April 18, 2008

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

SUBJECT: SEQUOYAH FUELS CORPORATION - MATERIALS LICENSE NO. SUB-1010 OPEN ISSUE AND CONFIRMATORY ITEMS REGARDING GROUNDWATER CORRECTIVE ACTION PLAN (TAC J52528)

Dear Mr. Ellis:

By letter dated June 16, 2003, you submitted a proposed Groundwater Corrective Action Plan (CAP) for the Sequoyah Fuels Corporation's (SFC's) Gore, Oklahoma site. The U.S. Nuclear Regulatory Commission (NRC) staff reviewed the CAP and issued a request for additional information (RAI) by letter dated September 28, 2005. SFC responded to this RAI by letter dated December 16, 2005. NRC staff has completed a detailed technical review of the CAP, and has identified 11 open issues that must be resolved before we can approve SFC's groundwater CAP. Additionally, we have identified 3 confirmatory items that must also be addressed by SFC. A description of the open issues and confirmatory items is enclosed.

If you would like to set up a conference call or meeting, or if you have any questions concerning this letter, please contact me at (301) 415-6664 or by e-mail at klk@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.

Sincerely,

/RA/

Ken Kalman, Project Manager
Materials Decommissioning Branch
Division of Waste Management
and Environmental Protection
Office of Federal and State Materials
and Environmental Management Programs

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

Enclosure: Open Issues and Confirmatory Items

cc: see attached list

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Michael Broderick, OK DEQ
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cc: see attached list

ML080940704

OFC	DWMEP	DWMEP	DWMEP/LA	DWMEP	DWMEP/BC
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DATE	04/04/08	04/08/08	04/09/08	4/18/08	04/17/08

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OPEN ISSUES

1. Sequoyah Fuels Corporation (SFC) needs to confirm the validity of the 2006 uranium isoconcentration map and explain why uranium contamination has migrated farther to the south, if the map is accurate.

U.S. Nuclear Regulatory Commission (NRC) staff reviewed isoconcentration surface maps from October 2002 [Figure 100 from SFC, 2005] and 2006 [Figures 11, 14, and 18 from SFC, 2007] to assess the migration of contaminants under the current conditions. A comparison of the October 2002 and 2006 uranium isoconcentration maps indicates that uranium concentrations have spread substantially in the Terrace/Shale 1 system. In 2002, most of the uranium contamination occurred in the processing area; however, in 2006, low concentrations (above 30 µg/l) appear south of the decorative pond near the Fertilizer Pond area. A review of the Shale 3, 2006 uranium isoconcentration map indicates that sufficient data may not be available to extend the isoconcentration lines toward the Fertilizer Ponds. SFC must confirm that the 2006 map represents uranium groundwater contamination at the site. If not, SFC must revise the 2006 map. If it does, SFC must explain why uranium contamination has migrated farther south than originally anticipated.

2. SFC needs to confirm that the 2006 nitrate isoconcentration map is accurate and explain why nitrate contamination is migrating easterly.

A comparison of the arsenic isoconcentration maps from October 2002 [Figure 113 from SFC, 2005] and 2006 [Figures 8, 12, 15, and 19 from SFC, 2007] indicate that arsenic contamination has spread substantially to the southern portion of the site. The 10,000-ug/l concentrations of 2002 no longer appear in 2006. Arsenic concentrations in the northern Processing Area appear to higher in 2006 than in 2002, which do not correspond to model predictions [Figure 113 from SFC, 2005]. However, the center of mass of the plume does appear to be migrating west according to model predictions.

A comparison of the nitrate isoconcentration maps from October 2002 [Figure 108, SFC, 2005] and 2006 [Figures 10, 13, 17, and 20, SFC, 2006] indicates that the nitrate plume appears to be spreading slightly east, as well as west. This may be an unintended artifact of the contouring process; therefore, SFC must confirm the 2006 nitrate isoconcentration map to ensure its accuracy. Otherwise, SFC must explain why nitrate concentration is migrating eastward.

3. SFC needs to address nitrate contamination in the southern portion of the site.

Capture zone data was provided by SFC in the form of particle tracking analyses from its groundwater flow model (SFC, 2005). Particle tracking traces, in a computer model, particles of groundwater from one location to another and is used to assess flow paths and capture zones for groundwater extraction structures (i.e., wells and trenches). Attachment CAP2B in the December 2005 response to NRC staff's Request for Additional Information (RAI) (SFC, 2005) presents capture zones for all wells and trenches based on SFC's particle tracking data.

A review of these figures indicates that SFC placed groundwater recovery trenches and wells at strategic locations to take advantage of natural groundwater flow patterns. However, the spacing between trenches MW-95 and 005 is approximately 305 m (1000 ft); therefore, some contamination will likely pass between the trenches and subsequently migrate offsite. Furthermore, no remediation is being performed or proposed in the southern portion of the site near the Fertilizer ponds. Nitrate contamination is extensive in this area, and the lack of groundwater remediation in this area will allow concentrations of nitrates well above the groundwater protection standard (GPS) to flow into the Illinois River. SFC must state how it intends to address the nitrate contamination in the southern portion of the site.

4. SFC needs to provide an initial estimate of the mass of groundwater contamination that entered the subsurface.

In addition to hydraulic effectiveness, remediation structures must be capable of actually removing contaminant mass. SFC has measured mass removal during the operation of the remediation structures by measuring volume of water removed and analyzing samples to obtain the contaminant concentrations in extracted water. According to its records, SFC has removed 20 lbs of uranium, 5,645 lbs of nitrate, and 0.3 lbs of arsenic between January 2004 and September 2005 (SFC, 2005). SFC did not provide any initial estimates of contaminant mass in the aquifer; consequently, NRC staff cannot determine the relative amount of contaminant mass removed. SFC must provide an estimate of initial contaminant mass in the aquifer and the basis for its estimate.

5. SFC needs to provide stream measurements or modeled stream flows for use in verifying the groundwater model.

SFC calibrated the groundwater flow model with steady-state conditions that represent the hydrogeologic and operational conditions at the site in 2002. SFC also evaluated the calibration of the groundwater flow model by comparing calculated stream flow at Streams 001, 004, 005, and 007 to the simulated flow at these stream cells. The NRC staff is concerned that the calculated stream flows based upon the empirical model in the Hydrogeologic Site Characterization Report (HGSCR) have limited usefulness. These calculated flows should not be used to support or reject the calibration of the revised model. Instead, SFC must measure flows at these streams or use a hydrologic model to estimate stream flows for use in comparisons with simulated discharges from MODFLOW.

6. SFC needs to clarify whether or not the predictive modeling assumes that active corrective actions will occur over the entire compliance period and whether or not this assumption is valid.

The purpose of predictive groundwater flow and transport modeling was to estimate the effects of remedial actions on long-term contaminant transport and the concentrations of COCs at receptor locations during the 1000-year compliance period. A review of the March 2005 RAI response indicates that SFC assumes that active corrective actions will be ongoing for the entire compliance period. If that is correct, SFC will need to revise its analyses to model active corrective actions for a more reasonable period. Note that the license cannot be terminated and the site transferred to the U.S. Department of Energy (DOE) while active corrective actions are being undertaken. Therefore, SFC must clarify whether or not the predictive modeling assumes that active corrective actions will occur over the entire compliance period and whether or not this

assumption is valid. Until such confirmation, NRC staff cannot assess the validity of the long-term predictions.

7. SFC needs to perform a thorough check of the input files for all its predictive runs. If revisions are made, SFC needs to rerun the nitrate predictive transport. 5.3.1

Staff reviewed several of the input files for both the flow and transport models in the predictive model for the constituents of concern (COCs). A few input files appear to have been incorrectly used. The nitrate predictive groundwater flow model has the original calibration K values for Layers 2 through 5 instead of the revised calibration K values (Table 9). Also, the uranium predictive groundwater flow model contains the incorrect Kz values for Layers 2 through 4, which is not a significant problem. However, incorrect K values for the nitrate predictive groundwater flow model present a more significant problem. The licensee, therefore, should rerun the nitrate predictive transport model using the appropriate K values. Also, the licensee should perform a thorough check of the input files used for all its predictive model runs and provide the NRC staff confirmation that correct files were used or revise the model.

8. SFC needs to state whether the assumptions used still apply with the revised transport model. SFC also needs to discuss how it handled the constant nitrate source terms in the calibration transport model within the revised predictive transport modeling.

SFC needs to clarify its predictive model assumptions for the transport model, which are as follows:

> Decommissioning activities will not remove the poorly constructed multi-unit screened wells that are simulated with the HCCs
>
> Any existing COC source material above the water table will be totally remediated and the only remaining source material is dissolved in the groundwater or permanently sorbed to the rock materials below the water table.

SFC needs to state whether these assumptions still apply with the revised transport model and if not, it must revise the model. SFC also needs to discuss how it handled the constant nitrate source terms in the calibration transport model within the revised predictive transport modeling.

9. SFC must demonstrate that the model does not underestimate uranium migration velocity from the Industrial Area in light of the conflicts between the 2006 uranium monitoring data and model simulations. 5.3.2

A review of uranium isoconcentration maps in the 2006 annual groundwater monitoring report (SFC, 2007) indicates that uranium above 30 µg/L has migrated approximately 457 m (1500 ft) south of the Decorative Pond to the Fertilizer Ponds. Such migration does not correlate with the 5-year uranium isoconcentration map (Figure 101, MFG, 2005) that shows uranium is a short distance south of the Decorative Pond. In the northern portion of the Industrial Area, 2006 data indicates that contamination has spread over a wider area than that represented on the five-year map. These conflicts may indicate that the model underestimates uranium migration velocity from the Industrial Area. SFC must address these conflicts between the model and actual groundwater monitoring data.

10. SFC must compare the 2006 nitrate data to the predicted 5-year isoconcentration map and discuss the validity of the model. Results should be presented in maps with comparable contour intervals.

According to the HGSCR, nitrate contamination in the streams does not exceed the 10 mg/l GPS during the compliance period. Although, contamination apparently decreases to levels below the GPS at the points of exposure (POEs), much of the nitrate contamination is allowed to migrate offsite in concentrations of hundreds of mg/l. Allowing such contaminant migration does not comply with the requirements in 10 CFR 40, Appendix A.

NRC staff attempted to compare the 2006 data to the five-year nitrate isoconcentration map (Figure 109, MFG, 2003); however, the contour intervals were too different to render valid conclusions. SFC should compare the 2006 nitrate data with the five-year modeled concentrations to determine if the predictive model results are valid.

11. SFC needs to correct model input errors.

SFC committed to revising the HGSCR to include the latest version of the groundwater model. In addition to the groundwater model, SFC should include the new calibration procedures committed to in its March 15, 2005, letter in response to NRC's RAI, dated December 6, 2004. SFC must also perform a thorough review of files used in the calibration of the groundwater flow and transport models and in running the predictive groundwater flow and transport models to confirm that the appropriate files were used in each model. Several errors were observed with model input files during our evaluation of these models.

CONFIRMATORY ITEMS

1. SFC must properly label the potentiometric surfaces in the map provided in attachment CAP3B-1 from the December 2005 RAI Response.

2. SFC must provide a table that presents the changes made to the groundwater flow and transport models.

3. SFC must update the HGSCR to include the latest groundwater flow and transport models.