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DEPARTMENT OF MINES
SOUTH AUSTRALIA

GEOLOGICAL SURVEY

EXPLORATION SERVICES DIVISION

PROGRAMME PLANNING FOR 1970

GEOCHEMICAL EXPLORATION SECTION

by

B. LEESON
ASSISTANT SENIOR GEOLOGIST
GEOCHEMICAL EXPLORATION SECTION

Rept.Bk.No. 70/57

9th April, 1970

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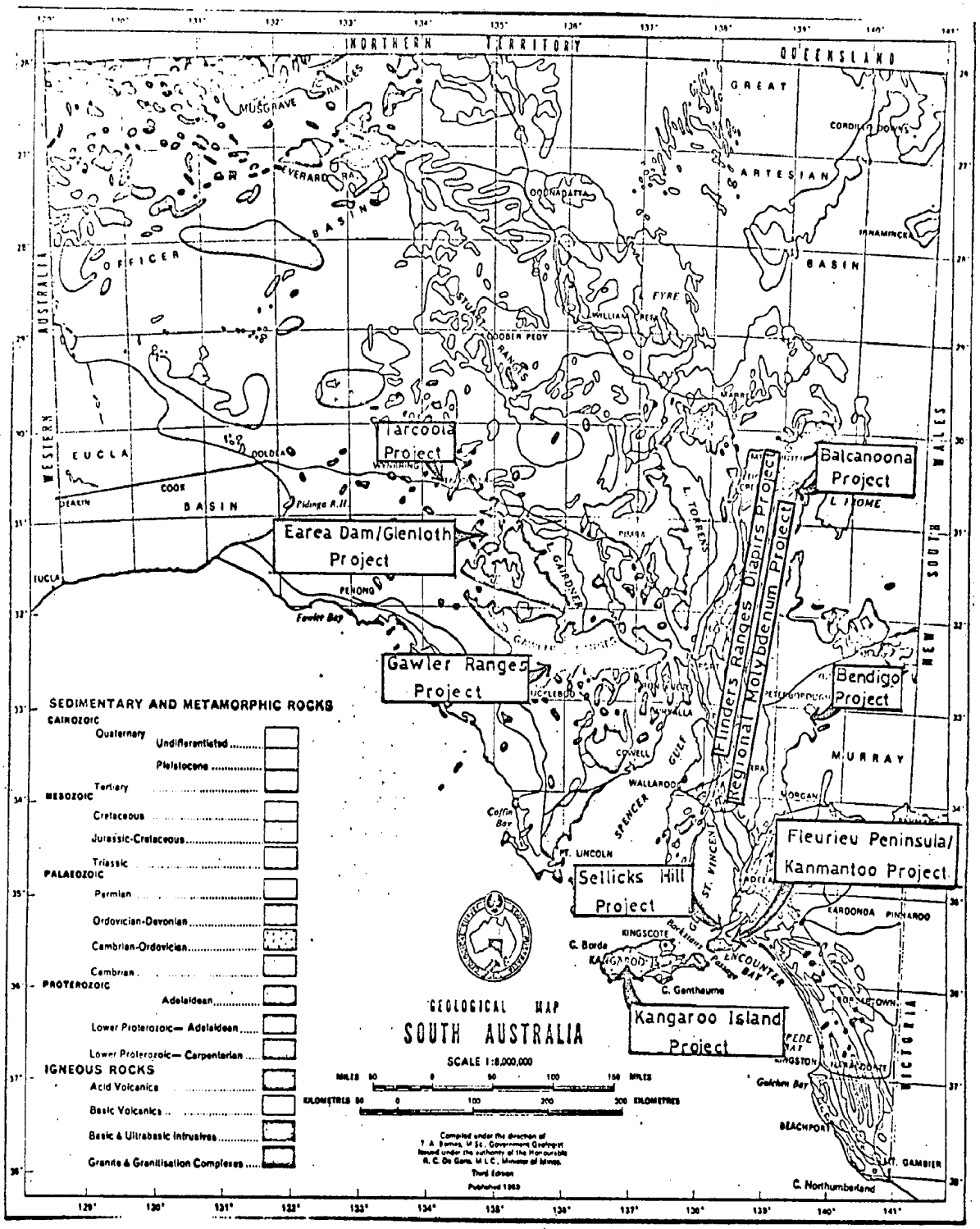

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Compiled: B.L.	Geochemical Exploration Section.	Date: 2.iv.70
Drn. | Ckd.	Plan showing Location of Project Areas. -1970	Drg. No. S 7689
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SOUTH AUSTRALIA

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PROGRAMME PLANNING FOR 1970

GEOCHEMICAL EXPLORATION SECTION

INTRODUCTION

During 1969 and the early months of 1970, two Section projects have been brought to completion, the Last Chance Mine Project, and the Baratta Hill Lead-Zinc investigation. Follow-up work on the Lenswood-Cherry Gardens Project has been postponed during the tenure of a Special Mining Lease (SML.180) held by Noranda Australia Ltd. over the area.

The Lenswood-Cherry Gardens Project has been reported in Binks (1968a). The resulting drilling programme at the Almanda Mine has been reported in Rowan (1969) and Leeson (1969a). The investigations failed to locate any economic ore-body. The first 6-monthly report on investigations at the Last Chance Mine, Peake and Denison Ranges has been issued (Leeson, 1969b). Investigations have been completed without any noteworthy extensions to the copper/uranium occurrence being found. The final report on this project is in preparation (Leeson). Investigations by N.R. Langsford during March of this year, using the Section's on-site analytical facilities, indicated that several stratigraphically controlled lead-zinc anomalies in the Baratta Hill area were caused by metal-rich erratics in the Sturtian tillite. Economic concentrations are not present and no follow-up work is considered feasible. A report will be written as soon as confirmatory analyses are received from Amdel.

Investigations are currently proceeding on the following projects:- The Balcanoona Mercury Prospect, the Earea Dam/Glenloth Project, the Bendigo Granite Project, the Flinders Ranges Diapirs Project and the Tarcoola Copper

TABLE 1.

Geochemical Exploration Section
Project Programming 1970

PROJECT	april	may	june	july	august	september	october	november	december
Balcanoona Project	BL chip sample	— A —	D → BL drill 12-15 Comb. rig						
Bendigo Project			NRL sample/map geophysics D →	NRL drill over burden pattern drilling D →	NRL drill 12 x 150 Holes				
Earea Dam Glenloth Project	NRL lake sampling								BL Regional Mo Project
Flinders Ranges Diapirs Project		PATAWARTA DIAPIR NRL map sample							NRL map/sample
Sellicks Hill Project			x. Sibenaler — Departmental Student — Honours thesis project						
Fleurieu Pen/Kanmantoo Project									
Tarcoola Project						NRL drill 12 x 130' Holes			
Regional Molybdenum Project									BL ? Geochemistry ? Earea Dam.
Kangaroo Island Project				BL geochemistry		BL geochemistry			
Gawler Ranges Project							BL + NRL Recon.		

Geologist (geophysicist) — — A — — Analysis

Field Assistant — — D — → Decision

Project; and in near-town areas on the Sellick Hill Project and the Fleurieu Peninsula-Kanmantoo Project. The Bendigo Granite investigations await the expiration of the current SML. over that area in May of this year.

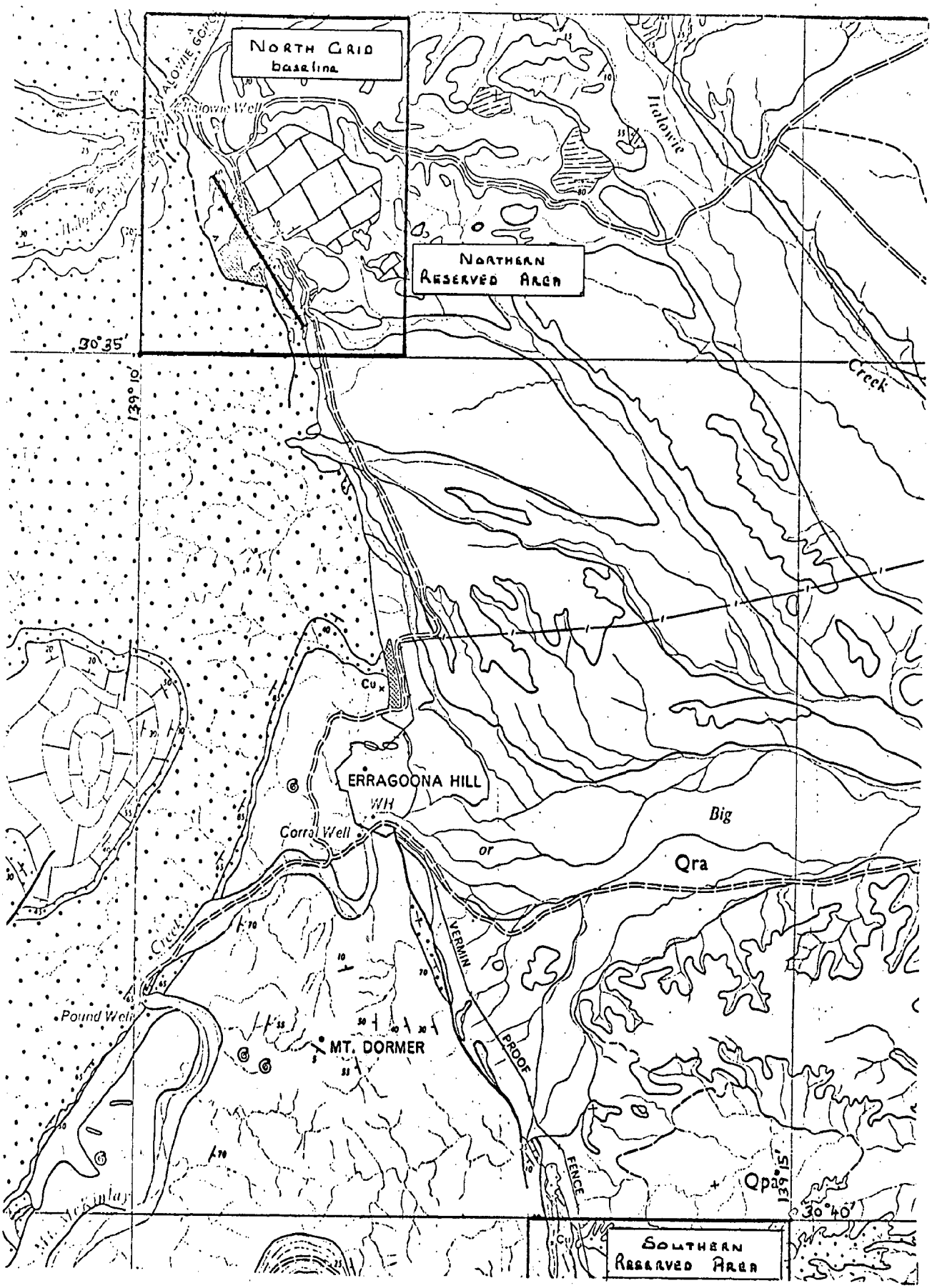
New projects are mooted for Kangaroo Island, the Gawler Ranges, and for a regional molybdenum appraisal. In addition R. South, field assistant will undertake, as a spare time activity, detailed investigation of the procedure used with the Section's atomic absorption spectrophotometer with particular reference to the analytical effect of digestion time.

Detailed proposals for these projects are set out below. The proposed project programming for 1970 is set out in Table 1. Project areas are shown on Plan S.7689.

CURRENT PROJECTS

Balcanoona Mercury Project

Two small areas on Balcanoona covering parts of the Mt. John-Paralana Fault are reserved from the operation of the Mining Act to allow Departmental investigations into an occurrence of the mercury mineral cinnabar. The soils in these areas have been sampled and analysed for a variety of metals in addition to mercury. An appraisal of the data so far collected is almost complete (B. Leeson). In the northern area (Plan S.7677/1) apparently anomalous concentrations of metals in the soils are thought to be related to a sub-jacent tongue of diapiric material with higher background concentrations than the country rocks. In the southern area (Plan S.7678/1), anomalous concentrations of copper in the soils are caused by material transported downslope from the Moro Copper Workings, and to verying background levels in the faulted blocks of the crush zone. Anomalous mercury has been detected in soils at three points along the line of the major fault plane over a distance of 4,000 feet, and are thought to be significant. In addition, reconnaissance rock-chip sampling over a wider area, has indicated the presence of mercury in faults to the west and south-west.



	DEPARTMENT OF MINES — SOUTH AUSTRALIA	Scale: 1" = 1 Mile
Compiled:	Balcanoona Mercury Prospect.	Date: 2-4-70
Drn. | Ckd.	Location of Northern Reserved Area showing North Grid base-line.	Drg. No. S 7677/1 cd.

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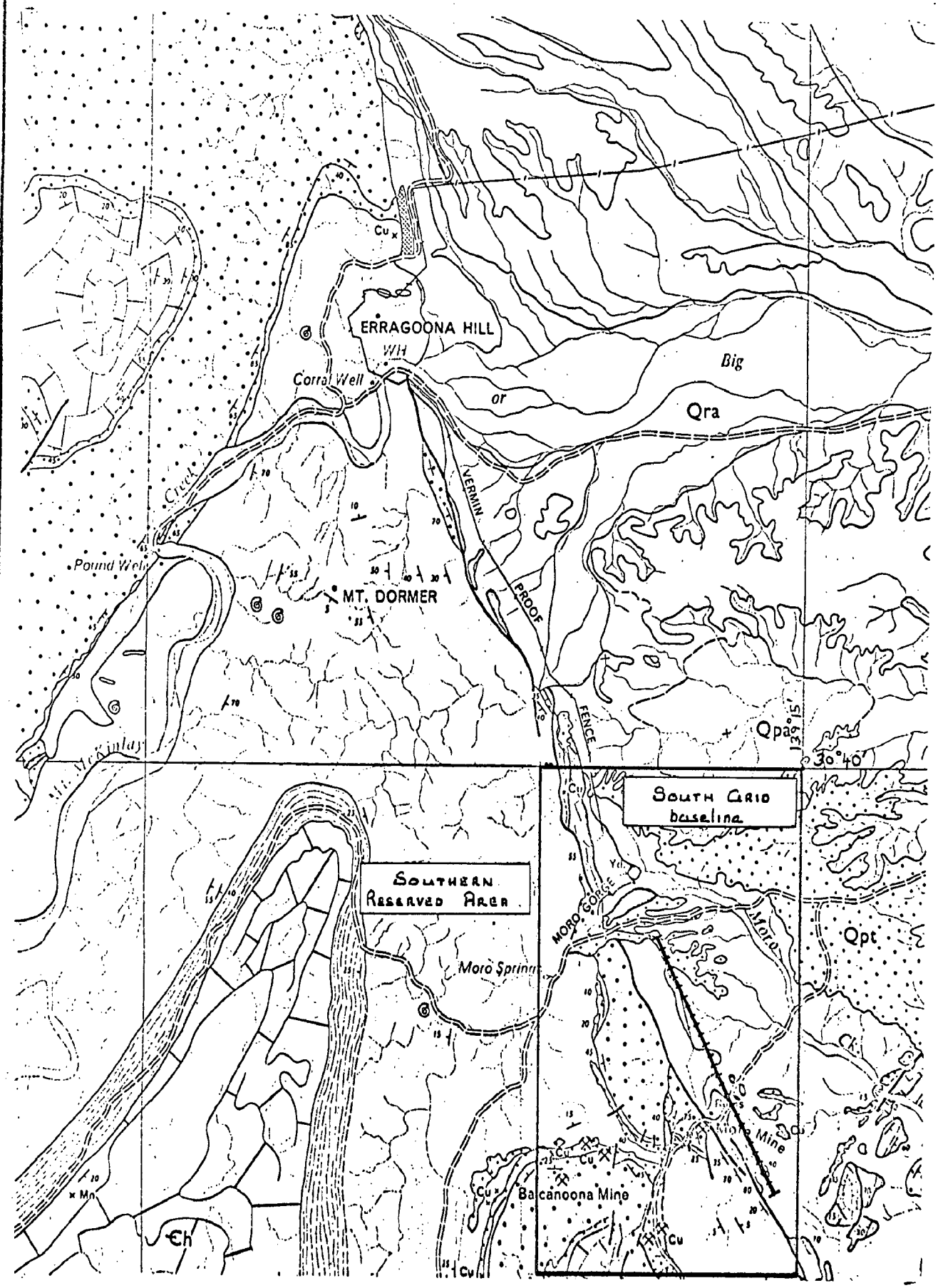

	DEPARTMENT OF MINES – SOUTH AUSTRALIA	Scale: 1" = 1 Mile.
Compiled:	Balcanoona Mercury Prospect.	Date: 12 - 4 - 70
Drn. | Ckd.	Location of Southern Reserved Area showing South Grid base-line.	Drg. No. S 7678/1 cd.

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Proposals

The northern area will be examined to confirm the above hypothesis. If confirmed, no further investigations will be recommended and the area Reservation may be rescinded.

The southern area remains of interest since it appears structurally favourable as an ore-trap for mercury-bearing solutions; the presence of trace mercury mineralization, and of epigenetic copper over a wide area supports this interpretation. The anomalous soil values will be checked by resampling as soon as weather conditions are suitable. In addition a programme of intensive rock-chip sampling and soil traverses along profile lines over major faults to the west and southwest of the Moro Workings will be undertaken. If the soil values are confirmed it is proposed to recommend the direct testing of the Mt. John-Paralana Fault and the adjacent fault zone in this area by at least 12 angled drill-holes. The combination drilling-rig shortly to be acquired by the Drilling Branch will probably be the most suitable machine for this programme in view of the water problems likely to be encountered. The Mt.John-Paralana Fault in this area is a spring-line.

At present it is not felt that detailed investigations into the geochemistry of mercury dispersion are warranted. Extraction temperature studies could be initiated at a later date following discussions with Amdel personnel on the validity of this method of distinguishing the various phases of mercury present in the soil and rocks. Metallogenetic studies would be proposed at a later date should any notable concentrations of ore be found.

Bendigo Granite Project

This project is to investigate the mineral occurrences associated with a newly discovered granite intrusion near Bendigo, BURRA. The first report has been issued (Langsford, 1969a). Investigations have been suspended during the tenure of a Special Mining Lease over the area (SML. 301 held by Anglo-American

Corporation). This expires in May, 1970 and it is requested that an area of approximately 120 sq.miles in the northeast of BURRA and the adjacent part of CHOWILLA, covering the area of interest, be reserved from the operation of the Mining Act. The boundary details are given below and are shown on the accompanying plan 70-244/1.

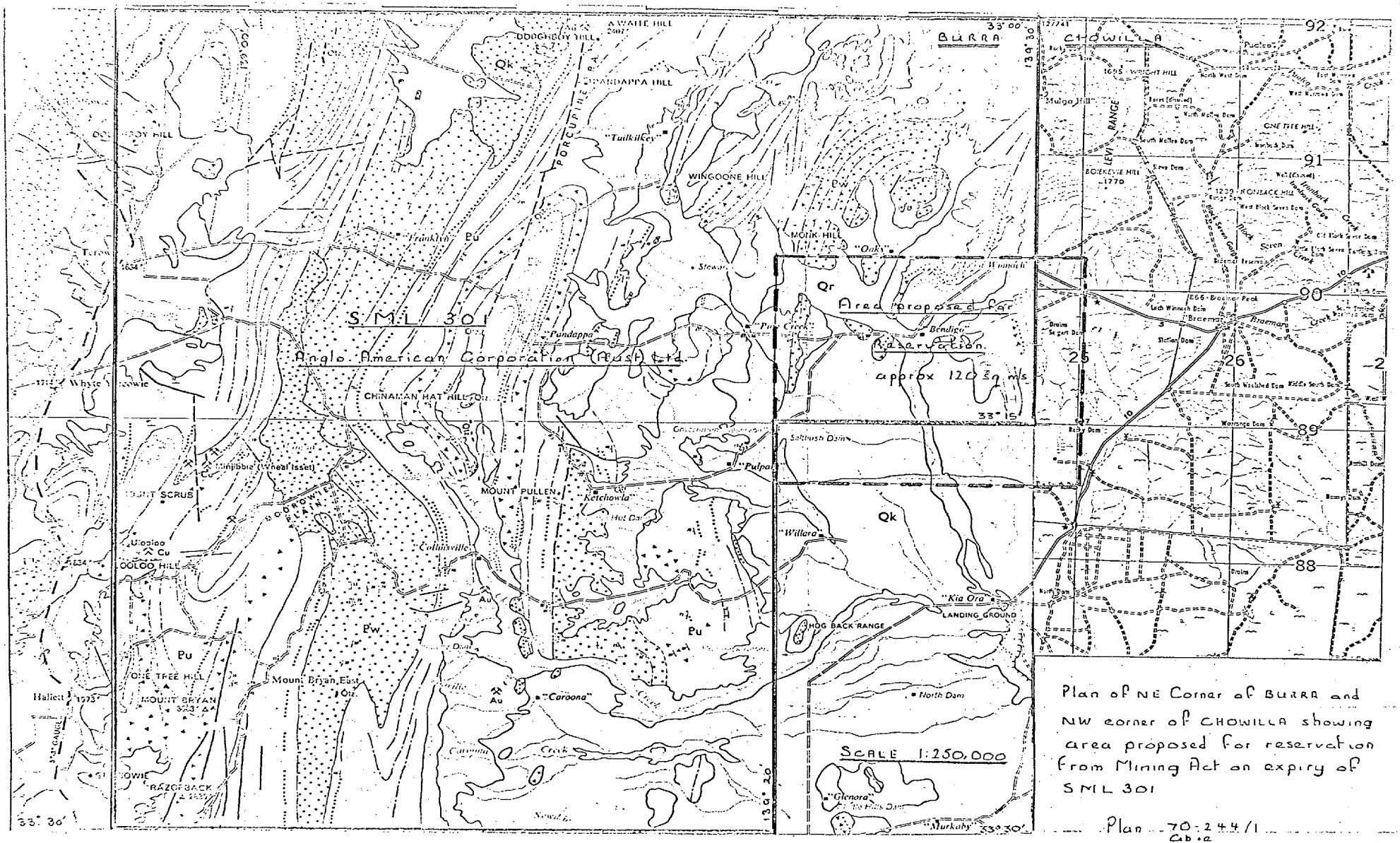
Commencing at a point being the intersection of longitude 139°20' and latitude 33°9'; thence east to longitude 139°32'; thence south to latitude 33°17'; thence west to longitude 139°20'; thence north to the point of commencement. (approximate area 120 sq. miles).

Proposals

Soil and rock sampling will be extended over the area of the intrusion. Concurrently the general area will be mapped at a scale of 1" to ½ mile with detailed mapping of significant areas at scales of 1" to 400' and 1" to 100'. The Geophysical Exploration Section will be requested to conduct a survey over soil-covered areas in the vicinity of the intrusion, following an assessment of the most suitable method, (?gravity, ?I.P.) The oberburden depth will be tested concurrently by Hammer Seismic lines. Should the geophysical surveys indicate a substantial extension to the granite or mineralized ground beneath the overburden, a programme of shallow pattern drilling to obtain bed-rock geochemical samples will be requested.

At an early stage, but preferably after the initial work outlined above a drilling programme will be proposed to explore the known geochemical anomalies. At present a programme of 12' x 150' Halco drill-holes could be designed to test the central area.

Full use will be made of on-site analytical facilities to reduce the time needed for this project and to increase operational efficiency. The timing of the various stages would depend upon the release of the area from SML. tenure,



Plan of NE Corner of BURRA and NW corner of CHOWILLA showing area proposed for reservation from Mining Act on expiry of SML 301

Plan 70-244/1 Ab+e

and the availability of geophysical and drilling teams. Sampling and mapping would probably take 4 field weeks. If the geophysical survey is carried out concurrently, the overburden drilling could start 4-6 weeks after the re-commencement of the investigations. Drilling of the central anomalies could take place during this initial 6 week period or, preferably, await the results of the overburden drilling.

Metal association and mobility studies, petrological work on alteration associated with the intrusion, and metallogenetic studies could be built into this project.

Note: The geophysical investigations could be carried out immediately following the expiration of the Lease, and prior to the reservation of the area from the operation of the Mining Act to identify the most significant areas. The extent of the requested Reservation could then be reduced to cover only the significant areas.

Earea Dam/Glenloth Project

The search for tin in the Earea Dam/Glenloth area has not so far met with success. Notes on this project (R.G. Wright) containing work carried out to date has been submitted to the Supervising Geologist. Drilling at Glenloth and Mt.Mitchell failed to locate economic concentrations of tin.

Proposals

No further search for tin in bed-rock is recommended. There is, however, a possibility that tin concentrates from the erosion of tin-bearing Tertiary Gravels, are present in the sediments of Lake Hamis. It is proposed to test this possiblity by hand sampling the Lake sediments at ¼ mile intervals along 12 lines half a mile apart.

A search for molybdenum in the Earea Dam/Glenloth area, and a study of its geochemical behaviour and distribution will be assessed following the receipt from Amdel of a literature appraisal on molybdenum. This is being undertaken by Dr. R. Davey. The detailed programming of this part of the project will not

be submitted until the literature appraisal has been studied, but will probably involve biogeochemical investigations and studies of metal mobilities and associations and Eh/pH factors. These investigations will be designed as part of the larger proposed project on molybdenum geochemistry.

Flinders Ranges Diapirs Project

This project is to assess (by drainage sampling) the geochemical characteristics of the Flinders Ranges Diapirs on a regional basis to add to the basic knowledge of these structures and of the factors affecting the associated mineralization. Three reports have been issued in this series, an initial brief appraisal (Binks, 1968b), and investigation reports on the Mt.Grainger (Binks, 1968c) and Windowarta (Langsford, 1969b) Diapirs. However, investigations have been carried out over a number of other diapirs as separate Departmental projects and by companies as part of their mineral investigations. There is consequently an urgent need to assess all the available data before long term programming can be undertaken. This assessment will be made (B. Leeson) as soon as pressure of other work permits.

Proposals

It seems apparent from a brief inspection of company reports that the majority of diapirs have been covered by drainage surveys. It is undesirable to repeat this work if all the data can be satisfactorily collated. This however may present considerable difficulties where different analytical laboratories have been used, and different sample fractions taken. Work may be needed to investigate Eh/pH conditions in each area. An orientation survey for each data set may also be needed.

It appears at present that the Patawarta (Mt.Rugged) Diapir (COPLEY) is the only large diapir which has not been sampled. Work on this structure will be undertaken as soon as suitable photo-enlargements are available. The work

will be undertaken by two field assistants under the direction of a geologist. The -80 fraction of the stream sediments will be analysed for Cu, Pb, Zn, Co, Ni, Mn, Mo, V, Nb.

Sellick Hill Project

The third report on the Sellick Hill Project (Wright, 1970) has been issued. Further Sectional work in this area may be recommended when the current company lease over the area expires and the results of the company's investigations are available. The Departmental student, X. Sibenaler, is however, continuing with detailed investigations into the nature and origin of the Forktree lead/zinc anomaly as an Honours thesis at Adelaide University. Departmental facilities are being made available to Mr. Sibenaler for this work. The investigations will include detailed dispersion studies, intensive soil studies over the anomaly, including mercury in soils; petrological and geological studies.

Fleurieu Peninsula / Kanmantoo Project

The southern coastal strip of the Fleurieu Peninsula has been geochemically sampled. Stream sediments were analysed for Cu, Pb, and Zn. No anomalies were located. A report is being prepared on this phase of the project.

The second phase of the project is continuing with sampling of the streams draining the Bruckinga Member of the Kanmantoo Group between Victor Harbour and Kanmantoo. An assessment will be made of the geochemical work carried out in the vicinity of the Kanmantoo copper deposit. Detailed orientation studies may be carried out in this area should they seem to be of value (N.R. Langsford).

Tarcoola Project

A programme of Halco drill-holes will be designated with the co-operation of the Supervising Geologist, Exploration Services Division, to test for copper in the basal conglomerate. This programme will be held in reserve until a

suitable time preferably when there is another drilling project in the area to offset mobilization costs.

No other work is envisaged on this project unless the drilling programme locates substantial accumulations of ore minerals.

Other Activities

Diamonds in South Australia

A literature appraisal on the favourability of South Australian conditions for the discovery of diamonds is being undertaken by N.R. Langsford. This will be submitted shortly.

NEW PROJECTS

Regional Molybdenum Project

Following a suggestion by the Deputy Director, a regional study of the distribution and geochemistry of molybdenum will be initiated this year. This will not be started until the literature appraisal on molybdenum by Dr. Davey of Amdel has been received and studied. The initial stage of the project will involve the study of molybdenum in the Barea Dam/Glenloth area, and an office collation of all available regional data, in particular from the Flinders Ranges area.

Kangaroo Island

Two Special Mining Leases covering the whole of Kangaroo Island held Elcor Australia Ltd. will probably soon be cancelled at the request of the Company. The suggestion has been received from the Supervising Geologist, Exploration Services, that the Department should apply for a Reservation of part of the Island from the operation of the Mining Act when the cancellation becomes effective to allow the Geochemical Exploration Section to undertake investigation of

anomalies located by Elcor. At the time of writing that Company's reports have not been received and more specific suggestions on this possible project cannot be made until these have been studied. It should be noted that at least one other company has shown interest in acquiring at least part of the area.

Gawler Ranges

In the event of the Kangaroo Island Project not becoming effective, consideration will be given to initiating a mineral search in the Gawler Ranges. A reconnaissance survey by Crawford and Johnson of the Regional Mapping Section produced a number of samples containing high levels of copper and chromium. The data was however badly recorded and certain identification of the sources of these samples is not possible; there is moreover a possibility of confusion with samples from other regions. The Gawler Ranges has never adequately prospected and there is a potential for discovering ore accumulations particularly in the southern zone of breccia pipes. A fairly comprehensive reconnaissance survey of the area would need to be undertaken to assess this potential. The establishing of a major project in this area would depend on the results of this survey.

No activity on this project or the preceeding reconnaissance survey will be taken until the future of the possible Kangaroo Island project becomes clear.

DRILLING PROGRAMMES

Possible drilling programmes for 1970 are set out in Table 2.

TABLE 2

PROPOSED DRILLING PROGRAMMES - 1970
GEOCHEMICAL EXPLORATION SECTION

Project	Unit	Programme	Date	Comments
BALCANCONA PROJECT	C	12' x 150' angle	As soon as unit is available	To test mercury anomalies along Mt.John-Paralana Fault, If these are confirmed by re-sampling.- Extension to programme may follow from results of rock-chip sampling across faults to the west-southwest.
BENDIGO PROJECT (1)	C or F	shallow pattern	Following geophysical survey	To obtain bedrock samples from beneath over-burden in areas indicated by geophysical survey. Size and design of programme awaits results of geophysical survey.
(2)	C or H	12' x 150' angle + verticle.	May-June. Programme available immediately area is reserved.	To test central anomalous area. (Preferable to defer programme until all other areas have been sampled - to avoid second mobilization costs in the event of other anomalies being located).
(3)	C or H		June - July	Depends on location of further anomalies by extension to surface geochemical investigations.
TARCOOLA PROJECT	H	Vertical. Programme to be designed.	To be held in reserve.	To test for copper in basal conglomerate.

C - Combination Rig
F - Failing WW1.
H - Halcodrill 150.

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Bri- Leeson.

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