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REPORT ON A VISIT TO

BOTSWANA

6 - 10 MARCH 1979

by

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OVERSEAS DIVISION

1 Proposal for a Mineral Exploration Project

- 1.1 The main purpose of my visit to Botswana was to discuss with the authorities and with our post possible projects involving mineral exploration programmes in the Kalahari. For this purpose I was accompanied by Dr D Masson Smith, Head of this Institute's Applied Geophysics Unit, and our visit constituted a follow-up to those of Drs D J Mallick and J D Cornwell which took place in November 1978. Mallick and Cornwell's objectives had been to consider the data which had recently become available consequent on the CIDA aeromagnetic survey of the Kalahari region, and to make recommendations for possible mineral exploration projects for implementation under the UK technical cooperation programme.
- 1.2 Consideration of Mallick's and Cornwell's reports and discussions with ODM led us to favour a mineral exploration programme in the Molopo Farms area of southern Botswana rather than tackle an area with considerably more sand cover and lacking any direct evidence of what might be causing the aeromagnetic anomalies disclosed by the CIDA financed survey. A reasonable amount of data is available on which to base a fairly detailed examination of the Molopo Farms area: this data includes ground magnetic and gravity measurements of part of the ground carried out by geophysicists (of whom Dr Masson Smith was one) of the former Overseas Geological Surveys in 1961; geophysical data obtained by commercial prospecting groups; and drill-cores also obtained by commercial prospecting parties and now deposited with the Botswana Geological Survey. In addition the area in general has a shallow sand cover and there are some rock outcrops. A further important consideration is access which is reasonably easy in the case of the Molopo Farms district: there exist other areas, eg the north-west corner of Botswana, west of the Okavango and north of the Ghanzi ridge, with equally interesting possibilities but overcoming the logistic problems would be extremely costly.
- 1.3 An outline proposal for a mineral exploration programme in the Molopo Farms district, to cover an area of approximately 20,000 sq kilometres, was therefore put to the Director of Geological Surveys, Dr C R Jones, at our initial meeting with him on 7 March. The project we outlined

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would have a substantial geophysical content (this was further quantified by Dr Masson Smith following examination of data in the Department and discussions with the Department's geophysicists) which would be carried out by IGS geophysicists, using IGS equipment for the most part, on a non-residential basis. Geological input would have to be on a residential basis with a geologist team-leader acting as the anchor man and supported by a field geologist. Initially the geologists would examine geological data and bore cores curated in the Geological Survey and this would be followed by fieldwork in the project area. The fieldwork would comprise detailed mapping of rock outcrops plus geochemical sampling and heavy mineral collection. Sampling and heavy mineral collecting on a grid system is envisaged with lines 2.5km apart. Bulk samples for heavy mineral separation would be collected at 500 metre intervals and samples for geochemical analyses every 250 metres. This would yield some 10,000 heavy mineral fractions and 25,000 geochemical samples which would be examined/analysed in the Geological Survey's laboratories in Lobatse or possibly in the GS10 Mobile Laboratory which may by then have completed its role in the Underground Water Evaluation Project. This phase, including the computer treatment of data, would take two years to complete.

- 1.4 The geophysical phase outlined by Dr Masson Smith would involve the extension of the gravity survey noted above to cover the whole project area aiming at a station density of two per square nautical mile. Ultra-basic rocks as distinct from most other sources of magnetic anomalies should produce positive gravity anomalies, and a combination of the aeromagnetic and gravity data should therefore lead to a more certain identification of the ultra-basic bodies. At a later stage seismic and possibly electrical methods would be used to measure Kalahari bed thicknesses and bedrock velocity and this would give additional information on the lithology. A synthesis of the data collected would lead to the siting of boreholes to identify structures causing anomalies and to confirm the validity of quantitative interpretations of the geophysical evidence. Because of the lack of motorable roads in most of the area, helicopter transport would have to be used.

- 1.5 The proposed work programme is as follows:

Year 1 : establishment of some 5,000 gravity stations at a density of 2/sq nautical mile followed by interpretation of data in the UK.

Year 1 - Geological: detailed examination of existing information in Geological Survey records and logging of bore-cores stored in the Department; fieldwork consisting of detailed outcrop mapping, geochemical sampling and heavy mineral collection; analysis of material collected.

Geophysical: establishment of some 5,000 gravity stations at a density of 2/sq nautical mile followed by interpretation of data in the UK.

Year 2 - Geological: continuation of programme as indicated for Year 1.

Geophysical:

Continuation of gravity survey with possible further 5,000 stations but number may be reduced depending on the data produced by the first year's work. This would be followed by the drilling of test boreholes of 2,000 metres total length: it would be essential to complete the drilling by the end of the second year of the project.

Year 3 - Geological:)
Geophysical:)

would commence with a synthesis of the data produced as a result of the two years' geological, geochemical and geophysical work. This would lead to the identification of targets for detailed geophysical study by gravity, magnetic and shallow seismic refraction profiling (total line kilometres about 200) followed by core-drilling of prospects (maximum of 4,000 metres). Cores would be logged and specimens analysed where necessary.

Year 4 - Geological:)
(first 6 Geophysical:)
months)

Evaluation of results and preparation of final report.

- 1.6 It is feasible, and on general considerations desirable, that the project should start at the beginning of April 1980.
- 1.7 The question of the Botswana Government counterpart contribution was reviewed with the Director of Geological Surveys. Housing for the two resident geologists would be provided by the Botswana Government at Lobatse but field and camping equipment would be the responsibility of the ODM. (The possibility that GSLO caravans will be available and suitable should be considered.) Fuel for ODM vehicles and the cost of maintenance would be BG responsibility and BG would also supply drivers and labourers for the various aspects of fieldwork such as line-cutting, preparation of camps, etc. Analytical facilities, as far as these could be spared from the day to day requirements, would also be supplied by the GSD (I said that if need be ODM/IGS could supply short-term staff support for the laboratories from IGS resources). The Botswana Government would supply core boxes in support of the drilling operations.

On 9 March Dr Masson Smith and I had a meeting with the Permanent Secretary, Ministry of Natural Resources, Mr Charles Tibone. Also present were the Director of Geological Surveys, the Principal Planning Officer, Mr Peter Agar, and the Ministry's Mineral Economist, Mr John Broawes (Ford Foundation). Dr Jones gave a resume of the developments leading up to our deliberations and I then outlined the general framework of our proposal for a programme of work in the Molopo Farms district. The Permanent Secretary expressed his Government's appreciation of ODM's willingness to help Botswana in developing her mineral resources, and said that in principle and subject to his

Minister's approval, the project as proposed was acceptable. He asked, however, that in considering the arrangements in detail, every effort should be made to make demands on Botswana Government resources as small as possible as those resources are already becoming very strained.

- 1.8 Dr Jones had previously warned me that the question of closing the Molopo Farms area to commercial prospecting during the tenure of the project was likely to be raised and the Permanent Secretary duly asked whether it would be our wish to have this done. I replied that heretofore the policy had been that we should not undertake projects in areas over which prospecting rights existed in whole or in part and I explained the reasons for this. The Minerals Economist expressed some disquiet at the suggestion that an area which had over the years been of interest to private organisations should be "sterilised" for three or more years. I, however, pointed out that commercial company prospecting had been unsatisfactory and largely ineffective and what was now needed was a comprehensive and thorough examination of the area's overall mineral potential. Such an exercise would be of substantial value to the Botswana Government in deciding its policies and priorities and would be well worth the three years' wait. It might, of course, be possible that some proportion of the 20,000 sq km area could be freed at the end of the second year of the project, either because of lack of mineral potential or because of sufficient indicated potential to enable the BG to grant exploration rights on very strict terms. The Principal Planning Officer asked at this juncture whether there would be any tie up between the project and British mining houses. I said that there would be none though we naturally hoped that British mining houses would show an interest in participating in any mineral development that might result from the project's work. Following some further exchanges in which I was supported by the Director, it was decided that the Permanent Secretary would discuss the matter with the Minister with a view to raising the question at the Minerals Policy Committee (the Director of Geological Surveys is a member of this Committee). The problem affects other aid donors in the minerals field - the West Germans, the Canadians and the Japanese at present - though I gathered that the latter, who have negotiated a project area in the north of the country, have not so far raised the question.
- 1.9 We met HE the British High Commissioner following our meeting at the Ministry of Natural Resources and informed him of the proposal we had outlined to the Permanent Secretary and of the discussion regarding private prospecting in the project area. Mr Turner was happy to note that our initiative in the minerals development field is being maintained and he could see no objection to the Molopo Farms proposal as briefly described to him. He reviewed with us the reasons why it would be desirable to close the project area to private prospecting and advised us on the points that should be put to the Minister of Natural Resources when we saw her later that afternoon.
- 1.10 We saw Dr Chiepe, Minister of Natural Resources, at the Paliament Building at 2pm on 9 March. Her Permanent Secretary, Mr Tibone, and the Director of Geological Surveys were also present. The meeting lasted for twenty minutes during which time I outlined, much as I had done to the Permanent Secretary earlier, our proposal for a mineral exploration project in the Molopo Farms area. I explained why our choice at this particular time had fallen on this area in preference to Ngamiland (NW Botswana) and its logistic problems and said that at a later stage we

might be prepared to consider another project there. The Minister welcomed our proposal. When the Permanent Secretary raised the question of closing the project area to private prospecting, the Minister said that she would need to consult her colleagues in the matter and that it would probably be appropriate for the Minerals Policy Committee to consider it. The meetings of the Minerals Policy Committee are ad hoc and I gathered that an early pronouncement is likely.

- 1.11 The Director of Geological Surveys informed me that the Government will wish to have the project proposal finalised in Botswana so that it may include itemised figures of expenditure for both the UK input and the counterpart contribution. A draft proposal is being prepared: the cost to UK TC funds is likely to be of the order of £980,000 roughly made up as follows:

Staff Costs

- | | | |
|--------------------------------|-------------------------------|----------|
| (a) Residential : | PSO, 3½ man-years) | £175,000 |
| | HSO, 3½ man-years) | |
| (b) Non-residential : | SSO, 3½ man-years @ £20,000 = | £70,000 |
| (inc passages, honoraria, etc) | SO, 4 man-years @ £18,000 = | £72,000 |

Field Costs

	£
(a) Vehicles	35,000
(b) Camp Equipment	15,000
(c) Telecommunication equipment	2,000
(d) Helicopter hire, 1,000 hours	60,000
(e) Core drilling, 6,000 metres @ £80/m	480,000
(f) Short-hole drilling for seismic work	5,000
(g) Explosives for seismic work	5,000
(h) Preparation of final report	1,000
(j) Contingencies	20,000
(k) Field and Laboratory equipment, augers, samplers, etc	20,000
(l) Repair/replacement, geophysical equipment	20,000
	<hr/>
	£980,000
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2 Staffing Matters

2.1 Discussions at the Geological Survey Department

- 2.1.1 Director of Geological Surveys: Dr C R Jones (seconded officer) informed me that he would welcome a transfer from his present post at the end of his current tour which is due to end in February 1980. He might, however, for personal reasons wish to extend his tour by three to four months. I said that it was not possible to foresee what alternative postings would be available in mid-1980 but that there might be organisational changes in which he could be involved.
- 2.1.2 Deputy Director: Dr R D Walshaw (seconded officer) will complete his current tour on 6 November 1980 and does not wish to return for further duty in Botswana.
- 2.1.3 Assistant Director: Dr G C Clark (seconded officer) commenced his present tour at the end of last January and will therefore be due for leave in July 1981. In view of the fact that the Deputy Director post will become vacant in the previous November, I asked him whether he would accept promotion to that post if offered. He said that he would be prepared to do so provided the duties could be varied so as to have a greater scientific content than is at present the case. Such a change is desirable but has not been feasible so far owing to the lack of Botswana officers who should be handling many of the administrative chores at present dealt with by the Deputy Director.
- 2.1.4 Principal Geologist: Dr R M Key (seconded officer) whose tour ends in March 1980 would also like a transfer from Botswana where he has now served for 4 years. From the point of view of his career it is desirable that he should move elsewhere so as to widen his experience but his departure would be a distinct loss to Botswana in whose geology he is so well versed.

2.2 Other Staff

- 2.2.1 Dr D Gould (seconded officer) has also served in Botswana for 8 years and it is desirable that he should move elsewhere or at least undertake different duties from those he has at present. His tour ends in April 1980 and he asked that he be considered for the post of Team Leader of the Molopo Farms Project if this materialises. This, of course, would mean that he continues to work in Botswana but his duties would be very different from his present work, and from the scientific viewpoint he is very well suited for the position of team leader. The Director of Geological Surveys thought that the Botswana Government would not object to Dr Gould being appointed as team leader.
- 2.2.2 Mr J Davies (OSAS contract, Hydrogeologist) asked for an interview and informed me that he is now looking for a permanent appointment with career prospects. He sought information on appointments in IGS to work overseas under the EHB arrangement and I told him to telex Dr Wright, Hydrogeological Adviser, who might be looking for experienced hydrogeologists at the present time.
- 2.2.3 Mr J Butterworth (Senior Chemist, OSAS contract) sought an interview and asked whether I was aware of rumoured plans to disband the Overseas

Services Aid Scheme. I said that I had heard of no such plans though I had been informed that ODM were considering a proposal to reorganise the terms of service of personnel working in various roles under the aid programme overseas. This reorganisation, if carried out, might affect OSAS in some ways but I would be most surprised if that meant the end of the arrangement.

- 2.2.4 Mr G McKewen (Technical Records Officer, OSAS contract) sought information regarding ODM's In-service Training Scheme. He intends to apply for an award to study for the MSc degree in Information Science starting in September 1982, ie following the completion of a second tour of duty in Botswana (he will complete his first tour next November). I gave him an outline of the basic requirements for an ISTS award, and said that one of the problems would be the likelihood of a post overseas in late 1983 which would be one of the considerations in considering his application. But we realised that all this is some time ahead; in the meantime I said I would ask ODM's Information Department to let him have any available papers on information dissemination.

I had good reports of Mr McKewen's work and he is held in high regard by the Director not least for his abilities as an editor.

- 2.2.5 Mr D Hutchins (Senior Geophysicist, OSAS contract) complained, as did other contract officers, about the reduction in the OSAS supplement which reduction was apparently back-dated to last July. The figures shown to me by Mr Hutchins appeared to show that the supplement payable to single officers on the Botswana PR2 scale is now less than that paid to single officers on the lower PR3 scale. There may be sound reasons why this should be so but I had to confess that none of these were apparent to me at the time of our discussion. Mr Hutchins is returning to the UK on leave in April and intends to discuss the situation with PSE, ODM.

- 2.2.6 Mr J Lewis (Chemist, OSAS contract) completes his tour of duty at the end of next July and had intended to read the Loughborough University MSc course in Water and Waste Engineering for Developing Countries starting in October 1979. An application for an ISTS award had been submitted (correspondence with Mr R A Ribeiro on ODM file OSD/P2221). Unfortunately Loughborough University had been forced to delay the start of the course until 1980, blaming ODM's tardiness in guaranteeing support. Mr Lewis is therefore faced with the prospect of unemployment until October 1980, assuming that the course does start then, or of undertaking full-time research leading to the award of the MSc degree at Loughborough. The University authorities are willing to accept him as a research student in the Water and Waste Engineering Department but Mr Lewis will be unable to take up the offer unless funding can be found for him.

I am not conversant with job opportunities in water and waste engineering in developing countries (though I am aware that Mr Lewis carried out a useful role in this field on behalf of ODM in Swaziland recently), but I would have thought that there is a requirement for such experts. Mr Lewis has developed a keen interest and zeal in this field and if it is possible for an ISTS award to be made available for him to undertake a one year MSc research project, then I would strongly support his candidature.

- 2.2.7 Mr J Farr and Mr C Cheney (GS10 seconded officers). I conducted Job Appraisal Reviews with these two officers and will be reporting separately

to the IGS Establishment Officer.

3 Discussions at the Ministry of Mineral Resources

- 3.1 Following the discussion regarding the Molopo Farms project proposal on 9 March at the Ministry of Natural Resources, I reviewed the general staffing situation in the Geological Survey Department with the Permanent Secretary. I mentioned the possibility that Dr C R Jones might relinquish the post of Director in the first half of 1980 and I said that if the Ministry so desired we would be able to second a well-qualified officer from IGS to replace him. I also said that Dr Walshaw would almost certainly relinquish the Deputy Director post in November 1980 by which time the new Director would have had enough time to play himself in. The Permanent Secretary asked whether I had any suggestion as to Dr Walshaw's successor and I said that I felt the post should go, on merit grounds and in accordance with normal Civil Service career progression, to the Assistant Director, Dr Clark.
- 3.2 The Permanent Secretary then asked whether there exists a formal arrangement between IGS, through the ODM, and the Botswana Ministry of Natural Resources for the filling of posts in the Geological Survey Department. I replied that so far everything had been on a purely informal basis and that we had responded whenever the BG asked ODM to fill a post. This system has worked perfectly well up to the present and there have been no serious gaps in the occupancy of any of the Department's managerial posts. This the Permanent Secretary accepted but he felt that the arrangement should now be placed on a more formal basis and in a fashion alike that existing between the Ministry and the Canadian Government who guarantee to fill the Mines Department managerial posts until such time as localisation can take place. The Permanent Secretary said that the Ministry would like a training commitment to be included in any formal agreement to fill GSD posts, again on the lines of the Canadian agreement which allows for the training of Batswana from the pre-"A" level stage through to graduate studies. I replied that subject to ODM's concurrence the IGS would welcome a formal agreement to fill certain GSD posts as this would facilitate our manpower planning (at present we are not certain until very often the last moment that we will be expected to fill a post). With regard to the question of training Batswana to take over GSD posts, I said that IGS is not a training establishment and that we have no means of making UK universities accept students for particular courses. The Permanent Secretary said that they had in mind selecting up to six candidates with good "O" levels, particularly in science subjects, and then proposing these for "A" level courses in the UK followed by university undergraduate geology courses or technician training schemes as appropriate depending on "A" level examination results. I informed the Permanent Secretary that provided ODM agreed, it would be possible to arrange "A" level training at Polytechnics or Sixth Form Colleges followed by university or further Polytechnic courses as the case might be.
- 3.3 It was therefore agreed that the Permanent Secretary would write to our High Commission requesting a formal agreement, as indicated above, the agreement to include arrangements for training Batswana in the UK so that there can be a gradual localisation of the GSD posts. Such an agreement has much to commend it and I recommend that the Botswana Government proposal be accepted. The training request is very important

and deserves the most serious consideration: much of the difficulty faced by developing nations in training earth scientists is due to the complete inadequacy of "A" level (or its equivalent) training in the science subjects particularly Mathematics, Physics and Chemistry, and the arrangement outlined above should go a long way towards overcoming that problem. I estimate that the trainees of university calibre would have to spend from five to six years in the UK but I consider that the cost would be money well spent.

4 Meeting at the Office of the Director of Personnel

- 4.1 We saw the Director of Personnel following our discussions at the Ministry of Natural Resources on 9 March, and reviewed the staffing situation in the GSD. There are 12 UK officers serving in the professional grades in the GSD; six of these are on secondment from IGS and the other six are on contract. In addition there are four UK officers serving on contract in the technical grades.
- 4.2 I informed the Director of Personnel of the proposal for a formal arrangement for secondments put forward by the Permanent Secretary, Ministry of Natural Resources, and I also informed him of the senior staff changes likely to take place in 1980. The Director expressed his appreciation of the support given to the GSD and hoped that this would continue. He stressed that in any arrangement entered into there should be provision for an adequate period of handover. I assured him that there is every intention of continuing support to the GSD and that the question of adequate handover will not be overlooked.

5 Meeting with HE the British High Commissioner

- 5.1 A mention of our discussion with our High Commissioner relating to the Molopo Farms proposal has already been made at paragraph 1.9 above. In the general context of minerals development in Botswana, Mr Turner said that he had visited the Department of Industry while he was on UK leave recently to discuss the possibility of interesting UK mining houses in Botswana's prospects. He had, however, been disappointed at the Department's lack of information pertaining to Botswana's minerals potentiality and he asked whether there is any means of redressing the balance. I told Mr Turner that there had already been correspondence between DOI and IGS on this question, clearly prompted by his visit to the Department, and that I expected there would be further developments shortly. We noted, however, that so far there have been no TC projects in Botswana concerned directly with mineral exploration from which information could have been fed to the DOI and thence to the UK mining houses. The Molopo Farms proposal if implemented will be the first in the field and I mentioned to the High Commissioner RTZ's involvement in a copper prospect identified by our TC project team working in North Sumatra.
- 5.2 I gave the High Commissioner a brief resume of the senior staff position as it affects the GSD and we noted that there will be no significant changes until next year. I mentioned the approach made by the Permanent Secretary, Ministry of Natural Resources for a formal agreement covering

the filling of certain GSD posts and for training Batswana in the UK.

- 5.3 Mr Turner noted that the problem over the disparity between field subsistence rates payable to OSAS and TC officers had still not been overcome and he asked me to continue to press ODM for a solution. I have already written to the Head of the Overseas Manpower Department on this subject.

6 Acknowledgements

We should like to thank Dr C R Jones for the excellent arrangements he made for our visit and for his kind hospitality. Our thanks are also extended to the members of his staff for their ready help in drawing together our project proposal.