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DOE/OR/20722-69

M-107

**RADIOLOGICAL SURVEY REPORT FOR
THE RESIDENTIAL PROPERTY AT
4 HANCOCK STREET
LODI, NEW JERSEY**

MAY 1965

Prepared for

**UNITED STATES DEPARTMENT OF ENERGY
OAK RIDGE OPERATIONS OFFICE
Under Contract No. DE-AC05-81OR20722**

By

**Bechtel National, Inc.
Advanced Technology Division
Oak Ridge, Tennessee**

Bechtel Job No. 14501

00223

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Attention: R. G. Atkin
Technical Services Division

Subject: Bechtel Job No. 14501, FUSRAP Project
DOE Contract No. DE-AC05-81OR20722
Final Issue of Radiological Survey Reports for
121 and 123 Avenue F, 3 and 4 Hancock Street,
and 56 and 64 Trudy Drive, Lodi, New Jersey
File 148, WBS 138

Dear Mr. Atkin:

Enclosed for your distribution to TSD personnel, DOE-HQ, and the affected property owners are eight copies of each of the subject reports. The completed Document Comment/Resolution forms are attached.

Very truly yours,

George P. Crotnell
George P. Crotnell
Project Manager - Maywood

JMH:jmh

Enclosures: As Stated

cc: E.L. Keller

CONCURRENCE

JMH	EDS	PK		
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TABLE OF CONTENTS

	<u>Page</u>
1.0 Introduction	1
2.0 Survey Methods	1
3.0 Survey Results	3
4.0 Summary	7
References	8

LIST OF FIGURES

<u>Figure</u>	<u>Title</u>	<u>Page</u>
1	Locations of Boreholes, Soil Samples, and PIC Measurements at 4 Hancock Street	2

LIST OF TABLES

<u>Table</u>	<u>Title</u>	<u>Page</u>
3-1	Summary of Applicable Radiation Guidelines for FUSRAP	4
3-2	Background Radiation Levels for the Northern New Jersey Area	5
3-3	Radionuclide Concentrations in Surface Soil at 4 Hancock Street	6

1.0 INTRODUCTION

A radiological survey of 4 Hancock Street, Lodi, New Jersey was conducted during February and March 1985 by Bachtel National, Inc. (BNI). This survey was part of the Formerly Utilized Sites Remedial Action Program, a U.S. Department of Energy (DOE) effort to identify, clean up, or otherwise control sites where low-level radioactive contamination (exceeding current guidelines) remains from the early years of the nation's atomic energy program. A screening survey had previously been performed by the Oak Ridge National Laboratory (ORNL) to determine radiological conditions in areas near the Stepan Company (formerly the Maywood Chemical Works) that were suspected of having become contaminated as a result of the thorium and rare earth processing operations at the plant between 1916 and 1956 (Ref. 1). Radiation levels in excess of normal background were identified on several properties during the ORNL survey. DOE requested that BNI perform a characterization survey on those properties and on adjacent properties that BNI personnel suspected of being contaminated. The property at 4 Hancock Street is one of the latter.

2.0 SURVEY METHODS

A walk-over scanning survey of the entire property was made using an unshielded 2-in. x 2-in. sodium iodide (NaI) detector (Eberline SPA-3). Concurrently, a 6-ft measurement grid, tied to the state coordinate system, was established, and systematic measurements of the gamma radiation levels were taken at the grid intersections. These measurements were made with a cone-shielded SPA-3 positioned 30 cm above the ground.

The results of the instrument measurements were used to select the locations at which to collect soil samples and place boreholes for subsurface measurements. These are shown in Figure 2-1. Surface soil samples (0-15 cm) were taken at six locations. Boreholes were logged using an unshielded SPA-3 detector.

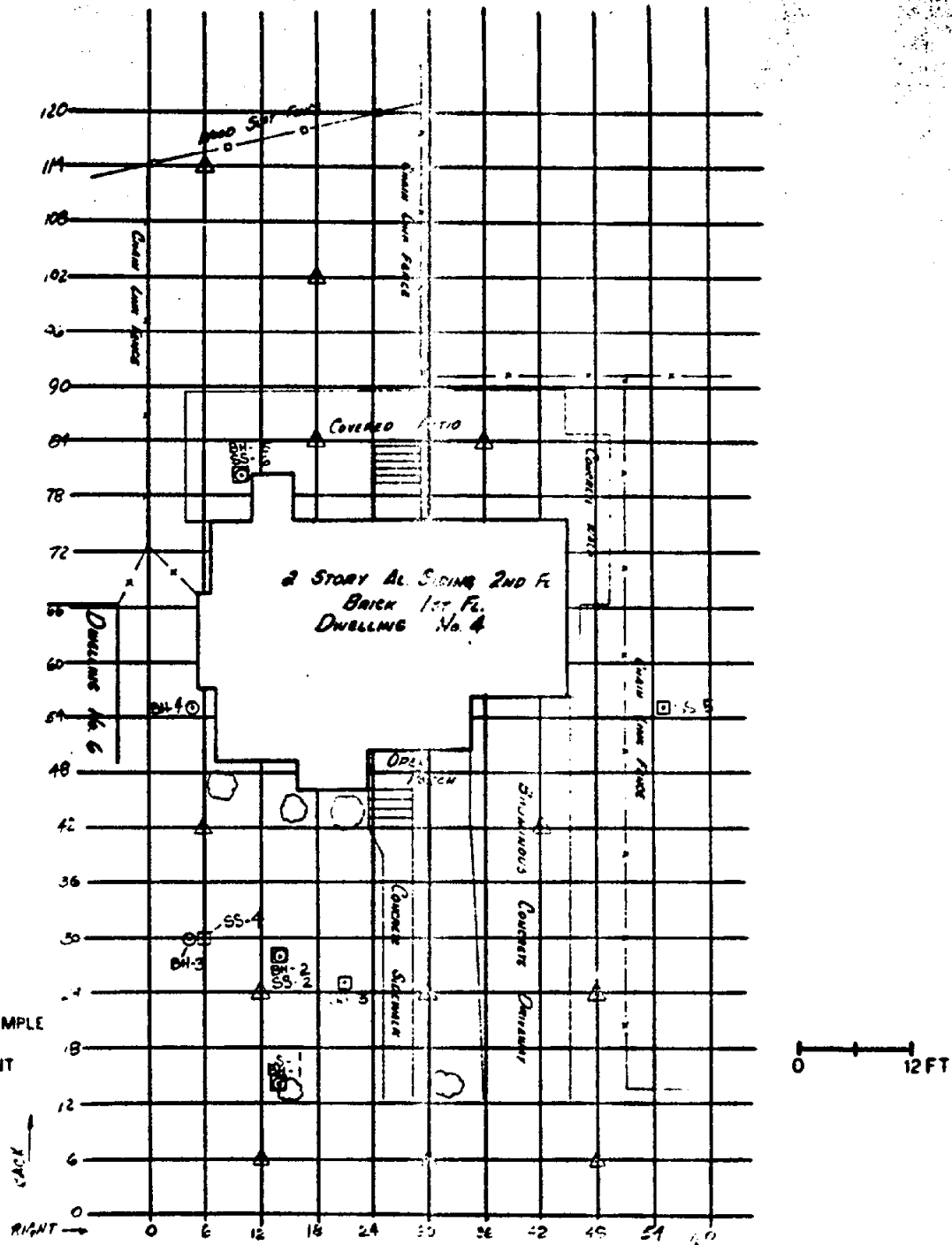


FIGURE 2-1 LOCATIONS OF BOREHOLES, SOIL SAMPLES, AND PIC MEASUREMENTS AT 4 HANCOCK STREET

Pressurized ionization chamber (PIC) measurements of the exposure rate at a height of 1 m above the ground were made at the locations shown in Figure 2-1.

3.0 SURVEY RESULTS

Applicable federal guidelines for external radiation exposure and radionuclide concentrations in soil have been summarized in Table 3-1. The normal background levels for the northern New Jersey area are presented in Table 3-2. These data are provided for comparison with the 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.

Soil Samples

Surface soil samples were taken from various locations on the property for radionuclide analyses. Locations of the surface samples (SS-#) are shown in Figure 2-1, with results of laboratory analyses provided in Table 3-3. None of the soil samples revealed radioactivity in excess of the DOE criteria.

Gamma Radiation Levels

Results of the gamma measurements on this property showed that gamma exposure rates varied from 8 to 11 $\mu\text{R}/\text{h}$. As noted in Table 3-2, the overall background rate for the northern New Jersey area is approximately 8.0 $\mu\text{R}/\text{h}$. The DOE criterion for gamma radiation at any location on a site to be released for unrestricted use is 20 $\mu\text{R}/\text{h}$ above background (Table 3-1).

27723

TABLE 3-1

SUMMARY OF APPLICABLE RADIATION GUIDELINES FOR FUSRAP

Exposure Conditions	Guideline Value	Guideline Source
<u>External Gamma Radiation</u>		
Level of gamma radiation at any location on a site to be released for unrestricted use	20 mR/h above background	U.S. DOE Guidelines for Residual Radioactivity at FUSRAP and Remote SFMP Sites (February 1985)
<u>Radionuclide Concentrations in Soil</u>		
Maximum permissible concentration of radium-226 and thorium-232 in soil above background levels averaged over 100 m ² area	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	U.S. DOE Guidelines for Residual Radioactivity at FUSRAP and Remote SFMP Sites (February 1985)

27723

TABLE 2-2

BACKGROUND RADIATION LEVELS FOR THE
NORTHERN NEW JERSEY AREA

Type of Radiation Measurement or Sample	Radiation Level or Radionuclide Concentrations
Gamma exposure rate at 1 m above floor or ground surface ($\mu\text{R/h}$)	$\sim 8.0^a$
Concentration of radionuclides in soil (pCi/g)	
Thorium-232	0.9 ^b
Uranium-238	0.9 ^b
Radium-226	0.9 ^b

^aDOE (Ref. 2).

^bORNL (Ref. 3).

27723

TABLE 3-3
RADIONUCLIDE CONCENTRATIONS IN SURFACE SOIL AT
4 HANCOCK STREET

SS-Number	Depth (inches)	Radium-226 (Picocuries/gram)	Thorium-232 (Picocuries/gram)
1	6	1.2	< 3.7
2	6	0.5	None Detected
3	6	0.5	< 3.5
4	6	< 0.9	4.5
5	6	2.6	None Detected
6	6	1.0	2.6

27723

4.0 SUMMARY

Instrument measurements made at 4 Hancock Street were all within the range of normal background radiation levels. Soil samples were taken from six locations and analyzed for thorium-232 and radium-226. No results exceeded the DOE remedial action guidelines.

REFERENCES

1. Oak Ridge National Laboratory. Results of the Mobile Gamma Scanning Activities in Lodi, New Jersey, ORNL/RASA-8413, Oak Ridge, TN, October 1984.
2. U.S. Department of Energy. Radiological Survey of the Middlesex Municipal Landfill, Middlesex, New Jersey, DOE/EV-0005/20, Oak Ridge, TN, April 1980.
3. Oak Ridge National Laboratory. State Background Radiation Levels: Results of Measurements Taken During 1975-1979, ORNL/TM-7343, Oak Ridge, TN, November 1981.