



UNITED STATES
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

February 20, 1997

Crow Butte Resources, Inc.
ATTN: Mr. Stephen P. Collings, President
216 Sixteenth Street Mall, Suite 810
Denver, Colorado 80202

SUBJECT: AMENDMENT 36 TO SOURCE MATERIAL LICENSE SUA-1534, CROW BUTTE
RESOURCES, INC. IN SITU MINE, DAWES COUNTY, NEBRASKA

Dear Mr. Collings:

The U.S. Nuclear Regulatory Commission staff has completed its review of Crow Butte Resources Inc.'s (CBR's) annual surety update as contained in your submittal of September 19, 1996, and subsequently revised by letter dated October 28, 1996. By these submittals, CBR proposed a revised surety amount of \$6,161,448, which represents an increase of \$808,936 from the previously approved amount. The proposed increase reflects (1) additional Mine Unit 5 construction, (2) activities related to the restoration of the Brule shallow aquifer in an area of Mine Unit 2, (3) additional deep disposal well reclamation costs, and (4) an increase by 2.9 percent to reflect inflationary increases from August 1995 to August 1996. The NRC staff's review finds the proposed increase in the surety amount to be appropriate, and the revised amount of \$6,161,448 is acceptable.

In addition, the NRC staff has completed its review of CBR's amendment request dated February 16, 1996, and subsequently amended by letters dated February 22 and July 10, 1996. By these submittals, CBR proposed resetting upper control limits for two shallow monitor wells completed in Mine Unit 4. The details of this amendment request are discussed in the NRC staff's Technical Evaluation Report (TER). The TER documents the basis for the NRC staff's evaluation of the amendment request and is provided as Enclosure 1. Based on its review, the NRC staff finds the amendment request to be acceptable.

Therefore, pursuant to Title 10 of the Code of Federal Regulations, Part 40, Source Material License SUA-1534 is hereby amended by revising License Condition Nos. 27 and 44. All other conditions of this license shall remain the same.

The license is being reissued to incorporate the above modifications (Enclosure 2). Environmental reviews were not performed since these actions are categorically excluded under 10 CFR 51.22(c)(10) and (c)(11) respectively.

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S. Collings

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These changes to your license were discussed and agreed to in a telephone conversation on February 7, 1997, between yourself and Mr. James Park of my staff. If you have any questions regarding this letter or the enclosures, please contact Mr. Park at (301) 415-6699.

Sincerely,

(Original signed by)

Joseph J. Holonich, Chief
Uranium Recovery Branch
Division of Waste Management
Office of Nuclear Material
Safety and Safeguards

Docket No. 40-8943
SUA-1534, Amendment No. 36
Cases Closed: L51371, L51464

Enclosures: As stated (2)

cc: R. Knode, CBR
H. Borchert, RCPD, NE
NDEQ
PDR, NE

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TECHNICAL EVALUATION REPORT
FOR REQUEST TO MODIFY SM 4-2 AND 4-7 UPPER CONTROL LIMITS

DATE: February 12, 1997

DOCKET NO. 40-8943

LICENSE NO. SUA-1534

LICENSEE: Crow Butte Resources, Inc.

FACILITY: Crow Butte In Situ Leach Mine

PROJECT MANAGER: James Park

SUMMARY AND CONCLUSIONS:

By letter dated February 16, 1996, and amended by submittals dated February 22, and July 10, 1996, Crow Butte Resources, Inc. (CBR) requested that upper control limits (UCLs) for two shallow monitor wells in Mine Unit 4 be reset. The two wells in question had been on excursion status since April 13, 1995 and December 29, 1995, respectively.

The NRC staff has reviewed CBR's proposal and finds the proposed UCL modifications to be acceptable. In addition, based on its review of the relevant data, the NRC staff considers the excursions to be concluded.

DESCRIPTION OF LICENSEE'S AMENDMENT REQUEST:

By letter dated February 16, 1996, as amended by letters dated February 22, and July 10, 1996, CBR requested that UCLs for two shallow monitor wells in Mine Unit 4 be reset. The two wells in question, SM 4-2 and SM 4-7, had been on excursion status since April 13, 1995 and December 29, 1995, respectively. CBR did not believe the measured exceedances of the UCLs for these wells to be related to excursions of mining fluids. Instead, it considered that water quality sampled by these wells was approaching the average baseline values for the mine unit as a whole.

CBR proposed that the new UCLs for the two wells be based on a statistical adjustment of the average values for the five excursion indicator parameters (sodium, sulfate, chloride, conductivity, and alkalinity), derived from the 33 baseline samples taken for the 11 shallow monitor wells in Mine Unit 4. The "multiple" UCL would be calculated as the average value plus three standard deviations, and the "single" UCL as the average value plus five standard deviations.

CBR provided a table showing statistics from the 33 baseline samples (minimum and maximum values observed, average value, sample deviation), and the proposed "multiple" and "single" UCLs.

TECHNICAL EVALUATION:

Excursion monitoring and corrective actions

By telephone call on April 14, 1995 and by letter dated April 19, 1995, CBR reported that multiple UCLs for sodium and alkalinity for SM 4-2 had been exceeded, and that it had begun to implement corrective actions to address the situation.

By telephone call on and letter dated December 29, 1995, CBR notified the NRC that the single UCL for chloride had been exceeded in SM 4-7, and that it had begun to implement corrective actions to address the situation.

In both cases, CBR did not consider that a true excursion had taken place, because constituent levels for the other indicator parameters were unaffected and levels for all of the parameters remained a fraction of those measured in the injection and production lixiviants. CBR believed that the sodium and alkalinity levels in SM 4-2 and the chloride levels in SM 4-7 were trending toward the average levels observed for the mine unit as a whole.

However, for each well, CBR instituted corrective actions, which included (1) sampling on a weekly basis, in accordance with License Condition 45 of SUA-1534, and (2) a review of well completion records and mechanical integrity tests (MIT) for wells immediately surrounding the well. On June 13, 1995 and February 29, 1996, CBR submitted a written report, for SM 4-2 and SM 4-7 respectively, describing the excursion event, corrective actions taken, and results obtained, in accordance with License Condition 46 of SUA-1534. These reports provided the following comparisons:

- groundwater chemistry as sampled from the excursion well to the entire suite of Mine Unit 4 shallow monitor wells, and
- groundwater chemistry as sampled from the excursion well to sampled injection/production lixiviant chemistries.

CBR also provided graphs of excursion indicator parameter concentrations for each monitor well over time, and noted that its review of the well completion records and MITs for each of the events did not reveal any problems that could lead to an excursion.

NRC staff determination concerning continued excursion status

The NRC staff's review of the graphs of concentration versus time found that, over the period of sampling provided (extending from approximately one year prior to the excursion event until two months following the event), concentrations have remained stable for the majority of indicator parameters. For the remaining parameters, increases in concentration, some of which led to the declaration of an excursion, were followed by a renewed period of stability, although at a slightly higher concentration (i.e., several parts per million (ppm) or milligrams per liter (mg/l) higher) than previous to the event. For all

sampled indicator parameters for both wells, concentrations remain between 4 and 20 percent of the measured injection/production concentrations, depending on the parameter in question.

In addition, the NRC staff reviewed sampling results for the two wells as reported in CBR's semi-annual effluent reports, submitted in accordance with 10 CFR 40.65. These results show sodium and alkalinity levels in SM 4-2 and chloride levels in SM 4-7 have stabilized and essentially re-established themselves at levels somewhat higher than originally analyzed as part of the pre-operational groundwater quality sampling program conducted for Mine Unit 4. Results of this sampling were submitted to NRC on February 7, 1994. As stated above, these new levels are well below concentrations observed in the lixiviant.

Therefore, based on the consistency in the sampling results obtained since the two wells were placed on excursion status, and the results of MIT testing in surrounding wells, the NRC staff considers that weekly excursion monitoring can be ended for the two wells in question and that these excursions are considered concluded.

NRC staff review of the request to reset UCLs

UCLs for the Crow Butte site are currently calculated in the following manner: (1) prior to operating a specific mine unit, three groundwater samples are collected at each of the monitoring well locations for the mine unit; (2) these samples are analyzed for sodium, sulfate, chloride, conductivity, and alkalinity; (3) the "multiple" UCL for each indicator parameter is set at the highest of the three sampled values plus 20 percent; and (4) the "single" UCL is set at the "multiple" UCL value plus 20 percent. If either the single UCL for one parameter or multiple UCLs for two or more parameters are exceeded, excursion monitoring provisions in CBR's source material license are implemented. CBR is proposing to calculate the multiple parameter UCL by taking the average value plus three standard deviations, and the "single" UCL as the average value plus five standard deviations.

In reviewing CBR's amended request, the NRC staff was unable to determine the sampling data CBR relied upon to develop its proposed UCLs since the Mine Unit 4 data and statistics provided in CBR's July 10, 1996, submittal did not match similar data and statistics supplied in its earlier February 1996 submittals. The February 1996 submittals used data derived from the pre-operational groundwater quality sampling program conducted for Mine Unit 4. Because the NRC staff could not identify the source of the July 10, 1996, data, the staff reviewed the proposed UCLs using the pre-operational groundwater quality data. Based on the staff's calculations, CBR's July 10, 1996, proposed UCLs did not differ significantly from those calculated using the pre-operational data.

Current and proposed UCLs for SM 4-2 and SM 4-7 are provided in Table 1.

<p style="text-align: center;">TABLE 1 COMPARISON OF PROPOSED UCLS TO CURRENT UCLS FOR WELLS SM 4-2 AND 4-7 (concentrations in parts per million unless otherwise specified)</p>					
	Sodium	Sulfate	Chloride	Conductivity (umhos/cm)	Alkalinity
Well SM 4-2 (current)	117/141	122/147	46/56	697/837	126/151
Well SM 4-7 (current)	132/158	59/71	17/20	752/903	236/284
Wells SM 4-2 and 4-7 (proposed)	208/257	126/170	88/127	1039/1256	393/513
Approximate lixiviant concentrations	1200	1140	580	5500	950

As can be observed in Table 1, the proposed UCL concentrations for the five indicator parameters are higher than the current UCLs. However the proposed UCL values remain a fraction of the concentrations observed in the lixiviant. The staff considers that the proposed values will provide adequate warning in the case of an excursion. For this reason, the staff considers CBR's amendment request to be acceptable.

The NRC staff's approval of CBR's amendment request addresses these two wells (SM 4-2 and 4-7) only; UCLs for all current and future monitor wells will continue to be calculated as specified above, unless modified by NRC in a future licensing action or by order.

This approval of CBR's amendment request was discussed with Mr. Steve Collings of CBR in a telephone call on February 7, 1997.

ENVIRONMENTAL IMPACT EVALUATION:

This action is considered a change in process operations which, in accordance with 10 CFR Part 51.22(c)(11), does not result in (i) significant change in the types or significant increase in the amounts of any effluent that may be released offsite, (ii) significant increase in individual or cumulative occupational radiation exposure, (iii) significant construction impact, (iv) significant increase in the potential for or consequences from radiological accidents, due to the implementation of this amendment. Therefore, the requirements for a categorical exclusion have been met and no further environmental action is required.