M&CD-03, A Century in Review, A Century Anew
Sponsored by ANS M&C, RP&S, Local Chapter, and RSICC
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RSICC'S 40TH ANNIVERSARY
REMINISCENCES OF AN OCTOGENARIAN

April 8, 2003, Betty F. Maskewitz

I am honored to greet you on this, the 40th Anniversary of a technical institute which I was privileged to serve for many happy years. I'm filled with pride in its continuation as a national asset to its sponsors and to the international nuclear community. I salute the dedicated staff for continuing progress, while never swerving from the principles on which RSIC was founded.

I have two tasks this evening: a) Indulge in some reminiscences – and b) to introduce our scientist-friend, a supporter of good science.

Background of BFM in the Nuclear Industry

What was my pathway to RSIC?

My 'computer life' began in WW-II with punched cards, wired boards, 1940's technology!

51 years ago (1952), I was hired by ORGDP as a "computer," in support of engineering design & analysis of the K-25, Portsmouth, OH and Paducah, KY plants. Using Frieden and Marchant machines, slide rules, and graphical solutions, a bank of "computers" supported the local engineers. Three of those "computers" are here with us tonight.

With the coming of the IBM series of computers, I became a "programmer" for ORNL reactor physics and shielding research groups. We formed a "Nuclear Codes Group" to implement and use large, machine language, computer codes - early kernel integration, moments methods, and 1-D discrete ordinates. When our problems exceeded the capacity of local computers, Elliot Whitesides and I spent many weekends commuting to use the NYU/Courant computer.

I had a comfortable, routine job, but longed for new challenges.

The IAC Concept – RSIC is Born

I became aware of the 1962 President's Science Advisory Report (PSAC) on Science, Government and Information, in which the IAC was suggested as a possible solution to the scientific information explosion. I learned that ORNL's Everitt Blizard, in the interest of preserving technology developed in cancelled Aircraft Nuclear Propulsion (ANP) programs, proposed that he test the concept within his Neutron Physics Division. Thus, RSIC, with the support of the AEC Reactor Physics Division (Ira Zartman & Phil Hemmig), was born in November 1962. Physicists Keith Penny and David Trubey were chosen to initiate the effort. With Peggy Emmett as programmer, they developed the SARIS system for literature in shielding research.

A "light" came on for me! After all, computing technology is "information." It badly needed evaluation, standards and improvements. It should be an integral part of the new IAC.

On January 22, 1963 – I spent the day indecisive – selecting representative exhibits of my current work – building a folder, essentially a resume'. In the early evening, I telephoned a well-known ORNL mathematician and asked to see him immediately. Puzzled, he invited me to his home. When he opened the door, I exclaimed, "I'm 45 years old today. I've had two martinis to give me courage – I've come to ask you to help me decide if there are any new challenges available to me – or, if I should settle down – be a vegetable – and get my 'kicks' elsewhere!" Upon recovering from my outburst, he agreed to circulate the packet within informal channels.

Blizard requested an interview – and within a short time, I entered RSIC as Computer Codes Coordinator. After a crash course in 'shielding' in which leading R&D groups were identified – I took off, and didn't stop for many years of tremendous job satisfaction!

Alvin Weinberg, unwittingly perhaps, and Everitt Blizard offered challenges for the most productive 30 years of my life (1963-1993).

Early ANS/M&C Division Conferences – ANS Support – Back to the Present

I became aware of the ANS/M&C division through membership in the informal Nuclear Codes Group formed in 1956 to promote standards in computer programming and documentation. It was later formalized as ANS-10 – with RSIC participation over the years.

The First ANS/M&CD Topical Meeting entitled "Application of Computing Methods to Reactor Problems," was convened at Argonne May 17-19, 1965 with Margaret Butler as General Chairman. The European Nuclear Agency (ENEA) was a sponsor. The conference was patterned after an IAEA 1960 seminar held in Vienna on "Codes for Reactor Computations". The published proceedings (ANL-7050) included papers entitled "Activities of the ANL-ENEA Computer Program Libraries and the ORNL Radiation Shielding Information Center" presented by Butler for the Argonne Code Center, Johnny Rosen of ENEA/CPL, and Betty Maskewitz of ORNL/RSIC.

I cite the following historic M&C topical meetings.

The 2nd meeting was convened in Mexico City (Report in 3 vols. CMM-R-2) in 1967 - the topic "International Conference on the Utilization of Research Reactors and Reactor Mathematics and Computation."

The third biennial M&CD topical entitled "The Effective Use of Computers in the Nuclear Industry" was convened in Knoxville, University of Tennessee April 21-23, 1969 with the RSIC Director as General Chairman. Luncheon sessions included addresses by AEC/RP Branch managers and by ORNL Director, Alvin Weinberg.

I was proud to be adopted as the 1969 ANS M&C Division's "Yiddische Mama – No. I."

Other ANS Technical Divisions Supporting RSIC

I speak in praise of the American Nuclear Society – in which RSIC became embedded in associated technical divisions, in ANS Standards activities, and in International activities. The Society provided a forum in which we met to exchange information and to promote standards in all our technical fields. National leaders were always helpful to RSIC, particularly in relation to international affairs – and we, in turn, supported ANS aspirations.

We were involved at an early stage in the reactor physics and shielding (ICRPSD) series of international conferences. RSIC convened the 5th in Knoxville April 18-23, 1977 with David Trubey as General Chairman. You may have seen the photos of participants shown here and recognize colleagues with youthful faces. The Hyatt Regency Hotel displayed the flags of each nation represented at the conference, a total of 23, including Eastern Bloc countries, Middle-and-Far-East, and the USSR. It was an impressive show.

The 1983 ICRPSD was hosted by Japan (Asaoka of JAERI, Chairman). The 20th RSIC Anniversary was celebrated in Tokyo. It was a gala affair, hosted by JAERI Director Ishakawa, whom I first met as a reactor physicist participant in the RSIC-ENEA -SW on O5R in 1966. The RSIC 20th Anniversary Issue (June 1983, No.223) is available on the RSICC Web Site.

My last direct connection was with the 7th - hosted by UKAEA. I'm told that the ICRPSD series is now biennial, and that the 12th was convened in Albuquerque in 2002. Long may they continue!

RSIC International from the Beginning

Recognizing that radiation does not recognize political boundaries, RSIC interacted internationally - from it's beginning - with the blessings of our government sponsors. We worked diligently to keep computing technology free from security concerns and did not distribute restricted application data – thus keeping RSIC products in the open public domain.

Working under existing USAEC International Agreements (OECD/ENEA, IAEA and ICSU/CODATA), we continually lobbied to keep RSIC free from restrictions to exchange. There were some difficulties – not insurmountable! As time passed, we were encouraged to "open windows" between nuclear research scientists living in different political environments and their counterparts in the USA. Success is exemplified in M&CD-03 and similar conferences.

The USSR? Exchange was far from easy!

While consulting with European "shielders," as guest of ENEA/CPL in 1969, I was asked by the AEC to investigate exchange with our counterparts in the Soviet Union. RSIC policy required an invitation from an interested host for foreign visits. I knew no 'interested colleagues' in the USSR. Don't ask me how I got the invitation! I got lots of help from RSIC friends in the European agencies.

An official invitation came from the USSR Atomic Energy Establishment in Moscow. It was open-ended, time set, mission not defined. It took me first to the Joint Research Institute at Dubna - to apparently 'look me over'. What was the mission of an American - a woman - traveling alone in the USSR?

My first contact was a young mathematician-programmer. He took me directly, into a large, dimly lit office filled with seated silent men, to meet the Director of Foreign Affairs. I was introduced only to the director, and was seated in a chair with my back to the audience. The opening question was startling: "Mrs. Moskovich, What is your purpose in coming here?" I silently panicked - asking myself "Why am I here?" I was reminded of an old saying, "Fools rush in where angels fear to tread."

I haltingly stumbled through "I have come to investigate the possibility of "opening windows" between Soviet and American nuclear scientists – to encourage information exchange in areas of radiation protection and shielding – with the hope that through the process, scientist to

scientist - we can, together, advance the cause of Peace!" The burst of applause from the 'silent' audience made my 'hair stand on end'.

I had found the key – Peace! The way was open – I was taken to the Institute of Physics & Power Engineering (IPPE) at Obninsk, Kaluga Region, where fast reactor shielding research was sited – and made some fast friends and colleagues. The AEC had an 'exchange' route, and several fast reactor research specialist groups met in the USSR and in the USA in ensuing years. RSIC continued communications – and managed to assist a few Soviet colleagues to attend and give papers in ANS topical meetings. Today, Obninsk and Oak Ridge are "Sister Cities."

I did not return to the USSR until after the Chernobyl accident. Many Americans offered help after the accident and were welcomed in the USSR.

In October 1986, I was asked to organize and lead an ANS group of nuclear power members on a People-to-People mission to the Eastern Bloc to meet with nuclear scientists – certainly the first of its kind. It was made possible through RSIC connections. We were received in Kurchatov in a televised session on safety matters related to the Chernobyl disaster, and then toured their fission and fusion research facilities. We met with many Eastern Bloc scientists. It was only in Hungary, however, that the group was able to spend a day freely inspecting an operating nuclear power plant – the PAKS.

In transit through Moscow from Latvia to Bulgaria in 1989, I had a fast consultation in the backseat of a car as I was taken from the domestic to the international USSR airline terminals. Dr. Tatiana Germogenova of Keldysh Institute of Applied Mathematics (KIAM) asked for help to open communication with American scientists with similar technical interests. She gave me publications for review and a formal letter of invitation to return to Moscow, as the guest of KIAM, to discuss ideas for personnel exchange.

And this brings me back to the ANS/M&C. I asked Paul Nelson of Texas A&M, the 1989 Chairman to accompany me as KIAM's guest. We attended the Annual USSR/NESU-90 conference, which reviewed all nuclear programs related to safety, and held discussions with KIAM and other institutions. The rest is history. Several of you participated in the Texas Specialists Workshop on numerical transport theory in 1991 – and attended the International Symposium on Numerical Transport Theory held in Moscow in 1992. The proceedings were published in the 1992 Issue of Transport Theory and Statistical Physics, under sponsorship of US/NSF and the USSR Academy of Sciences.

I was privileged to be an ANS delegate to the first meeting of the Russian Nuclear Society – afterwards visited colleagues in Russian research institutions – without my former KGB escorts.

CHINA

China was known as a "nuclear weapons" State, developed initially in collaboration with the USSR. Many Chinese were graduates of European and Soviet universities prior to the Cultural Revolution. The government attempted to protect the research institutes but a generation of potential nuclear engineers was lost during that period. With dreams for using nuclear energy to serve the Chinese people, the old guard turned to research for food production, nuclear power, and other needed pursuits.

ANS leaders were always interested in forming societies within nuclear states, and their focus was on China in the early 1980s. Octave Du Temple arranged an invitation for an RSIC

orientation visit to the China Institute of Atomic Energy (IAE) in 1983. The IAE Director brought together technical representatives from China's nuclear research institutes. We had an intensive review of their current state of the art in radiation transport and in China's computing capability. We ended with RSIC agreeing to recommend computing technology that could be used on their computers ~ CDC-1604 vintage. Our government, seeing exchange in its political interest – gave export approval for the recommended package of materials. RSIC visits to many Chinese research institutes were frequent through the '80s and early '90s – and much progress was noted each visit.

Exchange continued through the Chinese Codes and Data Centers established within IAE.

RSIC Highlights – Remembered Through the Years – I cite the following:

The acceptance of computing technology as scientific information – the "Open" code package as a viable concept for advancing the state-of-the-art. I am not surprised at its emergence as a major component of RSIC – and the expanded role, resulting in an additional "C" to the name!

RSIC accepted as a unifying force within its user/contributing community – and embedded in the programs of its financial sponsors. The RSIC Newsletter, a main contributor to this unity.

The Seminar Workshops, initiated in 1965 with Monte Carlo/O5R here and in ENEA, through which the state of the art is evaluated and advanced. Many SW's followed as standard operating practices. The RSIC newsletters serve as media channel.

CSEWG,- centered at BNL, Hank Honeck's dream of credible cross section data. RSIC was present at its initiation and always supported, promoted, tested, and used the end results.

This M&C topical and its predecessors and those of ICRP&S indicate that the state of the art continually advances – hopefully, RSICC is always at the center.

A dedicated staff, committed to service, continuing to bring RSIC processes forward into modern computing technology and electronic transmission and networking – a current necessity.

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40 Years of continuous service! I stand in awe of all those who made it possible.

I am pleased to note the presence here of original staff, now in Emeriti status: Henrietta Hendrickson and Jane Gurney Teasley (colleagues since 1952) and Juanita Brown Wright. These, along with Hemma Comolander, were the first to join the Codes Group, and deserve much credit for its success.

You've suffered through the unorganized reminiscences – remember, I am an Octogenarian!

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I now turn to the key event of the evening. I am told that "The more important and well-known the keynote speaker – the shorter the introduction."

Dr. Alvin M. Weinberg also entered the nuclear world in December 1942 as a "Computer" on the team of scientists working on the "Pile", a secret experiment conducted in the Squash Court, under the West Stand of the of the Chicago University Football Stadium. While Wigner, Fermi, Compton, Anderson, Wylie and others were seeking to control chain reaction in the nuclear

experiment, Alvin sat in the attic calculating ‘criticality’ on an electronic hand computer. Compton phoned success of the secret experiment to sponsors as “We have arrived in the New World – and the natives are friendly!”

Science profited when Alvin relinquished his “computer” role to head the ORNL Reactor Physics Division, and to follow Eugene Wigner as ORNL Director. Under his management, research at ORNL flourished. We always saw him as “Scientist-Scholar” in those exciting years – and sorely missed him when he went on to serve other scientific spheres. He established and led the Institute of Energy Analysis in the ORAU – was consulted on energy matters nationally and internationally – and was always available as a speaker within and outside the nuclear community.

He speaks tonight on the subject, <u>On “Immortal Reactors.”</u>

Please welcome my friend and yours, distinguished scientist, Dr. Alvin M. Weinberg.