

Dear Readers

Published online: 19 September 2009
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This will be a column of personal notes. That is an option that I have rarely imposed on you but I have some sad news and some good news to report. First the sad news: Frank T. Caruccio, recognized as a pioneer for his research on pyrite oxidation and acid mine drainage, passed away on July 29, 2009. I first met Frank back in the mid-1970s, when I was a graduate student looking for a Ph.D. thesis topic. I had already decided that I wanted to do my research in the area of acid mine drainage but this was an area that my faculty advisor knew nothing about (not a bad strategy, looking back at it, but that is another story). In reading the literature, it was apparent to me that the person doing the most interesting work in that area was Frank; his papers on framboidal pyrite and its role in acid formation was fascinating. So I called him up, out of the blue, and he suggested that I drive down and spend a few days at the University of South Carolina, where he was a professor, so that we could bounce ideas back and forth. It was a great weekend, even though virtually every idea I came up with was shot down. For him, a key feature of a good thesis topic was that it cannot be one that fails if you get a negative result. He said that he had seen too many graduate students spend too many years getting their Ph.D. degrees because they had selected such topics and he strongly suggested against going down such a path. His advice, which I have passed on to many others, was to pick a thesis topic where whatever result you obtain will be of sufficient interest to warrant publication (Fig. 1).

The only topic that I suggested that did not get shot down was one that neither of us knew much about; the possibility that iron-oxidizing bacteria somehow played a role in the formation of acid mine drainage. Although it may seem strange to younger readers, at the time, this was a fairly radical concept. Biologists were suggesting that

iron-oxidizing bacteria catalyzed pyrite oxidation, but virtually all of the geologists and mining engineers of the day were highly skeptical; we were no different. But I went back up north promising to read more on the topic and see if I could develop a thesis topic that would pass Frank's test. I kept in touch with him by phone (that was before e-mail was used for such things) as I learned enough about bacteriology to understand what had been done and what had not, and started a research project with the operating hypothesis that the results that the biologists were seeing was because of their experimental set-ups (after all, a mine is not artificially aerated, agitated, and heated); either I would prove the biologists wrong or I would prove them right, but either way, it would work as a thesis topic—and it did.

As I had moved into a thesis area outside of his area of expertise, Frank could not advise me on my research but we kept in touch and met up when he and Gwen Geidel (who he subsequently married) came up to Pennsylvania, where he was conducting research for the State of Pennsylvania. I served as an extra hand and learned a little about looking at drill cores and taking water samples and about mine sites in general. And after I graduated and began working at the U.S. Bureau of Mines, I had many opportunities to interact with him and to appreciate his extensive knowledge of hydrology, geochemistry, and mining, as well as his wonderful sense of humor. His development of empirical geochemical models that related paleoenvironment of sedimentary deposition to ground water geochemistry to pyrite grain size distributions improved our ability to predict drainage quality from disturbed rock/water interactions. His research, which was funded by the US EPA, US Bureau of Mines, the National Science Foundation, the states of Pennsylvania, West Virginia, and

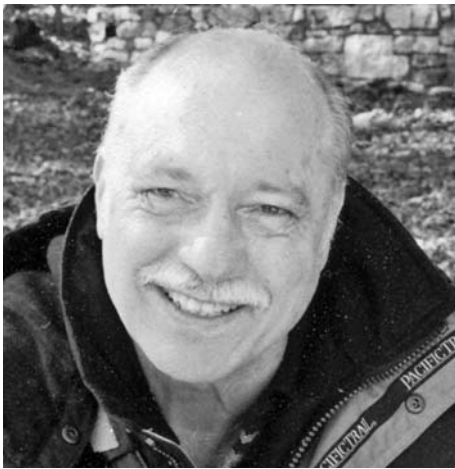


Fig. 1 Frank Thomas Caruccio, 1935–2009

South Carolina, and numerous mining, energy, and engineering companies, expanded the study of acid mine drainage from laboratory relationships to field studies and geologic basins. His extensive use and development of kinetic leaching tests led to publications on the relationships between carbonate dissolution and sulfide oxidation and how those factors affected water quality prediction. His patented process for the determination of the acid production potential from specific basins was used in conjunction with paleoenvironmental studies to predict, in advance of mining, projected water quality impacts.

During the 1980s, Frank served as a co-chair of the WV Acid Mine Drainage Technical Advisory Committee (AMDTAC); Gwen and I were also members of that group, which presented its findings at the WV AMD Task Force meetings. AMDTAC was a great experience for all of us who were involved with it.

While the initial focus of Frank's work was on prediction, his interests expanded over time to include the reclamation of mines impacted by acidic conditions. From his work in the 1980s at coal mines in WV to ongoing studies at kyanite deposits in Georgia (the state, not the country), he understood the necessity of an integrated approach to mitigation efforts. Ground water remediation efforts in WV led to the finding of "pseudo-karst" hydrologic conditions in reclaimed mine spoils, while application of principles related to differential densities, oxidation rates, and weathering provided for successful reclamation of acidic tailings in Georgia.

Frank's expertise was recognized by the National Research Council of the U.S. National Academy of Science and he served on committees evaluating the relationships of ground water to mining. He was a member of the South Carolina Mining Council and was influential in drafting the State's Mining Act. He also served on the Federal Inter-agency Committee on the Health and Environmental

Effects of Energy Technologies and on the Committee to Assess Impacts of Coal Conversion in Third World Countries, as well as the Beijer Institute and the Royal Swedish Academy of Sciences. He was also a member of the International Assoc. of Geochemistry and Cosmochemistry, the National Groundwater Association, the American Society for Mining and Reclamation, the Society for Environmental Geochemistry and Health, the American Academy of Arts and Sciences, among others. About 15 years ago, Frank was one of the first recipients of the William T. Plass Award, which is awarded by the American Society for Mining and Reclamation for lifetime achievements in the field of mine reclamation.

Frank published widely but was primarily focused on ensuring that the information was disseminated to the industries that would most benefit. His work with state agencies, mining and energy companies, airports, subways, and highway construction engineers was focused on mitigating the impacts of pyrite oxidation in the environment. Thus, while he published numerous journal articles, book chapters and reports on geochemical factors affecting mine drainage quality, pyrite oxidation, and reclamation, he also presented his findings at numerous national and international meetings.

Our younger readers may wonder why they have never heard of Frank. The fact is, since the early 1990s, Frank has been dealing with symptoms of Parkinson's disease. For those of you unfamiliar with the disease, it leaves the brain and mental processes intact but affects muscular control. It was understandably very frustrating for him—not just the physical restrictions that this disease imposed on him but the fact that it made him unable to communicate clearly. Frank loved to talk (and listen) and tell stories; taking away his ability to communicate was cruel indeed.

Frank is remembered fondly by many in the field who profited by learning and interacting with him over the years



Fig. 2 Ann McHoes and Bob Kleinmann

and by the many of us who considered him a personal friend. Our best wishes go out to Gwen and their children.

Now the good news: on July 25, Ann McHoes and I were married. Some of you got to meet Ann at last year's IMWA meeting in the Czech Republic. If you were not there, and if you need another incentive to come to this year's conference, Ann will be coming along this year as well. In fact, we are planning to take 3 weeks and make a honeymoon (with a conference in the middle) out of the trip. If you have not yet made plans to come and join us, it is not too late. The airlines are offering good fares and you could not ask for a better venue. And the opportunities for

sightseeing, before and after (and for family members, during) the conference are unsurpassed. The organizers have done a great job; now all they need are attendees. For more information, please go to the conference web site: <http://www.wisa.org.za/minewater2009.htm>. I look forward to seeing all of you there and to introducing you to my new bride (Fig. 2).

Until then, best wishes,
Bob Kleinmann, Editor-in-chief