

**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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November 4, 2021

USPS PRIORITY MAIL  
SIGNATURE CONFIRMATION

Sue Dempsey, Drinking Water and Groundwater Division Administrator  
Nebraska Department of Environment and Energy  
P.O. Box 98922  
Lincoln, NE 68509-8922

Class III UIC Permit NE0122611  
October 2021 Monthly Restoration Report

Dear Ms. Dempsey:

Please find enclosed the October 2021 Monthly Restoration Reports for Mine Units 2, 3, 4, 5, 6, 7 and 8. The reverse osmosis (RO) units continue to inject permeate and reductant into Mine Units 2, 4, 6, 7, and 8.

Mine Unit 3 and 5 remained in stability monitoring.

If you have any questions regarding this submittal, please feel free to contact me at (308) 665-2215, ext. 121.

Sincerely,  
Cameco Resources  
Crow Butte Operation

*Tate Hagman*

Tate Hagman  
Restoration Manager

Enclosures: As Stated

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

CROW BUTTE MINE  
 MONTHLY RESTORATION REPORT  
 October 2021  
 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):			

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

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

4. LIST WELLS SAMPLED DURING MONTH AND ASSAY RESULTS:

No in-house samples for October

CROW BUTTE MINE  
 MONTHLY RESTORATION REPORT  
 October 2021  
 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	
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:

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

4. LIST WELLS SAMPLED DURING MONTH AND ASSAY RESULTS:

No in-house samples were collected during the month.

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

October 2021

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		I549P, I550P
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:**

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

I549P

# Mine Unit 4 Restoration Data

Well ID	Date	Alk	Ca	Cl	Mg	Na	SO4	Cond	pH	TDS	Fe	U	V
I549P	10/5/2021	528	31.80	149	9.29	485	403	2280	7.27	1414	0.06	2.14	0.16

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

October 2021

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	
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:**

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

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

No in-house samples were collected during the month.

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

October 2021

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		P1337, P1399, P1461, P1625, P1628
d. Wellfield Recirculation		X	
e. Other (explain):		X	

**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:**

P1337, P1399, P1461, P1625, P1628

**Mine Unit 6 Restoration Data**

Well ID	Date	Alk	Ca	Cl	Mg	Na	SO4	Cond	pH	TDS	Fe	U	V
P1337													
	10/5/2021	417	9.51	95	2.68	326	188	1488	8.14	923	0.00	1.87	0.58
P1399													
	10/5/2021	449	24.76	186	6.11	467	372	2187	8.12	1356	0.01	1.31	0.14
P1461													
	10/5/2021	366	16.41	172	4.54	418	342	1978	8.15	1226	0.01	1.08	0.34
P1625													
	10/5/2021	448	18.85	151	5.25	406	277	1912	8.08	1185	0.01	1.59	0.46
P1628													
	10/5/2021	310	9.15	136	2.91	332	246	1565	8.35	970	0.00	0.63	0.42



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

October 2021

MINE UNIT 7

**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		IX and RO BL-17, CM4-14, CM4-15, CM4-16, CM4-17, CM4-18, I1971P, P1972, I1973P, I1975P, I1978P, P1986, P2014, P2038, P2040, P2103, I2183P, I2185P, P2188, P2216, P2226, P2316, P2359, P2384, P2401, I2429P, P2470, P2476, I2502P, P2505, P2523, P2538, P2601, P2610, P2660, P5220, P5230, P5250, P5283.
d. Wellfield Recirculation		X	
e. Other (explain):		X	

**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:**

BL-17, CM3-7, CM4-12, CM4-13, CM4-14, CM4-15, CM4-16, CM4-17, CM4-18, P1957, I1971P, P1972, I1973P, I1975P, I1977P, I1978P, I1982P, I1985P, P1986, P2014, P2038, P2040, P2108, P2125, I2183P, I2185P, P2188, P2216, P2219, P2226, I2244P, P2264, P2303, P2316, P2331, P2340, P2359, P2384, P2401, I2429P, P2468, P2470, P2476, P2481, I2502P,

P2505, P2510, P2523, P2538, P2540, P2541, P2601, P2610, P2612, P2614, P2615, P2624,  
P2660, P5230, P5250, P5258, P5271, P5278, P5283.

**Mine Unit 7 Restoration Data**

Well ID	Date	Alk	Ca	Cl	Mg	Na	SO4	Cond	pH	TDS	Fe	U	V
BL-17	10/5/2021	440	11.41	81	2.90	317	161	1436	8.19	890	0.00	0.36	1.45
CM3-7	10/18/2021	312	21.15	118	3.85	285	242	1492	7.77	925	0.06	0.31	0.23
CM4-12	10/18/2021	253	11.14	60	1.36	191	118	951	7.13	590	0.66	0.15	-0.11
CM4-13	10/5/2021	362	15.97	66	3.75	253	155	1200	7.85	744	0.01	0.45	0.29
CM4-14	10/5/2021	922	66.67	260	20.46	830	711	3792	7.56	2351	0.00	2.04	0.33
CM4-15	10/5/2021	814	59.96	214	16.80	713	604	3297	7.49	2044	0.01	1.49	0.50
CM4-16	10/5/2021	835	58.76	228	17.99	738	624	3388	7.52	2101	0.00	0.93	0.22
CM4-17	10/5/2021	735	51.82	194	15.92	622	482	2911	7.56	1805	0.04	0.55	0.03
CM4-18	10/5/2021	458	23.89	113	6.67	357	248	1718	7.95	1065	0.01	0.31	0.37
I1971P	10/5/2021	767	47.63	169	13.06	632	509	2909	7.57	1804	0.01	1.39	0.21
I1973P	10/5/2021	747	40.67	158	9.83	590	441	2725	7.76	1690	0.01	4.10	0.55
I1975P	10/5/2021	864	59.63	232	18.43	744	610	3443	7.65	2135	0.01	4.25	0.24
I1977P	10/18/2021	310	34.59	55	3.88	177	115	1043	7.39	647	0.10	0.39	0.07
I1978P	10/5/2021	423	23.84	81	5.46	310	209	1493	7.79	926	0.01	1.24	0.36
I1982P	10/18/2021	253	14.16	34	2.94	134	49	724	7.88	449	0.03	0.43	0.16
I1985P	10/18/2021	213	21.61	30	1.70	97	35	614	7.59	381	0.03	0.11	-0.04
I2183P	10/5/2021	578	44.23	142	10.38	481	387	2301	7.59	1427	0.01	5.77	0.85
I2185P	10/5/2021	0	67.14	242	20.38	893	784	4012	7.48	2487	0.00	3.89	2.01
I2244P	10/18/2021	242	22.34	179	5.81	339	338	1768	7.1	1096	0.15	1.14	0.09

**Mine Unit 7 Restoration Data**

Well ID	Date	Alk	Ca	Cl	Mg	Na	SO4	Cond	pH	TDS	Fe	U	V
I2429P													
	10/5/2021	415	20.39	106	5.75	347	259	1628	7.88	1009	0.01	2.57	0.42
I2502P													
	10/5/2021	329	19.71	189	5.32	419	375	2032	8.2	1260	0.01	0.45	0.12
P1957													
	10/18/2021	170	5.27	36	0.36	114	54	597	7.01	370	0.07	0.24	-0.07
P1972													
	10/5/2021	499	25.00	108	6.81	410	303	1909	7.57	1184	0.03	2.11	0.45
P1986													
	10/5/2021	484	22.88	155	6.81	454	341	2117	7.79	1313	0.01	1.15	0.52
P2014													
	10/5/2021	194	5.94	36	1.37	141	73	657	7.5	407	0.07	0.08	0.14
P2038													
	10/5/2021	602	36.49	150	10.81	512	409	2417	7.61	1499	0.03	1.75	0.15
P2040													
	10/5/2021	805	63.54	227	20.55	721	642	3401	7.6	2109	0.01	2.49	0.14
P2108													
	10/18/2021	241	9.20	46	0.85	158	82	819	7.28	508	0.49	0.26	-0.04
P2125													
	10/18/2021	364	13.87	77	2.62	281	211	1401	7.19	869	0.44	0.50	-0.10
P2188													
	10/5/2021	270	7.43	52	1.99	201	105	934	7.62	579	0.01	0.57	0.82
P2216													
	10/5/2021	465	29.75	184	6.71	483	383	2271	7.91	1408	0.01	2.97	0.62
P2219													
	10/18/2021	235	17.41	47	1.50	152	111	873	7.07	541	0.46	0.13	-0.11
P2226													
	10/5/2021	433	10.48	79	2.86	324	178	1457	7.96	903	0.00	1.61	0.60
P2264													
	10/18/2021	221	17.35	55	2.54	152	107	849	7.37	526	0.03	0.15	3.55
P2303													
	10/18/2021	165	8.74	34	1.00	95	52	565	7.07	350	1.16	0.18	-0.13
P2316													
	10/5/2021	688	49.67	149	13.12	536	443	2575	7.68	1597	0.01	4.02	0.59
P2331													
	10/18/2021	154	10.45	31	0.78	86	39	506	7.13	314	0.13	0.13	-0.12
P2340													
	10/18/2021	198	11.10	33	1.31	107	56	631	7.35	391	0.22	0.16	-0.12

**Mine Unit 7 Restoration Data**

Well ID	Date	Alk	Ca	Cl	Mg	Na	SO4	Cond	pH	TDS	Fe	U	V
P2359	10/5/2021	495	31.74	103	8.55	374	268	1811	7.63	1123	0.02	2.38	0.28
P2384	10/5/2021	586	44.97	155	13.03	514	456	2469	7.56	1531	0.01	2.19	0.49
P2401	10/5/2021	372	21.63	75	5.51	267	212	1369	7.93	849	0.00	0.43	0.32
P2468	10/18/2021	358	11.59	86	1.71	266	173	1337	7.97	829	0.03	0.57	0.62
P2470	10/5/2021	327	14.90	97	3.00	286	185	1353	8.16	839	0.01	0.55	0.59
P2476	10/5/2021	429	22.78	99	5.80	343	242	1636	7.92	1014	0.02	0.99	0.60
P2481	10/5/2021	571	17.41	112	5.15	444	278	1996	7.94	1238	0.00	1.13	1.53
P2505	10/5/2021	283	14.44	110	3.05	283	209	1358	8	842	0.01	0.19	0.56
P2510	10/18/2021	226	6.49	39	0.85	141	64	731	8.13	453	0.02	0.25	0.37
P2523	10/5/2021	337	10.78	62	2.74	250	146	1157	8.05	717	0.01	0.76	0.61
P2538	10/5/2021	313	14.50	98	4.28	295	225	1389	7.64	861	0.04	0.41	0.93
P2540	10/18/2021	292	23.83	53	2.44	162	87	925	7.83	574	0.05	1.02	-0.01
P2541	10/18/2021	167	13.66	27	0.95	79	25	495	7.53	307	0.05	0.23	-0.03
P2601	10/5/2021	439	25.95	167	6.83	426	335	2048	7.77	1270	0.06	0.31	0.50
P2610	10/5/2021	658	29.37	157	9.23	530	356	2420	7.67	1500	0.01	1.55	1.15
P2612	10/18/2021	203	7.56	39	0.77	133	72	694	7.39	430	0.04	0.16	0.47
P2614	10/18/2021	405	22.51	64	4.90	239	127	1261	7.92	782	0.02	0.54	-0.02
P2615	10/18/2021	289	11.11	44	1.36	178	75	875	7.99	543	0.07	0.50	1.17
P2624	10/18/2021	141	6.30	28	0.29	80	35	455	7.26	282	0.03	0.11	0.25

**Mine Unit 7 Restoration Data**

Well ID	Date	Alk	Ca	Cl	Mg	Na	SO4	Cond	pH	TDS	Fe	U	V
P2660													
	10/5/2021	418	17.72	87	4.46	321	207	1521	7.95	943	0.01	1.08	0.43
P5230													
	10/5/2021	864	61.39	204	16.98	741	606	3378	7.5	2094	0.06	3.74	0.53
P5250													
	10/5/2021	467	24.54	113	7.29	378	275	1812	7.74	1123	0.00	0.67	1.17
P5258													
	10/18/2021	136	9.12	30	0.42	76	43	483	6.91	299	0.22	0.17	-0.11
P5271													
	10/18/2021	864	103.60	193	22.09	631	576	3162	7.21	1960	0.04	1.84	0.25
P5278													
	10/18/2021	429	14.68	63	2.58	271	155	1355	7.79	840	0.02	1.24	0.59
P5283													
	10/5/2021	674	38.61	155	11.36	549	427	2563	7.72	1589	0.04	1.81	1.31

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

October 2021

MINE UNIT 8

**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		CM6-11, CM6-20, CM6-21, I2671P, I2672P, P2689, I2692P, P2701, P2702, P2715, P2724, P2734, P2740, P2758, P2764, P2765, P2770, P2774, P2808, P2844, P2855, P2863, P2880, P2904, P2908, P2926, P3153, P3166, P3170, P3173, P3178, P3189, P3192, P3209, P6101, P6102, P6103, P6104, P6105, P6107, P6109, P6110, P6111, P6112, P6127, P6140.
d. Wellfield Recirculation		X	
e. Other (explain):		X	

**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:**

<p>CM6-11, CM6-20, CM6-21, CM6-22, CM6-23, CM6-24, I2671P, I2672P, I2685P, P2686, P2689, P2700, P2702, P2715, P2724, P2729, P2734, P2758, P2764, P2765, P2770, P2774, P2808, P2844, P2855, P2904, P2908, P2926, I2976P, P3153, P3166, P3170, P3173, P3178, P3189, P3192, P3209, P6103, P6104, P6105, P6107, P6109, P6110, P6112, P6127, P6140.</p>
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**Mine Unit 8 Restoration Data**

Well ID	Date	Alk	Ca	Cl	Mg	Na	SO4	Cond	pH	TDS	Fe	U	V
CM6-11	10/5/2021	444	29.28	222	7.43	506	418	2419	8.06	1500	0.01	0.56	0.01
CM6-20	10/5/2021	450	16.34	169	4.45	433	290	2032	8.07	1260	0.04	0.96	0.26
CM6-21	10/5/2021	684	33.67	268	9.07	674	477	3070	7.77	1903	0.00	14.17	0.35
CM6-22	10/5/2021	428	17.40	204	4.98	472	354	2191	8.14	1358	0.02	2.23	0.22
CM6-23	10/5/2021	493	10.23	189	4.23	486	330	2232	8.17	1384	0.00	1.85	0.82
CM6-24	10/5/2021	625	19.75	252	7.42	623	429	2840	7.88	1761	0.00	1.49	0.84
I2671P	10/5/2021	702	21.80	215	6.80	616	388	2778	8.09	1722	0.03	4.40	0.62
I2672P	10/5/2021	456	10.33	178	3.06	457	301	2092	8.09	1297	0.04	1.07	0.05
I2685P	10/5/2021	674	22.47	270	7.75	690	496	3083	7.97	1911	0.01	7.97	0.88
I2976P	10/5/2021	534	14.72	214	5.12	549	381	2477	8.1	1536	0.00	1.30	0.63
P2686	10/5/2021	480	13.09	181	4.21	469	307	2141	7.99	1327	0.01	3.22	0.72
P2689	10/5/2021	617	20.99	263	6.42	644	468	2952	7.92	1830	0.10	5.71	0.09
P2700	10/5/2021	485	29.00	248	8.23	547	430	2593	7.91	1608	0.02	1.25	0.31
P2702	10/5/2021	485	10.68	175	3.37	477	309	2135	8.25	1324	0.01	2.41	0.69
P2715	10/5/2021	444	11.05	166	3.69	425	288	1965	8.25	1218	0.01	0.88	0.53
P2724	10/5/2021	790	20.65	290	8.63	779	537	3410	8.08	2114	0.00	4.98	1.24
P2729	10/5/2021	385	9.29	132	2.83	351	219	1625	8.47	1008	0.01	1.04	0.94
P2734	10/5/2021	763	26.54	323	9.55	804	567	3536	8.04	2192	0.00	13.45	0.98
P2758	10/5/2021	487	9.15	177	3.14	461	300	2122	8.3	1316	0.02	2.11	1.33



**Mine Unit 8 Restoration Data**

Well ID	Date	Alk	Ca	Cl	Mg	Na	SO4	Cond	pH	TDS	Fe	U	V
P2764	10/5/2021	636	20.27	263	7.33	650	455	2935	8.1	1820	0.01	6.64	1.02
P2765	10/5/2021	417	8.35	166	2.92	420	276	1923	8.25	1192	0.03	1.39	0.26
P2770	10/5/2021	519	14.00	195	5.10	497	330	2288	8.38	1419	0.00	1.19	1.75
P2774	10/5/2021	509	15.06	205	4.83	507	345	2324	8.14	1441	0.01	2.71	0.71
P2808	10/5/2021	483	12.61	184	4.42	471	312	2165	8.37	1342	0.01	1.43	1.00
P2844	10/5/2021	470	13.81	204	4.53	493	343	2262	8.12	1402	0.01	1.19	0.88
P2855	10/5/2021	540	19.81	228	6.62	555	383	2544	8.04	1577	0.01	2.70	0.56
P2904	10/5/2021	593	26.49	262	7.88	615	436	2851	7.78	1768	0.01	2.49	0.49
P2908	10/5/2021	563	12.60	210	4.40	552	361	2490	8.07	1544	0.01	5.23	0.60
P2926	10/5/2021	466	14.48	175	4.53	438	293	2076	8.11	1287	0.01	1.74	0.73
P3153	10/5/2021	491	11.05	156	3.37	437	271	2019	8.36	1252	0.05	3.39	0.48
P3166	10/5/2021	524	18.58	192	5.87	497	340	2307	8.19	1430	0.01	2.87	0.35
P3170	10/5/2021	525	23.00	211	6.60	523	362	2445	8.02	1516	0.02	1.83	0.31
P3173	10/5/2021	552	14.95	227	5.26	568	392	2592	8.07	1607	0.00	4.65	0.71
P3178	10/5/2021	563	17.42	215	5.67	551	387	2540	8.12	1575	0.01	2.47	0.34
P3189	10/5/2021	501	29.14	210	7.30	505	357	2376	8.04	1473	0.01	0.94	0.09
P3192	10/5/2021	595	28.75	255	7.74	609	449	2850	7.99	1767	0.03	1.45	0.07
P3209	10/5/2021	592	21.98	244	6.58	609	443	2803	8.01	1738	0.04	4.77	0.17
P6103	10/5/2021	461	15.65	178	4.81	450	293	2080	8.17	1290	0.01	0.49	0.70

**Mine Unit 8 Restoration Data**

Well ID	Date	Alk	Ca	Cl	Mg	Na	SO4	Cond	pH	TDS	Fe	U	V
P6104	10/5/2021	635	24.44	272	9.07	654	458	2968	7.99	1840	0.01	0.83	0.52
P6105	10/5/2021	431	14.79	171	4.07	427	295	1995	8.1	1237	0.04	0.19	0.21
P6107	10/5/2021	440	13.04	166	3.78	431	290	1996	8.22	1238	0.00	0.56	0.30
P6109	10/5/2021	458	8.57	170	3.13	441	281	2031	8.35	1259	0.01	0.81	0.63
P6110	10/5/2021	445	19.93	185	5.64	446	313	2111	8.18	1309	0.01	0.33	0.27
P6112	10/5/2021	414	8.10	159	2.85	416	274	1899	8.38	1177	0.01	0.13	0.32
P6127	10/5/2021	468	13.10	187	4.30	479	324	2191	8.21	1358	0.01	0.49	0.31
P6140	10/5/2021	540	16.91	211	5.97	538	373	2461	8.11	1526	0.01	0.41	0.56