RADIATION SURVEY OF NFSS VICINITY

On Sunday October 2, 1994, Jim Rauch, Tim Henderson, John Kohl and Pete Ohanessian conducted a gamma radiation exposure survey of several areas surrounding the Niagara Falls Storage Site (NFSS). The equipment used was made by Ludlum Measurements, Inc.: a Model 44-2 detector (a one inch sodium iodide crystal and 10 stage photomultiplier tube) connected to a Model 2221 scaler/ratemeter. The meter was used in the gross counting mode and the threshhold energy was set at 50 kilo-electron volts (keV). Measurements were taken with the detector held approximately 2 feet above the ground at each data collection point (see map).

Gross counts were accumulated for one minute, using the digital scaler, and recorded as counts per minute (cpm). With this equipment setup, 200 cpm roughly corresponds to a radiation exposure of one microRoentgen per hour (microR/hr).* MicroRoentgens per hour can be converted to milliRoentgens per year by multiplying by 8.76 (there are 8760 hours in a year); and milliRoentgens per year can be converted to millirems per year (mrem/yr) by multiplying by 0.83. The raw data (cpm) and these conversions (microR/hr and mrem/yr) are presented in the table below.

Background exposure was determined at the rear of the property at 953 Ridge Road and in the front yard at 415 Tryon Drive, both in the Town of Lewiston . These values were within the expected range, for this area, of 7 to 10 microR/hr (51 to 73 mrem/yr).

Measurably elevated exposure rates were found at several of the the locations: 1,5,6,7,8 and 9. These locations exhibited exposure rates (around-the-clock) above recent New York State Department of Environmental Conservation cleanup guidance for soils contaminated with radioactive materials (TAGM-4003) which limits maximum residual exposure to 10 mrem/yr above background. Accordingly, further investigation of these areas may be necessary to determine if these elevated exposures are due to site-related contamination.

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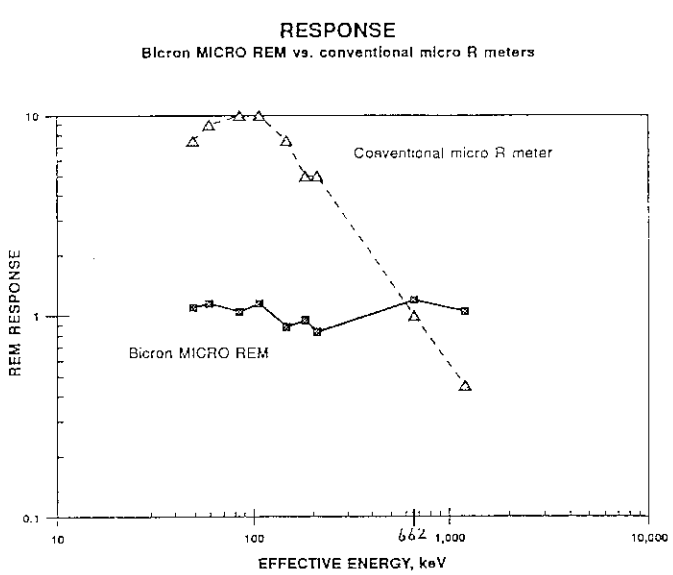
* Because the energy response of the sodium iodide detector is not flat across the gamma energy spectrum, this relationship is dependent upon the distribution of gamma energies (the shape of the gamma energy spectrum) being measured remaining fairly constant. The relationship (200 cpm representing approximately 1 microR/hr) holds for the typical mix of terrestial background gamma sources (naturally-occurring potassium-40, and uranium and thorium decay chain members) encountered in the field. However, a disproportionate increase in the lower energy gamma contribution (below 662 keV) to the total count rate will result in a corresponding overestimation of exposure rate (in microR/hr). Similarly, a disproportionate increase in the higher energy gamma contribution (above 662 keV) will result in a corresponding

underestimation of exposure rate. See energy response curve of typical sodium iodide detector, identified as "conventional micro R meter", shown below.

TABLE

Location	cpm	microR/hr	mrem/yr
Background:			
935 Ridge Road	1800	9.0	65
415 Tryon Drive	1503	7.5	54.5
1) swale between Pletcher Rd. and old LOOW road (near telephone pole SPA 435)	2802	14.0	102
2) West Drainage Ditch, south side of Pletcher Rd.	2424	12.1	88.1
3) West Drainage Ditch, north side of Pletcher Rd.	2050	10.2	74.5
4) swale near DOE fence along West Drainage Ditch	2188	10.9	79.5
5) ditch on east side of NFSS entrance road	2842	14.2	103
6) pavement opposite west side road	3196	16.0	116
7) pavement about 20 yards south of (6)	3104	15.5	113
contact (1 centimeter)	3324	16.6	121
8) Niagara Mohawk access road next to KOA campground	3704	18.5	135
9) pavement along old LOOW road	2997	15.0	109
10) west bank of Four Mile Creek	1607	8.0	58
11) south bank of Central Drainage Ditch, east side Lutts Rd.	2185	10.9	79.4



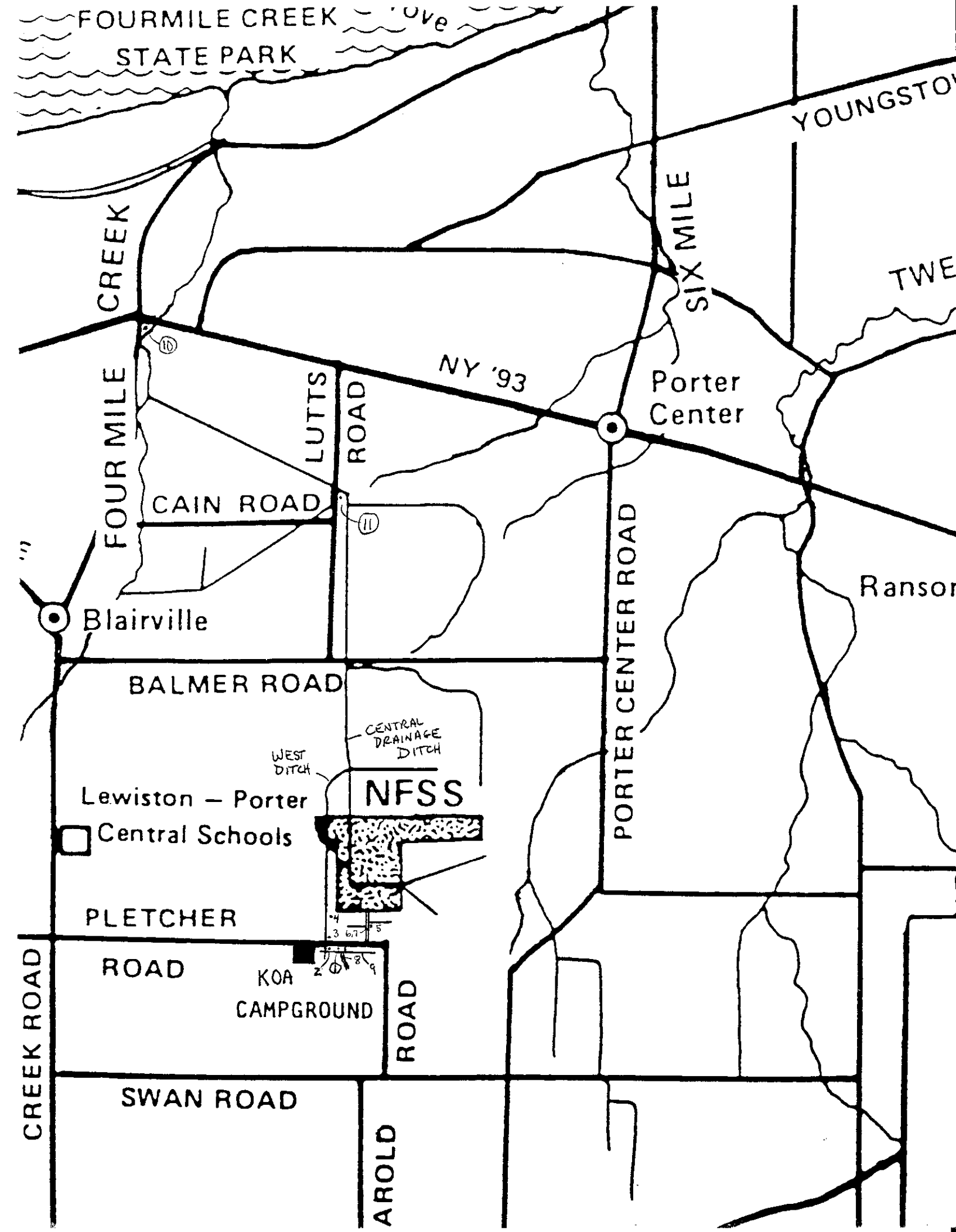
The **MICRO REM and MICRO SIEVERT models** are lightweight, portable survey meters for applications where accurate dose rate measurements of low radiation levels are required. They read absorbed dose rate directly so no conversion from mR/h is required.

The tissue-equivalent scintillator used in these instruments gives them a nearly flat, rem energy response. This rem response is based on the deep dose equivalent index for 1 cm depth, uniparallel directional beam as calculated on the ICRU standard sphere.

These instruments' rem response and accuracy sets them apart from conventional "micro R" meters which use NaI(Tl) detectors. NaI(Tl) detectors overrespond to low energies and produce erroneously high readings. Also, you have to convert μR/h readings to μrem/h to get absorbed dose.

(graph and text from Bicron Radiation Measurement Products catalog)

James Rauch 12-15-94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LUTTS
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CAIN ROAD
Blairville
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