The Engineering Geologist

THE GEOLOGICAL SOCIETY OF AMERICA

THE QUARTERLY NEWSLETTER OF THE ENGINEERING GEOLOGY DIVISION OF THE GEOLOGICAL SOCIETY OF AMERICA

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Dues and the budget

Strange as it may seem, the Management Board is *not* announcing an increase in division dues. Our fiscal position is still adequate to cover expenses, and with the help of the membership, it is entirely likely that we can remain solvent at the current $2 dues level for several more years to come.

One problem that perennially faces the board is a delay in establishing our position at the beginning of a new fiscal year. For example, headquarters staff in Boulder could not supply final budgetary figures last year until the Society's audit was completed, and our board waited through mid-April of this year for the report. As a result, Secretary-Treasurer Galster is investigating the possibility of transferring bookkeeping chores directly to the division. If he is successful, our future budgets should be considerably more accurate.

Our income (entirely from division dues) should total about $3,000 this year, and we estimate its distribution as follows:

Expenditures	*Percent of budget*
Publications and mailing of newsletter and ballot	44
Travel support for board members	39
E. B. Burwell, Jr., Memorial Award	3
Miscellaneous	1
Exigency fund	13

Budgeting 13 percent of our income for exigencies may seem anomalous to some of the membership, so a brief discussion of all the above elements is provided below:

PUBLICATIONS

Headquarters has already dedicated much copy to articles about sky-rocketing publication costs, and it would seem certain that newsletter expenses are sure to increase. We eliminated our summer issue this year, so we hope this budgetary element will stay in balance.

TRAVEL

Expenditures in support of travel vary with management-board makeup and the number and location of essential meetings. To a large degree, division officers (or their employers) pay expenses incurred during the year, but help is made available when necessary. In short, unless we make financial independence a requisite for membership on the board, this budgetary item offers little room for tightening.

BURWELL AWARD

This division honor (bestowed almost every year) consists of a $100 check and a certificate. Similar awards given by other divisions are funded by income from invested donations and grants—only our division supports its award through dues. If the entire membership contributed $1.25 during the next year to establish a Burwell Endowment, the award could be permanently supported thereafter from the earnings of such a fund. As yet this idea has stimulated little interest.

MISCELLANEOUS

Items carried under this element generally reflect contributions that the division periodically makes in support of engineering geology activities of other organizations.

EXIGENCY FUND

Funds earmarked for this category reflect the Board's knowledge of the division's past experience, and without such a "slush fund," unexpected expenses would put us in the red. We are making every effort to reduce the size of this budgetary element, and the initiation of pre-registration for annual luncheon tickets is one such innovation. Each year, at the Society's annual meeting, the Board is required to estimate attendance at our luncheon at least 24 hours in advance of the event. When attendance is less than anticipated, we are billed for the estimated meals whether served or not. In Miami, we suffered a minor disaster because our costs exceeded income by $159.50, and this loss represented roughly 5 percent of our annual budget. With membership cooperation in pre-registering for the luncheon this year (we are urging you here!), next year's management board should have reason to reduce the size of the exigency element.

It can be noted with some pride that the Engineering Geology Division over the years has been the only division of GSA that has "carried its own weight," and our finances have been reasonably well managed. This year, of course, all the other divisions have been requested by headquarters to follow in our footsteps. Let us hope that we will not be the division that leads all others in raising the dues above the $2 level. Anyone with constructive ideas on how we can strengthen our future financial position is encouraged to get in touch with Secretary-Treasurer Galster or raise the point at our annual meeting in Salt Lake.

From the Chairman

To many of us, especially those in academic life and those with school-aged children, the Labor Day season marks an end of summertime activity and a return to a more organized and businesslike existence. Speaking strictly for myself, the transition is much akin to the daily process of waking up each morning and attempting to organize another day. A brief period is spent in reflection upon what has been accomplished previously and then one quickly turns to the task of picking up where work terminated before the respite.

The distribution of this issue of *The Engineering Geologist* has been specifically scheduled to catch division members during their period of "fall waking" in the hope that they will find more time to read it carefully than might be expected when their schedules become more crowded. For example, it is particularly important to note in planning this fall that the Society's annual meeting date has been moved from November to October (October 20-22, Salt Lake City, Utah). Also, the division has introduced a change by arranging for its members to pre-register for the annual luncheon-business meeting (mentioned later in this newsletter under Dues and the Budget). Our luncheon, highlighted by the announcement of our new officers and the Burwell Award recipient, affords members the best opportunity of the year to learn of division activities and to air their views on division management. To assure participation this year, it will be almost mandatory for members to make an early decision to attend, because few tickets will be available at the registration desk.

It seems likely now that the 1975–1976 year will be eventful for engineering geologists. Continued progress is being made in developing closer cooperation between the division and the Association of Engineering Geologists as we anticipate back-to-back meetings of both organizations in Seattle in 1977. Of special interest to GSA members is news that AEG is considering a new classification of membership—"Academic and Research Associate"—that essentially affords the rights and responsibilities of full membership. This new category is largely designed to give interested GSA Engineering Geology Division members the opportunity to join this growing sister society even if they work outside of the mainstream of professional practice. I hope to have further information on this option at our meeting in October.

Finally, I wish to remind the membership of some unfinished business that has been neglected by many of us to which we should lend our support. I refer to the patient efforts of Lynn Brown's committee in revising the Engineering Geology Reference List. The committee has experienced a rather poor response to its earlier appeal published in the newsletter in October 1974 (v. 9, no. 3). If you missed reading it and don't save back copies, write me and I shall personally send you a copy complete with a form for submitting references. The committee's job cannot be completed without our contributions, and we can't wait "for George to do it." —He never returns from his vacation!

See you in Salt Lake!!!

Paul L. Hilpman, Chairman

Meetings

September 22–24, 1975:
16th Annual Rock Mechanics Symposium

This symposium, "Design Methods in Rock Mechanics," to be held on the Minneapolis campus of the University of Minnesota, is jointly sponsored by the university and the U.S. National Committee for Rock Mechanics. The symposium is intended (1) to review current design methods and approaches for rock engineering and (2) to make available a comprehensive reference collection of these design methods, with comments on their merits and limitations. Topics will include design methods pertaining to rock foundations (including dams), rock slopes, mine layouts (including ground movement and subsidence), tunnels and large excavation supports, and blasting rounds (surface and underground). For further information, write to Steven L. Crouch or to Charles Fairhurst, Department of Civil and Mineral Engineering, 112 Mines and Metallurgy Building, University of Minnesota, Minneapolis, Minnesota 55455.

October 9–10, 1975:
Geotechnical Engineering in the Urban Environment

This 28th Canadian conference will be held in Montreal. For complete information please write to Professor B. Ladanyi, Department of Mining Engineering, Ecole Polytechnique, University of Montreal, P.O. Box 6079—Station A, Montreal, P.Q. H3C 3A7, Canada.

October 28–31, 1975:
1st Annual William T. Pecora Memorial Symposium

The 1st Annual William T. Pecora Memorial Symposium will be held in Sioux Falls, South Dakota. The emphasis topic is "Applications of Remote Sensing to Mineral and Mineral Fuel Exploration." For more information, write to American Mining Congress, 1100 Ring Building, Washington, D.C. 20036.

November 2–8, 1975: 18th Annual
Convention, Association of Engineering Geologists

The annual convention of the Association of Engineering Geologists will be held at Stateline, Nevada (Lake Tahoe). The theme of the meeting is "Better Living through Geology." For more information, write to Carl J. Hauge, California Division of Mines and Geology, 1416 Ninth Street, Room 1341, Sacramento, California 95814.

Stone weathering and stone preservation

SELECTED ANNOTATED BIBLIOGRAPHY COMPILED BY ERHARD M. WINKLER, NOTRE DAME, INDIANA

This bibliography is a continuation of a previous effort, Chemical Preservatives for Natural Stone, Annotated Bibliography, The Engineering Geologist, Geol. Soc. America, v. 8(3), p. 2–3, September 1973.

Anonymous, 1961—Preserving stone and iron. Mining Magazine, 2nd. ser., vol. II, p. 85. *Treatment of Westminster Palace with silicate of Na-solution, washed after drying with dilute HCl resulting in pure silica coating after rain. Silica coat also formed on iron objects.*

Clarke, B. L., 1972—Some recent research on cleaning external masonry in Great Britain. R. Rossi-Manaresi, G. Torraca, ed., The Treatment of Stone, ICOMOS, Int. Centre for Conservation, Bologna 1972. *Cleaning methods discussed on Portland stone (British Museum), Kentish ragstone, a calcareous sandstone (Tower of London), and sandstone at Royal Palace in Edinburgh, Scotland. Water spray developed brown stain on limestone, dry-grit blasting good on hard stone, not usable on soft stone.*

Clarke, B. L., Ashurst, J., 1972—Stone preservation experiments. Building Research Establishment, Dept. of the Environment, Garston, Watford WD2 7JR. *Buildings in Britain were selectively treated with preservatives; observed weathering damage is discussed.*

Dearman, W. R., Fookes, P. G., 1972—The influence of weathering on the layout of quarries in southwest England. Proc. of the Ussher Society, v. 2(5):372–387. *Engineering classification of weathered rock given in combination with rock structure, lithostratigraphy and geomorphology for assessment of depth of weathering on layout for quarry sites in southwest England.*

EDWIN B. ECKEL has been elected to honorary membership in the Geological Society of London for his contributions to engineering geology. Congratulations!

Domaslowski, W., Lehmann, J., 1972—Recherches sur l'affermissement structural des pierres an moyen de solutions de resines thermoplastiques. R. Rossi-Manaresi, G. Torraca, ed., The Treatment of Stone, ICOMOS, Int. Centre for Conservation, Bologna, 1972, p. 255–272. *(Research about the structural strengthening of rock with thermoplastic solutions.) Impregnated Polish limestones and sandstones were checked for porosity, heat of hydration, and other properties.*

Fedorov, V. I., 1972—Quelques problems de conservation de la Maconnerie. R. Rossi-Manaresi, G. Torraca, ed., The Treatment of Stone, ICOMOS, Int. Centre for Conservation, Bologna, 1972, p. 183–196. *(Some problems in the conservation of masonry.) Discussion of various Russian churches; murals exposed to humidity and capillary water were treated with air conditioning and electro-osmosis.*

Gauri, K. Lal, 1972—Cleaning and impregnation of marble. R. Rossi-Manaresi, G. Torraca, ed., The Treatment of Stone, ICOMOS, Int. Centre for Conservation, Bologna, 1972, p. 231–238. *Gauri-technique of successive marble impregnation with epoxy-resins: (1) soaking of specimen in acetone; (2) soaked specimen treated with acetone plus resins with curing agent; (3) raising concentration of solution to 95 percent resin; and (4) after polymerization, resoaking in acetone and treatment with absolute resin.*

Gauri, K. Lal, Hagerty, D. J., Ullrich, Ch. R., 1972—Comparative physical properties of weathered impregnated and unimpregnated marble. Engineering Geology, vol. 6 (4):235–250. *Marble weathering forms three zones. Impregnation with resins provides cohesion between dislodged calcite crystals in zone of weathering. Shore scleroscope hardness, specific gravity show improvement of outer zone 59 percent, improvement of unweathered zone 24 percent.*

Gerard, R., 1972—Etude de la protection des pierres calcaires au moyen de resines silicones. R. Rossi-Manaresi, G. Torraca, ed., The Treatment of Stone, ICOMOS, Int. Centre for Conservation, Bologna, 1972, p. 145–164. *(Study of the protection of calcareous rocks with silicone resins.) Experiments with silicone resins on limestone with different concentration.*

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THE ENGINEERING GEOLOGIST
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Case History Volumes

In his address to the membership at the division's 25th anniversary luncheon in Minneapolis, Past-Chairman Robert F. Legget noted that our Case History Volumes were not regularly published and that many fine papers were available to compose such volumes. Indeed, he was right. Countering that trend, we now have the following three volumes planned, and the membership should be apprised of this progress.

Volume	*Subject*	*Editor*
10	Landslides	Donald R. Coates
11	Preservation of stone	Erhard M. Winkler
12	Nuclear power plant siting	Allen W. Hathaway

Although Case History Volumes commonly stem from papers presented at division-sponsored symposia, any member with the desire to organize such a volume may do so with the approval of the management board. If the subject lies within the domain of a division technical committee reporter, one should contact the appropriate reporter. For all other topics, contact Chairman-Elect James W. Skehan, S.J.

Stone weathering and stone preservation

–CONTINUED–

Hempel, K., Moncrieff, A., 1972–Summary of work on marble conservation at the Victoria and Albert Museum Conservation Department up to August 1971. R. Rossi-Manaresi, G. Torraca, ed., The Treatment of Stone, ICOMOS, Int. Centre for Conservation, Bologna, 1972, p. 165–181. *Methods of stone cleaning are discussed. Consolidation of decomposing marble with epoxy resins, Ca-salts from oversaturated natural waters. Water repellent treatment with wax, silicone resin, also treatment of non-porous stone with wax. Study of bird action on Carrara marble.*

Hyvert, Giselle, 1973–Borobudur, les bas-reliefs materiaux-facteurs responsables des degradations-programme de conservation. Studies of Conservation, v. 18(3):131–155. *(Borobudur, the materials of the bas-reliefs–factors responsible for the decay and program of conservation.) Porous volcanic rocks exposed to numerous destructive factors or humid tropical climate of the Java rain forest. Cryptogamic vegetation especially hard on stone. Program: cleaning and treatment with fungicides.*

Jaton, Charles, 1971–Contribution a l'etude de l'alteration microbiologique des pierres de monuments en France. Ph.D. Thesis, Univ. of Paris, France, Science Faculty, 193 p. *(Contribution to the study of microbiological alteration of stone on monuments in France.) Alveolization and spalling are main damage. Nitrifying and thiobacillus under study. Thiobacillus abundant in areas high in sulfate but restricted nitrifying bacteria. Reducing bacteria beneath zone of alteration of biological sulfur cycle.*

Kosev, N., 1972–Use of Schmidt's sclerometer for evaluating the degree of rock weathering (in Bulgarian). Patista, v. 11(7):11–14. *Weathering degree by coefficient of weathering, index of weathering; works excellent for rhyolite, good for granite, andesite, gneiss, but poor for basalt and limestone.*

Lewin, S. Z., 1972–Recent experience with chemical techniques of stone preservation. R. Rossi-Manaresi, G. Torraca, ed., The Treatment of Stone, ICOMOS, Int. Centre for Conservation, Bologna, 1972, p. 139–144. *Calcitic limestone and marble: treatment with barium carbonate plus urea, no urea used on colored stone. Porous siliceous stone; decayed sandstone: controlled hydrolysis of tetraalkyl silicate resulting in glassy deposits of silica.*

Mamillan, M., Simonnet, J., 1972–Recherches des proprietes physiques permettant de juger de l'efficacite. R. Rossi-Manaresi, G. Torraca, ed., The Treatment of Stone, ICOMOS, Int. Centre for Conservation, Bologna, 1972, p. 201–230. *(Research of the physical properties which permit the judgment of treatment efficiency.) Various products are discussed with their efficiency of protection; procedures of impregnation are shown with sketches, also procedures of stone cleaning. Protection of cleaned surfaces with water-repellent Mg- or Zn-fluosilicates, Na- or K-silicates, silicone, etc.*

Marschner, H., 1973–Laboratoriumsuntersuchungen zum Verwitterungsschutz von Bausteinen. Deutsche Kunst und Denkmalpflege, 1973, p. 23–44. *(Laboratory investigations on the protection of building stone against weathering.) Weathering experiments performed with 5 different sandstones frequently used in Germany, all treated with epoxy resins. Crystallization tests imitate natural weathering conditions. Best results with ethyl silicates, less good with epoxides. Lithology and degree of weathering determines selection of impregnant and degree of dilution.*

Marchesini, L., Biscontin, G., Frascati, S., 1972–Controle de la consolidation des marbres saccharoides. R. Rossi-Manaresi, G. Torraca, ed., The Treatment of Stone, ICOMOS, Int. Centre for Conservation, Bologna, 1972, p. 273–294. *(The control of the consolidation of saccharoidal marbles.) Carrara and Greek saccharoidal marbles were treated with solution of silicone resin in 50% xylene reducing porosity.*

Munnikendam, R. A., 1972–The combination of low viscosity epoxy resins and siliconesters for the consolidation of stone. R. Rossi-Manaresi, G. Torraca, ed., The Treatment of Stone, ICOMOS, Int. Centre for Conservation, Bologna, 1972, p. 197–200. *Ethyl and methyl silicates are best as dilutents. Impregnated chemicals in proper dilution with methanol has good penetration without change of color.*

Nadaillac, L. de, 1972–Utilisation du Rayonnement Gamma dans la Conservation des Biens culturels. R. Rossi-Manaresi, G. Torraca, ed., The Treatment of Stone, ICOMOS, Int. Centre for Conservation, Bologna, 1972, p. 73–79. *(The use of gamma rays for the conservation of cultural monuments.) Treatment of stone with Co^{60} or Cs^{137} for biological destruction; chemical treatment afterwards with monomers.*

Ribeiro, R. M., Monreaux, C., Mussi Santos, A., 1973–Action des micro-organism es sur l'alteration d'une roche basique. Cashiers Orstom serie Pedologie, v. 11(1):57-64. *(Alteration of a basic igneous rock by the action of micro-organisms.) Solution of Fe from a diabase in Brazil by fungus Aspergillus. Solution through micro-organisms is greater for Aspergillus niger in a nutritive medium with glucose or saccharose (4% of Fe leached from rock).*

Reiderer, J., 1972–The conservation of German stone monuments. R. Rossi-Manaresi, G. Torraca, ed., The Treatment of Stone, ICOMOS, Int. Centre for Conservation, Bologna, 1972, p. 105–138. *History of stone treatment in Germany. Stone deterioration, mostly by frost and salts; artificial weathering tests in climatic chamber.*

Riederer, J., 1973–Bibliographie der deutsch-sprachigen Literatur zur Verwitterung und Konservierung natuerlicher Bausteine. Deutsche Kunst und Denkmalpflege, 1973, p. 106–118. *(Bibliography on German language literature on the weathering and conservation of natural building stone.) 532 entries of German literature.*

Reiderer, J., 1973–Die schaedigende Einwirkung luftverunreinigender Stoffe auf Kunstwerke. Proceedings of the 3rd International Clean Air Congress, Verein Deutscher Ingenieure, p. A 86–89. *(The damaging influence of air-polluting substances on works of art.) Damage by air pollution is generally overrated for stone. Great damage to brass.*

Riederer, J., 1973–Steinkonservierung in Bayern. Jb. d. Bayer. Denkmalpflege, v. 28, p. 264–283. *(Stone conservation in Bavaria.) Large quantities of sulfate damage to stone only. Damage by salts, bacterial action described. Many cases are illustrated of improper cleaning and preservation. Discussion of the different preservatives, waterglass, fluates, inorganic solutions, organic silicon compounds, resins and oils, waxes. Documentation of treated monuments in Bavaria.*

Riederer, J., 1973–Die Erhaltung von Kunstwerken aus Stein in Deutschland. Maltechnik-Restauro, v. 73(1), p. 6–30. *(The preservation of art works of stone in Germany.) History of stone preservation is discussed, with examples from Cologne, Bamberg, Munich, Wuerzburg. Discussion of failures by neglect of sealing of moisture properly.*

Riederer, J., Steinkonservierung am Alphaia Tempel auf Aegina. Maltechnik-Restauro, v. 73(3). *(Stone conservation on the Alphaia Temple on the Island of Aegina, Greece.) Salt and wind action partly destroyed porous shell limestone, especially at the base of walls. Stone was dismantled, desalted in pans, and treated with preservative. Six different preservation fluids were tried; waterglass treatment worked best on this stone and is recommended.*

Riederer, J., 1974–Die Erhaltung aegyptischer Baudenkmaeler, Maltechnik-Restauro, v. 74(1), p. 43–52. *(The preservation of Egyptian monuments.) Damage mostly by salts: removal by application of damp absorbent material. Soft mortar was used for stone additions, free of gypsum and cement. For consolidation of sandstone and granite, silicic acid esther recommended, for fragmented, crumbling chalks epoxy resins are advised.*

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Stone weathering and stone preservation

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Rossi-Manaresi, R., 1972–On the treatment of stone sculptures in the past. R. Rossi-Manaresi, G. Torraca, ed., The treatment of Stone, ICOMOS, Int. Centre for Conservation, Bologna, 1972, p. 81–104. *Original treatment of sculptures with colophony or sandarac, or "rue oil" still offers protection on 15th century monuments.*

Sleater, G. A., 1973–A review of natural stone preservation. SBS I R, 75–444, Prelim. Rept. for Natl. Park Service, Center for Building Technology, National Bureau of Standards, Washington, D.C., 34 p. *A detailed account on stone decay by both natural weathering and pollutants. Stone preservatives: surface coatings of paints, waxes, oils, inorganic chemical surface treatments and impregnanats, silicones and synthetic organic polymers. Methods of evaluation of preservatives; ample glossary, bibliography.*

Stambolov, T., 1972–Cleaning and preservation of stone objects. R. Rossi-Manaresi, G. Torraca, ed., The Treatment of Stone, ICOMOS, Int. Centre for Stone Conservation, Bologna, 1972, p. 65–71. *Cleaning: (1) dust removal; (2) emulsion 6 pts. water, 1 pt. ionic detergent, 3 pts. white spirits, 2 pts. trichlorethylene; (3) treat also with ammonium bifluoride if not enough. Preservation: only polymers usable in unweathered stone.*

Voute, C., 1973–The restoration and conservation project of Borobudur Temple, Indonesia. Studies in Conservation, v. 18(3), p. 113–130. *Survey of physical environment, uneven settlement. Discussion of reconstruction of new foundation after dismantling and reconstruction of monument with insertion of filter layers and impervious screens.*

Zador, M., 1972–Conservation problems of stone monumental buildings in Hungary. R. Rossi-Manaresi, G. Torraca, ed., The Treatment for Stone, ICOMOS, Int. Centre for Stone Conservation, Bologna, 1972, p. 239–254. *Problems in cleaning and conservation of Roman and younger buildings. External and internal protection of masonry walls. "Silicophob 7607" was successfully used for protection.*

Zelizna, S. T., Roshkosh, Ya. T., 1973–Mechanism of carbonate metasomatism of sulfate rocks: Geol. Geokhim. Gorynch. Kopalin (Akad. Nauk URRSR) No. 35, p. 94–99. *Replacement of carbonate or sulfate anion can find application in stone chemical stone preservation.*

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