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

November 17, 2021

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

SUBJECT: SEQUOYAH FUELS CORPORATION - NRC INSPECTION REPORT 040-08027/2021-002

Dear Mr. Ellis:

This letter refers to the routine, announced U.S. Nuclear Regulatory Commission (NRC) inspection conducted on September 8-9, 2021, at your Sequoyah Fuels Corporation site in Gore, Oklahoma. This inspection examined activities conducted under your license as they relate to public health and safety, the common defense and security, and to confirm compliance with the Commission's rules and regulations and the conditions of your license.

The inspection included a confirmatory survey of the former southwest bench area. A confirmatory survey is a survey conducted by the NRC to verify the results of your final survey. The confirmatory survey included measurement of ambient gamma radiation levels and collection of soil samples. The preliminary inspection findings were discussed with you and your staff at the conclusion of the onsite inspection on September 9, 2021. A final exit briefing was held with your staff on October 19, 2021, after receipt of the soil sample results from the NRC's contract laboratory. No violations were identified, and no response to this letter is required.

In accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 2.390 of the NRC's "Agency Rules of Practice and Procedure," 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 Agencywide Documents Access and Management System (ADAMS), accessible from the NRC Web site at https://www.nrc.gov/reading-rm/adams.html. To the extent possible, your response should not include any personal privacy or proprietary information so that it can be made available to the Public without redaction.

Should you have any questions concerning this inspection, please contact Ms. Linda M. Gersey, Health Physicist, at (817) 200-1299 or the undersigned at (817) 200-1156.

Sincerely,

Signed by O'Keefe, Cornelius
on 11/17/21

Neil F. O'Keefe, Chief
Materials Licensing & Decommissioning Branch
Division of Nuclear Materials Safety

Docket: 040-08027
License: SUB-1010

Enclosure:
NRC Inspection Report 040-08027/2021-002

cc: w/enclosure:
S. Munson, Sequoyah Fuels Corporation
M. Broderick, Oklahoma Department of Environmental Quality
J. Dayvault, Department of Energy

SEQUOYAH FUELS CORPORATION - NRC INSPECTION REPORT 040-08027/2021-002
DATED NOVEMBER 17, 2021

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ADAMS ACCESSION NUMBER: ML21320A104

■ SUNSI Review By: LMG	ADAMS ■ Yes ☐ No	■ Non-Sensitive ☐ Sensitive	■ Publicly Available ☐ Non-Publicly Available	Keyword: NRC-002

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U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Docket No.:	040-08027
License No.:	SUB-1010
Report No.:	040-08027/2021-002
Licensee:	Sequoyah Fuels Corporation
Location:	Gore, Oklahoma
Dates:	September 8-9, 2021
Inspectors:	Linda M. Gersey, Health Physicist Materials Licensing and Decommissioning Branch Division of Nuclear Materials Safety
	Binesh K. Tharakan, Technical Assistant Division of Nuclear Materials Safety
Approved by:	Neil F. O'Keefe, Chief Materials Licensing and Decommissioning Branch Division of Nuclear Materials Safety
Attachment:	Supplemental Inspection Information

Enclosure

EXECUTIVE SUMMARY

Sequoyah Fuels Corporation
NRC Inspection Report 040-08027/2021-002

The U.S. Nuclear Regulatory Commission (NRC) performed a routine, announced confirmatory survey in the former southwest bench area on September 8-9, 2021, at the Sequoyah Fuels Corporation facility in Gore, Oklahoma. In summary, the inspectors concluded that the licensee was conducting decommissioning activities in accordance with regulatory and license requirements.

Closeout Inspection and Survey

- The inspectors reviewed the licensee's radiological survey design and sampling results for the former southwest bench area. The licensee's records indicated that it had designed and implemented a final survey in accordance with the NRC-approved Reclamation Plan. The survey results were less than the limits specified in the Reclamation Plan. The licensee's records indicated that the area had been effectively remediated. (Section 1.2a)

- The inspectors conducted a confirmatory survey of the former southwest bench area. The confirmatory survey consisted of measurement of ambient gamma radiation levels and collection of soil samples. The gamma radiation levels and the soil sample results were less than the respective action levels. In addition, the survey results were comparable to the licensee's final survey results. (Section 2.2b)

Report Details

Site Status

U.S. Nuclear Regulatory Commission (NRC) Materials License SUB-1010, License Condition 51, requires the licensee to conduct decommissioning activities in accordance with the Reclamation Plan dated July 2008 as amended (Agencywide Documents Access and Management System [ADAMS] Accession Nos. ML080220345 and ML08196023). The Reclamation Plan provides the instructions for dismantlement and removal of systems and equipment, demolition of structures, treatment of sludge and sediments, remediation of contaminated soils, and treatment of wastewater. Consistent with the Reclamation Plan, almost all waste material from decommissioning will be placed in an onsite engineered cell for permanent disposal. Since the last routine inspection, conducted in March 2021 (ADAMS Accession No. ML21127A145), the licensee continued to conduct decommissioning in accordance with the Reclamation Plan.

1 Closeout Inspection and Survey (Inspection Procedure 83890)

1.1 Inspection Scope

The inspectors reviewed the licensee's final survey of the former southwest bench area to ensure that the survey was conducted in accordance with the NRC-approved Reclamation Plan. The inspectors also conducted an independent confirmatory survey to verify that the area had been remediated to acceptable radiological levels as stipulated in the Reclamation Plan.

1.2 Observations and Findings

a. Review of Final Survey Results

At the time of the inspection, the licensee had remediated and completed a final survey of the former southwest bench area. This 3,618-square meter area was located south-southeast of the onsite disposal cell and was expected to be backfilled or recontoured as part of decommissioning. The inspectors reviewed the licensee's remedial and final survey results, to ensure that the licensee had sufficiently demonstrated that the area had been remediated prior to backfilling or recontouring.

To demonstrate that the area met the cleanup criteria as provided in Section 3.2.2 and Table 3-1 of the Reclamation Plan, the licensee conducted radiological surveys in accordance with Attachment B, "Final Status Survey Plan," to the Reclamation Plan. Attachment B instructs the licensee to use the guidance provided in NUREG-1575, Revision 1, "Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)." In accordance with Figure B-1, the former southwest bench area was classified as a Class 1 area as defined in MARSSIM.

The licensee's final survey included measurement of ambient gamma radiation levels and collection of soil samples. In accordance with Attachment B, Figure B-1, "Classification of Areas for Final Status Survey," the radionuclides of concern for this area included total uranium, thorium-230, and radium-226. The NRC-approved cleanup levels are as follows: (1) ≤ 100 picocuries per gram (pCi/g) for total uranium; ,(2) ≤ 43 pCi/g for the first 15 centimeters below the soil surface for thorium-230; and, (3) ≤15 pCi/g for the first 15 centimeters below the soil surface for radium-226. The licensee chose to

use ≤ 43 pCi/g for thorium-230 and ≤15 pCi/g for radium-226 (the subsurface values) in this area because it will become part of the cell footprint and will eventually be covered with greater than 15 centimeters of soil once the final cover is in place.

Attachment B to the Reclamation Plan states that scanning will be performed to identify areas of elevated radioactivity that may not be detected by other measures and methods. The licensee established an action level of three times background for the gamma walk-over surveys. MARSSIM recommends a scan survey coverage of 100 percent for Class 1 areas. Based on MARSSIM guidance, the soil sample density was calculated to be a minimum of one sample for every 250 square meters of surface area. Per site procedures, the licensee also collected duplicate and replicate samples for measurement of sample precision and accuracy, respectively.

The licensee conducted the walk-over survey using a ratemeter coupled to a global positioning system device. The licensee used the information to create a color-coded map of the area. The licensee's documentation demonstrated that it scanned 100 percent of the surface area. The scan survey results were less than the action level of three times background.

The licensee collected 14 soil samples in the 3,618-square meter area. The licensee also collected two sets of duplicate and replicate samples. The licensee collected one sample for every 250 square meters of land area. The licensee used an x-ray fluorescent meter to estimate the uranium concentrations in the soil samples prior to shipment to an offsite laboratory for analysis. In addition, the licensee's contract laboratory analyzed the samples for total uranium, thorium-230, and radium-226 concentrations. All sample results were less than the NRC-approved cleanup levels specified in the Reclamation Plan.

In summary, the licensee's records indicated that the former southwest bench area had been effectively remediated. The licensee designed and implemented a final survey that met the intent of MARSSIM and the Reclamation Plan. The scan survey results were less than the action level, and the preliminary and final soil sample results were less than the cleanup levels as specified in the Reclamation Plan.

b. NRC Confirmatory Survey

The inspectors conducted a confirmatory survey of the former southwest bench area. The purpose of the confirmatory survey was to confirm the effectiveness and accuracy of the licensee's final survey relative to whether the area met the acceptance criteria established in the Reclamation Plan. The confirmatory survey included measurement of ambient gamma exposure rates and collection of soil samples.

The inspectors conducted the gamma scans using ambient gamma exposure rate instrumentation. Prior to conducting the scan surveys, the inspectors measured the ambient background levels to establish action levels for the survey meters. The background measurements were recorded outside of the restricted area in the yard adjacent to the administrative building. Because the licensee's action level was set at three times the background level, for consistency, the inspectors' action levels were also set at three times the measured background levels. During the survey, the inspectors noted that some of the measurements may have been impacted by radiation emanating from the disposal cell, which was located adjacent to the surveyed area. However, as

summarized in Table 1 below, none of the survey measurements exceeded the action level of three times background within the southwest bench area:

Table 1: Scan Survey Results (in units of counts per minute)

NRC Meter	Serial Numbers	Calibration due dates	Background	Survey results	Area of survey
Radeye SX with SPA-3	52223 19205	12/23/21	9000	9,000-11,500	Southwest bench area
Ludlum Model 2221 with 44-10	076572 PR375265	04/14/22	7000	7,000-12,500	Southwest bench area

The inspectors' scan survey results were noted to be consistent with the licensee's final survey results.

The inspectors collected 6 soil samples from the southwest bench area. The samples were split with the licensee. The licensee used its x-ray fluorescent meter to estimate the uranium concentrations in the NRC's samples. The results were less than the action level of less than or equal to 100 pCi/g. The inspectors shipped the 6 soil samples to the NRC's contract laboratory for analysis (ADAMS Accession No. ML21273A380), while the licensee shipped the split samples to its contract laboratory. The sample results are presented in Table 2 below.

Table 2: Split Sample Results

NRC Sample ID	Licensee ID	Radionuclides	NRC (pCi/g)	Licensee (pCi/g)
NRC-107	HA-2356	Total uranium Thorium-230 Radium-226	2.37 1.04 ± 0.05 0.95 ± 0.05	2.13 1.62 ± 0.266 0.898 ± 0.201
NRC-108	HA-2357	Total uranium Thorium-230 Radium-226	2.46 1.29 ± 0.06 1.09 ± 0.05	2.21 0.886 ± 0.262 1.0 ± 0.226
NRC-109	HA-2358	Total uranium Thorium-230 Radium-226	3.49 1.73 ± 0.09 1.05 ± 0.05	3.14 1.62 ± 0.325 0.743 ± 0.189
NRC-110	HA-22359	Total uranium Thorium-230 Radium-226	2.74 1.94 ± 0.10 1.20 ± 0.06	1.77 2.88 ± 0.412 1.08 ± 0.218
NRC-111	HA-2360	Total uranium Thorium-230 Radium-226	38.74 20.5 ± 1.0 1.58 ± 0.07	48.27 27.1 ± 0.976 1.74 ± 0.295
NRC-112	HA-2361	Total uranium Thorium-230 Radium-226	2.05 1.57 ± 0.08 1.2 ± 0.06	1.27 2.51 ± 0.390 1.17 ± 0.253

The inspectors noted that the sample results for Sample NRC-111/HA-2360 passed the acceptance criteria, including sum-of-fractions ratio. However, the licensee elected to conduct additional remediation of that area. The licensee completed the remediation and resampled the area on September 14, 2021. The licensee forwarded the sample results to the NRC as shown in Table 3 below:

Table 3: Split Sample Results After Remediation

NRC Sample ID	Licensee ID	Radionuclides	NRC (pCi/g)	Licensee (pCi/g)
NA	HA-2362	Total uranium Thorium-230 Radium-226	NA	1.36 1.69 ± 0.289 0.883 ± 0.169
NA	Duplicate	Total uranium Thorium-230 Radium-226	NA	1.50 1.08 ± 0.228 0.836 ± 0.184
NA	Replicate	Total uranium Thorium-230 Radium-226	NA	2.63 1.26 ± 0.278 0.909 ± 0.190

The final results for the remediated area were generally consistent with the results of the remainder of the samples, and all results were less than the cleanup levels provided in the Reclamation Plan.

In summary, the gamma scan survey results at the former southwest bench area were less than the action level of three times background, and the soil sample results were less than the cleanup levels specified in the NRC-approved Reclamation Plan.

2.3 Conclusions

The inspectors reviewed the licensee's radiological survey design and sampling results for the former southwest bench area. The licensee's records indicated that it had designed and implemented a final survey in accordance with the NRC-approved Reclamation Plan. The survey results were less than the limits specified in the Reclamation Plan. The licensee's records indicated that the area had been effectively remediated.

The inspectors conducted a confirmatory survey of the former southwest bench area. The confirmatory survey consisted of measurement of ambient gamma radiation levels and collection of soil samples. The gamma radiation levels and the soil sample results were less than the respective action levels. In addition, the preliminary survey results were comparable to the licensee's final survey results.

3 Exit Meeting Summary

The NRC inspectors presented the preliminary inspection findings to the licensee's representatives at the conclusion of the onsite portion of the inspection on September 9, 2021. The final inspection findings were presented to the licensee's representatives on October 19, 2021, after receipt of the soil sample results from the NRC's contract laboratory.

SUPPLEMENTAL INSPECTION INFORMATION

Partial List Of Persons Contacted

Licensee Personnel

J. Ellis, President
S. Munson, Manager, Safety, Health and Environment
R. Miller, Contractor, RMA

Inspection Procedure Used

IP 83890 Closeout Inspection and Surveys

Items Opened, Closed and Discussed

Opened

None

Closed

None

Discussed

None

List of Acronyms

ADAMS	Agencywide Documents Access and Management System
CFR	*Code of Federal Regulations*
IP	NRC Inspection Procedure
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
NRC	U.S. Nuclear Regulatory Commission
pCi/g	picocuries per gram