

ORISE

OAK RIDGE INSTITUTE FOR SCIENCE AND EDUCATION

December 20, 1995

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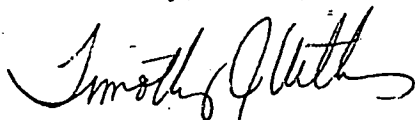
**SUBJECT: VERIFICATION SURVEY OF LATTY AVENUE PROPERTY 6, ST. LOUIS
AIRPORT SITE VICINITY PROPERTIES, HAZELWOOD, MISSOURI**

Dear Dr. Williams:

The Environmental Survey and Site Assessment Program (ESSAP) of the Oak Ridge Institute for Science and Education has completed the verification activities for the subject property. This was one of the two St. Louis Airport Site (SLAPS) Vicinity Properties that were remediated by Bechtel National, Inc. (BNI) during the period June through September 1995.

Enclosed is an interim letter report describing the procedures and results of the verification survey. ESSAP will provide draft reports for each property for review and comment following the issuance of BNI's post-remedial action report. Please contact me at (423) 576-5073 or William L. (Jack) Beck at (423) 576-5031 should you have any questions.

Sincerely,



Timothy J. Vitkus
Environmental Project Leader
Environmental Survey and
Site Assessment Program

TJV:tsf

Enclosure

cc: J. Wagoner, DOE/HQ
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**VERIFICATION SURVEY
OF
LATTY AVENUE VICINITY PROPERTY NUMBER 6
ST. LOUIS AIRPORT SITE VICINITY PROPERTIES
ST. LOUIS, MISSOURI**

INTRODUCTION AND SITE HISTORY

The St. Louis Airport Property Site (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 included 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 (including Latty Avenue) and contiguous properties, primarily collecting in drainage ditches. Redistribution of the contaminated materials probably occurred as a result of flooding, surface runoff, and road and utility line activities. The waste residues, stored at the Latty Avenue site, were eventually dried and shipped by rail to a mill site in Colorado.

Pursuant to specific direction in the 1984 Energy and Waste Appropriations Act, remedial action at the Latty Avenue site was assigned to the DOE, and DOE began investigating the site and nearby properties. Oak Ridge National Laboratory (ORNL) performed a radiological survey of the haul roads in 1985. This survey identified areas with elevated gamma exposure rates and/or Th-230 concentrations in soil (ORNL 1986). As a result, the haul roads were designated in 1986 for remedial action under the Formerly Utilized Sites Remedial Action Program (FUSRAP).

FUSRAP was created in 1974 to identify, investigate, and cleanup or control sites where contamination above today's guidelines remains from the early years of the Nation's atomic energy program. Bechtel National, Inc. (BNI) is the project management contractor for FUSRAP.

BNI performed site characterization activities during the period 1986 to 1989, in order to delineate contamination boundaries, the results of which are provided in the St. Louis Sites characterization reports (BNI 1990). Six properties, located along Latty Avenue, designated as Latty Avenue Vicinity Properties Numbers 1 through 6, were included in this characterization survey. Because the railroad used for shipping wastes borders the Latty Avenue Vicinity Property Number 6 (VP 6L), it is probable that some contaminated residues also spilled from the rail cars onto the property. BNI recently completed remedial actions of VP 6L. Remedial activities included excavation of soil from areas on both the north and south side of the railroad tracks that border the north end of the property and an additional area near the center of the property.

It is the policy of the DOE to perform independent verification of remedial actions conducted under FUSRAP. The Environmental Survey and Site Assessment Program (ESSAP) of the Oak Ridge Institute for Science and Education (ORISE) has been designated as the independent verification contractor (IVC) for the St. Louis sites.

SITE DESCRIPTION

SLAPS is located north of the Lambert-St. Louis International Airport in St. Louis County, Missouri approximately 24 kilometers (km [15 miles]) west of downtown St. Louis. VP 6L is located approximately 1 km northeast of SLAPS and 30 meters (m) southeast of the DOE's Hazelwood Interim Storage Site (Figures 1 and 2). The property is bordered by Seeger Industrial Drive to the south and by the Norfolk and Western Railroad property to the north and west.

OBJECTIVES

The objectives of the verification process were to ensure that the survey, sample analysis, and supporting documentation provided by BNI give an accurate and complete description of the radiological condition of the remediated vicinity property and confirm that both generic and site-specific DOE guidelines for release to unrestricted use have been met.

DOCUMENT REVIEW

ESSAP reviewed BNI's field data results and supporting documentation concerning site remediation activities. Information was evaluated to assure that areas identified as exceeding site guidelines had undergone decontamination and that residual radioactive material and exposure rate levels satisfied the established guidelines.

SURVEY PROCEDURES

On September 28, 27 and October 12, 1995, ESSAP personnel visited VP 6L and performed visual inspections and independent measurements and sampling of remediated areas in accordance with the SLAPS Vicinity Property survey plan previously submitted to and approved by the DOE (ORISE 1994). Verification activities included gamma surface scans, exposure rate measurements, and surface soil sampling.

REFERENCE SYSTEM

Measurement and sampling locations were referenced to the approximately 100 m² sampling units designated by BNI or to prominent site features.

SURFACE SCANS

Surface scans for gamma activity were conducted over approximately 50 percent of the unremediated portions and 100 percent of the remediated areas of VP 6L using NaI scintillation detectors coupled to ratemeters with audible indicators.

EXPOSURE RATE MEASUREMENTS

Exposure rate measurements were performed at 20 locations (Figure 3). Background exposure rate measurements, performed during previous SLAPS vicinity property surveys, were used for data comparison (Figure 4). Exposure rates were measured at 1 m above the surface using either a microrem meter or a pressurized ionization chamber.

SOIL SAMPLING

Soil samples were collected at the center and at four locations equidistant from the center and grid block corners in three of the excavated areas 100 m² sampling units (two of which were selected based on surface scan results and third was randomly selected) and at an additional five locations in adjacent unremediated areas (Figure 3). Background soil samples, collected during previous SLAPS vicinity property surveys, were used for comparison of results (Figure 4).

SAMPLE ANALYSIS AND DATA INTERPRETATION

Samples and data were returned to ORISE's ESSAP laboratory in Oak Ridge, Tennessee for analysis and interpretation. Soil samples were initially analyzed by solid state gamma spectrometry. The primary radionuclide of interest was Th-230, however, spectra were also reviewed for uranium, Ra-226, and Th-232, and any other identifiable photopeaks. After gamma spectrometry analyses were completed, the five samples collected from individual sampling units were composited for isotopic thorium analysis by alpha spectrometry. Analytical results for soil samples were reported in units of picocuries per gram (pCi/g). Exposure rates were reported in microroentgens per hour (μ R/h).

FINDINGS AND RESULTS

SURFACE SCANS

Surface scans identified gamma radiation levels within two sampling units that were approximately 1.5 times ambient area background. As a result, these sampling units were specifically included in the verification sampling.

EXPOSURE RATES

Exposure rates for VP 6L are summarized in Table 1. Exposure rates at 1 m above the surface ranged from 5 to 12 μ R/h. Area background exposure rates ranged from 9 to 10 μ R/h (Table 2).

RADIONUCLIDE CONCENTRATIONS IN SOIL

Radionuclide concentrations in soil samples are summarized in Table 1. The radionuclide concentration ranges in the individual samples analyzed by gamma spectrometry are as follows: Ra-226, 0.9 to 1.4 pCi/g; Th-230, less than 2.7 to 14.0 pCi/g; Th-232, 0.9 to 1.2 pCi/g; and U-238, 0.5 to 1.5 pCi/g. The Th-230 activity level, determined by alpha spectrometry in composite samples from sampling units 174 and 180, were 3.44 and 6.03 pCi/g, respectively. Background concentrations, presented in Table 2, were: 0.7 to 1.0 pCi/g for Ra-226, 1.31 pCi/g for Th-230 (determined from alpha spectrometry analysis on the composite sample), 1.0 to 1.1 pCi/g for Th-232, and 0.9 to 1.3 pCi/g for U-238.

COMPARISON OF RESULTS WITH GUIDELINES

Verification survey results were compared to the generic and site-specific DOE guidelines (DOE 1990a; DOE 1990b). The applicable soil guidelines for SLAPS vicinity properties are those for Ra-226, Th-230, Th-232, and U-238 which are:

<u>Radionuclide</u>	<u>Soil Concentration Above Background</u>
Ra-226, Th-230, Th-232	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

Radionuclide concentrations in individual soil samples were below the surface guidelines for Ra-226 and Th-232, and the site-specific U-238 guideline. Seven individual samples and the average activity in one sample unit exceeded the surface guideline of 5 pCi/g for Th-230. These samples were collected from areas that were greater than 15 cm below the surface prior to excavation and have since been backfilled and restored to original grade. Both individual sample activity levels and average activity levels were less than 15 pCi/g and therefore satisfy the subsurface Th-230 guideline.

The exposure rate guideline is 20 μ R/h above background (DOE 1990a). All verification exposure rate measurements were below the guideline level.

SUMMARY

Between September 27 and October 12, 1995, the Environmental Survey and Site Assessment Program of the Oak Ridge Institute for Science and Education performed verification activities on portions of the Latty Avenue Vicinity Property Number 6. Verification activities included document and post-remedial action data review, gamma surface scans, soil sampling, and exposure rate measurements.

The results of the verification survey indicate that Latty Avenue Vicinity Property Number 6 has been adequately remediated and that residual radionuclide concentrations in soil and exposure rate levels satisfy the DOE guidelines for release to unrestricted use.

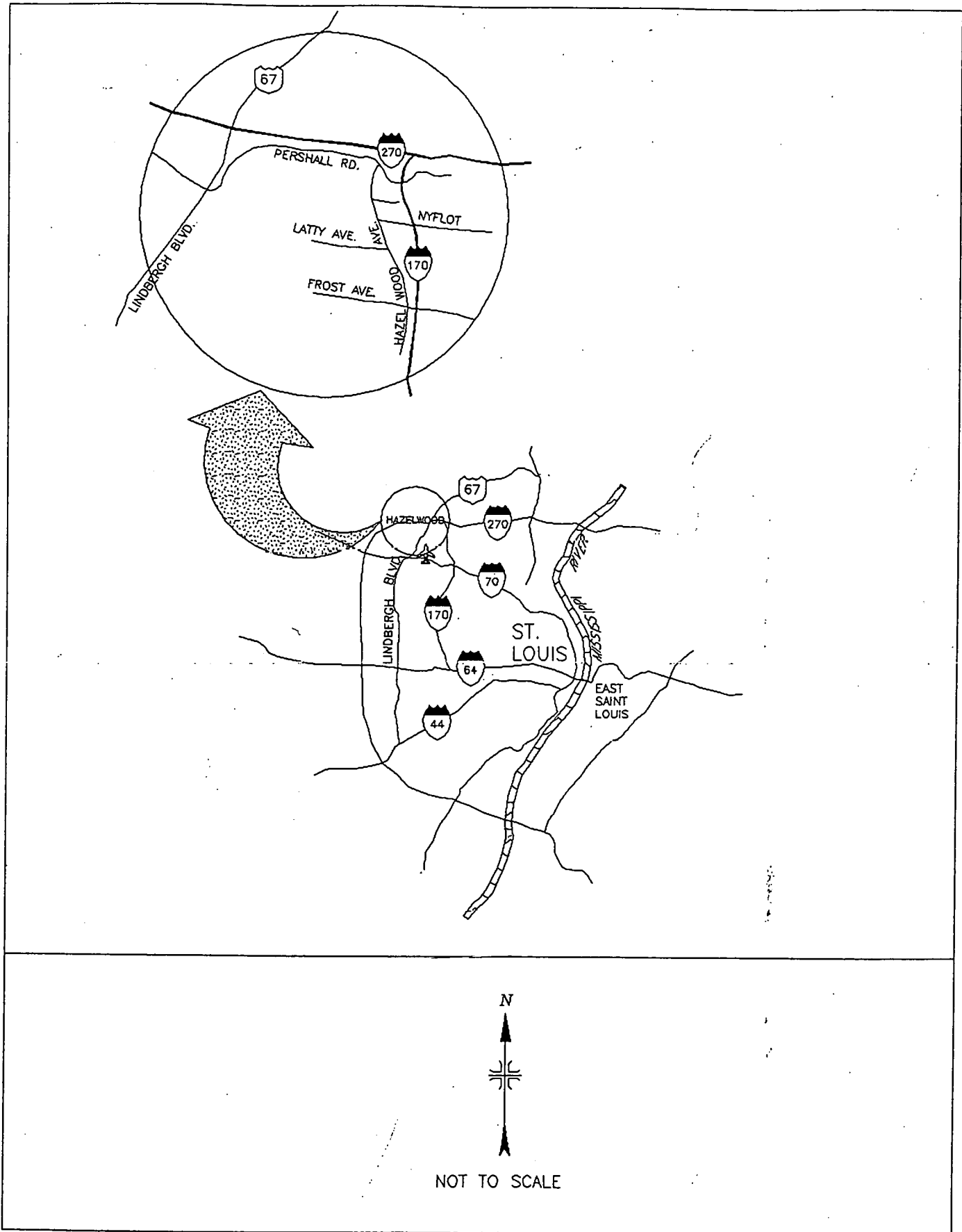


FIGURE 1: St. Louis, Missouri Area — Location of Haul Roads

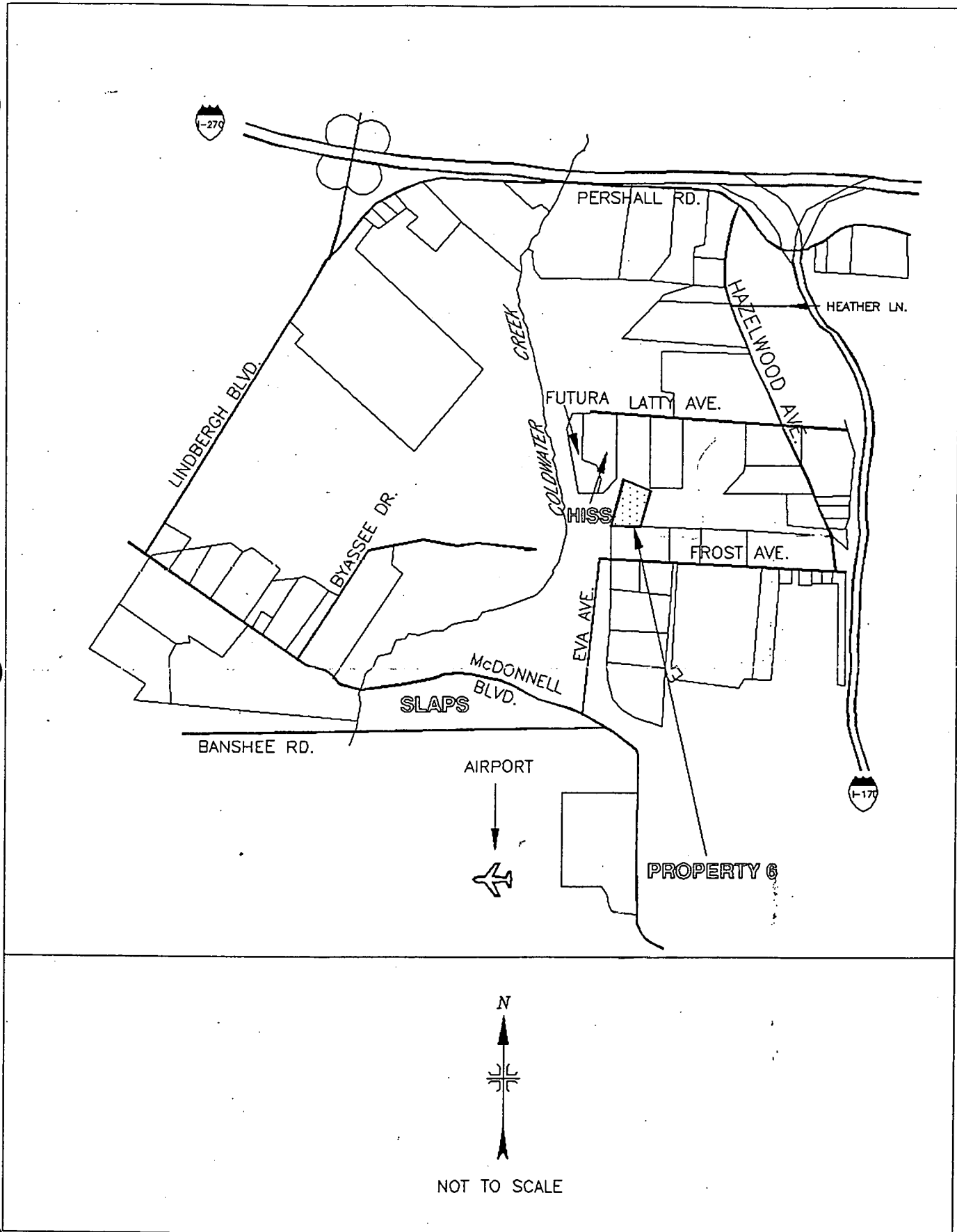


FIGURE 2: Location of SLAPS Latty Avenue Vicinity Property Number 6

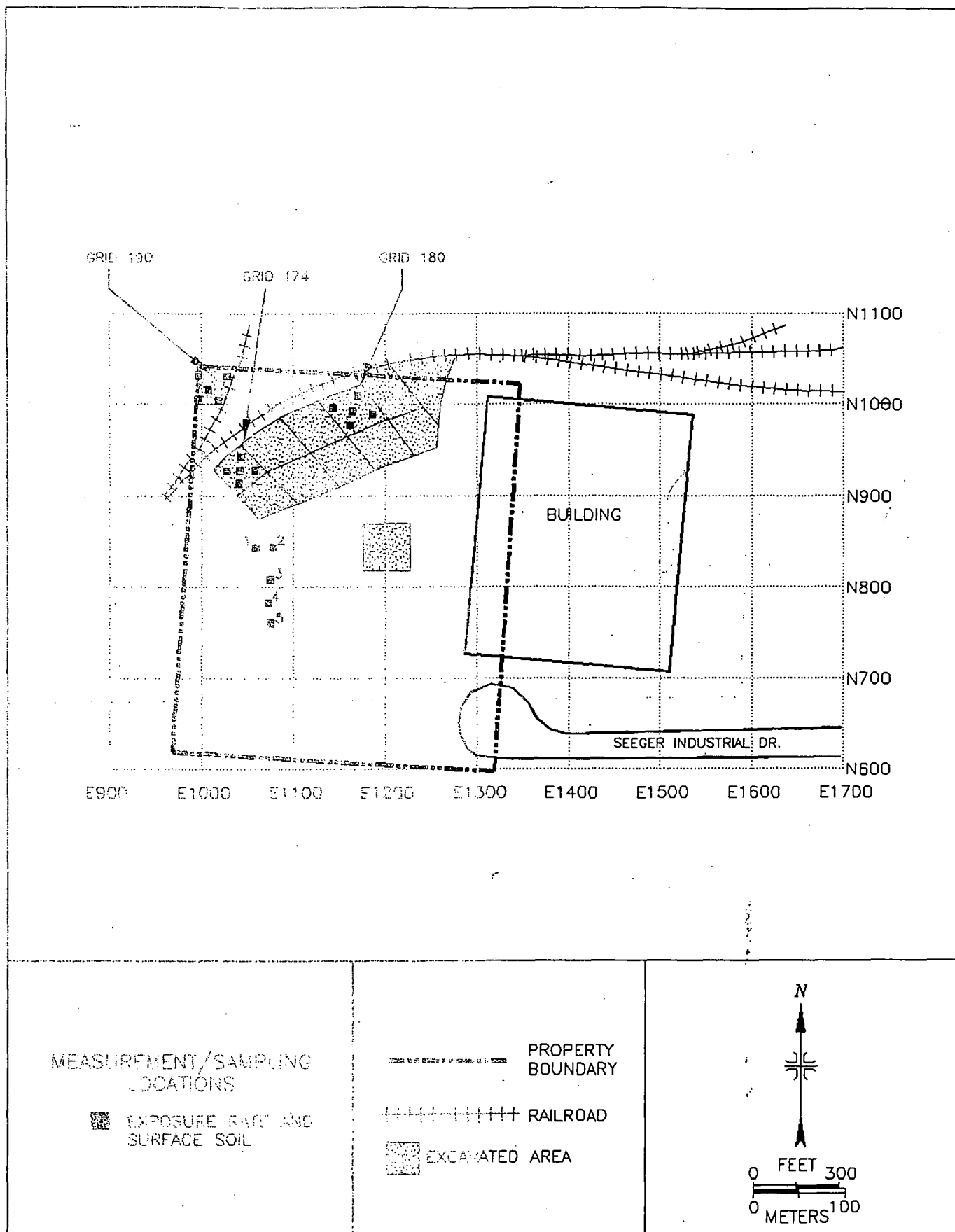


FIGURE 3: Latty Avenue Vicinity, Property Number 6 – Exposure Rate Measurement and Sampling Locations

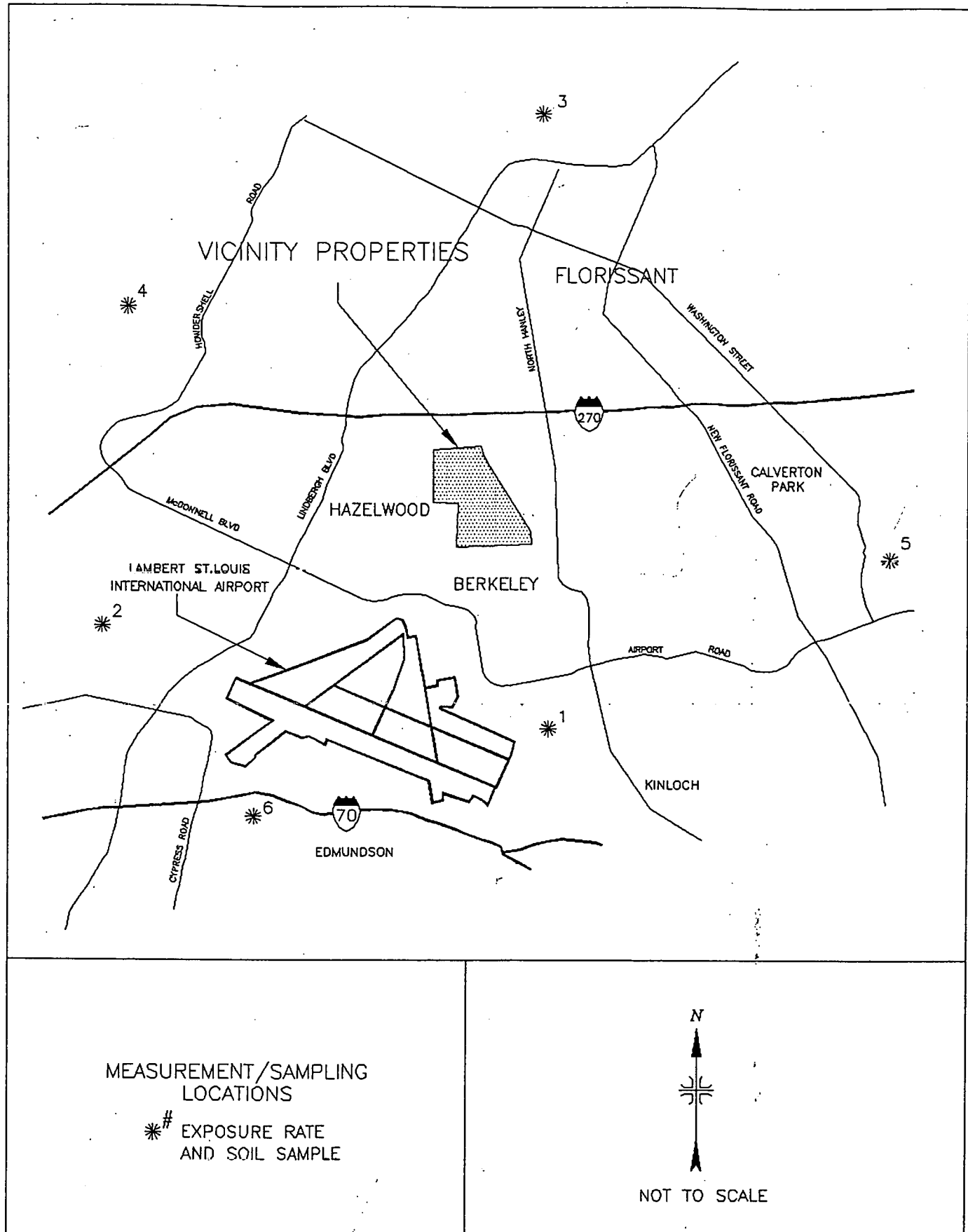


FIGURE 4: Hazelwood and Berkeley, Missouri Area Background Measurement and Sampling Locations

TABLE 1

**EXPOSURE RATES AND RADIONUCLIDE CONCENTRATIONS IN SOIL
LATTY AVENUE VICINITY PROPERTY NUMBER 6
ST. LOUIS AIRPORT SITE VICINITY PROPERTIES
ST. LOUIS, MISSOURI**

Location ^a	Exposure Rate at 1 m (μ R/h)	Radionuclide Concentration (pCi/g)			
		Ra-226	Th-230	Th-232	U-238
1	6	1.0 ± 0.1^b	<3.0	1.0 ± 0.1	1.1 ± 0.3
2	5	0.9 ± 0.1	3.7 ± 2.4	1.0 ± 0.1	1.0 ± 0.3
3	6	1.0 ± 0.1	<3.4	1.0 ± 0.1	1.4 ± 0.4
4	5	0.9 ± 0.1	3.7 ± 2.3	0.9 ± 0.1	1.0 ± 0.3
5	5	0.9 ± 0.1	<4.1	1.0 ± 0.1	1.2 ± 0.3
GRID 190^c					
A	10	1.1 ± 0.1	6.7 ± 2.8	1.0 ± 0.1	1.2 ± 0.3
B	11	0.9 ± 0.1	<2.7	1.1 ± 0.1	1.2 ± 0.3
C	12	0.9 ± 0.1	2.6 ± 2.0	0.9 ± 0.1	1.0 ± 0.2
D	12	1.1 ± 0.1	6.0 ± 2.7	1.0 ± 0.1	0.9 ± 0.2
E	10	1.1 ± 0.1	<3.6	1.2 ± 0.1	1.2 ± 0.4
GRID 174^c					
A	6	1.1 ± 0.1	<3.3	1.1 ± 0.1	1.3 ± 0.4
B	6	1.2 ± 0.1	<2.9	1.2 ± 0.1	0.9 ± 0.3
C	6	1.0 ± 0.1	6.4 ± 2.8	1.1 ± 0.1	1.1 ± 0.3
D	8	1.2 ± 0.1	6.5 ± 2.8	1.1 ± 0.1	1.0 ± 0.3
E	6	1.1 ± 0.1	3.9 ± 2.2	1.1 ± 0.1	1.0 ± 0.3
COMPOSITE ^d	NA ^e	--- ^f	3.44 ± 0.46	1.12 ± 0.22	---

TABLE 1 (continued)

**EXPOSURE RATES AND RADIONUCLIDE CONCENTRATIONS IN SOIL
LATTY AVENUE VICINITY PROPERTY NUMBER 6
ST. LOUIS AIRPORT SITE VICINITY PROPERTIES
ST. LOUIS, MISSOURI**

Location ^a	Exposure Rate at 1 m (μR/h)	Radionuclide Concentration (pCi/g)			
		Ra-226	Th-230	Th-232	U-238
GRID 180 ^c					
A	6	1.2 ± 0.1	5.7 ± 2.8	1.1 ± 0.1	0.5 ± 0.3
B	6	1.4 ± 0.1	4.9 ± 2.6	1.1 ± 0.1	0.9 ± 0.3
C	7	1.2 ± 0.1	7.3 ± 2.5	1.1 ± 0.1	0.8 ± 0.3
D	6	1.1 ± 0.1	4.4 ± 2.5	1.1 ± 0.1	1.0 ± 0.3
E	7	1.3 ± 0.1	14.0 ± 3.3	1.0 ± 0.1	1.5 ± 0.4
COMPOSITE ^d	NA	---	6.03 ± 0.70	0.89 ± 0.19	---

^aRefer to Figure 3.

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

^cBNI grid identification numbers.

^dComposite sample analyzed by alpha spectrometry.

^eNA = Not Applicable

^f--- = analysis not performed

TABLE 2

**BACKGROUND EXPOSURE RATES
AND RADIONUCLIDE CONCENTRATIONS IN SOIL SAMPLES
ST. LOUIS AIRPORT SITE VICINITY PROPERTIES
HAZELWOOD AND BERKELEY, MISSOURI**

Sample No.	Location ^a	Exposure Rate at 1 m (μ r/h)	Radionuclide Concentration (pCi/g)			
			Ra-226	Th-230	Th-232	U-238
1	School Access Road and Harmond Road	10	1.0 ± 0.1^b	1.31 ± 0.2^c	1.1 ± 0.1	1.1 ± 0.5
2	Fee Fee Road and Duncombe Drive	10	0.7 ± 0.1		1.0 ± 0.1	0.9 ± 0.5
3	St. Ferdinand Park at St. Pierre Street	9	0.9 ± 0.1		1.1 ± 0.1	1.3 ± 0.4
4	White Birch Park	9	0.8 ± 0.1		1.1 ± 0.1	1.1 ± 0.4
5	Robert Superior Park	9	0.9 ± 0.1		1.1 ± 0.1	1.2 ± 0.4
6	St. Ann Park at St. Ambrose Lane	9	0.8 ± 0.1		1.0 ± 0.1	0.9 ± 0.3

^aRefer to Figure 4.

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

^cComposite of samples 1 through 6. Alpha spectrometry results.

REFERENCES

Bechtel National, Inc. (BNI). Radiological Characterization Report for FUSRAP Properties in the St. Louis, Missouri Area, Volumes I-III. Oak Ridge, TN; March 1990.

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

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Oak Ridge National Laboratory (ORNL). Results of the Radiation Measurements Taken at Transportation Routes (1M004) in Hazelwood, Missouri. Oak Ridge, TN; December 1986.

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Formerly Utilized Sites Remedial Action Program (FUSRAP)

ADMINISTRATIVE RECORD

for the St. Louis Site, Missouri



U.S. Department of Energy