OAK RIDGE INSTITUTE FOR SCIENCE AND EDUCATION
Managed by ORAU for DOE

September 28, 2016

Mr. Gerald Schlapper
U.S. Nuclear Regulatory Commission
Region IV
1600 East Lamar Boulevard
Arlington, TX 76011

ORISE CONTRACT NO. DE-SC0014664
SUBJECT: LETTER REPORT FOR ANALYTICAL RESULTS FOR TEN SOIL SAMPLES ASSOCIATED WITH THE SEQUOYAH FUELS CORPORATION IN GORE, OKLAHOMA
[TAC NO. 040-08027/16-001] [DOCKET NO. 040-08027](RFTA NO. 16-001)
DCN: 5206-LR-07-0

Dear Mr. Schlapper:

Oak Ridge Associated Universities (ORAU), under the Oak Ridge Institute for Science and Education (ORISE) contract, received ten soil samples on August 8, 2016 from the Sequoyah Fuels Corporation in Gore, Oklahoma. The samples were received in good condition. Per the NRC Form 303 that was sent with the samples, the samples were analyzed for uranium by gamma spectrometry and isotopic uranium by alpha spectrometry. The analytical data, along with the procedure references, are presented in the attached reports. A case narrative is included to provide information regarding the analytical data.

ORAU's Quality Control (QC) requirements were met for these analyses. The QC files are available for your review upon request.

My contact information is listed below. You may also contact Forrest Smith at 865.574.9802 with any questions or comments.

Sincerely,

Wade P. Ivey

Wade Ivey, Manager
Laboratory

WPI:WFS:km:lw

Enclosures

Electronic:
T. Carter, NRC
E. Bailey, ORAU
D. Hagemeyer, ORAU
S. Roberts, ORAU
S. Munson, Sequoyah Fuels
File 10957
T. Vitkus, ORAU
K. Kalman, NRC

Distribution approval and concurrence:	Initials
Quality Review	LW for PB
Technical Review	GT for SR

CASE NARRATIVE

Gamma Spectrometry:

The samples were analyzed using ORAU/REAL standard operating procedure (SOP) CP1, revision 19. The requested radionuclide of concern (ROC) from NRC Form 303 was total uranium (U-Total) by gamma spectrometry. At low uranium concentrations, gamma spectrometry can only provide data for uranium-235 (U-235) and uranium-238 (U-238). Gamma spectrometry cannot provide useful data for uranium-234 (U-234) at low concentrations. The U-total provided in this report is based upon the alpha spectrometry data.

The identifying isotopes and peak energies used to quantify the ROCs are listed in the table below.

Radionuclide of Concern	Identifying Radionuclide	Peak Energy (keV)
U-235	U-235	143.8
U-238	Th-234	63.3

There were no deviations from the SOP and there were no unusual circumstances with the sample analysis.

Alpha Spectrometry:

The samples were analyzed using ORAU/REAL standard operating procedures (SOP) AP11, revision 8 and CP2, revision 19. The requested ROC from NRC Form 303 was U-Total by alpha spectrometry. The U-total provided in this report is based upon the alpha spectrometry data. The U-total was calculated by the following formula:

$$\text{U-Total} = \text{U-234} + \text{U-235} + \text{U-238}$$

There were no deviations from the SOPs and there were no unusual circumstances with the sample analysis.

Gamma Spectrometry Summary Results By Analyte

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Report Date: September 26, 2016

Analyte:	U-235	SOP (Rev. #)	CP1 (19)
Project Name:	Sequoyah Fuels	Energy Signature:	143.76 (KeV)
Project # :	201210957	SDG # :	201210957-2

Client Sample ID:	Lab Sample ID:	Result	TPU (2s)	MDC	Units	Qualifier Flag	Batch #
NRC 01	10957S0007	0.14	0.12	0.29	pCi/g	U	GS0325
NRC 02	10957S0008	0.025	0.058	0.138	pCi/g	U	GS0325
NRC 03	10957S0009	0.068	0.061	0.142	pCi/g	U	GS0325
NRC 04	10957S0010	0.43	0.12	0.24	pCi/g		GS0325
NRC 05	10957S0011	0.249	0.090	0.193	pCi/g		GS0325
NRC 06	10957S0012	0.035	0.075	0.179	pCi/g	U	GS0325
NRC 07	10957S0013	0.181	0.091	0.199	pCi/g	U	GS0325
NRC 08	10957S0014	0.101	0.065	0.147	pCi/g	U	GS0325
NRC 09	10957S0015	0.207	0.096	0.211	pCi/g	U	GS0325
NRC 10	10957S0016	0.122	0.087	0.202	pCi/g	U	GS0325

Electronically Validated By:
William Smith- 8/12/2016 08:50

Electronically Approved By:

Wade Ivey 9/26/2016 11:07

Qualifier Flags:
U = Analyte not detected (< MDC)

TPU = Total Propagated Uncertainty
MDC = Minimum Detectable Concentration

Gamma Spectrometry Summary Results By Analyte

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Report Date: September 26, 2016

Analyte:	U-238 by Th-234	SOP (Rev. #)	CP1 (19)
Project Name:	Sequoyah Fuels	Energy Signature:	63.29 (KeV)
Project # :	201210957	SDG # :	201210957-2

Client Sample ID:	Lab Sample ID:	Result	TPU (2s)	MDC	Units	Qualifier Flag	Batch #
NRC 01	10957S0007	1.89	0.55	0.75	pCi/g		GS0325
NRC 02	10957S0008	1.04	0.32	0.50	pCi/g		GS0325
NRC 03	10957S0009	1.59	0.46	0.62	pCi/g		GS0325
NRC 04	10957S0010	6.1	1.5	1.5	pCi/g		GS0325
NRC 05	10957S0011	5.2	1.2	0.9	pCi/g		GS0325
NRC 06	10957S0012	1.89	0.52	0.68	pCi/g		GS0325
NRC 07	10957S0013	1.70	0.54	0.82	pCi/g		GS0325
NRC 08	10957S0014	1.59	0.50	0.76	pCi/g		GS0325
NRC 09	10957S0015	3.5	1.1	1.6	pCi/g		GS0325
NRC 10	10957S0016	3.25	0.80	0.77	pCi/g		GS0325

Electronically Validated By:
William Smith- 8/12/2016 08:50

Electronically Approved By:

Wade Ivey 9/26/2016 11:07

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Alpha Spectrometry Summary Sheet

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Report Date: September 26, 2016

Project Name: Sequoyah Fuels
Project # : 201210957
COC # : 1608-004
SDG #: 201210957-2
Analyst: nagler

Batch # : AS0336
Receipt Date: 8/8/2016
Collection Date: 7/19/2016
Count Date: 9/1/2016
SOP (Rev. #): AP11 (8)

Client Sample ID	Lab Sample ID	Analyte	Result	TPU (2s)	MDC	Units	Yield	Qualifier
NRC 01	10957S0007	U-234	1.44	0.13	0.02	pCi/g	0.8707	
NRC 01	10957S0007	U-235	0.066	0.026	0.032	pCi/g	0.8707	
NRC 01	10957S0007	U-238	1.46	0.13	0.02	pCi/g	0.8707	
NRC 02	10957S0008	U-234	0.793	0.089	0.023	pCi/g	0.9747	
NRC 02	10957S0008	U-235	0.025	0.015	0.007	pCi/g	0.9747	
NRC 02	10957S0008	U-238	0.781	0.088	0.023	pCi/g	0.9747	
NRC 03	10957S0009	U-234	1.36	0.13	0.03	pCi/g	0.8443	
NRC 03	10957S0009	U-235	0.069	0.026	0.008	pCi/g	0.8443	
NRC 03	10957S0009	U-238	1.46	0.14	0.01	pCi/g	0.8443	
NRC 04	10957S0010	U-234	5.02	0.35	0.04	pCi/g	0.8763	
NRC 04	10957S0010	U-235	0.278	0.052	0.027	pCi/g	0.8763	
NRC 04	10957S0010	U-238	5.25	0.36	0.03	pCi/g	0.8763	
NRC 05	10957S0011	U-234	4.16	0.30	0.01	pCi/g	0.8763	
NRC 05	10957S0011	U-235	0.161	0.039	0.007	pCi/g	0.8763	
NRC 05	10957S0011	U-238	4.31	0.31	0.01	pCi/g	0.8763	
NRC 06	10957S0012	U-234	1.58	0.15	0.06	pCi/g	0.9012	
NRC 06	10957S0012	U-235	0.061	0.028	0.039	pCi/g	0.9012	
NRC 06	10957S0012	U-238	1.64	0.15	0.03	pCi/g	0.9012	
NRC 07	10957S0013	U-234	2.00	0.17	0.02	pCi/g	0.8661	
NRC 07	10957S0013	U-235	0.096	0.030	0.007	pCi/g	0.8661	
NRC 07	10957S0013	U-238	2.22	0.19	0.01	pCi/g	0.8661	
NRC 08	10957S0014	U-234	1.37	0.13	0.04	pCi/g	0.8718	
NRC 08	10957S0014	U-235	0.049	0.022	0.007	pCi/g	0.8718	
NRC 08	10957S0014	U-238	1.51	0.14	0.02	pCi/g	0.8718	
NRC 09	10957S0015	U-234	2.81	0.22	0.03	pCi/g	0.9144	
NRC 09	10957S0015	U-235	0.161	0.040	0.028	pCi/g	0.9144	
NRC 09	10957S0015	U-238	2.94	0.23	0.03	pCi/g	0.9144	
NRC 10	10957S0016	U-234	2.48	0.20	0.03	pCi/g	0.8765	
NRC 10	10957S0016	U-235	0.126	0.035	0.023	pCi/g	0.8765	
NRC 10	10957S0016	U-238	2.58	0.21	0.01	pCi/g	0.8765	
	BLK0336S	U-234	0.017	0.025	0.056	pCi/g	0.8831	U
	BLK0336S	U-235	0.021	0.031	0.069	pCi/g	0.8831	U
	BLK0336S	U-238	0.012	0.016	0.017	pCi/g	0.8831	U
	LCS0336S	U-234	3.87	0.29	0.03	pCi/sample	0.8550	
	LCS0336S	U-235	0.200	0.046	0.024	pCi/sample	0.8550	

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LCS0336S	U-238	3.91	0.29	0.03	pCi/sample	0.8550	

SampleCode	Isotope	Known Activity (pCi)	Known Uncertainty (1 s)	Meas./Known Activity Ratio
LCS0336S	U-234	4.18	0.19	0.93
LCS0336S	U-238	4.18	0.19	0.93

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MDC = Minimum Detectable Concentration

Report Date: September 26, 2016

AS Electronically Reviewed By:
Roxanne Nagle- 9/7/2016 09:09

Electronically Validated By:
Wade Ivey- 9/26/2016 11:06

Electronically Approved By:

Wade Ivey 9/26/2016 11:07

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Total Uranium

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Analyte: **U-Total** SOP (Rev. #): AP11 (8); CP2 (19)

Project Name: Sequoyah Fuels SDG #: 201210957-2
Project #: 201210957 Report Date: 9/28/2016

Client Sample ID	Lab Sample ID	Result	TPU(2s)	Units	Enriched or Natural	Batch #
NRC 01	10957S0007	2.97	0.19	pCi/g	Natural	AS0336
NRC 02	10957S0008	1.60	0.13	pCi/g	Natural	AS0336
NRC 03	10957S0009	2.89	0.19	pCi/g	Natural	AS0336
NRC 04	10957S0010	10.55	0.50	pCi/g	Natural	AS0336
NRC 05	10957S0011	8.63	0.43	pCi/g	Natural	AS0336
NRC 06	10957S0012	3.28	0.21	pCi/g	Natural	AS0336
NRC 07	10957S0013	4.32	0.26	pCi/g	Natural	AS0336
NRC 08	10957S0014	2.93	0.19	pCi/g	Natural	AS0336
NRC 09	10957S0015	5.91	0.32	pCi/g	Natural	AS0336
NRC 10	10957S0016	5.19	0.29	pCi/g	Natural	AS0336

Signed By: Ivey, Wade Digitally signed by Ivey, Wade DN: dc=net, dc=orau, ou=Standard Accounts, ou=UserAccts, cn=Ivey, Wade, email=Wade.Ivey@orau.org Date: 2016.09.26 13:10:44 -04'00'

Date: 9/26/2016

TPU= Total Propagated Uncertainty