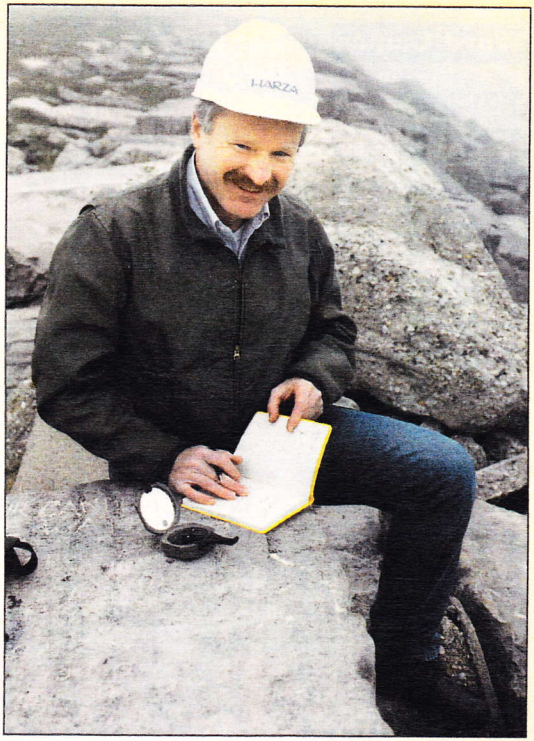
'This job enables me to see beneath the crust of the Earth'

Name: Arthur Stukey

Background: Stukey, 50, holds both a bachelor's and master's degree in geology. The New England native began his career doing subsurface geological exploratory work in west Texas, and for the last 15 years has worked primarily on hydroelectric and water-supply projects for Harza Engineering Co. He and his wife, Sue, live in Evanston and are the parents of two grown children.

Years as an engineering geologist: 22



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I'VE EVADED BULLS IN PASTURES and snakes in the desert. Geologists don't just sit in the office and take phone calls. We have to be in the field to know what's going on. I know what information I need, but I might have to struggle halfway up a mountain to get it.

One time, my partner and I were helicoptered into an area of Alaska to do some field mapping. We were dropped off next to a blueberry patch, and within a few minutes an enormous grizzly bear came loping out of the bushes, closer than we wanted it to be. My heart was pounding until we got the helicopter back into the area between us and the bear. So there are hazards, but that's how a geologist gathers data.

Most of my firm's clients are water-supply agencies and utility companies, so I work on large dams and reservoirs, primarily for water supply or power. My work has taken me to South America, Central America, Korea, Nigeria, Israel and Iran, and right now I have projects going in Georgia, Minnesota, Taiwan, El Salvador and China. In fact, years ago my church minister thought I worked for the CIA because everywhere I'd go there seemed to be a revolution.

I get involved in every phase of a project, from the initial screening of a site to continuing deeper exploration. Later, with the engineering staff, I work on the design of foundations and foundation treatments. I'm also involved during excavation and construction as well as in monitoring and maintenance after the project is completed.

For the initial screening of a site, I'm dropped off with maps and photographs, and I walk along stream beds and look at outcrops. I try to evaluate whether a dam can fit in a certain place and whether it should be a concrete dam or an earth-filled dam. I think about how the whole project is going to develop—not just the foundation but where the engineers are apt to place certain structures, such as the powerhouse.

Engineering geologists commonly deal with the upper 600 to 800 feet of the Earth's surface—areas never seen by anyone. We're a contributory part of a team. I spend a lot of my time attempting to let people know what's going on beneath the surface so they know what kind of risks they're taking on, what kind of treatment is necessary, what costs are involved in making the foundation work so that the dam's tunnels and powerhouses can function the way they're expected to.

My job is to minimize uncertainties and to determine whether there are any "fatal flaws"—things that would cost so much to design around that it would kill the project. For instance, if we were planning a reservoir in an area that had so many sinkholes and cavities that it would take years to find them and plug them and make the reservoir hold, that condition might be a fatal flaw.

Some sites are just not tenable. I looked at one in Wyoming, a substantial-looking hill that appeared to be a good location for a dam site. It turned out to be nothing but windblown dust—a very loose, non-cemented sediment that was a dust deposit from the Ice Age. If you put water on it, it would just dissolve and run off. But I can't tell that by looking at it from the road. I've got to get up and work with my tools.

Half the fun of underground exploration is getting out into adits, which are exploratory person-size tunnels driven into an abutment so a geologist can walk into the side of a hill and look all around, map the rock mass, and get a much better feel of the geometry of the bedrock situation.

During construction, I spend a lot of time crawling through tunnels and shafts trying to figure out the underground geologic conditions of the project. These tunnels are sizable affairs, 20 feet or more in diameter. Currently we're building a large dike on top of a mountain—over two miles long—and I'm involved in evaluating the tunnels that will connect the upper and lower reservoirs and tie into the pump turbines.

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Back in the office, I build models on paper and develop geological maps, cross-sections, and reports on the conditions. Geologic mapping is an art, developed from training. I make observations of various disconnected bits of information and bring them onto paper and a conceptual model to get an idea of what the major rock types are and what the underground conditions—bedrock, ground water, soil—are. It's an opportunity to apply an awful lot of geologic training to specific engineering purposes.

I visit excavations and recently had to go up about 100 feet in the air in a little basket hoisted by a huge crane, to get a vantage point on a piece of rock that's not stable. This is where the accountability of the profession really comes in. I can study the geology, make designs and plan for things, but it's when I've got an excavation in front of me that's got some condition that has to be treated that I really earn my keep. My judgment and treatment procedures are what make me valuable to the company.

I like the responsibility of being involved in a major construction project and having some impact on the economics of it, as well as on the safety of the people involved. It's satisfying to make a good, thorough investigation and have my findings turn out to be correct. Or to be called in during construction when unforeseen conditions appear and have to find a way to remedy the situation.

Of course, it's most satisfying to be present from the outset and to find these things before they become a problem. That's my job, really, to understand the foundation well enough to predict what's going to be found beneath the grass roots.

A lot of our subsurface investigations reveal rock formations and conditions that no other geologists have observed anywhere. This job enables me to get into excavations and see beneath the crust of the earth. I find that to be pretty fascinating. ■

Interview by Marya Smith