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Formerly Utilized Sites Remedial Action Program (FUSRAP)

ADMINISTRATIVE RECORD

for the Maywood Site, New Jersey

US Army Corps of Engineers®

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[redacted]
90 Orchard Place
Maywood, New Jersey 07607

Dear [redacted]

As you know, the Department of Energy has completed a radiological survey of your property at 90 Orchard Place, Maywood, New Jersey. The purpose of the survey was to determine if your property warrants consideration for remedial action. We are pleased to inform you that the preliminary results from that survey indicate that radiological conditions on your property comply with Guidelines applicable to the Department's Maywood, New Jersey, remedial action project. As a result, no remedial action is required at your property.

A copy of the final survey report will be sent to you in the next few months by our radiological contractor, Oak Ridge National Laboratory. The file number for this survey is MJ023. If you have any questions on this survey or the letter or on the report when your receive it, please call Mr. Andrew Wallo of my staff at 301-353-5439.

Sincerely,

151

James J. Fiore, Director
Division of Facility and Site
Decommissioning Projects
Office of Nuclear Energy

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HEALTH AND SAFETY RESEARCH DIVISION

Waste Management Research and Development Programs
(Activity No. AH 10 05 00 0; NEAH001)

RESULTS OF THE RADIOLOGICAL SURVEY AT 90 ORCHARD PLACE MAYWOOD, NEW JERSEY (MJ023)

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ABSTRACT

Maywood Chemical Works (MCW) of Maywood, New Jersey, generated process wastes and residues associated with the production and refining of thorium and thorium compounds from monazite ores from 1916 to 1956. MCW supplied rare earth metals and thorium compounds to the Atomic Energy Commission and various other government agencies from the late 1940s to the mid–1950s. Area residents used the sandlike waste from this thorium extraction process mixed with tea and cocoa leaves as mulch in their yards. Some of these contaminated wastes were also eroded from the site into Lodi Brook. At the request of the U.S. Department of Energy (DOE), a group from Oak Ridge National Laboratory conducts investigative radiological surveys of properties in the vicinity of MCW to determine whether a property is contaminated with radioactive residues, principally ^{232}Th, derived from the MCW site. The survey typically includes direct measurement of gamma radiation levels and soil sampling for radionuclide analyses. The survey of this site, 90 Orchard Place, Maywood, New Jersey (MJ023), was conducted during 1987.

While some radiological measurements taken at 90 Orchard Place were slightly greater than typical background levels encountered in the northern New Jersey area, no radionuclide concentrations nor radiation levels exceeded the applicable federal criteria. Based on the survey data, it is recommended that this site be eliminated from consideration for inclusion in the DOE remedial action program.

RESULTS OF THE RADIOLOGICAL SURVEY AT 90 ORCHARD PLACE, MAYWOOD, NEW JERSEY (MJ023)*

INTRODUCTION

From 1916 to 1956, process wastes and residues associated with the production and refining of thorium and thorium compounds from monazite ores were generated by the Maywood Chemical Works (MCW), Maywood, New Jersey. During the latter part of this period, MCW supplied rare earth metals and thorium compounds to various government agencies. In the 1940s and 1950s, MCW produced thorium and lithium, under contract, for the Atomic Energy Commission (AEC). These activities ceased in 1956, and approximately three years later, the 30-acre real estate was purchased by the Stepan Company. The property is located at 100 Hunter Avenue in a highly developed area in Maywood and Rochelle Park, Bergen County, New Jersey.

During the early years of operation, MCW stored wastes and residues in low-lying areas west of the processing facilities. In the early 1930s, these areas were separated from the rest of the property by the construction of New Jersey State Highway 17. The Stepan property, the interim storage facility, and several vicinity properties have been designated for remedial action by the Department of Energy (DOE).

The waste produced by the thorium extraction process was a sandlike material containing residual amounts of thorium and its decay products, with smaller quantities of uranium and its decay products. During the years 1928 and 1944 to 1946, area residents used these process wastes mixed with tea and cocoa leaves as mulch in their lawns and gardens. In addition, some of the contaminated wastes were apparently eroded from the site into Lodi Brook and carried downstream.

Lodi Brook is a small stream flowing south from Maywood with its headwaters near the Stepan waste storage site. Approximately 150 ft after passing under State Route 17, the stream has been diverted underground through concrete or steel culverts until it merges with the Saddle River in Lodi, New Jersey. Only a small section near Interstate 80 remains uncovered. From the 1940s to the 1970s when the stream was being diverted underground, its course was altered several times. Some of these changes resulted in the movement of contaminated soil to the surface of a few properties, where it is still in evidence. In other instances, the contaminated soil was covered over or mixed with clean fill, leaving no

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*The survey was performed by members of the Measurement Applications and Development group of the Health and Safety Research Division at Oak Ridge National Laboratory under U. S. DOE contract DE-AC05-84OR21400 with Martin Marietta Energy Systems, Inc.

immediate evidence on the surface. Therefore, properties in question may be drilled in search of former stream bed material, even in the absence of surface contamination.

As a result of the Energy and Water Appropriations Act of Fiscal Year 1984, the property discussed in this report and properties in its vicinity contaminated with residues from the former MCW, were included as a decontamination research and development project under the DOE Formerly Utilized Sites Remedial Action Program. As part of this project, DOE is conducting radiological surveys in the vicinity of the site to identify properties contaminated with residues derived from the MCW. The principal radionuclide of concern is thorium-232. The radiological survey discussed in this report is part of that effort and was conducted, at the request of DOE, by members of the Measurement Applications and Development Group of the Oak Ridge National Laboratory.

A radiological survey of the property at 90 Orchard Place, Maywood, New Jersey, was conducted during April 1987.

SURVEY METHODS

The radiological survey included a gamma scan of the entire property outdoors and the collection of surface and subsurface soil samples. No indoor survey measurements were performed. The survey methods followed the plan outlined in Reference 1. A comprehensive description of the survey methods and instrumentation has been presented in another report.[2]

Using a portable gamma scintillation meter, ranges of measurements were recorded for areas of the property surface. Systematic soil samples were obtained at randomly selected locations where gamma exposure rates were unremarkable. In addition, biased soil samples were collected at locations of elevated gamma levels.

SURVEY RESULTS

Applicable federal guidelines are summarized in Table 1.[3] Normal background radiation levels for the northern New Jersey area are presented in Table 2. These data are provided for comparison with survey results presented in this section. All direct measurement results presented in this report are gross readings; background radiation levels have not been subtracted. Similarly, background concentrations have not been subtracted from radionuclide concentrations measured in environmental samples.

Surface Gamma Radiation Levels

Radiation levels measured during a gamma scan of the surface of the property are given in Fig. 1. Gamma exposure rates over the property ranged from 9 to 12 μR/h.

Slightly elevated gamma levels of 14 μR/h were measured at the brick stairs on the southeast side of the house. Construction materials such as brick typically contain substances having naturally higher than background gamma exposure rates.

Systematic and Biased Soil Samples

Nine systematic (S) and five biased (B) soil samples were taken from three different locations on the property for radionuclide analyses. Locations of the samples are shown in Fig. 2 with results of laboratory analyses provided in Table 3. Concentrations of radium and thorium in the systematic samples ranged from 0.78 to 1.2 pCi/g and 0.87 to 1.5 pCi/g, respectively. Concentrations of radium and thorium in the biased samples ranged from 1.0 to 1.1 pCi/g and 1.2 to 1.4 pCi/g, respectively. All values are comparable to background concentrations typically encountered in the northern New Jersey area (Table 2).

SIGNIFICANCE OF FINDINGS

While some radiological measurements taken at 90 Orchard Place were slightly greater than typical background levels encountered in the northern New Jersey area, no radionuclide concentrations nor radiation levels exceeded the applicable federal criteria. Based on the results of this radiological assessment, it is recommended that this site be eliminated from consideration for inclusion in the DOE remedial action program.

REFERENCES

1. W. D. Cottrell, ORNL, to A. J. Whitman, DOE/HQ, correspondence, "Radiological Survey of Private Properties in Lodi, New Jersey" (August 15, 1984).

2. T. E. Myrick, B. A. Berven, W. D. Cottrell, W. A. Goldsmith, and F. F. Haywood, *Procedures Manual for the ORNL Radiological Survey Activities (RASA) Program,* Oak Ridge National Laboratory, ORNL/TM-8600 (April 1987).

3. U. S. Department of Energy, *Guidelines for Residual Radioactivity at Formerly Utilized Sites, Remedial Action Program and Remote Surplus Facilities Management Program Sites* (Rev. 2, March 1987).

4. U. S. Department of Energy, *Radiological Survey of the Middlesex Landfill, Middlesex, New Jersey,* DOE/EV-00005/20 (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).

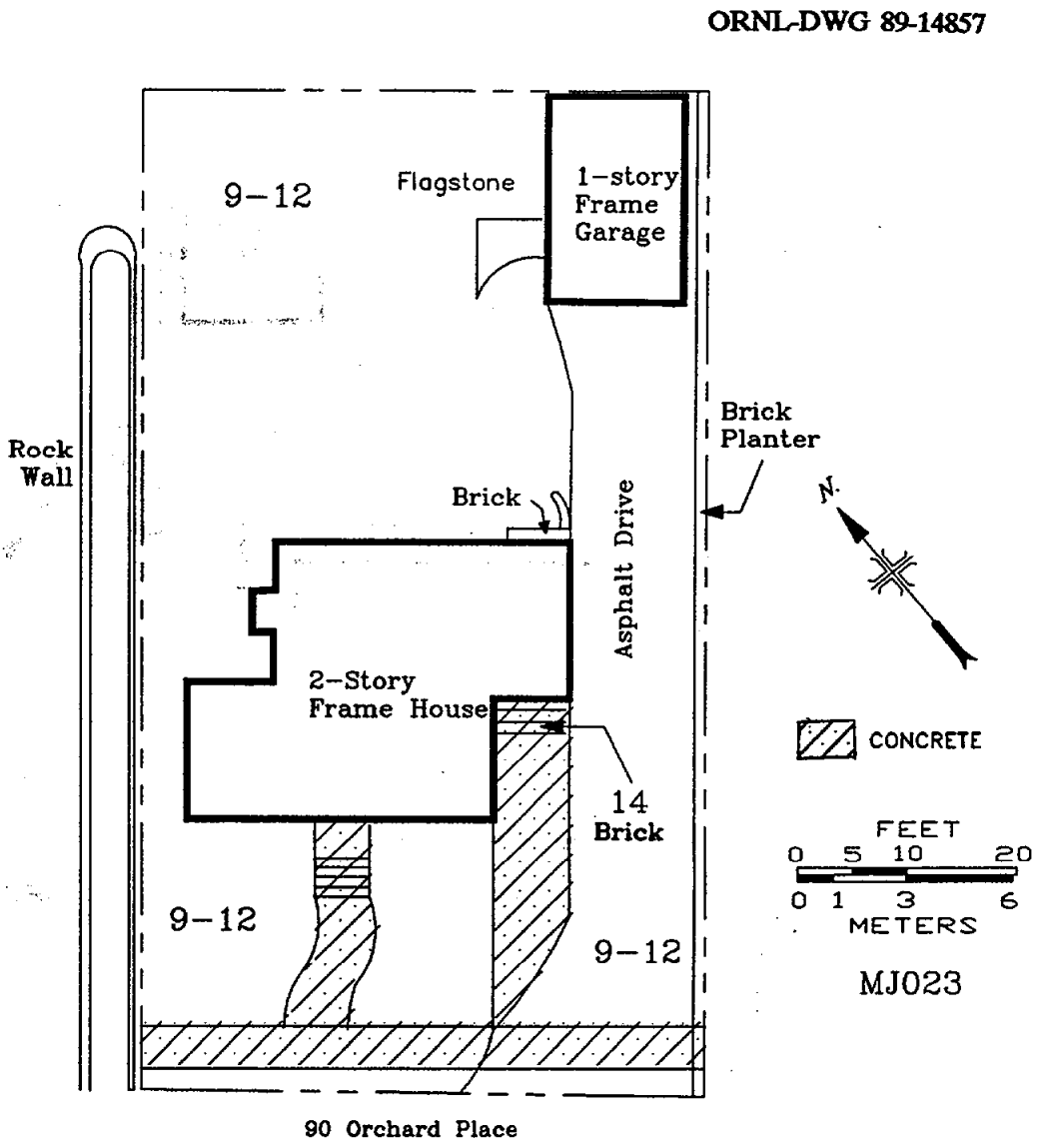

Fig. 1. Gamma radiation levels (μR/h) measured on the surface at 90 Orchard Place, Maywood, New Jersey (MJ023).

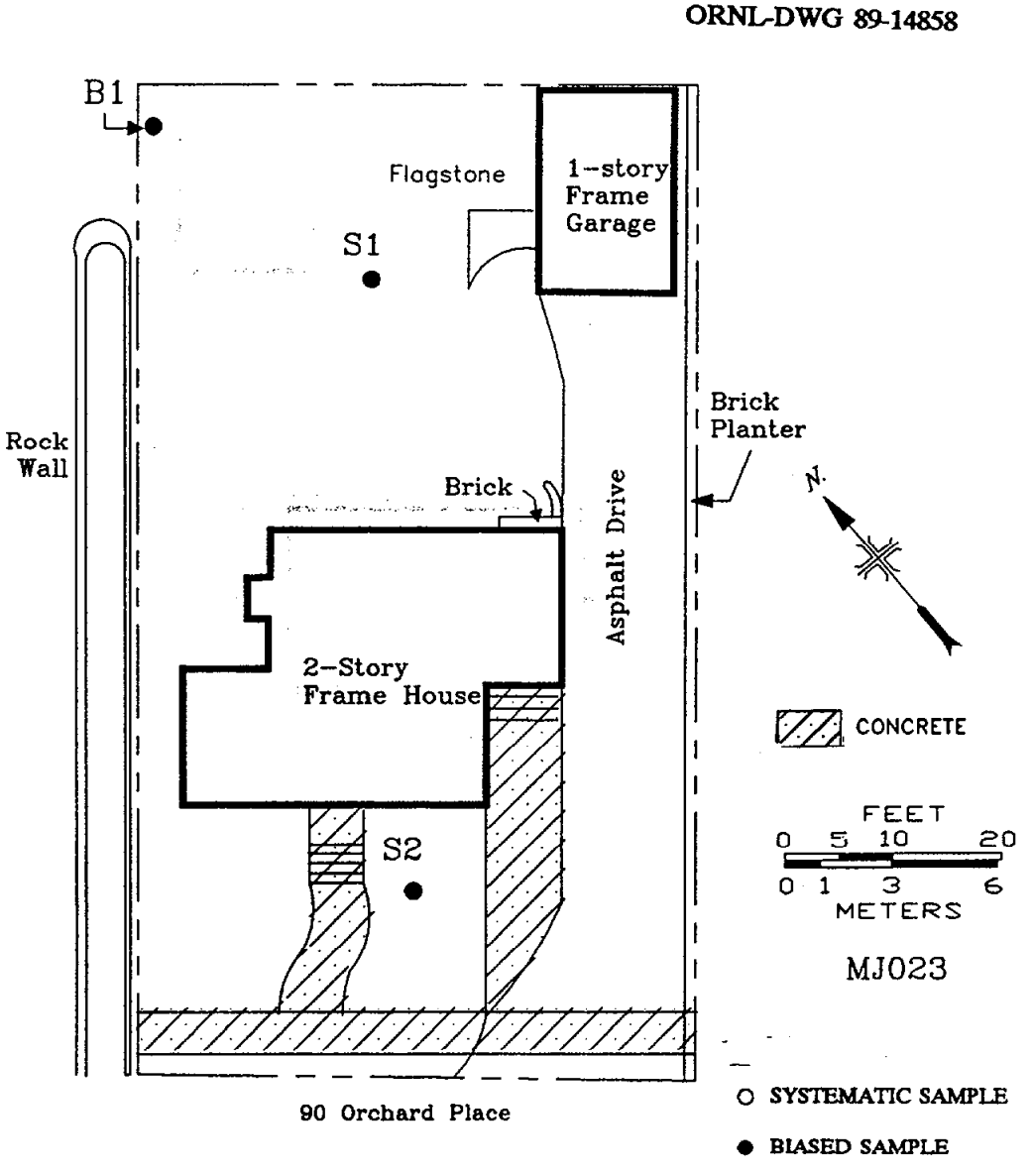

Fig. 2. Diagram showing locations of soil samples taken at 90 Orchard Place, Maywood, New Jersey (MJ023).

Table 1. Applicable guidelines for protection against radiation[a]

Mode of exposure	Exposure conditions	Guideline value
Radionuclide concentrations in soil	Maximum permissible concentration of the following radionuclides in soil above background levels averaged over 100 m^2 area ^{232}Th ^{230}Th ^{228}Ra ^{226}Ra	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

[a]Reference 3.

Table 2. Background radiation levels for the northern New Jersey area

Type of radiation measurement or sample	Radiation level or radionuclide concentration
Gamma exposure rate at 1 m above ground surface (μR/h)[a]	8
Concentration of radionuclides in soil (pCi/g)[b]	
^{226}Ra	0.9
^{232}Th	0.9
^{238}U	0.9

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

Table 3. Concentrations of radionuclides in soil at 90 Orchard Place, Maywood, New Jersey (MJ023)

Sample[a]	Depth (cm)	Radionuclide concentration (pCi/g)	
		^{226}Ra[b]	^{232}Th[b]
		Systematic samples	
S1A	0–15	Not processed	
S1B	15–30	0.78 ± 0.1	0.87 ± 0.1
S1C	30–45	1.1 ± 0.02	1.2 ± 0.04
S1D	45–60	1.2 ± 0.08	1.5 ± 0.4
S1E	60–75	1.2 ± 0.09	1.3 ± 0.2
S2A	0–15	Not processed	
S2B	15–30	1.1 ± 0.2	1.2 ± 0.1
S2C	30–45	1.2 ± 0.02	1.4 ± 0.04
S2D	45–60	1.1 ± 0.1	1.5 ± 0.2
		Biased samples[c]	
B1A	0–15	1.1 ± 0.06	1.4 ± 0.3
B1B	15–30	1.1 ± 0.03	1.3 ± 0.3
B1C	30–45	1.0 ± 0.1	1.2 ± 0.2
B1D	45–60	1.0 ± 0.08	1.3 ± 0.2
B1E	60–75	1.0 ± 0.1	1.2 ± 0.1

[a]Locations of soil samples are shown on Fig. 2.

[b]Indicated counting error is at the 95% confidence level ($\pm 2\sigma$).

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

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