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Formerly Utilized Sites Remedial Action Program (FUSRAP)

ADMINISTRATIVE RECORD

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ORNL/RASA-84/3

Health and Safety Research Division

RESULTS OF THE MOBILE GAMMA SCANNING ACTIVITIES IN LODI, NEW JERSEY

October 1984

Work performed as part of the
RADIOLOGICAL SURVEY ACTIVITIES PROGRAM

OAK RIDGE NATIONAL LABORATORY
Oak Ridge, Tennessee 37831
operated by
MARTIN MARIETTA ENERGY SYSTEMS, INC.
for the
U.S. DEPARTMENT OF ENERGY
under Contract No. DE-AC05-840R21400

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Investigation Team

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CONTENTS

LIST OF FIGURES AND TABLES

RESULTS OF THE MOBILE GAMMA-RAY SCANNING ACTIVITIES IN LODI, NEW JERSEY*

INTRODUCTION

A mobile gamma scanning survey of Lodi, New Jersey, was conducted during the period of June 14-18, 1984. The purpose of this survey was to identify all detectable gamma radiation anomalies which may be potentially related to the elevated levels of radioactivity in the Lodi, New Jersey, well water.

Through various communications between the New Jersey Department of Environmental Protection (DEP), Division of Water Resources (DWR), and the Department of Energy (DOE)[2] it was requested that Oak Ridge National Laboratory (ORNL) perform a mobile survey of the Lodi area. This report summarizes the results of the mobile survey and provides a listing of those properties with radiation anomalies and a short description of the properties' land use and any observed characteristics which may have influenced the response of the scanning van's detector system.

SURVEY METHODS

The following is a brief description of the scanning methods utilized for the mobile scanning of the Lodi area. Details of the system description and operation have been provided in Reference 1.

Instrumentation

The gamma radiation detection system employed in the ORNL scanning van consists of three 4 x 4 x 16-in. NaI(Tl) log crystals housed in a lead-shielded steel frame to provide a 12 x 16-in. detector surface area for acceptance of gamma radiation through one side of the survey van. The detector and shield height can be varied with a hydraulic lift mechanism to optimize the detector field-of-view. The detector output is transferred to a computer-controlled eight-channel discriminator and interface, which provides for continuous analysis of data inputs for

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* The survey was performed by members of the Radiological Survey Activities Group of the Health and Safety Research Division at Oak Ridge National Laboratory under DOE contract DE-AC05-840R21400.

correlation of system location with count rate information. Six separate energy regions-of-interest are analyzed and a ^{226}Ra-specific algorithm is employed to identify locations containing residual radium- and thorium-bearing materials. Multichannel analysis capabilities are included in the system for additional qualitative radionuclide identification.

Mobile Scanning Method

The data analysis method employed on the ORNL van is based on computations involving background count rates in specific energy regions. These background levels are normally obtained within small (10 square block) survey areas, based on coverage of at least 75% of the accessible streets in that area. Subsequent street-by-street scans of these areas are conducted at a slow speed (<5 mph), minimizing the distance between the detectors and the subject properties. All accessible streets, alleyways, and other public thoroughfares are scanned in both directions to maximize the number of views obtained for each property. Anomaly locations are highlighted by the computer system when the preset hit criteria are exceeded during the scan. The area covered during the survey is shown in Figure 1.

SURVEY RESULTS

Scope of Activities

The survey results presented in this report represent the scanning of all accessible streets, alleys, and thoroughfares in Lodi, New Jersey.

Scan Results

As the basis for analysis of the mobile scan data, background count rates in the regions of interest were measured in four areas of Lodi. Background count rates varied only slightly in all areas. This background data was used to provide baseline comparison in search of gamma radiation anomalies as described in detail in another report (reference 1).

Analysis of the mobile scan data indicates the presence of 25 anomalies associated with ^{226}Ra- and ^{232}Th-bearing materials. The exact areal extent of contamination surrounding these properties could not adequately be determined with the mobile gamma scanning van due to lack of access roads on all sides. Eighteen of the anomalous radiation levels over background levels in the Lodi area were associated with ^{226}Ra, and seven were associated with ^{232}Th. The location and descriptions of these properties are presented in Table 1. The location of the ^{226}Ra and ^{232}Th anomalies are shown on Figure 1.

SIGNIFICANCE OF FINDINGS

Based on the results of the ORNL scanning activities, 25 properties in the Lodi, New Jersey, area are recommended for future on-site surveys. These locations are listed in Table 1. Five of the properties listed had gamma energy spectrums which may have been influenced by isotopes other than ^{226}Ra or ^{232}Th. This could only be determined by on-site soil analysis. Also, it may be found that some of the listings may have been influenced by naturally-occurring radionuclides present in building materials and the close proximity to the radiation detectors during the mobile scan.

REFERENCES

1. Myrick, T. E., M. S. Blair, R. W. Doane, and W. A. Goldsith, A Mobile Gamma-Ray Scanning System for Detecting Radiation Anomalies Associated with Ra-226 Bearing Materials, Oak Ridge National Laboratory, ORNL/TM-8475, November 1982.

2. Correspondence from John E. Baublitz, Director, Division of Remedial Action Projects, to Mr. George J. Tyler, Assistant Commissioner, State of New Jersey, Department of Environmental Protection, June 8, 1984.

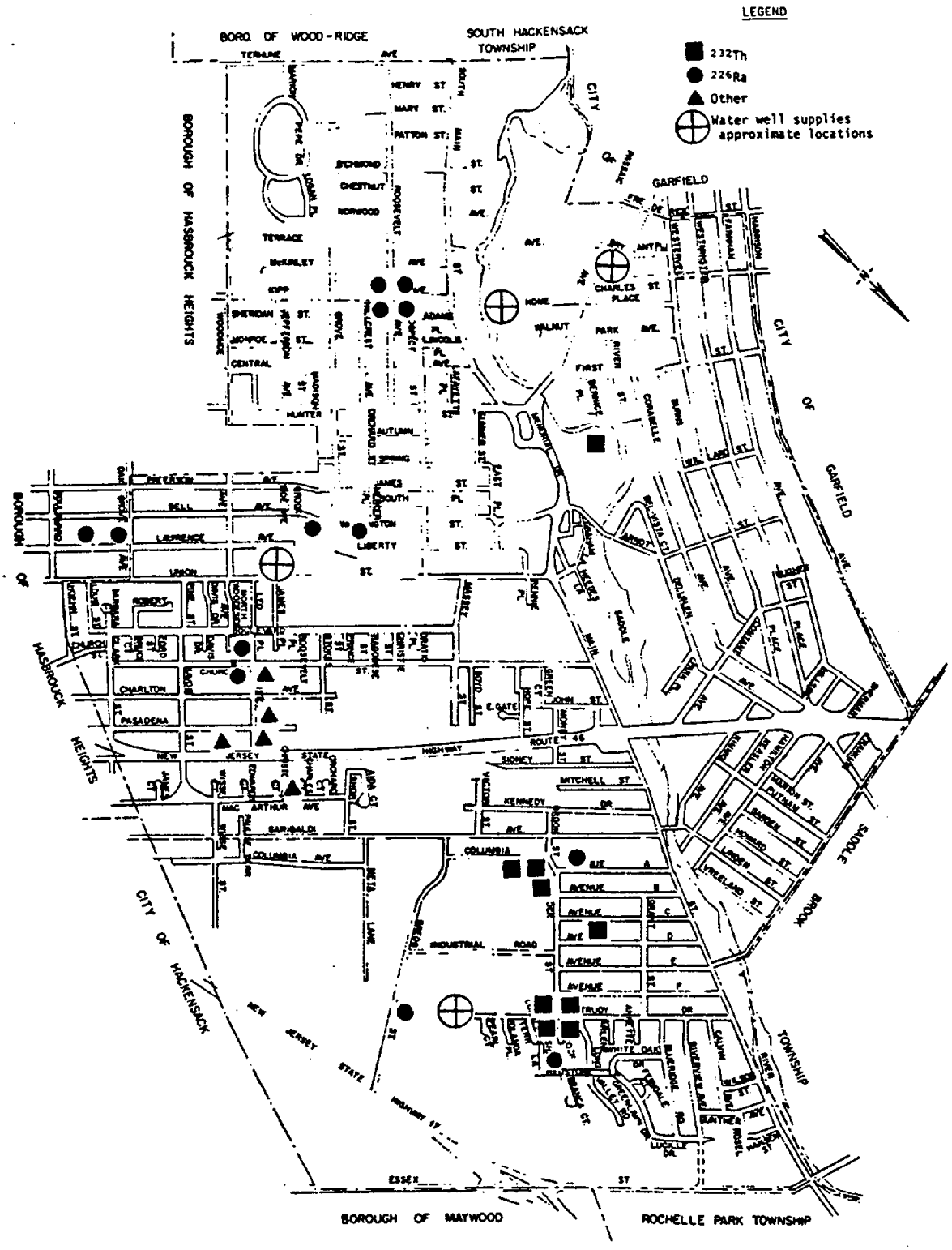

Fig. 1. Area surveyed during the mobile gamma scan of Lodi, New Jersey.

Table 1. Listing of Lodi, New Jersey, properties recommended for further investigation.

Property location	Type anomaly	Property description
8 Mill Street	Th-232	New Jersey Motor Vehicle Inspection Station
58 Trudy Drive	Th-232	Residential property
59 Trudy Drive	Th-232	Residential property
61 Trudy Drive	Th-232	Residential property
64 Trudy Drive	Th-232	Residential property
59 Avenue C	Th-232	Residential property
Memorial Drive	Th-232	City of Lodi municipal area ball field and playground; Lodi Memorial Park
75 Pasadena Avenue	Ra-226	Residential property[a]
257 Pasadena Avenue	Ra-226	Residential property[a]
Apartment #35 Pasadena Ave. (no other address)	Ra-226	Apartment building[a]
35 Christopher St. (directly across from Apt. 35)	Ra-226	Residential property[a]
45 Kipp Avenue	Ra-226	Residential property
46 Kipp Avenue	Ra-226	Residential property
36 Kipp Avenue	Ra-226	Residential property
170 Gregg Street	Ra-226	Bergen Cable Commercial property
Between houses #10 and 12 Charles Court	Ra-226	Residential property[a]
41 Kipp	Ra-226	Residential property

Table 1. (Continued)

Property location	Type anomaly	Property description
76 Washington Street	Ra-226	Residential property
2 Shady Lane	Ra-226	Residential property
68 Avenue A	Ra-226	Residential property
110 Lawrence Avenue[b]	Ra-226	Residential property
101 Paterson Avenue[b]	Ra-226	Residential property
141 Washington Street	Ra-226	Residential property
247 Church Street	Ra-226	Residential property
248 Church Street	Ra-226	Residential property

[a]Indicates possible count rate influence by other isotopes other than ^{226}Ra or ^{232}Th which can only be determined by soil analysis.

[b]Located in Hasbrouck Heights, New Jersey.