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OAK RIDGE INSTITUTE FOR SCIENCE AND EDUCATION

September 28,2007

Mr. John Nicholson
Region I
Division of Nuclear Materials Safety/D&LB
U.S. Nuclear Regulatory Commission
475 Allendale Road
King of Prussia, PA 19406

SUBJECT: CONFIRMATORY SURVEY RESULTS FOR THE GREENVILLE METALS INCORPORATED BOREHOLES, WHITTAKER CORPORATION WASTE AND SLAG STORAGE AREA, REYNOLDS INDUSTRIAL PARK, TRANSFER, PENNSYLVANIA (DOCKET NO. 040-07455, RFTA NO. 06-005)

Dear Mr. Nicholson:

Enclosed are the confirmatory survey results for the boreholes on the Greenville Metals Incorporated (GMI) property at the Whittaker Corporation Waste and Slag Storage Area, Reynolds Industrial Park in Transfer, Pennsylvania. Radiological survey activities were conducted on June 13 and July 18,2007 at the Whittaker site.

If you have any questions, please direct them to me at 865.576.0065 or Sarah Roberts at 865.241.8893.

Sincerely,

Wade C. Adams

Wade C. Adams
Health Physicist/Project Leader
Survey Projects

WCA:bf

Enclosure

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CONFIRMATORY SURVEY RESULTS
FOR THE
GREENVILLE METALS INCORPORATED BOREHOLES
WHITTAKER CORPORATION
WASTE AND SLAG STORAGE AREA
REYNOLDS INDUSTRIAL PARK
TRANSFER, PENNSYLVANIA

INTRODUCTION

Decommissioning of the Whittaker Corporation Waste and Slag Storage Area (Whittaker) site is being conducted in accordance with the commitments described in License No. SMA-1018. Whittaker, as well as prior owners of the site, extracted rare earth metals (lanthanides) from source material that contained licensable quantities of thorium and uranium. The source materials consisted mainly of Brazilian and Canadian Pyrochlore, a mineral found in granatic geologic formations. These operations resulted in slag by-products containing thorium and uranium. Materials processing took place at the site from 1966 to 1974. In general, the radiological contaminants consist mostly of natural uranium and thorium and their associated daughter products in secular equilibrium. However, uranium-238 (U-238) has been found in disequilibrium with its decay daughters in some slag samples indicating the presence of processed materials (ESL 2007a).

During routine remedial activities in Sections 2 and 4 of the Whittaker site, licensable material was identified in subsurface soils on the adjoining Greenville Metals Incorporated (GMI) site. The GMI site is an active facility that is not associated with Whittaker, which processes and refines scrap and other metals to produce metal alloys. GMI does not use NRC-licensed radioactive materials in its processes. Seventy-six sample boreholes were drilled in the area to determine the extent of the elevated subsurface contamination on the GMI property. The sample boreholes were investigated using sodium iodide (NaI) gamma scintillation detectors to determine the relative gamma radiation levels with depth. The ESL data from the boreholes indicated that some areas of elevated gamma radiation levels needed to be further evaluated (ESL 2007a).

In April 2007, the licensee's decommissioning contractor, Energy*Solutions*, LLC (ESL), submitted a characterization plan (CP), to the U.S. Nuclear Regulatory Commission (NRC). The data quality objective (DQO) of the CP was to direct additional characterization efforts such as remediation, development of derived concentration guideline levels (DCGL) for subsurface activity and the preparation of a dose assessment for leaving subsurface materials in place (ESL 2007a).

The NRC requested that the Oak Ridge Institute for Science and Education (ORISE) perform confirmatory survey activities on the boreholes located on the GMI property adjacent to the Whittaker Corporation Waste and Slag Storage Area site in Transfer, Pennsylvania (Figures 1 and 2). On June 13 and July 18, 2007, ORISE conducted confirmatory radiological surveys consisting of gamma borehole logging within judgmentally-selected boreholes on the GMI property (Figures 3 and 4).

PROCEDURES

Document Review

ORISE reviewed ESL's CP and survey documentation to determine the appropriateness and adequacy of the radiological instrumentation and procedures (ESL 2007a). Prior to the ORISE survey activities, ESL provided the original GMI borehole gamma measurement data for review (ESL 2007a). This was the first data set presented in the CP as evaluated by the previous contractor. While on-site, ESL provided ORISE with additional preliminary gamma measurement data results from the new boreholes (ESL 2007b).

Health and Safety Overview

A safety walkdown of the GMI site was performed by ORISE to evaluate the area for potential health and safety hazards. Additionally, the proposed ORISE survey and sampling procedures were evaluated to ensure that any hazards inherent to the procedures themselves were addressed in current job hazard analyses (JHAs). As part of this requited safety walkdown, ORISE identified several safety concerns (tripping hazards and heat stress) and discussed those issues with the ESL personnel. After discussions with the ESL personnel, it was determined that ORISE personnel would wear above the ankle safety boots and that adequate rest and re-hydration periods would be observed to combat heat stress.

Confirmatory Survey Procedures

Confirmatory radiological surveys performed by ORISE were in accordance with a site-specific survey plan that was submitted to and approved by the NRC (ORISE 2007a). Radiological survey activities were implemented per the guidance provided in the ORISE Survey Procedures and Quality Program Manuals (ORISE 2006 and 2007b). Survey activities consisted of gamma borehole logging.

Gamma radiation levels were determined at one foot increments within each selected borehole. During the June 2007 surveys activities, Boreholes 1, 3, 5, 7 and 10, which were part of the original borehole data set, were not accessible for gamma borehole logging. ESL personnel had drilled new boreholes (identified with the letter "A") when they arrived on site and had evaluated them separately from the original boreholes. Since the CP data set for the original boreholes indicated significant elevated gamma radiation levels, ORISE recommended that these boreholes be re-opened and re-evaluated. ORISE returned to the site in July 2007and performed gamma borehole logging survey activities on Boreholes 1, 3, 5, 7, 10, 41 and 66. Sodium iodide (NaI) scintillation detectors coupled to ratemeters with audible indicators were used for measuring gamma radiation levels within the boreholes. Gamma radiation levels at one foot increments (down to the bottom of the borehole or until contact with water) were recorded on ORISE data sheets. Borehole measurement locations are shown in Figures 3 and 4.

DATA INTERPRETATION

Radiological confirmatory survey data were returned to ORISE's office in Oak Ridge, Tennessee for interpretation. Borehole gamma radiation levels were reported in units of thousand counts per minute (kcpm).

FINDINGS AND RESULTS

For the original borehole data set, ORISE gamma radiation levels at approximately the same depth were equivalent to the previous contractor's results (Table 1). However, the ORISE data for the new borehole data set was not equivalent to ESL's data set (Table 2). It should also be noted that ESL had resurveyed the original boreholes after they were re-opened and the ESL gamma results were also not in agreement with the original results as provided by the previous contractor.

COMPARISON OF ORISE RESULTS WITH ENERGY*SOLUTIONS* DATA

The comparison of ORISE borehole gamma radiation levels to the original borehole and new borehole data sets provided by ESL indicated that ORISE's data were consistent with the original borehole data set and that the ESL results for the new borehole data set consistently exceeded ORISE's results by a factor of three to four.

CONCLUSION

During the period of June 13 and July 18, 2007, ORISE condueted confirmatory survey activities that included gamma borehole logging to assess the radiological conditions within boreholes located on the Greenville Metals Incorporated property that is adjacent to Sections 2 and 4 at the Whittaker Corporation Waste and Slag Storage Area in Transfer, Pennsylvania. The ORISE objective was to determine whether gamma radiation levels at specific depths within selected boreholes were in agreement with ESL-reported gamma radiation levels. Based upon ORISE's confirmatory survey results, the gamma radiation levels for the original data set (Boreholes 1, 3, 5, 7, 10, 41, 52, 66, and 77) were in agreement with the previously collected gamma radiation level data results collected by the previous contractor and presented in the characterization plan (ESL 2007a). ORISE's radiation levels for the new data set were not in agreement with the survey results provided by EnergySolutions, LLD, the current contractor.

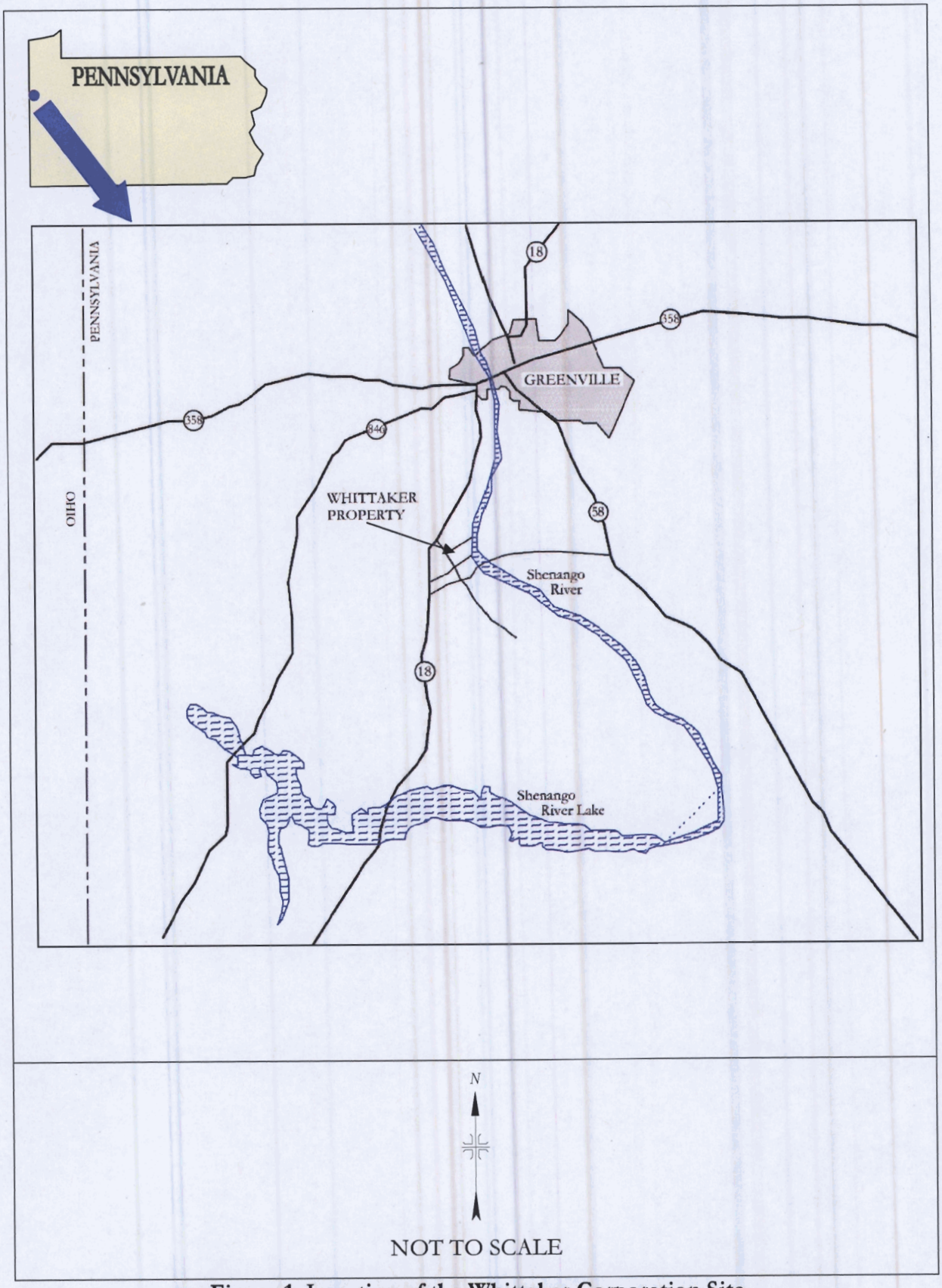

Figure 1: Location of the Whittaker Corporation Site

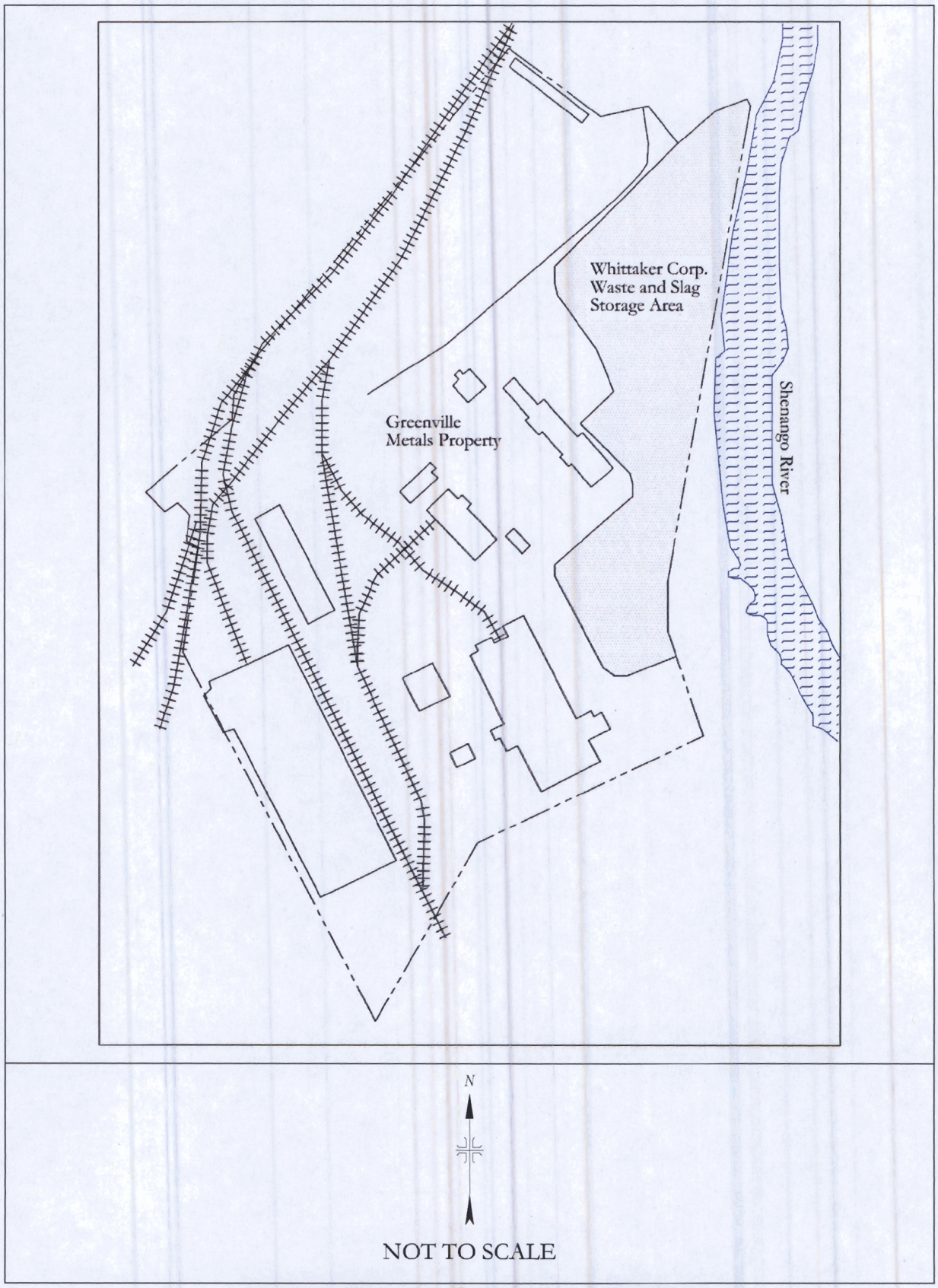

Figure 2: Whittaker Corporation – Plot Plan

Figure 3: Whittaker Corporation – Borehole Measurement Locations Adjacent to Section 2

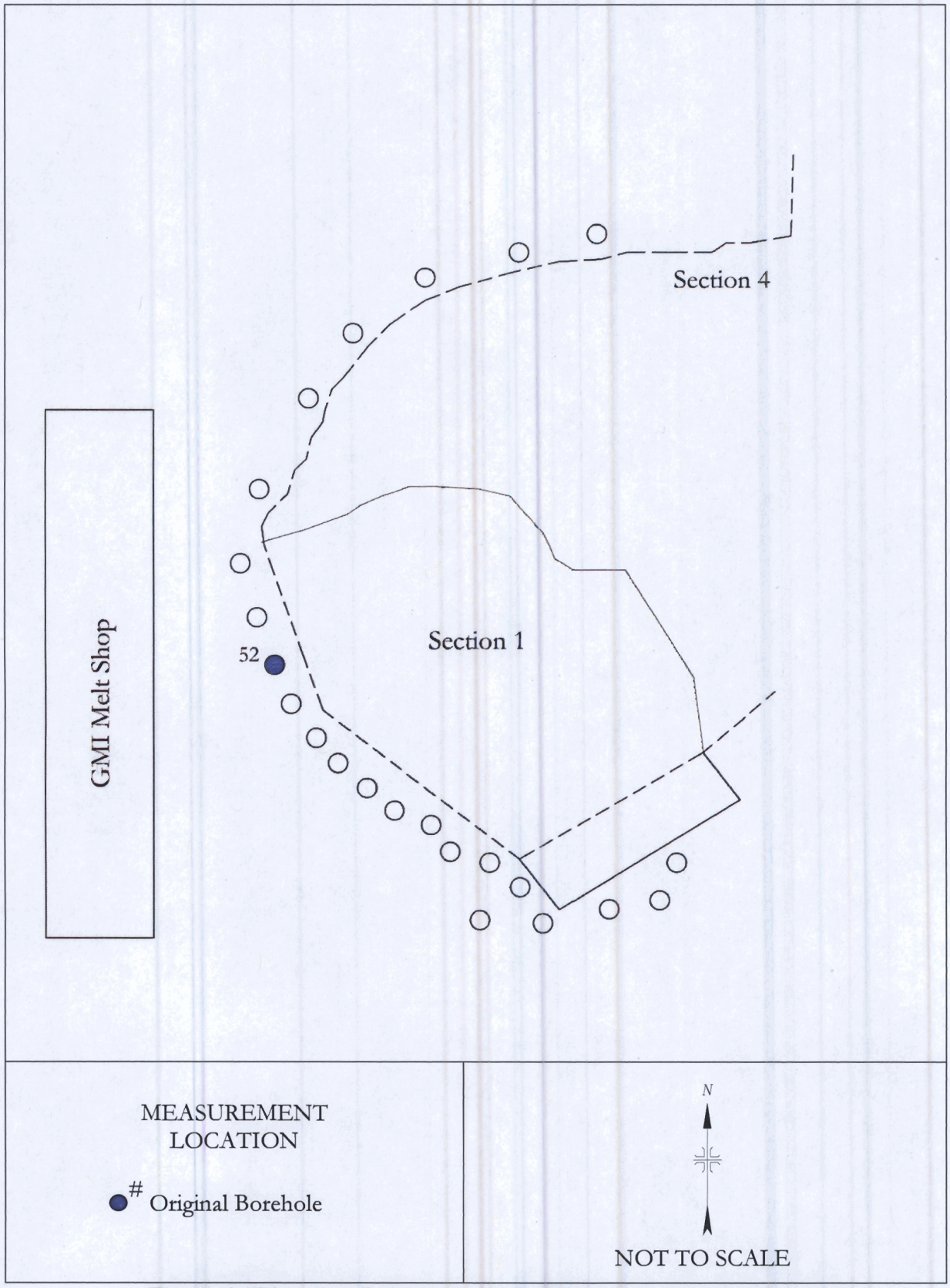

Figure 4: Whittaker Corporation – Borehole Measurement Location Adjacent to Section 1

TABLE 1

GAMMA RADIATION LEVEL COMPARISONS AT VARIOUS DEPTHS IN ORIGINAL BOREHOLE DATA SET ON THE GREENVILLE METALS INCORPORATED PROPERTY WHITTAKER CORPORATION WASTE AND SLAG STORAGE AREA TRANSFER, PENNSYLVANIA

Sample Depth (ft)	Gamma Radiation Level Comparisons at Depth of Borehole (kcpm)									
	Borehole #1		Borehole #3		Borehole #5		Borehole #7		Borehole #10	
	ORISE	ESL[a]	ORISE	ESL	ORISE	ESL	ORISE	ESL	ORISE	ESL
1	[illegible]	---[b]	[illegible]	---	[illegible]	---	[illegible]	---	[illegible]	---
2	[illegible]	5.8	[illegible]	4.9	[illegible]	5.1	[illegible]	6.5	[illegible]	7.9
3	[illegible]	---	[illegible]	---	[illegible]	---	[illegible]	---	[illegible]	---
4	[illegible]	5.4	[illegible]	5.2	[illegible]	5.1	[illegible]	8.8	[illegible]	4.8
5	[illegible]	---	[illegible]	---	[illegible]	---	[illegible]	---	[illegible]	---
6	[illegible]	5.3	[illegible]	4.9	[illegible]	5.6	[illegible]	29.5	[illegible]	4.4
7	[illegible]	---	[illegible]	---	[illegible]	---	[illegible]	---	[illegible]	---
8	[illegible]	5.4	[illegible]	5.0	[illegible]	19.6	[illegible]	4.3	[illegible]	4.1
9	[illegible]	---	[illegible]	---	[illegible]	---	[illegible]	---	[illegible]	---
10	[illegible]	4.8	[illegible]	9.9	[illegible]	4.7	[illegible]	4.2	[illegible]	4.2
11	[illegible]	---	[illegible]	---	[illegible]	---	[illegible]	---	[illegible]	---
12	[illegible]	4.6	[illegible]	440.4	[illegible]	3.7	[illegible]	4.6	[illegible]	4.3
13	[illegible]	---	[illegible]	---	[illegible]	---	[illegible]	---	[illegible]	---
14	[illegible]	5.6	[illegible]	113.6	[illegible]	3.7	[illegible]	4.2	[illegible]	4.5
15	[illegible]	---	[illegible]	---	[illegible]	---	[illegible]	---	[illegible]	---
16	[illegible]	215.1	[illegible]	5.7	[illegible]	3.7	[illegible]	4.7	[illegible]	4.0
17	[illegible]	---	[illegible]	---	[illegible]	---	[illegible]	---	[illegible]	---
18	[illegible]	21.9	[illegible]	4.0	[illegible]	3.9	[illegible]	3.8	[illegible]	3.5
19	[illegible]	---	[illegible]	---	[illegible]	---	[illegible]	---	[illegible]	---
20	[illegible]	5.7	[illegible]	4.2	[illegible]	3.9	[illegible]	3.3	[illegible]	3.2
21	[illegible]	---	[illegible]	---	[illegible]	---	[illegible]	---	[illegible]	---
22	[illegible]	---	[illegible]	---	[illegible]	---	[illegible]	---	[illegible]	---
23	[illegible]	---	[illegible]	---	[illegible]	---	[illegible]	---	[illegible]	---

TABLE 1 (continued)

GAMMA RADIATION LEVEL COMPARISONS AT VARIOUS DEPTHS IN ORIGINAL BOREHOLE DATA SET ON THE GREENVILLE METALS INCORPORATED PROPERTY WHITTAKER CORPORATION WASTE AND SLAG STORAGE AREA TRANSFER, PENNSYLVANIA

Sample Depth (ft)	Gamma Radiation Level Comparisons at Depth of Borehole (kcpm)									
	Borehole #41		Borehole #52		Borehole #66		Borehole #72		Borehole #77	
	ORISE	ESL[a]	ORISE	ESL	ORISE	ESL	ORISE	ESL	ORISE	ESL
1	[illegible]	---	[illegible]	---	[illegible]	---	[illegible]	---	[illegible]	---
2	[illegible]	4.5	[illegible]	4.2	[illegible]	4.2	[illegible]	5.1	[illegible]	4.5
3	[illegible]	---	[illegible]	---	[illegible]	---	[illegible]	---	[illegible]	---
4	[illegible]	4.4	[illegible]	4.1	[illegible]	3.9	[illegible]	5.1	[illegible]	4.3
5	[illegible]	---	[illegible]	---	[illegible]	---	[illegible]	---	[illegible]	---
6	[illegible]	10.2	[illegible]	4.3	[illegible]	4.4	[illegible]	4.5	[illegible]	3.6
7	[illegible]	---	[illegible]	---	[illegible]	---	[illegible]	---	[illegible]	---
8	[illegible]	5.5	[illegible]	4.4	[illegible]	4.7	[illegible]	5.1	[illegible]	4.7
9	[illegible]	---	[illegible]	---	[illegible]	---	[illegible]	---	[illegible]	---
10	[illegible]	5.2	[illegible]	4.9	[illegible]	7.0	[illegible]	18.8	[illegible]	5.0
11	[illegible]	---	[illegible]	---	[illegible]	---	[illegible]	---	[illegible]	---
12	[illegible]	5.7	[illegible]	4.8	[illegible]	11.5	[illegible]	162.0	[illegible]	5.4
13	[illegible]	---	[illegible]	---	[illegible]	---	[illegible]	---	[illegible]	---
14	[illegible]	5.6	[illegible]	49.1	[illegible]	4.8	[illegible]	6.0	[illegible]	19.0
15	[illegible]	---	[illegible]	---	[illegible]	---	[illegible]	---	[illegible]	---
16	[illegible]	3.4	[illegible]	5.2	[illegible]	3.6	[illegible]	4.4	[illegible]	4.7
17	[illegible]	---	[illegible]	---	[illegible]	---	[illegible]	---	[illegible]	---
18	[illegible]	2.9	[illegible]	4.8	[illegible]	3.3	[illegible]	5.1	[illegible]	4.0
19	[illegible]	---	[illegible]	---	[illegible]	---	[illegible]	---	[illegible]	---
20	[illegible]	2.8	[illegible]	4.5	[illegible]	3.5	[illegible]	3.8	[illegible]	3.8
21	[illegible]	---	[illegible]	---	[illegible]	---	[illegible]	---	[illegible]	---
22	[illegible]	---	[illegible]	---	[illegible]	---	[illegible]	---	[illegible]	---
23	[illegible]	---	[illegible]	---	[illegible]	---	[illegible]	---	[illegible]	---

[a]ESL gamma radiation level data provided by Energy*Solutions*, LLC.
[b]Measurement not performed.

TABLE 2

GAMMA RADIATION LEVEL COMPARISONS AT VARIOUS DEPTHS IN NEW BOREHOLE DATA SET ON THE GREENVILLE METALS INCORPORATED PROPERTY WHITTAKER CORPORATION WASTE AND SLAG STORAGE AREA TRANSFER, PENNSYLVANIA

Sample Depth (ft)	Gamma Radiation Level Comparisons at Depth of Borehole (kcpm)									
	Borehole #5A		Borehole #9A		Borehole #11A		Borehole #15A		Borehole #20A	
	[illegible]	ESL[a]	[illegible]	ESL	[illegible]	ESL	[illegible]	ESL	[illegible]	ESL
1	[illegible]	12.3	[illegible]	9.5	[illegible]	9.1	[illegible]	10.0	[illegible]	15.1
2	[illegible]	11.9	[illegible]	9.1	[illegible]	12.8	[illegible]	12.7	[illegible]	15.1
3	[illegible]	12.3	[illegible]	9.3	[illegible]	13.5	[illegible]	12.3	[illegible]	14.7
4	[illegible]	13.3	[illegible]	10.0	[illegible]	11.8	[illegible]	12.0	[illegible]	14.8
5	[illegible]	13.8	[illegible]	12.1	[illegible]	11.3	[illegible]	13.0	[illegible]	15.1
6	[illegible]	14.5	[illegible]	12.6	[illegible]	10.9	[illegible]	17.2	[illegible]	15.1
7	[illegible]	13.2	[illegible]	17.9	[illegible]	10.3	[illegible]	24.4	[illegible]	15.1
8	[illegible]	13.2	[illegible]	12.2	[illegible]	10.5	[illegible]	14.3	[illegible]	14.5
9	[illegible]	11.5	[illegible]	11.7	[illegible]	11.5	[illegible]	13.1	[illegible]	14.7
10	[illegible]	11.7	[illegible]	12.5	[illegible]	13.0	[illegible]	13.1	[illegible]	14.7
11	[illegible]	10.9	[illegible]	13.2	[illegible]	12.4	[illegible]	12.9	[illegible]	15.1
12	[illegible]	9.4	[illegible]	13.0	[illegible]	9.9	[illegible]	12.4	[illegible]	14.2
13	[illegible]	15.2	[illegible]	13.7	[illegible]	8.4	[illegible]	12.2	[illegible]	13.7
14	[illegible]	43.1	[illegible]	13.6	[illegible]	11.0	[illegible]	12.4	[illegible]	14.3
15	[illegible]	30.1	[illegible]	12.2	[illegible]	11.0	[illegible]	13.1	[illegible]	15.1
16	[illegible]	18.2	[illegible]	12.6	[illegible]	9.0	[illegible]	13.0	[illegible]	15.4
17	[illegible]	21.5	[illegible]	11.6	[illegible]	8.1	[illegible]	13.5	[illegible]	15.7
18	[illegible]	34.7	[illegible]	11.2	[illegible]	8.7	[illegible]	11.6	[illegible]	16.1
19	[illegible]	14.8	[illegible]	10.1	[illegible]	9.2	[illegible]	10.7	[illegible]	20.8
20	[illegible]	13.8	[illegible]	9.3	[illegible]	11.1	[illegible]	9.7	[illegible]	95.4
21	[illegible]	---	[illegible]	---	[illegible]	---	[illegible]	---	[illegible]	124.2
22	[illegible]	---	[illegible]	---	[illegible]	---	[illegible]	---	[illegible]	---
23	[illegible]	---	[illegible]	---	[illegible]	---	[illegible]	---	[illegible]	---

[a]ESL gamma radiation level data provided by Energy*Solutions*, LLC.
[b]Measurement not performed

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