Report written by Sir Kingsley Dunham on the completion of his Directorship 1967-1975

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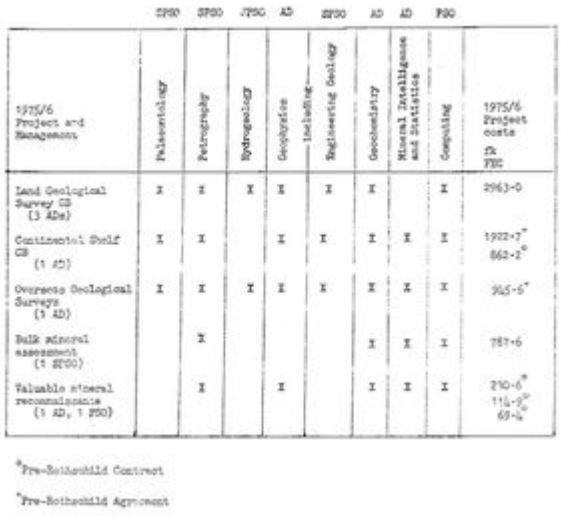
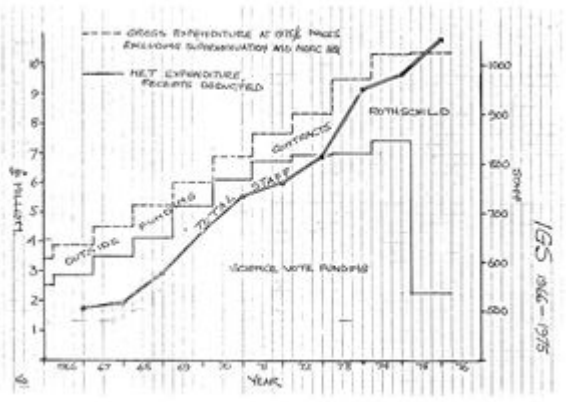


1975/6 Project and Management	Palaeontology	Petrography	Hydrogeology	Geophysics including	Engineering Geology	Geochemistry	Mineral Intelligence and Statistics	Computing	1975/6 Project costs £k FTE
Land Geological Survey GB (3 ADs)	X	X	X	X	X	X		X	2963-0
Continental Shelf GB (1 AD)	X	X		X	X	X	X	X	1922·7* 862·2*
Overseas Geological Surveys (1 AD)	X	X	X	X	X	X	X	X	905·6*
Bulk mineral assessment (1 SFOO)		X				X	X	X	787·6
Valuable mineral reconnaissance (1 AD, 1 FOO)		X		X		X	X	X	210·6* 114·9* 69·4*

*Pre-Rothschild Contract

*Pre-Rothschild Agreement

Diagram illustrating the new matrix structure. The institute now evolved towards what in modern systems terms is called a matrix organisation in which X is a series of disciplinary divisions in parallel, and Y crosscutting major projects in series, calling upon those parts of I required for their prosecution.



IGS funding/staff 1966-1975. Annex A.

Annex A Report written by Sir Kingsley Dunham on the completion of his Directorship 1967-1975

Institute of Geological Sciences of NERC

Final Report of the Second Director (Thirteenth Director of the Geological Survey of Great Britain)

1 I was appointed with effect 1 January 1967 and I am to retire on 31 December 1975, having served exactly nine years. My purpose in this report is not to list the work and achievements, of the Institute during this period; that has been done in extenso year by year in the IGS Annual Reports, and in a condensed form In the Annual Reports of the Natural Environment Research Council. Here I wish to comment, not uncritically, on some aspects of organisation, administration and possible future development, and to offer some conclusions which will be recognised as having a subjective element.

2 The items in the immediate background in 1967 are worth recalling:

(a) The recommendations of the Brundrett Committee of 1963-4 that Overseas Geological Surveys and the Atomic Energy Division of GSGB should be united in a close union with the home Survey. I was one of the two geologist members of the Committee (Norman Falcon was the other) but I little thought that I world hass the task of effecting the marriage.

(b) The Report of the Trend Committee leading in 19d5 to the creation of NERC and the assignment or the Geological Survey to this research council and not, as some expected, to the Ministry of Technology.

(c) The setting-up of a Geology and Geophysics Committee by NERC, chaired by Cecil Mitcheson, under whose recommendation to Council the Institute was created. The name adopted was that proposed by Norman Falcon.

3 Graham Sutton, first Chairman of NERC, made very plain his view that government geology needed considerably wader horizons and this coincided with my own belief, as expressed in my Presidential Addresses to the Geological Society of London in 1967 and 1948, and in what one might regard as an inaugural lecture to a crowded meeting of the Institute staff held in the big theatre of the Natural History Museum in March 1967. In fact my, predecessor James Stubblefield, before he retired, had placed before the Geology and Geophysics Committee four major projects for developing IGS: (i) Geological survey of the British continental shelf (ii) Assessment of sand and gravel resources in S E England (iii) Major re-organisation of the ground floer of the Geological Museum, virtually- unchanged from the time of John Flett in 1935 (iv) Hydrogeological survey of a major river basin (with the Trent basin in mind). The first three are in progress; the fa-oath has never got off the ground, mainly because of the politics of water investigation.

4 Upon appointment, I considered that I had a mandate to make whatever organisational changes were necessary to produce a unified and effective research institute. Stevenson Buchan was my closest counsellor at this time, but I was able to consult widely among staff, and I was already au fait from personal contact with geological survey practice in USA. Canada, Australia and same European countries.

The re-organisation was carried out against the background of the deaialsa of the Council for Science Policy of PES to give most favoured treatment to the new Research Council; this made it possible to contemplate a growth-rate of 15–20 per cent per annum for IGS for several years. What emerged were four new, potentially strong divisions; Geophysics, Geochemistry and Mineral Resources, each with a field component and a larger base component in its structure; and an Overseas Division designed to meet the needs of the Ministry of Overseas Development for home-based geologists for Technical Aid to developing countries. The GSGB was held static except that Continental Shelf units were introduced at Leeds and Edinburgh. The older specialist departments of palaeontology, petrography and hydrogeology linked with the Survey had a limited expansion. The

GSGB has gradually overcome the doubts In high quarters about it, as it had on several times before, so that non it is widely- recognised as central to the organisation. The institute now evolved towards what in modern systems terms is called a matrix organisation in which X is a series of disciplinary divisions in parallel, and Y crosscutting major projects in series, calling upon those parts of X required for their prosecution. The following diagram, simplified from the Main Project Summary, and by no means complete, illustrates the point.

I acknowledge with gratitude the acquiescence in (and in many uses, real enthusiasm for) these changes among the staff, and their acceptance by Council. In the course of making them the equipment (which was not as good in 1966 as in my university department in some important respects) has been brought fully into line with modern requirements.

	SPSO	SPSO	SPSO	AD	SPSO	AD	AD	PSO	
	Palaeontology	Petrography	Hydrogeology	Geophysics (including	Engineering geology	Geochemistry	Mineral Intelligence and Statistics	Computing	1975/6 Project costs fk FEC
Land Geological Survey CB (3 ADs)	X	X	X	X	X	X		X	2963.0
Continental Shelf GB (1 AD)	X	X		X	X	X	X	X	1922.7[+] 862.2[*]
Overseas Geological Survey (1 AD)	X	X	X	X	X	X	X	X	945.6[+]
Bulk mineral assessment (1 SPSO)		X				X	X	X	787.6
Valuable Mineral Reconnaisance (1 AD, 1 PSO)		X		X		X	X	X	230.6[*] 114.9[*] 69.4[*]
[*]Pre-Rothschild Contract									
[+]Pre-Rothschild Agreement									

5 The changes briefly outlined above have called for a great expansion in manpower; in 1966 our total strength was 501 (including all the units eventually incorporated into the Institute); this year it has passed 1000. We have preferred to continue to recruit through the Civil Service Commission, and see no reason to abandon this practice. It is interesting that but for the Robbins-inspired honeymoon in the universities (in which I was myself one of the fortunate participants) this large number of excellently qualified geologists required could not have been found. In practice, we have only had difficulty in the fields of geophysics and hydrogeology. I pay tribute to the universities for the good men they have provided us with.

Establishments policy, after the initial three years when more than half the expansion was accomplished, began to move towards the traditional doable control of allotted complement and available finance. There was, however, a welcome returns to de facto control by available finance alone during the past two years while new major contracts were being staffed, and only very recently has the impending crisis caused headquarters to insist that even replacements must go through a manpower committee. I have been frankly impatient of an arbitrary complementing system; it seems to me that the two tests of whether (a) the work is required and (b) the money is available are sufficient without recourse to a hypocritical appeal to complement. Nevertheless, it must be admitted that the Establishment officers Arthur Cunliffe and Philip Smith could hardly have

been more helpful, both in recruiting and in promoting staff. It is worth saying that the fluid complementing system up to PSO has provided, especially since the Fulton Report, was implemented, a reasonable career for the average goad man. The obscuring of the former distinction between ExperilUentS1 and Scientific Officer is on the other hand not satisfactory, nor is it improved by streaming. Our most conspicuous failure of these years has been the failure to provide GSGB and other divisions of the Institute with support ("slow-stream") staff, the use of whom could easily raise output by 50 per cant. Mention must also be made of the problems created, since 1972, by engaging short-term contract rather than established staff.

6 During ay service as a geologist with GSGB (1935–50) I had become increasingly aware that the Geological Survey was too little known and less respected in Whitehall circles. A remark of the Chief Scientist to the Government when I first met him in 1967 is worth reproducing. "Dunham" he said "You are from that gentleman's club for making geological maps". By 1967 reports prepared by the staff association show how disaffected many of their members were with a job that did not seem to them to be furthering national welfare. It was imperative to bring the Institute more deeply into government, even though it had been handed over to a [sic].

The externally funded work for ODM, MHLG. and UKAEA were therefore most welcome, but did not go far enough. A happy idea of Ray Beverton's made progress possible — the formation of the Mineral Resources Development Committee Drought together reasonably senior representatives of the natty executive departments and research institutes dealing weth minerals. Dossiers were prepared, anyone who could participating, for 35 mineral commodities and these ere gradually being published. More important, the committee (and other committees at a much higher level) were to lead to two large contracts, one with DTI to carry out a nation-wide reconnaissance for new sources of metalliferous and associated minerals, another, initially for MEP Petroleum Division for the correlation of the geophysical and geological results of company research and prospecting in the North Sea basins.

7 The Rothschild tragedy followed the negotiation of these contracts. I say tragedy deliberately because in spite of their offensive tone, Victor Rothschild's proposals seemed to me to offer just what we had been seeking — a way to establish earth science in its rightful place in government; but much of the good that could have been done has been -vitiated by the fatally-wrong un-negotiated figures for the transfers imposed upon NERC. The DOI (and its fission product the DOEn) have been given far more transferred money than NERC can or ought to meet, while the DOE (after all, NERC's main concern is the Environment of Man) far too little. The dire effects of this gross error have largely descended upon IGS, which carries at least 40 per sent more than its equitable share of the total NERC transfers. In the table which follows transfers affecting IGS Cash Funds are compared with the totals effecting NERC.

Post-Rothschild White PaperTransfers in £k

D. Energy	1875	3745
D. Industry	702	
D. Evironment	1472	2412
MAFF	—	809
NCC	—	501
Total	4049	7467
	(54.1%)	100%

In addition to this, ICS has contractual obligations of 806.0k (offshore studies, DOEN) + 1096.3 (Minerals, DOI) + 49.0 (Fiscal Incentives DOI) 609.1 (Overseas, ODM) + 87.4 (Geol. Survey of N Ireland) = £2675.8k (in cash terms, ie not including superannuation or NERC Admin Cost) . Thus out of a total cash expenditure forecast for 1970/76 of £7047k, outside sources provide £6696.8k, or 95 per cent. The Institute attracts therefore a negligible amount of the Science Vote money available to NERC. It could easily be argued however, that our success in attracting customers is laying the seeds of major future difficulties, in which, if Council is to continue to govern and 'manage' IGS; my successors will feel entitled to more consideration by ABRC.

Rothschild transfer has placed in immediate jeopardy the Continental Shelf Survey and it has in effect monopolised our Mineral Intelligence and Economics and Statistical units. Even so, an untransferred balance of money remains with NERC which is a grave threat to the development of any new Whitehall contract.

No-one from NERC (or from the Royal Society) was able to moderate this unhappy affair. The figures in the White Paper, though more reasonable in the Green in total, were quite wrong in balance. I still hope that a way will be found to approach Ministers to correct the imbalance; it is a small thing for them, but a potential disaster for us.

8 I wish to venture two ocher comments on the effects of the Rothschild Report. The anxieties and tensions it has created in NERC have absorbed an excessive amount of time and effort which could better have been devoted to science, and unfortunately they are liable to lead to further over-administration. To take only one case, the IGS costing system is unquestionably too elaborate (our fault, not NERC's), so much so that I am well aware that some members of staff are turning in fictitious figures (adding up, of course, to the right total) and the SPSOs find the figures they receive useless for any serious management purpose. If this is so at middle management level, what possible use can they be at headquarters? The work of our large research institute can be subdivided to an almost infinite extent; I find that the list of MS projects totals over 1500 (or 2.5 per scientist) and I regard this as a complete nonsense. It is urgently necessary to restore the flexibility middle management must have by grouping these into little more than the main projects. Frankly, I fear the effects of the information system now being introduced by Council, if it is not kept within strict limits; for I remember very clearly the 9000 pieces of paper uselessly generated annually for the Director by the abortive DSIR scheme. We seem to be within sight of an equally over-administrated situation.

The other cause for continued anxiety is the control of finance for projects by departmental Research Requirements Boards and similar organisations not, in my view, in all cases adequately qualified to do this, and often manifestly taking an excessively short-term view. It is good that this remark does not apply to the Geological Survey Consortium. The loss of flexibility sustained by the Institute is fast becoming; apparent; the worst aspect being the increasing lack of provision for non-mission oriented research. My Advisory Committee has twice called the attention of Council to the fact that good short-term applied geology cannot be maintained without a living body of basic research behind it. This must apply to the I column in the matrix. The provision for this is, frankly, inadequate. Therefore it is very much to be hoped that in the fntuxe it will become possible to lean more heavily on science vote funding, and to adjust the balance within NERC, where IGS could be said to be relying at least twice as heavily on transferred and outside funding as the Council's institutes and activities as a whole.

9 The second directorate has been heavily overshadowed with problems of accommodation. Edinburgh, 13 years after the file was opened, is almost solved. The small extension to the Museum based, at the insistence of Arthur Butler on negotiations began with the Trustees of the Natural History Museum in 1913, is almost an accomplished fact. But the most critical problem, the

rehousing of field staff and specialist groups in the England and Wales regions is still unsolved, while the threat of huge rent rises in London and the termination of the lease of the (temporary) buildings in Leeds draws nearer. I am deeply disappointed that this problem has proved so refractory; it is no use, I suppose, locking back to the time when we could have had a developer for the Nottingham site if permission had been given, but I can at least express the hope that the matter of Keyworth will not be permitted to die for six months or a year in the way the university site was treated. I continue to believe that, given the extra buildings for PSOs and above and for the Geochemical Division and Engineering Geology this could indeed be a good solution to the problem. It is gratifying that Planning Permission for the Keyworth site, including the Core Store, has been granted.

The move away from London will mean certain problems connected with the Exhibition Road building. Were I still to be Director, I would wish the head office and establishments office to be maintained in London, even though it would mean even more travelling than now. The library, much improved since we a professional librarian (Kenneth Spencer) is the principal public reference library for earth science in the country. It must be maintained here and should take over at of the basement for book stacks. The national collections (the Museum Reserve collection of rocks, the Sliced Rock Collection and the Fossil Collection) present a problem. The MR must, of course, stay. I think that the Sliced Rock Collection (and therefore the head office of the Petrographical Department) ought also to remain. I think that particular parts of Palaeontology could go to Nottinghamshire but am unhappy about removing all British palaeontological material at the moment when the British Museum of Natural History has just completed its fine building for foreign fossils, especially since a deliberate connexion between the two buildings has been provided. The Mineral Intelligence, and Mineral Statistics and Economics units must remain, having virtually been taken over by DOI. The penthouses which will become available when Hydrogeology moves to the Midlands or to Wallingford could usefully be divided between museum and palaeontology staff if part of the latter remain in London.

10 Relations with the Local Whitley Council have been cordial throughout. In 1966 I feared they might not ba; there was widespread opposition to the proposed move into the ReadingNewbury–Oxford triangle which had to be taken note of. However, Richard Melville, Frank Dimes and Reg Thurrell introduced me to the changes that had occurred since I was myself Treasurer of the Association and I have done my best to keep staff fully informed about developments and plans affecting them.

I notice with some dismay, however, that practically all negotiations involving finance are carried on at HQ or national level, without reference to the views of the director. en all the complex negotiations on UK field allowance and ship allowance my view was never sought. Field allowance has gone up from 7/6 per day when I was a geologist, to £8.10 (= 170/-) per day now, ie by a factor of 23, faster than inflation by a factor 23. Of course I an glad that my staff are better paid; but does this not introduce further vulnerability into the system? I say nothing of the wildly unreasonable overtime pay at sea, except that I would not have agreed to it.

I also have doubts about the concession which allows field officers to travel long distances to their homes at weekends. The dedication once called for is not there in this sense: it is mainly to be found in Overseas Division, and the officers of that Division are fast becoming aware of the fact.

11 Computing descended on us, as on most organisations, early in my term of office. The most useful thing it could have done for IGS, the coding and storage of the data from the hundreds of thousands of borings of which we hold the records, was worked on but found to be impracticable because of the large manpower requirements (chiefly of geologists) which I estimate as between 50 and 100 man-years. Geochemical data (for all who wish to participate) will soon begin tc go on magnetic tape.

Large storage capacity is also necessary and available for geomagnetism and seismology. Manipulation by computer under the G-EXEC programme devised by Vic Loudon's unit (which has won wide international acclaim) is a more encouraging story. I am sorry to have to say that I think that the NERC Automated Cartography Unit has proved that automated methods of making our geological maps from the field slips cannot come near to competing in cost or manpower with our well-equipped and staffed drawing offices.

12 Publishing is an area that still requires attention. The good work done with the Ordnance Survey by the late Vernon Wilson and more recently by Peter Sabine is gratefully acknowledged. The changeover to 1:50 000 as the principal publication scale has been smooth and efficient, and very large numbers of reprints at this enlarged scale have already appeared as well as many new and revised maps which have come out. An important new development is the Drift Map of Britain at 1:625 000 which will soon appear; Eric Edmonds has taken charge of the correlation of data for this, started by the late Tam Eastwood in London and later Talbot Whitehead in Edinburgh thirty years ago but abandoned. It will be criticised, but out of the criticism improved later editions will arise. The same is true of John Wright's Geological Map of the Continental Shelf, of which the second, much-amended edition will soon become available.

The creation of an Editorial Department with Arthur Simpson and Tim Dhonau from OGS, and Maud Briant from GSGB as the original nucleus has improved the flow of written publications, but the new Report series has not lived up to my expectations of it as a speedy publication medium. Fifty issues a year is still the desirable objective. There are few serious delays in publishing memoirs, bulletins and of Overseas Geology and Mineral Resources. The Annual Report has once appeared in June, and its performance is generally better than formerly thanks to the prompt submission of material from all units.

The other principal means of communicating with the general public is through the Museum. Once the problem of the curatorship was resolved, this has gone ahead fast to become what many visitors have defined to me as the finest exposition of the earth sciences in the world. Much credit is due to Fred Dunning and his staff for the Story of the Earth. It provided, with the visit of H H The Queen and the Royal Family one of the most memorable days is the 140-year history of GSM; literally millions of people have visited it since. The Museum, maintained very economically in comparison with its neighbours, deserves to be supported.

13 What of the future? The national need for earth science investigations of the highest possible quality is demonstrably greater now than it has ever been. In practical fields, the fossil fuels coma first. In addition to the IGS discovery of a hitherto unsuspected major coalfield (North Oxfordshire) there is much to be done in aid of the DOEn and the operators in the offshore gas and oil development and here the Institutes role is now clearly established and for a time should grow, particularly in stratigraphic nomenclature and structural synthesis. Like Oxfordshire, where NCB proving is just beginning, other new or extended coalfields will be developed and allowance shodd be made for extended stratigraphical/palaeontological advice to the Coal Board. Should the "hot rock" experiment by USERDA succeed, there will be a call for deep drilling into non-permeable strata at temperatures over 200°C and only the Institute has a broad enough picture of the subsurface to advise on the subsurface and control the drilling. Engineering Geology and Global Seismology units both have interests in dam sites, and the former is expected to contribute to the understanding of the stability of the sea bed.

In the valuable minerals area, the DOI programme arranged by Stanley Bowie has in a relatively short time (for this kind of work, as any metalliferous consultant knows, takes such time and patience) identified deposits of high promise in Shetland, S Uplands, Galloway, Bowland and elsewhere, but it would be very unfortunate and wasteful of previous effort if the DOI became

discouraged before the necessary proving by drilling had been done. Eventually I would see RMMU as an important asset for the Overseas Division. In general I identify the Overseas Division as a major growth area for the Institute, with potential yet to develop. The Hydrogeology unit is already a growing field in overseas work. At home, it should not, I suggest, seek to compete with the Central Water Research Organisation but should develop further itsework on, for example, deep groundwater as well as continuing to produce survey water data. The Bulk Minerals field will come under further pressure when the Report of the Verney Committee is published early next year; but see pars 7 for my view of what ought to be done about DOE financing.

14 Although I have frequently been critical of the fact that I was denied membership of, or direct access to my governing body (Council) in spite of my position as head of a multi-million pound organisation, this has in practice been mitigated by the close personal relationship I have enjoyed with Ray Beverton ever since he joined me on the CSP in 1965. The late afternoons spent in his office or mine solved many tiresome problems and: must record my deep gratitude, not least for his unfailing courtesy. Of the four chairmen of Council, each as had his particular preoccupation and only the present one has taken much interest in IGS; I record my thanks to Peter Kent for his fertile suggestions and his tactful conduct of Visiting Groups (devices not calculated to be popular with directors!).

The ADs, DGs and SPSOs have been wonderful people to work with and any achievement is eo be credited to them for they, and their loyal staffs have pue the flesh on the bare bones of all the plans that have come to fruition. I mention particularly Alan Archer, David Bleackley, Steve Buchan, William Bullerwell, Robert Eden, Howell Francis, Dave Grey, John Pallister, Jim Robbie, Peter Sabine, Sydney Shaw, Vernon Wilson and John Wright, the seniors among a host of other good friends. If I have learned to make decisions without a committee — something that no vice-chancellor or professor in my university felt able to do — it was because I have come to know what complete reliance could be placed on advice from these men and upon their acceptance of the verdict. To the two ladies who have as PAs run my affairs so smoothly, Diana Dagoati and Margaret Grundy I shall always be most grateful.

Finally, and with the greatest satisfaction, I welcome Austen Woodland as the Third and Fourteenth Director. Distinguished for the admirable spirit he engendered at Leeds, he has already proved that he has the qualities needed by the top administrator at IGS. I wish him very well.

Have we built a vast house of cards? I do not think so, but think IGS will stand unless Western Civilisation itself turns into a house of cards, and crumbles. Something of its essence might even survive that.

KINGSLEY DUNHAM CSO–1

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