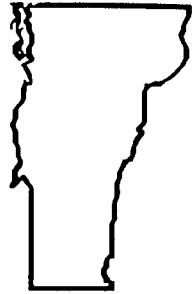


THE GREEN MOUNTAIN GEOLOGIST



QUARTERLY NEWSLETTER OF THE VERMONT GEOLOGICAL SOCIETY

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The Vermont Geological Society
Spring Meeting
for the
Presentation of Student Papers

SATURDAY APRIL 23, 1993, 9 AM

Twilight Auditorium
MIDDLEBURY COLLEGE

Directions: The spring VGS student meeting will take place in Twilight Auditorium on the Middlebury College campus. Twilight Auditorium is housed in the old Grammar school, a three-story brick building located in the green between Franklin Street and College Street (downhill and east of the Science Center). Members may park in the parking lot behind the Science Center.

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PRESIDENT'S LETTER

1 April 1994

Dear Members,

Don't be **fooled** in spite of the date!! The Vermont Geological Society does need you!

Although, many VGS members have served through the years and made our Society much stronger than those organizations where few do the work of many, we can do even better! Your perspectives and talents are VGS's lifeblood but only when you volunteer them.

Your executive committee is currently revising the VGS Constitution and Bylaws to be voted on at this fall's annual meeting. Your input regarding revisions is needed. The nominating committee is seeking VGS members willing to serve as officers, directors and permanent committee chairpersons for next year. Let the committee know you'd like to be a nominee. Stephen Wright is looking for guest editors for future *GMGs*. Give him a call. Kent Koptiuch is the guest editor for the summer *GMG* which will be devoted to groundwater issues. Tell Kent if you've something to contribute. The executive committee will be reviewing proposals in May that were submitted for VGS Research Grant Program funding. If you'd like to be a reviewer let us know. The Society needs leaders for future field trips as well.

The VGS spring meeting will be held on 23 April 1994 at Middlebury College. We had originally planned on holding the meeting at UVM, but the UVM campus and all meeting rooms were booked for a campus-wide event on that day. Students will present their research results and three VGS members are needed to serve as judges to determine the winners of the VGS best presentations awards. I've been a judge twice and was very impressed with the quality of the student research and their professional presentations. Plan to attend and support the students. They deserve our recognition.

As you can see there's no shortage of VGS functions to which you can apply your talents. It's simply a matter of making a commitment to do so. What's holding you back?

Sincerely,

Larry Gatto

SPRING MEETING PROGRAM

Twilight Auditorium, Middlebury College
April 23, 1994

8:30 Coffee/Doughnuts

9:00 Yana L. Minnis: *Field Relationships and Structural Analysis of an Ultramafic Belt near Westfield, Vermont*

9:15 Adam Schoonmaker: *The Brome Thrust in Northern Vermont*

9:30 Matthew J. Evans: *Geochemistry of Metadiabase Dikes and Metavolcanic Rocks from North-Central Vermont*

9:45 Laura M. Kretschmar: *Miocene Volcanism in Southwestern British Columbia: Geochemistry and Tectonic Implications*

10:00 Matthew K. Bingham: *Flood History Since 1800 in Relation to Late Holocene Climate Change and Stream Incision, Yellowstone National Park*

10:15 Peter M. O'Hara: *Morphometric Analysis of Flood and Erosion Potential of Drainage Basins in Northeastern Yellowstone National Park*

10:30 David Bryan: *A Geomorphic Approach to Maximum Discharge Estimation, New Haven River, Vermont*

10:45 Coffee Break

11:00 Kelly A. Kryc: *Surface Characterization of the Northern Bjorn and Gardar Sediment Drifts, North Atlantic*

11:15 Russell A. Schuck: *A Study of Metals in Arrowhead Mountain Lake, Milton, Vermont*

11:30 Scott D. Thompson: *The Effects of the Internal Seiche in Lake Champlain on a Shallow Basin*

(Continued Next Page)

- 11:45 Kenneth Mansfield:** *Geologic and Economic Analysis of Beach Erosion near Barnegat Inlet, New Jersey*
- 12:00 Michael B. Sayre:** *A Correlation of Glacial Sediment Stratigraphy and Groundwater Availability on Block Island, Rhode Island*
- 12:30 Eugene Lee:** *Radon Potential in the Middlebury and East Middlebury Area, Addison County, Vermont*
- 12:45 Timothy Loescher:** *The Relationship between Soil Radon Concentrations and Surficial Sediment Characteristics in Middlebury and East Middlebury, Vermont*
- 1:00 Lunch:** *Lunch is available at several restaurants within walking distance of the meeting.*
- 1:30 VGS Executive Committee Meeting:** *All members are invited to attend!*

SPRING MEETING ABSTRACTS

FLOOD HISTORY SINCE 1800 IN RELATION TO LATE HOLOCENE CLIMATE CHANGE AND STREAM INCISION, YELLOWSTONE NATIONAL PARK

Bingham, Matthew K., Department of Geology, Middlebury College, Middlebury, VT 05753

Soda Butte Creek, a tributary of the Lamar and Yellowstone Rivers in the northeast corner of Yellowstone National Park, WY-MT, exhibits high gravelly flood bars which are especially prominent in Round Prairie below the narrow constriction of Icebox Canyon. Three locally distinct levels of these bars are populated by apparent even-age stands of conifers, primarily lodgepole pine (*Pinus contorta*), suggesting colonization of bars subsequent to deposition. Dendrochronological analysis of 180 trees within these stands was used to approximately date the deposition of the flood bars. Trees on the highest set of bars are up to about 110 yrs old, suggesting a large flood in the late 1800s (prior to instrumental discharge records). Indirect discharge estimates imply a flow of approximately 10,000 cfs ($283 \text{ m}^3/\text{s}$) for the associated flood. This discharge is almost an order of magnitude greater than the 100-yr flood estimated using discharge/basin-area relations derived from gage records for the northern Yellowstone region; it approaches the maximum recorded flood for a basin of this size in the same region. The middle set of bars supports trees no older than about 59 yrs; discharge estimates are about 8,000 cfs ($227 \text{ m}^3/\text{s}$). Narrative accounts exist of a probable associated flood on the Lamar River in June 1918. These accounts are corroborated by the highest recorded discharges on the Yellowstone River just north of the park. A smaller flood was produced on Soda Butte Creek by a mine tailings dam break at Cooke City in 1950; trees on associated flood bars are up to about 35 yr old and discharge reconstruction suggests a flow of about 4,000 cfs ($113 \text{ m}^3/\text{s}$). Lower Soda Butte Creek displays a well-developed set of Holocene fill-cut terraces. ^{14}C ages show that overbank sedimentation on the lowest of these terraces (T4) began ca. 1200 AD. Tree-ring data suggest that this floodplain level became inactive by ca. 1850, thus T4 terrace activity approximately corresponds to the Little Ice Age. A trend toward warmer and drier conditions (largely due to reduced winter precipitation) since 1880 is evident in instrumental climate records in Yellowstone. Most large floods in this region are produced by heavy rain-on-snow events during snowmelt. Major floods, downcutting, and channel instability characterize fluvial activity at the end of the Little Ice Age in this area.

A GEOMORPHIC APPROACH TO MAXIMUM DISCHARGE ESTIMATION, NEW HAVEN RIVER, VERMONT

Bryan, David, Department of Geology, Middlebury College, Middlebury, Vt. 05753

Until recently, no consistent discharge records were kept of the New Haven River, which is located in central Vermont and flows west out of the Green Mountains. Previous discharge estimation was made by regional flood frequency analysis. This study used geomorphic features to indirectly estimate maximum discharges of large floods at study sites located above the confluence of the New Haven with the Muddy River Branch and at the Route 7 bridge. The physical features which were used to estimate maximum discharge are stepped flood plain surfaces and channel cross sections. The flood plain surfaces are similar to low terraces, but lack of soil development indicates a young age. A laser theodolite was used to survey flood plain slopes and channel profiles relative to present stream levels. Slope estimations from a flood insurance study were used because field estimates of flood plain slope proved to be inaccurate. The simplified slope area method estimated the maximum discharge to be 28,000 ft³/s at the first site and 32,000 ft³/s at the second site with an estimated error of ±30%. The relationship of maximum recorded flood discharge to drainage area for ten rivers in Vermont yielded a comparison for the Route 7 site estimate. The two greatest discharges for the ten rivers, in respect to drainage size occurred in 1927 and were close to 180 ft³/s/mi². The relation for the New Haven is higher, 280 ft³/s/mi², again with a possible error of ±30%. Results from this study suggest that recent large floods have had substantial impact on the geomorphology of the New Haven Valley.

GEOCHEMISTRY OF METADIABASIC DIKES AND METAVOLCANIC ROCKS FROM NORTH-CENTRAL VERMONT

Evans, Matthew J., Department of Geology, Middlebury College, Middlebury, VT 05753

Metamorphosed diabasic dikes and volcanic rocks from the Westfield area and metavolcanic rocks from the Newport Center area were sampled and geochemically analyzed.

The Westfield area rocks are primarily chlorite- and epidote-rich greenstones which display a prominent fabric. They are found in the Ottaquechee/Stowe formations. The diabasic dikes are feldspar-rich and are associated with dull green-gray phyllite. The metavolcanics near Newport Center are part of the Bolton Mountain volcanic complex in the Moretown Member of the Missisquoi Formation. They are slightly metamorphosed but retain some igneous structure, including pillows.

This research show both sets of rocks have TiO₂ levels from 0.96 to 1.64 weight percent, Y concentrations from 22 to 44 ppm, and Zr concentrations from 96 to 167 ppm. The rocks are classified as tholeiitic basalts and both the Westfield and Bolton Mountain samples clearly display a MORB (mid-ocean ridge basalt) signature when plotted on tectonic discriminant diagrams such as

Y-Cr and Ti-Zr-Y. These findings concur with previous geochemical work on metavolcanics and diabasic dikes in the Stowe and Ottaquechee formations but are in contrast to earlier theories for the Bolton Mountain Volcanics which had been interpreted as an island-arc terrane. Current research shows that both the Westfield and Bolton Mountain rocks probably formed as either late-stage rift or early ocean floor basalts which were tectonically emplaced during the closing of the proto-Atlantic ocean.

MIOCENE VOLCANISM IN SOUTHWESTERN BRITISH COLUMBIA: GEOCHEMISTRY AND TECTONIC IMPLICATIONS

Kretschmar, Laura M., Dept. of Geology, Middlebury College, Middlebury, VT 05753

Mount Noel and Chipmunk Mountain are two Miocene volcanic complexes located in the Coast Mountains of southwestern British Columbia, 120 km northeast of Vancouver. Stratigraphy, K/Ar age dates, petrography, and geochemistry show that the volcanics of Mount Noel are in close association with the Neogene Chilcotin Group Basalts, while the volcanics of Chipmunk Mountain are in close association with the Oligocene-Miocene Pemberton Volcanic Belt.

The volcanics of Mount Noel crop out in three 1-3 km² areas and consist of flat-lying, columnar jointed, olivine-bearing basalt flows interlayered with volcanoclastic debris flows. Major and trace element analyses on thirty-eight samples indicate that the Mount Noel rocks are predominantly tholeiitic basalts and basaltic andesites. The Mount Noel analyses plot directly in the within-plate tectonic environment of the Zr-Zr/Y diagram and plot transitionally between the within-plate and mid-ocean ridge tectonic environments of the Zr/Ti diagram. The geochemistry of the Mount Noel volcanics is similar to the Chilcotin Group Basalts. Spatially the Mount Noel volcanics lie in the range of the Chilcotin Group Basalts, and, at 19.8 Ma (Mathews, 1988), they probably represent early stages of Neogene Chilcotin volcanism.

The volcanics of Chipmunk Mountain, 15 km south of Mount Noel, crop out in a 12 km² area and consist of undifferentiated pyroclastics, sills, and dykes. Major and trace element analyses on twenty-six samples show that the rocks range from basalts to rhyolites, with the majority classifying as basaltic andesites and andesites. The trend of the whole-rock analyses on the FAM diagram and SiO₂ vs. K₂O is clearly calc-alkaline. On the MgO-Al₂O₃-FeO tectonic discriminant diagram, the Chipmunk Mountain analyses plot transitionally between the fields of orogenic and spreading island volcanics. The geochemistry of the Chipmunk Mountain rocks appear to be closely related to the calc-alkaline volcanic centers of the Pemberton Volcanic Belt. Spatially and temporally, at 26.8 ± 1.4 Ma, the Chipmunk Mountain volcanics further correlate with the Pemberton Volcanic Belt.

The two volcanic complexes of this study represent two different episodes of Miocene volcanism in southwestern British Columbia. The Mount Noel volcanics and the Chilcotin Group Basalts appear to have erupted in a back-arc tectonic setting due to asthenosphere upwelling associated with the subduction

of the Juan de Fuca Plate beneath the North American Plate while the Chipmunk Mountain volcanics appear to have erupted in an arc also associated with subduction of the Juan de Fuca Plate.

SURFACE CHARACTERIZATION OF THE NORTHERN BJORN AND GARDAR SEDIMENT DRIFTS, NORTH ATLANTIC

Kryc, Kelly A., Department of Geology, Middlebury College, Middlebury, VT 05753

The northern reaches of the Bjorn and Gardar sediment drifts, south of Iceland and east of the Rekjanes Ridge, have a complex history of sedimentary influences. Data collected during June 1993 aboard the *R/V Maurice Ewing* included 3.5 kHz seismic profiles and piston and gravity cores. To determine the surficial sedimentary processes in this area, echo-character mapping of 3.5 kHz seismic profiles was done. To elucidate the exact nature of the acoustic reflectors seen in the 3.5 kHz profiles, cores taken from the survey area were analyzed for compressional velocity and density. From these parameters, synthetic seismograms were generated and the results compared to the 3.5 kHz profiles.

The surface echo-character map consists of four distinct echo types. The nature of these echoes include prolonged echoes, continuous echoes with multiple sub-bottom reflectors, discontinuous echoes with multiple sub-bottom reflectors, and acoustically transparent returns. The main portions of the Bjorn and Gardar sediment drifts are represented by continuous echoes with multiple sub-bottoms showing that they are formed from contourite currents. Morphologically, a "drift valley" separates the two drifts. Acoustically it is represented by discontinuous echoes with multiple sub-bottoms. This valley underlies the bottom current having the highest velocity, causing the deposited sediment to be modified by scour. Also, within this valley there is evidence of large deposits of sand which indicate that this region is subjected to large mass wasting events. Additionally, certain sections of both drifts have been faulted.

The correlation of the synthetic seismograms with the echo-character map and bathymetry of the survey site provides an accurate analysis of the sedimentary processes occurring on these sediment drifts for the most recent past. The surface characterization has shown that the sedimentary evolution of the northern regions of these drifts, though predominantly contourite controlled, has been modified and in some instances controlled by tectonism and mass wasting events. This is probably due to the proximity to the voluminous source of sediments on Iceland and to the Rekjanes Ridge.

RADON POTENTIAL IN THE MIDDLEBURY AND EAST MIDDLEBURY AREA, ADDISON COUNTY, VERMONT

Lee, Eugene, Department of Geology, Middlebury College, Middlebury, VT 05753

Radon is a potential leading cause of lung cancer. Average outdoor levels of radon are low enough (about 0.2 pCi/l), due to dilution by the atmosphere, that they do not threaten human health. It is only when radon levels accumulate and build up indoors that they become dangerous. The U.S. EPA's action-level for radon mitigation of a home is 4 pCi/l. Utilizing E-PERMs (Electret-Passive Environmental Radon Monitors), soil radon levels in six different surficial materials in the Middlebury and East Middlebury area in Addison County, Vermont, were obtained for periods of two, four, and eight days. Radon levels in houses built upon the six surficial materials were also obtained with E-PERMs for periods ranging from six to thirty days. Initial results show that the silt and the stream alluvium sites have low average soil and indoor radon levels with the average indoor levels registering 1.55 pCi/l and 0.5 pCi/l respectively on the short-term E-PERMs. Results from the long-term E-PERMs are still pending at the time of writing. The lacustrine sands and gravels of site 5 had high average soil and indoor radon levels with an average indoor level of 8.95 pCi/l. At each of the other three surficial material sites, indoor and outdoor radon levels did not agree in relative magnitude. Variations in indoor radon levels are difficult to explain solely by geological factors like soil porosity, permeability, and moisture content. Anthropogenic factors such as house design and freedom of air circulation in a house due to open or shut windows can strongly affect indoor radon levels and may account for observed relative differences between soil and indoor radon measurements.

THE RELATIONSHIP BETWEEN SOIL RADON CONCENTRATIONS AND SURFICIAL SEDIMENT CHARACTERISTICS IN MIDDLEBURY AND EAST MIDDLEBURY, VERMONT

Loescher, Timothy, Department of Geology, Middlebury College, Middlebury, VT 05753

The purpose of this research is to evaluate the reliability of surficial geologic characteristics as indicators of soil radon potential. Six surficial geologic environments common in the Middlebury/East Middlebury area were defined comprising a range of sediment type, texture, permeability, porosity, and moisture content. These include lacustrine clay, lacustrine silt, two deltaic sand and gravel units (Lake Vermont sediments), sandy glacial till, and sandy postglacial stream alluvium. Soil radon concentrations were measured in the surficial sediments for intervals of 2, 4, and 8 days at a depth of 18-19 inches. The highest soil radon levels were measured in the two sand and gravel units; the average levels were 201 and 241 pCi/liter-days. The glacial till and stream alluvium had low results with averages of 37 and 59 pCi/liter-days, respectively. The average soil radon level measured in the clay was 130 pCi/liter-days, whereas in the silt it was 55 pCi/liter-days. An anomalous radon level of 302 pCi/liter-days measured in the silt over the 4-day interval was omitted from the

calculated average. Moisture content levels in the surficial sediments varied, but the percentages measured in each of the finer-grained clays, silts, and alluvium were near field capacity. The highly porous and permeable sands and gravels contained lower moisture content than both the relatively impermeable clays and silts, and the moderately drained till and alluvium. The high moisture content and low permeability of the clays and silts contributed to a prediction of relatively low soil radon concentration. The average levels measured much higher than predicted, particularly in the clay; however, average soil radon levels declined substantially from the 2-day to the 8-day measurements. The inevitable soil disruption that occurs when radon detection devices are buried in the ground may release large amounts of previously immobile radon gas when the clay is disturbed. This results in initially high soil radon readings, but lower average flux rates over the longer time intervals. These results indicate that surficial geologic characteristics may be useful in predicting soil radon concentrations.

GEOLOGIC AND ECONOMIC ANALYSIS OF BEACH EROSION NEAR BARNEGAT INLET, NEW JERSEY

Mansfield, Kenneth, Department of Geology, Middlebury College, Middlebury, VT 05753

Barnegat inlet is one of five inlets on the New Jersey coastline stabilized through the use of jetties. The inlet was first stabilized in 1939–1940 by the construction of two converging stone jetties. In the 100 years prior to stabilization, the inlet migrated 1.6 km to the south, as a result of the net southerly longshore drift in the area. The inlet's behavior remained highly unpredictable, however, and in 1991 a new jetty was added to create a "subparallel" configuration. Littoral drift was prevented from entering the intra-jetty area, creating a more efficient inlet bypass system. In response to the new inlet dynamics, a large ebb tidal delta formed just seaward of the inlet. The ebb tidal delta created a local longshore current reversal, which is presently causing massive beach erosion south of Barnegat inlet. After analyzing all of the available options, it is recommended that an artificial reef is put into place off of those beaches experiencing erosion. Simultaneous beach replenishment could be used if rapid beach recovery is desired. Finally, a long term plan of beach management is proposed in which an end to coastal development, along with gradual retreat from the shoreline is urged.

FIELD RELATIONSHIPS AND STRUCTURAL ANALYSIS OF AN ULTRAMAFIC BELT NEAR WESTFIELD, VT.

Minnis, Yana L., Department of Geology, Middlebury College, Middlebury, VT 05753.

Field data collected in northern Vermont provides insight into the tectonic relationship of the rocks in this area. Mapping was done at a scale of 1:10,000 over a 4 square mile area near Westfield, Vermont. Rocks studied are located in an ultramafic belt, parts of which have been correlated with the Baie Verte-Brompton Line in Canada.

Lithologies mapped include a dark gray to black, rusty weathering, pyritiferous phyllite with associated greenstones; a dull, green-gray, homogeneous phyllite with associated metadiabasic dikes; a green-gray quartzose metasediment; and a white, micaceous sericitic schist. Serpentinite bodies have also been mapped and form ridges throughout the study area.

The rocks in this study area record at least two phases of deformation. The dominant foliation generally trends N20E to N40E and dips steeply to the east. Folding is recorded in many of the phyllites and can also be seen in map pattern. A second, less intense foliation cuts the dominant foliation between N40E and N60E and dips steeply to the north.

Data collected in the field supports current tectonic models of the Appalachian Mountain System applicable to this study area. One model proposed by previous workers suggests that the ultramafic rocks are fragments of oceanic crust thrust onto the continental margin of the North American continent as the proto-Atlantic Ocean closed during the Taconic Orogeny. The black phyllites can be correlated to the deep sea sediments of the North American continent, while the greenstones and metadiabasic dikes in this area are similar to other ocean crustal rocks found in northern Vermont.

MORPHOMETRIC ANALYSIS OF FLOOD AND EROSION POTENTIAL OF DRAINAGE BASINS IN NORTHEASTERN YELLOWSTONE NATIONAL PARK

O'Hara, Peter M., Department of Geology, Middlebury College, Middlebury, VT 05753

A recent controversy has revolved around the sources of turbidity in the Yellowstone River drainage. Drainage basins in the Soda Butte and Slough Creeks in northeastern Yellowstone National Park were analyzed using morphometric parameters to determine differences between drainage basins with incised alluvial fan channels and drainage basins with unincised fan channels. Drainage networks were constructed on USGS 7.5 minute topographic maps, and morphometric parameters such as drainage density (D), basin area (A), drainage frequency (F), and relief ratio (R_h) were determined. Soda Butte Creek has many incised fan channels, whereas Slough Creek had few prior to the 1988 fires. Mean values of relief ratio, drainage density, and drainage frequency are higher in Soda Butte Creek than Slough Creek ($\alpha = 0.01$). There is a relationship between the morphometric parameters and incised fan channels. For basins less than 10 km^2 , the formula $R_h = 0.34 A^{-0.38}$ was

obtained. This formula indicates the threshold value of R_h above which fan channels have a strong tendency to be incised. The formula $R_h = -0.11D + 1.25$ indicates the threshold relationship between drainage density and relief ratio. The greater the drainage density value, the lower the relief ratio value necessary for incised fan channels. These results suggest that intrinsic geomorphic differences are in large part responsible for fan erosion, thus higher suspended sediment loads in Soda Butte Creek.

A CORRELATION OF GLACIAL SEDIMENT STRATIGRAPHY AND GROUNDWATER AVAILABILITY ON BLOCK ISLAND, RHODE ISLAND

Sayre, Michael B., Departments of Geology and Geography, Middlebury College, Middlebury, VT, 05753.

Block Island, Rhode Island is located 10 miles south of the Rhode Island coast and 13 miles northeast of Montauk, NY. Over the past decade, increases in summer population have raised concerns about the future availability of fresh groundwater on the island. The U.S. Geological Survey initiated a study in 1988 to evaluate the hydrogeology and water resources of Block Island, however, water availability was assessed only on the basis of arbitrary elevation intervals such as above and below sea level. No correlation between geology and groundwater availability was made. The surficial geology of Block Island is dominated by late Pleistocene glacial deposits in which an upper and lower moraine zone have been identified. This research assessed whether the contact between the two moraine zones forms a significant hydrogeological boundary.

I employed a Geographic Information System (GIS) to construct a spatial data base of geologic and hydrologic parameters including well data, driller's logs, surficial geology maps, ground-penetrating radar data, and recent seismic data from the surrounding Block Island Sound. I used GIS to aid in classifying wells according to screening unit and water availability, to construct a model of the contact surface between moraine zones, and to investigate correlations between local geology and water availability. Although wells on Block Island have historically been drilled deeper to obtain greater yields, results indicate that water availability is not strongly dependent on screening depth. In addition, wells screened in each of three lithologic units (upper moraine zone stratified sediments, upper moraine zone diamict sediments, and lower moraine zone sediments) do not possess statistically different hydrologic or hydrogeologic characteristics. Results further suggest that siting priority for future well sites should favor shallow drilling depth to reduce energy and drilling costs, and to discourage salt water intrusion. GIS techniques as employed in this study should prove valuable to similar hydrologic studies across southern New England.

THE BROME THRUST IN NORTHERN VERMONT

Schoonmaker, Adam, Department of Geology, University of Vermont, Burlington, Vermont 05405

The Brome Thrust has been traced southward to the International Border by many workers in southern Québec and is regarded as a regional Taconian structure. Recent field observations indicate that the Brome Thrust extends into northern Vermont and may be genetically related to anomalous, along-strike, stratigraphic changes found in the Oak Hill Group west of the Green Mountain Axis. These along-strike variations, as well as the Brome Thrust may have been controlled by rift-related continental margin morphology.

Petrologic, stratigraphic, and outcrop evidence indicate that the Brome Thrust extends into northern Vermont and separates the Oak Hill Group into two distinct sequences that differ in intensity of tectonic deformation. The Oak Hill Group, west of the fault, is only slightly deformed, while lithologically equivalent stratigraphy to the east, is schistose and highly thinned. The Brome Thrust also marks a boundary for late metamorphic reactions associated with the fault-related deformation.

Structural and petrologic evidence indicates that the field area underwent 3 deformational events during Taconian evolution. Calc-alkaline volcanics of the Tibbit Hill formation and volcanic flows interbedded in the Pinnacle formation provide a reasonably accurate record of metamorphic changes that occurred during each of these 3 events. Structural relationships show that the Brome Thrust formed during the second of these events. This event reached chlorite-grade metamorphism, retrograding an earlier biotite- and hornblende-grade event and was only slightly retrograded later by muscovite growth during the third phase.

As the Brome Thrust continues southward into Vermont it appears to overturn from an initially west-dipping structure to one that dips steeply to the east. This characteristic may be responsible for along strike variations in stratigraphy, most notably the discontinuation of the massive belt of basal Tibbit Hill Formation south of the International Border.

A STUDY OF METALS IN ARROWHEAD MOUNTAIN LAKE, MILTON, VERMONT

Schuck, Russell A., Department of Geology, University of Vermont, Burlington, Vermont 05405

Arrowhead Mountain Lake, located in Milton, Vermont was formed when the Lamoille River was impounded in 1937. Analyses of surface sediment grab samples reveal high concentrations of arsenic and nickel. The concentrations of these metals exceed levels determined by NOAA to be toxic to biota (Long and Morgan, 1990). Determining the extent of metal contamination and its source is important for several reasons. A) Arrowhead Mountain Lake is actively used for drinking water and recreation and is home to a variety of wildlife. B) The Lamoille River carries water leaving Arrowhead Mountain Lake into Lake Champlain. Sediments near the mouth of the Lamoille in Malletts Bay, Lake

Champlain, show elevated concentrations of arsenic and nickel. C) By determining the source, measures may be taken to stop or decrease their input into Arrowhead Mountain Lake, as well as to Lake Champlain.

The goal of this project is to assess the extent of and temporal distribution of arsenic and nickel in the sediments of Arrowhead Mountain Lake. Secondly, an attempt will be made to identify potential sources of these metals. Based on my compilation of data within the Lamoille Drainage Basin, I hypothesize that the arsenic and nickel are derived primarily from exposures of ultramafic rocks within the drainage. Secondly, it is possible that the loadings of these metals have increased over the last 100 years by mining of asbestos and talc from these rocks. To test this, I plan to evaluate the extent of contamination and changes in metal input over time. Specifically, I will compare metal distributions and their relationship to different sediment types in Arrowhead Mountain Lake with those of a pond adjacent to the mining operations. Changes in metal input in Arrowhead Mountain Lake will be compared with historical data such as opening or closing of mines.

Sediment cores have been obtained from two locations in Arrowhead Mountain Lake and cores will be obtained from the mining district in April of 1994. These cores will be sub-sampled and analyzed for trace metals, grain size, organic content, and particle morphology. Furthermore, the sediments in the cores will be dated by isotopic methods (^{137}Cs , ^{210}Pb) so that depth vs. time correlations can be made. The profiles produced should reveal present, historical and background (pre-industry) concentrations of the metals in the two lakes and indicate how levels have changed since man's intervention. Grain size and organic content will be determined in order to recognize any correlation between these parameters and metal concentration. Particle morphology will be determined with a scanning electron microprobe using energy dispersive X-ray analyses and may provide information associating the metals to specific particles derived from the ultramafic rocks.

THE EFFECTS OF THE INTERNAL SEICHE IN LAKE CHAMPLAIN ON A SHALLOW BASIN

Thompson, Scott D., Department of Geology, Middlebury College, Middlebury, Vermont.

A consecutive ten day survey in July 1993 sampled eighteen stations throughout Thompson's Point Bay and the adjoining lake. This was a cooperative study between the New York Department of Environmental Conservation, Vermont Agency of Natural Resources, and Middlebury College to document the variability of water chemistry and quality within a shallow bay caused by internal seiche activity. For each station a temperature profile, using a Seabird CTD sensor, and discreet water samples were taken. The water samples were analyzed for phosphorus and carbon levels as well as chlorophyll-a to determine water quality.

The data were analyzed using a Silicon Graphics 4D-25TG workstation. These 4-dimensional data sets were investigated both quantitatively and qualitatively using a 3-dimensional gridding and analysis software package

(EarthVision from Dynamic Graphics, Inc.). Qualitatively the ebb and flood of the bay due to the wind-forced internal seiche was apparent. Quantitatively it was possible to determine the volumes of water flowing in and out of the lake (approximately 17 million cubic meters above the 20 meter contour). Minimum bottom currents were determined to be about 1.5 cm/s. A change in net heat due to the seiche impact on the bay and its relationship to chlorophyll-a was also determined.

Taking into account the meteorological data and current speeds from an up-looking Acoustic Doppler current profiler over a longer time period, the magnitude of the seiche during the study can be compared to other cycles of the seiche. From this we can estimate the impact of the seiche on the bay under varying seiche conditions. In turn, by observing this shallow bay, we can theorize seiche impact on similar regions throughout the lake.

VERMONT GEOLOGICAL SOCIETY BUSINESS AND NEWS

New Members

We are pleased to welcome the following new member who has joined the Vermont Geological Society since the Winter *GMG* was published:

Brenda K. Bryan-Wood

Plano, TX

Treasurer's Report

The Society's finances are in excellent condition, in spite of the large drop in membership caused by the removal of members who have not paid their dues from the Society's rolls (discussed in more detail below). Income from dues continues to be supplemented by occasional sales of Volume 7 of *Vermont Geology*. Helped, in part, by the donations in excess of yearly dues made recently by several of our members, the Society has increased its commitment to the Student Research Grant Program by soliciting proposals to meet two deadlines, one in May and one in November, instead of a single May deadline, as was the case in the past. The Executive Committee, and from your comments, the vast majority of the Society's members, continues to believe that support of the Research Grant Program is one of our highest priorities.

As of April 11, 1994, the Society's membership stands at 125 members, a decrease of 68 members since my last report, two months ago. I have tabulated the results of the question concerning the level of VGS dues from the 99 dues statements returned to me with opinions and comments. A large majority of members, 86%, felt that the dues charged by the Society were appropriate. Four percent of our members felt that dues were too high, most often citing the difficulties of affording dues to a professional society while on fixed incomes. Ten percent of our members felt that dues were too low, suggesting that they could be raised as high as \$25.00 for members. A close examination of our membership database indicated that most of the members who did not renew their membership were no longer actively employed in New England or attending school in the area; many had been carried on our rolls for as long as five years through the goodwill of my predecessors! The Executive Committee agreed last year with my opinion that the Society had to run a tighter ship and that it was fiscally irresponsible to continue to mail the *Green Mountain Geologist* to members who had not paid their dues. Stringent controls on unnecessary expenses such as these will allow the Society to postpone an increase in dues for as long as possible, despite increasing postal costs. You will note as you read this issue of the *GMG* that the Executive Committee is not content with a shrinking membership base, however, and has begun an aggressive membership drive.

Finally, I would like to acknowledge the efforts of the rest of the Executive Committee. These individuals donate their time to running a very smooth ship,

often refusing to accept financial compensation for legitimate expenses. The spirit of volunteerism is, most definitely, alive!

Sincerely,

Stephen S. Howe

Executive Committee Minutes—February 26, 1994

The Executive Committee of the Vermont Geological Society was called to order at 1:30 p.m. on February 26, 1994 at the CRREL research facilities in Hanover, New Hampshire. Members present included Larry Gatto, Steve Howe, Stephen Wright, Shelley Snyder, Kent Koptiuch, and Nancy Keller.

Treasurer's Report: Steve Howe reported a current balance of \$3,654.31 in the VGS bank account and updated the status of the membership dues. VGS currently has 193 members on its mailing list. Of those, 104 members have paid their 1993 dues. Steve projected that the paid membership may reach 125. With this projection, VGS income per year should range between \$1,800 and \$2,000. This would mean that, after the expense for the *GMG*, there should be approximately \$700 to \$800 available per year for student research grants.

Brenda K. Bryan-Wood, a senior geologist with the Arkoma Basin Exploration Company in Rockwell, Texas, was accepted as a new member.

Membership Directory: Steve Howe will organize the directory once the dues statements are returned. The directory is expected to be ready by May or June 1994.

Reciprocal Agreements: Reciprocal agreements between the New Hampshire and Maine Geological Societies were briefly discussed. More information regarding these agreements will be forthcoming at the next executive committee meeting.

Guest Editors: Kent Koptiuch has volunteered to be the guest editor for the Summer 1994 issue of the *GMG* which will focus on environmental geology.

Permanent Committee Report(s): Education Committee Chair, Shelley Snyder, reported that she and Kent will update the teacher's hand-book for geologic information and have it ready for release by October 1994. VGS would like to distribute this and other related information at the Vermont Education Association's convention, October 19–21, 1994.

Public Issues Committee Chair Vacancy: Tabled until next executive committee meeting.

Nominating Committee: Larry Gatto reported that he has contacted a list of potential nominating committee members. Since a full committee is not yet established, it was agreed to publish a request for nominations of VGS officers in the GMG. In the meantime, Larry and Shelley Snyder have agreed to continue to work on recruiting membership for this committee.

VGS Posters: Larry shared the poster designs for advertising the VGS Research Grant Program and for encouraging membership in VGS. Revisions will be shared at the next executive meeting before final printing. It was agreed to set a budget of \$120.00 for this project.

VGS Research Grant: Deadlines for the 1994 VGS Research Grants were discussed. It was decided that there will be two award periods per year. Proposals would be due on May 15 and then again on November 15, thus accommodating those students whose projects are planned in the Fall and Spring Semesters.

Summer and Fall Field Trips: The upcoming Summer and Fall field trips were discussed. The committee agreed to ask Lucy Harding to lead the Summer field trip to Crown Point, New York and to ask Gregory and Nancy McHone to lead the Fall field trip to the Rutland area. Tentative dates of July 9 and September 25 were chosen.

By-laws Changes: Shelley Snyder and Steve Howe have agreed to do the initial modifications of the by-laws. These revisions will be reviewed at the next executive committee meeting. Changes to the by-laws would then be published in the Summer GMG and voted by the VGS membership during the Fall meeting.

Spring Meeting: The 1994 Spring Meeting was discussed. It will be held on April 23 at the University of Vermont in Burlington, Vermont and will feature student research presentations. Morning refreshments will be provided by the Society.

Next Meeting: The Executive Committee will hold a luncheon meeting on April 23, 1994 at the University of Vermont.

Meeting adjourned at 3:33 p.m.

Respectfully submitted,

Nancy Keller, Secretary

SEMINARS, MEETINGS, and FIELD TRIPS

April 18: **University of Vermont Fall Seminar Series** (4 P.M.):
"Risk Assessment: Using earth sciences for safety decisions" Dr.
Richard Bernknopf, U.S. Geological Survey.

April 23: **Vermont Geological Society Spring Meeting: Student
Papers**, Middlebury College, see this issue of the *GMG* for details.

July 9: **Vermont Geological Society Summer Field Trip:**
*Depositional Environments in the Mid-Ordovician Section at
Crown Point, New York*, Field Trip Leader: Lucy Harding.

September 24: **Vermont Geological Society Fall Field Trip:**
Cretaceous Intrusions in the Rutland Area, Field Trip Leaders:
Greg and Nancy McHone.

October 7-9: **New York State Geological Association Annual
Meeting.** *Geology of the Rochester Area of New York; Fairchild's
Genesee Valley Geology Revisited;* For details send a postcard with
name and address to Dr. Carlton E. Brett; Dept. of Earth and
Environmental Sciences; Univ. Rochester; Rochester, NY 14627.

THE GREEN MOUNTAIN GEOLOGIST
VERMONT GEOLOGICAL SOCIETY
DEPARTMENT OF GEOLOGY
UNIVERSITY OF VERMONT
BURLINGTON, VERMONT 05405-0122

The *GREEN MOUNTAIN GEOLOGIST* is published quarterly by the Vermont Geological Society, a non-profit educational corporation.

Executive Committee

- | | | |
|----------------|------------------|-------------------|
| President | Larry Gatto | 603-646-4273 |
| Vice President | Kent Koptiuch | 878-1620 |
| Secretary | Nancy Keller | 524-0226 |
| Treasurer | Stephen Howe | 656-0388 |
| Board | Lucy Harding '95 | 388-3711 ext 5444 |
| of | Helen Mango '95 | 468-5611 ext 478 |
| Directors | Ron Parker '94 | 860-6065 |

- | | |
|--|----------------------|
| Geological Education Committee Chair | Shelley Snyder |
| Advancement of Science Committee Chair | Rolfe Stanley |
| Public Issues Committee Chair | |
| Publications/Editorial Committee Chair | Stephen Wright |
| | 656-4479 or 644-5031 |

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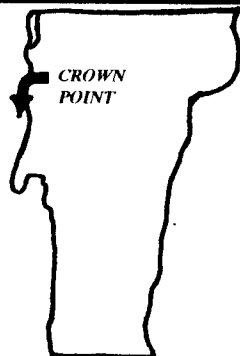


Charles A. Ratté
 4 Chestnut Hill Rd.
 Montpelier, VT 05602



THE

GREEN
MOUNTAIN
GEOLOGIST



QUARTERLY NEWSLETTER OF THE VERMONT
GEOLOGICAL SOCIETY

SUMMER 1994

VOLUME 21

NUMBER 2

*The Vermont Geological Society
Summer Meeting and Field Trip:*
**DEPOSITIONAL ENVIRONMENTS
in the MID-ORDOVICIAN SECTION
at CROWN POINT, New York**
SATURDAY JULY 9, 1994, 9:30 AM
See Inside For Details.

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PRESIDENT'S LETTER

June 1, 1994

Dear Members:

I realized after our Spring Meeting on April 23, that **1994 is our 20th anniversary year**. The Society officially came into being on February 23, 1974 at the Tavern Motor Inn in Montpelier. Happy Birthday to us!! I find it a very happy birthday because our society is so healthy and vibrant.

On April 27, 1974, the VGS held its first regular meeting, which was also its first student presentations meeting. Fifteen student papers were presented and the Summer GMG following that meeting reported that "...everyone was impressed by the reports." The same is just as true today. All those attending at Middlebury College to hear the presentations at this year's Spring Meeting heard, and viewed, twelve excellent student presentations. Congratulations to all the student presenters! The VGS appreciates your efforts and wishes you good luck in your future endeavors.

Particular recognition goes to the winner of the Doll Award for the best undergraduate presentation, Matthew K. Bingham (Middlebury College). Matthew's presentation was also judged the best overall. Kenneth Mansfield (Middlebury College) earned the second place award, and Scott D. Thompson (Middlebury College) the third place.

*"1994 is our
20th anniversary
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1974 at the
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Inn in
Montpelier."*

The VGS Executive Committee continues to work on revising the VGS Constitution and Bylaws for a vote at this Fall's annual meeting. The Nominating Committee, Bruce Cox, Bill Norland, and Anne Volmer, is seeking VGS members willing to serve as officers, directors, and permanent committee chairpersons for next year. Call any one of them to volunteer. Stephen Wright welcomes members as guest editors for future GMGs, or if you'd like to lead a field trip, tell anyone on the Executive Committee. We also need a guest speaker for the Fall Banquet. Call Helen Mango at Castleton State College if you'd like to volunteer or if you have a good suggestion for a speaker.

The VGS Research Grant Program coordinators, Rolfe Stanley and Kent Koptiuch, are processing grant applications submitted in May. Their selections will have been made by the time this letter appears, but grant applications can be submitted again in November. If you'd like to help them in the evaluation process for the new applications, let them know.

Our continued health and vigor as a society depends on your involvement in VGS affairs. Commit to a bright future for the VGS. You won't regret it!

Sincerely,
Larry Gatto



GUEST EDITORIAL

This issue of the GMG revisits the theme of applied environmental geology in Vermont. The environmental consulting industry, particularly that segment targeting the investigation and remediation of hazardous waste sites, has undergone a dramatic growth and maturation cycle over the past twenty years. Geologists and hydrogeologists have often assumed leading roles in guiding the development of this industry.

As the American public has become educated to the needs of our Earth's environmental health, the regulatory mechanisms have been defined, and refined, to promote the sound management of our resources. On a national level, some of the more important of these mechanisms include:

- the **Clean Water Act** (CWA) amendments of 1972 and 1975,
- the **Safe Drinking Water Act** (SDWA) of 1974,
- the **Resource Conservation and Recovery Act** (RCRA) of 1976,
- the **Comprehensive Environmental Response, Compensation, and Liability Act** (CERCLA) of 1980,
- the **SDWA Amendments** of 1986,
- the **Superfund Amendments and Reauthorization Act** (SARA) of 1986, and
- the **RCRA Hazardous and Solid Waste Amendments** of 1984.

As general industry strives to comply with the requirements imposed by these, and other federal regulations, the market for knowledgeable professionals in the management of groundwater and surficial materials has expanded correspondingly. Because many commercial and industrial enterprises do not require a full-time staff of environmental experts, environmental consultants fill a vital service niche in an efficient and cost-effective manner while minimizing a customer's long-term investment in personnel and their associated benefits.

Perhaps due to our innate Yankee characteristic of clinging to individuality, and its associated freedoms, Vermont is fortunate to boast a proliferation of small to mid-sized environmental consulting firms that provide a wide variety of services to the state's varied industries. As a result, many geologists and hydrogeologists have become multidisciplinary scientists, while simultaneously becoming proficient business operators.

A bonus factor associated with this development is that we have finally gained recognition; the business community has come to realize that scientists have a place outside of government and multi-national corporate think-tanks. Hand in hand with this recognition lies the responsibility of professional accountability. As professional scientists, we have always lived in accord with a strict code of ethics. Unfortunately, the state legislature does not recognize geologists or hydrogeologists in the same way that engineers are recognized. This is an issue which often results in the need to hire a Professional Engineer just to put his stamp on a report. Furthermore, up until very recently, most of us could recognize almost any other practicing geologist or hydrogeologist in the state by name, if not by face. With the continuing expansion of our scientific community, however, there arises the need to establish a stan-

(Continued on page 4)

(Guest Editorial Continued from page 3)

dard of qualifications, experience, and testing that will place members of our profession on level equivalent to that of a Professional Engineer.

I am asking all members of the Vermont Geological Society to use the GMG as a sounding board for your viewpoints. Send your comments and ideas relative to this issue to me in care of our mailbox at UVM's Department of Geology. Jefferson Hoffer, CPG, is currently putting together an evaluation of testing and licensing requirements set forth by other states; we will present this information in the next issue of the GMG along with a summary of your viewpoints.

If the membership so desires, the VGS could become instrumental in making this an issue before the legislature. Remember, this is your organization. The VGS can be much more than an information forum; we can be both a sounding board and a tool to further strengthen the economic ties between our scientific community and Vermont's business community. Let me know what you think!

Sincerely,
Kent Koptiuch

"The VGS can be much more than an information forum; we can be both a sounding board and a tool to further strengthen the economic ties between our scientific community and Vermont's business community."

INDUSTRY & COMMUNITY NEWS

- The American Association for the Advancement of Science (AAAS) recently presented Nancy Bazilchuk, investigative reporter for the Burlington Free Press, with the **AAAS-Westinghouse Science Journalism Award** in the small newspaper category for an investigative series for her in-depth Pine Street Barge Canal series, "Superfund: The Road To Nowhere."
- The Montshire Museum of Science in Norwich is offering a graduate level course for elementary teachers and others interested in science education August 1 - 5, 9 am - 4 PM. **Teaching and Learning Inquiry Science** will use the museum as a laboratory for participants to develop and pilot their own activities. Participants will earn three graduate credits through Trinity College (Burlington, VT). Pre-registration is required; call Trinity at (802) 658-0337.
- The **Vermont Public Interest Research Education Fund** has received an EPA grant of \$50,000.00 to provide remedial oversight activities at the BFI-Rockingham Landfill Superfund site in Rockingham, Vermont.

(Continued on page 5)



(Industry & Community: Continued from page 4)

- The Vermont Department of Health (DOH) Radiological and Occupational Program is providing the Montshire Museum, and also the Fairbanks Museum of St. Johnsbury, with funding assistance through an EPA grant program, in conducting a **residential radon testing program**. The Montshire is distributing coupons for "free" radon samplers, with analysis included, to Girl Scout Troops as they visit the museum over the Summer. The Fairbanks will be instituting a similar program through local elementary schools in the Fall. The DOH instituted a similar initiative this past Spring by distributing coupons at the Vermont Home Show in Essex. The results are tabulated in the state data base by postal zip code.
- The Soil & Water Conservation Society (SWCS), in cooperation with the USDA Soil Conservation Service, will coordinate a series of public forums and events in coming months on natural resource issues to be addressed in the 1995 farm bill. **Agriculture and the Environment: Listening to the Grassroots** will give state & local level constituencies an opportunity to present their views on natural resource management issues. Burlington was chosen as one of 16 sites for public forums. Contact Max Schnepf, SWCS, 1-800-THE SOIL, ext. 14.
- The SWCS also has some great elementary level educational materials available at very reasonable prices. Their **Environmental Adventures** program includes some great lesson plans, and enjoyable reading for 8-12 year olds with an emphasis on resource management and conservation. Call 1-800-THE SOIL, ext. 19.
- In March, New Hampshire Congressmen Bill Zeliff and Bob Smith introduced a comprehensive **Superfund reform bill** that strives to eliminate retroactive liability. This is an effort to direct federal dollars towards hazardous waste cleanup and safeguarding public health, rather than towards litigation and bureaucratic overhead, as is currently the case. Opposition to passage of this bill is expected to be strong.
- Dupont's third place 1994 **Plunkett Student Award for Innovation with Teflon** went to a University of Michigan team working on coating the insides of drinking water intake pipes with a Teflon coating to eliminate zebra mussel infestations. This methodology could have important ramifications in Vermont as the zebra mussel continues to encroach on Lake Champlain via boat traffic from the Richelieu River and the Champlain Canal. Zebra mussels deplete dissolved oxygen levels in water bodies. They are also notorious as colonizers of water intake pipes causing severe flow reduction problems.
- The National Ground Water Association (NGWA) will be holding their annual **Focus Conference on Eastern Regional Groundwater Issues** at the Radisson in Burlington, October 3-5. The Focus Conference is a forum for the latest developments in applied hydrogeology and remedial technology. For information call the NGWA at 1-(800) 551-7379.

EPA SIDEBAR
**New EPA rules
require solid
waste landfills to
screen incoming
loads for PCB-
containing
materials and
hazardous
waste.**

STORM WATER PERMITTING UPDATE

(excerpted from Pollution Engineering, June, 1994, pp 64-66)

The EPA deadline to file a Notice of Intent (NOI) for the National Pollutant Discharge Elimination System (NPDES) permits for storm water discharges under the Clean Water Act (CWA) passed in October, 1993. As of February, however, no NOIs have been filed from source owners in Vermont. The EPA anticipates permitting approximately 500 individual facilities here in the state. Non-compliance with EPA permit requirements can subject violators to fines of up to \$25,000.00 per day. Many facility owners are not even aware of the requirement to file.

“As of February...no NOIs have been filed from source owners in Vermont...Non-compliance with EPA permit requirements can subject violators to fines of up to \$25,000.00 per day.”

Lean regulatory staffing in Vermont, and in most other states, appears to be a major contributor to non-compliance; public education regarding the program is practically non-existent. To address this issue, the EPA has prepared a draft guidance strategy for administering the program from a compliance monitoring and enforcement perspective. This strategy is expected to focus heavily on outreach and public awareness. In addition, regulators will begin to collect annual permitting fees, thereby increasing their resources to the enforcement program.

GUEST EDITOR'S NOTE:

Individual facilities discharging storm waters to ANY public waterbody or watercourse were required to have developed a Storm Water Pollution Prevention Plan (SW3P) by February 1, 1994. This plan is to be implemented by August 1, 1994. The SW3P must be prominently displayed in the work space, and be readily available for regulatory inspection. The SW3P must be reviewed annually, and updated as required to remain in compliance. There is no actual fee to obtain the permit, however, annual renewal is \$50.00.

MEMBER NEWS

- **Anne Volmer, Bill Norland, and Bruce Cox** have agreed to serve on this year's VGS Nominating Committee for 1995 Executive Committee officers. Thanks for volunteering!
- **Rolfe Stanley**, Advancement of Science Committee Chair, has offered to present a Winter meeting workshop on systems dynamics through hands-on implementation of the STELLA software program. More information will be made available at the annual Fall Meeting.
- VGS Research Grants have been awarded to **Lars C. Cherichetti**, UVM Graduate student for field expenses in preparation of *“The Development of the Quebec Reentrant by Both Upper Plate (Quebec) and Lower Plate (Vermont) Asymmetric Rifting as*

(Continued on page 7)

LEGISLATIVE UPDATE

- The Petroleum *Cleanup Fund* (PCF), administered by the Sites Management Section of the DEC's Hazardous Materials Management Division, has been given a new life. Originally due to sunset on June 30, 1994, the PCF has been extended another five years by the State Legislature and is awaiting Governor Dean's signature. PCF monies are used to fund remedial activities at leaking underground storage tank (LUST) sites for uninsured operators. The PCF is self-supporting through revenues accrued from underground storage tank registration and use fees.
- Legislators could not come to terms with proposed changes designed to simplify and reform the *ACT 250* permit review process.
- Vermont's *low-level radioactive wastes* will be shipped to a yet-to-be built disposal site in Texas. Vermont Yankee ratepayers will be footing the bulk of the \$27.5 million in costs. The decision will bring about the dismantling of the Low-level Radioactive Waste Authority and their million dollars per year budget. One of the Authority's final acts was to win a suit against Battelle Memorial Institute in Ohio for repayment of more than one million dollars spent to identify the Vermont Yankee site in Vernon as a wetland.
- Bennington will receive \$500,000 to help pay the legal bills associated with the *Town of Bennington Landfill Superfund Site*.



(Member News: Continued from page 6)

- Recorded by the Distribution and Facies in the Pinnacle Formation,"* and to: **Jonathan L. Goldberg**, also a UVM Graduate student, for thin-section expenses in preparation of "*Sequence Stratigraphy and Provenance of the Lower Cambrian, Lower Monkton Quartzite, Western Vermont.*" Both students will present their work at the VGS' Spring Meeting in 1995. **CONGRATULATIONS!**
- **Ronald W. Miller**, Hydrogeologist II, has been promoted to Regional Manager at Ground Water of Vermont in Burlington.
 - **Ronald L. Parker**, former Regional Manager and Hydrogeologist II for Ground Water of Vermont in Burlington, has recently gone out on his own to create Lone Rock Geoscience in Burlington.
 - **Kent S. Koptiuch**, former Northeast Operations Manager and Senior Geologist for Matrix Environmental Technologies Inc. of Essex Junction, has recently incorporated as KENT S. KOPTIUCH, Inc. Geo-Environmental Services (KSKGeoS) in Essex Junction. Koptiuch is a Certified Ground Water Professional through the Association of Ground Water Scientists and Engineers.

SEND US YOUR
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DEPOSITIONAL ENVIRONMENTS in the MID-ORDOVICIAN SECTION at CROWN POINT, NEW YORK

B. Baldwin & L.E. Harding

FIELD TRIP DESCRIPTION:

We will meet at the entrance to New York's Crown Point State Park, approximately ¼ mile west of the Champlain Bridge on New York Route 8. Our first stop will be in the rocks exposed just south of this intersection. The VGS Executive Committee will hold an informal meeting on-site after the field trip.

Members wishing to carpool from the UVM Geology Department should meet in the parking lot outside the Perkins Geology Building by 8:20 AM. If the group is large enough we can take a Geology Department van. Distance from Burlington is approximately 40 miles. All members are welcome to attend.

Equipment and Background Information: Bring a lunch and water. A Visitor's Information Center is located on the site and will be open. Absolutely no collecting or rock hammers are allowed in Crown Point State Historic Site. Its pristine condition is maintained because the many geologists who have visited the site over the years have honored this rule. It is useful to circle fossils in chalk for the aid of others.

Introduction: The Crown Point section, exposed at the Crown Point State Historic Site, is a wonderful place for using fossils, sedimentary textures and structures, and lithologies to interpret changing environments of deposition. Formations exposed in the 120 meter (400 feet) thick section include the *Crown Point*, *Valcour*, *Orwell*, and *Glens Falls Limestones*, deposited between about 458-444 million years ago on the eastern margin of North America. The rocks record the onset of continent-arc collision known as the *Taconic Orogeny*. The lower half of the section records deposition on a slowly subsiding, passive continental margin. The upper half records a swift transition to deeper water environments as the continental margin entered the subduction zone. At Crown Point these rocks comprise a homoclinal section dipping about 8 degrees to the west-northwest.

(Continued on page 9)

The full text, with figures, for this field excursion is found in Vermont Geology, Volume 7. The Vermont Geological Society, Burlington, Vermont, March, 1993, pp. 29-42.

Copies can be obtained by writing with your check or money order for \$8.00 (\$10.00 for non-members) to:

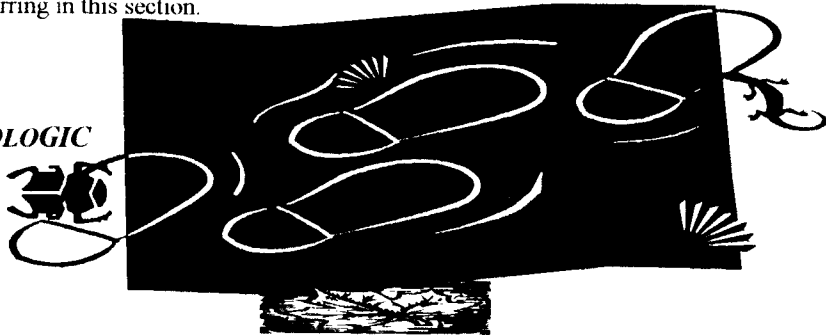
**Treasurer,
Vermont
Geological
Society
c/o Dept. of
Geology
UVM
Burlington,
Vermont 05405**

A limited number of copies will be available for sale at the meeting place

(Crown Point: Continued from page 8)

The Middlebury College geology department uses the Crown Point section as a field exercise for both first- and second-year geology students. Their field trip, as well as yours, consists of a walking tour beginning about 500 meters southeast of Fort Crown Point, heading towards and through the Fort, and then continuing west for about 200 meters along the Lake Champlain Shoreline. We will visit most of the lettered stations shown on the index and air photo maps (Figures 1 & 2). The lettered stations are also shown on the detailed columnar section (Figure 3) and the student columnar section (Figure 4). For historical purposes, Figure 3 also shows Raymond's (1902) sections B and C; he listed a large number of fossils from these sections. Appendix A (reprinted from Baldwin and Mehrtens, 1985) diagrams the fossils occurring in this section.

**THE GEOLOGIC
TRAIL**



**VERMONT GEOLOGICAL SOCIETY
BUSINESS AND NEWS**

New Members

We are pleased to welcome the following new members who have joined the VGS since the Spring GMG was published:

- **Edward Hasenhohr**, Fair Haven, Vermont, and
- **Kristen Underwood**, Underhill, Vermont.

Treasurer's Report

As of June 14, 1994, the Society's membership stands at 131 members. Our financial condition is excellent, and continued tight cost controls will ensure that it remains so for the foreseeable future. As I indicated in a previous report, I anticipate no increase in dues for 1995, despite rising postal costs.

I would like to congratulate **Lars Cherichetti** and **Jonathan Goldberg**, both of whom were awarded Student Research Grants. The Society remains committed to this important program and looks forward to new applications for the November 15th deadline.

The membership directory is nearing completion and should be in the hands of every VGS member in the next few weeks.

Respectfully submitted,

Stephen S. Howe

(Continued on page 10)

(VGS Business & News: Continued from page 9)

Executive Committee Minutes - April 23, 1994

The Executive Committee of the Vermont Geological Society was called to order at 1:25 PM on April 23, 1994 at the Twilight Auditorium, Middlebury College, Middlebury, Vermont. Members present included Larry Gatto, Kent Koptiuch, Steve Howe, Helen Mango, Ron Parker, Rolfe Stanley, Stephen Wright, and Ed Hasenohr. Stephen Wright volunteered to substitute as Secretary in Nancy Keller's absence.

Treasurer's Report: Steve Howe reported a balance of \$3,909.14 in the Society's account. Dues have been collected from 128 members and the mailing list appropriately reduced to 128. Two new applications for membership were approved: Kristen Underwood and Ed Hasenohr.

Membership Directory: Steve Howe has reviewed the membership information collected on the dues statements. 25% of members have an electronic mailing address (E-mail), and 43% have access to facsimile machines. Steve has compiled membership information in a spreadsheet program and will put together the membership directory in June. He envisions that the directory will be approximately 10 pages long. This will be a separate mailing to members as opposed to a centerfold in the Summer GMG.

Reciprocal Agreements: Stephen Wright confirmed with Jean Detenbeck that we currently have a reciprocal agreement with the Maine Geological Society. Stephen has yet to initiate contact with the New Hampshire Geological Society.

Summer Green Mountain Geologist: Stephen Wright suggested that the deadline for material to be included in the Summer GMG be the first week of June. Kent Koptiuch is the guest editor for the Summer GMG and he is trying to gather short articles focused on environmental geology. The Summer Field Trip will be led by Lucy Harding to Crown Point. The field trip guide for this trip was first published in Vermont Geology #7. Stephen will advertise this in the GMG, and Steve Howe will bring along copies to sell to members at the field trip.

Vermont Geology: Vermont Geology #8 will be a guide to field trips in the Stowe area. The executive committee suggested the Stephen publish these as separate field trips (e.g. Field Trip to the Lake Mansfield Area, and Field Trip to Smuggler's Notch) rather than wait until all of the field trips were prepared. Stephen concurred with this and suggested that the Lake Mansfield and Smuggler's Notch field trip guides could realistically be published this summer.

Fall Field Trip, Banquet, Annual Meeting, and Guest Speaker: Greg and Nancy McHone have agreed to lead a trip in the Rutland area to look at Cretaceous igneous intrusions on the 24th of September. Helen agreed to check out restaurants capable of hosting 20 to 30 people. Stephen noted that the executive committee needs to find a guest speaker.

Advancement of Science Committee: Rolfe briefly outlined some of the systems dynamics work he has been doing, and then offered to hold a hands-on workshop for the Society's members during the Winter Meeting in February. The executive committee accepted Rolfe's offer. Rolfe suggested that Middlebury College might be a place with the computers necessary for the workshop.

(Continued on page 11)

(VGS Business & News: Continued from page 10)

Nominating Committee: Larry announced that he had found three members willing to serve on the Nominating Committee: *Bruce Cox, William Norland, and Anne Volmer*. Open and potentially open Executive Committee positions were briefly reviewed. Kent has agreed to run for *President* next year. Larry, Helen, and Ron are all willing to serve on the *Board of Directors*. Stephen is willing to continue as *Editor*. Steve Howe will tentatively continue as *Treasurer*. The Nominating Committee will need to find candidates for *Vice-President, Secretary, and Public Issues Committee Chair*. Stephen suggested that Nancy Keller might be interested in running for VP, or continuing as Secretary.

Vermont Geological Society Research Grants: Steve Howe announced that the Society is financially able to fund two awards this year at a minimum \$400.00 level, and perhaps for more. There will be two deadlines for applications this year: May 15 and November 15. Steve has mailed applications to approximately 15 colleges and universities around Vermont. Rolfe and Kent will review applications and seek other qualified review as necessary. Rolfe and Kent hope to complete the review process and award checks within a few weeks of the deadlines.

The winners will be announced in the *Summer* and the *Winter GMG's*. Stephen suggested that more flexibility be given recipients of the Grants concerning when they present their results to the Society. He noted that most UVM graduate students will need two years from receipt of the award to finish their thesis and have significant results to present. Steve Howe disagreed and suggested that the one-year deadline be retained. No decision was reached.

Outside contributions to the VGS research fund will be solicited in the GMG. Steve Howe relayed Brad Jordan's suggestion that a check-off box for contributions be put on membership renewal forms.

Constitution and Bylaw Changes: Larry Gatto has made substantial revisions to the bylaws, mostly to improve their clarity and to bring them up to date. Steve Howe and Shelley Snyder will review these changes along with their own. Their proposed changes will be circulated among the members of the Executive Committee prior to publication of one revised version in the Summer GMG for membership review. Members will then have the opportunity to vote on the acceptance of the revisions during the Annual Meeting in the Fall.

Next Meeting: The Executive Committee will next meet for a short, informal gathering after the Crown Point field trip on Saturday, July 9.

Meeting adjourned at 2:45 PM.

Respectfully Submitted,

Stephen Wright, with minor additions by Stephen Howe

April 25, 1994

*Need to vent
some geo-
internal energy?
The VGS always
welcomes
member input
and assistance.*

SEMINARS, MEETINGS, and FIELD TRIPS

- **July 9, 1994:** Vermont Geological Society Summer Field Trip: "*Depositional Environments in the Mid-Ordovician Section at Crown Point, New York.*" Lucy Harding will lead.
- **August 12-13, w/field trip August 14-19, 1994:** *New Perspectives in the Appalachian-Caledonian Orogen: A Symposium in Honour of Hank Williams*, Corner Brook, Newfoundland, Canada. For information contact: J. Hibbard, MEAS, Box 8208, NCSU, Raleigh, NC27695. (919)515-7242, fax (919)515-7802. E-Mail: hibbard@meavax.nrrc.ncsu.edu.

At only \$15.00 per year the VGS offers one of the best bargains in Professional Association dues around. Do you know a "rock head" in your depositional environment who hasn't settled in? Let's get their mudcast today!

- **September 24, 1994:** Vermont Geological Society Fall Field Trip: "*Cretaceous Intrusions in the Rutland Area.*" Greg and Nancy McHone will lead.
- **September 24-25, 1994:** *Geomorphology and Natural Hazards*, 25th Annual Binghamton Geomorphology Symposium, Binghamton, NY. For details, contact Marie Morisawa, Dept. of Geological Sciences and Environmental Studies, SUNY Binghamton, NY 13902-6000. (607)777-2837, fax (607)777-2288, E-Mail: marieem@bingvmb.cc.binghamton.edu.
- **October 3-5, 1994:** *Focus Conference on Eastern Regional Groundwater Issues* at the Radisson in Burlington, VT. For information call the National Ground Water Association at 1-(800) 551-7379.
- **October 7-9, 1994:** New York State Geological Association Annual Meeting. "*Geology of the Rochester Area, New York; Fairchild's Genesee Valley Geology Revisited.*" For details, send a postcard with name and address to Dr. Carlton E. Brett, Department of

Earth & Environmental Sciences, University of Rochester, Rochester, NY 14627.

- **October 16-18, 1994:** *Ninth Annual Conference on Hydrogeology and Engineering Geology of Karst Terranes*, Nashville, Tennessee. For information contact: James F. Quinlan, Box 110539, Nashville, TN 37222. (615)833-4324.
- **October 17-20, 1994:** *Ninth Annual Conference on Contaminated Soils*, Amherst, Massachusetts. For details contact Paul Kostecki, Environmental Health & Sciences, N344 Morrill, University of Massachusetts, Amherst, MA 01003. (413)545-2934, fax (413)545-4692.
- **October 24-27, 1994:** Annual Meeting, *Geological Society of America*, Washington State Convention & Trade Center, Seattle Sheraton Hotel, Seattle, WA. For details call the GSA Meetings Department at 1-800-472-1988.
- **March 20-22, 1995:** Northeastern Section Meeting, *Geological Society of America*, Radisson Hotel, Hartford, CT. For details call the GSA Meetings Department at 1-800-472-1988.

(Continued on page 13)

DRINKING WATER UPDATE

K.S. Koptiuch

RADON WARS: There has been a lot of talk lately concerning radon in drinking water. The EPA has recently completed a cost-benefit analyses of the federal program designed to meet *Safe Drinking Water Act (SDWA)* standards for Radon. Their findings:

- EPA estimates that approximately 19 million people are routinely exposed to radon in drinking water at levels above the proposed SDWA standards.
- Total annual costs of regulating radon in water - \$2.72 Million Annually.
- Meeting SDWA standards would prevent 84 cancer deaths per year - cost per life saved - \$3.2 Million.
- Average increase in single-family municipal water costs: \$242.00 Annually.

By comparison, full compliance with the EPA's voluntary indoor-air radon reduction program would:

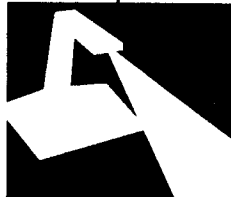
- Prevent up to 2,200 cancer deaths per year - cost per life saved - \$700,000.00.

15 million people are routinely exposed to radon in indoor-air at levels above the voluntary standards. (Source: *U.S. Water News, June, 1994*)

LEAD HEADS: The EPA's recent warning concerning submersible pumps containing brass or bronze components less than one year old has raised a major outcry among pump manufacturers and installers. The EPA issued their warning based solely on the limited results of two environmental groups, the Environmental Defense Fund, and the Natural Resources Defense Council. These groups are suing four prominent pump manufacturers with the claim that the brass and bronze components in their pumps leach lead into drinking water, during their first two years of operation, in excess of California State standards. The EPA has recommended that any well owners with pumps meeting this description have their water tested for lead content; in the interim, bottled drinking water should be employed. Pipes and pipe fittings, including pump components, may not contain more than 8% lead under a lead rule passed by Congress in 1986. Private wells are not, however, required to meet federal laws pertaining to lead components.

This is brash action on EPA's part compared to their normal "Let's study it for a few years and spend a few million tax dollars before we decide to do nothing (*author's opinion only*)."

(Continued on page 14)



(Seminars, Meetings & Field Trips: Continued from page 12)

- **April 2-5, 1995:** *Fifth Multidisciplinary Conference on Sinkholes and the Engineering and Environmental Impacts of Karst*, Gatlinburg, TN. Abstracts deadline: September 2, 1994. Contact P.E. LaMoreaux & Associates, Inc., Box 4412, Oak Ridge, TN 37831-4412.

(Drinking Water Update: Continued from page 13)

"... have sufficient data to determine how long the high lead leaching would continue, or how much lead would appear at the water tap (*Water Well Journal, June 1994*)."

The NGWA has stepped in with and offered to assist the EPA in determining whether these claims are substantive or not. Let us hope that level heads and sound science will prevail.

*Have you got
an article or
information
that you'd like
to see in the
Green
Mountain
Geologist?
We want to
hear from you!*

LOCAL LEAD: Closer to home we find the Champlain Water District (CWD) cautioning its customers to run their water approximately 20 seconds if they haven't used it for more than six hours. Although CWD water is not impacted by lead, the precaution was issued because the solder used in the pipeworks of many pre-1988 homes could contain lead. There is potential for leaching to occur when water sits in the pipes for prolonged periods.

HOW CLEAN WAS MY WATER? *June 13, 1994:* The EPA released proposed rules to protect public drinking water supplies from "disinfection by-products," with additional safeguards against disease-causing micro-organisms. As an initial step, the EPA has requested that potable water suppliers fund a joint, five-year research program on said disinfection by-products and micro-organisms at an estimated cost of \$50 million.

The use of chlorine, chloramine, chlorine dioxide, and ozone, the EPA purports, can create by-products that may cause liver and kidney damage, cancer, heart and neurological effects, and may affect unborn children. Full implementation of the proposed rules could cost billions of dollars annually if applied to all 80,000 public water supply systems in the country.

SALARY SURVEY: A recent survey, conducted by **Environmental Protection** magazine (April, 1994), listed average salaries for professionals in water management in the \$100,000.00 range for the Northeastern United States. GMC would like to know if this is a realistic figure. Was anyone in Vermont surveyed? Let us know.

EPA GRANTS totaling \$318,000 for 23 environmental education projects in the New England Region, conducted by schools, local governments, and not-for-profit corporations have recently been awarded. To receive announcements for the 1995 fiscal year grant program, contact:

**US EPA Environmental Education Div.,
(a-107),
401 M Street, SW**



THE INVESTIGATION EXPRESSWAY - A NEW ROAD FOR HAZARDOUS WASTE SITE INVESTIGATIONS

L. Wedderspoon

The State of Vermont, Department of Environmental Conservation, Hazardous Materials Management Division (HMMD), Sites Management Section (SMS), has recently introduced a new method of performing site investigations at hazardous waste sites. This new method has been termed "*The Site Investigation Expressway*." The Expressway is intended to significantly reduce the time it takes to evaluate hazardous waste sites. Since the majority of Vermont's hazardous waste sites result from leaking underground storage tanks (LUSTs), the Expressway focuses on these petroleum sites.

"One advantage of using the Expressway model for the site owner and the SMS is that an investigation in almost immediately once the site is identified."

In the past, the SMS has required that all site investigation work be pre-approved by the SMS prior to its initiation. Although this pre-approval process is an important step in ensuring that site investigation work meets all the requirements of the SMS, it typically causes delays and adds to the overall site costs. The Expressway, on the other hand, does not require SMS pre-approval; this is anticipated to be a major time saver. To "*ride the Expressway*," the SMS does require that:

- The SMS is pre-notified that a site is "*taking the ride*," and
- All work scope activities must be completed in accordance with the SMS's "*Site Investigation Guidance*" document that was distributed in May, 1994.

The SMS expects that the Expressway will reduce the time elapsed between the initial site referral to the completion of site investigation from

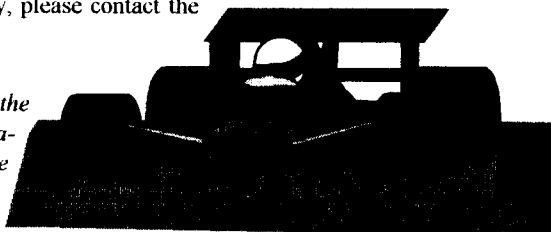
200 days to approximately 45 days. One advantage of using the Expressway model for the site owner and the SMS is that an investigation can begin almost immediately once the site is identified. A quick response to sites where a release has occurred or threatened sensitive receptors, where present, not only saves time and money, but will help to "*catch contamination*" before it is severely contaminated groundwater, surface water, and soils.

The Expressway process has the potential to assist in preserving and protecting some of Vermont's precious natural resources. This should be reason enough to utilize this streamlined, improved site investigation process.

For a copy of the SMS's "*Site Investigation Guidance*," document, which includes more detailed information about the Expressway, please contact the HMMD at (802)241-3888.



Lynda Wedderspoon is the "Expressway" information coordinator for the SMS.



INVESTIGATOR'S



FIELDBOOK

FIELD & BENCH SCALE COMPARISON OF PHOTOIONIZATION DETECTORS

J.P. Hoffer, K.S. Koptiuch, & R.L. Parker

INTRODUCTION

Portable photoionization detectors (PIDs) are widely used in site contamination investigations to measure vapor concentrations of volatile organic compounds (VOCs). These measurements are conducted to comply with health and safety regulations requiring air monitoring of worker air space, as well as to determine the relative concentration of contaminants. PIDs provide real-time detection of the most frequently encountered VOCs at many hazardous waste sites.

The State of Vermont Sites Management Section (SMS) of the Hazardous Materials Management Division (HMMD) has developed guidelines for discriminating petroleum contaminated soil from soil that may be backfilled during underground storage tank (UST) closures. These guidelines are based on a PID response threshold of 20 parts per million (ppm) for gasoline, and 10 ppm for diesel, kerosene, and #2 fuel oil. While the Vermont guidelines recognize that instrument responses and sensitivities vary according to PID model and manufacturer, the type of PID to be used for field screening activities is not specified.

The authors will present the complete text, with results and graphical interpretation, of this study in a poster session at the 1994 NGWA Focus Conference on Eastern Regional Ground Water Issues, October 3-5 at the Radisson Hotel in Burlington.

This study was conducted to define whether or not a linear correlation between the response factor for PIDs of different manufacture can be identified. This information could then be applied interpretively when reviewing investigative results from different petroleum hydrocarbon hazardous waste sites.

METHODOLOGY

Two commonly used PIDs were chosen for this study: a Photovac MicroTip HL-2000 (10.6 eV) and a HNU PI-101 (10.2 eV). Each unit was calibrated with 100% isobutylene to respond to benzene in parts per million (ppm) of calibration gas equivalents (CGE).

Bench scale measurements of fresh diesel, kerosene, and gasoline samples were evaluated by closed-loop, head-space methodology to prevent product loss through volatilization. Each sample consisted of one (1)-ounce of pure product injected into a sealed and sanitized, eight (8)-ounce, glass sample jar containing three (3)-ounces of washed, #2 Whitehead sand. The Teflon-lined jar lids were modified with two (2) 1/4" diameter, threaded Teflon bulkhead fittings. Each fitting was controlled with a Teflon needle valve. A method blank, identical to

(Continued on page 17)

(PIDs: Continued from page 16)

the other samples in construction, was prepared; no product was injected in the blank. The samples were agitated by shaking for five (5)-seconds each prior to running through the test.

Each product sample was tested a total of five times with each PID; the instruments were allowed to return to zero, or to stabilize if zero could not be achieved, between each sampling event. The method blank was tested before and after each product series with each PID.

Field headspace determinations were made on samples collected from a gasoline contaminated soil stockpile under normal field screening conditions.

Results were tabulated and graphed using QuattroPro and Freelance Graphics. Linear correlations were defined through slope determination of lines of best fit.

RESULTS

Bench scale measurements of diesel, kerosene, and gasoline headspace samples ranged from 122 to 1800 ppm on the MicroTip, and from 78 to 450 ppm on the HNU. The data from all three (3) petroleum hydrocarbon products was tabulated together. A strong linear correlation exists for the data and can be expressed as:

$$\text{HNU} = (\text{MicroTip} \times 0.23) + 72$$

In addition, the data for gasoline was tabulated separately. The linear correlation for gasoline alone can be expressed as:

$$\text{HNU} = (\text{MicroTip} \times 0.18) + 120$$

Field headspace measurements from the gasoline contaminated soil stockpile ranged from 8.8 to 929 ppm on the MicroTip, and from 2.0 to 240 ppm on the HNU. Two distinct linear correlations were defined. For HNU readings below 200 ppm the linear correlation can be expressed as:

$$\text{HNU} = (\text{MicroTip} \times 0.35) + 8.8$$

For HNU readings below 20 ppm, the linear correlation is expressed as:

$$\text{HNU} = (\text{MicroTip} \times 0.40) - 0.22$$

CONCLUSIONS

The results of this study are not intended to be authoritative in nature. By conducting this experiment, the authors hope to make field investigators and regulatory personnel aware that, although response from instruments of different manufacture will vary, relative correlations can be defined and applied to compare these responses. The logi

“...although response from instruments of different manufacture will vary, relative correlations can be defined and applied to compare these responses.”

(Continued on page 18)

(PIDs: Continued from page 17)

cal extension of this experiment is to conduct similar comparisons with additional PIDs of different manufacture, and to compare the results to those yielded through laboratory chemical analyses of the same test media.

Consultants have long been aware of the intrinsic differences between PIDs of various manufacture. This information could theoretically be applied advantageously to limit, or to maximize, the quantity of soils segregated for hazardous waste disposal during subsurface investigations. As a result, field screening of soils by PID invokes an inherent level of mistrust.

The method offered here could be employed to define qualitative values and performance curves for various PIDs. This information could then be incorporated into the standards set forth by the SMS in their guidance documents for site investigations and UST closures.

Jefferson P. Hoffer is a consulting hydrogeologist based in Waterbury, VT. He received a B.S. in geology from Dickenson College, and a M.S. in environmental pollution control from Penn. State. Mr. Hoffer has over seven years experience in hydrogeologic investigations and groundwater supply development. He is a Certified Professional Geologist (AIPG).

Kent S. Koptiuch is President and Principal Geologist of KENT S. KOPTIUCH, Inc. Geo-Environmental Services (KSKGeoS) in Essex Jct., VT. He received a B.A. in geology, and a B.A. in geography from the University of Vermont. He has over ten years experience in hydrogeologic and environmental consulting with an emphasis in hazardous waste remedial design and implementation. Mr. Koptiuch is a Certified Ground Water Professional (AGWSE), and a Certified Environmental Inspector (EAA).

Ronald L. Parker is Principal Geologist with Lone Rock Geoscience, an environmental consulting firm specializing in contaminant hydrogeology, in Burlington, VT. He received a B.A. in geology from Colgate University, and a M.S. in Geology from the University of Vermont. Mr. Parker has over eight years experience as a regulator and hydrogeologic consultant.

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VERMONT GEOLOGY, VOLUME 7
"FIELD TRIP GUIDEBOOK NUMBER 3"**

Editor: Stephen F. Wright

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J. Gregory McHone & Nancy W. McHone

Depositional Environments in the Mid-Ordovician Section at Crown Point, New York

Brewster Baldwin & Lucy E. Harding

The Altona Flat Rock Jack Pine Barrens, Altona, New York

David A. Franzl & Kenneth B. Adams

The Champlain Thrust Fault, Lone Rock Point, Burlington, Vermont

Rolfe S. Stanley

Stratigraphy of the Cambrian Platform in Northwestern Vermont

Charlotte J. Mehtens

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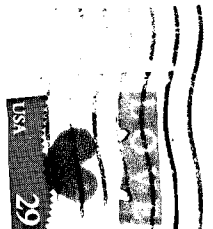


GREEN MOUNTAIN GEOLOGIST

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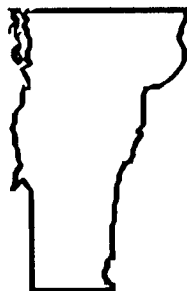
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THE GREEN MOUNTAIN GEOLOGIST



QUARTERLY NEWSLETTER OF THE VERMONT GEOLOGICAL SOCIETY

FALL 1994

VOLUME 21

NUMBERS 3 & 4

*The Vermont Geological Society's
Fall Field Trip*

**Cretaceous Intrusions in the
Rutland Area**

Saturday October 15th

Leaders: J. Gregory and Nancy McHone

Annual Meeting and Banquet: Castleton State College

*Banquet Speaker: Ed Hasenohr
"A Geological Tour of Japan"*

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PRESIDENT'S LETTER

9 September 1994

Dear Members,

This is my last letter to you and I hope I've influenced some of you to become more involved in the VGS than you may have been before. I've enjoyed tremendously my involvement with the VGS executive committee and others with whom I've worked during the last year. Thank you all for your help and devotion to the VGS.

As in any organization there is a core group of people who make things happen. Within the VGS core, I believe that Stephen Howe and Stephen Wright stand out for their commitment and devotion to our Society. They routinely make an extra effort for the VGS such that their contributions are too numerous to list. I wholeheartedly thank them.

Special thanks to Bruce Cox, Bill Norland and Anne Volmer (our Nominating Committee) for finding candidates for next year, to Kent Koptiuch for being a very active vice president involved in numerous functions, to Helen Mango for organizing this October's annual banquet, to Rolfe Stanley and Kent for coordinating the Research Grants Program this year, and to Lucy Harding for running the summer field trip.

Our continued health and vigor as a society depends on your involvement in VGS affairs. Commit to making our future bright. You won't regret it!

Sincerely,
Larry Gatto

VICE PRESIDENT'S LETTER

The Vermont Geological Society's twentieth year is fast coming to a close and I can't help but to reflect upon the success and growing strength of our organization. Through the dedicated efforts of many of our members, we've been able to put forth a number of excellent meetings and field trips. In addition, we have successfully reestablished a cooperative agreement with the New Hampshire Geological Society, and we've established a new working relationship with the Vermont/New Hampshire Chapter of the Soil and Water Conservation Society. As an environmental and groundwater geologist, I've especially enjoyed partaking in these events as it has allowed me to maintain a more solid relationship with academia, and with bedrock geology in particular.

That, in my mind, is one of the greatest benefits of an organization such as the VGS; scientists practicing in all facets of geological study have the opportunity to exchange thoughts and concepts on an equal basis. This can only enhance our appreciation for the width and scope of geology as a science.

We are fortunate to live in a state that is small enough to allow most of us to interact on a first name basis, yet still large enough to offer a wide variety of subjects for scientific study. Unlike other regions of this country, Vermont offers a rich diversity of igneous, metamorphic, sedimentary, surficial, and glacial geomorphogeny. No matter what aspect of the science one wishes to investigate, there is ample opportunity here for exploration.

I had the fortunate opportunity to present several talks to elementary school classes over the past year. I was, as usual, amazed at the eagerness and awe that young students express to grasp even the most technical concepts. The geologists of our future are in the schools now. We all should make it a point to provide them with the chance to "taste-test" the science. The occasional hour of our time invested in speaking, sample demonstration, or even leading a short field trip right on the school grounds, is always rewarding personally, and doubly rewarding to the students.

In this edition of the *GMG*, Jeff Hoffer has prepared a status report regarding the professional registration of geologists. I ask all of our members to take a few moments to (re)consider the concept, and to let us know whether this is a task that you would like the VGS to explore further. Until there is a nationally recognized registration program, implementation of a State-sanctioned program may be a viable alternative. I know that this issue has been explored by the VGS in the past, however, times have changed, and the number of practicing geologists in the state has grown dramatically in recent years. Please take a few moments to drop us a note and let us know what you think.

I have said it before, but I don't think it can be emphasized enough; the VGS is an organization for all of Vermont's geologists, and even a few ex-patriot geologists. Your continual input and contributions are what makes us a strong organization. I have tremendously enjoyed my work with the VGS over the past year, and I am looking forward to working with all of you in the coming year.

The VGS Fall field trip and annual banquet/meeting is fast upon us. Greg and Nancy McHone will be leading an excursion to view Cretaceous igneous intrusions in the Rutland area. If you caught their talk on the subject during last Winter's meeting, I am sure you'll be as interested as I am in attending. If you missed last Winter, here is your opportunity to join your fellow members and to exchange thoughts while enjoying the best of New England's foliage season. Look for details on the field trip and the annual banquet/meeting elsewhere in this edition. I hope to see you out there!

Respectfully,
Kent S. Koptiuch

1994 FALL FIELD TRIP**Cretaceous Intrusions in the
Northern Taconic Mountains
Region, Vermont****Saturday October 15th at 10 A.M.***Leaders***J. Gregory McHone and Nancy McHone*****Meeting Place and Time***

Meet at the Vermont Information kiosk in the parking lot of the Vermont Marble Company, Proctor, Vermont at 10 A.M.. From the north, drive south on Route 7 to Pittsford, then follow Route 3 southwest to Proctor. From southern/eastern/western approaches, turn north onto Route 3 off Business Route 4 between Rutland and West Rutland, then north to Proctor. The Vermont Marble Company is just across the bridge in the western part of the village. If there is sufficient interest from members in the Burlington area, a Geology Department van may be available for the trip and members can meet at the Perkins Geology Building. Call Stephen Wright if you are interested (656-4479).

Equipment and Background Information:

A lunch break will be made in the village of Castleton where lunch materials can be purchased. The background geology and field trip stops are all described in a field trip guide published in Volume 7 of *Vermont Geology*. Ordering information for this volume is given on the last page of this *GMG*. Steve Howe will also bring along copies that can be purchased by participants on the field trip.

Trip Description

The field trip itinerary will follow that outlined in the field guide to this trip. The first two stops will be in Proctor to observe both trachyte and monchiquite dikes. We will then head west to look at spessartite dikes in Castleton and near Lake Bomoseen. The trip then turns south a short distance to view the spessartite dike exposed in Lewis Creek flume and then back east along Route 4. We will next look at outcrops of trachyte and diabase dikes in South Clarendon, the Shrewsbury intrusive breccia, and will finish the trip at the Cuttingsville quartz syenite igneous complex.

FALL DINNER, ANNUAL MEETING, & KEYNOTE ADDRESS**Great Hall of the Old Chapel, Castleton State College
Castleton, Vermont*****Directions***

The Old Chapel is a white clapboard building with a little cupola located on Seminary Street. Seminary Street is the first left turn off Main Street (when coming from the east) for which there is a college sign. After taking the left turn off Main, the Old Chapel is about 300 m up the street on the left, set back from the road.

Dinner: 5:00-6:30 PM

We will have a dinner catered in the Old Chapel. The cost will be \$12 which includes pre-dinner munchies, dinner (salad, chicken or vegetarian lasagne, and bread), dessert, coffee and soda, seltzer, or cider. We will try to arrange a cash bar. You can pay for the dinner during or after the field trip. Please make checks out to the Vermont Geological Society and give them to Stephen Howe.

So that we can accurately inform the caterer of our number, **please call, write, or E-mail Steve Howe by Wednesday October 12** if you are planning on attending the dinner.

Steve Howe: (802-656-0388); showe@moose.uvm.edu

Business Meeting: Election of new officers: 6:30-7:00 PM

Following dinner we will have a brief business meeting to elect new officers. If you are unable to attend, please fill out the absentee ballot on the last page of this *GMG*.

A Geological Tour of Japan: Ed Hasenohr: 7:00-8:00 PM

Our guest speaker is Ed Hasenohr, an igneous petrologist who has recently returned from Japan where he was teaching. Ed will give us a tour of Japan emphasizing the volcanic history of the country. Please come and welcome Ed back to the U.S. and enjoy his presentation.

GEOLOGISTS AND PROFESSIONAL REGISTRATION

Jefferson P. Hoffer

Consulting Hydrogeologist

P.O. Box 428 Waterbury, VT 05676

(802) 244-5573

Geologists make decisions which impact public health, safety, and welfare. In Vermont, geologists are responsible for the siting and evaluation of potential waste disposal sites, the characterization and remediation of soil and groundwater contamination, mineral extraction projects, geotechnical evaluations, and the siting and management of water supply sources. We also provide technical advice or opinions to other professionals such as lawyers and engineers on a variety of issues and projects. Unlike other technical professions such as engineering or surveying, there is no registration requirement for geologists in the State of Vermont. Geologists practicing in Vermont, as well as the general public, may benefit from some type of registration, certification, or licensing program. These programs are typically designed to ensure to the public that practicing geologists meet a standard of qualifications, and adhere to a code of ethics. While no certification or registration program exists in Vermont, the Environmental Protection Rules do provide definitions for hydrogeologists performing work under various rules, including the following:

Hydrogeologist means a person with training or experience in bedrock geology, glacial geology, and groundwater hydrology sufficient to prepare adequately the hydrogeologic analyses required by these rules (Chapter 21, Water Supply Rule).

Hydrogeologist means an individual who has specialized training and experience in bedrock geology, glacial geology, geomorphology and groundwater hydrology, including well hydraulics and contaminant hydrogeology (Chapter 14, Indirect Discharge Rule).

The issue of professional registration or certification of geologists in Vermont has periodically been brought up for discussion, and these efforts have been reviewed in previous issues of the *Green Mountain Geologist*. The Spring 1974 *GMG* (vol. 1, No. 1) reviewed the efforts of the Association of Engineering Geologists to evaluate registration possibilities in the New England States. At that time, Maine had recently enacted their certification program for geologists. In the Winter 1985 *GMG* (Vol. 11, No. 4), Charles Ratté summarized the efforts of a 1981 V.G.S. professional committee's findings as follows:

1. It was not likely that the legislature would look kindly on yet another bill to establish a registration or certification of a professional discipline.
2. The records of the professional engineers or surveyors did not indicate an effective internal policing capability existed, thus the organizations functioned more as a professional society than as a watchdog over the quality of work performed in the state. It was concluded that it would be equally difficult to carry out disciplinary functions in a small group of registered geologists in Vermont.
3. There was little enthusiasm for voluntarily taking on the time-consuming task of formulating a registry law or administering such a law.

4. It was decided that individuals who felt the need to be professionally registered should be encouraged to join the American Institute of Professional Geologists (AIPG).

In a recent guest editorial in the Summer 1994 *GMG* (Vol. 21, No. 2), Kent S. Koptiuch discussed the growth of the environmental consulting field, which has resulted in an increase in the number of geologists practicing in Vermont. As a result, it may be worthwhile to re-examine the issue of professional registration or certification in Vermont. Many states currently have or are working on geologist registration or certification programs. The status of geologist registration for states in the Northeast is summarized below:

Connecticut	No registration, certification, or definition and no change reported.
Maine	Two part examination, 6-8 hour length, including regional knowledge, environmental geology, and a number of specialties. Specialty examples include hydrology, marine, sedimentation, and structure. Applicants take two of the specialties in the examination process. No specialty registration. More than 300 registrants.
Massachusetts	No registration, certification, or definition and no change reported.
New Hampshire	Proposed act to register geologists and other scientists practicing agronomy, pedology, and soil science. Certification based on resumé and formal exam. Includes reciprocity, exempts state and federal employees. In its present proposed format, this act is opposed by the geologic community and N.H. Department of Environmental Services. In study committee as of April 1, 1993.
New Jersey	No changes and no activity foreseen in near future. There is a certification program based on UST regulations that includes definition of qualified groundwater consultants.
New York	No registration, certification, or definition and no change reported.
Pennsylvania	Registration Act 151 was passed by the Pennsylvania legislature December 21, 1992. Joined with the Engineering Board of Registration as an amendment. Bill model for those who would consider a combined geologist-engineer board. Even though combined with engineering registration, geologists position retains basic concepts of the model law. Oil and gas exploration exempted.
Rhode Island	No registration, certification, or definition and no change reported.
Vermont	No registration, certification, or definition and no change reported.

(The information in the above table was excerpted from American Association of State Geologists, Professional Affairs Committee, James H. Williams, Chairman, October, 1993.)

Those with an opinion regarding professional registration for geologists are encouraged to use the *GMG* as a forum to express their views. It may be appropriate for the VGS to conduct a poll of the Vermont geologic community to gauge its level of interest in professional registration.

DRINKING WATER UPDATE

K.S. Koptiuch

CLEAN WATER ACT REAUTHORIZATION [H.R.3948] has been fighting a long, upstream battle in congress. This is primarily due to the bill's non-specific language concerning groundwater. In addition, there is strong concern regarding the possibility of federal jurisdictional encroachment upon state and local governments. The National Ground Water Association's (NGWA's) Clean Water Act Task Force has been working with both the EPA and Congress to filter out some of the beaucroatic flotsam.

BACK ON THE FARM the Vermont Department of Agriculture has proposed new rules aimed at reducing farm related, non-point source pollution in Vermont's waterways. The rules will require farmers to alter their present manure disposal practices. Approximately one-half of Vermont's farmers will be affected. Manure will be stored, either in a structure or stacked in a field, through the winter and spread later in the spring after peak runoff has occurred. In addition, a vegetative buffer strip will be required separating agricultural lands from surface waters. Other requirements will include: prohibition of manure, fertilizer, and pesticide buildings within floodplains; a provision mandating physical incorporation of manure into the soil within 48 hours on lands subject to annual flooding; and cultivation practices in adherence with the soil loss tolerances calculated through the Universal Soil Loss Equation. The new rules are expected to be adopted in November or December; sounds like moosic to the ears!

THE STATE WATER QUALITY STANDARDS have recently been amended by the Water Resources Board (*effective August 1, 1994*). The new water quality standards give the Agency of Natural Resources (ANR) the authority to create "*waste management zones*" along surface waterways. The zones will effectively replace the former Class C rating on waterways. Class A waters are considered of *very high quality*, and Class B waters are of *high quality*. Waste management zones will be those areas designated for the permitted discharge of treated wastewaters. Under the new criteria, zones must be:

- Long enough to accommodate the discharge,
- Consistent with the state's anti-degradation policy, and
- Located so as to not result in "more than a negligible increased risk to public health" within, adjacent to, or downstream of the zone.

In addition, the waste management zones must not constitute a barrier to the passage or migration of fish or result in an undue adverse affect on fish, aquatic biota, or wildlife.

EPA's PROPOSED DISINFECTION BY-PRODUCTS RULES, part of the *Clean Water Act reauthorization*, could cost water utilities across the nation as much as \$1 billion during the first year of changeover. The rule change, aimed at protecting drinking water from disinfection by-products created through the natural interaction of haloacetic acids, bromate, chlorine, chloramine, chlorine dioxide, and ozone (common disinfection chemicals) with organic matter in target waters. By-products have been linked to kidney and liver damage, and to cancer. EPA's goal is to improve existing safeguards against disease-causing microorganisms, particularly *Cryptosporidium*. It is not likely that the proposed rules will go into effect for another five years while the EPA and water suppliers across the country conduct a \$50 million study of the impacts of the by-products.

THE NATIONAL GROUND WATER ASSOCIATION (NGWA), in a finding contrary to an EPA standing promulgated earlier this year, states that lead-bearing, brass cast components in private water well pumping systems are not a universal problem. After the EPA issued their warning in April, the NGWA stepped in to offer assistance in determining the validity of claims made by several partisan environmental organizations in California. The NGWA reviewed independent data sources from state government agencies and concluded that there is no cause for concern at this time.

Many industry experts have criticized EPA's reliance on a laboratory experiment that may have been biased and lacking in a satisfactory control study. The EPA is awaiting the results of additional independent field tests in Minnesota and Arkansas before making a final ruling, however, they have not as yet rescinded their previous recommendation that well owners with less-than-a-year old submersible pumps with brass parts use bottled drinking water until they test their drinking water for lead.

In May, the U.S. Senate passed the *Senate Safe Drinking Water Act (SDWA)*, S.2019. The legislation includes an amendment requiring the EPA to produce their own report that reviews all available data and information on the leaching of lead from water well pumps and water well system components. This would serve to counter any potential bias that may have been introduced in the initial studies. The House of Representatives has not yet acted on SDWA legislation.

VERMONT GEOLOGICAL SOCIETY BUSINESS AND NEWS

New Members

Although no new members have joined the VGS since the Summer GMG was published, two applications are awaiting approval by the Executive Committee at our Annual Meeting on October 15th.

Treasurer's Report

As of September 29, 1994, the Society's membership stands at 136 members. Several institutional members have recently renewed their membership. Our financial condition remains excellent, with our income from dues and sales of *Vermont Geology* slightly exceeding our expenses of the publication and mailing GMG and our support of the Student Research Grant program. Tight cost controls will insure that this balance persists. I anticipate no increase in expenses for 1995, despite rising postal costs, and will make a recommendation to the Executive Committee at the Annual Meeting to that effect. I also recommend to the Executive Committee that the VGS maintain its current level of support for the Student Research Grant. It is my opinion that increases in expenses over the next year can be met by attracting new members and stimulating sales of *Vermont Geology*, and I will suggest to the Executive Committee that we promote the Society vigorously at the Northeastern Section Meeting of the Geological Society of America at Cromwell, Connecticut in March, 1995.

I anticipate that dues statements for 1995 will be mailed to all members slightly earlier this year, in mid-December, so as to take advantage of the lower postal rates. This will also have the added benefit of firming up our membership roll before the publication of the Winter GMG.

As always, I welcome comments and suggestions concerning the financial condition of the Society from all members.

Respectfully submitted,
Stephen S. Howe

Member News

Jeff Hoffer, consulting hydrogeologist, has recently hired Timothy Schmalz as a project geologist in his Waterbury office. Hoffer provides services in groundwater supply development and groundwater contamination investigation. Schmalz has recently moved to Vermont from State College, Pennsylvania where he was employed as a project geologist for Nittany Geoscience. Schmalz received his B.A. in geology from Colgate in 1991.

Executive Committee Minutes: July 9, 1994¹

The Executive Committee of the Vermont Geological Society was called to order at 12:30 p.m. on July 9, 1994 at the Crown Point, New York Historic Site. Members present were Larry Gatto, Kent Koptiuch, Steve Howe, Nancy Keller, Helen Mango, Shelley Snyder, and Stephen Wright.

Treasurer's Report: Steve Howe reported a balance of \$2,936.24 in the VGS bank account. No new members have joined the Society since the last Executive Committee meeting. Dues statements for 1995 will be mailed to members by December to take advantage of the \$0.29 postage rate.

Membership Directory: The membership directory has been completed and mailed. Members should have received the directory by late June or early July. A mailing separate from the *GMG*. The Executive Committee is committed to update this directory annually and to include any new member information in the *GMG* on an as-needed basis.

Reciprocal Agreements: Stephen Wright reported that he is awaiting a message regarding the status of the reciprocal agreement with the New Hampshire Geological Society. Kent Koptiuch brought it to our attention that the Soil and Water Conservation Society (SWCS) is looking to expand its contacts with other related professional associations. The Executive Committee supported the idea of extending a reciprocal agreement with the SWCS and requested that Kent pursue this matter further.

Publications/Editorial Committee: Kent Koptiuch's contribution as guest editor of the Summer 1994 *GMG* were recognized and praised. Kent has agreed to continue to volunteer his help in publishing future *GMGs*.

Discussion also centered around the question of increasing the page size of the *GMG*, as it would allow more layout options. It was agreed that the current size is a likeable and recognizable trait of the *GMG*, and that no change would be made. It was also agreed that, should any changes to the size of the *GMG* be made in the future, those changes should be made at the beginning of a new volume year for the convenience of library binderies.

Steve Howe brought it to the attention of the Executive Committee that the quality of the last printing of the *GMG* had declined and recommended that other print shops be investigated.

In anticipation of the Fall field trip, the Executive Committee supported Stephen Wright's suggestion that a post card announcing the event be mailed to VGS members in late August. If the Fall field trip is not announced until the *GMG* is published in late September, members may not have the lead time necessary to plan their participation.

Steve Howe also mentioned that he had received information that the focus of the June 1996 Rocks and Minerals magazine would be on Vermont, and

¹July 20, 1994 [with minor additions in brackets made on July 21, 1994 by Steve Howe].

that the VGS may want to solicit its membership regarding contributions to that issue. More information regarding this topic will be made available at the next Executive Committee meeting. [Initial contact with Sue Hadden, VGS member and our liaison for this special issue, indicated that the manuscript situation for the issue was set, but that advertising space was still available.]

Geological Education Committee: Shelley Snyder reported that she is still in pursuit of a booth at the Vermont Education Association's convention in October, 1994. Nancy Keller suggested that the Vermont Science Teachers Association be contacted and that perhaps the VGS could share their space. A teacher handbook and resource list regarding Vermont geology was discussed. No progress to date has been made. It was suggested that the VGS could put together kits that would support teachers and students in the study of geology.

VGS Research Grants: After reviewing the May 1994 grant proposals, Kent suggested that both he and Rolfe Stanley had felt that the guidelines for the student research grant include a recommendation that figures, maps, cross sections, and other graphic information be supplied with each proposal. Two grants, totalling \$500.00, were awarded.

Fall Field Trip/Banquet/Annual Meeting/Guest Speaker: The date for the Fall field trip and meeting has been changed due to conflicts with NEIGC. Other possible dates included October 1st or 15th [As of July 21, 1994, the most likely date appears to be October 15th]. Greg and Nancy McHone have agreed to lead a trip in the Rutland area to look at Cretaceous igneous intrusions. Helen Mango is making arrangements at Castleton State College for hosting the banquet and presentation. Final decisions regarding dates and logistics will be made by late August. A guest speaker for this event has not yet been found.

Constitution and Bylaw Changes: Changes to the constitution and bylaws are on hold until Steve Howe and Shelley Snyder have had an opportunity to review them. The proposed changes will be circulated among members of the Executive Committee before publication in the *GMG* and their final acceptance, by vote, by the VGS membership.

Nominating Committee: The Nominating Committee will report their nominations to Larry Gatto by August 19th.

Next Meeting: The Executive Committee will meet following the Fall field trip and dinner as part of the Annual Meeting.

Meeting adjourned at 2:00 p.m.

Respectfully submitted,
Nancy Keller

INDUSTRY AND COMMUNITY NEWS

THE INTERNAL REVENUE SERVICE recently ruled (*Revenue Ruling 94-38*) that cleanup costs for remediating contaminated soils and groundwater can be deducted as a business expense (*Internal Revenue Code, Section 162*). The ruling applies to ongoing treatment expenses and not to the cost of installing the remedial system itself. Remedial systems are considered a capital expense; therefore, these costs can be depreciated over the useful life of the system.

STELLA FOODS EAST INC. and the Town of Hinesburg have been under the thumb of the EPA for alleged violations of the Clean Water Act. EPA claims that Stella Foods was discharging pollutants in concentrations exceeding their National Pollutant Discharge Elimination System (NPDES) permit. Hinesburg Town is faced with the same charge. Stella Foods is facing potential penalties of \$125,000.00, while the Town is looking at penalties in the \$15,000.00 range.

THE ABENAKI NATION OF VERMONT recently received a \$7,500.00 grant from the EPA to create the Missisquoi River Keeper Program. The program will endeavor to cleanup and manage the Missisquoi's ecosystem.

THE LAKE CHAMPLAIN BASIN PROGRAM will be unveiling its draft environmental management plan "*Opportunities for Action*" for public comment sometime this fall. The final plan, incorporating an economic impact analysis and public input is expected in 1995. The program's goal is to recommend strategies aimed at promoting a healthier Lake Champlain through: nutrient input reduction; management of non-point source pollution; prevention of toxic substance introductions; wetlands protection; and management of foreign, nuisance aquatic vegetation.

MAINE'S WETLANDS are the focus of a regulatory conflict between the EPA, the Army Corps of Engineers, and the Maine Department of Environmental Protection (DEP). A number of Maine business groups under the banner of the *Maine Alliance* and the *Maine Chamber of Commerce* have called for DEP to assume jurisdiction of all state wetlands; the EPA has stated in the past that this is permissible if state level regulations are comparable to federal laws, *i.e.* the Clean Water Act. The proposal is aimed at reducing interagency redundancy in wetlands reviews. The *Natural Resource Council of Maine* has urged caution in consideration of the proposal due to the potential added cost burden to Maine's already stressed DEP budget.

OUTBOARD BOAT MOTORS have been targeted by the EPA as a primary threat to atmospheric and surface water quality. In a report released this Summer, the EPA claims that outboards contribute more than 19% of the hydrocarbons released into the atmosphere. In addition, the report implicates these same motors in the release of somewhere between 150 million and 420 million gallons of unburned fuel annually.

GOVERNOR DEAN NAMES EWING AS E-BOARD CHAIR

Beginning December 31, 1994, John Ewing, former Bank of Vermont president, will assume the chair position of Vermont's Environmental Board. Ewing has been a member of the board for several months. He is past chairperson of the Chittenden County district environmental commission. Ewing will replace acting chairperson Arthur Gibb. Gibb will remain on the board.

SEMINARS, MEETINGS, AND FIELD TRIPS

- October 8–9: **New York State Geological Association Annual Meeting** with Field Trips, Rochester University, Rochester, New York.
- October 15: **Vermont Geological Society Fall Field Trip and Annual Meeting** with Greg and Nancy McHone: *Cretaceous Intrusions in the Rutland area*. See this issue of the *Green Mountain Geologist* for details.
- October 16–18: **Ninth Annual Conference on Hydrogeology and Engineering Geology of Karst Terranes**, Nashville, Tennessee. For information contact: James F. Quinlan, Box 110539, Nashville, TN 37222. (615) 833-4324.
- October 17–20: **Ninth Annual Conference on Contaminated Soils**, Amherst, Massachusetts. For details contact Paul Kostecki, Environmental Health & Sciences, N344 Morrill, University of Massachusetts, Amherst, MA 01003. (413) 545-2934, fax (413) 545-4692.
- October 17: **University of Vermont Fall Seminar Series (4 P.M.): "Icebergs, Shell and Raised Beaches: Gaging the Retreat of Late Wisconsin Ice from the Puget Lowlands, Washington"** Dr. David Dethier, Williams College.
- October 23–27: **Geological Society of America Annual Meeting**, Seattle, Washington. A complete description of the meeting is contained in the June 1994 issue of *GSA Today*. Contact the GSA Meetings Department for additional details (1-800-472-1988).
- October 31–November 3: **International Hazardous Materials Spills Conference**, Buffalo, New York. Contact Sarah Bauer at (202) 260-8247 for information and Angela Moody at (703) 442-9824 for registration.
- November 7: **University of Vermont Fall Seminar Series (4 P.M.): "The Age of Blueschists on the Seward Peninsula, Alaska: Hazards of Dating Under Pressure"** Dr. Kimberly Hannula, Middlebury College.
- March 20–22, 1995: **Northeastern Section Meeting, Geological Society of America**, Radisson Hotel, Hartford, CT. For details call the GSA Meetings Department at 1-800-472-1988.
- April 2–5, 1995: **Fifth Multidisciplinary Conference on Sinkholes and the Engineering and Environmental Impacts of Karst**, Gatlinburg, TN. Contact P.E. LaMoreaux & Associates, Inc., Box 4412, Oak Ridge, TN 37831-4412.

ABSENTEE BALLOT: 1994
Vermont Geological Society

Officers:

President	Kent Koptiuch	_____	_____
		_____	_____
Vice-President	Ron Parker	_____	_____
		_____	_____
Secretary	Nancy Keller	_____	_____
		_____	_____
Treasurer	Stephen Howe	_____	_____
		_____	_____

Board of Directors (2-year term):

Bruce Cox	_____

If you will not be attending the VGS Annual Meeting in Burlington, please complete this ballot and return it in an envelope marked with the word "BALLOT" in the lower left hand corner and your name and address in the upper left hand corner to:

Stephen Howe, Treasurer
 Department of Geology
 University of Vermont
 Burlington, VT 05405

To be counted, this ballot must be received by October 14, 1994.

Vermont Geology

Volume 7
"Field Trip Guidebook Number 3"

Editor: Stephen F. Wright

Contents

**Cretaceous Intrusions in the Northern Taconic Mountains Region,
Vermont**

J. Gregory McHone & Nancy W. McHone

**Depositional Environments in the Mid-Ordovician Section at Crown
Point, New York**

Brewster Baldwin & Lucy E. Harding

The Altona Flat Rock Jack Pine Barrens, Altona, New York

David A. Franzi & Kenneth B. Adams

The Champlain Thrust Fault, Lone Rock Point, Burlington, Vermont

Rolfe S. Stanley

Stratigraphy of the Cambrian Platform in Northwestern Vermont

Charlotte J. Mehrtens

Price: \$8.00 (members), \$10.00 (non-members)

Pick up a copy at this year's fall field trip!

Mail orders with payment to: Stephen Howe, Treasurer
Department of Geology
University of Vermont
Burlington, VT 05405

THE GREEN MOUNTAIN GEOLOGIST
VERMONT GEOLOGICAL SOCIETY
DEPARTMENT OF GEOLOGY
UNIVERSITY OF VERMONT
BURLINGTON, VERMONT 05405-0122

The **GREEN MOUNTAIN GEOLOGIST** is published quarterly by the Vermont Geological Society, a non-profit educational corporation.

Executive Committee

President	Larry Gatto	603-646-4273
Vice President	Kent Koprivich	878-1620
Secretary	Nancy Keller	524-0226
Treasurer	Stephen Howe	656-0388
Board	Lucy Harding '95	388-3711 ext 5444
of	Helen Mango '95	468-5611 ext 478
Directors	Ron Parker '94	860-6065

Geological Education Committee Chair	Shelley Snyder
Advancement of Science Committee Chair	Rolfe Stanley
Public Issues Committee Chair	Philip Jones
Publications/Editorial Committee Chair	Stephen Wright
	656-4479 or 644-2439

ADDRESS CHANGE?

Please send it to the Treasurer at the above address.

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Larry Becker
RD #3 Box 57
Middlesex, VT 05602

THE GREEN MOUNTAIN GEOLOGIST



QUARTERLY NEWSLETTER OF THE VERMONT GEOLOGICAL
SOCIETY

WINTER 1994

VOLUME 20

NUMBER 4

The Vermont Geological Society's Winter Meeting

Cold Regions Research and Engineering Laboratory
(CRREL)

Hanover, New Hampshire

Saturday February 26th

Tour of the CRREL Facilities after the Meeting

See inside for details.

Directions: To reach CRREL, exit I-91 at the Hanover, New Hampshire Exit (Exit 13), cross over the river and go through the only traffic light in the center of Hanover. Take the next left turn (north) around the village green and follow it (Route 10) north for approximately 2 miles. The CRREL facility is located on the west side of Rte. 10. Use the main entrance to the facility adjacent to the parking lot. Phone: 603-646-4100.

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PRESIDENT'S LETTER

20 December 1993

Dear Members,

The strength of every organization comes from its members applying their talents to accomplishing their organization's goals. We thank Sue Hadden for doing so last year as VGS secretary. We especially thank Lucy Harding, Bruce Wilson, Leslie Kanat, Stephen Howe, Ron Parker, Shelly Snyder, Rolfe Stanley, and Stephen Wright for their long-term commitment to the VGS. They have each served our Society for more than a year. Special thanks go to Ron Parker again for making the arrangements for our annual meeting and banquet in October, to Paul Bierman for being the guest speaker at the banquet, and to Dave Franzi for leading the October field trip. The dedication these members have displayed is required of us all to keep the VGS a viable organization with a solid future.

Continuing with this theme, I encourage you to commit yourself to your Society by volunteering for one or more of the following: Chairperson, Public Issues Committee; guest editor for the *Green Mountain Geologist*; the Nominating Committee; and, reviewer for VGS Research Grant proposals. Use your talents and make your VGS membership meaningful.

As a minimum, if you choose not to donate your talents to the VGS, the Society needs your financial support. One of our main goals is to advance the science and profession of geology by encouraging research. And one of the ways we accomplish that goal is through our VGS Research Grant Program which is supported by your dues. Please pay your dues.

Your Executive Committee will be working on the following items during the next year in addition to organizing the Winter and Spring Meetings and Summer and Fall field trips. We will revise the VGS Constitution and Bylaws so you can vote on them next fall. We will update the VGS membership directory and request that you ensure that the address we have for you is correct. We will explore establishing reciprocal agreements with the Maine and New Hampshire Geological Societies. I request that you contact any Executive Committee member with your input regarding these items.

The VGS winter meeting will be held on 26 February 1994 at the Cold Regions Research and Engineering Laboratory (CRREL) in Hanover, NH. Please plan to attend and be a contributing VGS member. Volunteer for your Society! Talents that remain unused are of no benefit to anyone.

Sincerely,

Larry Gatto

WINTER MEETING PROGRAM

*Cold Regions Research and Engineering Laboratory
Hanover, New Hampshire
February 26, 1994*

9:30 Coffee

10:00 Stewart F. Clark, James B. Shanley, and Jon C. Denner: *Groundwater, surface water, and soil moisture relations during the initial stages of snowmelt on a small forested hillslope*

10:20 Don Maynard: *An inexpensive design for a vibratory sediment core sampler*

10:40 Lawrence W. Gatto: *River bank conditions and erosion in winter*

11:00 Gregory J. McHone and Nancy W. McHone: *Mantle xenoliths from the North Hartland dike and the origin of Mesozoic lamprophyres in Vermont*

11:20 TOUR OF CRREL FACILITIES BY LARRY GATTO

12:15 Lunch

12:30 VGS Executive Committee Meeting: *All members are invited to attend!*

WINTER MEETING ABSTRACTS

GROUND WATER, SURFACE WATER, AND SOIL MOISTURE RELATIONS DURING THE INITIAL STAGES OF SNOWMELT ON A SMALL FORESTED HILLSLOPE

Clark, Stewart F., James B. Shanley, and Jon C. Denner
U.S. Geological Survey, Montpelier, Vermont 05602

Ground water, surface water, and soil moisture were monitored during the 1993 snowmelt period at Sleepers River Research Watershed in Danville, Vermont. In mid-March, the snowpack reached maximum depth (95 cm) and water equivalent (20 cm). On March 16, the air temperature rose from -16 °C to +2 °C, dipped to -1 °C overnight and rose to +2 °C on March 17, when 6 mm of rain fell between 8:00 a.m. and 11:00 a.m. Soil moisture increased from 0.33 to 0.37 (volume fraction), ground-water level rose 19 cm, and stream discharge increased from 0.71 to 2.55 liters per second, within 4 hours of the start of rainfall. Colder temperatures (-5 °C to 0 °C) returned on the night of March 17 and persisted until March 23. During this period, streamflow recession followed the ground-water recession.

A thaw, lasting several days, began on March 23. Although the temperature pattern on March 23-24 was very similar to that of March 16-17, there was no rainfall and no response in streamflow. On March 25, diurnal streamflow cycles began with successively higher daily peaks. Ground-water levels also increased in stepwise fashion during the same diurnal cycle. Initially, the daily ground-water response lagged the stream response, but by March 28, the responses coincided.

Rain on snow and snowmelt caused increases in ground-water levels and streamflow. Despite a dry snowpack, the rapid response of soil water, ground water, and streamflow suggests preferential flowpaths through the snowpack. The timing of increases in soil moisture with depth shows that water is infiltrating to the saturated zone from the land surface. The timing of stream and ground-water response is consistent with the timing of moisture increases in the vertical array of moisture probes. Comparison of oxygen-18 in snowmelt, streamwater, and ground water suggests that ground water is the dominant component of streamflow. Increased streamflow during snowmelt is largely the result of increased recharge to, and discharge from the ground-water system.

RIVER BANK CONDITIONS AND EROSION IN WINTER

Gatto, Lawrence W., Geological Sciences Branch, Cold Regions Research and Engineering Laboratory, Hanover, NH 03755-1290

Winter in cold climates is a season when some of the well-documented processes that contribute to riverbank erosion have either slowed or are inactive. For example, river hydraulic forces are often minimal and usually affect only the upper portion of the river bed, not the riverbank directly, because river stage and discharge are frequently at an annual low and rivers are often completely or partially ice-covered. Precipitation usually falls as snow, which minimizes overland flow down the bank face during precipitation events as well. However, numerous field observations show that bank erosion does not cease during the winter. Freeze-thaw cycling and the formation of ground ice in riverbanks disrupt bank soil structure, thereby reducing soil strength, which often results in in-situ bank sediment being dislodged and moved down slope via gravity. Sublimation of ground ice at the bank face during the winter also releases ice-bonded bank sediments, and when ground ice melts in the spring a saturated zone of bank face sediment remains that is unstable and susceptible to slides. River ice can abrade and transport in-situ bank soils and any sediments that have accumulated along the bank face and toe as river stage rises in the spring. If the freezing and thawing, ground ice processes, and river ice actions do not directly remove bank soils, they can individually or collectively disturb the soils sufficiently to make them more susceptible to erosion by processes that are active during other seasons. Thus, year-round measurements are needed to determine the seasonal extent of erosion, including the quantitative effects of winter factors. Only from such studies will we improve our current inadequate capability to predict riverbank recession.

AN INEXPENSIVE DESIGN FOR A VIBRATORY SEDIMENT CORE SAMPLER

Maynard, Donald M. , The Johnson Company, 5 State Street, Montpelier, Vermont 05602

The Johnson Company, Inc. has designed a vibratory sediment core sampler that can be constructed for under \$5,000. With two technicians, the sampler can collect a five foot long, three inch diameter sediment sample in fewer than 20 minutes. The sampler penetrates through saturated silts, sands, and fine gravel, and has been used in up to 40 feet of water. Over 175 successful sediment cores have been collected, with a typical core recovery of more than 70% of penetration depth.

The sediment sampler uses a 10,000 vibration per minute gas powered vibrator. The vibrator was originally design for use in concrete placement. The vibrator is attached to 1.5 inch diameter aluminum AW drill rod. The rod in turn is threaded into the check valve assembly of the core barrel. The design utilizing the rigid rods has significant advantages over a cable operated design. The rods allow precise control over the penetration and location of the sampler, even under conditions of high waves or high water velocity. The core barrel is standard 3.5 inch NQ steel casing with

machined threads. The barrel and tip of the sampler are machined to match ASTM D4823-88 specifications. A plexiglass or Lexan[®] liner is used inside the core barrel. The liner helps to prevent cross contamination between sampling points, and maintains the sample in its original condition and stratigraphy.

A stable platform and a winch are necessary for performing sediment sampling on lakes or rivers. The absolute minimum equipment that is necessary is a 16 foot pontoon boat and a winch and boom assembly rated for 1600 pounds pull. Three anchors are recommended for platform stability. Determining the precise location of each sample point can be performed in at least three ways. The most accurate method is to use a surveyor stationed onshore and a stadia rod held in the boat. Another method is to use a global positioning system (GPS). The GPS can theoretically provide ± 10 foot accuracy when used with a sub-meter antenna and double-difference differential processing. A third, less expensive method is to measure the distance and bearing from the sample point to several onshore objects. The distance measurement can be performed with a calibrated rangefinder. The bearing measurement requires a marine or automobile compass.

MANTLE XENOLITHS FROM THE NORTH HARTLAND DIKE AND THE ORIGIN OF MESOZOIC LAMPROPHYRES IN VERMONT

McHone, J. Gregory, Graduate Liberal Studies Program, Wesleyan University, Middletown, CT 06459, and McHone, Nancy W., Geological and Natural History Survey, Dept. of Environmental Protection, 79 Elm Street, Hartford, CT 06106

A Cretaceous (133 ± 6 Ma) camptonite dike in the spillway of the North Hartland flood control dam displays abundant inclusions of spinel lherzolites and lesser amounts of dunite, harzburgite, and clinopyroxenite, as well as quartz plagioclase granulites and other xenoliths. The inclusions range up to fist-sized and are concentrated in bands through the middle part of the intrusion. Other Mesozoic dikes in the Northeast contain high-grade metamorphic crustal inclusions, but dikes with ultramafic (mantle) xenoliths are rare. Electron microprobe analyses of mantle minerals from North Hartland include enstatite, diopside, low-Ti augite, Mg-rich olivine, brown chromian spinel, and rare phlogopite, with compositions that are generally comparable to mantle minerals from four other New England and Québec lamprophyres. Geothermometer calculations using the North Hartland analyses indicate equilibrium temperatures that are somewhat lower than those from other sites.

Xenolith occurrences are important to studies of tectonic features and the origin of igneous rocks in the region. Geochemical data from the North Hartland and other xenolith sites show that the Cretaceous mantle had little variation across terrain boundaries in the region, with vertical heterogeneity but relatively good lateral homogeneity of mantle rock types. Volatile-rich compositions are rare in the xenoliths, with little evidence for chemical enrichment with mobile elements in their source areas. Such enrichment may be required for the generation of alkaline basalt melts that

ascended as lamprophyre dikes, and which also puddled into chambers that became plutons such as Ascutney Mountain. Vermont lamprophyre rare-earths show a possible equilibrium with deeper, garnet-bearing and enriched source rocks, and so the xenoliths may represent incidental mantle material not related to lamprophyre genesis and mantle enrichment processes.

STATE GEOLOGIST'S REPORT

Diane L. Conrad
Vermont State Geologist and Director
Vermont Geological Survey

The Vermont Geological Survey continues to promote the geological sciences in Vermont. We currently employ seven professionals—geologists, engineers, and technical and administrative staff—who work in three programs: geology, radioactive waste management and the Agency of Natural Resources' Geographic Information Systems. The GIS program recently reformed as "Information Management Services" to better reflect its role in the Agency as the coordinator of the use of this technology.

The geology program has contracted with geologists from the University of Vermont and Castleton State College to contribute to the bedrock mapping project currently in progress for the state. The map is scheduled to be published early in 1997, with interim products made available open file annually in paper and digital format. In mid-January, we submitted our latest STATEMAP proposal to the U.S. Geological Survey for mapping northern and central Vermont, part of the longer term goal of the new state geologic map. This proposal allows us to expand the program and contract with more Vermont and U.S.G.S. mappers.

Information Management Services is currently developing a methodology for creating a digital bedrock geology map. Digitizing geologic maps is largely unprecedented, and no standard symbology or method exists to guide mappers in map preparation or IMS staff in digitization. V.G.S. staff have collaborated with U.S.G.S. and UVM geologists on two pilot projects—Dr. Charlotte Mehrtens' work in northwest Vermont and the work of Dr. Nick Ratcliffe and Greg Walsh in the Mount Holly and Ludlow 7.5 minute quadrangles—that will result in a set of guidelines for contract mappers to use when preparing maps to be digitized. These guidelines will shorten the time required to digitize these maps.

Last year, Diane Vanecek, information specialist, fielded more requests for geologic information than ever before. Of the people she helped, 305 telephoned, 116 wrote, and 62 walked in; a 50% increase over 1992. Late Winter usually heralds numerous requests for where to find gold in Vermont, and she is ready to help. Orders for Survey publications have increased too, and we still have T-shirts and hats for sale with our *Pirates of the Paleozoic* logo on them. Diane thinks they're destined to become collectors' items. Can you afford *not* to own one? Call her at 241-3601 to place your order.

As we write, the Vermont State Legislature is considering a bill to dispose of Vermont's low-level radioactive waste at a site in Hudspeth County in West Texas. Once Vermont's law passes, Congress must ratify the compact, a three-state agreement between Vermont, Maine, and Texas. The 50-year agreement calls for a payment by Vermont and Maine of \$27.5

million each, with a total of \$5 million to benefit the nearby town of Sierra Blanca. The site is located in the Eagle Flat basin, a closed basin where the groundwater table is located 800 feet below the surface.

The recent earthquakes in southern California remind us that they could happen here, too. A pamphlet from the New England States Earthquake Consortium (NESEC) states that there is a 19%-28% probability of a damaging (magnitude 5 or greater) earthquake in New England within a 20-year period. New England's hard-rock base transmits seismic waves over an area 4 to 40 times greater than in California; significant damage could result from even a moderate earthquake. NESEC has produced a 20-minute videotape entitled *New England's Next Earthquake: The Writing on the Wall*. We have a copy in our library and would be glad to lend it to any interested party. Call Diane Vanecek for details.

A new U.S.G.S. report, *Geologic Radon Potential of EPA Region 1*, states that the radon potential of Vermont is generally moderate, but varies across the state. The open-file report, No. 93-292-A, goes on to say that several types of rocks in Vermont—granitic and micaceous metamorphic rocks, granite plutons, graphitic and carbonaceous phyllites, slates and schists—have the potential to produce high radon levels. Nevertheless, this is a generalized assessment, and is inappropriate for use in identifying the radon potential of small areas such as neighborhoods, individual building sites, or housing tracts. A copy of the report and accompanying map of radon potential across the U.S. are available through the Survey library.

Andrew V. Raiford (1937-1993)

Andy WAS geology at Castleton State College. He came here in 1970, and single-handedly built up the geology program. For 16 years he was the only geologist in the natural sciences department. Despite this, he ran a complete major (he filled in the few gaps by requiring his majors to go to two field camps) and turned out many successful geologists. He was a native of New Orleans, receiving a Bachelors degree in geology from Louisiana State University and a Masters degree in geology from Tulane. Before coming to teach at Castleton, he taught earth science in the Jefferson Parish school district in Louisiana, was a geophysicist for Gulf Oil International and Conoco Oil, and worked for Boeing Aerospace, where he designed the silk screen process to put the U.S. flag on the Saturn booster. Andy was deeply committed to geology and to his students. He was easy to spot on field trips run by V.G.S., N.E.I.G.C. and others by the flock of Castleton students around him. Andy Raiford died on December 4, 1993 after a long and difficult struggle with a rare form of bone-marrow cancer.

Helen Mango
Castleton, Vermont

VERMONT GEOLOGICAL SOCIETY BUSINESS AND NEWS

New Members

We are pleased to welcome the following new members who have joined the Vermont Geological Society since the Fall *GMG* was published:

Paul Bierman

David Laing

Ground Water of Vermont

Burlington, VT

White River Junction, VT

Burlington, VT

Treasurer's Report

Your dues make it possible for the Vermont Geological Society to publish the *Green Mountain Geologist*, *Vermont Geology*, and to continue its commitment to our newly instituted Student Research Grant program. As of February 11, 1994, only three weeks before the March 1st payment deadline, dues for 1994 have been received from 86 of the 194 members of the Society. This amounts to 44% of our membership. Those of you who have not sent in your payment are identified by a red mark in a box located on the back cover of this issue of the *GMG*. Please use the dues statement and self-addressed stamped envelope that were sent to you on January 10, 1994.

I would like to acknowledge the donations in excess of yearly dues made recently by several of our members to support our Student Research Grant. Your generosity is much appreciated!

Your thoughtful comments concerning VGS dues have been most useful. I will have a statistical breakdown in my report in the Spring *GMG*, but a large majority of you feel that the cost of membership in the VGS is appropriate. A few of you even considered it a bargain! Despite postal costs that are slated to rise soon, we will endeavor to hold down our expenses so that we may postpone an increase in dues for as long as possible.

Sincerely,

Stephen S. Howe

Executive Committee Meeting—1/3/94

Minutes

The Executive Committee of the Vermont Geological Society was called to order at 5:35 p.m. on January 3, 1994 at the University of Vermont, Burlington, Vermont. Members present included Larry Gatto, Steve Howe, Stephen Wright, Ron Parker, Shelley Snyder, Kent Koptiuch, and Nancy Keller.

Treasurer's Report: Steve Howe reported a current balance \$2,048.70 in the VGS bank account and updated the status of the membership dues. VGS currently has 190 members on its mailing list. Of those 190, 110 members have paid their 1993 dues. Steve also reported that he will prepare the 1994 dues statement that will be directly mailed to all 190 members. Those members who have not paid their 1993 dues by 3/1/94 will be dropped from the mailing list. The 1994 dues notice will also include a call for abstracts for the Winter Meeting, a survey regarding the approval/disapproval of the current cost for VGS membership, and a request for information for the VGS membership directory. Three new members were approved.

Winter Meeting: The 1994 Winter Meeting was discussed. This will be held at the CRREL facilities in Hanover, NH on February 26. Arrangements will be made for supplying morning refreshments only.

Reciprocal Agreements: Reciprocal agreements between the New Hampshire and Maine Geological Societies were briefly discussed. Stephen Wright reported that such an agreement does exist with the Maine Geological Society but was unsure of our arrangements with the New Hampshire Geological Society. More information regarding these agreements will be forthcoming at the next Executive Committee Meeting.

Guest Editors: Stephen Wright also requested recommendations for Guest Editor for the spring or summer GMG. It was decided to place a notice in the GMG inviting those interested in this opportunity to contact Stephen Wright or any member of the executive committee. It was suggested that there be only one guest editor for one issue per year.

Permanent Committee Reports: Education Committee Chair, Shelley Snyder, suggested that the teacher's hand-book for geologic information published by VGS be updated. Kent Koptiuch volunteered to help Shelley in this endeavor. Shelley was also interested in putting together a list of those VGS members who may be interested in allowing students to shadow them at their place of work.

Nominating Committee: A list of potential members of a Nominating Committee was created. Larry Gatto volunteered to contact these people to solicit their possible interest in serving on this committee.

The membership status of this committee will be discussed at the next executive committee meeting.

VGS Research Grant: Deadlines for the VGS Research Grants were discussed. It was suggested that there be two grant deadlines and awards each year (November and May). This change in the grant cycle would accommodate those students whose projects are planned in the fall semester and then initiated and completed during the spring semester. It was unclear if our dues could support the additional funding cycle. A decision will be made at the next Executive Committee Meeting.

Public Issues Committee Chair Vacancy: A recommendation was made for filling the post of Chair of the Public Issues Committee. Ron Parker agreed to contact a possible candidate for this position.

By-laws Changes: Larry Gatto recommended that the by-laws be updated. Suggested changes to the by-laws will be published in the GMG prior to the Fall Meeting.

VGS Posters: Larry also reported that he has gotten permission from CRREL to use their graphic design department to produce posters that will advertise the VGS Research Grant Program and that will encourage membership in VGS. These posters will be reviewed at the next executive committee. Recommendations will be made regarding color, size, quantity and cost.

Next Meeting: The Executive Committee will hold a luncheon meeting on February 26, 1994 at the CRREL facilities in Hanover, NH.

Meeting adjourned at 6:30 p.m.

Respectfully submitted

Nancy Keller
St.. Albans, Vermont

SEMINARS, MEETINGS, AND FIELD TRIPS

- February 26: **Vermont Geological Society Winter Meeting** at the Cold Regions Research and Engineering Lab, Hanover, New Hampshire. See this issue of the *Green Mountain Geologist* for details.
- February 28: University of Vermont Fall Seminar Series (4 P.M.): "*The Re-Os surprise at Mount Emmons, Colorado*" Dr. Holly Stein, U.S. Geological Survey.
- March 14: University of Vermont Fall Seminar Series (4 P.M.): "*Assembling a Continent: Deep crustal processes at an Archean plate zone boundary, Snowbird Tectonic Zone, Saskatchewan*" Dr. Michael Williams, University of Massachusetts.
- March 28-30: **Northeastern Section Geological Society of America Annual Meeting**, Binghamton. For information regarding the meeting contact H. Richard Naslund, Dept. of Geological Sciences, SUNY Binghamton, Binghamton, NY 13902; 607-777-4313.
- April 16 or 23: Vermont Geological Society Spring Meeting for the presentation of Student Papers. University of Vermont.
- April 18: University of Vermont Fall Seminar Series (4 P.M.): "*Risk Assessment: Using earth sciences for safety decisions*" Dr. Richard Bernknopf, U.S. Geological Survey.

Vermont Geology

Volume 7

"Field Trip Guidebook Number 3"

Editor: Stephen F. Wright

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**Cretaceous Intrusions in the Northern Taconic Mountains
Region, Vermont**

J. Gregory McHone & Nancy W. McHone

**Depositional Environments in the Mid-Ordovician Section at
Crown Point, New York**

Brewster Baldwin & Lucy E. Harding

The Altona Flat Rock Jack Pine Barrens, Altona, New York

David A. Franzi & Kenneth B. Adams

**The Champlain Thrust Fault, Lone Rock Point, Burlington,
Vermont**

Rolfe S. Stanley

**Stratigraphy of the Cambrian Platform in Northwestern
Vermont**

Charlotte J. Mehrtens

Price: \$8.00 (members), \$10.00 (non-members)

Order from: Stephen Howe, Treasurer

Department of Geology

University of Vermont

Burlington, VT 05405

THE GREEN MOUNTAIN GEOLOGIST
VERMONT GEOLOGICAL SOCIETY
DEPARTMENT OF GEOLOGY
UNIVERSITY OF VERMONT
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Executive Committee

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Vice President	Kent Kophinuch	800-498-9310
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of	Helen Mango '95	468-5611 ext 478
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