



Department of Energy

Oak Ridge Operations Office
P.O. Box 2001
Oak Ridge, Tennessee 37831—
March 12, 1997

Mr. Frank Palazzo
Chart Automotive Group, Inc.
8801 Frost Avenue
Berkeley, MO 63134

Dear Mr. Palazzo:

COMPLETION OF REMEDIATION ACTIVITIES AT VICINITY PROPERTY #24 (8801 FROST AVENUE)

DOE has completed the cleanup of the radioactively contaminated portions of the property located at 8801 Frost Avenue in Berkeley, Missouri. Approximately 1935 cubic yards of soil contaminated with thorium-230 was excavated from the property and shipped to a licensed disposal facility.

An independent verification contractor (IVC) survey was conducted by the Oak Ridge Institute of Science and Energy and Education (ORISE), subsequent to the cleanup conducted on your property. Protocol of the Formerly Utilized Sites Remedial Action Program (FUSRAP) mandates independent surveys to ensure that the post remedial action status of the site meets the guidelines set forth in the Department of Energy (DOE) Order 5400.5. These approved guidelines have been determined to be protective of human health and the environment.

All post remedial action soil samples collected for verification were below the site specific residual radioactive contamination criteria. Based on the results of the IVC survey, all areas assessed within your property meet the guidelines established in DOE Order 5400.5 and your property can be released without radiological restrictions. Enclosed is a copy of the IVC Verification Report.

We greatly appreciate your cooperation during our cleanup activities. If you need additional guidance or have any concerns or questions regarding the cleanup of your property, please contact me at (314) 524-6429 or Bob Atkin at (423) 576-1826.

Sincerely,


E. R. Valdez
St. Louis Site Manager

Enclosure

cc: Dan Wall, US-EPA Region 7
Bob Geller, MDNR
Ken Albin, BNI
Wayne Johnson, BNI

ESSAP performed independent verification surveys of VP 24 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 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 locations of elevated direct gamma radiation within VP 24 in grids 2, 4, 8, 9, and 12. Systematic soil samples were collected from the center and four locations equidistant from the center and the grid corners of the selected grids. Surface and subsurface samples were also collected at locations of elevated direct radiation detected by surface scans. Additionally, 12 samples were collected from four borehole locations in the VP 24 driveways. Figure 2 shows soil sampling locations. In addition, exposure rate measurements at 1 meter above the surface using a microrem meter were performed at each soil sampling location and results are presented in Table 1. Exposure rates ranged from 5 to 15 $\mu\text{R/h}$ 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 initial soil samples, including background, are summarized in Table 1. Concentration ranges were as follows: 0.7 to 16.6 pCi/g for Ra-226, less than 4.7 to 773.4 pCi/g for Th-230, and 0.8 to 12.3 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

Numerous sampling locations in grids 2, 8, 9, and 12 exceeded the guidelines for Th-230 and one location in grid 9 exceeded the Ra-226 guidelines. As a result, BNI excavated additional soil from these grids. ESSAP then either performed additional verification activities of each area during subsequent survey visits that included gamma surface scans, exposure rate measurements, and the collection of independent soil samples (grids 2 and 9) or performed confirmatory analysis of the post-RA samples that BNI collected (grids 8 and 12).

Radionuclide concentrations in post-RA soil samples are also presented in Table 1. After the additional remediation, final concentration ranges were from 0.7 to 1.7 pCi/g for Ra-226, less than 3.0 to 25.5 pCi/g for Th-230 and 0.8 to 1.8 pCi/g for U-238. Because these samples were collected from a post-excavation depth of greater than 15 cm and the excavations were backfilled, the subsurface guideline is applicable. Of the final samples, two samples—one each in grids 8 and 9—exceeded the applicable subsurface guideline for Th-230. However, the guidelines permit averaging residual radionuclide concentration levels over an area of 100 m² and application of the hot spot criteria. The average Th-230 concentrations were 10.3 pCi/g for grid 8 and 8.2 pCi/g for grid 9, which satisfy the subsurface guideline.

In summary, verification surveys of the property identified locations of undocumented residual contamination where the hot spot criteria and/or the 100 m² average residual radionuclide concentration guidelines were exceeded—requiring BNI to perform additional remediation. Followup investigations of these areas, together with verification surveys of the remaining portions of VP 24, indicated that the radiological status of the property satisfied the 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,



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

TJV:dka

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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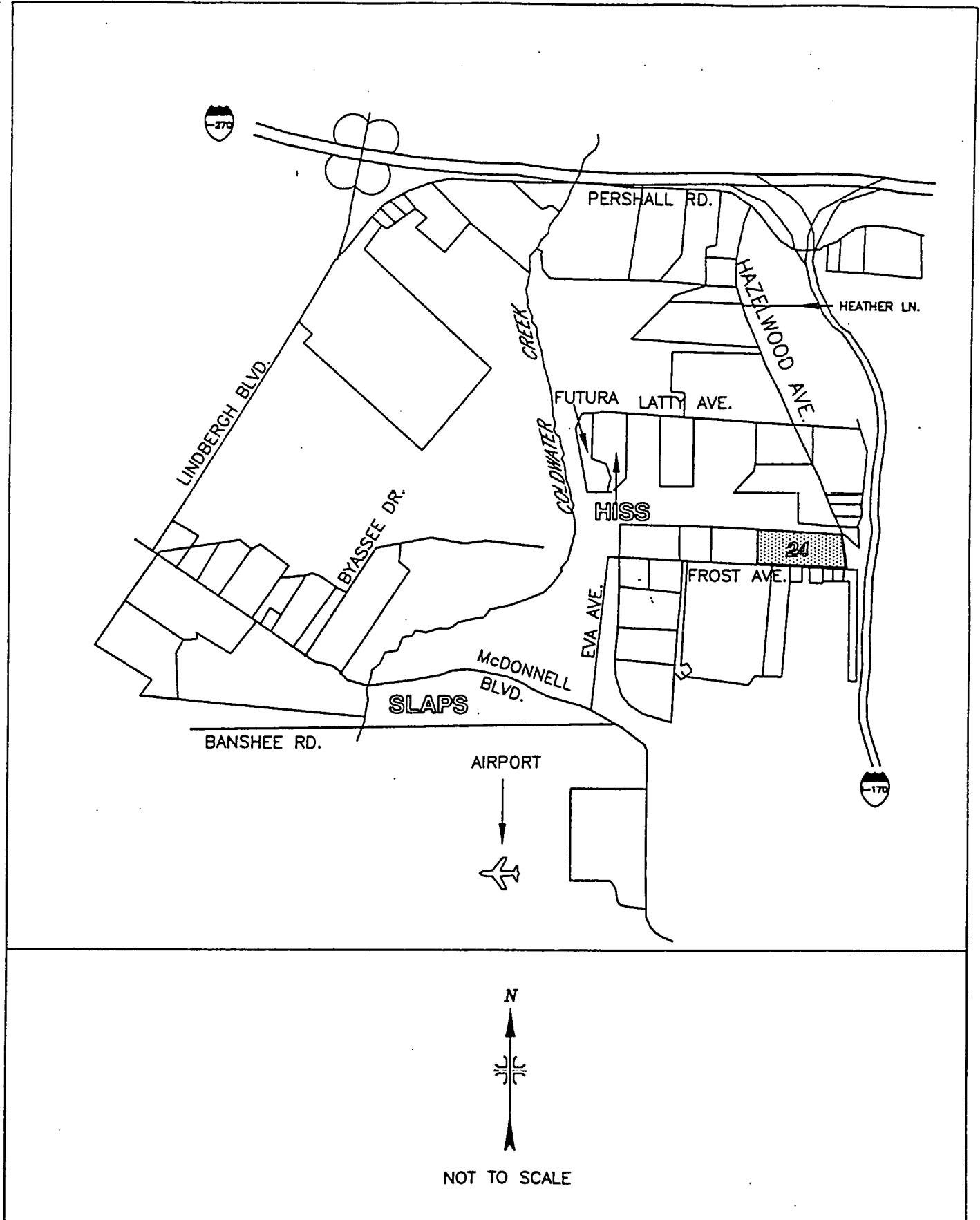


FIGURE 1: Location of SLAPS Vicinity Property Number 24

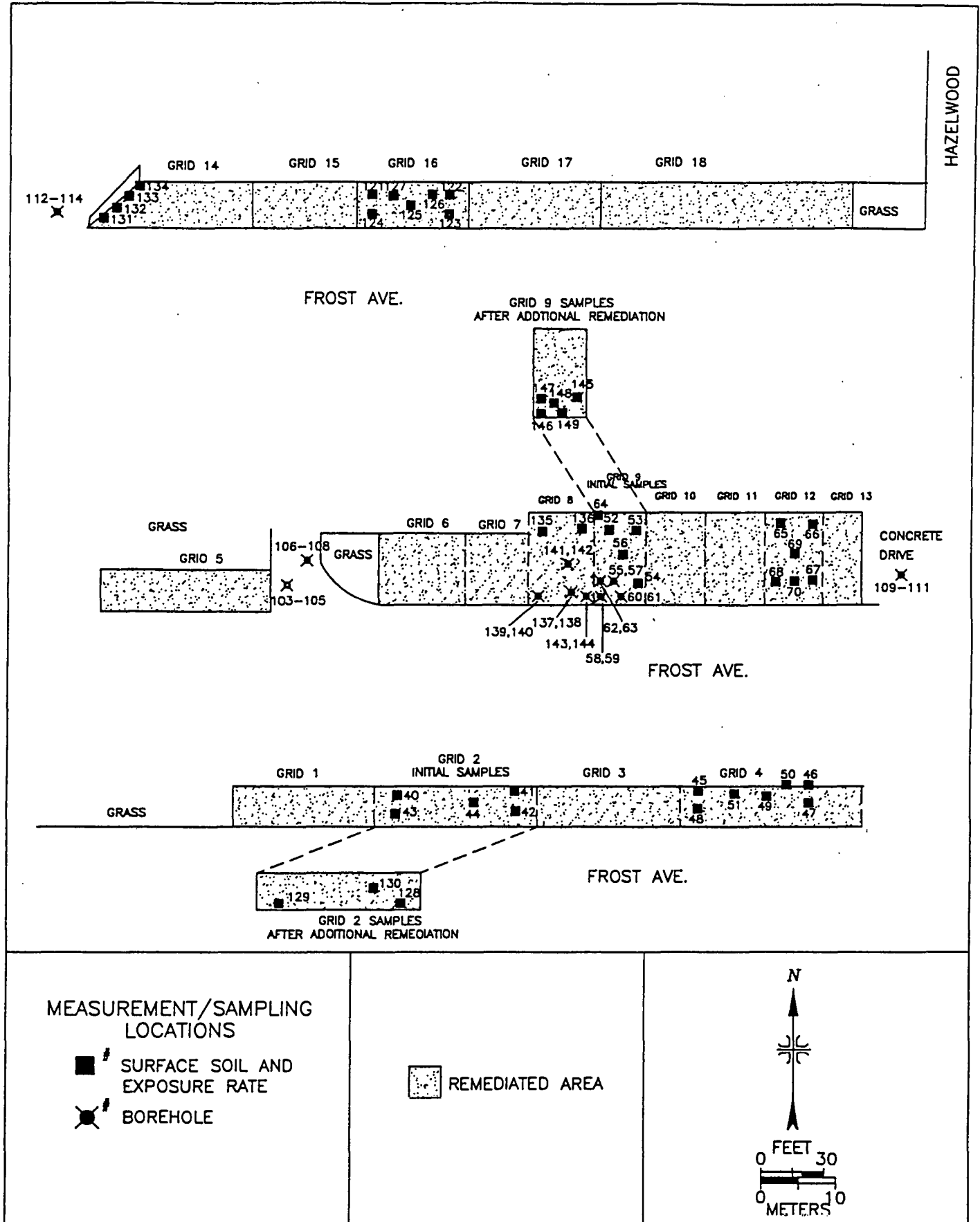


FIGURE 2: Property 24, St. Louis Airport Properties – Measurement and Sampling Locations

TABLE 1

**EXPOSURE RATES AND
RADIONUCLIDE CONCENTRATION IN SOIL SAMPLES
ST. LOUIS AIRPORT SITE VICINITY PROPERTY 24
HAZELWOOD, MISSOURI**

Sample Location ^a	Exposure Rate (μR/h) ^b	Radionuclide Concentrations (pCi/g) ^b		
		Ra-226	Th-230	U-238
GRID 2				
40	12	0.7 ± 0.1 ^c	<4.3	1.4 ± 0.4
41	11	0.9 ± 0.1	<3.6	1.1 ± 0.3
42	12	1.3 ± 0.1	26.4 ± 3.7	1.5 ± 0.4
128 (After additional remediation of Location 42)	7	1.0 ± 0.1	5.7 ± 2.4	1.1 ± 0.3
43	13	1.3 ± 0.1	28.7 ± 3.9	2.3 ± 0.4
129 (After additional remediation of Location 43)	5	1.1 ± 0.1	5.7 ± 2.8	1.5 ± 0.3
44	12	0.9 ± 0.1	<4.6	1.3 ± 0.3
130 (After additional remediation of Location 44)	6	1.0 ± 0.1	<3.2	1.0 ± 0.3
GRID 4				
45	13	1.1 ± 0.1	<3.5	1.3 ± 0.4
46	11	0.8 ± 0.1	<4.5	0.9 ± 0.3
47	11	1.2 ± 0.1	12.7 ± 3.3	1.7 ± 0.4
48	11	1.0 ± 0.1	8.3 ± 2.7	1.4 ± 0.4
49	9	1.1 ± 0.1	<3.6	1.3 ± 0.3
50	10	1.0 ± 0.1	<4.7	1.0 ± 0.3
51	13	1.1 ± 0.1	<3.6	1.1 ± 0.3

TABLE 1 (Continued)

**EXPOSURE RATES AND
RADIONUCLIDE CONCENTRATION IN SOIL SAMPLES
ST. LOUIS AIRPORT SITE VICINITY PROPERTY 24
HAZELWOOD, MISSOURI**

Sample Location ^a	Exposure Rate (μR/h) ^b	Radionuclide Concentrations (pCi/g)		
		Ra-226	Th-230	U-238
GRID 8				
135	5	1.1 ± 0.1	<4.4	0.8 ± 0.3
136	4	1.1 ± 0.1	<3.2	0.9 ± 0.3
137	5	3.8 ± 0.1	111.6 ± 4.3	3.2 ± .4
138 (15-30 cm)	--- ^d	1.9 ± 0.1	34.5 ± 4.1	1.7 ± 0.4
156 ^c (After additional remediation of Location 137/138)	---	0.8 ± 0.1	<10	1.4 ± 0.7
139	5	1.1 ± 0.1	4.9 ± 2.6	1.5 ± 0.3
140 (15-30 cm)	---	1.1 ± 0.1	2.8 ± 2.1	1.2 ± 0.3
155 ^c (After additional remediation of Location 139)	---	0.8 ± 0.1	<10	0.7 ± 0.7
141	6	1.1 ± 0.1	<4.1	1.2 ± 0.4
142 (15-30 cm)	---	1.6 ± 0.1	<3.6	1.0 ± 0.3
143	5	1.4 ± 0.1	13.3 ± 2.9	1.5 ± 0.4
144 (15-30 cm)	---	1.0 ± 0.1	4.5 ± 2.2	0.9 ± 0.2
157 ^c (After additional remediation of Location 143)	---	0.9 ± 0.2	25.5 ± 11.7	1.4 ± 0.9
100 m ² average			10.3	
GRID 9				
52	8	0.9 ± 0.1	2.7 ± 2.5	0.9 ± 0.3

TABLE 1 (Continued)

**EXPOSURE RATES AND
RADIONUCLIDE CONCENTRATION IN SOIL SAMPLES
ST. LOUIS AIRPORT SITE VICINITY PROPERTY 24
HAZEL WOOD, MISSOURI**

Sample Location ^a	Exposure Rate (μR/h) ^b	Radionuclide Concentrations (pCi/g) ^b		
		Ra-226	Th-230	U-238
GRID 9 (Continued)				
53	10	1.0 ± 0.1	<3.1	0.9 ± 0.3
54	14	1.5 ± 0.1	25.9 ± 3.1	1.5 ± 0.4
145 (After additional remediation of Location 54)	6	1.3 ± 0.1	8.2 ± 3.0	0.9 ± 0.3
55	12	16.6 ± 0.2	773.4 ± 9.7	12.3 ± 0.8
57 (15-30 cm)	---	6.7 ± 0.1	291.1 ± 6.4	7.3 ± 0.6
146 (After additional remediation of Location 55/57)	5	1.3 ± 0.1	10.2 ± 3.0	1.4 ± 0.3
56	10	1.0 ± 0.1	6.9 ± 3.2	1.2 ± 0.4
58	15	4.7 ± 0.1	173.4 ± 5.2	3.4 ± 0.5
59 (15-30 cm)	--- ^d	6.8 ± 0.1	249.2 ± 8.0	8.7 ± 0.7
147 (After additional remediation of Location 58/59)	5	1.3 ± 0.1	6.6 ± 3.3	1.1 ± 0.4
60	11	2.2 ± 0.1	60.1 ± 3.3	1.9 ± 0.3
61 (15-30 cm)	--- ^d	2.3 ± 0.1	47.9 ± 4.3	1.8 ± 0.4
148 (After additional remediation of Location 60/61)	6	1.3 ± 0.1	7.6 ± 3.2	1.8 ± 0.3
62	12	1.6 ± 0.1	26.0 ± 3.2	1.4 ± 0.4
63 (15-30 cm)	--- ^d	1.5 ± 0.1	21.2 ± 3.3	1.5 ± 0.4

TABLE 1 (Continued)

**EXPOSURE RATES AND
RADIONUCLIDE CONCENTRATION IN SOIL SAMPLES
ST. LOUIS AIRPORT SITE VICINITY PROPERTY 24
HAZELWOOD, MISSOURI**

Sample Location ^a	Exposure Rate (μR/h) ^b	Radionuclide Concentrations (pCi/g) ^b		
		Ra-226	Th-230	U-238
GRID 9 (Continued)				
149 (After additional remediation of Location 62)	5	1.7 ± 0.1	20.0 ± 3.6	1.3 ± 0.4
64	14	1.1 ± 0.1	3.1 ± 2.5	0.8 ± 0.3
100 m ² average			8.2	
GRID 12				
65	12	1.1 ± 0.1	<3.3	0.9 ± 0.3
66	13	1.0 ± 0.1	3.5 ± 2.5	1.4 ± 0.3
67	11	1.5 ± 0.1	19.1 ± 3.7	1.0 ± 0.3
164 ^c (After additional remediation of Location 67)	--- ^d	1.3 ± 0.1	<15	1.7 ± 1.1
68	15	1.9 ± 0.1	38.0 ± 4.0	2.0 ± 0.4
165 ^c (After additional remediation of Location 68)	--- ^d	1.0 ± 0.2	<12	1.4 ± 1.2
69	14	1.2 ± 0.1	<3.5	1.2 ± 0.3
70	13	1.7 ± 0.1	26.8 ± 4.0	1.5 ± 0.4
166 ^c (After additional remediation of Location 70)	--- ^d	0.9 ± 0.2	<14	1.8 ± 1.0

TABLE 1 (Continued)

**EXPOSURE RATES AND
RADIONUCLIDE CONCENTRATION IN SOIL SAMPLES
ST. LOUIS AIRPORT SITE VICINITY PROPERTY 24
HAZEL WOOD, MISSOURI**

Sample Location ^a	Exposure Rate (μR/h) ^b	Radionuclide Concentrations (pCi/g) ^b		
		Ra-226	Th-230	U-238
GRID 14				
131	5	1.2 ± 0.1	<4.4	0.9 ± 0.3
132	5	1.2 ± 0.1	<4.6	0.8 ± 0.3
133	6	1.4 ± 0.1	<3.4	0.8 ± 0.3
134	5	1.3 ± 0.1	<3.4	1.1 ± 0.3
GRID 16				
121	5	0.8 ± 0.1	<4.1	1.0 ± 0.3
122	5	0.9 ± 0.1	<3.2	1.0 ± 0.3
123	5	0.9 ± 0.1	<3.2	0.8 ± 0.3
124	6	1.0 ± 0.1	<4.2	1.0 ± 0.3
125	7	1.0 ± 0.1	<3.4	1.0 ± 0.3
126	5	0.9 ± 0.1	<3.2	0.9 ± 0.3
127	5	1.1 ± 0.1	<4.2	0.9 ± 0.3
BOREHOLES				
103 (0-15 cm)	6	1.1 ± 0.1	6.5 ± 2.5	1.2 ± 0.3
104 (15-30 cm)	---	1.0 ± 0.1	<4.2	1.1 ± 0.3
105 (30-45 cm)	---	1.1 ± 0.1	<3.1	1.2 ± 0.3
106 (0-15 cm)	6	1.1 ± 0.1	2.1 ± 1.9	1.2 ± 0.2
107 (15-30 cm)	---	1.0 ± 0.1	<4.0	0.9 ± 0.3
108 (30-45 cm)	---	1.1 ± 0.1	4.4 ± 2.3	1.1 ± 0.3
109 (0-15 cm)	6	1.0 ± 0.1	6.0 ± 2.7	1.3 ± 0.4

TABLE 1 (Continued)

**EXPOSURE RATES AND
RADIONUCLIDE CONCENTRATION IN SOIL SAMPLES
ST. LOUIS AIRPORT SITE VICINITY PROPERTY 24
HAZELWOOD, MISSOURI**

Sample Location ^a	Exposure Rate (μR/h) ^b	Radionuclide Concentrations (pCi/g) ^b		
		Ra-226	Th-230	U-238
BOREHOLES (Continued)				
110 (15-30 cm)	---	1.1 ± 0.1	<3.1	0.8 ± 0.3
111 (30-45 cm)	---	1.1 ± 0.1	<3.1	0.9 ± 0.3
112 (0-15 cm)	6	1.0 ± 0.1	<4.1	1.0 ± 0.3
113 (15-30 cm)	---	1.2 ± 0.1	<3.0	1.0 ± 0.3
114 (30-45 cm)	---	1.2 ± 0.1	<4.1	1.1 ± 0.4

^aRefer to Figure 2.

^bResults include background.

^cUncertainties represent the 95% confidence level, based only on counting statistics.

^dMeasurement not performed.

^eSamples collected by BNI.

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)

ADMINISTRATIVE RECORD

for the St. Louis Site, Missouri



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