

Anecdotal Autobiography on Harwell days by Peter Schofield

Materials Physics Division

After twenty years in Theoretical Physics Division, in 1976 I moved to Materials Physics Division. Here I took the title *Coordinator of Neutron Scattering*. This title was suggested by my National Service days when anyone who appeared to be standing around doing nothing, when challenged, would say he was 'coordinating'. The move was part of a reorganisation in which Mick Lomer head of MPD had moved to the Directorate and was replaced by Vic Crocker. It was a time when increasing pressure was put on the AEA to take on more commercial work for Industry, epitomised by Walter Marshall's edict that the quality of the research would no longer be the sole criterion for undertaking it. This eventually led to the demise of Harwell as a serious research institute.

It was also the zenith of the SRC-AEA Joint Research Programme, which started around 1970 and ran until about 1985. This had been devised by Mick Lomer and Bill Mitchell as a means of allowing university scientists access to the neutron beam research facilities at Harwell and at Aldermarston. This entailed SRC paying in full for half the neutron beam time for their own use, and paying a further quarter for joint research programmes of university and AEA workers. The remaining quarter was used on AEA programmes. In addition, both parties collaborated on instrumental development as well as SRC building its own instruments.

The extremely successful Joint Programme became the prototype for the ILL and other Institutes. For many years, it was renewed each year in a short formulaic meeting between the parties, Lomer for AEA and Leo Hobbis for SRC. I grew to have enormous respect for Lomer's management style and his insights: 'never set objectives until you have achieved them', 'circumvent obstacles rather than confront them'. Of Walter Marshall, he said 'his problem is that he will play chess when everyone else is playing poker' When Ken Henry took over from his predecessor as Head of Reactor Division another naval man: 'Henry runs the Division like a yacht while his predecessor ran it as a submarine'.

The day I joined MPD in 1976 was the day on which it was announced that the SRC was proposing to build a neutron spallation source at the Rutherford Appleton Laboratory to save the jobs of the accelerator scientists made redundant by the closure of the high-energy research programme.

So, I started my new job with the twin threats of the pressure to staff commercial research projects at Harwell and the expanding Non-Destructive Testing Centre under Roy Sharpe, and the pressure on SRC funding of the Joint Programme.

When I took over, there were three Groups involved in neutron beam research - Diffraction under Terry Willis, Inelastic Scattering under Ray Lowde, based in Building 521 and Pulsed Neutron Research under Colin Windsor in Building 418, using the existing 70 Mev Linac with its replacement, the jointly funded 135 Mev Linac being built by Eric Lynn and Mike Coates in Nuclear Physics Division. In the Diffraction Group were Alan Wedgewood, already in transition to non-destructive testing work, the brilliant but temperamental Mike Thomas, and David Worcester pioneering the study of biological systems with small-angle scattering. Ray Lowde and Mike Hutchings were the prime exploiters of triple-axis spectrometry. Michael Stringfellow had already left the Group for commercial work. In Colin Windsor's Group was the ever-reliable Roger Sinclair. Under construction were two small-angle scattering position sensitive detectors, one for Harwell and one for Aldermarston. The Harwell project was not being properly managed and one of my first decisions was to ask Ian Page to take charge of this.

Page's other activity deserves mention. In the days of the Shah, attempts were underway to develop nuclear relations with Persia. Indeed Walter Marshall encouraged all to work closely with Persian scientists and to drum up commercial business. Ian Page spent a period of time in Persia. To this end master's students were being trained in the UK and the AEA was building a research reactor in Teheran. Following the euphoria of the first nuclear power reactors, several Institutes had set up Nuclear Engineering Departments to train engineers. These included Imperial College, Queen Mary College, Birmingham University, Guildford Poly (later Surrey University). However, it proved impossible to fill places with UK students, so places were filled with students from overseas, including Iran, as Persia became. Thus, it was that the UK became a training ground for the Iranian nuclear programme.

Among the students was an extremely attractive Master's student, dubbed 'The Princess' attached to Harwell, studying neutron radiography. In this she had the technical staff falling over themselves to help her. On one of Page's visits to Teheran she asked him if he would mind taking her brothers jeans, not mentioning she had four brothers. After the take-over by the Ayatollahs we became very concerned for her safety, not least because her husband was a senior naval officer. The first reassurance I received was when I had a letter from the Iranian delegate to the International Atomic Energy Agency in Vienna asking 'In the name of Allah etc. etc.' If I could recommend a source of gadolinium foil. Later she turned up at a conference in London where she was studying for a PhD at Imperial College, the only change being now wearing Muslim attire.

Returning to the Neutron Beam Programme, I have yet to mention Ron Dyer whose Group in MPD was responsible for all the engineering work and 'Rusty' Harris, helped by Doug Cummins, running the Joint Programme on Neutron Beam Research on the ground, scheduling the instruments and keeping the users happy. No small difficulty as smoothing over difficulties with the requirements of site security and the lax attitude of the university users, such as finding an Iranian and a Chinese cooperating unsupervised in the reactor. On one occasion, the police complained about students climbing over the fence to the Rutherford Laboratory as a short cut to using the gates provided to visit the canteen there for lunch. It turned out that one of the students was a distinguished emeritus professor. Rusty controlled his domain from the Building 436 tea-room, where all congregated for refreshment, Harwell scientists University visitors and, not least, the dedicated technicians, Vic Rainey, Les Bunce, Nick Hance, Arthur Baston, and others. Hance went on to make a career for himself in public relations, producing a history of Harwell that completely failed to mention the Joint Programme.

On taking over the neutron beam programme in 1976, I realised that firm action was needed for the scientific programme to respond to commercial pressures. Before I took over, Lomer had already asked Tony Hughes, then in Materials Development Division to look into this. The first thing I did was to produce a forward-looking report on 'A Programme of Neutron Beam Research' which was studied and endorsed by the Management. Each scientist was asked to write down his own ideas as to how neutrons could contribute to his own field of science. Especially valuable contributions were made by my own Group of

younger scientists, Chris Wright, Bruce Tofield, Andrew Allen and theoretician Colin Sayers.

To staff the programme, another wheeze of Lomer's was employed. This was the idea of 'flow-through'. This was to recruit the best post-doctoral students, who were at that time being trained in neutron scattering, either as short-term Harwell Fellows or to the permanent staff to be given a free hand to do their own thing before diverting them into other areas of Harwell's programmes.

Neutron Radiography

An area where considerable progress had already been made was in Neutron Radiography. Small silicon discs cut from large single crystals had each to be radiographed individually for quality. This programme run by Ron Parrish in the Non-Destructive Testing Centre brought in a steady income. On one occasion Walter Marshall brought round Lord Weinstock, then Chairman of GEC to see the neutron beam facilities to try to persuade him to invest in neutron beam research. Weinstock's reply was, holding one of the large single crystals, 'give me the name of the company which makes the machines which slice up the crystals and I will buy it'. Such was our difficulty!

The 10H beam on Dido extended outside the shell was installed to provide for a super-chopper spectrometer designed by Peter Egelstaff, following his experience at Chalk River. The spectrometer was never built owing to personal antagonism between Lomer and Egelstaff, which had led to Egelstaff's departure in 1970 to Guelph in Canada. This presented the challenge: what to do about 10H? The answer was in dynamic real-time neutron radiography. This led to an aero-engine being mounted in the beam and the flow of fuel visualised during start-up. This was undertaken by Stan Cocking. While this spectacular demonstration impressed many visitors, it did not lead to any commercial contracts. (Cocking's hobby was underwater filming. At his retirement party, he showed some of his films of sea creatures, most of them ugly. He said 'they look dangerous but you are told they are not dangerous and you believe they are not dangerous'. But do *they* know they are not dangerous?)

Neutron Beam Research Committee

The SRC use of the AEA neutron beams was controlled by their Neutron Beam Research Committee (NBRC) to which University users applied for beam-time on the instruments and support services. The chairman and members were chosen from the community of users and I sat on the NBRC as AEA observer. This was a very successful mode of operation which became the prototype for ILL and other user facilities and which has stood the test of time. Problems only arise when members of the relevant Steering Committee tried to interfere. One new member of the ILL Steering Committee just could not get his head round the fact that most experiments lasted only hours or days.

50 years of the neutron: Cambridge Conference 1982

In 1979 I succeeded Brian Fender as Chairman of the Neutron Scattering Group of the Institute of Physics. At a meeting of Group Chairmen to discuss future IOP conferences, I was able to point out that 1982 was the fiftieth anniversary of the discovery of the neutron by James Chadwick working in Cambridge and I was invited to organise a conference to mark this event. This became the Conference and Exhibition 'The Neutron and its Applications' jointly organised by IOP and Harwell. Cambridge was the obvious choice of venue and the dates chosen as the third week in September. (The contents of the Proceedings of this Conference may be found on

<http://neutronsources.org/files/theneutron1982cambridgeconference.pdf>)

Having lived in Cambridge for seven years I knew that it never rained in Cambridge in the third week in September. Had it done so on the first day it would have been a total disaster since the lecture theatres were dotted about all over the University. Plenary lectures were held in the Guildhall. In order to be comprehensive, we could not dodge the question of nuclear weapons. We therefore included a session on 'Nuclear Power and Nuclear Weapons'. Walter Marshall was invited to speak on the former and Sam Edwards on the latter. Lord Zuckerman was invited to chair the session. This caused me acute embarrassment. 'You have given too much time to Marshall. Cut him down to thirty minutes' he demanded. 'Why have you chosen Edwards. He knows nothing about nuclear weapons.' I explained that he was Chairman of a Committee devoted to the subject. 'That was set up by me. It was purely a white-washing job.' In the end both Richard Garvin and Sam Edwards talked on nuclear weapons. Edwards's point was that the main danger from nuclear weapons was not from

the great powers, but from smaller countries obtaining them – at that time a new thought.

Because of the controversial nature of the subject, we thought it prudent to alert the local police. In the event all passed off quietly, but someone who opened the wrong door in attempting to find the conference hall found a roomful of police in full riot gear.

The Exhibition put together by John Stubbings and the Harwell design centre, with help from John White and Colin Windsor, gave a comprehensive view of the neutron's history. A floor had to be strengthened to accommodate Brockhouse's first triple-axis spectrometer. A loan of the original Frisch-Peierls memorandum, alerting the Government to the possibility of an atomic bomb, was arranged. This remarkable document set out in two pages in March 1940 the entire case including the effects of radiation. Only missing were cost and manpower. This document remained in my office for some time, as I was unable to find out to whom to return it.

In the spring of 1979 I spent six weeks in Japan as Visiting Scientist. I was able to announce the proposed conference on arrival to find the Japanese were also planning to mark the event. This experience is recounted elsewhere. Suffice to say here that this was an action-packed event. On arrival I was presented with a detailed itinerary: 'Place for sleep. Title of lecture'.

Duties at ILL

Having fought a rear-guard action for Harwell's neutrons for some years and unhappy with management changes in MPD, I returned to Theoretical Physics Division in the mid-eighties; Mike Hutchings taking over the reducing neutron work until the reactors shut down in 1990. The experience of managing Harwell's neutrons put me in good stead to accept a second poisoned chalice as British Assistant Director from 1991 to 1994 at the Institut Laue-Langevin in Grenoble, fighting for survival with a broken-down reactor.

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