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**RESULTS OF RADIOLOGICAL
SURVEYS OF 20
BOROUGH-OWNED PROPERTIES
MAYWOOD, NEW JERSEY
(MJ050)**

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R. F. Carrier

OPERATED BY
MARTIN MARIETTA ENERGY SYSTEMS, INC.
FOR THE UNITED STATES
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HEALTH AND SAFETY RESEARCH DIVISION

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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 these 20 borough-owned properties Maywood, New Jersey, was conducted during 1987.

Survey measurements indicate that none of the properties contained radioactive contamination. Slightly elevated gamma exposure rates in several areas were related to the presence of ashes or to natural materials used in the construction of buildings and asphalt surfaces.

RESULTS OF RADIOLOGICAL SURVEYS OF 20 BOROUGH-OWNED PROPERTIES, MAYWOOD, NEW JERSEY (MJ050)*

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 acres of 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, including 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.

As a result of the Energy and Water Appropriations Act of Fiscal Year 1984, the properties discussed in this report and properties in their 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 MCW. The principal radionuclide of concern is ^{232}Th . The radiological surveys discussed in this report are part of that effort and were conducted, at the request of DOE, by members of the Measurement Applications and Development Group of the Oak Ridge National Laboratory.

This report describes the results of surveys conducted in April 1987 of 20 public properties owned by the Borough of Maywood. Two other properties owned by the Borough, the West Hunter Avenue Firehall and Grant Avenue Memorial Park, were also surveyed. The results are reported elsewhere.¹⁻²

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

SURVEY METHODS

The radiological survey consisted of a gamma scan at the ground surface over the entire outdoor property using a portable gamma scintillation meter. No indoor survey measurements were performed. The survey procedures followed a plan proposed in 1984.³ A comprehensive description of the survey methods and instrumentation has been presented in another report.⁴

SURVEY RESULTS

Figure 1 shows the locations of the borough-owned properties, each of which was arbitrarily assigned a number from 1 to 20 as shown in Table 1.

The gamma exposure rates measured during the surveys of the 20 properties ranged from 4 to 20 $\mu\text{R/h}$ (Table 1). Slightly elevated measurements were observed in small, localized areas on most of the properties. In every case, these anomalies were associated either with an ashy material apparently derived from coal or with brick or asphalt surfaces. The maximum gamma exposure rate found during the surveys, 20 $\mu\text{R/h}$, was measured near the surface of an asphalt parking lot (property 14). These anomalies do not appear to be caused by material from the MCW site. Rather, they may be attributed to naturally occurring radioactive substances present in both the ashes and the construction materials used for brick and asphalt structures. Coal ashes often contain elevated radiation levels due to concentration of naturally radioactive materials in coal during combustion. Many natural substances such as these typically exhibit elevated gamma exposure rates when compared to surrounding soils.

SIGNIFICANCE OF FINDINGS

No evidence for radioactive contamination was discovered on any of the 20 borough-owned properties. Slightly elevated gamma exposure rates in several areas were related to the presence of ashes or to natural materials used in the construction of buildings and asphalt surfaces.

REFERENCES

1. R. D. Foley and L. M. Floyd, *Results of the Radiological Survey at West Hunter Avenue Firehall, Maywood, New Jersey (MJ037)*, ORNL/RASA-88/32 (MJ027).
2. R. D. Foley, J. W. Crutcher, R. F. Carrier, and L. M. Floyd, *Results of the Radiological Survey at Grant Avenue Memorial Park (MJ028), Maywood, New Jersey*, ORNL/RASA-88/21 (February 1989).
3. W. D. Cottrell, ORNL, to A. J. Whitman, DOE/HQ, correspondence, "Radiological Survey of Private Properties in Lodi, New Jersey" (August 15, 1984).
4. 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).

**Table 1. Results of gamma exposure rate measurements at
20 borough-owned properties in Maywood, New Jersey**

Location (Fig. 1)	Property/ Address	Range of gamma exposure rates found during scan ($\mu\text{R/h}$)	Average and/or anomalous gamma exposure rates ($\mu\text{R/h}$)
1	Pumping Station Spring Valley Ave. (Block 1, Lot 6)	5-15	Property averaged 5-10; maximum of 15 found on steps due to bricks that often show slightly elevated levels from naturally radioactive constituents
2	Memorial School 764 Grant Ave. (Block 43, Lot 1)	5-12	Property averaged 5-10; maximum of 12 on bldg. brick; all readings within typical background for the area
3	Public Library/ Municipal Office 459 Maywood Ave. (Block 144, Lots 5-12, 23-29)	6-12	Property averaged 6-10; maximum of 12 on bldg. brick; all readings within typical background for the area
4	Maywood Avenue School 425 Maywood Ave. (Block 145, Lot 1)	5-15	Property averaged 5-12; 15 on bldg. brick
5	Municipal Pool-Brook Ave. (Block 160, Lot 1)	5-11	Pool area, including play area outside fence at entrance averaged 5-10; average for parking lot serving pool was 7-10; all readings within typi- cal background for the area
6	Public Safety Bldg. & Parking areas 15 Park Ave. (Block 101, Lots 10-13, 20-22)	5-12	All readings within typical background for the area
7	Dept. of Public Works Garage 205 E. Hunter Ave. (Block 187, Lot 4)	5-10	Property averaged 5-10; all readings within typical background for the area
8	Pistol Range - E. Hunter Ave. (Block 187B, Lot 3)	7-18	Property averaged 7-12; localized coal ashes at maxi- mum gamma

Table 1 (continued)

Location (Fig. 1)	Property/ Address	Range of gamma exposure rates found during scan ($\mu\text{R/h}$)	Average and/or anomalous gamma exposure rates ($\mu\text{R/h}$)
9	Playground & School Parking Lot, Fairmount Ave. (Block 46A-47A, Lot 1-1A)	4-10	Property, including parking lot averaged 4-10; playground ball field averaged 5-10; all readings within typical background for the area
10	Fetzer Park Cedar & Locust Aves. (Block 15, Lot 10)	5-10	Property averaged 5-10; all readings within typical background for the area
11	Grove Avenue Park Grove Ave. (Block 100, Lots 13-19)	5-15	Property averaged 5-11; evidence of coal ashes in 3 locations
12	Duvier Park - Duvier Place (Block 163, Lots 13-19)	7-11	Property averaged 7-9; all readings within typical background for the area
13	Parking Lot - Albert St. (Block 108, Lots 30, 32, 34)	5-11	Property averaged 5-6; 11 on asphalt patch
14	Parking Lot Maywood Ave. & Passaic St. (Block 117, Lots 1, 5, 6, 7, 61)	5-20	Property averaged 5-6; spots of 20 at coal ashes
15	Vacant Land Thoma Ave. & Maple Lane (Block 150, Lots 1,3,4,5)	7-15	Property averaged 7-15; maximum at coal ashes in several areas
16	Vacant Land Brook Ave. & Magnolia lane (Block 169, Lots 6-9, 12-15)	6-11	Property averaged 6-9; all levels within typical back- ground for the area
17	Vacant Land Duvier Place & Magnolia Lane (Block 169A, Lots 2-5,5A,5B)	6-14	Property averaged 6-10; one spot of 14
18	Vacant Land (off Frontage) Central Ave. & Hergesell (Block 174, Lots 13B,14B,15B,16B,17B,18C)	7-17	Property averaged 7-10; several areas at maximum had coal ashes; large areas inaccessible due to trash

Table 1 (continued)

Location (Fig. 1)	Property/ Address	Range of gamma exposure rates found during scan ($\mu\text{R/h}$)	Average and/or anomalous gamma exposure rates ($\mu\text{R/h}$)
19	Vacant Land - Ward St. (Block 202, Lot 9)	5-10	Property averaged 5-10; all readings within typical background for the area
20	Vacant Land - Brookdale St. (Block 202, Lot 25)	6-14	Property averaged 6-10; maximum of 14 on bank of Cole's Brook

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