

136599
M-547

Formerly Utilized Sites Remedial Action Program (FUSRAP)

ADMINISTRATIVE RECORD

for Maywood, New Jersey



U.S. Department of Energy

Health and Safety Research Division

RESULTS OF THE RADIOLOGICAL SURVEY AT
75 CHRISTOPHER STREET (LJ008), LODI, NEW JERSEY

October 1984

Work performed as part of the
RADIOLOGICAL SURVEY ACTIVITIES PROGRAM

OAK RIDGE NATIONAL LABORATORY
Oak Ridge, Tennessee 37831
operated by
MARTIN MARIETTA ENERGY SYSTEMS, INC.
for the
U. S. DEPARTMENT OF ENERGY
under Contract No. DE-AC05-84OR21400

Health and Safety Research Division

RESULTS OF THE RADIOLOGICAL SURVEY AT
75 CHRISTOPHER STREET (LJ008), LODI, NEW JERSEY

R. W. Doane

Investigation Team

B. A. Berven - RASA Program Manager
W. D. Cottrell - RASA/FUSRAP Project Director
R. W. Doane - Survey Field Supervisor

Work performed as part of the
RADIOLOGICAL SURVEY ACTIVITIES PROGRAM

Prepared by the
OAK RIDGE NATIONAL LABORATORY
operated by
MARTIN MARIETTA ENERGY SYSTEMS, INC.
for the
U. S. DEPARTMENT OF ENERGY
under Contract No. DE-AC05-84OR21400

CONTENTS

	<u>Page</u>
LIST OF FIGURES AND TABLES	iii
INTRODUCTION	1
SURVEY METHODS	1
SURVEY RESULTS	1
Systematic and Biased Soil Samples.	2
Gamma Radiation Levels.	2
SUMMARY.	2
REFERENCES	3

LIST OF FIGURES AND TABLES

<u>Figure</u>		<u>Page</u>
1	Diagram showing locations of soil samples taken at 75 Christopher Street	4
2	Location of elevated gamma radiation levels at 75 Christopher Street	5
<u>Table</u>		<u>Page</u>
1	A summary of applicable radiation guidelines.	6
2	Background radiation levels for the northern New Jersey area	7
3	Results of radionuclide concentrations in soil at 75 Christopher Street	8

RESULTS OF THE RADIOLOGICAL SURVEY AT
75 CHRISTOPHER STREET, LODI, NEW JERSEY*

INTRODUCTION

A radiological survey of 75 Christopher Street, Lodi, New Jersey, was conducted by Oak Ridge National Laboratory (ORNL) on August 23, 1984 at the request of the Department of Energy (DOE). Contaminated material was discovered during mobile gamma scan of Lodi, New Jersey.

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 have 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; background radiation levels have not been subtracted. Similarly, background concentrations have not

* 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.

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 analysis. Locations of the systematic (LJ8S) and biased (LJ8B) samples are shown in Fig. 1, with results of laboratory analyses provided in Table 3. Concentrations of ^{232}Th did not exceed the background concentrations of ^{232}Th anticipated for northern New Jersey area. However, ^{238}U and ^{226}Ra concentrations were present in the biased soil samples above background levels and possibly in excess of DOE guidelines (Table 1). The owner of this property (for 27 years) stated that no fill material had ever been hauled to his property and the only dirt moving was during construction of the road (Pasadena Avenue).

Gamma Radiation Levels

Results of the gamma scan of the surface of the property show areas where gamma exposure rates are in excess of background radiation levels. These locations are shown in Fig. 2, and the measurements are quantified. These locations indicate where the elevated gamma radiation levels were observed. The maximum gamma exposure rate observed on this property was $110 \mu\text{R/h}$.

SUMMARY

Measurements taken at 75 Christopher Street indicate that the property contains radioactive contamination primarily from the ^{238}U decay chain. Due to the background levels of ^{232}Th found in the soil samples and the variable ratios of ^{238}U to ^{226}Ra , the origin of this material could not be established based on this data. A comprehensive survey may be warranted for further evaluation of this property.

REFERENCES

1. R. W. Doane and B. A. Berven, "Results of the Mobile Gamma Scanning Activities in Lodi, New Jersey," Oak Ridge National Laboratory, ORNL/RASA-84/3 (October 1984).
2. W. D. Cottrell, ORNL, to A. J. Whitman, DOE/EQ, correspondence, "Radiological Survey of Private Properties in Lodi, New Jersey" (August 15, 1984).
3. Oak Ridge National Laboratory, Procedures Manual for the ORNL Remedial Action Survey and Certification Activities (RASCA) Program, ORNL/TM-8600 (October 1982).
4. U.S. Department of Energy, Radiological Survey of the Middlesex Municipal Landfill, Middlesex, New Jersey, DOE/EV-0005/20, April 1980.
5. T. E. Myrick and B. A. Berven, State Background Radiation Levels: Results of Measurements Taken During 1975-1979, Oak Ridge National Laboratory, ORNL/TM-7343 (November 1981).

● systematic samples

▲ biased sample

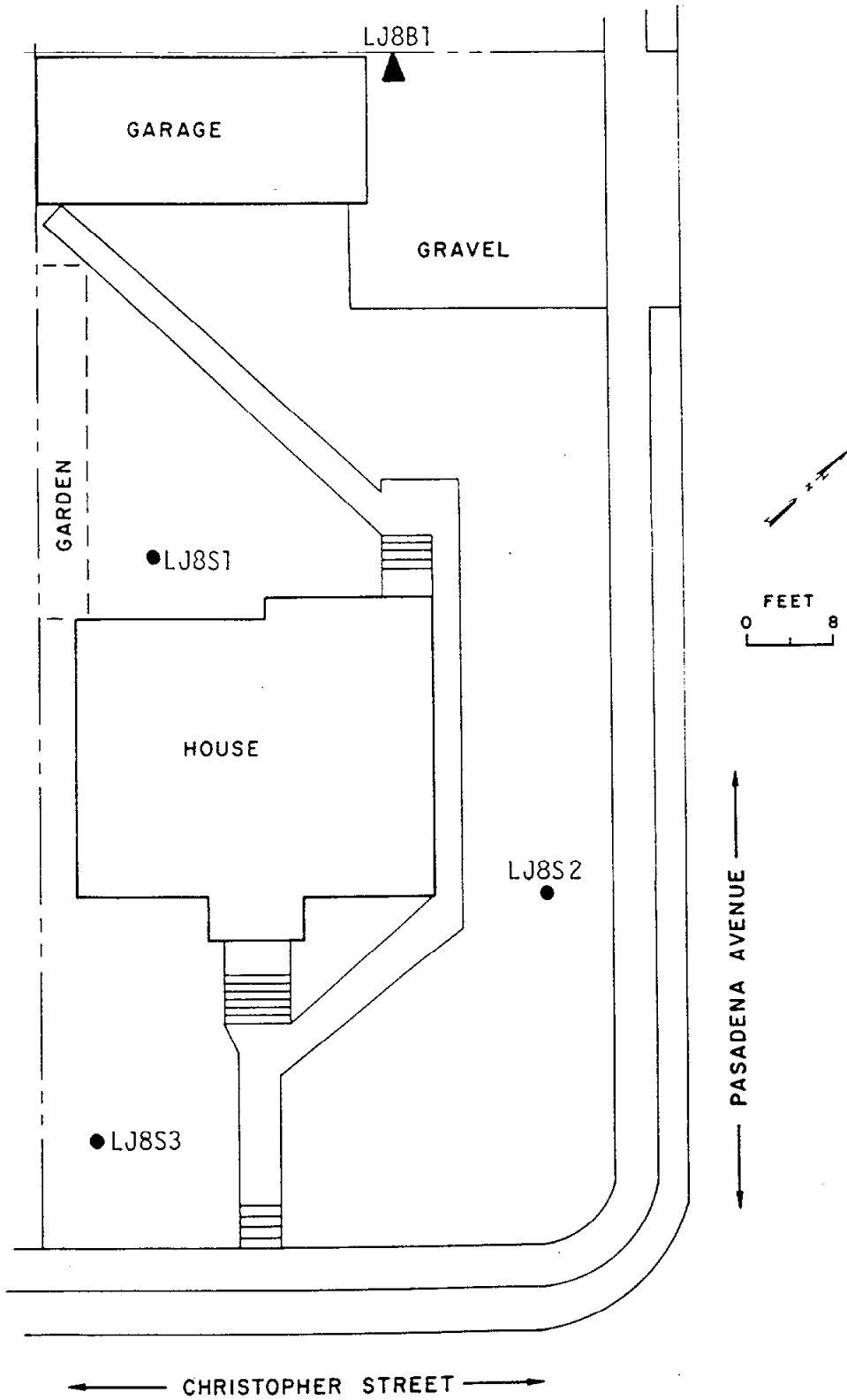


Fig. 1. Diagram showing locations of soil samples taken at 75 Christopher Street.

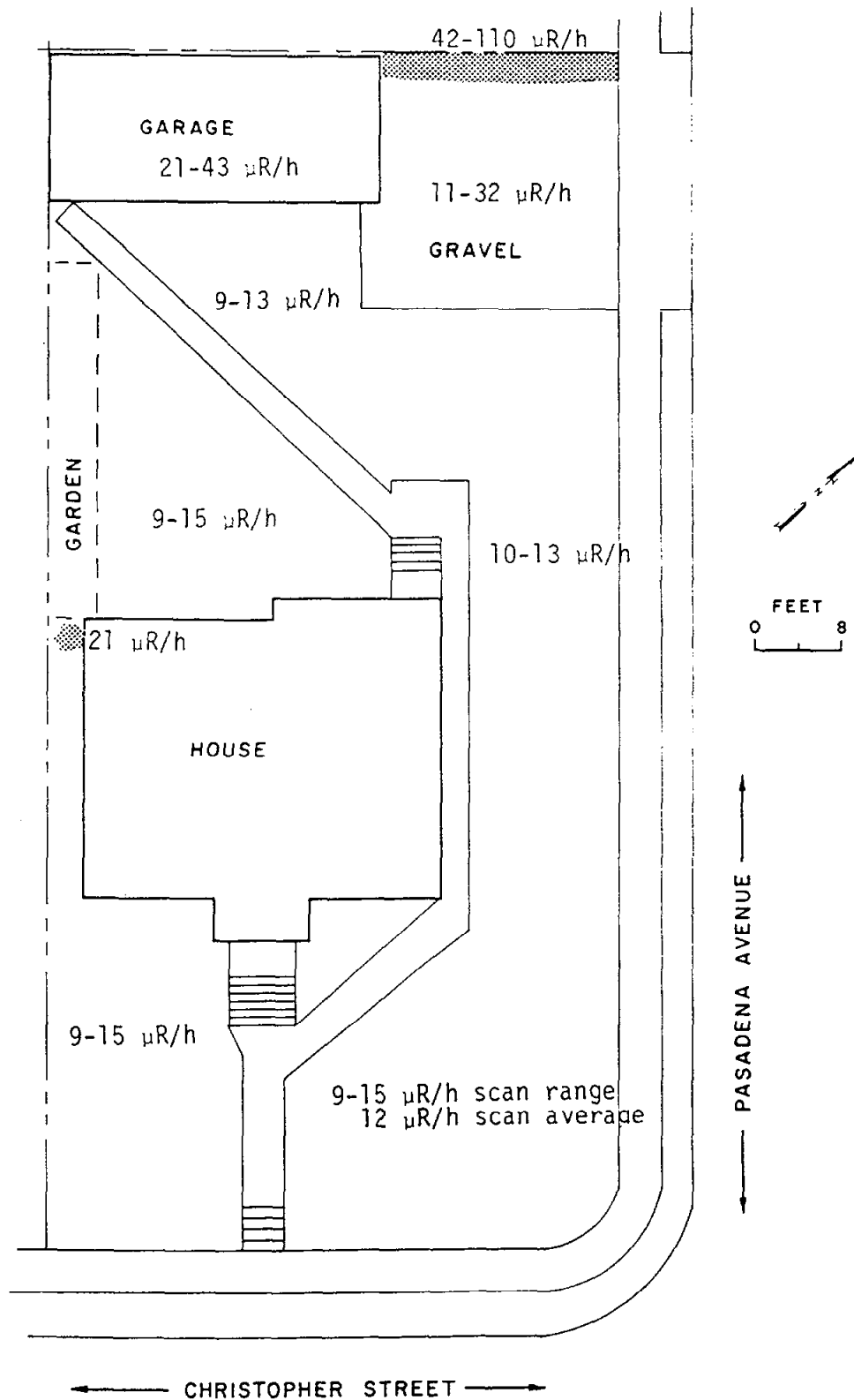


Fig. 2. Location of elevated gamma radiation levels at 75 Christopher Street.

Table 1. A summary of proposed applicable radiation guidelines for the FUSRAP program (April 1984).

Mode of exposure	Exposure conditions	Guideline value	Guideline source
1. External gamma radiation	Continuous exposure to individual in general population (whole body)	60 μ R/h	Nuclear Regulatory Commission (NRC) - Standards for Protection Against Radiation (10 CFR 20.105)
2. Radionuclide concentrations in soil	Maximum permissible concentration of the following radionuclides in soil above background levels averaged over 100 m ² area	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.	DOE Interim Residual Contamination and Waste Control Guidelines for FUSRAP and SFMP Sites (April 1984)
	^{226}Ra ^{232}Th		

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 ($\mu\text{R}/\text{h}$)	8a
Concentration of radionuclides in soil (pCi/g)	
^{232}Th	0.9b
^{238}U	0.9b
^{226}Ra	0.9b

^aReference 4.

^bReference 5.

Table 3. Results of soil sample analyses at property LJ008.

Sample ^a	Depth (cm)	Radionuclide concentration (pCi/g)		
		²²⁶ Ra ^b	²³² Th	²³⁸ U ^c
<u>Systematic samples</u>				
LJ8S1	0 - 15	4.2 ± 0.1	1.2 ± 0.3	2.8
LJ8S2	0 - 15	1.7 ± 0.2	<0.10	1.2
LJ8S3	0 - 15	1.6 ± 0.1	0.79 ± 0.3	6.8
<u>Biased samples^d</u>				
LJ8B1A	0 - 10	13 ± 0.6	0.73 ± 0.4	3.2
LJ8B1B	10 - 20	170 ± 3	<1.3	55
LJ8B1C	20 - 30	120 ± 3	<0.90	33

^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 $\pm 3\%$ (95% confidence level).

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