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Health and Safety Research Division**RESULTS OF THE RADIOLOGICAL SURVEY AT
58 TRUDY DRIVE (LJ004), 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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58 TRUDY DRIVE (LJ004), LODI, NEW JERSEY**

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RESULTS OF THE RADIOLOGICAL SURVEY AT
58 TRUDY DRIVE, LODI, NEW JERSEY*

INTRODUCTION

At the request of the Department of Energy (DOE), a radiological survey of 58 Trudy Drive, Lodi, New Jersey, was conducted by Oak Ridge National Laboratory (ORNL) on August 21, 1984. 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 at ground surface; background radiation levels have not been subtracted. Similarly, background concentrations have not been subtracted from radionuclide concentrations

* 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.

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 (LJ4S) and biased (LJ4B) samples are shown in Fig. 1, with results of laboratory analyses provided in Table 3. Concentrations of ^{232}Th exceeded the background concentrations of ^{232}Th anticipated for northern New Jersey in the systematic soil samples (LJ4S2 and LJ4S3) and biased samples (LJ4B1 and LJ4B2) collected at 58 Trudy Drive. These results indicate that ^{232}Th -bearing residues exist on this site. The amount of material present appears to be in excess of DOE guidelines (Table 1).

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 suggest locations of potential ^{232}Th contamination. Gamma exposure rate levels up to 53 $\mu\text{R}/\text{h}$ exist on the ground surface at this property.

SUMMARY

Measurements taken at 58 Trudy Drive indicate that the property contains radioactive contamination primarily from the ^{232}Th decay chain, and to a lesser extent from the ^{238}U decay chain. This material is found in the locations shown in Fig. 2. Concentrations of radionuclides significantly above background and in excess of DOE guidelines were measured in some areas on this property, but because of the limited scope of this survey, it is recommended that a comprehensive radiological survey be performed at this site to delineate the extent of contamination to plan any necessary remedial action.

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/HQ, 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 samples

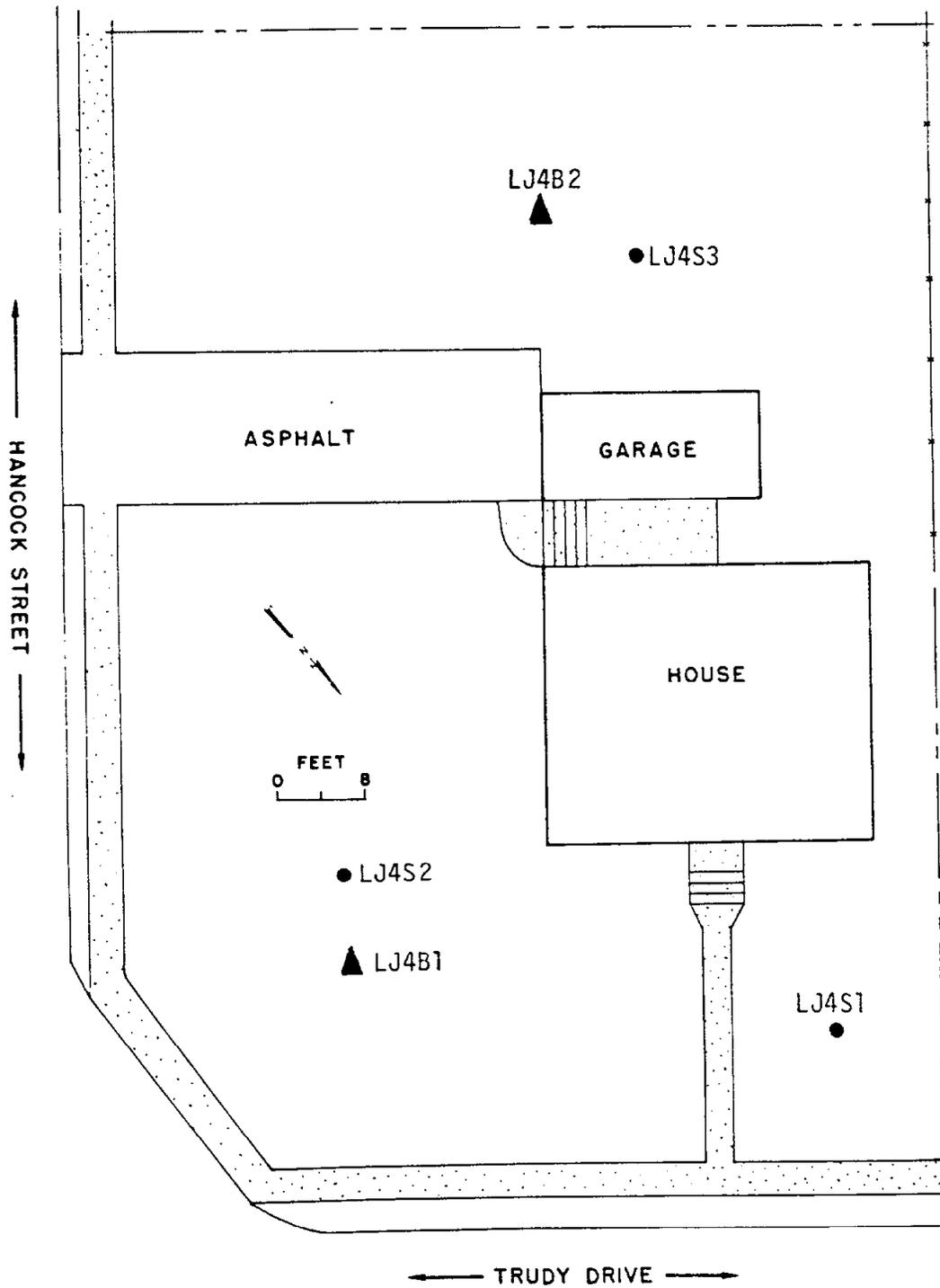


Fig. 1. Diagram showing locations of soil samples taken at 58 Trudy Drive.

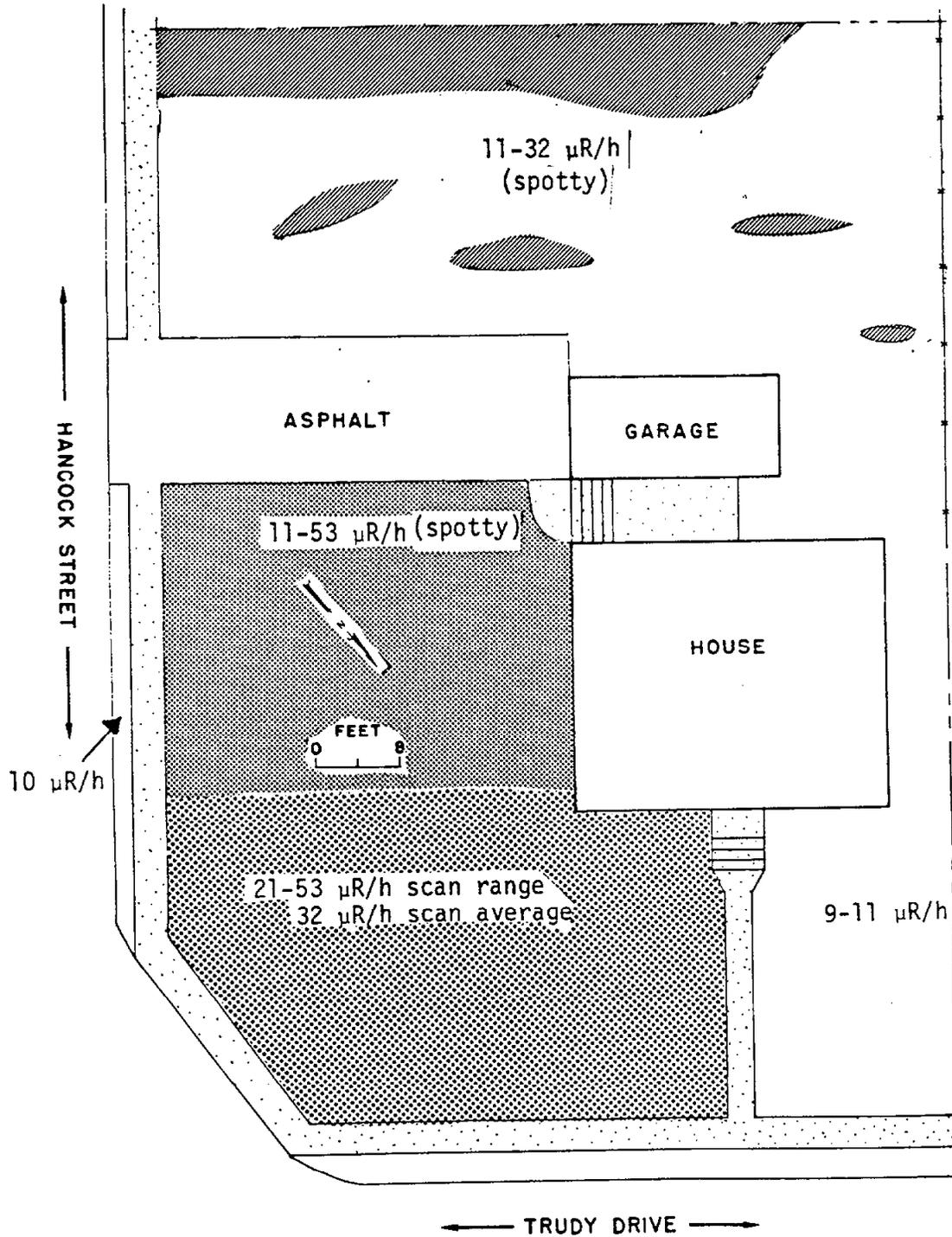


Fig. 2. Location of elevated gamma radiation levels at 58 Trudy Drive.

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 LJ004.

Sample ^a	Depth (cm)	Radionuclide concentration (pCi/g)		
		²²⁶ Ra ^b	²³² Th	²³⁸ Uc
<u>Systematic samples</u>				
LJ4S1	0 - 15	0.87 ± 0.1	1.2 ± 0.3	0.88
LJ4S2	0 - 15	4.6 ± 0.2	20 ± 5	8.6
LJ4S3	0 - 10	2.8 ± 0.3	12 ± 3	5.2
<u>Biased samples^d</u>				
LJ4B1A	0 - 10	5.2 ± 0.6	30 ± 7	9.6
LJ4B1B	10 - 20	3.5 ± 0.4	18 ± 4	6.2
LJ4B2A	0 - 10	2.2 ± 0.3	8.6 ± 3	3.7
LJ4B2B	10 - 18	2.8 ± 0.4	12 ± 3	5.0

^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.