

Murray Rosenthal: one of ORNL's best cheerleaders

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Carolyn Krause brings us another in depth study of one of our local scientists. Murray Rosenthal has been engaged in Oak Ridge in many ways during his career at the Oak Ridge National Laboratory. He wrote the history of the 13 ORNL reactors and is a recognized authority on nuclear reactor engineering. If you know Murray, you will be pleased to read Carolyn's excellent treatment of him.

If you do not know him, get ready to be amazed. In this three-part series of *Historically Speaking*, Carolyn will introduce you to the many varied aspects of one of our own respected scientists, local leader and all around really great person, Murray Rosenthal.

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In the last half of the 20th century, Murray Rosenthal rose through the ranks at Oak Ridge National Laboratory. It wasn't just because he has a Ph.D. from M.I.T. His knowledge of reactor engineering, contagious enthusiasm, and beliefs in people, technological progress, fairness and the value of continued learning made him a likeable and respected leader. A former Navy man, he readily accepted leadership positions offered him, knowing that the outcomes could be a combination of smooth sailing and unwelcome storms.

When Rosenthal, now 91, retired in 1994, he had been deputy director of ORNL for five years. Previously, he had been named a fellow of the American Nuclear Society and elected to the National Academy of Engineering. Four decades earlier, in 1953, he had joined the laboratory as a chemical engineer and then received a number of promotions. He became a leader of various lab committees, groups and programs and later an associate laboratory director of multiple areas of scientific and technological endeavors, from non-nuclear energy systems to thermonuclear fusion research.

"In none of my positions did I ever ask for what I was given," Rosenthal told Steve Stow in a 2003 oral history interview at ORNL. "Lab management said to me, 'Go do that!' Someone once commented to me that I didn't seem to be able to hold a job!

"But I discovered that with the good people we have at the lab, you mostly just have to get them started on something, watch them at first and then leave them alone. I think the reason I was able to participate in lots of programs in which I had little knowledge was that the lab had numerous people who knew a lot and who didn't need much in the way of direction. My job was to help them raise money, keep up with the progress and be a cheerleader."

Rosenthal left his home in Cleveland, Miss., in 1943 to serve in the U.S. Navy for three years. For him the most memorable event during that time was chatting with Albert Einstein during a dinner he and others were invited to while on a short stay in Princeton, N.J. After the war ended, the Navy retained Rosenthal for a year as a junior officer on a new heavy cruiser that anchored often in Guantanamo Bay, Cuba.

After discharge, he enrolled at Louisiana State University and earned a B.S. degree in chemical engineering in 1949, the year he married Mimi Teplit of Lambert, Miss. He entered graduate school at the Massachusetts Institute of Technology and received a Ph.D. in chemical engineering in 1953, the year he joined ORNL.

"I got a job offer from down here through a professor I worked for without ever having been interviewed by anyone," he said. "I thought I'd work here four or five years and get some experience and go back to teaching in a university. But, we loved it here." They raised their children, Elaine and Douglas, in Oak Ridge.

At ORNL he initially conducted research on heat transfer in nuclear reactors, mainly for tasks associated with the Aircraft Nuclear Propulsion (ANP) project. "During that time, I came to two conclusions," he said. "First, the ANP was never going to work, and secondly, if I was going to be

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here, I needed to know more about reactors. So, I asked if I could go to the Oak Ridge School of Reactor Technology (ORSORT) at ORNL."

The reply was that he could lecture on reactor engineering, not take courses, at the school. ("The best way to learn is to teach.") Then he joined the program responsible for the Aqueous Homogeneous Reactor, one of the 13 reactors constructed and operated at the laboratory. He was named leader of the reactor analysis group for the project. "A solution of uranium in heavy water appeared promising as a breeder reactor," Rosenthal said, "but the Homogeneous Reactor Test run at the laboratory revealed serious technical problems, and the concept was abandoned."

In 1961, he was on leave from ORNL as a visiting professor of chemical engineering at M.I.T. From 1961 to 1963, Rosenthal was project engineer of the proposed Pebble Bed Reactor Experiment. Afterwards he became responsible for long-range planning in ORNL's Reactor Division.

On leave from ORNL Rosenthal spent a year in Washington, D.C., in 1965-66 as technical assistant to the Assistant General Manager for Reactors of the U. S. Atomic Energy Commission. During that time he interacted with Milton Shaw, a University of Tennessee graduate who headed AEC's division of reactor research and development and whose sister Genevieve married the Oak Ridge merchant Homer Kramer. Shaw, an ORSORT graduate and protégé of Admiral Hymen Rickover, had overseen the design and construction of the reactors that powered the first nuclear submarine and the first nuclear aircraft carrier.

"People have often asked me about Shaw," Rosenthal said. "Milt had greatly admired ORNL Director Alvin Weinberg, but their relationship deteriorated over the direction in which Shaw led the reactor programs. I spent a lot of time with Milt and learned that he was clearly hurt by Alvin's comments about his leadership. Milt and I had many differences about reactor program directions, but I admired his determination and diligence, and we became good friends."

At the end of his assignment, Rosenthal received offers of several senior positions in Washington, but he and his family wanted to return to Oak Ridge, and Weinberg welcomed him back and put him in charge of the team that operated the Molten Salt Reactor Experiment (MSRE) and that worked on the technology of molten salt power reactors.

The MSRE was an outgrowth of the ANP program. It used a fluoride salt and operated at high temperatures. "I came into it a little while after it started, not right at the beginning," Rosenthal said. "The lab had gotten approval to go ahead and build a small reactor. And I became program director just about the time it started up."

The goal was to develop a thermal reactor that would breed more fuel. The idea was to make fissionable uranium-233, a nuclear fuel, by bombarding thorium-232 with reactor neutrons. As part of the program, the lab wanted to demonstrate that MSRE could operate on U-233.

"After we'd run the MSRE on uranium-235, the normal fuel, we got our hands on some U-233," he said. "We processed out the U-235 and replaced it with the U-233. And the MSRE became the world's first reactor to ever operate fully on U-233."

Despite the MSRE's success, the AEC withdrew its support for the program largely because it favored the liquid metal fast breeder reactor, which produces plutonium fuel from uranium. The LMFBR project was later abandoned. But the molten salt reactor concept didn't completely die. Enthusiasm for it has been resurrected in foreign countries – including Canada, China, and the United Kingdom – and once more in the United States.

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There you have the first installment of the series of three Carolyn has created on Murray

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Rosenthal. Next, she will bring us more insight as Murray broadens his management skills, moving from nuclear reactors to non-nuclear energy systems and thermonuclear fusion.



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Murray Rosenthal after a full and satisfying career at ORNL