



NUCLEAR FUEL SERVICES, INC.
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21G-13-0052
GOV-01-55-04
ACF-13-0072
44N-13-0005
March 25, 2013

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

- References:
- 1) Docket No. 70-143; SNM-124
 - 2) Letter from the NRC; Acknowledgement and Acceptance of Revision 3 to North Site Decommissioning Plan, dated May 18, 2006 (TAC L31949)
 - 3) Letter from Mark P. Elliott to the NRC; Final Status Survey Final Report for Survey Units 2, 8, 9, 19, and 20, dated May 24, 2010 (21G-10-0082)
 - 4) Letter from Mark P. Elliott to the NRC; Amendment 1 to Final Status Survey Final Report for Survey Units 2, 8, 9, 19, and 20, dated August 12, 2010 (21G-10-0159)
 - 5) Letter from Mark P. Elliott to the NRC; Response to the Request for Additional Information Concerning Final Status Survey Report for Survey Units 2, 8, 9, 19, and 20, dated February 18, 2011 (21G-11-0025)
 - 6) Letter from Mark P. Elliott to the NRC; Response to the NRC Staff Evaluation of NFS Responses to RAIs Regarding Final Status Survey Report for Survey Units 2, 8, 9, 19, and 20, dated March 1, 2012 (21G-12-0039)
 - 7) Letter from Mark P. Elliott to the NRC; Addendum to the Final Status Survey Report for Survey Units 1, 3, and 10; and Addendum to the Final Status Survey Report for Survey Units 2, 8, 9, 19, and 20, dated November 14, 2012 (21G-12-0228)

Subject: Submittal of Additional Information for Final Status Survey Report for Survey Units 2, 8, 9, 19, and 20, and Revised Report

Nuclear Fuel Services, Inc. (NFS) hereby submits additional information in response to teleconferences held with NRC staff on December 6, 2012, and February 15, 2013, for the Final Status Survey (FSS) Report for Survey Units 2, 8, 9, 19, and 20. Responses to staff questions are included in the Attachment and Enclosure 2. The discussions also resulted in revisions to the FSS Report, which are included in Enclosures 3 and 4. For ease of use by the staff, the Addendum to the FSS Report submitted with Reference 7 has been included in Enclosure 3; however, the content has not changed.

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NMS501

Portions of the enclosed report (Enclosure 3) contain contractor proprietary information, as set forth in the enclosed affidavit (Enclosure 1), in accordance with 10 CFR 2.390(a)(4), and are not suitable for public release. A redacted version of the report, included as Enclosure 4, is suitable for public release. Appendices A through G of the report, included as Enclosure 5, are also suitable for public release. Therefore, Enclosure 5 is part of both Enclosures 3 and 4.

If you or your staff have any questions, require additional information, or wish to discuss this further, please contact me, or Mr. Scott Morie, Decommissioning Environmental Unit Manager at (423) 735-5616. Please reference our unique document identification number (21G-13-0052) in any correspondence concerning this letter.

Sincerely,

NUCLEAR FUEL SERVICES, INC.



Mark P. Elliott, Director
Quality, Safety, and Safeguards

CSM/pdj

- Attachment: Additional Information for Final Status Survey Report for Survey Units 2, 8, 9, 19, and 20
- Enclosure 1: Affidavit
Enclosure 2: NFS Grading Plan
Enclosure 3: Revised Report for Survey Units 2, 8, 9, 19, and 20
Enclosure 4: Redacted Report for Survey Units 2, 8, 9, 19, and 20
Enclosure 5: Appendices A Through G to the FSS Report

Copy:

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Attachment

Additional Information for
Final Status Survey Report for Survey Units 2, 8, 9, 19, and 20

8 pages to follow

**Additional Information for
Final Status Survey Report for Survey Units 2, 8, 9, 19, and 20**

Based on the conference call December 6, 2012, the following are items for which clarifications and additional information are needed to complete the review of the FSS Report for survey units 2, 8, 9, 19, and 20. References are to the FSS Report, unless noted otherwise.

(1) During the teleconference, there was significant discussion about the depths of the historical data relative to the depths of current soil. The documentation is not clear enough to conclude that the historical data for Survey Unit 20 are not relevant to the current conditions of the site. Figure 4-99 shows the vertical alignment matrix for Survey Unit 20, and indicates the top of the new core samples as being mapped to layers 1, 4 (mostly), 3, or 5. The mapping to layer 4 indicates the top of the cores are approximately 3 m (about 10 ft) below the final grade. The depths indicated for the historical data, in Appendix A, include a number of samples at 12.5 and 13.5 ft depth. Thus, it would appear that the historical data are representative of the current conditions, as the overlap appears to be about 1 m.

(1a) Appendix A does not indicate that the depths are estimated depth below the final grade. If this is correct, this should be clarified/documentated.

NFS Response:

Explained on the conference call December 6, 2012 and in the FSS Report, the historical dataset that NFS provided to contractor MACTEC (now a wholly-owned subsidiary of 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 current radiological conditions of the Site.

Survey Unit 20 underwent remediation in November of 2005. Field records indicate that the majority of the survey unit was excavated down 2.5 meters with volumetric sampling occurring throughout and at the conclusion of the excavation process. However, the post-remedial action sample results from the 2005 remedial actions were not included in the 2006 dataset that had been initially provided to MACTEC.

The 2006 historical dataset provided to MACTEC included sparsely distributed data within the Survey Unit 20 boundary with only 13 individual sample IDs, dating back to a 1995 pre-remediation characterization. All 13 sample IDs were classified as "pre," denoting the samples were collected prior to remedial activities. 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 current radiological conditions in Survey Unit 20 and that the post-remedial action samples collected in 2005 should be considered the relevant radiological data.

When the historical dataset was given to MACTEC in 2006, NFS provided MACTEC with an elevation contour map of the North Site, created by NFS surveyor subcontractor. During data visualization using computer software SADA, historical data was mapped to the NFS North Site with the elevation contour map overlaid to assist with survey unit demarcation. Figures 2-1 through 2-4 of the FSS Report present data visualization in SADA with elevation contours overlaid in Figure 2-2 and Figure 2-4. Figure 1 of this response is a zoomed in screenshot of SADA that shows the 13 historical data points, represented by the colored points labeled "Pre," with the 2006 contour map overlaid. Each contour line represents a 1-foot depth increment.



Figure 1 "Pre" Remediation Historical Data, Visualized in SADA

It was during the SADA visualization of the data that MACTEC incorrectly attributed the 2006 contour map as being representative of the pre-remediation ground surface of Survey Unit 20. Upon examination of the 2008 NFS drainage plan contours (included with response #2 below) it is evident that the 2006 contours match the 2008 contours almost exactly. Since the contours in 2008 are indicative of the North Site conditions at that time (see NFS Drainage Plan legend) and were surveyed well after the 2005 Survey Unit 20 remediation, the 2006 contour map must be representative of the post-remediation conditions of Survey Unit 20.

Examination of remedial action daily records and field notes from 2005 further support this conclusion. Survey Unit 20 underwent remediation in November of 2005, resulting in steep excavation banks demarcating the west, south, and east borders of Survey Unit 20 (Figure 2-7 of the FSS Report). Field records indicate that the majority of the survey unit was excavated down 2.5 meters. Elevation contour labels in the NFS drainage plan provide further evidence of the Survey Units' remediation and excavation depths.

Because MACTEC believed the 2006 contour map represented pre-remediation conditions, the 1995 samples (labeled as “pre” in Figure 1) were incorrectly mapped according to the depth below ground surface (bgs) of the 2006 ground surface. In reality, the 1995 sample depths should have been mapped in relation to the ground surface at the time of sampling (1995 pre-remediation ground surface). Because MACTEC mapped depths according to the 2006 contours, representing the post-remediation excavation surface of Survey Unit 20 (excavation depth of 2.5 meters), sample points were artificially, and incorrectly, “lowered” in elevation in comparison to the final North Site grade. Sample depths of the Survey Unit 20 historical dataset, Appendix A of the FSS Report, are the artificially lowered depths and their relation to the expected final grade of the North Site.

NFS has correctly mapped the 1995 dataset to accurate depths 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 20 from the 1995 dataset are presented in Table 1. Note that each sample depth is presented with a “Min Depth” and a “Max Depth” due to sample collection technique of using a hand auger. No sample “Max Depth” exceeds 2.5 meters bgs.

Table 1 Pre-Remediation 1995 Sample Results

Sample ID	Date Collected	Sample Depth (bgs) [meter]	
		Min Depth	Max Depth
904-I8-3	7/7/1995	1.2	2.1
904-I8-4	7/7/1995	2.1	2.5
905-F7-3	6/30/1995	1.2	1.7
906-C2-3	6/29/1995	1.2	1.4
907-C2-3	6/29/1995	1.2	1.7
908-C2-3	7/17/1995	1.2	1.9
909-B1-3	7/17/1995	1.2	1.9
911-C2-2	6/27/1995	0.3	1.2
911-C2-3	6/27/1995	1.2	2.1
944-J9-3	6/28/1995	1.2	1.4
945-I8-3	6/29/1995	1.2	1.6
946-H7-2	6/28/1995	0.3	1.2
946-H7-3	6/28/1995	1.2	1.8

The re-mapped samples to their un-altered depths and plotted against the post-remediation contour map demonstrate that the soils represented by these samples were removed in 2005 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 2.5 meters. Any samples representing those remediated soils are no longer

considered relevant to post-remediation conditions. In November 2005, at the conclusion of excavation, volumetric samples were collected from the remediated surface, and are presented in Table 2.

Table 2 Post-Remediation 2005 Sample Results

Sample ID	Date Collected	Sample Depth Below Pre-excavation Surface [meter]	Analytical Results [pCi/g]		
			Am-241	Th-232	U-235
228	11/4/05	2.0	0.171	2.138	0.087
229	11/4/05	2.0	0.102	1.384	0.419
230	11/4/05	2.0	-0.647	1.863	1.298
231	11/4/05	2.0	0.417	1.698	0.596
232	11/4/05	2.0	-0.642	1.103	2.459
234	11/4/05	2.5	-1.390	1.755	1.050
235	11/4/05	2.5	0.088	1.546	0.903
240	11/8/05	2.5	0.149	3.278	0.483
241	11/8/05	2.0	0.100	2.174	0.550
242	11/8/05	2.5	-0.552	4.602	2.769
243	11/8/05	2.5	1.102	0.906	0.075
244	11/8/05	2.5	-1.511	2.984	2.485
245	11/8/05	2.5	-0.708	3.373	3.282
248	11/8/05	2.5	-0.481	2.295	0.691
250	11/8/05	2.5	-1.160	2.877	2.716
251	11/8/05	2.5	-0.508	2.929	3.282

The dataset shown in Table 2 is representative of current radiological conditions of the site and will be considered the relevant "historical" dataset from which the Survey Unit 20 corehole density has been confirmed with.

NFS has reevaluated the Survey Unit 20 corehole spacing using the 16 post-remediation ("operational") sampling results collected in November of 2005 (Table 2) after the remedial action was performed. To reevaluate the survey unit design, the post-remediation sample results were plotted into SADA to verify their locations within Survey Unit 20, and are shown in Figure 2 (labeled as "Post").



Figure 2 "Post" Remediation Historical Data, Visualized in SADA

Next, the dataset was inputted into the Subsurface Soil DCGL calculators as the historical dataset, replacing the pre-remediation samples from circa 1995. This test was performed to determine what the resultant corehole spacing would have been, if the post-remediation data had been available and were used during the survey design. This evaluation confirmed the conservative nature of the survey design for Survey Unit 20. It affirmed that corehole spacing prescribed in the design (one corehole every 50 m²) 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 unit. Using the post-remedial action data, the Subsurface Soil DCGL calculators conclude that the *Minimum Areal Sample Frequency required to Satisfy DCGL_{EMC} 90th Percentile* is 999m² and that the *Minimum Areal Sample Frequency required to Satisfy DCGL_{EMC} Observed Maximum* is 999m² (the default maximum size of the SSDCGL calculators).

The historical dataset of Survey Unit 20, Appendix A, has been replaced in its entirety with 2005 sample results, shown in Table 2. (See Enclosure 5.)

(1b) As was discussed in the teleconference, the final grade is important to the determinations of DCGLs (which are a function of depth) for the FSS compliance calculator. Section 4.8.2 refers to the “NFS Drainage Plan,” which was also mentioned in the teleconference. We are unable to find the Drainage Plan on the NRC docket. Because the Drainage Plan is an NFS commitment, used to perform the vertical alignment, the document must be on the docket. If the document is not on the docket, please submit it. If the document was submitted, provide reference information (e.g., date, Subject line of cover letter), so that we can search the docket.

NFS Response:

The current North Site Drainage Plan is included as Enclosure 2.

(2) We have relooked at the issue of what the DP requires regarding the corehole density adjustment. The documentation is not clear enough to conclude that the DP requirements were met. The informal NFS response, sent 12/04/2012, to NRC questions, refers to Section 3.3 of the DP and quotes part of that section. Part of what NFS wrote is (yellow highlight added for emphasis):

Section 3.3 *Adjusting Corehole Density to Demonstrate Compliance with Local Area Subsurface Soil DCGLs of Appendix B [i.e., of the DP] states:*

The “reasonable maximum concentration” is defined as the concentration above which it is estimated that there is a reasonably small likelihood of occurrence in the resulting sample data set. For practical purposes, this value is derived by calculating the 90th percentile concentration considering the pre-existing data that is relevant to conditions in the survey unit at the time the sample design is implemented. The “expected maximum concentration” is defined as the highest concentration that is expected to be observed in the resulting sample data set. For practical purposes, this value is associated with observed maximum concentration considering the pre-existing data that is relevant to conditions in the survey unit at the time the sample design is implemented. Other factors including pertinent data from nearby areas, information gleaned from a historical site assessment, and professional judgment are also taken into account (particularly where there is a paucity of relevant pre-existing data) in establishing the value of the “reasonable maximum

concentration.” Pre-existing data that was collected under conditions no longer representative of the radiological status of the survey unit (e.g., data representing conditions prior to remediation) should not be included if subsequent data from the same area collected post-remediation is available.

Based on the current wording in the FSS Report (i.e., p. 2-47 and 2-50) the reasonable maximum concentration was the 90th percentile of the historical data, which was 21.66 pCi/g. The FSS Report does not discuss a modification of that reasonable maximum. From the discussion during the December 6th conference call, it may be the case that NFS concluded that value was not the reasonable maximum concentration (this impression is based on the discussion of the three main inputs to the number of samples, with one being the historical data for Survey Unit 19). The documentation should be clarified so that NRC staff can come to a conclusion about this DP requirement.

NFS Response:

See NFS response to question 1 and 1a above.

Enclosure 1

AMEC Environment & Infrastructure Affidavit

1 page to follow

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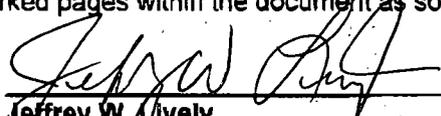
AFFIDAVIT TRADE SECRETS OR PROPRIETARY COMMERCIAL INFORMATION

I, Jeffrey W. Lively, Senior Principal Health Physicist at AMEC Environment & Infrastructure (AMEC), to the best of my knowledge and beliefs make the following representation contained herein:

- A. The following documents, portions of which AMEC wishes to have withheld from public disclosure are:

Enclosure 3: Revised Report for Final Status Survey Report for Survey Units 2, 8, 9, 19, and 20

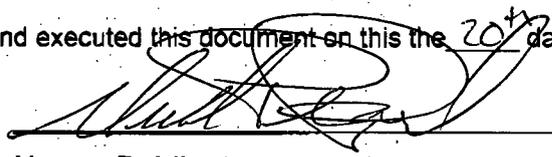
- B. Parts of the information contained in the documents cited in A above has been held in confidence by AMEC, in that they contains trade secrets or proprietary commercial information as specified in Title 10, Code of Federal Regulations, Part 2.390(a). The basis for requesting that portions of these documents be withheld from public disclosure is explicitly marked on the cover page to the aforementioned document and/or the top of each affected page in accordance with 10 CFR 2.390(b)(i)(B).
- C. The information contained in the documents cited in A above is the intellectual property of AMEC, and as such is customarily held in confidence by AMEC. As such, AMEC has customarily submitted privileged and confidential information of this type to the Nuclear Regulatory Commission (NRC) in confidence.
- D. The information contained in the marked pages of the documents cited in A above has not been made available to public sources by AMEC, nor has AMEC authorized that it be made available. In accordance with AMEC policies governing the protection and control of information, proprietary information contained herein has been made available, on a limited basis, to others outside AMEC only as required and under suitable agreement providing for nondisclosure and limited use of the information.
- E. The public disclosure of the information contained in the marked pages of the documents cited in A above is likely to cause substantial economic harm to the competitive advantage held by AMEC. The basis for withholding said information is that it contains distinguishing aspects of a process, methodology, or component(s), the exclusive use of which provides a competitive advantage for AMEC in product optimization or marketability.
- F. The proprietary information that AMEC requests to be withheld from public disclosure is contained on clearly marked pages within the document as so marked.


 Jeffrey W. Lively
 Senior Principal Health Physicist
 Radiological Services Division
 AMEC Environment & Infrastructure

3/20/2013
Date

I certify the above named person appeared before me and executed this document on this the 20th day of March, 2013

My commission expires: 9-26-2016



Notary Public

MICHAEL P. MCDONALD
 NOTARY PUBLIC
 STATE OF COLORADO
 NOTARY ID #20044000809
 My Commission Expires September 26, 2016

Enclosure 2
NFS Grading Plan
1 page to follow

The following Drawing specifically reference

Enclosure 2

Decommission Area

North Site

NFS Grading Plan

Project NO.

0814802C

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