

**CAMECO RESOURCES
CROW BUTTE OPERATION**



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

**(308) 665-2215
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December 16, 2015

**CERTIFIED MAIL
RETURN RECEIPT REQUESTED**

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

Request to Replace Baseline Restoration Well
Class III UIC Permit NE0122611

Dear Ms. Link:

Crow Butte Resources, Inc. (CBR) d/b/a Cameco Resources – Crow Butte Operation, is submitting this request for approval to replace a baseline restoration well at the Crow Butte Uranium Project. Specifically, well P-684 is a Mine Unit 5 baseline restoration well and is unusable for its intended purpose. There, CBR is intending to replace P-684 with I-1126. The following information supports the proposed change.

CBR is required by the Class III UIC Permit, Part II.C to designate and sample one well per four acres as a restoration well. In the Notice of Intent submitted for Mine Unit 5 on September 12, 1995, CBR identified production well P-684 as one of the thirty three baseline wells for Mine Unit 5. Baseline water quality data was submitted for these restoration wells and was used to calculate the proposed restoration criteria for the mine unit.

On November 4, 2014, while pulling the pump and piping from well P-684 for routine 5-year Mechanical Integrity Testing (MIT), the downhole equipment (pump, piping and wire) became stuck in the casing. On December 9, 2014, a drill rig was used to provide a greater pulling force on the stuck equipment. Approximately 60 feet of HDPE pipe and wire were successfully removed from the well before the pump once again became wedged inside the casing. The HDPE pipe stretched, and then failed as it was pulled apart. The failed pipe went back down the well casing. Downhole video showed the failed pipe at approximately 18 feet. Three unsuccessful attempts to retrieve the pipe resulted in further stretching and failure of the HDPE pipe as the pump remained wedged in place. Further downhole video analysis showed damage to the HDPE pipe that precluded further attempts to retrieve it from the well.

On December 16, 2014, CBR submitted an abandonment plan for well P-684 to NDEQ. In the plan, CBR indicated intentions to drill away the stuck HDPE pipe to a depth of 400 feet and abandon the well with cement.



Initial rig work to retrieve the downhole pump, piping and wire commenced on February 27, 2015. Over the next three days, attempts to retrieve the equipment were unsuccessful. Active drilling away of the HDPE began on March 12, 2015. On March 13, 2015, approximately 500 feet of the downhole electrical wire was retrieved from the well. On March 16, 2015, the drill bit broke through the side of the well casing at a depth of 120 feet. Attempts to reinsert the drill string inside the casing to continue the drilling process were hindered by the remaining HDPE pipe blocking the well bore.

CBR contacted NDEQ personnel, and determined that insertion of a small diameter tremie pipe beside the HDPE would be an acceptable method to facilitate abandonment of the well. On March 18, 2015, with the use of the downhole video equipment, 480 feet of 1½ inch galvanized pipe was placed into the well beside the remaining HDPE. Abandonment fluid was mixed and circulated through the well. On March 19, 2015, the tremie pipe was placed at 140 feet, and a neat cement slurry was pumped into the well bore to the surface. This cement plug extended approximately 20 feet below the casing breach. The tremie pipe was removed from the well, and the fluid level in the well was observed for subsidence. The well was then topped off with approximately five feet of bentonite chips (Abandonment letter dated March 20, 2015).

As a designated restoration well, CBR is required to collect samples from P-684 following the completion of groundwater restoration activities in Mine Unit 5 that are now in progress. In accordance with the restoration requirements in the Class III UIC Permit and CBR's Restoration Plan for Mine Unit 5, restoration wells must be sampled for the restoration parameters during the stabilization phase of restoration. The data that results from the sampling is used to determine the effectiveness of restoration.

CBR proposes replacing P-684 with well I-1126 as a replacement restoration well for Mine Unit 5. CBR believes that I-1126 is an acceptable replacement for P-684 based on the following:

- **Physical Proximity:** Well I-1126 is located approximately 63 feet southwest of P-684. A scale map depicting the location of both wells is attached as Enclosure #1. It is selected to adequately sample the water quality in this area due to the extent of the screen interval.
- **Screened Interval:** Well I-1126 is completed in the same zone of the Chadron Formation as P-684 when baseline sampling was performed. Well I-1126 was originally installed as an injection well for the Mine Unit 5 operation. The completion information for both well is listed below:

P-684 Completion Information (January 1995):

Telescope screen hung on K Packer
K Packer depth: 606 ft.
Blank: 10 ft.
Screen: 10 ft. (616 ft. to 626 ft.)

I-1126 Completion Information (April 1996)

Telescope screen hung on K Packer
K Packer depth: 602 ft.

CROW BUTTE RESOURCES, INC.



Blank: 10 ft.
Screen: 20 ft. (612 ft. to 632 ft.)

- **Baseline Water Quality:** As noted above, well P-684 was originally installed as a baseline monitor well. The well had baseline sampling performed with three samples collected in May and June 1995 (Enclosure #2).

Well I-1126 was installed as a Mine Unit 5 injection well in April 1996. Based on the physical proximity and similar screen interval, as discussed above, the baseline analytical data for these two well is projected to be very similar.

CBR does not propose to change the restoration goals previously approved by NDEQ for Mine Unit 5 (Enclosure #3).

Because I-1126 and P-684 intersect the same hydrologic zones and meet the required permit criteria, CBR requests that NDEQ approve this change to Mine Unit 5 and allow restoration sampling in I-1126.

If you have any questions regarding this submittal, please feel free to contact me at (308) 665-2215, Ext. 122.

Sincerely,
Cameco Resources
Crow Butte Operation

Bob Tiensvold
Mine Manager

Enclosures: As Stated

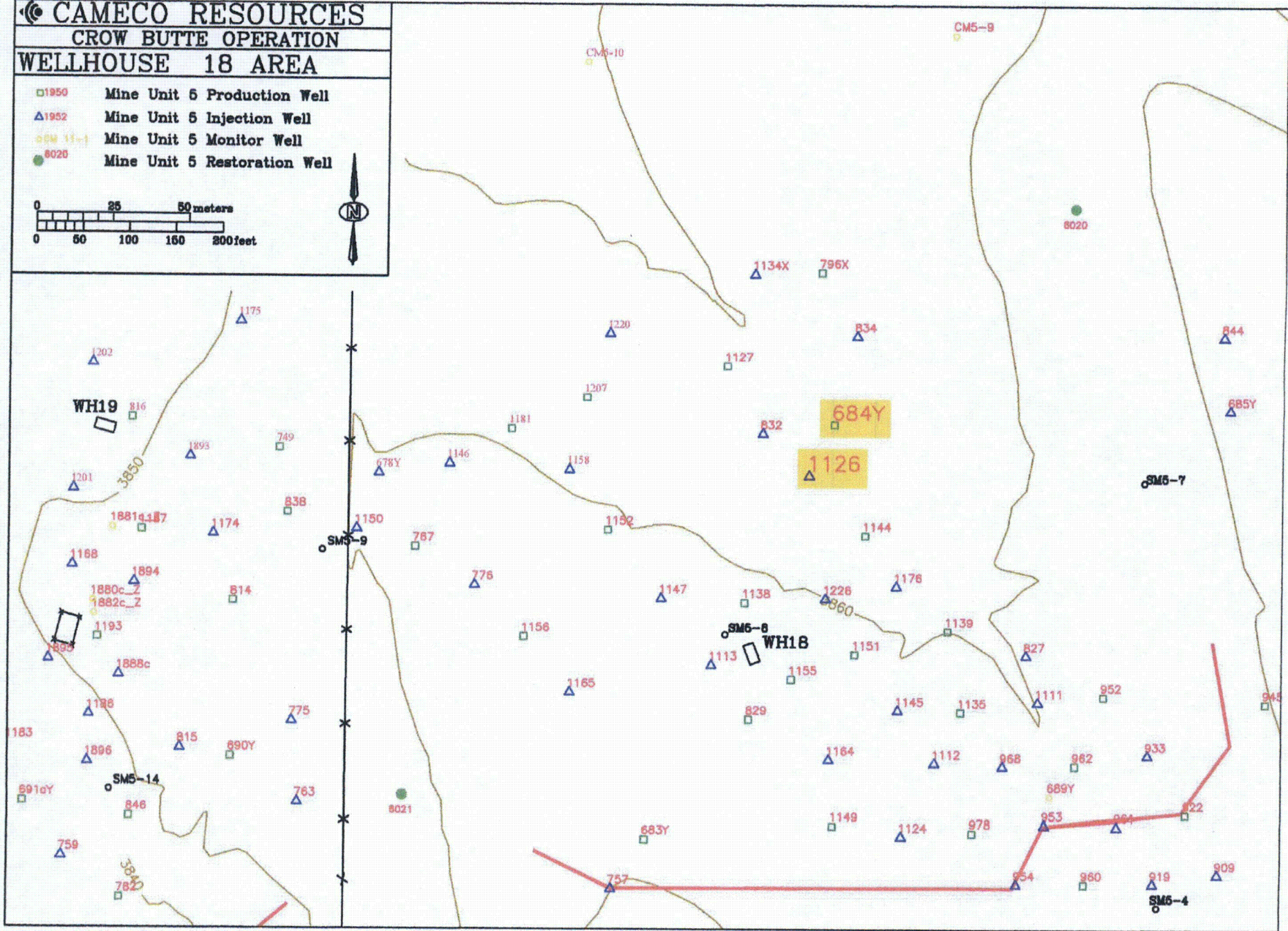
cc: Ron Burrows - NRC
CBO - File
cc: CR - Casper
Nancy Harris - NDEQ Program Coordinator
Lena Vishni - NDEQ - Chadron Field Office

Enclosure #1

CAMECO RESOURCES
CROW BUTTE OPERATION
WELLHOUSE 18 AREA

- 1950 Mine Unit 5 Production Well
- △ 1952 Mine Unit 5 Injection Well
- SM 11-1 Mine Unit 5 Monitor Well
- 8020 Mine Unit 5 Restoration Well

0 25 50 meters
 0 50 100 150 200 feet



Enclosure #2



ENERGY LABORATORIES, INC.

P.O. BOX 3258 • CASPER, WY 82602 • PHONE (307) 235-0515
 254 NORTH CENTER, SUITE 100 • CASPER, WY 82601 • FAX (307) 234-1639

CROW BUTTE RESOURCES, INC. - BASELINE WATER ANALYSIS REPORT

Sample Identification:

	I-684 Round 1	I-684 Round 2	I-684 Round 3	Mean	Standard Deviation
Sample Date:	05-09-95	05-22-95	06-06-95		
Report Date:	06-12-95	06-19-95	06-28-95		
Laboratory I.D. #:	95-25017	95-30541	95-31783		

MAJOR IONS mg/l:

Ca - Calcium	15.3	15.1	15.2	15.2	0.1
Mg - Magnesium	3.7	3.6	3.7	3.7	0.1
Na - Sodium	384	381	384	383	1.7
K - Potassium	9.7	9.5	9.8	9.7	0.2
CO3 - Carbonate	0	0	0	0.0	0.0
HCO3 - Bicarbonate	386	377	378	380	4.9
SO4 - Sulfate	362	354	352	356	5.3
Cl - Chloride	184	191	185	187	3.8
NH4 - Ammonium	0.51	0.29	0.25	0.35	0.14
NO2 - Nitrite	<0.10	<0.10	<0.10	0.10	0.00
NO3 - Nitrate	<0.10	<0.10	<0.10	0.10	0.00
F - Fluoride	0.60	0.60	0.58	0.59	0.01
SiO2 - Silica	12.1	11.1	12.1	11.8	0.6
TDS - Total Dissolved Solids	1163	1149	1160	1164	15.5
EC - Conductivity (umho/cm)	1950	1912	1894	1919	28.6
Alk - Alkalinity as CaCO3	316	309	310	312	3.8
pH (std units)	8.28	8.28	8.15	8.24	0.08

TRACE METALS mg/l:

Al - Aluminum	<0.10	<0.10	<0.10	0.10	0.00
As - Arsenic	<0.001	<0.001	<0.001	0.001	0.000
Ba - Barium	<0.10	<0.10	<0.10	0.10	0.00
B - Boron	0.78	0.78	0.79	0.78	0.01
Cd - Cadmium	<0.01	<0.01	<0.01	0.01	0.00
Cr - Chromium	<0.05	<0.05	<0.05	0.05	0.00
Cu - Copper	<0.01	<0.01	<0.01	0.01	0.00
Fe - Iron	<0.05	<0.05	<0.05	0.05	0.00
Pb - Lead	<0.05	<0.05	<0.05	0.05	0.00
Mn - Manganese	<0.01	0.01	0.01	0.01	0.00
Hg - Mercury	<0.001	<0.001	<0.001	0.001	0.000
Mo - Molybdenum	<0.10	<0.10	<0.10	0.10	0.00
Ni - Nickel	<0.05	<0.05	<0.05	0.05	0.00
Se - Selenium	<0.001	<0.001	<0.001	0.001	0.000
V - Vanadium	<0.10	<0.10	<0.10	0.10	0.00
Zn - Zinc	0.03	0.01	0.01	0.02	0.01

RADIOMETRIC pCi/l:

U-nat - Uranium Natural (mg/l)	0.056	0.059	0.049	0.0547	0.0051
Ra226 - Radium 226	319	259	347	308	45.0
Radium 226 Precision +/-	5.0	4.5	5.7	5.4	0.8

Quality Assurance Data:

Anion Milliequivalents	19.09	18.98	18.79		
Cation Milliequivalents	18.07	17.90	18.05		
Anion-Cation Balance	-2.75	-2.93	-2.01		
Calculated TDS mg/l	1166	1156	1153		
TDS Balance A/C %	1.00	0.99	1.02		

**RESTORATION TABLE
MINE UNIT 5**

Enclosure #3

Parameter	Groundwater Standard	MU-5 Baseline	MU-5 Standard Deviation	MU-5 NDEQ Restoration Value
Ammonium (mg/L)	10.0	0.28	0.05	10.0
Arsenic (mg/L)	0.05	<0.001	N/A	0.05
Barium (mg/L)	1.0	<0.10	N/A	1.0
Cadmium (mg/L)	0.005	<0.01	N/A	0.005
Chloride (mg/L)	250.0	191.9	7.9	250.0
Copper (mg/L)	1.0	<0.01	N/A	1.0
Fluoride (mg/L)	4.0	0.64	0.07	4.0
Iron (mg/L)	0.3	<0.05	N/A	0.3
Mercury (mg/L)	0.002	<0.001	N/A	0.002
Manganese (mg/L)	0.05	<0.01	N/A	0.05
Molybdenum (mg/L)	1.0	<0.10	N/A	1.0
Nickel (mg/L)	0.15	<0.05	N/A	0.15
Nitrate (mg/L)	10.0	<0.1	N/A	10.0
Lead (mg/L)	0.05	<0.05	N/A	0.05
Radium (pCi/L)	5.0	166.0	184.6	535.0
Selenium (mg/L)	0.05	<0.002	N/A	0.05
Sodium (mg/L)	N/A	397.6	14.4	3976
Sulfate (mg/L)	250.0	364.5	10.5	385.0
Uranium (mg/L)	5.0	0.072	0.056	5.0
Vanadium (mg/L)	0.2	<0.10	N/A	0.2
Zinc (mg/L)	5.0	<0.02	N/A	5.0
pH (Std. Units)	6.5 - 8.5	8.5	0.1	6.5 - 8.5
Calcium (mg/L)	N/A	12.6	1.8	126.0
Total Carbonate (mg/L)	N/A	372	13.0	590.0
Potassium (mg/L)	N/A	11.5	1.2	115.0
Magnesium (mg/L)	N/A	3.4	0.4	34.0
TDS (mg/L)	N/A	1179.5	22.5	1202.0

Notes:

N/A = Not Applicable