



SL-1169

March 25, 1997

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**SUBJECT: REVISED INTERIM LETTER REPORT—VERIFICATION SURVEY OF  
THE ST. LOUIS AIRPORT SITE (SLAPS) VICINITY PROPERTY NO. 23,  
HAZELWOOD, MISSOURI**

Dear Dr. Williams:

The Environmental Survey and Site Assessment Program (ESSAP) of the Oak Ridge Institute for Science and Education (ORISE) conducted verification activities at the St. Louis Airport Site (SLAPS) Vicinity Property (VP) No. 23 during May and June, 1996. Verification activities were performed in support of the remedial actions that Bechtel National, Inc. (BNI), the Formerly Utilized Sites Remedial Action Program project management contractor, performed for a number of the SLAPS VPs during Fiscal Year 1996.

SLAPS was acquired by the Manhattan Engineer District (MED) and operated from 1946 to 1966. The site was used for storage of waste materials that were generated during uranium processing from 1942 until the late 1950s at the Mallinckrodt facility, located in downtown St. Louis. These processing wastes, which consisted of pitchblende raffinate residues, radium-bearing residues, and barium sulfate cake, were purchased by Continental Mining and Milling Company of Chicago (CMMC) in 1966 and, subsequently, transported to 9200 Latty Avenue for storage under an Atomic Energy Commission (AEC), predecessor agency to the U.S. Department of Energy (DOE), license. During transit, some of the materials spilled onto the haul roads and contiguous properties, primarily collecting in the drainage ditches. The haul roads used for transport to the Latty Avenue storage site and other sites included McDonnell Boulevard, formerly Brown Avenue, Hazelwood Avenue, Pershall Road, Eva Avenue, Frost Avenue, and Latty Avenue.

VP 23 is located on Frost Avenue in Hazelwood, Missouri (Figure 1). Soil contamination was confined to the right-of-way portion of the property and extended from the boundary with Frost Avenue to approximately 2.5 meters north of the road. BNI remediated the contaminated soil from the property to depths of approximately 0.5 to 1 meter below the surface. Figure 2 shows the remediated portions of VP 23. BNI then subdivided the excavated portion of the property into approximately 100 m<sup>2</sup> survey units and performed post-remedial action (post-RA) surveys and sampling of each survey unit. The results of BNI's post-RA survey and sampling indicated that contaminants had been reduced to levels below the acceptable residual contamination guidelines.

ESSAP performed independent verification surveys of VP 23 following the completion of remedial activities and upon the receipt of BNI's post-RA data. Independent verification is performed in order to provide independent survey and analytical data for use by the DOE in determining the adequacy and accuracy of the BNI conclusions as to the remediated areas radiological status. Verification activities included review of BNI's post-RA data, gamma surface scans using NaI scintillation detectors coupled to ratemeters with audible indicators, exposure rate measurements, and soil sampling.

Surface scans identified two locations of elevated direct gamma radiation, one each in grids 1 and 2. ESSAP personnel collected a total of 15 systematic surface (0-15 cm) soil samples from grids 1, 2, and 4. Samples were collected along the east to west center line of the excavation. The two locations of elevated direct gamma radiation identified by surface scans were also sampled. Additionally, two boreholes were hand-augered beneath the paved drive adjacent to the excavation. Samples were collected from 0-15 cm, 15-30 cm, and 30-45 cm depths from each borehole. Sample locations are shown on Figure 2. In addition, exposure rate measurements at 1 meter above the surface using a microrcm meter were performed at each surface soil sampling location and results are presented in Table 1. Exposure rates ranged from 4 to 13  $\mu\text{R/h}$  and were comparable to background exposure rates obtained during previous SLAPS vicinity property surveys, which ranged from 9 to 10  $\mu\text{R/h}$  (ORISE 1996).

Soil samples were analyzed by solid-state gamma spectrometry and the spectra were reviewed for the contaminants of interest, which were Ra-226, Th-230, and U-238. Radionuclide concentrations in soil samples, including background, are summarized in Table 1. Concentration ranges were as follows: 0.8 to 2.0 pCi/g for Ra-226, less than 4.9 to 28.6 pCi/g for Th-230, and less than 2.1 to 2.6 pCi/g for U-238. The previously determined average background radionuclide concentrations in soil were 0.9 pCi/g for Ra-226, 1.31 pCi/g for Th-230, and 1.1 pCi/g for U-238 (ORISE 1996).

Sample results were then compared to the generic and site-specific soil concentration guidelines (DOE 1990a and 1990b). These guidelines are as follows:

<u>Radionuclide</u>	<u>Soil Concentration Above Background</u>
Ra-226, Th-230	5 pCi/g averaged over the first 15 cm of soil below the surface; 15 pCi/g, averaged over 15 cm thick layers of soil greater than 15 cm below the surface.
U-238	50 pCi/g

Because the surface these samples were collected from was originally, and will be again following backfill, at a depth of greater than 15 cm, the subsurface guideline is applicable. Two samples—one each in grids 1 and 2—exceeded the 15 pCi/g guideline for Th-230 with concentrations of 19.75 pCi/g and 28.61 pCi/g, respectively. However, the guidelines permit averaging the radionuclide concentration over an area of 100 m<sup>2</sup> and application of the hot spot criteria. For both grids 1 and 2, the 100 m<sup>2</sup> averages for Th-230 concentration, which were 7.48 and 9.54 pCi/g, satisfied the guideline. Radionuclide concentrations in all other samples satisfied the guidelines.

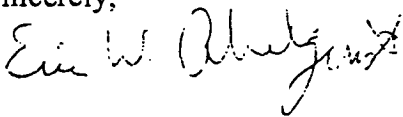
Dr. Alexander Williams

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In summary, the radiological status of VP 23 satisfies the applicable DOE guidelines for release for unrestricted use. A draft verification report will be prepared following the receipt of BNI's post-remedial action report. In the interim, please contact me at (423) 576-5073 or Eric Abelquist at (423) 576-3740 should you have any questions, comments, or require additional information.

Sincerely,



for

Timothy J. Vitkus  
Survey Projects Manager  
Environmental Survey and Site  
Assessment Program

TJV:tsf

Enclosure

cc: A. Johnson, DOE/HQ  
D. Adler, DOE/FSRD/ORO  
K. Albins, BNI  
W. Beck, ORISE/ESSAP  
E. Abelquist, ORISE/ESSAP  
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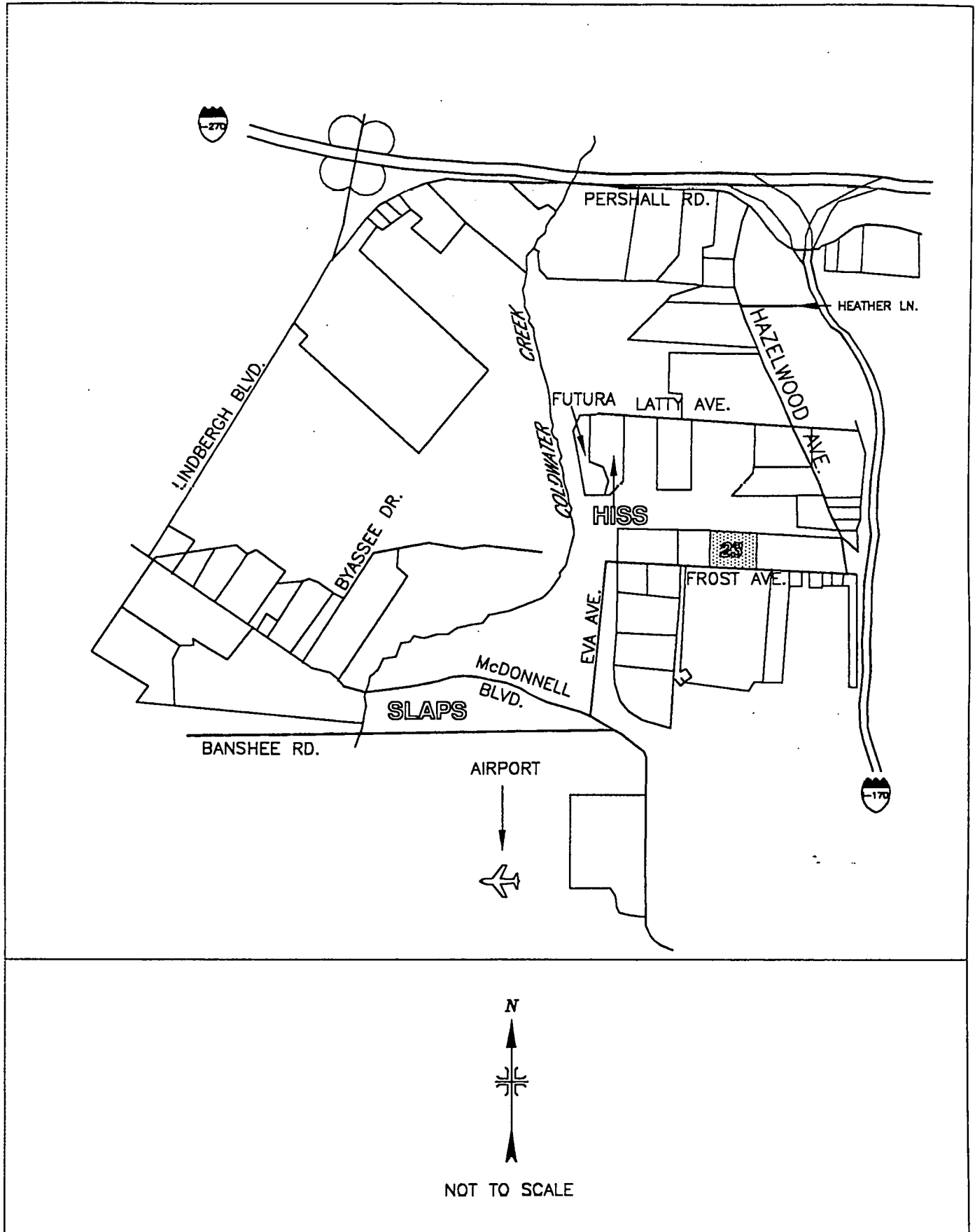


FIGURE 1: Location of SLAPS Vicinity Property Number 23

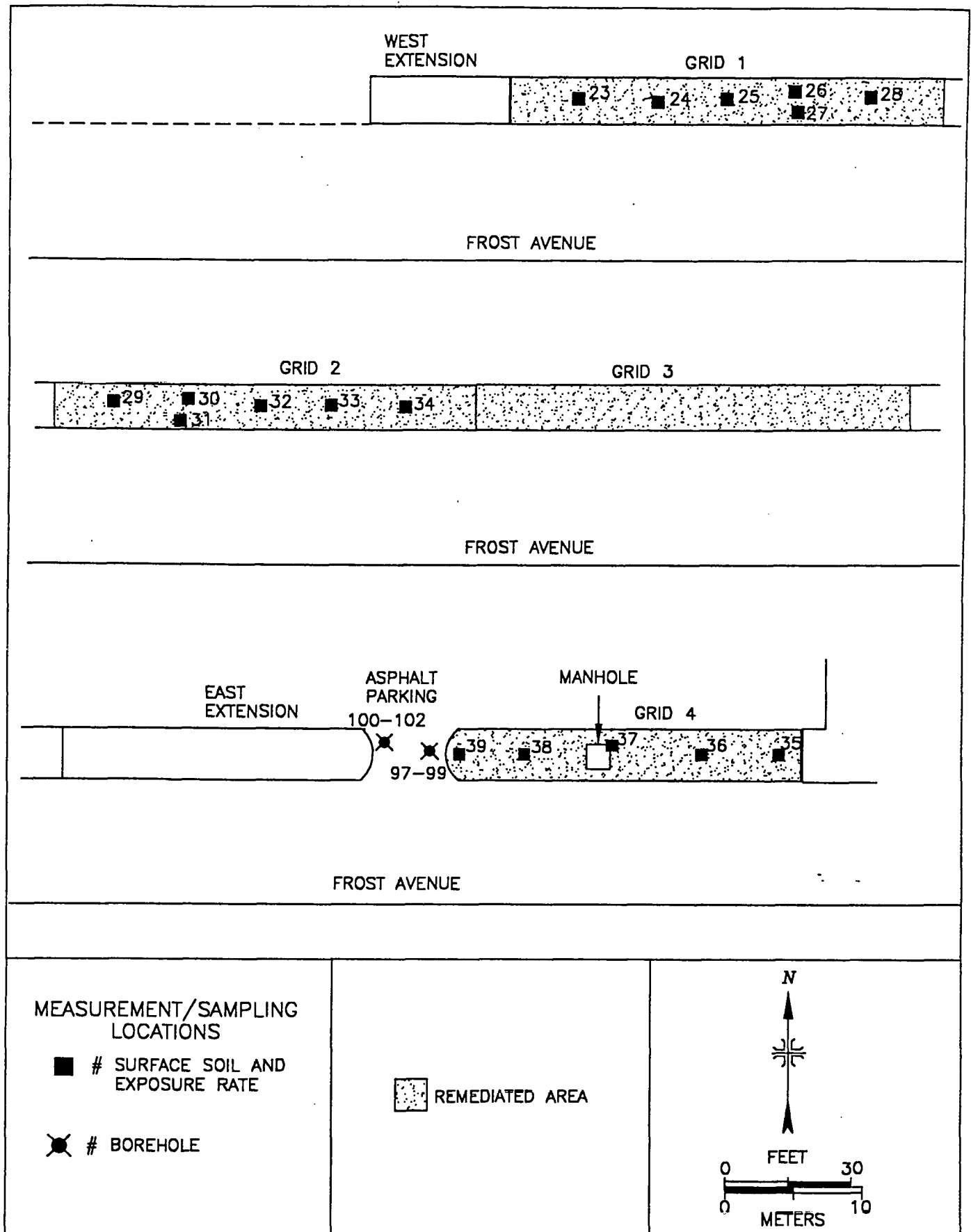


FIGURE 2: SLAPS Vicinity Properties, Property 23 – Measurement and Sampling Locations

TABLE 1

**EXPOSURE RATES AND RADIONUCLIDE CONCENTRATIONS IN SOIL SAMPLES  
ST. LOUIS AIRPORT SITE VICINITY PROPERTY NUMBER 23  
HAZELWOOD, MISSOURI**

Sample Location <sup>a</sup>	Exposure Rates at 1 m (μR/h) <sup>b</sup>	Radionuclide Concentration (pCi/g) <sup>b</sup>		
		Ra-226	Th-230	U-238
GRID 1				
23	5	1.2 ± 0.2 <sup>c</sup>	4.02 ± 0.48 <sup>d</sup>	<2.1
24	5	1.4 ± 0.2	5.84 ± 0.78 <sup>d</sup>	1.3 ± 1.4
25	6	1.4 ± 0.2	4.57 ± 0.69 <sup>d</sup>	<2.1
26	5	1.7 ± 0.2	4.43 ± 0.57 <sup>d</sup>	2.3 ± 1.5
27	8	1.8 ± 0.2	19.75 ± 2.25 <sup>d</sup>	2.5 ± 1.8
28	5	1.1 ± 0.2	6.26 ± 0.65 <sup>d</sup>	2.0 ± 1.4
100 m <sup>2</sup> Average:			7.48	
GRID 2				
29	7	1.3 ± 0.2	4.38 ± 0.60 <sup>d</sup>	<1.6
30	4	2.0 ± 0.3	28.61 ± 3.64 <sup>d</sup>	2.6 ± 1.5
31	6	1.5 ± 0.2	3.37 ± 0.44 <sup>d</sup>	2.6 ± 1.6
32	6	1.5 ± 0.2	2.15 ± 0.32 <sup>d</sup>	0.9 ± 1.0
33	7	1.3 ± 0.2	4.60 ± 0.59 <sup>d</sup>	1.8 ± 1.4
34	5	1.5 ± 0.2	14.12 ± 1.47 <sup>d</sup>	1.8 ± 1.4
100 m <sup>2</sup> Average:			9.54	
GRID 4				
35	10	0.9 ± 0.1	<4.9	1.1 ± 0.4
36	13	1.0 ± 0.1	5.4 ± 2.8	1.2 ± 0.4
37	12	0.9 ± 0.1	4.6 ± 2.8	1.4 ± 0.4
38	12	0.8 ± 0.1	3.6 ± 1.7	0.9 ± 0.2
39	8	0.9 ± 0.1	6.4 ± 2.4	0.9 ± 0.3

TABLE 1 (Continued)

**EXPOSURE RATES AND RADIONUCLIDE CONCENTRATIONS IN SOIL SAMPLES  
ST. LOUIS AIRPORT SITE VICINITY PROPERTY NUMBER 23  
HAZELWOOD, MISSOURI**

Sample Location <sup>a</sup>	Exposure Rates at 1 m (μR/h) <sup>b</sup>	Radionuclide Concentration (pCi/g) <sup>b</sup>		
		Ra-226	Th-230	U-238
ASPHALT DRIVE BETWEEN GRIDS 3 AND 4, BOREHOLES				
97 (0-15 cm)	--- <sup>c</sup>	1.1 ± 0.1	5.0 ± 2.4	1.2 ± 0.3
98 (15-30 cm)	---	1.1 ± 0.1	<3.2	1.1 ± 0.3
99 (30-45 cm)	---	1.2 ± 0.1	<3.1	1.4 ± 0.3
100 (0-15 cm)	---	1.1 ± 0.1	<3.2	1.5 ± 0.3
101 (15-30 cm)	---	1.3 ± 0.1	<3.2	1.5 ± 0.3
102 (30-45 cm)	---	1.3 ± 0.1	<3.2	1.0 ± 0.3

<sup>a</sup>Refer to Figure 2.

<sup>b</sup>Results include background.

<sup>c</sup>Uncertainties represent the 95% confidence level, based only on counting statistics.

<sup>d</sup>Alpha spectrometry results.

<sup>e</sup>Measurements not performed.

## REFERENCES

Oak Ridge Institute for Science and Education (ORISE). Draft Reports-Verification Surveys of Properties 19, 20, 41, 43, and 45, St. Louis Airport Site Vicinity Properties, Hazelwood and Berkeley, Missouri. Oak Ridge, Tennessee; February 23, 1996.

U.S. Department of Energy (DOE). Radiation Protection of the Public and Environment. Washington, DC: DOE Order 5400.5. June 5, 1990a.

U.S. Department of Energy. Memorandum from J. Fiore to L. Price, "Uranium Cleanup Guidelines for St. Louis, MO, FUSRAP Sites." November 6, 1990b.



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Formerly Utilized Sites Remedial Action Program (FUSRAP)

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# ADMINISTRATIVE RECORD

for the St. Louis Site, Missouri

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