalation): 10,000 mg/m3 (human - cough) TDLo (Ingestion): 5500 mg/kg (child - anaesthesia)

12. ECOLOGICAL INFORMATION

Environment	Ethylene glycol will mainly exist in the vapour phase in the ambient atmosphere where it will be degraded by reaction with hydroxyl radicals. Expected to be very highly mobile in soil. Not anticipated to volatilise from moist soil or water surfaces. Biodegradation in both soil and water is expected to be a major fate process for this compound. Not expected to bioconcentrate in aquatic organisms.
Ecotoxicity	LC50 (Aquatic species): >100mg/L/96hrs. Non hazardous to aquatic organisms.

13. DISPOSAL CONSIDERATIONS

Waste Disposal	Dispose of by controlled incineration, by licensed or competent personnel. Contact the manufacturer for additional information. Prevent contamination of drains and waterways as aquatic life may be threatened and environmental damage may result.
Legislation	Dispose of in accordance with relevant local legislation.

14. TRANSPORT INFORMATION

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

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

15. REGULATORY INFORMATION

Poison Schedule	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

ETHYLENE GLYCOL: Has been reported to cause teratogenic and mutagenic effects, however the doses recorded for these effects are extremely high. For example experimental rat studies by the oral route have shown that ingestion of 8.5 g/kg by pregnant rats in their 6-15 day of gestation caused teratogenic effects. This equates to the ingestion of 500 ml of ethylene glycol by a 60 kg women for similar effects to occur. Exposure at such levels is not reported in industry.

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.

STORAGE OF COMBUSTIBLE LIQUIDS. Combustible liquids with a flash point between 61°C and 150°C are required to be stored as for flammable liquids (Dangerous Goods Class 3) under AS 1940. [Refer to Australian Standard 1940, Storage and Handling of Flammable and Combustible Liquids, for full storage guidelines].

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

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

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

Report Status

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

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

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

Prepared By

Risk Management Technologies
5 Ventnor Ave, West Perth
Western Australia 6005
Phone: +61 8 9322 1711
Fax: +61 8 9322 1794
Email: info@rmt.com.au
Web: www.rmt.com.au

SDS Date 01 Nov 2010

End of Report