



Department of Energy
Washington, D.C. 20545

F. Fitzpatrick

JUN 27 1984

Mr. Guido Rocco
President, Passaic County Board
of Technical and Vocational Education
45 Rheinhardt Road
Wayne, New Jersey 07470

Dear Mr. Rocco:

I am enclosing a copy of the Radiological Survey Report of the property identified as Passaic County Technical and Vocational High School (PCTVHS), Wayne, New Jersey. Although the radiological survey indicates levels of contamination slightly above background, they do not represent a significant health hazard to the students at the school.

In 1983, Congress authorized the Department of Energy to clean up the radioactivity contamination at the W. R. Grace site in Wayne, New Jersey, and the Stepan Company site in Maywood, New Jersey, as well as the nearby properties that became contaminated from these two sites. Soil samples from the PCTVHS, W. R. Grace site in Wayne, New Jersey, and the Stepan Company site in Maywood have been collected and analyzed to determine the source of contamination at the PCTVHS. These samples were analyzed by Oak Ridge Associated Universities for radiological activity and elemental composition with an emphasis on rare earths. The basic raw material at the former chemical plants at the Wayne and Maywood sites was monazite which contained a high concentration of rare earths. These rare earths were also in the wastes after processing. It appears from the elemental analysis that the soil sample from the PCTVHS did not contain detectable levels of rare earths. This analysis indicated that the contaminated soil at the PCTVHS did not originate at either the Wayne or Maywood sites.

Inasmuch as the radioactive contamination at the PCTVHS did not come from either the Wayne or the Maywood sites, the Department of Energy cannot clean up the contamination at your school.

We are informing the New Jersey Division of Environmental Protection and providing them a copy of the survey by copy of this letter.

If there are any questions, please call Mr. Arthur J. Whitman on
301-353-5439.

Sincerely,

A handwritten signature in cursive script that reads "John E. Baublitz". The signature is written in dark ink and is positioned above the typed name and title.

John E. Baublitz, Director
Division of Remedial Action Projects
Office of Terminal Waste Disposal
and Remedial Action

Enclosure

cc: w/enclosure
S. Kurhtz, NJDEP
J. Eng, BRH/NJDEP
F. Fitzpatrick, Health Officer
Pequannock Township

200-1d

DOE/OR/20722-10

**FORMERLY UTILIZED SITES REMEDIAL ACTION PROGRAM (FUSRAP)
CONTRACT NO. DE-AC05-81OR20722**

**RADIOLOGICAL SURVEY REPORT FOR THE
PASSAIC COUNTY TECHNICAL AND
VOCATIONAL HIGH SCHOOL**

WAYNE, NEW JERSEY

JUNE 1984



**Bechtel Job 14501
Bechtel National, Inc.
Advanced Technology Division**

RADIOLOGICAL SURVEY REPORT FOR
THE PASSAIC COUNTY TECHNICAL AND
VOCATIONAL HIGH SCHOOL
WAYNE, NEW JERSEY

JUNE 1984

Prepared for

UNITED STATES DEPARTMENT OF ENERGY
OAK RIDGE OPERATIONS OFFICE
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By

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

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1.0 INTRODUCTION

A designation survey of radiological conditions at the Passaic County Technical and Vocational High School (PCTVHS), Wayne, New Jersey was conducted on November 12 and 13, 1983 by Bechtel National, Inc. This survey was part of the Formerly Utilized Sites Remedial Action Program (FUSRAP), a U.S. Department of Energy (DOE) effort to identify, clean up, or otherwise control sites where low-level radioactive contamination, at levels above current guidelines, remains from the early years of the U.S. atomic energy program. DOE requested the survey as a follow-up to two previous screening surveys (Refs. 1 and 2) that indicated radiation levels higher than normal background. The screening surveys had been performed to determine radiological conditions in areas near the former W. R. Grace plant that were suspected of having become contaminated as a result of the thorium and rare earth processing operations at the plant between 1948 and 1971.

The major objectives of this survey were to determine the areal extent of radioactive contamination, to identify the radionuclides, and to determine whether the contamination originated at either of the northern New Jersey FUSRAP sites (Wayne or Maywood).

2.0 SURVEY METHODS

A walk-over scan of the main campus was performed using 2 in. x 2 in. sodium iodide (NaI) detectors (Eberline SPA-3 held within 15 cm of the ground surface) to locate areas of elevated radiation levels. All areas where radiation levels exceeded twice the normal background were marked on a plot plan and are presented in Figure 2-1. Following the walk-over scan, biased soil samples were collected for laboratory analysis to determine the concentrations of suspected radionuclides (thorium-228, -230, and -232, radium-226, and uranium-234, -235, and -238). Surface soil samples (0-15 cm)

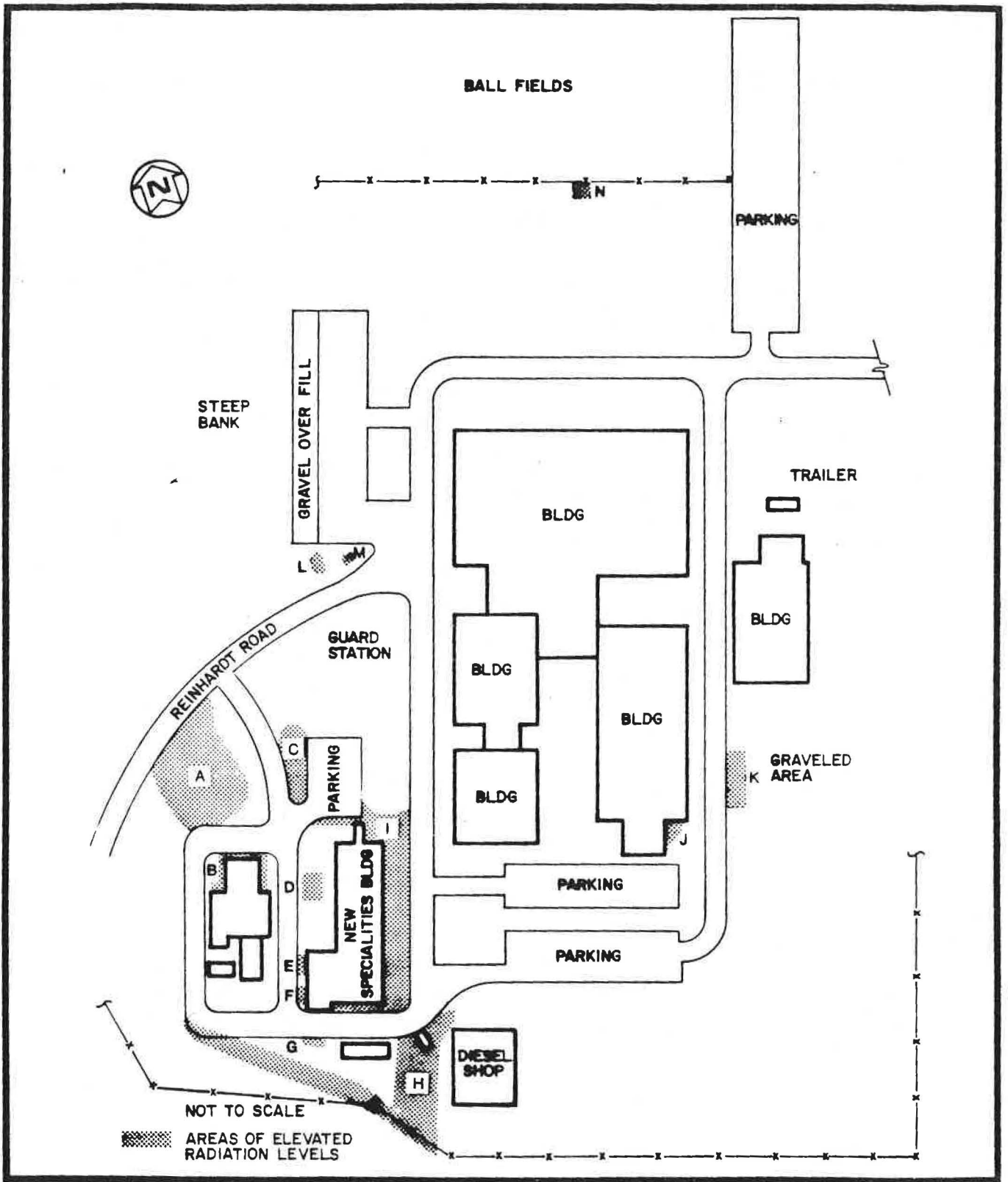


FIGURE 2-1 AREAS OF ELEVATED RADIATION LEVELS AT THE PASSAIC COUNTY TECHNICAL AND VOCATIONAL HIGH SCHOOL

were collected at 10 locations and subsurface samples were taken at two of these locations. Attempts were made to obtain other subsurface samples, but rock encountered near the surface and time limitations prevented further drilling. Sampling locations are shown on Figure 2-2.

3.0 RESULTS

The walk-over scan results are shown by the shaded areas in Figure 2-1. These areas have external gamma radiation levels that exceed the typical background level (about 10,000 counts per minute (cpm) on the SPA-3) by at least a factor of two. Readings as high as 100,000 cpm were observed. Most of the areas with elevated radiation levels, areas A through I, are within a 130 m x 150 m area adjacent to Reinhardt Road that also includes the recently completed Specialities Building and a second building with an attached greenhouse. Areas D through I appear to be new fill material recently seeded and covered with straw. A long, narrow strip, part of area H, running south of the Specialities Building also appears to be new fill material in a ditch line. However, areas A through C appear to be long-established lawns.

Five small areas, J through N, had readings slightly above twice background. In areas J through M gravel may account for the slightly elevated readings. Area N (north of the main building near the ball fields) appears to be fill soil placed in a spot eroded by effluent from a drain pipe.

Soil sample analyses indicate that the major radionuclides present are radium-226 (1 to 23 pCi/g), thorium-232 (background to 13 pCi/g), and their daughter products, with much smaller concentrations of natural uranium. Table 3-1 summarizes the soil analysis data and compares the radionuclide concentrations found with the present DOE criteria for remedial action. Corresponding soil sample locations are presented in Figure 2-2.

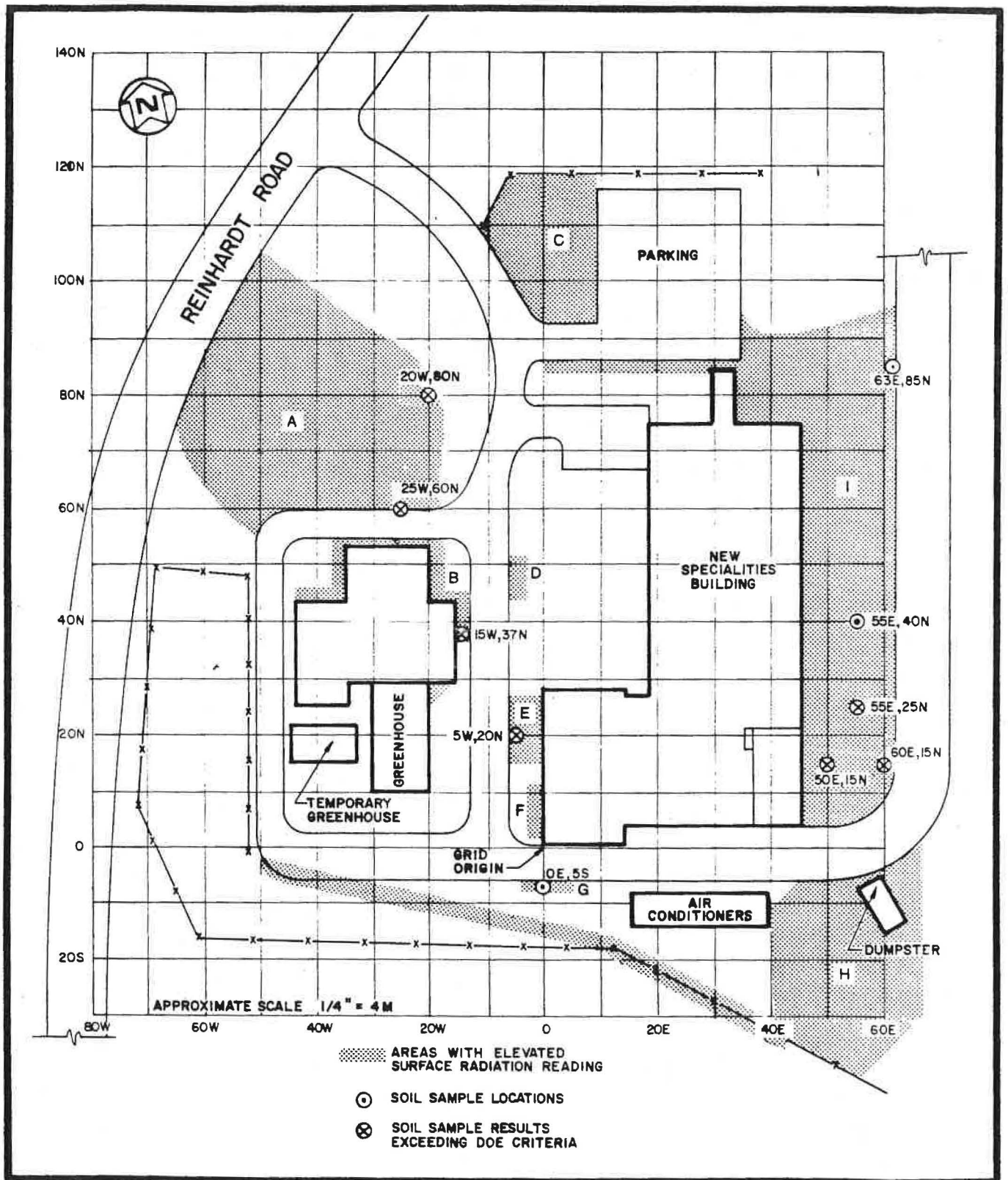


FIGURE 2-2 LOCATION OF SOIL SAMPLES AND AREAS OF ELEVATED RADIATION LEVELS AT THE PASSAIC COUNTY TECHNICAL AND VOCATIONAL HIGH SCHOOL

TABLE 3-1
 RADIONUCLIDES IN SOIL SAMPLES COMPARED WITH REMEDIAL ACTION CRITERIA
 PASSAIC COUNTY TECHNICAL AND VOCATIONAL HIGH SCHOOL

Sample No.	Location Coordinates	Ra-226 (pCi/g) ^a	Percent of Criterion ^b (%)	Th-230 (pCi/g) ^a	Percent of Criterion ^b (%)	Th-232 (pCi/g) ^a	Percent of Criterion ^b (%)	Uranium-238 (pCi/g) ^{a,c}	Percent of Criterion ^b (%)	Cumulative Percent of Criteria ^{b,e}
12092	5W, 20N	6	96	1.2	8	12	80	1.6	2	186
12093 ^d (15-30 cm)	5W, 20N	2	13	BKG	0	1.8	12	1	1	26
12094 ^d (30-45 cm)	5W, 20N	1	7	BKG	0	BKG	0	0.3	1	8
12095	15W, 37N	23	438	1.1	7	13	87	6.1	8	540
12096	20W, 80N	13	248	0.6	4	11	73	5.7	8	325
12097	25W, 60N	17	340	BKG	0	2.5	17	4.1	5	362
12098	OE, 5S	2	40	BKG	0	1	7	0.7	1	48
12099 ^d (15-30 cm)	OE, 5S	2	13	BKG	0	2.5	17	1.1	1	31
12100	50E, 15N	6	96	1.2	8	9	60	2.9	4	168
12101	55E, 25N	10	190	0.5	3	10	67	6.7	10	70
12102	55E, 40N	1	20	BKG	0	0.1	1	1	1	22
12103	60E, 15N	6	120	BKG	0	1.2	8	1.2	1	129
12104	63E, 85N	3	60	BKG	0	5.3	35	1	1	96

^aAbove background (1 pCi/g was taken as the background for the radionuclides listed above and subtracted from gross results) (Ref. 3)

^bCriteria:

Ra-226 Surface 5 pCi/g;
 Ra-226 Subsurface 15 pCi/g;
 Th-230 15 pCi/g;
 Th-232 15 pCi/g;
 Natural Uranium 75 pCi/g;

If the radium-226 concentration exceeds thorium-230 concentration, the percent of criteria is calculated by replacing the radium-226 concentration by the difference between radium-226 and thorium-230 concentrations.

^cUranium-238 and uranium-234 are in equilibrium, therefore uranium concentrations are represented by uranium-238 values.

^dSubsurface samples

^eTypical measurement errors in these soil analyses are estimated to be +25 percent for measurements greater than 10 pCi/g and +50 percent for measurements between 1 and 10 pCi/g.

Seven of ten surface soil samples collected exceeded the DOE criteria for unrestricted land use. All soil samples were collected from areas of elevated radiation levels as determined during surface scans and therefore reflect maximum surface contamination levels. Four of the soil samples exceeding criteria were obtained near the new Specialities Building. Three of these were from the area that appeared to be new fill. Other samples exceeding criteria were taken adjacent to the greenhouse building and in the area near Reinhardt Road. Subsurface soil samples obtained from two locations were below criteria.

4.0 SUMMARY AND CONCLUSIONS

The results of this designation survey of the PCTVHS indicate that 14 areas totaling approximately 5000 m² have elevated concentrations of radioactive material. The radioactive materials are primarily radium-226, thorium-232, and their daughter products which are normally found in soils. However, the concentrations found in this survey were up to 20 times the expected background levels. While these radionuclide concentrations do exceed the DOE remedial action criteria, they do not represent a significant health hazard to the staff and students at the school.

Most of the contaminated areas appear to be related to construction activities for the new Specialities Building. Soil samples from the PCTVHS, the Wayne Interim Storage Site (the former Rare Earths, Inc./W. R. Grace plant), and the Maywood Interim Storage Site (the former Maywood Chemical Company/Stepan Chemical plant) have been analyzed to determine whether the contamination at the PCTVHS came from either the Wayne or Maywood sites. The samples were analyzed by Oak Ridge Associated Universities (an independent DOE subcontractor) for radiological activity and for elemental composition with an emphasis on the rare earths content. The basic raw material for the former chemical plants at the Wayne and Maywood sites was monazite sand that contained high concentrations of the rare earths. As presented in Table 4-1, samples from both former

plant sites show the expected concentrations of rare earths while the material from the PCTVHS does not contain detectable levels of the rare earths. This indicates that the contaminated soils at the PCTVHS did not originate at either the Wayne or the Maywood sites.

TABLE 4-1
ANALYTICAL RESULTS - SOILS FROM NEW JERSEY SITES

Sample	Source Site	Concentrations (ppm) ^a								
		Th-232	U-238	Sm(155) ^b	Dy(165m) ^b	Nd(149) ^b	La(140) ^b	Eu(152m) ^b	Na(24) ^b	Al(28) ^b
2841	Sheffield Brook	2300	170	890	170	2000	3700	12	1.4E4	6.9E4
2867	Sheffield Brook	470	85	500	140	710	1300	4	1.3E4	5.3E4
4366	W.R. Grace	3.7E4	3300	1.7E4	8200	1.7E4	3.5E4	120	N.D. ^c	N.D.
4625	School Yard	370	12	100	N.D.	N.D.	N.D.	N.D.	9300	5.5E4
4626	Ballod Property	2.0E4	1200	2900	1300	1.2E4	7200	17	1900	4600
4627	Peck Ave.	6400	390	N.D.	780	1.7E4	2.4E4	86	1900	2.2E4
4628	Peck Ave.	7400	340	N.D.	1800	2.8E4	3.4E4	120	720	1.1E4
4818	W.R. Grace	3.2E4	5900	1.9E4	1.8E4	1.7E4	5.6E4	160	N.D.	N.D.

^a All values rounded to 2 significant figures; uncertainties range from approximately 6 to 11%.

^b Number in parenthesis refers to radioactive isotope used for determination of concentration.

^c N.D. indicates none detected.

Al - Aluminum
Dy - Dysprosium
Eu - Europium
La - Lanthanum
Na - Sodium
Nd - Neodymium
Sm - Samarium
Th - Thorium
U - Uranium

ppm - parts per million

REFERENCES

1. Energy Measurements Group. An Aerial Radiological Survey of Wayne, New Jersey and Surrounding Area, September 1982, EG&G Survey Report EP-F-006, October 1982.
2. Oak Ridge National Laboratory. Results of the Mobile Gamma Scanning Activities at Wayne, New Jersey, and Surrounding Communities, Contract No. W-7405-ENG-261, Oak Ridge, TN, January 1983.
3. Oak Ridge National Laboratory. State Background Radiation Levels: Results of Measurements Taken During 1975-1979, ORNL/TM-7343, Oak Ridge, TN, November 1981.