## CBRLicenseRenPEm Resource

**From:** Robert Lenhard [rlenhard@cnwra.swri.edu]
**Sent:** Thursday, June 19, 2008 10:46 AM
**To:** Hakan Basagaoglu; Roland Benke
**Subject:** FW: Documents for Crow Butte License Renewal
**Attachments:** ADAMS Legacy Library ReportJune 19a.wpd; Compliance Log.xls; RAS renewal Package 2001.pdf; ADAMS Legacy Library ReportJune 19.wpd

FYI

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**From:** Stephen Cohen [mailto:Stephen.Cohen@nrc.gov]
**Sent:** Thursday, June 19, 2008 6:52 AM
**To:** rlenhard@swri.org
**Cc:** CrowButte-LicenseRenewal Resource
**Subject:** Documents for Crow Butte License Renewal

Robert:

Attached are files containing the Accession Numbers for all the documents you'll need for the review. If you have a problem accessing any document, please let me know. I've also attached the Rio Algom Smith Ranch license renewal review example. It is still "nonpublic", but actually should be public. I would like to schedule your site visit on July 21 and 22, since I'll be at CBR the week before for the inspection and on July 23 and 24, for hearing procedures for the North Trend Expansion amendment.

Very Important. Please note that this project could go to hearing. Therefore every work product you or your staff produce must be saved and any emails you send must be copied to the address in the cc: above. Work products include report drafts, calculations, and other notes, as well as emails. The aforementioned email address goes to our email capture system. If you have any questions, please call me.

Sincerely,

Stephen J. Cohen
Team Leader - New Facility Licensing
Office of Federal and State Materials
and Environmental Management Programs
U.S. Nuclear Regulatory Commission
Mailstop T8F5
Washington, DC 20555
301-415-7182
stephen.cohen@nrc.gov

**Hearing Identifier:** CrowButteUR_LicenseRenewal_Public
**Email Number:** 33

**Mail Envelope Properties** (rlenhard@cnwra.swri.edu20080619104621)

**Subject:** FW: Documents for Crow Butte License Renewal
**Sent Date:** 6/19/2008 10:46:21 AM
**Received Date:** 6/19/2008 10:46:21 AM
**From:** Robert Lenhard

**Created By:** rlenhard@cnwra.swri.edu

**Recipients:**
"Hakan Basagaoglu" <hbasagaoglu@cnwra.swri.edu>
Tracking Status: None
"Roland Benke" <rbenke@cnwra.swri.edu>
Tracking Status: None

**Post Office:**

| **Files** | **Size** | **Date & Time** |
|---|---|---|
| MESSAGE | 1474 | 6/19/2008 10:46:21 AM |
| ADAMS Legacy Library ReportJune 19a.wpd | 36290 | |
| Compliance Log.xls | 26688 | |
| RAS renewal Package 2001.pdf | 1095581 | |
| ADAMS Legacy Library ReportJune 19.wpd | 12472 | |

**Options**
**Priority:** Standard
**Return Notification:** No
**Reply Requested:** No
**Sensitivity:** Normal
**Expiration Date:**
**Recipients Received:**

| Accession No. & Microfiche Address | Title/Description Includes Est. Page Count | Document Date | Document Type | Author Affiliation(s) | Addressee Affiliation(s) | Docket Number |
|---|---|---|---|---|---|---|
| ML080940313<br>~~~~~~~~~~~<br>Fiche Address: | Drawing, Figure 2.2-2, “Land Use Map”..<br>1 Page(s) | 09/30/1980 | Drawing, License-Application for (Amend/Renewal/New) for DKT 30, 40, 70, Map | Ferret Exploration Co of Nebraska, Inc | NRC/FSME | 04008943 |
| ML073480274<br>~~~~~~~~~~~<br>Fiche Address: | Map, “Commercial Study Area Habitat Types,” Figure 2.8-2..<br>1 Page(s) | 08/01/1982 | Map | Wyoming Fuel Co | NRC/FSME | 04008943 |
| ML080940317<br>~~~~~~~~~~~<br>Fiche Address: | Drawing, Figure 3.1-6, “Proposed Mine Schedule Years 1-10"..<br>1 Page(s) | 08/03/1987 | Drawing, License-Application for (Amend/Renewal/New) for DKT 30, 40, 70 | Ferret Exploration Co of Nebraska, Inc | NRC/FSME | 04008943 |
| ML080940315<br>~~~~~~~~~~~<br>Fiche Address: | Drawing, Figure 2.9-1, “Non-Radiological Sample Locations”..<br>1 Page(s) | 08/04/1987 | Drawing, License-Application for (Amend/Renewal/New) for DKT 30, 40, 70 | Ferret Exploration Co of Nebraska, Inc | NRC/FSME | 04008943 |
| ML080940316<br>~~~~~~~~~~~<br>Fiche Address: | Drawing, Figure 2.10-1, “Radiological Sample Locations”..<br>1 Page(s) | 08/04/1987 | Drawing, License-Application for (Amend/Renewal/New) for DKT 30, 40, 70 | Ferret Exploration Co of Nebraska, Inc | NRC/FSME | 04008943 |
| ML080940318<br>~~~~~~~~~~~<br>Fiche Address: | Drawing, Figure 5.7-1, “Radiological Operational Sample Locations”..<br>1 Page(s) | 08/04/1987 | Drawing, License-Application for (Amend/Renewal/New) for DKT 30, 40, 70 | Ferret Exploration Co of Nebraska, Inc | NRC/FSME | 04008943 |
| ML080940312<br>~~~~~~~~~~~<br>Fiche Address: | Drawing, Figure 2.1-4, “Outline of Areas”..<br>1 Page(s) | 08/31/1987 | Drawing, License-Application for (Amend/Renewal/New) for DKT 30, 40, 70 | Ferret Exploration Co of Nebraska, Inc | NRC/FSME | 04008943 |

| Accession No. & Microfiche Address | Title/Description Includes Est. Page Count | Document Date | Document Type | Author Affiliation(s) | Addressee Affiliation(s) | Docket Number |
|---|---|---|---|---|---|---|
| ML080940314<br>~~~~~~~~~~~<br>Fiche Address: | Drawing, Figure 2.8-3, “Commercial Study Area Habitat Types”..<br>1 Page(s) | 08/31/1987 | Drawing, License-Application for (Amend/Renewal/New) for DKT 30, 40, 70 | Ferret Exploration Co of Nebraska, Inc | NRC/FSME | 04008943 |
| ML080940306<br>~~~~~~~~~~~<br>Fiche Address: | Application for Source Material License for Ferret Exploration Company of Nebraska, Inc., Section 1.0 - Proposed Activities..<br>26 Page(s) | 10/07/1987 | License-Application for (Amend/Renewal/New) for DKT 30, 40, 70 | Ferret Exploration Co of Nebraska, Inc | NRC/FSME | 04008943 |
| ML080940308<br>~~~~~~~~~~~<br>Fiche Address: | Application for Source Material License for Ferret Exploration Company of Nebraska, Inc., Section 2.1 - Site Location and Layout..<br>178 Page(s) | 10/07/1987 | License-Application for (Amend/Renewal/New) for DKT 30, 40, 70 | Ferret Exploration Co of Nebraska, Inc | NRC/FSME | 04008943 |
| ML080940309<br>~~~~~~~~~~~<br>Fiche Address: | Application for Source Material License for Ferret Exploration Company of Nebraska, Inc., Appendix 2.7 (A) - First Aquifer Test..<br>194 Page(s) | 10/07/1987 | License-Application for (Amend/Renewal/New) for DKT 30, 40, 70, Report, Miscellaneous | Ferret Exploration Co of Nebraska, Inc | NRC/FSME | 04008943 |
| ML080940310<br>~~~~~~~~~~~<br>Fiche Address: | Application for Source Material License for Ferret Exploration Company of Nebraska, Inc., Appendix 2.9 (A) - Water Quality Data..<br>130 Page(s) | 10/07/1987 | License-Application for (Amend/Renewal/New) for DKT 30, 40, 70 | Ferret Exploration Co of Nebraska, Inc | NRC/FSME | 04008943 |
| ML080940346<br>~~~~~~~~~~~<br>Fiche Address: | Application for Source Material License for Ferret Exploration Company of Nebraska, Inc., Section 3.0 - Description of Proposed Facility..<br>25 Page(s) | 10/07/1987 | License-Application for (Amend/Renewal/New) for DKT 30, 40, 70 | Ferret Exploration Co of Nebraska, Inc | NRC/FSME | 04008943 |

| Accession No. & Microfiche Address | Title/Description Includes Est. Page Count | Document Date | Document Type | Author Affiliation(s) | Addressee Affiliation(s) | Docket Number |
|---|---|---|---|---|---|---|
| ML080940347<br><br>~~~~~~~~~~~<br>Fiche Address: | Application for Source Material License for Ferret Exploration Company of Nebraska, Inc., Section 4.0 - Effluent Control Systems..<br><br>13 Page(s) | 10/07/1987 | License-Application for (Amend/Renewal/New) for DKT 30, 40, 70 | Ferret Exploration Co of Nebraska, Inc | NRC/FSME | 04008943 |
| ML080940367<br><br>~~~~~~~~~~~<br>Fiche Address: | Application for Source Material License for Ferret Exploration Company of Nebraska, Inc., Sections 5.1 to 5.6 - Operations..<br><br>57 Page(s) | 10/07/1987 | License-Application for (Amend/Renewal/New) for DKT 30, 40, 70 | Ferret Exploration Co of Nebraska, Inc | NRC/FSME | 04008943 |
| ML080940368<br><br>~~~~~~~~~~~<br>Fiche Address: | Application for Source Material License for Ferret Exploration Company of Nebraska, Inc., Section 6.0 - Groundwater Quality Restoration, Surface Reclamation and Plant Decommissioning..<br><br>35 Page(s) | 10/07/1987 | License-Application for (Amend/Renewal/New) for DKT 30, 40, 70 | Ferret Exploration Co of Nebraska, Inc | NRC/FSME | 04008943 |
| ML080940369<br><br>~~~~~~~~~~~<br>Fiche Address: | Application for Source Material License for Ferret Exploration Company of Nebraska, Inc., Section 7.1 - Environmental Effects of Site Preparation and Construction..<br><br>51 Page(s) | 10/07/1987 | License-Application for (Amend/Renewal/New) for DKT 30, 40, 70 | Ferret Exploration Co of Nebraska, Inc | NRC/FSME | 04008943 |
| ML080940370<br><br>~~~~~~~~~~~<br>Fiche Address: | Application for Source Material License for Ferret Exploration Company of Nebraska, Inc., Appendix 7.5 (A) Spell Control Plan..<br><br>15 Page(s) | 10/07/1987 | License-Application for (Amend/Renewal/New) for DKT 30, 40, 70 | Ferret Exploration Co of Nebraska, Inc | NRC/FSME | 04008943 |

| Accession No. & Microfiche Address | Title/Description Includes Est. Page Count | Document Date | Document Type | Author Affiliation(s) | Addressee Affiliation(s) | Docket Number |
|---|---|---|---|---|---|---|
| ML080940371<br><br>~~~~~~~~~~~<br>Fiche Address: | Application for Source Material License for Ferret Exploration Company of Nebraska, Inc., Section 8.0 - Alternatives to Proposed Action..<br><br>7 Page(s) | 10/07/1987 | License-Application for (Amend/Renewal/New) for DKT 30, 40, 70 | Ferret Exploration Co of Nebraska, Inc | NRC/FSME | 04008943 |
| ML080940372<br><br>~~~~~~~~~~~<br>Fiche Address: | Application for Source Material License for Ferret Exploration Company of Nebraska, Inc., Section 9.0 - Benefit - Cost Analysis..<br><br>4 Page(s) | 10/07/1987 | License-Application for (Amend/Renewal/New) for DKT 30, 40, 70 | Ferret Exploration Co of Nebraska, Inc | NRC/FSME | 04008943 |
| ML080940373<br><br>~~~~~~~~~~~<br>Fiche Address: | Application for Source Material License for Ferret Exploration Company of Nebraska, Inc., Section 10.0 - Environmental Approvals and Consultations..<br><br>3 Page(s) | 10/07/1987 | License-Application for (Amend/Renewal/New) for DKT 30, 40, 70 | Ferret Exploration Co of Nebraska, Inc | NRC/FSME | 04008943 |
| ML080740168<br><br>~~~~~~~~~~~<br>Fiche Address: | Transmittal of Maps for UIC Permit Application..<br><br>13 Page(s) | 01/22/1988 | Letter, Map | Ferret Exploration Co of Nebraska, Inc | NRC/RGN-IV | 04008943 |
| ML080840294<br><br>~~~~~~~~~~~<br>Fiche Address: | Map 2, “Solar Evaporation Pond Engineering Design Report, Site Layout.”.<br><br>1 Page(s) | 03/15/1988 | Drawing, Map | Western Water Consultants, Inc | NRC/NMSS | 04008943 |
| ML080840295<br><br>~~~~~~~~~~~<br>Fiche Address: | Map 3, “Solar Evaporation Pond Engineering Design Report, Cross Sections.” Sheet 1 of 2..<br><br>1 Page(s) | 03/15/1988 | Drawing, Map | Western Water Consultants, Inc | NRC/NMSS | 04008943 |

| Accession No. & Microfiche Address | Title/Description Includes Est. Page Count | Document Date | Document Type | Author Affiliation(s) | Addressee Affiliation(s) | Docket Number |
|---|---|---|---|---|---|---|
| ML080840296<br><br>~~~~~~~~~~~<br>Fiche Address: | Map 4a, “Solar Evaporation Pond Engineering Design Report, Detail (Single Liner Option).”.<br><br>1 Page(s) | 03/15/1988 | Drawing, Map | Western Water Consultants, Inc | NRC/NMSS | 04008943 |
| ML080840297<br><br>~~~~~~~~~~~<br>Fiche Address: | Map 4b, “Solar Evaporation Pond Engineering Design Report, Detail (Double Liner Option).”.<br><br>1 Page(s) | 03/15/1988 | Drawing, Map | Western Water Consultants, Inc | NRC/NMSS | 04008943 |
| ML080800224<br><br>~~~~~~~~~~~<br>Fiche Address: | Corrected Replacement Pages for the Application and Supporting Environmental Report for USNRC Commercial Source Material License..<br><br>134 Page(s) | 03/28/1988 | Environmental Report, Letter | Ferret Exploration Co of Nebraska, Inc | NRC/NMSS | 04008943 |
| ML080840293<br><br>~~~~~~~~~~~<br>Fiche Address: | Map 1, “Solar Evaporation Pond Engineering Design Report, Location Map.”.<br><br>1 Page(s) | 04/14/1988 | Drawing, Map | Western Water Consultants, Inc | NRC/NMSS | 04008943 |
| ML080840483<br><br>~~~~~~~~~~~<br>Fiche Address: | Crow Butte Project, Solar Evaporation Pond Engineering Design Report..<br><br>84 Page(s) | 04/27/1988 | Report, Technical | Ferret Exploration Co of Nebraska, Inc, Western Water Consultants, Inc | NRC/NMSS | 04008943 |
| ML080800236<br><br>~~~~~~~~~~~<br>Fiche Address: | 5/18/1988 Gary Konwinski Ltr re: Revised Pages for the Application and Supporting Environmental Report for the USNRC Commercial Source Material License..<br><br>11 Page(s) | 05/18/1988 | Letter | Ferret Exploration Co of Nebraska, Inc | NRC/RGN-IV | 04008943 |

| Accession No. & Microfiche Address | Title/Description Includes Est. Page Count | Document Date | Document Type | Author Affiliation(s) | Addressee Affiliation(s) | Docket Number |
|---|---|---|---|---|---|---|
| ML080800238<br><br>~~~~~~~~~~~<br>Fiche Address: | Corrected Replacement Pages for Application and Supporting Environmental Report for State of Nebraska Underground Injection Control, Program Commercial Permit for Crow Butte Project - Docket 40-8943..<br><br>3 Page(s) | 08/30/1988 | Environmental Report | State of NE, Dept of Environmental Control | NRC/FSME | 04008943 |
| ML080740159<br><br>~~~~~~~~~~~<br>Fiche Address: | Letter from Ferret Exploration Company Re: Crow Butte License Environmental Assessment..<br><br>2 Page(s) | 09/23/1988 | Letter | Ferret Exploration Co of Nebraska, Inc | NRC/RGN-IV | 04008943 |
| ML080800232<br><br>~~~~~~~~~~~<br>Fiche Address: | Crow Butte Revised Pages for the Commercial-UIC Permit Application..<br><br>5 Page(s) | 10/24/1988 | Letter | Ferret Exploration Co of Nebraska, Inc | NRC/FSME, State of NE | 04008943 |
| ML080740164<br><br>~~~~~~~~~~~<br>Fiche Address: | Letter from S. Collings, Ferret Exploration Company of Nebraska, Enclosing a Copy of NDEC Letter on Restoration of Wellfield No. 2 at Crow Butte..<br><br>2 Page(s) | 12/20/1988 | Letter | Ferret Exploration Co of Nebraska, Inc | NRC/RGN-IV | 04008943 |
| ML080730272<br><br>~~~~~~~~~~~<br>Fiche Address: | Safety Evaluation Report for Ferret Exploration Company of Nebraska, Crow Butte Project..<br><br>22 Page(s) | 12/12/1989 | Memoranda, Safety Evaluation Report | NRC/RGN-IV | NRC/RGN-IV | 04008943 |
| ML080730293<br><br>~~~~~~~~~~~<br>Fiche Address: | Environmental Assessment for Ferret Exploration Company of Nebraska - Crow Butte Commercial In Situ Leach Operation..<br><br>70 Page(s) | 12/12/1989 | Environmental Assessment | NRC/RGN-IV | | 04008943 |

| Accession No. & Microfiche Address | Title/Description Includes Est. Page Count | Document Date | Document Type | Author Affiliation(s) | Addressee Affiliation(s) | Docket Number |
|---|---|---|---|---|---|---|
| ML080740166<br><br>~~~~~~~~~~~<br>Fiche Address: | Publication of a Final Finding of No Significant Impact for Ferret Exploration Company of Nebraska, Crow Butte Project..<br><br>4 Page(s) | 12/12/1989 | Federal Register Notice, Memoranda | NRC/RGN-IV | NRC/SECY | 04008943 |
| ML080800215<br><br>~~~~~~~~~~~<br>Fiche Address: | June 25, 1997 Crow Butte Response to NRC's June 2, 1997 Request for Additional Information re: License Renewal..<br><br>68 Page(s) | 06/25/1997 | Letter | Crow Butte Resources, Inc | NRC/NMSS/DWM | 04008943 |
| ML080800212<br><br>~~~~~~~~~~~<br>Fiche Address: | Revised Source Material License Renewal Application and Draft of Standard Operating Procedure for the Safety and Environmental Review Panel..<br><br>23 Page(s) | 10/31/1997 | Letter | Crow Butte Resources, Inc | NRC/NMSS/DWM | 04008943 |
| ML071520242<br><br>~~~~~~~~~~~<br>Fiche Address: | Environmental Assessment for Renewal of Crow Butte Resource's Source Material License SUA-1534, dated February 1998..<br><br>83 Page(s) | 02/28/1998 | Environmental Assessment | NRC/NMSS/DWM | | 04008943 |
| ML081080325<br><br>~~~~~~~~~~~<br>Fiche Address: | Safety Evaluation Report for Renewal of Crow Butte Resources, Inc.'s Source Material License SUA-1534..<br><br>36 Page(s) | 02/28/1998 | Safety Evaluation Report | NRC/NMSS/DWM | Crow Butte Resources, Inc | 04008943 |
| ML081080333<br><br>~~~~~~~~~~~<br>Fiche Address: | 3/4/98 NRC Source Material License for Renewal of Crow Butte Resources, Inc. - Docket 40-8943..<br><br>10 Page(s) | 03/04/1998 | License-Materials Byproduct Amendment DKT 30 | NRC/NMSS/DWM | Crow Butte Resources, Inc | 04008943 |

| Accession No. & Microfiche Address | Title/Description Includes Est. Page Count | Document Date | Document Type | Author Affiliation(s) | Addressee Affiliation(s) | Docket Number |
|---|---|---|---|---|---|---|
| ML080800210<br><br>~~~~~~~~~~~<br>Fiche Address: | Engineering Design Report Dated April 27, 1988 by Western Water Consultants for the Solar Evaporation Ponds at the Crowe Butte Project..<br><br>9 Page(s) | 05/23/1998 | Letter | Ferret Exploration Co of Nebraska, Inc | NRC/RGN-IV | 04008943 |

**CROW BUTTE COMPLIANCE LOG**

| Event | Location | Date | Accession No. | Comments |
|---|---|---|---|---|
| EXCURSION | SM6-18 | 7/14/2000 | ML003730221 | SHALLOW WELL NOT RELATED TO MINING |
| EXCURSION | SM6-12 | 12/18/2000 | ML037819580 | STUCK INJECTION WELL VALVE - SPILLED FLUIDS, OFF EXCURSION |
| EXCURSION | CM5-11 | 12/9/2002 | ML023540532 | GW EXTRACTION WORKING |
| EXCURSION | PR-8 | 12/24/2003 | ML040070077 | LONG-TERM EXCURSION DUE TO MU-1 AND OTHERS UNDER RESTORATION |
| EXCURSION | CM5-19 | 6/1/2005 | ML051590208 | GW EXTRACTION NEAR WELL |
| EXCURSION | SM6-28 | 6/22/2005 | ML051800471 | SHALLOW WELL NOT RELATED TO MINING |
| EXCURSION | SM6-12 | 7/1/2005 | ML051930057 | SHALLOW WELL NOT RELATED TO MINING |
| EXCURSION | IJ-13 | 3/26/2003 | ML030930417 | LONG-TERM EXCURSION DUE TO MU-1 AND OTHERS UNDER RESTORATION |
| EXCURSION | CM9-16 | 8/5/2005 | ML052440099 | |
| EXCURSION | SM7-23 | 4/28/2000 | ML003712933 | |
| EXCURSION | SM6-12 | 6/28/2005 | ML052980462 | SHALLOW WELL NOT RELATED TO MINING |
| EXCURSION | CM6-6 | 7/1/1999 | LEGACY | |
| EXCURSION | IJ-13 | 12/31/2002 | ML030170560 | MU WELL LONG-TERM EXCURSION |
| EXCURSION | CM6-7 | 4/4/2002 | ML021640176 | |
| EXCURSION | CM8-21 | 1/20/2006 | ML061220279 | |
| EXCURSION | PR-15 | 10/2/2006 | ML062860036 | |
| EXCURSION | PR-15 | 1/13/2000 | LEGACY | |
| EXCURSION | SM6-28 | 5/25/2000 | ML003729524 | |
| EXCURSION | SM6-13 | 5/25/2000 | ML003736980 | |
| EXCURSION | SM6-13 | 3/1/2001 | ML010740362 | |
| LEAK | POND 4 | 6/16/2000 | ML003726069 | LINER REPAIRED |
| LEAK | POND 3 | 10/31/2000 | ML0037679481 | LINER REPAIRED |
| LEAK | POND 1 | 7/7/2000 | ML003781828 | LINER REPAIRED |
| LEAK | POND 1 | 6/4/2003 | ML031710020 | LINER REPAIRED |
| LEAK | POND 1 | 6/11/2004 | ML041840142 | LINER REPAIRED |
| LEAK | POND 1 | 9/18/2002 | ML022770139 | LINER REPAIRED |
| LEAK | POND 1 | 4/26/2001 | ML020280159 | LINER REPAIRED |
| LEAK | POND 4 | | ML061320051 | ML061780355, LINER REPAIRED. |
| MIT FAILURE | I622-10 | 2/2/2004 | ML040960396 | WELLS DRILLED AND SAMPLED AROUND LEAK. NO IMPACT. |
| MIT FAILURE | I-723-14 | 7/4/2005 | ML052430386 | WELLS DRILLED AND SAMPLED AROUND LEAK. NO IMPACT. |
| MIT FAILURE | I-2430-31 | | ML060230309 | WELLS DRILLED AND SAMPLED AROUND LEAK. NO IMPACT. |
| NO VIOLATION | SITE | 4/9/2000 | ML003705485 | ANNUAL INSPECTION |
| NO VIOLATION | SITE | 5/4/2001 | ML011280480 | ANNUAL INSPECTION |
| NO VIOLATION | SITE | 6/17/2002 | ML021680257 | ANNUAL INSPECTION |
| NO VIOLATION | SITE | 9/22/2003 | ML032650623 | ANNUAL INSPECTION |
| NO VIOLATION | SITE | 10/15/2004 | ML042920385 | ANNUAL INSPECTION |
| NO VIOLATION | SITE | 10/20/2005 | ML052930434 | ANNUAL INSPECTION |
| NO VIOLATION | SITE | 9/8/2006 | ML062540084 | ANNUAL INSPECTION |
| OFF EXCURSION | SM6-18 | 7/17/2001 | ML0119805421 | PRECIPITATION |
| OFF EXCURSION | CM5-11 | 6/3/2003 | ML031640167 | GW EXTRACTION WORKED |
| OFF EXCURSION | SM6-28 | 7/15/2005 | ML052220108 | |
| OFF EXCURSION | SM6-12 | 7/28/2005 | ML052280353 | |
| OFF EXCURSION | CM5-19 | 7/27/2005 | ML052280359 | |
| OFF EXCURSION | CM6-7 | 4/29/2002 | ML021640176 | |
| OFF EXCURSION | SM7-23 | 11/29/2001 | ML020300030 | |
| OFF EXCURSION | SM6-18 | 4/23/2001 | ML011200152 | |
| OFF EXCURSION | SM6-31 | 4/23/2001 | ML011200146 | |
| OFF EXCURSION | CM9-16 | 11/14/2005 | ML053270239 | |
| OFF EXCURSION | CM8-21 | 4/4/2006 | ML061220279 | |
| OFF EXCURSION | CM6-6 | 9/23/1999 | LEGACY | |
| OFF EXCURSION | PR-15 | 3/22/2000 | LEGACY | |
| OFF EXCURSION | SM7-23 | 1/13/2004 | MISSING DOC | |
| OFF EXCURSION | SM6-28 | 6/22/2000 | ML003729524 | |
| OFF EXCURSION | SM6-13 | 7/20/2000 | ML003736980 | |
| OFF EXCURSION | SM6-13 | 4/23/2001 | ML010740362 | |
| OFF EXCURSION | SM6-12 | 11/20/2000 | ML003769667 | |
| VIOLATION | SITE | 1/1/2006 | ML072890610 | SECURITY LEVEL IV, NO POND WELL MONITORING, SELF IDENTIFIED |
| VIOLATION | SITE | 9/1/2007 | ML072890610 | SECURITY LEVEL IV, DID NOT SCAN SHIPMENT, SELF IDENTIFIED |

UNITED STATES
**NUCLEAR REGULATORY COMMISSION**
WASHINGTON, D.C. 20555-0001

May 8, 2001

Mr. William P. Goranson, Manager
Radiation Safety, Licensing & Regulatory Affairs
Rio Algom Mining Corp.
6305 Waterford Blvd. Suite 325
Oklahoma City, Oklahoma 73118

SUBJECT: RENEWAL OF SOURCE MATERIAL LICENSE SUA-1548, RIO ALGOM MINING CORPORATION (RAMC), RIO ALGOM SMITH RANCH IN SITU LEACH (ISL) PROJECT, CONVERSE COUNTY, WYOMING

Dear Mr. Goranson:

The U.S. Nuclear regulatory Commission (NRC) staff has completed its review of RAMC's license renewal application for Source Material License SUA-1548, as submitted by letter dated November 15, 1999. Additional supplements and revisions to the renewal application were provided by letter dated September 27, 2000.

The NRC staff determined, in accordance with Title 10 of the Code of Federal Regulations (CFR), Part 51.25, that preparation of an environmental assessment (EA) was necessary to document its review. The NRC staff issued an EA (enclosure 1) to the public document file on April 27, 2001. Based on its analysis, the NRC staff concluded that the environmental impacts associated with the proposed license action (i.e., renewal of SUA-1548) were not significant and that the proposed action was acceptable. A final finding of no significant impact (FONSI) was prepared in accordance with 10 CFR 51.32, and, on May 4, 2001, published in the Federal Register (Enclosure 2), providing notice of (1) the NRC's intent to issue the proposed license renewal, (2) the availability of the EA to the public, and (3) an opportunity for hearing for affected individuals.

The NRC staff also reviewed RAMC's license renewal application for compliance with the requirements under Title 10 CFR Parts 20 and 40, and the guidance in NUREG-1569, "DRAFT STANDARD REVIEW PLAN for *In Situ* Leach Uranium Extraction License Applications." The staff prepared a Safety Evaluation Report (SER) to document its review (Enclosure 3). Based on this review the staff concludes that the renewal application is acceptable.

Therefore, pursuant to 10 CFR Part 40, Source Material License SUA-1548 is hereby issued for the continued commercial operation at the Rio Algom Smith Ranch ISL project (Enclosure 4). With this licensing action, the NRC staff will be authorizing continued operations under the Performance-Based License Condition (PBLC) format.

The issuance of this renewal license was discussed in a telephone conversation on May 7, 2001, between Mr. Paul Goranson of RAMC and Mr. John Lusher of my staff. If you have any questions concerning this letter or the enclosures, please contact Mr. Lusher, the NRC Point of Contact for the Rio Algom Smith Ranch facility, at (301) 415-7694 or by e-mail to JHL@nrc.gov.

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).

Sincerely,
**/RA/**

Daniel M. Gillen, Acting Chief
Fuel Cycle Licensing Branch
Division of Fuel Cycle Safety and Safeguards
Office of Nuclear Material Safety and Safeguards

Docket No. 40-8964
SUA-1548, Renewal

Enclosures: As stated (4)

cc: S. Ingle, WDEQ
B. Ferdinand, RAMC

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Sincerely,

**/RA/**
Daniel M. Gillen, Acting Chief
Fuel Cycle Licensing Branch
Division of Fuel Cycle Safety and Safeguards
Office of Nuclear Material Safety and Safeguards

Docket No. 40-8964
SUA-1548, Renewal

Enclosures: As stated (4)

cc: S. Ingle, WDEQ
B. Ferdinand, RAMC

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UNITED STATES
**NUCLEAR REGULATORY COMMISSION**
WASHINGTON, D.C. 20555-0001

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Enclosure 1

# ENVIRONMENTAL ASSESSMENT FOR RENEWAL OF SOURCE MATERIAL LICENSE NO. SUA-1548

**RIO ALGOM MINING CORPORATION**
**SMITH RANCH URANIUM PROJECT**
**CONVERSE COUNTY, WYOMING**

**APRIL 2001**

**DOCKET NO. 40-8964**

**U.S. Nuclear Regulatory Commission**

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

Office of Nuclear Material Safety and Safeguards
Division of Fuel Cycle Safety and Saffeguards
Fuel Cycle Licensing Branch

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## 1.0 INTRODUCTION

This environmental assessment (EA) is assisting with the Nuclear Regulatory Commission (NRC) decision on whether or not to renew the Rio Algom Mining Corporation (RAMC) license for in situ uranium recovery pursuant to the requirements in 10 CFR Part 40.

By letter dated November 15, 1999, RAMC submitted a license renewal application (LRA) (RAMC, 1997) for Source Material License SUA-1548 for the Smith Ranch Uranium Project, which is located in Converse County, Wyoming. RAMC provided additional information by letter dated September 27, 2000. In response to comments and requests for additional information from the NRC staff, RAMC provided page changes to the LRA by a letter dated September 27, 2000. Approval of this license renewal, will authorize the continuation of commercial uranium recovery operations under a performance-based license. Under a performance-based license, the licensee will be permitted to make changes in the facility or procedures described in the license application and conduct new tests or experiments within the specified parameters. These parameters include evaluation that changes remain within the bounding conditions and analysis of this EA, as determined by an RAMC Safety and Environmental Review Panel (SERP). In addition to maintaining records of safety and environmental evaluations, an annual report describing changes will be provided to the NRC. Departures from this EA or the Technical Evaluation Report will require NRC review and authorization of license amendment and a new NRC environmental review.

Information and discussion in this EA are based principally on information contained in the LRA and supplement, NRC licensing actions approved since December 1995, semiannual environmental monitoring reports submitted by RAMC since the issuance of SUA-1548 in 1992, and NRC inspection reports generated during the more than six years of commercial operating experience at the Smith Ranch site. Impact analysis includes the 16,200 acre site and extends to the surrounding area as potential impacts imply, an approximate 50 mile radius (map provided in Appendix “A,” Figure A-1). Analyses include the following: Site location and layout; Uses of lands and waters; Population

distribution; Regional historic, archaeological, architectural, science, cultural and natural landmarks; Meteorology; Geology; Hydrology; Ecology; Background radiological characteristics; Background non-radiological characteristics; In Situ leaching (ISL) process; Ion exchange and central processing plant; Instrumentation; Effluent control systems; Operational/environmental monitoring; Groundwater restoration; Surface reclamation and decommissioning; Environmental effects; Alternatives to the proposed action; Management Organization and administrative procedures.

### 1.1 Background

Rio Algom Mining Corporation's Smith Ranch Uranium Project, Converse County, Wyoming, Source Material License SUA-1548, submitted a License Renewal Application and a performance based license request by letter dated February 12, 1997.
In response to comments and requests for additional information from the U.S. Nuclear Regulatory Commission staff, RAMC provided a complete newly revised version to the LRA by letter dated November 15, 1999 and page changes by letter dated September 27, 2000.

Source Material License SUA-1387 was issued June 2, 1981, for the Smith Ranch research and development (R&D) operation. The license for the R&D project, also known as the O-sand/Q-sand project, was renewed by NRC on January 29, 1988. The commercial operation has expanded upon the R&D operation, and utilizes existing surface facilities as well as those of an existing shaft mine. An EA dated December 18, 1987, was prepared in consideration of renewing SUA-1387 for continued R&D operation. The operation continues to this day, but was placed on standby status during commercial plant expansion.
The plant site is found 17 air miles northeast of Glenrock, Wyoming (map provided in Appendix "A," Figure A-2). The pilot uranium recovery project occurred in Sections 26 and 36, Township 36 North, Range 74 West (T36N R74W), in Converse County, Wyoming. The commercial uranium recovery project is located in an area permitted by the Wyoming Department of Environmental Quality (DEQ) exceeding 16,000 acres. Proposed uranium recovery activities will actually affect approximately 500 to 900 acres comprised of portions of land in Sections 25, 26, 27, 33, 34, 35, and 36 T36N R74W; and Sections 2, 8, 16, 17, 18, and 21 T35N R74W (map provided in Appendix "A," Figure A-3).

## 2.0 Purpose and Need for the Proposed Action

NRC is examining the possibility of granting the RAMC application letter dated September 27, 2000 and request to renew its NRC license for in situ mining the Smith Ranch Uranium Project site in Converse County, Wyoming and located 17 miles Northeast of Glenrock (map provided in Appendix "A," Figure A-2). In situ uranium mining is regulated by NRC and requires a license issued pursuant to Part 40 of Title 10 of the Code of Federal Regulations (10 CFR Part 40), "Domestic Licensing of Source Material." Further, the Uranium Mill Tailings Radiation Control Act (UMTRCA) of 1978 and Atomic Energy Act of 1954 require persons who conduct uranium source material operations to obtain a byproduct material license to own, use, or process tailings and wastes generated by the operation, including above-ground wastes from ISL operations.

The purpose of the RAMC proposed license renewal is to meet the following objectives:

A. Continue to mine the known and environmentally characterized uranium deposits; and

B. Expand operations within the site boundaries to further claim the natural resource of uranium for sale and use in fuel for nuclear power plants.

Pursuant to 10 CFR and the conditions of RAMC's NRC Source Material License SUA-1584, Docket Number 40-8964, the license term is for a duration of 5 years. The license is currently in the status of "timely-request-for-renewal," pending completion of the current NRC review and determination on whether or not to authorize the license renewal as presented in RAMC's application. The mining activities at the site are currently on standby status during commercial plant expansion.

## 2.1 Previous Environmental Assessments Associated with Smith Ranch In situ Mining

The RAMC source material license was first issued by a letter dated June 2, 1981, for the Smith Ranch research and development (R&D) operation, also known as the O-sand/Q-sand project. The license was renewed by a letter dated January 29, 1988, providing for expansion of the R&D operation into the current commercial operation. The corresponding EAs and published statements of finding-of-no-significant impact are dated February 20, 1992 and September 22, 1992.

## 2.2 Related Permits and Reviews

### 2.2.1 Technical Evaluation Report (TER)

Additional information concerning safety aspects of the proposed action are located in the associated TER dated November 7, 2000. This EA references descriptions and analyses provided in the TER.

### 2.2.2 State of Wyoming, Department of Environmental Quality (WDEQ)

The WDEQ administers and implements the State rules and regulations. RAMC posesses a current WDEQ mining permit for its commercial operations. This EA refers to the WDEQ permit area within the NRC licensed site boundaries as the "permit area" for the convenience of referencing this smaller subset area proposed for continued commercial mining. WDEQ was consulted during the development of this EA. Further, NRC coordinated with the Governor appointed NRC State Liason Officer residing in WDEQ.

### 2.2.3 U.S. Bureau of Land Management (BLM)

Federal surface ownership lands administered under the jurisdiction of BLM occur within the proposed mining area. A majority of the mineral estate within the proposed mining area is also under Federal ownership and is administered by BLM. Numerous BLM oil and gas leases occur throughout and bordering the permit area. BLM concerns are limited to (1) undue and unnecessary degradation of this land; (2) threatened and endangered species under the Endangered Species Act of 1973, as amended by public law 97-304 of 1982; and (3) cultural and historic resources that qualify for the National Historic Register of Historic Places as outlined under 36 CFR Part 800 and the implementing regulations for Section 106 of the National Historic Preservation Act of 1966, and (4) close coordination between the Oil and Gas lease holders and RAMC. BLM was consulted during the preparation of this EA.

## 3.0 Description of the Proposed Action

RAMC proposes to continue solution recovery of uranium occurring in sandstone strata of the Wasatch and Fort Union Formations, at depths of 450 to 1000 feet. Ore deposits typically are sinuous with lengths up to several thousand feet and 100- to 300-foot widths. As a basis of comparison the O-sand and Q-sand pilot projects were conducted at approximately 500 and 750 feet deep, respectively.

During the uranium extraction process, RAMC will prepare aqueous solutions of sodium carbonate, sodium bicarbonate, carbon dioxide, oxygen, and hydrogen peroxide, adding them to ground water. The mining solution, known as lixiviant, will be pumped down injection wells under pressure into the mineralized zones where it will dissolve uranium from the formation. The uranium-bearing solution will migrate through the formation, will be recovered from production wells, and the uranium extracted in the processing plant. The leaching solution is then recharged and reused. Well fields will be designed in a five-spot or seven-spot pattern, with each recovery well being located inside a ring of injection wells.

Extracted solutions will be pumped to a processing plant where uranium will be recovered. Following uranium recovery in each individual uranium recovery unit, the applicant shall restore ground-water conditions to baseline. Restoration will involve ground-water sweep, clean water injection, and geochemical stabilization of the aquifer with a reductant. The goal of ground-water restoration is to return the aquifer to baseline conditions existing prior to uranium recovery.

### 3.1 In situ Leaching (ISL) Process

Numerous facilities have used in situ leach methods of uranium recovery for research and development and commercial use since 1975. For the most part, these ventures have shown that uranium can be economically recovered and ground-water quality restored to baseline or the pre-uranium recovery upper control limit class (UCL) of use standards.

There are many environmental advantages to in situ leaching of uranium over conventional alternative uranium recovery methods. Open pits, mine dewatering, spoil piles, and other features of conventional mining methods create significant impacts on the environment. The greatest impact of the in situ leach extraction method is a temporary impact to the ore zone ground-water quality. This impact is termed temporary because, in most instances, the ground water can be restored to its baseline quality, pre-recovery use, or potential use category. In situ leaching permits economic recovery of deep, low-grade sandstone uranium deposits currently economically unrecoverable by conventional mining methods. The extent to which in situ leaching can be conducted is limited in that the ore zone conditions must be suitable for containing and controlling lixiviant during the leaching process.

During in situ leaching an oxidant-charged lixiviant is injected into the production zone aquifer through injection wells. With slight pH adjustments, the reduced mineralized uranium is oxidized and dissolved when contacted by the lixiviant. Following this, the uranium-rich solution is drawn to the recovery wells where it is pumped to the surface and transferred to the processing facility.

During production, uranium recovery solution continually moves through the aquifer from the outlying injection wells to the internal recovery wells. The wells can be arranged in a number of geometric patterns depending on ore body configuration, aquifer permeability and operator preference. Monitor wells surround the well-field pattern area, both vertically and horizontally, and are screened in appropriate stratigraphic horizons to detect any lixiviant in case it migrates out of the production zone. Due to confining layers above and below the mining zone and the continual movement of lixiviant to centrally located recovery wells, excursions of mining solutions have not occurred at the Rio Algom Smith Ranch ISL uranium recovery facility, since its research and development and commercial operations began.

### 3.2 Well Field Design and Operation

The proposed mining project involves approximately 14 individual uranium recovery units. When the project is fully operational, approximately five uranium recovery units will be in production at a time. Well field installation and testing for each unit requires a 1 - 1.5 year period. Uranium recovery will last approximately 3 years in each unit, followed by an equivalent period of unit restoration and surveillance monitoring. RAMC's proposed schedule covers a total of about 20 years. The exact locations and boundaries at each uranium recovery unit will be adjusted as more detailed stratigraphic and ore-occurrence data are collected during wellfield construction. A single well pattern consists of a square five spot pattern. Spacing between wells will vary from 75 to 150 feet depending on characteristics of the ore body, the aquifer, and topography. Well patterns may be altered to fit the size, shape, and boundaries of individual ore bodies.

Figure A-4 provides RAMC's proposed uranium recovery schedule. The schedule is based on known ore zones and projected capacity of the uranium recovery plant. The applicant originally proposed to run the plant at a rate of 5000 gallons per minute (gpm). In addition, the applicant intends to install satellite ion-exchange units in the well fields having a capacity for 4000 gpm. The applicant's calculation of radiological effluents, however, has been based on two ion-exchange units, each operating at 4000 gpm, producing three and a half million pounds of yellowcake as $U_3O_8$ per year. Therefore, the licensee will be limited by license condition to annual production of three and a half

million pounds of yellowcake as $U_3O_8$, and a total well-field production rate of 12000 gpm.
Each injection, production and monitor well will be constructed using the same technques. First, each hole will be drilled through the expected ore zone employing mud rotary methods with a 5-inch diameter drill bit. After drilling to the proper depth, the hole will be logged. If all logs indicate the hole is suitable for its intended purpose, it will then be reamed a second time to 7- to 10-inch diameter to the top of the ore zone. Casing will be placed to the top of the ore and cemented in place. Cementing will be completed by injecting the cement under pressure down the casing, out the bottom, with return to the surface through the annulus. When the cement has set, it will be drilled out of the casing. At this time, the ore zone will be under-reamed if desired, and cleaned out. Finally, a recoverable screen string will be lowered through
the casing into the ore zone, with packers sealing it against the interior of the casing string.

Each well will undergo a mechanical integrity test (MIT) prior to use in the well field. MIT utilizes a packer just above the screen and another just below the ground surface. These packers will isolate the nonperforated section of the well casing. The test consists of pressurizing the isolated portion of the casing to a level which simulates the maximum anticipated operating pressure plus an engineering safety factor. If more than a 5 percent pressure loss occurs during 10 minutes, the well will fail the MIT. Wells not passing the MIT can be abandoned or reworked and tested again. Repeated failure of the MIT will result in the well being abandoned. The MIT program will ensure that fluids injected and recovered during mining are not lost from the well due to failure in the casing.

In addition to initial MIT, the license will require that wells be retested for integrity after any well servicing that could cause casing damage. Repeated integrity testing will also be required for operating wells on a schedule of once each 5 years. Any unsuitable holes or abandoned wells will be plugged by the licensee, in accordance with Wyoming DEQ requirements.

Each well will be connected to the respective injection or production manifold in a header house. The manifolds will route solution to the pipelines to and from the recovery plant. Meters and control valves in individual well lines will monitor and control flow rates and pressures for each well. Wellfield piping is either high density polyethylene pipe, PVC and/or steel. Individual well lines and trunk lines to the recovery plant will be buried to prevent freezing. The use of field header houses and buried lines has been proven to be effective in protecting the pipelines. Pilot programs and commercial operations have operated continuously through the past 11 years without freeze-ups or other significant weather related problems.

### 3.3 Lixiviant Chemistry

The proposed chemicals to be mixed with the recirculated ground water will consist of sodium carbonate, sodium bicarbonate, carbon dioxide oxygen, and/or hydrogen peroxide. No other form of lixiviant will be permitted at the site without NRC approval as a license amendment.

## 3.4 Uranium Recovery Process

Uranium solution will be routed from several uranium recovery units to the processing plant. The plant is schematically illustrated in Figure A-5, and will process solution at a flow rate not to exceed 12,000 gpm. This environmental analysis is based, in part, on this process diagram. Any significant changes to the process will require an amendment to the license.

During uranium recovery, the wellfield waters will be enriched with uranium as well as several other metals that are also associated with the bedrock minerals. Data from the R&D project and commercial operation indicate that to a lesser extent, other trace metals such as arsenic, selenium, vanadium, iron and manganese are moblized during the leaching process with the uranium. Once the solution reaches the plant, it is stored in a surge tank or is pumped directly into a series of ion exchange (IX) columns. It is here that the uranium is adsorbed onto the resin beads. The resulting barren solution exits the IX columns, is recharged with additional oxidizing and complexing agents, and is reinjected in the wellfield.

Once the majority of the ion exchange sites on the IX column resin are filled with uranium, the column is taken off stream for elution. In the elution process, the uranium is stripped from the resin beads with a concentrated solution of sodium chloride. The resulting uranyl carbonate (pregnant) eluant is discharged into a holding tank.

When a sufficient volume of pregnant eluant is held in storage, it will be acidified to destroy the uranyl carbonate complex ion. Hydrogen peroxide or ammonia will then be added to the solution to precipitate the uranium. The precipitated uranyl peroxide slurry (yellowcake) is pH-adjusted and allowed to settle. Following this, the clear solution is decanted and either recirculated back to the barren eluant storage tank or treated as a waste and sent to deep disposal wells or evaporation ponds. The yellowcake is further dewatered and washed using a vacuum belt filter or equivalent and dried. RAMC expects to recover approximately 3,500,000 pounds of yellowcake per year as $U_3O_8$.

## 3.5 Description of Processing Plant, Ponds, and Waste

### 3.5.1 The Processing Plant

The ion exchange (IX) circuit consists of a series of columns containing IX resin, tanks to store solutions, and pumps. Lixiviant is pumped through the columns where uranyl carbonate complexes will be removed. Barren lixiviant is then returned to the wellfield injection system. When a resin column becomes fully charged with uranyl complex, it is taken off line to begin the elution/precipitation circuit. Lean eluant will be pumped from barren eluant tanks to the IX column and the resulting pregnant eluant will be transferred to the acidizer/precipitator where uranium is precipitated. The precipitated uranium then begins the final drying circuit, where it is dewatered and washed. Finally, the uranium will be vacuum dried on site and packaged for storage and shipment.

### 3.5.2 Wastes

Liquid and solid wastes are generated at the Smith Ranch facility. According to the license application as transmitted by letter dated September 27, 2000, operating the processing plant results in two major liquid effluent streams: the production bleed and the eluant bleed. These streams are routed to water treatment units or to evaporation ponds. RAMC treats the production bleed to remove radium, and then the discharge is sent to the deep disposal wells, which is the preferred method of disposal and is permitted by WDEQ, evaporation ponds, or another approved discharge point. For an assumed total production rate of 12,000 gpm, bleed from eluant, precipitation, and water softener recharging will be discharged to evaporation ponds or the approved disposal wells at 290 gpm (88.7 million gallons per year).

Two additional waste streams will occur when aquifer restoration is underway. The first effluent stream will stem from mine-unit water cleaned of dissolved solids by a combination of IX columns and/or in an electrodialysis or reverse osmosis (erd/ro) unit. The stream will then be treated for radium removal and discharged with an assumed recovery plant operation rate of 12000 gpm. The resulting brine will contain concentrated total dissolved solids and will be discharged to the disposal wells. Additional erd/ro water will be recycled through the aquifer restoration system.

To assure that all liquid wastes are accounted for, RAMC is required by License Condition to return all liquid effluents to the process circuit or to an approved disposal system. Water will require treatment to maximum constituent standards. Unapproved disposal methods will require an amendment to the license, an environmental assessment, and Wyoming DEQ approval.

Sanitary wastes from the restrooms and lunchroom are disposed of in an approved existing septic system. The septic system is subject to continued approval by the State of Wyoming.

Solid wastes generated at the site will consist of spent resin, empty reagent containers, miscellaneous pipes and fittings, and domestic trash. These wastes are classified as contaminated or non-contaminated waste, according to their radiological survey results. Non-contaminated wastes are disposed of in the site's existing solid waste facility as authorized by the Wyoming DEQ.

Contaminated solid waste will be separated into two categories. The first category will be waste which has some salvage value and can be decontaminated to unrestricted release limits. This type of waste may include piping, valves, instruments, equipment and any other item which can be decontaminated. Decontaminated materials will have radiation levels lower than those specified in NRC Branch Technical Position "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material." All decontaminated wastes will be inspected and surveyed by the radiation safety officer or health physics technician prior to their release from the site to assure that appropriate decontamination procedures have been observed.

The second category of waste includes items which have no salvage value and have been contaminated during uranium recovery

operations. The most common type of this material is radium contaminated filters. These materials are stored within a restricted area until they can be shipped to a licensed waste disposal site or licensed mill tailings facility for disposal. All waste byproduct material will be disposed of at the Quivira Mining Company tailings pile in New Mexico.

### 3.5.3 Evaporation Ponds

Evaporation cells have been proposed for ISL operations. Additional cells will be constructed as needed. Cell dimensions will be approximately 550 feet by 1000 feet, or about 12.5 acres. Construction will be similar to existing ponds. Embankments will be constructed of clay and sandy clay excavated onsite. Each cell shall be lined synthetically and include a leak detection system. All embankments are to be constructed to divert surface runoff away from the ponds and to prevent embankment erosion. In addition, ponds are to be fenced to exclude domestic animals and wild game.

Absolute freeboard requirements have not been determined by the applicant. Therefore, all detailed evaporation pond designs will be subject to NRC approval in the form of a license amendment prior to construction of the ponds. Freeboard capacity will be required to accommodate a Probable Maximum Precipitation event, maximum wind-generated wave runup, and include an engineering safety factor of 1.8. In addition, pond capacities will be limited such that any one pond may be drained into the others in case liner repairs become necessary. All designs will be required to meet NRC Regulatory Guide 3.11, Staff Technical Position Paper No. WM-8101, and WDEQ requirements. RAMC will need to apply for a license amendment to construct additional evaporation ponds and an environmental assessment will be required.

### 3.5.4 Existing Settling Ponds

RAMC's previous activities at the Smith Ranch site include mining from the pilot and commercial ISL projects and the adjacent Bill Smith shaft mine. Shaft mining activities are not subject to NRC regulation. Each mining project produced liquid effluent to the environment. The shaft mine was dewatered to prevent underground flooding, while the ISL projects produced well field bleed. RAMC routed these effluents to a series of radium settling ponds, and then released them under an NPDES permit issued by the State. In current commercial operations, RAMC disposes of waste water via the deep injection wells, permitted by WDEQ.

## 3.6 Ground-Water Restoration, Reclamation, and Decommissioning

### 3.6.1 Ground-Water Restoration

The primary goal of restoration is to return all ground water affected by the mining to baseline conditions. RAMC proposed to return water quality of the affected ground water to the premining quality of use. This proposal is not entirely consistent with the primary restoration

criteria of returning water to baseline quality. Therefore, RAMC is required by license condition to use baseline conditions as its primary restoration target. As evidenced in the R&D restoration demonstration, baseline levels for all ground-water parameters cannot always be reasonably met. Therefore, a secondary ground-water restoration goal of returning the water to a quality consistent with its premining use will be established. To assure that the staff has sufficient time to review all restoration plans, the license will stipulate that all ground-water restoration plans be submitted for NRC review at least three months prior to starting restoration of each mine unit.

RAMC proposes that the restoration criteria be established on a mine-unit average basis for each parameter. This is consistent with current ISL restoration practices. RAMC's well fields average 13 acres in size, ranging between 5 and 20 acres apiece. Baseline for each mine unit is established by at least ten wells evenly distributed. Those units exceeding ten acres will have additional baseline data generated by one well for every two additional acres. From each well, three samples will be collected and analyzed for the parameters listed in Table B-1. Laboratory results for each parameter will be used to arrive at a mine-unit mean. These numerical values will establish the primary restoration goal, recognizing spatial and temporal variations.

RAMC proposes to use essentially the same restoration methodology in the commercial operation as was used for the R&D project. Ground-water restoration conducted at the R&D operation utilized ground-water sweep, permeate injection, reductant injection, and aquifer recirculation.

Ground-water sweep draws well field waters as well as natural ground water toward the center of the mining unit. This procedure is generally performed without any well field injection. Thus, a cone of depression is established causing waters to flow into the mining unit. During the R&D operation, this stage was continued until the majority of the injected solution was recovered from the area surrounding the well field. Samples from the injection wells and comparative volume calculations are utilized to determine when this phase is complete.

After ground-water sweep has been completed, the permeate injection/reductant stage will be initiated. In this stage, the water recovered from the well field will be processed by ion exchange to remove remnant amounts of uranium, and then electrodialysis or reverse osmosis (edr/ro) treatment will remove other dissolved solids. The resulting permeate, or other clean water can then be injected into the well field. Brine solutions from edr/ro treatment will be routed to the deep disposal wells. If required, this flushing process will be followed by reductant injection. Its purpose is to re-establish reducing conditions in the aquifer; immobilizing metals like arsenic, molybdenum, selenium, uranium, and vanadium. Prior to commencing restoration, the licensee will be required by license condition to have an approved occupational safety plan in place concerning the use of chemical reductants in the plant or well field. Finally, clean water is again circulated through the aquifer to reduce the dissolved solids introduced during the reductant phase. RAMC estimates six pore-volumes of water will be circulated through each mining unit as restoration proceeds.

The NRC reviewed the restoration results of the Q-sand project and on August 11, 1987, amended the R&D license to confirm successful restoration of the well field (Table B-2). One well in the field exhibited values for uranium and nitrate above the targets. The values were

below Wyoming DEQ drinking water standards, however, and the well-field averages as a whole were below the targets. The R&D approved restoration criterion was based upon returning the ground water to a category of use standard rather than to the mean of the baseline values.

### 3.6.2. Decommissioning and Reclamation

When the project is fully operational, RAMC expects approximately 15 mining units will be in development, mining, or restoration at any one time. Therefore, reclamation will occur in interim steps to minimize environmental impacts during and after mining takes place, and will restore disturbed land to its premining use. A final decommissioning plan will be required by license condition at least 12 months prior to license termination, for NRC review and approval.

The most prominent surface disturbance will occur at the evaporation ponds. Foundations, buildings, storage areas, and parking lots for the processing plant already exist at the former Bill Smith Mine site. Surface disturbance will also occur during the well drilling programs, pipeline installations, road construction, and header building construction. These disturbances, however, involve relatively small areas or have short-term impacts.

#### 3.6.2.1 Topsoil Handling

Soil disturbances caused by the mining operation are kept to a minimum. Topsoil from the existing mine facility was stockpiled and seeded with a cover crop to control erosion. Topsoil from future disturbed areas will be removed and stockpiled. Stockpiles will be located, shaped, and seeded with a cover crop and crimp mulched to minimize erosion. Topsoil signs will also be placed on each stockpile.

In the well fields, topsoil will be removed from new access roads and well header building sites and stockpiled as discussed above. If unanticipated high traffic roadways are developed, the topsoil on such roadways shall be subject to the same preservation program. For areas where only limited disturbance occurs, such as well sites and pipeline routes, topsoil will be bladed to one side and then re-spread over the area as soon as construction is completed. These areas will then be stubble mulched. If topsoil stockpiling or retopsoiling of an area is completed in the winter or spring, a stubble crop of oats will normally be planted with the final grass seed mix or a long-term cover seed mix planted in the stubble in the autumn.

#### 3.6.2.2 Well Fields

After successful restoration of ground water in the mined aquifers, each well field will be decommissioned. All buried well-field lines and pipelines will be removed. In addition, injection, production, and monitor wells will be plugged and abandoned according to Wyoming DEQ

requirements. Land owners may negotiate with the applicant to convert monitor wells to water-supply wells provided all materials involved meet standards for release to unrestricted use. After pumps and tubing are removed, each well will be backfilled with approved abandonment mud or cement slurry to within 5 feet of the surface. The casing will then be cut at least 2 feet below the surface, and a cement plug will be placed at the top. The wellhead area will then be backfilled and the surface reclaimed according to the approved plan.

3.6.2.3 Pad Reclamation

The plant and pond areas will be reclaimed in a similar fashion as the well field areas. Excess soil from the built-up plant base and pond embankments will be returned to the ponds as fill. Following this, land surface contours will be reestablished. Finally, topsoil will be replaced on all plant and pond disturbed areas. Reseeding of these areas will also follow guidelines in the Wyoming DEQ permit. A period of several years will be required for establishment of viable vegetative cover. The licensee will be required to maintain exclusionary fences and release areas for test grazing according to the State permit.

3.6.2.4 Decommissioning and Disposal

Dismantled equipment from the processing plant may be disposed of in one of three ways. First, contaminated equipment may be dismantled and sold to another licensed facility. Alternatively, equipment decontaminated in accordance with '[1]Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use of Termination of Licenses for Byproduct or Source Material, August 1987," published by NRC, may be sold for salvage or scrap. Second, decontaminated materials having no resale value, such as building foundations, may be buried on-site. Finally, waste materials that cannot be decontaminated to acceptable levels for release, shall be disposed of in an NRC-licensed facility as discussed in Section 3.5.2.

After all liquid in ponds has been evaporated, decontaminated, or disposed of in a licensed facility, the precipitated solids and the pond liner will be removed and disposed of in a licensed facility. Pond liners cannot typically be economically cleaned to standards required for unrestricted use. The pond area will then be reclaimed as other disturbed areas, discussed in a following section.

3.6.2.5 Radiation Surveys

After the equipment, buildings, foundations, piping, and associated support facilities have been removed, gamma surveys will be conducted over the areas. In the well fields themselves, gamma surveys will also be conducted during the decommissioning of each mining unit. Gamma survey results will be compared with background values, and soil samples will be obtained from locations which exhibit elevated gamma readings. Soil samples will be analyzed for natural uranium and radium-226 content. Contaminated soil will be excavated as specified in 10 CFR 40 Appendix A, and disposed of in the same manner as other contaminated material. All survey results will be subject

to verification by the NRC.

3.6.2.6 Recontouring

After decommissioning and decontamination have been completed, final reclamation will proceed. Compacted soil along roads and beneath foundations will be ripped. Recontouring the land where disturbance has taken place will restore the surface and provide a terrain consistent with the post mining land use. Because no major changes in the topography will result from the proposed mining operation, a final contour map is not required for this project.

3.6.2.7 Revegetation

During mining operations the topsoil stockpiles, and other areas disturbed during the interim, will be seeded with a cover crop to minimize erosion.

Long-term cover crop seed mix, unless requested otherwise by the surface owner, is expected to be a mix of western wheatgrass (4 lbs/acre), stream bank wheatgrass (3 Ibs/acre) and thickspike wheatgrass (3 ibs/acre). The long-term cover grass mix will be used to protect topsoil stockpiles and/or retopsoiled areas which are expected to remain in place for longer than one year prior to final seeding. These practices, tested and proven in the pilot programs, will provide the needed protection for the topsoil, and will minimize erosion.

When topsoil is replaced during final reclamation, an area normally will be seeded with oats to establish a stubble crop, then reseeded with grasses the next growing season using the pure live seed mixtures shown in Table B-3.

Reseeding will normally be accomplished by broadcast seeding or drilling with seeding completed before May 1 or after October 15, during the year in which the topsoil is replaced. If drilling is not practical, seeds will be broadcast with a hand spreader, and the area will then be harrowed or raked.

Vegetation in larger reclaimed areas will be protected by fencing until a viable stand of growth is obtained. When vegetation cover and productivity are adequate to support normal grazing, the licensee will apply to the NRC and Wyoming DEQ for bond release.

## 4.0 Description of the Affected Environment

### 4.1 Location and Land Use

The proposed facility and associated well-fields are located in east central Wyoming. No active residences occur in the permit area. The land has been used mainly for sheep and cattle grazing. In the past, some areas were settled by homesteaders for dry farming, but most of

these farms are now abandoned. Historically the population density for the State of Wyoming has been low and in the last couple of decades has decreased. Continued operation will provide employment for eighty to one hundred area residents. RAMC and other firms have conducted uranium exploration and production in the region for several decades. RAMC had two pilot projects and has commercial wellfields, processing plant, satellite facility and two deep disposal wells located within the permit area. The company intends to return individual well fields to agricultural uses after the site is restored.

Total land area to be enclosed by the state permit exceeds 16,000 acres. Of this land, RAMC estimates approximately 500 - 700 acres will be disturbed during the project.

## 4.2 Geology and Hydrogeology of the Ore Zones

### 4.2.1 Stratigraphic Setting

The permit area occurs at the southern end of the Powder River Basin. Rock formations exposed in the basin consist mainly of Tertiary-age clastic sediments deposited in fluvial environments. Older rock formations are found on the flanks of the basin. The basin is, in turn, surrounded by structural uplifts. Most of the background information for this description is derived from Sharp and Gibbons (1964).

The Fort Union Formation consists of alternating and discontinuous mudstones and siltstones with lenticular beds of coarser arkosic sandstones. Historically, disconnected drainage systems resulted in swampy environments, that resulted in the coal seams commonly found through the Fort Union Formation.

Overlying Fort Union, rocks of the Eocene Wasatch Formation underlie most of the permit area surface. The Wasatch consists of nearly 1000 feet accumulation of claystones and siltstones with widespread discontinuous lenses of coarse arkosic sandstone. Grain size of Wasatch rocks decreases northward, farther from the source area of the sediment.

Historically, large accumulations of sediment from volcanic sources entered the basin and were deposited as the White River Group. These sediments, along with tuffaceous and arkosic lithologies in other Tertiary rocks, were the source of uranium in the region. The White River subsequently has mostly been eroded from the basin and it no longer occurs in the permit area.

Unconsolidated materials in the area consist mainly of locally derived colluvium on hill slopes and alluvial deposits along water courses. Thickness of these deposits ranges from 0 to 10 feet or more. Playa deposits are also found in closed depressions. They also are derived from local bedrock, but also contain alkaline evaporite mineralization.

### 4.2.2 Ore Occurrence

Uranium deposits occurring in most of the region are roll-front types. Roll fronts occur in areas where ground water infiltrated from the surface or migrated through an aquifer composed of sediment containing minerals with slight amounts of uranium. Near the surface, oxidizing conditions result in weathering of the minerals such as feldspar and volcanic ash and mobilization of minute concentrations of uranium in solution. The White River Formation appears to be the principal source of uranium minerals in this region. As ground water continued to migrate, it encountered reducing conditions where uranium is no longer stable in solution. The reducing environment may be a result of $H_2S$, pyrite, or organic material existing in the aquifer. As a result, uranium precipitated from the ground water and formed coatings of minerals such as uraninite or coffinite on the sediment grains in the formation. The roll front extends farther in the middle of an aquifer. Therefore, uranium minerals occur concentrated in the direction of flow, resulting in typical distorted C-shape deposits. Individual fronts range in thickness from 2 to more than 25 feet. Mineral ore may exist laterally along a front hundreds of feet long, and fronts may coalesce to form ore bodies miles in length. Thin mineralized trails and more finely disseminated minerals are found branching off the main front and located between fronts. In general, eastern Wyoming uranium deposits average about 0.20 percent uranium oxide.

The physical shape of the ore deposit is dependent on the local permeability of the sandstone matrix, its continuity and distribution in the geologic unit, as well as the former oxidation/reduction front in the aquifer. The recoverable ore is located in portions of the Wasatch and Fort Union Formations extending from depths of 400 to 1000 feet.

For in situ leaching to be successful, the ore deposit must (1) be located in a saturated zone, (2) be bounded above and below by suitable confining layers, (3) have adequate permeability, and (4) be amenable to chemical leaching. As described below, the proposed mining area has favorable hydrogeological and structural characteristics to allow in situ leaching of uranium. The hydrogeology and aquifer characteristics indicate that mining solutions will be contained within the production zone. Further evidence of this is demonstrated by the operational history of the R&D project and commercial operation.

### 4.2.3 Hydrostratigraphy

#### 4.2.3.1 Alluvium

Small volumes of ground water exist in unconsolidated alluvial deposits near the ground surface. Total thickness of these deposits is 1 to 30 feet. Small amounts of precipitation infiltrate the alluvium during part of the year and intermittent flows across the alluvium may provide some recharge. The water table, however, is typically more than 100 feet below the land surface throughout most of the permit area. Therefore, most of the recharge water flows through the alluvium into the lower formations. In the natural drainage system in the southwestern portion of the permit area, perched water in the alluvium may be the source of water discharging from intermittent, low-yielding springs. The potential for future development of alluvial ground-water supplies in the permit area is considered very poor because of low yield and low recharge rates.

4.2.3.2 Wasatch Formation

The Wasatch is one of the most important shallow aquifers in the Powder River Basin. It underlies all except the southwestern edge of the permit area. For the most part, ground water in the Wasatch aquifer occurs under unconfined conditions and its primary use in the permit area is low-yield wells used for watering livestock. Confined zones near the base of the formation are separated from near-surface deposits and from each other by impermeable shale layers. Because there is the impermeable shale layer the low-yield wells used for livestock watering should not be impacted during uranium recovery operations.

4.2.3.3 Fort Union Formation

The top of the Fort Union is exposed at the surface in the southwestern and western portions of the area, but may be at depths of 500 feet or more in the eastern and northeastern part of the permit area. Typically, the Fort Union is comprised of lenticular fine- to coarse-grained sandstones with interbedded claystones, siltstones, and coal. The formation is as much as 3000 feet thick beneath the mine site. The Fort Union Formation is an important aquifer in the Powder River Basin, and nearly all solution mining wells are completed in this formation. While most of the solution mining wells are designated for limited yields (5 to 30 gpm of water), wells completed in the Fort Union associated with the former Bill Smith Mine dewatering program have produced as much as 560 gpm. The most significant water impact will be the withdrawal and beneficial use of about 20,000 acre feet of groundwater over the life of the uranium recovery project; approximately the same volume as was produced from the former Bill Smith Mine between 1974 and 1982. Most of the water removed will be returned to the environment after treatment and discharge or used for irrigation, etc. The remaining water removed from the formation will be evaporated or disposed through authorized deep well injection with only small amounts leaving the site as wet product and/or waste.

4.2.4 Water Quality

RAMC submitted a compilation of water quality data collected from wells completed in aquifers as part of the O-sand and Q-sand pilot projects. Water quality, based on Environmental Protection Agency (EPA) drinking water standards, is relatively good in both aquifers. Only radium-226, which is a daughter product of the uranium decay chain, naturally exists in concentrations above EPA primary drinking water standards. EPA's standard for radium is 15 picocuries per liter (pCi/l), and baseline data from the O-sand ranged from 61 to 580 pCi/l. The calculated average is 272 pCi/l. Both aquifers contain calcium-sulfate type water with total dissolved solids (TDS) ranging from 155 to 673 milligrams per liter (mg/l). Sulfate and TDS routinely are found in O-sand samples exceeding EPA secondary standards, but not by wide margins. In addition, various metals are intermittently found to exceed standards. However, these conditions vary with location and sampling period.

4.2.5 Aquifer Testing

Substantial volumes of water can be produced from the Fort Union in the Southern Powder River Basin as demonstrated by the Bill Smith Mine. The mine produced 1500 to 1700 gpm from initial development until the mine was allowed to flood, a period of several years. Hydrologic characteristics of the Fort Union are illustrated by the O-Sand pilot pump test and the Section 25 and Section 35 pump tests summarized in Appendix D-6, of the application.

The upper confinement for the project is composed of the Wasatch Formation above the Q-sand interval. Most ground water in the Wasatch occurs under unconfined conditions. Confined zones are found deep, near the base of the formation, and are separated from the shallow aquifers by impermeable shale layers. These shale layers isolate the lower ore zones under several hundred feet of various lithologies. The most distinctive confining layer found in the permit area is the P-shale. This shale persists throughout the area, averaging 60 feet in thickness, and provides the lower confining layer for the Q-sand, and upper confinement above the O-sand. Its calculated vertical hydraulic conductivity is $4.8 \times 10^{-8}$ cm/s.

The lower confinement is provided by the L-shale underlying the M-sand. The L-shale was penetrated by Well No. 741, used in the M-sand (Section 35) aquifer tests. Its penetrated thickness is about 50 feet. Its vertical hydraulic conductivity is $1.7 \times 10^{-9}$ cm/s. Deeper confining layers have not been characterized.

Lateral confinement of the ore zones has been successfully accomplished artificially by over pumping the recovery wells. That is, more fluid is pumped out than injected. This procedure maintains a cone of depression around each production well and the well field as a whole. To detect lixiviant that might migrate to areas of the formation where it would be considered to be an excursion, the staff will continue to require by license condition that the monitor wells and trend wells be monitored above and below, as well as around the perimeter of the mining units. Additionally, the staff will continue to require that any confirmed excursion be followed by appropriate preapproved corrective actions. The results of the corrective actions shall be reported to the NRC for review.

Aquifer testing indicates that ground-water flow will be contained by the confining strata and concentrated within the production zone. The confining characteristics, associated hydraulic conductivities and the continuous extent of the confining beds assure vertical control of the mining solutions. Further evidence of the confining characteristics associated with the strata bounding the production zone has been demonstrated by the lack of vertical migration during operation of the R&D project.

### 4.3 Archaeological and Historical Resources

A Class III Cultural Resource Inventory for the proposed permit area was completed in November 1985 by Frontier Archaeology of Worland, Wyoming. These data are presented in Appendix D-3 of the application. Eighteen sites were located. Ten of the sites are historic and eight are prehistoric. Following review of these sites by the BLM and the Wyoming State Archives, Museums and Historical Department

during the Spring 1986, it was determined that only two sites could be potentially affected by the project. The mitigation and protection of these two sites are discussed in the operation plan of the application. If during mining operations any cultural or significant paleontological evidence are exposed during any excavation or other installation work in the permit area, such activities will be delayed until the appropriate state office has been notified and a qualified person has examined the evidence.

Appendix D-3 of the application contains the Cultural Resource Class III Survey plus the appropriate letters from the SHPO, etc. The report also includes a listing of cultural resource (i.e. The Bozeman Trail) sites known in the vicinity of the permit area. This list was compiled through review of the State Archives, WSHPO and Casper BLM office.

Another Cultural Resource Class III Survey was conducted in December 1998 by Pronghorn Archeological Services of Mills, Wyoming. The scope of the survey covered the areas within the permit area not previously surveyed in the 1985 survey. The 1998 survey identified three new historic sites, thirteen prehistoric sites, and twenty-two isolated artifacts. Of those, twelve of the prehistoric sites were considered to be eligible for inclusion to the National Register of Historic Places, and none of those sites are located where mining activities are planned. The BLM and WSHPO have reviewed the report and in a letter dated May18, 1999 indicated a determination of “no Effect.” Appendix D-3 of the application contains this report and supporting correspondence. Additionally, the NRC will provide a license condition to cover these activities.

## 5.0 ALTERNATIVES

The action under consideration is the renewal of Source Material License SUA-1548, for continued commercial operation of the Rio Algom Smith Ranch Uranium Project, as requested by RAMC. The alternatives available to NRC are to:

(1) Renew the license with such conditions as are considered necessary or appropriate to protect public health and safety and the environment;

(2) Renew the license, with such conditions as are considered necessary or appropriate to protect public health and safety and the environment, but not allow RAMC to expand its operations beyond those previously approved; or

(3) Deny renewal of the license.

Based on its review of the information the NRC staff has concluded that the environmental impacts associated with the proposed action do not warrant either the limiting of RAMC’s future operations or the denial of the license renewal. Additionally, in the TER prepared for this action, the staff has reviewed the licensee's proposed action with respect to the criteria for license issuance specified in 10 CFR Part 40, Section 40.32, and NUREG-1569, “Draft Standard Review Plan for In Situ Leach Uranium Extraction License Applications,” and has no

basis for denial of the proposed action. Therefore, the staff considers that Alternative 1 is the appropriate alternative for selection.

## 6.0 Environmental Impacts of the Proposed Action and Alternatives

### 6.1 Introduction

*In situ* leaching of uranium is an established technology. The major human health and environmental concerns associated with this technique of uranium recovery are the impacts of mining on groundwater quality, the impacts from potential evaporation pond leakage, the radiological impacts, and the disposal of wastes.

The ISL activities at the Rio Algom Smith Ranch Project have involved or will involve (1) the temporary change in the land use of a permitted area of about 6,555 ha (16,200 acres), (2) disturbance of about 202 to 364 ha (500 to 900 acres), (3) net withdrawal of groundwater of about 454 Lpm (120 gpm) during ore extraction and 2460 Lpm (650 gpm) during restoration (RAMC, 2000), and (4) the temporary contamination of monitored groundwater aquifers. Facilities required for an ISL operation have already been constructed at the Rio Algom Smith Ranch site.

The commercial operation was previously evaluated in an EA (NRC, 1991) and an SER (NRC, 1992) prepared by the NRC staff for the issuance of Source Material License SUA-1548 on March 12, 1992. With the renewal of SUA-1548 under the PBLC format, the licensee's SERP will be required to determine whether proposed changes in the facility, process circuit, or procedures (1) conflict with any license conditions or impair RAMC's ability to meet all applicable NRC regulations; (2) degrade the essential safety and environmental commitments in the LRA; or (3) are not consistent with the conclusions of actions analyzed and selected in this EA. If any of these determinations are answered in the affirmative, then RAMC will be required to request an amendment to SUA-1548 for the proposed change.

As discussed in Section 7.0, the licensee monitors all effluent streams and the various environmental pathways that could be affected (e.g., air, surface water, and groundwater). The results of this monitoring are submitted to NRC on a semiannual basis, in accordance with 10 CFR 40.65, along with injection rates, recovery rates, and injection manifold pressures. These conditions will continue to be required in the renewal license.

### 6.2 Air Quality Impacts

#### 6.2.1 Construction-Related

Construction and development of the continued operations associated with this project could affect air quality by the release of diesel

emissions from drilling and construction equipment and by releases of dust. Diesel emissions should be minor and of short duration, and will be readily dispersed in the atmosphere. Fugitive dust generated from construction and drilling activity, as well as vehicle traffic on unpaved roads, tends to be localized and of short duration.

6.2.2 Operations-Related

The main non-radiologic gaseous effluents that will be released from the operation of processing equipment in the uranium recovery plant include gases such as $CO_2$ and hydrogen chloride. These gases will be vented directly to the atmosphere where they will be readily dispersed.

## 6.3 Land Use Impacts

The primary impact on land use is the fencing of the restricted areas within the permit area boundary to exclude livestock from approximately 61 ha (150 acres) until the completion of restoration and reclamation. These effects will be limited, temporary, and reversible through returning the land to its former grazing use following completion of post-recovery surface reclamation.

## 6.4 Water Impacts

### 6.4.1 Potential Impact to Ephemeral Drainages

Within the permit area, the main drainages collect surface precipitation and snowmelt in a roughly northwest to southeast direction along Sage Creek. All flow within the permit is ephemeral with no intermittent or perennial streams or flows. The volume of flow from these ephemeral drainages is seasonal and directly related to local climatic conditions. The climate is semi-arid with an overall precipitation averaging 12 inches per year. Snow accumulations are generally light and overall contribute little to the total annual precipitation. Most of the precipitation comes in the form of local rain-bearing thunderstorms. Recovery activities may sometimes come in contact with ephemeral drainages as a result of roads or wellfield operations. The travel roads include two track and/or established roadways. To the extent possible, existing travel roads are utilized when traveling within the permit area. In instances where ephemeral drainages may be impacted by mining operations, whether by road or wellfield operations, the appropriate protection measures will be afforded to minimize impact to the drainage including prevention of erosion.

The primary surface disturbances associated with in-situ leaching occur with well drilling, pipeline installations, road and wellfield construction. These disturbances however, involve relatively small areas and/or have a very short-term impact. Continuing efforts are made to keep short-term disturbances caused by these operations to a minimum.

Activities associated with drilling include construction of drill pits and preparation of drill sites. Once a drill site has been selected, the appropriate topsoil protection methodology (Chapter 6 of the application) is employed. Erosion protection measures which may be taken,

based on the site specific requirements, include the placement of hay bales, sedimentation breaks, placement of water contour bars, grading and contouring both before and/or after drilling operations to minimize erosion.

Road construction is kept to a minimum by utilizing existing roads when possible. When designing and constructing new roads, weather, elevation contours, land rights, and drainages are considered. When constructing new roads, efforts are made to cross ephemeral drainages or channels at right angles to enhance erosion protection measures. However, given that each specific site is different, it may not always be feasible or warranted to construct roads or crossings at right angles or along elevation contours. In such cases, appropriate erosional measures are considered, examined, and utilized to minimize erosion.

During the construction of wellfields, many activities are on-going including drilling, casing of wells, well development, pipeline construction, header house construction, lateral pipeline placement, and access road construction. These activities may have a short term or temporary effect on erosion. To reduce the potential impact of these activities, erosion protection measures are employed based on site specific conditions. These measures may include; the placement of hay bales, sedimentation breaks, placement of water contour bars, installing culverts, grading and contouring to help minimize erosion.

In steep grade areas, in addition to the previously noted erosion protection measures, the disturbed areas are re-seeded as soon as possible after construction is completed. This seeding commences at the appropriate time for optimum growth, whether the next spring or fall planting, and weather permitting.

In areas where wells may be constructed in drainage areas, impacts are minimized through the use of necessary erosion protection structures including but not limited to; placement of hay bales; construction of water contour bars; installing culverts; flow diversion structures; grading and contouring; application of rip rap; and designated traffic routes. Traffic within the drainage bottoms is limited to work activities necessary to construct and service wells. Wells that are constructed in significant drainages where runoff has a likely potential to impact the wellhead will have added wellhead protection. This protection will vary depending on the drainage and its potential for runoff. Protection measures may include barriers surrounding the wellhead, protective steel casing, cement blocks or other means to protect the wellhead from damage that may be caused by runoff.

### 6.4.2 Surface Water Impacts

The potential impacts to surface waters as a result of operations at the Smith Ranch are considered to be minimal and temporary. There is, however, the potential for impacts to occur during wellfield construction and reclamation activities. During leaching, restoration, and after reclamation, the surface will be vegetated and contoured to minimize temporary effects to surface water quality.

The physical presence of the surface facilities including wellfields and associated structures, access and haul roads, satellite IX buildings,

office buildings, pipelines, central processing plant and other structures associated with the ISL mining and processing of uranium ore are not expected to significantly change peak surface water flows because of the relatively flat topography of the drainages at the sites, the low regional precipitation, the absorptive capacity of the soils, and the small area of disturbance relative to the large drainage area within and adjacent to the permit area. In areas where these structures may affect surface water drainage patterns, diversion ditches and culverts are used to prevent excessive erosion and control runoff. In areas where runoff is concentrated, energy dissipaters are used to slow the flow of runoff to minimize erosion and sediment loading in the runoff.

During wellfield construction and reclamation, the potential loss of vegetation to those activities may cause increased opportunities for erosion and potential movements of sediments into drainages. Where possible, contouring is used to minimize the potential effects of erosion. Upon completion of construction and reclamation, and as soon as feasible considering growing seasons, re-vegetation work is started using either cover crops or a native seed mix to stabilize the soil and minimize erosion due to runoff.

### 6.4.3 Groundwater Impacts

Over the long-term, the groundwater concentration of some parameters in the ore zone may slightly vary compared with the initial condition; however, any changes are minimal and will not alter the potential use category of these waters as defined by the Wyoming Department of Environmental Quality. The most significant water impact will be the withdrawal and beneficial use of about 20,000 acre feet of groundwater over the life of the project; approximately the same volume as was produced from the Bill Smith Mine between 1974 and 1982. Most of the water removed will be returned to the environment after treatment and discharge or used for irrigation, etc. The remaining water removed from the formation will be evaporated or disposed through authorized deep well injection with only small amounts leaving the site as wet product and/or waste.

## 6.5 History of Excursions

While it is common to dramatically degrade the water quality within the mineralized zone during uranium recovery activities, migration of lixiviant-fortified groundwater beyond the expected confines (horizontal or vertical) of a wellfield may occur and be detected in a monitor well. These “excursions” may occur due to a variety of circumstances. Most excursions result from an improper balance between injection and recovery rates, undetected high permeability strata or geologic faults, improperly abandoned exploration drill holes, discontinuity and unsuitability of the confining units that allow movement of the lixiviant out of the ore zone, poor well integrity, or hydrofracturing of the ore zone or surrounding units. The potential for horizontal excursions will be primarily controlled through wellfield bleed (i.e., minor wellfield overproduction). Should overproduction fail, lixiviant-fortified groundwater could move to a monitor well. If such an event takes place, the excursion is reversed typically by increasing the overproduction rate, and thereby drawing the lixiviant back into the extraction zone.

During the commercial operation of the Rio Alogm Smith Ranch Project, no horizontal or vertical excursions have been reported.

## 6.6 Evaporation Pond Spills and Seepage

Spills from the evaporation ponds resulting from dike failure could result in unacceptable contamination of surface waters and groundwater. However, the likelihood of dike failure is considered to be minimal, because the evaporation pond embankments have been designed in accordance with NRC staff recommendations in Regulatory Guide 3.11 (NRC, 1977). To ensure that the design specifications will not be exceeded, RAMC will continue to be required by license condition to maintain minimum acceptable freeboard limits for each pond.

In addition, the licensee currently is required by license condition to conduct regular inspections of its evaporation ponds in accordance with the approved Evaporation Pond Onsite Inspection Program. Finally, the evaporation ponds are also inspected periodically by NRC or its contractors to ensure compliance with Federal guidelines for dam safety.

Accidental leaks from the evaporation ponds, if uncontrolled, potentially could contaminate shallow aquifers and locally degrade groundwater quality. Several minor leaks have been identified through monitoring of the leak detection system, as part of the environmental monitoring program. All reported leaks have involved only the upper, or primary, liner in a double-lined system; at no time have impounded solutions leaked into the ground beneath the ponds.

RAMC will continue to be required, by license condition, to notify NRC in the event of an evaporation pond leak and to implement corrective actions to mitigate the potential consequences of the leak. In the past, corrective actions have included: (1) lowering the pond level in the leaking pond through liquid transfer to other ponds, (2) identifying and patching holes or tears in the liner, and (3) analyzing the water quality in the pond leak detection system for all leak indicators once a week during the leak period and once a week for the two weeks following repairs.

## 6.7 Impacts on Ecological Systems

The principal effect on the ecology will be disturbance of the soil as a result of drilling activities and construction of wellfield houses, plant facilities, access roads, and pipelines. These disturbances will be confined for the most part to the uranium recovery facility and the wellfields, and will consist of cleared land parcels surrounded by undisturbed land. Reclamation and reseeding of the property will occur after cessation of ore extraction or sooner when possible, as in the case of buried pipelines. Alteration of fewer than about 202 to 364 ha (500 to 900 acres) is not considered to constitute a significant adverse impact.

## 6.8 Impact on Endangered Species

There are no known endangered species or endangered species habitat within the project area; as indicated in Appendix D-9 of the application; therefore, there is no impact to endangered species from the proposed project.

6.9 Impact on Wildlife

The species observed on the permit area are common throughout eastern Wyoming and many other areas of the Rocky Mountain region. Many individuals of the small animal species such as the small burrowing mammals, snakes, lizards, and arthropods that now live in areas that will be disturbed by the proposed project will be destroyed when the vegetation is removed. The total area disturbed during the project life will approximate 700 acres. Since a relatively small number of reptiles inhabit the disturbed permit area, the impact on these animals is relatively minor. Vegetation removal also has a relatively minor effect on insects and other arthropods because of their ability to quickly re-establish populations on reclaimed area. However, the loss of arthropods does decrease the amount of food available to insectivorous animals, including many species of birds. More small mammals (mice, rats, and ground squirrels) are lost as a result of vegetation removal than any other group of vertebrates. The number of animals lost in any area will generally be proportional to the number of acres disturbed. The short average life cycle of small mammals means that the loss in potential biomass accumulates during each year of project operation and rebounds proportionally once project areas are revegetated and released. It is estimated that as much as 8.4 to 120 lbs./yr. of rodent biomass may be lost throughout the life of the recovery plant and associated facilities. A total of 84 to 1200 lbs./yr. of rodent biomass may be lost as a result of wellfield installation and operation. Construction and operation of the additional satellite facilities may result in a loss of 4.2 to 60 lb./yr. of rodent biomass. While this does not significantly affect the long-term maintenance of small mammal populations in the area, it does reduce the amount of food available to predatory animals such as raptors, coyotes, and badgers. Whittaker (1970) states that the efficiency of food utilization by primary carnivores may be as high as 15 percent. If this figure is used as a rough estimate, then project operations may result in the loss of a maximum of 14 to 198 lbs./yr. of carnivore biomass. Construction of the future additional facilities could result in a loss of 1 to 9 lbs./yr. of carnivore biomass.

Highly mobile species, such as the larger mammals (pronghorn antelope and mule deer) and most birds, will be able to escape the disturbed area. However, the movement of those animals into adjacent undisturbed habitat may result in increased competition for food, shelter, territory, mates, and other necessities. This may result in the loss of some of these animals.
In terms of economic value and public interest, the most important wildlife species that utilizes the permit area is probably the pronghorn antelope. It is estimated that the density of antelope in this region is five to seven animals per square mile and that they remain in the area throughout the year. Consequently, the loss of 40 acres of vegetation due to the recovery plant and associated facilities may result in a reduction in antelope carrying capacity on the permit area by less than one (1) animal, while mining activities on an average of 40 acres/year may reduce antelope carry capacity by the same amount. Operation of the additional satellite facilities (an average of 80 acres/year) could reduce antelope carrying capacity by one (1) animal.

The increased number of people in the permit area could have an additional impact on antelope and other wildlife populations, since some

animals are likely to be killed by increased vehicular traffic. These additional wildlife losses are not expected to result in any long-term decrease in any wildlife populations, including antelope, since the number lost each year is expected to be a very small percentage of the total population.

Other than actual removal of vegetation and the potential of accidents resulting from activity in the area, project activities are not expected to significantly affect the antelope population. These animals do not appear to be disturbed by mining and processing activities similar to those proposed for this project. For example, at the Highland ISL Uranium Project adjacent to the Smith Ranch permit area, antelope are commonly observed near active mining areas without any noticeable concern. No reduction in the pronghorn population has been observed in the vicinity of that facility since it was originally constructed by Exxon in the early 1970's.
Construction and operation of the Smith Ranch project should not have a significant effect on raptors utilizing the permit area due to the small percentage of prey that would be lost as a result of vegetation removal.

Wildlife species will re-invade disturbed areas after they are reclaimed. The time required for re-invasion is a function of the habitat requirements of each species. Herbivores capable of feeding on grasses and weedy plant species (e.g., deer mouse, thirteen-lined ground squirrel, mourning dove, and horned lark) would be the first animals to establish themselves on re-vegetated areas. Those animals also nest on the ground and prefer open habitats. Predaceous arthropods, such as ground beetles and assassin bugs, and insectivorous animals, such as the grasshopper mouse, meadowlark, loggerhead shrike, and horned lizard, would also be expected to be early invaders of re-vegetated areas. Several other species of animals (such as sage grouse) that are heavily dependent on sagebrush and other shrubs for food, cover, and/or nesting could take several years to successfully re-invade reclaimed areas because of the time required for shrubs to become re-established.

Although it is likely that noise has some effect on certain species of wildlife, the EPA states that a thorough literature search "revealed an almost complete lack of information concerning the effects of noise on wildlife" (EPA, 1972). Specific effects of mining noise on the wildlife in the permit area cannot be determined; however, from experience at similar mine sites, it is likely that most species will quickly become accustomed to noise from operating machinery. For example, at the Highland ISL Uranium Project, the deer and pronghorn antelope are commonly observed within active mining and drilling areas and they display no noticeable concern. Although this does not prove that noise created by mining has no effect on wildlife, it tends to indicate that effects, if any, are minor.

Impacts to wetlands and surface water sources available to wildlife are expected to be minimal during the life of the project. At this time, no disturbances to any wetlands or water sources are planned. If, in the future, a change in the mine plan should involve an impact to a wetlands area or water source, appropriate agencies will be contacted for development of a mitigation plan. All proposed drainage crossings will comply with appropriate regulations.

## 6.10 Radiological Impacts

6.10.1 Introduction

The primary source of radiological impact to the environment from site operations is radon-222 released from the processing plant and the wellfields. This section describes project-contributed incremental radiological effects on the environment in the vicinity of the project. Among the items discussed are: (1) exposure pathways, (2) impacts to nearby individuals, and (3) impacts to biota other than man.

Because the operations at the Rio Algom Smith Ranch facility do not involve conventional blasting and removal of ore from the orebody, there will be no radionuclide particulate emissions associated with such activities, nor from the grinding of ore, as is done at a conventional uranium mill. In addition, Roi Algom Smith Ranch facility employs a vacuum dryers for final yellowcake processing, with dust and gas generated from drying collected in a liquid condenser. As a result, no particulates will be released to the environment.

6.10.2 Offsite Impacts

The only avenue, which is considered a potentially significant radiological exposure pathway for the proposed project, is the release of gaseous radon-222 to the atmosphere.

The effects of radon gas release from wellfields, satellites, main production facility, and ponds during production and restoration were modeled with the use of MILDOS-Area, a dispersion model approved by NRC for estimating potential radiological impacts caused by air emissions. The 1997 version of the model allows comparison of specific receptor site air concentrations with the ALCs given in 10 CFR 20.

The major population areas within 50 miles of the recovery plant site are the towns of Glenrock with a population of approximately 2,000 (17 miles SSW), Douglas with a population of approximately 5,000 (23 miles SE), and Casper with a population of approximately 52,000 (36 miles WSW). A regional population within 50 miles of the plant site is approximately 59,000 persons.

In the FEIS for the Teton ISL Project (NUREG-0925, Section 4.5.7), the NRC staff stated the primary sources of radiological exposure to the population in the vicinity of the Teton project were naturally occurring cosmic and terrestrial radiation (174 mRem/yr), naturally occurring radon-222 (up to 625 mRem/yr), and diagnostic medical procedures (75 mRem/yr). Since the Teton ISL project is only some 10 miles from the Smith Ranch Central Processing Facilities, it can be assumed that natural background radiological exposure are similar in nature at Smith Ranch.

Annual population doses computed by MILDOS-Area for the period of maximum mine emissions of radon-222 indicated a dose of 0.3

person-Rem/yr from mine activities to persons living within 50 miles of the site.

A series of nearby receptors were assessed in the MILDOS-Area model runs. These receptors included nearby dwellings and ranches, towns as far distant as Casper, and a series of hypothetical receptors placed around the perimeter of the project on the permit boundary. These last receptors included locations downwind of the satellites and the main processing facility.

The highest radon working level at a permit boundary receptor with access to an unrestricted area was 7.99E-05 WL compared to an ALC of 1.10E-03 WL. Dose to Effective was predicted to be 2.24 mRem/yr at this receptor (downwind of the main processing facility). Dose to Bronchi at two unrestricted area boundary receptors were more than 25 mRem/yr but within the error of the model. These two locations are monitored for dosage during the period of maximum mine activity

### 6.10.3 Radiological Impacts on Biota Other than Man

Although no guidelines concerning acceptable limits of radiation exposure have been established for the protection of species other than humans, it is generally agreed that the limits for humans are conservative for other species. Doses from gaseous effluents to terrestrial biota such as birds and mammals will be similar to those calculated for humans and use the same exposure pathways. Because the effluents of the facility will be monitored to protect human health and safety, no adverse radiological impact is expected for resident animals. Fencing prevents most large domestic and wild animals from entering the evaporation ponds and the plant facilities. It is possible that migratory birds may land on the ponds, but the visits should be infrequent.

## 6.11 In-Plant Safety

The NRC, through 10 CFR Part 20 and license conditions, requires a radiological safety program that contains the basic elements needed to assure that exposures are kept low or, in any event, as low as is reasonably achievable (ALARA). Therefore, an in-plant radiation safety program which includes the following is required:

- Qualified management of the radiation safety program and appropriate training of personnel,
- Written radiation procedures,

- Airborne and surface contamination sampling and monitoring,
- Internal and external radiation monitoring programs,
- An approved respiratory protection program, and
- An annual ALARA audit and frequent in-house inspections.

In addition, during routine radiation safety inspections, the NRC staff observes in-plant industrial safety for deficiencies and brings any deficiencies found to the attention of facility management.

The NRC considers the program of in-plant safety, as required by Federal regulations, and the radiation safety program, as defined by 10 CFR Part 20, to be sufficient to protect the worker during normal operations.

### 6.12 Waste Disposal Impacts

Under NRC regulations (10 CFR Part 40, Appendix A, Criterion 2), to avoid the proliferation of waste disposal sites, byproduct material from uranium ISL operations must be disposed at existing uranium mill tailings disposal sites, unless such offsite disposal is shown to be impracticable or the benefits of onsite disposal clearly outweigh those of reducing the number of waste disposal sites. Therefore, NRC will continue to require, by license condition, that waste byproduct materials generated by project operations be disposed at a licensed byproduct waste disposal site.

To ensure that RAMC retains control of all contaminated wastes while they are onsite, the licensee will continue to be required, by license condition, to maintain an area within the restricted area boundary for the storage of contaminated materials prior to their disposal. RAMC will survey all equipment, buildings, and other items for radioactive contamination, prior to their release from the site for unrestricted use. RAMC will continue to be required to dispose of all contaminated wastes and evaporation pond residues at a licensed radioactive waste disposal site. Finally, transportation of all material to the byproduct disposal facility will be handled in accordance with U.S. Department of Transportation and NRC regulations (49 CFR 173.389 and 10 CFR Part 71, respectively) .

## 7.0 Planned Monitoring

## 7.1 Ground Water

Ground water is monitored prior to, during, and after mining. Prior to well-field installation, ground-water data will be collected to determine water quality and define aquifer properties. This regional data is built upon during well-field development when data is collected to establish upper control limits and restoration criteria. During and following mining and restoration, additional ground-water monitoring is performed to verify the effect, if any, on the aquifer.

### 7.1.1 Water Quality Monitoring

Numerous water quality monitoring wells are located in and around the various well fields. Additional monitoring systems are installed underlying all evaporation ponds. All monitor wells are sampled on a routine basis during mining to determine if solutions are being contained within the mining zone. Monitoring for vertical excursions will take place in the first saturated aquifers overlying and underlying the mineralized zone. Monitor wells for horizontal excursions encircle the various mining units with wells completed in the mineralized formations at a distance not to exceed 500 feet downgradient, 1000 feet upgradient, and spaced not more than 500 feet apart.

Excursion indicators are chloride, conductivity, and alkalinity. Biweekly samples for these parameters are collected from monitor wells during mining and restoration. An excursion will be declared if any two excursion indicators in any monitor well exceed their respective upper control limits (UCLs) or a single excursion indicator exceeds its UCL by 5 standard deviations. The UCLs for each excursion indicator will be defined as the mean baseline water quality value plus 5 standard deviations.

If a lixiviant excursion is indicated, a verification sample must be taken within 24 hours after results of the first analyses are received. If the second sample does not indicate exceedance of the UCLs, a third sample will be taken within 48 hours after the second sampling data is acquired. If neither the second nor third sample indicate exceedance of the UCLs, the first sample shall be considered in error. If the second or third sample contains the indicators above UCLs, an excursion will be confirmed.
When excursion status is confirmed, corrective action is required to return the water quality to baseline concentrations. During corrective action, sample frequency will be increased to weekly for the excursion indicators until the excursion is concluded.

If corrective actions are not effective within 60 days since the first excursion verification, injection of lixiviant within the well field on excursion shall be suspended until the problem is solved and aquifer cleanup is complete. Because ground-water travel times are relatively slow in these formations, the amount of lixiviant involved in the excursion will generally be small, and several weeks will be required for water quality to begin to improve. Therefore, a 60-day time limit is appropriate.

Quality Assurance (QA) programs must be maintained by the Radiation Safety Officer. All QA programs will be conducted according to the Regulatory Guide 4.15 “Quality Assurance for Radiological Monitoring Programs (Normal Operations) - Effluent Streams and the Environment.” Standard QA procedures will be maintained throughout the project life.

### 7.1.2 Evaporation Pond Leak Detection Monitoring

RAMC has proposed daily inspections of the leak detection system sumps during operations. If water levels greater than 6 inches are detected in the sump, chemical assays for specific conductance and chloride will be used to confirm the source of the water. Elevated levels of these constituents shall confirm a liner leak, and will be reported to the NRC within 48 hours. Corrective actions shall commence upon leak confirmation, consisting of transferring the solution to another pond so that repairs can be made. All assay results will be reported in writing as soon as they are available.

## 7.2 Environmental Monitoring

RAMC conducts a radiological monitoring program in accordance with the requirements of its application and operational license. The program includes monitoring surface water, soils and sediments, direct radiation, radon, and ground water at multiple sites. The license requires RAMC to monitor the various environs and report the results semiannually in accordance with 10 CFR 40.65. In addition, RAMC is required by license condition to maintain all monitoring records for a minimum of 5 years.

An outline of an environmental monitoring program is discussed in Section 5, of the application. Environmental monitoring is designed to determine if the environmental assessment of the project accurately represents the impact on the environment. To assure that a high quality sampling and analytical program is maintained, Approval of the RAMC renewal will include a license condition to prepare, review, and update standard operating procedures for all environmental monitoring required for the operation.

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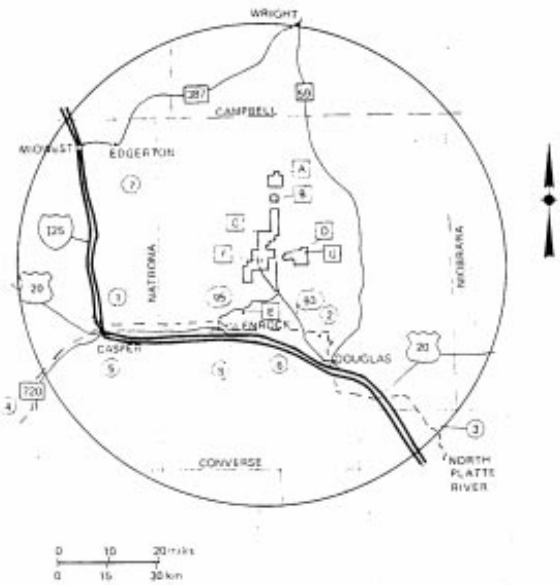
# APPENDIX A

# FIGURES




**URANIUM MINING AREAS**

A. BEAR CREEK URANIUM CO
B. PIONEER NUCLEAR
C. SEQUOYAH FUELS CORP
D. EVEREST MINERAL CO
E. LEUNBERGER SITE (CEGB
F. PROJECT PLANT SITE
G. EXXON MILL SITE

**LOCATION OF POINTS OF INTEREST**

1. FORT CASPER
2. FORT FETTERMAN
3. GLENDO STATE PARK
4. ALCOVA RECREATION AREA
5. CASPER MOUNTAIN RECREATION AREA
6. AYRES NATURAL BRIDGE
7. SALT CREEK OILFIELD TEAPOT DOME
8. DAVE JOHNSTON COAL POWER PLANT

POPULATION AND ACTIVITY CENTERS WITHIN 50 MILES OF THE PROJECT RECOVERY PLANT SITE

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**FIGURE A-1**

**LOCATION OF and ACCESS TO RECOVERY PLANT**
**FIGURE A-2**

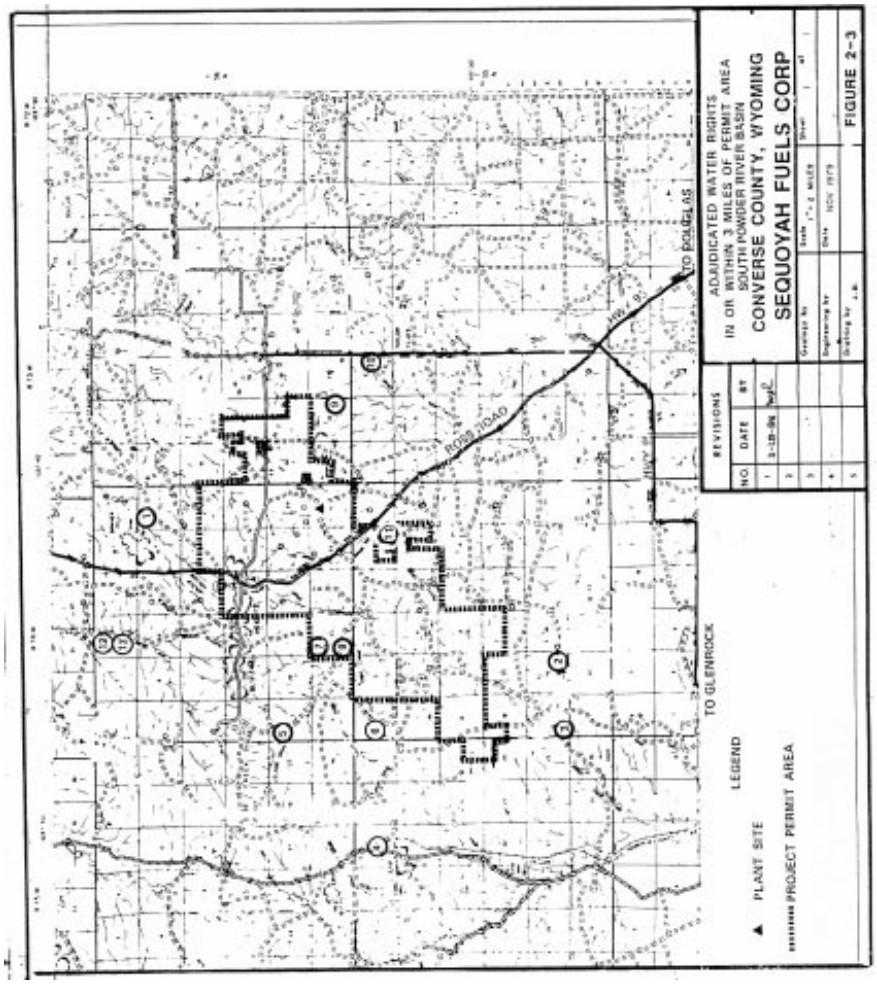
ADJUDICATED WATER RIGHTS
(3) OR WITHIN 3 MILES OF PERMIT AREA
SOUTH POWDER RIVER BASIN
CONVERSE COUNTY, WYOMING
SEQUOYAH FUELS CORP
FIGURE 2-3
REVISIONS
NO. DATE BY
1 3-28-84
TO GLENROCK
TO DOUGLAS
ROSS ROAD
HWY 91
LEGEND
PLANT SITE
PROJECT PERMIT AREA

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**FIGURE A-3**

**Figure A-4**
**PROJECTED DEVELOPMENT SCHEDULE BY WELLFIELD**

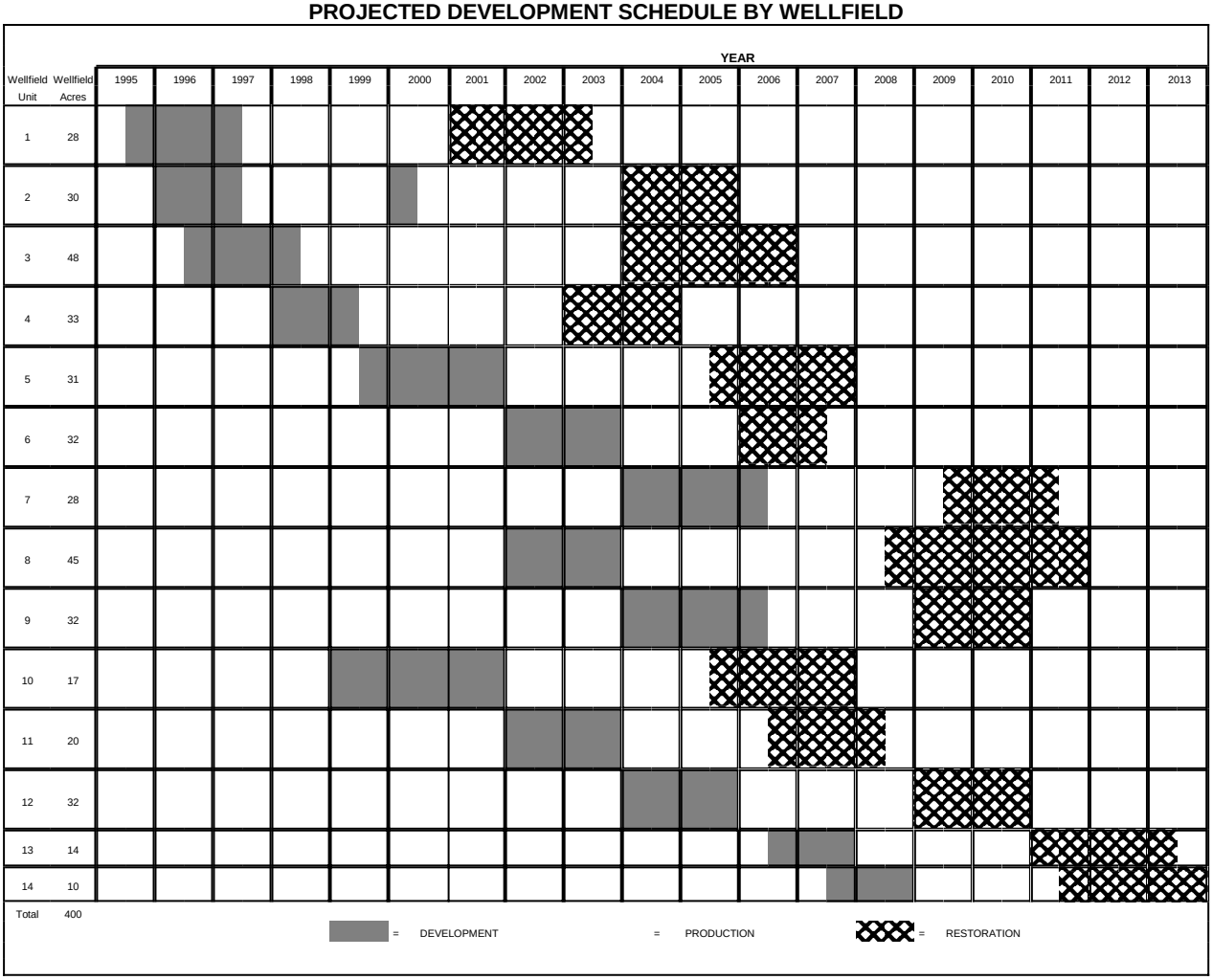
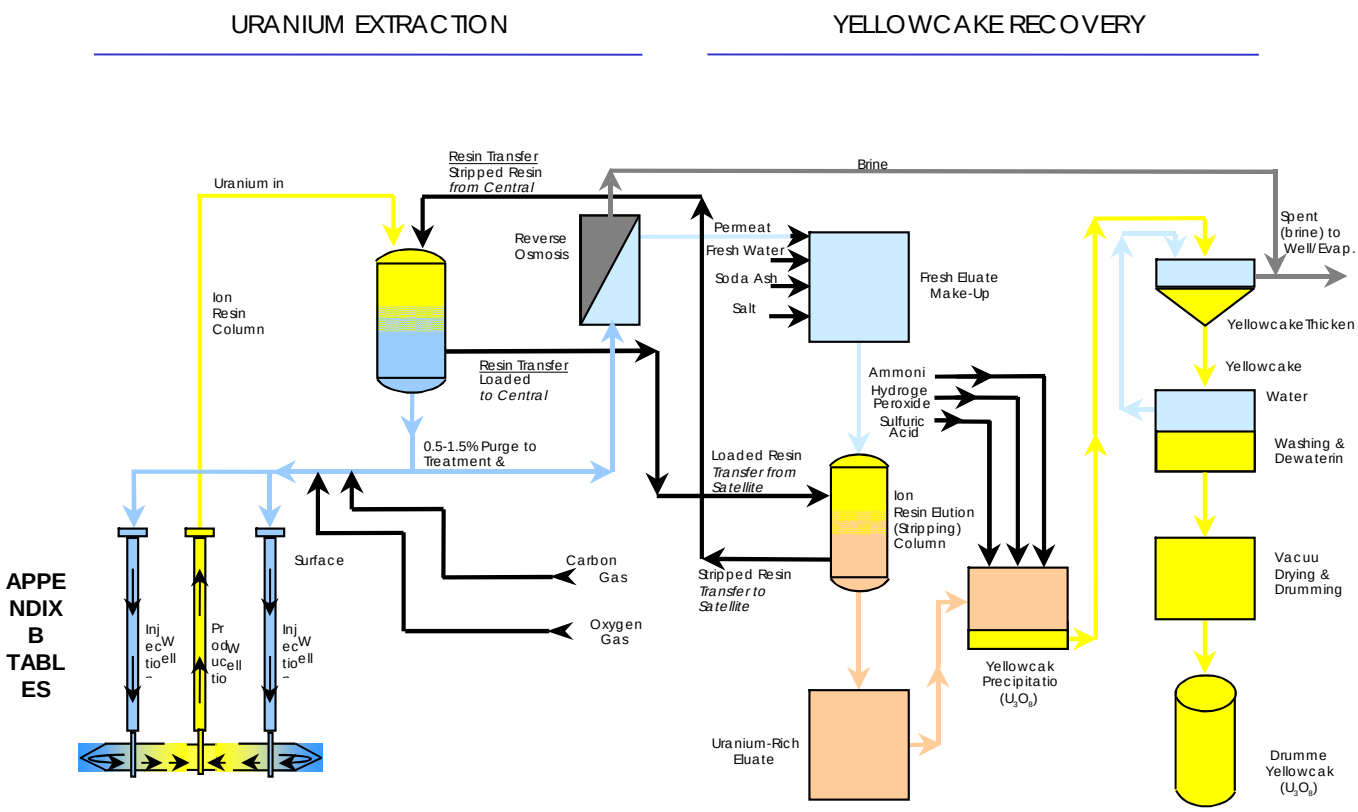


**FIGURE A-5**
**FLOW PROCESS SCHEMATIC**




APPENDIX B TABLES

# APPENDIX B
# TABLES

Table B-1: Baseline parameters analyzed in each ground-water monitor well, Smith Ranch ISL project, Converse County, Wyoming.

0.1 Common Constituents (in milligrams per liter)

| | |
|---|---|
| Bicarbonate | Magnesium |
| Calcium | Potassium |
| Carbonate | Sodium |
| Chloride | Sulfate |
| Fluoride | Nitrate (as N) |
| Ammonia | |

0.2 Trace and Minor Elements (in milligrams per liter)

| | |
|---|---|
| Aluminum | Manganese |
| Arsenic | Mercury |
| Barium | Molybdenum |
| Boron | Nickel |
| Cadmium | Selenium |
| Chromium | Uranium |
| Copper | Vanadium |
| Iron | Zinc |
| Lead | |

Radium-226 in picocuries per liter

0.3 Physical Parameters

Total Dissolved Solids - mg/l
Temperature - $F^0$
Specific Conductivity - umhos @$25^0$C pH - units

Table B-2: Baseline ground-water conditions, aquifer restoration goals, and actual final restoration values approved by NRC for the Q-Sand pilot well field (from Rio AAlgom'sapplication, March 31, 1988). All values in mg/l, unless specified otherwise.

| Parameter | Range | Mean | Restoration Goal | Actual Restoration |
|---|---|---|---|---|
| Arsenic | .001-.013 | .004 | .05 | .008 |
| Boron | .002-.70 | .15 | .54 | .14 |
| Calcium | 24-171 | 72 | 120 | 78 |
| Iron | .01-.27 | .025 | .3 | .24 |
| Magnesium | 3-22 | 16 | .092 | .06 |
| Manganese | .01-.077 | .023 | n/a | .1 |
| Selenium | .001-.024 | .004 | .029 | .003 |
| Uranium | .001-3.1 | .28 | 3.7 | 1.45 |
| Chloride | 4-65 | 18 | 250 | 15 |
| Bicarbonate ($HCO_3$) | 129-245 | 199 | 294 | 254 |
| Carbonate ($CO_3$) | nd-75 | 18 | 15 | nd |
| Nitrate | .1-1.0 | .4 | na | .13 |
| Potassium | 7-34 | 12 | 23 | 8 |
| Sodium | 19-87 | 28 | 41 | 38 |
| Sulfate | 100-200 | 124 | 250 | 128 |
| TDS | 155-673 | 388 | 571 | 443 |
| Spec. Conductivity (pmhos/cm) | 518-689 | 582 | 827 | 642 |
| pH (standard units) | 7.5-9.4 | 8.0 | 6.5-8.6 | 7.0 |
| Radium-226 (pCi/l) | 6-1132 | 340 | 923 | 477 |
| Thorium-230 (pCi/l) | .027-4.65 | 1.03 | 5.62 | 3.4 |

Table B-3

Pure live seed (pls) mixtures required for soil revegetation,
Smith Ranch ISL Project, Converse County, Wyoming

| | |
|---|---|
| * Western Wheatgrass (Rosana) | 4 lb./acre |
| * Thickspike Wheatgrass (Critiana) | 2 lb./acre |
| * Streambank Wheatgrass (Sodar) | 3 lb./acre |
| Canby Bluegrass | 1 lb./acre |
| Sheep Fescue (Covar) | 2 lb./acre |
| Sweetclover | 0.5 lb./acre |
| Winterfat | 2 lb./acre |
| | 14.5 lb./acre |

*Quantity doubled for broadcast seeding.

Alternate species, if any of the non-wheatgrass grasses are unavailable, are as follows:

| | |
|---|---|
| Indian Ricegrass | 3 lb./acre |
| Prairie Junegrass | 0.5 lb./acre |
| Green Needlegrass | 3 lb./acre |

**APPENDIX C**
**LEGAL LAND DESCRIPTIONS**
**FOR THE SMITH RANCH PERMIT AREA**
**Compiled by the U.S. Bureau of Land Management**

BLM Compilation of Federal Land, Mineral, and Grazing ownership
in the RAMC State Permit Area

| Legal Description | Acreage | Surface Owner | Mineral Owner | Grazing Lessee |
|---|---|---|---|---|
| T. 36 N., R. 73 W. | | | | |
| Section 19,SE¼NE¼ | 40 acres | Private | Private | |
| Sw¼, W½SE¼NE¼SE¼ | 280 acres | Private | Private | |
| Section 20 | | | | |
| E½NW¼, S'½SW¼NW¼ | 100 acres | Private | USA | |
| | 160 acres | Private | Private | |
| Section 29 | | | | |
| | 160 acres | Private | Private | |
| | 320 acres | Private | USA | |
| Section 30, | | | | |
| E½, NW¼, N½SW¼, | | | | |
| SE¼SW¼ | 600 acres | Private | Private | |
| Section 31, | | | | |
| NW¼ | 160 acres | Private USA | | |
| T. 35 N., R. 74 W. Section 2, | | | | |
| N½N½ | 160 acres | USA | Private | Smith Sheep Co. |
| S½N½ | 160 acres | Private | Private | |
| E½SW¼, S½SE¼ | 160 acres | Private | Private | |
| Section 3, | | | | |
| | 320 acres | State | State | |
| | 320 acres | Private | USA | |
| Section 4, | | | | |
| NE¼ | 160 acres | State | State | |
| | 320 acres | Private | Private | |
| SE¼ | 160 acres | Private | USA | |
| Section 5, | | | | |
| Entire | 640 acres | Private | USA | |
| Section 8, | | | | |
| E½, N½NW¼, SW¼SW¼ | | | | |
| S½NW¼, N½SW¼ | 440 acres | Private | USA | |
| SE¼SW¼ | 200 acres | Private | Private | |
| Section 9, | | | | |
| | 320 acres | Private | Private | |
| | 320 acres | Private | USA | |
| Section 10, | | | | |
| NE¼, W½, N½SE¼ | 560 acres | Private | USA | |
| S½SE¼ | 80 acres | Private | Private | |
| T.35 N., R. 74 W. (continued) | | | | |
| Section 11, | | | | |
| SE¼NE¼, N½NE | | | | |
| W½, NE¼SE¼ | 480 acres | Private | Private | |

| | | | | |
|---|---|---|---|---|
| Section 16, | | | | |
| Entire | 640 acres | State | State | |
| Section 17, | | | | |
| Entire | 640 acres | Private | USA | |
| Section 18, | | | | |
| Entire | 640 acres | Private | USA | |
| Section 19, | | | | |
| W½NW¼ | 80 acres | Private | USA | |
| Section 21, | | | | |
| | 320 acres | Private | Private | |
| T.36 N., R. 74 W. | | | | |
| Section 13, | | | | |
| | 320 acres | Private | Private | |
| Section 14, | | | | |
| | 320 acres | Private | USA | |
| Section 22, | | | | |
| Entire | 320 acres | USA | USA | Smith Sheep Co. |
| | 320 acres | Private | USA | |
| Section 23, | | | | |
| | 320 acres | Private | Private | |
| | 320 acres | Private | USA | |
| Section 24, | | | | |
| | 320 acres | Private | Private | |
| | 320 acres | Private | USA | |
| Section 25, | | | | |
| | 320 acres | Private | Private | |
| | 160 acres | USA | USA | |
| SW¼ | 160 acres | USA | Private | |
| Section 26, | | | | |
| Entire | 640 acres | USA | Private | Smith Sheep Co. |
| Section 27, | | | | |
| | 320 acres | USA | USA | Smith Sheep Co. |
| | 320 acres | Private | USA | |
| Section 33, | 320 acres | USA | USA | Smith Sheep Co. |
| N½S½, SE¼SE¼ | 200 acres | Private | USA | |
| S½SW¼, SW¼SE¼ | 120 acres | Private | Private | |
| Section 34, | | | | |
| | 320 acres | Private | Private | |
| E½W½, Sw¼SW¼ | 200 acres | Private | USA | |
| W½NW¼, NW¼SW¼ | 120 acres | USA | USA | Smith Sheep Co. |
| T.35 N. , R. 74 W. (continued) | | | | |
| Section 35, | | | | |
| Entire | 640 acres | USA | Private | Smith Sheep Co. |

| | | | |
|---|---|---|---|
| Section 36, | | | |
| Entire | 640 acres | State | State |
| T.35 N., R. 75 W. | | | |
| Section 13, | | | |
| SE¼ | 160 acres | Private | USA |
| Section 24, | | | |
| N½NE¼ | 80 acres | Private | USA |

16,220 acres - Total Acreage
1,240 acres - USA Surface and Mineral Ownership
6,780 acres - Private Surface Ownership and USA Minerals
5,000 acres - Private Surface and Private Minerals
1,440 acres - USA Surface and Private Minerals
1,760 acres - State Surface and State Minerals

Enclosure 2

**UNITED STATES**
**NUCLEAR REGULATORY COMMISSION**
**WASHINGTON, D.C. 20555-0001**

April 30, 2001

MEMORANDUM TO: Michael T. Lesar, Acting Chief
Rules and Directives Branch
Division of Administrative Services
Office of Administration

FROM: Daniel M. Gillen, Acting Chief /s/
Fuel Cycle Licensing Branch
Division of Fuel Cycle Safety
and Safeguards, NMSS

SUBJECT: PUBLISHING FONSI IN THE FEDERAL REGISTER CONCERNING APPROVAL OF THE RENEWAL OF SOURCE MATERIAL LICENSE SUA-1548

Attached please find one signed original, five copies, and an electronic version on a floppy diskette of the Federal Register Notice identified below for your transmittal to the Office of the Federal Register for publication.

- [ ] Notice of Finding of No Significant Impact for the proposed renewal of Source Material License No. SUA-1548, Rio Algom Mining Corporation, Smith Ranch, Commercial Uranium Recovery Project, Converse County, Wyoming
- [ ] Notice of Availability of Environmental Report

- [ ] Notice of Opportunity for Hearing for the renewal of Source Material License SUA-1548
- [ ] Notice of Availability of License Amendment Application for:

- [ ] Notice of Availability of Draft EIS for:

☐ Notice of Availability of Final EIS for:_____
_____

☐ Notice of Issuance of Facility Operating License or Amendment_____
_____

☐ Notice of Preparation of Environmental Assessment_____
_____

☐ Environmental Assessment_____
_____

☐ Other_____
_____

CONTACT: John H. Lusher, NMSS/FCSS
(301) 415-7694

Docket No. 40-8964
License No. SUA-1584

Attachments: As stated (7)

☐ Other_____

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Docket No. 40-8964
License No. SUA-1548

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NUCLEAR REGULATORY COMMISSION

DOCKET NO. 40-8964

RIO ALGOM MINING CORPORATION

AGENCY: Nuclear Regulatory Commission

ACTION: Final Finding of No Significant Impact
Notice of Opportunity for Hearing

SUMMARY: The U.S. Nuclear Regulatory Commission (NRC) proposes to renew NRC Source Material License SUA-1548 to authorize the licensee, Rio Algom Mining Corporation (RAMC), to continue commercial operations of its in situ leach (ISL) Rio Algom Smith Ranch Uranium Recovery Project in Converse County, Wyoming. This license currently authorizes RAMC to receive, acquire, possess, and transfer uranium at the Rio Algom Smith Ranch Project, which is located approximately 17 miles (27 Kilometers) Northeast of Glenrock, Wyoming. An Environmental Assessment (EA) was performed by the NRC staff in support of its review of RAMC renewal request, in accordance with the requirements of 10 CFR Part 51. The conclusion of the Environmental Assessment is a Finding of No Significant Impact (FONSI) for the proposed licensing action.

FOR FURTHER INFORMATION CONTACT: Mr. John H. Lusher, Fuel Cycle Licensing Branch, Division of Fuel Cycle Safety and Safeguards, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Mail Stop T8-A33, Washington, D.C. 20555. Telephone 301/415-7694.

SUPPLEMENTARY INFORMATION:

Background

At the Rio Algom Smith Ranch Facility, ISL uranium recovery method involves: (1) The injection of native groundwater, with added sodium carbonate/bicarbonate and oxygen or hydrogen peroxide, into uranium-bearing orebody through injection wells; (2) the chemical mobilization of the uranium through oxidation and then complexation with the carbonate species; and (3) the extraction of the uranium-bearing solution from the subsurface through a pattern of pumping wells. The uranium is separated from the leach solution by conventional ion exchange methods in the processing facility. The resulting uranium-poor solution is recharged with carbonate and oxygen and returned to the leaching zone for additional uranium recovery. This cycle continues until the ore zone is depleted or recovery of uranium is no longer economically feasible.

The recovered uranium solution is processed further by using ammonia or hydrogen peroxide to precipitate the uranium into a slurry. The resulting slurry is thickened by gravity settling, and then washed and de-watered in a filter press to about 50 percent solids. The filter press solids (cake) are then dried in a natural gas heated oil vacuum dryer, to produce uranium oxide,

which is commonly known as “yellowcake.” The dried yellowcake is packaged in 55-gallon (208-liter) steel drums for storage and eventual shipment to a fuel processing facility.

RAMC conducts uranium recovery operations within designated areas (wellfield units) of the Rio Algom Smith Ranch site. These wellfield units consist of about 50 acres (20 hectars) in size. A number of well patterns are installed in each wellfield unit, with each pattern typically including four injection wells laid out in a roughly rectangular shape and one centrally-located pumping (production) well. Currently, RAMC is conducting uranium recovery operations in three wellfield units.

Summary of the Environmental Assessment

The NRC staff performed an appraisal of the environmental impacts associated with the continued operation of the Rio Algom Smith Ranch ISL facility, in accordance with 10 CFR Part 51, Licensing and Regulatory Policy Procedures for Environmental Protection. In conducting its appraisal, the NRC staff considered the following information: (1) RAMC’s license renewal application, as amended; (2) previous environmental evaluations of the RAMC facility; (3) RAMC’s amendment request submitted subsequent to its renewal application, and NRC staff approval of such request; (4) data contained in required environmental monitoring reports; (5) results of NRC staff site visits and inspections of the RAMC facility; and (6) consultations with the U.S. Fish and Wildlife Service, the U.S. Bureau of Land Management, and the Wyoming State Historic Preservation Officer. The results of the staff’s appraisal are documented in an Environmental Assessment. The safety aspects for the continued operation are discussed separately in a Safety Evaluation Report (SER).

The license renewal would authorize RAMC to continue operating the Rio Algom Smith Ranch ISL facility, such that the plant and satellite facilities throughput does not exceed a flow rate of 12,000 gallons (45,420 liters) per minute, exclusive of the flow involved in restoring the depleted wellfield units. Annual yellowcake production will not be authorized to exceed 3.5 million pounds (1,587,565 kilograms).

All conditions in the renewal license and commitments presented in the renewal application are subject to NRC inspection. Violation of the license may result in enforcement action.

Conclusions

The NRC staff has re-examined actual and potential impacts associated with continued commercial operation of the Rio Algom Smith Ranch ISL facility, and has determined that the renewal of Source Material License SUA-1548 will: (1) be consistent with requirements of 10 CFR Part 40, (2) not be inimical to the public health and safety; and (3) not have long-term detrimental impacts on the environment. The following statements summarize the conclusions resulting from the staff's environmental assessment, and support the FONSI:

1. The proposed ground water monitoring program is sufficient to detect excursions (vertical and horizontal) of recovery solutions. Furthermore, aquifer testing and previous operations indicate that the production zone is adequately confined, thereby assuring hydrological control of recovery solutions;

2. Liquid process waste will be disposed in accordance with approved waste disposal options. Monitoring programs are in place to ensure appropriate operation of the deep disposal wells and to detect potential leakage from the evaporation ponds;

3. An acceptable environmental and effluent monitoring program is in place to monitor effluent releases and to detect if applicable regulatory limits are exceeded. Radiological effluents from facility operation have been and are expected to remain below the regulatory limits;

4. All radioactive waste generated by facility operations will be disposed offsite at a licensed 11e.(2) byproduct disposal site;

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

6. Because the staff has determined that there will be no significant impacts associated with approval of the license renewal, there can be no disproportionally high and adverse effects or impacts on minority and low-income populations. Consequently, further evaluation of Environmental Justice concerns, as outlined in Executive Order 12898 and NRC's Office of Nuclear Material Safety and Safeguards Policy and Procedures Letter 1-50, Revision 1, is not warranted.

Alternatives to the Proposed Action

The proposed action is to renew NRC Source Material License SUA-1548, for continued operation of the Rio Algom Smith Ranch ISL facility as requested by RAMC. Therefore, the principal alternatives available to NRC are to:

(1) Renew the license with such conditions as are considered necessary or appropriate to protect public health and safety and the environment; or

(2) Renew the license with such conditions as are considered necessary or appropriate to protect public health and safety and the environment, but not allow RAMC to expand its operations beyond those previously approved; or

(3) Deny the renewal of the license.

Based on its review, the NRC staff has concluded that the environmental impacts associated with the proposed action do not warrant either the limiting of RAMC's future operations or the denial of the license renewal. Additionally, in the SER prepared for this action, the staff has reviewed the licensee's proposed action with respect to the criteria for license issuance, specified in 10 CFR Part 40, Section 40.32, and has no basis for denial of the proposed action. Therefore, the staff considers that Alternative 1 is the appropriate alternative for selection.

FINDING OF NO SIGNIFICANT IMPACT

The NRC staff has prepared an EA for the proposed renewal of NRC Source Material License SUA-1548, On the basis of this assessment, the NRC staff has concluded that the environmental impacts that may result from the proposed action would not be significant, and therefore, preparation of an Environmental Impact Statement is not warranted.

The EA and other documents related to this proposed action are available for public inspection and copying at the NRC Public Document Room, One White Flint North, 11555 Rockville Pike, Rockville, MD 20852.

**Notice of Opportunity for Hearing**

The Commission hereby provides notice that this is a proceeding on an application for a licensing action falling within the scope of 10 CFR Part 2, Subpart L, "Informal Hearing Procedures for Adjudications in Materials and Operators Licensing Proceedings," of the Commission's Rules of Practice for Domestic Licensing Proceedings and Issuance of Orders. Pursuant to § 2.1205(a), any person whose interest may be affected by this proceeding may file a request for a hearing. In accordance with § 2.1205(d), a request for a hearing must be filed within thirty (30) days from the date of publication of this FEDERAL REGISTER notice. The request for a hearing must be filed with the Office of the Secretary either:

(1) By delivery to the Rulemakings and Adjudications Staff of the Office of the Secretary at One White Flint North, 11555 Rockville Pike, Rockville, MD 20852; or

(2) By mail or telegram addressed to the Secretary, U.S. Nuclear Regulatory Commission, Washington, DC 20555, Attention: Rulemakings and Adjudications Staff. In accordance with 10 CFR 2.1205(f), each request for a hearing must also be served, by delivering it personally or by mail to:

(1) The applicant, Rio Algom Mining Corporation, 6305 Waterford Blvd, Suite 325, Oklahoma City, OK 73118;

(2) The NRC staff, by delivery to the General Consel, One White Flint North, 11555 Rockville Pike, Rockville, MD 20852, or

(3) By mail addressed to the Executive Director for Operations, U.S. Nuclear Regulatory Commission, Washington, DC 20555.

In addition to meeting other applicable requirements of 10 CFR Part 2 of the Commission's regulations, a request for a hearing filed by a person other than an applicant must describe in detail:

(1) The interest of the requestor in the proceeding;

(2) How that interest may be affected by the results of the proceeding, including the reasons why the requestor should be permitted a hearing, with particular reference to the factors set out in § 2.1205(h);

(3) The requestor's areas of concern about the licensing activity that is the subject matter of the proceeding; and

(4) The circumstances establishing that the request for a hearing is timely in accordance with § 2.1205(d).

Any hearing that is requested and granted will be held in accordance with the Commission's “Informal Hearing Procedures for Adjudications in Materials and Operator  Licensing Proceedings“ in 10 CFR Part 2, Subpart L.

Dated at Rockville, Maryland, this 30Th day of April 2001.

FOR THE NUCLEAR REGULATORY COMMISSION

/RA//

Daniel M. Gillen, Acting Chief
Fuel Cycle Licensing Branch
Division of Fuel Cycle Safety
and Safeguards
Office of Nuclear Material Safety
and Safeguards

**Enclosure 3**

# SAFETY EVALUATION REPORT
# FOR RENEWAL OF
# SOURCE MATERIAL LICENSE NO. SUA-1548

## RIO ALGOM MINING CORP.
## SMITH RANCH IN-SITU LEACHING FACILITY
## CONVERSE COUNTY, WYOMING

**April 2001**

**DOCKET NO. 40-8964**

**U.S. Nuclear Regulatory Commission**
**Office of Nuclear Material Safety and Safeguards**
**Division of Waste Management**

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## CHAPTER 1. 0, PROPOSED ACTIVITIES

The U.S. Nuclear Regulatory Commission (NRC) has completed its review of the summary of the proposed activities at the Rio Algom Smith Ranch Project *In Situ* Leach (ISL) facility. This review included the proposed activities using the review procedures in "Draft Standard Review Plan (DSRP) for *In Situ* Leach Uranium Extraction License Applications," NUREG-1569, Section 1.2 and the acceptance criteria outlined in DSRP Section 1.3.

The applicant has acceptably described the proposed activities at the Rio Algom Smith Ranch Project ISL facility including (i) corporate entities involved; (ii) location of the facility; (iii) land ownership; (iv) ore-body locations and estimated $U_3O_8$ content; (v) proposed solution mining method and recovery process; (vi) operating plans, design throughput, and annual $U_3O_8$ production; (vii) schedules for construction, startup, and duration of operations; (viii) waste management and disposal plans; and (ix) surety arrangements covering facility decommissioning, ground-water quality restoration, and site reclamation. For license renewal, the applicant has provided a summary of proposed changes, a record of amendments since the last license issuance, and documentation of inspection results. The applicants has included results from R&D operations or previous operating experience.

Based on the information provided in the application and the detailed review conducted of the summary of the proposed activities at the Rio Algom Smith Ranch Project ISL facility, the staff has concluded that the summary of the proposed activities is acceptable and is in compliance with 10 CFR 40.32, which describes the general requirements for the issuance of a specific license.

## CHAPTER 2.0, SITE CHARACTERISTICS

2.1 Site Location and Layout

NRC has completed its review of the site characterization information concerned with site location and layout at the Rio Algom Smith Ranch Project ISL facility. This review included an evaluation using the review procedures in DSRP Section 2.1.2 and the acceptance criteria outlined in DSRP Section 2.1.3.

The licensee has acceptably described the site location and layout with appropriately scaled and labeled maps showing site layout; principal facilities and structures; regional location; geology; boundaries; exclusion areas and fences; applicant property including leases and adjacent properties; nearby population centers and transportation links; and topography. References are cited acceptably. Any maps previously submitted (e.g .,maps from the original application in the case of renewals) are legible, and actual or proposed changes are highlighted.

Based on the information provided in the application, and the detailed review conducted of the characterization of site location and layout for the Rio Algom Smith Ranch Project ISL facility, the staff has concluded that the information is acceptable and is in compliance with 10 CFR 51.45, which requires a description of the affected environment containing sufficient data to aid the Commission in its conduct of an independent analysis.

## 2.2 Use of Adjacent Lands and Waters

NRC has completed its review of the site characterization information concerned with uses of adjacent lands and waters near the Rio Algom Smith Ranch Project ISL facility. This review included an evaluation using the review procedures in DSRP Section 2.2.2 and acceptance criteria outlined in DSRP Section 2.2.3.

The applicant has acceptably described the present and projected land use, including residential; commercial; agricultural; industrial; flora and fauna sanctuaries; arboreal; grazing; recreation (e.g., hunting, swimming, skiing); and infrastructure. Appropriate information on the location and extent of each use has been provided. In particular, the description and associated tabulated data of the location, nature, amounts, and population associated with each use point of present and projected (life of the facility) surface and ground-water adjacent to the site including water supplies, irrigation, reservoirs, recreation, and transportation within at least 3.3 km (2 mi) of the site boundary [0.8 km (0.5 mi) for R&D operations] are acceptable for determination of likely impacts of the proposed ISL facility. Tabulated data on present and projected water withdrawal rates, return rates, types of water use (e.g., municipal, domestic, agriculture, and livestock); source; water-use estimates; and abandoned well locations are acceptable. The applicant has identified and located (or has noted the absence of) other nuclear fuel cycle facilities located or proposed within an 80-km (50-mi) radius of the site.

Based on the information provided in the application, and the detailed review conducted of the characterization of uses of adjacent lands and waters for the Rio Algom Smith Ranch Project ISL facility, the staff has concluded that the information is acceptable and is in compliance with 10 CFR 51.45 which requires a description of the affected environment containing sufficient data to aid the Commission in its conduct of an independent analysis.

## 2.3 Population Distribution

NRC has completed its review of the site characterization information concerned with population distribution and food production near the Rio Algom Smith Ranch Project ISL facility. This review included an evaluation using the review procedures in DSRP Section 2.3.2 and acceptance criteria outlined in DSRP Section 2.3.3.

The applicant has acceptably described the population distribution using population data from generally accepted sources. A map showing the location of significant population centers, within an 80-km radius (50 mi) of the approximate center of proposed operations, is provided. A table and accompanying map providing population in pie-shaped wedges, centered on each of the 16 compass points, is included. Nearest residence distances are noted for each sector. The applicant has provided acceptable information on schools, industrial facilities, sports facilities, residential areas, parks, and forests within 3.3 km (2 mi) of the proposed ISL facility. Food production data (e.g., vegetables, meat, milk) have been described and keyed on a map. Based on a description of the methodology and sources, all the data have been appropriately projected for the proposed life of the ISL facility.

Based on the information provided in the application, and the detailed review conducted of the characterization of population distribution and food production for the Rio Algom Smith Ranch Project ISL facility, the staff has concluded that the information is acceptable and is in compliance with 10 CFR 51.45, which requires a description of the affected environment, containing sufficient data to aid the Commission in its conduct of an independent analysis.

2.4 Regional Historic, Archaeological, Architectural, Scenic, Cultural and Natural Landmarks

NRC has completed its review of the site characterization information concerned with regional historic, archeological, architectural, scenic, cultural, and natural landmarks near the Rio Algom Smith Ranch Project ISL facility. This review included an evaluation using the review procedures in DSRP Section 2.4.2 and acceptance criteria outlined in DSRP Section 2.4.3.

The licensee has acceptably described the regional historic, archeological, architectural, scenic, cultural, and natural landmarks. A listing of all nearby areas and properties included or eligible for inclusion in the National Registry of Natural Landmarks or the National Register of Historic Places is provided. A map showing all historic landmarks and places with respect to ISL facilities is included. A record of the investigation of places and properties with historic, archeological, architectural, scenic, cultural, and natural landmark significance, which follows guidance equivalent to that of the National Park Service, is provided. Contact with local tribal authorities is acceptably documented. A letter from the SHPO addressing any issues related to the properties that might be affected by the ISL facilities is included. The applicant has acceptably demonstrated that the SHPO and tribal authorities agree with the planned protection from or determination of lack of conflict with ISL facilities and activities and with any places of importance to the State, Federal, or tribal authorities. The applicant has acceptably rated the aesthetic and scenic quality of the site in accordance with the BLM Visual Resource Inventory and Evaluation System.

Based on the information provided in the application, and the detailed review conducted of the characterization of regional historic, archeological, architectural, scenic, cultural, and natural landmarks near the Rio Algom Smith Ranch Project ISL facility, the staff has concluded that the information is acceptable and is in compliance with 10 CFR 51.45, which requires a description of the affected environment containing sufficient data to aid the Commission in its conduct of an independent analysis.

2.5 Meteorlogy

NRC has completed its review of the site characterization information concerned with meteorology at the Rio Algom Smith Ranch Project ISL facility. This review included an evaluation using the review procedures in DSRP Section 2.5.2 and acceptance criteria outlined in DSRP Section 2.5.3.

The licensee has acceptably described the site meteorology by providing NWS station data located within 80 km (50 mi) of the site, including available joint frequency distribution data on; (i) wind direction and speed; (ii) stability class; (iii) period of record; (iv) height of data measurement; and (v) average inversion height. The data cover a sufficient time period to constrain long-term trends and support atmospheric dispersion modeling. The applicant has provided acceptable onsite meteorological data, including: (i) descriptions of instruments; (ii) locations and heights of instruments; and (iii) joint frequency distributions. The joint-frequency data presented are for a minimum of 1 yr, with a joint data recovery of 90 percent or more. Additional data on: (i) annual average mixing layer heights; (ii) a description of the regional climate; and (iii) total precipitation and evaporation by month have been provided. The applicant has noted any effect of nearby water bodies or terrain on meteorologic measurements. The applicant has acceptably demonstrated that meteorologic data used for assessing environmental impacts are representative of long-term meteorologic conditions at the site. The applicant's report on the existing levels of air pollution at the site and nearby is acceptable.

Based on the information provided in the application, and the detailed review conducted of the characterization of meteorology at the Rio Algom Smith Ranch Project ISL facility, the staff has concluded that the information is acceptable to allow evaluation of the spread of airborne contamination at the site and development of conceptual and numerical models, and is in compliance with 10 CFR 51.45, which requires a description of the affected environment containing sufficient data to aid the Commission in its conduct of an independent analysis.

2.6 Geology and Seismology

NRC has completed its review of the site characterization information concerned with geology and seismology at the Rio Algom Smith Ranch Project ISL facility. This review included an evaluation using the review procedures in DSRP Section 2.6.2 and acceptance criteria outlined in DSRP Section 2.6.3.

The licensee has acceptably described the geology and seismology by providing: (i) a description of the local and regional stratigraphy; (ii) geologic, topographic, and isopach maps at acceptable scales showing surface and subsurface features and locations of all wells and site explorations used in defining stratigraphy; (iii) a geologic and geochemical description of the ore zone and the geologic units adjacent to the ore zone; (iv) an inventory of nearby economically significant minerals and energy-related deposits; (v) a description of the local and regional geologic structure; (vi) a discussion of the seismicity and seismic history of the region; (vii) a generalized stratigraphic column that includes thickness of rock units, representation of lithologies, and ore horizon definition; and (viii) a description and map of the soils.

Based on the information provided in the application, and the detailed review conducted of the characterization of the geology and seismology at the Rio Algom Smith Ranch Project ISL facility, the staff has concluded that the information is acceptable to allow

evaluation of the geologic and seismologic characteristics of the site and associated conceptual and numerical models and is in compliance with 10 CFR 40.31(f), which requires inclusion of an environmental report (ER) in the application, and 10 CFR 51.45, which requires a description of the affected environment containing sufficient data to aid the Commission in its conduct of an independent analysis.

## 2.7 Hydrology

NRC has completed its review of the hydrologic site characterization information for the Rio Algom Smith Ranch Project ISL facility. This review included an evaluation using the review procedures in DSRP Section 2.7.2 and acceptance criteria outlined in DSRP Section 2.7.3.

The licensee has acceptably described the hydrology by providing: (i) estimates of the local and regional hydraulic gradients, using potentiometric surface maps with acceptable contour intervals, including the ore zone aquifer and other overlying or underlying aquifers, and the likely consequences to affected populated areas; (ii) hydrologic cross-sections, based on an appropriate number of boreholes; (iii) acceptable comprehensive chemical and radiochemical analyses of water samples, from in and near the ore body, that define the preoperational baseline water quality conditions; (iv) all hydraulic parameters used to determine expected operational and restoration performance; and (v) characterization of surface water in the ISL facility and nearby areas, including presentation of such information on maps. Zones of interchange between surface and ground water have been identified. The applicant has provided acceptable erosion protection against the effects of flooding from nearby streams and for drainage and diversion channels, such that the suggested criteria of WM–8201 (U.S. Nuclear Regulatory Commission, 1983) have been followed and that the design meets the requirements of 10 CFR Part 40, Appendix A.

Based on the information provided in the application, and the detailed review conducted of the characterization of the hydrology at the Rio Algom Smith Ranch Project ISL facility, the staff has concluded that the information is acceptable to allow evaluation of the site and associated conceptual and numerical models and is in compliance with 10 CFR 51.45, which requires a description of the affected environment containing sufficient data to aid the Commission in its conduct of an independent analysis.

## 2.8 Ecology

NRC has completed its review of the site characterization information concerned with ecology at the Rio Algom Smith Ranch Project ISL facility. This review included an evaluation using the review procedures in DSRP Section 2.8.2 and acceptance criteria outlined in DSRP Section 2.8.3.

The licensee has described the ecology by providing acceptable: (i) inventories of terrestrial and aquatic species; (ii) inventories of locally significant domestic flora and fauna (e.g., cattle, sheep, goats); (iii) discussions of important species found within a radius where impacts are reasonably expected to occur and estimations of their current and historical abundance; and (iv) thorough descriptions of the species-environment relationships for any important species.

Based on the information provided in the application, and the detailed review conducted of the characterization of the ecology at the Rio Algom Smith Ranch Project ISL facility, the staff has concluded that the information is acceptable to allow evaluation of the site ecology and associated conceptual and numerical models and is in compliance with 10 CFR 51.45, which requires a description of the affected environment containing sufficient data to aid the Commission in its conduct of an independent analysis.

2.9 Background Radiological Characteristics

NRC has completed its review of the characterization information concerned with the background radiological characteristics at the Rio Algom Smith Ranch Project ISL facility. This review included an evaluation using the review procedures in DSRP Section 2.9.2 and acceptance criteria outlined in DSRP Section 2.9.3.

The licensee has acceptably established the background radiological characteristics by providing: (i) monitoring programs, to determine background radiologic characteristics that include radionuclides monitored, sampling frequency, and methods, location, and density; (ii) air quality stations located consistent with the prevailing wind directions; (iii) time periods for preoperational monitoring that allow for 12 consecutive months of sampling; and (iv) radiologic analyses of soil samples at 5-cm(2-inch) and 15-cm (6-inch) depths.

Based on the information provided in the application, and the detailed review conducted of the characterization of the background radiological characteristics at the Rio Algom Smith Ranch Project ISL facility, the staff has concluded that the information is acceptable to allow evaluation of the radiological background of the site and associated conceptual and numerical models and is in compliance with 10 CFR 51.45, which requires a description of the affected environment containing sufficient data to aid the Commission in its conduct of an independent analysis.

2.10 Background Non-radiological Characteristics

NRC has completed its review of the information concerned with the background nonradiological characteristics at the Rio Algom Smith Ranch Project ISL facility. This review included an evaluation using the review procedures in DSRP Section 2.10.2 and acceptance criteria outlined in DSRP Section 2.10.3.

The licensee has acceptably established the background nonradiological characteristics by documenting: (i) site-related effluents (e.g., heavy metals, and other toxic substances); (ii) baseline atmospheric constituent levels; (iii) background soil constituent concentrations; (iv) ground and surface water background constituents; and (v) preoperational data or information from other sources.

Based on the information provided in the application, and the detailed review conducted of the characterization of the background nonradiological characteristics at the Rio Algom Smith Ranch Project ISL facility, the staff has concluded that the information is

acceptable to allow evaluation of the nonradiologic background of the site and associated conceptual and numerical models and is in compliance with 10 CFR 51.45, which requires a description of the affected environment containing sufficient data to aid the Commission in its conduct of an independent analysis.

## CHAPTER 3.0, DESCRIPTION OF FACILITY

### 3.1 Proposed Facility

NRC has completed its review of the solution mining process and equipment proposed for use at the Rio Algom Smith Ranch Project ISL facility. This review included an evaluation using the review procedures in DSRP Section 3.1.2 and the acceptance criteria in DSRP Section 3.1.3.

The applicant has acceptably described the ore body(ies), demonstrated protection against vertical migration of water, proposed tests for well integrity that assure facility stability, and demonstrated that the ISL process will meet the following criteria: (i) down hole injection pressures are less than formation fracture pressures; (ii) overall production rates are higher than injection rates; (iii) plant material balances and flow rates are appropriate; (iv) lixiviant makeup is such that restoration goals can be achieved in a timely manner; (v) recovery efficiency is assessed through mass balance calculations; and (vi) reasonable estimates of gaseous, liquid, and solid wastes and effluents are provided (used in evaluation of effluent monitoring and control measures in DSRP Section 4.0). The applicant has used the results from R&D or other production operations to support the evaluation of the solution mining process. The applicant has provided acceptable operating plans, schedules, and timetables for well field operation, surface reclamation, and
ground-water restoration.

Based on the information provided in the application and the detailed review conducted of the solution mining process and equipment for the Rio Algom Smith Ranch Project ISL facility, the staff has concluded that the proposed solution mining process and equipment are acceptable and are in compliance with 10 CFR 40.32(c) which requires the applicant's proposed equipment, facilities, and procedures to be adequate to protect health and minimize danger to life or property; 10 CFR 40.32(d), which requires that the issuance of the license will not be inimical to the common defense and security or to the health and safety of the public; 10 CFR 40.41(c), which requires the applicant to confine source or byproduct material to the location and purposes authorized in the license; and 10 CFR Part 40, Appendix A, Criteria 5(A)(1) and (2), for ground-water protection. The related reviews of the 10 CFR Part 20 radiological aspects of the solution mining process and equipment in accordance with DSRP Sections 4.0, "Effluent Control Systems"; 5.0, "Operations"; and 7.0, "Environmental Effects; are addressed elsewhere in this TER".

### 3.2 Recovery Plant Equipment

NRC has completed its review of the recovery plant equipment proposed for use at the Rio Algom Smith Ranch Project ISL facility. This review included an evaluation using the review procedures in DSRP Section 3.2.2 and the acceptance criteria outlined in DSRP Section 3.2.3.

The recovery plant equipment has been acceptably diagramed to show areas where dusts, fumes, or gases would be generated. Ventilation, filtration, confinement and dust collection systems, and the locations of radiation monitoring equipment have been provided.

Based on the information provided in the application and the detailed review conducted of the recovery plant equipment for the Rio Algom Smith Ranch Project ISL facility, the staff has concluded that the proposed recovery plant equipment is acceptable and is in compliance with 10 CFR 40.32(c), which requires that the applicant's proposed equipment, facilities, and procedures be adequate to protect health and minimize danger to life or property; 10 CFR 40.32(d), which requires that the issuance of the license will not be inimical to the common defense and security or to the health and safety of the public; and 10 CFR 40.41(c), which requires the applicant to confine source or byproduct material to the locations and purposes authorized in the license. The related reviews of the 10 CFR Part 20 radiological aspects of the recovery plant equipment in accordance with DSRP Sections 4.0, "Effluent Control Systems"; 5.0, "Operations"; and 7.0, "Environmental Effects"; are addressed elsewhere in this TER.

### 3.3 Instrumentation

NRC has completed its review of the instrumentation proposed for use at the Rio Algom Smith Ranch Project ISL facility. This review included an evaluation using the review procedures in DSRP Section 3.3.2 and the acceptance criteria outlined in DSRP Section 3.3.3.

The instrumentation has been acceptably described for components including the well fields, well field houses, trunk lines, production circuit, surface impoundments, and deep injection disposal wells. The instrumentation allows for continuous monitoring and control of systems, including total inflow to the plant, total waste flow exiting the plant, tank levels, and the yellowcake drier. Appropriate alarms are part of the instrumentation systems. Each critical system is equipped with an acceptable backup that automatically activates in the event of a power failure.

Based on the information provided in the application and the detailed review conducted of the instrumentation for the Rio Algom Smith Ranch Project ISL facility, the staff has concluded that the proposed instrumentation is acceptable and is in compliance with 10 CFR 40.32(c), which requires the applicant's proposed equipment, facilities, and procedures to be adequate to protect health and minimize danger to life or property; 10 CFR 40.32(d), which requires that the issuance of the license will not be inimical to the common defense and security or to the health and safety of the public; and 10 CFR 40.41(c), which requires the applicant to confine source or byproduct material to the locations and purposes authorized in the license. The related reviews of the 10 CFR Part 20 radiological aspects of the solution mining process and equipment, in accordance with DSRP Sections 4.0, "Effluent Control Systems"; 5.0, "Operations"; and 7.0, "Environmental Effects"; are addressed elsewhere in this TER.

## CHAPTER 4.0, EFFLUENT CONTROL SYSTEMS

4.1 Gaseous and Airborne Particulates

NRC has completed its review of the effluent control systems for gaseous and airborne particulates proposed for use at the Rio Algom Smith Ranch Project ISL facility. This review included an evaluation using the review procedures in DSRP Section 4.1.2 and the acceptance criteria outlined in DSRP Section 4.1.3.

The applicant has acceptably described the discharge types, estimated composition, and flow rates of effluents released to the atmosphere. The applicant has designated monitoring and control systems (e.g., ventilation, filtration, and confinement) for the types of effluents generated. Also, the applicant has specified acceptable monitoring criteria and has located the facility monitoring and control systems for the required functions to optimally assess worker exposure in locations of likely maximum concentrations determined by the applicant's analysis of airflow patterns. The applicant has demonstrated that ventilation systems are acceptable to prevent radon gas buildup where: (i) recovery solutions enter the plant, (ii) tanks are vented during the extraction process; and (iii) drying and packaging operations occur. By providing information on the health and safety impacts of system failures and identifying contingencies for such occurrences, the applicant has acceptably shown that effluent control systems will limit radiation exposures under both normal and accident conditions. The applicant has committed to occupational radiation doses and doses to the general public that meet dose limits and ALARA goals.

Based on the information provided in the application and the detailed review conducted of the effluent control systems for gaseous and airborne particulates for the Rio Algom Smith Ranch Project ISL facility, the staff has concluded that the proposed effluent control systems for gaseous and airborne particulates are acceptable and are in compliance with 10 CFR 20.1101, which requires that an acceptable radiation protection program that achieves ALARA goals is in place and that a constraint on air emissions, excluding Radon-222 and its decay products, will be established to limit doses from these emissions; 10 CFR 20.1201, which defines the allowable occupational dose limits for adults; 10 CFR 20.1301, which defines dose limits allowable for individual members of the public; 10 CFR 20.1302, which requires compliance with dose limits for individual members of the public; and 10 CFR Part 40, Appendix A, Criterion 8, which provides requirements for control of airborne effluent releases. The related reviews of the 10 CFR Part 20 radiological aspects of the effluent control systems for gaseous and airborne radionuclides in accordance with DSRP Sections 5.0, "Operations"; and 7.0, "Environmental Effects"; are addressed elsewhere in this TER.

4.2 Liquids and Solids

NRC has completed its review of the effluent control systems for liquids and solids proposed for use at the Rio Algom Smith Ranch Project ISL facility. This review included an evaluation using the review procedures in DSRP Section 4.2.2 and the acceptance criteria outlined in DSRP Section 4.2.3.

The applicant has acceptably described the common liquid effluents generated at the facility. Appropriate control methods, including diversion to surface impoundments, deep well injection, and land application/irrigation (select appropriate methods) are identified. Onsite evaporation system designs are prescribed in acceptable detail, including engineering plans and drawings.

**Table 4.2.3-1. Non-Nuclear Regulatory Commission permits that may be required to support liquid effluent disposal at uranium *in situ* leach facilities**

| Permit | Comments |
|---|---|
| Underground Injection Control | Mandatory. Issued either by EPA or a State under EPA authority. EPA reserves exclusive aquifer exemption action. |
| Surface Water Discharge non-11e.(2) | Optional. Usually issued by the State, under EPA authority. |
| Air | Mandatory with dryer. Usually issued by a State under EPA authority; may also be local. |
| Mining | Mandatory. Usually issued by a State under legislative authority. |
| Wetlands | Issued by U.S. Army Corps of Engineers |
| Consumptive Water Use | Mandatory. Issued by a State under legislative authority. (Secure water rights) |
| Leases/Permits on Federal Lands | Issued by U.S Bureau of Land Management , U.S Bureau of Indian Affairs (Department of the Interior), U.S. Forest Services. U.S. Department of Agriculture, or U.S. Bureau of Reclamation. |
| Construction/Sewage | Issued by local authorities: building codes, utility authorities, and planning authorities. |
| Leases/Permits on State Lands | Issued by State land offices. |

The applicant has shown that liquid waste disposal facilities are adequate to handle production and restoration efforts and has designed installation and operation of surface impoundments such that the impoundments can contain the entire contents of any other leaking or inoperative impoundment. The applicant has demonstrated that any dikes used to form a surface impoundment are designed, constructed, and maintained with sufficient structural integrity to prevent massive failure. Additionally, surface impoundments and associated liners are properly designed. The applicant has proposed daily checks of impoundment freeboard and leak detection systems. Chemical sampling is initiated when levels are greater than 15 cm (6 in). The planned sampling and

analysis of contaminants in the leak detection systems are acceptable. An appropriate corrective action plan is described that allows for the contents of a given impoundment to be transferred to another impoundment with no release of contamination. The applicant has an acceptable action plan to notify NRC, analyze samples, and file a written report in the event of leaks. The applicant has ensured that disposal plans are in compliance with applicable directives. Acceptable plans and procedures that address contingencies for all reasonably expected system failures are provided. The applicant has demonstrated that sump capacity is sufficient to contain the volume of the largest hazardous material source. The facility has acceptable alarms to notify the operator of loss of or excess pressure within the production circuits. The applicant's log of significant solution spills is acceptable. The applicant's plan for spill notification is acceptable. The applicant has an acceptable plan for the disposal of contaminated solid wastes that are generated by the facility. The applicant has proposed storage of contaminated material that either cannot or will not be decontaminated and released for unrestricted use. The applicant has demonstrated that the contamination will be managed to insure compliance with occupational dose limits, as discussed in Section 5.7 of the DSRP. The applicant will dispose of noncontaminated solid waste periodically at a licensed disposal site landfill, in accordance with State and local regulations. The applicant has demonstrated possession of the appropriate water quality certification and discharge permits or has plans in place to obtain them. By providing information on the health and safety impacts of system failures and identifying contingencies for such occurrences, the applicant has shown that effluent control systems will limit radiation exposures under both normal and accident conditions. The applicant has committed to maintaining occupational radiation doses and doses to the general public that meet exposure limits and ALARA goals.

Based on the information provided in the application and the detailed review conducted of the effluent control systems for liquids and solids for the Rio Algom Smith Ranch Project ISL facility, the staff has concluded that the proposed effluent control systems for liquids and solids are acceptable and are in compliance with 10 CFR 20.1101, which requires that an acceptable radiation protection program that achieves ALARA goals is in place; 10 CFR 20.1201, which defines the allowable occupational dose limits for adults; 10 CFR 20.1301, which defines dose limits allowable for individual members of the public; 10 CFR 20.1302, which requires compliance with dose limits for individual members of the public; 10 CFR 20.2007, which requires that disposal by injection in deep wells must also meet any other applicable Federal, State, and local government regulations pertaining to deep well injection; 10 CFR Part 40, Appendix A, Criterion 2, which requires that the applicant provide an estimate of the amount of contaminated material that will be generated and objective evidence of an agreement for disposal of these materials either in a licensed waste disposal site or at a licensed mill tailings facility to demonstrate nonproliferation of waste disposal sites; 10 CFR Part 40, Appendix A, Criteria 5A(1) through 5A(5), which define design provisions for surface impoundments; Criterion 5E which addresses installation of liners; Criterion 5F which provides requirements for seepage control; Criterion 6(6), which defines cleanup standards for radium; and Criterion 8, which requires conformance to the provisions in 40 CFR Part 440, as applicable. The related reviews of the 10 CFR Part 20 radiological aspects of the effluent control systems for liquids and solid radionuclides, in accordance with DSRP Sections 5.0, "Operations"; and 7.0, "Environmental Effects"; are addressed elsewhere in this TER.

If surface impoundments are to be used at the facility to manage 11e.(2) byproduct material, the design of dikes used to construct surface water impoundments has been demonstrated to comply with Regulatory Guide 3.11, Sections 2 and 3 (U.S. Nuclear Regulatory Commission, 1977), and therefore meet the requirements of 10 CFR Part 40, Appendix A, Criterion 5(A)5. In addition,

because the impoundment dikes may meet the definition of a dam as given in the Federal Guidelines for Dam Safety, they may be subject to the NRC Dam Safety Program, and to Section 215, “National Dam Safety Program, of the Water Resources Development Act of 1966.”

The staff has also considered the environmental impacts from the proposed liquid waste management approach. Considered in the evaluation were the potential environmental impacts as well as alternatives and mitigative measures. In evaluating the environmental impacts, the staff examined effects from radiological as well as nonradiological aspects. Alternatives considered include deep well injection. The staff has determined that the environmental impacts from the proposed facility are acceptable.

## CHAPTER 5.0, OPERATIONAL/ENVIRONMENTAL MONITORING

5.1 Ground and Surface Water monitoring

NRC has completed its review of the ground-water and surface-water monitoring programs at the Rio Algom Smith Ranch Project ISL facility. This review included an evaluation using the review procedures in DSRP Section 5.7.8.2 and the acceptance criteria outlined in DSRP Section 5.7.8.3.

The applicant has established acceptable ground-water and surface-water monitoring programs at the Rio Algom Smith Ranch Project ISL site. The applicant has established acceptable baseline sampling programs including the number and timing of samples, constituents sampled, and appropriate statistical methods to remove outliers. The applicant has selected acceptable excursion indicator parameters and an approach for establishing upper control limits (UCLs). Appropriate criteria are used to establish monitor well locations for all aquifers likely to be affected. Appropriate well field test procedures are established. The applicant has defined acceptable operational approaches for the ground-water and surface-water monitoring programs, including identifying appropriate wells for monitoring for excursion indicators, monitoring frequency, and criteria for determining the presence of an excursion. The applicant has defined an acceptable sampling program for any surface water body that lies within the facility boundary, including downstream sampling locations; appropriate preoperational seasonal data collection, and standard approaches for monitoring including a schedule, and a list of analyzed constituents. The applicant has prepared an acceptable corrective action plan, including notification of NRC and subsequent reporting in the event of an excursion.

Based on the information provided in the application and the detailed review conducted of the ground-water and surface-water monitoring programs at the Rio Algom Smith Ranch Project ISL facility, the staff has concluded that the ground-water and surface-water monitoring programs are acceptable and are in compliance with 10 CFR 40.32(c), which requires the applicant’s proposed equipment, facilities, and procedures to be adequate to protect health and minimize danger to life or property; 10 CFR 40.32(d), which requires that the issuance of the license will not be inimical to the common defense and security or to the health and safety of the public; 10 CFR 40.41(c), which requires the applicant to confine source or byproduct material to the locations and purposes authorized in the license; and 10 CFR 40.31, which defines requirements for applications for specific licenses.

Preoperational monitoring is conducted as part of site characterization and is addressed in Section 2 of this TER whereas restoration monitoring is conducted during ground-water restoration and is addressed in Section 6 of this TER.

**CHAPTER 6.0, RECLAMATION PLAN**

6.1 Plans and Schedules for Groundwater Quality Restoration

NRC has completed its review of the plans and schedules for ground-water quality restoration proposed for use at the Rio Algom Smith Ranch Project ISL facility. This review included an evaluation of the methods that will be used to develop the ground-water restoration program and schedules using the review procedures in DSRP Section 6.1.2 and the acceptance criteria outlined in DSRP Section 6.1.3.

The applicant has acceptably demonstrated that well field ground-water restoration standards will be representative of the preoperational baseline ground-water conditions. As a secondary restoration goal, the applicant has identified and committed to use the Federal primary and secondary drinking water standards.

The applicant's method for estimating well field pore volume is acceptable taking into account the estimated effective porosity of the contaminated region and the lateral and vertical extent of contamination. With respect to the methodology for undertaking restoration, the applicant provided an acceptable mix of ground-water sweep, reverse osmosis, and ground-water recirculation. The well-field-specific mix of these approaches will be determined as part of the ground-water restoration plan for each individual well field. In addition, the applicant has demonstrated an acceptable method for determining the extent of well field flare and for ensuring acceptable restoration of the flare. The applicant has committed to an acceptable schedule for complete restoration for any well field after ore extraction ceases.

The applicant has presented an acceptable list of constituents to be monitored and has specified acceptable criteria to determine the success of restoration either on a well-by-well or well field average basis. The number of pore volume replacements necessary to achieve the primary restoration targets has been provided and is acceptable. The applicant has demonstrated that the primary restoration program will return the water quality of the ore zone and affected aquifers to pre-extraction (baseline) water quality or better, that any secondary restoration standards proposed by the applicant are acceptable, or that final water quality will protect public health and safety and the environment in compliance with ALARA principles. The applicant's postrestoration stability monitoring program is acceptable. Any likely adverse offsite effects of ground-water restoration are acceptable.

The methods proposed for abandoning wells and sealing them to restore the well field to pre-extraction hydrologic conditions are acceptable. The applicant has evaluated the consumptive water impacts of the ISL facility using acceptable methods.

Based on the information provided in the application and the detailed review conducted of the plans and schedules for ground-water quality restoration for the Rio Algom Smith Ranch Project ISL facility, the staff has concluded that the proposed

plans and schedules for ground-water quality restoration are acceptable and are in compliance with 10 CFR 40.32(c), requiring the applicant's proposed equipment, facilities, and procedures to be adequate to protect health and minimize danger to life or property; 10 CFR 40.32(d), requiring that the issuance of the license will not be inimical to the common defense and security or to the health and safety of the public; and 10 CFR 51.45(c), which requires the applicant to provide sufficient data for the Commission to conduct an independent analysis. The related reviews of the 10 CFR Part 51 environmental protection regulations for domestic licensing and related regulatory functions for plans and schedules for ground-water restoration in accordance with DSRP Sections 5.0, "Operations"; and 7.0, "Environmental Effects"; are addressed elsewhere in this TER.

## 6.2 Plans and Schedules for Reclaiming Disturbed Lands

NRC has completed its review of the plans and schedules for reclaiming disturbed lands proposed for use at the Rio Algom Smith Ranch Project ISL facility. This review included an evaluation of the methods that will be used to develop the reclamation of disturbed lands program and schedules using the review procedures in DSRP Section 6.2.2 and the acceptance criteria outlined in DSRP Section 6.2.3.

The applicant has acceptable plans for a prereclamation soil survey that uses instrumentation and techniques similar to the preoperational survey used to establish baseline site conditions. The applicant has acceptably considered results from operational monitoring and other information relative to areas of expected contamination in its reclamation plans. Areas to be evaluated are acceptable and include diversion ditches, surface impoundments, well field surfaces, buildings and structures in process and storage areas, onsite transportation routes, and other areas likely to be contaminated. The applicant has proposed acceptable methodology to determine areas to be resampled or sampled with higher than normal densities. The applicant has defined appropriate procedures for the prereclamation survey and the means used to identify candidate areas for cleanup using the acquired data. An acceptable prefacility construction contour map is provided, along with a description of any significant disruptions to surface features during facility construction, operation, and shutdown. An acceptable plan of activities for surface restoration, including identification of any irreversible changes, has been provided. The applicant has assured NRC that any required changes to the radiation safety program identified as a result of the decommissioning and reclamation work will be implemented before commencing the work.

Based on the information provided in the application and the detailed review conducted of the plans and schedules for reclaiming disturbed lands for the Rio Algom Smith Ranch Project ISL facility, the staff has concluded that the proposed plans and schedules are acceptable and are in compliance with 10 CFR 40.32(c), which requires the applicant's proposed equipment, facilities, and procedures to be adequate to protect health and minimize danger to life or property; 10 CFR 40.41(c), which requires the applicant to confine source or byproduct material to the locations and purposes authorized in the license; and 10 CFR 40 Appendix A, Criterion 6, which identifies cleanup criteria and schedule requirements, and 10 CFR 51.45(c), which requires the applicant to provide sufficient data for the Commission to conduct an independent analysis. The related reviews of the 10 CFR Part 51 environmental protection regulations for domestic licensing and related regulatory functions for plans and schedules for

ground-water restoration in accordance with DSRP Sections 5.0, “Operations”; and 7.0, “Environmental Effects”, are addressed elsewhere in this TER.

### 6.3 Procedures for Removing and Disposing of Structures and Equipment

NRC has completed its review of the procedures for removing and disposing of structures and equipment proposed for use at the Rio Algom Smith Ranch Project ISL facility. This review included an evaluation of the methods that will be used to develop the procedures for removing and disposing of structures and equipment using the review procedures in DSRP Section 6.3.2 and the acceptance criteria outlined in DSRP Section 6.3.3.

The applicant has established an acceptable program for the elimination of residual contamination on structures and equipment. The applicant has made acceptable plans for measurements of radioactivity on the interior surfaces of pipes, drain lines, and ductwork by making appropriate measurements at all traps, and other access points where contamination is likely to be representative of system-wide contamination. All premises, equipment, or scrap likely to be contaminated but that cannot be measured, have been assumed by the applicant to be contaminated in excess of limits and will be treated accordingly. For all premises, equipment, or scrap contaminated in excess of specified limits, the applicant has provided detailed, specific information describing the premises, equipment, or scrap in terms of extent and degree of radiological contamination. The applicant has provided an acceptable detailed health and safety analysis that reflects that the contamination and any use of the premises, equipment, or scrap will not result in an unreasonable risk to the health and safety of the public nor the environment. The applicant plans to conduct a comprehensive radiation survey to establish that any contamination is within limits specified before the release of the premises, equipment, or scrap. A contract exists between the licensee and a waste disposal operator to dispose 11e(2) byproduct material.

Based on the information provided in the application and the detailed review conducted of the procedures for removing and disposing of structures and equipment for the Rio Algom Smith Ranch Project ISL facility, the staff has concluded that the procedures are acceptable and are in compliance with 10 CFR 40.32(c), which requires the applicant’s proposed equipment, facilities, and procedures to be adequate to protect health and minimize danger to life or property; and 10 CFR 40.41(c), which requires the applicant to confine source or byproduct material to the locations and purposes authorized in the license. The related reviews of the 10 CFR Part 51 environmental protection regulations for domestic licensing and related regulatory functions for plans and schedules for ground-water restoration in accordance with DSRP Sections 5.0, “Operations”; and 7.0, “Environmental Effects”; are addressed elsewhere in this TER.

### 6.4 Procedures for Conducting Postreclamation and Decommissioning Surveys

NRC has completed its review of the postreclamation and decommissioning radiological surveys proposed for use at the Rio Algom Smith Ranch Project ISL facility. This review included an evaluation of the methods that will be used for the postreclamation

and decommissioning radiological surveys using the review procedures in DSRP Section 6.4.2 and the acceptance criteria outlined in DSRP Section 6.4.3.

The applicant has developed an acceptable program for cleanup of radium that demonstrates that the radium concentration in the upper 15 cm (6 in) of soil will not exceed 5 pCi/g and in subsequent 15 cm (6 in) layers will not exceed 15 pCi/g. The applicant has established an acceptable program for cleanup of total uranium at 10 pCi/g or less with decay products in secular equilibrium; 30 pCi/g or less with no decay products present; or higher concentrations if buried at least 1.2 m (4 ft) beneath the surface, and it has been demonstrated that the uranium will be stabilized in place. The applicant has an acceptable plan for cleaning up areas with elevated thorium levels by continuing reclamation until the radium activity (residual and from thorium decay) that would be present in 1,000 years will be 5 pCi/g or less in the top 15 cm (6 in) of soil and 15 pCi/g or less in subsequent 15 cm (6 in) layers standards; or the applicant has demonstrated that for a deeply-buried thorium deposit, the amount of radon that could exit into a 100 $m^2$ (1,076 $ft^2$)structure built over that deposit would meet the EPA radon progeny standard for habitable structures. The applicant has acceptably sampled for thorium and has ensured that habitable buildings to remain onsite will be evaluated against the EPA radon progeny standard and that interior gamma levels are demonstrated to meet the EPA standard. The applicant has acceptably demonstrated that the survey methods employed to determine contamination on facilities and equipment are sufficient to show compliance with NRC limits on decontamination of facilities and equipment destined for unrestricted use.

Based on the information provided in the application and the detailed review conducted of the procedures for conducting postreclamation and decommissioning radiological surveys for the Rio Algom Smith Ranch Project ISL facility, the staff has concluded that the procedures are acceptable and are in compliance with 10 CFR 40.32(c), which requires the applicant's proposed equipment, facilities, and procedures to be adequate to protect health and minimize danger to life or property; 10 CFR 40.32(d), which requires that the issuance of the license will not be inimical to the common defense and security or to the health and safety of the public; 10 CFR 40.41(c), which requires the applicant to confine source or byproduct material to the locations and purposes authorized in the license; 10 CFR Part 40, Appendix A, Criterion 6(6), which provides standards for cleanup of radium; and 10 CFR 51.45(c), which requires the applicant to provide sufficient data for the Commission to conduct an independent analysis. The related reviews of the 10 CFR Part 51 environmental protection regulations for domestic licensing and related regulatory functions for plans and schedules for ground-water restoration in accordance with DSRP Sections 5.0, "Operations"; and 7.0, "Environmental Effects"; are addressed elsewhere in this TER.

## 6.5 Financial Assessment for Groundwater Restoration, Decommissioning, Reclamation, Waste Disposal, and Monitoring

NRC has completed its review of the procedures for conducting financial assessment for ground-water restoration, decommissioning, reclamation, waste disposal, and monitoring proposed for use at the Rio Algom Smith Ranch Project ISL facility. This review included an evaluation of the methods that will be used to develop the procedures using the review procedures in DSRP Section 6.5.2 and the acceptance criteria outlined in DSRP Section 6.5.3.

The applicant has established an acceptable financial surety based on the requirements in 10 CFR Part 40, Appendix A, Criterion 9. The applicant has assured that sufficient funds would be available for completion of the reclamation plan by an independent contractor. The applicant has included in the financial analyses all the activities in the reclamation plan or in Sections 6.1 through 6.4 of the DSRP. The applicant has based the assumptions for financial surety analysis on site conditions, including experiences with generally accepted industry practices, research and development at the site, and previous operating experience. The values used in the financial surety analysis are based on current dollars (or adjusted for inflation) and reasonable costs for the required reclamation activities are defined. The financial instrument(s) proposed are acceptable to NRC and meet the total surety requirements.

Based on the information provided in the application and the detailed review conducted of the procedures for conducting the financial assessment for ground-water restoration, decommissioning, reclamation, waste disposal, and monitoring for the Rio Algom Smith Ranch Project ISL facility, the staff has concluded that the procedures are acceptable and are consistent with 10 CFR Part 40, Criterion 9, which requires financial surety arrangements be established by each operator. The related reviews of the 10 CFR Part 51 environmental protection regulations for domestic licensing and related regulatory functions for plans and schedules for ground-water restoration in accordance with DSRP Sections 5.0, “Operations”; and 7.0, “Environmental Effects”; are addressed elsewhere in this TER.

## CHAPTER 7.0 ENVIRONMENTAL EFFECTS

### 7.1 Site Preparation and Construction

NRC has completed its review of the plans for site preparation and construction proposed for use at the Rio Algom Smith Ranch Project ISL facility. This review included an evaluation of the methods that will be used to conduct the site preparation and construction using the review procedures in DSRP Section 7.1.2 and the acceptance criteria outlined in DSRP Section 7.1.3.

The applicant has acceptably identified all environmental impacts from construction activities including waste generation; dusts; smoke; noise; traffic congestion; disruption of public services, routines, and property; and aesthetic impacts. The applicants’s plans are supported with site-specific data and modeling studies or calculations, where applicable. The effects of all unavoidable and irreversible impacts on the natural environment and humans are acceptable. Disturbance of land and the length and nature of the disturbance are acceptably described. The applicant has recommended appropriate mitigation measures for all significant impacts. The applicant has determined that the land can be returned to its original use after cessation of ISL operations.

Based on the information provided in the application and the detailed review conducted of the site preparation and construction plans for the Rio Algom Smith Ranch Project ISL facility, the staff has concluded that the proposed site preparation and construction are acceptable and are in compliance with 10 CFR 40.32(c), which requires the applicant’s proposed equipment, facilities, and procedures be adequate to protect health and minimize danger to life or property; 10 CFR 40.32(d), which requires

that the issuance of the license will not be inimical to the common defense and security nor to the health and safety of the public; 10 CFR 40.41(c), which requires the applicant to confine source or byproduct material to the location and purposes authorized in the license; and 10 CFR 51.45(c), which requires the applicant to provide sufficient data for the Commission to conduct an independent analysis.

7.2 Effects of Operation

The applicant has acceptably described all anticipated significant environmental impacts from facility operations. The applicant has provided acceptable: (i) mitigation of such impacts; (ii) justification of why impacts cannot be mitigated; or (iii) justification of why it is not necessary to mitigate the impacts to protect the local environment. The applicant has demonstrated that anticipated impacts to terrestrial ecology, air quality, surface and ground-water systems, and land use are environmentally acceptable.

Based on the information provided in the application and the detailed review conducted of the effects of operations on the Rio Algom Smith Ranch Project ISL facility, the staff has concluded that the anticipated effects of operations are acceptable and are in compliance with 10 CFR 40.41(c), which requires the applicant to confine source or byproduct material to the location and purposes authorized in the license; and 10 CFR 51.45(c), which requires the applicant to provide sufficient data for the Commission to conduct an independent analysis.

7.3 Radiological Effects

NRC has completed its review of the radiological effects of exposure from water pathways at the Rio Algom Smith Ranch Project ISL facility. This review included an evaluation of the methods that will be used to evaluate radiological effects using the review procedures in DSRP Section 7.3.1.1.2 and the acceptance criteria outlined in DSRP Section 7.3.1.1.3.

The applicant’s estimates of individual exposure to radionuclides from water pathways at the site boundary are acceptable since they are less than the requirements in 10 CFR 20.132 (b)(2)(i) with regard to annual average concentrations in liquid effluents, or they are less than the dose limit in 10 CFR 20.1301. The applicant has demonstrated that the concentrations of radionuclides in receiving water where it is consumed or otherwise used by humans, or where it is inhabited by biota significant to the human food chain are in compliance with the public dose limits in 10 CFR 20.1301. The applicant has included the relevant pathway diagrams in the application. The applicant has used an acceptable representation of the conditions at the site in the determination of the source term for the model calculations. The applicant has acceptable values for parameters used to estimate the source term, environmental concentrations, and exposures, and the parameters are representative of the Rio Algom Smith Ranch Project site.

NRC has completed its review of the radiological effects of exposure from air pathways at the Rio Algom Smith Ranch Project ISL facility. This review included an evaluation of the methods that will be used to evaluate radiological effects using the review procedures in DSRP Section 7.3.1.2.2 and the acceptance criteria outlined in DSRP Section 7.3.1.2.3.

The applicant’s demonstrations of individual exposure to radionuclides from air pathways are acceptable since they are less than the limits in 10 CFR 20.1302 (b)(2)(i) with regard to annual average concentrations in airborne effluents or they are less than the dose limit in 10 CFR 20.1301. The applicant has acceptably demonstrated that the concentrations of radionuclides in air at locations where residents live or where biota of significance to human food chains exist are in compliance with the public dose limits in 10 CFR 20.1301 and the ALARA constraint on air emissions in 10 CFR 20.1101(d). The applicant has included the relevant airborne exposure pathway diagrams in the application. The applicant has used an acceptable representation of the atmospheric conditions at the site in the determination of the source term and individual exposures for model calculations. The applicant has used acceptable values for parameters used to estimate the source term, environmental concentrations, and exposures; and the parameters are representative of the Rio Algom Smith Ranch Project site.

NRC has completed its review of the radiological effects of exposure from external radiation at the Rio Algom Smith Ranch Project ISL facility. This review included an evaluation of the methods that will be used to evaluate radiological effects using the review procedures in DSRP Section 7.3.1.3.2 and the acceptance criteria outlined in DSRP Section 7.3.1.3.3.

The applicant's demonstration of individual exposure to radionuclides from external radiation is acceptable and meets the limits in 10 CFR 20.1301(a)(2) in accordance with the requirements of 10 CFR 20.1302 (b). The applicant has provided an acceptable exposure pathway diagram that includes all relevant external pathways. The applicant has used an acceptable representation of the external exposures at the site in the determination of the source term, environmental concentrations, and individual exposures for the model calculations. The applicant has used acceptable values for parameters used to estimate the source term, environmental concentrations, and exposures; and the parameters are representative of the Rio Algom Smith Ranch Project site.

NRC has completed its review of the radiological effects of total human exposures at the Rio Algom Smith Ranch Project ISL facility. This review included an evaluation of the methods that will be used to evaluate radiological effects using the review procedures in DSRP Section 7.3.1.4.2 and the acceptance criteria outlined in DSRP Section 7.3.1.4.3.

The applicant’s determination of total human exposure to radionuclides at the site boundary is acceptable since it meets the requirements in 10 CFR 20.1301. The applicant has provided an exposure pathway diagram that includes all relevant external pathways. The applicant has used an acceptable representation of the external exposures at the site in the determination of the source term, environmental concentrations, and individual exposures for the model calculations. The applicant has used acceptable values for parameters used to estimate the source term, environmental concentrations, and exposures; and the parameters are representative of the Rio Algom Smith Ranch Project site.

NRC has completed its review of the radiological effects of exposures to flora and fauna at the Rio Algom Smith Ranch Project ISL facility. This review included an evaluation of the methods that will be used to evaluate radiological effects using the review procedures in DSRP Section 7.3.1.5.2 and the acceptance criteria outlined in DSRP Section 7.3.1.5.3.

The applicant has demonstrated that the offsite impacts of operation would be minimal. Flora and fauna in the areas surrounding the project site are similar to those onsite and are common in the region. Since calculated human exposures are protective of human health, they would not be expected to adversely affect the native plants and animals, and as such, are acceptable.

7.4 Nonradiological Effects

NRC has completed its review of the nonradiological effects at the Rio Algom Smith Ranch Project ISL facility. This review included an evaluation of the methods that will be used to evaluate nonradiological effects using the review procedures in DSRP Section 7.4.2 and the acceptance criteria outlined in DSRP Section 7.4.3.

The applicant has acceptably described all anticipated significant nonradiological environmental impacts from facility operations. The estimated effects of nonradioactive wastes in effluents at the point of discharge and the projected effects for both acute and chronic exposure of biota are acceptable.

7.5 Effects of Accidents

NRC has completed its review of the effects of accidents involving radioactivity proposed at the Rio Algom Smith Ranch Project ISL facility. This review included an evaluation of the methods that will be used to evaluate effects of accidents involving radioactivity using the review procedures in DSRP Section 7.5.1.2 and the acceptance criteria outlined in DSRP Section 7.5.1.3.

The applicant has acceptably described all likely significant effects of accidents from facility operations involving radioactivity. The applicant has provided an acceptable analysis of probable accidents involving radioactivity and their consequences consistent with the facility design and planned operations. The applicant has identified likely environmental impacts from such accidents and has included mitigation measures. The applicant has considered the analyses of accidents involving radioactivity resulting from past operating experience at similar facilities. The applicant's response program will comply with the notification requirements of 10 CFR 20.2202 and 20.2203.

NRC has completed its review of the effects of transportation accidents proposed for the Rio Algom Smith Ranch Project ISL facility. This review included an evaluation of the methods that will be used to evaluate effects of transportation accidents using the review procedures in DSRP Section 7.5.2.2 and the acceptance criteria outlined in DSRP Section 7.5.2.3.

The applicant has acceptably described all likely significant effects of transportation accidents from facility operations covering the full extent of transportation activities reviewed in Section 5.0 of this DSRP. The applicant has provided an acceptable analysis of probable transportation accident scenarios and consequences consistent with the facility design and industry transportation experience. The applicant has identified likely environmental impacts from such transportation accidents and has included mitigation and remediation measures. The applicant has considered the analyses of transportation accidents resulting from past

operating experience at similar facilities. The assessment of transportation accidents considers local routing options and accident rates for those routes, including the change in rates resulting from the additional shipments required by facility operation.

NRC has completed its review of the effects of other accidents (those not involving radioactive materials) proposed at the Rio Algom Smith Ranch Project ISL facility. This review included an evaluation of the methods that will be used to evaluate effects of other accidents using the review procedures in DSRP Section 7.5.3.2 and the acceptance criteria outlined in DSRP Section 7.5.3.3.

The applicant has acceptably described all likely significant effects of other accidents from facility operations covering the full extent of activities discussed in Sections 3.0, 4.0, and 5.0 of the DSRP. The applicant has provided an acceptable analysis of likely accidents and consequences consistent with the facility design and industry wide experience. The applicant has acceptably identified likely environmental impacts from such other accidents and has included mitigation and remediation measures for them. The applicant has considered the analyses of other accidents resulting from past operating experience at similar facilities.

7.6 Economic and Social Effects of Construction and Operation

NRC has completed its review of the economic and social benefits of construction and operation proposed at the Rio Algom Smith Ranch Project ISL facility. This review included an evaluation of the methods that will be used to evaluate effects of economic and social benefits of construction and operation using the review procedures in DSRP Section 7.6.1.2 and the acceptance criteria outlined in DSRP Section 7.6.1.3.

The applicant has acceptably described all anticipated economic and social benefits of construction and operation of the facility covering the full extent of activities discussed in Sections 3.0, 4.0, and 5.0 of the DSRP. The applicant has provided an acceptable analysis of probable benefits consistent with the facility design and industrywide experience. The applicant has included analyses of (i) tax revenues; (ii) creation of temporary and permanent jobs and accrued payroll; (iii) incremental increases in regional productivity; (iv) enhancement of recreational values; (v) environmental enhancement and increased knowledge of the environment through ecological research and environmental monitoring programs; and (vi) creation and improvement of infrastructure (e.g., roads, waterways, water and power supply, and other transportation facilities). The applicant has acceptably identified for each benefit who is affected and the expected duration of the beneficial effect. Overall, the applicant has demonstrated that the analysis of the economic and social benefits from the construction, operation, restoration, reclamation, and decommissioning of the proposed ISL facility are supported by properly interpreted data, calculations, and model results.

## CHAPTER 8.0 ALTERNATIVES TO THE PROPOSED ACTION

8.1 Alternate Mining Methods

NRC has completed its review of the alternatives to the proposed action at the Rio Algom Smith Ranch Project ISL facility. This review included an evaluation of the methods that will be used to develop the alternatives to the proposed action using the review procedures in DSRP Section 8.2 and the acceptance criteria outlined in DSRP Section 8.3.

The applicant has considered other alternatives to its proposed ISL facility such as open-pit or underground mining. Alternatives to the proposed facility operations that might mitigate environmental, social, and economic effects identified in DSRP Section 7.0 are presented in a form similar to that described in Sections 3.0, 4.0, 5.0, and 6.0, of the DSRP. Alternatives were acceptably considered for lixiviant chemistry, ground-water restoration techniques, waste management practices, and uranium recovery processes. The applicant has demonstrated that the choice of alternative is effective in meeting all regulatory requirements. Data from past operations or considerations based on results of an R&D site were included in the evaluation of the alternatives, as appropriate. The applicant has considered a no-licensing alternative and has demonstrated that the social and economic benefits of the proposed Rio Algom Smith Ranch Project ISL facility outweigh any adverse environmental impact of the facility.

## CHAPTER 9.0 MANAGEMENT ORGANIZATION AND ADMINISTRATIVE PROCEDURES

### 9.1 Management Organization

NRC has completed its review of the corporate organization and administrative procedures proposed for use at the Rio Algom Smith Ranch Project ISL facility. This review included an evaluation using the review procedures in DSRP Section 5.1.2 and the acceptance criteria outlined in DSRP Section 5.1.3.

The applicant has an acceptable corporate organization that defines management responsibilities and authority at each level. The applicant's definition of the responsibilities and procedures with respect to development, review, approval, implementation, and adherence to operating procedures, radiation safety programs (including record keeping and reporting), environmental and ground-water monitoring programs, QA programs, routine/nonroutine maintenance activities, and changes to any of these is acceptable. Integration among groups that support operation and maintenance of the facility is demonstrated. In the case of a new facility, integration between facility construction and plant management is acceptably detailed. The applicant has established a Safety and Environmental Review Panel (SERP) with at least three individuals representing expertise in management/financial, operations/construction, and radiation safety matters. The applicant has demonstrated that specific technical issues will be dealt with by the SERP, with support from other qualified staff members, or consultants, as appropriate.

Based on the information provided in the application and the detailed review conducted of the corporate organization and administrative procedures for the Rio Algom Smith Ranch Project ISL facility, the staff has concluded that the proposed corporate organization and administrative procedures are acceptable and are in compliance with 10 CFR 20.1101, which defines radiation protection program requirements; 10 CFR Part 20, Subpart L, Sections 2101–2110, which define requirements for record keeping;

and 10 CFR Part 20, Subpart M, Sections 2201–2206, which present the requirements for reporting. In addition, the requirements of 10 CFR 40.32(b), (c), and (d) are also met as they relate to the proposed corporate organization and SERP functions.

9.2 Management Qualifications

NRC has completed its review of the qualifications of facility personnel conducting the radiation safety program at the Rio Algom Smith Ranch Project ISL facility. This review included an evaluation using the review procedures in DSRP Section 5.4.2 and the acceptance criteria outlined in DSRP Section 5.4.3.

The qualifications of personnel conducting the radiation safety program at the Rio Algom Smith Ranch Project ISL site are acceptable as they meet the recommendations of NRC Regulatory Guide 8.31 (U.S. Nuclear Regulatory Commission, 1983).

Based on the information provided in the application and the detailed review conducted of the qualifications of the personnel conducting the radiation safety program for the Rio Algom Smith Ranch Project ISL facility, the staff has concluded that the qualifications of the personnel are acceptable and are in compliance with 10 CFR 20.1101, which defines radiation protection program requirements.

9.3 Management Control Program

NRC has completed its review of the management control program proposed for use at the Rio Algom Smith Ranch Project ISL facility. This review included an evaluation using the review procedures in DSRP Section 5.2.2 and the acceptance criteria outlined in DSRP Section 5.2.3.

The applicant has an acceptable management control program that assures that all activities can be conducted according to written operating procedures. The applicant has provided acceptable operating procedures or a process that will be used to develop standard operating procedures. The applicant has acceptably identified radiation protection, maintenance activities (especially in radiation areas), development of well fields, and SERP reviews as areas where standard operating procedures (SOPs) are acceptable and correctly applied. The applicant has demonstrated that nonroutine work or maintenance activity will comply with radiation safety requirements and has provided for the issuance of radiation work permits for activities where SOPs do not apply.

Based on the information provided in the application and the detailed review conducted of the management control program for the Rio Algom Smith Ranch Project ISL facility, the staff has concluded that the proposed management control program is acceptable and is in compliance with 10 CFR 20.1101, which defines radiation protection program requirements; 10 CFR Part 20, Subpart L, Sections 2101–2110, which define requirements for record keeping; and 10 CFR Part 20, Subpart M, Sections 2201–2206, which present the requirements for reporting.

9. Employee Training

NRC has completed its review of the radiological protection training program for personnel conducting the radiation safety program at the Rio Algom Smith Ranch Project ISL facility. This review included an evaluation using the review procedures in DSRP Section 5.5.2 and the acceptance criteria outlined in DSRP Section 5.5.3.

The radiological protection training program for personnel at the Rio Algom Smith Ranch Project ISL site adheres to the guidance and acceptable approaches contained in NRC Regulatory Guides 8.31 (U.S. Nuclear Regulatory Commission, 1983), 8.13 (U.S. Nuclear Regulatory Commission, 1987), and 8.29 (U.S. Nuclear Regulatory Commission, 1981). The content of the training material, testing, on-the-job training, and the extent and frequency of retraining are acceptable. Acceptable written safety instructions for employees have been produced.

Based on the information provided in the application and the detailed review conducted of the radiological protection training program for personnel for the Rio Algom Smith Ranch Project ISL facility, the staff has concluded that the radiological training program is acceptable and is in compliance with 10 CFR 20.1101, which defines radiation protection program requirements, and 10 CFR 40.32(b), as it relates to applicant qualifications through training.

9.5 Bioassay Program

NRC has completed its review of the bioassay program at the Rio Algom Smith Ranch Project ISL facility. This review included an evaluation using the review procedures in DSRP Section 5.7.5.2 and the acceptance criteria outlined in DSRP Section 5.7.5.3.

The applicant has established an acceptable bioassay program at the Rio Algom Smith Ranch Project ISL site that is consistent with Regulatory Guide 8.22 (U.S. Nuclear Regulatory Commission, 1988). An acceptable program for baseline urinalysis and exit bioassay is in place. Individuals routinely exposed to yellowcake dust are a part of the bioassay program. An acceptable action program to curtail uranium intake is established, and appropriate action levels are set. The applicant has established reporting and record-keeping protocols in conformance with the requirements of 10 CFR Part 20, Subpart L.

Based on the information provided in the application and the detailed review conducted of the bioassay program at the Rio Algom Smith Ranch Project ISL facility, the staff has concluded that the bioassay program is acceptable and is in compliance with 10 CFR 20.1204, which provides requirements for the determination of internal exposure.

9.6 Exposure Calculations

NRC has completed its review of the exposure calculations at the Rio Algom Smith Ranch Project ISL facility. This review included an evaluation using the review procedures in DSRP Section 5.7.4.2 and the acceptance criteria outlined in DSRP Section 5.7.4.3.

The applicant has provided acceptable techniques for exposure calculations at the Rio Algom Smith Ranch Project ISL site. The applicant has provided procedures allowing determination of intake of radioactive materials by personnel in work areas. The applicant's exposure calculations for natural uranium and airborne radon daughter exposure are acceptable and are in conformance with the guidance in Regulatory Guide 8.30 (U.S. Nuclear Regulatory Commission, 1983) and Regulatory Guide 8.34 (U.S. Nuclear Regulatory Commission, 1992a). The applicant has acceptable procedures for calculating prenatal and fetal radiation exposures consistent with Regulatory Guides 8.13 (U.S. Nuclear Regulatory Commission, 1987) and 8.36 (U.S. Nuclear Regulatory Commission, 1992b). All exposure calculation methods for routine operations, nonroutine operations, maintenance, and cleanup activities are acceptable and are consistent with Regulatory Guide 8.30 (U.S. Nuclear Regulatory Commission, 1983) and Regulatory Guide 8.34 (U.S. Nuclear Regulatory Commission, 1992a). The applicant has used parameters that are representative of the site, such as using both full- and part-time workers in exposure calculations. The applicant has considered maximum production capacity and anticipated efficiencies of airborne particulate control systems in providing procedures for exposure calculations. All reporting and record-keeping is in conformance with Regulatory Guide 8.7 (U.S. Nuclear Regulatory Commission, 1982).

Based on the information provided in the application and the detailed review conducted of the exposure calculations at the Rio Algom Smith Ranch Project ISL facility, the staff has concluded that the exposure calculations are acceptable and are in compliance with 10 CFR 20.1101, which defines radiation protection program requirements; 10 CFR 20.1201(a), which specifies individual occupational dose limits; 10 CFR 20.1201(e), which defines allowed intake of soluble uranium; 10 CFR 20.1202, which describes the means of compliance when summing internal and external doses; 10 CFR 20.1203 for determination of dose from airborne external radiation; 10 CFR 20.1204, which provides requirements for determination of internal exposure; and 10 CFR 20.1208, which specifies the exposure limits for a fetus.

9.7 Facility Radiation Surveys

NRC has completed its review of the airborne radiation monitoring program at the Rio Algom Smith Ranch Project ISL facility. This review included an evaluation using the review procedures in DSRP Section 5.7.3.2 and the acceptance criteria outlined in DSRP Section 5.7.3.3.

The applicant has an acceptable airborne radiation monitoring program at the Rio Algom Smith Ranch Project ISL site. The applicant has provided an acceptable chart that depicts the facility layout and the location of airborne radiation monitors. The airborne radiation monitors are acceptably placed. The applicant demonstrated that the range, sensitivity, and calibration of monitors of airborne radiation will support protection of the health and safety of employees during facility operations. The workers are acceptably protected from radon gas releases from venting of processing tanks and from yellowcake dust from drying

operations, spills, and maintenance activities. Planned radiation surveys are acceptable. Planned documentation of radiation exposures is consistent with the requirements of 10 CFR Part 20. The applicant's respiratory protection program is acceptable. The applicant's program for monitoring of uranium and sampling of radon or its daughters is acceptable, and the results of this monitoring will be used for employee exposure calculations.

Based on the information provided in the application and the detailed review conducted of the airborne radiation monitoring program at the Rio Algom Smith Ranch Project ISL facility, the staff has concluded that the airborne radiation monitoring program is acceptable and is in compliance with 10 CFR 20.1101, which defines radiation protection program and ALARA requirements; 10 CFR 20.1201(a), which provides individual occupational dose limits; 10 CFR 20.1201(e), which specifies allowed intake of soluble uranium; 10 CFR 20.1202, which describes the means of compliance when summing internal and external doses; 10 CFR 20.1203, for determination of dose from airborne external radiation; 10 CFR 20.1208, which specifies the exposure limits to a fetus during pregnancy; 10 CFR 20.1301 which identifies public dose limits, 10 CFR 20.1702, which allows employees to limit dose to individuals by controlling access, limiting exposure times, prescribing use of respiratory equipment, or use of other controls; 10 CFR Part 20, Subpart L, which specifies record-keeping requirements; 10 CFR Part 20, Subpart M, which provides requirements for reports and notification; and 10 CFR Part 40, Appendix A, Criterion 8, which provides requirements for control of airborne effluents.

NRC has completed its review of the contamination control program at the Rio Algom Smith Ranch Project ISL facility. This review included an evaluation using the review procedures in DSRP Section 5.7.6.2 and the acceptance criteria outlined in DSRP Section 5.7.6.3.

The applicant has established an acceptable contamination control program at the Rio Algom Smith Ranch Project ISL site. The program is consistent with Regulatory Guide 8.30 (U.S. Nuclear Regulatory Commission, 1983). Acceptable controls are in place to prevent contaminated employees from entering clean areas or leaving the site. The SOPs will include provisions for contamination control, such as maintaining changing areas and personal alpha radiation monitoring before leaving radiation areas. Acceptable action levels have been set in accordance with Regulatory Guide 8.30 (U.S. Nuclear Regulatory Commission, 1983), and plans for surveys are in place for skin and personal clothing contamination. The applicant has established that all items removed from the restricted area are surveyed by the radiation safety staff and meet release limits. All reporting and record-keeping is done in conformance with protocols established in Regulatory Guide 8.7 (U.S. Nuclear Regulatory Commission, 1982). The applicant has demonstrated that the range, sensitivity, and calibration of monitoring equipment will support protection of the health and safety of employees during the full scope of facility operations. The licensee has demonstrated that contaminated surfaces will not be covered unless, before covering, a survey documents that the contamination level is below the limits specified in Table 5.7.6.3-1. The applicant will determine the radioactivity on the interior surfaces of pipes, drain lines, or duct work by making measurement at appropriate access points that will have been shown to be representative of the interior contamination. The applicant has committed to establishing that contamination on material, equipment, or scrap will be within the limits in Table 5.7.6.3-1 before unrestricted release. To relinquish possession or control of premises, equipment, or scrap with material in excess

of the limits specified in Table 5.7.6.3-1, the applicant will provide detailed information on the contaminated material and will provide a detailed health and safety analysis that shows that the release of the contaminated material will not result in an unreasonable risk to the health and safety of the public.

Based on the information provided in the application and the detailed review conducted of the contamination control program at the Rio Algom Smith Ranch Project ISL facility, the staff has concluded that the contamination control program is acceptable and is in compliance with 10 CFR 20.1101, which defines radiation protection program and ALARA requirements; 10 CFR 20.1501, which provides survey and monitoring requirements; and 10 CFR 20.1702, which allows employees to limit dose to individuals by controlling access, limiting exposure times, prescribing use of respiratory equipment, or other controls.

9.8 Management Audit and Inspection Program

NRC has completed its review of the management audit, inspection, and spill notification programs proposed for use at the Rio Algom Smith Ranch Project ISL facility. This review included an evaluation using the review procedures in DSRP Section 5.3.1.2 and the acceptance criteria outlined in DSRP Section 5.3.1.3.

The applicant has acceptable management audit, inspection, and spill notification programs that provide frequencies, types, and scopes of reviews and inspections; action levels; and corrective action measures sufficient to implement the proposed actions. The applicant has established acceptable record control procedures that insure maintenance of all records for the required period. The applicant has acceptably demonstrated that it will record and report spills of hazardous materials at the site in an accurate and timely manner. The applicant will furnish an annual, written report, to NRC, that provides the bases for any changes in the approved management audit, inspection, and spill notification programs, along with any appropriate change pages.

Based on the information provided in the application and the detailed review conducted of the management audit, inspection, and spill notification programs for the Rio Algom Smith Ranch Project ISL facility, the staff has concluded that the proposed programs are acceptable and are in compliance with 10 CFR 20.1101, which defines radiation protection program requirements; 10 CFR 20.1501, which contains the general requirements for surveying and monitoring; 10 CFR 20.1204, which provides procedures for determining individual exposure; 10 CFR 20.1702, which requires the use of process or other engineering measures to control the concentrations of radioactive material in the air; 10 CFR Part 20, Subpart L, Sections 2101–2110, which define requirements for record keeping; and 10 CFR Part 20, Subpart M, Sections 2201–2206, which present the requirements for reporting. In addition, the requirements of 10 CFR 40.32(b), (c), and (d) are met as they relate to the acceptability of management audits to ensure protection of health and minimize danger to life and property.

NRC has completed its review of the record-keeping and record retention program proposed for use at the Rio Algom Smith Ranch Project ISL facility. This review included an evaluation using the review procedures in DSRP Section 5.3.2.2 and the acceptance criteria outlined in DSRP Section 5.3.2.3.

The applicant has proposed an acceptable record-keeping and record retention program that will be adequate to ensure that the licensee is able to track, control, and demonstrate control over the source and byproduct materials that are processed, produced, or stored at the facility during its operating life, through decommissioning, and to license termination. The record keeping plans are demonstrated to assist the applicant in ensuring that both onsite and offsite exposures are kept within regulatory limits, and in documenting compliance with regulations. The applicant has demonstrated an acceptable program to maintain records on spills, likely contamination events, and unusual occurrences for use in calculating annual surety amounts and to ensure complete decommissioning. The applicant has demonstrated an awareness of, and a commitment to, the long-term need to maintain records on decommissioning, onsite and offsite disposal, and offsite releases of radioactivity, as a permanent record for the facility that will be transferred to any new owner or licensee, and then ultimately to NRC, before license termination.

Based on the information provided in the application and the detailed review conducted of the proposed record keeping and record retention program for the Rio Algom Smith Ranch Project ISL facility, the staff has concluded that the proposed record keeping and record retention plans are acceptable and are in compliance with 10 CFR Part 20, Subpart L, which defines requirements for record keeping; 10 CFR 40.61(d) and (e), which also define requirements for record-keeping; and 10 CFR 40.36(f), which defines the records important to decommissioning.

NRC has completed its review of the security measures at the Rio Algom Smith Ranch Project ISL facility. This review included an evaluation using the review procedures in DSRP Section 5.6.2 and the acceptance criteria outlined in DSRP Section 5.6.3.

The security measures at the Rio Algom Smith Ranch Project ISL site demonstrate that the applicant has acceptable active and passive constraints on ingress to the licensed and restricted areas. The applicant has identified acceptable passive controls including barbed wire fencing, locked gates, and warning signage for site control and active security systems for buildings. The applicant will check daily to verify the integrity of the security system.

Based on the information provided in the application and the detailed review conducted of the security measures for the Rio Algom Smith Ranch Project ISL facility, the staff has concluded that the security measures are acceptable and are in compliance with 10 CFR Part 20, Subpart I, which provides requirements for the security of stored material and control of material not in storage.

## CHAPTER 10.0 BENEFIT-COST SUMMARY

NRC has completed its review of the benefit-cost analysis for the Rio Algom Smith Ranch Project ISL facility. This review included an evaluation of the methods that will be used to conduct the benefit-cost analysis and the results using the review procedures in DSRP Section 9.2 and the acceptance criteria outlined in DSRP Section 9.3.

The applicant has acceptably summarized the economic benefits of the construction and operation of the proposed Rio Algom Smith Ranch Project ISL facility including: (i) additional tax revenues; (ii) temporary and permanent jobs; (iii) incremental increases in regional product; (iv) enhancement of recreational values; (v) environmental enhancement including protection or propagation of wildlife; (vi) creation and improvements in local infrastructure; and (vii) increased awareness of the environment resulting from ecological research and monitoring and any technological improvements resulting from the applicant's program. The applicant has determined economic benefits from objective sources including: (i) census data; (ii) tax information; and (iii) other data as evaluated in Section 2.0 of this DSRP. The applicant has acceptably summarized costs including: (i) internal; (ii) capital; (iii) other operating and maintenance; (iv) plant decommissioning and site reclamation; and (v) future improvements. The costs for groundwater restoration, decommissioning, and reclamation, as considered in the financial assessment for surety reviewed in Section 6.5 of this DSRP, are acceptable. The applicant has identified all short-term ISL facility-driven external costs including: (i) housing shortages; (ii) local inflation; (iii) noise and congestion; (iv) overloading of infrastructure (e.g., schools, water supply, transportation links); and (v) disruption of people's lives as a result of land acquisition. The applicant has acceptably determined all facility-driven long-term external costs including: (i) impacts on recreation through reduction in wildlife or sport animals; (ii) restrictions to access to land or water; (iii) aesthetic impacts; (iv) degradation or limited access to historic, scenic, or cultural interests; (v) lost income related to limitations on access to land or recreational facilities; (vi) decreased real estate values; and (vii) increased costs to provide government services for any additional population. The applicant has acceptably identified and considered the extent and longevity of the effect of construction and operation on individuals. The applicant has presented a comparison of the benefits and costs that acceptably justifies the proposed ISL facility and operations.

## 11.0 Conclusion

Upon completion of the safety review of RAMC's renewal application for a source material license, the NRC staff concludes that the continued operation of the Smith Ranch ISL Project, in accordance with the standard license conditions of Source Material License SUA-1548, is protective of the health and safety and fulfills the requirements of 10 CFR Parts 20 and 40. The NRC therefore recommends renewal of RAMC's Source Material License SUA-1548.

**Enclosure 4**

# 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.

| Licensee | | |
|---|---|---|
| 1. Rio Algom Mining Corp. | | 3. License Number SUA-1548 |
| 2. 6305 Waterford Boulevard, Suite 325<br>Oklahoma City, Oklahoma 73118 | | 4. Expiration Date September 30, 2010 |
| | | 5. Docket or Reference Number40- 40-8964 |
| 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 |
| Natural Uranium | a. Any | a. Unlimited |
| Byproduct material as defined in 10 CFR 40.4 | b. Unspecified | b. Quantity generated under operations authorized by this license |

**9. ADMINISTRATIVE CONDITIONS**

9.1 The authorized place of use shall be the licensee's Rio Algom Smith Ranch In-situ Leach (ISL) Facility in Converse County, Wyoming.

9.2 All written notices and reports to NRC required under this license 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 Materials Safety and Safeguards, U. S. Nuclear Regulatory Commission, 11545 Rockville Pike, Two White Flint North, Rockville, MD 20852-2738.

Required telephone notification shall be made to the NRC Operations Center at (301) 816-5100, unless otherwise specified in license conditions.

9.3 The licensee shall conduct operations in accordance with the commitments, representations, and statements contained in the license application dated November 15, 1999, as amended by submittals or amendments dated September 27, 2000, and October 12, 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.

**MATERIALS LICENSE**
**SUPPLEMENTARY SHEET**

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| License Number | SUA-1548 |
| Docket or Reference Number | 40-8964 |

## 9.4 Performance Based License Condition

UNITED STATES NUCLEAR REGULATORY COMMISSION

**MATERIALS LICENSE**
**SUPPLEMENTARY SHEET**

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|---|---|
| License Number | SUA-1548 |
| Docket or Reference Number | 40-8964 |

d) The licensee shall maintain records of any changes made pursuant to this condition until license termination. These records shall

**MATERIALS LICENSE**
**SUPPLEMENTARY SHEET**

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|---|---|
| License Number | SUA-1548 |
| Docket or Reference Number | 40-8964 |

9.6 The licensee shall dispose of 11e.(2) byproduct material from the Rio Algom Smith Ranch ISL facility at a site licensed by NRC or an

**MATERIALS LICENSE**
**SUPPLEMENTARY SHEET**

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| License Number | SUA-1548 |
| Docket or Reference Number | 40-8964 |

10.2 The licensee shall maintain effluent control systems as specified in Section 4.1 of the license application dated September 27,2000, as

UNITED STATES NUCLEAR REGULATORY COMMISSION

**MATERIALS LICENSE**
**SUPPLEMENTARY SHEET**

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| License Number | SUA-1548 |
| Docket or Reference Number | 40-8964 |

10.9 The licensee is prohibited from conducting well-field installation in the southwestern part of the State of Wyoming permit area, T35N

**MATERIALS LICENSE**
**SUPPLEMENTARY SHEET**

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| License Number | SUA-1548 |
| Docket or Reference Number | 408964 |

## 12. REPORTING REQUIREMENTS

PRINTED ON RECYCLED PAPER

NRC FORM 374 (3-2000)

| Accession No. & Microfiche Address | Title/Description Includes Est. Page Count | Document Date | Document Type | Author Affiliation(s) | Addressee Affiliation(s) | Docket Number |
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| ML080720341<br>~~~~~~~~~~~<br>Fiche Address: | Stephen P. Collings ltr re: Acceptance Review, License Renewal Amendment Request, Crow Butte Resources, Inc., Crawford, Nebraska, Source Materials License, Sua-1534..<br>2 Page(s) | 03/28/2008 | Letter | NRC/FSME/DWMEP/DURLD | Crow Butte Resources, Inc | 04008943 |
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