Granite State Geologist

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GSNH Summer Field Trip – Alstead, NH October 2005 Flood Revisited, *Submitted By: Bettina Eames, Loureiro Engineering Associates*

The rain held off and on Saturday August 19, 2006, approximately 80 members and friends of the GSNH met at the Lake Warren Dam in Alstead, New Hampshire to revisit the scene(s) of the October 9, 2005 flood. While many of the of us were (thankfully) sipping coffee and munching on donuts, Dick Lane of the New Hampshire Department of Transportation (NHDOT) and Dave Wunsch, the State Geologist of New Hampshire presented an overview of the hydrography of the area and discussed the geologic factors which led to the surge of floodwater from the Warren Brook and the Cold River. Pictures taken by the NHDOT which showed the many homes, bridges and roadways along Route 123 that were destroyed by the flooding, were also on display.

After an initial introduction at the Lake Warren Dam, the rest of the morning was spent walking and driving to various stops along Route 123. Stops made included: a view of the flood levels at the Old Mill and erosion of the local road below the Lake Warren Dam; collapse of the road embankment and culvert at the intersection of Cooper Hill Road and Route 123; erosion (down to bedrock in some locations!) along the Cold River; the site of a former gasoline station building which was ripped off its foundation and damage to the Alstead Village Route 123 bridge abutments.

Photo 1: Morning talk at the Lake Warren Dam.

The trip reminded us all of how powerful water can be. We were reminded that the heavy rainfall (almost 11 inches in less than 24 hours) and flooding (which was a 500-year event for Warren Brook and a 100-year event for the Cold River) exceeded the limits for normal engineering design.

The NHDOT faced many reconstruction challenges to restore the 57 miles of roads that were closed and/or damaged during the flood. Most of the repairs to the roads and/or bridges were done within an 8-week period prior to winter. According to NHDOT statistics, approximately 36,575 tons of debris was generated as a result of the October 2005 flood, which included: 6,330 tons of burned debris, 25,320 tons of loam, 600 tons of concrete/pavement, 5,427 tons of debris to landfills, 91 tons of tires and 200 tons of metal (which were recycled), 1,061 tons of wood chips and 400 tons of logs. Transportation and disposal cost $150,000 a day and totaled $5 million.

After the morning tour, the group gathered on the town green in Drewsville for lunch and relaxation. Brown-bag lunches, which tasted great, were provided by the local general store. The lucky lantern battery winners were Jacob Mechaber (son of Rich Mechaber, a GSNH member) and Len Rappolli.

After lunch, the group headed out in cars and drove to Westmoreland, NH for an afternoon of mineral hunting at the Weiss Mine, which is known for its fluorite crystals ("the Most Colorful Mineral in the World"!). Bob Whitmore of the Capital Mineral club, one of our members, presented a short overview of the geology of the mine and what to look for while mineral hunting. After enjoying a healthy snack of watermelon and mineral hunting at the mine, the rain slowly started and reminded us that is was time to go home. Everyone agreed that *"A Good Time Was Had by All!*

Photo 2: Stop at the intersection of Copper Hill Road and Route 123.

Photo 3: Mineral hunting at the Weiss Mine in Westmoreland.

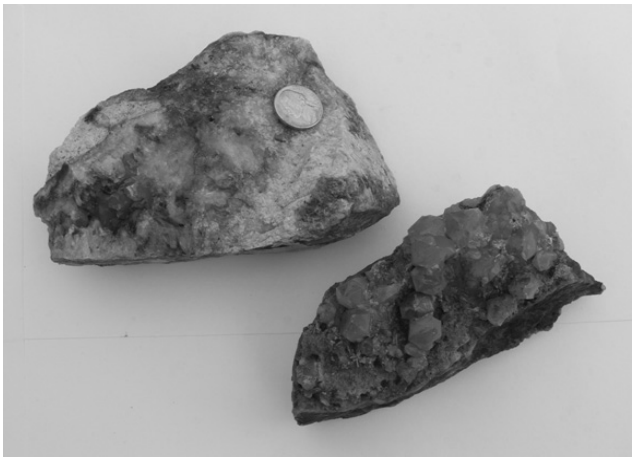


Photo 4: Cluster of quartz crystals found at the mine.

Submitted by Ralph Wickson, NHDES

The New Hampshire Department of Environmental Services Waste Management Division will be hosting a series of special interest technical seminars for staff and all interested public, consultants, municipal officials, regulated community and other stakeholders at our offices on 29 Hazen Drive in Concord, NH. The sign in will start at 11:45 a.m. while the seminars themselves will be held in our auditorium from noon to 1:00 p.m. The presentations will be structured like a Town Meeting so that everyone can ask questions and participate in the discussion in any way they feel comfortable. Experts from UNH, industry and consulting will be part of the presentations and bring us up to date on the latest in technical innovations in waste site cleanup, waste management and waste reuse. A number of people have expressed interest in these topics so each seminar will certainly benefit from such free and open discussion. Please contact Amy Azeredo at aazeredo@des.state.nh.us or phone 271-2905, if you plan to attend so that we can plan our accommodations. Please feel free to bring your lunch. We also have a new food service, Paulson's Café, with take out in the building.

October 20, 2006 -***"New Regulatory Frontiers – Sediment, Soil & Vapor"*** **Sampling the Water Below the Water – New Developments in Pore Water Sampling of Sediments. "**

It is always difficult finding where groundwater enters a surface water body, let alone sampling groundwater below such a water body or telling where it's going next. Stop in and see how the Maine DEP's pore water sampling protocol helps overcome these problems and lead to a better understanding of the water quality below our lakes and rivers.

November 17, 2006 - ***"Vapor Intrusion Guidance for Contaminated Sites in New Hampshire - Can We All Breathe Easier?"***

A new and important contaminant pathway, vapor intrusion, has become a major clean-up criteria on some sites in New Hampshire which contain volatile contaminants in the groundwater. Using this pathway contaminant vapors, from substances like TCE and Perc, actually volatilize from the regional groundwater into the vadose zone and soil pores and have the potential to enter building spaces and affect indoor air quality. This seminar will summarize key changes to the state Risk Characterization Management Policy (RCMP) and how the new guidance will address this immerging concern.

December 15, 2006 -***"The New NHDES Contaminant Site Management Rules, Env Or 600, One Stop Shopping for Regulatory Clean Up Criteria"***

The NHDES is proposing new clean up rules for all contaminated sites in the state for such things as oil and hazardous waste and putting them under one rule. Stop by and learn how groundwater management, soil clean-up and vapor intrusion criteria will all be consolidated into one rule and associated guidance documents.

Earth Science Teacher Workshops

AEG National Meeting in Boston, MA, November 4, 2006: Attention all New Hampshire Earth Science Teachers looking for a workshop to attend: check out the AEG Meeting in Boston on November 4, 2006 at http://www.aegweb.org/i4a/pages/Index.cfm?pageID=3943. The AEG will be offering a fascinating ES Teachers Workshop on Saturday, November 4, 2006 at the Boston Park Plaza Hotel. This year's workshop will be aimed at Grade 7-12 Earth Science teachers. In the morning session several forensic geology modules will be presented that can be used to introduce students to basic geological principles. Participants will come away with several classroom activities that they can use with their students. The afternoon session will consist of a field trip to several geologically interesting areas in the "Boston Basin." At the end of the field trip, teachers will be provided a CD, containing a virtual version of this field trip, suitable for classroom use, and a student activities sheet based on the virtual field trip. Mark your calendar for this worthwhile event and check the AEG website for upcoming registration information

GSA-NE Section Meeting in Durham, March 11-14, 2007: This workshop will be held in Durham, New Hampshire (http://www.geosociety.org/sectdiv/northe/07nemtg.htm#sc).

Southeastern Regional Educational Service Center: Also various earth science workshops are listed at http://www.seresc.net/files/content/ceilupload/ceil%20science%20earth.pdf. All workshops qualify for CEU's, Highly Qualified credit and/or graduate credit.

Online Credit Courses

You may be interested in checking out the on-line courses offered by GeoScience Data Management. Currently they are offering *Understanding Natural Geologic Hazards* and *An Introduction to Landslides or Mass Wasting*. Earn CEU's from these AIPG accredited courses in Geoscience. For details see: http://www.geodm.com/profinst.shtml.

A River Cuts a New Course, Leaving a New Hampshire Town High and Dry

By Katie Zezima as published on May 29, 2006

EPSOM, N.H., May 25, 2006 - Nicholas Tilton and Jamie Lucier's wedding ceremony was supposed to be held outside an old lumber mill here on May 20, with a waterfall on the Suncook River serving as the perfect backdrop. The river, however, had other plans, and chose not to show up.

A week before the wedding, the Suncook River jumped its banks and cut a new course during torrential rains and flooding, leaving a 1.52-mile stretch of what was once river close to empty. Now, the patio of the restaurant that replaced the mill is overlooking two dams and some rocks, all bone-dry. State officials are still trying to determine why the river moved. One theory is that a man-made gravel pit near the river removed sediment that would have created a natural dam. Another is that the area contains a natural depression. Or it could be a combination of the two.

"It flooded over, but when the water receded it took the path of least resistance," said David Wunsch, the New Hampshire state geologist. "It found a path where it could get out of its channel and make a shortcut. Why it did - that is a question." Victor Baker, a professor of hydrology at the University of Arizona who is not familiar with the situation in Epsom, said that changing course was a natural process in the history of a river, and that it could occur more quickly because of construction or other human interference. The process is relatively common in large rivers with big flood plains, including the Mississippi, but is less common in New England.

"In New England, the flood plains are relatively narrow, maybe a few miles across," Professor Baker said. "The rivers can shift across those, and it may seem dramatic in a small town. "It's not as common in New England" as in other places, he added. No homes or businesses were destroyed along the Suncook River's new course. But what the river left behind is striking - moss-covered rocks, quicksand and a huge sandy pit that looks like a scene from the Southwest. Many residents now refer to it as the Grand Canyon.

The river's new path has caused a controversy in this town, 11 miles east of Concord. Should the river be allowed to stay where it is or be moved back to its old bed? Owners of businesses and land along the river, as well as people downstream who now have sand and silt in their backyards, want it put back. Some other people would rather let nature take its course and leave the river where it is. Others don't want to foot a hefty bill to redirect it.
"We want them to reroute the river back because we don't want to lose the river," said Rich Paro, who works at the Lazy River Campground. The river was once the campground's main attraction, drawing canoeists and kayakers. The campground was severely flooded, but is open and full for the holiday weekend, even though it is now by an almost dry riverbed.

"People like the river," Mr. Paro said. Donna Mailhot-Dornhofer, who owns Center Epsom Antiques, thinks the

river knows what is best. "If we're not going to get the Old Man in the Mountain back, we're not going to get a river back," she said, referring to the state's iconic rock figure, which collapsed in 2003. "I don't want to be putting my tax money into that." There are also environmental concerns. The river contains a rare mussel that is on the state's endangered list. The shift's effect on the mussel is unknown. The town has asked the state to study putting the river back, and various agencies are scheduled to meet Tuesday to discuss the situation. A town meeting is planned for next Monday.

In town, many theories abound as to why the shift happened and how the river could be put back. Al Bickford, 73, a lifelong resident whose father used to own the mill, is the town's resident river expert. Mr. Bickford thinks the breach happened in a place where officials removed a beaver dam about 10 years ago, weakening the bank. Robert Griggs, who owns the land the mill is on, suggested building a beaver-like dam with cut trees and sand, saying the river could be back to its old course in a week.

Julie Clermont, a town selectwoman who lives near the river, said she was not sure what the town would do. But she said that because of budgetary restrictions, any action would require a special vote. "It's dividing the town," Ms. Clermont said. She said she would side with the townspeople if it were put to a vote, but is not sure how she feels about the issue. Ms. Claremont enjoyed kayaking on the river when it flowed near her home, and she said she was uncertain whether moving it back was a good idea.

Nature decided to move the river on May 14 and 15. Town officials and volunteers sandbagged the dams near the mill and points along the river that were prone to flooding. Suddenly, residents said, the high water at the dam by the mill started to recede and flow backward until it drained out like a bathtub, exposing the rocky bed.

Mr. Bickford worked with the Fire Department to pinpoint possible flooding spots, but missed the one where it breached. "That old son of a gun blindsided me," Mr. Bickford said. "I've got to say, emotionally, it hurts. It's like losing an old friend. I've lived on the river, fished the river. The river has always been a part of my life."

As for Mr. Tilton and Ms. Lucier, their wedding in the old mill went on as planned. The couple was married outside in front of a large rock. Mr. Tilton's mother, Leigh, said she had been extremely nervous about the rain and had prayed all week before the wedding for the water to go down, so the restaurant would not flood and the couple could marry near the waterfall.

"God must have misunderstood my prayer because the water did go down, all of it!" she said in an e-mail message. "There is no waterfall. There is no river! Just an empty riverbed. The reception hall was dry. Another example to be careful what you pray for!"

NHGS Groundwater Level Monitoring – May, June, July and August 2006

Submitted by Genevieve Al-Egaily, NH Geologic Survey

Ground water level measurements were collected by NHGS staff member Genevieve Al-Egaily with help from Yvette Meunier on: May 23-25, 2006; June 27-29, 2006; July 23-25, 2006 and August 28-30, 2006.

May 2006: During May, the statewide average showed a 1.78 foot increase in ground-water levels from last month. Increases were seen in all wells with the greatest change at the Hooksett well, which showed an increase of 3.88 feet. When compared with May 2005, the statewide average ground-water level increased 1.43 feet.

June 2006: During June, the statewide average showed a 0.68 foot decrease in ground-water levels from last month. When compared with June 2005, the statewide average ground-water level increased 0.83 feet.

July 2006: During July, the statewide average showed a 0.24 foot decrease in ground-water levels from last month. The Campton and Colebrook Wells showed decreases of 0.06 feet and 0.42 feet respectively compared to last year. When compared with July 2005, the statewide average ground-water level increased 1.5 feet.

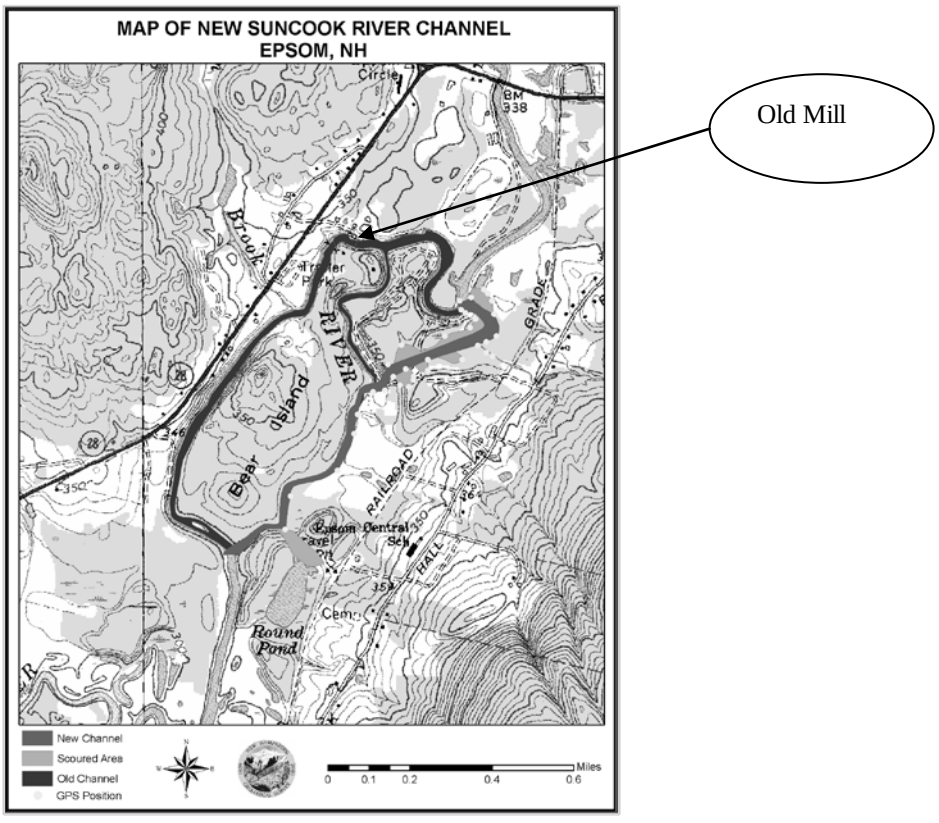
August 2006: During August, the statewide average showed a 1.17 foot decrease in ground-water levels from last month. The Colebrook and Concord Airport Wells showed slight increases in water levels of 0.07 feet and 0.16 feet respectively. When compared with August 2005, the statewide average ground-water level increased 1.08 feet.

NH Geological Survey Assesses Shift of the Suncook River

This article was written by Chad Wittkop, Surficial Geologist for the NHGS. It was first published in the July 2006 DES newsletter…Environmental News.

Large portions of a river's channel can become abandoned through a process known as **avulsion**. High water levels during flood events seek the path of least resistance to flow and can at times find and follow a new course. A common form of avulsion occurs within a river's floodplain when a meander bend is bypassed at its neck, leaving the abandoned section of channel to become an oxbow lake.

River avulsion outside the normal floodplain is much more unusual. Such an event occurred on the Suncook River in Epsom during the flooding of May 14-15, 2006 when the river left its channel and initiated formation of a 0.44-mile section of new valley, abandoning 1.52 miles of old channel in the process.



The former course of the Suncook River around Bear Island was determined by a series of low glacial ridges composed of sand and gravel, which acted as natural levees and directed the river westward, north of Bear Island. Near the Old Mill (restaurant), a 0.5-mile reach of the Suncook flowed through an area of shallow bedrock,

creating a unique habitat for the rare brook floater mussel. In the days after the avulsion, biologist attempted to salvage as many of these mussels as possible, moving them to a new location.

In the 10,000 years since the glaciers left the region, the Suncook River has worked to find a more direct route through the Bear Island area as evidenced by a small pre-existing gap in the glacial ridge through which the river now flows. Human intervention may have hastened this change through the excavation of the sand and gravel deposits that comprised these ridges.

During the May 14-15 avulsion event, the river breached a glacial ridge at the southwestern corner of a gravel pit, initiating rapid formation of the new channel through easily eroded glacial lake and wetland sediments. Post flood surveys uncovered a high-water mark around the edges of the gravel pit, indicating that water pooled there to a depth of three to four feet during the flood. Excavations in the gravel pit artificially expanded the Suncook's floodplain. This allowed high water to flow nearer the natural gap in the glacial ridge than would have otherwise occurred if the flooding were limited to the native wetland area.

New Hampshire Geological Survey staff worked to collect field data and analyze available geologic information in an effort to better understand this unique event. These efforts included collecting high-precision GPS data used to generate the first accurate maps of the new channel's location. NHGS will continue to gather data, perform analysis, and share results with the public as this unique situation develops.

Geological Society of New Hampshire

ANNUAL FALL 2006 DINNER MEETING

Speaker: Bob Whitmore

Topic: "Pegmatite Excursion in Brazil"

*******Annual elections for GSNH officers will be held. Polls open 6 -7:30 PM********

Thursday, October 12, 2006

Cat n-Fiddle Restaurant

Exit 13, I-93, Manchester Street, Concord, NH

6:00 pm Social Hour, 7:00 pm Buffet Dinner, 7:45 pm Speaker

GSNH 2006 Annual Fall Dinner Meeting, Thursday October 12.

Advance Reservations: _____Member (Dues Paid) @ $20.00.

- Member at the Door or Non-Member with Reservation ($22.00).
- Non-Member without Reservation ($24.00).
- Students $10.00 with valid student ID card (Reservation Requested).

Note: GSNH will also accept dinner reservations by e-mail, which will then allow you to pay at the door. Please note that e-mail reservations constitute an agreement with the Society for which you will be responsible to pay, whether you are able to attend or not, unless you cancel your reservation by noon the day before the Dinner.

Note: Reservations will be taken until Wednesday Afternoon October 4, 2006! Make checks payable to: Geological Society of New Hampshire

Mail to: Lee Wilder, 477 Putney Hill Road, Hopkinton, NH 03229. Reply via e-mail to: boslwne@tds.net.

Name(s):_____
Address:_____
Phone and/or Email:_____
Half the cost of the dinner may be tax-deductible as a business expense.

The lecture part of the program counts as 1.5 hours of CEU contact hour credit.

Upcoming Events/Dates to Remember!

- **SEPTEMBER 17–20, 2006, 125th New England Water Works Association Conference, Danvers, MA. Sheraton Ferncroft Resort.**
- **SEPTEMBER 29–OCTOBER 1, 2006 – NEIGC, Hosted by Univ. of Maine at Farmington, Saddleback Ski Area in Rangeley, Maine.**
- **October 7-8, 2006: NEWBURY, NEW HAMPSHIRE: 43rd Annual Festival; Capital Mineral Club, Sunapee Ski Area, Rte. 103.**
- **OCTOBER 12, 2006 – FALL DINNER MEETING at Cat-n-Fiddle Restaurant in Concord, NH**
- **OCTOBER 12-13, 2006 – Fall 2006 Water Resources Symposium, University of New Hampshire, Durham, NH.**
- **OCTOBER 8-14, 2006 - Earth Science Week**
- **OCTOBER 30-NOVEMBER 4, 2006 – Association of Engineering Geologists Annual Meeting, Boston, MA.**
- **March 11-14, 2007 –Geological Society of America-Northeast Section at UNH, Durham, NH**
- **FALL 2006 MINERAL-FOSSIL SHOWS, Sept 9-10, New Milford, CT; Oct 14-15 Sunapee, NH; Oct 28-29 Warwick, RI; Nov 4-5 Greenwich, CT and Nov 18-19 in Worcester, MA**

GSNH Promoting Geological Science & Education

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