

January 21, 2013

Mr. Kevin Ramsey
 Senior Project Manager
 Fuel Manufacturing Branch
 U.S. Nuclear Regulatory Commission
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**SUBJECT: COMPARISON OF RESULTS FOR QUARTER 2 SURFACE WATER
 SPLIT SAMPLES COLLECTED AT THE NUCLEAR FUEL SERVICES
 SITE, ERWIN, TENNESSEE
 DCN: 5198-SR-02-0**

Dear Mr. Ramsey:

Oak Ridge Associated Universities (ORAU), under the Oak Ridge Institute for Science and Education (ORISE) contract, has completed the collection, sample analysis, and review of split surface water sample results collected at the Nuclear Fuel Services site in Erwin, Tennessee.

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





Sincerely,



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

DAK:fr

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**COMPARISON OF RESULTS FOR QUARTER 2 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 November 15, 2012. Representatives from the U.S. Nuclear Regulatory Commission and 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 that, at a 99% confidence interval, 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 does not specify the confidence level of reported uncertainties (NFS 2012). Therefore, standard two sigma reporting is assumed and uncertainty values were divided by 1.96.

In conclusion and as shown in Table 1, all DER values were less than 3 and 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 2012. File name “11-15-12 Split Samples.pdf” emailed by Carol Hale/NFS to Jason Lee/ORAU on January 9, 2013. Nuclear Fuel Services.

Table 1. Quarter 2 Results for Split Surface Water Samples Collected on November 15, 2012

Quarter	Station	ORAU Sample	NFS Sample	Analyte	ORAU (pCi/L)			NFS (pCi/L)			DER	
					Result	Uncert.	MDC	Result	Uncert.	MDC	Value	≤ 3?
2	NRU	5198W0005	NRU	Gross alpha	0.05	0.10	0.38	1.61	0.63	1.67	2.4	YES
				Gross beta	0.79	0.23	0.75	1.77	0.64	1.92	1.4	YES
2	NRD	5198W0006	NRD	Gross alpha	0.05	0.11	0.39	0.65	0.45	1.49	1.3	YES
				Gross beta	1.14	0.24	0.76	0.41	0.43	1.53	1.5	YES
2	MCU	5198W0007	MCU	Gross alpha	0.21	0.11	0.36	-0.12	0.32	1.62	1.0	YES
				Gross beta	1.34	0.24	0.75	2.33	0.71	2.10	1.3	YES
2	MCD	5198W0008	MCD @ RR Trestle	Gross alpha	0.96	0.18	0.43	1.45	0.63	1.74	0.7	YES
				Gross beta	1.87	0.26	0.76	2.36	0.64	1.77	0.7	YES

Uncert. = one sigma uncertainty

MDC = minimum detectable concentration