

AGL UPSTREAM INVESTMENTS PTY LTD GLOUCESTER GAS PROJECT

November 2015 Water Monitoring Report
Waukivory Pilot Project: Fracture Stimulation and Flow Test
EPL 20358

Reporting Period: September - October 2015

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Foreword

PREMISES Gloucester Coal Seam Gas Project

Bucketts Way

Gloucester NSW 2422

LICENCE DETAILS Environment Protection Licence 20358

LICENCEE AGL Upstream Investments Pty Limited (AGL)

LICENCEE'S ADDRESS Locked Bag 1837, North Sydney, NSW 2060

MONITORING DATE(s) 26 August, 1, 22 & 23 September, and 21 October 2015

MONITORING BY Parsons Brinckerhoff, on behalf of AGL

ANALYSIS BY ALS Laboratory, Smithfield (Work order: ES1532008, ES1532002,

ES1529385, ES1534210, ES1534159)

DATE AGL OBTAINED DATA 19, 20, 22, 30 October 2015

REPORT DATE 02 November 2015

REPORT PREPARED BY James Duggleby, Senior Hydrogeologist



Introduction

AGL is proposing to build the Gloucester Gas Project (GGP) which comprises several stages of development facilitating the extraction of coal seam gas (CSG) from the Gloucester Basin. Concept plan and project approval (Part 3A Approval) for the Stage 1 Gas Field Development Area (GFDA) was granted on 22 February 2011 under Part 3A of the Environmental Planning and Assessment Act (1979) (EP&A Act). In addition the project received approval under the Environment Protection and Biodiversity Conservation Act (1999) (EPBC Act) (EPBC Approval) on 11 February 2013.

The GGP will involve depressurising of deep groundwater and the extraction of gas from multiple coal seams within the Gloucester coal measures. Target coal seam depths will vary from site to site but are expected to range between 250 and 1,000 m below ground level (mbgl). The current GGP includes the construction, operation, and decommissioning of not more than 110 coal seam gas wells and associated infrastructure, including gas and water gathering lines within the Stage 1 GFDA. A comprehensive groundwater investigation (Phase 2 Groundwater Investigations) was completed in early 2012 to confirm the hydrogeological conceptual model across the Stage 1 GFDA (PB, 2012). Surface water and groundwater investigations are ongoing.

The Gloucester Coal Seam Gas Project has Environment Protection Licence (EPL) 20358 for coal seam gas activities. This Monitoring Report relates to the water monitoring activities specified in Part 5, Monitoring and Recording Conditions, of EPL 20358. This report relates specifically to the monitoring surrounding the Waukivory Pilot Project, and details:

- > Monitoring results from monthly samples at monitoring points 7, 8, 9 (WKSW03, WKSW02, WKSW01) (Appendix B);
- > Monitoring results from fortnightly samples post fracture stimulation at monitoring points 86, 87, 88, 89 (WK11, WK12, WK13, WK14) (Appendix B);
- > Monitoring results from monthly monitoring point 91 (GW08487) (Appendix B); and
- > Monitoring results from monthly samples at monitoring point 92 (AST2) (Appendix B).

As per the EPL, monitoring encompasses the monitoring points at the locations as shown in Table 1 and Figure 1.

The monitoring points that are the subject of this report are part of the GGP surface water and groundwater monitoring network, as described in AGL's Surface Water and Groundwater Management Plan (SGMP) for the Waukivory Pilot Project (AGL, 2015).

Two methods were used to obtain the water samples:

- > Water samples were collected directly from the separator valve located at the surface headworks of each gas well; and
- > A telescopic sampler to collect grab samples from the flowback water monitoring point 92 and the surface water monitoring points 7, 8, and 9.

The water quality samples are analysed by an external NATA certified laboratory (ALS Environmental, Smithfield), in accordance with the EPA Approved Methods Publication "Approved Methods for the Sampling and Analysis of Water Pollutants in New South Wales" (EPA, 2004), with the exception of:

- Monoethanolamine borate, which was analysed as monoethanolamine using the Liquid Chromatography Triple Quadruple Mass Spectrometry (LC/MSMS) method. The EPA have acknowledged that this method is a suitable technique for representing detections of monoethanolamine borate in water (EPA, 2014b).
- > Sodium hypochlorite, where detections of free and total residual chlorine were used as a proxy. The EPA have acknowledged that this method is a suitable technique for representing detections of sodium hypochlorite in water (EPA, 2014a).

This report is prepared in accordance with the *Requirements for Publishing Pollution Monitoring Data* (EPA, 2012) (Publication Requirements).

The remaining water and land monitoring points in EPL 20358 will be reported in subsequent reports when the requirement for monitoring is triggered. More information on the groundwater monitoring of the GGP is available on the project website: agl.com.au/Gloucester



Table 1: Waukivory Pilot Project water monitoring points (as per EPL 20358)

EPA	Monitoring	Type of monitoring point	Easting (m)	Northing (m)		
Identification no.	Point					
7	WKSW03	Stream gauge (surface water)	402486.36	6453090.65		
8	WKSW02	Stream gauge (surface water)	402748.00	6452139.00		
9	WKSW01	Stream gauge (surface water)	402069.00	6452241.00		
10	WKMB01	Groundwater monitoring bore	402153.63	6452566.28		
11	WKMB02	Groundwater monitoring bore	402575.54	6452572.49		
12	WKMB03	Groundwater monitoring bore	402589.87	6452584.93		
14	PL03	Vibrating wire piezometer (groundwater)	402633.90	6449898.67		
85	WKMB05	Packer and piezometer completion: multizone monitoring well (groundwater)	402576.59	6452128.62		
86	WK11	Gas well	402419.02	6452589.82		
87	WK12	Gas well	402748.92	6452883.77		
88	WK13	Gas well	402416.74	6452164.46		
89	WK14	Gas well	402906.10	6452384.08		
90	GR-P3	Private groundwater bore	402905.50	6452518.71		
91	GW080487	Private groundwater bore	401226.00	6454020.00		
92	AST2	Above ground storage tank	Located on the	WK13 work pad		

Notes:

Coordinate reference system: Map Grid of Australia 1994



Figure 1: Location of groundwater and surface water quality monitoring points: Waukivory Pilot Program (as per EPL 20358)





References

- AGL, 2015. Surface Water and Groundwater Management Plan for the Waukivory Pilot Program Gloucester Gas Project. Available online:
 - $\frac{\text{http://www.agl.com.au/} \sim /\text{media/AGL/About\%20AGL/Documents/How\%20We\%20Source\%20}{\text{Energy/Gloucester\%20Document\%20Repository/Water\%20Plans/20150506} \ Surface\%20Water\%20and\%20Groundwater\%20Management\%20Plan\%20for\%20the\%20Waukivory\%20Pilot\%20Program.pdf}$
- Environment Protection Authority (EPA), 2014a. Letter correspondence to AGL Energy Limited. EPA reference: DOC14/192084-03; SF14/602, delivered on the 20 October 2014, signed: Carmen Dwyer, Special Project Manager Coal Seam Gas.
- Environment Protection Authority (EPA), 2014b. Letter correspondence to AGL Energy Limited. EPA reference: DOC14/279381-01; SF14/602, delivered on the 1 December 2014, signed: Brett Nudd, Acting Special Project Manager Coal Seam Gas.
- Environment Protection Authority (EPA), 2004. Approved Methods for the Sampling and Analysis of Water Pollutants in New South Wales, The Department of Environment and Conservation, Sydney, Australia. Available online:

 http://www.environment.nsw.gov.au/resources/water/approvedmethods-water.pdf
- Parsons Brinckerhoff (PB), 2012. Phase 2 Groundwater Investigations Stage 1 Gas Field Development Area, Gloucester Gas Project. Report dated January 2012, PR_5630. Available online:
 - $\frac{\text{http://www.agl.com.au/} \sim /\text{media/AGL/About\%20AGL/Documents/How\%20We\%20Source\%20}{\text{Energy/CSG\%20and\%20the\%20Environment/Gloucester/Assessments\%20and\%20Reports/20}{12/January/PB\%20Gloucester\%20Groundwater\%20Report\%20Phase\%202\%20Appendices\%20E-P.pdf}$
- The State of NSW and Environment Protection Authority (EPA), 2012. Requirements for publishing pollution monitoring data. Environment Protection Authority, Sydney, Australia. Available online: http://www.epa.nsw.gov.au/resources/licensing/130742reqpubpmdata.pdf

Appendix A: Analytes monitored and frequency required for monitoring points in Table 1 (as per EPL 20358 (dated 17 September 2015))

							Monitorii	ng points						
Pollutant	Units of measure		7,8,9		10,11,12, 90		1	14,85		86,87,88,89		92		
ronatane	omes of measure	Frequency				Frequency	Sampling method	Frequency	Sampling method	Frequency	Sampling method	Frequency	Sampling method	
Aluminium	millianama nor litro							requency	Sampling method			rrequency	Sampling method	
Ammonia		Special Frequency 5	Grab Sample	Special Frequency 3	Grab sample Grab sample	,	Grab sample			Special Frequency 4	Grab sample			
Arsenic	milligrams per litre milligrams per litre	Special Frequency 5	Grah sample	Special Frequency 3 Special Frequency 3	Grab sample	Special Frequency 3 Special Frequency 3	Grab sample			Special Frequency 4 Special Frequency 4	Grab sample Grab sample			
Barium	milligrams per litre	-,,	Grab sample	Special Frequency 3	Grab sample	Special Frequency 3	Grab sample			Special Frequency 4	Grab sample			
	micrograms per	opecial Frequency 5	Grab bampic		·		·			Special Frequency 1	Grab barripic	Monthly	Grah cample	
Benzene	litre*	0 115 5	0.11	Special Frequency 3	Grab sample	Special Frequency 3	Grab sample			0 115 4		Pioritiny	Grab sample	
Beryllium	milligrams per litre	Special Frequency 5	·	Special Frequency 3	Grab sample		Grab sample			Special Frequency 4				
Bicarbonate	milligrams per litre	Special Frequency 5	·		Grab sample	Special Frequency 3	·			Special Frequency 4	Grab sample			
Boron Cadmium	milligrams per litre milligrams per litre	Special Frequency 5 Special Frequency 5		Special Frequency 3 Special Frequency 3	Grab sample Grab sample		Grab sample Grab sample			Special Frequency 4 Special Frequency 4	Grab sample Grab sample			
Calcium	milligrams per litre		Grab sample	Special Frequency 3	Grab sample		Grab sample			Special Frequency 4	Grab sample			
Carbonate	milligrams per litre	Special Frequency 5		Special Frequency 3	Grab sample	Special Frequency 3	Grab sample			Special Frequency 4	Grab sample			
Chloride	milligrams per litre		Grab sample	Special Frequency 3	Grab sample		Grab sample			Special Frequency 4	Grab sample			
Chromium	-	Special Frequency 5		Special Frequency 3	Grab sample	Special Frequency 3				Special Frequency 4	Grab sample			
Cobalt	milligrams per litre	Special Frequency 5		Special Frequency 3	Grab sample		Grab sample			Special Frequency 4	Grab sample			
Copper	milligrams per litre	Special Frequency 5		Special Frequency 3	Grab sample		Grab sample			Special Frequency 4	Grab sample			
Ethyl benzene	micrograms per litre*			Special Frequency 3	Grab sample	Special Frequency 3	Grab sample					Monthly	Grab sample	
Electrical conductivity	microsiemens per centimetre	Special Frequency 5	Grab sample	Special Frequency 3	Grab sample	Special Frequency 3	Grab sample			Special Frequency 4	Grab sample			
Fluoride	milligrams per litre	Special Frequency 5	Grab sample	Special Frequency 3	Grab sample	Special Frequency 3	Grab sample			Special Frequency 4	Grab sample			
Iron	milligrams per litre	Special Frequency 5	Grab sample	Special Frequency 3	Grab sample	Special Frequency 3	Grab sample			Special Frequency 4	Grab sample			
Lead	milligrams per litre	Special Frequency 5	Grab sample	Special Frequency 3	Grab sample	Special Frequency 3	Grab sample			Special Frequency 4	Grab sample			
Magnesium	milligrams per litre	Special Frequency 5	Grab sample	Special Frequency 3	Grab sample	Special Frequency 3	Grab sample			Special Frequency 4	Grab sample			
Manganese	milligrams per litre	Special Frequency 5	Grab sample	Special Frequency 3	Grab sample	Special Frequency 3	Grab sample			Special Frequency 4	Grab sample			
Mercury	milligrams per litre	Special Frequency 5	Grab sample	Special Frequency 3	Grab sample	Special Frequency 3	Grab sample			Special Frequency 4	Grab sample			
Methane	milligrams per litre			Special Frequency 3	Grab sample	Special Frequency 3	Grab sample			Special Frequency 4	Grab sample			
Molybdenum	milligrams per litre	Special Frequency 5		Special Frequency 3	Grab sample	Special Frequency 3	Grab sample			Special Frequency 4	Grab sample			
Monoethanolamine Borate	micrograms per litre	Special Frequency 5	Method approved in writing by the Authority	Special Frequency 3	Method approved in writing by the Authority	Special Frequency 3	Method approved in writing by the Authority			Special Frequency 4	Method approved in writing by the Authority			
Nickel	milligrams per litre	Special Frequency 5		Special Frequency 3	Grab sample	Special Frequency 3	Grab sample			Special Frequency 4	Grab sample			
Nitrate	milligrams per litre			Special Frequency 3	Grab sample	Special Frequency 3	Grab sample			Special Frequency 4	Grab sample			
Nitrite	milligrams per litre			Special Frequency 3	Grab sample	Special Frequency 3	Grab sample			Special Frequency 4	Grab sample			
pH	рН	Special Frequency 5	Grab sample	Special Frequency 3	Grab sample	Special Frequency 3	Grab sample			Special Frequency 4	Grab sample			
Phosphorus (total)	milligrams per litre			Special Frequency 3	Grab sample	Special Frequency 3	Grab sample			Special Frequency 4	Grab sample			
Potassium	milligrams per litre	Special Frequency 5	Grab sample	Special Frequency 3	Grab sample	Special Frequency 3	Grab sample			Special Frequency 4	Grab sample			
Reactive Phosphorus	milligrams per litre			Special Frequency 3	Grab sample	Special Frequency 3	Grab sample			Special Frequency 4	Grab sample			
Selenium	milligrams per litre	Special Frequency 5	Grab sample	Special Frequency 3	Grab sample	Special Frequency 3	Grab sample			Special Frequency 4	Grab sample			
Silica	milligrams per litre	Special Frequency 5	Grab sample	Special Frequency 3	Grab sample	Special Frequency 3	Grab sample			Special Frequency 4	Grab sample			
Sodium	milligrams per litre	Special Frequency 5	Grab sample	Special Frequency 3	Grab sample	Special Frequency 3	Grab sample			Special Frequency 4	Grab sample			
Sodium Hypochlorite	milligrams per litre	Special Frequency 5	Method approved in writing by the Authority	Special Frequency 3	Method approved in writing by the Authority	Special Frequency 3	Method approved in writing by the Authority			Special Frequency 4	Method approved in writing by the Authority			
Standing water level	meters (Australian Height Datum)			Special Frequency 8		Special Frequency 6*	Special Method 1	Special Frequency 8	Special Method 5	Special Frequency 9				
Strontium (dissolved)	milligrams per litre	Special Frequency 5	·	Special Frequency 3		Special Frequency 3	-			Special Frequency 4				
Sulfate		Special Frequency 5	Grab sample	Special Frequency 3		Special Frequency 3	Grab sample			Special Frequency 4	Grab sample			
Toluene	micrograms per litre*			Special Frequency 3	·	Special Frequency 3						Monthly	Grab sample	
Total dissolved solids	milligrams per litre	Special Frequency 5			Grab sample	Special Frequency 3				Special Frequency 4				
Total organic carbon	milligrams per litre	Special Frequency 5	·	Special Frequency 3	Grab sample		Grab sample			Special Frequency 4	Grab sample			
Total suspended solids		Special Frequency 5		Special Frequency 3	Grab sample		Grab sample			Special Frequency 4	Grab sample			
Uranium		Special Frequency 5	-	Special Frequency 3	·	Special Frequency 3				Special Frequency 4				
Vanadium	milligrams per litre micrograms per	Special Frequency 5	Grap sample	Special Frequency 3		Special Frequency 3	·			Special Frequency 4	Grab sample			
Xylene	litre*			Special Frequency 3		Special Frequency 3						Monthly	Grab sample	
Zinc	milligrams per litre	Special Frequency 5	Grab sample	Special Frequency 3	Grab sample	Special Frequency 3	Grab sample			Special Frequency 4	Grab sample			

Notes:

Special Frequency 3 - 6 monthly

Special Frequency 4 – Every fortnight for the first 8 weeks of extraction from the commencement of the Waukivory pilot flow testing, then every 2 months thereafter until the cessation of the Waukivory pilot flow testing. Should the flow be suspended during that

stage, then the timeframes will also be suspended and recommence when flows from the wells recommence.

Special Frequency 5 – One sampling event within 24 hours of the completion of the fracture stimulation of each well, and one sampling event one week after the completion of the fracture stimulation of each well & 6 months after cessation of fracture stimulation,

then monthly for the next 12 months. Sampling requirements to be reassessed in May 2016.

Special Frequency 6 – One monitoring event to determine water level prior to the Waukivory Pilot Project fracture stimulation. *monitoring - following the 17 September 2015 revision of EPL 20358, monthly monitoring of water levels at monitoring point 91 is no longer required.

Special Frequency 8 - Every 6 hours

Special Frequency 9 – Every 6 hours when using an automated datalogger, or, once every fortnight using a Sonolog in the event of failure of an automated datalogger.

Special method 1 - manual dip Special method 3 - Use of an automated datalogger. As a back up contingency, by use of Sonolog in the event of failure of an automated datalogger.

Special method 5 - Automated datalogger Shaded grey = not required to be analysed

Special method 7 - Sodium Hypochlorite is monitored through its elemental constituents. Free residual and total chlorine are monitored using existing validated methods

*EPL20358 (issued 17 September 2015) contains inconsistancies in the required Units of Measure for Benzene. Toluene. Ethyl Benzene and Xvlene. For consistency with laboratory data BTEX concentrations are reported here in micrograms per litre.

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Appendix B: Water quality monitoring data for points 7, 8, 9, 86, 87, 88, 89, 91, 92 Analysis by: ALS Laboratory, Smithfield (Work order: ES1532008, ES1532002, ES1529385, ES1534210, ES1534159)

		Monitoring points	7 8			9			86	87	88	89	91	92	A .			
		Location		WKSW03			WKSW02			WKSW01		WK11	WK12	WK13	WK14	GW080487	AST2	7
		Sampled date	26/08/2015	22/09/2015	21/10/2015	26/08/2015	23/09/2015	21/10/2015	26/08/2015	23/09/2015	21/10/2015	23/09/2015	23/09/2015: Well pump not online at time of sampling; unable to collect sample	23/09/2015	23/09/2015	1/09/2015	21/10/2015	1
		Date AGL obtained data	19/10/2015	19/10/2015	30/10/2015	19/10/2015	19/10/2015	30/10/2015	19/10/2015	19/10/2015	30/10/2015	19/10/2015	-	19/10/2015	19/10/2015	20/10/2015	22/10/2015	
		Monitoring event (see key below)	a	a	a	a	a	a	a	a	a	b	b	b	b	с	a	
Analyte	Units of measure	Limit of reporting																Analyte
Aluminium	mg/L	0.01	< 0.01	< 0.01	< 0.01	0.01	<0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	-	0.02	<0.01			Aluminium
Ammonia	mg/L	0.01										4.67	-	0.02	4.94			Ammonia
Arsenic	mg/L	0.001	<0.001	<0.001	< 0.001	< 0.001	< 0.001	0.002	< 0.001	<0.001	<0.001	0.003	-	0.004	0.004			Arsenic
Barium	mg/L	0.001	0.06	0.056	0.055	0.048	0.055	0.067	0.054	0.066	0.055	5.93	-	3.69	7.50			Barium
Benzene	μg/L	1															<1	Benzene
Beryllium	mg/L	0.001	<0.001	<0.001	<0.001	< 0.001	<0.001	< 0.001	<0.001	< 0.001	<0.001	< 0.001	-	< 0.001	<0.001			Beryllium
Bicarbonate	mg/L	1	51	80	75	75	103	121	52	72	75	5780	-	3280	4480			Bicarbonate
Boron	mg/L	0.05	<0.05	<0.05	<0.05	<0.05	0.05	< 0.05	<0.05	<0.05	< 0.05	2.16	-	2.57	3.03			Boron
Cadmium	mg/L	0.0001	< 0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	-	<0.0001	<0.0001			Cadmium
Calcium	mg/L	1	17	25	22	23	33	29	15	21	22	18	-	12	34			Calcium
Carbonate	mg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	100	<1			Carbonate
Chloride	mg/L	0.1	108	145	143	109	145	105	98.2	145	143	813	-	674	2130			Chloride
Chromium	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.015	-	0.002	0.006			Chromium
Cobalt	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001			Cobalt
Copper	mg/L	0.001	0.002	<0.001	<0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	-	<0.001	<0.001			Copper
Ethyl benzene	μg/L	2															<2	Ethyl benzene
Electrical conductivity	μS/cm	1	522	628	681	557	647	607	489	671	681	10700	-	7190	12300			Electrical conductivity
Fluoride	mg/L	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.1	<0.1	0.2	1.9	-	2.6	0.9			Fluoride
Iron	mg/L	0.05	0.18	0.18	0.27	0.33	0.10	1.49	0.10	0.11	0.27	1.10	-	0.74	2.97			Iron
Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-	<0.001	<0.001			Lead
Magnesium	mg/L	1	12	17	17	12	18	17	11	18	17	2	-	2	12			Magnesium
Manganese	mg/L	0.001	0.094 <0.0001	0.288 <0.0001	0.169 <0.0001	0.093 <0.0001	0.305 <0.0001	1.27	0.045 <0.0001	0.371 <0.0001	0.169 <0.0001	0.021 <0.0001	-	0.009 <0.0001	0.035 <0.0001			Manganese
Mercury Methane	mg/L mg/L	0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	30.60	-	26.40	23.80			Mercury Methane
Molybdenum	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.009		0.004	0.008			Molybdenum
Monoethanolamine Borate	μg/L	1	<1	<1	<1	<1	<1	2	<1	<1	<1	44	-	38	23			Monoethanolamine Borate
Nickel	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	< 0.001	<0.001	<0.001	<0.001	0.003	_	0.002	0.002			Nickel
Nitrate	mg/L	0.01	10.001	40.001	10.001	10.001	40.001	40.001	10.001	40.001	40.001	0.01	-	0.03	<1.00			Nitrate
Nitrite	mg/L	0.01										<0.01	_	<0.01	<1.00			Nitrite
pH	pH Unit	0.01	6.99	8.69	7.97	7.06	7.96	6.89	7.22	8.68	7.97	8.01	_	8.67	7.03			pH
Phosphorus (total)	mg/L	0.01					1100				7.5	2.83	_	0.12	1.43			Phosphorus (total)
Potassium	mg/L	1	3	4	4	6	4	4	3	4	4	13	-	13	18			Potassium
Reactive Phosphorus	mg/L	0.01										0.41	-	0.14	0.07			Reactive Phosphorus
Selenium	mg/L	0.01	<0.01	< 0.01	< 0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	<0.01	<0.01			Selenium
Silica	mg/L	0.05	4.13	2.65	0.24	3.28	3.66	8.17	6.11	3.08	0.24	6.48	-	26.9	44.4			Silica
Sodium	mg/L	1	59	75	78	57	69	53	55	85	78	2480	- 1	1860	3150			Sodium
Sodium Hypochlorite (reported as free chlorine)	mg/L	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	-	<0.2	<0.2			Sodium Hypochlorite (reported as free chlorine)
Sodium Hypochlorite (reported as residual chlorine)	mg/L	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2		<0.2	<0.2			Sodium Hypochlorite (reported as residual chlorine)
Standing water level	mAHD	0.01										V	/ill be reported in subsequent	reports as results are obtain	ned	100.98		Standing water level
Strontium (dissolved)	mg/L	0.001	0.223	0.320	0.317	0.259	0.386	0.356	0.217	0.375	0.317	3.54	-	2.45	6.68			Strontium (dissolved)
Sulfate	mg/L	1	28	18	24	13	6	<1	25	37	24	<1	-	<1	<1			Sulfate
Toluene	μg/L	2															<2	Toluene
Total dissolved solids	mg/L	10	246	386	328	287	375	290	266	413	328	6820	-	4440	8060			Total dissolved solids
Total organic carbon	mg/L	1	6	7	4	11	4	5	5	8	4	36*	-	22*	11*			Total organic carbon
Total suspended solids	mg/L	5	10	<5	<5	9	<5	15	<5	<5	<5	73	-	7	14			Total suspended solids
Uranium	mg/L	0.001	<0.001	<0.001	< 0.001	< 0.001	< 0.001	< 0.001	<0.001	< 0.001	< 0.001	<0.001	-	< 0.001	<0.001			Uranium
Vanadium	mg/L	0.01	< 0.01	<0.01	<0.01	< 0.01	<0.01	< 0.01	< 0.01	<0.01	< 0.01	<0.01		<0.01	< 0.01			Vanadium
Xylene	μg/L	2															<2	Xylene
Zinc	mg/L	0.005	0.006	<0.005	0.005	0.006	<0.005	< 0.005	<0.005	<0.005	0.005	< 0.005	-	< 0.005	<0.005			Zinc
															•			

Key:Shaded grey = not required to be reported

- not analysed / available

*nonpurgeable organic carbon analysis was carried out due to high inorganic carbon content Monitoring event:

a monthly sample
b Sample taken formightly for 8 weeks from commencement of flowback
c monitoring frequency was monthly at the time of monitoring - following the 17 September 2015 revision of EPL 20358, monthly monitoring of water levels at monitoring point 91 is no longer required.