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Formerly Utilized Sites Remedial Action Program (FUSRAP)

ADMINISTRATIVE RECORD

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ORNL/RASA-84/LJ5

Health and Safety Research Division

RESULTS OF THE RADIOLOGICAL SURVEY AT LODI MUNICIPAL PARK (LJ005), 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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RESULTS OF THE RADIOLOGICAL SURVEY AT LODI MUNICIPAL PARK, LODI, NEW JERSEY*

INTRODUCTION

A radiological survey of Lodi Municipal Park, Lodi, New Jersey, was conducted by Oak Ridge National Laboratory (ORNL) on August 22, 1984 at the request of the Department of Energy (DOE). Contaminated material was discovered during mobile gamma scan of Lodi, New Jersey.

The radiological survey conducted on this property was for the purpose of determining whether the property had any radioactive material onsite in excess of background radiation levels, and, if so, were these radioactive materials in excess of remedial action guidelines established by DOE such that the property could be "designated" for further investigation. This report summarizes the results of the "designation" survey performed on this property.

SURVEY METHODS

The radiological survey of the property included: (1) a gamma scan of the entire property outdoors; and (2) sampling of surface (0-15 cm) soil. These survey methods followed the plan outlined in Reference 2. A comprehensive description of the survey methods and instrumentation have been presented in another report.[3]

SURVEY RESULTS

Applicable federal guidelines have been summarized in Table 1. The normal background levels for the northern New Jersey area are presented in Table 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 at ground surface; background radiation levels have not been subtracted. Similarly, background concentrations have not been subtracted from radionuclide concentrations

* 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.

measured in environmental samples.

Systematic and Biased Soil Samples

Systematic and biased soil samples were taken from various locations on the property for radionuclide analyses. Locations of the systematic (LJ5S) and biased (LJ5B) samples are shown in Fig. 1, with results of laboratory analyses provided in Table 3. Concentrations of ^{232}Th did not exceed the background concentration of ^{232}Th anticipated for northern New Jersey in the systematic soil samples collected at Lodi Municipal Park (LJ5S). Concentrations of ^{232}Th in four biasd soil samples were only slightly elevated above background concentrations of ^{232}Th. These four samples (LS5B1A, LS5B1B, LS5B1C, and LS5B2A) contained crushed granite fill material which is known to have naturally higher concentrations of radionuclides from the ^{238}U and ^{232}Th decay chains. Use of this type of material for ballast under walkways was noted during scanning and sampling procedures. These results indicate that no ^{232}Th-bearing residues above DOE guidelines (Table 1) exist on this site.

Gamma Radiation Levels

Results of the gamma scan of the surface of the property show no areas where gamma exposure rates are in excess of variations in background radiation levels. These locations are shown in Fig. 2, and the measurements are quantified. Gamma exposure rate levels range from 5 to 15 μR/h on this property.

SUMMARY

Measurements taken at Lodi Municipal Park indicate that the property contains no radioactive contamination above variations in background from the ^{232}Th and ^{238}U decay chains. Although concentrations of ^{232}Th in four biased soil samples were slightly elevated above background, the levels are not in excess of DOE remedial action guidelines. It is recommended that this be excluded from further consideration in the DOE remedial action programs.

REFERENCES

1. R. W. Doane and B. A. Berven, "Results of the Mobile Gamma Scanning Activities in Lodi, New Jersey," Oak Ridge National Laboratory, ORNL/RASA-84/3 (October 1984).

2. W. D. Cottrell, ORNL, to A. J. Whitman, DOE/HQ, correspondence, "Radiological Survey of Private Properties in Lodi, New Jersey" (August 15, 1984).

3. Oak Ridge National Laboratory, Procedures Manual for the ORNL Remedial Action Survey and Certification Activities (RASCA) Program, ORNL/TM-8600 (October 1982).

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 and B. A. Berven, State Background Radiation Levels: Results of Measurements Taken During 1975-1979, Oak Ridge National Laboratory, ORNL/TM-7343 (November 1981).

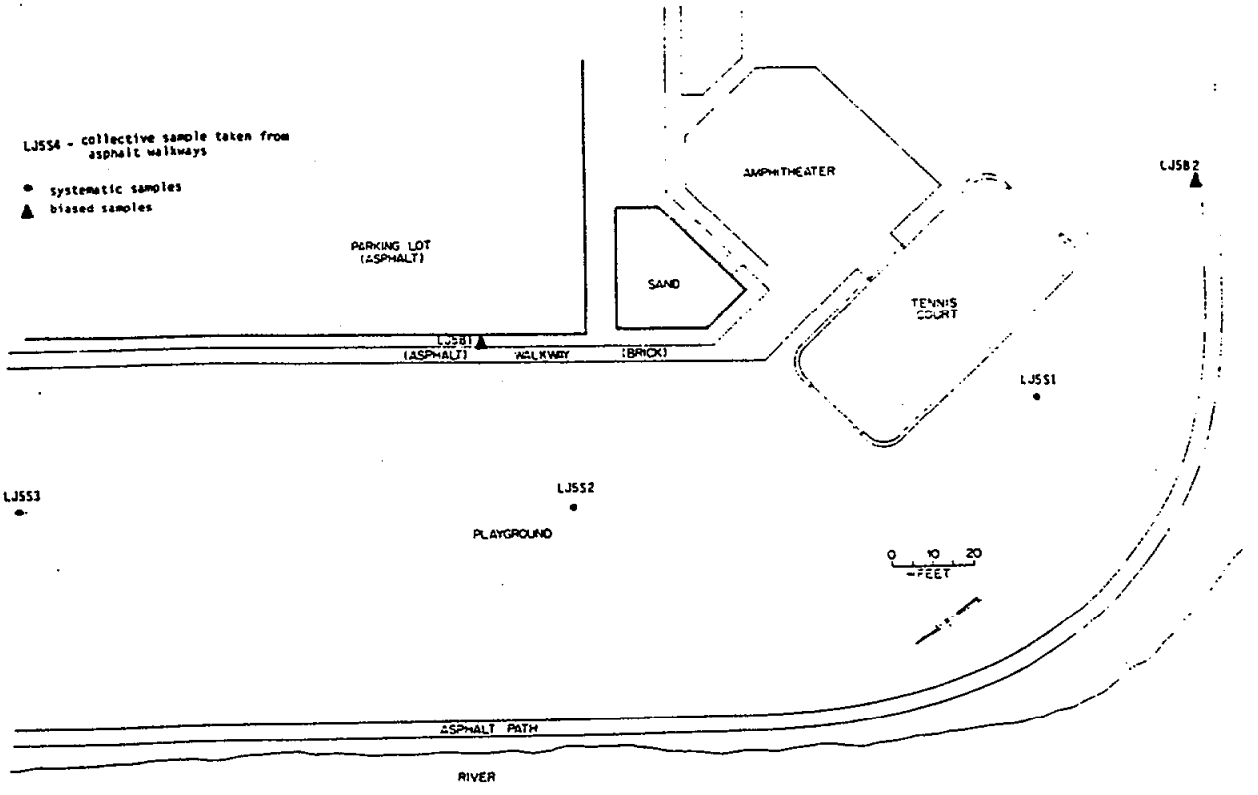

Fig. 1. Diagram showing location of soil samples taken at Lodi Municipal Park.

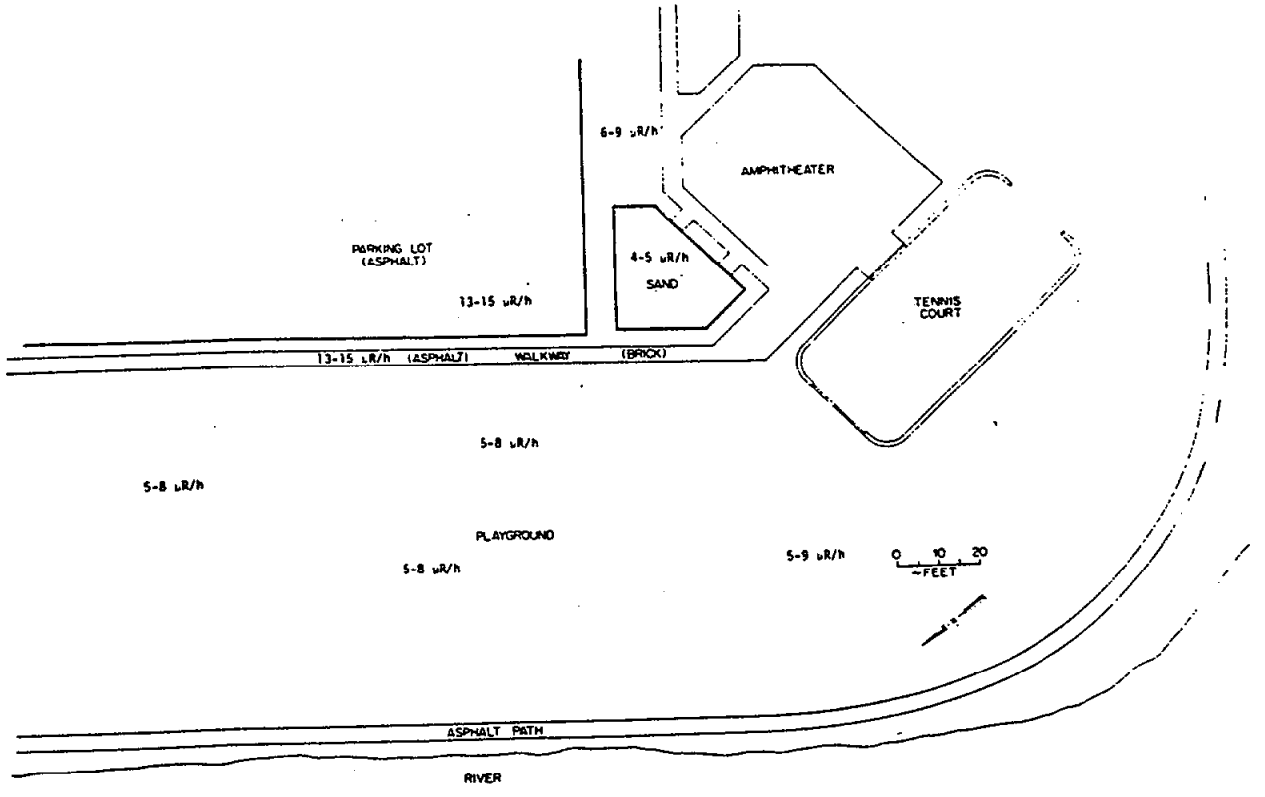

Fig. 2. Location of gamma radiation levels at Lodi Municipal Park.

Table 1. A summary of proposed applicable radiation guidelines for the FUSRAP program (April 1984).

Mode of exposure	Exposure conditions	Guideline value	Guideline source
1. External gamma radiation	Continuous exposure to individual in general population (whole body)	60 μR/h	Nuclear Regulatory Commission (NRC) - Standards for Protection Against Radiation (10 CFR 20.105)
2. Radionuclide concentrations in soil	Maximum permissible concentration of the following radionuclides in soil above background levels averaged over 100 m^2 area		DOE Interim Residual Contamination and Waste Control Guidelines for FUSRAP and SFMP Sites (April 1984)
	^{226}Ra ^{232}Th	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.	

Table 2. Background radiation levels for the northern New Jersey area.

Type or radiation measurement or sample	Radiation level or radionuclide concentration
Gamma exposure rate at 1 m above floor or ground surface (μR/h)	8[a]
Concentration of radionuclides in soil (pCi/g)	
^{232}Th	0.9[b]
^{238}U	0.9[b]
^{226}Ra	0.9[b]

[a]Reference 4.
[b]Reference 5.

Table 3. Results of soil sample analyses at property LJ005.

Sample[a]	Depth (cm)	Radionuclide concentration (pCi/g)		
		^{226}Ra[b]	^{232}Th	^{238}U[c]
		Systematic samples		
LJ5S1	0 - 15	0.64 ± 0.05	0.69 ± 0.2	0.95
LJ5S2	0 - 15	0.59 ± 0.1	0.60 ± 0.6	1.1
LJ5S3	0 - 15	0.38 ± 0.03	0.47 ± 0.2	0.58
LJ5S4	0 - 0	0.33 ± 0.04	0.30 ± 0.2	0.33
		Biased samples[d]		
LJ5B1A	0 - 10	1.4 ± 0.1	2.6 ± 0.9	1.3
LJ5B1B	10 - 20	2.0 ± 0.4	3.7 ± 1	2.0
LJ5B1C	20 - 30	1.9 ± 0.2	3.7 ± 0.9	1.6
LJ5B2A	0 - 10	1.6 ± 0.2	3.1 ± 0.8	2.3
LJ5B2B	10 - 20	2.8 ± 0.1	<0.28	3.2

[a]Locations of soil samples are shown on Fig. 1.

[b]Indicated counting error is at the 95% confidence level (± 2 σ).

[c] Total analytical error of measurement results is less than ± 3% (95% confidence level).

[d]Biased samples are taken from areas shown to have elevated gamma exposure rates.