



NUCLEAR FUEL SERVICES, INC.
a subsidiary of The Babcock & Wilcox Company

■ 1205 banner hill road ■ erwin, tn 37650 ■ phone 423.743.9141
■ www.nuclearfuelservices.com

21G-14-0022
GOV-01-55-06
ACF-14-0029

January 28, 2014

Director, Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

- Reference:
- 1) Docket No. 70-143; SNM License 124
 - 2) Letter from B. Marie Moore to NRC, submittal of North Site Decommissioning Plan, Revision 3, (21G-06-0049) dated May 2, 2006
 - 3) Letter from NRC to B. Marie Moore, Nuclear Fuel Services, Inc., Acknowledgement and Acceptance of Revision 3 to North Site Decommissioning Plan (TAC L31949), dated May 18, 2006
 - 4) Letter from M. P. Elliott to the NRC, Final Status Survey Final Report for Survey Units 13, 14, and 15, (21G-13-0212) dated September 30, 2013
 - 5) Letter from NRC to M. P. Elliott, Nuclear Fuel Services, Inc., Acceptance for Review of Final Status Survey Report for Survey Units 13, 14, and 15 (TAC L33291) dated November 26, 2013

Subject: Supplemental Information for Final Status Survey Report for Survey Units 13, 14, and 15

Nuclear Fuel Services, Inc. (NFS) hereby submits supplemental information to support the review of Reference 4, Final Status Survey (FSS) Report for Survey Units 13, 14, and 15, as requested in Reference 5, NRC Acceptance for Review of FSS Report for Survey Units 13, 14, and 15. The Attachment includes the technical basis for the adjusted corehole sampling density in Survey Units 13 and 15.

If you or your staff have any questions, require additional information, or wish to discuss this, please contact me, or Mr. Scott Morie, Decommissioning Environmental Unit Manager, at (423) 735-5616. Please reference our unique document identification number (21G-14-0022) in any correspondence concerning this letter.

Sincerely,

NUCLEAR FUEL SERVICES, INC.

Richard J. Freudenberger, Director
Safety and Safeguards

DML/pdj

NMSSD1

Attachment: Supplemental Information for Final Status Survey Reports for
Survey Units 13, 14, and 15

Copy:

Regional Administrator
U.S. Nuclear Regulatory Commission
Region II
245 Peachtree Center Ave., NE, Suite 1200
Atlanta, GA 30303-1257

Mr. Kevin Ramsey
Senior Project Manager
Fuel Manufacturing Branch
Division of Fuel Cycle Safety and Safeguards
Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
One White Flint North
11555 Rockville Pike
Rockville, MD 20852-2738

Mr. David Hartland
Project Inspector
U.S. Nuclear Regulatory Commission
Region II
245 Peachtree Center Ave., NE, Suite 1200
Atlanta, GA 30303-1257

Mr. Charles Stancil
Senior Resident Inspector
U.S. Nuclear Regulatory Commission

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Attachment
Supplemental Information for Final Status Survey Reports for
Survey Units 13, 14, and 15

4 pages to follow

As stated in The NRC Acceptance for Review Letter:

Please note that our technical reviewer failed to find a technical basis for the adjusted corehole sampling density in Survey Units 13 and 15. A similar issue was identified in the final status survey report for Survey Unit 20. The technical basis that resolved the previous issue is described in our safety evaluation report transmitted June 10, 2013 (Agencywide Documents Access and Management System [ADAMS] Accession No. ML13129A166). If similar information is provided in the report for Survey Units 13 and 15, please inform us where it is located.

NFS Response:

As was the case for Survey Unit 20, the final design of Survey Units 13 and 15 was ultimately determined in 2006 using professional judgment relying on the consideration of three mathematical points: the corehole frequency determined using "historical data", the corehole frequency of the neighboring survey units sharing similar historical properties, and areal frequency as suggested by the MARSSIM (USNRC 2000) to evaluate areas of elevated radioactivity for open land areas. Because surface scanning is not applicable for subsurface soil characterization and known elevated concentrations of residual radioactivity existed in these areas in the past, a conservative approach was taken. In Survey Unit 13, the reference system spacing area identified in MARSSIM (100 m²) was reduced by a factor of two, resulting in a reference system spacing surface area of 50 m² (approximately every 7 meters). In Survey Unit 15, the reference system spacing area identified in MARSSIM (100 m²) was reduced by a factor of ten, resulting in a reference system spacing surface area of 10 m² (approximately every 3 meters).

Explained in the FSS Report and the 2007 Characterization Plan, the historical dataset that NFS provided to contractor MACTEC (now AMEC Environment & Infrastructure) in 2006 contained 23,429 sample data points. Of these 23,429 samples, MACTEC utilized 19,107 samples during the design of the Characterization Plan. Analytical samples not used were removed from the dataset because they were located within the top 3 feet of previously excavated areas and thus predate the post-remediation radiological conditions in those areas. The vast majority of expunged data was labeled as "pre" versus "post" indicating the samples were taken previous to excavation/remediation. The expunged data was deemed irrelevant to radiological conditions of the Site at that time.

Survey Unit 13 underwent additional remediation in October of 2008. Field records indicate that the survey unit was excavated down 3 - 4 meters below 1640 feet above mean sea level (msl) with volumetric sampling occurring throughout and at the conclusion of the excavation process. However, the post-remedial action sample results from the 2008 remedial actions were not included in the 2006 dataset that had been initially provided to MACTEC.

Survey Unit 15 underwent additional remediation in September of 2008. Field records indicate that the survey unit was excavated down 2 - 3 meters below 1640 feet above msl with volumetric sampling occurring throughout and at the conclusion of the excavation process. However, the post-remedial action sample results from the 2008 remedial actions were not included in the 2006 dataset that had been initially provided to MACTEC.

In 2013, NFS provided a supplemental dataset to AMEC that included five historical analytical sample results located within Survey Unit 13 and seven historical analytical sample results located within Survey Unit 15. The supplemental dataset is comprised of analytical results from volumetric samples collected in September and October 2008 following the additional remedial activities in Survey Units 13 and 15. The supplemental dataset is representative of radiological conditions of the site at the time of FSS activities and is considered the relevant historical dataset for Survey Units 13 and 15.

Upon receipt of the supplemental historical dataset in 2013, AMEC re-evaluated the selected corehole spacing for Survey Units 13 and 15 using the same final design criteria as outlined in Section 2.7.2 of the FSS Report. To reevaluate the Survey Unit 13 and 15 corehole designs, the post-remediation sample results were plotted into SADA to verify their locations. Next, the dataset was inputted into the Subsurface Soil DCGL calculators as the historical dataset, replacing the samples collected prior to the 2008 remedial activities. This test was performed to determine what the resultant corehole spacing would have been, if the post-remediation data had been available and used during the survey design. This evaluation confirmed the conservative nature of the survey design for Survey Unit 13 and Survey Unit 15. It affirmed that corehole spacing prescribed in the designs (one corehole every 50 m² for Survey Unit 13 and every 10 m² for Survey Unit 15) was far more densely spaced than would be reasonably required to assess the dose consequences of locally elevated pockets of residual radioactivity in the survey units. Using the post-remedial action data (2013 supplemental dataset), the Subsurface Soil DCGL calculators conclude that the *Minimum Areal Sample Frequency required to Satisfy DCGL_{EMC} 90th Percentile* is 999 m² and that the *Minimum Areal Sample Frequency required to Satisfy DCGL_{EMC} Observed Maximum* is 999 m² (the default maximum size of the Subsurface Soil DCGL calculators) for both survey units.

The historical dataset of Survey Unit 13 and Survey Unit 15, Appendix A, will be replaced in its entirety with the 2008 sample results, shown in Tables 2 and 4. Further survey unit-specific information is provided below.

Survey Unit 13

The 2006 historical dataset provided to MACTEC included 13 individual sample IDs within the Survey Unit 13 boundary, dating back to 1992, 1993, and 2005, well before the 2008 remediation. Based on the findings described in this response, it is evident that none of the data points provided to MACTEC in 2006 are relevant to the radiological conditions in Survey Unit 13 at the time of FSS sampling and that the post-remedial action samples collected in 2008 should be considered the relevant radiological data.

NFS mapped the 1992, 1993, and 2005 dataset to evaluate the datasets' relevancy to current (post-remediation) physical and radiological conditions of the survey unit. Sample results and un-altered sample depths from the 13 samples located in Survey Unit 13 from the 1992, 1993, and 2005 dataset are presented in Table 1. No sample depth exceeds 3 feet below ground surface (bgs).

Table 1 Survey Unit 13 Pre-remediation Sample Results

Sample ID	Date Collected	Sample Depth (ft bgs)
5747	2/21/05	0
5749	2/21/05	0
*****		0
*****		0
5748	2/21/05	0
5750	2/21/05	0
5751	2/21/05	0
02-S-112	8/19/93	3
5713	2/17/05	0
5757	2/23/05	0
02-S-127	8/19/93	3
02-S-050	7/29/92	3
02-S-130	8/23/93	3

Mapping samples to the depths listed in Table 1 and plotted against the post-remediation contour map demonstrate that the soils represented by these samples were removed in 2008 and disposed of as part of NFS' approved soil remediation activities. As explained above, field records and elevation contour labels indicate that the majority of the survey unit was excavated down 3 - 4 meters. Any samples representing those remediated soils are no longer considered relevant to post-remediation conditions. In October 2008, at the conclusion of excavation, volumetric samples were collected from the remediated surface, and are presented in Table 2.

Table 2 Survey Unit 13 Post-remediation 2008 Sample Results

Sample ID	Date Collected	Sample Depth Below Pre-excavation Surface [meter]	Analytical Results [pCi/g]		
			Am-241	Th-232	U-235
OP-923	10/14/2008	3.5	1.329	3.314	0.764
OP-924	10/14/2008	3.5	1.191	2.321	0.570
OP-925	10/14/2008	3.5	-0.629	2.994	0.298
OP-926	10/14/2008	3.5	0.342	2.287	0.286
OP-927	10/14/2008	3.5	-0.837	2.275	0.343

The dataset shown in Table 2 is representative of radiological conditions of the site at the time of FSS sampling and will be considered the relevant "historical" dataset from which the Survey Unit 13 corehole density has been confirmed.

Survey Unit 15

The 2006 historical dataset provided to MACTEC included six individual sample IDs within the Survey Unit 15 boundary dating back to 1992 and 1993, well before the 2008 remediation. Based on the findings described in this response, it is evident that none of the data points provided to MACTEC in 2006 are relevant to the radiological conditions in Survey Unit 15 at the time of FSS sampling and that the post-remedial action samples collected in 2008 should be considered the relevant radiological data.

NFS mapped the 1992 and 1993 dataset to evaluate the datasets' relevancy to current (post-remediation) physical and radiological conditions of the survey unit. Sample results and unaltered sample depths from the six samples located in Survey Unit 15 from the 1992 and 1993 dataset are presented in Table 3. No sample depth exceeds 3 feet bgs.

Table 3 Survey Unit 15 Pre-remediation Sample Results

Sample ID	Date Collected	Sample Depth (ft bgs)
02-S-060	7/31/92	0.5
02-S-061	7/31/92	1.5
02-S-062	7/31/92	3
02-S-098	8/25/93	0.5
02-S-099	8/27/93	1.5
02-S-100	8/31/93	3

Mapping samples to the depths listed in Table 3 and plotted against the post-remediation contour map demonstrate that the soils represented by these samples were removed in 2008 and disposed of as part of NFS' approved soil remediation activities. As explained above, field records and elevation contour labels indicate that the majority of the survey unit was excavated down 2-3 meters. Any samples representing those remediated soils are no longer considered relevant to post-remediation conditions. In October 2008, at the conclusion of excavation, volumetric samples were collected from the remediated surface, and are presented in Table 4.

Table 4 Survey Unit 15 Post-remediation 2008 Sample Results

Sample ID	Date Collected	Sample Depth Below Pre-excavation Surface [meter]	Analytical Results [pCi/g]		
			Am-241	Th-232	U-235
OP-881	9/18/2008	2.5	0.272	1.825	0.102
OP-882	9/18/2008	2.5	-0.072	0.937	0.046
OP-883	9/18/2008	2.5	-0.288	1.009	0.810
OP-884	9/19/2008	2.5	0.150	1.968	0.167
OP-885	9/18/2008	2.5	-0.588	1.648	1.166
OP-886	9/19/2008	2.5	-0.277	1.241	0.690
OP-887	9/19/2008	2.5	-1.003	2.538	1.241

The dataset shown in Table 4 is representative of current radiological conditions of the site and will be considered the relevant "historical" dataset from which the Survey Unit 15 corehole density has been confirmed.