

August 22, 2005

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

SUBJECT: AMENDMENT 31 - SEQUOYAH FUELS CORPORATION - MATERIALS  
LICENSE NO. SUB-1010 - APPROVAL OF REQUEST TO AUTHORIZE A  
GROUNDWATER COMPLIANCE MONITORING PLAN (TAC L52529)

Dear Mr. Ellis:

This letter is in response to Sequoyah Fuels Corporation's (SFC's) letters, dated June 12, 2003, and February 25, 2005, requesting that the U.S. Nuclear Regulatory Commission (NRC) amend Source Materials License No. SUB-1010 to authorize implementation of SFC's proposed Groundwater Monitoring Plan (GWMP). Condition 49 of your license required the submittal of a GWMP.

Based on its review of the request and its independent analysis, the staff concludes that the proposed GWMP is acceptable with several conditions. These conditions were discussed with SFC's vice-president, Craig Harlin, by telephone on August 12, 2005, and he agreed to them. The basis for the staff's approval is documented in a Technical Evaluation Report, provided as Enclosure 1. Additionally, the staff completed an Environmental Assessment (EA) which led to a finding of no significant impact. A copy of the EA was sent to you on August 9, 2005. Your license has therefore been amended to include the authorization you requested. A copy of Amendment 31 of your license is provided as Enclosure 2.

If you have any questions concerning this letter, please contact the NRC project manager, Dr. Myron Fliegel, at (301) 415-6629 or via e-mail to [mhf1@nrc.gov](mailto: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>.

Sincerely,

**/RA/**

Gary S. Janosko, Chief  
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

Enclosures:

1. Technical Evaluation Report
2. License Amendment No. 31

cc: William Andrews, USGS  
Michael Broderick, OK DEQ  
Kelly Burch, Esq., OK AG  
Will Focht, OSU  
Alvin Gutterman, Esq., Morgan Lewis & Bockius  
Pat Gwin, Cherokee Nation  
Jeannine Hale, Esq., Cherokee Nation  
Craig Harlin, SFC  
Jim Harris, USACE  
Troy Poteete, Cherokee Nation  
Charles Scott, USFWS  
Saba Tahmassebi, OK DEQ  
Rita Ware, EPA  
Robert Welsh, OK DEQ  
Kim Winton, USGS  
Merritt Youngdeer, BIA

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Closes TAC L52529

**ML052280163**

\*See previous concurrence

<b>OFC</b>	FCFB		FCFB		FCFB		FCFB	
<b>NAME</b>	MFliegel*	BGarrett		RNelson		GJanosko		
<b>DATE</b>	08/16/05	08/16/05		08/17/05		08/22/05		

TECHNICAL EVALUATION REPORT  
SEQUOYAH FUELS CORPORATION  
REQUEST TO AMEND LICENSE TO AUTHORIZE  
A GROUNDWATER COMPLIANCE MONITORING PLAN

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

DATE: May 18, 2005

FACILITY: UF<sub>6</sub> conversion plant, Gore, Oklahoma

LICENSEE: Sequoyah Fuels Corporation  
P.O. Box 610  
Gore, Oklahoma, 74435

TECHNICAL REVIEWER: William von Till

PROJECT MANAGER: Myron Fliegel

**SUMMARY AND CONCLUSIONS:**

By letter dated June 12, 2003, Sequoyah Fuels Corporation (SFC) submitted a groundwater monitoring plan (GWMP) for its Gore, Oklahoma site. Submittal of a GWMP was required by license condition 49 of SFC's license. As a result of requests for additional information by, and other interactions with, NRC staff, SFC submitted a revised GWMP on February 25, 2005.

The staff used 10 CFR Part 40, Appendix A, Criterion 5 and 7, and 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," Final Report (June, 2003) to review SFC's proposed GWMP. In addition, several site visits were made as part of this review. The staff concludes that SFC's February 25, 2005, submittal is adequate for a groundwater compliance monitoring plan and recommends approval.

**PURPOSE/LICENSEE REQUEST:**

The purpose of this licensing action is the following:

1. Determine hazardous constituents in groundwater as a result of licensed activities.
2. Develop groundwater protection standards for hazardous constituents.
3. Develop a groundwater compliance monitoring program. This consists of monitoring locations, monitoring frequency, and monitoring parameters.

For NRC to approve the licensee's request, it must conclude that the proposed GWMP satisfies those three items.

## **BACKGROUND:**

The SFC facility operated as a uranium conversion facility, but has not operated since 1993. As a uranium conversion facility, SFC was authorized to possess and use source material. NRC's regulatory authority over source material, which consists of uranium and thorium, does not extend to the non-radioactive constituents that contaminated the soil and groundwater at the SFC site. In 1993, the U.S. Environmental Protection Agency (EPA) issued an Administrative Order on Consent (AOC) that required monitoring of the groundwater. Results of the groundwater monitoring under the AOC have been submitted to NRC and EPA annually.

In 2002, the Commission, in response to a request from SFC, determined that most of the waste at the SFC site can be classified as 11e.(2) byproduct material and the license was amended to reflect that change in classification and to add several license conditions necessitated by the change to an 11e.(2) site. One of the conditions added to the license was a requirement that SFC submit a GWMP, which SFC did on June 12, 2003.

## **HYDROGEOLOGY:**

The hydrogeology is complex at this site. The site is underlain by fill material, and quaternary-age terrace deposits which consist of clay and silts, with lesser amounts of sandy silts, silty clays, gravelly silts, gravelly clays, and silty sandy clays. These terrace deposits range from 0 to 16.5 feet thick, averaging about 8 feet under the process area. Alluvium can be found primarily in the southwest portions of the site and consists of silt, silty clay, and sandy gravel, with lesser amounts of silty sand and gravel. Alluvium thickness ranges from 0 to greater than 35 feet, with the greater thickness found near the western extent of the site. Colluvium deposits include all unconsolidated sediment not identified as either terrace or alluvium deposits. These consist of fluvial deposits along smaller streams and outflows, subaerial sediment gravity flows and mass waste deposits. Colluvium thickness ranges from 0 to over 20 feet but are mostly under 6 feet.

Beneath the fill, terrace, alluvium, and colluvium sediments are the geologic units of the Atoka Formation. In order of descending stratigraphic position, the units are: Unit 1 Shale, Unit 1 Sandstone, Unit 2 Shale, Unit 2 Sandstone, Unit 3 Shale, Unit 3 Sandstone, Unit 4 Shale, Unit 4 Sandstone, and Unit 5 shale. The thickness of these alternating shales and sandstones is approximately 390 feet in monitoring well 2331 but varies depending on erosion. Detailed descriptions of these units can be found in SFC's submittals. Of significance to this action is that the shales are the water bearing units and the sandstones act as aquitards due to cementing.

For the compliance purposes there are five units: Terrace/Shale 1, Shale 2, Shale 3, Shale 4, and Shale 5. Each of these units has been impacted by site derived groundwater contamination. Regional groundwater flow in the area is generally westward towards the Illinois or Arkansas Rivers; however, a groundwater mound exists at the eastern portion of the process area. This mound causes groundwater to flow in several directions in that portion of the site.

One important hydrogeologic feature of the site is several groundwater seeps. A number of seeps occur downgradient from (and to the west of) the processing area, where the shale units outcrop due to erosion. These are important monitoring points due to potential exposure and are key hydrogeologic features due to groundwater discharge of water bearing units.

## CONSTITUENTS OF CONCERN:

SFC has identified the following constituents that are reasonably expected to be present in the materials processed at the site: antimony, arsenic, barium, beryllium, cadmium, chromium, fluoride, lead, mercury, molybdenum, nickel, nitrate, radium-226, selenium, silver, thallium, thorium-230, uranium, trichloroethane, trichlorofluoromethane, and PCBs. Mercury, silver, trichloroethane, trichlorofluoromethane, and PCBs have been eliminated from the list because they have not been detected in the groundwater in significant concentrations. However, SFC has proposed groundwater protection standards for mercury and silver; therefore, they will remain as hazardous constituents.

SFC has identified antimony, arsenic, barium, beryllium, cadmium, chromium, fluoride, lead, mercury, molybdenum, nickel, nitrate, radium-226, selenium, silver, thallium, thorium-230, and uranium as constituents of concern or hazardous constituents. However, the main constituents with sizable groundwater contaminant plumes are arsenic, nitrate, fluoride, and uranium.

## REGULATORY FRAMEWORK:

10 CFR Part 40, Appendix A, Criteria 5 and 7, outline requirements for groundwater compliance monitoring for a Part 40 licensee such as SFC. Criterion 5B(1) states that:

*“Hazardous constituents entering the groundwater from a licensed site must not exceed the specified concentration limits in the uppermost aquifer beyond the point of compliance during the compliance period.”*

Hazardous constituents are determined under Criterion 5B(2), which states:

*“A constituent becomes a hazardous constituent subject to paragraph 5B(5) only when the constituent meets all three of the following tests:*

- (a) The constituent is reasonably expected to be in or derived from the byproduct material in the disposal area;*
- (b) The constituent has been detected in the groundwater in the uppermost aquifer; and*
- (c) The constituent is listed in Criterion 13 of this appendix.”*

Criterion 5B(5) states that:

*“At the point of compliance, the concentration of a hazardous constituent must not exceed-*

- (a) The Commission approved background concentration of that constituent in the groundwater;*
- (b) The respective value given in the table in paragraph 5C if the constituent is listed in the table and if the background level of the constituent is below the value listed; or*
- (c) An alternate concentration limit established by the Commission.”*

Criterion 7A states that:

*“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 the 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 actions.”*

As hazardous constituents have been detected in the groundwater from licensed activities at the time of this review, SFC must proceed directly to a groundwater compliance program. Additionally, site standards established as a result of this action have been exceeded, necessitating a corrective action plan. SFC has submitted a proposed groundwater corrective action plan which is being reviewed separately from this action.

Guidance used in this review was NUREG-1620 entitled “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,” Final Report, June, 2003. Specifically, section 4.0 “Protecting Water Resources” was used.

#### **TECHNICAL EVALUATION:**

SFC initially submitted its proposed GWMP on June 12, 2003. NRC staff review of that document led to a request for additional information (RAI) on October 31, 2003. SFC responded to the RAI on January 5, 2004. Staff review of the SFC responses resulted in a second RAI, on August 17, 2004. SFC responded in two phases: on October 29, 2004, and on December 30, 2004. On February 25, 2005, SFC submitted a revised version of the GWMP, incorporating information and revisions from the responses to the RAIs.

#### **Hazardous Constituents**

Based on SFC’s submittals, staff concludes that the following parameters will be designated as hazardous constituents per 10 CFR Part 40, Appendix A, Criterion 5B(2):

Antimony, arsenic, barium, beryllium, cadmium, chromium, fluoride, lead, mercury, molybdenum, nickel, nitrate, radium-226, selenium, silver, thallium, thorium-230, and uranium.

Staff has found SFC’s basis for excluding other potential constituents as hazardous constituents acceptable.

## GROUNDWATER PROTECTION STANDARDS:

Based on SFC's submittals, staff concludes that the following groundwater protection standards should be implemented at the site:

Hazardous Constituent	Groundwater Standard	Type of Standard
Antimony, mg/L	0.0060	ACL
Arsenic, mg/L	0.01	MCL
Barium, mg/L	1.0	ACL
Beryllium, mg/L	0.004	ACL
Cadmium, mg/L	0.01	MCL
Chromium, mg/L	0.05	MCL
Fluoride, mg/L	4.0	ACL
Lead, mg/L	0.05	ACL
Mercury, mg/L	0.002	MCL
Molybdenum, mg/L	0.0012	Background
Nickel, mg/L	0.023	Background
Nitrate, mg/L	10	ACL
Combined Radium-226 and 228, pCi/L	5	MCL
Selenium, mg/L	0.01	ACL
Silver, mg/L	0.05	MCL
Thallium, mg/L	0.005	Background
Thorium-230, pCi/L	1.2	Background
Uranium, ug/L	30	ACL

Table 6 of the GWMP summarizes information used for groundwater protection standards or corrective action goals. Note that the staff recommends that the arsenic groundwater standard be 0.01 mg/L in concert with EPA's maximum contaminant level (MCL) revision from 0.05 to 0.01 mg/L and that the radium standard be for combined radium 226 and 228 to be consistent with Table 5C of part 40, Appendix A.

The staff concludes that the MCLs and background standards are acceptable based on the regulations and guidance. Parameters listed as alternate concentration limits (ACLs) have been derived from the EPA National Primary Drinking Water regulations. However, as they are not listed in Table 5C of 10 CFR Part 40, Appendix A, and the concentrations are above

background levels, these standards must be implemented as ACLs. Since the EPA has already conducted comprehensive studies, and rulemaking, including public comment periods, to derive these concentrations, the staff considers these ACLs to be protective as groundwater standards. EPA considers that levels below these Primary Drinking Water levels to be safe for public consumption. As low as reasonably achievable (ALARA) and technical alternative aspects of the ACL criteria are not applicable due to the requirement for SFC to perform corrective action at the site and that these EPA drinking water standards are ALARA.

#### **GROUNDWATER COMPLIANCE MONITORING PROGRAM:**

The proposed groundwater monitoring program is found in Table 4 of the proposed GWMP. The staff has reviewed the monitoring locations, parameters, and frequency, which have been revised from earlier versions in response to staff comments, and concludes that SFC's proposal is acceptable. One of the staff issues related to the sampling of seeps. The staff, along with the Cherokee Nation and the State of Oklahoma, concluded that these seeps must be sampled due to potential exposure at the seep locations and that these seeps are the natural groundwater discharge points from the water bearing units. SFC has adequately addressed these concerns.

#### **STAKEHOLDER INTERACTION:**

A number of meetings, site visits, and teleconferences were held with personnel from the Cherokee Nation, the State of Oklahoma, and EPA in support of this review. During these communications, the staff received comments from the stakeholders and took the comments into consideration in several RAIs.

#### **RECOMMENDED REVISIONS TO THE LICENSE:**

Based on its review, the staff recommends that License Condition 49 be revised to the following:

49. The licensee shall implement a ground-water compliance monitoring program containing the following:

- A. Implement a groundwater compliance monitoring program as described in the licensee submittal dated February 25, 2005. All sampling points identified in table 4 of that submittal shall be designated as compliance points and are subject to part B of this condition.
- B. Comply with the following ground-water protection standards at compliance points designated in part A of this license condition.

Antimony = 0.006 mg/L, arsenic = 0.01 mg/l, barium = 1.0 mg/l, beryllium = 0.004 mg/l, cadmium = 0.01 mg/l, chromium = 0.05 mg/l, fluoride = 4.0 mg/L, lead = 0.05 mg/l, mercury 0.002 mg/L, molybdenum = 0.0012 mg/l, nickel = 0.023 mg/l, nitrate = 10 mg/l, combined radium-226 and 228 = 5.0 pCi/l, selenium = 0.01 mg/l, silver = 0.05 mg/L, thallium = 0.005 mg/L, thorium-230 = 1.2 pCi/l, and uranium = 0.03 mg/l.

- C. Submit, by April 1 of each year, a groundwater compliance monitoring summary report, including a table of results, groundwater contour maps, and groundwater

isoconcentration maps for arsenic, fluoride, nitrate, and uranium.

**REFERENCES:**

Ellis, John H., *Sequoyah Fuels Corporation, Docket - 40-8027, Request for Additional Information - Groundwater Monitoring Plan*, January 5, 2004, ML040090146.

Ellis, John H., *Sequoyah Fuels Corporation, Docket - 40-8027, Response to Second Request For Additional Information - Ground Water Monitoring Plan (TAC L52529)*, October 29, 2004, ML043140355.

Ellis, John H., *Sequoyah Fuels Corporation, Docket - 40-8027, Response to Second Request For Additional Information - Ground Water Monitoring Plan (TAC L52529)*, December 30, 2004, ML050210282.

Fliegel, Myron H., *Sequoyah Fuels Corporation - Materials License no. SUB-1010 - Request for Additional Information - Ground Water Monitoring Plan (TAC # L52529)*, October 31, 2003, ML033080355.

Fliegel, Myron H., *Sequoyah Fuels Corporation - Materials License no. SUB-1010 - Second Request for Additional Information - Ground Water Monitoring Plan (TAC # L52529)*, August 17, 2004, ML042330768.

Sequoyah Fuels Corporation, *Groundwater Monitoring Plan, Sequoyah Facility, May 2003*, June 12, 2003, ML031810551.

Sequoyah Fuels Corporation, *Groundwater Monitoring Plan, Sequoyah Facility, February 2005*, February 25, 2005, ML050680226.

U.S. Nuclear Regulatory Commission, NUREG-1620, Rev. 1, *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*, Final Report, June, 2003.