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REGION 1

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 WHITTAKER CORPORATION, WASTE AND SLAG STORAGE AREA, SECTIONS 1 AND 4, REYNOLDS INDUSTRIAL PARK, TRANSFER, PENNSYLVANIA (DOCKET NO. 040-07455, RFTA NO. 06-005)

Dear Mr. Nicholson:

Enclosed are the confirmatory survey results prepared by Oak Ridge Institute for Science and Education of the Waste and Slag Storage Area at the Whittaker Corporation, Reynolds Industrial Park in Transfer, Pennsylvania. Confirmatory survey activities were conducted during the period of June 11 through 13, 2007 in Sections 1 and 4 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,

Matt Beckholz for.

Wade C. Adams
Health Physicist/Project Leader
Survey Projects

WCA:ar

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**CONFIRMATORY SURVEY RESULTS
FOR THE WHITTAKER CORPORATION
WASTE AND SLAG STORAGE AREA
SECTIONS 1 AND 4
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 Corporation, 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, minerals 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 (ESL 2007a). Seventy-six sample boreholes were drilled in the area to determine the extent of the elevated subsurface contamination on the GMI property (ESL 2007a).

The licensee's decommissioning contractor, EnergySolutions, LLC (ESL), submitted a decommissioning plan (DP), to the U.S. Nuclear Regulatory Commission (NRC). The DP incorporates the dose-based criteria of 10 CFR Part 20, Subpart E, and provides guidance for the release of the site for unrestricted use (ESL 2006). ESL is also using the *Multi-Agency Radiation Survey and Site Investigation Manual* (MARSSIM) to design surveys and statistical approaches for preparation of final status survey plans (FSSP) for the site (NRC 2000 and ESL 2007b). Each FSSP describes the methods that ESL will use to demonstrate compliance with the NRC-approved derived concentration guideline levels (DCGL).

The NRC requested that the Oak Ridge Institute for Science and Education (ORISE) perform confirmatory surveys at the Whittaker site (Figures 1 and 2). During the period of June 11 to 13, 2007, ORISE conducted confirmatory surveys consisting of gamma surface scans and soil sampling within Sections 1 and 4 at the site. Confirmatory survey activities were performed in Survey Units (SU) 1, 2 and 3 of Section 1 and Survey Unit 1 of Section 4 (Figure 3).

Document Review

ORISE reviewed ESL's survey documentation to determine the appropriateness and adequacy of the final status survey (FSS) radiological instrumentation and procedures (ESL 2006, 2007a and b). The FSS results for Sections 1 and 4 were provided to ORISE prior to confirmatory survey activities.

Health and Safety Overview

A safety walkdown of the Whittaker site was performed to evaluate the area for potential health and safety hazards. Additionally, the proposed survey and sampling procedures were evaluated to ensure that any hazards inherent to the activities were addressed in current job hazard analyses (JHAs). As part of this required safety walkdown, safety concerns were identified by ORISE personnel and discussed with the appropriate site personnel. Potential safety concerns identified included snake bites, poison ivy, tripping hazards, and heat stress. Protective and preventative measures included the wearing of snake chaps and long-sleeved shirts along with adequate rest and hydration.

Radiological Survey Procedures

ORISE performed confirmatory surveys in accordance with a site-specific survey plan that was submitted to and approved by the NRC (ORISE 2007a). Confirmatory survey activities were implemented per the ORISE Survey Procedures and Quality Program Manuals (ORISE 2006b and 2007b). Survey activities consisted of gamma surface scans and soil sampling.

The gamma surface scan density in Section 1 SUs 1, 2 and 3 was 75%, and in Section 4 SU 1 was 25%; accessibility to some areas was restricted due to safety concerns. Sodium iodide scintillation detectors coupled to ratemeters with audible indicators were used for scanning. Locations of elevated radiation levels were marked for further investigation.

ORISE collected seven surface (0 to 15 cm) soil samples at judgmental locations in three of the four SUs. Sample locations are shown in Figure 3.

SAMPLE ANALYSIS AND DATA INTERPRETATION

Radiological data and sample media were returned to ORISE's laboratory in Oak Ridge, Tennessee for analysis and interpretation. Radioassays were performed in accordance with the ORISE Laboratory Procedures Manual (ORISE 2007c). Soil samples were analyzed by gamma spectroscopy for the primary radionuclides of concern (ROC): natural uranium, natural thorium, and total U-238. However, gamma spectra were also reviewed for other gamma-emitting radionuclides. Soil sample results were reported in units of picocuries per gram (pCi/g).

FINDINGS AND RESULTS

Surface scans identified elevated radiation levels at six locations in Section 1, SU 1; three locations in Section 1, SU 2; and at four locations in Section 1, SU 3. No elevated radiation levels were identified in Section 4, SU 1. ORISE determined that at the majority of the

locations the elevated radioactivity was within rock/slag material that remained on the soil surface. The rock/slag materials were removed and the underlying soil was further evaluated to determine if elevated radiation levels remained. Judgmental soil samples were collected from seven locations within the evaluated SUs. One soil sample was collected from Section 1, SU 1, and four soil samples were collected from Section 1, SU 3 based on elevated radiation level scan results. The NRC site representative requested that ORISE collect two additional judgmental soil samples from within the North Outfall stream in Section 4, SU 1.

The concentrations reported for the ROCs ranged from 0.54 to 40.7 pCi/g for Th-232; 0.38 to 4.37 pCi/g for U-238 in equilibrium with the daughter products; and 0.36 to 7.5 pCi/g for U-238. The Sum-of-Fractions (SOF) for the confirmatory samples ranged from 0.12 to 6.3 with two of the seven samples exceeding the unity rule. The individual sample results are provided in Table 2.

COMPARISON OF RESULTS WITH RELEASE CRITERIA

ESL developed soil site-specific DCGLs for the ROCs based on a dose limit of 25 mrem/year total effective dose equivalent (TEDE) as presented in Section 5 of the DP (ESL 2006a). The site DCGLs are as follows:

TABLE 1: WHITTAKER SITE DCGLS*

	Thorium-232+D	Uranium-238+D	Uranium-238
DCGL (pCi/g)	7.0	9.7	166.5
Peak Dose (mrem/yr)	24.9	24.9	6.3

*Site DCGLs are from Table 3-1 in the Final Status Survey Plan, Section 1 and 4 of the Whittaker Corporation Waste and Storage Area, Reynolds Industrial Park, Transfer, Pennsylvania. ESL reported Ac-228 for Th-232+D and for U-238 and reported Pb-214 for U-238+D.

The results of soil samples collected by ORISE were evaluated and compared to the site-specific DCGLs for the primary ROCs. Samples 1687S0004 and 1687S0005 exceeded the site-specific DCGL for Th-232 and also exceeded the SOF.

CONCLUSION

During the period of June 11 to 13, 2007, ORISE conducted confirmatory survey activities that included gamma scans and soil sampling to assess the final site condition within Section 1, Survey Units 1, 2 and 3 and Section 4, Survey Unit 1 at the Whittaker Corporation Waste and Slag Storage Area in Transfer, Pennsylvania. ORISE collected a total of seven judgmental soil samples within the survey units. Based upon ORISE's confirmatory survey results, the radionuclide concentrations for two soil samples collected in Section 1, Survey Unit 3 exceeded the release criteria specified within the Final Status Survey Plan (ESL 2007b). Two other soil samples collected in Survey Unit 3, as well as soil samples collected in the other survey units indicated radionuclide concentrations below the release criteria.

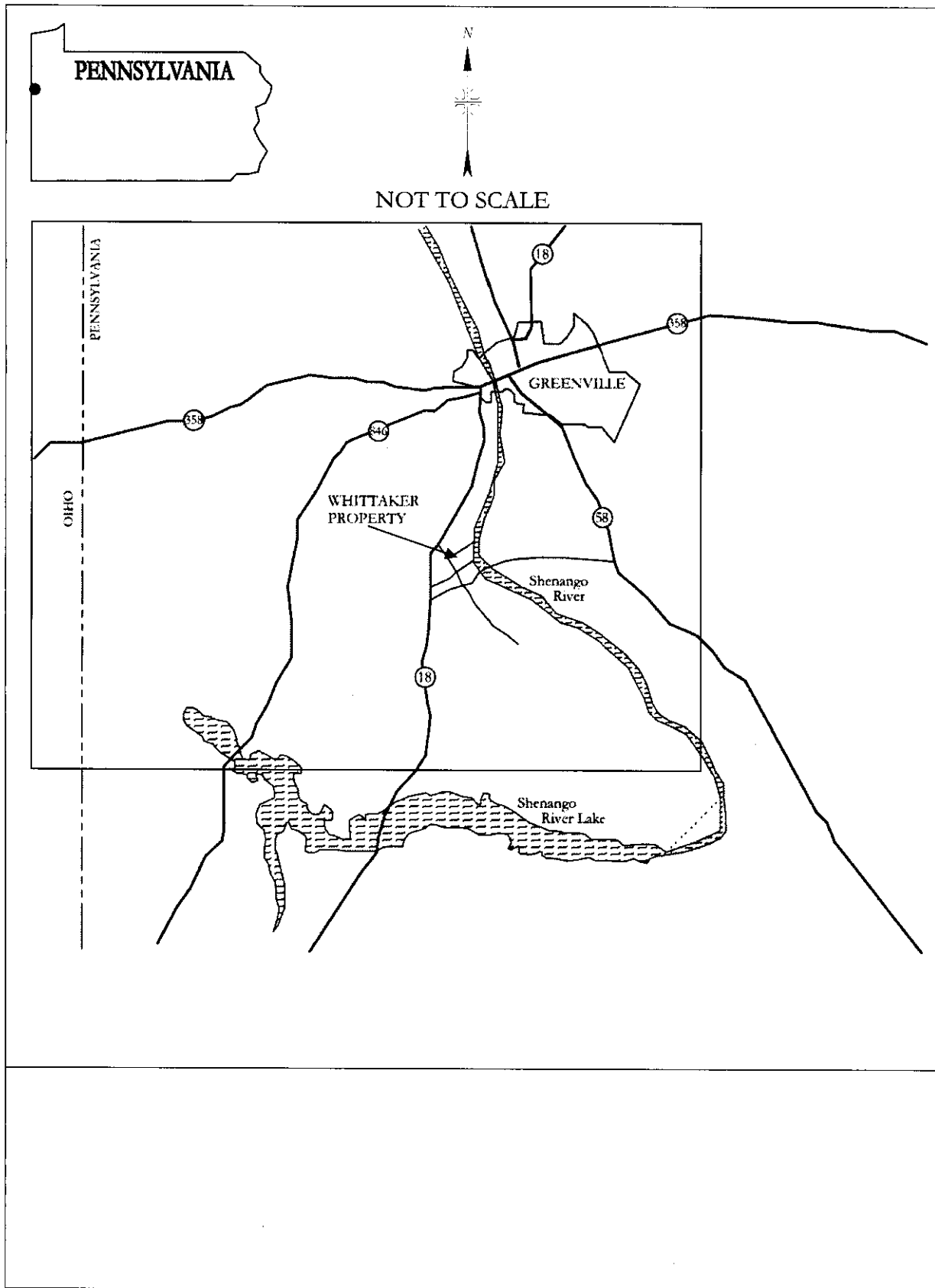


Figure 1: Location of the Whittaker Corporation Site

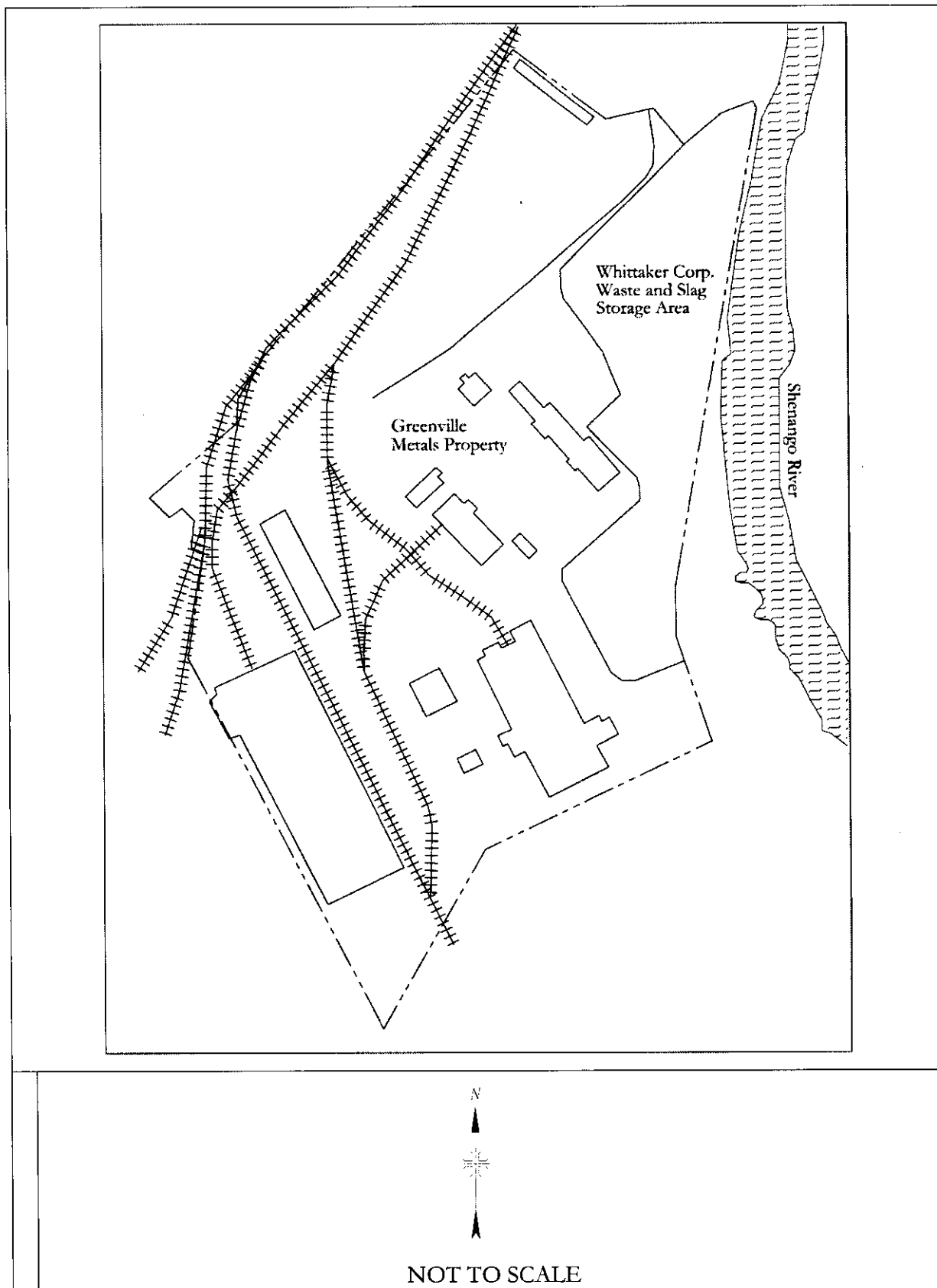


Figure 2: Whittaker Corporation – Plot Plan

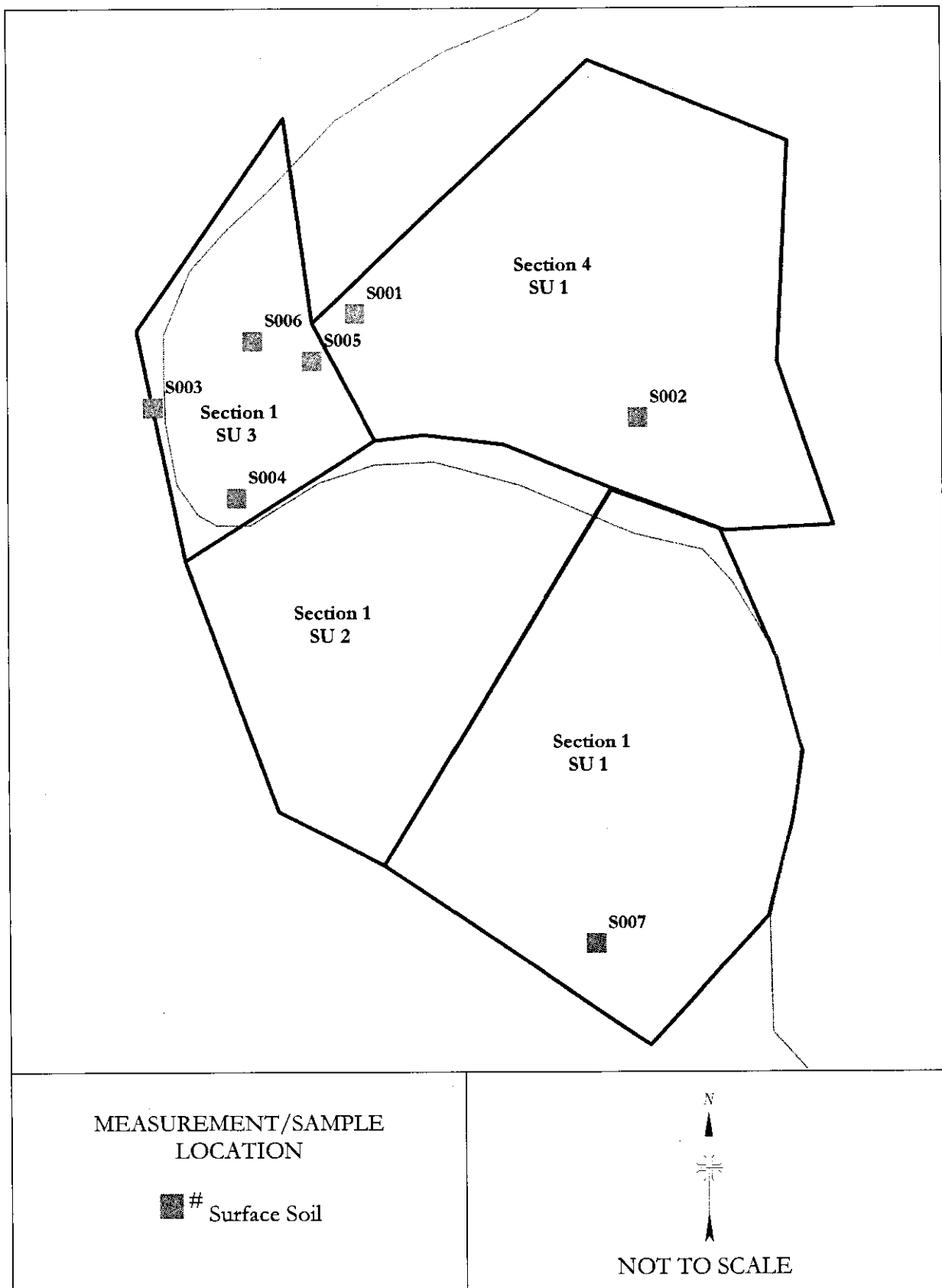


Figure 3: Whittaker Corporation – Soil Sample Locations

TABLE 2
RADIONUCLIDE CONCENTRATIONS IN SOIL SAMPLES
WHITTAKER CORPORATION
WASTE AND SLAG STORAGE AREA
SECTIONS 1 AND 4
TRANSFER, PENNSYLVANIA

Sample Number ^a	Radionuclide Concentrations (pCi/g)			Sum of Fractions ^e
	Th-232 ^b	U-238+D ^c	U-238 ^d	
1687S0001	1.38 ± 0.21 ^f	0.72 ± 0.09	1.16 ± 0.60	0.28
1687S0002	0.54 ± 0.10	0.38 ± 0.04	0.36 ± 0.31	0.12
1687S0003	1.20 ± 0.14	0.78 ± 0.07	1.00 ± 0.39	0.26
1687S0004	9.22 ± 0.82	1.47 ± 0.17	1.6 ± 1.3	1.5
1687S0005	40.7 ± 3.2	4.37 ± 0.29	7.5 ± 2.0	6.3
1687S0006	5.75 ± 0.56	1.01 ± 0.12	1.5 ± 1.0	0.93
1687S0007	0.96 ± 0.17	0.90 ± 0.10	1.14 ± 0.71	0.24

^aRefer to Figure 3.

^bBased on Ac-228 gamma spectroscopy result; DCGL = 7.0 pCi/g.

^cBased on Pb-214 gamma spectroscopy result; DCGL = 9.7 pCi/g.

^dBased on Th-234 gamma spectroscopy result; DCGL = 166.5 pCi/g.

^eSum of Fractions calculated based on DCGLs for Th-232, U-238+D and U-238 being 7.0, 9.7, and 166.5 pCi/g, respectively.

^fUncertainties represent the 95% confidence level, based on total propagated uncertainties.

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