

**CAMECO RESOURCES  
CROW BUTTE OPERATION**



**86 Crow Butte Road  
P.O. Box 169  
Crawford, Nebraska 69339-0169**

**(308) 665-2215  
(308) 665-2341 – FAX**

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December 18, 2017

**USPS PRIORITY MAIL  
SIGNATURE CONFIRMATION**

**Marty Link, Water Quality Division Administrator  
Nebraska Department of Environmental Quality  
P.O. Box 98922  
Lincoln, NE 68509-8922**

**Class III UIC Permit NE0122611  
October 2017 Monthly Restoration Report**

Dear Ms. Link:

Please find enclosed the November 2017 Monthly Restoration Reports for Mine Units 2, 3, 4, 5 and 6. The reverse osmosis (RO) units continue to inject permeate and reductant into Mine Units 4, 5, and 6 with groundwater sweep continuing in portions of the three mine units. Spot treatment with permeate and reductant continued in P246 in Mine Unit 3.

Mine Unit 2 remained in stability monitoring.

If you have any questions regarding this submittal, please feel free to contact me at (308) 665-2215, ext. 117.

Sincerely,  
Cameco Resources  
Crow Butte Operation



Walter D. Nelson  
SHEQ Coordinator

Enclosures:      As Stated

cc:      Ron Burrows – NRC  
         CBO - File  
cc:      CR – Electronic File  
         Kory Winters – NDEQ Field Office  
         Amanda Jones – NDEQ Program Coordinator

**CROW BUTTE MINE**  
**MONTHLY RESTORATION REPORT**

**November 2017**

**MINE UNIT 2**

**1. RESTORATION ACTIVITY DURING MONTH:**

	YES	NO	
a. Groundwater Transfer		X	(if yes, complete part 2)
b. Groundwater Sweep		X	(if yes, complete part 3)
c. Groundwater Treatment		X	
d. Wellfield Recirculation		X	
e. Other (explain):	X		The Mine Unit is in Stability Monitoring.

**2. LIST WELLS USED IN GROUNDWATER TRANSFER DURING THE MONTH:**

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**3. LIST WELLS USED IN GROUNDWATER SWEEP DURING THE MONTH:**

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**4. LIST WELLS SAMPLED DURING MONTH AND ASSAY RESULTS:**

**No wells were sampled during the month.**

**CROW BUTTE MINE**  
**MONTHLY RESTORATION REPORT**

November 2017

MINE UNIT 3

**1. RESTORATION ACTIVITY DURING MONTH:**

	YES	NO	
a. Groundwater Transfer		X	(if yes, complete part 2)
b. Groundwater Sweep		X	(if yes, complete part 3)
c. Groundwater Treatment	X		RO and Reductant P246
d. Wellfield Recirculation		X	
e. Other (explain):			

**2. LIST WELLS USED IN GROUNDWATER TRANSFER DURING THE MONTH:**

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**3. LIST WELLS USED IN GROUNDWATER SWEEP DURING THE MONTH:**

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**4. LIST WELLS SAMPLED DURING MONTH AND ASSAY RESULTS:**

P246

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# Mine Unit 3 Restoration Data

Well Name	Date	Alk	Ca	Cl	Mg	Na	SO4	Cond	pH	TDS	Fe	U	V
P246	11/29/2017	393	27.99	141	6.123	18.23	252.4	1757	7.48	1096	0.068	3.055	0.086

**CROW BUTTE MINE**  
**MONTHLY RESTORATION REPORT**

November 2017

MINE UNIT 4

**1. RESTORATION ACTIVITY DURING MONTH:**

	YES	NO	
a. Groundwater Transfer		X	(if yes, complete part 2)
b. Groundwater Sweep	X		(if yes, complete part 3)
c. Groundwater Treatment	X		RO and Reductant P392, P410, P456, I539P, I544P, I542P, I545P, I546P, I551P, P6024, and P6029.
d. Wellfield Recirculation		X	
e. Other (explain):			

**2. LIST WELLS USED IN GROUNDWATER TRANSFER DURING THE MONTH:**

**3. LIST WELLS USED IN GROUNDWATER SWEEP DURING THE MONTH:**

BL-10 and CM2-4.

**4. LIST WELLS SAMPLED DURING MONTH AND ASSAY RESULTS:**

BL-8, BL-9, BL-10, BL-18, BL-19, BL-20, CM1-7, CM2-1, CM2-2, CM2-4, P392, P393, P394, P410, I534P, I537P, I541P, I544P, I545P, I546P, I547P, I550P, P6024, P6029, and PM-3.

# Mine Unit 4 Restoration Data

Well Name	Date	Alk	Ca	Cl	Mg	Na	SO4	Cond	pH	TDS	Fe	U	V
BL-10	11/8/2017	322.0	10.32	106.0	2.61	287.5	160.1	1370	8.02	861	0.006	1.713	0.268
BL-18	11/8/2017	247.0	3.76	52.0	0.53	179.7	67.9	829	8.38	534	0.011	0.780	1.642
BL-19	11/8/2017	288.0	3.98	53.0	0.79	210.6	82.0	964	8.10	590	0.013	1.883	0.329
BL-20	11/8/2017	294.0	7.16	86.0	0.88	258.6	133.9	1196	7.86	715	0.069	0.561	0.043
BL-8	11/8/2017	249.0	3.60	38.0	0.48	167.9	43.3	739	8.28	518	0.090	0.687	0.130
BL-9	11/8/2017	158.0	2.26	37.0	0.32	102.4	32.8	478	7.72	321	0.324	0.146	0.125
CM1-7	11/8/2017	403.0	10.92	115.0	2.87	360.5	219.6	1693	7.71	1061	0.007	0.784	0.075
CM2-1	11/8/2017	442.0	20.55	86.0	4.99	331.3	178.1	1567	7.63	997	0.050	1.123	0.035
CM2-2	11/8/2017	241.0	7.93	36.0	0.58	153.9	45.8	719	8.53	504	0.053	0.297	0.204
CM2-4	11/29/2017	369.0	16.67	166.0	4.24	23.8	262.1	1829	7.69	1134	0.031	0.552	0.003
IS34P	11/8/2017	339.0	15.27	169.0	3.02	352.9	219.7	1698	8.02	1064	0.044	1.774	0.118
IS37P	11/8/2017	153.0	27.08	229.0	1.34	217.2	68.9	1184	7.87	710	0.036	0.014	0.006
IS40P	11/8/2017	218.0	2.05	28.0	0.27	146.1	39.1	642	8.76	405	0.008	0.547	0.693
IS44P	11/29/2017	603.0	42.51	167.0	11.70	10.6	367.3	2450	7.39	1552	0.011	2.698	0.216
IS45P	11/29/2017	506.0	30.60	144.0	8.11	8.8	279.7	2009	7.37	1238	0.011	1.610	0.262
IS46P	11/29/2017	473.0	30.64	139.0	8.25	20.2	275.1	1948	7.38	1202	0.035	0.954	0.075
IS47P													

# Mine Unit 4 Restoration Data

Well Name	Date	Alk	Ca	Cl	Mg	Na	SO4	Cond	pH	TDS	Fe	U	V
	11/8/2017	376.0	9.43	60.0	1.86	284.1	136.9	1285	7.59	808	0.080	2.453	0.042
I550P													
	11/8/2017	115.0	1.46	28.0	0.09	85.8	25.0	404	7.60	244	0.796	0.026	0.060
P392													
	11/29/2017	422.0	27.08	110.0	6.84	33.2	221.1	1667	7.60	1048	0.010	1.167	0.317
P393													
	11/8/2017	272.0	61.05	100.0	5.78	194.4	163.2	1168	7.49	702	0.020	0.257	0.010
P394													
	11/8/2017	180.0	8.71	39.0	1.09	131.8	55.3	640	7.73	404	0.021	0.059	0.014
P410													
	11/29/2017	417.0	23.54	102.0	5.84	21.6	207.7	1579	7.53	1004	0.011	1.606	0.194
P6024													
	11/29/2017	476.0	30.94	128.0	7.77	16.7	289.0	1933	7.01	1193	0.069	0.471	0.008
P6029													
	11/29/2017		172.40	453.0	43.89	29.5	1259.0	6017	7.04	3785	0.187	6.038	0.024
PM-3													
	11/8/2017	281.0	10.68	81.0	2.49	236.1	128.8	1156	8.02	694	0.010	0.696	0.055

**CROW BUTTE MINE**  
**MONTHLY RESTORATION REPORT**

**November 2017**

**MINE UNIT 5**

**1. RESTORATION ACTIVITY DURING MONTH:**

	YES	NO	
a. Groundwater Transfer		X	(if yes, complete part 2)
b. Groundwater Sweep	X		(if yes, complete part 3)
c. Groundwater Treatment	X		RO and Reductant BL5-3, I685P, P837, and P1156.
d. Wellfield Recirculation		X	
e. Other (explain):		X	

**2. LIST WELLS USED IN GROUNDWATER TRANSFER DURING THE MONTH:**

**3. LIST WELLS USED IN GROUNDWATER SWEEP DURING THE MONTH:**  
P699, and P1002.

**4. LIST WELLS SAMPLED DURING MONTH AND ASSAY RESULTS:**

BL5-3, CM5-14, CM5-15, CM5-16, CM5-17, I685P, P699, P1002, and P1156.



# Mine Unit 5 Restoration Data

Well Name	Date	Alk	Ca	Cl	Mg	Na	SO4	Cond	pH	TDS	Fe	U	V
BL5-3	11/29/2017	366	18.23	155	4.51	13.0	271.3	1823	7.86	1130	0.038	0.044	0.015
CM5-14	11/29/2017	343	23.61	222	4.89	17.8	379.4	2256	7.99	1402	0.094	0.076	0.036
CM5-15	11/29/2017	375	49.46	289	9.15	15.1	497.2	2732	7.79	1762	0.370	1.836	0.171
CM5-16	11/29/2017	535	25.67	156	6.46	10.2	273.9	2137	7.81	1312	1.315	1.803	1.018
CM5-17	11/29/2017	481	33.01	281	9.52	8.0	515.2	2921	7.86	1899	0.342	0.037	-0.026
J685P	11/29/2017	418	16.64	169	4.49	35.2	307.5	2007	7.93	1236	0.010	1.907	0.235
P1002	11/29/2017	355	18.17	186	4.69	17.6	341.7	2064	8.02	1270	0.009	1.122	0.240
P1156	11/29/2017	461	16.68	149	4.15	14.1	257.4	1934	7.84	1194	0.012	3.272	0.089
P699	11/29/2017	333	13.80	176	3.78	17.0	333.1	1981	8.08	1221	0.011	1.127	1.024

**CROW BUTTE MINE**  
**MONTHLY RESTORATION REPORT**

November 2017

MINE UNIT 6

**1. RESTORATION ACTIVITY DURING MONTH:**

	YES	NO	
a. Groundwater Transfer		X	(if yes, complete part 2)
b. Groundwater Sweep	X		(if yes, complete part 3)
c. Groundwater Treatment	X		RO and Reductant P1265, I1272P, P1314, P1315, P1355, I1356P, P1358, P1402, P1404, P1449, P1494, P1532, P1582, P1584, P1585, I1602P, I1667P, P1690, P1704, P1751, P1765, P1779, P1800.
d. Wellfield Recirculation		X	
e. Other (explain):		X	

**2. LIST WELLS USED IN GROUNDWATER TRANSFER DURING THE MONTH:**

**3. LIST WELLS USED IN GROUNDWATER SWEEP DURING THE MONTH:**

I1267P.

**4. LIST WELLS SAMPLED DURING MONTH AND ASSAY RESULTS:**

I686P, P1265, I1272P, P1274P, P1314, P1315, P1318, P1348, P1358, P1396, P1399, P1402, P1404, P1426, I1423, P1439, P1440, P1449, P1457, P1494, P1532, P1582, I1601P, I1602P, P1611, P1624, P1663, P1690, P1704, P1751, P1765, P1779, P1800.

# MU6 Restoration Data

Well Name	Date	Alk	Cl	Ca	Mg	Na	SO4	Cond	pH	TDS	Fe	U	V
P1272P	11/29/2017	471	261	35.24	9.49	23.6	429.9	2600	7.73	1668	0.02	1.922	0.071
P1274P	11/29/2017	244	52	10.21	1.34	4.2	72.7	822	7.51	532	0.20	0.310	0.230
P1423P	11/29/2017	409	221	42.47	7.24	18.7	394.0	2337	7.37	1467	0.22	3.889	0.119
P1601P	11/29/2017	473	124	28.31	2.82	4.7	154.2	1663	8.20	1047	0.16	2.074	1.806
P1602P	11/29/2017	453	152	13.65	4.13	26.5	227.7	1844	8.15	1142	0.04	2.603	2.577
P1636P	11/29/2017	304	185	18.65	3.05	4.5	303.7	1902	7.76	1174	0.07	1.792	0.007
P1265	11/29/2017	515	251	33.20	9.12	105.3	415.0	2610	7.84	1680	0.03	0.640	0.041
P1314	11/29/2017	611	197	21.60	6.37	42.0	336.1	2483	7.97	1580	0.02	3.414	1.721
P1315	11/29/2017	481	232	29.48	7.86	35.7	408.4	2540	7.72	1622	0.04	0.649	0.186
P1318	11/29/2017	859	215	19.27	7.00	10.0	388.1	3049	7.88	1990	0.15	10.180	1.141
P1348	11/29/2017	480	150	15.07	3.89	8.2	254.7	1966	7.80	1213	0.08	3.192	0.450
P1358	11/29/2017	344	199	17.89	4.66	28.3	353.8	2103	7.86	1292	0.02	1.457	0.182
P1396	11/29/2017	300	184	16.83	4.24	6.1	332.2	1950	7.85	1204	0.04	0.056	0.107
P1399	11/29/2017	507	181	26.51	6.08	24.1	312.9	2163	7.93	1330	0.07	1.914	0.075
P1402	11/29/2017	458	165	20.19	4.88	13.7	268.3	1998	7.74	1230	0.06	2.030	0.421
P1404	11/29/2017	508	178	23.83	5.91	52.1	297.8	2210	7.71	1367	0.03	1.573	0.360
P1426	11/29/2017	392	233	26.48	6.40	3.4	434.8	2456	7.63	1559	0.06	3.133	0.083
P1439	11/29/2017	351	79	6.06	1.11	8.0	130.3	1237	8.41	742	0.06	1.641	0.722
P1449													

# MU6 Restoration Data

Well Name	Date	Alk	Cl	Ca	Mg	Na	SO4	Cond	pH	TDS	Fe	U	V
P1457	11/29/2017	595	111	10.61	2.94	68.3	219.6	1997	8.04	1230	0.01	4.955	0.810
P1494	11/29/2017	316	53	5.96	1.15	8.2	63.7	933	8.92	585	0.45	1.520	2.137
P1532	11/29/2017	422	172	16.97	4.21	49.5	312.0	2075	7.83	1277	0.07	2.368	0.264
P1582	11/29/2017	403	154	17.63	3.99	25.7	300.6	1971	7.73	1215	0.02	0.524	-0.017
P1584	11/29/2017	354	176	12.97	3.51	33.0	287.1	1873	8.19	1157	0.02	1.026	0.725
P1611	11/29/2017	451	111	7.99	2.55	11.7	173.3	1646	8.31	1038	0.08	2.725	1.250
P1624	11/29/2017	315	188	17.82	3.94	7.8	333.9	2002	7.89	1233	0.28	3.270	0.283
P1663	11/29/2017	260	50	3.41	0.66	5.8	75.0	865	8.59	541	0.04	0.656	1.775
P1690	11/29/2017	307	132	7.95	2.35	43.9	194.6	1482	8.45	929	0.01	0.526	0.310
P1704	11/29/2017	770	333	52.06	15.04	26.5	549.2	3579	7.69	2380	0.03	6.039	0.514
P1751	11/29/2017	328	134	8.77	2.38	105.1	230.2	1607	7.84	1018	0.10	1.783	0.393
P1765	11/29/2017	395	110	9.96	2.84	8.1	181.2	1558	7.75	993	0.07	3.283	0.623
P1779	11/29/2017	498	159	14.10	3.49	19.3	268.7	2030	8.10	1250	0.02	5.856	0.716
P1800	11/29/2017	247	59	8.24	1.80	3.8	78.4	859	8.61	539	0.04	1.001	2.404
	11/29/2017	506	200	24.07	6.40	6.8	302.0	2275	7.70	1419	0.01	2.593	0.377