

June 26, 2001

Mr. Michael L. Griffin  
Manager of Environmental and Regulatory Affairs  
Crow Butte Resources, Inc.  
86 Crow Butte Road  
Post Office Box 169  
Crawford, NE 69339-0169

SUBJECT: LICENSE AMENDMENT 11, CROW BUTTE RESOURCES *IN SITU* LEACH  
FACILITY, LICENSE NO. SUA-1534

Dear Mr. Griffin:

We have completed our review of your requests to amend Materials License SUA-1534, Condition 10.3. You submitted the amendment requests by letter dated January 14, 2000 (ML003677825), and revised it by letter dated February 8, 2000 (ML003685137). You requested that License Condition 10.3 be amended to 1) change the constituents required to characterize wellfield baseline water quality and demonstrate wellfield restoration; 2) include secondary restoration goals; and 3) approve the completion of Unit 1 wellfield restoration.

Staff concludes that two of the amendment requests are acceptable. These two amendments to License Condition 10.3 are applicable solely to groundwater within the portion of the Chadron aquifer exempted by the U.S. Environmental Protection Agency. Based on the information provided in the above referenced submittals, staff concludes the revised constituent list and the inclusion of secondary restoration goals are acceptable and in compliance with Title 10 Code of Federal Regulations (10 CFR) 40.32(c), which requires that the licensee's proposed equipment, facilities, and procedures are adequate to protect public health and minimize the danger to life and property; and 10 CFR 40.41(c), which requires that the licensee confine source and byproduct material to the locations and purposes authorized in the license. However, you will need to provide additional information in order for staff to complete the review of your requested approval of the Unit 1 wellfield restoration. Enclosure 1 contains the Request for Additional Information (RAI). Staff's Technical Evaluation Report of your amendment requests and the supporting information for the RAI is contained in Enclosure 2. Please provide your responses to Enclosure 1 to the NRC within sixty days from the date of this letter.

Pursuant to 10 CFR Part 2, Subpart A, we hereby amend License Condition 10.3 to include two of the modifications you stipulated in the January 10, and February 8, 2000 submittals. All other conditions of the license shall remain the same. Enclosure 3 contains the reissued license, which incorporates these changes. You are hereby directed to revise the appropriate portions of the approved license application to include the revisions and commitments contained in the January 10, 2000 submittal. This revision shall include a table in section 6.1.3 of the approved license application, showing the numerical limits and other restoration parameters contained in the Nebraska Underground Injection Control Permit NE012261, dated March 9, 2001. These license application revisions will be reviewed during the next inspection scheduled for your facility.

June 26, 2001

2

M. Griffin

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/NRC/ADAMS/index.html> (the Public Electronic Reading Room). If you have any questions concerning this letter, please notify the NRC point of contact, Mr. Michael Layton, at (301) 415-6676 or e-mail [mcl@nrc.gov](mailto:mcl@nrc.gov).

Sincerely,

**/RA/**

Melvyn Leach, Acting Chief  
Fuel Cycle Licensing Branch  
Division of Fuel Cycle Safety  
and Safeguards  
Office of Nuclear Material Safety  
and Safeguards

Docket No. 40-8943  
License No. SUA-1534

Enclosure 1: Request for Additional Information  
Enclosure 2: Technical Evaluation Report  
Enclosure 3: Amendment 11, Materials License SUA-1534

cc w/ enclosures:

Stephen P. Collings, CBR, Denver  
Dave Miesbach, Nebraska, UIC, DEQ

cc w/o enclosures:

Dave Carlson Nebraska, UIC, DEQ  
Cheryl K. Rogers, Nebraska, RMP, PHA

June 26, 2001

M. Griffin

2

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/NRC/ADAMS/index.html> (the Public Electronic Reading Room). If you have any questions concerning this letter, please notify the NRC point of contact, Mr. Michael Layton, at (301) 415-6676 or e-mail [mcl@nrc.gov](mailto:mcl@nrc.gov).

Sincerely,

/RA/

Melvyn Leach, Acting Chief  
Fuel Cycle Licensing Branch  
Division of Fuel Cycle Safety  
and Safeguards  
Office of Nuclear Material Safety  
and Safeguards

Docket No. 40-8943  
License No. SUA-1534

Enclosure 1: Request for Additional Information  
Enclosure 2: Technical Evaluation Report  
Enclosure 3: Amendment 11, Materials License SUA-1534

cc w/ enclosures:

Stephen P. Collings, CBR, Denver  
Dave Miesbach, Nebraska, UIC, DEQ

cc w/o enclosures:

Dave Carlson Nebraska, UIC, DEQ  
Cheryl K. Rogers, Nebraska, RMP, PHA

**Casework: L51917 Closed**

**DISTRIBUTION** w/Encl.: FILE CENTER NMSS r/f FCLB r/f CNWRA  
ACNW PUBLIC WFord WVonTill CCain RIV LCarson RIV  
w/o Encl.: MMorarity ANorris

**DOCUMENT NAME: L:\CBR11#**

<b>OFC</b>	FCLB		FCLB		FCLB		OGC		FCLB	
<b>NAME</b>	MLayton*		ARamirez*		DGillen*		STreby*		MLeach	
<b>DATE</b>	05/04/01		05/04/01		05/30/01		06/13/01		06/26/01	

see previous concurrence

**OFFICIAL RECORD COPY**

**This document should be made available to the PUBLIC**

MCL

(Initials)

05/04/01

(Date)

## **REQUEST FOR ADDITIONAL INFORMATION**

### **Unit 1 Groundwater Restoration Completion**

Staff completed its review of the approval request for the completion of groundwater restoration in Unit 1, as presented in Crow Butte's "Mine Unit 1 Restoration Report," (Crow Butte Resources, Inc., 2000B). The submitted data show that groundwater quality has been restored to the baseline concentrations established for the amended license condition 10.3. However, the licensee has not described what measures were attempted to meet the primary restoration goals described in the approved Groundwater Restoration Plan (Crow Butte Resources, Inc., 1999). In addition, the submitted data do not demonstrate that these concentrations have reached a level of stability that will assure continued compliance with the restoration goals. Section 6.1 of NUREG-1569 (NRC, 1997) provides the acceptance criteria for evaluating groundwater restoration at ISL facilities. These criteria for restoration success are based on the ability to meet the restoration goals and the absence of a significant increasing trend during the stability monitoring period (NRC, 1997, section 6.1.3(3)). Staff identified the following items, which indicate the Unit 1 restoration has not yet reached stability, and the additional information that is needed:

#### **1. Primary Restoration Goals**

Crow Butte's approved license application dated December 1995 and revised July 9, 1999 describes the primary restoration goal for wellfield restoration as, "... to return groundwater affected by mining operations to baseline values on a mine unit average." Crow Butte's approved Groundwater Restoration Plan dated November 26, 1999, also affirms the primary restoration goal. Section 4.0 of the approved Groundwater Restoration Plan states:

"If restoration activities have returned the well field average of restoration parameters to concentrations at or below those approved by the USNR [primary restoration goals], CAR will proceed with the stabilization phase of restoration."

Crow Butte's January 14, 2000 letter requests an amendment to license condition 10.3C to include secondary restoration goal, *in addition* to the primary restoration goal.

The license must provide a written description of the attempts and effort it put forward to attain the primary restoration goals for Unit 1 contained in the approved license application. The description should include a listing of those parameters that meet the primary restoration goal and those that are above the primary restoration goal, as well as those at or below the secondary restoration goal. The description should also include the technical or economic reasons why it was not possible to achieve the primary restoration goals.

#### **2. Stability of Groundwater Restoration**

The submitted stabilization monitoring data show strongly increasing trends in the concentrations of uranium, carbonate, potassium, radium-226, calcium, ammonium, chloride, iron, magnesium, manganese, molybdenum, sodium, sulfate, and total dissolved solids. The Unit 1 restoration does not appear to have stabilized over the six month stabilization period provided by the January 10, 2000 submittal.

The licensee must submit additional monitoring data to show that all measured constituents have reached the restoration goals in License Condition 10.3 and that the restored concentrations are stable, as demonstrated by no strongly increasing concentration trends

**REQUEST FOR ADDITIONAL INFORMATION**  
**Unit 1 Groundwater Restoration Completion**

through time. These data should be presented in time versus concentration graphs of each constituent, with the restoration standard indicated on the graph. Tables of numerical values used to compile the graphs, and laboratory measurements should also be included. These data should include the time period just prior to and during the stabilization period, and measurements taken since the end of the 6-month stabilization period. The licensee must also submit iso-concentration maps of uranium, radium-226, total carbonate, and total dissolved solids in the Unit 1 restoration wells and perimeter monitoring wells, once the restoration has stabilized, to illustrate well field water-quality conditions at the end of stabilization.

**3. Restoration of Well field Flare**

The submitted information does not address how the so-called well field flare (contaminated groundwater between the well field and the perimeter monitoring wells) was restored.

Describe how the well field contamination flares, between the well field and the perimeter monitoring wells on the north and south sides of Unit 1, have been restored. Provide any monitoring data, analyses, or calculations that show restoration has occurred in these areas.

## Technical Evaluation Report

**DATE:** May 3, 2001

**DOCKET NO.:** 40-8943

**LICENSE NO.:** SUA-1534

**FACILITY:** Crow Butte Resources, Chadron, Nebraska

**PROJECT MANGER:** Michael C. Layton

**TECHNICAL REVIEWER:** William H. Ford, Hydrogeologist  
William von Till, Hydrogeologist  
Michael C. Layton, Hydrogeologist

**SUMMARY AND CONCLUSIONS:** Staff concludes that the licensee's proposed reduction in the number of parameters for characterizing the baseline groundwater quality of a well field will not adversely affect its ability to demonstrate that the well field has been restored after the uranium extraction phase is complete. Staff also concludes that the licensee's amendment request to include secondary groundwater restoration goals in its well field restoration program is protective of human health and the environment. Both requests are acceptable and in compliance with 10 CFR 40.32(c), which requires that the licensee's proposed equipment, facilities, and procedures are adequate to protect public health and minimize the danger to life and property; and 10 CFR 40.41(c), which requires that the licensee confine source and byproduct material to the locations and purposes authorized in the license and 10 CFR 40.31. Staff concludes that the licensee has not demonstrated that the Unit 1 restoration has stabilized, and must provide additional data and analysis.

**DESCRIPTION OF AMENDMENT REQUESTS:** By letter dated January 14, 2000 (Crow Butte Resources, Inc., 2000A), the licensee submitted the results of its Unit 1 groundwater restoration stabilization period in an attached report dated January 10, 2000 (Crow Butte Resources, Inc., 2000B) for the purpose of demonstrating that the well field has been restored. In addition, the licensee also requested an amendment of License Condition 10.3 to revise groundwater constituents needed to characterize the water quality in a well field before lixiviant is injected, and revise the numerical limits needed to demonstrate achievement of groundwater restoration. The licensee's January 10, 2000 submittal was amended by letter dated February 8, 2000 (Crow Butte Resources, Inc., 2000C) to include a formal request for approval on the Mine Unit 1 restoration.

The licensee requested the following revision to License Condition 10.3B:

*"The samples shall be analyzed for ammonia, arsenic, barium, cadmium, calcium, chloride, copper, fluoride, iron, lead, magnesium, manganese, mercury, molybdenum, nickel, nitrate, pH, potassium, radium-226, selenium, sodium, sulfate, total carbonate, total dissolved*

## Technical Evaluation Report

*solids, uranium, vanadium, and zinc.”*

The licensee also requested the following revision to License Condition 10.3C:

*“Groundwater restoration goals shall be established on a parameter-by-parameter basis for the constituents identified in License Condition 10.3B. The primary goal of restoration shall be on a parameter-by-parameter basis to return the average mine unit concentration to baseline conditions. The secondary goal of groundwater restoration shall be on a parameter-by-parameter basis to return the average mine unit concentration to the class-of-use standards established by the Nebraska Department of Environmental Quality in Underground Injection Control Permit NE0122611. The licensee shall conduct groundwater restoration activities in accordance with the groundwater restoration plan submitted by letter dated November 26, 1996.”*

The licensee also requested approval that groundwater restoration for Unit 1 has been completed, based on the licence revisions proposed above.

The licensee must demonstrate that the proposed modification meets the general requirements of 10 CFR Part 40, specifically 10 CFR 40.32; as described in NUREG-1569, “ Draft Standard Review Plan for *In Situ* Leach Uranium Extraction License Applications” (SRP)(NRC, 1997).

### EVALUATION:

#### **Amendment to License Condition 10.3B:**

Staff completed its review of the proposed modifications to License Condition 10.3B, which lists the parameters used to determine the preoperational groundwater quality; and ultimately the parameters for which groundwater restoration will be measured. The licensee’s requested change removes nine parameters from consideration. These parameters and the licensee’s rationale for excluding them from the parameter list are as follows:

- alkalinity - The licensee indicated that alkalinity is included in the analysis of another water quality parameter. Staff recognizes that the parameters alkalinity, bicarbonate, and carbonate typically measure the effects or speciation of dissolved calcium/magnesium carbonate in the groundwater. Alkalinity is one of five upper control limit used to evaluate whether extraction fluids have migrated beyond the well field during operations (License Condition 10.3B). The license proposes to measure total carbonate as a substitute for alkalinity, bicarbonate, and carbonate. Staff agrees with the licensee’s rationale for removing this parameter from the list.
- bicarbonate - The licensee indicated that bicarbonate is included in the analysis of another water quality parameter. As described in the discussion for alkalinity, staff agrees with the licensee’s rationale for removing this parameter from the list.
- boron - The licensee indicated that boron is a parameter of concern for the potential impact on the growth of crops, and that there is virtually no current groundwater use for irrigation

## Technical Evaluation Report

within the area of the facility. Staff recognizes that boron is typically a trace element in non-saline groundwater, and is not a constituent of concern affecting human health. Staff reviewed the water use survey provided in Crow Butte's updated license renewal application, regarding irrigation uses of groundwater in the area, to verify that irrigation was not a major groundwater use in the area. Staff also examined the tabulated baseline water quality, which vary around 1 mg/L, and the post-extraction water quality measurements (before restoration commenced) for Unit 1, which vary around 1.5 mg/L, as provided in the Crow Butte's updated license renewal application and the January 10, 2000 submittal. This confirmed that ambient boron levels are only slightly affected by extraction operations using the sodium bicarbonate lixiviant. Staff agrees with the licensee's rationale for removing this parameter from the list.

- carbonate - The licensee indicated that carbonate is included in the analysis of another water quality parameter. As described in the discussion for alkalinity, staff agrees with the licensee's rationale for removing this parameter from the list.
- chromium - The licensee indicated that there are low background concentrations of chromium in the area, and that the post-extraction water quality in Units 1, 2, and 3 are below method detection limits. Staff examined the tabulated baseline water quality and the post-extraction water quality measurements (before restoration commenced) for Unit 1, as provided in the Crow Butte's updated license renewal application and the January 10, 2000 submittal. This confirmed that ambient chromium levels are unaffected by extraction operations using the sodium bicarbonate lixiviant. Staff agrees with the licensee's rationale for removing this parameter from the list.
- specific conductivity - The licensee indicated that specific conductivity is included in the analysis of another water quality parameter. Staff recognizes that specific conductivity is a general indicator of the ionic concentration (total dissolved solids) of water. Specific conductivity is typically used as rapid field measurement to provide general indications of the total dissolved solids contained in groundwater. Staff agrees with the licensee's rationale for removing this parameter from the list.
- nitrate - The licensee indicated that the *in situ* leach (ISL) uranium recovery process does not affect nitrate levels in the groundwater. Staff examined the tabulated baseline water quality, which vary less than a few (<5) mg/L, and the post-extraction water quality measurements (before restoration commenced) for Unit 1, which also vary less than a few mg/L, as provided in the Crow Butte's updated license renewal application and the January 10, 2000 submittal. The maximum contaminant level where a health effect is exhibited is 10 mg/L. This confirmed that ambient nitrate levels are relatively unaffected by extraction operations using the sodium bicarbonate lixiviant. Staff agrees with the licensee's rationale for removing this parameter from the list.
- silica - The licensee indicated that the ISL uranium recovery process does not affect silica levels in the groundwater. Staff examined the tabulated baseline water quality, which vary around 20 mg/L, and the post extraction water quality measurements (before restoration commenced) for Unit 1, which vary around 25 mg/L, as provided in the Crow Butte's



## Technical Evaluation Report

January 10, 2000 submittal. This confirmed that ambient silica levels are relatively unaffected by extraction operations using the sodium bicarbonate lixiviant. Staff agrees with the licensee's rationale for removing this parameter from the list.

- temperature - The licensee indicated that the ISL uranium recovery process does not affect temperature of the groundwater. Staff agrees with the licensee's rationale for removing this parameter from the list.

Staff concludes that the licensee's proposed reduction in the number of parameters for characterizing the baseline groundwater quality of a well field will not adversely affect its ability to demonstrate that the well field has been restored after the uranium extraction phase is complete. Further, removing these constituents from well field baseline characterizations and restoration demonstrations will not adversely impact human health or the environment. The uranium extraction operations have little or no affect on the levels of boron, chromium, nitrate, silica, and temperature. The impacts measured by alkalinity, bicarbonate, carbonate, and specific conductivity will be adequately addressed by monitoring total carbonate and total dissolved solids. The State's Underground Injection Control Permit (No. NE0122611) does not include the above listed constituents. Amending NRC's license will also bring an added level of consistency between the NRC and Nebraska groundwater protection programs at this facility.

### **Amendment to License Condition 10.3C:**

Staff completed its review of the proposed modifications to License Condition 10.3C, which requests the addition of the secondary groundwater restoration goals permitted by the State of Nebraska's Underground Injection Control (UIC) Permit NE0122611.

### **Policy Framework**

Since the licensee submitted its January 14, 2000 amendment request, the Commission issued a policy direction to the NRC staff regarding the agency's regulatory authority at ISL facilities. The policy was issued as a Staff Requirements Memorandum on July 26, 2000 and stated:

The NRC takes the position that any waste water generated during or after the uranium extraction phase of site operations, and all evaporation pond sludges derived from such waste waters, would be classified as 11e.(2) byproduct material. The staff would make no legal distinction among the waste waters produced at different stages in a facility's life cycle.

The Commission has approved the staff continuing discussions with EPA and appropriate States to determine the extent the NRC can rely on the EPA Underground Injection Control (UIC) program for groundwater protection issues, thereby potentially minimizing NRC review of groundwater protection issues at ISL facilities.

This policy affirms the NRC's jurisdiction over ISL well field restoration, and recognizes the authority of the EPA and the EPA-authorized States to also provide groundwater protection at ISL facilities. The policy was further clarified in Chairman Meserve's reply to Paul Goranson's

## Technical Evaluation Report

October 2, 2000 letter expressing concerns raised by regulating all ISL effluents as 11e.(2) byproduct material:

Although we [NRC] recognize and agree that the potential of dual regulation may occur, dual regulation is not a result of Commission action, but is a matter of statutory requirements. Dual regulation in wellfields stems, in part, from overlapping authorities granted by two separate Federal laws -- the Atomic Energy Act, which gives authority to the NRC, and the Safe Drinking Water Act, which gives authority to the U.S. Environmental Protection Agency (EPA) and the EPA-authorized States. Consistent with our past practice, the NRC will recommit itself to working with EPA and those States acting under an EPA-authorized program lessen the likelihood and extent of dual regulation of 11e.(2) byproduct material. (Meserve, 2001)

As a result of the Commission's direction, staff held two meetings with staff and managers from two headquarters offices and four regions of EPA to determine the extent to which NRC could rely on technical reviews performed by EPA or the authorized-States, as a basis for NRC's licensing actions. As part of these meeting, the EPA emphasized that all States with licensed ISL facilities have either adopted the federal UIC program in its entirety, or use the federal program, as a minimum, and impose additional requirements that are more stringent than the federal program. An example of more stringent requirements is the criterion for groundwater restoration within the exempted aquifer area that some states or Indian Lands may have adopted.

EPA approves the aquifer exemption that removes the affected portion of the aquifer as an underground source of drinking water, as defined in 40 CFR 144.7. EPA does not impose groundwater restoration limits within the exempted area, because it exempts the area in perpetuity. However, individual States can impose groundwater restoration limits within the exempted area. Although EPA does not require well field restoration, it may require corrective action (cleanup) measures in the exempted well field, if there is an indication that the exempted area might impact the water quality in the adjacent portions of the aquifer (EPA/NRC, 2000).

### Crow Butte's Licensing Background

NRC's environmental assessment for the licensing of commercial ISL operations at the Crow Butte Project (NRC, 1989) relied on the Crow Butte Research & Development (R&D) facility to conclude that groundwater restoration could be accomplished at the commercial operation. The stated restoration goal in the Nebraska's draft UIC permit was a category of use standard. The Nebraska Department of Environmental Quality (NDEQ) considered these goals appropriate within the permitted area. NRC's environmental assessment concluded that based upon previous testing, groundwater could be restored to baseline concentrations or applicable class of use standards. This conclusion was included in the Finding of No Significant Impact (FONSI), published in the Federal Register (54 FR 53200 December 27, 1989). NRC issued a license for the commercial ISL operations at the Crow Butte facility on December 29, 1989. The license contained a condition requiring the licensee to restore groundwater to the average baseline, pre-operational water quality, within each well field.

## Technical Evaluation Report

EPA published its approval of the Chadron Aquifer exemption for Crow Butte's commercial ISL facility in the Federal Register on May 23, 1990 (55 FR 21191, May 23, 1990). EPA concluded that the exempted portion of the Chadron Aquifer did not currently serve as a source of drinking water and will not serve as a source of drinking water in the future. This conclusion was based on the observation that no one was consuming groundwater within the permit boundary, and no one would drink the water in the future, because that portion of the aquifer contains minerals that are expected to be commercially producible. The EPA also considered other criteria in making its decision. The EPA concluded that the exempted portion of the aquifer would not serve as a source of drinking water because it is so naturally contaminated that it would be economically or technologically impractical to render the water fit for human consumption. EPA concluded that it would be unreasonable for the nearest town, Crawford, to develop that portion of the aquifer as a source of drinking water in the future, because other water sources (shallower aquifers and surface water), which require less treatment, are available. The EPA further concluded that uranium and radium concentrations within the exempted area made the aquifer unusable for drinking water without treatment (55 FR 21191, May 23, 1990).

EPA's aquifer exemption further stated that EPA, the NRC, and the NDEQ agreed that groundwater restoration was successful at the Crow Butte Research and Development well field, and that the groundwater use suitability had been restored to conditions that existed prior to ISL activities. EPA also concluded that changes in water chemistry were minimal and that the goals of the restoration goals, which were the UIC permit goals, had been achieved (55 FR 21191, May 23, 1990). NRC has historically viewed groundwater restoration as a method to restore preoperational water use within the wellfields, and prevent adverse impacts to water quality and use outside the well field areas. Crow Butte's wellfields are contained within the exempted portion of the aquifer. NDEQ views the water within the exempted portion of the Chadron aquifer at the Crow Butte facility as unfit for human consumption and views groundwater restoration as a method to prevent contamination of groundwater outside the exempted portion of the aquifer.

NRC's FONSI terminating the license for Crow Butte's R&D test facility was published in the Federal Register (55 FR 22869, June 4, 1990), and concluded, "The licensee has demonstrated that groundwater quality can be stabilized and restored to values determined by the Nebraska Department of Environmental Control."

NDEQ issued its UIC permit for the commercial ISL operations at Crow Butte in April 1990, following lengthy hearings and investigations, based on contentions from the Western Nebraska Resources Council (WNRC). WNRC also challenged EPA's aquifer exemption for commercial operations in the Eighth Circuit Court of Appeals. The Court upheld EPA's aquifer exemption on September 3, 1991.

Crow Butte applied for a renewal of its commercial license in 1995. The renewal application stated that the primary goal of the groundwater restoration program is to return groundwater affected by ISL operations to baseline values on a well field unit average. A secondary goal is to return the groundwater to a quality consistent with pre-operational use or uses. The application also stated that the restoration values specified by NDEQ are consistent with this secondary goal and the restoration values. The application also describes the specific details

## Technical Evaluation Report

of the UIC permit goal. NRC performed an environmental assessment for the renewal, which re-examined the actual and potential environmental impacts associated with continued operation of the commercial ISL facility. NRC issued its FONSI for the renewal on February 23, 1998 (63 FR 9023, February 23, 1998) and concluded:

“Groundwater impacted by mining operations will be restored to baseline conditions on a mine unit average, as a primary goal. If baseline conditions cannot be reasonably achieved, the R&D operations have demonstrated that the groundwater can be restored to applicable class-of-use standards;”

NRC issued the license renewal on February 28, 1998, with the primary restoration goal of returning the groundwater to pre-operational baseline conditions on a wellfield average, as was approved in the original license.

### Crow Butte's Amendment Request

Crow Butte requested an amendment of License Condition 10.3C to include the ability to restore groundwater within the wellfields to the secondary restoration goals contained in its NDEQ UIC permit. The licensee cited the previous NRC environmental reviews performed for the R&D facility, original licensing, and the license renewal as a basis for supporting the amendment request. Staff reviewed the licensing background, contacted the NDEQ, and examined the restoration goals contained in the current UIC permit.

Staff identified that the NDEQ UIC uranium concentration goal is 5 mg/L, which is higher than NRC's uranium concentration of 300 pCi/L (approximately 0.44 mg/L) in 10 CFR Part 20, Appendix B, Table 2 for unrestricted effluent releases. Staff recognizes that NRC and EPA share regulatory authority for groundwater protection at ISL facilities. Staff also recognizes that EPA's aquifer exemption removes that portion of the aquifer from consideration as a drinking water source, and consequently, from the groundwater protection standards administered by EPA. Staff considers that EPA's aquifer exemption demonstrates that the wellfield areas were unsuitable for human consumption without treatment before ISL operations commenced.

EPA's and NDEQ's primary groundwater protection concern appears to be focused on protecting groundwater in the areas adjacent to the exempted aquifer area from impacts of ISL operations. Discussions with NDEQ confirmed that the basis for requiring ISL well field restoration is to assure protection of adjacent groundwater resources. As a result, groundwater protection within the exempted area is currently administered by NDEQ and the NRC. NDEQ's groundwater restoration requirements are imposed as an additional requirement to assure groundwater protection of the adjacent aquifer. Staff also views groundwater restoration within the well field as one means of assuring protection of adjacent groundwater. Staff considers that NDEQ's statutory authority and groundwater protection program, along with EPA's oversight role, provide an adequate level of assuring protection of human health and environment, although the uranium concentrations of the secondary restoration goal are above the NRC's unrestricted release limits.

Staff concludes the licensee's amendment request to include secondary groundwater

## Technical Evaluation Report

restoration goals in its well field restoration program is protective of human health and the environment.

### **Unit 1 Groundwater Restoration Completion:**

Staff completed its review of the approval request for the completion of groundwater restoration in Unit 1, as presented Crow Butte's "Mine Unit 1 Restoration Report," (Crow Butte Resources, Inc., 2000B). The submitted data show that groundwater quality has been restored to the baseline concentrations established for the amended license condition 10.3. However, the licensee has not described what measures were attempted to meet the primary restoration goals described in the approved Groundwater Restoration Plan (Crow Butte Resources, Inc., 1999). In addition, the submitted data do not demonstrate that these concentrations have reached a level of stability that will assure continued compliance with the restoration goals. Section 6.1 of NUREG-1569 (NRC, 1997) provides the acceptance criteria for evaluating groundwater restoration at ISL facilities. These criteria for restoration success are based on the ability to meet the restoration goals and the absence of a significant increasing trend during the stability monitoring period (NRC, 1997, section 6.1.3(3)). Staff identified the following items, which indicate the Unit 1 restoration has not yet reached stability, and additional information that is needed:

- 1) **Finding:** Crow Butte's approved license application dated December 1995 and revised July 9, 1999 describes the primary restoration goal for well field restoration as, .."to return groundwater affected by mining operations to baseline values on a mine unit average." Crow Butte's approved Groundwater Restoration Plan (Crow Butte Resources, Inc., 1999) also affirms the primary restoration goal. Section 4.0 of the approved Groundwater Restoration Plan states:

"If restoration activities have returned the well field average of restoration parameters to concentrations at or below those approved by the USNR [primary restoration goals], CAR will proceed with the stabilization phase of restoration."

Crow Butte's January 14, 2000 letter requests an amendment to license condition 10.3C to include secondary restoration goal, *in addition* to the primary restoration goal.

**Request:** The license must provide a written description of the attempts and effort it put forward to attain the primary restoration goals for Unit 1 contained in the approved license application. The description should include a listing of those parameters that meet the primary restoration goal and those that are above the primary restoration goal, as well as those at or below the secondary restoration goal. The description should also include the technical or economic reasons why it was not possible to achieve the primary restoration goals.

- 2) **Finding:** The submitted stabilization monitoring data show strongly increasing trends in the concentrations of uranium, carbonate, potassium, radium-226, calcium, ammonium, chloride, iron, magnesium, manganese, molybdenum, sodium, sulfate, and total dissolved

## Technical Evaluation Report

solids. The Unit 1 restoration does not appear to have stabilized over the six month stabilization period provided by the January 10, 2000 submittal.

**Request:** The licensee must submit additional monitoring data to show that all measured constituents have reached the restoration goals in License Condition 10.3 and that the restored concentrations are stable, as demonstrated by no strongly increasing concentration trends through time. These data should be presented in time versus concentration graphs of each constituent, with the restoration standard indicated on the graph. Tables of numerical values used to compile the graphs, and laboratory measurements should also be included. These data should include the time period just prior to and during the stabilization period, and measurements taken since the end of the 6-month stabilization period. The licensee must also submit iso-concentration maps of uranium, radium-226, total carbonate, and total dissolved solids in the Unit 1 restoration wells and perimeter monitoring wells, once the restoration has stabilized, to illustrate well field water-quality conditions at the end of stabilization.

- 3) **Finding:** The submitted information does not address how the so-called well field flare (contaminated groundwater between the well field and the perimeter monitoring wells) was restored.

**Request:** Describe how the well field contamination flares, between the well field and the perimeter monitoring wells on the north and south sides of Unit 1, have been restored. Provide any monitoring data, analyses, or calculations that show restoration has occurred in these areas.

Staff concludes that the licensee must provide additional data and analysis to affirm the achievement of the secondary restoration goals and show that the Unit 1 restoration has stabilized. Staff recommends that a request for additional information be sent to the licensee to address the above findings.

**RECOMMENDED REVISIONS TO THE LICENSE:** The following revisions to the Crow Butte license are recommended. Revision to License Condition 9.3 is administrative and includes the reference to the licensee's January 14, 2000 amendment request. Revisions 10.3 reflect modifications to the groundwater baseline characterization and restoration programs evaluated above and language clarifications to assure the condition can be easily inspected.

- 9.3 The licensee shall conduct operations in accordance with the commitments, representations, and statements contained in the license application dated December 1995, as amended by submittals dated April 1, June 25, July 28, October 31, 1997, and January 14, 2000 which are hereby incorporated by reference, except where superseded by license conditions below. Whenever the word "will" or "shall" is used in the above referenced documents, it shall denote a requirement.

[Applicable Amendment: 11]

- 10.3 The licensee shall establish pre-operational baseline groundwater quality data for all



## Technical Evaluation Report

well field units. Baseline water quality sampling shall provide representative pre-operational groundwater quality data and restoration criteria as described in the approved license application.

The data shall consist, at a minimum, of the following sampling and analyses:

- A. Three samples shall be collected from production and injection wells at a minimum density of one production or injection well per 4 acres. These samples shall be collected at least 14 days apart.
- B. The samples shall be analyzed for ammonia, arsenic, barium, cadmium, calcium, chloride, copper, fluoride, iron, lead, magnesium, manganese, mercury, molybdenum, nickel, nitrate, pH, potassium, radium-226, selenium, sodium, sulfate, total carbonate, total dissolved solids, uranium, vanadium, and zinc.
- C. Groundwater restoration goals shall be established on a parameter-by-parameter basis for the constituents identified in License Condition 10.3B. The primary goal of restoration shall be on a parameter-by-parameter basis to return the average well field unit concentration to baseline conditions. The secondary goal of groundwater restoration shall be on a parameter-by-parameter basis to return the average well field unit concentration to the numerical class-of-use standards established by the Nebraska Department of Environmental Quality, as described in section 6.1.3 of the approved license application. The licensee shall conduct groundwater restoration activities in accordance with the groundwater restoration plan submitted by letter dated November 26, 1996.

[Applicable Amendment: 11]

## Technical Evaluation Report

### ENVIRONMENTAL REVIEW:

Staff determined that the amendment of License Condition 9.3 is purely administrative and an environmental assessment is not required in accordance with 10 CFR 51.22(c)(2).

Staff determined the following criteria have been met for the amendment of License Condition 10.3B:

- There is no significant change in the types or significant increase in the amounts of any effluents that may be released offsite,
- There is no significant increase in individual or cumulative occupational radiation exposure,
- There is no significant construction impact, and
- There is no significant increase in the potential for or consequences from radiological accidents.

Accordingly, pursuant to 10 CFR 51.22(c)(11), neither an environmental assessment nor an environmental impact statement is warranted for this action.

Staff determined that the amendment of License Condition 10.3C was fully evaluated in the previous environmental assessments for the Crow Butte R&D facility, the license for commercial operations issued on December 29, 1989, and the license renewal issued on February 28, 1998. No additional environmental review is required.

**COORDINATION AND CONSULTATION:** This technical review and the proposed license amendment were discussed and coordinated with NRC's Region IV Inspection Program, and the Nebraska Department of Environmental Quality, which regulates the Crow Butte Resources facility under its Underground Injection Control Program, delegated from the U.S. Environmental Protection Agency. Revisions to Crow Butte's proposed language for License Condition 10.3C were discussed with the licensee by telephone and e-mail. No unresolved concerns were identified through the course of this coordination.



## Technical Evaluation Report

### REFERENCES:

- Code of Federal Regulations (CFR), Title 10, Chapter I - Nuclear Regulatory Commission, Parts 20 and 51, revised as of January 1, 2001.
- Crow Butte Resource, Inc. 1999. Crow Butte ISL Mine Groundwater Restoration Plan. Letter from Stephen Collings, Crow Butte Resources to Joseph Holonich, Uranium Recovery Branch, NRC, dated November 26, 1999, with attachment. Accession Number 9612040273.
- Crow Butte Resource, Inc. 2000A. Mine Unit 1 Restoration Report and Request License Amendment, Materials License No. SUA-1534. Letter from Michael Griffin, Crow Butte Resources to John Surmeier, Uranium Recovery Branch, NRC, dated January 14, 2000, with attachments. Accession Number ML003677825.
- Crow Butte Resource, Inc. 2000B. Mine Unit 1 Restoration Report Crow Butte Uranium Project. Report attached to Letter from Michael Griffin, Crow Butte Resources to John Surmeier, Uranium Recovery Branch, NRC, dated January 10, 2000. Accession Number ML003677938.
- Crow Butte Resource, Inc. 2000C. Page change for Mine Unit 1 Restoration Report Crow Butte Uranium Project. Report attached to Letter from Michael Griffin, Crow Butte Resources to John Surmeier, Uranium Recovery Branch, NRC, dated February 8, 2000. Accession Number ML003685137.
- EPA/NRC (U.S. Environmental Protection Agency/U.S. Nuclear Regulatory Commission). 2000. Summary of October 10, 2000 Meeting. Accession Number ML011220371.
- Meserve, Richard A. 2001. Letter to Mr. William Paul Goranson, Rio Algom Mining Corporation, January 17, 2001. Accession Number ML003761932.
- NRC (U.S. Nuclear Regulatory Commission). 1997. Draft Standard Review Plan for *In Situ* Leach Uranium Extraction License Applications. NUREG-1569. Office of Nuclear Material Safety and Safeguards.

## **Enclosure 3**

**MATERIALS LICENSE**

Pursuant to the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974 (Public Law 93-438), and the applicable parts of Title 10, Code of Federal Regulations, Chapter I, Parts 19, 20, 30, 31, 32, 33, 34, 35, 36, 39, 40, 51, 70, and 71, and in reliance on statements and representations heretofore made by the licensee, a licensee is hereby issued authorizing the licensee to receive, acquire, possess, and transfer byproduct, source, and special nuclear material designated below; to use such material for the purpose(s) and at the place(s) designated below; to deliver or transfer such material to persons authorized to receive it in accordance with the regulations of the applicable Part(s). This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, as amended, and is subject to all applicable rules, regulations, and orders of the Nuclear Regulatory Commission now or hereafter in effect and to any conditions specified below.

<b>Licensee</b>		
1. Crow Butte Resources, Inc.		3. License Number SUA-1534
		Amend No. 11
2. 274 Union Blvd. Suite 310 Lakewood, Colorado 80228 [Applicable Amendments: 6, 10]		4. Expiration Date February 28, 2008
		5. Docket or Reference 40-8943
6. Byproduct, Source, and/or special Nuclear Material	7. Chemical and/or Physical Form	8. Maximum Amount that Licensee May Possess at Any one Time Under This License
a. Natural Uranium	Any	a. Unlimited
b. Byproduct material as Defined in 10 CFR 40.4	Unspecified	b. Quantity generated under Operations authorized by

**SECTION 9: Administrative Conditions**

- 9.1 Authorized place of use shall be the licensee's Crow Butte uranium recovery and processing facilities in Dawes County, Nebraska.
- 9.2 All written notices and reports to the NRC required under this license, with the exception of reports submitted in accordance with 10 CFR 40.65, shall be addressed to the Chief, Fuel Cycle Licensing Branch, c/o Document Control Desk, Division of Fuel Cycle Safety and Safeguards, Office of Nuclear Material Safety and Safeguards, Mail Stop T-8-A-33, Nuclear Regulatory Commission, 11545 Rockville Pike, Rockville, MD 20850. Semiannual effluent monitoring reports required under 10 CFR 40.65 shall be addressed to Director, Division of Nuclear Material Safety, Region IV, Nuclear Regulatory Commission, 611 Ryan Plaza Drive, Suite 400, Arlington, Texas, 76011.

Incident and event notifications that require telephone notification shall be made to the NRC Operations Center at (301) 816-5100.

[Applicable Amendment: 7]

- 9.3 The licensee shall conduct operations in accordance with the commitments, representations, and statements contained in the license application dated December 1995, as amended by submittals dated April 1, June 25, July 28, October 31, 1997, and January 14, 2000 which are hereby incorporated by reference, except where superseded by license conditions below. Whenever the word "will" or "shall" is used in the above referenced documents, it shall denote a requirement.

[Applicable Amendment: 11]

- 9.4 A. The licensee may, without prior NRC approval, and subject to the conditions specified in Part B of this condition:



**MATERIALS LICENSE  
SUPPLEMENTARY SHEET**

License Number SUA-1534

Docket or Reference  
Number 40-8943

Amendment No. 11

(1) Make changes in the facility or process, as presented in the approved application.

(2) Make changes in the procedures presented in the approved application.

(3) Conduct tests or experiments not presented in the approved application.

B. The licensee shall file an application for an amendment to the license, unless the following conditions are satisfied:

(1) The change, test, or experiment does not conflict with any requirement specifically stated in this license (excluding information referenced in the approved license application), or impair the licensee's ability to meet all applicable NRC regulations.

(2) There is no degradation in the essential safety or environmental commitments in the license application, or provided by the approved reclamation plan.

(3) The change, test, or experiment is consistent with the conclusions of actions analyzed and selected in the Environmental Assessment dated February 1998.

C. The licensee's determinations concerning Part B of this condition shall be made by a "Safety and Environmental Review Panel" (SERP). The SERP shall consist of a minimum of three individuals employed by the licensee, and one of these shall be designated as the SERP chairman. One member of the SERP shall have expertise in management and shall be responsible for approval of managerial and financial changes; one member shall have expertise in operations and/or construction and shall have responsibility for implementing any operational changes; and one member shall be the site Corporate Radiation Safety Officer or equivalent, with the responsibility for assuring changes conform to radiation safety and environmental requirements. Additional members may be included in the SERP as appropriate, to address technical aspects such as health physics, groundwater hydrology, surface-water hydrology, specific earth sciences, and other technical disciplines. Temporary members or permanent members, other than the three above-specified individuals, may be consultants.

9.5 The licensee shall maintain an NRC-approved financial surety arrangement, consistent with 10 CFR 40, Appendix A, Criterion 9, adequate to cover the estimated reclamation and closure costs, if accomplished by a third party, for all existing operations and any planned expansions or operational changes for the upcoming year. Reclamation includes all cited activities and groundwater restoration, as well as off-site disposal of all 11e.(2) byproduct material.

Within three months of NRC approval of a revised closure plan and cost estimate, the licensee shall submit for NRC review and approval, a proposed revision to the financial surety arrangement if estimated costs in the newly approved site closure plan exceed the amount covered in the existing financial surety. The revised surety shall then be in effect within three months of written NRC approval.

Annual updates to the surety amount, required by 10 CFR 40, Appendix A, Criterion 9, shall be provided to NRC by October 1 of each year. If NRC has not approved a proposed revision 30 days prior to the expiration date of the existing surety arrangement, the licensee shall extend the existing arrangement, prior to expiration, for one year. Along with each proposed revision or annual update of the surety, the licensee shall submit supporting documentation showing a breakdown of the costs and the basis for the cost estimates with adjustments for inflation, maintenance of a minimum 15 percent contingency, changes in engineering plans, activities performed, and any other conditions affecting estimated costs for site closure.



**MATERIALS LICENSE  
SUPPLEMENTARY SHEET**

License Number SUA-1534

Docket or Reference  
Number 40-8943

Amendment No. 11

At least 90 days prior to beginning construction associated with any planned expansion or operational change which was not included in the annual surety update, the licensee shall provide for NRC approval an updated surety to cover the expansion or change.

The licensee shall also provide NRC with copies of surety-related correspondence submitted to the State of Nebraska, a copy of the State's surety review, and the final approved surety arrangement. The licensee also must ensure that the surety, where authorized to be held by the State, identifies the NRC-related portion of the surety and covers the above-ground decommissioning and decontamination, the cost of offsite disposal, soil and water sample analyses, and groundwater restoration associated with the site. The basis for the cost estimate is the NRC-approved site closure plan or the NRC-approved revisions to the plan. Reclamation/decommissioning plan, cost estimates, and annual updates should follow the outline in Appendix E to NUREG-1569 (NRC, 1997), entitled "Recommended Outline for Site-Specific *In Situ* Leach Facility Reclamation and Stabilization Cost Estimates."

Crow Butte Resources, Inc.'s currently approved surety instrument, an Irrevocable Standby Letter of Credit issued by the Royal Bank Of Canada (New York Branch), in favor of the State of Nebraska, shall be continuously maintained in the sum total amount of no less than \$12,026,303 for the purpose of complying with 10 CFR 40, Appendix A, Criterion 9, until a replacement is authorized by both the State of Nebraska and NRC.

[Applicable Amendments: 1, 2, 5, 9]

- 9.6 Written standard operating procedures (SOPs) shall be established and followed for all operational process activities involving radioactive materials that are handled, processed, or stored. SOPs for operational activities shall enumerate pertinent radiation safety practices to be followed. Additionally, written procedures shall be established for non-operational activities to include in-plant and environmental monitoring, bioassay analyses, and instrument calibrations. An approved, up-to-date copy of each written procedure shall be kept in the process area to which it applies.
- All written procedures for both operational and non-operational activities shall be reviewed and approved in writing by the site Corporate Radiation Safety Officer (CRSO) before implementation and whenever a change in procedure is proposed to ensure that proper radiation protection principles are being applied. In addition, the CRSO shall perform a documented review of all existing SOPs at least annually.
- 9.7 The licensee shall dispose of 11e.(2) byproduct material from the Crow Butte facility at a site licensed by NRC or an NRC Agreement State to receive 11e.(2) byproduct material. The licensee shall identify the disposal facility to NRC in writing. The licensee's approved waste disposal agreement must be maintained on-site. In the event the agreement expires or is terminated, the licensee shall notify NRC in writing, in accordance with License Condition 9.2, within 7 days after the date of expiration or termination. A new agreement shall be submitted for NRC approval within 90 days after expiration or termination, or the licensee will be prohibited from further lixiviant injection.
- 9.8 Release of equipment, materials, or packages from the restricted area shall be in accordance with the NRC guidance document entitled "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material," dated May 1987, or suitable alternative procedures approved by NRC prior to any such release.



**MATERIALS LICENSE  
SUPPLEMENTARY SHEET**

License Number SUA-1534

Docket or Reference  
Number 40-8943

Amendment No. 11

- 9.9 Before engaging in any construction activity not previously assessed by NRC, the licensee shall complete a cultural resource inventory. All construction associated with the proposed development will be completed in compliance with the National Historic Preservation Act of 1966 (as amended) and its implementing regulations (36 CFR Part 800), and the Archaeological Resources Protection Act of 1979 (as amended) and its implementing regulations (43 CFR Part 7).

In order to ensure that no unapproved disturbance of cultural resources occurs, any work resulting in the discovery of previously unknown cultural artifacts shall cease. The artifacts shall be inventoried and evaluated in accordance with 36 CFR Part 800, and no disturbance shall occur until the licensee has received authorization from NRC to proceed.

Prior to any developmental activity in the immediate vicinity of the six "potentially eligible" sites identified in Section 2.4 of the approved license application, the licensee shall provide documentation of its coordination with the Nebraska State Historical Society to NRC.

- 9.10 The licensee shall conduct operations within the permit area boundaries shown in Figure 1.3-1 of the approved license application, as amended by the submittal dated July 28, 1997.
- 9.11 The licensee is hereby exempted from the requirements of Section 20.1902(e) of 10 CFR Part 20 for areas within the facility, provided that all entrances to the facility are conspicuously posted in accordance with Section 20.1902(e) and with the words, "ANY AREA WITHIN THIS FACILITY MAY CONTAIN RADIOACTIVE MATERIAL . "
- 9.12 Any corporate organization changes affecting the assignments or reporting responsibilities of the radiation safety staff as described in Section 5 of the approved license application shall conform to Regulatory Guide 8.31.
- 9.13 The licensee shall have a training program for all site employees as described in Regulatory Guide 8.31 and as detailed in the approved license application. The training program shall cover the topics identified in Section 2.5 of Regulatory Guide 8.31.

The CRSO, or their designee, shall have the education, training and experience as specified in Regulatory Guide 8.31. The CRSO shall also receive 40 hours of related health and safety refresher training every two (2) years.

Individuals designated as the Health Physics Technician (HPT) shall report directly to the CRSO on matters dealing with radiological safety. In addition, the CRSO shall be accessible to the HPT at all times. The HPT shall have the qualifications specified in Regulatory Guide 8.31, or equivalent. Any person newly hired as an HPT shall have all work reviewed and approved by the CRSO as part of a comprehensive training program until appropriate course training is completed, and at least for 6 months from the date of appointment.

- 9.14 DELETED by Amendment No. 4

**SECTION 10: Operations, Controls, Limits, and Restrictions**

- 10.1 The licensee shall use a lixiviant composed of native groundwater, with added sodium carbonate/bicarbonate and oxygen or hydrogen peroxide, as described in the approved license application.
- 10.2 The licensee shall construct all wells in accordance with methods described in Section 3.1.2 of the approved license application.



**MATERIALS LICENSE  
SUPPLEMENTARY SHEET**

License Number SUA-1534

Docket or Reference  
Number 40-8943

Amendment No. 11

Mechanical integrity tests shall be performed on each injection and production well before the wells are utilized and on wells that have been serviced with equipment or procedures that could damage the well casing. Additionally, each well shall be retested at least once each five (5) years it is in use. The integrity test shall pressurize the well to 125 percent of the maximum operating pressure and shall maintain 90 percent of this pressure for 20 minutes to pass the test. A single point resistance test may be used only in conjunction with another approved well integrity testing method. If any well casing failing the integrity test cannot be repaired, the well shall be plugged and abandoned.

- 10.3 The licensee shall establish pre-operational baseline groundwater quality data for all well field units. Baseline water quality sampling shall provide representative pre-operational groundwater quality data and restoration criteria as described in the approved license application.

The data shall consist, at a minimum, of the following sampling and analyses:

- A. Three samples shall be collected from production and injection wells at a minimum density of one production or injection well per 4 acres. These samples shall be collected at least 14 days apart.
- B. The samples shall be analyzed for ammonia, arsenic, barium, cadmium, calcium, chloride, copper, fluoride, iron, lead, magnesium, manganese, mercury, molybdenum, nickel, nitrate, pH, potassium, radium-226, selenium, sodium, sulfate, total carbonate, total dissolved solids, uranium, vanadium, and zinc.
- C. Groundwater restoration goals shall be established on a parameter-by-parameter basis for the constituents identified in License Condition 10.3B. The primary goal of restoration shall be on a parameter-by-parameter basis to return the average well field unit concentration to baseline conditions. The secondary goal of groundwater restoration shall be on a parameter-by-parameter basis to return the average well field unit concentration to the numerical class-of-use standards established by the Nebraska Department of Environmental Quality, as described in section 6.1.3 of the approved license application. The licensee shall conduct groundwater restoration activities in accordance with the groundwater restoration plan submitted by letter dated November 26, 1996.

[Applicable Amendment: 11]

- 10.4 The licensee shall establish upper control limits (UCLs) in designated upper aquifer and perimeter monitoring wells before lixiviant is injected in each well field unit. The UCLs shall be established by collecting and analyzing groundwater samples from those designated wells according to the following criteria:

- A. Three samples shall be collected from each designated monitoring well at a minimum density of: 1) one upper aquifer monitoring well per 5 acres of well field area, and 2) all perimeter monitoring wells. These samples shall be collected at least 14 days apart. The results of these analyses shall constitute the baseline for each designated well.
- B. The samples shall be analyzed for the following indicator parameters: chloride, sodium, sulfate, conductivity, and total alkalinity.
- C. The UCLs shall be calculated for each indicator parameter, in each monitoring well, as equal to 20 percent above the maximum concentration measured for that parameter, among the three baseline samples. For those indicator parameters with baseline concentrations that average 50 mg/L or less, the UCL for that parameter may be calculated as equal to 20 percent above the maximum baseline concentration, the baseline average plus 5 standard deviations, or the baseline average plus 15 mg/L. [Applicable Amendments: 8, 10]



**MATERIALS LICENSE  
SUPPLEMENTARY SHEET**

License Number SUA-1534

Docket or Reference  
Number 40-8943

Amendment No. 11

10.5 The plant throughput shall not exceed a maximum flow rate of 5000 gallons per minute, excluding restoration flow. Annual yellowcake production shall not exceed 2 million pounds.

10.6 Each of the R&D evaporation ponds shall have at least 0.9 meters (3 feet) of freeboard. Each of the commercial evaporation ponds shall have at least 1.5 meters (5 feet) of freeboard.

Additionally, the licensee shall maintain, at all times, sufficient reserve capacity in the evaporation pond system to enable transferring the contents of a pond to the other ponds. In the event of a leak and subsequent transfer of liquid, freeboard requirements shall be suspended during the repair period.

10.7 All liquid effluents from process buildings and other process waste streams, with the exception of sanitary wastes, shall be returned to the process circuit; discharged to the solar evaporation ponds; disposed by land irrigation in accordance with the licensee's proposal submitted on August 3, 1988, as modified by its submittal on June 7, 1993; or deep well injected in accordance with the licensee's report submitted on August 24, 1993, as modified by submittals dated December 7, 1995, April 3, 1996, and September 12, 2000.

[Applicable Amendment: 7]

10.8 The licensee shall maintain effluent control systems as specified in Sections 4.1 and 5.7.1.1 of the approved license application, with the following exceptions:

- A. If any of the yellowcake emission control equipment fails to operate within specifications set forth in the standard operating procedures, the drying and packaging room shall immediately be closed-in as an airborne radiation area and heating operations shall be switched to cooldown, or packaging operations shall be temporarily suspended. Packaging operations shall not be resumed until the vacuum system is operational to draw air into the system.
- B. The licensee shall, during all periods of yellowcake drying operations, assure that the negative pressure specified in the standard operating procedures for the dryer heating chamber is maintained. This shall be accomplished by either (1) performing and documenting checks of air pressure differential approximately every four hours during operation, or (2) installing instrumentation which will signal an audible alarm if the water flow or air pressure differential falls below the recommended levels. If an audible alarm is used, its operation shall be checked and documented at the beginning and end of each drying cycle when the differential pressure is lowered.

10.9 The licensee shall be required to use a Radiation Work Permit (RWP) for all work or non-routine maintenance jobs where the potential for significant exposure to radioactive materials exists, and for which no standard written operating procedure exists. The RWP shall be issued by the CRSO, or designee qualified by way of specialized radiation protection training, and RWPs shall include, as a minimum, the information described in Section 2.2 of Regulatory Guide 8.31, "Health Physics Surveys in Uranium Recovery Facilities."

10.10 In-plant radiological monitoring for airborne uranium and radon daughters shall be conducted at the locations shown in Figure 5.7-1 in the approved license application.



**MATERIALS LICENSE  
SUPPLEMENTARY SHEET**

License Number SUA-1534

Docket or Reference  
Number 40-8943

Amendment No. 11

- 10.11 Employees shall monitor themselves with an alpha survey instrument prior to exiting the restricted area. Should the results of monitoring exceed an action level of 1000 dpm/100 cm<sup>2</sup>, employees shall decontaminate themselves to less than the action level. If decontamination cannot be accomplished, the employee shall report the incident to the CRSO for investigation.
- 10.12 In addition to the bioassay program discussed in Section 5.7.5 of the approved license application, the licensee also shall perform *in vivo* measurements in accordance with the recommendations contained in Revision 1 of Regulatory Guide 8.22.
- 10.13 All radiation monitoring, sampling, and detection equipment shall be recalibrated after each repair and as recommended by the manufacturer, or at least annually, whichever is more frequent. In addition, all radiation survey instruments shall be operationally checked with a radiation source each day when in use.
- 10.14 The licensee shall maintain an area within the restricted area boundary for temporary storage of contaminated materials. All contaminated wastes and evaporation pond residues shall be disposed at a radioactive waste disposal site licensed to accept 11e.(2) byproduct material.
- 10.15 The licensee shall construct evaporation ponds 2 and 5 in accordance with the engineering design report dated April 27, 1988, as modified by the submittals dated May 11, and July 16, 1992. In addition, the ponds shall be constructed as follows:
- A. Fill material shall be classified as a silty sand material in accordance with the Unified Soil Classification System.
  - B. Quality control of the fill shall be performed in accordance with the guidance provided for radon barrier materials in the NRC "Staff Technical Position on Testing and Inspection Plans during Construction of DOE's Remedial Action at Inactive Uranium Mill Tailing Sites" (January 1989).
  - C. As-built drawings of the constructed ponds shall be submitted to NRC within 3 months of the completion of construction of each pond.
- 10.16 Production zone monitor wells drilled after April, 1999, shall be spaced no greater than 300 feet from a well field unit and no greater than 400 feet between the wells.

**SECTION 11: Monitoring, Recording, and Bookkeeping Requirements**

- 11.1 Flow rates on each injection and recovery well, and manifold pressures on the entire system, shall be measured and recorded daily. During wellfield operations, injection pressures shall not exceed the integrity test pressure at the injection well heads.
- 11.2 All designated perimeter and upper aquifer monitor wells shall be sampled and tested no more than 14 days apart, except in the event of the situations identified in the licensee's submittal dated March 19, 1998. If a designated monitor well is not sampled within 14 days of a previous sampling event, the reasons for the postponement of sampling shall be documented. Sampling shall not be postponed for greater than five days.



**MATERIALS LICENSE  
SUPPLEMENTARY SHEET**

License Number SUA-1534

Docket or Reference  
Number 40-8943

Amendment No. 11

If two UCLs are exceeded in a well or if a single UCL is exceeded by 20 percent, the licensee shall take a confirming water sample within 48 hours after the results of the first analyses are received and analyze the sample for the indicator parameters. If the second sample does not indicate an exceedance, a third sample shall be taken and analyzed in a similar manner with 48 hours after the second set of samples was acquired. If neither the second nor the third sample indicate an exceedance, the first sample shall be considered in error.

If either the second or third sample confirms that a UCL(s) has been exceeded, the well in question shall be placed on excursion status. Upon confirmation of an excursion, the licensee shall notify NRC in accordance with License Condition 12.2, implement corrective action, and increase the sampling frequency for the indicator parameters at the excursion well to once every seven (7) days. Corrective actions for confirmed excursions may be, but are not limited to, those described in Section 5.7.8.1 of the approved license application. An excursion is considered concluded when the concentrations of the indicator parameters are below the concentration levels defining an excursion for three (3) consecutive weekly samples.

[Applicable Amendment: 1]

- 11.3 The licensee shall establish and conduct an effluent and environmental monitoring program in accordance with the program submitted by letter dated March 18, 1999.

[Applicable Amendment: 3]

- 11.4 The licensee shall perform and document inspections in accordance with the February 5, 1996, revision to its Evaporation Pond Onsite Inspection Program.

Any time 6 inches or more of fluid is detected in a commercial pond standpipe, it shall be analyzed for specific conductance. If the water quality is degraded beyond the action level, the water shall be further sampled and analyzed for chloride, alkalinity, sodium, and sulfate. Any time 6 inches or more of fluid is detected in an R&D pond standpipe, it shall be analyzed for specific conductance, chloride, alkalinity, sodium, and sulfate.

Upon verification of a liner leak, the licensee shall notify NRC in accordance with License Condition 12.3, lower the fluid level by transferring the pond's contents to an alternate cell, and undertake repairs, as needed. Water quality in the affected standpipe shall be analyzed for the five parameters listed above once every 7 days during the leak period and once every 7 days for at least 14 days following repairs.

- 11.5 The licensee shall conduct the in-plant radiological inspection program described in Section 5.3 of the license renewal application, with the following modifications:
- A. The licensee shall document problems observed during the daily visual walk-through inspections in writing; and
  - B. The CRSO and plant manager, or qualified designees, shall perform weekly inspections to observe general radiation control practices and to review required changes in procedures and equipment.



**MATERIALS LICENSE  
SUPPLEMENTARY SHEET**

License Number SUA-1534

Docket or Reference  
Number 40-8943

Amendment No. 11

- 11.6 The results of the following activities, operations, or actions shall be documented: sampling; analyses; surveys and monitoring; survey/monitoring equipment calibration results; reports on audits and inspections; all meetings and training courses required by this license; and any subsequent reviews, investigations, or corrective actions. Unless otherwise specified in the NRC regulations, all such documentation shall be maintained for a period of at least five (5) years.
- 11.7 The licensee shall maintain records of any changes made pursuant to License Condition 9.4 until license termination. These records shall include written safety and environmental evaluations, made by the Safety and Environmental Review Panel, that provide the basis for determining that changes are in compliance with the requirements referred to in Part B of License Condition 9.4

**SECTION 12.0 Reporting Requirements**

- 12.1 Effluent and environmental monitoring program results submitted in accordance with 10 CFR 40.65 shall be reported in the format shown Table 3 of Regulatory Guide 4.14, (Rev 1) entitled, "Sample Format for Reporting Monitoring Data." These reports also shall include injection rates, recovery rates, and injection manifold pressures.
- 12.2 In the event of lixiviant excursion is confirmed by groundwater monitoring, NRC shall be notified by telephone within 24 hours and by letter within seven (7) days from the time the excursion is confirmed, in accordance with License Condition 9.2. In addition, a written report shall be submitted to NRC within 60 days of excursion confirmation. The report shall describe the excursion event, corrective actions taken, and results obtained. If the well(s) are still on excursion when the report is submitted the report also must contain a schedule for the submittal of future reports to NRC which will provide an update of corrective actions taken and the results obtained. In addition, if the well(s) are still on excursion at the time the 60-day report is submitted, the licensee shall terminate injection of lixiviant into the well field on excursion until such time that aquifer cleanup is complete.
- 12.3 In the event evaporation pond standpipe water analyses indicate that a pond is leaking, NRC shall be notified by telephone within 48 hours of verification, in accordance with License Condition 9.2. In addition, a written report shall be submitted to NRC within 30 days of first notifying NRC that a leak exists. This report shall include analytical data, describe the mitigative action, and discuss the results of that action.
- 12.4 Until license termination, the licensee shall maintain documentation on all spills of source or 11e.(2) byproduct materials, and all spills of process chemicals. Documented information shall include: date, spill volume, total activity of each radionuclide released, radiological survey results, corrective actions, results of remediation surveys, and a map showing the spill location and impacted area.
- The licensee shall notify NRC by telephone within 48 hours of any spill of source or 11e.(2) byproduct materials and all spills of process chemicals, that may have a radiological impact on the environment. This notification shall be followed, within seven (7) days, by submittal of a written report detailing the conditions leading to the spill, corrective actions taken, and results achieved. This requirement is in addition to the reporting requirements of 10 CFR Part 20 and 10 CFR 40.60.
- 12.5 The licensee shall submit a detailed decommissioning plan to NRC for review and approval at least 12 months prior to the planned final shutdown of well field extraction operations.



**MATERIALS LICENSE  
SUPPLEMENTARY SHEET**

License Number SUA-1534

Docket or Reference  
Number 40-8943

Amendment No. 11

- 12.6 An annual ALARA audit of the radiation safety program shall be performed in accordance with Regulatory Guide 8.31 and Section 5.3 of the approved license application. The CRSO shall accompany the audit team. A report of this audit shall be retained on-site for NRC inspection. The report also shall summarize the results of the daily walk-through inspections.
- 12.7 The licensee shall furnish, in an annual report to NRC, a description of changes, tests, or experiments made under License Condition 9.4, including a summary of the safety and environmental evaluation of each. In addition, the licensee shall annually submit to NRC page changes to the approved license application to reflect changes made under License Condition 9.4.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA/

Dated: 6/26/01

Melvyn. Leach, Acting Chief  
Fuel Cycle Licensing Branch  
Division of Fuel Cycle Safety  
and Safeguards  
Office of Nuclear Material Safety  
and Safeguards





