State of Vermont

Vermont Geological Survey
Department of Environmental Conservation
AGENCY OF NATURAL RESOURCES
103 South Main Street
Old Laundry Building
Waterbury, VT 05671-0411
(802) 241-3608
FAX: 241-3273

Radioactivity Map- Fact Sheet

1. Why make a radioactivity map of Vermont?

In 2000, groundwater from a number of private wells in the towns of Milton and Colchester was found to have elevated radioactivity. Subsequent to this discovery, the Vermont Geological Survey investigated the geologic literature and found that some previous geophysical and geological surveys had identified elevated radioactivity (anomalies) in this area. The earlier studies, most of which were related to uranium exploration, consisted of ground-based and airborne geophysical (Geiger Counter) surveys between 1951-1988. The anomaly areas detected via the airborne survey corresponded well with most of the areas with elevated groundwater radioactivity. Further geologic mapping conducted during the summer of 2001 by the Vermont Geological Survey confirmed the presence of elevated radioactivity on the ground within the airborne anomalies as well as in the vicinity of previous ground-based anomalies. The coincidence of radioactive anomalies from earlier surveys with areas where elevated radioactivity was detected in private bedrock wells in Milton and Colchester, suggested that it would be useful to assemble the existing radioactivity data for the entire state of Vermont.

2. Is there a connection between elevated radioactivity measured via airborne and ground-based surveys and wells with elevated radioactivity?

In the towns of Milton and Colchester, completed work suggests that there is a correlation between the elevated radioactivity areas discovered via airborne and ground-based studies and elevated radioactivity in groundwater wells.

3. Where does the existing information on radioactivity come from?

During the 1970s and 1980s, the U.S. Department of Energy sponsored a program called the National Uranium Resource Evaluation (NURE) that sought to explore for uranium ***throughout*** the United States. This exploration focussed on finding areas that would be economically favorable for uranium deposits. The NURE survey that covered most of Vermont also covered the states of Connecticut, Rhode Island, Massachusetts and parts of New York, New Hampshire, and Maine. The NURE investigations consisted of three separate surveys which were: 1) airborne geophysical surveys, 2) ground-based geophysical surveys coupled with geochemical analysis of uranium bearing rocks, and 3) analysis of the uranium and thorium content of sediments in streams. Airborne surveys were completed over all of Vermont except the northeasternmost corner whereas ground-based geophysical and rock geochemistry surveys and stream sediment surveys focussed on the southern half of

Vermont. Airborne geophysical surveys of the southern half of Vermont were also flown in 1964 by the U.S. Geological Survey.

Other sources of data on radioactivity include: 1) Mineral Resource Data System (MRDS) for Vermont which is a cooperative U.S. Geological Survey/Vermont Geological Survey database of all known mineral occurrences in Vermont from which uranium occurrences were extracted and 2) Dept. of Environmental Conservation, Water Supply Division database of Public Water Supply Wells with elevated radioactivity.

4. What are the categories on the radioactivity map?

There are four categories on the radioactivity map which are designed to separate the different methods of acquiring the geophysical and geologic data. There are also two sets of data points.

Category1 means that elevated radioactivity was measured in all or parts of these areas via ground-based geophysical or geological studies. In other words, elevated radioactivity was measured on the ground surface by geologists conducting surveys with Geiger Counters in all or parts of these areas. Ground-based surveys where direct measurements of elevated radioactivity are taken are considered to be the most reliable data. Rock samples were taken from some of these areas and were geochemically analyzed and found to have elevated amounts of uranium and thorium. Groundwater wells in some of these areas were found to have elevated radioactivity.

Category 2 means that elevated radioactivity was measured indirectly in these areas via airborne or stream sediment surveys and was not measured directly via ground-based surveys. Airborne radioactivity surveys are conducted by airplanes flying at a relatively constant altitude and speed above the earth's surface towing a Geiger Counter. Because of the altitude and speed of the airplane, the areas of elevated radioactivity (anomalies) determined from the air may be larger than the source of the radioactive anomaly on the ground.

Stream sediment survey teams were responsible for sampling sediments in streams over large areas. The sediments were geochemically analyzed to determine the amounts of uranium and thorium present. Areas where the uranium and thorium content of the stream sediments was significantly elevated relative to the surrounding areas were outlined as anomalies. Because these sediments may be transported significant distances along the stream valley away from their source, the current location of the anomalies may not reflect the radioactivity of the areas where they were found.

Since the areas of elevated radioactivity shown as Category 2 have not, to our knowledge, been checked via ground-based geological or geophysical surveys, we have distinguished these areas from Category 1 areas and consider them to be less reliable than Category 1.

Category 3 means that elevated radioactivity was not measured in these areas other than in elevated public water supply wells and uranium occurrences. Category 3 also includes the unsurveyed areas between flight lines.

Category 4- No Data means that no known geological/geophysical radioactivity survey data exists for this area.

Data Points

Public water supply wells with unadjusted gross alpha greater than or equal to 15 picocuries/liter* are shown as brown crosses. *Prior to January 2002, 15 picocuries/liter was the EPA level that triggered further testing.

Uranium occurrences are sites where uranium was found during ground-based surveys for the NURE program or sites where uranium was listed as the commodity of interest in the Mineral Resource Data System (MRDS) of the U.S. Geological Survey; these occurrences are shown as blue crossed circles.

5. If I live within Category 1 or 2 areas, does it mean that I will have elevated radioactivity in my drinking water?

Because many wells with elevated radioactivity in the Milton and Colchester area correlate with airborne and ground-based radioactivity anomalies, there is reason to believe that this correlation may be a valid for other areas of Vermont as well. The only way to know for sure if one has a radioactivity problem is to test. Even in areas where there are numerous wells with elevated radioactivity, the problem wells are scattered over a large area. In addition, there are cases where a particular well has a radioactivity problem and the neighboring well does not.

6. If I live in a Category 3 area, should I be worried about radioactivity in my well water?

Category 3 includes areas where elevated radioactivity was not been reported as well as unsurveyed areas between flight lines. There are public water supply wells with elevated radioactivity in category 3 areas as well as uranium occurrences. People in Category 3 areas should also consider testing their water.

7. What does the map show?

The map is a compilation of areas where ground-based and airborne geophysical and geological surveys have indicated the presence of elevated radioactivity relative to surrounding areas. Public water supplies with elevated radioactivity and uranium occurrences are also shown. Since elevated radioactivity areas determined via these surveys in the Milton and Colchester area coincide with many of the locations of groundwater wells with radioactivity problems, we decided to show the statewide distribution of elevated radioactivity areas.

Although the Vermont Department of Health recommends that **all** private well owners test their wells routinely for radioactivity, the map can provide some guidance to people who are uncertain whether or not to test.