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Prepared by
Oak Ridge Associated
Universities

Prepared for
Division of Fuel
Cycle and
Material Safety

U.S. Nuclear
Regulatory
Commission

**PRELIMINARY RADIOLOGICAL SURVEY OF
PROPOSED STREET RIGHT-OF-WAY**

AT

FUTURA COATINGS, INC.

9200 LATTY AVENUE

HAZELWOOD, MISSOURI

L.W. COLE

**Radiological Site Assessment Program
Manpower Education, Research, and Training Division**

FINAL REPORT

December 1981

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AT
FUTURA COATINGS, INC.
9200 Latty Avenue
Hazelwood, Missouri

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TABLE OF CONTENTS

	<u>Page</u>
List of Figures	ii
Introduction.	1
Survey Procedures	2
Results	3
Summary	4
Table 1: Concentrations of Radionuclides in Soil Samples	9

LIST OF FIGURES

	<u>Page</u>
FIGURE 1: Map of Northwestern St. Louis, Missouri, Showing the Location of the Latty Avenue Site.	5
FIGURE 2: Plan View of the Futura Chemical Company Property at 9200 Latty Avenue	6
FIGURE 3: Plan View of the Survey Site Indicating Locations of Radiation Level Measurements.	7
Figure 4. Plan View of the Survey Site Indicating Sample Locations.	8

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INTRODUCTION

Between 1943 and 1946 uranium bearing ores and residues were processed by the Mallinckrodt Chemical Co. of St. Louis, Missouri, under contracts with the Atomic Energy Commission and its predecessor, the Manhattan Engineer District. Following termination of these contracts, process wastes from the operations were temporarily stored at the St. Louis airport. These wastes contained radionuclides of the naturally-occurring uranium-238, uranium-235, and thorium-232 decay series.

In early 1966, the waste materials were moved from the airport to the site at 9200 Latty Avenue in Hazelwood, Missouri. Between 1967 and 1973 several transactions occurred, resulting in the transfer of this material to other locations. Measurements of soil concentrations and radiation levels by the Nuclear Regulatory Commission in 1976, indicated residual uranium and thorium concentrations and exposure levels at the site in excess of the criteria for release for unrestricted use. An extensive survey performed in 1977 by the Health and Safety Research Division, Oak Ridge National Laboratory (ORNL), confirmed these findings. Decontamination of the property, including removal of approximately one-half meter of surface soil, was performed. A large pile of contaminated debris from cleanup activities remains on the eastern portion of that site. A survey to characterize the radionuclide concentrations in that pile was conducted by Oak Ridge Associated Universities (ORAU) in June 1981.

The city of Hazelwood, Missouri, is anticipating improvements to Latty Avenue. These improvements will include property previously used in the processing of the waste materials. At the request of the

Nuclear Regulatory Commission a preliminary radiological survey of the section of Latty Avenue property being considered for improvement was performed by the Radiological Site Assessment Program of ORAU, June 1-5, 1981.

Site Description

The Latty Avenue site is the property of the Futura Coatings Inc., a manufacturer of chemical coatings. The site is located in a heavily industrialized area, approximately 1 km north of the St. Louis airport (Figure 1). It occupies about 4.7 hectares. There are three buildings on the western portion of the property; the eastern portion is currently unused and overgrown with tall weeds and brush. The pile of decontamination debris is located on this section (Figure 2).

The area covered by this survey is a narrow strip along the northern boundary of the Latty Avenue site (Figure 3). It is approximately 100 m long by 15 m wide; 10 m of this width are local easement, 5 meters are on property belonging to the Futura Co. A chain-link fence designates the Futura boundary. A drainage ditch runs the length of the site between the fence and Latty Avenue. Portions of the property are covered with heavy brush and were inaccessible for complete surveying.

SURVEY PROCEDURES

The objectives of this survey were to measure direct gamma radiation levels and to identify and quantify radionuclides in the soil.

1. A survey reference line was established parallel to the fence. Grid markers were placed at 15 m intervals along this line.
2. A walkover surface scan was performed between the fence and the survey reference line using a gamma scintillation ratemeter to identify areas of elevated contact radiation levels. Other areas were inaccessible due to heavy brush cover.
3. Exposure rates at 1 m above the surface were measured at 15 m intervals along the reference line, the fence line, and the road edge.
4. Surface soil samples were collected at seven randomly selected locations. Subsurface samples (0.5 m) were collected at four of these locations.
5. Biased soil samples were collected at two locations where surface contact radiation levels were identified by the walkover scan as notably higher than the surrounding areas. A subsurface sample was also taken at one of these locations.

Samples were returned to Oak Ridge, Tennessee, for analysis. The locations and results of these measurements and analyses are summarized in Figures 3 and 4 and Table 1.

RESULTS

Radiation levels at 1 meter above the surface over the entire site were above the average background levels for the St. Louis area (Figure 3). The maximum level noted was a region along the fence

near the western end of the site; exposure rates in this area were up to 1.8 mR/h.

All soil samples, including those from 0.5 m below the surface, contained elevated concentrations of radionuclides associated with the uranium processing operation. These concentrations are presented in Table 1. Thorium-230 levels in these soils were particularly high, ranging from 110 to 80,400 pCi/g in the random samples and from 96,500 to 180,000 pCi/g in the biased samples. Other concentration ranges in the random samples were: Ra-226, 0.8 to 250 pCi/g; U-235, 0.1 to 27 pCi/g; U-238, <2.4 to 470 pCi/g; Th-232, 0.7 to 4.6 pCi/g; Pa-231, 0.75 to 700 pCi/g; and Ac-227, 2.6 to 990 pCi/g. Biased samples contained concentrations up to: Ra-226, 620 pCi/g; U-235, 57 pCi/g; U-238, 1300 pCi/g; Th-232, 8.5 pCi/g; Pa-231, 1070 pCi/g; and Ac-227, 2250 pCi/g.

SUMMARY

A preliminary radiological survey was conducted on a section of property along Latty Avenue, under consideration for street improvements. Results indicate that external radiation levels and radionuclide concentrations in soil on that property exceed the federal guidelines for unrestricted areas.

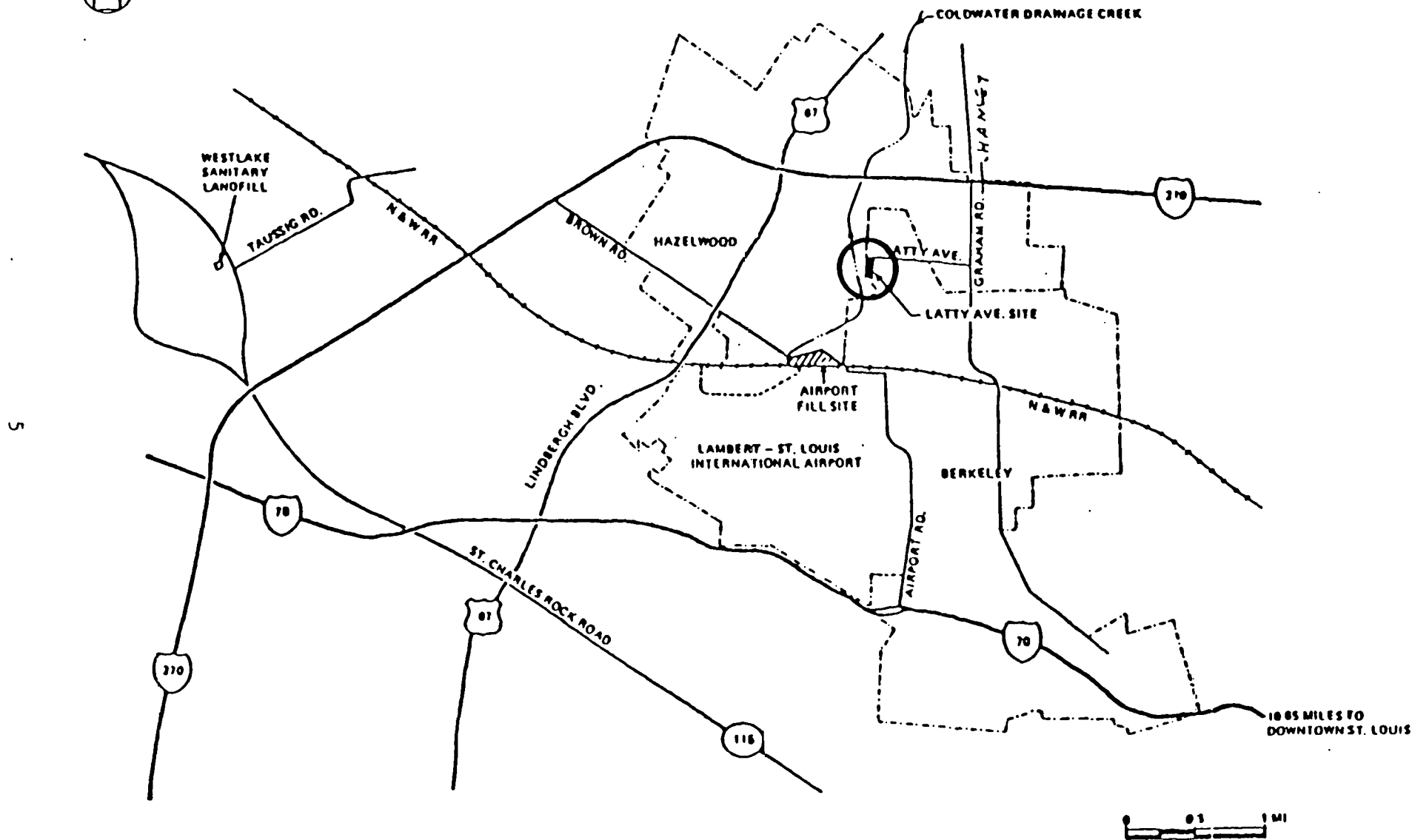


FIGURE 1. Map of Northwestern St. Louis, Missouri, Showing the Location of the Latty Avenue Site.

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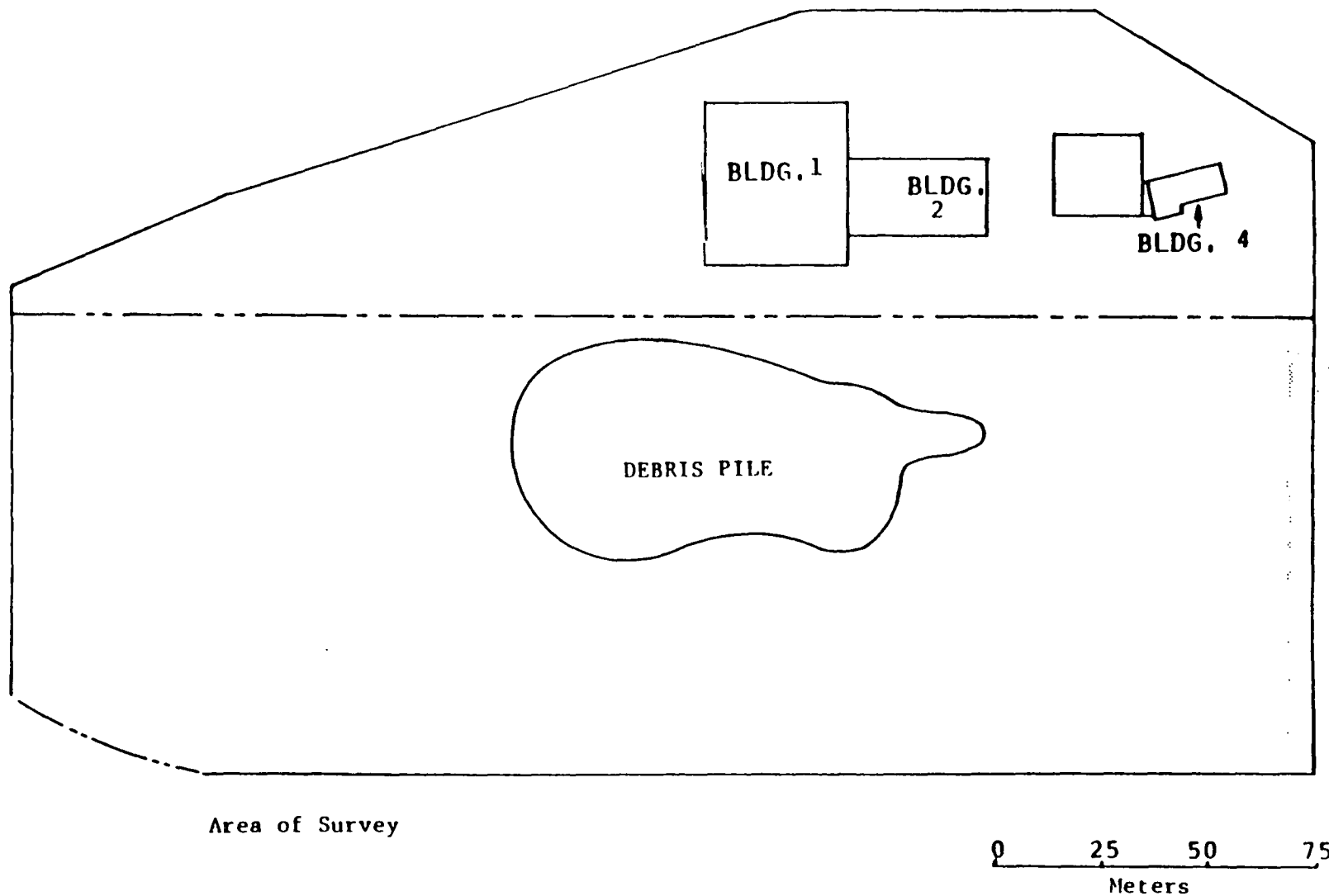


FIGURE 2. Plan View of the Futura Chemical Company Property at 9200 Latty Avenue.

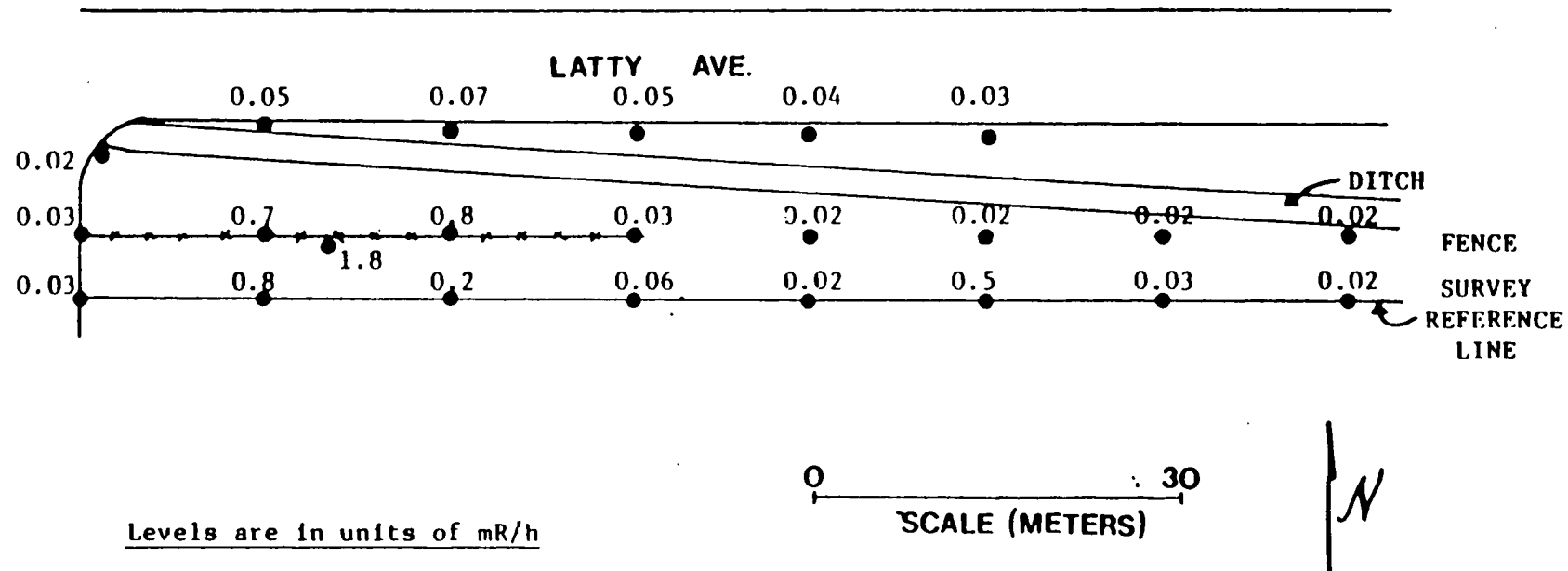


FIGURE 3. Plan View of the Survey Site Indicating Locations of Radiation Level Measurements

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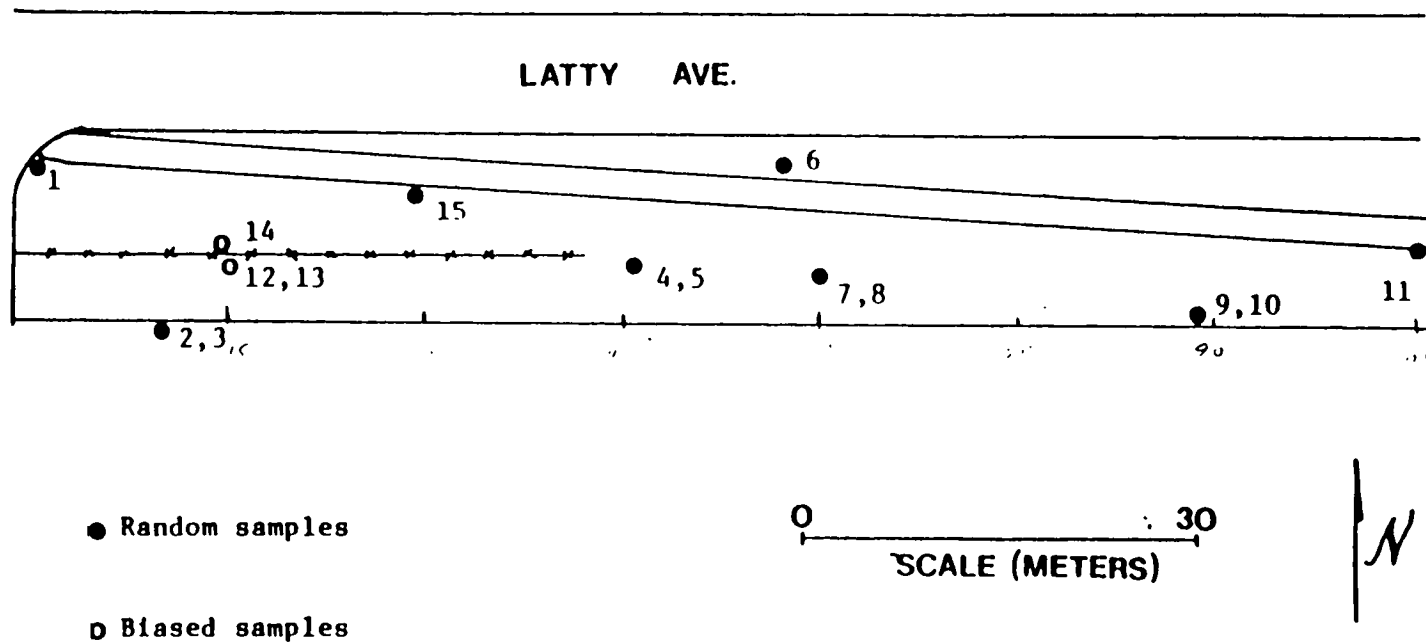


FIGURE 4. Plan View of the Survey Site Indicating Soil Sample Locations.

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TABLE 1

CONCENTRATIONS OF RADIONUCLIDES IN SOIL SAMPLES

Sample # ^a	Depth	Radionuclide Concentrations (pCi/g)						
		Ra-226	U-238	U-235	Th-232	Th-230	Pa-231	Ac-227
Random:								
1	Surface	1.5 ± 0.1 ^b	<2.8	0.17 ± 0.06	0.86 ± 0.19	15,400 ± 1350	2.1 ± 0.8	4.1 ± 0.4
2	Surface	210 ± 2	750 ± 40	20.9 ± 0.8	2.8 ± 1.0	33,600 ± 1350	380 ± 10	780 ± 5
3	0.5 m	110 ± 1	470 ± 30	7.5 ± 0.4	2.0 ± 0.7	33,600 ± 1350	230 ± 8	430 ± 4
4	Surface	250 ± 2	470 ± 60	27 ± 1	4.6 ± 1.6	80,400 ± 2000	700 ± 15	980 ± 8
5	0.5 m	19.9 ± 0.4	38 ± 12	2.1 ± 0.2	1.2 ± 0.4	5930 ± 400	56 ± 3	82 ± 2
6	Surface	1.3 ± 0.1	<2.4	0.2 ± 0.1	0.8 ± 0.2	320 ± 100	2.8 ± 0.9	4.1 ± 0.4
7	Surface	4.7 ± 0.2	16 ± 6	0.6 ± 0.1	0.7 ± 0.2	1560 ± 180	12 ± 1	17.6 ± 0.7
8	0.5 m	0.8 ± 0.1	5 ± 4	0.1 ± 0.1	0.7 ± 0.2	240 ± 80	0.75 ± 0.62	2.6 ± 0.3
9	Surface	3.5 ± 0.2	6 ± 6	0.5 ± 0.1	0.8 ± 0.2	1330 ± 190	9.4 ± 1.4	13.9 ± 0.7
10	0.5 m	1.0 ± 0.1	<3.6	0.1 ± 0.1	0.9 ± 0.2	110 ± 100	0.97 ± 0.81	3.1 ± 0.4
11	Surface	17.4 ± 0.4	40 ± 10	1.9 ± 0.2	1.2 ± 0.3	3630 ± 300	38 ± 3	66 ± 1
15	Surface	4.1 ± 0.4	<7.8	0.26 ± 0.15	0.4 ± 0.3	1130 ± 290	6.9 ± 3.9	14.5 ± 1.2
Biased:								
12	Surface	195 ± 3	470 ± 60	25 ± 1	4.8 ± 1.9	33,300 ± 2100	480 ± 30	780 ± 8
13	0.5 m	690 ± 3	470 ± 60	39 ± 1	3.7 ± 1.9	180,000 ± 2700	1070 ± 19	2250 ± 10
14	Surface	480 ± 3	470 ± 60	57 ± 1	8.5 ± 1.9	96,500 ± 2300	810 ± 20	1590 ± 9

^a Refer to Figure 4.^b 2σ error from counting statistics only.