

# CROW BUTTE RESOURCES, INC.

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February 18, 2005

Mr. Dwight Chamberlain, Director  
Division of Nuclear Material Safety  
Region IV  
United States Nuclear Regulatory Commission  
611 Ryan Plaza Drive, Suite 400  
Arlington, Texas 76011

FEB 23 2005

Subject: Semiannual Radiological Effluent and Environmental Monitoring Report  
Source Materials License No. SUA-1534, Docket No. 40-8943

Dear Mr. Chamberlain:

Enclosed please find one copy of the Semiannual Radiological Effluent and Environmental Monitoring Report for the Crow Butte Uranium Project. The report is provided in accordance with License Condition 12.1 of Source Materials License SUA-1534 and 10 CFR Part 40. This report covers the third and fourth quarters of 2004.

If you have any questions concerning the report, please feel free to call me at (308) 665-2215.

Sincerely,  
CROW BUTTE RESOURCES, INC.

Michael L. Griffin  
Manager of Health, Safety, and Environmental Affairs

c: Mr. Gary Janosko  
Branch Chief, Fuel Cycle Licensing Branch  
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**CROW BUTTE URANIUM PROJECT**  
**RADIOLOGICAL EFFLUENT**  
**AND**  
**ENVIRONMENTAL MONITORING**  
**REPORT**

**for**

**THIRD AND FOURTH QUARTERS, 2004**

**USNRC Source Materials License SUA 1534**



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## **1 WATER QUALITY MONITORING DATA**

### **1.1 Excursion Monitoring**

Biweekly excursion monitoring in the shallow aquifer and perimeter monitor wells was continued in Mine Units 1 through 9 during the third and fourth quarters of 2004.

PR-8 and IJ-13 remain on excursion status. Excursion reports have been submitted as required in License Condition 12.2. Complete excursion monitoring results are available on site for inspection.

### **1.2 Water Supply Wells and Surface Water**

Summary sheets of quarterly radiological analytical data for the reporting period from all surface waters and water supply wells within one kilometer of the active wellfield boundary are included in Appendix A.

The reported radiological data are within the expected ranges for each well or stream. Samples were obtained from all sample locations with the exceptions noted in Appendix A.

## **2 OPERATIONAL**

### **2.1 Production Data Summary**

Mining operations continued through the third and fourth quarters of 2004. The average operating production flow rate was 4,262 gpm for the third quarter and 4,364 gpm for the fourth quarter. The average production flow for the second half of 2004 was 4,313 gpm. Injection and production totals from the totalizers and the calculated bleed totals for the reporting period are included in Appendix B.

The main injection trunkline is equipped with a continuous pressure sensor. The average and maximum injection pressures for each wellhouse are included in Appendix C in the Wellfield Injection Pressure table.



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### **2.2 Wastewater Summary**

The total volume of wastewater discharged to the ponds was 2,168,180 gallons during the third quarter and 2,357,500 gallons during the fourth quarter. Currently, all five evaporation ponds contain wastewater.

Wastewater that is not disposed of in the evaporation ponds is injected into the Deep Disposal Well (DDW). Currently, the well is operated on a continuous basis and 19,334,418 gallons of wastewater was injected into the well during the second half of 2004. A summary of the total volume of wastewater injected and the average radionuclide content is contained in Appendix D.

### **2.3 Effluent Release**

10 CFR §40.65 requires licensees to report quantities of radionuclides in liquid and gaseous effluent releases to the environment. In the Application for Renewal of Source Materials License SUA-1534, submitted December 1995, Table 7.3(A) presented calculations of the annual radon emissions for the Crow Butte Plant. These calculations assumed a  $7.04 \times 10^{-4}$  Curies/m<sup>3</sup> radon release from leaching operations and the radon release calculations for the second half of 2004 use this release rate estimate.

During the third quarter production occurred at an average flow rate of 4,262 gpm (16,133 lpm). Production was maintained nearly continuously for 92 days during the third quarter with an operating factor of 99.3%. The production flow for the third quarter results in a calculated radon release of 1,076 Curies. During the fourth quarter production occurred at an average flow rate of 4,364 gpm (16,520 lpm). Production was maintained nearly continuously for 91 days during the fourth quarter with an operating factor of 99.7%. The production flow for the fourth quarter results in a calculated radon release of 1,094 Curies. Calculations for radon release from production operations are shown in Appendix E.

Additional wells were brought on line during the second half of 2004. Calculations for the start-up of 13.7 acres of a new wellfield are shown in Appendix E. The calculated radon released from start-up of 13.7 acres is 17 Curies.

The total radon emission due to leaching operations from the Crow Butte plant for the second half of 2004 was 2,187 Curies. This calculated release rate is comparable with the releases estimated in CBR's License Renewal Application.

Radon gas is also released from restoration activities. For restoration water that is treated by ion exchange only, the radon concentration is 0.697  $\mu$ Ci/l. Of the total restoration production flow it is assumed that 25% of the radon is released through wellfield loss and 10% of the remaining radon is released during pressurized ion exchange treatment. For water that is treated by reverse osmosis, it



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is assumed that 100% of the remaining radon is released. For water treated by reverse osmosis the radon concentration is 0.470  $\mu\text{Ci/l}$  after adjusting for wellfield loss and ion exchange loss.

During the second half of 2004, a total of 149,836,804 gallons (567,194,004 l) of restoration water was produced from Mine Units 2, 3 and 4. Based upon an estimated radon concentration of 0.697  $\mu\text{Ci/l}$ , the total amount of radon in the restoration solution was calculated to be 395 Curies as shown in Appendix E. The estimated release of radon through wellfield loss at 25% of this total was 99 Curies. The plant loss for ion exchange treatment of the restoration water is estimated at 10% of the remaining radon, or 30 Curies.

Of the total amount of restoration water produced in the second half of 2004, 40,742,104 gallons (154,225,641 l) of the water was treated by reverse osmosis. The release of radon from reverse osmosis treatment is estimated to be 100% of the remaining radon, after correction for wellfield and ion exchange losses. These corrections result in an estimated radon concentration of 0.470  $\mu\text{Ci/l}$ . The total estimated radon release from reverse osmosis treatment was 72 Curies. An additional 2.8 acres of wellfields were placed in restoration during the second half of 2004. The calculated radon released from start-up of 2.8 acres is 4 Curies. Calculations for the start-up of 2.8 acres of a wellfield placed in restoration are shown in Appendix E.

Based upon the calculations shown in Appendix E, the total estimated semiannual radon emission for the second half of 2004 from restoration activities was 205 Curies. This resulted in a total estimated radon release from the Crow Butte project during the second half of 2004 of 2,392 Curies.

### **2.4 Restoration**

Restoration activities continued in Mine Units 2, 3, and 4 during the second half of 2004. Restoration injection and production totals are included in Appendix B. Restoration injection pressures are included in Appendix C.

## **3 ENVIRONMENTAL MONITORING**

### **3.1 Air Monitor Stations**

Seven air monitoring stations are used to monitor the Crow Butte Plant. Ambient radon-222 concentrations and radionuclide concentrations in air for each monitoring site are listed in Appendix F. All air monitoring results were within expected historical ranges.

In the Semiannual Radiological Effluent and Environmental Monitoring Report for the second half of 2003, it was noted that the radon-222 results from three stations (AM-1, AM-2, and AM-8) were



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elevated above concentrations that are normally present. In that report, CBR noted that there was no identifiable cause for these elevated concentrations from licensed operations and that one possible cause for the anomalous results from the second half of 2003 was sampling or analytical error. In order to monitor this possibility, CBR deployed duplicate monitors at six stations for the second half of 2004 for comparison of results. In the initial analytical results provided by Landauer, Inc., the results from several stations were elevated and did not correlate well to the results from the duplicate monitors. CBR requested that Landauer reanalyze all monitors from the second half of 2004. The results of the reanalysis resulted in changes in reported values ranging from 0 percent to over 120 percent. Landauer suggested that the variance in the reported values was principally due to a routine quarterly update of the background track density for manufacturing lots. The repeat analysis was performed after the background update and in all cases where the reanalysis resulted in a change, the reported values were lower and were consistent with historical concentrations. It is possible that a similar situation was the cause of the higher concentrations noted in the second half of 2003. CBR will continue to place duplicate monitors at six stations through 2005 to determine the accuracy of the monitoring method.

### **3.2 TLD Monitors**

Environmental TLD monitors are located at each air monitoring station. The results of the area TLD monitors fall within the expected ranges and are listed in Appendix G.

### **3.3 Stream Sediments**

Sediment samples are collected from two locations on Squaw Creek and two locations on English Creek on an annual basis in October. The results of sediment sampling are included in Appendix H.

## **Appendix A**

### **Private Well and Surface Water Radiological Monitoring Results**

**Third and Fourth Quarter, 2004**



**CROW BUTTE RESOURCES, INC.**

**PRIVATE WELL AND SURFACE WATER RADIOLOGICAL MONITORING RESULTS**

**THIRD QUARTER, 2004**

| <b>SAMPLE ID</b>       | <b>DATE SAMPLED</b>                   | <b>URANIUM mg/l</b> | <b>URANIUM <math>\mu</math>Ci/ml</b> | <b>RADIUM-226 pCi/l</b> | <b>RADIUM-226 precision <math>\pm</math></b> |
|------------------------|---------------------------------------|---------------------|--------------------------------------|-------------------------|--|
| Well #8                | 7/29/04                               | 0.0132              | 9.09E-09                             | ND                      | -  |
| Well #11               | 7/30/04                               | 0.0085              | 5.89E-09                             | ND                      | -  |
| Well #12               | 7/29/04                               | 0.0036              | 2.50E-09                             | ND                      | -  |
| Well #19               | SAMPLING DISCONTINUED-WELL NOT IN USE |                     |                                      |                         |  |
| Well #24               | 8/11/04                               | 0.0047              | 3.20E-09                             | ND                      | -  |
| Well #25               | 7/30/04                               | 0.0053              | 3.60E-09                             | ND                      | -  |
| Well #26               | 7/30/04                               | 0.0071              | 4.80E-09                             | ND                      | -  |
| Well #27               | 7/30/04                               | 0.0073              | 5.00E-09                             | ND                      | -  |
| Well #28               | 7/29/04                               | 0.0057              | 3.80E-09                             | ND                      | -  |
| Well #41               | WELL INOPERABLE-NO SAMPLE COLLECTED   |                     |                                      |                         |  |
| Well #63               | 8/11/04                               | 0.0164              | 1.10E-08                             | ND                      | -  |
| Well #125              | 7/30/04                               | 0.0069              | 4.70E-09                             | ND                      | -  |
| Well #129              | 7/29/04                               | 0.0073              | 5.00E-09                             | ND                      | -  |
| Well #131              | 7/30/04                               | 0.0047              | 3.20E-09                             | ND                      | -  |
| Well #133              | 7/30/04                               | 0.0085              | 5.80E-09                             | ND                      | -  |
| Well #134              | 7/28/04                               | 0.0097              | 6.60E-09                             | ND                      | -  |
| Well #135              | 7/28/04                               | 0.0174              | 1.28E-08                             | ND                      | -  |
| Well #138              | 7/30/04                               | 0.0178              | 1.20E-08                             | ND                      | -  |
| Well #140              | 8/9/04                                | 0.0096              | 6.50E-09                             | ND                      | -  |
| Drinking Water Well    | 7/30/04                               | 0.0074              | 5.00E-09                             | ND                      | -  |
|                        |                                       |                     |                                      |                         |  |
| Stream S-1             | 7/29/04                               | 0.0034              | 2.30E-09                             | ND                      | -  |
| Stream S-2             | 7/29/04                               | 0.0034              | 2.30E-09                             | ND                      | -  |
| Stream S-5             | 7/29/04                               | 0.0044              | 3.00E-09                             | ND                      | -  |
| Stream E-1             | 7/28/04                               | 0.0129              | 8.70E-09                             | ND                      | -  |
| Stream E-5             | 7/28/04                               | 0.0024              | 1.69E-09                             | ND                      | -  |
|                        |                                       |                     |                                      |                         |  |
| Impoundment I-3        | 7/28/04                               | 0.0133              | 9.00E-09                             | ND                      | -  |
| Impoundment I-4        | 7/28/04                               | 0.0091              | 6.20E-09                             | ND                      | -  |
|                        |                                       |                     |                                      |                         |  |
| <b>Reporting Limit</b> |                                       | <b>0.0003</b>       | <b>2.00E-10</b>                      | <b>0.2</b>              | -  |

ND-Not detected at the reporting limit

**CROW BUTTE RESOURCES, INC.**

**PRIVATE WELL AND SURFACE WATER RADIOLOGICAL MONITORING RESULTS**

**FOURTH QUARTER, 2004**

| <b>SAMPLE ID</b>       | <b>DATE SAMPLED</b>                        | <b>URANIUM mg/l</b> | <b>URANIUM <math>\mu</math>Ci/ml</b> | <b>RADIUM-226 pCi/l</b> | <b>RADIUM-226 precision <math>\pm</math></b> |
|------------------------|--|---------------------|--------------------------------------|-------------------------|--|
| Well #8                | 11/1/04                                    | 0.0120              | 8.00E-09                             | 0.4                     | 0.2  |
| Well #11               | 10/29/04                                   | 0.0069              | 4.70E-09                             | 0.3                     | 0.2  |
| Well #12               | 11/1/04                                    | 0.0035              | 2.40E-09                             | 0.4                     | 0.2  |
| Well #24               | 10/29/04                                   | 0.0038              | 2.60E-09                             | ND                      | -  |
| Well #25               | 10/29/04                                   | 0.0045              | 3.00E-09                             | 0.3                     | 0.2  |
| Well #26               | 10/29/04                                   | 0.0062              | 4.20E-09                             | 0.3                     | 0.2  |
| Well #27               | 10/28/04                                   | 0.0058              | 3.90E-09                             | 0.3                     | 0.2  |
| Well #28               | 11/1/04                                    | 0.0054              | 3.70E-09                             | 0.4                     | 0.2  |
| Well #41               | <b>WELL INOPERABLE-NO SAMPLE COLLECTED</b> |                     |                                      |                         |  |
| Well #63               | 11/15/04                                   | 0.0150              | 1.00E-08                             | 0.2                     | 0.2  |
| Well #125              | 10/29/04                                   | 0.0060              | 4.00E-09                             | ND                      | -  |
| Well #129              | 11/15/04                                   | 0.0071              | 4.80E-09                             | ND                      | -  |
| Well #131              | 10/29/04                                   | 0.0039              | 2.60E-09                             | 0.4                     | 0.2  |
| Well #133              | 10/29/04                                   | 0.0076              | 5.10E-09                             | 0.4                     | 0.2  |
| Well #134              | 11/15/04                                   | 0.0087              | 5.90E-09                             | 0.3                     | 0.2  |
| Well #135              | 11/15/04                                   | 0.0170              | 1.10E-08                             | ND                      | -  |
| Well #138              | 11/17/04                                   | 0.0150              | 1.00E-08                             | 0.4                     | 0.3  |
| Well #140              | 11/1/04                                    | 0.0091              | 6.20E-09                             | 0.3                     | 0.2  |
| Drinking Water Well    | 11/15/04                                   | 0.0060              | 4.10E-09                             | ND                      | -  |
| Stream S-1             | 11/15/04                                   | 0.0033              | 2.20E-09                             | ND                      | -  |
| Stream S-2             | 11/8/04                                    | 0.0033              | 2.30E-09                             | ND                      | -  |
| Stream S-5             | 11/8/04                                    | 0.0038              | 2.60E-09                             | ND                      | -  |
| Stream E-1             | 11/8/04                                    | 0.0096              | 6.50E-09                             | 0.6                     | 0.3  |
| Stream E-5             | 11/8/04                                    | 0.0054              | 3.60E-09                             | 3.00E-01                | 2.00E-01                                     |
| Impoundment I-3        | 11/8/04                                    | 0.0110              | 7.40E-09                             | ND                      | -  |
| Impoundment I-4        | 11/8/04                                    | 0.0097              | 6.60E-09                             | 4.00E-01                | 2.00E-01                                     |
| <b>Reporting Limit</b> |  | <b>0.0003</b>       | <b>2.00E-10</b>                      | <b>0.2</b>              | <b>-</b>                                     |

ND-Not detected at the reporting limit

## **Appendix B**

### **Plant Production and Waste Totals**

**Third and Fourth Quarter, 2004**

| WASTE VOLUME<br>Third Quarter 2004 |                 |              |                    |                        |                    |                |
|------------------------------------|-----------------|--------------|--------------------|------------------------|--------------------|----------------|
| TOTALIZER                          | PLANT TO POUNDS | PLANT TO DDW | RESTORATION TO DDW | CLEAN WATER INTO PLANT | DDW TOTAL INJECTED | TRUCKS TO POND |
| July                               | 860,080         | 699,032      | 2,349,175          | 568,552                | 3,048,207          | 2,150          |
| August                             | 641,180         | 1,069,274    | 2,267,858          | 475,151                | 3,327,132          | 23,150         |
| September                          | 664,920         | 742,566      | 2,394,610          | 412,024                | 3,137,176          | 52,800         |
| TOTAL GAL. EOQ                     | 2,166,180       | 2,500,872    | 7,011,643          | 1,455,727              | 9,512,515          | 78,100         |

|   |                    |
|---|--------------------|
| TOTAL 3rd QTR VOLUME DISCHARGED TO WASTE PONDS =          | 2,166,180 GALLONS  |
| TOTAL 3rd QTR VOLUME DISCHARGED TO DEEP WELL =            | 9,512,515 GALLONS  |
| TOTAL 3rd QTR VOLUME DISCHARGED TO WASTE PONDS + DPWELL = | 11,678,695 GALLONS |
| TOTAL 3rd QTR VOLUME WF BLEED FROM WELLFIELDS =           | 10,222,988 GALLONS |

| WELLFIELD BLEED    |      |        |           |
|--------------------|------|--------|-----------|
| Third Quarter 2004 |      |        |           |
| MONTH              | July | August | September |
| BLEED              | 0.5% | 0.6%   | 0.5%      |

| PLANT FLOW                   |                         |
|------------------------------|-------------------------|
| Third Quarter 2004           |                         |
| AVERAGE OPERATING FLOW RATE= | 4,262 GPM EOQ           |
| TOTAL GALLONS PRODUCED=      | 564,576,286 GALLONS EOQ |
| TOTAL GALLONS INJECTED=      | 545,551,784 GALLONS EOQ |

|           | TOTAL GALS. PRODUCED | TOTAL GALS. INJECTED | HOURS IN MONTH | HOURS IN PRODUCTION | AVERAGE PROD. GPM | AVERAGE COM INJ GPM | AVERAGE REST INJ GPM | HRS. DOWN TIME |
|-----------|----------------------|----------------------|----------------|---------------------|-------------------|---------------------|----------------------|----------------|
| Prev. YTD | 1,102,328,940        | 1,060,215,508        | 4,368          | 4,349               |                   |                     |                      | 16             |
| July      | 188,033,969          | 180,430,455          | 744            | 736                 | 4,212             | 4,042               | 440                  | 8              |
| August    | 191,855,835          | 185,166,959          | 744            | 736                 | 4,298             | 4,148               | 473                  | 8              |
| September | 184,686,481          | 179,954,370          | 720            | 720                 | 4,275             | 4,166               | 460                  | 0              |
| EOQ TOTAL | 564,576,286          | 545,551,784          | 2,208          | 2,192               | 4,262             | 4,118               | 458                  | 16             |
| YTD TOTAL | 1,666,905,226        | 1,595,767,292        | 6,576          | 6,541               | 4,225             | 4,044               | 374                  | 32             |

|           | TOTAL MUH | TOTAL MUHII | TOTAL MUUV | TOTAL BRINE | TOTAL PERM | COMM BLEED TO RO FEED | MUHH BLEED TO DDW |
|-----------|-----------|-------------|------------|-------------|------------|-----------------------|-------------------|
| Prev. YTD | 577,168   | 59,522,187  | 45,664,740 | 5,602,055   | 22,071,936 | 2,308,667             | 3,920,882         |
| July      | 273,825   | 10,611,041  | 12,941,428 | 1,951,936   | 6,802,420  | 1,191                 | 397,239           |
| August    | 514,411   | 9,942,836   | 15,267,494 | 1,914,089   | 5,293,264  | 9,292                 | 353,769           |
| September | 483,788   | 9,285,600   | 15,148,720 | 895,697     | 4,395,807  | 10,000                | 1,498,913         |
| EOQ TOTAL | 1,272,024 | 29,839,477  | 43,357,642 | 4,761,722   | 16,491,491 | 20,483                | 2,249,921         |
| YTD TOTAL | 1,849,192 | 89,361,664  | 89,022,382 | 10,363,777  | 38,563,427 | 2,329,150             | 6,170,803         |

**WASTE VOLUME**  
Fourth Quarter 2004

| TOTALIZER      | PLANT TO POUNDS | PLANT TO DDW | RESTORATION TO DDW | CLEAN WATER INTO PLANT | DDW TOTAL INJECTED | TRUCKS TO POND |
|----------------|-----------------|--------------|--------------------|------------------------|--------------------|----------------|
| October        | 772,560         | 989,698      | 2,263,701          | 460,336                | 3,253,399          | 124,700        |
| November       | 679,790         | 679,541      | 2,503,781          | 450,123                | 3,183,322          | 78,400         |
| December       | 905,150         | 631,658      | 2,753,524          | 492,905                | 3,385,182          | 54,925         |
| TOTAL GAL. EOQ | 2,357,500       | 2,300,897    | 7,521,006          | 1,403,364              | 9,821,903          | 258,025        |

TOTAL 4th QTR VOLUME DISCHARGED TO WASTE PONDS = 2,357,500 GALLONS

TOTAL 4th QTR VOLUME DISCHARGED TO DEEP WELL = 9,821,903 GALLONS

TOTAL 4th QTR VOLUME DISCHARGED TO WASTE PONDS + DPWELL = 12,179,403 GALLONS

TOTAL 4th QTR VOLUME WF BLEED FROM WELLFIELDS = 10,776,039 GALLONS

**WELLFIELD BLEED**

| Fourth Quarter 2004 |         |          |          |
|---------------------|---------|----------|----------|
| MONTH               | October | November | December |
| BLEED               | 0.7%    | 0.5%     | 0.5%     |

**PLANT FLOW**

|                               |               |             |
|-------------------------------|---------------|-------------|
| Fourth Quarter 2004           |               |             |
| AVERAGE OPERATING FLOW RATE = | 4,364 GPM EOQ |             |
| TOTAL GALLONS PRODUCED =      | 578,101,962   | GALLONS EOQ |
| TOTAL GALLONS INJECTED =      | 554,581,817   | GALLONS EOQ |

|           | TOTAL GALS. PRODUCED | TOTAL GALS. INJECTED | HOURS IN MONTH | HOURS IN PRODUCTION | AVERAGE PROD. GPM | AVERAGE COM INJ GPM | AVERAGE REST INJ GPM | HRS. DOWN TIME |
|-----------|----------------------|----------------------|----------------|---------------------|-------------------|---------------------|----------------------|----------------|
| Prev. YTD | 1,666,905,226        | 1,585,767,292        | 6,576          | 6,541               |                   |                     |                      | 40             |
| October   | 191,801,349          | 185,292,291          | 744            | 738                 | 4,297             | 4,151               | 476                  | 6              |
| November  | 189,298,190          | 180,429,679          | 720            | 720                 | 4,362             | 4,177               | 384                  | 0              |
| December  | 197,002,422          | 188,859,847          | 744            | 744                 | 4,413             | 4,231               | 446                  | 0              |
| EOQ TOTAL | 578,101,962          | 554,581,817          | 2,208          | 2,202               | 4,364             | 4,186               | 436                  | 6              |
| YTD TOTAL | 2,245,007,188        | 2,150,349,109        | 8,784          | 8,743               | 4,260             | 4,080               | 389                  | 46             |

|           | TOTAL MUH GALS PRODUCED | TOTAL MUH GALS PRODUCED | TOTAL MUH GALS PRODUCED | TOTAL BRINE GALS PRODUCED | TOTAL PERM GALS PRODUCED | COMM BLEED TO RO FEED | MUHH BLEED TO DDW |
|-----------|-------------------------|-------------------------|-------------------------|---------------------------|--------------------------|-----------------------|-------------------|
| Prev. YTD | 1,849,192               | 89,361,664              | 89,022,382              | 10,363,777                | 38,563,427               | 2,329,150             | 6,170,803         |
| October   | 485,598                 | 9,390,114               | 15,929,617              | 1,866,462                 | 4,370,144                | 10,536                | 397,239           |
| November  | 497,846                 | 9,215,381               | 15,128,762              | 2,150,012                 | 4,007,702                | 9,848                 | 353,769           |
| December  | 493,454                 | 9,464,799               | 14,762,090              | 1,587,000                 | 5,559,203                | 10,765                | 1,166,524         |
| EOQ TOTAL | 1,476,898               | 28,070,294              | 45,820,469              | 5,603,474                 | 13,937,049               | 31,149                | 1,917,532         |
| YTD TOTAL | 3,326,090               | 117,431,958             | 134,842,851             | 15,967,251                | 52,500,476               | 2,360,299             | 8,088,335         |

## **Appendix C**

### **Wellfield Injection Pressures**

**Third and Fourth Quarter, 2004**

**WELLFIELD INJECTION PRESSURE**  
Third Quarter 2004

| WF HOUSE #1  |         | WF HOUSE #2  |         | WF HOUSE #3  |         | WF HOUSE #4  |         | WF HOUSE #5  |         |
|--------------|---------|--------------|---------|--------------|---------|--------------|---------|--------------|---------|
| AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM |
| July         | 0       | 0            | 0       | 0            | 0       | 0            | 0       | 0            | 0       |
| August       | 0       | 0            | 0       | 0            | 0       | 11           | 38      | 7            | 21      |
| September    | 0       | 0            | 0       | 0            | 0       | 33           | 38      | 22           | 26      |
| AVERAGE      | 0       | 0            | 0       | 0            | 0       | 15           | 38      | 10           | 26      |
| WF HOUSE #6  |         | WF HOUSE #7  |         | WF HOUSE #8  |         | WF HOUSE #9  |         | WF HOUSE #10 |         |
| AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM |
| July         | 22      | 0            | 0       | 13           | 27      | 61           | 69      | 0            | 0       |
| August       | 25      | 5            | 12      | 16           | 19      | 62           | 70      | 0            | 0       |
| September    | 19      | 18           | 70      | 10           | 19      | 63           | 68      | 0            | 0       |
| AVERAGE      | 22      | 8            | 70      | 13           | 27      | 62           | 70      | 0            | 0       |
| WF HOUSE #11 |         | WF HOUSE #12 |         | WF HOUSE #13 |         | WF HOUSE #14 |         | WF HOUSE #15 |         |
| AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM |
| July         | 0       | 63           | 70      | 59           | 75      | 91           | 93      | 66           | 78      |
| August       | 0       | 64           | 76      | 58           | 68      | 89           | 92      | 69           | 90      |
| September    | 1       | 66           | 72      | 60           | 70      | 88           | 92      | 69           | 76      |
| AVERAGE      | 0       | 64           | 76      | 59           | 75      | 89           | 93      | 68           | 90      |
| WF HOUSE #16 |         | WF HOUSE #17 |         | WF HOUSE #18 |         | WF HOUSE #19 |         | WF HOUSE #20 |         |
| AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM |
| July         | 5       | 74           | 76      | 0            | 0       | 0            | 0       | 82           | 85      |
| August       | 1       | 74           | 78      | 0            | 0       | 0            | 0       | 82           | 85      |
| September    | 0       | 72           | 76      | 0            | 0       | 0            | 0       | 80           | 85      |
| AVERAGE      | 2       | 73           | 78      | 0            | 0       | 0            | 0       | 81           | 85      |
| WF HOUSE #21 |         | WF HOUSE #22 |         | WF HOUSE #23 |         | WF HOUSE #24 |         | WF HOUSE #25 |         |
| AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM |
| July         | 96      | 96           | 98      | 0            | 0       | 97           | 98      | 96           | 99      |
| August       | 95      | 95           | 96      | 0            | 0       | 97           | 98      | 98           | 99      |
| September    | 92      | 93           | 98      | 0            | 0       | 94           | 98      | 95           | 99      |
| AVERAGE      | 94      | 95           | 99      | 0            | 0       | 96           | 98      | 96           | 99      |
| WF HOUSE #26 |         | WF HOUSE #27 |         | WF HOUSE #28 |         | WF HOUSE #30 |         | WF HOUSE #31 |         |
| AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM |
| July         | 97      | 96           | 99      | 0            | 0       | 60           | 64      | 92.90322581  | 98      |
| August       | 94      | 95           | 98      | 2            | 60      | 61           | 63      | 95           | 98      |
| September    | 95      | 92           | 99      | 0            | 0       | 60           | 65      | 92           | 98      |
| AVERAGE      | 95      | 94           | 99      | 1            | 60      | 60           | 65      | 93           | 98      |
| WF HOUSE #32 |         | WF HOUSE #33 |         | WF HOUSE #34 |         | WF HOUSE #35 |         | WF HOUSE #36 |         |
| AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM |
| July         | 42      | 94           | 98      | 98           | 99      | 97           | 99      | 98           | 99      |
| August       | 44      | 97           | 98      | 98           | 99      | 97           | 99      | 96           | 99      |
| September    | 43      | 95           | 99      | 94           | 99      | 95           | 99      | 94           | 99      |
| AVERAGE      | 43      | 95           | 99      | 97           | 99      | 96           | 99      | 96           | 99      |
| WF HOUSE #37 |         | WF HOUSE #38 |         | WF HOUSE #39 |         | WF HOUSE #40 |         | WF HOUSE #41 |         |
| AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM |
| July         | 97      | 99           | 99      | 0            | 0       | 0            | 0       | 53           | 56      |
| August       | 98      | 98           | 99      | 55           | 55      | 0            | 0       | 55           | 58      |
| September    | 94      | 94           | 98      | 0            | 0       | 0            | 0       | 54           | 60      |
| AVERAGE      | 96      | 99           | 99      | 0            | 0       | 0            | 0       | 54           | 60      |
| WF HOUSE #42 |         | MAXIMUM      |         |              |         |              |         |              |         |
| AVERAGE      | MAXIMUM |              |         |              |         |              |         |              |         |
| July         | 42      | 47           |         |              |         |              |         |              |         |
| August       | 44      | 49           |         |              |         |              |         |              |         |
| September    | 43      | 50           |         |              |         |              |         |              |         |
| AVERAGE      | 43      | 50           |         |              |         |              |         |              |         |

**WELLFIELD INJECTION PRESSURE**  
Fourth Quarter 2004

|          | WF HOUSE #1  |         | WF HOUSE #2  |         | WF HOUSE #3  |         | WF HOUSE #4  |         | WF HOUSE #5  |         |
|----------|--------------|---------|--------------|---------|--------------|---------|--------------|---------|--------------|---------|
|          | AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM |
| October  | 0            | 0       | 0            | 0       | 0            | 0       | 37           | 40      | 27           | 30      |
| November | 0            | 0       | 0            | 0       | 0            | 0       | 20           | 26      | 9            | 22      |
| December | 0            | 0       | 0            | 0       | 0            | 0       | 14           | 20      | 6            | 12      |
| AVERAGE  | 0            | 0       | 0            | 0       | 0            | 0       | 24           | 40      | 14           | 30      |
|          | WF HOUSE #6  |         | WF HOUSE #7  |         | WF HOUSE #8  |         | WF HOUSE #9  |         | WF HOUSE #10 |         |
|          | AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM |
| October  | 16           | 18      | 20           | 26      | 6            | 58      | 62           | 78      | 0            | 0       |
| November | 20           | 30      | 20           | 35      | 8            | 20      | 54           | 82      | 0            | 0       |
| December | 19           | 30      | 9            | 17      | 13           | 20      | 32           | 64      | 0            | 0       |
| AVERAGE  | 18           | 30      | 16           | 35      | 9            | 58      | 49           | 82      | 0            | 0       |
|          | WF HOUSE #11 |         | WF HOUSE #12 |         | WF HOUSE #13 |         | WF HOUSE #14 |         | WF HOUSE #15 |         |
|          | AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM |
| October  | 0            | 0       | 65           | 70      | 58           | 64      | 89           | 92      | 68           | 72      |
| November | 0            | 0       | 55           | 61      | 49           | 55      | 88           | 92      | 59           | 65      |
| December | 0            | 0       | 33           | 65      | 29           | 60      | 65           | 92      | 37           | 70      |
| AVERAGE  | 0            | 0       | 51           | 70      | 45           | 64      | 80           | 92      | 55           | 72      |
|          | WF HOUSE #16 |         | WF HOUSE #17 |         | WF HOUSE #18 |         | WF HOUSE #19 |         | WF HOUSE #20 |         |
|          | AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM |
| October  | 0            | 0       | 74           | 76      | 0            | 0       | 0            | 0       | 81           | 84      |
| November | 0            | 0       | 73           | 78      | 0            | 0       | 30           | 78      | 81           | 85      |
| December | 0            | 0       | 53           | 77      | 0            | 0       | 48           | 85      | 60           | 94      |
| AVERAGE  | 0            | 0       | 67           | 78      | 0            | 0       | 26           | 85      | 74           | 94      |
|          | WF HOUSE #21 |         | WF HOUSE #22 |         | WF HOUSE #23 |         | WF HOUSE #24 |         | WF HOUSE #25 |         |
|          | AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM |
| October  | 95           | 98      | 97           | 99      | 0            | 0       | 98           | 99      | 96           | 99      |
| November | 92           | 97      | 95           | 98      | 0            | 0       | 92           | 98      | 92           | 95      |
| December | 68           | 98      | 69           | 99      | 0            | 0       | 69           | 98      | 67           | 96      |
| AVERAGE  | 85           | 98      | 87           | 99      | 1            | 95      | 86           | 99      | 85           | 99      |
|          | WF HOUSE #26 |         | WF HOUSE #27 |         | WF HOUSE #28 |         | WF HOUSE #30 |         | WF HOUSE #31 |         |
|          | AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM |
| October  | 98           | 99      | 95           | 96      | 0            | 0       | 60           | 63      | 93.67741935  | 96      |
| November | 94           | 99      | 92           | 99      | 0            | 0       | 57           | 62      | 89           | 96      |
| December | 68           | 98      | 67           | 95      | 0            | 0       | 41           | 60      | 65           | 96      |
| AVERAGE  | 87           | 99      | 85           | 99      | 0            | 0       | 52           | 63      | 83           | 96      |
|          | WF HOUSE #32 |         | WF HOUSE #33 |         | WF HOUSE #34 |         | WF HOUSE #35 |         | WF HOUSE #36 |         |
|          | AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM |
| October  | 43           | 45      | 98           | 99      | 99           | 99      | 98           | 99      | 97           | 99      |
| November | 42           | 46      | 95           | 99      | 94           | 99      | 94           | 99      | 94           | 99      |
| December | 30           | 44      | 70           | 99      | 69           | 99      | 69           | 99      | 69           | 99      |
| AVERAGE  | 38           | 46      | 87           | 99      | 87           | 99      | 87           | 99      | 87           | 99      |
|          | WF HOUSE #37 |         | WF HOUSE #38 |         | WF HOUSE #39 |         | WF HOUSE #40 |         | WF HOUSE #41 |         |
|          | AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM | AVERAGE      | MAXIMUM |
| October  | 98           | 99      | 94           | 99      | 0            | 0       | 0            | 0       | 55           | 58      |
| November | 92           | 97      | 94           | 99      | 0            | 0       | 0            | 0       | 51           | 55      |
| December | 68           | 99      | 69           | 99      | 0            | 0       | 0            | 0       | 36           | 53      |
| AVERAGE  | 86           | 99      | 86           | 99      | 0            | 0       | 0            | 0       | 47           | 58      |
|          | WF HOUSE #42 |         | MAXIMUM      |         |              |         |              |         |              |         |
|          | AVERAGE      | MAXIMUM |              |         |              |         |              |         |              |         |
| October  | 43           | 47      |              |         |              |         |              |         |              |         |
| November | 39           | 44      |              |         |              |         |              |         |              |         |
| December | 28           | 44      |              |         |              |         |              |         |              |         |
| AVERAGE  | 37           | 47      |              |         |              |         |              |         |              |         |



## **Appendix D**

### **Deep Disposal Well Injection Radiological Data**

**Third and Fourth Quarter, 2004**

## Crow Butte Uranium Mine

### Deep Disposal Well Injection Radiological Data

| Month        | Total Gallons<br>Injected | Average Natural<br>Uranium (mg/l) | Total Natural<br>Uranium Injected<br>(mg) | Total Natural<br>Uranium Injected<br>(uCi) | Average Radium-<br>226 (pCi/l) | Total Radium-<br>226 Injected<br>(uCi) |
|--------------|---------------------------|-----------------------------------|---|--|--------------------------------|--|
| July-04      | 3,048,207                 | 6                                 | 6.92E+07                                  | 4.69E+04                                   | 1,020                          | 1.18E+04                               |
| August-04    | 3,327,132                 | 11                                | 1.39E+08                                  | 9.38E+04                                   | 941                            | 1.19E+04                               |
| September-04 | 3,137,176                 | 5                                 | 5.94E+07                                  | 4.02E+04                                   | 712                            | 8.46E+03                               |
| October-04   | 3,253,399                 | 3                                 | 3.69E+07                                  | 2.50E+04                                   | 899                            | 1.11E+04                               |
| November-04  | 3,183,322                 | 3                                 | 3.61E+07                                  | 2.45E+04                                   | 873                            | 1.05E+04                               |
| December-04  | 3,385,182                 | 6                                 | 7.69E+07                                  | 5.21E+04                                   | 1,250                          | 1.60E+04                               |
| Totals       | 19,334,418                |                                   | 4.17E+08                                  | 2.82E+05                                   |                                | 6.97E+04                               |

## **Appendix E**

### **Radon Release Calculations**

**Third and Fourth Quarter, 2004**

### Radon Effluent Release Calculation (Production and Startup)

#### Third Quarter 2004 Radon Release from Leaching Operations:

| Curies/M3 | Production Flow<br>(liters) | Radon-222 Decay<br>Constant | Operating Days | Operating Factor | M3/liter<br>conversion | Hours/Day<br>Conversion | Minutes/Hour<br>Conversion | Total Radon<br>Release from<br>Leaching |
|-----------|-----------------------------|-----------------------------|----------------|------------------|------------------------|-------------------------|----------------------------|---|
| 7.04E-04  | 16,133                      | 0.72                        | 92             | 99.3%            | 0.001                  | 24                      | 60                         | 1,076                                   |

#### Fourth Quarter 2004 Radon Release from Leaching Operations:

| Curies/M3 | Production Flow<br>(liters) | Radon-222 Decay<br>Constant | Operating Days | Operating Factor | M3/liter<br>conversion | Hours/Day<br>Conversion | Minutes/Hour<br>Conversion | Total Radon<br>Release from<br>Leaching |
|-----------|-----------------------------|-----------------------------|----------------|------------------|------------------------|-------------------------|----------------------------|---|
| 7.04E-04  | 16,520                      | 0.72                        | 91             | 99.7%            | 0.001                  | 24                      | 60                         | 1,094                                   |

#### Second Half 2004 Radon Release From Startup:

| Curies/M3 | Total Acres of New<br>Wellfield | Meter3/Acre<br>Conversion | Orebody Thickness<br>(meters) | Porosity | Total Radon<br>Release from<br>Startup |
|-----------|---------------------------------|---------------------------|-------------------------------|----------|--|
| 7.04E-04  | 14                              | 4,074                     | 1.52                          | 0.29     | 17                                     |

**Total Estimated Radon Release from Production:**

**2,187**

### Radon Effluent Release Calculation (Restoration)

#### Second Half 2004 Radon Release From Restoration:

| Total Restoration<br>Flow (liters) | Microcuries/liter | Curies/Microcurie | Production Potential |
|------------------------------------|-------------------|-------------------|----------------------|
| 567,194,004                        | 0.697             | 1.00E-06          | 395                  |

Wellfield Loss (25% of Production Potential):

99

Ion Exchange Loss (10% of Production Potential minus Wellfield Loss):

30

Reverse Osmosis Loss (100% of remaining activity at 0.470 microcuries/liter)

72

| Total Reverse<br>Osmosis Flow<br>(liters) | Microcuries/liter | Curies/Microcurie |
|---|-------------------|-------------------|
| 154,225,641                               | 0.470             | 1.00E-06          |

#### Second Half 2004 Radon Release From Startup of New Restoration:

| Curies/M3 | Total Acres of New<br>Wellfield | Meter3/Acre<br>Conversion | Orebody Thickness<br>(meters) | Porosity | Total Radon<br>Release from<br>Startup |
|-----------|---------------------------------|---------------------------|-------------------------------|----------|--|
| 7.04E-04  | 2.8                             | 4074                      | 1.52                          | 0.29     | 4                                      |

**Total Estimated Radon Release from Restoration:**

**205**

**Total Estimated Radon Release, Second Half 2004:**

**2,392**

**Appendix F**  
**Environmental Air Monitoring Results**  
**Third and Fourth Quarter, 2004**

# HIGH VOLUME AIR SAMPLING REPORT

CLIENT: CROW BUTTE RESOURCES

REPORT DATE: February 1, 2005

SAMPLE ID: AM-1

| Quarter/Date Sampled<br>Air Volume                                       | Radionuclide      | Concentration<br>$\mu\text{Ci/mL}$ | Error<br>Estimate<br>$\mu\text{Ci/mL}$ | L.L.D.<br>$\mu\text{Ci/mL}$ | Effluent<br>Conc.*<br>$\mu\text{Ci/mL}$ | % Effluent<br>Concentration |
|--|-------------------|------------------------------------|--|-----------------------------|---|-----------------------------|
| C04040194-001A<br>01/02/2004-03/31/2004<br>Air Volume in mLs<br>5.10E+09 | <sup>nat</sup> U  | 1.45E-16                           | N/A                                    | 1.00E-16                    | 9.00E-14                                | 1.61E-01                    |
|  | <sup>226</sup> Ra | 1.68E-16                           | 9.31E-17                               | 1.00E-16                    | 9.00E-13                                | 1.86E-02                    |
|  | <sup>210</sup> Pb | 2.44E-14                           | 1.83E-15                               | 2.00E-15                    | 6.00E-13                                | 4.07E+00                    |

| Quarter/Date Sampled<br>Air Volume                                       | Radionuclide      | Concentration<br>$\mu\text{Ci/mL}$ | Error<br>Estimate<br>$\mu\text{Ci/mL}$ | L.L.D.<br>$\mu\text{Ci/mL}$ | Effluent<br>Conc.*<br>$\mu\text{Ci/mL}$ | % Effluent<br>Concentration |
|--|-------------------|------------------------------------|--|-----------------------------|---|-----------------------------|
| C04070210-001A<br>03/31/2004-07/01/2004<br>Air Volume in mLs<br>5.51E+09 | <sup>nat</sup> U  | < 1.00E-16                         | N/A                                    | 1.00E-16                    | 9.00E-14                                | < 1.11E-01                  |
|  | <sup>226</sup> Ra | < 1.00E-16                         | N/A                                    | 1.00E-16                    | 9.00E-13                                | < 1.11E-02                  |
|  | <sup>210</sup> Pb | 9.31E-15                           | 3.28E-15                               | 2.00E-15                    | 6.00E-13                                | 1.55E+00                    |

| Quarter/Date Sampled<br>Air Volume  | Radionuclide      | Concentration<br>$\mu\text{Ci/mL}$ | Error<br>Estimate<br>$\mu\text{Ci/mL}$ | L.L.D.<br>$\mu\text{Ci/mL}$ | Effluent<br>Conc.*<br>$\mu\text{Ci/mL}$ | % Effluent<br>Concentration |
|---|-------------------|------------------------------------|--|-----------------------------|---|-----------------------------|
| C04100296-001<br>07/01/2004 - 10/01/2004<br>Air Volume in mLs<br>5.43E+09 | <sup>nat</sup> U  | < 1.00E-16                         | N/A                                    | 1.00E-16                    | 9.00E-14                                | < 1.11E-01                  |
|   | <sup>226</sup> Ra | < 1.00E-16                         | N/A                                    | 1.00E-16                    | 9.00E-13                                | < 1.11E-02                  |
|   | <sup>210</sup> Pb | 1.87E-14                           | 2.05E-15                               | 2.00E-15                    | 6.00E-13                                | 3.11E+00                    |

| Quarter/Date Sampled<br>Air Volume  | Radionuclide      | Concentration<br>$\mu\text{Ci/mL}$ | Error<br>Estimate<br>$\mu\text{Ci/mL}$ | L.L.D.<br>$\mu\text{Ci/mL}$ | Effluent<br>Conc.*<br>$\mu\text{Ci/mL}$ | % Effluent<br>Concentration |
|---|-------------------|------------------------------------|--|-----------------------------|---|-----------------------------|
| C05010207-001<br>10/01/2004 - 01/03/2005<br>Air Volume in mLs<br>5.51E+09 | <sup>nat</sup> U  | < 1.00E-16                         | N/A                                    | 1.00E-16                    | 9.00E-14                                | < 1.11E-01                  |
|   | <sup>226</sup> Ra | < 1.00E-16                         | N/A                                    | 1.00E-16                    | 9.00E-13                                | < 1.11E-02                  |
|   | <sup>210</sup> Pb | 1.23E-14                           | 9.31E-16                               | 2.00E-15                    | 6.00E-13                                | 2.06E+00                    |

Final prep volume is 0.95 liter

LLD's are from Reg. Guide 4.14

\*Effluent Concentration from the NEW 10 CFR Part 20 - Appendix B - Table 2

Year for Natural Uranium

Week for Radium-226

Day for Lead-210

# HIGH VOLUME AIR SAMPLING REPORT

CLIENT: CROW BUTTE RESOURCES

REPORT DATE: February 1, 2005

SAMPLE ID: AM-2

| Quarter/Date Sampled<br>Air Volume                                       | Radionuclide      | Concentration<br>$\mu\text{Ci/mL}$ | Error<br>Estimate<br>$\mu\text{Ci/mL}$ | L.L.D.<br>$\mu\text{Ci/mL}$ | Effluent<br>Conc.*<br>$\mu\text{Ci/mL}$ | % Effluent<br>Concentration |
|--|-------------------|------------------------------------|--|-----------------------------|---|-----------------------------|
| C04040194-002A<br>01/02/2004-03/31/2004<br>Air Volume in mLs<br>4.17E+09 | <sup>nat</sup> U  | 6.68E-15                           | N/A                                    | 1.00E-16                    | 9.00E-14                                | 7.42E+00                    |
|  | <sup>226</sup> Ra | 2.28E-16                           | 1.37E-16                               | 1.00E-16                    | 9.00E-13                                | 2.53E-02                    |
|  | <sup>210</sup> Pb | 5.15E-15                           | 1.73E-15                               | 2.00E-15                    | 6.00E-13                                | 8.58E-01                    |

| Quarter/Date Sampled<br>Air Volume                                       | Radionuclide      | Concentration<br>$\mu\text{Ci/mL}$ | Error<br>Estimate<br>$\mu\text{Ci/mL}$ | L.L.D.<br>$\mu\text{Ci/mL}$ | Effluent<br>Conc.*<br>$\mu\text{Ci/mL}$ | % Effluent<br>Concentration |
|--|-------------------|------------------------------------|--|-----------------------------|---|-----------------------------|
| C04070210-002A<br>03/31/2004-07/01/2004<br>Air Volume in mLs<br>5.13E+09 | <sup>nat</sup> U  | 1.39E-15                           | N/A                                    | 1.00E-16                    | 9.00E-14                                | 1.55E+00                    |
|  | <sup>226</sup> Ra | 1.98E-16                           | 1.52E-16                               | 1.00E-16                    | 9.00E-13                                | 2.20E-02                    |
|  | <sup>210</sup> Pb | 1.75E-14                           | 3.69E-15                               | 2.00E-15                    | 6.00E-13                                | 2.92E+00                    |

| Quarter/Date Sampled<br>Air Volume  | Radionuclide      | Concentration<br>$\mu\text{Ci/mL}$ | Error<br>Estimate<br>$\mu\text{Ci/mL}$ | L.L.D.<br>$\mu\text{Ci/mL}$ | Effluent<br>Conc.*<br>$\mu\text{Ci/mL}$ | % Effluent<br>Concentration |
|---|-------------------|------------------------------------|--|-----------------------------|---|-----------------------------|
| C04100296-002<br>07/01/2004 - 10/01/2004<br>Air Volume in mLs<br>5.05E+09 | <sup>nat</sup> U  | 5.19E-16                           | N/A                                    | 1.00E-16                    | 9.00E-14                                | 5.77E-01                    |
|   | <sup>226</sup> Ra | < 1.00E-16                         | N/A                                    | 1.00E-16                    | 9.00E-13                                | < 1.11E-02                  |
|   | <sup>210</sup> Pb | 1.61E-14                           | 2.12E-15                               | 2.00E-15                    | 6.00E-13                                | 2.68E+00                    |

| Quarter/Date Sampled<br>Air Volume  | Radionuclide      | Concentration<br>$\mu\text{Ci/mL}$ | Error<br>Estimate<br>$\mu\text{Ci/mL}$ | L.L.D.<br>$\mu\text{Ci/mL}$ | Effluent<br>Conc.*<br>$\mu\text{Ci/mL}$ | % Effluent<br>Concentration |
|---|-------------------|------------------------------------|--|-----------------------------|---|-----------------------------|
| C05010207-002<br>10/01/2004 - 01/03/2005<br>Air Volume in mLs<br>5.12E+09 | <sup>nat</sup> U  | 6.22E-16                           | N/A                                    | 1.00E-16                    | 9.00E-14                                | 6.91E-01                    |
|   | <sup>226</sup> Ra | < 1.00E-16                         | N/A                                    | 1.00E-16                    | 9.00E-13                                | < 1.11E-02                  |
|   | <sup>210</sup> Pb | 1.65E-14                           | 1.06E-15                               | 2.00E-15                    | 6.00E-13                                | 2.75E+00                    |

Final prep volume is 0.95 liter

LLD's are from Reg. Guide 4.14

\*Effluent Concentration from the NEW 10 CFR Part 20 - Appendix B - Table 2

Year for Natural Uranium

Week for Radium-226

Day for Lead-210

# HIGH VOLUME AIR SAMPLING REPORT

**CLIENT:** CROW BUTTE RESOURCES

**REPORT DATE:** February 1, 2005

**SAMPLE ID:** AM-3

| Quarter/Date Sampled<br>Air Volume                                       | Radionuclide      | Concentration<br>$\mu\text{Ci/mL}$ | Error<br>Estimate<br>$\mu\text{Ci/mL}$ | L.L.D.<br>$\mu\text{Ci/mL}$ | Effluent<br>Conc.*<br>$\mu\text{Ci/mL}$ | % Effluent<br>Concentration |
|--|-------------------|------------------------------------|--|-----------------------------|---|-----------------------------|
| C04040194-003A<br>01/02/2004-03/31/2004<br>Air Volume in mLs<br>4.91E+09 | <sup>nat</sup> U  | 3.71E-16                           | N/A                                    | 1.00E-16                    | 9.00E-14                                | 4.13E-01                    |
|  | <sup>226</sup> Ra | 1.93E-16                           | 1.16E-16                               | 1.00E-16                    | 9.00E-13                                | 2.15E-02                    |
|  | <sup>210</sup> Pb | 6.56E-15                           | 1.51E-15                               | 2.00E-15                    | 6.00E-13                                | 1.09E+00                    |

| Quarter/Date Sampled<br>Air Volume                                       | Radionuclide      | Concentration<br>$\mu\text{Ci/mL}$ | Error<br>Estimate<br>$\mu\text{Ci/mL}$ | L.L.D.<br>$\mu\text{Ci/mL}$ | Effluent<br>Conc.*<br>$\mu\text{Ci/mL}$ | % Effluent<br>Concentration |
|--|-------------------|------------------------------------|--|-----------------------------|---|-----------------------------|
| C04070210-003A<br>03/31/2004-07/01/2004<br>Air Volume in mLs<br>5.19E+09 | <sup>nat</sup> U  | 2.23E-16                           | N/A                                    | 1.00E-16                    | 9.00E-14                                | 2.48E-01                    |
|  | <sup>226</sup> Ra | < 1.00E-16                         | N/A                                    | 1.00E-16                    | 9.00E-13                                | < 1.11E-02                  |
|  | <sup>210</sup> Pb | 1.48E-14                           | 3.59E-15                               | 2.00E-15                    | 6.00E-13                                | 2.47E+00                    |

| Quarter/Date Sampled<br>Air Volume  | Radionuclide      | Concentration<br>$\mu\text{Ci/mL}$ | Error<br>Estimate<br>$\mu\text{Ci/mL}$ | L.L.D.<br>$\mu\text{Ci/mL}$ | Effluent<br>Conc.*<br>$\mu\text{Ci/mL}$ | % Effluent<br>Concentration |
|---|-------------------|------------------------------------|--|-----------------------------|---|-----------------------------|
| C04100296-003<br>07/01/2004 - 10/01/2004<br>Air Volume in mLs<br>5.13E+09 | <sup>nat</sup> U  | 2.24E-16                           | N/A                                    | 1.00E-16                    | 9.00E-14                                | 2.49E-01                    |
|   | <sup>226</sup> Ra | < 1.00E-16                         | N/A                                    | 1.00E-16                    | 9.00E-13                                | < 1.11E-02                  |
|   | <sup>210</sup> Pb | 1.72E-14                           | 2.11E-15                               | 2.00E-15                    | 6.00E-13                                | 2.86E+00                    |

| Quarter/Date Sampled<br>Air Volume  | Radionuclide      | Concentration<br>$\mu\text{Ci/mL}$ | Error<br>Estimate<br>$\mu\text{Ci/mL}$ | L.L.D.<br>$\mu\text{Ci/mL}$ | Effluent<br>Conc.*<br>$\mu\text{Ci/mL}$ | % Effluent<br>Concentration |
|---|-------------------|------------------------------------|--|-----------------------------|---|-----------------------------|
| C05010207-003<br>10/01/2004 - 01/03/2005<br>Air Volume in mLs<br>5.23E+09 | <sup>nat</sup> U  | 2.11E-16                           | N/A                                    | 1.00E-16                    | 9.00E-14                                | 2.34E-01                    |
|   | <sup>226</sup> Ra | < 1.00E-16                         | N/A                                    | 1.00E-16                    | 9.00E-13                                | < 1.11E-02                  |
|   | <sup>210</sup> Pb | 1.30E-14                           | 9.82E-16                               | 2.00E-15                    | 6.00E-13                                | 2.17E+00                    |

Final prep volume is 0.95 liter

LLD's are from Reg. Guide 4.14

\*Effluent Concentration from the NEW 10 CFR Part 20 - Appendix B - Table 2

Year for Natural Uranium

Week for Radium-226

Day for Lead-210



# HIGH VOLUME AIR SAMPLING REPORT

CLIENT: CROW BUTTE RESOURCES

REPORT DATE: February 1, 2005

SAMPLE ID: AM-4

| Quarter/Date Sampled<br>Air Volume                                       | Radionuclide      | Concentration<br>$\mu\text{Ci/mL}$ | Error<br>Estimate<br>$\mu\text{Ci/mL}$ | L.L.D.<br>$\mu\text{Ci/mL}$ | Effluent<br>Conc.*<br>$\mu\text{Ci/mL}$ | % Effluent<br>Concentration |
|--|-------------------|------------------------------------|--|-----------------------------|---|-----------------------------|
| C04040194-004A<br>01/02/2004-03/31/2004<br>Air Volume in mLs<br>5.25E+09 | <sup>nat</sup> U  | 1.41E-16                           | N/A                                    | 1.00E-16                    | 9.00E-14                                | 1.57E-01                    |
|  | <sup>226</sup> Ra | 1.99E-16                           | 9.05E-17                               | 1.00E-16                    | 9.00E-13                                | 2.21E-02                    |
|  | <sup>210</sup> Pb | 4.09E-15                           | 1.37E-15                               | 2.00E-15                    | 6.00E-13                                | 6.82E-01                    |

| Quarter/Date Sampled<br>Air Volume                                       | Radionuclide      | Concentration<br>$\mu\text{Ci/mL}$ | Error<br>Estimate<br>$\mu\text{Ci/mL}$ | L.L.D.<br>$\mu\text{Ci/mL}$ | Effluent<br>Conc.*<br>$\mu\text{Ci/mL}$ | % Effluent<br>Concentration |
|--|-------------------|------------------------------------|--|-----------------------------|---|-----------------------------|
| C04070210-004A<br>03/31/2004-07/01/2004<br>Air Volume in mLs<br>5.46E+09 | <sup>nat</sup> U  | 1.18E-16                           | N/A                                    | 1.00E-16                    | 9.00E-14                                | 1.32E-01                    |
|  | <sup>226</sup> Ra | 2.66E-16                           | 1.38E-16                               | 1.00E-16                    | 9.00E-13                                | 2.96E-02                    |
|  | <sup>210</sup> Pb | 9.40E-15                           | 3.31E-15                               | 2.00E-15                    | 6.00E-13                                | 1.57E+00                    |

| Quarter/Date Sampled<br>Air Volume  | Radionuclide      | Concentration<br>$\mu\text{Ci/mL}$ | Error<br>Estimate<br>$\mu\text{Ci/mL}$ | L.L.D.<br>$\mu\text{Ci/mL}$ | Effluent<br>Conc.*<br>$\mu\text{Ci/mL}$ | % Effluent<br>Concentration |
|---|-------------------|------------------------------------|--|-----------------------------|---|-----------------------------|
| C04100296-004<br>07/01/2004 - 10/01/2004<br>Air Volume in mLs<br>5.42E+09 | <sup>nat</sup> U  | 1.54E-16                           | N/A                                    | 1.00E-16                    | 9.00E-14                                | 1.71E-01                    |
|   | <sup>226</sup> Ra | < 1.00E-16                         | N/A                                    | 1.00E-16                    | 9.00E-13                                | < 1.11E-02                  |
|   | <sup>210</sup> Pb | 2.25E-14                           | 2.12E-15                               | 2.00E-15                    | 6.00E-13                                | 3.75E+00                    |

| Quarter/Date Sampled<br>Air Volume  | Radionuclide      | Concentration<br>$\mu\text{Ci/mL}$ | Error<br>Estimate<br>$\mu\text{Ci/mL}$ | L.L.D.<br>$\mu\text{Ci/mL}$ | Effluent<br>Conc.*<br>$\mu\text{Ci/mL}$ | % Effluent<br>Concentration |
|---|-------------------|------------------------------------|--|-----------------------------|---|-----------------------------|
| C05010207-004<br>10/01/2004 - 01/03/2005<br>Air Volume in mLs<br>5.62E+09 | <sup>nat</sup> U  | 1.98E-16                           | N/A                                    | 1.00E-16                    | 9.00E-14                                | 2.20E-01                    |
|   | <sup>226</sup> Ra | < 1.00E-16                         | N/A                                    | 1.00E-16                    | 9.00E-13                                | < 1.11E-02                  |
|   | <sup>210</sup> Pb | 1.36E-14                           | 9.30E-16                               | 2.00E-15                    | 6.00E-13                                | 2.26E+00                    |

Final prep volume is 0.95 liter

LLD's are from Reg. Guide 4.14

\*Effluent Concentration from the NEW 10 CFR Part 20 - Appendix B - Table 2

Year for Natural Uranium

Week for Radium-226

Day for Lead-210

# CROW BUTTE RESOURCES, INC.



## Memorandum

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TO: File  
FROM: Rhonda Grantham *RG*  
DATE: January 26, 2005  
SUBJECT: Relocation of air monitoring stations AM-5

On January 10, 2005 air monitoring station AM-5 was relocated. The air monitoring station was established on April 15, 1982 and was located at the site of the baseline weather monitoring station. The monitoring station measured airborne radionuclide concentrations, radon gas concentrations, and direct gamma radiation in the environment for licensing and compliance purposes.

When the station was established in 1982 the location was remote from the proposed sites of the R & D facility and the commercial plant site. In subsequent years, however, wellfield expansion has placed the location inside of the active wellfield of MU # 8.

The new location of the monitoring station has been moved approximately 400 feet north and it is adjacent to Well #134 which is the water supply well for the #2 driller's pond. This location places the station outside of the active wellfield and within a short distance from the Mayfield house which is currently occupied.

cc: Mike Griffin  
Jim Stokey

# HIGH VOLUME AIR SAMPLING REPORT

CLIENT: CROW BUTTE RESOURCES  
REPORT DATE: February 1, 2005  
SAMPLE ID: AM-5

| Quarter/Date Sampled<br>Air Volume                                       | Radionuclide      | Concentration<br>$\mu\text{Ci/mL}$ | Error<br>Estimate<br>$\mu\text{Ci/mL}$ | L.L.D.<br>$\mu\text{Ci/mL}$ | Effluent<br>Conc.*<br>$\mu\text{Ci/mL}$ | % Effluent<br>Concentration |
|--|-------------------|------------------------------------|--|-----------------------------|---|-----------------------------|
| C04040194-005A<br>01/02/2004-03/31/2004<br>Air Volume in mLs<br>4.39E+09 | $^{238}\text{U}$  | 8.33E-16                           | N/A                                    | 1.00E-16                    | 9.00E-14                                | 9.26E-01                    |
|  | $^{226}\text{Ra}$ | 1.51E-16                           | 1.08E-16                               | 1.00E-16                    | 9.00E-13                                | 1.68E-02                    |
|  | $^{210}\text{Pb}$ | 4.89E-15                           | 1.64E-15                               | 2.00E-15                    | 6.00E-13                                | 8.15E-01                    |

| Quarter/Date Sampled<br>Air Volume                                       | Radionuclide      | Concentration<br>$\mu\text{Ci/mL}$ | Error<br>Estimate<br>$\mu\text{Ci/mL}$ | L.L.D.<br>$\mu\text{Ci/mL}$ | Effluent<br>Conc.*<br>$\mu\text{Ci/mL}$ | % Effluent<br>Concentration |
|--|-------------------|------------------------------------|--|-----------------------------|---|-----------------------------|
| C04070210-005A<br>03/31/2004-07/01/2004<br>Air Volume in mLs<br>5.26E+09 | $^{238}\text{U}$  | 2.08E-16                           | N/A                                    | 1.00E-16                    | 9.00E-14                                | 2.31E-01                    |
|  | $^{226}\text{Ra}$ | < 1.00E-16                         | N/A                                    | 1.00E-16                    | 9.00E-13                                | < 1.11E-02                  |
|  | $^{210}\text{Pb}$ | 1.46E-14                           | 3.54E-15                               | 2.00E-15                    | 6.00E-13                                | 2.44E+00                    |

| Quarter/Date Sampled<br>Air Volume  | Radionuclide      | Concentration<br>$\mu\text{Ci/mL}$ | Error<br>Estimate<br>$\mu\text{Ci/mL}$ | L.L.D.<br>$\mu\text{Ci/mL}$ | Effluent<br>Conc.*<br>$\mu\text{Ci/mL}$ | % Effluent<br>Concentration |
|---|-------------------|------------------------------------|--|-----------------------------|---|-----------------------------|
| C04100296-005<br>07/01/2004 - 10/01/2004<br>Air Volume in mLs<br>5.24E+09 | $^{238}\text{U}$  | 4.72E-16                           | N/A                                    | 1.00E-16                    | 9.00E-14                                | 5.24E-01                    |
|   | $^{226}\text{Ra}$ | 1.43E-16                           | 1.14E-16                               | 1.00E-16                    | 9.00E-13                                | 1.59E-02                    |
|   | $^{210}\text{Pb}$ | 1.55E-14                           | 2.05E-15                               | 2.00E-15                    | 6.00E-13                                | 2.58E+00                    |

| Quarter/Date Sampled<br>Air Volume  | Radionuclide      | Concentration<br>$\mu\text{Ci/mL}$ | Error<br>Estimate<br>$\mu\text{Ci/mL}$ | L.L.D.<br>$\mu\text{Ci/mL}$ | Effluent<br>Conc.*<br>$\mu\text{Ci/mL}$ | % Effluent<br>Concentration |
|---|-------------------|------------------------------------|--|-----------------------------|---|-----------------------------|
| C05010207-005<br>10/01/2004 - 01/03/2005<br>Air Volume in mLs<br>5.48E+09 | $^{238}\text{U}$  | 1.65E-16                           | N/A                                    | 1.00E-16                    | 9.00E-14                                | 1.84E-01                    |
|   | $^{226}\text{Ra}$ | < 1.00E-16                         | N/A                                    | 1.00E-16                    | 9.00E-13                                | < 1.11E-02                  |
|   | $^{210}\text{Pb}$ | 9.93E-15                           | 8.84E-16                               | 2.00E-15                    | 6.00E-13                                | 1.65E+00                    |

Final prep volume is 0.95 liter

LLD's are from Reg. Guide 4.14

\*Effluent Concentration from the NEW 10 CFR Part 20 - Appendix B - Table 2

Year for Natural Uranium

Week for Radium-226

Day for Lead-210

# HIGH VOLUME AIR SAMPLING REPORT

CLIENT: CROW BUTTE RESOURCES

REPORT DATE: February 1, 2005

SAMPLE ID: AM-6

| Quarter/Date Sampled<br>Air Volume                                       | Radionuclide      | Concentration<br>$\mu\text{Ci/mL}$ | Error<br>Estimate<br>$\mu\text{Ci/mL}$ | L.L.D.<br>$\mu\text{Ci/mL}$ | Effluent<br>Conc.*<br>$\mu\text{Ci/mL}$ | % Effluent<br>Concentration |
|--|-------------------|------------------------------------|--|-----------------------------|---|-----------------------------|
| C04040194-006A<br>01/02/2004-03/31/2004<br>Air Volume in mLs<br>5.16E+09 | $^{235}\text{U}$  | 1.31E-16                           | N/A                                    | 1.00E-16                    | 9.00E-14                                | 1.45E-01                    |
|  | $^{226}\text{Ra}$ | < 1.00E-16                         | 7.36E-17                               | 1.00E-16                    | 9.00E-13                                | < 1.11E-02                  |
|  | $^{210}\text{Pb}$ | 9.35E-15                           | 1.51E-15                               | 2.00E-15                    | 6.00E-13                                | 1.56E+00                    |

| Quarter/Date Sampled<br>Air Volume                                       | Radionuclide      | Concentration<br>$\mu\text{Ci/mL}$ | Error<br>Estimate<br>$\mu\text{Ci/mL}$ | L.L.D.<br>$\mu\text{Ci/mL}$ | Effluent<br>Conc.*<br>$\mu\text{Ci/mL}$ | % Effluent<br>Concentration |
|--|-------------------|------------------------------------|--|-----------------------------|---|-----------------------------|
| C04070210-006A<br>03/31/2004-07/01/2004<br>Air Volume in mLs<br>5.37E+09 | $^{235}\text{U}$  | 1.20E-16                           | N/A                                    | 1.00E-16                    | 9.00E-14                                | 1.34E-01                    |
|  | $^{226}\text{Ra}$ | 1.58E-16                           | 1.50E-16                               | 1.00E-16                    | 9.00E-13                                | 1.75E-02                    |
|  | $^{210}\text{Pb}$ | 2.15E-14                           | 3.63E-15                               | 2.00E-15                    | 6.00E-13                                | 3.58E+00                    |

| Quarter/Date Sampled<br>Air Volume  | Radionuclide      | Concentration<br>$\mu\text{Ci/mL}$ | Error<br>Estimate<br>$\mu\text{Ci/mL}$ | L.L.D.<br>$\mu\text{Ci/mL}$ | Effluent<br>Conc.*<br>$\mu\text{Ci/mL}$ | % Effluent<br>Concentration |
|---|-------------------|------------------------------------|--|-----------------------------|---|-----------------------------|
| C04100296-006<br>07/01/2004 - 10/01/2004<br>Air Volume in mLs<br>5.26E+09 | $^{235}\text{U}$  | < 1.00E-16                         | N/A                                    | 1.00E-16                    | 9.00E-14                                | < 1.11E-01                  |
|   | $^{226}\text{Ra}$ | 1.21E-16                           | 1.11E-16                               | 1.00E-16                    | 9.00E-13                                | 1.35E-02                    |
|   | $^{210}\text{Pb}$ | 1.93E-14                           | 2.11E-15                               | 2.00E-15                    | 6.00E-13                                | 3.22E+00                    |

| Quarter/Date Sampled<br>Air Volume  | Radionuclide      | Concentration<br>$\mu\text{Ci/mL}$ | Error<br>Estimate<br>$\mu\text{Ci/mL}$ | L.L.D.<br>$\mu\text{Ci/mL}$ | Effluent<br>Conc.*<br>$\mu\text{Ci/mL}$ | % Effluent<br>Concentration |
|---|-------------------|------------------------------------|--|-----------------------------|---|-----------------------------|
| C05010207-006<br>10/01/2004 - 01/03/2005<br>Air Volume in mLs<br>5.24E+09 | $^{235}\text{U}$  | 1.05E-16                           | N/A                                    | 1.00E-16                    | 9.00E-14                                | 1.17E-01                    |
|   | $^{226}\text{Ra}$ | < 1.00E-16                         | N/A                                    | 1.00E-16                    | 9.00E-13                                | < 1.11E-02                  |
|   | $^{210}\text{Pb}$ | 1.92E-14                           | 1.07E-15                               | 2.00E-15                    | 6.00E-13                                | 3.20E+00                    |

Final prep volume is 0.95 liter

LLD's are from Reg. Guide 4.14

\*Effluent Concentration from the NEW 10 CFR Part 20 - Appendix B - Table 2

Year for Natural Uranium

Week for Radium-226

Day for Lead-210

# HIGH VOLUME AIR SAMPLING REPORT

CLIENT: CROW BUTTE RESOURCES

REPORT DATE: February 1, 2005

SAMPLE ID: AM-8

| Quarter/Date Sampled<br>Air Volume                                       | Radionuclide      | Concentration<br>$\mu\text{Ci/mL}$ | Error<br>Estimate<br>$\mu\text{Ci/mL}$ | L.L.D.<br>$\mu\text{Ci/mL}$ | Effluent<br>Conc.*<br>$\mu\text{Ci/mL}$ | % Effluent<br>Concentration |
|--|-------------------|------------------------------------|--|-----------------------------|---|-----------------------------|
| C04040194-007A<br>01/02/2004-03/31/2004<br>Air Volume in mLs<br>4.15E+09 | <sup>nat</sup> U  | 2.13E-16                           | N/A                                    | 1.00E-16                    | 9.00E-14                                | 2.37E-01                    |
|  | <sup>226</sup> Ra | 1.14E-16                           | 1.14E-16                               | 1.00E-16                    | 9.00E-13                                | 1.27E-02                    |
|  | <sup>210</sup> Pb | 6.48E-15                           | 1.76E-15                               | 2.00E-15                    | 6.00E-13                                | 1.08E+00                    |

| Quarter/Date Sampled<br>Air Volume                                       | Radionuclide      | Concentration<br>$\mu\text{Ci/mL}$ | Error<br>Estimate<br>$\mu\text{Ci/mL}$ | L.L.D.<br>$\mu\text{Ci/mL}$ | Effluent<br>Conc.*<br>$\mu\text{Ci/mL}$ | % Effluent<br>Concentration |
|--|-------------------|------------------------------------|--|-----------------------------|---|-----------------------------|
| C04070210-007A<br>03/31/2004-07/01/2004<br>Air Volume in mLs<br>5.25E+09 | <sup>nat</sup> U  | 1.85E-16                           | N/A                                    | 1.00E-16                    | 9.00E-14                                | 2.05E-01                    |
|  | <sup>226</sup> Ra | 1.85E-16                           | 1.56E-16                               | 1.00E-16                    | 9.00E-13                                | 2.05E-02                    |
|  | <sup>210</sup> Pb | 1.47E-14                           | 3.55E-15                               | 2.00E-15                    | 6.00E-13                                | 2.44E+00                    |

| Quarter/Date Sampled<br>Air Volume  | Radionuclide      | Concentration<br>$\mu\text{Ci/mL}$ | Error<br>Estimate<br>$\mu\text{Ci/mL}$ | L.L.D.<br>$\mu\text{Ci/mL}$ | Effluent<br>Conc.*<br>$\mu\text{Ci/mL}$ | % Effluent<br>Concentration |
|---|-------------------|------------------------------------|--|-----------------------------|---|-----------------------------|
| C04100296-007<br>07/01/2004 - 10/01/2004<br>Air Volume in mLs<br>5.18E+09 | <sup>nat</sup> U  | < 1.00E-16                         | N/A                                    | 1.00E-16                    | 9.00E-14                                | < 1.11E-01                  |
|   | <sup>226</sup> Ra | 1.22E-16                           | 1.12E-16                               | 1.00E-16                    | 9.00E-13                                | 1.36E-02                    |
|   | <sup>210</sup> Pb | < 2.00E-15                         | N/A                                    | 2.00E-15                    | 6.00E-13                                | < 3.33E-01                  |

| Quarter/Date Sampled<br>Air Volume  | Radionuclide      | Concentration<br>$\mu\text{Ci/mL}$ | Error<br>Estimate<br>$\mu\text{Ci/mL}$ | L.L.D.<br>$\mu\text{Ci/mL}$ | Effluent<br>Conc.*<br>$\mu\text{Ci/mL}$ | % Effluent<br>Concentration |
|---|-------------------|------------------------------------|--|-----------------------------|---|-----------------------------|
| C05010207-007<br>10/01/2004 - 01/03/2005<br>Air Volume in mLs<br>5.29E+09 | <sup>nat</sup> U  | 1.60E-16                           | N/A                                    | 1.00E-16                    | 9.00E-14                                | 1.77E-01                    |
|   | <sup>226</sup> Ra | < 1.00E-16                         | N/A                                    | 1.00E-16                    | 9.00E-13                                | < 1.11E-02                  |
|   | <sup>210</sup> Pb | 1.34E-14                           | 9.69E-16                               | 2.00E-15                    | 6.00E-13                                | 2.23E+00                    |

Final prep volume is 0.95 liter

LLD's are from Reg. Guide 4.14

\*Effluent Concentration from the NEW 10 CFR Part 20 - Appendix B - Table 2

Year for Natural Uranium

Week for Radium-226

Day for Lead-210

**Crow Butte Resources, Inc.**  
Crow Butte Uranium Project

**Track Etch Cup Ambient Radon Concentrations**

*Air Monitoring Station*

*No.*

*Period: July 1, 2004 to January 3, 2005*

|   | Gross Count | Average Radon<br>Concentration<br>(x 10 <sup>-9</sup> µCi/ml) | Accuracy<br>(x 10 <sup>-9</sup> µCi/ml) | Percent Effluent<br>Concentration |
|---|-------------|---|---|-----------------------------------|
| AM-1  | 56.7        | 0.3   | 0.04                                    | 3.0%                              |
| AM-2  | 91.4        | 0.5   | 0.05                                    | 5.0%                              |
| AM-3  | 38.6        | 0.2   | 0.03                                    | 2.0%                              |
| AM-4  | 38.6        | 0.2   | 0.03                                    | 2.0%                              |
| AM-5  | 108.2       | 0.6   | 0.06                                    | 6.0%                              |
| AM-6  | 30          | 0.2   | 0.04                                    | 2.0%                              |
| AM-8  | 64.3        | 0.3   | 0.04                                    | 3.0%                              |
| AB-1 (AM-1 Duplicate)                                   | 52.1        | 0.3   | 0.04                                    | 3.0%                              |
| AB-2 (AM-2 Duplicate)                                   | 69.8        | 0.4   | 0.05                                    | 4.0%                              |
| AB-3 (AM-3 Duplicate)                                   | 30          | 0.2   | 0.04                                    | 2.0%                              |
| AB-5 (AM-5 Duplicate)                                   | 107.7       | 0.6   | 0.06                                    | 6.0%                              |
| AB-6 (AM-6 Duplicate)                                   | 30          | 0.2   | 0.04                                    | 2.0%                              |
| AB-8 (AM-8 Duplicate)                                   | 59.1        | 0.3   | 0.04                                    | 3.0%                              |
| LLD (x 10 <sup>-9</sup> µCi/ml)                         |             |   |   | 0.2                               |
| Effluent Concentration Limit, 10 CFR 20 App B Column 2: |             |   |   | 10                                |

# LANDAUER

February 9, 2005

Ms. Rhonda Grantham  
Crow Butte Resources, Inc.  
86 Crow Butte Road  
Crawford, NE 69339

Dear Ms. Grantham:

Attached are the results of the re-analysis of the Radtrak radon monitors you requested. These monitor readings were calculated based upon an updated laboratory background value. The original reported values were based upon a dated background value.

Radtrak radon monitors develop background tracks due mostly to cosmic radiation during storage. Landauer monitors the buildup of this background track density over time with test monitors selected from manufacturing lots. Every quarter a sample of the selected monitors are analyzed and the laboratory background value is updated. The timing of your original analysis was such that it was just prior to the routine update of the monitor's background values. Between the original analysis and the re-analysis of your monitors, the background values were updated. The data attached incorporates the new background values and is the primary change in the reported exposures.

I hope this letter sufficiently explains the analysis change of your monitor results. If you have any further questions, please contact me.

Sincerely,

LANDAUER, INC.



Mark R. Salasky  
Health Physics Manager

MRS:lw  
Enclosure

u:\letters\GranthamMRS

**Appendix G**  
**Environmental TLD Monitoring Results**  
**Third and Fourth Quarter, 2004**



Crow Butte Resources  
 PO Box 169  
 Crawford, NE 69339  
 Attn: Rhonda Grantham

# **SPHERICAL X9 ENVIRONMENTAL REPORT** **Prepared by Landauer, Inc.**

**Account Number: 306192**

|                 |            |
|-----------------|------------|
| Process Number: | X9SP GF302 |
| Received Date:  | 5-Oct-04   |
| Report Date:    | 15-Oct-04  |
| Released by:    | CAS        |

| Participant No.                                    | Name/Description | Mean Ambient           |                  |                  |                  |                  | Net Values<br>after control<br>subtraction |                           | 95% Confidence Interval |  |  |
|--|------------------|------------------------|------------------|------------------|------------------|------------------|--|---------------------------|-------------------------|--|--|
|  |                  | Dose Equivalent (mrem) |                  |                  |                  |                  | Dose Equivalent (mrem)                     | Standard Deviation (mrem) | Interval (mrem)         |  |  |
|  |                  | Reading 1 (mrem)       | Reading 2 (mrem) | Reading 3 (mrem) | Reading 4 (mrem) | Reading 5 (mrem) |  |                           |                         |  |  |
| Quarterly Monitoring Period starting: July 1, 2004 |                  |                        |                  |                  |                  |                  |  |                           |                         |  |  |
| Control  |                  |                        |                  |                  |                  |                  |  |                           |                         |  |  |
| 1001   | AM-1             | 34                     | 34               | 36               | 36               | 35               |  | 1.0                       | 1.2                     |  |  |
| 1002   | AM-2             | 46                     | 44               | 44               | 45               | 46               | 10   | 1.0                       | 1.2                     |  |  |
| 1003   | AM-6             | 44                     | 43               | 43               | 42               | 43               | 8  | 0.8                       | 1.0                     |  |  |
| 1008   | AM-8             | 43                     | 45               | 46               | 46               | 45               | 10   | 1.3                       | 1.6                     |  |  |
| 1009   | AM-3             | 46                     | 44               | 44               | 45               | 45               | 10   | 0.8                       | 1.0                     |  |  |
| 1010   | AM-4             | 49                     | 46               | 44               | 45               | 46               | 11   | 1.9                       | 2.3                     |  |  |
| 1011   | AM-5             | 44                     | 41               | 43               | 43               | 45               | 8  | 1.5                       | 1.8                     |  |  |
|  |                  | 44                     | 44               | 43               | 45               | 43               | 9  | 0.8                       | 1.0                     |  |  |

95% Confidence Interval is based on the standard error of the mean

Crow Butte Resources  
 PO Box 169  
 Crawford, NE 69339  
 Attn: Rhonda Grantham

# SPHERICAL X9 ENVIRONMENTAL REPORT

Prepared by Landauer, Inc.

Account Number: 306192

|                 |            |
|-----------------|------------|
| Process Number: | X9SP GF654 |
| Received Date:  | 6-Jan-05   |
| Report Date:    | 24-Jan-05  |
| Released by:    | CAS        |

| Participant No. | Name/Description | Mean Ambient Dose                     |                  |                  |                  |                  | Mean Ambient Dose Equivalent (mrem) | Standard Deviation (mrem) | 95% Confidence Interval (mrem) |  |
|-----------------|------------------|---------------------------------------|------------------|------------------|------------------|------------------|-------------------------------------|---------------------------|--------------------------------|--|
|                 |                  | Quarterly Monitoring Period starting: |                  |                  |                  |                  |                                     |                           |                                |  |
|                 |                  | Reading 1 (mrem)                      | Reading 2 (mrem) | Reading 3 (mrem) | Reading 4 (mrem) | Reading 5 (mrem) |                                     |                           |                                |  |
| October 1, 2004 |                  |                                       |                  |                  |                  |                  |                                     |                           |                                |  |
| Control         |                  | 39                                    | 40               | 40               | 40               | 41               | 40                                  | 0.7                       | 0.9                            |  |
| 1001            | AM-1             | 50                                    | 53               | 51               | 53               | 55               | 52                                  | 12                        | 1.9                            |  |
| 1002            | AM-2             | 50                                    | 47               | 49               | 49               | 50               | 49                                  | 9                         | 1.2                            |  |
| 1003            | AM-6             | 50                                    | 50               | 49               | 47               | 49               | 49                                  | 9                         | 1.5                            |  |
| 1008            | AM-8             | 49                                    | 50               | 51               | 49               | 50               | 50                                  | 10                        | 1.2                            |  |
| 1009            | AM-3             | 49                                    | 48               | 49               | 49               | 50               | 49                                  | 9                         | 1.5                            |  |
| 1010            | AM-4             | 49                                    | 50               | 49               | 51               | 47               | 49                                  | 9                         | 1.8                            |  |
| 1011            | AM-5             | 51                                    | 50               | 51               | 52               | 52               | 51                                  | 11                        | 1.0                            |  |

**Appendix H**  
**Sediment Monitoring Results**  
**Third and Fourth Quarter, 2004**



## LABORATORY ANALYTICAL REPORT

**Client:** Crow Butte Resources  
**Project:** Annual Stream and Impoundment Sediments  
**Lab ID:** C04110969-001  
**Client Sample ID:** E13 Stream E1

**Report Date:** 12/09/04  
**Collection Date:** 11/08/04  
**Date Received:** 11/23/04  
**Matrix:** Sediment

| Analyses                 | Result | Units     | Qual | MCL/ |     | Method     | Analysis Date / By   |
|--------------------------|--------|-----------|------|------|-----|------------|----------------------|
|                          |        |           |      | RL   | QCL |            |                      |
| RADIONUCLIDES - TOTAL    |        |           |      |      |     |            |                      |
| Lead 210                 | ND     | pCi/g-dry |      | 1.0  |     | NERHL-65-4 | 12/02/04 06:09 / trs |
| Radium 226               | 0.8    | pCi/g-dry |      | 0.2  |     | E903.0     | 11/30/04 13:15 / df  |
| Radium 226 precision (±) | 0.09   | pCi/g-dry |      |      |     | E903.0     | 11/30/04 13:15 / df  |
| Uranium, Activity        | 0.13   | pCi/g-dry |      | 0.01 |     | SW6020     | 12/07/04 12:47 / bws |

**Report** RL - Analyte reporting limit.  
**Definitions:** QCL - Quality control limit.

MCL - Maximum contaminant level.  
ND - Not detected at the reporting limit.



## LABORATORY ANALYTICAL REPORT

**Client:** Crow Butte Resources  
**Project:** Annual Stream and Impoundment Sediments  
**Lab ID:** C04110969-004  
**Client Sample ID:** E16 Stream E5

**Report Date:** 12/09/04  
**Collection Date:** 11/08/04  
**Date Received:** 11/23/04  
**Matrix:** Sediment

| Analyses                 | Result | Units     | Qual | MCL/ |     | Method     | Analysis Date / By   |
|--------------------------|--------|-----------|------|------|-----|------------|----------------------|
|                          |        |           |      | RL   | QCL |            |                      |
| RADIONUCLIDES - TOTAL    |        |           |      |      |     |            |                      |
| Lead 210                 | 1.4    | pCi/g-dry |      | 1.0  |     | NERHL-65-4 | 12/02/04 06:09 / trs |
| Lead 210 precision (±)   | 0.4    | pCi/g-dry |      |      |     | NERHL-65-4 | 12/02/04 06:09 / trs |
| Radium 226               | 0.5    | pCi/g-dry |      | 0.2  |     | E903.0     | 11/30/04 13:15 / df  |
| Radium 226 precision (±) | 0.07   | pCi/g-dry |      |      |     | E903.0     | 11/30/04 13:15 / df  |
| Uranium, Activity        | 0.11   | pCi/g-dry |      | 0.01 |     | SW6020     | 12/07/04 13:08 / bws |

**Report** RL - Analyte reporting limit.  
**Definitions:** QCL - Quality control limit.

MCL - Maximum contaminant level.  
ND - Not detected at the reporting limit.



## LABORATORY ANALYTICAL REPORT

**Client:** Crow Butte Resources  
**Project:** Annual Stream and Impoundment Sediments  
**Lab ID:** C04110969-007  
**Client Sample ID:** E19 Stream S1

**Report Date:** 12/09/04  
**Collection Date:** 11/08/04  
**Date Received:** 11/23/04  
**Matrix:** Sediment

| Analyses                 | Result | Units     | Qual | MCL/ |     | Method     | Analysis Date / By   |
|--------------------------|--------|-----------|------|------|-----|------------|----------------------|
|                          |        |           |      | RL   | QCL |            |                      |
| RADIONUCLIDES - TOTAL    |        |           |      |      |     |            |                      |
| Lead 210                 | ND     | pCi/g-dry |      | 1.0  |     | NERHL-65-4 | 12/02/04 06:09 / trs |
| Radium 226               | 0.4    | pCi/g-dry |      | 0.2  |     | E903.0     | 11/30/04 13:15 / df  |
| Radium 226 precision (±) | 0.07   | pCi/g-dry |      |      |     | E903.0     | 11/30/04 13:15 / df  |
| Uranium, Activity        | 0.05   | pCi/g-dry |      | 0.01 |     | SW6020     | 12/07/04 13:37 / bws |

**Report** RL - Analyte reporting limit.  
**Definitions:** QCL - Quality control limit.

MCL - Maximum contaminant level.  
ND - Not detected at the reporting limit.



## LABORATORY ANALYTICAL REPORT

**Client:** Crow Butte Resources  
**Project:** Annual Stream and Impoundment Sediments  
**Lab ID:** C04110969-006  
**Client Sample ID:** E18 Stream S2

**Report Date:** 12/09/04  
**Collection Date:** 11/08/04  
**Date Received:** 11/23/04  
**Matrix:** Sediment

| Analyses                 | Result | Units     | Qual | MCL/ |     | Method     | Analysis Date / By   |
|--------------------------|--------|-----------|------|------|-----|------------|----------------------|
|                          |        |           |      | RL   | QCL |            |                      |
| RADIONUCLIDES - TOTAL    |        |           |      |      |     |            |                      |
| Lead 210                 | ND     | pCi/g-dry |      | 1.0  |     | NERHL-65-4 | 12/02/04 06:09 / trs |
| Radium 226               | 0.4    | pCi/g-dry |      | 0.2  |     | E903.0     | 11/30/04 13:15 / df  |
| Radium 226 precision (±) | 0.06   | pCi/g-dry |      |      |     | E903.0     | 11/30/04 13:15 / df  |
| Uranium, Activity        | 0.03   | pCi/g-dry |      | 0.01 |     | SW6020     | 12/07/04 13:30 / bws |

**Report** RL - Analyte reporting limit.  
**Definitions:** QCL - Quality control limit.

MCL - Maximum contaminant level.  
ND - Not detected at the reporting limit.



## LABORATORY ANALYTICAL REPORT

**Client:** Crow Butte Resources  
**Project:** Annual Stream and Impoundment Sediments  
**Lab ID:** C04110969-005  
**Client Sample ID:** E17 Stream S5

**Report Date:** 12/09/04  
**Collection Date:** 11/08/04  
**Date Received:** 11/23/04  
**Matrix:** Sediment

| Analyses                 | Result | Units     | Qual | MCL/ |     | Method     | Analysis Date / By   |
|--------------------------|--------|-----------|------|------|-----|------------|----------------------|
|                          |        |           |      | RL   | QCL |            |                      |
| RADIONUCLIDES - TOTAL    |        |           |      |      |     |            |                      |
| Lead 210                 | ND     | pCi/g-dry |      | 1.0  |     | NERHL-65-4 | 12/02/04 06:09 / trs |
| Radium 226               | 0.4    | pCi/g-dry |      | 0.2  |     | E903.0     | 11/30/04 13:15 / df  |
| Radium 226 precision (±) | 0.07   | pCi/g-dry |      |      |     | E903.0     | 11/30/04 13:15 / df  |
| Uranium, Activity        | 0.03   | pCi/g-dry |      | 0.01 |     | SW6020     | 12/07/04 13:12 / bws |

**Report** RL - Analyte reporting limit.  
**Definitions:** QCL - Quality control limit.

MCL - Maximum contaminant level.  
ND - Not detected at the reporting limit.





## LABORATORY ANALYTICAL REPORT

**Client:** Crow Butte Resources  
**Project:** Annual Stream and Impoundment Sediments  
**Lab ID:** C04110969-002  
**Client Sample ID:** E14 Impoundment I3

**Report Date:** 12/09/04  
**Collection Date:** 11/08/04  
**Date Received:** 11/23/04  
**Matrix:** Sediment

| Analyses                 | Result | Units     | Qual | MCL/ |     | Method     | Analysis Date / By   |
|--------------------------|--------|-----------|------|------|-----|------------|----------------------|
|                          |        |           |      | RL   | QCL |            |                      |
| RADIONUCLIDES - TOTAL    |        |           |      |      |     |            |                      |
| Lead 210                 | ND     | pCi/g-dry |      | 1.0  |     | NERHL-65-4 | 12/02/04 06:09 / trs |
| Radium 226               | 0.5    | pCi/g-dry |      | 0.2  |     | E903.0     | 11/30/04 13:15 / df  |
| Radium 226 precision (±) | 0.08   | pCi/g-dry |      |      |     | E903.0     | 11/30/04 13:15 / df  |
| Uranium, Activity        | 0.13   | pCi/g-dry |      | 0.01 |     | SW6020     | 12/07/04 13:01 / bws |

Report RL - Analyte reporting limit.  
Definitions: QCL - Quality control limit.

MCL - Maximum contaminant level.  
ND - Not detected at the reporting limit.



## LABORATORY ANALYTICAL REPORT

**Client:** Crow Butte Resources  
**Project:** Annual Stream and Impoundment Sediments  
**Lab ID:** C04110969-003  
**Client Sample ID:** E15 Impoundment I4

**Report Date:** 12/09/04  
**Collection Date:** 11/08/04  
**Date Received:** 11/23/04  
**Matrix:** Sediment

| Analyses                 | Result | Units     | Qual | MCL/ |     | Method     | Analysis Date / By   |
|--------------------------|--------|-----------|------|------|-----|------------|----------------------|
|                          |        |           |      | RL   | QCL |            |                      |
| RADIONUCLIDES - TOTAL    |        |           |      |      |     |            |                      |
| Lead 210                 | ND     | pCi/g-dry |      | 1.0  |     | NERHL-65-4 | 12/02/04 06:09 / trs |
| Radium 226               | 0.6    | pCi/g-dry |      | 0.2  |     | E903.0     | 11/30/04 13:15 / df  |
| Radium 226 precision (±) | 0.08   | pCi/g-dry |      |      |     | E903.0     | 11/30/04 13:15 / df  |
| Uranium, Activity        | 0.07   | pCi/g-dry |      | 0.01 |     | SW6020     | 12/07/04 13:05 / bws |

**Report** RL - Analyte reporting limit.  
**Definitions:** QCL - Quality control limit.

MCL - Maximum contaminant level.  
ND - Not detected at the reporting limit.