

NY.17-9

8275  
NY.17

# ornl

ORNL/RASA-85/1

**OAK RIDGE  
NATIONAL  
LABORATORY**

**MARTIN MARIETTA**

RESULTS OF THE MOBILE GAMMA SCANNING  
ACTIVITIES IN NIAGARA FALLS, NEW YORK AREA

OPERATED BY  
MARTIN MARIETTA ENERGY SYSTEMS, INC.  
FOR THE UNITED STATES  
DEPARTMENT OF ENERGY

Access to the information in this report is limited to those  
indicated on the distribution list and to Department of Energy  
and Department of Energy Contractors

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

Health and Safety Research Division

RESULTS OF THE MOBILE GAMMA SCANNING ACTIVITIES  
IN NIAGARA FALLS, NEW YORK AREA

W. H. Shinpaugh, B. A. Berven, and W. D. Cottrell

NUCLEAR AND CHEMICAL WASTE PROGRAMS  
(Activity No. AH 10 05 00 0; ONLWC01)

Manuscript Completed - February 1985

Date of Issue - August 1985

Investigation Team

B. A. Berven - RASA Program Manager  
W. D. Cottrell - FUSRAP Project Director  
W. H. Shinpaugh - Field Survey Supervisor

Work performed as part of the  
RADIOLOGICAL SURVEY ACTIVITIES PROGRAM

Prepared by the  
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-AC05-84OR21400

CONTENTS

	<u>Page</u>
LIST OF FIGURES AND TABLES . . . . .	v
ACKNOWLEDGEMENTS . . . . .	vii
INTRODUCTION . . . . .	1
SURVEY METHODS . . . . .	1
Instrumentation . . . . .	1
Mobile Scanning Method . . . . .	2
SURVEY RESULTS . . . . .	2
Scope of Activities . . . . .	2
Scan Results . . . . .	2
SIGNIFICANCE OF FINDINGS . . . . .	3
REFERENCES . . . . .	4

LIST OF FIGURES AND TABLES

<u>Figure</u>		<u>Page</u>
1	Area surveyed during the mobile gamma scan of Niagara Falls, New York . . . . .	5
2	Anomaly locations in the Lewiston-Lake Ontario Ordnance Works area . . . . .	6
3	Anomaly locations in the Niagara Falls area . . . . .	7
4	Anomaly locations in the Grand Island-Tonawanda area. . .	8

<u>Table</u>		<u>Page</u>
1	Anomalies on south side of Pletcher Road. . . . .	9
2	Anomalies on north side of Pletcher Road and south side of Old Pletcher Road . . . . .	10
3	Anomalies in Lewiston, New York area. . . . .	11
4	Anomalies northeast of Niagara Falls area . . . . .	12
5	Anomalies in Grand Island-Tonawanda area. . . . .	13
6	Anomalies in Niagara Falls, New York. . . . .	14

## ACKNOWLEDGEMENTS

Research for this project was sponsored by the Division of Remedial Action Projects, Oak Ridge National Laboratory (ORNL), U.S. Department of Energy. The authors wish to acknowledge the support of J. E. Baublitz, Director, Division of Remedial Action Projects, E. G. DeLaney, Manager, FUSRAP/Surplus Facilities Group, and members of their staff. The authors recognize the valuable contributions of M. S. Blair and J. A. Roberts of the RASA group for participation in the mobile scan of the area. In addition, the authors appreciate the manuscript preparation by S. E. Huckaba.

# RESULTS OF THE MOBILE GAMMA SCANNING ACTIVITIES IN NIAGARA FALLS, NEW YORK AREA

## INTRODUCTION

A mobile gamma scanning survey of some streets in Niagara Falls, New York, and the surrounding area was conducted during the period of October 3-16, 1984. The purpose of this survey was to identify all detectable gamma radiation anomalies which may be related specifically to the transporting of radioactive waste material to the Lake Ontario Ordnance Works for storage. Daily logs and other reports from LOOW, AEC, and Linde Air Products were used in determining which routes may have been used in transporting these materials.

It was requested by the U.S. Department of Energy (DOE) that Oak Ridge National Laboratory (ORNL) perform a mobile survey of the Niagara Falls 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' 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 Niagara Falls 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

---

\* 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.

is transferred to a computer-controlled eight-channel discriminator and interface, which provides for continuous analysis of data inputs for correlation of system location with count rate information. Six separate energy regions-of-interest are analyzed and a  $^{226}\text{Ra}$ -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.

## SURVEY RESULTS

### Scope of Activities

The survey results presented in this report represent the scanning of all streets, roads, and highways that were likely to have been used for the transporting of waste material from Linde Air Products in Tonawanda to the LOOW site. The area covered during the survey is shown in Fig. 1.

### Scan Results

As the basis for analysis of the mobile scan data, background count rates in the regions of interest were measured on thoroughfares that were to be scanned. These background data were used to provide baseline

comparison in search of gamma radiation anomalies as described in detail in another report (Ref. 1).

Analysis of the mobile scan data indicates the presence of 100 anomalies associated with  $^{226}\text{Ra}$ - and  $^{232}\text{Th}$ -bearing materials. The exact areal extent of contamination associated with these properties could not be determined with the mobile gamma scanning van due to lack of access roads on all sides of areas. Eighty-seven of the anomalies were associated with  $^{226}\text{Ra}$ , and 13 were associated with  $^{232}\text{Th}$ .

The location and descriptions of these properties are presented in Table 1. The location of the  $^{226}\text{Ra}$  and  $^{232}\text{Th}$  anomalies are shown on Figures 2-4. No anomalies were found on the following roads: Swann Road, Model City Road, Harold Road, and Creek Road north of Highway 104.

#### SIGNIFICANCE OF FINDINGS

Based on the results of the ORNL scanning activities, 100 properties in the Niagara Falls, New York, area are recommended for future on-site inspections. It may be found that some of the listings may have been influenced by naturally-occurring radionuclides present in building materials and their close proximity to the radiation detectors during the mobile scan. Additionally, several of the radiation anomalies are associated with parking lots and streets, which may have used phosphate slag material originating from the former Oldbury Furnace in Niagara Falls, New York.<sup>3</sup>

## REFERENCES

1. Myrick, T. E., M. S. Blair, R. W. Doane, and W. A. Goldsmith, 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. Berger, James D., Oak Ridge Associated Universities, Memorandum to Claude L. Yarbrow, DOE/OR, dated July 2, 1984.
3. W. D. Cottrell, B. A. Berven, and F. F. Haywood, "Radiological Survey at Selected Locations in Niagara Falls, New York," Central Files Memorandum, ORNL/CF-80/320 (October 1981).

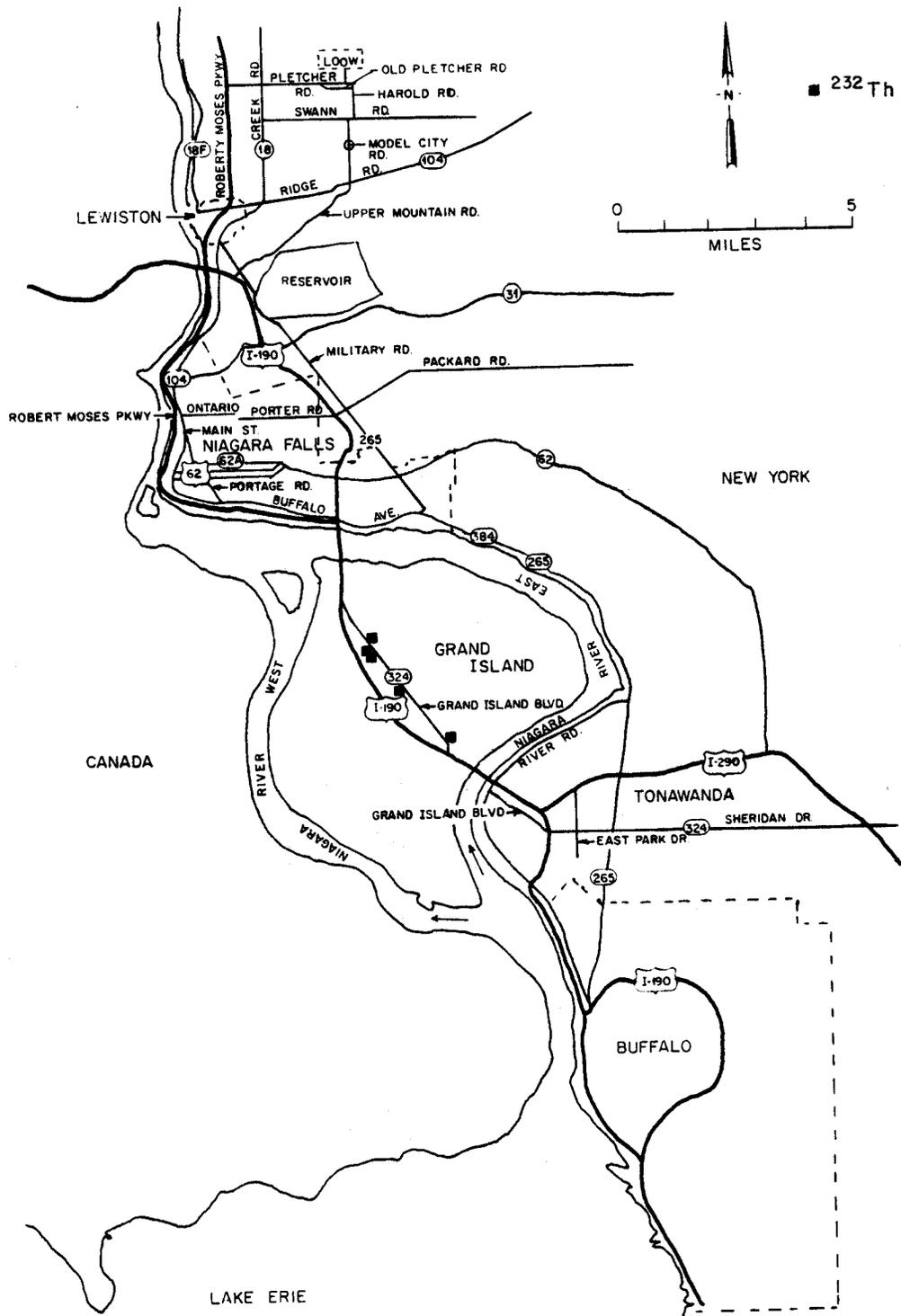


Fig. 1. Area surveyed during the mobile gamma scan of Niagara Falls, New York.

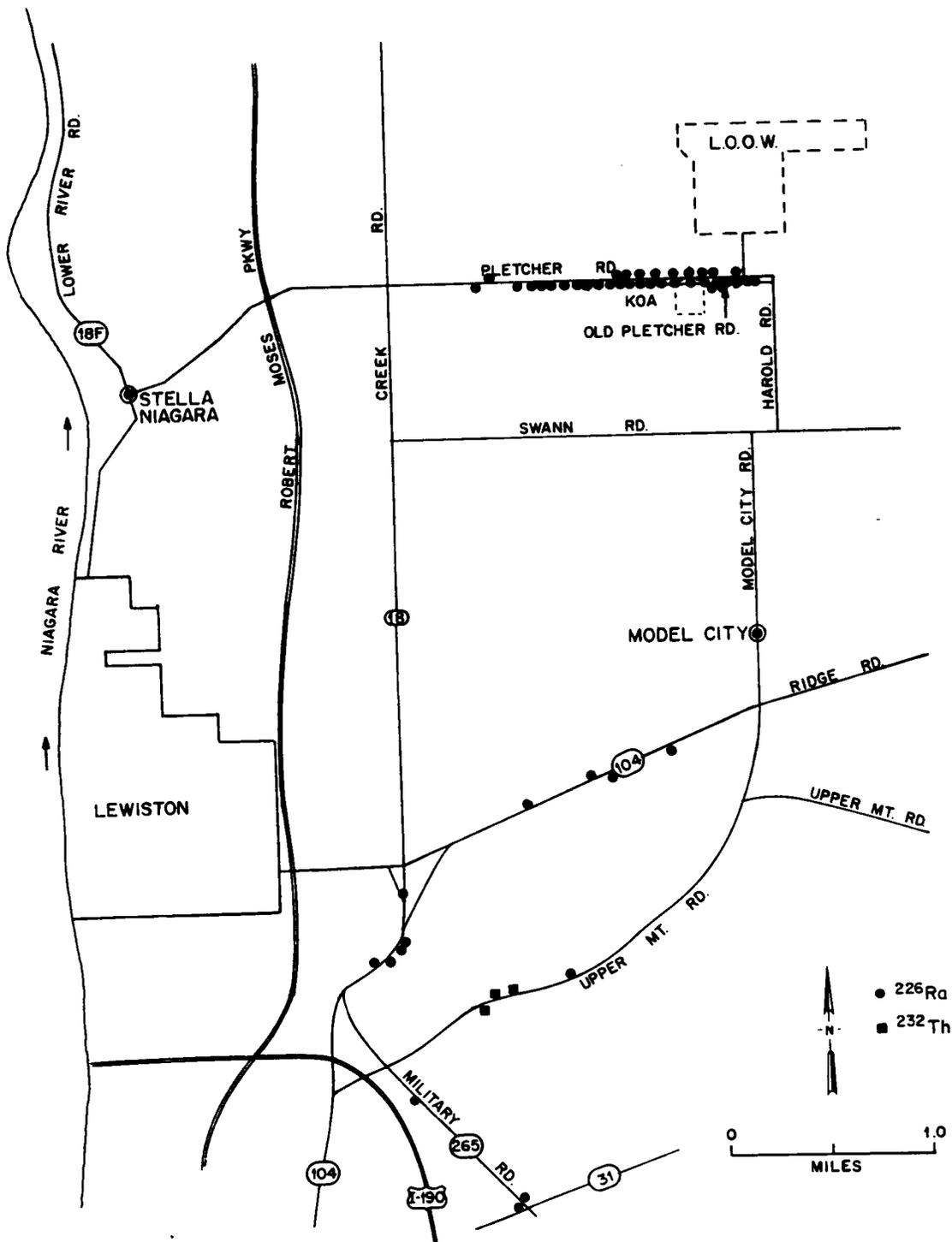


Fig. 2. Anomaly locations in the Lewiston-Lake Ontario Ordnance Works area.

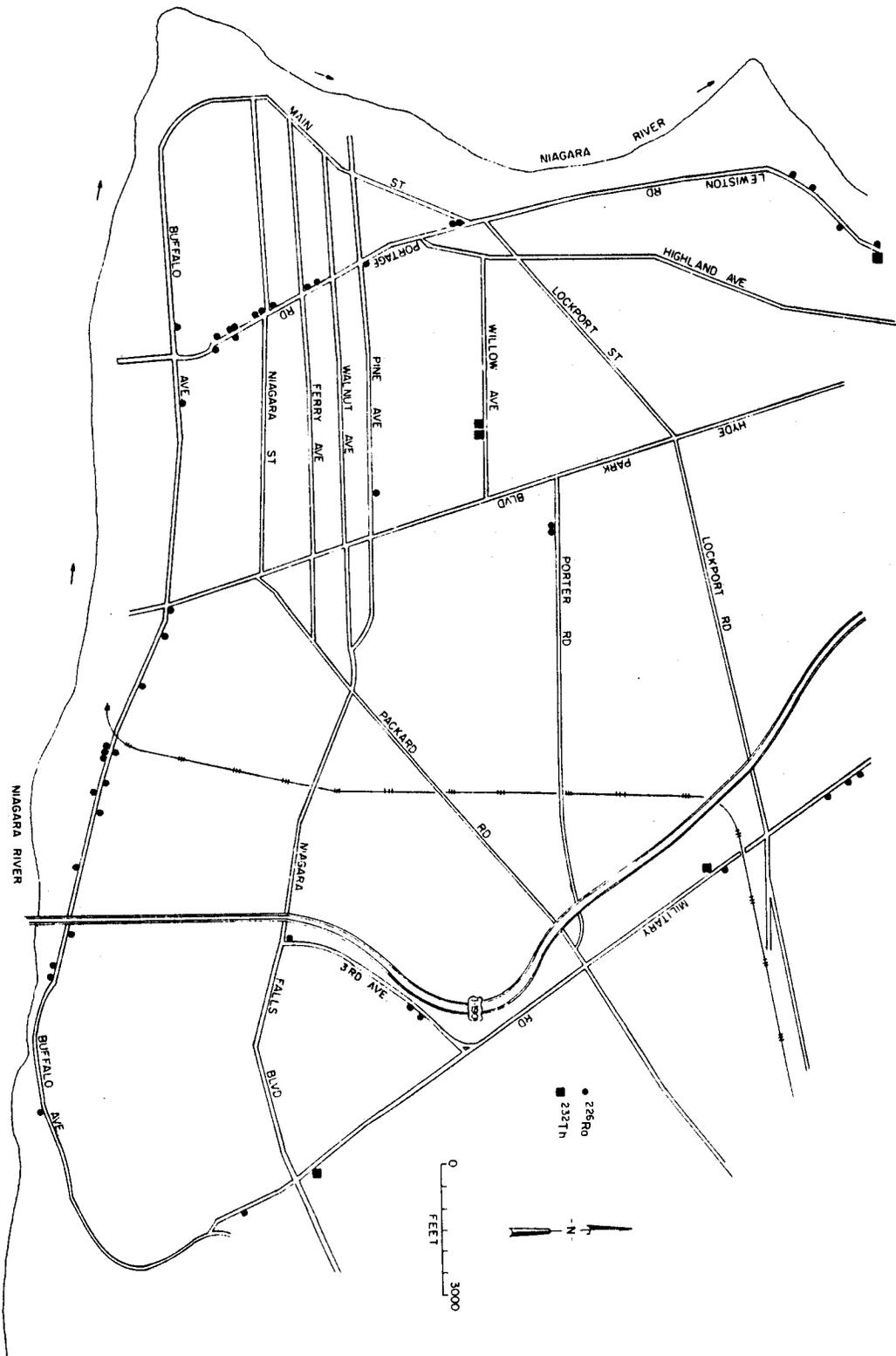


Fig. 3. Anomaly locations in the Niagara Falls area.

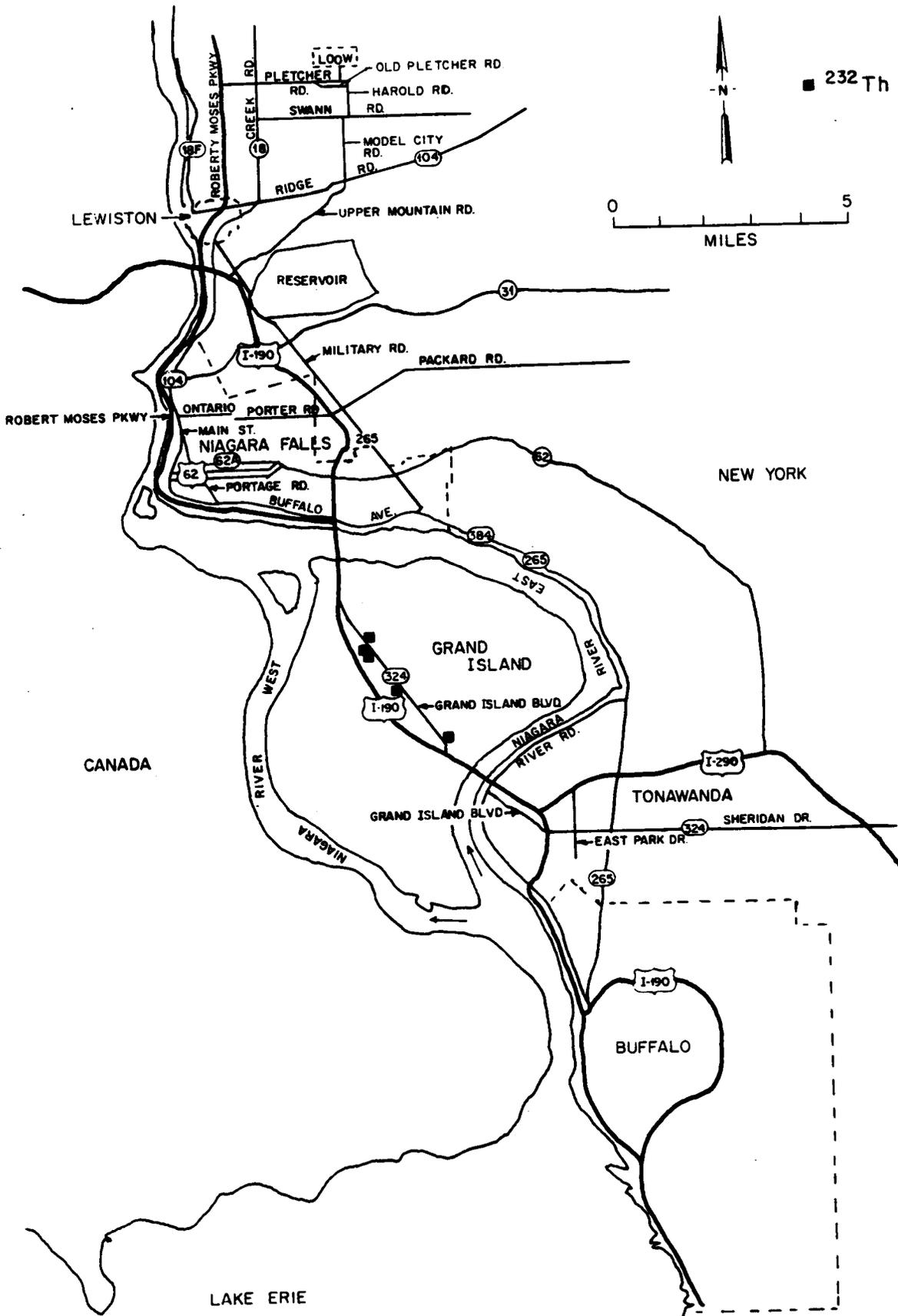


Fig. 4. Anomaly locations in the Grand Island-Tonawanda area.

Table 1. Anomalies on south side of Pletcher Road (distance measurements in feet scanning east from Creek Road).

Distance (ft)	Type anomaly	Property description
2200	Ra-226	Open field
2950	Ra-226	Open field
3950	Ra-226	Open field
4080	Ra-226	Open field
4300	Ra-226	Open field
4880	Ra-226	Open field
5775	Ra-226	Open field
6460	Ra-226	Open field
6875	Ra-226	Open field
7025	Ra-226	Open field
7138	Ra-226	Open field
7192	Ra-226	Open field
7312	Ra-226	Open field
7340	Ra-226	Open field
7407	Ra-226	Open field
7452	Ra-226	Open field
7525	Ra-226	Open field
7600	Ra-226	Open field
7915	Ra-226	Open field
7927	Ra-226	Open field
8343	Ra-226	Open field
8628	Ra-226	Open field
8960	Ra-226	Open field

**Table 2. Anomalies on north side of Pletcher Road and south side of Old Pletcher Road (distance measurements in feet scanning west from Howard Road).**

<b>Distance (ft)</b>	<b>Type anomaly</b>	<b>Property description</b>
746	Ra-226	Open field
1169	Ra-226	Open field
1298	Ra-226	Open field
1488	Ra-226	Open field
2333	Ra-226	Open field
2363	Ra-226	Open field
2530 (large area)	Ra-226	Open field
2768	Ra-226	Open field
2844	Ra-226	Open field
6170	Ra-226	Open field
<b>Old Pletcher Road</b>		
490 feet east of KOA entrance	Ra-226	Open field
570 feet east of KOA entrance	Ra-226	Open field

Table 3. Anomalies in Lewiston, New York area.

Location	Type anomaly	Property description
961 Ridge Road	Ra-226	Driveway
House between 889 and 913 Ridge Road	Ra-226	Driveway
1082 Ridge Road	Ra-226	Probably driveway
Circle gravel drive south side Ridge Road at TP45	Ra-226	Open field
1011 Upper Mt. Road	Ra-226	Driveway
783 Upper Mt. Road	Th-232	Yard and driveway
789 Upper Mt. Road	Th-232	Yard and driveway
738 Upper Mt. Road	Th-232	Yard and driveway
4977 Creek Road	Ra-226	Yard
4979 Creek Road	Ra-226	Yard
4945 Creek Road	Ra-226	Yard
Junction of Highways 18 and 104 (NE side of 104 and 18)	Ra-226	Highway median
4986 Creek Road and adjoining lot	Ra-226	Yard

Table 4. Anomalies northeast of Niagara Falls area.

Location	Type anomaly	Property description
Across street from 5439 and 5447 Military Road	Ra-226	Open field
Reservoir State Park (NW corner of Military Road and Highway 31)	Ra-226	Park
Military Road ~ 400 ft north of Highway 31 (both sides of creek)	Ra-226	Vacant lots
2924 Military Road	Th-232	Resident
6560 Niagara Falls Blvd.	Ra-226	Business
Walter S. Kozdranski Co., Inc. 1865 3rd Avenue	Ra-226	Business
Nuts and Bolts Products, Inc. 2115 3rd Avenue	Ra-226	Business
Save-Rite Discount Store 4301 Military Road	Ra-226	Business
Louie's Place 4509 Military Road	Ra-226	Business
4611 and 4613 Military Road	Ra-226	Parking lot
Prince of Peace Church Military Road (Rectory, 908 N. Military Road)	Ra-226	Parking lot
Metropolitan Life and National Fuel 1329 N. Military Road	Th-232	Business

Table 5. Anomalies in Grand Island-Tonawanda area.

Location	Type anomaly	Property Description
Kelly's Country Store 3121 Grand Island Blvd.	Th-232	Business
Mobil Service Station 1685 Grand Island Blvd.	Th-232	Business
3060 Grand Island Blvd.	Th-232	Probably parking lot
3050 and 3044 Grand Island Blvd.	Th-232	Probably parking lot
KOA Campground 2570 Grand Island Blvd.	Th-232	Business

Table 6. Anomalies in Niagara Falls, New York.

Location	Type anomaly	Property description
SE corner of Cudaback and Portage Road	Ra-226	Commercial building
Between 245 and 257 Portage Road	Ra-226	Parking lot
Niagara Falls High School Pine Street and Portage Road	Th-232	School
1318-1324 Portage Road	Ra-226	Business
Harris and Lever Florists Portage Road	Ra-226	Business
574 Portage Road	Ra-226	Business
NW corner Ferry Avenue and Portage Road (probably 504 Portage Road)	Ra-226	Vacant lot
Property between 434 Portage Road and 1338 Niagara Street	Ra-226	Residence
368 Portage Road	Ra-226	Residence
356 Portage Road	Ra-226	Residence
256 Portage Road	Ra-226	Residence
Between 242 Portage Road and Payne's Floor Covering	Ra-226	Vacant lot
200 Portage Road	Ra-226	Business
Opposite 5704 Buffalo Avenue	Ra-226	Vacant lot
6901 Buffalo Avenue	Ra-226	Vacant lot
7723 Buffalo Avenue	Ra-226	Business
5512 Buffalo Avenue	Ra-226	Business
Buffalo Avenue (230 ft west of 53rd Street)	Ra-226	Grass area and sidewalk

Table 6. Continued.

Location	Type anomaly	Property description
Occidental Chemical Corp. Buffalo Avenue	Ra-226	Business
Opposite ALOX Corp. Buffalo Avenue	Ra-226	Parking lot
Buffalo Avenue (east side of Hyde Park intersection)	Ra-226	Vacant lot
Buffalo Avenue opposite SOHIO	Ra-226	Parking lot
1920 Buffalo Avenue	Ra-226	Business
Buffalo Avenue opposite Carborundum Corp.	Ra-226	Vacant lot
2434 Willow Avenue	Th-232	Residence
2430 Willow Avenue	Th-232	Residence
3017 Lewiston Road and property on south side	Ra-226	Residence
4831 Lewiston Road	Th-232	Residence
4842 Lewiston Road	Ra-226	Residence
Intersection Rankine Road and Lewiston Road (west side)	Ra-226	Street
Intersection McKinney and Lewiston Road (west side)	Ra-226	Street
2919 Porter Road	Ra-226	Residence
2923 Porter Road	Ra-226	Residence
Corner of Pine Street and 29th Street (Wilson Farms Store)	Ra-226	Business

## INTERNAL DISTRIBUTION

- |      |                |     |                          |
|------|----------------|-----|--------------------------|
| 1-5. | B. A. Berven   | 11. | T. H. Row                |
| 6.   | R. O. Chester  | 12. | IR&A Publications Office |
| 7-9. | W. D. Cottrell | 13. | Laboratory Records - RC  |
| 10.  | S. V. Kaye     |     |                          |

## EXTERNAL DISTRIBUTION

14. Office of Assistant Manager, Energy Research and Development,  
Oak Ridge Operations Office, Oak Ridge, TN 37831
- 15-16. Technical Information Center, DOE, Oak Ridge, TN 37831
- 17-26. Arthur J. Whitman, U.S. Department of Energy, 19901 Germantown  
Road, Germantown, MD 20874