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OAK RIDGE NATIONAL LABORATORY

MARTIN MARIETTA

RESULTS OF RADIOLOGICAL MEASUREMENTS TAKEN NEAR JUNCTION OF HIGHWAY 31 AND MILITARY ROAD IN NIAGARA FALLS, NEW YORK

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HEALTH AND SAFETY RESEARCH DIVISION

Nuclear and Chemical Waste Programs
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RESULTS OF RADIOLOGICAL MEASUREMENTS TAKEN NEAR JUNCTION OF HIGHWAY 31 AND MILITARY ROAD IN NIAGARA FALLS, NEW YORK

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Work performed as part of the
RADIOLOGICAL SURVEY ACTIVITIES PROGRAM

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INTRODUCTION

A mobile gamma scanning survey was conducted of some streets in Niagara Falls, New York, and the surrounding area by the Radiological Survey Activities (RASA) group of Oak Ridge National Laboratory (ORNL) during the period October 3-16, 1984.[1] The purpose of this mobile scanning survey was to identify all detectable gamma radiation anomalies which may be related to the transportation of radioactive waste material to the Lake Ontario Ordnance Works for storage. As a result of this activity, 100 properties in the Niagara Falls, New York area were identified as having elevated radiation levels and were recommended for onsite survey. The property 122 m north of the junction of Highway 31 and Military Road was one of the 100 properties identified by the mobile gamma scanning van.

A radiological survey of the property near the junction of Highway 31 and Military Road was conducted on July 15, 1985. The purpose of the radiological survey at this property was to determine if contaminated materials were present on this property, and, if so, determine if it were in excess of remedial action guidelines established for the Niagara Falls Storage Site (NFSS) in the Department of Energy's (DOE) Formerly Utilized Sites Remedial Action Project (FUSRAP). This report provides the results of that radiological survey.

SURVEY METHODS

The radiological survey of this property included a gamma scan of the entire ground surface of this area, and a soil sample from an area of elevated gamma radiation levels. A comprehensive description of the survey methods and instrumentation has been presented in another report.[2]

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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-AC05-84OR21400.

SURVEY RESULTS

Typical background radiation levels for the Niagara Falls area are presented in Table 1. The data is provided for purposes of comparison with the survey results presented in this section.

All measurements presented in this report are gross readings; background radiation levels have not been subtracted. Similarly, background concentrations have not been subtracted from radionuclide concentrations in soil samples.

Gamma Measurements

The area surveyed is shown in Fig. 1. All areas were within the background gamma exposure rate levels of 8 to 10 μR/h (microroentgen* per hour) with the exception of an area averaging 25 ft wide (7.6 m) by 25 ft (7.6 m) in length on the east side of Military Road , 3 ft wide (1.0 m) by 33 ft (10 m) in length on the west side of Military Road (see shaded portion of Fig. 1). The gamma exposure rate in these areas ranged from 14 to 29 μR/h.

Soil Sample

A single soil sample (NF2B33) was taken from the surface (0-10 cm) of the area of elevated gamma radiation. The concentration of ^{226}Ra in this sample was 40 ± 1 pCi/g (picoCuries** per gram), and the concentration of ^{238}U was 4.7 ± 1 pCi/g.

SIGNIFICANCE OF FINDINGS

A 25 x 25-ft area (625 ft^2 or 58 m^2) with elevated gamma radiation levels ranging up to 29 μR/h on the ground surface was observed on the west side of a property 122 m north of the junction of Highway 31 and Military Road in Niagara Falls, New York. A soil sample taken from this

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*The roentgen (R) is a unit which was defined for radiation protection purposes for people exposed to penetrating x-rays or gamma radiation. A microroentgen (μR) is one millionth of a roentgen.

**The curie is a unit used to define the radioactivity in a substance and equals that quantity of any radioactive isotope undergoing 2.2 x 10^{12} disintegrations per minute. The picocurie is one million-millionth of a curie or that amount yielding 2.2 disintegrations per minute.

area had concentrations of ^{226}Ra in excess of 47 times average background levels, while the ^{238}U concentration was five times average background levels.

The ratio of $^{226}Ra/^{238}U$ activity is consistent with contaminated material originating from the NFSS. The amount of material present on this property is believed to be in excess of relevant FUSRAP remedial action guidelines[3] (e.g. the weighted average in excess of 5 pCi/g of ^{226}Ra over 100 m^2 in the upper 15 cm of soil).

Based on the results of the radiological survey conducted at this property, it is recommended that this property be designated for a formal radiological characterization survey.

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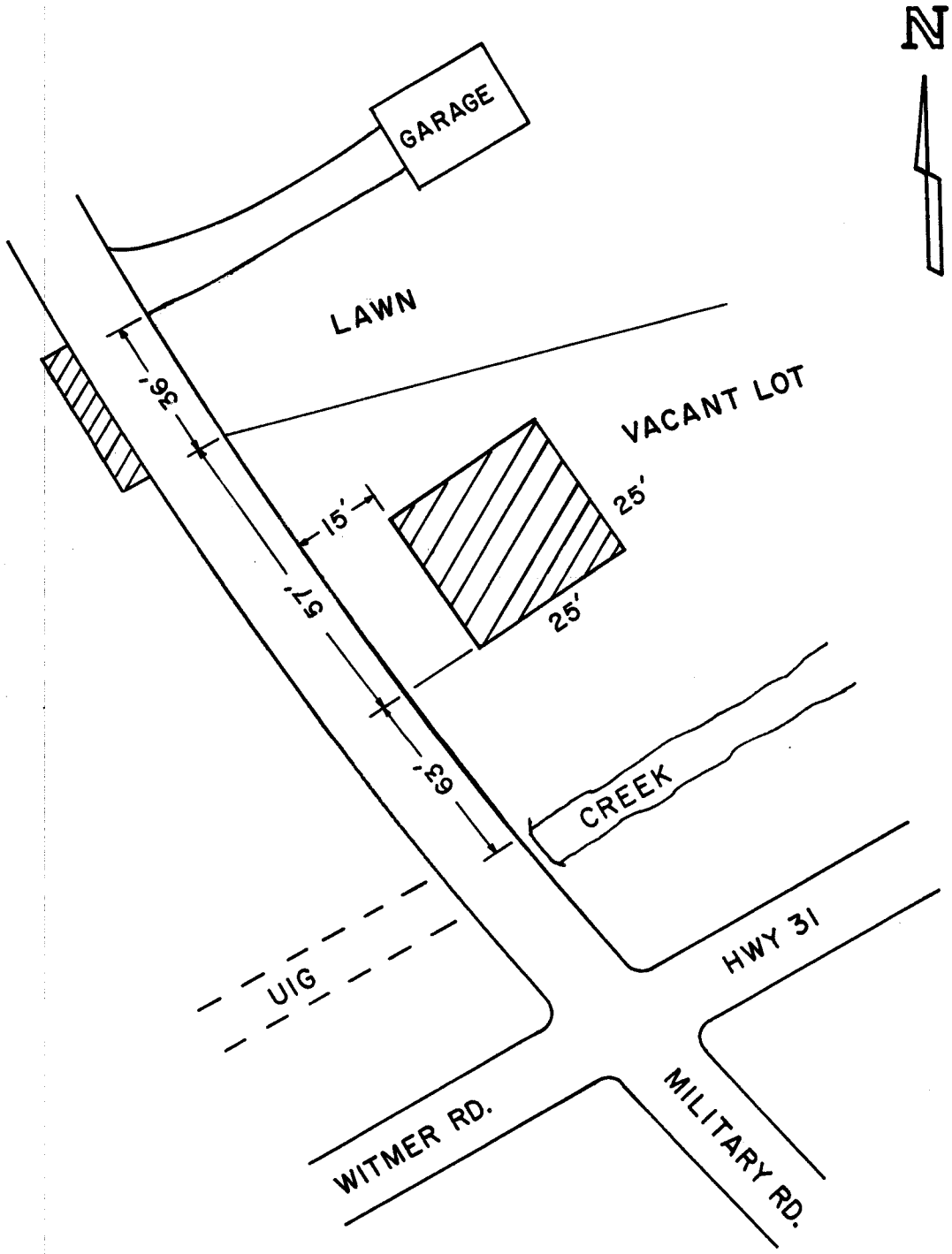

CONTAMINATED AREA

DRAWING NOT TO SCALE

Fig. 1. Area surveyed near the junction of Highway 31 and Military Road in Niagara Falls, New York.

Table 1. Background radiation levels in the Niagara Falls area.

Type of radiation measurement or sample	Radiation level or radionuclide concentration	
	Range	Average
Gamma exposure rate at 1 m above floor or ground surface (μR/h)[a]	8-10	9
Concentration of radionuclides in soil (pCi/g)[b]		
^{238}U	0.76-1.2	0.96
^{226}Ra	0.48-1.2	0.85

[a]Values obtained from four locations in the New York area.
[b]Soil samples obtained from six locations around the Niagara Falls area.

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