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RESULTS OF THE RADIOLOGICAL SURVEY AT 10 CHARLES COURT (LJ017), LODI, NEW JERSEY

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MARTIN MARIETTA ENERGY SYSTEMS, INC.
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HEALTH AND SAFETY RESEARCH DIVISION

Nuclear and Chemical Waste Programs
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RESULTS OF THE RADIOLOGICAL SURVEY AT 10 CHARLES COURT (LJ017), LODI, NEW JERSEY

R. W. Doane

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RADIOLOGICAL SURVEY ACTIVITIES PROGRAM

Prepared by the
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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 (LJ17S) and biased (LJ17B) 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 the systematic samples. However, concentrations of uranium and radium were elevated above background levels in both biased soil samples. These samples were removed from the points of maximum gamma measurements and ranged from 3.5 pCi/g to 14 pCi/g of ^{238}U and 14 pCi/g to 38 pCi/g of ^{226}Ra. Concentrations of ^{232}Th were within normal background levels in both biased samples. The samples taken below the surface resembled a reddish shale-like material with no ore-like characteristics. Concentrations of ^{226}Ra exceeded those for ^{238}U, but it is believed to be naturally-occurring material.

Gamma Radiation Levels

Results of the gamma scan of the surface of the property showed gamma exposure rates in excess of background radiation levels. Locations and exposure rates are shown in Fig. 2. These results locate areas where ^{238}U-bearing materials exists. Gamma exposure rates up to 30 μR/h exist on the surface of this property.

SUMMARY

Measurements taken at 10 Charles Court indicate that the property contains radioactive contamination primarily from the ^{238}U decay chain. This material was found in the locations shown in Fig. 2. While the ratios of ^{238}U to ^{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.

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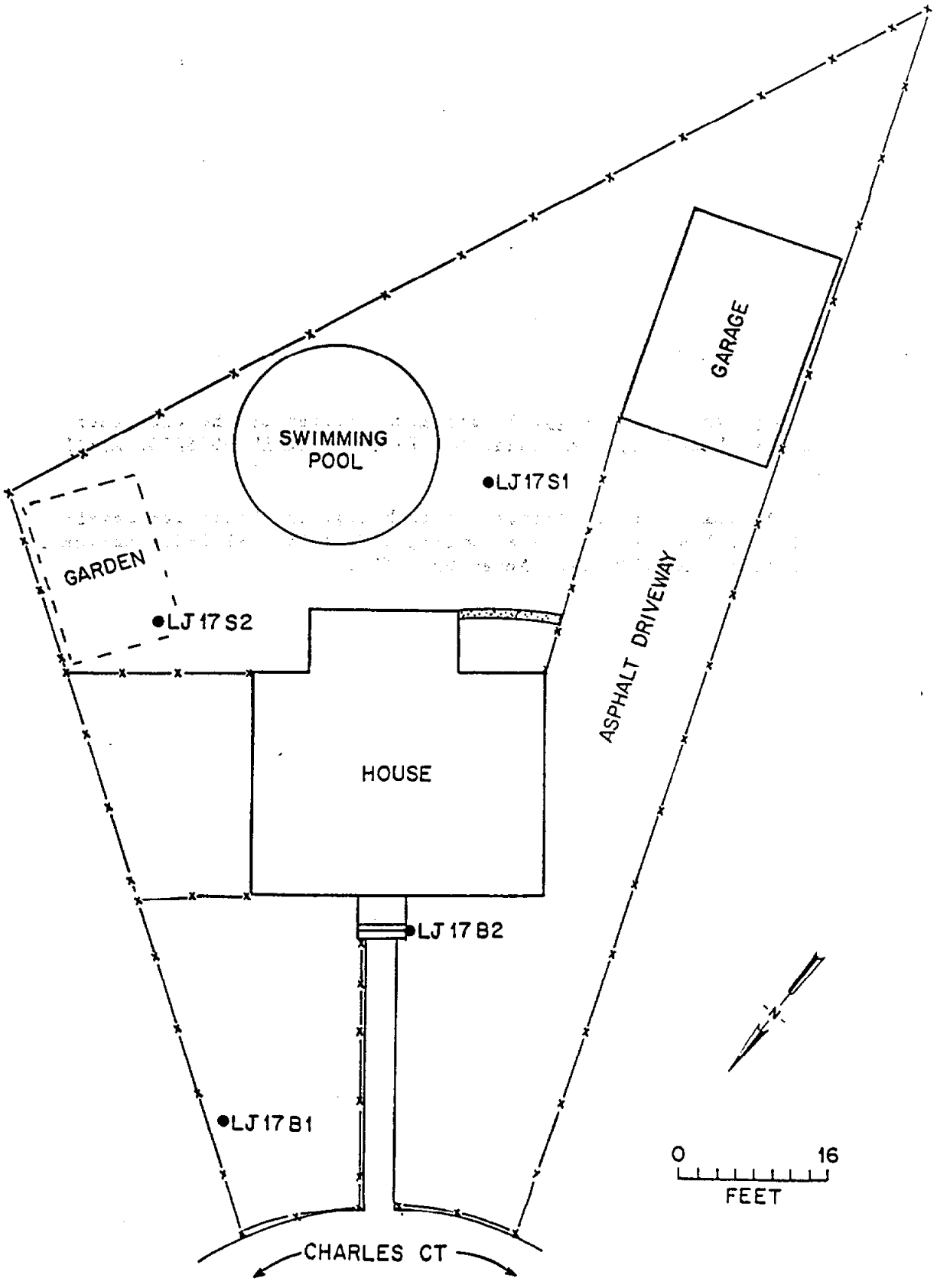

Fig. 1. Diagram showing locations of soil samples taken at 10 Charles Court, Lodi, New Jersey.

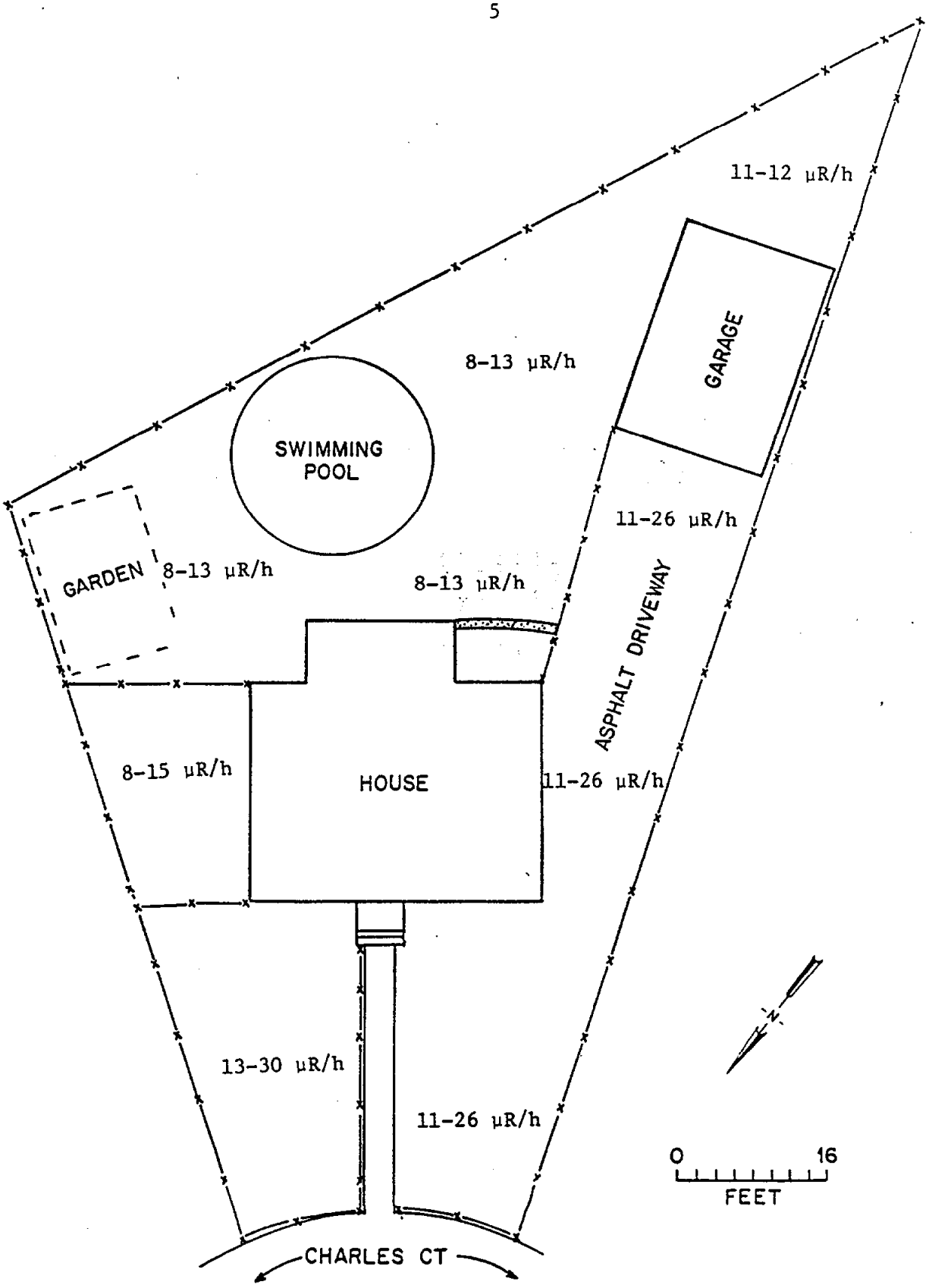

Fig. 2. Gamma radiation levels measured at 10 Charles Court, Lodi, New Jersey.

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 μR/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		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)
		^{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	

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 (μR/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]

[a]Reference 4.
[b]Reference 5.

Table 3. Concentrations of radionuclides in soil at 10 Charles Court, Lodi, New Jersey.

Sample[a]	Depth (cm)	Radionuclide concentration (pCi/g)		
		^{226}Ra[b]	^{232}Th[b]	^{238}U[c]
	Systematic samples			
LJ17S1	0 - 15	1.0 ± 0.1	0.95 ± 0.5	0.91
LJ17S2	0 - 15	1.6 ± 0.1	0.88 ± 0.3	1.3
	Biased samples[d]			
LJ17B1A	0 - 10	14 ± 0.4	1.2 ± 0.8	3.5
LJ17B1B	10 - 20	18 ± 0.6	1.3 ± 0.8	4.3
LJ17B2A	0 - 15	26 ± 0.4	1.2 ± 0.4	11
LJ17B2B	15 - 25	38 ± 0.8	1.4 ± 0.6	14

[a]Locations of soil samples are shown on Fig. 1.

[b]Indicated counting error is at the 95% confidence level (± 2 σ).

[c] Total analytical error of measurement results is less than ± 5% (95% confidence level).

[d]Biased samples are taken from areas shown to have elevated gamma exposure rates.

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