Dr. Stafford

PLA/A/04

29th August, 1961 NI/61/20

NATIONAL INSTITUTE FOR RESEARCH IN NUCLEAR SCIENCE

GOVERNING BOARD

Future Expenditure by the N.I.R.N.S.

Note by the Secretary

1. Introduction

As reported to the Board in Dr. Pickavance's note dated August 17th, the Chairman has received a letter from the Office of the Minister for Science, informing him that in the present circumstances, the Chancellor is not likely to accept proposals for expenditure by the N.I.R.N.S. in the next five years on the scale shown in 5-year forecasts which were recently prepared and discussed with the Treasury.

In this paper, the 5-year forecasts are set out, and alternative ways are put forward for reducing the expenditure to amounts which there is reason to think that the Minister's office will support and which it is suggested the Treasury should be strongly pressed to accept. The annual totals are as follows:- (£ millions). In all cases the Atlas computer costs are excluded, as the Treasury have agreed to treat them separately.

	1962/3	1963/4	1964/5	1965/6	1966/7
a) 5-year forecast as discussed with the Treasury on July 10th 1961	7.74	7.63	6.85	6.78	8.14
b) 5-year forecast amended in the light of subsequent work on the preparation of 1962/63 estimates (For details see Table I)	7.75	7.83	7.17	6.87	8.34
c) Figures arrived at by the Minister for Science on certain assumptions and which the Minister would be prepared to support though not sure of Treasury acceptance (See Appendix I)	7.2	6.5	6.0	6.4	7.0
d) Target assumed in this paper	6.5	6.6	6.7	6.8	6.9

2. The 5-Year Forecast

The up-to-date 5-Year forecast of expenditure required to meet our programme (approved and not yet approved, but excluding Atlas) is given in Table I.

Two comments must be made on the Treasury suggestion that expenditure should continue "at about the present rate", i.e. presumably the 1961/2 grant of £6.1 million.

(a) The estimate for 1961/2 was £6.9 million; the grant allowed for a "shadow cut" of £0.83 million to take account of unforeseen delays in the programme. As Members know, delays did indeed occur, and the expenditure in 1961/2, which may even fall below £6.1 million, represents a disappointing rate of progress, which must be improved.

(b) Substantial progress has been made in recruiting the staff required to carry out the programme. This will increase the major items of recurrent expenditure almost in proportion to the numbers, and will allow better progress with the capital scheme. Total expenditure is therefore bound to increase. The average number of staff of all grades at the Rutherford Laboratory in each year and the expenditure are as follows (the figures for the last three years are of course forecasts):-

	1959/60	1960/61	1961/62	1962/63	1963/64
Staff	250*	400*	650	840	915
Expenditure:	£m.	£m.	£m.	£m.	£m.
Recurrent	1.3	1.9	2.3	2.8	3.2
Total	4.2	5.1	5.7	7.7	7.8

*Mainly A.E.A. staff. Very approximate figures not including A.E.A. supporting staff within A.E.R.E.

The letter from the Minister's office (Appendix) appears to recognise by implication the need for some increase, since it is stated that the Minister would support a programme which averages £6.6 million per year.

3. Possible Economies

If the Board accept the figures in Table I, and the target figures in para. 1(d) above, the task before them appears to be to find savings as follows (£ million):-

1962/63	1963/64	1964/65	1965/66	1966/67
1.25	1.23	0.47	0.07	1.44

In order to help in this task, Tables II and III have been prepared. Table II lists against each separate item of the estimate the greatest delay and/or reduction which seems to me to be a responsible suggestion. Undoubtedly the Board will not wish to adopt all these possible economies fully. On the other hand they may even wish to push some a little further.

Table III presents the same information as Table II in the form of a list of reductions against each item and may be found convenient when considering which economies can be least well afforded.

The figures in Tables II and III are based on the following considerations:-

Staff in post. The figures are for Rutherford Laboratory staff, not including the Electron Laboratory or the Atlas Computer, which are estimated to build up to about 250 and 45 respectively. The figures in Tables II and III represent a 5% cut in the estimated requirement, and would be sharply felt in 1962/63. It is hard to see clearly further ahead.

(a) Salaries, wages etc.

and (b) Stores, materials and services.

These depend on the staff numbers. A 5% reduction is shown.

(c) Other Current Expenditure. These are miscellaneous items including electricity and other services, extra-mural research, repairs and maintenance. Substantial cuts are not practicable.

(d) Charges by A.E.R.E. Charges, with overheads, for those engineering and administrative services still carried out by A.E.R.E. A rather uncertain item, very difficult for us to reduce.

(e) Nimrod Project. Clearly there must be no deliberate slowing down.

(f) Orion. The contract has been placed.

(g) Extension to R.2. Accommodation very urgently needed for Nimrod operation, and approved by Treasury. No delay is recommended.

(h) Extension to P.L.A. buildings. These buildings are already in the middle of construction.

(i) Heavy Liquid Bubble Chamber. Some slowing down is possible.

(j) Beam Handling Plant - Phase I. This is the £1 million initial scheme. Some slowing down is possible.

(k) Minor capital Items. These are all the items and schemes under £100,000. In the early years, they include a considerable amount for buildings and houses. They also include, on a continuing basis, provision for smaller items of nuclear research and beam equipment, and general equipment for the Laboratory.

Some reduction is possible.

(l) Peach Croft Housing. This scheme has not yet been approved by the Treasury but is urgently required.

(m) Helium Bubble Chamber. Not yet approved. Some deferment is possible.

(n) Beam handling plant - Phase II. The cut shown in Tables II and III represents a slowing down of new schemes of beam handling plant but recognises the large continuing requirement in later years.

(o) Nuclear Physics Apparatus. These are the major schemes previously described as visual and electronic techniques, less the helium bubble chamber which has absorbed the provision for visual techniques previously entered for the next two years. The amount of cut shown is substantial, and members may wish to look closely at it. The other main provision for experimental apparatus is in item (k).

(p) Capital Accelerator Development. This broader heading replaces the item "Extensions to the P.L.A." which has occurred in previous estimates, and relates to some future scheme for P.L.A. extension or some other development. In present circumstances deferment of such schemes has to be considered, but a sum is left in in the last year.

(q) Nimrod experimental area extension. This is the second main experimental area which has always been forecast at a total of £280,000. Further deferment is indicated in Tables II and III.

(r) High Flux Reactor. Requirements not yet determined. Further deferment indicated.

(s) University Use of Reactors. The Institute have always regarded support of University reactor work as important. The first substantial proposals for work in the "Merlin" reactor are only now being formulated for consideration by the Research Reactor Committee. Very roughly they seem likely to ask for an expenditure of £200,000 over 2 years, so if they are recommended by the Research Reactor Committee the present figures would represent a large cut.

(t) and (u) are based on the figures in the Electron Laboratory paper NI/61/16. This is a case where actual expenditure might in any case have fallen short of estimates. The figures in Table II and III represent a 1-year deferment of expenditure, but if approval were given now, even with severely restricted expenditure in the first year, much early work could be done, and completion should not be as much as 12 months late.

(v) Future major site. Reduced to token only in 1966/7.

(w) Shadow cut. Experience suggests that we must expect some delay even in the items which we are trying to press forward without any cut. The amount of shadow cut which would be appropriate would depend on the total approval for new schemes, but assuming that severe cuts on the lines indicated were made, the appropriate shadow cut is estimated at £100,000.

4. General

I would like to make a few general remarks:-

(1) The place of the 5-year forecast in future is not yet clear, but it seems likely to become nearly as important as the annual estimates. In particular, we may find that the forecast for the next year but one is regarded by the Treasury as firmly limiting us, unless there are major unforeseen changes. Clearly, therefore, the 5-year forecasts will have to be approved by the Board in future.

(2) In those cases where deferment of the start of a project is suggested as a possibility, I think it is most important that actual approval of the project should not be deferred. This applies particularly to the Electron Laboratory, where a great deal of necessary work can go on without

appreciable expenditure. It also applies to the other projects, where it would be extremely useful to be free to start with designing, and also to start expenditure if delays elsewhere led to unexpected under-spending.

(3) It is extremely difficult at this date to be specific about 1966/7 when the beginning of expenditure has been indicated on two large future projects; the second major accelerator site and the suggested high-flux reactor.

TABLE I

5-YEAR FORECAST OF EXPENDITURE TO MEET THE FULL PROGRAMME NOW FORESEEN EXCLUDING THE ATLAS COMPUTER

Rutherford Laboratory (excld. Atlas)	1962/63	1963/64	1964/65	1965/66	1966/67
Staff in post at end of year	880	950	1,000	1,000	1,000
			£ million		
EXPENDITURE					
Non-capital					
(a) Salaries, Wages etc.	1.04	1.13	1.20	1.22	1.24
(b) Stores Materials and Services	.92	.98	1.07	1.09	1.11
(c) Other Current Expenditure	.41	.64	.65	.67	.69
(d) Charges by A.E.R.E.	.46	.46	.45	.40	.40
Total non-capital	2.83	3.21	3.37	3.38	3.44
Capital - Approved					
(e) Nimrod Project	1.71	.77	.10		
(f) Orion Computer	.15				
(g) Extension to Bld. R2	.08	.10	.03		
(h) Extension to P.L.A. Buildings	.11	.02			
(i) Heavy Liquid Bubble Chamber	.18	.13	.06		
(j) Beam Handling Plant - Ph. I	.25	.40	.31		
(k) Minor Items	1.24	.85	.64	.65	.65
Total capital approved	3.72	2.27	1.14	.65	.65
Not yet approved					
(l) Peach Croft Housing	.10	.15	.06		
(m) Helium Bubble Chamber	.06	.18	.17		
(n) Beam Handling Plant - Ph. II	.02	.05	.13	.30	.30
(o) Nuclear Physics Apparatus	.12	.13	.12	.20	.30
(p) Capital Accelerator Development	-	.15	.35	.25	.25
(q) Nimrod Experimental Area Extension			.15	.13	
(r) High Flux Reactor				.20	1.30
(s) University use of reactors (including non-capital)	.10	.15	.15	.15	.15
Total capital not approved	.40	.81	1.13	1.23	2.30
Total capital	4.12	3.08	2.27	1.88	2.95
Rutherford Lab. - Total	6.95	6.29	5.64	5.26	6.39
Electron Laboratory					
(t) Non capital	.34	.53	.67	.75	.80
(u) Capital	.46	1.01	.86	.86	.86
	.80	1.54	1.53	1.61	1.66
(v) Future Major Site					.29
N.I.R.N.S. total	7.75	7.83	7.17	6.87	8.34

TABLE II

5-YEAR FORECAST SHOWING MAXIMUM CUTS AND DEFERMENTS IN EACH ITEM

Rutherford Laboratory (excld. Atlas)	1962/63	1963/64	1964/65	1965/66	1966/67
Staff in post at end of year	835	900	950	950	950
			£ million		
EXPENDITURE					
Non-capital					
(a) Salaries, Wages, etc.	.99	1.08	1.14	1.16	1.18
(b) Stores, Materials and Services	.87	.93	1.02	1.04	1.06
(c) Other Current Expenditure	.41	.64	.65	.67	.69
(d) Charges made by A.E.R.E.	.46	.46	.45	.40	.40
Total non-capital	2.73	3.11	3.26	3.27	3.33
Capital - Approved					
(e) Nimrod Project	1.71	.77	.10		
(f) Orion Computer	.15				
(g) Extension to Bld. R2	.08	.10	.03		
(h) Extension to P.L.A. Buildings	.11	.02			
(i) Heady Liquid Bubble Chamber	.10	.10	.10	.07	
(j) Beam Handling Plant - Ph.I	.15	.25	.25	.15	
(k) Minor Items	1.00	.75	.60	.60	.60
Total capital approved	3.30	1.99	1.08	.82	.60
Not yet approved					
(l) Peach Croft Housing	.10	.15	.06		
(m) Helium Bubble Chamber	-	.06	.10	.20	.04
(n) Beam Handling Plant - Ph.II	-	-	-	.30	.30
(o) Nuclear Physics Apparatus	-	.02	.10	.10	.10
(p) Capital Accelerator Development	-	-	-	-	.30
(q) Nimrod Experimental Area Extension	-	-	-	-	-
(r) High Flux Reactor	-	-	-	-	.01 Token
(s) University use of reactors (including non-capital)	.05	.05	.05	.05	.05
Total capital not approved	.15	.28	.31	.65	.80
Total capital	3.45	2.27	1.39	1.47	1.40
Rutherford Lab. - Total	6.18	5.38	4.65	4.74	4.73
Electron Laboratory					
(t) Non capital	.10	.34	.53	.67	.75
(u) Capital	.08	.46	1.01	.86	.86
	.18	.80	1.54	1.53	1.61
(v) Future Major Site					.01 Token
(w) Shadow cut	(0.10)				
N.I.R.N.S. Total	6.26	6.18	6.19	6.27	6.35
Target (see para 1 d)	6.50	6.60	6.70	6.80	6.90
Margin available	.24	.42	.51	.53	.55

TABLE III

Table of differences between Tables I and II, showing the possible saving on each item.

(Ringed figures are additional expenditure due to deferment of larger sums to later years).

£. million

Rutherford Laboratory (Non Capital)	1962/63	1963/64	1964/65	1965/66	1966/67
(a) Salaries, Wages, etc.	.05	.05	.06	.06	.06
(b) Stores Materials and Services	.05	.05	.05	.05	.05
(c) Other Current Expenditure	–	–	–	–	–
(d) Charges by A.E.R.E.	–	–	–	–	–
Total non capital	.10	.10	.11	.11	.11
Capital - Approved					
(e) Nimrod Project	–	–	–		
(f) Orion Computer	–	–	–		
(g) Extension to Bld. R2	–	–	–		
(h) Extension to P.L.A. Buildings	–	–	–		
(i) Heavy Liquid Bubble Chamber	.08	.03	(.04)	(.07)	
(j) Beam Handling Plant - Ph. I	.10	.15	.06	(.15)	
(k) Minor Items	.24	.10	.04	.05	.05
Total capital approved	.42	.28	.06	(.17)	.05
Not Yet Approved					
(l) Peach Croft Housing	–	–	–		
(m) Helium Bubble Chamber	.06	.12	.07	(.20)	(.04)
(n) Beam Handling Plant - Ph. II	.02	.05	.13		
(o) Nuclear Physics Apparatus	.12	.11	.02	.10	.20
(p) Capital Accelerator Devlpmt.	–	.15	.35	.25	(.05)
(q) Nimrod Experimental Area Ext.			.15	.13	
(r) High Flux Reactor				.20	1.29
(s) University use ofreactors (Including non-capital)	.05	.10	.10	.10	.10
Total capital not approved	.25	.53	.82	.58	1.50
Total capital	.67	.81	.88	.41	1.55
Rutherford Lab. - Total	.77	.91	.99	.52	1.66
Electron Laboratory					
(t) Non capital	.24	.19	.14	.08	.05
(u) Capital	.38	.55	(.15)	–	–
	.62	.74	(.01)	.08	.05
(v) Future Major Site					.28
(w) Shadow cut	.10				
N.I.R.N.S. Total	1.49	1.65	0.98	.60	1.99
Margin available for reducing the maximum cuts set out above and for new major schemes	.24	.42	.51	.53	.55

Appendix to NI/61/20

LETTER FROM MR. F.F. TURNBILL, SECRETARY OF THE MINISTER FOR SCIENCE'S OFFICE

2nd August, 1961.

Dear Bridges,

The estimates of expenditure by the National Institute for Research in Nuclear Science over the next five years show that the present rate of expenditure is likely to grow substantially, particularly in 1962/3, 1963/4 and 1966/7. Excluding the ATLAS computer, the figures appear to be, in millions of pounds:

1961/62	1962/63	1963/64	1964/65	1965/66	1966/67
6.1	7.8	7.5	6.7	6.7	8.2

Our preliminary contacts with the Treasury have indicated that in present conditions the Chancellor is most unlikely to accept proposals for expenditure on this scale, and that the most he would accept is a continuation of expenditure at about the present rate.

I have therefore been looking at the programme in the light of what we know about the relative importance to the Institute of the various projects. I believe I am right in thinking that your first priority is the Electron Laboratory project. If this went ahead, as planned, but accepting deferment until 1964/65 of the other uncommitted major capital schemes (the support for Nimrod, including the helium bubble chamber; the P.L.A. extensions, and the high flux reactor) we should get the following pattern:

6.1	7.2	6.5	6.0	6.4	7.0

The Lord President would be prepared to support this, but the increase of £1.1 M next year may be more than the Chancellor will concede. It might be necessary to consider a one-year deferment of the Electron Laboratory, leading to the pattern:

6.0	6.6	5.7	5.9	6.5	6.8

I would be grateful for your views. Would you agree that in current financial conditions we should discuss with the Treasury on this basis and get the best we can, or would you like to take part in discussions with the Treasury yourself if the first proposition is not attainable?

I am sending a copy of this letter to Drake of the Atomic Energy Authority.

Yours sincerely,

(Sgd.) F.F. TURNBULL

The Rt. Hon. Lord Bridges, G.C.B., G.C.V.O., M.C.,
Goodmans Furze, Headley, Epsom.

NOTES BY J.A.V. WILLIS

1. Mr. Turnbull, as Secretary of the Minister for Science's office, is the Accounting Officer responsible for N.I.R.N.S. expenditure.

2. There are small discrepancies between the figures given in this letter and my figures, but I do not think that they affect the issue.