THE MAINE GEOLOGIST

THE NEWSLETTER OF THE GEOLOGICAL SOCIETY OF MAINE

DECEMBER 1977

VOL. 4 NO. 2

FALL MEETING: SUCCESS!

Prof. A. M. Hussey II hosted the Fall Meeting of the Geological Society of Maine at Bowdoin College on Friday and Saturday, December 2-3, with three interesting and informative sessions in the 2-day period. In keeping with Art's style, these sessions flowed without a hitch.

The Friday afternoon session, at which the Society formally incorporated itself, was held in the Geology Department lab with about 30 members. For the Friday evening session, at which Bruce Bouley described volcanogenic massive sulfide deposits, the crowd had swelled to around 50 and was smoothly transferred to Room 109 of Cleaveland Hall where projection facilities, seating and the acoustics were perfect. Again on Saturday morning Cleaveland 109 was used for a 4-hour meeting with representatives of the Corps of Engineers on the proposed Dickey-Lincoln hydro project, with 50 or more in attendance.

For both the Friday and Saturday sessions, members of Bowdoin's Cleaveland Society helped immeasurably to keep the throng oriented and comfortable, by their guidance to meeting sites and their laying on of coffee and doughnuts. The Cleaveland Society is made up of about 25 Bowdoin students interested in geology. Their work for the GSM meeting added greatly to its success, and we thank them very kindly indeed.

Winter Meet Plans

The next formal gathering of the Society is scheduled (tentatively) for Friday, MARCH 17th, at an appropriate location someplace within the State of Maine. While we do not yet have much precision on the place and hours for the meeting, we do have a kind commitment from Brad Caswell, Hydrogeologist for the Maine Survey, to present for the evening program his paper "Groundwater Planning in the Maine Coastal Zone". For your information, the "coastal zone" extends easterly from Kittery to Eastport and inland for about 20 miles. Mark the date. We'll notify you again.

FIELDTRIPS '78

EXCURSIONS WITH ART HUSSEY AND KOST PANKIWSKYJ (et al) ALONG THE NONESUCH RIVER-NORUMBEGA FAULT TERRANE FROM WESTBROOK TO LIBERTY!! POSSIBLY ON JULY 29-30 WEEKEND. KEEP IT IN MIND... IT WILL BE ANOTHER WINNER FOR THE SOCIETY. COUNT ON IT.

DICKEY-LINCOLN

On December 3rd at Bowdoin, representatives of the New England Division, Corps of Engineers (NED-CE) presented geotechnical information to about 50 GSM members & guests on the proposed Dickey-Lincoln hydro project, and responded to questions generated by Society members. Corps specialists and their presentations included: Mr. C. G. Tiersch, NED-CE, on project overview and scheduling; Mr. E. A. Blackey, NED-CE, on bedrock & surficial geology; Dr. H. L. McKim, Cold Regions Research & Engineering Laboratory-CE, on remote-sensing studies; Dr. D. M. Patrick, Waterways Experiment Station-CE, on seismological studies; Dr. R. Hirschfeld, Geotechnical Engineers, Inc., on dynamic testing of soils; and Mr. H. Baker, NED-CE, on design for foundations and embankments. Following the Corps' presentations, questions submitted by Society members were read by J. R. Rand, GSM. The meeting was recorded in full on magnetic tape.

Following the Corps meeting, attending GSM members convened to discuss their views on the Corps' geotechnical studies to date. As a result of these discussions, a committee was appointed to express the Society's position for the public record relative to the adequacy of these studies for the Environmental Impact Statement. The letter presenting that position is reproduced in full on Pages 2 and 3 herein.

members & dues

As of December 5, 1977, there were 73 paid-up members of the Society. In addition, 37 old members still owed dues for this current 1977-78 Society year, and 19 other old members owed for the 1976-77 _and 1977-78 years. "Apparent" GSM membership, therefore, seems to amount to something like 129 souls, some quicker than others.

The Membership year runs from August 1 to July 31. Annual dues are $5 for Regular members; $4 for Associate members; and $2 for Student members. There is also a one-time $2 Application Fee for new members.

In keeping with our historic practice, we have color-coded the address labels on this Newsletter to designate your membership standing. If your address label is snowy white, you are paid up through July 31, 1978. If your label is coded yellow, you still owe for 1977-78. If your label shows shocking pink, you owe dues for both 197677 PLUS 1977-78, and we must have to consider removing your name from the mailing list if you do not come down off the mountain shortly.

THE GEOLOGICAL SOCIETY OF MAINE
Cundy's Harbor R D 2 - Box 210A
Brunswick, Maine 04011

Colonel John P. Chandler
Corps of Engineers
424 Trapelo Road
Waltham, Massachusetts 02154

December 5, 1977

DICKEY-LINCOLN SCHOOL LAKES
HYDROELECTRIC PROJECT

Dear Colonel Chandler:

On December 3, 1977, the Geological Society of Maine sponsored a special meeting at Bowdoin College with technical representatives of the New England Division of the Corps of Engineers relative to the Corps' geological, geophysical and seismological *investigations* and findings, and to the Draft Environmental Impact Statement and supporting data earlier supplied to the Society by the Corps, for the proposed Dickey-Lincoln School Lakes hydroelectric project in Aroostook County, Maine. Approximately fifty Society members and guests attended the special meeting.

The meeting format included three hours of presentations by six Corps specialists and consultants on project overview and scheduling, site setting, bedrock and surficial geology, remote-sensing studies, tectonic structures, seismological investigations, seismic design factors, dynamic analyses of foundation soils, and design considerations for foundations and embankments, followed by one hour of Corps specialists' response to questions submitted by Society members.

Upon completion of the special meeting, the attending members of the Society convened to discuss and evaluate the Corps' investigations and findings, as these were variously presented in the Draft Environmental Impact Statement of September 1977, or at the special meeting of December 3, 1977. Leading from these Society discussions, we, the undersigned, were appointed as a committee to express to you the Society's position on the issue of the adequacy of earth-science investigations conducted for the project to date in relation to the release schedule for the Final Environmental Impact Statement, as follows:

1. Geologic and geotechnical investigations to date have been largely of a reconnaissance or preliminary character and have not developed adequate detailed information for assessment of the project at the Final Environmental Impact Statement level. Site-specific geologic and geophysical characteristics of fundamental significance in estimating costs and in evaluating the ultimate integrity of dams and dikes have not yet been defined for several critical subject areas, among them, for example,

a. with respect to the three-dimensional distribution, physical properties, hydrologic characteristics and response to dynamic loading

of the several, diverse and locally thick deposits of unconsolidated sediment upon which the dams, including particularly the Dickey embankments, will be founded;

b. with respect to the potential for seismic strain and surface displacement on the Rocky Mountain fault system adjacent to the Dickey reservoir and beneath Hafey Brook dam, due to differential crustal loading and fault plane lubrication by the Dickey impoundment;

c. with respect to the location, structural nature, hydrologic characteristics and potential for seismic strain and surface displacement of the Hunnewell Lake lineament, inferred to pass directly beneath the south Dickey dam, and of other linear structures which have been identified only by remote-sensing techniques.

2. Investigations and analyses have not been addressed in the Draft Environmental Impact Statement to the subject of downstream effects of the proposed project with respect first, to the potential loss of historically-commercial stream gravels, leading to the concomitant possible increase in erosion of stream banks; and second, to the human and environmental impact which would result should the Lincoln School or Dickey dams fail.

3. Since the many cost- and safety-significant questions raised are now deferred for attention to the construction phase of the project, and further since unfavorable geotechnical conditions discovered at that advanced stage could substantially elevate costs or, for reasons of safety, wholly preclude completion of the project, the Society feels that the Final Environmental Impact Statement should not be issued until the appropriate subject investigations are completed, evaluated and made available for public and professional review and comment.

We request that this position statement of the Geological Society of Maine be formally incorporated in the Public Comment section of the

Yours very truly,

THE GEOLOGICAL SOCIETY OF MAINE

Robert G. Gerber
Bradford A. Hall
Donaldson Koons
John R. Rand (for the Committee)

cc:
Gov. James B. Longley
Sen. Edmund S. Muskie
Sen. William D. Hathaway
Rep. William S. Cohen
Rep. David Emery

GSM, Inc.

At the afternoon business meeting of GSM in the geology lab at Bowdoin on December 2, 1977, it having been determined by Bill Rideout that a quorum was present, it was moved by D. S. Westerman, seconded by C. H. Norburg, Jr., and voted unanimously "to accept a Certificate of Organization of a Corporation, under Title 13, Chapter 81 of the Revised Statutes of Maine and Amendments thereto". Upon the subsequent filing of the Certificate in Augusta by Attorney Peter Mills of Farmington, the GSM has become a Maine corporation.

Since there will be a charge for drawing up and filing the corporation papers, it was moved by A. W. Berry, Jr., seconded by W. A. Anderson, and voted unanimously "to appropriate a sum not to exceed $150 to pay legal and filing fees for incorporating the Society, and to authorize the Treasurer to pay such charges when billed". The Treasurer was also authorized to investigate "NOW" accounts offered by various banks to see if some relative financial advantage might be gained by the Society's opening such an account.

Archie Berry, who had been delegated by the Society at the Annual Meeting to handle the matter of finding a lawyer to draw up papers, enumerated some significant points concerning our new status:

1. The GSM Bylaws (enacted 08/01/75) have not been made a part of the Corporation papers, so that they may be modified from time to time without our having to go back each time through the business of incorporating all over again;

2. As the Corporation is newly set up, it can accept financial GRANTS from any source without unfavorable tax consequences, and any grants can also be taken as a tax deduction by the grantor;

3. The Society is established as a non-profit corporation only for charitable, religious, educational or scientific purposes, and cannot carry on propaganda, nor practice politics in behalf of any individual. The Society can, however, take positions on issues, and appear at public hearings, etc. to advance its positions on issues. Members as individuals can continue to offer their own thoughts and support their own political choices, however and whereever it may seem best to them.

If you have any questions on this matter, please contact Archie W. Berry, Jr., Department of Geology, Univ. Maine, Farmington, Maine 04938.

SOCIETY OF MINING ENGINEERS

On the initiative of Herbert R. Babitzke, BuMines-Augusta, five members of the Society of Mining Engineers (SME) of the American Association of Mining, Metallurgical & Petroleum Engineers (RIME) sat down at Clare's Dolphin Restaurant between GSM meetings at Bowdoin on Dec. 2nd, to launch the Maine Subsection of SME-RIME. SME members present at the inaugural were C. E. Heinonen (J.S. Cummings,Inc.), R. W. Holliday (BuMines-Ret.), J. R. Rand (Self), W. H. Synhorst (Mine Enforcement & Safety Admin.), and H. R. Babitzke, who was promptly & unanimously elected Chairman and sole officer of the fledgling subsection. Interested witnesses to the festivities included GSM members R. G. Gerber, W. W. Rideout and T. C. Williamson, and E. Wells of M.E.S.A.

Having got the christening out of the way, talk turned to questions of just what the new Maine SME-AIMS might DO. On the matter of sponsoring presentations, technical slide shows, etc., it was felt that GSM filled that gap well enough. However, on the matter of knowing about who is mining & processing what, where and how in Maine, there is a void which AIME has historically filled very well elsewhere in the U.S., by scheduling plant and mine tours for members. There are a number of interesting operations in Maine, producing bricks, cement, feldspar, lime, peat, slate, steel and (soon) garnet, which few SME members here know much about. Accordingly, Herb Babitzke was appointed a committee-of-one to see about organizing plant tours, come Spring, for SME members. If you're interested in seeing mineral operations from the inside, contact H. R. Babitzke, P.O. Box 228, Augusta 04330 about how to become a member of SME-AIME.

CALL FOR PAPERS

call or write today

If you have been reading the various GSM news items and announcements which have flown your way this past year and/or have attended any of the past several Society meetings, you will probably be aware that the Society wishes to publish a Bulletin of Shorter Contributions to Maine Geology; that this effort is under the editorial management of A. M. Hussey and D. S. Westerman; that a formal call for contributions went out almost two months ago; and that the deadline for submitting papers for review is FEBRUARY 1, 1978.

The Bulletin committee has received two papers plus abstracts for two more papers, as of December 1st, and wishes to advise that additional contributions will be welcome. Since each paper ultimately published in the Bulletin will have been subjected to full professional review procedures, the publication itself will qualify the authors for academic credits.

If you are now writing a paper for your presentation at the Northeastern Section of The Geological Society of America (in Boston, March 9-11, 1978), you should consider having it published at the earliest possible date... in Volume I of the GSM Bulletin, July 1978.

Would those who are considering writing a paper for the Bulletin PLEASE advise Art or Dave of your intentions right away, even if all you have to offer now is a title and notes.

SEND ALONG YOUR CONTRIBUTION

NOW

Arthur M. Hussey II
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Brunswick, Maine 04011

David S. Westerman
Dept. of Earth sciences
Northeastern University
Boston, Mass.02115

Volcanogenic Deposits

Bruce A. Bouley, manager of exploration for Phelps Dodge Corporation in our region came down from Bangor on December 2nd to reveal to assembled GSM members the intricacies of spatial & genetic relationships between massive metallic sulfide deposits and volcanic rocks. In Maine, there are two geologic provinces where massive sulfide deposits might be expected to occur, generally termed the Northern and Coastal volcanic belts.

The Northern belt extends discontinuously across the state from near Parmachenee on the west to northeastern Aroostook County. Numerous sulfide occurrences associated with volcanic rocks have been investigated in this zone since the early 1950's. The most recent discovery here, reported a couple of months ago by a combine of Superior Oil Company and Louisiana Land & Exploration Company, is located in the wildlands townships about 5 miles north of Big Machias Lake, 35 miles west of Presque Isle.

The Coastal volcanic belt in Maine extends discontinuously from Penobscot Bay to Passamaquoddy Bay. This belt was the scene of a shortlived "mining boom" in the early 1880's, and has been of somewhat more productive significance in the past decade with the commercial development and production of zinc-copper ores from mines at Harborside on Cape Rosier and near Second Pond in Blue Hill. The Harborside mine was depleted and closed in 1972. Because of the current severely depressed metal markets, the Blue Hill mine, with ore reserves remaining, was shut down two months ago after 5 years of production.

To try to paraphrase Bruce Bouley's extensive narrative and slide descriptions on massive sulfide deposits, let us start with definitions of the ore type. The deposits are termed "massive" when the rock sulfide content exceeds 60%. Of primary commercial interest in this material are the zinc and copper sulfides, sphalerite and chalcopyrite, which predominate, and the lead sulfide, galena. The deposits are volcanogenic and stratabound, occurring almost exclusively within volcanic rocks and sandwiched between units of a volcanic sequence which displays a mafic-through-felsic cyclicity. Morphologically, the deposits are generally lens-shaped or tabular, frequently trailing down to a keel, and have sharp hangingwall contacts with the overlying volcanic units. They display metals zonation, with a copper-rich base giving way upward to a zinc-rich zone and to a lead-zinc zone at the top.

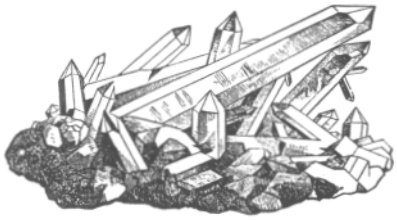
The general geologic setting for massive sulfide deposits is within a differentiated volcanic pile or "edifice" characterized successively from the bottom up by a subaqueous pillow basalt platform, intermediate andesite-dacite flows, and overlying rhyolite domes with aprons of tuffaceous pyroclastic rocks. A key feature,

1 in an exploration and stratigraphic sense, is the occurrence of iron-rich chemical-sedimentary horizons. In the immediate area of the deposits, the iron-formation facies may be characterized as pyritic chert, which changes with distance from the deposit to hematitic chert ("red mudstone") and, farther away, to carbonate-facies iron-formation. Massive sulfide deposits of Kuroko, Japan, have a wrapper of "red mudstone" around the deposits.

The origin of massive sulfide deposits is interpreted to be intimately associated with the formation of the volcanic pile itself. After build-up of the pile, meteoric water, heated due to the thermal gradient of the pile or by plutons rising through the pile, may first have moved through the pile in pipes and stringers to strip metals from the volcanic rocks. Exhalations from depth may also carry metals. Sulfide deposits then formed upon settling of these sulfide-rich brines into ponded areas of the pile. Ores exhibit well-banded stratification, fine-grained textures, soft-sediment slump features and intra-bed deformations which suggest that they were deposited initially as gelatinous sulfide-rich muds. Since some stratabound deposits are cut by dikes whose emplacement was penecontemporaneous with volcanism, those deposits, at least, must have been deposited at the time of construction of the pile which encloses them.

For Maine, Bruce described the Cape Rosier area as exemplifying a proximal volcanic pile (Castine volcanics), surrounded by volcanogenic sediments (Ellsworth formation). Rhyolite domes crop out on many hilltops, and are flanked by coarse explosion breccias. Percolation of meteoric waters or exhalations from depth, the development of magnesium-rich alterations, and deposition of massive sulfides in several lens-shaped deposits were the final episodes in the formational history of the pile, on the order of 424 million years ago. Bruce does not see any strain effects or chemical changes in the Castine volcanics edifice due to the subsequent Acadian orogeny, although the country rock (Ellsworth formation) surrounding the pile may have been deformed. He further interprets the pyrite-rich "Penobscot formation" to the north of Castine as part of the Castine volcanics stratigraphic sequence, and not like the Penobscot formation rocks on the west side of the Bay.

For a final note, Bruce briefly pointed out that massive sulphide deposits are of particular economic interest because of their high content of metals, which may permit them to be developed and mined even in times of depressed markets. He is looking specifically for highgrade zinc and lead, and suggested that the inadvertant discovery of a huge, low-grade porphyry copper deposit might not ensure his election to his Company's Hall of Fame. (JRR)



The Geological Society of Maine c/o
John R. Rand, Cundy's Harbor
RD 2 - 210A, Brunswick, Maine 04011

THE MAINE GEOLOGIST is published four times a year, more-or-less, in September, late Fall, late Winter and maybe June or July, for members of the Geological Society of Maine, a non-profit educational Maine corporation interested in all aspects of the geology of the State of Maine.

Correspondence about this Newsletter, or about membership in the Society may be addressed to John R. Rand, Cundy's Harbor, RD2-Box 210A, Brunswick 04011.

Maine Survey

Walter A. Anderson has announced that a new series of bedrock and surficial map indexes are now in from the printer and ready for distribution upon request (Free - Scale 1:1,000,000). Also now available is Geologic Map Series GM-4, Geologic Map of the Kezar Falls Quadrangle, by Richard A. Gilman (colored map and 16-page text for $1.75 plus 91~ in-State tax). Walter has further noted that the geologic maps of the Skowhegan, Kingsbury, Anson and Kingfield are in the mill and should be finished for release sometime this winter. To lighten the load on their warehouse, the Maine Survey will shortly be notifying you of a SPECIAL SALE of some old publications (that is, so long as your name is on the Survey's 1500-1600 name mailing list).

Also of interest: the Telephone Company is now installing lines for new seismometer installations at Hinckley, Moose River (Jackman area) and Bucksport. These should be operational some time this winter, hooked into the Northeastern U.S. Seismic Network. The Bucksport station may be particularly useful, since it will be located near the southern end of the zone between Milo and Orrington where numerous earthquakes have been recorded in the past few decades. Between 1821 and 1938, four intensity V(MM) events were reported for the Bangor-Orrington vicinity, only 10 to 15 miles to the north of this new Bucksport station.

ISLAND WATCHERS NEEDED

We are advised by Barry S. Timson, the Maine Coordinator for the Barrier Island Coalition, that he is on the lookout for volunteer "Barrier Island Watchers". BIW's apparently are needed to observe Maine's barrier islands on some periodic basis, and to record erosional and constructional changes which may take place with time and tide. Barry is now a private consulting geologist, with offices at P.O. Box 2147, Augusta 04330. If you happen to be where you can look regularly at a barrier island (or know someone who might be so situated), please get in touch with Barry as soon as possible.

Gin and Beer

"When spring-time flushes the desert grass,
Our kafilas wind through the Khyber Pass.
Lean are the camels but fat the frails,
Light are the purses but heavy the bales,
As the snowbound trade of the North comes down
To the market-square of Peshawur town." (Kipling)

It was some time back that Luke Fournier wrote to say he was working on a 10,000' wildcat test called TEXASGULF KARAK-1, looking for oil in Cenozoic sediments about 65 miles south of Peshawar and the Khyber Pass in the Northwest Frontier Province of Pakistan, near the Afghanistan border. As we look today out over the icy bay we can only hope that Luke hit it big and plentiful.