



UNITED STATES  
**NUCLEAR REGULATORY COMMISSION**  
REGION IV  
1600 EAST LAMAR BLVD  
ARLINGTON, TEXAS 76011-4511

August 27, 2012

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

SUBJECT: NRC INSPECTION REPORT 040-08027/12-002

Dear Mr. Ellis:

This refers to the inspection conducted on August 1-3, 2012, at your Sequoyah Fuels Corporation site located near Gore, Oklahoma. This inspection was an examination of activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. Within these areas, the inspection consisted of selected examination of procedures and representative records, observations of activities, and interviews with personnel. The enclosed report presents the results of this inspection. No violations were identified, and no response to this letter is required.

The inspectors noted that you had installed a geomembrane felt cover and planted vegetation on top of the Phase I and II areas to temporarily control erosion on the disposal cell. During the inspection, the geomembrane felt cover was not in good condition in some areas, and subsidence was apparent in other areas due to poor compaction of the soil beneath the felt cover. The inspectors discussed your plans for the geomembrane cover and vegetation, and you stated that it was your intention to remove the felt cover and vegetation, and to re-grade the soil, prior to construction of the final cover. If you decide to leave the cover and vegetation in place, the NRC expects you to conduct a technical analysis to ensure that the felt cover and vegetation will not have an impact on the performance of the final cover. The NRC staff will review your decision regarding the final disposition of the felt cover and vegetation during a future inspection.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response, if you choose to provide one, will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's Agencywide Documents Access and Management System (ADAMS), accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>. To the extent possible, your response should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the Public without redaction.

Should you have any questions concerning this inspection, please contact Mr. Robert Evans, Senior Health Physicist, at 817-200-1234 or the undersigned at 817-200-1191.

Sincerely,

**/RA/**

D. Blair Spitzberg, PhD, Chief  
Repository and Spent Fuel Safety Branch

Docket: 040-08027

License: SUB-1010

Enclosure:

NRC Inspection Report 040-08027/12-002

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U.S. NUCLEAR REGULATORY COMMISSION  
REGION IV

Docket: 040-08027

License: SUB-1010

Report: 040-08027/12-002

Licensee: Sequoyah Fuels Corporation

Location: P.O. Box 610  
Gore, Oklahoma

Dates: August 1-3, 2012

Inspectors: Robert Evans, PE, CHP, Senior Health Physicist  
Repository and Spent Fuel Safety Branch

Zahira L. Cruz, Geotechnical Engineer  
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Approved by: D. Blair Spitzberg, PhD, Chief  
Repository and Spent Fuel Safety Branch

Attachment: Supplemental Inspection Information

Enclosure

## **EXECUTIVE SUMMARY**

### Sequoyah Fuels Corporation NRC Inspection Report 040-08027/12-002

This inspection was a routine, announced inspection of decommissioning activities being conducted at the Sequoyah Fuels Corporation site in Gore, Oklahoma. Overall, the licensee was conducting decommissioning activities in accordance with the NRC-approved reclamation plan.

#### **Management Organization and Control**

- The licensee had sufficient staff to conduct decommissioning work and to ensure compliance with license requirements. The licensee was implementing its performance-based license condition in accordance with license requirements (Section 1.2).

#### **Radiation Protection**

- The licensee conducted its radiation protection program in accordance with the requirements of 10 CFR Part 20 and the license (Section 2.2).

#### **Onsite Construction**

- The licensee was constructing the disposal cell in accordance with license requirements (Section 3.2).

#### **Radwaste Management/Low Level Radioactive Waste Storage**

- The licensee was staging and storing radioactive waste material in accordance with license requirements (Section 4.2).

## **Report Details**

### **Summary of Plant Status**

At the time of the inspection, the licensee was conducting site decommissioning in accordance with the NRC-approved reclamation plan. The licensee commenced with site decommissioning during April 2009. To decommission the site, the licensee plans to dismantle and remove systems and equipment, demolish structures, treat site sludges and sediments, remediate contaminated soils, and treat wastewater. Most of the residual waste material will be placed in an onsite disposal cell for permanent disposal.

The disposal cell will be constructed in three phases. At the time of this inspection, the licensee had filled both the Phase I and Phase II areas with waste material. Because the licensee needed additional space to temporarily stage contaminated material destined for disposal, the licensee slightly overfilled both the Phase I and II areas with material. At some future date, the licensee will relocate this excess material to the Phase III area of the disposal cell.

During the inspection, the licensee was excavating the footprint of the Phase III disposal cell, in preparation for construction of the base of this portion of the cell. After excavation, the licensee plans to conduct a demonstration survey to confirm that the area meets the radiological limits established in the license. After the survey, the licensee plans to backfill the excavated area and construct the base of this portion of the cell. Other work in progress included reclamation of the former sanitary lagoon and excavation of the solvent extraction building subsurface area.

The remaining site structures within the radiologically restricted area included the eastern end of the former main processing building, water treatment facility, oil storage building, and laundry building. Since the previous inspection, the licensee demolished and disposed of the former evaporator. The licensee still has to reclaim and dispose of the subsurface structures and soils around the building foundations.

The licensee continued to store equipment that had been salvaged from the former DUF<sub>4</sub> (depleted uranium tetrafluoride) building. The salvaged equipment was being temporarily stored in the eastern end of the former main process plant. The salvaged equipment included electrical switchgear and contaminated process equipment. The licensee plans to transfer this material to a different NRC licensee in the future.

Prior to demolition of the western portion of the main process building, the licensee recovered yellowcake material from the process systems. The licensee was storing this yellowcake material in drums in the eastern portion of the main process building pending transfer to an out-of-state facility. The licensee also recovered some DUF<sub>4</sub> material prior to demolition of the DUF<sub>4</sub> building. This material was also being stored in the main processing building pending offsite transfer.

## **1 Management Organization and Controls (88005)**

### **1.1 Inspection Scope**

The inspectors reviewed management organization and controls to ensure that the licensee was maintaining effective oversight of decommissioning activities.

## 1.2 Observations and Findings

### a. Organizational Staffing

The organizational structure is provided in Section 11.1 and Figure 2-1 of the license application. At the time of the inspection, the primary plant staff consisted of five individuals: the president, environmental/health and safety manager, senior health and safety technician, decommissioning and decontamination project supervisor, and administrative assistant. The licensee also received part-time support from the director of regulatory affairs.

The licensee used contractors for quality assurance oversight, geotechnical support, cell construction, radiation safety support, and miscellaneous site maintenance activities as needed. The number of contractors ranged from about 25-35 per day, depending on the work in progress. The inspectors concluded that the licensee had sufficient staff to ensure compliance with license and regulatory requirements.

### b. Performance-Based License Review

In accordance with License Condition 54, the licensee is authorized to make changes to the license application, including the reclamation plan, under certain instances. The inspectors reviewed the licensee's implementation of its performance-based license. The licensee had completed four technical reviews during 2012.

The licensee's reviews included four changes to the construction technical specifications and one change to the construction plan. The licensee also documented one deviation from technical specifications involving the use of onsite sand with different physical characteristics.

The approved changes included use of clean soil in the disposal cell construction, use of crushed concrete as sub-base fill material, and clarification of the sequence of material placement. The inspectors discussed the changes with the licensee. The inspectors concluded that none of the changes required prior NRC approval.

The licensee also submitted its first annual summary to the NRC, as required by License Condition 54.e, by letter dated February 22, 2012. The inspectors reviewed the annual report and confirmed that the required information had been presented in the report.

## 1.3 Conclusions

The licensee had sufficient staff to conduct decommissioning work and to ensure compliance with license requirements. The licensee was implementing its performance-based license conditions in accordance with license requirements.

## 2 **Radiation Protection (83822)**

### 2.1 Inspection Scope

The inspectors examined the licensee's radiation protection program for compliance with license and 10 CFR Part 20 requirements.



## 2.2 Observations and Findings

The inspector reviewed the licensee's occupational exposure records for the first half of 2012. Exposure monitoring consisted of a combination of external monitoring, internal monitoring, and bioassays. The licensee monitored 41 individuals during 2012, and the highest dose was 0.198 rem (0.00198 sievert) with a regulatory limit of 5 rem (0.05 sievert).

To monitor for external exposures, thermoluminescent dosimeters were assigned to certain individuals based on work activities. During 2012, the licensee assigned dosimeters to contract workers who were conducting building demolition work. The licensee exchanged the dosimeters quarterly. The highest external exposure for 2012 was 0.021 rem (0.00021 sievert).

In accordance with License Condition 51, the licensee monitored internal exposures using breathing zone/lapel air samplers. The licensee measured the derived air concentration-hours to which individuals were exposed. The highest internal doses were associated with Pond 2 reclamation work due to the licensee's use of the thorium-230 effluent concentration limit. During 2012, the highest internal dose (and the highest total dose) was 0.198 rem (0.00198 sievert) total effective dose equivalent.

The inspectors reviewed the licensee's program for calibrating and issuing lapel air samplers. The inspectors also observed the licensee's protocols for handling and analyzing air sample filters. The inspectors concluded that the licensee was implementing its air sampling program in accordance with license requirements.

During the inspection, the licensee was decommissioning the sanitary lagoon area. The sanitary lagoon sediments were placed into super-sacks for temporary storage. The inspectors reviewed the licensee's hazardous work permit for this activity. The hazardous work permit described worker protection requirements for activities involving radioactive material. This hazardous work permit provided instructions for personnel air sampling, contamination control, and personal protective equipment. The hazardous work permit did not require the use of respirators due to the low air sample results. The inspectors noted that the work was being conducted using the controls established in the hazardous work permit.

The inspectors conducted a review of the air sample results for the sanitary lagoon work to ensure that respirators were unnecessary. The licensee's records indicate that the sample results were less than the job-specific derived air concentration (DAC) level, and the results were a fraction of the DAC. In recent days, the air sample results were 0.21 DAC or less. The licensee's lowest action level was 1 DAC, and the administrative limit was 10 DAC-hours per day. The inspectors concluded that respirators were not required based on these low air sample results.

The inspectors also reviewed the air sample results for other tasks conducted in recent weeks. The air sample results for the solvent extraction building demolition work was 0.161 DAC or less. However, one worker recently exceeded the licensee's administrative limit for internal exposures. During March 2012, one equipment operator exceeded the limit while conducting reclamation of Pond 2. The worker's dose for the work period totaled 40 DAC-hours, or about 0.1 rem (0.001 sievert). In response, the equipment operator was placed on work restriction for a period of time.

The bioassay requirements are specified in License Conditions 9.4, 42, and 43. The licensee collected routine bioassay samples from workers for analysis of uranium concentrations. During 2012, the highest sample result was 12.1 micrograms per liter. No individual sample result exceeded the lowest action level of 15 micrograms of uranium per liter of urine. In summary, the sample results for 2012 suggest that no individual experienced an intake of radioactive material greater than the 10 milligrams of uranium per week limit specified in 10 CFR 20.1201(e).

## 2.3 Conclusions

The licensee conducted its radiation protection program in accordance with the requirements of 10 CFR Part 20 and the license.

## 3 **Onsite Construction (88001)**

### 3.1 Inspection Scope

The inspectors reviewed the licensee's decommissioning activities to determine if these activities were being conducted in accordance with the NRC-approved reclamation plan, license conditions, and construction specifications.

### 3.2 Observations and Findings

License Condition 51 allows the licensee to conduct site decommissioning in accordance with the NRC-approved reclamation plan. The construction technical specifications, an attachment to the reclamation plan, provide the detailed requirements for construction of the disposal cell. The inspectors conducted tours of the onsite construction areas to observe work in progress. The inspectors compared the work in progress to the technical specification requirements provided in the reclamation plan. At the time of the inspection, the Phase I and Phase II areas had been filled with radioactive waste material. The licensee was excavating the area where it will construct the Phase III portion of the cell.

During the site tours, the inspectors noted that the licensee had overfilled the Phase I and Phase II areas with wastes. These additional wastes were being temporarily staged in these two areas but will eventually be relocated into the Phase III area when this portion of the cell is ready to accept material for permanent disposal. The inspectors discussed the impacts of overfilling the Phase I and II areas with licensee representatives. The licensee's representatives stated that the overfilled areas would have no structural impacts on final cell operation or design, in part, because the volume of overfill was less than the volume of the cover material that will be installed on the cell. As a precaution, the licensee stated that it would conduct measurements of the overfilled areas to ensure that the material height did not exceed the final cover height.

The inspectors also noted that the licensee had installed a geomembrane felt cover and planted vegetation on top of Phase I and II areas to temporarily control erosion. The inspectors noted that the geomembrane felt cover was not in good condition in some areas, and areas of subsidence were apparent due to poor compaction of the soil beneath it. The inspectors discussed the licensee's future plans for the geomembrane felt cover and vegetation, and the licensee stated that it intended to remove the

geomembrane material and vegetation and re-grade the soil prior to construction of the final cover.

The inspectors reviewed changes that the licensee recently made to the reclamation plan and technical specifications. The licensee's Plant Review Committee (PRC) reviewed and approved these changes. The inspectors discussed several technical bases for these changes with licensee representatives:

- The PRC approved a revision to Sections 4.2.6 and 4.3.10 of technical specifications which delegated the responsibility for approving the method of synthetic liner anchoring to the quality assurance manager. The inspectors believed that the reclamation project manager should have this approval authority instead of the quality assurance manager who is supposed to provide independent oversight of cell construction. The licensee acknowledged this observation and planned to reconsider this PRC-approved change to technical specifications.
- Section 4.4.1 of technical specifications describes the field density testing requirements for compacted subgrade fill. This section provides instructions for correlating the nuclear density gauge results to sand cone test results and laboratory testing for water content using an oven drying method on similar material. The PRC approved a change to Section 4.4.1 which allowed correlation of "similar" material, instead of the "same" material. The licensee did not clearly document what it meant by "similar" soil when conducting these correlation tests. The licensee agreed to update the technical justification for this change.
- In Sections 6.2 and 6.3 of technical specifications, the licensee changed the material placement requirements to allow flexibility in placement of Type A, B, and C material into the disposal cell. This flexibility allows the mixing of different types of waste together instead of the wastes being on top of each other. Although the licensee conducted a safety and environmental analyses, the licensee didn't clearly explain in the PRC documentation why this flexibility was technically acceptable. The licensee stated that it planned to update the approval documentation to provide these technical justifications.
- The PRC approved a change which allowed it to use limited quantities of uncontaminated "clean" soil in the construction of the disposal cell. The inspectors questioned the licensee about how much clean soil would be added to the disposal cell, and how the licensee would confirm that the clean soil was physically comparable to the disposed material. Further, the technical specifications change only mentions the use of "soil" and does not describe the type of soil that will be used to support cell construction. Finally, the inspectors questioned the licensee's justification for the impacts of adding this material to the disposal cell (no additional stresses, changes in properties, etc.). The licensee stated that it would revise the approval documentation to explain what is meant by the terms "soil" and "limited quantities" of soil, and the licensee would address the characteristics of the clean soil and the impact of adding this material to the disposal cell.
- The PRC approved the use of crushed concrete as subgrade fill. The inspectors questioned whether the characteristics of the crushed concrete would change if the material were to become wet. The licensee stated that the characteristics of the

crushed concrete would not change if it became wet but would address this issue in an updated approval package.

In summary, the inspectors determined that the changes to the technical specifications were acceptable but the inspectors concluded that the licensee's technical bases for some of these changes were incompletely documented.

### 3.3 Conclusions

The licensee was constructing the disposal cell in accordance with license requirements.

## **4 Radwaste Management/Low Level Radioactive Waste Storage (84850/84900)**

### 4.1 Inspection Scope

The inspectors interviewed licensee representatives, toured the site, and reviewed applicable records to determine if the licensee had established and maintained an effective program for management of radioactive wastes.

### 4.2 Observations and Findings

The inspectors observed the licensee's handling and storage of radioactive wastes. At the time of the inspection, the licensee's contractor was excavating sediments from the bottom of the former sanitary lagoon and was staging the material in super-sacks. At the time of the inspection, the licensee had filled slightly over 400 sacks with sediments. The sacks were unlined to allow for release of moisture. The licensee staged the sacks near the edge of the Phase III footprint. Any liquid effluents that leak from the unlined sacks will be captured in the licensee's water collection system. The collected water will be pumped to the clarifiers for processing. The licensee will eventually relocate the dewatered sacks of sediments to the yellowcake pad for staging. Eventually, the licensee plans to ship this material to an offsite mill for recovery of uranium.

The inspectors conducted confirmatory surveys of the bagged sanitary lagoon sediments and reviewed the licensee's survey results for this material. The inspectors measured the beta-gamma exposure rates using a Ludlum Model 2401P survey meter (NRC No. 21190G, calibration due date of 01/09/13). The inspectors observed that the material exhibited mainly beta particulate radioactivity versus gamma radiation. None of the measurements exceeded 5 millirems (0.05 millisieverts) per hour at 30 centimeters, the definition of a radiation area.

The licensee's contractor was also excavating the subsurface area of the former solvent extraction building. This excavated material was being staged on top of the Phase II disposal area as overfill and will be permanently disposed in the Phase III disposal cell, after the Phase III cell has been constructed. In addition, the license plans to use a former calcium fluoride clarifier basin for temporary storage of low radiologically impacted soils.

The licensee recently excavated contaminated soils from Pond 2, but the final status survey results indicated that more reclamation was necessary to remove all of the thorium-230 contamination from the pond. The licensee elected to remove more material from the bottom of the pond and stage the excavated material on the slopes of

the pond. The licensee plans to relocate this staged material from the slopes of Pond 2 and into Phase III of the disposal cell, when this portion of the cell has been placed into service.

Since the last inspection, the licensee had sectioned most of the former uranium hexafluoride cylinders. The licensee possessed slightly less than 800 cylinders. The shells of the cylinders were sand-blasted, surveyed, and free-released. The end caps could not be free-released and were either disposed in the Phase II area or staged as overfill on top of Phase II. The remainder of the end caps will be disposed in Phase III of the disposal cell.

The licensee still possessed approximately 11,000 super-sacks of raffinate sludge. Most of the raffinate sludge originated from the four clarifier basins. In recent months, the licensee bagged sediments from the emergency basin and north ditch areas, and during the inspection, the licensee was bagging sediments from the sanitary lagoon. The licensee continues to stage the bagged and dewatered sludge material on the former yellowcake storage pad for possible transfer to an out-of-state uranium mill for processing as alternate feed material. If the licensee is unable to transfer the material, the reclamation plan allows the licensee to dispose of the raffinate sludge and pond sediments in the onsite disposal cell. If the licensee subsequently ships the sludge and sediments to the out-of-state mill, the licensee estimates that it will take approximately 650 truck shipments to transfer all of the material to the mill.

In summary, the inspectors compared the licensee's handling of wastes with the requirements of the reclamation plan, and the inspectors concluded that the licensee was staging and storing radioactive wastes as discussed in the reclamation plan.

#### 4.3 Conclusions

The licensee was staging and storing radioactive waste material in accordance with license requirements.

### 5 **Exit Meeting**

The inspectors reviewed the scope and findings of the inspection during an exit meeting that was conducted at the conclusion of the onsite inspection on August 3, 2012. During the inspection, the licensee did not identify any information reviewed by the inspectors as proprietary.

### **Supplemental Inspection Information**

#### **PARTIAL LIST OF PERSONS CONTACTED**

John Ellis, President  
Scott Munson, Environmental Manager  
Billy Reid, Quality Assurance Manager

#### **INSPECTION PROCEDURES USED**

IP 83822	Radiation Protection
IP 84850	Radioactive Waste Management
IP 84900	Low Level Radioactive Waste Storage
IP 88001	Onsite Construction
IP 88005	Management Organization and Controls

#### **ITEMS OPENED, CLOSED, AND DISCUSSED**

##### **Opened**

None

##### **Closed**

None

##### **Discussed**

None

#### **LIST OF ACRONYMS**

CFR	<i>Code of Federal Regulations</i>
DUF <sub>4</sub>	depleted uranium tetrafluoride
IP	NRC Inspection Procedure
PRC	Plant Review Committee