

**SUPPLEMENTAL ENVIRONMENTAL ASSESSMENT
LICENSE RENEWAL APPLICATION
SOURCE MATERIALS LICENSE SUA-1341**

**URANIUM ONE USA, INC.
WILLOW CREEK IN SITU RECOVERY PROJECT
JOHNSON AND CAMPBELL COUNTIES, WYOMING**

January 2013

**Source Materials License SUA-1341
Docket No. 040-08502**

Prepared By:

**U.S. Nuclear Regulatory Commission
Office of Federal and State Materials
and Environmental Management Programs
Division of Waste Management and Environmental Protection**

INTRODUCTION

On May 30, 2008, COGEMA Mining, Inc. (COGEMA) submitted a License Renewal Application (LRA) to the U.S. Nuclear Regulatory Commission (NRC) for the continuation of operations at the Irigaray and Christensen Ranch uranium in-situ recovery (ISR) project, located in Campbell and Johnson Counties, Wyoming (COGEMA, 2008b). COGEMA did not request any changes to its approved license and asked that the current license be approved for a period of 10 years. Subsequent to the LRA, the ownership of the project changed twice, first from COGEMA to Uranium One, Inc. (NRC, 2009), and then from Uranium One, Inc. to JSC Atomredmetzoloto (ARMZ) (NRC, 2010). The current licensee is Uranium One USA, Inc. (Uranium One), a subsidiary of Uranium One, Inc., which is a subsidiary of ARMZ. The project is now referred to as the Willow Creek Project by Uranium One.

In responses to comments and requests for additional information (RAI) from the NRC staff relating to the LRA, the licensee also provided page changes to the LRA by letters dated October 31, 2008 (COGEMA, 2008a), July 17, 2009 (COGEMA, 2009), and November 19, 2010 (Uranium One, 2010). During NRC's review, on March 7, 2012, Uranium One requested an upgrade to its Christensen Ranch satellite plant throughput from 15,140 liters per minute (L/min) (4,000 gallons per minute (gpm)) to 34,070 L/min (9,000 gpm) and provided page changes to the 2008 LRA (Uranium One, 2012b). The NRC staff decided to incorporate the request to increase the flow rate at the Christensen Ranch satellite plant into the ongoing license renewal review (NRC, 2012a).

The NRC staff reviewed Uranium One's request to increase the flow rate, and by letter dated June 7, 2012, issued a RAI regarding dose modeling and process flow issues (NRC, 2012a). Uranium One responded to this RAI by letter dated July 10, 2012, and submitted additional page changes to the LRA (Uranium One 2012a).

The original LRA (COGEMA, 2008b) and replacement pages (COGEMA, 2008a; 2009; Uranium One, 2010; 2012a; 2012b) are collectively referred to as the LRA in this Supplemental Environmental Assessment (SEA).

The NRC staff published an Environmental Assessment (EA) in support of the license renewal in July 2011, prior to Uranium One's flow rate increase request (NRC, 2011). Since the EA was completed in July 2011, the NRC staff is supplementing the EA to incorporate analysis pertaining to the request to increase the flow rate from 15,140 liters per minute (L/min) (4,000 gallons per minute (gpm)) to 34,070 L/min (9,000 gpm).

This SEA documents the NRC staff's environmental review of this proposed action.

Regulatory Environment

The NRC issues source material licenses under Title 10, Part 40, "Domestic Licensing of Source Material," of the *Code of Federal Regulations* (10 CFR Part 40). 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 the operations. The NRC staff has prepared this SEA in accordance with 10 CFR Part 51, "Environmental Protection Regulations for Domestic Licensing and Related

Regulatory Functions,” which implements the NRC’s environmental protection program under the National Environmental Policy Act of 1969 (NEPA). 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 determine that a finding of no significant impact (FONSI) is appropriate; (2) facilitate preparation of an EIS when one is necessary; and (3) demonstrate the NRC’s compliance with NEPA when an EIS is unnecessary. Evidence presented herein describes the proposed action, impacts of the proposed action, and impacts of alternatives to the proposed action, including the no-action alternative.

Proposed Action

The proposed action is to renew the Willow Creek Project license. This supplemental environmental assessment addresses new information since the original environmental assessment for license renewal regarding the applicant’s proposed change to increase the licensee’s Christensen Ranch satellite plant throughput from 15,140 liters per minute (L/min) (4,000 gallons per minute (gpm)) to 34,070 L/min (9,000 gpm). To accommodate the increased flow, Uranium One is proposing to add six additional ion exchange (IX) columns (three column pairs) to the Christensen Ranch satellite plant which would give the plant a total of seven IX column pairs, an increase from the current four column pairs currently in place. The additional IX columns are identical in size and flow capacity to the existing IX columns. A small expansion to the existing satellite plant is required to accommodate a resin transfer bay. Uranium One plans to use the old transfer bay location to house groundwater restoration related equipment that was previously located where the new IX columns will be located. Any other minor modifications needed to the satellite plant to accommodate the flow increase will be within the existing foot print of the satellite plant (Uranium One 2012a; 2012b).

Uranium One stated operational standard operating procedures (SOPs) will not have to be changed as a result of the proposed change. The proposed increase in flow rate will not affect the operations of the individual wellfields, individual wellfield operating pressures or individual well flow rates. Uranium One anticipates the site will need an additional deep disposal well to handle production and restoration disposal capacities. Uranium One anticipates that two uranium-laden resin transfers will occur daily from the Christensen Ranch satellite plant to the Irigaray central processing plant (CPP), including return trips, that will result in an increase from one trip per day, as currently licensed, to two trips per day.

Figure 3.12 in the LRA presents the proposed Christensen Ranch satellite plant modifications.

Uranium One is not requesting an increase in the dried yellowcake production which is currently set by license condition 10.5 at 2.5 million pounds of dried yellowcake production per year.

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 is seeking to renew its source materials license to authorize continued commercial-scale ISR and processing at its Willow Creek Project. The purpose and need for the proposed federal action is to provide an option that allows Uranium One to continue using ISR technology to recover uranium and produce yellowcake at its Willow Creek

Project. Yellowcake is the uranium oxide product of the ISR milling process that is used to produce fuel for commercially-operated nuclear power reactors. The additional satellite plant capacity would facilitate extraction of residual uranium from previously approved well fields at a faster rate. Total production from individual well fields would not increase, but more well fields could be in production at the same time allowing for increase in the rate of uranium production.

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.

ENVIRONMENTAL IMPACTS OF THE PROPOSED ACTION

The proposed action involves installing up to six IX columns within the existing Christensen Ranch satellite plant. The only additional construction proposed by Uranium One is the addition of a 30 foot by 22 foot truck bay for receiving loaded resin and transferring barren resin; consequently, the footprint of the satellite plant will expand by approximately 660 square feet into an existing gravel parking area next to the existing Christensen Ranch satellite plant. Uranium One has not proposed to open any new wellfields, beyond those currently approved in its license. The NRC staff, therefore, does not expect the proposed action to impact geology, surface water, endangered and threatened species, socioeconomic and historic and cultural resources. The staff also does not expect significant environmental impacts to air quality, public and occupational exposures, soil and groundwater, waste generation, and transportation, as discussed below.

Air Quality, Public and Occupational Doses

The NRC staff assessed air quality, public safety, and occupational safety to determine whether the new IX and resin screening circuits would impact the site and surrounding areas. Gaseous radon-222 is the primary source of radiological impact to the environment from site operations. Uranium One will be installing pressurized down-flow IX columns that help keep radon in solution, which dramatically decreases the radon release and its associated dose from these tanks. The NRC staff guidance in NUREG-1569, Section 5.7.1.3, states, "[e]ffective control of radon gas can be achieved by using a pressurized processing tank system that eliminates venting in process buildings . . ." (NRC, 2003). Additionally, NUREG-1569, Section 7.3.1.2.2, states, "[i]f a closed processing loop is used, then radon release from processing is expected to be negligible." (NRC, 2003). Radon is primarily released from down-flow columns when replacing the resin within these columns. Conversely, up-flow columns vent radon while in use, which makes radon doses from these tanks higher than those resulting from down-flow columns. Based on the foregoing discussion, the NRC staff finds that the use of pressurized down-flow tanks will minimize the impacts to air quality and public and occupational exposures.

Uranium One used MILDOS-AREA, a dispersion model approved by the NRC, to estimate the dose commitments received by individuals and the general population from the operation of the proposed plant, including both the existing and proposed IX circuits. The MILDOS-AREA model

required Uranium One to obtain site-specific data for input into the model, as well as to make certain assumptions about the input data. Validity of the input data is the critical aspect in obtaining a reasonably conservative estimate of the dose commitments to the public. The NRC staff has evaluated the input data for the MILDOS-AREA model and has determined that Uranium One used reasonably conservative assumptions for these data.

An NRC staff review of the results indicated that increasing the Christensen Ranch satellite plant throughput would result in a Total Effective Dose Equivalent (TEDE) of 3.4 millirem (mrem)/year (yr) at AS-5A located adjacent to the Christensen Ranch satellite plant as reported in LRA Table 7.3-5. An NRC staff review of the MILDOS-AREA results provided by Uranium One indicates that the closest resident at location AS-6 will receive a dose of 0.26 mrem/yr from the modified Christensen Ranch satellite plant as reported in LRA Table 7.3-5. The results from location AS-5A and AS-6 (locations shown in LRA Figure 5.5) indicate that the estimated dose to the nearest resident and members of the public is significantly below the 100-mrem/yr public dose limit specified in 10 CFR 20.1301, Dose Limits for Individual Members of the Public.

The latest NRC inspection report of the Willow Creek Project operations indicates that the TEDE was below the occupational dose limits in 10 CFR Part 20. For example, the NRC staff 2012 inspection report stated, “[t]he inspectors noted that the highest total effective dose equivalent (the summation of internal and external radiation exposure) for CY 2011 was 2 milliSieverts (200 millirem). This is below the annual [occupational dose] limit of 50 milliSieverts (5,000 millirem)” (NRC, 2012b). The highest exposure is approximately 4 percent of the 5,000 mrem/yr occupational dose limit. The NRC staff determined from the data provided by Uranium One, and data obtained during inspections, that the proposed action would not significantly impact air quality or occupational and public health and safety.

Soil and Groundwater

Piping and Well Leaks

Increasing the capacity of the Christensen Ranch satellite plant will allow more wellfields to operate simultaneously, resulting in more opportunities for releases of barren or pregnant lixiviant. Such releases could occur because of leaks or ruptures of pipe or casing failures in wells that service the wellfields. Such leaks could result in the contamination of soil and/or groundwater that would then require remediation.

The NRC considered the environmental impacts of piping and well leaks in Sections 3.2 and 3.3 of the EA for the current license renewal for the Willow Creek Project (NRC, 2011). Additionally, Section 3.3.3.3 of the 2008 LRA discusses the means by which Uranium One mitigates pipeline and well failures. According to the LRA, Section 3.3.3.3, Uranium One “uses recovery and injection flow meters connected via signal wires to remote collection devices. The instantaneous and totalized flow information is then entered directly into a computer data base for flow balancing. Remote transmitting units are used to transmit the data to a centralized location. The computer system is also used to flag abnormal flow values which could be indicative of a leak in the trunkline, or a problem with an individual well. Any irregularities will initiate inspection of the trunklines, feeder lines, or individual wells. Upon identification of a leak, relevant operations are curtailed until a repair is completed.” Section 2.5 of the 2011 EA discusses production,

injection and monitor well casing integrity. Uranium One performs mechanical integrity tests every 5 years on each well and repairs those wells that fail the tests. Uranium One has also performed subsurface investigations to determine whether groundwater or subsurface soils have been contaminated by leaking wells. The NRC determined in Section 5.4.3.3 of the 1998 license renewal EA that, “[t]here is also the potential on site for accidental spills of process chemicals to infiltrate shallow aquifers and locally reduce groundwater quality. The volume of these chemicals is generally quite small, and the vertical distance to the groundwater is large, so impacts from such spills are considered to be minimal.” (NRC, 1998). The NRC determined in Section 4.6 of the 2011 EA that environmental impacts from piping spill and leaks are not expected to be different due to a license renewal (NRC, 2011). This determination is not expected to change due to the proposed action.

Excursions

The simultaneous operation of more wellfields also increases the opportunities for excursions, which occur when lixiviant-fortified groundwater migrates beyond the expected confines (horizontal or vertical) of a wellfield. Excursions may occur because of an improper balance between injection and recovery rates, undetected high permeability strata or geologic faults, improperly abandoned exploration drill holes, discontinuity and unsuitability of the confining units that allow movement of the lixiviant out of the ore zone, poor well integrity, or hydrofracturing of the ore zone or surrounding units. The potential for horizontal excursions is primarily controlled through wellfield bleed. Wellfield bleed is the process of withdrawing more water from the wellfield than is returned to the wellfield, resulting in a wellfield inward hydraulic gradient. The wellfield bleed is approximately one percent for Willow Creek wellfields.

Section 2.5 of the 2011 EA discusses the excursion monitoring, reporting, and corrective action process (NRC, 2011). By NRC license condition, Uranium One 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 re-samples the wells to verify the excursion. If an excursion is identified, Uranium One is required to notify the NRC via telephone or email within 48 hours and follow up with a written report within 30 days. Uranium One is required to take 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. NRC determined in the 2011 EA that historically, excursion events at Irigaray and Christensen Ranch have been controlled and determined to pose no threat to human health or the environment, and this determination is not expected to change due to the proposed action.

Groundwater Impacts on Nearby ISR Projects

The licensed Uranerz Energy Corporation Hank Unit and the licensed Power Resources, Inc. North Butte ISR sites are sufficiently close to the Christensen Ranch license area to create the potential for interactions between the groundwater aquifers. The 2011 EA evaluated these potential interactions and found the cumulative impact to groundwater use due to the Hank Unit and North Butte operations is expected to be small (NRC, 2011). The 2011 EA reported that, “[t]he 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.” The 2011 EA further stated, “[t]he 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. The cumulative impact to groundwater use due to the Hank Unit and North Butte operations is expected to be small.” The 2011 EA determination is not expected to change due to the proposed action.

Groundwater Restoration

Uranium One has outlined a series of restoration steps, including groundwater transfer, groundwater sweep, groundwater treatment, and wellfield circulation, to remove and/or fix residual contamination within the ore body in the LRA. This strategy successfully restored mine units 1-9 at Irigaray, which was approved by the NRC staff on September 20, 2006 (NRC, 2006). NRC staff determined in the 1998 Irigaray and Christensen Ranch license renewal EA that, “the impacts of a properly implemented ISR [ISL (in situ leach)] and groundwater restoration program on local groundwater quality will be minimal.” (NRC, 1998). This finding was reiterated in the 2011 EA that stated, “[h]istorical 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, 2011). A review of information provided by Uranium One and independently obtained by NRC staff indicates that no significant impacts would result from the proposed action. The determination of minimal impacts on groundwater quality in previous EAs is not expected to change due to the proposed action.

Waste Generation

The LRA indicates liquid wastes at Christensen Ranch are disposed of in two U.S. Environmental Protection Agency-defined Class I deep disposal wells that are permitted by the Wyoming Department of Environmental Quality (WDEQ) as well as four lined solar evaporation ponds. The NRC staff has determined that additional plant flow will correspond to an increase in the volume of liquid waste (primarily in the form of process water bleed) generated at the Willow Creek Project, but not a significant increase in waste volume over the life of the Willow Creek Project. Uranium One has stated this additional waste water will be disposed in three disposal wells. As stated, Willow Creek currently has two disposal wells installed onsite and expects to need a third disposal well by 2016 as production flow increases from 15,140 L/min (4,000 gpm) to 34,070 L/min (9,000 gpm). Willow Creek currently has four permitted and licensed waste disposal wells at Christensen Ranch. Uranium One reports that the two currently installed disposal wells are capable of disposing 568 L/min (150 gpm). The additional permitted disposal well would be located in the same geologic formation and NRC staff expects this well to be capable of disposing similar volumes of liquid waste as the currently permitted wells. The NRC staff agrees with Uranium One’s determination of the need for an additional disposal well as production increases.

Willow Creek Project solid waste generated will increase proportionally to the increase in flow. However, over the life of the project, the waste generated will remain the same; it will only be generated at a faster rate due to the increase in flow. This waste is fairly minimal and consists

mainly of filter bags collecting broken resin and clay particles from the injection water. Criterion 2 of Appendix A, Criteria Relating to the Operation of Uranium Mills and the Disposition of Tailings or Wastes Produced by the Extraction or Concentration of Source Material from Ores Processed Primarily for Their Source Material Content, to 10 CFR Part 40 requires that all solid waste be disposed off site at an NRC-licensed facility. The Willow Creek Project currently is required through license condition 9.7 to identify the waste disposal facility to the NRC in writing and the Willow Creek Project's approved waste disposal agreement must be maintained onsite.

Overall, the amount of liquid and solid wastes generated due to the increase in flow rate of 9,000 gpm will be similar to that generated for 4000 gpm since no additional wellfields are being approved for operations. The difference is that the same amount of waste will be generated over a shorter period of time. The NRC staff determined in Section 4.12 of the 2011 EA that waste management impacts are expected to be small and this determination is not expected to change due to the proposed action.

Transportation

Uranium One USA, Inc. would use an average of two trucks round-trip, per day for hauling resin between Irigaray and Christensen Ranch. This is an increase from the one truck round-trip per day as analyzed in the 2011 EA. 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. The increase from one to two round-trips per day resin shipments is not expected to affect previous analysis as discussed in the 2011 EA. Transportation impacts are expected to remain small.

ENVIRONMENTAL IMPACTS OF THE ALTERNATIVE TO THE PROPOSED ACTION

The alternative to the proposed action is to deny Uranium One's request to increase its flow rate from 15,140 L/min (4,000 gpm) to 34,070 L/min (9,000 gpm) as part of the license renewal. The environmental impacts would remain the same as was analyzed in past EAs if Uranium One's flow rate increase request was denied. This alternative would preclude Uranium One from recovering uranium at a faster rate at its Willow Creek Project and the project would proceed under the same schedule as reviewed in the previous EA (NRC, 2011).

AGENCIES CONSULTED

The staff sent a draft SEA to the WDEQ on August 29, 2012 and requested comments on the draft SEA for the proposed action. By e-mail dated October 2, 2012, the WDEQ responded that it would not have any comments (WDEQ, 2012).

Because the proposed action only affects 660 square feet as an addition to the current Willow Creek Christensen Ranch satellite plant, NRC staff has determined that the proposed action will not affect listed species or critical habitat. Therefore, no further consultation is required under

Section 7 of the Endangered Species Act. Likewise, NRC staff has determined that the proposed action is not the type of activity that has potential to cause effects on historic properties. Therefore, no further consultation is required under Section 106 of the National Historic Preservation Act.

CONCLUSIONS

The NRC staff has assessed the environmental impacts associated with the request from Uranium One to renew its source materials license SUA-1341 and documented the results in an EA (NRC, 2011) and this SEA. The staff performed the assessment in accordance with the requirements of 10 CFR Part 51. In conducting the assessment, the staff considered the following:

- information in the LRA
- information in the response to the staff's RAI
- information from dose modeling reports
- communications with Uranium One staff and representatives and the WDEQ
- information from NRC staff site visits and inspections

The NRC staff has concluded that the proposed action will comply with the licensing requirements found in Appendix A to 10 CFR Part 40. Uranium One has not proposed to open any new wellfields, beyond those currently approved in its license, as a result of this proposed action. The proposed increase in flow rate at the Christensen Ranch satellite plant, that is the specific subject of this supplemental environmental assessment, will allow Uranium One to recover uranium at a faster rate. The increase in flow rate will only require an additional 660 square feet of related construction in a gravel parking area next to the existing Christensen Ranch satellite plant. The NRC staff, therefore, does not expect increase in flow rate to impact geology, surface water, endangered and threatened species, socioeconomic and historic and cultural resources. The staff does not expect significant environmental impacts to air quality, public and occupational exposures, soil and groundwater, waste generation, and transportation. On the basis of the EA completed in 2011 (NRC, 2011) and this SEA, the NRC staff concludes that there are no significant environmental impacts and the license renewal application does not warrant the preparation of an EIS. Accordingly, the staff has determined that a FONSI is appropriate.

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