



# Granite State Geologist

The Newsletter of the Geological Society of New Hampshire, formerly NH Geological Society

Summer 2003 Issue No. 41

[www.gsnhonline.org](http://www.gsnhonline.org)

## GSNH

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### **President's Message**

Lee Wilder, President - Geological Society of New Hampshire

The newspaper headlines read, "It's gone." Weathering and erosion created the Old Man and we all knew weathering and erosion would take it away, but nobody expected it to happen on the night of May 2-3, 2003. I still can't believe it's gone.

The first meeting of The Old Man of the Mountain Revitalization Task Force was convened on May 10th at the Franconia Notch State Park Headquarters. Dr. David Wunsch, NH State Geologist, who has been appointed to the Task Force, represented the geological community.

The Task Force meeting began with a presentation of the geology of the Old Man given by Dave. It was decided that the immediate goal for a subcommittee of the Task Force was to have a plan in place by the time all the curious tourists start showing up in the notch. The public will have questions—"Where was The Old Man? What made it fall? Where is it now?" The subcommittee aims to give the former Old Man viewing site a personal information touch, coupled with geological information.

The GSNH Spring 2003 Dinner Meeting was a great success with a near record attendance. Some ninety members enjoyed camaraderie, a delicious buffet, and a presentation on the Geology of Southern New Hampshire.

The Society is working to provide information on its website about upcoming field trips, workshops or conferences – as general information for members and for those looking for Continuing Education Units. Be sure to check out our website at the new address [Gsnhonline.org](http://Gsnhonline.org). Please contact Julie Spencer, the GSNH website coordinator, if you have any current information you think would be of interest to the NH geological community.

#### Calendar Reminders:

\*Gilsun Rock Swap - June 28-29, 2003 – we encourage you to attend this great family event.

\*Summer Field Trip (for Continuing Education Credits) July 25-27, 2003  
a combined field trip with the Geological Society of Maine. See the registration form enclosed.

\*The Capital Mineral Club's Gem and Mineral Show—October 2003.

And don't forget EARTH SCIENCE WEEK 2003 is in October. The Society's popular Annual Meeting will be held at the Cat 'n Fiddle in Concord. I talked to Greg Kirby and

got a sneak preview of one of  
the mineral raffle specimens, a  
spectacular 3"x4" bladed  
calcite crystal cluster! Mark  
your calendar now and have a  
great summer 2003.

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## **Sedimentologist Wanted!**

Cape Cod National Seashore, Wellfleet, MA: Historically, the Herring River (Wellfleet, MA) was the site of a major herring run and a productive salt marsh system encompassing more than 1100 acres. In 1909, the salt marsh system was diked and drained to accommodate a new road, facilitate mosquito control and to provide additional land for development. The tidal restriction of this system has resulted in major water quality problems including hypoxia, acidic waters (pH <3) and the formation of acid sulfate soils. The conditions have caused fish kills and the lack of tidal flushing has resulted in marsh level subsidence, which in turn translates to lack of storm buffering capacity. Because of the draining, exotic plants have dominated the habitat, replacing native species.

Cape Cod National Seashore has conducted a series of studies to evaluate options to improve habitat quality. The most reasonable approach to restoration of the system involves returning tidal flow to the area by altering the current dike system. Previous studies have modeled the salinity changes to the system, mapped the bathymetry, and modeled the flooded area. Studies have also addressed the effects of flooding on the groundwater supply. Recently, town officials and resource managers have expressed concerns over the degree of sedimentation that might occur in the river and Wellfleet Harbor in association with changing the tidal flow to the system. The issue concerns the shellfish beds in Wellfleet Harbor and how changing the tidal regime in the river might impact sedimentation on the shellfish beds. Oyster culture is the primary income generating industry and any action associated with altering the tidal system cannot affect the oyster culture.

Cape Cod National Seashore would like to secure a professional in the field of sedimentology to address the concerns. Time Frame - August 2003 to October 2003. Qualifications: Coastal Sedimentologist, minimum Master's degree or candidate preferred.

This position will be funded by the Association for Women Geoscientists (AWG). Applications must include a well constructed CV or Resume, a letter describing your qualifications and experience relevant to the position for which you are applying, and the names and full contact information of three references who can speak to your qualifications for the position. Application deadline is June 28. Send to the Geologist in the Parks Coordinator, Maggie Toscano: awg-gip@awg.org. Feel free to contact Maggie with any questions. Please email everything in WordPerfect, Word for Windows, or PDF (preferred). A committee of experienced AWG members will evaluate the applications and forward candidates to the National Park Service. Park personnel make the final choices and may interview candidates by phone during the selection process.

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## **GSNH Spring Dinner Meeting**

Approximately 90 GSNH members and friends gathered for the Spring Dinner meeting on Thursday April 10, 2003. Patrick J. Barosh presented a talk on his interpretation of the "Geology of Southeastern New Hampshire". The talk presented a summary of his understanding of: 1) the region based on detailed stratigraphic and structural control in Massachusetts and Maine, using mainly fossil dating; 2) the post-Triassic faulting controlling the present tectonics and; 3) the environmental implications. The food was delicious and we thank Pat for coming to speak to us.

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## **Professional Geologist License Renewal and Continuing Education Tim Stone, VP-PG Branch**

The time is fast approaching for the first round of licensed geologist who are approaching their biennial license renewal and will need to meet the continuing education requirements established by the New Hampshire Code of Administrative Rules Chapter Geo 100. During the first renewal period, licensed geologist will need to accrue and properly document 12 Continuing Education Activity Hours (CEAH). After the first renewal period, 24 CEAHs will be required every two years. CEAHs can be obtained a

**Professional Geologist License Renewal and Continuing Education, cont'd.**

number of ways some of which include attending professional meetings, taking courses, teaching, and participating in field trips. Continuing education activities must be relevant to the practice of geology and may include technical, ethical, or managerial content. Geologists are encouraged to carefully review the complete rules which can be accessed at <http://www.state.nh.us/jtboard/georules.htm>.

The following is a summary of the licensed renewal process:

- Licenses expire on the last day of the licensee's month of birth in the second year following the year of issuance.
- The board will send notification of the impending license expiration to each licensee at least one month prior to the expiration of the license.
- Licensees may renew their licenses by paying the \$150 renewal fee prior to the expiration date and by presenting evidence of completion of the continuing education requirements.

Based upon these requirements, the first round of geologists who were granted a license in the fall of 2001 will need to renew their license in 2003 by their birth date and meet the 12 CEAH requirement. A Generic Activity Form is available at the Joint Board web site for documenting individual event CEAHs, as well as a form to summarize your CEAHs. Stayed tuned to [www.gsnhonline.org](http://www.gsnhonline.org) where CEAH opportunities will be posted as we learn of them.

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## **GSM Short Course**

**Lisa Churchill-Dickson, President, Geological Society of Maine**

The Geological Society of Maine announces a one-day short course on the Geology of Maine. The course is targeted at individuals who work on or are interested in the geological aspects of Maine. We anticipate an audience comprising state agency employees, journalists, teachers, undergraduates and practicing geologists. No strong science background is assumed. This is also a good review opportunity for those preparing to take the state's geology certification exam, as well as for professionals whose areas of expertise may lie outside of these subject areas. Continuing Education Units are available for this course. Complete information including course schedule and registration information are available at [www.gsmmaine.org](http://www.gsmmaine.org).

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## **Field Trip Guides**

**Nelson Eby, UMass-Lowell**

On the main page of my web site "[http://faculty.uml.edu/Nelson\\_Eby](http://faculty.uml.edu/Nelson_Eby)" you will find links to my field trip guides, four of which are for the White Mountains (the other two are for the Monteregian Hills). They are all in "pdf" format so you can download them and print them out. They are freely available to anyone who's interested. On the research link you will find what I'm currently up to, and one of the continuing projects is on the White Mountain - Monteregian Hills provinces. The Ossipee research is the latest posted to the site. On the publications link there is a link to BrooksCole, in case anyone wants to buy the book. Its probably the cheapest source, although one should always check with "Amazon.com" (where its currently more expensive) or your local bookstore.

## Mineral Box and Scholarships

Need mineral "props" to give a talk to a local school class, scout group or organization? As a current GSNH Member, you may sign up and borrow the "GSNH MINERAL TALK BOX". It contains everything you need to give a "hands-on-talk" on minerals, their identification and uses. Designed with NH specimens, this will make your presentation an interesting and educational event. To make arrangements to borrow the Mineral Talk Box, contact Lee Wilder at: [geology@des.state.nh.us](mailto:geology@des.state.nh.us) .

At the GSNH board meeting of 3/13/03 the board of directors voted to give a NH Science teacher a scholarship to attend the American Ground Water Trust 2003 Summer Institute.

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## Website Warning and gsnhonline.org Information Julie Spenser, GSNH Website Coordinator

### **WARNING!**

**For those who had the old NHCPG website bookmarked, please delete it. Through an unfortunate set of circumstances, another site now occupies our old website. Please add gsnhonline.org to your favorites list. NHGS.org is still available while the new website is under construction.**

News from gsnhonline.org:

I hope everyone has had a chance to check out the new website. We're starting to get some real changes in there and it is looking good! Coming next are pages for Events, Outreach and Licensing. In the works are pages for Continuing Education, Legislation and Regulations. If anyone has any ideas for other pages, information or events we should post, or if you find broken links on the website, please contact [jspencer@ENSR.com](mailto:jspencer@ENSR.com).

As always, volunteers are welcome to assist with website content, and if you'd like to join this or another committee click on the "About the GSNH" button and check out the link to the "Board/Committees." Contact information is in there for each board member and committee chairperson.

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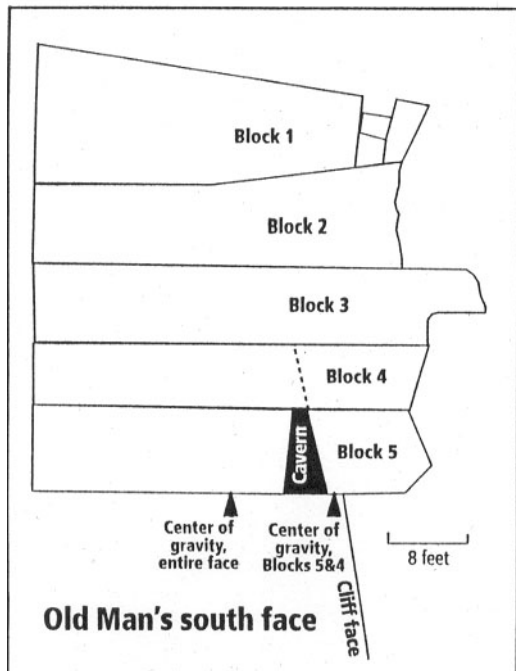
## NH Business and Industry Association Survey Tim Stone, GSNH VP-PG Branch

Business & Industry Association of NH (BIA) conducted a survey in March of 2003; the survey included questions about environmental regulation. Interestingly, when it comes to environmental issues, the majority of respondents supported tougher air emission regulation, regulation of business use of water (we assume groundwater), and mandatory recycling. This is an encouraging sign from a group which often takes a rather conservative position on issues associated with regulations. GSNH is a member of BIA and a Legislative Committee member regularly attends the monthly BIA Environmental Affairs Committee meetings as part of our legislation and regulation monitoring effort. When asked their view on environmental regulation, 58% of BIA respondents supported and 30% opposed tougher air emission regulations, 33% opposed and 48% did not oppose restricted use of water, 54% supported and 33% opposed mandatory recycling, and, 36% opposed and 43% did not oppose tougher environmental permitting requirements [each question had a number of undecided votes and non-responses].

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## Geology in the News....

Given the events of early May, there were many articles relating to the demise of the Old Man, many of them quoting our own Brian Fowler and David Wunch. Brian graciously sent in several abstracts, and, the information and figures which were used in a May 11, 2003 article in the NH Sunday News titled "The Old Man's Autopsy". A summary of Brian's theory on what happened is provided below:



NH Sunday News, May 11, 2003: Brian Fowler "...believes this view [*the south side*] holds the key as to how and why The Old Man fell last week. The Old Man actually was made of five slabs of Conway granite balanced atop one another, as shown [*see sketch courtesy of Brian Fowler*]. As seen in this view, but hidden in the familiar view from the north, was a cavern, about four feet wide, behind The Old Man's chin (Block 5) that ran almost the entire width of The Old Man's face. About 80 percent of the chin block hung out over the cliff, according to Fowler. Thus, just about two feet of the chin was anchored to the cliff, held there only by the weight of the four slabs above it. Amazingly, the other four slabs were positioned just so, so that the center of gravity of the chin block was within that two-foot span, allowing the entire Old Man to balance on its chin for centuries.....According to Fowler, the physical and chemical damage to The Old Man's granite through the years, especially in the cavern, eventually wore away enough rock just behind the chin that the center of gravity of that block moved slightly forward, past the cliff face. When that happened last weekend, Fowler believes, the chin tumbled down the cliff, and the rest of The Old Man quickly followed."

*Here are some articles which do not relate to the Old Man:*

*Press Release:* Jim Skehan, S.J., Weston Observatory, Dept of Geology and Geophysics, Boston College was honored by Prof. Mark A.S. McMenamin, paleontologist, Mount Holyoke College, whose research is the basis for establishing the new trilobite genus Skehanos, named for Dr. Skehan "to honor his contributions to New England geology." The ca 500 million year old Middle Cambrian arthropod is the first new trilobite genus from Massachusetts to be named since the 1880s and was found in Haywards Quarry at the site of the Fore River Shipyard. The published basis for the new genus Skehanos was in *Northeastern Geology and Environmental Sciences*, 24(4), 276-281, Dec. 2002. Much of Jim's published research over the past 40 years has been concerned with the Avalonian terrane of eastern North America for which Paradoxides and Skehanos and are now diagnostic.

## Geology in the News, continued

*Portsmouth Herald, Sunday May 25, 2003: Ancient Artwork or Modern Hoax? Mass. geologist attempts to crack mystery of the five stone faces. Worcester, Mass. – “They’ve been overlooked as useless oddities for decades – flat-backed stones with sunken eye sockets and gaping mouths carved in them – stowed in bowling ball bags, left in barns or fashioned into candle holders by those who found them in the woods of central Massachusetts. Now, in the hands of retired state geologist Joseph Sinnott, the five stone faces.....are getting the attention of archaeologists and antiquity researchers throughout New England. ....[Sinnot] argues with those who say the visages are a hoax. There is no evidence that the wide, smiling mouths and deep eye sockets are hollowed out with modern metal tools, he said. And the carvings – which can’t be dated with certainty – appear to be hundreds of years old because of how they’ve oxidized. ...The carvings match nothing the Nipmuc [Indian tribe] ever did... though he disagrees that the faces were made by modern day pranksters, Sinnott is open to other explanations as to who carved them.”*

*If you see an article describing something related to the geology of New Hampshire, let us know! Email submissions to Tania Brice Coffin at [coffin@cheshire.net](mailto:coffin@cheshire.net)*

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### State Geologist’s Update

**David R. Wunsch, Ph.D., State Geologist**

#### NH in the News

Probably the geologic issue on most people’s minds is the unfortunate collapse of the Old Man of the Mountain. However unfortunate, the fate of the Old Man did provide recognition of the importance of geology and geologic process, and how tangible they are as items of importance to the public. My office was inundated with requests for information from local, state, and national press outlets. I was pleased to be in a position to assist the Governor in his assessment of the cause and status of the Old Man’s collapse. My Geologic Advisory Council chairman, Brian Fowler, has also played a critical role in disseminating data to the media. I have been assigned to the Governor’s Old Man Revitalization Task Force, and I look forward to briefing the Task Force on the geologic implications and considerations related to the committee’s upcoming decisions.

On another front, Geotimes journalist Christy Reed accompanied me to the summit of Mount Washington last winter to do an article on the history and role of the Mount Washington Observatory. She also covered cold-weather phenomenon and geology, the weather station, and opportunities for earth science teachers through the Observatory’s EduTrips. An article on our visit was published in the February 2003 issue of Geotimes magazine. Incidentally, through a new marketing initiative by AGI, Geotimes is now available on the racks of many popular bookstores, as well as through subscription.

#### New NHGS Location

NHGS has fully relocated to the basement level of the NHDES building on Hazen Drive. We occupy the space that formerly housed the NHDES library. The move increased our space by about 200 square feet, which allowed us to add our maps and flat files to our immediate work area, as well as drafting tables for reviewing maps. We have a small glass case that we will use to display publications of interest as well as minerals from New Hampshire. On that note, we would welcome the donation of any of your “extra” exceptional specimens of NH minerals that we could display (with appropriate citation, of course). Please contact me if you have any specimens to donate. Thanks to Dartmouth College, and the University of New Hampshire, we have been able to obtain portraits of all of NH’s State Geologists since the position was formally instituted. We plan to display each photo in a gallery along the wall above our small waiting area. Please stop in and visit our new digs!

## **State Geologist's Update, continued**

### **Staff**

We now have 6 full-time professional staff, and one part-time outreach coordinator. The most recent addition to the professional staff is Mr. Greg Barker, who filled a new Hydrogeologist II position at NHGS. Greg came to NHGS from the NHDES Division of Waste, but he also has significant consulting career in the private sector. Greg will be working on building water-well and monitoring-well databases specific to the Seacoast region of NH as part of a Cooperative project with the Office of State Planning, Seacoast communities, and the U.S. Geological Survey. This summer we will have two interns. Christian Swasey and Krystle Day began working with the NH Geological Survey on May 13th, 2003. They will also be working on the Seacoast Water Availability Project, collecting subsurface data from the NHDOT, and entering water well data into the database. Christian is a graduate of UNH ('00) with a BS in Water Resources Management, and a minor in Earth Sciences; Krystle is a graduate of the University of Maine at Farmington ('03) and has a BA in Geology/Chemistry.

### **Earth Science Education Initiatives**

NHGS staff are working with Dan Reidy, a high school teacher from Moultonborough HS who is this year's recipient of the Christa McAuliffe Teacher Sabbatical. The NHGS will be assisting Dan in creating an interactive web site for middle and high school students and educators to aid them in learning about the exciting geology of New Hampshire. The web site will cover NH's historical geology, as well as issues contingent on geology such as natural resources and economic aspects, ecosystem diversity, and student and teacher exercises that integrate it all. Other cooperators include the Squam Lakes Science Center and NH Public Television.

Ms. Ruth Krumhansl, a high school teacher from Souhegan High School, has been working with NHGS staff and our contract mappers to create an inquiry-based science curriculum based on geological mapping. Ultimately, NHGS staff will assist with field training and materials (e.g. base maps), and the students, armed with GPS units, augurs and shovels, digital cameras, and soil and sediment identification materials, will collect data in the field that will assist our mappers with their surficial mapping data collection. In return, the student will be mentored by experienced geologists and contribute to an actual scientific study and a product (geological map) that will benefit society. The proposal was fully funded by a Toyota Corporation Tapestry Grant.

### **Geological Mapping Program**

Mappers under contract with the NHGS are currently beginning their field mapping season. This year we will map the surficial geology of the following 7.5 minute quadrangles: New Boston, Enfield, and Northfield. Each of these quads were selected for mapping to assist state or local government entities with water supply, land-use, or resources assessment information. The future of our surficial mapping program will be more and more based on cooperative arrangements with communities and public and private groups who are interested in funding or partially funding our mapping efforts. I am always interested in developing new mapping programs with interested groups, so please feel free to contact me and relay contact information if you know of a group or particular area of New Hampshire where detailed geological information would be of immediate benefit.

NHGS staff met with members of the Maine Geological Survey (MGS) and faculty from the University of New Hampshire Geology Department to discuss a cooperative project to complete the Kittery 1:100,000 bedrock geology map, which is a sub-project of the MGS' STATEMAP 2003 proposal. The NH portion of the Kittery map will be based on data compiled at the 1:24,000 scale. NHGS and UNH will contribute geological data from southeastern New Hampshire that will assist Maine in completing the map. In return, NHGS will receive compiled digital data of the 1:24,000 NH maps and assistance and mapping protocol from MGS for preparing GIS and digital bedrock maps.



## State Geologist's Update, continued

The NHGS held its third annual "Mappers Workshop" on June 2, 2003. The mappers workshops were initiated to encourage communication between NHGS staff and the contract mappers who conduct surficial geological mapping for the state through the NHDES/NHGS STATEMAP cooperative geologic mapping program. Our first mapping workshop was specifically for the benefit of the contract mappers, and the program mainly covered proposed mapping projects, details about the state's contract system, and programmatic changes. Last year we expanded the program to include presentations from university professors, students, and other geoscientists who participate in the EDMAP program or other NH mapping activities so they could share their findings through professional presentations of geological data and information. This year's morning session was opened to all NHDES geologists and others who were interested, to familiarize them with the program, and to aid in their professional growth. With growth in the mapping program in the future, and with proper logistical planning, I hope to open the morning technical session to all geologists in NH, where licensed geologists could update their knowledge of geologic information in the state, and gain continuing education activity hours (CEAH's) toward their PG requirements.

### Continuing Education

Many geologists have called my office inquiring about opportunities where they can meet their CEAH requirements for their NH PG license. In order to accommodate this need, the NHGS will sponsor a series of four, 1.0-hour lunchtime lectures open to all geologists. The lectures will be held at the NHDES Auditorium, and will begin early this summer. Currently there is a moratorium for holding public meetings at the auditorium because of parking constraints related to construction at the DES building. Please email [geology@des.state.nh.us](mailto:geology@des.state.nh.us) if you are interested in attending, and we will send you information related to the time, date, and place. The tentative lecture topics are, but not limited to, the following:

- ❑ Remote sensing application and inclined drilling techniques for locating high-yield wells—this talk will focus on inclined drilling techniques developed to explore for fractures in bedrock that could sustain high-yield water wells. We had great success using this method in KY, and it may be especially pertinent here in NH.
- ❑ Hydrochemical facies model for the dissected Appalachian Plateau—this work incorporates ground water flow and chemical evolution developed from isotope hydrology and geochemical modeling, as well as additional studies into the cause and occurrence of elevated barium and fluoride in ground water. Research on sulfur-reducing bacteria related to this project is highlighted in Frank Chapelle's text book: "Ground water geochemistry and microbiology".
- ❑ Modern surface coal mining and reclamation—This lecture will cover innovative monitoring and reclamation projects at large surface coal mines. NE Geologists have probably had minimal exposure to modern mining techniques, AMD issues, and reclamation in large mines. The information gleaned from this lecture will be more pertinent if you attend lecture #2 above.
- ❑ Geoscience and public policy—this lecture was presented at universities throughout the U.S. on a speaking tour after my Congressional Science Fellowship, sponsored by the American Geological Institute's Fellows Outreach Program. I cover issues such as congressional views of science, energy policy, and uses of public lands in western states for mining, oil and gas production, etc.

I will also be teaching a college-level course titled "Low-Temperature Geochemistry" through the University of New Hampshire this coming fall. I do not have the exact course number as of this writing, but tentatively the course will be taught on Tuesday and Thursday evenings from 5:00 – 6:15 at the NHDES Auditorium in Concord.

## **State Geologist's Update, continued**

The course is designed for upper-level undergraduates and graduate students, and will consist of a mix of theory and applied applications. I taught this course successfully for several years at the University of KY. The early evening schedule makes it convenient for scientists and engineers employed in state government or the private sector who would like to learn or refresh knowledge of geochemistry. This course will have an emphasis on environmental and ground water applications. Please email me at: [dwunsch@des.state.nh.us](mailto:dwunsch@des.state.nh.us) if you are interested in attending, and I will forward information regarding class prerequisites, course description, and a syllabus.

### **Legislative Issues**

The NHDES Capitol Budget (CP) request included an appropriation to expand the state's ground water monitoring network. Currently, the state network consists of 25 shallow wells that are measured each month to monitor the ground water of the state. The New Hampshire Geological Survey is responsible for the data collection, management, and maintenance of the current network of wells. The data we collect from these wells is used for decision-making by the state, including providing the critical ground water information upon which the Governor's Drought Management Task Force issues various levels of drought alerts and mitigative actions. However, the current network of wells is not very representative of the state's ground water resources. For example, 97 percent of all new domestic wells in New Hampshire are drilled into the bedrock aquifer, but only one of the 25 monitoring wells we measure is installed in bedrock! The majority of our monitoring wells (24) are installed in the surficial aquifer, which supplies only 3 percent of domestic wells statewide. Moreover, the average depth of the state's 25 monitoring wells is 50.0 feet, whereas the average depth of domestic water wells used by New Hampshire homeowners is 329.6 feet. Clearly, using the shallow wells for monitoring the conditions in the deeper, bedrock aquifer is like comparing "apples and oranges". We were successful in keeping our request in the House version of the CP Bill, but as of this writing, the Senate has removed it. I would appreciate your support for this ongoing effort to develop a realistic monitoring well network for the state.

Finally, the legislature is currently looking to cut budgets of state agencies. Unfortunately, the state fund that is used for the seed money for our STATEMAP program has been listed as a potential program to be cut. I believe that this would be a travesty for a program that is only now gaining momentum, and which also provides critical geological data for the citizens of NH. I would also welcome your support and actions to prevent the elimination of this important state program.

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### **Continuing Education Activities** **Wayne Ives, GSNH Education Committee**

Finding appropriate continuing education activities will be a constant exercise for geologists. Currently there is no experience or track record for CEAHs and the market may need to further develop as it has for engineers and other professionals. The rules governing continuing education for NH geologists are in Sections 403.05-.07 of the NH Code of Administrative rules which govern the licensing of geologists, these rules are available at <http://www.state.nh.us/jtboard/georules.htm>. The rules define the type and degree of activity which qualifies as a Continuing Education Activity Hour; the relationship between CEAH and the more familiar Continuing Education Unit (CEU) is also defined. Reading the rules is a requirement of licensing and every New Hampshire licensed professional geologist should be familiar with them. The first criterion in the rules is that the activity be relevant to the practice of geology. This opens up a lot of possibilities. The NH Professional Geologist Board has indicated they will let the rules stand alone, without comment from the Board. The rules should be self explanatory. The Board will not be generating a list of pre-approved CEAH opportunities, nor will it create a list of disallowed activities. It will be up to each of us to decide individually which activities meet the requirements of the rules.

## Continuing Education Activities, continued

While the decision of appropriate continuing education activities rests with the Board and the licensed professionals, the GSNH can provide information on possible activities that might help each geologist meet the standards set by the rules. The Society's newsletter will try to include a list of upcoming activities such as GSNH Dinner Meetings, geologic field trips sponsored by various organizations, geologic lectures, seminars and conferences. GSNH membership may also check [gsnhonline.org](http://gsnhonline.org) for possible CEA events listed there. The Society would appreciate input from our members on future events that may be appropriate to include in our newsletters and as notices at our dinner meeting. Generic forms, not required but available for documenting and tracking continuing education activities, are at <http://www.state.nh.us/jtboard/pgce.htm>.

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### Conway Granite Geothermal Drilling Project Lee Wilder, GSNH President

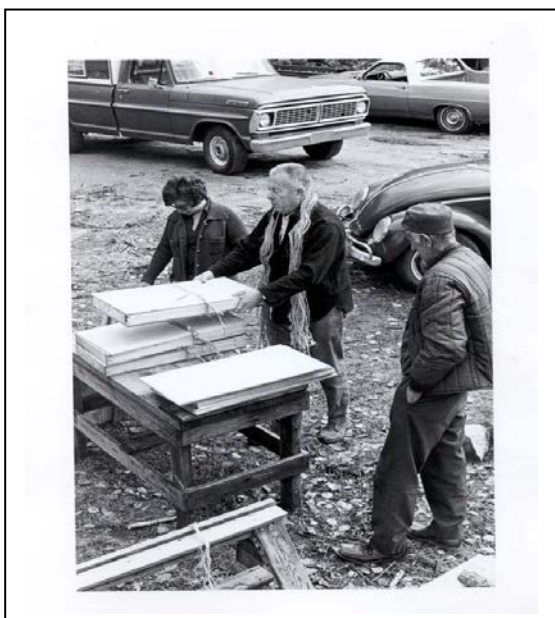
[Lee has graciously given us permission to reprint his publication, written in 2002, before the demise of the Old Man]

#### Geothermal Energy in New Hampshire?

Based on work with earlier shallower drill holes in the Conway Granite, Roy, et al. (1968) theorized that a deep bore hole (~6 km.), within the Red Phase of the Conway Granite pluton (intrusion) should produce more than enough heat to power steam turbines and generate electricity. For New Hampshire's 'North Country', this geothermal energy would be a great economic boost. The geothermal heat would be produced by the natural decay of several radioactive minerals present in the Conway Granite.

In 1975, the Longyear Drilling Co., of Minneapolis, MN, was contracted by the Resource and Reservoir Assessment Branch, Division of Geothermal Energy, US Energy Research and Development Administration (Hoag and Stewart, 1977). The Longyear Company drilled a 2 7/8" diameter hole, 3002' deep, (producing a 1 7/8" [47 mm] diameter core) in the Conway Granite at the Redstone Quarry, in North Conway, NH. At the time, the quarry was jointly owned by the Fletcher Brothers Granite Company of Milford, NH and the John Swenson Granite Company of Concord, NH.

This quarry is located in the Redstone district of Conway, NH, northeast of US 302, and east of its junction with NH 16. According to Caruso and Simmons (1985) "the drill site is located 0.5 km north of the center of Redstone near North Conway, New Hampshire." Hoag and Stewart's report (1977) contains a map showing the drill hole along the NW edge of the quarry floor.



NH State Geologist, (1963-1979) Glenn W. Stewart, (center) oversaw the drilling project and core recovery. Harry Mason, (right) a former Redstone quarryman, was caretaker of the inactive Redstone quarry.



## Conway Granite Geothermal Drilling Project, continued

The Conway Granite is Jurassic in age (Lyons, et al, 1997). Hoag and Stewart (1977) report that “the dates for the main batholith, of which the Redstone Quarry is a part, vary from 180 to 168 m.y. (million years old). The variable ages indicate that the Conway Granite probably did not originate from a single magma chamber, but originated from several different chambers. Alternatively, a single chamber may have been dormant over a long time, becoming active periodically perhaps due to a build up of heat generated by radioactive decay.” They note, “Most opinions are that ”the magma was produced by assimilation of siliceous sediments followed by fractional crystallization.” Today, petrologists (geologists specializing in rocks) would classify the Conway as an "I" or "A" type granite, based on its composition.

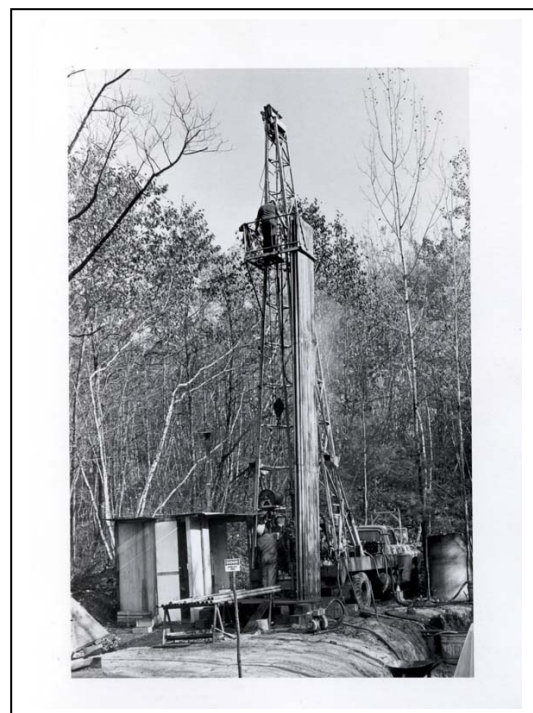
The Conway Granite is typically a coarse grained, pink, biotite granite (the red phase). In reality, it occurs in at least five different phases: the coarse pink (the red phase), which is typical of the Redstone Quarry; a porphyritic phase, having large feldspar (5-20 mm in diameter) and quartz crystals (2-5 mm in diameter); a medium grained and a fine grained phase; and a green phase (related to the Mt. Osceola Granite) - the green probably being kaolinite altered from green micro-perthite (Hoag and Stewart, 1977).

Typically, the Conway granite has two feldspars present. The large quantity of potassium feldspar (Orthoclase) gives this igneous rock a pink color (the red phase). The sodium feldspar often is exsolved (separated as it cools) within the potassium feldspar producing a vein-like texture, referred to as perthitic intergrowths.

More importantly, the coarse pink phase of the Conway Granite also contains minerals of high thorium and uranium content. In this red phase of the Conway, the uranium content is 2-4 times that of “average” granites (Billings and Keevil, 1946). Normal radioactive decay of these elements produces heat, as in a nuclear reactor where the fission of uranium heats water to produce working steam.

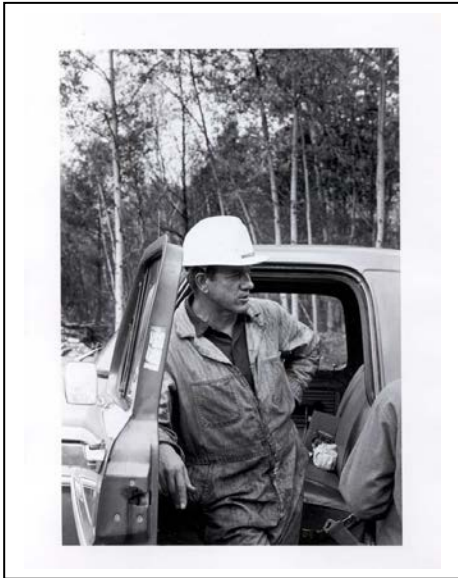
But the Conway Granite was not as uniform at great depth as it was assumed. If it really was a massive igneous intrusion, it should be fairly consistent in mineral composition to great depths. Caruso and Simmons (1985) noted, "Although the hole was collared in the Conway granite, it penetrated three major lithographic units identified as: the Mount Osceola granite (termed greenphase by Hoag and Stewart, 1977); the Conway Granite (redstone or red phase); and the Albany quartz syenite. Core recovery was nearly 100 %. Three lamprophyre dikes, at depths of 498-506 m (~1640'), 523-526 m (~1722'), and 605-614 m (~2001'), were cut by the borehole. Fine grained granitic units occur occasionally and randomly throughout the core."

The Longyear Drilling Company  
Rig drilling the Conway  
Borehole at the Redstone  
Quarry 8/12 - 11/28/75.



## Conway Granite Geothermal Drilling Project, continued

Hoag and Stewart (1977) report that work by Wetterauer and Bothner (1977) suggests that the Conway Granite may extend to 2.4 km near the Redstone Quarry and may be even deeper toward the center of the pluton. By 1000 m (~3000'), Pat (Everett) Hughes, the driller for the Longyear Drilling Company, was bringing up cores, that were not like the Conway Granite which was found near the surface, and on which the original heat flow assumptions were made Roy et al (1968) and Eggers (1976). Without the quantity of radioactive minerals for decay, there was not the heat energy necessary to produce a good geothermal source. It was estimated that at 1000 m (1 km) the temperature should have been 44.5 degrees C. and at 6 km the temperature should be some 260° C. With a down hole temperature of only 33° C. at 3002' (1 km) (Hoag and Stewart 1977), the drilling stopped.



Pat (Everett) Hughes, the driller for the Longyear Drilling Company, Conway Granite borehole project.

Scott Keyes and Dr. Dwight Eggers, of the Water Resources Division of the USGS, logged the Conway borehole core late in January through March of 1976. After the initial logging of these cores, they were housed in the Department of Earth Sciences at UNH. Later, NH state prison labor moved them to the basement of the Walker building, at the corner of Pleasant and South Fruit Street, in Concord, NH. In the fall of 2001, as the State of New Hampshire began refurbishing this building, the cores were removed from the basement of the Walker building by NH Geological Survey staff and volunteers. The NH Geological Survey, having no place to store the core, entered into a memorandum of understanding with Robert Whitmore, to store the core in his yard in Weare, NH. From there the core sections of Conway Granite samples are currently being distributed, mainly for educational purposes. The core boxes went to the NH Department of Transportation along with the “last” core box, containing the core from the 3002’ level. DOT geologist Richard Lane has agreed to store and display that core box. Even though the Conway Granite did not produce enough heat at the Redstone borehole site, it is still an important NH granite. Besides its continued popularity as a building and monument stone, it is the bedrock of Cannon Mountain, in Franconia Notch. Fortuitous glacial plucking and frost wedging of the bedrock joints in the Cannon cliffs there, have left a famous rock profile—New Hampshire's famous Old Man of the Mountains, composed of the Red Phase of the Conway granite. In fact, this true granite continues further eastward in NH from Cannon Mountain. It is the rock underlying a number of mountains in the Pemigewasset Wilderness, the Conway area and eastward to the Maine border.

Draft of 07/08/02

Lee Wilder

NHGSurvey [geology@des.state.nh.us](mailto:geology@des.state.nh.us)

## Conway Granite Geothermal Drilling Project, continued

### References

Correspondence with:

Wally Bothner, Geology Dept., UNH

Gene Boudette, NH State Geologist, retired

Gene Simmons, Hager Richter, Geoscience

David Wunsch, NH State Geologist

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A special thanks to Roland B. Hoag and Fred Bickford of HydroSource Associates in Ashland NH, for a complete copy of the original Hoag and Stewart (1977) report, from which much of this summary was excerpted.

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Photos from the state website of the Old Man before and after the slide:



**(Photo of the Old Man 2000)**



**(View After the Rock Slide  
May 3, 2003)**

Geological Society of New Hampshire  
and the  
Geological Society of Maine  
*Joint Summer 2003 Geology Field Trip*

**Mount Washington and the Gorham Area of the NH White Mountains Friday evening July 25<sup>th</sup> through Sunday mid-afternoon the 27<sup>th</sup>**

The GSM and the GSNH has planned a joint summer Geology Field Trip. Those wishing to camp for the weekend may stay at the group 4 or 5 site in Barnes Field at Dolly Copp Campground, on NH Rte. 16, south of Gorham. Or you can make reservations at one of the many motels in the Gorham area. Make your motel reservation early because this will be peak tourist season. The AMC Pinkham Notch Camp on Rte. 16 also provides very nice lodgings. Rates include bed, sheets, shower, and breakfast/meal options. Reservations there, can be made by calling 603-466-2727, Monday to Saturday, 9 a.m. to 5 p.m.

**The trip's present itinerary includes:**

**FRIDAY EVENING, 7/25:**

8:00 PM - talk by Brian Fowler on the Old Man of the Mountain, at the Visitor Center, Dolly Copp Campground. Park at our designated campsite in Barnes Field if space permits; otherwise, parking at the Visitor Center is subject to a National Forest \$3.00 fee.

**SATURDAY, 7/26:**

6:30-7:00 AM: Assemble and consolidate vehicles in the large parking lot on the west side of Rte. 16, just south of the Mt. Washington Auto Road entrance. Dyk Eusden has made special arrangements for our group to get EARLY admission to the road at a rate of \$18.00 per vehicle (including occupants). Sturdy vans would be good if colleges or others can bring them. (Occupants of each van are responsible for somehow "coughing up" the \$18...)

7:00 AM – 5 PM: Drive to summit of Mt. Washington. Depending on the weather...we will: study the Summit geology with Dyk, Brian Fowler and Thom Davis; tour the Mt. Washington Observatory and Museum; and descend the Auto Road, stopping at various turnouts and parking areas to examine bedrock, glacial, and periglacial geology. (Bring a lunch to eat enroute.)

Mid to late afternoon: Bedrock and glacial stops along Rte. 16 with Tim Allen and Brian Fowler.

**“Free time” to relax and freshen up for the...**

**SAT EVENING, 7/26:**

6:00 PM: Catered Barbequed chicken and steak Cook-Out at the covered picnic pavilion at Dolly Copp Campground. Hot coffee will be provided - members wanting other beverages must BYO.

(If you have brought the family on this trip, they are welcomed at the Cook-Out of course! See pricing on reservation form.)

**SUNDAY, 7/27:**

8:00-8:30 AM: Assemble at State rest area on the north side of U.S. Route 2 in Shelburne.

8:30 AM - noon: Bedrock and glacial stops (with Woody Thompson) along the Androscoggin valley in Shelburne. Drive to Mt. Jasper in Berlin for lunch, or have lunch at Shelburne Dam on the Androscoggin River. (Bring a lunch to eat enroute.)

1:00-3:00 PM: Mt. Jasper Paleo-Indian site with Dick Boisvert the NH State Archeologist. (Note this stop requires a short hike.) If time permits, there are one or two other glacial stops. Trip will end as close to 3:00 PM as possible.

*(NOTE to those needing CEAH's for their PG's...this entire GSNH/GSM Geology Field Trip is worth up to 18 hours.)*



Reservation Form: Cut or Photocopy as needed

**The Geological Society of New Hampshire and the Geological Society of Maine**  
*Joint Summer 2003 Geology Field Trip*

Mount Washington and the Gorham Area of the NH White Mountains Friday evening July 25<sup>th</sup>  
through Sunday mid-afternoon the 27<sup>th</sup>, 2003.

1. Name(s) of those attending the GFT: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

(Include only those paying to attend, not family members who will be with you, but doing other activities during the trip times.)

2. I/We WILL camp at the Barnes Field group sites: Yes / No If yes, number in camping group? \_\_\_\_\_

3. Saturday Evening Barbeque: You may choose either steak or chicken (hotdogs will be available for children desiring them).  
Drinks are BYO...but there will be hot coffee available.

Cost is \$17.00 each. Children: <5 free; 5-9 1/2 price (\$8.50) and 10 or older \$17.00

There will be \_\_\_\_\_ (#) attending the Barbeque Cook-out Sat. eve - \_\_\_\_\_ (#) Steak and \_\_\_\_\_ (#) Chicken.

Be sure to include a check made out to the Geological Society of NH. We have enclosed a check for: \$ \_\_\_\_\_

**Space is limited, so return this completed registration form (with check) well before July 15! to:**

*John Noble, GSNH/GSM FT, 226 Whitten Road, Milford, NH. 03055*  
(Note: John is collecting for **both** Societies.)

**Questions?**

Contact Woody Thompson at: 207.287-7178 or Woodrow.B.Thompson@maine.gov

## Dates to Remember!

GSNH Summer Field Trip, July 25-27, 2003  
GSNH/GSM Joint Summer Geology Field Trip in the Gorham, NH  
area

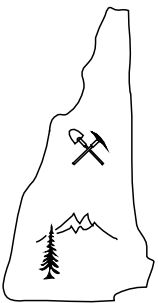
GSNH Family Event - GSNH families are encouraged to attend the  
39th Annual Gilsum Rock Swap & Mineral Show to be held on  
June 28-29, 2003 Gilsum, NH.

GSNH Fall 2003 Dinner Meeting, Catn'Fiddle, Concord, NH  
Thurs. Oct. 16, 2003 @ 6 PM

Earth Science week is Oct. 12-18, 2003

GSNH Winter 2003 Dinner Meeting, Catn'Fiddle, Concord, NH  
Thurs. January 8, 2004 @ 6 PM

**Geological Society of NH**  
**PMB 133, 26 South Main Street**  
**Concord, NH 03301**



Your membership status is listed on the mailing label.