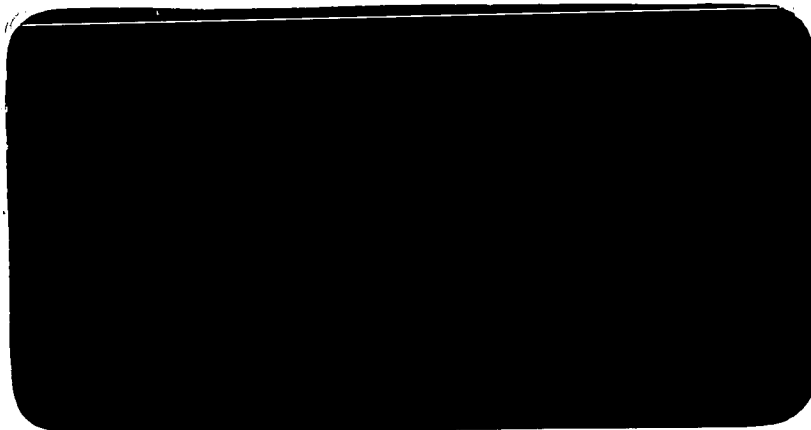




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REPORT ON ADVISORY/INSPECTION VISITS TO
PAKISTAN AND KENYA

BY

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2 - 24 NOVEMBER 1981

Report No. 81/15

Report on a Visit to Kenya, 15 - 24 November 1981

1. Summary

- 1.1 The Samburu-Marsabit geological mapping and mineral exploration project is proceeding satisfactorily but it is likely that there will be an overrun of Phase 1 by between 6 and 12 months.
- 1.2 It is recommended that a full-time residential geochemist be appointed, under TC arrangements, to the team.
- 1.3 In view of its high petrol consumption consideration should be given to exchanging the project's Bedford 5-ton lorry for a more economical vehicle.
- 1.4 It is recommended that the post-graduate training award in Hydrogeology stipulated in the MOU be varied to an award in Applied/Geochemistry/Mineral Exploration.
- 1.5 A 3 months' training award is recommended for one counterpart field geologist annually starting in 1982, to enable attendance at the Photogeology and Remote Sensing course held at the Overseas Division, IGS.
- 1.6 Another 3-4 months' award is recommended for Mr F.K. Muruga to obtain practical experience in applied geochemistry with IGS.
- 1.7 The supply of a small number of text-books for the project team is recommended.

2. Itinerary

- Sunday 15 November: arrived Nairobi 2330 hours from Karachi.
- Monday 16 November: Nairobi, at the Mines and Geology Department. Discussions with Dr Hackman, Team Leader, members of the Samburu-Marsabit Project team and Mr J Wachira, Acting Chief Geologist.
- Tuesday 17 November: Nairobi, meeting with Mr C.Y.O. Owayo, Head, Mines and Geology Department; further discussions with Samburu-Marsabit project team, including Mr Siambi, Co-Leader.
- Wednesday 18 November: Meeting at British High Commission, present Messrs. Hemans and Kerr, BHC, Mr Siambi and Dr Hackman, Samburu-Marsabit Project. Lunch hosted by Mr Hemans. Afternoon, continued review of project work at the Mines and Geology Department. Evening, reception given by IGS officers in Dr Hackman's residence.
- Thursday 19 November: morning, discussions with Dr Hackman, afternoon, travelled to Naro Moro Lodge, near Nanyuki.
- Friday 20 November: field inspection with Mr Machira, Acting Chief Geologist, Mr Siambi, Dr Hackman and Mr Charsley. At Samburu Lodge overnight.
- Saturday 21 November: field inspection of Dr Key's mapping area, including manganese occurrence. Overnight at Colcheccio Lodge.

Sunday 22 November: inspection of graphite prospect with Samburu-Marsabit team and with Mr Frank Almond, ITIS and Mr D Briggs, IGS. Returned to Nairobi in the evening.

Monday 23 November: at Mines and Geology Department; inspected laboratory facilities; further discussions with Dr Hackman and Mr Siambi. Round-up meeting with Mr Owayo. 2330 hours departed Nairobi for London.

3. The purpose of my visit to Kenya was to review the progress of the Samburu-Marsabit geological mapping and mineral exploration project started at the end of 1980 and now therefore at the end of its first year of operation. The ODA/IGS team is led by Dr B.D. Hackman and the other members are Mr T.J. Charsley, Dr R.M. Key and Dr A.F. Wilkinson, geologists and Mr G Wood, Higher Grade Cartographer. I talked to each team member and had discussions with the Head of the Mines and Geology Department, the Acting Chief Geologist and with each counterpart geologist. I also had a meeting with Mr Hemans and Mr Kerr at the BHC and a brief discussion with Mr P.C. Duff, Head of EADD.

4. Fieldwork

4.1 The area investigated so far amounts to almost the whole of that covered by degree square no. 36, i.e. some 12,200 sq.km and one-quarter of the scheduled Phase 1 ground. As this has taken up almost one-half of the time available for Phase 1 there is understandable concern felt that it will not be possible to complete the four degree squares by the end of 1982. This will almost certainly be the case though there should be an appreciable speeding up of the fieldwork from now on, for reasons which will be noted later.

4.2 The rate of progress so far has been governed by the number of parties which could be maintained in the field. As training plays such an important part in the project, UK and Kenyan geologists have up to the present, worked alongside each other so that there could be the maximum opportunity for the transfer of know-how. Henceforth however, Dr Hackman plans to have, instead of 4 field-parties, seven mapping units in operation and possibly eight when he is able to do fieldwork himself. This will not result in an outright doubling of the rate of geological mapping and prospecting as the British geologists will have to monitor and advise the Kenyan geologists, but there should be a considerable speeding up by comparison with the first year's output.

4.3 Other factors which have affected the rate of progress are the need to establish field routines, the sorting out of logistic problems and the initial delays in commencing fieldwork due to first arrival problems such as housing, licensing of vehicles, etc. One delaying factor which is still present is that concerning supplies of fuel for the project's vehicles and in explanation of this I quote the following from Dr Hackman's report for the quarter ending the 30 September 1981:

The following factors were responsible for the difficulties.

- (i) The fuel supply depot at Naro Moru refused to honour LPO's for fuel because of non-clearance of earlier debts e.g. in September the amount of Kshs 7,000 was recorded as outstanding since July.

- (ii) The government supply depot in Nairobi also temporarily ceased issuing fuel due to an accumulation of uncleared debts.
 - (iii) Availability of imprests from MENR, specifically to pay for casual labour and fuel, was sporadically restricted, particularly during July, again due to delays in repayment procedures.
- 4.4 In an attempt to improve this situation the Project Co-Leader has assumed responsibility for fuel supplies; one method of doing this would be to supply the project with a standing imprest so that petrol and diesel oil could be purchased for cash as and when required. The Kenyan authorities have however, declined to accept this proposal.
- 4.5 One unknown element in these considerations is the publications issue. The work must be properly and promptly written up and to do this expeditiously will probably pose problems as our past experience has been that counterpart geologists encounter very considerable difficulty in report preparation. This is something that Dr Hackman is well aware of and he is also cognisant of the fact that this is an aspect of the training that must not be glossed over.
- 4.6 The extent of over-run is therefore difficult to assess; Dr Hackman in his Annual Report indicates that this may amount to 1 year but hopefully this estimate is on the high side and with an accelerating field programme something of the order of six months may suffice. A more accurate assessment will be possible at the time of the project review in April 1982 and consideration will have to be given to the following:
- (a) should the proposed Phase II go ahead? if so
 - (b) would it be possible to complete Phase II in less than the 2 years originally envisaged? There are some grounds for thinking that this could prove to be so as less detailed attention will need to be given to appreciable stretches of the area than is required in the case of Phase I;
 - (c) if it accepted that Phase II could be completed in less than 2 years then it may still be possible for both phases to be accomplished in the original 4 year period proposed. In that case the team-members could proceed on leave at the end of two-year tours, i.e. before completion of the Phase I programme, and then return for a further two years.
- 4.7 The portents for a Phase II are promising; the main question marks Ranging over the area concerns security and so far there do not appear to be grounds for alarm. The Kenyans' ability to sustain their counterpart obligations is the other important factor and this has been encouragingly good apart from the fuel problem. From the scientific point of view the work programme is well thought out and the project team is of high calibre and full of enthusiasm. From my discussions with the Kenyans it is clear that they are most anxious that Phase II should go ahead.

5. Laboratory Work

- 5.1 The Mines and Geology Department does not have a properly qualified geochemist on its staff and owing to the financial restraints present when the project was drawn up, it was not possible to include a geochemist in the British team. Instead it was arranged that this important aspect be catered for by providing specialist input on a short-term basis, from the Overseas Division of IGS. This has been effected by visits from Dr Ridgway who has set out a field sampling procedure and organised a laboratory routine. Following pressure from Dr Hackman and Dr Ridgway, a Kenyan was detailed by the Mines and Geology Department to act as a counterpart to the latter (and thereby receive training in applied geo-chemistry) and to perform the duties of a liaison officer between the project team and the laboratory staff during the intervals between the geochemist's visits. This arrangement, although the best that could be devised in the circumstances, has not worked well and the situation has been further exacerbated by the departure of the officer concerned to read a post-graduate course at Nairobi University. A replacement has been provided but he will have to start from scratch having only had the benefit of a very short instruction period from Dr Ridgway prior to the latter's return to the UK.
- 5.2 In view of the fact that geochemical prospecting is all important in a mineral exploration project such as this, I feel that the most serious consideration should now be given to providing additional TC funds to enable the appointment of a full-time residential applied geochemist. Dr Hackman and Dr Ridgway agree with this view and Mr Owayo was enthusiastic particularly as the training aspect will be very considerably enhanced.
- 5.3 Dr Ridgway was performing his second assignment with the project during my visit to Kenya and he will be submitting a report on his work in due course. One or two deficiencies in the geochemical laboratory will be noted and he will suggest ways of over-coming these.

6. Cartographic Services

- 6.1 The inclusion of a cartographer in the UK team has proved very successful and Mr Wood has made most satisfactory progress with his unit in the department's drawing office. An appreciable upgrading of the drawing office capability has resulted from the installation of equipment supplied by ODA; a few items are still en route from the UK and when these have been received Mr Wood will commence instructing his two counterparts in scribing techniques.
- 6.2 The work load of the unit assigned to the project's draughting requirements will increase considerably as the 1:50,000 geological sheets are received from the geologists and it is doubtful whether the present complement of two Kenyan draughtsman and Mr Wood will be able to keep abreast. Dr Hackman has therefore suggested to Mr Owayo that at least one more trainee draughtsman be assigned to the project; so far this has not been agreed to.

7. Transport

- 7.1 The project's Landrover fleet has operated satisfactorily, fuel problems apart, except that one vehicle suffered considerable damage as a result of a driver-induced accident. The vehicle was under repair at the time of my visit and it is understood that the driver is being surcharged with the cost.
- 7.2 There is some dissatisfaction with the Bedford 5-ton truck's high fuel consumption and this vehicle is used as little as possible usually only for moving camps. A diesel-engined lorry would have been cheaper to run but diesel fuel is not so easily procureable in the rural areas as is petrol. The possibility of exchanging this lorry for a less "thirsty" vehicle might be considered though there are clearly several problems which might make an exchange impracticable.

8. Training

- 8.1 On-the-job training is proceeding as a routine for the counterpart geologists and for the most part this has been received enthusiastically. Report writing and map preparation are aspects which will shortly come to the boil as the maps and accompanying reports for the 50,000 scale sheets making up degree square no. 36 are to be finalised as far as is possible, before embarking on further fieldwork.
- 8.2 The question of formal training in the UK for the counterpart geologists was discussed with the project co-leader and with the Head of the Mines and Geology Department. I pointed out that in the MOU overseas training in Applied Geophysics and Hydrogeology for two Kenyan members of the team is included amongst its provisions: Mr Owayo said that as the department's hydrogeological responsibilities had now been completely handed over to another ministry he would like the two training awards to be in applied geophysics and applied geochemistry/mineral exploration. I said that I foresaw no difficulty over this though there may however, be a problem in identifying a suitable candidate for training in applied geophysics from amongst the present counterparts as a sound knowledge of physics and/or mathematics is required. Mr Owayo however, thought that a suitably qualified man was already available in the department and he would confer with the Chief Geologist and Dr Hackman about him.
- 8.3 For the department's immediate needs and recognising that post-graduate training might take almost 3 years to mature, Mr Owayo asked whether Mr Muruga a geologist who is interested in applied geochemistry and has had some experience in this field, could spend 3 to 4 months with IGS in the UK to gain broad experience. I said that IGS would probably be able to offer suitable training provided a British Council award could be organised for Mr Muruga and I recommend that favourable consideration be given to this request.
- 8.4 Training in photogeology and remote sensing techniques would be of considerable benefit to the counterpart field geologists who make almost constant use of air photographs in the course of their work. The ODA sponsored 3 months' course run annually by the Overseas Division of IGS would be ideal for them and I recommend that a training award be provided for one counterpart for the next course due to start in August 1982.

8.5 A course in management techniques would be most useful for the project co-leader and this possibility was discussed with the head of department. Such a course is on offer in Kenya and it is possible that Mr Owayo will arrange for Mr Siambi to attend one.

9. Library facilities

9.1 Dr Hackman raised with me the difficulty of access to up-to-date publications and asked whether a reasonable number of text-books could be supplied for the project and kept by the team until the conclusion of work when they would be handed over to the department's library. I believe this request to be very sensible and I recommend that a sum of around £500 be allocated from the aid provision for the purchase of books. Dr Hackman will draw up a list of suggested volumes for consideration.

10. Discussions with the Head, Mines and Geology Department

10.1 I had two meetings with Mr Owayo, the first with the Chief Geologist and the Project Leader and Co-Leader present and the second on our own. At the first meeting we noted that good progress had been made but that it seemed unlikely that Phase 1 would be completed in the time allotted. I thanked Mr Owayo for his department's cooperation and said that the way things were going it seemed as if the omens for Phase II were promising. A final decision would however, depend on a formal review of the progress achieved in Phase 1 and other factors such as security. Mr Owayo expressed his appreciation of the work accomplished so far which had resuscitated the department's mapping activities in suspense almost since independence was achieved. He went on to ask whether Phase 1 would be allowed to overrun and if so would Phase II also be carried out. I replied that I would recommend to ODA that funding for an overrun of Phase 1 be provided but that the question of Phase II would depend on the outcome of the review I had already mentioned.

10.2 Mr Owayo said that he was very impressed by the excellent report submitted by Dr Ridgway following his first assignment as visiting geochemist.

10.3 In my round-up meeting with Mr Owayo there was a frank exchange of views regarding the position and responsibilities of the project co-leader and on one or two other matters which he (Mr Owayo) had raised previously with Dr Hackman. The co-leader, Mr Siambi, although a man of some experience - he worked with Dr Cannon on the Coastal Geology Project for 3 years for instance - is still on the basic Geologist grade and the lack of promotion is doing nothing to help his status nor his confidence. Mr Owayo promised to do everything possible to resolve this problem and he recognised that unless something was done there was a danger that Mr Siambi would leave the department. It was further agreed that we would look at the matter again during the course of the review in April 1982 and in the meantime I promised to send Mr Owayo a note supporting the case for Mr Siambi's upgrading.

10.4 The question of a resident applied geochemist was discussed and Mr Owayo fully accepted the case for such a post. It was left that I would seek approval for the appointment.

11. Discussion at the British High Commission

11.1 I was accompanied by Dr Hackman and Mr Siambi to the BHC where we met

Mr Hemans and Mr Kerr. The project's progress was reviewed and the likelihood that Phase 1 could not be completed by the end of 1982 was recognised. I mentioned the need for a resident applied geochemist and Mr Hemans said that he would take note of this and also of my recommendation regarding providing some text-books for the team.

11.2 Mr Hemans raised the question of follow-up work on any mineral occurrences noted as a result of the project's investigations and asked whether the stage had been reached where consideration might be given to drilling. We replied that this stage had not been reached, as the geochemical data was far from complete, but that several interesting shows did occur which merited further examination possibly on a "task-force" basis. We briefly reviewed the merits of an in-house drilling facility vis-a-vis contract drilling and Mr Siambi observed that he believed all his department's rigs were tied up with UN Revolving Fund work in the Nyanza region. If drilling was to be considered in the project area his department would not be in a position to undertake the work and the meeting therefore recognised that consideration might have to be given to providing additional TC funds for this purpose. In this context Mr Hemans mentioned the possibility of supplying a drilling rig to assist in geothermal exploration in the Rift Valley (this was to be discussed during Dr E.P. Wright's visit to Kenya in December 1981).

12. Acknowledgements Dr B.D. Hackman made excellent arrangements for my visit and I am most grateful to him for this. I also thank him, his UK colleagues and Mr Hemans for the kind hospitality extended to me and I thank Miss Edwards, ODA for her help in arranging my visit.

Report on a Visit to Pakistan, 2 - 14 November 1981

1. Itinerary

- Monday, 2 November: arrived Rawalpindi thence by road to hotel in Islamabad. Discussions with Mr Peter Watson, Project Manager, Hazara Phosphate Project and with Mr Brian Eddy, British Embassy.
- Tuesday, 3 November: morning, further discussions with Mr Eddy and Mr Watson followed by visit to Development and Planning Division, Ministry of Planning; afternoon, by road to Peshawar; evening, discussion with Mr Malik, Director (Minerals) Sarhad Development Authority (SDA).
- Wednesday, 4 November: 0800 hours departed Peshawar by road for Chitral, arriving 1900 hours.
- Thursday, 5 November: discussions with Mr Malik, Director (Minerals) SDA, Mr Khan, Chief Geologist, SDA and local SDA officials; obtaining various permits from the Deputy Commissioner's Office; visited antimony reduction plant; viewed site of Krij antimony prospect; visited Lotkoh locality and inspected hot-water springs.
- Friday, 6 November: Moslem Sabbath; visited Kalash Valley
- Saturday, 7 November: Chitral to Peshawar by road.
- Sunday, 8 November: morning, brief discussion with Mr Azim Khan, SDA; afternoon, travelled Peshawar to Abbottabad.
- Monday, 9 November: at Abbottabad; discussions at British Mining Consultants' Hazara Phosphate Project office with Project Manager, Project Geologist and SDA officials. Then to Tarnwai to inspect Lagarban Phosphate investigations.
- Tuesday, 10 November: morning, visited Kakul Phosphate Mine; afternoon, inspected SDA chemical and mineralogical laboratories in Abbottabad.
- Wednesday, 11 November: Abbottabad to Besham; inspected mineral prospects being investigated by SDA geologists.
- Thursday, 12 November: Abbottabad to Islamabad by road. Visited British Embassy for discussion with Mr Eddy.
- Friday, 13 November: on 0600 flight from Rawalpindi to Quetta arriving 0830. At 1100 hours meeting at Pakistan Geological Survey Department headquarters. Afternoon, shown around the Department's facilities.

Saturday, 14 November: Quetta - Karachi.

Sunday, 15 November: Karachi - Nairobi, Kenya.

2. Apart from the Hazara Phosphate and the Saindak Copper Projects there has not been any appreciable involvement, under the U.K. aid programme, in Pakistan's mineral resources field. Assistance of a minor nature has been rendered to the country's Geological Survey Department over the years since 1977, mainly in improving the department's geological mapping standard, and there have been two or three tentative approaches for cooperative geological mapping and mineral exploration programmes. For a number of reasons these have not been seriously considered and the matter was not pursued during my brief call on the Geological Survey Department in Quetta.

3. The Saindak Copper Project is still active but without any U.K. involvement at the present time and the Hazara Phosphates programme is currently the only beneficiary of U.K. aid in the minerals field. The investigations are being carried out by British Mining Consultants (BMC) in association with the Sarhad Development Authority (SDA): the project is being monitored by Mr S.D. Day, Mining Adviser who accompanied me to Abbottabad (and to Chitral). He is reporting separately on his visit.

4. The SDA has accorded a high priority to mineral development in the North-West Frontier Province with its main aim the establishment of phosphate mining at the Kakul and Lagarban localities. In addition increasing efforts are being directed at occurrences of base-metals in other areas of the Province and a request for U.K. aid in up-grading the SDA's exploration unit activities in connection with certain mineral prospects then under examination, was discussed with Mr Day during his visit to Pakistan in August 1981. Subsequently this request was formalised and it was agreed that an economic geologist from IGS should undertake a visit of about 2 months or so to advise the SDA regarding the evaluation of lead, zinc, molybdenum, chromite and cobalt mineralisation in the Besham area and antimony, gold and scheelite mineralisation in the Chitral district. The timing of the economic geologist's visit was to have been in October/November so that he could complete his assignment before the onset of heavy snow. In the event delays in obtaining formal Pakistan Government acceptance of the officer proposed for the work has resulted in the postponement of the visit until April/May 1982. My visit to Pakistan, which was to have been performed on the way back from attendance at an ESCAP Committee in Bangkok, was to enable familiarisation with the NWFP in general and the Hazara Phosphate project and the Chitral and Besham areas in particular. The opportunity was also taken of paying a courtesy call on the Geological Survey of Pakistan at Quetta.

5. Ministry of Planning

5.1 Mr Day and I met Mr Tajammal Hussein, Deputy Chief, (Minerals), Development and Planning Division on the morning of the 3 November. The problems encountered in attempting to obtain clearance for the economic geologist's visit were rehearsed by Mr Hussein and it transpired that formal approval had still not been given. I accordingly informed Mr Hussein that in view of the approach of winter the visit would have to be postponed until the spring of 1982. (Formal clearance for the visit has since been received).

5.2 Mr Hussein emphasised his Government's wish to provide job opportunities in the NWFP and in Baluchistan through the establishment of mining operations. He mentioned that in Chagai sufficient good quality iron ore (45% Fe capable of beneficiation to 66% Fe) is available (Japanese estimate of 20 million tons but probably 100 million tons nearer the truth) and a literature survey is underway to determine whether any further investigatory work is required before proceeding to a feasibility study.

5.3 Development of the Saindak copper ore bodies was to be by means of a joint venture between Pakistan and a consortium of Yugoslav, French, Swedish and Canadian interests. No further details were divulged by Mr Hussein but he did say that a coordinating committee under the chairmanship of the Minister of Finance, had been set up to deal with Saindak matters.

5.4 I mentioned to Mr Hussein the possibilities, mentioned above, of collaborative mineral exploration programmes in Baluchistan but emphasised that everything depended on the availability of ODA funding. I went on to say that I did not intend to pursue these possibilities myself as Dr Jones, Regional Geologist for Asia and the Middle East would probably be in Pakistan early in 1982 and he would discuss the position then.

6. SDA Activities in the Chitral District

6.1 The Chitral District's remoteness has to a large extent, inhibited serious prospecting despite the fact that mineralisation in various localities has been common knowledge for a long time. In an attempt to evaluate the area's mineral possibilities, the SDA in 1974 commissioned Austromineral to examine the various known occurrences and to submit proposals for development. This programme, which is being paid for under a 12 year credit arrangement by the SDA, was completed in 1978 and on our return to Peshawar we were given a copy of the final report. Unfortunately however, the copy given to us lacks maps and diagrams (we were assured that these will be available for the economic geologist when he starts his assignment) and I am not therefore able to adjudge its merits but Mr Malik and his colleagues were unanimous in condemning it as being a waste of money. From my reading of the report this appears to be unfair as it contains a wealth of geological information on which it should be possible for the SDA's Minerals Division to base a reasonable evaluation programme. Possibly the Austromineral report is not sufficiently specific for the SDA staff who quite clearly are lacking in experience and more importantly, in self confidence. There is consequently much merit in providing the services of an experienced economic geologist initially for 2 to 3 months to put them on the right path.

6.2 The SDA's minerals effort is at present confined to the extraction of antimony ore from the Krij mine and its calcining at a wood and charcoal plant on the banks of the Chitral River some 8 miles NE of Chitral town. About 10 tonnes of ore are extracted monthly and this after calcining, provides some 1.27 tonnes of antimony tri-oxide yielding a monthly profit, so we were told, of approximately £800. The reduction plant is old and of a simple design but a new site has been acquired with electricity available so that an electric arc furnace is to be commissioned. This will enable a much larger throughput of ore and this in turn will necessitate the blocking out of more reserves than are at present available.

The SDA geologists do not appear to have the capacity to do this without guidance and it must be admitted that this is not an easy task as the antimony occurs in small pod-like masses which by their very nature are difficult to locate.

6.3 We were unable in the time available, to see anything of the scheelite (wolframite) mineralisation in a neighbouring area. According to the Austromineral report there is very little surface expression of this mineralisation (the SDA view is that very little effort was made to locate it) but there was apparently strong geochemical evidence for its existence. Guidance on the direction further prospecting should take will be expected from the IGS economic geologist during his forthcoming visit.

6.4 The copper possibilities of the Chitral district have not as far as is known, received much attention and this is an aspect which the SDA's Minerals Division should look at. Several granite/granodiorite bodies occur within the area and in one of these cut by the main road to Chitral, copper mineralisation was plainly visible.

7. Mineralisation in the Besham area (Kohistan)

7.1 In company with Mr Day and accompanied by Dr Ashrif Khan, Chief Geologist, Hazara Phosphate Exploration Project I was taken on a day visit to the Besham area from Abbottabad, along a route which for part of the way lies along the Karakoram Highway. This area, rugged and mountainous like Chitral, has several occurrences of base metals and the SDA Minerals Division is more active here than appeared to be the case in Chitral. We were told that one lead-zinc horizon had been traced over a distance of two miles - we were unable to examine this mineralisation - and another occurrence on the banks of the Indus north of Besham was being opened up at the time of our visit. This revealed interesting lead-zinc-copper mineralisation, probably along a fault-zone as is almost certainly the case with the other occurrences in the area. There did not appear to be a well-thought out plan of attack with regard to the investigation and it is quite clear that considerable guidance is required in the mounting of a proper prospecting programme.

7.2 Cobalt and chromium mineralisation has been noted in the Patan locality, west of Besham and advice as to how this should be investigated will be expected from the IGS geologist.

8. Visit to the Geological Survey Department (Ministry of Petroleum and Natural Resources) Quetta

8.1 I spent one day in Quetta en route from Islamabad to Karachi where I was to enplane for Nairobi. Unfortunately this was a Friday and a further misfortune was that the Director-General, Dr Azirullah had been called away at short notice to a meeting in Islamabad. However, a meeting of all the heads of units in the Department had been arranged and I was able to have a most useful round-table discussion with them on general geological and mineral development matters. The picture that emerged was a somewhat gloomy one and it seemed to me that the Department is handicapped owing to its isolated location in Quetta some considerable distance from the seat of central government in Islamabad. The Department

has an impressive range of buildings with apparently modern facilities and it would obviously cost a great deal of money to relocate it and the staff in Islamabad.

8.2 The Department's main emphasis in recent years has been on the geological mapping and mineral exploration of Baluchistan and as has been noted earlier some small measure of assistance with this work has been given under the U.K. aid programme. At the time of my visit no field work was in progress - and in fact none had been carried out since the beginning of June, the start of the Pakistan financial year, as the requisite funds though approved by Parliament had still not been made available to the department. Apparently this is a regular occurrence though this year the delay in making the funds available had been more protracted than usual. It is difficult to see how a technical cooperation programme with the GSP would be possible under such circumstances and in fact there does not appear to be much activity on the part of other aid donors on this front. I learned however, that my counterpart in the U.S. Geological Survey, Dr John Reinemund, Chief of the Foreign Geology Branch would be visiting Quetta the following day to discuss various aid possibilities such as the setting up of a seismological network and a rock dating facility. I gathered from the unit heads that previous U.S. aid programmes with the GSP had not been all that successful.

8.3 Appreciation of the help given under ODA auspices by IGS officers in the geological mapping sphere was expressed by the senior GSP officer and particular mention was made of the excellent production of Dr Gee's Salt Range maps.

8.4 Dr Ibrahim Shah who collaborated with Mr Quennell then of IGS, in the production of a CENTO monograph the publication costs of which were met by ODA, raised a query regarding extra copies of the book and I promised to take this matter up on his behalf.

9. Acknowledgements Grateful thanks are extended to Mr Azim Khan, Chairman and Mr M.I. Malik Director (Minerals) SDA for the excellent arrangements made for our visit to the NWF and for the Authority's hospitality. The kind reception afforded to me in Abbottabad by Mr P.W. Watson and Dr L.D. Wright and in Quetta by the senior officers of the GSP was greatly appreciated and I am also grateful to Mr Brian Eddy for his help and kind hospitality. My thanks are also due to Mr Brian Moorhouse, ODA for his help in arranging my visit.