The Final Day of Neutron Beams from Harwell's Reactors and their Instrument Portfolio

On 31 March 1990 the two AERE Harwell Reactors, DIDO and PLUTO, were permanently shut down. Fig. 1 shows the final neutrons detected on the PLUTO triple axis instrument's monitor counter as the beam shut off, witnessed by Jon Goff, Pete Bowen and myself! This followed the reactor operation managers' announcements, first at DIDO, and then at PLUTO – *'PLUTO reactor shutting down'* (I can still hear it!), and put an end to a long history of pioneering neutron scattering at Harwell. The neutron beam work had always been supplementary to the main use of the reactors – irradiation and research reactor physics. Before the announcement, a few months before the shutdown, it had been anticipated that one principal user and sponsor would require DIDO to continue to operate, and plans were underway to transfer some instruments from PLUTO to DIDO. So it came as a surprise that without much warning both reactors would be closed down at the end of March. This presented the neutron beam programme with a clear problem, but as the Harwell programme of commercial and underlying research had already been partly carried out using other facilities, at ILL, Riso, Saclay and the rapidly developing ISIS source, it was continued in a reduced form using these facilities. As Head of Neutron Beam Studies as its UKAEA Project Co-ordination Officer and Business Centre Manager, I issued a brief 'press release' which is attached below as Appendix 1. Indeed the use of neutron beams by Harwell scientists continued in this way for over 15 years.

At shut down both reactors had a full suite of operational instruments, and it was decided to put these up for sale, along with the ancillary equipment. I therefore prepared the following list of the instruments at shutdown, in the form of a sales brochure which was widely circulated to all other operating reactors in the hope that some may wish to purchase an item. In the event only one Mark VI diffractometer went to KFKI Budapest, with some help from The British Council. The high temperature furnace was purchased by the University of Vienna. Nevertheless the sales brochure forms a historical picture of the Harwell instrument portfolio operating up to 1990, and gives examples of their use over previous years.

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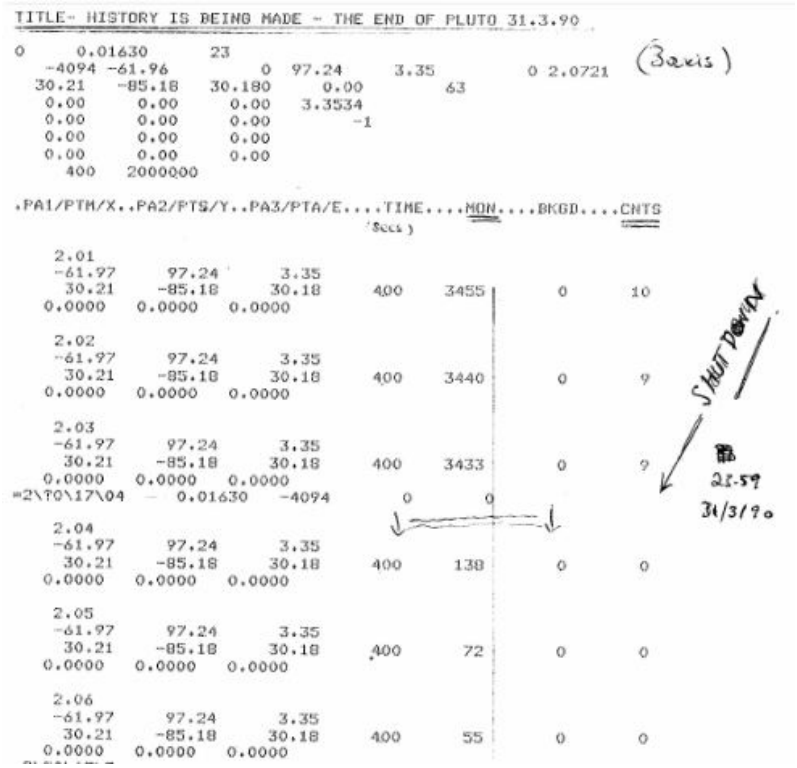
Figure 1. The monitor beam counter of the Pluto triple Axis spectrometer shows the very end of neutron scattering at Harwell.



Appendix 1. A contribution to the Press Release about the Harwell reactors shut down.

Technical Highlights DIDO and PLUTO Closure Press Release

Neutron Beams

In the early days of both reactors neutron beams from the horizontal ports were used by the pioneers of neutron scattering, physicists and metallurgists, to develop and refine their techniques for the study of materials of importance to the Nuclear Industry and to probe fundamental properties of the solid state, particularly with regard to magnetism. Early collaborative work with University workers led to the formal establishment of a "Joint Programme" for their use of the facilities in 1966, thus pioneering a trend now followed at most research reactors worldwide. Most of the current U.K. Neutron Scattering Community which now includes chemists, material scientists, engineers and biologists, have been trained using the two reactors through the Joint Programme. They view their closure with deep regret. So successful was the Programme that in order to deal with the increased demand, the SERC joined the Institut Laue-Langevin at Grenoble in 1973 as a third major partner, and set up its own excellent spallation source ISIS at the Rutherford Appleton Laboratory in 1985.

In 1970 Harwell were again pioneers in offering a neutron scattering service to paying Industrial customers. Neutron Radiography was a key component, and was developed to investigate active fuel assemblies, aircraft engine blades, and real time video pictures of moving components. At the end of the Joint Programme in 1983 commercial work became a more important feature of the use of the reactor's beams, and this development is also now being followed worldwide. As a result AEA Technology has been able to address a range of customer's materials problems concerning defective or complex structures in metals, porous media such as clays, reactor fuels, and glasses, and to measure stresses in welds and components, using techniques developed on Dido and Pluto. Stress measurement by neutron diffraction is now used at most reactors worldwide. We shall continue to offer customers our service in neutron scattering by renting facilities on available neutron sources in the UK and Europe.

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