

# THE GREEN MOUNTAIN GEOLOGIST



QUARTERLY NEWSLETTER OF THE VERMONT GEOLOGICAL SOCIETY

VGS Website: [www.uvm.org/vtgeologicalsociety/](http://www.uvm.org/vtgeologicalsociety/)

WINTER 2006

VOLUME 33

NUMBER 1

*The Vermont Geological Society  
Winter Meeting  
February 18, 2006, 9:00AM  
Cabot Science Building, Room 085  
Norwich University, Northfield, Vermont*

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**WINTER MEETING PROGRAM**

- 9:00AM COFFEE & REFRESHMENTS
- 9:30AM David S. Westerman: AN ANALYSIS OF THE COX BROOK DRAINAGE BASIN: THE VALUE OF INTEGRATED SENIOR PROJECTS
- 9:50AM George E. Springston and Richard K. Dunn: SOME HIGHLIGHTS OF THE SURFICIAL GEOLOGY OF THE SOUTHERN WORCESTER MOUNTAINS, CENTRAL VERMONT
- 10:10AM Laurence R. Becker and Marjorie H. Gale: AN OVERVIEW OF THE VERMONT MINERAL INDUSTRY
- 10:30AM Andy McIntosh: THE CHANGING METAMORPHIC DEGREE OF THE SHELBURNE FORMATION THROUGHOUT CENTRAL AND NORTHERN VERMONT AND SOUTHERN QUEBEC
- 10:50AM Marjorie H. Gale, Peter J. Thompson, and Nicholas Ratcliffe: A PROGRESS REPORT FOR THE BEDROCK GEOLOGIC MAP OF VERMONT
- 11:20AM BREAK
- 11:30AM EXECUTIVE COMMITTEE MEETING

**ABSTRACTS****AN ANALYSIS OF THE COX BROOK DRAINAGE BASIN: THE VALUE OF INTEGRATED SENIOR PROJECTS**

David S. Westerman, Department of Geology, Norwich University, 158 Harmon Drive, Northfield, VT 05663

Environmental Science and Geology seniors from Norwich University studied different aspects of the Cox Brook Drainage Basin in central Vermont during the fall of 2004. Projects included 1) geochemical analysis of underlying bedrock down the axis of the basin which trends across strike, 2) correlation studies of clast lithologies and fine-grained fraction geochemistry of overlying lodgement till, 3) hydrologic discharge efficiency of sub-basins in the system, 4) correlation analysis of water chemistry, bedrock and till distribution, and anthropogenic influences, 5) contaminant distribution from a compromised well field within the basin, 6) analysis of water quality from a wetland and pond downstream from the well field, and 7) analysis of that pond's ecosystem. Each student spent the first part of the study collecting data and analyzing it to identify anomalies or "mysteries". It was quickly apparent that each project required the results from other projects in the study. For example, students found that clasts in

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till respond more quickly to changes in underlying bedrock composition than does the fine-grained fraction. Stream discharge varies with bedrock type and till cover. Stream chemistry is influenced by fault distribution, underlying bedrock and till composition, and development (roads and farms). Drilling additives are long-lived and traceable, but natural processes in wetlands and ponds are powerful in quickly modifying water composition and quality. As students work to prepare their final reports, each of them realizes the added value derived from building on the work of their colleagues.

#### SOME HIGHLIGHTS OF THE SURFICIAL GEOLOGY OF THE SOUTHERN WORCESTER MOUNTAINS, CENTRAL VERMONT

George E. Springston and Richard K. Dunn, Department of Geology, Norwich University, 158 Harmon Drive, Northfield, VT 05663; [gsprings@norwich.edu](mailto:gsprings@norwich.edu), [rdunn@norwich.edu](mailto:rdunn@norwich.edu)

Surficial geologic mapping has recently been completed in the southern Worcester Mountains in parts of Middlesex and Waterbury as part of a Vermont Geological Survey pilot project to integrate surficial and bedrock geologic data for ground water resource evaluation. During this work we have uncovered evidence for a previously unrecognized glacial lake and additional evidence for a late Wisconsinan glacial readvance in central Vermont.

Besides the previously recognized glacial Lakes Winooski, Mansfield I, and Mansfield II, we have uncovered evidence for a glacial lake on the west side of the Worcester Mountains that we have named Lake Thatcher. Lake Thatcher was impounded between ice to the west and hills to the east and south and drained south via Middlesex Notch. The present-day elevation of the shoreline is roughly 1,230 feet. An extensive sand and gravel deposit south of the notch appears to have been deposited by outflow from Lake Thatcher. Collapse features in the sand and gravel suggest deposition on a tongue of ice in the Winooski valley at a time coeval with Lake Winooski.

Two sites with dense, silt-matrix diamict overlying lacustrine deposits are interpreted to be the result of a glacial readvance. Other sites in the field area are also suggestive of readvance. Although the field research is still ongoing, these are the latest in a series of sites that we and other researchers have encountered in recent years that suggest that there was at least one substantial glacial readvance in central Vermont. We speculate that the readvance sites described here may correlate with the 11.9 ka <sup>14</sup>C Middlesex Readvance described by Fred Larsen in the Montpelier quadrangle.

#### AN OVERVIEW OF THE VERMONT MINERAL INDUSTRY

Laurence R. Becker and Marjorie H. Gale, Vermont Geological Survey, Waterbury, VT 05671; [laurence.becker@state.vt.us](mailto:laurence.becker@state.vt.us), [marjorie.gale@state.vt.us](mailto:marjorie.gale@state.vt.us)

In the early 21<sup>st</sup> century, Vermont's extractive industries are focused on the industrial mineral sector. Granite, marble, and slate are sold as dimension stone. Crushed product as an industrial filler is obtained from marble and talc sources. Within haul distances that are economically feasible, aggregate for road and construction purposes comes from a variety of rock types and

sand and gravel. The USGS in cooperation with the Vermont Geological Survey collects data on the State's mineral industry. Vermont mining production grew almost 70 percent between 1993 and 2003, but most of the growth came from increased mining of sand, gravel, and crushed rock. With extraction goes the reclamation of lands in response to today's environmental concerns. New quarry applications address operational and water quality considerations, set backs, final contours, and aesthetic considerations.

#### THE CHANGING METAMORPHIC DEGREE OF THE SHELBURNE FORMATION THROUGHOUT CENTRAL AND NORTHERN VERMONT AND SOUTHERN QUEBEC

Andy McIntosh, OMYA, Inc., 61 Main Street, Proctor, VT 05765

*[Abstract unavailable at press time]*

#### A PROGRESS REPORT FOR THE BEDROCK GEOLOGIC MAP OF VERMONT

Marjorie H. Gale, Vermont Geological Survey, Waterbury, VT 05671, marjorie.gale@state.vt.us; Peter J. Thompson, University of New Hampshire, Durham, NH 03824, pjt3@cisunix.unh.edu; and Nicholas Ratcliffe, U.S. Geological Survey, Reston, VA 20192, nratclif@usgs.gov

The Vermont Geological Survey (VGS), the U.S. Geological Survey (USGS), the University of Vermont and contractors have participated since the early 1980's in a cooperative venture to produce the new bedrock geological map of Vermont, first through the COGEOGMAP program, and later through the STATEMAP programs. The map incorporates detailed field studies conducted over 30 years by more than 60 geologists, including many students mentored by Stanley, Doolan, and Mehrstens.

Editors for the Vermont map are Nicholas Ratcliffe and Rolfe Stanley (posthumous). Associate Editors are Marjorie Gale and Peter Thompson. The one-degree sheets were compiled by Nicholas Ratcliffe, Rolfe Stanley, Barry Doolan, Charlotte Mehrstens, Norman Hatch, Douglas Rankin, Peter Thompson, Marjorie Gale, Jonathan Kim, and Greg Walsh. Vermont State Geologists involved in the project include Laurence Becker, Diane Conrad and Charles Ratte. Many other geologists have made significant contributions to the new map and it is important to share the progress of the map as we move towards review.

The 1:100000 scale map is based on mapping at scales of 1:5000 to 1:100000. More than 55 1:24000 scale quadrangles have been mapped, with additional reconnaissance mapping at a scale of 1:100000. During the past 12 years, many of the 1:24000 scale maps have been digitized and released as open file reports, thereby bringing new mapping to the public within a 1-2 year time frame. A brief comparison of the new map with the 1961 Centennial Geologic Map of Vermont will reveal many similarities yet highlight the greater detail throughout the state and the newly mapped faults and lithotectonic packages in northern Vermont.

A draft of the map was presented at VGS in 2001 and at NEGSA in Virginia in 2004. Since that time we have completed the correlation of units chart (CMU), generated a single set of unit

descriptions (DMU) and common nomenclature, reduced the number of units from over 800 to over 400, compiled the Mesozoic dikes and generated drafts of 5 cross-sections. New 1:24000 scale mapping from the Montpelier, Colchester, and Highgate areas has been added and Ratcliffe completed the compilation of the Taconics. The Silurian-Devonian section of Vermont, compiled by Norman Hatch, has been prepared digitally for review including the CMU and DMU. The review drafts of the NW and SW sheets, now with the USGS production staff and Chief Editor N. Ratcliffe in Reston, VA, are hand-drafted and hand-colored. Remaining tasks include final cross-sections which are consistent from north to south, a tectonic map, a map of references, and compilation/publication of geochronological and geochemical data.

## **PRESIDENT'S LETTER**

Hello all,

As I write this, my first "President's Letter", winter is trying to make a comeback, and recently we have had flooding (Dog and Mad Rivers locally) and landslides (downtown Montpelier), and with recent earthquakes and other natural hazards in the news, people are acutely aware of Earth as a dynamic place. Perhaps the apparent increase in natural hazards is just an increase in the media coverage, and the fact that we can get global news on the Internet, but whatever the reason, I hope that we as earth scientists are taking this opportunity of increased awareness and curiosity to educate our communities and to try and increase the number of geoscience students at our educational institutes.

Last summer's field trip on bedrock and surficial geology and its relation to water resources in the southern Worcesters, led by Jon Kim, Marjie Gale, George Springston and myself was well attended and spurred us to complete some of our work. The Fall Field Trip to Highgate Falls Gorge, to be led by Adam Schoonmaker, was cancelled due to high water and submerged rocks, but we hope to reschedule it sometime this year, so keep an eye out for a date on that. No field trip meant no Executive Meeting, but we did manage to decide by email that we would take the GMG to pdf format to save costs, and I urge you to select that option if you haven't already. We are looking for a summer field trip, so please think about volunteering some of your time and rocks.

Last year I served as the first VGS Lecturer and I was invited to talk at three Vermont colleges, Essex High School and the University of Maine-Farmington. We are looking for the next Lecturer, so please, if you have some recent research to share, volunteer for this, or nominate a colleague. I had a wonderful experience.

The Winter Meeting is just around the corner and I look forward to seeing you all here at Norwich. Lastly, thank you to Tim Grover, past President, for two great years of leadership.

Best wishes,  
Rick Dunn, President

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## ANNUAL MEETING MINUTES & ELECTIONS

Due to the cancellation of the Summer Field Trip to Highgate Falls Gorge, the Annual Meeting was also cancelled. The Executive Committee conducted its business electronically instead. I, acting as temporary secretary for Dave West, have summarized the discussions that took place by e-mail as the minutes to the Annual Meeting.

1. Steve Howe reported that Adam Schoonmaker was willing to run his Highgate Falls Gorge field trip again during the summer or fall of 2006. The Committee tentatively agreed that the trip would be best run in the fall, especially if an overnight canoe trip on the upper Connecticut River proposed by Dave Westerman at the Winter 2005 Meeting for the summer came to fruition.
2. February 18, 2006 was selected as the date for the upcoming Winter Meeting to be held at Norwich University. Although it was agreed that the theme this year would be "mineral resources," the Committee also suggested that personnel from the Vermont Geological Survey be encouraged to discuss their progress on the new bedrock geologic map of Vermont at the meeting.
3. Steve Howe reported that the Society had awarded over \$1,300 to four students who had applied to the Research Grant Program by the October 1, 2005 deadline. He indicated that the Society would be able to support the Program up to \$1,000 for the next round, the deadline of which is April 1, 2006.
4. A new publishing committee was established to handle the creation, printing, and mailing of the *Green Mountain Geologist* (GMG) for the next calendar year. Kathy Howe will handle acquiring all of the material from contributors and formatting both the paper and electronic versions of each issue. Steve Howe will review the content of each issue and send out the electronic version to members who have elected to receive it as a pdf file. Dave West will have the paper version printed and will mail it to members who have elected to receive a paper copy.

The GMG will also be modified so that it will be printed back-to-back on 8-1/2x11 inch paper, making formatting each issue much less time-consuming. The issue will be stapled once at the upper right and folded in half prior to mailing.

The Executive Committee also agreed strongly that efforts to urge members to opt to receive the GMG electronically as a pdf file should continue, emphasizing the significant savings in cost and effort to produce and mail an electronic version compared to a paper version, to say nothing of the environmental benefits of reducing paper consumption.

5. Membership renewal and directory information forms for 2006 were mailed out by the end of December to all members. It was agreed that dues would not be increased, despite the proposed increase in postal service rates in early January. The deadline for payment of dues was January 31, 2006.
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6. April 29, 2006 was selected as the date for the upcoming Spring Meeting to be held at Middlebury College this year.
7. The entire slate of Officers proposed for 2006 was voted for unanimously by a combination of e-mail messages from Executive Committee members and absentee ballots sent in to the Secretary by Society members. Immediate past-President Tim Grover was appointed to the Board of Directors for a one-year term, replacing Shelley Snyder whose long service to the Board was gratefully acknowledged. The Officers and Board of Directors assumed their duties at the close of the Annual Meeting.

Respectfully submitted,  
Stephen S. Howe

### **TREASURER'S REPORT**

The financial condition of the Society continues to be very strong. As of February 1, 2006, the Society's checking account balance was \$5,054.86. As indicated in the Advancement of Science Committee report, four Research Grants totaling over \$1,300 were awarded during the latest round of reviews. I expect to be able to support the Research Grant Program at a similar level for the next two rounds, but it is possible that, given the relatively flat income from dues, additional research grant contributions, and other sources, future support beyond next year may be slightly more constrained. To my knowledge, there are no outstanding bills.

The 2006 membership renewal and directory information form was mailed to all members before December 31, 2005. The deadline for renewal is January 31, 2006. Many members have already returned their forms with their payments, including a number with additional contributions to the Research Grant Program, but there are still quite a few members who have not yet returned their forms. Please help the Society keep expenses to a minimum by renewing your membership promptly.

Despite the increase in postal service rates, I have recommended that dues remain at the same level as last year. I urge as many members as possible to consider receiving the *Green Mountain Geologist* electronically as a pdf file to help keep the Society's publication and mailing costs low, which will, in turn, allow us to keep membership in the VGS the bargain that it already is.

Respectfully submitted,  
Stephen S. Howe, Treasurer

### **ADVANCEMENT OF SCIENCE COMMITTEE REPORT**

The Committee has been busy with two projects since its last report, reviewing applications to the Research Grant Program and soliciting abstracts for the Winter Meeting.

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Four applications to the Research Grant Program were received by the October 1, 2005 deadline from students at Dartmouth College, Green Mountain College, Middlebury College, and the University of Vermont. The Committee was very impressed with the quality of the applications and awarded over \$1,300 in Research Grants to all four students.

The theme of the Winter Meeting this year is “mineral resources.”

Respectfully submitted,  
Stephen S. Howe, Chair

## **VERMONT STATE GEOLOGIST’S REPORT**

Thanks to those who wrote the Agency of Natural Resources in support of geology, the earth sciences and the need for science in decision making. Comments are still being accepted by contacting:

John Sayles, Director for Policy Research and Planning  
Agency of Natural Resources, 103 South Main St., Waterbury, VT 05671  
802-241-3957; john.sayles@state.vt.us

Some recent examples of the uses of basic geologic data are described below:

### **Manchester Quadrangle**

Surficial geologic mapping and groundwater resource derivative maps for Manchester in September 2004 led to a funded special project to determine how water may be contributed to the Town wells in Manchester from the far side of the Battenkill River. The maps completed by Dave DeSimone were further employed in the review of a proposed development in Manchester near Bourn Brook and Richville Road. Depth to groundwater as it relates to a stormwater retention basin is at issue and static levels from located water wells and surficial geologic mapping gave a picture of the water table. Comments to regulators and the Town also incorporate lessons learned from the groundwater level monitoring study. Both these science efforts relating to groundwater protection issues are prime examples of the importance of understanding the groundwater resource through geologic mapping.

### **Montpelier Rockslide**

Jon Kim and Marjorie Gale have mapped in the Montpelier Quadrangle including the formation in which the December 26<sup>th</sup> rockslide occurred. The Vermont Survey met with Montpelier’s geotechnical consulting firm, Golder Associates. Tom Eliassen of the Highway Department and the Assistant City Engineer were in attendance having been the first to address the problem. The Division provided a briefing to Golder on the base geologic information and recent post slide structural geology measurements taken by Jon Kim. Golder is designing the stabilization plan and always uses detailed geologic information to insure long-term stability of the geotechnical engineering design and construction.

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**Groundwater Resource Mapping – Williston**

On October 25, 2005, the State Geologist presented to the Williston Planning Commission the results of a hydrogeologic study prepared by the Vermont Survey for select areas in the Town using existing information. One of the selected areas is often reported to have low yields and located water well data confirm the difficulties home owners face in the area when drilling for adequate yields to meet domestic demand. The maps and well data can assist future homeowners and the Town when planning to mitigate the low yield issue.

**Westmore Route 5A Rock Slides**

Sam Lewis, Agency of Transportation (AOT) Operations Director, called a meeting at the District Garage serving the Route 5A section that is east of Lake Willoughby and below steep slopes and talus of Mt. Pisgah. The purpose was to better understand a recent rockslide and get a historical perspective on other events. The AOT geologist, Tom Eliassen, and Jon Kim of the Vermont Survey both presented on the subject and a discussion was held with Mr. Lewis, the District Chief, local emergency responders, geologists, and the State Geologist to consider prudent follow-up steps.

**Moretown Landfill and Geology**

The State's Waste Management Division (WMD) contacted the Vermont Survey about bedrock geology in the vicinity of the Moretown landfill. An application to expand the landfill is in technical review. Geology is mapping the northern portion of the Waterbury quadrangle and has mapped an inactive, steep, thrust fault in the area. The fault mapped is near the western edge of the landfill property. Marjorie Gale of the Vermont Survey visited the site with WMD and the landfill consultant to describe the bedrock geology and the fault zone. WMD asked the applicants to include a discussion about the bedrock geology in their site characterization, specifically how it may relate to movement of contaminants through groundwater and their groundwater-monitoring plan.

**Dry Fuel Storage at Vermont Yankee**

The State Geologist is advising the Agency of Natural Resources on review of a dry cask storage proposal at Vermont Yankee. Storage of high-level radioactive waste in concrete canisters is proposed to begin in 2007. The planned testimony focuses on seismic and liquefaction questions and the State Geologist directed his attention to groundwater levels and geologic materials as they relate to liquefaction potential beneath the storage pad. Cooperation with UVM geotechnical engineering professor Mandar Dewoolkar led to his testimony (November 2005) on seismic soil intersection studies, a cask sliding analysis, seismic slope instability, and liquefaction issues. The liquefaction technical issues focus on the use of blow counts from individual wells vs. averaging blow counts for all the overburden under the dry fuel storage pad.

**New Location**

The move is complete so please stop by and visit. The Logue House is out front along the horseshoe shaped entrance to the Waterbury State Office complex. The new address is:

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Vermont Geological Survey  
Division of Geology and Mineral Resources  
Vermont Dept. of Environmental Conservation  
103 South Main Street  
Waterbury, VT 05671-2420

Respectfully submitted,  
Laurence R. Becker, State Geologist

## CALL FOR STUDENT ABSTRACTS

### SPRING MEETING OF THE VERMONT GEOLOGICAL SOCIETY SATURDAY, APRIL 29, 2006

The Vermont Geological Society will hold its Spring 2006 Meeting in Bicentennial Hall Room 220 at Middlebury College in Middlebury, Vermont. The meeting is dedicated to students conducting research in the geological sciences. Undergraduate and graduate students are encouraged to submit abstracts outlining the results of their research. Abstracts covering all aspects of the geological sciences are welcome and will be published in the Spring issue of the *Green Mountain Geologist*. The Charles Doll Award for the outstanding undergraduate paper will be presented. Cash awards for the top three papers will also be presented based on quality of the research, the abstract, and the presentation of the paper.

Abstracts should be prepared using the style employed for abstracts submitted to Geological Society of America meetings (maximum of 2,000 characters without spaces). We strongly encourage speakers to send their abstracts electronically as a Word file attachment to an e-mail message sent to Kathleen Howe at [khowe@uvm.edu](mailto:khowe@uvm.edu)

If electronic submission is not possible, please mail your abstract well in advance of the deadline to:

Kathleen Howe  
University of Vermont  
Office of Health Promotion Research  
1 South Prospect Street, Room 4428A  
Burlington, VT 05401

Oral presentations will be limited to 15 minutes with 5 additional minutes for questions. A computer projection system for PowerPoint presentations will be available as well as slide and overhead projectors.

**Deadline for abstracts: Monday, April 10, 2006**

For additional information regarding capabilities for presentations at the meeting, contact Dave West at (802) 443-3476 or [dwest@middlebury.edu](mailto:dwest@middlebury.edu)

**ANNOUNCEMENTS****STUDENT RESEARCH GRANT APPLICATIONS  
DUE APRIL 1, 2006**

Students and secondary school teachers are encouraged to apply to the VGS Research Grant Program by April 1, 2006. Downloadable Research Grant Program Applications are available from the Society's website at [www.uvm.org/vtgeologicalsociety/](http://www.uvm.org/vtgeologicalsociety/). For those without Internet access, forms may be obtained by writing to Stephen Howe at the Dept. of Earth and Atmospheric Sciences, University at Albany, ES-351, 1400 Washington Avenue, Albany, NY 12222-0001. Tel: (518) 442-5053; e-mail: [showe@albany.edu](mailto:showe@albany.edu)

**VERMONT GEOLOGICAL SOCIETY CALENDAR**

- April 1: Student Research Grant Program Applications due
- April 10: Student abstracts for Spring Meeting due
- April 10: Executive Committee reports due
- April 29: Spring Meeting, Middlebury College

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

**Executive Committee**

President	Richard Dunn	802-485-2304	<a href="mailto:rdunn@norwich.edu">rdunn@norwich.edu</a>
Vice President	George Springston	802-485-2734	<a href="mailto:gsprings@norwich.edu">gsprings@norwich.edu</a>
Secretary	David West	802-443-3476	<a href="mailto:dwest@middlebury.edu">dwest@middlebury.edu</a>
Treasurer	Stephen Howe	518-442-5053	<a href="mailto:showe@albany.edu">showe@albany.edu</a>
Board	Ray Coish	802-443-5423	<a href="mailto:coish@middlebury.edu">coish@middlebury.edu</a>
of	Tim Grover	802-468-1289	<a href="mailto:grovert@castleton.edu">grovert@castleton.edu</a>
Directors	Helen Mango	802-453-1478	<a href="mailto:mangoh@castleton.edu">mangoh@castleton.edu</a>

**Committees**

Advancement of Science	Stephen Howe
Education	Christine Massey
Membership	Stephen Wright
Public Issues	Laurence Becker
Publishing	Kathleen Howe, Stephen Howe, and David West

**Vermont Geological Society  
Winter Meeting  
February 18, 2006, 8:30 AM  
Cabot Science Building, Room 085  
Norwich University, Northfield, Vermont**

Directions to Norwich University:

Norwich University is located on VT Route 12, one mile south of the center of Northfield. It can be reached from I-89 by taking Exit 5 and following VT Route 64 west to Route 12, and then north to the University. The Geology Department is located in Cabot Science Building, the southeastern most brick building on campus, just west of Route 12. The entrance is near the northeast corner of the very large white Kreitzburg Library, which can't be missed. The easiest parking for the meeting will be in the commuter lot opposite the Science/Engineering complex on the east side of Route 12.

**Vermont Geological Society  
P.O. Box 1224  
Saint Albans, VT 05478-1224**

*ADDRESS CHANGE?*

*Please send it to the Treasurer at the above address*

# THE GREEN MOUNTAIN GEOLOGIST



QUARTERLY NEWSLETTER OF THE VERMONT GEOLOGICAL SOCIETY

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*The Vermont Geological Society's*

## *Summer Field Trip*

*The Stanbridge Nappe in Vermont: A Reappraisal of its Allochthonous Nature  
Highgate Falls Gorge, Highgate Center, Vermont*

*June 24, 2006*

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**SUMMER FIELD TRIP DESCRIPTION AND ROAD LOG**

Saturday, June 24, 2006

TITLE: The Stanbridge Nappe in Vermont: A Reappraisal of its Allochthonous Nature

TIME: 9:00 AM – 5:00 PM

MEETING POINT INFORMATION: We will meet at 9:00 AM in the parking lot behind the UVM Geology Department at Delehanty Hall on the old Trinity College Campus adjacent to the University of Vermont. From I-89, take exit 14 (Main Street–Route 2 exit), and go west (towards the lake) to East Avenue. Turn right on East Avenue and go to the end of East Avenue and proceed straight across Colchester Avenue and into the driveway. Delehanty Hall has a slate exterior and large granite blocks in front of it. Once on the driveway, bear around to the left and the parking lot is in the rear. The first field trip stop near Highgate Center will be about an hour's drive from this location.

LEADER: Adam Schoonmaker, Department of Geology, UVM

FIELD TRIP DESCRIPTION: This trip will feature the spectacular exposure of upper Cambrian and Lower Ordovician carbonate shelf strata and overlying shales in the Highgate Falls Gorge, at Highgate Center, northwestern Vermont. Here, a continuously exposed, conformable sequence of sandy dolomitic breccias of the Gorge Formation and slaty limestones and limestone breccias of the Highgate Formation, are overlain by black slates of the Morses Line Formation. In Quebec, this sequence is inferred to contain a major tectonic boundary between allochthonous slaty limestones and slates (Highgate and Morses Line Formations) and underlying dolomites of the Laurentian shelf sequence. We shall examine the relationship of these rocks in the gorge and at selected stops to the north, near the International Border.

Also, beautifully exposed in the gorge, is the lightly studied Highgate Falls Thrust, an out-of-sequence thrust fault that is likely part of the larger Champlain Thrust system, and emplaces upper Cambrian dolomite breccias of the Gorge Formation over lower to mid-Ordovician black slates of the Morses Lines Formation. Additionally, diachronously evolved en echelon fractures sets (many showing various stages of rotation) and associated minor thrusts are well displayed throughout the slates beneath the thrust.

*Walking in the gorge can be somewhat treacherous due to boulder field in the channel—may be slippery if wet. Care should be observed, and adequate footwear is advised.*

FIELD TRIP ROAD LOG: (See above for information on departure location)

- 0.0 mi Parking Lot behind Delehanty Hall. Leave for main entrance at intersection of Colchester and East Ave.
- 0.1 Go straight through intersection onto East Ave.
- 0.8 Take left onto Main St.
- 1.3 Take right onto entrance ramp of I-89 North.
- 30.9 Take Exit 20 at St. Albans. Go right onto VT Route 207 North.

- 37.6 Go over bridge over Mississquoi River (Highgate Gorge).
- 37.9 Take right onto VT Route 78 (also follows VT 207).
- 38.1 Take right at village green (Mill Hill St). Take unlabelled street (also Mill Hill St?) by bearing right down to gorge.
- 38.4 Park at areas next to footbridge and Highgate Falls dam.  
**STOP 1: Highgate Falls Gorge.**
- Go back up Mill Hill St(?) to intersection with VT 78.
- 38.7 Take right onto VT 78 (also VT 207).
- 38.75 Take left to stay on VT 207 (leaving VT 78).
- 40.3 Take left onto Tarte Road.
- 41.8 Pull over and park just before small bridge over Rock River. **STOP 2: Highgate Formation.**
- 42.9 Take driveway on left at right-angle turn in road (Choiniere's blue house on corner). Pass through gate in electric fence (PLEASE CLOSE GATE AFTER ENTERING AND LEAVING!). Park in cow field. Mind your step here. **STOP 3: Choiniere Farm.**

## SPRING MEETING MINUTES

Saturday, April 29, 2006

The Spring Meeting was a great success, with 14 excellent talks by Middlebury students. Unfortunately, we had only two judges, Greg Walsh and myself, and this is an issue the Executive Committee will have to address prior to next year's Spring Meeting, to be held at the University of Vermont. I, acting as temporary secretary for Dave West, have summarized the Executive Meeting discussions below.

Once again, there was no quorum at the Executive Committee Meeting after the student presentations, with just Dave West and myself in attendance. I presented my usual Treasurer's and Advancement of Science Committee Reports and we discussed a number of the items that were brought up previously at the Winter Meeting. We agreed that we would like to have both a summer and a fall field trip, and that the fall field trip and annual meeting should be held on October 14th, the last day of Earth Science Week. This date also has the advantage of not conflicting with the dates for a number of other geological meetings in a crowded fall. We recommended that Rick Dunn and George Springston be asked to continue to serve as President and Vice President, respectively, for 2006-2007, but noted that we need 3 new candidates for the Board of Directors to take office in the fall. We commented on the success of Rick Dunn's tenure as VGS Lecturer and suggested the names of several candidates to bring up to the entire Executive Committee as potential future Lecturers. Finally, we recommended that it is not necessary for the Society to take a position concerning the Geological Society of America's statement about evolution.

Respectfully submitted,  
Stephen S. Howe

## **TREASURER'S REPORT**

The financial condition of the Society continues to be very strong. As of June 1, 2006, the Society's checking account balance was \$4,905.86. To my knowledge, there are no outstanding bills.

The following member has been approved for membership in the Society since the last report: Peter Ryan, Middlebury, VT.

Respectfully submitted,  
Stephen S. Howe, Treasurer

## **ADVANCEMENT OF SCIENCE COMMITTEE REPORT**

The Society's Spring Meeting was a showcase for the excellent research carried out by 14 Middlebury College undergraduate students. The following students received awards for their presentations:

1st Place Award and Doll Award (\$100): Nate Morris, Middlebury College  
2nd Place Award (\$75) (tie): Brad Michalchuk, Middlebury College  
2nd Place Award (\$75) (tie): Lynne Zummo, Middlebury College  
3rd Place Award (\$50): Hillary Brooks, Middlebury College

The Charles G. Doll Award, given for the top undergraduate student presentation, is a plaque with the student's name and school engraved on it that is kept at the student's school until the following year's Spring Meeting. The Spring 2007 Meeting will be held at the University of Vermont.

The Committee will recommend several dates in early March 2007, for the Society's next Winter Meeting. Members are encouraged to contact me with any suggestions they may have for a theme for the meeting.

The Committee received one application to the Society's Research Grant Program by the deadline of April 1, 2006. It awarded a partial grant to Elizabeth J. Barclay, from Dartmouth College, for her proposal "Vertical Infiltration of Particle-bound Contaminants into Stream Beds." Applications for the second round are due September 30, 2006. Please see the Society's website for details.

The Committee gratefully acknowledges the contribution to the Society's Research Grant Program by Peter Ryan.

Respectfully submitted,  
Stephen S. Howe, Chair

## **STATE GEOLOGIST'S REPORT**

In May 2006, the Vermont Legislature established a committee to report by January 2007 on a proposed schedule for the groundwater mapping of the State including a proposed funding mechanism. The State Geologist is named to the committee along with the Secretary of the Agency of Natural Resources, legislators, and others representing various interests. In anticipation of groundwater mapping finally achieving the status that it deserves, the Vermont Geological Survey has been developing prototype map products in recent years. Most recent offerings are the Draft Surficial Geology and Hydrogeology of Brandon, Vermont, by David DeSimone, and the Geologic Framework for Evaluating Ground Water Resources in the Southern Worcester Mountains, Central Vermont by Jonathan Kim, George Springston, Marjorie Gale, Richard Dunn, and Laurence Becker (a poster presented at the Northeastern Section Meeting of the Geological Society of America in March 2006). This is an exciting time, as groundwater contained within the geologic vessel will soon receive increased study with practical benefits for resource identification and protection.

Respectfully submitted,  
Laurence R. Becker, State Geologist

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**ANNOUNCEMENTS****NEW MEMBERSHIP DIRECTORY**

A new membership directory is enclosed in this issue of the Green Mountain Geologist.

**COMMUNICATIONS DIFFICULTIES WITH AOL E-MAIL ADDRESSES**

The Society wishes to alert VGS members that Stephen Howe, who normally sends out all Society e-mail correspondence, is unable to communicate intermittently with those members having AOL e-mail addresses. Until further notice, Kathleen Howe will send pertinent e-mail notices to AOL members instead. We remind all members to also check the Society's website frequently for updated calendar announcements.

**VERMONT GEOLOGICAL SOCIETY CALENDAR**

6/24/06	VGS Summer Field Trip, Highgate Center, Vermont
9/29-10/1/06	NEIGC 98 <sup>th</sup> Annual Meeting, Rangely, Maine
9/30/06	Student Research Grant Program Applications due
10/6-8/06	NYSGA Annual Meeting, Buffalo, New York
10/14/06	VGS Fall Field Trip and Annual Meeting
10/22-25/06	GSA Annual Meeting and Exhibition, Philadelphia
10/30-11/4/06	AEG Annual Meeting, Boston

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

**Executive Committee**

President	Richard Dunn	802-485-2304	rdunn@norwich.edu
Vice President	George Springston	802-485-2734	gsprings@norwich.edu
Secretary	David West	802-443-3476	dwest@middlebury.edu
Treasurer	Stephen Howe	518-442-5053	showe@albany.edu
Board	Ray Coish	802-443-5423	coish@middlebury.edu
of	Tim Grover	802-468-1289	grovert@castleton.edu
Directors	Helen Mango	802-453-1478	mangoh@castleton.edu

**Committees**

Advancement of Science	Stephen Howe
Education	Christine Massey
Membership	Stephen Wright
Public Issues	Laurence Becker
Publishing	Kathleen Howe, Stephen Howe, and David West

**Vermont Geological Society**  
**P.O. Box 1224**  
**Saint Albans, VT 05478-1224**

***ADDRESS CHANGE?***

*Please send it to the Treasurer at the above address*

**Vermont Geological Society**  
**Summer Field Trip**  
**June 24, 2006, 9:00 AM**  
**Delehanty Hall Parking Lot**  
**University of Vermont, Burlington, Vermont**

Directions to Delehanty Hall:

We will meet at 9:00 AM in the parking lot behind the UVM Geology Department at Delehanty Hall on the old Trinity College Campus adjacent to the University of Vermont. From I-89, take exit 14 (Main Street–Route 2 exit), and go west (towards the lake) to East Avenue. Turn right on East Avenue and go to the end of East Avenue and proceed straight across Colchester Avenue and into the driveway. Delehanty Hall has a slate exterior and large granite blocks in front of it. Once on the driveway, bear around to the left and the parking lot is in the rear.

# THE GREEN MOUNTAIN GEOLOGIST



QUARTERLY NEWSLETTER OF THE VERMONT GEOLOGICAL SOCIETY

VGS Website: [www.uvm.org/vtgeologicalsociety/](http://www.uvm.org/vtgeologicalsociety/)

FALL 2005

VOLUME 33

NUMBER 4

*The Vermont Geological Society's  
Fall Field Trip & Annual Meeting*

*Glacial Geology of Northern Vermont: Waterville, Belvidere, and Eden*

*October 14, 2006*

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## FALL FIELD TRIP DESCRIPTION AND ROAD LOG

**Saturday, October 14, 2006**

**Title:** Glacial Geology of Northern Vermont: Waterville, Belvidere, and Eden

**Time:** 9:30 AM – 5:00 PM

**Meeting Point:** Meet at 9:30 AM at the Grand Union parking lot, Main Street (Route 15), Johnson, Vermont

**Leader:** Stephen Wright, Department of Geology, University of Vermont

**Field Trip Description:** The objective of this year's fall field trip is to introduce participants to several key elements of northern Vermont's glacial geology. In particular, we will look at several localities that shed light on changes that were taking place as the ice sheet thinned and its flow direction changed from flowing southeastward across the mountains to southward, parallel to the mountain range. All of the field stops occur along the upper reaches of two tributaries to the Lamoille River: the North Branch and the Gihon River. Field stops will include the spectacular bedrock channels with 5-meter-diameter potholes occurring on the eastern side of Shattuck Mountain, a variety of high-elevation ice-contact sediments deposited in and around Belvidere Bog, the outlet to the western arm of Glacial Lake Memphremagog just below the Belvidere asbestos mine, large-scale fluvial landforms produced downstream from that outlet, and a visit to Ritterbush Pond to investigate both its glacial and Holocene history. I will present maps showing reconstructions of the retreating Laurentide Ice Sheet to explain the hydrologic setting within the ice sheet and environments in which ice-contact and lacustrine sediments were deposited.

**Food:** Please bring along a lunch, as we will be far from any source of food during most of the trip. Food is available from several restaurants in Johnson including the Edelweiss Bakery on the west end of the village, the Bad Girls Café in the center of the village, and the Plum and Main Restaurant, also in the middle of the village. All are a short walk from the Grand Union parking lot.

**Hikes:** This field trip includes several short hikes. To reach Stop 1, the Shattuck Mountain Channels, we will hike less than 1 km with a modest elevation gain, but the hike does involve some bushwhacking and some short, but steep slopes. Stop 5 (Ritterbush Pond) is reached via a ~1.5 km hike along an almost level woods road. Once there we will also hike up to Big Muddy Pond (an additional 15-minute hike). Hiking boots or sturdy sneakers should be adequate foot wear.

### Detailed Road Log (distance in miles):

0	<b>START—Grand Union Parking Lot on Rt 15.</b> Go left (west).
1.7	Jct Hogback Rd with Rt 15: Turn right. Road follows north side of Lamoille River Valley.
6.2	Jct Hogback Rd with Rt 109: Turn right (north) on 109. Pass through village of Waterville.
10.4	Jct Rt 109 and Smithville Rd: Turn left.
11.3	Jct Smithville Rd with Shipman Rd: Turn left.
11.4	Shipman Rd takes sharp right turn. Continue along single lane road.

11.8	Continue past several camps to clearing. Park here. <b>STOP 1—Shattuck Mountain Channels and Potholes</b>
13.2	Return to jct with Rt 109: Turn left (north) here.
14.3	Glacial Lake Mansfield Delta terrace (246 m).
20.4	Jct Bog Rd, Rt 109, and Rt 118: Turn right on Bog Rd.
21.3	Parking area on south side of road just past bridge over stream (N. Branch of Lamoille River). <b>STOP 2—Small Gravel Pit: Glaciolacustrine/Ice Contact Sediments</b>
22.2	Return to Jct with Bog Rd/Rt 109/Rt 118. Go north on Rt 118.
25.2	Pull off along side of Rt 118. <b>STOP 3—Esker and Kettle</b>
28.2	Return to Jct of 118 and 109. Continue East on 118.
30.1	Turn left into Long Trail Parking Lot. <b>STOP 4—Striations depicting two different directions of ice flow</b>
30.9	Jct with Rt 118 and Crooks Rd: Turn right (south) on Crooks Rd.
32.3	Jct with Crooks Rd and Baker Rd: Turn right (west) on Baker Rd.
32.9	Babcock Preserve Parking Lot: Parking here is limited to ~5 cars. Vehicles not fitting in this lot may park along the side of the road before entering the Babcock Preserve. <b>STOP 5—Ritterbush Pond: Ice-Contact Deposits, Glacial Lake Winooski Delta, and Holocene History</b>
33.5	Return to Jct of Baker Rd with Crooks Rd: Turn right on Crooks Rd.
34.6	Jct of Crooks Rd with Knowles Flat Rd: Turn right (south) on Knowles Flat Rd.
35.2	Jct with White Rd on right: Bear left continuing on Knowles Flat Rd.
36.3	Jct Rt 100 and Knowles Flat Rd: Turn right (south) on Rt 100 <b>STOP 6—Dark Branch, White Branch, and Gihon river valley history.</b> If time permits, we will drive north to the Belvidere Asbestos mine, which is also the outlet of the Western Arm of Glacial Lake Memphremagog.
39.6	Jct Rt 100 and Rt 100C in North Hyde Park: Turn right on 100C.
44.2	Jct Rt 100C and Rt 15 in Johnson Village: Turn right (west).
44.4	<b>END—Grand Union Parking Lot on Rt. 15.</b>

## ANNUAL MEETING AND ELECTION OF OFFICERS

The VGS Annual Meeting will take place immediately following the field trip. The exact location of this meeting will be decided during the field trip, but it will be at either the Bad Girls Café or the Plum and Main Restaurant. If you are unable to attend the field trip and Annual Meeting, please send the enclosed absentee ballot by October 12, 2006 to David West, Dept. of Geology, Middlebury College, Middlebury, VT 05753. The ballot lists the names of the incumbent officers and three new nominees for Board of Directors.

## PRESIDENT'S LETTER

Dear Fellow VGS Members,

Fall is upon us and outcrops are beginning to emerge from the foliage. This means the fall field trip is here! Stephen Wright will lead us on a trip this year – please see the details in this newsletter and make every effort to leave those daily responsibilities behind for a day of field wanderings.

Our Society is financially sound. We are saving some money by moving the GMG to a pdf format as much as possible, and our student research fund awaits applicants. Three new candidates are up for election to the Board of Directors this year, Les Kanat, Jon Kim, and John Van Hoesen. Thanks to the three of you.

Earth Science Week is October 8-14, and the theme this year is “Be a Citizen Scientist!” According to the AGI, “*What does it mean to be a citizen scientist? It means getting involved! Real people collecting data, observing, and testing. You don't have to have a Ph.D. or even formal education in Earth science to be a citizen scientist, only an interest and desire to learn. A citizen scientist is YOU involved in real science and research!*” I urge our members to think of one small thing (at least!) that they can do to address the statements above, whether it be directed to K-12 kids or local policy makers or your neighbors! We need more, much more, public awareness of our field, the kind of scientific exploration we conduct, and the kind of information we provide to the public. Talk to some people and then let them promote us.

Have a great fall, and I look forward to seeing you at the field trip!  
Rick Dunn, President

## SUMMER MEETING MINUTES

Saturday, June 24, 2006

The Executive Committee Meeting was held over lunch during the Summer Field Trip in Highgate Center, Vermont. Once again, there was no quorum as the two of us were the only members of the Executive Committee in attendance. Steve presented the Treasurer's and Advancement of Science Committee reports, indicating that the Society is financially sound, that one student research grant was awarded in the round that concluded in the spring, and that the Society can continue to support the research grant program at the same financial level for the next several rounds. Membership in the Society has been very stable with approximately 100 individual and family memberships and about 10 institutional memberships. We agreed on the need to stimulate student membership. Fifty percent of members have elected to receive the *Green Mountain Geologist* electronically as a pdf file and that we should continue to promote this option in order to save more Society funds for research grants. Rick noted that no one had volunteered to be the next VGS Lecturer, but we both felt this is a program worthy of continuance. Finally, we discussed the need for three new candidates for Board of Directors in the upcoming election. Following the meeting, Steve asked Les Kanat and Jon Kim if they would both consider standing for election to the Board of Directors and both agreed. A third candidate would be identified later.

Respectfully submitted,  
Rick Dunn and Steve Howe

## TREASURER'S REPORT

The financial condition of the Society continues to be strong. As of September 1, 2006, the checking account balance was \$4,910.46. To my knowledge, there are no outstanding bills. A financial statement for the period 10/1/05-9/1/06 is indicated below. The Green Mountain Geologist was printed this year at no cost to the Society due to the generosity of the Department of Geology of Middlebury College.

The following members have been approved for membership in the Society since the last report: Paul Madden, Enosburg Falls, Vermont; Maartjee L. Melchior, Bristol, Vermont; and Tom Rigley, Springfield, Vermont.

The 2007 membership renewal and directory information form will be mailed out to all members by December 31, 2006. The deadline for renewal will be January 31, 2007.

Respectfully submitted,  
Stephen S. Howe, Treasurer

### Income and Expenses 10/1/05-9/1/06

#### INCOME

Total Dues		\$1,658.00
Member	\$1,320.00	
Family	\$240.00	
Student	\$8.00	
Institution	\$90.00	
Student Research Grant Contributions		\$490.00
<i>Vermont Geology Sales</i>		\$165.00
<b>TOTAL INCOME</b>		<b>\$2,313.00</b>

#### EXPENSES

<i>Green Mountain Geologist Printing</i>		\$0.00
Postage		\$165.61
Office Supplies, telephone call		\$10.03
Post Office Box Rental (to 8/1/07)		\$50.00
Winter Meeting Refreshments		\$68.71
Spring Meeting Refreshments		\$74.50
Awards		\$1,746.00
Research Grants	\$1,446.00	
Spring Meeting Student Talks	\$300.00	
<b>TOTAL EXPENSES</b>		<b>\$2,114.85</b>
<b>TOTAL INCOME – TOTAL EXPENSES</b>		<b>\$198.15</b>

## **ADVANCEMENT OF SCIENCE COMMITTEE REPORT**

The Committee will recommend several dates in early March 2007 for the Society's next Winter Meeting. Members are encouraged to contact me with any suggestions they may have for a theme for the meeting.

Respectfully submitted,  
Stephen S. Howe, Chair

## **STATE GEOLOGIST'S REPORT**

### **Isle La Motte**

The dedication at the Goodsell Ridge Fossil Preserve brought an unexpected pleasure. I had the good fortune to stand with Dr. Charles Ratté, the former Vermont State Geologist from 1975 to 1991, while helping to cut the ceremonial ribbon. Chuck during his tenure suggested to the Fitch family that the fossil reef be preserved for educational purposes and it was a proud day to see him help launch the new enterprise. Thanks to Charlotte Mehrtens, Linda Fitch, the LaBombards, Lake Champlain Land Trust, and the Isle la Motte Preservation Trust for the dedication ceremony and all their hard work to bring this project to fruition.

### **Geology Mapping and Arsenic**

Geologic mapping by Marjorie Gale and Jon Kim is complete north of Waterbury to understand the geologic context for the occurrence of high levels of arsenic in several homes. As part of a larger mapping project, Middlebury College is cooperating by collecting water well samples and analyzing data. The Department of Environmental Conservation lab is involved in water quality analyses as well.

### **Smugglers' Notch Slides**

Stowe Mountain Rescue identified recent slide blocks in Easy Gully. A meeting was held at Smugglers' Notch with Commissioner Jonathan Wood of Forest, Parks and Recreation; Larry Becker, Vermont State Geologist; Chris Benda, AOT Geotechnical Engineer; Gary Moran, AOT Regional Office; George Springston, Geologist, Norwich University; and Neil Van Dyke of Stowe Rescue. It was agreed that this is a continuous slide process happening throughout the Notch and that the boulder(s) in question are now in the middle of the process of breaking off and moving to the toe of the slope, but when they will next move is not known. At first discussion, the danger at present did not seem out of line with other settings that pose a risk of blocks moving to the toe of slope and toward Vermont Route 108. Neil Van Dyke, however, believes that one boulder is unusually placed compared to all others he has seen in his 30-year career in the Notch. Signage to indicate the hazard for people accessing trails near Route 108 and for the road approaches to the highway were discussed as mitigation measures. Norwich University, in partnership with the Vermont Geological Survey, will write up the geology, and recommendations will be made after the details are considered. For management planning, the Survey will propose to Forest, Parks, and Recreation a study to indicate higher risk areas in the Notch. Confusion between a debris slide visit of July 5<sup>th</sup> and the boulder/large rock event first reported on August 14<sup>th</sup> was cleared up. These are two different events. The previous event was of a smaller scale.

**Brandon Groundwater**

Following a presentation by Dave DeSimone and by the State Geologist to the Brandon Fire District, Planning Commission, and Town Manager of draft groundwater resource and recharge area maps based on Dave's surficial mapping and existing bedrock geology, the Fire District met to consider issues raised by the maps. The study identified potential sand and gravel aquifers in the McConnell Road area and pointed to the need to know more about the Neshobe's surface water contribution to the existing aquifer that serves the Town wells. The Fire District also wants to know the extent of the existing aquifer and its long-term sustainable yield. A replacement aquifer should have the following characteristics: not hydraulically connected to the existing tapped aquifer; within a reasonable distance of the current distribution line; possessing sufficient yield and quality for public water supply use; protected by low permeability surficial deposits; free of existing high-risk land-use activities; and unappealing for future land development.

Respectively submitted,  
Laurence R. Becker, State Geologist

**ANNOUNCEMENT**

*OMYA Middlebury Quarry Open House  
East Middlebury, Vermont, October 14, 2006*

OMYA is once again holding its annual open house at its Middlebury Quarry to commemorate Earth Science Week. This large quarry produces white, high-calcium marble that is processed into fillers and extenders for the paper, plastic, and paint industries. It has also produced some very attractive salmon-colored calcite. This will be a family event that will include quarry tours, viewing quarrying equipment close-up, earth science activities, and refreshments. The event is free and will be held from 10:00 AM to 4:00 PM, with the last tour at 3:00 PM.

The road to the quarry is off the east side of US Route 7, 2.5 miles south of the *Middlebury Inn* (traveling southbound) and 1 mile north of the turnoff to the junction of Routes 125 and 116 (traveling northbound). The quarry road is between *Standard Register* and *Foster Motors*, and the green street sign is labeled *1975 Private Road*. Continue straight on this road at the first stop sign. The second stop sign is at the quarry. Please park where instructed. For further information, call Alice Blount at (802) 770-7267 during business hours or visit the website at [www.omya-na.com](http://www.omya-na.com)

## VERMONT GEOLOGICAL SOCIETY CALENDAR

9/29-10/1/06	NEIGC Annual Meeting, Rangely, ME
9/30/06	Student Research Grant Program Applications due
10/6-8/06	NYSGA Annual Meeting, Buffalo, NY
10/8-15/06	Earth Science Week, Theme: "Be a Citizen Scientist!"
10/14/06	VGS Fall Field Trip and Annual Meeting
10/22-25/06	GSA Annual Meeting and Exhibition, Philadelphia, PA
10/30-11/4/06	AEG Annual Meeting, Boston, MA
3/11-14/07	GSA Meeting, Northeastern Section, Durham, NH

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### Executive Committee

President	Richard Dunn	802-485-2304	rdunn@norwich.edu
Vice President	George Springston	802-485-2734	gsprings@norwich.edu
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of	Tim Grover	802-468-1289	grovert@castleton.edu
Directors	Helen Mango	802-453-1478	mangoh@castleton.edu

### Committees

Advancement of Science	Stephen Howe
Education	Christine Massey
Membership	Stephen Wright
Public Issues	Laurence Becker
Publishing	Kathleen Howe, Stephen Howe, and David West

## ABSENTEE BALLOT 2006

Vermont Geological Society

*Please enter your name and address here:*

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### Officers

President	Richard Dunn	_____
Vice-President	George Springston	_____
Secretary	David West	_____
Treasurer	Stephen Howe	_____

### Board of Directors

Les Kanat	_____
Jon Kim	_____
John Van Hoesen	_____

If you will not be attending the annual meeting, please complete the absentee ballot and return it to David West, Dept. of Geology, Middlebury College, Middlebury, VT 05753 no later than October 12, 2006.

Returning Permanent Committee Chairs:

Advancement of Science: Stephen Howe  
Education Committee: Christine Massey  
Membership: Stephen Wright  
Public Issues: Laurence Becker  
Publications: David West

**Vermont Geological Society  
P.O. Box 1224  
Saint Albans, VT 05478-1224**

***ADDRESS CHANGE?***

*Please send it to the Treasurer at the above address*

**Vermont Geological Society  
Fall Field Trip  
October 14, 2006, 9:30 AM  
Grand Union Parking Lot  
Main Street (Route 15)  
Johnson, Vermont**