

Table 2.9-10 Marsland Expansion Area Non-Radiological Analytical Results (November 2011 to August 2012) Chadron Wells

Location ID: Date Collected: Formation:	Monitor 1		Monitor 1		Monitor 1		Monitor 1		Monitor 2		Monitor 2		Monitor 2		
	11/7/2011		2/13/2012		6/4/2012		8/20/2012		11/7/2011 ^a		2/13/2012		6/4/2012		
	CHADRON		CHADRON		CHADRON		CHADRON		CHADRON		CHADRON		CHADRON		
	UNITS	RESULTS	RL ^a	RESULTS	RL	RESULTS	RL	RESULTS	RL	RESULTS	RL ^a	RESULTS	RL	RESULTS	RL
MAJOR IONS															
Alkalinity Total as CaCO ₃	mg/L	288	1	398	5	411	5	416	5	374	1	394	5	398	5
Bicarbonate as HCO ₃	mg/L	193	1	486	5	488	5	475	5	439	1	480	5	475	5
Carbonate as CO ₃	mg/L	78	1	<5	5	7	5	16	5	9	1	<5	5	5	5
Chloride	mg/L	605	4	180	1	170	1	177	1	176	1	168	1	161	1
Fluoride	mg/L	0.9	0.1	0.6	0.1	0.6	0.1	0.5	0.1	0.5	0.1	0.6	0.1	0.6	0.1
Magnesium	mg/L	<1	1	1	1	1	1	1	1	1	1	1	1	1	1
Nitrogen Ammonia as N	mg/L	0.7	0.05	0.3	0.1	0.22	0.05	0.01	0.1	0.27	0.05	0.2	0.1	0.24	0.05
Nitrogen Nitrate+Nitrite as N	mg/L	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1
Potassium	mg/L	35	1	11	1	8	1	11	1	8	1	12	1	8	1
Silica	mg/L	20.7	0.2	14	1	15.2	0.2	15	1	15.6	0.2	15	1	17.2	0.2
Sodium	mg/L	514	2	330	1	307	1	349	1	299	1	322	1	298	1
Sulfate	mg/L	80	8	48	1	60	4	49	1	57	1	47	1	56	4
PHYSICAL PROPERTIES															
Conductivity @ 25 °C	umhos/cm	2740	1	1490	1	1410	1	1350	1	1410	1	1450	1	1380	1
pH	s.u.	9.62	0.01	8.3	0.01	8.29	0.01	8.6	0.1	8.32	0.01	8.3	0.01	8.29	0.01
Total Dissolved Solids @ 180 °C	mg/L	1400	10	830	10	853	10	840	10	791	10	830	10	818	10
METALS, DISSOLVED															
Aluminum	mg/L	0.3	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	0.1	0.1	0.1	0.1	<0.1	0.1
Arsenic	mg/L	0.001	0.001	0.001	0.001	0.002	0.001	0.002	0.001	0.003	0.001	0.002	0.001	0.002	0.001
Barium	mg/L	0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1
Boron	mg/L	1.2	0.1	1.4	0.1	1.4	0.1	1.6	0.1	1.3	0.1	1.4	0.1	1.5	0.1
Cadmium	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
Calcium	mg/L	10	1	4	1	5	1	5	1	4	1	5	1	5	1
Chromium	mg/L	<0.05	0.05	<0.05	0.05	<0.05	0.05	<0.05	0.05	<0.05	0.05	<0.05	0.05	<0.05	0.05
Copper	mg/L	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.1	<0.01	0.01	<0.01	0.01	<0.01	0.01
Iron	mg/L	0.04	0.03	<0.05	0.05	0.03	0.03	<0.05	0.05	0.05	0.03	0.05	0.05	<0.05	0.03
Lead	mg/L	<0.001	0.001	<0.001	0.05	0.001	0.001	<0.001	0.05	<0.001	0.001	<0.001	0.05	<0.001	0.001
Manganese	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
Mercury	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	0.001
Molybdenum	mg/L	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1
Nickel	mg/L	<0.05	0.05	<0.05	0.05	<0.05	0.05	<0.05	0.05	<0.05	0.05	<0.05	0.05	<0.05	0.05
Selenium	mg/L	0.006	0.001	0.002	0.001	0.002	0.001	<0.002	0.001	0.003	0.001	<0.002	0.001	0.002	0.001
Vanadium	mg/L	0.1	0.1	<0.1	0.02	<0.1	0.1	<0.1	0.02	<0.1	0.1	<0.1	0.02	<0.1	0.1
Zinc	mg/L	<0.01	0.01	<0.01	0.01	0.03	0.01	<0.01	0.01	0.02	0.01	0.03	0.01	0.5	0.01
DATA QUALITY															
A/C Balance (± 5)	%	-1.57		3.04		-1.19		4.77		-0.51		3.49		-0.691	
Anions	meq/L	24.6		14.08		14.3		14.34		13.7		13.61		13.7	
Cations	meq/L	23.8		14.96		13.9		15.78		13.5		14.6		13.6	
Solids Total Dissolved Calculated	mg/L	1450		830		800		860		789		810		770	

Notes:

umhos/cm - micromhos per centimeter

mg/L = milligrams per liter

meq/L = milliequivalents per liter

RL = analyte reporting limit

s.u. = standard unit

^a A different lab was used for 11/7/2011 bicarbonate analyses than for the other analytical dates (RL of 1 vs RL of 5 mg/L).

Table 2.9-10 Marsland Expansion Area Non-Radiological Analytical Results (November 2011 to August 2012) Chadron Wells

Location ID: Date Collected: Formation:	Monitor 2		CPW-2010-1		CPW-2010-1		CPW-2010-1		CPW-2010-1		Monitor 4A		Monitor 4A		
	8/20/2012		11/7/2011		2/13/2012		6/4/2013		8/20/2012		11/7/2011		2/13/2012		
	CHADRON		CHADRON		CHADRON		CHADRON		CHADRON		CHADRON		CHADRON		
	UNITS	RESULTS	RL	RESULTS	RL ^a	RESULTS	RL	RESULTS	RL	RESULTS	RL	RESULTS	RL ^a	RESULTS	RL
MAJOR IONS															
Alkalinity Total as CaCO ₃	mg/L	410	5	288	1	281	5	281	5	298	5	323	1	358	5
Bicarbonate as HCO ₃	mg/L	471	5	193	1	286	5	306	5	311	5	342	1	414	5
Carbonate as CO ₃	mg/L	14	5	78	1	28	5	18	5	26	5	25	1	11	5
Chloride	mg/L	166	1	605	4	563	1	368	5	327	1	258	2	226	1
Fluoride	mg/L	0.5	0.1	0.9	0.1	0.8	0.1	0.8	0.1	0.6	0.1	0.8	0.1	0.7	0.1
Magnesium	mg/L	1	1	<1	1	<1	1	<1	1	<1	1	<1	1	<1	1
Nitrogen Ammonia as N	mg/L	0.01	0.1	0.7	0.05	0.5	0.1	0.49	0.05	0.4	0.1	0.36	0.05	0.3	0.1
Nitrogen Nitrate+Nitrite as N	mg/L	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1
Potassium	mg/L	11	1	35	1	40	1	21	1	23	1	18	1	23	1
Silica	mg/L	16	1	20.7	0.2	17	1	17.8	0.2	15	1	15.3	0.2	14	1
Sodium	mg/L	337	1	514	2	488	1	393	1	399	1	365	1	367	1
Sulfate	mg/L	46	1	80	8	76	1	88	4	73	1	113	2	103	1
PHYSICAL PROPERTIES															
Conductivity @ 25 °C	umhos/cm	1340	1	2740	1	2360	1	1890	1	1740	1	1750	1	1710	1
pH	s.u.	8.6	0.1	9.62	0.01	9	0.1	8.98	0.01	8.9	0.1	8.91	0.01	8.6	0.01
Total Dissolved Solids @ 180 °C	mg/L	850	10	1400	10	1260	10	1090	10	1070	10	958	10	940	10
METALS, DISSOLVED															
Aluminum	mg/L	<0.1	0.1	0.3	0.1	<0.1	0.1	0.3	0.1	0.2	0.1	<0.1	0.1	<0.1	0.1
Arsenic	mg/L	0.001	0.001	0.001	0.001	0.001	0.001	<0.001	0.001	<0.001	0.001	0.005	0.001	0.002	0.001
Barium	mg/L	<0.1	0.1	0.1	0.1	<0.1	0.1	0.1	0.1	0.1	0.1	<0.1	0.1	<0.1	0.1
Boron	mg/L	1.5	0.1	1.2	0.1	1.5	0.1	1.4	0.1	1.3	0.1	1.3	0.1	1.6	0.1
Cadmium	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
Calcium	mg/L	5	1	10	1	10	1	19	1	14	1	3	1	4	1
Chromium	mg/L	<0.05	0.05	<0.05	0.05	<0.05	0.05	<0.05	0.05	<0.05	0.05	<0.05	0.05	<0.05	0.05
Copper	mg/L	<0.01	0.1	<0.01	0.01	<0.01	0.1	<0.01	0.1	<0.01	0.1	<0.01	0.01	<0.01	0.01
Iron	mg/L	<0.05	0.05	0.04	0.03	<0.05	0.05	<0.05	0.05	<0.05	0.05	<0.05	0.03	<0.05	0.05
Lead	mg/L	<0.001	0.05	<0.001	0.001	<0.001	0.05	<0.001	0.05	<0.001	0.05	<0.001	0.001	<0.001	0.05
Manganese	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
Mercury	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	0.001
Molybdenum	mg/L	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1
Nickel	mg/L	<0.05	0.05	<0.05	0.05	<0.05	0.05	<0.05	0.05	<0.05	0.05	<0.05	0.05	<0.05	0.05
Selenium	mg/L	<0.002	0.001	0.006	0.001	<0.002	0.001	0.002	0.001	0.008	0.001	0.003	0.001	0.024	0.001
Vanadium	mg/L	<0.1	0.02	0.1	0.1	<0.1	0.02	<0.1	0.02	<0.1	0.02	<0.1	0.1	<0.1	0.02
Zinc	mg/L	0.09	0.01	<0.01	0.01	0.09	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.01
DATA QUALITY															
A/C Balance (± 5)	%	4.81		-1.57		0.8		2.28		4.63		1.32		3.17	
Anions	meq/L	13.85		24.6		23.12		17.9		16.99		16.1		15.71	
Cations	meq/L	15.26		23.8		22.75		18.7		18.64		16.6		16.74	
Solids Total Dissolved Calculated	mg/L	830		1450		1360		1100		1030		971		950	

Notes:

umhos/cm - micromhos per centimeter

mg/L = milligrams per liter

meq/L = milliequivalents per liter

RL = analyte reporting limit

s.u. = standard unit

^a A different lab was used for 11/7/2011 bicarbonate analyses than for the other analytical dates (RL of 1 vs RL of 5 mg/L).

Table 2.9-10 Marsland Expansion Area Non-Radiological Analytical Results (November 2011 to August 2012) Chadron Wells

Location ID: Date Collected: Formation:	Monitor 4A		Monitor 4A		Monitor 5		Monitor 5		Monitor 5		Monitor 5		Monitor 6		
	6/4/2012		8/20/2012		11/7/2011		2/13/2012		6/4/2012		8/20/2012		11/7/2011		
	CHADRON		CHADRON		CHADRON		CHADRON		CHADRON		CHADRON		CHADRON		
	UNITS	RESULTS	RL	RESULTS	RL	RESULTS	RL ^a	RESULTS	RL	RESULTS	RL	RESULTS	RL	RESULTS	RL ^a
MAJOR IONS															
Alkalinity Total as CaCO ₃	mg/L	360	5	390	5	248	1	260	5	260	5	266	5	271	1
Bicarbonate as HCO ₃	mg/L	405	5	432	5	140	1	214	5	234	5	230	5	280	1
Carbonate as CO ₃	mg/L	17	5	22	5	80	1	51	5	43	5	47	5	25	1
Chloride	mg/L	209	1	196	1	320	2	280	1	254	1	233	1	398	4
Fluoride	mg/L	0.8	0.1	0.6	0.1	0.7	0.1	0.6	0.1	0.7	0.1	0.5	0.1	0.8	0.1
Magnesium	mg/L	1	1	<1	1	1	1	1	1	2	1	1	1	<1	1
Nitrogen Ammonia as N	mg/L	0.33	0.05	0.1	0.1	0.54	0.05	0.2	0.1	0.41	0.05	0.2	0.1	0.53	0.05
Nitrogen Nitrate+Nitrite as N	mg/L	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1
Potassium	mg/L	16	1	19	1	31	1	36	1	27	1	29	1	22	1
Silica	mg/L	18.1	0.2	17	1	25	0.2	23	1	22.9	0.2	20	1	15.5	0.2
Sodium	mg/L	340	1	357	1	438	1	454	1	421	1	429	1	377	1
Sulfate	mg/L	115	4	95	1	312	4	269	1	308	4	275	1	53	1
PHYSICAL PROPERTIES															
Conductivity @ 25 °C	umhos/cm	1580	1	1510	1	2260	1	2220	1	2010	1	1880	1	1950	1
pH	s.u.	8.78	0.01	8.7	0.1	9.72	0.01	9.3	0.01	9.48	0.01	9.3	0.1	8.82	0.01
Total Dissolved Solids @ 180 °C	mg/L	951	10	930	10	1290	10	1220	10	1270	10	1190	10	1040	10
METALS, DISSOLVED															
Aluminum	mg/L	<0.1	0.1	<0.1	0.1	0.3	0.1	0.2	0.1	0.1	0.1	<0.1	0.1	0.1	0.1
Arsenic	mg/L	0.003	0.001	0.002	0.001	0.002	0.001	<0.001	0.001	0.002	0.001	<0.001	0.001	0.002	0.001
Barium	mg/L	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	0.1	0.1
Boron	mg/L	1.4	0.1	1.5	0.1	1.1	0.1	1.2	0.1	1.3	0.1	1.3	0.1	1.2	0.1
Cadmium	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
Calcium	mg/L	5	1	4	1	4	1	5	1	7	1	5	1	13	1
Chromium	mg/L	<0.05	0.05	<0.05	0.05	<0.05	0.05	<0.05	0.05	<0.05	0.05	<0.05	0.05	<0.05	0.05
Copper	mg/L	<0.01	0.01	<0.01	0.1	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.1	<0.01	0.01
Iron	mg/L	<0.05	0.03	<0.05	0.05	0.04	0.03	<0.05	0.05	<0.05	0.03	<0.05	0.05	<0.05	0.03
Lead	mg/L	<0.001	0.001	<0.001	0.05	<0.001	0.001	<0.001	0.05	<0.001	0.001	<0.001	0.05	<0.001	0.001
Manganese	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
Mercury	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	0.001
Molybdenum	mg/L	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1
Nickel	mg/L	<0.05	0.05	<0.05	0.05	<0.05	0.05	<0.05	0.05	<0.05	0.05	<0.05	0.05	<0.05	0.05
Selenium	mg/L	0.002	0.001	<0.002	0.001	0.005	0.001	0.068	0.001	0.003	0.001	0.006	0.001	0.004	0.001
Vanadium	mg/L	<0.1	0.1	<0.1	0.02	<0.1	0.1	<0.1	0.02	<0.1	0.1	<0.1	0.02	<0.1	0.1
Zinc	mg/L	<0.01	0.01	<0.01	0.01	0.02	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.01
DATA QUALITY															
A/C Balance (± 5)	%	0.175		2.72		-8.37		4.76		1.17		4.62		0.32	
Anions	meq/L	15.5		15.34		20.6		19.11		19.1		17.99		17.8	
Cations	meq/L	15.6		16.2		20.2		21.03		19.6		19.73		17.7	
Solids Total Dissolved Calculated	mg/L	900		920		1290		1220		1200		1150		1050	

Notes:

umhos/cm - micromhos per centimeter

mg/L = milligrams per liter

meq/L = milliequivalents per liter

RL = analyte reporting limit

s.u. = standard unit

^a A different lab was used for 11/7/2011 bicarbonate analyses than for the other analytical dates (RL of 1 vs RL of 5 mg/L).

Table 2.9-10 Marsland Expansion Area Non-Radiological Analytical Results (November 2011 to August 2012) Chadron Wells

Location ID: Date Collected: Formation:	Monitor 6 2/13/2012		Monitor 6 6/4/2012		Monitor 6 8/20/2012		Monitor 7 11/7/2011		Monitor 7 2/13/2012		Monitor 7 6/4/2012		Monitor 7 8/20/2012		
	CHADRON		CHADRON		CHADRON		CHADRON		CHADRON		CHADRON		CHADRON		
	UNITS	RESULTS	RL	RESULTS	RL	RESULTS	RL	RESULTS	RL ^a	RESULTS	RL	RESULTS	RL	RESULTS	RL
MAJOR IONS															
Alkalinity Total as CaCO ₃	mg/L	292	5	260	5	322	5	245	1	283	5	301	5	311	5
Bicarbonate as HCO ₃	mg/L	334	5	234	5	345	5	264	1	321	5	338	5	339	5
Carbonate as CO ₃	mg/L	11	5	43	5	23	5	17	1	12	5	14	5	20	5
Chloride	mg/L	361	1	254	1	304	1	241	1	216	1	188	1	192	1
Fluoride	mg/L	0.8	0.1	0.7	0.1	0.6	0.1	0.8	0.1	0.8	0.1	0.8	0.1	0.6	0.1
Magnesium	mg/L	<1	1	2	1	1	1	2	1	2	1	2	1	2	1
Nitrogen Ammonia as N	mg/L	0.4	0.1	0.41	0.05	0.3	0.1	0.33	0.05	0.2	0.1	0.29	0.05	0.1	0.1
Nitrogen Nitrate+Nitrite as N	mg/L	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1
Potassium	mg/L	25	1	27	1	23	1	16	1	21	1	15	1	18	1
Silica	mg/L	15	1	22.9	0.2	16	1	15.8	0.2	16	1	18.5	0.2	16	1
Sodium	mg/L	381	1	421	1	378	1	410	1	422	1	386	1	423	1
Sulfate	mg/L	45	1	308	4	46	1	305	2	266	1	306	4	278	1
PHYSICAL PROPERTIES															
Conductivity @ 25 °C	umhos/cm	1920	1	2010	1	1660	1	1960	1	1970	1	1810	1	1730	1
pH	s.u.	8.6	0.01	9.48	0.01	8.8	0.1	8.86	0.01	8.6	0.01	8.76	0.01	8.8	0.1
Total Dissolved Solids @ 180 °C	mg/L	1000	10	1270	10	970	10	1110	10	1130	10	1130	10	1080	10
METALS, DISSOLVED															
Aluminum	mg/L	0.2	0.1	0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1
Arsenic	mg/L	<0.001	0.001	0.002	0.001	<0.001	0.001	0.002	0.001	0.001	0.001	0.002	0.001	0.001	0.001
Barium	mg/L	<0.1	0.1	<0.1	0.1	0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1
Boron	mg/L	1.2	0.1	1.3	0.1	1.4	0.1	1.3	0.1	1.4	0.1	1.5	0.1	1.4	0.1
Cadmium	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
Calcium	mg/L	5	1	7	1	9	1	6	1	7	1	10	1	8	1
Chromium	mg/L	<0.05	0.05	<0.05	0.05	<0.05	0.05	<0.05	0.05	<0.05	0.05	<0.05	0.05	<0.05	0.05
Copper	mg/L	<0.01	0.01	<0.01	0.01	<0.01	0.1	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.1
Iron	mg/L	<0.05	0.05	<0.05	0.03	<0.05	0.05	<0.05	0.03	<0.05	0.05	<0.05	0.03	<0.05	0.05
Lead	mg/L	<0.001	0.05	<0.001	0.001	<0.001	0.05	<0.001	0.001	<0.001	0.05	<0.001	0.001	<0.001	0.05
Manganese	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
Mercury	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	0.001
Molybdenum	mg/L	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1
Nickel	mg/L	<0.05	0.05	<0.05	0.05	<0.05	0.05	<0.05	0.05	<0.05	0.05	<0.05	0.05	<0.05	0.05
Selenium	mg/L	0.068	0.001	0.003	0.001	0.001	0.001	0.004	0.001	0.011	0.001	0.002	0.001	<0.002	0.001
Vanadium	mg/L	<0.1	0.02	<0.1	0.1	<0.1	0.02	<0.1	0.1	<0.1	0.02	<0.1	0.1	<0.1	0.02
Zinc	mg/L	<0.01	0.01	<0.01	0.01	<0.01	0.01	0.01	0.01	0.04	0.01	<0.01	0.01	<0.01	0.01
DATA QUALITY															
A/C Balance (± 5)	%	2.56		1.17		4.62		1.67		4.86		0.403		4.57	
Anions	meq/L	17.01		19.1		16		18.1		17.59		17.7		17.72	
Cations	meq/L	17.9		19.6		17.55		18.7		19.39		17.9		19.42	
Solids Total Dissolved Calculated	mg/L	1020		1200		970		1150		1120		1100		1120	

Notes:

umhos/cm - micromhos per centimeter

mg/L = milligrams per liter

meq/L = milliequivalents per liter

RL = analyte reporting limit

s.u. = standard unit

^a A different lab was used for 11/7/2011 bicarbonate analyses than for the other analytical dates (RL of 1 vs RL of 5 mg/L).

Table 2.9-10 Marsland Expansion Area Non-Radiological Analytical Results (November 2011 to August 2012) Chadron Wells

Location ID: Date Collected: Formation:	Monitor 8		Monitor 8		Monitor 8		Monitor 8		Monitor 9		Monitor 9		Monitor 9		
	11/7/2011		2/13/2012		6/4/2012		8/20/2012		11/7/2011		2/13/2012		6/4/2012		
	CHADRON		CHADRON		CHADRON		CHADRON		CHADRON		CHADRON		CHADRON		
	UNITS	RESULTS	RL ^a	RESULTS	RL	RESULTS	RL	RESULTS	RL	RESULTS	RL ^a	RESULTS	RL	RESULTS	RL
MAJOR IONS															
Alkalinity Total as CaCO ₃	mg/L	253	1	274	5	282	5	296	5	307	1	336	5	343	5
Bicarbonate as HCO ₃	mg/L	267	1	918	5	323	5	336	5	297	1	381	5	387	5
Carbonate as CO ₃	mg/L	20	1	5	5	10	5	13	5	38	1	14	5	16	5
Chloride	mg/L	250	2	197	1	177	1	169	1	269	2	252	1	232	1
Fluoride	mg/L	0.7	0.1	0.7	0.1	0.7	0.1	0.5	0.1	0.8	0.1	0.8	0.1	0.8	0.1
Magnesium	mg/L	2	1	2	1	3	1	3	1	<1	1	<1	1	<1	1
Nitrogen Ammonia as N	mg/L	0.39	0.05	0.3	0.1	0.32	0.05	0.1	0.1	0.33	0.05	0.3	0.1	0.34	0.05
Nitrogen Nitrate+Nitrite as N	mg/L	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1
Potassium	mg/L	20	1	24	1	17	1	23	1	15	1	19	1	14	1
Silica	mg/L	18.9	0.2	16	1	18.5	0.2	15	1	14.9	0.2	15	1	17.3	0.2
Sodium	mg/L	445	1	441	1	425	1	430	1	344	1	362	1	341	1
Sulfate	mg/L	388	2	349	1	388	4	362	1	91	2	78	1	95	4
PHYSICAL PROPERTIES															
Conductivity @ 25 °C	umhos/cm	2180	1	2090	1	1950	1	1830	1	1700	1	1690	1	1570	1
pH	s.u.	8.91	0.01	8.5	0.01	8.65	0.01	8.6	0.1	8.91	0.01	8.7	0.01	8.75	0.01
Total Dissolved Solids @ 180 °C	mg/L	1260	10	1190	10	1220	10	1250	10	946	10	890	10	910	10
METALS, DISSOLVED															
Aluminum	mg/L	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1
Arsenic	mg/L	0.001	0.001	<0.001	0.001	0.001	0.001	<0.001	0.001	0.002	0.001	<0.001	0.001	0.001	0.001
Barium	mg/L	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1
Boron	mg/L	1.2	0.1	1.2	0.1	1.4	0.1	1.3	0.1	1.1	0.1	1.2	0.1	1.3	0.1
Cadmium	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
Calcium	mg/L	12	1	10	1	12	1	10	1	2	1	10	1	4	1
Chromium	mg/L	<0.05	0.05	<0.05	0.05	<0.05	0.05	<0.05	0.05	<0.05	0.05	<0.05	0.05	<0.05	0.05
Copper	mg/L	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.1	<0.01	0.01	<0.01	0.01	<0.01	0.01
Iron	mg/L	<0.05	0.03	<0.05	0.05	<0.05	0.03	<0.05	0.05	<0.05	0.03	<0.05	0.05	<0.05	0.03
Lead	mg/L	<0.001	0.001	<0.001	0.05	<0.001	0.001	<0.001	0.05	<0.001	0.001	<0.001	0.05	<0.001	0.001
Manganese	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
Mercury	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	0.001
Molybdenum	mg/L	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1
Nickel	mg/L	<0.05	0.05	<0.05	0.05	<0.05	0.05	<0.05	0.05	<0.05	0.05	<0.05	0.05	<0.05	0.05
Selenium	mg/L	0.003	0.001	0.012	0.001	0.002	0.001	<0.002	0.001	0.004	0.001	0.011	0.001	0.003	0.001
Vanadium	mg/L	<0.1	0.1	<0.1	0.02	<0.1	0.1	<0.1	0.02	<0.1	0.1	<0.1	0.02	<0.1	0.1
Zinc	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
DATA QUALITY															
A/C Balance (± 5)	%	0.971		4.86		2.74		4.72		-0.463		2.77		0.0047	
Anions	meq/L	20.2		18.6		18.7		18.23		15.7		15.51		15.5	
Cations	meq/L	20.6		20.51		19.8		20.04		15.5		16.4		15.5	
Solids Total Dissolved Calculated	mg/L	1290		1200		1200		1190		925		930		890	

Notes:

umhos/cm - micromhos per centimeter

mg/L = milligrams per liter

meq/L = milliequivalents per liter

RL = analyte reporting limit

s.u. = standard unit

^a A different lab was used for 11/7/2011 bicarbonate analyses than for the other analytical dates (RL of 1 vs RL of 5 mg/L).

Table 2.9-10 Marsland Expansion Area Non-Radiological Analytical Results (November 2011 to August 2012) Chadron Wells

Location ID: Date Collected: Formation:	Monitor 9		Monitor 10		Monitor 10		Monitor 10		Monitor 10		Monitor 11		Monitor 11		
	8/20/2012		11/7/2011		2/13/2012		6/4/2012		8/20/2012		11/7/2011		2/13/2012		
	CHADRON		CHADRON		CHADRON		CHADRON		CHADRON		CHADRON		CHADRON		
	UNITS	RESULTS	RL	RESULTS	RL ^a	RESULTS	RL	RESULTS	RL	RESULTS	RL	RESULTS	RL ^a	RESULTS	RL
MAJOR IONS															
Alkalinity Total as CaCO ₃	mg/L	356	5	274	1	307	5	314	5	361	5	323	1	352	5
Bicarbonate as HCO ₃	mg/L	390	5	301	1	363	5	360	5	412	5	330	1	393	5
Carbonate as CO ₃	mg/L	22	5	16	1	6	5	11	5	14	5	32	1	18	5
Chloride	mg/L	224	1	151	1	143	1	141	1	137	1	370	4	318	1
Fluoride	mg/L	0.6	0.1	0.8	0.1	0.7	0.1	0.8	0.1	0.6	0.1	0.7	0.1	0.8	0.1
Magnesium	mg/L	<1	1	1	1	2	1	<1	1	2	1	1	1	1	1
Nitrogen Ammonia as N	mg/L	0.2	0.1	0.37	0.05	0.4	0.1	0.38	0.05	0.2	0.1	0.37	0.05	0.3	0.1
Nitrogen Nitrate+Nitrite as N	mg/L	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1
Potassium	mg/L	18	1	11	1	15	1	11	1	16	1	21	1	28	1
Silica	mg/L	15	1	17.2	0.2	16	1	18	0.2	16	1	12.4	0.2	13	1
Sodium	mg/L	361	1	386	1	405	1	392	1	425	1	425	1	439	1
Sulfate	mg/L	79	1	347	2	307	1	347	4	300	1	124	2	107	1
PHYSICAL PROPERTIES															
Conductivity @ 25 °C	umhos/cm	1500	1	1810	1	1880	1	1770	1	1710	1	2120	1	2060	1
pH	s.u.	8.8	0.1	8.66	0.01	8.4	0.01	8.54	0.01	8.6	0.1	8.99	0.01	8.7	0.01
Total Dissolved Solids @ 180 °C	mg/L	1180	10	1080	10	1090	10	1120	10	1180	10	1160	10	1110	10
METALS, DISSOLVED															
Aluminum	mg/L	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1
Arsenic	mg/L	0.001	0.001	0.002	0.001	<0.001	0.001	0.001	0.001	<0.001	0.001	0.003	0.001	0.002	0.001
Barium	mg/L	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1
Boron	mg/L	1.4	0.1	1.3	0.1	1.3	0.1	1.4	0.1	1.5	0.1	1.2	0.1	1.3	0.1
Cadmium	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
Calcium	mg/L	3	1	6	1	7	1	8	1	7	1	5	1	6	1
Chromium	mg/L	<0.05	0.05	<0.05	0.05	<0.05	0.05	<0.05	0.05	<0.05	0.05	<0.05	0.05	<0.05	0.05
Copper	mg/L	<0.01	0.1	<0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.1	<0.01	0.01	<0.01	0.01
Iron	mg/L	<0.05	0.05	<0.05	0.03	<0.05	0.05	<0.05	0.03	<0.05	0.05	<0.05	0.03	<0.05	0.05
Lead	mg/L	<0.001	0.05	<0.001	0.001	<0.001	0.05	<0.001	0.001	<0.001	0.05	<0.001	0.001	<0.001	0.05
Manganese	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
Mercury	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	0.001
Molybdenum	mg/L	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1
Nickel	mg/L	<0.05	0.05	<0.05	0.05	<0.05	0.05	<0.05	0.05	<0.05	0.05	<0.05	0.05	<0.05	0.05
Selenium	mg/L	<0.002	0.001	0.003	0.001	<0.002	0.001	0.001	0.001	<0.002	0.001	0.0005	0.001	0.022	0.001
Vanadium	mg/L	<0.1	0.02	<0.1	0.1	<0.1	0.02	<0.1	0.1	<0.1	0.02	<0.1	0.1	<0.1	0.02
Zinc	mg/L	<0.01	0.01	<0.01	0.01	0.03	0.01	0.02	0.01	0.04	0.01	<0.01	0.01	<0.01	0.01
DATA QUALITY															
A/C Balance (± 5)	%	3.85		1.52		4.67		1.4		4.96		-0.277		4.45	
Anions	meq/L	15.1		17		16.87		17.5		17.61		19.5		18.5	
Cations	meq/L	16.31		17.5		18.53		18		19.45		19.4		20.22	
Solids Total Dissolved Calculated	mg/L	910		1090		1080		1100		1120		1160		1120	

Notes:

umhos/cm - micromhos per centimeter

mg/L = milligrams per liter

meq/L = milliequivalents per liter

RL = analyte reporting limit

s.u. = standard unit

^a A different lab was used for 11/7/2011 bicarbonate analyses than for the other analytical dates (RL of 1 vs RL of 5 mg/L).

Table 2.9-10 Marsland Expansion Area Non-Radiological Analytical Results (November 2011 to August 2012) Chadron Wells

Location ID: Date Collected: Formation:	Monitor 11		Monitor 11		
	6/4/2012		8/20/2012		
	CHADRON		CHADRON		
	UNITS	RESULTS	RL	RESULTS	RL
MAJOR IONS					
Alkalinity Total as CaCO ₃	mg/L	365	5	369	5
Bicarbonate as HCO ₃	mg/L	403	5	394	5
Carbonate as CO ₃	mg/L	21	5	28	5
Chloride	mg/L	292	2	270	1
Fluoride	mg/L	0.7	0.1	0.6	0.1
Magnesium	mg/L	2	1	1	1
Nitrogen Ammonia as N	mg/L	0.32	0.05	0.2	0.1
Nitrogen Nitrate+Nitrite as N	mg/L	<0.1	0.1	<0.1	0.1
Potassium	mg/L	21	1	26	1
Silica	mg/L	14.7	0.2	13	1
Sodium	mg/L	403	1	414	1
Sulfate	mg/L	131	4	110	1
PHYSICAL PROPERTIES					
Conductivity @ 25 °C	umhos/cm	1890	1	1760	1
pH	s.u.	8.85	0.01	8.8	0.1
Total Dissolved Solids @ 180 °C	mg/L	1130	10	1120	10
METALS, DISSOLVED					
Aluminum	mg/L	<0.1	0.1	<0.1	0.1
Arsenic	mg/L	0.003	0.001	0.001	0.001
Barium	mg/L	<0.1	0.1	<0.1	0.1
Boron	mg/L	1.4	0.1	1.4	0.1
Cadmium	mg/L	<0.005	0.005	<0.005	0.005
Calcium	mg/L	8	1	6	1
Chromium	mg/L	<0.05	0.05	<0.05	0.05
Copper	mg/L	<0.01	0.01	<0.01	0.1
Iron	mg/L	<0.05	0.03	<0.05	0.05
Lead	mg/L	<0.001	0.001	<0.001	0.05
Manganese	mg/L	<0.01	0.01	<0.01	0.01
Mercury	mg/L	<0.001	0.001	<0.001	0.001
Molybdenum	mg/L	<0.1	0.1	<0.1	0.1
Nickel	mg/L	<0.05	0.05	<0.05	0.05
Selenium	mg/L	0.002	0.001	<0.002	0.001
Vanadium	mg/L	<0.1	0.1	<0.1	0.02
Zinc	mg/L	<0.01	0.01	<0.01	0.01
DATA QUALITY					
A/C Balance (± 5)	%	0.897		4.88	
Anions	meq/L	18.3		17.31	
Cations	meq/L	18.6		19.09	
Solids Total Dissolved Calculated	mg/L	1100		1060	

Notes:

umhos/cm - micromhos per centimeter

mg/L = milligrams per liter

meq/L = milliequivalents per liter

RL = analyte reporting limit

s.u. = standard unit

^a A different lab was used for 11/7/2011 bicarbonate analyses than for the other analytical dates (RL of 1 vs RL of 5 mg/L).