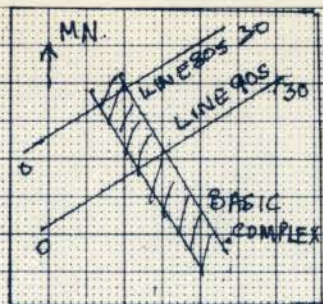


GEOPHYSICAL, GEOCHEMICAL ALONG LINE 90S, KAPALAGULU BA TANZANIA

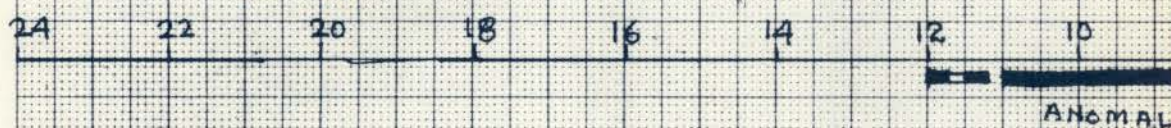
BY
S. N. SAHA
SEPT. 1973

Best. Nr. 1280



APPARENT RESISTIVITY

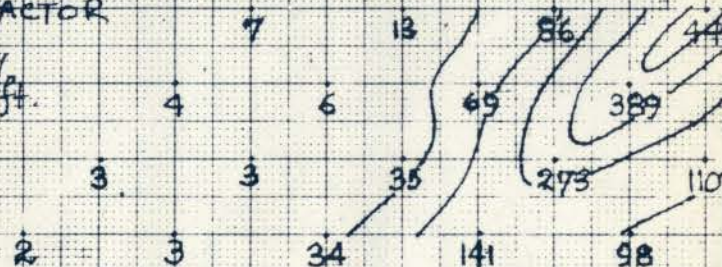
$$\left(\frac{P_{AC}}{2\pi} \right) \text{ ohm-ft}$$



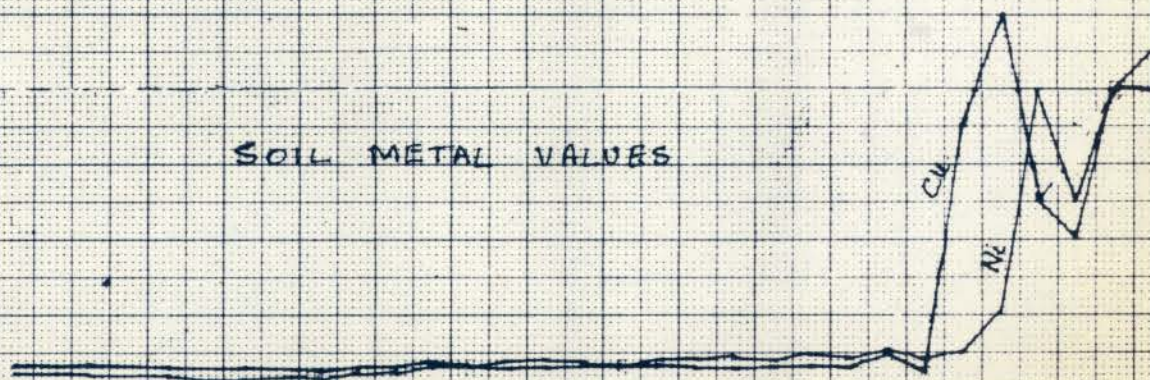
I. P.

APPARENT METAL FACTOR

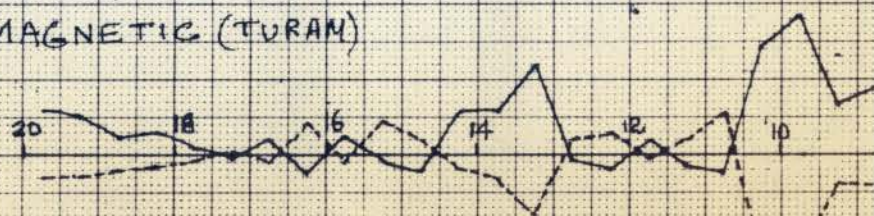
$$MCF_a = \frac{P.F.E}{P_{AC}} \times 10^3 \text{ mho/ft.}$$



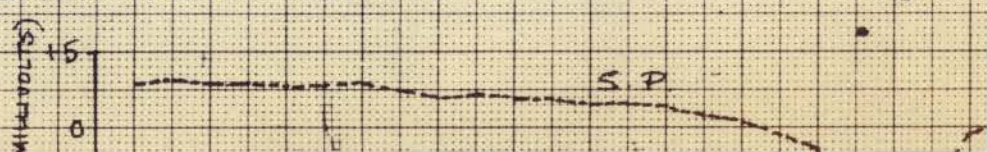
SOIL METAL VALUES



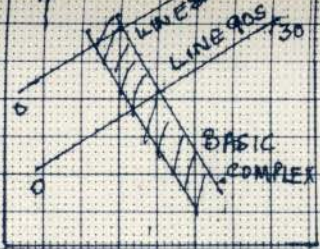
ELECTROMAGNETIC (TURAN)



SPONTANEOUS POTENTIAL

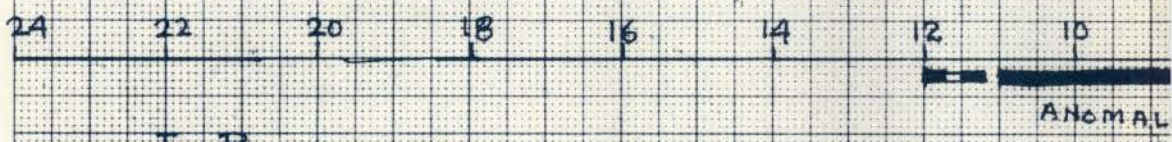


S. N. SAHA
SEPT. 1973



APPARENT RESISTIVITY

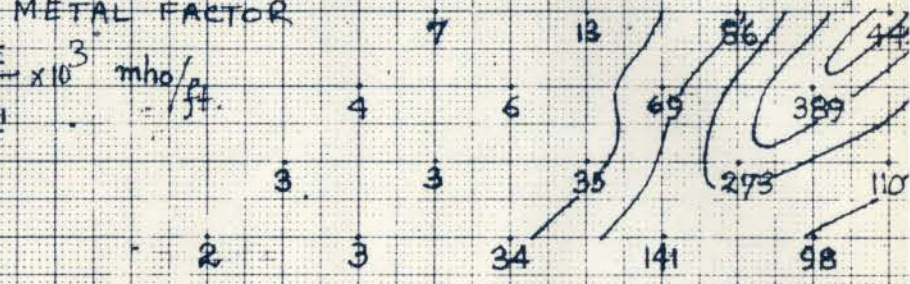
$$\left(\frac{\rho_{AC}}{2\pi} \right) \text{ ohm-ft}$$



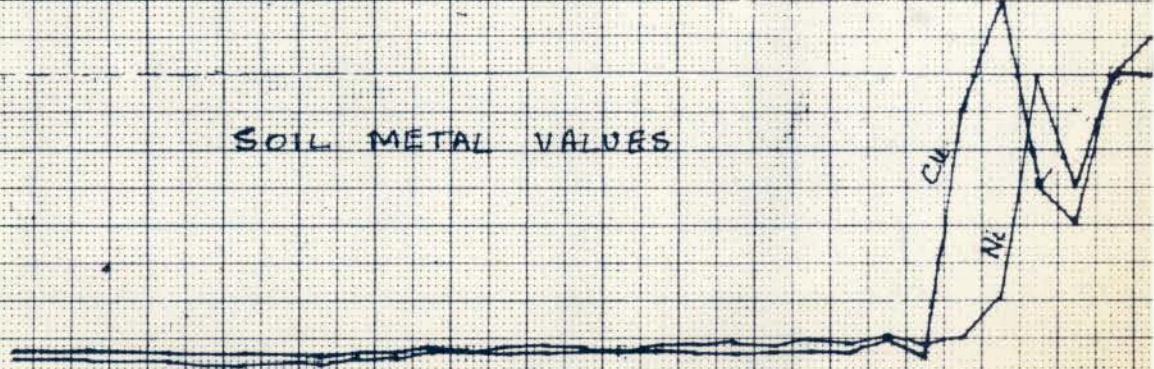
I. P.

APPARENT METAL FACTOR

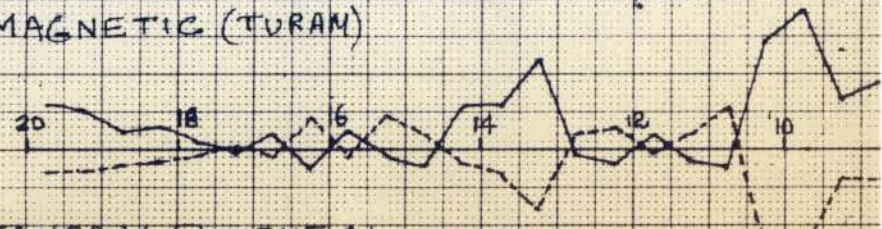
$$MCF_a = \frac{P.F.E}{\rho_{AC}} \times 10^3 \text{ mho/ft}$$



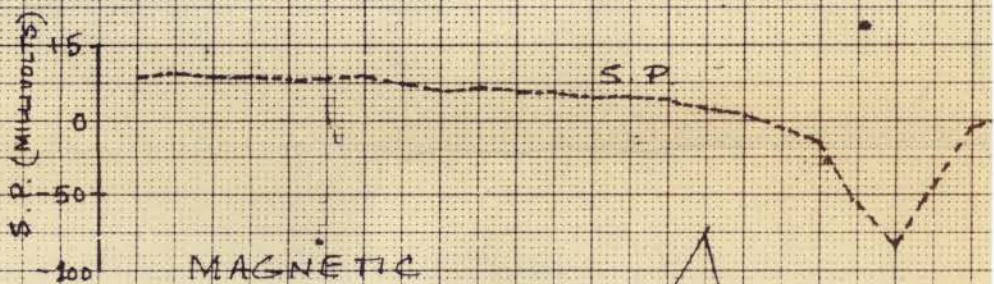
SOIL METAL VALUES



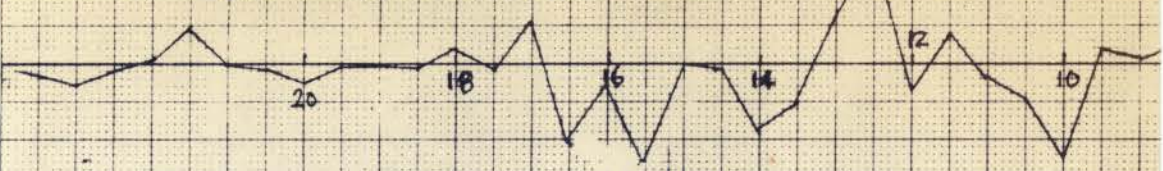
ELECTROMAGNETIC (TURAN)



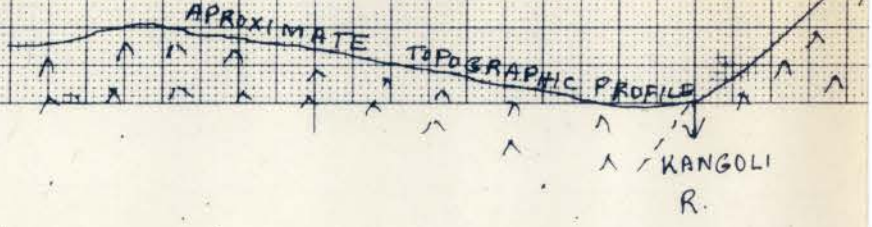
SPONTANEOUS POTENTIAL



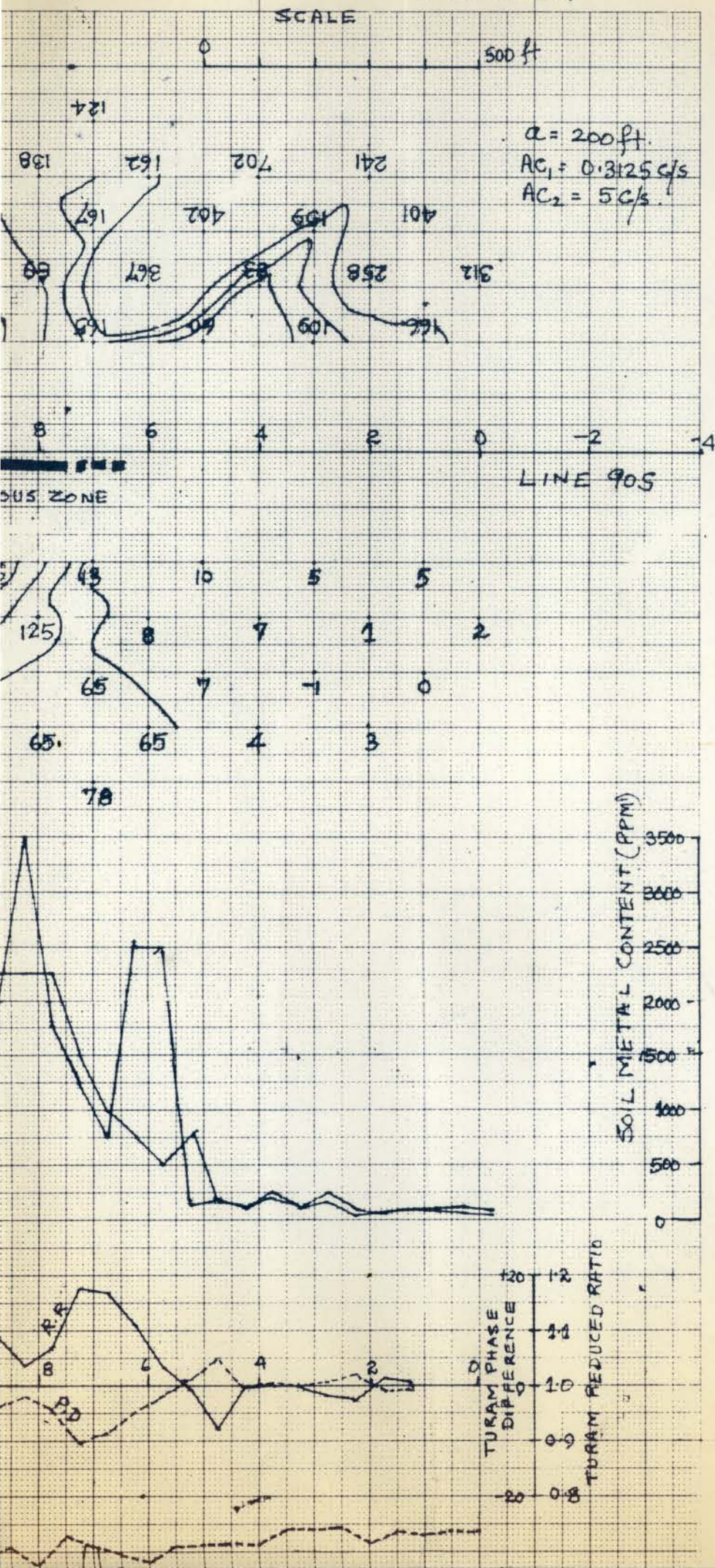
MAGNETIC

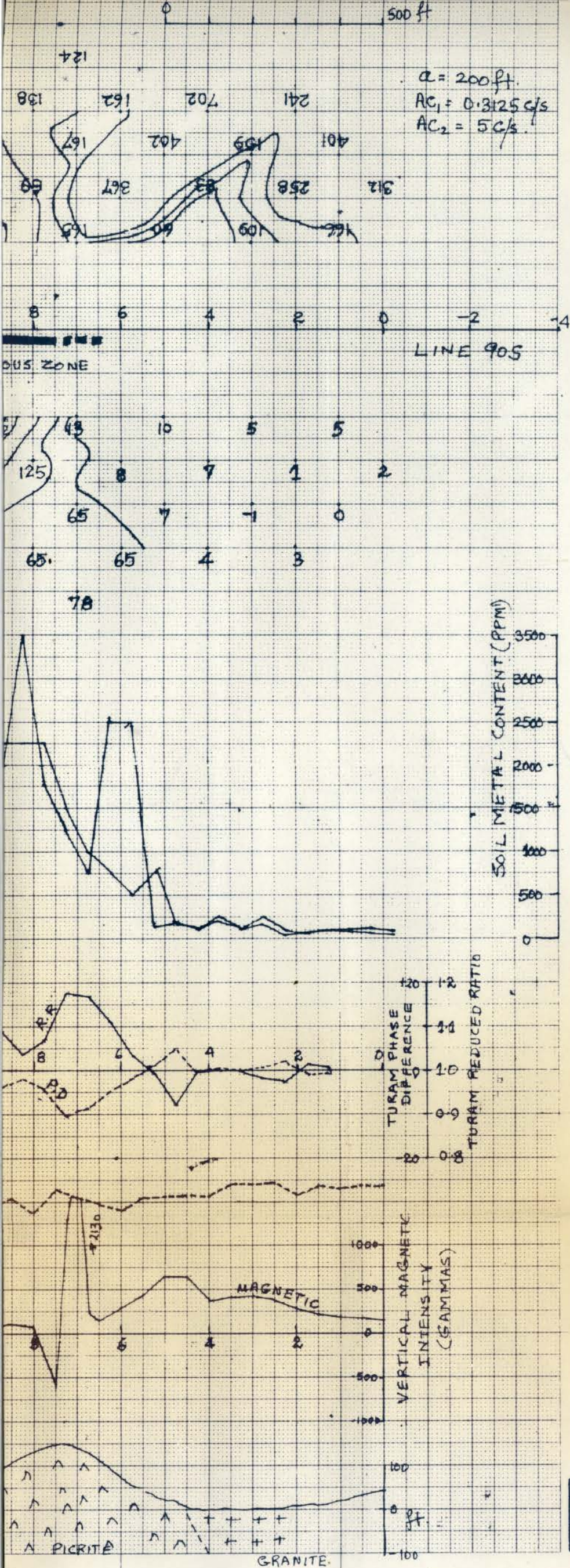


APPROXIMATE TOPOGRAPHIC PROFILE



2 GEOLOGICAL CROSS SECTIONS
SIC COMPLEX, LAKE TANGANYIKA AREA,





ENCLOSURE ATTACHED



UNITED NATIONS
DEVELOPMENT PROGRAMME

DAR ES SALAAM, TANZANIA

JUL 12 1973

ACTION

TO:	Mr. Watts
1	
2	
3	
<input checked="" type="checkbox"/>	- Action Completed
<input type="checkbox"/>	- Acknowledged
<input type="checkbox"/>	- No Action Required
INITIALS	Basem Khader

Cable: UNDEVPRO, DAR ES SALAAM

POST OFFICE BOX 9182

Telex 41284 Telephone: 27411-5

4 July 1973

TE 432/21 TANZA(15)

MATASALAMAT MANSION
Zanaki Street

Reference URT/69/019

Dear Mr. Watts,

UNDP Project URT/69/019
Mineral Exploration

.....

Enclosed please find three copies of the quarterly report
(April/June 1973) submitted to us by Dr. S.N. Saha for forwarding
to you.

Yours sincerely,

Basem Khader
Officer-in-Charge

Mr. Kenneth Watts
Deputy Director
Africa Branch
Office of Technical Co-operation
United Nations
NEW YORK

2/239

QUARTERLY REPORT FOR THE PERIOD APRIL TO JUNE 1973

By
S. N. Saha,
Geophysicist UN/OPAS

Mineral Resources Division,
P.O.Box 903,
Dodoma, Tanzania.

UNDP-TANZANIA	
RECD	2.7.73
FILE	URT/69/019 REP
XD	
RR	
AO	80
1	
2	
3	
4	
5	
<input type="checkbox"/> AO	
<input type="checkbox"/> AP	
<input type="checkbox"/> NA	

QUARTERLY REPORT FOR THE PERIOD APRIL TO JUNE 1973

By
S.N. Saha, Geophysicist UN/OPAS

General

The writer rejoined the office at Dodoma ~~after~~ on 2nd April 1973 after availing 2 months home leave in India. During the above period all the geophysical instruments and the Landrover supplied by the United Nations were received. The chemical analysis of the rest of the soil samples being available, all the maps of the last field season's work were completed and corrected. The maps are being finalised now in the drawing office. The report on the work is now being written on the basis of these maps.

An advance party left for Kapalagulu in Lake Tanganyika on 29 May 1973 without the writer. They have been busy in constructing a bridge across the Luegele river and a road to Mugambazi. The bridge constructed earlier had been washed away.

Two counterpart geologists and a Field Assistant were provided in early May 1973. A few tests have been made to check the newly acquired instruments.

Instruments

During the period the following instruments and equipment have been received from the United Nations.

- 1) One Portable Sensitive Gravimeter,
- 2) One Portable Flux Gate Magnetometer,
- 3) One Portable Gamma Ray Spectrometer,
- 4) One Frequency Domain Induced Polarisation Unit,
- 5) Model cases for I.P. interpretation,
- 6) One Land rover Station Wagon.

All the above items except (4) have been field tested and found to be in good order. The I.P. unit has been checked but could not be field tested due to lack of time. The unit has been sent to the field and will be tested there. The gravimeter was calibrated at Dar Es Salaam and tested for its drift behaviour.

A portable Refraction Seismic equipment purchased by the government was field tested. One of the 13 traces was found to be defective, but the instrument has been found to be in good order. The ~~blasting~~ blasting unit could not be tested due to lack of explosives, and the instrument was tested with the hammer source kit. Arrangement for repairing the defect is under way.

One Landrover Station Wagon, ST 2837, was made available to the project. A roof rack was fitted on the vehicle, and it has been sent to the field with the advance party.

Personnel

Mr. M. Ngond'ya, Field Assistant, joined the writer sometimes in April 1973. Two Geologists, Messrs M. Budhani and M.M. Pondaga were attached to the writer in May 1973, to assist him in the field investigations at Kapalagulu. This was a great relief after being without a counterpart from January 1973. All the three assistants are new and need to be trained from the fundamentals. This will naturally involve spending a little more time with them.

Movement

An advance field party consisting of Messrs Budhani, Pondaga, Ngondya, 3 geological hands, 1 headman, two drivers and a cook, left Dodoma on 29 May 1973, along with a landrover and a truck. The writer, the party chief, is expected to leave on

2 July 1973. The bridge and the road to Mugambazi are expected to be completed by 30 June 1973, according to a report from the advance party. The bridge constructed last year had been washed away by the swelling river during the last rains.

The writer had been to Dar Es Salaam twice during May 1973 (9 to 13 and 20 to 23 May 1973), to collect the landrover and the gravimeter respectively. The writer was on leave on 25 and 26 June 1973.

Office work

During the period in question, the rest of the chemical analysis of the soil samples being completed, the writer finished the drawing of the soil nickel and copper anomaly maps of the Kapalagulu area. The other maps including the E.M. and magnetic surveys were also prepared and interpretations attempted. The finalised maps are being prepared by the drawing office. The report on the area is now being prepared.

The writer also submitted a draft proposal for ~~the~~ a request by the government to the UNDP for the appointment of an Electronic Technician under the UN volunteer scheme. A draft proposal for a regional gravity and magnetic survey across the Gregory fault zone in north central Tanzania has also been submitted. This survey is likely to enhance and delineate the geology, structures, and areas of geothermal interest in the zone.

Preliminary results of Kapalagulu Survey during 1972

An area nearly 3 miles long and 3000 ft wide was covered during the last field season from the northern end of the Kapalgulu basic complex, covering mostly the basal, and intermediate zones.

A glance at the maps so far prepared of this area indicates that the geophysical and the geochemical maps complement each other very well in their trend and character. The geochemical maps show elongated regions of high and coincident soil Nickel and Copper values (about 2500ppm or less with threshold of about 200ppm) parallel to the strike of the complex and mostly within the basal layer. The E.M. map shows several similarly disposed conductors, some of which match excellently with the areas of high Nickel and Copper contours. The magnetic map also shows ~~show~~ similar elongated patterns of magnetic highs (low in northern hemisphere) coinciding with the Ni and Cu anomaly pattern and the E.M. conductors at places. The magnetic highs (assuming no remanent magnetism exists) could be caused by magnetite or pyrrhotite bands or basic dykes within the complex. The E.M. conductors could be possible magnetite or pyrrhotite bands or other type of conductors. The correlation of these bands ~~are interesting from the point of view of rich primary mineralisation~~ with zones of high Ni or ~~copper~~ Cu values in soil, ~~are~~ is interesting and may indicate zones of rich primary mineralisation of Ni and Cu associated with pyrrhotite bands.

The anomalous soil Ni and Cu values are mostly confined to the basal layer (western portion) of the basic complex and follows the formation faithfully. It is possible that this layer is generally rich in Ni and Copper. Some wildcat drilling carried out during 1951-53 and in 1960 showed that the formation in general has an average Ni and Cu values of 0.27% and 0.13% respectively.

With the present geophysical and geochemical data showing good correlation at places it will be worthwhile to drill these areas to see if there are any primary sulphide mineralisations rich in Ni and Cu contents. It is expected that the Russian Geological Mission, based at Mpanda will drill some of the anomalies indicated in this report.

The soil samples are being analysed also for existence of other trace minerals.


Field work

The advance party is now at Bolimba building the bridge across Luegele river. They are expected to move to Mugambazi by 1st week of July 1973. Initial field work will consist in correcting the baseline alignment which became slightly curved due to the magnetic attraction of the basic complex or magnetic bands within it, on the needle of the prismatic compass. Work will be continued southwards from the place it was left last year.

Miscellaneous

Some difficulties have been encountered in sending the field parties in time due to lack of funds. The technical leadership of the division is still to be determined as the appointment of a Principal Geological Survey Officer - a new post - ^{is} yet to be made. The difficulties faced by the writer in getting all the instruments maintained and stored are still to be remedied. The appointment of a volunteer technician to maintain these instruments and repair them is awaited. Maximum output from the utilisation of these instruments could only then be derived.

Consideration should be given to provide some funds to the project to enable ~~samples analysis~~ checking of some samples analysis abroad and buying some ~~time~~ computer time to make interpretations of various geophysical problems.


(S.N. Saha)
29 June 1973.



UNITED NATIONS
DEVELOPMENT PROGRAMME

DAR ES SALAAM, TANZANIA

APR 18 1973

ACTION

ENCLOSURE ATTACHED

MATASALAMAT MANSION
Zanaki Street

Reference URT/69/019/REP

TO:	Mr. Watts
1	Mr. R. Knowles
2	Mr. R. Knowles
3	Mr. R. Knowles
Action Completed	
Cable: UNDEVPRO, DAR ES SALAAM	
<input type="checkbox"/> - Acknowledged	
PGS No. 01812	
INITIALS	Telephone: 27411-5

TE432/21 TANZA (15)

13 April 1973

Dear Mr. Watts,

UNDP Project URT/69/019
Mineral Exploration

..... Please find enclosed three copies of the quarterly report
(January to March 1973) submitted to us by Dr. S.N. Saha for
forwarding to you.

Yours sincerely,

W. H. Binnendijk
Willem H. Binnendijk
Deputy Resident Representative

Mr. Kenneth Watts
Deputy Director
Africa Branch
Office of Technical Co-operation
United Nations
New York.

308/4
Res

PROGRESS REPORT FOR THE QUARTER JANUARY TO MARCH 1973

By

S.N. Saha
Geophysicist UN/OPAS

Mineral Resources Division,
Dodoma,
Tanzania.

PROGRESS REPORT FOR THE QUARTER JANUARY TO MARCH 1973

By
S.N. Saha,
Geophysicist UN/OPAS

General

During the first part of January the writer was busy in compiling and preparing geophysical and geochemical maps of the surveyed area of the Kapalagulu Ni-Cu prospect, east of Lake Tanganyika. Most of the maps were submitted for final drawing. The geochemical maps are still incomplete due to the non-availability of some of the analytical data. The writing of the report will be started as soon as all the maps are completed.

The writer went on home leave between 5 February to 29 March 1973 and was away from Dodoma between 30 January to 1 April 1973.

Instruments

During his absence from Tanzania, the following instruments purchased by the United Nations for the project (URT/69/019), were received:

- 1) One Portable Gamma Ray Spectrometer DISA 300,
- 2) One Portable Flux Gate Magnetometer MF-2-100,
- 3) One Complete Induced Polarisation equipment (Mcphar System).
- 4) Three volumes of I.P. and Resistivity cross sections of model cases (Geoscience).

The above instruments are yet to be checked. The following equipment are still to be received:

- 1) One Portable sensitive Gravimeter,
- 2) 12000 ft. of single conductor insulated cable with reels,
- 3) One landrover.

The department of the Mineral Resources has already acquired a Resistivity unit and a Refraction Seismic unit.

Personnel

Counterpart Geophysicist, Mr. B.A. Mcharo left for Canada sometimes by the middle of January 1973 to start postgraduate studies in geophysics in the University of Toronto, under a UN fellowship. Counterpart Field Assistant, Mr. W. Lyombe, also left the same month, for Romania, to carry out graduate studies in geophysics. The writer has no counterpart personnel at present. Even the expatriate geologist, Mr. A.P. Shah, attached to the project for the two field seasons, has been assigned independent duties elsewhere. It seems that with the efflux of geologists to the newly formed State Mining Corporation the Mineral Resources Division is very much depleted of its technical personnel. Further, as per existing rules, new incumbents cannot be recruited to the posts left vacant by the Mr. Mcharo and Mr. Lyombe.

Under the above circumstances, and with the arrival of new geophysical instruments, it is virtually impossible to carry out surveys, tests, and maintain all the instruments singlehanded.

The writer has requested the commissioner for assignment of a second geologist and two Field Assistants to get over this difficulty. Presently, it has been promised that the services of two Field Assistants and that of Mr. Shah (for two months only) will be made available.

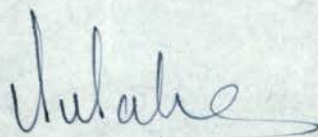
In this context it is necessary to point out that the services of a qualified technician with sound knowledge of electronics has become essential to maintain and repair the instruments which have been bought by the UN and the department. At present the department has none. This technician could also be usefully employed as a technical help in carrying out surveys in the field. The need is strongly felt in view of the number of instruments acquired and lack of trained personnel to assist the writer both at headquarters and in the field. A proposal, for engagement of such a technician in the rank of a volunteer or the like, under the UN, is likely to be forwarded by the government.

Miscellaneous

The field of activity of the Mineral Resources Division has been very much reduced due to the take over by the State Mining Corporation of several fields, in the area of exploration. The scope of the division is likely to be limited to geological mapping and work on certain fields of Economic geology.

Future work

An advance party is likely to proceed to the Kapalagulu Prospect in May with the object of continuing the geophysical and geochemical work further south of the presently surveyed area. Some of the geophysical and geochemical anomalies of the surveyed area may be drilled using a drill from the Russian Project, in operation in the neighbourhood.



(S.N. Saha)

Dated 6 April 1973

PROGRESS REPORT FOR THE QUARTER OCTOBER TO DECEMBER 1972

BY

S.N.Saha
Geophysicist UN/OPAS.

Mineral Resources Division,
P.O.Box 903,
Dodoma, Tanzania.

UNDP-TANZANIA	
RECD.	
FILE	
XD	
RR	
AO	
1	
2	
3	
4	
5	
<input type="checkbox"/> AO	
<input type="checkbox"/> AP	
<input type="checkbox"/> HA	

PROGRESS REPORT FOR THE QUARTER OCTOBER TO DECEMBER 1972

By

S.N.Saha
Geophysicist UN/OPAS,
Mineral Resources Division,
Dodoma, Tanzania.

General

During the period, the geophysical field camp at Kapalagulu area was closed and the party returned to headquarters at Dodoma on 14 October 1972. Computation of the data and preparation of various maps were continued. Nearly half the number of the soil samples collected have so far been analysed, and Cu and Ni anomaly maps were made over half of the area. During November 1972, the writer went to Kenya to attend as a government delegate the 'Seminar on Groundwater in East Africa'. He also visited the UN project on Geothermal Energy Resources Exploration in Kenya. Counterpart geologist, Mr. B.A. Mcharo, and Field Assistant, W.Lyombe, have left for Dar es Salaam on their way to Canada and Romania respectively for higher studies in geophysics.

Kapalagulu Basic Complex (Prospecting for Copper and Nickel)

The Kapalagulu basic complex is a NNW-SSE trending gabbroic ultrabasic intrusive with linear bands of vertically disposed layered basic rocks with increasing basicity towards the basal layer. ^{The basal layer,} mainly bronzite and picrite, is known to contain on an average 0.27 percent of Nickel and 0.13 percent of Copper.

The object of this survey was to investigate mainly the basal section of this intrusive by geophysical, geological and geochemical methods. During the period in the field, only the north section covering a NS distance of about 3 miles and width of about 3/5 mile, was surveyed. Cross lines, in the N60°E direction, were laid at intervals of 500 ft. and stations at 50 ft. interval were measured on them. Geology, geophysics and geochemistry were examined over these lines.

Geophysical observations carried out included Turam (EM), and vertical magnetic intensity measurements on all lines, and S.P. and E.M. gun measurements on a few selected lines. The geochemical soil survey was carried out on all the lines and consisted of sampling every 50ft. stations on the lines.

The samples were analysed chemically (colorimetric) for trace elements of Nickel and Copper. Selected samples were also scanned under a spectrograph for possible occurrence of other minerals. Detailed geological survey was carried out on all the lines to map out area. The survey lines were laid by prismatic compass.

The object of the survey was to find if there are any conductive or magnetic sulphide bands associated with the Ni and Cu sulphides and if the geochemical and geological results correlate well enough to indicate zones of richer sulphide deposit.

Even though at this stage it is premature to make any concrete interpretation and evaluation of the data, it will be appropriate to make a few remarks on the basis of the available results.

Electromagnetic Methods:

The Turam anomalies over cross lines indicated several parallel linear conductors some of which continue over a good distance. These conductors may sometimes be attributed to magnetite or sulphide bands within the basal layer of the complex.

Magnetic Method:

The magnetic anomaly indicated clearly: i) a north south continuous fault in the western part of the complex with the down thrown side towards west. This is attributed to a linear fault of the western rift system. ii) Some sharp linear magnetic anomalies which are sometimes coincident with the EM anomalies - suggesting magnetite or pyrrhotite bands.

S.P. Method:

The S.P. survey over 4 selected parallel lines did not indicate anything interesting except for two weak zones of S.P. low (-75mV) over two lines, coinciding with an E.M. anomaly in the basal zone.

Geochemical method:

Soil samples collected in the area were analysed colorimetrically for Cu and Ni contents and the results have been mapped over a part of the area. The threshold values of Ni and Cu are respectively 200, and 110 ppm, whereas the values range from 13 ppm to the anomalous values of 2500ppm. Both the copper and nickel maps show identical linear anomalous zones trending NNW-SSE throughout the mapped area. Some thin bands of Cu and Ni values are prominent within the area as seen through the 1500ppm contour. Generally, the anomalous zones coincide with the geologically mapped basal zone of bronzite and picrite.

It is therefore suspected that the formation itself is rich in nickel and copper with selected bands of better enrichment. This has been corroborated in some drill holes so far sunk in the area. The geochemical anomalies seem to have good correlations at places with the linear magnetic and electromagnetic anomalies, suggesting possible association of Ni and Cu sulphide mineralisation in the form of thin bands. The exact picture is still to be mapped and evaluated.

Selected number of samples are being analysed for other mineral contents. The maps are still to be completed and subsequent correlation and interpretation should await for the time being.

Geology:

The geological map of the area has been prepared by Mr. A.P. Shah and is being drawn to its final stage.

Visit to Kenya to attend the Seminar on groundwater in East Africa.

The writer was in Kenya between 14 to 19 November 1972 as a Tanzania government delegate to attend the 'Seminar on Groundwater in East Africa'. The Seminar was sponsored by the East African Agricultural, and Forest Research Organisation and was held between 15 to 17 November 1972. The geohydrological and hydrological problems in the three east African countries, Tanzania, Uganda, and Kenya, were the main subjects of discussion. Application of geophysics to solve many such problems were the topics of many papers and discussions. The paper on utilisation of geothermal energy from underground water, by the UN Geothermal Energy Resources Exploration Project at Kenya, was very well received. After the conference, the writer visited a geothermal project site at lake Naivasha to see the steaming grounds and the exploration techniques. He also appraised himself of the several types of data collected by the project and the present state of the survey. Unfortunately, due to his short stay, it was not possible for him to study the project reports exhaustively. A report on the visit has been submitted to the government, with a copy to the United Nations.

Instruments

The department acquired one Electrical Resistivity meter and a Refraction Seismic instrument. The Seismic instrument awaits a field test. The old E.M. Gun, repaired recently at Sweden, was used in the Kapalagulu area with unsatisfactory results. It

appears that the instrument is only suited for a survey with coil separation of 100 ft, thus limiting its use for exploration of very shallow subsurface conductors. The magnetometer, (Askania torsion) is having a warped level, making it difficult to obtain reliable readings.

The instruments to be purchased by the United Nations are still to be received.

Training

The counterpart trainees, Mr.B.A.Mcharo, Geologist, and W.Lyombe, Field Assistant, both, are expected to leave shortly for higher studies in geophysics abroad. Mr. Mcharo had been awarded a UN Scholarship under the Kagera River Development Project of UN, to carry out postgraduate studies in the university of Toronto, Canada. Mr.W.Lyombe, Field Assistant, also left Dodoma and is likely to proceed to Romania in January 1973 for graduate studies in geophysics. The writer, unfortunately, had the entire task of preparing the survey maps in addition to interpretation and writing of the report. Very little secretarial assistance is available to help him in the office and report writing. He has requested for re-allocation of two field assistants and a counterpart geologist to help him.

Personal

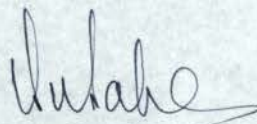
The writer has been requested to act in the place of the Principal Mining Geologist and look after the Economic Geology section of the department which includes geophysical and drilling operations, with effect from January 1973.

The writer is proceeding on home leave to India with effect from 5 February 1973 for about 2 months.

Miscellaneous

A new parastatal body - State Mining Corporation has been formed with effect from 18 August 1972 (Govt. notification no.163, dated 18.8.72), with the object of organising and coordinating the mining, exploration, exploitation, and marketing of minerals in Tanzania. So far seven mining companies, including Williamson diamond mines, Portland Cement Company, with a total asset of about 100 million shillings, have been transferred from the control of National Development Corporation to the State Mining Corporation.

The mining and exploration wings of the Mineral Resources Division, are likely to be taken over by the corporation. The function of the Mineral Resources Division will be limited to reconnaissance exploration, geological mapping and controlling mining legislations. Several geologists and mining engineers have been transferred from the Mineral Resources Division to the Corporation, and a part of the office of the Mineral Resources Division will be used by the corporation. The geophysical section is not likely to be transferred to the corporation.


(S.N. Saha)

10 January 1973