

U.S. NUCLEAR REGULATORY COMMISSION  
OFFICE OF FEDERAL AND STATE MATERIALS AND ENVIRONMENTAL  
MANAGEMENT PROGRAMS  
DIVISION OF WASTE MANAGEMENT AND ENVIRONMENTAL PROTECTION

FINAL ENVIRONMENTAL ASSESSMENT  
FOR THE RENEWAL OF U.S. NUCLEAR REGULATORY COMMISSION  
LICENSE NO. SUA-1341 FOR URANIUM ONE USA, INC.  
IRIGARAY AND CHRISTENSEN RANCH PROJECTS (WILLOW CREEK PROJECT)  
WYOMING

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## ACRONYMS/ABBREVIATIONS

ARMZ	JSC Atomredmetzoloto
BLM	Bureau of Land Management
CBM	Coal Bed Methane
CFR	Code of Federal Regulations
CPP	Central Processing Plant
COGEMA	COGEMA Mining, Inc.
DAC	Derived Air Concentration
DOT	U.S. Department of Transportation
EA	Environmental Assessment
FONSI	Finding of No Significant Impact
FR	Federal Register
FWS	U.S. Fish and Wildlife Service
ISR	In-Situ Recovery
IX	Ion Exchange
MU	Mine Unit
NEPA	National Environmental Policy Act
NRC	U.S. Nuclear Regulatory Commission
PSA	Purchase and Subscription Agreement
RAI	Request for Additional Information
SER	Safety Evaluation Report
SHPO	State Historic Preservation Office
TLD	Thermoluminescent Dosimeter
Uranium One	Uranium One, Inc.
WDEQ	Wyoming Department of Environmental Quality
WSEO	Wyoming State Engineers Office
WYOGCC	Wyoming Oil and Gas Conservation Commission
WYPDES	Wyoming Pollutant Discharge Elimination System

## 1.0 INTRODUCTION

### 1.1 License Renewal Request

By letter dated May 30, 2008 (COGEMA, 2008a), COGEMA Mining, Inc. (COGEMA) submitted an application to the U.S. Nuclear Regulatory Commission (NRC) for renewal of Source Materials License SUA-1341 for the continued combined operation of the Irigaray and Christensen Ranch commercial scale uranium In-Situ Recovery (ISR) operations located in Johnson and Campbell Counties, Wyoming. COGEMA filed the current renewal application 30 days prior to the license expiration date of June 30, 2008. Therefore, in accordance with Section 40.42 of Title 10 of the *Code of Federal Regulations* (CFR) (10 CFR 40.42), the existing license will not expire until the NRC makes a final determination on the renewal application. COGEMA has requested a 10-year license renewal.

By letter dated December 29, 2008, NRC staff notified COGEMA that the renewal application had been accepted for review (NRC, 2008a). NRC staff initiated an environmental review of the renewal request and sent a letter with Requests for Additional Information (RAIs) to COGEMA on March 24, 2009 (NRC, 2009a). COGEMA's response to the RAIs was provided in a letter dated July 17, 2009 (COGEMA, 2009a).

On February 9, 2009, a Notice of License Renewal Request and an Opportunity for Hearing was published in the *Federal Register* (FR) (74 FR 6436). In response, the Oglala Delegation of the Great Sioux Nation Treaty Council (Delegation) and the Powder River Basin Resource Council (Council) filed petitions to intervene and requests for hearing. For reasons stated in the Memorandum and Order LBP-09-13, dated July 23, 2009, the Atomic Safety and Licensing Board concluded that neither the Delegation nor the Council demonstrated standing as required by 10 CFR 2.309(a) (NRC, 2009b). Therefore, the petitions were denied.

During NRC review of the COGEMA application for license renewal, COGEMA entered into a Share Purchase Agreement with Uranium One, Inc. (Uranium One). NRC reviewed and approved an application for change of control and ownership on December 17, 2009 (NRC, 2009c). The sale was finalized on January 25, 2010, which resulted in a change of control and ownership of the Irigaray and Christensen Ranch ISR projects to Uranium One. As a result of the transaction, Uranium One USA, Inc., a daughter company of Uranium One, became the licensee.

Uranium One submitted a Letter of Intent to the NRC on January 18, 2010 (Uranium One, 2010a), proposing to operate the proposed Moore Ranch, Ludeman, and Allemand-Ross ISR projects as satellites to the Irigaray site. In light of this new information, NRC sent an email to Uranium One on March 2, 2010 (NRC, 2010a), requesting additional information to support the evaluation of the cumulative impacts of operating the additional proposed satellite facilities. Uranium One's response to this information request was provided in an email dated April 21, 2010 (Uranium One, 2010b).

On June 8, 2010, Uranium One entered into a Purchase and Subscription Agreement (PSA) with JSC Atomredmetzoloto (ARMZ) and its wholly owned subsidiaries, Effective Energy N.V. (Effective Energy), a Dutch limited liability company, and Uranium Mining Company (UMC), a

Russian open joint stock company. NRC reviewed and approved an application for change of control and ownership on November 23, 2010 (NRC, 2010b). ARMZ acquired approximately 51% stake in Uranium One. This transaction was completed on December 27, 2010 and resulted in the indirect change of control of License SUA-1341 from Uranium One to Rosatom through ARMZ. While the parent company changed as a result of the indirect change of the control to Rosatom, Uranium One USA, Inc., a daughter company of Uranium One and Rosatom, remains the licensee.

## 1.2 Regulatory History

The Irigaray project, including a Central Processing Plant (CPP) and well fields, was licensed for commercial ISR operation in August 1978, under the ownership of Westinghouse Electric Corporation. The project was licensed to operate at an 800 gallons per minute (gpm) flow rate. In 1982, operations ceased at the Irigaray plant and well fields, and the project was placed on standby status pending improvements in the uranium market. In 1987, Malapai Resources Company (Malapai) purchased the Irigaray project and resumed operations. In 1988, Malapai was granted an amendment to the Irigaray license SUA-1341 to include the Christensen Ranch satellite ion exchange plant and associated well fields. In February 1990, operations at both the Irigaray and Christensen Ranch facilities ceased, due to the uranium market, and in September of 1990, Malapai was sold to Electricite de France, a French nuclear utility. In April 1993, COGEMA acquired ownership of the Irigaray and Christensen Ranch projects.

COGEMA last renewed its license in 1998 for a 10-year period, which ended on June 30, 2008. However, in March 2001, COGEMA was granted a license amendment, which removed its authorization to use lixiviant to extract uranium from the underground ore body, and placed the facility under decommissioning and restoration status. The expiration date for this possession-only license was “until terminated.” In July 2004, COGEMA requested concurrence from the Land Quality Division (LQD) of the Wyoming Department of Environmental Quality (WDEQ) that restoration of the existing well fields at Irigaray had been successfully completed. The final groundwater restoration of the existing well fields at Irigaray was approved by the WDEQ/LQD in a letter dated November 1, 2005 (COGEMA, 2005) and concurred on by the NRC in a letter dated September 20, 2006 (NRC, 2006). COGEMA also conducted groundwater restoration in all existing Christensen Ranch well fields and reported the results to WDEQ and the NRC in Wellfield Restoration Report, Christensen Ranch project, Wyoming, by letter dated April 8, 2008 (COGEMA, 2008b). The review of this report is ongoing and has yet to be approved.

In April 2007, COGEMA requested a return to operational status with essentially the same license conditions that existed in its last operational license before it obtained a possession-only license for restoration and decommissioning (COGEMA, 2007). The return to operational status was approved by the NRC by letter dated September 30, 2008 (NRC, 2008b), contingent upon an update in surety to reflect operational conditions and a successful NRC Region IV preoperational inspection. The operational surety was approved on December 16, 2010 (NRC, 2010c). Following inspections on October 25-28 and December 7-9, 2010, the authorization for restart was approved on December 17, 2010 (NRC, 2010d). Restart of uranium recovery operations at the Irigaray and Christensen Ranch projects commenced shortly after the authorization to restart.

### 1.3 Proposed Action

The proposed action is to renew the Source Materials License SUA-1341 for a ten-year period to authorize the commercial operation of the Irigaray CPP and several well fields at the Christensen Ranch project, so that uranium recovery can continue. Mine Unit (MU) 5 and MU 6 at Christensen Ranch, although currently restored (pending NRC review), might be evaluated by the licensee for additional ISR recovery operations. Barren lixiviant would be injected into the underground ore body to dissolve uranium into solution and the uranium-laden (pregnant) lixiviant would be pumped back to the surface and transferred to the Christensen Ranch satellite processing facility. Uranium would be removed from the pregnant lixiviant by ion exchange resins. These uranium-loaded resins would then be trucked to the Irigaray CPP for elution and final processing into dried yellowcake powder (COGEMA, 2008a).

Production is scheduled to run for 12 years from the Christensen Ranch well fields. Restoration of the final producing well field would be completed within 3 years after production ends. Overall, the remaining Christensen Ranch project life is about 16 years.

Any future development of remaining reserves at Irigaray would require a major reconstruction of the Irigaray plant to replace the decommissioned circuits that previously supported ISR operations at Irigaray. If this development becomes desirable the licensee would submit to the NRC and WDEQ an approval request for such a renovation prior to any work. If remaining reserves at Irigaray were developed, the overall project life could be extended an additional eight years (COGEMA, 2008a).

### 1.4 Purpose and Need for the Proposed Action

NRC regulates uranium milling, including the ISR process, under 10 CFR Part 40, "Domestic Licensing of Source Material." Uranium One USA, Inc. is seeking to renew its source materials license to authorize continued commercial-scale ISR and processing at its Christensen Ranch and Irigaray project sites. The purpose and need for the proposed federal action is to provide an option that allows Uranium One USA, Inc. to continue using ISR technology to recover uranium and produce yellowcake at its Christensen Ranch and Irigaray ISR project sites. Yellowcake is the uranium oxide product of the ISR milling process that is used to produce fuel for commercially-operated nuclear power reactors.

This definition of purpose and need reflects the Commission's recognition that, unless there are findings in the safety review required by the Atomic Energy Act of 1954, as amended, or findings in the environmental analysis required by the National Environmental Policy Act of 1969, as amended (NEPA) that would lead the NRC to reject a license renewal application, the NRC has no role in a company's business decision to submit a license application to continue operating an ISR facility at a particular location.

### 1.5 Alternative to the Proposed Action

#### No Action Alternative

The alternative considered in this Environmental Assessment (EA) is the No-Action Alternative. Under the No-Action Alternative, the NRC would not renew license SUA-1341. Uranium

recovery operations at the Christensen Ranch project and uranium processing at the Irigaray project would cease and decommissioning activities would begin.

## 1.6 Scope of the Environmental Analysis

### 1.6.1 Federal and State Authorities

NRC source material licenses are issued under 10 CFR Part 40 (Domestic Licensing of Source Material). As stated in 10 CFR 40.3, a “person subject to the regulations in this part may not receive title to, own, receive, possess, use, transfer, provide for long-term care, deliver or dispose of byproduct material or residual radioactive material...or any source material after removal from its place of deposit in nature, unless authorized in a specific or general license issued by the Commission...” “Source material” is defined in 10 CFR 40.4 as (1) uranium or thorium, or any combination thereof, in any physical or chemical form or (2) ores that contain by weight 0.05 percent or more of uranium, thorium, or any combination thereof.

In addition, the Uranium Mill Tailings Radiation Control Act of 1978, as amended, requires persons who conduct uranium source material operations to obtain a byproduct material license to own, use, or possess tailings and wastes generated by ISR operations (including above-ground wastes).

This EA has been prepared in accordance with 10 CFR Part 51, “Licensing and Regulatory Policy Procedures for Environmental Protection,” the NRC’s NEPA implementing regulations. In accordance with 10 CFR Part 51, an EA serves to (1) briefly provide sufficient evidence and analysis for determining whether to prepare an Environmental Impact Statement (EIS), or a Finding of No Significant Impact (FONSI); (2) facilitate creation of an EIS when one is necessary; and (3) aid the NRC’s compliance with NEPA when an EIS is not necessary.

A Safety Evaluation Report (SER) will follow the EA and accompany the licensing action, if approved. In preparing these two documents, the staff has evaluated the potential environmental impacts and health and safety issues associated with the continued commercial operation of the Irigaray and Christensen Ranch sites. In addition to issuing this EA and FONSI, should the NRC determine in the SER that health and safety issues are appropriately addressed, based on the licensee’s application materials (COGEMA, 2008a; 2008c; 2008d; 2009a; 2009b; Uranium One, 2010b), previous operational data, and the earlier EAs (NRC, 1998; 2001; 2008c) and SERs, a renewed commercial source material license would be issued to Uranium One USA, Inc.

The WDEQ administers and implements the State of Wyoming’s rules and regulations for environmental protection at the Irigaray and Christensen Ranch projects under Permit to Mine No. 478, Amendment No. 2.

### 1.6.2 Basis for Review

The NRC staff has addressed the environmental impacts associated with the renewal of the licensee’s source material license and documented the results of the assessment in this report. The staff performed this assessment in accordance with the requirements of 10 CFR Part 51.



In conducting this assessment, the staff considered the following:

- Information contained in the license renewal application, dated May 30, 2008 (COGEMA, 2008a), and in revisions and supplemental information submitted on October 31, 2008, July 17, 2009 (COGEMA, 2008c; 2009a; 2009b), and April 21, 2010 (Uranium One, 2010b);
- Information in the license, License SUA-1341 Amendment 18, dated November 24, 2010 (NRC, 2010e);
- Information contained in previous environmental evaluations of the Irigaray and Christensen Ranch Uranium projects (NRC, 1998; 2001; 2008c);
- The commercial operational history since 1998 as evidenced by semiannual environmental monitoring reports and wellfield restoration information provided by COGEMA;
- Wellfield Excursion Reports and corrective action analyses;
- Information derived from NRC site visits and inspections of the Irigaray and Christensen Ranch facilities; and
- Information provided by outside parties and stakeholders (see Table 5.1).

Because this EA evaluates the environmental impacts of continuing the currently licensed operations (renewing a license), many aspects of the proposed action, the affected environment, and the interaction between the two have been addressed previously in past NRC environmental review documents. Therefore, this EA uses the EAs prepared for the previous license renewal and the recent restart (NRC, 1998, and NRC, 2008c) as a basis. This EA focuses on new and significant information, including proposed changes to current operations, changes in the affected environment (including future changes expected to occur during the proposed license period), and the recent operating history, to determine whether the new information is within or outside the bounds of what was previously evaluated and to determine whether the conclusions in the previous EAs are still appropriate.

The conclusions presented in this EA are based on all aspects of the proposed action and the affected environment, including those that have been evaluated in previous environmental documents. However, in order to limit redundancy and to focus this EA on issues that have not been previously evaluated, the reader might be asked to refer to past environmental review documents for more detailed descriptions of those aspects of analysis that remain unchanged.

## 2.0 DESCRIPTION OF SITE AND ACTIVITIES

### 2.1 Site Description

Although under one license, the Irigaray and Christensen Ranch ISR projects are two distinct sites located within the southern portion of the Powder River Basin, a structural and topographic basin in eastern Wyoming and southern Montana. As shown in Figure 2.1, the Christensen Ranch site lies at the base of the Pumpkin Buttes to the northwest and the Irigaray project is located approximately 13 road miles to the northwest of the Christensen Ranch site. Both of the properties are characterized by rolling uplands, which are bisected by sharp deep-cut drainages. Most of the drainages on the sites flow to Willow Creek, a seasonal tributary to the Powder River, which crosses both properties from southeast to northwest. Elevations are generally high and range from 4,300 feet (1,311 m) to 5,200 feet (1,585 m).

The Irigaray project site is located in southeast Johnson County, approximately 10 miles northeast of Sussex, Wyoming, 43 miles southeast of Buffalo, Wyoming, and 90 miles north-northeast of Casper, Wyoming. The Irigaray NRC license area includes approximately 1,000 acres; however, only a small fraction of this land has been disturbed by previous and current uranium recovery activities. The various research and development phases at the Irigaray project occupied approximately 10 acres. Previous commercial well field operations have been limited to approximately 40 acres. Well field operations at the Irigaray site ended in 1994 and all well fields were restored by late 2001. The well fields are currently undergoing decommissioning, which involves removal and plugging of wells, piping, and associated structures. The licensed central processing facility is located at the Irigaray site and would be used to process yellowcake if the license is renewed. Because there are currently no plans to develop well fields at the Irigaray project, very little land disturbance is expected to take place at the Irigaray site.

The Christensen Ranch project area is located along the Campbell-Johnson County boundary, about 30 miles north-northeast of the town of Midwest, Wyoming, and 50 miles southwest of Gillette, Wyoming. The total surface area expected to be disturbed by existing and future operations is 974 acres, which is approximately seven percent of the 14,000 acres within the license area. Land disturbance could consist of well field piping installation, header house construction, production and injection well construction, and well field decommissioning and restoration.

The last operating well field at Christensen Ranch was shut down on June 23, 2000 and the well fields have been undergoing restoration since this time. If the license is renewed, uranium extraction activities would continue in those previously licensed well fields that have not had uranium extracted.



**COGEMA MINING**  
 Figure 2.1  
 Irigaray and Christensen  
 Ranch Area  
 General Location Map

SUA 1341, May, 2008

Figure 2.1 General Location Map – Irigaray and Christensen Ranch (COGEMA, 2008a)

## 2.2 ISR Process Description

During the ISR process, an oxidant-charged solution, called a lixiviant, is injected into the production zone aquifer (uranium ore body) through injection wells. Typically, a lixiviant uses native ground water (from the production zone aquifer), carbon dioxide, and sodium carbonate/bicarbonate, with an oxygen or hydrogen peroxide oxidant. As it circulates through the production zone, the lixiviant oxidizes and dissolves the mineralized uranium, which is present in a reduced chemical state. The resulting uranium-rich solution is drawn to recovery wells by pumping, and then transferred to a processing facility via a network of pipes buried just below the ground surface. At the processing facility, the uranium is recovered from the solution. The uranium recovered from the solution is processed, dried into yellowcake, packaged into NRC- and U.S. Department of Transportation (DOT)-approved 205-liter (55-gallon) steel drums, and trucked offsite to a licensed uranium conversion facility. The resulting barren solution is then recharged with the oxidant and re-injected to recover more uranium from the well field.

During production, the uranium recovery solution continually moves through the production aquifer from outlying injection wells to internal recovery wells. These wells can be arranged in a variety of geometric patterns depending on ore body configuration, aquifer permeability, and operator preference. Well fields are often designed in five or seven spot patterns, with each recovery (i.e., production) well being located inside a ring of injection wells. There are multiple five or seven spot patterns in a well field. Overlying and underlying aquifers are separated from the production zone aquifer by aquitards, which reduce the potential for vertical lixiviant migration. Monitoring wells surround the well field pattern area, terminating in the production zone aquifer as well as in both the overlying and underlying aquifers. These monitoring wells are screened in appropriate stratigraphic horizons to detect lixiviant that could migrate out of the production zone. If lixiviant migrates out of the production zone, this is termed an excursion.

At Christensen Ranch lateral confinement of ISR lixiviant would be accomplished by maintaining a 1 percent bleed from the recovery wells, resulting in slightly more water being extracted from the well fields than is injected. This procedure maintains a net inflow of surrounding groundwater to the well field to ensure that lixiviant does not travel to areas of the formation where it would cause an excursion. Uranium One USA, Inc. is required by license condition to install monitoring wells above, below, and around the perimeter of the MUs. Additionally, Uranium One USA, Inc. is required to have a set of corrective actions and reporting procedures that can be implemented in the event that an excursion is detected.

## 2.3 Current Facility Use

The Irigaray CPP produces the final yellowcake product. The Irigaray operation currently consists of an elution process, uranium precipitation circuit, yellowcake dewatering and drying circuit, yellowcake storage, and the capability to package and ship either slurry or dried uranium product. The elution, precipitation, and packaging/shipping portions of the Irigaray operation are used to process Christensen Ranch uranium-laden resin and uranium product. Additionally, the plant is equipped and licensed to receive, store, and dry yellowcake slurry from other ISR operations. Uranium One USA, Inc. does not currently accept yellowcake slurry from other ISR operations and does not plan to do so during the period of this license renewal. However, as indicated in a Letter of Intent (Uranium One, 2010a), Uranium One USA, Inc. is considering operating three of its own proposed future ISR facilities (Moore Ranch, Ludeman, and Allemand

Ross) as satellites to Irigaray. These proposed activities are discussed further in Section 2.6 - Anticipated Changes to Facility Over 10-Year Licensing Period.

The CPP building at Irigaray is divided into two main areas: (1) the dry/pack area, which has controlled access and (2) the general process area. The decommissioned section of the plant has not been used since 1982 and now houses only the transfer water holding tank. The lack of use is because there is no longer active ore extraction within the Irigaray license area. The old portion of the plant is also used for storage of byproduct material, and could be used in the future for a vanadium circuit, if necessary.

The Christensen Ranch facility is considered the satellite operation and consists of an Ion Exchange (IX) extraction plant with capabilities for lixiviant makeup and water treatment. It was originally intended to be operated at an average flow rate of 13,680 Liters Per Minute (lpm) (3,600 gpm). However, the NRC approved a license amendment that allows a maximum flow rate of 15,140 lpm (4,000 gpm). This plant does not have a resin elution circuit. For this reason, approximately once or twice a day, resin from the IX columns must be transferred via truck to the Irigaray facility for processing. The facility also contains a Reverse Osmosis (RO) unit that is used to process approximately 600 lpm (160 gpm) of water from the process circuit. During production, the concentrated salts or brine from the RO process (up to 40 gpm) are sent to lined ponds for evaporation, or to deep well disposals. Approximately 120 gpm of the clean product water or permeate is used for lixiviant makeup and resin transfer or is recycled to the injection stream and sent back to the well field. Uranium One USA, Inc. stores reverse osmosis permeate in clay-bottomed ponds. The 40 gpm brine portion constitutes a 1 percent bleed from the well field for lixiviant migration control. A radium-226 adsorption column could be included in the line, which would feed permeate to the unlined storage pond for further radium-226 removal, if necessary. During restoration, a maximum flow of 150 gpm, which is composed of approximately 37.5 gpm salts or brine from the RO unit and 112.5 gpm groundwater sweep, could be sent to lined ponds or deep wells for disposal.

The lixiviant makeup system consists of a chemical mixing tank and an outside storage silo for solid soda ash. Up to 120 gpm of permeate is used to mix the lixiviant. This system is operated manually by filling the makeup tank with permeate and adding sodium bicarbonate. The resulting mixture is pumped to a day tank for metering into the injection stream. The Irigaray CPP and Christensen Ranch satellite plant building are each equipped with a spill containment system. The curbed plant foundation and pumpable sumps ensure that leaks and spills within the plants would not leave the plant areas. The sump systems are equipped with a pump, which delivers liquid spill and washdown water contents to the lined evaporation pond system or back into the plant process circuits.

Various maintenance tasks have been completed on the remaining plant facilities at Irigaray and Christensen Ranch in anticipation of restart operations. The resumption of ISR operations has focused on Christensen Ranch with the transportation of loaded resin to Irigaray.

## 2.4 Waste Generated and Waste Management

The processes associated with ISR operations generate airborne, liquid, and solid waste. The primary source of emissions from the ISR operations is from the processing plants and associated equipment. Liquid waste disposal capability includes evaporation in lined ponds, treatment and disposal via surface discharge under a Wyoming Pollutant Discharge Elimination

System (WYPDES) permit, and deep well injection (COGEMA, 2008a). All pond areas are fenced with posted signs and given enough freeboard to prevent the overtopping of waves caused by high winds.

#### 2.4.1 Irigaray

Emissions from the Irigaray CPP include fugitive dust from vehicular traffic, release of radon gas, and release of yellowcake particulate through the dryer packaging system. At the Irigaray drying/packaging area, there are three types of emissions: combustion byproducts, volatilized solution residuals, and uranium fines. The 1.2 million BTU/hr drying unit is propane fired, and the resulting combustion byproduct emissions are carbon dioxide (CO<sub>2</sub>), water (H<sub>2</sub>O), oxygen (O<sub>2</sub>), and nitrite (N<sub>2</sub>), which are not considered hazardous. To limit emissions of volatilized solution residuals and uranium fines, the dryer off-gas system is equipped with a Venturi scrubber that removes particulates down to the micron size. Most uranium fines are generated during packaging; however, any uranium fines generated while filling the storage drums are captured in a drum hood, which is kept under negative pressure, and are transported by suction line to the baghouse dust collector. The filtered air from the baghouse is combined with the dryer off-gas and is passed through the Venturi scrubber. The baghouse filters are cleaned by an air shock back flush, which causes the solids to fall to the bottom of the baghouse where they are discharged to a drum by a rotary valve (NRC, 1998).

Liquid waste management at the Irigaray site is through evaporation in lined ponds. Currently, there are four lined evaporation ponds at the Irigaray site. Solid wastes (non-radioactive) are transported to an industrial landfill and 11e.(2) byproduct materials are transported to the Pathfinder Mines Corporation's Shirley Basin tailings facility for final burial (COGEMA, 2008a).

#### 2.4.2 Christensen Ranch

Emissions from the Christensen Ranch satellite facility include releases of radon gas and releases of soda ash particulate from the process facility. Radon gas is mobilized from the ore zone during the ISR process and is present in recovery solutions when they enter the plant facilities. The majority of the radon would remain in solution because the IX columns are pressurized. Radon that could be released into the unpressurized lixiviant makeup tanks during resin transfer operations is vented directly to the atmosphere outside the processing plant buildings. Particulate emissions from the processing facility primarily occur from the lixiviant make-up process, where soda ash is used to generate the sodium bicarbonate lixiviant. The soda ash is stored in an outside silo that is equipped with a baghouse dust collection system, which collects over 99% of the product particulate created during the addition of soda ash to the silo. Because the process at Christensen Ranch is entirely wet, there are very little uranium or radon daughter product particulate effluents.

Liquid wastes from the operation of the ISR facilities are generated from both the ISR process and aquifer restoration process. Two liquid waste streams are produced during routine ISR operations. The first is the well field bleed used to control lixiviant migration. Disposal of well field bleed at Christensen Ranch is predominantly by injection into the deep disposal wells. The second stream is process wastewater that consists of sand filter backwash solutions, resin transfer wash water, plant wash down water, and occasionally brine from the reverse osmosis unit. These solutions, when present, equal approximately 5 gpm and are diverted to the lined solar evaporations ponds or the deep disposal wells. There are four lined evaporation ponds

and 1 unlined permeate pond at the Christensen Ranch site. In case future water storage needs require it, an additional pond has been permitted at the Christensen Ranch site and could be installed. The lined solar evaporation ponds were initially designed to provide a surface area and a capacity to evaporate a 5 gpm process waste stream.

## 2.5 Monitoring Programs

Uranium One USA, Inc. conducts regular monitoring of groundwater, evaporation ponds, and the surrounding environment to assess and mitigate impacts from commercial operations to individuals at and near the facility, and to the environment. Monitoring and inspections of evaporation ponds during operations occur on a weekly basis and ensure that the ponds are not overfilled and that leaks, eroded areas, liner damage, or other potential problems are detected. Permeate storage ponds are unlined as they contain water that meets WYPDES surface discharge criteria. Therefore, leak detection systems are not installed. However, water quality in the permeate storage ponds is sampled quarterly. Results are provided to the NRC and WDEQ semi-annually.

Quarterly gamma exposure rate surveys are performed in areas accessible to personnel. For areas found to be over the 2.0 mrem/hr administrative limit, surveys would be conducted on a monthly basis. Monitoring for airborne uranium is performed by gross alpha counting of glass fiber filters. Samples are counted on a monthly basis unless the sample count exceeds 25% of the Derived Air Concentration (DAC); then, sampling is increased to a weekly basis. When the dryer is in operation, continuous sampling is performed with weekly collection and analysis. Historically, uranium samples have been less than 10 percent of the DAC (COGEMA, 2008a).

On a monthly basis, Uranium One USA, Inc. conducts radon daughter surveys in the operating areas of the Irigaray and Christensen Ranch facilities. As with airborne uranium, the licensee has established an action level for radon of 25 percent of the DAC. Radon daughter concentrations in excess of the action level would trigger an investigation of the cause and an increase in sampling frequency to weekly until the concentrations are below the action level. Historically, since 1995, radon daughter monitoring results have been below the DAC. In 1998, at Christensen Ranch, there was one occurrence where the maximum radon daughter concentration exceeded the DAC. However, from 1995 through 2007, average radon daughter activity concentrations remained well below the regulatory limit (COGEMA, 2008a).

Emissions from the dryer are monitored by Uranium One USA, Inc. on a semi-annual basis through stack testing. The tests monitor for natural uranium, radium-226, thorium-230, and lead-210. Average total particulate emissions from 1980 to 2001, when the plant was last operating at full commercial scale, was 23.7 percent of the 0.30 lbs/hr WDEQ permit limit (COGEMA, 2008a).

Fulltime personnel at Irigaray and Christensen Ranch are monitored for gamma exposure using Thermoluminescent Dosimeters (TLDs), which are exchanged and read quarterly. Historical results of TLD monitoring show that average exposure rates have been below 1 percent of the 5 rem/yr regulatory limit and the highest exposure rates have been below 10 percent of this regulatory limit (COGEMA, 2008a).

Uranium One USA, Inc. samples excursion monitoring wells every two weeks for three excursion identification parameters: chloride, conductivity, and total alkalinity. If samples

exceed the upper control limits set for each parameter, Uranium One USA, Inc. re-samples the wells to verify the excursion. If an excursion is identified, Uranium One USA, Inc. notifies the NRC via telephone or email within 48 hours and follows up with a written report within 30 days. Uranium One USA, Inc. then takes corrective action to address the excursion. An excursion is considered concluded when the concentrations of excursion indicators fall below the criteria defining an excursion for three consecutive one-week samples (COGEMA, 2008a, NRC, 2010c). Since 1998, until the time that the current application for license renewal was submitted, COGEMA reported 19 horizontal and 3 vertical excursions. All, but one, of these excursions have been concluded. The remaining well, 5MW-66, in which an excursion was detected in July 2004, was released from excursion status in March 2005 by WDEQ after COGEMA showed that the area of the aquifer affected by the excursion was limited and had a chemical makeup consistent with the pre-mining class of use for the aquifer; however, the WDEQ required that the well continue to be monitored on a quarterly basis. NRC staff agreed with this action as it was in compliance with an existing license condition (COGEMA, 2005, NRC, 2010c). COGEMA submitted information on this excursion to NRC as part of the well field restoration report for MU 5, which is currently under NRC Staff review. The WDEQ, however, has recently required that the licensee characterize the affected water quality at and near 5MW-66 and submit a corrective action plan for its restoration. The licensee provided a corrective action plan, which involved pumping this well and two nearby wells in November 2010. This corrective action was implemented in December 2010. The licensee reports the results of the corrective action at 5MW-66 on a monthly basis to WDEQ and the NRC continues to monitor its progress.

In addition to excursion monitoring, the licensee is required by license condition to test all injection and production wells for mechanical integrity every five years to ensure they will not leak lixiviant, source, or byproduct material. The wells that fail these tests are taken out of service or repaired. Since 1998, until the time that the current application for license renewal was submitted, COGEMA has reported a total of 135 mechanical integrity failures. Annually, about 5 percent of the wells tested for mechanical integrity have failed. Historically, impacts from well casing failures and excursions at Irigaray and Christensen Ranch have been shown to pose no threat to human health or the environment (NRC, 2009d).

Uranium One USA, Inc. continues to take quarterly grab samples of surface water at four locations at Irigaray and three at Christensen Ranch. Sample locations include upstream and downstream Willow Creek monitoring stations at Irigaray and stations upstream and downstream from well field operations at Christensen Ranch. Samples are taken annually from the Powder River (COGEMA, 2008a). Surface water monitoring results are provided to the NRC and WDEQ semi-annually. Results of surface water monitoring since 1995 are presented in Table 5.25 of the license renewal application (COGEMA, 2008a). Average concentrations of sampled constituents (uranium, radium-226, thorium-230, lead-210, and polonium-210) are consistent with the original baseline concentrations.

Historically, prior to obtaining a possession-only license for restoration, the licensee conducted an annual soil and vegetation sampling program with sample locations coinciding with Irigaray and Christensen Ranch air quality monitoring sites. Soil and vegetation samples were analyzed for natural uranium, radium-226, thorium-230, and lead-210. The last samples for this annual program were taken in 2000. The sampling programs did not result in the identification of any trends (COGEMA, 2008a). Due to the change to operational status, this soil and vegetation



sampling program was resumed. Uranium One USA, Inc. would continue the program if the license renewal is granted.

## 2.6 Anticipated Changes to Facility Over 10-Year Licensing Period

Any future well field development at Irigaray would likely begin a minimum of 10 years from the point of operations restart at Christensen Ranch. Due to the major plant reconstruction to accommodate production at Irigaray, any future production at Irigaray would necessitate that Uranium One USA, Inc. submit a license/permit revision to address the change.

Future operations at Christensen Ranch would include completion of MU 7 and the sequential development of MUs 8 through 12. Initial restart activity would focus on well field drilling in anticipation of future lixiviant injection. Future operations might also include production from MUs 5 and 6, which would entail re-entry to these previously restored (pending NRC verification) well fields. Production is scheduled to run for 12 years from the Christensen Ranch well fields. Well field restoration is scheduled to occur in sequence as production from each well field is completed. Restoration of the final production well field would be completed within 3 years of the end of production (COGEMA, 2008a).

Drying capability at the Irigaray plant is equivalent to approximately 2.5 million pounds (1,134,000 kg) throughput per year, which exceeds projected production at Christensen Ranch. By letter dated January 18, 2010 (Uranium One, 2010a), Uranium One notified the NRC of its intent to operate the proposed Moore Ranch, Ludeman, and Allemand-Ross ISR projects as additional satellite facilities to Irigaray. This potential activity would include the receipt at the Irigaray CPP of up to four resin shipments per day from the proposed satellites (one per day from Moore Ranch and Allemand-Ross and two per day from Ludeman). Uranium One, USA, Inc. is currently authorized by license condition to receive source material for purposes of drying and storage. The additional proposed processing activities would not exceed the 2.5 million pounds of dried yellowcake that the Irigaray facility is currently licensed to process on an annual basis (Uranium One, 2010b). This EA includes a consideration of the cumulative impacts of activities associated with the three proposed satellite facilities.

## 2.7 Decommissioning

The NRC will require Uranium One USA, Inc. to decontaminate and decommission the Irigaray and Christensen Ranch project prior to termination of License SUA-1341. The NRC has approved a decommissioning plan for the Irigaray and Christensen Ranch facilities, which is reflected as a license condition. A change to the decommissioning plan will require a revision or update of the approved plan and would be submitted to the NRC and WDEQ to reflect site changes consistent with applicable license termination criteria at the time of decommissioning. The NRC will review the decommissioning plan from a safety and environmental impact perspective. Additionally, Uranium One USA, Inc. must provide (and re-calculate annually) financial surety for restoration, decommissioning, and reclamation for the overall project, which is maintained in the form of a letter-of-credit in favor of the State of Wyoming.

### 3.0 AFFECTED ENVIRONMENT

This section provides a framework for the environmental impact discussion. To avoid re-stating information that was presented in the EA prepared for the previous license renewal (NRC, 1998) and that has not changed, a full description of the affected environment for each of the 12 resource areas evaluated in Chapter 4 – Environmental Impacts is not provided here. Instead, this section will provide a full description of the affected environment for those resource areas that have changed since the 1998 EA was prepared (Land Use, Groundwater, and Soil). For the remaining 9 resource areas, a brief description of the affected environment is provided within the environmental impacts discussion in Chapter 4.

#### 3.1 Land Use

##### 3.1.1 In-Situ Uranium Recovery

The CPP is located at the Irigaray site and will remain there if the license is renewed. The CPP annex building remains capable of processing the loaded resin (i.e., elution, precipitation, and drying/packaging). The restoration IX columns and associated equipment have been removed from the Irigaray annex building because restoration of all wellfields at Irigaray is completed and approved. All well fields at the Irigaray facility have been restored and are in the process of undergoing surface decommissioning (COGEMA, 2008a). Several evaporation ponds at Irigaray have been decommissioned; liners, leak detection systems, and contaminated underlying soil have been removed. Four ponds are currently used as evaporation ponds (COGEMA, 2008a) to support the restart of operations. All decommissioning activities that have been accomplished to date have been consistent with the approved Decommissioning Plan referenced in License SUA-1341 (COGEMA, 2008a).

At Christensen Ranch, well field operations have disturbed approximately 94.3 hectares (233 acres) (NRC, 2008c). MUs 2 through 6 have been restored and a restoration report has been submitted to the NRC for review. The total expected disturbance at Christensen Ranch is approximately 7 percent of the 14,035-acre license area or 974 acres (COGEMA, 2008b).

There are seven other uranium ISR operations proposed or located within a 50-mile radius of the Irigaray and Christensen Ranch projects. These operations are listed in Table 3.1.

Table 3.1 Other Uranium ISR Mining Operations Proposed or Located within a 50-mile Radius of the Irigaray and Christensen Ranch Projects		
Operation	Status and Date of License Application	Direction/Distance from Christensen Ranch Facility
Uranerz Energy Corp., Hank & Nichols Project	Commercial ISR New - Received 12/07	SSE/5 miles
Uranium One, Moore Ranch	Commercial ISR New - Completed 09/10	SE/30 miles
Cameco, Ruby Ranch	Commercial ISR Expansion – Expected FY/13	ESE/14 miles
AUC LLC Minerals Corp., Reno Creek Project	Commercial ISR New – Expected 12/11	ESE/21 miles
Power Resources, Inc., Highland Project	Commercial ISR Expansion – Expected 09/11	SE/51 miles
Power Resources, Inc. (PRI), North Butte Project	Commercial ISR Expansion – Expected 07/11	SE/2 miles
Uranium One, Allemand Ross	Commercial ISR Expansion – Expected 9/11	SE 40 miles
Source: NRC table “Major Uranium Recovery Licensing Applications: Updated 5/12/2011” < <a href="http://www.nrc.gov/materials/uranium-recovery/license-apps/ur-projects-list-public.pdf">http://www.nrc.gov/materials/uranium-recovery/license-apps/ur-projects-list-public.pdf</a> >.		

The proposed Uranerz Hank Unit and the licensed PRI North Butte ISR sites are sufficiently close to the Christensen Ranch license area that interactions between the groundwater aquifers have the potential to occur. The production aquifer at the nearby Uranerz Hank Unit is located in a geological layer that contains the overlying aquifer at Christensen Ranch. At PRI North Butte, although the sites use different nomenclature for the aquifers, based on the location of coal marker beds, the production aquifer appears to be in the same geological layer as the production aquifer at Christensen Ranch. Additional drawdown created by the consumptive water use could potentially occur when the North Butte and Christensen Ranch facilities are operating at the same time.

The secondary use of land surrounding the Irigaray facility continues to be petroleum production from wells dispersed throughout the region. There are 24 oil wells located near the site, 17 of which are producing and 7 of which have been abandoned. The closest oil well to the Irigaray and Christensen Ranch project is located approximately one-third of a mile (0.6 km) west of the Christensen Ranch plant. At the time the application was provided, COGEMA was not aware of any new oil wells having been drilled in close proximity to either project (COGEMA, 2008a). NRC staff is unaware of any additional oil wells and did not observe any during visits to the site since the staff received the license renewal application.

### 3.1.2 Coal Bed Methane

Since the last license renewal in 1998, there has been additional interest in the development of Coal Bed Methane (CBM) gas in the immediate area around the Christensen Ranch project. At the time of the renewal application, COGEMA reported that five CBM wells were drilled within a half-mile (0.8 km) of Christensen Ranch MUs 5 and 6 during 2005. These wells are capped and

awaiting additional evaluation and pipeline installation before development continues. Many more CBM wells are planned and permitted (potentially more than 400 wells within 1 mile of the Christensen Ranch license area), but at the time the application was provided, no new CBM wells were drilled in close proximity to either project (COGEMA, 2008a).

In February 2010, the NRC staff performed a search of the Wyoming Oil and Gas Conservation Commission (WYOGCC) records to assess the number of CBM wells that have been constructed in the license area of Christensen Ranch. The staff determined that 59 CBM wells have been installed within the Christensen Ranch license area boundary. The NRC review of WYOGCC records also revealed that four of these CBM wells, three owned by Anadarko and one owned by Yates, are now operational and have produced CBM water in 2010 and 2011.

The majority of the CBM water produced by Anadarko Petroleum Company CBM wells will be transported through a pipeline to a conventional oil/gas field near Midwest, Wyoming, for reinjection into a deep aquifer (COGEMA Mining, Inc., 2008a, p. B-1a). For the other CBM wells in and near the license area, WDEQ requires that all CBM produced water be discharged to CBM water impoundments or storage/treatment tanks under WYDES permits.

Five CBM-produced water impoundments exist within 1.9 km [1.2 mi] of the license area (COGEMA Mining, Inc., 2008a, Figure B.1.A, Figure B1.A). Three of the six impoundments are permitted to receive CBM-produced water under a WYPDES permit (WY0044059) held by Windsor Energy Corporation (COGEMA Mining, Inc., 2008a, Figure B.1.A). There are three outfalls numbered 001-004, 008-0013, and 016-018 located southwest of the Christensen Ranch license area, which discharge to these impoundments (COGEMA Mining, Inc., 2008a, Figure B.1.A, Figure B1.A). A search of the Wyoming State Engineers Office (WSEO) for surface water rights permits showed that two of the six impoundments were identified as stock reservoirs and would receive CBM produced water. These two additional impoundments are Christensen 43-5-44-76, located within the license area just to the west of MU-7, and P24-1, located outside the license boundary to the north of MU-8 (COGEMA Mining, Inc., 2008a, p. B-1a). The impoundment identified as Christensen 43-5-44-76 is permitted to receive CBM-produced water from Williams RMT Corporation wells. The P24-1 impoundment is identified as receiving CBM-produced water from Bill Barrett Corporation.

### 3.2 Groundwater

Due to the leaching effects of the injected lixiviant, groundwater quality in the production aquifer varies throughout the lifetime of the ISR operation. Before the original license was issued to begin ISR operations at both the Irigaray site and the Christensen Ranch site, the licensee completed a baseline study of groundwater characteristics (Wyoming Mineral Corporation, 1977; Malapai Resources Company, 1988). Additionally, before Uranium One USA, Inc. is authorized to begin operating a MU, Uranium One USA, Inc. is required by license condition to produce a well field baseline data package, which establishes baseline water quality within the ore zone, at the ore zone perimeter, and in the first overlying and underlying aquifers. Historically, these groundwater studies for new MUs have supported the original, general baseline studies. Therefore, initial groundwater quality in future MUs is expected to be as described in the original, general baseline studies (Wyoming Mineral Corporation, 1977; Malapai Resources Company, 1988).

During operation, there is a potential for spills to occur in the well field area, due to injection line separation inside or adjacent to MU module buildings. The licensee monitors the groundwater and submits results of the monitoring program to the NRC semi-annually. Past accidental leaks and spills of process chemicals have not been shown to migrate into the near surface or lower aquifers. The primary cause of groundwater degradation during operations is due to the mobilization of metals present in the ore zone, such as uranium, radium-226, arsenic, and selenium, caused by the reaction of the ore with the injected lixiviant. This groundwater degradation is localized in the well field production zone, which is not a source of drinking water. Additionally, excursion of lixiviant beyond the production zone can cause degradation of water quality. Uranium One USA, Inc. is required by license condition to take corrective action if an excursion is identified. All but one excursion, which is currently being reviewed by NRC staff, have been successfully terminated by COGEMA and verified by the NRC, indicating that concentrations of chemical constituents are at levels that are protective of human health and the environment (NRC, 2009d).

When the licensee has completed ore zone extraction in a MU, groundwater restoration in the depleted ore zone is initiated. The goal of groundwater restoration is to reduce the concentration of mobilized constituents remaining in the groundwater and to return the groundwater quality back to the quality of the pre-mining baseline. A secondary goal, if pre-mining baseline is unachievable using best practicable technology, is to bring the groundwater quality back to an alternate standard that is protective of public health, safety, and the environment. Restored groundwater quality in past MUs is described in the Wellfield Restoration Reports (COGEMA, 2005; 2008b). Historically, the restored MUs at the Irigaray/Christensen Ranch site have all been brought back to the secondary, pre-mining class of use standards versus an alternate standard as is currently approved in Uranium One USA, Inc.'s license.

The licensee stated that there have been no new domestic or livestock wells installed in the area of Christensen or Irigaray Ranch. NRC staff reviewed the WSEO water rights database and verified that no new domestic wells had been installed in the Christensen Ranch license area in the past ten years.

### 3.3 Soil

Before the NRC granted the original license to begin ISR operations at the Irigaray site and, subsequently, the Christensen Ranch site, the licensee completed a baseline study of soil characteristics. Past operational effects on soil are primarily physical and include impacts from the construction of buildings and well fields as well as the installation of underground pipelines. WDEQ requires that Uranium One USA, Inc. salvage and stockpile topsoil from any significant construction, such as pipelines, roads, and buildings. At Christensen Ranch, the total estimated acreage disturbed by existing operations is 454 acres. Specifically, about 19 acres are being disturbed for the plant and pond facilities, 274 for well field, pipeline, and staging areas, 36 acres for access roads, 10 acres for soil stockpiles, and 115 acres for the future MUs delineation drilling and other miscellaneous facilities. The total expected disturbance is 7 percent of the 14,035-acre license area or 974 acres. To date, an estimated 133 acres of the 617-acre Irigaray license area has been disturbed (COGEMA, 2009b).

Past unintentional impacts to soil were caused by spills of process chemicals and injection solution and by leaks from evaporation ponds. The high specific retention capacity of dry soils

at the Irigaray/Christensen Ranch site allows for a rapid absorption of any spills (NRC, 1998). Chemical or radiological impacts to soil from past spills have not been shown to have affected soil characteristics (COGEMA, 2008a; NRC, 2008c). During restoration, radiologically impacted soils are transferred to a licensed disposal facility. At Irigaray, contaminated soil has been removed from four of five evaporation ponds and from one water storage pond. Soil quality in restored well fields meets unrestricted release standards (NRC, 2006). Soil quality in un-mined areas can be found in the original baseline studies (Wyoming Mineral Corporation, 1977; Malapai Resources Company, 1988).

#### 4.0 ENVIRONMENTAL IMPACTS

NRC staff reviewed the applicant's environmental report and license application and evaluated the potential environmental impacts for the various resources on the affected environment from the proposed action. The staff applied the guidelines outlined in NUREG-1748, "Environmental Review Guidance for Licensing Actions Associated with NMSS Programs" (NRC, 2003), in its evaluation. In accordance with this guidance, the staff evaluated the direct, indirect, cumulative, short-term, and long-term effects that each resource may encounter from the proposed action. The staff qualified the effects in terms of small, moderate, or large. The NRC applies the same qualitative measurements in its environmental assessments for nuclear power plants (10 CFR Part 51).

The definitions are as follows:

- SMALL - environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource.
- MODERATE – environmental effects are sufficient to alter noticeably, but not to destabilize, important attributes of the resource.
- LARGE – environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

#### 4.1 Land Use

Under the proposed action, only the CPP would be utilized at Irigaray. Additional construction at Irigaray would be limited to small ancillary buildings or trailers to accommodate additional workers. Uranium One USA, Inc. would continue to plug and abandon wells at the Irigaray well fields where groundwater restoration is complete and return the land to its previous ranch use. At the Irigaray site, the primary impact on land use has been loss of grazing capacity during the life of the project, which is minimal given the small percentage of disturbed land. A total of seven animal unit-months have been removed from use, an amount that would support approximately five cows per year. After reclamation, this land would be restored to its original grazing capacity. Therefore, these impacts are temporary and reversible, and are considered a small environmental impact. Under the no action alternative, the license would not be renewed and Uranium One USA, Inc. would need to cease operations and commence decommissioning and reclamation activities. Uranium One USA, Inc. would continue to plug and abandon wells at the Irigaray well fields.

Under the proposed action, MUs 7 through 12 at Christensen Ranch would undergo uranium processing operations. The effect of operations on these MUs would involve land disturbance for well field construction that was identified and evaluated during the last license renewal process in 1998 (NRC, 1998). Anticipated land use impacts would not change due to this proposed license renewal action, since the licensee has not requested any major changes to the previous operating license conditions. The primary land use impact of the Christensen Ranch project is the removal of up to 400 hectares (1,000 acres) of rangeland from grazing use for a period of 25 to 30 years. Of this acreage, less than 50 percent is likely to be disturbed at any time (COMEGA, 2008a). These impacts are temporary and reversible, and are considered a small environmental impact. Once uranium recovery, surface reclamation, and groundwater restoration are completed, all areas affected by ISR operation will be reclaimed, re-contoured, and returned to their original use as livestock and wildlife grazing lands. Under the no action alternative, MUs 7 through 12 at Christensen Ranch would not undergo uranium processing operations. Decommissioning and reclamation activities would begin if the license renewal request is not approved.

It is anticipated that upwards of 400 CBM wells will exist on and within one mile of the Christensen Ranch license area once CBM development is complete. Additionally, CBM operators have built new primary access roads in the area. Future disturbance one mile outside and within the license area is expected to total 700 acres due to roads, over 200 acres due to well development (0.5 acres per well site with 1 well per 80 acres), and additional disturbance due to ancillary facilities such as electrical power corridors and pipelines. Therefore, the cumulative surface disturbance from the proposed action and CBM development would be approximately 1,700 acres, which is only 5 percent of the overall land area, and would be temporary (COGEMA, 2009b). Potential hazards exist due to the proximity of buried oil and gas lines and CBM buried pipelines and utilities near uranium well fields. The licensee plans to survey buried equipment locations and coordinate with the local oil and gas and CBM operators to plan and engineer installations to avoid hazards and conflicts. Therefore, the NRC considers the cumulative impacts to land use to be small.

#### 4.2 Transportation

Uranium One USA, Inc. would use an average of one truck round-trip per day for hauling resin between Irigaray and Christensen Ranch, and approximately eight additional truck and small vehicle material deliveries per week to the site during operations. Uranium One USA, Inc. might construct new roads to access new well fields at Christensen Ranch. The Irigaray facility could receive up to a total of four additional deliveries from the Moore Ranch, Ludeman, and Allemand Ross proposed satellite projects once all three satellite projects are in operation. Uranium One USA, Inc. anticipates that Moore Ranch, Ludeman, and Allemand-Ross will begin operating in 2012, 2013, and 2014, respectively (Uranium One, 2010b). However, to date, the NRC has received a complete application and granted a license for only the Moore Ranch project. No new road development is anticipated to support transporting materials from the three proposed satellites. However, CBM traffic would require the development of additional roads. A summary of changes in transportation is discussed by COGEMA in its response to RAIs (COGEMA, 2008d).

Transportation of source and byproduct material would be managed in accordance with DOT (49 CFR 173.389) and NRC (10 CFR Part 71) regulations. The environmental impact of an accident involving a truck carrying source and byproduct material would include the salvage of soil impacted by the spill and the subsequent restoration of the topsoil and vegetation. Potential impacts from transportation accidents were evaluated in the 1998 EA (NRC, 1998) and are not expected to change. Radiological impacts from accidents associated with the transportation of resin to Irigaray from the proposed satellites are anticipated to be smaller than impacts from transporting yellowcake product, as loaded resin would be easier to clean during a spill and would contain less uranium than a yellowcake shipment (NRC, 2009e).

The increase in traffic from CBM development and the proposed satellites is not expected to cause a significant increase in the current low number of traffic incidents due to the imposition of speed limits and the natural slowing of traffic caused by the rugged and curved nature of the roads. Transportation impacts are expected to remain small.

#### 4.3 Socioeconomics

An increase in the number of employees from approximately 12 to an estimated 39, associated with the restart of operations at Irigaray/Christensen Ranch, is expected (NRC, 2008c). Under the no action alternative, additional employees that were hired following approval of the restart of operations would likely be terminated or transferred and future job opportunities in the vicinity would likely decrease. Cumulative socioeconomic impacts of ISR and CBM activities will include the creation of jobs and contracts for drilling companies. Other socioeconomic benefits could arise from an increased demand for goods, services, and housing in nearby towns. If there is a shortage of goods, services, housing, or available drillers, there could be an inflationary impact on costs. The ISR and CBM activities would result in additional tax revenues for Federal, State, and local governments. Uranium One USA, Inc. is evaluating automation of certain systems, which could reduce future workforce needs. There could be an incremental increase in workforce needs with the addition of the three proposed satellites (Uranium One, 2010b). The direct socioeconomic impacts due to a license renewal are expected to be small and primarily positive, due to an expected continuation of (1) the need for the recent increase in the workforce and (2) revenue. Whereas, the direct socioeconomic impacts due to a denied license renewal (the no action alternative) are expected to be small and primarily negative, due to an expected net decrease in workforce needs and revenue. Additionally, because this region is accustomed to the boom and bust economy caused by mineral extraction developments, the cumulative impacts are also expected to be small.

#### 4.4 Air Quality

Fugitive dust from access road traffic and soda ash particulates are the primary sources of non-radiological particulate emissions during operations. Additional road traffic could be experienced with the license renewal due to additional workers that will be needed to operate the facility and due to the resin shipments from the proposed satellites. The addition of CBM traffic could double the amount of fugitive dust seen solely from ISR activity. Traffic and fugitive dust would decrease as the initial development phases are concluded.



Under the no action alternative, there would be less vehicular traffic and resulting fugitive dust emissions than what is expected under the proposed action (NRC, 2001). Impacts from fugitive dust are expected to remain small as efforts to reduce fugitive dust would continue to be made by applying water to the access roads.

Uranium fines released during drying and packaging of yellowcake are limited by a stack scrubber and filtration system, and routine monitoring is conducted for airborne uranium particulates. The dryer would be operated under the no action alternative on a less frequent basis than what is expected under the proposed action (NRC, 2001). Control of particulates and radon gas within regulatory limits was achieved by COGEMA during past production. Air quality within the buildings, the dryer facility, and the perimeter of the site would be monitored and controlled within the required radiological limits. Therefore, air quality impacts are expected to be small.

#### 4.5 Water Quality and Use

The activities that could potentially impact surface water in the license areas include decommissioning of the well fields, pipelines, process lines, access roads, and soil excavation. These activities could increase siltation in the seasonal waterways on the site for a short period of time; therefore, silt fences would be used, as necessary. Well fields at Irigaray that have been, or are in the process of being, decommissioned would not contribute significant siltation. Well field development at Christensen Ranch under the proposed action could contribute to some surface particulate runoff, but this would be minimized since each MU is developed separately over several years. Due to the limited size and scope of soil disturbance for each MU, the impact to surface water quality is expected to be small. There would be no well field development at Christensen Ranch under the no action alternative. Silt fences would be used, as necessary, to decrease siltation during decommissioning.

Potential impacts to groundwater can result from inadequate restoration of the production aquifer following completion of ISR operations, leakage from a failure of the subsurface well materials, or an excursion of the leaching fluids to the aquifers surrounding the production or exempted aquifer. Groundwater restoration is required after ISR operations are complete. The licensee is required to return groundwater in the MU to baseline conditions. If this cannot be achieved using best practicable technology, the groundwater is required to be returned to an alternate standard that is determined to be protective of public health, safety, and the environment. Impacts to water resources have been evaluated in the previous EA (NRC, 1998) and are not expected to be different due to a license renewal. Historical results of restoration at Irigaray and Christensen Ranch have shown that concentration levels at the time of restoration approval have been protective of human health and the environment and continue to decrease over time (NRC, 2009d).

During operations, pregnant lixiviant is removed from the MU well field at a slightly greater rate than what is injected. This acts to draw groundwater from outside the well field into the well field, which reduces the chances of excursions. Monitoring wells are installed in a manner that would allow identification of excursions before the excursion can migrate beyond the production or exempted aquifer. NRC Staff would review monitoring well placement locations proposed by the licensee. The monitoring wells act to ensure that groundwater surrounding the well field is not impacted, that any impacts to the groundwater are minimized and corrected, and that underground sources of drinking water are not impacted (NRC, 2008c). Historically, excursion

events at Irigaray and Christensen Ranch have been controlled and determined to pose no threat to human health or the environment (NRC, 2009d).

Uranium One USA, Inc. is required by license condition to perform mechanical integrity tests for all production and injection wells initially, to ensure that the wells are constructed properly, and routinely during operation, to ensure that the wells do not develop leaks. Since 1998, fewer than 5 percent of the wells tested annually have failed. Impacts from these failures have been determined not to pose a threat to human health and the environment (NRC, 2009d).

CBM is produced in the Powder River Basin and in the area near the site. Targeted coal seams for CBM development are approximately 800 to 1,000 feet (245 to 300 m) below uranium-bearing sands. COGEMA reviewed data from four ore sand wells in the Christensen Ranch project area over the last ten years. The data shows that the water levels within the production aquifer have recovered approximately 100 feet (30 m) from the lowest levels during the previous ten years of operations. The increase in water levels in response to the end of uranium recovery operations does not show signs of additional effects on the ore sand from the CBM production in this area (COGEMA, 2008a). Had CBM influenced the wells, there would likely be additional drawdown shown, or very little well recovery. There are multiple aquitards located between the uranium-bearing sands and the CBM targeted coal seam. The presence of these aquitards limits the connectivity between the units and the effects of drawdown on the uranium bearing sands from CBM operations.

Over four hundred CBM wells are planned in and around the Christensen Ranch license area. According to an NRC review of the WYOGCC records, fifty-nine wells have already been installed in the Christensen Ranch license area. The majority of the CBM water produced by Anadarko Petroleum Company CBM wells will be transported through a pipeline to a conventional oil/gas field near Midwest, Wyoming for reinjection into a deep aquifer (COGEMA Mining, Inc., 2008a, p. B-1a). For the other CBM wells in and near the license area, WDEQ requires that all CBM produced water be discharged to CBM water impoundments or storage/treatment tanks under WYDES permits. Five WDEQ-permitted CBM-produced water impoundments exist within 1.9 km [1.2 mi] of the license area (COGEMA Mining, Inc., 2008a, Figure B.1.A, Figure B1.A). These impoundments will contain the produced water, which must meet water quality limits set by the WYPDES permits. According to WDEQ regulations, any release of water from the impoundment to the surface can occur only in response to natural precipitation that causes overtopping of the banks. The impact to surface water quality is, therefore, expected to be small.

CBM-produced water discharged to impoundments on the surface could infiltrate into groundwater and potentially impact baseline and operational water quality monitoring in the overlying aquifer (i.e., the J unit). However, a thick aquitard exists underneath all CBM impoundments and therefore would retard movement of CBM-produced water from the surface down to the J unit (COGEMA Mining, Inc., 2008a, Figures B.1.C through B.1.G). The impact to ground water quality from the CBM produced water impoundments is, therefore, expected to be small.

There would be significant changes to groundwater use in the general area due to the CBM wells that have been constructed in the immediate vicinity of the Christensen Ranch operations, along with the numerous CBM wells expected to be constructed over the next few years in the vicinity of both Irigaray and Christensen Ranch facilities. However, the CBM groundwater withdrawals are not anticipated to have a significant impact on water use or quality in the Wasatch aquifer, the zone of completion for the licensee's wells and local ranch wells, due to the fact that the Wasatch Formation is separated from the CBM production coal seams by layers of sand/sandstone and silt/shale sequences (COGEMA, 2008a, Appendix B). The impacts to water use and water quality in the Wasatch aquifer are expected to be small.

The proposed Uranerz Hank Unit and licensed PRI North Butte ISR sites are sufficiently close to the Christensen Ranch license area to create the potential for interactions between the groundwater aquifers. The production aquifer at the nearby Uranerz Hank Unit is located in a geological layer that contains the overlying aquifer at Christensen Ranch. Therefore, it is unlikely that concurrent operations at the Christensen Ranch and Hank Unit would cause significant additive groundwater drawdown in the aquifers. Conversely, based on the location of coal marker beds, the production aquifer at North Butte appears to be in the same geological layer as the production aquifer at Christensen Ranch, although the sites use different nomenclature for the aquifers. If both facilities are operating, the expected drawdown from both facilities could be additive and reduce water levels in the production aquifer. This drawdown could impact water use in private wells between the two facilities if the wells are located in this same aquifer. The North Butte license contains a license condition which requires the licensee to conduct an evaluation to determine the potential impacts of North Butte operations on groundwater levels before operations can begin. The result of this environmental evaluation would be to identify and implement appropriate mitigation measures to reduce impacts to groundwater use. Additionally, North Butte, although licensed, is not expected to begin operations for several years and might not be operating concurrently with Willow Creek well fields. Therefore, additional drawdown might not occur. The cumulative impact to groundwater use due to the Hank Unit and North Butte operations is expected to be small.

#### 4.6 Geology and Soils

ISR operations have little impact on geological resources with the exception that uranium in the geologic formation is removed by dissolution of the lixiviant solution and pumped to the surface for further processing. A license renewal would result in the construction of new well fields for ISR operations. There would be no new well fields constructed under the no action alternative. The installation of new wells, pipelines, and well field header houses under the proposed action will cause disturbances to soil in the immediate vicinity of the well field. Topsoil removed during well field construction is stockpiled for reuse. Once the well field is constructed, the site is reseeded, which limits the potential for soil erosion and runoff. Additionally, once the well field is depleted of uranium and restored, well field infrastructure would be removed and the site would be re-vegetated with a mix of native plants. Any soils that are radiologically impacted and are above NRC reclamation standards for unrestricted release would be removed from the site and transferred to a licensed disposal facility. These impacts were evaluated in the previous EA (NRC, 1998) and, based on NRC staff's review for this EA, the impacts are still expected to be small.

## 4.7 Ecology

The U.S. Fish and Wildlife Service (FWS) has identified several threatened and endangered or candidate species in Johnson and Campbell Counties that might be near the project area. No threatened or endangered plant species were identified at the Irigaray or Christensen Ranch sites by COGEMA (COGEMA, 2008e).

COGEMA conducted an annual wildlife monitoring study to evaluate potential impacts from activities on wildlife in the license area until 2000 (COGEMA, 2008a). The study included a wintering big game aerial survey, sage grouse strutting ground census, nesting raptor surveys, and searches for new nests. Impacts on wildlife attributed to the ISR operations and decommissioning during historic activities at the site have been limited to small areas of habitat loss at the processing locations and during disturbances for well field installation and removal. Wild life surveys were reinitiated by COGEMA in 2007 and 2008. Sage grouse and raptor surveys have been conducted. Sage grouse surveys at Irigaray and Christensen Ranch show that local populations appear to be increasing, though the general population in the western United States is declining. Eight greater sage grouse leks have been identified within the Irigaray/Christensen Ranch survey area. With the granting of the license amendment to restart operation, COGEMA, and the new licensee, Uranium One USA, Inc., have committed to consultation with the Bureau of Land Management (BLM) and/or FWS to mitigate noise and other impacts of ISR activity to sage grouse. This commitment is reflected as a license condition in the current license and would remain as a condition if the license were renewed.

COGEMA indicated that eagles have been present at various locations around Irigaray and Christensen Ranch, sporadically over the last 20 years. A survey conducted by contractors to COGEMA has identified bald eagle observations from the winters of 2004 through 2008 and known eagle roosts based on BLM records (COGEMA, 2008a). As indicated in the 2008 EA for the restart of operations (NRC, 2008c), eagle activity does not appear to have been negatively affected by traffic during previous operational activities or during restoration and decommissioning activities at the site. BLM, in a comment on the 2008 draft EA for the restart of operations, stated that it was not likely that eagles would be negatively affected by the anticipated level of mine traffic that would occur with a restart of operations (NRC, 2008c). Because this license renewal would allow for a continuation of activities evaluated in the 2008 EA for the restart of operations, it is likewise not likely that eagles would be negatively affected by the anticipated level of mine traffic that would occur with a license renewal.

COGEMA also conducted big game surveys within the license area. The 2007 annual wildlife survey report was included with the application as Appendix C (COGEMA, 2008a). Annual big game surveys conducted for the Irigaray and Christensen Ranch license areas from 1989 through 2000 indicated that there were no trends of adverse impacts due to mining activities. The surveys also demonstrated that the project sites were not critical winter habitat for big game. Due to these trends, in 2000, WDEQ with concurrence from the Wyoming Game and Fish Department approved COGEMA's request to terminate annual big game surveys (COGEMA, 2009a).

If license renewal is granted, some additional impacts to local vegetation could occur due to installation of new well fields. However, Uranium One USA, Inc. has committed to reseeded areas with natural native species of plants. Habitat loss due to the processing facilities would be restored at the end of operations, when the site would be reclaimed. These effects to

vegetation are expected to be small and limited to a relatively short duration during well field installation and decommissioning. The threatened plant, Ute-Ladies Tresses, should not be encountered because the physical characteristics in the general project area have limited potential to support this plant. This plant is found in seasonally moist soils and wetland meadows below 7000 feet. The Blowout Penstemon is expected to be found around sand blowouts or sand dunes and this habitat is not known to exist at the site (NRC, 2008c).

Recent wildlife surveys have shown that current CBM and oil and gas development have not resulted in any negative trends with respect to local wildlife (COGEMA, 2009b). BLM regulates CBM activities on Federal land to protect sage grouse. The potential for traffic-related wildlife fatalities could increase with the increase in traffic from CBM and oil and gas development. However, these incidences have been historically low and are not expected to increase due to the slowing of traffic discussed in Section 4.2 – Transportation. The NRC has determined that the proposed action would not affect listed species or critical habitat. No further consultation is required under Section 7 of the Endangered Species Act. Overall, effects on ecology due to a license renewal are expected to be small.

#### 4.8 Noise

Noise levels are expected to increase commensurate with the level of activity of operating ISR facilities. The nearest residence to the Irigaray Ranch is four miles away and the nearest residence to the Christensen Ranch is three miles away. Both sites are remotely located. Noise would be similar to that which existed at the facility during past operations and animal species were observed to be generally tolerant of routine, operational noise (COGEMA, 2008a). Noise impacts are expected to increase with increased CBM and oil and gas activity. However, the increase is not expected to be significant and the impact of the increase is expected to be low, based on the remoteness of the facilities and the location of the nearest resident. Noise impacts due to the proposed action or the no action alternative would likely be small.

#### 4.9 Historic and Cultural

NRC staff contacted the Wyoming State Historic Preservation Office (WSHPO) for concurrence on a determination of no effects to historic and cultural resources at the site associated with COGEMA's license amendment request to restart operations. The WSHPO concurred with a finding that no historic properties will be affected by the project as planned (NRC, 2008c).

The BLM has determined that "oil, gas, and mineral extraction activities are an adverse effect to the setting of the Pumpkin Buttes" (BLM, 2008) and require Native American consultation for projects within two miles of the Buttes. Since some of the MUs are within two miles of the Buttes, the NRC, during its review of COGEMA's amendment request to convert to operational status, initiated consultation with 11 tribes (NRC, 2008c). The Northern Cheyenne Tribe responded to the request for information stating that there are no properties of religious and cultural significance to the Tribe in the proposed construction area.

The WSHPO and 11 tribes were contacted again in February 2009 (NRC, 2009f) for this proposed license renewal and provided no further significant comments or input. The list of tribes contacted and the results of communications are provided in Table 5.1. Based on the previous EA's no effects determination and the lack of any additional input from the tribes regarding the Pumpkin Buttes, the NRC considers the impact to historic and cultural properties to be small.

#### 4.10 Scenic/Visual

No expansion of the main processing facilities would occur at either Irigaray or Christensen Ranch due to a license renewal, and no expansion of well fields has been requested beyond what was approved in the original licensing of the project and during previous license renewals. The license renewal would not cause additional scenic or visual impacts beyond the low to moderate impacts described in the previous EA prepared by the NRC to evaluate COGEMA's request to restart operations. The Christensen Ranch does not represent unique or valuable vistas and there are no parks visually proximate to the site (COGEMA, 2009b). CBM and oil and gas development would cause an increased cumulative impact to scenic and visual resources. Generally, the short-term impacts to visual and scenic resources from the well field would be moderate and the long-term impacts are expected to be small.

#### 4.11 Public and Occupational Health and Safety

The license renewal would not cause an increase in the amount of radiological effluents released from the plant and well fields beyond those evaluated in the previous license amendment EA (NRC, 2008c). Effluent releases expected during operations were modeled and analyzed during the last license renewal. The MILDOS-AREA dose assessment model was used to estimate exposures at 48 receptor locations both onsite and at the nearest residences with the yellowcake dryer operating at its maximum licensed capacity and the Irigaray and Christensen Ranch operating at maximum flow rates. The exposures were found to be within regulatory limits (NRC, 1998). Historically, public and occupational radiological and non-radiological health impacts from ISR activities have been minimal and well below any regulatory limits (COGEMA, 2009b). The addition of CBM and oil and gas activity would likely result in a cumulative public health impact that is higher than the impacts from ISR activities alone. However, due to the remote nature of the site, the potential public health and safety impacts are expected to remain small. CBM and oil and gas operators would be required to adhere to occupational health and safety standards. Overall, public and occupational health and safety impacts are expected to continue to be small.

#### 4.12 Waste Management

Additional volumes of waste would be generated from the proposed license renewal. The volume of waste would be commensurate with the amounts that were generated when the facility was last operational and found to be acceptable. Liquid waste generated at the Irigaray CPP will be disposed of in solar evaporation ponds and deep disposal currently installed at the site. Additionally, excess process bleed water is disposed of in U.S. Environmental Protection Agency-defined Class I deep disposal wells that are permitted by the WDEQ. No additional ponds or deep disposal wells beyond what are currently proposed are anticipated to be necessary if Irigaray begins processing resin from the three proposed satellites (Moore Ranch, Ludeman, and Allemand-Ross). Uranium One USA, Inc. is required by license condition to

dispose of 11e.(2) byproduct materials at a licensed site, identify the disposal area, and maintain an approved waste disposal agreement onsite at all times. The licensee currently has a waste disposal agreement with the Pathfinder Shirley Basin 11e.(2) byproduct material disposal facility. The waste management impacts are expected to be small for the license renewal.

## 5.0 AGENCIES AND PERSONS CONSULTED

NRC staff has consulted with other agencies regarding the proposed action in accordance with NUREG-1748. These consultations are intended to (i) ensure that the requirements of the Endangered Species Act Section 7 and the National Historic Preservation Act Section 106 are met and (ii) provide the designated state liaison agency the opportunity to comment on the proposed action.

### 5.1 Wyoming State Historic and Preservation Office (WSHPO)

For the 2007 COGEMA license amendment, the WSHPO was consulted regarding a determination of effects on cultural and historic resources. The WSHPO concurred with a finding that no historic properties would be affected by the project as planned (NRC, 2008c). The WSHPO was contacted by the NRC to provide information relevant for this EA (NRC, 2009f). The WSHPO had no further comments or information for the proposed license renewal.

### 5.2 Wyoming Department of Environmental Quality (WDEQ)

By NRC letter dated February 13, 2009 (NRC, 2009f), WDEQ was contacted regarding NRC staff's intent to prepare this EA and had no comments or additional information to provide to support preparation of the draft document. By NRC letter dated May 25, 2010 (NRC, 2010f), a copy of the predecisional draft EA was sent to WDEQ for comment. WDEQ indicated in a follow-up telephone conversation that they would not be able to provide comments (NRC, 2010g).

### 5.3 Bureau of Land Management Buffalo Field Office

In preparation of the EA to review COGEMA's license application for restart of operations (NRC, 2008c), NRC staff contacted BLM's Buffalo field office for a list of tribes that might have an interest in activities surrounding the Pumpkin Buttes. BLM provided to the NRC a list of tribes that have expressed interest in the Pumpkin Buttes (BLM, 2008). By NRC letter dated February 13, 2009 (NRC, 2009f), BLM was contacted regarding NRC staff's intent to prepare this EA and had no further comment or information to support preparation of the draft document. By NRC letter dated May 25, 2010 (NRC, 2010f), a copy of the predecisional draft EA was sent to BLM for comment. The following comments were received via email dated July 28, 2010 (BLM, 2010):

Comment 1: A quick review of the 2008 wildlife comments and the current EA indicates that two comments (#003 & 005) may not have been sufficiently addressed. I found no mention of the bald eagle nest adjacent to the Irigaray Road, nor did the document indicate the potential disruption to sage-grouse breeding and nesting activity from noise.

*Response: This EA evaluates the impacts of continuing the currently licensed operations, many aspects of which have been reviewed in previous EAs. Therefore, NRC staff attempts to focus*

*this review on new and significant information. In the 2008 final EA, which was prepared to evaluate the impacts of COGEMA's restart of operations, the NRC responds to BLM comment #003 on the draft version of the EA as follows:*

*"COGEMA has indicated that eagles have been present off and on at various locations around Irigaray and Christensen Ranch over the last 20 years. A survey conducted by contractors to COGEMA has identified bald eagle observations from the winters of 2004 through 2008 and known eagle roosts based on BLM records (COGEMA, 2008a). Mine traffic has been present over the past 20 years, but has been somewhat less over the last 6 years. Eagle activity apparently has not been negatively affected by traffic during previous operational activities or during restoration and decommissioning activities at the site. NRC staff agrees with BLM staff that the increase in traffic due to a return to operational status will not likely negatively affect Eagle activity at the site." (NRC, 2008c)*

*NRC staff finds that the conclusion in the 2008 EA holds for this license renewal due to the lack of any new or contradictory information. In response to the comment, the EA text has been revised in Section 4.7 – Ecology to restate our previous findings regarding impacts to the bald eagle.*

*Section 4.8 – Noise of this EA states, "Noise would be similar to that which existed at the facility during past operations and animal species were observed to be generally tolerant of routine, operational noise (COGEMA, 2008a)... Noise impacts due to the proposed action or no action alternative would likely be small." Additionally, Section 4.7 – Ecology states, "With the granting of the license amendment to restart operation, COGEMA committed to consultation with Bureau of Land Management (BLM) and/or FWS to mitigate impacts of ISR activity to sage grouse. This commitment is reflected as a license condition in the current license and would remain as a condition if the license were renewed." As indicated in these statements, NRC finds that the impacts to animal species (including sage grouse) due to noise would be small. Additionally, the renewed license would contain a condition whereby the licensee would consult with BLM and/or FWS to mitigate impacts to sage grouse. NRC staff finds that the EA adequately addressed impacts to sage grouse due to noise. Therefore, the text has not been revised.*

Comment 2: *Of greater concern is the disconnect between resources identified in the Affected Environment section of the document. Chapter 4's wildlife discussion appears to have affected environment and impacts combined into one section. There does not appear to be a cumulative impacts description for wildlife resources impacted. Though we have failed to be timely in our review of this particular project, perhaps a review of the format of our oil & gas EAs might be helpful in establishing a format for future actions. The most recent EA can be found at: [http://www.blm.gov/style/medialib/blm/wy/information/NEPA/bfodocs/pods/yates.Par.12344.File.dat/Congaree\\_EA.pdf](http://www.blm.gov/style/medialib/blm/wy/information/NEPA/bfodocs/pods/yates.Par.12344.File.dat/Congaree_EA.pdf)*

*Response: NRC staff appreciates BLM's sharing of the Congaree EA as an example, but points out that the goal for this EA, as described in Section 1.6.2, is to create a clear and concise document that does not unnecessarily repeat information that has been presented in previous EAs. Therefore, Chapter 3 – Affected Environment includes only sections for those aspects of the affected environment that have been determined to have changed since the 1998 EA. This process is explained in the introduction to Chapter 3, which has been expanded in response to this comment to state the following: "This section provides a framework for the environmental impact discussion. To avoid re-stating information that was presented in the EA prepared for*



*the previous license renewal (NRC, 1998) and that has not changed, a full description of the affected environment for each of the 12 resource areas evaluated in Chapter 4 – Environmental Impacts is not provided here. Instead, this section will provide a full description of the affected environment for those resource areas that have changed since the 1998 EA was prepared (Land Use, Groundwater, and Soil). For the remaining 9 resource areas, a brief description of the affected environment is provided within the environmental impacts discussion in Chapter 4.” NRC staff determined that the affected environment with respect to ecology had not changed significantly since the 1998 EA and an inclusion of a section on ecology within Chapter 3 would have, therefore, been repetitive of the 1998 EA. Because the affected environment discussion provides a framework for the environmental impacts discussion, Section 4-7 on impacts to ecology touches on aspects of the affected environment (e.g., identifying animal and plant species that are present) in order to adequately describe the impacts on this environment. The cumulative impact portion of the ecology section is presented at the end of Section 4.7 and addresses cumulative impacts to wildlife due to CBM and oil and gas development. NRC staff finds that the EA adequately provides a basis for the exclusion of a section on ecology within the chapter on affected environment and also adequately addresses cumulative impacts on ecology. Therefore, the text has not been revised except as noted above.*

5.4 Section 106 Tribal Consultations

Nine Section 106 tribal consultation initiation letters were sent on February 13, 2009, soliciting input on COGEMA’s proposal for license renewal (NRC, 2009f). Initially, no comments or further information was provided in response to the letters. NRC staff followed the letters with telephone and email communications. The communication record is provided in Table 5.1.

Tribe Contacted	Communication Record
Eastern Shoshone	<ul style="list-style-type: none"> <li>• Section 106 Consultation letter sent February 13, 2009.</li> <li>• NRC telephone call to Mr. Reed Tidzump on 4/1/2009 (No response. Left voicemail message)</li> <li>• NRC telephone call to Mr. Reed Tidzump on 4/17/2009 (Left message with secretary)</li> <li>• Telephone call returned by Mr. Arlan Shroyo on 4/20/2009 (NRC staff unavailable. Mr. Shroyo left a voicemail requesting a return call.)</li> <li>• NRC telephone call to Mr. Arlan Shroyo (No response. Left voicemail message.)</li> </ul>
Northern Arapaho	<ul style="list-style-type: none"> <li>• Section 106 Consultation letter sent February 13, 2009.</li> <li>• NRC telephone call to Ms. JoAnne White on 4/1/2009. NRC staff informed</li> </ul>

	<p>that Ms. White had resigned and no one would be available to respond to the letter.</p>
Northern Cheyenne	<ul style="list-style-type: none"> <li>• Section 106 Consultation letter sent February 13, 2009.</li> <li>• NRC telephone call to Mr. Conrad Fisher on 4/1/2009 (No response.)</li> <li>• NRC telephone call to Mr. Conrad Fisher on 4/17/2009 (Mr. Fisher requested that the letter be re-sent via email)</li> <li>• Email received from Mr. Fisher on 4/29/2009:  “First, thanks for taking the time to revisit and call our office about your concerns. The Northern Cheyenne tribe would be interested in whether or not there was a cultural survey/archy survey on the expanded permit area. If there is not, then we would like to request additional information by requesting an archeological survey in reference to the expanded mine permit so that we may better consider our response to your request.” <ul style="list-style-type: none"> <li>• NRC responds to Mr. Fisher on 5/1 via email:  “Thank you for your response. The license renewal request/proposed action addressed in the EA does not include an expansion of the permit area. Please let me know if you need any additional information.”</li> </ul> </li> <li>• No response received by the NRC</li> </ul>
Blackfeet	<ul style="list-style-type: none"> <li>• Section 106 Consultation letter sent February 13, 2009.</li> <li>• NRC telephone call to Mr. John Murray on 4/1/2009 (No response.)</li> <li>• NRC telephone call to Mr. John Murray on 4/17/2009 (Response: "Due to the amount of work and the fact that this is a license renewal, we will not submit comments. We would be happy to participate with respect to new licenses and if public meetings to brief the tribes are held.")</li> </ul>
Three Affiliated Tribes (Mandan, Hidatsa, and Arikara)	<ul style="list-style-type: none"> <li>• Section 106 Consultation letter sent February 13, 2009.</li> <li>• NRC telephone call to Mr. Perry Brady on 4/1/2009 (No response.)</li> <li>• NRC telephone call to Mr. Perry Brady</li> </ul>

	<p>on 4/17/2009 (Response: "This project is on the fringes of our aboriginal territory." No plan to provide comments.)</p>
Ft. Peck Assiniboine/Sioux	<ul style="list-style-type: none"> <li>• Section 106 Consultation letter sent February 13, 2009.</li> <li>• NRC telephone call to Mr. Darrel "Curley" Youpee on 4/1/2009 (No answer.)</li> <li>• NRC telephone call to Mr. Darrel "Curley" Youpee on 10/20/2010 followed by a summary email ML102940059.</li> </ul>
Oglala Sioux	<ul style="list-style-type: none"> <li>• Section 106 Consultation letter sent February 13, 2009.</li> <li>• NRC telephone call to Ms. Joyce Whiting on 4/1/2009 (No response.)</li> <li>• NRC telephone call to Ms. Joyce Whiting on 4/17/2009 (Ms. Whiting requested that the letter be re-sent via email)</li> <li>• NRC telephone call to Ms. Joyce Whiting on 4/29/2009 to verify receipt of email (Ms. Whiting indicates that email was received and a response would be sent to the NRC on 5/1.)</li> <li>• No response received by NRC</li> </ul>
Crow	<ul style="list-style-type: none"> <li>• Section 106 Consultation letter sent February 13, 2009.</li> <li>• NRC telephone call to Mr. Dale Old Horn on 4/1/2009 (No response.)</li> <li>• NRC telephone call to Mr. Dale Old Horn on 4/17/2009 (Mr. Old Horn requested that the NRC contact Tim McCleary, an archaeologist reviewing the NRC letter)</li> <li>• NRC telephone call to Mr. Tim McCleary on 4/17/2009 (No response.)</li> <li>• Mr. McCleary telephone call to NRC on 4/17/2009 (Crow has no comment on the proposed action.)</li> </ul>
Cheyenne River Sioux	<ul style="list-style-type: none"> <li>• Section 106 Consultation letter sent February 13, 2009.</li> <li>• NRC telephone call to Ms. Donna Rae Peterson on 4/1/2009 (No response.)</li> <li>• NRC telephone call to Ms. Donna Rae Peterson on 4/17/2009 (Ms. Peterson</li> </ul>

	<p>indicated that the letter “did not come across my desk.”)</p> <ul style="list-style-type: none"> <li>• NRC emails letter to Ms. Peterson on 4/17/2009.</li> <li>• No response received by the NRC</li> </ul>
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## 5.5 US Fish and Wildlife Service

The FWS was consulted to obtain a list of endangered and threatened species for Johnson and Campbell Counties, Wyoming. An endangered and threatened species list for counties in Wyoming dated February 2008 was obtained from the FWS web site at <http://www.fws.gov/mountain-prairie/endspp/countylists/wyoming.pdf>. Additionally, a list, dated August 2009, of threatened and endangered species was obtained for Johnson County at <http://www.fws.gov/wyominges/PDFs/CountySpeciesLists/Johnson-sp.pdf> and for Campbell County at <http://www.fws.gov/wyominges/PDFs/CountySpeciesLists/Campbell-sp.pdf>.

## 6.0 ALTERNATIVES

The action under consideration is the renewal of Source Material License SUA-1341 for continued commercial operation of the Irigaray and Christensen Ranch ISR projects. The alternatives evaluated are to:

- (1) Renew the license with such conditions as are considered necessary or appropriate to protect the public health and safety and the environment; or
- (2) Deny renewal of the license. Denial of the request would require the licensee to reinitiate final decommissioning and restoration activities at the site.

Based on its review of the information identified in Section 1.6.2, NRC staff has concluded that the environmental impacts associated with the proposed action do not warrant either limiting the licensee’s future operations or denying the license amendment. Therefore, the staff considers that the proposed action, Alternative 1, is the appropriate alternative for selection.

## 7.0 CONCLUSION

The NRC staff concludes that the renewal of License SUA-1341, involving continued operation of the Irigaray and Christensen Ranch projects, would not significantly impact the environment. Additionally, public and occupational radiological dose exposures are expected to be below 10 CFR Part 20 regulatory limits. Pursuant to 10 CFR Part 51, the NRC staff has prepared this EA and determined that a FONSI can be made regarding the proposed action to renew Uranium One’s license. On the basis of this EA, the NRC has concluded that the proposed action does not warrant the preparation of an EIS.

## 8.0 LIST OF PREPARERS

J. Moore, Project Manager, All Sections  
 J. Trefethen, Project Manager, All Sections

## 9.0 REFERENCES

Bureau of Land Management (BLM), 2008. Email with BLM, Wyoming, Re: Native American Consultation on COGEMA Restart. February 22, 2008. ADAMS No. ML080600310.

BLM, 2010. Email from BLM, Buffalo Field Office, Re: Comments on Draft EA for 2010 Irigaray/Christensen Ranch Proposed License Renewal. July 28, 2010. ADAMS No. ML102360242.

COGEMA Mining, Inc. (COGEMA), 2009a. Response to RAI Dated February 19, 2009 re, License Renewal Application. July 17, 2009. ADAMS No. ML092110694.

COGEMA, 2009b. Replacement Pages for Cogema Mining, Inc., License Renewal Application for July 17, 2009. July 17, 2009. ADAMS No. ML092110692.

COGEMA, 2008a. COGEMA Mining, Inc., Irigaray and Christensen Ranch Projects, Licensing Renewal Application. May 30, 2008. ADAMS No. ML081850689.

COGEMA, 2008b. Transmittal of Wellfield Restoration Report, Christensen Ranch Project. April 8, 2008. ADAMS No. ML081060155.

COGEMA, 2008c. Replacement Pages for Insertion in the renewal package Dated May 2008 for COGEMA Mining – Docket 40-8502, License SUA-1341. October 31, 2009. ADAMS No. ML083110405.

COGEMA, 2008d. Response to 3/4/08 Request for Additional Information for COGEMA's Irigaray/Christensen Ranch Project. March 28, 2008. ADAMS No. ML080980222.

COGEMA, 2008e. Historic and Cultural Resources/Species Info at COGEMA's Christensen/Irigaray. April 14, 2008. ADAMS No. ML081080327.

COGEMA, 2007. Letter from T. Hardgrove, COGEMA Mining, Re: Request for Amendment to License SUA-1341 for Restart of Irigaray/Christensen Ranch Facilities. April 3, 2007. ADAMS No. ML071020274.

COGEMA, 2005. Letter from Licensee, with enclosures Re: Request for NRC Concurrence, Irigaray Restoration Approval at Cogema's Site. November 7, 2005. ADAMS No. ML053270028.

COGEMA, 1996. COGEMA - Supplemental Information for License Renewal. January 5, 1996. ADAMS No. ML091060506.

74 FR 6436. *Federal Register* Volume 74, No. 25, Page 6436, "Notice of Application to Renew Source Material License SUA-1341, COGEMA Mining, Inc." February 2009.

Energy Metals, 2007. Application for Source Material License Moore Ranch Uranium Project. October 2, 2007. ADAMS No. ML072851218.

Malapai Resources Company, 1988. Request for Amendment to Source Material License No. SUA-1341 Incorporation of Christensen Ranch Amendment Area. January 5, 1988. ADAMS No. ML090160399

U.S. Nuclear Regulatory Commission (NRC), 2010a. Request for Additional Information – Environmental, Irigaray and Moore Projects. March 2, 2010. ADAMS No. ML100610326.

NRC, 2010b. Order Approving the Change of Control of Materials License from Uranium One, Inc. to State Atomic Energy Corporation Rosatom. November 23, 2010. ADAMS No. ML103120147.

NRC, 2010c. Uranium One, USA, Inc., Irigaray and Christensen Ranch Project, Campbell and Johnson Counties, Wyoming – Annual Surety Estimate Adjustment and Operational Surety Adjustment. December 16, 2010. ML103140491.

NRC, 2010d. IR 04008502-10-001, 10/25-28 and 12/07-09/2010, NRC Inspection and Authorization for Restart Uranium One USA, Inc. December 17, 2010. ML103540468.

NRC, 2010e. License SUA-1341 Amendment 18. November 23, 2010. ADAMS No. ML103120213.

NRC, 2010f. T. Bills and G. Mooney Letter Re: Request for Comments on Draft Environmental Assessment for the Proposed 10-Year License Renewal for Uranium One Inc.'s Irigaray and Christensen Ranch Projects in Campbell and Johnson Counties, Wyoming. May 25, 2010. ADAMS No. ML100210638.

NRC, 2010g. Email J. Trefethen and J. Moore. Re: Calls to Wyoming DEQ and BLM. August 26, 2010. ADAMS No. ML102380090.

NRC, 2009a. Letter Re: Request for Additional Information to Support Environmental Review of License Renewal Request, COGEMA Mining, Inc. March 24, 2009. ADAMS No. ML090750369.

NRC, 2009b. 2009/07/23-Board Memorandum and Order (Ruling on Petition for Review and Request for Hearing) (LBP-09-13). July 23, 2009. ADAMS No. ML092040627.

NRC, 2009c. B. Bonifas Ltr Re: Order Approving Change of Control and License Amendment of License SUA-1341 COGEMA Mining, Inc. December 17, 2009. ADAMS No. ML093290021.

NRC, 2009d. Enclosure – WITS 200900004/EDATS: SECY-2009-0016 – Data on Groundwater Impacts at Existing ISR Facilities. July 10, 2009. ADAMS No. ML091770385.

NRC, 2009e. “Generic Environmental Impact Statement for In-Situ Leach Uranium Milling Facilities.” NUREG-1910. May 2009. ADAMS No. ML091480244.

NRC, 2009f. COGEMA Mining and Christensen Ranch Projects Ltrs. February 13, 2009. ADAMS No. ML090400214.

NRC, 2008a. Acceptance Review, License Renewal Amendment Request, COGEMA Mining, Inc. Source Material License SUA-1341. December 29, 2008. ADAMS No. ML082760265.

NRC, 2008b. Letter Re: Approval of License Amendment 13 to Change to Operating Status Irigaray/Christensen Ranch Facilities, COGEMA Mining, Inc. September 30, 2008. ADAMS No. ML072840544.

NRC, 2008c. Final Environmental Assessment Regarding the License Amendment Request to Return to Operating Status from Decommissioning Status of COGEMA Mining, Inc., Irigaray and Christensen Ranch Projects. September 8, 2008. ADAMS No. ML082110026.

NRC, 2006. D. Wichers Letter re: Review of COGEMA Mining, Inc.'s Irigaray Mine Restoration Report, Production Units 1 through 9. September 20, 2006. ADAMS No. ML062570175.

NRC, 2001. Environmental Assessment for Surface Decommissioning Plan Source Material License No. SUA-1341 COGEMA Mining, Inc. Irigaray and Christensen Ranch Projects. December 2001. ADAMS No. ML013460397.

NRC, 2003. NUREG-1748, "Environmental Review Guidance for Licensing Actions Associated with NMSS Programs." August 2003.

NRC, 1998. Renewal of Source Material License SUA-1341, Irigaray/Christensen Ranch ISL Facility – Enclosure 1, Environmental Assessment. June 18, 1998. ADAMS No. ML081060063.

Uranium One Inc. (Uranium One), 2010a. "Updated Letter of Intent for pending applications for Uranium One Americas, Inc." January 18, 2010. ADAMS No. ML100290373.

Uranium One, 2010b. "Irigaray/Christensen Ranch and Moore Ranch Cumulative Impacts RAI responses." April 21, 2010. ADAMS No. ML101160084.

Wyoming Mineral Corporation, 1977. Revised Environmental Report. July 29, 1977. ADAMS No. ML091350094