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Formerly Utilized Sites Remedial Action Program (FUSRAP)

ADMINISTRATIVE RECORD

for Maywood, New Jersey



U.S. Department of Energy

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ORNL/RASA-85/34

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RESULTS OF THE RADIOLOGICAL SURVEY AT
45 KIPP AVENUE (LJ020), LODI, NEW JERSEY

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HEALTH AND SAFETY RESEARCH DIVISION

**Nuclear and Chemical Waste Programs
(Activity No. AH 10 05 00 0; ONLWC01)**

**RESULTS OF THE RADIOLOGICAL SURVEY AT
45 KIPP AVENUE (LJ020), LODI, NEW JERSEY**

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Date of Issue - December 1985

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**Work performed as part of the
RADIOLOGICAL SURVEY ACTIVITIES PROGRAM**

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MARTIN MARIETTA ENERGY SYSTEMS, INC.
for the
U. S. DEPARTMENT OF ENERGY
under Contract No. DE-AC05-84OR21400**

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ACKNOWLEDGEMENTS

Research for this project was sponsored by the Division of Remedial Action Projects, U.S. Department of Energy. The author wishes to acknowledge the support of J. E. Baublitz, Director, Division of Facility & Site Decommissioning Projects, E. G. DeLaney, Manager, FUSRAP/Surplus Facilities Group, and members of their staff. In addition, the author appreciates the manuscript preparation by S. E. Huckaba.

RESULTS OF THE RADIOLOGICAL SURVEY AT
45 KIPP AVENUE, LODI, NEW JERSEY*

INTRODUCTION

A radiological survey of 45 Kipp Avenue, Lodi, New Jersey, was conducted by a survey team from Oak Ridge National Laboratory (ORNL) on April 12, 1985 at the request of the Department of Energy (DOE). This property was identified as being suspected of having contaminated material present during the mobile gamma scan of Lodi, New Jersey.¹

The radiological survey conducted on this property was for the purpose of determining whether the property had any radioactive material onsite in excess of background radiation levels, and, if so, were these radioactive materials in excess of remedial action guidelines established by DOE such that the property could be "designated" for further investigation. This report summarizes the results of the "designation" survey performed on this property.

SURVEY METHODS

The radiological survey of the property included: (1) a gamma scan of the entire property outdoors; and (2) sampling of surface (0-15 cm) soil. No indoor survey measurements were performed. These survey methods followed the plan outlined in Reference 2. A comprehensive description of the survey methods and instrumentation has been presented in another report.³

SURVEY RESULTS

Applicable federal guidelines have been summarized in Table 1. The normal background levels for the northern New Jersey area are presented in Table 2. These data are provided for comparison with the survey results presented in this section. All direct measurement results presented in this report are gross readings at ground surface;

* The survey was performed by members of the Radiological Survey Activities Group of the Health and Safety Research Division at Oak Ridge National Laboratory under DOE contract DE-AC05-84OR21400.

background radiation levels have not been subtracted. Similarly, background concentrations have not been subtracted from radionuclide concentrations measured in environmental samples.

Systematic and Biased Soil Samples

Systematic and biased soil samples were taken from various locations on the property for radionuclide analyses. Locations of the systematic (LJ20S) and biased (LJ20B) samples are shown in Fig. 1, with results of laboratory analyses provided in Table 3. Concentrations of uranium, radium, and thorium were within normal background levels in both systematic samples. Concentrations of uranium and radium were slightly elevated in both biased soil samples which ranged from 3.4 pCi/g to 4.2 pCi/g and 12 pCi/g to 13 pCi/g, respectively. Concentrations of ^{232}Th were within normal background levels in both biased soil samples. Concentrations of ^{226}Ra exceed those for ^{238}U in the biased samples but are believed to be due to naturally-occurring material.

Gamma Radiation Levels

Results of the gamma scan of the surface of the property behind the retaining walls showed no gamma exposure rates in excess of background radiation levels (6 $\mu\text{R/h}$ to 9 $\mu\text{R/h}$). Locations and exposure rates are shown in Fig. 2. Maximum gamma exposure rates of 17-21 $\mu\text{R/h}$ were measured on the northwest corner of this property and cover approximately 350 square feet. These results locate areas where ^{238}U -bearing material exists.

SUMMARY

Measurements taken at 45 Kipp Avenue indicate that the property contains some radioactive contamination primarily from the ^{238}U decay chain. This material was found in the locations shown in Fig. 2. However, the majority of the property is within normal background radiation levels. While the ratios of ^{238}U and ^{226}Ra are not in total equilibrium, it is believed that this is naturally-occurring material. Further investigation may be required to determine if this uraniferous material is an outcrop of uranium ore material which is native to this area of northern New Jersey.

REFERENCES

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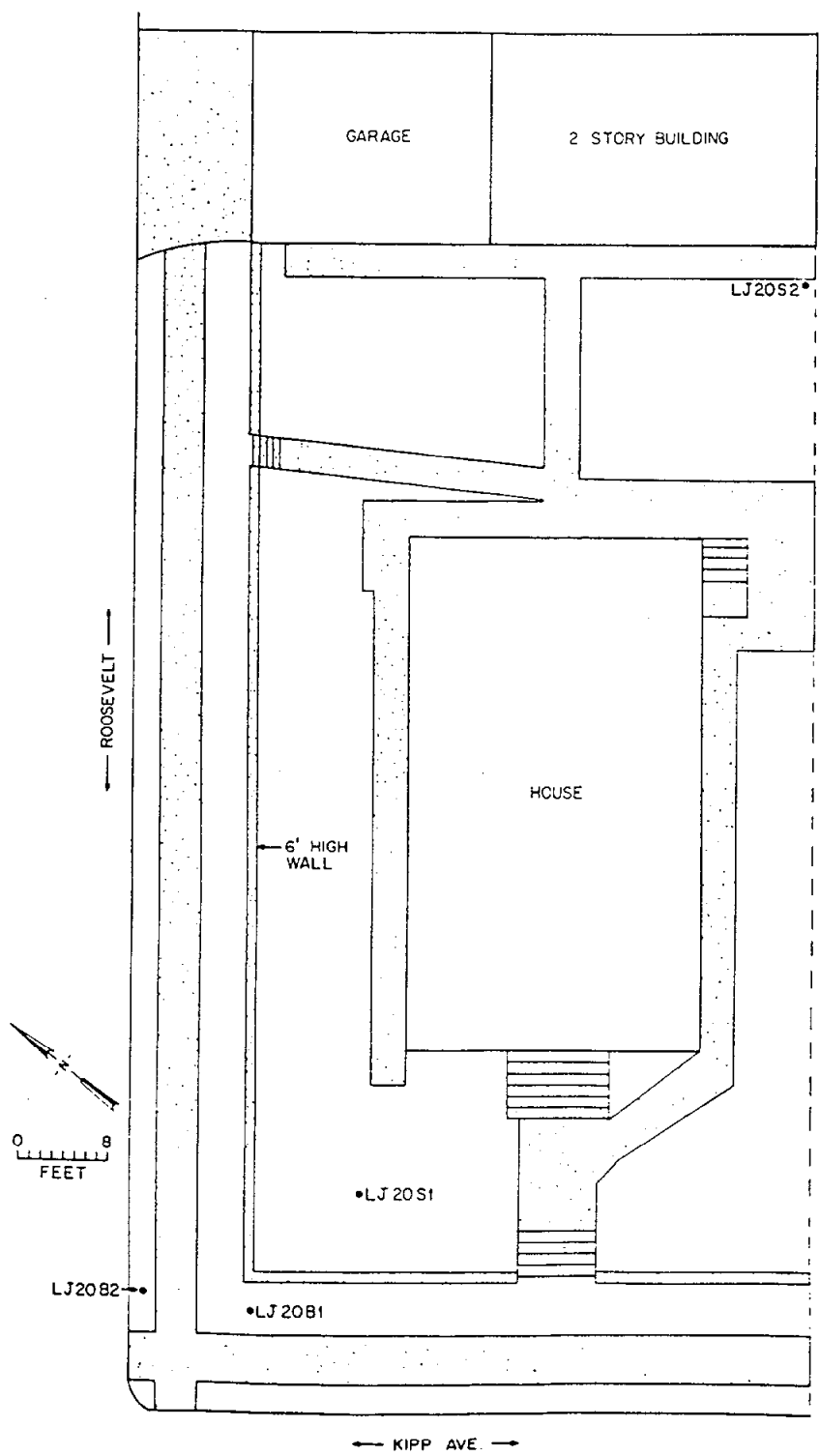


Fig. 1. Diagram showing locations of soil samples taken at 45 Kipp Avenue, Lodi, New Jersey.

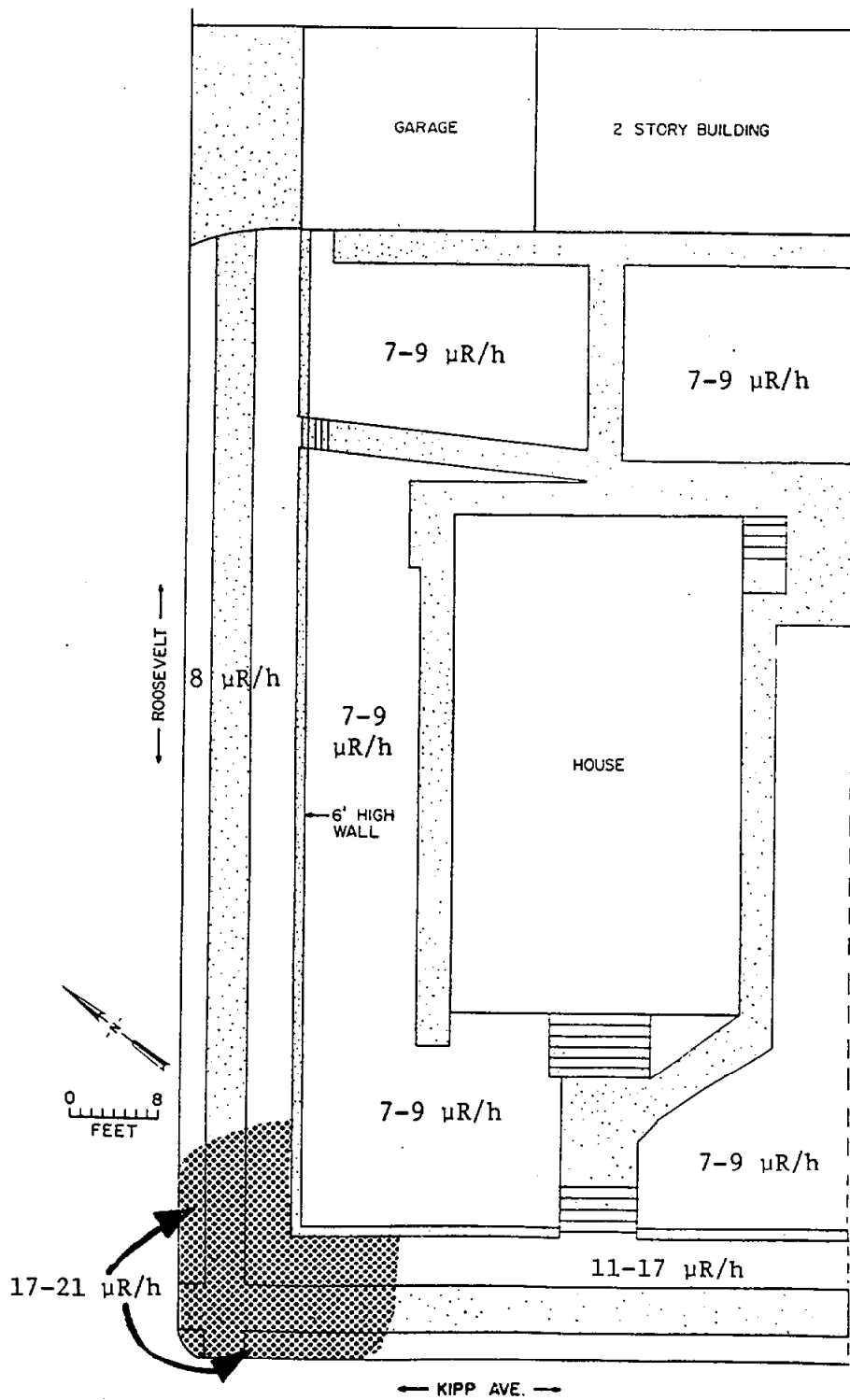


Fig. 2. Gamma radiation levels measured at 45 Kipp Avenue, Lodi, New Jersey.

Table 1. A summary of applicable radiation guidelines for the FUSRAP program (July 1985).

Mode of exposure	Exposure conditions	Guideline value	Guideline source
1. Gamma radiation	Continuous exposure to individual in general population (whole body)	57 μ R/h	DOE Order 5480.1A Chapter 11 Requirements for Radiation Protection
2. Radionuclide concentrations in soil	Maximum permissible concentration of the following radionuclides in soil above background levels averaged over 100 m ² area ^{226}Ra ^{232}Th	5 pCi/g averaged over the first 15 cm of soil below the surface; 15 pCi/g when averaged over 15-cm thick soil layers more than 15 cm below the surface and less than 1.5 m below the surface	U.S. Department of Energy Guidelines for Residual Radioactivity at Formerly Utilized Sites Remedial Action Program and Remote Surplus Facilities Management Program Sites (Revision 1, July 1985)

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Table 2. Background radiation levels for the northern New Jersey area.

Type or radiation measurement or sample	Radiation level or radionuclide concentration
Gamma exposure rate at 1 m above floor or ground surface ($\mu\text{R/h}$)	8 ^a
Concentration of radionuclides in soil (pCi/g)	
²³² Th	0.9 ^b
²³⁸ U	0.9 ^b
²²⁶ Ra	0.9 ^b

^aReference 4.^bReference 5.

Table 3. Concentrations of radionuclides in soil at 45 Kipp Avenue, Lodi, New Jersey.

Sample ^a	Depth (cm)	Radionuclide concentration (pCi/g)		
		²²⁶ Ra ^b	²³² Th ^b	²³⁸ U ^c
<u>Systematic samples</u>				
LJ20S1	0 - 15	1.0 ± 0.08	0.96 ± 0.2	0.86
LJ20S2	0 - 15	0.91 ± 0.2	1.0 ± 0.3	0.89
<u>Biased samples^d</u>				
LJ20B1	0 - 15	12 ± 0.3	1.2 ± 0.5	4.2
LJ20B2	0 - 15	13 ± 0.7	1.4 ± 0.7	3.4

^aLocations of soil samples are shown on Fig. 1.

^bIndicated counting error is at the 95% confidence level ($\pm 2 \sigma$).

^cTotal analytical error of measurement results is less than $\pm 5\%$ (95% confidence level).

^dBiased samples are taken from areas shown to have elevated gamma exposure rates.

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