NI (60) Second Meeting

NATIONAL INSTITUTE FOR RESEARCH IN NUCLEAR SCIENCE

GOVERNING BOARD

Minutes of the meeting held at the Rutherford High Energy Laboratory on Monday 20th June, 1960.

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Present:

Lord Bridges (in the Chair)
Dr. R. Aitken
Professor P. M. S. Blackett
Sir John Cockcroft
Sir Alan Hitchman
Sir Harrie Massey
Sir Harry Melville
Professor N. F. Mott
Professor R. E. Peierls
Sir William Penney
Dr. B. F. J. Schonland
Professor D. H. Wilkinson
Dr. T. G. Pickavance
Dr. J. A. V. Willis (Secretary)

Apologies for absence were received from Professor Brambell, Sir William Hodge, Sir James Mountford and Sir Keith Murray.

The Chairman expressed the congratulations of the Institute to Dr. Aitken and Dr. Schonland on their knighthoods announced in the Birthday honours list.

1. Minutes of the last meeting

The Board approved the minutes of their first meeting of 1960, held on the 10th of March.

The Chairman said that no further progress had been made with the possible Institute site referred to in minute 7. Plans for further accelerators did not yet appear to be sufficiently definite to warrant a specific bid for the land.

The Chairman said that the Treasury had suggested that the Institute ought to charge Oxford University for the assistance with accelerator design approved at the last meeting (minute 9). The Secretary reported that arguments against making such a charge had been put to the Treasury: principally the argument that the services of the Institute accelerator design staff constituted one of the facilities which the Institute was set up to provide. The Board confirmed that in their view a charge would be inappropriate.

2. Progress at the Rutherford Laboratory

Dr. Pickavance said that he was glad that on this occasion members had come to the Laboratory and could see some of the progress for themselves. He therefore gave a rather shorter verbal report than usual.

Dealing first with the P.L.A., Dr. Pickavance said that it was now running at 30 MeV, for nuclear physics research and would run at 50 MeV later in the year. Of 46 graduate research workers using the machine, 4 were from the Rutherford Laboratory, 6 from the A.E.R.E. and 36 from Universities.

The construction of Nimrod was proceeding satisfactorily. A quarter of the magnet coils were delivered. The design of the alternator foundation block was complete and construction was in hand. The injector vacuum vessel was installed. The liner was very satisfactory and was due for delivery soon. The drift tubes were in manufacture. The prototype section of outer vacuum vessel for Nimrod was being made. Difficulties were still being met over air inclusions and over dimensional inaccuracies, but the reason for making the prototype was to overcome such difficulties.

On the building side, the mounding of earth on the Nimrod magnet hall was going on, The construction of the experimental area was finished and it was in use partly as a clean testing area for vacuum vessels. The pre-fabricated office building and the bubble chamber building and plant house were nearing completion.

Dr. Pickavance briefly discussed the expected performance of Nimrod, in the light of the great success of the C.E.R.N. 25 GeV proton synchrotron, which is already producing over 10^{11} protons per pulse as compared with the design figure of 10^{9}. He said that the design figure for Nimrod was 10^{12} protons per pulse. The injector intensity and injection time was greater than in other accelerators, and if not limited by space charge effects the accelerator could certainly produce more than 10^{13} protons per pulse. The space charge limitation was not yet known, but at Berkeley, where 8 million dollars worth of modification was being done to the Bevatron, which would make it comparable with Nimrod except in shielding, energy and repetition rate, they were predicting 10^{13} protons per pulse. We could expect to do as well as they, but Dr. Pickavance preferred a more cautious estimate of a few times 10^{12}.

At the end of his report, Dr. Pickavance mentioned two other items. The first was that since the former A.E.R.E. accelerator design staff were now expected to transfer to Institute employment, the Institute would very likely be asked to assist in the design of future accelerators required by the A.E.A.

Secondly Dr. Pickavance mentioned that three recent university appointments had been made on the assumption that the men concerned would use the Rutherford Laboratory, but no approach to the Institute had been made by the University. Although these particular cases presented no difficulty and were welcomed, the Board took the view that some consultation with the Institute would be desirable. Dr. Aitken agreed to consider how this might be arranged.

3. Minutes of the Personnel Committee and the Research Reactor Committee

There were no comments on the minutes which had been circulated, but two points arose from the papers for the morning's meeting of the Personnel Committee.

The Chairman said that the Personnel Committee recommended that offers to join the permanent staff of the Institute should be made to Mr. Mullett and Dr. Stafford, as proposed in paper NI/P/60/5. The Board agreed.

The proposal in paper NI/P/60/3 to make security clearance a requirement for certain NIRNS posts was viewed with suspicion by at least one member of the Board. It was agreed that such a requirement occurs only so that a man may go in and out of the A.E.R.E., and further that at present it applies only to certain existing staff and a few further administrative posts. Any suggestion for extension to new engineering or scientific staff would be referred to the Board.

4. Future Accelerator Policy

Introducing paper NI/60/7, Sir John Cockcroft listed the recommendations in order of the ease with which they could be accepted:-

Recommendation (d) (Full use of existing accelerators) - non-controversial.

Recommendation (e) (research into new methods and storage rings) - equally important, and not very expensive to start with.

Recommendation (c) (extension of the P.L.A. by stages) - clearly a sound development, not requiring large staff and suitable for approval bit by bit.

Recommendation (b) (Study for a new very large accelerator in five years time) - This is the sort of project we have always expected. We don't know yet what sort of accelerator it would be.

Recommendation (a) (Study for a moderate energy electron accelerator) - perhaps the most controversial proposal, strongly urged by Professor Cassels. Two possible types of accelerator. Either would cost £2M-£4M.

Sir John also drew attention to Sir George Thomson's dissenting views, which are given in an appendix to the paper.

The Board endorsed recommendations d, e and c with little discussion, but there was a particularly lively discussion in which nearly every member took part, of recommendations (b) and, particularly, (a). The following points were made in the discussion:-

(i) That plans for future accelerators should be co-ordinated with those of C.E.R.N., which was perhaps the natural place for our activities in the field of the most expensive accelerators. It was recognised that we are in very close touch with the thoughts of the C.E.R.N. future accelerators team and the Institute team might be able to make major contributions to the design of some future accelerator even if it were considered too big for this country alone.

(ii) That it would be very desirable if possible to build the major accelerator (b) in this country, since under the conditions at C.E.R.N. many types of counter experiment are impossible for self-contained visiting teams, and also the time available to British physicists is of course severely limited not only by the provision for other visitors but particularly by the provision for C.E.R.N. staff.

(iii) That the major accelerator (b) is a more essential goal than the smaller (a) and much more expensive. If it is decided to ask for (a) this must be made clear, so that the chances of getting (b) when we are ready to ask for it are not prejudiced.

(iv) That with the proviso at (iii) above (a) could be finished by the time we were ready to ask for (b).

(v) That if built at all, (a) must be started very soon to be fully valuable. Even so there would be two similar but rather higher energy machines in operation one or two years before it.

On the basis of the estimate by Cornell, expected soon an estimate of cost suitable for submission to the Treasury could be worked out by the Rutherford Laboratory staff within six months.

(vi) That the study of (b) involves physics of great interest in its own right, but a detailed design for (a) will probably only be undertaken with enthusiasm if there is a good prospect of construction.

(vii) That the responsibility of the N.I.R.N.S. should be to put forward a reasonable programme for nuclear physics - not to weigh it against other sciences. The latter must be done at a higher Governmental level, presumably by the Minister for Science advised by the Advisory Council for Scientific Policy, notwithstanding that the Minister for Science does not control the universities.

The N.I.R.N.S. should however judge the proper proportion of effort in different branches of nuclear and high-energy physics, and the figures given in paragraph 14 and Appendix 4 of the paper support the view that the programme proposed is reasonable from this point of view.

(viii) The strong relationship between recommendations (e) and (b) was pointed out and it was suggested that the two should be combined, the specific reference in (b) to the preparation of a detailed proposal for a large machine being deleted.

Other Members, however held that this specific proposal was the essential long-term proposal. It was therefore not agreed to delete it.

ACTION 1 After further discussion the Board agreed to put forward all the recommendations (a) to (e), re-arranged as proposed by Sir John Cockcroft. Dr. Pickavance was asked to arrange for the necessary revision of the paper, which would then be submitted to members by correspondence.

5. Proposed Helium Bubble Chamber

Professor Wilkinson introduced paper NI/60/8 proposing a design study for a large helium bubble chamber. The Physics Committee had recommended it to the Board subject to the Board being reasonably satisfied that if the design study turned out satisfactorily they would support a proposal to build the chamber.

Several members expressed the view that the proposal was scientifically a very good one and well timed. It was an example of the "most acceptable" recommendation in the paper considered in minute 4 above; namely equipment for the fullest use of existing accelerators.

It was agreed that a formal design committee should be set up to ensure close contact with the other major bubble chamber teams.

It was suggested that an attempt should be made to attach to the project representatives of industrial firms, (at the firms' expense) who might thus be enabled to meet better the very special requirements of certain parts of the plant.

ACTION 2 The Board approved the design study proposed in paper NI/60/8, taking the view that their was a reasonable prospect that they would support a proposal for construction of a chamber of the kind described.

6. Recommendations of the Research Reactor Committee

Introducing paper NI/60/9, the Chairman thanked Sir Harry Melville for his help in getting a satisfactory procedure agreed for university reactors, as recorded in Appendix 1 of the paper.

Sir John Cockcroft then summarised the recommendations given in Appendix 2. He said that in addition to the projects at Imperial College, Liverpool/Manchester and Queen Mary College which were fully detailed, there had been fairly extensive discussions with Glasgow/Edinburgh and with Birmingham. The other proposals were as yet much more nebulous, but it was estimated that in addition to the five named, one or two other reactors might be recommended in the next four years. The recommendations were made on the basis that six or seven reactors would be approved in that time. If not, the Committee would wish to re-consider their recommendations.

ACTION 3 The Board adopted the recommendations of the Research Reactor Committee contained in paper NI/60/9. They added the comment that if money is not available to implement the full recommendation the Committee should be asked to recommend an order of priority.

7. Third Annual Report

The draft report was generally approved, subject to any minor corrections to be sent to the Secretary within a week. It was agreed to put the membership of committees in an appendix and also to omit the proposed photograph of Coseners House.

8. Procedure for making Research Appointments

The Board approved paper NI/60/11 subject to the amendment of the word "reader" in paragraph 2 to read "Senior Lecturer or reader". This change was made because of the different use of the title "reader" in different universities.

J. A. V. Willis
Secretary

Rutherford High Energy Laboratory,
Harwell.

20th June, 1960