

March 29, 2002

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: DENIAL, WELLFIELD UNIT 1 GROUND-WATER RESTORATION  
APPROVAL, CROW BUTTE RESOURCES *IN SITU* LEACH FACILITY,  
LICENSE NO. SUA-1534 (TAC No. L52376)

Dear Mr. Griffin:

The U.S. Nuclear Regulatory Commission (NRC) completed its review of your request to approve the completion of the Unit 1, wellfield restoration. Staff concludes that the data in your Restoration Report, submitted by letter dated January 14, 2000, and the additional information submitted by letter dated August 24, 2001, do not demonstrate that the restoration activities in Unit 1, have resulted in constituent levels that will remain below levels protective of human health and the environment, in accordance with 10 CFR 40.31(h) and Criterion 5F, 10 CFR Part 40, Appendix A. As a result, I am denying approval of the Unit 1, restoration request. Staff's Technical Evaluation Report, which provides the technical basis of this denial is provided as an enclosure to this letter.

In addition, you are hereby required to immediately restart stabilization ground-water monitoring in Unit 1, at the monitoring locations described in your January 10, 2000, Restoration Report. The ground-water shall be sampled and analyzed for the constituents listed in License Condition 10.3B, SUA-1534, on a schedule of at least 14 days apart. The wellfield restoration shall be considered stable if four consecutive sampling episodes show no strongly increasing concentration trends for all monitored constituents, on a wellfield average, as described in Section 6.1.3, "Standard Review Plan for *In Situ* Leach Uranium Extraction License Applications," NUREG-1569.

At that time, you shall submit a written report for NRC review and approval, which provides a tabulation of all stability monitoring data for Unit 1, graphics showing time versus concentration of each monitored constituent, and analyses that demonstrate the restored constituent concentrations are within license limits and are stable. Stability monitoring should continue until four consecutive sampling episodes show no strongly increasing concentration trends. Wellfield restoration activities should be immediately re-initiated in Unit 1, if the concentration of any monitored constituent exceeds its license limit. You shall notify NRC in writing, within 30 days of receiving confirmation of any exceedance of the Unit 1 restoration limits. Crow Butte Resources should also revise its ground-water restoration plan to reflect a stability monitoring period which will allow all constituents to reach stability before ceasing the monitoring. This revision should be submitted for NRC review and approval in the form of a license amendment to Condition 10.3C.

A Notice of Denial shall be published in the FEDERAL REGISTER, pursuant to 10 CFR 2.108(b). Upon publication, Crow Butte Resources will have 30 days to file a petition, requesting a hearing before the Atomic Safety Licensing Board Panel on this denial.

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/reading-rm.html> (the Public Electronic Reading Room).

If you have any questions concerning this letter, please call me directly at (301) 415-7836 or by e-mail [mnl@nrc.gov](mailto:mnl@nrc.gov).

Sincerely,

**/RA/**

Melvyn Leach, 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: Technical Evaluation Report

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

M. Griffin

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

**Casework No.: L52376 - CLOSED**

Enclosure: Technical Evaluation Report

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<b>NAME</b>	MLayton*		JMuszkiewicz*		GJanosko*		STreby		MLeach	
<b>DATE</b>	03/07/02		03/11/02		03/12/02		03/22/02		03/29/02	

\* See previous concurrence

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## Technical Evaluation Report

**DATE:** March 6, 2002

**DOCKET NO.:** 40-8943

**LICENSE NO.:** SUA-1534

**FACILITY:** Crow Butte Resources *In Situ* Leach Uranium Project, Chadron, Nebraska

**PROJECT MANGER:** Michael C. Layton

**TECHNICAL REVIEWER:** Michael C. Layton, Hydrogeologist

**SUMMARY AND CONCLUSIONS:** Staff concludes the data submitted in the January 10, 2000, Restoration Report (CBR, 2000B) and the additional information submitted by letter dated August 24, 2001 (CBR, 2001), do not demonstrate that restoration activities in Wellfield Unit 1, have resulted in constituent levels that will remain below levels protective of human health and the environment, in accordance with 10 CFR 40.31(h) and Criterion 5F, 10 CFR Part 40, Appendix A.

**DESCRIPTION OF AMENDMENT REQUESTS:** By letter dated January 14, 2000 (CBR, 2000A), the licensee submitted the results of its Unit 1, ground-water restoration stabilization period in an attached report dated January 10, 2000 (CBR, 2000B), for the purpose of demonstrating that the wellfield had been restored. The licensee's January 10, 2000, submittal was amended by letter dated February 8, 2000 (CBR, 2000C), to include a formal request for approval on the Mine Unit 1 restoration. The request was also amended by an August 24, 2001 (CBR, 2001), submittal, which responded to NRC's Request for Additional Information (NRC, 2001) to support the request for wellfield restoration approval.

The licensee must demonstrate that the proposed request meets the general requirements of 10 CFR Part 40, specifically 10 CFR 40.31(h) and 10 CFR Part 40, Appendix A, Criterion 5F; as described in Section 6.1.3 (5), "Standard Review Plan for *In Situ* Leach Uranium Extraction License Applications" (SRP), NUREG-1569 Rev. 1 (NRC, 2002).

**EVALUATION:** Staff completed its review of the approval request for the completion of ground-water restoration in Unit 1, as presented in Crow Butte's "Mine Unit 1 Restoration Report," and supplemental documents (CBR, 2000B; CBR, 2000C; and CBR, 2001). The submitted data show that ground-water quality has been restored to the baseline concentrations or the secondary restoration standards established by license condition 10.3C, SUA-1534.

Stability monitoring, after completing ground-water restoration, and demonstrating that the restored ground-water concentrations will remain within license limits, is the final step of the *in situ* leaching process before a wellfield unit is decommissioned and released from the license for the purposes of financial assurance. Guidance to staff for evaluating these measures is provided in Section 6.1.3 of NUREG-1569 (NRC, 2002), and has been included in previous drafts of the SRP since 1997. The SRP directs staff that, "Wellfields may be decommissioned

when all constituents meet the approved standards and show no strong trends in groundwater quality deterioration as a result of ISL activities.” Crow Butte Resources committed to conducting stability monitoring at each wellfield for six months in the 1998 license renewal application and the ground-water restoration plan for the Crow Butte facility (CBR, 1996), which is part of the renewal application. The six-month period was based on forecasts for commercial-scale wellfields, using the restoration and stability data from the smaller pilot-scale wellfield demonstration. In the restoration plan, Crow Butte Resources did not commit to assuring that the restored ground-water was stable before ceasing the stability monitoring program.

The only data provided by the licensee for the majority of the constituents of concern were collected during the six-month stability monitoring period. The licensee did not provide additional data for these constituents beyond the stability monitoring period, as requested in the June 26, 2001, Request for Additional Information. The licensee did provide some additional monitoring data and graphical analysis since the close of the stability monitoring period for the selected constituents of alkalinity, conductivity, sulfate, sodium, and chloride; but did not provide additional data or analyses for other restoration constituents, such as: ammonium, arsenic, boron, calcium, fluoride, iron, magnesium, manganese, molybdenum, potassium, radium-226, selenium, total dissolved solids, uranium, vanadium, or zinc. As a result, staff evaluated the stability of the restoration with the data collected during the stability monitoring period. Staff constructed graphical plots of the data provided by the licensee and performed a regression analysis, using a second order polynomial (Microsoft® Excel 97 SR-1), and visually inspected the resulting polynomial curve fitted to the data to determine whether strongly increase concentration trends were evident in the stability data.

1. **Finding:** Staff’s analysis indicates that concentrations of ammonium, iron, radium-226, selenium, total dissolved solids, and uranium show strongly increasing concentration trends over the stability monitoring period. These trends indicate a reasonable likelihood that license limits would be exceeded in the near future. Other constituents appear to have reached stability, or exhibit such a weakly increasing trend that stability is not a concern. Figures 1, and 2, provide examples of strongly increasing concentration trends in the monitored data during the stability monitoring period. These increasing trends represent a particular concern when a constituent has been restored to the secondary restoration goal, as these two examples were. The secondary restoration standards are greater than the pre-operational baseline concentrations, but are considered protective of the adjacent aquifer beyond the limits of the U.S. EPA designated aquifer exemption boundary. Increasing trends that indicate a potential future exceedance of baseline limits do not represent an immediate concern, since the secondary limits are higher than the baseline limits and are considered protective. Figures 3, and 4, illustrate two constituents that appear to have stabilized during the stability monitoring period. Although Figure 3, shows an increasing trend, this trend is not significant. Figure 4 shows a strongly increasing trend in the early measurements, but the trend dissipated by the time the later data were collected.

FIGURE 1. Unit 1 Radium-226 Measurements

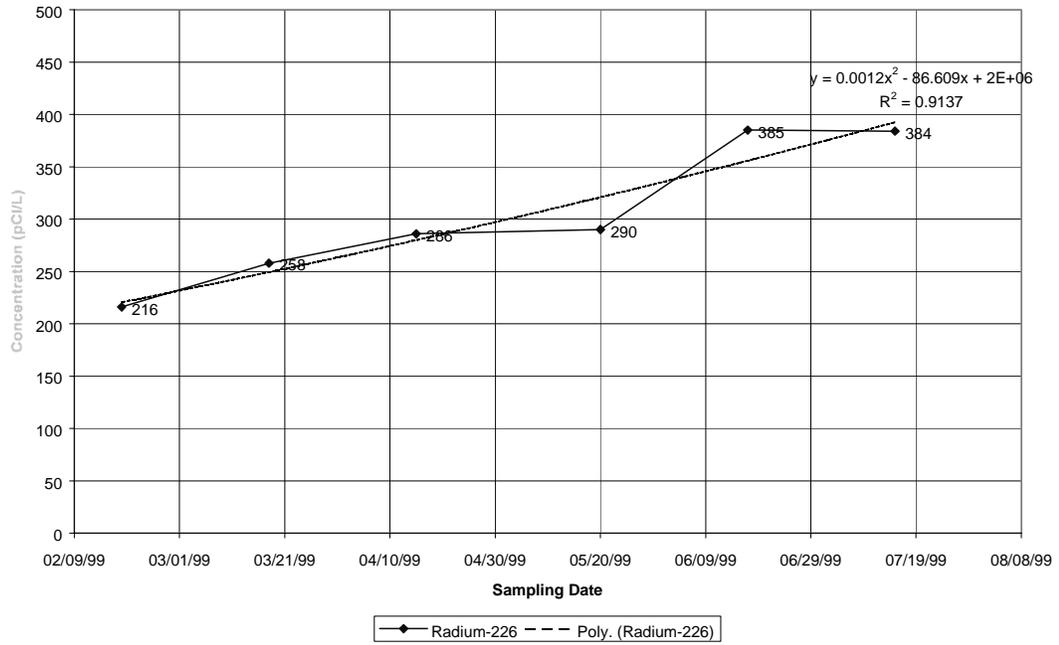


FIGURE 2. Unit 1 Uranium Measurements

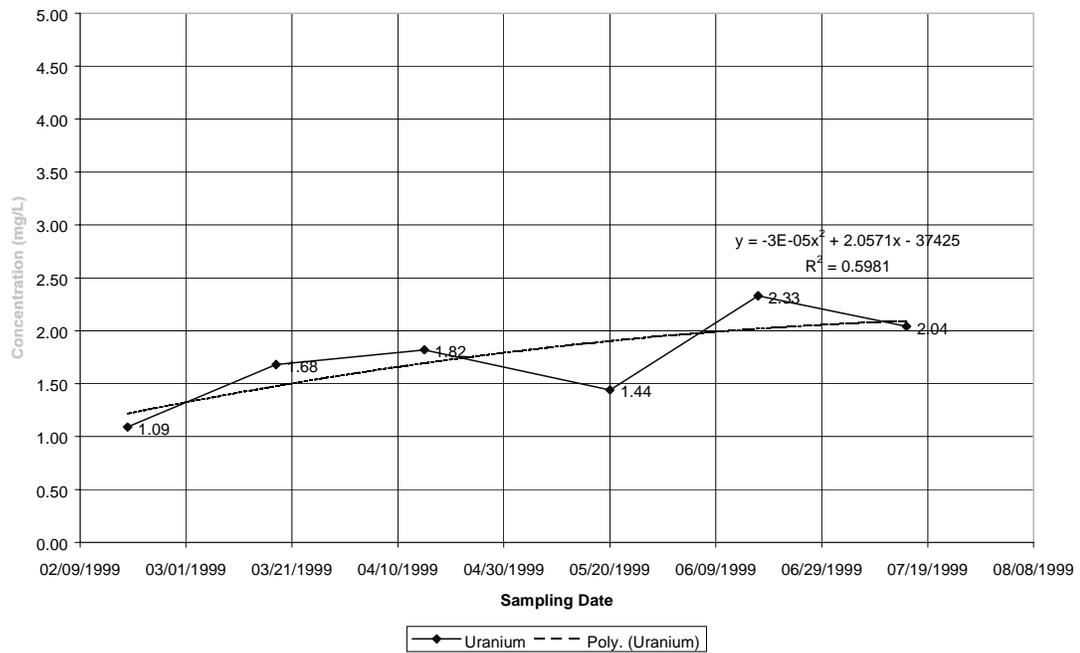


FIGURE 3. Unit 1 Arsenic Measurements

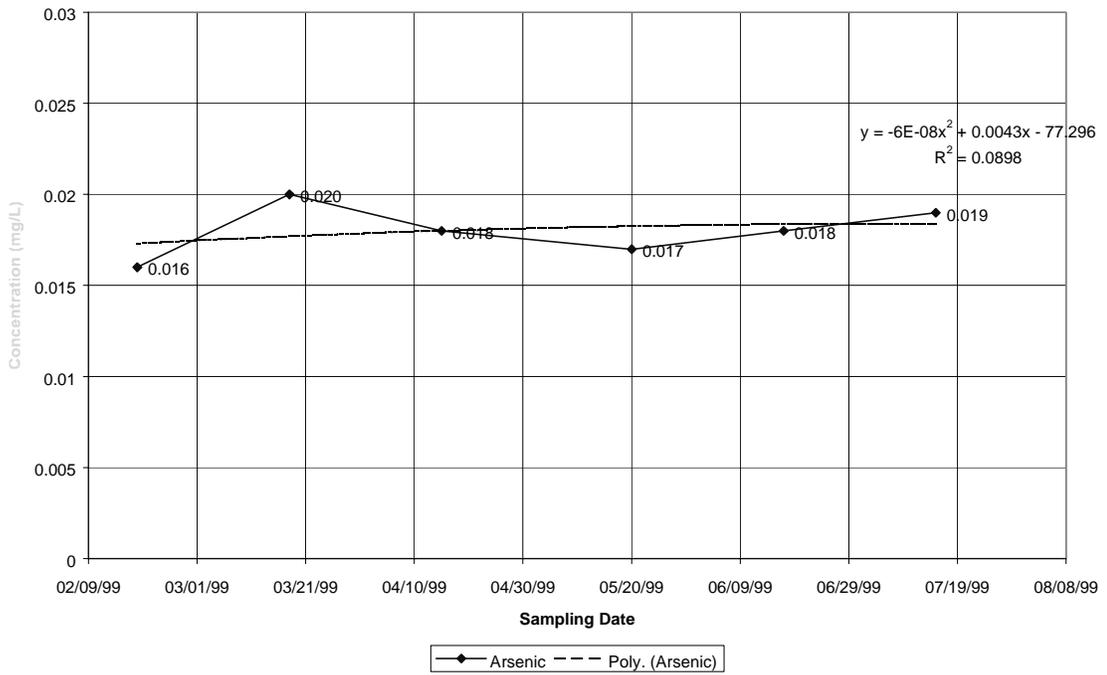
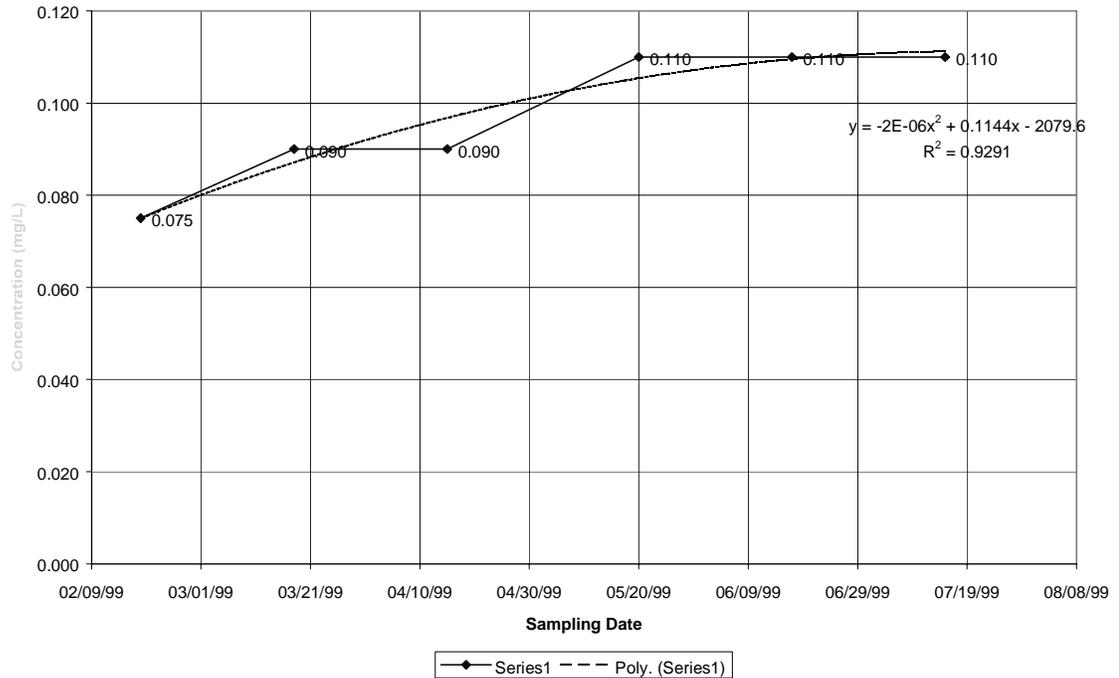


FIGURE 4. Unit 1 Molybdenum Measurements



2. **Conclusion:** The data provided by the licensee in the original submittal (CBR, 2000B), and the supplemental data provided in response to NRC's Request for Additional Information (CBR, 2001), has not demonstrated that these concentrations have reached a level of stability that will assure continued compliance with the restoration goals. The Unit 1 restoration does not appear to have stabilized over the six month stabilization period provided by the licensee, and the licensee has not demonstrated that the restored ground-water concentrations in Unit 1 will remain stable and will not exceed the established license limits at some point in the future.

Staff's analysis and findings strongly indicate that the six-month period for stability monitoring at this site is insufficient to assure stability for all monitored constituents. Many constituents reached stability within a relatively short time; however, increasing concentrations for several constituents persist at the end of, and presumably beyond, the six-month stability period. The stability monitoring data provided by this first commercial-scale wellfield restoration at the site indicates that the originally forecasted stability period was underestimated.

#### **RECOMMENDATIONS:**

1. The licensee's request for Unit 1 wellfield restoration approval should be denied.
2. Decommissioning of Unit 1 should not proceed at this time.
3. Stabilization ground-water monitoring in Unit 1 should be restarted immediately at the monitoring locations described in the January 10, 2000, Restoration Report. The ground-water should be sampled and analyzed for the constituents listed in License Condition 10.3B, SUA-1534, on a schedule of at least 14 days apart. The wellfield restoration shall be considered stable if four consecutive sampling episodes show no strongly increasing concentration trends for all monitored constituents, on a wellfield average, as described in Section 6.1.3, "Standard Review Plan for *In Situ* Leach Uranium Extraction License Applications," NUREG-1569.
4. The licensee should submit a written report for NRC review and approval when four consecutive sampling episodes show no strongly increasing concentration trends. The report should provide a tabulation of all stability monitoring data for Unit 1 graphics showing time versus concentration of each monitored constituent, and analyses that demonstrate the restored constituent concentrations are within license limits and are stable.
5. Stability monitoring should continue until four consecutive sampling episodes show no strongly increasing concentration trends.
6. Wellfield restoration activities should be immediately re-initiated in Unit 1 if the concentration of any monitored constituent exceeds its license limit and the NRC should be notified, in writing, within 30 days of this occurrence.
7. The licensee should extend the stability monitoring period for all future wellfields beyond the six-month monitoring period forecasted by the pilot-scale wellfield restoration.

**ENVIRONMENTAL REVIEW:** Staff determined that the denial of Crow Butte Resources's request regarding the Unit 1 wellfield restoration is purely administrative, therefore an environmental assessment is not required in accordance with 10 CFR 51.22(c)(11).

Staff determined that the following criteria have been met for a categorical exclusion:

- 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.

**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. No unresolved concerns were identified through the course of this coordination.

## REFERENCES:

- Code of Federal Regulations (CFR), Title 10, Chapter I - Nuclear Regulatory Commission, Parts 2 , 40, and 51, revised as of January 1, 2002.
- CBR (Crow Butte Resource, Inc.). 1996, Crow Butte ISL Mine Groundwater Restoration Plan. Letter from Stephen Collings, Crow Butte Resources to Joseph Holonich, Uranium Recovery Branch, NRC, dated November 26, 1996, with attachment. Accession Number 9612040273.
- CBR (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.
- CBR (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.
- CBR (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.
- CBR (Crow Butte Resource, Inc.). 2001. Mine Unit 1 Restoration; Response to Request for Additional Information. Report attached to Letter from Michael Griffin, Crow Butte Resources to Melvyn Leach, Fuel Cycle Licensing Branch, NRC, dated August 24, 2001. Accession Number ML012710072.
- NRC (U.S. Nuclear Regulatory Commission). 1998. Environmental Assessment for renewal of Source material License No. SUA-1534. Office of Nuclear Material Safety and Safeguards. Accession Number 9803100003.
- NRC (U.S. Nuclear Regulatory Commission). 2001. Request for Additional Information, transmitted by letter from Daniel M. Gillen, acting chief, Fuel Cycle Licensing Branch, NRC, dated June 26, 2001. Accession Number ML011830343.
- NRC (U.S. Nuclear Regulatory Commission). 2002. Standard Review Plan for *In Situ* Leach Uranium Extraction License Applications. NUREG-1569 Rev. 1. Office of Nuclear Material Safety and Safeguards. Accession Number ML020320181.