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INDUSTRIAL NEEDS AND ACADEMIC RESEARCH IN REACTOR KINETICS**

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**REACTOR PHYSICS DIVISION
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THEOS J. THOMPSON MEMORIAL ADDRESS: A PERSONAL TRIBUTE

Elias P. Gyftopoulos

Obviously, I approach my task this evening with very intensive and mixed emotions. I wish I never had to give this talk in memory of my friend Theos J. Thompson. On the other hand, things being as they are, I am grateful to Curt Haire who gave me the opportunity to share with you my thoughts about Tommy the engineer and Tommy the man. For, with his untimely death last November when he was killed in a plane accident, those of us who knew Tommy well recognized that we lost both an outstanding colleague and a dear friend. So I would like to make a few remarks about Tommy's professional career and then illustrate his humane qualities through some of my personal experiences with him.

Tommy had always doubts about the righteousness of his convictions and actions. Nevertheless, once he put his mind on an activity he would not abandon it until he carried it to full completion. This devotion to his chosen efforts is amply exemplified by his career at Los Alamos Scientific Laboratory, Massachusetts Institute of Technology and the Atomic Energy Commission and his relations with his friends and students. Tommy studied chemistry at the University of Nebraska and served as quarterback on the Nebraska football team which played in the Rose Bowl in 1941. Here he showed the talents for exercising leadership in difficult and challenging situations, talents that distinguished his later professional life.

He joined the United States Army through the ROTC program in 1942. After a period in the chemical warfare service he was assigned to the military academy at West Point. There he was appointed instructor in physics and was an assistant football coach.

His exposure to physics at West Point stimulated his interest in the subject and lead him to study for a doctorate in nuclear physics at the University of California in Berkeley. There he developed an appreciation for basic research which remained his guiding star for the rest of his short life.

His knowledge of chemistry and nuclear physics qualified him well for his next activity as a research worker at the Los Alamos Scientific Laboratory. He was assigned to work on Clementine, the world's first fast reactor fueled with plutonium and cooled by mercury. When Clementine's fuel sprung a leak Tommy's combined knowledge of chemistry and physics made him uniquely qualified to shut down and dismantle the reactor, and the success with which he performed this potentially dangerous task was ample evidence of his engineering talents. This led to his appointment as Chairman of the Design Committee for the Omega West reactor. He successfully completed the design and construction of this fine reactor; thus establishing himself as a great reactor engineer.

In 1955 MIT's young program in nuclear engineering needed a man with real life experience with nuclear reactors to impart that experience to our students and to direct the design of the research reactor that was about to be built at MIT. Tommy's experience in teaching, chemistry, physics and reactor engineering made him an ideal addition to the MIT nuclear engineering faculty. Tommy's personality and capacity for leadership proved just as valuable as his professional skills. In the short space of two years after he came to MIT Tommy assembled a team of able assistants and designed and built the MIT reactor. The project was

completed on schedule and within the budget and the reactor worked perfectly. For the students who had the good fortune to work with Tommy in the design, construction, and startup of the reactor it was a marvelous educational experience. Tommy earned the admiration and affection of all those who worked with him and built friendships which have lasted to today.

When Tommy came to MIT New England's first power reactor, the Yankee reactor, was being designed and built. He served as senior consultant to the Yankee organization and made many contributions to reducing the cost and improving the reliability of the Yankee power plant. In both the research he undertook at MIT and the new courses he developed Tommy had a wonderful gift for challenging students, for stimulating their imagination, and for bringing out their best qualities. He tirelessly and continuously urged his students to become creative leaders in their chosen fields of endeavor and to respond imaginatively and wisely to the needs of their fellow men.

Tommy's experience with MIT and Yankee reactors made him an outstanding member of the Atomic Energy Commission's Advisory Committee on Reactor Safeguards on which he served from 1959 through 1965. This afforded him an excellent vantage point from which to follow all of the United States reactor projects. He is remembered as a hard working, sincere and fair chairman of this committee and as a chairman with very strong views.

Tommy's interest in reactor safety convinced him of the need for a book describing many of the technical topics on which safety depends. He persuaded the Atomic Energy Commission to establish a project to prepare such a book with him as chief editor and director, and he assembled a team of world renown co-authors. The authoritative work The Technology of Nuclear Reactor Safety produced by this group is complete evidence of Tommy's unique insight, knowledge and plain hard work. He sacrificed countless hours of family life and leisure time to make this a valuable part of the permanent literature.

In 1964 the Atomic Energy Commission recognized Tommy's contributions by granting him the Ernest O. Lawrence Memorial Award with a citation for leadership in developing safe, useful and economic nuclear reactors and for inspired teaching of nuclear engineers.

Tommy's knowledge of reactor safety gave him an appreciation of both the hazard potential of nuclear reactors and the protection obtainable from sound engineering. He was, therefore, an exceptionally effective speaker in refuting the exaggerated concern of the public opponents of nuclear power plants. In his public appearances his sincerity and dedication spoke eloquently for him.

In 1965 Tommy resigned from the Advisory Committee on Reactor Safeguards and decided to concentrate: on teaching, on a book on reactor safety, on public information and on upgrading the design of the MIT reactor. He conceived a way to modify the core of the MIT reactor so that its useful flux of thermal neutrons could be tripled without the need for increasing its power. His associates at MIT have completed the engineering of his ideas and just one week before Tommy's death requested permission from the AEC to modify the reactor to implement Tommy's redesign concept.

In 1969 Tommy received the highest tribute to his talents and wisdom. President Nixon invited him to serve as a member of the U. S. Atomic Energy Commission. Tommy's experience made him an ideal choice for this position. He was familiar with accelerators from Berkeley, with nuclear weapons from Los Alamos, with research reactors and education from MIT, with nuclear power from consulting, and with reactor safety from his committee work and writing. As Commissioner he worked indefatigably and effectively. His entire previous career fitted him admirably for this most responsible assignment of his entire life.

Tommy was a truly great engineer, broadly and deeply informed with unerring intuition and sound engineering judgment; however, what stands as even greater in my thoughts are Tommy's feelings and genuine interest in his fellow men. There are countless examples which have convinced me of Tommy's humane qualities. Instead of telling you in general about these examples, I felt it more appropriate to share with you my personal experiences with Tommy. I believe they are typical of the man.

I met Tommy in 1955 when he first came to MIT and I was a graduate student in electrical engineering. I had the fortitude to express to Tommy a vague and indeed naive interest in the relation between electrical engineering control concepts and reactor dynamics. That was enough for Tommy. For the next few years he was working on me trying to convince me that my future was not in high voltage vacuum breakdown, the topic of my doctoral research, but in reactor dynamics. He succeeded as in all his efforts and I am very grateful that he did so.

Tommy was not satisfied with his first success. He also wanted to help me establish my professional activities outside our ivory tower and in the real world. He got his first opportunity when Art Wasserman, one of his graduate students, decided to do his doctoral research at the SPERT Project out here in Idaho Falls. Tommy suggested to Warren Nyer, who then was in charge of the SPERT Project, that I also should participate in Wasserman's efforts and in fact that I should do more so than even Tommy himself. This selfless gesture so characteristic of Tommy's approach to his relations with his friends has been an important landmark in my career. My association with the Phillips Petroleum Company lasted for many years and was one of my most rewarding professional experiences.

Tommy - I am very grateful to you.

Tommy was also concerned about my becoming involved in the affairs of the American Nuclear Society. For this reason he was constantly seeking the opportunity to introduce me to the activities of the society. He succeeded in 1959 when upon his recommendation I became a member of the program committee. This also has been a rewarding experience in my career and I am thankful to Tommy for it. Of course, I must say that the experience would have been even greater if my long association with the program committee did not end up in my being called "Elias-turned-down-my-paper" by many of my friends.

I am also grateful to Tommy because he literally saved my life. In 1961 practically the same group that organized the meeting today had organized a meeting on reactor kinetics in Sun Valley, Idaho. Tommy and I were among the participants. Unfortunately, I developed some difficulties with an abscess tooth. I think I remember that Deslonde deBoisblanc and Herb Kouts took me to a dentist in Ketchum, Idaho. The dentist worked on me but upon returning to Sun Valley I was more miserable than before going to Ketchum. Tommy became aware of my difficulties and immediately

insisted that I retire to my hotel room. Tommy then started visiting with me every 15 to 30 minutes. He would abandon whatever he was doing and he would come to the room to see whether I needed anything and whether there was something he could do to relieve my pain. I am grateful he did so because during the end visit he found me unconscious with a blood infection and he literally had to carry me to the Sun Valley hospital in his arms.

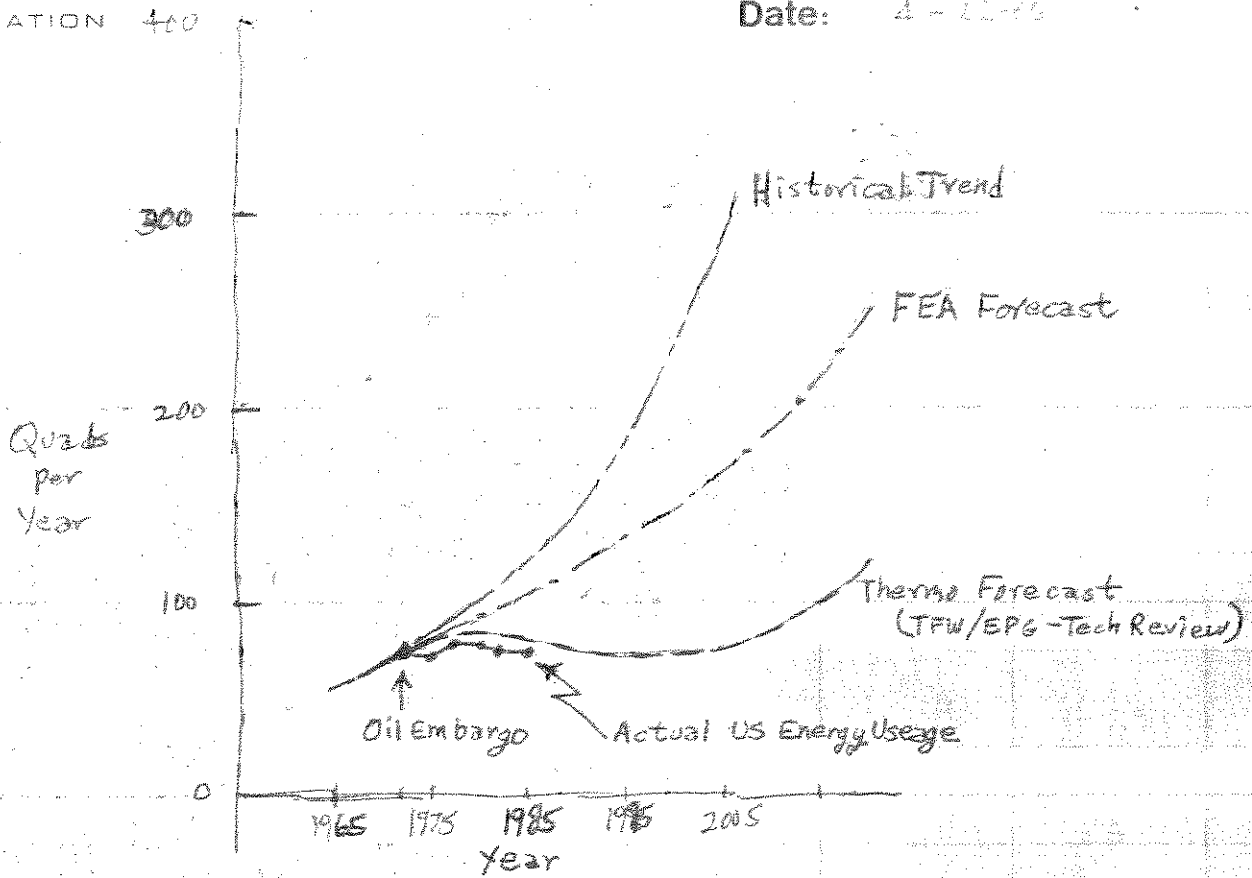
I would not like to leave the impression that Tommy's concern about his fellow man is that of giving a helping hand to a young fellow starting his career. His concern was a lasting one. Over a year ago Tommy and I were flying to Boston from Washington. He asked me what kind of work I was doing. I responded and I also told him that I was in need to talk with some knowledgeable but also some extremely thoughtful physicists. His reaction was decisive and immediate. He offered to give me the auspices of his office at the Atomic Energy and ask a couple of physicists that he knew to assist me and to comment on my work.

I have many more examples that speak eloquently of Tommy's kindness and concern for his friends. I will not burden you with those however. On the other hand, lest you get the feeling that Tommy was always successful in his efforts I must tell you at least one initiative which produced no tangible results.

For many years while I knew Tommy I was a bachelor. Tommy was very much concerned about that too. He was convinced that I should not be neglecting that aspect of my life and neither should he. He was telling me that I should be dating young ladies and more specifically that I should have a date in whatever city I happened to be. Well, sometime in the early 1960's we both were in Idaho Falls staying at the Flamingo Motel. During the day while we were working at the site Tommy mentioned that he had spotted a beautiful waitress at the Flamingo and that I should have a date with her. I told him that it was not as easy as he thought but Tommy disregarded all my arguments. He had already a plan and he was determined to put it into effect and have me go out with the pretty young lady that same evening. He never told me what the details of his plan were. I regret to inform you however even after so many years that his plan failed miserably and I never had a date in Idaho Falls.

Tommy was a wonderful colleague and a wonderful man. Now because of an ill-fated accident Tommy is not between us any more. I hope the principles he stood for, the example he set with his working habits and the dedication he practiced to whatever he was doing will live long beyond him.

Thank you.



Actual US Demand (Quads)

73	-	74.3
74	-	72.5
75	-	70.5
76	-	74.7
77	-	76.3
78	-	78.6
79	-	78.9
80	-	76.0
81	-	74.0
82	-	70.8
83	-	70.5
84	-	74.1
85	-	73.8