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Formerly Utilized Sites Remedial Action Program (FUSRAP)

ADMINISTRATIVE RECORD

for the Maywood Site, New Jersey



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of Engineers®**

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Health and Safety Research Division

RESULTS OF THE RADIOLOGICAL SURVEY AT
35 PASADENA AVENUE (LJ009), 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

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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 35 Pasadena Avenue.	4
2	Elevated gamma radiation levels measured at 35 Pasadena Avenue.	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 35 Pasadena Avenue.	8

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INTRODUCTION

At the request of the Department of Energy (DOE), a radiological survey of 35 Pasadena Avenue, Lodi, New Jersey, was conducted by Oak Ridge National Laboratory (ORNL) on August 23, 1984. The access agreement was signed by the building landlord who resides at 83 Christopher Street. 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, do these radioactive materials occur in excess of remedial action guidelines established by DOE. 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

* 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.

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 (LJ9S) and biased (LJ9B) samples are shown in Fig. 1, with results of laboratory analyses provided in Table 3. Concentrations of ^{238}U exceeded the background concentrations of ^{238}U anticipated for northern New Jersey in two of the biased soil samples collected (LJ9B1B and LJ9B1C). These results indicate that ^{238}U -bearing material exists on this site. Sample LJ9B1C was a sandstone type rock (31.5 g) with yellow streaks on one side. This material, resembling a naturally occurring ore sample, was collected at a depth of 15 cm below the ground surface. Concentrations of ^{238}U and ^{226}Ra in this sample were 8600 pCi/g (2.6% by weight) and 5400 pCi/g, respectively.

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. Locations and exposure rates are shown in Fig. 2. These results locate areas where ^{238}U -bearing material exists. Gamma exposure rate levels up to 43 $\mu\text{R}/\text{h}$ exist on this property, and levels up to 86 $\mu\text{R}/\text{h}$ exist in the adjacent road (Pasadena Avenue).

SUMMARY

Measurements taken at 35 Pasadena Avenue indicate that the property contains radioactive contamination primarily from the ^{238}U decay chain. This material is found in the locations shown in Fig. 2. The ratios of ^{238}U to ^{226}Ra are indicative of natural uranium ore, but the origin of the material is not known. Further investigation may be required to determine if this uraniferous material is an outcrop of uranium ore material which is native to this area in northern New Jersey.

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

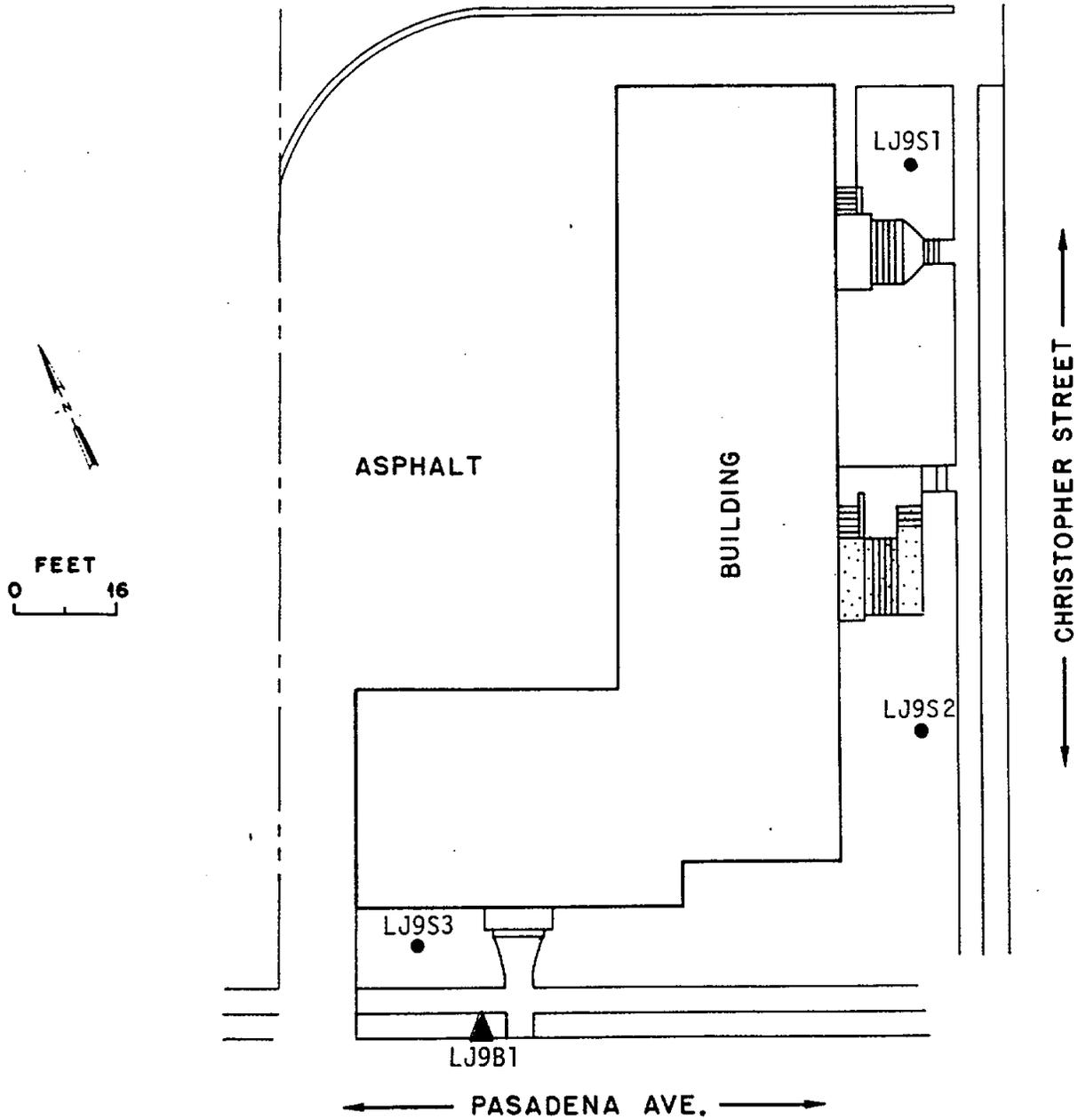


Fig. 1. Diagram showing locations of soil samples taken at 35 Pasadena Avenue.

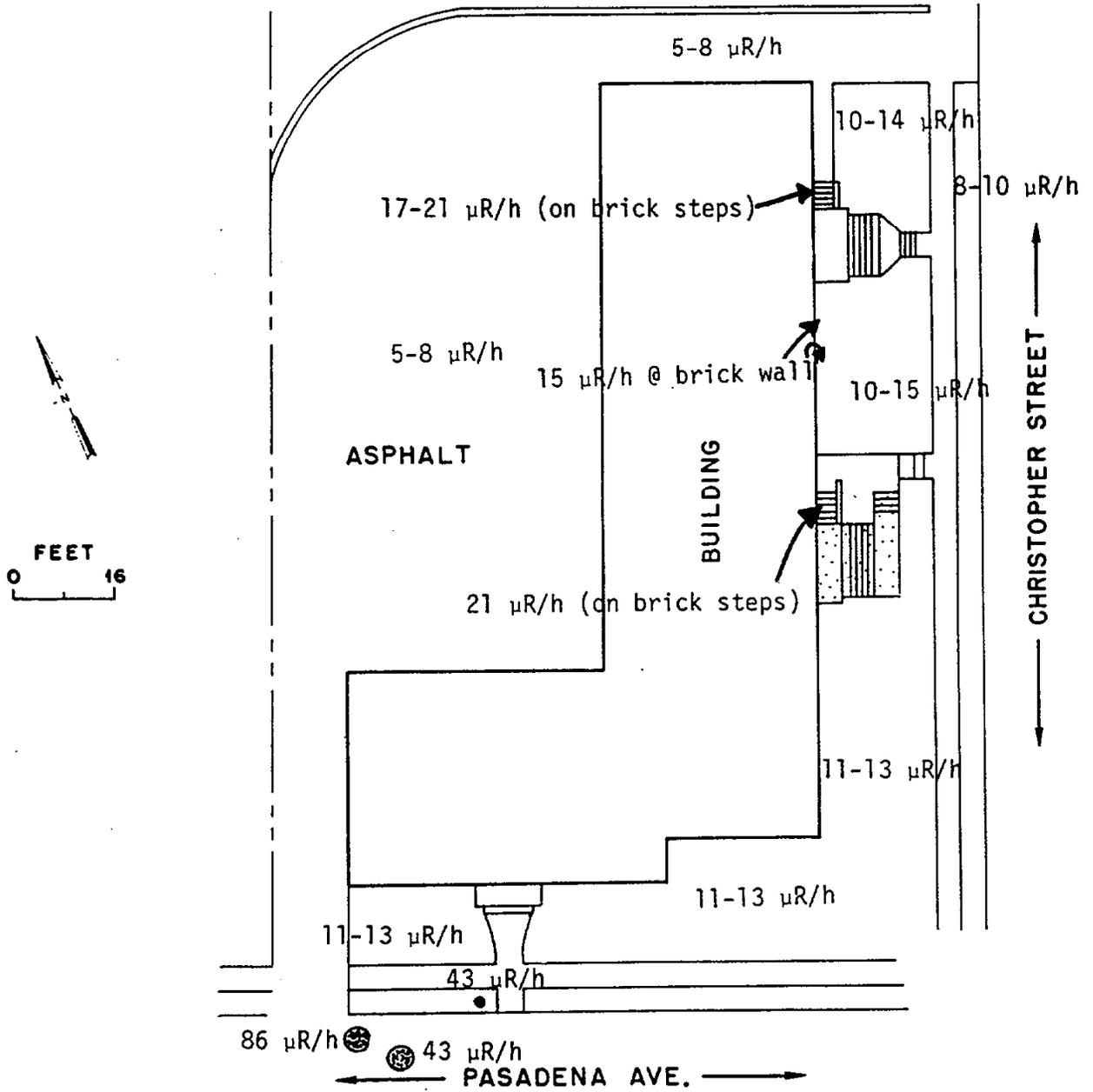


Fig. 2. Elevated gamma radiation levels measured at 35 Pasadena Avenue.

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 ($\mu\text{R/h}$)	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. Results of soil sample analyses at property LJ009.

Sample ^a	Depth (cm)	Radionuclide concentration (pCi/g)		
		²²⁶ Ra ^b	²³² Th	²³⁸ U ^c
<u>Systematic samples</u>				
LJ9S1	0 - 10	2.0 ± 0.2	1.1 ± 0.4	1.1
LJ9S2	0 - 10	0.82 ± 0.08	0.93 ± 0.9	1.0
LJ9S3	0 - 10	1.2 ± 0.2	1.1 ± 0.4	1.1
<u>Biased samples^d</u>				
LJ9B1A	0 - 10	4.7 ± 0.3	0.76 ± 0.4	2.5
LJ9B1B	10 - 20	54 ± 0.8	<0.81	120
LJ9B1C	15 cm	5400 ± 450	<300	8600

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

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

^cTotal 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.