

State of Vermont

Environmental Radiation Surveillance Report



2001 Summary



**Vermont Department of Health
Office of Occupational & Radiological Health**

AIR SAMPLES 2001

Air samples are taken at various fixed locations using a line powered piston type compressor operating at a rate of 1 cubic foot per minute nominal. The sample is collected on a fiberglass 2" diameter filter. Collection time is continuous with a nominal sampling period of four weeks. The samples are sent to the Vermont State Department of Health Laboratory for gross Alpha and Beta analyses. Results are reported in picoCuries per cubic meter of air with 2 sigma (standard deviation) value.

(picoCuries/Cubic Meter)

Sample Period	Windham County Court		Brattleboro State Police	
	Alpha	Beta	Alpha	Beta
1/3 - 2/1/01	0.0026 + 0.0009	0.0218 + 0.0021	0.0023 + 0.0008	0.0155 + 0.0015
2/1 - 3/1/01	0.0023 + 0.0010	0.0186 + 0.0022	0.0017 + 0.0007	0.0142 + 0.0014
3/1 - 4/20/01	0.0019 + 0.0008	0.0112 + 0.0013	0.0014 + 0.0006	0.0096 + 0.0010
4/20 - 5/14/01	0.0047 + 0.0016	0.0202 + 0.0025	0.0043 + 0.0014	0.0166 + 0.0021
5/14 - 6/6/01	0.0024 + 0.0010	0.0096 + 0.0016	0.0017 + 0.0071	0.0071 + 0.0013
6/6 - 7/3/01	0.0044 + 0.0013	0.0154 + 0.0017	0.0027 + 0.0010	0.0135 + 0.0015
7/3 - 8/2/01	0.0027 + 0.0009	0.0136 + 0.0015	0.0024 + 0.0008	0.0123 + 0.0013
8/2 - 9/10/01	0.0036 + 0.0009	0.0182 + 0.0015	0.0033 + 0.0008	0.0152 + 0.0012
9/10 - 10/3/01	0.0040 + 0.0015	0.0166 + 0.0025	0.0033 + 0.0012	0.0130 + 0.0020
10/3 - 11/1/01	0.0048 + 0.0011	0.0200 + 0.0016	0.0035 + 0.0008	0.0151 + 0.0013
11/1 - 12/6/01	0.0050 + 0.0014	0.0227 + 0.0022	0.0036 + 0.0010	0.0190 + 0.0017
12/6/01 - 1/3/02	0.0036 + 0.0010	0.0196 + 0.0024	0.0034 + 0.0008	0.0156 + 0.0018

AIR SAMPLES 2001
(picoCuries/Cubic Meter)

Sample Period	Guilford Town Garage		Henry Transportation, Vernon	
	Alpha	Beta	Alpha	Beta
1/3 – 2/1/01	0.0036 ± 0.0010	0.0216 ± 0.0019	0.0025 ± 0.0008	0.0183 ± 0.0016
2/1 – 3/1/01	0.0043 ± 0.0011	0.0175 ± 0.0017	0.0023 ± 0.0007	0.0157 ± 0.0015
3/1 – 4/20/01	0.0025 ± 0.0008	0.0116 ± 0.0012	0.0019 ± 0.0006	0.0098 ± 0.0010
4/20 – 5/14/01	0.0045 ± 0.0015	0.0184 ± 0.0022	0.0039 ± 0.0013	0.0167 ± 0.0020
5/14 – 6/6/01	0.0012 ± 0.0008	0.0080 ± 0.0014	0.0020 ± 0.0008	0.0071 ± 0.0013
6/6 – 7/3/01	0.0024 ± 0.0010	0.0142 ± 0.0015	0.0023 ± 0.0010	0.0131 ± 0.0015
7/3 – 8/2/01	0.0019 ± 0.0007	0.0109 ± 0.0013	0.0023 ± 0.0007	0.0121 ± 0.0013
8/2 – 9/10/01	0.0028 ± 0.0008	0.0175 ± 0.0014	0.0036 ± 0.0008	0.0172 ± 0.0013
9/10 – 10/3/01	0.0038 ± 0.0014	0.0155 ± 0.0023	0.0026 ± 0.0011	0.0144 ± 0.0020
10/3 – 11/1/01	0.0041 ± 0.0010	0.0150 ± 0.0014	0.0036 ± 0.0009	0.0159 ± 0.0013
11/1 – 12/6/01	0.0048 ± 0.0013	0.0211 ± 0.0020	0.0044 ± 0.0011	0.0179 ± 0.0017
12/6/01 – 1/3/02	0.0036 ± 0.0010	0.0192 ± 0.0022	0.0024 ± 0.0007	0.0159 ± 0.0018

AIR SAMPLES 2001
(picoCuries/Cubic Meter)

Sample Period	Power Line River Crossing		Renaud Brothers (Puffers)	
	Alpha	Beta	Alpha	Beta
1/3 – 2/1/01	0.0031 ± 0.0009	0.0198 ± 0.0017	0.0026 ± 0.0008	0.0161 ± 0.0016
2/1 – 3/1/01	0.0025 ± 0.0008	0.0174 ± 0.0016	0.0031 ± 0.0009	0.0164 ± 0.0016
3/1 – 4/20/01	0.0023 ± 0.0007	0.0104 ± 0.0011	0.0020 ± 0.0007	0.0100 ± 0.0011
4/20 – 5/14/01	0.0042 ± 0.0014	0.0173 ± 0.0022	0.0044 ± 0.0014	0.0172 ± 0.0021
5/14 – 6/6/01	0.0019 ± 0.0009	0.0072 ± 0.0014	0.0022 ± 0.0009	0.0078 ± 0.0014
6/6 – 7/3/01	0.0028 ± 0.0010	0.0144 ± 0.0015	0.0022 ± 0.0010	0.0113 ± 0.0014
7/3 – 8/2/01	0.0024 ± 0.0008	0.0121 ± 0.0014	0.0018 ± 0.0007	0.0126 ± 0.0014
8/2 – 9/10/01	0.0037 ± 0.0008	0.0177 ± 0.0014	0.0033 ± 0.0008	0.0177 ± 0.0013
9/10 – 10/3/01	0.0029 ± 0.0012	0.0145 ± 0.0022	0.0026 ± 0.0012	0.0156 ± 0.0022
10/3 – 11/1/01	0.0033 ± 0.0008	0.0161 ± 0.0014	0.0037 ± 0.0009	0.0156 ± 0.0013
11/1 – 12/6/01	0.0042 ± 0.0012	0.0205 ± 0.0019	0.0040 ± 0.0011	0.0190 ± 0.0018
12/6/01 – 1/3/02	0.0038 ± 0.0009	0.0175 ± 0.0014	0.0028 ± 0.0008	0.0157 ± 0.0019

AIR SAMPLES 2001
(picoCuries/Cubic Meter)

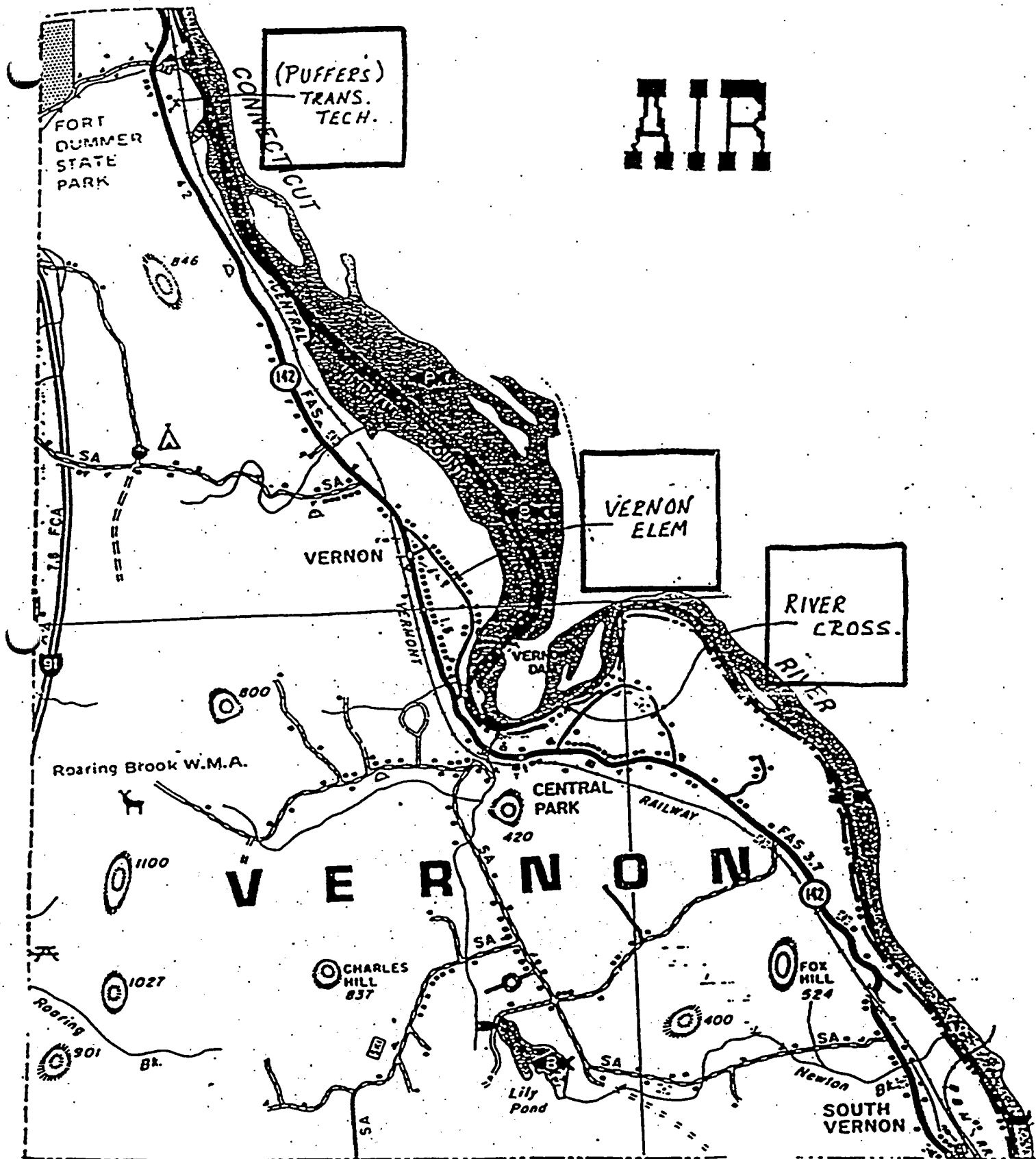
Sample Period	Vernon Elementary School		Brattleboro Union High School	
	Alpha	Beta	Alpha	Beta
1/3 – 2/1/01	0.0030 ± 0.0009	0.0179 ± 0.0017	0.0024 + 0.0008	0.0168 + 0.0016
2/1 – 3/1/01	0.0035 ± 0.0010	0.0157 ± 0.0016	0.0034 + 0.0009	0.0161 + 0.0015
3/1 – 4/20/01	0.0018 ± 0.0007	0.0101 ± 0.0011	0.0020 + 0.0007	0.0108 + 0.0011
4/20 – 5/14/01	0.0048 ± 0.0016	0.0189 ± 0.0023	0.0049 + 0.0015	0.0177 + 0.0021
5/14 – 6/6/01	0.0021 ± 0.0009	0.0080 ± 0.0015	0.0019 + 0.0008	0.0064 + 0.0013
6/6 – 7/3/01	0.0021 ± 0.0010	0.0150 ± 0.0016	0.0017 + 0.0010	0.0127 + 0.0015
7/3 – 8/2/01	0.0020 ± 0.0008	0.0110 ± 0.0014	0.0023 + 0.0008	0.0111 ± 0.0013
8/2 – 9/10/01	0.0041 + 0.0009	0.0178 + 0.0014	0.0033 + 0.0008	0.0179 + 0.0014
9/10 – 10/3/01	0.0040 + 0.0014	0.0140 + 0.0021	0.0033 + 0.0013	0.0150 + 0.0021
10/3 – 11/1/01	0.0043 + 0.0009	0.0160 + 0.0014	0.0045 + 0.0009	0.0170 + 0.0014
11/1 – 12/6/01	0.0037 + 0.0011	0.0207 + 0.0019	0.0038 + 0.0011	0.0200 + 0.0018
12/6/01 – 1/3/02	0.0039 + 0.0009	0.0180 + 0.0020	0.0034 + 0.0010	0.0175 + 0.0023

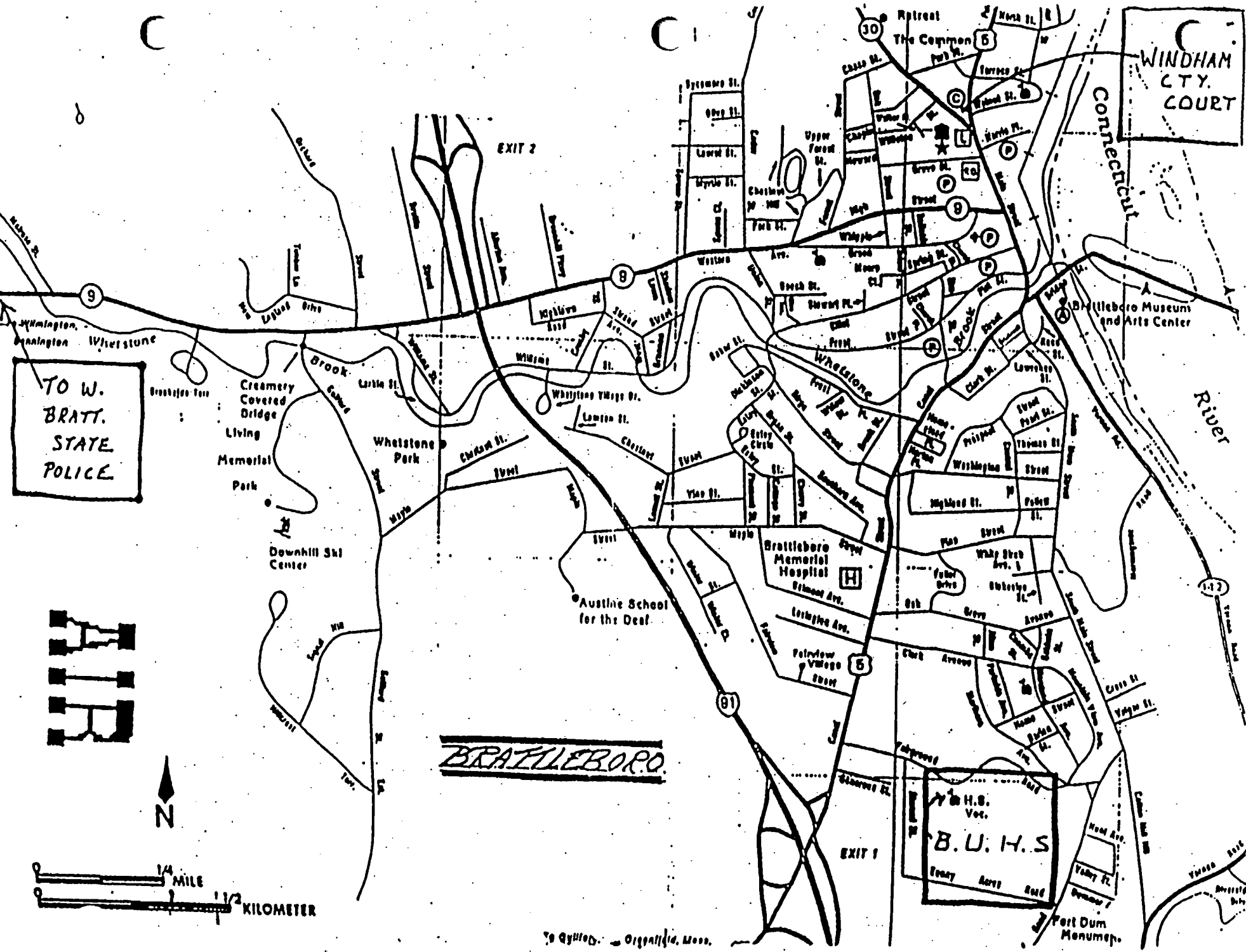
AIR SAMPLES 2001
(picoCuries/Cubic Meter)

Sample Period	Dummerston State Highway Garage	
	Alpha	Beta
1/3 – 2/1/01	0.0022 + 0.0008	0.0185 + 0.0017
2/1 – 3/1/01	0.0025 + 0.0008	0.0168 + 0.0016
3/1 – 4/20/01	0.0016 + 0.0006	0.0112 + 0.0011
4/20 – 5/14/01	0.0040 + 0.0014	0.0182 + 0.0022
5/14 – 6/6/01	0.0014 + 0.0008	0.0078 + 0.0014
6/6 – 7/3/01	0.0033 + 0.0012	0.0149 + 0.0016
7/3 – 8/2/01	0.0021 ± 0.0008	0.0116 ± 0.0014
8/2 – 9/10/01	0.0034 + 0.0008	0.0195 + 0.0015
9/10 – 10/3/01	0.0032 + 0.0013	0.0160 + 0.0023
10/3 – 11/1/01	0.0048 + 0.0010	0.0176 + 0.0014
11/1 – 12/6/01	0.0045 + 0.0012	0.0227 + 0.0020
12/6/01 – 1/3/02	0.0035 + 0.0009	0.0208 + 0.0022

AIR SAMPLES 2001
(picoCuries/Cubic Meter)

Sample Period	Wilmington State Highway Garage	
	Alpha	Beta
1/3 – 2/1/01	0.0022 ± 0.0007	0.0168 ± 0.0015
2/1 – 3/1/01	0.0022 ± 0.0007	0.0144 ± 0.0014
3/1 – 4/20/01	0.0016 ± 0.0006	0.0084 ± 0.0009
4/20 – 5/14/01	0.0030 ± 0.0012	0.0145 ± 0.0019
5/14 – 6/6/01	0.0011 ± 0.0007	0.0070 ± 0.0013
6/6 – 7/3/01	0.0021 ± 0.0009	0.0124 ± 0.0014
7/3 – 8/2/01	0.0021 ± 0.0007	0.0102 ± 0.0012
8/2 – 9/10/01	0.0030 ± 0.0007	0.0153 ± 0.0012
9/10 – 10/3/01	0.0022 ± 0.0010	0.0137 ± 0.0020
10/3 – 11/1/01	0.0036 ± 0.0008	0.0156 ± 0.0013
11/1 – 12/6/01	0.0038 ± 0.0010	0.0186 ± 0.0017
12/6/01 – 1/3/02	0.0031 ± 0.0008	0.0151 ± 0.0018





TO W.
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STATE
POLICE

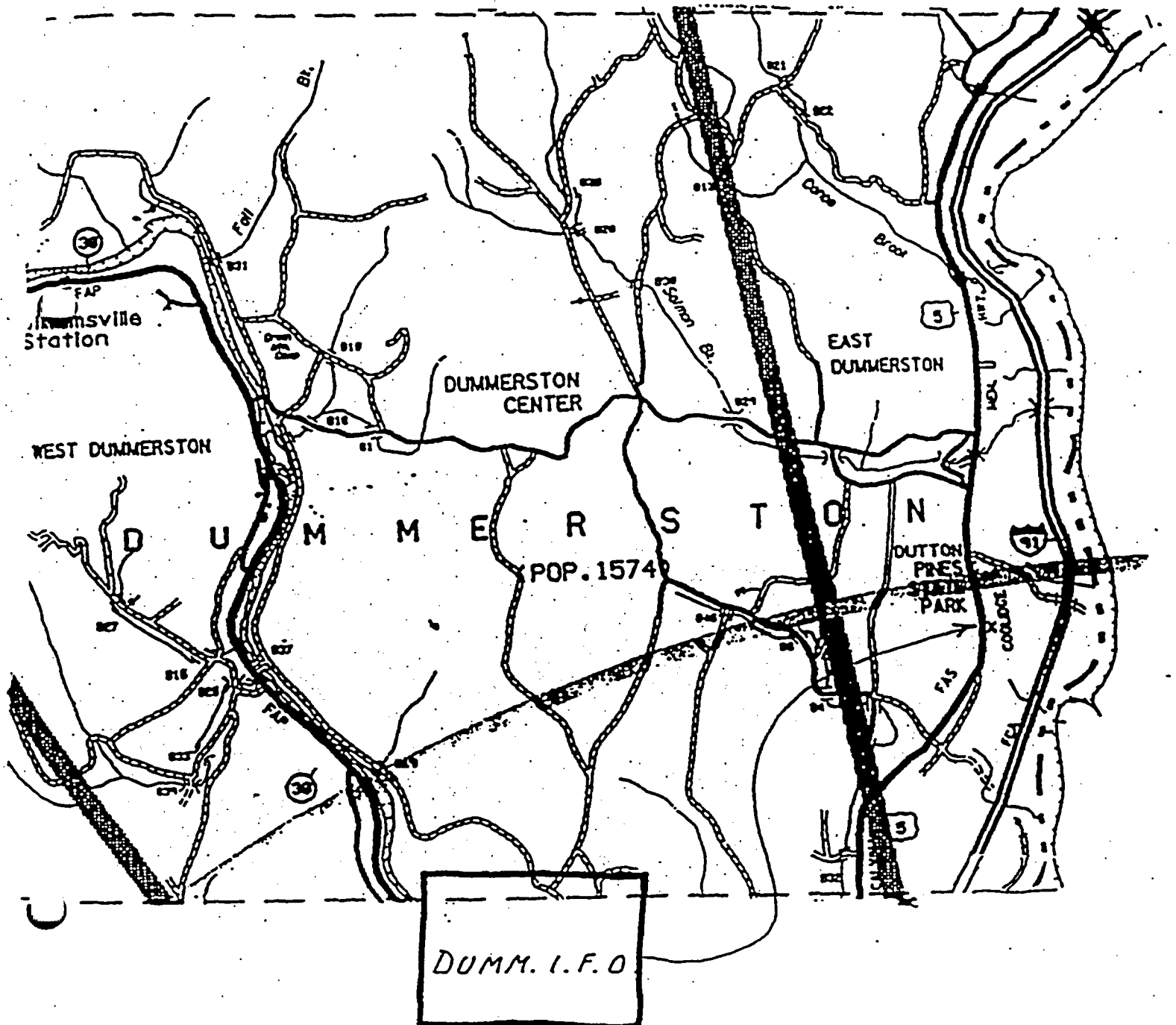
WINDHAM
CTY.
COURT

BRATTLEBORO

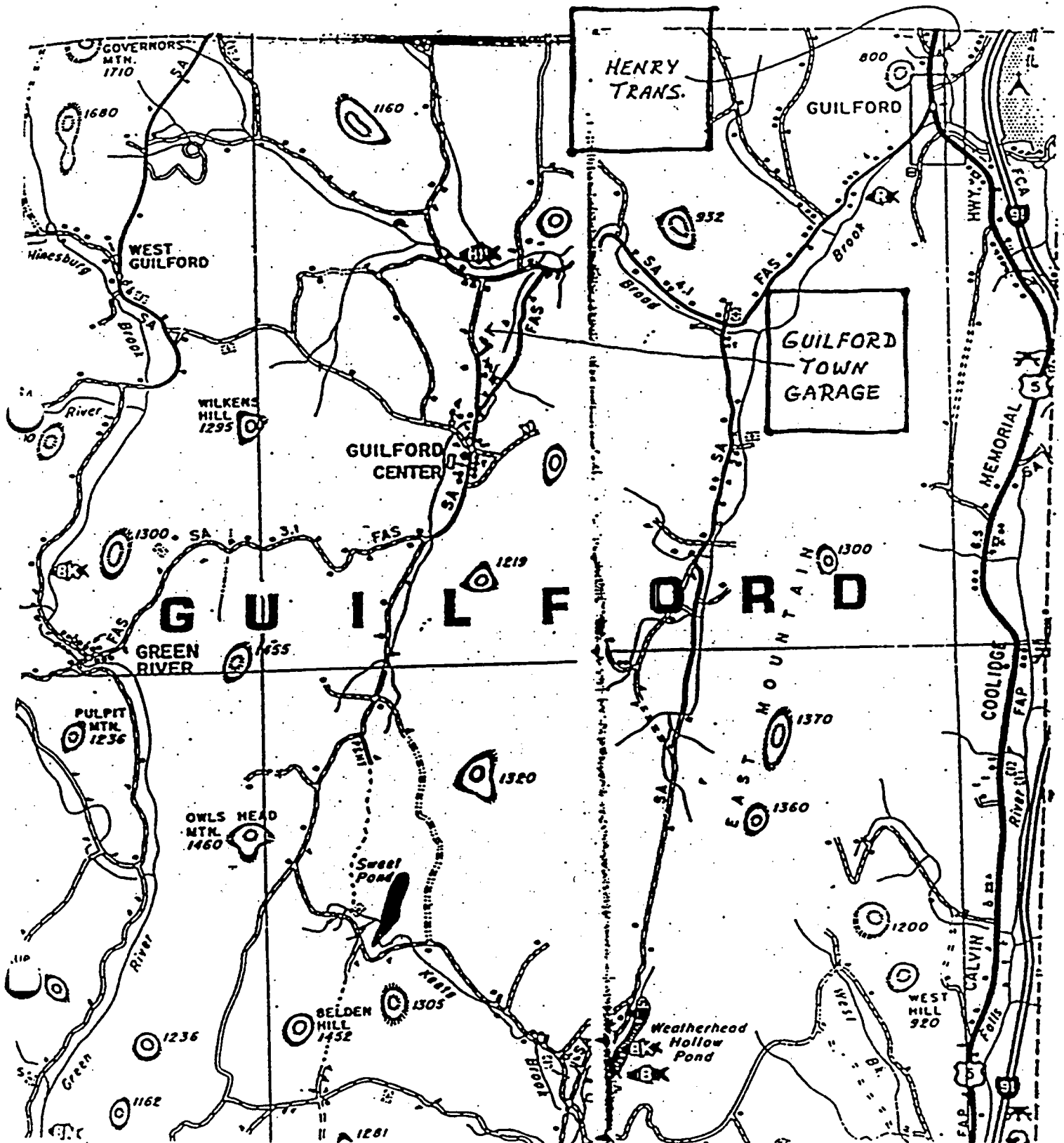
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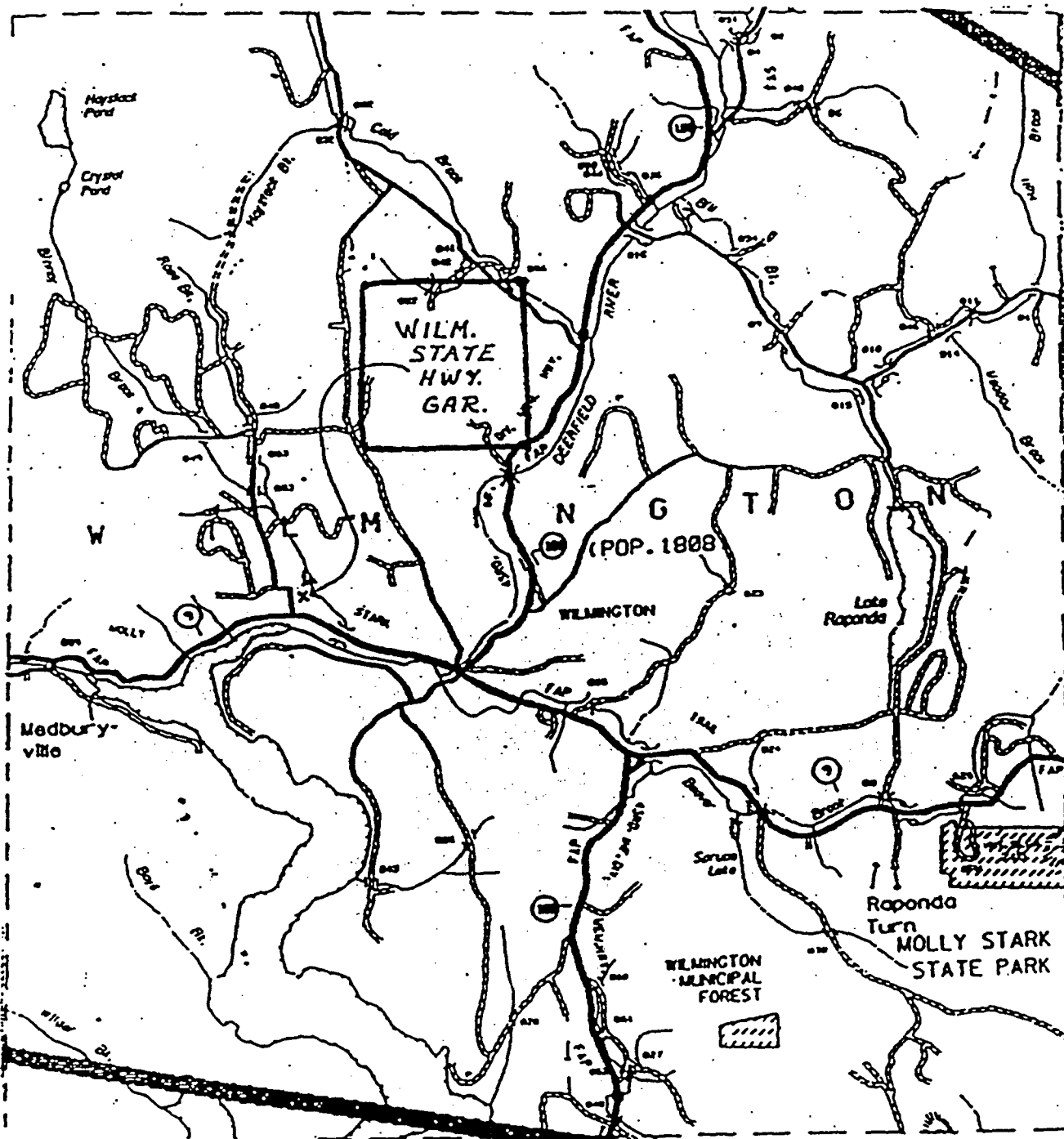
AIR



AIR



AIR



BIOTA 2001

Occasional sampling, most often once a year, is done on other biologicals and wild foods as available or needed. Samples are collected (usually in the Northwest quadrant) within a mile or two from the facility. These normally consist of ferns (fiddleheads), edible fungi (*Clavaria* sp., *Boleti* sp., *Russlae* sp., grapes, etc.) and grass. Sample sizes range from 250 to 1,000 grams. The samples are weighed, placed wet in reentrant beakers and analyzed in the laboratory gamma spectrometer. Usual spectra include primordial radionuclides, archival Cesium-137 and occasional cosmogenic Beryllium-7.

Vernon – Northwest Fence of Vt. Yankee (picoCuries/kilogram)

Season	Biota	Cesium-137 *	Potassium-40	Beryllium-7 **
Summer 6/6/01	Alfalfa	ND	3860 \pm 380	436 \pm 135
Summer 6/6/01	Grass	ND	6020 \pm 530	405 \pm 104
Summer 6/7/01	Fern	ND	6950 \pm 610	3300 \pm 350
Fall 11/1/01	Grass	ND	7510 \pm 750	1430 \pm 270

Samples were also evaluated for the radionuclides listed below. None were present in excess of the lower limits of detection.

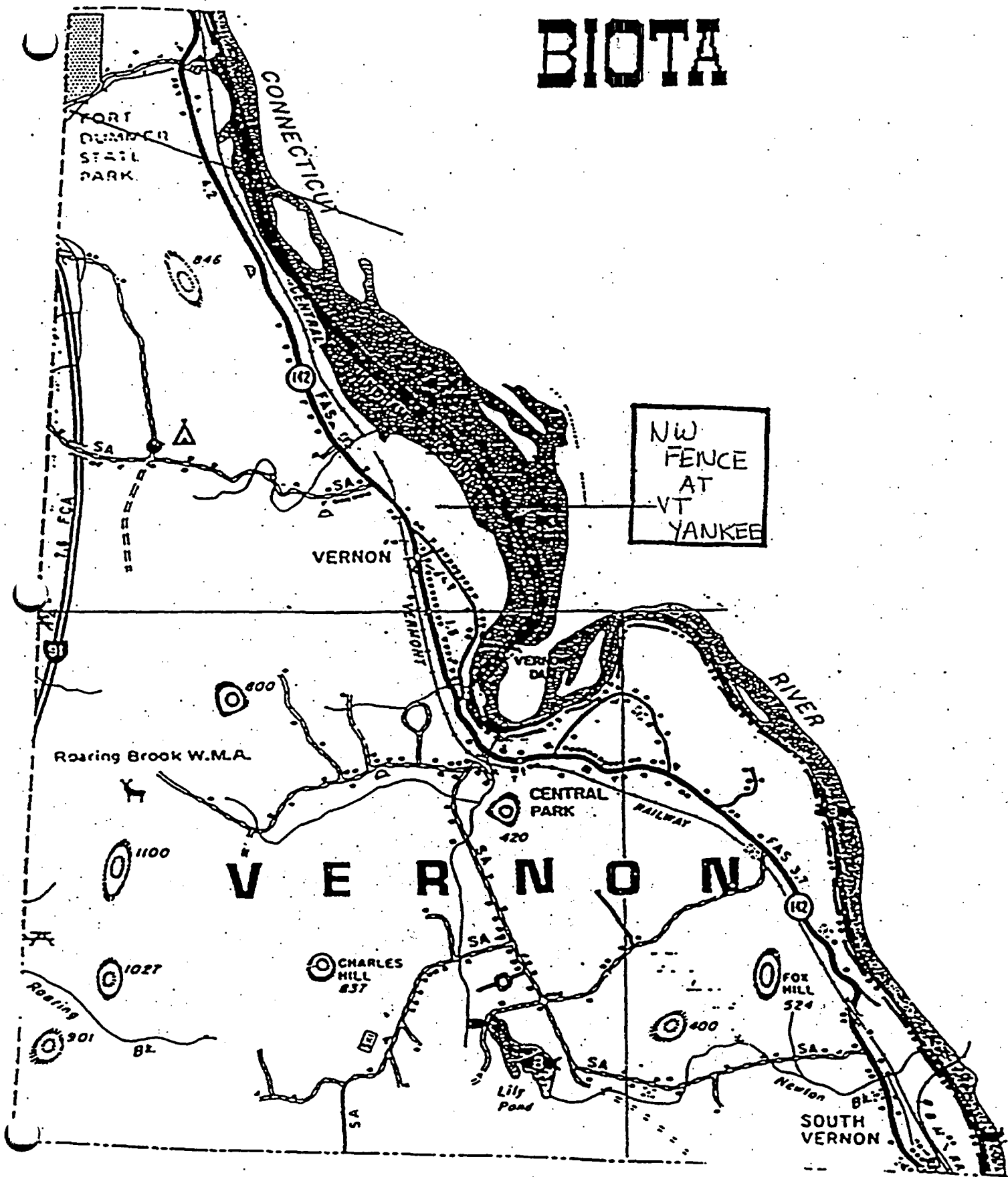
Radionuclide	L.L.D.	Radionuclide	L.L.D.
Cr-51	69	Sb-126	18
Mn-54	15	I-131	27
Co-56	15	Cs-134	58
Co-60	21	Cs-136	18
Zn-65	18	Cs-137	5
Sr-85	86	Ce-139	93
Ru/Rh-103	32	Ce-141	98
Sb-124	18	Ce-144	98

* = Chernobyl event and archival atmospheric testing

** = Cosmogenic

ND = Below Detection Limits

BIOTA



FISH 2001

Two locations (3-4 Vernon Pond and 3-8 Route 9 Highway bridge) provide fish samples in Spring and Fall of about one kilogram for each sample location. Fish are captured via an electroshock method with those having game or commercial value chosen. Fish are captured via an electroshock method with those having game or commercial value chosen for samples. The fish are frozen whole, weighed, and chopped (entire) for loading into a reentrant beaker and subsequent analysis in a ReGe detector equipped Gamma Spectrometer System. Radionuclides detected usually include naturally occurring Potassium-40, Thorium and Uranium with daughters, archival Cs-137 due to former open atmospheric nuclear testing, and occasional traces of cosmogenic Beryllium-7. Reporting units are picoCuries per Kilogram.

Spring

Site	Cesium-137 * Wet Weight	Natural Potassium-40 Wet Weight
3-4	ND	2380 + 740
3-8	ND	2390 + 740

Fall

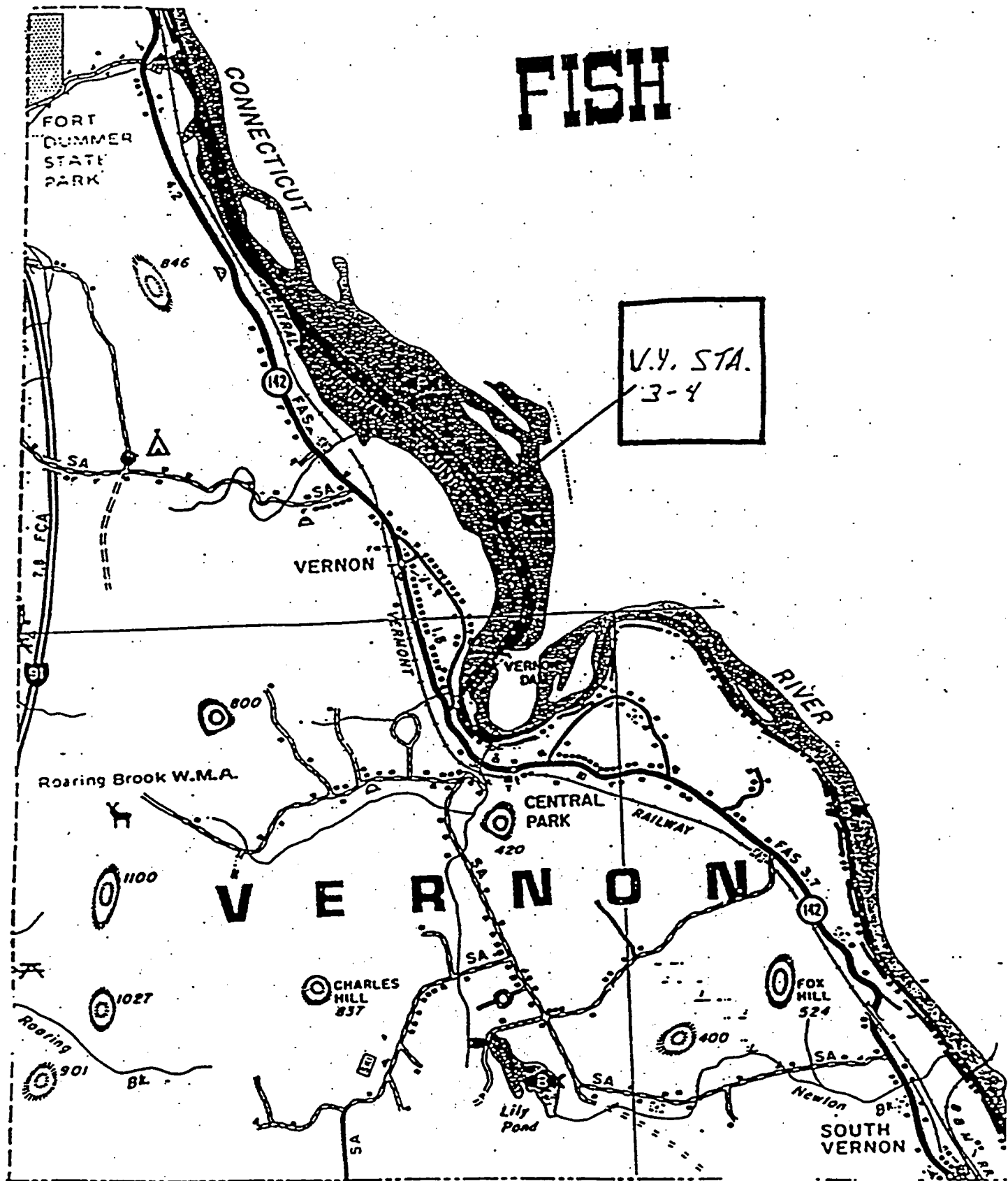
Site	Cesium-137 * Wet Weight	Natural Potassium-40 Wet Weight
3-4	ND	2040 + 320
3-8	ND	1960 + 310

Samples were also evaluated for the radionuclides listed below. None were present in excess of the lower limits of detection (L.L.D.) which are shown in pCi/kg.

Radionuclide	L.L.D.	Radionuclide	L.L.D.
Cr-51	69	Sb-126	18
Mn-54	15	I-131	27
Co-56	15	Cs-134	58
Co-60	21	Cs-136	18
Zn-65	18	Cs-137	5
Sr-85	86	Ce-139	93
Ru/Rh-103	32	Ce-141	98
Sb-124	18	Ce-144	98

* = Chernobyl event and archival atmospheric testing
 ND = Below Detection Limit

FISH



IODINE CARTRIDGES 2001

Charcoal cartridges loaded with TEDA for facilitative iodine collection are part of the air sampling train at selected air filter sampling stations. The sample rate and sampling times coincide with those used for air filters. Response to Chönobyl iodine release was marked, proving the sensitivity to environmental trace levels of iodine of this system. The Health Department Radiation Laboratory analyzes the cartridges for iodine by gamma spectroscopy. Nominal Minimum Detectable Activity is 2×10^{-5} pCi/l of air.

Sample Period	Dummerston Highway Garage	Vernon School	Renaud Bros Vernon	Brattleboro Union High School
January	X	X	X	X
February	X	X	X	X
March	X	X	X	X
April	X	X	X	X
May	X	X	X	X
June	X	X	X	X
July	X	X	X	X
August	X	X	X	X
September	X	X	X	X
October	X	X	X	X
November	X	X	X	X
December	X	X	X	X

Sample Period	Brattleboro State Police	Windham County Court
January	X	X
February	X	X
March	X	X
April	X	X
May	X	X
June	X	X
July	X	X
August	X	X
September	X	X
October	X	X
November	X	X
December	X	X

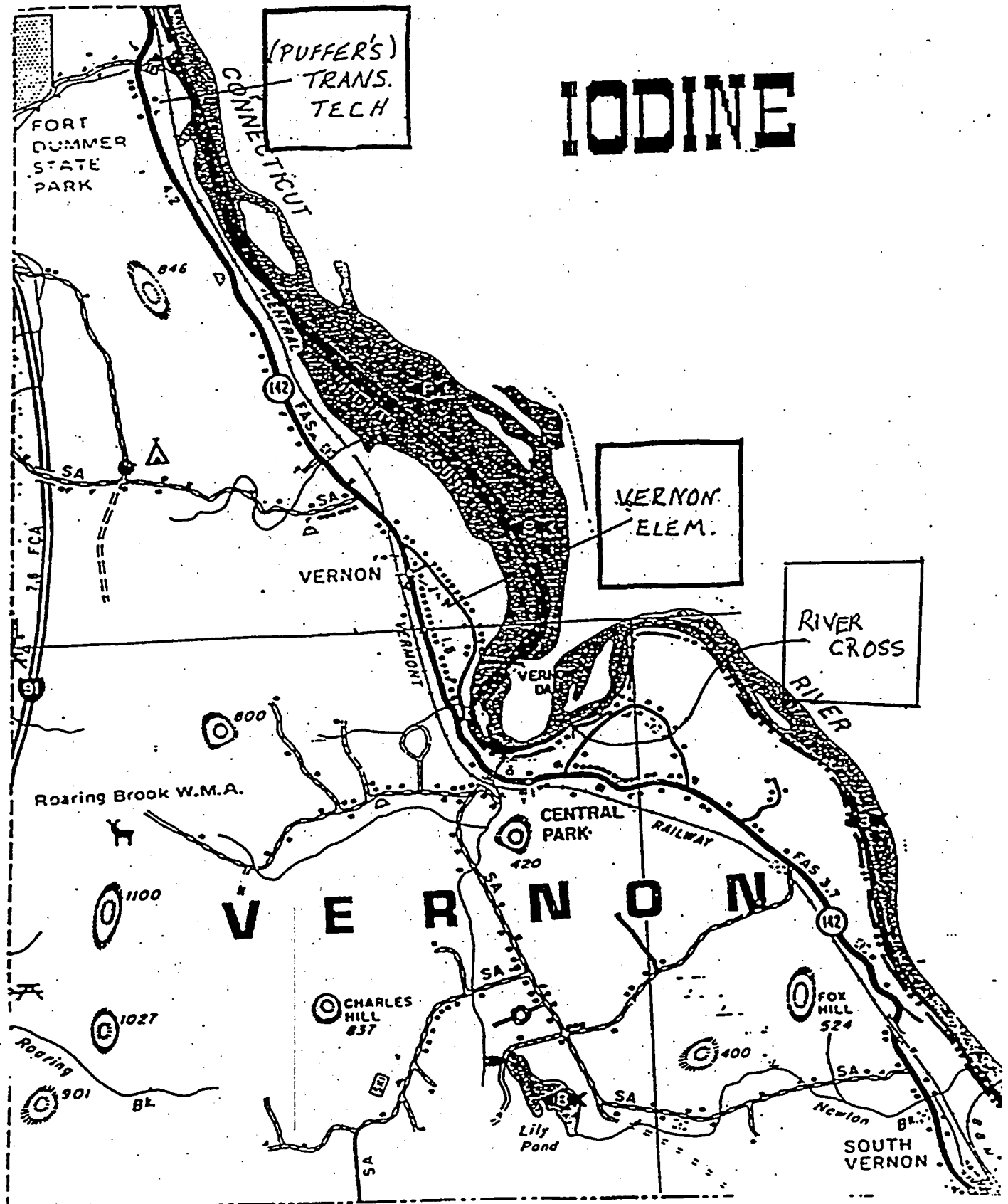
X = No Evidence of Iodine 131

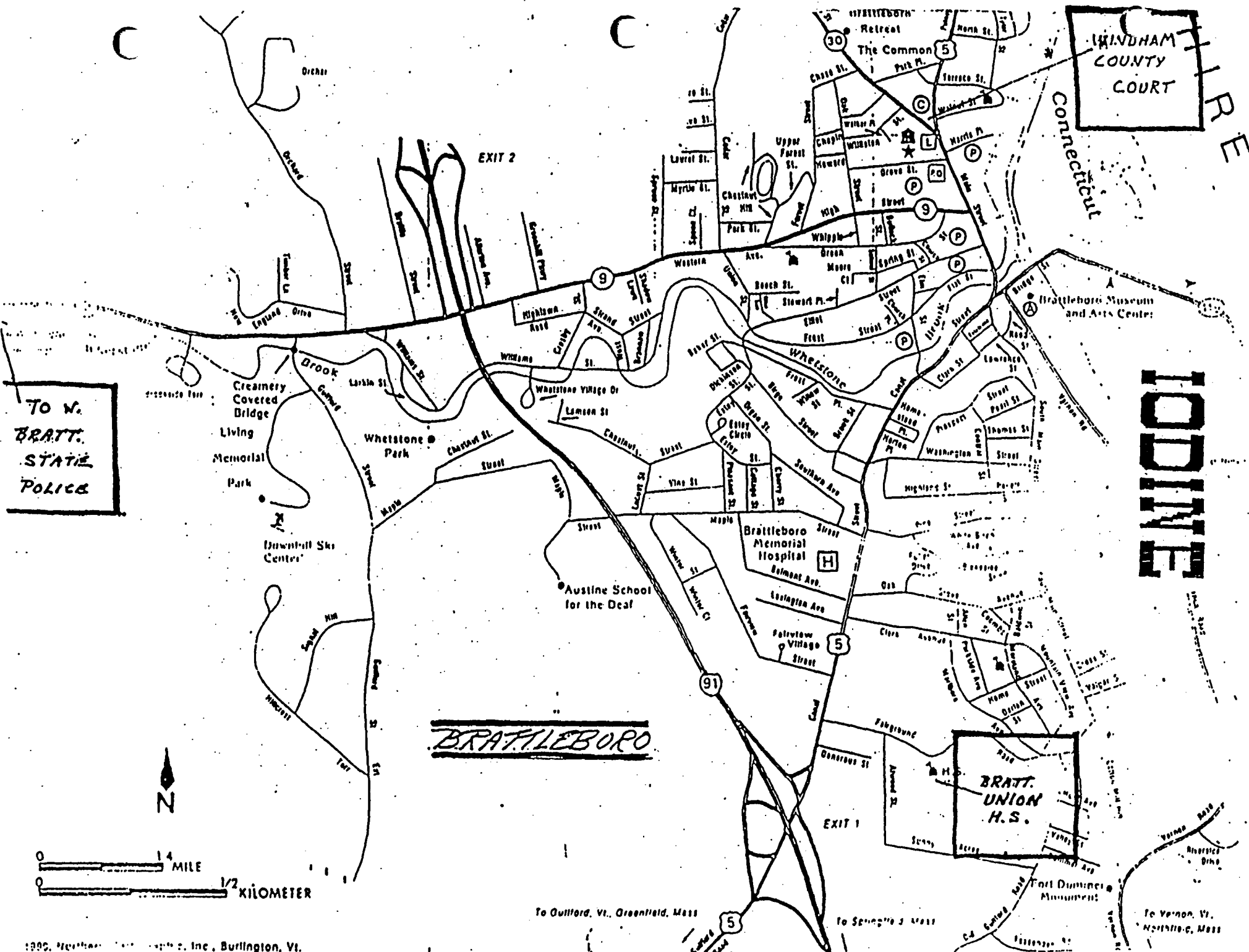
IODINE CARTRIDGES 2001

Sample Period	Powerline River Crossing	Guilford Highway Garage	Wilmington State Highway	D & E Henry's
January	X	X	X	X
February	X	X	X	X
March	X	X	X	X
April	X	X	X	X
May	X	X	X	X
June	X	X	X	X
July	X	X	X	X
August	X	X	X	X
September	X	X	X	X
October	X	X	X	X
November	X	X	X	X
December	X	X	X	X

X = No Evidence of Iodine 131

IODINE





TO N.
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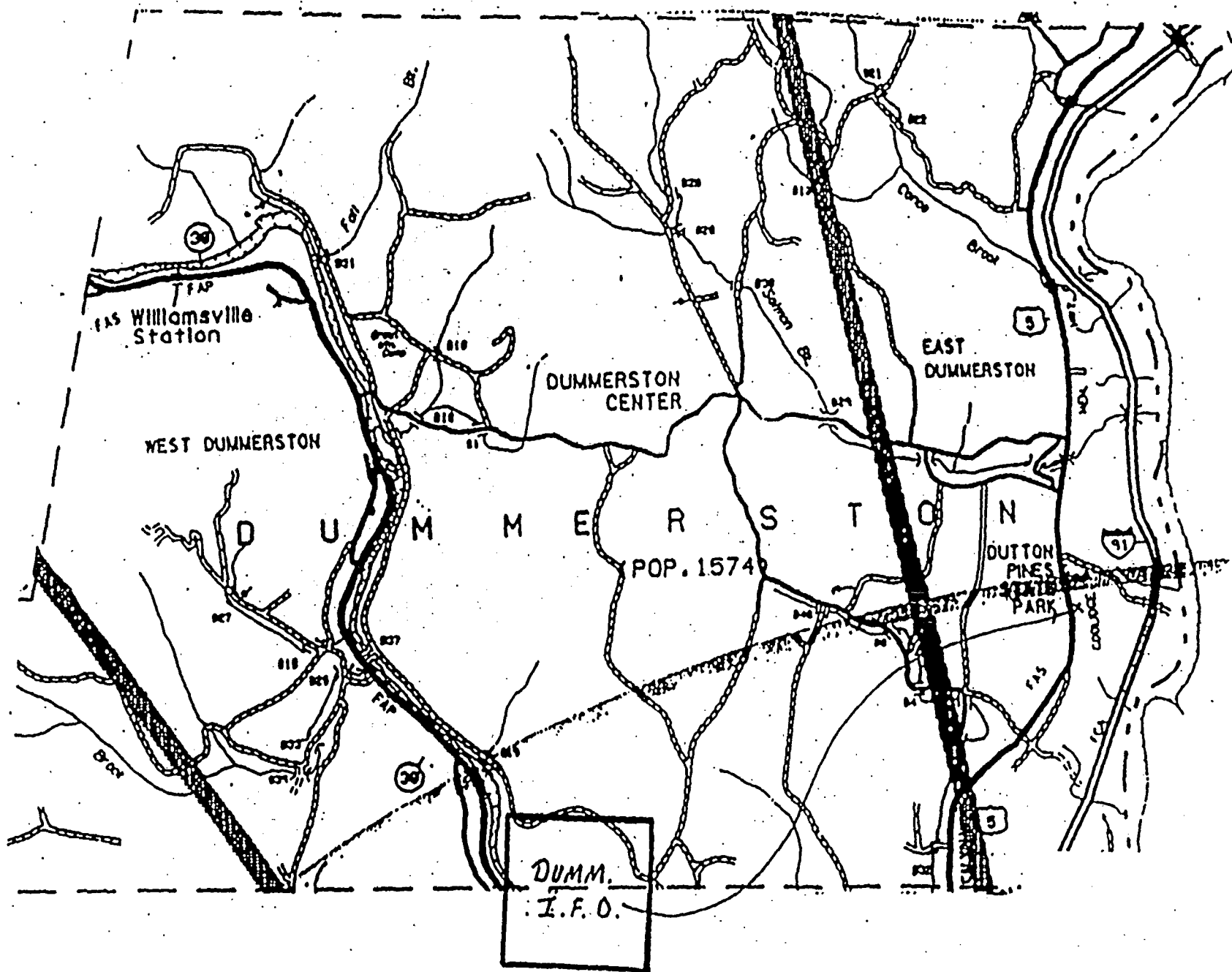
BRATTLEBORO

0 1/2 MILE
0 1/2 KILOMETER

To Guilford, Vt., Greenfield, Mass

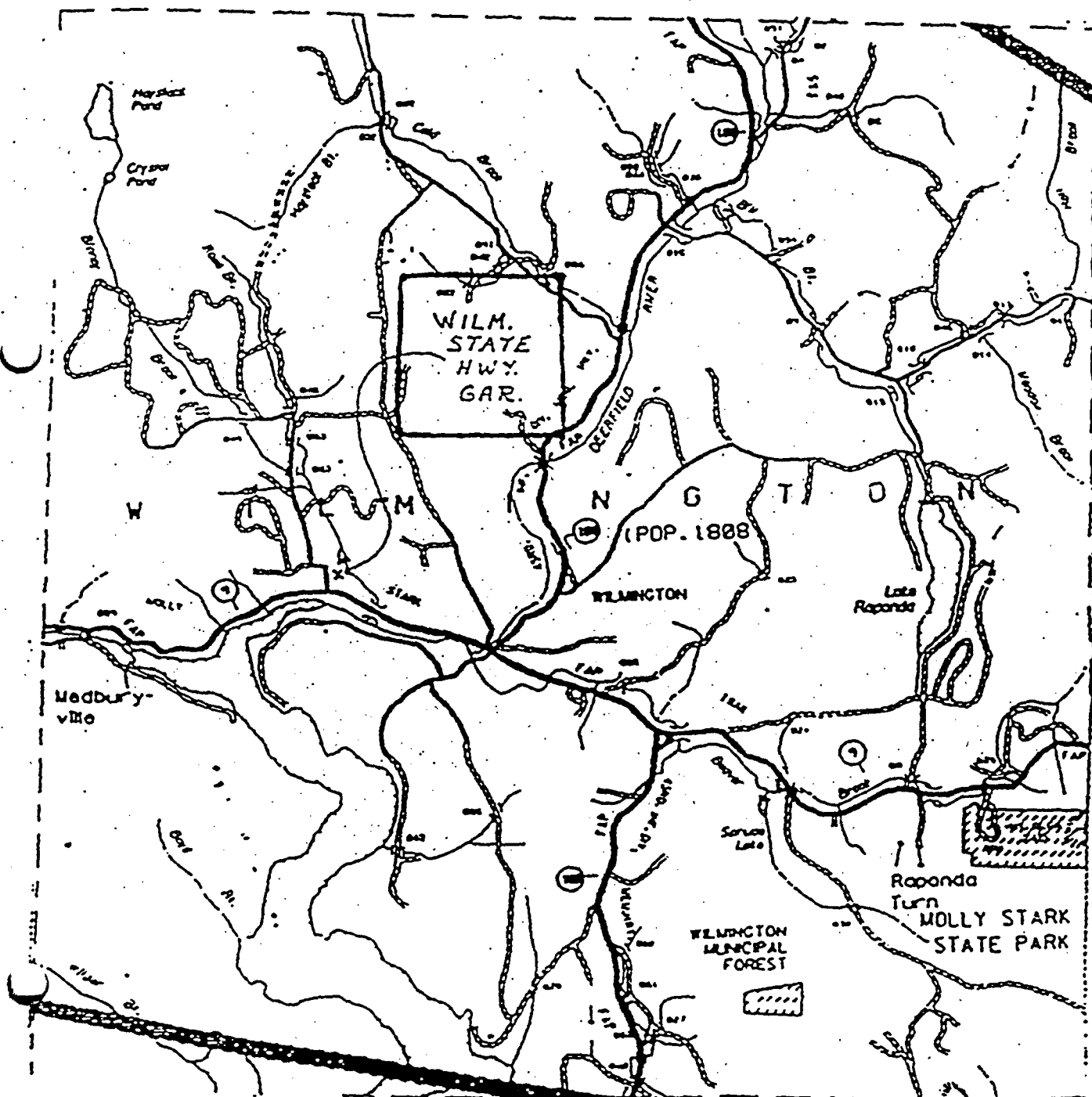
To Springfield, Mass

To Vernon, Vt., Northfield, Mass

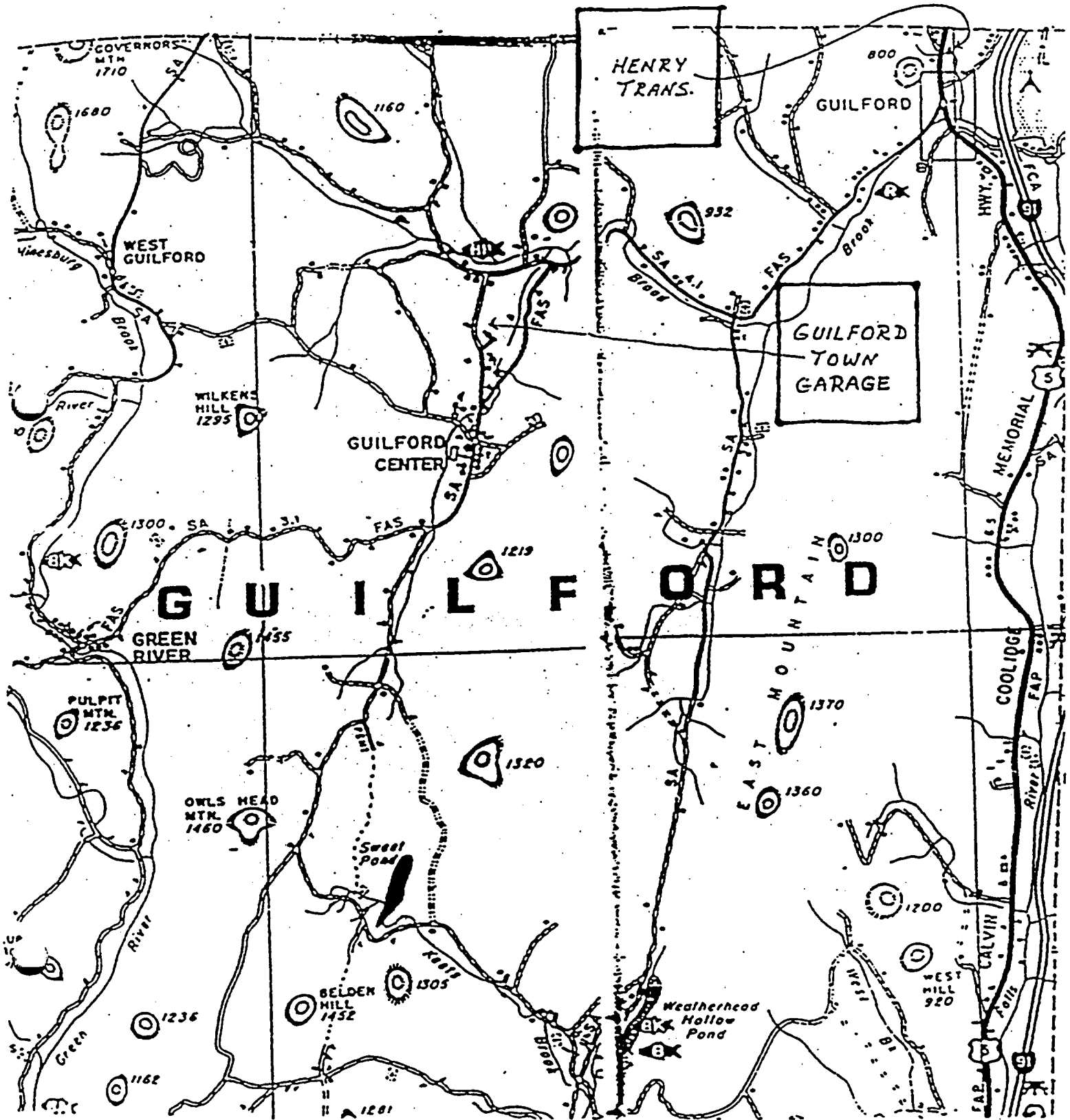


IDONE

IODINE



IODINE



MILK 2001

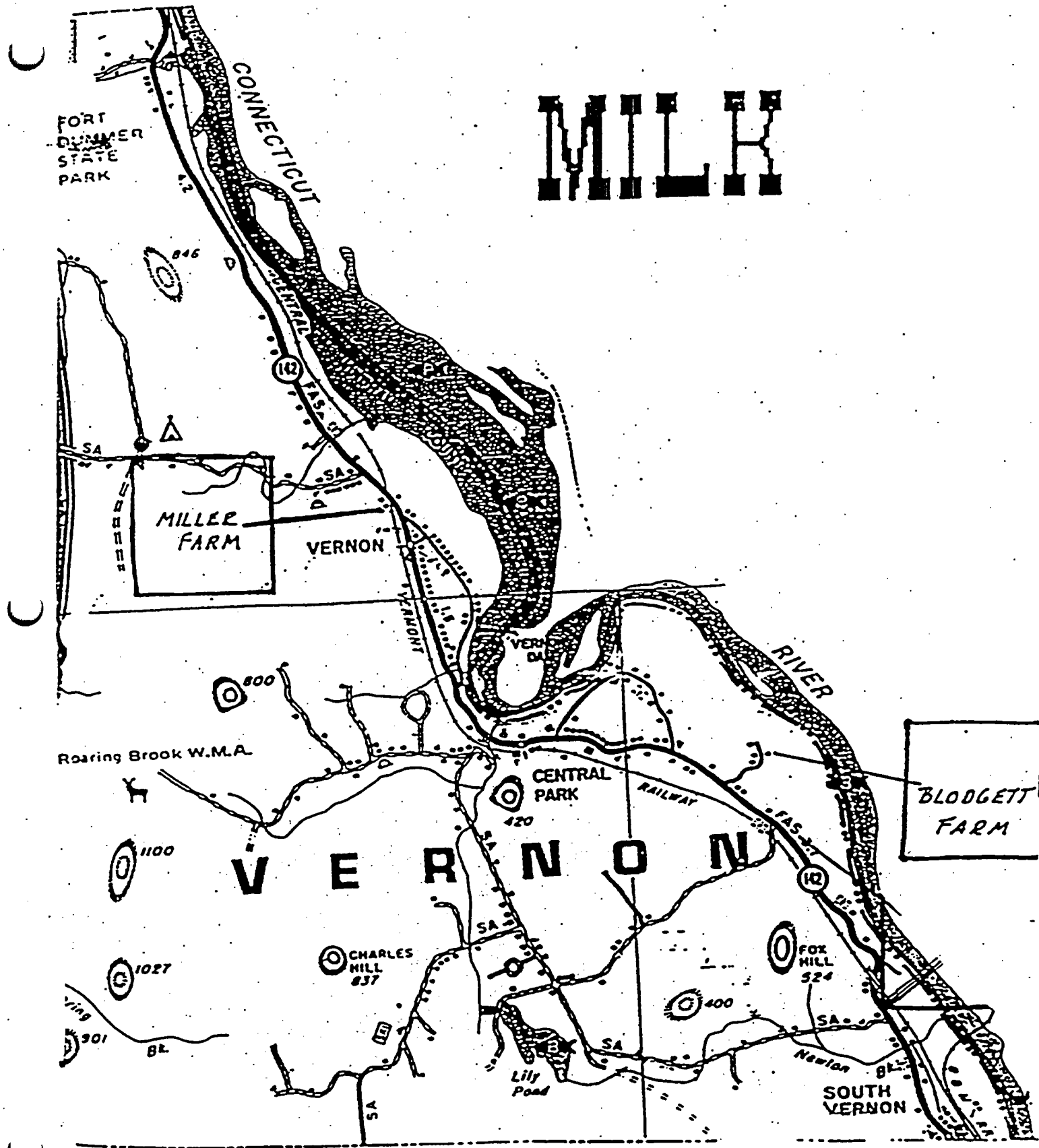
All samples were analyzed for Iodine-131. No results, except as noted, were found above or at the detection limit of 10 picoCuries/liter. Significant indications of the presence of any other radionuclides are investigated and reported if found.

Farm	Jan	Feb	Mar	Apr	May	Jun
Blodgett	X	X	X	X	X	X
Miller	X	X	X	X	X	X

Farm	Jul	Aug	Sept	Oct	Nov	Dec
Blodgett	X	X	X	X	X	X
Miller	X	X	X	X	X	X

X = None Detected

MILK



SEDIMENT 2001

A sediment sample is taken ranging from approximately 0.75 to 1.25 kilograms from the Connecticut River at three separate locations in the spring and fall of each year. The sample is dried then weighed and top loaded in a one liter Marinelli Beaker and counted. A normal spectrum will include primordial radionuclides with daughters, and archival Cesium-137 dissipating from former open atmospheric nuclear testing. On occasion short-lived cosmogenic Beryllium-7 can be discerned at levels comparable with natural Potassium-40.

SPRING picoCuries/kilogram

Site	Cesium-137*	Potassium-40	Beryllium-7**
3-3	95 + 26	13900 + 1000	ND
3-4	55 + 20	9860 + 790	ND
3-8	71 + 22	10300 + 800	ND

FALL picoCuries/kilogram

Site	Cesium-137*	Potassium-40	Beryllium-7**
3-3	55 + 22	12200 + 1000	ND
3-4	81 + 24	13200 + 1100	ND
3-8	40 + 15	10700 + 800	ND

Samples were also evaluated for the radionuclides listed below. None were present in excess of the lower limits of detection (L.L.D.) which are shown in pCi/kg.

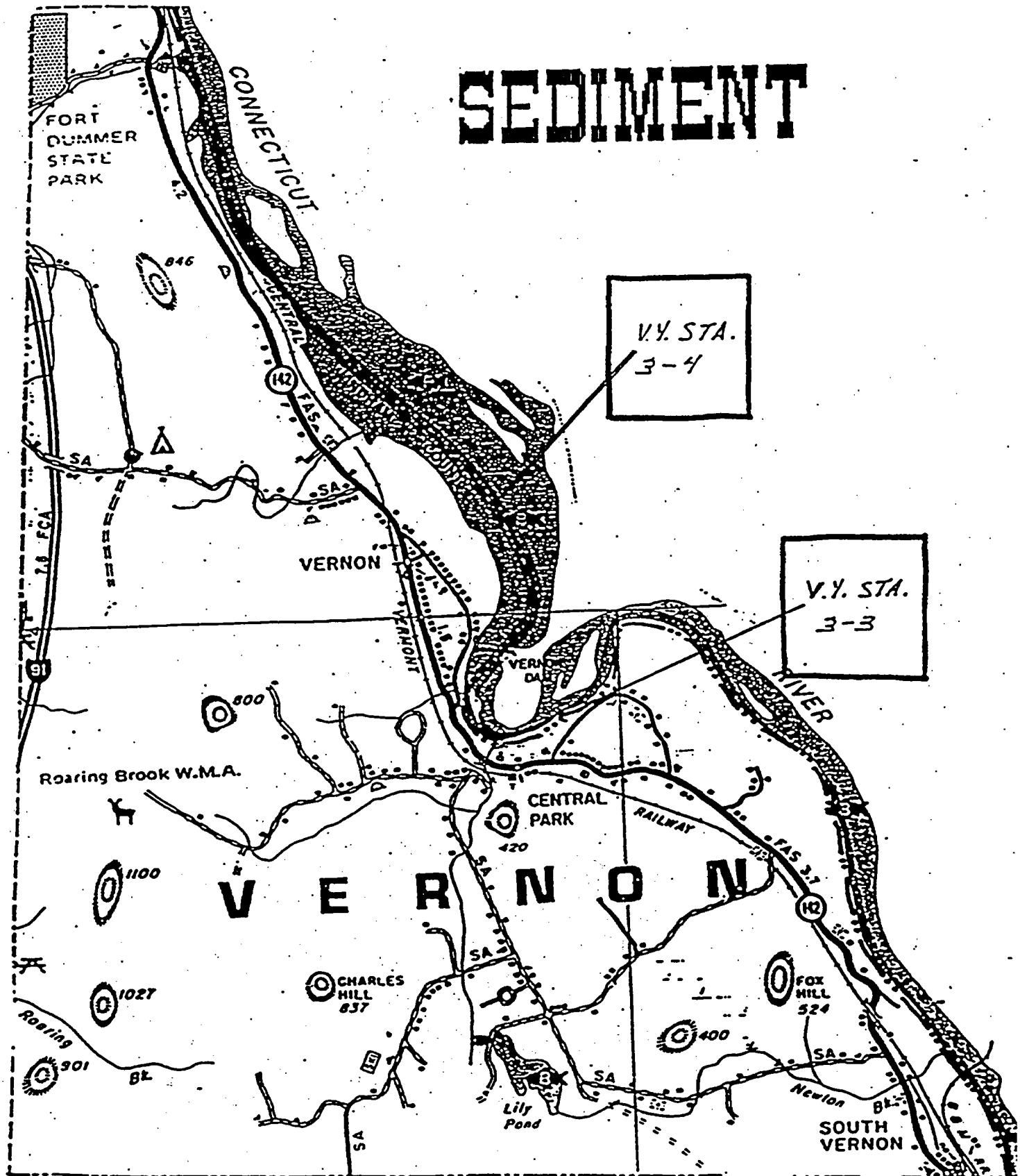
Radionuclide	L.L.D.	Radionuclide	L.L.D.
Cr-51	69	Sb-126	18
Mn-54	15	I-131	27
Co-56	15	Cs-134	58
Co-60	21	Cs-136	18
Zn-65	18	Cs-137	5
Sr-85	86	Ce-139	93
Ru/Rh-103	32	Ce-141	98
Sb-124	18	Ce-144	98

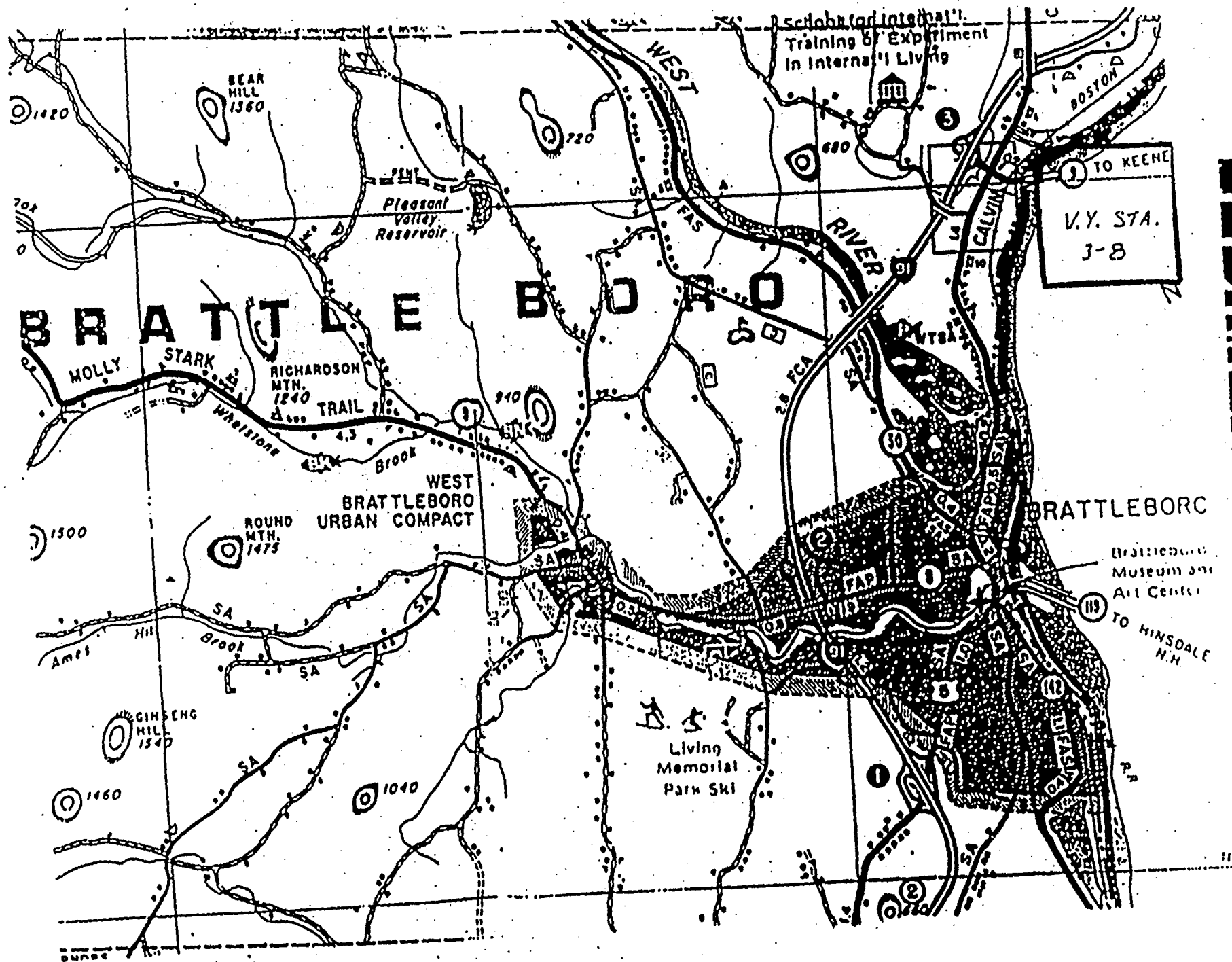
* = Chönobyl event and archival atmospheric testing

** = Cosmogenic

ND = None Detected

SEDIMENT





SEDIMENT

SOIL 2001

Occasional sampling, most often once a year, is done on other soils as available or needed. Samples are collected (usually in the Northwest quadrant) within a mile or two from the facility. Sample sizes range from 250 to 1,000 grams. The samples are weighed, dried and placed in 500 ml wide mouth HDPE bottles and analyzed in the laboratory gamma spectrometer. Usual spectra include primordial radionuclides, archival Cesium-137 and occasional cosmogenic Beryllium-7. Reporting units are picoCuries per Kilogram.

Northwest Corner Vermont Yankee Fence picoCuries/kilogram

Season	Cesium-137*	Potassium-40	Beryllium-7**
Spring 6/6/01	135 \pm 30	13400 \pm 1100	ND
Fall 11/1/01	175 \pm 31	15000 \pm 1200	564 \pm 222

* = Chernobyl event and archival atmospheric testing

** = Cosmogenic

ND = Below Detection Limits

SPECIAL STUDY - SEDIMENT
VERMONT YANKEE - NORTH STORM DRAIN OUTFALL
Results in picoCuries/kilogram
SPRING 2001

Grid Location	Beryllium-7**	Cobalt-60	Potassium-40	Cesium-137
S-1	ND	ND	13700 ± 1000	116 ± 27
S-2	ND	ND	17500 ± 1200	164 ± 36
S-3	ND	ND	15900 ± 1200	199 ± 47
S-4	ND	ND	17700 ± 1200	141 ± 30
S-5	*	*	*	*
T-1	ND	ND	12100 ± 900	ND
T-2	ND	ND	13300 ± 900	94 ± 32
T-3	ND	ND	15800 ± 1200	162 ± 36
T-4	ND	ND	14900 ± 1000	114 ± 26
T-5	*	*	*	*
U-1	ND	ND	13800 ± 1000	112 ± 28
U-2	ND	ND	16600 ± 1200	145 ± 33
U-3	ND	ND	16100 ± 1200	151 ± 29
U-4	ND	ND	15300 ± 1100	128 ± 28
U-5	*	*	*	*
V-1	ND	ND	15100 ± 1100	152 ± 34
V-2	ND	ND	14800 ± 1100	185 ± 39
V-3	ND	ND	15200 ± 1100	122 ± 29
V-4	ND	ND	12600 ± 1000	102 ± 23
V-5	*	*	*	*
W-1	*	*	*	*
W-2	ND	ND	15600 ± 1100	150 ± 27
W-3	ND	ND	16900 ± 1300	117 ± 39
W-4	ND	ND	14000 ± 1000	108 ± 24
W-5	*	*	*	*
X-1	*	*	*	*
X-2	ND	ND	15800 ± 1200	167 ± 43
X-3	ND	ND	14300 ± 1000	121 ± 23
X-4	ND	ND	12500 ± 1000	90 ± 33
X-5	*	*	*	*
Y-1	*	*	*	*
Y-2	ND	ND	18300 ± 1300	172 ± 32
Y-3	ND	ND	15500 ± 1100	120 ± 27
Y-4	*	*	*	*
Y-5	*	*	*	*
Z-1	*	*	*	*
Z-2	*	*	*	*
Z-3	ND	ND	18000 ± 1400	132 ± 45
Z-4	ND	ND	18000 ± 1300	164 ± 37
Z-5	*	*	*	*

* Location not included for sampling

** Chernobyl event and archival atmospheric testing

ND = None Detected

SPECIAL STUDY - SEDIMENT
VERMONT YANKEE - NORTH STORM DRAIN OUTFALL
Results in picoCuries/kilogram
FALL 2001

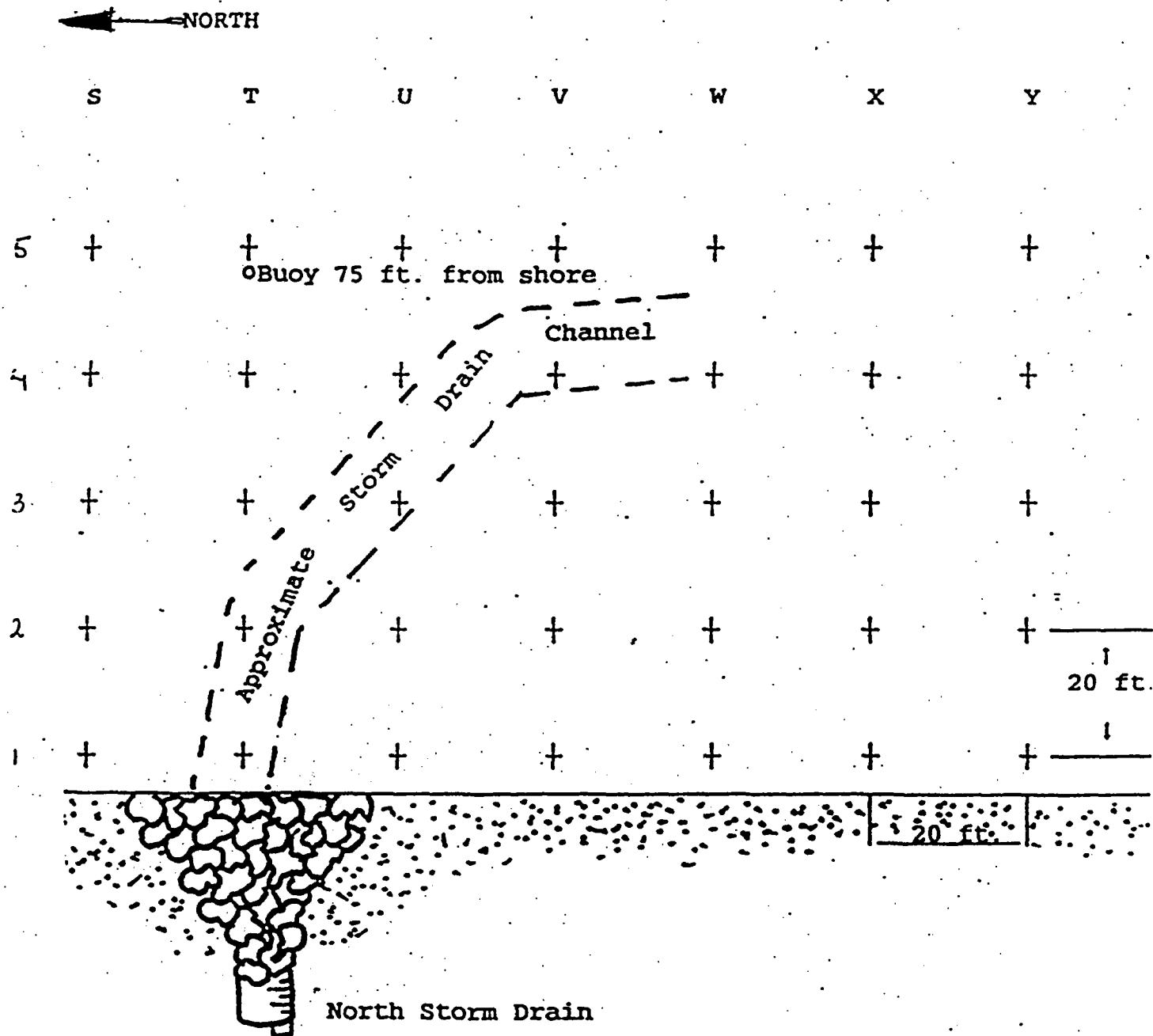
Grid Location	Beryllium-7**	Cobalt-60	Potassium-40	Cesium-137
S-1	ND	ND	19500 + 1500	153 + 33
S-2	ND	ND	15300 + 1200	129 + 39
S-3	ND	ND	17900 + 1400	172 + 44
S-4	ND	ND	15000 + 1200	114 + 40
S-5	*	*	*	*
T-1	ND	ND	13700 + 1100	104 + 27
T-2	ND	ND	15900 + 1200	145 + 32
T-3	ND	ND	16300 + 1300	158 + 38
T-4	ND	ND	14700 + 1200	94 + 26
T-5	*	*	*	*
U-1	1570 + 480	ND	13300 + 1100	127 + 35
U-2	742 + 511	ND	15200 + 1200	116 + 26
U-3	ND	ND	15400 + 1200	137 + 31
U-4	ND	ND	15300 + 1200	154 + 35
U-5	*	*	*	*
V-1	ND	409 + 38	14600 + 1200	166 + 41
V-2	ND	ND	16300 + 1300	209 + 45
V-3	ND	ND	15500 + 1200	141 + 35
V-4	ND	ND	15800 + 1200	127 + 28
V-5	*	*	*	*
W-1	*	*	*	*
W-2	ND	ND	17700 + 1400	149 + 34
W-3	ND	ND	15800 + 1200	124 + 38
W-4	ND	ND	15400 + 1200	122 + 28
W-5	*	*	*	*
X-1	*	*	*	*
X-2	ND	ND	13800 + 1100	135 + 38
X-3	ND	ND	13200 + 1000	114 + 24
X-4	ND	ND	14000 + 1100	111 + 26
X-5	*	*	*	*
Y-1	*	*	*	*
Y-2	ND	ND	17200 + 1300	137 + 32
Y-3	ND	ND	14700 + 1200	117 + 26
Y-4	*	*	*	*
Y-5	*	*	*	*
Z-1	*	*	*	*
Z-2	*	*	*	*
Z-3	ND	ND	14400 + 1100	131 + 26
Z-4	ND	ND	13900 + 1100	108 + 28
Z-5	*	*	*	*

* Location not included for sampling

** Chernobyl event and archival atmospheric testing

ND = None Detected

APPENDIX A
RADIOLOGICAL SAMPLING PROGRAM OF BOTTOM SEDIMENT
NORTH STORM DRAIN



THERMOLUMINESCENT DOSIMETRY (TLD) DATA 2001
(milliRoentgens \pm 2 Sigma)

This method samples direct gamma radiation in the environment. Detectors utilize crystals which store energy from gamma and x-rays until analyzed for their cumulative energy exposure experience. Vermont has over twenty selected locations where direct radiation levels have been measure for over ten years. Some of these sites are located where other types of samples - air, milk, water are taken. Detectors are provided to the State of Vermont by Proxtonics, Inc. and are deployed for a quarterly sampling interval. Levels of direct radiation from the natural environment are routinely detected at each site.

Location	1st Qtr.	2nd Qtr.
Miller Farm, Vernon	11.4 \pm 1.1	16.6 \pm 1.6
Elementary School Exterior, Vernon *	13.9 \pm 2.5	18.6 \pm 2.7
Elementary School Interior, Vernon	16.4 \pm 1.7	21.0 \pm 2.6
VY North Fence, Vernon	11.4 \pm 1.1	19.0 \pm 2.8
VY Parking Lot Fence, Vernon	14.9 \pm 0.3	22.6 \pm 2.1
Dummerston State Highway Garage (IFO)	12.9 \pm 0.3	18.7 \pm 3.1
VY Southwest Fence, Vernon	10.4 \pm 1.1	18.4 \pm 2.3
Renaud Bros. (Puffers), Vernon*	12.9 \pm 0.3	17.9 \pm 2.4
Tyler Hill & Franklin Road, Vernon	13.9 \pm 0.3	18.0 \pm 1.9
Power Line River Crossing, Vernon *	11.9 \pm 0.3	17.1 \pm 2.8
Blodgett Farm, Vernon	13.4 \pm 1.1	19.3 \pm 1.8
Brattleboro U.H.S., Brattleboro	12.9 \pm 0.3	18.0 \pm 1.9
Henry Transportation, Guilford *	15.4 \pm 4.0	18.2 \pm 1.1
Guilford Town Highway Garage, Guilford *	12.4 \pm 1.1	19.1 \pm 3.6
Evans Farm, Guilford	12.4 \pm 1.1	16.8 \pm 1.5
Putney Town Clerk, Putney	11.4 \pm 1.1	16.6 \pm 2.7
State Highway Garage, Wilmington *	14.9 \pm 2.5	21.9 \pm 1.7
State Police, West Brattleboro *	11.9 \pm 2.5	16.6 \pm 2.8
Windham County Courthouse, Brattleboro	10.9 \pm 0.3	16.3 \pm 2.1
VDORH-A	11.9 \pm 0.3	9.1
Smead Lumber, Vernon	12.9 \pm 0.3	16.9 \pm 1.6
Pond Rd. & Rte. 142 N, Vernon	15.4 \pm 1.1	18.1 \pm 0.4
Engle Dr., West Rd., Vernon	10.9 \pm 3.1	17.1 \pm 2.5
Fairman Rd., Vernon	11.9 \pm 0.3	17.6 \pm 0.3
Pond Rd. & Houghton Hill Rd., Vernon	11.4 \pm 1.1	18.0 \pm 3.1
Rte. 5, Transmission Line, Guilford (10)	13.9 \pm 0.3	18.6 \pm 2.2
Rte. 5, Andrews Cemetery, Guilford (40)	13.9 \pm 0.3	17.6 \pm 3.0
Rte. 5 & Tkaczyk Farm Rd., Guilford (11)	11.4 \pm 1.1	19.3 \pm 2.9
Tyler Hill Rd., Vernon	13.4 \pm 1.1	19.2 \pm 3.1
Rte. 142 N of Transmission Line, Vernon	13.4 \pm 1.1	18.0 \pm 1.4
Rte. 5 to Guilford Ctr. Rd., Guilford (14)	14.4 \pm 1.1	17.3 \pm 1.4
Guilford Ctr Rd. & Tater Rd., Guilford	13.4 \pm 1.1	18.2 \pm 2.6
Weatherhead Hollow & Stony Hill Rds, Gfd	13.4 \pm 1.1	17.1 \pm 0.5

* Collocated with Air Sampling Station

THERMOLUMINESCENT DOSIMETRY (TLD) DATA 2001
(milliRoentgens \pm 2 Sigma)

Location	1st Qtr.	2nd Qtr.
Huckle Hill Rd. N of VT/MA Border, Vernon	13.4 \pm 1.1	21.6 \pm 3.8
Rte. 5, Dummerston School, Dummerston	12.9 \pm 0.3	18.0 \pm 2.6
Pond Rd., Vernon Rec. Area, Vernon	10.9 \pm 0.3	15.8 \pm 1.3
Rte. 142, Vernon Fire Dept., Vernon	12.4 \pm 1.1	18.4 \pm 2.5
Rte. 142 S & Pond Rd., Vernon	13.9 \pm 0.3	18.1 \pm 0.4
Rte. 142 & Newton Rd., Vernon	10.9 \pm 0.3	16.5 \pm 0.6
Rte. 142 & Depot St., VT/MA Line, Vernon	13.4 \pm 1.1	18.0 \pm 0.7
Gov. Hunt Rd. at Vernon Elem. School	14.4 \pm 1.1	19.6 \pm 2.6

* Collocated with Air Sampling Station

THERMOLUMINESCENT DOSIMETRY (TLD) DATA 2001
(milliRoentgens \pm 2 Sigma)

Location	3rd Qtr.	4 th Qtr.
Miller Farm, Vernon	20.0 \pm 2.4	23.7 \pm 0.1
Elementary School Exterior, Vernon *	24.5 \pm 2.2	23.0 \pm 2.1
Elementary School Interior, Vernon	26.3 \pm 3.6	25.5 \pm 3.1
VY North Fence, Vernon	23.8 \pm 2.7	24.8 \pm 0.3
VY Parking Lot Fence, Vernon	34.1 \pm 4.1	28.6 \pm 4.4
Dummerston State Highway Garage (IFO)	22.7 \pm 1.0	24.5 \pm 4.0
VY Southwest Fence, Vernon	23.5 \pm 1.4	23.0 \pm 2.0
Renaud Bros. (Puffers), Vernon*	25.5 \pm 2.9	21.8 \pm 2.6
Tyler Hill & Franklin Road, Vernon	23.0 \pm 3.4	22.7 \pm 2.1
Power Line River Crossing, Vernon *	21.8 \pm 2.0	21.6 \pm 3.5
Blodgett Farm, Vernon	23.3 \pm 1.5	26.5 \pm 4.1
Brattleboro U.H.S., Brattleboro*	21.2 \pm 0.4	24.7 \pm 3.0
Henry Transportation, Guilford *	21.9 \pm 1.8	25.9 \pm 2.4
Guilford Town Highway Garage, Guilford *	24.7 \pm 5.4	28.5 \pm 5.2
Evans Farm, Guilford	21.0 \pm 3.4	23.4 \pm 1.9
Putney Town Clerk, Putney	21.4 \pm 1.4	22.9 \pm 0.7
State Highway Garage, Wilmington *	26.4 \pm 6.3	25.5 \pm 2.8
State Police, West Brattleboro *	21.1 \pm 2.3	21.2 \pm 1.4
Windham County Courthouse, Brattleboro	20.6 \pm 3.2	20.7 \pm 2.7
VDORH A	21.5 \pm 1.2	21.3 \pm 0.2
Smead Lumber, Vernon	24.1 \pm 2.5	No Sample**
Pond Rd. & Rte. 142 N, Vernon	22.4 \pm 3.7	24.8 \pm 0.5
Engle Dr., West Rd., Vernon	21.1 \pm 3.2	22.3 \pm 0.6
Fairman Rd., Vernon	24.1 \pm 1.3	24.8 \pm 3.3
Pond Rd. & Houghton Hill Rd., Vernon	21.1 \pm 0.2	29.6 \pm 4.4
Rte. 5, Transmission Line, Guilford	25.0 \pm 1.3	24.7 \pm 3.0
Rte. 5, Andrews Cemetery, Guilford	26.5 \pm 3.4	24.7 \pm 1.8
Rte. 5 & Tkaczyk Farm Rd., Guilford	23.5 \pm 0.7	22.4 \pm 2.8
Tyler Hill Rd., Vernon	23.1 \pm 2.8	25.0 \pm 0.2
Rte. 142 N of Transmission Line, Vernon	30.1 \pm 5.2	26.4 \pm 1.0
Rte. 5 to Guilford Ctr. Rd., Guilford	26.1 \pm 1.3	21.3 \pm 2.1
Guilford Ctr Rd. & Tater Rd., Guilford	22.8 \pm 2.7	25.1 \pm 3.6
Weatherhead Hollow & Stony Hill Rds, Gfd	20.7 \pm 3.1	21.9 \pm 1.7

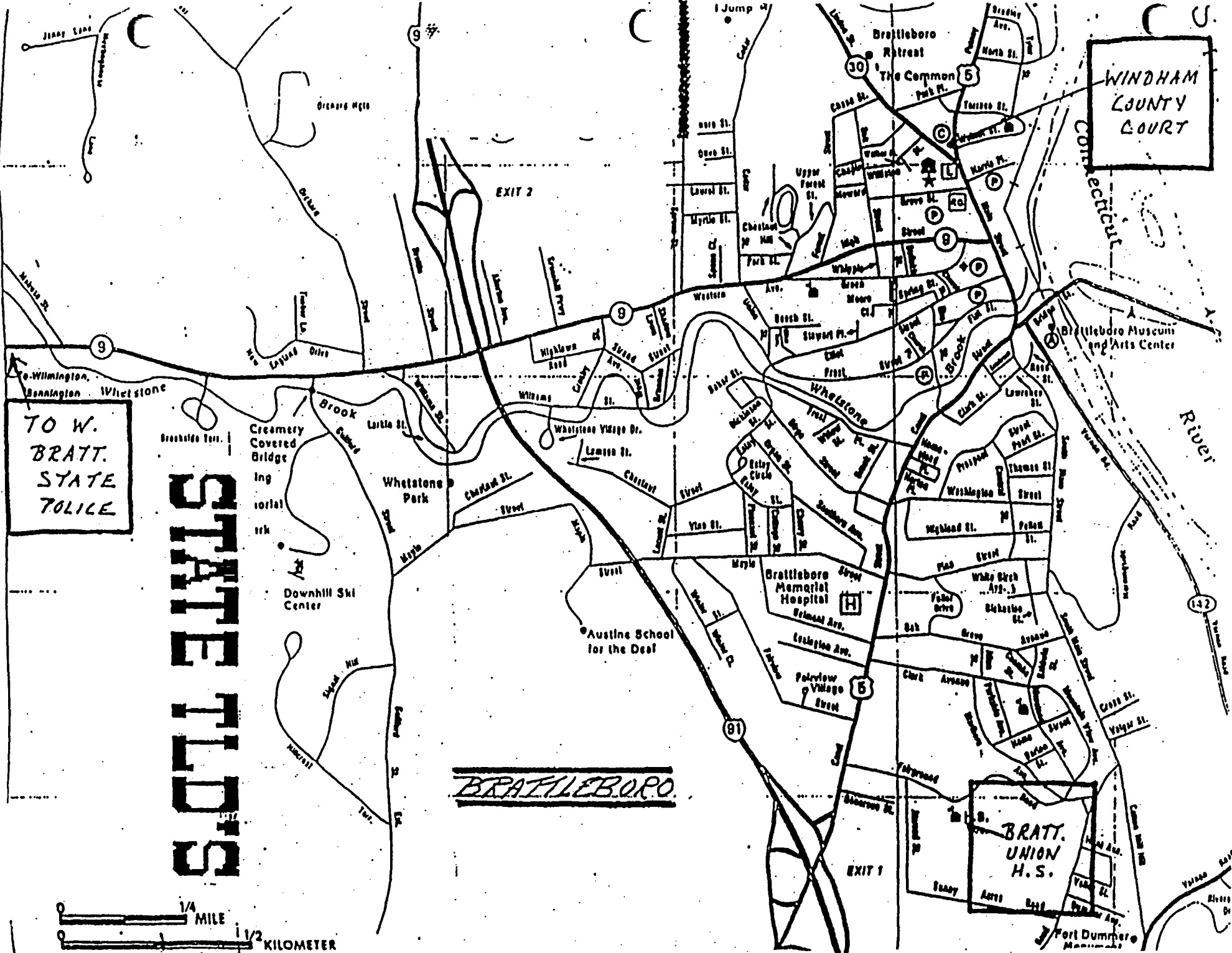
* Collocated with Air Sampling Station

THERMOLUMINESCENT DOSIMETRY (TLD) DATA 2001
(milliRoentgens \pm 2 Sigma)

Location	3rd Qtr.	4th Qtr.
Huckle Hill Rd. N of VT/MA Border, Vernon	25.3 \pm 3.5	31.7 \pm 0.5
Rte. 5, Dummerston School, Dummerston	23.0 \pm 1.0	24.2 \pm 0.2
Pond Rd., Vernon Rec. Area, Vernon	22.0 \pm 3.2	19.1 \pm 2.1
Rte. 142, Vernon Fire Dept., Vernon	21.5 \pm 0.2	22.0 \pm 3.5
Rte. 142 S & Pond Rd., Vernon	23.2 \pm 0.4	21.1 \pm 1.5
Rte. 142 & Newton Rd., Vernon	19.6 \pm 2.1	19.4 \pm 2.6
Rte. 142 & Depot St., VT/MA Line, Vernon	23.7 \pm 0.3	21.6 \pm 2.5
Gov. Hunt Rd. at Vernon Elem. School	24.2 \pm 0.5	27.0 \pm 0.3

*Collocated with Air Sampling Station

**Sample missing from cage.



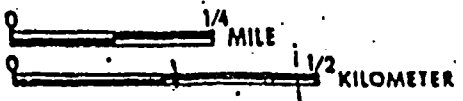
WINDHAM
COUNTY
COURT

TO W.
BRATT.
STATE
POLICE

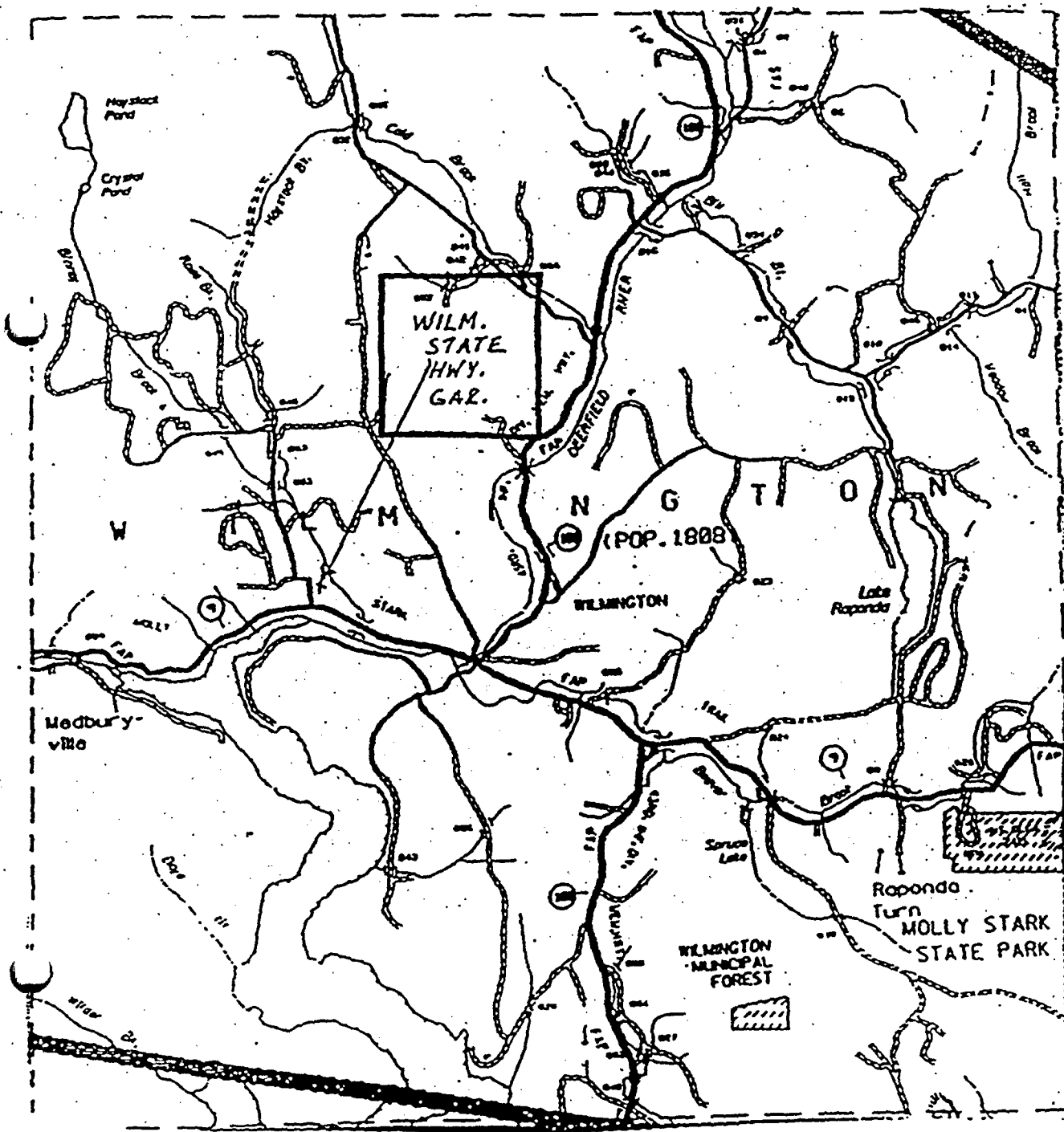
STATE
TLD'S

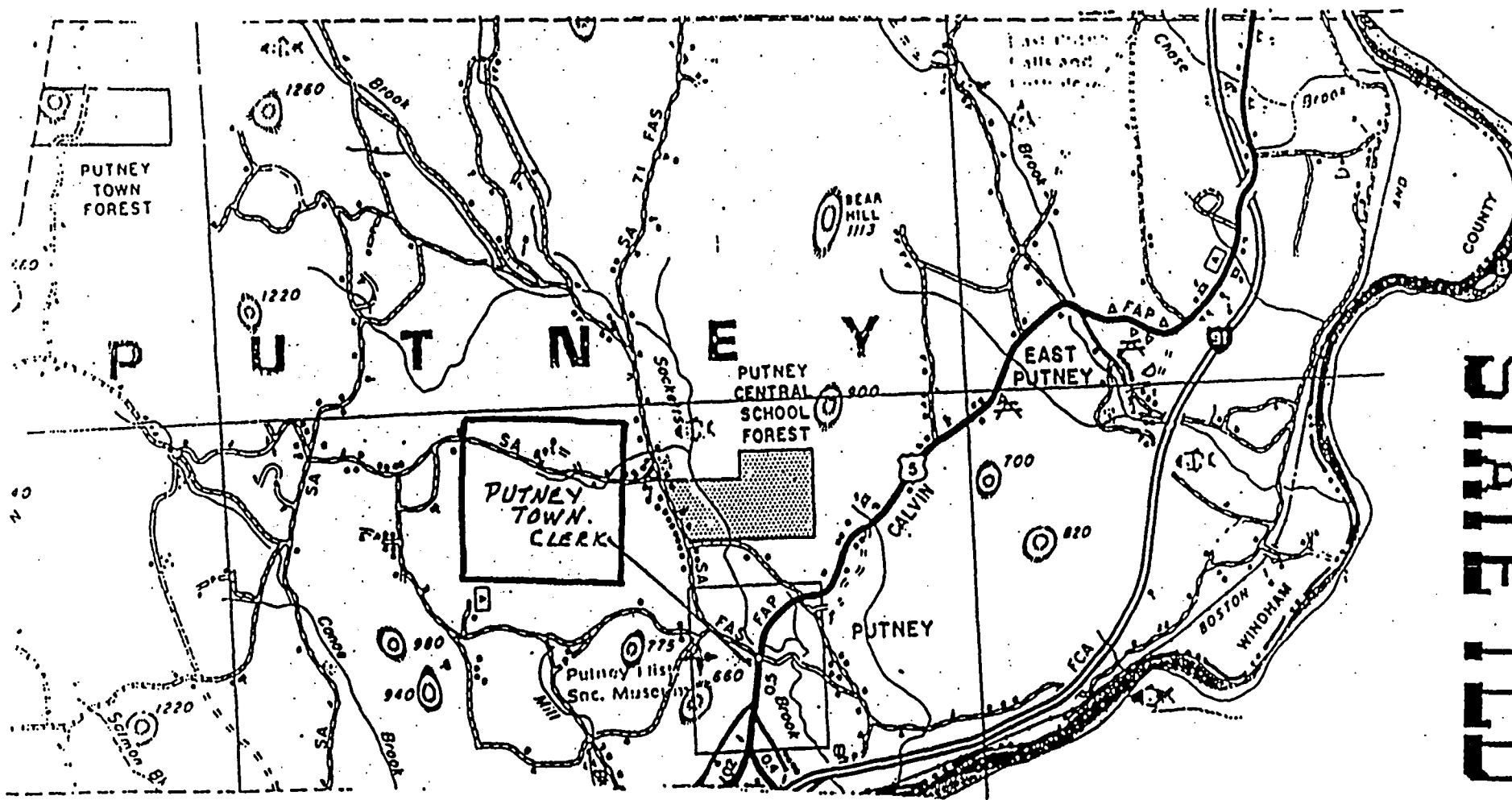
BRATT.
UNION
H.S.

BRATTLEBORO



STATE TLD'S



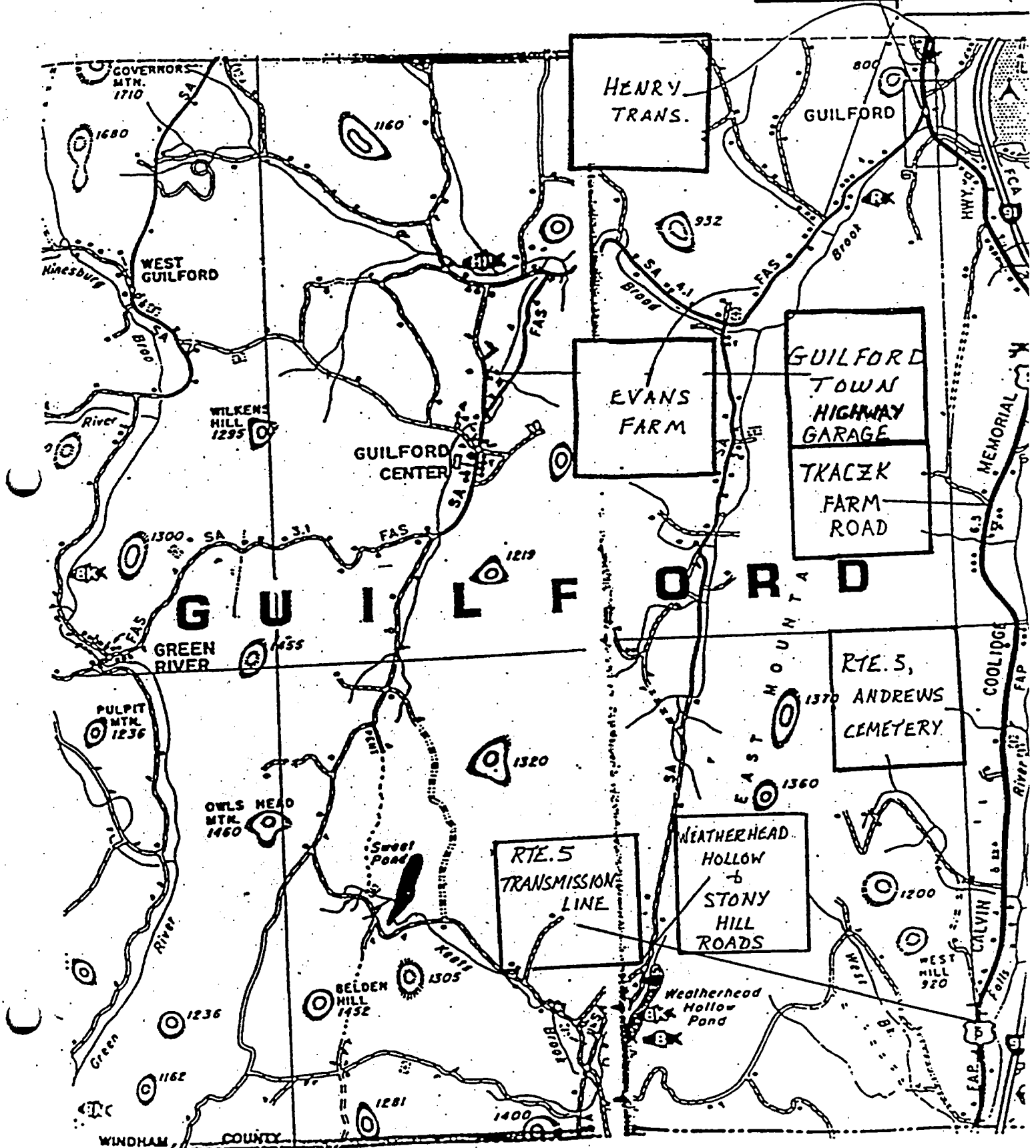


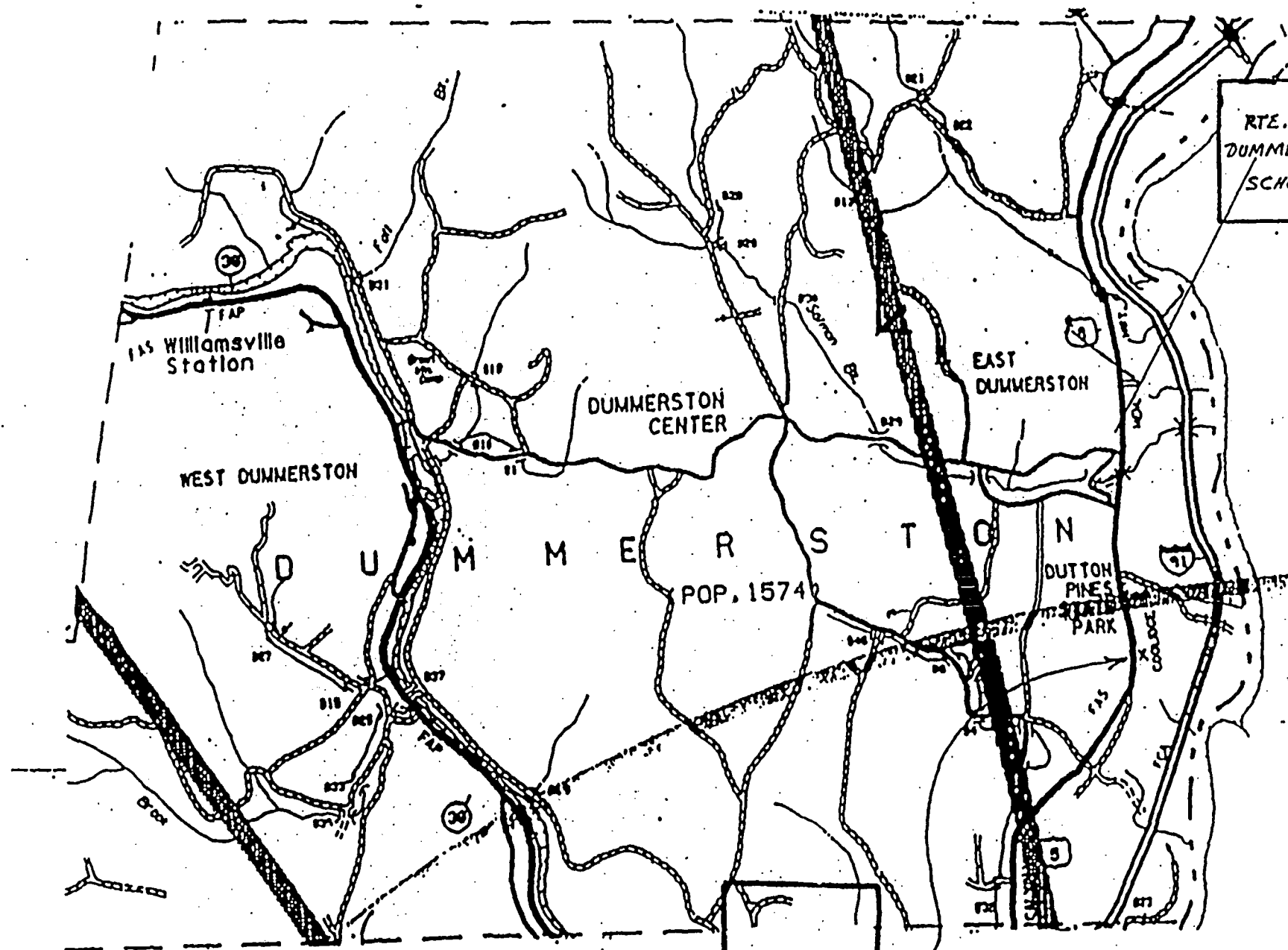
STATE TLD'S

STATE TLD'S

RTE. 5 &
GUILFORD
CENTER
ROAD

GUILFORD CTR.
ROAD &
TATER
ROAD





RTE. 5
DUMMERSTON
SCHOOL

STATE TLD'S

DUMM. LEO
STATE
HIGHWAY
GARAGE

TRANS.

TECH

RENAUD BROS.

RTE. 142 N. OF

TRANSMISSION

LINE

VERMONT.

YANKEE

②

VERNON

ELEM.

"SMEAD.
/LUMBER"

1

RIVER

CROSS

POND ROAI

_____ to RT.

142 N.

BLODGETT

FARM

RTE.142

6

NEWTON
RAA

~~SECRET~~

RTE. 142 S.

6

POND ROAD

RTE
142/DEPOT ST

17/11/1946

VII MA LINE

HUCKLE

HILL

ROAD

VERNON,

FIRE!

DEPARTM

POND RD.

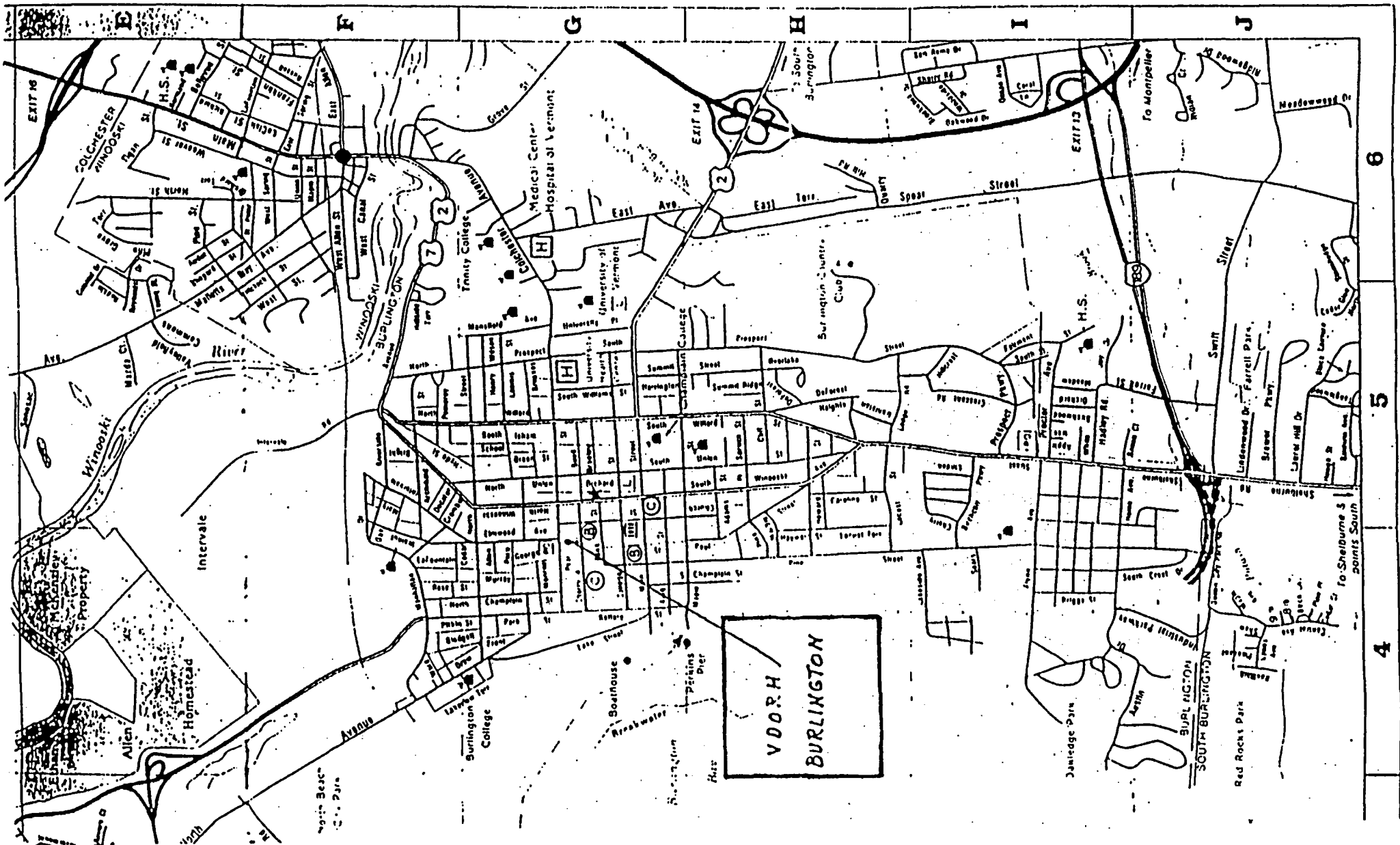
3/

HOUGHTON

VI MASS

STATE TLD'S

Burlington



TRITIUM IN WATER 2001

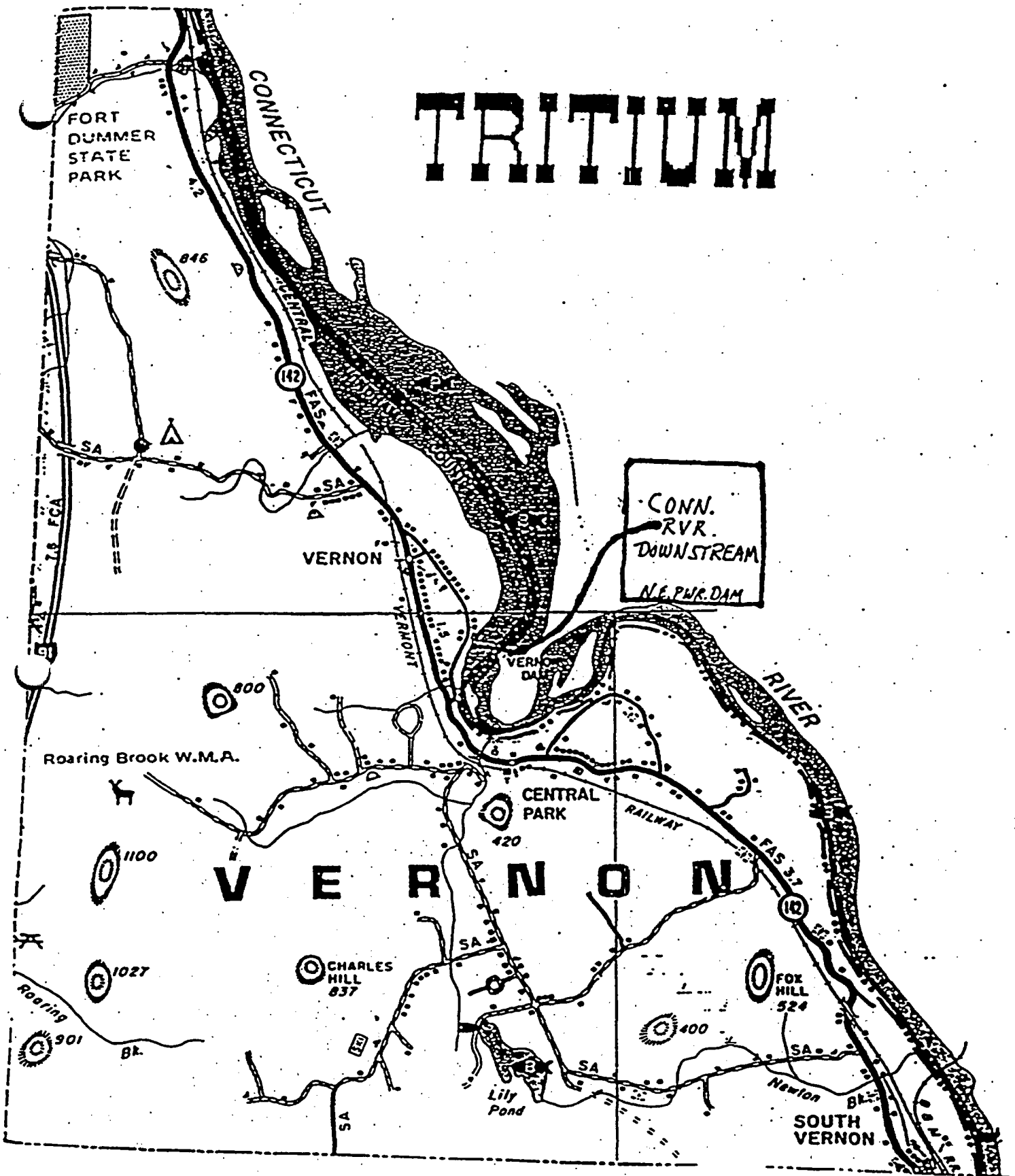
VERMONT YANKEE (CONNECTICUT RIVER)

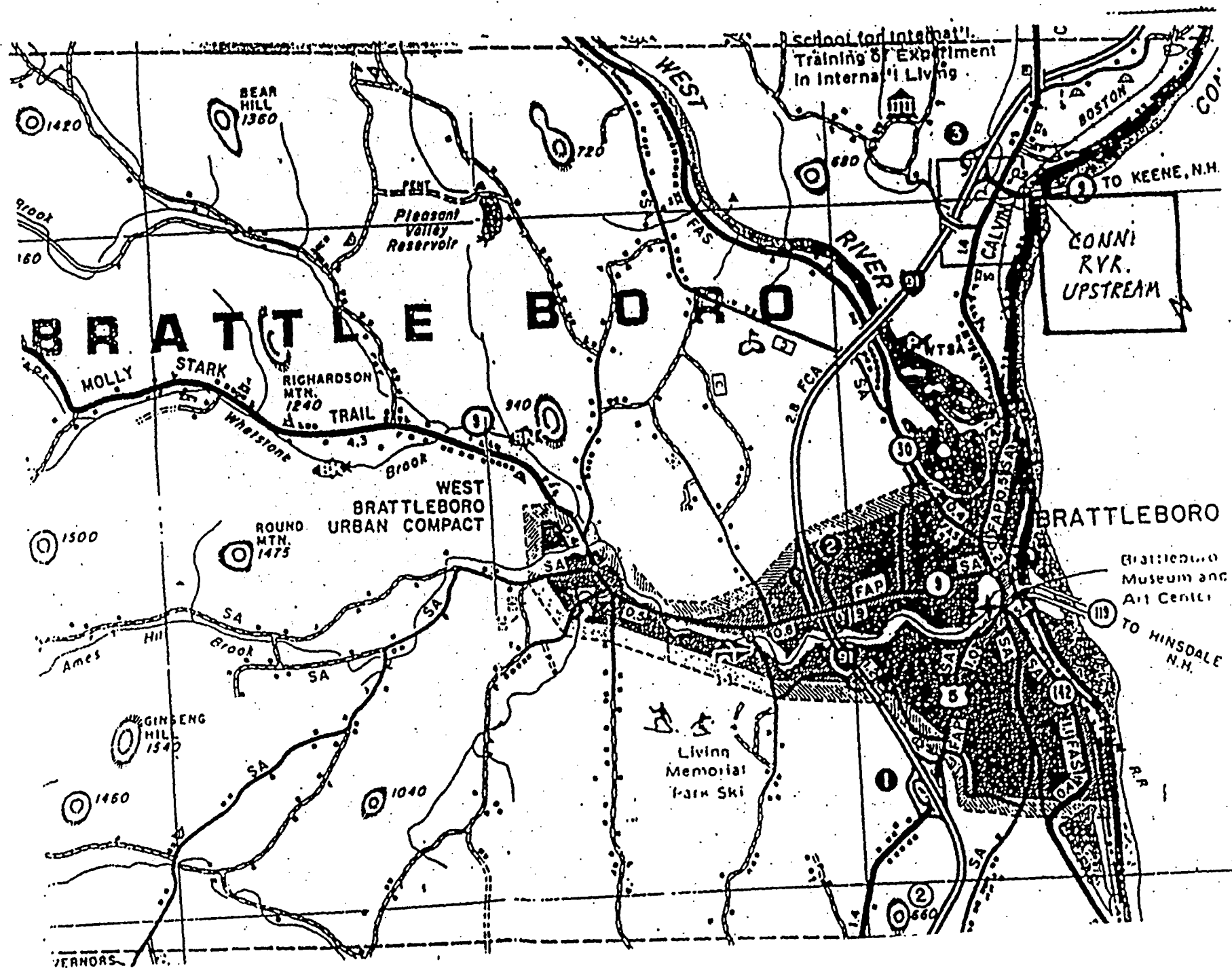
Results in nanoCuries/liter

As part of the water sampling effort, an aliquot of the monthly grab samples is analyzed for Hydrogen -3. Two locations are reported monthly for Hydrogen-3 content from the Connecticut River (upstream and downstream of the power station).

Month	Downstream	Upstream
January	< 0.5	< 0.5
February	< 0.5	< 0.5
March	< 0.5	< 0.5
April	< 0.5	< 0.5
May	< 0.5	< 0.5
June	< 0.5	< 0.5
July	< 0.5	< 0.5
August	< 0.5	< 0.5
September	< 0.5	< 0.5
October	< 0.5	< 0.5
November	< 0.5	< 0.5
December	< 0.5	< 0.5

TRITIUM





BRATTLEBORO

WATER SAMPLES 2001
(picoCuries/Liter)

Month	Test	Vernon School Well	NE Power Dam	VY Discharge	Brattleboro Town
January	Alpha	5.3 ± 1.0	3.2 ± 1.8	< 2.5	< 2.4
	Beta	6.1 ± 1.6	8.5 ± 1.7	2.9 ± 1.5	< 2.4
	Gamma	*	ND	ND	ND
February	Alpha	6.7 ± 1.2	1.4 ± 1.0	< 1.4	< 1.4
	Beta	2.2 ± 1.5	3.3 ± 1.5	< 2.3	3.1 ± 1.5
	Gamma	*	ND	ND	ND
March	Alpha	5.3 ± 1.0	< 2.6	< 2.6	< 2.5
	Beta	4.5 ± 1.5	2.3 ± 1.5	< 2.3	< 2.3
	Gamma	*	ND	ND	ND
April	Alpha	5.3 ± 1.2	< 2.6	< 2.6	< 2.8
	Beta	4.6 ± 2.4	< 3.7	< 3.7	< 3.7
	Gamma	*	ND	ND	ND
May	Alpha	5.8 ± 1.3	< 2.8	< 2.8	< 2.8
	Beta	3.9 ± 2.3	< 3.6	< 3.6	< 3.6
	Gamma	*	ND	ND	ND
June	Alpha	6.4 ± 1.2	2.0 ± 1.1	< 1.5	3.1 ± 1.8
	Beta	4.5 ± 1.8	< 2.5	< 2.5	< 2.7
	Gamma	*	ND	ND	ND
July	Alpha	6.5 ± 1.3	< 2.9	< 2.9	< 1.7
	Beta	3.9 ± 2.3	< 3.6	< 3.6	< 1.8
	Gamma	ND	ND	ND	ND
August	Alpha	5.4 ± 1.0	< 3.0	< 3.0	< 1.8
	Beta	3.8 ± 2.2	< 3.5	< 3.5	< 1.8
	Gamma	ND	ND	ND	ND
September	Alpha	5.9 ± 1.3	< 2.7	< 2.6	< 1.4
	Beta	< 3.6	< 3.6	< 3.6	< 1.8
	Gamma	*	ND	ND	ND
October	Alpha	5.5 ± 1.0	< 2.1	< 3.2	< 1.0
	Beta	< 3.7	< 1.8	< 3.6	< 1.2
	Gamma	*	ND	ND	ND
November	Alpha	5.3 ± 1.0	< 2.6	< 2.7	< 1.4
	Beta	< 3.6	< 3.6	< 3.6	< 1.8
	Gamma	*	ND	ND	ND
December	Alpha	6.0 ± 1.0	< 2.7	< 2.6	< 1.4
	Beta	4.0 ± 2.2	< 3.4	< 3.4	< 1.7
	Gamma	*	ND	ND	ND

* = Naturally Occurring Radionuclides
ND = None Detected

WATER SAMPLES 2001
(picoCuries/Liter)

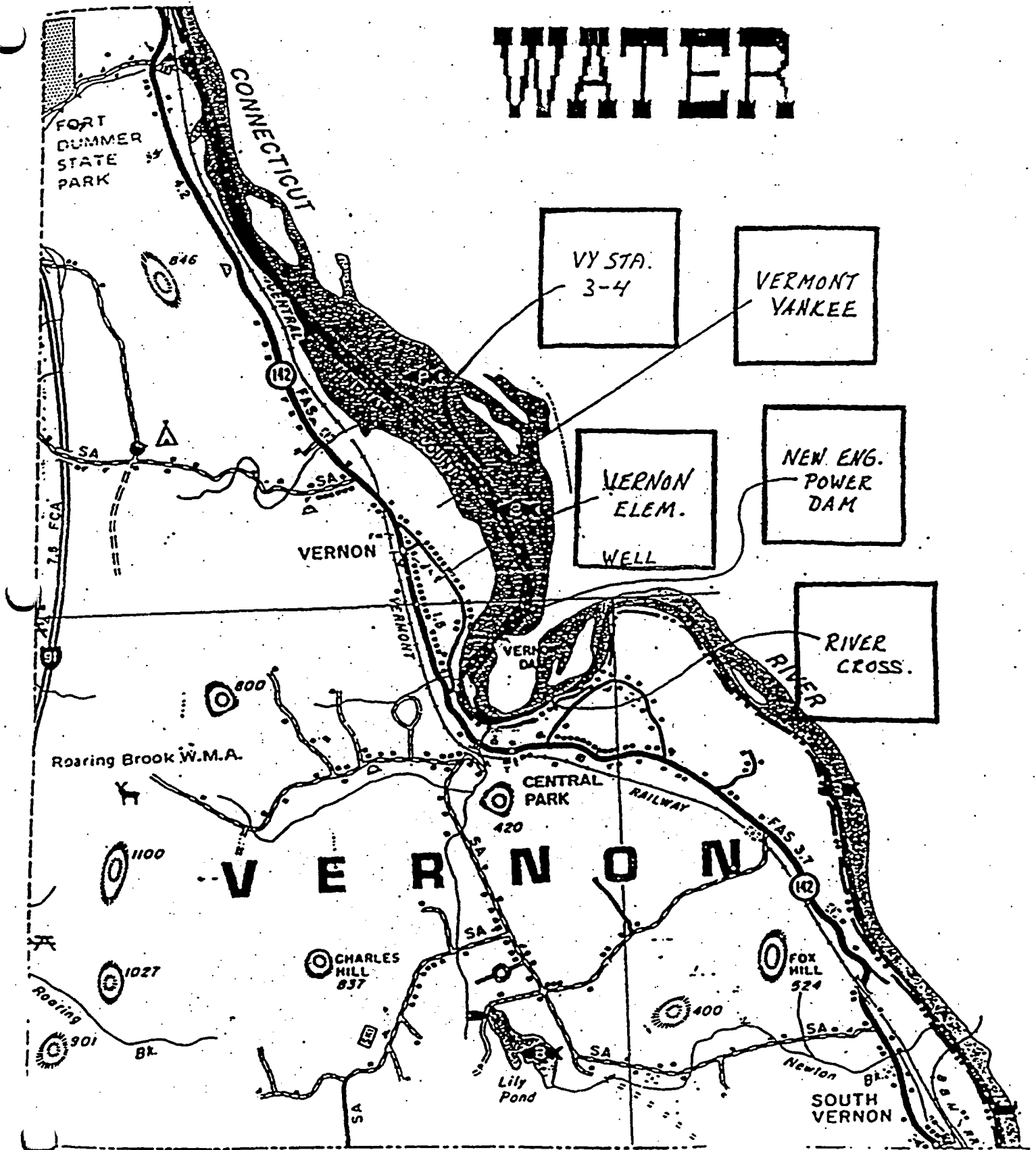
Month	Test	Powerline River Crossing (3-3)	Island Park	Conn. River Upstream (3-8)	Conn. River Downstream (3-4)
January	Alpha	< 1.5	< 1.5	6.0 + 1.6**	< 1.5
	Beta	2.8 + 1.5	< 2.4	7.5 + 1.6**	< 2.4
	Gamma	ND	ND	ND	ND
February	Alpha	< 1.8	< 1.3	< 1.8	< 1.7
	Beta	< 2.4	< 2.3	< 2.4	< 2.4
	Gamma	ND	ND	ND	ND
March	Alpha	< 1.5	River Frozen No Sample Taken	< 1.5	< 1.5
	Beta	< 2.2		< 2.2	< 2.2
	Gamma	ND		ND	ND
April	Alpha	< 2.2	< 2.9	< 3.0	< 2.3
	Beta	< 3.7	< 3.7	< 3.7	< 3.7
	Gamma	ND	ND	ND	ND
May	Alpha	< 2.2	< 2.9	< 2.3	< 2.2
	Beta	< 3.6	< 3.6	< 3.6	< 3.6
	Gamma	ND	ND	ND	ND
June	Alpha	< 1.8	< 1.5	2.1 + 1.2	< 1.8
	Beta	< 1.7	< 2.5	1.7 + 1.1	< 1.7
	Gamma	ND	ND	ND	ND
July	Alpha	< 2.7	< 2.9	< 2.8	< 3.0
	Beta	< 3.9	< 3.6	< 3.9	< 3.9
	Gamma	ND	ND	ND	ND
August	Alpha	< 2.7	< 1.8	< 2.8	< 2.8
	Beta	< 3.4	< 1.8	< 3.4	< 3.4
	Gamma	ND	ND	ND	ND
September	Alpha	< 2.6	< 2.5	< 2.5	< 2.5
	Beta	< 3.8	< 3.6	< 3.8	< 3.8
	Gamma	ND	ND	ND	ND
October	Alpha	< 3.0	< 2.1	< 3.2	< 3.2
	Beta	< 3.7	< 3.7	< 3.7	< 3.7
	Gamma	ND	ND	ND	ND
November	Alpha	< 2.7	< 2.7	< 2.6	< 2.8
	Beta	< 3.3	< 3.6	< 3.3	< 3.3
	Gamma	ND	ND	ND	ND
December	Alpha	< 2.6	< 2.6	< 2.6	< 2.6
	Beta	< 3.4	< 3.4	< 3.4	< 3.4
	Gamma	ND	ND	ND	ND

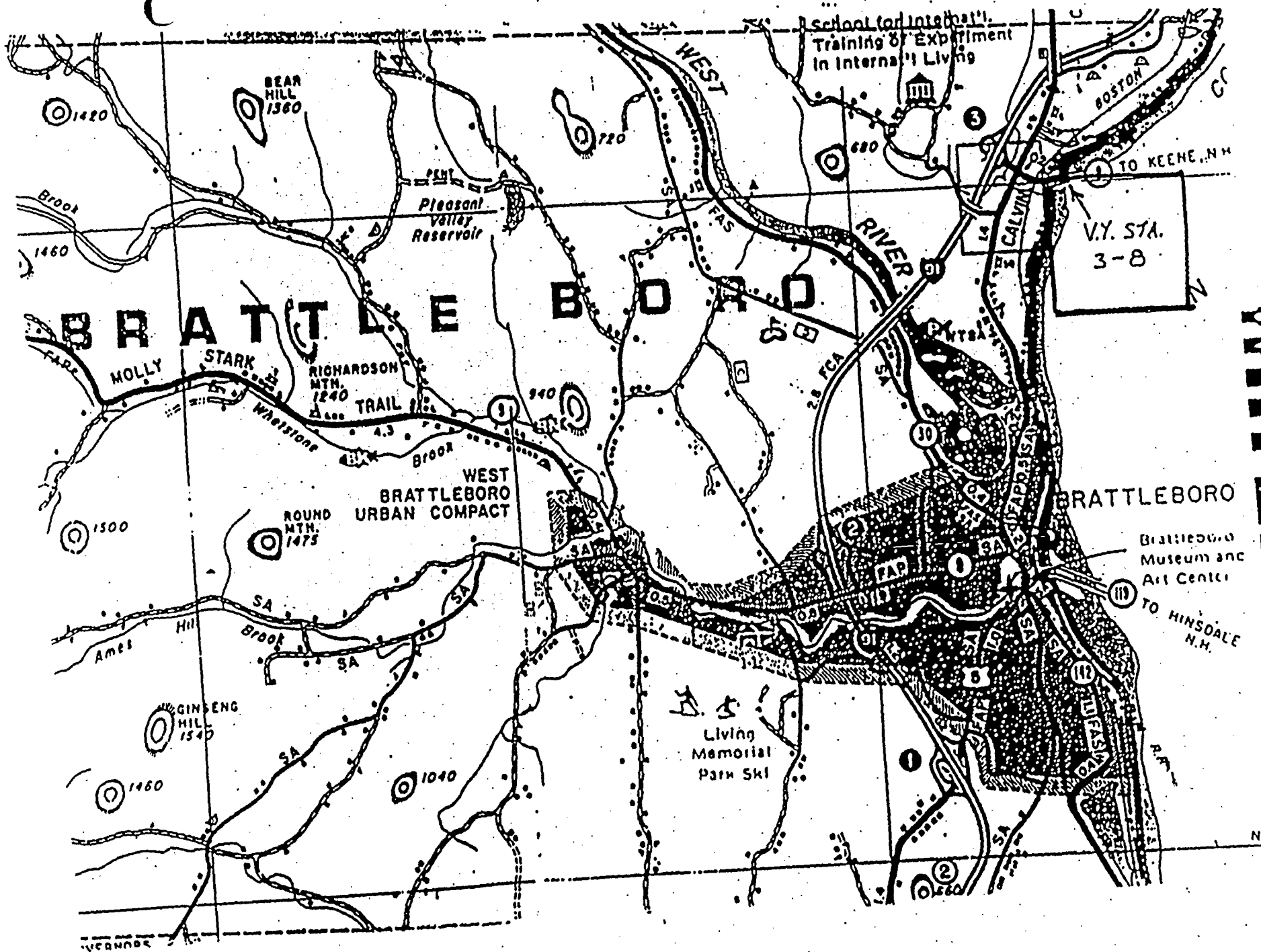
* = Naturally Occurring Radionuclides

** = Some sediment collected with river water sample

ND = None Detected

WATER





VERMONT

Health Physics, Radiological Health & Safety

**III.E. Annual Occupational Exposure
Reports 2001 - 2005**

Vermont Yankee Nuclear Power
REG. GUIDE 1.16 MAN-REM FINAL END OF THE YEAR REPORT FOR 2001

	NUMBER OF PERSONNEL OVER 100 M			TOTAL MAN-REM		
	STATION EMPLOYEES	UTILITY EMPLOYEES	CONTRACT WORKERS AND OTHERS	STATION EMPLOYEES	UTILITY EMPLOYEES	CONTRACT WORKERS AND OTHERS
REACTOR OPERATIONS & SURVEILLANCE						
MAINTENANCE	35	0	51	11.276	0.040	20.917
OPERATIONS	14	0	0	3.841	0.000	0.000
HEALTH PHYSICS	13	0	3	3.658	0.000	1.583
SUPERVISORY	0	0	0	0.024	0.000	0.000
ENGINEERING	0	0	0	0.258	0.000	0.004
OTHER	2	0	0	0.261	0.000	0.018
SECURITY	1	0	0	0.255	0.000	0.008
ROUTINE MAINTENANCE						
MAINTENANCE	30	1	231	8.456	0.148	70.933
OPERATIONS	4	0	0	1.394	0.000	0.000
HEALTH PHYSICS	3	0	0	1.050	0.000	0.103
SUPERVISORY	0	0	0	0.063	0.000	0.000
ENGINEERING	0	0	0	0.060	0.000	0.014
OTHER	1	0	0	0.281	0.000	0.022
SECURITY	0	0	0	0.011	0.000	0.000
INSERVICE INSPECTION						
MAINTENANCE	0	0	20	0.118	0.000	7.204
OPERATIONS	0	0	0	0.002	0.000	0.000
HEALTH PHYSICS	0	0	0	0.046	0.000	0.075
SUPERVISORY	0	0	0	0.005	0.000	0.000
ENGINEERING	0	0	0	0.014	0.000	0.000
OTHER	0	0	0	0.033	0.000	0.017
SECURITY	0	0	0	0.000	0.000	0.000
SPECIAL MAINTENANCE						
MAINTENANCE	3	0	21	1.336	0.000	7.503
OPERATIONS	0	0	0	0.016	0.000	0.000
HEALTH PHYSICS	0	0	0	0.270	0.000	0.002
SUPERVISORY	0	0	0	0.000	0.000	0.000
ENGINEERING	0	0	0	0.000	0.000	0.000
OTHER	0	0	0	0.000	0.000	0.043
SECURITY	0	0	0	0.000	0.000	0.000
WASTE PROCESSING						
MAINTENANCE	0	0	0	0.000	0.000	0.096
OPERATIONS	0	0	0	0.000	0.000	0.000
HEALTH PHYSICS	0	0	0	0.012	0.000	0.017
SUPERVISORY	0	0	0	0.000	0.000	0.000
ENGINEERING	0	0	0	0.000	0.000	0.000
OTHER	0	0	0	0.000	0.000	0.000
SECURITY	0	0	0	0.000	0.000	0.000
REFUELING						
MAINTENANCE	0	0	0	0.239	0.014	0.650
OPERATIONS	0	0	0	0.062	0.000	0.000
HEALTH PHYSICS	0	0	0	0.012	0.000	0.000
SUPERVISORY	0	0	0	0.014	0.000	0.000
ENGINEERING	0	0	0	0.002	0.000	0.000
OTHER	0	0	0	0.019	0.000	0.005
SECURITY	0	0	0	0.000	0.000	0.000

Vermont Yankee Nuclear Power
 REG. GUIDE 1.16 MAN-REM FINAL END OF THE YEAR REPORT FOR 2001

	NUMBER OF PERSONNEL OVER 100 MREM			TOTAL MAN-REM		
	STATION EMPLOYEES	UTILITY EMPLOYEES	CONTRACT WORKERS AND OTHERS	STATION EMPLOYEES	UTILITY EMPLOYEES	CONTRACT WORKERS AND OTHERS
TOTALS						
MAINTENANCE	68	1	323	21.426	0.203	107.303
OPERATIONS	18	0	0	5.314	0.000	0.000
HEALTH PHYSICS	16	0	3	5.047	0.000	1.780
SUPERVISORY	0	0	0	0.106	0.000	0.000
ENGINEERING	0	0	0	0.333	0.000	0.018
OTHER	3	0	0	0.595	0.000	0.105
SECURITY	1	0	0	0.266	0.000	0.008
GRAND TOTAL	106	1	326	33.087	0.203	109.215

Approved by : -----
 Radiation Protection Manager Date