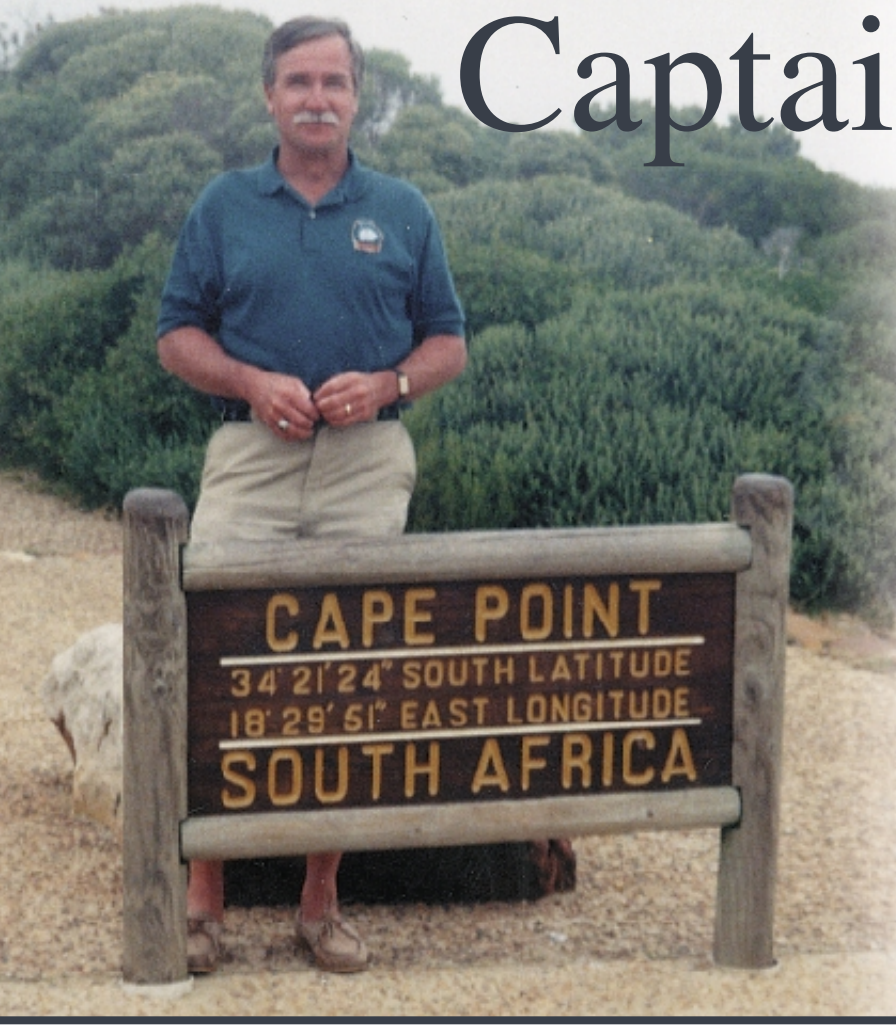
Captain Kadak



Guided by unwavering faith in nuclear energy—a faith that's been tested a few times—Andy Kadak helms the American Nuclear Society for the coming year and charts an aggressive course.

BY PATRICK SINCO

Tip of the continent: Kadak stands near the proposed location of ESKOM's pebble bed reactor plant; he's leading an effort to get a similar plant built in the United States.

ANDY KADAK LIVES to sail—something he won't have much time to do as the 45th president of ANS. And he tells the story of a particular kind of storm he encounters in the Caribbean where he charters a boat each winter. The storm, as Kadak describes it, is as manic as it is brief. And what happens inside the hour that begins with dirty clouds quickly scuffing up the blue sky and ends when a sunny breeze has impossibly restored the Caribbean order, is sure to expose any misgivings one has about sailing. If one isn't prepared to maneuver a now-hurtling sailboat through blasts of thick gray rain—while consumed with thoughts of hidden reefs and dearest loved ones—then one ought to be lying on a beach reading a book about a sailing adventure.

Andy Kadak's gut has similarly been checked a few times during his career in nuclear over more than three decades. He endured the cancellation of a project to introduce nuclear power to a New England state, and he watched his high-performing nuclear power plant be prematurely shut down. Such experiences have undoubtedly led him to consider spending his life on a beach blanket with a stack of novels. But he hasn't. And won't.

It's with a veteran mariner's knowledge of storms that Kadak begins his turn as 1999–2000 ANS President. Kadak brings a rare and formidable set of skills to ANS. Grounded firmly in the technical, he is nearly equally accomplished in the regulatory, managerial, political, and public acceptance aspects of the nuclear power industry.

Rising sun

Near the end of World War II, Andrew Christian Kadak was born in Reutte, Austria. His mother, Galina, a seamstress who had been crowned Miss Estonia a few years earlier, had just fled her homeland to escape the Russian invasion. Kadak's father, Paul, a well-off businessman who owned several factories and farms in Estonia that were being taken over or destroyed under the occupation, would take the family to the United States when Andy was four years old.

After living in Philadelphia for a few years the family settled on Long Island. The ocean air and emerging engineer's intellect would soon conspire as Kadak began to collect stray plywood boards. He began to spend his summer days and evenings working in the garage, measuring and calculating and sawing. When he was through he had built himself a boat—not a model boat that a typical 14-year-old might build, but a life-sized, seafaring vessel.

By the time Kadak finished high school and entered Union College in New York, he knew he wanted to become an engineer. He graduated from Union College with a degree in me-

The young engineer: Young Andy and his sister Sophie in Austria circa 1948

chanical engineering, but not before taking a class in nuclear engineering during his senior year. The gleam of a career spent designing gears and cams soon began to dull, and Kadak began to investigate postgraduate possibilities in nuclear engineering.

The summer after graduation, Kadak went to work for MPR Associates, an engineering firm founded by ex-Naval Reactors personnel (two of whom, Ted Rockwell and Harry Mandel, are still active ANS members) who had worked under Admiral Hyman G. Rickover. Kadak spent the summer working on reactor vessel head designs for liquid metal breeder reactors. His work had impressed his employers, and they suggested that he forget about graduate school, telling him how much farther ahead he would be professionally and financially. The prospect was especially enticing because Kadak had just married a young woman named Mary Ellen Clemenz that summer. But he knew that to succeed as a nuclear engineer, which he was now set upon, he would need an advanced degree.

By that fall he was enrolled at the Massachusetts Institute of Technology (MIT). By 1972, he was the father of two children, Christian and Noelle, and had earned a master's degree and PhD in nuclear engineering with an emphasis on reactor physics. A minor in political science would prove almost as valuable.

Leaving port

After receiving his advanced degrees, Andy Kadak accepted a position with Combustion Engineering, and was soon engaged in the technical aspects of reactor physics and core performance analysis. He concentrated on the operational control aspects of pressurized water reactors, developed monitoring and safety protection systems, and investigated reactor maneuvering capabilities and the application of space-time kinetics to safety analysis. During this time, self-styled consumer advocate Ralph Nader was commanding the nation's attention with high-profile criticism of the nuclear energy industry. Using familiar fear tactics, he called for a moratorium on nuclear power. During the 1973 ANS Winter Meeting in San Francisco, Nader held a press conference in one of the rooms next to the ongoing ANS technical sessions. He claimed Atomic Energy Commission Chairman Dixy Lee Ray was suffering from "professional insanity" and that she was "leading the Atomic Energy Commission into prescribed technological suicide through nuclear fission." Kadak and a group of five other ANS members had heard enough.

The "Cambridge Six," as they were then called because they were all MIT alumni, issued a paper the following summer titled, *The Nuclear Debate: A Call to Reason.* "Ralph Nader says that nuclear power is 'unsafe, unreliable, and unnecessary,'" the preface read. "Some members of the nuclear industry claim that nuclear power is clean, safe, and virtually accident free. Who's right? We feel that neither is correct." The report was an attempt to counter Nader's emotional pleas and boost science-based reasoning in the public debate over nuclear energy, and to examine fossil-fueled energy sources with the scrutiny with which nuclear was being examined.

"It's perfectly correct to ask about the waste of nuclear power plants, about the safety of nuclear power plants," coauthor Gil Brown said recently, who was then a nuclear engineering instructor at Lowell Technological Institute (and still is, although it's now the University of Massachusetts–Lowell). "But then you have to ask the same questions about the waste from coal plants and the waste from oil, and the environmental impacts from oil. And then weigh them in a risk-benefit analysis."

Joe Turnage, another member of the Cambridge Six who was at the time a nuclear scientist with Yankee Atomic Electric Company (and who is currently senior vice president–technical resources for PG&E Generating), remembers "We were just learning that people's attitudes about risk are very sensitive to whether they think risk is voluntary or involuntary."

(Turnage also remembers Kadak, in his free time, building another boat in the storage area outside their office in the reactor building at MIT. "I was convinced it would sink like a rock," Turnage said. "He actually took it out and the thing worked. It just absolutely amazed me.")

As the nuclear industry was learning, the issue of risk was well understood within the field, but much less so within the public sphere. The industry was beginning to appreciate that science-based approval would not guarantee public or political approval, and the issue of *social soundness* became increasingly interesting to Kadak.

"I saw myself as a scientist trying to communicate," he said of his time with the group. "Even if you think you have the right technical answer, the political process has a direct impact on whether that answer will be accepted."

An opportunity to address that political and public process soon presented itself to Kadak. In the spring of 1974 when *A Call to Reason* was published, there were 44 nuclear power plants in the United States, with 54 plants under construction and 105 more planned. One of those plants in the initial stages of development was to be built in Rhode Island, one of only two New England states not to have nuclear power plants. (New Hampshire's Seabrook plant, which went on-line in 1990, was also in the planning stages.) Kadak accepted the challenge to build, from the grassroots up, public support for a nuclear power plant that was to be built in a small, rural, seaside New England town.

Kadak mulled over the decision to accept the position because he was concerned about leaving the technical side of the nuclear in-

Bigger than the one he built as a kid? Kadak and *Heritage,* the other love of his life

Not just any cucumbers: Kadak, Byron Lee (left), and Gary Weigand sample cucumbers grown in a hothouse near the Chernobyl station in 1989; they tasted just fine.

dustry. If he left, reentering would become that much more difficult. But his political science coursework at MIT and subsequent experience with the Cambridge Six had instilled in him a fundamental notion that, as he said, "If the public doesn't support what you're doing, it's not going to get done." And he was dissatisfied with the way much of the nuclear industry was presenting itself to the public.

"It was being sold as product, like a consumer product," Kadak said, "when, in fact, the anxiety level in people about nuclear power was much higher than that: It got to the fundamental fears in people. So, the real challenge was, Can a scientist communicate messages that are fundamentally science-based in an understandable and convincing way? And that was the challenge that got me into the field of communications."

Kadak, in fact, relished the occasion. Being a small state, Rhode Island was a "closed system," as he called it, and was manageable. The prospect of getting to know all the stakeholders—both for and against the project—as well as the local scientists, teachers, politicians, the Narragansett Indian tribe, labor representatives, industrial workers, and just plain people, was reachable. Kadak looked forward to working with people to build coalitions, which, he said, was "the most interesting part of the challenge."

With a staff of five, he opened offices in Providence and Charlestown—near where the plant was to be built—to meet the public's requests for information on the project, organize support groups, and develop political support.

"The opportunity for me was extraordinary," Kadak said, "because I had an opportunity to develop the message and the messengers—advertising, publications, newspapers."

Knowing that hammering away at an already skeptical public about the wonders of nuclear power might backfire, Kadak made available in the public information office literature outlining positions on both sides of the nuclear debate. "And I can well recall," said Charlestown project manager Joseph Harrington (now assistant dean and director of development at MIT's School of Engineering), "the consternation with which some in the company received the idea that Andy actually included [not only] pronuclear literature but antinuclear literature—responsible antinuclear literature. . . . That, in the end, lent us more credibility than we would have had otherwise."

In 1976, the year after Kadak came aboard, the New England Power Company and 30 other utilities applied to the Nuclear Regulatory Commission for permission to construct the two 1150-MWe Westinghouse pressurized water reactors, dubbed NEP-1 and -2. The plant site was to be an abandoned naval airfield near Charlestown in southwestern Rhode Island. There were many hurdles involved in securing the site, but none appeared insurmountable. In July 1978, the NRC issued a favorable report concluding the plant could be safely built provided the proposed land could be acquired. In the spring of 1979, a utility source anticipated finally gaining control of the land in early summer via purchase from the federal General Services Administration.

"Everything was going great," Kadak remembered, "until I got a call one day from a news reporter who asked me if I knew where Three Mile Island [TMI] was. I told him, 'Yes, I know where it is.'

"Then he asked me, 'What's a general emergency?' Now, that, of course, is not a good thing.

"I said, 'Frank, I'll get back to you.'"

Still waters

By the end of the 1979 summer, Kadak was deciding how his career should proceed. The project to build NEP-1 and -2 had been deferred and finally canceled in light of the General Services Administration's decision not to sell the land near Charlestown to the utility, a decision that arrived within three months of the tide-turning TMI accident. In the fall, Kadak was contacted by the president of Yankee Atomic Power Company, Larry Minnick, who asked him to come work for the utility. Kadak remembers that there was no specific job he was to do, just that he would come aboard as Minnick's staff assistant and work his way into a job. He saw the opportunity as his ticket back into the technical world.

Kadak arrived at Yankee Atomic despite Minnick's unexpected departure beforehand. ("My first day of actual work I reported to a vice president, Don Vandenberg: 'By the way, I'm now your assistant,'" he recalled with a laugh.) Following TMI, the NRC promulgated new emergency planning regulations, and Kadak settled into coordinating emergency planning systems for Yankee Rowe, Vermont Yankee, and Seabrook. A technical response plan, a media response plan, and an offsite response plan were developed for all three plants, as well as instrumentation changes that allowed operators to get a better understanding of the status of the reactor.

Although he would never again perform calculations, Kadak once again had firm footing in the technical world by the time he would accept his next position within Yankee Atomic as project manager for Yankee Rowe. Among his duties was managing the plant's response to the NRC's Systematic Evaluation Program, in which he would evaluate, implement necessary changes, and then demonstrate to the NRC that the oldest plant in the United States was at least functionally compliant with current requirements. The task brought him up against the hard technical issues, but also called upon his experience as a communicator.

"Back to the communication question again: Can you make the technical case for your position while recognizing the needs of the regulator?" Kadak said.

He would have nearly a decade of experience working with regulators—subsequently as project manager for Vermont Yankee, then as vice president for Yankee Atomic—before he would be named president and chief executive officer of Yankee Atomic in 1989. Kadak, only half-jokingly, referred to his years at Yankee until this point as "more or less a quiet time."

Dark clouds

In the spring of 1991, Yankee Rowe—which President George Bush the year before had called "the model for the future of nuclear power"—was nearing its 30th anniversary of commercial operation. With fewer than 10 years left on its license, the utility was in the midst of developing a license renewal application that would keep the plant in service through 2020. The application was expected to result in the first long-term license renewal under a new NRC rule that would pass that summer allowing for plants to renew an operating license for up to 20 years. Yankee Rowe would serve as a model for maximizing the life of a power plant—a crucial, forward-looking process for an industry that hadn't seen a plant ordered in more than 15 years. What occurred instead would only make one hope that President Bush was wrong.

A key issue in Yankee Rowe's preparations for license renewal was the state of the

Their turn: Mary Ellen and Noelle guide *Heritage* across Rhode Island's Narragansett Bay.

plant's reactor vessel and the degree to which 30 years of neutron bombardment had affected the ductility of the vessel—whether, in emergency circumstances, the vessel would crack from the shock of the sudden changes in temperature or pressure. Yankee Atomic had been working for more than a year with the NRC to identify and validate the characteristics of the vessel, and was developing an inspection and test program to support the license renewal application. On June 4, the Union of Concerned Scientists (UCS), citing concern with the condition of the reactor vessel, filed a petition with the NRC calling for the immediate shutdown of the plant. Within three weeks the petition would be denied by the NRC, but not before catching the attention of some members of Congress. All bets were off.

"Well, when UCS got involved," Kadak said, "it instantly politicized the whole issue.

"To give you an example of how political it became, Ivan Selin became chairman of the commission on July 2nd. *Six days* after that he was at Rowe with two congressmen, wanting to hear a presentation about our reactor vessel. The question was not whether the plant was suitable for license renewal, but whether it should be operating at all.

"The NRC, based on the information available, felt that the plant could be safely operated. What happened after that is what happens when technical issues get out of the control of technical people in the political process."

In late July 1991, Yankee Atomic announced it was deferring plans for license renewal to devote all of its technical resources to evaluating the reactor vessel. A week later, Selin was defending the utility before a House subcommittee against repeated questions of why the plant was allowed to operate while doubts existed about its safety. Yankee Atomic then submitted to the NRC requested procedural modifications to be used in the event of a small loss-of-coolant accident during the remainder of its fuel cycle, scheduled to expire the following April. On September 30, the NRC staff rejected the operational modifications—because a conclusive demonstration of numerical targets suggested by the commissioners could not be achieved—and recommended that Yankee Rowe cease operations. The next day, Yankee Atomic shut down the plant voluntarily.

After preparing to spend $28 million to make the technical case that the vessel was fine (and while UCS had seized upon the utility's plight as a fund-raising opportunity, according to Kadak), the NRC indicated that such tests wouldn't guarantee permission for startup. "Given all the focus and political heat on this issue, they were unprepared to make that call," Kadak said.

"I still remember that day in February when I sat across from Tom Murley, who was then the director of Reactor Regulation, in an NRC meeting room [Murley is also an ANS member who now serves with Kadak on a nuclear safety oversight board]. I said to Tom, 'We're prepared to conduct an extensive technical interaction on all outstanding issues to reach closure for startup. If the answers come out

The Hampton Bays (Long Island) High School freshman class of 1963: Kadak—top row, third from the left—had eyes for the young woman, Mary Ellen Clemenz, sitting in the second row, fourth from the right; she would one day become Mary Ellen Kadak.

. . . and the 25th anniversary reunion: Kadak is again in the top row, third from the left; Mary Ellen is third from the right in the bottom row.

Christmas at the Kadaks': Right to left, Kadak, daughter Noelle, wife Mary Ellen (holding Tara), and son Christian (holding Misty) with a friend

right—' but before I could finish the thought Tom handed me 15 to 30 more questions and issues. And this was after three months of such meetings.

"I said, 'This is not working.'"

Based in part on Kadak's recommendations that there seemed to be no resolution in sight, Yankee Rowe was permanently shut down on February 26, 1992. The closing ended nearly 31 years of operation with a lifetime capacity factor of 74 percent. Kadak plunged into the next task at hand.

Clearing skies

In decommissioning, Yankee Rowe was, again, to serve as a showcase for the industry: "We want to demonstrate," Kadak said in an interview published in *Radwaste Magazine,* "that a nuclear power plant can be designed, constructed, and operated for its full life cycle, and then the site restored to its original state. That is our mission. That is the promise of nuclear power."

Preliminary work on the estimated $360- to $370-million project began in May 1993, and by the following June four steam generators, five main coolant pumps, the pressurizer, and internal reactor hardware had been shipped to a low-level waste site in Barnwell, S.C. To ship the last of the major radioactive components, the 165-ton reactor vessel, would be to demonstrate to the public that even the most "menacing" element of a nuclear power station could be dismantled, transported, and disposed of safely.

Using a large crane inside the containment sphere, workers lowered Yankee Rowe's reactor vessel into a 90-ton steel shipping container, injected about 80 tons of concrete into the container, and permanently welded shut the container lid. Five months later in April 1997, the vessel traveled on a state police–escorted truck to a railway 6.5 miles away, at an average speed of 1 mile per hour. Over the course of eight days the reactor vessel was transported by rail through nine states over 1100 miles before arriving in Barnwell, S.C., without incident, excepting a few cows that had to be shooed from the tracks.

The public relations value of the trek was immeasurable to Kadak, who, on the last night, numbered among the contingent traveling with the vessel. "What we demonstrated with this shipment of the reactor vessel from a public perception standpoint was that we can ship high-level nuclear waste—which was the perception of this reactor—safely to a facility. . . . It was not and should not be a big deal. This shows that utilities can ship their own 'high-level waste' to Yucca Mountain or any other place safely without a lot of government 'help.'"

Kadak left Yankee Atomic in July 1997 with most of the decommissioning completed, and opened the doors to his consulting firm, Kadak Associates. He also began to pursue an idea 30 years in the making.

A new morning

Andy Kadak was soon back at MIT, and it wasn't to build a boat (not yet, anyway). Instead, what began as a one-day-per-week commitment as a senior visiting lecturer in the Nuclear Engineering Department grew into a project with no less the ambition than designing a nuclear power plant to be built in the United States. "MIT is a place that abhors a vacuum, and it is easy to get involved in exciting work," Kadak said.

Kadak's three decades of experience in the nuclear industry is reflected keenly in the title of this project: "A Politically Correct Reactor." He began instructing a series of courses that set out to design such a reactor.

"So we said, 'What do we need in a new plant?'" Kadak said. "The list was relatively short: It should be safe, economic, proliferation-resistant, and it should output a waste form that's amenable to direct disposal (without reprocessing or a 10 000-year container)."

Kadak brought speakers to his classroom to discuss the reactor requirements, as well as to speak on some advanced reactor designs. The group of 11 students then decided that a small modular pebble bed gas reactor would have the best chance of competing with natural gas and gaining popular support. Among the reasons the reactor concept was chosen was its naturally safe design—which doesn't require any active cooling systems and can cool down using natural heat conduction and convection—and its small and modular design, which lent it to factory fabrication and, therefore, lower costs.

The reactor concept itself is not new. A pebble bed reactor design was considered by the Atomic Energy Commission in 1958 for a 120-MW plant, but it could not compete with

'Grandpa does what?' Kadak relaxes with Noelle's son, Zachary, who was born last year.

emerging commercial light-water reactor designs that had benefited from years of military R&D. The Germans actually built and for 20 years operated a pebble bed research reactor, and it was in Germany, after Kadak had spent three days talking to their scientists and engineers, that he became convinced that the pebble bed reactor "was, in fact, a very good concept." The South African national utility ESKOM is planning to build a version of the pebble bed reactor—and Kadak has traveled to South Africa to discuss the design with government authorities. Also, in April, Kadak traveled to China and witnessed the lowering of the core barrel into the vessel of a 10-MWt experimental pebble bed reactor near Beijing that is expected to be operational by the end of next year.

The 250-MWt small, modular pebble bed high-temperature gas reactor, as envisioned by Kadak and his students (they're still working on a catchier name), powers a helium gas turbine generator. The reactor core contains about 360 000 billiard ball–sized fuel pebbles (Kadak is holding one in the picture on this issue's cover). Each of those fuel pebbles encloses approximately 11 000 silicon carbide–coated uranium oxide microspheres.

Besides the reactor's high fuel burnup of more than 80 000 MWd/MT, there is another significant safety advantage in the fuel as compared to light-water reactor fuel. The specific heat and high melting temperatures of the materials allow the fuel to contain the decay heat from a nuclear reaction without being damaged. Subsequently, the reactor can withstand a loss of coolant without sustaining damage or requiring an active safety system. At this stage, Kadak said, meltdown does not appear even to be physically possible with this design.

"When I give lectures at various universities and colleges," Kadak said, "I ask, 'How long do you think it will take a typical light-water reactor before the fuel melts given the following scenario: A large pipe-break, loss-of-coolant accident occurs, and there's no ability to provide forced emergency cooling and the control rods are removed at their maximum speed?' And the answer I get is, 'Somewhere between 10 and 30 seconds.'

"For this same scenario [in the pebble bed reactor], before I even reach the maximum temperature of 1600 degrees centigrade—which is about 400 degrees below just the beginning of some initial microsphere fuel failure—it takes five days. Meltdown? We hope to be able to kiss the China Syndrome goodbye."

One current objective of the project is to improve the fuel reliability of the microspheres. Kadak said they're looking to design and test a fuel particle whose releases—even from failed particles under the scenario he just outlined—will be minimal and below Environmental Protection Agency action levels.

Also, the student-designers are looking at using other barriers within the microsphere to prevent the migration of one particular isotope, according to Paul Owen, an MIT student who recently graduated after completing his thesis on the pebble bed reactor's spent fuel disposal characteristics. Silver-110m is currently able to travel through the protective silicon carbide layer of the fuel element, Owen said.

One interesting wrinkle of the pebble bed reactor is that it could be used for processes besides generating electricity, according to James Lake, director of advanced nuclear energy products at Idaho National Engineering and Environmental Laboratory, which is working with MIT on the project. The reactor could generate process heat, which invites the possibility of having more than one product to sell from a nuclear power plant. If the United States, to lower carbon dioxide emissions, began moving toward hydrogen fuels in the transportation sector instead of hydrocarbon fuels, the pebble bed reactor could provide an essentially carbon-free means of making hydrogen, according to Lake.

As part of the ANS's Economic Imperative endeavor and subsequent launching of a nationwide student design project to make new reactor designs more competitive, the MIT pebble bed reactor project has enlisted the support of three other universities. Ohio State University is working on a new monitoring system concept for reactor control; the University of Cincinnati is developing a device for online measurements of pebble burnup; and the University of Tennessee is evaluating how to make the reactor vessel smaller to allow for onsite shipment of the intact vessel and to ease onsite assembly of the modular plant.

While Kadak concedes the intimidating obstacles yet to be cleared for the pebble bed reactor project to succeed, he maintains that there are few other alternatives in attempting to revive the nuclear option in this country. He hopes to bring a conceptual design before Congress in about a year to request funding for what has so far been largely a student-based project, which Kadak regards as a strength when maneuvering through the political system. As soon as the politicians see it's either a lab mission or an industrial mission, Kadak said, then the project is branded as either a lab bailout or corporate welfare. "Wouldn't it be great," he asked, "if the students who came up with this idea actually saw it built and had a hand in building it?"

Charting the course

Andy Kadak sees his MIT reactor project as an example of at least one aim of his term as 1999–2000 ANS president: reinvigorating the nuclear industry by catching the interest of bright students and mobilizing them toward nuclear engineering. And the two things that have to be done in this country to bring in students, Kadak said, are funding of engrossing R&D projects—"because if it's not interesting, it's over"—and showing students that there will be jobs waiting for them when they graduate.

"If every utility hired two students in their postgraduate training programs," he said, "and made that visible commitment—which is peanuts for these companies, *peanuts*—we could rejuvenate young people's interest in going into nuclear power, nuclear energy as a profession."

Hiker and camper: Kadak at the summit of New Hampshire's Mt. Washington

Another focus of Kadak's presidency is to build coalitions with the environmental community, such as the Sierra Club, the Natural Resources Defense Council, and the National Audubon Society. "There should be no conflicting message, no message that they put out that we don't also share," Kadak said. "I couldn't imagine why we couldn't agree on some of the fundamentals and work together to clean the environment."

The greatest task of Kadak's term, however, will be to weigh on members to work to help improve their industry. "The bottom line is," Kadak said, "if you want to turn this industry around it's not going to happen by sitting at home. . . .

"What I'm looking for is commitment, capability, and essentially a desire to work. And I'm talking work, here.

"It's nice to be on the board of directors at ANS, but that comes with a certain amount of responsibility. My expectations will be, If you're a board member, you're going to be working. If you're a professional division chair, you're going to be working. If you're a committee chair or a member of a committee, we're expecting some results. . . . If there are people in the group who are busy, can't do it, or don't think it's such a good idea, we'll find good people who can.

"Our mission is to make people want to join ANS because that is where the action is and that is where they need to be."

Staying the course

Andy Kadak has said that if the modular pebble bed reactor plant does get built, it would represent the culmination of everything he's learned throughout his 30-plus year career in nuclear—the technical, the political, the regulatory, and the communicative. "And that," Kadak said, "would put a period at the end of that sentence [laughs] in a very nice way."

For now, though, he'll have to settle for a comma; the remarkable sentence is still unfolding. NN