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97
RGP(59) 4

WORKING PARTY ON FUTURE RESEARCH GROUP POLICY

Division Heads' replies to questionnaire

At the first meeting of the Working Party it was agreed that a note should be sent to all Division Heads asking them to suggest, on the assumption that their complement was to remain fixed, what work they would stop or put out to contract. Copies of the replies
... received from Division Heads are attached.

15th April, 1959.

R.M. Fishenden

Circulation: Mr. D.W. Fry
Dr. J.V. Dunworth
Mr. L. Grainger
Dr. R. Spence
Mr. D.R. Willson
Dr. E. Bretscher
Dr. W.M. Lomer
Mr. L.B. Mullett
✓ Dr. T.G. Pickavance
Mr. R.M. Fishenden
H59/2651x.

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Reference.....

21203

28518

Mr. D. R. Willson,
Building 329.

Future Programme of Research Group

As requested in your note to Division Heads, here is an appreciation of what we would do if the complement were fixed at its present level. Although because of the creation of the National Institute this is a hypothetical situation it is worthwhile looking at it.

The Proton Linear Accelerator is now being successfully commissioned but a considerable amount of effort which should be going into preparation for the nuclear physics programme is being used to supplement that of the accelerator team. If the complement were fixed then the commissioning and the instrumentation for nuclear physics would have to go in series, and modifications to improve the performance of the machine and to exploit its characteristics for special experiments would have to be postponed.

The Proton Synchrotron group is now at about the minimum level to complete the research and development and to get industry geared up for production. If the complement were fixed there would be insufficient effort (particularly in junior grades) to cope with the testing of vast quantities of components, and with the installation and commissioning of the machine. The instrumentation for nuclear physics (two million pounds worth) such as beam extraction, beam handling equipment, particle analysers and beam cleaning systems would have to wait for effort to be freed from the machine. The consequences would be that the time scale for the machine would be considerably increased, and when commissioned it could not be exploited for nuclear physics of the calibre required from a machine entering this energy range many years after the Bevatron.

The Tandem Generator group has always been the bare minimum required to produce a good machine to a good time scale. If the complement were fixed any new electrostatic generator project would have to go very slowly, but in the general context of a complement freeze the group would have to be cannibalised. The key people in the electrostatic generator field might be converted to other activities but would probably prefer to start up a new group under new auspices. The junior staff would have to be transferred to the other projects, probably the synchrotron.

The Accelerator Research Group has a very modest programme at the moment, and is certainly not anywhere near strong enough to prepare the way for any new accelerator. It is of course always possible to find the "man and a boy" team for some special purpose, but this scale of effort soon becomes grossly inadequate. If the complement were frozen then we should be hardly able to do more than think about future accelerators. The staff would have to be raided to keep the synchrotron going. The work on spiral ridge cyclotrons, especially that for "conversion" of the Harwell Cyclotron, would have to go.

Under these circumstances we should be stretched to the limit to complete our projects and to bring them into successful operation. There would be little future to offer to the key personnel and it might even be difficult to retain them until the present programme is completed.

The alternative approach to accelerator research, development and construction is to fall back upon the Universities and Industry. It is however obvious that the task has become too great for the Universities to handle alone, and we have had some bitter experiences in relying upon Industry. If the National Institute had not already been brought into being we should have been debating such a solution right now.

It is inevitable that the Rutherford Laboratory of the National Institute should have a large measure of autonomy. It is in the self interests of both the Institute and A.E.R.E. that the Rutherford Laboratory should free itself from the mundane worries of the Research Group complement and management load by having its own staffing policy. The Institute will undoubtedly employ a considerable number

/of engineers

of engineers and Scientific staff for operation of its facilities and for nuclear physics, and it will inevitably employ all the supporting personnel (industrial grades and so on). It is however in the joint interest of A.E.R.E. and the National Institute to retain a link in Accelerator physics and engineering, through the medium of the Accelerator Division. Such a scientific link would be far more valuable than one which just supplies workshop personnel, canteen girls and such like. It is not too late for A.E.R.E. to decide upon a policy of this nature but it must be done quickly.

On the more general issue of how the Research Group might solve its problems I shall be sending my comments to Mr. Fishenden.

L. B. Mullett

L. B. Mullett

Copy to Dr. T. G. Pickavance
Mr. D. W. Fry

Accelerator Division,
Building 412.10.
31st March, 1959.

Reference.....

28502

Mr. D. R. Willson, *DRW*
Building 329.

Future Programme of Research Group

Re. your recent note to Division Heads on this subject. It is proposed that work on **Zeta I** should terminate by June 1960. Some small-scale experiments are likely to be completed within 3 years, but it is expected that they will be replaced by other similar experiments, and the number of staff on such work is not likely to decrease.

The number of C.T.R. Division staff at present on Zeta I (including Engineering support) is about 100. It is intended to use this staff on the I.S.C.E. project which has been provisionally approved by the C.T.R. Technical Policy Committee.

T. F. Johns

T. F. Johns

for P.C.T.

C.T.R. Division,
Hangar 7.
25th March, 1959.

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UNITED KINGDOM ATOMIC ENERGY AUTHORITY

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TELEPHONE ABINGDON 1220



ATOMIC ENERGY RESEARCH ESTABLISHMENT,

HARWELL,

DIDCOT, BERKS

OUR REFERENCE:

YOUR REFERENCE:

Dr
D. R. Willson, Esq.,
Technical Secretary.

Future Programme of Research Group

I find great difficulty in answering paragraph 5 of your note on the above subject. We have literally hundreds of jobs, most of them forming an integral part of Station projects in which other Divisions are involved. We could not therefore stop work unilaterally on a given project. On the other hand, the stopping of some Station projects might well free some of our staff.

With regard to the possibility of moving work outside the Authority, much of our electronic development work is already being done by the industry and we are doing what we can to increase this further. The question is not, however, which jobs go to industry, but rather at how early a stage they go to the industry.

It is hoped that, if the electronic running contracts are a success, this will enable us to put with industry work corresponding to the efforts of about a dozen staff. This does not, of course, mean that a dozen staff will be freed, but merely that they may be able to get on with other essential work that is not at present being done.

E. H. Cooke
E. H. Cooke-Yarborough

1st April, 1959

Mr. D.R. Willson. *DR*

Future Programme of the Research Group

You ask what work we would have to drop to maintain the Division's complement at its existing level in three years time. As Health Physics is essentially a service Division with over two-thirds of its members directly employed in providing day-to-day cover to other Divisions, it is clear that the answer to your question can be provided only after the replies from the other Divisions have been received.

When the re-deployment of the old Music Group is complete, the only groups having staff not directly concerned with day-to-day operations are the Radiation Measurements Group, Environmental Monitoring Group and Chamberlain's Aerosol and Fuel Rig Group. In each of these groups there are problems such as radioactivity in drinking water, removal of radioactivity in rainwater collection areas by natural processes, deposition velocities of iodine, etc. which could be stopped or transferred outside the Authority as other interesting and more urgent problems arise. Any such transfer must not be allowed to change the balance of work in the Division. It is essential to have staff working on problems other than the immediate day-to-day operational ones so as to help develop reactor siting and safety thought in the country and to have a reserve of trained personnel to assist in any accidents which may occur.

The correct place to conserve personnel is in the monitoring services provided to other Divisions. Our aim should be to make ourselves a Division of experts and many of the monitoring duties, at present performed by over 50 non-tech. and industrial staff, should be either reduced, eliminated by the development of better methods of handling radioactive materials, or by transfer to other Divisions. Similarly, much of the work which falls on the senior staff as the aftermath of the "Fleck Report" should be re-timed or re-allocated to allow more attention to be given to reducing the cost of radiological safety.

Conclusions

The best way of keeping the complement at its present level is to streamline the services provided to other Divisions and so avoid any further expansion of the Industrial complement of the Division.

There are projects which could, in theory, be transferred elsewhere which would make small numbers of staff available for new research problems.

B. S. Smith

B.S. Smith

Health Physics Division.

31st March, 1959.

cc. Dr. W.G. Marley

THEORETICAL PHYSICS DIVISION

Theoretical Physics Division is in three parts, not very clearly separated:

- a) 8.5 General Accelerator development
8.16 Nuclear Theory
8.18 Solid State Theory
- b) 8.4 } P.L.A.
8.24 } Gevatron
8.5 Atomic and Plasma Theory
- c) 9.9 } Computing Services and
8.19 } Mathematical Research

Group (a) are projects with no clearly defined aim except to further our fundamental knowledge of the relevant fields. They are small groups of about six people only and exist in order to provide enlightened criticism over the whole field of theoretical physics.

Group (b) stand intermediate between the long range group (a) on the one hand and the experimentalists on the other, and between the experimentalists and the computing section on the other. They could not be conceivably put out to contract.

Group (c) Computation. It is possible to put all computing out to contract. It is not practicable to do so unless one has some pool of computers on the establishment to talk professionally to the contractors. Many of our problems are different in type from any studied before, and we would therefore need great confidence in our contractors, and would need some assurances that they would undertake to keep their machinery up to date. At present there exist no machines in this country outside the Authority which could accept our larger calculations. Nor is there any body of programmers. It is quite likely that an Authority decision to buy time rather than run its own machines would create the necessary facilities (I.B.M. Company would almost certainly take it up). The cash cost would be about four times higher, on the basis of present charges, for such a solution, though clearly there is room for negotiation on that.

The results of contracting out all our major computing are hard to guess. First, there would be no drive, from the computers, for the production of general purpose programmes. There would therefore be delay on each job. Second, there would be less spread in the knowledge of computer methods, and the advance of design techniques would suffer. However computing is a service, and if it is preferable to the users to live with the delay and confusion of off-site work than to find staff, then Theoretical Physics Division would necessarily have to accept the decision.

W. M. Lomer
W. M. Lomer

T.P. Division,
Bldg. 8.9,
31st March, 1959.

28513

edw.
Mr. D. R. Willson,
Building 329.2

Future Programme of Research Group

The direct answer to the question you pose, in paragraph 5 of your minute received on 23rd March 1959, is none ! Because I had assumed that my complement would remain at its present level and had already discounted actions to move work outside the Authority.

My difficulty has always been to find staff to work on new ideas rather than to meet project needs, although of course ideas are needed there too.

You will, I think, already know about the following, where decisions to stop or transfer have already been made but are not yet effective.

1.		<u>Available for redeployment</u> <u>in the Division</u>		
		<u>SC - AEO</u>	<u>Ancillary</u>	<u>P.W.</u>
1.	<u>Mineral Dressing</u> Transfer to D.S.I.R. - effective say May 1959.	9	2	3 M, 4 W
2.	<u>Development of New Graphites</u> (Graphite Experimental Plant) Proposed transfer to industry, with <u>luck</u> arrangements should be complete by end 1959 and effective in 1960. Other graphite work will continue, but possibly not all in C.E. Division. <u>NOTE</u> : not all work coded 4/15 is on the experimental plant.	4	2	8
3.	<u>Hydrogen Liquefier</u> C.E. need for this plant will end in 1959, but liquid hydrogen will still be needed inside the Establishment. I do not know whether it is possible to provide the service by external contract.	2	1	3

Heavy water research is already running down, although some will continue into 1960. However if there is a resurgence of interest in heavy water reactions the whole picture will change. In this event one hopes that it will be possible to interest external contractors.

If it is any consolation, I am looking at the efficiency of utilization of process labour. If no major shift operation turns up, it looks as if I should be able to give you a little slack here. We have some jobs now understaffed to keep priority things at full strength, so the reduction will not be large. We have already declared 4 women Process Workers redundant and there will be found other jobs inside the Establishment, but there may be as many as 6 more (men) by 1 April 1960.

Chemical Engineering Division,
Building 351.15

A. S. White
A. S. White

31st March 1959

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FUTURE DEPLOYMENT OF EFFORT IN METALLURGY DIVISION

EFFECT OF COMPLEMENT STAND-STILL

1. Introduction

In this note the effect of a complete ban on expansion is briefly considered. The numbers quoted refer to total non-industrial scientific effort, including scientific assistants; the numbers of professional staff, according to Authority definition, is less by about one-third.

2. Current Proposals for Increased Effort

The problems of fixing the Metallurgy Division complement at this time are made extremely acute because a re-appraisal of the present programme has shown an urgent need for an extension of effort in the following fields:

(a) Industrial Power Programme	
(1) Magnox/U stations	15
(2) A.G.R.	20
(3) A.R.P. (1959)	30
(b) Plutonium Ceramics	20
(c) Ceramics (more advanced than A.G.R.)	15
(d) Plutonium Jobbing Shop	20

The work on Magnox/U stations is mainly irradiation, but some work on magnesium, on the mechanism of fast bursts and on the physical metallurgy of uranium is proposed; on A.G.R., an extension of the basic technology of beryllium and UO_2 is required. These items have the strong support of R. & D.B.; so also has the work on plutonium ceramics, which initially will assist A.G.R. but has important longer term implications also.

The 1959 A.R.P. review recommended two new reactor systems; from previous experience the figure of 30 staff proposed is an absolute minimum initial figure solely as close support for the increased effort in the Reactor Division, taking full account of the similarities of the systems proposed, existing work in these fields, and R. & D.B. effort.

The Plutonium Jobbing Shop has been suggested because of difficulties experienced by the Reactor Division in the supply of fuel for physics experiments.

The current favourable outlook on UO_2 emphasises the need for a wider effort on ceramics, both homogeneous and dispersions in graphite and beryllia.

3. Current Disposition of Staff and Possible Immediate Savings

The present broad disposition of effort is shown in Table 1. Because of changes in Authority policy or programmes, reductions in the following sections are already contemplated:

	<u>Reduction</u>
C.T.R. Materials and Liquid Metals	10
Extraction Metallurgy	10
Analysis	5

Reorganisations, especially on irradiation work, are expected to result in the saving of about 5 men.

4. Discussion

From the above it will be seen that a net increase of 90 staff is required to undertake additional work believed to be important to the power programme. An important point is that all the increases are required quickly if they are to be effective; about half the total would be needed in the next few months and the remainder early in 1960/61. Commitments have in fact been undertaken with the consortia covering most of the new work proposed on the Magnox/U stations and this must be put in hand immediately. The question then arises, if these immediate increases are accepted, of future expansion of the Division. So far as can be foreseen from the Authority's reactor programme, it is felt that the Division's strength could be stabilised after the 90 increase, old work being thereafter replaced by new; the present difficulty arises because the effort available on basic technology is inadequate for the size of the reactor programme and the role the Research Group expects to play in it. It is also felt that such an increase would result in a satisfactory balance between basic technology and physics.

If the complement had to be fixed at the present level, there are several possibilities to be explored, including

- (a) passing more work to R. & D.B.;
- (b) increasing the extra-mural work;
- (c) divisional reorganisations;
- (d) eliminating or delaying items.

The work proposed on the Magnox/U and A.G.R. stations cannot be devolved to R. & D.B. because of lack of staff and facilities there; in any case, the scale of effort in the Division (and perhaps the Research Group) relevant to the Industrial Group has become too low for the health of both A.E.R.E. and R. & D.B. Failure to take up work shortly on the new A.R.P. reactors and on plutonium and advanced ceramics would be quite contrary to the Research Group's traditional role and would be incompatible with proposals for strengthening the Reactor Division.

Extensions of the extra-mural work are difficult in the fields proposed because so much of it is concerned either with irradiation or toxic materials. In any case, R. & D.B. are already seeking to increase industry's share of the work where appropriate, as rapidly as it can be absorbed. Furthermore, the advantages of close support of the Reactor Division and the utilisation of experimental scientists and existing facilities at Harwell would be lost. Of the new items listed, those on the new A.R.P. reactors and on advanced ceramics could perhaps be put out with the least harmful consequences.

Internal rearrangements within the basic technology field have been discussed above; the only other possibility is a reduction in the effort on the basic physics side. This is not a very attractive possibility, however, since not only would most of the individuals concerned be unwilling to transfer but the long term result of reduction in the effort in this field would be disastrous. As a very temporary measure a reduction of about 10 might be tolerable. In due course this might be made up by the transfer of some work, on about this scale, to the National Institute.

The only new item which could conceivably be eliminated is the Plutonium Jobbing Shop; the responsibility for this work might be left with A.W.R.E. or taken by the Reactor Division, presumably at Winfrith. One item which could be delayed without early obvious repercussions is that on Plutonium Ceramics; a start must, however, be made now if the Research Group is to play its proper part in this important objective, and the long-term results of such a delay would be serious.

5. Conclusions

If the Metallurgy Division complement were fixed at its present level, the following steps would probably be taken:

- (a) The increased effort on Magnox/U and A.G.R. stations would have priority and would be implemented.
- (b) Internal reorganisations would be effected as in section 3 to save 30

men and the effort of 10 men would be provided, if possible, from the basic physics groups. This would allow (a) and some small increase on plutonium ceramics to take place.

- (c) Work on the A.R.P. reactors and advanced ceramics would be put out to extra-mural contract exclusively for the present.
- (d) Starting in about a year and extending over 2-3 years, work on (a) would be reduced, more quickly than desirable, and the effort transferred to the items in (b) and (c) above.
- (e) No Plutonium Jobbing Shop would be provided by the Metallurgy Division.

L. Grainger

Metallurgy Division,
13th April, 1959.

Distribution

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Table 1

Current Disposition of Staff (Professional and ancillary
scientific, including A.Sc.)

1. Basic Technology Groups

(a) Physical Metallurgy (Pugh)

	<u>Staff</u>	
Irradiation	22	)
Pu Metallurgy	21	)
Reactor Alloys	7	)
CTR Materials + Liquid Metals	21	)
		71

(b) Chemical Metallurgy (Murray)

Ceramics and Be	27	)
Fabrication Development	13	)
Extraction Metallurgy	9	)
Corrosion	20	)
Analysis	10	)
X-ray Diffraction	5	)
Non-Destructive Testing	4	)
		88

2. Basic Physics Groups

(a) Basic Irradiation Studies (Barnes)	26	)
(b) Metal Physics Group (Le Claire)	28	)
(c) Stored Energy Group (Simmons)	15	)
(d) Neutron Diffraction (Bacon)	17	)
		86

245

Dr. Richardson

Please attach to RGP/59/4

48756

77

Chemistry Division,
Building 220.

17th April, 1959.

Mr. D. R. Willson,
Building 329.2.

Future Programme of Research Group

Reference your circular to Division Heads on this topic, the situation I foresee in the Chemistry Division is briefly as follows:-

1. I assume that the Group functions will not be drastically changed. This is to conserve knowledge and experience in the broad fields of chemistry with which the Authority is concerned.
2. New ideas originating in the Division usually only involve a small number of people and result either in scientific publication or in some outside technical project. Therefore it is unlikely that any single new scientific development made within the Division will call for drastic changes in the programme to accommodate it. The difficulties would mainly arise outside the Division.
3. A large proportion of the programme is determined by the needs of the various Authority reactor projects and priorities cannot be fixed by the Division Head alone.
4. During the last few years, the basic research programme has been severely restricted to allow more scope for technology. Some readjustment is needed here.
5. Bearing in mind item 4, and to provide for new requirements without increase of staff, the following items might be stopped:

	Prof.	Ancill.
(a) Work on pressurised water systems	9.00	3.75
(b) Work on organic liquid moderators and coolants	8.00	2.00
(c) Work on waste disposal	5.20	2.00
(d) Electro Magnetic separation of isotopes	3.90	1.00
(e) Work on behalf of C.T.R. Division	4.10	-

R. Spence

Copies to:

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Dr. E. Glueckauf
Mr. A. A. Smales
Dr. W. Wild