IN CONFIDENCE

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SCIENCE RESEARCH COUNCIL

HIGH POWERED LASER FACILITY

Memorandum by the Chairman of the Science Board and the Director, Rutherford Laboratory

1. Introduction

At its meeting on 30 May 1974 the Science Board considered a report (SB 30/74) from its Physics Committee which made a case for the establishment of a central facility of high-powered lasers for the use of University groups. The report appears as Appendix I of this paper. The Board expressed its strong support of the proposal and agreed that it would wish to submit to Council a bid for funds for the establishment of such a facility. The Board also instructed the Office to seek the collaboration of the Rutherford Laboratory in looking more closely into the resources that would be needed to carry out such a project, taking into account the possibility of collaboration with AERE.

2. The Scientific Programme

The detailed scientific programme has been set out in SB 30/74. High-power neodymium-glass and CO_2 lasers are proposed to meet the scientific objectives which are envisaged. At least ten SRC supported university groups are currently working with lasers, and these would become active participants in the realisation and use of the new facility.

Independently of the proposals to the Science Board, a study group in the Atomic Energy Authority Research Group has proposed a high-powered laser facility for compression studies; this proposal is currently being considered by AEA management. The two proposals have much in common, both in the basic installations and in their scientific justifications although, naturally, there are differences in emphasis.

The complementary nature of the two proposals suggests that the provision of a high-powered laser facility as an AEA-SRC collaborative programme should be considered seriously.

3. Costs

Detailed costings for the facility have not yet been prepared. Both the Science Board and the AEA proposals include estimates based on the major capital costs of lasers and building and the likely operating costs including staff costs. Although different equipment is specified in the two proposals, as at present formulated, the figures quoted give some indication of the scale of the project. Rather more than half the cost over the first two years of the project would be for the provision of lasers, some of which are commercially available.

The AEA proposal contains an estimate of £5.6 million for a three-year programme. For a roughly comparable five-year programme with more energetic lasers the Science Board paper gives an estimate of £6.2 million.

4. Possible Security Implications

The AEA have drawn attention to classified topics associated with the high-powered laser facility. Alongside the classified studies, a large region of new physics of a fundamental nature would become accessible with the provision of the facility. Much of this work would not be classified and university scientists should be able to participate freely in this research. However, the classified nature of some of the theoretical and experimental investigations that are likely to be undertaken suggests that the high-powered laser facility would have to be situated in an establishment where security could be ensured.

Thus, in embarking on a programme centred on a high-powered laser facility, the Council may not be able to avoid becoming involved in some work of a classified nature, in which case university groups using a joint facility will find themselves constrained by the provisions of the Officials Secrets Acts. In this event, collaboration with the AEA would be an essential feature of the programme.

5. A Possible Scheme for Council Involvement

One method of working would be for a joint AEA-SRC team to construct and operate a facility on the HARWELL/CHILTON site. If necessary, the security arrangements already operative on the Harwell site of the AEA could be extended to include the facility and the AEA could be responsible for all security aspects of work at the facility. The construction and operation of the facility would be controlled by a joint AEA-SRC steering Committee which would be responsible for its subsequent scientific programme. Construction and operating costs would

be shared. This scheme of Council participation is based on the assumptions of comparable utilisation and roughly equal partnership with the AEA. If close examination of the likely programmes indicates a significant imbalance in the interests then the scheme could be adjusted accordingly.

The Science Board is however anxious that whatever arrangements are made should properly reflect the needs of academic research workers who have been funded from the SRC and the initiative which they have taken in developing this new field.

The activities of university users could be supported by a Laser Research Unit set up at the Rutherford Laboratory. The mode of operation of the Unit could be similar to that of the Council's Neutron Beam Research Unit.

6. Recommendations

In order to appraise the resources required to operate the proposed facility, and to prepare the ground for UK establishment, it would be necessary to spend up to £20000 at the Rutherford Laboratory on a preliminary study, in consultation with appropriate university scientists and the AEA. The possibilities for collaboration with the AEA and the security implications would be examined closely. An important aspect would be the assessment of the relative interests of the AEA and SRC in using the facility, since this would influence the arrangements for collaboration and the costs to the SRC.

We would propose to report back not later than December 1974, and to make recommendations then on how Council might proceed with the project.

7. The Council are INVITED

i) to approve in principle the provision of high powered laser facilities on the scale indicated in Appendix I, subject to the availability of funds and provided that appropriate arrangements can be made with AEA;

ii) to approve the proposals for expenditure on the preliminary study set out in section 6 above.