Air Sampling Results

Using nine air sampling stations, the Vermont Department of Health assesses radioactivity in the air around Vermont Yankee. The locations of the air samplers are shown on Map 8 below. The ID numbers on the map may be matched with those on Tables 8, 9, 10 and 11. The sampling apparatus uses a mechanical pump to pull environmental air through sample media. Between the pump and sample media is positioned an in-line flow meter. The flow meter tracks the volume of air drawn through the sample media. The air samplers run continuously, and the air samples collected there are retrieved and analyzed at least monthly.

The air samplers use two different sample media to capture airborne radioactivity. One is a glass fiber filter. This filter collects particulate material. The air filter is analyzed by the Vermont Department of Health Laboratory in Burlington, which reports the results as total alpha radioactivity and total beta radioactivity. Alpha radioactivity is a measure of radioactive materials that emit alpha radiation, while beta radioactivity is a measure of radioactive materials that emit beta radiation. The air filters are also counted for gamma radioactivity in what are called the quarterly composites. An example of a natural radioactive particulate is beryllium-7. A radioactive particulate only associated with human activity is cesium-137.

The second media is a charcoal cartridge treated with triethylenediamine (TEDA). This cartridge has an affinity for radioactive iodine. As air passes through the cartridge, radioactive iodine gets trapped in the charcoal cartridge. The radioactive iodine is measured at the Vermont Department of Health Laboratory. In addition, other radioactive gases and vapors may be trapped in the charcoal cartridge. These, too, are analyzed by the laboratory. A radioactive iodine of particular interest is iodine-131. The lab reports the iodine-131 radioactivity, and identifies any other radioactive gases or vapors that were collected on the cartridge.

Alpha and beta radioactivity on the glass fiber filters is measured using a gas flow proportional counter. This analysis is particularly useful with environmental levels of radioactivity, and allows easy discrimination between alpha and beta radioactivity. The charcoal cartridges are analyzed for radioactive iodine and other gamma radiation emitting radioactive materials with a gamma spectrometer system using a reverse electrode germanium detector. This instrument can detect hundreds of different radioisotopes and identify them individually by their unique gamma radiation energy signatures. The instruments used at the Vermont Department of Health Laboratory are very sensitive and subject to significant quality controls. Still, each instrument has a limit of detection. When a sample is analyzed and no radioactivity is detected, the result is not recorded as zero, but it is recorded as less than the lower limit of detection. The lower limit of detection for iodine-131, for example is 0.0038 pCi/m^3

Total alpha, total beta, and iodine-131 radioactivity is reported in picocuries per cubic meter. A picocurie (pCi) is a measure of radioactivity. One pCi is one trillionth of a curie, and one curie is the amount of radioactivity in one gram of radium-226. A cubic meter (m^3) is a measure of volume, so the number of pCi/m^3 in these air samples is a measure of the airborne radioactivity concentration. Table 8 presents the total alpha radioactivity results from the 2007 air sample filters. Table 9 presents the total beta radioactivity from these filters. Table 10 presents the radioactive iodine-131 results following analysis of the charcoal cartridge samples, while Table 11 presents the gamma spectrometry results for the analysis of these charcoal cartridges.

Results for 2007 are that 1) alpha radioactivity is within the historical range of less than the lower limits of detection to 0.0071 pCi/m^3; 2) that beta radioactivity is within the historical range of less than the lower limits of detection to 0.0251 pCi/m^3; 3) that iodine-131 samples were all less than the limit of detection; and 4) that all gamma radioactivity detected was of natural origin. Specific concentrations for alpha radioactivity ranged from 0.000038 pCi/m^3 to 0.00456 pCi/m^3 while the specific concentrations for beta radioactivity ranged from 0.000458 pCi/m^3 to 0.0194 pCi/m^3.

Each calendar quarter, the air filter samples from all nine air sample locations are analyzed together in what is called a quarterly composite. The quarterly composite corrects for radioactive decay over the calendar quarter. The filters are analyzed with the gamma spectrometer system used to evaluate the air cartridges for radioactive materials. Table 12 presents the quarterly composite results.

In the graph in Figure 1, the mean alpha radioactivity for each of the nine Vermont Department of Health air sample stations is plotted. The graph indicates that there is little difference between results at locations close to Vermont Yankee Nuclear Power Station, for example at the Vernon Elementary School, and at locations far from the plant, for example the Windham County Courthouse in Brattleboro. As with alpha radioactivity, a look at the mean air sample total beta radioactivity indicates no significant difference between air sample results for locations near the plant as compared to locations further from the plant. These mean air sample beta radioactivity results from the nine air sample stations are plotted in the graph in Figure 2.

Table 10 presents the monthly results of iodine-131 sample analysis. No iodine-131 above the lower limit of detection was identified at any of the nine air sampling stations. The lower limit of detection is 0.0038 picocuries per cubic meter (pCi/m^3).

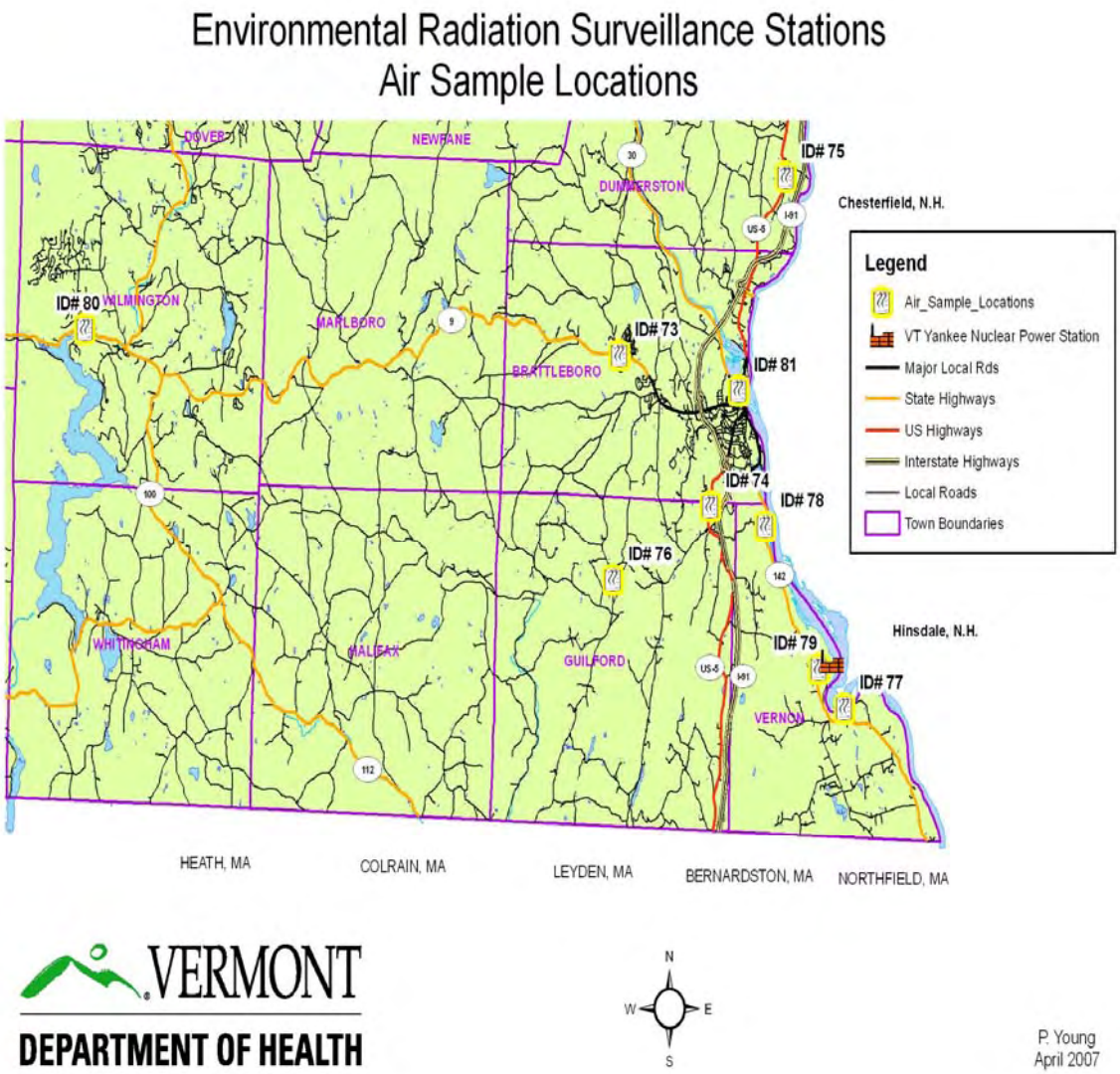
In Table 11 is presented the gamma spectroscopy results for air sample charcoal cartridges for the nine air samplers in the Vermont Yankee Nuclear Power Station area. All of the results indicate only naturally occurring radioactive materials were detected. Table 13 provides a list of some of the naturally occurring radioactive materials commonly found in gamma spectroscopy at the Vermont Department of Health Laboratory. Table 14 is a list of radioactive materials that may be identified through gamma spectroscopy that are predominantly associated with nuclear facilities.

Table 12 presents the quarterly air sample composite analysis. The quarterly composites are analyses of all air filters collected from the nine air sampling stations over the three-

month calendar quarter. The 27 filters are analyzed by gamma spectroscopy, which can identify any radioactivity that emits gamma radiation. The analysis of these filters indicated only naturally occurring beryllium-7 present in excess of the lower limit of detection. Beryllium-7 is a cosmogenic radioactive material. Cosmogenic radioactive materials are created by cosmic radiation interactions in the earth's atmosphere. The beryllium-7 accumulates on the surface of the earth when washed out of the atmosphere by precipitation.

In summary, gamma spectroscopy of air sample cartridges and filters around Vermont Yankee showed no evidence of radioactivity from the station. The alpha and beta radioactivity measurements are within the historical range and are considered most likely only associated with natural radioactive materials in the air.

Map 8



VERMONT
DEPARTMENT OF HEALTH

Table 8. 2007 Air Sample Alpha Radioactivity Results

Sample Date	Sample Location	Map ID No.	Results pCi/m^3	Error pCi/m^3
1/29/2007	Brattleboro State Police	73	0.00237	0.00073
1/29/2007	D & E Tree	74	0.00194	0.00069
1/29/2007	Dummerston State Garage	75	0.00207	0.00073
1/29/2007	Guilford Town Garage	76	0.00229	0.00074
1/29/2007	Power Line River Crossing	77	0.00376	0.001
1/29/2007	Renauld Brothers	78	0.00172	0.00066
1/29/2007	Vernon Elementary School	79	0.0028	0.00084
1/29/2007	Wilmington State Garage	80	0.00221	0.00072
1/29/2007	Windham County Court	81	0.00271	0.00074
2/27/2007	Brattleboro State Police	73	0.00237	0.00073
2/27/2007	D & E Tree	74	0.00264	0.00095
2/27/2007	Dummerston State Garage	75	0.00268	0.00098
2/27/2007	Guilford Town Garage	76	0.00176	0.00056
2/27/2007	Power Line River Crossing	77	0.00321	0.00112
2/27/2007	Renauld Brothers	78	0.00185	0.00084
2/27/2007	Vernon Elementary School	79	0.00336	0.00109
2/27/2007	Wilmington State Garage	80	0.00235	0.00091
2/27/2007	Windham County Court	81	0.00265	0.00089
3/20/2007	Brattleboro State Police	73	0.00314	0.00099
3/20/2007	D & E Tree	74	0.00157	0.00052
3/20/2007	Dummerston State Garage	75	0.0000794	0.000259
3/20/2007	Guilford Town Garage	76	0.00204	0.00074
3/20/2007	Power Line River Crossing	77	0.00254	0.00069
3/20/2007	Renauld Brothers	78	0.0000431	0.000236
3/20/2007	Vernon Elementary School	79	0.00153	0.00052
3/20/2007	Wilmington State Garage	80	0.00139	0.0005
3/20/2007	Windham County Court	81	0.00151	0.00048
4/30/2007	Brattleboro State Police	73	0.00156	0.00051
4/30/2007	D & E Tree	74	0.00237	0.00073
4/30/2007	Dummerston State Garage	75	0.00194	0.00069
4/30/2007	Guilford Town Garage	76	0.00207	0.00073
4/30/2007	Power Line River Crossing	77	0.00229	0.00074
4/30/2007	Renauld Brothers	78	0.00376	0.001
4/30/2007	Vernon Elementary School	79	0.00172	0.00066
4/30/2007	Wilmington State Garage	80	0.0028	0.00084
4/30/2007	Windham County Court	81	0.00221	0.00072

Table 8. 2007 Air Sample Alpha Radioactivity (continued)

Sample Date	Sample Location	Map ID No	Results pCi/m^3	Error pCi/m^3
5/29/2007	Brattleboro State Police	73	0.000291	0.000412
5/29/2007	D & E Tree	74	0.00087	0.000556
5/29/2007	Dummerston State Garage	75	0.00204	0.00074
5/29/2007	Guilford Town Garage	76	0.00214	0.00077
5/29/2007	Power Line River Crossing	77	0.000198	0.000404
5/29/2007	Renauld Brothers	78	0.00205	0.00072
5/29/2007	Vernon Elementary School	79	0.000388	0.000442
5/29/2007	Wilmington State Garage	80	0.0000387	0.000309
5/29/2007	Windham County Court	81	0.000184	0.000375
6/29/2007	Brattleboro State Police	73	0.000695	0.000482
6/29/2007	D & E Tree	74	0.00187	0.00071
6/29/2007	Dummerston State Garage	75	0.000571	0.000467
6/29/2007	Guilford Town Garage	76	0.00234	0.00077
6/29/2007	Power Line River Crossing	77	0.00322	0.00085
6/29/2007	Renauld Brothers	78	0.000532	0.000434
6/29/2007	Vernon Elementary School	79	0.00245	0.00076
6/29/2007	Wilmington State Garage	80	0.00154	0.00059
6/29/2007	Windham County Court	81	0.00279	0.00079
7/31/2007	Brattleboro State Police	73	0.000441	0.000299
7/31/2007	D & E Tree	74	0.00192	0.00052
7/31/2007	Dummerston State Garage	75	0.00249	0.00057
7/31/2007	Guilford Town Garage	76	0.00223	0.00055
7/31/2007	Power Line River Crossing	77	0.00338	0.00064
7/31/2007	Renauld Brothers	78	0.00178	0.00047
7/31/2007	Vernon Elementary School	79	0.00272	0.00058
7/31/2007	Wilmington State Garage	80	0.00191	0.00042
7/31/2007	Windham County Court	81	0.00244	0.00055
8/30/2007	Brattleboro State Police	73	0.000369	0.000384
8/30/2007	D & E Tree	74	0.00269	0.0008
8/30/2007	Dummerston State Garage	75	0.00224	0.00074
8/30/2007	Guilford Town Garage	76	0.00181	0.00067
8/30/2007	Power Line River Crossing	77	0.00324	0.00083
8/30/2007	Renauld Brothers	78	0.000136	0.000271
8/30/2007	Vernon Elementary School	79	0.00381	0.0009
8/30/2007	Wilmington State Garage	80	0.00191	0.00042
8/30/2007	Windham County Court	81	0.00239	0.00072

Table 8. 2007 Air Sample Alpha Radioactivity (continued)

Sample Date	Sample Location	Map ID No.	Results pCi/m^3	Error pCi/m^3
9/25/2007	Brattleboro State Police	73	0.00335	0.00095
9/25/2007	D & E Tree	74	0.00386	0.00097
9/25/2007	Dummerston State Garage	75	0.00307	0.00085
9/25/2007	Guilford Town Garage	76	0.00413	0.00085
9/25/2007	Power Line River Crossing	77	0.00383	0.00087
9/25/2007	Renauld Brothers	78	0.00389	0.00097
9/25/2007	Vernon Elementary School	79	0.00359	0.0008
9/25/2007	Wilmington State Garage	80	0.00212	0.00065
9/25/2007	Windham County Court	81	0.00265	0.00071
10/30/2007	Brattleboro State Police	73	0.0031	0.00078
10/30/2007	D & E Tree	74	0.00456	0.00089
10/30/2007	Dummerston State Garage	75	0.00314	0.00074
10/30/2007	Guilford Town Garage	76	0.00413	0.00085
10/30/2007	Power Line River Crossing	77	0.00295	0.00051
10/30/2007	Renauld Brothers	78	0.00373	0.0008
10/30/2007	Vernon Elementary School	79	0.00333	0.00088
10/30/2007	Wilmington State Garage	80	0.00209	0.00075
10/30/2007	Windham County Court	81	0.0024	0.0008
11/30/2007	Brattleboro State Police	73	0.00317	0.00094
11/30/2007	D & E Tree	74	0.00264	0.0008
11/30/2007	Dummerston State Garage	75	0.000057	0.00041
11/30/2007	Guilford Town Garage	76	0.00253	0.00078
11/30/2007	Power Line River Crossing	77	0.00295	0.00051
11/30/2007	Renauld Brothers	78	0.00249	0.00076
11/30/2007	Vernon Elementary School	79	0.00305	0.00101
11/30/2007	Wilmington State Garage	80	0.00267	0.00097
11/30/2007	Windham County Court	81	0.000624	0.000568
12/20/2007	Brattleboro State Police	73	0.00403	0.00124
12/20/2007	D & E Tree	74	0.00401	0.00113
12/20/2007	Dummerston State Garage	75	0.000397	0.00118
12/20/2007	Guilford Town Garage	76	0.00323	0.00102
12/20/2007	Power Line River Crossing	77	0.00235	0.00085
12/20/2007	Renauld Brothers	78	0.0032	0.00098
12/20/2007	Vernon Elementary School	79	0.00335	0.00095
12/20/2007	Wilmington State Garage	80	0.00386	0.00097
12/20/2007	Windham County Court	81	0.00307	0.00085

Figure 1, 2007 Mean Alpha Radioactivity in Air Around VYNPS

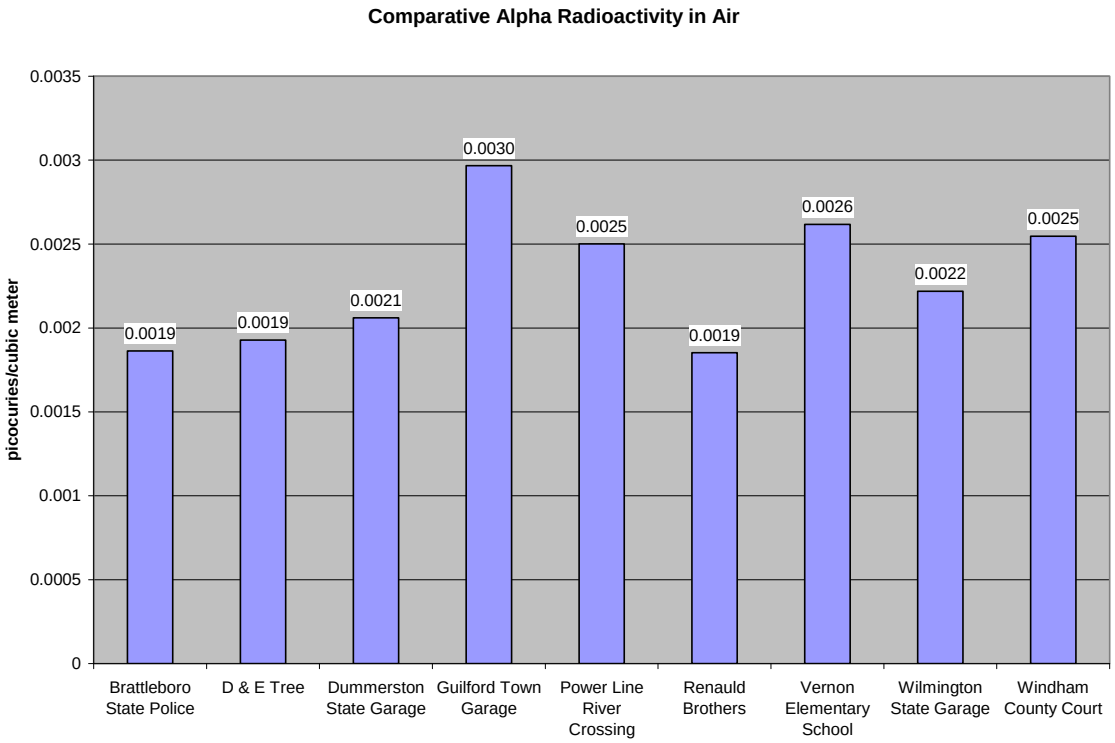


Table 9. 2007 Air Sample Beta Radioactivity Results

Sample Date	Sample Location	Map ID No.	Results pCi/m^3	Error pCi/m^3
1/29/2007	Brattleboro State Police	73	0.00116	0.00047
1/29/2007	D & E Tree	74	0.00845	0.00095
1/29/2007	Dummerston State Garage	75	0.00905	0.00097
1/29/2007	Guilford Town Garage	76	0.0146	0.0013
1/29/2007	Power Line River Crossing	77	0.00473	0.00075
1/29/2007	Renauld Brothers	78	0.0188	0.0021
1/29/2007	Vernon Elementary School	79	0.006	0.00081
1/29/2007	Wilmington State Garage	80	0.0106	0.001
1/29/2007	Windham County Court	81	0.0132	0.0013
2/27/2007	Brattleboro State Police	73	0.0116	0.0013
2/27/2007	D & E Tree	74	0.0103	0.0012
2/27/2007	Dummerston State Garage	75	0.01	0.0012
2/27/2007	Guilford Town Garage	76	0.0172	0.0016
2/27/2007	Power Line River Crossing	77	0.00665	0.00101
2/27/2007	Renauld Brothers	78	0.0161	0.0015
2/27/2007	Vernon Elementary School	79	0.00863	0.0011
2/27/2007	Wilmington State Garage	80	0.0124	0.0012
2/27/2007	Windham County Court	81	0.0132	0.0013
3/20/2007	Brattleboro State Police	73	0.012	0.0015
3/20/2007	D & E Tree	74	0.0113	0.0015
3/20/2007	Dummerston State Garage	75	0.00689	0.00085
3/20/2007	Guilford Town Garage	76	0.0163	0.0019
3/20/2007	Power Line River Crossing	77	0.00911	0.00139
3/20/2007	Renauld Brothers	78	0.0137	0.0017
3/20/2007	Vernon Elementary School	79	0.00908	0.00137
3/20/2007	Wilmington State Garage	80	0.00933	0.0013
3/20/2007	Windham County Court	81	0.0118	0.0015
4/30/2007	Brattleboro State Police	73	0.00711	0.00084
4/30/2007	D & E Tree	74	0.000722	0.000457
4/30/2007	Dummerston State Garage	75	0.00689	0.00085
4/30/2007	Guilford Town Garage	76	0.00912	0.00101
4/30/2007	Power Line River Crossing	77	0.000458	0.000412
4/30/2007	Renauld Brothers	78	0.00721	0.00086
4/30/2007	Vernon Elementary School	79	0.00657	0.00082
4/30/2007	Wilmington State Garage	80	0.00696	0.00079
4/30/2007	Windham County Court	81	0.00737	0.00084

Table 9. 2007 Air Sample Beta Radioactivity Results (continued)

Sample Date	Sample Location	Map ID No.	Results pCi/m^3	Error pCi/m^3
5/29/2007	Brattleboro State Police	73	0.00092	0.000643
5/29/2007	D & E Tree	74	0.00515	0.001
5/29/2007	Dummerston State Garage	75	0.00959	0.00124
5/29/2007	Guilford Town Garage	76	0.0109	0.0013
5/29/2007	Power Line River Crossing	77	0.000616	0.00064
5/29/2007	Renauld Brothers	78	0.00976	0.00122
5/29/2007	Vernon Elementary School	79	0.0011	0.0067
5/29/2007	Wilmington State Garage	80	0.000973	0.000584
5/29/2007	Windham County Court	81	0.0011	0.00064
6/29/2007	Brattleboro State Police	73	0.000917	0.000553
6/29/2007	D & E Tree	74	0.00958	0.00119
6/29/2007	Dummerston State Garage	75	0.00214	0.00068
6/29/2007	Guilford Town Garage	76	0.0113	0.00113
6/29/2007	Power Line River Crossing	77	0.0135	0.0013
6/29/2007	Renauld Brothers	78	0.00188	0.00062
6/29/2007	Vernon Elementary School	79	0.0123	0.0013
6/29/2007	Wilmington State Garage	80	0.00937	0.00107
6/29/2007	Windham County Court	81	0.0112	0.0012
7/31/2007	Brattleboro State Police	73	0.0012	0.00069
7/31/2007	D & E Tree	74	0.00941	0.00128
7/31/2007	Dummerston State Garage	75	0.01	0.0013
7/31/2007	Guilford Town Garage	76	0.0103	0.0013
7/31/2007	Power Line River Crossing	77	0.0115	0.0013
7/31/2007	Renauld Brothers	78	0.0114	0.0013
7/31/2007	Vernon Elementary School	79	0.0116	0.0009
7/31/2007	Wilmington State Garage	80	0.0054	0.00059
7/31/2007	Windham County Court	81	0.0118	0.0013
8/30/2007	Brattleboro State Police	73	0.000771	0.000697
8/30/2007	D & E Tree	74	0.0102	0.0013
8/30/2007	Dummerston State Garage	75	0.00823	0.0012
8/30/2007	Guilford Town Garage	76	0.0103	0.0013
8/30/2007	Power Line River Crossing	77	0.015	0.0014
8/30/2007	Renauld Brothers	78	0.00128	0.00065
8/30/2007	Vernon Elementary School	79	0.0147	0.0014
8/30/2007	Wilmington State Garage	80	0.0054	0.00059
8/30/2007	Windham County Court	81	0.0122	0.0013

Table 9. 2007 Air Sample Beta Radioactivity Results (continued)

Sample Date	Sample Location	Map ID No.	Results pCi/m^3	Error pCi/m^3
9/25/2007	Brattleboro State Police	73	0.0157	0.0015
9/25/2007	D & E Tree	74	0.0117	0.0014
9/25/2007	Dummerston State Garage	75	0.0109	0.0015
9/25/2007	Guilford Town Garage	76	0.0104	0.0014
9/25/2007	Power Line River Crossing	77	0.0144	0.0015
9/25/2007	Renauld Brothers	78	0.0141	0.0015
9/25/2007	Vernon Elementary School	79	0.0167	0.0013
9/25/2007	Wilmington State Garage	80	0.0126	0.0013
9/25/2007	Windham County Court	81	0.0141	0.0015
10/30/2007	Brattleboro State Police	73	0.0159	0.0013
10/30/2007	D & E Tree	74	0.00956	0.0011
10/30/2007	Dummerston State Garage	75	0.0112	0.0012
10/30/2007	Guilford Town Garage	76	0.0132	0.0013
10/30/2007	Power Line River Crossing	77	0.0156	0.0013
10/30/2007	Renauld Brothers	78	0.0139	0.0012
10/30/2007	Vernon Elementary School	79	0.0167	0.0013
10/30/2007	Wilmington State Garage	80	0.0114	0.0008
10/30/2007	Windham County Court	81	0.0141	0.0012
11/30/2007	Brattleboro State Police	73	0.013	0.0013
11/30/2007	D & E Tree	74	0.0107	0.0012
11/30/2007	Dummerston State Garage	75	0.012	0.0013
11/30/2007	Guilford Town Garage	76	0.0131	0.0014
11/30/2007	Power Line River Crossing	77	0.0147	0.0014
11/30/2007	Renauld Brothers	78	0.00164	0.00066
11/30/2007	Vernon Elementary School	79	0.0141	0.0013
11/30/2007	Wilmington State Garage	80	0.0114	0.0008
11/30/2007	Windham County Court	81	0.0145	0.0013
12/20/2007	Brattleboro State Police	73	0.0164	0.0018
12/20/2007	D & E Tree	74	0.0129	0.0017
12/20/2007	Dummerston State Garage	75	0.00317	0.00102
12/20/2007	Guilford Town Garage	76	0.0172	0.002
12/20/2007	Power Line River Crossing	77	0.0179	0.0019
12/20/2007	Renauld Brothers	78	0.0194	0.002
12/20/2007	Vernon Elementary School	79	0.0184	0.0019
12/20/2007	Wilmington State Garage	80	0.0127	0.0015
12/20/2007	Windham County Court	81	0.0166	0.0017

Figure 2

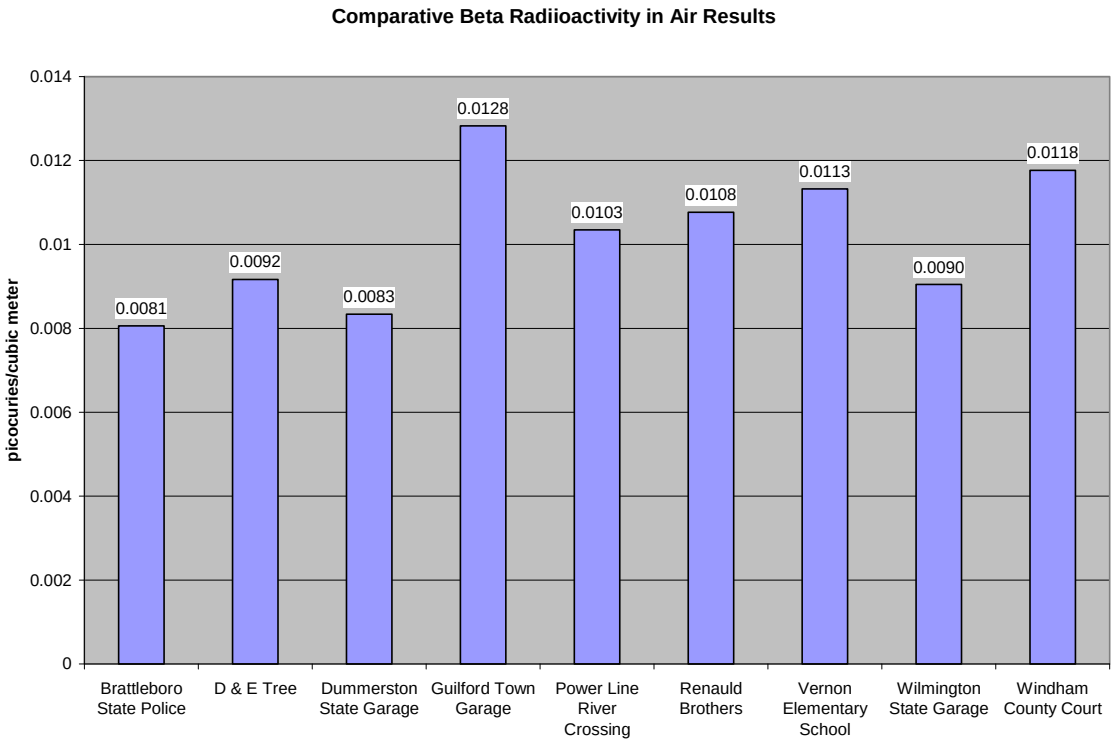

Comparative Beta Radiioactivity in Air Results
picocuries/cubic meter
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
0.0081
0.0092
0.0083
0.0128
0.0103
0.0108
0.0113
0.0090
0.0118
Brattleboro State Police
D & E Tree
Dummerston State Garage
Guilford Town Garage
Power Line River Crossing
Renauld Brothers
Vernon Elementary School
Wilmington State Garage
Windham County Court

Table 10. 2007 Air Sample Radioactive Iodine-131 Results

Sample Date	Sample Location	Map ID No.	Results pCi/m^3
1/29/2007	Brattleboro State Police	73	<0.02
1/29/2007	D & E Tree	74	<0.02
1/29/2007	Dummerston State Garage	75	<0.02
1/29/2007	Guilford Town Garage	76	<0.02
1/29/2007	Power Line River Crossing	77	<0.02
1/29/2007	Renauld Brothers	78	<0.02
1/29/2007	Vernon Elementary School	79	<0.02
1/29/2007	Wilmington State Garage	80	<0.02
1/29/2007	Windham County Court	81	<0.02
2/27/2007	Brattleboro State Police	73	<0.02
2/27/2007	D & E Tree	74	<0.02
2/27/2007	Dummerston State Garage	75	<0.02
2/27/2007	Guilford Town Garage	76	<0.02
2/27/2007	Power Line River Crossing	77	<0.02
2/27/2007	Renauld Brothers	78	<0.02
2/27/2007	Vernon Elementary School	79	<0.02
2/27/2007	Wilmington State Garage	80	<0.02
2/27/2007	Windham County Court	81	<0.02
3/20/2007	Brattleboro State Police	73	<0.02
3/20/2007	D & E Tree	74	<0.02
3/20/2007	Dummerston State Garage	75	<0.02
3/20/2007	Guilford Town Garage	76	<0.02
3/20/2007	Power Line River Crossing	77	<0.02
3/20/2007	Renauld Brothers	78	<0.02
3/20/2007	Vernon Elementary School	79	<0.02
3/20/2007	Wilmington State Garage	80	<0.02
3/20/2007	Windham County Court	81	<0.02
4/30/2007	Brattleboro State Police	73	<0.02
4/30/2007	D & E Tree	74	<0.02
4/30/2007	Dummerston State Garage	75	<0.02
4/30/2007	Guilford Town Garage	76	<0.02
4/30/2007	Power Line River Crossing	77	<0.02
4/30/2007	Renauld Brothers	78	<0.02
4/30/2007	Vernon Elementary School	79	<0.02
4/30/2007	Wilmington State Garage	80	<0.02
4/30/2007	Windham County Court	81	<0.02

Table 10. 2007 Air Sample Radioactive Iodine-131 Results (continued)

Sample Date	Sample Location	Map ID No.	Results pCi/m^3
5/29/2007	Brattleboro State Police	73	<0.02
5/29/2007	D & E Tree	74	<0.02
5/29/2007	Dummerston State Garage	75	<0.02
5/29/2007	Guilford Town Garage	76	<0.02
5/29/2007	Power Line River Crossing	77	<0.02
5/29/2007	Renauld Brothers	78	<0.02
5/29/2007	Vernon Elementary School	79	<0.02
5/29/2007	Wilmington State Garage	80	<0.02
5/29/2007	Windham County Court	81	<0.02
6/29/2007	Brattleboro State Police	73	<0.02
6/29/2007	D & E Tree	74	<0.02
6/29/2007	Dummerston State Garage	75	<0.02
6/29/2007	Guilford Town Garage	76	<0.02
6/29/2007	Power Line River Crossing	77	<0.02
6/29/2007	Renauld Brothers	78	<0.02
6/29/2007	Vernon Elementary School	79	<0.02
6/29/2007	Wilmington State Garage	80	<0.02
6/29/2007	Windham County Court	81	<0.02
7/31/2007	Brattleboro State Police	73	<0.02
7/31/2007	D & E Tree	74	<0.02
7/31/2007	Dummerston State Garage	75	<0.02
7/31/2007	Guilford Town Garage	76	<0.02
7/31/2007	Power Line River Crossing	77	<0.02
7/31/2007	Renauld Brothers	78	<0.02
7/31/2007	Vernon Elementary School	79	<0.02
7/31/2007	Wilmington State Garage	80	<0.02
7/31/2007	Windham County Court	81	<0.02
8/27/2007	Brattleboro State Police	73	<0.02
8/27/2007	D & E Tree	74	<0.02
8/27/2007	Dummerston State Garage	75	<0.02
8/27/2007	Guilford Town Garage	76	<0.02
8/27/2007	Power Line River Crossing	77	<0.02
8/27/2007	Renauld Brothers	78	<0.02
8/27/2007	Vernon Elementary School	79	<0.02
8/27/2007	Wilmington State Garage	80	<0.02
8/27/2007	Windham County Court	81	<0.02

Table 10. 2007 Air Sample Radioactive Iodine-131 Results (continued)

Sample Date	Sample Location	Map ID No.	Results pCi/m^3
9/25/2007	Brattleboro State Police	73	<0.02
9/25/2007	D & E Tree	74	<0.02
9/25/2007	Dummerston State Garage	75	<0.02
9/25/2007	Guilford Town Garage	76	<0.02
9/25/2007	Power Line River Crossing	77	<0.02
9/25/2007	Renauld Brothers	78	<0.02
9/25/2007	Vernon Elementary School	79	<0.02
9/25/2007	Wilmington State Garage	80	<0.02
9/25/2007	Windham County Court	81	<0.02
10/30/2007	Brattleboro State Police	73	<0.02
10/30/2007	D & E Tree	74	<0.02
10/30/2007	Dummerston State Garage	75	<0.02
10/30/2007	Guilford Town Garage	76	<0.02
10/30/2007	Power Line River Crossing	77	<0.02
10/30/2007	Renauld Brothers	78	<0.02
10/30/2007	Vernon Elementary School	79	<0.02
10/30/2007	Wilmington State Garage	80	<0.02
10/30/2007	Windham County Court	81	<0.02
11/30/2007	Brattleboro State Police	73	<0.02
11/30/2007	D & E Tree	74	<0.02
11/30/2007	Dummerston State Garage	75	<0.02
11/30/2007	Guilford Town Garage	76	<0.02
11/30/2007	Power Line River Crossing	77	<0.02
11/30/2007	Renauld Brothers	78	<0.02
11/30/2007	Vernon Elementary School	79	<0.02
11/30/2007	Wilmington State Garage	80	<0.02
11/30/2007	Windham County Court	81	<0.02
12/20/2007	Brattleboro State Police	73	<0.02
12/20/2007	D & E Tree	74	<0.02
12/20/2007	Dummerston State Garage	75	<0.02
12/20/2007	Guilford Town Garage	76	<0.02
12/20/2007	Power Line River Crossing	77	<0.02
12/20/2007	Renauld Brothers	78	<0.02
12/20/2007	Vernon Elementary School	79	<0.02
12/20/2007	Wilmington State Garage	80	<0.02
12/20/2007	Windham County Court	81	<0.02

Table 11. 2007 Air Sample Gamma Radioactivity Results

Sample Date	Sample Location	Map ID No.	Results pCi/m^3
1/29/2007	Brattleboro State Police	73	Natural
1/29/2007	D & E Tree	74	Natural
1/29/2007	Dummerston State Garage	75	Natural
1/29/2007	Guilford Town Garage	76	Natural
1/29/2007	Power Line River Crossing	77	Natural
1/29/2007	Renauld Brothers	78	Natural
1/29/2007	Vernon Elementary School	79	Natural
1/29/2007	Wilmington State Garage	80	Natural
1/29/2007	Windham County Court	81	Natural
2/27/2007	Brattleboro State Police	73	Natural
2/27/2007	D & E Tree	74	Natural
2/27/2007	Dummerston State Garage	75	Natural
2/27/2007	Guilford Town Garage	76	Natural
2/27/2007	Power Line River Crossing	77	Natural
2/27/2007	Renauld Brothers	78	Natural
2/27/2007	Vernon Elementary School	79	Natural
2/27/2007	Wilmington State Garage	80	Natural
2/27/2007	Windham County Court	81	Natural
3/20/2007	Brattleboro State Police	73	Natural
3/20/2007	D & E Tree	74	Natural
3/20/2007	Dummerston State Garage	75	Natural
3/20/2007	Guilford Town Garage	76	Natural
3/20/2007	Power Line River Crossing	77	Natural
3/20/2007	Renauld Brothers	78	Natural
3/20/2007	Vernon Elementary School	79	Natural
3/20/2007	Wilmington State Garage	80	Natural
3/20/2007	Windham County Court	81	Natural
4/30/2007	Brattleboro State Police	73	Natural
4/30/2007	D & E Tree	74	Natural
4/30/2007	Dummerston State Garage	75	Natural
4/30/2007	Guilford Town Garage	76	Natural
4/30/2007	Power Line River Crossing	77	Natural
4/30/2007	Renauld Brothers	78	Natural
4/30/2007	Vernon Elementary School	79	Natural
4/30/2007	Wilmington State Garage	80	Natural
4/30/2007	Windham County Court	81	Natural

Table 11. 2007 Air Sample Gamma Radioactivity Results (continued)

Sample Date	Sample Location	Map ID No.	Results pCi/m^3
5/29/2007	Brattleboro State Police	73	Natural
5/29/2007	D & E Tree	74	Natural
5/29/2007	Dummerston State Garage	75	Natural
5/29/2007	Guilford Town Garage	76	Natural
5/29/2007	Power Line River Crossing	77	Natural
5/29/2007	Renauld Brothers	78	Natural
5/29/2007	Vernon Elementary School	79	Natural
5/29/2007	Wilmington State Garage	80	Natural
5/29/2007	Windham County Court	81	Natural
6/29/2007	Brattleboro State Police	73	Natural
6/29/2007	D & E Tree	74	Natural
6/29/2007	Dummerston State Garage	75	Natural
6/29/2007	Guilford Town Garage	76	Natural
6/29/2007	Power Line River Crossing	77	Natural
6/29/2007	Renauld Brothers	78	Natural
6/29/2007	Vernon Elementary School	79	Natural
6/29/2007	Wilmington State Garage	80	Natural
6/29/2007	Windham County Court	81	Natural
7/31/2007	Brattleboro State Police	73	Natural
7/31/2007	D & E Tree	74	Natural
7/31/2007	Dummerston State Garage	75	Natural
7/31/2007	Guilford Town Garage	76	Natural
7/31/2007	Power Line River Crossing	77	Natural
7/31/2007	Renauld Brothers	78	Natural
7/31/2007	Vernon Elementary School	79	Natural
7/31/2007	Wilmington State Garage	80	Natural
7/31/2007	Windham County Court	81	Natural
8/27/2007	Brattleboro State Police	73	Natural
8/27/2007	D & E Tree	74	Natural
8/27/2007	Dummerston State Garage	75	Natural
8/27/2007	Guilford Town Garage	76	Natural
8/27/2007	Power Line River Crossing	77	Natural
8/27/2007	Renauld Brothers	78	Natural
8/27/2007	Vernon Elementary School	79	Natural
8/27/2007	Wilmington State Garage	80	Natural
8/27/2007	Windham County Court	81	Natural

Table 11. 2007 Air Sample Gamma Radioactivity Results (continued)

Sample Date	Sample Location	Map ID No.	Results pCi/m^3
9/25/2007	Brattleboro State Police	73	Natural
9/25/2007	D & E Tree	74	Natural
9/25/2007	Dummerston State Garage	75	Natural
9/25/2007	Guilford Town Garage	76	Natural
9/25/2007	Power Line River Crossing	77	Natural
9/25/2007	Renauld Brothers	78	Natural
9/25/2007	Vernon Elementary School	79	Natural
9/25/2007	Wilmington State Garage	80	Natural
9/25/2007	Windham County Court	81	Natural
10/30/2007	Brattleboro State Police	73	Natural
10/30/2007	D & E Tree	74	Natural
10/30/2007	Dummerston State Garage	75	Natural
10/30/2007	Guilford Town Garage	76	Natural
10/30/2007	Power Line River Crossing	77	Natural
10/30/2007	Renauld Brothers	78	Natural
10/30/2007	Vernon Elementary School	79	Natural
10/30/2007	Wilmington State Garage	80	Natural
10/30/2007	Windham County Court	81	Natural
11/30/2007	Brattleboro State Police	73	Natural
11/30/2007	D & E Tree	74	Natural
11/30/2007	Dummerston State Garage	75	Natural
11/30/2007	Guilford Town Garage	76	Natural
11/30/2007	Power Line River Crossing	77	Natural
11/30/2007	Renauld Brothers	78	Natural
11/30/2007	Vernon Elementary School	79	Natural
11/30/2007	Wilmington State Garage	80	Natural
11/30/2007	Windham County Court	81	Natural
12/20/2007	Brattleboro State Police	73	Natural
12/20/2007	D & E Tree	74	Natural
12/20/2007	Dummerston State Garage	75	Natural
12/20/2007	Guilford Town Garage	76	Natural
12/20/2007	Power Line River Crossing	77	Natural
12/20/2007	Renauld Brothers	78	Natural
12/20/2007	Vernon Elementary School	79	Natural
12/20/2007	Wilmington State Garage	80	Natural
12/20/2007	Windham County Court	81	Natural

Table 12. 2007 Air Sample Quarterly Composite Results

Sample Date	Sample Location	Results pCi/m^3	Error pCi/m^3	Sample Comment
3/31/2006	All 9 Vermont Yankee Filters for Quarter 1	4140	370	Be-7
6/30/2006	All 8 Vermont Yankee Filters for Quarter 2	6540	500	Be-7
10/31/2006	All 9 Vermont Yankee Filters for Quarter 3	4520	430	Be-7
12/31/2006	All 9 Vermont Yankee Filters for Quarter 4	3800	350	Be-7

Table 13. Common Natural Gamma Radiation Emitters

Actinium-228	Americium-241	Beryllium-7
Bismuth-212	Bismuth-214	Lead-210
Lead-212	Lead-214	Polonium-210
Potassium-40	Protactinium-234m	Radium-224
Radium-226	Radium-228	Radon-222
Technetium-99	Thallium-208	Thorium-228
Thorium-229	Thorium-230	Thorium-231
Thorium-232	Thorium-234	Uranium-233
Uranium-234	Uranium-235	Uranium-238

Table 14. Nuclear Facility Gamma Radiation Emitters

Antimony-124	Antimony-126	
Barium-140/Lanthanum-140	Cerium-139	Cerium-140
Cerium-144/promethium-144	Cobalt-56	Cobalt-60
Chromium-51	Cesium-134	Cesium-136
Cesium-137	Iodine-131	Iodine-132
Iodine-133	Iodine-135	Krypton-85
Krypton-88	Manganese-54	Plutonium-239
Plutonium-240	Ruthenium-103	Ruthenium-106
Strontium-85	Strontium-89	Strontium-90
Tellurium-132	Xenon-133	Xenon-133m
Xenon-135	Zinc-65	Zirconium-95/Niobium-95

Water Sampling Results

Water is sampled each month at 10 locations. Six are sample locations in the Connecticut River. Of these six Connecticut River locations, two samples are taken monthly in the pool where the plant discharges cooling water, two are taken monthly downstream of the station in the pool just below the Vernon dam, and two are taken from the river upstream of the station in Brattleboro. The remaining four sample locations include one representing the Brattleboro municipal water supply, and one each from groundwater wells that serve the Miller and Blodgett Farms in Vernon and the Vernon Elementary School. Results are in Tables 15 - 18. New for this year, we have included analyses of samples from the White River Junction area of Vermont for comparison purposes.

Each of the water samples undergoes four different analyses. The first three analyses are like those for the air samples: analysis for alpha radioactivity, analysis for beta radioactivity, and analysis for all radionuclides by gamma spectroscopy. The fourth analysis is unique to water samples. It is an analysis for tritium, the common name for the radioisotope hydrogen-3. Some of the water samples were also analyzed specifically for uranium and radium.

The concerns about alpha, beta and gamma radiation were discussed earlier. Tritium is a source of very weak beta radiation. Tritium is created when water passes through the reactor core. The reactor coolant water at Vermont Yankee, as is the case at all nuclear power stations, becomes tritiated as the hydrogen atoms in water molecules are activated by neutron radiation in the reactor core. Tritiated water may leave the plant site any way non-radioactive water leaves the plant - in the air, in groundwater and through discharges into surface waters like the Connecticut River. Unmonitored tritium releases from nuclear facilities have always been a source of concern. Tritium monitoring by the Vermont Department of Health may help identify releases if they develop.

A map showing the routine water sample locations around the Vermont Yankee site, Map 9, is below. Tables 15, 16, 17 and 18 present the water sample results. The tables list the

map identification numbers so the locations can be seen on Map 9. Sample locations 84A and 86 are in the Connecticut River downstream. These are labeled in Tables 15 to 18 as Connecticut River, Station 3-3 and Connecticut River Downstream. Sample locations 84B and 84D are in the basin where Vermont Yankee Nuclear Power Station discharges water from the plant into the Connecticut River. The tables identify them as Connecticut River, Station 3-4 and Discharge Forebay. Samples 84C and 87 are in the Connecticut River upstream of the plant. They are identified as Connecticut River, Station 3-8 and Connecticut River Upstream in Tables 15, 16, 17 and 18.

In addition to showing the individual analysis results over the course of 2007, we have taken the mean results of each of the samples at the 10 water sample locations, and plotted them in graphs. Figures 3 and 4 allow comparisons of the mean alpha and mean beta radioactivity results for the 10 locations. These figures also depict the analytical results for three other sites in Vermont. The Vermont Department of Health is collecting samples and analyzing them throughout Vermont as part of our emergency preparedness program, and including the analytical results in our annual Vermont Yankee environmental surveillance report. We hope these sample measurements will help us better understand the specific results around Vermont Yankee, as well as the general nature of radioactivity in Vermont as a whole. These sites are depicted in Maps 10 and 11.

Also new for 2007, the Department of Health analyzed ground water samples from the Miller Farm, Blodgett Farm and Vernon Elementary School for radium and uranium. This was done to help identify the source of some of the elevated alpha and beta radioactivity found in ground water samples over the years. We believed that the elevated alpha and beta radioactivity measurements in ground water samples as compared to Brattleboro municipal water was due to radium, uranium and other natural radioactive materials being filtered from the water at the Brattleboro water treatment facility. We also believed if the ground water samples had higher alpha and beta radioactivity as compared to surface water samples because of the atmospheric release of radon gas from the surface

water. Precursors of radon - uranium, radium and thorium, the radon gas itself and the particulate radon decay products are often found in groundwater but not surface water. These new analyses are needed to test these hypotheses.

Alpha Radioactivity Analyses

The alpha radioactivity measured in all samples is within the historical range for alpha radioactivity. In particular, alpha radioactivity measurements around Vermont Yankee over the past 35 years of operations and environmental surveillance have ranged from below the lower limit of detection for alpha radioactivity up to 15 picocuries per liter (pCi). The 2007 results for all samples ranged from -1.12 to 8.07 pCi/l and are shown in Table 15. The mean results, shown in Figure 3, indicate the Blodgett Farm and the Vernon Elementary School have the highest natural alpha emitters in their water.

The mean Connecticut River upstream sample results of 0.357 to 0.533 picocuries per liter (pCi/l) may be useful as a sort of background relative to water samples taken in the Connecticut River near the Vermont Yankee Nuclear Power Station discharge area and downstream in the Connecticut River. The upstream samples are taken near Brattleboro. The samples more likely to be affected by Vermont Yankee Nuclear Power Station operations, near the discharge and downstream of the plant discharge have mean sample results in the range of 0.405 to 0.578 pCi/l and 0.312 to 0.578 pCi/l, respectively. Considering the results with their uncertainty at the 95 percent confidence level, there is no statistical difference between water samples in the discharge basin and downstream of Vermont Yankee Nuclear Power Station as compared to water samples upstream of Vermont Yankee. The Brattleboro municipal water supply mean results of 0.341 pCi/l are also not significantly different from samples obtained from the Connecticut River upstream of the nuclear power station.

While there are elevated measurements of alpha radioactivity at the Blodgett Farm and at the Vernon elementary School, the same results were not found at the Miller Farm. Given the Miller Farm samples do show elevated beta radioactivity (see below) and traces of

uranium and radium, it is thought that the Miller Farm geology consists of more natural beta radiation emitting radioactive materials and less natural alpha emitting radioactive materials as compared to the Blodgett Farm and Vernon Elementary School. This characteristic is not unique to the Miller Farm, as indicated in Figures 3 and 4. These graphs show similarly low alpha radioactivity measurements and elevated beta radioactivity measurements at Dewey Mills and Lake Pineo Beach in Quechee, Vermont and the Meacham Farm in Hartland, Vermont.

Beta Radioactivity Analysis

The beta radioactivity analysis results are found in Table 16. The results were all well within the historical range of less than the lower limit of detection and 15 picocuries per liter. Specifically, the measurements in Table 16 range from -0.79 to 8.45 picocuries per liter. Taking the mean results for each of the sample sites and plotting them gives us the graph in Figure 4. In this graph, some of the characteristic results observed in the alpha radioactivity analyses are also seen with beta radioactivity. Specifically, the river water samples contain significantly less radioactivity as compared to the groundwater samples. Also like the alpha radioactivity sample results, the samples from the Connecticut River near the Vermont Yankee Nuclear Power Station discharge area and downstream of the plant, ranging from 1.373 to 1.403 pCi/l and from 0.928 to 1.623 pCi/l, respectively, are not significantly different from the samples from the Connecticut River upstream of the station where the sample means ranged between 0.880 and 1.370 pCi/l. Another similarity is seen in the Brattleboro municipal water sample: the mean beta radioactivity measured over the year is not significantly different from other mean beta radioactivity measurements, including in the Connecticut River upstream of Vermont Yankee.

One difference between the alpha and beta radioactivity measurements is what is seen in the groundwater measurements. While the Blodgett Farm and the Vernon Elementary School alpha radioactivity samples were significantly higher than the Miller Farm alpha radioactivity results, the beta radioactivity measurements for the three sites fed by well water are not significantly different. As mentioned above, the elevated beta radioactivity

at Miller Farm is not coincident with elevated alpha radioactivity, and this characteristic is shared with the samples taken from bodies of surface water near Quechee, Vermont and from ground water from a farm in Hartland, Vermont. These features are thought to be due to the different geological attributes at each of the sites causing the expression of certain natural radioactive materials and not others.

Analysis of Natural Radioactivity in Water

There are a relatively small number of naturally occurring radioactive materials. They are found in the soil and sediments that cover the Earth and they are always found in minute quantities in the air and waters that flow around, over and through the Earth. A list of some of these naturally occurring radioactive materials is found in Table 13 above. The natural isotopes uranium-235, uranium-238 and thorium-232 are very important because as they undergo radioactive decay to shed the excess energy in their nuclei, these three isotopes generate many other prominent radioactive materials including radium 226, radium 228 and radon-222. Each of these decays to create other radioactive materials. Most of them emit beta and gamma radiation, and most of the heaviest isotopes, those heavier than lead, emit alpha radiation. The Vermont Department of Health Laboratory can analyze water samples for radium-226, radium-228 and total uranium to assess the relative risk to members of the public from these radioisotopes and their precursor and daughter decay products.

In Figures 5, 6 and 7, the mean of radium and uranium measurements for the Miller and Blodgett Farms and for the Vernon Elementary School are presented. While the bars in the charts seem to indicate a lot of natural radioactivity, note that the values in picocuries per liter and milligrams per liter are quite small. To put them into context, the United States Environmental Protection Agency and the State of Vermont have limits on these three radioactive contaminants to help manage risk. Radium-226 and radium-228 radioactivity are limited to 5 picocuries per liter (pCi/l), while total uranium is limited to 20 milligrams per liter (mg/l). None of the sample natural radioactivity measurements from the Blodgett Farm, the Miller Farm or the Vernon Elementary School are near these

limits. The mean radium-226 results shown in Figure 5 range from 0.04 to 0.82 pC/l); the mean radium-228 results shown in Figure 6 range from 0.23 to 0.46 pCi/l; and the mean uranium results shown in Figure 7 range from 0.001 to 0.006 mg/l.

Gamma Spectroscopy

Gamma spectroscopy is a technique that allows for the identification and quantification of any radioactive material that emits gamma radiation. Most of the water samples, 87 of them, were found to be less than the lower limit of detection. Gamma radiation-emitting radioactive materials were identified in the remaining 33 samples, but all were naturally occurring radioactive materials. The gamma spectroscopy results for the water samples are found in Table 17. The lower limits of detection for water samples are listed in Table 19 below. The commonly identified natural radioactive materials that emit gamma radiation may be found listed in Table 13 above.

Tritium Measurement Results

No tritium above the laboratory instrumentation lower limit of detection, approximately 300 pCi/l, was identified in any of the groundwater, surface water or municipal water samples obtained by the Vermont Department of Health in 2006. The tritium analysis results are presented in Table 18.

Figure 3

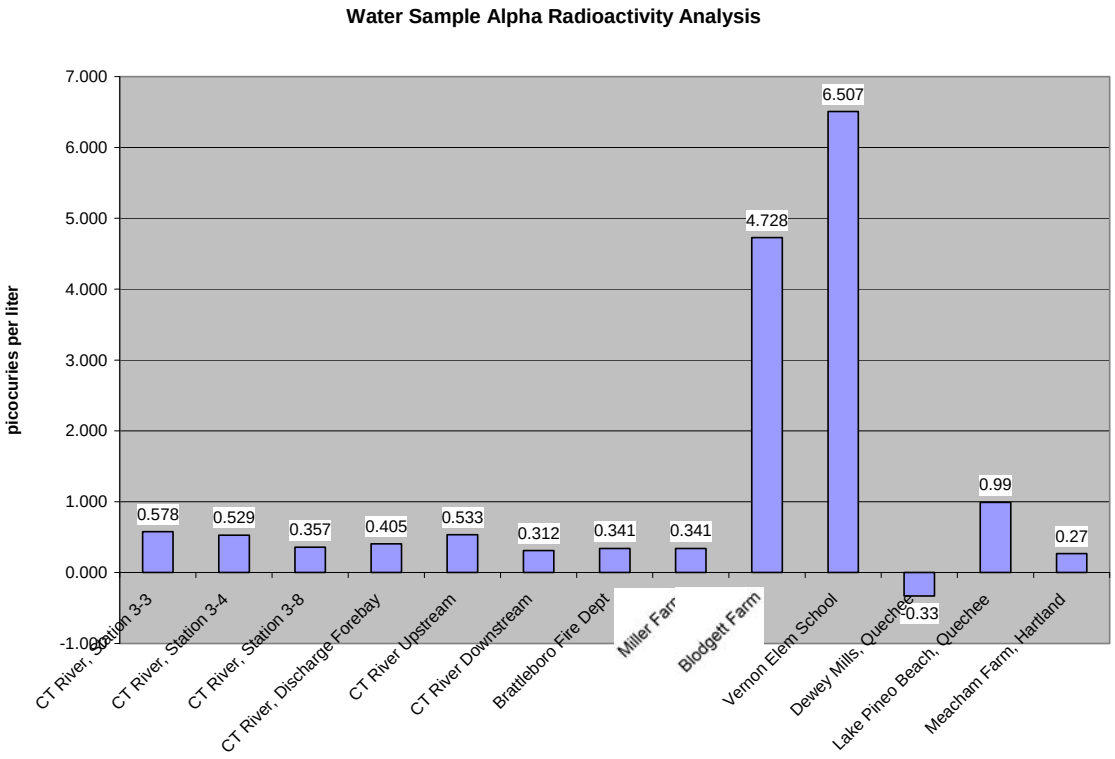

Water Sample Alpha Radioactivity Analysis
picocuries per liter
7.000
6.000
5.000
4.000
3.000
2.000
1.000
0.000
-1.000
0.578
0.529
0.357
0.405
0.533
0.312
0.341
0.341
4.728
6.507
-0.33
0.99
0.27
CT River, Station 3-3
CT River, Station 3-4
CT River, Station 3-8
CT River, Discharge Forebay
CT River Upstream
CT River Downstream
Brattleboro Fire Dept
Miller Farm
Blodgett Farm
Vernon Elem School
Dewey Mills, Quechee
Lake Pineo Beach, Quechee
Meacham Farm, Hartland

Figure 4

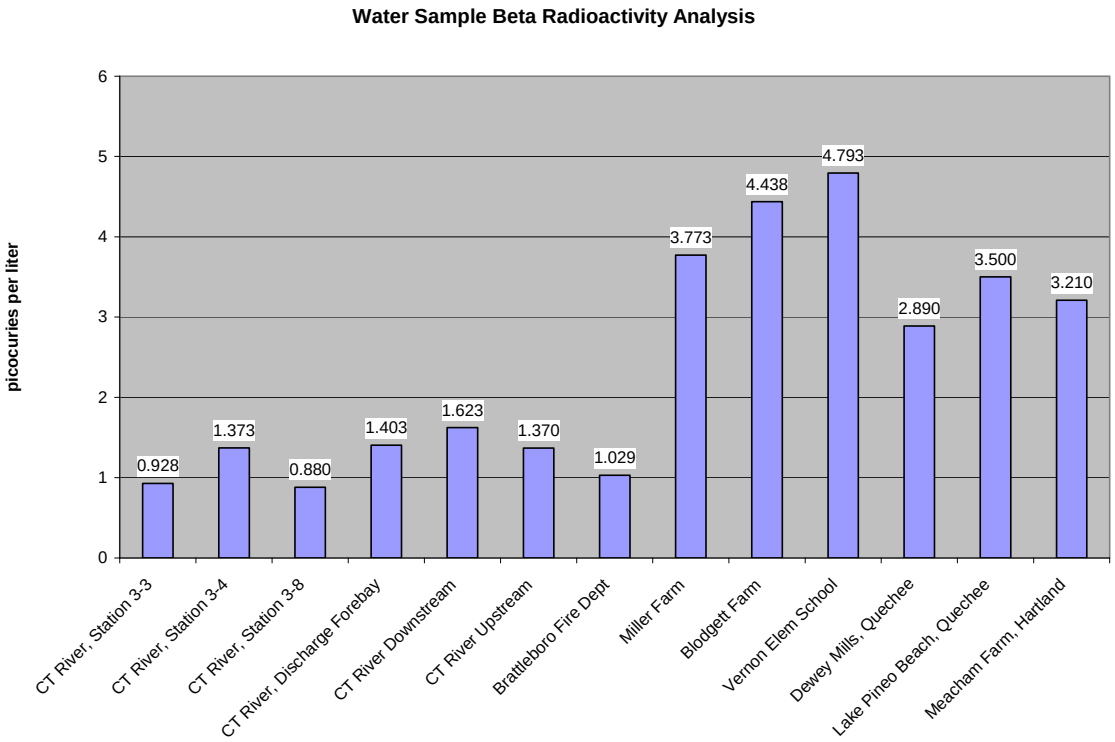


Figure 5

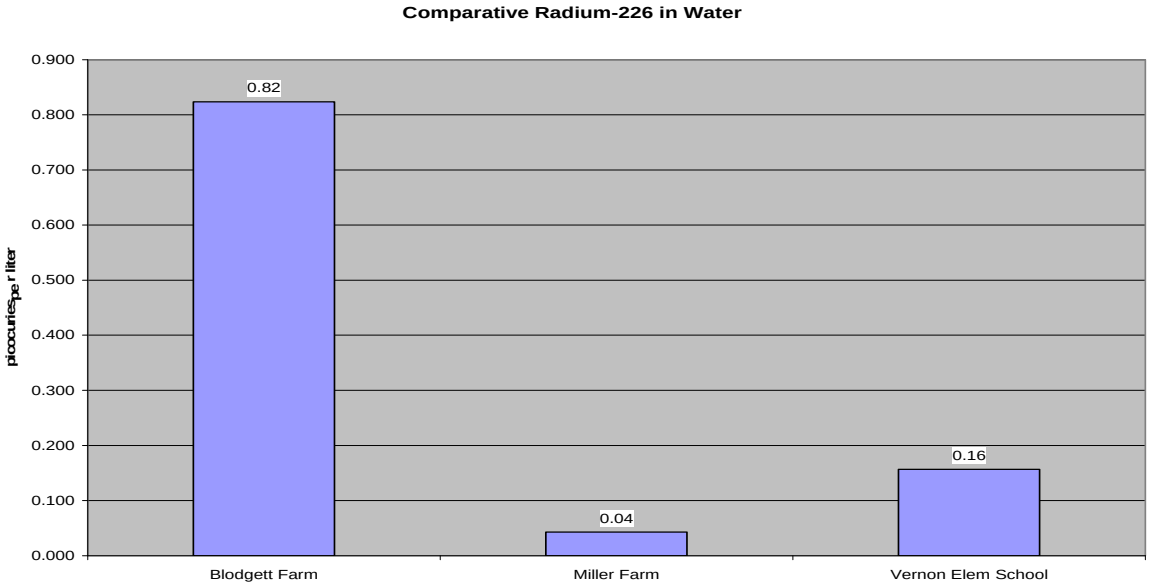


Figure 6

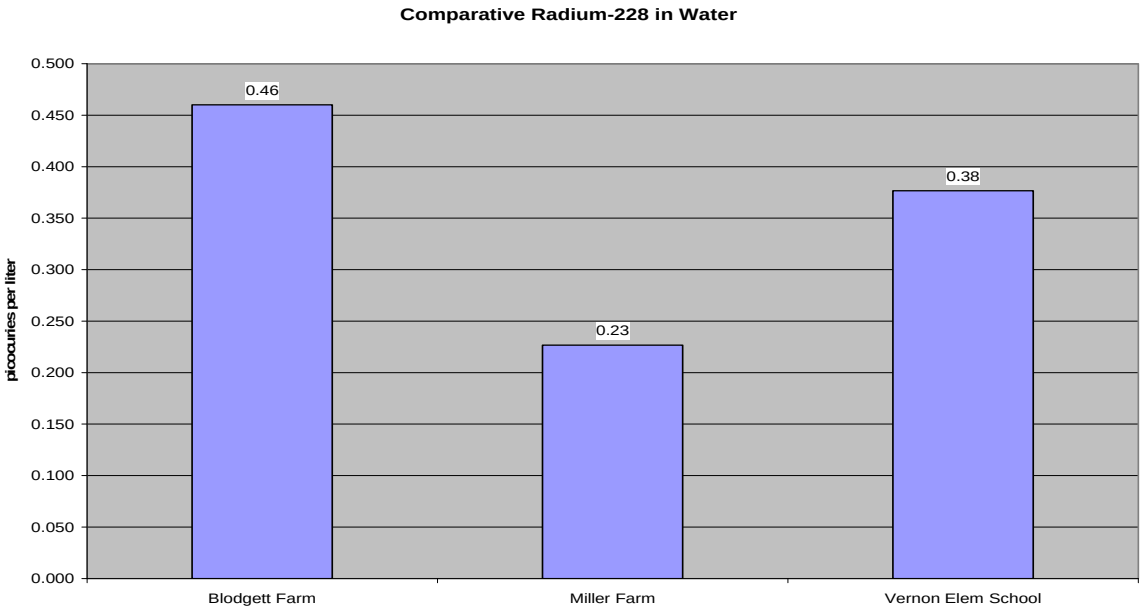
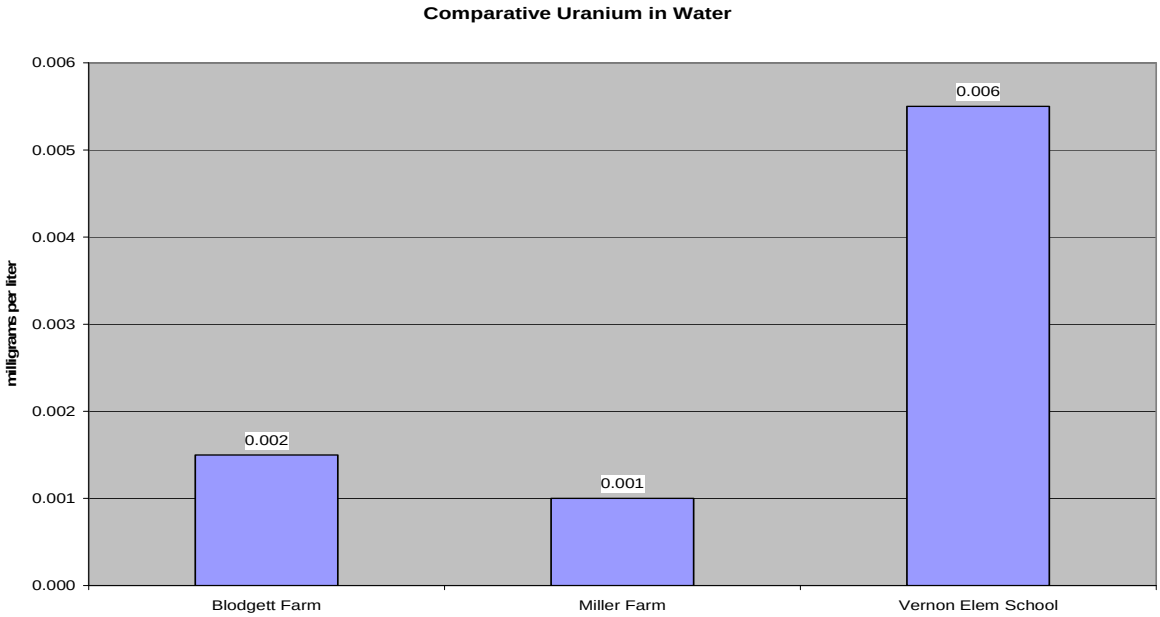
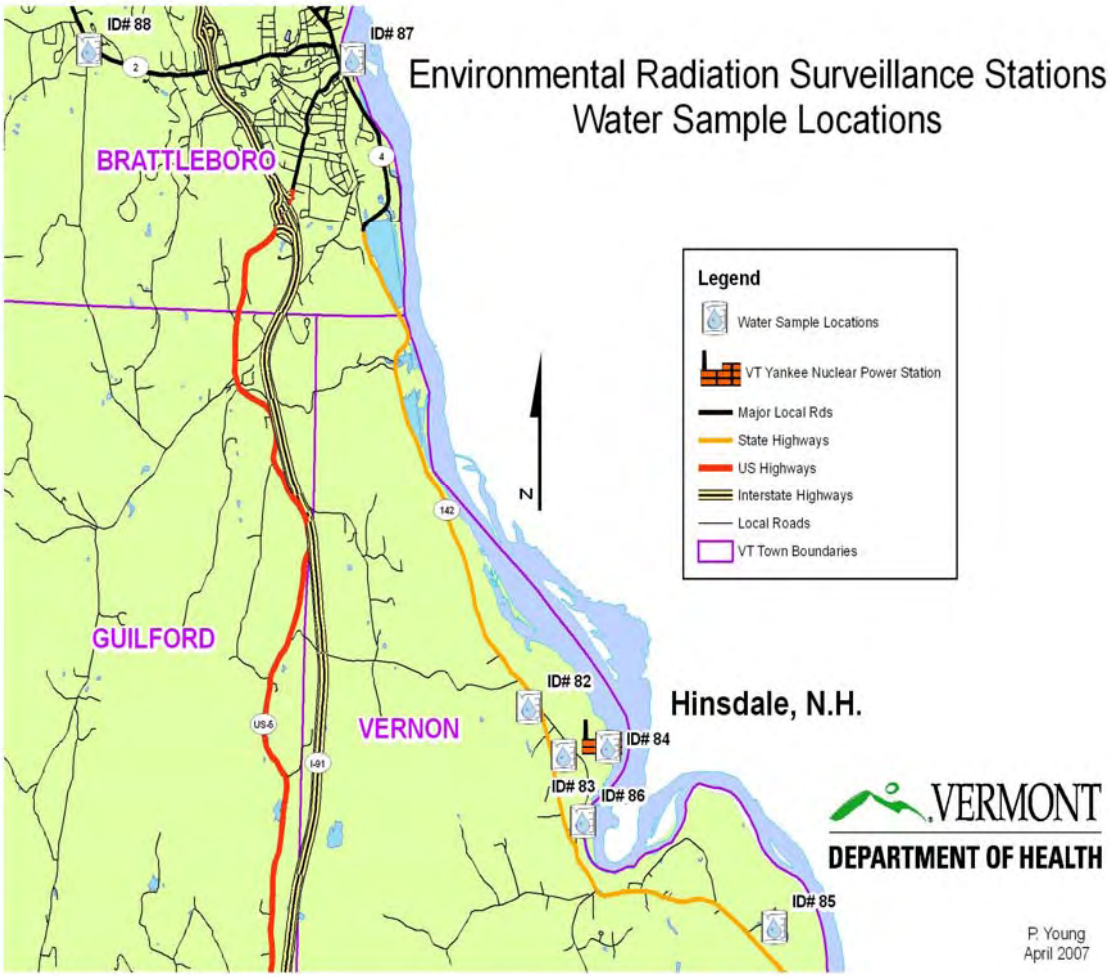


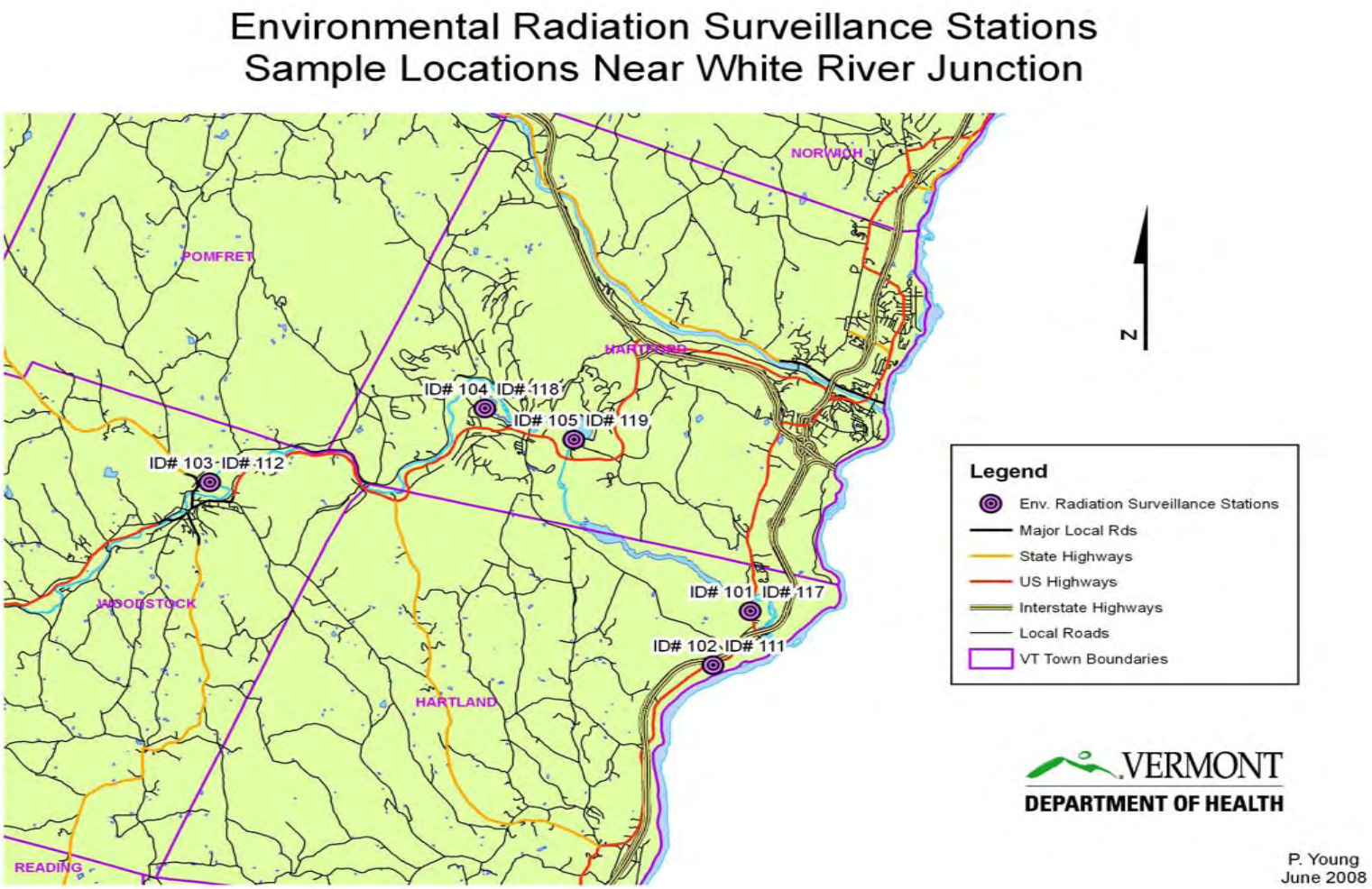
Figure 7



Map 9


Environmental Radiation Surveillance Stations
Water Sample Locations
ID# 88
ID# 87
BRATTLEBORO
GUILFORD
VERNON
ID# 82
ID# 84
ID# 83
ID# 86
ID# 85
Hinsdale, N.H.
Legend
Water Sample Locations
VT Yankee Nuclear Power Station
Major Local Rds
State Highways
US Highways
Interstate Highways
Local Roads
VT Town Boundaries
N
VERMONT
DEPARTMENT OF HEALTH
P. Young
April 2007

Map 10, Special Sampling Locations for 2007, Central Vermont



Map 11, Special Sampling Sites for 2007, Southern Vermont

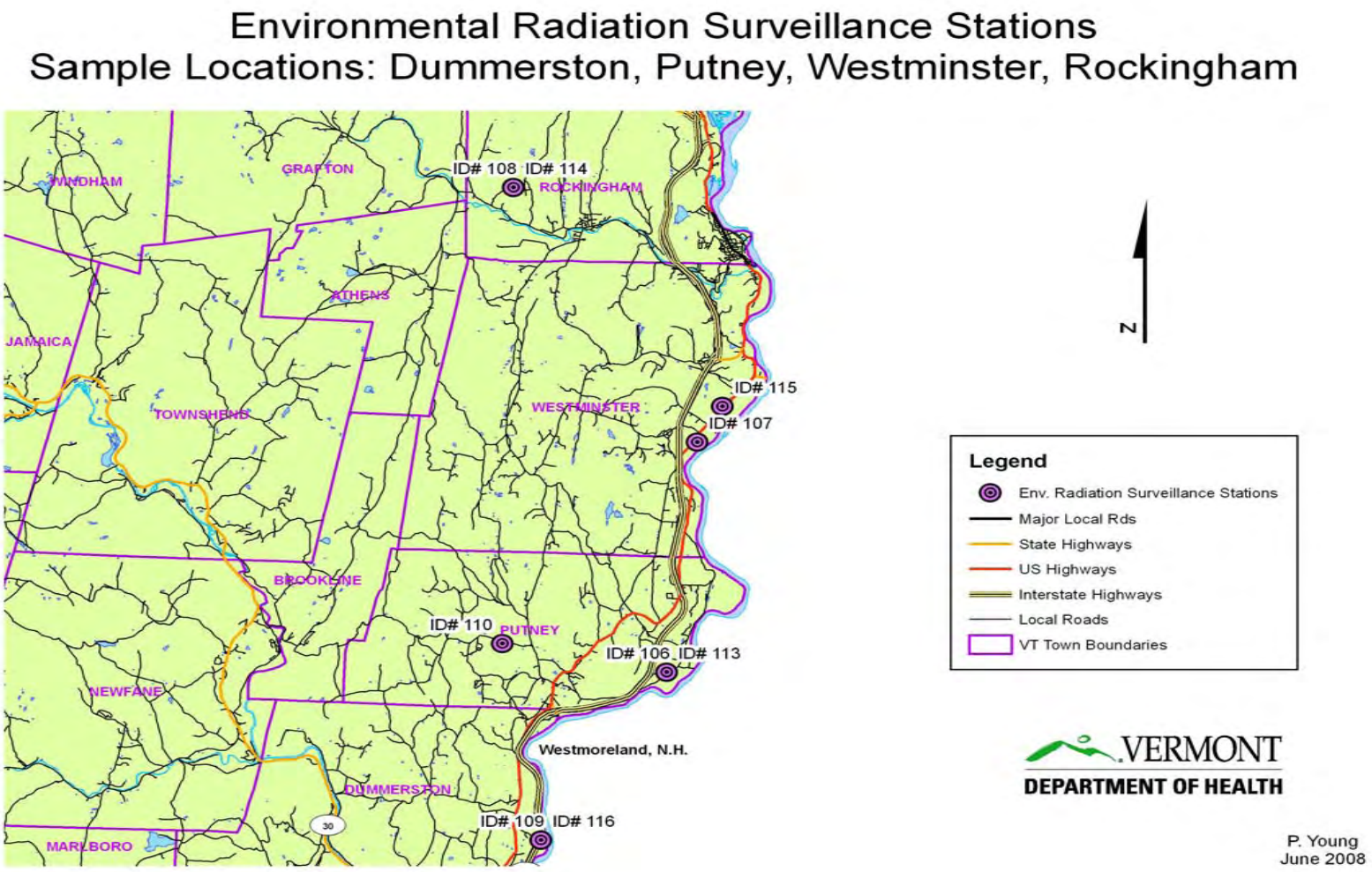


Table 15. 2007 Water Sample Alpha Radioactivity Results

Sample Date	Sample Location	Map ID No.	Results pCi/l	Error pCi/l	Analysis Method
1/16/2007	CT River, Station 3-3	84A	1.07	0.85	EPA 900
1/16/2007	CT River, Station 3-4	84B	0.61	0.82	EPA 900
1/16/2007	CT River, Station 3-8	84C	N/A	N/A	N/A
1/29/2007	Discharge Forebay	84D	0.62	0.83	EPA 900
1/29/2007	Blodgett Farm	85	4.5	1.04	EERF 00-02
1/29/2007	Brattleboro Fire Dept	88	1.6	1.47	EPA 900
1/29/2007	Conn River Downstream	86	0	1.41	EPA 900
1/29/2007	Conn River Upstream	87	0.82	1.45	EPA 900
1/29/2007	Miller Farm	82	0.55	0.73	EERF 00-02
1/29/2007	Vernon Elem School	83	6.06	1.14	EERF 00-02
2/13/2007	CT River, Station 3-3	84A	-0.55	1.53	EPA 900
2/13/2007	CT River, Station 3-4	84B	-1.12	1.51	EPA 900
2/13/2007	CT River, Station 3-8	84C	-0.55	0.74	EPA 900
2/13/2007	Discharge Forebay	84D	-0.84	1.53	EPA 900
2/27/2007	Blodgett Farm	85	4.9	1.07	EERF 00-02
2/27/2007	Brattleboro Fire Dept	88	-0.94	0.83	EPA 900
2/27/2007	Conn River Downstream	86	0	1.56	EPA 900
2/27/2007	Conn River Upstream	87	0.27	1.42	EPA 900
2/27/2007	Miller Farm	82	0.69	0.74	EERF 00-02
2/27/2007	Vernon Elem School	83	7.46	1.22	EERF 00-02
3/14/2007	CT River, Station 3-3	84A	1.12	1.52	EPA 900
3/14/2007	CT River, Station 3-4	84B	0.82	1.47	EPA 900
3/14/2007	CT River, Station 3-8	84C	0.19	0.51	EPA 900
3/14/2006	Discharge Forebay	84D	1.91	1.52	EPA 900
3/20/2007	Blodgett Farm	85	5.08	1.05	EERF 00-02
3/20/2007	Brattleboro Fire Dept	88	0.16	0.83	EPA 900
3/20/2007	Conn River Downstream	86	0.54	1.44	EPA 900
3/20/2007	Conn River Upstream	87	N/A	N/A	N/A
3/20/2007	Miller Farm	82	-0.07	0.63	EERF 00-02
3/20/2007	Vernon Elem School	83	7.09	1.18	EERF 00-02
4/13/2007	CT River, Station 3-3	84A	0.76	1.35	EPA 900
4/13/2007	CT River, Station 3-4	84B	1.85	1.48	EPA 900
4/13/2007	CT River, Station 3-8	84C	-0.27	1.33	EPA 900
4/13/2007	Discharge Forebay	84D	0.54	1.41	EPA 900
4/30/2007	Blodgett Farm	85	4.73	1.05	EERF 00-02
4/30/2007	Brattleboro Fire Dept	88	0.77	1.35	EPA 900
4/30/2007	Conn River Downstream	86	0.85	0.78	EPA 900
4/30/2007	Conn River Upstream	87	1.27	0.81	EPA 900
4/30/2007	Miller Farm	82	-0.21	0.72	EERF 00-02
4/30/2007	Vernon Elem School	83	6.89	1.19	EERF 00-02

Table 15. 2007 Water Sample Alpha Radioactivity Results (continued)

Sample Date	Sample Location	Map ID No.	Results pCi/l	Error pCi/l	Analysis Method
5/15/2007	CT River, Station 3-3	84A	0.31	0.82	EPA 900
5/15/2007	CT River, Station 3-4	84B	0.28	1.46	EPA 900
5/15/2007	CT River, Station 3-8	84C	0.16	0.85	EPA 900
5/15/2007	Discharge Forebay	84D	0	1.41	EPA 900
5/29/2007	Blodgett Farm	85	3.9	1	EERF 00-02
5/29/2007	Brattleboro Fire Dept	88	0.45	0.81	EPA 900
5/29/2007	Conn River Downstream	86	0.47	0.83	EPA 900
5/29/2007	Conn River Upstream	87	0.46	0.82	EPA 900
5/29/2007	Miller Farm	82	0.89	0.77	EERF 00-02
5/29/2007	Vernon Elem School	83	6.1	1.14	EERF 00-02
6/13/2007	CT River, Station 3-3	84A	0.93	0.89	EPA 900
6/13/2007	CT River, Station 3-4	84B	0.81	1.5	EPA 900
6/13/2007	CT River, Station 3-8	84C	3.36	1.74	EPA 900
6/13/2007	Discharge Forebay	84D	0.27	1.45	EPA 900
6/29/2007	Blodgett Farm	85	4.37	1.05	EERF 00-02
6/29/2007	Brattleboro Fire Dept	88	-0.33	0.86	EPA 900
6/29/2007	Conn River Downstream	86	0.56	1.54	EPA 900
6/29/2007	Conn River Upstream	87	0.89	1.67	EPA 900
6/29/2007	Miller Farm	82	0.2	0.73	EERF 00-02
6/29/2007	Vernon Elem School	83	5.53	1.12	EERF 00-02
7/16/2007	CT River, Station 3-3	84A	0.83	1.41	EPA 900
7/16/2007	CT River, Station 3-4	84B	0.27	1.35	EPA 900
7/16/2007	CT River, Station 3-8	84C	1.1	0.48	EPA 900
7/16/2007	Discharge Forebay	84D	0.27	1.36	EPA 900
7/31/2007	Blodgett Farm	85	4.5	1.03	EERF 00-02
7/31/2007	Brattleboro Fire Dept	88	0.31	0.77	EPA 900
7/31/2007	Conn River Downstream	86	-0.87	1.36	EPA 900
7/31/2007	Conn River Upstream	87	1.13	1.46	EPA 900
7/31/2007	Miller Farm	82	0.48	0.72	EERF 00-02
7/31/2007	Vernon Elem School	83	5.12	1.07	EERF 00-02
8/16/2007	CT River, Station 3-3	84A	0.88	1.42	EPA 900
8/16/2007	CT River, Station 3-4	84B	0	1.39	EPA 900
8/16/2007	CT River, Station 3-8	84C	-0.88	1.31	EPA 900
8/16/2007	Discharge Forebay	84D	0	1.33	EPA 900
8/27/2007	Blodgett Farm	85	4.55	1.04	EERF 00-02
8/27/2007	Brattleboro Fire Dept	88	0	1.22	EPA 900
8/27/2007	Conn River Downstream	86	0.59	1.4	EPA 900
8/27/2007	Conn River Upstream	87	-0.62	1.4	EPA 900
8/27/2007	Miller Farm	82	0.28	0.7	EERF 00-02
8/27/2007	Vernon Elem School	83	8.07	1.25	EERF 00-02

Table 15. 2007 Water Sample Alpha Radioactivity Results (continued)

Sample Date	Sample Location	Map ID No.	Results pCi/l	Error pCi/l	Analysis Method
9/13/2007	CT River, Station 3-3	84A	0.82	1.4	EPA 900
9/13/2007	CT River, Station 3-4	84B	1.35	1.42	EPA 900
9/13/2007	CT River, Station 3-8	84C	0.56	1.4	EPA 900
9/13/2007	Discharge Forebay	84D	1.67	1.48	EPA 900
9/25/2007	Blodgett Farm	85	5.98	1.11	EERF 00-02
9/25/2007	Brattleboro Fire Dept	88	0.51	1.27	EPA 900
9/25/2007	Conn River Downstream	86	1.62	1.43	EPA 900
9/25/2007	Conn River Upstream	87	0.81	1.38	EPA 900
9/25/2007	Miller Farm	82	0.21	0.66	EERF 00-02
9/25/2007	Vernon Elem School	83	6.4	1.14	EERF 00-02
10/15/2007	CT River, Station 3-3	84A	-0.56	1.44	EPA 900
10/15/2007	CT River, Station 3-4	84B	-0.56	1.44	EPA 900
10/15/2007	CT River, Station 3-8	84C	0.28	1.49	EPA 900
10/15/2007	Discharge Forebay	84D	-0.28	1.46	EPA 900
10/30/2007	Blodgett Farm	85	3.96	0.99	EERF 00-02
10/30/2007	Brattleboro Fire Dept	88	0.26	1.39	EPA 900
10/30/2007	Conn River Downstream	86	0.26	1.38	EPA 900
10/30/2007	Conn River Upstream	87	0	1.58	EPA 900
10/30/2007	Miller Farm	82	-0.14	0.65	EERF 00-02
10/30/2007	Vernon Elem School	83	6.21	1.14	EERF 00-02
11/16/2007	CT River, Station 3-3	84A	-0.27	1.47	EPA 900
11/16/2007	CT River, Station 3-4	84B	0.15	0.86	EPA 900
11/16/2007	CT River, Station 3-8	84C	-0.15	0.84	EPA 900
11/16/2007	Discharge Forebay	84D	0.16	0.87	EPA 900
11/30/2007	Blodgett Farm	85	5.15	1.09	EERF 00-02
11/30/2007	Brattleboro Fire Dept	88	0	0.79	EPA 900
11/30/2007	Conn River Downstream	86	0	0.82	EPA 900
11/30/2007	Conn River Upstream	87	0.3	0.84	EPA 900
11/30/2007	Miller Farm	82	0	0.7	EERF 00-02
11/30/2007	Vernon Elem School	83	6.59	1.18	EERF 00-02
12/13/2007	CT River, Station 3-3	84A	1.59	1.33	EPA 900
12/13/2007	CT River, Station 3-4	84B	1.89	1.37	EPA 900
12/13/2007	CT River, Station 3-8	84C	0.13	0.63	EPA 900
12/13/2007	Discharge Forebay	84D	0.54	1.29	EPA 900
12/21/2006	Blodgett Farm	85	5.11	1.08	EERF 00-02
12/21/2006	Brattleboro Fire Dept	88	1.3	1.29	EPA 900
12/21/2006	Conn River Downstream	86	-0.28	1.29	EPA 900
11/30/2007	Conn River Downstream	87	N/A	N/A	N/A
12/21/2006	Miller Farm	82	-0.07	0.67	EERF 00-02
12/21/2006	Vernon Elem School	83	6.56	1.17	EERF 00-02

Table 16. 2007 Water Sample Beta Radioactivity Results

Sample Date	Sample Location	Map ID No.	Results pCi/l	Error pCi/l	Analysis Method
1/16/2007	CT River, Station 3-3	84A	0.95	0.94	EPA 900
1/16/2007	CT River, Station 3-4	84B	1.03	0.94	EPA 900
1/16/2007	CT River, Station 3-8	84C	N/A	N/A	N/A
1/29/2007	Discharge Forebay	84D	1.51	0.96	EPA 900
1/29/2007	Blodgett Farm	85	3.99	1.94	EPA 900
1/29/2007	Brattleboro Fire Dept	88	0.32	1.84	EPA 900
1/29/2007	CT River Downstream	86	2.06	1.89	EPA 900
1/29/2007	Conn River Upstream	87	1.27	1.87	EPA 900
1/29/2007	Miller Farm	82	3.34	1.92	EPA 900
1/29/2007	Vernon Elem School	83	2.7	1.91	EPA 900
2/13/2007	CT River, Station 3-3	84A	2.03	1.76	EPA 900
2/13/2007	CT River, Station 3-4	84B	2.34	1.77	EPA 900
2/13/2007	CT River, Station 3-8	84C	1.32	0.89	EPA 900
2/13/2007	Discharge Forebay	84D	3.43	1.79	EPA 900
2/27/2007	Blodgett Farm	85	5.33	1.85	EPA 900
2/27/2007	Brattleboro Fire Dept	88	1.95	0.9	EPA 900
2/27/2007	CT River Downstream	86	3.27	1.79	EPA 900
2/27/2007	Conn River Upstream	87	N/A	N/A	N/A
2/27/2007	Miller Farm	82	4.68	1.83	EPA 900
2/27/2007	Vernon Elem School	83	5.78	1.86	EPA 900
3/14/2007	CT River, Station 3-3	84A	0.91	1.77	EPA 900
3/14/2007	CT River, Station 3-4	84B	1.66	1.79	EPA 900
3/14/2006	CT River, Station 3-8	84C	1.06	0.61	EPA 900
3/20/2007	Discharge Forebay	84D	0.45	1.76	EPA 900
3/20/2007	Blodgett Farm	85	5.01	1.88	EPA 900
3/20/2007	Brattleboro Fire Dept	88	1.06	0.9	EPA 900
3/20/2007	CT River Downstream	86	3.48	1.83	EPA 900
3/20/2007	Conn River Upstream	87	N/A	N/A	N/A
3/20/2007	Miller Farm	82	6.06	1.89	EPA 900
3/20/2007	Vernon Elem School	83	4.86	1.87	EPA 900
4/13/2007	CT River, Station 3-3	84A	2.85	1.71	EPA 900
4/13/2007	CT River, Station 3-4	84B	3.9	1.74	EPA 900
4/13/2007	CT River, Station 3-8	84C	0.6	1.65	EPA 900
4/30/2007	Discharge Forebay	84D	2.4	1.7	EPA 900
4/30/2007	Blodgett Farm	85	8.45	1.85	EPA 900
4/30/2007	Brattleboro Fire Dept	88	3.3	1.72	EPA 900
4/30/2007	CT River Downstream	86	3.16	0.9	EPA 900
4/30/2007	Conn River Upstream	87	3.61	0.91	EPA 900
4/30/2007	Miller Farm	82	7.08	1.82	EPA 900
4/30/2007	Vernon Elem School	83	7.38	1.83	EPA 900

Table 16. 2007 Water Sample Beta Radioactivity Results (continued)

Sample Date	Sample Location	Map ID No.	Results pCi/l	Error pCi/l	Analysis Method
5/15/2007	CT River, Station 3-3	84A	1.06	0.88	EPA 900
5/15/2007	CT River, Station 3-4	84B	1.06	1.46	EPA 900
5/15/2007	CT River, Station 3-8	84C	1.37	0.89	EPA 900
5/15/2007	Discharge Forebay	84D	1.21	1.74	EPA 900
5/29/2007	Blodgett Farm	85	4.28	1.83	EPA 900
5/29/2007	Brattleboro Fire Dept	88	1.37	0.89	EPA 900
5/29/2007	CT River Downstream	86	1.44	0.889	EPA 900
5/29/2007	Conn River Upstream	87	1.6	0.9	EPA 900
5/29/2007	Miller Farm	82	3.96	1.81	EPA 900
5/29/2007	Vernon Elem School	83	5.95	1.86	EPA 900
6/13/2007	CT River, Station 3-3	84A	-0.77	0.89	EPA 900
6/13/2007	CT River, Station 3-4	84B	-0.46	1.79	EPA 900
6/13/2007	CT River, Station 3-8	84C	0.31	1.81	EPA 900
6/13/2007	Discharge Forebay	84D	-0.15	1.8	EPA 900
6/29/2007	Blodgett Farm	85	1.39	1.86	EPA 900
6/29/2007	Brattleboro Fire Dept	88	0.61	0.92	EPA 900
6/29/2007	CT River Downstream	86	1.22	1.83	EPA 900
6/29/2007	Conn River Upstream	87	0.46	1.82	EPA 900
6/29/2007	Miller Farm	82	1.07	1.83	EPA 900
6/29/2007	Vernon Elem School	83	3.22	1.89	EPA 900
7/16/2007	CT River, Station 3-3	84A	1.75	1.83	EPA 900
7/16/2007	CT River, Station 3-4	84B	0.95	1.81	EPA 900
7/16/2007	CT River, Station 3-8	84C	0.48	1.8	EPA 900
7/16/2007	Discharge Forebay	84D	1.91	1.84	EPA 900
7/31/2007	Blodgett Farm	85	3.05	1.88	EPA 900
7/31/2007	Brattleboro Fire Dept	88	1.11	0.92	EPA 900
7/31/2007	CT River Downstream	86	1.27	1.82	EPA 900
7/31/2007	Conn River Upstream	87	0.16	1.79	EPA 900
7/31/2007	Miller Farm	82	2.23	1.85	EPA 900
7/31/2007	Vernon Elem School	83	4.95	1.92	EPA 900
8/16/2007	CT River, Station 3-3	84A	0.16	1.87	EPA 900
8/16/2007	CT River, Station 3-4	84B	0.64	1.88	EPA 900
8/16/2007	CT River, Station 3-8	84C	0.64	1.88	EPA 900
8/16/2007	Discharge Forebay	84D	0.64	1.88	EPA 900
8/27/2007	Blodgett Farm	85	3.72	1.97	EPA 900
8/27/2007	Brattleboro Fire Dept	88	-0.16	1.86	EPA 900
8/27/2007	CTn River Downstream	86	0.48	1.88	EPA 900
8/27/2007	Conn River Upstream	87	-0.16	1.86	EPA 900
8/27/2007	Miller Farm	82	3.38	1.95	EPA 900
8/27/2007	Vernon Elem School	83	4.19	1.97	EPA 900

Table 16. 2007 Water Sample Beta Radioactivity Results (continued)

Sample Date	Sample Location	Map ID No.	Results pCi/l	Error pCi/l	Analysis Method
9/15/2006	CT River, Station 3-3	84A	1.24	1.83	EPA 900
9/15/2006	CT River, Station 3-4	84B	1.55	1.84	EPA 900
9/15/2006	CT River, Station 3-8	84C	0.31	1.81	EPA 900
9/15/2006	Discharge Forebay	84D	1.55	1.84	EPA 900
9/27/2006	Blodgett Farm	85	4.06	1.91	EPA 900
9/27/2006	Brattleboro Fire Dept	88	0.15	1.8	EPA 900
9/27/2006	CT River Downstream	86	0.15	1.8	EPA 900
9/27/2006	CT River Upstream	87	1.08	1.83	EPA 900
9/27/2006	Miller Farm	82	2.17	1.86	EPA 900
9/27/2006	Vernon Elem School	83	3.58	1.89	EPA 900
10/13/2006	CT River, Station 3-3	84A	1.28	1.84	EPA 900
10/13/2006	CT River, Station 3-4	84B	1.6	1.84	EPA 900
10/13/2006	CT River, Station 3-8	84C	2.08	1.86	EPA 900
10/13/2006	Discharge Forebay	84D	1.76	1.85	EPA 900
10/27/2006	Blodgett Farm	85	4.35	1.92	EPA 900
10/27/2006	Brattleboro Fire Dept	88	2.56	1.87	EPA 900
10/27/2006	CT River Downstream	86	1.28	1.84	EPA 900
10/27/2006	CT River Upstream	87	2.72	1.87	EPA 900
10/27/2006	Miller Farm	82	5.79	1.95	EPA 900
10/27/2006	Vernon Elem School	83	5.78	1.95	EPA 900
11/15/2006	CT River, Station 3-3	84A	-0.79	1.86	EPA 900
11/15/2006	CT River, Station 3-4	84B	0.8	0.96	EPA 900
11/15/2006	CT River, Station 3-8	84C	1.04	0.96	EPA 900
11/15/2006	Discharge Forebay	84D	1.04	0.97	EPA 900
11/22/2006	Blodgett Farm	85	3.36	1.97	EPA 900
11/22/2006	Brattleboro Fire Dept	88	-0.08	0.94	EPA 900
11/22/2006	CT River Downstream	86	1.19	0.97	EPA 900
11/22/2006	CT River Upstream	87	1.59	0.98	EPA 900
11/22/2006	Miller Farm	82	3.03	1.96	EPA 900
11/22/2006	Vernon Elem School	83	3.67	1.97	EPA 900
12/15/2006	CT River, Station 3-3	84A	0.47	1.81	EPA 900
12/15/2006	CT River, Station 3-4	84B	1.4	1.83	EPA 900
12/15/2006	CT River, Station 3-8	84C	0.47	0.91	EPA 900
12/15/2006	Discharge Forebay	84D	1.09	1.83	EPA 900
12/21/2006	Blodgett Farm	85	6.26	1.96	EPA 900
12/21/2006	Brattleboro Fire Dept	88	0.16	1.8	EPA 900
12/21/2006	CT River Downstream	86	0.47	1.81	EPA 900
12/21/2006	CT River Upstream	87	N/A	N/A	N/A
12/21/2006	Miller Farm	82	2.49	1.86	EPA 900
12/21/2006	Vernon Elem School	83	5.46	1.94	EPA 900

Table 17. 2007 Water Sample Gamma Radioactivity Results

Sample Date	Sample Location	Map ID No.	Results pCi/l
1/16/2007	CT River, Station 3-3	84A	< LLD
1/16/2007	CT River, Station 3-4	84B	< LLD
1/16/2007	CT River, Station 3-8	84C	< LLD
1/16/2007	Discharge Forebay	84D	< LLD
1/29/2007	Blodgett Farm	85	Natural
1/29/2007	Brattleboro Fire Dept	88	< LLD
1/29/2007	CT River Downstream	86	< LLD
1/29/2007	CT River Upstream	87	< LLD
1/29/2007	Miller Farm	82	Natural
1/29/2007	Vernon Elem School	83	Natural
2/13/2007	CT River, Station 3-3	84A	< LLD
2/13/2007	CT River, Station 3-4	84B	< LLD
2/13/2007	CT River, Station 3-8	84C	< LLD
2/13/2007	Discharge Forebay	84D	< LLD
2/27/2007	Blodgett Farm	85	Natural
2/27/2007	Brattleboro Fire Dept	88	< LLD
2/27/2007	CT River Downstream	86	< LLD
2/27/2007	CT River Upstream	87	< LLD
2/27/2007	Miller Farm	82	Natural
2/27/2007	Vernon Elem School	83	Natural
3/14/2007	CT River, Station 3-3	84A	< LLD
3/14/2007	CT River, Station 3-4	84B	< LLD
3/14/2007	CT River, Station 3-8	84C	< LLD
3/14/2006	Discharge Forebay	84D	< LLD
3/20/2007	Blodgett Farm	85	Natural
3/20/2007	Brattleboro Fire Dept	88	< LLD
3/20/2007	CT River Downstream	86	< LLD
3/20/2007	CT River Upstream	87	< LLD
3/20/2007	Miller Farm	82	Natural
3/20/2007	Vernon Elem School	83	Natural
4/13/2007	CT River, Station 3-3	84A	< LLD
4/13/2007	CT River, Station 3-4	84B	< LLD
4/13/2007	CT River, Station 3-8	84C	< LLD
4/13/2007	Discharge Forebay	84D	< LLD
4/30/2007	Blodgett Farm	85	Natural
4/30/2007	Brattleboro Fire Dept	88	< LLD
4/30/2007	CT River Downstream	86	< LLD
4/30/2007	CT River Upstream	87	< LLD
4/30/2007	Miller Farm	82	Natural
4/30/2007	Vernon Elem School	83	Natural

LLD: Lower limits of detection

Table 17. 2007 Water Sample Gamma Radioactivity Results (continued)

Sample Date	Sample Location	Map ID No.	Results pCi/l
5/15/2007	CT River, Station 3-3	84A	< LLD
5/15/2007	CT River, Station 3-4	84B	< LLD
5/15/2007	CT River, Station 3-8	84C	< LLD
5/15/2007	Discharge Forebay	84D	< LLD
5/29/2007	Blodgett Farm	85	Natural
5/29/2007	Brattleboro Fire Dept	88	< LLD
5/29/2007	CT River Downstream	86	< LLD
5/29/2007	CT River Upstream	87	< LLD
5/29/2007	Miller Farm	82	Natural
5/29/2007	Vernon Elem School	83	Natural
6/13/2007	CT River, Station 3-3	84A	< LLD
6/13/2007	CT River, Station 3-4	84B	< LLD
6/13/2007	CT River, Station 3-8	84C	< LLD
6/13/2007	Discharge Forebay	84D	< LLD
6/29/2007	Blodgett Farm	85	Natural
6/29/2007	Brattleboro Fire Dept	88	< LLD
6/29/2007	CT River Downstream	86	< LLD
6/29/2007	CT River Upstream	87	< LLD
6/29/2007	Miller Farm	82	Natural
6/29/2007	Vernon Elem School	83	Natural
7/16/2007	CT River, Station 3-3	84A	< LLD
7/16/2007	CT River, Station 3-4	84B	< LLD
7/16/2007	CT River, Station 3-8	84C	< LLD
7/16/2007	Discharge Forebay	84D	< LLD
7/31/2007	Blodgett Farm	85	Natural
7/31/2007	Brattleboro Fire Dept	88	< LLD
7/31/2007	CT River Downstream	86	< LLD
7/31/2007	CT River Upstream	87	< LLD
7/31/2007	Miller Farm	82	Natural
7/31/2007	Vernon Elem School	83	Natural
8/16/2007	CT River, Station 3-3	84A	< LLD
8/16/2007	CT River, Station 3-4	84B	< LLD
8/16/2007	CT River, Station 3-8	84C	< LLD
8/16/2007	Discharge Forebay	84D	< LLD
8/27/2007	Blodgett Farm	85	Natural
8/27/2007	Brattleboro Fire Dept	88	< LLD
8/27/2007	CT River Downstream	86	< LLD
8/27/2007	CT River Upstream	87	< LLD
8/27/2007	Miller Farm	82	Natural
8/27/2007	Vernon Elem School	83	Natural

LLD: Lower limits of detection

Table 17. 2007 Water Sample Gamma Radioactivity Results (continued)

Sample Date	Sample Location	Map ID No.	Results pCi/l
9/13/2007	CT River, Station 3-3	84A	< LLD
9/13/2007	CT River, Station 3-4	84B	< LLD
9/13/2007	CT River, Station 3-8	84C	< LLD
9/13/2007	Discharge Forebay	84D	< LLD
9/25/2007	Blodgett Farm	85	Natural
9/25/2007	Brattleboro Fire Dept	88	< LLD
9/25/2007	CT River Downstream	86	< LLD
9/25/2007	CT River Upstream	87	< LLD
9/25/2007	Miller Farm	82	Natural
9/25/2007	Vernon Elem School	83	Natural
10/15/2007	CT River, Station 3-3	84A	< LLD
10/15/2007	CT River, Station 3-4	84B	< LLD
10/15/2007	CT River, Station 3-8	84C	< LLD
10/15/2007	Discharge Forebay	84D	< LLD
10/30/2007	Blodgett Farm	85	Natural
10/30/2007	Brattleboro Fire Dept	88	< LLD
10/30/2007	CT River Downstream	86	< LLD
10/30/2007	CT River Upstream	87	< LLD
10/30/2007	Miller Farm	82	Natural
10/30/2007	Vernon Elem School	83	Natural
11/16/2007	CT River, Station 3-3	84A	< LLD
11/16/2007	CT River, Station 3-4	84B	< LLD
11/16/2007	CT River, Station 3-8	84C	< LLD
11/16/2007	Discharge Forebay	84D	< LLD
11/30/2007	Blodgett Farm	85	Natural
11/30/2007	Brattleboro Fire Dept	88	< LLD
11/30/2007	CT River Downstream	86	< LLD
11/30/2007	CT River Upstream	87	< LLD
11/30/2007	Miller Farm	82	Natural
11/30/2007	Vernon Elem School	83	Natural
12/13/2007	CT River, Station 3-3	84A	< LLD
12/13/2007	CT River, Station 3-4	84B	< LLD
12/13/2007	CT River, Station 3-8	84C	< LLD
12/13/2007	Discharge Forebay	84D	< LLD
12/21/2006	Blodgett Farm	85	Natural
12/21/2006	Brattleboro Fire Dept	88	< LLD
12/21/2006	CT River Downstream	86	< LLD
12/21/2006	CT River Upstream	87	< LLD
12/21/2006	Miller Farm	82	Natural
12/21/2006	Vernon Elem School	83	Natural

LLD: Lower limits of detection

Table 18. 2007 Water Sample Tritium Results

Sample Date	Sample Location	Map ID No.	Results pCi/l
1/16/2007	CT River, Station 3-3	84A	< 300
1/16/2007	CT River, Station 3-4	84B	< 300
1/16/2007	CT River, Station 3-8	84C	< 300
1/16/2007	Discharge Forebay	84D	< 300
1/29/2007	Blodgett Farm	85	< 300
1/29/2007	Brattleboro Fire Dept	88	< 300
1/29/2007	CT River Downstream	86	< 300
1/29/2007	CT River Upstream	87	< 300
1/29/2007	Miller Farm	82	< 300
1/29/2007	Vernon Elem School	83	< 300
2/13/2007	CT River, Station 3-3	84A	< 300
2/13/2007	CT River, Station 3-4	84B	< 300
2/13/2007	CT River, Station 3-8	84C	< 300
2/13/2007	Discharge Forebay	84D	< 300
2/27/2007	Blodgett Farm	85	< 300
2/27/2007	Brattleboro Fire Dept	88	< 300
2/27/2007	CT River Downstream	86	< 300
2/27/2007	CT River Upstream	87	< 300
2/27/2007	Miller Farm	82	< 300
2/27/2007	Vernon Elem School	83	< 300
3/14/2007	CT River, Station 3-3	84A	< 300
3/14/2007	CT River, Station 3-4	84B	< 300
3/14/2007	CT River, Station 3-8	84C	< 300
3/14/2006	Discharge Forebay	84D	< 300
3/20/2007	Blodgett Farm	85	< 300
3/20/2007	Brattleboro Fire Dept	88	< 300
3/20/2007	CT River Downstream	86	< 300
3/20/2007	CT River Upstream	87	< 300
3/20/2007	Miller Farm	82	< 300
3/20/2007	Vernon Elem School	83	< 300
4/13/2007	CT River, Station 3-3	84A	< 300
4/13/2007	CT River, Station 3-4	84B	< 300
4/13/2007	CT River, Station 3-8	84C	< 300
4/13/2007	Discharge Forebay	84D	< 300
4/30/2007	Blodgett Farm	85	< 300
4/30/2007	Brattleboro Fire Dept	88	< 300
4/30/2007	CT River Downstream	86	< 300
4/30/2007	CT River Upstream	87	< 300
4/30/2007	Miller Farm	82	< 300
4/30/2007	Vernon Elem School	83	< 300

Table 18. 2007 Water Sample Tritium Results (continued)

Sample Date	Sample Location	Map ID No.	Results pCi/l
5/15/2007	CT River, Station 3-3	84A	< 300
5/15/2007	CT River, Station 3-4	84B	< 300
5/15/2007	CT River, Station 3-8	84C	< 300
5/15/2007	Discharge Forebay	84D	< 300
5/29/2007	Blodgett Farm	85	< 300
5/29/2007	Brattleboro Fire Dept	88	< 300
5/29/2007	CT River Downstream	86	< 300
5/29/2007	CT River Upstream	87	< 300
5/29/2007	Miller Farm	82	< 300
5/29/2007	Vernon Elem School	83	< 300
6/13/2007	CT River, Station 3-3	84A	< 300
6/13/2007	CT River, Station 3-4	84B	< 300
6/13/2007	CT River, Station 3-8	84C	< 300
6/13/2007	Discharge Forebay	84D	< 300
6/29/2007	Blodgett Farm	85	< 300
6/29/2007	Brattleboro Fire Dept	88	< 300
6/29/2007	CT River Downstream	86	< 300
6/29/2007	CT River Upstream	87	< 300
6/29/2007	Miller Farm	82	< 300
6/29/2007	Vernon Elem School	83	< 300
7/16/2007	CT River, Station 3-3	84A	< 300
7/16/2007	CT River, Station 3-4	84B	< 300
7/16/2007	CT River, Station 3-8	84C	< 300
7/16/2007	Discharge Forebay	84D	< 300
7/31/2007	Blodgett Farm	85	< 300
7/31/2007	Brattleboro Fire Dept	88	< 300
7/31/2007	CT River Downstream	86	< 300
7/31/2007	CT River Upstream	87	< 300
7/31/2007	Miller Farm	82	< 300
7/31/2007	Vernon Elem School	83	< 300
8/16/2007	CT River, Station 3-3	84A	< 300
8/16/2007	CT River, Station 3-4	84B	< 300
8/16/2007	CT River, Station 3-8	84C	< 300
8/16/2007	Discharge Forebay	84D	< 300
8/27/2007	Blodgett Farm	85	< 300
8/27/2007	Brattleboro Fire Dept	88	< 300
8/27/2007	CT River Downstream	86	< 300
8/27/2007	CT River Upstream	87	< 300
8/27/2007	Miller Farm	82	< 300
8/27/2007	Vernon Elem School	83	< 300

Table 18. 2007 Water Sample Tritium Results (continued)

Sample Date	Sample Location	Map ID No.	Results pCi/l
9/15/2006	CT River, Station 3-3	84A	< 300
9/15/2006	CT River, Station 3-4	84B	< 300
9/15/2006	CT River, Station 3-8	84C	< 300
9/15/2006	Discharge Forebay	84D	< 300
9/27/2006	Blodgett Farm	85	< 300
9/27/2006	Brattleboro Fire Dept	88	< 300
9/27/2006	CT River Downstream	86	< 300
9/27/2006	CT River Upstream	87	< 300
9/27/2006	Miller Farm	82	< 300
9/27/2006	Vernon Elem School	83	< 300
10/13/2006	CT River, Station 3-3	84A	< 300
10/13/2006	CT River, Station 3-4	84B	< 300
10/13/2006	CT River, Station 3-8	84C	< 300
10/13/2006	Discharge Forebay	84D	< 300
10/27/2006	Blodgett Farm	85	< 300
10/27/2006	Brattleboro Fire Dept	88	< 300
10/27/2006	CT River Downstream	86	< 300
10/27/2006	CT River Upstream	87	< 300
10/27/2006	Miller Farm	82	< 300
10/27/2006	Vernon Elem School	83	< 300
11/15/2006	CT River, Station 3-3	84A	< 300
11/15/2006	CT River, Station 3-4	84B	< 300
11/15/2006	CT River, Station 3-8	84C	< 300
11/15/2006	Discharge Forebay	84D	< 300
11/22/2006	Blodgett Farm	85	< 300
11/22/2006	Brattleboro Fire Dept	88	< 300
11/22/2006	CT River Downstream	86	< 300
11/22/2006	CT River Upstream	87	< 300
11/22/2006	Miller Farm	82	< 300
11/22/2006	Vernon Elem School	83	< 300
12/15/2006	CT River, Station 3-3	84A	< 300
12/15/2006	CT River, Station 3-4	84B	< 300
12/15/2006	CT River, Station 3-8	84C	< 300
12/15/2006	Discharge Forebay	84D	< 300
12/21/2006	Blodgett Farm	85	< 300
12/21/2006	Brattleboro Fire Dept	88	< 300
12/21/2006	CT River Downstream	86	< 300
12/21/2006	CT River Upstream	87	< 300
12/21/2006	Miller Farm	82	< 300
12/21/2006	Vernon Elem School	83	< 300

Food Chain Sampling Results

Monitoring of the food chain involves direct monitoring of some foods such as milk, cultivated vegetation and fish. It also involves monitoring of the soil and sediment that support land and aquatic species, and natural vegetation like grass, ferns, and fungi that serves as feed to land animals.

Milk Sample Results for 2007

Cow's raw milk is sampled monthly from two farms in Vernon. One farm is about one-half mile north of Vermont Yankee Nuclear Power Station and the other is about three miles south of the plant. Map 12 shows the location of these two dairy farms.

Milk is analyzed for all gamma radiation-emitting radioactive materials, and a separate assessment for iodine-131 is conducted. Table 20 shows the iodine-131 results. The analyses found no iodine-131 greater than the lower limit of detection, which is 2.53 picocuries per liter (pCi/l).

As recorded in Table 21, the gamma spectroscopy of milk also revealed no nuclear facility-generated radioactive materials in excess of the counting system's lower limits of detection. The lower limits of detection for radioactive materials in milk are listed in Table 19.

The one radioactive material that was detected above its lower limit of detection was potassium-40, a primordial radioactive material. Primordial radioactive materials are those created with the formation of the earth and other cosmic features. Potassium-40 has a half-life of 1,280,000,000 years. The gamma spectroscopy results are presented in Table 21. The potassium-40 results for all milk samples, ranging from 1380 to 1670 pCi/l, fall within the historical range for potassium-40 of 1,200 to 2,000 pCi/l.

Vegetation Sample Results for 2007

A variety of natural and cultivated plants are sampled to verify that no Vermont Yankee Nuclear Power Station radioactive materials are accumulating in the human and animal food chains. None of the sample results were outside of the historical range for vegetation samples. The historical range for gamma radioactivity in vegetation varies for the specific kind of plant, but, generally, the range is from the lower limit of detection to 20,400 picocuries per kilogram (pCi/kg). The specific values for 2007 are found in Table 23.

In May 2007, members of the Vermont Emergency Management Radiological Sampling Team, composed of employees from the Vermont Department of Health, the Agency for Natural Resources and the Agency of Agriculture, conducted one of their biannual Vermont Yankee emergency preparedness drills in the White River Junction area of Vermont. During the drill, many environmental samples were collected and several of them were counted by the Vermont Department of Health Laboratory. From this May 2007 drill, samples of hay and alfalfa were analyzed. These results from Queechee and Hartland, Vermont help serve as a background for comparison to samples near Vermont Yankee. Map 10 above shows where all of the environmental samples were taken. Table 23 lists two of the sites from Map 10 where vegetation samples were taken, the Billings Farm and the Green Acres Farm. They are identification numbers 111 and 112 on Map 10.

In September 2007, members of the same team conducted additional sampling activities in Dummerston, Putney, Westminster and Rockingham. Along with soil and water samples, broccoli, grass, apple, hay and alfalfa samples were taken from this drill and analyzed by the Vermont Department of Health Laboratory. The sample sites are found on Map 10 above, and the vegetation sample sites are identification numbers 110, 113, 114, 115 and 116. The gamma radioactivity measurement results are found in Table 23. The sites are Green Mountain Orchard, Stoneholm Farm, Saxton River Orchard, Westminster Farm and Walker Farm. In June of 2007, additional grass samples from three sites in Vernon were obtained and analyzed in the same fashion as in past years.

These sites are depicted on Map 13 below. Table 23 presents the results of the gamma radioactivity analyses conducted on these samples.

The gamma radioactivity results in picocuries per kilogram for the 2007 vegetation samples are shown in Figures 8 and 9. Figure 8 shows the beryllium-7 results, while Figure 9 shows the potassium-40 results. The graphs show something interesting. Note how the vegetation at Stoneholm Farm in Figure 8 indicates more beryllium-7 than samples at the other sample sites. It is actually not the farm that is different, it is the sample media, the plant that was sampled that caused the difference. The sample from Stoneholm Farm was hay. In Figure 9, this same hay sample also had an elevated potassium-40 concentration, as compared to most of the other samples. Given that the hay at Billings Museum also showed elevated potassium-40 concentrations, one might conclude that hay takes up and holds more naturally occurring radioactivity from the soil than do the other vegetation types reported on here.

Remember that these radioactive materials, potassium-40 and beryllium-7, are purely naturally-occurring radioactive materials, Remember, too, that these concentrations are within the historical range for vegetation samples which has been as high as 20,400 picocuries per kilogram.

Soil Sample Results for 2007

Soil samples were also collected in the same fashion as with the vegetation samples – at two Sampling Team drills in the spring and fall of 2007 and as in past years in Vernon during the summer. The locations of the May 2007 samples in the White River Junction area are shown on Map 10 above; the southern Vermont locations for soil samples are shown on Map 11, also above; and, the Vernon soil sample sites are depicted on Map 14 below. The table of soil sample results is Table 24. The Map 10 identification numbers on Table 24 corresponding to Map 10 are 101, 102 and 103; the Map 11 identification numbers for the Dummerston, Putney, Westminster and Rockingham soil samples are

106, 107, 108 and 109; the Map 14 identification numbers for the Vernon area are 95, 96, 97 and 98.

With one exception, all sample results were within the historical range of less than the lower limit of detection to 500 picocuries per kilogram for cesium-137, and from 7,000 to 20,000 picocuries per kilogram for potassium-40. The one exception was for potassium-40 at the Green Acres Farm in Hartland, Vermont. At 32,400 picocuries per kilogram, the concentration is nearly double the historical range (see Figure 10). But potassium-40 is a purely natural radioactive mineral. This measurement is taken only as an indication of the wide natural variability in the concentration of this mineral in Vermont, not as any kind of public health concern. As more samples are obtained throughout Vermont, we will be able to better characterize anomalous results such as this one.

Unlike potassium-40, cesium-137 exists only due to human activity. Figure 11 shows the samples with cesium-137 activity. As can be seen, cesium-137 may be found in central Vermont near White River Junction and in southern Vermont near Westminster, as well as in southeastern Vermont near Vermont Yankee. In past reports, we have explained this in terms of residual radioactivity from above ground nuclear weapons testing fallout and from fallout from the plume that sent radioactivity around the world for several weeks following the nuclear reactor explosion and fire at Chernobyl in the former Soviet Union. The graph in Figure 11 shows that cesium-137 from these sources is widely distributed in Vermont, and samples from other parts of Vermont should demonstrate this further.

Sediment Sample Results for 2007

Sediment samples are taken from the bottom of the Connecticut River by an environmental contractor. The samples in this report are analyzed by the Vermont Department of Health Laboratory. The sediment samples are taken from four areas of the Connecticut River. The first is near what is called the North Storm Drain. It is an area where radioactive sedimentary contaminants from Vermont Yankee Nuclear Power

Station were discovered prior to 1998, and it is an area just east of the plant stack. Sample locations S-1, S-2, T-1, T-2, T-3, U-1, U-2, U-3, U-4, V-3, V-4, V-5, W-4, W-5 and X-5 are from this North Storm Drain area. These sample locations are shown in an illustration included as Figure 12.

The second location is in the pool upstream of the Vernon Dam, near the primary plant discharge at the south end of the plant property near the cooling towers. In Table 25, the samples for location 3-4 are from this part of the Connecticut River. The third location, 3-3, is south of the Vernon Dam in the pool created downstream of the hydroelectric facility there. The final sample location, 3-8, is well upstream of the plant where the Route 9 highway bridge crosses the Connecticut River north of Brattleboro.

Two sets of samples are obtained, one set in the spring and one set in the fall. A sediment sample is taken with a mass ranging from 0.75 to 1.25 kilograms. At the Vermont Department of Health Laboratory, the sample is dried, weighed on a top-loaded balance and placed in a 500 milliliter high density polyethylene bottle. The sample is counted on the gamma spectrometer system using a reverse germanium detector. A normal spectrum will include naturally occurring, primordial radioactive materials such as potassium-40, cosmogenic, naturally occurring radioactive materials such as beryllium-7, and archival cesium-137 from past atmospheric nuclear weapons testing and the releases from Chernobyl. North Storm Drain samples in the past included trace amounts of cobalt-60. Cobalt-60 is radioactive material of only human origin.

For 2007, primordial potassium-40 is within the historical range of 6,000 – 26,000 pCi/kg at 9,370 – 20,900 pCi/kg. The archival cesium-137 is within the historical range of the lower limit of detection to 500 pCi/kg at 51.6 – 153 pCi/kg. There were no other radioactive materials in excess of the counting system's lower limits of detection including cobalt-60. The lower limits of detection for sediment are the same as those for soil, and shown in Table 22. The potassium-40 results are graphed in Figure 12, while the cesium-137 are graphed in Figure 13.

Fish Sample Results for 2007

Table 26 presents the results of gamma spectroscopy of fish samples. The fish were obtained from the Connecticut River by an environmental contractor. The fish samples were analyzed by the Vermont Department of Health Laboratory. Table 25 shows that the only results in excess of the counting system's lower limits of detection were for naturally occurring, cosmogenic potassium-40. Potassium-40 in 2007, ranging from 2,450 to 2,790 pCi/kg falls within the historical range for these samples: 1,000 – 5,000 pCi/kg.

Location 3-4 in the table above corresponds with the Vernon Pond, the basin formed by the Vernon Dam on the Connecticut River just downstream from Vermont Yankee Nuclear Power Station. Location 3-8 is near the Route 9 highway bridge north of Brattleboro. Fish are captured via an electroshock method. The fish are frozen whole, weighed and chopped or blended for loading into a reentrant beaker. The sample of about one kilogram is then analyzed with a gamma spectrometer system using a reverse electrode germanium detector.

Table 19. Gamma Spectroscopy Lower Limits of Detection for Milk, Water, Vegetation and Fish Samples

Radioactive material	Lower Limit of Detection
Cadmium-109	45.96 pCi/l
Cobalt-58	1.78 pCi/l
Cerium-139	2.13 pCi/l
Mercury-203	2.48 pCi/l
Tin-113	3.46 pCi/l
Cesium-137	2.75 pCi/l
Yttrium-88	2.03 & 3.00 pCi/l
Cobalt-60	2.56 & 2.61 pCi/l
Beryllium-7	20.55 pCi/l
Potassium-40	41.66 pCi/l
Barium-133	3.30 pCi/l
Cesium-134	2.78 pCi/l
Iodine-131	2.53 pCi/l
Zinc-65	5.31 pCi/l
Manganese-54	2.76 pCi/l
Silver-110m	2.56 pCi/l
Cerium-144	14.68 pCi/l
Cerium-141	3.54 pCi/l
Chromium-51	20.34 pCi/l
Antimony-126	2.47 pCi/l
Ruthenium-103	2.47 pCi/l
Strontium-90	2.87 pCi/l
Antimony-124	2.67 pCi/l
Ruthenium-106	25.19 pCi/l
Cesium-136	2.56 pCi/l
Cobalt-58	2.63 pCi/l

Map 12

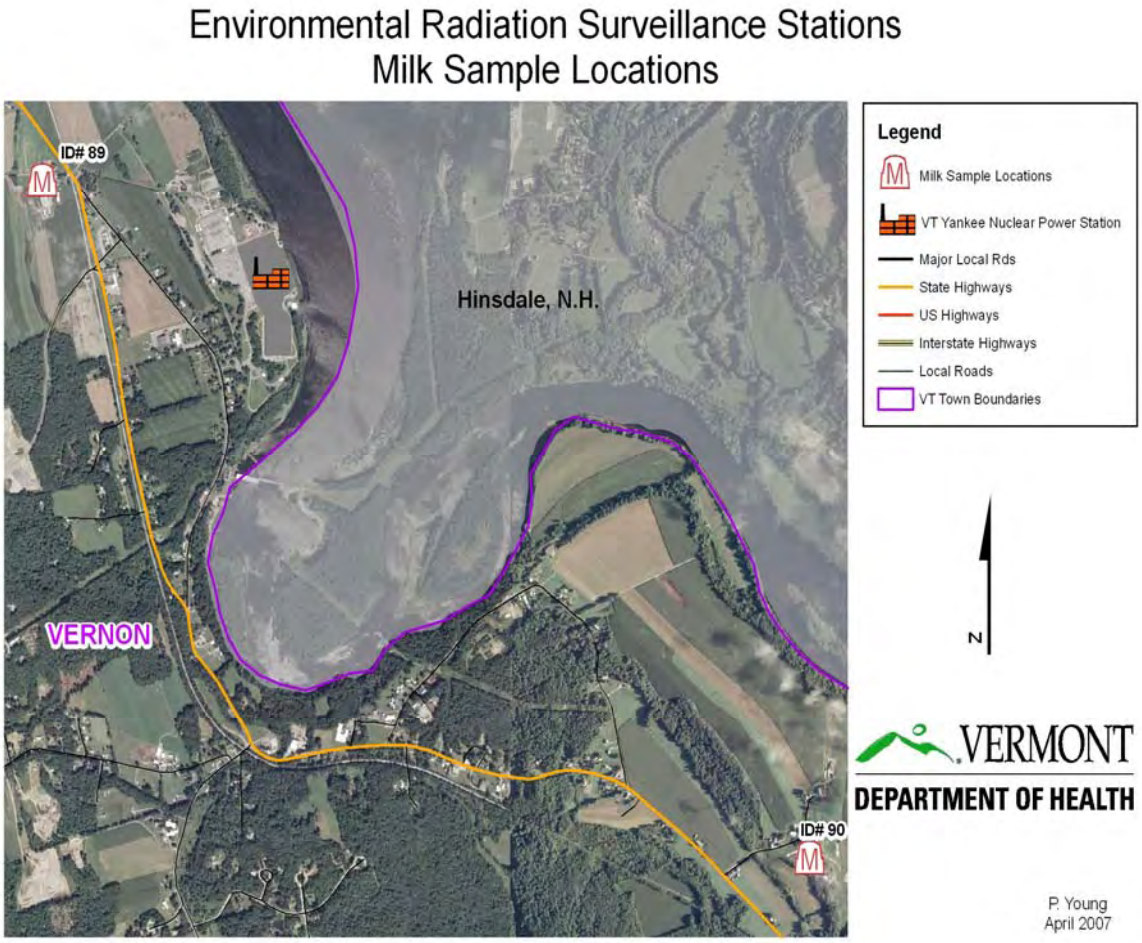

Environmental Radiation Surveillance Stations
Milk Sample Locations
ID# 89
Hinsdale, N.H.
VERNON
ID# 90
Legend
Milk Sample Locations
VT Yankee Nuclear Power Station
Major Local Rds
State Highways
US Highways
Interstate Highways
Local Roads
VT Town Boundaries
N
VERMONT
DEPARTMENT OF HEALTH
P. Young
April 2007

Table 20. 2007 Milk Sample Iodine-131 Results

Sample Date	Sample Location	Map ID No.	Results Nuclides	Results pCi/l	Error pCi/l
1/29/2007	Blodgett Farm	90	I-131	< 2.26	N/A
1/29/2007	Miller Farm	89	I-131	< 2.26	N/A
2/27/2007	Blodgett Farm	90	I-131	< 2.26	N/A
2/27/2007	Miller Farm	89	I-131	< 2.26	N/A
3/20/2007	Blodgett Farm	90	I-131	< 2.26	N/A
3/20/2007	Miller Farm	89	I-131	< 2.26	N/A
4/30/2007	Blodgett Farm	90	I-131	< 2.26	N/A
4/30/2007	Miller Farm	89	I-131	< 2.26	N/A
5/29/2007	Blodgett Farm	90	I-131	< 2.26	N/A
5/29/2007	Miller Farm	89	I-131	< 2.26	N/A
6/29/2007	Blodgett Farm	90	I-131	< 2.26	N/A
6/29/2007	Miller Farm	89	I-131	< 2.26	N/A
7/31/2007	Blodgett Farm	90	I-131	< 2.26	N/A
7/31/2007	Miller Farm	89	I-131	< 2.26	N/A
8/27/2007	Blodgett Farm	90	I-131	< 2.26	N/A
8/27/2007	Miller Farm	89	I-131	< 2.26	N/A
9/25/2007	Blodgett Farm	90	I-131	< 2.26	N/A
9/25/2007	Miller Farm	89	I-131	< 2.26	N/A
10/30/2007	Blodgett Farm	90	I-131	< 2.26	N/A
10/30/2007	Miller Farm	89	I-131	< 2.26	N/A
11/30/2007	Blodgett Farm	90	I-131	< 2.26	N/A
11/30/2007	Miller Farm	89	I-131	< 2.26	N/A
12/20/2007	Blodgett Farm	90	I-131	< 2.26	N/A
12/20/2007	Miller Farm	89	I-131	< 2.26	N/A

Table 21. 2007 Milk Sample Gamma Radioactivity Results

Sample Date	Sample Location	Map ID No.	Results Nuclides	Results pCi/l	Error pCi/l
1/29/2007	Blodgett Farm	90	K-40	1480	110
1/29/2007	Miller Farm	89	K-40	1550	110
2/27/2007	Blodgett Farm	90	K-40	1280	90
2/27/2007	Miller Farm	89	K-40	1530	120
3/20/2007	Blodgett Farm	90	K-40	1430	100
3/20/2007	Miller Farm	89	K-40	1510	110
4/30/2007	Blodgett Farm	90	K-40	1540	100
4/30/2007	Miller Farm	89	K-40	1510	110
5/29/2007	Blodgett Farm	90	K-40	1550	100
5/29/2007	Miller Farm	89	K-40	1500	100
6/29/2007	Blodgett Farm	90	K-40	1540	110
6/29/2007	Miller Farm	89	N/A	N/A	N/A
7/31/2007	Blodgett Farm	90	K-40	1620	110
7/31/2007	Miller Farm	89	K-40	1440	100
8/27/2007	Blodgett Farm	90	K-40	1570	100
8/27/2007	Miller Farm	89	K-40	1550	110
9/25/2007	Blodgett Farm	90	K-40	1490	100
9/25/2007	Miller Farm	89	N/A	N/A	N/A
10/30/2007	Blodgett Farm	90	K-40	1570	110
10/30/2007	Miller Farm	89	K-40	1500	100
11/30/2007	Blodgett Farm	90	K-40	1640	110
11/30/2007	Miller Farm	89	K-40	1460	100
12/20/2007	Blodgett Farm	90	K-40	1630	110
12/20/2007	Miller Farm	89	K-40	1430	100

Table 22. Lower Limits of Detection for Soil and Sediment Samples

Radioactive material	Lower Limit of Detection
Cadmium-109	272.28 pCi/l
Cobalt-57	10.62 pCi/l
Cerium-139	12.79 pCi/l
Mercury-203	15.08 pCi/l
Tin-113	21.27 pCi/l
Cesium-137	17.37 pCi/l
Yttrium-88	19.30 & 13.28 pCi/l
Cobalt-60	17.04 & 16.83 pCi/l
Beryllium-7	127.61 pCi/l
Potassium-40	274.20 pCi/l
Barium-133	20.26 pCi/l
Cesium-134	17.46 pCi/l
Iodine-131	15.51 pCi/l
Zinc-65	34.64 pCi/l
Manganese-54	17.66 pCi/l
Silver-110m	16.17 pCi/l
Cerium-144	87.76 pCi/l
Cerium-141	21.21 pCi/l
Chromium-51	124.42 pCi/l
Antimony-126	15.24 pCi/l
Ruthenium-103	15.34 pCi/l
Strontium-90	17.89 pCi/l
Antimony-124	16.77 pCi/l
Ruthenium-106	158.59 pCi/l
Cesium-136	16.43 pCi/l
Cobalt-58	16.84 pCi/l

Table 23. 2007 Vegetation Gamma Radioactivity Results

Sample Date	Sample Location	Map ID No.	Results pCi/kg	Error pCi/kg	Results Nuclides	Comment
5/17/2007	Billings Museum	112	17500	1600	K-40	Hay
5/17/2007	Green Acres Farm	111	4730	500	K-40	Alfalfa
5/17/2007	Green Acres Farm	111	837	182	Be-7	Alfalfa
6/29/2007	Power Line River Crossing	92	523	166	Be-7	Grass
6/29/2007	Power Line River Crossing	92	5470	480	K-40	Grass
6/29/2007	Vernon Elementary School	93	6210	530	K-40	Grass
6/29/2007	Vernon Elementary School	93	928	202	Be-7	Grass
6/29/2007	Blodgett Farm	94	7000	600	K-40	Grass
6/29/2007	CT River Downstream	98	5430	580	K-40	Grass
9/20/200/	Walker Farm	116	1970	200	K-40	Broccoli
9/20/2007	Westminster Farm	115	1430	280	Be-7	Grass
9/20/200/	Westminster Farm	115	5770	530	K-40	Grass
9/20/2007	Saxtons Orchard	114	1400	120	K-40	Apple
9/20/2007	Green Mountain Orchard	110	1140	110	K-40	Apple
9/20/200/	Stoneholm Farm	113	18600	1100	K-40	Hay
9/20/2007	Stoneholm Farm	113	4590	410	Be-7	Hay
9/20/200/	Stoneholm Farm	113	6820	470	K-40	Alfalfa
9/20/2007	Stoneholm Farm	113	469	146	Be-7	Alfalfa

Figure 8

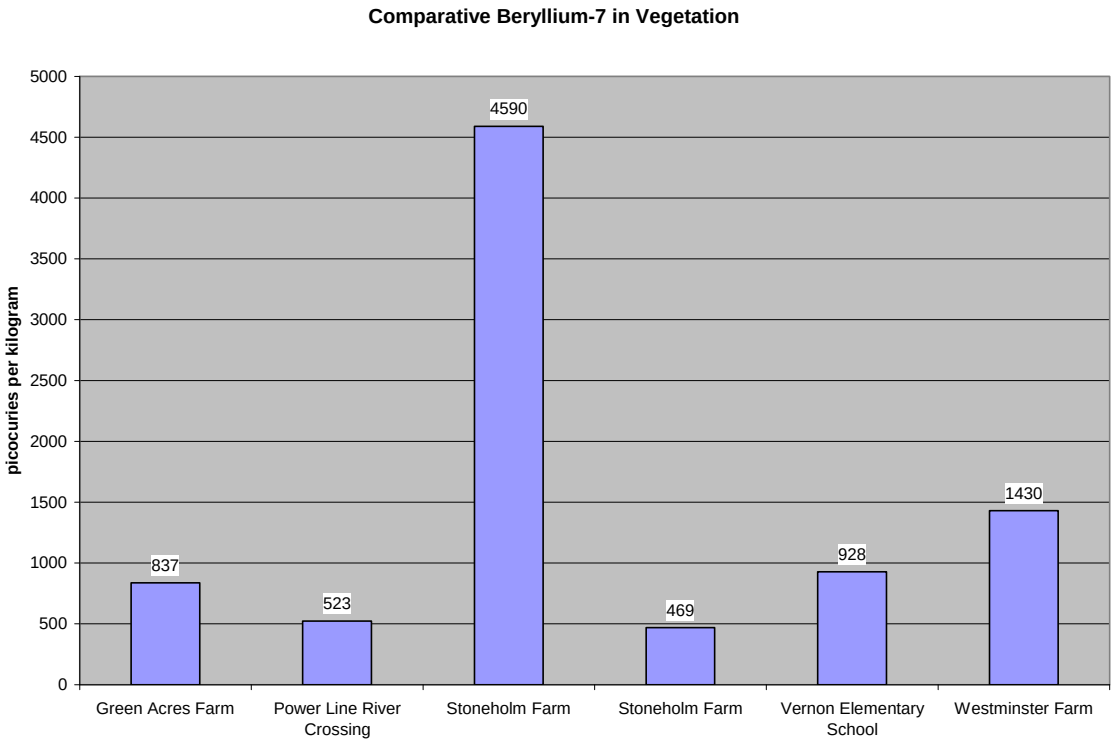
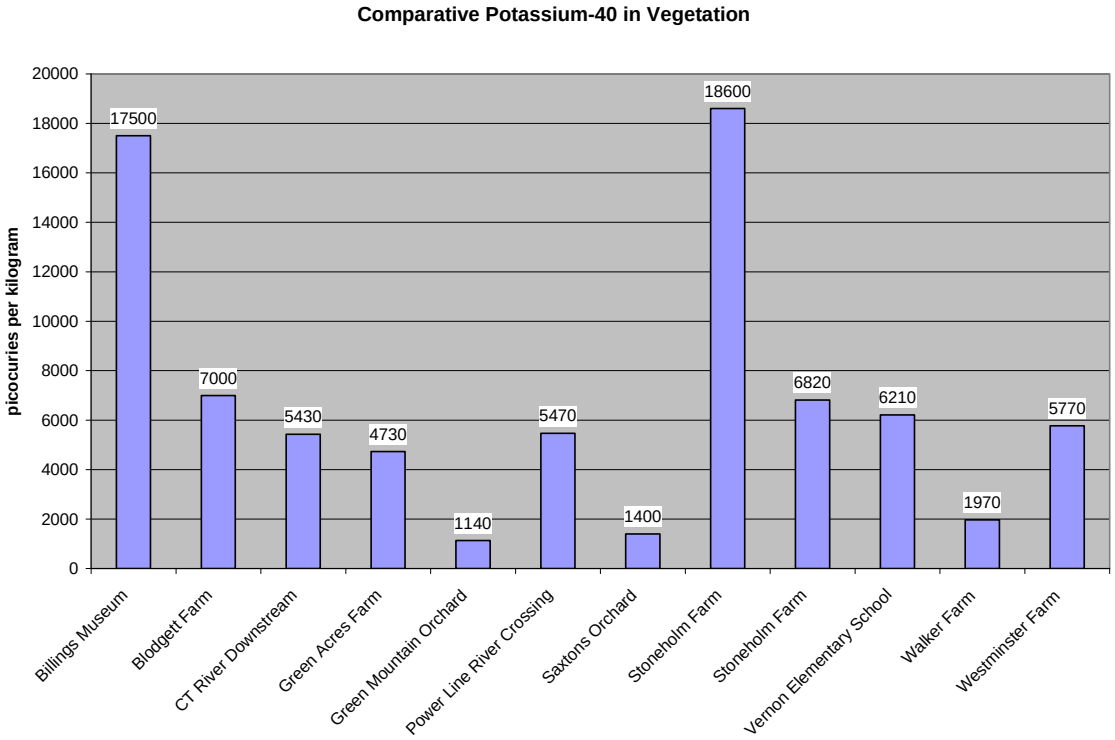

Comparative Beryllium-7 in Vegetation
picocuries per kilogram
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
837
523
4590
469
928
1430
Green Acres Farm
Power Line River Crossing
Stoneholm Farm
Stoneholm Farm
Vernon Elementary School
Westminster Farm

Figure 9


Comparative Potassium-40 in Vegetation
picocuries per kilogram
20000
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
17500
7000
5430
4730
1140
5470
1400
18600
6820
6210
1970
5770
Billings Museum
Blodgett Farm
CT River Downstream
Green Acres Farm
Green Mountain Orchard
Power Line River Crossing
Saxtons Orchard
Stoneholm Farm
Stoneholm Farm
Vernon Elementary School
Walker Farm
Westminster Farm

Map 13

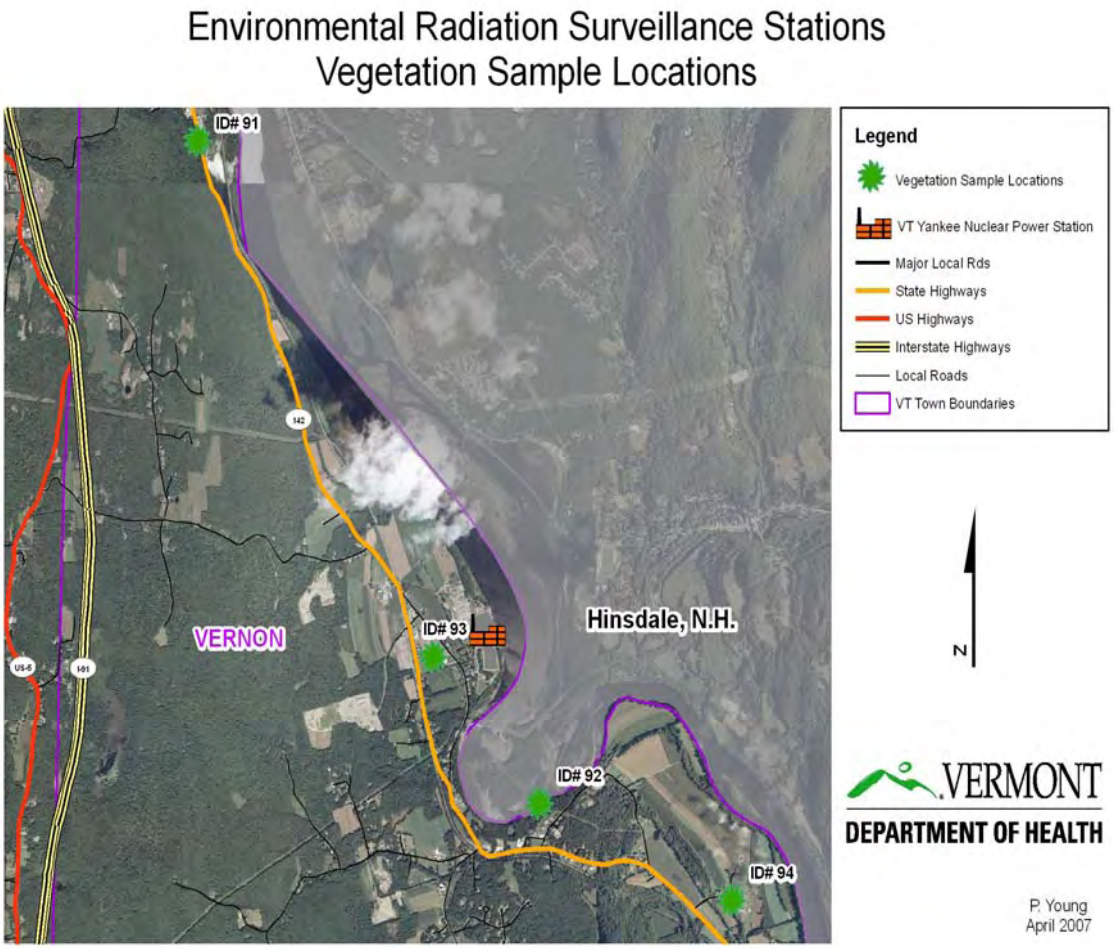

Environmental Radiation Surveillance Stations
Vegetation Sample Locations
ID# 91
ID# 93
ID# 92
ID# 94
VERNON
Hinsdale, N.H.
Legend
Vegetation Sample Locations
VT Yankee Nuclear Power Station
Major Local Rds
State Highways
US Highways
Interstate Highways
Local Roads
VT Town Boundaries
N
VERMONT
DEPARTMENT OF HEALTH
P. Young
April 2007

Table 24. 2007 Soil Sample Gamma Radioactivity Results

Sample Date	Sample Location	Map ID No.	Results pCi/kg	Error pCi/kg	Results Nuclides
5/17/2007	Meacham Farm	101	14900	1000	K-40
5/17/2007	Meacham Farm	101	125	34	Cs-137
5/17/2007	Green Acres Farm	102	32400	1800	K-40
5/17/2007	Billings Farm	103	11100	800	K-40
5/17/2007	Lake Pineo Beach	104	10400	700	K-40
5/17/2007	Dewey Mills	105	9050	630	K-40
6/29/2007	Vernon Elementary School	96	12400	800	K-40
5/16/2006	Vernon Elementary School	96	68.5	25.7	Cs-137
6/29/2007	Power Line River Crossing	95	10400	700	K-40
6/29/2007	Blodgett Farm	97	11100	700	K-40
6/29/2007	Blodgett Farm	97	80.6	22.3	Cs-137
6/29/2007	Conn River Downstream	98	12900	800	K-40
9/20/2007	Stoneholm Farm	106	12600	800	K-40
9/20/2007	Stoneholm Farm	106	128	33	Cs-137
9/20/2007	Harlows Farm	107	16100	1000	K-40
9/20/2007	Harlows Farm	107	97.4	24	Cs-137
9/20/2007	Saxton River Orchard	108	10400	700	K-40
9/20/2007	Walker Farm	109	13600	900	K-40

Figure 10

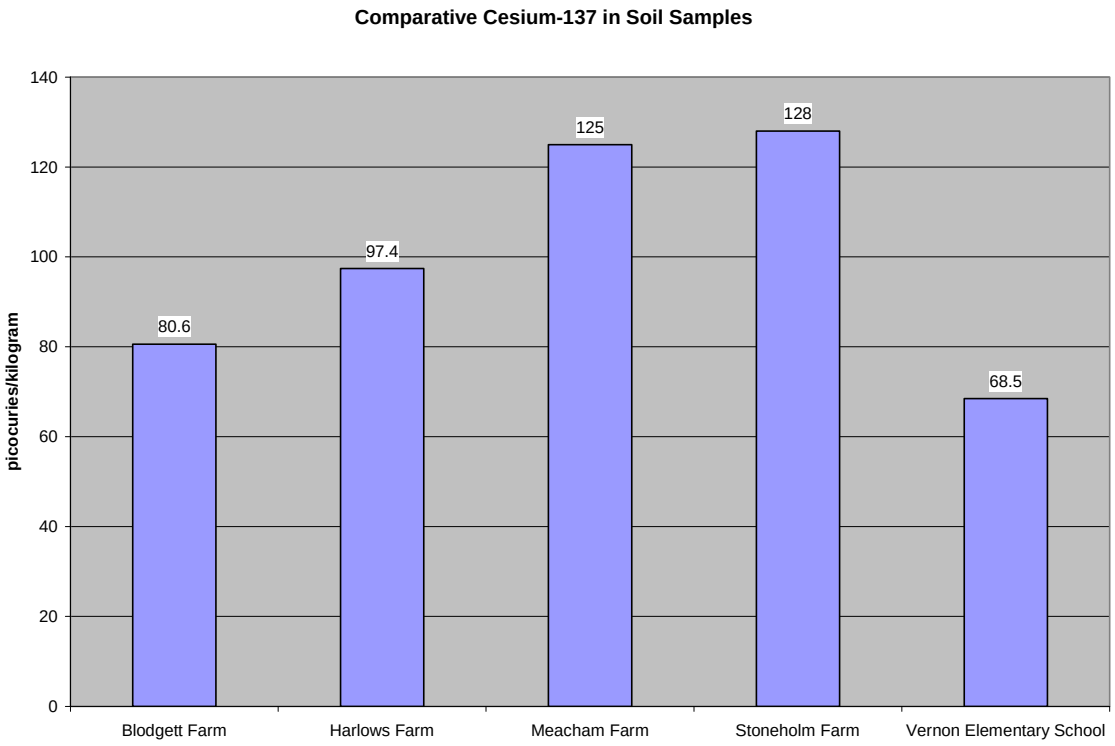
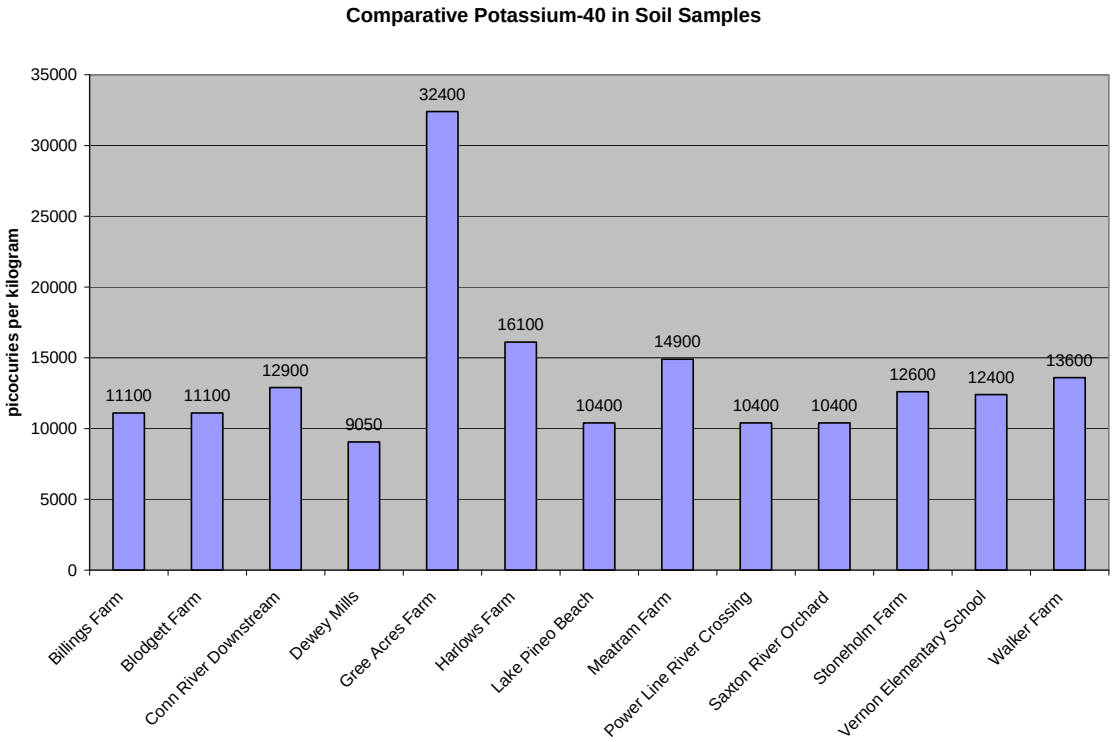

Comparative Cesium-137 in Soil Samples
picocuries/kilogram
140
120
100
80
60
40
20
0
80.6
97.4
125
128
68.5
Blodgett Farm
Harlows Farm
Meacham Farm
Stoneholm Farm
Vernon Elementary School

Figure 11


Comparative Potassium-40 in Soil Samples
picocuries per kilogram
35000
30000
25000
20000
15000
10000
5000
0
11100
11100
12900
9050
32400
16100
10400
14900
10400
10400
12600
12400
13600
Billings Farm
Blodgett Farm
Conn River Downstream
Dewey Mills
Gree Acres Farm
Harlows Farm
Lake Pineo Beach
Meatram Farm
Power Line River Crossing
Saxton River Orchard
Stoneholm Farm
Vernon Elementary School
Walker Farm

Map 14

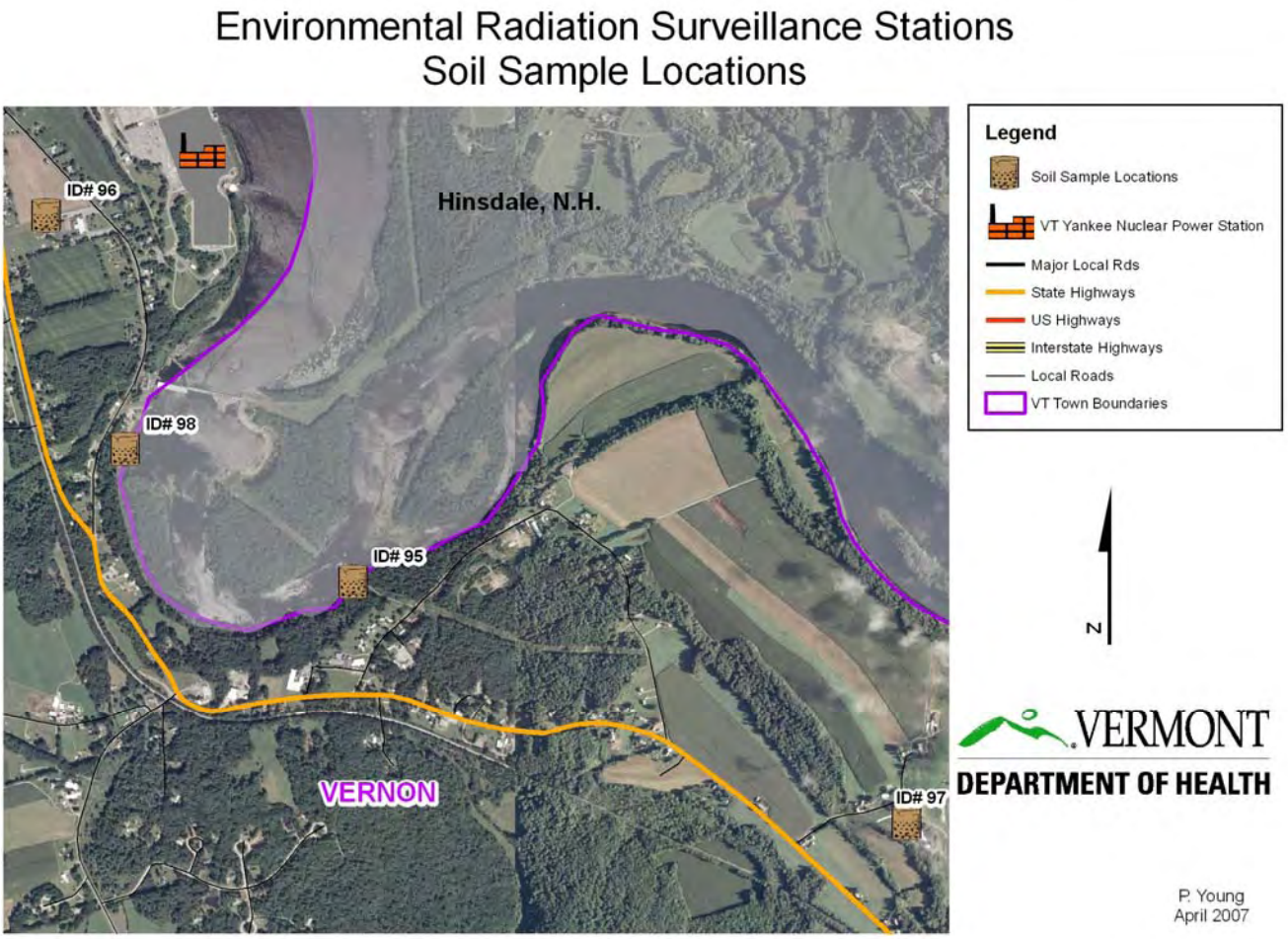

Environmental Radiation Surveillance Stations
Soil Sample Locations
Hinsdale, N.H.
ID# 96
ID# 98
ID# 95
ID# 97
VERNON
Legend
Soil Sample Locations
VT Yankee Nuclear Power Station
Major Local Rds
State Highways
US Highways
Interstate Highways
Local Roads
VT Town Boundaries
N
VERMONT
DEPARTMENT OF HEALTH
P. Young
April 2007

Figure 12, Sediment Sample Locations

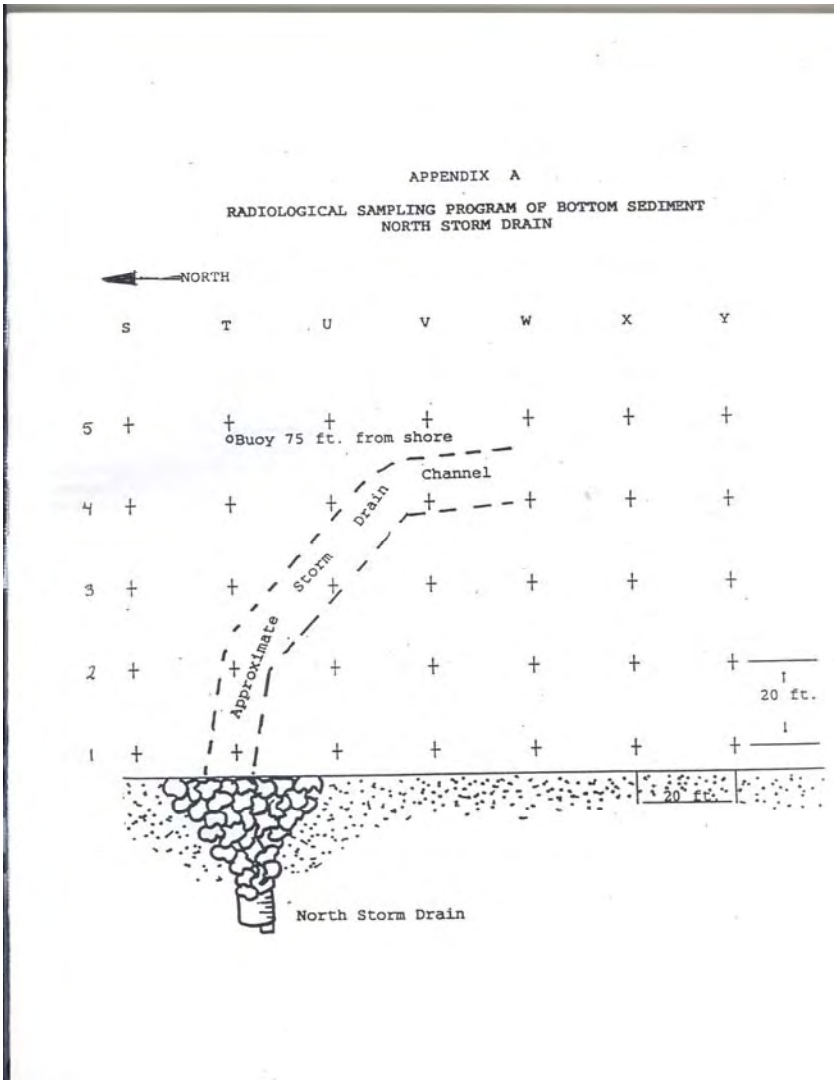


Figure 13

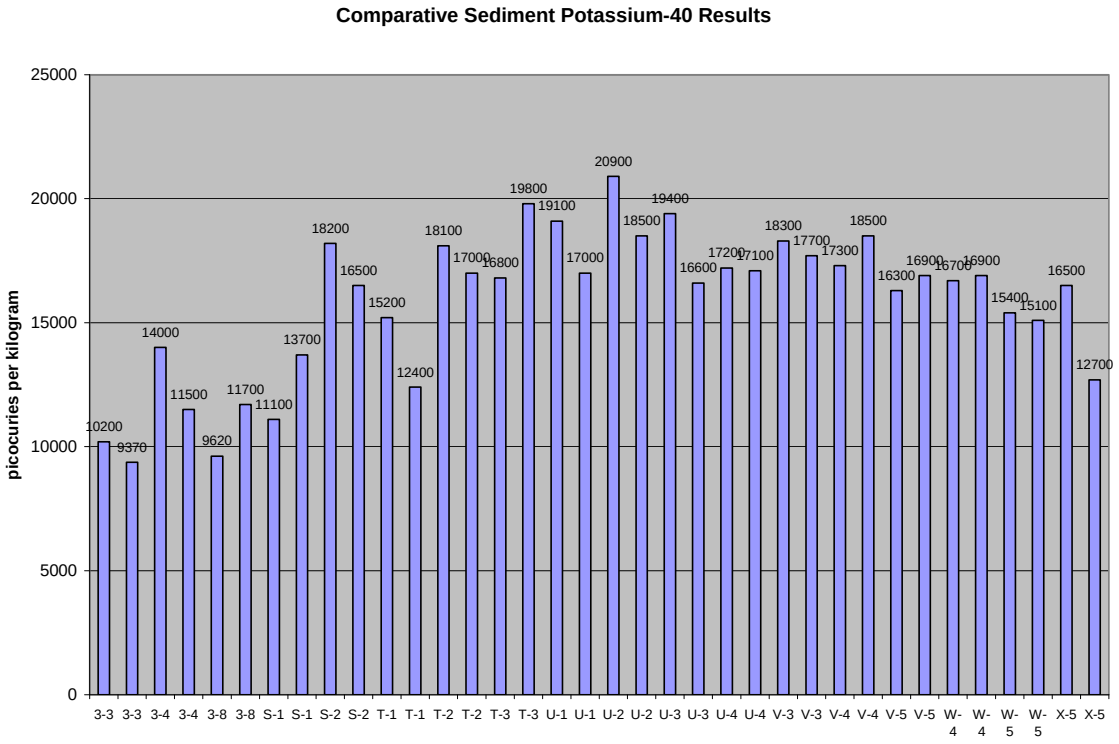

Comparative Sediment Potassium-40 Results
picocuries per kilogram
25000
20000
15000
10000
5000
0
10200
9370
14000
11500
9620
11700
11100
13700
18200
16500
15200
12400
18100
17000
16800
19800
19100
17000
20900
18500
19400
16600
17200
17100
18300
17700
17300
18500
16300
16900
16700
16900
15400
15100
16500
12700
3-3 3-3 3-4 3-4 3-8 3-8 S-1 S-1 S-2 S-2 T-1 T-1 T-2 T-2 T-3 T-3 U-1 U-1 U-2 U-2 U-3 U-3 U-4 U-4 V-3 V-3 V-4 V-4 V-5 V-5 W-4 W-4 W-5 W-5 X-5 X-5

Figure 14

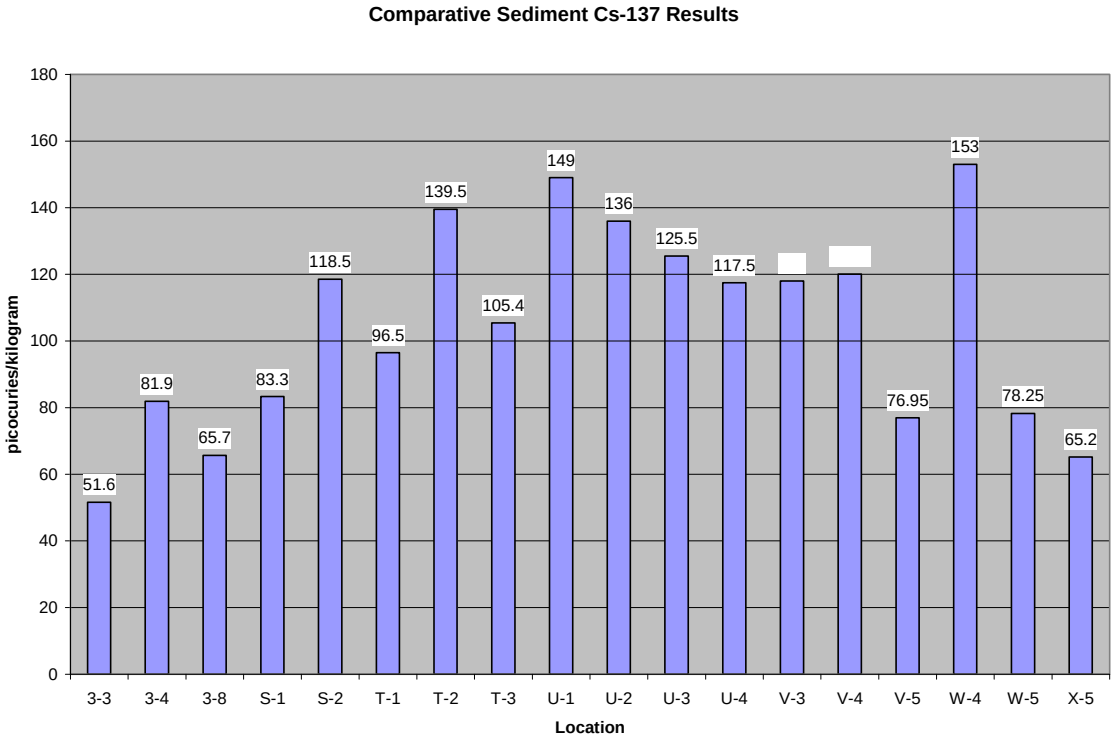

Comparative Sediment Cs-137 Results
picocuries/kilogram
180
160
140
120
100
80
60
40
20
0
51.6
81.9
65.7
83.3
118.5
96.5
139.5
105.4
149
136
125.5
117.5
76.95
153
78.25
65.2
3-3
3-4
3-8
S-1
S-2
T-1
T-2
T-3
U-1
U-2
U-3
U-4
V-3
V-4
V-5
W-4
W-5
X-5
Location

Table 25. 2007 Sediment Sample Gamma Radioactivity Results

Sample Date	Sample Location	Results Nuclides	Results pCi/kg	Error pCi/kg	Comment
5/15/2007	3-4	K-40	14000	900	Natural
5/15/2007	3-4	Cs-137	103	30	
5/15/2007	3-8	K-40	9620	640	Natural
5/15/2007	3-8	Cs-137	50.6	18	
5/15/2007	S-1	K-40	11100	800	Natural
5/15/2007	S-1	Cs-137	90.5	24	
5/15/2007	S-2	K-40	18200	1200	Natural
5/15/2007	S-2	Cs-137	123	42	
5/15/2007	T-1	K-40	15200	1100	Natural
5/15/2007	T-1	Cs-137	111	30	
5/15/2007	T-2	K-40	18100	1100	Natural
5/15/2007	T-2	Cs-137	131	27	
5/15/2007	T-3	K-40	16800	1100	Natural
5/15/2007	T-3	Cs-137	93.8	33.8	
5/15/2007	U-1	K-40	19100	1600	Natural
5/15/2007	U-1	Cs-137	148	50	
5/15/2007	U-2	K-40	20900	1300	Natural
5/15/2007	U-2	Cs-137	130	35	
5/15/2007	U-3	K-40	19400	1300	Natural
5/15/2007	U-3	Cs-137	151	43	
5/15/2007	U-4	K-40	17200	1200	Natural
5/15/2007	U-4	Cs-137	124	34	
5/15/2007	V-3	K-40	18300	1200	Natural
5/15/2007	V-3	Cs-137	123	32	
5/15/2007	V-4	K-40	17300	1200	Natural
5/15/2007	V-4	Cs-137	90.2	31.4	
5/15/2007	V-5	K-40	16300	1100	Natural
5/15/2007	V-5	Cs-137	79.1	28.8	
5/15/2007	W-4	K-40	16700	1200	Natural
5/15/2007	W-4	Cs-137	190	52	
5/15/2007	W-5	K-40	15400	1000	Natural
5/15/2007	W-5	Cs-137	85.3	33.9	
5/15/2007	X-5	K-40	16500	1100	Natural
5/15/2007	X-5	Cs-137	71.1	31.5	
5/24/2007	3-3	K-40	10200	700	Natural
5/24/2007	3-3	Cs-137	46.8	14.4	

Table 25. 2007 Sediment Sample Gamma Radioactivity Results (continued)

Sample Date	Sample Location	Results Nuclides	Results pCi/kg	Error pCi/kg	Comment
10/26/2007	3-8	K-40	11700	800	Natural
10/26/2007	3-8	Cs-137	80.8	22.9	
10/26/2007	T-1	K-40	12400	900	Natural
10/26/2007	T-1	Cs-137	82	25.1	
10/26/2007	T-2	K-40	17000	1100	Natural
10/26/2007	T-2	Cs-137	148	37	
10/26/2007	U-3	K-40	16600	1100	Natural
10/26/2007	U-3	Cs-137	100	36	
10/26/2007	3-4	K-40	11500	700	Natural
10/26/2007	3-4	Cs-137	60.8	23.3	
10/26/2007	S-2	K-40	16500	1100	Natural
10/26/2007	S-2	Cs-137	114	28	
10/26/2007	S-1	K-40	13700	900	Natural
10/26/2007	S-1	Cs-137	76.1	22.1	
10/26/2007	X-5	K-40	12700	800	Natural
10/26/2007	X-5	Cs-137	59.3	26.5	
10/26/2007	T-3	K-40	19800	1200	Natural
10/26/2007	T-3	Cs-137	117	34	
10/26/2007	V-4	K-40	18500	1200	Natural
10/26/2007	V-4	Cs-137	150	53	
10/26/2007	3-3	K-40	9370	640	Natural
10/26/2007	3-3	Cs-137	56.4	16.8	
10/26/2007	V-5	K-40	16900	1100	Natural
10/26/2007	V-5	Cs-137	74.8	29.8	
10/26/2007	W-5	K-40	15100	1000	Natural
10/26/2007	W-5	Cs-137	71.2	22.7	
10/26/2007	W-4	K-40	16900	1100	Natural
10/26/2007	W-4	Cs-137	116	40	
10/26/2007	V-3	K-40	17700	1100	Natural
10/26/2007	V-3	Cs-137	113	31	
10/26/2007	U-2	K-40	18500	1200	Natural
10/26/2007	U-2	Cs-137	142	31	
10/26/2007	U-4	K-40	17100	1100	Natural
10/26/2007	U-4	Cs-137	111	29	
10/26/2007	U-1	K-40	17000	1100	Natural
10/26/2007	U-1	Cs-137	150	36	

Table 26. 2007 Fish Sample Gamma Radioactivity Results

Sample Date	Sample Location	Results pCi/kg	Error pCi/kg	Results Nuclides
5/10/2007	3-4	2680	230	K-40
5/14/2007	3-8	2790	210	K-40
10/220/2007	3-4	2450	220	K-40
11/2/2007	3-8	2590	190	K-40