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Formerly Utilized Sites Remedial Action Program (FUSRAP)

ADMINISTRATIVE RECORD

for the Maywood Site, New Jersey



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**RESULTS OF THE
INDEPENDENT RADIOLOGICAL
VERIFICATION SURVEY**

**AT
86 PARK WAY, ROCHELLE PARK,
NEW JERSEY (MJ02L)**

M. G. Yalcintas
C. A. Johnson

OPERATED BY
MARTIN MARIETTA ENERGY SYSTEMS, INC.
FOR THE UNITED STATES
DEPARTMENT OF ENERGY

ORNL/RASA-86/41
(MJ02L)

HEALTH AND SAFETY RESEARCH DIVISION

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AT
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RADIOLOGICAL SURVEY ACTIVITIES PROGRAM

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CONTENTS

	Page
LIST OF FIGURES	v
LIST OF TABLES	vii
ACKNOWLEDGMENTS	ix
INTRODUCTION	1
PROCEDURES	2
Objectives	2
Document Reviews	2
VERIFICATION SURVEY AND ANALYSIS	2
Gamma Measurements	3
Soil Sampling	3
CONCLUSION	4
REFERENCES	5

LIST OF FIGURES

Figure		Page
1	Vicinity properties in the Rochelle Park, New Jersey, area	6
2	Diagram showing grid point and grid block locations outdoors on the property at 86 Park Way, Rochelle Park, New Jersey (MJ02L)	7
3	Locations of soil samples on the property at 86 Park Way, Rochelle Park, New Jersey (MJ02L)	8

LIST OF TABLES

Table		Page
1	Summary of residual contamination guidelines for the Rochelle Park, New Jersey, site	9
2	Background radiation levels in the Rochelle Park, New Jersey, area	11
3	Results and locations of the pressurized ionization chamber (PIC) measurements at 86 Park Way, Rochelle Park, New Jersey (MJ02L)	11
4	Results of soil sample analysis at 86 Park Way, Rochelle Park, New Jersey (MJ02L)	12

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CONCLUSION

Measurements of the gamma exposure levels taken from the excavated area before backfilling determined that the exposure rate at 1 m above the ground surface averaged 10 $\mu\text{R}/\text{h}$. For comparison, the background for the state of New Jersey^{7,8,9} averages $\sim 8 \mu\text{R}/\text{h}$ and ranges from 6 to 11 $\mu\text{R}/\text{h}$ based on 1968 measurements. The results of soil radionuclide analyses for ^{238}U , ^{226}Ra , and ^{232}Th show that all soil concentration measurements are within the limits prescribed by DOE radiological guidelines.¹⁰

Based upon the results of the post-remedial action data, which were confirmed by the verification survey data, soil concentration measurements fall well below the limits prescribed by DOE radiological guidelines established for this site. It is concluded that the site successfully meets the DOE remedial action objectives.

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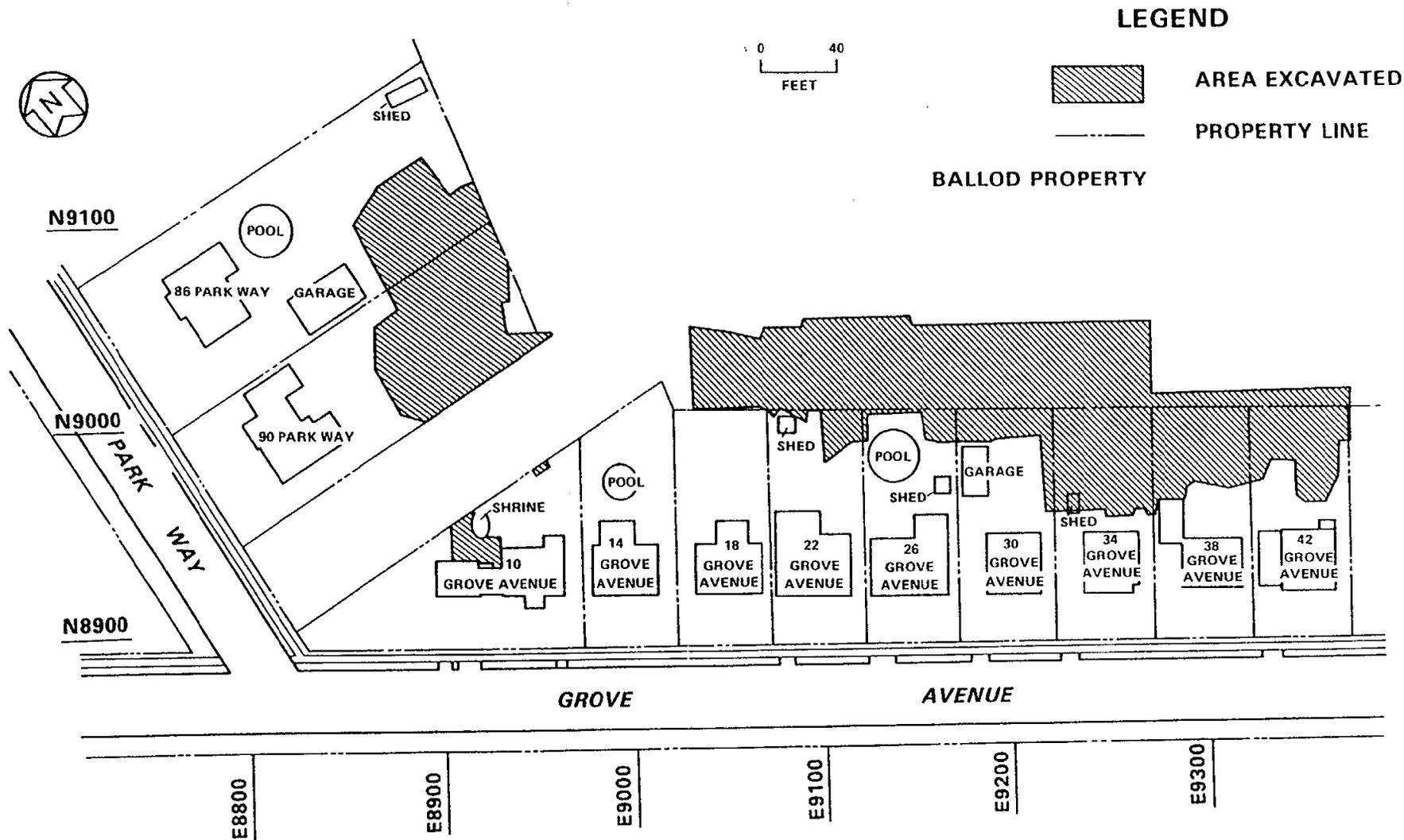


Fig. 1. Vicinity properties in the Rochelle Park, New Jersey, area.

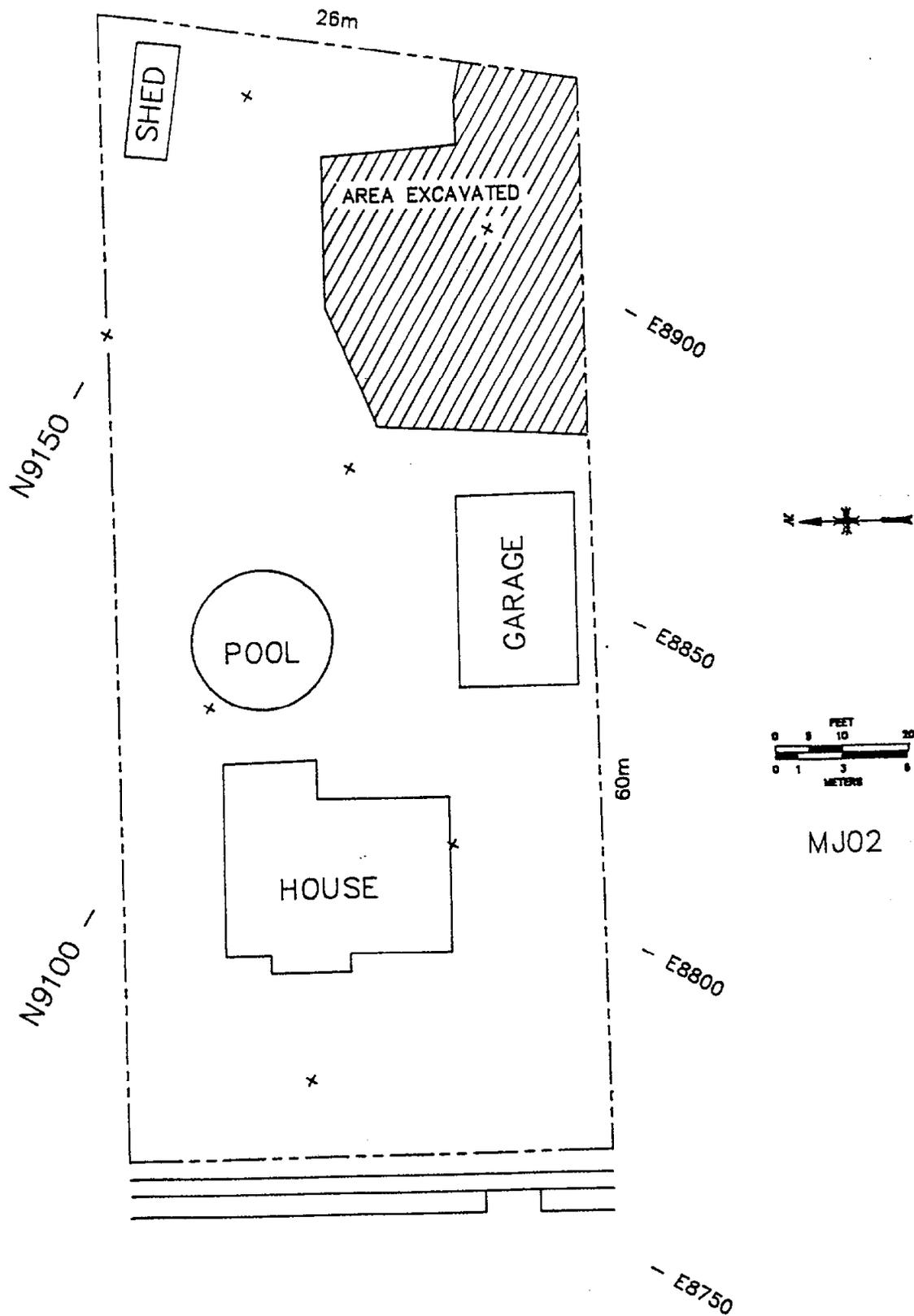


Fig. 2. Diagram showing grid point and grid block locations outdoors on the property at 86 Park Way, Rochelle Park, New Jersey (MJ02L).

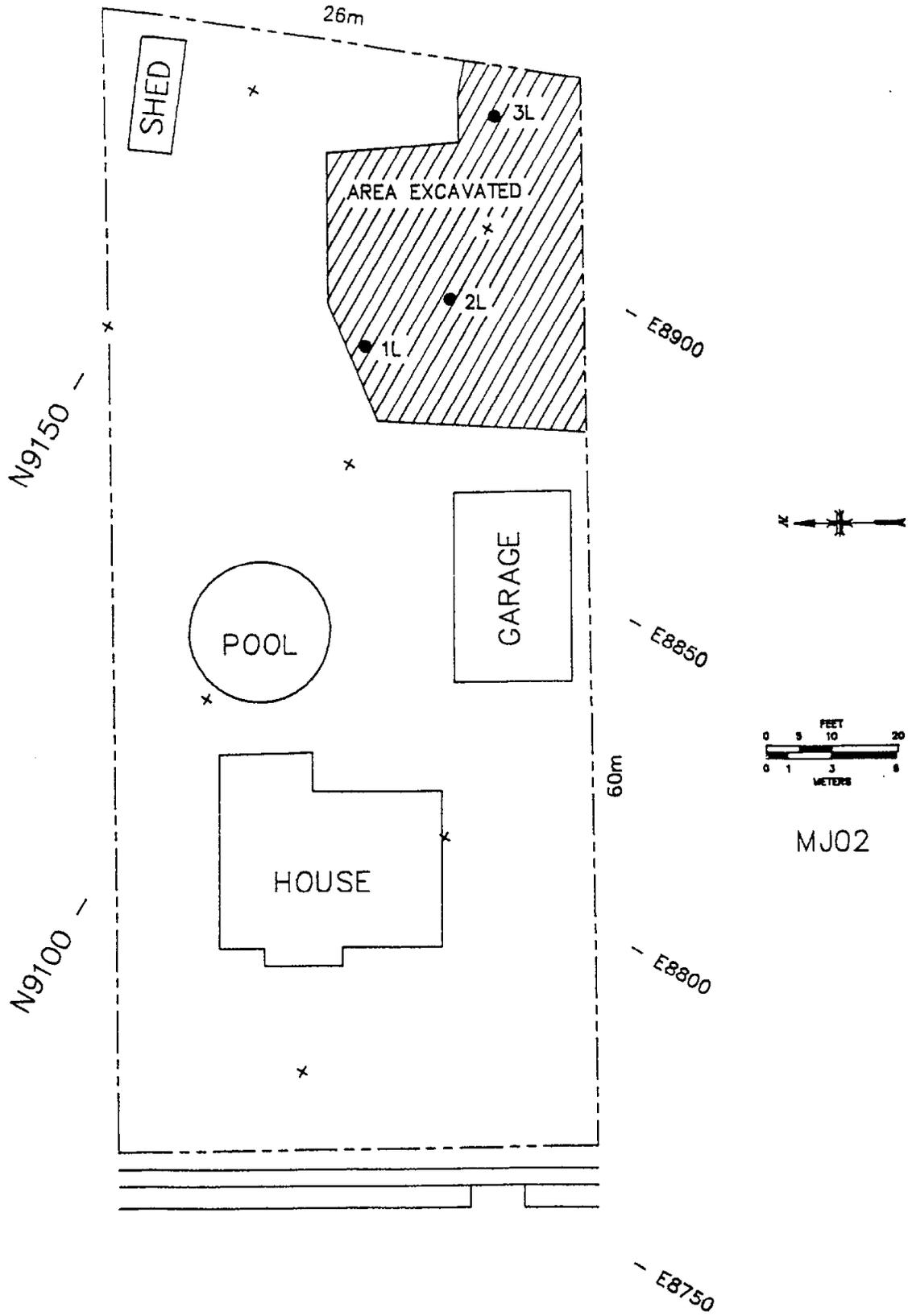


Fig. 3. Locations of soil samples on the property at 86 Park Way, Rochelle Park, New Jersey (MJ02L).

Table 1. Summary of residual contamination guidelines
for the Rochelle Park, New Jersey, site

Soil (Land) Guidelines (Maximum Limits for Unrestricted Use)	
Radionuclide	Soil concentration (pCi/g) above background ^{a,b,c}
²²⁶ Ra ²²⁸ Ra ²³⁰ Th ²³² Th	5 pCi/g, averaged over the first 15 cm of soil below the surface; 15 pCi/g when averaged over any 15-cm-thick soil layer below the surface layer
Other radionuclides	Soil guidelines will be calculated on a site-specific basis using the DOE manual developed for this use

Structure Guidelines (Maximum Limits for Unrestricted Use)

Indoor Radon Decay Products

For ²²²Ra and ²²⁰Rn concentrations in buildings, the average annual radon decay product concentration (including background) due to uranium or thorium by-products should not exceed 0.02 WL after remedial action. When remedial action has been performed and it would be unreasonably difficult and costly to reduce the level below 0.03 WL, the remedial action may be terminated, and the reasons for termination should be documented. Remedial action shall be undertaken for any building that exceeds an annual average radon decay product concentration (including background) of 0.03 WL.

Indoor Gamma Radiation

The indoor gamma radiation after decontamination shall not exceed 20 microrentgen per hour (20 μ R/h) above background in any occupied or habitable building.

Indoor/Outdoor Structure Surface Contamination

Radionuclide ^e	Allowable Surface Residual Contamination ^d (dpm/100 cm ²)		
	Average ^{f,g}	Maximum ^f	Removable ^f
Transuranics, ²²⁶ Ra, ²²⁸ Ru, ²³⁰ Th, ²²⁸ Th, ²³¹ Pa, ²²⁷ Ac, ¹²⁵ I, ¹²⁹ I	100	300	20
Natural Th, ²³² Th, ⁹⁰ Sr, ²²³ Ra, ²²⁴ Ra, ²³² U, ¹²⁶ I, ¹³¹ I, ¹³³ I	1,000	3,000	200
Natural U, ²³⁵ U, ²³⁸ U, and associated decay products	5,000	15,000	1,000

Table 1 (continued)

Radionuclide ^e	Indoor/Outdoor Structure Surface Contamination		
	Allowable Surface Residual Contamination ^d (dpm/100 cm ²)		
	Average ^{f,g}	Maximum ^f	Removable ^f
Beta-gamma emitters (radionuclides with decay modes other than alpha emission or spontaneous fission) except ⁹⁰ Sr and others noted above	5,000	15,000	1,000

^aIn the event of occurrence of mixtures of radionuclides, the fraction contributed by each radionuclide to its limit shall be determined, and the sum of these fractions shall not exceed 1.

^bThese guidelines represent unrestricted-use residual concentrations above background averaged across any 15-cm thick layer to any depth and over any contiguous 100-m² surface area.

^cLocalized concentrations in excess of these limits are allowable provided that the average over 100 m² is not exceeded.

^dAs used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

^eWhere surface contamination by both alpha- and beta-gamma-emitting radionuclides exists, the limits established for alpha- and beta-gamma-emitting radionuclides shall apply independently.

^fMeasurements of average contaminant should not be averaged over more than 1 m². For objects of less surface area, the average shall be derived for each such object.

^gThe average and maximum radiation levels associated with surface contamination resulting from beta-gamma emitters should not exceed 0.2 mrad/h at 1 cm and 1.0 mrad/h at 1 cm, respectively, measured through not more than 7 mg/cm² of total absorber.

Table 2. Background radiation levels in the Rochelle Park, New Jersey, area

Type of radiation measurement or sample	Radiation level or radionuclide concentration	
	Range	Average
Gamma exposure rate at 1 m above floor or ground surface ($\mu\text{R}/\text{h}$) ^a	8-11	9
Concentration of radionuclides in soil (pCi/g) ^b		
²³⁸ U	0.13-1.4	0.86
²²⁶ Ra	0.24-1.4	0.87
²³² Th	0.31-1.5	0.9

^aValues obtained from 35 locations in the Rochelle Park area.⁸

^bSoil samples obtained from locations around the Maywood area.⁶

Table 3. Results and locations of the pressurized ionization chamber (PIC) measurements at 86 Park Way, Rochelle Park, New Jersey (MJ02L)^a

Coordinates		Gamma exposure rate ($\mu\text{R}/\text{h}$)
East	North	
8880	9080	10
8880	9110	10
8895	9095	10
8925	9095	10

^aRef. 4.

Table 4. Results of soil sample analysis at 86 Park Way,
Rochelle Park, New Jersey (MJ02L)

Sample	Location ^a		Depth (cm)	Radionuclide concentration (pCi/g)		
	East	North		²²⁶ Ra ^b	²³² Th ^c	²³⁸ U ^d
Systematic Samples^e						
1L	8875	9115	15-30	0.83 ± 0.05 (1.1) ^f	3.3 ± 0.1 (3.5) ^f	0.6 (<5) ^f
2L	8885	9100	15-30	0.89 ± 0.09 (0.8) ^f	1.8 ± 0.1 (2.5) ^f	1.9 ± 0.9 (<5) ^f
3L	8920	9115	30-45	0.89 ± 0.08 (1.0) ^f	2.2 ± 0.1 (1.9) ^f	0.73 ± 0.9 (<5) ^f

^aLocations of soil samples are shown on Fig. 3.

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

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

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

^eSystematic samples are taken at grid locations irrespective of gamma exposure.

^fBNI results are shown in parentheses.

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