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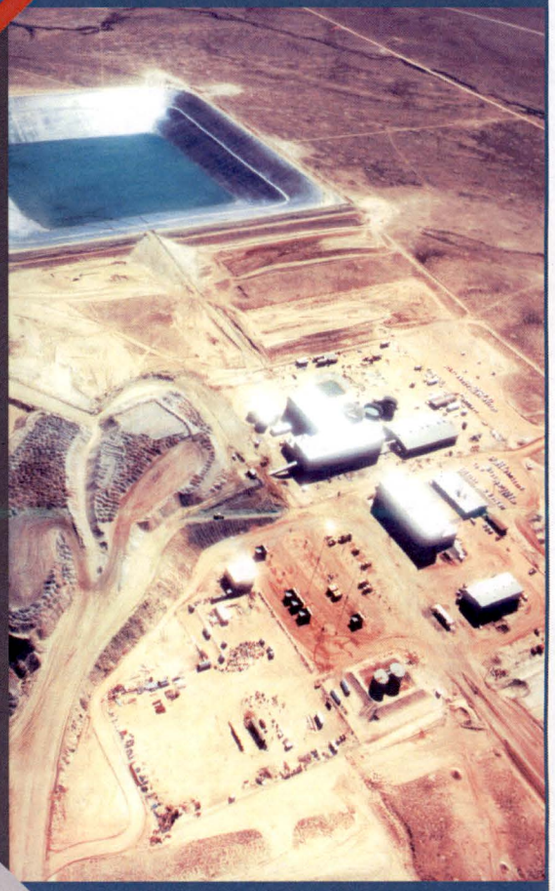
Second Revised Supplement to Licensee's Environmental Report

Sweetwater Uranium Project
Docket Number: 40-8584
Source Material License SUA-1350



January 2018

Prepared for:

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Signature Page

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1.0 INTRODUCTION

Kennecott Uranium Company (Kennecott) manages and operates the Sweetwater Uranium Project (Project), located in the Red Desert portion of the Great Divide Basin, Sweetwater County, Wyoming. The Project is licensed by Nuclear Regulatory Commission (NRC) Source Material License SUA-1350, held by Kennecott Uranium Company, the licensee since June 23, 1992. The Project is located approximately 42 miles northwest of Rawlins (Figure 1), and consists of a mill building, solvent extraction (SX) building, ancillary buildings, an existing tailings impoundment including internal evaporation ponds, and a diversion channel.

On July 24, 2014, Kennecott submitted its Request for a Renewal of Source Material License SUA-1350 for a Ten (10) Year Term for the Project. License SUA-1350 expired on November 10, 2014; however, by letter on October 22, 2014 the NRC acknowledged timely receipt of license renewal application for the Project under 10 CFR 40.42. By letter on November 25, 2014 the NRC completed the acceptance review and found the application sufficient for a detailed technical and environmental review. This Supplement to Licensee's Environmental Report (Supplemental ER) is submitted as part of the July 24, 2014 license renewal request and was prepared in accordance with 10 CFR 51.60, with the contents as required by 10 CFR 51.45, and in reference to the guidance provided in NUREG-1748, "Environmental Review Guidance for Licensing Actions Associated with NMSS Programs" (NRC, 2003). The Project is currently under an approved postponement of the implementation of the requirements of timeliness in decommissioning dated October 4, 2011. A subsequent application for postponement of the implementation of the requirements of timeliness in decommissioning was submitted on May 26, 2016. This submittal is currently under agency review.

Source Material License SUA-1350 was renewed on August 18, 1999 following submittal of a Revised Environmental Report (Shepherd Miller, Inc., 1994) and Final Design – Tailings Management Plan (Shepherd Miller, Inc., 1997 to 1999) as a performance-based operating license, with a standby provision. The license was renewed by the NRC on

November 10, 2004. The NRC approved the 2004 renewal in a letter on November 10, 2004. This letter concluded:

> *"Based on the foregoing considerations and the past performance of the licensee (inspection reports with no violations), the staff finds that approval of the request for a 10-year license renewal for the Sweetwater facility is consistent with NRC policy and is appropriate."*

The facility was inspected by the NRC on September 20, 2016 and no violations were identified. The facility has been operated by Kennecott for more than 25 years without a cited NRC violation.

This Supplemental ER is limited to incorporating by reference, updating, and supplementing information previously submitted to reflect any significant changes, including any significant environmental changes resulting from operational experience since the 1999 and 2004 license renewals.

The proposed action, further detailed in Section 1.2, is to renew the existing license to allow resumed operation of the Sweetwater Uranium Project's mill. Mill operations would involve processing ore for the purpose of producing uranium "yellowcake", mostly U_3O_8, which would be further processed offsite by others at a uranium conversion facility into uranium hexafluoride and ultimately into fuel for nuclear power production. All Project operations would be compliant with the 13 criteria in 10 CFR 40 Appendix A. The mill was constructed in 1979 and 1980 and processed ore from an adjacent open pit mine from February 1981 through April 1983 by Minerals Exploration Company, a wholly owned subsidiary of Union Oil Company of California (UNOCAL). The mill facility has been on standby since that time. Resumed operations will occur when market conditions are advantageous for uranium production at the Project.

The Project is currently staffed to provide maintenance, radiation safety, environmental monitoring, corrective action operations (detailed in Section 5.0), and administration. Staffing levels are considered adequate by the NRC per the Project's most recent inspection report dated October 3, 2016, which states, "*the licensee had sufficient staff for the work*

in progress, conducted safety evaluations as allowed by the license, conducted annual program reviews as required by regulations, and established and maintained site procedures as required by the license." Site maintenance activities ensure that the facility including the mill and solvent extraction buildings remain poised for future start-up.

1.1 Purpose and Need for the Proposed Action

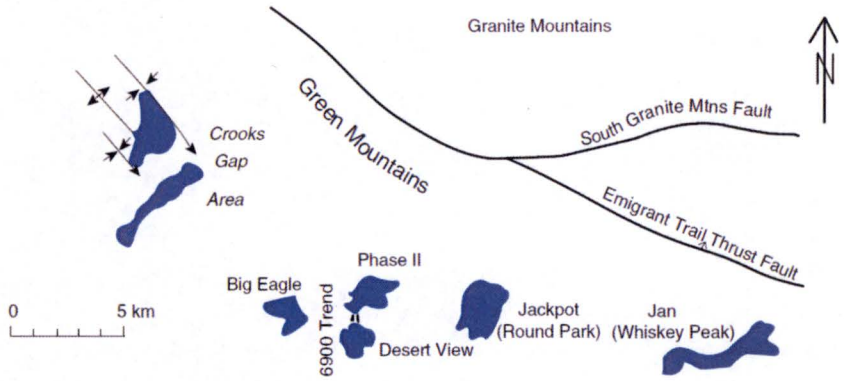
The Sweetwater mill is one of only three remaining standing conventional uranium mills in the United States as of 2016, and the only mill located in Wyoming. The Sweetwater mill, with a capacity of 3,000 tons/day, is larger than the Shootaring Canyon mill (750 tons/day) and the White Mesa mill (2,000 tons/day) (EIA, 2016). A conventional uranium mill located in central Wyoming provides an extant and positive opportunity for uranium production. There are substantial uranium resources in Wyoming that are not amenable to in-situ recovery and can only be extracted via conventional mining and processing in a conventional uranium mill, such as deposits on Green Mountain and Sheep Mountain in Fremont County, Wyoming. These deposits are summarized in Table 1-1, with size data referenced from (IAEA, 2016).

Table 1-1 Summary of Green Mountain/Sheep Mountain Resources

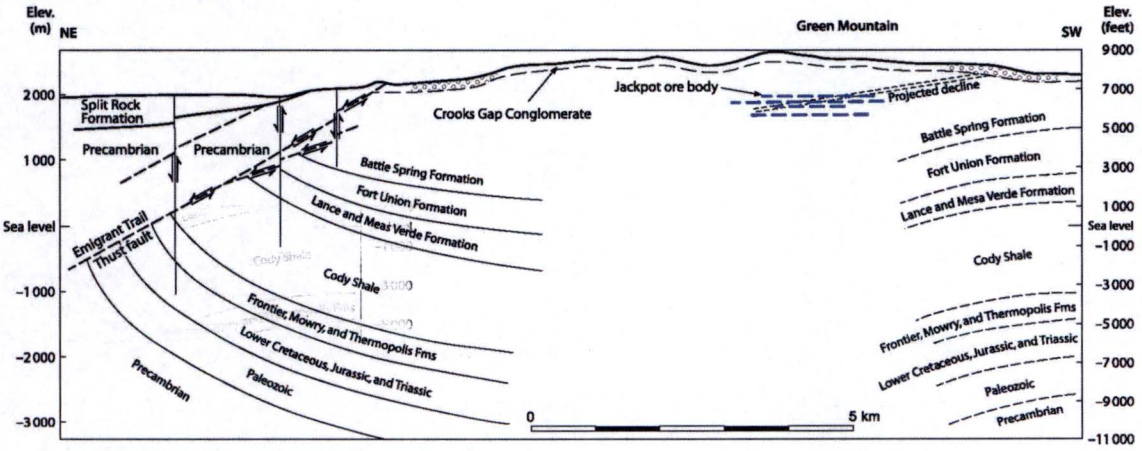
Deposit Name	Location	Size Range (tonnes U)
Jackpot Mine	Beneath Green Mountain – Fremont County, Wyoming	10,000 – 25,000
Big Eagle Phase II	Beneath Green Mountain – Fremont County, Wyoming	5,000 – 10,000
Sheep Mountain Mines (Energy Fuels Inc.)	Beneath Green Mountain – Fremont County, Wyoming	10,000 – 25,000

These deposits are discussed in (Dahlkamp, 2010), who discusses the geology, mineralization, and metallogenetic aspects of the resources. Dahlkamp provides both a plan view and cross sectional depiction of the Green Mountain District in the excerpted figures that follow.

Green Mountains, Crooks Gap-Green Mountain-Whiskey Peak area, location of principal uranium deposits, (Courtesy of International Nuclear Inc. 2008, modified)



Green Mountain, NE–SW section showing the stratigraphic and structural setting on the northeastern margin of the Great Divide Basin and position of the Jackpot deposit. (After GMMV Jackpot Mine, Draft, EIS, US Dpt Interior, BLM, Wyoming State Office, Rawlins, June 1995)



The cross section above demonstrates the depth of the Jackpot uranium ore body below the surface of Green Mountain to be about 1,500 to 2,000 feet. Moreover, Dahlkamp notes that the Green Mountain resources lack an aquiclude beneath the resource:

> *"...continuous layers of aquicludes as well as favorable host horizons, such as those found in the other Wyoming Basins containing classical rollfront-type U deposits, are missing in the Green Mountain district. The host environment is a large body of lithologically heterogeneous aquifers without confining mudstone beds or even continuous semi-confining siltstone horizons."*

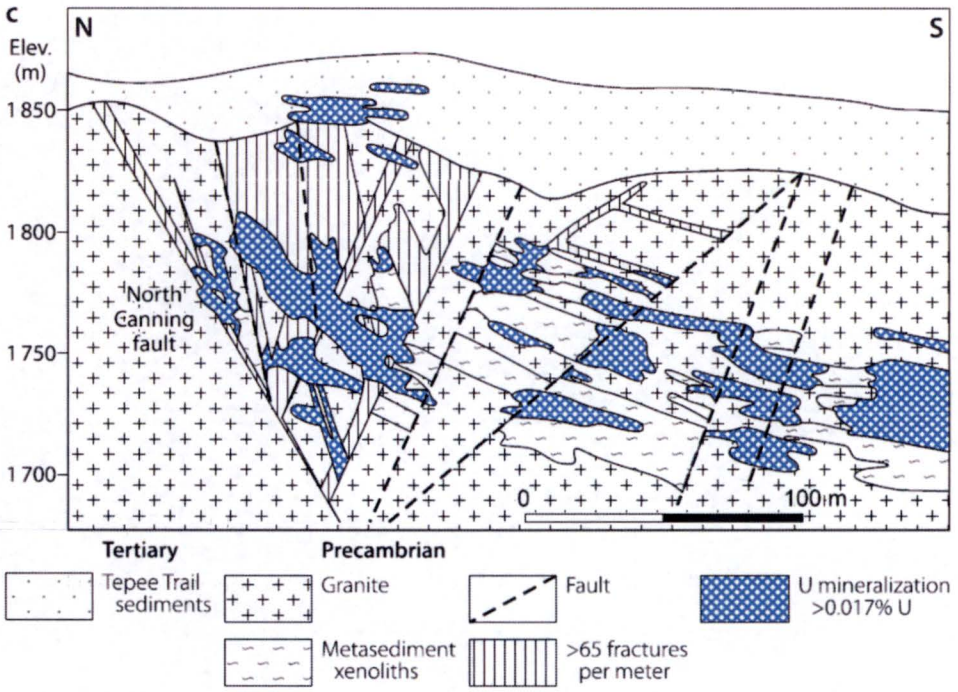
(Klingmuller, 1987) also addresses the resources of the Green Mountain uranium district, discussing the morphological origin and mineralization of these resources. In comparing the Green Mountain resources, located south of the Granite Mountains, to the Gas Hills

resources which lie to the north, he noted that the Granite Mountains and erosion therefrom provide the uranium source to both sets of uranium ore bodies, stating the following:

> *"...a significant difference exists in morphological habit between the two districts...This difference is contributed to the absence of continuous aquicludes in the Green Mountain area. The host rock is a leaky aquifer, an uncommon host for solution front uranium deposits. Confining shales or even continuous semi-confining siltstone units are lacking because of sediments accumulating near a rapidly subsiding area adjacent to a rising source terrain."*

Thus it can be seen that the Sheep and Green Mountain uranium ore bodies are lacking a lower aquiclude that would allow the mineralized host rock to be mined by in-situ recovery methods. These deposits, when economical to mine, will require conventional milling to allow resource recovery. Absent a nearby mill, these resources remain essentially stranded—available for mining but unable to be economically processed.

Conventional milling is also required for processing uranium mineralization from other geological settings. (Dahlkamp, 2010) describes the Copper Mountain deposit, located approximately 110 aerial miles north of the Project. The Copper Mountain (North Canning) deposit is hosted in brecciated Precambrian granitic rock, as depicted below in the geological cross section taken from (Dahlkamp, 2010), which is not amenable to in-situ recovery in the same way as is mineralization hosted in more permeable sedimentary rock underlain by sedimentary aquicludes.



The ability of the Sweetwater mill to process these nearby ore bodies makes it a valuable local and national resource. Thus, the purpose of the proposed action is to allow the resumption of conventional milling of ore, or processing of alternate feed material, for the purpose of extracting uranium for ultimate use in nuclear power reactors. As one of only three current mills, and with the largest capacity of the three, the Sweetwater mill is uniquely suited to process and recover certain U.S. uranium resources. As of the date of this Supplemental ER, 20 percent of U.S. electricity generation is provided by 100 nuclear power reactors (U.S. Energy Information Administration, 2016). Assuring a continual, domestic supply of uranium fuel to these power sources is in the national interest.

In a letter dated July 17, 2001, the NRC, in granting a request for the postponement of the initiation of requirements for timeliness in decommissioning for the Project, stated:

> *"KUC [Kennecott] could resume uranium mining and milling when the market conditions allow. The continued existence of this facility is in the public interest as it is one of only six uranium mills remaining in the United States [Note: only three mills exist as of the date of this Supplemental ER] and the only one remaining in Wyoming. There is renewed interest in the United States in nuclear power as clearly*

expressed in the National Energy Policy of May 2001 [Note: recent energy discussion at the federal level is focused on energy efficiency, generating more electricity from renewable sources, reduction of carbon emissions, and use of 'all-of-the-above' as viable energy sources in the United States' energy strategy]...Maintaining the domestic capacity to provide the raw material for nuclear power is in the public interest."

Furthermore, Tennessee Valley Authority's new 1150 megawatt Watts Bar 2 nuclear power plant came on line in the summer of 2016. Additional plants are under construction at an existing nuclear power plant site in Georgia. Uranium mills provide the benefit of processing uranium ore so that uranium for the nuclear fuel cycle can be produced, and thereby resulting in the consequent benefits to the United States and the customers who are provided electricity by means of nuclear power.

The Project's mill has the added benefit of already having been constructed, with the attendant economic savings resulting therefrom. Construction of a new conventional uranium mill would certainly require extensive economic costs—both in permitting and construction capital.

The Project also provides regional employment opportunities, both in current standby operations, and more so during resumed operations when market conditions allow. Thus, the need for the Project is both regional and national.

1.2 The Proposed Action

The licensee has requested renewal of its performance-based operating license, determined to be in timely renewal. The proposed action is the set of activities already included in that license. The proposed action has been described fully in several previous documents incorporated herein by reference, as summarized in Table 1-2. The list of documents referenced in Table 1-2 is not exhaustive, but is representative in detailing the proposed action. The proposed action is a 10-year renewal of the existing license that provides for standby operation of the Project until the licensee determines that market conditions allow for uranium processing, at which time the Project would become fully operational. At that time, Kennecott would meet pre-operational conditions listed in the license and then would

commence mill preparation and operation, construction of new lined tailings impoundments (up to 6 impoundments would be needed if the mill were to operate at its 3,000 tons/day design capacity for at least 20 years), construction of up to 10 lined evaporation ponds, and reclamation of both the existing and any new tailings impoundments. All features to be constructed were designed to meet 10 CFR 40 Appendix A criteria.

Table 1-2 Summary of Documents Describing the Proposed Action

Document Title	Prepared By	Date	Contents Summary
Revised Environmental Report	Shepherd Miller, Inc.	August 1994	Complete revision and update to original 1976 Environmental Report
Addendum to the Revised Environmental Report, Geologic Cross Sections and Aquifer Information	Shepherd Miller, Inc.	August 1995	Additional information from onsite geological and hydrological testing
Addendum to the Revised Environmental Report, Background Ground Water Quality and Detection Standards	Shepherd Miller, Inc.	January 1996	Provides basis for groundwater monitoring: background, sampling locations and detection standards
Final Design Report, Volume I, Executive Summary Report	Shepherd Miller, Inc.	October 1997	A summary of the final design components
Final Design Report, Volume II, Data Report	Shepherd Miller, Inc.	July 1997	Presentation of data collected in support of final design
Final Design Report, Volume III, Embankment Design Report	Shepherd Miller, Inc.	June 1997	Design of embankments for the first 40-acre tailings impoundment
Final Design Report, Volume IV, Liner Design Report	Shepherd Miller, Inc.	July 1997	Design of the liner system for the first 40-acre tailings impoundment
Final Design Report, Volume V, New Impoundment Reclamation Plan	Shepherd Miller, Inc.	August 1997	Reclamation plan for the first 40-acre tailings impoundment, and up to five additional impoundments
Final Design Report, Volume VI, Existing	Shepherd Miller, Inc.	August 1997	Reclamation plan for the existing 60-acre

Impoundment Reclamation Plan			tailings impoundment
Final Design Report, Volume VI, Part 2, Mill Decommissioning Addendum to the Existing Impoundment Reclamation Plan	Shepherd Miller, Inc.	June 1998	Decommissioning plan for the mill and solvent extraction buildings
Final Design Report, Volume VII, Operations Plan	Shepherd Miller, Inc.	September 1997	Operations of mill fluids and evaporation ponds, tailings management, and environmental monitoring plan
Final Design Report, Volume VIII, Response Report to the Requests for Additional Information Dated December 3, 1998	Shepherd Miller, Inc.	February 1999	Response to specific NRC requests for additional information on the final design
Final Design Report, Volume IX, Second Response Report	Shepherd Miller, Inc.	March 1999	Response to specific NRC requests for additional information on the final design
Environmental Assessment For Source Material License SUA-1350, Renewal for Operations and Amendment for the Reclamation Plan (Revision 1)	Nuclear Regulatory Commission	July 1999	Support for the decision-making process concerning the request for resumption of mill operation and approval of the reclamation plan
Request for a Renewal Source Material License SUA-1350 for a Ten (10) Year Term	Kennecott Uranium Company	July 24, 2014	Application for license renewal with re-baselined surety

The proposed action is summarized in the 1994 Revised Environmental Report (Shepherd Miller Inc., 1994) in Section 1.0, and in the Final Design, Volume I (Shepherd Miller, Inc., 1997g). The proposed action would involve steps to prepare the mill for resumed operations, including construction of the first new tailings impoundment and evaporation ponds, refurbishment of the mill building and ancillary buildings to get the mill and related processes operational again, and the hiring of new employees to bring the full-time number of mill employees to approximately 30 to 35. The expected life of the mill is at least 20

years, and projected/design mill throughput is 3,000 tons per day, resulting in an output of up to 4.1 million pounds of uranium oxide per year.

Final design for the Project's tailings management included four primary components: 1) mill water management, including various water conservation measures, 2) design of an evaporation pond system, 3) preparation of a reclamation plan for the existing tailings impoundment, and 4) design of a new tailings impoundment, including operational and reclamation features. The existing partially below-grade tailings impoundment may either be reclaimed or modified to accept new tailings and reused during resumed operation. The Environmental Protection Agency (EPA) concurred in a letter dated March 21, 1996 that the existing impoundment meets the 40 CFR Part 61 Subpart W definition of "existing impoundment" and may be reused for uranium mill tailings storage if fitted with a new liner system with leak detection capability below any newly deposited tailings. This was discussed as well in the Final Design Report, Volume I (Shepherd Miller, Inc., 1997g). Reclamation of the new impoundments would involve placing a 6-m (20 to 21-foot) thick soil cover over the tailings followed by rock erosion protection layers for both the top and side surfaces. Decommissioning the mill and land would include demolition of buildings and disposal of contaminated debris, equipment, and soil in the impoundment.

1.3 Applicable Regulatory Requirements, Permits, and Required Consultations

NRC source material licenses are issued under Title 10, Code of Federal Regulations, Part 40 (10 CFR Part 40). This Supplemental ER has been prepared in accordance with the following regulations:

- 10 CFR 51.45, Environmental report, and
- 10 CFR 51.60, Environmental report–materials licenses

This Supplemental ER relies on the Revised Environmental Report (Shepherd Miller, Inc., 1994) and other documents, providing updated information either directly or by reference, as updates pertain to any significant environmental change, change in operations, facility changes, remediation work completed, or changes in proposed decommissioning activities. Thus, this report has been prepared under the following guideline in 10 CFR 51.60:

If the application is for an amendment to or a renewal of a license or other form of permission for which the licensee has previously submitted an environmental report, the supplement to licensee's environmental report may be limited to incorporating by reference, updating or supplementing the information previously submitted to reflect any significant environmental change, including any significant environmental change resulting from operational experience or a change in operations or proposed decommissioning activities.

Consultations pertaining to the licensee's Revised Environmental Report (Shepherd Miller, Inc., 1994) are provided in Section 12 of that document. Required consultations pertaining to this Supplemental ER are summarized in Table 1-3.

Table 1-3 Required Consultations

Consultation Description	Activity Covered	Status	Documentation of Actions
2014 Request for a Renewal Source Material License SUA-1350 for a Ten (10) Year Term	Request to NRC for approval	Pending	Prepared updated Ecological Survey
Request for Additional Information, Dated July 13, 2015	License Renewal Request	Response provided October 12, 2015	Provided additional groundwater analysis and radon concentration and dose evaluation and modeling
Request for Additional Information, Dated February 12, 2016	License Renewal Request	Response in progress	Updates, provided herein, for the following: • Transportation • Population Distributions • Wind Data • Geology • Seismicity

2.0 ALTERNATIVES

The action requested by Kennecott and under consideration by the NRC is the renewal of Source Material License SUA-1350 under the current conditions which include resumption of mill operations. The alternatives available to the licensee are:

(1) No Action –The condition beginning with the denial of Kennecott's request for renewal of the currently active license, and commencing with decommissioning activities by Kennecott; or

(2) Proposed Action – Continue licensed milling operations as provided in the Project's performance-based operating license.

2.1 Detailed Description of the Alternatives

License SUA-1350 permits a standby mode of operation, a condition under which the licensee has been operating since the facility ceased active milling on April 15, 1983. The license is also a performance-based operating license, approved on August 18, 1999 and renewed on November 10, 2004, allowing the future, contingent resumption of milling operations. The contingency in the resumption of milling operations is provided in License Condition 9.4, which states:

> *For monitoring purposes, the standby mode of operation is applicable for any continuous 90-day or longer period when no yellowcake is produced by the mill. The NRC shall be notified at least ninety (90) days prior to any planned resumption of uranium milling operations.*

This contingency is also stated in the EA prepared in support of 1999 licensing approval (NRC, 1999):

> *The actual resumption of mill operations would be conditional on: 1) a 90-day notice to NRC; 2) completion of the pre-operational inspection; and 3) resolution of any associated safety issues. The inspection will confirm that operating procedures are in place, the facility was constructed as designed, pre-operational testing was completed, and that approved radiation safety and environmental monitoring programs are in place.*

Thus, renewal of the current license provides Kennecott with the ability to function in either the standby mode or to resume full operations.

Additionally, the license allows site closure and reclamation according to the plans and design documents listed in Table 1-2, including the Final Design Report, Volume V, New Impoundment Reclamation Plan (Shepherd Miller, Inc., 1997e), Final Design Report, Volume VI, Existing Impoundment Reclamation Plan (Shepherd Miller, Inc., 1997d), and Final Design Report, Volume VI-Part 2, Mill Decommissioning Addendum to the Existing Impoundment Reclamation Plan (Shepherd Miller, Inc., 1998).

NRC staff, in a letter from Lydia Chang, Chief of the Environmental Review Branch, Division of Fuel Cycle Safety, Safeguards, and Environmental Review, Office of Nuclear Material Safety and Safeguards, dated August 9, 2016, directed Kennecott to define the no-action alternative as follows:

> *"NUREG-1748 (NRC, 2003) states, in part, that the no-action alternative is a discussion of the results from a lack of action (i.e., status quo or the existing state). In other word [sic], KUC does not taking [sic] any action and allow the license to expire [Note: Kennecott interprets this sentence to read, 'In other words, the no-action alternative would involve KUC not taking any action and thus allowing the license to expire.']. NUREG-1748 also states, in part, that for the no-action alternative, the proposed action would not take place. For Sweetwater Uranium Project, the proposed action is the license renewal request. The no-action alternative could also be that the NRC rejects the license renewal application request. As a result, the license is not renewed, and KUC's license would have expired as of November 25, 2014. Therefore, under the no-action alternative the Sweetwater Uranium Project would not be able to remain in a standby condition."*

2.1.1 No-Action Alternative

The no-action alternative as identified by the NRC in the August 9, 2016 letter is either a) Kennecott does not take action and allows the license to expire, or b) the NRC rejects the license renewal application. Since Kennecott has already taken the action of timely requesting of license renewal, the no-action alternative would be defined as the denial of Kennecott's request for renewal of the existing license. This no-action alternative is in effect the opposite of the proposed action; it represents what would occur if the proposed action were not to occur. Where the proposed action is the requested license renewal, and thereby all activities allowed and required by the license up to and including decommissioning and reclamation, the no-action alternative would lead to only decommissioning activities. These potential activities would include, but not be limited to, the following:

1. Perform all environmental monitoring required by license conditions.
2. Operate the Corrective Action Program as required by the license. Continue to recover and pump groundwater to the existing tailings impoundment and/or implement modified corrective action activities, and monitor progress in achieving intents of the corrective action or approved Alternate Concentration Limits toward meeting groundwater standards.

3. Conduct Project decommissioning activities in accordance with the license. Implement reclamation and closure steps as approved in the Project's Final Design, Volume VI, Existing Tailings Impoundment Reclamation Plan (Shepherd Miller, Inc., 1997d), Final Design, Volume V, New Tailings Impoundment Reclamation Plan (Shepherd Miller, Inc., 1997e), and in the Final Design, Volume VI, Part 2, Mill Decommissioning Addendum to the Existing Tailings Impoundment Reclamation Plan (Shepherd Miller, Inc., 1998).
4. Deed private lands and transfer management of public lands associated with the Project (specifically those containing 11(e).2 byproduct material or currently underlain or will be underlain in the future (a minimum of 200 years to 1,000 years) by the tailings/catchment basin groundwater plume) to the Department of Energy (DOE) as the long-term custodian for the land.

The activities performed under the no-action alternative and the results therefrom provide the baseline to which the proposed action may be compared.

2.1.2 Proposed Action

The proposed action entails those activities currently permitted and required by License SUA-1350, and for which the renewal request applies, i.e., standby operations with license conditions allowing resumption of milling operations. These milling operations activities include:

1. Perform all environmental monitoring required by license conditions.
2. Perform Project maintenance activities allowing license conditions to be safely and sufficiently completed, and allowing the facility to be readied for future operations, as market conditions allow.
3. Operate the Corrective Action Program as required by the license. Continue to recover and pump groundwater to the existing tailings impoundment and/or recover and pump groundwater to be used as mill make-up water, and monitor progress in achieving intents of the corrective action.
4. Prepare the mill for resumed operations per license conditions, including 90-day notice, NRC preoperational inspection, and resolution of any safety issues.
5. Construct new tailings impoundments and evaporation ponds as designed in the Final Design documents prepared by Shepherd Miller, Inc. in 1997 and 1998 and approved by the NRC in its Finding of No Significant Impact as concluded in its Environmental Assessment (NRC, 1999).
6. Resume operations of the mill and tailings system in accordance with the Project's performance-based license as approved by the NRC.
7. Conduct Project reclamation and closure activities in accordance with the license. Implement reclamation and closure steps as approved in the Project's Final Design, Volume VI, Existing Tailings Impoundment Reclamation Plan (Shepherd Miller, Inc., 1997d), Final Design, Volume V, New Tailings Impoundment Reclamation

Plan (Shepherd Miller, Inc., 1997e), and in the Final Design, Volume VI, Part 2, Mill Decommissioning Addendum to the Existing Tailings Impoundment Reclamation Plan (Shepherd Miller, Inc., 1998).

8. Deed private lands and transfer management of public lands associated with the Project (specifically those containing 11(e).2 byproduct material or currently underlain or will be underlain in the future (a minimum of 200 years to 1,000 years) by the tailings/catchment basin groundwater plume) to the Department of Energy (DOE) as the long-term custodian for the land.

2.2 Alternatives Considered but Eliminated

There are no alternatives to the licensee other than the no-action alternative and the proposed action. The Project is in standby, with a performance-based license and standing uranium mill. The mill is constructed and cannot be economically relocated. The Project is currently under an approved postponement of the implementation of the requirements of Timeliness in Decommissioning. The mill will be operated per the license, allowing standby or restarted as approved; or, if the license renewal is denied, Kennecott will pursue decommissioning.

2.3 Cumulative Effects

The Great Divide Basin in the Project vicinity has a limited number of land uses. Dispersed ranching at a level appropriate to the arid environment occurs in portions of the Red Desert north, east, and south of the Project. Oil and gas exploration and development has occurred, is present, and can be reasonably expected to continue throughout the Great Divide Basin, but especially in the vicinity of Bairoil, and along the Wamsutter-Crooks Gap Road southwest of the Project. The Lost Creek In-Situ Recovery (ISR) project, NRC License No. SUA-1598, is located north of the Sweetwater Project, with its plant located approximately 6.1 miles north-northeast of the Project. No other actions are reasonably foreseen.

The presence of dispersed activity associated with ranching, oil and gas development, and uranium recovery operations in the Project vicinity present more cumulative benefits than negative impacts. Each provides regional employment, with secondary employment and tax generation benefits. These activities provide a human presence in the region. This presence provides for a measure of health, security and safety benefits for those limited

users of the local road system. The presence of two uranium recovery licensees in relatively close proximity provides for synergistic benefits: in hiring employees, addressing related uranium industry technical and operational issues, in maintaining remote local roads and in providing a measure of health, security and safety benefits for those limited users of the local road system.

No cumulative negative environmental consequences for these dispersed actions can be reasonably expected.

2.4 Comparison of the Predicted Environmental Impacts

The proposed action would consist of mill preparation, operation, monitoring and reclamation. Preparation would involve mill modifications and construction of up to 6 new lined 40-acre tailings impoundments and up to 10 lined evaporation ponds. Reclamation would involve construction of diversion channels and reclamation of both the existing and any new tailings impoundments as well as decommissioning of the facilities, including disposal of all 11e.(2) byproduct material in the tailings impoundment or offsite disposal of non-11e.(2) byproduct material. Construction of new tailings impoundments, diversion channel, and evaporation ponds will add approximately 614 acres of new disturbance associated with full operations. The post-reclamation closure footprint, with the addition of diversion channels, and the decommissioning of other Project areas, is expected to add 626 acres to the existing impoundment area.

The chief differences between the two alternatives are socioeconomic and in loss (stranding) of uranium resource; the proposed action would entail the benefits and costs associated with resumed operations and use of the resource. The chief difference in environmental impacts would be in the footprint of affected lands. It is expected that environmental monitoring will occur with equal rigor, but perhaps with different monitoring locations, under both alternatives. Activities associated with groundwater remediation under the Corrective Action Program will occur with equal rigor under both alternatives. Reclamation measures will occur with equal rigor, but with different footprints and timing, between each alternative.

Mill operations and reclamation under the proposed action will be conducted in accordance with NRC standards and approvals, and should not have a significant impact on the resources assessed. Environmental monitoring on and near the Project area, as required would alert the licensee to potential issues so that corrective actions may be taken as needed.

Table 2-1 compares the potential impacts of the proposed action with those of the no-action alternative.

Table 2-1 Comparison of Predicted Impacts

Description of Potential Impact	Proposed Action	No-Action Alternative
Purpose and Need	Ability would be maintained to mill uranium for use in nuclear power production and public interest served.	Loss (stranding) of valuable and limited economic uranium resource, loss of productive capacity, and loss of jobs and tax base.
Land Use	Impacts to grazing, recreation, and mineral exploration and extraction are not anticipated.	Impacts to grazing, recreation, and mineral exploration and extraction would not be anticipated.
Transportation	Most of the estimated 30 to 35 permanent employees would likely live in Rawlins and commute to the site, generating negligible impacts upon local transportation systems, including the state highway network and the paved access road. No impact associated with transport of yellowcake is anticipated.	Long-term impacts to the transportation network, in part due to loss of current maintenance to a portion of the access road to the site that is in Carbon County may be anticipated. Minor short-term impacts due to daily travel of 20 construction crew members on U.S. 287 and County Road 63.
Geology and Soils	Potential impacts to soils will be addressed via erosion control methods during construction, remediation of wind-blown contamination, if any, and reclamation of all disturbed areas. Approximately 965 acres of Project land would be affected by	Impacts to the site soils would not be anticipated, or would be anticipated to be addressed via remediation and reclamation of all disturbed areas. Approximately 664 acres of Project land would be affected by decommissioning activities.

	decommissioning activities.	
Water Resources	No impact to surface waters is anticipated. Impact to groundwater will be limited by design, operation and closure in accordance with 10 CFR 40 Appendix A criteria.	No impact to surface waters is anticipated. Impact to groundwater will be limited by design, operation, or closure in accordance with 10 CFR 40 Appendix A criteria.
Ecological Resources	During operations, some loss of habitat will occur, but ample habitat remains in the region. At the Project's termination, Project-related disturbed areas will have been or be in the process of being reclaimed. Implementation of the reclamation program based on current results will result in the long-term reestablishment of plant communities similar to those presently on the site.	At the Project's termination, Project-related disturbed areas will have been or be in the process of being reclaimed. Implementation of the reclamation program based on observed current results will result in the long-term reestablishment of plant communities similar to those presently on the site.
Air Quality	Estimates of airborne radionuclide releases caused by the resumption of mill operations and compliance with regulations were demonstrated by the licensee with the dose modeling codes MILDOS-AREA and COMPLY (Section 5.2.3, Volume VII of Final Design, Shepherd Miller, Inc., 1997f). Wind conditions at the Project area will disperse most emissions, and no residential receptors are nearby. Non-radiological air quality impacts during construction and operations will be controlled by permit.	The site would be decommissioned to be in compliance with all radiological and non-radiological air quality regulations.
Noise	According to the Revised ER (Shepherd Miller, Inc., 1994), noise levels of less	According to the Revised ER (Shepherd Miller, Inc., 1994), noise levels of less than 50

	than 50 dB(A) would be expected at a distance of 2 miles, and noise levels at the nearest sage-grouse lek are estimated herein at 36-41 dB(A).	dB(A) would be expected at a distance of 2 miles, and noise levels at the nearest sage-grouse lek are estimated herein at 36-41 dB(A) under decommissioning construction activities.
Historic and Cultural Resources	Under the proposed action, the milling operation, construction, and reclamation activities will affect land areas that have already been surveyed for historic and cultural resources. One site, located near the diversion channel to be constructed with reclamation, may be potentially eligible for inclusion on the National Register. Kennecott will perform an archeological survey and obtain approval before disturbing any previously unsurveyed areas.	Activity will occur over land already surveyed for historic and cultural resources. One site, located near the diversion channel to be constructed with reclamation, may be potentially eligible for inclusion on the National Register. The licensee will perform an archeological survey and obtain approval before disturbing any previously unsurveyed areas and any previously surveyed areas with sites potentially eligible for inclusion on the National Register.
Visual/Scenic Resources	Under the proposed action, minor impacts to the visual and scenic resources of the area are expected with the construction, operation and reclamation of the new impoundments. There are no nearby residents or key observation areas, and thus no receptors are affected by the changes to visual and scenic resources.	Minor impacts to the visual and scenic resources of the area are expected with the decommissioning of the facility by the current disturbance associated with the decommissioning. There are no near-by residents or key observation areas, and thus no receptors are affected by the changes to visual and scenic resources.
Socioeconomic	Mill operations are expected to provide long-term direct employment for 30-35 people, and other temporary employment. The operations are expected to generate indirect employment for approximately 40-45 people	The jobs and tax benefits associated with the Project would be lost. Loss of valuable and limited economic resource, loss of productive capacity would occur. Existing uranium deposits not amenable to in

	in secondary sectors. The annual mill payroll would be approximately $4.08 million at Project inception, and direct (corporate) and indirect (salaries, sales, gasoline, etc.) taxes are expected to be significant. The proposed Project would generate direct and indirect tax revenues, including severance tax revenue. Nearby uranium deposits would be accessed and processed. Community resources in the form of services and public facilities (i.e., police and fire protection, public transportation, education, etc.) would be minimally impacted as a result of the proposed action.	situ recovery would likely be stranded with the decommissioning of this conventional mill. The ability to process alternate feed through this mill would be lost as well.
Environmental Justice	The mill facilities are already constructed, and therefore the location of the mill would not have environmental justice impacts. The mill is located in a rural area, distant from population centers. Thus, expansion of tailings impoundments within the NRC bonded area would have no impact on any population group, regardless of ethnicity or economic status. During operations, the mill will employ qualified individuals regardless of gender, race, and ethnicity.	The mill facilities are already in place, and therefore the location of the mill would not have environmental justice impacts. The mill is located in a rural area, distant from population centers. Decommissioning contractors will be required to employ qualified individuals regardless of gender, race, and ethnicity.
Public and Occupational Health	Use of up-to-date techniques for waste storage, handling, and disposal for non-	Potential public and occupational health impacts would be reduced to NRC's regulatory long-term health

	radiological effluents will continue to be employed to preclude impacts to public or occupational health. Results from MILDOS-AREA modeling, including radon, indicated effective whole body doses to the nearest resident of no more than 0.233 mrem/year; and to residents of Bairoil, the nearest community, of 0.245 mrem/year as a result of the resumption of mill operations. The above-mentioned values are less than 0.25 percent (0.0025) of the corresponding 10 CFR 20 standard of 100mrem/year and about 0.14 percent (0.0014) of regional background radiation.	criteria. A small risk for occupational health impacts would exist during the period of decommissioning activities.
Waste Management	Impacts from wastes will be minimized under the construction, operation, monitoring and eventual reclamation of the proposed tailings impoundments as presented in detail in the Final Design Volumes (Shepherd Miller, Inc. 1997 through 1999) and as assessed in the NRC's Environmental Assessment (1999).	Decommissioning activities would be managed and conducted to be in compliance with all radiological and non-radiological waste regulations.
Environmental Measurements and Monitoring	The Project would be monitored per State, NRC and EPA regulations as detailed in the Final Design Volume VII (Shepherd Miller, Inc., 1997f) and modified herein.	The Project would be monitored in conformance with all radiological and non-radiological environmental monitoring requirements during decommissioning, post-decommissioning compliance monitoring, and under long-term surveillance.
Costs and Benefits	Benefits and costs would	Project benefits would not

	accrue to the Project as defined in Section 7 herein.	accrue, and operational Project costs would be avoided. All tangible decommissioning costs and socioeconomic costs would be realized.

3.0 DESCRIPTION OF THE AFFECTED ENVIRONMENT

The Project is located in the Red Desert region of the Great Divide Basin. The regional landscape consists of broad, undulating lowlands intersected by ridges, shallow draws, and a few rock outcroppings. No surface drainage leaves the basin. The Project is located within the Battle Spring Draw watershed, which empties into Battle Spring Flat, a playa located approximately six miles southwest of the site. Local topography is characterized by low relief, sagebrush-dominated plains dissected by small, ephemeral drainages. Climate in the region is highly arid and windy, with short summers and cold, relatively lengthy winters. There are no perennial surface waters, and the small drainages only convey water during spring snowmelt and after intense rainstorms. Elevations in the immediate Project area range from 6,500 to 6,700 feet above mean sea level, and the surface slope is less than one percent, at approximately 40 feet per mile. Precipitation is approximately 5.5 inches per year. The region is sparsely populated, with the closest permanent residence located approximately 17 air miles east of the site.

The Project is located approximately 42 miles northwest of Rawlins, (Figure 1). The paved Minerals Exploration Road connecting to Highway 287, along with the gravel Wamsutter - Jeffrey City road provide access to the Project. The facility is constructed on privately owned land and covers approximately 1,975 acres. The Project includes a reclaimed mine pit lake and overburden pile, as well as the mill, associated buildings, and tailings impoundment. The Revised Environmental Report in Section 2 (Shepherd Miller, Inc., 1994) provides an extensive overview of the Project area and affected environment.

3.1 Land Use

Local and regional land use remains largely unchanged since the Revised Environmental Report (Shepherd Miller, Inc., 1994) and November 10, 2004 license renewal. Updates regarding oil, gas, and uranium exploration and local land uses may be found in the annual

Source Materials License #SUA-1350 - License Conditions 11.2 and 12.3 - Land Use Reports, 1975-2016 (most recent: Kennecot Uranium Company, January 27, 2016) and the licensee's 2014 license renewal application (Kennecot Uranium Company, 2014).

The site is currently zoned as Sweetwater County Mineral Development District 1 (MD-1), a zoning district intended for mineral extraction or production and ancillary facilities. A 5-mile radius of the permit area also includes Mineral Development Overlay District 2 (MD-2), intended to accommodate underground mining in conjunction with the surface uses of the base zoning district, and Agricultural District (A), intended to reflect the County's vast open spaces with large tracts of undeveloped land, and recognize uses including open range livestock grazing and trailing; oil, gas and mineral exploration and extraction and cultivated agriculture (Sweetwater County, Wyoming, 2015) (Figure 2). All references to a 5-mile radius herein are based on a 5-mile distance from the portion of the NRC bonded area boundary that encompasses the mill and existing and future tailings impoundments. The portion of the NRC bonded area boundary that bounds the proposed reclamation diversion channel north of the overburden pile was not included in the defined 5-mile radius because it will contain no 11e.(2) material.

Regional land use includes livestock grazing, dispersed recreation, wildlife habitat, oil and gas extraction, and mineral exploration and production. Gas pipelines and electrical transmission lines cross the basin. There is no crop production; the only agricultural production is related to grazing. The licensee's 2016 Land Use Report states that cattle were present on surrounding Bureau of Land Management (BLM) lands throughout the survey period, and two sheep camps were established in December of 2015. Oil and gas development and production continue as a principle land use, and uranium exploration drilling has recently been conducted in the region. As detailed in the licensee's 2014 license renewal application, UR Energy, Inc.'s Lost Creek project (an in-situ uranium recovery operation) commenced production in August 2013. The Lost Creek facility is approximately six miles north-northeast, upstream and downwind, of the Project. Gas and oil extraction and uranium exploration activities near the site are described in detail in the Land Use Reports. Recreational pursuits in the Great Divide Basin consist of sightseeing,

camping, and hunting of antelope, elk, sage grouse, mule deer, coyotes and rabbits. There are no residences, wildlife preserves, sanctuaries, or designated recreational areas within a 5-mile radius of the Project. Further information on land use in the general region may be found in the Section 2.2 of the Revised Environmental Report (Shepherd Miller, Inc., 1994). Land use has been discussed in the documents listed in Table 3-1. This is not intended to be a comprehensive list of all documents that have discussed land use, but the documents listed collectively provide a thorough treatment of the subject.

Table 3-1 Summary of Documents Describing Land Use

Document Title	Prepared By	Date	Contents Summary
Revised Environmental Report	Shepherd Miller, Inc.	August 1994	Complete revision and update to original 1976 Environmental Report
Annual Source Materials License #SUA-1350 - License Conditions 11.2 and 12.3 - Land Use Reports	Kennecott Uranium Company	February of each year, most recent: February 2016	Annual summary of regional and site-specific land use
Environmental Assessment For Source Material License SUA-1350, Renewal for Operations and Amendment for the Reclamation Plan (Revision 1)	Nuclear Regulatory Commission	July 1999	Support for the decision-making process concerning the request for resumption of mill operation and approval of the reclamation plan
Environmental Assessment for Amendment of Source Material License SUA-1350 for the Catchment Basin Reclamation	Nuclear Regulatory Commission	May 2005	Support for the decision-making process concerning reclamation of contaminated soil and groundwater onsite.
Request for a Renewal Source Material License SUA-1350 for a Ten (10) Year Term	Kennecott Uranium Company	July 24, 2014	Application for license renewal with re-baselined surety
Licensee-submitted annual Land Use Surveys	Kennecott Uranium Company	Annual – February of each year for the previous year	Describes land use in the vicinity of the facility

3.2 Transportation

The transportation system accessing the Project includes a railroad approximately 42 miles to the south and a public road system as depicted in Figure 4. Interstate 80 is located adjacent to the railroad; U.S. Highway 287 extends from Rawlins northward through Muddy Gap, and Jeffrey City; Minerals Exploration Road (Sweetwater County Road 63) extends from U.S. 287 to the Wamsutter to Crooks Gap Road (County Road 23), providing direct access to the Project; and County Road 23 connects from Wamsutter through Crooks Gap to Jeffrey City. The best (paved) route to the Project is from the Interstate 80 at Rawlins, then north on U.S. 287 to Minerals Exploration Road. The route from Wamsutter to the site via the Wamsutter to Crooks Gap Road (County Road 23) and Sweetwater County Road 63 is the shortest route from Interstate 80; however, it is not paved. In addition to these designated routes, off-road tracks exist around the Project's perimeter as BLM-maintained roads or as informal, unmaintained roads used for ranching, recreation, or mineral and oil and gas exploration purposes.

Table 3-2 summarizes the road network in the Project vicinity, with information provided regarding road classification, surface type, number of lanes, and traffic counts (if available). Traffic counts are not available for the county roads.

Table 3-2 Road Network in Project Vicinity

Road/Classification	Road Surface	Lanes	Average Daily Traffic[1]
Interstate-80	Paved	4	23,287
U.S. Highway 287	Paved	2	2,556
Minerals Exploration Road/County Road 63	Paved	2, no shoulder	N/A
Wamsutter to Crooks Gap Road/County Road 23	Gravel	2	N/A

[1]Data for 2015, Wyoming Department of Transportation, for I-80 west of Rawlins and for U.S. 287 south of Muddy Gap

It is not currently known how the anticipated 30 to 35 employees during resumed operations (the proposed action) would travel to the site. Transport by passenger van, carpool, or other means to limit trip-miles to and from the site is very likely to occur. However, for the purposes of this Supplemental ER, we have assumed that each employee

will travel individually, with one arriving trip and one departing trip per employee per day. In addition, we have assumed that an equal number of arriving and departing trips are made by delivery vehicles, contractors, consultants, and other visitors. Table 3-3 lists the projected number of vehicle trips each day to/from the site under existing non-operating conditions and under resumed operations (proposed action).

Table 3-3 Existing and Projected Vehicle Trips

	Assumptions		Total Trips Per Day
	Employees	Visitor Trips (deliveries & visitors)	
Existing Condition	4	4	16
Proposed Action	35	35	140

3.3 Geology and Soils

3.3.1 Structure and Stratigraphy

The Great Divide Basin is a broad depression that spans approximately 3,500 square miles in south-central Wyoming. The geomorphology of the Great Divide Basin is a result of tectonic activity associated with the Laramide orogeny (Late Cretaceous). During this upheaval, the Wind River Mountains and Granite Mountains were uplifted on the north side of the Great Divide Basin. The Rawlins Uplift formed to the east; the Wamsutter Arch formed to the south; and the Rock Spring Uplift formed to the west. The Continental Divide, extending from the south, splits into two and encircles the Great Divide Basin on the east and west, joining again as one topographic high to the north. Contemporaneous with the uplift of the surrounding mountains, episodes of normal and thrust faulting occurred within and around the Basin. Most of the major faults are located in the northern part of the Basin, with displacement ranging from a few feet to over 3,000 feet.

Erosion of these regional uplifts supplied sediments to the Great Divide Basin area throughout the Cenozoic (65 million years ago - present). Tertiary rocks have been divided into six formations (Figure 5); the earliest sedimentation is the Fort Union Formation (Paleocene), which was unconformably deposited on top of the Lance Formation (Late Cretaceous). The Fort Union is unconformably overlain by interfingering sediments of the

Green River, Wasatch, and Battle Spring Formations (Eocene). These beds are conformably overlain by the Bridger Formation (Eocene), which in turn is unconformably overlain by the Brown's Park Formation (Oligocene to Miocene). Quaternary alluvium of sands, silts, and gravels covers much of the present surface. Figure 5 is a geologic map derived from the Revised Environmental Report (Shepherd Miller, Inc., 1994). While more recent geologic mapping of Wyoming exists, this existing map was selected for reference because of the relative uniformity of the surficial geology within 5 miles of the NRC bonded area boundary. Surface formations at and near the Project site include only the Battle Spring Formation and quaternary lake deposits and wind-blown sand deposits.

The upper portion of the Battle Spring Formation is the host to the uranium mineralization in the vicinity of the Project, and consists of interfingered beds of sandstone, siltstone, and mudstone. The uranium contained in the Battle Spring Formation was previously mined and milled at the Project. However under the proposed action, the mill would process ore from nearby Green Mountain ore deposits. Detailed local and regional geologic descriptions may be found in Section 2.5 of the Revised Environmental Report (Shepherd Miller, Inc., 1994).

3.3.2 Soils

Project area soils have developed from erosion of the sedimentary bedrock (mainly sandstone, siltstone, and mudstone), and consist generally of sandy loams. Section 2.5 of the Revised Environmental Report (Shepherd Miller, Inc., 1994) and the Final Design, Volume II, (Section 3 – Characterization of On-Site Materials) (Shepherd Miller, Inc., 1997b) provide an overview of the Project area soils.

Project-area soils and sub-grade geologic formations have been impacted by previous operations (prior to Kennecott ownership) in three ways. First, windblown tailings have been deposited outside the existing tailings impoundment. The extent of windblown tailings is small and was defined by Shepherd Miller, Inc. (1997c) in the Final Design, Volume VI. Current tailings impoundment management practices, through keeping tailings covered or saturated, greatly reduce the potential for windblown tailings. Second, Project-

area soils and sub-grade geologic formations were impacted by leaks from the Project's diesel fuel storage tanks, located west of the mill. Approximately 400,000 cubic yards of diesel-contaminated soils were placed on a landfarm for remediation. The contaminated area was remediated by excavation of the contaminated soils to Wyoming DEQ standards and documented to the NRC in the Hydrocarbon Contamination Remediation Report (Kennecot Uranium Company, 2003).

Third, seepage of mill and solvent extraction fluids occurred through the unlined catchment basin during mill operations from 1981 through 1983 (refer to Section 3.4.2). Kennecott analyzed both soil and groundwater in the vicinity of the catchment basin and determined that a portion of the samples exhibited high levels of diesel range organics (DRO) and radionuclides. Kennecott submitted in May 2004 a request to amend its license, Corrective Action Program, and approved decommissioning plan to remediate soil and groundwater contamination below and adjacent to the catchment basin. At that time Kennecott expected to excavate approximately 120,000 cubic yards of DRO- and Ra-226-contaminated soil. Under Kennecott's proposed plan, after excavation and prior to backfilling, a verification sampling program would be undertaken to confirm the results of the soil removal. Soil remediation criteria were selected and discussed with NRC staff prior to remediation activities and proposed in a letter dated January 18, 2005. These criteria were 35 pCi/g natural uranium and 15 pCi/g Th-230. After verification sampling, Kennecott would backfill the area with suitable clean fill. In May 2005 NRC prepared an EA for Amendment of Source Material License SUA-1350 for the Catchment Basin Reclamation, issuing a Finding of No Significant Action for the proposed remediation activities.

Kennecott conducted the remediation from December 2005 through November 2007 after NRC's issuance of the EA. Approximately 233,270 cubic yards of contaminated soils were excavated from this area and placed within the existing tailings impoundment. Kennecott documented the remediation of the catchment basin soils in the Catchment Basin Excavation Completion Report (Kennecot Uranium Company, 2008). NRC responded with Requests for Additional Information in November 2008, clarified by email and telephone conversations on November 20 and 25, 2008. NRC stipulated and Kennecott

concurred that a response to these RAIs would be issued in which alternate soil remediation criteria to those proposed and accepted prior to the remediation would be evaluated. Specifically, the following criteria from NRC's NUREG-1620, Standard Review Plan for the Review of a Reclamation Plan for Mill Tailings Sites Under Title II of the Uranium Mill Tailings Radiation Control Act of 1978 (NRC, June 2003) would be evaluated:

> *"However, if a subject licensee can demonstrate that no contaminated buildings will remain, and that soil thorium-230 (Th-230) does not exceed 5 pCi/g (above background) in the surface and 15 pCi/g in subsurface soil in any 100-square-meter area that meets the radium standard, and the natural uranium (U-nat, that is, U-238, U-234, and U-235) level is less than 5 pCi/g above background, radium benchmark dose modeling is not required."*

In response, Kennecott performed RESRAD (RESidual RADioactive) modeling to determine that the benchmark dose with the 5/15 criteria from NUREG-1620 would not be exceeded by the dose resulting from residual radionuclides at the base of the catchment basin excavation. Kennecott removed certain grids from the RESRAD modeling that were: 1) wholly or partially behind the synthetic curtain liner installed at the west wall of the excavation, or 2) that clearly contained soils documented to be influenced by natural or in situ ore grade materials, or 3) that were positioned geographically such that they had been precluded from having been contaminated by catchment basin fluids. The RESRAD modeling indicated that annual radiation doses from residual radionuclides at the bottom of the backfilled excavation would not exceed the benchmark dose at any time over a thousand years. The maximum calculated doses from the residual radioactivity were zero for all time periods and all nuclides, which are by definition as low as reasonably achievable (ALARA). These results were presented by Kennecott in a January 28, 2009 Response to Request for Additional Information (RAI) dated November 19, 2008, in which Kennecott requested approval by NRC of the excavation work and full release of the excavated area for unrestricted use. Kennecott awaits NRC's response.

3.3.3 Seismicity

Sweetwater is located in the northeastern portion of the Great Divide Basin in south-central Wyoming. Historically, this area is associated with a low to moderate level of seismicity, and few earthquakes have been recorded. Earthquakes that have occurred in the area have

generally been small, ranging in magnitude from 2 to 4 on the Richter scale.

In 1996, Sweetwater submitted a Revised Addendum to the Sweetwater Uranium Project Revised Environmental Report: Regional Seismicity (Shepherd Miller, Inc., 1996b) detailing the seismic hazard potential for the site for both deterministic and probabilistic seismic events. Analyses by Shepherd Miller included input from (Case, 1996) regarding the maximum credible earthquake from the Chicken Springs fault system. This evaluation concluded that the deterministic seismic hazard potential for the site primarily exists from the two active fault systems in the vicinity of the Project: the Green Mountain Segment of the South Granite Mountains fault (25 miles distant), and the Chicken Springs fault system (9 miles distant). A thorough discussion of the seismic potential can be found in the Shepherd Miller (1996b) Regional Seismicity report.

Since the submittal of the Shepherd Miller (1996b) Regional Seismicity report, two additional reports/report series have been published that characterize the seismology of south-central Wyoming. The Wyoming State Geological Survey (WSGS) produced a Basic Seismological Characterization of Sweetwater, Carbon, Freemont, and Natrona Counties (Case et al., 2002a, 2002b, 2002c, 2003). This latter series of four reports includes analyses of historic seismicity, the Uniform Building Code, a deterministic analysis of nearby faults, an analysis of the maximum credible "floating earthquake," and an evaluation of the existing short- and long-term probabilistic seismic hazard analysis within the site area.

The second published report after Shepherd Miller (1996b) is the Environmental Report for the nearby Lost Creek project (Lost Creek ISR, LLC, 2007). The seismology section of the Lost Creek ER summarizes the findings from the WSGS (Case et al., 2002a, 2002b, 2002c, 2003) and presents no additional insight on seismic hazard potential at the site. The Lost Creek ER identifies a third fault system approximately six miles to the northeast at the Lost Creek Permit Area, deemed the Lost Creek Fault. The Lost Creek Fault system is only shown on one plate and associated cross section in the Lost Creek ER and is not documented or referenced in the text as active. Similarly, the fault system is not included in the U.S. Geological Survey (USGS) Map of Quaternary Faults and Folds of Wyoming (U.S. Geological Survey, 2001) as active, nor is it referenced or referred to the WSGS

studies (Case et al., 2002a, 2002b, 2002c, 2003).

Table 3-4 Summary of Documents Describing Geology and Soils

Document Title	Prepared By	Date	Contents Summary
Revised Environmental Report	Shepherd Miller, Inc.	August 1994	Complete revision and update to original 1976 Environmental Report
Addendum to the Revised Environmental Report, Geologic Cross Sections and Aquifer Information	Shepherd Miller, Inc.	August 1995	Additional information from onsite geological and hydrological testing
Final Design Report, Volume II, Data Report	Shepherd Miller, Inc.	July 1997	Section 3: Characterization of On- (Shepherd Miller, Inc., 1996b) Site Materials
Addendum to the Revised Environmental Report: Regional Seismicity	Shepherd Miller, Inc.	August 1995	
Revised Addendum to the Revised Environmental Report - Regional Seismicity, Sweetwater Uranium Facility	Shepherd Miller, Inc.	June 26, 1996	
Environmental Assessment For Source Material License SUA-1350, Renewal for Operations and Amendment for the Reclamation Plan (Revision 1)	Nuclear Regulatory Commission	July 1999	Support for the decision-making process concerning the request for resumption of mill operation and approval of the reclamation plan
Environmental Assessment for Amendment of Source Material License SUA-1350 for the Catchment Basin Reclamation	Nuclear Regulatory Commission	May 2005	Support for the decision-making process concerning reclamation of contaminated soil and groundwater onsite.
Request for a Renewal Source Material License SUA-1350 for a Ten (10) Year Term	Kennecott Uranium Company	July 24, 2014	Application for license renewal with rebaselined surety

Since the 2002 WSGS characterization, no additional seismological characterization has been conducted in this region. A search of USGS earthquake database results in ten

earthquakes recorded within a 50-mile radius of the Project area since the 2002 analysis (U.S. Geological Survey, 2016). Earthquakes since 2002 range in magnitude from 2.5 to 3.7 (Figure 6). The closest earthquakes to the site were a 3.1-magnitude earthquake centered approximately 23 miles to the northeast near Bairoil on December 25, 2005, and a 3.5-magnitude earthquake approximately 23.5 miles to the northeast near the same location (Figure 6).

Regional and local geology, soils, and seismicity for the Sweetwater Project have been discussed in the documents listed in Table 3-4. This is not intended to be a comprehensive list of all documents that have discussed regional and local geology, but the documents listed collectively provide a thorough treatment of the subject.

3.4 Water Resources

3.4.1 Surface Water

The Great Divide Basin is an internally drained basin defined by a bifurcation of the Continental Divide. The Project lies in the east-central portion of this basin in the ephemeral Battle Spring Draw watershed. The Battle Spring Draw watershed empties into Battle Spring Flat, a playa located approximately 9.7 km (6 miles) southwest of the Project.

Precipitation at the Project is very low, averaging approximately 5.5 inches per year, and therefore there is very little surface water runoff in the Great Divide Basin. Surface flow occurs infrequently and only after relatively extreme snowmelt or rainstorm events. Some shallow perennial lakes are located a few miles south of the Project in Chain Lakes Flat, which is near the center of the basin. No surface drainage leaves the basin.

Baseline surface water hydrology and water quality have been discussed in the documents listed in Table 3-5. This is not intended to be a comprehensive list of all documents that have discussed site-vicinity surface water, but the documents listed collectively provide a thorough treatment of the subject.

The baseline surface water quality of natural lakes and draws has not been impacted by past Project operations, whose excursions (Section 3.4.2) have been limited to groundwater impacts.

Table 3-5 Summary of Documents Describing Surface Water Hydrology

Document Title	Prepared By	Date	Contents Summary
Environmental Report, Sweetwater Uranium Project	Woodward-Clyde Consultants	1976	Original Environmental Report prepared for Minerals Exploration Company
Revised Environmental Report	Shepherd Miller, Inc.	August 1994	Complete revision and update to original 1976 Environmental Report
Final Design Report, Volume V, New Impoundment Reclamation Plan	Shepherd Miller, Inc.	August 1997	Design of surface water diversion for long-term erosional stability of the reclaimed tailings impoundments
Environmental Assessment For Source Material License SUA-1350, Renewal for Operations and Amendment for the Reclamation Plan (Revision 1)	Nuclear Regulatory Commission	July 1999	Support for the decision-making process concerning the request for resumption of mill operation and approval of the reclamation plan
Request for a Renewal Source Material License SUA-1350 for a Ten (10) Year Term	Kennecott Uranium Company	July 24, 2014	Application for license renewal with rebaselined surety

3.4.2 Groundwater

Regional and local groundwater hydrology and water quality have been discussed in the documents listed in Table 3-6. The list in Table 3-6 is not intended to be a comprehensive list of all documents that have discussed regional and local groundwater, but the documents listed collectively provide a thorough treatment of the subject.

Table 3-6 Summary of Documents Describing Groundwater Conditions

Document Title	Prepared By	Date	Contents Summary
Environmental Report, Sweetwater Uranium Project	Woodward-Clyde Consultants	1976	Original Environmental Report prepared for Minerals Exploration

			Company
Revised Environmental Report	Shepherd Miller, Inc.	August 1994	Complete revision and update to original 1976 Environmental Report
Addendum to the Revised Environmental Report, Background Ground Water Quality and Detection Standards	Shepherd Miller, Inc.	January 1996	Provide bases for groundwater monitoring: background, sampling locations and detection standards
Final Design Report, Volume II, Data Report	Shepherd Miller, Inc.	July 1997	Geotechnical borings to the north of the existing impoundment and Aquifer Test Report
Environmental Assessment For Source Material License SUA-1350, Renewal for Operations and Amendment for the Reclamation Plan (Revision 1)	Nuclear Regulatory Commission	July 1999	Support for the decision-making process concerning the request for resumption of mill operation and approval of the reclamation plan
Annual Corrective Action Program Review and Groundwater Monitoring Reports (Kennecott Uranium Company, 1999-2016)	Kennecott Uranium Company	Annually in February	Report on prior year's activities, with pumping and water quality data
Final Ground Water Plume Interpretation (Telesto Solutions Inc., 2009)	Telesto Solutions Inc.	February 2009	An evaluation of the extent of impacts to groundwater at the site and the distinction between natural and anthropogenic sources of uranium in groundwater
Request for a Renewal Source Material License SUA-1350 for a Ten (10) Year Term	Kennecott Uranium Company	July 24, 2014	Application for license renewal with rebaselined surety

Hydrogeology

Hydrogeologic units that occur beneath the Sweetwater Project and vicinity include the following: recent alluvial, windblown, and lake deposits; the Eocene Battle Spring and Wasatch Formations; the Paleocene Fort Union Formation; and the Cretaceous Lance

Formation. These units are classified as aquifers and depending on their hydrologic characteristics, yield groundwater to wells and springs. The Battle Spring and Wasatch Formations are the two most important aquifers in the Great Divide Basin.

The Project is located within a closed groundwater system, the low point of which lies within the 6500-foot contour located approximately 8 miles south and southwest of the site. Groundwater moves toward the center of the basin and discharge occurs principally in the playa lakes to the south (Chain Lakes) and southwest (Battle Spring Flat) of the site. Since the Basin is also closed topographically, the discharged water is ponded, and most of this water is lost to evaporation. This leads to annual fluctuations in water table elevation in the system; during periods of relatively higher runoff, surface drainage and groundwater flow collects in the playa lakes, with a corresponding increase in the water surface elevation occurring radially outward from the lakes. In addition, there is some discharge from springs near Battle Spring Flat and Chain Lakes Flat. This water is also subject to evaporation. The Battle Spring Aquifer is recharged mainly by infiltration of precipitation in its outcrop area near the perimeter of the Great Divide Basin. Precipitation may also seep into the aquifer in smaller amounts throughout the basin, especially in areas where sand dunes directly overlie the surface.

Aquifer tests were performed for the original Environmental Report (Woodward-Clyde Consultants, 1976), which were also reported in Section 2.7 of the Revised Environmental Report (Shepherd Miller, Inc., 1994). Shepherd Miller, Inc. in December 1996 completed an aquifer test in the immediate vicinity of the existing tailings impoundment, which is reported in Appendix E of the Final Design Volume II (Shepherd Miller, Inc., 1997b). From the December 1996 aquifer test, for the upper portion of the Battle Spring Aquifer in the vicinity of the existing tailings impoundment, Shepherd Miller, Inc. reported a range of transmissivity of approximately 3,200 to 13,800 gpd/ft, with an average horizontal conductivity of approximately 1 x 10^{-2} ft/min and vertical conductivity of approximately 1 x 10^{-6} ft/min.

Wells

Regional wells are completed in either the Battle Spring or Wasatch Formations. The Battle Spring Formation underlies the site and interfingers with the Wasatch Formation southwest of the Project. The Battle Spring Formation consists of a fine- to coarse-grained arkosic sandstone, with lenticular interbeds of silts and shales. These less permeable lenses act as local, discontinuous, and spotty aquicludes, where percolating water can collect.

Uses of the Battle Spring and Wasatch Aquifers include water supplies for industrial use (including for drilling, oil recovery, dust control and drinking water in very limited locations) and for stock watering. These water supplies can yield potable water; however, regional mineralogy affects baseline groundwater quality, and non-potable water is encountered under baseline conditions in some wells. Twenty-four (24) regional and local wells were addressed in the Revised Environmental Report (Shepherd Miller, Inc., 1994). Of these 24, five continue to be monitored by the Project for water levels as part of the Project's Wyoming DEQ Permit to Mine #481 reporting (JES-1, RE-111D, RE-110, North Camp Well, and DB-1), and the other 19 have either been abandoned, become blocked, or discontinued from the monitoring program. A total of 55 wells and nine lakes or springs are currently monitored under the DEQ Permit to Mine.

Kennecott (2014b) in its Annual Land Use Report noted other livestock wells in the Project vicinity: three wells along the Minerals Exploration Road (Road 63) and seven wells equipped with solar powered submersible pumps. The three road wells are located east of the Project: Road #4 is 1.6 miles ESE, Road #3 is 10 miles ENE, and Road #2 is 15 miles E. The seven wells equipped with solar powered submersible pumps are scattered across the region, and only two are within 10 miles of the Project: Sooner Reservoir Well is 7 miles ENE, and 25-92-21-BA is 7 miles NNE. Regional wells outside the Project's 5-mile radius are shown in Figure 7.

All non-Kennecott water uses within an 8.0-km (5-mile) radius of the Project are for stock watering purposes. These are owned by the Bureau of Land Management (BLM), the State of Wyoming, and private parties. Figure 8 shows the location of regional wells within the

Project's 5-mile radius. There are no non-Kennecott domestic or potable water supplies down-gradient of the Project.

Background Groundwater Quality

Background water quality levels were established as part of the 1975 pre-operational Environmental Assessment conducted by Minerals Exploration Company (MEC) and UNOCAL, Inc. in cooperation with the Bureau of Mines (Shepherd Miller, Inc., 1994). For the 1975 study, twenty-four well locations were sampled to evaluate the pre-mine water quality. A second background study was conducted in 1996, which involved over 1,000 groundwater samples (Shepherd Miller, Inc., January 1996). The 1996 study was weighted toward data from site wells. The laboratory results were analyzed statistically and the mean plus two standard deviations was used to establish background concentrations for metals, non-metals, and radionuclides. For certain chemical and radionuclide constituents, the United States Nuclear Regulatory Commission (NRC) adopted the 1996 background study mean concentrations plus two (2) standard deviations as groundwater protection standards, and these are listed in the NRC Source Material License (SUA-1350). The NRC adopted, for example, 36.0 pCi/L as the background concentration and groundwater protection standard for natural uranium. Data for some wells extending back until 1975 (i.e., North Camp Well) were considered in the 1996 study.

A number of the wells used in the 1975 study later used in the 1976 Environmental Report were regional (remote) wells and slightly remote wells. The 1996 Background Groundwater Study was prepared to address groundwater background in the immediate vicinity of the Project because, until approval of the background parameters in the report, the NRC was basing background groundwater quality at the site on a limited number of samples from a single well, TMW-5.

It should be noted that the values reported in the 1996 report for background are not the most elevated background samples measured during the study. Groundwater data included on-site, local and more-distant regional wells, using wells with a relatively complete sampling history. Data were screened using Wyoming Department of Environmental Quality methodology, and outliers were accordingly removed from analysis. Additionally,

regional wells with an incomplete sampling history were not included in the database but were used as confirmatory wells. Thus, some background samples for regional wells contained constituents at concentrations several times higher than were reported as background in the study. (Shepherd Miller, Inc., 1996a) noted that "*natural variability in uranium produces regional background concentrations of one to two orders of magnitude greater than that estimated for the site.*"

The U.S. Geological Survey (Mason & Miller, 2004) prepared a report on the water resources of Sweetwater County. Seven water-quality samples were collected from the Battle Spring Aquifer for this 2004 USGS study, and 11 historical samples were available for comparison. Mason and Miller noted that, in general, water-quality samples collected and reviewed from the Battle Spring Aquifer had the best overall quality of those studied in the county. The only notable exceptions to the relatively good water quality from the aquifer were from high radionuclides in several samples. Radon-222 and uranium concentrations were measured in all seven new samples collected. Five of the seven new samples collected had radon concentrations that exceeded the proposed EPA Maximum Contaminant Level of 4,000 pCi/L.

One of the seven wells, No. 170 in the study, located approximately 18 miles east of the Project, had a natural uranium concentration of 278 µg/L (185 pCi/L); and a second well, No. 173 in the study, located approximately 18 miles northeast of the Project, had a natural uranium concentration of 32.9 µg/L (22 pCi/L). These relatively high background concentrations for natural uranium were consistent with data observations and conclusions from Shepherd Miller, Inc. (1994).

A water sample was collected from well 25-92-21AB on October 5, 2010 (Kennecott Uranium Company, 2016), with a measured uranium concentration of 1.05 mg/L (700 pCi/L). This well is located approximately 6.5 miles northeast (upgradient) from the Project. A water sample was collected from well DB-1 on August 19, 2015, with a measured uranium concentration of 0.609 mg/L (406 pCi/L). This well is located approximately 2 miles west (cross-gradient) from the mill. A third water sample was collected from well OW-1 (Oil Well 1) on July 13, 2016, with a measured uranium

concentration of 1.03 mg/L (687 pCi/L). This well is located approximately 1.5 miles southwest (downgradient) from the mill. These data from DB-1 and OW-1 have not been presented elsewhere, and therefore laboratory data sheets are provided in Attachment 4 for documentation purposes.

The presence of high levels of uranium in Tertiary sediments and groundwater of the Great Divide Structural Basin has been known for a long time. The most notable example of this is the Lost Creek schroeckingerite deposit in the north-central part of the basin. Sheridan et al. (1961, p. 428) reported that deposition of the schroeckingerite deposit probably occurred by a simple process of crystallization from uraniferous groundwater during evaporation.

Mason and Miller quoted Masursky (1962) as describing three possible sources for the uranium in the groundwaters of the Great Divide Structural Basin: hydrothermal solutions associated with middle Eocene volcanic rocks, uranium leaching from volcanic ash found in nearby Miocene tuffaceous rocks, and leaching of uranium from sediments derived by erosion from the Granite Mountains. This third of Masursky's three possible sources for high natural uranium in groundwater is applicable to the sedimentary Battle Spring Formation. Sediments of the Battle Spring Formation were derived from the Granite Mountains, and contain from 0.0005 to 0.001 percent uranium (Masursky, 1962).

Baseline Conditions Resulting from Historical Operations

MEC mined uranium ore from the open pit located approximately three-quarters of a mile northwest of the Sweetwater mill, beginning with overburden removal in 1979. MEC dewatered the pit by a ring of dewatering wells that depressed the water table in the Battle Spring Aquifer. Dewatering began in September 1979 and was discontinued on April 25, 1983, after which groundwater levels in the aquifer began to rebound. MEC ceased open pit excavation on April 15, 1983. Groundwater appeared in the open pit in July 1983 and after that time, the pit lake level rose and the lake area increased. The pit lake is currently stabilized with a surface area of about 64 acres and a water level at about 6,540 feet above mean sea level. This level was reached in about 1997. Mining and milling operations

ceased in April 1983. Kennecott took ownership of the property in June 1992. The pit area has been reclaimed and Wyoming DEQ released the bond. The pit lake was bioremediated and the pit area reclaimed. There was no remediation standard for the pit lake for uranium, so Kennecott voluntarily agreed to decrease the uranium concentration from 8.51 mg/L (October 5, 1999) to less than 5 mg/L (4.37 mg/L (June 8, 2016), per water quality data collected by Kennecott. Selenium was also remediated, being reduced from 0.526 mg/L (October 5, 1999) to 0.008 mg/L (June 8, 2016), per water quality data collected by Kennecott. The release of the reclamation surety for the pit lake included release of the water in the pit lake following a five-year stability monitoring period that ended in April 2005.

In Spring 1983, a leak developed in the upper portion of the single-layer synthetic liner at the existing tailings impoundment, and this caused tailings water to seep downward into the underlying geologic materials (Shepherd Miller, Inc., 1994). Evaporation was allowed to lower the water level in the impoundment to below the elevation of the damaged liner. Since the mid-1980s, mine personnel have operated an enhanced evaporation system in the tailings impoundment consisting at various times and as conditions warranted of a spray system, liner drip system and/or flooded evaporation lagoons to decrease fluid volumes in the impoundment and evaporate pumpback water.

The NRC license requires that a Corrective Action Program (CAP) be conducted with the objective of returning the groundwater concentrations of chromium, U-Nat, and Ra 226-228 in areas that were impacted by milling activities to below corrective action levels. The license further stipulates that the groundwater protection standards apply to point of compliance (POC) wells TMW-15, 16, 17, and 18, which are located near the perimeter of the existing tailings impoundment. A groundwater-pumping program north and west of the tailings impoundment was initiated in 1986 to recover affected groundwater and the associated contamination in the Battle Spring Aquifer. Using stipulated and optional wells, the pumping program has continued to the present time. The pumped groundwater is discharged to the tailings impoundment for subsequent evaporation.

Additionally, groundwater with elevated uranium and potentially affected by organic compounds was identified in the catchment basin area, leading to the installation of additional wells to characterize the extent of impact. Groundwater pumping adjacent to the catchment basin was initiated in 2005 to recover the impacted groundwater and reduce the potential for offsite migration. Pumping continues to the present and the extracted groundwater is discharged to the tailings impoundment for evaporation

The catchment basin was a concrete walled impoundment measuring approximately 145 feet by 130 feet with no lined bottom (by design) that was intended to hold fluids from upsets in the mill and solvent extraction (SX) buildings as well as other runoff. Aerial photographs taken during operations indicate that the catchment basin held substantial amounts of SX fluids. Over 233,268 cubic yards of contaminated soils were excavated from this area in 2006 and 2007 removing the source consisting of hydrocarbon contaminated soils containing in excess of 2,300 milligrams per kilogram Total Petroleum Hydrocarbons (TPH) and some associated radionuclides. Excavation of this material eliminated a source term, specifically a source of potential groundwater contamination.

3.5 Ecological Resources

The Sweetwater Project area is located within the Salt Desert Shrub Basin of the Wyoming Basin ecoregion (Chapman et al. 2004). The Wyoming Basin ecoregion is a broad arid intermontane basin interrupted by hills and low mountains and dominated by grasslands and shrublands. The Salt Desert Shrub Basins region includes broad plains, disjunct playas and sand dunes scattered throughout the Wyoming Basin. Soils in the ecoregion tend to be alkaline with low permeability. Vegetation is a sparse cover of drought-tolerant shrubs such as Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*), rabbit brush (*Chrysothamnus* spp.), budsage (*Artemesia spinescens*), greasewood (*Sarcobatus vermiculatus*), and saltbush (*Atriplex* spp.). Most of the land is in rangeland, utilized for cattle and sheep grazing, or wildlife and wild horse habitat. Due to the low relief topography, harsh winters, and aridity, ecological diversity in the region is limited.

3.5.1 Vegetation

Habitat on the site has been characterized as sagebrush shrublands with a lesser extent of and desert shrublands. Sagebrush shrublands are dominated by Wyoming big sagebrush and rabbitbrush, with an herbaceous understory of native grasses such as wheatgrasses (*Agropyron* spp.), rye (*Elymus* spp.), and bluegrasses (*Poa* spp.) as well as the invasive cheatgrass (*Bromus tectorum*). Desert shrublands species are dominated by budsage and saltbush (*Atriplex* spp.). A very small wetland habitat, associated with the reclaimed mine pit contains cattails (*Typha* spp.), sedges (Cyperaceae spp.), and other wetland associated species.

3.5.2 Wildlife

The sagebrush-dominated habitats of the site support a variety of Wyoming wildlife species, including grazing animals such as pronghorn (*Antilocapra americana),* mule deer (*Odocoileus hemionus)*, and elk *(Cervus canadensis)*; predators such as coyote (*Canis latrans*), badger (*Taxidea taxus*), and long-tailed weasel (*Mustela frenata*); and smaller mammals such as deer mice (*Peromyscus maniculatus*), the least chipmunk (*Eutamias minimus*), prairie dogs (*Cynomys* spp.), and rabbits (*Sylvilagus* and *Lepus* spp.). Many raptor species are known to occur in the region, including the great horned owl *(Bubo virginianus)*, golden eagle (*Aquila chrysaetos*), ferruginous hawk (*Buteo regalis*), Swainson's hawk (*Buteo swainsoni*), northern harrier (*Circus cyaneus*), rough-legged hawk (*Buteo lagopus*), and American kestrel (*Falco sparverius*). With the exception of the golden eagle and the rough-legged hawk, these birds migrate from the area in the fall and return to the region in early spring. Greater sage-grouse (*Centrocercus urophasianus*), as well as many species of songbirds and shorebirds also occur in the Project vicinity. Wildlife observations are routinely documented on the Project area and presented by Kennecott in the annual reports under Wyoming DEQ/LQD Permit to Mine #481 (1997-2015).

Discussion of the Greater sage-grouse was provided in Appendix 3 of Kennecott's 2014 license renewal request (Kennecot Uranium Company, 2014), in a report prepared by ICF International (ICF), Gillette, Wyoming. ICF noted that:

The NRC bonded area ...does not lie in any designated core or connectivity areas and these areas lie to the west, north, and east of the project site...The NRC bonded area is not an island within the core area, but is connected to the south to additional non-core areas...The nearest lek (Minex West) is located approximately 1.7 miles west of the NRC bonded area in SW SE Section 5, T24N:R93W...The lek has been monitored annually since 1978 and has been active in most years.

The nearest boundary of the defined Greater sage-grouse core area to the mill is approximately 1.5 miles to the east (Figure 9). The Greater sage-grouse core area shown on Figure 9 was determined from the Wyoming Game & Fish Department (Wyoming Game & Fish Department, 2016).

The current executive order governing Greater sage-grouse protection (State of Wyoming, Office of the Governor, 2015) states that existing land uses prior to August 1, 2008 are not subject to core area stipulations:

Valid existing rights shall be recognized and respected. Activities existing or permitted in Core Population Areas prior to August 1, 2008, will not be required to be managed under Core Population Area stipulations...Examples of existing activities include oil and gas, mining, agriculture, processing facilities, housing, and other uses that were in place prior to the development of the Core Population Areas. Federal and state permitted activities, within a defined project boundary (such as a recognized federal oil and gas unit, drilling and spacing unit, mine plan, subdivision plat, utility ROW, grazing allotment, etc.), shall be allowed to continue within the existing boundary even if the use exceeds recommended stipulations.

3.5.3 Threatened and Endangered (T&E) Species

Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 et seq.), Federal agencies are required to use their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

An official query of the USFWS Environmental Conservation Online System-Information, Planning, and Conservation System (ECOS-IPaC) database was performed for Sweetwater County, Wyoming and specifically for the Project area to verify that there are no new federally listed species with the potential to occur within the Project area since the June 2014 wildlife habitat report (ICF International, 2014) (Table 3-7, Attachment 1).

Table 3-7 Threatened and Endangered Species of Sweetwater County (ECOS-IPaC, 2016)

Species	Scientific Name	Status	Critical Habitat
Birds			
Least tern	*Sterna antillarum*	Endangered	
Piping Plover	*Charadrius melodus*	Threatened	Final designated
Whooping crane	*Grus americana*	Endangered	Final designated
Yellow-billed cuckoo	*Coccyzus americanus*	Threatened	Proposed
Fish			
Bonytail chub	*Gila elegans*	Endangered	Final designated
Colorado pikeminnow	*Ptychocheilus lucius*	Endangered	Final designated
Humpback chub	*Gila cypha*	Endangered	Final designated
Pallid sturgeon	*Scaphirhynchus albus*	Endangered	
Razorback sucker	*Xyrauchen texanus*	Endangered	Final designated
Plants			
Ute ladies'-tresses	*Spiranthes diluvialis*	Threatened	
Western prairie fringed orchid	*Platanthera praeclara*	Threatened	
Mammals			
Black-footed ferret	*Mustela nigripes*	Experimental	

No T&E species have been documented in the study area. The greater sage grouse (*Centrocercus urophasianus*), documented in the 2014 wildlife report as occurring in the Project vicinity has been removed from the candidate species list (U.S. Fish and Wildlife Service, 2015). The black-footed ferret (*Mustela nigripes*) is the only T&E species with the potential to occur within the Project area (Attachment 2, ECOS-IPac, 2016), however this is an experimental/non-essential population, which does not require Section 7 consultation except on lands administered by the U.S. Fish and Wildlife Service or the National Park Service. There is currently a petition to list the Wyoming pocket gopher (*Thomomys clusius*), a 2016 tier 1 species of greatest conservation need, as an endangered species (WildEarth Guardians, 2015). The petition also requests designation of critical habitat for the species and suitable habitat may exist in the Project area. Currently, no designated critical habitat is present in the Project vicinity for any listed species.

3.5.4 Migratory birds

The Migratory Bird Treaty Act (16 U.S.C. 703-712), prohibits the taking of any migratory birds, their parts, nests, or eggs except as permitted by regulations, and does not require intent to be proven. Except for introduced species and some upland game birds, almost all birds occurring in the wild in the United States are protected (50 CFR 10.13). Additionally, the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d) prohibits knowingly

taking, or taking with wanton disregard for the consequences of an activity, any bald or golden eagles or their body parts, nests, or eggs.

According to the ECOS-IPaC query (2016), 31 species of migratory birds may be found year-round or seasonally in Sweetwater County, and many have been documented in the Project area (Kennecott annual reports, 1997-2015). Nesting platforms for golden eagles and ferruginous hawks are installed onsite, and have been utilized by pairs of nesting raptors.

Table 3-8 Summary of Documents Describing Ecological Resources

Document Title	Prepared By	Date	Contents Summary
Revised Environmental Report	Shepherd Miller, Inc.	August 1994	Complete revision and update to original 1976 Environmental Report
Final Design Report, Volume II, Data Report	Shepherd Miller, Inc.	July 1997	Section 7: Wildlife Biology Report
Final Design Report, Volume V, New Impoundment Reclamation Plan	Shepherd Miller, Inc.	August 1997	New Impoundment Reclamation Plan addressing impacts of burrowing mammals
Environmental Assessment For Source Material License SUA-1350, Renewal for Operations and Amendment for the Reclamation Plan (Revision 1)	Nuclear Regulatory Commission	July 1999	Support for the decision-making process concerning the request for resumption of mill operation and approval of the reclamation plan
Request for a Renewal, Source Material License SUA-1350 for a Ten (10) Year Term	Kennecott Uranium Company	November 10, 2004	Application for license renewal with rebaselined surety
Environmental Assessment for Amendment of Source Material License SUA-1350 for the Catchment Basin Reclamation	Nuclear Regulatory Commission	May 2005	Support for the decision-making process concerning reclamation of contaminated soil and groundwater onsite.
Sweetwater Uranium Project Wildlife Summary	ICF International	June 2014	Summary of T&E species in Project vicinity
Request for a Renewal Source Material License	Kennecott Uranium	July 24, 2014	Application for license renewal with

SUA-1350 for a Ten (10) Year Term	Company		rebaselined surety and update of ecological resources
Annual Report, DEQ/LQD Permit to Mine #481	Kennecott Uranium Company	1997-2015	Reports include a summary of wildlife observations

3.6 Meteorology, Climatology, and Air Quality

The climate of the Project vicinity, a high elevation desert basin, is characterized by long cold winters, short hot summers, low precipitation occurring primarily in the warmer months, moderate to high wind speeds, and a large diurnal temperature variation.

The National Oceanic and Atmospheric Administration (NOAA) maintains weather stations and provides annual and cumulative climate summaries for sites across the U. S. The nearest weather station at Muddy Gap (WY US COOP 486595) is no longer producing data, but a climate summary is provided for data gathered until 2008 (Table 3-9). The Rawlins weather station (WY US COOP 487533) climatological data is summarized in Table 3-10. In 2015, mean maximum temperature for Rawlins was 60.9°F, mean minimum temperature was 34.3°F, and overall annual mean temperature was 47.6°F (NOAA, 2016). Total annual precipitation in 2015 was 10.06 inches in Rawlins.

Air quality is regulated in accordance with National Ambient Air Quality Standards (NAAQS) and Wyoming Ambient Air Quality Standards (WAAQS). The air quality in the Project area is generally free of contaminants. The area is sparsely populated and is not heavily developed with industrial sources of air pollution. The closest live monitoring station is in Wamsutter, and shows that regional air quality is in compliance with the NAAQS and Wyoming Ambient Air Quality Standards (WAAQS) (Wyoming Department of Environmental Quality, 2016).

The Project's meteorology, climatology and air quality remain relatively unchanged since the November 10, 2004 license renewal and the 1994 Revised Environmental Report. The meteorological data presented in that report was collected by the Project's weather station

and selected to be representative of site conditions. Kennecott Uranium Company operates a weather station onsite and collects wind speed, wind direction, sigma theta, two (2) meter and ten (10) meter temperature, precipitation, relative humidity, evaporation, net solar radiation and barometric pressure data. Site data indicate that the Project is dryer than either Muddy Gap or Rawlins, with an average annual precipitation of 5.44 inches. See Appendix A for updated wind data for the 2004 through 2014 time period.

Table 3-9 Muddy Gap Average Climate (1949-2008) (Western Regional Climate Center, 2016a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average/ Total
Average Max. Temperature (F)	31.3	34.9	43.4	55.2	66.0	76.2	85.1	83.1	72.8	59.9	42.1	32.7	56.9
Average Min. Temperature (F)	13.8	15.9	21.4	29.2	37.9	46.4	53.5	52.2	42.5	32.9	22.1	15.1	31.9
Average Total Precipitation (in.)	0.29	0.43	0.74	1.24	1.90	1.11	0.83	0.63	0.82	0.83	0.60	0.46	9.87
Average Total SnowFall (in.)	5.2	7.3	9.5	8.8	2.0	0.2	0.0	0.0	1.0	3.7	7.2	6.6	51.6

Table 3-10 Rawlins Average Climate (1951-2015) (Western Regional Climate Center, 2016b)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average/ Total
Average Max. Temperature (F)	30.8	33.7	41.5	52.7	63.9	75.5	84.0	81.3	70.6	57.0	40.8	32.0	55.3
Average Min. Temperature (F)	12.7	14.5	20.5	27.7	36.2	44.5	51.6	50.0	40.8	31.2	20.5	13.8	30.3
Average Total Precipitation (in.)	0.45	0.51	0.68	1.02	1.28	0.87	0.77	0.74	0.83	0.80	0.56	0.47	8.99
Average Total SnowFall (in.)	7.9	7.5	7.8	7.1	1.6	0.2	0.0	0.0	1.2	3.4	7.7	7.5	51.9

Table 3-11 Summary of Documents Describing Meteorological, Climatology, and Air Quality Resources

Document Title	Prepared By	Date	Contents Summary
Revised Environmental Report	Shepherd Miller, Inc.	August 1994	Complete revision and update to original 1976 Environmental Report
Environmental Assessment	Nuclear	July 1999	Support for the

For Source Material License SUA-1350, Renewal for Operations and Amendment for the Reclamation Plan (Revision 1)	Regulatory Commission		decision-making process concerning the request for resumption of mill operation and approval of the reclamation plan
Request for a Renewal, Source Material License SUA-1350 for a Ten (10) Year Term	Kennecott Uranium Company	November 10, 2004	Application for license renewal with re-baselined surety
Environmental Assessment for Amendment of Source Material License SUA-1350 for the Catchment Basin Reclamation	Nuclear Regulatory Commission	May 2005	Support for the decision-making process concerning reclamation of contaminated soil and groundwater onsite.
Request for a Renewal Source Material License SUA-1350 for a Ten (10) Year Term	Kennecott Uranium Company	July 24, 2014	Application for license renewal with rebaselined surety

Wind data collected by the licensee at its onsite meteorological station for the period 2004 through 2014 were used to create a wind rose for the Project. Wind speed and direction data are collected at 15-minutes intervals. The licensee used a mechanical anemometer through this entire period and the wind rose was prepared using the mechanical anemometer data. However, the licensee installed a digital anemometer in November 2011, and continues to collect data from both. Figure 10 is the corresponding wind rose based on this data.

3.7 Noise

Background noise in the Sweetwater Project area is representative of a quiet rural area, and primarily established by natural sources. Although onsite sound levels have not been measured, similar rural areas have normal background sound levels near 30dB(A), which equates to 37 dB(A) on the EPA's (1974) day-night equivalent sound level scale (Ldn). There are no sensitive human receptors near the Project area. The closest residence is approximately 17 miles east of the Project. The nearest Greater sage-grouse lek is located 1.7 miles to the west of the NRC bonded area.

Table 3-12 Summary of Documents Describing Project Noise

Document Title	Prepared By	Date	Contents Summary
Revised Environmental Report	Shepherd Miller, Inc.	August 1994	Complete revision and update to original 1976 Environmental Report
Environmental Assessment For Source Material License SUA-1350, Renewal for Operations and Amendment for the Reclamation Plan (Revision 1)	Nuclear Regulatory Commission	July 1999	Support for the decision-making process concerning the request for resumption of mill operation and approval of the reclamation plan
Environmental Assessment for Amendment of Source Material License SUA-1350 for the Catchment Basin Reclamation	Nuclear Regulatory Commission	May 2005	Support for the decision-making process concerning reclamation of contaminated soil and groundwater onsite.

3.8 Historic and Cultural Resources

Prehistoric and cultural resources in the region are widely dispersed, and most sites are small and consist of artifacts typical of small parties traveling through the region for activities such as hunting. No Native American reservation lands are located within or near the Project area. Previous descriptions of the historical and cultural resources at the Project are presented in the 1994 Environmental Report (Shepherd Miller, Inc., 1994), the NRC's 1999 Environmental Assessment undertaken as part of a license renewal action, and the NRC's 2005 Environmental Assessment. As discussed in these documents, site 48SW9829, generally located in the area of the proposed diversion channel to be constructed during reclamation, is considered to be potentially eligible for inclusion in the National Register of Historic Places. As provided in Appendix B to the 1994 Revised Environmental Report (Shepherd Miller, Inc., 1994), the State Historic Preservation Office (SHPO) indicated the following:

> *"The documentation is well done and meets the Secretary of Interior's Standards for Archaeology and Historic Preservation (48FR44716-42). Sites 48SW9827 and 48SW9828 do not meet the criteria of eligibility for the National Register of Historic Places. No further work or protective measures are necessary for these sites. Site 48SW9829 was originally recommended by the consultant as eligible for*

the National Register of Historic Places. We would prefer that the eligibility for 48SW9829 remain unevaluated until additional testing demonstrates the presence of intact cultural deposits. If construction impacts to this site are proposed, we recommend that an archaeological testing program be conducted to further assess site eligibility and project effects."

On March 5, 1998, NRC staff requested BLM consultation with tribal entities to assess the absence or presence of culturally significant areas to Native American tribes on the Project area. The BLM replied on May 13, 1998, that none of the four groups contacted expressed an interest in this Project.

The NRC (1999) addressed cultural resources at the Project, stating:

Based on the license condition and commitments made by the licensee, the NRC staff considers that historical and cultural resources will be protected from destruction or disruption by the proposed activities.

Table 3-13 Summary of Documents Describing Historical and Cultural Resources

Document Title	Prepared By	Date	Contents Summary
Revised Environmental Report	Shepherd Miller, Inc.	August 1994	Complete revision and update to original 1976 Environmental Report
Final Design Report, Volume II, Data Report, Section 6.0 – Archeological Investigation	Shepherd Miller, Inc.	July 1997	Summary of archeological data related to the final design
Environmental Assessment For Source Material License SUA-1350, Renewal for Operations and Amendment for the Reclamation Plan (Revision 1)	Nuclear Regulatory Commission	July 1999	Support for the decision-making process concerning the request for resumption of mill operation and approval of the reclamation plan
Request for a Renewal, Source Material License SUA-1350 for a Ten (10) Year Term	Kennecott Uranium Company	November 10, 2004	Application for license renewal with re-baselined surety
Environmental Assessment for Amendment of Source	Nuclear Regulatory	May 2005	Support for the decision-making

Material License SUA-1350 for the Catchment Basin Reclamation	Commission		process concerning reclamation of contaminated soil and groundwater onsite.
Request for a Renewal Source Material License SUA-1350 for a Ten (10) Year Term	Kennecott Uranium Company	July 24, 2014	Application for license renewal with rebaselined surety

3.9 Visual/Scenic Resources

Visual resources consist of landforms, vegetation, rock and water features and cultural modifications that create the visual character and sensitivity of landscapes. Important visual resources are areas that have landscape qualities of unusual or intrinsic scenic value and areas of human and cultural use that are valued for their visual settings. The NRC, as the regulatory agency for this Project, does not own or manage lands, and thus does not have its own protocol to manage visual resources. The Project area encompasses BLM as well as private lands, and the BLM does maintain policies and guidelines for Visual Resource Management (VRM), as documented in BLM Manual 8400 – Visual Resource Management, and Manual 8431 – Visual Resource Contrast Rating.

The Rawlins Resource Management Plan (RMP; BLM 2008) establishes the VRM system for the Project area. An Environmental Assessment was recently conducted to amend the VRM conclusions in the RMP, a document still in progress. As shown in the 2008 RMP and EA, the Project area is located within an area managed as VRM Class IV, the inventory class with the lowest relative value of the visual resource. VRM classes are assigned based on combinations of scenic quality, sensitivity levels, and distance zones. The VRM Class IV rating was assigned based on a low sensitivity rating and visual quality ratings, used for areas that lack visual resource amenities or have been degraded.

The Project area is not visually pristine or of special visual interest. No developed parks, recreation areas, residences or frequently traveled highways are located within a 5-mile radius of the Project, and thus there are no receptor sites. Travel routes in the region include CR 63, CR 23N, and BLM 3215. While the mill can be seen from CR 63 (Minerals Exploration Road), the mill building has been painted with a neutral color to blend with

the surrounding landscape. The Project is located approximately 28 miles from the Ferris Mountain Wilderness Study Area, and no Wilderness Areas, National Natural Landmarks, National Parks, or Areas of Critical Environmental Concern are located within viewing distance of the Project. Recreation in the vicinity, including hiking, sightseeing, antler collecting, off-highway vehicle use, hunting, and wild horse viewing is dispersed and occurs at a low frequency. The sole visually sensitive receptors within the Project vicinity are a small number of dispersed recreationists and passersby.

Table 3-14 Summary of Documents Describing Visual/Scenic Resources

Document Title	Prepared By	Date	Contents Summary
Revised Environmental Report	Shepherd Miller, Inc.	August 1994	Complete revision and update to original 1976 Environmental Report
Environmental Assessment For Source Material License SUA-1350, Renewal for Operations and Amendment for the Reclamation Plan (Revision 1)	Nuclear Regulatory Commission	July 1999	Support for the decision-making process concerning the request for resumption of mill operation and approval of the reclamation plan
Request for a Renewal, Source Material License SUA-1350 for a Ten (10) Year Term	Kennecott Uranium Company	November 10, 2004	Application for license renewal with re-baselined surety
Environmental Assessment for Amendment of Source Material License SUA-1350 for the Catchment Basin Reclamation	Nuclear Regulatory Commission	May 2005	Support for the decision-making process concerning reclamation of contaminated soil and groundwater onsite.
Request for a Renewal Source Material License SUA-1350 for a Ten (10) Year Term	Kennecott Uranium Company	July 24, 2014	Application for license renewal with rebaselined surety

3.10 Socioeconomic

The Project is located in Sweetwater County, approximately 42 miles northwest of Rawlins. Bairoil is the nearest community, located approximately 22 miles northeast of the Project. The nearest resident is located 17 miles to the east. The 2010 census data for communities

within a 50-mile radius of the Project are: Rawlins 9,259, Sinclair 433, Wamsutter 451, and Bairoil 108 (Table 3-15; U.S. Census Bureau, 2010). There are no permanent residents within a 5-mile radius of the Project, and there have been no changes to the potentially affected population within this radius. The Project security officer who resides in a trailer onsite is considered the nearest resident for purposes of the calculation of dose to the nearest resident/member of the general public since he is considered a member of the general public when not on duty.

Table 3-15 Population for Nearest Communities (U.S. Census Bureau, 2010)

Community	County	Distance from Site	Direction from Site	2010 Population
Bairoil	Sweetwater	22	NE	106
Wamsutter	Sweetwater	27	S	451
Jeffrey City	Fremont	31	N	58
Rawlins	Carbon	40	ESE	9,259
Sinclair	Carbon	44	ESE	433

Socioeconomic impacts associated with the Project have been discussed in the documents listed in Table 3-6.

Table 3-16 Summary of Documents Describing Socioeconomic Resources

Document Title	Prepared By	Date	Contents Summary
Revised Environmental Report	Shepherd Miller, Inc.	August 1994	Complete revision and update to original 1976 Environmental Report
Environmental Assessment For Source Material License SUA-1350, Renewal for Operations and Amendment for the Reclamation Plan (Revision 1)	Nuclear Regulatory Commission	July 1999	Support for the decision-making process concerning the request for resumption of mill operation and approval of the reclamation plan
Request for a Renewal, Source Material License SUA-1350 for a Ten (10) Year Term	Kennecott Uranium Company	November 10, 2004	Application for license renewal with re-baselined surety
Environmental Assessment for Amendment of Source Material License SUA-1350 for the Catchment	Nuclear Regulatory Commission	May 2005	Support for the decision-making process concerning reclamation of

Basin Reclamation			contaminated soil and groundwater onsite.
Request for a Renewal Source Material License SUA-1350 for a Ten (10) Year Term	Kennecott Uranium Company	July 24, 2014	Application for license renewal with rebaselined surety

3.11 Public and Occupational Health

3.11.1 Public Health and Safety

The NRC has the statutory responsibility to protect public health and safety from exposure to radiation under 10 CFR Part 20, which specifies that the total effective dose equivalent to individual members of the public from the licensed operation does not exceed 0.1 rem (1 mSv) in a year and 0.002 rem (0.02 mSv) per hour, exclusive of the dose contributions from background radiation.

As stated in the 1994 Revised Environmental Report (Shepherd Miller, Inc.), natural background due to radon-222 alone in the Project area vicinity would result in an annual dose equivalent to the whole body of 212 mrem/year. The NRC (1992) determined that the general internal background dose due to inhaled and ingested radionuclides to the whole body is 174 mrem per year for the Wyoming Basin.

As documented in Kennecott submittals of Semi-Annual 10 CFR 40.65 Reports from 2007 to 2015 (Kennecott Uranium Company, 2016), for example, and as confirmed in a letter from the NRC, dated October 4, 2011, the site is currently being maintained in a manner that is protective of public health and the environment. Semi-Annual 10 CFR 40.65 reports do not report any public doses in excess of regulatory limits.

3.11.2 Occupational Health and Safety

Occupational health and safety risks to workers are also regulated through the Radiation Protection Standards (10 CFR Part 20). These regulations incorporate the principal of doses As Low As Reasonably Achievable (ALARA) through worker safety training, engineering, and administrative controls to prevent or minimize exposure of radiation doses and effluents. Industrial hazards such as airborne pollutants, dust, and chemicals are also an

occupational health and safety concern; these are regulated by the Wyoming Division of Mine Inspection and Safety (Wyoming, Title 30- Mines and Minerals, Chapter 2-Mining Operations, Article 2- Inspector of Mines).

Kennecott's annual ALARA Audit reports (2007-2015), submitted to NRC (Kennecot Uranium Company, 2007-2015), focus on the occupational radiation safety aspects of the Radiation Protection Program. In the most recent Annual ALARA Audit Report, dated February 2015, the licensee indicated that external gamma radiation surveys were less than 5.0 mR/Hr and no radiation posting was necessary. The licensee also reported the maximum exposed individual was estimated at 0.138 rem per year. This is below the regulatory limit of 5,000 mrem per year (5 rem/year) Total Effective Dose equivalent (TEDE) to a radiation worker from a licensed operation. The 0.1 rem (100 mrem) TEDE limit discussed above is the dose limit to a member of the general public from a licensed operation. In a review dated February 24, 2011, NRC staff determined that occupational exposures were minimal due to current suspension of operations.

Table 3-17 Summary of Documents Describing Public and Occupational Health

Document Title	Prepared By	Date	Contents Summary
Revised Environmental Report	Shepherd Miller, Inc.	August 1994	Complete revision and update to original 1976 Environmental Report
Environmental Assessment For Source Material License SUA-1350, Renewal for Operations and Amendment for the Reclamation Plan (Revision 1)	Nuclear Regulatory Commission	July 1999	Support for the decision-making process concerning the request for resumption of mill operation and approval of the reclamation plan
Request for a Renewal, Source Material License SUA-1350 for a Ten (10) Year Term	Kennecott Uranium Company	November 10, 2004	Application for license renewal with re-baselined surety
Environmental Assessment for Amendment of Source Material License SUA-1350 for the Catchment Basin Reclamation	Nuclear Regulatory Commission	May 2005	Support for the decision-making process concerning reclamation of contaminated soil and groundwater onsite.

Semiannual 10 CFR 40.65 Report	Kennecott Uranium Company	August 22, 2016	Dose to nearest member of the general public
Annual ALARA Audit Reports	Kennecott Uranium Company	February 9, 2016	Occupational radiation safety exposures

3.12 Waste Management

Waste management has been discussed in the documents listed in Table 3-18. The list in Table 3-18 is not intended to be a comprehensive list of all documents that have discussed waste management, but the documents listed collectively provide a thorough treatment of the subject.

Table 3-18 Summary of Documents Describing Waste Management

Document Title	Prepared By	Date	Contents Summary
Revised Environmental Report	Shepherd Miller, Inc.	August 1994	Complete revision and update to original 1976 Environmental Report
Final Design Report, Volume VII, Operations Plan	Shepherd Miller, Inc.	September 1997	Mill water and tailings management, monitoring program
Environmental Assessment For Source Material License SUA-1350, Renewal for Operations and Amendment for the Reclamation Plan (Revision 1)	Nuclear Regulatory Commission	July 1999	Support for the decision-making process concerning the request for resumption of mill operation and approval of the reclamation plan
Request for a Renewal Source Material License SUA-1350 for a Ten (10) Year Term	Kennecott Uranium Company	July 24, 2014	Application for license renewal with rebaselined surety

3.12.1 11e.(2) Wastes

By-product generated from the extraction of uranium or thorium by processing ore primarily for its source material content (11e.(2) wastes) will include gaseous, air particulate, liquid and solid wastes. These waste streams were given a thorough presentation in Section 3 of the 1994 Revised Environmental Report (Shepherd Miller, Inc.,

1994), and were also discussed in NRC (1999) and Kennecott Uranium Company (2014). The primary source of solid and liquid 11e.(2) waste by volume under the proposed action will be tailings. Tailings impoundment design, reclamation and operation were presented in the Final Design Reports prepared by Shepherd Miller, Inc. from 1997 through 1999.

Wastes classified as 11e.(2) wastes will also be generated in the course of preparing the mill for operation. These would be solid wastes associated with mill equipment that may be removed and replaced with new equipment. All mill equipment removed during preparation activities will be placed in the existing tailings impoundment and will be cut, crushed, or otherwise handled to minimize voids. The Revised Environmental Report (Shepherd Miller, Inc., 1994) addressed the generation of wastes in mill preparation in Section 4.

3.12.2 Non-11e.(2) Wastes

Non-11e.(2) wastes will primarily be solid and liquid wastes associated with the activities performed by Project employees in the administration building and shops. These waste streams are regulated by the Wyoming DEQ and were discussed in the 1994 Revised Environmental Report (Shepherd Miller, Inc.) and Kennecott Uranium Company (2014). These wastes will include various solid wastes produced in office, kitchen, and shop activities and will be disposed of under both the no-action and proposed action alternatives in an onsite landfill permitted by the Wyoming DEQ. These wastes will also include liquid wastes generated through the kitchen and site restrooms that are and will continue to be routed to a permitted leach field located southwest of the administration building.

Non-11e.(2) wastes will also be generated in course of preparing the mill for operation and constructing the first new tailings impoundment and diversion channel. These would be solids associated with packaging materials and routine construction waste (timber, rags, meal trash, etc.) and liquids associated with kitchen and restroom use at the administration building. A proprietary report on the costs to prepare the mill for operations and construct the first tailings impoundment was prepared for Kennecott in February 2008. Although the results are proprietary, the following conclusion is applicable for this Supplemental ER:

It has been determined that the plant can be fairly easily re-constructed to get it operational again and that this effort can be accomplished (in 15 months), if actions are taken as perceived.

All non-11e.(2) wastes generated during mill preparation activities will be handled through the permitted onsite landfill and leach field. The Revised Environmental Report (Shepherd Miller, Inc., 1994), in Section 4, addressed the generation of wastes in mill and tailings impoundment preparation. Section 3.6 of the Revised Environmental Report addressed sanitary wastes.

3.12.3 Summary of Solid and Liquid Waste Volumes

The annual volumes of solid and liquid waste to be generated by the Project under the existing condition and proposed action alternatives are summarized in, which presents the sources of estimated solid and liquid wastes, for both 11e.(2) and non-11e.(2) wastes, under both alternatives, including the assumptions that drive the volumes. Both solid and liquid wastes from the onsite laboratory will be disposed of in the tailings impoundment, but cumulative quantities of lab waste will be minimal. Water recycling in the mill circuit and from tailings has been discussed in the Final Design, Volume VII (Shepherd Miller, Inc., 1997f). Waste volumes are provided for both tons/day (TPD) and tons/year (TPY).

A volume not to exceed 27 million gallons per year is currently pumped from the Battle Spring Aquifer under the Project's CAP to the existing tailings impoundment for evaporation. This volume is listed in the second row of Table 3-19 under the existing condition heading, and for the purposes of this calculation is considered a liquid mill tailings waste. The volume of liquid pumped from the Battle Spring Aquifer would increase under the proposed action in order to provide mill makeup water, and this additional volume is represented in the second row of under the proposed action heading.

Table 3-20 summarizes solid and liquid waste volumes associated with these sources, for both 11e.(2) and non-11e.(2) wastes, under both the existing condition and the proposed action.

Table 3-19 Sources of Wastes

Source, Description	Assumption	Existing Condition		Proposed Action	
		Daily Volume, TPD	Annual Volume, TPY	Daily Volume, TPD	Annual Volume, TPY
11e.(2), solid • Mill tailings • Lab	Design condition	0	0	3,000 <1	1,095,000 <1
11e.(2), liquid • Mill tailings • Lab	CAP/Design condition	309 0	113,000 0	750 <1	273,750 <1
Non-11e.(2), solid • Office/kitchen • Shop	2 lbs/person/day 3 lbs/person/day	Combined: <1	Combined: 1.1	Combined: <1	Combined: 15.5
Non-11e.(2), liquid • Sewage	35 gals/person/day	<1	121	5.1	1,865

Table 3-20 Waste Volume Summary

	11e.(2) wastes		Non-11e.(2) wastes	
	Solid Tons/year	Liquid Tons/year	Solid, Onsite landfill, Tons/year	Liquid, Onsite leach field, Tons/year
Existing Condition	0	113,000	1.1	121
Proposed Action	1,095,000	273,750	15.5	1,865

All waste disposal in the tailings impoundment, in the Wyoming DEQ-permitted landfill, and via the leach field, will occur onsite. No vehicles will be used to haul wastes offsite.

4.0 ENVIRONMENTAL IMPACTS

The proposed action would consist of mill preparation, operation, monitoring and reclamation. Preparation would involve mill modifications and construction of up to 6 new lined 40-acre tailings impoundments and up to 10 lined evaporation ponds. Reclamation would involve construction of diversion channels and reclamation of both the existing and any new tailings impoundments. The area of the NRC bonded area is 1633 acres. The mill and tailings-area footprint during operations will be approximately 761 acres, and the post-reclamation closure footprint is expected to be 709 acres. The mill is permitted to produce 4,100,000 pounds of yellowcake (mostly U_3O_8) annually, based on License Condition 10.1. This license condition references the Revised Environmental Report (Shepherd Miller, Inc., 1994). The finished product would be transported in trucks to be further processed offsite

by others. Mill operation is expected to employ 30-35 full time workers, with 10-15 temporary employees for mill preparation, 30-40 for tailings impoundment and evaporation pond construction, and 10-20 for reclamation. Operations are expected to generate 40-45 indirect jobs in nearby communities. Mill operations and reclamation will be conducted in accordance with NRC standards and approvals, and should not have a significant impact on the resources assessed. Environmental monitoring on and near the Project area, as required would alert the licensee to potential issues so that corrective actions may be taken.

The no-action alternative would be comprised by the opposite action: the requested for license renewal would be denied by the NRC. Decommissioning activities would then commence as listed in Section 2.1.1. Potential impacts of the no-action alternative and proposed action are summarized in the following sections for the resources described above.

4.1 Land Use Impacts

4.1.1 No-Action Alternative

As the licensee would implement decommissioning activities, there would be associated short-term effects on land use associated with the intensive effort required for mill decommissioning and tailings impoundment reclamation. Land use impacts would be mitigated via standard operating procedures and mandated construction practices for workers. These short-term effects would be similar in character under either the proposed action or the no-action alternative but would occur under different timeframes.

Since the facility is limited in area, has legal private ownership of the Project area, has a history of prior operation, and adheres to NRC environmental monitoring and protection regulations, potential impacts to grazing, recreation, and mineral exploration and extraction are not anticipated.

4.1.2 Proposed Action

Under the proposed action, the mill would resume licensed active milling operations as currently licensed. Land use impacts are not anticipated to occur due to mill preparation,

but will result from the footprint of lands affected by operation and reclamation. The Sweetwater mill and its associated access road have been constructed, and during operations, the mill will be processing ores derived offsite.

Potential impacts associated with mill preparation will be contained within the mill building and the existing tailings impoundment. Any existing mill or solvent extraction building equipment removed will be disposed of within the existing impoundment. Any liquid generated from washing mill or solvent extraction building equipment will be collected in concrete-lined sumps and pumped to the existing tailings impoundment. Non-11e.(2) solid wastes will be disposed of in the permitted onsite landfill. No waste associated with mill preparation activities are expected to be hauled offsite.

Potential impacts related to construction would be limited to the construction of new tailings impoundments, evaporation ponds and diversion channel. The existing tailings impoundment covers approximately 83 acres; five new impoundments (including tailings storage, embankment areas and diversion channel) will cover an additional approximately 522 acres of land, and eight evaporation ponds will affect 92 acres.

Placement of the new tailings impoundments and evaporation ponds adjacent to the existing cell will consolidate and limit the footprint of the facilities, including the new tailings facilities in the direction of Battle Spring Draw. During conceptual design of the new tailings impoundments, the licensee considered various alternatives for tailings impoundment locations, and proposed a location adjacent to the existing impoundment, but with a slight separation to allow groundwater monitoring in existing monitoring wells. Proposed groundwater monitoring for the first new tailings impoundment was presented in Section 5 of the Final Design, Volume VII, (Shepherd Miller, Inc., 1997f) and accepted by the NRC in its Environmental Assessment (1999). With respect to monitoring, NRC concluded in Section 10.0 of the 1999 EA, Finding of No Significant Impact, "the licensee will implement an acceptable ground-water detection monitoring program to ensure compliance with the requirements of 10 CFR 40 Appendix A."

Since the facility is limited in area, has legal ownership of the Project area, has a history of prior operation, and adheres to NRC environmental monitoring and protection regulations, potential impacts to grazing, recreation, and mineral exploration and extraction are not anticipated. Detailed discussions of potential environmental impacts to land use from construction, preparation, operation, and decommissioning are provided in the following sections.

4.2 Transportation Impacts

4.2.1 No-Action Alternative

Implementation of decommissioning activities would result in minor short-term transportation impacts associated with the intensive effort required for mill decommissioning and tailings impoundment reclamation. Transportation impacts would be mitigated via standard operating procedures and mandated construction practices for workers. These short-term effects would be similar in character under either the proposed action or the no-action alternative, and would include vehicle trips to and from the site by workers during the period of active decommissioning activities, sporadic haul traffic by trucks importing material used in tailings impoundment reclamation (such as riprap), by trucks hauling waste and scrap material from the site (non-11e.(2) scrap and wastes) and by trucks hauling equipment to and from the site.

Approximately 20 workers would be anticipated at any one time during decommissioning activities. Minor short-term transportation impacts on roads and traffic conditions would result from these 20 workers' daily trips to and from the site. The crews are assumed to be housed nightly in Rawlins, and short-term impacts would be expected for U.S. Highway 287 and County Road 63.

Kennecott is responsible for maintaining the eight miles of paved access road located in Carbon County, within right-of-way originally dedicated to Minerals Exploration Company. A long-term impact may result from the no-action alternative to Carbon County and its residents either in the cost of maintaining these eight miles of paved road or in its

gradual degradation and loss of snow removal currently performed by site personnel, adversely impacting access to the area.

4.2.2 Proposed Action

Under the proposed action, active mill operations, as currently licensed, could resume, and vehicular travel to and from the Project area would increase with mill preparation and operation, construction of tailings impoundments, evaporation ponds, and diversion channel, and reclamation. Most of the estimated 30 to 35 permanent employees would likely live in Rawlins and commute to the site, generating negligible impacts upon local transportation systems, including the state highway network and the paved access road (refer to Section 3.2). Construction activities would also involve temporary employee commutes. Transport of equipment would occur only at the beginning and end of the construction efforts. Materials transport would add a limited amount of additional traffic. Increased vehicular traffic in Rawlins due to the influx of construction and mill operation personnel would be minor. Airport facilities in Rawlins and Casper would experience a small increase in utilization. Rail facilities may receive an increase in usage during construction for transport of equipment and materials.

The mill is permitted to produce 4,100,000 pounds of product annually, and the finished product (yellowcake, mostly U_3O_8, a low specific activity (LSA) material) will be shipped from the site by truck. Regulations pertaining to packaging and shipping yellowcake are provided in 10 CFR Part 71, Packaging and Transportation of Radioactive Material (NRC) and 49 CFR Parts 170 through 189 (Department of Transportation, DOT). The yellowcake will be shipped in Type A packaging, 55 gallon steel drums as DOT Radioactive Material Hazard Class 7, LSA-I materials. The drums will be sealed and marked as per the requirements of 49 CFR Part 173. The product will be shipped in DOT approved containers designed to withstand the impact of most accidents. At approximately 900 pounds per drum and 48 drums per load (Shepherd Miller, Inc., 1994), approximately 95 trips would occur annually at full mill capacity.

These potential impacts on the transportation network are at the same level as described in Section 7.0 of the Revised Environmental Report (Shepherd Miller, Inc., 1994). The driver training, shipping procedures, spill contingency and emergency response plans anticipated for the Project have not changed.

The risks of a transportation accident involving yellowcake have been discussed in the Final Generic Environmental Impact Statement for Uranium Milling (FGEIS) (U.S. Nuclear Regulatory Commission, 1980), and given the general similarity between the Sweetwater Project and the model mill assessed in the FGEIS, risks would be similar for the transportation accidents associated with the Project. In the FGEIS the NRC classified accidents into eight categories, consistent with the approach taken in NUREG-0170 (U.S. Nuclear Regulatory Commission, 1977), depending on the combined stresses of impact, puncture, crush and fire. On this basis, conditional truck accident probabilities were determined for each of the eight severity levels.

Two accident models for the model mill considered in the FGEIS were evaluated by the NRC to assess the risk associated with the fraction of radioactive material released when an accident of a given severity occurs. Accident Model I was hypothetical; complete loss of drum contents was assumed for all but the lowest accident severity category. Model II was based on actual tests; partial loss of drum contents was assumed. For the amount of yellowcake being transported from the model mill, the FGEIS estimated the quantity of yellowcake released from shipping containers in the event of a truck accident for both accident models. The FGEIS then estimated the fraction of the released material dispersed to the atmosphere. Using this estimated volume of radioactive material released to the atmosphere and the typical population density of the eastern U.S., to which the shipments would likely be bound, the NRC estimated the risk associated with a transportation accident. The FGEIS concluded that the 50-year dose commitment to the lungs of the general public would be about 200 man-rem and 14 man-rem for accident Models I and II, respectively.

In an accident that occurred near Springfield, Colorado in 1977, and subsequently studied by the NRC (U.S. Nuclear Regulatory Commission, 1980), a commercial carrier hauling 50 yellowcake drums overturned and spilled an estimated 7000 pounds of yellowcake on

the ground and in the trailer. Within 3 hours the material was covered with plastic sheeting to prevent further release to the atmosphere. The consequence to members of the public in the area where the accident occurred, and where the population density was about 2.5 persons/square mile, was estimated by the NRC to be 1.2 man-rem. No clinical effects were observed among the individuals who were involved with the spill and cleanup. Also, uranium bioassays of 27 persons who were in the spill vicinity, including law enforcement and rescue personnel, indicated that toxic levels of uranium intake did not occur.

Under the regulations of the U.S. Department of Transportation, uranium oxide is classified as low specific activity material (49 CFR Part 173, Sections 173.389C and 173.392) and has a low level of radioactivity. The material also has a high density (approximately 7 g/cm^3) and is not easily dispersed. The vehicles transporting the finished product will be properly marked for the shipment of radioactive material. Carriers will only be used that have Spill Prevention Control and Countermeasures (SPCC) plans, trained drivers, and special procedures for transporting yellowcake.

4.3 Geology and Soils Impacts

4.3.1 No-Action Alternative

With implementation of decommissioning activities, there would be short-term soils impacts associated with the intensive effort required for mill decommissioning and tailings impoundment reclamation. Soils impacts would be mitigated via standard operating procedures and mandated construction practices for workers. These short-term effects would be similar in character under either the proposed action or the no-action alternative, except under different timeframes. The reclamation footprint would be smaller under the No-Action Alternative. In reclaiming currently impacted Project lands, including mill, tailings impoundments and constructing required diversion channels, approximately 664 acres of land would be affected.

4.3.2 Proposed Action

Under the proposed and currently licensed action, approximately 614 acres of land would be disturbed for construction of the new tailings impoundments, evaporation ponds, and

diversion channel. In decommissioning the total area under the proposed action, approximately 965 acres of land would be reclaimed. Because the area of operations is localized, no geologic or soils impacts are expected beyond the mill facility area. Surface disturbances, such as vegetation removal and overburden stripping, are not expected to result in soil erosion because of the flat topography of the area, the low regional precipitation, and the absorptive capacity of the soils. Topsoil management during construction of the tailings impoundments is addressed in Final Design Volume III – Embankment Design Report in Section 2.4 (Shepherd Miller, Inc., 1997a).

Remediation of potential wind-blown tailings is discussed in the Final Design Volumes VI and VI Part 2 (Shepherd Miller, Inc., 1997d, 1998).

Erosion control methods are addressed by the Large Construction General Permit for Stormwater Discharges, number WYR101081, issued by the Wyoming DEQ-Water Quality Division (WQD) and the associated Construction Stormwater Pollution Prevention Plan. During reclamation, the Final Design (Volumes V and VI, Shepherd Miller, Inc., 1997e, 1997d) calls for capping tailings impoundments with a thick cover constructed from onsite soils to limit radon flux and reduce rainwater infiltration. When reclamation has been completed, erosion potential of soils across the site is not expected to differ measurably from present conditions. Erosion control methods are addressed in the Large Construction General Permit for Stormwater Discharges, number WYR101081, issued by the Wyoming Department of Environmental Quality (Wyoming DEQ) Water Quality Division (WQD) and the associated Construction Stormwater Pollution Prevention Plan.

Chapter 5 of the Revised Environmental Report (Shepherd Miller, Inc., 1994) presents a detailed analysis of radiological impacts on animals and humans that includes the airborne pathway to soils using MILDOS-AREA as the predictive tool.

Neither alternative would affect the soils of the remediated areas contaminated by activities that pre-dated Kennecott's mill ownership, i.e., the diesel contaminated soils and catchment basin area soils, Section 3.3.2.

4.4 Water Resources Impacts

4.4.1 No-Action Alternative

Under decommissioning activities, it is not expected that there would be water resources impacts associated with the intensive effort required for mill decommissioning and tailings impoundment reclamation. Potential impacts to the local surface water and groundwater systems would be mitigated via standard operating procedures and mandated construction practices for workers. This would also be true under the proposed action.

Groundwater protection standards or approved Alternate Concentration Limits will be met before license termination, and post-decommissioning. DOE as the site custodian will provide monitoring and institutional control of the Project land.

A diversion channel will be constructed to divert Battle Spring Draw around the tailings impoundments and a second diversion channel will be constructed to divert flows away from the overburden pile. The channels will serve to control surface water during construction and provide long-term physical stability of the reclaimed tailings impoundment and the overburden pile. The channels are not expected to change overall flow rates from the Project area. The surface water diversions would be addressed by the Large Construction General Permit for Stormwater Discharges, number WYR101081, issued by the Wyoming DEQ-WQD and the associated Construction Stormwater Pollution Prevention Plan.

Surface disturbances associated with the no-action alternative are expected to have limited impact on surface water flows because of the region's flat topography, low precipitation, and soil absorptive capacity. When reclamation has been completed, peak flows from the Project area are not expected to differ measurably from present conditions.

Although surface disturbance will temporarily increase erosion potential, materials suspended in rare surface flows will not be transported far from the Project area because of the site's low stream gradients and the implementation of erosion control methods. As needed, a National Pollutant Discharge Elimination System (NPDES) permit may be

acquired for construction activities. Erosion control methods are addressed in the Large Construction General Permit for Stormwater Discharges, number WYR101081, issued by the Wyoming DEQ-WQD and the associated Construction Stormwater Pollution Prevention Plan.

Reclamation of the existing tailings impoundment would provide long-term groundwater protection. The final cover of onsite soil is designed to receive rainfall infiltration at a negligible amount. This would limit the potential for rainfall to infiltrate, build hydraulic head, and increasing the potential for leachate to be discharged the tailings over a long time period.

Decommissioning activities would include continued operation of the Corrective Action Program, or approved alternate, such that approved groundwater standards are met.

4.4.2 Proposed Action

Surface Water Impacts

Under the proposed action, resumed mill operation and associated construction and reclamation activities are not anticipated to impact surface waters in the Project vicinity because (1) mill effluents will not discharge to surface waters; (2) the Project will not use any surface water in mill operation or reclamation; (3) there will be no change in the milling process that would result in a significant change in the environmental impacts at the Project; and (4) mill liquid effluents (spills) are designed to not leave the mill area, except that they would be pumped to the tailings impoundment of necessary.

A diversion channel will be constructed to divert Battle Spring Draw around the tailings impoundments. The channel will serve to control surface water during construction, protect cells from surface runoff during operation, and provide long-term physical stability of the reclaimed impoundments. The channel is not expected to change overall flow rates from the Project area. The surface water diversion is addressed by the Large Construction General Permit for Stormwater Discharges, number WYR101081, issued by the Wyoming DEQ-WQD and the associated Construction Stormwater Pollution Prevention Plan.

Surface disturbances associated with the proposed action are expected to have limited impact on surface water flows because of the region's flat topography, low precipitation, and soil absorptive capacity. When reclamation has been completed, peak flows from the Project area are not expected to differ measurably from present conditions.

Although surface disturbance will increase erosion potential, materials suspended in rare surface flows will not be transported far from the Project area because of the site's low stream gradients and the implementation of erosion control methods. As needed, a National Pollutant Discharge Elimination System (NPDES) permit will be acquired for construction activities. Erosion control methods are addressed in the Large Construction General Permit for Stormwater Discharges, number WYR101081, issued by the Wyoming DEQ-WQD and the associated Construction Stormwater Pollution Prevention Plan.

Groundwater Impacts

New technology and an improved design should prevent groundwater in the Project vicinity from being adversely impacted by resumed milling operations. The new tailings impoundment would be lined with a layered system composed of two flexible membrane synthetic liners over a three-foot minimum thickness of compacted clay, as specified in Final Design Volumes I, IV, and VII (Shepherd Miller, Inc., 1997g, 1997c, 1997f). A leak detection and recovery system would be installed and monitored regularly. Groundwater monitoring wells located immediately downgradient of the tailings impoundments would also provide early contamination detection in the unlikely event that both liners failed, as required by 10 CFR Part 40, Appendix A, and 40 CFR 264.221.

Tailings impoundment management during operations would minimize groundwater contamination potential. The impoundments are designed to dewater tailings through a process water recovery system (PWRS). The PWRS will be installed above the liner and beneath the tailings to continually dewater the tailings above the liner. This system is designed to protect groundwater by eliminating a hydraulic head in the tailings pile, which would reduce the possibility of liner failure and subsequent contamination.

Groundwater protection measures under the proposed action apply to monitor wells shown in Figures 7 and 8, and to the Project's three potable water wells (PWW-1, PWW-2, and Drake-1). Moreover, the potential to impact the wells identified as Road #4, Road #3, Road #2, Sooner Reservoir Well, 25-92-21BA, and 24-93-16BBB, which are used to water livestock, under the proposed action would be infinitesimally small due to their distance and direction from the proposed tailings impoundments, which would be constructed in accordance with 10 CFR 40 Appendix A criteria.

Decommissioning and reclamation would provide long-term groundwater protection. The final cover of onsite soil and cap rock is designed to reduce rainfall infiltrati6n to a negligible amount, which would prevent rainfall from becoming a source of leachate, and building a hydraulic head over time that could cause the leachate to move through the tailings.

Evaporation ponds will also have a dual synthetic liner with leak detection and recovery system. Monitoring wells would be located immediately downgradient, and monitored according to regulatory requirements. Evaporation ponds would be decommissioned by evaporating liquid and disposing of liners and accumulated solids in tailings cells.

The diversion channel is not anticipated to affect recharge of the Battle Spring Aquifer or change regional groundwater flow.

4.5 Ecological Resources Impacts

4.5.1 No-Action Alternative

Under the no-action alternative and the licensee's activities in decommissioning, there would be short-term ecological resources impacts associated with the intensive effort required for mill decommissioning and tailings impoundment reclamation. Ecological resources impacts would be mitigated via standard operating procedures and mandated construction practices for workers. These short-term effects would be similar in character under either the proposed action or the no-action alternative, under different timeframes and affecting a smaller footprint than under the proposed action.

Implementation of decommissioning measures will result in the long-term reestablishment of plant communities similar to those present on site. Wildlife species inhabiting and utilizing the Project area are common throughout the region, and it is unlikely that any loss of individuals that might result from Project decommissioning activities will have population-level effects on any species. Some individuals of small mammals, snakes and lizards may be disturbed by decommissioning activities; however, the multi-year pace of decommissioning will allow many of these individuals to escape to adjacent undisturbed habitats. Highly mobile species, such as antelope, coyotes, jackrabbits and most birds will be able to escape areas subject to disturbance. However, it is likely that resource competition as wildlife move into adjacent areas may ultimately result in the loss of some animals. The increased number of people in the Project area during decommissioning activities could have an additional impact on wildlife populations, since some wildlife are likely to be killed by increased vehicular traffic.

4.5.2 Proposed Action

The currently licensed proposed action will consist of mill preparation and operation, construction of new tailings impoundments and evaporation ponds, and reclamation of both the existing and new tailings impoundments. The vegetation on approximately 614 acres of new land disturbance will be removed for tailings cells, evaporation ponds, and diversion channel construction over the proposed 20-year life of the Project. Most of this vegetation will consist of native sagebrush and shrubland species. Topsoil will be removed and stockpiled for use during reclamation. As each tailings cell is filled, reclamation will proceed concurrently with operation in the next cells. At the Project's termination, Project-related disturbed areas will have been or be in the process of being reclaimed. Implementation of the reclamation program is very likely to result in the long-term reestablishment of plant communities similar to those presently on the site.

Wildlife species inhabiting and utilizing the Project area are common throughout the region, and it is unlikely that any loss of individuals that might result from Project activities will have population-level effects on any species. The removal of approximately 614 acres of vegetation during the 20-year life of the Project will temporarily eliminate a source of

forage and habitat. Some individuals of small mammals, snakes and lizards will be disturbed by construction of the new tailings cells, however, the multi-year pace of construction will allow many of these individuals to escape to adjacent undisturbed habitats. Highly mobile species, such as antelope, coyotes, jackrabbits and most birds will be able to escape areas subject to disturbance. However, it is likely that resource competition as wildlife move into adjacent areas may ultimately result in the loss of some animals. The increased number of people in the Project area during construction activities could have an additional impact on wildlife populations, since some wildlife are likely to be killed by increased vehicular traffic. Additionally, mill facilities currently are and will be fenced to prevent access of large wildlife.

Wildlife may also be impacted from onsite and contained effluent generated through the milling and tailings operation. Although no guidelines concerning acceptable limits of radiation exposure have been established for the protection of other species, it is generally agreed that the limits for humans are also conservative for other species. Effluents of the facility will be closely monitored and maintained within safe protection limits for man, and therefore, no adverse radiological impact is expected for animals within or near the Project area.

Section 5 of the Revised Environmental Report (Shepherd Miller, Inc., 1994) presents a detailed analysis of radiological impact of mill operation on non-human biota.

4.6 Air Quality Impacts

4.6.1 No-Action Alternative

As decommissioning activities would be implemented, there would be short-term air quality resources impacts such as dust associated with the intensive effort required for mill decommissioning and tailings impoundment reclamation. Air quality resources impacts would be mitigated via standard operating procedures and mandated construction practices for workers including dust control by wetting areas as required. These short-term effects would be similar in character under either the proposed action or the no-action alternative.

Long-term impacts associated with emanation of radon from the existing tailings will be reduced to regulatory levels or less with the proposed reclamation cap.

4.6.2 Proposed Action

As detailed in the 1994 Revised Environmental Report (Shepherd Miller, Inc., 1994), the facility, as currently licensed to operate, is expected to process at average throughput rates approximately 3,000 tons per day of uranium ore producing approximately 2040 tons of yellowcake (U_3O_8) per year. Mill operation and construction of tailings cells and evaporation ponds of the proposed action would generate dust and emissions that would affect localized air quality. During mill operation, gaseous emissions from process chemicals, fugitive dust, and radon emissions from the ore pad would occur. An assessment of the radiological airborne effluents is discussed under Section 4.12. Gaseous emissions are expected to be primarily from heavy-duty equipment engine exhaust. The control systems used to minimize emission from the mill are incorporated into the design of the mill process and equipment. All internal combustion engines would be maintained in proper operating condition to minimize the release of pollutants in exhaust gases. Such maintenance will include periodic engine inspection and tune-up, periodic replacement of fuel and air filters, and occasional engine rebuilding. An appropriate air quality permit addressing boiler emissions as necessary would be obtained from the Wyoming DEQ prior to mill operation.

Fugitive dust will be generated by construction and earth-moving equipment during construction and reclamation, and by wind erosion from developed areas. Estimates of airborne radionuclide releases caused by the resumption of mill operations and compliance with regulations were demonstrated by the licensee with the dose modeling codes MILDOS-AREA and COMPLY (Section 5.2.3, Volume VII of Final Design, Shepherd Miller, Inc., 1997f). Wind conditions at the Project area will disperse most emissions, and no residential receptors are nearby. Meteorological calculations indicate that the current federal/state primary 24-hour standard for particulate matter will not be exceeded by proposed activities unless background concentrations are high. Dust and radon levels would be controlled through water spraying, while the other emissions should not exceed

regulatory standards. All haul roads and working surfaces would be watered as necessary on a daily basis and/or treated with a chemical binder to decrease the amount of dust generated by equipment activities; also, subject to state approval, chemical stabilizers may be used on inactive working surfaces such as topsoil stock piles.

Mill operation will have air quality impacts related to emissions from the boilers, ammonia from the dryer stack, fumes from the solvent extraction building, fumes from the leach area of the mill which will be controlled by scrubbers, and fumes from the laboratory.

4.7 Noise Impacts

4.7.1 No-Action Alternative

In decommissioning activities, there would be short-term noise impacts associated with the intensive effort required for mill decommissioning and tailings impoundment reclamation. Noise impacts would be mitigated via standard operating procedures and mandated construction practices for workers. These short-term effects would be similar in character under either the proposed action or the no-action alternative.

While decommissioning activities are ongoing, noise associated with construction would increase over ambient levels. Offsite noise levels resulting from onsite construction activities will be a function of the construction schedule and the distance between the noise source and the receptor. Noise levels are expected to range between 80 and 85 dB(A) at a distance of 50 feet from operating heavy equipment (U.S. Department of Energy, 2005). However, there are no near-by residents, and thus no human receptors will be affected by the noise impacts of proposed activities. Noise impacts under the no-action alternative would occur over a shorter timeframe than would occur under the proposed action.

4.7.2 Proposed Action

Under the currently licensed proposed action, noise associated with construction and mill operation would increase. Offsite noise levels resulting from onsite construction activities will be a function of the construction schedule and the distance between the noise source and the receptor. Noise levels are expected to range between 80 and 85 dB(A) at a distance

of 50 feet from operating heavy equipment (U.S. Department of Energy, 2005). However, there are no near-by residents, and thus no human receptors will be affected by the noise impacts of proposed activities. Expected noise impacts are also discussed in Section 11 of the Revised Environmental Report (Shepherd Miller, Inc., 1994).

Noise levels associated with the SAG mill will be reduced by the insulated steel walls of the mill building. In addition, the unit may be rubber lined as opposed to steel lined which will reduce noise. Outside noise associated with heavy earth-moving equipment may be expected to diminish at a rate equal to 6 dB(A) for each doubling of the distance. For the nearest Greater sage-grouse lek, the distance of 1.7 miles (9,000 feet) from the mill corresponds to a total of 7.4 "doublings" of the 50-feet distance from equipment at which the noise may be 80 to 85 dB(A). This corresponds to a reduction in noise of approximately 44 dB(A), to approximately 36 to 41 dB(A) at the lek.

4.8 Historic and Cultural Resources Impacts

4.8.1 No-Action Alternative

There will be no impact to historical and cultural resources impacts associated with the intensive effort required for mill decommissioning and existing tailings impoundment reclamation, because the only site potentially eligible for inclusion on the National Register of Historic Places, Site 48SW9829, is located to the east of the existing tailings impoundment (Shepherd Miller, Inc., 1994). Prior to decommissioning activities, this site will be surveyed by a qualified archeologist to determine whether the site is eligible for inclusion on the National Register of Historic Places.

Any previously unsurveyed areas expected to be affected by decommissioning activities will be surveyed prior to decommissioning. Any discovered historical and cultural resources impacts would be mitigated via standard operating procedures and mandated construction practices for workers. These potential impacts would be similar in character under either the proposed action or the no-action alternative, but a smaller footprint will be disturbed under the no-action alternative.

4.8.2 Proposed Action

Under the currently licensed proposed action, the combination of milling operation, construction, and reclamation activities will affect a total of approximately 761 acres; these areas have been surveyed for historic and cultural resources, as detailed in Section 3.8. Kennecott is required by license condition to perform an archeological survey and obtain approval before disturbing any previously unsurveyed areas. Depending on the final design, construction of the diversion channel may affect Site 48SW9829. An archaeologist would be present during construction of the diversion channel to monitor potential cultural impacts. The proposed activities will occur in an existing industrial area, and no additional historical or cultural resource impacts are expected.

Expected impacts on historic and cultural resources are also discussed in Section 2.4 of the Revised Environmental Report (Shepherd Miller, Inc., 1994).

4.9 Visual/Scenic Resources Impacts

4.9.1 No-Action Alternative

There would be short-term visual/scenic resources impacts associated with the intensive effort required for mill decommissioning and tailings impoundment reclamation. These short-term effects would be similar in character under either the proposed action or the no-action alternative. Long-term, the land will be recontoured to blend with existing topography, and revegetation practices will promote a visual consistency with existing landforms and vegetation appearance.

4.9.2 Proposed Action

Under the proposed action, minor impacts to the visual and scenic resources of the area are expected with the construction of the new tailings impoundments, which would occur in accordance with the current performance-based operating license. The estimated crest of new tailings cells will range from 40 to 60 feet above existing ground surface, with reclaimed surfaces approximately 7 feet higher. The color of reclamation materials would blend in with the surrounding landscape and aesthetic impact will be minimal. There are

no near-by residents or key observation areas, and thus no receptors are affected by the changes to visual and scenic resources.

4.10 Socioeconomic Impacts

4.10.1 No-Action Alternative

Under the no-action alternative, without resumed mill operation and with completion of site decommissioning, there would be a loss of those significant long-term socioeconomic benefits associated with re-startup and operation of the Project's conventional mill. The Sweetwater mill is one of only three remaining standing conventional uranium mills in the United States as of 2016, has the largest capacity of the three, and is the only mill located in Wyoming. A conventional uranium mill located in central Wyoming provides an extant and positive opportunity for uranium production. There are substantial uranium resources in Wyoming that are not amendable to in-situ recovery and can only be extracted via conventional mining and processing in a conventional uranium mill, such as deposits on Green Mountain, Sheep Mountain and Copper Mountain in Fremont County, Wyoming. These deposits would become essentially stranded with the loss of the mill. The proposed action will allow the resumption of milling of ore or processing of alternate feed material for the purpose of extracting uranium for ultimate use in nuclear power reactors, which would not occur if decommissioning were pursued under the no-action alternative result of license renewal denial. As of the date of this Supplemental ER, 20 percent of U.S. electricity generation is provided by 100 nuclear power reactors (U.S. Energy Information Administration, 2016).

In a letter dated July 17, 2001, the NRC, in granting a request for the postponement of the initiation of requirements for timeliness in decommissioning for the Project, stated:

> *"Kennecott could resume uranium mining and milling when the market conditions allow. ...Maintaining the domestic capacity to provide the raw material for nuclear power is in the public interest."*

The Project's mill has the added benefit of already having been constructed, with the attendant economic savings resulting from costs already borne. Construction of a new

conventional uranium mill would certainly require extensive additional economic costs—both in permitting and construction capital.

The Project provides regional high-quality employment opportunities, both in current standby operations, and much more so during resumed operations when market conditions allow. Thus, the need for the Project is both regional and national.

4.10.2 Proposed Action

Under the currently licensed proposed action, active milling operations would resume. Mill operations are expected to provide long-term direct employment for approximately 30-35 people, and temporary employment for an additional 10-15 people for mill preparation, 30-40 people for tailings impoundment and evaporation pond construction, and 10-20 people for site reclamation. The operations are expected to generate indirect employment for approximately 40-45 people in secondary sectors. As detailed in Section 11 of the Revised Environmental Report (Shepherd Miller, Inc., 1994) and Section 7 of this Supplemental ER the Project would make an economic contribution to communities in the surrounding area, particularly the city of Rawlins, where most of the employees are expected to reside. The annual mill payroll would be approximately $4.08 million at Project inception, and direct (corporate and severance) and indirect (salaries, sales, gasoline, etc.) taxes are expected to be significant (note: all economic values presented herein were based on the 1994 Revised Environmental Report (Shepherd Miller, Inc., 1994) values and underlying assumptions, converted to 2016 dollars). The proposed Project would generate direct and indirect tax revenues, including increased sales and use taxes, motor fuel taxes, personal property taxes, license fees, severance taxes, and ad valorem taxes. Community resources in the form of services and public facilities (i.e., police and fire protection, public transportation, education, etc.) would be minimally impacted as a result of the proposed action.

Positive socioeconomic impacts associated with the Project include those benefits that are listed in Section 7 herein and are summarized below:

- Annual production of about 4.1 million pounds of uranium oxide at expected average operating conditions
- Total 20-year production value of $1,058 million (present value, 2016 dollars, using the same economic assumptions as used in the 1994 Revised Environmental Report)
- Construction-phase employment with Project-induced secondary workers
- Operational direct employment of 30 to 35 persons and Project-induced secondary employment of 40 to 45
- Annual average uranium oxide production representing approximately 7.175×10^{10} kilowatt-hours of electrical energy
- Construction phase wages during tailing impoundment construction
- Estimated annual gross wages accruing to Project-related employees of $4.08 million (2016 dollars) during operation.
- Direct annual tax revenues (amount cannot be accurately determined at this time)
- Environmental studies and monitoring programs that will provide increased knowledge of the Red Desert area in Wyoming
- A presence of trained personnel and emergency equipment in the remote Red Desert in the event of emergency to nearby passersby or other users of the Red Desert

4.11 Environmental Justice

Proposed actions are to be evaluated against the degree to which they may result in disproportionately high or adverse human health or environmental effects on minority populations and low-income populations (Executive Order 12898, Federal Register, February 11, 1994). Specific consideration of equity and fairness in resource decision-making is addressed under environmental justice.

4.11.1 No-Action Alternative

There would be no anticipated environmental justice impacts associated with the intensive effort required for mill decommissioning and tailings impoundment reclamation. However, any short-term, decommissioning-related impacts would be similar in character under either the proposed action or the no-action alternative. The mill facilities and tailings

impoundment are already constructed, and therefore the location of the mill would not have environmental justice impacts. The mill is located in a rural area, distant from population centers, reducing exposures to members of the general public. Decommissioning contractors would be required to employ qualified individuals regardless of gender, race, and ethnicity. Decommissioning activities would have no impact on any population group, regardless of ethnicity of economic status.

4.11.2 Proposed Action

Under the currently licensed proposed action, active milling operations would resume. The mill facilities are already constructed, and therefore the location of the mill would not have environmental justice impacts. The mill is located in a rural area, distant from population centers, reducing exposures to members of the general public. Thus, expansion of tailings impoundments within the NRC bonded area would have no impact on any population group, regardless of ethnicity of economic status. Economic activities within the region are primarily ranching and resource extraction. In total, the poverty rate in Sweetwater County was 9.3 percent, which compared to a statewide poverty rate of 10.1 percent in Wyoming (Wyoming Community Development Authority, 2014). People with incomes below the poverty status reside within 50 miles of the Project, but not disproportionately. The 5 percent of the population identified as non-white in Sweetwater County will not be disproportionately impacted by any component of the proposed action. During operations, the mill will employ qualified individuals regardless of gender, race, and ethnicity. As stated in the NRC's Finding of No Significant Impact (1999), "because the staff has determined that there will be no significant impacts associated with approval of the license renewal and reclamation plan amendment, there can be no disproportionately high and adverse effects or impacts on minority and low-income populations. Consequently, further evaluation of 'Environmental Justice' concerns, as outlined in Executive Order 12898 and NRC's Office of Nuclear Material Safety and Safeguards Policy and Procedures Letter 1-50, Rev. 1, is not warranted."

4.12 Public and Occupational Health Impacts

4.12.1 No-Action Alternative

There would be short-term occupational health risks associated with the intensive effort required for mill decommissioning and tailings impoundment reclamation. Health risks would be decreased via standard operating procedures and mandated safety and health practices for workers. In any event, mandated public and occupational dose limits would not be exceeded. Any short-term effects would be similar in character under either the proposed action or the no-action alternative.

Potential public health risks would be minimized to regulatory limits or less as a result of tailings impoundment closure with a thick soils cap. Groundwater contamination will be controlled and minimized to accepted standards via continued implementation of the Corrective Action Program or accepted alternate plan, and post-decommissioning, DOE as the site custodian will provide monitoring and institutional control of the Project land.

4.12.2 Proposed Action

Under the proposed action described under the current license and directly related documents, mill operations would resume. Current technologies for waste storage, handling, and disposal would be employed to minimize impacts to public or occupational health.

Nonradiological Impacts

Effluents from the Project containing non-radiological contaminants will not be released into pathways that could impact public and occupational health. In addition, no other aspects of the proposed Project will impact public and occupational health beyond that reasonably foreseeable from any mining project (e.g., mechanical risks due to operation of machinery). Liquid, gaseous and solid effluents and measures used to handle these effluents are summarized in section 4.13.2 and in the Revised Environmental Report (Shepherd Miller, Inc., 1994). Use of up-to-date techniques for waste storage, handling,

and disposal will continue to be employed to preclude impacts to public or occupational health.

Radiological Impacts

Detailed radiological modeling was performed in the Revised Environmental Report (Shepherd Miller, Inc., 1994), and estimated potential doses to the public would be a small fraction of background, which is approximately 212 mrem/yr whole body for the region. Results from MILDOS-AREA modeling, including radon, indicated effective whole body doses to the nearest resident of no more than 0.233 mrem/year (approximately 0.12% of background); and to residents of Bairoil, the nearest community, of 0.245 mrem/year (also approximately 0.12% of background) as a result of the resumption of mill operations. The effective doses in Bairoil are slightly higher due to the direction of the prevailing winds. The above-mentioned values are less than 0.25 percent (0.0025) of the corresponding 10 CFR 20 standard of 100mrem/year and about 0.14 percent (0.0014) of regional background radiation. Therefore, it can be concluded that the resumption of the mill operations, even using the higher ore grade, will not result in the nearest resident or the nearest community being subject to radiation that exceeds the regulatory standard or is significantly different than background radiation. During the proposed reclamation, potential offsite radiation doses will be monitored and action would be taken if any radiation levels approach the regulatory limits. Based on the modeled results, radiological impacts would not be expected to exceed any limit. No health impacts to either members of the public or workers would be anticipated.

4.13 Waste Management Impacts

4.13.1 11e.(2) Waste Impacts

Under both the proposed action and the no-action alternative, impacts associated with 11e.(2) wastes would be associated with CAP activities: pumping water from the CAP pumpback wells, as described in the Project's annual CAP reports, from the upper portion of the Battle Spring Aquifer to the existing tailings impoundment. A *de minimis* amount of 11e.(2) byproduct would also be generated from ongoing maintenance activities and environmental and human health monitoring activities.

Under both the proposed action and the no-action alternative, short-term wastes associated with decommissioning would be generated. Table 4-1 summarizes the estimated 11e.(2) wastes generated during decommissioning. Steel debris will be generated from facility outside walls and roofs, tanks, and other equipment. Concrete debris will be generated from floors, and cinder block debris will be generated from interior walls. Contaminated soil from catchment basin seepage is assumed to remain beneath the mill and SX building, and is estimated at 140,000 yds^3 (Kennecot Uranium Company, 2014). Windblown tailings volumes were determined in the application process for license amendment (Shepherd Miller, Inc., 1998) at 71,000 yds^3. All 11e.(2) wastes will be deposited in the existing tailings impoundment.

Table 4-1 Short-Term 11e.(2) Wastes Generated During Decommissioning

Type of Waste	Volume (yds^3)	Weight (tons)
Steel	15,500	104,400
Concrete	2,800	5,500
Cinder Block	1,200	900
Subtotal, buildings	19,500	110,800
Contaminated Soil	140,000	
Windblown Tailings	130,000	

Under the proposed action, 11e.(2) wastes, as discussed in Section 3.12, will be generated from the mill at a projected average throughput of 3,000 tons per day, yielding an estimated annual 1,095,000 tons of solids, and 273,750 tons of liquids. These numbers could be higher if lower grade ores are processed. Small quantities of additional 11e.(2) wastes will be generated from the onsite laboratory located in the administration building. Impacts from the wastes will be minimized under the construction, operation, monitoring and eventual reclamation of the proposed tailings impoundments as presented in detail in the Final Design Volumes (Shepherd Miller, Inc. 1997 through 1999) and as assessed in the NRC's Environmental Assessment (1999).

In the course of mill preparation, 11e.(2) wastes may be generated from mill preparation activities (Section 3.12 of this Supplemental ER). The impact from these wastes will be

minimal and limited to the site because these wastes will be cut, crushed, or otherwise handled to minimize voids and will be placed in the existing tailings impoundment.

4.13.2 Non-11e.(2) Waste Impacts

Under both the proposed action and no-action alternative, short-term non-11e.(2) waste generation impacts will be associated with the intensive effort required for decommissioning. Waste generation impacts would be controlled and limited via standard operating procedures and mandated waste management practices for workers. These short-term effects would be similar in character under either the proposed action or the no-action alternative.

Table 4-2 summarizes the estimated non-11e.(2) wastes generated during decommissioning. Steel debris will be generated from facility outside walls and roofs, tanks, and other equipment. Concrete debris will be generated from floors, and cinder block debris will be generated from interior walls. No non-11e.(2) contaminated soils are known to exist on site. All non-11e.(2) wastes will be deposited in an on-site landfill.

Table 4-2 Short-Term Non-11e.(2) Wastes Generated During Decommissioning

Type of Waste	Volume (yds^3)	Weight (tons)
Steel	5,300	35,400
Concrete	1,900	3,800
Cinder Block	2,800	2,200
Subtotal, buildings	10,000	41,400

Under the proposed action, non-11e.(2) wastes, as discussed in Section 3.12, will be generated from the office and kitchen functions at the administration building and from wastes generated at the shop. Non-11.e(2) wastes will be managed under the proposed action in the same manner as under the no-action alternative, but the volumes of solid and liquid wastes will increase proportionately with the increased number of employees at the Project under the proposed action, estimated at 30 to 35. Impacts from these wastes will be limited to onsite, permitted facilities: the landfill for solid wastes and the leach field for

liquid wastes. Liquid wastes from the laboratory are routed to the mill and ultimately to the tailings impoundment. No impacts from these facilities are anticipated.

In the course of mill preparation, non-11e.(2) wastes will be generated from mill preparation and tailings impoundment construction activities (Section 3.12 of this Supplemental ER). The impact from these wastes will be minimal and limited to the site because these wastes will be placed in permitted onsite facilities.

4.14 Impacts from Mill/Tailings Management System Accidents

The environmental effects of potential accidents at the mill or in the tailings management system involving the release of radioactive materials or harmful chemicals was evaluated in Section 7 of the Revised Environmental Report (Shepherd Miller, Inc., 1994). The Final Environmental Impact Statement (FGEIS) for Uranium Mining (U.S. Nuclear Regulatory Commission, 1980) was followed closely as a template for determining which accidents to consider, the assumptions to be used and the methods to employ to determine potential impacts. Nothing has changed in this regard in the time interval between the Revised Environmental Report and this Supplement. Releases of radioactivity from potential accidents were found in the Revised Environmental Report to have negligible effects on the nearest resident, located 17 miles (28 km) east of the Project. Impacts of transportation accidents are addressed herein in Section 4.2.

For the purposes of the assessment performed in the Revised Environmental Report, postulated plant accidents involving radioactivity were considered to occur in the following three categories:

1. Minor accidents, i.e., those not resulting in a release of radioactive material to the external environment (outside the licensee's NRC permit area boundary);
2. Small releases of radioactive material to the external environment; and
3. Large releases of radioactive material to the external environment.

Minor accidents considered in the FGEIS and in the Revised Environmental Report included leaks or ruptures in tanks or piping internal to the mill, centrifuge failure and

corresponding tank rupture, and rupture of a pipe in the tailings disposal system. In all cases, spills resulting from these ruptures would be contained internal to the mill and drained to sumps, or, in the case of a tailings pipeline rupture, would be contained within bermed areas and drained to natural or excavated sump areas. All liquids or slurries released in such a manner would be collected to the extent practicable and reintroduced to the mill process circuit or directed to the tailings impoundment.

Table 4-3 summarizes the assessment of accidents involving potential small and large releases of radioactivity as presented in the Revised Environmental Report (Shepherd Miller, Inc., 1994).

Table 4-3 Summary of Effects of Accidents in the 1994 Revised Environmental Report

Type of Failure	Measures to Mitigate Risks	Probability of Accident	Predicted Exposures[1]
Small Releases			
Yellowcake Air Cleaning System Failure	Instrumentation and controls	"Unlikely" per FGEIS	6.1 mrem to lung 0.003 mrem to whole body
Fire in Solvent Extraction	Fire suppression system and safety measures	0.01 to 0.0004 per year	25 mrem to bone
Explosion in the Yellowcake Drying Area	Isolation of yellowcake dryer	No data found to calculate probability	0.49 mrem to lung 0.0003 mrem to whole body
Large Releases			
Tornado	None, given probability level	0.00032 in Wyoming	0.0000663 mrem to lung
Earthquake	Liner and embankment design	N/A – design based on maximum credible earthquake	N/A – acceptable design safety factors
Flood	Diversion channel	N/A – design based on probable maximum flood (PMF)	N/A – channel will convey PMF

[1] The predicted doses listed in this table would be to the nearest permanent resident and were based on conservative assumptions--actual doses are likely to be lower.

5.0 MITIGATION MEASURES

As stated in the NRC's Environmental Assessment's Finding of No Significant Impact (1999) relative to the proposed action:

> *"The NRC staff has reexamined actual and potential environmental impacts associated with yellowcake production at the mill site, and has determined that renewal of the source material license (1) will be consistent with requirements of 10 CFR Part 40; (2) will not be inimical to public health and safety; and (3) will not have long-term detrimental impacts on the environment."*

Thus, no formal mitigation measures were required. The licensee has developed rigorous project design, monitoring, operational and reclamation features in accordance with Source Material License SUA-1350 and regulatory criteria in 10 CFR 40 Appendix A to minimize the potential for events requiring mitigation for the proposed action. Thus no additional mitigation measures are proposed with for future activities associated with the proposed action.

Mitigation to address impacts with past operational activities, all of which pre-date the ownership of the site by the current licensee, has been performed and completed for soil contamination associated with leaks from the diesel fuel storage tanks and associated with seepage from the mill catchment basin (Section 3.32 of this Supplemental ER). Mitigation to address impacts associated with the leak from the existing tailings impoundment is ongoing through the Project's Corrective Action Program, with annual reports provided to the NRC. Future mitigation for windblown tailings has been defined in the Final Design Reports, Volume VI, Existing Impoundment Reclamation Plan, and Volume VI Part 2, Mill Decommissioning Addendum to the Existing Impoundment Reclamation Plan (Shepherd Miller, Inc., 1997d and 1998, respectively). Current groundwater remediation and future windblown tailings remediation activities will be identical under both alternatives.

The tailings surface in the existing impoundment has been reconfigured as described in the annual inspection reports for the tailings impoundment (2009 to 2015 inspections), which

are included in the Annual Corrective Action Program Reviews (Kennecott Uranium Company, 2016).

6.0 ENVIRONMENTAL MEASUREMENTS AND MONITORING PROGRAMS

Environmental monitoring at the Project consists of monitoring performed to meet the regulatory requirements of three agencies: NRC, the Wyoming DEQ, and the EPA. The operational environmental monitoring program is described in the documents listed in Table 6-1.

Table 6-1 Summary of Documents Describing Environmental Monitoring

Document Title	Prepared By	Date	Contents Summary
Revised Environmental Report	Shepherd Miller, Inc.	August 1994	Complete revision and update to original 1976 Environmental Report
Final Design Report, Volume VII, Operations Plan	Shepherd Miller, Inc.	September 1997	Sweetwater mill environmental monitoring program and summary of NRC, Wyoming DEQ, and EPA requirements.
Environmental Assessment For Source Material License SUA-1350, Renewal for Operations and Amendment for the Reclamation Plan (Revision 1)	Nuclear Regulatory Commission	July 1999	Support for the decision-making process concerning the request for resumption of mill operation and approval of the reclamation plan
Annual Corrective Action Program Reports	Kennecott Uranium Company	Annually in February	Report on prior year's activities, with pumping and water quality data
Final Ground Water Plume Interpretation	Telesto Solutions, Inc.	February 2009	An evaluation of the extent of impacts to groundwater at the site
Request for a Renewal Source Material License SUA-1350 for a Ten (10) Year Term	Kennecott Uranium Company	July 24, 2014	Application for license renewal with rebaselined surety

6.1 Radiological Monitoring

Table 6-2, a reformatting of Tables 5-1 through 5-11 of the Final Design Volume VII (Shepherd Miller, Inc., 1997f), provides a listing of radiological monitoring for the Project under the current non-operating condition and the proposed action. Monitoring locations are depicted in figures provided in the Final Design Volume VII (Shepherd Miller, Inc., 1997f), and copied in Attachment 3 to this Supplemental ER, as modified with this 2014 license renewal application process. Where the number of analytical parameters to be tested under a monitoring action is long, reference to the appropriate table in other document is provided. Non-operations and proposed action (resumed operations) monitoring under the Wyoming DEQ Permit to Mine is not included in this table, but can be located in Section 5 of the Final Design Volume VII (Shepherd Miller, Inc., 1997f). EPA monitoring, however, is included in

Table 6-2.

Monitoring using a tracer for potential leakage from new tailings impoundments in the unlikely event that fluid would escape through both liners was not included in Section 5 of the Final Design Volume VII (Shepherd Miller, Inc., 1997f). However, Kennecott has proposed leak detection monitoring for potassium bromide injected into the tailings discharge line as an attachment to an October 18, 2016 letter to Ms. Andrea Kock, Deputy Director, Decommissioning and Uranium Recovery Licensing Directorate, Division of Waste Management and Environmental Protection, Office of Federal and State Materials and Environmental Management Programs, NRC (ADAMS Accession # ML 16298A14), and leak detection monitoring for bromide is listed in Table 6-2. Kennecott also proposed in this same letter attachment that monitoring be performed of the potentially perched zone created by the existence of a discontinuous clay aquitard in the vicinity of the first proposed tailings impoundment through monitoring of well TMW-65, which was completed in this zone, as listed in Table 6-2.

Stack sampling for radon-222 was not included in Section 5 of the Final Design Volume VII (Shepherd Miller, Inc., 1997f). However, Kennecott has proposed stack sampling for radon-222 in an October 18, 2016 letter to Ms. Andrea Kock, Deputy Director, Decommissioning and Uranium Recovery Licensing Directorate, Division of Waste Management and Environmental Protection, Office of Federal and State Materials and Environmental Management Programs, NRC (ADAMS Accession # ML 16298A14), and stack sampling for radon-222 is listed in Table 6-2.

Table 6-2 Summary of Radiological Monitoring

Category	Locations	Frequency	Analytical Parameters
Non-Operational Monitoring			
Air (Particulate)	Downwind: Air-4A	Continuously, composited quarterly	Natural uranium, Ra-226, Th-230, Pb-210
Air (Env. Radon)	Downwind: Air-4A Upwind: Air-2A	Continuously with quarterly changes	Rn-222
Gamma	Downwind: Air-4A Control: Administration Building	Continuously with quarterly changes	Environmental Gamma (TLD)
Tailings Liquid	Ex. Tailings Impoundment	Annually	See Table 5-1, Final Design Volume VII
Point of Compliance Wells	TMWs -15, -16, -17 and -18	Semiannually	See Table 5-1, (Kennecott Uranium Company, 2005)
Tailings Monitoring Wells	See current license	Semiannually (CAP)	See Table 5-1, Final Design Volume VII
Catchment Basin Monitoring Wells	See (Kennecott Uranium Company, 2005)	Semiannually Quarterly	See Table 5-1, (Kennecott Uranium Company, 2005) See Table 5-1, (Kennecott Uranium Company, 2005)
Tailings Impoundment Pumpback Wells	See current license	Quarterly (CAP)	See Table 5-1, Final Design Volume VII
Catchment Basin Pumpback Wells	See current license	Quarterly	See Table 5-1, (Kennecott Uranium Company, 2005)
Potable Water Wells	PWW-1, PWW-2,	Quarterly	Dissolved and suspended

	Drake 1		natural uranium, Ra-226, Th-230, PB-210
Operational Monitoring			
Air (Particulate)	GS-1 through GS-4	Continuously, composited quarterly	Natural uranium, Ra-226, Th-230, Pb-210
Air (Env. Radon)	GS-1 through GS-4	Continuously with quarterly changes	Rn-222
Gamma	GS-1 through GS-4 Control: Administration Building	Continuously with quarterly changes	Environmental Gamma (TLD)
Tailings Liquid	Tailings Impoundments	Annually	See Table 5-2, Final Design Volume VII
Rn-222 emissions from the Tailings Impoundment	GS-3 and MILDOS model	Annually	Rn-222, with dose as modeled with MILDOS
Background Well	TMW-5 or new background well	Semiannually	See Table 5-2, Final Design Volume VII plus bromide
Point of Compliance Well, Evaporation Ponds	New well	Semiannually	See Table 5-2, Final Design Volume VII, plus bromide
Point of Compliance Well, New Tailings Impoundment	TMW-64	Semiannually	See Table 5-2, Final Design Volume VII, plus bromide
Potentially Perched Aquifer Well	TMW-65	Semiannually	pH, conductivity, chloride and bromide
Potable Water Well Quality	PWW-1, PWW-2, Drake 1	Quarterly	Dissolved and suspended natural uranium, Ra-226, Th-230, PB-210
Surface Water	BS1, BS2 BS-3	Monthly, when flowing Quarterly	Dissolved and suspended natural uranium, Ra-226, Th-230, PB-210
Stack Sampling	Ore grinding, leach, and yellowcake dryer stacks	Semiannually (ore and leach), Quarterly (yellowcake)	Natural uranium, Ra-226, Th-230, Pb-210 and Rn-222 (also stack flow rate when sampled)
EPA Subpart W Monitoring			
Tailings Impoundments	Any impoundment	Annually	Radon-222, for pre-1989 impoundments; 40-acre standard for post-1989 impoundments
Evaporation Ponds (based on Subpart W updates)	Any evaporation pond	Daily observations and weekly	Presence of solid materials above the liquid surface

		digital photographs	

6.2 Physiochemical Monitoring

Table 6-3, a reformatting of Tables 5-1 through 5-11 of the Final Design Volume VII (Shepherd Miller, Inc., 1997f), provides a listing of physiochemical monitoring for the Project under the non-operating condition and the proposed action. Table 5-1 was modified by licensee (Kennecott Uranium Company, 2005) and approved by NRC, and is referenced below. Monitoring locations are depicted in figures provided in the Final Design Volume VII (Shepherd Miller, Inc., 1997f), and copied in Attachment 3 to this Supplemental ER. Where the number of analytical parameters to be tested under a monitoring action is long, reference to the Final Design Volume VII is provided.

Table 6-3 Summary of Physiochemical Monitoring

Category	Locations	Frequency	Analytical Parameters
Non-Operational Monitoring			
Tailings Impoundment	Ex. impoundment	Weekly Bi-Annual	Visual inspection Lab analysis of liner in even-numbered years
Tailings Liquid	Ex. impoundment	Annually Monthly	See Table 5-1, (Kennecott Uranium Company, 2005) Fluid Level
Point of Compliance Wells	TMWs -15, -16, -17 and -18	Semiannually Monthly (CAP)	See Table 5-1, (Kennecott Uranium Company, 2005) Water Levels
Tailings Monitoring Wells	See (Kennecott Uranium Company, 2005)	Semiannually (CAP) Monthly (CAP) Monthly	See Table 5-1, (Kennecott Uranium Company, 2005) Water Levels Water Levels
Catchment Basin Monitoring Wells	See (Kennecott Uranium Company, 2005)	Semiannually Quarterly	See Table 5-1, (Kennecott Uranium Company, 2005) See Table 5-1, (Kennecott Uranium Company, 2005)

		Monthly	Water Levels
Tailings Impoundment Pumpback Wells	See current license	Quarterly Quarterly (CAP)	See Table 5-1, (Kennecott Uranium Company, 2005) Water Levels
Catchment Basin Pumpback Wells	See current license	Quarterly Monthly (CAP)	See Table 5-1, (Kennecott Uranium Company, 2005) Water Levels
Potable Water Wells	PWW-1, PWW-2	Monthly	Water Levels
Meteorological Monitoring	Met. Station	Continuous	Wind speed and direction, sigma/theta, temperature, precipitation, pan evaporation, barometric pressure, and relative humidity
Operational Monitoring			
Tailings Impoundment	New Tailings Impoundments	Daily Weekly Monthly	Visual inspection, water level in leak detection and recovery system Visual inspection of liner Water level in pond
Evaporation Ponds	Evap Ponds	Daily	Water level in LDRS
Tailings Liquid	Tailings Impoundments	Annually	See Table 5-2, Final Design Volume VII
Background Well	TMW-5 or new background well	Semiannually	See Table 5-2, Final Design Volume VII
Monitoring Wells	TMW-78, TMW-75, TMW-31	Monthly for first year, quarterly thereafter	pH, conductivity, chloride
Monitoring Wells, Evaporation Ponds	New well	Monthly for first year, quarterly thereafter	pH, conductivity, chloride
Point of Compliance Well, Evaporation Ponds	New well	Semiannually	See Table 5-2, Final Design Volume VII
Point of Compliance Well, New Tailings Impoundment	TMW-64	Semiannually	See Table 5-2, Final Design Volume VII
Meteorological Monitoring	Met. Station	Continuous	Wind speed and direction, sigma/theta, barometric pressure, pan evaporation, temperature

			(2m and 10m), precipitation

6.3 Ecological Monitoring

Table 6-4, a reformatting of Tables 5-1 through 5-11 of the Final Design Volume VII (Shepherd Miller, Inc., September 1997), provides a listing of ecological monitoring in soil, sediment, and vegetation (no animal sampling is included) for the Project under the proposed action. Monitoring locations are depicted in figures provided in the Final Design Volume VII (Shepherd Miller, Inc., September 1997), and copied in Attachment 3 to this Supplemental ER, as modified in this 2014 license renewal application process.

Table 6-4 Summary of Ecological Monitoring

Category	Locations	Frequency	Analytical Parameters
Operational Monitoring			
Soil	GS-1 through GS-4	Annually	Natural uranium, Ra-226, Pb-210
Sediment	GS-1 through GS-4	Annually	Natural uranium, Ra-226, Th-230, Pb-210
Vegetation	GS-1 through GS-4	3 times during the grazing season	Ra-226, Pb-210

7.0 COST - BENEFIT ANALYSIS

The following analysis is patterned after that presented in Section 11 of the Revised Environmental Report (Shepherd Miller, Inc., 1994), and updated to current conditions based on the Consumer Price Index for April 2016 for All Urban Consumers-U.S. City Average relative to the equivalent index for December 1993 (the end of the year immediately prior to the preparation date for the Revised Environmental Report).

The Project will create numerous benefits and costs throughout its operational phases. Project-associated benefits and costs will accrue to the company, to direct and indirect employees, to various governmental agencies and to society as a whole.

7.1 BENEFITS

7.1.1 Proposed Action Benefits

Those Project benefits that may be considered internal (pertaining to the licensee) stem directly from uranium oxide production and are summarized below:

- Annual production of about 4.1 million pounds of uranium oxide at expected average operating conditions
- Total 20-year production value of $2,460 million (assuming $30 per pound uranium price)

External benefits deriving from the proposed Project will be both direct and indirect. These values include:

- Construction-phase employment with Project-induced secondary workers
- Operational direct employment of 30 to 35 persons and Project-induced secondary employment of 40 to 45
- Annual average uranium oxide production representing approximately 7.175×10^{10} kilowatt-hours of electrical energy
- Construction phase wages during tailing impoundment construction
- Estimated annual gross wages accruing to Project-related employees of $4.08 million (2016 dollars) during operation.
- Direct annual tax revenues (amount cannot be accurately determined at this time)
- Environmental studies and monitoring programs that will provide increased knowledge of the Red Desert area in Wyoming
- A presence of trained personnel and emergency equipment in the remote Red Desert in the event of emergency to nearby passersby or other users of the Red Desert

7.1.2 No-Action Alternative Benefits

The no-action alternative benefits are summarized below.

- Smaller footprint of affected land, and thus a smaller decommissioning footprint, although both alternatives will be decommissioned to achieve or exceed applicable environmental and health-related regulations

7.2 COSTS

7.2.1 Proposed Action Costs

Project implementation is expected to generate the following internal operation costs:

- Annual operating costs of $13 to 16 million (converted to 2016 dollars from cost estimates provided in the 1994 Revised Environmental Report, and not including mining costs)
- Decommissioning costs of $12 million (Kennecot Uranium Company, 2014)

Project-related population will increase demands for public services and facilities principally in Rawlins, Carbon County, and Carbon County School District No. 1. The external Project costs include:

- Minimal annual municipal costs in the city of Rawlins
- Minimal annual costs in Carbon County
- Minimal annual education costs in Carbon County School District No. 1

Project implementation and its resultant population effects will also have impacts on numerous elements of the community infrastructure. These costs are summarized below.

- Competition for the available housing stock will increase, and prices may increase, although the current housing market can absorb the expected population increase with little impact.
- Traffic in the Rawlins area and, in particular, on U.S. Highway 287 north of Rawlins for the 16 miles between Rawlins and Minerals Exploration Road will increase.

7.2.2 No-Action Alternative Costs

Implementation of the no-action alternative is expected to generate the following internal decommissioning costs:

- Decommissioning costs of $12 million (Kennecot Uranium Company, 2014)

Other no-action alternative costs include:

- Loss (stranding) of valuable and limited economic resource
- Loss of road maintenance by licensee along 8 miles of paved mine access road in Carbon County

8.0 SUMMARY OF ENVIRONMENTAL CONSEQUENCES

The currently licensed proposed action's environmental consequences were summarized in Section 11 of the Revised Environmental Report (Shepherd Miller, Inc., 1994) and are re-summarized herein.

Operation activities will generate limited environmental effects. These effects include the following:

- Release of additional controlled quantities of fugitive dust during construction and operation
- Temporary disturbance of the operational footprint. These areas will be reclaimed when the facility is decommissioned, and pre-Project vegetative conditions will be re-established.
- Potential loss of life for individual small mammals and birds, but without population-level effects on any species
- A maximum total dose commitment at the nearest residence 17 miles to the east of 0.689 mrem/year to the bones, 0.305 mrem/year to the lungs, 2.27 mrem/year to the bronchial epithelium, and 0.233 mrem/year to the whole body (total effective dose equivalent). These predicted doses are compared to the applicable 10 CFR 20 total effective dose equivalent standard of 100 mrem/year; predicted total effective dose equivalent is 0.23 percent of the standard.

- A maximum total dose commitment at the nearest community, Bairoil, 22 miles to the northeast of 0.717 mrem/year to the bones, 0.310 mrem/year to the lungs, 2.40 mrem/year to the bronchial epithelium, and 0.245 mrem/year to the whole body (total effective dose equivalent). These predicted doses are equivalent to 0.25 percent of the 10 CFR 20 standard.
- Noise levels of less than 50 dB(A) at a distance of 2 miles from the Project area

These environmental effects will not last indefinitely. Noise emissions will end at Project termination as will air emissions from mill operations. Reclamation procedures will restore the majority of the land disturbed to productive habitat for livestock and wildlife species.

9.0 REFERENCES

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10.0 LIST OF PREPARERS

This Supplemental ER was entirely prepared by Telesto Solutions, Inc., with contributors listed on the Signature Page at the front of the document. Report review and data were provided by Kennecott.

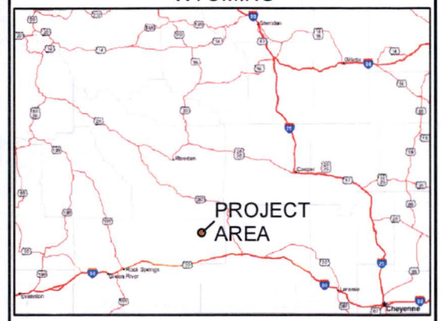
Figures

Date: 5/31/2016 User: dolson

Legend

- Project Area
- 5 Mile Radius
- Watershed
- ★ Sweetwater Mill

WYOMING



0 2

SCALE IN MILES

COORDINATE SYSTEM
LOCAL SWEETWATER MINE

N

FIGURE 1
REGIONAL OVERVIEW
SWEETWATER

PREPARED BY:
TELESTO SOLUTIONS • INCORPORATED

PREPARED FOR:
Rio Tinto

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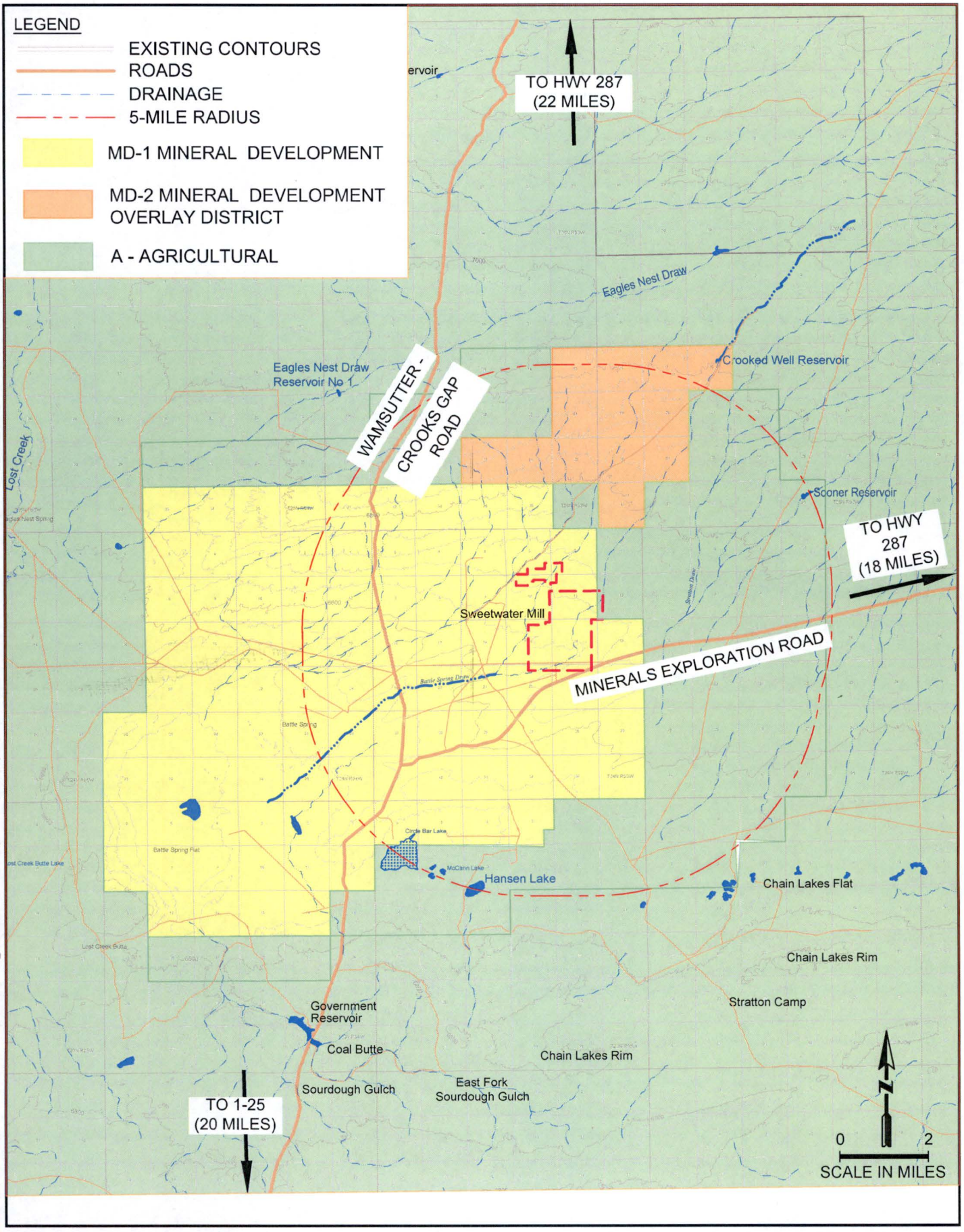

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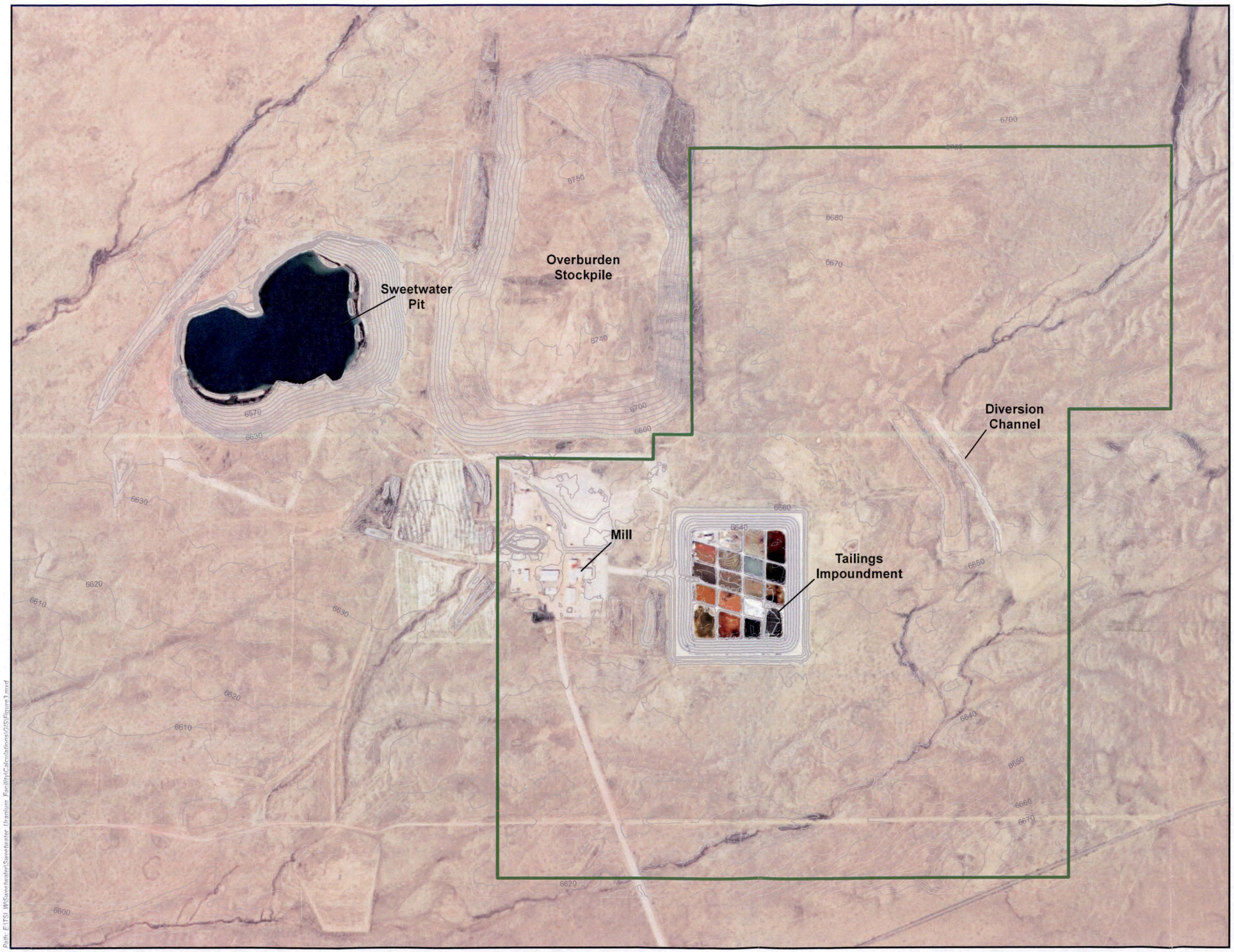
PROJECT:	TASK:
451307	02

PREPARED BY: TELESTO SOLUTIONS • INCORPORATED

FIGURE 2
ZONING MAP

PREPARED FOR: Rio Tinto



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Date: 5/31/2016 User: dulisse

Legend

Bonded Area Boundary

0 1,200

SCALE IN FEET

COORDINATE SYSTEM
LOCAL SWEETWATER MINE

N

FIGURE 3
EXISTING PROJECT FACILITIES
SWEETWATER

PREPARED BY:

TELESTO SOLUTIONS • INCORPORATED

PREPARED FOR:

RioTinto

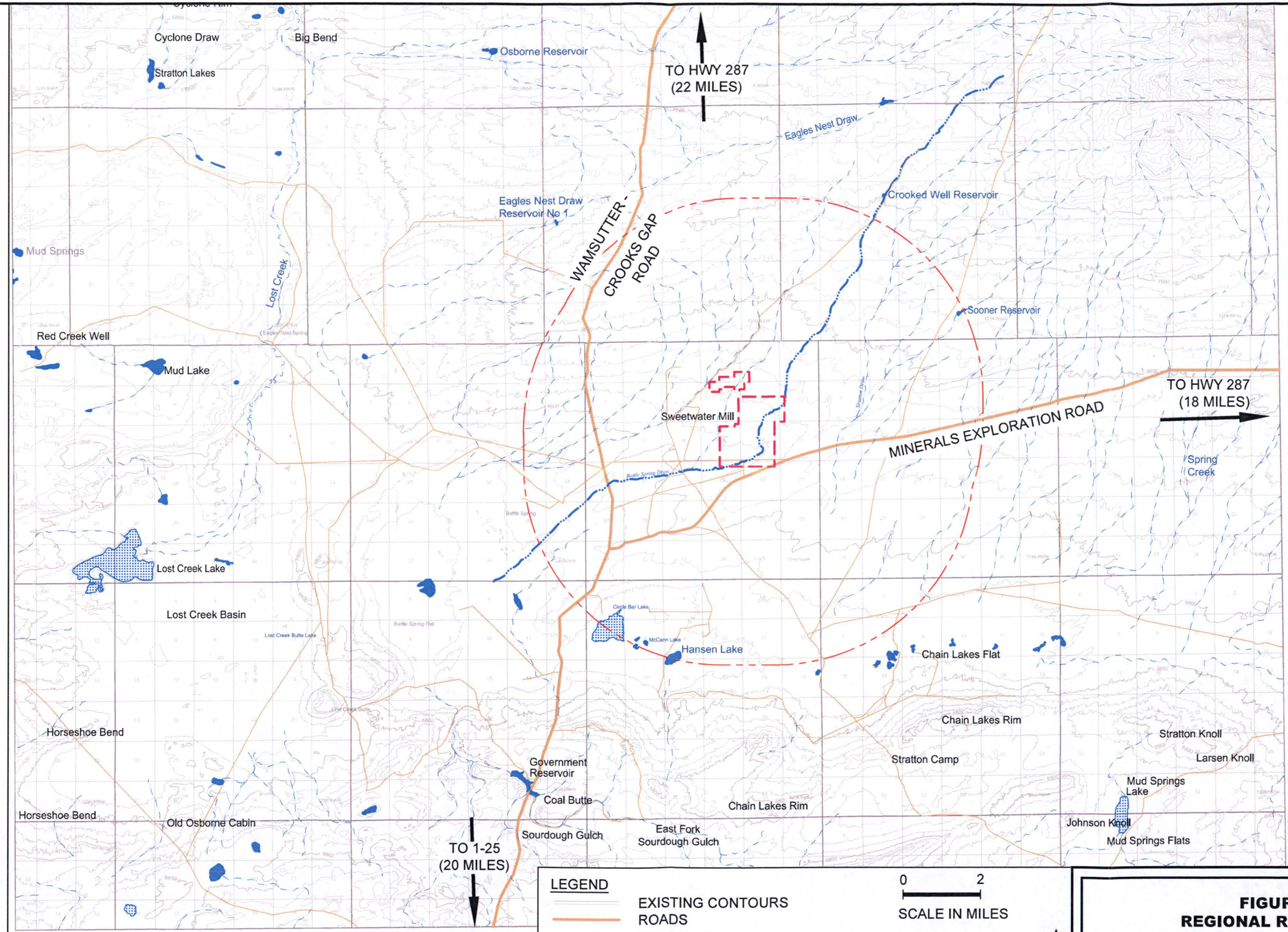


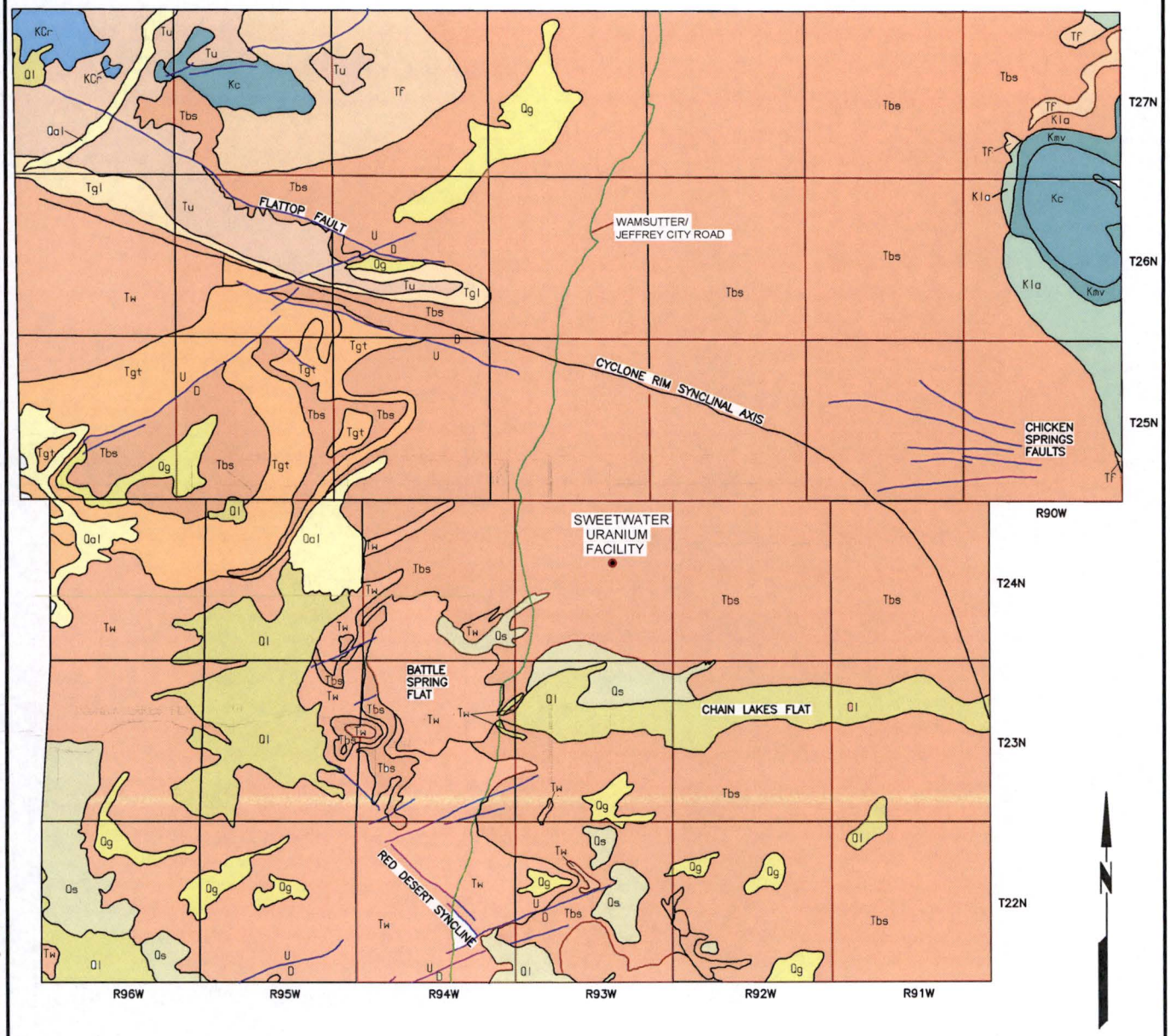
FIGURE 4
REGIONAL ROADS MAP

PROJECT:	TASK:
451307	02

PREPARED BY: TELESTO SOLUTIONS • INCORPORATED

PREPARED FOR: RioTinto

11/14/2016 R:\Sweetwater\Sweetwater\Uranium\Calculations\AutoCad\RAIs_Feb2016\2016_May_roads map.dwg



SCALE 1" = 6 MILES

LEGEND:

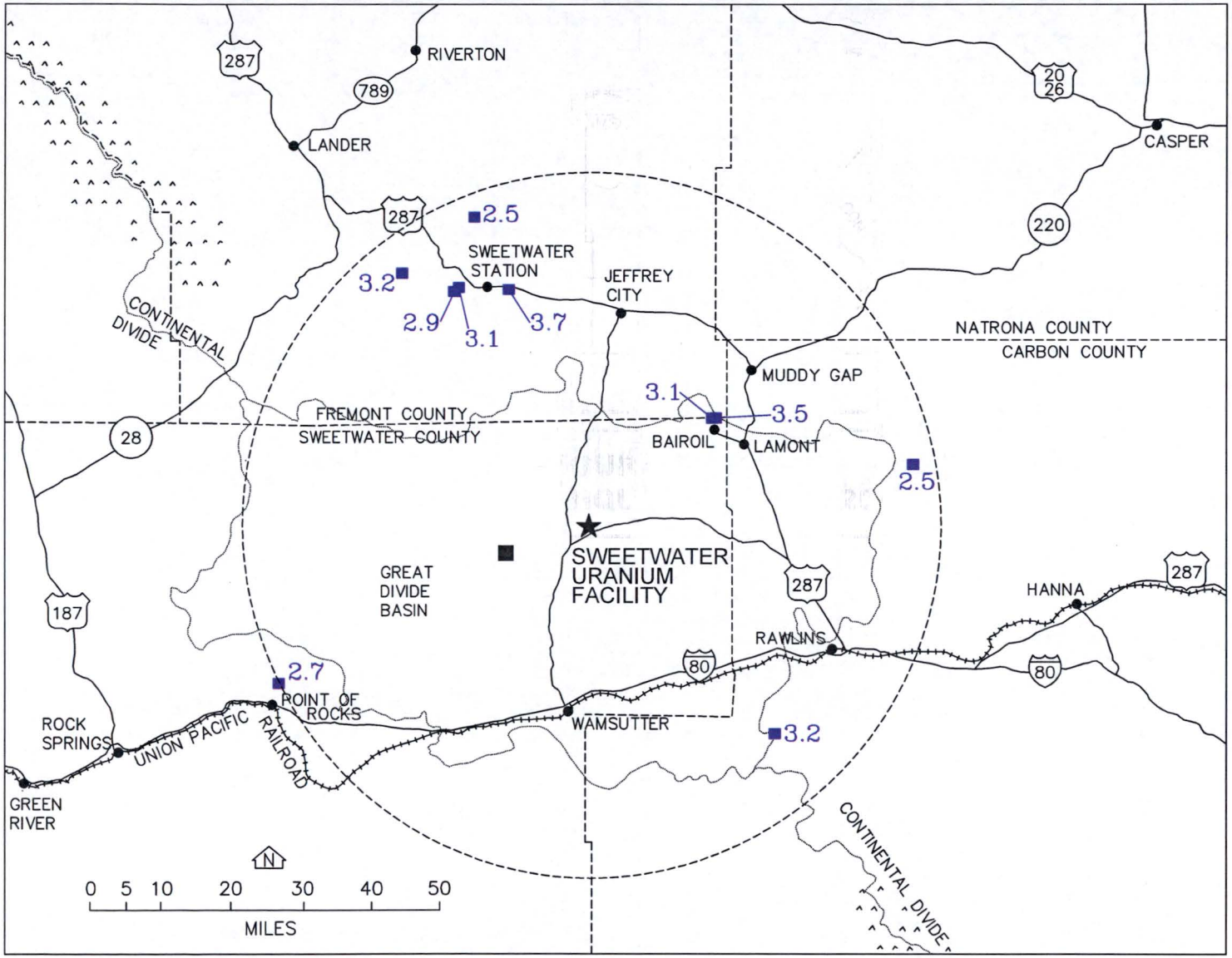
Tbs - BATTLE SPRING FORMATION	Qal - ALLUVIAL DEPOSITS	Kal - ALMOND FORMATION
Tw - WASATCH FORMATION	Qg - GRAVEL DEPOSITS	Kmv - MESAVERDE GROUP
Tgt - TIPTON TONGUE OF THE GREEN RIVER FORMATION	Ql - LAKE DEPOSITS	Kc - CODY SHALE
Tf - FORT UNION FORMATION	Qs - WIND-BLOWN SAND	KCr - CODY SHALE

PROJECT:	TASK:
415307	02

PREPARED BY: TELESTO SOLUTIONS INCORPORATED

FIGURE 5
REGIONAL SEISMICITY MAP

PREPARED FOR: RioTinto



■ EARTHQUAKE EPICENTER AND MAGNITUDE

PROJECT:	TASK:
415307	02

PREPARED BY: TELESTO SOLUTIONS INCORPORATED

FIGURE 6
REGIONAL EARTHQUAKES SINCE 2002

PREPARED FOR: Rio Tinto

Date: 6/12/2016 3:09:21 PM R:\Sweetwater\SweetwaterUranium\Calculations\AutoCad\RAIs_Feb2016\REGIONAL EARTHQUAKES.dwg Plotted By: Stacy Tyler

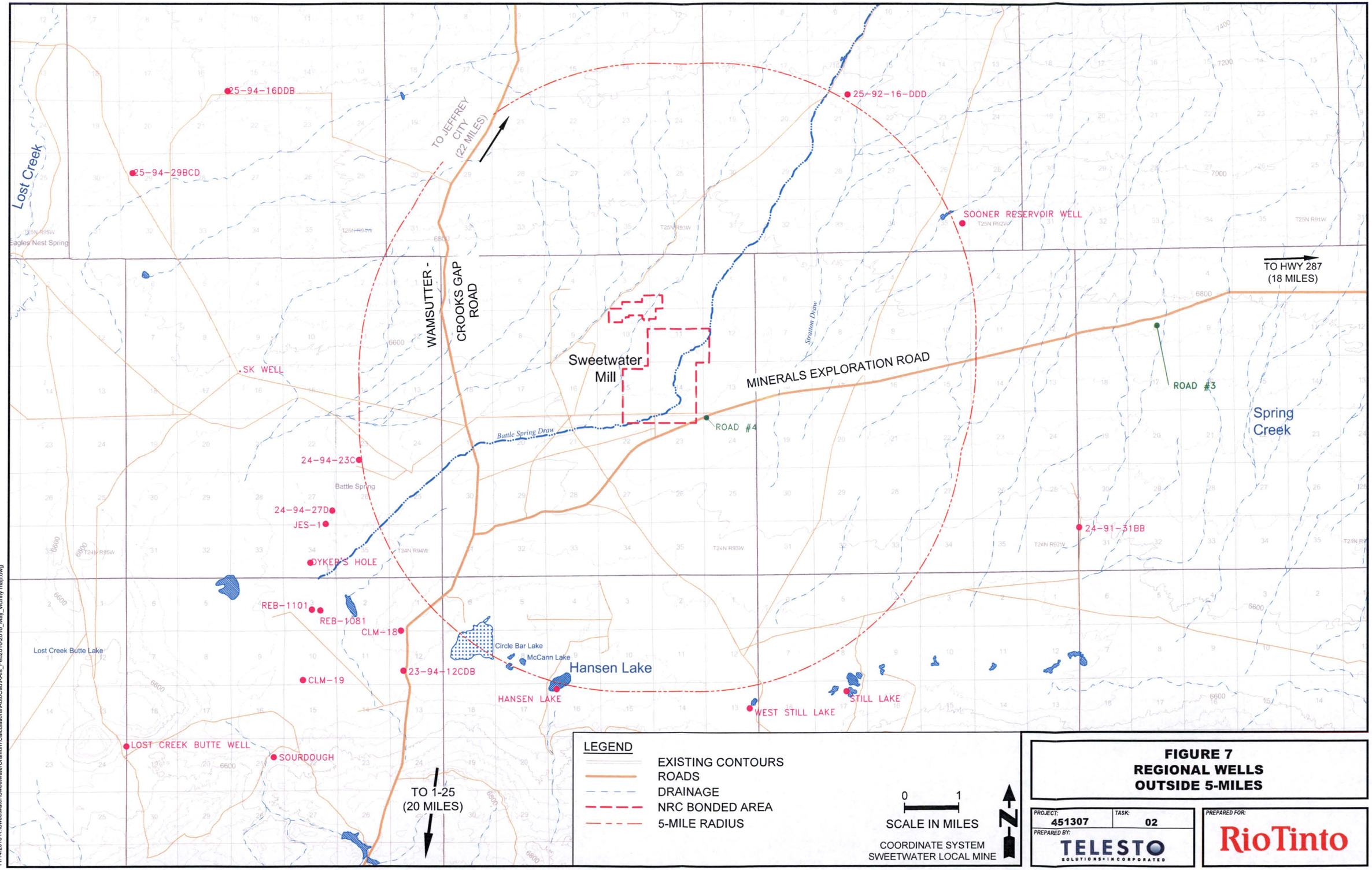


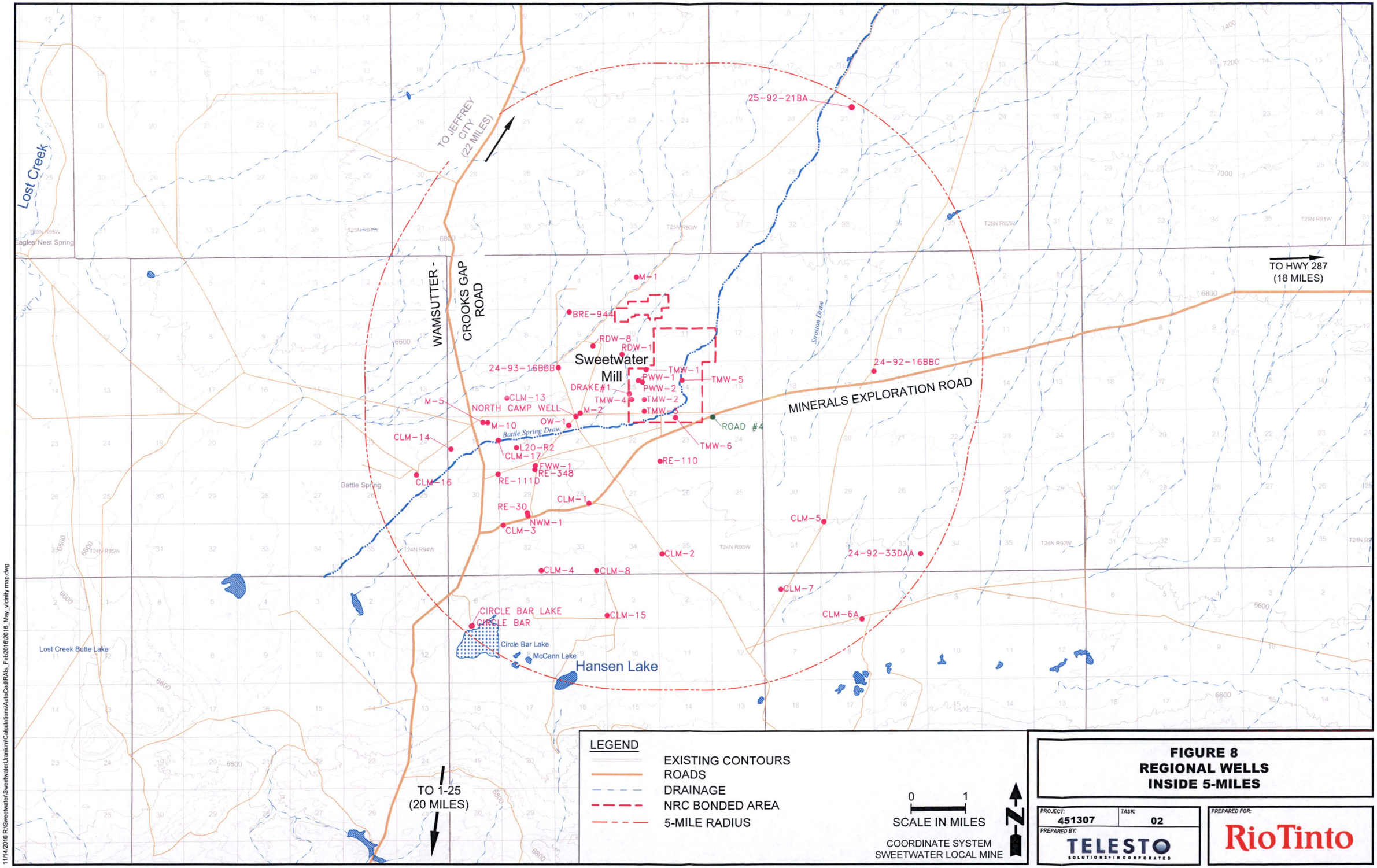
FIGURE 7
REGIONAL WELLS
OUTSIDE 5-MILES

PROJECT:	TASK:
451307	02

PREPARED BY: TELESTO SOLUTIONS INCORPORATED

PREPARED FOR: RioTinto

11/14/2016 R:\Sweetwater\Sweetwater\Uranium\Calculations\AutoCad\RAIs_Feb2016\2016_May_vicinity map.dwg



LEGEND

- EXISTING CONTOURS
- ROADS
- DRAINAGE
- NRC BONDED AREA
- 5-MILE RADIUS

0 1
SCALE IN MILES

COORDINATE SYSTEM
SWEETWATER LOCAL MINE

N

FIGURE 8
REGIONAL WELLS
INSIDE 5-MILES

PROJECT:	TASK:
451307	02

PREPARED BY: TELESTO SOLUTIONS INCORPORATED

PREPARED FOR: RioTinto

11/14/2016 R:\Sweetwater\Sweetwater\Uranium\Calculations\AutoCad\RAIs_Feb2016\2016_May_vicinity map.dwg

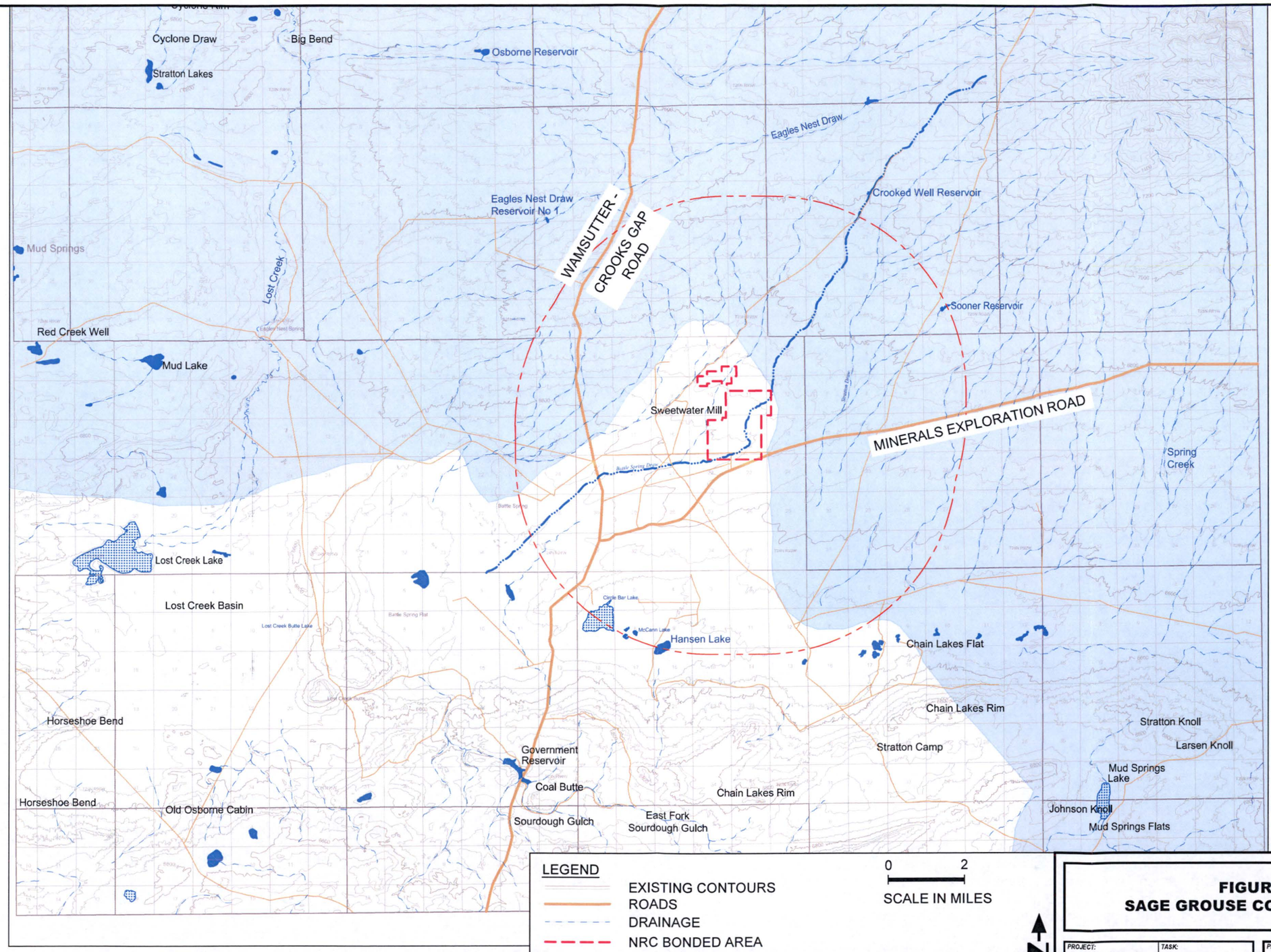


FIGURE 9
SAGE GROUSE CORE AREA MAP

PROJECT:	TASK:
451307	02

PREPARED BY: TELESTO SOLUTIONS • INCORPORATED

PREPARED FOR: RioTinto

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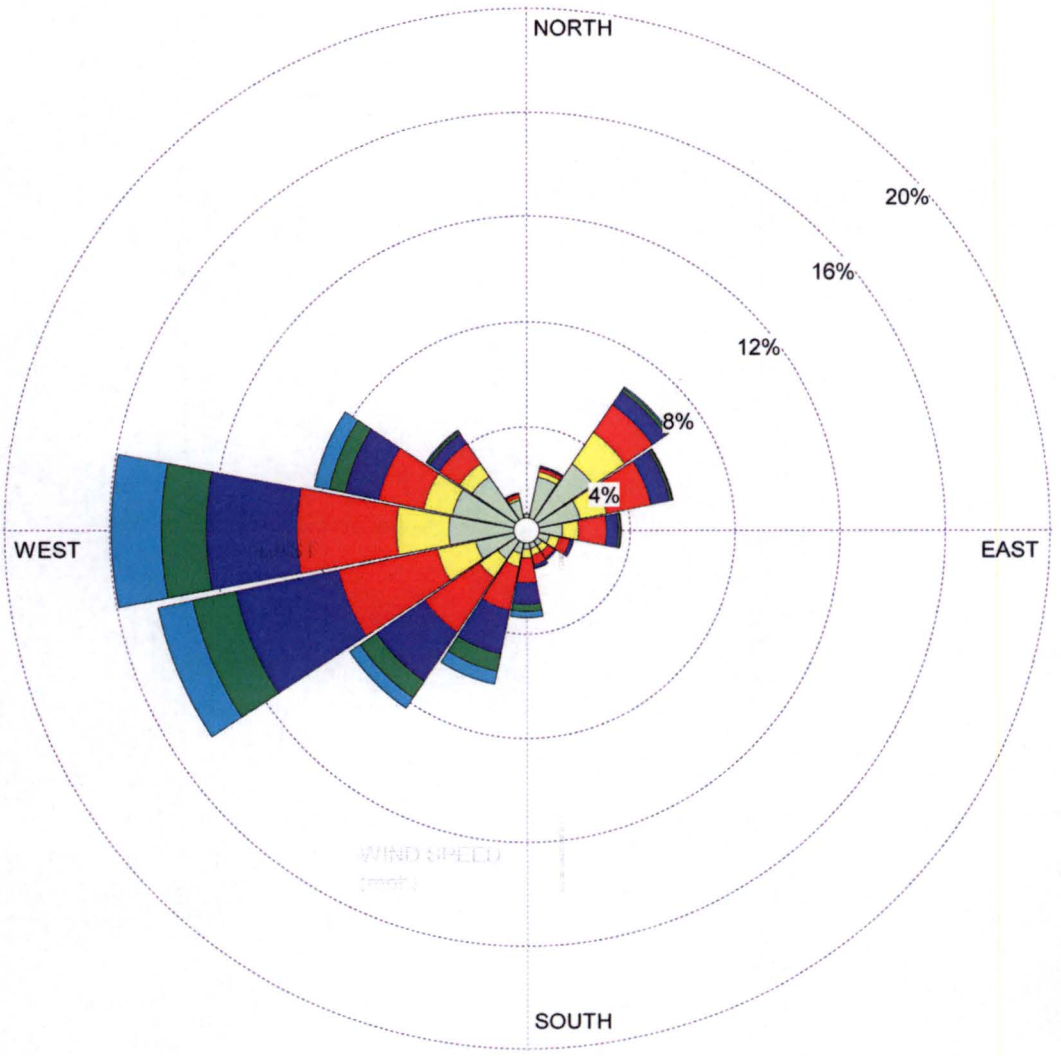


WIND SPEED DIRECTION
(BLOWING FROM)

DATA PERIOD:
START DATE: 1/1/2004 - 00:00
END DATE: 12/31/2014 - 23:00

TOTAL COUNT:
94664 HOURS

AVERAGE WIND SPEED:
7.98 MPH

DATE GENERATED:
5/26/2016

Date: 6/2/2016 11:14:02 AM R:\Sweetwater\Sweetwater\Uranium\Calculations\AutoCad\RAIs_Feb2016\windrose.dwg Plotted By: Stacy Tyler

PROJECT: 451307	TASK: 02
PREPARED BY: TELESTO SOLUTIONS • INCORPORATED	

FIGURE 10
SWEETWATER WIND ROSE,
ONSITE DATA, 2004 THROUGH 2014

PREPARED FOR: RioTinto

Attachment 1
USFWS ECOS-IPaC, Sweetwater County

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Wyoming Ecological Services Field Office
5353 YELLOWSTONE ROAD, SUITE 308A
CHEYENNE, WY 82009
PHONE: (307)772-2374 FAX: (307)772-2358
URL: www.fws.gov/wyominges/

Consultation Code: 06E13000-2016-SLI-0196 May 10, 2016
Event Code: 06E13000-2016-E-01000
Project Name: Sweetwater Uranium Project

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the Environmental Conservation Online System-Information, Planning, and Conservation System (ECOS-IPaC) website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

Please feel free to contact us if you need more information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. We also encourage you to visit the Wyoming Ecological Services website at http://www.fws.gov/wyominges/Pages/Species/Species_Endangered.html for more information about species occurrence and designated critical habitat.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 et seq.), Federal agencies are required

to use their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A biological assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a biological assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a biological assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the biological assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species, and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:
http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

We also recommend that you consider the following information when assessing impacts to federally listed species, as well as migratory birds, and other trust resources:

Colorado River and Platte River Systems: Consultation under section 7 of the Act is required for projects in Wyoming that may lead to water depletions or have the potential to impact water quality in the Colorado River system or the Platte River system, because these actions may affect threatened and endangered species inhabiting the downstream reaches of these river systems. In general, depletions include evaporative losses and/or consumptive use of surface or groundwater within the affected basin, often characterized as diversions minus return flows. Project elements that could be associated with depletions include, but are not limited to: ponds, lakes, and reservoirs (e.g., for detention, recreation, irrigation, storage, stock watering, municipal storage, and power generation); hydrostatic testing of pipelines; wells; dust abatement; diversion structures; and water treatment facilities.

Species that may be affected in the Colorado River system include the endangered bonytail (*Gila elegans*), Colorado pikeminnow (*Ptychocheilus lucius*), humpback chub (*Gila cypha*), and razorback sucker (*Xyrauchen texanus*) and their designated critical habitats. Projects in the Platte River system may impact the endangered interior population of the least tern (*Sterna antillarum*), the endangered pallid sturgeon (*Scaphirhynchus albus*), the threatened piping plover (*Charadrius melodus*), the threatened western prairie fringed orchid (*Platanthera praeclara*), as well as the endangered whooping crane (*Grus americana*) and its designated critical habitat. For more information on consultation requirements for the Platte River species, please visit http://www.fws.gov/platteriver.

Migratory Birds: The Migratory Bird Treaty Act (16 U.S.C. 703-712), prohibits the taking of any migratory birds, their parts, nests, or eggs except as permitted by regulations, and does not require intent to be proven. Except for introduced species and some upland game birds, almost

all birds occurring in the wild in the United States are protected (50 CFR 10.13). Guidance for minimizing impacts to migratory birds for projects that include communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm.

The Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d) prohibits knowingly taking, or taking with wanton disregard for the consequences of an activity, any bald or golden eagles or their body parts, nests, or eggs, which includes collection, molestation, disturbance, or killing. Eagle nests are protected whether they are active or inactive. Removal or destruction of nests, or causing abandonment of a nest could constitute a violation of one or both of the above statutes. Projects affecting eagles may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

If nesting migratory birds are present on or near the project area, timing of activities is an important consideration and should be addressed in project planning. Activities that could lead to the take of migratory birds or eagles, their young, eggs, or nests, should be coordinated with our office prior to project implementation. If nest manipulation (including removal) is proposed for the project, the project proponent should contact the Migratory Bird Office in Denver at 303-236-8171 to see if a permit can be issued for the project. If a permit cannot be issued, the project may need to be modified to protect migratory birds, eagles, their young, eggs, and nests.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment

United States Department of Interior
Fish and Wildlife Service

Project name: Sweetwater Uranium Project

Official Species List

Provided by:

Wyoming Ecological Services Field Office
5353 YELLOWSTONE ROAD, SUITE 308A
CHEYENNE, WY 82009
(307) 772-2374
http://www.fws.gov/wyominges/

Consultation Code: 06E13000-2016-SLI-0196
Event Code: 06E13000-2016-E-01000

Project Type: MINING

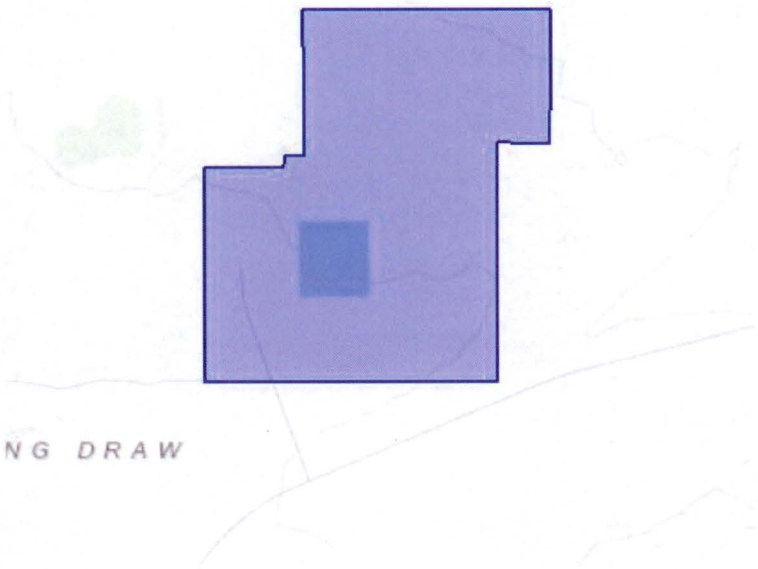
Project Name: Sweetwater Uranium Project
Project Description: License Renewal

Please Note: The FWS office may have modified the Project Name and/or Project Description, so it may be different from what was submitted in your previous request. If the Consultation Code matches, the FWS considers this to be the same project. Contact the office in the 'Provided by' section of your previous Official Species list if you have any questions or concerns.

United States Department of Interior
Fish and Wildlife Service

Project name: Sweetwater Uranium Project

Project Location Map:



Project Coordinates: MULTIPOLYGON (((-107.90303078995878 42.0539704744226, -107.90303713361935 42.0595459545091, -107.89571076454241 42.05949597927872, -107.89568360594123 42.060357311673194, -107.89386435586567 42.060340704634385, -107.89394663376018 42.07030725947962, -107.87123173207934 42.070363891486714, -107.87129491337302 42.06120586097921, -107.87611583747453 42.06121405582806, -107.87614431244697 42.0448557933587, -107.90304959446205 42.04487843942243, -107.90303078995878 42.0539704744226)))

Project Counties: Sweetwater, WY

United States Department of Interior
Fish and Wildlife Service

Project name: Sweetwater Uranium Project

Endangered Species Act Species List

There are a total of 1 threatened or endangered species on your species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Note that 1 of these species should be considered only under certain conditions. Critical habitats listed under the **Has Critical Habitat** column may or may not lie within your project area. See the **Critical habitats within your project area** section further below for critical habitat that lies within your project. Please contact the designated FWS office if you have questions.

Mammals	Status	Has Critical Habitat	Condition(s)
Black-Footed ferret *(Mustela nigripes)* Population: U.S.A. (WY and specific portions of AZ, CO, MT, SD, and UT)	Experimental Population, Non-Essential		Experimental, non-essential population of black-footed ferrets established pursuant to Section 10(j) of the ESA. Section 7 consultation not required except on lands administered by the U.S. Fish and Wildlife Service or the National Park Service.

Critical habitats that lie within your project area

There are no critical habitats within your project area.

Attachment 2
USFWS ECOS-IPaC, Project Area

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Wyoming Ecological Services Field Office
5353 YELLOWSTONE ROAD, SUITE 308A
CHEYENNE, WY 82009
PHONE: (307)772-2374 FAX: (307)772-2358
URL: www.fws.gov/wyominges/

Consultation Code: 06E13000-2016-SLI-0191 May 04, 2016
Event Code: 06E13000-2016-E-00985
Project Name: Sweetwater Uranium Project

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

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Attachment

United States Department of Interior
Fish and Wildlife Service

Project name: Sweetwater Uranium Project

Official Species List

Provided by:

Wyoming Ecological Services Field Office
5353 YELLOWSTONE ROAD, SUITE 308A
CHEYENNE, WY 82009
(307) 772-2374
http://www.fws.gov/wyominges/

Consultation Code: 06E13000-2016-SLI-0191
Event Code: 06E13000-2016-E-00985

Project Type: ** OTHER **

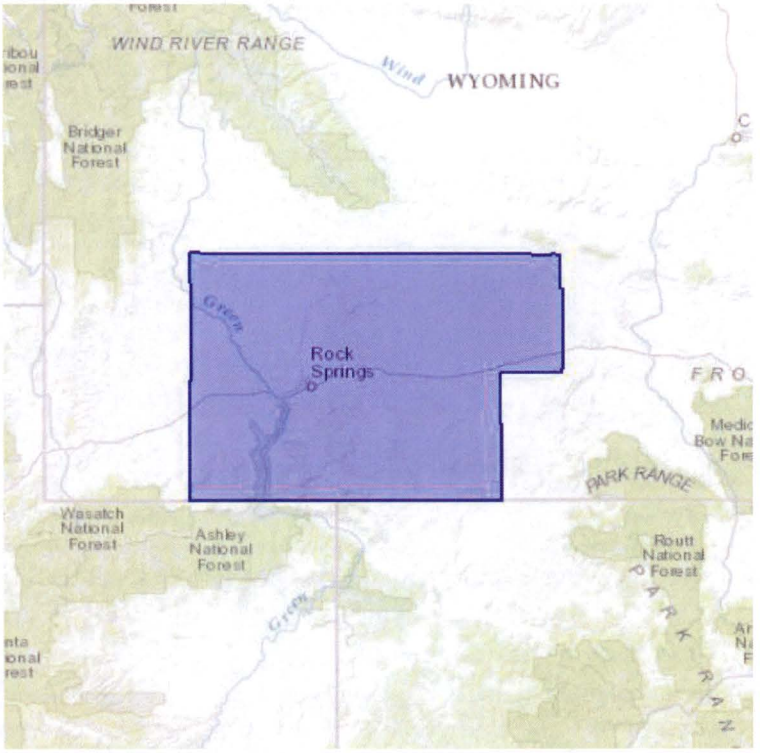
Project Name: Sweetwater Uranium Project
Project Description: Source Material License-SUA 1350 Renewal Application

Please Note: The FWS office may have modified the Project Name and/or Project Description, so it may be different from what was submitted in your previous request. If the Consultation Code matches, the FWS considers this to be the same project. Contact the office in the 'Provided by' section of your previous Official Species list if you have any questions or concerns.

United States Department of Interior
Fish and Wildlife Service

Project name: Sweetwater Uranium Project

Project Location Map:



Project Coordinates: The coordinates are too numerous to display here.

Project Counties: Sweetwater, WY

United States Department of Interior
Fish and Wildlife Service

Project name: Sweetwater Uranium Project

Endangered Species Act Species List

There are a total of 12 threatened or endangered species on your species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Note that 1 of these species should be considered only under certain conditions. Critical habitats listed under the **Has Critical Habitat** column may or may not lie within your project area. See the **Critical habitats within your project area** section further below for critical habitat that lies within your project. Please contact the designated FWS office if you have questions.

Birds	**Status**	**Has Critical Habitat**	**Condition(s)**
Least tern *(Sterna antillarum)* Population: interior pop.	Endangered		
Piping Plover *(Charadrius melodus)* Population: except Great Lakes watershed	Threatened	Final designated	
Whooping crane *(Grus americana)* Population: except where EXPN	Endangered	Final designated	
Yellow-Billed Cuckoo *(Coccyzus americanus)* Population: Western U.S. DPS	Threatened	Proposed	
Fishes			
Bonytail chub *(Gila elegans)* Population: Entire	Endangered	Final designated	
Colorado pikeminnow *(Ptychocheilus lucius)* Population: Entire, except EXPN	Endangered	Final designated	
Humpback chub *(Gila cypha)* Population: Entire	Endangered	Final designated	
Pallid sturgeon *(Scaphirhynchus*	Endangered		

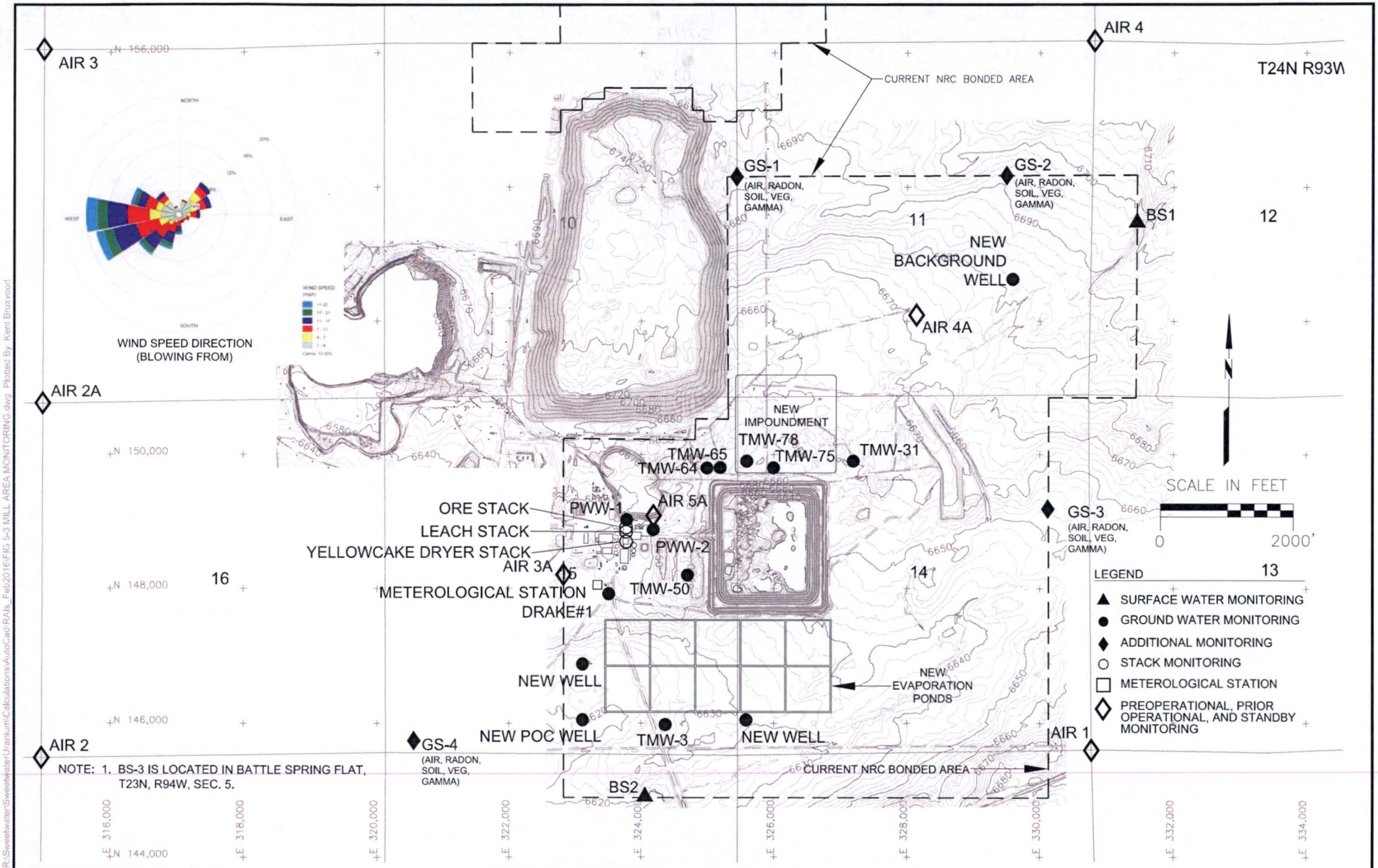
albus) Population: Entire			
Razorback sucker *(Xyrauchen texanus)* Population: Entire	Endangered	Final designated	
Flowering Plants			
Ute ladies'-tresses *(Spiranthes diluvialis)*	Threatened		
Western Prairie Fringed Orchid *(Platanthera praeclara)*	Threatened		
Mammals			
Black-Footed ferret *(Mustela nigripes)* Population: U.S.A. (WY and specific portions of AZ, CO, MT, SD, and UT)	Experimental Population, Non-Essential		Experimental, non-essential population of black-footed ferrets established pursuant to Section 10(j) of the ESA. Section 7 consultation not required except on lands administered by the U.S. Fish and Wildlife Service or the National Park Service.

Critical habitats that lie within your project area

The following critical habitats lie fully or partially within your project area.

Birds	Critical Habitat Type
Yellow-Billed Cuckoo *(Coccyzus americanus)* Population: Western U.S. DPS	Proposed

Attachment 3
Environmental Monitoring Locations



NOTE: 1. BS-3 IS LOCATED IN BATTLE SPRING FLAT, T23N, R94W, SEC. 5.

REVISED 9/2016 INCLUDING NRC BONDED AREA, WIND ROSE, ADDITION OF TMW-65 AND NEW LOCATION FOR GS-3

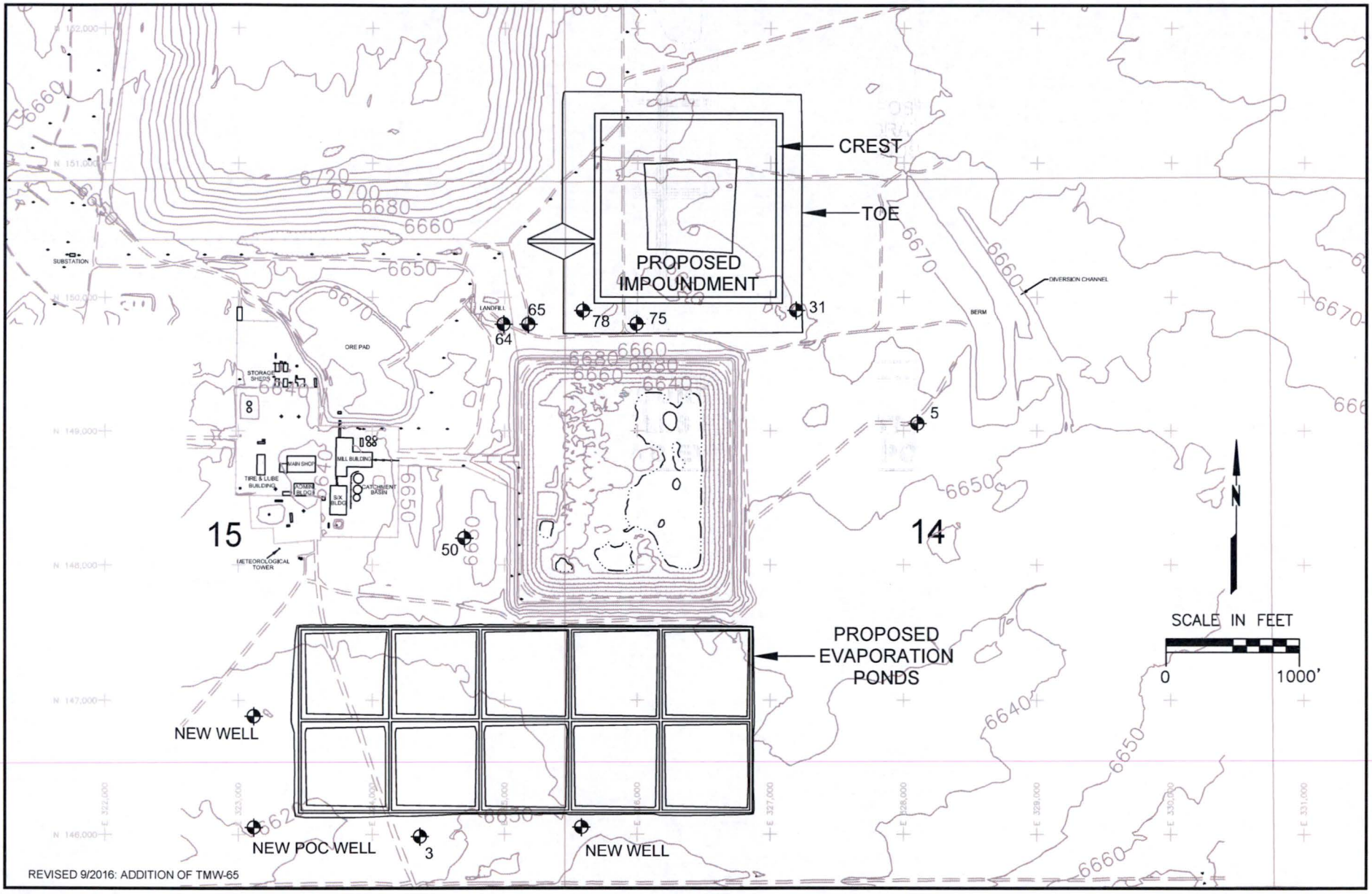
Date: 10/11/2016 1:30:56 PM R:\Sweetwater\Uranium\Calculations\AutoCad\RAIs_Feb2016\FIG 5-3 MILL AREA MONITORING.dwg Plotted By: Kent Bruxvoort

PROJECT:	TASK:
415307	02

TELESTO SOLUTIONS INCORPORATED

FIGURE 5-3
NRC MILL AREA MONITORING LOCATIONS, RESUMED OPERATIONS, FIRST NEW TAILINGS IMPOUNDMENT AND EVAPORATION PONDS

PREPARED FOR: RioTinto



PROJECT:	TASK:
415307	02

PREPARED BY: TELESTO SOLUTIONS INCORPORATED

FIGURE 5-7
PROPOSED MONITORING WELLS FOR THE FIRST NEW TAILINGS IMPOUNDMENT AND EVAPORATION PONDS

PREPARED FOR: RioTinto

Attachment 4
Water Quality Data Sheets, DW-1 and OW-1

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ANALYTICAL SUMMARY REPORT

September 11, 2015

Kennecott Uranium Company
43 Miles NW of Rawlins
Rawlins, WY 82301-1500

Work Order: C15080791 Quote ID: C67

Project Name: Sweetwater Uranium

Energy Laboratories, Inc. Casper WY received the following 1 sample for Kennecott Uranium Company on 8/21/2015 for analysis.

Lab ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
C15080791-001	DB-1	08/19/15 12:09	08/21/15	Aqueous	Metals by ICP/ICPMS, Dissolved Alkalinity Anion - Cation Balance Cyanide, Total Manual Distillation Conductivity Fluoride E300.0 Anions Nitrogen, Nitrate + Nitrite pH Gross Alpha minus Rn222 and Uranium Lead 210, Dissolved Radium 226, Dissolved Radium 228, Dissolved Thorium, Isotopic Solids, Total Dissolved Solids, Total Dissolved - Calculated

The results as reported relate only to the item(s) submitted for testing. The analyses presented in this report were performed at Energy Laboratories, Inc., 2393 Salt Creek Hwy., Casper, WY 82601, unless otherwise noted. Radiochemistry analyses were performed at Energy Laboratories, Inc., 2325 Kerzell Lane, Casper, WY 82601, unless otherwise noted. Any exceptions or problems with the analyses are noted in the Laboratory Analytical Report, the QA/QC Summary Report, or the Case Narrative.

If you have any questions regarding these test results, please call.

Report Approved By:

Stephanie D Waldrop
Reporting Supervisor

Digitally signed by
Stephanie Waldrop
Date: 2015.09.11 13:39:51 -06:00

CLIENT: Kennecott Uranium Company
Project: Sweetwater Uranium
Work Order: C15080791

Report Date: 09/11/15

CASE NARRATIVE

BRANCH LABORATORY SUBCONTRACT ANALYSIS
Tests associated with analyst identified as ELI-B were subcontracted to Energy Laboratories, 1120 S. 27th St., Billings, MT, EPA Number MT00005.

Tests associated with analyst identified as ELI-CS were subcontracted to Energy Laboratories, 415 Graham Rd., College Station, TX, EPA Number TX01520.

ALPHA-U ANALYSIS
After evaluating our analytic methods based on industry and EPA standards we have identified areas in the method for gross radium alpha minus uranium that do not meet EPA method requirements. In order to meet these requirements we have made a change to our analytic method that may result in an increase of the sample result and MDC. The changes may produce higher counts where radium 224 is present and may result in higher recoveries than historically observed.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Kennecott Uranium Company
Project: Sweetwater Uranium
Lab ID: C15080791-001
Client Sample ID: DB-1

Report Date: 09/11/15
Collection Date: 08/19/15 12:09
DateReceived: 08/21/15
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Alkalinity, Total as CaCO3	66	mg/L		5		A2320 B	08/21/15 21:26 / wc
Carbonate as CO3	ND	mg/L		5		A2320 B	08/21/15 21:26 / wc
Bicarbonate as HCO3	80	mg/L		5		A2320 B	08/21/15 21:26 / wc
Calcium	74.7	mg/L		0.5		E200.7	08/24/15 15:32 / sf
Chloride	7	mg/L		1		E300.0	08/25/15 00:28 / wc
Fluoride	0.2	mg/L		0.1		A4500-F C	08/24/15 13:12 / wc
Magnesium	3.3	mg/L		0.5		E200.7	08/24/15 15:32 / sf
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.1		E353.2	08/24/15 15:16 / lr
Potassium	2.1	mg/L		0.5		E200.7	08/24/15 15:32 / sf
Silica	11.3	mg/L		0.2		E200.7	08/24/15 15:32 / sf
Sodium	47.7	mg/L		0.5		E200.7	08/24/15 15:32 / sf
Sulfate	221	mg/L		1		E300.0	08/25/15 00:28 / wc
NON-METALS							
Cyanide, Total	ND	mg/L		0.005		Kelada-01	08/25/15 12:39 / eli-b
PHYSICAL PROPERTIES							
Conductivity @ 25 C	618	umhos/cm		5		A2510 B	08/21/15 15:30 / mag
pH	7.25	s.u.	H	0.01		A4500-H B	08/21/15 15:30 / mag
Solids, Total Dissolved TDS @ 180 C	412	mg/L		10		A2540 C	08/24/15 10:18 / lmc
METALS - DISSOLVED							
Aluminum	ND	mg/L		0.1		E200.7	08/24/15 15:32 / sf
Arsenic	ND	mg/L		0.001		E200.8	08/26/15 23:16 / smm
Barium	ND	mg/L		0.1		E200.7	08/24/15 15:32 / sf
Beryllium	ND	mg/L		0.01		E200.7	08/24/15 15:32 / sf
Boron	ND	mg/L		0.1		E200.7	08/24/15 15:32 / sf
Cadmium	ND	mg/L		0.005		E200.7	08/24/15 15:32 / sf
Chromium	ND	mg/L		0.01		E200.7	08/24/15 15:32 / sf
Cobalt	ND	mg/L		0.001		E200.8	08/26/15 23:16 / smm
Copper	ND	mg/L		0.01		E200.8	08/26/15 23:16 / smm
Iron	3.91	mg/L		0.05		E200.7	08/24/15 15:32 / sf
Lead	ND	mg/L		0.01		E200.8	08/26/15 23:16 / smm
Manganese	0.18	mg/L		0.01		E200.7	08/24/15 15:32 / sf
Mercury	ND	mg/L		0.0002		E200.8	08/26/15 23:16 / smm
Molybdenum	ND	mg/L		0.01		E200.8	08/26/15 23:16 / smm
Nickel	ND	mg/L		0.01		E200.7	08/24/15 15:32 / sf
Selenium	ND	mg/L		0.001		E200.8	08/26/15 23:16 / smm
Silver	ND	mg/L		0.01		E200.7	08/24/15 15:32 / sf
Thallium	ND	mg/L		0.01		E200.8	08/26/15 23:16 / smm
Vanadium	ND	mg/L		0.1		E200.7	08/24/15 15:32 / sf
Zinc	1.07	mg/L		0.01		E200.7	08/24/15 15:32 / sf

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Kennecott Uranium Company
Project: Sweetwater Uranium
Lab ID: C15080791-001
Client Sample ID: DB-1

Report Date: 09/11/15
Collection Date: 08/19/15 12:09
DateReceived: 08/21/15
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
RADIONUCLIDES - DISSOLVED							
Gross Alpha minus Rn & U	11.9	pCi/L				E900.1	08/25/15 18:52 / dmf
Gross Alpha minus Rn & U Precision (±)	3.3	pCi/L				E900.1	08/25/15 18:52 / dmf
Gross Alpha minus Rn & U MDC	1.7	pCi/L				E900.1	08/25/15 18:52 / dmf
Lead 210	1.5	pCi/L				E909.0	08/29/15 01:33 / eli-cs
Lead 210 precision (±)	0.7	pCi/L				E909.0	08/29/15 01:33 / eli-cs
Lead 210 MDC	1.1	pCi/L				E909.0	08/29/15 01:33 / eli-cs
Radium 226	1.5	pCi/L				E903.0	09/07/15 08:01 / dmf
Radium 226 precision (±)	0.36	pCi/L				E903.0	09/07/15 08:01 / dmf
Radium 226 MDC	0.11	pCi/L				E903.0	09/07/15 08:01 / dmf
Radium 228	1.7	pCi/L				RA-05	08/31/15 13:02 / plj
Radium 228 precision (±)	0.7	pCi/L				RA-05	08/31/15 13:02 / plj
Radium 228 MDC	0.9	pCi/L				RA-05	08/31/15 13:02 / plj
Thorium 230	0.3	pCi/L				E908.0	09/09/15 08:53 / cng
Thorium 230 precision (±)	0.2	pCi/L				E908.0	09/09/15 08:53 / cng
Thorium 230 MDC	0.2	pCi/L				E908.0	09/09/15 08:53 / cng
Uranium	0.609	mg/L		0.0003		E200.8	08/26/15 23:16 / smm
Uranium, Activity	412	pCi/L		0.2		E200.8	08/26/15 23:16 / smm
- See Case Narrative regarding Alpha-U analysis.							
DATA QUALITY							
A/C Balance (± 5)	0.12	%				A1030 E	08/26/15 13:44 / kbh
Anions	6.12	meq/L				A1030 E	08/26/15 13:44 / kbh
Cations	6.13	meq/L				A1030 E	08/26/15 13:44 / kbh
Solids, Total Dissolved Calculated	410	mg/L				A1030 E	08/26/15 13:44 / kbh
TDS Balance (0.80 - 1.20)	1.00	unitless				A1030 E	08/26/15 13:44 / kbh

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

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ANALYTICAL SUMMARY REPORT

August 29, 2016

Kennecott Uranium Company
43 Miles NW of Rawlins
Rawlins, WY 82301-1500

Work Order: C16070517 Quote ID: C67

Project Name: Sweetwater Uranium

Energy Laboratories, Inc. Casper WY received the following 6 samples for Kennecott Uranium Company on 7/15/2016 for analysis.

Lab ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
C16070517-001	Oil Well I	07/13/16 10:45	07/15/16	Aqueous	Metals by ICP/ICPMS, Dissolved Alkalinity Anion - Cation Balance Cyanide, Total Manual Distillation Conductivity Fluoride E300.0 Anions Nitrogen, Nitrate + Nitrite pH Gross Alpha minus Rn222 and Uranium Lead 210, Dissolved Radium 226, Dissolved Radium 228, Dissolved Thorium, Isotopic Solids, Total Dissolved Solids, Total Dissolved - Calculated
C16070517-002	TMW 901	07/13/16 11:42	07/15/16	Aqueous	Metals by ICP/ICPMS, Dissolved Alkalinity Anion - Cation Balance Cyanide, Total Manual Distillation Conductivity Fluoride Liquid-Liquid Extraction Diesel Range Organics Gasoline Range Organics E300.0 Anions Nitrogen, Nitrate + Nitrite pH Gross Alpha minus Rn222 and Uranium Lead 210, Dissolved Radium 226, Dissolved Radium 228, Dissolved Thorium, Isotopic Solids, Total Dissolved Solids, Total Dissolved - Calculated 8260-Volatile Organic Compounds-Short List
C16070517-003	TMW 109	07/13/16 11:42	07/15/16	Aqueous	Same As Above
C16070517-004	TMW 108 B	07/13/16 13:40	07/15/16	Aqueous	Same As Above
C16070517-005	TMW 108 A	07/13/16 14:15	07/15/16	Aqueous	Same As Above
C16070517-006	Trip Blank	07/13/16 00:00	07/15/16	Trip Blank	8260-Volatile Organic Compounds-Short List

ANALYTICAL SUMMARY REPORT

The results as reported relate only to the item(s) submitted for testing. The analyses presented in this report were performed at Energy Laboratories, Inc., 2393 Salt Creek Hwy., Casper, WY 82601, unless otherwise noted. Radiochemistry analyses were performed at Energy Laboratories, Inc., 2325 Kerzell Lane, Casper, WY 82601, unless otherwise noted. Any exceptions or problems with the analyses are noted in the Laboratory Analytical Report, the QA/QC Summary Report, or the Case Narrative.

If you have any questions regarding these test results, please call.

Report Approved By: David Blaida

David Blaida, Project Manager

Digitally signed by
Dave Blaida
Date: 2016.08.29 17:18:58 -06:00

CLIENT: Kennecott Uranium Company
Project: Sweetwater Uranium
Work Order: C16070517

Revised Date: 08/29/16
Report Date: 08/24/16

CASE NARRATIVE

REVISED/SUPPLEMENTAL REPORT
The attached analytical report has been revised from a previously submitted report due to the request by Oscar Paulson on 8/24/16 for the reanalysis/addition of chromium on sample(s) 2-3. The data presented here is from that recheck/additional analysis. The report has been revised and replaces any previously issued report in its entirety.

Tests associated with analyst identified as ELI-B were subcontracted to Energy Laboratories, 1120 S. 27th St., Billings, MT, EPA Number MT00005.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Kennecott Uranium Company
Project: Sweetwater Uranium
Lab ID: C16070517-001
Client Sample ID: Oil Well I

Revised Date: 08/29/16
Report Date: 08/24/16
Collection Date: 07/13/16 10:45
DateReceived: 07/15/16
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
MAJOR IONS							
Alkalinity, Total as CaCO3	107	mg/L		5		A2320 B	07/21/16 20:05 / ljl
Carbonate as CO3	ND	mg/L		5		A2320 B	07/21/16 20:05 / ljl
Bicarbonate as HCO3	131	mg/L		5		A2320 B	07/21/16 20:05 / ljl
Calcium	58.8	mg/L		0.5		E200.7	07/19/16 21:18 / sf
Chloride	43	mg/L		1		E300.0	07/23/16 05:49 / ljl
Fluoride	0.2	mg/L		0.1		A4500-F C	07/22/16 11:26 / ljl
Magnesium	4.7	mg/L		0.5		E200.7	07/19/16 21:18 / sf
Nitrogen, Nitrate+Nitrite as N	ND	mg/L		0.1		E353.2	07/20/16 13:33 / ljl
Potassium	2.9	mg/L		0.5		E200.7	07/19/16 21:18 / sf
Silica	8.5	mg/L		0.2		E200.7	07/19/16 21:18 / sf
Sodium	51.5	mg/L		0.5		E200.7	07/19/16 21:18 / sf
Sulfate	121	mg/L		1		E300.0	07/23/16 05:49 / ljl
NON-METALS							
Cyanide, Total	ND	mg/L		0.005		Kelada-01	07/21/16 16:13 / eli-b
PHYSICAL PROPERTIES							
Conductivity @ 25 C	526	umhos/cm		5		A2510 B	07/18/16 14:52 / wc
pH	7.94	s.u.	H	0.01		A4500-H B	07/18/16 14:52 / wc
Solids, Total Dissolved TDS @ 180 C	359	mg/L		10		A2540 C	07/18/16 14:50 / wc
METALS - DISSOLVED							
Aluminum	ND	mg/L		0.1		E200.7	07/19/16 21:18 / sf
Arsenic	0.019	mg/L		0.001		E200.8	07/21/16 01:02 / sf
Barium	ND	mg/L		0.1		E200.7	07/19/16 21:18 / sf
Beryllium	ND	mg/L		0.01		E200.7	07/19/16 21:18 / sf
Boron	ND	mg/L		0.1		E200.7	07/19/16 21:18 / sf
Cadmium	ND	mg/L		0.005		E200.7	07/19/16 21:18 / sf
Chromium	ND	mg/L		0.01		E200.7	07/19/16 21:18 / sf
Cobalt	ND	mg/L		0.001		E200.8	07/21/16 01:02 / sf
Copper	ND	mg/L		0.01		E200.8	07/21/16 01:02 / sf
Iron	ND	mg/L		0.05		E200.7	07/19/16 21:18 / sf
Lead	ND	mg/L		0.01		E200.8	07/21/16 01:02 / sf
Manganese	ND	mg/L		0.01		E200.7	07/19/16 21:18 / sf
Mercury	ND	mg/L		0.0002		E200.8	07/21/16 01:02 / sf
Molybdenum	ND	mg/L		0.01		E200.8	07/21/16 01:02 / sf
Nickel	ND	mg/L		0.01		E200.7	07/19/16 21:18 / sf
Selenium	0.51	mg/L	D	0.03		E200.7	07/19/16 21:18 / sf
Silver	ND	mg/L		0.01		E200.8	07/21/16 01:02 / sf
Thallium	ND	mg/L		0.01		E200.8	07/21/16 01:02 / sf
Vanadium	ND	mg/L		0.1		E200.7	07/19/16 21:18 / sf
Zinc	ND	mg/L		0.01		E200.7	07/19/16 21:18 / sf

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
D - RL increased due to sample matrix.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
H - Analysis performed past recommended holding time.

LABORATORY ANALYTICAL REPORT

Prepared by Casper, WY Branch

Client: Kennecott Uranium Company
Project: Sweetwater Uranium
Lab ID: C16070517-001
Client Sample ID: Oil Well I

Revised Date: 08/29/16
Report Date: 08/24/16
Collection Date: 07/13/16 10:45
DateReceived: 07/15/16
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
RADIONUCLIDES - DISSOLVED							
Gross Alpha minus Rn & U, dissolved	1.3	pCi/L				E900.1	08/02/16 22:07 / trs
Gross Alpha minus Rn & U, dissolved Precisio	1.5	pCi/L				E900.1	08/02/16 22:07 / trs
Gross Alpha minus Rn & U, dissolved MDC	1.7	pCi/L				E900.1	08/02/16 22:07 / trs
Lead 210, dissolved	0.73	pCi/L	U			PBW01	08/22/16 18:37 / plj
Lead 210, dissolved precision (±)	0.51	pCi/L				PBW01	08/22/16 18:37 / plj
Lead 210, dissolved MDC	0.81	pCi/L				PBW01	08/22/16 18:37 / plj
Radium 226, dissolved	0.71	pCi/L				E903.0	08/16/16 07:27 / dmf
Radium 226, dissolved precision (±)	0.20	pCi/L				E903.0	08/16/16 07:27 / dmf
Radium 226, dissolved MDC	0.19	pCi/L				E903.0	08/16/16 07:27 / dmf
Radium 228, dissolved	0.9	pCi/L				RA-05	08/11/16 11:40 / plj
Radium 228, dissolved precision (±)	0.9	pCi/L				RA-05	08/11/16 11:40 / plj
Radium 228, dissolved MDC	1.4	pCi/L				RA-05	08/11/16 11:40 / plj
Thorium 230, dissolved	0.05	pCi/L				E908.0	08/10/16 09:19 / cng
Thorium 230, dissolved precision (±)	0.1	pCi/L				E908.0	08/10/16 09:19 / cng
Thorium 230, dissolved MDC	0.2	pCi/L				E908.0	08/10/16 09:19 / cng
Uranium	1.03	mg/L		0.0003		E200.8	07/21/16 01:02 / sf
Uranium, Activity	699	pCi/L		0.2		E200.8	07/21/16 01:02 / sf
DATA QUALITY							
Solids, Total Dissolved - Calculated	360	mg/L				A1030 E	07/26/16 08:35 / kbh
A/C Balance	-2.11	%				A1030 E	07/26/16 08:35 / kbh
Anions	5.88	meq/L				A1030 E	07/26/16 08:35 / kbh
Cations	5.64	meq/L				A1030 E	07/26/16 08:35 / kbh
TDS Ratio	1.01	unitless				A1030 E	07/26/16 08:35 / kbh

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
U - Not detected at minimum detectable concentration