

Tulenko: Keeping things moving

*Traveler, industry groundbreaker,
college professor, and 50th ANS
President, Jim Tulenko thinks
there is a manifest destiny
for nuclear energy.*



Jim Tulenko, with a University of Florida Gator pin on his lapel, is the 50th ANS President.

BY RICK MICHAL

JIM TULENKO IS a man on the move. He has just returned to his University of Florida office from a 17-day tour of China, Japan, and Taiwan as a representative of the American Nuclear Society, promoting nuclear technology and cooperation across borders. In another day, he will rise at 4 a.m. to drive two hours from his home to the Orlando airport, from where he will fly to New Mexico for a meeting with a former high-ranking Energy Department official to discuss, among other things, how the nuclear renaissance will be affected if the nuclear-friendly Bush administration fails to keep the White House in November. After that, he and his wife, Lois, will cruise to England aboard the world's largest ocean liner, the brand new *Queen Mary 2*, for a two-week celebration of their 39 years of marriage.

He prefaces his life story by talking about his three children, now grown. He is not bragging, but only explaining how proud and lucky he and Lois have been to have had "good kids." His eldest, Mark, is 37 years old and a physical therapist who owns his own practice in Charlottesville, Va. Next is Christina, 35, who first became a lawyer and then an emergency room doc-

tor, and currently is working for Marion General Hospital in Ohio. His youngest is Kate, 33, also a medical doctor, who works for the World Bank supervising AIDS clinics in Africa.

Like the ex-football player he is, he believes a good offense is based on a good ground game, and when talking business, that means spreading the good news about nuclear at the grass-roots level. The Grass-roots Initiative was a major focus of Larry Foulke's term as ANS president that will be carried forward by Tulenko as the 50th President in the 50-year history of the Society. "Grass roots" means giving talks at the local Rotary Club or Kiwanis chapter and paying visits to state and federal representatives in their local offices, where they are most likely to listen to what nuclear professionals have to say. It includes talking with neighbors and making presentations at town hall meetings, where there likely will be "a very positive response from a crowd that's open-minded," he says.

Tulenko's enthusiasm for nuclear energy is passionate, yet he knows that economics will be a major factor in deciding its fate as a power source. He is a specialist in the nuclear fuel cycle, yet he once thought his career would be as a petroleum engineer. He has worked in many areas of nuclear tech-

nology and has received many honors, but he is at ease working with a student entering the ground floor of a nuclear education.

Tulenko is a Harvard University graduate in applied physics, and he gained his master of science in nuclear engineering from the Massachusetts Institute of Technology (MIT). In 1981 he became an ANS Fellow, and in 1986, he joined the University of Florida (UF) as professor and head of its Nuclear Engineering Department. Under his leadership, that department became one of the best nuclear engineering programs in the United States, according to a national publication.

Despite his accomplishments and position in life, he is unassuming, congenial, and accessible. He seems to be one of the guys, as the following example illustrates: On the UF campus, he is eating a salad at a food court when a young nuclear engineering student approaches without hesitation. "Are we still getting together later to talk about my research project?" the student asks casually.

Tulenko responds, "Oh, sure!" and then the two make small talk with the ease of lab partners discussing the weekend's plans. Although the student and instructor are separated by decades and depth of knowledge, Jim Tulenko seems always comfortably available.

Growing up

Tulenko is matter-of-fact about much of his life, even though by most standards it has been exemplary. He was born in 1936 in Holyoke, Mass., to parents who had one other child, John, four years older than Tulenko. His father was a college football star at the University of Massachusetts who went on to achieve some acclaim as the chemist who invented the cleaning product Lestoil, manufactured by Clorox. His mother reached some fame herself when later in life she took up golf and became a club champion. Athletics and the Tulenkos seemed to go together.

Tulenko's brother John was a sports star starting in grammar school and on through college. Newspapers of the day carried headlines of John's exploits on the gridiron at Harvard University. A possible career in professional football was ended by a blind-side tackle during a game at Harvard, which caused a hip injury that sidelined him forever. No matter. John found success in another field—medicine—and he graduated as an M.D. and went on to become a highly regarded cosmetic surgeon in the New York area.

Tulenko followed in his brother's footsteps, excelling in sports and academics. In grammar school, he played on championship basketball teams. In high school, as a member of the Holyoke High Purple Knights, he was featured in newspaper articles accompanied by photographs showing a strapping 6-foot-tall teenager on the football field or during a track meet. He was a running back on the football team, and his career rushing average was an impressive four yards per carry. Humble as he is, Tulenko credits much of his success to teammate Fran O'Brien, a lineman who opened holes through which Tulenko could run. O'Brien went on to become a five-time All



Tulenko's high school portrait from 1954



Tulenko (right) and his brother John at their grandparents' farm in the 1940s.

Pro in the National Football League, according to Tulenko. (Interesting note: After retiring from the NFL, O'Brien opened Fran O'Brien's Stadium Steak House, a restaurant located at the Capital Hilton Hotel, in Washington, D.C., where long ago ANS held some of its national meetings.) Like his brother John, Tulenko also suffered a leg injury on the football field, leaving him to this day with a hitch in his step.

High school was a time of many accomplishments. Tulenko was co-captain of the track team and a high-jump champion. His bowling team won a national championship. He was a winner of a literature award presented by Harvard University to high school students. He was a member of the Air Scouts, a category of Boy Scouts that worked on and flew airplanes. He was president of student council, was crowned "king" during a school dance, and was voted "most considerate" among his graduating class. On high-school graduation day, he gave a speech titled "Opportunities in the United States."

Major universities pursued Tulenko as a student. Rensselaer Polytechnic Institute, Princeton, and Harvard offered scholarships. Urged by his brother John, Tulenko picked Harvard, attending that university starting in 1954. His goal was to become a petroleum engineer because he had always been interested in the energy sources that power the world. He had not yet considered nuclear as a career objective because the technology was still in its infancy. It was 1953 when Eisenhower gave his "Atoms for Peace" speech, and it was 1954 when Tulenko started college. "The American Nuclear Society hadn't even been formed yet," he explains.

During his junior year at Harvard, in 1957, Mobil Oil Company selected him for

its "Summer Abroad" program. That program sent 10 deserving college students to Europe for two months to initiate them in the petroleum business, in hopes they would come work for Mobil upon graduation. Tulenko was selected for the program based on his Harvard grades, a qualifying essay he wrote, and interviews he did with company representatives.

During the students' stay in the United Kingdom, they were given tours of Mobil's refinery plants and training facilities. At Mobil's petrol stations, he had to pump gas, change oil, and wash windows. There were glamorous activities, too, Tulenko remembers. "I had lunch with the Duke and Duchess of Devonshire at their estate," he recalls, smiling at the memory. He also was the official starter for the Mobil Economy Run, a race once conducted to see which car and driver could go 1000 miles around England using the least amount of gas. The race culminated with a Grand Ball, where Tulenko's date was the daughter of the Lord Mayor of Manchester. Tulenko also attended the Edinburgh Festival in Scotland and toured Paris, Amsterdam, and parts of Germany during the program.

Despite heavy emphasis on the petroleum business during the summer of 1957, it was also the year that Tulenko turned his attention to nuclear energy. "It was the time of the *Sputnik* satellite into space, of far-reaching goals, and I decided nuclear was the way of the future," he says.

During his Harvard years, he was elected president of the Harvard Engineering Society and was a starter on the Harvard freshman football team, but he suffered severe medial and lateral meniscus damage that required surgery and ended his football career. He rehabilitated his knee and was a two-year letterman on the lacrosse team,



In 1957, Tulenko spent the summer in Europe participating in a Mobil Oil Co. program. In left photo, he performs maintenance under the hood at a Mobil station, and in right photo, he checks his watch against the clock at London's Big Ben.

but he broke his ankle during a game in his senior year. Tulenko was on the Dean's List throughout his Harvard years, and while on crutches because of the lacrosse injury, graduated *cum laude* in 1958 with a bachelor of arts in applied physics. He continued at Harvard to earn his master of arts in applied physics in 1960.

While attending Harvard, Tulenko had also registered at MIT because that was where many nuclear engineering courses were being offered. During this period, he went into the military as a 2nd lieutenant in the Corps of Engineers and served as a platoon leader in the 20th Engineering Battalion of the 1st Army. He received a Department of Defense medal as outstanding military cadet and spent a week at West Point as an exchange student. Upon completion of his military service, he returned to MIT, where he worked on the organic loop project conducted at the school's research reactor, and was part of the reactor theory group at Brookhaven National Laboratory, in New York. He also was a founding officer of the ANS student section at MIT, which represented his first involvement with ANS. He received his master of science in nuclear engineering from MIT in 1963.

Work life

Lois Wagner was an executive secretary for United Nuclear Corporation in 1963 when the company's manager of nuclear engineering stopped at her desk before leaving on a recruiting trip. "Lois, I'm off to MIT, and I'm going to find you a husband," said the manager, George Sofer. When Sofer returned from his trip, he tossed Tulenko's resumé on her desk and said confidently, "Lois, I found your man." She looked at the resumé and commented skeptically, "George, he looks good on paper, but let's see what he's like in real life."

Lois had noticed that Tulenko played tennis, and she too was an active player.

She saw he was on a national championship bowling team in high school, so she went out and took bowling lessons. The romance didn't start until Tulenko and Lois were placed on the same bowling team in a company league. Two years later, in 1965, they were married. It wasn't until many years later—when Lois had pulled her two daughters aside to tell them, "When you see the fellow you want, go af-

ter him"—that Tulenko learned of how George Sofer had pulled strings to pair the two together.

Tulenko joined United Nuclear in 1963 as an engineer in the mobile compact reactor group, and by 1966 he had ascended to manager of nuclear development. United Nuclear at the time was the first independent reload fuel supplier, located in Elmsford, N.Y. As a result of his research, he de-



On the same day in 1958 that Tulenko (second from right) graduated from Harvard University, his brother John was graduating from Harvard's medical school. At left in the photo are their parents.

veloped and patented the water rod concept used in all boiling water reactor fuel. The results of Tulenko's research were presented at the June 1968 ANS meeting in Toronto in a paper titled "A Thermal Flux Trap for Plutonium Recycle Assemblies." As noted in the paper, "This technique offers a means of increasing the H/fissile atom ratio in the assembly without altering the flow characteristics of the assembly and thereby makes it compatible with existing assemblies in a reactor." The water rod concept eventually was to be used in all BWRs in the United States.

While with United Nuclear, Tulenko also was the lead engineer for the nation's first commercial plutonium recycle reload, placing 11 plutonium recycle assemblies into the Dresden-1 BWR (now shut down), then operated by Commonwealth Edison, in Illinois. He co-designed the plutonium configuration and wrote the licensing document for the reload, which was performed in the fall of 1969.

Tulenko was then contracted by United Nuclear to the government of what was then West Germany, to study plutonium recycle in various German plants and transfer that technology to NUKEM Corporation. At the same time, he became instrumental in transferring reload technology to Japan's Nuclear Fuel Industries.

United Nuclear also made Tulenko the proposal manager and then the project manager for the first reload contract supplied by a company other than the original equipment supplier. In this case, the contract was for American Electric Power's (AEP's) D. C. Cook plant, in Bridgman, Mich., which has two Westinghouse pressurized water reactors. United Nuclear won the contract because it could sell uranium and the fabricated fuel to AEP at a lower price than could Westinghouse. The event marked the entry of an independent fuel supplier into the fuel reload business and was the first time that a new plant was sold with the first six reloads to be supplied by a company other than the reactor vendor.

It was during his years with United Nuclear that his children, Mark, Christina, and Kate, were born.

In 1970, Tulenko left United Nuclear to go work as physics manager for NUMEC Corporation, another independent fuel supplier, located in Pittsburgh, Pa. A year later, he became physics manager and then manager of fuel engineering for Babcock & Wilcox (B&W), in Lynchburg, Va., after that company had acquired NUMEC. In his new role, he was responsible for the design and operation of all B&W commercial fuel, and by 1973 the first modern B&W PWR, Duke Energy's Oconee-1, in Seneca, S.C., went critical. By the way, Tulenko and his fuel team had predicted the initial critical boron concentration within 25 ppm.



Tulenko and his wife, Lois, in 1969, with their children Christina, 6 months, and Mark, 2 years, and their dog Pettina.

When the phenomenon of densification was first observed in fuel in the 1970s, Tulenko and another researcher carried out experiments at Oconee-1 using zirconium oxide spacers in fuel rods. The experiments, reported at an annual ANS meeting, demonstrated that B&W's in-core equipment could detect densification gaps as small as 0.4 in.

Under Tulenko's management, B&W also developed a 17×17 lattice fuel assembly that improved fuel economics and performance. Also under Tulenko's watch, B&W developed the low-leakage (or in-out) fuel management scheme currently used in all PWRs.

There were many firsts for B&W in the fuel area, according to Tulenko. The company was the first PWR vendor to use natural uranium pellets as an axial reflector in the top and bottom nine inches of each fuel rod. Similarly, B&W was the first PWR fuel supplier to use gadolinia burnable poison successfully. Under Tulenko, B&W also replaced Ag-In-Cd (silver-indium-cadmium) control rods containing B_4C with an Ag-In-Cd tip that saved considerable money without loss of performance. In addition, Tulenko and B&W developed zirconium spacer grids and ran demonstration assemblies with annular pellets at Entergy's Arkansas Nuclear One-1, a B&W PWR plant in Russellville, Ark.

Tulenko also brought home the bacon for B&W, as under his watch the company received more than \$50 million in fuel research funding from the DOE.

In 1983, Tulenko turned down B&W's offer to become chief nuclear engineer (CNE). "Fuel was a great interest of mine,

and I wasn't really that much interested in becoming CNE," he recalls. "At the time, PWRs were having their challenges with regard to steam generator performance. I would have become immersed in steam generators and problems with pressurizers, control rod drives, pumps, pump seals, etc., and I didn't have interest in that." Instead, he took a job as manager of computer business service, in charge of engineering automation for McDermott Corporation, parent company of B&W.

Although he found the computer work challenging, he still held interest in nuclear technology. He turned his sights to an academic career and interviewed with UF in 1985. "I saw nothing happening in the industry as far as the building of nuclear plants, and I saw the university job as a new door opening," he says. He took the job as professor and chair of the Nuclear Engineering Sciences Department on May 1, 1986, and held that position for 15 years.

Academia days

After a successful commercial career, Tulenko took control of UF's Nuclear Engineering Department, which for years had failed to crack the nation's top 10 programs as ranked by a national publication. He had always been active in education while in industry, having been the first nonacademic chair of ANS's Accreditation and Professional Development Committee. As nuclear engineering enrollments were falling nationwide, resulting in a drying up of the manpower supply to the industry, Tulenko became a national leader in transitioning programs from a curriculum dominated by

nuclear power to one characterized by a common nuclear educational core. From the new core came a variety of nuclear-based majors, including health physics, medical physics, and engineering physics, in addition to nuclear engineering fields such as waste management, probabilistic risk assessment, criticality analysis, fuel management, and robotics.

Tulenko also broadened UF's Nuclear Engineering Department by developing international programs and securing support from regional utilities such as Florida Power and Light (FPL), Southern Nuclear, Florida Power Corporation, and Duke Energy. FPL created an endowed chair at UF, the first such endowment by a utility to a domestic nuclear engineering department in more than 20 years.

To expand educational opportunities, Tulenko developed a graduate research program devoted to the application of robotics for maintenance at nuclear power plants and for environmental restoration and waste management of nuclear facilities. He made UF a leader in the effects of radiation on electronic systems. He co-developed a master's degree program in waste management, making UF one of the leading schools in that area.

Tulenko's methods for pumping up the program were successful. By 2001, UF's Nuclear Engineering Department had risen to a top-10 ranking in the nation, according to *U.S. News and World Report*. During his tenure as department chairman, which

Tulenko was one of the originators of the University Working Conference, which was established by ANS to address and highlight the serious challenges to nuclear engineering programs. He was chairman of a conference titled "Relevance of Nuclear Engineering Departments/Programs in the 21st Century," and subtitled "Ensuring the Nuclear Workforce for the 21st Century."

In addition, in 1998, he coauthored "Nuclear Engineering in Transition: A Vision for the 21st Century," a publication of the Nuclear Engineering Department Heads Organization (NEDHO) that addressed the challenges to nuclear engineering education and outlined recommended changes.

Tulenko served as vice chairman and then chairman of NEDHO and headed efforts to lobby Congress and work with the DOE to ensure that nuclear engineering education funding was a part of the DOE's appropriations bill. He also helped establish initial funding for the DOE's Nuclear Engineering Education Research program. Tulenko was active in the establishment of DOE fellowship programs, and has served on DOE fellowship selection committees

for more than 10 years. While nuclear engineering chairman at UF, Tulenko brought the program up to third in the nation for total number of DOE fellowships received.

In the area of the accreditation of nuclear engineering programs, Tulenko

has been a leader. After serving as head of ANS's Accreditation Division, he went on to sit on the Engineering Accreditation Commission (EAC) during a crucial time when the new Engineering Criteria 2000 program was being implemented and refined. The Accreditation Board for Engineering and Technology created Criteria 2000 to alter the landscape of engineering education in the United States. Tulenko was kept on the EAC an additional year—2000–2001—as a team leader to aid in Criteria 2000's critical review.

Tulenko has reviewed more than half the accredited nuclear engineering programs in the United States, and was made a member of the National Nuclear Accrediting Board as a representative of post-secondary education. He also has participated in the review

of more than 15 nuclear utility programs.

Tulenko has presented and published extensively on nuclear engineering education for both ANS and the American Society for Engineering Education (ASEE). He has held numerous posts for ASEE, including chairman of the Nuclear Engineering Division, vice president of the Public Interests Council, and a member of the board and the ex-

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ecutive committee. In 1997 he was awarded ASEE's Glenn Murphy Award as the outstanding nuclear engineering educator.

In recognition of his expertise in high-burnup fuel, Tulenko in 1999 was selected by the Nuclear Regulatory Commission to be a member of a committee to review the agency's fuel performance code incorporating burnup up to 60 000 MWd/tU.

For ANS, he has chaired three divisions, two local sections, and served on the board of directors. He was a founding officer of ANS's MIT Student Section and a founding member of the Fuel Cycle and Waste Management Division. On the local front, the ANS Florida Student Section has won the Glasstone Award a record 18 times (and, incidentally, the Florida Health Physics Society Student Section has won the Best Section Award many times).

Regarding ANS activities, in 1997 Tulenko was presented with the Mishima Award for his outstanding contributions in research and development of nuclear fuels and materials. In 2002 he received the Arthur Holly Compton Award in Education. Currently, he sits on the ANS Board of Directors and is a member of the Robotics and Remote Systems Division (RRSD), Education and Training Division, Materials Science and Technology Division (MSTD), Scholarship Policy and Coordination Committee, and Special Committee on Government Relations. He is a past chair of the Fuel Cycle and Waste Management Division, RRSD, MSTD, the Florida Section, and the Virginia Section. He has served as Student Activities chair for the Power Division. He has been a technical program chairman of four topical and one national meeting, and general chairman of one topical.

He co-developed a master's degree program in waste management, making UF one of the leading schools in that area.

ended with his retirement from that position in 2001, UF's graduate program tripled in enrollment and the undergraduate program became the largest in the country in terms of bachelor's degrees granted. He continues on today as professor of nuclear engineering, and is an integral part of the department at UF.

Other accomplishments include his development of the 3/2 program for UF's Nuclear Engineering Department. That program allows outstanding students to have graduate student status in their senior year and to double count 12 hours of advanced courses toward both their bachelor's and master's degrees. Other educators at the school noticed Tulenko's success, and now most departments at UF offer the 3/2 program.



The Tulenko clan assembles for a wedding photo in August 2001. From left are daughter-in-law Cindy Grace (wife of Mark), grandson Tyler (small boy), granddaughter Cassie, grandson Brad, son Mark, daughter Kate, wife Lois, daughter Christina and her husband Ralph Ruppe, Tulenko, and Ken Heyman (husband of Kate).

School's out

Although Tulenko stepped down as UF's nuclear engineering chair in 2001, he has not slowed down. He is still active as a professor and is an avid fan of the university's Florida Gators sports teams, holding season tickets to football and basketball games. He chuckles when he tells the story of how he and Lois attended a UF sporting event and the person sitting next to Lois was a fresh-faced young man in sweat shirt and sweat pants. She struck up a conversation, assuming the young man was a student. She asked what classes he was taking, and much to her embarrassment, he replied none, because he was Billy Donovan, head coach of the men's basketball team.

Tulenko also is an associate in the Advanced Fuel Cycle Initiative at Los Alamos National Laboratory (LANL), working to put together an international group to develop a first principles (atomistic) nuclear fuel performance code. He also serves as chair of the advisory review committee for the Chemical Engineering Division of Argonne National Laboratory and is a member of the review committee for the Decisions Sciences Division at LANL. He is an adjunct professor in the Nuclear Engineering Program at the University of South Carolina.

Tulenko and Lois travel out of state quite a bit to visit their children and five grandchildren. Their son Mark and his wife, Cindy, have three children—Brad, who is 14 and already 6 ft 2 ½ in. tall and growing; Tyler, 9; and Cassie, 7. Tulenko's daughter Christina is married to Ralph Ruppe, and they have two sons, Nicholas, 2, and Max, less than one year. Tulenko's youngest, Kate, lives with her husband, Ken Heyman, in the Washington, D.C. area and is hoping to give Tulenko more grandchildren.

Tulenko's hobbies include racquetball and collecting something called fractional currency. He explains: "I like fractional currency because it's a limited collection. During the time of the Civil War, metals were in short supply. They were being used for bullets, etc. The government replaced the coins by issuing paper money called fractional currency—paper nickels, paper dimes, paper quarters, paper half-dollars, 75-cent pieces, even one-cent bills. This fractional currency existed for a period of about five years. It was issued by the Treasury Department."

Tulenko has many of the pieces but not all. "There were so many versions of fractional currency with pictures of Civil War generals on them that Congress passed a law that you could not have the image of a living person on a coin or paper money," he says. He collects the currency because "it's a part of American history that people aren't really aware of."

While he enjoys his hobbies, his passion is still nuclear energy. He believes there is a manifest destiny for it. "In the next 50 years, the fossil fuels will be depleted and will price themselves out of the energy market," he observes. "The world will have only two choices for energy—coal and nuclear. I think there really will not be much of a choice; it's going to be nuclear."

He agrees that solar and wind will add to the power supply, but only as supplemental energy sources. The antifossil and anti-nuclear crowds will howl, of course, he says, because they will think that solar and wind can be primary. But, he notes, in mock misuse of the language, "When the sun don't shine and the wind don't blow, they don't produce any energy at all."

He considers himself to be a "sort of economist," he says. "Everything eventu-

ally rises or falls based on whether it's economic. You can have the greatest thing, but if it's too expensive it's just not going to be built."

That's why the federal government will play a key role in ushering in the next generation of nuclear plants. "We need to have two things before we build another plant," he explains. "First of all, we need to have a carbon tax so that the environmental benefits of the 'no greenhouse effects' of nuclear are actually translated into an economic benefit. This is being pushed by Senator [Pete] Domenici" (R., N.M.), under whose plan a new nuclear plant would gain about \$25 million a year because of nongeneration of carbon dioxide. Tulenko is strong in his praise of the role Domenici is playing in ensuring that the United States has a realistic energy strategy.

The second need is for the government to guarantee costs to utilities in the event that new plants they build are not allowed to operate because of political intrusion, such as what happened with the Shoreham plant in New York in the 1980s. He references his recent trip to Taiwan, where a new administration is pushing for a nuclear-free zone and wants to shut down all nuclear plants. In Germany, the Social Democrats are doing the same. "What happens if a new administration comes in after November and wants to shut down a plant the same way the Shoreham plant was shut down?" he asks. "You have to have some kind of guarantee that if by government action your plant does not run, you get back your investment. There has to be some sort of basic guarantee."

As ANS's 50th President, Tulenko thinks that the battle for nuclear energy will be determined by those who best explain the technology to the public. For that reason, the real strength of ANS is in its local and plant sections, he says. Because these sections have suffered attrition during the last decade, he has made it a priority to work with ANS's Local Sections Committee and its national headquarters to reinvigorate and support local and plant sections in their role in serving the local membership of ANS. It is these sections, he believes, that will deliver the grass-roots efforts of educating teachers, the public, and political representatives.

Tulenko also wants to be responsive to ANS membership. He has set up an e-mail address so that anyone can send in ideas on how ANS can better ensure that it is responsive to membership and its professional obligations. The e-mail address is <jimtulenکو_ans@yahoo.com>.

Today, Tulenko and Lois live in a home on a golf course not far from UF. He doesn't yet play golf, but plans to follow his mother's footsteps and take up the sport someday when he retires. For the active Tulenko, that day seems a long way off. ■