A 'WHOI Way' of Doing Things

A conversation with research associate George Tupper

George Tupper is one of the longest-serving technicians in the WHOI Buoy Group. Raised in Minnesota, he never saw the ocean until he was 19. After high school, unable to afford a college education, he enlisted in the U.S. Air Force, where he worked on maintaining radar and missile systems for eight years. "I got discharged in 1967 on a Friday and started working here [at Woods Hole Oceanographic Institution] on Monday."

Originally hired by the Buoy Group as a current-meter technician, he soon began designing moorings and leading Buoy Group cruises, averaging two to three months per year at sea for the rest of his career. He retired in 2001 but has continued to work as a WHOI casual employee. Since his "retirement," he has taken part in more than 40 research cruises, most recently in November 2010.

How quickly did you sense the different working styles between the Air Force and WHOI?

All I had for reference was the military, which was quite hierarchical. I came here, and the first cruise I went on, other than being horribly seasick, I was *so amazed* that the grunts like me, and my co-workers, and the Ph.D.s were all sweating bullets doing manual labor, working on getting this mooring over the side. The chief scientist was working as well. That was quite an education for me to see everybody pitching in together. Nobody was saying, "That's not my job. Hey, *you* go do that." I'll never forget it.

There's not a whole lot of intellectual snobbery going on here. When you have an idea, people don't necessarily look at you to see how many degrees you have. They listen to ideas, and if it has merit, off you go, and if it doesn't have merit, it gets quashed, and nobody's feelings are hurt.

So you went from a place where you had to answer to higher authorities, who may not know as much about a subject as you do, to a place where everybody's on the same boat?

When I first came here, it amazed me how things got *done* [snapping fingers]—just like that. Things happened *quickly,* without a whole bunch of authorizations.

One of the glaring differences between the military and WHOI was, I was free to innovate. That was like a breath of fresh air. Not that the military was bad, but there was a whole different concept at WHOI of working with an instrument—an instrument, say, designed by some guy who didn't know a whole lot about where it was going, and how it worked, and what effects the physical environment in which it was used would have.

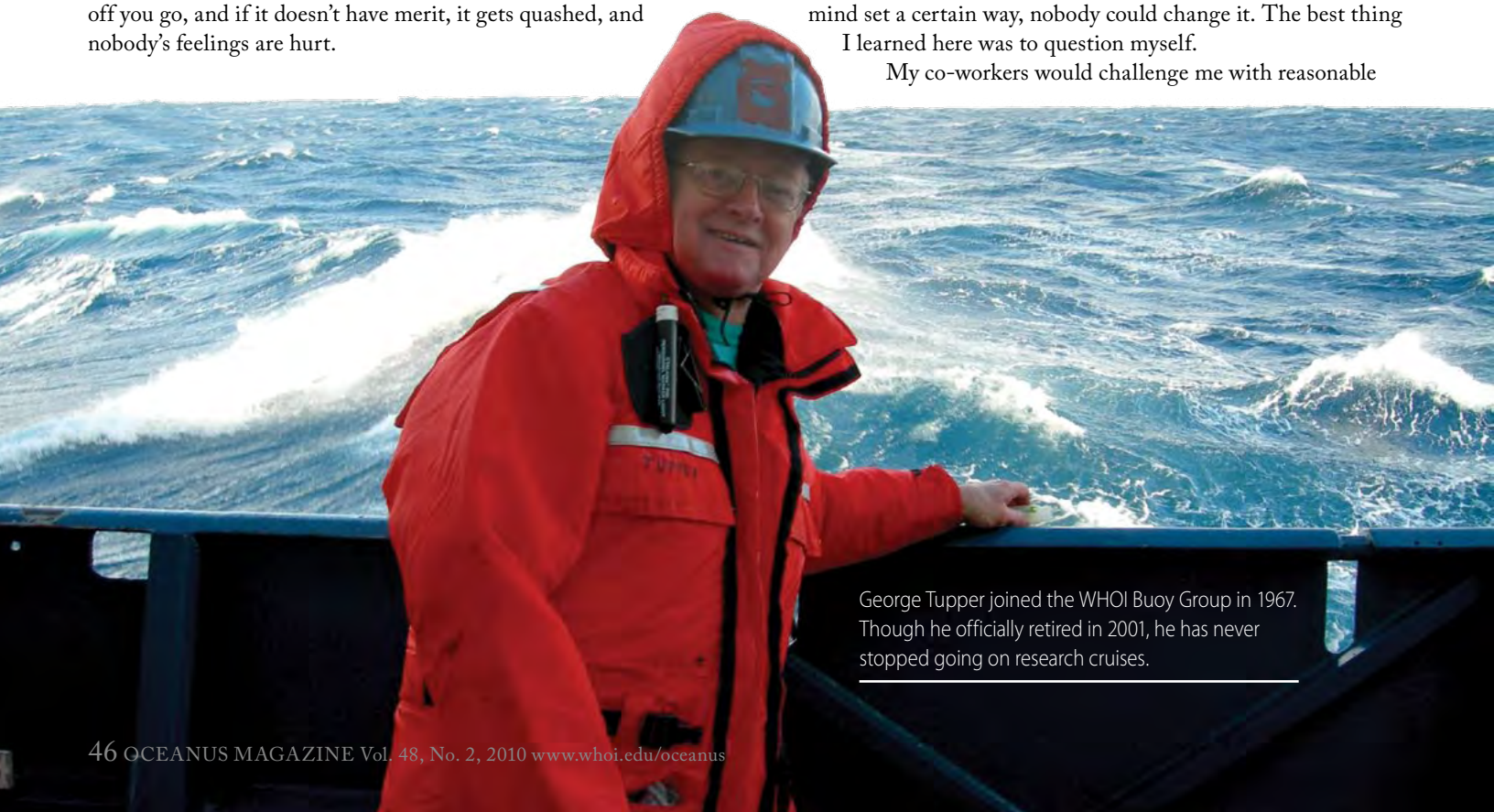
You put those instruments out to sea for a while, and you start learning things about them. You can see things that you would design differently. And I was given the opportunity to do that.

And the other thing was an enormous feeling that I was trusted. No one was watching my back and saying, "Did you do this? Are you sure you worked eight hours on that?" I'm a grownup, and I was treated like one from the time I got here. It's a wonderful thing, and it makes you more responsible than if there's someone looking at you with time charts and stopwatches.

What did you think about your co-workers at WHOI?

I was blown away by most of them. It was just a pleasure to be surrounded by people like that, and I learned by working with them. I was kind of argumentative in the Air Force. If I got my mind set a certain way, nobody could change it. The best thing I learned here was to question myself.

My co-workers would challenge me with reasonable



George Tupper joined the WHOI Buoy Group in 1967. Though he officially retired in 2001, he has never stopped going on research cruises.

Penny Foster, WHOI

Putting a mooring in the ocean requires teamwork and attention to detail. Here, a WHOI mooring team deploys a cluster of yellow plastic hardhats attached to a mooring line. Each hardhat encloses a glass ball that provides flotation. If the mooring line breaks, the balls will rise to the surface, where line and instruments can be retrieved.

arguments, and I began to think, "Wait a minute. Am I trying to prove myself right, or am I trying to learn something?" That's a real breakthrough: to be totally objective and to be able to say, "I was wrong and I can change my mind." That's what working with these guys did for me. You can't help but respect them.

Scientists usually measure a cruise's success on the data they collect and the conclusions they make from them. How do engineers and technicians measure success on a cruise?

We got all the moorings back that we were supposed to get back. We put in all the moorings, and nothing got broken. I was in charge of the current meters, and if the majority of them worked, I was very happy.

I don't know how this came through to me, but ever since I've been here, I knew that data is almost *sacred*. The scientists have a job to do and questions they want to answer. If *your* methodology allows them to answer those questions, you've done your job. With most of the guys that I've worked with, there's a sense of "If I gloss over something, or if I skip this detail, or if I don't doublecheck that solder joint, or make sure the data tape is in there straight, there goes the scientist's data record, and for no particular reason other than I was lazy." And that's just something that we'd rather work all night to get it right, rather than take a chance on losing what could be invaluable data.

The WHOI buoy and mooring teams were the pioneers of deep ocean science, but mooring know-how is more widespread now. How is the WHOI group regarded today by others in the field?

I've been with the group when we go on other institutions' ships, a Navy ship, whatever, and there's usually a universal dawning of respect for how things get done, and how we kind of dot the i's and cross the t's. It's very self-serving to say that, but I think that there's a lot of truth to that.

I think the Buoy Group and these guys still are the tops. And I think one of the reasons they are is not so much that they're unique but that we were allowed to make all the mistakes and learn from them.

Partly as a result of those early mistakes, the Buoy Group ended up doing a lot of the testing of mooring components and even some of the manufacturing steps itself. What was behind that?

The mantra for oceanography and instrumentation is "don't trust anybody." If you don't test it yourself, you're crazy, because you can't pin a scientist's hopes on "Oh, it'll probably work."

Every single detail has to be thought through. And it's as good as the weakest link. I can remember launching a mooring, and at the bottom of the mooring, just above the anchor release, was a half-inch galvanized chain. And I forget who saw it, but we were watching the thing, and it was under tension, and somebody said, "Hold it." And one of the chain's links was not welded. It was an open chain link, a manufacturing defect. It had gotten past everybody. If we had launched the mooring, we would have lost it. It would have let go of the anchor and not come back.

So you can't relax, ever, ever, ever. Everything you count on to be done right, isn't. And everything that's not going to break, does.

—Interview by Frank Taylor. Edited by Cherie Winner

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Terry Joyce, WHOI

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