

## Foreword

This is the 15<sup>th</sup> report of the activities of the NIST Center for Neutron Research (NCNR) for which I have written an introduction, following the retirement of Dr. Robert S. Carter (who wrote all of the preceding introductions). It is particularly appropriate to note this milestone this year for two reasons. First, because Bob Carter, Carl Muehlhause, and Harry Landon, the designers of the NIST reactor, are being recognized this year by having their pictures hung in the NIST Portrait Gallery for their contributions to NBS/NIST. This is an honor well deserved, and we are hoping that they will all return in September for the ceremony. Second, this will be my last such introduction, as I intend to retire as Director before the next one is written. Therefore, I will not limit my remarks to this year's accomplishments only, but try to summarize my thoughts after 15 years as Director, and 31 years at NIST.

The source designed and guided through its formative years by Carter, Muehlhause, and Landon has been a tremendous success, providing remarkably cost-effective service to NIST and the nation. Its design has proved its worth over and over, as the focus of the program has shifted over the years from being primarily for local nuclear physics, irradiations for analytical chemistry, and neutron diffraction to in-house and collaborative thermal neutron scattering involving a broader community, to its present role as the major national center for thermal and cold neutron research, with a full suite of scattering instruments, an active analytical chemistry effort serving national as well as local needs, and a thriving program in neutron physics. With this continuing growth, expansion and transformation in our research and measurement activities, the need for predictable, dependable operation has increased greatly. It is a tribute to all of the people involved that the challenge has been met with only a moderate increase in cost and staff, in spite of increasing regulatory requirements, and an increase in power from 10 to 20 MW in 1985. For many years, as Chief of Reactor

Operations and Engineering, Tawfik Raby set the highest standards for safe, reliable, and economical reactor operations, and his successor, Seymour Weiss, has continued in this tradition. Many of our most senior operators have retired or will in the next few years, but we have managed to hire outstanding young people to carry on. By the end of this year, we will apply for a license renewal for an additional 20 years of operation, and I am confident that it will be approved, and that the reactor will continue to serve NIST and the nation for the foreseeable future.

While the reactor has provided the constant source of neutrons required for success, the instrumentation around it has been continually improved and updated. When I first arrived at NIST in 1973, I worked with Jack Rush, Sam Trevino and Hank Prask to develop our first triple axis spectrometer (an instrument that has been modified and updated regularly, and for which the last "original" part should disappear in the next two years). (Incidentally, it was during the design of this instrument, which was done in part at Ames Laboratory, that I first met my wife Nancy Chesser, who was then a staff member at Ames.) This year alone, we have begun the installation of a next-generation doubly focusing thermal neutron triple axis spectrometer which will have unprecedented intensities and flexibility; installed a new cold neutron reflectometer/diffractometer as part of Cold Neutrons for Biology and Technology initiative; and commissioned a new facility for radiography that has been used to study operating fuel cells. We are also well into the detailed design of a new cold neutron double-focusing triple axis spectrometer, MACS, in partnership with The Johns Hopkins University. We are now on our third cold neutron source, which incorporates the experiences from the first D<sub>2</sub>O ice source installed in 1985 and the first liquid hydrogen source. This source operates totally reliably, and achieved a 100 % availability (ready to run when the reactor is) this year. The pace of instrumentation development has accelerated continuously during my time here, to encompass ideas that we never considered even 15 years ago. For this I am

grateful to the many people who have worked so hard over the years — far too many to acknowledge here, but I would be remiss if I did not mention Ivan Schroder and his engineering colleagues, who have solved so many “impossible” engineering problems, and Bob Williams and more recently, George Baltic, and their technical team, who put into practice on the floor what we dreamt up in our offices. And Pat Gallagher has led the transition from the somewhat anarchic Cold Neutron Project to the Research Facility Operations Group, a fully functioning group that serves the user mission of the NCNR extraordinarily well.

Last, but far from least, the science group has grown from the 9 regular staff members that it had when I arrived to over 30 NIST employees and 36 long-term guest researchers. At the same time, the mission and focus of the group has evolved, with added responsibilities for instrument development, support for user operations, new research areas in soft matter, and many new interactions with the rest of NIST and with 200 outside organizations. Throughout my 31 years, Jack Rush, my good friend and colleague, has guided the fortunes of the research group with a sure and steady hand, ever alert to new opportunities, to good science, and to good people. As I have read through this year’s science reports, and through earlier years, I have been struck by the continuing high quality of the research, even as the scientific emphasis has changed, the techniques have developed, and our mode of operation has been totally transformed. One of the greatest pleasures of this job has been the opportunity to walk through the facility to meet and learn from the intelligent and dedicated people who do the research. Young and not so young, they give me a high level of optimism for the future

because of their infectious enjoyment of their activities (it seems wrong to call something so enjoyable work!). As always, the science highlights that form the bulk of this report are the final indicator of what we have done in the past year. I hope that you enjoy reading them as much as I did.

So, in closing, I thank everyone who has been part of my life here — I hope that what we have accomplished together over the years is a source of pride to you, as it is to me. I look forward to seeing the continual progress of the NCNR, for which the best is yet to come.



A handwritten signature in blue ink that reads "Mike Lawe". The signature is written in a cursive, flowing style.