ENERGYSOLUTIONS

August 3, 2017 CD17-0177

Mr. Ray Kellar
Chief – Fuel Cycle and Decommissioning Branch
U.S. NRC Region IV
1600 East Lamar Boulevard
Arlington, Texas 76011-4511

Subject: Energy*Solutions* Clive Disposal Facility – Radioactive Material License UT 2300249
License Condition 13, Special Nuclear Material

Mr. Kellar:

This letter serves as written follow-up notification of a potential license limit exceedance regarding a shipment of waste containing Special Nuclear Material (SNM). On July 26, 2017 Energy*Solutions* received analytical results from General Engineering Laboratories LLC (GEL), which identified U-235 at a concentration in excess of the limit allowed by License Condition 13.A. In accordance with License Condition 13.H, Energy*Solutions* is required to provide the U.S. Nuclear Regulatory Commission (NRC) Region IV office notification which was provided via phone and e-mail within 24 hours if any License Condition applicable to our SNM exemption is violated. Energy*Solutions* is also required to provide the NRC Region IV office written notification within seven days of the event.

Summary of Events

On June 2, 2017, Energy*Solutions* received waste shipment 0318-05-0195 from Nuclear Fuel Services Inc. (NFS), located in Erwin, Tennessee. The waste stream consists of filter cake from the NFS waste water treatment facility and is packaged in 96 ft^3 soft-sided supersacks. Ten supersacks of filter cake were manifested on this shipment. The waste was sampled on the day it arrived at the Clive disposal facility. The sample was obtained by taking an aliquot from six of the ten randomly selected supersacks and then homogenizing the collected material into one sample for analysis. The waste was placed on the Clive Facility's LLRW disposal embankment on June 24, 2017. Subsequent waste shipments from a variety of other generators have since been placed over the shipment in question.

The sample was analyzed via on site gamma spectroscopy on July 14, 2017 with the result being reviewed and verified on July 18, 2017 by the Clive facility laboratory manager. The initial screening result indicated the potential presence of U-235 concentration in excess of the SNM concentration limit of 1,190 pCi/g. Due to these initial results and in accordance with Energy*Solutions* Procedure CL-LB-PR-041, the Clive facility Radiation Safety Officer (RSO) was immediately notified. The RSO directed the lab manager to verify the initial result using two different characterized gamma spectroscopy detectors. The results from the additional analyses indicated U-235 concentrations below the SNM exemption limit of 1,190 pCi/g.

As required by the above procedure the gamma spectroscopy results were within 20 percent of the SNM concentration limits, the RSO directed the lab manager to send a sample to an independent certified laboratory. The waste sample was sent to GEL on July 18, 2017 for alpha spectroscopy analysis. The GEL analysis report was received on July 26, 2017. The report indicated that the sample contained U-235 at 1,880 pCi/g, with an enrichment value of 93.5%.

Energy*Solutions* contacted NFS to inform them of the sample results. NFS representatives reviewed their data for this specific shipment and provided the following detailed information on their SNM accountability tracking process. The NFS waste water treatment facility receives aqueous liquid from multiple sources within the plant. The aqueous discards from the various areas are collected in holding tanks. Batches of the collected liquid waste are treated and then the resulting precipitate is pumped to a holding tank, allowed to settle, and then dewatered by filtration. The filter cake is placed into the supersacks in layers. Each supersack contains between four to seven distinct batch layers with varying concentrations ranging from a few pCi/g U-235 up to approximately 4,000 pCi/g U-235. Each batch layer is made up of multiple influent waste streams into the waste water treatment facility. NFS calculates the average U-235 concentration for the manifested package summing all of the grams of U-235 divided by the weight of the waste in the manifested package. As such, the average concentration for each supersack ranges between approximately 200 pCi/g U-235 up to 400 pCi/g U-235 which is below the SNM license limit of 1,190 pCi/g.

The aliquots were taken from the top two to three inches of waste from each supersack. It is believed that due to this layering effect of the filter cake within the package, the Energy*Solutions* verification sample was not representative of this waste. NFS provided the attached table showing the U-235 concentration of each layer within each supersack (Attachment 1). The first entry represents the first layer of filter cake placed into the bottom of the supersack and the last entry represents the last layer of filter cake placed into the supersack which is the top layer that would have been sampled by the Energy*Solutions* technician. As illustrated in Attachment 1, one of the supersacks sampled contained a top layer with 3,795 pCi/g of U-235 but the average concentration for all layers in that supersack was 396 pCi/g U-235.

Due to the layering effect, NFS also ensures compliance with the spatial distribution requirement in License Condition 13.E by evaluating each batch that is layered into the supersack. The grams of U-235 are averaged over contiguous mass layers to ensure that the concentration limits are not exceeded over any 600 kilograms of contiguous mass as illustrated in Attachment 2.

After discussions with NFS and reviewing all available data, Energy*Solutions* believes NFS data are more comprehensive than the one composite sample collected from the top layer of each supersack. Energy*Solutions* will reset the sampling frequency for this waste stream and will sample the next shipment by coring down through the layers in each randomly selected manifested package to collect a more representative sample. Energy*Solutions* has initiated a Condition Report CL-CR17-035 to document all of the sample results, information received from NFS, and corrective actions that are being developed to ensure compliance with the license for this specific waste stream.

If you need any additional information, please do not hesitate to contact me by work phone at 801-649-2168, cell phone at 801-739-4592 or via e-mail at tabrown@energysolutions.com

Sincerely,

Thomas A. Brown
Radiation Safety Officer

Cc: DWMRC
Scott Anderson
Don Verbica

ATTACHMENT 1

Nuclear Fuel Services Data
(Six Supersacks Sampled at Energy*Solutions* Clive Disposal Facility)

Filter Cake Batch No.	Lift Liner No.	Batch No.	gU	gU-235	Net Mass lbs	Waste Lock (lbs)	Net Mass lbs	Net Mass kg	U-234 Wt%	U-235 Wt%	2.16E+06 U-235 pCi/g
WWTF-16-022	7064876		402.7	342.7	4,202		4,202		0.00861	85.10%	389
		TOTAL	402.7	371.8			4,202	1,906			
		Waste Lock	0	0		150	150	68			
		WWTF-16-085	4.4	3.8			687	312	0.00882	86.36%	26
		FWTF-16-022 A	0.6	0.5			343	156	0.00833	83.33%	7
		WWTF-16-086	13.8	12.4			687	312	0.00942	89.86%	86
		WWTF-16-087	14.9	12.4			687	312	0.00831	83.22%	86
		FWTF-16-023 P	181	168.3			206	93	0.01000	92.98%	3,894
		FWTF-16-023 A	0.5	0.5			549	249	0.01145	100.00%	4
		WWTF-16-088	11.2	9.9			687	312	0.00916	88.39%	69
		FWTF-16-024 P	176.3	164			206	93	0.01000	93.02%	3,795
WWTF-17-004	7065311		268.6	216.9	3,946		3,946		0.00794	80.75%	262
		TOTAL	268.6	216.9			3,946	1,790			
		Waste Lock	0	0		150	150	68			
		WWTF-17-012	12.7	9.7			730	331	0.00731	76.38%	63
		WWTF-17-013	12.3	10.4			803	364	0.00853	84.55%	62
		FWTF-17-003 A	125.2	116.6			219	99	0.01002	93.13%	2,538
		WWTF-17-014	94.1	57.4			730	331	0.00541	61.00%	375
		FWTF-17-003 A	1.5	1.3			511	232	0.00887	86.67%	12
		WWTF-17-016	22.8	21.5			803	364	0.01025	94.30%	128
WWTF-17-006	7065394		176.4	161	3,826		3,826		0.00968	91.27%	201
		TOTAL	176.4	161			3826	1735			
		Waste Lock	0	0		150	150	68			
		FWTF-17-005 P	76.9	71.6			334	152	0.01002	93.11%	1,021
		WWTF-17-020	19.6	17.6			1,114	505	0.00941	89.80%	75
		WWTF-17-021	78.2	70.2			1,225	556	0.00941	89.77%	273
		FWTF-17-005 A	1.7	1.6			1,003	455	0.01022	94.12%	8
WWTF-17-008	7065444		160.6	128.5	3,872		3,872		0.00783	80.01%	158
		TOTAL	160.6	128.5			3,872	1,756			
		Waste Lock	0	0		150	150	68			
		WWTF-17-028	106.6	83.2			1,128	512	0.00754	78.05%	352
		FWTF-17-007 P	21.7	20.2			338	153	0.01002	93.09%	285
		WWTF-17-030	17.7	13.3			1,128	512	0.00714	75.14%	56
		WWTF-17-031	14.6	11.8			1,128	512	0.00795	80.82%	50
WWTF-17-011	7065519		169	156.4	3,592		3,592		0.00991	92.54%	208
		TOTAL	169	156.4			3,946	1,790			
		Waste Lock	0	0		150	150	68			
		WWTF-17-038	27.9	25.6			1,071	486	0.00977	91.76%	114
		FWTF-17-010 A	0	0			779	353	0.00000	0.00%	-
		WWTF-17-039	9.7	8.7			973	442	0.00939	89.69%	43
		FWTF-17-011 P	129.6	120.4			292	132	0.00998	92.90%	1,966
		FWTF-17-011 A	1.8	1.7			681	309	0.01028	94.44%	12

ATTACHMENT 2

Nuclear Fuel Services
Spatial Distribution Analysis

Activity per 600 kg
Contiguous Mass

Depiction of Super Sack 7064876

1906.0 kg Waste Total
389 pCi U-235/g Waste Average for Super Sack

600 kg @ 628 pCi/g

FWTF-16-24 P 93.5 **kg Waste Batch** 3,794.9 **pCi U-235/g Waste**
WWTF-16-088 311.5 **kg Waste Batch** 68.7 **pCi U-235/g Waste**
FWTF-16-023 A 249.2 **kg Waste Batch** 4.3 **pCi U-235/g Waste**

54.2 kg @ 4.3 pCi/g

600 kg @ 679pCi/g

FWTF-16-023 P 93.5 **kg Waste Batch** 3,894.4 **pCi U-235/g Waste**
WWTF-16-087 311.5 **kg Waste Batch** 86.1 **pCi U-235/g Waste**
WWTF-16-086 311.5 **kg Waste Batch** 86.1 **pCi U-235/g Waste**

116.5 kg @ 86.1 pCi/g

467.3 kg @ 19.9 pCi/g

FWTF-16-022 A 155.8 **kg Waste Batch** 6.9 **pCi U-235/g Waste**
WWTF-16-085 311.5 **kg Waste Batch** 26.4 **pCi U-235/g Waste**
Waste Lock 68.0 **kg Waste Batch** 0.0 **pCi U-235/g Waste**