December 6, 2004

Mr. John H. Ellis
President
Sequoyah Fuels Corporation
P.O. Box 610
Gore, OK 74435

SUBJECT: SEQUOYAH FUELS CORPORATION - MATERIALS LICENSE NO. SUB-1010 - REQUEST FOR ADDITIONAL INFORMATION - GROUND WATER CORRECTIVE ACTION PLAN (TAC L52528)

Dear Mr. Ellis:

The U.S. Nuclear Regulatory Commission (NRC) has completed a detailed technical review of your ground water flow and transport modeling as part of our review of Sequoyah Fuels Corporation's (SFC's) proposed Ground Water Corrective Action Plan (GWCAP) for the SFC facility in Gore, Oklahoma. Our review has identified deficiencies in the modeling; we will need the additional information identified in the enclosure in order for us to complete our review.

Additionally, we initiated our detailed technical review of other aspects of the GWCAP and have identified a deficiency in the information provided. Rather than wait until that review is complete, we are providing that request for additional information (RAI) along with the modeling RAIs. We will provide additional RAIs on the GWCAP after we complete our detailed technical review.

Within 30 days of the date of this letter, please either provide the requested information or a schedule to provide the information. If you have any questions concerning this letter please contact me at (301) 415-6629 or by e-mail at mhf1@nrc.gov.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice for Domestic Licensing Proceedings and Issuance of Orders," 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/reading-rm/adams.html.

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Sincerely,

/RA/

Myron H. Fliegel, Project Manager
Fuel Cycle Facilities Branch
Division of Fuel Cycle Safety
and Safeguards
Office of Nuclear Material Safety
and Safeguards

Docket No.: 40-8027
License No.: SUB-1010

Enclosure: Request for Additional Information

cc: William Andrews, USGS
Patricia Ballard, NRMNC
Michael Broderick, OK DEQ
Kelly Burch, Esq., OK AG
Will Focht, OSU
Alvin Gutterman, Esq., Morgan Lewis & Bockius
Pat Gwin, Cherokee Nation
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Craig Harlin, SFC
Jim Harris, USACE
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Charles Scott, USFWS
David Smit, OK DEQ
Rita Ware, EPA
Kim Winton, USGS
Merritt Youngdeer, BIA

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NAME	M. Fliegel		B. Garrett		R. Nelson	
DATE	12/6/04		12/3/04		12/6/04	

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Sequoyah Fuels Corporation
Ground Water Corrective Action Plan Review
Request for Additional Information

Ground Water Flow and Transport Modeling (MOD)

MOD1 **Flow Model Calibration**

The ground water flow model calibration appears adequate for steady-state conditions. The calibrated flow model can be applied to steady-state and non-pumping scenarios in transport modeling. It can also be used to simulate future steady-state and non-pumping ground water flow modeling scenarios. However, additional clarification is needed on the calibration procedures to support the basis for the modeling approach. The licensee should provide additional information of the following issues.

A. The recharge discussion (pp 85 - 86 of Hydrogeological and Geochemical Site Characterization Report - Volume 1 [Report]) needs additional clarification.

   1. Deep percolation (recharge) from excess irrigation waters on Bermuda grass is apparently added to the natural recharge in the Agland area. Deep percolation from irrigation in the Agland area should be explained more thoroughly in the report.

   2. The time period when leakage from the fire water system occurred in the Process Area should be discussed. Also, explain how the leakage volume was determined, and provide information on its annual variability.

B. The Evapotranspiration (ET) discussion (p 86 of the Report and Appendix I of the Report - Volume 2) needs additional clarification.

   1. The ET rate of 0.0 feet per day for the Process Area and Fertilizer Pond Area (Figure 8-10) needs to be discussed.

   2. The large ET rate (2.4×10^{-2} feet per day) for the Bermuda grass pasturelands, the Agland area, needs additional clarification. Also, an examination of the ET values in Appendix I for the three land uses does not always match the licensee's ET rates for these land uses. These variations should be discussed.

C. It appears that the high conductive cells are residual calibration parameters that were selected to improve the flow model calibration. The discussion pertaining to these cells in the Report (pp 90 - 91) indicates that their location and size significantly impacted the calibration of the ground water flow model. Provide information regarding attempts to add these cells at all wells screened in multiple layers. Additional discussion on the placement and size of these cells should be provided.

Enclosure

D. The licensee should provide a table or spread sheet of the observed ground water levels used to develop the target ground water levels that were used in the flow model calibration. Calibrating the flow model exclusively with target ground water levels may create a problem because some layers have only a few measured ground water levels and because the spatial distribution of measurements within some layers is restricted.

Basis:

The licensee's ground water flow calibration appears to have been significantly based upon modifying recharge, ET, leakage from the fire water system, and the high conductance cells to improve the overall calibration. The licensee could enhance its calibration credibility with respect to the recharge and ET parameters by calculating recharge, ET, and deep percolation (recharge) from excess irrigation using site-specific climatic, land use, and soil factors that are independent of the ground water flow model calibration. These calculated parameters and expert estimates should be used to bound the range of possible values for these parameters during the calibration. This will provide greater confidence in the calibration given that the calibration does not provide a unique solution.

MOD2 **Transport Model Calibration**

The ground water transport model calibration does not appear adequate for steady-state transport modeling. Additional justification or clarification is needed on the following issues:

A. The licensee is not consistent within the Report on whether additional source terms were added for the nitrate, uranium, or arsenic during the transport calibration. (The licensee's contractor has also indicated that no source terms were added during the transport model calibration.) The licensee needs to clarify whether additional concentrations of nitrate, uranium, or arsenic were added during the transport modeling calibration. Please refer to pages 97 through 100 of the Report. If additional source terms were added to the transport model, justify the use of these sources beyond the initial concentrations of nitrate, uranium, or arsenic already dissolved in the ground water.

Basis:

Adding source(s) at selected locations will impact the quality of the transport model calibration. It may also indicate that other transport parameters are not adequately modeled.

B. An evaluation of the chemographs for nitrate, uranium, and arsenic concentrations for various target wells (Appendix F in Volume 2) provides a predominantly poor match between observed and simulated concentrations. The licensee needs to provide additional explanation on how the chemographs were used in calibrating the transport model and why the transport model should be considered as adequately calibrated.

Basis:

In the Report, the licensee has indicated the following procedures for calibrating the transport model. The observed concentrations of nitrate, uranium, and arsenic were compared to simulated concentrations from the early 1990s through 1999 via chemographs. First, the dispersion and effective porosity were calibrated by comparing the observed to simulate nitrate concentrations in the transport model, where nitrate is modeled as conservative (Kd = 0). Then the licensee adjusted the Kd's for uranium and arsenic by comparing the observed to simulated values in the transport model.

The NRC staff qualitatively evaluated each chemograph for nitrate, uranium, and arsenic concentrations for the licensee's selected monitoring wells. The staff also plotted on these chemographs additional observed results from 2000 through 2003 and extended the simulated trends where appropriate. The chemographs were qualitatively evaluated by examining the degree of fit of the curves, the degree of comparison of the trends, and whether the simulated results tended to over or under estimate the observed results.

The NRC staff's qualitative evaluation of the nitrate, uranium, and arsenic chemographs indicated that about 2/3 of the chemographs were classified as unacceptable. This indicates that the dispersion and/or effective porosity need further adjustments. Also, the Kd's and/or source term for uranium and arsenic may need further adjustments. Therefore, the staff believes that the licensee's transport model calibration is not adequate.

MOD3 **Editorial and Technical Issues with the Report**

The text, tables, and figures in the Report - Volumes 1 and 2 should be reviewed for editorial and technical issues. The following are a few recommended revisions:

- Table 8-2 has errors. The Kz for the Terrace and Shale Unit 1 is 0.02 and not 0.002 ft/day.
- The recharge for the oak woodland is listed incorrectly in the legend for Figure 8-9. The recharge value should be 1.8 $x10^{-3}$ ft/day.
- The legend for Figure 7-13 incorrectly labels Extent Of Alluvium as the Extent Of Shale Unit.
- Figure 7-14, Conceptualized Hydrogeology, incorrectly lists the first unit under the surface cover as a sandstone when it is a shale.
- The units for many of chemical constituents in Table 5-6 are not listed.
- Table 5-9 incorrectly lists the units for uranium as mg/L instead of Fg/L.
- The text and some tables refer to the MCL for nitrate as 10 mg/L. The MCL for nitrate-nitrogen is 10 mg/L.

Ground Water Corrective Action Plan (CAP)

CAP1 SFC has not adequately demonstrated that its proposed ground water pumping strategy will capture ground water contamination. SFC must demonstrate that contamination will be captured and prevent contamination from migrating past recovery points. SFC must provide a hydraulic basis for the selection of these recovery locations.

Basis:

10 CFR Part 40, Appendix A, Criterion 5D, states that, “the objective of the program is to return hazardous constituent concentration levels in ground water to the concentration limits set as standards.” A basis must be provided that the ground water recovery strategy will recover contaminated ground water and prevent the spread of contamination beyond recovery points.