

October 28, 2004

Mr. Oscar Paulson  
Sweetwater Uranium Facility  
Kennecott Uranium Company  
P.O. Box 1500  
Riverton, WY 82501

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION CONCERNING SOURCE  
MATERIAL LICENSE SUA-1350 AMENDMENT REQUEST FOR THE  
KENNECOTT URANIUM COMPANY'S SWEETWATER URANIUM MILL SITE  
(TAC LU0046)

Dear Mr. Paulson:

By letter dated May 12, 2004, Kennecott Uranium Company (Kennecott) submitted an amendment request to the U.S. Nuclear Regulatory Commission (NRC) for the revision of License Conditions 9.10, 11.3, and 11.5 of Source Material License SUA-1350 for the Sweetwater Uranium Project. The changes would primarily address the remediation of groundwater and soils contaminated with organic compounds at the site. The NRC staff is requesting additional information that is needed to complete its review (see enclosure).

Please provide a schedule to address these comments within 30 days. We are closing our current tracking number (TAC LU0046) and will open a new TAC number when we receive your schedule. If you have any questions regarding this letter, please contact me at (301) 415-6606 or via e-mail to [esb@nrc.gov](mailto:esb@nrc.gov).

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/NRC/reading-rm/adams.html>.

Sincerely,

**/RA/**

Elaine Brummett, Project Manager  
Fuel Cycle Facilities Branch  
Division of Fuel Cycle Safety  
and Safeguards  
Office of Nuclear Material Safety  
and Safeguards

Docket No.: 40-8584  
License No.: SUA-1350

cc: R. Atkinson, Kennecott  
J. Wagner, WY DEQ

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<b>OFC</b>	FCFB		FCFB		FCFB	
<b>NAME</b>	E. Brummett		B. Garrett		B. von Till, Acting	
<b>DATE</b>	10/27/04		10/27/04		10/28/04	

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**KENNECOTT URANIUM COMPANY  
SWEETWATER URANIUM PROJECT  
REQUEST FOR ADDITIONAL INFORMATION ON  
AMENDMENT REQUEST DATED MAY 12, 2004**

The NRC has reviewed the license amendment request submitted by Kennecott Uranium Company (KUC) on May 12, 2004. KUC seeks to amend source material license SUA-1350 to address the remediation of groundwater and soils contaminated with organic compounds at the Sweetwater Uranium Project site. The request includes modifications to various aspects of the current groundwater corrective action plan (CAP) and mill standby environmental monitoring plan, as well as the addition of a soils cleanup plan and standards. Based on the information provided, the NRC has the following questions and comments regarding this amendment request.

**1.0 CONTAMINATED SOILS REMEDIATION PLAN**

**Comment 1A.** A review of the soils data provided in Part II of the May 12, 2004 submittal indicates that soil samples were analyzed for diesel range organics (DRO), oil range hydrocarbons (ORH), naphthalene, natural uranium, radium 226, and thorium 230. However, a review of the groundwater data provided in Part I of the aforementioned submittal indicates that other organics, such as methyl ethyl ketone (MEK), 1,1-dichloroethene, and gasoline range organics (GRO) are present in the groundwater. The NRC cannot discern from the data submitted whether hot spots of these and other documented groundwater organic contaminants occur in the soils. If KUC possesses such information, please provide it to the NRC.

**Basis:** 10 CFR 40, Appendix A, Criterion 5D, states the following regarding corrective action programs, "The licensee's proposed program must address removing the hazardous constituents that have entered the ground water at the point of compliance or treating them in place." Without the above information, it is not possible to determine if all sources of organic groundwater contamination are being addressed by the corrective action plan.

**Comment 1B.** According to the information provided in the May 12, 2004 submittal, monitoring wells TMW-92, -101, -111, -112, -113, and -115 and recovery wells TMW-90, -91, -102, -105 are within the proposed excavation area. KUC proposes to save these wells, to the extent practicable; however, if any well is damaged it will be removed from the monitoring network. It is not appropriate to remove any well from the monitoring network simply because it was damaged during excavation, especially since wells in the excavated area are important to monitor corrective action effectiveness. KUC will reinstall any wells in the monitoring network that are damaged during corrective actions. **KUC will also inspect and document, in writing and with photographs, the condition of each of these wells at excavation completion, and during backfill operations and submit this information to the NRC immediately after completing backfill operations.**

Enclosure

**Basis:** 10 CFR 40, Appendix A, Criterion 5B(1) states the following, “Hazardous constituents entering the ground water from a licensed site must not exceed the specified concentration limits in the uppermost aquifer beyond the point of compliance during the compliance period.” Compliance with this criterion is not possible if wells in the proposed monitoring network are arbitrarily removed because of damage during corrective actions.

**Comment No. 1C.** On the soil contamination profiles (May 12, 2004 submittal), KUC presents a static water level of approximately 6,642 ft in elevation. This elevation level is in the upper sand portion of the Battle Spring Aquifer according to the document, “Evaluation of Aquifer Test Data,” dated February 1997. However, a perched aquifer is situated above the Battle Spring Formation, and the aquifer test data indicates that the Battle Spring Aquifer is unconfined (See Comment No. 3A). Therefore, some degree of hydraulic connection must exist between the perched aquifer and the Battle Spring Aquifer. Thus, KUC should revise the soil contamination profiles to show the perched aquifer potentiometric surface instead of the upper sand aquifer potentiometric surface.

**Basis:** Although the conceptual model in the aforementioned report implies that the Battle Spring Aquifer is semi-confined, pumping test data, water level data, and the conclusions of the aforementioned report indicate that it is unconfined. Consequently, the perched and Battle Spring Aquifers must be considered hydraulically connected making the perched aquifer the uppermost aquifer according to the definitions of “Aquifer” and “Uppermost Aquifer” described in 10 CFR 40, Appendix A. Accordingly, 10 CFR 40, Appendix A, Criterion 5B(1) applies and states the following, “Hazardous constituents entering the ground water from a licensed site must not exceed the specified concentration limits in the uppermost aquifer beyond the point of compliance during the compliance period.”

**Comment No. 1D.** On Figure 6 of 24, the western soil excavation boundary does not appear to capture all contamination in excess of 2,300 mg/kg.

**Basis:** 10 CFR 40, Appendix A, Criterion 5D states that the objective of a corrective action program is to return hazardous constituent concentrations in groundwater to the concentration limits set as standards. This program must address removing hazardous constituents that have entered the groundwater at the point of compliance and between the point of compliance and the site boundary. Removing all soils containing DRO concentrations that exceed the soil cleanup standards is necessary to expedite groundwater remediation and comply with this criterion.

**Comment No. 1E.** On Figure 7 of 24, the southern soil excavation boundary does not appear to capture a TPH hotspot in excess of 2,300 mg/kg.

**Basis:** Same as Comment No. 1D.

## 2.0 GROUNDWATER CORRECTIVE ACTION PLAN

**Comment No. 2A.** KUC states that it will stop sampling for organics in any well where organic contaminants are not detected for two consecutive months. NRC disagrees with this approach. Although contaminants in a well may not be detected for two consecutive months, additional slugs of contamination may migrate to a well, and the NRC would not be aware of this situation because of the cessation in sampling. Instead, KUC should continue sampling and submit a license amendment request to modify the sampling plan when it believes that organic contaminant concentrations in all compliance and pumping wells justify such a modification. **KUC should also document the progress of the proposed corrective action in the annual report required per license condition 12.3.**

**Basis:** 10 CFR 40, Appendix A, Criterion 5D, states the following, “The Commission will determine when the licensee may terminate corrective action measures based on data from the ground-water monitoring program and other information that provide reasonable assurance that the groundwater protection standard will not be exceeded.” KUC’s automatic cessation of sampling for organic compounds based on two consecutive quarters of non-detects is essentially an assumption of the NRC’s authority. Additionally, two consecutive quarters of non-detects does not provide the reasonable assurance specified in the criterion.

**Comment No. 2B.** KUC recommends that TMW-91 become the point of compliance (POC) for the catchment basin. The POC designation is no longer applicable to this monitoring network because groundwater contamination was detected in excess of the GPSs. Therefore, all wells in the monitoring network are considered compliance monitoring wells and should be labeled as such on future maps. Although a specific POC is no longer applicable, KUC should identify any previous POC wells in future submittals (i.e. maps and tables).

**Basis:** 10 CFR Part 40, Appendix A, Criterion 7A, states, “Once ground-water protection standards have been established pursuant to paragraph 5B(1), the licensee shall establish and implement a compliance monitoring program. The purpose of the compliance monitoring program is to determine that hazardous constituent concentrations in groundwater continue to comply with the standards set by the Commission. In conjunction with a corrective action program, the licensee shall establish and implement a corrective action monitoring program. The purpose of the corrective action monitoring program is to demonstrate the effectiveness of the corrective action.”

**Comment No. 2C.** KUC states that because EPA MCLs are not available for naphthalene, 1, 1-dichloroethene, and 1,2,4-trimethylbenzene, no GPSs are being proposed for these contaminants. However, a review of Wyoming’s Drinking Water Equivalent Levels, Wyoming’s Voluntary Remediation Program, and EPA’s risk based concentrations (RBCs) indicates that concentrations for drinking water have been established for each of the aforementioned compounds. Also, a review of the groundwater data presented in the response to comments dated July 22, 2004, indicates that volatile organic compounds (VOCs) in addition to the compounds identified in the May 12, 2004 submittal are present in the groundwater near the catchment basin. As such, these VOCs should also be assigned GPSs. Accordingly, Table 1 (below) presents a list of suggested GPSs for inclusion into the KUC license including those presented by KUC in the May 12, 2004 submittal.

**Table 1  
Groundwater Protection Standards**

Parameter	Groundwater Protection Standard (mg/l)
1,1-Dichloroethane	3.0 (2)
1,1-Dichloroethene	0.007 (1)
DRO	10 (3)
GRO	10 (3)
Methyl Ethyl Ketone	1.6 (2)
Naphthalene	1.3 (2)
Toluene	1 (1)
1,1,1-Trichloroethane	0.20 (1)
1,2,4-Trimethylbenzene	0.012 (4)
1,3,5-Trimethylbenzene	0.012 (4)
m+p Xylenes	10 (1)

- (1) - EPA MCL
- (2) - Wyoming Drinking Water Equivalent Level
- (3) - Wyoming VRP, Fact Sheet 12
- (4) - EPA RBC - Tap Water

**Basis:** 10 CFR 40, Appendix A, Criterion 5B(5), gives the NRC authority to set groundwater protection standards for hazardous constituents in groundwater. Furthermore, in the November 30, 2000, NRC Regulatory Issue Summary 200-23, the NRC discussed that the Commission, in the SRM for SECY-99-0277, determined that the NRC has exclusive jurisdiction over both the radiological and non-radiological hazards of 11e.(2) byproduct material. Groundwater contamination, including organic compounds resulting from Sweetwater site activities, are classified as 11e.(2) byproduct material and must be properly addressed by implementing site groundwater protection standards due to their potential impact on water quality degradation and the environment.

**Comment No. 2D.** A review of the latest available groundwater monitoring information attached to the submittal of July 22, 2004, indicates that groundwater concentrations of aluminum, cadmium, iron, lead, manganese, and nickel are equal to or have exceeded either EPA MCLs or Wyoming's DWELs. The NRC requests that KUC investigate the background concentrations of these metals in groundwater because these metals could occur naturally and/or from site-derived waste.

**Basis:** 10 CFR 40, Appendix A, 5B(5), provides authority to the NRC to set groundwater protection standards for hazardous constituents in groundwater. Because the aforementioned metals could be naturally occurring, as well as site-derived, background concentrations of these metals must be assessed to determine if a groundwater protection standard is required.

### 3.0 CONCEPTUAL MODEL

**Comment No. 3.0** A review of the site-specific hydrogeology indicates that the hydrogeologic conceptual model for the site could be flawed. For example, in the report, "Evaluation of Aquifer Test Data", dated February 1997, a geologic cross-section through the tailings impoundment area indicates that the impoundment is isolated from the Battle Spring Aquifer, and the Battle Spring Aquifer is hydraulically isolated from the perched aquifer. The report also states that it is a leaky-confined aquifer. In addition, the "Revised Environmental Report," dated April 1995, states that "no fractures, joint patterns, or faults" have been observed in the area of the impoundment.

However, pretest water levels indicate that the piezometric surface of the Battle Spring Aquifer is actually within this aquifer itself. This condition indicates that the Battle Spring Aquifer is actually an unconfined aquifer. If it were a leaky confined aquifer, the piezometric surface would be above the top of the Battle Spring Aquifer, and the driving force for the leakage would be the difference in total head between the perched aquifer and the Battle Spring Aquifer. Furthermore, page 23, Item 1, of the aforementioned report states that, "The upper saturated sand responds to pumping like an unconfined aquifer, although the leaky-confined response may also be appropriate." It is not possible for aquifers to be leaky-confined and unconfined at the same time.

Furthermore, according to the aquifer test report, the vertical hydraulic conductivity of the rock units is approximately  $10E-6$  ft/min. Assuming a conservative vertical gradient and porosity of 0.03 and 0.3, respectively, the vertical groundwater velocity would be 0.053 ft/yr. For contamination to infiltrate to the top of the screened interval in TMW-102 (depth = 130 ft), it would require 2,500 years. However, as reported in the May 12, 2004, submittal, DRO contamination is currently 130 feet deep at the location of well TMW-102. This indicates that secondary porosity must be present within these units to allow water and contaminants to migrate vertically. Therefore, KUC needs to review the conceptual model to evaluate its accuracy and provide the NRC with any necessary revisions.

**Basis:** 10 CFR 40, Appendix A, Criterion 5G, states that in support of a tailings disposal system, the operator shall supply specific information including the characteristics of the underlying soils and geology as they will control transport of contaminants and solutions. Compliance with this criterion is not possible as long as conflicts exist between the conceptual model and aquifer test data.