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Formerly Utilized Sites Remedial Action Program (FUSRAP)

ADMINISTRATIVE RECORD

for Maywood, New Jersey



U.S. Department of Energy



Department of Energy
Washington, DC 20585

NOV 16 1980

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Mr. and Mrs. Brian P. Nugent
441 Central Avenue
Hackensack, New Jersey 07601

Dear Mr. and Mrs. Nugent:

With your consent, the U.S. Department of Energy (DOE) requested that Oak Ridge National Laboratory (ORNL) perform a radiological survey of your home. I have received the enclosed letter report with the results of the survey.

A number of samples and measurements were taken during the course of the survey. Normal background levels of radiation and concentrations of radioactive elements were found in the soil of the yard and in the fill underneath the sun room. Slightly elevated radiation levels and concentrations of radium, thorium, and uranium were identified in a sample of the cinder block used in the construction of the garage. Slightly elevated levels of direct radiation were also measured in contact with some of the cinder block in other portions of the house.

The slightly elevated levels of radium in the cinder block may be the source of the radon levels that you have observed. However, the radium in the cinder block does not have a connection with the Maywood Chemical Works, and it cannot be addressed as part of DOE's Formerly Utilized Sites Remedial Action Program.

I appreciate very much your interest in DOE. If you have any questions, or if I can assist you further, please call me at 301-903-8149.

Sincerely,

A handwritten signature in black ink, appearing to read "W. Alexander Williams".

W. Alexander Williams, PhD
Designation and Certification Manager
Division of Off-Site Programs
Office of Eastern Area Programs
Office of Environmental Restoration

Enclosure

cc:
S. Cange, Oak Ridge
M. Murray, ORNL
L. Woods, DOE Maywood Information Center

OAK RIDGE NATIONAL LABORATORY
MANAGED BY MARTIN MARIETTA ENERGY SYSTEMS, INC.
FOR THE U.S. DEPARTMENT OF ENERGY

POST OFFICE BOX 2008
OAK RIDGE, TENNESSEE 37831

November 8, 1993

Dr. W. A. Williams
Department of Energy
Trevion II Building
EM-421
Washington, D. C. 20585-0002

Dear Dr. Williams:

Transmittal of Radiological Survey Results for 441 Central Avenue, Hackensack, New Jersey

Enclosed are the results of the radiological survey conducted at 441 Central Avenue, Hackensack, New Jersey. These results will not be published in a formal report unless requested by the Department of Energy (DOE). Please call if there are any questions concerning this survey.

Sincerely,



Michael E. Murray
Measurement Applications
and Development Group

MEM:ec

Enclosure 1

c: W. D. Cottrell
R. D. Foley

RADIOLOGICAL SURVEY RESULTS AT 441 CENTRAL AVENUE, HACKENSACK, NEW JERSEY (MJ053)*

This report describes the radiological survey of the private residential property at 441 Central Avenue, Hackensack, New Jersey, conducted by the Oak Ridge National Laboratory (ORNL) at the request of the Department of Energy (DOE), Office of Environmental Restoration.

The house at 441 Central Avenue is a single family dwelling with a garage connected to the house by a sun porch. The house has a full basement whose cinder block walls support the house. The garage is also constructed of cinder blocks. The floors in both the basement and garage are concrete. The owner of the property had expressed concern over elevated radon levels in his basement and the possibility that the fill underneath the sun porch may have come from contaminated soil at the nearby former Maywood Chemical Works (MCW) in Maywood, New Jersey.

A scoping survey of the property was conducted on May 10, 1993 by ORNL's Measurement Applications and Development Group. The purpose of the survey was to determine the nature and extent of any radiological contamination on the property. The results of this survey will be considered in the designation of this property for possible inclusion in FUSRAP.

A field survey drawing indicating areas of elevated radiation measurements and radiological results is included in this report as Fig. 1.

Scope of the Survey

A comprehensive description of the survey methods and instrumentation used in this survey is given in *Procedures Manual for the ORNL Radiological Survey Activities (RASA) Program*, ORNL/TM-8600 (April 1987).

The radiological survey included: (1) a surface gamma scan of the floors of the attached sun porch, basement, and garage and the grounds outside the house, including all grassy and graveled areas and the sidewalks; (2) discrete beta-gamma scans of the floor inside the sun porch, basement, front porch, and around the outside foundations of the house and garage; and (3) collection of concrete structural material and surface and subsurface soil samples for analysis.

Gamma radiation levels were determined using a portable NaI gamma scintillation probe connected to a Victoreen ratemeter. Measurements were recorded and converted to $\mu\text{R/h}$. Because NaI gamma scintillators are energy dependent, measurements of gamma radiation levels in counts per minute (CPM) are normalized to pressurized ionization chamber (PIC) measurements to estimate gamma exposure rates in $\mu\text{R/h}$. Using a Geiger-Mueller pancake detector, beta-gamma radiation levels in cpm were measured over surfaces outdoors and some floor surfaces indoors, and then converted to mrad/h.

* The survey was performed by members of the Measurement Applications and Development Group of the Health Sciences Research Division at Oak Ridge National Laboratory under DOE contract DE-AC05-84OR21400.

Surface and subsurface soil samples were strategically collected over the property. A concrete sample was also collected from a cinder block in the garage wall. The cinder block is typical of those found in the foundations of the house.

Survey Results

Results of the surface gamma scan over the property are shown in Fig 1. Gamma measurements outside generally ranged from 6-10 $\mu\text{R/h}$ in both the front and back yards, and up to 11 $\mu\text{R/h}$ on contact with the slate walks. Ranges were from 9-13 $\mu\text{R/h}$ around the foundations and inside the sun porch and garage. Indoor gamma radiation limits set by DOE are 20 $\mu\text{R/h}$ above background. A maximum of 15 $\mu\text{R/h}$ was measured in the area outside the sun porch near the back entrance. This elevated gamma reading may be due to the natural activity in the cinder block foundation and the geometric effects of the small area.

Beta gamma dose rates taken around the foundations of the house and garage ranged from 0.01 to a maximum of 0.03 mrad/h. The maximum was measured on the front porch and on the gravel around the front of the garage. DOE guidelines limit the exposure to 0.2 mrad/h/m².

Surface and subsurface soil samples were collected from five areas on the property, two of which were samples obtained by drilling through the floor of the sun porch to the fill material below (S4 and S5). A sample of concrete chips was taken from the northwest corner of the garage just above the garage door.

Results of the soil analyses are shown in Table 1. Ranges for both surface and subsurface soil were from 0.37 to 0.97 pCi/g for ²²⁶Ra, 0.50 to 0.98 pCi/g for ²³²Th, and 0.81 to 1.5 pCi/g for ²³⁸U. All the measurements are comparable to the typical background levels for the northern New Jersey area of 0.9 pCi/g for these radionuclides (T.E. Myrick, et al., ORNL/TM-7343, 1981). However, maximum radium, thorium and uranium levels of 2.5, 2.3, and 2.8 pCi/g, respectively, were found in the cinder block chips taken from the garage (sample M1). This could account for the elevated radon concentrations discovered by the owner.

Conclusions

While some gamma and beta-gamma measurements were slightly above the average for the area, they were well below DOE guidelines. The results of the soil analysis showed that the soil and fill material beneath the sun porch contained normal levels of radionuclides, while the cinder block sample taken from the garage contained slightly elevated concentrations of all three radionuclides. Radon and its progeny are produced as a gas from the radioactive decay of radium, thorium, and uranium. It is therefore probable that the high radon readings inside the basement and sun porch with which the owner was concerned were caused by the cinder blocks used in the construction of the garage and structural foundations on the property. Therefore it is not recommended that this property be included in the FUSRAP program.

Table 1. Concentrations of radionuclides in soil and other materials at 441 Central Avenue, Hackensack, New Jersey. (MJ053)

Sample number ^a	Depth (cm)	Radionuclide concentration (pCi/g) ^b		
		²²⁶ Ra	²³² Th	²³⁸ U
<i>Soil samples</i>				
S1A	0-15	0.76 ± 0.04	0.82 ± 0.07	0.85 ± 0.5
S1B	15-30	0.88 ± 0.03	0.97 ± 0.07	1.5 ± 0.6
S2A	0-15	0.92 ± 0.07	0.85 ± 0.08	1.1 ± 0.6
S2B	15-30	0.97 ± 0.07	0.98 ± 0.07	1.0 ± 0.5
S2C	30-45	0.87 ± 0.04	0.98 ± 0.06	1.2 ± 0.6
S2D	45-60	0.82 ± 0.03	0.92 ± 0.06	1.1 ± 0.5
S3A	0-15	0.81 ± 0.04	0.81 ± 0.07	0.81 ± 0.6
S3B	15-30	0.70 ± 0.07	0.74 ± 0.07	1.2 ± 0.5
S4B ^c	0-20	0.38 ± 0.03	0.51 ± 0.04	0.83 ± 0.4
S5B	0-20	0.37 ± 0.02	0.50 ± 0.04	<0.89
<i>Miscellaneous sample^d</i>				
M1		2.5 ± 0.30	2.3 ± 0.78	2.8 ± 1.1

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

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

^cS4 and S5 are core samples taken under concrete slab.

^dM sample is a cinder block sample from garage.

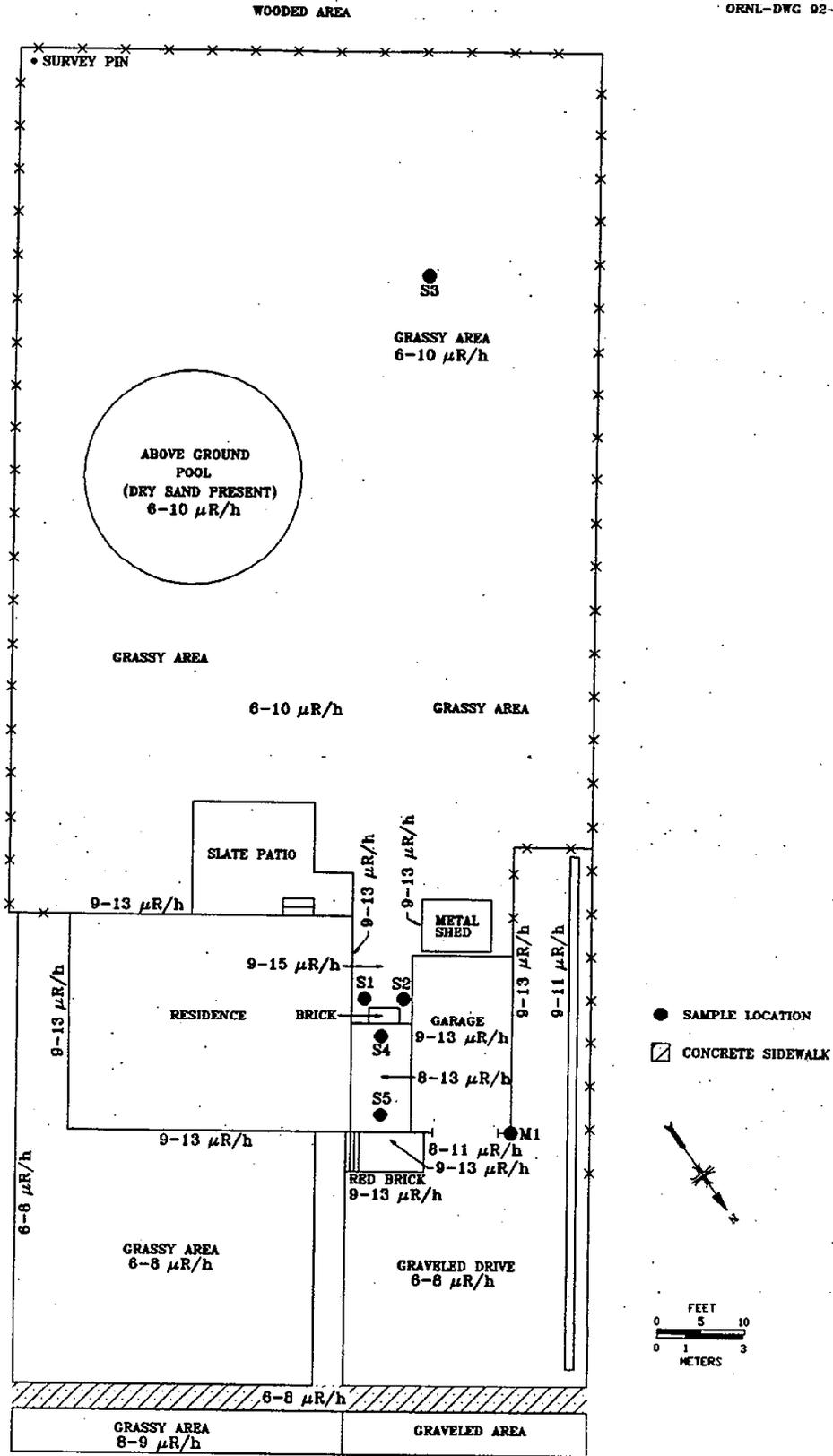


Fig. 1. Diagram of the property at 441 Central Ave., Hackensack, New Jersey (MJ053).