Cameco

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March 14, 2013

U.S. Nuclear Regulatory Commission
Attn: Douglas Mandeville
11545 Rockville Pike
Two White Flint North, Mailstop T8 F5
Rockville, MD 20852-2738

RE: License SUA-1548, Docket 40-8964,
Request for Additional Information

Dear Mr. Mandeville:

By letter dated December 19, 2012, Power Resources, Inc., doing business as Cameco Resources (Cameco), submitted a license amendment request to the Nuclear Regulatory Commission (NRC). The NRC completed its review of the submitted amendment and has Requested Addition Information (RAI) by letter dated February 28, 2013. With this submittal Cameco is responding to the RAI and attaching the requested North Butte Safety and Environmental Review Committee (SERP) report.

License Condition 10.1.2.c

In the December 19, 2012 submittal, Cameco stated it would notify the NRC two months prior to the restart of the Highland Dryer. As the request states that further notification will be provided prior to restart of the dryer, this condition has not been satisfied at this time. Cameco should clearly state when it plans to restart the Highland Dryer. Staff does not need to know the exact date when the Highland Dryer will be restarted, but identification of the month or quarter that activities will aid in staff's review of this license condition.

Cameco plans to complete its renovation of the Highland Plant mid to late summer, 2013. At this time it is uncertain if the dryer startup date will be later this year or 2014.

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License Condition 10.2.1

In the December 19, 2012 submittal, Cameco has indicated that it has reviewed its plans for the North Butte satellite through the Safety and Environmental Review Panel (SERP) process. Normally, staff would review this SERP as part of its oversight responsibilities during inspections and would provide its approval or agreement with the SERP decision at that time. Given Cameco's timeframe for activities at North Butte, staff requests that Cameco submit its complete SERP for North Butte for staff's review at this time instead of waiting for the next inspection. Staff's review of the completed SERP and associated documents will aid in its consideration of this license condition for removal.

Cameco is submitting the completed SERP for operation of the North Butte Satellite as an attachment to this response. If you have any further questions or need clarification on this please contact me.

Respectfully,
Cameco Resources

Josh Leftwich
Director, SHEQ, Permitting and Licensing

Enclosures: North Butte SERP

JL:JMc

cc: Cheyenne

Cameco

Cameco Resources

NORTH BUTTE SATELLITE OPERATIONAL PLAN, 2013

SAFETY AND ENVIRONMENTAL REVIEW PANEL (SERP)

REVIEW AND APPROVAL DOCUMENTS

NUCLEAR. *The Clean Air Energy.*

ORC/SERP CHANGE CONTROL FORM

Change Identification **ORC/SERP log #**

Date: 10/25/12. Completed by: _____.
SHEQ Coordinator or Designee

Title of Change: North Butte Operating Plan.

Originator: John McCarthy.

Significance to request an ORC/SERP (YES) NO

Change requires an ORC/SERP (YES) NO

Signed: _____ Date: 11/8/12.
General Manager

Signed: _____ Date: 11/8/12.
SHEQ Manager

Signed: _____ Date: 11/8/12
Project Manager

ORC Review
Date Performed/completed: Date: 11 / 8.
Approved: _____ Disapproved: _____.
see attached documentation

SERP Review
Date performed/completed: Date: 11 / 8.
Approved: ✓ Disapproved: _____ Not Applicable: _____.
see attached documentation

Change Implementation
Have all controls and actions identified by the ORC/SERP completed prior to start up.
YES: ✓ NO: _____ N/A: _____.

Signed: _____ _____ 3/7/13.
General Manager Environmental Coordinator or Designee

Is Risk Assessment Required? YES: _____ NO: X.
if yes see attached .

Is Surety In Place? YES: X NO: _____ N/A: _____.

Controls: SOPs: X JHAs: _____ RWPs: _____.

Will this Change Require a NRC Application Revision: YES: _____ NO: X*.
if yes, to be included in the Semi-Annual Report.

* NO, IF THE LICENSE renewal is approved by Jan 1, 2014
Yes, IF NOT AMP

ORC/SERP CHANGE CONTROL FORM

Change Identification **ORC/SERP log #**

Date: 10/25/12. Completed by: _____.
SHEQ Coordinator or Designee

Title of Change: North Butte Operating Plan.

Originator: John McCarthy.

Significance to request an ORC/SERP (YES) NO

Change requires an ORC/SERP (YES) NO

Signed: _____ Date: 11/8/12.
General Manager

Signed: _____ Date: 11/8/12.
SHEQ Manager

Signed: _____ Date: 11/8/12
Project Manager

ORC Review
Date Performed/completed: Date: 11 / 8.
Approved: _____ Disapproved: _____.
see attached documentation

SERP Review
Date performed/completed: Date: 11 / 8.
Approved: ✓ Disapproved: _____ Not Applicable: _____.
see attached documentation

Change Implementation
Have all controls and actions identified by the ORC/SERP completed prior to start up.
YES: ✓ NO: _____ N/A: _____.

Signed: _____ _____.
General Manager Environmental Coordinator or Designee

Is Risk Assessment Required? YES: _____ NO: X.
if yes see attached

Is Surety In Place? YES: X NO: _____ N/A: _____.

Controls: SOPs: X JHAs: _____ RWPs: _____.

Will this Change Require a NRC Application Revision: YES: _____ NO: X*.
if yes, to be included in the Semi-Annual Report.

* NO, IF THE LICENSE renewal is approved by Jan 1, 2014
Yes, IF NOT AMP

Cameco

CAMECO RESOURCES
Smith Ranch-Highland Operation

Inter-Office Memo

To: File

From: Nikolas Roche and Arlene Faunce

Date: 1/14/2013

Subject: Approval Signature Page for the North Butte Operating Plan Document

Author		
Corporate RSO	John McCarthy	1/23/13
Title	**Name**	**Signature/Date**
Approver		
General Manager	Brent Berg	2/11/13
Title	**Name**	**Signature/Date**
Approver		
Mine Manager, North Butte	Mike Bryson	
Title	**Name**	**Signature/Date**
Approver		
RSO	Arlene Faunce	Arlene Faunce
Title	**Name**	**Signature/Date**
Approver		
Health Physics Technician	*Beth Frye	Michael D. Bryson 2/28/13
Title	**Name**	**Signature/Date**
Approver		
Health Physics Technician	Nikolas Roche	2/19/13
Title	**Name**	**Signature/Date**

BETH IS OFF SITE ON maternity Leave. MDB

Cameco

CAMECO RESOURCES
Smith Ranch-Highland Operation

Inter-Office Memo

To: ORC/SERP File

From: Nikolas Roche and Arlene Faunce

Date: 11/8/2012

Cc:

Subject: ORC/SERP # 10/12-2, North Butte Operating Plan

An ORC/SERP was held on 11/8/2012 to deliberate on a proposed operating plan for Cameco Resources' (Cameco's) North Butte project. The members of the ORC/SERP are listed on the sign-in sheet.

The meeting started with a brief overview of the events necessitating the SERP. The overview, project history, and operating specifications are contained within the Safety and Environmental Evaluation attached with the ORC/SERP document. Multiple supporting documents are also attached with the ORC/SERP document.

It was stated that License Condition 10.2.1 requires Cameco to submit a new operating plan in accordance with NUREG-1569 before commencing any commercial *in situ* leach activities not previously assessed by the Nuclear Regulatory Commission (NRC). The NRC reiterated this license condition in the cover letters to Amendments 5 and 6 to Source Material License SUA-1548, by stating that a new operating plan must be submitted prior to operations. However, at the time of the issuance of Amendment 6, Environmental Assessments (EA) and operating plans for the satellite facilities at Reynolds Ranch and SR-2 had not yet been assessed and approved by the NRC. With the approval for the operation of those two satellites, Cameco now has approved satellites with which to tier off. Since Cameco currently has a Performance Based License, Cameco has the ability to approve changes to the license or license application if a SERP has determined that the proposed change will not result in any greater environmental impact than that previously assessed. Since the NRC had already assessed and approved satellite facilities at the Smith Ranch-Highland Uranium Project (SR-HUP) which conduct the same activities as the proposed satellite facility at North Butte, and as the NRC previously approved a site specific License Application for North Butte, Cameco decided to present the information to a SERP to determine if an operating plan would need to be submitted to the NRC in the form of a license amendment prior to initiating commercial *in situ* leach activities at North Butte. In verbal discussions between Josh Leftwich, John McCarthy and Scott Bakken (Cameco Resources) and the NRC concerning the license condition, the NRC was made aware of Cameco's plan to present the information to a SERP, and if approved, use existing documents as an operating plan to commence activities.

It was further stated that a License Application for operations at North Butte was submitted by Uranerz to the NRC in March, 1989. The NRC reviewed and approved the License Application with the submittal of Source Material License SUA-1540. Cameco has since purchased the property, and SUA-1540 and the associated License Application was subsumed under Cameco's SUA-1548. As the proposed activities at North Butte will be analogous to the activities currently occurring at Cameco's SR-HUP, the commitments and descriptions outlined in the SUA-1548 License Application will supersede those outlined in Uranerz's License Application, unless the Uranerz License Application holds site specific information. The License Renewal for SUA 1548 is currently being reviewed by the NRC, and if approved, will become the new License Application. Thus, the information presented in the Uranerz and Reynolds License Applications will be superseded by the License Renewal.

The ORC/SERP determined that none of the conditions outlined in Source Material License 1548 License Condition 9.4(b) will occur as all proposed activities have been previously assessed and approved by the NRC. Additionally, proposed activities will not violate the stipulations outlined in License Condition 9.4(c). Therefore, the ORC/SERP approved the proposed commercial *in situ* leach activities at North Butte, and the use of previously assessed and approved documents as the operating plan.

The ORC/SERP members concluded that a standalone operations plan will be prepared for NRC review at the next scheduled inspection. The operations plan will include the ORC/SERP documentation, in addition to pertinent past assessments, in one document for ease of reference.

North Butte Operating Plan
ORC/SERP

Overview

As a result of the Nuclear Regulatory Commission's (NRC's) inspection of August 29th, 2012, and the subsequent inspection report dated September 14th, 2012, the NRC recommended an assessment of Source Material License SUA-1548 License Condition (LC) 10.2.1 prior to commencement of operations at Cameco Resource's North Butte Facility.

Specifically, SUA-1548 LC 10.2.1 states:

> "Before engaging in any commercial *in situ* leach activity not previously assessed by the NRC, the licensee shall prepare a new operating plan in accordance with the guidance in NUREG-1569 (June 2003), for NRC review and approval, and shall prepare and record an environmental evaluation of such activity. When the evaluation indicates that such activity may result in a significant adverse environmental impact that was not previously assessed or that is greater than that previously assessed, the licensee shall provide a written evaluation of such activities and obtain prior approval as the NRC in the form of a license amendment."

As such, Cameco Resources (Cameco) reviewed existing documents to verify that any commercial *in situ* leach activity proposed for North Butte has been previously assessed by the NRC. The documents reviewed are listed in Appendix A. The review will be submitted to a Safety and Environmental Review Panel (SERP) to determine if the proposed activities will meet any of the criteria listed in LC 9.4(b) and to ensure the activities are consistent with LC 9.4(c). Pending SERP approval, the pertinent documents will be used as an operating plan for the North Butte Satellite facility and LC 10.2.1 will be satisfied.

Project Location

The Project site is located in the southern Powder River Basin in southwest Campbell County, Wyoming. The site is approximately 50 road miles from the City of Gillette and 40 road miles from the Town of Wright. The licensed area contains approximately 1,010 acres and includes portions of Sections 18 and 19 in Township 44 North, Range 75 West and Sections 13, 23, 24 and 25 in Township 44 North, Range 76 West. The street address for the Satellite facility is 213 N Uranium Rd, Gillette, WY 82718. The proposed satellite at the North Butte properties will have the same function and general layout as previously approved satellites at Smith Ranch-Highland, specifically SR-2, amendment No. 11 and Reynolds Ranch, amendment No. 12. The minor differences

would be advancements in technology and materials which result in continual improvements.

Project History

In the late 1970s, the Cleveland-Cliffs Iron Company (Cleveland-Cliffs) owned the uranium claims within the current licensed area and planned to operate a conventional underground mine. Cleveland-Cliffs performed environmental and cultural studies at the site and submitted a permit to mine application to the Wyoming Department of Environmental Quality (DEQ), Land Quality Division (LQD) for a conventional underground mine. The application was subsequently withdrawn in the early 1980s.

Uranerz USA, Inc. purchased the project from Cleveland-Cliffs during the 1980s and proceeded to develop an ISR permit-to-mine application for the LQD and a Source Material application for the US Nuclear Regulatory Commission (NRC). The application was submitted to both agencies on March 7, 1989. In September 1990 the US Environmental Protection Agency (EPA) provided conditional concurrence with the proposed aquifer classification as Class V for ground water within the entire A, B, and C Sand zones within the production unit. In their letter to DEQ, Water Quality Division (WQD), EPA stated that absent significant public comment, the classification is the equivalent to an aquifer exemption. The actual Class V designation was to be established after the mine unit was "drilled out" and the applicant requested approval to proceed with mining. Uranerz received their approved LQD permit and NRC license in early 1991.

Uranerz never commenced construction on the Project and subsequently sold the property to Pathfinder Mines (Pathfinder) in 1991. The LQD permit (No. 632) was transferred from Uranerz to Pathfinder in March 1991. The NRC license (SUA-1540) was transferred to Pathfinder in January 1992. Pathfinder added approximately 50 acres to the original permit area and revised the application. These revisions included an increase in flow rate and a relocation of the evaporation ponds, plant and access roads. Their original plan was to start construction in mid-1992 but was delayed because of a change of company ownership and economic conditions.

In 1992, Pathfinder drilled 40 monitoring wells in the Mine Unit 1 and 2 areas for acquisition of baseline data including 20 perimeter ore zone wells, nine upper sand wells, two upper sand wells, and nine ore zone/baseline restoration wells. Mechanical integrity testing (MIT) was completed in 1993. In 1996, four quarters of baseline water quality data were collected from the monitoring wells together with pump testing to establish communication with the monitoring wells within the ore zone. Twenty

additional hydrology test wells were installed in 1996, and aquifer testing of those wells was completed in 1997.

Pathfinder continued to delay construction for economic reasons through 2001 when Power Resources, Inc., now Cameco Resources (CR) purchased the project. The LQD permit and NRC license were transferred to CR in November 2001. In 2003, CR requested and received subsequent approval from NRC to add the North Butte Project to the Smith Ranch-Highland (SRH) License SUA 1548. License SUA 1540 was then terminated.

CR approved the construction of a Satellite building at the North Butte properties with SERP #4/12-1: North Butte Satellite Construction.

General Project Description

The site will incorporate five mining units, a primary and several secondary access roads, satellite plant office building, surge ponds and several disposal wells. The uranium ore will be mined via ISR methods. ISR involves the use of a leaching solution, called a lixiviant, to extract the uranium from the geologic formation in which it occurs without physically removing the ore bearing strata. For uranium ISR, the lixiviant typically consists of native ground water to which is added an oxidant (typically oxygen or hydrogen peroxide) and a complexing agent (typically sodium bicarbonate and/or carbon dioxide). ISR is accomplished by injecting the lixiviant through injection wells and circulating it through the ore bearing strata, where the uranium is mobilized and placed into solution with the lixiviant. The resultant uranium bearing solution is extracted from the ground via adjacent production wells. The uranium-laden ground water is then routed via underground pipelines to the surface ion exchange (IX) Satellite facility. Once the IX resin has removed the uranium from the lixiviant, the majority of ground water is returned to the mine unit for recirculation through the uranium bearing sandstone. To maintain a hydraulic gradient in the direction of the recovery wells, a small purge or bleed volume (approximately 0.5 to 1.0%) is removed prior to reinjection and is directed to a deep disposal well.

ISR has been applied to a variety of minerals that can be mobilized in situ, including salts (halite, trona, anhydrite, potash) and metals (copper, uranium) for many years. Commercial uranium ISR production has been practiced since the mid-1960s in the United States and is currently the leading extraction technology for uranium production in the United States.

North Butte Operating Plan
ORC/SERP

For uranium ISR to be successful, normally the host formation must be: (1) permeable; (2) below the water table; and (3) contain uranium minerals in economic quantities that can be mobilized by a lixiviant. Many of the sandstone-hosted "roll front" uranium deposits of the western United States meet these criteria and have proven to be excellent ISR candidates. These roll front deposits were originally formed when oxidized uranium-bearing ground water passed through permeable host sands (host formation) and encountered a reduction/oxidation (redox) boundary. This boundary resulted in the conversion of the uranyl ion from its oxidized (U+6) to its reduced form (U+4) and the precipitation of the uranium minerals into a "roll front" or similar geometry. Also associated with this redox boundary are several accessory or gangue minerals such as various metal sulfides. The ISR process reverses this geochemistry by oxidizing the uranyl ion and putting it back into solution. During the recovery process, several of these gangue minerals may also be recovered in the ISR recovery solutions.

After the economic recovery limit of a mine unit or portion of a mine unit has been reached, lixiviant injection is stopped and ground water restoration is started. Ground water restoration is typically accomplished using a combination of techniques including ground water sweep and ground water treatment by reverse osmosis (RO) with reinjection. Bioremediation and/or chemical reductant addition may also be utilized during the restoration process to assist in bringing the ground water quality back to its pre-mining condition in a reasonable length of time. The intent of ground water restoration is to return the mined aquifer to as close to its original condition as possible. Ground water restoration is discussed more thoroughly in the Reclamation Plan.

The Project consists of approximately 1,010 acres. The goal is to extract approximately 500 thousand to 1.5 million pounds of uranium per year over an anticipated operating life of up to 20 years. Surface disturbance will include mine unit pattern areas during wellfield construction, surge ponds, IX recovery and water treatment facilities, mine unit piping distribution centers, pipelines, booster pump stations, deep disposal wells and roads. It is anticipated that a total of approximately 400 acres (wellfields, buildings, pads and roads) will be disturbed during the life of the project. Since restoration, final reclamation and interim surface stabilization occur contemporaneously with development and production, it is expected that no more than 170 acres will be disturbed at any single point in time. In reality this number will be even smaller since re-vegetation will immediately follow wellfield establishment. Practical experience suggests that vegetation will become well established within three years of initial disturbance. The production areas within each mine unit will be fenced to limit access by livestock.

Other mineralized trends exist adjacent to the licensed area, but have not been extensively explored. If future exploration and delineation shows potential for development of these other existing trends, appropriate baseline evaluations will be made at that time and submitted to NRC as an amendment.

Because the Project will be operated as a satellite IX uranium extraction facility to the SR-HUP, located in Converse County, Wyoming, only mine unit uranium recovery, IX and water treatment activities will occur at the Project. Proposed facilities are described in more detail in the following sections of this Operations Plan.

ISR mine units typically consist of arrays of injection and production wells arranged with four corner injection wells and a central production well per array (aka a "five spot pattern"). The "pattern" cell dimensions vary depending on the formation and the characteristics of the ore body. The injection wells in a normal pattern are expected to be between 70 feet and 150 feet apart. The five-spot configuration is common in ISR mining, especially in areas of good permeability. In a five-spot pattern, four injection wells surround a central recovery well in a rectangular or square configuration. In an actual wellfield of repeating five-spot patterns, each injection well services four recovery wells and each recovery well is serviced by four injection wells. The exception to this will be along the boundary of a mine unit pattern area where a slightly higher injector to producer ratio will be required.

Variations to the standard five-spot may occur in certain areas. A seven-spot configuration may be employed. In a single isolated seven-spot pattern, six injection wells in a hexagonal configuration are employed. In the center is a recovery well. Solutions enter the ore zone through the injectors and are recovered from the center well. In a large wellfield array of many patterns, each injection well services three production wells and each production well is serviced by six injection wells. The exception to this is along the boundary of the mine unit pattern area where a slightly higher injector to producer ratio is required.

In both the five-spot patterns and the seven-spot patterns, the spacing of the wells will vary but the completion of each well will be similar allowing each well to be used as either an injector or producer, depending on the configuration of the ore and the economic considerations.

Line drives, whether alternating or staggered, will be used to exploit narrow portions of the ore body where five or seven-spot configurations are impractical. Line drives consist of alternating injection and production wells which follow a narrow ore trend. The offset

placement of injectors and producers yields a staggered line drive. As in the five and seven-spot patterns, the role of each well may be reversed as required. The spacing and distance between wells is controlled by the width of the ore.

Based on experience at other ISR facilities in similar geologic and hydrologic environments, the flow rate of each recovery well should range between 5 to 40 gallons per minute (gpm) depending upon the permeability of the localized area. The injection rate of each injection well should be in the range of 2 to 30 gpm. The total inflow and outflow within well pattern groups of any particular mine unit will be controlled to allow a slight hydraulic depression to form by bleeding approximately 0.5 to 1.0% of the total recovery flow after uranium has been extracted. Waste water processing methods, which may include electrodialysis, RO, IX purification, deep disposal well injection, and/or evaporation, will be used to dispose of waste water. The injection and production wells will be connected through distribution centers, called header houses, where an oxidizing agent is added to the injection fluid prior to it being injected into the formation. Fluids will be conveyed between the mine units and the recovery facilities via pipelines.

Injection pressures within each mine unit will be controlled to ensure that the operating pressures are maintained at less than the formation fracture pressure. During mining, recovery wells and injection wells may be reversed in function to take advantage of the flow path reversals and improved oxidation potential. The proposed mine plan for the North Butte ore body is to extract the economically recoverable uranium from approximately five mine units.

Besides production, restoration and processing equipment, which is described throughout this document, there will be ancillary equipment used at the North Butte site. This equipment will include truck mounted pump pulling units, truck mounted hose reels, electrical generators, backhoes, etc. Since the wells are typically installed by drilling contractors, non-Cameco Resource owned well drilling equipment will be present on the mine site.

Other commodities currently being developed in the general area include coal bed methane (CBM). Anadarko is the local producer within and surrounding the licensed area. Because the CBM operations are occurring at depths ranging from 1,000 to 1,500 feet below the uranium bearing sands, CR does not anticipate that the CBM activities will be impacted by the ISR activities and vice versa. This conclusion is further supported by the fact that the CBM producing horizons are separated from the uranium bearing sands by low permeability claystone, siltstone and shale.

Project Schedule

The estimated project operations and reclamation schedule of the Reclamation Plan is based on an initial annual production rate of 500,000 pounds of uranium per year, with that rate being increased to the maximum sustainable production rate, currently estimated to be approximately 1.5 million pounds of uranium per year. The actual production schedule is dependent upon several factors, including mine unit flows, production rates and economics.

Ground water restoration will occur concurrently with mining throughout the life of the Project. The ground water restoration portion of the schedule is designed to achieve the fastest restoration possible, given the ability of the aquifer to yield water. After ground water restoration and stability have been achieved in a mine unit and regulatory concurrence has been granted, approximately one to two years are typically needed to reclaim the mine unit surface and ancillary buildings and equipment.

SITE PREPARATION ACTIVITIES

Site Access

The site can be accessed from State Highway 50 near Savageton. From Highway 50, travel is west and south on Van Buggenum Road, then Christensen Road (approximately 6 miles) to North Ranch Rd, which is on the T-Chair Ranch. There will be two main access routes to the Project site that will utilize the North Ranch Rd: access the site from the northeast side of the license boundary by turning onto North Butte Rd and then onto N Uranium Rd. This road begins at a point located in the NE1/4 of the NE1/4 of Section 19, Township 44 North, Range 76 West. This access road will be a combination of existing and new roadway that will cover a distance of approximately 1.8 miles to the proposed satellite IX facility.

The site can be accessed from the south on the North Ranch Rd on T-Chair property. One travels past onto the North Ranch Rd and continues in a westerly direction past the Pfister Ranch. One takes the fork in the road towards the north onto Man Camp Rd. and goes north across Willow Creek. This existing gravel road will be used by Cameco Resources to reach the Project Access Road which starts at a point located in the NE1/4 of the NW1/4 of Section 25, Township 44 North, Range 76 West. This access road is an existing road built by Cleveland-Cliffs during the initial development of the North Butte orebody. Cameco Resources plans to upgrade this road, which is all within

the licensed boundary, for a distance of approximately 0.9 mile to the proposed satellite IX facility.

Primary Access Road

Access to the North Butte facilities will utilize a combination of existing and new constructed road. As such, topsoil salvage will be limited. The proposed access roads are shown on an attached map. (Mine Unit 1 only). Cameco Resources will rehabilitate the existing roads by upgrading the level of service (top width, surfacing and grading). A 20 foot top width will be provided with approximately 3 to 6 inches of crushed gravel or scoria placed on the road surface. The design has included hydraulic investigations to verify the capacity and condition of existing culverts in the road and to provide miscellaneous drainage. The upgrading and new construction of the access roads will comply with the landowner's desires. New sections of road will be constructed by blading the top 3 to 6 inches of soil to each side of the road and constructing a drain ditch on each side with the topsoil windrowed to the outside of each drain. The windrowed topsoil from the construction of the road and the drain will be placed in the bottom of the drain and seeded,BMPs or ASCMs will be utilized as required to ensure that no topsoil is lost.

Secondary Access Roads

A series of roads will be constructed along and within the mine units to provide access for drill rigs, pump pulling units, air compressors, maintenance vehicles, etc. These roads will connect with Primary Access Roads and will be designed and constructed in such a manner so as to minimize the amount of land disturbance.

Additionally, the road design is intended to provide year-round access to the mine unit well patterns in both dry and wet seasons. The locations of proposed mine unit secondary access roads within Mine Unit 1 will utilize a combination of BMPs that may include water bars, ditch cut-outs and riprap to prevent excessive erosion on those portions of the road that have a steep grade.

The construction of the mine unit and pattern area secondary access roads will consist of blading the top 6 to 8 inches of soil to each side of the road and constructing a drain on each side with the "A" horizon topsoil windrowed to the outside of each drain. After the drain is constructed, the topsoil will be placed in the bottom of the drain and seeded. Similar to the main access road, these secondary roads will be crowned, and ditches will be maintained on each side of the constructed road. The road width will be

approximately 12 to 16 feet. A layer of approximately 3 to 6 inches of gravel, conglomerate or scoria material will be placed on top of the bladed surface to provide an all-weather base. This method of construction will keep the driving surface higher than the adjacent land providing for good drainage and preventing bogs from forming during the wet season. A 2 foot buffer will exist on each side of the road where topsoil will not be placed but will route runoff to the roadside ditch. As reflected in letters from the landowner dated January 8, 1990 and October 30, 2010, the landowner fully supports and has dictated this method of construction for secondary access roads at the Project.

At the conclusion of all mining and restoration operations in a mine unit, the secondary access roads will be reclaimed as described in the Reclamation Plan. The main access road will be left in a condition acceptable to the landowner.

During the life of the mine, it will be necessary for access roads to cross drainage channels. The crossings will consist of either gravel bottomed constructed crossings or culvert crossings. These crossings will be maintained over the life of the mine unit and additional gravel or scoria will be added to any disturbed section.

Non-Constructed Two-Track Roads

Within the mine units, injection and production wells will be installed in rows with buried pipelines running along the rows. Access to these wells, as well as the monitor wells, will be provided by establishing two track service roads connecting to the mine unit secondary access road. CR will install minor culvert crossings, where necessary, to allow access from the mine unit secondary access road into the pattern areas, header houses and monitor wells. Sensitive areas, such as springs and wetlands, will be avoided. Travel will be limited to light-duty vehicle use. During mine unit operations, routine access will be limited to Secondary Access Roads and Monitoring Well Access Roads. Traffic off these roads will be restricted to the extent possible. During wet ground conditions, activities in vegetated areas of mine unit pattern areas will be limited to the extent possible to ensure that rutting and impact to the soil structure will not occur.

Satellite Operating Plan

The surface facilities at the Project will include the wellheads, header houses which protect the pipeline manifolds, buried pipelines, overhead and buried power lines,

facilities access roads and the satellite IX building. Mineral processing and water treatment (RO during restoration) facilities will be located at the satellite facility.

Pipeline and power lines will follow access roads when practicable. Power lines and pipelines will run along opposite sides of the access road right-of-way. Power lines will be constructed to meet current codes for wildlife protection. Pipelines will range from 1.25 to as much as 24 inches in diameter. The main pipeline corridor will house up to eight lines to facilitate water handling, treatment, recycling, and ground water restoration.

The uranium-bearing solution pumped from a mine unit is piped to the satellite for extraction of the uranium by use of down flow IX columns to remove the uranium. As the solution passes through the resin in the IX column, the uranium is preferentially removed from the solution by attachment to the resin. The following IX reaction occurs when the uranium bearing lixiviant contacts the resin:

(1) $2RCl + (UO_2)(CO_3)_2^{2-} \rightarrow R_2UO_2(CO_3)_2 + 2Cl^-$

Where "R" denotes the IX resin.

Once the resin in a column is sufficiently loaded with uranium, the vessel is isolated from the normal process flow and the resin is removed from the column. For the North Butte satellite IX facility, this will be performed by transferring the uranium loaded resin from the IX column to a bulk solids type trailer, which is then transported from the Project to the SR or Highland Central Processing Plant, where it is transferred into columns for elution and further processing into yellowcake. The eluted resin (or barren resin) is then placed back in service for additional uranium recovery. The uranium rich fluid (rich eluate) is pumped to the precipitation circuit for further processing.

The barren solution leaving the IX columns normally contains less than 2 ppm of uranium. After the barren solution leaves the IX columns, a small bleed (averaging 0.5 to 1.5% of the total flow) is removed and sent to the waste water disposal system. This ensures that there will always be a net cone of depression within the mine unit, thereby reducing the chance of excursions. The remainder of the barren solution will be refortified with carbon dioxide and/or carbonate/bicarbonate as necessary to return the carbonate/bicarbonate concentration to the desired operating level. The solution is then pumped back to the mine unit, with the oxidant (O_2 gas) added either as it leaves the satellite, or just before the solution is re-injected into the production zone at a header house.

IX columns are arraigned in trains or pairs, with a pass of production fluid over each resin bead to ensure maximum collection. This arraignment also allows for removal of one loaded resin bed for transfer to an elution column without interfering in the flow from the welfield(s).

Satellite Equipment and Layout

The satellite building will house IX columns, water treatment equipment, chemical reductant and/or resin transfer facilities, pumps for injection of lixiviant, disposal well equipment, RO units and bioremediation materials for ground water restoration, a laboratory area, offices, and an employee break room. CO_2 and O_2 will be stored in compressed form adjacent to the building or in the mine unit areas. The building will occupy approximately 25,600 ft^2 and will be designed to operate with a maximum flow of 6,000 gpm during operations; however, until a permit modification takes place, the system will be restricted to less than 4,000 gpm. Engineered and procedural limitations will ensure the flow is kept below 4,000 gpm.

The floor of the satellite building will slope to the centrally located floor sump. The floor is engineered to contain 110% of the contents of the largest tank/vessel, to ensure containment in case of leakage. Floor sumps will collect spilled fluids within the building and will be automatically started by level indicator. These fluids will be pumped to a holding tank within the building and ultimately pumped either to the surge ponds or outside holding tanks as needed, or directly to the deep disposal well(s).

Booster Pump Facilities

To maintain adequate injection/recovery pressures and flows to the mine units and the satellite facility, several booster pump stations may be required. The final design of the booster stations and their actual locations will be determined during the detailed engineering for each mine unit. Initial analysis indicated that the North Butte facility will not need a booster station.

Waste Water Treatment and Disposal Facilities

There will be four primary process waste water streams for the Project:

1. Wellfield bleed, averaging from 0.5 to 1.5% of production flow rates;
2. Ground water restoration waste water;
3. Well development and/or work-over water; and
4. Wash down water.

All of these waste streams will be combined and treated in the satellite as follows:

1. Filtration to remove suspended solids;
2. Disposal via a Class I UIC injection well(s).

In addition to the disposal wells, two surge ponds will be installed to assist in holding capacity prior to batch waste water disposal.

Chemical Storage Facilities

Most bulk hazardous materials will be stored outside and segregated from areas where NRC licensed materials will be processed and stored. Other bulk process materials (e.g., sodium bicarbonate) that do not have the potential to impact radiological safety will be stored next to the satellite building.

Process Related Materials

Bulk hazardous materials stored on site will include bicarbonate, oxygen, carbon dioxide, and hydrochloric acid. These materials will be stored outside of the satellite building in a chemical tank farm area segregated from process areas until transferred by pipeline to their point of use within the process system. Outside bulk liquid (stored at atmospheric pressure/temperature) storage tanks will be contained within curbed secondary containment structures capable of containing 110% of the capacity of the tank.

Carbon dioxide is typically stored adjacent to the satellite where it is added to the lixiviant prior to leaving the IX facility and/or at the header houses. Oxygen is also typically stored at the satellite facility, or within mine unit areas, where it will be centrally located for addition to the injection stream at the satellite or header houses.

Hazardous materials typically used during ground water restoration activities include the use of an acid (hydrochloric acid) for pH control and the addition of a chemical or biological reductant. To minimize potential impacts to safety, these materials will be stored outside of process areas and will be contained within double walled tanks, or the tanks will be provided with sufficient secondary containment structures. Hydrochloric acid will also have double containment piping to prevent any release or exposure.

An approved bioremediation method may be used during ground water restoration. Materials utilized for bioremediation include methanol, molasses, cheese whey and other "non-hazardous" organic materials. Methanol will be stored in bulk at the satellite area (where restoration is occurring) in 500- or 2,000-gallon tanks.

Non Process Related Materials

Non-process related chemicals that will be stored at the Project will include petroleum (gasoline, diesel), propane, drill mud additives, soil amendments, powdered concrete mixture, etc. Due to the flammable and/or combustible properties of stored petroleum products, bulk quantities will be stored outside of process areas at the facility. The Project Spill Prevention Countermeasures and Control Plan will address petroleum product storage in more detail. Powdered concrete mixtures will be delivered in bulk volumes and dispensed into a silo specifically designed for its storage and dispensed. Drilling and soil amendment materials will be stored in areas near their point of use and will be protected from the weather.

Chemical Risks

NUREG/CR-6733 noted that the scope of the NRC mission includes hazardous chemicals to the extent that mishaps with these chemicals could affect releases of radioactive materials. Industrial safety aspects associated with the use of hazardous chemicals at the Project will be regulated by the Wyoming Occupational Health and Safety Administration. Additionally, Cameco's SHEQ Management System contains procedures for the safe handling of chemicals and the emergency response to mishaps.

Oxygen

Oxygen presents a substantial fire and explosion hazard. The design and installation of the oxygen storage facility is typically performed by the oxygen supplier and meets applicable industry standards. The oxygen will be delivered by truck and stored on site under pressure in a cryogenic tank in liquid form. The oxygen will be allowed to evaporate and will be added to the barren lixiviant upstream of the injection manifold. The design and installation of underground and above-ground gaseous oxygen piping at North Butte including material specifications, velocity restrictions, location and specifications for valves, and design specifications for metering stations and filters will be in accordance with industry standards contained in Compress Gas Association CGA G-4.4. Header houses will be equipped with an exhaust ventilation system for both radon and oxygen concerns.

Combustibles such as oil and grease will burn in oxygen if ignited. Cameco Resources will ensure that all oxygen service components are cleaned to remove all oil, grease, and other combustible material before putting them into service or during maintenance operations. Acceptable cleaning methods are described in CGA G-4.1.

Cameco Resources will develop procedures that implement emergency response instructions for a spill or fire involving oxygen systems.

Carbon Dioxide

The primary hazard associated with the use of carbon dioxide is concentration in confined spaces, presenting an asphyxiation hazard. Bulk carbon dioxide facilities are typically located outdoors and are subject to industry design standards.

Sodium Carbonate and Sodium Chloride

Sodium bicarbonate is primarily an inhalation hazards. Bicarbonate and carbon dioxide gas will be used to prepare bicarbonate/carbonate species for injection in the wellfield. Dry storage and handling systems will be designed to industry standards to control the discharge of dry material.

Safety Considerations

The work will be perform in conjunction with Cameco Resources' Safety, Health, Environment and Quality (SHEQ) Management System, Vol. 5, Safety Manual, OSHA requirements and Company Policies. For example, Volume 5 contains a Lockout/Tagout procedure, Confined Entry procedure and Working at Heights procedure. Supervisors will have training in CPR/AED/First Aid and orientation regarding Cameco Resources' emergency response procedures/requirements. Daily Tailgate Meetings will be conducted and documented prior to beginning the work day. Safety regarding job specific task will be evaluated through the Job Hazard Analysis (JHA) process and Radiation Work Permits (RWPs) when applicable. Work cannot begin until the analysis is performed with all participating workers present and signed by all. Contractors will comply with Cameco Resources' Contractor Management Program and Policies, compliance will be verified by Cameco Resources.

Health Physics Consideration (ALARA REVIEW)

During operations, Smith Ranch-Highland Uranium Project (SR-HUP)'s SHEQ Management System will encompass the North Butte operation, including: Volume III, Standard Operating Procedures (SOP), with site specific operational revisions; Volume IV, Health Physics Manual; Volume V, Safety Manual; Volume VI, Environmental Manual, with site specific revisions; Volume VII, Training Manual; and Volume VIII, Emergency Response Manual. The plant sampling plan as submitted to the NRC in the license Renewal document details the sampling plan for North Butte Satellite will be followed when approved. The Uranerz March 1989 Source Material License Application

Section 19.1 "Radiation Safety Program" has been superseded by the Reynolds Ranch Amendment (December 2004) Volume I Chapter 9 "Management, Organization, and Administrative Procedures", and the SHEQ Management System, specifically Volume IV "Health Physics Manual".

Environmental Impacts

In terms of water quantity, the impacts on surface water in the North Butte area as a result of the planned operations will be insignificant. There will be no construction of detention ponds, and all drainages will pass through existing and proposed roads via culverts. The water quality in Willow Creek may be temporarily impacted by a small increase in total suspended solids resulting from the surface disturbance during mine unit pattern drilling operations. Willow Creek will not be relocated or disturbed during production or restoration, thus no reconstruction or reclamation of the channel will be necessary.

Wetlands

Potential wetlands were delineated in 2010 during the confirmatory vegetation survey, which includes a wetlands determination letter from the U.S. Army Corps of Engineers (COE). In general, disturbances of wetlands within the limits of the proposed production areas will be avoided. However, should it become apparent that a potential wetland area may become affected by the operation a mitigation plan will be developed for approval by LQD and the COE. The most likely type of disturbance would be a road and/or pipeline crossing. Prior to disturbance of any potential wetland area, the COE will be contacted for a jurisdictional wetland determination and approval of a mitigation plan by LQD and COE. Wetland information and/or mitigation plan approvals will be submitted with the Hydrologic Testing Package for each mine unit, if needed.

Tank Failure

A spill of the materials contained in the process tanks at the Project will present a minimal risk. The Satellite floor is engineered to slope to the center of the building where a sump is located. The floor design calls for 110% containment of the contents of the largest tank/vessel. In the event of tank failure the sump pump would automatically activate and transfer fluids to one of two waste disposal tanks. The tanks/vessels will contain injection and production solutions, IX resin, and liquid waste. All tanks/vessels will be constructed of fiberglass or steel and are compatible with the solutions contained. Tank/vessel failure would more likely occur as a small leak in the container, pumps or associated piping. In this case, the tank/vessel contents would be transferred to another tank to at least a level below the leaking area and repairs or

replacement made as necessary. Pumps and piping would be isolated using lockout-tagout procedures and repaired/replaced as needed.

NUREG/CR-6733 assessed the potential dose from a catastrophic spill from an ion exchange column resulting in the release of the entire contents of the vessel and the resultant release of radon gas. Based on a number of assumptions, the predicted dose was 1.3 rem in a 30-minute period to a worker in the area. Any change to the Rn-222 concentration or exposure time has a linear effect on dose. For example, if the room size is doubled or the exposure time is halved, then the dose will be halved. NUREG/CR-6733 recommended that the use of ventilation or atmosphere-supplying respirators designed to protect against gases would be sufficient to mitigate doses. Any unprotected personnel should evacuate spill areas near IX columns, and that ISR facilities maintain proper equipment, training, and procedures to respond to large lixiviant spills or IX column failure.

The NRC Environmental Assessment of the construction and operation of satellite SR-2, December, 2007 associated with Amendment 12 described the potential surface impacts and proactive actions to minimize releases. Cameco Resources is required under license condition 12.1 to maintain documentation of all releases of source material and 11e(2) byproduct materials, including recovery related solutions until license termination.

Transportation

Unlike conventional mines, an ISR operation has relatively few major roads, no haul roads or haul trucks, and very limited traffic. Most traffic at the project site will be limited to pickup trucks and typical over-the-road drill rigs, flatbed trucks and similar types of vehicles. To assist in providing for employee safety and to minimize collisions with wildlife, reduced speed limits will be posted and maintained on access roads and within mine unit areas.

The transportation requirements for the activation, operation, and decommissioning of the North Butte *in situ* uranium mine to be operated by Cameco Resources Inc. are outlined in the following plan. This plan covers a 24 year period for the anticipated mine life expectancy.

The transportation plan detail is broken down into the following elements:

North Butte Operating Plan
ORC/SERP

1. Transportation of Operating Personnel
2. Drilling Supporting the Operation Plan
3. Construction Personnel and Trucking Assessment
4. Operations Supply Support
5. Resin Transport

1. Transportation of Operating Personnel

North Butte Management, Operation, Decommissioning and Technical Personnel will be required. It is anticipated that 75% of the operations staff for the facility will be traveling from the Gillette, 20% from the Wright area and the remaining 5% from the Casper area. The North Butte Satellite facility will utilize an average of 40 personnel throughout the lifecycle of the mining operations.

Vehicle transport to facility will be provided by employees. It is anticipated that several vehicle types will be utilized, including cars, pickups, and car pool vans. Further, most trips will be made with one or more empty seats in each vehicle. For the occupancy for each vehicle in this document we use the following estimates:

Cars (80%): Occupancy average is 2 persons per trip
Pickups (20%): Occupancy average is 1 person per trip

The transportation route to Gillette will be as follows:

North Butte Facility to HWY 50 (gravel road)	10 miles
HWY 50 to Gillette (paved road)	44 miles

The transportation route to Wright will be as follows:

North Butte Facility to HWY 50 (gravel road)	10 miles
HWY 50 to HWY 387 (paved road)	9 miles
HWY 387 to Wright (paved road)	19 miles

The transportation route to Casper will be as follows:

North Butte Facility to HWY 50 (unpaved gravel road)	10 miles
HWY 50 to HWY 387 (paved road)	9 miles
HWY 387 to HWY 259 (paved road)	32 miles
HWY 259 to I-25 (paved road)	18 miles
I-25 to Casper (paved road)	23 miles

The annual mileage and traffic data for this section is provided on Table 1 below.

Table 1. Transportation of Operations Personnel

Route	Average Employees / Day	[4]Passenger Car Vehicles / Year	[5]Pickup Truck Vehicles / Year	Annual One-Way Trips	Unpaved Mileage / Trip	Paved Mileage / Trip	Total Unpaved Mileage	Total Paved Mileage
[1]Casper to North Butte Facility	2	0	730	730	20	164	14,600	119,720
[2]Wright to North Butte Facility	8	1,168	584	1,752	20	56	35,040	98,112
[3]Gillette to North Butte Facility	30	4,380	2,190	6,570	20	88	131,400	578,160

1 - Assumes that 5% of staff based out of Casper, WY Trucks only

2 - Assumes that 20% of staff based in Wright, WY

3 - Assumes that 75% of staff based in Gillette, WY

4- Assumes 80% passenger car traffic to facility

5 - Assumes 20% pickup vehicle traffic to facility

2. Drilling Supporting the Operation Plan

The mine operation will require a contract drilling effort to support the advancement of mining operations. It is anticipated that 7 drill rigs will be at the facility and they will be on-site except for quarterly maintenance in Gillette. The drill rigs will be supported by a water truck, a pipe truck, and a transport truck for the drill crew. Additional support vehicles include an occasional mechanics truck.

The drilling operations and support vehicles will be supported from the Gillette and Casper, Wyoming areas (60% and 40% respectively). Once on-site the drill rig and pipe truck will accumulate an average of 5 miles per day on unpaved roadway within the permitted boundary. The water truck will accumulate about 15 miles daily on unpaved

roadways within the permitted boundary. Each rig will have a transport truck which will travel from the facility to their respective home bases each day.

The vehicle traffic associated with this section is provided in Table 2 below.

Table 2. Drilling Supporting the Operating Plan

Vehicle Type	Number of Vehicles / Day	Average Annual Unpaved Mileage	Average Annual Paved Mileage
[1]Drill Rig	7	11,200	4,144
[1]Pipe Truck	7	11,200	4,144
[2]Water Truck	7	32,200	4,144
[3]Transport Truck	7	42,000	248,640
Miscellaneous	N/A	1,000	3,000

1 -5 miles per day per vehicle plus additional mileage for quarterly maintenance
2 - 15 miles per day per vehicle plus additional mileage for quarterly maintenance to home base (60% Gillette and 40% Casper)
3 - Each crew traveling from Gillette or Casper to facility daily (approx.60/40 split). Additional trips included for unforeseen rig breakdown (one round trip to Casper/Gillette for all vehicles except transport truck)
4-Due to weather – assumption of 65 days lost (total days 300/year)

3. Construction Traffic

Initial construction of the mining pipe network, process buildings, and surge ponds will take place beginning in 2012 and will be completed in one year. We expect short term deliveries heavy equipment, concrete, piping, and the pre-fabricated building. For the duration of construction we anticipate an average daily crew size of 6 people which will transport from Gillette to the facility. Additional construction personnel, contract employees, and project management personnel from Casper will account for 4 more individuals. The following table outlines the anticipated traffic during the construction phase of the project.

Table 3

Vehicle Type	Number of Vehicles / Day	Annual Unpaved Mileage	Annual Paved Mileage

[1]Equipment and Product Deliveries	1	5,200	34,736
[2]Transport Truck	2	11,700	75,192

1 -20 miles per day unpaved mileage per delivery. Included concrete trucks; heavy equipment deliveries, pre-fabricated building delivery; piping deliver; and other equipment deliveries.
2 - Each crew traveling from Casper or Gillette to facility daily (60% and 40% respectively). 20 Unpaved miles per day for each crew. Additional trips included for support trips to Gillette (estimated at 25% for each)

4. Operations Supply Support

Daily operations will be required to support the mining operations. Personnel will be required for water sampling, a casing crew, well field services, construction, maintenance, safety, and geology. Crews traveling to the facility are covered under Section 1 of this plan. Once on-site, the crews will travel within the permit boundary with company vehicles for various tasks. The roadways within the permit boundary are unpaved gravel surfaced roadways. The following table provides annual traffic for the operations supply support personnel within the permitted mine boundaries.

Table 4a. Operations Supply Support

Crew	No. of Crews	Miles / Day / Crew	Annual Unpaved Mileage
Water Sampling	1	10	3,650
Casing Crew	2	15	10,950
Well Field Services	2	20	14,600
Construction	4	10	14,600
Maintenance	2	10	7,300
Safety	1	30	10,950
Geology	1	10	3,650

In addition to the above operations, the facility will require deliveries of sodium bicarbonate, carbon-dioxide, oxygen, hydrochloric acid, and propane. An occasional miscellaneous delivery vehicle will be required to support the operations. The following table outlines the estimated mileage and trips required by these support deliveries.

Figure 4b. Operations Supply Support Deliveries

Delivery Type	Deliveries / Month	Annual Unpaved Mileage	Annual Paved Mileage
Sodium Bicarbonate	3	720	23,616
Carbon Dioxide	2	480	11,232
Oxygen	3	720	16,848
Hydrochloric Acid	1	240	3,972
Propane	2	480	2,112
Misc. Delivery	4	960	4,224
O_2 & CO_2 from Cheyenne WY, $NaHCO_3$ from Green River, and Propane from Gillette WY.			

5. Ion Exchange Resin Transport

The North Butte mine will utilize Ion Exchange Resin to capture and to provide a transportable matrix of IX Resin containing the product U_3O_8.

This matrix of resin/U_3O_8 will be trucked from North Butte, to be delivered to the Smith Ranch Central Processing Plant (CPP) and/or the Highland CPP. In these CPPs, the U_3O_8 will be separated from the resin. Barren resin will be returned to the North Butte site by truck.

The average production for the North Butte facility is anticipated to be about 550,000 pounds per year. Based on the average yearly production, approx.183 truckloads per year will be transported from the North Butte Facility to the Smith Ranch CPP and/or the Highland CPP.

The transportation of IX resin can be through two distances paths, although alternate routes may be used based on weather conditions. The two set routes are via HWY 59 and via I-25/Casper. The I-25/Casper path will be the preferred route (95% of resin transport traffic) due to road quality and maintenance during inclement weather. The following are the two proposed paths.

North Butte Operating Plan
ORC/SERP

The transportation route to the Highland or Smith Ranch Facilities via Casper will be as follows:

North Butte Facility to HWY 50 (unpaved gravel road)	10 miles
HWY 50 to HWY 387 (paved road)	9 miles
HWY 387 to HWY 259 (paved road)	32 miles
HWY 259 S to I-25 (paved road)	18 miles
I-25 to Casper then to US-20 (paved road)	25 miles
US-20E to WY-95 N (paved road)	21 miles
WY-95 N to WY-93 N (paved road)	17 miles

The resin can then be taken by:

WY-93 N to Co Rd 32/Highland Loop Rd (paved road)	8 miles
Co Rd 32/Highland Loop Rd to Highland Facility (unpaved)	7 miles

Or
WY-93N to Co Rd 31/Ross Road (paved road)
Co Rd 31/Ross Road to Smith Ranch Facility (paved road)

The transportation route to the Highland or Smith Ranch Facilities via Wright/Hwy 59 will be as follows:

North Butte Facility to HWY 50 (unpaved gravel road)	10 miles
HWY 50 to HWY 387 (paved road)	9miles
HWY 387 to HWY 59 (paved road)	19 miles
HWY 59 to Highland Loop Road (paved road)	53 miles

The resin can then be taken by:

Highland Loop Road to Highland Facility (unpaved road)	22 miles

Or
Highland Loop Road to Smith Ranch Facility (unpaved road)

The following table provides the annual estimated vehicular traffic and mileage anticipated for this process.

Table 5. Ion Exchange Resin Transport

Annual One-Way Trips	Annual Unpaved Vehicle Mileage	Annual Paved Vehicle Mileage
180	7,100	51,020

The NRC performed a Safety Evaluation Report for third party ion exchange processing at Smith Ranch, July, 28, 2009 and approved the action with license amendment 15. The conclusion for transportation accidents stated: "PRI already has approved procedures for the receipt, transfer, and shipping of IX resins from the existing satellites at SR-HUP." and "The resin beads can be recovered from a spill site using a vacuum truck. All disturbed areas would then be reclaimed in accordance with State and NRC regulations. There is no risk of airborne release of uranium since it will remain fixed to the resin." The NRC Environmental Assessment of July 28, 2009, stated: "the additional traffic volume of approximately 1 truck per day is relatively small compared to the existing traffic volumes on the roadways listed in Table 1. Therefore, the additional traffic resulting from shipment of IX resin to and from SR-HUP is not expected to significantly contribute to the congestion or accident rate on these roadways.". The above table lists the average one way trips would be equivalent to approximately 3 shipments per week and will not adversely affect these road ways.

Cultural and Historical Resources

A Class III survey was performed in 2010 to confirm the data collected by previous operators and to include certain areas that had not yet been surveyed. At least two sites within the permit boundary have been determined to be eligible for the National Register of Historic Places. One site (48CA409) is an artifact scatter site with demonstrated subsurface deposits and potentially datable features. The second site (48CA268), North Butte, is part of the Pumpkin Buttes cultural resource area with boundaries that include Dome Butte, North Butte, North Middle Butte, South Middle Butte, Indian Butte, and South Butte. In the case of North Butte, the base of the area considered as part of 48CA268 is the 5,280 foot contour line, which includes part of the northwest portion of the permit area. In addition to being eligible for listing on the National Register of Historic Places, the buttes have also been designated a Traditional Cultural Property (TCP).

Cultural Resource Mitigation

The following cultural resource mitigation measures will apply to all areas and activities as described in the Operations and Reclamation Plans.

- Site 48CA409: No surface disturbing activities will take place within 50 feet of the site boundary. The perimeter of the site will be surveyed and marked using green colored snow fence material. The fencing material will not be highly visible but will protect the area from inadvertent disturbance. No signs will be used to

mark the site. Small openings (6-8 feet wide) will be provided in the fencing to allow livestock and wildlife into and through the site.

- CR will not conduct any surface disturbing activities in areas that have not been previously inventoried and cleared for cultural resources
- If CR determines that it must conduct surface disturbing activities within the boundaries of an eligible site, CR will notify NRC, State Historic Preservation Office (SHPO), and LQD, and will prepare an appropriate cultural resource mitigation plan for submittal to the NRC and SHPO for review and approval. Once approved, the mitigation plan will be implemented prior to any surface disturbing activities being undertaken. Any such approved mitigation plan(s) will be subsequently incorporated into the permit document.
- If any cultural resources are discovered during operations, CR will immediately halt activities in the area of the discovery and notify LQD, NRC, and the SHPO. Within two working days of notification, the LQD, NRC, and SHPO will evaluate or have evaluated any discovered cultural resources and will determine if any action may be required to protect or preserve such discoveries.
- All discovered cultural resources will remain under the jurisdiction of the private landowner or the United States government depending on where the cultural resource(s) were discovered.
- CR will instruct all employees, contractors, subcontractors and any additional parties involved with the project to avoid impacts to cultural resource sites and the North Butte TCP, and to not search for archaeological materials (i.e., arrow head hunting).
- If Native American human remains, funerary objects, or objects of cultural patrimony are encountered, CR will stop all work in the immediate area and will immediately notify NRC and LQD, and the NRC will comply with Section 3 of the Native American Graves Protection and Repatriation Act and its implementing regulations at 43 CFR Part 10. If Native American human remains, funerary objects, or objects of cultural patrimony are encountered as a result of a NRC undertaking on private surface, the remains will be evaluated as a historic property. Existing state and local laws will be followed pertaining to discovery of Native American human remains, funerary objects, sacred objects or objects of cultural patrimony on private surface.

Although there is no U.S. Bureau of Land Management involvement with the North Butte ISR Project, CR will follow the spirit and goals of the Pumpkin Buttes

Programmatic Agreement regarding protection of and mitigation of adverse impacts to the Pumpkin Buttes TCP. The NRC, as the lead federal agency for the Project, will take the lead with respect to the preservation and conservation of cultural resource sites within the Project area.

Background Radiological Characteristics

Background radiological characteristics have been assessed and documented. These surveys are on file in the Smith Ranch library or archives and have been forwarded to the NRC.

Land Use Impacts

The primary goal during construction and operation will be to minimize sedimentation and erosion. Preservation of existing vegetation and sequencing the construction activities in progressive phases will limit the amount of surface being disturbed at any particular time. During mine unit development planning, a traffic pattern will be established whereby access to each well and header house will be via delineated routes. Whenever possible, pipe and power line installation will occur directly adjacent to access roads. Topsoil and subsoil material from drill mud pits will be stockpiled in common areas away from the active drilling area. These actions will limit the overall surface disturbance footprint during the mine unit construction phase of the operation. It is Cameoc Resources' goal to leave 50% or more of a mine unit's areal extent undisturbed during construction. Where possible, vegetative buffer strips will be maintained between drill sites, between the disturbed areas and drainages.

There may be instances where standard mine unit construction and normal revegetation procedures and vegetative buffer strips will not provide adequate erosion/sediment control of a disturbed area. Some example conditions include construction operations adjacent to a drainage channel, on steep terrain or locations where vegetative buffer strips cannot be maintained. In these instances, additional sediment control measures may be required. ASCM or Best Management Practices (BMP), as described in LQD Guideline No. 15, will be utilized to provide erosion/sediment control. The ASCM or BMP chosen will be dependent upon the existing situation.

ASCMs or BMPs may include, but are not limited to, any of the following:

1. Ditches and Berms – A temporary ditch or ridge of compacted soil at the top or base of disturbed areas including stock piles used to (1) divert storm runoff away

from disturbed upland areas or (2) capture sediment laden storm runoff from disturbed areas and route to a protected outlet, sediment trap or basin. Ditches and berms may also be constructed on the contour across slopes, reducing overall slope lengths and diverting captured flows to a controlled discharge location.

2. Conveyance Channel – A permanent designed earthen or vegetated channel that is shaped, sized and surfaced to safely convey concentrated flow without causing excessive erosion.
3. Riprap – Temporary or permanent erosion resistant ground cover of large loose angular stone with filter fabric and/or granular bedding used to (1) protect soil from erosive forces of concentrated runoff, (2) slow the velocity of concentrated runoff and (3) stabilize slopes with seepage problems and/or non-cohesive soils.
4. Outlet Protection – Structurally lined aprons or other energy dissipating devices placed at the point of a concentrated discharge. Outlet protection preserves the integrity of outlet structures, prevents scour from concentrated discharge, and minimizes the potential for downstream erosion by reducing flow velocity and energy.
5. Sediment Trap – Temporary ponded area formed by constructing an earthen embankment or incised basin which is used to detain sediment laden runoff from small disturbed areas (<5 acres) long enough to allow for sediment settling. Discharge is controlled through a protected outlet.
6. Straw Bale Barrier – A temporary sediment barrier consisting of a row of entrenched and anchored straw bales used to (1) intercept and detain small amounts of sediment from disturbed areas of limited extent and (2) decrease the velocity of overland sheet flow.
7. Silt Fence – A temporary sediment barrier consisting of a synthetic filter fabric stretched and entrenched across supporting posts used to (1) intercept and detain small amounts of sediment from disturbed areas of limited extent and (2) decrease the velocity of overland sheet flow.
8. Biobags or Wattles – A manufactured burlap, jute mesh or geotextile wrapped sausage-like barrier to prevent movement of sediment off of a site or stockpile.
9. Check Dam – A small temporary dam of stone, sand bags, straw bale or alternate material placed across a swale or drainage ditch, typically in series. Check dams are used to reduce the velocity of concentrated flow, thereby limiting erosive forces. Check dams can also provide very limited sediment capture.

Run-on and run-off from larger contributing undisturbed areas will be diverted around or through the disturbed areas using ditches, berms or culverts. Ditches and berms will be constructed parallel to the contour to prevent disturbed area run-off from commingling with undisturbed area runoff. Similarly, berms will be used to direct run-on from large contributing areas of undisturbed land around the construction area to prevent commingling with disturbed area run-off.

All long term topsoil stockpiles (e.g., soil removed from building areas, access roads, etc.) will be fully contained and vegetated. A containment ditch and berm will be constructed at the base of each stockpile to prevent any loss of topsoil before new vegetation can be established. Temporary topsoil stockpiles (e.g., soil removed from drill pad areas, mudpits, etc.) will not be re-vegetated but will be contained and protected from runoff. Temporary topsoil will be replaced to its original location usually within one to two months, re-contoured and seeded during the fall or spring seeding window.

Sediment or silt fences will be used to prevent sediment from leaving disturbed areas within defined drainages with areas of concentrated flow. Straw bales will be used to prevent sediment moving from disturbed areas within poorly-defined drainages with un-concentrated (sheet) flow.

Fuel storage areas will be managed to prevent off-site drainage to or from the area. All petroleum products stored at the site will be contained in approved and appropriately labeled above ground containers. Secondary containment will be accomplished by berming and/or ditching the perimeter of the entire fuel storage area. No solid materials (e.g. drilling materials) or liquids (e.g. petroleum products) will be discharged to any drainage within the Project.

Purge water from monitor wells will be discharged towards diversion structures to prevent sedimentation of disturbed areas. Discharges from mine unit aquifer pump tests will be contained and sampled. Upon completion of sampling and analysis, mine unit pump test waters will be disposed via deep well injection. In the event it is disposed on site, all waters will be properly conveyed away from disturbed areas using straw bale dams, conveyance channels or other control methods to ensure that undisturbed and disturbed areas are protected. A temporary discharge permit will be obtained from DEQ, WQD or provisions will be made to store and properly dispose of the pump test discharge prior to performing Mine Unit pump tests.

As delineation drilling and wellfield development proceeds, it may become necessary to disturb lands adjacent to live surface waters and/or temporary wet areas, including wetlands. These areas will be protected by the installation of appropriate silt fencing.

For exposed soil areas where construction activities have temporarily ceased for a period of 28 days or more, temporary stabilization measures will be implemented. These measures may include surface roughening, cover crop plantings, mulching or erosion control blankets, etc. Temporary erosion protection will be especially important for areas containing graded slopes, ditches, berms and soil stockpiles.

All ASCMs used during construction activities will be properly selected, installed and maintained in accordance with the manufacturer's specifications and good engineering practices. All measures will be built to withstand and function properly during precipitation events up to a 2-year, 24-hour storm event.

WQD has issued Cameco Resources a general permit to discharge storm water associated with large construction activity under the WYPDES. When operations commence at the Project, the construction permit will be transferred to an industrial activity permit. As required by the permit, a Storm Water Pollution Prevention Plan (SWPPP) has been developed and will be maintained on file at the Project office. The SWPPP identifies potential pollutants that may leave the site during storm water runoff and identifies BMPs which, when implemented, will eliminate or minimize pollutants in storm water runoff. The SWPPP will be modified whenever there is a change in design, construction, operation or maintenance that may change the potential for the discharge of pollutants into waters of the state.

The construction permit also requires that Cameco Resources routinely inspect disturbed areas and sediment control. During operations, under an industrial activity storm water permit, all BMPs will be inspected at least once at the beginning of the runoff season (March 1 to November 1), once each calendar quarter during the runoff season and within 48 hours of each runoff event. Any BMP damage will be logged on the inspection report and repaired as soon as possible after it occurs.

Air Quality Impacts

Unlike conventional mines, fugitive dust emissions are minimal at ISR sites. Dirt moving equipment, haul roads, and large excavations are not used. Disturbed areas within each mine unit will be seeded during the first available seeding window after construction has been completed to minimize soil loss and fugitive dust emissions to the atmosphere. All mine unit roads will either be unconstructed light use two-track roads or constructed

narrow (i.e., 12-15 feet wide) secondary access roads. Primary equipment used on these roads will be light duty trucks. Speed limits on these mine unit/header house access roads will be 10 mph, which will minimize the dust caused by vehicular traffic. The main access road between the proposed satellite facility and the nearest residence may, during certain times of the year, require dust suppression activities. Any dust suppression will be in accordance with the DEQ, Air Quality Division permit requirements and the landowner's specifications. Verification samples of previously submitted environmental and radiological background data are being collected at sites listed in the license.

Final Decommissioning

Following the completion of mining/processing at the North Butte Satellite, the buildings, equipment, all wells will be plugged with cement slurry and foundations will be dismantled, sold to another NRC licensed facility or decontaminated in accordance to NRC guidance or disposed of at a NRC approved 11e(2) licensed facility. Gamma radiation surveys will be conducted over the area after removal of surface and subsurface materials to determine potential contamination. Materials with contamination levels requiring disposal will be transported in accordance with DOT regulations and disposed of at an approved licensed facility. Upon closure all surface areas disturbed will be blended in with the natural terrain and be consistent with the post-mining land use.

Water Impacts

Ground Water Impacts

The limited surface water supplies within and adjacent to the licensed area are used for livestock and wildlife watering. Even during wet years, Willow Creek in the vicinity of the licensed area only flows for a couple of months. During dry years, such as 1988, there is essentially no flow the entire 12 month period. Stock reservoirs in the area provide additional sources of water for livestock and wildlife.

Water wells within and adjacent to the licensed area are used primarily for livestock watering and industrial purposes. When Uranerz prepared the original license application the industrial use consisted of water for exploration drilling, and environmental wells for water quality monitoring and hydrologic studies.

There are ten livestock wells or springs within or adjacent to the licensed area. The water from these wells is not suitable for human consumption, and is used for livestock watering only. The residents at the Pfister Ranch haul their drinking and cooking water to their house.

The Site SWPPP will be utilized during construction activities to minimize impact and ensure controls.

Ground water impacts will be monitored by sampling monitor wells surrounding the production zone and overlying aquifer. The wells will be sampled twice a month and analyzed for excursion parameters, water level, chloride, alkalinity and conductivity. These excursion indicators will ensure the containment of mining solutions within the wellfields.

Nearest Municipal Water Source

The nearest municipal water source is located at the unincorporated community of Savageton, Wyoming, approximately 10 air miles northeast of the Project. At the time of the original Uranerz license application, the Savageton water system consisted of a well, supply tank and distribution lines. The system served up to 15 trailer homes. The well is 700 feet deep with 6 inch steel casing and has a 5 horsepower pump. Information on completion interval, depth to water and yield is not available. In 1988, the distribution system consisted of 2 inch diameter plastic pipe. The water from the well is potable according to the operator of the system at that time.

Surface Water Usage

There will be no diversion or use of surface water for mining or reclamation purposes at the Project.

Ground Water Usage

Water used at the Project will be obtained from ground water sources appropriated in accordance with Wyoming statutes.

Water required for the industrial uses noted above will be obtained from post-treatment (such as RO and/or the satellite water well). Water required for domestic uses (showering, laundry, etc.) will be obtained from a well completed in a non-uranium bearing formation or from an external bulk potable water supplier. Drinking water will be obtained from a municipal supply or a commercial water bottling company. The total amount of domestic use water that will be needed at the Project during mining and

restoration is estimated at between 50 and 200 gallons per day. A fresh water well has been drilled and completed. It is hoped that the well will produce approx. 50 gpm. This water will be used for process water makeup, waste water effluent for the septic system and drilling water.

The greatest volumes of water used will occur during the ground water sweep phase of ground water restoration at each mine unit. The primary source for restoration "treated ground" water will be production water from the operating well fields and water removed and treated from the well field under restoration. Alternate sources of "make-up water may include Cameco Resources' negotiated acquisition and treatment of CBM well(s) and/or the drilling, completion and, as required, treatment of a new and strictly water production well or well field. Based on the proposed production rate and the waste minimization program at the Project, it is estimated that the maximum annual volume of treated ground water, which will require disposal, will be approximately 68 million gallons (132 gpm average).

The mining phase of the Project will result in a wellfield bleed stream of approximately 0.5 to 1.5% of the recovery flow, or about 25 to 60 gpm being removed from the ground water system ("A", "B" and "C" sand members of the North Butte Mining Sand). This approximate 1% bleed stream will ultimately be disposed of through deep well disposal. A portion of the 1% bleed stream may be used in various plant processes such as eluant make-up, filter backwash, resin washes, and other process purposes. The portion of the bleed stream used for these purposes will also be disposed using the deep disposal well(s).

Wildlife Impacts

Compared with conventional surface mining, ISR generally poses a lower level of impact on wildlife, especially big game species such as deer and antelope. This is primarily because the area of disturbance is limited and temporary. Heavy equipment, such as large earth excavators and haul trucks, are not used, and the number of people involved in an ISR operation is significantly less than a conventional mine. Once header houses and well fields are installed the disturbed surface area is reseeded and returned to a grazing habitat. All well fields are fenced to prohibit livestock grazing and access resulting in unobstructed wildlife access. Historically wildlife at Smith Ranch frequent and graze within the operating well fields.

Wildlife inventories have been completed at the project between 1978 and 1987. These surveys included big game, game bird species, migratory birds of high federal interest (MBHFI), as well as other raptors and species that are on, or candidates for, the threatened and endangered species list (T&E).

The 2010 wildlife inventory which updates the site wildlife inventory, including T&E species was completed. A Wildlife Monitoring Plan (Plan) for the Project which was prepared after the 2010 survey update. The Plan has been reviewed and approved by Wyoming Game and Fish Department (WGFD) and US Fish and Wildlife Service (USFWS) and provides the methodology and frequency of the annual monitoring as well as the specific target species to be monitored. The Plan will be reviewed on an annual basis to address any necessary changes, such as, adding or eliminating T&E species, reducing number of surveys or eliminating surveys altogether for those species that are not present in the licensed area. All documentation is being supplied in the License Renewal application to be submitted early February, 2012.

The results of annual wildlife surveys will be documented and provided to LQD in each Annual Report, with a copy to the NRC.

Wildlife Mitigation

Adverse impacts to wildlife as a result of the Project activities will be minimal for the following reasons:

1. No important big game migration routes or crucial winter habitats have been identified during surveys performed to date.
2. ISR activities disturb relatively small amounts of land surface at any one time.
3. Areas disturbed by mine unit construction or operations activities will be revegetated after mine unit well pattern construction and will be available for wildlife use throughout the Project life; fencing will be used only to keep livestock out of active production/restoration areas.
4. Livestock restrictive fencing will be limited to relatively small areas and will not significantly impede wildlife movements.
5. Vehicular traffic will be limited with reduced speed limits utilized for safety purposes and to decrease the likelihood of vehicle and wildlife collisions.
6. The North Butte permit area and its associated mining and restoration activities do not fall within the Sage Grouse Core Area.

To avoid adverse impacts to any raptor, MBHFI or T&E species, the primary mitigative action will be avoidance. Whenever possible, CR will avoid performing ground disturbing activities, including drilling and construction activities within certain areas during active nesting or breeding times. Time and area restrictions around raptor nests, sage grouse leks and mountain plover nests will be in accordance with LQD, WGFD and USFWS specifications, which currently are as follows:

Sage grouse leks: Avoid ground disturbing activities within 0.25 mile of any active sage grouse lek year-round. Avoid such activities within 2 miles of any active lek between February 1 and July 31. For leks within the core area, mitigative actions will be determined in consultation with the LQD, WGFD and USFWS.

Raptor nests: Avoid ground disturbing activities within 0.75 mile of any active raptor nests between February 1 and July 31 of each year.

Mountain plover nests: Avoid ground disturbing activities within 0.25 mile of any nesting mountain plover nest between April 10 and July 10 of each year.

If it is determined that avoidance will not be possible, CR will consult with LQD, WGFD and the USFWS prior to initiation of any ISR activities. Based on this consultation CR will prepare and execute a mitigation plan.

New power lines will be constructed in a manner that will minimize potential electrocution hazards to raptors by following the guidance in "Suggested Practices for Raptor Protection on Power Lines - The State of the Art in 2006," by the Avian Power Line Interaction Committee, 2006.

The satellite and mine unit facilities will be fenced, primarily to prevent sheep and cattle from interrupting production activities. The lined surge ponds will be fenced to prevent both livestock and large game animals from accessing the ponds. Fences will be constructed utilizing the guidance provided in LQD Guideline No. 10 such that impacts to wildlife will be minimized.

It is anticipated that the surge ponds will not attract long term residence of water fowl because they will not contain any food source or shoreline vegetation for hiding or nesting. There are numerous, more attractive water bodies in the area that will provide food and hiding/nesting vegetation. These include small stock ponds in and around the Project. Other than short, transient migratory stop-overs, CR does not anticipate that water fowl will inhabit the surge ponds long enough to be impacted. CR will monitor water fowl activities in the area of these ponds and will implement additional mitigative

action should it become necessary. Such actions may include propane cannons, netting over the ponds, brightly colored pennants, etc. CR will consult with LQD, WGFD and USFWS in developing water fowl mitigative action plans if the above actions are not successful.

Radiological Impacts

The primary source of radiological impacts will be from the release of radon-222 from the satellite and associated wellfields. A MILDOS model has been completed and reviewed for inclusion in the NRC license renewal documents. The impacts from radon will be minimal and expected to similar to the impacts evaluated in the EA for the addition of satellite SR-2 at Smith Ranch (EA NRC, December, 2007). The model output estimated a worst case scenario would result in a total population dose of 305.6 person-rem/yr and a general dose to the population of less than 1 mrem/yr.

The original Uranerz Source Material License Application, March 1998, Section 19.8 presents a MILDOS model of a full ISR operating plant. The model was approved by the NRC through an EA process.

Waste Disposal Impacts

North Butte is licensed for two deep disposal wells through the Wyoming Department of Environmental Quality, UIC program. One well has been drilled, mechanical integrity tested, step rate tested and injected into with drill water. The test result report has been forwarded to the WDEQ and approval to operate with the appropriate conditions has been granted. Waste water generated during the production, restoration phases of mining would be disposed of by deep well injection.

Sanitary from restrooms and lunchrooms waste will be disposed of in an approved septic system.

Solid waste generated on site will include both non-contaminated wastes and contaminated wastes. Contaminated waste will be disposed of at a NRC approved and licensed 11e(2) materials disposal site. Materials and equipment used in the mining or processing operations will be surveyed to meet free release criteria or disposed of as stated above. A secured restricted area will be maintained within the satellite controlled area for the storage of contaminated materials prior to shipment. The contaminated materials will be stored in appropriate container for shipment when in storage. All

shipments of contaminated materials will meet DOT and NRC requirements for transportation.

Environmental Monitoring

Environmental monitoring is ongoing at North Butte and consists of radon, air particulates and environmental gamma badges and no changes to the program will be required. Environmental monitoring will also include quarterly sampling of surface and ground water, consistent with SHEQ Management System Volume VI and the original application.

Security

Measures to secure NRC licensed material from unauthorized removal and access will be put in place at the Project. The active mine unit production areas will be controlled with fences and appropriate signs. All areas containing NRC source or by-product materials will be fenced and locked. The main access entry points to the facilities area will be equipped with locking gates. The operating facilities will be manned 24 hours per day, 7 days per week, and in controlled and/or unrestricted areas, surveillance will be maintained through the presence of the operators and workers on site. Visitors will be required to check in and sign in at the office before being allowed to enter controlled access areas of the facility.

NRC licensed material in the form of 11e.(2) by-product material and source material will be securely stored within fenced areas at the satellite facility. Satellite operators will perform a visual inspection at the beginning of each shift to ensure the proper storage and security of NRC licensed material. The inspection will determine whether all NRC licensed material is properly stored in a restricted area or, if in a controlled or unrestricted area, is properly secured. Operators will ensure that uranium loaded IX resin and by-product material are properly secured. If NRC licensed material is found outside a restricted or controlled area, the Operator will ensure that it is secured, locked and moved to a restricted area, or kept under constant surveillance by direct observation by site personnel until it can be removed to a restricted area. The results of these inspections will be retained on site for review by regulatory agencies.

Cameco Resources will routinely receive, store, use and ship hazardous materials as defined by the Department of Transportation. In addition to packaging and shipping requirements contained in the Department of Transportation Hazardous Materials Regulations at 49 CFR 172, Subpart I, Security Plans, requires that persons offering for

transportation or transport certain hazardous materials develop a security plan. The security plans must address transportation security risks and evaluate appropriate measures to address those risks. All hazardous materials shippers and transporters subject to these standards must take measures to provide personnel security by screening potential job applicants, prevent unauthorized access to the hazardous materials or vehicles being prepared for shipment, and provide for en route security. Companies must also train appropriate personnel in the elements of the Security Plan.

Transport of licensed/hazardous material by Cameco Resources employees or Contractors will typically be restricted to transporting IX resin from the North Butte satellite facility to the SRH Central Processing Plant (CPP), Highland CPP or transferring contaminated equipment between company facilities. The goal of the driver, cargo, and equipment security measures will be to ensure the safety of the driver and the security and integrity of the cargo from the point of origin to final destination by:

1. Clearly communicating general point-to-point security procedures and guidelines to all drivers and non-driving personnel;
2. Providing the means and methods of protecting the drivers, vehicles, and cargo while on the road; and
3. Establishing consistent security guidelines and procedures that will be observed by all personnel.

For the security of all tractors and trailers, the following will be adhered to:

1. If material is stored in the trailer, access will be secured at all openings with locks and/or tamper indicators;
2. Off-site tractors will always be secured when left unattended with windows closed, doors locked, the engine shut off, and no keys or spare keys left on or in the vehicle; and,
3. The vehicle will be kept in sight by an employee at all times when left unattended outside a restricted area.

These security guidelines and procedures will apply to all transport employees. All driving and non-driving personnel will be expected to be knowledgeable of, and adhere to these guidelines and procedures when performing any load-related activity.

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Surety Bonding

The approved surety bonding will not be impacted by the proposed change and the construction activities and are included in the current approved document. Restoration and the following year's activities will be included in the next submitted annual surety.

Conclusions

The Uranerz U.S.A., Inc. Environmental Assessment (EA), 1990, for North Butte and Ruth properties describes a processing plant which would have included IX, elution, precipitation, thickening and drying capacity. The statement also allows for the transfer of loaded and unloaded resins to another facility, not specific. Uranerz did not have a Performance Based License that would allow review and approval of changes in the license if the change had been previously assessed by the NRC through EA and SER process. Since the Uranerz license has rolled into SUA-1548 with the purchase of the North Butte and Ruth properties the Smith Ranch Performance Based license applies to the existing North Butte/Ruth license as well. This allows Cameco Resources to review and approve proposed changes within the license if the SERP license conditions are met through the ORC/SERP process.

The Smith Ranch-Highland Central Processing Plant (CPP) is divided into five staging areas separated with cement curbing or different rooms. The dryer/packaging, precipitation/thickner, elution, brine water makeup and IX/wastewater/RO areas. All satellites associated with Smith Ranch-Highland are similar to and function the same as the IX/wastewater/RO segment of the approved Smith Ranch CPP. The changes that have evolved over time are mostly related to instrumentation upgrades due to technological advances. The approved plant at North Butte was described and designed to function the same as the approved Smith Ranch CPP, SR-2 Satellite, and Reynolds Ranch Satellite. The statement in the North Butte EA that allows for the transfer of load and unloaded resins to another facility indicates that the only functioning portion of the approved plant is the IX, wastewater and RO systems or a Satellite.

License Amendments 11 and 12 to SUA-1548 approved the Reynolds Ranch Satellite and Satellite SR-2, respectively. The planned activities and satellite design approved and assessed for the Satellite SR-2 project included: construction activities; barren lixiviant pumped to the wellfields; be the recipient of pregnant lixiviant from the wellfields; then pumped to a series of IX columns; uranium would be extracted by the resin; loaded resin would be transferred to the smith Ranch CPP for processing; waste water storage; reverse osmosis and restoration effluent waste. The North Butte

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Satellite plant layout design and function, including tanks, pumps, vessels, control room, restrooms, change rooms and lab would be the same as SR-2 with exception of orientation and placement. Some components may be newer more advanced models, especially electronics. The approved Reynolds Ranch Satellite has not been constructed to date, but will be the same function and basic design of SR-2 and North Butte satellites.

Clearly all activities proposed at the North Butte Satellite have been previously assessed by the NRC through an EA process for North Butte, SR-2 and Reynolds Satellite application and amendments and are all found to have no adverse impacts. The construction and operation of the IX/wastewater/RO section of the originally approved North Butte Plant would have less environmental impacts than a full plant as approved. The EAs of both the SR-2 and Reynolds Satellite amendments support this conclusion.

The operation of two satellite facilities (SR-2 and Reynolds Ranch) have been reviewed and approved by the NRC. Additionally, operating plans described in the Uranerz and Reynolds Ranch License Application have been previously assessed and approved. An operating plan is present which would utilize the existing License Application approved with the Reynolds Ranch Amendment as the primary operating plan at North Butte supplemented with site specific operating conditions from the 1989 Uranerz Application. Cameco's SHEQ Management System, reviewed during NRC's semi-annual inspections, will also extend to the operations at North Butte.

The ORC/SERP process will determine whether an operating plan for North Butte exists by reviewing the operating plan described above and contained in supporting documents as required in License Condition 10.2.1.

APPENDIX A

Environmental Assessments and Supporting Documents

Previous Environmental Assessments and Supporting Documents

March 1989 Uranerz, U.S.A. submitted a Source Materials License Application for their North Butte and Ruth properties for NRC review and approval. The NRC approved the license after completing and issuing an Environmental Assessment, Feb. 11, 1991. Pathfinder Mines purchased Uranerz North Butte and Ruth properties in early 1990s. August 18, 2003 Power Resources, Inc. submitted a license amendment for the combination of Smith Ranch - Highland Uranium project (SR-HUP), Ruth and North Butte licenses, with license amendment 5.

Originally, SR-HUP was two separate facilities (Smith Ranch and Highland) licensed to two different corporate entities under different source materials licenses. The NRC first authorized Kerr-McGee Corporation (KM) to conduct research and development (R&D) ISL operations in June 1981 under source materials license SUA-1387. A corresponding Environmental Impact Assessment (EIA) was issued for the R&D operation (46 FR 30924). In February 1984, SUA-1387 was amended to reflect that Sequoyah Fuels Corporation, a wholly owned subsidiary of KM, was the licensee for the Smith Ranch operations (NRC 1984). The NRC renewed Sequoyah Fuels license for continued operations by letter dated January 29, 1988 (NRC 1988). A Finding of No Significant Impact (FONSI) was published in the *Federal Register* on January 7, 1988 (53 FR 459).

Rio Algom Mining Corp. (RAMC) acquired Smith Ranch in December, 1988 (Quivira Mining Corp. 1988) and proposed expansion from a R&D operation into commercial scale production. An Environmental Assessment (EA) was developed in conjunction with the licensing action (NRC 1991a). The NRC reviewed ground water impacts (Section 4.1), Waste Disposal (Section 4.4), In-Plant Radiological Safety (Section 4.3), Offsite Radiological Impacts (Section 4.2), and Cultural Resources (Section 4.5) for ISL related activities. An EA/FONSI was published in the *Federal Register* on January 10, 1992 (57 FR 306). On March 12, 1992 Source Materials License SUA-1548 was issued to RAMC authorizing commercial scale production.

A proposed license amendment was presented to the NRC requesting the addition of Reynolds Ranch ISL satellite to Source Materials License SUA-1548 by letter dated January 14, 2005. The Reynolds Ranch properties are contiguous to the SUA 1548 licensed area to the north. An EA addressing ISL construction and operational impacts was developed as part of the Reynolds Ranch review in November 2006 (NRC 2006), and the EA/FONSI was published in the *Federal Register* on January 5, 2007 (72 FR 586-588).

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As part of RAMC's SUA-1548 license renewal effort, the NRC developed an EA summarizing their review (NRC 2001). The NRC evaluated environmental impacts of continued solution recovery of uranium from the Wasatch and Fort Union formations, at depths from 400-1000 feet below surface. The analysis considered all components of the extraction process including injection/recovery well patterns, spacing, and mechanical integrity testing, headerhouse manifolds and connecting injection/production wells, and lixiviant chemistry (Sections 3.2 and 3.3). Impacts to ground water (Section 6.4) and potential for loss of vertical or horizontal containment of lixiviant to the subsurface (Section 6.5) were considered. NRC (2001) also assessed ISL related impacts including construction of wellfields, plant facilities, access roads, and pipelines to ecological systems (Section 6.7), endangered species (Section 6.8), and wildlife (Section 6.9). Based on the NRC (2001) assessment, a FONISI for the Smith Ranch ISL operation was published I the *Federal Register* on May 4, 2001 (66 FR 22620).

A proposed license amendment was sent to the NRC on October 11, 2006 requesting approval for the construction and operation of a satellite facility (SR-2). The NRC prepared an EA to evaluate the environmental impacts associated with the licensing action. A finding of no significant Impacts was published in the *Federal Register* on January 8, 2008 (73 FR 1367-1370). In support of the license amendment a Safety Evaluation Report (SER) was prepared by the NRC documenting their review of the proposal in regards to safety and health safety (December 2007).

A proposed amendment authorizing SR-HUP to receive third party ion exchange resin (Toll milling) for processing was requested for approval by Power Resources, Inc.d/b/a Cameco Resources by letter dated June 19, 2008. The NRC prepared an EA and SER based on their review of the proposal and determined the request to be acceptable by approving the amendment on September 15, 2009.

The Highland site is located east and contiguous to the Smith Ranch licensed area. Initially, the NRC authorized Everest Minerals Corp. to conduct commercial-scale operations at the Highland site under Source Materials License SUA-1511 in 1987 (NRC 1987). The staff's environmental review was documented in an EA/FONSI issued on July 2, 1987 (52 FR 25094). Everest Minerals Corp. changed its name to Power Resources, Inc. in 1989 (Everest Minerals Corp. 1989). In 1995, the NRC renewed SUA-1511 for Rower Resources, Inc.'s Highland facility, with the EA/FONSI published in the *Federal Register* on August 18, 1995 (60 FR 44367).

Power Resources Inc. acquired the Smith Ranch properties and source materials license from Rio Algom Mining Corp. in July, 2002. By letter dated August 18, 2003, the NRC approved the integration of the Highland Uranium Operations into the Smith Ranch license (NRC 2003). The operations at the combined SR-HUP were authorized

under Source Materials License SUA-1548. The NRC did not prepare an EA/FONSI, as this action was considered administrative and organizational in nature.

Power Resources Inc. submitted an application for amendment to Source Material License SUA-1548 dated June 24, 1998 to allow operation of a satellite at Gas Hills Project site. The application was supplemented by correspondence dated: September 24, 1999; November 11, 1999; May 21, 1999; July 15, 1999; May 3, 2002 and October 10, 2003. An EA and SER were completed on January 2004.

Cameco Resources ORC/SERP for the Selenium Treatment Facility, 2009.

NRC Regulatory Issue Summary 2012-06, NRC Policy regarding submittal of amendments for processing of equivalent feed at licensed uranium recovery facilities, 2012.

NRC Inspection Report 040-08964/12-002. September 14th 2012.

Cameco Resources' SHEQ Management System; Vol. I, Standards; Vol. II, Management Procedures; Vol. III, Standard Operating Procedures; Vol. IV, Health Physics Manual; Vol. V, Industrial Safety Manual; Vol. VI, Environmental Manual; Vol. VII, Training Manual; Vol. VIII, Emergency Manual

Assessment Matrix between Previous North Butte Documents and Current Operating Plans

Cameco will utilize the NRC approved operating procedures such as those outlined in the Reynold's Ranch License Application (2003), SR-2 NRC EA (Dec. 2007) and Cameco's eight (8) volume Safety, Health, Environment and Quality (SHEQ) Management System as the Operating Plan for North Butte. Previously NRC approved documents for North Butte, such as Pathfinder's License Application (1989), will also be used as part of the Operating Plan when such documents outline site specific conditions.

Relevant documents were reviewed to determine the requirements set forth in those documents. The matrix below lists all requirements described in the documents and evaluates the applicability of those requirements to the operations at North Butte. The matrix also determines whether conditions set forth in Uranerz's and Pathfinder's documents are superseded by Cameco's Reynold's Ranch License Application or other relevant NRC approved documents. The matrix ensures the most conservative or stringent condition described in the pertinent documents is followed during North Butte's operations. As such, the matrix will serve as the Operating Plan for North Butte.

Doc. Date	Submittal	Section/ Page #	Comment	Applicable
Mar. 1989	Uranerz Vol. 1	1-5	will be divided into ten mining units	Mine units will be approved on a case by case situation through the ORC SERP process
Mar. 1989	Uranerz Vol. 1	1-5	flow rate of up to 4,000 gpm	True, until license renewal approval
Mar. 1989	Uranerz Vol. 1	1-5	wells will be completed only in zones "A", "B" and "C"	Yes
Mar. 1989	Uranerz Vol. 1	1-5	well field flow rates and pressures will be collected routinely	Yes, detailed in Reynolds Ranch application
Mar. 1989	Uranerz Vol. 1	1-6	restored to a quality consistent with regulatory requirements	Yes
Mar. 1989	Uranerz Vol. 1	1-6	DOT approved trailers will be used to transport the resin to and from other uranium mining facilities	Yes
Mar. 1989	Uranerz Vol. 1	1-6	leaching solution or lixiviant will consist of a diluted sodium carbonate bicarbonate solution plus an oxidant	Yes, further detailed in Reynolds Ranch application
Mar. 1989	Uranerz Vol. 1	1-6	waste solution from the precipitation and yellowcake circuits will be filtered and disposed of in the deep disposal well	Yes, but YC circuit proposed.
Mar. 1989	Uranerz Vol. 1	1-6	Reclamation and restoration activities will commence as soon as practicable once mining in a well field has terminated	Yes
Mar. 1989	Uranerz Vol. 1	15-4	Approximately 1,000,000 lbs of product throughput per year	Yes. The approximate

				production rate will range from 500,000 to 1,500,000 lbs of product throughput per year.
Mar. 1989	Uranerz Vol. 1	15-5	Sodium carbonate, if needed, will be added to recovered ground water, pH will be adjusted to near neutral using CO2 gas, approximately 3 mg/l will be added to prevent bacterial plugging, O2 or hydrogen peroxide will be added to serve as the oxidant	Yes, as described in Reynolds Ranch application
Mar. 1989	Uranerz Vol. 1	15-6	Distance between wells will be 50-120 ft & flow rate of 20-40 GPM	Yes
Mar. 1989	Uranerz Vol. 1	15-6	Injection rate 15-35 GPM	Yes
Mar. 1989	Uranerz Vol. 1	15-6	Injection pressures in well field will be controlled at 140 psig or less	Yes
Mar. 1989	Uranerz Vol. 1	15-7	Submit request for well field authorization with appropriate reg. agency	Yes, DEQ and the ORC SERP process
Mar. 1989	Uranerz Vol. 1	15-11	Line drives will be used where 5 or 7 spot is not practical	Yes
Mar. 1989	Uranerz Vol. 1	15-11	Wells will be drilled and completed to be used as injection or production	Yes
Mar. 1989	Uranerz Vol. 1	15-11	Rotary drilling will be employed in well drilling	Yes
Mar. 1989	Uranerz Vol. 1	15-15	Abandoned wells will be filled with heavy bentonite, abandonment mud, bentonite, or cementing it to the surface	Yes
Mar. 1989	Uranerz Vol. 1	15-15	Holes will be marked and identified on the surface until mining is complete and then removed	Yes
Mar. 1989	Uranerz Vol. 1	15-19	Injection & production wells will be integrity tested prior to being used and retested every 5 years or when a cutting tool is put down well	Yes
Mar. 1989	Uranerz Vol. 1	15-19	Will employ the use of two inflatable packers nitrogen to be used to inflate the packers and to put pressure between the packers	Yes
Mar. 1989	Uranerz Vol. 1	15-16	A cement slurry will be forced out of the bottom of the casing and up through the annulus	Yes
Mar. 1989	Uranerz Vol. 1	15-22	Injection pressure will be 90% of the pressure rating of the casing and the test will hold the initial pressure with in 10% for 10 minutes	Yes, but following the current MIT procedures outlined in the SHEQ Management System, Volume III.
Mar. 1989	Uranerz Vol. 1	15-22	Records of integrity testing will be kept on site and available for inspection	Yes
Mar. 1989	Uranerz Vol. 1	15-27	Will utilize O2 as the primary oxidant but hydrogen peroxide may also be used	Yes
Mar. 1989	Uranerz Vol. 1	15-28	The barren lixiviant will be reconstituted to its prior bicarbonate strength prior to well field injection CO2 will be used to adjust the pH to a range of 6.0-8.5 units. Sesqui-carbonate or soda ash will be used, to maintain proper sodium bicarbonate strength	Yes
Mar. 1989	Uranerz Vol. 1	15-32	The evaporation ponds will be used for the temporary storage of water that requires radium settling before surface discharge and for temporary storage during maintenance periods on the deep disposal well.	Yes, surge ponds are holding tanks prior to deep disposal well discharge, no surface discharge will take place
Mar. 1989	Uranerz	15-32	Effluents generated from the above mining and restoration periods will	Yes

	Vol. 1		be sampled and classified to determine the disposal approach	
Mar. 1989	Uranerz Vol. 1	15-32	Deep disposal well: To accept water with TDS in excess of 5,000 mg/l and/or U30, in excess of 5 mg/I. Estimated flow rate of 10 - 100 GPM.	No, per WDEQ Permit UIC 02-050, Cameco can inject various industrial processing wastes into the deep disposal well. The description of acceptable processing wastes is outlined in the permit. The pH of the processing wastes must be >2.0 and <11.0, and the concentration of natural uranium may not exceed 65.0 mg/L. No more than 216,000 gallons per day shall be injected into any one well.
Mar. 1989	Uranerz Vol. 1	15-50	well field roads will be designed and constructed in such a manner so as to minimize the amount of land disturbance and keep reclamation costs as low as practicable	Yes
Mar. 1989	Uranerz Vol. 1	15-50	Will utilize a combination of water bars, ditch cut-outs and riprap to prevent excessive erosion on those portions of the road that have a steep grade.	Yes
Mar. 1989	Uranerz Vol. 1	15-53	Rather, the ponds are actually holding ponds, sized to store a 40 GPM bleed stream for a 30-day time period to allow for maintenance or repair of the deep disposal well. The target operating parameter of the deep injection well is 150 GPM maximum, at 2,000 psi surface injection pressure; two deep wells are permitted for the North Butte ISL project, each with also GPM capacity. Pathfinder plans to install only one deep well initially, and operate it at a rate less than the maximum 150 GPM	Yes, surge ponds are holding tanks prior to deep disposal well discharge, no surface discharge will take place
Mar. 1989	Uranerz Vol. 1	16-1	The horizontal excursion monitor wells will be located no more than 400 feet from the edge of the well· field and the distance between horizontal excursion wells will be no greater than 400 feet down gradient, 600 feet on the sides and 1,000 feet up gradient	No, Reynolds Ranch application describes wells as no more than 500ft by 500ft which is the present industry standard
Mar. 1989	Uranerz Vol. 1	16-1	Prior to lixiviant injection into any new mining unit, Uranerz will submit to the LQD and the NRC results of pump tests which demonstrate that the perimeter ore zone *monitor* wells are in communication with the production unit ore zone wells, and that the potentially affected overlying aquifer is hydrologically isolated from the production unit ore zone wells.	No, pump test results will be submitted to DEQ for review and approval and approved through the ORC SERP process
Mar. 1989	Uranerz Vol. 1	16-2a	The adjacent upper aquifer excursion monitor wells will be completed in the "F" sand (upper) aquifer at a frequency of one well for every four acres of well field	Yes, but one monitoring well will be installed per every 3 acres of

				pattern area as per the Reynold Ranch application (Section 5.1.2), or at a frequency determined by the WDEQ. The WDEQ uses the guidance contained in Attachment II to WDEQ-LQD Guideline No. 4, *In-Situ Mining,* 1994
Mar. 1989	Uranerz Vol. 1	16-4	A vertical excursion monitor well will be placed in the first continuous sandstone unit above the upper aquifer on a density of one well per mining unit	No, see 16-2a
Mar. 1989	Uranerz Vol. 1	16-4	Baseline water quality for the horizontal and vertical monitor wells will be established by collecting four rounds of samples from each well with a minimum of two weeks between sampling events.	No, sample frequency is twice a month
Mar. 1989	Uranerz Vol. 1	16-4	The water level in each well used to obtain baseline data will be measured on each sampling event prior to pumping. The water level data will be forwarded *with* the water quality data	Yes
Mar. 1989	Uranerz Vol. 1	16-6	The horizontal and vertical (upper aquifer) excursion monitor wells in the operating mining unit will be sampled twice each month	Yes
Mar. 1989	Uranerz Vol. 1	16-6	The samples will be analyzed for the following excursion parameters: Specific Conductivity, Chloride, Carbonate plus Bicarbonate	Yes
Mar. 1989	Uranerz Vol. 1	16-6	At least two casing volumes of water will be pumped from each excursion monitor well prior to collecting the samples	No, as per Reynolds Ranch amendment
Mar. 1989	Uranerz Vol. 1	16-6	The Upper Control Limit (UCL) for specific conductivity and carbonate plus bicarbonate for a mining unit will be established by adding five standard deviations to the mean of the baseline values for each category of well (Le., horizontal, upper aquifer, lower aquifer excursion monitor wells)	Yes, will be established per WDEQ Guideline No. 4, *In-Situ Mining,* 1994
Mar. 1989	Uranerz Vol. 1	16-6	The procedure for calculating the chloride UCL will be to add 15 mg/l to the baseline mean value or add five standard deviations to the baseline mean, whichever is higher	Yes, will be established per WDEQ Guideline No. 4, *In-Situ Mining,* 1994
Mar. 1989	Uranerz Vol. 1	16-7	A horizontal or vertical excursion monitor well will be declared in an Excursion status if a routine sample analysis and a confirmation sample' (or second confirmation sample) analysis show that at least two of the three excursion parameters exceed their UCL's. A confirmation sample will be collected within 48 hours of receiving the results of a routine sampling event that indicate a possible excursion (I.e., two of the three parameters exceed their UCL's). If the first confirmation sample does not indicate an excursion, a second confirmation sample will be collected within 48 hours of receiving the results of the first confirmation sample	Yes
Mar. 1989	Uranerz Vol. 1	16-7	The LQD/DEQ and the NRC will be notified via telephone within 24 hours of confirming an excursion and a written report on the incident will be mailed to the same two agencies within seven days of confirming the excursion. The known details of the excursion including available monitor well data will be presented in the written report along with information on the corrective action(s) that are being taken to correct the situation. Thereafter, a monthly report will be submitted to	Yes

			the NRC and the LQD/DEQ on the status of the excursion along with all pertinent data. The monthly reports will continue until the monitor well in excursion status is no longer in excursion status	
Mar. 1989	Uranerz Vol. 1	16-7	During the period when a monitor well is in excursion status, the problem well will be sampled weekly. The analytical data from the weekly sampling of the monitor well on excursion status will be included in the monthly excursion report.	Yes
Mar. 1989	Uranerz Vol. 1	16-10a	The inspection tubes from each pond will be inspected once a week to check for the presence of liquid	No, the tubes are inspected daily as per Reynolds Ranch amendment (Section 5.3.9.2)
Mar. 1989	Uranerz Vol. 1	16-10a	If a level of liquid is present that is equal to the level of fluid in the pond, it will be chemically analyzed to verify from its composition that liner failure has occurred. If the failure is confirmed, an attempt will be made to repair the leak while the liquid remains in the pond. If this procedure is not successful, the liquid in the pond with the failure will be evacuated to the required level and the leak will be repaired	No, if six inches or more of fluid is detected, it will be sampled to determine if there is a leak. If there is a leak, the appropriate agencies will be notified and the contents of the pond will be transferred to another cell. If water continues to flow to the sump, samples will be taken every seven days and the appropriate agencies will be notified as per Reynolds Ranch amendment and application (Section 5.3.9.2).
Mar. 1989	Uranerz Vol. 1	16-11	Operationally, the water quality at the three surface water stations will be sampled and analyzed once each year during spring or early summer if liquid is present.	No, surface water sampling will be conducted quarterly, when liquid is present, as per WDEQ guidelines and described in Reynolds Ranch application (Section 5.3.6)
Mar. 1989	Uranerz Vol. 1	16-11	Sediment samples will not be collected annually, but will be collected at the end of decommissioning	Yes. Sediment sampling is not currently being done at SRH, and will not be done at N Butte unless by special request of the WDEQ.
Mar. 1989	Uranerz Vol. 1	16-11	The operational surface water monitoring program will commence with the start of construction, and end when surface reclamation and aquifer restoration have been completed	Yes

Mar. 1989	Uranerz Vol. 1	16-12	The baseline radiological soil and sediment sampling program and laboratory analysis results are presented in Section 14, Appendix "D-I0" Pre-Mining Radiological Assessment.	Yes, verified through the license renewal document
Mar. 1989	Uranerz Vol. 1	16-12	No operational sampling of soils or sediments is planned for the North Butte ISL project. If, however, an accidental spill occurs or routine sampling and monitoring of the operation indicate a potential problem, soil and sediment sampling may be implemented to determine if contamination has occurred and if so the extent of the contamination.	Yes
Mar. 1989	Uranerz Vol. 1	16-16	Baseline thermoluminescent dosimetry results are presented in Section 14, Appendix "D·IO", Pre-Mining Radiological Assessment. The operational thermoluminescent dosimetry program will be a continuation of the baseline program. The same locations will be monitored with the dosimeters being changed and read on a quarterly basis	Yes
Mar. 1989	Uranerz Vol. 1	16-16	The baseline atmospheric Radon-222 monitoring program and sample results are described in Section 14, Appendix "D-IO" Pre-Mining Radiological Assessment	Yes
Mar. 1989	Uranerz Vol. 1	16-16	The operational Radon·222 monitoring will be a continuation of the baseline program. Radon--cations will be monitored continuously using "trak-etch" radon cups which will be changed and read on a quarterly basis	No, twice a year
Mar. 1989	Uranerz Vol. 1	16-17	The baseline radiological air particulate monitoring program and sample results are described in Section 14, Appendix "0·10" Pre-Mining Radiological Assessment	Yes
Mar. 1989	Uranerz Vol. 1	16-17	The radiological air particulate monitoring will be a continuation of the baseline program. Samples will be collected at the three baseline locations once each month and composited on a quarterly basis for analysis	Yes
Mar. 1989	Uranerz Vol. 1	16-17	In order to determine the uranium production from the operation, the barren solution will be analyzed periodically.	Yes
Mar. 1989	Uranerz Vol. 1	19-4	Uranerz will develop and finalize an Operations Manual which will contain operating procedures for all mining activities at the site	Completed with the addition of Reynolds Ranch to the license including the management system which is applicable at NB
Mar. 1989	Uranerz Vol. 1	19-5	Operations Manual will be reviewed annually	Yes
Mar. 1989	Uranerz Vol. 1	19-6	The Monthly Report will include a discussion of all radiation monitoring and exposure data for the month. Any actual or potential safety problems will be presented in the report and a comparison of the radiological data to the ALARA (As Low As Reasonably Achievable) program will be made in order to define any unsatisfactory trends	Yes
Mar. 1989	Uranerz Vol. 1	19-6	Annual ALARA Audit which will include an inspection of the facilities and radiation records, and the preparation of a written report. The written report will be forwarded to the NRC	Yes
Mar. 1989	Uranerz Vol. 1	19-6	The Annual ALARA Audit team will review the following: 1. Bioassay results; 2. Employee exposure records; 3. Training records; 4. Visitor and inspection logs; 5. Radiological monitoring data; 6. Safety meeting reports; 7. Over exposure reports;	Yes

			8. Approved changes in operating procedures; 9. Quality assurance program.	
Mar. 1989	Uranerz Vol. 1	19-7	All site employees will receive radiation and general safety training that complies with NRC and MSHA regulations. The safety instruction will include both class room and on-the-job training which will be administered by the RSO or other qualified individuals	Yes, but OSHA standards are applicable instead of MSHA
Mar. 1989	Uranerz Vol. 1	19-8	all new workers, including supervisors, will be given specialized instruction on the health and safety aspects of the specific jobs they will perform	Yes
Mar. 1989	Uranerz Vol. 1	19-8	visitors who have not received training will be escorted by on site personnel properly trained and knowledgeable about the hazards of the facility	Yes
Mar. 1989	Uranerz Vol. 1	19-8	contractors having work assignments at the facility will be given appropriate training and safety instruction	Yes
Mar. 1989	Uranerz Vol. 1	19-10	Personal external gamma radiation exposure monitoring will be performed by the use of thermo luminescent dosimeter (TLD) badges. The badges will be read on a quarterly basis for all Uranerz employees assigned to work at the North Butte facility	Yes, but employees exposure will be assessed by historic determinations at SR to determine employees needing TLD's
Mar. 1989	Uranerz Vol. 1	19-12	Airborne uranium particulate levels at the North Butte facility will be determined by taking periodic air samples on a monthly basis	Yes
Mar. 1989	Uranerz Vol. 1	19-13	The amount of exposure of North Butte ISL Project personnel to airborne radioactive materials will be calculated from both the concentrations of airborne radionuclides and the worker occupancy factors.	Yes
Mar. 1989	Uranerz Vol. 1	19-13	Site employees and visitors will either shower or self-monitor for alpha contamination before leaving the restricted area. If the action level of DPM/IOO cm2 is exceeded the individual must remove the contamination and monitor again to ensure that the alpha reading is below the action level	Yes, but action level will be 50 dpm/100 cm2
Mar. 1989	Uranerz Vol. 1	19-13	The alpha meter will be checked for consistency with a check source once each day.	Yes
Mar. 1989	Uranerz Vol. 1	19-13	Not in the restricted area. These spaces will be alpha surveyed on a monthly basis	Yes
Mar. 1989	Uranerz Vol. 1	19-14	The RSO will ensure that the instruments used to perform the surveys are well maintained and calibrated according to the manufacturers specifications or annually, whichever is sooner	Yes
Mar. 1989	Uranerz Vol. 1	19-14	1. Fixed Alpha Measurement- Eberline Model RM-20 or equivalent NBS traceable alpha standard, Thorium-230 2. Removable Alpha Measurement- Eberline SAC-4 scaler with alpha scintillator or equivalent NBS traceable alpha standard, Thorium-230 3. Gamma Measurement- Eberline E-120 or equivalent Cs-137 check source 4. Air Particulate Measurement- Eberline RAS-I or equivalent Eberline SAC-4 scaler with alpha scintillator or equivalent NBS traceable alpha standard, Thorium-230 5. Radon Daughter Measurement- MSA Type S slow volume pump or equivalent Eberline SAC-4 scaler with alpha scintillator and filter holder or equivalent	Yes

			NBS traceable alpha standard, Tho.rium-230	
Mar. 1989	Uranerz Vol. 1	19-15	the Continuous monitoring for airborne effluents will include passive radon monitoring with trac-etch cups and environmental TLD's to determine the radon daughter concentrations and the external gamma radiation levels, respectively	Yes
Mar. 1989	Uranerz Vol. 1	19-21	The actions that the Uranerz staff will take in the event of a transportation accident will be detailed in an Emergency Response Plan	No, detailed in the SHEQ Management System Volume VIII
Feb. 1991	Ruth-NB – NRC EA Final	Sec 3.3 P. 19	Prior to injection of lixiviant in a given mining unit, Uranerz will be required to submit a request for well field authorization. Request will include baseline water quality data for the excursion monitor wells and restoration sampling wells.	Yes, submitted to the WDEQ for review and approval and reviewed internally by the ORC SERP procedure
Feb. 1991	Ruth-NB – NRC EA Final	Sec 3.3 P. 19	Wells to be drilled with a rotary drill rig. At least 4 heavy drill collars will be used along the casing. Bentonite and drilling mud additives will be used to insure a clean open hole.	Yes, collars will be determined by the driller performing the work
Feb. 1991	Ruth-NB – NRC EA Final	Sec 3.3 P. 19	Holes will be logged by geophysical methods.	Yes
Feb. 1991	Ruth-NB – NRC EA Final	Sec 3.3 P. 19	Logging parameters will include the following as necessary: Natural gamma for recognition and assessment, Resistance for identifying the different lithologic zones and their boundaries, Spontaneous potential for a back-up method to determine lithological zones, Neutron to assist in marker bed identification and ascertain porosity, Deviational survey to locate bottom of well in reference to surface location	Yes, neutron will be on a case by case basis by a specific logging unit
Feb. 1991	Ruth-NB – NRC EA Final	Sec 3.3 P. 19	If uranium content is sufficient, the hole will be reamed to a diameter of 6-3/4 to 7-1/2 to allow setting of the casing and allow sufficient annulus to insure a good cement seal.	Yes, as per Reynolds Ranch amendment
Feb. 1991	Ruth-NB – NRC EA Final	Sec 3.3 P. 19	Abandoned wells will be filled with heavy bentonite, bentonite chips, or cementing it to the surface. The hole will be marked and identified on the surface until mining is complete and then surface markings will be removed	Yes, as per Reynolds Ranch amendment
Feb. 1991	Ruth-NB – NRC EA Final	Sec 3.3 P. 21	Injection and production wells will be completed in the same manner. The standard completion method for these wells will be under reaming.	Yes, as per Reynolds Ranch amendment
Feb. 1991	Ruth-NB – NRC EA Final	Sec. 3.3 P. 21	All monitor, injection, and production wells will be integrity tested prior to being put into use and retested at least once every five years. Wells will also be tested after a cutting tool or any other equipment which could damage the casing is used.	Yes, as per Reynolds Ranch amendment
Feb. 1991	Ruth-NB – NRC EA Final	Sec 3.3 P.21	Two methods will be used to integrity test wells: Method 1 Inflatable Packers – Lower packer will be set at a depth of App. 10 ft. above the completed interval. It will be lowered on a ¼ inch steel cable with a ¼ inch nylon high pressure tube for inflation. The lower packer will be inflated and the casing filled with water before the upper packer is set and inflated. Nitrogen will be used to inflate the packers. The interval between the packers will be pressurized to the maximum anticipated injection pressure plus 20%. Method 2 will utilize casing cementing pressure coupled with single point resistance test. Each well will be required to maintain pressure within 10% of the initial test pressure for a period of 10 minutes.	Yes, but only method 1 is used. Currently at SRH this depth is a maximum of 20' above the J-top, and cable size ranges from ¼" – 5/16". Each well tested by method 1 will be required to maintain

				pressure within 10% of the initial test pressure for a period of 10 minutes and should read 25% of injection pressure, as per SHEQ Management System Volume III.
Feb. 1991	Ruth-NB – NRC EA Final	Sec. 3.3 P. 21	If a well fails the integrity test it will be retested. If it continues to fail it will be declared unusable. The problem well will either be repaired and retested or abandoned by proper procedure.	Yes
Feb. 1991	Ruth-NB – NRC EA Final	Sec 3.3 P. 21	Records of integrity testing on all injection, production, and monitor wells used in the mining process will be kept on the premises and will be available for inspection.	Yes
Feb. 1991	Ruth-NB – NRC EA Final	Sec. 3.3 P. 21	Integrity testing data will be submitted to the NRC on a calendar quarter basis.	Yes, the data will be submitted to the WDEQ on a quarterly basis and will be reviewed by the NRC during their routine inspections
Feb. 1991	Ruth-NB – NRC EA Final	Sec. 3.4 P. 25	The lixiviant will be diluted sodium carbonate/bicarbonate aqueous solution. Oxygen or Hydrogen peroxide will be added to oxidize the uranium underground. Carbon dioxide is also provided to lower the ph to about neutral and as an additional source of carbonate/bicarbonate.	Yes, as per Reynolds Ranch amendment
Feb. 1991	Ruth-NB – NRC EA Final	Sec. 3.4 P. 25	The barren solution, after leaving the uranium ion exchange system, will be refortified with chemicals prior to the reinjection into the mineralized zone.	Yes
Feb. 1991	Ruth-NB – NRC EA Final	Sec. 3.5 P. 25	Uranium will be mined from the mineralized formations at a combined flow rate not to exceed 4000 gpm.	Yes
Feb. 1991	Ruth-NB – NRC EA Final	Sec. 3.5 P. 25	The well field waters will be enriched with uranium as well as several other metals associated with the formation. The metal enriched groundwater solution is pumped to the surface and transferred from the well field by utilizing buried pipelines.	Yes
Feb. 1991	Ruth-NB – NRC EA Final	Sec. 3.5 P. 25	Once ion exchange sites on the ion exchange column resins are filled with uranium, the column is taken off stream. The column is then eluted of uranium through an elution process. In the elution process, the uranium is stripped from the resin beads with a concentrated solution of sodium carbonate and sodium chloride.	No, the uranium is stripped from the resin beads with a strong sodium-chloride salt solution, as per Reynolds Ranch application (Section 3.1.2)
Feb. 1991	Ruth-NB – NRC EA Final	Sec. 3.6.2 P. 28	Freeboard requirements will be necessary to ensure that the ponds do not accidently discharge byproduct materials to the environment.	Yes
Feb. 1991	Ruth-NB – NRC EA Final	Sec. 3.6.2 P. 28	The evaporation ponds at the Ruth site currently have a 3-ft freeboard requirement which will be required by license condition to apply during commercial operations.	Yes, freeboard to be determined as ½ the capacity of the two ponds
Feb. 1991	Ruth-NB – NRC EA	Sec. 3.6.3	Operation of the process circuits will result in two primary sources of liquid waste: the eluent bleed and the production bleed. These wastes	No, evaporation ponds and/or deep

	Final	P. 30	will be routed to water treatment facilities of the evaporation ponds.	injection wells are used to collect and dispose of process wastewaters, as per Reynolds Ranch amendment (Section 3.1.3)
Feb. 1991	Ruth-NB – NRC EA Final	Sec. 3.6.3 P. 30	The Ruth site will utilize evaporation from the solar evaporation ponds as the primary method of disposal	No, deep disposal well
Feb. 1991	Ruth-NB – NRC EA Final	Sec. 3.6.3 P. 30	The NB Site will utilize evaporation from solar evaporation ponds, surface discharge during restoration, and deep well injection.	No, surface discharge will not take place
Feb. 1991	Ruth-NB – NRC EA Final	Sec. 3.6.3 P. 32	Uranerz will be required by license condition to utilize these deep disposal wells consistent with their application for disposal as well as maintain an accounting of the amount of waste water disposed. Such disposal will also require a permit from the State of Wyoming.	Yes
Feb. 1991	Ruth-NB – NRC EA Final	Sec. 3.6.3 P. 33	To assure that all liquid wastes are accounted for, Uranerz will be required by license condition to return all liquid effluents to the process circuit or to the appropriate disposal system.	Yes, to be determined by license condition or within Reynolds Application
Feb. 1991	Ruth-NB – NRC EA Final	Sec. 3.6.3 P. 33	Optional disposal methods will require an amendment proposal and environmental assessment.	Yes
Feb. 1991	Ruth-NB – NRC EA Final	Sec. 3.6.3 P. 33	Wastes will be classified as contaminated or non-contaminated waste, according to their radiological survey results.	Yes
Feb. 1991	Ruth-NB – NRC EA Final	Sec. 3.6.3 P. 33	Contaminated solid waste will be separated into two categories.	See below
Feb. 1991	Ruth-NB – NRC EA Final	Sec. 3.6.3 P. 33	The first category will be waste that has some salvage value and can be decontaminated to unrestricted release limits of non-contaminated waste. All decontaminated trash will be inspected and surveyed by the RSO or trained assistant prior to their release from the site to assure that appropriate decontamination procedures have been observed.	Yes
Feb. 1991	Ruth-NB – NRC EA Final	Sec. 3.6.3 P. 33	The second category of waste will include items that have no salvage value and have been contaminated during uranium recovery operations. These materials will be required to be stored in a secure area until such time as they can be shipped to a licensed waste disposal site or mill tailings facility.	Yes
Feb. 1991	Ruth-NB – NRC EA Final	Sec. 3.6.3 P. 33	Non-contaminated solid waste will be collected at the site on a regular basis and disposed of in the nearest sanitary landfill. The waste is surveyed to assure that no contaminated waste is released from the site.	Yes
Feb. 1991	Ruth-NB – NRC EA Final	Sec. 3.7.1 P. 36	Uranerz will be required by license condition to have as its target, returning the water in the affected aquifer to baseline conditions. A secondary groundwater restoration goal of returning the water to a quality consistent with its pre-mining use will be established.	Yes, baseline conditions or approved ACL
Feb. 1991	Ruth-NB – NRC EA Final	Sec. 3.7.1 P. 36	The license will stipulate that at least 3 months prior to termination of a mining unit, a groundwater restoration plan be submitted for NRC review and approval.	Yes, SUA-1548 LC 10.1.9 (b) requires that prior to commencing ground-water restoration wellfields be added

				through the SERP process to the wellfield restoration plan outlined in Chapter 6 of the application. However, the current license does not stipulate a required time interval.
Feb. 1991	Ruth-NB – NRC EA Final	Sec. 3.7.1 P. 36	Specific restoration values will be established prior to mining for each mining unit by computing an average baseline of representative wells on a frequency of one restoration sampling well per four acres of well field area.	Yes, or as per current requirements
Feb. 1991	Ruth-NB – NRC EA Final	Sec. 5.1 P. 47	Groundwater monitoring will be done prior, during and after the proposed operations.	Yes
Feb. 1991	Ruth-NB – NRC EA Final	Sec. 5.1.1 P. 47	All monitor wells will be sampled on a routine basis during extraction operations to determine if mining solutions are being contained within the mining zone.	Yes
Feb. 1991	Ruth-NB – NRC EA Final	Sec. 5.1.1 P. 47	Monitoring for vertical excursions will take place in the first saturated aquifers overlying and underlying the mineralized zones.	Yes, but at NB there is no underlying zone
Feb. 1991	Ruth-NB – NRC EA Final	Sec. 5.1.1 P. 47	Monitoring for horizontal excursions will encircle the various mining units with wells completed in the mineralized formations at distances of 400 to 1000 ft. from the production area.	Yes
Feb. 1991	Ruth-NB – NRC EA Final	Sec. 5.1.1 P. 47	Excursion indicators will include conductivity, chloride, and carbonates plus bicarbonate. Monthly samples for these parameters will be collected from monitor wells associated with well fields during mining and restoration.	Yes
Feb. 1991	Ruth-NB – NRC EA Final	Sec. 5.1.1 P. 47	An excursion will be assumed if any two excursion indicators in any monitor well exceed their respective upper control limits or a single indicator exceeds its UCL by 20%.	Yes, until license renewal application approval
Feb. 1991	Ruth-NB – NRC EA Final	Sec. 5.1.1 P. 47	IF 2 UCL values are exceeded in a well or if a single UCL value is exceeded by 20%, a verification sample will be taken within 24 hours. If the second sample does not exceed values the first sample will be considered an error. If the second sample indicates elevated levels, the well will be put on excursion status.	Yes, until license renewal application approval
Feb. 1991	Ruth-NB – NRC EA Final	Sec. 5.1.1 P. 47	A well on excursion status will be sampled weekly.	Yes
Feb. 1991	Ruth-NB – NRC EA Final	Sec. 5.1.2 P. 48	Uranerz will be required to inspect the leak detection system on the evaporation ponds on a daily basis. If a leak is detected, chemical assays will be for chloride, and TDS.	Yes
Feb. 1991	Ruth-NB – NRC EA Final	Sec. 5.1.2 P. 48	The detection of elevated levels of these constituents in the leak detection system will be reported to the NRC within 48 hours. All assay results will be reported in writing as soon as they are available. If a leak is confirmed, the damaged pond will be emptied immediately by transferring the solution to the other pond so that remedial actions can be made.	Yes
Feb. 1991	Ruth-NB – NRC EA Final	Sec. 5.2 P. 48	Uranerz will be required by license condition to monitor the various environs and report the results on a semi-annual frequency. They will be required by license condition to maintain all monitoring records for a minimum of 5 years. These records will include a log of all significant	Yes

			solution spills that have taken place at the site.	
March 1992	NB NRC Ops Plan	Sec. 1.1 P. 1-1	A commercial scale ISL processing facility and well fields will be installed at the site to accomplish the mining and processing of the uranium product. All equipment will be purchased for the North Butte operation as there are no processing facilities or equipment on site. The equipment purchased for the North Butte ISL Project will be of a proven design.	Yes
March 1992	NB NRC Ops Plan	Sec. 1.1 P. 1-1	The North Butte production complex will be composed of processing plant, well fields and auxiliary facilities including office accommodations, sleeping quarters, evaporation ponds, disposal well and surface discharge area as explained below.	Yes, satellite only and no surface discharge
March 1992	NB NRC Ops Plan	Sec. 1.1 P. 1-2	The well fields will have injection, recovery and monitoring wells with the appropriate equipment to transfer the mined solution to and from the process facility. The wells will be completed in the confined mine aquifer labeled "A", "B", and/or "C" sand members depending upon the location of the economically concentrated ore. All of the sand members comprising the mine aquifer are flat lying with no known faults.	Yes
March 1992	NB NRC Ops Plan	Sec. 1.1 P. 1-2	The two evaporation ponds will have artificial impermeable membrane liners and act primarily as a holding facility in the event the disposal well cannot accommodate waste solutions during maintenance periods, etc. The disposal well will be installed near the processing facility and serve as a final elimination mechanism to solutions with high salt content.	Yes
March 1992	NB NRC Ops Plan	Sec. 1.4.1 P. 1-5	The orebody at the commercial North Butte ISL Project will be divided into ten mining units. Each mining unit will consist of approximately 65 five spot patterns which will be used to extract the uranium from the sandstone formation. The pattern area will be comprised of approximately 15 surface acres for each mining unit. The uranium, which lies in a confined aquifer in the Wasatch Formation, will be removed by circulating leach solutions through the mineralized portions of the sandstone at a nominal flow rate of up to 4,000 gpm.	Yes, MU-1 has approximately 180 planned patterns in 10 different header house areas.
March 1992	NB NRC Ops Plan	Sec. 1.4.1 P. 1-5	The injection and recovery wells will be completed only in the mineralized zones of the "A", "B" and "C" sand members of the mining sand to insure as little dilution as possible.	Yes
March 1992	NB NRC Ops Plan	Sec. 1.4.1 P. 1-5	The method of well drilling and completion will involve casing the hole, cementing the annulus, and either underreaming or drilling under the casing to expose the mineralized interval.	Yes
March 1992	NB NRC Ops Plan	Sec. 1.4.1 P. 1-5	Horizontal and vertical monitor wells will be installed in and around the wellfield to insure containment L of the leaching solutions. A slight over production from the wellfield will keep groundwater moving into the operating mining unit. Additionally, information on wellfield flow rates and pressures will be collected routinely to monitor for excessive injection or recovery in any portion of the mining unit.	Yes
March 1992	NB NRC Ops Plan	Sec. 1.4.1 P. 1-5	Following the extraction of the uranium from the orebody aquifer using solution mining techniques, the groundwater affected by the mining operation will be restored to a quality consistent with regulatory requirements. The techniques to be utilized for groundwater restoration at the North Butte site will be similar to those employed by Uranerz during the successful Ruth R & D groundwater restoration effort.	Yes
March 1992	NB NRC Ops Plan	Sec. 1.5 P. 1-6	At the appropriate stages in the life of the North Butte project, reclamation of the land surface and restoration of the affected aquifer(s) will take place. Reclamation and restoration activities will commence as soon as practicable once mining in a wellfield has terminated. The goal of reclamation will be to return all affected lands to their pre-mining use of livestock grazing and wildlife habitat, and the goal of restoration will	Yes

			be to return the water quality in affected aquifer(s) to acceptable regulatory standards.	
Nov. 2006	Reynolds EA	Sec. 2.3.2 P. 5	Once wellfield operations begin, uranium-rich solution would be routed from the wellfields to the planned satellite plant. In the satellite building, the solution would be pumped into a series of IX columns where the uranium (as uranyl carbonate complexes) would be adsorbed onto resin beads in the columns.	Yes
Nov. 2006	Reynolds EA	Sec. 2.3.2 P. 5	The resulting uranium-poor (i.e., "barren") lixiviant (which contains normally less than 2 parts per million of uranium) would then exit the IX columns, be recharged with additional oxidizing and complexing agents, and then be reinjected in the wellfields.	Yes. Lixiviant during upset conditions could be as much as 10-20 ppm.
Nov. 2006	Reynolds EA	Sec. 2.3.2 P. 5	Once the majority of the ion exchange sites on the IX column resin are filled with uranium, the column would be taken offline to begin the elution/precipitation circuit to recover the uranium.	Yes
Nov. 2006	Reynolds EA	Sec. 2.3.2 P. 5	At this point in the process, the uranium-loaded resin would be transferred from the satellite plant IX columns to a truck for transport to the Smith Ranch Central Processing Plant (CPP) for 6 further processing.	Yes. The uranium-loaded resin can also be transported to the Highland Central Processing Plant (HCPP) for further processing pending administrative change to the license conditions.
Nov. 2006	Reynolds EA	Sec. 2.3.2 P. 6	The stripped resin beads would then be returned by truck to the satellite plant where they would be loaded back onto the IX columns.	Yes
Nov. 2006	Reynolds EA	Sec. 2.3.3 P. 6	Prior to conducting uranium recovery operations in a mine unit, PRI is required by license condition 10.1.9 of SUA-1548 to collect baseline ground water quality data from the wells completed in the planned production zone, and from these data, to determine and set postmining restoration criteria.	Yes
Nov. 2006	Reynolds EA	Sec. 2.3.3 P. 6	Under license condition 10.1.9, the primary goal of the PRI restoration is to return the ground water quality, on a mining unit average, to pre-mining baseline conditions.	Yes
Nov. 2006	Reynolds EA	Sec. 2.3.3 P. 7	license condition 10.1.9, a secondary ground water restoration goal is to restore the ground water to a quality consistent with the use, or uses, for which the water was suitable prior to ISL mining activities.	Yes
Nov. 2006	Reynolds EA	Sec. 2.3.3 P. 7	To restore wellfield ground water to acceptable levels, PRI employs a series of techniques that include ground water transfer, ground water sweep, and permeate injection (Chapter 6 of PRI, 2005a).	Yes
Nov. 2006	Reynolds EA	Sec. 2.3.3 P. 7	Ground water transfer involves the movement of ground water between the wellfield entering restoration and another wellfield in which uranium recovery is commencing, or alternately, within the same wellfield, if one area is in a more advanced state of restoration than another. The purpose of this technique is to displace mining-affected waters in the restoration wellfield with baseline quality waters from the wellfield commencing mining.	Yes
Nov. 2006	Reynolds EA	Sec. 2.3.3 P. 7	Ground water sweep involves pumping ground water from a wellfield without injection. This draws baseline quality ground water from the perimeter of the mining unit toward the center of the mining unit.	Yes
Nov. 2006	Reynolds EA	Sec. 2.3.4 P. 8	Under license condition 9.11 of SUA-1548, PRI is required to submit for NRC review and approval a final detailed decommissioning plan at least 12 months prior to the planned commencement of	Yes

			decommissioning of a wellfield.	
Nov. 2006	Reynolds EA	Sec. 2.3.4 P. 8	Following the completion of restoration, PRI would plug and abandon all production, injection, and monitoring wells in the wellfield, in accordance with WDEQ rules and regulations. Such practices could include (1) removal of all pumps and tubing; (2) plugging of the well with an appropriately formulated abandonment gel or slurry; (3) cutting the well casing below the ground surface; (4) placing a cement plug to seal the well; and (5) backfilling, smoothing, and leveling the area to blend in with the surrounding terrain	Yes. Additionally, all outer ring monitors would also need marked with a steel tag below ground level.
Nov. 2006	Reynolds EA	Sec. 2.3.4 P. 8	buried wellfield lines and pipelines would be removed and the affected surface areas appropriately reclaimed. Affected areas would be leveled and re-seeded with a WDEQ approved seed mixture of native wheatgrasses, fescues, and clovers.	Yes
Nov. 2006	Reynolds EA	Sec. 2.3.4 P. 8	PRI has stated (PRI, 2005a) that its goal is to return all lands disturbed by the mining project to their pre-mining land use of livestock grazing and wildlife habitat unless an alternate use is approved by the State and the landowner (e.g., a rancher who wishes to retain access roads and/or buildings). In addition, PRI=s objective is to return the disturbed lands to a production capacity equal to or better than that existing prior to mining (PRI, 2005a).	Yes
Nov. 2006	Reynolds EA	Sec. 2.3.6 P. 9	Liquid wastes generated at the proposed Reynolds Ranch satellite facility would be disposed through a deep injection well. These wastes would include the production bleed stream, wash down water, and ground water restoration waste water (i.e., from ground water sweep and ground water treatment activities). The planned deep injection well would be similar in design and depth to current deep injection wells at Smith Ranch and located near the Reynolds Ranch area. This deep injection well would be permitted through the WDEQ and operated according to permit requirements.	Yes
Nov. 2006	Reynolds EA	Sec. 2.3.6 P. 9	Disposal of liquid wastes via deep well injection would comply with license condition 10.1.8 of SUA-1548. This condition requires PRI to dispose of all liquid effluents stemming from mining units, process buildings, and process waste streams (with the exception of sanitary wastes) in an approved manner, including deep well injection.	Yes
Nov. 2006	Reynolds EA	Sec. 2.3.6 P. 9	Sanitary wastes from the restrooms and lunchroom at the satellite plant would be disposed of in an approved septic system. PRI's septic system is subject to continued approval by the State of Wyoming	Yes
Nov. 2006	Reynolds EA	Sec. 2.3.6 P. 9-10	Solid wastes generated at the site would include both contaminated and non-contaminated wastes. Contaminated wastes would include rags, trash, packing material, worn or replaced parts from equipment, piping, and sediments removed from process pumps and vessels. Radioactive solid wastes with contamination levels requiring disposal at a licensed facility would be isolated in drums or other suitable containers prior to offsite disposal. Under license condition 10.1.7 of SUA-1548, PRI is required to maintain an area within the restricted area boundary for the storage of contaminated materials prior to their disposal. PRI would dispose of non-contaminated wastes in the SR-HUP site disposal landfill in accordance with the permit issued by the WDEQ.	Yes, but there is no current landfill at the site.
Nov. 2006	Reynolds EA	Sec. 5.2 P. 21	Under license condition 12.1, PRI also is required to maintain documentation of all spills of source or 11e (2) by-product materials (including mining solutions) and of process chemicals until license termination. This documentation would include: the date and volume of the spill; the total activity of each radionuclide released; results of radiological surveys and soil samples; the corrective actions performed; and a map showing the spill location and the affected areas.	Yes

Nov. 2006	Reynolds EA	Sec. 5.4.2 P. 25	Migration of lixiviant-fortified ground water beyond the expected confines (horizontal or vertical) of a wellfield could occur. These "excursions" could occur due to a variety of circumstances, including: (1) an improper balance between injection and recovery rates; (2) undetected high permeability strata or geologic faults; (3) improperly abandoned exploration drill holes; (4) discontinuity and unsuitability of the confining units that allow movement of the lixiviant out of the ore zone; (5) poor well integrity; or (6) hydrofracturing of the ore zone or surrounding units. Appropriate characterization of the geologic and hydrogeologic setting and adequate construction, testing, and abandonment of wells would address the majority of these circumstances. These aspects of PRI's operations are discussed in section 2 of this EA.	Yes
Nov. 2006	Reynolds EA	Sec. 5.4.2. P. 25	PRI would control the potential for horizontal excursions (i.e., within the production zone aquifer) primarily through wellfield bleed (i.e., minor wellfield overproduction relative to injection) (PRI, 2005a).	Yes
Nov. 2006	Reynolds EA	Sec. 5.4.2 P. 25	Pre-mining aquifer testing by PRI would ensure that confining layers are present to restrict the vertical movement of ISL leaching solutions and to restrict the influence of pumping in the deeper mining zones on water levels in the stratigraphically higher non-mining aquifers.	Yes
Nov. 2006	Reynolds EA	Sec. 5.5 P. 26	Impacts to soils and vegetation from PRI's operations at the Reynolds Ranch area would result primarily from well drilling activities and from the construction of wellfield houses, pipelines, access roads, and the planned satellite facility. These impacts would be confined for the most part to the satellite facility site and the wellfields, and would involve the clearing of top soils, trench digging and refilling, ground clearing and surface preparation for the roads and the satellite facility and associated structures. Areas affected by well drilling activities, pipeline laying, and access road construction would be re-seeded as soon as possible following the activities.	Yes
Nov. 2006	Reynolds EA	Sec. 5.5 P. 26	Soils and vegetation also would be affected by spills of injection and production fluids during operations. As discussed in section 5.2 of this EA, since 2001, 24 spills have occurred within the SR-HUP permit area. Impacts from spills in the Reynolds Ranch area would be limited in area as PRI would take immediate actions to stop the leak and to contain and recover as much as possible of the spilled fluid.	Yes
Nov. 2006	Reynolds EA	Sec. 5.8.1 P. 27	The primary source of radiological impact to the environment from site operations is gaseous radon-222, which is released from the satellite facility and from the wellfields.	Yes
Nov. 2006	Reynolds EA	Sec. 5.8.2 P. 27	PRI is required to meet the annual occupational dose limits in 10 CFR Part 20 (10 CFR 20.1201). PRI has established written Standard Operating Procedures (SOPs) for all operational activities involving radioactive materials that are handled, processed, stored, or transported by its employees. PRI also has established procedures for in-plant and environmental monitoring, bioassay analysis, and instrument calibration for activities involving radiation safety (PRI, 2005a). All permanent employees receive new-hire training in topics such as the basic principles of radiation safety, radiation safety procedures, responses to emergencies or accident involving radioactive materials. In addition, these employees also attend quarterly safety meetings and receive annual refresher training that includes a review of any new radiation safety regulations, site safety experience, and radiation exposure trends (PRI, 2005a).	Yes
Nov. 2006	Reynolds EA	Sec. 5.8.2	PRI would conduct quarterly gamma surveys at specified locations (e.g., the IX columns) throughout the planned satellite facility to assure that	Yes

		P. 27-28	areas requiring posting as "Radiation Areas" are identified, posed and monitored to assess external radiation conditions. PRI also would conduct routine visual and instrument surveys of the planned satellite facility to determine any obvious signs of contamination and the total alpha contamination (PRI, 2005a).	
Nov. 2006	Reynolds EA	Sec. 5.8.3 P. 28	PRI modeled the effects of radon gas release from the wellfields and satellite facility proposed for the Reynolds Ranch area (PRI, 2005a). PRI used MILDOS-Area, a dispersion model approved by the NRC, to estimate the potential radiological impacts from air emissions of radon-222. The results of the modeling can be compared with the effluent concentration limits and the dose limits for the general public in 10 CFR Part 20.	Yes
Nov. 2006	Reynolds EA	Sec. 5.9 P. 29	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. PRI is required under license condition 9.6 of SUA-1548 to dispose of 11e.(2) byproduct materials generated by project operations at a licensed byproduct waste disposal site. Currently, PRI disposes of its radioactively-contaminated wastes at Pathfinder Mine Corp.'s Shirley Basin uranium mill site in eastern Wyoming.	Yes
Nov. 2006	Reynolds EA	Sec. 5.9 P. 29	To ensure that it retains control of all contaminated wastes while such wastes are onsite, PRI is required by license condition 10.1.7 of SUA-1548 to maintain an area within the restricted area boundary for the storage of contaminated materials prior to their disposal. PRI has specially designated and placarded containers at the SR-HUP central processing plant and at each of the satellite facilities for the storage of such materials. These containers are set off from containers for non-contaminated materials, and a re-attachable tarp is used as a cover to prevent the inadvertent dispersal of the stored wastes.	Yes
Nov. 2006	Reynolds EA	Sec. 5.9 P. 29	PRI also is required by license condition 10.1.7 to dispose of all contaminated wastes at a licensed radioactive waste disposal site. PRI will survey all equipment, buildings, and other items for radioactive contamination, prior to their release from the site for unrestricted use (PRI, 2005a). Finally, transportation of all material to the byproduct disposal facility would be handled in accordance with U.S. Department of Transportation and NRC regulations (49 CFR 173.389 and 10 CFR Part 71, respectively).	Yes
Nov. 2006	Reynolds EA	Sec. 6.0 P. 29	PRI would monitor all effluent streams and the various environmental pathways that could be affected (e.g., air, surface water, and ground water) by ISL mining operations at the Reynolds Ranch area. PRI is required to submit the results of this monitoring, along with injection rates, recovery rates, and injection manifold pressures, to the NRC on a semiannual basis, in accordance with 10 CFR 40.65.	Yes
Nov. 2006	Reynolds EA	Sec. 6.1 P. 30	PRI would monitor injection well and production well flow rates and pressures so that injection and production can be balanced for each pattern and the entire wellfield (PRI, 2005a). The flow rate of each production and injection well would be determined by monitoring individual flow meters in each wellfield header house. PRI would determine production well flow rates on a daily basis and injection well flow rates at least every three days. Additionally, through operating experience and the fact that injection pressures remain relatively constant, PRI has found that monitoring injection well flow rates at least every three days has been more than adequate to ensure that wellfield	Yes

			patterns are adequately balanced (PRI, 2005a).	
Nov. 2006	Reynolds EA	Sec. 6.1 P. 30	On a daily basis, PRI would determine the pressure of each production well and the production trunk line in each wellfield header house. The pressure of the injection trunk line would also be determined daily in each wellfield header house. The surface injection pressures would not exceed the maximum surface pressures posted in each header house (PRI, 2005a). PRI would maintain on-site the data records for these monitoring activities.	Yes
Nov. 2006	Reynolds EA	Sec. 6.2 P. 30	PRI would monitor pressure and flow indicators on the main pipelines to and from the planned satellite facility to ensure that the pressures and flows are maintained within the safe working limits of the pipeline (PRI, 2005a).	Yes
Nov. 2006	Reynolds EA	Sec. 6.3 P. 30	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 data is built upon during wellfield development when mine unit-specific data is collected to establish upper control limits for operational monitoring and post-mining criteria for restoration. During and following mining and restoration, additional ground-water monitoring is performed to verify the effect, if any, on the aquifer. Pre-mining sampling and restoration stability monitoring are addressed in section 2.3.3 of this EA.	Yes
Nov. 2006	Reynolds EA	Sec. 6.3.1 P. 30	PRI would install monitor wells within the production zone aquifer outside and around the pattern area (i.e., as a monitor well ring) and also within overlying and underlying aquifers to ensure that the lixiviant and production fluids do not leave the defined production zone. Monitor wells in the production zone aquifer would encircle the various mining units with wells completed in the mineralized formations at a distance of 250 to 600 feet (76 to 183 m) from the production patterns and between 300 to 800 feet (91 to 244 m) from each other. Monitor wells for the overlying and underlying aquifers would be installed at a density of one for each four acres of wellfield area (PRI, 2005a). The distance between these monitor wells would not exceed 1000 feet (305 m), and all such wells would be installed within the confines of the wellfield area.	Yes
Nov. 2006	Reynolds EA	Sec. 6.3.1 P. 31	Under license condition 11.5 of SUA-1548, PRI is required to sample all monitor wells twice per month. In its application (PRI, 2005a), PRI states that the samples would be taken no less than 10 days apart. The samples are analyzed for the excursion indicators (chloride, conductivity, and alkalinity) and the results compared to the upper control limits (UCLs) for the sampled well. If two excursion indicators (i.e., two UCLs) for the monitor well are exceeded, PRI is required to take a confirmatory sample within 24 hours. If the confirmatory sample indicates that UCLs have been exceeded, then the well in question is placed on excursion status, and the sampling frequency is increased to weekly in the affected well. PRI would sample at this increased frequency until it controls the excursion (i.e., returns the concentrations of the excursion parameters to below the respective UCLs).	Yes
Nov. 2006	Reynolds EA	Sec. 6.3.1 P. 31	PRI's Radiation Safety Officer must maintain quality assurance (QA) programs. All QA programs would 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 would be maintained throughout the project life.	Yes
Nov. 2006	Reynolds EA	Sec. 6.4 P. 31	PRI would conduct a radiological monitoring program in accordance with the requirements of its application and NRC source materials	Yes

			license. An outline of PRI's environmental monitoring program is discussed in Section 5 of its amendment application (PRI, 2005a). PRI's program includes monitoring surface water, soils and sediments, direct radiation, radon, and ground water at multiple sites. PRI is required under license conditions 11.6 and 12.2 of SUA-1548 to monitor the various environs and to provide in an annual report to the NRC a copy of one of the semiannual effluent and environmental monitoring reports required under 10 CFR 40.65.	
Nov. 2006	Reynolds EA	Sec. 6.4 P. 31	As discussed in sections 4.6 and 5.6 of this EA, PRI also conducts annual raptor surveys with the primary intent of protecting against unforeseen conditions, such as the construction of a new nest in an area where operations may take place.	Yes
Nov. 2006	Reynolds EA	Sec. 7.2 P. 32	Federal land occurs within the proposed mining area and, consequently, involves U.S. Bureau of Land Management (USBLM) jurisdiction as it pertains to federal surface and minerals and to split estate lands when there is no surface agreement with the land owner in the permit area. USBLM 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.	Yes
Nov. 2006	Reynolds EA	Sec. 7.3 P. 32	By letter dated August 11, 2005, the NRC staff requested information from the Wyoming State Historic Preservation Office (WSHPO) regarding cultural and historic properties that may be affected the proposed addition of the Reynolds Ranch area to the SR-HUP operational area (USNRC, 2005c). By return letter dated August 24, 2005, the WSHPO provided its concurrence that no historic properties would be adversely affected by the proposed action (WSHPO, 2005).	Yes, SHIPO has reviewed cultural resources at NB and the applicable recommendations will be followed
Nov. 2006	Reynolds EA	Sec. 7.4 P. 32-33	The WDEQ administers and implements the State rules and regulations concerning protection of the environment while supporting responsible stewardship of the State's resources. WDEQ has granted PRI a mining permit, a National Pollutant Discharge Elimination System (NPDES) permit, and a Surface Water Protection Plan for PRI's commercial operations at the SR-HUP. Prior to ISL operations in the Reynolds Ranch area, PRI would need to have these permits and plan amended to include the Reynolds Ranch area. PRI also has permits from the WDEQ for its SR-HUP deep disposal wells and will need a permit for the deep disposal well planned for the Reynolds Ranch area.	Yes
Jan. 2007	NRC SER Rey.Ranch	2.2 Page 2	The staff has completed its review of the summary of proposed activities at the Reynolds Ranch ISL Satellite (PRI 2004, Section 1). Information contained in PRI's application has acceptably described the proposed activities at the Reynolds Ranch ISL Satellite including: (I) corporate entities involved; (ii) location of the facility; (iii) land ownership; (iv) ore-body locations; (v) proposed solution mining method and recovery process; (vi) operating plans, and design throughput; (vii) schedules for construction, startup, and duration of operations; and (viii) waste management and disposal plans. PRI has discussed pilot projects at the nearby Highland Uranium Project, which showed the ability of the regional uranium ore body to host ISL processing and restoration of affected ground water. PRI also discussed the active ISL operation at SR-HUP which demonstrates the ability to process uranium using in situ processes, to contain process fluids, and to complete ground water restoration. Based on the information provided in the application, the staff has concluded that the summary of the	Action acceptable to NRC

			proposed activities is acceptable and is in compliance with 10 CFR 40.32, which describes the general requirements for an application for the issuance of a specific license.	
Jan. 2007	NRC SER for Rey. Ranch	3.1.1 Page 3	Prior to full scale operations, PRI will develop a Mine Unit Hydrologic Test Document for each individual mine unit. In this document, PRI will further evaluate the hydraulic properties of the ore deposit and the over-lying and underlying aquifers. In addition, the relationship between wellfield operating pressures (projected downhole injection pressure), the hydrostatic pressure of the fluid column, sustainable well casing pressures, and formation rupture pressures will be included in the document if it is determined that significant differences exist from previous evaluations.	Yes, true at NB also
Jan. 2007	NRC SER for Rey. Ranch	3.1.1 Page 3	To reduce the potential for uranium solution excursions, PRI will recover more fluid than it injects. This over production or "bleed" will create an inward directed hydraulic gradient	Yes, true at NB also
Jan. 2007	NRC SER for Rey. Ranch	3.1.1 Page 3	PRI will use a minimal bleed rate of 0.5 percent of the total wellfield production rate, with a maximum bleed rate typically approaching 1.5 percent	Yes, true at NB also
Jan. 2007	NRC SER for Rey. Ranch	3.1.1 Page 3-4	After injection or production wells are installed, but prior to operation, PRI is required to perform mechanical integrity tests (MITs) of the well casings per Source Material License SUA-1548, License Condition 10.1.3. In these tests, wells must maintain 90 percent of 125 percent of the maximum operating wellhead casing pressure for 10 minutes. MITs will be repeated once every 5 years for all wells used for injection of liviviant or injection of fluids for restoration operations	Yes, true at NB also
Jan. 2007	NRC SER for Rey. Ranch	3.1.1 Page 4	PRI proposes to install monitor wells within the Production Zone, and outside the Production Zone and injection/production pattern area. Based on past experience, PRI expects monitor well spacing to be 500 feet between monitor wells and 500 feet between the monitor wells and the Production Zone. Monitor wells will also be installed within overlying and underlying aquifers at a density of one of each type of well per every 3 acres; however, if necessary, denser monitoring networks may be installed based on the geologic stratigraphy of the mine unit (PRI 2004 and 2006a, Section 5.1.2). Typical well casing material will be fiberglass or PVC.	Yes, true at NB also, but no underlying wells
Jan. 2007	NRC SER for Rey. Ranch	3.1.2 Page 4	The Reynolds Ranch Satellite building will contain IX columns, process tanks (e.g., lixiviant and waste water storage), water treatment equipment, resin transfer facilities, numerous pumps (injection of lixiviant, transfer of waste water, etc.), radon and gamma monitoring instruments, a small laboratory, and an employee break room. The layout of the Reynolds Ranch Satellite facility is shown in Figure 3.11 (NRC 2004). Separate ventilation systems (air duct or piping connected to the top of each process tank to exhaust fumes to the outside atmosphere) consisting of 4 to 6-inch PVC piping and exhaust fans, where needed, will be installed for IX columns, process tanks, and resin transfer and RO area sumps. The facility is designed for a maximum flow rate of 4,500 gallons per minute (gpm) and vessel pressures of 150 pounds per square inch (psi) during production operations	Yes, true at NB also, but NB will operate at 4,000 gpm until the license renewal is approved then 6,000 gpm
Jan. 2007	NRC SER for Rey. Ranch	3.1.3 Page 4	Instrumentation and control at the Reynolds Ranch ISL Satellite starts in the wellfield. Individual flow meters will be installed for each injection and production well. Pressure gauges will be installed in injection and production trunk lines. Automatic shutdown systems will be utilized throughout the Reynolds Ranch Satellite operation. High and low pressure alarms will be used to automatically shut down pipelines,	Yes, true at NB also

			headerhouses, wellfields, disposal wells, and/or IX facilities, depending on the location and scale of the alarm.	
Jan. 2007	NRC SER for Rey. Ranch	3.2 Page 5	Based on the information provided in the application, the staff concludes that the proposed solution mining process and equipment; satellite processing, wellfield and chemical storage facilities; and instrumentation and controls are acceptable and are in compliance with: 1) 10 CFR 40.32© which requires PRI's proposed equipment, facilities, and procedures to be adequate to protect health and minimize danger to life or property; 2) 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; 3) 10 CFR 40.41©, which requires PRI to confine source or byproduct material to the location and purposes authorized in the license; and 4) 10 CFR 40, Appendix A, Criterion 5B for secondary ground water protection, Criterion 5C for maximum constituent concentration values for ground water protection, and Criterion 13 for identification of hazardous constituents.	NRC determines the actions are acceptable.
Jan. 2007	NRC SER for Rey. Ranch	4.1 Page 5	The primary gaseous effluent released from ISL Satellite facilities is radon-222. To address this effluent, the Reynolds Ranch ISL Satellite building design includes ventilation systems for all indoor non-sealed process tanks, and resin transfer and RO area sumps to control the release of radon-222 [PRI 2004 (Section 4.1) and 2006a]. Where needed, exhaust fans can pull air from the top of the tanks or from a sump and discharge the air to the outside through the ventilation system. Radon daughters will be monitored on a monthly basis at the Reynolds Ranch ISL Satellite building using a Gilair Air Pump. PRI has indicated that from 1988 to 1993, weekly and monthly monitoring at SR-HUP has shown radon daughters are less than 10 percent of the regulatory limit of 0.33 working level (WL) found in 10 CFR 20, Appendix B.	Yes, true at NB also
Jan. 2007	NRC SER for Rey. Ranch	4.2	Liquid effluents from the operation of the Reynolds Ranch ISL Satellite include production bleed stream, plant wash-down water, ground water restoration equipment effluent, restoration bleed, and facility sanitary waste [PRI 2004 (Section 4.2) and 2006a].	Yes, true at NB also
Jan. 2007	NRC SER for Rey. Ranch	4.3 Page 7	Based on the information provided in the application, the staff concludes that the effluent control systems for the proposed Reynolds Ranch ISL Satellite are acceptable and are in compliance with: 1) 10 CFR 20.1101, which requires that an acceptable radiation protection program that achieves ALARA goals is in place; 2) 10 CFR 20.1201, which defines the allowable occupational dose limits for adults; 3) 10 CFR 20.1301, which defines dose limits allowable for individual members of the public; 4) 0 CFR 20.1302, which requires compliance with dose limits for individual members of the public; 5) 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; 6) 10 CFR 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; and 7) 10 CFR 40, Appendix A, Criterion 5(G)(1), which requires that the chemical and radioactive characteristics of the wastes be defined.	Yes, true at NB also
Jan. 2007	NRC SER for Rey. Ranch	5.1.2 Page 9	PRI's Environmental Health and Safety (EHS) Management System is the basis for its approach to EHS management. PRI's EHS Management System is compatible with the International Organization for Standardization – ISO 14001 Environmental Management System,	Yes, true at NB also

			which is an international standard that specifies a process for controlling and improving a company's environmental performance. PRI's EHS Management System uses a series of standards that aligned with specific management processes and sets out the minimum expectations for EHS performance [PRI 2004 (Section 9.5)]. PRI's EHS Management System standards cover all EHS-related management processes, including assessment, planning, implementation (e.g., training, corrective actions, safe work programs, and emergency response), checking (e.g., auditing, incident investigation, compliance management, and reporting), and management review	
Jan. 2007	NRC SER for Rey. Ranch	5.1.2 Page 9	As part of its ongoing operations, PRI has established written Standard Operating Procedures (SOPs) for all operational activities currently licensed under Source Material License SUA-1548. These include activities related to radioactive materials that are handled, processed, stored, or transported by employees; and health and safety-related activities including in-plant and environmental monitoring, bioassay analysis, and instrument calibration for activities involving radiation safety. All procedures involving radiation safety are reviewed and approved in writing by the RSO or another individual with similar qualifications, prior to being implemented. When employees are required to conduct activities of a non-routine nature where there is the potential for significant exposure to radioactive materials, and no SOPs exist for the activity, a Radiation Work Permit (RWP) is required. The RWP describes the scope of the work, precautions necessary to maintain radiation exposures ALARA, and any supplemental radiological monitoring and sampling to be conducted during the work. The RWP is reviewed and approved in writing by the RSO, RST, or Manager-Health, Safety, and Environmental Affairs prior to initiation of work	Yes, true at NB also
Jan. 2007	NRC SER for Rey. Ranch	5.1.2 Page 9	Record keeping is a component of PRI's current EHS Management System and that program will extend to the Reynolds Ranch ISL Satellite. Records of surveys, calibrations, personnel monitoring, bioassays, transfers or disposal of source or byproduct material, and transportation accidents are maintained on site until license termination. Records containing information pertinent to decommissioning and reclamation (i.e., descriptions of spills, contamination events, drawings of buried pipes or pipelines, baseline soil and ground water quality values, etc.) are maintained on site until license termination. Duplicates of all significant records are maintained in the corporate office or other offsite locations	Yes, true at NB also
Jan. 2007	NRC SER for Rey. Ranch	5.1.4 Page 11	Based on the information provided by PRI in its application and in supplemental information, the staff concludes that the proposed corporate organization and administrative procedures, management control program, and management audit and inspection program for the proposed Reynolds Ranch ISL Satellite are acceptable. The programs and procedures are in compliance with 10 CFR 20.1101, which defines radiation protection program requirements; 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 20, Subpart L and Subpart M, which define requirements for record keeping and reporting; and 10 CFR 40.61(d) and (e), which also define requirements for record keeping. In addition, the requirements of 10 CFR 40.32(b), ©, and (d) are also met as they relate to the proposed corporate organization and SERP functions and the acceptability of management audits to ensure protection of health and to minimize danger to life and property.	NRC approves the SHEQ management system
Jan. 2007	NRC SER	5.2.4	Based on the information provided by PRI in its application and in	Yes, true at NB also

	for Rey. Ranch	Page 12	supplemental information, the staff concludes that the qualifications of the personnel implementing the radiation safety program and the radiation safety training program for the proposed Reynolds Ranch ISL Satellite are acceptable. These programs are in compliance with 10 CFR 20.1101, which defines radiation protection program requirements, and 10 CFR 40.32(b), which specifies requirements for applicant qualifications. The qualifications of personnel conducting the radiation safety program are acceptable and are in accordance with the guidance provided in NRC Regulatory Guide 8.31	
Jan. 2007	NRC SER for Rey. Ranch	5.3.2 Page 13	Based on the information provided by PRI in its application and in supplemental information, the staff concludes that the security program for the proposed Reynolds Ranch ISL Satellite is acceptable and is in compliance with 10 CFR 20, Subpart I, which provides requirements for the security of stored material and control of material not in storage	Yes, true at NB also
Jan. 2007	NRC SER for Rey. Ranch	5.4.1 Page 13	To address exposure to radon-222 gas, PRI has designed the Reynolds Ranch ISL Satellite building with a ventilation system that is connected to all process vessels where significant radon-222 or process fumes could reasonably be expected to be released	Yes, true at NB also
Jan. 2007	NRC SER for Rey. Ranch	5.4.2 Page 14	Uranium bearing fluids in PRI's ISL facilities are fully contained in pipes, tanks, and IX vessels. Consequently, PRI has found, based on previous experience at SR-HUP, that the potential for exposure to uranium in the air is remote. To ensure that potential exposures to gamma radiation remain less than 10 percent of the annual limit (i.e., or less than 500 mrem), Reynolds Ranch ISL Satellite operators will utilize NRC approved dosimeters.	Yes, true at NB also
Jan. 2007	NRC SER for Rey. Ranch	5.4.2 Page 14	PRI currently has an ALARA program at the operating SR-HUP facility. The Reynolds Ranch ISL Satellite will be added to the existing program	Yes, true at NB also
Jan. 2007	NRC SER for Rey. Ranch	5.4.3 Page 14	Due to the fact that the uranium-bearing fluids at the Reynolds Ranch ISL Satellite are fully contained within pipes, tanks, and IX vessels, the likelihood of any significant quantities of uranium in the air is very remote. PRI has indicated that many years of monitoring data collected at existing SR-HUP Satellites have shown virtually no occurrence of airborne uranium at these facilities and has concluded that uranium particulates need not be routinely monitored at Satellite facilities [PRI 2004 (Section 9.10)].	Yes, true at NB also
Jan. 2007	NRC SER for Rey. Ranch	5.4.3 Page 14-15	PRI has indicated that many years of monitoring data collected at existing SR-HUP Satellites have shown virtually no occurrence of airborne uranium at these facilities and has concluded that uranium particulates need not be routinely monitored at Satellite facilities [PRI 2004 (Section 9.10)]. With respect to radon daughters, PRI found that during the period 1988 through 1993, weekly and monthly monitoring results at numerous sites throughout SR-HUP showed that radon daughter concentrations were routinely less than 10 percent of the regulatory limit of 0.33 WL found in 10 CFR 20, Appendix B. Based on this data, PRI concluded that monitoring for routine exposure of workers to radon daughters only needed to be determined for Smith Ranch Central Plant Workers (Central Plant and Dryer Operators). Nevertheless, radon daughters will be monitored on a monthly basis at the Reynolds Ranch ISL Satellite.	Yes, true at NB also
Jan. 2007	NRC SER for Rey. Ranch	5.4.4 Page 15	Airborne uranium and radon daughter exposure calculations, as well as the calculation of total effective dose equivalent, are detailed in PRI's Reynolds Ranch ISL Satellite application and supplemental material [PRI 2004 (Section 9.11) and 2006a].	Yes, true at NB also
Jan. 2007	NRC SER	5.4.5	Workers potentially exposed to concentrations of uranium above	Yes, true at NB also

	for Rey. Ranch	Page 15	regulatory limits are also required to submit urine specimens for uranium analysis 2 to 4 days following the potential exposures. PRI conducts this testing, even if respiratory protection has been utilized, to ensure that the respiratory protection equipment has been worn properly and to ensure that respirators are functioning as designed. PRI also randomly obtains monthly urine specimens from other workers at the facility to confirm that workers are not subject to an unknown uptake of uranium. The contract laboratory provides immediate notification (via telephone or fax) of all urinalyses exceeding 15 micrograms per liter (ug/l) of uranium.	
Jan. 2007	NRC SER for Rey. Ranch	5.4.6 Page 16	Alpha contamination surveys will be performed monthly in Reynolds Ranch ISL Satellite process areas and weekly in designated clean areas [PRI 2004 (Section 9.13)]. Routine surveys in the process area will consist of both a visual inspection for obvious signs of contamination and instrument surveys to determine total alpha contamination. If the total alpha survey indicates contamination greater than 200,000 dpm/100 cm2, the area will be cleaned and resurveyed	Yes, true at NB also
Jan. 2007	NRC SER for Rey. Ranch	5.4.6 Page 16	In designated Clean Areas, such as Lunch Rooms and offices, the target level of contamination is "nothing detectable". If the total uranium alpha survey in these areas indicates contamination in excess of 250 dpm/100 cm2, a smear test will be performed to assess the level of removable alpha activity	Yes, true at NB also
Jan. 2007	NRC SER for Rey. Ranch	5.4.6 Page 16	Prior to release from the Reynolds Ranch ISL Satellite, PRI will perform radiation surveys on equipment and materials that have been used or stored in an area where contamination by uranium or uranium daughters could potentially occur	Yes, true at NB also
Jan. 2007	NRC SER for Rey. Ranch	5.4.7 Page 16-17	PRI currently conducts a continuous air monitoring program at the SR-HUP facility [PRI 2004 (Section 5.3)]. Passive radon-222 and gamma radiation will be monitored at the Reynolds Ranch ISL Satellite through a background station (Air Station No. 1) and Air Station No. 6. Results of the analyses are reported to the NRC in the Semi-Annual Report	Yes, true at NB also, at designated sites found in the Uranerz/pathfinder license
Jan. 2007	NRC SER for Rey. Ranch	5.4.8 Page 17	A typical Mine Unit Hydrologic Test Document will contain the following information: • A description of the proposed mine unit (location, extent, etc.). • A map(s) showing the proposed production patterns and locations of all monitor wells. • Geologic cross-sections and cross-section location maps. • Isopach maps of the Production Zone sand, overlying confining unit, and underlying confining unit. • Discussion of how the hydrologic test was performed, including well completion reports. • Discussion of the results and conclusions of the hydrologic test, including pump test raw data, drawdown match curves, potentiometric surface maps, water level graphs, drawdown maps, and, when appropriate, directional transmissivity data and graphs. • Sufficient information to show that wells in the monitor well ring are in adequate communication with the production patterns. • Any other information pertinent to the area tested. In addition, the following topics may be addressed in a Mine Unit Hydrologic Test Document if it is determined that significant differences exist from previous evaluations: • The relationship between wellfield operating pressures (projected downhole injection pressure), the hydrostatic pressure of the fluid column, sustainable well casing pressures, and formation rupture pressures. An impact analysis that includes the ability to control the migration of lixiviant from the production zones to surrounding	Yes, true at NB also

			environs and identifies ground water and surface water pathways that might transport extraction solutions offsite in the event of an uncontrolled excursion, surface piping leak, or incomplete restoration. • The impact of ISL operations on ground water flow patterns and aquifer levels. • The expected post-extraction impact on geochemical properties and water quality.	
Jan. 2007	NRC SER for Rey. Ranch	5.4.8 Page 18	PRI's baseline program also includes the collection, chemical analysis, and statistical analysis of baseline water quality data from three zones: Production Zone, Monitor Well Ring, and Overlying and Underlying Zones [PRI 2004 (Section 5.1.5)]. Upper Control Limits (UCLs) will be determined from the baseline water quality data	Yes, true at NB also
Jan. 2007	NRC SER for Rey. Ranch	5.4.10 Page 19	The staff has completed its review of radiation safety controls and monitoring, including effluent control measures, the external radiation exposure monitoring program, the airborne radiation monitoring program, exposure calculations, the bioassay program, the contamination control program, airborne effluent and environmental monitoring programs, the ground water and surface water monitoring programs, and the quality assurance program at the proposed Reynolds Ranch ISL Satellite. This review included an evaluation using the review procedures and acceptance criteria in Section 5.7 of the SRP. Concluding PRI has acceptable programs in place.	NRC determined acceptable programs are in place.
Jan. 2007	NRC SER for Rey. Ranch	6.6 Page 25	Based on the information provided in the application and the detailed review of the plans and schedules for ground water quality restoration for the proposed Reynolds Ranch ISL satellite facility, the staff concludes that the proposed measures are in compliance with 10 CFR 40.32©, 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; 10 CFR 40.41©, which requires the applicant to confine source or byproduct material to the locations and purposes authorized in the license; 10 CFR 40, Appendix A, Criterion 2, which requires the applicant to dispose of 11e.(2) byproduct materials either in a licensed waste disposal site or at a mill tailings facility to demonstrate non-proliferation of waste disposal sites; 10 CFR 40, Appendix A, Criterion 6(6), which provides standards for cleanup of radium and other radionuclides in soil; and 10 CFR 40, Criterion 9, which requires financial surety arrangements be established by each uranium recovery facility operator.	Yes, true at NB also
Jan. 2007	NRC SER for Rey. Ranch	7.1 Page 25-26	Numerous process vessels and tanks will be present within the Reynolds Ranch ISL Satellite and PRI has considered failure of these vessels in its satellite building design. Alarms and automatic controls are used to monitor and keep tank fluid levels within prescribed limits. If there is a failure of a process vessel or tank occurs at the Reynolds Ranch ISL Satellite building, the fluid or resin would be contained within the building, collected in sumps, and pumped to other tanks. The area would then be washed down with the wash water contained in a similar manner, minimizing any environmental impact from the failure. There is little risk of airborne release of uranium since it will remain fixed to the resin. Failure of a tank outside the Reynolds Ranch ISL Satellite (e.g. during transport) could result in the spill of leach solution to a retention or containment system. The liquids would then be pumped to another tank. Any contaminated soils or material requiring controlled disposal would be removed and disposed of in accordance with NRC and/or Wyoming State requirements.	Yes, true at NB also

Jan. 2007	NRC SER for Rey. Ranch	7.2 Page 26	The rupture of a pipeline between the Reynolds Ranch ISL Satellite and a wellfield could result in a loss of either pregnant or barren solutions to the surface. To minimize the volume of lost fluid, the pipeline systems at SR-HUP are equipped with high pressure and low pressure shutdown systems and flowmeters. The systems also are equipped with alarms so the operator will be alerted immediately if a major malfunction occurs. If the volume and/or concentration of the solutions released in such an accident did constitute an environmental concern, the area would be surveyed and the contaminated soils would be removed and disposed of according to NRC and/or State regulations.	Yes, true at NB also
Jan. 2007	NRC SER for Rey. Ranch	7.3 Page 26	Fire and explosion hazards at the Reynolds Ranch ISL Satellite will be minimal as the facility does not use flammable liquids in the recovery process. Natural gas used for building heat would be the primary source for a potential fire or explosion. In the wellfields, injection and recovery-well piping systems are manifolded for ease of operational control. Piping manifolds, submersible pump motor starters/controllers, and gaseous oxygen delivery systems are situated within electrically heated, all weather buildings ("Headerhouses"). An accumulation of gaseous oxygen would be the primary source for a potential fire or explosion. Both the gaseous oxygen and primary leaching solution lines entering each Headerhouse are equipped with automatic low pressure shut off valves to minimize the delivery of oxygen to a fire or of liquids to a spill. Additionally, each Headerhouse is equipped with a continuously operating exhaust fan that would assist in preventing the build-up of oxygen in the building.	Yes, true at NB also
Jan. 2007	NRC SER for Rey. Ranch	7.4 Page 26	Well casing failure in an injection well would have the potential for a significant environmental impact because the leaching fluid is injected under pressure. In the event of such a failure, the defective well would either be repaired or plugged and abandoned. If contamination of another aquifer was indicated in the monitoring network, additional wells would be installed in the contaminated aquifer and used to recover the released leaching solution. In addition, casing integrity tests will be performed on all injection wells prior to using the wells for injection and after any work that involves entering a fiberglass or PVC cased well with a cutting tool, such as a drill bit or under-reamer. Failure of a production well casing would normally not cause fluid migration to overlying aquifers because the production wells operate at pressures lower than the aquifer pressures.	Yes, true at NB also
Jan. 2007	NRC SER for Rey. Ranch	7.5 Page 27	The operation of the Reynolds Ranch ISL Satellite requires that the resin used for IX operations be transferred from the Satellite building to the Smith Ranch CPP. Resin is transported in specially designed 500 to 700 ft3 aluminum tanks. The tanker trucks typically haul 500 ft3 of loaded resin. An accident involving vehicles transporting resin could result in some of the resin being spilled. If an accident causes the release of resin and process water, all resin, liquids, and contaminated soils would be removed and processed through the elution circuit or disposed of in a licensed facility. All disturbed areas would then be reclaimed in accordance with all applicable State and NRC regulations. There is no risk of airborne release of uranium since it will remain fixed to the resin. There have been no spills from resin transport to date from operations at the SR-HUP.	Yes, true at NB also
Jan. 2007	NRC SER for Rey. Ranch	7.6 Page 27	Based on the information provided in the application and the detailed review conducted of the accidents considered for the proposed Reynolds Ranch ISL Satellite, the staff concludes that PRI has demonstrated compliance with 10 CFR 40.32©, which requires the applicant's equipment, facilities, and procedures to be adequate to protect health	NRC finds acceptable the information provided for accidents and

			and minimize danger to life or property; and 10 CFR Parts 20.2202 and 20.2203, which define response program requirements for radiological accidents.	failures.
Dec. 2007	NRC EA for SR-2	1.0 Page 1	By letter dated October 11, 2006, PRI submitted a request to construct ISL Satellite SR-2 (SR-2) at the SR-HUP site (PRI 2006a). In this proposed action, an ISL satellite facility is a structure (i.e., building and associated equipment) where the ion exchange portion of the ISL processing circuit is conducted. ISL Satellite SR-2 would service Mine Units 9, 10, 11, and 12, located near the southwest corner of Smith Ranch. The satellite description and design are detailed in PRI's Reynolds Ranch Amendment (PRI 2004). Supplemental information concerning ISL Satellite SR-2 was submitted on December 28, 2006, and March 15, April 16, and May 4, 2007 (PRI 2006b, 2007a, 2007b, and 2007c).	Introduction to the SR-2 NRC EA.
Dec. 2007	NRC EA for SR-2	2.2 Page 4	Construction of SR-2 would entail the clearing of about 1.5 acres of land due to satellite building and access road construction. The SR-2 facility would be the source of the barren lixiviant pumped into the uranium ore zone (i.e., barren) and the recipient of the pregnant lixiviant recovered from Mine Units 9, 10, 11, and 12. Upon recovery from the subsurface, the pregnant lixiviant would be pumped to a series of IX columns located within ISL Satellite SR-2, where uranium from the lixiviant would be extracted from the solution via adsorption onto the IX resin in the columns. Following IX extraction of the uranium, the resin would be removed from the tanks and transported to the Smith Ranch CPP for further processing (i.e., elution, precipitation, drying into a U3O8 powder, and packing into 55-gallon drums). As part of supporting the ISL operation at Mine Units 9, 10, 11, and 12, activities at ISL Satellite SR-2 would include lixiviant and waste water storage, ion exchange, resin transfer, reverse osmosis operations associated with ground water restoration, and deep well injection of production and restoration effluent wastes. Operation period for SR-2 and Mine Units 9, 10, 11, and 12, is estimated to be approximately nine years (PRI 2004a).	Yes, true at NB also
Dec. 2007	NRC EA for SR-2	2.2 page 4	PRI has stated that its goal is to return all lands disturbed by its ISL operations to their preoperational land use of livestock grazing and wildlife habitat unless an alternate use is approved by the State and the landowner (e.g., a rancher who wishes to retain access roads and/or buildings) (PRI 2004a). In addition, PRI=s objective is to return the disturbed lands to a production capacity equal to or better than that existing prior to ISL operations (PRI 2004a).	Yes, true at NB also
Dec. 2007	NRC EA for SR-2	2.2 Page 5	PRI's revegetation practices are conducted in accordance with WDEQ-LQD regulations and PRI's WDEQ mine permit. Following topsoiling for final reclamation, an area would normally be seeded with oats to establish a stubble crop, and then re-seeded with grasses during the next growing season (PRI 2004a). If the area in question is to be disturbed again prior to final decommissioning, PRI may apply a long-term temporary seed mix of one or more native wheatgrasses (*i.e.*, Western Wheatgrass, Thickspike Wheatgrass) at a seeding rate of 12-14 lbs. of pure live seed per acre. A permanent seeding mixture would typically contain native wheatgrasses, fescues, and clovers, with typical seeding rates of 12-14 lbs. of pure live seed per acre	Yes, true at NB also
Dec. 2007	NRC EA for SR-2	2.3 Page 5	As part of the reclamation following the end of ISL operations in SR-2, the satellite building would need to be decommissioned. In doing so, process equipment could either be dismantled and sold to another licensed facility or decontaminated in accordance with the applicable NRC guidance. Materials that could not be decontaminated to acceptable levels would be disposed in a licensed disposal facility.	Yes, true at NB also

			Decontaminated materials having no resale value, such as building foundations, may be buried on-site.	
Dec. 2007	NRC EA for SR-2	2.3 Page 5	After the equipment, buildings, foundations, piping, and associated support facilities are removed, gamma radiation surveys would be conducted over the areas. In the wellfields themselves, gamma surveys would also be conducted during the decommissioning of each mining unit. Material with contamination levels requiring disposal in a licensed facility would be removed, packaged as needed, and shipped to a licensed disposal facility.	Yes, true at NB also
Dec. 2007	NRC EA for SR-2	2.3 Page 5	After decommissioning and decontamination have been completed, surface areas disturbed by project operations would be re-contoured so that these areas would blend in with the natural terrain and be consistent with the post-mining land use.	Yes, true at NB also
Dec. 2007	NRC EA for SR-2	2.4 Page 5-6	Liquid wastes generated at SR-2 would be disposed through a deep injection well. These wastes would include the production bleed stream, wash down water, and ground water restoration waste water (*i.e.*, from ground water sweep and ground water treatment activities). The planned deep injection well would be similar in design and depth to current deep injection wells at Smith Ranch and located near the SR-2 building. This deep injection well would be permitted through the WDEQ and operated according to permit requirements.	Yes, true at NB also
Dec. 2007	NRC EA for SR-2	2.4 Page 6	Disposal of liquid wastes via deep well injection would comply with license condition 10.1.8 of SUA-1548. This condition requires PRI to dispose of all liquid effluents stemming from mining units, process buildings, and process waste streams (with the exception of sanitary wastes) in an approved manner, including deep well injection.	Yes, true at NB also
Dec. 2007	NRC EA for SR-2	2.4 Page 6	Sanitary wastes from the restrooms and lunchroom at the satellite plant would be disposed of in an approved septic system. PRI's septic system is subject to continued approval by the State of Wyoming.	Yes, true at NB also
Dec. 2007	NRC EA for SR-2	2.4 Page 6	Solid wastes generated at the site would include both contaminated and non-contaminated wastes. Contaminated wastes would include rags, trash, packing material, worn or replaced parts from equipment, piping, and sediments removed from process pumps and vessels. Radioactive solid wastes with contamination levels requiring disposal at a licensed facility would be isolated in drums or other suitable containers prior to offsite disposal. Under license condition 10.1.7 of SUA-1548, PRI is required to maintain an area within the restricted area boundary for the storage of contaminated materials prior to their disposal. PRI would dispose of non-contaminated wastes in the SR-HUP site disposal landfill in accordance with the permit issued by the WDEQ.	Yes, true at NB also
Dec. 2007	NRC EA for SR-2	4.10 Page 11	Background radiological characteristics for North Butte have been conducted by Uranerz in the 1960 and confirmed by R and D Enterprises, Inc., 2010 and again by Tetra Tech Inc. 2012. The original Uranerz survey included: soil samples, gamma survey, vegetation samples, sediment samples, dosimetry, Rn-222 concentrations and air particulates.	Supplied site specific information applicable to NB
Dec. 2007	NRC EA for SR-2	5.2 Page 11-12	The primary impact on land use would be the temporary loss (approximately nine years) of about 1.5 acres from livestock use. These effects would be limited, temporary, and reversible through returning the land to its former grazing use following completion of post-recovery surface reclamation. Another potential impact to the land surface would be lixiviant releases from the SR-2 facility. Since June 1997, PRI and the previous site operator, RAMC, have reported 79 unintended releases of ISL-related solutions to the ground surface. Of the 79 reported releases, only four have been related to wastewater disposal activities	Yes, true at NB also, but the number of spills has increased over time.

			related to Satellite buildings or the Smith Ranch CPP. These releases ranged from 400 to 198,500-gallons, with approximately 88 percent of the releases less than 10,000 gallons. Uranium concentrations ranged from 0.7 to 152 mg/L, with about 70 percent of the releases below 10 mg/L. Predominantly, the cause for these spills has been the failure of joints, flanges, and unions in wells or wellfield pipelines, although the large spill identified above appears to have been the result of human error. Of the 79 reported releases, only four were associated with wastewater disposal activities related to Satellite buildings or the Smith Ranch CPP. PRI has implemented a process where equipment failures that result in releases are evaluated and parts/designs are modified in new facilities to eliminate such failures (PRI 2007e and 2007f). PRI uses high density polyethylene, fiberglass, polyvinyl chloride, plastic, stainless steel, and coated carbon steel for all wetted surfaces; tanks, wells, piping and related items for all new construction. All facilities for SR-2 and Mine Units 9 through 11 would have fiber optic based monitoring and/or controls. These are real time devices and include camera/video and audio facilities. PRI's immediate responses for unintended liquid releases have included shutting down the affected pipeline, recovering as much of the spilled fluid as possible, and collecting samples of the affected soil from a nearby background site to be analyzed for uranium, radium-228, and selenium. As required by License Condition 12.1 of Source Materials License SUA-1548, PRI reports each of its spills to the NRC and the Wyoming Department of Environmental Quality (WDEQ) within 24 hours, followed within 30 days by a report to the NRC, describing the conditions leading to the spill, the corrective actions taken, and the results achieved. This reporting requirement allows the NRC to promptly evaluate and request further actions, if necessary, to mitigate environmental impacts and radioactive material contamination. Under License Condition 12.1, PRI is also required to maintain documentation of all spills of source or 11e.(2) byproduct materials (including uranium recovery related solutions) and of process chemicals until license termination. This documentation includes: the date and volume of the spill; the total activity of each radionuclide released; results of radiological surveys and soil samples; the corrective actions performed; and a map showing the spill location and the affected areas. This information will be used in conjunction with pre- and post-operational radiological surveys in evaluating final site decommissioning activities. Any soils with contamination levels requiring disposal in a licensed facility would be removed, packaged (if needed), and shipped to an approved facility for disposal.	
Dec. 2007	NRC EA for SR-2	5.3.1 Page 12-13	Construction activities related to SR-2 would include: preparation and construction of the proposed satellite building and support road. Air quality would be impacted by the release of diesel emissions from construction equipment and from fugitive dust from construction activities and vehicle traffic. Diesel emissions would be minor and of short duration, and would be readily dispersed in the atmosphere. Non-radiological particulates (i.e., fugitive dust) generated from construction activity, as well as vehicle traffic on unpaved roads would be localized and of short duration (SR-2 building construction is expected to be completed within 12 months of approval). Background soil quality data for Smith Ranch does not indicate elevated levels of radionuclides; consequently, radiological dose from inhalation of fugitive dust should be minimal. Consequently, because of the relatively low and temporary surface disturbance necessary to construct an ISL satellite facility,	Yes, true at NB also

			additional atmospheric pollution (i.e., above background) in the form of particulates is anticipated to be minimal. Following completion of ISL activities, localized areas affected by the operation would be reclaimed, cached topsoil reapplied, and reseeded. PRI has committed additionally to reseeding disturbed surface areas to minimize erosion from wind and water. Vegetation normally would be reestablished within two years of disturbance (PRI 2004a). The SR-2 building site and access roads would be re-contoured, covered with topsoil, and reseeded to minimize long-term impacts to air quality. Noise impacts would primarily be related to construction activities and operational truck traffic related to resin transfer from the SR-2 building to the SR-HUP CPP. These impacts would be minimal and restricted to the initial phase of the project (construction) and during daily resin transfer (truck traffic).	
Dec. 2007	NRC EA for SR-2	5.3.2 Page 13	Dissolved radon gas, generated by its dissolution from processing solutions, may escape to the atmosphere and potentially adversely impact air quality in the wellfields and immediate vicinity of processing buildings. Radon can be vented to the atmosphere from the wellfields at each wellhead or from the process equipment in the proposed satellite facility. PRI would use pressurized downflow IX columns, and therefore radon releases would occur only when individual IX columns are disconnected from the circuit and opened to remove the resin for elution. The radiological impacts of operations are discussed in section 5.8 of this EA. Uranium recovered at SR-2 would be processed at the Smith Ranch CPP. The main nonradiologic gaseous effluents that would be released from the operation of processing equipment in the CPP include gases such as CO2 and hydrogen chloride. At the CPP, these gases are vented directly to the atmosphere where they are readily dispersed	Yes, true at NB also
Dec. 2007	NRC EA for SR-2	5.4.1 Page 13-14	As discussed in Section 4.6.1 of this EA, within SR-2, surface precipitation and snowmelt collect in small basins at topographic low points. Surface runoff is limited, and surface flow is ephemeral as a result. When designing and constructing new roads, PRI will consider weather, elevation contours, land rights, cultural resources, and drainages. When constructing new roads, PRI will make efforts to cross ephemeral drainages or channels at right angles to enhance erosion protection measures. However, as it may not always be feasible or warranted to construct roads or crossings at right angles or along elevation contours, PRI will consider and implement erosion measures appropriate for the situation (PRI 2004a). In steep grade areas, in addition to the previously noted erosion protection measures, the disturbed areas would be re-seeded as soon as possible after construction is completed. PRI will begin seeding, weather permitting, at the appropriate time for optimum growth, whether the next spring or fall planting	Yes, true at NB also
Dec. 2007	NRC EA for SR-2	5.4.2 Page 14	Potential impacts to the ground water would be the infiltration of lixiviant into the subsurface due to surface releases from the SR-2 facility. As discussed in Section 5.2, PRI and the previous site operator, RAMC, have reported 79 unintended releases of ISL-related solutions to the ground surface, of which four were associated with wastewater disposal activities at satellite buildings or the Smith Ranch CPP. Subsurface impacts from spills in SR-2 will be limited as PRI will take immediate actions to stop the leak and to contain and recover as much as possible of the spilled fluid. The water table at SR-HUP is typically more than 100 feet below the land surface throughout most of the area. Much of the alluvium overlying the water table at SR-HUP is comprised of claystones and shales. Infiltration of surface-released lixiviant	Yes, true at NB also

			through such low permeable material is unlikely.	
Dec. 2007	NRC EA for SR-2	5.5 Page 14	Impacts to Ecological Systems related to ISL operations at the Smith Ranch site, including construction of plant facilities and access roads, were previously evaluated in *Environmental Assessment for the Renewal of Source Materials License SUA-1548* (NRC 2001, Section 6.7). Impacts to soils and vegetation from PRI's proposed SR-2 satellite would result primarily from the construction of the planned satellite building and access roads. These impacts would be confined for the most part to the building site and would involve the clearing of top soils for the laying of foundations for the satellite and associated structures and ground clearing and surface preparation for the roads. Final reclamation and re-seeding of the satellite facility site would occur after the cessation of ISL operations in the area. Alteration of an approximately 1.5 acre area is not considered to constitute a significant adverse impact. Soils and vegetation also would be affected by spills of injection and production fluids during operations. As discussed in Section 5.2 of this EA, since June 1997, 78 spills have occurred within the SR-HUP permit area. Impacts from spills in SR-2 would be limited in area as PRI would take immediate actions to stop the leak and to contain and recover as much as possible of the spilled fluid. PRI's spill documentation, as required under its NRC license, would be used during decommissioning of the affected area to identify contaminated soils requiring offsite disposal at a licensed facility. As part of PRI's decommissioning activities, affected areas would be re-seeded using a WDEQ-approved seed mixture.	Yes, true at NB also
Dec. 2007	NRC EA for SR-2	5.4 Page 14-15	Wildlife impacts related to ISL operations at the Smith Ranch Site, including the area containing SR-2, were previously evaluated in *Environmental Assessment for the Renewal of Source Materials License SUA-1548* (NRC 2001, Section 6.9). The NRC (2001) analysis included construction and operational impacts to herbivores (e.g., sage grouse and morning doves), small mammals (e.g., mice, ground squirrels), carnivores (e.g., raptors and coyotes), and larger mobile mammal (e.g., antelope) populations. Wildlife losses were not expected to result in any long-term decrease in any wildlife populations since the number lost due to construction and operation of ISL activities at Smith Ranch (including SR-2) is expected to be a very small percentage of the total population. Further, wildlife populations are expected to rebound as the disturbed areas are reclaimed. As with the ecological systems discussed above, alteration of an approximately 1.5 acre area is not considered to constitute a significant adverse impact. No federally-listed endangered or threatened species or critical species habitat are found within the SR-2 area (U.S. Fish and Wildlife 2006). Given the small area (approximately 1.5 acres) and short duration of the project (about nine years), no effect on endangered or threatened species or critical habitat is expected from the proposed construction and operation of SR-2. PRI conducts an annual raptor survey, in accordance with WDEQ-LQD requirements, to identify any new nests, to assess whether known nests are being used, and to protect against unforeseen conditions, such as the construction of a new nest in an area where ISL operations may take place (PRI 2004a). The survey covers all areas of planned activity for the life of the project and a one-mile area around the activity. In the event that it would be necessary for PRI to disturb a raptor nest, PRI would obtain a permit for a mitigation plan from the U.S. Fish and Wildlife Service.	Yes, true at NB also, but the approved WGF wildlife monitoring plan would be followed for annual surveys.
Dec. 2007	NRC EA for SR-2	5.8 Page	The primary source of radiological impact to the environment from site operations is gaseous radon-222, which is released from the satellite	Yes, true at NB also, mildos has been...

		15-16	facility and from the wellfields. PRI used MILDOS-AREA, a dispersion model approved by the NRC, to estimate the dose commitments received by individuals and the general population (i.e. receptors) from the operation of SR-HUP including SR-2 (PRI 2007a, 2007b, and 2007c). The MILDOS-AREA model required PRI to obtain site specific data for input into the model, as well as make some assumptions about the input data. The validity of the input data is the critical aspect in obtaining a reasonably conservative estimate of the dose commitments to the public. NRC staff evaluated the input data and has determined that PRI used conservative default input data when appropriate. For the site specific data required, NRC staff has determined that the site specific inputs to the model are representative of the actual site conditions with significant conservatism to ensure that the values are protective of the environment and the public. PRI used a worst case scenario methodology when evaluating its site and assembling its model. In its estimation, the worst case scenario would be 16 SR-HUP mine units all operational at the same time. This would result in the maximum probable release from the site at any time throughout its current operational schedule. PRI also identified the nearest receptors (off-site), as well as arbitrary receptors placed at the site boundaries to evaluate site boundary conditions. The model was run for this worst case scenario year to determine the peak dose to members of the public with the assumption that, assuming normal operations, all subsequent years must be less than the peak calculated dose based on a continuous reduction of activities over the remaining operational time at the mill. NRC staff evaluated this methodology and agrees that it is conservative and will yield dose estimates that can reliably predict the maximum estimated dose to members of the public throughout the operation of the mill. The model output estimates a total population dose of 305.6 person-rem/yr and a general dose to the population of less than 1 mrem/yr. The two nearest residents, Sunquest Ranch and the Vollman Ranch, are estimated to receive a peak maximum yearly dose of 17.5 and 13.2 mrem/yr respectively for the worst case scenario. However, it is very unlikely that these peak doses would be reached due to the modeling methodology and input data conservatism. Additionally, the airborne sampling program at PRI has been used and would continue to be used to verify the off site dose to the nearest resident and the general population. NRC staff evaluated the model results and has determined that estimated dose to the nearest resident and members of the public meet the requirements of 10 CFR 20.1301 (i.e., 100 mrem/yr).	for the combined Ruth/North Butte by Uranerz. The model assumed a dryer at NB and satellite at Ruth leading to a worst case scenario. Cameco has run a new Mildos specific to the NB satellite and submitted the results in the license renewal. The MILDOS referred to in the SR-2 EA was for a worst case scenario including SR-HUP and Reynolds the resultant exposures to the public was far below the dose limit for the general public and would be less at NB because of fewer wellfields, satellites and CPP.
Dec. 2007	NRC EA for SR-2	5.9 Page 16-17	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. PRI is required under license condition 9.6 of SUA-1548 to dispose of 11e.(2) byproduct materials (i.e., wastes produced by the extraction or concentration of uranium or thorium from any ore processed primarily for its source material content) generated by project operations at a licensed byproduct waste disposal site. Currently, PRI disposes of its radioactively-contaminated wastes at Pathfinder Mine Corp.'s Shirley Basin uranium mill site in eastern Wyoming. To ensure that it retains control of all contaminated wastes while such wastes are onsite, PRI is required by license condition 10.1.7 of SUA-1548 to maintain an area within the restricted area boundary for the storage of contaminated	Yes, true at NB also, but the approved disposal site is now at Blanding UT rather than Pathfinder, WY. The current approved contract is on file at Smith Ranch.

			materials prior to their disposal. PRI has specially designated and placarded containers at the SR-HUP central processing plant and at each of the satellite facilities for the storage of such materials. These containers are set off from containers for non-contaminated materials, and a re-attachable tarp is used as a cover to prevent the inadvertent dispersal of the stored wastes. PRI also is required by license condition 10.1.7 to dispose of all contaminated wastes at a licensed radioactive waste disposal site. For non-waste materials, PRI would survey all equipment, buildings, and other items for radioactive contamination, prior to their release from the site for unrestricted use (PRI 2004a). Finally, transportation of all material to the byproduct disposal facility would be handled in accordance with U.S. Department of Transportation and NRC regulations (49 CFR 173.389 and 10 CFR Part 71, respectively).	
Dec. 2007	NRC EA for SR-2	5.11 Page 17-18	The cumulative radiological impacts (i.e., gaseous radon-222) from the entire SR-HUP operation were evaluated by PRI using the MILDOS-AREA, dispersion code (PRI 2007a, 2007b, and 2007c). As discussed in Section 5.8, NRC staff has evaluated the model results and has determined that the cumulative radiological dose to the nearest resident and members of the public meet the requirements of 10 CFR 20.1301. Other potential cumulative impacts associated with the SR-2 facility concern the subsurface disposal of satellite generated liquid effluents (e.g., well-field production bleed and restoration water). PRI currently has three operating deep disposal wells at SR-HUP under Wyoming Department of Environmental Quality (WDEQ) Underground Injection Control (UIC) Program. Class I Injection wells WDW #1 and WDW #2 are located at Smith Ranch and are associated with operations at the CPP and ISL Satellite SR-1, respectively. Class I Injection well Morton 1- 20 is located at Highland, between Satellites #1 and #2. PRI has a UIC Class I Injection well permit for a second Highland deep disposal well (Vollman 33-27), which has not as yet been constructed (PRI 2004). PRI has applied for a Class I Injection well for the subsurface disposal of liquid effluent from SR- 2 (Petrotek 2007). The well would be located within close proximity of the SR-2 building. The injection zone for SR-2 deep disposal well is between 4,750 to 7,000 feet below ground surface, with a mid-point depth of 5,875 feet. Subsurface liquid effluent disposal at SR-2 is not expected to affect local stock and domestic ground water use. Stock wells located within three miles of SR-2 are completed in stratigraphic horizons that are several thousand feet above and hydraulically isolated from the zone planned for liquid effluent disposal (see Table 1). Domestic wells are also completed in stratigraphic horizons that are several thousand feet above and hydraulically isolated from the zone planned for liquid effluent disposal. No domestic wells are located within three miles of the proposed SR-2 deep disposal well location. Potential cumulative impacts related to conventional uranium mining and milling is the vicinity of SR-HUP are unlikely. In the southern Powder River Basin, where the SR-HUP facility is located, uranium was historically mined via conventional methods (e.g., open pits and subsurface mine shafts) during the 1970s and 1980s. At SR-HUP, construction of the Bill Smith mine shaft was initiated in September 1972, and completed in early 1977. However, due to porous sands and heaving shale zones in the Fort Union formation, conventional subsurface mining was terminated in June 1978 (Paydirt 1999). Open pit uranium mining occurred from 1970 to 1984 at the Exxon Highland facility, which is adjacent to the eastern edge of the SRHUP permit area (approximately 15 miles northeast of SR-2).	Yes, true at NB also, this assessment included the entire SR-HUP operation or worst case scenario

			Although the potential for future conventional mining exists, two factors make conventional mining in the vicinity of the SR-HUP unlikely: ISL operations are approximately two to three times more cost effective than open pit mining/conventional milling operations, and virtually all the South Powder River Basin uranium ore deposits are amenable to ISL development.	
Dec. 2007	NRC EA for SR-2	5.12 Page 18	PRI would conduct a radiological monitoring program in accordance with the requirements of its application and NRC source materials license. An outline of PRI's environmental monitoring program is discussed in Section 5 of its amendment application (PRI 2004a). PRI's monitoring program includes surface water, soils and sediments, direct radiation, radon, and ground water at multiple sites. PRI is required under license conditions 11.6 and 12.2 of SUA-1548 to monitor the various environs and to provide in an annual report to the NRC a copy of one of the semiannual effluent and environmental monitoring reports required under 10 CFR 40.65. As discussed in sections 4.6 and 5.6 of this EA, PRI also conducts annual raptor surveys with the primary intent of protecting against unforeseen conditions, such as the construction of a new nest in an area where operations may take place.	Yes, true at NB also
Dec. 2007	NRC EA for SR-2	7.0 Page 20	The NRC staff have prepared this EA in support of PRI's proposed action to construct and operate SR-2. On the basis of this EA, NRC has concluded that there are no significant environmental impacts and the licensing action does not warrant the preparation of an Environmental Impact Statement. Accordingly, it has been determined that a Finding of No Significant Impact is appropriate and will be published in the *Federal Register*.	No significant impacts by NRC
Nov. 2008	NRC EA Rey.Ranch	2.2	authorized to use native ground water, carbon dioxide, and sodium carbonate/bicarbonate as the mining solution, with an oxygen or hydrogen peroxide oxidant.	Yes, true at NB also
Nov. 2008	NRC EA Rey.Ranch	2.2	Wellfields in the Reynolds Ranch area would be designed in a five-spot or seven-spot pattern	Yes, true at NB also
Nov. 2008	NRC EA Rey.Ranch	2.2	Monitor wells surround the wellfield pattern area, being located in the production zone aquifer as well as in the overlying and underlying aquifers	Yes, over lying and production zones, but not underlying at NB
Nov. 2008	NRC EA Rey.Ranch	2.3.1	Each well would be connected to the respective injection or production manifold in a nearby header house	Yes, true at NB also
Nov. 2008	NRC EA Rey.Ranch	2.3.1	The wellfield piping would be high-density polyethylene pipe, PVC,and/or steel	Yes, true at NB also
Nov. 2008	NRC EA Rey.Ranch	2.3.1	Individual well lines and trunk lines to the recovery plant would be buried to prevent freezing of the transferred solutions	Yes, true at NB also
Nov. 2008	NRC EA Rey.Ranch	2.3.1/ page 4	First,a pilot hole for the well would be drilled to the top of the target depth with a small rotary drilling unit using native mud and a small amount of commercial drilling fluid additive for viscosity control	Yes, true at NB also
Nov. 2008	NRC EA Rey.Ranch	2.3.1/ page4	The hole then would be logged and reamed, and the casing set and cemented to isolate the completion interval from all other aquifers	Yes, true at NB also
Nov. 2008	NRC EA Rey.Ranch	2.3.1/ page 4	The cement would be placed by pumping it down the casing and forcing it out the bottom of the casing and back up the casing-drill hole annulus	Yes, true at NB also
Nov. 2008	NRC EA Rey.Ranch	2.3.1/ page 4	The purpose of the cement is to stabilize and strengthen the casing and to plug the annulus of the hole to prevent vertical migration of mining solutions	Yes, true at NB also
Nov. 2008	NRC EA Rey.Ranch	2.3.1/ page 4	After the well is cemented to the surface and the cement has set, the well would be drilled out and completed either as an open hole or fitted with a screen assembly (slotted liner), which may have a sand filter	Yes, true at NB also

			pack installed between the screen and the underreammed formation. The well would then be air lifted for about 30 minutes to remove any remaining drilling mud and/or cuttings	
Nov. 2008	NRC EA Rey.Ranch	2.3.1/ Page 5	mechanical integrity test (MIT) on each well prior to its use in the wellfield	Yes, true at NB also
Nov. 2008	NRC EA Rey.Ranch	2.3.1 page 5	In the integrity test, the bottom of the casing adjacent to or below the overlying confining stratigraphic layer is sealed with a plug, downhole packer, or other suitable device	Yes, true at NB also
Nov. 2008	NRC EA Rey.Ranch	2.3.1/ Page 5	The top of the casing is then sealed in a similar manner or with a threaded cap, and a pressure gauge is installed to monitor the pressure inside the casing. By license condition 10.1.3 of SUA-1548, PRI is required to pressurize the well to 125 percent of the maximum operating wellhead casing pressure	Yes, true at NB also
Nov. 2008	NRC EA Rey.Ranch	2.3.1/ Page 5	The well must maintain 90% of this pressure for 10 minutes to pass the test. Wells not passing the MIT are reworked and tested again. PRI would abandon the well upon repeated failure of the MIT.	Yes, true at NB also
Nov. 2008	NRC EA Rey.Ranch	2.3.1/ Page 5	repeat MITs once every five years for all wells used for injection of lixiviant, or injection of fluids for restoration operations (PRI, 2005a)	Yes, true at NB also
Nov. 2008	NRC EA Rey.Ranch	2.3.1/ Page 5	Additionally, a MIT would be conducted whenever a downhole drill bit or underreaming tool is used to repair an injection well. PRI would perform a new MIT for any injection well with evidence of suspected subsurface damage prior to the well being returned to service (PRI, 2005a).	Yes, true at NB also
Nov. 2008	NRC EA Rey.Ranch	2.3.1/ Page 5	The satellite building would house the ion exchange (IX) columns, water treatment equipment, resin transfer facilities, pumps for injection of the lixiviant, a small laboratory, and an employee break room.	Yes, true at NB also
Nov. 2008	NRC EA Rey.Ranch	2.3.1/ Page 5	It would be designed to operate with a maximum through-flow of 4,500 gallons per minute (gpm) (17,034 liters per minute) during production operations.	Yes, true at NB also, but the flow rate would 4,000 gpm, with the approval of the license renewal the rate would increase to 6,000 gpm
Nov. 2008	NRC EA Rey.Ranch	2.3.1/ Page 5	Bulk carbon dioxide and oxygen would be stored in compressed form adjacent to the building or in the wellfield. Gaseous carbon dioxide is added to the lixiviant as the fluid leaves the satellite building for the wellfield and header houses	Yes, true at NB also
Nov. 2008	NRC EA Rey.Ranch	2.3.2 Page 5	Once wellfield operations begin, uranium-rich solution would be routed from the wellfields to the planned satellite plant. In the satellite building, the solution would be pumped into a series of IX columns where the uranium (as uranyl carbonate complexes) would be adsorbed onto resin beads in the columns	Yes, true at NB also
Nov. 2008	NRC EA Rey.Ranch	2.3.2 Page 5	The resulting uranium-poor (*i.e.*, "barren") lixiviant (which contains normally less than 2 parts per million of uranium) would then exit the IX columns, be recharged with additional oxidizing and complexing agents, and then be reinjected in the wellfields.	Yes, true at NB also
Nov. 2008	NRC EA Rey.Ranch	2.3.2 Pages 5-6	Once the majority of the ion exchange sites on the IX column resin are filled with uranium, the column would be taken offline to begin the elution/precipitation circuit to recover the uranium. At this point in the process, the uranium-loaded resin would be transferred from the satellite plant IX columns to a truck for transport to the Smith Ranch Central Processing Plant (CPP) for 6 further processing.	Yes, true at NB also, but could also be shipped to HUP CPP for processing pending administrative change to the license

				conditions.
Nov. 2008	NRC EA Rey.Ranch	2.3.2 Page 6	At the CPP, the uranium would be stripped (*i.e.*, eluted) from the resin beads with a concentrated solution of sodium chloride. The stripped resin beads would then be returned by truck to the satellite plant where they would be loaded back onto the IX columns.	Yes, true at NB also
Nov. 2008	NRC EA Rey.Ranch	2.3.3 Page 6	Prior to conducting uranium recovery operations in a mine unit, PRI is required by license condition 10.1.9 of SUA-1548 to collect baseline ground water quality data from the wells completed in the planned production zone, and from these data, to determine and set postmining restoration criteria. The ground water restoration criteria are set on a parameter-byparameter basis, with the restoration values for each parameter calculated as the average and range of the pre-mining sample values (PRI, 2005a).	Yes, true at NB also
Nov. 2008	NRC EA Rey.Ranch	2.3.3 Page 6-7	Under license condition 10.1.9, the primary goal of the PRI restoration is to return the ground water quality, on a mining unit average, to pre-mining baseline conditions. 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 operations indicate that, to a lesser extent, other trace metals such as arsenic, selenium, vanadium, iron and manganese are mobilized during the leaching process with the uranium. As evidenced in the R&D restoration demonstration (see Table B-1), baseline levels for all ground water parameters cannot always be reasonably met. Therefore, by license condition 10.1.9, a secondary ground water restoration goal is to restore the ground water to a quality consistent with the use, or uses, for which the water was suitable prior to ISL mining activities. In order to apply these secondary standards, PRI must demonstrate that baseline conditions are not achievable after the application of Best Practicable Technology. Upon the completion of restoration of each mining unit, PRI is required to submit a wellfield completion report for NRC review and approval.	Yes, true at NB also
Nov. 2008	NRC EA Rey.Ranch	2.3.3 Page 7	To restore wellfield ground water to acceptable levels, PRI employs a series of techniques that include ground water transfer, ground water sweep, and permeate injection (Chapter 6 of PRI, 2005a).	Yes, true at NB also
Nov. 2008	NRC EA Rey.Ranch	2.3.4 Page 8	Under license condition 9.11 of SUA-1548, PRI is required to submit for NRC review and approval a final detailed decommissioning plan at least 12 months prior to the planned commencement of decommissioning of a wellfield. Activities associated with such decommissioning would involve plugging and abandonment of the wells and reclamation of the surface areas disturbed by operations. Surface disturbance associated with the satellite plant, the field header houses, and access roads to and through the wellfield would be for the life of those buildings and roads. As a result, final decommissioning of those structures and roads could await the end of operations in that mining area.	Yes, true at NB also
Nov. 2008	NRC EA Rey.Ranch	2.3.4 Page 8	Following the completion of restoration, PRI would plug and abandon all production, injection, and monitoring wells in the wellfield, in accordance with WDEQ rules and regulations. Such practices could include (1) removal of all pumps and tubing; (2) plugging of the well with an appropriately formulated abandonment gel or slurry; (3) cutting the well casing below the ground surface; (4) placing a cement plug to seal the well; and (5) backfilling, smoothing, and leveling the area to blend in with the surrounding terrain.	Yes, true at NB also
Nov. 2008	NRC EA Rey.Ranch	2.3.4 Page 8	In addition, buried wellfield lines and pipelines would be removed and the affected surface areas appropriately reclaimed. Affected areas would	Yes, true at NB also

			be leveled and re-seeded with a WDEQ approved seed mixture of native wheatgrasses, fescues, and clovers	
Nov. 2008	NRC EA Rey.Ranch	2.3.4 Page 8	PRI has stated (PRI, 2005a) that its goal is to return all lands disturbed by the mining project to their pre-mining land use of livestock grazing and wildlife habitat unless an alternate use is approved by the State and the landowner (*e.g.*, a rancher who wishes to retain access roads and/or buildings). In addition, PRI=s objective is to return the disturbed lands to a production capacity equal to or better than that existing prior to mining (PRI, 2005a).	Yes, true at NB also
Nov. 2008	NRC EA Rey.Ranch	2.3.4 Page 8-9	PRI's revegetation practices are conducted in accordance with WDEQ-LQD regulations and PRI's WDEQ mine permit. Following topsoiling for final reclamation, an area would normally be seeded with oats to establish a stubble crop, and then re-seeded with grasses during the next growing season (PRI, 2005a). If the area in question is to be disturbed again prior to final decommissioning, PRI may apply a long-term temporary seed mix of one or more native wheatgrasses (*i.e.*, Western Wheatgrass, Thickspike Wheatgrass) at a seeding rate of 12-14 lbs. of pure live seed per acre. A permanent seeding mixture would typically contain native wheatgrasses, fescues, and clovers, with typical seeding rates of 12-14 lbs. of pure live seed per acre.	Yes, true at NB also, but the seed mixture would be approved by the landowner and WDEQ.
Nov. 2008	NRC EA Rey.Ranch	2.3.5 Page 9	As part of the reclamation following the end of mining operations in the Reynolds Ranch area, the satellite facility would need to be decommissioned. In doing so, process equipment could either be dismantled and sold to another licensed facility or decontaminated in accordance with the applicable NRC guidance. Materials that could not be decontaminated to acceptable levels would be disposed in a licensed disposal facility. Decontaminated materials having no resale value, such as building foundations, may be buried on-site.	Yes, true at NB also
Nov. 2008	NRC EA Rey.Ranch	2.3.5 Page 9	After the equipment, buildings, foundations, piping, and associated support facilities are removed, gamma radiation surveys would be conducted over the areas. In the wellfields themselves, gamma surveys would also be conducted during the decommissioning of each mining unit. Material with contamination levels requiring disposal in a licensed facility would be removed, packaged as needed, and shipped to a licensed disposal facility.	Yes, true at NB also
Nov. 2008	NRC EA Rey.Ranch	2.3.5 Page 9	After decommissioning and decontamination have been completed, surface areas disturbed by project operations would be re-contoured so that these areas would blend in with the natural terrain and be consistent with the post-mining land use.	Yes, true at NB also
Nov. 2008	NRC EA Rey.Ranch	2.3.6 Page 9	Liquid wastes generated at the proposed Reynolds Ranch satellite facility would be disposed through a deep injection well. These wastes would include the production bleed stream, wash down water, and ground water restoration waste water (*i.e.*, from ground water sweep and ground water treatment activities). The planned deep injection well would be similar in design and depth to current deep injection wells at Smith Ranch and located near the Reynolds Ranch area. This deep injection well would be permitted through the WDEQ and operated according to permit requirements.	Yes, true at NB also
Nov. 2008	NRC EA Rey.Ranch	2.6.6 Page 9	Disposal of liquid wastes via deep well injection would comply with license condition 10.1.8 of SUA-1548. This condition requires PRI to dispose of all liquid effluents stemming from mining units, process buildings, and process waste streams (with the exception of sanitary wastes) in an approved manner, including deep well injection.	Yes, true at NB also
Nov. 2008	NRC EA Rey.Ranch	2.6.6 Page 9	Sanitary wastes from the restrooms and lunchroom at the satellite plant would be disposed of in an approved septic system. PRI's septic system	Yes, true at NB also

			is subject to continued approval by the State of Wyoming.	
Nov. 2008	NRC EA Rey.Ranch	2.6.6 Page 9-10	Solid wastes generated at the site would include both contaminated and non-contaminated wastes. Contaminated wastes would include rags, trash, packing material, worn or replaced parts from equipment, piping, and sediments removed from process pumps and vessels. Radioactive solid wastes with contamination levels requiring disposal at a licensed facility would be isolated in drums or other suitable containers prior to offsite disposal. Under license condition 10.1.7 of SUA-1548, PRI is required to maintain an area within the restricted area boundary for the storage of contaminated materials prior to their disposal. PRI would dispose of non-contaminated wastes in the SR-HUP site disposal landfill in accordance with the permit issued by the WDEQ.	Yes, true at NB also, but no current landfill on site.
Nov. 2008	NRC EA Rey.Ranch	5.3.2 Page 21-22	Dissolved radon gas, generated by its dissolution from processing solutions, may escape to the atmosphere and potentially adversely impact air quality in the wellfields and immediate vicinity of processing buildings. Radon can be vented to the atmosphere from the wellfields at each wellhead or from the process equipment in the proposed satellite facility. PRI would use pressurized downflow ion exchange (IX) columns, and therefore radon releases would occur only when individual IX columns are disconnected from the circuit and opened to remove the resin for elution.	Yes, true at NB also
Nov. 2008	NRC EA Rey.Ranch	5.4.1 Page 23	PRI would use diversion ditches and engineered culverts to prevent excessive erosion and control runoff. In areas where runoff is concentrated, PRI would utilize energy dissipaters to slow the flow of runoff to minimize erosion and sediment loading in the runoff (PRI, 2005a).	Yes, true at NB also
Nov. 2008	NRC EA Rey.Ranch	5.4.1 Page 22-23	Traffic within the drainage bottoms would be limited to work activities necessary to construct and service the wells. Wells that are constructed in significant drainages where runoff has a likely potential to impact the wellhead would have added wellhead protection. This protection would 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 (PRI, 2005a).	Yes, true at NB also
Nov. 2008	NRC EA Rey.Ranch	5.8.1 Page 27	The primary source of radiological impact to the environment from site operations is gaseous radon-222, which is released from the satellite facility and from the wellfields. This section provides the radiological impacts to the environment from ISL mining operations at the Reynolds Ranch area	Yes, true at NB also
Nov. 2008	NRC EA Rey.Ranch	5.8.1 Page 27	20.1201). PRI has established written Standard Operating Procedures (SOPs) for all operational activities involving radioactive materials that are handled, processed, stored, or transported by its employees. PRI also has established procedures for in-plant and environmental monitoring, bioassay analysis, and instrument calibration for activities involving radiation safety (PRI, 2005a). All permanent employees receive new-hire training in topics such as the basic principles of radiation safety, radiation safety procedures, responses to emergencies or accident involving radioactive materials. In addition, these employees also attend quarterly safety meetings and receive annual refresher training that includes a review of any new radiation safety regulations, site safety experience, and radiation exposure trends (PRI, 2005a).	Yes, true at NB also, but safety meeting are annual rather than four quarters. The same subjects are discussed including annual rad. refresher training but during one safety meeting. Daily tailgate meetings keep employees informed of changes in procedures/regulatio ns

Nov. 2008	NRC EA Rey.Ranch	5.8.1 Page 27	PRI would conduct quarterly gamma surveys at specified locations (*e.g.*, the IX columns) throughout the planned satellite facility to assure that areas requiring posting as "Radiation Areas" are identified, posed and monitored to assess external radiation conditions. PRI also would conduct routine visual and instrument surveys of the planned satellite facility to determine any obvious signs of contamination and the total alpha contamination (PRI, 2005a).	Yes, true at NB also
Nov. 2008	NRC EA Rey.Ranch	5.8.3 Page 28	PRI modeled the effects of radon gas release from the wellfields and satellite facility proposed for the Reynolds Ranch area (PRI, 2005a). PRI used MILDOS-Area, a dispersion model approved by the NRC, to estimate the potential radiological impacts from air emissions of radon-222. The results of the modeling can be compared with the effluent concentration limits and the dose limits for the general public in 10 CFR Part 20.	Yes, true at NB also
Nov. 2008	NRC EA Rey.Ranch	5.9 Page 29	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. PRI is required under license condition 9.6 of SUA-1548 to dispose of 11e.(2) byproduct materials generated by project operations at a licensed byproduct waste disposal site.	Yes, true at NB also
Nov. 2008	NRC EA Rey.Ranch	6.0 Page 29-30	PRI would monitor all effluent streams and the various environmental pathways that could be affected (*e.g.*, air, surface water, and ground water) by ISL mining operations at the Reynolds Ranch area. PRI is required to submit the results of this monitoring, along with injection rates, recovery rates, and injection manifold pressures, to the NRC on a semiannual basis, in accordance with 10 CFR 40.65.	Yes, true at NB also
Nov. 2008	NRC EA Rey.Ranch	6.1 Page 30	PRI would monitor injection well and production well flow rates and pressures so that injection and production can be balanced for each pattern and the entire wellfield (PRI, 2005a). The flow rate of each production and injection well would be determined by monitoring individual flow meters in each wellfield header house. PRI would determine production well flow rates on a daily basis and injection well flow rates at least every three days. Additionally, through operating experience and the fact that injection pressures remain relatively constant, PRI has found that monitoring injection well flow rates at least every three days has been more than adequate to ensure that wellfield patterns are adequately balanced (PRI, 2005a).	Yes, true at NB also
Nov. 2008	NRC EA Rey.Ranch	6.1 Page 30	On a daily basis, PRI would determine the pressure of each production well and the production trunk line in each wellfield header house. The pressure of the injection trunk line would also be determined daily in each wellfield header house. The surface injection pressures would not exceed the maximum surface pressures posted in each header house (PRI, 2005a).	Yes, true at NB also
Nov. 2008	NRC EA Rey.Ranch	6.1 Page 30	PRI would maintain on-site the data records for these monitoring activities.	Yes, true at NB also
Nov. 2008	NRC EA Rey.Ranch	6.2 Page 30	PRI would monitor pressure and flow indicators on the main pipelines to and from the planned satellite facility to ensure that the pressures and flows are maintained within the safe working limits of the pipeline (PRI, 2005a).	Yes, true at NB also
Nov. 2008	NRC EA Rey.Ranch	6.3 Page 30	Ground water is monitored prior to, during, and after mining. Prior to well-field installation, ground water data will be collected to determine	Yes, true at NB also

			water quality and define aquifer properties. This data is built upon during wellfield development when mine unit-specific data is collected to establish upper control limits for operational monitoring and post-mining criteria for restoration. During and following mining and restoration, additional ground-water monitoring is performed to verify the effect, if any, on the aquifer.	
Nov. 2008	NRC EA Rey.Ranch	6.3.1 Page 30-31	As part of wellfield development in the Reynolds Ranch area, PRI would install monitor wells within the production zone aquifer outside and around the pattern area (i.e., as a monitor well ring) and also within overlying and underlying aquifers to ensure that the lixiviant and production fluids do not leave the defined production zone. Monitor wells in the production zone aquifer would encircle the various mining units with wells completed in the mineralized formations at a distance of 250 to 600 feet (76 to 183 m) from the production patterns and between 300 to 800 feet (91 to 244 m) from each other. Monitor wells for the overlying and underlying aquifers would be installed at a density of one for each four acres of wellfield area (PRI, 2005a). The distance between these monitor wells would not exceed 1000 feet (305 m), and all such wells would be installed within the confines of the wellfield area.	Yes, true at NB also, but there are no underlying aquifer monitoring wells.
Nov. 2008	NRC EA Rey.Ranch	6.3.1 Page 31	Under license condition 11.5 of SUA-1548, PRI is required to sample all monitor wells twice per month. In its application (PRI, 2005a), PRI states that the samples would be taken no less than 10 days apart. The samples are analyzed for the excursion indicators (chloride, conductivity, and alkalinity) and the results compared to the upper control limits (UCLs) for the sampled well. If two excursion indicators (*i.e.*, two UCLs) for the monitor well are exceeded, PRI is required to take a confirmatory sample within 24 hours. If the confirmatory sample indicates that UCLs have been exceeded, then the well in question is placed on excursion status, and the sampling frequency is increased to weekly in the affected well. PRI would sample at this increased frequency until it controls the excursion (*i.e.*, returns the concentrations of the excursion parameters to below the respective UCLs).	Yes, true at NB also
Nov. 2008	NRC EA Rey.Ranch	6.3.1 Page 31	If corrective actions are not effective within 60 days since the first excursion verification, PRI has committed to suspending injection of lixiviant into the mining zone adjacent to the excursion until the problem is resolved (PRI, 2005a).	Yes, true at NB also
		6.3.1 Page 31	PRI's Radiation Safety Officer must maintain quality assurance (QA) programs. All QA programs would 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 would be maintained throughout the project life.	Yes, true at NB also
Nov. 2008	NRC EA Rey.Ranch	6.4 Page 31	PRI would conduct a radiological monitoring program in accordance with the requirements of its application and NRC source materials license. An outline of PRI's environmental monitoring program is discussed in Section 5 of its amendment application (PRI, 2005a). PRI's program includes monitoring surface water, soils and sediments, direct radiation, radon, and ground water at multiple sites. PRI is required under license conditions 11.6 and 12.2 of SUA-1548 to monitor the various environs and to provide in an annual report to the NRC a copy of one of the semiannual effluent and environmental monitoring reports required under 10 CFR 40.65.	Yes, true at NB also

Nov. 2008	NRC EA Rey.Ranch	6.4 Page 31	As discussed in sections 4.6 and 5.6 of this EA, PRI also conducts annual raptor surveys with the primary intent of protecting against unforeseen conditions, such as the construction of a new nest in an area where operations may take place.	Yes, true at NB also, but also swift fox and sage grouse following the wild life monitoring plan required WGF
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 1.4.2 P.1-4	Cameco is requesting that NRC Staff approve this LRA. This LRA includes updated technical information, detailed new technical information, a summary of SERPs, which have been subjected to numerous NRC inspections, updated MILDOS calculations and updated and new discussion on environmental resources, impacts, and mitigative actions. License Condition 10.2.1of SUA-1548 requires that before engaging in any commercial ISR activity *not previously assessed* by the NRC at the North Butte and Ruth remote satellites, Cameco must prepare a new *Operating Plan* in accordance with the guidance in NUREG-1569, for NRC review and approval and must also prepare and record an environmental evaluation of such activity. On August 18, 2003, the NRC issued Amendment No. 5 to SUA-1548 approving the consolidation of the Highland, Ruth, and North Butte licenses into SUA-1548. NRC had performed an environmental evaluation for North Butte in its 1990 EA which covered both the North Butte and Ruth facilities. Cameco may initiate operations of the North Butte remote satellite within the operating envelope previously reviewed and approved by the NRC Staff. Changes to plans at North Butte requiring additional evaluation include updated design plans for North Butte surge ponds and satellite facility as well as flow rate increases at the North Butte facility from the current approved flow rate of 17,034 to 23,000 liters/minute (4,500 to 6,000 gallons/minute). The MILDOS model has been revised to take into consideration the increased flow rate from 252 to 379 liters/second (4,000 to 6,000 gallons/minute), and that there will be no slurried or dried yellowcake produced at the North Butte Remote Satellite. Finally, the primary method for process waste water disposal will be UIC Class I disposal wells only rather than the previously assessed combination of disposal wells and solar evaporation ponds. The ponds to be built at North Butte will be used only to temporarily hold water to provide surge capacity for the disposal wells. All other aspects of the North Butte Remote Satellite Plan have not changed from the 1990 NRC Staff evaluation and EA. The above referenced changes are described within Sections 3.0, 4.0 and 6.0 and comprise Cameco's Operating Plan for the North Butte Remote Satellite. Cameco's environmental assessment of these changes is provided in the ER.	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 3 p. 3.3 (TR)	The North Butte Remote Satellite facility is located in southwest Campbell County, Wyoming. The site is approximately 80 kilometers (50 miles) from the City of Gillette and 64 kilometers (40 miles) from the Town of Wright. The permit area contains approximately 408 hectares (1,010 acres) and includes portions of Sections 18 and 19 in T44N, R75W and Sections 13, 23, 24 and 25 in T44N, R76W.	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will

				provide the basis of the operating plan.
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 3 p. 3.3 (TR)	The surface facilities at the North Butte Remote Satellite will include the mine units, header houses, buried pipelines, overhead and buried power lines, access roads, laydown yard, surge ponds, Class I UIC disposal wells, and the satellite IX building. The locations of the satellite building and associated facilities are shown on **Figure 1.10**. The satellite building will house IX columns, water treatment equipment, resin transfer facilities, pumps for injection of lixiviant, disposal well equipment, RO units and bioremediation materials for groundwater restoration, a laboratory area, offices, and an employee break room. **Figure 3.1, North Butte Remote Satellite Floor Plan** shows the equipment layout for the proposed satellite building. The building will occupy approximately 1,560 meters^2 (16,800 feet^2) and will be designed to operate with a maximum flow of 22,680 liters/minute (6,000 gallons/minute) during operations. The original license amendment for North Butte specified a maximum flow rate of 17,010 liters/minute (4,500 gallons/minute) and Cameco requests that the maximum flow rate be increased to 22,712 liters/minute (6,000 gallons/minute) through this LRA. The original plant design in the license amendment had a smaller building dimension than stated above (see Change No. 6, NRC Application, Page1-6, Section 1.4.2 dated March 27, 1992).	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 3 p. 3.4 (TR)	The North Butte uranium orebody has been divided into five proposed mine units. Preliminary geologic and hydrologic information has been developed by Uranerz and PMC and is presented in Appendices D5 and D6 of the North Butte WDEQ permit which accompany this LRA. Detailed geologic and hydrologic information of the individual mine units such as isopach maps, potentiometric surface maps and monitor well locations will be submitted as part of each mine unit hydrologic testing package.	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 3.3.2.1 p. 3-6 (TR)	The uranium mineralization is present as coffinite, a black uraniferous silicate mineral. The host sandstones are composed of quartz, feldspars, and rock fragments with locally occurring carbon fragments. Grain size ranges from very fine-grained to small granules. The sandstone is weakly to moderately cemented and friable. Occasional occurrences of pyrite and calcite as cementing materials can be observed. The uranium is deposited on individual detrital sand grains or on and within authigenic clays in the interstices. The interstitial clays present are primarily montmorillonite with lesser amounts of kaolinite and smectite. Hematite is a common oxidation product of pyrite within the host rock, along with minor limonite. Accessory biotite and muscovite are also present.	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 3.3.2.1 p. 3-6 (TR)	In 2010, Cameco conducted a detailed mineralogical study on two North Butte cores at the Cameco Research Center at Port Hope, Ontario. The new mineralogical studies confirmed that the predominant mineral in the formation is coffinite. Mineralogical characterization of the North Butte ore was done using bulk energy dispersive X-ray analysis (EDX), X-ray diffractometry (XRD) and microscopy of polished sections of unbroken ore pieces, and	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz

			porosimeter measurements. The XRD results indicated that quartz, albite, the K-feldspars microcline and orthoclase as well as the phyllosilicates chlorite and muscovite/illite are the primary gangue minerals. XRD results confirmed the arkosic nature of the sandstone. The Scanning Electron Microscope/EDX work showed the trace mineral content to be highly variable. The occurrence of unoxidized heavy minerals such as ilmenite and magnetite as well as leucoxene and limonite indicates that overall, the sandstone was not strongly affected by weathering and diagenetic alteration. This conclusion is also supported by the relatively high amount of unaltered feldspar in the rock and some delamination and alteration of micas. Trace amounts of elemental selenium and ferroselite were identified as selenium-bearing minerals, and in one sample, trace amounts of nickel-arsenic-bearing pyrite were identified. Thorium minerals were present in both drill cores and may have influenced some of the radiometric drill hole logging data. The uranium mineralization is fine grained and predominantly within the sandstone matrix. It often forms coatings on the sandstone detritus above or below layers of clay minerals that appear to be commonly of chloritic to montmorillonitic composition. Other than clay and regular detritus, uranium mineralization was also associated with iron-titanium minerals, pyrite, zircon, calcite and carbonaceous material. The predominant uranium mineralization is coffinite associated with tyuyamunite with a minor component of uraninite associated with tyuyamunite.	documents will provide the basis of the operating plan.
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 3.5.1.1 P. 3-21	In both the five-spot and seven-spot patterns, the spacing of the wells will vary, but the completion of each well will be similar allowing each well to be used as either an injector or recovery, depending on the configuration of the ore and economic considerations	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 3.5.1.2 p. 3-21	As many as five types of monitor wells may be used. The actual density, spacing and location of monitor wells vary from mine unit to mine unit and will be determined during the orebody delineation and defined in the Hydrologic Testing Proposal document for each mine unit. "M" wells are installed in the ore sand aquifer, laterally from the production zone, to detect lateral movement of lixiviant from the ore zone. In accordance with LQD Rules and Regulations Chapter 11, Section 6(h)(iv) and LQD Guideline 4, Section C. 5. B. and Attachment II of Guideline 4, the location and spacing of these wells will be determined by a technically sound method which may include, but not be limited to, hydrologic modeling, delineation drilling data, gradient consideration, dispersivity of recovery fluids, the calculated operational flare and calculated excursion recoverability within 60 days. The density and spacing of M wells is determined for each mine unit during the detailed geohydrologic assessment of each mine unit.	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.

			"MO" wells are installed in the next overlying aquifer to detect vertical migration upward of lixiviant from the ore zone. One MO well is installed for each hectare (3 acres) of proposed pattern area. "MU" wells are installed in the next underlying aquifer, if existent, to detect vertical migration downward of lixiviant from the ore zone. One MU well is installed for each hectare (3 acres) of proposed pattern area. "MP" wells are installed in production zone pattern areas to characterize the baseline quality of the groundwater within the ore zone. One MP well is installed for each hectare (3 acres) of proposed pattern area. Class of Use and RTVs are established for the MP wells using the baseline water quality data as described in Section 3.4.4. Detailed discussions of the production zone geology and hydrogeology for each mine unit is provided in WDEQ Permit Appendices D-5 and D-6 for Smith Ranch, North Butte Remote Satellite and Gas Hills Remote Satellite. "MT" wells, although optional, may be installed near pre-existing conventional mine workings or areas where it is known that the adjacent groundwater quality will be significantly different from what is present in a particular Mine Unit. This type of well can also be used as an early warning of a potential excursion. For this purpose, MT wells are typically located between the pattern edge and the "M" wells. Water quality data from these wells is not reportable to the agencies. The use of these wells is a preventative measure to allow greater operational control of recovery fluids and to decrease the possibility of an excursion reaching a reportable monitor well. The actual density, spacing and location of monitor wells will vary from mine unit to mine unit at each facility and will be determined during the hydrologic testing and assessment of each mine unit.	
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 3.5.2.1 p. 3-22	Several types of wells are installed at the Smith Ranch Project SUA-1548 license areas. These include injection wells, production wells and monitor wells. All wells are constructed in such a manner to ensure that the well annulus is sufficiently sealed to prevent communication from the production zone to overlying and underlying aquifers that have been penetrated by the well. All wells will be constructed in accordance with WSEO, WQD and LQD rules and regulations. Multiple completion zone wells will be installed at Smith Ranch and the Gas Hills Remote Satellite. In June 2011, the WSEO revised Part III, Chapter 3, Section 2(c)(ii) to state: "All wells shall be constructed with at least a 5 centimeter (2 inch) annular space surrounding the outermost casing and extending not less than 6 meters (20 feet) below ground surface (bgs)". Additionally, LQD Rules and Regulations Chapter 11, Section 6(c)(i) states: "The drill hole shall be of sufficient diameter for adequate sealing and, at any given depth, at least 7 centimeters (3 inches) greater in nominal diameter than the diameter of the outer casing at that depth". Cameco ensures that the annular space of all wells drilled meets the above requirements.	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 3.5.2.2 p.3.23	The typical well casing used is rigid PVC Standard Dimension Ratio 17 (SDR-17) with a nominal 13 centimeters (5 inches) outside diameter (Certainteed or similar). However, should a larger pump size be required, larger diameter casing may be utilized. Each joint of PVC	This will be the operating plan when the License Renewal is approved by the

			casing typically has a length of approximately 6 meters (20 feet) and a wall thickness of 0.7 centimeters (0.3 inches). The pipe is rated for 1.1 MPa (160 pounds/inch^2) maximum internal pressure (i.e., working pressure including safety factor) and 2 MPa (224 pounds/inch^2) for resistance to hydraulic collapse (i.e., external pressure where the casing fails). The maximum working pressure is the pressure rating for the pipe and does not take into consideration the cement backing in the well. The collapse pressure is important during well cementing and development. Once the grout has cured around the annulus of the casing, the collapse pressure caused by the slurry is eliminated. The current casing is joined mechanically using pipe threads or a water tight O-ring seal with a high strength nylon spline. Metal screws, *although used in the past,* are not used to support the joining of casing sections. Alternative casing materials, such as fiberglass or steel, may also be used as long as they meet applicable standards of the American Society for Testing and Materials (ASTM) and American Petroleum Institute (API) specifications for well casing and are found suitable for the required service. Well siting and construction are in accordance with LQD Rules and Regulations Chapter 11, Section 6(b) through (g). The top of each well casing ends above grade, and where possible, above any known high water conditions of flooding from runoff or ponded water. The immediate area around each well collar slopes away from the well to direct surface runoff away from the well. Wells are not located in the channel or floodplain of any perennial or intermittent drainage. If wells must be located in ephemeral drainages, they are not located in the flow course. Precautions will be taken during installation to minimize damage to the channel from erosion and sedimentation, protect the well from damage due to erosion, and prevent surface runoff from entering the well. This is typically ensured by keeping well locations several feet away from the streambed and utilizing appropriate best management practices (BMP) to prevent sedimentation into the channel and erosion. A temporary channel diversion may be required. The primary sediment/erosion control measure is to re-establish a vegetative cover as soon as possible after well completion using a temporary seed mix followed by interseeding with the permanent seed mix. Until a vegetation cover has been established, temporary sediment and erosion control measures are implemented. These temporary measures may include silt fences, rock check dams, sediment traps, contour ditches, mulch, geotextile fabric or other BMPs as deemed appropriate for the particular situation. When not in use, each well is covered with a well cap to prevent the introduction of undesirable materials into the well. Injection and production wells utilize insulated hard covers to protect the well head during inclement weather conditions. Wells are clearly marked as to their identification. The surrounding area of each well head is kept clear of excessive vegetation and/or debris so that well identification is clearly visible. Wells constructed near buildings or power lines are located at a distance from the building or power line to allow access for repairs, maintenance, sampling, etc. At a minimum, a well must clear any building projection by at least 1 meters (3 feet) and any power line by at	NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.

			least 3 meters (10 feet).	
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 3.5.2.3 p. 3-23	The following well completion techniques will be utilized at all SUA-1548 license areas: 1. Two completion techniques include the following: A pilot hole (nominally 13 centimeters[6 in] in diameter) will be drilled through the ore zone by use of a rotary drill and a drilling mud system. The second method employs the use of a larger bit (Polly Diamond Carbide [PDC]) that provides an annular space adequate to meet the WSEO and LQD requirements. Drift control will be maintained using weighted drill collars and close supervision during drilling. The drill holes will not be drilled into the underlying confining unit by more than 2 to 3 meters (5 to 10 feet). 2. The drill hole is then geophysically logged using tools including natural gamma, spontaneous potential, and single point resistance to determine lithology, grade, thickness and distribution of the ore. Deviation logs will be run to determine the location of the bottom of the hole. 3. Upon verification that the well location is suitable for its intended purpose, the pilot hole will be reamed to a nominal diameter that provides an annular space adequate to meet the WSEO and LQD requirements described in Section 3.5.2.1. Holes drilled with PDC do not require reaming. 4. Prior to installing the casing, the borehole will be circulated with water or drilling mud to remove loose drill cuttings, rock chips or other obstructions. 5. The hole will be cased with a nominal 11 to 15 centimeters (5 to 6 inches) diameter SDR-17 PVC well casing. Fiberglass or steel casing may also be used. The casing will extend from the top of the target zone to approximately 0.6 meters (2 feet) above ground level. Each joint of SDR-17 casing will be connected by a water tight O-ring seal which is locked with a high strength nylon spline. No glue or screws will be used with these types of well casing materials. Centralizers will be placed at a maximum spacing of one per 12 meters (40 feet to ensure there is sufficient annular space for the placement of the "sealing" grout. 6. Pursuant to LQD Rules and Regulations Chapter 11, Section 6(c)(iv), the casing will be grouted in place with a neat cement slurry, sand-cement grout, or bentonite-clay mixture as approved by the LQD Administrator. Casing may also be grouted in place with a cement-bentonite grout slurry or cement-pozzolan grout slurry as approved by the LQD Administrator. The grout slurry will be pumped down through the casing and up the annulus of the well at a rate adequate to maintain turbulent flow in the slurry to prevent channeling. The cement within the casing will be displaced with a volume of water or drilling mud sufficient to displace the cement to the surface. A wiper plug may also be used to displace the grout slurry. The	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.

			well casing will be pressure sealed with the casing secured in place, and the sealing grout will be allowed to cure for approximately 24 hours. Maintaining the pressure inside the well casing ensures that the sealing material remains in the annulus until it is cured. 7. After curing, the well annulus at the surface is topped off with additional sealing material. If, during well sealing procedure, the grout slurry does not return to the surface, or settling during curing is more than 12 meters (40 feet), a tremie pipe will be used to complete the sealing to the surface to ensure that bridging does not occur. If casing is set above the production zone, the wiper plug or sealant column in the bottom of the casing will then be drilled out. If casing is set through the production zone, then the wiper plug or sealant will be left in the bottom of the casing. An under-reaming tool will then be lowered into the well creating a cavity approximately 28 to 36 centimeters (11 to 14 inches) in diameter where the well screen will be placed. 8. The well screen will then be lowered through the casing and secured within the casing joint above the screen interval using a K packer assembly. Depending on the competency of the formation and/or the proposed use of the well, the annulus outside the well screen will either be gravel packed or left for natural well development (eg., monitor wells). 9. If gravel packed, a properly sized silica sand filter pack will be pumped from the surface through the drill pipe and out through a one-way valve, located at the bottom of the screen assembly, into the under-reamed zone to form a filter pack around the screen. 10. After well completion, casing integrity will be verified by conducting the approved MIT. If defects are found, they will be repaired. If repairs are not possible, the well will be plugged and abandoned and may be replaced with a new well. 11. The completed well will then be developed by pumping and surging formation water using methods such as swabbing and/or pumping. A well construction completion report will be prepared for each well, and will be maintained on site for review by LQD.	
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 3.5.2.4 p. 3-25	In areas of overlapping multiple ore trends contained within one or more isolated stratigraphic horizons, alternative well completion techniques such as recompletions or twinning may be used to mine ore trends that occur in multiple stratigraphic horizons. Ore trends that occur in stratigraphically multiple horizons may be reached by recompletion of wells used to produce from the initial production zone. Wells will only be recompleted after the initial ore zone and any of its adjacent stratigraphically equivalent zones have been depleted. Ore trends that occur in multiple stratigraphic horizons may be mined	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.

			by installation of twinned wells and operated in accordance with this section.	
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 3.5.2.7 p. 3-25	All cased wells are tested for integrity following completion and prior to their initial use in accordance with EPA techniques to ensure there are no significant leaks in the casing and no significant movement of fluid into an unauthorized zone. The integrity of the wells is retested on a schedule of at least once every 5 years. Wells are also tested after undergoing any physical alteration from under reaming or after any workover operation involving the use of a cutting tool that may have caused casing damage. Integrity testing will also be performed on any well that may be suspected to be damaged from any operational issues that may arise, such as over-pressurization of the well. If a monitor well is converted to an injection or recovery well, it will be tested for mechanical integrity prior to the conversion and will be retested at 5-year intervals. Only MIT techniques that have been approved for use by the EPA are used. The primary method consists of a pressure-packer system approved by the EPA for Class III ISR injection wells constructed with PVC or fiberglass casing. Alternative MIT methodologies summarized below may be acceptable only if they have been approved by the EPA, LQD and NRC. 1. The primary MIT procedure is as follows: One or two inflatable packers will be installed in the casing. The bottom packer will be set just above the well screen, and the upper packer will be set at the wellhead. Alternatively, a well cap can be used at the wellhead instead of the upper packer. 2. The packer(s) will be inflated and the casing then pressurized to 125% of the expected maximum operating pressure. 3. The well and packer system will then be "closed in", and the pressure maintained for a minimum of 10 minutes. 4. If more than 10% of the "closed in" pressure is lost during this time period, the well will be deemed unacceptable for use, and will be repaired and retested, or plugged and abandoned within 120 days. At no time will Cameco use an injection pressure greater than 90% of the pressure rating of the casing. Upon passing the MIT, a well will be deemed acceptable for service. Any Class III injection well failing the MIT will be retested. If the well fails the second test, the well will be repaired or plugged within 120 days of the testing which indicates a lack of mechanical integrity. If the well is repaired rather than plugged, the MIT will be repeated within 120 days after the repair has been completed. The repaired well will not be used for injection purposes until written notification has been received from the applicable regulatory agency concurring that the well demonstrates mechanical integrity. All MIT results will be documented and maintained on file at the Project site.	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.

Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 3.5.2.8 p. 3-26	Prior to drilling an exploration, delineation or well pilot drill hole, topsoil will be removed from the mud pit location and stockpiled on native ground at a sufficient distance to avoid impacts by drilling activities. Subsoil excavated from the mud pit will be stockpiled on native ground, separate from the stockpiled topsoil and near the mud pit Drill sites located on steep slopes such as those proposed for the Gas Hills Remote Satellite will require excavation of a pad, and access route as well as the mud pit. Topsoil will be stripped from the pad, mud pit and access road and windrowed to the uphill side of the drill hole location. Subsoil excavated from the mud pit will be stockpiled next to the pit and downhill from the topsoil stockpile. The drill rig and water truck will then move onto the site and drill the hole. Cameco has developed and implemented BMPs that will be used during drilling and well installation activities to minimize impacts to vegetation, topsoil and the general environment. These BMPs aresummarized below. 1. To minimize vegetation and topsoil disturbance, access routes to each drill location or group of locations will be plainly marked with survey stakes or similar types of markers. Vehicles will be required to travel only on these designated access routes and existing roads and trails. Should the designated access routes become compacted from use, they will be scarified and seeded as part of the drilling reclamation program. 2. To the extent possible, crossing perennial and intermittent drainages with drill equipment and vehicles will be avoided. If it becomes necessary to cross a drainage to reach a drilling Cameco Resources Smith Ranch Project Technical Report – February 2012 Nuclear Regulatory Commission Source Material License No. SUA-1548 Renewal Page 3-27 site, a stream crossing will be constructed at right angles to the channel with adequate embankment protection and installation of properly sized culverts. 3. Mobilization of the drill rig from hole to hole during exploration and delineation drilling activities will be restricted to dry or frozen ground conditions. 4. Drill rigs will be inspected by the contractor prior to project startup and daily during the project; any leaks will be repaired prior to drilling. 5. Spill containment and cleanup equipment, such as drip pans, absorbent cloths, dams, etc., will be readily available at each drill site. In the event of a spill (not contained by the drip pan) by drilling rig malfunction(s), drilling will be suspended, all contaminants will be cleaned up before drilling resumes. 6. All petrochemicals will be stored in approved containers. 7. Site clearing and preparation will be minimized to the extent possible to avoid excessive surface disturbance. However, drilling sites located on extremely steep slopes may require excavation of a level drill pad as well as an excavated access route into the location. Stripped topsoil will be windrowed to the uphill side of the drill site and access road. Subsoil excavated from the mud pit will be stockpiled next to the pit and downhill from the stockpiled topsoil. The surface disturbance footprint for each delineation drill hole, excluding access routes, will typically be approximately 74 meters2 (800 feet2). Each drill hole site will have an earthen mud pit excavated with a backhoe and sized to contain the drill cuttings and drilling fluid from the proposed total depth of the hole. Topsoil will be removed from each mud pit location and stockpiled on native soil at a sufficient distance to avoid impacts by the drilling activities. Topsoil stockpiles will be cordoned off and marked with flagging or other signage. A tackifier may be applied to topsoil stockpiles rather than other control measures to prevent migration by	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.

			sedimentation. Subsoil excavated from the mud pit will be stockpiled on native soil separate from the stockpiled topsoil and near the mud pit. 8. All drill hole, well sites and access roads will be located, constructed and maintained to minimize erosion. BMPs to minimize erosion and offsite sedimentation will vary with specific site conditions, such as slope, vegetative cover and proximity to surface waters of the state. BMPs may include silt fencing, straw bales, vegetation buffers, slope roughening, mulch, geotextile fabrics, and other measures designed to reduce erosion and minimize the transport of sediment from the disturbed area. 9. No drill holes or wells will be installed within 30 meters (100 feet) of the edge of any perennial or intermittent drainage without first consulting with Cameco's environmental staff to determine the specific spill and erosion protection measures to be implemented at each drilling location.	
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 3.5.2.9 p. 3-27	All drill holes will be abandoned in accordance with W.S. 35-11-404 and LQD Rules and Regulations Chapter 8 and Chapter 11, Section 8 using an approved abandonment material. The abandonment material will be mixed with water and circulated through the drill pipe filling the drill hole from bottom to top. The mixed abandonment fluid will have a 10 minute gel strength of at least 20 pounds/100 foot2 and a filtrate volume not to exceed 13.5 cc. Each drill hole will be completely filled to the collar of the hole or securely capped at a minimum depth of 0.6 meters (2 feet) below either the original land surface or the collar of the hole, whichever is at the lower elevation. If capped, the cap will be made of concrete or other material satisfactory for such capping. A metal tag with the drill hole number stamped on it will be affixed to the top of the cap for future hole identification. The remaining hole above the cap will be backfilled to the original land surface. If the hole cannot be plugged immediately after probing, it will be securely covered until plugging is performed. Following abandonment of the drill hole, the mud pit will be allowed to dry out prior to backfilling. After backfilling the pits with subsoil, the pits will be allowed to settle before applying topsoil and performing final grading. Compaction may be used to further reduce potential settling of reclaimed pits. Steep slope sites and access routes will be reclaimed using a dozer, track hoe or similar equipment to minimize thesurface disturbance. Those drill sites that will become part of a mine unit within 1- year of drilling the hole will not be seeded until wellfield construction is complete. Those sites that will not become part of a mine unit within one year will be seeded after mud pit reclamation is complete. In either case, seeding will take place during the next available seeding window, spring or fall. All seeding is completed using the approved permanent seed mixture.	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 3.5.2.11 p. 3-28 (TR)	The well stimulation method or work over program typically utilizes well swabbing. The well swabbing program involves pulling a swabbing cup up the well, thereby lifting the column of fluid above the swab tool to the surface. This reduces the pressure beneath the swab and pulls water from the formation at the screened interval into the well, in effect "flushing", and thus cleaning the screen. The flushed fluids will be captured in an enclosed water tank and disposed of through the waste water treatment system.	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 3.5.3.1 p. 3-28-	The selection of an appropriate ISR lixiviant must take into consideration the effectiveness of the lixiviant reagents to mobilize the uranium minerals, the cost and availability of those reagents, their effect	This will be the operating plan when the License Renewal

		29 (TR)	on other minerals present in the uranium orebody, and their impact on the ore sand aquifer relative to the achievement of groundwater restoration. Since the mid-1980s, virtually all uranium ISR operations in the United States have utilized a lixiviant containing oxygen gas or hydrogen peroxide as an oxidant, carbon dioxide gas or sodium bicarbonate as the uranium complexing ion, and with mineral acids or bases for pH and bicarbonate/carbonate ratio control. The lixiviant at Cameco's Wyoming operations consists of native groundwater fortified with a carbonate complexing agent of sodium carbonate, sodium bicarbonate and/or carbon dioxide and an oxidant consisting of oxygen or hydrogen peroxide. The target concentrations of oxidant and complexing agents are typically less than 1 g/L oxygen and less than 5 g/L bicarbonate The amenability of the North Butte orebody to ISR is assured by the similarity of this ore deposit to those located in the surrounding area. Both the Ruth ore deposit to the south and the Christensen Ranch ore deposit to the west were tested using standard ISR technology and a sodium bicarbonate/carbonate, oxygen enhanced lixiviant. Both of these deposits, as well as Irigaray to the northwest, Reno Creek to the southeast, and Smith Ranch to the south have demonstrated excellent amenability to in situ extraction methods. The clay mineralogy at North Butte is predominantly chloritic to montmorillonitic, which can exchange ions with percolating fluids. Cameco's lab testing program has shown that the effect of sodium exchange on the clays is more profound at higher pH and sodium concentrations. Higher pHs (above 9) tend to be more prone to cause clay swelling problems. The operating pH for the North Butte Remote Satellite will be 7 to 7.5. Additionally, operating experience at Christensen Ranch, Smith Ranch Satellite SR2, and Crow Butte Resources using a sodium bicarbonate lixiviant has shown that the projects can be successfully operated and restored without adverse effects on the formation.	is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 3.5.3.2 p. 3-31 (TR)	Uraninite and coffinite have been shown to be effectively mobilized during ISR by a two stage process. The first stage is the oxidation of U+4 to U+6, which can be accomplished by any oxidizing reagent that increases the redox state from negative to positive. The second stage is the complexation of the oxidized uranium so that it can be carried in the recovered groundwater. This can be accomplished with any number of anions, including bicarbonate, chloride, and sulfate. The most common and efficient complexing anion has proven to be bicarbonate. Based on more than 20 years of operating experience, Cameco has developed an efficient and cost-effective carbonate leaching solution consisting of varying concentrations and combinations of sodium carbonate (Na2CO3), sodium bicarbonate (NaHCO3), oxygen (O2), H2O2, and/or CO2 added to the native groundwater. Uranium in the U+4 oxidation state is extremely insoluble in water at near neutral pH. Therefore, the first step in uranium ISR is to increase the oxidation potential of the groundwater in contact with the uranium from less than zero to greater than zero. This redox reaction is typically accomplished by adding gaseous oxygen or hydrogen peroxide. The basic uranium oxidation step using oxygen gas can be represented by the following reaction: (1) 2UO2 (s) + O2 (g) = 2UO3 (s) The oxygen can also be provided by hydrogen peroxide. Hydrogen peroxide decomposes rapidly tooxygen and water by the following reaction: (2) 2H2O2 (l) + H2O (l) = O2 (g)	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.

			+3H2O (l) Therefore, the choice of gaseous oxygen or liquid hydrogen peroxide is mostly based on cost. However, it should be noted that the theoretical solubility of oxygen gas in water, which is temperature and pressure dependent, is limited by the following relationship: (3) ppm O2 = (170 P)(1.082 – 0.0304 ln P)/35.5 + T where P is pressure in psi (actual) and T is temperature in degrees Celsius. Where limited head (i.e., water pressure) is available above the ore to allow dissolution of adequate gaseous oxygen, hydrogen peroxide may be selected. Following oxidation of the uranium minerals as represented by reaction (2) above, the uranium is in the oxidized U+6 valence state and is now soluble in water and capable of combining with a complexing anion. As discussed above, the complexing anion of choice is the bicarbonate ion. The bicarbonate ion may be introduced into the lixiviant by adding a solution of sodium carbonate into the natural groundwater. The addition of the sodium bicarbonate solution adds operational flexibility by maintaining the bicarbonate at optimal levels for the best leaching conditions. The addition of sodium bicarbonate provides a measure of operational safety by limiting the maximum possible pH of the injection solution to 8.5. A second method for introducing bicarbonate into the lixiviant is by injection of gaseous CO2 which causes the dissolution of carbonate from the contained formation calcite and creates a slight acidic condition in the lixiviant. If calcite (CaCO3) and CO2 are present in adequate quantities, the following reactions take place: (4) CO2 (g) + H2O = H2CO3, which lowers the pH of the lixiviant, and (5) CaCO3 (s) + H2CO3 = Ca2+ + 2HCO3. Bicarbonate (HCO3) formed by the addition of CO2 is the least expensive on a molar basis and creates minimum geochemical disturbance with no attendant clay swelling. The complexation reactions that occur between the oxidized uranium minerals and the bicarbonate complexing agent can be represented by the following reaction: (6) UO3 + 2HCO3 = UO2(CO3)2-2 + H2O, which shows the dissolved oxidized uranium species to be the uranium bicarbonate ion. This oxidized species is highly mobile in water at a near neutral pH.	
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 3.5.3.3 p. 3-35 (TR)	The facility layout and pipeline systems have been designed to facilitate production and allow restoration activities to begin as soon as production has ceased within a mine unit or a portion of a mine unit. Production and restoration flow to and from the satellite and header houses of each mine unit will be through separate but parallel pipelines. This arrangement, along with the central water treatment design, allows for minimization of groundwater use, particularly during concurrent production in one mine unit, aquifer restoration via groundwater sweep in another, and water treatment and reinjection in possibly a third. Excess water from any mine unit may be utilized in another mine unit (i.e. for RO make-up). This design also assists in the minimization of necessary disposal volumes and associated facilities. All mine unit pipelines are constructed of high density polyethylene (HDPE). The size of the pipe varies from 5.1 to 7.6 centimeter (1.25 to 2 inch) in diameter (well to header house) to as much as 45.7 centimeter (18 inches (main trunklines to and from the satellite). All pipelines are pressure tested for leakage prior to use. The smaller diameter piping used to connect individual wells with the header houses are typically one continuous run of pipe with no field joints, which greatly reduces the potential for leakage in the burial trench. The larger diameter piping has joints that are welded together using a manufacturer approved butt fusion technique. All buried pipelines are installed a minimum of 0.14 meter (5.5 feet) bgs to protect from freezing. Protection from vehicle vibration	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.

			damage is pursuant to design guidelines provided by the Plastic Pipe Institute in their *Handbook of Polyethylene Pipe, Second Edition.* Chapter 6, Section 3 of the manual provides the criteria to be used to prevent piping damage due to vehicle loading. Utilizing the Standard Trench or Embankment Installation Category, which applies to pipes installed with between 45.7 centimeter and 15.2 meters (18 inch and 50 feet) of cover, the pipe must have a minimum cover of at least one pipe diameter or 45.7 centimeter (18 inches), whichever is greater. The Campbell County regulations will be used for the North Butte, and Ruth Remote Satellite pipeline construction. Fremont, Johnson and Converse Counties do not have specifications for buried pipelines; however Gas Hills Remote Satellite will also follow the Campbell County regulations. A smaller pipeline, called the cleanout line, may be used to carry waste water produced by well cleaning operations from the mine unit to the satellite for uranium removal prior to being directed to the waste treatment system. A separate pipeline may be used to carry oxidant from a centralized location in the mine unit or near the satellite to the mine unit header houses for introduction into the barren lixiviant prior to injection.	
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 3.5.3.4 p. 3-34 (TR)	During the operational phase of an ISR facility, approximately 99% of the water withdrawn is returned to the ore zone. Thus, the impact on regional pressure changes, groundwater gradients and flow paths is minimal. Pressure changes are generally limited to localized gradients to control flow between injection and production wells. The ISR process is operated as a closed system, with the injection rate to the mine unit maintained below the total production rate from the mine unit. The water which is removed from the mine unit is referred to as bleed or purge. The bleed creates a hydrologic cone of depression within the production zone which prevents the unwanted migration of lixiviant away from the production area. The bleed is removed from the closed system after the lixiviant passes through the IX columns for uranium removal. The volume of bleed required to maintain a zone of control around a mine unit is dependent in part on the hydraulic gradient. Typically, the steeper the hydraulic gradient across the mine unit, the greater the bleed rate must be to maintain the same zone of control. The bleed rate typically varies from 0.5% to 1.5% across a mine unit, and is distributed across the mine unit based on an engineering design that considers geologic and hydrologic factors unique to each situation. Fluid volumes removed during well work-over activities also contribute to the total bleed. At Smith Ranch and North Butte, this excess water will be disposed using deep disposal well injection and/or land application (Smith Ranch only). At Gas Hills, the excess water will be disposed of using evaporation ponds, but Cameco is also investigating the efficiency of utilizing deep deposal well injection. The disposal options at Ruth have not yet been developed but will likely be a combination of the same options being used at the current and planned operations. Injection pressures within well casing above the ground surface as well as associated wellhead piping are typically less than 0.82 MPa (120 psi) and will always be at least 10% below the pressure rating of the casing. Because the well casing is cemented into the bore hole, downhole pressures can substantially exceed the pressure rating of the casing	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.

			without adversely affecting the integrity of the casing.	
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 3.5.3.4 p. 3-36 (TR)	Production well flow rates will vary from well to well depending on screen thickness, the variable hydraulic characteristics of the ore zone aquifer, the available hydraulic head, the depth to the ore zone, the flow rates of associated injection wells, and the capacity of pumps. Production well flow rates range from 0.013 to 0.10 liters/minute (5 to 40 gallons/minute), and injection well flow rates range from 0.005 to 0.08 liters/minute (2 to 30 gallons/minute). To maximize resource extraction and to maintain hydrologic control, each mine unit is normally operated at the maximum sustainable flow for each pattern. This maximum flow rate is adjusted to maintain an adequate head on the ore zone aquifer such that the oxygen and carbon dioxide in the lixiviant remain in solution. Once each day the flow rates for each injection and production well is measured and recorded. These measurements are compared to targets for each well, and the rates are adjusted to maintain the mine unit pattern balance. The required flow rates are determined by the well balancing program and the actual flow rates are adjusted, if required. The adjusted flow rates are re-entered into the program and the required flow rates recalculated. Header house flow data are recorded and delivered to the Wellfield Operations Superintendent or designee. The Wellfield Operations Superintendent is responsible for maintaining these data and the mine unit balance.	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 3.5.3.6 p. 3-37 (TR)	Each production well is protected by a flange mechanism installed on the well head and by a fiberglass or plastic well cover installed over each well. Each well house is clearly marked for ease of well identification. Debris or refuse are routinely removed from mine unit pattern areas to facilitate access by mobile equipment. Access is maintained to each well site to facilitate routine well maintenance or monitoring, including potential re-entry to a well by a drill rig.	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec 3.5.3.7 p. 3-37 (TR)	The uranium which is present in the orebody represents only about 0.1 weight % of the rock, or about 0.03 volume %. The ore minerals occur between the sand grains, in the interstitial pore spaces of the rock. Because the lixiviant is specific for uranium minerals, it will not dissolve any constituents of the host rock. Because of the very low volume percentage of the uranium minerals, the leaching process does not affect the structural integrity of the host rock. Therefore, no void spaces are created by ISR, and no subsidence due to ISR is anticipated. There has never been an incidence of surface subsidence due to ISR at Smith Ranch during the more than 20 years of operation.	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 3.6.3.1 p. 3-51 (TR)	The surface facilities at the North Butte Remote Satellite will include the wellheads, header houses, buried pipelines, overhead and buried power lines, facilities access roads, deep disposal wells, surge ponds and the satellite IX building. The satellite building is located in the NE¼ Section 24, T44N, R75W. The building will occupy approximately 2,378 meters (25,600 ft^2) and will be designed to operate with a maximum flow of 22,680 liters/minute (6,000 gallons/minute) during	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and

			operations. Mineral processing and water treatment facilities will be located at the satellite facility shown on **Figure 1.10**. The water treatment facilities will include the surge ponds, also shown **on Figure 1.10** Map. The detailed design and design report for the surge ponds are provided in **Appendix D, North Butte Surge Pond Design.** Pipeline and power lines will follow access roads. **Figure 1.10** depicts the proposed locations of main and secondary access roads. Additional detail and wellfield access roads for Mine Unit No.1 are shown on **Figure 3.35, Primary and Secondary Access Road Construction.** As shown on **Figure 3.35** power lines and pipelines will run along opposite sides of the access road right-of-way. Power lines will be constructed to meet current codes for wildlife protection. Pipelines within the mine unit wellfields and from the header houses to the main collection and distribution lines will nominally be 20 centimeters (8 inch) in diameter or smaller. The main collection and distribution pipelines will nominally be up to 61 centimeters (24 inch) in diameter. The main pipeline corridor will house up to eight lines to facilitate water handling, treatment, recycling, and groundwater restoration. The location of the satellite facility is shown on **Figure 1.10**.	Pathfinder/Uranerz documents will provide the basis of the operating plan.
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 3.6.3.3 p. 3.52 (TR)	The four primary process waste water streams for North Butte are the same as that for the Smith Ranch satellites. All of these waste streams will be combined and treated in the satellite as follows: 1. Filtration to remove suspended solids; 2. Disposal via a Class I UIC injection well(s). In addition to the disposal wells, two surge ponds will be installed to assist in the waste water disposal. **Figure 3.36, North Butte Waste Water Treatment Schematic** provides a schematic describing waste water treatment at the North Butte Remote Satellite.	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 3.6.3.3 p. 3-52 (TR)	Cameco has an existing Class I UIC permit for two deep disposal wells. Currently, (January 2012) Cameco is drilling one test well at the North Butte Remote Satellite in preparation for installing the two disposal wells future operations. The North Butte Remote Satellite will ultimately have four Class I UIC wells. The installation of these wells will be staged to be installed as needed for operation and restoration requirements. The proposed location of these wells is shown on **Figure 1.10**. Each disposal well will be equipped with a high-level shutoff switch on the injection tubing to prevent operation of the injection pump at pressures greater than the limiting surface injection pressure. Additionally, each well will be equipped with a low pressure shut-down switch on the surface injection line that will deactivate the injection pump in the event of a surface leak. Finally, each installation will include a high/low pressure shut-down switch with a pressure sensor on the tubing/casing annulus. This switch will stop the injection pump in the event of either a tubing leak or a casing, packer or wellhead leak. This instrumentation and control system will provide the best protection against process waste water spills to the environment by limiting the amount of fluid released and providing immediate indicators of potential well integrity issues. Back-up for the automatic emergency shut-down systems will include local displays and instrumentation metering in the satellite control room	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.

			and at the wellhead building. Additionally, inspections of the disposal well systems will be performed once per shift. **Figure 1.10** shows the disposal well equipment layout within the satellite. In addition to the disposal wells, two surge ponds will be installed to assist in the waste water disposal. **Figure 3.36** provides a flow chart for the waste water disposal system and **Figure 3.37, North Butte Disposal Well Building Layout** describes the disposal well building layout.	
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 3.6.3.3 p. 3-52 (TR)	The North Butte Remote Satellite design includes the construction of a surge pond to contain waste water from the satellite facility. The overall pond dimensions will be approximately 85 meters by 104 meters (280 feet by 340 feet) and will be divided into two cells. The cell bottoms will have approximate dimensions of 15 meters by 37 meters (50 feet by 120 feet) and the pond side slopes will be constructed at 3:1. The majority of the pond will be below grade and the second cell will provide redundancy. The pond location is shown on **Figure 1.10**. Pond design details, the geotechnical investigation and final design report are provided in **Appendix D**. Additional information, including operations and maintenance recommendations and closure requirements are included in the same attachment. The ponds will have a double synthetic liner with a leak detection system between the two liners. The upper liner will consist of a 60 mil HDPE liner and the lower liner will consist of 40-mil HDPE. Underlying the lowest synthetic liner will be 1 meter (3 feet) of compacted clay. The leak detection system will consist of a perforated 5 centimeter (2 inch) diameter collection pipe system with a sump (well) as presented on the design drawings (**Appendix D**). The sumps will be monitored every two weeks for the presence of fluid as long as the ponds are in use. The design of the ponds has met the guidance provided in NRC Regulatory Guide 3.11, "Design, Construction and Inspection of Embankment Retention Systems at Uranium Recovery Facilities" and the standards provided in 10 CFR Part 40, Appendix A, Criterion 5(A). It should be noted that the standards and requirements referenced above apply to tailings impoundments and some of the requirements are not applicable to the design of surge ponds. Evaluation criteria for selection of the liner system included: 1. The liner material's physical and chemical inertness to the materials to be stored in the ponds; 2. The top liner's physical and chemical inertness to ultra violet exposure; and 3. Method of placement, seaming requirements and puncture resistance.	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 3.6.3.4 p. 3-54 (TR)	The North Butte Remote Satellite building will house IX columns, water treatment equipment, resin transfer facilities, pumps for injection of lixiviant, disposal well equipment, RO units and bioremediation materials for groundwater restoration, a laboratory area, offices, and an employee break room. The IX system consists of ten fixed bed IX vessels. The IX vessels will be operated as four sets of two vessels in series with two vessels available for restoration. WDEQ Figure OP-13 shows the equipment layout for the proposed satellite building. CO_2 and O_2 will be stored in compressed form adjacent to the building or in the mine unit areas. Header house and main trunkline instrumentation and	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of

			control for the North Butte Remote Satellite are similar to that described in Section 3.6.1.4.	the operating plan.
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 3.6.4.2 p. 3-55 (TR)	The resin loading/elution circuit will be the same as described above for the Smith Ranch satellites and the North Butte Remote Satellite	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 3.7.1.2 p.3-65 (TR)	The North Butte Remote Satellite can be accessed from State Highway 50 near Savageton. From Highway 50, travel is west and south on Van Buggenum Road, then Christensen Road (approximately 10 kilometers or 6 miles) to an existing oil field road owned by T-Chair Ranch. There will be two main access routes to the site that will utilize the T-Chair Road. To access the site from the northeast side of the permit boundary, travel along the T-Chair Road for approximately 2.1 kilometers (1.3 miles). At that point turn north onto a graveled CBM road and travel approximately 1.2 kilometers (0.75 miles) and turn west onto the Project Access Road. This road begins at a point located in the NE1/4, NE1/4 of Section 19, T44N, R76W. This access road will be a combination of existing and new roadway that will cover a distance of approximately 3 kilometers (2 miles) to the proposed satellite IX facility. This access road is an existing road built by Cleveland-Cliffs during the initial development of the North Butte orebody. Cameco plans to upgrade this road, which is all within the permit boundary. The proposed access roads are shown on **Figure 1.10**. Tetra Tech, Inc. has recently completed road designs to upgrade the access roads at the North Butte Remote Satellite. The design documents and easement descriptions are provided in **Appendix G, North Butte Road Design**. Cameco will rehabilitate the existing roads by upgrading the level of service (top width, surfacing and grading). A 6.1 meter (20 feet) top width will be provided with approximately 7.6 to 15.2 centimeter (3 to 6 inches) of crushed gravel or scoria placed on the road surface. The design has included hydraulic investigations to verify the capacity and condition of existing culverts in the road and to provide miscellaneous drainage. The upgrading and new construction of the access roads will comply with the landowner's desires, as provided in letters to Cameco and LQD. New sections of road will be constructed by blading the top 7.6 to 15.2 centimeters (3 to 6 inches) of soil to each side of the road and constructing a drain ditch on each side with the topsoil windrowed to the outside of each drain. The windrowed topsoil from the construction of the road and the drain will be placed in the bottom of the drain and seeded. The typical road construction standard is presented on **Figure 3.35**. Where BMPs or alternate sediment control measures (ASCM) are required to ensure that no topsoil is lost, Cameco will commit to their implementation (see Section 3.8).	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 3.7.2 p.3-67	A series of roads will be constructed along and within the mine units to provide access for drill rigs, pump pulling units, maintenance vehicles, etc. These roads will connect with Primary Access Roads and will be	This will be the operating plan when the License Renewal

		(TR)	designed and constructed in such a manner so as to minimize the amount of land disturbance. Road designs have not yet been developed for this remote satellite location.	is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 3.8.2 p. 3-68 (TR)	The Smith Ranch is operational whereas the Reynolds Ranch Satellite, North Butte, Gas Hills, and Ruth Remote Satellites have not yet been developed. The topsoil management and erosion control methods employed at each facility are similar, but facility-specific requirements exist and are detailed where appropriate in the following sections. Mine delineation will be ongoing at each facility and the most current BMP will be employed.	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 3.8.2 p. 3-68 (TR)	LQD Rules and Regulations Chapter 11, Section 4(a)(iii) stipulates that procedures required in Chapter 3, Section 2(c)(i) through (iii) be used to ensure the protection of topsoil and subsoil from excessive compaction, degradation, and wind and water erosion where stockpiling of topsoil and subsoil is necessary. These regulations require that Cameco perform ISR activities in a manner that minimizes topsoil damage and controls the amount of sediment lost to wind and water erosion. Should any surface drainage require diversion around an operating area, such diversions will be constructed in an erosionally stable manner in accordance with certain design standards. Similarly culverts, which pass below disturbed areas, including roads, will be protected. Additionally, LQD Noncoal Rules and Regulations, Guideline No. 4 Attachment III provides guidance for the management of topsoil and subsoil resources at ISR operations. The LQD Guideline No. 4 stresses that the ISR operator limit areas of disturbance during mine unit delineation, construction and operation by minimizing temporary access roads, and segregating topsoil and subsoil materials during mud pit, pipeline, mine unit pattern construction, and other excavations. Although topsoil and subsoil are generally not stripped and stockpiled for the entire mine unit area, soil salvage in specific mine unit pattern areas, where traffic is concentrated, may be necessary in site-specific situations	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 3.8.3 p. 3-68 (TR)	The main hydrologic control features will consist of culverts to be installed during the development of access roads (see Section 3.5). Installation of these culverts will allow road crossings of drainage ways without erosion or sedimentation problems related to vehicle traffic on water courses. Culverts will maintain existing site drainage conditions. Culvert design includes providing adequate capacity for both water and sediment yield. Culvert design criteria are based on LQD Guideline No. 8, which factors the design life of the facility or structure with hydrologic return period or flood frequency probability. Culvert slope will be adequate (greater than 2%) to convey sediment through the culvert. Inlet and outlet protection will occur as required. On a local scale, surface drainage will be directed away from or under facilities, roads and topsoil stockpiles utilizing shallow ditches, culverts and/or berms. As delineation drilling and mine unit development	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.

			proceeds, should it become necessary to disturb lands adjacent to surface waters and/or wetland areas, these areas will be protected by the installation of appropriate silt fencing or other appropriate sediment control measures as outlined in the Smith Ranch Storm Water Pollution Prevention Plan (SWPPP). Smith Ranch has an Industrial General Permit (IGP). A SWPPP will be developed and permits will be obtained for the remote satellites prior to beginning any construction activities.	
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 3.8.4 p. 3-69 (TR)	Surface water diversions are constructed as necessary to divert water around buildings, ponds, and other structures as required to protect facilities and minimize erosion and sedimentation. Any diversion structure will be constructed in accordance with accepted BMPs and standard engineering practices.	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 3.9 p. 3-69 (TR)	Project schedules and water balances have been developed for each of the SUA-1548 Project facilities. The following general assumptions were made for all SUA-1548 license areas, and specific assumptions for the individual facility are provided in the further discussions. 1. The groundwater sweep is calculated on the volume of water withdrawn from the formation. 2. The 8 pore volumes of the RO treatment were calculated on the volume of permeate injected not the volume of water withdrawn from the formation. 3. The recovery on the RO units is 80%. 4. The pore volumes are based on 2010/2011 approved surety estimates. 5. Future production is accounted for in the water balance. 6. The operational time is 360 days per year or 98.6%. The production water balances detailed on **Table 3-11, Table 3-12, Smith Ranch Water Balance, Table 3-13, Reynolds Ranch Water Balance, Table 3-14, Highland Water Balance**, and **Table 3-15, North Butte Water Balance**, for each of the SUA-1548 license areas show the sequencing of the development and restoration of the individual mine units. Anticipated production flows, disposal requirements and capacity are also detailed in the aforementioned tables. The actual production schedule for each facility is dependent upon several factors, including mine unit flows, production rates and economics. Groundwater restoration will occur concurrently with mining throughout the life of the Project. The groundwater restoration portion of the schedule is designed to achieve the fastest restoration possible, given the ability of the aquifer to yield water. After groundwater restoration and stability have been achieved in a mine unit and regulatory concurrence has been granted, approximately one to two years are typically needed to decommission and reclaim the mine unit surface and ancillary buildings and equipment.	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.

Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 3.9.2 p. 3-70 (TR)	North Butte Remote Satellite. The estimated project operations and reclamation schedule, presented in **Table 3-15** is based on an initial annual production rate of 227 metric tons (250 tons) of uranium per year, with that rate being increased to the maximum sustainable production rate, currently estimated to be approximately 680 metric tons (750 tons) of uranium per year. The assumptions for the North Butte water balance include the following: 1. The production bleed is 1%. 2. Two deep disposal wells will be installed at the beginning of the project and a third deep disposal well will be installed at the start of restoration. A fourth well will be installed as needed. The disposal capacity of each well was estimated at 189 liters/minute (50 gallons/minute). 3. The water balance assumes a 2,268 liters/minute (600 gallons/minute) [feed] RO unit.	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 4.1 p. 4-1 (TR)	Because the Smith Ranch Satellites, Reynolds Satellite, North Butte Remote Satellite, and Ruth Remote Satellite are strictly IX facilities and will have no precipitation of uranium, the only significant radioactive airborne effluent is Rn-222 (radon). Yellowcake slurry may also be produced at the Gas Hills Remote Satellite, but because it will be a wet product, again the only significant radioactive airborne effluent will be radon. At the Smith Ranch CPP, the primary effluent will be radon released during resin transfer operations. Uranium particulate emissions are related only to the yellowcake packaging area when product is being drummed. Because the dryers themselves are low emission vacuum dryers and contain no vent stacks, no uranium particulates are released to the atmosphere from the drying process (see Section 4.1.2).	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 4.1.1 p. 4-1 (TR)	A separate ventilation system is installed for all indoor non-sealed process tanks and vessels where radon or process gases would be expected. The system consists of an air duct or piping system connected to the top of each of the process tanks. Redundant exhaust fans direct collected gases to discharge piping that exhaust to the outside atmosphere. The design of the exhaust fans is such that the system is capable of limiting employee exposures even with the failure of any single fan. Discharge vents are located away from building ventilation intakes to prevent introducing exhausted radon into the facility as recommended in Section 3.3 of NRC Regulatory Guide 8.31 (NRC, 2002a). Airflow through any openings in the vessels is from the process area into the vessel and into the ventilation system, controlling any releases that occur inside the vessel. Venting any released radon to the atmosphere outside the plant minimizes employee exposure.	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 4.1.1 p. 4-2 (TR)	Small amounts of radon may be released inside the satellite buildings via solution spills, filter changes, IX resin transfer, RO system operation during groundwater restoration, and equipment maintenance activities. Separate ventilation systems are used as needed for the functional areas within the plant to remove radon from the buildings. Radon is monitored at all facilities to measure potential exposure to employees. This monitoring program and results are provided in Section 5.0. The more than 20 years of radon sampling data show that there have been no negative impacts to employees, the public or the environment from radon. Since the Reynolds Ranch Satellite, North Butte, Gas Hills, and	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of

			Ruth Remote Satellites will have the same equipment and ventilation systems, it is anticipated that there will be no impacts from radon at these facilities as well. Since the satellite IX and yellowcake slurry processes are entirely wet processes and uranium is not dried at the facilities, there are no uranium particulate effluents. Spills inside the satellites are immediately washed down, thereby eliminating the potential for any buildup of radioactive particulates inside the building.	the operating plan.
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 4.1.1 p. 4-2 (TR)	Small amounts of radon may also be released at the header houses via spills or during well sampling. Data collected indicate that these releases are minimal and occur on an infrequent basis. Each header house is equipped with an exhaust fan to remove any radon that is released in the buildings. Header houses associated with active mine unit wellfield pattern areas (production or restoration) are routinely monitored for radon. A total of four header houses are sampled each month rotating through a schedule ensuring that all header houses are sampled in a timely fashion. A review of radon monitoring records for header houses between 2000 and 2010 indicates that the average radon concentrations within the header houses did not exceed 10% of the derived air concentration (DAC) during the period. The same header house design will be used at all future satellites. Therefore it is anticipated that radon daughter levels from the header houses at the Reynolds Ranch Satellite, North Butte Remote Satellite, Gas Hills Remote Satellites and Ruth Remote Satellite will not create an exposure problem see **Table 4-1, Trend Analyses of Concentrations of Radon-222 Progeny in the Air.**	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 4.1.1 p. 4-2 (TR)	Other non-radiological particulate emissions are vehicle exhaust, fugitive dust from limited vehicular traffic and minor sodium bicarbonate releases during the filling of the outside storage vessel. Impacts from fugitive dust and vehicle emissions are described in Section 7.2 of this TR and Section 4.6 of the ER. Impacts from potential emissions from process chemicals (e.g., hydrochloric acid) that will be used at the plant are described in Section 7.2. There are no significant combustion related emissions from the process facility as commercial electrical power is available at the site. A backup diesel electrical generation system is installed at the CPP, CPF and each satellite facility, but the unit is located and vented to the atmosphere so as not to allow any exhaust to enter the building.	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 4.2.1.1 p. 4-4 (TR)	The operation of the IX process generates production bleed, the primary source of liquid waste, as discussed in Section 3.9. This bleed is treated for the removal of radium and selenium and is routed to surge ponds or storage tanks and eventually to the deep disposal well(s) or land application facility for disposal. The bleed may also be processed through reverse osmosis and sent again through the IX process before final disposal. Liquid process waste (bleed) from the Gas Hills Remote Satellite will be routed to evaporation ponds or possibly deep disposal wells. Other liquid process waste streams from the satellite plants, the CPP and the CPF include plant wash down water and spills collected in the sumps of the plant buildings. However, these other liquid process waste streams make up a very small portion of the total waste stream volume.	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.

			During mine unit wellfield development and operation, well stimulation (swabbing) and aquifer test waters are generated. Water collected from well swabbing is containerized and transported to the surge or storage ponds for eventual discharge to the deep disposal wells. Water collected during aquifer tests is containerized and can be used on-site as drilling water or for dust suppression. Depending on the quality of the aquifer test water, a temporary Wyoming Pollution Discharge Elimination System (WYPDES) discharge permit may be obtained for land application of the test water.	
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 4.2.1.1 p. 4-4 (TR)	Following production, restoration of the affected aquifer commences which results in the production of additional wastewater. The current groundwater restoration plan described in Section 6.0 consists of three primary activities: • Groundwater sweep; • Treated water reinjection (typically RO treatment with permeate injection, as described in Section 6.0); • Addition of a chemical reductant; and • Potentially bioremediation. Aquifer restoration using bioremediation should be considered as experimental at this time, although Cameco is actively researching the efficacy of bioremediation as a restoration treatment method. Only the groundwater sweep and groundwater treatment and reinjection activities generate waste water. During groundwater sweep, water is extracted from the mining zone without injection, causing an influx of native aquifer water to sweep the affected wellfield area. The extracted water is sent directly to the wastewater treatment and disposal systems during this activity. Groundwater treatment activities involve the use of process equipment to lower the ion concentration of the groundwater in the affected wellfield area. An RO unit is used to reduce the total dissolved solids of the groundwater. The RO unit produces relatively clean water stream (RO permeate) and a high TDS waste water stream (RO reject). The permeate is injected back into the formation and the reject is sent to the RO/IX for further TDS reduction prior to disposal. The purpose of recycling the reject stream is to reduce the final volume of water needing to be discharged to the waste disposal systems. Chemical reducing (pH) agents such as sodium sulfide or biological reducing agents (R&D) are also employed during the groundwater treatment phase.	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 4.2.1.1 p. 4-5 (TR)	Water from wellfield releases consists of injection or recovery fluid recovered from areas where a liquid release has occurred from a well or pipeline. The water is collected and transported to the waste water disposal system for treatment and disposal using the deep well injection system or land application.Water from header houses consists of injection or recovery fluids recovered from the sump or basement in the header house(s) where a liquid release has occurred. Each new header house basement floor has a sump and a sump pump capable of pumping any spilled fluids from the floor back into a production pipeline. Many of the older Smith Ranch header houses do not have concrete basements. A discussion of the conversion to header houses with basements is provided in Section 4.2.4.	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.

			Water collected within a satellite consists of injection or recovery fluids recovered from the sump in the satellite building where a liquid release has occurred from a piping failure, tank or IX column leakage, or collection of plant wash down water. These fluids are pumped to a holding tank within the building and then pumped either to the deep disposal well(s) or, after treatment, to the land application system The well house at the deep injection well(s) contain a sump and sensor that allow detection of a release. Collected water from the well house is pumped back into the waste disposal system. Domestic liquid wastes from the restrooms and lunchrooms are disposed in an approved septic system that meets the requirements of the State of Wyoming. These systems are in common use throughout the United States and the effect of the system on the environment is known to be minimal. Liquid waste from the facility laboratories are disposed at the deep disposal wells. The septic system designs for all SUA-1548 facilities do and will meet all requirements of the State of Wyoming. A final source of water is storm water runoff. Storm water management is controlled under WYPDES permits issued by the WDEQ-WQD. Facility drainage is designed to route storm water away or around the buildings, ancillary buildings and parking areas, chemical and fuel storage areas. The design of the facilities and procedural and engineering controls contained in a SWPPP utilizing BMP has been implemented at all facilities such that runoff is not considered to be a potential impact to the environment.	
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 4.2.2.4 p. 4-9 (TR)	Cameco has an existing Class I UIC permit for two deep disposal wells at the North Butte Remote Satellite. This satellite facility will ultimately have four Class I UIC wells. The installation of these wells will be staged as needed for operation and restoration requirements. DEQ North Butte Permit Figure OP-16 shows the disposal well equipment layout within the satellite. In addition to the disposal wells, two surge ponds will be installed to provide for temporary storage of waste water prior to disposal into the deep disposal wells. Specific details pertaining to the operation of the deep disposal wells are provided in Section 3.6.6.3. Prior to operation of the disposal wells, Cameco will evaluate the components of the deep well disposal in reference to 10 CFR 20.2002 under a SERP and will consider the following: 1. The waste to be disposed of, including the physical and chemical properties important to risk evaluation, and the manner and condition of the deep well disposal; 2. An analysis and evaluation of the pertinent information on the nature of the affected environment; 3. The nature and location of potentially affected licensed and unlicensed facilities; and 4. Analysis and procedures to ensure that doses are maintained ALARA and within dose limits. *Surge Ponds* The North Butte Remote satellite includes the construction of a surge pond to temporarily contain waste water from the satellite facility. The	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.

			overall pond dimensions will be approximately 85.3 meter by 103.6 meter (280 feet by 340 feet) and will be divided into two cells. The cell bottoms will have approximate dimensions of 15 meter by 36 meter (50 feet by 120 feet) and the pond side slopes will be constructed at 3:1 side slopes. The majority of the pond will be below grade and the second cell will provide redundancy. The pond location is shown on DEQ North Butte Permit Plate OP-1. Pond design details, the geotechnical investigation and final design report are provided in DEQ North Butte Permit Operations Plan Attachment OP-7 and are discussed in Section 3.6.6.3.	
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 4.2.3 p. 4-10 (TR)	Waste which is not contaminated with radioactive material or which can be decontaminated to unrestricted release criteria may include valves, instrumentation, process equipment, etc. Prior to release for unrestricted use, surveys for residual surface contamination are made and the results documented. To be released for unrestricted use, decontaminated materials must have activity levels lower than those specified in NRC guidance titled *"Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct or Source Materials"*, September 1984. Methods for decontamination and release of contaminated equipment are discussed in further detail in Section 5.8.6.4. Cameco tracks the solid waste disposal at the Smith Ranch facility and estimates that the facility transports off-site approximately 32,659 kilograms of uncontaminated solid waste per year. Cameco anticipates that the North Butte and Gas Hills Remote Satellites will each produce approximately 329-382 meters^3 (300-500 yards^3) of uncontaminated solid waste per year. The addition of the Reynolds Ranch satellite will increase the solid waste production for the Smith Ranch facility by an estimated 153 meters (200 yards^3) per year. Uncontaminated solid waste will be collected on the respective site and disposed of in the nearest sanitary landfill. Domestic solid wastes from the restrooms and lunchrooms are disposed in an approved septic system that meets the requirements of the State of Wyoming. These systems are in common use throughout the United States and the effect of the system on the environment is known to be minimal.	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 4.2.3 p. 4-11 (TR)	Solid and liquid wastes that have become contaminated with uranium and uranium daughter products as a result of recovering uranium are called 11.e(2) byproduct material. These types of wastes may include: tanks, vessels, IX resin, filter media, process piping and equipment. It could also include fluids such as the production and restoration waste water streams as well as the solids remaining in the surge or evaporation ponds at the end of the Project. All contaminated items that cannot be decontaminated to meet unrestricted use criteria release criteria are properly packaged, transported, and disposed at a disposal site licensed to accept 11e.(2) byproduct material. It is estimated that between 38 and 329 meters^3 (50 and 300 yards^3) of solid 11.e(2) byproduct material will be generated each year at the Smith Ranch (SUA-1548) Project sites. Annually, approximately 150,000 kilograms (330,000 pounds) of barium sludge will be shipped off-site for disposal. Those materials that cannot be	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.

			decontaminated for unrestricted release will be stored in appropriately labeled and covered containers and will periodically be transported to an NRC licensed disposal facility. Cameco currently has a contract disposal agreement with Denison Mines (USA) Corp. for disposal at the White Mesa Mill in Blanding, Utah.	
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 4.2.3 p. 4-11 (TR)	The potential exists for any industrial facility to generate hazardous waste as defined by the RCRA. In the State of Wyoming, hazardous waste is governed by WDEQ Hazardous Waste Rules and Regulations. Based on preliminary waste determinations conducted by Cameco in consideration of the processes and materials that are used at the project, Cameco will likely continue to be classified as a Conditionally Exempt Small Quantity Generator, defined as a generator that generates less than 100 kilograms of hazardous waste in a calendar month and that complies with all applicable hazardous waste program requirements. No pesticides or anti-freeze are stored on-site. Cameco expects that only used waste oil and universal hazardous wastes such as spent batteries, florescent light bulbs, etc. will be generated at the Smith Ranch (SUA-1548) Project. The used oil is burned for heating purposes and excess oil is recycled. In 2010, approximately 3,780 liters (1,000 gallons) of used oil was recycled. Cameco is committed to recycling universal wastes whenever possible.	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 4.2.4 p. 4-11 (TR)	*Spills from Well Houses, Pipelines and Header Houses* Wellfield header houses are not considered to be a potential source of pollutants during normal operations, as there will be no process chemicals or effluents stored within them. The only instance in which these wellfield features could contribute to pollution would be in the event of a release of injection or recovery fluids due to a pipe or well failure. The possibility of such an occurrence is considered to be minimal as the piping will be leak checked first. In addition, the flows through the piping will be at a relatively low pressure and can quickly be stopped, thus any release would not migrate far. Piping from the wellfields to the header houses is typically buried, minimizing the possibility of an accident. Large piping leaks would quickly become apparent to the plant operators due to a decrease in flow and pressure, thus any release could be mitigated rapidly. All piping is leak checked prior to operation. A conductivity probe or a level transducer is installed in each new header house to detect fluids on the floor and/or basement of the house. There are two separate alarm stages associated with the floor leak detection system. The first alarms when water is at a depth of a few inches at which time the sump pump will automatically start pumping water from the sump. The second alarms when water has reached a few feet in depth, indicating that the leak is larger than the sump pump can handle. If fluids are detected at the second alarm level, the PLC shuts down the injection flow and shuts off the production wells in the header house. A beacon on the outside of the header house activates in the event moisture is detected, and the PLC alarms on the main computer in the Control Room at the satellite facility that the header house has shut down. All newer header houses (as of March 2008), beginning with Mine Unit 15, Header House 17, have concrete basements to prevent spilled fluids from soaking into the soil. All additional header houses 15-18 through 15-23 also have concrete basements and all of MU-9 and MU-K-6 through K-9 currently have this style of basement as will all	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.

			new constructed header houses. Each newer header house basement has a sump and a sump pump capable of pumping any spilled fluids from the floor back into a production pipeline. The flow from individual production and injection wells is measured using turbine meters which are located in the header house. The individual well flows are measured and adjusted daily. A flow meter is used to measure the total production and injection flow rates from each header house. At all new header houses, the flow meters' instantaneous flow rate is monitored by the PLC. The PLC sends an alarm to the satellite in the event of a flow problem. High and low flow limits are set for each well, and the well automatically shuts down if the limits have been exceeded. The automatic shutdown of a well triggers an alarm at the satellite. A high flow alarm for an injection well may indicate a break in a line between the injection wellhead and the header house. A low flow alarm for a production well may indicate a leak between the pump and the header house. The run status of all production pumps is monitored continuously enabling the pumps to be stopped and started remotely. Additionally, each new header house can be remotely shut down from the satellite. As discussed above and in Section 3.6.5.1, the above discussions pertain to header houses constructed from March 2008 forward. Basement free header houses were constructed at Mine Units D, F, E, H, I, J, and headerhouses K1-K5. Furthermore, many of the older header houses do not have PLC based controls. Older wellfields prior to Mine Unit K and 9 do not have basements nor are there plans to install basements. In general, trunk line piping from the plant to the header houses and within the wellfield is constructed of HDPE with butt welded joints or the equivalent. All pipelines are pressure tested before being buried and placed into operation. It is unlikely that a break would occur in a buried section of line because no additional stress is placed on the piping. In addition, underground pipelines are protected from a major cause of potential failure, which is vehicles driving over the lines causing breaks. Typically, the only exposed pipes will be at the central plant, at the wellheads, and in the header houses in the wellfields. Main trunkline flows and manifold pressures are monitored for process control. The older header houses are fitted with pneumatic valves and a straight line pipe configuration. These valves called Cla-Vals in the older header houses have responded accordingly during power outages. It is only in the newer header houses where the pipeline configuration has included the use of a 90 degree "T" in the line that failure of the pneumatic valve has been noted; most recently at the May 3, 2011 Mine Unit 15A spill in the wellfield serviced by header house HH15-20. This failure was due to a pressure variance caused by the lack of power, essentially creating a hammer effect and causing the Cla-Vals to fail. As a result, those new header houses equipped with a 90 degree "T" in the pipeline and Cla-vals will be identified and replaced with a mechanical valve. The mechanical valve would shut off the flows at the header house on any indication of a spill or power outage. Also, when there is a power outage, the phase indicator will alarm in the satellites. In a letter to NRC dated July 30, 2007 (related to an H-wellfield release) it was indicated that bell holes were retro-fitted with leak indicators. All new installations, in areas where fiber optics are being used, will be	

			installed with "wet sump" detectors that alarm to the nearest satellite plant. Additionally, all header houses, starting in Mine Unit K, header house 6, utilize wellhead leak detection devices. For all future wellfields, the well heads will be fitted with leak detection systems. Older wellfields have not been retro-fitted as it would potentially create a greater chance for a fluid release than leaving them in their current status. Engineering and administrative controls are in place at the satellite facilities to prevent both surface and subsurface releases to the environment, and to mitigate the effects should an accident occur.	
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 4.2.4 p. 4-13 (TR)	The satellite and remote satellite facilities are a major component of the ISR operations at the Smith Ranch (SUA-1548) Project. Therefore, the satellite plant areas have the greatest potential for spills or accidents resulting in the release of fluids containing radioactive materials. Spills could result from a release of process chemicals from bulk storage tanks, piping failure, or a process storage tank failure. New satellite facilities will be constructed for the Reynolds Ranch, North Butte, Gas Hills and Ruth expansion areas, and the engineering design for these facilities will incorporate proven designs from the Smith Ranch satellites along with new features. The design of the satellite plant building is such that any release of liquid waste would be contained within the structure. A concrete curb is built around the entire process building. This pad is designed to contain the contents of the largest tank within the building in the event of a rupture. In the event of a piping failure, the pump system will immediately shut down, limiting any release. Liquid inside the building, both from a spill or from wash down water, will be drained through a sump and sent to the liquid waste system. Similar to the header houses, a conductivity probe or a level transducer is installed in the satellite plant building to detect fluids on the floor and/or sump of the building. There are two separate alarm stages (high and high/high) associated with the floor leak detection system. The first alarms when water is at a depth of a few inches at which time the sump pump automatically starts pumping water from the sump. The second alarms when water has reached a few feet in depth, indicating that the leak is larger than the sump pump can handle. If fluids are detected at the second alarm level, the PLC shuts down the injection flow and shuts off the production wells. Each satellite building has leak resistant floors, berms and water stops to prevent spilled fluids from soaking into the soil or leaving the building.	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 4.2.4 p. 4-13 (TR)	The design of the deep disposal well houses and wellheads are such that any release of liquids will be contained within the building or in a bermed containment area surrounding the facilities. Released fluids inside the building are contained and managed as discussed in Section 4.2.2.1.	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.

Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 4.2.4 p. 4-14 (TR)	For the North Butte Remote satellite facility, the two-celled double-lined surge pond will be constructed with a leak detection system consisting of a network of perforated pipes between the primary and secondary liners with the pipes draining to a collection sump. Should a leak in the liner occur, the water will enter a perforated pipe and flow to a sump. SOPs will detail the monitoring program for the leak detection system. The monitoring program for the lined ponds will include either a fluid level sensor in each pond sump with an alarm displayed at the satellite or a daily inspection of each sump by an operator. The storage ponds will be inspected daily for visual indications of leaks or embankment deterioration by an individual instructed in proper inspection procedures. The pond inspections will be recorded and initialed by the inspector. If 15.2 centimeters (6 inches) or more of fluid is detected in any leak detection system sump, it will be sampled and analyzed for chloride and conductivity. If analyses indicate a pond leak, and the analyses are confirmed, the LQD and NRC will be notified by telephone within 24 hours after receiving the confirming analyses, and the water level in the pond with the indicated leak will be lowered by transferring the contents to another cell. A written report will be submitted to LQD and NRC within 30 days after the notification of the suspected leak and every 30 days thereafter until the leak is repaired. The reports will include the available analytical data, the corrective actions taken, and results of the actions. If water continues to flow to the sump, samples will be collected every seven days and analyzed for chloride and conductivity. Additionally, once per month a sample will be collected and analyzed for bicarbonate, uranium, and sulfate. A freeboard of at least 1.5 meters (5 feet) will be maintained in each pond to prevent loss of waste water by wave action and to allow for holding the contents of another pond on a temporary basis in the event of a leak.	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 4.3 p. 15 (TR)	Surface contamination surveys will be conducted of potentially contaminated equipment and materials before they are released to unrestricted areas. The applicable surface contamination limits are provided by NRC, Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct or Source Materials, September 1984. A comprehensive radiation survey will be made in conformance with these guidelines, which establishes that contamination is within the limits specified in the referenced guidelines and is as low as is reasonably achievable before release of the equipment or material for unrestricted use. If contamination above these limits is detected, the equipment or material will be decontaminated until the limits are satisfied, or the item will not be released to unrestricted use. Radioactivity on surfaces will not be covered by paint, plating, or other covering unless contamination levels, as determined by a survey and documented, are below the aforementioned limits before application of the covering. A reasonable effort will be made to minimize the contamination before use of any covering. The radioactivity of the interior surfaces of pipes, drain lines, or duct work will be determined by making measurements at all traps and other appropriate access points, provided that contamination at these locations is likely to be representative of contamination on the	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.

			interior of the pipes, drain lines, or duct	
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Chapt. 5 (TR)	Chapter 5 of the TR details the Corp. structure, SERP process, SOPs and Health Physics Program. The same information is found in the Reynolds Ranch Application in Chapter 9. The Reynolds Ranch version will be implemented at North Butte until the approval of the License Renewal at which time Chapter 5 of the TE will be utilized.	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec.6.1 p.6-1 (TR)	ISR is an iterative process, conducted in phases from the installation of the production, injection and recovery wells through the restoration of the affected groundwater. When the uranium concentration of the lixiviant from a mine unit, or a portion of a mine unit, falls below the predetermined economic recovery limit, continued extraction of uranium will cease. Once this economic recovery limit has been reached, the mine unit is taken out of production and placed into groundwater restoration. In accordance with 10 CFR 40.42(d), once a decision has been made to permanently cease lixiviant injection in a particular wellfield, Cameco will notify NRC and initiate groundwater restoration within 60 days of making the restoration decision. 10 CFR 40.42(h)(1) specifies that groundwater restoration within a wellfield must be completed within 24 months after restoration activities have been initiated. If restoration in a wellfield requires more than 24 months to complete, Cameco will notify the NRC and request an alternate schedule for completing restoration. It should be noted that, with respect to reclamation of waste disposal areas, uranium recovery licensees are exempt from the requirements in 10 CFR 40.42d(4), g and h. The request will provide adequate justification and information to ensure that restoration will be completed as soon as practical and that the health and safety of workers and the public will be protected (NRC, 2008). Pursuant to 10 CFR 40.42(i), the NRC Staff may approve a request for an alternate decommissioning schedule (including groundwater restoration) if the Staff determines that the request is warranted by consideration of the following: • Whether it is technically feasible to allow completion of groundwater restoration or decommissioning activities within the allotted 24-month period; • Whether sufficient waste disposal capacity is available to allow completion of groundwater restoration or decommissioning activities within the allotted 24-month period; • Whether a significant volume reduction in wastes requiring disposal will be achieved by allowing short-lived radionuclides to decay over a longer period of time; • Whether a significant reduction in radiation exposure to workers can be achieved by allowing short-lived radionuclides decay over a longer time period; and Other site-specific factors on a case-by-case basis, such as the regulatory requirements of other government agencies, lawsuits,	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.

			groundwater restoration activates, monitored natural attenuation, actions that could result in more environmental harm than deferring the groundwater restoration or decommissioning activity, and other factors beyond the control of Cameco.	
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 6.1.1 p. 6-2 (TR)	Prior to commencing operations in an area, Cameco requests an aquifer exemption for the portion of the aquifer to be impacted by ISR activities. The purpose of the aquifer exemption is to protect groundwater adjacent to the mining zone. Approval of an aquifer exemption by WDEQ and EPA is required before ISR operations can begin. The aquifer exemption removes the production zone from protection under the Safe Drinking Water Act. Approval is based on existing water quality, the ability to commercially produce minerals, and the lack of use as an underground source of drinking water. Groundwater restoration prevents any mobilized constituents from affecting aquifers adjacent to the ore zone. Aquifer exemptions have been received by Cameco for all of the facilities licensed under SUA-1548 as follows: • Smith Ranch: Monitor well ring of each mine unit (EPA, August 1990) • Highland: Monitor well ring of each mine unit (EPA, June 1987; September 1991) • North Butte Remote Satellite: Monitor well ring of each mine unit (EPA, October 1990) • Gas Hills Remote Satellite: the edge of each mine unit plus ¼ mile, also including any additional 40 acre parcel intersected by the ¼ mile zone; EPA excluded from the exemption a ¼ mile buffer around the Carol Shop well because records showed that it was used as a source of drinking water (EPA, February 2001). The State Engineer Records show that the well was permitted for miscellaneous use (Nov. 25, 1977). The water quality on the well indicates that it should not be used for drinking water and Cameco Resources is attempting to have the exclusion removed • Ruth Remote Satellite: Monitor well ring of each mine unit (EPA, October 1990) The approved primary groundwater restoration goal for SUA-1548 is to return the groundwater quality within the affected zone to the standards identified in 10 CFR 40, Appendix A, Criterion 5B(5), which is consistent with pre-operational baseline water quality conditions. Specifically, the groundwater is to be restored to the values provided in the table in 10 CFR Part 40, Appendix A, Criterion 5C. However, if after employing BPT in an effort to achieve pre-operational baseline, the restoration efforts do not achieve baseline conditions, Cameco may propose ACLs in accordance with 10 CFR Part 40, Appendix A, Criterion 5B(6) that continue to protect public health, safety and the environment and do not produce an unacceptable degradation to the water use of adjacent groundwater resources. The restoration criteria for the groundwater in a mine unit is based on the baseline water quality data established for each mine unit from the wells completed in the planned Production Zone (i.e., MP-Wells), on a parameter-by-parameter	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.

<table>
<tr><td></td><td></td><td></td><td>basis.</td><td></td></tr>
<tr><td>Feb 1, 2012</td><td>NRC Lic. Renewal Doc. (TR)</td><td>Sec. 6.1.2 p. 6-3 (TR)</td><td>The restoration criteria for the groundwater in a mine unit is based on the baseline water quality data collected for each mine unit from the wells completed in the planned Production Zone (i.e., MP-Wells), on a parameter-by-parameter basis. To characterize water quality in the mineralized zone, MP wells are sampled as part of the mine unit testing program. Two separate samples collected at least two weeks apart from the MP wells are analyzed for the parameters listed in Table 3-4. Two additional samples collected at least two weeks apart are sampled for the following list of parameters:
<table>
<tr><td>Alkalinity</td><td>Selenium</td></tr>
<tr><td>Chloride</td><td>Uranium</td></tr>
<tr><td>Conductivity</td><td>Radium 226</td></tr>
<tr><td>Sulfate</td><td>Arsenic*</td></tr>
<tr><td>TDS</td><td>Fluoride*</td></tr>
<tr><td>pH</td><td></td></tr>
<tr><td colspan="2">*Arsenic and fluoride are deleted from the above list of parameters if the previous two analyses show that arsenic and fluoride are below detection limits.</td></tr>
</table>
Sample collection, preservation and analysis are in accordance with approved sampling and analysis plans.

MP well baseline data are screened for outliers and averaged over the mine unit for each parameter. If the data indicate that waters of significantly different quality exist within the same mine unit, the data will be divided into sub-zones and evaluated to determine RTVs for each sub-zone.

Outliers are anomalously high or low values relative to the other values and can compromise a data base. To evaluate outliers, the data are screened visually to identify obvious outliers. These values are then evaluated utilizing the tolerance-limit formula recommended in LQD Guideline No. 4. Once an outlier is identified, the reasons for the outlier will be investigated and the data point will be corrected if possible. If no explanation for the outlier can be ascertained, the data point will be excluded if it fails the tolerance limit statistical screening.

Based upon statistical analysis of the baseline water quality parameters, RTVs are established. To account for natural variation in water quality within the mining zone, the RTVs are calculated as the mean plus two standard deviations of the baseline concentrations for each parameter. The exact average baseline value for a particular parameter will probably not be met at the end of groundwater restoration; therefore the restored concentration should fall within a range of acceptable values around the mean baseline value. The mean plus two standard deviations accounts for the variability in the measured values and should encompass 95% of the expected values for a given parameter.

RTVs have been calculated for five mine units at Smith Ranch that are currently in restoration, Mine Units 1, 4/4A, C, D and E. The calculated RTVs are presented in Table 6-1, Smith Ranch Restoration Target Values. Cameco is calculating RTVs for all of the other mine units in production at Smith Ranch. At all of the satellites, Cameco will</td><td>This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.</td></tr>
</table>

			calculate RTVs for the various mine units during the mine unit baseline sampling and analysis program. If during restoration, the average concentration of a parameter in the designated production area wells within the mine unit (i.e., MP-Wells) is not reduced to the RTV within a reasonable time frame using BPT, consistent with the ALARA principle, Cameco will apply for ACLs consistent with the detailed requirements of Criterion 5B(5) and 5B(6) of Appendix A to 10 CFR Part 40 which if approved by NRC will provide adequate protection of public health and the environment.	
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 6.1.3 p. 6-4 (TR)	Schedules for groundwater restoration at Smith Ranch including Highland and Reynolds Ranch are provided in **Tables 3-12, 3-13,** and, **3-14**. These tables identify the practical extraction rate range and estimated pore volumes (including flare factor) for each mine unit at Smith Ranch. The schedule for project operations and groundwater restoration for North Butte is provided in **Table 3-15.** The water balance provided in **Table 3-15** identifies the practical extraction rate range and estimated pore volume of each mine unit at North Butte. A restoration schedule has also been developed for the Gas Hills Remote Satellite as part of the water balance for the site. The schedule for project operations and groundwater restoration for Gas Hills is provided in **Table 3-11**. The proposed water balances for the North Butte and Gas Hills Remote Satellites are preliminary in nature. More detailed restoration schedules will be developed for these sites as hydrologic unit testing further defines the hydrogeologic characteristics of these remote satellites. A water balance has not yet been completed for the Ruth Remote Satellite, so a restoration schedule has not been determined. A restoration schedule for the Ruth Remote Satellite will be provided to NRC once the data have been collected and the schedule has been developed. The schedules for the mine units at Smith Ranch and the North Butte and Gas Hills Remote Satellites are based on one pore volume of groundwater sweep (GWS) and eight pore volumes of water being extracted, treated and re-injected during clean water injection. The water balances for Smith Ranch and Highland utilize actual deep disposal well injection rates and show that for Mine Units 1, C, D/D ext where restoration is currently underway, less than eight pore volumes will be required to complete restoration. The duration of restoration activities will vary according to the size of the area being restored, the porosity and permeability of the production zone, and the extent to which the groundwater has been affected. The restoration schedule recognizes that it is necessary to isolate restoration from production activities. If restoration areas are not isolated, lixiviant could potentially flow into areas undergoing restoration, thus reducing the effectiveness of restoration efforts and increasing the length of time to achieve groundwater restoration. The duration of groundwater restoration for each mine unit is affected by many factors. The two most critical factors are the practical extraction rate and number of pore volumes until restoration is achieved. The practical extraction rate is that rate which creates a cone of depression such that lixiviant from adjacent producing mine unit patterns do not flow into mine unit patterns undergoing groundwater restoration.	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.

			Groundwater restoration of a mine unit will follow the completion of uranium production consistent with the requirements of 10 CFR 40.42(d) as may be modified by NRC agreement to a request for delay of groundwater restoration under 10 CFR 40.42(f), should such a request be made by Cameco. If the mine unit or portion of a mine unit being prepared for groundwater restoration is located adjacent to an active production area, restoration activities may need to be delayed until production is completed in the adjacent unit. At that time, the mine unit portion that just completed production may need to serve as a buffer zone between the restoration unit and another unit that is in a production phase. Additionally, once production ceases in a mine unit or portion thereof, additional restoration wells may need to be installed and additional equipment replaced or added to header houses. The additional time it takes to accomplish these pre-restoration activities may trigger a request by Cameco to delay the start of restoration under 10 CFR 40.42(f). Cameco understands that, except for reclamation of waste disposal areas, 10 CFR 40.42(h)1 requires that restoration be completed within 24 months of commencement. Based upon past experience, Cameco has developed realistic restoration schedules for the various mine units at Smith Ranch, including Highland and Reynolds Ranch. These schedules are designed to achieve the fastest restoration possible given geologic, hydrologic and technical constraints inherent with the restoration process. Cameco will strive to improve restoration timing (see Section 6.1.8). Therefore, in accordance with 10 CFR 40.42(i), Cameco is requesting approval of the schedules referenced above as an alternate restoration schedule for the Project.	
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 6.1.4 p. 6-5 (TR)	Historically, the restoration program at SUA-1548 has involved three phases of restoration processes, including: • GWS; • Groundwater extraction and treated water injection (typically reverse osmosis (RO) treatment with permeate injection); and • Addition of a chemical reductant. These phases were used to restore Mine Units A and B at Highland. Again as discussed in other sections of this TR, Cameco is actively researching the efficacy of bioremediation as a primary or secondary groundwater restoration technique and these efforts are currently in the research and development phase	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 6.1.4.1 p.6-5	GWS consists of pumping affected groundwater within the production zone without re-injection of water. This process causes an influx of natural background quality water from the perimeter of the production area (i.e., cone of depression), which sweeps the affected portion of the production zone with groundwater of background quality. The plume of affected groundwater near the perimeter of the production area is also drawn further inside the boundaries of the mine unit. GWS has to be implemented with caution, as an excessive cone of depression can cause undesirable movement of groundwater (incursion) into other active restoration areas and/or operating mine units in the same formation. Groups of mine unit patterns undergoing GWS can be operated	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.

			simultaneously while other pattern groups are being injected with treated water. In this way, restoration is advanced progressively through the mine unit, pattern group by pattern group. The water recovered from the GWS activity is routed through the IX circuit to remove uranium and is then either disposed directly to the deep disposal wells or is further treated by RO to reduce TDS, and other treatment methods to remove Ra-226 and selenium and disposed via land application. In some instances, treated water produced during GWS can be used as make-up water thereby reducing overall water consumption. As GWS continues, it becomes less effective in reducing the concentrations of certain parameters. At this point, treatment and re-injection of the groundwater being removed (i.e., clean water injection) is necessary to accelerate the restoration process. Because GWS is more consumptive than, and not as effective as, clean water injection, it may be used in conjunction with clean water injection to add flexibility to the restoration program. It is anticipated that up to one pore volume of GWS will be utilized during the groundwater restoration process. Cameco anticipates that the use of GWS will be limited or not used at all at future SUA-1548 restoration efforts. A conservative estimate of one pore volume of GWS has been incorporated into the various restoration schedules	
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 6.1.4.2 p. 6-6 (TR)	Treated water injection involves the pumping of affected groundwater and re-injection of treated aquifer water or water from other water sources that are of similar quality. This restoration technique increases flow rates and reduces the concentration of certain parameters, such as TDS, thereby accelerating the rate of restoration. The source of the treated water may originate from: 1. RO; 2. Electro dialysis reversal; 3. IX; 4. Water extracted from a mining unit that is in a more advanced state of restoration; 5. Water being exchanged with a new mining unit; or 6. A combination of the above sources. Historically, the treatment process at Smith Ranch has been RO treatment with reinjection of permeate enhanced with a chemical reductant. The time required to complete treated water injection depends on the initial water quality within the mine unit patterns being restored. Typically, more time is required to restore the groundwater quality of the first set of patterns within a mine unit as compared to those patterns that are adjacent to already treated patterns. Experience has shown that treated water injection works best when the treated water is directed to a small number of patterns at any one time before advancing to the next pattern area(s). It is anticipated that an average of five to eight pore volumes of clean water injection will be utilized for each mine unit to achieve groundwater restoration. Completion of the treated water injection phase in each pattern is determined by monitoring the reduction in concentration of selected water quality parameters to their final RTV. Chloride, alkalinity, and	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.

			sulfate concentrations are typically good indicators of the effectiveness of the formation sweep. Historically, this methodology has proven to be very effective at Smith Ranch. The uranium concentration is reduced during treated water injection, but may not be adequately reduced until chemical reductant addition, and possibly biological remediation, has been completed.	
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 6.1.4.3 p. 6-6 (TR)	If certain parameters remain elevated during restoration efforts, the use of bioremediation (i.e., bioreduction) and/or the addition of a reducing agent or chemical reductant will be implemented. Typically, this additional process is utilized as necessary on individual mine units or on a pattern-by-pattern basis. The use of bioremediation and/or introduction of chemical reductants into the formation may be effective in reversing the ISR process by immobilizing redox sensitive parameters such as selenium, arsenic and uranium. Bioremediation has been demonstrated to be effective in a laboratory setting, but further studies are needed to demonstrate a positive effect in an actual mine unit. Cameco believes that bioremediation techniques for groundwater restoration can be developed and is actively researching this area. Bioremediation is accomplished through the injection of nutrients into the groundwater so that native bacteria in the orebody can reduce redox-sensitive species such as metals. Nutrients include electron donors such as molasses, ethanol, methanol, cheese whey, cooking oil or other food sources. The choice of the nutrient is based on the native bacteria species which are present. The food that best stimulates biological remediation is determined by performing microcosm studies. A microcosm is an artificial, simplified ecosystem that is used to simulate and predict the behavior of the natural ecosystem under controlled conditions. If a native bacterial assemblage is not available within the formation, chemical reductants may be required. Chemical reductants typically consist of a sulfur compound such as gaseous hydrogen sulfide (H_2S) or dilute solutions of sodium hydrosulfide (NaHS) or sodium sulfide (Na_2S). Prior to introducing a biologic reductant Cameco will submit a proposal to the NRC and LQD for review and concurrence including: • The stated goal of the bioremediation. Such a goal may not only include the removal of metals, but will also present other target conditions that will be evaluated during the program. • A control plan to limit oxygen introduction into the formation. • The testing results addressing the carbon source and its effect on the specific bacterial population in the wellfield. • A discussion on the nutrient forms such that they can be uniformly applied to the wellfield. • The target concentrations in the wellfield for the nutrients and chemical additives (based on bench testing results). • Assurance that the wells, piping, pumps etc. are in proper working order, prior to the test.	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.

			• A monitoring plan, which defines interim goals, while providing flexibility to make corrections depending on interim results. • Procedures to address biofouling and undesirable precipitation (such as carbonate). Historically at Smith Ranch, Cameco has used sodium hydroxide (NaOH) and potassium hydroxide (KOH) for pH adjustment, although other pH adjusting chemicals may also be used. This step may be combined with groundwater treatment and re-injection or as the final stage of injection.	
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 6.1.4.4 p. 6-7 (TR)	The excess water created by the restoration process is disposed of through land application and/or deep well injection. There are currently (January 2012) ten Class I deep disposal injection wells permitted (eight of which have been drilled), which will allow the disposal of excess water generated by both mine unit and yellowcake processing operations. In addition to the deep disposal wells, Purge Storage Reservoir No. 2 and a land application facility allows for the disposal of treated process water by evaporation and land application. The groundwater extracted and treated during production and restoration contains dissolved selenium. The Satellite No. 2 Selenium Treatment Facility treats water from Satellites No. 2 and 3 for the removal of selenium, thereby allowing a selenium- free stream to be discharged into Purge Storage Reservoir No. 2 for eventual disposal by land application. The Selenium Treatment Facility also includes a radium removal circuit. After removal of uranium and Ra-226, the water is pumped into selenium removal columns where the selenium is captured in an iron-sand media. When the media reaches selenium saturation, the media is removed, dewatered, and disposed at a NRC licensed disposal facility. New iron-sand media is installed in the selenium removal column and the column is put back into service. Operating experience has shown that the rate of land application and evaporation during the summer months sufficiently reduces the contained volume (water level) in Purge Storage Reservoir No. 2 such that continuous inflow to the reservoir can occur during the winter months when land application cannot take place. The current plan for water disposal at the North Butte Remote Satellite is to dispose of excess water exclusively through deep well injection. North Butte has two permitted UIC Class I disposal injection wells with one of them currently being installed (January 2012). Additional disposal wells will be permitted and installed as required. The anticipated total number of UIC disposal wells required over the life of the North Butte Satellite is four wells. Two surge ponds will be maintained at North Butte to store waste water from the satellite facility prior to deep well injection. The design of the ponds meets the guidance provided in NRC Regulatory Guide 3.11, "Design, Construction and Inspection of Embankment Retention Systems at Uranium Recovery Facilities" and the standards provided in 10 CFR Part 40, Appendix A, Criterion 5(A).	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.
Feb 1, 2012	NRC Lic. Renewal	Sec. 6.1.5.1	At the start of groundwater restoration in each mine unit or portion thereof, the baseline characterization of the MP-wells of that mine unit	This will be the operating plan when

	Doc. (TR)	p. 6-8 (TR)	is reviewed and each MP well is sampled and analyzed for the parameters in **Table 6-2, Groundwater Restoration Monitoring Parameters**. This sampling effort will characterize an "end of injection" water quality average. To track the progress of restoration, the MP-wells, in areas where active restoration activities are occurring, will be sampled and analyzed for conductivity, chloride and uranium once every two months, with at least 45 days between sampling events. In the event that unforeseen conditions (such as snowstorms, flooding, equipment malfunction, etc.) occur, the NRC and LQD will be contacted if the well(s) cannot be monitored within seven days of the target sampling date. Depending on the results of initial sampling at the beginning of restoration, other specific parameters, such as selenium, may be tracked during restoration to evaluate the need for bioremediation/reductant addition, pH control, etc. The perimeter wells (M wells), overlying aquifer wells (MO or MS-wells), and underlying aquifer wells (MU or MD-wells) are sampled once every two months with at least 45 days between sampling events and analyzed for the excursion parameters (chloride, total alkalinity or bicarbonate, and conductivity). Static water levels are also measured at these wells prior to sampling.	the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 6.1.5.2 p. 6-8 (TR)	Following regulatory concurrence that groundwater restoration has been achieved in a particular mine unit and, unless otherwise approved by the agency, a one-year stability monitoring period is completed to demonstrate that the restoration standard has been adequately maintained. The following groundwater restoration stability monitoring program is performed during the one year stability period: 1. Routine excursion monitoring for alkalinity, chloride and conductivity at all perimeter, overlying and underlying monitor wells will continue until restoration is approved by the NRC. 2. The MP-wells will be sampled at the beginning of the stability period and quarterly thereafter. LQD, NRC and/or Cameco may determine that additional stability sampling rounds beyond the first five may be necessary. Samples will be analyzed for the parameters in **Table 6-2**. 3. All wells on excursion status must be restored to 10 CFR 40, Appendix A Criterion 5B(5) standards as part of the restoration process. In the event that unforeseen conditions (such as snowstorms, flooding, equipment malfunction, etc.) occur, the NRC will be contacted if any of the M-wells or MP-wells cannot be monitored within seven days of the scheduled sampling event.	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 6.1.6 p. 6-9 (TR)	At the end of the stability period, the stability monitoring data will be evaluated to determine the success of the groundwater restoration effort. A report will be completed summarizing the results of the restoration program. The restoration results will be compared with the RTVs. The report will also provide the results of the stability monitoring program. The report will be submitted to the regulatory agencies for their review and approval. The acceptance of the mine unit restoration and stability success will be based on the ability to meet the goals of the restoration	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz

			program and the lack of significant increasing trends during the stability monitoring period. After concurrence from the WDEQ and NRC that appropriate the restoration goals have been achieved and stability criteria have been met, decommissioning and surface reclamation of the restored area will be initiated as described in Sections 6.2 and 6.3.	documents will provide the basis of the operating plan.
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 6.2.2 p. 6-15 (TR)	Following regulatory concurrence by both WDEQ and NRC that groundwater restoration has been successful within a mine unit or for the license area as a whole, all wells will be abandoned in accordance with applicable State and Federal regulations. Typical abandonment procedures will include: 1. A drill rig or hose reel will be used for well plugging to ensure that the well is properly sealed from bottom to top. The abandonment material may be neat cement slurry, sand-cement grout, bentonite chips or other plugging materials which will prevent the movement of fluids into or between unauthorized zones or water-bearing strata. Except for bentonite chips, the abandonment material will be mixed with water and pumped through the drill pipe, or a tremie pipe in the case of a hose reel, filling the well from bottom to top. The well will remain open for at least 48 hours to allow for settling of the abandonment fluid. As needed, additional abandonment materials will be added to the well until the well has been plugged to within at least two feet of the surface. After the fluid level has stabilized, the soil around the well collar will be excavated to expose the casing to at least 0.6 meters (2 feet) bgs. The casing will then be cut off at a minimum of 0.6 meters (2 feet) bgs. A cement or concrete hole plug will be placed in the top of the casing. If cement is used to plug the well to within 0.9 meters (3 feet) of the surface, a concrete plug will not be required. If the abandoned well is a monitor well contained within a monitor well ring surrounding a mine unit, a steel plate will be placed on top of the well casing showing the permit number, well identification, and date of plugging. The marking device will be installed at a minimum depth of 0.6 meters (2 feet) bgs. The excavated area around the abandoned well and any surface disturbance will be backfilled with the excavated material to the original surface and seeded with the approved seed mixture. A written abandonment report will be completed for each abandoned well, providing detailed documentation of the abandonment, which will be placed in the individual well file and reported to WDEQ and the WSEO in accordance with LQD Rules and Regulations Chapter	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.

			11, Section 15(e). The boundaries of each mine unit and the location of the monitor well ring around each mine unit will be recorded as a deed notice with the appropriate county, in accordance with LQD Rules and Regulations Chapter 11, Section 8(h)(i). Should a well have artesian flow to the surface, a counter pressure will be applied to force the abandonment fluid into the annular space of the well. This counter pressure will be maintained for the length of time required for the abandonment fluid to set or fully hydrate to permanently seal off the flow and/or pressure of the artesian aquifer such that surface or subsurface leakage will not occur. The well will then be abandoned as described in 1 through 10 above. Written abandonment reports for wells that are artesian to the surface will be submitted to the appropriate State agencies	
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 6.2.3 p. 6-16	The primary surface disturbances associated with ISR are the sites for processing facilities. Surface disturbances also occur during the well drilling program, pipeline installations, road construction, and header house construction. These disturbances however, involve relatively small areas and have very short-term impacts. Disturbances associated with drilling, mine unit construction and pipeline installation are normally limited, and are reclaimed and seeded in the same season. Vegetation is normally re-established over these areas within two years of the initial disturbance.	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 6.2.4 p. 6-16 (TR)	All disturbed surfaces will be scarified and contoured, if necessary, followed by topsoil placement and seeding with the WDEQ approved seed mix. Since ISR does not create major changes in the natural topography, no major re-contouring is anticipated, and the existing ground topography will closely mirror the final ground topography. Areas to be topsoiled will first be treated with a harrow, chisel plow or conventional disk to relieve compaction. Stockpiled and salvaged topsoil will be replaced on the final ground surface. If necessary, the replaced topsoil will be disked to create a proper seed bed. Topsoil will be placed in a single lift to avoid compaction. On slopes of 4H:1V or flatter, topsoil will be placed along the contour. Topsoil will not be placed if site conditions are excessively wet, dry or frozen. Such ground conditions would cause excessive clods or frost chunks to form and may impart undesirable physical characteristics to the final seedbed. Topsoil thicknesses will generally be uniform and reflect the approximate thickness of topsoil originally available at the locality being reclaimed. This replacement depth will be determined on site by Cameco. Typically the adjacent undisturbed surface will be augured to determine topsoil depth and the existing undisturbed ground will be smoothly transitioned into the disturbed ground following replacement of the topsoil. The reclamation area will not be left as a "hole", nor will it be super-elevated above the existing ground surface. All salvaged topsoil will be utilized for reclamation purposes. Once the surface reclamation activities are completed, the area will be seeded with the approved seed mix. Seeding is typically performed	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.

			using a drill seeder or may be hand broadcast if the area is small. Typically, seeding is completed during the fall seeding window (October 15 to frozen ground conditions). If spring seeding is required, seeding is typically performed no later than April 15 of each year. Seeding is completed in the spring or fall during the year in which the topsoil is replaced. Ideally the two operations will occur consecutively. In addition to seeding areas that require topsoil replacement, seeding will also occur where vegetation has been removed or disturbed. These would most likely be areas within the mine units where no topsoil was removed and normal operations have impacted the vegetation. These areas will be scarified to loosen the surface soil prior to seeding. No seeding will be conducted when the ground is frozen or snow covered. The reclaimed surface will be available for unrestricted use at the end of the decommissioning/reclamation process.	
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 6.3.1 p. 6-17 (TR)	Prior to decommissioning of structures, equipment or scrap, preliminary radiological surveys will be conducted to characterize the levels of contamination on structures and equipment and to identify any potential hazards. These surveys will include alpha, beta and gamma surveys and smear surveys, where appropriate. In general, the operational contamination control program, as discussed in Section 5.8.6, will be appropriate for use during decommissioning of structures. The surveys will support the development of procedures for dealing with such hazards prior to commencement of decommissioning activities. Based on the results of the preliminary radiological surveys, gross decontamination techniques will be employed to remove loose contamination before decommissioning activities proceed. This initial decontamination will generally consist of washing all accessible surfaces with high-pressure water. In areas where contamination is not readily removed by high-pressure water, a decontamination solution (e.g., dilute acid) may be used. The wash water will be contained and properly disposed.	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 6.3.2 p. 6-18 (TR)	The majority of the equipment in the process buildings may be reusable, depending on its age and functionality, as well as the buildings. Alternatives for the disposition of the buildings and equipment are discussed in this section. All process or potentially contaminated equipment and materials including tanks, filters, pumps, piping, etc., will be inventoried, listed and designated for one of the following removal alternatives: 1. Removal to a new location within SUA-1548 for future use; 2. Removal to another licensed facility for use; 3. Decontamination to meet unrestricted use criteria for release, sale or other unrestricted use by others; or 4. If the equipment or materials cannot be decontaminated to unrestricted release criteria, disposal at a NRC licensed disposal facility. It is anticipated that process buildings will be decontaminated, dismantled and released for use at another location. If decontamination efforts are unsuccessful, the material will be transported to a NRC	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.

			licensed disposal facility. Cement foundation pads and footings will be broken up and transported to a solid waste disposal site or to a NRC-licensed disposal facility if contaminated, or, if approved by the regulatory agencies and surface owners, buried on site.	
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 6.3.2.1 p. 6-18 (TR)	Salvageable building materials, equipment and other materials to be released for unrestricted use will be surveyed for alpha contamination in accordance with NRC guidance. Release limits for alpha radiation are as follows: • Removable alpha contamination of 1,000 disintegrations per minute/100 centimeters^2 • Average total alpha contamination of 5,000 disintegrations per minute/100 cm^2 over an area no greater than 1 meter^2. • Maximum total alpha contamination of 15,000 disintegrations per minute /100 cm^2 over an area no greater than 100 centimeters^2. Decontamination of surfaces will be guided by the ALARA principle to reduce surface contamination to levels as far below the limits as practical. Non-salvageable contaminated equipment, materials, and dismantled structural sections will be transported to a NRC licensed disposal facility. In most cases, the byproduct material will be shipped as Low Specific Activity (LSA-I) material, UN2912, pursuant to 49 CFR 173.427. Any underground or above ground petroleum storage tank located at any facility will be closed in accordance with Wyoming Statute 35-11 Article 14 (Wyoming Storage Tank Act of 2007). The WDEQ/ Storage Tank Program will be notified of the proposed closure and Cameco will arrange to have environmental samples collected after the closure, if needed.	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 6.3.2.2 p. 6-18 (TR)	If facilities or equipment are to be moved to a facility licensed for disposal of 11e.(2) byproduct material, the following procedures will be used. • The exterior surfaces of process equipment will be surveyed for contamination. If the surfaces are found to be contaminated the, equipment will be washed down to permit safe handling. • The equipment will be disassembled only to the degree necessary for transportation. All openings, pipe fittings, vents, etc., will be plugged or covered prior to moving equipment from the plant building. • Equipment in the building, such as large tanks, may be transported on flatbed trailers. Smaller items, such as links of pipe and ducting material, will be crushed to reduce the volume and placed in lined roll off containers or covered dump trucks or drummed in barrels for delivery to the disposal facility. • Contaminated buried main trunk lines and sump drain lines will be excavated and removed for transportation to a NRC licensed disposal facility.	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.

			Contaminated HDPE liners and any contaminated soils underlying the surge ponds and reservoirs will be excavated and removed for transportation to a NRC licensed disposal facility.	
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 6.3.3 p. 6-19 (TR)	Pursuant to License Condition 9.6 of SUA-1548, materials, equipment, and structures that cannot be decontaminated to meet the appropriate release criteria will be disposed at a NRC licensed disposal site. Cameco currently has a contract disposal agreement with Denison Mines (USA) Corp. for disposal at the White Mesa Mill near Blanding, Utah. A current disposal agreement will be maintained with a minimum of one licensed disposal facility throughout the duration of licensed operations. Should Cameco contract with a new disposal facility, Cameco will notify the NRC in accordance with License Condition 9.6 of SUA-1548. Transportation of all contaminated waste materials and equipment from the site to the approved licensed disposal facility or other licensed sites will be conducted in accordance with the DOT Hazardous Materials Regulations (49 CFR Part 173) and the NRC transportation regulations (10 CFR 71).	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.
Feb 1, 2012	NRC Lic. Renewal Doc. (TR)	Sec. 6.4 p. 6-19 (TR)	Surface soils will be cleaned up in accordance with the requirements of 10 CFR Part 40, Appendix A, including a consideration of ALARA goals and the chemical toxicity of uranium. On April 12, 1999, the NRC issued a Final Rule (64 FR 17506) that requires the use of the existing soil radium standard to derive a dose criterion for the cleanup of byproduct material. The amendment to Criterion 6(6) of 10 CFR Part 40, Appendix A was effective on June 11, 1999. This "benchmark approach" requires that NRC licensees model the site-specific dose from the existing radium standard and then use that dose to determine the allowable quantity of other radionuclides that would result in a similar dose to the average member of the critical group. These determinations must then be submitted to NRC with the site decommissioning plan or included in license applications. Cameco will utilize RESRAD Version 6.4 or later versions to calculate radiation doses and cancer risks, if any, to the existing population groups and derive cleanup standards for radioactively contaminated soils. The benchmark modeling will be performed and submitted with the decommissioning plan required by License Condition 9.11 of SUA 1548. Concurrent with publication of the Final Rule, NRC published draft guidance (64 FR 17690) for performing the benchmark dose modeling required to implement the final rule. Final guidance was published as Appendix E to NUREG-1569. This guidance discusses acceptable models and input parameters. This guidance and site-specific parameters will be utilized in the modeling efforts.	This will be the operating plan when the License Renewal is approved by the NRC. Until that time, the Reynolds, SR-2 and Pathfinder/Uranerz documents will provide the basis of the operating plan.

Cameco

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December 19, 2012

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U.S. Nuclear Regulatory Commission
Attn: Douglas Mandeville
11545 Rockville Pike
Two White Flint North, Mailstop T8 F5
Rockville, MD 20852-2738

License SUA-1548, Docket 40-8964, Administrative Changes to License Conditions

Dear Mr. Mandeville:

Cameco Resources (Cameco) is writing to address items in the NRC Inspection Report 040-08964/12-002, September 14, 2012 regarding the adherence to four of NRC License Conditions found in SUA-1548 Amendment No. 17. Cameco requests administrative changes including a revision to the License Condition 9.1 and that License Conditions 10.1.2.c and 10.1.12 be deleted. The rationale is provided below. In relation to the North Butte Expansion Area, Cameco believes that License Condition 10.2.1 has been satisfied by prior NRC assessments of other Cameco expansion areas. The rationale and proposed approach for North Butte is provided below.

<u>The following Administrative Changes are being proposed</u>:

License Condition 9.1

> *"The authorized places of use shall be the license's Smith Ranch-Highland Project (SR-HUP), which is the primary processing facility located in Converse County, Wyoming: Highland in-situ Leach (ISL) Satellite facility located in Converse County, Wyoming; Ruth ISL Satellite Facility located in Johnson County, Wyoming; North Butte ISL Satellite facility located in Campbell County, Wyoming; Gas Hills ISL Satellite Facility located in Fremont and Natrona Counties, Wyoming; and Reynolds Ranch Satellite ISL facility located in Converse County, Wyoming. As satellite facilities, operations at the Highland, Ruth, North Butte, Gas Hills and Reynolds Ranch facilities shall be limited to shipments of loaded ion exchange (ix) resin or yellowcake slurry which will be transported to the central processing plant at Smith Ranch, as further explained in the commitments, representations, and statements listed in licenses condition 9.3."*

The Highland Satellite Plant was taken offline and put on standby status in late 2002, and Cameco is currently in the process of updating the internal components of the facility to process loaded resin from other licensed facilities including Cameco and/or Third-parties. This facility will be a full processing facility, including a vacuum dryer similar to the Smith Ranch Central Processing Plant, and will produce yellowcake. Cameco requests that license condition 9.1 be revised to include the pending operational status of the renovated Highland Central Processing Plant. The proposed revision to the license condition is:

> "*The authorized places of use shall be the license's Smith Ranch-Highland Uranium Project (SR-HUP), which is the primary processing facility located in Converse County, Wyoming: Highland in-situ Leach (ISL) Satellite facility located in Converse County, Wyoming; Ruth ISL Satellite Facility located in Johnson County, Wyoming; North Butte ISL Satellite facility located in Campbell County, Wyoming; Gas Hills ISL Satellite Facility located in Fremont and Natrona Counties, Wyoming; and Reynolds Ranch Satellite ISL facility located in Converse County, Wyoming. As satellite facilities, operations at the ~~Highland,~~ Ruth, North Butte, Gas Hills and Reynolds Ranch facilities shall be limited to shipments of loaded ion exchange (ix) resin or yellowcake slurry which will be transported to the central processing plant at Smith Ranch Central Processing Plant (CPP) or the Highland Central Processing Plant (HCPP). Shipments of loaded ion exchange (ix) resin or yellowcake slurry can be transported between the central processing plants, as further explained in the commitments, representations, and statements listed in licenses condition 9.3.*"

The proposed changes in the license condition will allow Cameco to receive loaded resins and slurry at the Smith Ranch CPP or Highland CPP while also allowing transfers between the two plants to maximize the efficiency of both.

License Condition 10.1.2 c.

> "*The NRC shall be notified prior to restart of the Highland dryer.*"

Cameco will fulfill this license condition by notifying the NRC two months prior to startup of dryer to provide NRC time to schedule their pre-operational inspection. Upon the fulfillment of the license condition we respectfully request that License Condition 10.1.2 be deleted from the license.

License condition 10.1.12

"The licensee may receive and process up to 365 toll shipments of loaded ion exchange (IX) resin at the Smith Ranch central processing plant per calendar year. The tolled IX resin must be generated at NRC licensed uranium recovery facilities located in the State of Wyoming. The activities will be performed in accordance with the submittals dated June 19, 2008, and October 1, 2008"

Comment:
The NRC Regulatory Issue Summary 2012-06 "NRC Policy Regarding Submittal of Amendments for Processing of Equivalent Feed at Licensed Uranium Recovery Facilities" issued April 16, 2012 contains language that defines equivalent feed for community water supply, mine dewatering operation and resin shipments originating form licensed uranium recovery facilities. The statement from the aforementioned issue summary is as follows:

> "In a similar fashion to ULRs originating from a CWS or mine dewatering operation, ULRs from another licensed uranium recovery facility can also be treated as equivalent feed if it meets the above mentioned criteria."

Cameco will receive shipments of loaded resin from licensed uranium recovery facilities and possibly Community Water Supply sources that will include tolled shipments while complying with license condition 10.1.1 which states ".... (A)nnual yellowcake production shall not exceed 5.5 million pounds as U3O8". In adherence to the NRC Regulatory Issue Summary (RIS), Cameco understands that tolled shipments, which meet the criteria listed in the RIS, may be treated as equivalent feed. In an effort to keep license conditions updated and uniform with NRC policy, Cameco requests that license condition 10.1.12 be deleted as it has been superseded by and was fully addressed in the RIS 2012-06.

<u>The proposed approach for North Butte is as follows</u>:

License Condition 10.2.1

"Before engaging in any commercial in situ leach activity not previously assessed by the NRC, the licensee shall prepare a new operating plan in accordance with the guidance in NUREG-1569 (June 2003), for NRC review and approval, and shall prepare and record an environmental evaluation of such activity. When the evaluation indicates that such activity may result in a significant adverse environmental impact that was not previously assessed or that is greater than that previously assessed, the licensee shall provide a written evaluation of such activities and obtain prior approval of the NRC in the form of a license amendment."

Comment:
The Uranerz U.S.A., Inc. License Application and Environmental Assessment (EA), 1990, for North Butte and Ruth properties describes a processing plant which would have included IX, elution, precipitation, thickening and drying capacity. The statement also allows for the transfer of loaded and unloaded resins to another unspecified facility. Since the Uranerz license has rolled into License SUA-1548 with the purchase of the North Butte and Ruth properties, the Smith Ranch Performance Based license applies to the existing North Butte/Ruth license. This allows Cameco Resources to review and approve proposed changes within the license if the SERP license conditions are met through the ORC/SERP process.

License Amendments 11 and 12 to SUA-1548 approved the Reynolds Ranch Satellite and Satellite SR-2, respectively. The activities, operating plan and satellite design assessed and approved for the Satellite SR-2 project included: construction activities; barren lixiviant pumped to the wellfields; receipt of pregnant lixiviant from the wellfields; pumping through as series of IX columns; uranium extraction by the resin; loaded resin transfer to the Smith Ranch CPP for processing; waste water storage; reverse osmosis and restoration effluent waste.

The North Butte Satellite plant design and function, including tanks, pumps, vessels, control room, restrooms, change rooms and lab is consistent with Satellite SR-2, with exception of orientation and placement. Some components may be newer and more advanced models, especially electronics. The approved Reynolds Ranch Satellite has not been constructed to date, but will follow the same function and basic design of SR-2 and North Butte satellites. All activities will operate under the existing and approved SHEQ Management System including Standard Operating Procedures (SOPs), Safety Manual, Health Physics Manual, Training Manual and Emergency Preparedness Manual.

It is evident that all activities proposed at the North Butte Satellite have been previously assessed by the NRC through an EA process for North Butte, SR-2 and Reynolds Satellite application in which no adverse impacts were identified the EAs of both the Satellite SR-2 and Reynolds Satellite amendments support this conclusion.

Cameco reviewed existing documents to verify that an operating plan which has been previously assessed by the NRC is applicable to North Butte. A thorough review revealed that the ORC/SERP process can be employed to appraise, and if appropriate, approve an operating plan for the North Butte Satellite facility as required in License Condition 10.2.1. Consistent with this correspondence, Cameco has advised NRC staff verbally of our intention to follow the ORC/SERP process.

The documents will be available for NRC review during the next semi-annual inspection, assuming that the ORC/SERP panel approves the documents presented for the North Butte Satellite operations. The noted ORC/SERP document will be finalized and available for review at the next scheduled inspection.

With this correspondence, Cameco is also notifying the NRC of the intent to start operations at its North Butte Satellite facility April 1, 2013. This notification is provided to the NRC in advance to allow scheduling for a pre-operational inspection of the facility.

If you have any questions, please contact me at 307-316-7588 or at Josh_Leftwich@cameco.com.

Sincerely

Cameco Resources
Josh Leftwich
Director of Safety, Health, Environment, Quality

Ec: Cameco- SRH

Cameco

CAMECO RESOURCES
Development Department

Inter-Office Memo

To: Josh Leftwich

From: John McCarthy

Date: 11/12/12

Subject: Phone Conversation with NRC, 10/25/12

On the morning of October 25, 2012, Josh Leftwich, Scott Bakken and John McCarthy contacted Doug Mandeville of the Nuclear Regulatory Commission for a conference call concerning four (4) license conditions and Cameco Resources' (Cameco) path forward to address the conditions.

The NRC Inspection Report of September 14, 2012 stated that there were four license conditions that would require addressing prior to operating the North Butte Satellite and Highland Plant. Specifically, License condition 9.1, authorized places of use; 10.1.2.c, notification of restart of Highland; 10.1.12, toll shipments and 10.2.1, a North Butte operating plan for NRC review and approval are conditions that would require actions.

Doug Mandeville, Project Manager, was informed that Cameco planned to submit a request for an administrative change to license conditions 9.1, 10.1.2.c and 10.1.12 as our proposed activities will alter or eliminate these conditions. A letter will be submitted to the NRC with justifications and proposed revisions to the conditions. Condition 9.1 will require revisions to reflect Smith Ranch or Highland as the recipient of resins or slurry and removing the Highland plant as a satellite to Smith Ranch. Condition 10.1.12 will be address by informing the NRC two months prior to anticipated startup of the Highland plant to allow NRC time to schedule a pre-startup inspection. Condition 10.1.12 has been expanded from the original Toll Milling Amendment by the recent RIS concerning Equivalent Feed and we would be requesting closing of the condition.

We then discussed license condition 10.2.1 and the language in the condition. Before engaging in commercial in situ activities not previously assessed by the NRC, the licensee shall prepare a new operating plan for North Butte to be submitted to NRC review and approval. We stated our intent of using the SERP process to evaluate North Butte with the original Uranerz application, Reynolds Ranch Satellite and SR-2 Satellite. These three submittals have been reviewed and approved by the NRC using the Environmental Assessment (EA) process, allowing for SERP review. The Reynolds Ranch and SR-2 satellites function and will be operated the same as the proposed North Butte Satellite. There are minor differences concerning technological advances and electronic enhancements. The Project Manager agreed and stated the concept and general operation should be the same and the NRC would not expect exact duplicates, but would expect the function of the satellite to be as assessed. The Project

Manager stated that during the next inspection the NRC would review the documentation against license condition 9.4, SERP requirements.

The project Manager also requested a conference call to discuss clarifications concerning the License Renewal. There were also discussions concerning Surety and NRC comments that will be address with the next submittals.