

Amungee NW 2H Flowback Report EP 98

REV	DATE	REASON FOR ISSUE	AUTHOR	APPROVER
0	27/08/2023	Flowback report	LP	MK
1	15/09/2023	Flowback report- updated to include field chemistry		MK

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1 Introduction

Tamboran B2 Ltd (Tamboran) was granted approval for the Beetaloo Sub-basin multi-well drilling, stimulation and well testing program Environment Management Plan (ORI 10-3) on 19 May 2022. The Amungee NW 2H well was successfully stimulated in March 2023, with flowback operations commencing on April 25 2023 post well clean up. In accordance with the Northern Territory (NT) Petroleum (Environment) Regulation 2016 (PER), a report on the quality of hydraulic flowback fluid (Section 37A) and produced water (Section 37B) must be submitted to the Minister within six (6) months of flowback occurring. The following section satisfies these regulatory reporting requirements.

2 Reporting requirement

2.1 37A Report about flowback fluid

In accordance with section 37A, Origin is required to provide certain information relating to chemicals or Naturally Occurring Radioactive Material (NORM) found within flowback fluid within six (6) months of commencing flowback operations. The information required under section 37A of the PER's, is provided in Table 1.

Table 1 37A Report about flowback fluid

Reporting requirement	Amungee NW 2H information
(a) The identity of any chemical or NORM found in the flowback fluid	Characterisation of the flowback was completed with the analytes listed in the Code of Practice: Onshore Petroleum Activities in the Northern Territory (Code of Practice) C.8 Wastewater chemistry analytes. The full list of analytes is listed in Appendix A.
(b) The concentration of any chemical or NORM found in the flowback fluid	Characterisation of the flowback was completed with the analytes listed in the Code of Practice: C.8 Wastewater chemistry analytes. The full list of analytes and their concentration are listed in Appendix A.
(c) Details regarding how any chemical or NORM has been or will be managed	All flowback, including chemical and NORM constituents, are currently stored within double lined, enclosed wastewater tanks as per the code of Practice. Each tank has continuous leak detection and level monitoring, with all freeboard having a 1:1000 Annual re-occurrence interval wet/dry season freeboard.
(d) Details regarding how any chemical or NORM has been or will be transported	Flowback, and associate chemical and NORM constituents, will be transported by licenced listed water transport provider, in accordance with the NT Waste Management and Pollution Control Act 1998.
(e) Details regarding how any chemical or NORM has been or will be treated	Flowback, including chemical and NORM constituents, will be treated in open wastewater tanks to reduce the volume of flowback through evaporation.
(f) Details regarding any action proposed	A spill management plan and emergency management has been implemented, as a part of the approved Beetaloo Sub-

Reporting requirement	Amungee NW 2H information
to be taken to prevent any chemical or NORM spill	<p>basin multi-well drilling, stimulation and well testing Program Environment Management Plan (Ori 10-3). Actions implemented to prevent the spill of chemical or NORM from flowback water include:</p> <ul style="list-style-type: none"> • Use of double lined enclosed tanks • Use of secondary containment for all transfer points • Use of continuous leak detection and level monitoring on wastewater tank fluid levels with alarms • Lease pad is fully bunded to contain 110% of the volume of the largest tank • Routine (daily during wet season and weekly during dry season) site inspections • Procedures in place to manage significant rainfall events
(g) Details of the emergency contingency plan included in the environment management plan to which the activity relates	<p>An emergency management plan (NT-2050-15-MP-024) was developed, as a part of the Beetaloo Sub-basin multi-well drilling, stimulation and well testing Program EMP (Ori 10-3). Contingent plans include:</p> <ul style="list-style-type: none"> • Response processes for onsite and offsite spills • Onsite wastewater transfer equipment to transfer wastewater in case of a spill • First response civil equipment onsite to contain a spill
(h) The requirements in relation to the management of any chemical or NORM of the prescribed chemical legislation	<p>The management of flowback wastewater must be undertaken in accordance with the approved the Beetaloo Sub-basin multi-well drilling, stimulation and well testing Program EMP (Ori 10-3) and Code of Practice for Onshore Petroleum Activities in the Northern Territory. This includes requirements to manage the environmental risks associated with generation, storage, treatment and disposal.</p> <p>All flowback wastewater is classified as a listed waste under the Waste Management and Pollution Control Act 1998. Transport and disposal of flowback must be undertaken in accordance with this Act.</p> <p>The NORM levels observed are consistent with historical assessments, indicating the levels within the flowback do not meet the limits, as described in the NT Radiation Protection Regulation 2007</p>

2.2 37B Report about produced water

In accordance with section 37B, Tamboran is required to provide certain information relating to chemicals or NORM found within produced water within 6 months of produced water being extracted. The information required under section 37B of the PER's, is provided in Table 2.

Table 2 Report about produced water

Reporting requirement	Amungee NW 2H information
(a)The identity of any chemical or NORM found in the flowback fluid	N/A-no produced water has been encountered during the Amungee NW 2Hflowback activities.
(b)The concentration of any chemical or NORM fund in the flowback fluid	N/A- no produced water has been encountered during the Amungee NW 2Hflowback activities.
(c) Details regarding how any chemical or NORM has been or will be managed	N/A- no produced water has been encountered during the Amungee NW 2Hflowback activities.
(d) Details regarding how any chemical or NORM has been or will be transported	N/A- no produced water has been encountered during the Amungee NW 2Hflowback activities.
(e) Details regarding how any chemical or NORM has been or will be treated	N/A- no produced water has been encountered during the Amungee NW 2Hflowback activities.
(f) Details regarding any action proposed to be taken to prevent any chemical or NORM spill	N/A- no produced water has been encountered during the Amungee NW 2Hflowback activities.
(g) Details of the emergency contingency plan included in the environment management plan to which the activity relates	N/A- no produced water has been encountered during the Amungee NW 2Hflowback activities.
(h) The requirements in relation to the management of any chemical or NORM of the prescribed chemical legislation	N/A- no produced water has been encountered during the Amungee NW 2Hflowback activities.

Appendix A- Amungee NW 2H flowback laboratory data

			Amungee NW 2H															
			Date	27 Mar 2023	02 Apr 2023	01 May 2023	14 May 2023	22 May 2023	29 May 2023	01 May 2023	10 Apr 2023	05 Jun 2023	12 Jun 2023	19 Jun 2023	26 Jun 2023	03 Jul 2023	10 Jul 2023	15 Jul 2023
	Unit	EQL																
BTEX	Naphthalene (VOC)	mg/L	0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
	Benzene	µg/L	1	3	4	<1	<1	<1	1	<1	<5	<1	1	1	<5	<5	<1	<1
	Toluene	µg/L	2	4	6	<2	<2	<2	<2	<2	<5	<2	<2	<2	<5	<5	<2	<2
	Ethylbenzene	µg/L	2	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<5	<5	<2	<2
	Xylene (m & p)	µg/L	2	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<5	<5	<2	<2
	Xylene (o)	µg/L	2	<2	<2	<2	<2	<2	<2	<2	<5	<2	<2	<2	<5	<5	<2	<2
	Xylene Total	µg/L	2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
	Total BTEX	µg/L	1	7	10	<1	<1	<1	1	<1	<2	<1	1	1	<2	<2	<1	<1
	Halogenated Benzenes	Hexachlorobenzene	µg/L	0.5	<0.5	<0.5	<2.5	<2.5	<24.8	<24.2	ND	<4.8	<2.7	ND	<2.9	<2.6	<2.5	<2.6
Inorganics	Total Phosphorus as P (Organic Phosphate as P)	mg/L	0.01	2.04	1.48	0.79	0.45	0.29	0.31	0.67	0.77	0.52	0.37	0.20	0.36	0.37	0.38	0.32
	Sulfate as SO4 - Turbidimetric (filtered)	mg/L	1	<1	141	38	32	23	87	36	63	12	25	4	5	3	1	<1
	Silicon as SiO2	mg/L	0.1	179	186	198	200	192	205	197	188	220	183	190	203	202	164	257
	Silicon as SiO2 (filtered)	mg/L	0.1					166	178									
	Nitrite + Nitrate as N	mg/L	0.01	0.07	<0.01	0.03	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	0.02	<0.01	<0.01	0.06	<0.01	<0.01
	Reactive Silica	mg/L	0.05					173	196									
	Alkalinity (Bicarbonate as CaCO3)	mg/L	1	881	856	430	362	325	246	435	508	339	244	262	266	259	271	274
	Alkalinity (Carbonate as CaCO3)	mg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
	Alkalinity (Hydroxide) as CaCO3	mg/L	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1

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	Unit	EQL																
BTEX																		
	Alkalinity (total) as CaCO3	mg/L	1	881	856	430	362	325	246	435	508	339	244	262	266	259	271	274
	Ammonia as N	mg/L	0.01	26.2	26.9	34.4	34.2	31.4	32.6	34.4	30.6	45.1	1.81	25.6	37.3	35.0	1.60	1.67
	Anions Total	meq/L	0.01	174	210	387	397			393			490					
	Bromide	µg/L	10	83,200	143,000	121,000	170,000	712,000	182,000	125,000	108,000	318,000	215,000	178,000	142,000	162,000	274,000	321,000
	Bromine	µg/L	100	53,400	61,600	146,000	129,000	189,000	202,000	143,000	112,000	207,000	170,000	196,000	185,000	193,000	205,000	227,000
	Bromine (filtered)	µg/L	100	40,000	63,300	145,000	164,000	180,000	202,000	143,000	103,000	222,000	197,000	202,000	222,000	249,000	242,000	274,000
	Cations Total	meq/L	0.01	156	201	421	432			418			548					
	Chloride	mg/L	1	5,540	6,730	13,400	13,800	16,400	17,100	13,600	10,300	21,000	17,200	18,600	21,400	20,100	22,200	24,000
	Fluoride	mg/L	0.1	2.0	1.3	6.0	0.9	0.8	1.0	1.0	1.4	0.9	0.8	0.9	0.6	0.8	0.8	1.0
	Ionic Balance	%	0.01	5.27	2.13	4.17	4.15			3.02			5.53					
	Kjeldahl Nitrogen Total	mg/L	0.1	57.8	62.9	60.7	50.3	65.5	60.9	62.1	56.5	73.2	57.9	44.9	67.3	65.6	64.4	67.3
	Nitrate (as N)	mg/L	0.01	0.07	<0.01	0.03	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	0.02	<0.01	<0.01	0.06	<0.01	<0.01
	Nitrite (as N)	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	<0.01	<0.01	<0.01
	Nitrogen (Total)	mg/L	0.1	57.9	62.9	60.7	50.3	65.5	60.9	62.1	56.5	73.2	57.9	44.9	67.3	65.7	64.4	67.3
	Reactive Phosphorus as P (Orthophosphate as P)	mg/L	0.01	0.14	<0.01	0.09	<0.10	<0.01	0.01	0.02	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
	Sodium	mg/L	1							8,280								
	Sodium (filtered)	mg/L	1	3,310	4,230	8,570	8,660	9,420	10,400	8,500	6,070	11,100	10,700	10,700	10,900	10,500	13,400	14,900
	Sodium Absorption Ratio (filtered)	-	0.01	60.3	65.4	77.6	73.5	76.9	80.0	77.3	72.6	78.9	73.4	81.0	71.1	68.4	94.1	93.1
	Total Dissolved Solids (Lab)	mg/L	10	10,100	12,400	23,800	28,700	31,900	35,000	23,600	19,500	34,200	31,200	32,100	33,500	36,100	41,600	44,300
	Total Suspended Solids (Lab)	mg/L	5	19	82	39	115	98	102	8	135	176	80	104	126	130	156	168
Metals																		
	Aluminium	mg/L	0.01	0.11	0.16	0.36	0.22	0.11	0.24	0.26	0.27	0.29	0.17	<0.10	<0.10	<0.10	<0.10	<0.10

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	Unit	EQL																	
BTEX																			
Aluminium (filtered)	mg/L	0.01	0.08	0.02	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	
Antimony	mg/L	0.001	0.012	0.113	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.025	<0.010	<0.010	<0.010	<0.010	<0.010	
Antimony (filtered)	mg/L	0.001	0.002	0.070	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	
Arsenic	mg/L	0.001	0.043	0.012	0.011	<0.010	<0.010	<0.010	0.012	0.014	0.040	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	
Arsenic (filtered)	mg/L	0.001	0.038	0.005	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	
Barium	mg/L	0.001	4.38	7.63	25.0	19.4	18.8	40.6	25.8	14.3	52.4	48.2	51.0	64.1	64.8	65.0	77.3		
Barium (filtered)	mg/L	0.001	4.17	6.90	25.3	30.8	37.3	12.0	25.1	13.0	54.4	55.4	46.1	62.8	62.7	71.1	80.3		
Beryllium	mg/L	0.001	<0.001	<0.001	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	
Beryllium (filtered)	mg/L	0.001	<0.001	<0.001	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	
Boron	mg/L	0.05	12.3	14.0	18.2	18.0	21.9	23.5	19.0	16.9	24.8	20.2	20.6	21.7	22.8	20.9	23.6		
Boron (filtered)	mg/L	0.05	11.6	14.2	18.5	20.6	20.9	21.7	19.8	16.8	23.3	19.7	18.9	21.1	21.8	22.5	25.0		
Cadmium	mg/L	0.0001	<0.0001	<0.0001	<0.0010	<0.0010	0.0017	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
Cadmium (filtered)	mg/L	0.0001	<0.0001	<0.0001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
Calcium	mg/L	1							657										
Calcium (filtered)	mg/L	1	161	226	676	787	822	929	663	372	1,150	1,260	968	1,410	1,410	1,070	1,410		
Chromium (III+VI)	mg/L	0.001	0.012	0.031	<0.010	0.130	<0.010	0.011	<0.010	0.039	<0.010	0.014	<0.010	0.011	<0.010	0.018	<0.010		
Chromium (III+VI) (filtered)	mg/L	0.001	0.002	0.007	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010		
Cobalt	mg/L	0.001	<0.010	<0.010	<0.010		<0.010	<0.010		<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010			
Cobalt (filtered)			<0.010	<0.010	<0.010		<0.010	<0.010		<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010			
Copper	mg/L	0.001	<0.001	0.001	<0.010	0.059	<0.010	0.042	<0.010	0.015	0.029	0.013	<0.010	0.072	<0.010	0.038	0.011		
Copper (filtered)	mg/L	0.001	<0.001	<0.001	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.023	<0.010	<0.010	<0.010		
Iron	mg/L	0.05	20.5	40.2	16.2	20.4	22.1	27.0	16.8	38.0	31.8	30.1	30.1	39.2	37.6	42.0	45.9		
Iron (filtered)	mg/L	0.05	15.2	7.08	3.30	4.35	1.26	2.41	2.45	1.18	1.04	4.54	28.8	0.83	2.45	0.63	4.05		
Lead	mg/L	0.001	<0.001	<0.001	<0.010	0.026	<0.010	0.030	<0.010	<0.010	0.012	<0.010	<0.010	0.114	<0.010	<0.010	<0.010		

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	Unit	EQL																
BTEX																		
	Lead (filtered)	mg/L	0.001	<0.001	<0.001	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	
	Magnesium	mg/L	1						154									
	Magnesium (filtered)	mg/L	1	41	55	151	161	191	214	154	96	211	212	215	226	228	283	321
	Manganese	mg/L	0.001	0.841	1.35	2.03	2.16	2.77	3.26	2.09	1.74	3.64	3.13	3.39	3.63	3.62	3.86	4.36
	Manganese (filtered)	mg/L	0.001	0.823	1.23	2.03	2.20	2.75	3.14	2.03	1.67	3.20	3.14	3.00	3.58	3.54	3.54	4.02
	Mercury	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	0.0002	<0.0001	0.0002	0.0002
	Mercury (filtered)	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	<0.0001	<0.0001	<0.0001
	Molybdenum	mg/L	0.001	0.049	0.049	0.019	0.016	0.011	0.014	0.020	0.039	0.014	0.014	0.014	0.014	0.011	0.016	<0.010
	Nickel	mg/L	0.001	0.003	0.003	<0.010	<0.010	<0.010	<0.010	<0.010	0.025	<0.010	0.014	<0.010	<0.010	<0.010	0.014	<0.010
	Nickel (filtered)	mg/L	0.001	0.003	0.002	<0.010	<0.010	<0.010	<0.010	<0.010	0.016	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Potassium	mg/L	1						82									
	Potassium (filtered)	mg/L	1	42	52	85	92	93	102	83	63	92	88	95	88	88	110	120
	Selenium	mg/L	0.01	<0.01	<0.01	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Selenium (filtered)	mg/L	0.01	<0.01	<0.01	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
	Silver	mg/L	0.001	0.002	<0.001	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Silver (filtered)	mg/L	0.001	<0.001	<0.001	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Strontium	mg/L	0.001	8.05	12.6	43.8	49.7	62.9	74.3	44.5	26.3	87.7	83.4	83.7	104	103	103	125
	Strontium (filtered)	mg/L	0.001	7.81	9.68	43.1	49.2	62.6	72.5	42.1	24.2	86.8	91.8	76.9	104	110	121	138
	Thorium	µg/L	1	17	4	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	Thorium (filtered)	µg/L	1	<1	<1	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	Tin	mg/L	0.001	0.006	0.002	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Tin (filtered)	mg/L	0.001	<0.001	<0.001	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium	µg/L	1	<1	<1	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
	Uranium (filtered)	µg/L	1	<1	<1	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10

			Amungee NW 2H																
			Date	27 Mar 2023	02 Apr 2023	01 May 2023	14 May 2023	22 May 2023	29 May 2023	01 May 2023	10 Apr 2023	05 Jun 2023	12 Jun 2023	19 Jun 2023	26 Jun 2023	03 Jul 2023	10 Jul 2023	15 Jul 2023	
	Unit	EQL																	
BTEX																			
	Vanadium	mg/L	0.01	<0.01	0.01	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	
	Vanadium (filtered)	mg/L	0.01	<0.01	<0.01	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	
	Zinc	mg/L	0.005	0.013	0.146	<0.052	<0.052	<0.052	<0.052	<0.052	<0.052	0.069	<0.052	<0.052	<0.052	<0.052	<0.052	<0.052	
	Zinc (filtered)	mg/L	0.005	0.012	0.038	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	
NA																			
	Formaldehyde	mg/L	0.1	1.9	3.3	1.7	4.4	1.2	5.8	1.0	5.4	4.6	5.2	5.2	5.4	5.4	2.8	4.5	
	Propane	mg/L	0.01																
Organic																			
	Dissolved Organic Carbon	mg/L	1	302	307	293	220	258	280	283	283	358	195	188	260	219	221	212	
	Ethane	µg/L	10																
	Methane	mg/L	0.01																
	Total Organic Carbon	mg/L	1	356	311	398	309	357	283	388	345	386	255	234	391	210	322	327	
PAH																			
	Benzo(b+j+k)fluoranthene	mg/L	0.001	<0.0010	<0.0010	<0.0050	<0.0051	<0.0496	<0.0484		<0.0096	<0.0054		<0.0059	<0.0053	<0.0050	<0.0051	<0.0053	
	Acenaphthene	µg/L	1	<1.0	<1.0	<2.5	<2.5	<24.8	<24.2	<47.6	<4.8	<2.7	<47.6	<2.9	<2.6	<2.5	<2.6	<2.7	
	Acenaphthylene	µg/L	1	<1.0	<1.0	<2.5	<2.5	<24.8	<24.2	<47.6	<4.8	<2.7	<47.6	<2.9	<2.6	<2.5	<2.6	<2.7	
	Anthracene	µg/L	1	<1.0	<1.0	<2.5	<2.5	<24.8	<24.2	<47.6	<4.8	<2.7	<47.6	<2.9	<2.6	<2.5	<2.6	<2.7	
	Benzo(a)anthracene	µg/L	1	<1.0	<1.0	<2.5	<2.0	<19.8	<19.4	<47.6	<3.8	<2.2	<47.6	<2.9	<2.6	<2.5	<2.6	<2.7	
	Benzo(a) pyrene	µg/L	0.5	<0.5	<0.5	<2.5	<2.5	<24.8	<24.2	<47.6	<4.8	<2.7	<47.6	<2.9	<2.6	<2.5	<2.6	<2.7	
	Benzo(b+j)fluoranthene	mg/L	0.001	<0.0010	<0.0010	<0.0476	<0.0472	<0.0476	<0.0476	<0.0476	<0.0476	<0.0472	<0.0556	<0.0476	<0.0472	<0.0490	<0.0490	<0.0476	<0.0476
	Benzo(g,h,i)perylene	µg/L	1	<1.0	<1.0	<2.5	<2.0	<19.8	<19.4	<47.6	<3.8	<2.2	<47.6	<2.9	<2.6	<2.5	<2.6	<2.7	
	Benzo(k)fluoranthene	µg/L	1	<1.0	<1.0	<47.6	<47.2	<47.6	<47.6	<47.6	<47.2	<55.6	<47.6	<47.2	<49.0	<49.0	<47.6	<47.6	
	Chrysene	µg/L	1	<1.0	<1.0	<2.5	<2.0	<19.8	<19.4	<47.6	<3.8	<2.2	<47.6	<2.9	<2.6	<2.5	<2.6	<2.7	
	Dibenz(a,h)anthracene	µg/L	1	<1.0	<1.0	<2.5	<2.0	<19.8	<19.4	<47.6	<3.8	<2.2	<47.6	<2.9	<2.6	<2.5	<2.6	<2.7	

			Amungee NW 2H															
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	Unit	EQL																
BTEX																		
	Fluoranthene	µg/L	1	<1.0	<1.0	<2.5	<2.5	<24.8	<24.2	<47.6	<4.8	<2.7	<47.6	<2.9	<2.6	<2.5	<2.6	<2.7
	Fluorene	µg/L	1	<1.0	<1.0	<2.5	<2.5	<24.8	<24.2	<47.6	<4.8	<2.7	<47.6	<2.9	<2.6	<2.5	<2.6	<2.7
	Indeno(1,2,3-c,d)pyrene	µg/L	1	<1.0	<1.0	<2.5	<2.0	<19.8	<19.4	<47.6	<3.8	<2.2	<47.6	<2.9	<2.6	<2.5	<2.6	<2.7
	Naphthalene	µg/L	1	<1.0	<1.0	<2.5	<2.5	<24.8	<24.2	<47.6	<4.8	<2.7	<47.6	<2.9	<2.6	<2.5	<2.6	<2.7
	Phenanthrene	µg/L	1	<1.0	<1.0	<2.5	<2.5	<24.8	<24.2	<47.6	<4.8	<2.7	<47.6	<2.9	<2.6	<2.5	<2.6	<2.7
	Pyrene	µg/L	1	<1.0	<1.0	<2.5	<2.5	<24.8	<24.2	<47.6	<4.8	<2.7	<47.6	<2.9	<2.6	<2.5	<2.6	<2.7
	Benzo(a)pyrene TEQ calc (Zero)	mg/L	0.0005	<0.0005	<0.0005	<0.0012	<0.0013	<0.0124	<0.0121	<0.0238	<0.0024	<0.0014	<0.0238	<0.0015	<0.0013	<0.0012	<0.0013	<0.0013
	PAHs (Sum of total)	µg/L	0.5	<0.5	<0.5	<1.2	<1.3	<12.4	<12.1	<23.8	<2.4	<1.4	<23.8	<1.5	<1.3	<1.2	<1.3	<1.3
Phenols																		
	3&4-Methylphenol (m&p-cresol)	µg/L	4	<4	<4	<5	<5	<50	<48	ND	<10	<5	ND	<6	6	6	<5	<5
	2,3,5,6-Tetrachlorophenol	mg/L	0.002	<0.002	<0.002	<0.002	<0.002	<0.025	<0.024	ND	<0.005	<0.003	ND	<0.003	<0.003	<0.002	<0.002	<0.003
	2,4,5-Trichlorophenol	µg/L	2	<2	<2	<2	<2	<25	<24	ND	<5	<3	ND	<3	<3	<2	<2	<3
	2,4,6-Trichlorophenol	µg/L	2	<2	<2	<2	<2	<25	<24	ND	<5	<3	ND	<3	<3	<2	<2	<3
	2,4-Dichlorophenol	µg/L	2	<2	<2	<2	<2	<25	<24	ND	<5	<3	ND	<3	<3	<2	<2	<3
	2,4-Dimethylphenol	µg/L	4	<4	<4	<4	<4	<25	<24	ND	<5	<4	ND	<4	<4	<4	<4	<4
	2,4-Dinitrophenol	mg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.99	<0.97	ND	<0.19	<0.11	ND	<0.12	<0.1	<0.1	<0.1	<0.11
	2,6-Dichlorophenol	µg/L	2	<2	<2	<2	<2	<25	<24	ND	<5	<3	ND	<3	<3	<2	<2	<3
	2,3,4,5 & 2,3,4,6-Tetrachlorophenol	mg/L	0.002	<0.002	<0.002	<0.005	<0.005	<0.05	<0.048	ND	<0.01	<0.005	ND	<0.006	<0.005	<0.005	<0.005	<0.005
	2-Chlorophenol	µg/L	2	<2	<2	<2	<2	<25	<24	ND	<5	<3	ND	<3	<3	<2	<2	<3
	2-Methylphenol	µg/L	4	<4	<4	<4	<4	<25	<24	ND	<5	<4	ND	<4	<4	<4	<4	<4
	2-Nitrophenol	µg/L	4	<4	<4	<4	<4	<25	<24	ND	<5	<4	ND	<4	<4	<4	<4	<4
	4,6-Dinitro-2-methylphenol	µg/L	50	<50	<50	<100	<100	<990	<970	ND	<190	<110	ND	<120	<100	<100	<100	<110

			Amungee NW 2H															
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	Unit	EQL																
BTEX																		
	4,6-Dinitro-o-cyclohexyl phenol	µg/L	50	<50	<50	<100	<100	<990	<970	ND	<190	<110	ND	<120	<100	<100	<100	<110
	4-chloro-3-methylphenol	µg/L	4	<4	<4	<4	<4	<25	<24	ND	<5	<4	ND	<4	<4	<4	<4	<4
	4-Nitrophenol	µg/L	50	<50	<50	<100	<100	<990	<970	ND	<190	<110	ND	<120	<100	<100	<100	<110
	Cresol Total	mg/L	0.004	<0.004	<0.004	<0.025	<0.025	<0.248	<0.242	ND	<0.048	<0.027	ND	<0.029	<0.026	<0.025	<0.026	<0.027
	Pentachlorophenol	µg/L	2	<2	<2	<5	<5	<50	<48	ND	<10	<5	ND	<6	<5	<5	<5	<5
	Phenol	µg/L	4	<4	<4	<4	<4	<25	<24	ND	<5	<4	ND	19	12	12	<4	<4
	Phenols (halogenated) EPAVic	µg/L	2	<2	<2	<10	<10	<99	<97	ND	<19	<11	ND	<12	<10	<10	<10	<11
	Phenols (non-halogenated) EPAVic	µg/L	4	<4	<4	<10	<10	<99	<97	ND	<19	<11	ND	19	18	18	<10	<11
Phthalates																		
	Bis(2-ethylhexyl) phthalate	µg/L	10	<10	<10	<10	<10	<20	<19	ND	<10	<10	ND	<10	<10	<10	30	<10
Radionuclides																		
	Gross Beta Activity -K40	Bq/L	0.1	<0.52	<0.67	3.73	2.17	6.94	5.56	3.73	0.9	7.62	6.03	7.64	8.11	10.4	7.1	8.89
	Gross alpha activity	-	0	<0.26	1.39	4.14	4.46	12.4	10.1	4	1.85	0.00	14.0	14.3	19.1	24.1	27.9	29.6
	Gross beta activity	-	0	1.4	2.17	5.82	5.64	11.0	9.23	6.59	2.96	0.00	8.37	9.88	9.95	10.4	13.4	15.2
TPH																		
	C6-C9 Fraction	µg/L	20	90	170	80	50	100	120	80	150	140	200	100	<100	<100	60	70
	C10-C14 Fraction	µg/L	50	180	510	511,000	369,000	242,000	613,000	380,000	418,000	626,000	410,000	258,000	282,000	604,000	549,000	175,000
	C15-C28 Fraction	µg/L	100	700	2,190	202,000	118,000	63,600	590,000	86,200	71,300	163,000	94,100	53,900	53,600	63,200	303,000	69,500
	C29-C36 Fraction	µg/L	50	<50	360	180	3,150	50	60	100	170	<670	<570	<1,420	<50	<50	160	<50
	C10-C36 Fraction (Sum)	µg/L	50	880	3,060	713,000	490,000	306,000	1,200,000	466,000	489,000	789,000	504,000	312,000	336,000	667,000	852,000	244,000
TRH																		

			Amungee NW 2H															
			Date	27 Mar 2023	02 Apr 2023	01 May 2023	14 May 2023	22 May 2023	29 May 2023	01 May 2023	10 Apr 2023	05 Jun 2023	12 Jun 2023	19 Jun 2023	26 Jun 2023	03 Jul 2023	10 Jul 2023	15 Jul 2023
	Unit	EQL																
BTEX	C6-C10 Fraction (F1)	µg/L	20	80	170	80	60	110	130	90	190	130	190	120	<100	<100	70	80
	C6-C10 (F1 minus BTEX)	µg/L	20	70	160	80	60	110	130	90	190	130	190	120	<100	<100	70	80
	>C10-C16 Fraction (F2)	µg/L	100	600	950	700,000	476,000	300,000	1,050,000	467,000	479,000	767,000	484,000	305,000	322,000	651,000	825,000	229,000
	>C10-C16 Fraction (F2 minus Naphthalene)	µg/L	100	600	950	700,000	476,000	300,000	1,050,000	467,000	479,000	767,000	484,000	305,000	322,000	651,000	825,000	229,000
	>C16-C34 Fraction (F3)	µg/L	100	290	2,030	17,700	18,400	8,860	160,000	12,100	4,560	30,800	19,300	4,980	11,900	19,300	61,600	15,800
	>C34-C40 Fraction (F4)	µg/L	100	<100	<100	<100	1,270	<100	<100	<100	<100	<670	<570	<1,420	<100	<100	<100	<100
	>C10-C40 Fraction (Sum)	µg/L	100	890	2,980	718,000	496,000	309,000	1,210,000	479,000	484,000	798,000	503,000	310,000	334,000	670,000	887,000	245,000

ND- No data due to laboratory oversight.

Appendix B- Field Chemistry

Amungee NW 2H Field chemistry water chemistry data summary

Analyte	units	Minimum	Maximum	Average	Median
pH		6.0	8.8	7.0	6.8
Electrical conductivity	µs/cm	2195	60840	40260	40260
Temperature	°C	14.0	67.4	38.5	37.2
Dissolved Oxygen	mg/L	1.0	8.0	3.4	3.1