

July 3, 2014

Mr. Kevin Ramsey
 Senior Project Manager
 Fuel Manufacturing Branch
 U.S. Nuclear Regulatory Commission
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**SUBJECT: COMPARISON OF RESULTS FOR QUARTER 8 SURFACE WATER
 SPLIT SAMPLES COLLECTED AT THE NUCLEAR FUEL SERVICES
 SITE, ERWIN, TENNESSEE (DOCKET NO. 10-143; RFTA 11-018)
 DCN: 5198-SR-08-0**

Dear Mr. Ramsey:

Oak Ridge Associated Universities (ORAU), under the Oak Ridge Institute for Science and Education (ORISE) contract, has completed laboratory analysis and review of results for split surface water samples collected on May 21, 2014, at the Nuclear Fuel Services site in Erwin, Tennessee. Details of these activities are presented in the enclosed report.

Please contact me at 865.574.0685, or Erika Bailey at 865.576.6659, if you have any questions or comments.

Sincerely,



David A. King, CHP, PMP
 Sr. Health Physicist/Project Manager
 Independent Environmental Assessment
 and Verification Program

DAK:fs

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**COMPARISON OF RESULTS FOR QUARTER 8 SURFACE WATER
SPLIT SAMPLES COLLECTED AT THE NUCLEAR FUEL SERVICES SITE
ERWIN, TENNESSEE**

Oak Ridge Associated Universities (ORAU), under the Oak Ridge Institute for Science and Education (ORISE) contract, collected split surface water samples with Nuclear Fuel Services (NFS) representatives on May 21, 2014. Representatives from the U.S. Nuclear Regulatory Commission (NRC) and the Tennessee Department of Environment and Conservation were also in attendance. Samples were collected at four surface water stations, as required in the approved Request for Technical Assistance Number 11-018. These stations included Nolichucky River upstream (NRU), Nolichucky River downstream (NRD), Martin Creek upstream (MCU), and Martin Creek downstream (MCD).

Both ORAU and NFS performed gross alpha and gross beta analyses, and Table 1 presents the comparison of results using the duplicate error ratio (DER), also known as the normalized absolute difference. A $DER \leq 3$ indicates at a 99% confidence interval that split sample results do not differ significantly when compared to their respective one standard deviation (sigma) uncertainty (ANSI N42.22). The following equation presents the DER calculation.

$$DER = \frac{|P - S|}{\sqrt{U_P^2 + U_S^2}}$$

Where:

- P = NFS primary sample result
- S = ORAU split sample result
- U_P = NFS primary sample one sigma uncertainty
- U_S = ORAU split sample one sigma uncertainty

The NFS split sample report specifies 95% confidence level (two sigma) for the reported uncertainties (NFS 2014). Therefore, the reported two sigma uncertainty values were divided by 1.96 so the DER equation above could be used. A comparison of split sample results, using the DER equation, indicates that the DER for all pairings was between 0.3 and 2.0.

The highest DER of 2.0 was calculated for gross beta results from ORAU MCD @ RR Trestle sample 5198W0032 and NFS laboratory sample MCD-349376004. The ORAU result was 1.93 ± 0.38 pCi/L (value ± 1 sigma uncertainty) compared to the NFS result of 0.78 ± 0.44 pCi/L (value

± 1 sigma uncertainty). Comparison of the analytical data indicates both laboratories' results are consistent with low (e.g., background) concentrations.

REFERENCES

ANSI N42.22. *Traceability of Radioactive Sources to NIST and Associated Instrument Quality Control*. American National Standards Institute.

NFS 2014. File name "MCU MCD NRU NRD May 2014.pdf," e-mailed by Carol Hale/NFS to Jason Lee/ORAU on June 24, 2014. Nuclear Fuel Services.



Table 1. Quarter 8 Results for Split Surface Water Samples Collected on May 21, 2014

Quarter	Station	ORAU Sample	NFS Sample	Analyte	ORAU (pCi/L)			NFS (pCi/L) ^a			DER	
					Result	Uncert. ^b	MDC ^c	Result	Uncert.	MDC	Value	≤ 3?
8	NRU	5198W0029	NRU	Gross alpha	0.71	0.24	0.26	0.13	0.44	1.95	1.2	YES
				Gross beta	0.78	0.33	0.52	1.36	0.67	2.13	0.8	YES
				Gross alpha	0.29	0.18	0.26	-0.13	0.38	1.98	1.0	YES
8	NRD	5198W0030	NRD	Gross beta	1.06	0.34	0.52	0.60	0.62	2.16	0.6	YES
				Gross alpha	0.16	0.15	0.24	1.42	0.65	1.87	1.9	YES
				Gross beta	1.20	0.34	0.51	1.01	0.63	2.09	0.3	YES
8	MCD	5198W0032	MCD @ RR Trestle	Gross alpha	1.28	0.32	0.30	0.71	0.56	1.92	0.9	YES
				Gross beta	1.93	0.38	0.53	0.78	0.44	1.41	2.0	YES

^aData from the licensee laboratory reported a range of significant digits with individual values as low as the ten thousandths place (e.g., 0.000X); for ease of reference, their values are presented using the format X.XX.

^bUncert. = one sigma uncertainty is presented; two sigma uncertainties are reported in NFS data, thus the licensee's uncertainty values were divided by 1.96.

^cMDC = minimum detectable concentration