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Formerly Utilized Sites Remedial Action Program (FUSRAP)

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# ADMINISTRATIVE RECORD

for the Maywood Site, New Jersey

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**US Army Corps  
of Engineers®**

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Mr. Eric Hsieh  
1085 Route 22  
Mountain Side, New Jersey 07092

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Dear Mr. Hsieh:

As you know, the Department of Energy has completed a radiological survey of your property at Route 17 and Becker Avenue, Rochelle Park, New Jersey. The purpose of the survey was to determine if your property warrants consideration for remedial action under the Department's Maywood remedial action project. We are pleased to inform you that the preliminary results from that survey identified no residual radioactive material associated with the work done at the Former Maywood Chemical Works. As a result, no remedial action is required at your property. The survey did identify concentrations of radionuclides in asphalt that are greater than those normally found in Northern New Jersey; however, based on the isotopic concentrations of uranium, thorium and radium, this material appears to be naturally occurring radioactive material.

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 RJ001. If you have any questions on this survey or the letter or on the report when you receive it, please call Mr. Andrew Wallo of my staff at 301-353-5439.

Sincerely,

ISI

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

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RESULTS OF THE  
RADIOLOGICAL SURVEY  
AT  
ROUTE 17(S) AND BECKER AVENUE,  
ROCHELLE PARK, NEW JERSEY  
(RJ001)

R. D. Foley  
R. F. Carrier

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

065403

**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 ROUTE 17(S) AND BECKER AVENUE,  
ROCHELLE PARK, NEW JERSEY  
(RJ001)**

**R. D. Foley and R. F. Carrier**

**Date Published - November 1989**

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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  $^{232}\text{Th}$ , derived from the MCW site. The surveys typically include direct measurement of gamma radiation levels and soil sampling for radionuclide analyses. The survey of this commercial property at Route 17(S) and Becker Avenue, Rochelle Park, New Jersey (RJ001), was conducted in 1986.

Measurements taken at the commercial property located at Route 17(S) and Becker Avenue indicate slightly elevated gamma exposure rates in three areas of the parking lot. Although results of analysis of the asphalt disclosed radionuclide concentrations in excess of the applicable criterion, their presence is due to naturally radioactive substances in asphalt patching materials and is not associated with material from the MCW site. Therefore, it is recommended that this site be eliminated from consideration for inclusion in the DOE remedial action program.

**RESULTS OF THE RADIOLOGICAL SURVEY AT ROUTE 17 &  
BECKER AVENUE, ROCHELLE PARK, NEW JERSEY  
(RJ001)\***

**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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\*Members of the Measurement Applications and Development Group of the Health and Safety Research Division at Oak Ridge National Laboratory performed the survey under DOE contract DE-AC05-84OR21-400.

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 was 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 commercial property at Route 17(S) and Becker Avenue, Rochelle Park, New Jersey, was conducted on November 19, 1986.

## SURVEY METHODS

The radiological survey included a gamma scan of the entire property outdoors and collection of surface and subsurface soil samples. No indoor survey measurements were performed. The survey methods followed the basic plan outlined in a correspondence from W. D. Cottrell to A. J. Whitman.<sup>1</sup> A comprehensive description of the survey methods and instrumentation has been presented in another report.<sup>2</sup>

Using a portable gamma scintillation meter, ranges of measurements were recorded for areas of the property surface. Samples of asphalt, as well as surface and subsurface soil were collected in order to characterize and define the extent of contamination.

## SURVEY RESULTS

Applicable federal guidelines are summarized in Table 1.<sup>3</sup> Typical background radiation levels for the Maywood, New Jersey area are presented in Table 2.<sup>4-5</sup> 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 soil 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 major portion of the property ranged from 4 to 10  $\mu\text{R/h}$ , values approximating background for the northern New Jersey area. Elevated gamma levels ranging from 17 to 21  $\mu\text{R/h}$  were measured at three newly asphalted areas of the parking lot located along Route 17. The particular type of asphalt used in paving and patching the lot has been used in other locations in the Rochelle Park/Maywood area where it was also found to have elevated gamma exposure rates. The fill aggregate is thought to contain naturally occurring radionuclides responsible for the slight elevations observed. The three areas total approximately 170  $\text{m}^2$ .

### Biased Soil and Asphalt Samples

Four biased (B) samples were taken from varying depths at one location of elevated gamma levels for radionuclide analyses. One sample (B1A) was asphalt from the surface of the patching; three samples were soil. The sampling location is shown in Fig. 2 with results of laboratory analyses provided in Table 3.

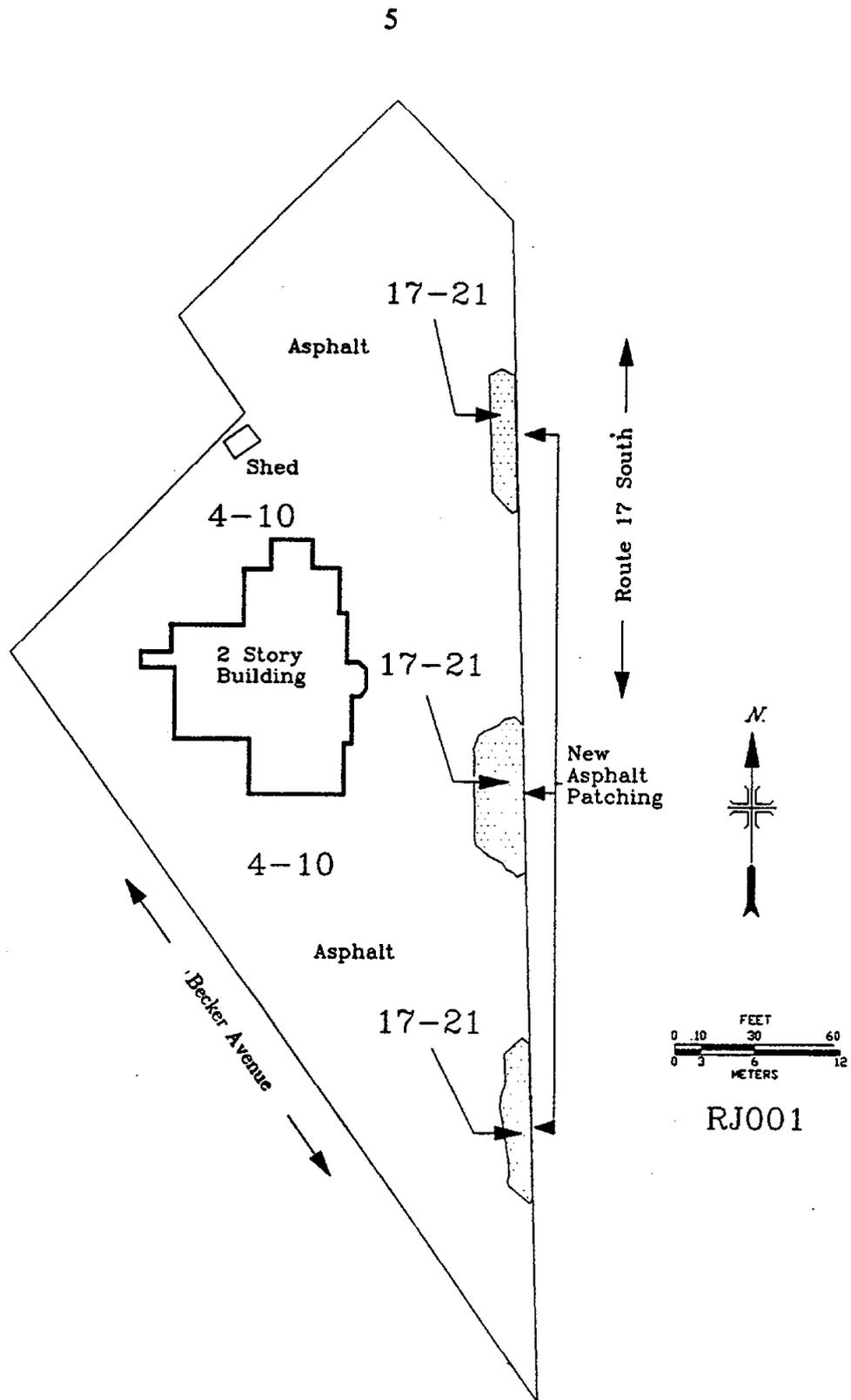
Concentrations of radium and thorium in the soil samples approximated background levels for the northern New Jersey area (Table 2), ranging from 0.61 to  $\sim 0.65$  pCi/g and 0.75 to 0.96 pCi/g, respectively. Uranium-238 concentrations in samples B1B, B1C, and B1D were also low at 0.67 to 0.94 pCi/g. Radium-226,  $^{232}\text{Th}$ , and  $^{238}\text{U}$  concentrations in the asphalt sample were above background at 2.6, 4.8, and 4.5 pCi/g, confirming that the elevated gamma levels resulted from substances present in the patching material. When  $^{226}\text{Ra}$  and  $^{232}\text{Th}$  values from the asphalt are combined, the resulting concentration of 7.4 pCi/g exceeds the DOE criterion for the surface when considered over the 170  $\text{m}^2$  area of anomalous gamma readings.

## SIGNIFICANCE OF FINDINGS

Measurements taken at the commercial property located at Route 17(S) and Becker Avenue indicate that slightly elevated gamma exposure rates observed in three areas of the parking lot result from naturally radioactive substances in asphalt patching materials and are not associated with material from the MCW site. Although the combined  $^{232}\text{Th}$  and  $^{226}\text{Ra}$  concentrations in a sample of the asphalt exceed the applicable DOE criterion (Table 1), 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 Radioactive Material 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 Municipal Landfill, Middlesex, New Jersey* DOE/EV-0005/20 (April 1980).
5. T. E. Myrick, B. A. Berven, and F. F. Haywood, *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 ( $\mu\text{R/h}$ ) measured on the surface at Route 17(S) and Becker Avenue, Rochelle Park, New Jersey (RJ001).**

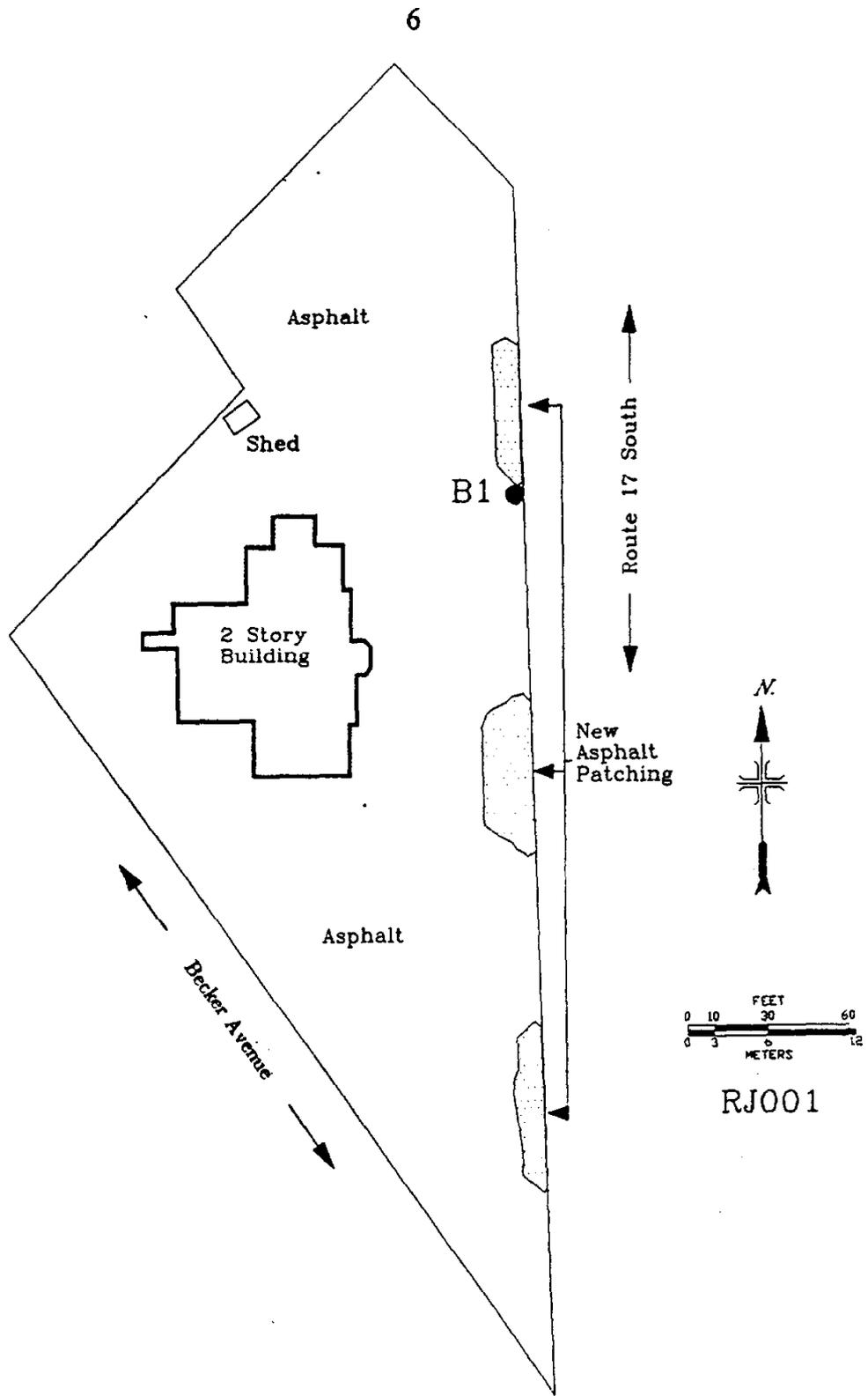


Fig. 2. Diagram showing location of soil sample taken at Route 17(S) and Becker Avenue, Rochelle Park, New Jersey (RJ001).

Table 1. Applicable guidelines for protection against radiation<sup>a</sup>

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 <sup>2</sup> area <sup>232</sup> Th <sup>230</sup> Th <sup>228</sup> Ra <sup>226</sup> 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

<sup>a</sup>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 ( $\mu$ R/h) <sup>a</sup>	8
Concentration of radionuclides in soil (pCi/g) <sup>b</sup>	
<sup>226</sup> Ra	0.9
<sup>232</sup> Th	0.9
<sup>238</sup> U	0.9

<sup>a</sup>Reference 4.<sup>b</sup>Reference 5.

Table 3. Concentrations of radionuclides in soil at Route 17 & Becker Avenue, New Rochelle, New Jersey (RJ001)

Biased sample <sup>a</sup>	Depth (cm)	Radionuclide concentration (pCi/g)		
		<sup>226</sup> Ra <sup>b</sup>	<sup>232</sup> Th <sup>b</sup>	<sup>238</sup> U <sup>b</sup>
B1A	0-5	2.6 ±0.2	4.8 ±0.4	4.5
B1B	0-15	0.61±0.05	0.75±0.08	0.71
B1C	15-30	0.65±0.06	0.96±0.21	0.67
B1D	30-45	0.61±0.05	0.82±0.10	0.94

<sup>a</sup>Location of soil sample is shown on Fig. 2. Biased samples are taken from areas shown to have elevated gamma exposure rates.

<sup>b</sup>Indicated counting error is at the 95% confidence level ( $\pm 2 \sigma$ ).

<sup>c</sup>Total analytical error of measurement results is less than  $\pm 5\%$  (95% confidence level).

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