

*This is a personal tale with a moral; three morals, actually.*

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## Making It Safe, Making It Legal, and Creating Peace of Mind

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### INTRODUCTION

In 1973, with the ink still wet on my Master's degree in low-temperature solid state physics, I found myself thrust into the job of "assistant radiation safety officer" in a medical and academic setting. At the time, I thought I was entering a doctoral program in medical physics, but that's another story. Suffice it to say that in the two months after I started work, my boss had been fired, my fired boss's boss had disappeared, and there was no one between me and the Vice President for Health Affairs. And, except for some friendly guidance from an x-ray technician and a nuclear chemist, who deigned to speak to grad students, I was clueless.

Despite such a start, I spent a little over 5 years in the 1970's in the cauldron of medical and academic radiation safety, which, for me, was the school of hard knocks with the occasional stroke of good fortune.

When I had been at work for a little over a month, an Eberline salesman named Stan Hungerford stopped by the office. He asked, "Are you going to attend

the Campus Radiation Safety Officers' conference?" I replied, "What's a Radiation Safety Officer?" He said, "I thought you were the Radiation Safety Officer." I replied, "No that's the consultant's job." Instead of trying to sell me a Geiger counter, he proceeded to try to convince me that I needed to go to the conference.

Thanks to Stan's empowering suggestion, I attended the 1973 Campus Radiation Safety Officer's meeting hosted by Ron Zelac at Temple University in Philadelphia. I'll never forget sitting down to breakfast the first morning of the conference, in what I remember to be a dormitory setting, excited but already overwhelmed by the experience. A tall, gray-haired gentleman, looking both youthful and distinguished, sat down beside me and introduced himself: "Hi. I'm Paul Ziemer from Purdue." Paul evidently had a marvelous instinct for identifying "those who needed mentoring" as he asked thoughtful questions and made many helpful suggestions. (Paul Ziemer has done it all: been a professor and Dean at Purdue, President of the Health Physics Society at the time he introduced himself to me, and Assistant Secretary of Energy for Health, Safety, and Environment.) He

helped me maximize my first real contact with that most versatile of Operational Radiation Safety specialists, the campus radiation safety officer.

As a result of the Campus RSO Conference (<http://ibaserver.physics.isu.edu/radinf/crso.htm>), I learned that 1) I was underpaid; 2) I needed office and laboratory space and a bunch of equipment, including Geiger-Muller counters, an Ion Chamber, gamma spectroscopy equipment, a thyroid bioassay counter, a liquid scintillation counter, etc., etc.; 3) I needed two full-time technicians and a secretary; and 4) I definitely needed some real training in health physics. I asked for what I wanted—it helps to know what to ask for—and all was granted. Most importantly, I managed to get into what was at that time a 10-week course in radiation safety at Oak Ridge Associated Universities.

I returned to work after the ORAU course holding the Certified Health Physicist in awe, having met a number of distinguished CHPs. With the goal of someday becoming a CHP myself, I went to work.

By the end of the 1970's, I had figured out a few things. I had figured out that I had three jobs: I had to keep it safe, I had to keep it legal, and I had to help people *feel* they were safe.



*See extended author profile.*

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Keeping it safe was fairly easy, except for exposures to patients, over which I had no control and very little real influence.

Keeping it legal was much harder. I had to prove to Atomic Energy Commission and later, Nuclear Regulatory Commission inspectors, that my radiation safety programs were working. This meant living up to my end of the contract I had with those regulators, accepting Title 10, Code of Federal Regulations, Part 20 (10 CFR 20), *Standards for Protection Against Radiation*, and all of my license conditions. Those commitments meant performing many operational radiation safety duties and, most importantly, keeping easily accessible records of that performance.

From a public health perspective, I have come to believe that creating peace of mind is part of the job of a radiation safety officer. Creating peace of mind—that is, helping people to feel safe—was the most challenging and difficult task. The only *real* health effects that most RSOs ever see are from fear of radiation effects, not from those effects themselves. My personal experience has included workers' choices, made from fear, about terminating a pregnancy; workers experiencing insomnia, weight loss, and debilitating anxiety, all caused by fear; and workers quitting jobs because of fear. Public

health professionals will tell you that the worst thing for an employee's health is to terminate employment when it results in loss of health insurance. Few on-the-job dangers are bigger than the risk of having no health insurance.

This editorial is a plea to those practicing operational radiation safety to seriously consider the importance of dealing with fear (or radiation phobia) on the part of workers, patients, patients' families, and the public.

Peace of mind cannot be imposed on anyone. The process of creating peace of mind requires the creation of trust, which must be granted by the recipient. Realize that many people are not swayed by a discussion of numbers or quantitative concepts. Rather, just having their concerns genuinely heard will make many feel better. Deal with fear up-front, proactively, and explicitly. A good start is to be alert to people's concerns, ask about those concerns, and listen. To paraphrase Francis of Assisi, try to understand before trying to be understood.

There might be a situation where, after listening, you would say, "So, you're scared of radiation. I am too. High radiation levels scare me, but low radiation levels do not scare me. For me to be scared, it depends on how much radiation there is. My level

of caution depends on how serious the hazard is. Big hazards require serious protection. Small hazards require less protection. And there are even levels of radiation that I feel require no protective actions, because they are so small."

If those who benefit from radiation safety trust those who provide it, a first, solid step has been made toward creating peace of mind.

## SUMMARY

The job of a medical or academic radiation safety officer has three parts: keeping it safe, keeping it legal, and helping people feel that they are safe. Absence of peace-of-mind about radiation protection matters can create very real health effects, even when there is little or no radiation exposure involved. Frightened people may make decisions such as changing jobs (and losing health insurance), terminating a pregnancy, or moving, all of which impact health. Furthermore, frightened people who choose to stick with it may suffer from anxiety, stress, insomnia, and weight loss or even weight gain. Genuinely listening to the concerns of those who benefit from radiation safety services can help to provide peace-of-mind and minimize decisions that are risky to health.

# Author Profile



Dan attended the University of Connecticut, where he earned a B.A. in physics and French in 1971, an M.S. in low-temperature solid state physics in 1973, and continued graduate study through 1976 in the physical and life sciences. His formal introduction to health physics was a 10-week course at Oak Ridge Associated Universities in 1974. He earned a Ph.D. in Environmental Sciences and Engineering at the University of North Carolina at Chapel Hill in 1983, assessing occupational radiation monitoring records for use in the DOE Health and Mortality Studies.

A member of the Health Physics Society since 1974, Dan became a Fellow in 2001. Dan was certified by the American Board of Health Physics in 1980 and was Chair of the ABHP Comprehensive Panel of Examiners for the 1993 exam and served on the Board of Directors of the American Academy of Health Physics

from 1996–1998. He has been an Associate Editor of *Health Physics* since 1995.

His work experience includes being Radiation Safety Officer at the University of Connecticut Health Center, 1973–1976; Radiation Safety Officer, Old Dominion University and Eastern Virginia Medical School, 1978–1980; Associate Professor of Health Physics in the Department of Radiation Health, Graduate School of Public Health at the University of Pittsburgh, 1984–1991; and Adjunct Associate Professor in the Department of Environmental Sciences, Washington State University Tri-Cities, 1994-present. Dan has been employed at Pacific Northwest National Laboratory since 1991 as a Staff Scientist, currently in the Risk Analysis and Health Protection Group. He also serves as Technical Network Leader for PNNL's Human Health and Safety Technical Network.

Dan's active research interests include quantitative risk analysis

for radiological and chemical hazards, models relating radiation and detriment (cancer and heritable ill-health), exposures to the radons and their short-lived decay products, radiation doses from intakes of radionuclides, and applied statistical inference in support of these topics. He also pursues an interest in simple and clear communication (look for his upcoming Health Physics Forum article on clarity and jargon). He maintains web sites for DOE's Bioassay and Internal Dosimetry Users Group (<http://bidug.pnl.gov/>), for Bayesian statistics for internal dosimetry (<http://www.pnl.gov/bayesian/>), and for the quantitative evaluation of contamination consequences (<http://qecc.pnl.gov>). A more detailed resume appears at <http://www.pnl.gov/bayesian/strom/strombio.htm>. Links to copies of publications are found at these sites and also at <http://www.pnl.gov/berc/epub.html>.