ISSN: 0029-5574

nuclear news

A PUBLICATION OF THE AMERICAN NUCLEAR SOCIETY

JULY 1981/VOL. 24/NO. 9

Corwin L. Rickard
ANS President

profile

Corwin L. Rickard: Persistent optimist

Had his curiosity not been piqued by the possibilities of the then fledgling atomic energy industry, Corwin L. ("Rick") Rickard might well have become better known for his work in automotive engine design than for his engineering design contributions in gas-cooled reactor technology. He was certainly headed in that direction when, at the age of 21, as the basis for his master's thesis, he assisted an inventor by the name of Broderson in the building of the first successful stratified-charge internal combustion engine, a forerunner of the type introduced commercially by Honda. Rickard, now 54, and just beginning his one-year term as president of the American Nuclear Society, presumably has no regrets about his career decision. He has found in atomic energy a fruitful field in which to use, on the one hand, his expertise in heat transfer, thermodynamics, and fluid mechanics and, on the other, his extraordinary skills as an executive.

Except for a few years spent at Brookhaven National Laboratory, where he got started in nuclear energy work, Rickard has spent his entire nuclear career at General Atomic Company, where he presently serves as executive vice president in charge of the high-temperature gas-cooled reactor (HTGR) and fusion programs. He is one of three executive vp's* who, along with president Harold Agnew, constitute the executive committee of the company. Of the company's present 2500 employees (not including GA's one-half interest in Allied-General Nuclear Services at Barnwell, S.C., or its 45 percent interest in the German company Hoch-Temperatur Reaktorbau [HRB]), some 500 are within Rickard's area of responsibility. Reporting directly to him are two vice presidents, one for each of the major technology programs: Tom Johnston in the HTGR work, where he concentrates on marketing and business development; and Tihiro Ohkawa, who runs the fusion research program as a wholly integrated division. Also reporting directly to Rickard are the managers of the HTGR programs, of the Fort St. Vrain program, of the licensing group, and of the General Atomic Europe office in Zurich, Switzerland.

Apart from his technical and managerial gifts, Rickard is remarkable for his persistent optimism in the cause of nuclear power—especially in its gas-cooled variety. A soft-spoken, but no less enthusiastic, person, he epitomizes his company's unshakable faith that the market will return for the HTGR,** that its process heat potentials will prove out, that the steam-cycle HTGR will be successful, bringing added efficiency and greater siting flexibility, and that the prospects for the gas-cooled fast breeder reactor (GCFR) will ultimately be realized. His faith is unflappable also in the hot pursuit of feasibility milestones in fusion technology—both in GA's well-known Doublet series and in its newer ohmic-heated toroidal experiment (OHTE).

In addition to his characteristic cheerfulness, Rickard, nearing his 25th anniversary with the San Diego, Calif., enterprise, has shown versatility and durability. He joined the company in 1956, only a year after its inception as a division of General Dynamics Corporation. In 1967 he saw the company change hands when Gulf Oil Company bought it (changing its name to Gulf General Atomic). In 1974 Royal Dutch Shell came into the picture, buying one-half interest in the company from Gulf (whereupon the name of the company reverted to General Atomic).

Rickard spent his first 10 years at GA working basically as an engineer,

*The other two are Creighton Gallaway, in charge of financial, personnel, and administrative operations, and Dirk van Hilten, in charge of GA's commercial activities and its resource group of scientists and engineers.

**In 1974 GA had eight HTGR units, beyond Fort St. Vrain, on its order books. Twin installations were slated for each of the following: Philadelphia Electric (Fulton, 1160 MWe each), Southern California Edison (Vidal, 770 MWe), Louisiana Power & Light (St. Rosalie, 1160 MWe), and Delmarva (Summit, 770 MWe). In addition, Ohio Edison was showing strong inclinations to go with HTGRs for its proposed twin Erie units. Then came the Arab oil embargo of 1974 and in its wake OPEC-dictated price increases, with their downward effect on the U.S. economy and, in particular, on electricity demand. All eight HTGR orders were canceled by the end of 1975.

Rickard is confident that when demand picks up again, HTGRs will be a factor in nuclear power's comeback, because of their high safety factor, superior efficiency, and environmental advantages. He notes: "We have never stopped trying to get another project, or another series of HTGR projects, launched. However, the first must be one where the industry and the utilities together can see positive support of nuclear power, including the HTGR, by the government."

GA is currently participating in a site evaluation study for a large HTGR with the utility group Gas-Cooled Reactor Associates and Florida Power & Light Company.

primarily on the HTGR during its early developmental stages. While acknowledging Peter Fortescue, who left the U.K. Atomic Energy Authority's research establishment at Harwell to join GA in 1957, as "the real source of innovation" in gas reactor technology, Rickard contributed strongly to the technology himself. He was in charge of the original design for Philadelphia Electric Company's 40-MWe Peach Bottom-1 plant, the first HTGR and a highly successful project. Later he headed up the team that designed the first large HTGR, which, with design evolution, became the 330-MWe Fort St. Vrain station, now being readied for full-power operation on the Public Service Company of Colorado system.†

Rickard confers with GA associate (and ANS aide) Gilbert Melese-d'Hospital

In 1960 Rickard did the first calculations on the gas-cooled breeder reactor and determined from the heat transfer and thermal hydraulics calculations that gas could be used as a coolant for a fast reactor. Up until that time, most people assumed that only liquid metal could be relied upon for removing heat at the higher power densities of fast breeder reactors.

Technology exchange

Rickard has been extremely active in fostering the exchange of ideas and experiences among members of the nuclear community on an international scale. As early as 1959 he was helping to lay the groundwork for cooperation between the United States and Euratom/Great Britain involving the gas-cooled Dragon reactor at Winfrith Heath. He well remembers meeting with Sigvard Eklund at the Swedish Embassy in Washington in 1959 to discuss U.S.-Euratom exchanges. Eklund was then chairman of the management committee for the Dragon project, not yet having gone on to head the International Atomic Energy Agency.

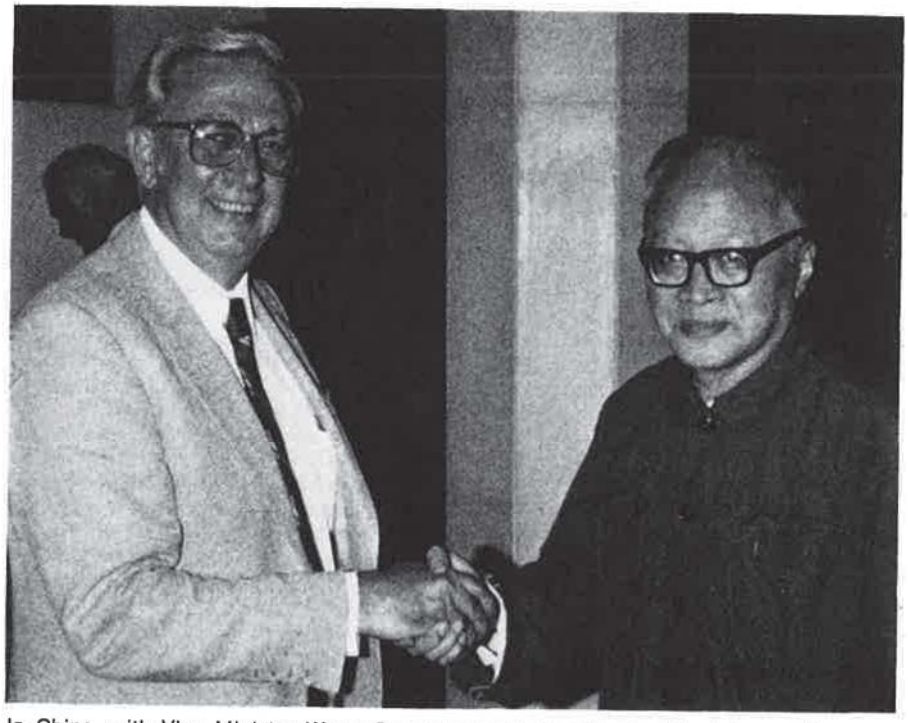
In another example of technology exchange, Rickard participated in bringing over from Europe the concept of prestressed concrete pressure vessels and introducing this feature into the design of HTGRs. He helped make the agreements overseas with both the French and the British to acquire this technology.

Because of his penchant for international cooperation, Rickard drew an assignment in the early 1960s to start a subsidiary company in Germany, known as General Atomic Germany. Rickard set up offices in Düsseldorf and carried out the preliminary design work for an HTGR project in Germany. Eventually this effort was terminated, and in 1972 GA acquired a 45 percent interest in HRB, which has built the 15-MWe AVR with a pebble-bed core and is presently completing the 300-MWe THTR (thorium high-temperature reactor).

In 1966 he was appointed assistant to the president, Frederic de Hoffmann, at which time Rickard had the overseas operations reporting to him, as well as public relations, the TRIGA (training and research reactors) operation, nuclear instrumentation activities, and the Magneform division (a spinoff business that produced metal-forming machines).

In 1967, when the company was acquired by Gulf, Rickard became a vice president and served as the liaison between San Diego and Pittsburgh, spending Mondays and Tuesdays in the East and the rest of the week in the West. From 1971 until assuming his present position he was responsible for Advanced Energy Systems. He was appointed executive vice president in July 1977.

†At this writing, the unit was down for its second refueling, during which it was to have one-sixth of the core replaced. Before shutdown, it had generated over 2 billion kilowatt-hours of electricity and had operated at 88.6 percent of full power in its NRC-approved program of testing to full power.



In China, with Vice Minister Wang Ganchang, Chinese Nuclear Society president

The Rickards of Medina

Corwin L. Rickard was born on September 26, 1926, in Medina, Ohio, the fifth of seven children (three boys and four girls) born to Howard and Carrie Rickard. In addition to his

immediate family, young Corwin grew up in the midst of a whole community of Rickards in this northern Ohio town of some 5000. For one thing, his father was also one of seven children, all of whom remained to spend their adult lives in Medina; for another, Medina was originally settled in the early 1800s by Rickard's great-great-grandfather and his family, migrating there from Pennsylvania Dutch country.

Rick was no stranger to work in his growing-up years, since there was always plenty to do in his father's businesses in Medina, a grocery store and a bakery. He was a serious student and got his first taste of things technical at the high school in Medina, where a physics teacher by the name of Leggett sparked his interest in the field. In his senior year he was elected president of his class and served as president of the student assembly.

The country was in the midst of World War II when Rickard was in high school, and he was eager to serve. He enlisted in the Navy Air Corps program on his seventeenth birthday, but had to wait until his graduation in the class of 1944 before entering service. Upon graduation he was enrolled in the Navy's V5 program, consisting of two years of preflight education. He was sent to Bucknell, in Lewisburg, Pa., and took pre-engineering courses there, completing this work in 1945. Then along came VE Day; the program closed out, and with it went Rickard's dreams of becoming a Navy pilot. He was reassigned to officer candidate school and was shipped off to Rochester, N.Y., where, at the University of Rochester, he finished his engineering studies to receive a BS in mechanical engineering. He was 20 years old when, in 1947, he received his degree, his commission, and his discharge from the Navy, all at the same time.

High school student with winged dreams

He stayed on at Rochester as an instructor while working on a master's degree in mechanical engineering. In 1949, upon receiving his MS, Rickard, at the ripe age of 22, was appointed assistant professor of mechanical engineering by the University. At this time, as mentioned earlier, his interests ran strongly in the direction of internal combustion engines.

Anne and other interests

Rickard's devotion to automobile engines was not all-absorbing, however, as attested to by his marriage in February 1948 to Anne Hillman, a major in nursing at the University, whom he met the year before during a summer school session. A Rochester girl with a lively sense of humor, Anne was soon to discover that there was irony in being married to an engineer. During the summer period in 1948 the young instructor/engineer got his first technical job when he followed up on the exciting prospect of making calorimetric determinations of the heating value of coal. It turned out that the biggest part of his job, with a local commercial testing company, was going out to the railroad yards and digging coal out of trains according to a standard ASTM procedure, then carrying hundreds of pounds of coal back to the laboratory, and grinding it up for purposes of testing. "I'd come home absolutely black," says Rickard, "but I'll never forget that as long as I live—I saw all the coal in all of northern Ohio, Pennsylvania, and New York. I learned a lot about coal." For one thing, he says in hindsight, he learned that nuclear is a lot cleaner. He also says that Anne could not believe that an engineer could come home looking like he did. Some attraction must have been there, however, for the Rickards soon welcomed the arrival of their first child, a daughter, Cheryl.

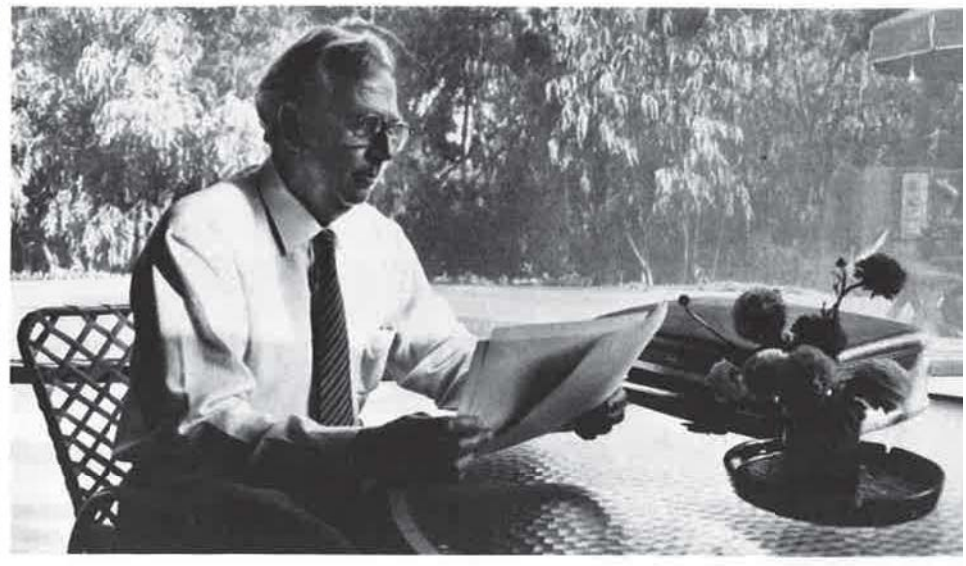
About this time, in 1949, Rickard, completing work for his master's degree, was introduced to the fast-developing field of nuclear energy. It was in the summer of 1949 that the dean of engineering at Rochester, Lewis Conta, who had been one of Rickard's professors, obtained an opportunity for Rickard to go to Brookhaven National Laboratory as part of a visiting instructors program. Rickard remembers that 1949 was an interesting time to be at Brookhaven, because scientists and engineers there were just finishing their first reactor, an air-cooled graphite natural-uranium reactor. Rickard was able to participate in the final design checks, air flow distributions, fluid mechanics, and other parameters. He also remembers working at the time on the problem of boiling stability in conceptual designs for boiling water reactors—something that wasn't all that clear at the time.

He also learned that the things that were fundamental to mechanical engineering—such as fluid mechanics, heat transfer, and thermodynamics—were, in addition to core physics, the things that make up a nuclear power plant. His interest, very clearly, was piqued.

Rickard continued to teach at the University of Rochester, giving courses in thermodynamics, fluid mechanics, internal combustion engines, and steam power plants. During summer periods he worked as a consultant for various companies, including Worthington Corporation, in Buffalo, where he worked at the engine research laboratory, and Boeing, in Seattle, where he consulted on a problem in hydraulics analysis on the B-47. The Boeing work offered the Rickards their first trip to the West Coast. Spending the summer there and returning to Rochester by way of New Mexico, Rick and Anne discovered their love for the West and hoped one day that they would live there.

In 1951, encouraged by Conta, Rickard took leave from the University of Rochester to go to Cornell University to complete his PhD requirements—which he could not do at the University of Rochester because of his being on the faculty. In addition to his studies at Cornell, he taught courses in heat transfer and power engineering, somehow managing to support his now augmented family on a $2000-a-year instructor salary. The Rickards' second child, John, was born in Rochester just

Newlyweds, February 1, 1948



Against a eucalyptus backdrop, Rick sits with Anne at poolside; ponders work in a screened-in office away from the office

before the move to Cornell. Anne recalls with characteristic wry humor, "He was six weeks old when Rick gave up his teaching profession to become a student again!"

Return to Brookhaven

Rickard spent two years at Cornell, teaching full-time and doing the necessary course work to satisfy candidacy requirements for his degree. After doing so, he had the opportunity to return to Brookhaven, this time at the invitation of Orin Dwyer, who had come to Brookhaven from the University of Rochester, where he was a professor of chemical engineering. As part of his work at Brookhaven, Rickard was allowed to do his doctoral thesis on liquid metal heat transfer. (This led at length to his PhD, conferred by Cornell in 1961.)

Working for Dwyer in the engineering group at Brookhaven, Rickard worked on a number of things, including a liquid-metal fuel reactor. He performed extensive experimental and theoretical investigations of heat transfer to liquid metals. He also spent a good deal of time in boiling water heat transfer and boiling water burnout studies. He was named national editor for the "Boiling Burnout Newsletter" in the early days of the Navy program, when the departure from nucleate boiling (to film boiling) was a problem to be resolved. Getting the correlation among flow rate, pressure, and degree of subcooling in the burnout phenomenon was important to both boiling water reactors and pressurized water reactors. Rickard was in contact with people at Bettis, Columbia, Knolls Atomic Power Laboratory, and other facilities in pinning down the conditions that determined critical heat flux.

It was a time when a number of different laboratories were trying to determine the ideal system for commercial nuclear power. At that time there were only two commercial demonstrations, one being the Shippingport PWR, under Rickover in the Navy program, and the other being the gas-cooled reactor in the United Kingdom. Other concepts were being developed, as Rickard remembers, including molten salt at Oak Ridge, liquid-metal fuel at Brookhaven, sodium-graphite at Atomics International, the BWR at General Electric, and the heavy-water reactor, under study by Walter Zinn and his group in Florida. It was a time of great ferment, and in this atmosphere Rickard was invited in the summer of 1956 to San Diego, where General Dynamics Corporation was attempting to put together a program for its new General Atomic Division.

Starting at GA

It was Dave Gurinsky, head of Brookhaven's metallurgy materials science group, who introduced Rickard to Fred de Hoffmann and Ed Creutz, who were the leading lights of the new organization. Rickard found himself in illustrious company, for among the consultants who were on hand at various times in 1956 and 1957 to advise de Hoffmann and Creutz on what General Atomic should do were Edward Teller, Hans Bethe, Manson Benedict, Peter Fortescue, and many others.

Rickard was excited by the prospects of the new company and joined as a permanent employee in the fall of 1956. One of his first duties was to work as a member of one of the competing teams assigned to study the prospects and potentials of different reactor types. Rickard was assigned to the HTGR team and found himself in good company. Bethe served as leader of the team in the summer of 1957; Fortescue, who had spent the summer of 1956 at GA, returned in the fall of 1957 and became team leader. As things turned out, the HTGR team "won" the competition and set the direction for the future of the company.

Another visitor to San Diego, at the time GA was still in its original schoolhouse location (before it had moved to its present 400-acre mesa site), was Rudolph Schulten, who was then working on the pebble-bed concept for the AVR gas-cooled reactor in Germany. Rickard was honored a few years later at the first gas-cooled reactor conference in the United States, convened in Philadelphia in 1960 by the Franklin Institute, to share the podium with Schulten in giving the first papers on the subject, Schulten's on the pebble-bed and Rickard's on the HTGR.

The HTGR, however, was only one of four major projects started in 1957 at GA, all simultaneously. The other three were: fusion, TRIGA reactors, and a maritime gas-cooled beryllium-moderated reactor (MGCR). Only the last-named of these projects was dropped, Rickard points out. As it turned out, the company did succeed in building in the 1960s an experimental device, known as EBOR (experimental beryllium oxide reactor) at Idaho, and it was ready to run when the bottom fell out of the idea of using reactors for maritime ship propulsion. The concept was abandoned by the Atomic Energy Commission and the Maritime Commission.

At home with the Rickards

With their children now grown and married, Rick and Anne Rickard have no lack of living space in their sprawling ranch home on hilly terrain in Rancho Santa Fe, Calif. The house is flanked on one side by a long screened-in recreation room featuring a suspended fireplace. Just outside this

room, in which Rickard spends a great deal of his spare time (especially since the room serves as his office away from the office) is an irregular-shaped pool, which, along with the rest of the property, is surrounded by a stand of tall eucalyptus trees.

Anne, whose undergraduate work was interrupted by the events of early married life, won her degree in health science in California during the 1970s. In recent years she has gone into business with her daughter at Lake Elsinore, Calif., which is about 60 miles north of Rancho Santa Fe. She and Cheryl began a yarn business in this desert town near Palm Springs, but no sooner had they started than the rains came, and the (until then) drybed lake rose 28 feet and flooded the town, not damaging their shop but ruining their market. Recently they traded the yarn business for a horse ranch, also at Lake Elsinore (but on the outskirts) and now are in the business of horse breeding. Cheryl, herself the mother of three children, is ranch manager and, in her mother's words, is "a good horse person," having bought, trained, and sold horses while still in high school.

The Rickards' son, John, owns a Porsche parts and maintenance service and is an avid sailboat racing enthusiast. He owns a 6-meter sloop, which he keeps at Oceanside. John's wife, also a mother of three, shares his interest as an active participant in racing.

ANS involvement

Rickard has been a member of the American Nuclear Society since 1958 and has long been active in the San Diego Section, chartered 20 years ago. He was among the original group that decided to form the ANS Power Division and held office in that group from 1967 to 1970. He has served on various other committees of the Society, including two separate terms on the Executive Committee. Last year he was elected vice president/president-elect. He was named an ANS Fellow in 1973.

He also has served as a director of the United States National Committee of the World Energy Conference. He is a member of the American Society of Mechanical Engineers and of the American Association for the Advancement of Science. He is a member of Sigma Xi and Phi Kappa Phi. He has had numerous papers on nuclear energy published and has to his credit three patents, one of which he shares with Peter Fortescue; assigned to General Dynamics, the patent bears the simple title: "Nuclear Reactor."—*Christopher J. FitzGerald.*

Statement of goals for ANS by Corwin L. Rickard

During the past several years and with a great deal of effort, the ANS Planning Committee, under the chairmanship of Mike Lineberry and in consultation with officers, division chairmen, committee chairmen, and members, has pulled together an exceptionally good statement of American Nuclear Society goals. In addition to calling our attention to the overall goal contained in the Society bylaws—"to promote the advancement of science and engineering relating to the atomic nucleus, and of allied sciences and arts"—the committee identifies nine technical and six professional goals that should provide a clear, long-term view of Society directions and envelop the whole of Society activities. These were distributed to ANS divisions, groups, and committees during the 1980 Winter Meeting in the form of a committee report titled "ANS Planning Cycle—A Guide to Implementation." The Planning Committee, the officers, and the Board, I am sure, are all looking forward to feedback from the members on this document, including the statement of Society goals. I am personally fully supportive of this method of establishing goals initiated by the Planning Committee, and I feel it will continue to serve the Society well in the future.

From my present perspective, I believe we should give priority attention to the following three of these goals:

- *"To stimulate the exchange of technical information among members."* The primary goal of the Society is to increase knowledge in nuclear science, engineering, and technology. We should continue to seek ways to make the technical programs at national and topical meetings of the highest quality and attractiveness. Similarly, we should continue to seek the highest quality in the papers published in our technical journals.

- *"To promote thorough public understanding of issues involving use of nuclear energy."* As the nuclear debate has intensified, so too have Society activities in public information. A vigorous public information activity, from formal programs and projects to information supplied to individual members, is vital to the Society. We should structure activities to inform political leaders, journalists, and the public. We should strive for objectivity and technical accuracy.

- *"To promote international understanding and cooperation among nuclear scientists and technologists."* The world growth of nuclear technology presents a significant opportunity for technical exchange. These exchanges have taken the form of foreign membership in ANS, encouragement for foreign scientists to present and publish their work within ANS, formation of foreign sections of the Society, assistance in formation of other national nuclear societies, and joint sponsorship of meetings between ANS and other national societies. We should continue to define appropriate activities to increase the interaction with foreign scientists and engineers, and we should explore possibilities for greater international cooperation among the nuclear societies.

I feel these goals are particularly important to the Society because:

- We must always hold the technical and professional goals of our divisions and committees as the first priority for Society activities.

- We all must acknowledge our professional responsibility to share our particular knowledge of nuclear science and engineering with the public, and this includes the activities of the Public Information and Public Policy Committees as well as the many activities of the Society in public and student education.

- We must seek to expand the beneficial uses of nuclear science and technology on an international scale, particularly in those areas of the world where there are large populations that are energy deficient and where nuclear technology could contribute substantially to satisfying their needs.

As personal goals during my term, I intend to work closely with the executive director and the dedicated ANS staff in their constant efforts to serve the membership, and to increase productivity in all of the Society's affairs and operations so as to maximize the benefits to the membership at minimum cost; I also will endeavor to further improve both internal and external communications with respect to Society activities.