

**CAMECO RESOURCES,  
CROW BUTTE OPERATION**



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

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

January 26, 2010

Mr. Keith I McConnell, Deputy Director  
Decommissioning and Uranium Recovery Licensing Directorate  
Division of Waste Management and Environmental Protection  
Office of Federal and State Materials and Environmental Management Programs  
Mailstop T8-F5  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555-0001

Re: Source Materials License SUA-1534  
Docket No. 40-8943  
Evaporation Pond 4 Liner Leak

Dear Mr. McConnell:

On December 31, 2009, routine evaporation pond monitoring results of Cameco Resources, Crow Butte Operation (CBO) Evaporation Pond 4, water level readings from the southeast and southwest underdrains indicated a potential pond liner leak. A sample was collected from both underdrains and analyzed for chloride, alkalinity, conductivity, sodium, and sulfate. The results of these samples indicated that the concentration of the indicator analytes in the underdrains were similar to the pond contents. Based upon these results, it was determined that a liner leak potentially existed in Pond 4.

An email message notifying Mr. Burrows of the liner leak was sent at 3:17 pm on December 31, 2009 as required by Part B of the UIC Permit. This report provides analytical data, monitoring results, mitigative actions, and the results of those actions as required in the permit.

Upon confirmation of a liner leak, CBO began weekly sampling of the southwest and southeast underdrains. These samples were analyzed for alkalinity, chloride, sodium, conductivity, and sulfate. Attachment 1 contains copies of the Weekly Evaporation Pond Underdrain Analysis forms and the analytical results from the CBO laboratory. Samples were obtained on December 30, 2009, and January 7, 14, and 21, 2010.

In addition to weekly analysis of the underdrain, CBO obtained non-routine samples from pond monitor wells CPM-1 and CPM-2. CPM-1 and CPM-2 are completed in the first aquifer and are located downgradient of Pond 4 at the fenced restricted area boundary. The samples were obtained and analyzed for the indicator analytes on December 31, 2009 and January 7, 14, and 21, 2010, to

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ensure that there was no indication of leakage in the secondary liner. Analytical results were consistent with historical sampling results and are contained in Attachment 2.

Upon confirmation of the liner leak, CBO began attempting to lower the level of Pond 4 by pumping water to Pond 1. Concurrently, an immediate visual inspection of the pond liner was performed. These efforts were hampered by extremely cold temperatures in late December 2009 and early January 2010. Additionally, a 2-3 feet deep drift of crusted snow and ice on the west side of Pond 4 made access to the west liner difficult. Initial efforts to locate the leak were not successful. Transfer of water from Pond 4 to Pond 1 progressed slowly because the transfer line froze up due to the extreme cold. Underdrain readings on January 14, 2010, indicated that the water level in the pond was below the liner leak. On January 15, 2010, CBO staff identified a failing patch on the west southwest side of the liner. CBO is currently continuing to transfer water from Pond 4 to Pond 1 in order to lower the water level and allow access to the patch so repairs can be made. Colorado Linings has been contacted and plans to repair the leak during the first week of February, 2010, contingent upon weather conditions.

CBO will begin pumping the affected underdrains dry during the spring. The underdrains will be pumped dry and purged with clean water to lower the concentration of the indicator parameters. When this process is completed, a sample will be obtained and analyzed for the indicator analytes. If the concentrations remain elevated in the underdrains, the pond level will be lowered and inspections will be performed to determine whether there are other areas of potential liner leakage.

Attachment 3 contains copies of the Commercial Pond Inspection Forms for the period of December 31, 2009 to January 21, 2010. Weekly analysis of the underdrain contents will be continued until CBO is confident that all leaks have been located and repaired.

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If you have any questions or require any further information, please do not hesitate to call me at (308) 665-2215 ext 117.

Sincerely,  
CAMECO RESOURCES, CROW BUTTE OPERATION



Walter D. Nelson  
Environmental Leadership Coordinator

Enclosures: As Stated

cc: Mr. Joe Brister - CBO, Denver  
Mr. Ronald Burrows – Program Manager  
CBO File



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**Attachment 1**

**Pond 4 Underdrain Analysis**

31-Dec-09

SMLT

|                  | <u>Alk</u><br>mg/L | <u>Cl</u><br>mg/L | <u>Cond</u><br>µmhos | <u>SO<sub>4</sub></u><br>mg/L | <u>Na</u><br>mg/L |
|------------------|--------------------|-------------------|----------------------|-------------------------------|-------------------|
| Pond #4 Contents | 5100               | 95,498            | 176,300              | 4754                          | 59,994            |
| Pond #4 SE       | 4350               | 85,087            | 171,600              | 6227                          | 58,328            |
| Pond #4 SW       | 4588               | 87,746            | 172,900              | 5756                          | 66,660            |

7-Jan-10

SMLT

|           | <u>Alk</u><br>mg/L | <u>Cl</u><br>mg/L | <u>Cond</u><br>µmhos | <u>SO<sub>4</sub></u><br>mg/L | <u>Na</u><br>mg/L |
|-----------|--------------------|-------------------|----------------------|-------------------------------|-------------------|
| Pond 4 SE | 4250               | 85,619            | 172,000              | 6297                          | 57,570            |
| Pond 4 SW | 4375               | 86,860            | 173,400              | 5227                          | 59,388            |

14-Jan-10

SM/LT

|                  | <u>Alk</u><br>mg/L | <u>Cl</u><br>mg/L | <u>Cond</u><br>µmhos | <u>SO<sub>4</sub></u><br>mg/L | <u>Na</u><br>mg/L |
|------------------|--------------------|-------------------|----------------------|-------------------------------|-------------------|
| Pond #4 Contents | 4167               | 82,960            | 166,300              | 4407                          | 55,298            |
| Pond #4 SE       | 4167               | 90,760            | 171,700              | 6172                          | 60,600            |
| Pond #4 SW       | 4333               | 87,923            | 175,400              | 5564                          | 60,600            |

21-Jan-10

SMLT

|                  | <u>Alk</u><br>mg/L | <u>Cl</u><br>mg/L | <u>Cond</u><br>µmhos | <u>SO<sub>4</sub></u><br>mg/L | <u>Na</u><br>mg/L |
|------------------|--------------------|-------------------|----------------------|-------------------------------|-------------------|
| Pond #4 Contents | 4667               | 91,469            | 174,500              | 4619                          | 57,722            |
| Pond #4 SE       | 4334               | 92,887            | 172,900              | 6609                          | 57,722            |
| Pond #4 SW       | 4417               | 87,923            | 174,300              | 5731                          | 58,176            |



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**Attachment 2**

**Pond Monitor Well CPM-1 and CPM-2 Analysis**

12/31/09

SM/LT

|                                       | <u>Alk</u> | <u>Cl</u> | <u>Cond</u> | <u>SO<sub>4</sub></u> | <u>Na</u> |
|---------------------------------------|------------|-----------|-------------|-----------------------|-----------|
|                                       | mg/L       | mg/L      | umhos       | mg/L                  | mg/L      |
| <b>Commercial Pond<br/>Monitor #1</b> | 154        | 4.3       | 450         | 15                    | 14        |
| <b>Commercial Pond<br/>Monitor #2</b> | 154        | 5.0       | 420         | 14                    | 15        |

1/7/10

SMLT

|                                       | <u>Alk</u> | <u>Cl</u> | <u>Cond</u> | <u>SO<sub>4</sub></u> | <u>Na</u> |
|---------------------------------------|------------|-----------|-------------|-----------------------|-----------|
|                                       | mg/L       | mg/L      | umhos       | mg/L                  | mg/L      |
| <b>Commercial Pond<br/>Monitor #1</b> | 202        | 5.6       | 440         | 14                    | 16        |
| <b>Commercial Pond<br/>Monitor #2</b> | 186        | 5.7       | 420         | 15                    | 14        |

1/14/10

SM/LT

|                                       | <u>Alk</u> | <u>Cl</u> | <u>Cond</u> | <u>SO<sub>4</sub></u> | <u>Na</u> |
|---------------------------------------|------------|-----------|-------------|-----------------------|-----------|
|                                       | mg/L       | mg/L      | umhos       | mg/L                  | mg/L      |
| <b>Commercial Pond<br/>Monitor #1</b> | 200        | 5.6       | 440         | 14                    | 16        |
| <b>Commercial Pond<br/>Monitor #2</b> | 184        | 5.8       | 420         | 14                    | 15        |

1/21/10

SMLT

|                                       | <u>Alk</u> | <u>Cl</u> | <u>Cond</u> | <u>SO<sub>4</sub></u> | <u>Na</u> |
|---------------------------------------|------------|-----------|-------------|-----------------------|-----------|
|                                       | mg/L       | mg/L      | umhos       | mg/L                  | mg/L      |
| <b>Commercial Pond<br/>Monitor #1</b> | 201        | 5.7       | 440         | 14                    | 15        |
| <b>Commercial Pond<br/>Monitor #2</b> | 185        | 5.8       | 420         | 15                    | 14        |

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**Attachment 3**

**Commercial Pond Inspection Forms**

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12/31

**CROW BUTTE RESOURCES, INC.**  
**WEEKLY EVAPORATION POND UNDERDRAIN ANALYSIS**

| COMMERCIAL PONDS              | UNDERDRAIN WATER DEPTH / INCHES | METER READING  | TEMP °C | CONDUCTIVITY µmhos/cm | LAB RESULTS µmhos/cm |
|-------------------------------|---------------------------------|----------------|---------|-----------------------|----------------------|
| Depth = 17 feet<br>POND # 1   | POND LEVEL                      | * Snow Covered |         |                       |                      |
|                               | *FREEBOARD                      |                |         |                       |                      |
|                               | NE UNDERDRAIN                   | 0              |         |                       |                      |
|                               | NM UNDERDRAIN                   | 0              |         |                       |                      |
|                               | NW UNDERDRAIN                   | 1              |         |                       |                      |
|                               | SE UNDERDRAIN                   | 0              |         |                       |                      |
|                               | SM UNDERDRAIN                   | 0              |         |                       |                      |
|                               | SW UNDERDRAIN                   | 4              |         |                       |                      |
| Depth = 17.5 feet<br>POND # 3 | POND LEVEL                      | * Snow Covered |         |                       |                      |
|                               | *FREEBOARD                      |                |         |                       |                      |
|                               | NE UNDERDRAIN                   | 3              |         |                       |                      |
|                               | NM UNDERDRAIN                   | 5              |         |                       |                      |
|                               | NW UNDERDRAIN                   | 0              |         |                       |                      |
|                               | SE UNDERDRAIN                   | 0              |         |                       |                      |
|                               | SM UNDERDRAIN                   | 1              |         |                       |                      |
|                               | SW UNDERDRAIN                   | 3              |         |                       |                      |
| Depth = 17.5 feet<br>POND # 4 | POND LEVEL                      | * Snow Covered |         |                       |                      |
|                               | *FREEBOARD                      |                |         |                       |                      |
|                               | NE UNDERDRAIN                   | 16             | 91.4 ms | 2.4                   |                      |
|                               | NM UNDERDRAIN                   | 15             | 73.4 ms | 6.1                   |                      |
|                               | NW UNDERDRAIN                   | 18             | 91.5 ms | 0.7                   |                      |
|                               | SE UNDERDRAIN                   | 33             | 90.9 ms | 0.9                   |                      |
|                               | SM UNDERDRAIN                   | 11             | 59.6 ms | 4.6                   |                      |
|                               | SW UNDERDRAIN                   | 46             | 93.0 ms | 0.0                   |                      |

|  |
|--|
| <b>R &amp; D POND LEVELS (Depth = 15 ft)</b> |
| EAST LEVEL: * Snow Covered                   |
| **EAST FREEBOARD:                            |
| EAST UNDERDRAIN: 4"                          |
| WEST LEVEL: * Snow Covered                   |
| **WEST FREEBOARD:                            |
| WEST UNDERDRAIN: 0"                          |

|                                       |
|---------------------------------------|
| REMARKS: SNOW ON ALL LINES            |
|                                       |
|                                       |
| *COMMERCIAL POND FREEBOARD = 5 FT MAX |
| ** R&D POND FREEBOARD = 3 FT MAX      |
| SAMPLER: B. Bass / R. Pelton          |
| DATE: 12/31/09                        |

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1/7

## CROW BUTTE RESOURCES, INC. WEEKLY EVAPORATION POND UNDERDRAIN ANALYSIS

| COMMERCIAL PONDS                     | UNDERDRAIN WATER DEPTH / INCHES | METER READING   | TEMP °C | CONDUCTIVITY µmhos/cm | LAB RESULTS µmhos/cm |
|--------------------------------------|---------------------------------|-----------------|---------|-----------------------|----------------------|
| Depth = 17 feet<br><b>POND # 1</b>   | POND LEVEL                      | * snow on liner |         |                       |                      |
|                                      | *FREEBOARD                      |                 |         |                       |                      |
|                                      | NE UNDERDRAIN                   | 0               |         |                       |                      |
|                                      | NM UNDERDRAIN                   | 0               |         |                       |                      |
|                                      | NW UNDERDRAIN                   | 1               |         |                       |                      |
|                                      | SE UNDERDRAIN                   | 0               |         |                       |                      |
|                                      | SM UNDERDRAIN                   | 0               |         |                       |                      |
|                                      | SW UNDERDRAIN                   | 4               |         |                       |                      |
| Depth = 17.5 feet<br><b>POND # 3</b> | POND LEVEL                      | * snow on liner |         |                       |                      |
|                                      | *FREEBOARD                      |                 |         |                       |                      |
|                                      | NE UNDERDRAIN                   | 2               |         |                       |                      |
|                                      | NM UNDERDRAIN                   | 2               |         |                       |                      |
|                                      | NW UNDERDRAIN                   | 0               |         |                       |                      |
|                                      | SE UNDERDRAIN                   | 0               |         |                       |                      |
|                                      | SM UNDERDRAIN                   | 0               |         |                       |                      |
|                                      | SW UNDERDRAIN                   | 3               |         |                       |                      |
| Depth = 17.5 feet<br><b>POND # 4</b> | POND LEVEL                      | 5.9             |         |                       |                      |
|                                      | *FREEBOARD                      | 11.6            |         |                       |                      |
|                                      | NE UNDERDRAIN                   | 17              | 90.2 ms | 1.9                   |                      |
|                                      | NM UNDERDRAIN                   | 14              | 71.4 ms | 4.8                   |                      |
|                                      | NW UNDERDRAIN                   | 23              | 91.4 ms | -2.5                  |                      |
|                                      | SE UNDERDRAIN                   | 40              | 86.4 ms | -1.5                  |                      |
|                                      | SM UNDERDRAIN                   | 15              | 93.2 ms | 4.0                   |                      |
|                                      | SW UNDERDRAIN                   | 63              | 91.6 ms | -1.5                  |                      |

  

|   |   |
|---|---|
| <p style="text-align: center;"><b>R &amp; D POND LEVELS (Depth = 15 ft)</b></p> <p>EAST LEVEL: *</p> <p>**EAST FREEBOARD:</p> <p>EAST UNDERDRAIN: 4</p> <p>WEST LEVEL: *</p> <p>**WEST FREEBOARD:</p> <p>WEST UNDERDRAIN: 0</p> | <p><b>REMARKS:</b></p> <hr/> <p>*COMMERCIAL POND FREEBOARD = 5 FT MAX</p> <p>** R&amp;D POND FREEBOARD = 3 FT MAX</p> <p>SAMPLER: Bass / Pelton</p> <p>DATE: 1/7/10</p> |
|---|---|

W.D.  
11/4/07

**CROW BUTTE RESOURCES, INC.**  
**WEEKLY EVAPORATION POND UNDERDRAIN ANALYSIS**

| COMMERCIAL PONDS  |          | UNDERDRAIN WATER DEPTH / INCHES | METER READING | TEMP °C | CONDUCTIVITY µmhos/cm | LAB RESULTS µmhos/cm |
|-------------------|----------|---------------------------------|---------------|---------|-----------------------|----------------------|
| Depth = 17 feet   | POND # 1 | POND LEVEL                      | *10.3'        |         |                       |                      |
|                   |          | *FREEBOARD                      | 6.7'          |         |                       |                      |
|                   |          | NE UNDERDRAIN                   | 0             |         |                       |                      |
|                   |          | NM UNDERDRAIN                   | 0             |         |                       |                      |
|                   |          | NW UNDERDRAIN                   | 0             |         |                       |                      |
|                   |          | SE UNDERDRAIN                   | 0             |         |                       |                      |
|                   |          | SM UNDERDRAIN                   | 0             |         |                       |                      |
|                   |          | SW UNDERDRAIN                   | 1             |         |                       |                      |
| Depth = 17.5 feet | POND # 3 | POND LEVEL                      | *             |         |                       |                      |
|                   |          | *FREEBOARD                      |               |         |                       |                      |
|                   |          | NE UNDERDRAIN                   | 0             |         |                       |                      |
|                   |          | NM UNDERDRAIN                   | 0             |         |                       |                      |
|                   |          | NW UNDERDRAIN                   | 0             |         |                       |                      |
|                   |          | SE UNDERDRAIN                   | 0             |         |                       |                      |
|                   |          | SM UNDERDRAIN                   | 0             |         |                       |                      |
|                   |          | SW UNDERDRAIN                   | 4             |         |                       |                      |
| Depth = 17.5 feet | POND # 4 | POND LEVEL                      | 5.7'          |         |                       |                      |
|                   |          | *FREEBOARD                      | 11.9'         |         |                       |                      |
|                   |          | NE UNDERDRAIN                   | 19            | 88.7 ms | 2.0                   |                      |
|                   |          | NM UNDERDRAIN                   | 14            | 70.1 ms | 4.6                   |                      |
|                   |          | NW UNDERDRAIN                   | 21            | 89.8 ms | 2.1                   |                      |
|                   |          | SE UNDERDRAIN                   | 40            | 87.3 ms | 2.4                   |                      |
|                   |          | SM UNDERDRAIN                   | 15            | 92.2 ms | 3.0                   |                      |
|                   |          | SW UNDERDRAIN                   | 65            | 89.2 ms | 1.4                   |                      |

| R & D POND LEVELS (Depth = 15 ft) |   |
|-----------------------------------|---|
| EAST LEVEL:                       | * |
| **EAST FREEBOARD:                 |   |
| EAST UNDERDRAIN:                  | 4 |
| WEST LEVEL:                       | * |
| **WEST FREEBOARD:                 |   |
| WEST UNDERDRAIN:                  | 0 |

|                                       |
|---------------------------------------|
| REMARKS: * Frozen                     |
|                                       |
|                                       |
| *COMMERCIAL POND FREEBOARD = 5 FT MAX |
| ** R&D POND FREEBOARD = 3 FT MAX      |
| SAMPLER: Bass-Pelton                  |
| DATE: 1-14-10                         |

11/21/10

**CROW BUTTE RESOURCES, INC.**  
**WEEKLY EVAPORATION POND UNDERDRAIN ANALYSIS**

| COMMERCIAL PONDS  |          | UNDERDRAIN WATER DEPTH / INCHES | METER READING           | TEMP °C | CONDUCTIVITY µmhos/cm | LAB RESULTS µmhos/cm |  |
|-------------------|----------|---------------------------------|-------------------------|---------|-----------------------|----------------------|--|
| Depth = 17 feet   | POND # 1 | POND LEVEL                      | 10.8 * Frozen           |         |                       |                      |  |
|                   |          | *FREEBOARD                      | 6.2                     |         |                       |                      |  |
|                   |          | NE UNDERDRAIN                   | 0                       |         |                       |                      |  |
|                   |          | NM UNDERDRAIN                   | 0                       |         |                       |                      |  |
|                   |          | NW UNDERDRAIN                   | 2                       |         |                       |                      |  |
|                   |          | SE UNDERDRAIN                   | 0                       |         |                       |                      |  |
|                   |          | SM UNDERDRAIN                   | 0                       |         |                       |                      |  |
|                   |          | SW UNDERDRAIN                   | 4                       |         |                       |                      |  |
| Depth = 17.5 feet | POND # 3 | POND LEVEL                      | * snow covered / frozen |         |                       |                      |  |
|                   |          | *FREEBOARD                      |                         |         |                       |                      |  |
|                   |          | NE UNDERDRAIN                   | 0                       |         |                       |                      |  |
|                   |          | NM UNDERDRAIN                   | 0                       |         |                       |                      |  |
|                   |          | NW UNDERDRAIN                   | 0                       |         |                       |                      |  |
|                   |          | SE UNDERDRAIN                   | 0                       |         |                       |                      |  |
|                   |          | SM UNDERDRAIN                   | 0                       |         |                       |                      |  |
|                   |          | SW UNDERDRAIN                   | 2                       |         |                       |                      |  |
| Depth = 17.5 feet | POND # 4 | POND LEVEL                      | 5.2                     |         |                       |                      |  |
|                   |          | *FREEBOARD                      |                         |         |                       |                      |  |
|                   |          | NE UNDERDRAIN                   | 20                      | 89.6 ms | -1.3                  |                      |  |
|                   |          | NM UNDERDRAIN                   | 14                      | 69.3 ms | 3.0                   |                      |  |
|                   |          | NW UNDERDRAIN                   | 20                      | 62.8 ms | -0.2                  |                      |  |
|                   |          | SE UNDERDRAIN                   | 37                      | 88.3 ms | -2.0                  |                      |  |
|                   |          | SM UNDERDRAIN                   | 15                      | 91.1 ms | 2.7                   |                      |  |
|                   |          | SW UNDERDRAIN                   | 56                      | 89.6 ms | -0.7                  |                      |  |

|  |
|--|
| <b>R &amp; D POND LEVELS (Depth = 15 ft)</b> |
| EAST LEVEL: <i>Frozen</i>                    |
| **EAST FREEBOARD:                            |
| EAST UNDERDRAIN: <i>4"</i>                   |
| WEST LEVEL: <i>Frozen</i>                    |
| **WEST FREEBOARD:                            |
| WEST UNDERDRAIN: <i>0</i>                    |

|   |
|---|
| REMARKS: <i>R. Pelton R &amp; D Ponds</i> |
| <i>B. Bass Commercial Ponds</i>           |
| *COMMERCIAL POND FREEBOARD = 5 FT MAX     |
| ** R&D POND FREEBOARD = 3 FT MAX          |
| SAMPLER: <i>Pass</i>                      |
| DATE: <i>1/21/10</i>                      |