

Grout Line

Overture

Welcome to this fourteenth appointment with the Grout Line.

For this issue there are no technical papers, but instead a short presentation and tribute, prepared by Jim Warner and reviewed by Larry Johnson (actual Chairman of the Grouting Committee), related to the Grouting Committee.

I would like to take this opportunity to express myself few words about the Grouting Committee. The Committee's web page (www.grouters.org) defines the Grouting Committee as "a working group inside the Geo-Institute (ASCE) dedicated to increase the quality of grouting projects and to foster the continuing development of grouting technology. It is composed by a group of industry practitioners, chiefly consist-

ing of contractors, consultants, academicians, regulators and suppliers". On the web site you can find all the related information.

All of us (considering I am part of the Committee) are volunteers and we meet generally twice at years usually in conjunction with an ASCE's Geotechnical Conference.

As mentioned by Jim Warner at the end of his Early History, the Grouting Committee is the organizer of the unique "Grouting Conference", starting back in 1982 and held approx every 10 years since.

Additionally he said "The Committee on Grouting was again without doubt, headed in a positive direction" and the result was:

- 1982, 64 papers

- 1992, 106 papers

- 2003, 127 papers

We are now in progress of organizing the 2012 conference.

The chairmen:

1952-1960	Raymond Davis
1961-1965	Judson Elston
1966-1968	W.K. Seaman
1969-1974	Jim Polatty
1975-1979	Lloyd Gebhart
1980-1984	R.H. Karol
1984-1987	Wallace Baker
1987-1992	James Gould
1992-1995	Ed Graf
1995-1997	Roy Borden
1997-2000	Mike Byle
2001-2005	Donald Bruce
2005-present	Larry Johnsen

Early History of the Geo-Institute Committee on Grouting

James Warner

The Geo-Institute Committee on Grouting was originally formed in 1952 as a Committee of the Soil Mechanics and Foundations Division of the American Society of Civil Engineers. It was recognized that "Injection of grout is a very common technique of the oil industry" but "While the civil engineer has made limited use of injection to aid construc-

tion in sandy soils and to help seal foundations he does not exploit this valuable technique to the extent he could and probably should". The mission of the new Committee was thus "Advancing the art and supplying information on grouting to the engineering profession". The official function was "to sponsor research and promote the de-

velopment of more suitable grouting mixtures and procedures for soil; and foundation stabilization; to organize working subcommittees as may be required for carrying out specific assignments to this end".

Members of the new Committee included well known academics and practitioners represented all facets of both

geotechnical engineering and the then fledgling grouting industry. The founding members were:

- Raymond Davis - Chairman; University of California, Berkeley
- O. James Porter - Porter, Urquhart, McCreary & O'Brien, Newark, NJ
- Francis B. Slichter - Corps of Engineers, Washington DC
- Ralph W. Spencer - Southern California Edison Co., Los Angeles, CA
- Walter H. Price - Bureau of Reclamation, Denver
- Clarence E. Blee - Executive Board Contact

To accomplish the assigned task, these early visionaries wasted no time in undertaking their charge. It was decided to present a "Symposium on Grouting" which would include both oral as well as written contributions. To carry out the Symposium four Task Committees, one each to report on cement, clay, bitumen, and chemical grout materials and their use were formed, the original Committee being renamed the Administrative Committee on Grouting. Although a draft report on clay grout was prepared, it was eventually merged into cement grouting and several papers as well as meeting sessions were presented under the general heading "Cement and Clay Grouting". Likewise, due to minimal interest in, or use of bitumen grouts, this focus was assumed by the Task Committee on Chemical Grout. The Symposium continued for the next eleven years with publication of 19 technical papers as well as presentation of technical sessions at ASCE national meetings in 1954, 1956, and 1960.

The Task Committees approached their work in very different ways. Whereas the Committee on Chemical Grouting prepared a single comprehensive written report, the Task Committee on Cement Grouting chose to have individual members prepare papers on different aspects of the subject but all falling within the topic "Cement and Clay Grouting of Foundations".

The very comprehensive 160 page report "Chemical Grouting" was prepared by the Task Committee on Chemical Grouting, under the chairmanship

of T. W. Lambe. It appeared in the November, 1957 Journal of the Soil Mechanics and Foundations Division of ASCE as proceeding paper number 1426. Included was a list of more than 90 patents as well as a brief description of nearly 100 previously completed projects involving chemical and bitumen grouts throughout the world. It further contained a bibliography of some 178 previously published references on the subject. The subcommittee listed its members as:

- T. W. Lambe, Chairman - Professor, Massachusetts Institute of Technology
- J. B. Clark
- John Gnaedinger - Soil Testing Services, Chicago
- H. P. Hall - Robert College, Istanbul, Turkey
- Alan S. Michaels
- J. D. Parsons - Moran, Proctor, Rutledge, Mueser, New York, NY
- Milos Polivka - Professor, University of California, Berkeley
- C. Martin Riedel - Chemical Soil Solidification Company, Chicago
- Woodland G. Shockley, Corps of Engineers - Waterways Experiment Station
- Leslie P. Witte - Bureau of Reclamation, Denver

Chemical grouting in the U.S. was still in its infancy at the time, and there was much curiosity as to its possible use in lieu of cement grout. Most previous such work was to solidify granular soils as an aid in shoring, and employed the multiple shot sodium silicate "Joosten" process, developed by Dutch mining engineer Hugo Joosten, and patented in the U.S. in 1925. Joosten's son-in-law C. Martin Riedel was certainly the most experienced American in such work and a particularly active member of the subcommittee. Another early innovator, though primarily involved with cementitious grouts, was Louis S. Wertz, whose Prepakt Concrete Company also used chemical grouts. Much of their early research was accomplished at the University of California, Berkeley, by Professors Ray Davis, Milos Polivka, and Alexander Kline. Professor Polivka had a strong interest

in potential chemical grouts resulting in significant contributions to the subcommittee work. And of course both the Bureau of Reclamation and Corps of Engineers who built and managed most of the large dams were represented.

A final separate paper on Chemical Grout was provided by R. H. Karol and A. M. Swift, "Symposium on Grouting: Grouting in Flowing Water and Stratified Deposits", *ASCE Soil Mechanics and Foundations Division, Journal*, Vol. 87, No SM2, Paper 2797, April 1961. The authors were researchers for the American Cyanamid Company which had introduced Acrylamide Grouts in the late 1950s.

Historically, most grouting had been accomplished with cementitious grouts and these were widely used in the United States, especially for dam foundations. It is thus not surprising, the cementitious subcommittee had the greatest number of members. As aforementioned, they chose to have papers on separate topics authored by individual members under the umbrella of "Cement and Clay Grouting of Foundations".

Chairmen of the subcommittee were V. L. Minear (1952 to 1956), A. Warren Simmons (1957 and 1958) and Judson P. Elston (1959 and 1960). Other members included:

- Edward B Burwell - Chief Geologist, Corps of Engineers
- C. C. Carlson
- Bruce E. Clark - District Geologist, Corps of Engineers, Nashville District
- Irving B. Crosby - Construction Engineer, Geologist, Boston, MA
- J. B. Clark - Bureau of Reclamation
- H. W. Cook
- Walter M. Duncan
- Judson Elston - Corps of Engineers, Rock Island District
- John Gnaedinger - Soil Testing Services, Chicago
- J. D. Gorman
- L. F. Grant - Tennessee Valley Authority
- H. P. Hall - Robert College, Istanbul, Turkey
- J. B. Hays - Morrison-Knudsen Afghanistan Co., New York

- Stanley Johnson – Chief, Embankments and Foundations, Corps of Engineers
- Thomas Kennedy – Corps of Engineers Waterways Station, Vicksburg
- John King – Chief Engineer, Intrusion Prepakt Inc.
- Alexander Kline – Professor, University of California, Berkeley
- Glebe Kravetz – Corps of Engineers
- T. W. Lambe – Professor, Massachusetts Institute of Technology
- G. K. Leonard – Tennessee Valley Authority
- Fred H. Lippold – Bureau of Reclamation, Denver
- Adolf Meyer – Construction Engineer, Annapolis, MD
- Alan S. Michaels
- Virgil L. Minear – Bureau of Reclamation, St. George, UT
- J. D. Parsons – Moran, Proctor, Rutledge, Mueser, New York
- Jim Polatty – Corps of Engineers, Waterways Station, Vicksburg
- Milos Polivka – Professor, University of California, Berkeley
- C. Martin Riedel – Chemical Soil Solidification Company, Chicago
- W. K. Seaman – Tennessee Valley Authority, Johnson City, TN
- Woodland Shockley – Corps of Engineers, Waterways Station, Vicksburg
- Warren Simonds – Bureau of Reclamation, Denver
- Francis B. Slichter, Corps of Engineers, Washington, D.C.
- Brian W. Steel – Corps of Engineers, Washington D.C.
- Frank C. Sturges – Pennsylvania Drilling Co., Pittsburgh, PA
- William Swiger – Stone and Webster Engineering Co.
- Ivan L. Tyler – Portland Cement Association
- Leslie Witte – Materials Engineer, Bureau of Reclamation
- Clarence E. Blee - Board Contact

Most grouting of the day was in connection with Dam Foundations, and managed by one of three large Federal agencies, the Corps of Engineers, Bureau of Reclamation, and Tennessee Valley Authority. Each of these organizations was well represented and they

accounted for nearly half of the Committee. American Grouting pioneer Louis S. Wertz interest was in other uses, especially those relating to structural construction and repair. His Prepakt Concrete Company was unquestionably the most innovative firm of the time. With the help of Professors Ray Davis, Milos Polivka, and Alexander Kline from the University of California, Berkeley, they originated many grouting materials such as expansive admixtures and the use of pozzolans in grout for improved pumpability and reduction of bleed. They also devised processes that survive to this day, such as preplaced aggregate concrete and augercast piles, even extending to quality control by development of what is now the ASTM C939 Flow Cone. The company was well represented on the Committee by John King, Chief Engineer as well as by all three Berkeley professors.

Papers published under the Symposium heading “Cement and Clay Grouting of Foundations” included:

- Simonds, A. W., “Cement and Clay Grouting of Foundations: Present Status of Pressure Grouting Foundations”, *ASCE Soil Mechanics and Foundations Division, Journal*, Vol. 84, No SM1, Paper 1544, Feb. 1958.
- Johnson, S. J., “Cement and Clay Grouting of Foundations: Grouting with Clay and Cement Grouts”, *ASCE Soil Mechanics and Foundations Division, Journal*, Vol. 84, No SM1, Paper 1545, Feb. 1958.
- Kravetz, G. A., “Cement and Clay Grouting of Foundations: The Use of Clay in Pressure Grouting” *ASCE Soil Mechanics and Foundations Division, Journal*, Vol. 84, No SM1, Paper 1546, Feb. 1958.
- Klein, A and Polivka, M., “Cement and Clay Grouting of Foundations: The Use of Admixtures in Cement Grouts” *ASCE Soil Mechanics and Foundations Division, Journal*, Vol. 84, No SM1, Paper 1547, Feb. 1958.
- Elston, J. P., “Cement and Clay Grouting of Foundations: Suggested Specifications for Pressure Grouting”, *ASCE Soil Mechanics and Foundations Division, Journal*, Vol. 84, SM1, Paper 1548, Feb. 1958
- Lippold, F. H., “Cement and Clay Grouting of Foundations: Pressure Grouting with Packers”, *ASCE Soil Mechanics and Foundations Division, Journal*, Vol. 84, No SM1, Paper 1549, February 1958.
- Mayer, A., “Cement and Clay Grouting of Foundations: French Grouting Practice”, *ASCE Soil Mechanics and Foundations Division, Journal*, Vol. 84, No SM1, Paper 1550, February 1958.
- Burwell, E. B., “Cement and Clay Grouting of Foundations: Practice of the Corps of Engineers”, *ASCE Soil Mechanics and Foundations Division, Journal*, Vol. 84, No SM1, Paper 1551, February 1958.
- Leonard, G. K. and Grant, L. F., “Cement and Clay Grouting of Foundations: Experience of TVA with Clay Cement and Related Grouts”, *ASCE Soil Mechanics and Foundations Division, Journal*, Vol. 84, No SM1, Paper 1552, February 1958.
- Kennedy, T. B., “Pressure Grouting Fine Fissures”, *ASCE Soil Mechanics and Foundations Division, Journal*, Vol. 84, No SM3, Paper 1731, Aug. 1958.
- King, J. C. and Bush, E. G., “Symposium on Grouting: Grouting of Granular Materials”, *ASCE Soil Mechanics and Foundations Division, Journal*, Vol. 87, SM2, Paper 2791, April 1961
- Clark, B. E., “Symposium on Grouting: Grouting at Fort Campbell Theatre Building”, *ASCE Soil Mechanics and Foundations Division, Journal*, Vol. 87, No SM2, Paper 2792, April, 1961.
- Gnaedinger, J. P., “Symposium of Grouting: Grouting to Prevent Vibration of Machinery”, *ASCE Soil Mechanics and Foundations Division, Journal*, Vol. 87, No SM2, Paper 2793, April 1961.
- _____ “Symposium on Grouting: Research in Foundation Grouting with Cement”, *ASCE Soil Mechanics and Foundations Division, Journal*, Vol. 87, No SM2, Paper 2794, April 1961.
- Polatty, J. M., “Symposium on

Grouting: Investigation of Sand-Cement Grouts”, *ASCE Soil Mechanics and Foundations Division, Journal*, Vol. 87, No SM2, Paper 2795, April 1961.

- Swiger, W. F., “Symposium on Grouting: Construction of Rocky Reach Grouted Cutoff, *ASCE Soil Mechanics and Foundations Division, Journal*, Vol. 87, No SM1, Paper 2796, April. 1961.
- “Bibliography on Cement Grouting: Second Progress Report, Committee on Grouting” *ASCE Soil Mechanics and Foundations Division, Journal*, Vol. 89 No SM4, Paper 3375, July, 1963

The Committee as a whole, presented four sessions on grouting at Society national meetings.

- June 1954 in Atlantic City, New Jersey
- June 1956 in Knoxville, Tennessee
- June 1960 in Reno Nevada, two sessions

As the various presentations that formed the Symposium on Grouting were completed in the early 1960s, most of the original members of the Committee and subcommittees retired. All the subcommittees were discharged in 1961 and the original name, Committee on Grouting readopted. None of the members of the original Administrative Committee on Grouting remained and the resulting group was much smaller, with only 5 to 7 members for the next several years. The initiative of the founders was lacking, relatively little output occurred, and there was an apparent attitude that nothing remained to be done; the Symposium did it all.

A paper “Guide Specifications for Chemical Grouts” appeared in the March, 1968 *ASCE Soil Mechanics and Foundations Division Journal* under the banner of the Committee on Grouting. Many felt it was biased toward the manufacturer of one generic chemical grout formulation and its provisions effectively prohibited the use of sodium silicate base formulations which predominated at the time. Five different ASCE members provided written discussion pointing out the proprietary nature of the offering, generally but not

always in a discreet manner. The resulting controversy cast a bad light on the Committee and its activities, from many involved with the grouting industry.

A Committee meeting was held in New Orleans in February 1969. The controversy surrounding the Chemical Grout Specifications publication was discussed. Rube Karol suggested the Committee prepare a paper on Professionalism in Grouting to offset the descent. He was assigned to head the effort.

The Committee met in St. Louis in October, 1971. New Executive Board Contact Member Joe DeSalvo suggested the Committee should make periodic announcements of their activities in the Division Newsletter. In response to an extensive discussion of procedures for acceptance of new committee members, he advised that new members could be appointed by either the Committee or the Division Executive Committee.

Possible future tasks were discussed and individual committee members were assigned to lead several that were adopted. The previously published Chemical Grout Guide Specification was again discussed and it was agreed an “Outline of Grouting Practice” would also be published to rectify any misunderstandings. Rube Karol had previously sent out copies of the draft Professionalism in Grouting paper but received no comments or replies. Neither the paper on professionalism nor Outline of Grouting Practice were ever completed or published.

In September 1973, the Committee Chairman responded to an Executive Committee inquiry as to the apparent lack of activity of the Committee. The response was apologetic in nature and contained the admission “Your chairman hasn’t been doing his job, but I hope to make up for our inactivity so that we can have a full agenda at our proposed Los Angeles Meeting (provided our meeting is authorized)” The response included a copy of the first draft of the paper Professionalism in Grouting prepared by Rube Karol, a draft of the proposed Glossary of Terms Related to Grouting prepared by James Warner, a list of 10 Task assignments in-

cluding the name of the lead committee member, and a list of seven proposed new tasks.

The Committee met in Los Angeles on January 21, 1974. The previously assigned tasks were discussed with little progress noted except for completion of the draft papers previously mentioned. It was noted that a total of 18 tasks had been assigned to the nine committee members. The Chairman emphasized we must show progress on our activity or the Committee could be dissolved!

July 22, 1974, the Division Executive Committee notified the Grouting Committee that it was considering discharge of the Committee due to “low effectiveness.” On August 19, 1974, long time Committee member Lloyd Gebhart sent a letter to the Executive Committee pleading the Committee’s case and outlining future plans adopted during the previous Los Angeles meeting. These included thirteen specific tasks with assigned task leaders, plus a commitment to work with the Rock Mechanics Committee on an upcoming Specialty Conference to take place in Denver during November, 1975.

The Executive Committee acted positively and on September 4, 1974 advised that the Committee on Grouting was reinstated “for at least the next biennial period”. They further appointed Lloyd R. Gebhart to be the Chairman.

The next Committee meeting was in Denver on November 5, 1975. The various tasks were discussed with time tables in place, and some progress was reported. The Committee had also been officially accepted as a cosponsor of the Rock Mechanics Specialty Conference to be held in Boulder Colorado, August 1976.

During the Rock Mechanics Specialty Conference in Boulder, Colorado, an informal meeting was held on August 16, 1976. It was announced that the *Geotechnical Journal* had accepted for publication the Committee’s State-of-the-Art paper on Slabjacking. Wally Baker suggested we sponsor a Specialty Conference on Grouting and agrees to lead a task committee for this.

The Committee report “Slabjacking—State-of-the Art” appeared in the September 1977 *Journal*

of the Geotechnical Engineering Division, ASCE.

The Committee presented a session at the San Francisco national meeting of ASCE in October 1977, with "An estimated 170 people" attending. The session titled Unusual Grouting Solutions to Geotechnical Problems consisted of five papers. A Committee meeting was held on October 18. Progress on thirteen tasks that had been previously assigned to sub groups was discussed. Little significant progress was reported. Contact member Dick Gray advised that he discussed the idea of a Specialty Conference on Grouting with the Executive Committee. "There was some concern on whether sufficient interest exists in the profession for a conference limited to grouting."

The Bibliography on Grouting which had been largely composed by Committee members was published by the Corps of Engineers, Waterways Experiment Station in Vicksburg, Mississippi in June 1978.

Another session on grouting was

presented at the ASCE National meeting in Chicago, on Oct 18, 1978, with five papers being presented.

A planning meeting for the proposed Specialty Conference on Grouting was held in Atlanta on October 23, 1979. "The chairman announced executive approval for a February, 1982, 2 ½ day Specialty Conference in New Orleans". "It was tentatively decided that the first paper would be a history and overview and that M. Caron (Soletache, France) would be invited to present a paper on chemical grouts".

The Preliminary Glossary of Terms Relating to Grouting was published in the July 1980 Journal of the Geotechnical Division, ASCE.

Rube Karol, Wally Baker, and Joe Welsh met on August 6, 1981 to finalize planning for the upcoming Specialty Conference on Grouting. Far more papers than expected had been submitted, many from outside the U.S. In order to accommodate as many as possible, the conference was expanded to three full days. There were to be eleven sessions

consisting of four to six ten minute presentations each, followed by a 30 minute discussion period.

The ASCE Conference on Grouting in Geotechnical Engineering was held at the Monteleone Hotel in New Orleans, February, 1982. Attendance was 419 individuals from 23 different countries; more than twice what had been expected. Many expressed an interest in coming together more often. There was indeed a great interest in grouting, which was shown to be true technology that is ever-expanding. The Committee on Grouting was again without doubt, headed in a positive direction!

Send your grouting papers, articles or comments to:

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Ciao!