

Table 2.9-42 Marsland Expansion Area Radiological Analytical Results (Q4 2013 - Q3 2014) – Arikaree Wells

Location ID:		AOW-3		AOW-3		AOW-3		AOW-3		AOW-4		AOW-4		AOW-4		AOW-4		AOW-5	
Date Collected:		11/8/2013		2/25/2014		6/16/2014		9/16/2014		11/8/2013		2/25/2014		6/16/2014		9/17/2014		11/8/2013	
	UNITS	RESULTS	RL	RESULTS	RL	RESULTS	RL	RESULTS	RL	RESULTS	RL	RESULTS	RL	RESULTS	RL	RESULTS	RL	RESULTS	RL
RADIONUCLIDES-DISSOLVED																			
Lead 210	µCi/ml	<1E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9
Lead 210 precision (±)	µCi/ml	NA		4E-10		3E-10		NA		NA		4E-10		3E-9		4E-10		NA	
Polonium 210	µCi/ml	<1E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9
Polonium 210 precision (±)	µCi/ml	NA		2E-10		2E-10		NA		NA		2E-10		2E-10		1E-10		NA	
Radium 226	µCi/ml	<2E-10	2E-10	2E-10	2E-10	3E-10	2E-10	4E-10	2E-10	<2E-10	2E-10	2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10
Radium 226 precision (±)	µCi/ml	NA		1E-10		1E-10		1E-10		NA		1E-10		1E-10		4E-11		NA	
Thorium 230	µCi/ml	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10
Thorium 230 precision (±)	µCi/ml	NA		1E-10		0.0		NA		NA		1E-10		4E-11		4E-11		NA	
Thorium 229 Tracer (30-120)	%	66		87		100		76		61		100		91		86		57	
METALS - DISSOLVED																			
Uranium	mg/L	0.0087	0.0003	0.0068	0.0003	0.0052	0.0003	0.0041	0.0003	0.0052	0.0003	0.0041	0.0003	0.0051	0.0003	0.0044	0.0003	0.0077	0.0003
Uranium Activity	µCi/ml	5.9E-9	2E-10	4.6E-9	2E-10	3.5E-9	2E-10	2.8E-9	2E-10	3.5E-9	2E-10	2.8E-9	2E-10	3.5E-9	2E-10	3E-9	2E-10	5.2E-9	2E-10
RADIONUCLIDES-SUSPENDED																			
Lead 210	µCi/ml	<1E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9	1.1E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9	1.2E-9	1E-9	1.3E-9	1E-9	<1E-9	1E-9
Lead 210 precision (±)	µCi/ml	NA		5E-10		4E-10		6E-10		NA		4E-10		4E-10		6E-10		NA	
Polonium 210	µCi/ml	2E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9	1.2E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9	1.1E-9	1E-9	<1E-9	1E-9
Polonium 210 precision (±)	µCi/ml	7E-10		2E-10		2E-10		5E-10		NA		2E-10		1E-10		5E-10		NA	
Radium 226	µCi/ml	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	6E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	3E-10	2E-10	<2E-10	2E-10
Radium 226 precision (±)	µCi/ml	NA		4E-11		0.0		1E-10		NA		3E-11		0.0		1E-10		NA	
Thorium 230	µCi/ml	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10
Thorium 230 precision (±)	µCi/ml	NA		3E-11		3E-11		NA		NA		4E-11		1E-10		1E-10		NA	
Thorium 229 Tracer (30-120)	%	68		100		90		99		64		98		96		78		68	
METALS - SUSPENDED																			
Uranium	mg/L	0.0004	0.0003	0.0006	0.0003	<0.0003	0.0003	0.0004	0.0003	0.0017	0.0003	<0.0003	0.0003	<0.0003	0.0003	0.0004	0.0003	0.0004	0.0003
Uranium Activity	µCi/ml	3E-10	2E-10	4E-10	2E-10	<2E-10	2E-10	3E-10	2E-10	1.2E-9	2E-10	<2E-10	2E-10	<2E-10	2E-10	3E-10	2E-10	3E-10	2E-10

Notes:

uCi/mL = microcuries per milliliter

mg/L = milligrams per Liter

RL - Analyte reporting limit

AOW-1 & AOW-7; Do not produce sufficient water volume to produce sample

AOW-2 - Not drilled

Table 2.9-42 Marsland Expansion Area Radiological Analytical Results (Q4 2013 - Q3 2014) – Arikaree Wells

Location ID:		AOW-5		AOW-5		AOW-5		AOW-6		AOW-6		AOW-6		AOW-6		AOW-8		AOW-8	
Date Collected:		2/26/2014		6/17/2014		9/17/2014		11/8/2013		2/26/2014		6/17/2014		9/17/2014		11/8/2013		2/26/2014	
	UNITS	RESULTS	RL	RESULTS	RL	RESULTS	RL	RESULTS	RL	RESULTS	RL	RESULTS	RL	RESULTS	RL	RESULTS	RL	RESULTS	RL
RADIONUCLIDES-DISSOLVED																			
Lead 210	µCi/ml	<1E-9	1E-9	1.3E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9	1.3E-9	1E-9	<1E-9	1E-9
Lead 210 precision (±)	µCi/ml	4E-10		4E-10		4E-10		NA		4E-10		0.3		4E-10		4E-10		4E-10	
Polonium 210	µCi/ml	<1E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9
Polonium 210 precision (±)	µCi/ml	2E-10		1E-10		1E-10		NA		1E-10		2E-10		2E-10		NA		2E-10	
Radium 226	µCi/ml	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10
Radium 226 precision (±)	µCi/ml	3E-11		0.0		5E-11		NA		4E-11		0.0		3E-11		NA		4E-11	
Thorium 230	µCi/ml	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10
Thorium 230 precision (±)	µCi/ml	1E-10		2E-11		1E-10		NA		0.0		0.03		0.0		NA		5E-11	
Thorium 229 Tracer (30-120)	%	100		95		86		63		94		87		75		63		71	
METALS - DISSOLVED																			
Uranium	mg/L	0.0077	0.0003	0.0072	0.0003	0.0071	0.0003	0.0069	0.0003	0.0070	0.0003	0.0062	0.0003	0.0062	0.0003	0.0039	0.0003	0.0041	0.0003
Uranium Activity	µCi/ml	5.2E-9	2E-10	4.9E-9	2E-10	4.8E-9	2E-10	4.7E-9	2E-10	4.7E-9	2E-10	4.2E-9	2E-10	4.2E-9	2E-10	2.6E-9	2E-10	2.8E-9	2E-10
RADIONUCLIDES-SUSPENDED																			
Lead 210	µCi/ml	<1E-9	1E-9	2E-9	1E-9	1.4E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9	1.1E-9	1E-9	3.1E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9
Lead 210 precision (±)	µCi/ml	4E-10		6E-10		6E-10		NA		4E-10		7E-10		7E-10		NA		4E-10	
Polonium 210	µCi/ml	<1E-9	1E-9	<1E-9	1E-9	1.9E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9
Polonium 210 precision (±)	µCi/ml	2E-10		1E-10		6E-10		NA		2E-10		2E-10		4E-10		NA		2E-10	
Radium 226	µCi/ml	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10
Radium 226 precision (±)	µCi/ml	3E-11		0.0		4E-11		NA		2E-11		0.0		4E-11		NA		3E-11	
Thorium 230	µCi/ml	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10
Thorium 230 precision (±)	µCi/ml	3E-11		4E-11		2E-11		NA		2E-11		2E-11		5E-11		NA		1E-10	
Thorium 229 Tracer (30-120)	%	100		91		93		69		96		79		70		74		110	
METALS - SUSPENDED																			
Uranium	mg/L	<0.0003	0.0003	<0.0003	0.0003	<0.0003	0.0003	0.0009	0.0003	<0.0003	0.0003	<0.0003	0.0003	<0.0003	0.0003	0.0004	0.0003	<0.0003	0.0003
Uranium Activity	µCi/ml	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	6E-9	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	3E-10	2E-10	<2E-10	2E-10

Notes:

uCi/mL = microcuries per milliliter

mg/L = milligrams per Liter

RL - Analyte reporting limit

AOW-1 & AOW-7; Do not produce sufficient water volume to produce sample

AOW-2 - Not drilled

Table 2.9-42 Marsland Expansion Area Radiological Analytical Results (Q4 2013 - Q3 2014) – Arikaree Wells

Location ID:		AOW-8		AOW-8		AOW-9		AOW-9		AOW-9		AOW-9		AOW-10		AOW-10		AOW-10	
Date Collected:		6/16/2014		9/16/2014		11/8/2013		2/26/2014		6/17/2014		9/17/2014		11/8/2013		2/25/2014		6/16/2014	
	UNITS	RESULTS	RL	RESULTS	RL	RESULTS	RL	RESULTS	RL	RESULTS	RL	RESULTS	RL	RESULTS	RL	RESULTS	RL	RESULTS	RL
RADIONUCLIDES-DISSOLVED																			
Lead 210	µCi/ml	<1E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9	1E-9	1E-9	1.4E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9
Lead 210 precision (±)	µCi/ml	3E-10		NA		NA		7E-10		6E-10		5E-10		NA		4E-10		3E-10	
Polonium 210	µCi/ml	<1E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9
Polonium 210 precision (±)	µCi/ml	2E-10		NA		NA		2E-10		1E-10		3E-10		NA		1E-10		1E-10	
Radium 226	µCi/ml	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10
Radium 226 precision (±)	µCi/ml	0.0		NA		NA		3E-11		0.0		4E-11		NA		4E-11		3E-11	
Thorium 230	µCi/ml	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10
Thorium 230 precision (±)	µCi/ml	2E-11		NA		NA		3E-11		3E-11		0		NA		5E-11		0.0	
Thorium 229 Tracer (30-120)	%	89		69		71		100		82		82		74		85		75	
METALS - DISSOLVED																			
Uranium	mg/L	0.0039	0.0003	0.0038	0.0003	0.0083	0.0003	0.0074	0.0003	0.0077	0.0003	0.0077	0.0003	0.0069	0.0003	0.0069	0.0003	0.0069	0.0003
Uranium Activity	µCi/ml	2.6E-9	2E-10	2.6E-9	2E-10	5.6E-9	2E-10	5E-9	2E-10	5.2E-9	2E-10	5.2E-9	1E-10	4.7E-9	2E-10	4.7E-9	2E-10	4.7E-9	2E-10
RADIONUCLIDES-SUSPENDED																			
Lead 210	µCi/ml	<1E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9	4.8E-9	1E-9	<1E-9	1E-9	1.1E-9	1E-9	<1E-9	1E-9
Lead 210 precision (±)	µCi/ml	4E-10		NA		NA		6E-10		4E-10		8E-10		NA		5E-10		4E-10	
Polonium 210	µCi/ml	<1E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9	1.3E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9
Polonium 210 precision (±)	µCi/ml	2E-10		NA		NA		2E-10		2E-10		6E-10		NA		3E-10		2E-10	
Radium 226	µCi/ml	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	3E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10
Radium 226 precision (±)	µCi/ml	0.0		NA		NA		4E-11		0.0		1E-10		NA		3E-11		0.0	
Thorium 230	µCi/ml	<2E-10	2E-10	2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10
Thorium 230 precision (±)	µCi/ml	2E-11		2E-10		NA		1E-10		1E-10		1E-10		NA		4E-11		1E-10	
Thorium 229 Tracer (30-120)	%	96		32		71		110		93		80		72		96		95	
METALS - SUSPENDED																			
Uranium	mg/L	<0.0003	0.0003	<0.0003	0.0003	0.0004	0.0003	0.0003	0.0003	<0.0003	0.0003	0.0008	0.0003	<0.0003	0.0003	<0.0003	0.0003	<0.0003	0.0003
Uranium Activity	µCi/ml	<2E-10	2E-10	<2E-10	2E-10	3E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	5E-9	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10

Notes:

uCi/mL = microcuries per milliliter

mg/L = milligrams per Liter

RL - Analyte reporting limit

AOW-1 & AOW-7; Do not produce sufficient water volume to produce sample

AOW-2 - Not drilled

Table 2.9-42 Marsland Expansion Area Radiological Analytical Results (Q4 2013 - Q3 2014) – Arikaree Wells

Location ID:		AOW-10		AOW-11		AOW-11		AOW-11		AOW-11	
Date Collected:		9/17/2014		11/8/2013		2/26/2014		6/17/2014		9/17/2014	
	UNITS	RESULTS	RL	RESULTS	RL	RESULTS	RL	RESULTS	RL	RESULTS	RL
RADIONUCLIDES-DISSOLVED											
Lead 210	µCi/ml	1.2E-9	1E-9	<1E-9	1E-9	1.1E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9
Lead 210 precision (±)	µCi/ml	5E-10		NA		4E-10		3E-10		5E-10	
Polonium 210	µCi/ml	<1E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9
Polonium 210 precision (±)	µCi/ml	2E-10		NA		1E-10		1E-10		2E-10	
Radium 226	µCi/ml	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10
Radium 226 precision (±)	µCi/ml	4E-11		NA		3E-11		0.0		5E-11	
Thorium 230	µCi/ml	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10
Thorium 230 precision (±)	µCi/ml	1E-10		NA		3E-11		0.0		2E-11	
Thorium 229 Tracer (30-120)	%	88		76		88		75	76	85	
METALS - DISSOLVED											
Uranium	mg/L	0.0068	0.0003	0.0067	0.0003	0.0064	0.0003	0.0065	0.0067	0.0067	0.0003
Uranium Activity	µCi/ml	4.6E-9	2E-10	4.5E-9	2E-10	4.3E-9	2E-10	4.4E-9	2E-10	4.5E-9	2E-10
RADIONUCLIDES-SUSPENDED											
Lead 210	µCi/ml	4.1E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9
Lead 210 precision (±)	µCi/ml	7E-10		NA		4E-10		4E-10		5E-10	
Polonium 210	µCi/ml	<1E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9	<1E-9	1E-9
Polonium 210 precision (±)	µCi/ml	4E-10		NA		1E-10		0.1		1E-10	
Radium 226	µCi/ml	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10
Radium 226 precision (±)	µCi/ml	4E-11		NA		2E-11		0.0		4E-11	
Thorium 230	µCi/ml	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10
Thorium 230 precision (±)	µCi/ml	1E-10		NA		4E-11		4E-11		1E-10	
Thorium 229 Tracer (30-120)	%	84		74		110		95	74	81	
METALS - SUSPENDED											
Uranium	mg/L	<0.0003	0.0003	<0.0003	0.0003	<0.0003	0.0003	<0.0003	<0.0003	<0.0003	0.0003
Uranium Activity	µCi/ml	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10	<2E-10	2E-10

Notes:

uCi/mL = microcuries per milliliter

mg/L = milligrams per Liter

RL - Analyte reporting limit

AOW-1 & AOW-7; Do not produce sufficient water volume to produce sample

AOW-2 - Not drilled