Rept.Bk.No. 69/124
G.S. No. 4379

DEPARTMENT OF MINES
SOUTH AUSTRALIA

GEOLOGICAL SURVEY

EXPLORATION SERVICES DIVISION

SIX MONTHLY REPORT

on

LAST CHANCE MINE AREA

PEAKE AND DENISON RANGES

Grid G.3

by

B. LEESON
ASSISTANT SENIOR GEOLOGIST
GEOCHEMICAL EXPLORATION SECTION

D.M.736/69

28th November, 1969

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INTRODUCTION

An area of 5 square miles around the Last Chance Mine, Peake and Denison Ranges was reserved from the operation of the Mining Act in February, 1969 to permit the investigation by the Geochemical Exploration Section of a reported uranium/copper occurrence.

The Last Chance Mine was worked briefly for copper in 1915-16. The presence of uranium in the deposit was not detected until August 1966 when R.E. Milton (Senior Geophysicist) located a source of radio-activity in the open pit, and recorded a series of peaks on a number of scintillometer traverses north and south of the mine.

North Broken Hill Limited carried out regional and detailed geochemical surveys in this Special Mining Lease over the Peake and Denison Ranges between September 1966 and December 1968. The only mineral occurrence within the area of the present Reservation, located by this survey was the mine deposit. A soil survey over the deposit revealed a small linear copper anomaly to the north and south of the mine.

It was felt that stream sediment sampling could be profitably repeated using a shorter sampling interval. Soil and radiometric surveys would be carried out in any area giving anomalous stream sediment analyses.

INITIAL STREAM SEDIMENT SAMPLING

The availability of drainage sampling data from North Broken Hill's survey, allowed the present stream sediment sampling to proceed without the need for a separate orientation survey. Orientation analyses to determine the optimum size fraction and the metals present, were carried out on samples collected during the regional drainage survey.

All creeks were sampled at approximately 400 feet intervals, with additional samples from immediately above confluences. A total of 494 samples were collected in 8 working days by one field assistant, 25 of these samples were selected for orientation experiments. These consisted of 10 samples from creeks draining the vicinity of the Mine (mineralized area), 10 samples from an area of no obvious mineralization, and a further 5 samples from an area of basement granite. Each sample was split into 4 size fractions and analysed for copper, lead, zinc, cobalt, nickel, tin and molybdenum, and radiometrically for uranium and thorium. The results indicated that only copper would be worthwhile searching for. The greatest contrast of values of samples from mineralized areas over samples from background areas was obtained for the -80 mesh fraction. Consequently the remaining samples were analysed only for copper in the -80 mesh fraction. To speed up results and to provide analytical training the samples were analysed on the Department's Atomic Absorption Spectrophotometer, before being submitted to AMDEL for confirmatory analysis.

The results were not received from AMDEL prior to the "following" soil sampling being carried out. This programme was therefore based on Departmental analytical data. The AMDEL results have since been received but pressure of other committments has not allowed time for plotting and appraisal.

The Departmental analyses showed anomalous copper in creeks draining the Last Chance Mine, (Mine anomaly) and lower order anomalies in creeks draining an area some 4,000 feet to the south (Southern anomaly), and 5,000 feet to the southeast (Southeastern anomaly). Very low order anomalies were recorded in streams draining rocks in the far south and southwest of the Reservation.

FOLLOW UP SAMPLING

At the commencement of the "follow-up" stage, all these areas were examined for signs of minieralization, but the only visible copper associated with a geochemical anomaly was around the mine workings.

To test the mine anomaly and the southern anomaly, a grid was surveyed over the area with a roughly north-south oriented base line 5,400 feet long. East-west oriented sampling lines 800 to 1200 feet long were

surveyed at intervals of 100 feet along the base-line. To achieve maximum time utilization soil sampling was carried out concurrently with ground scintillometer readings by one field assistant. Soil samples were taken at 50 foot intervals from a depth of 6 inches a total of 1020 samples being collected in 7½ working days. Scintillometer readings were taken at each soil sampling point, and additionally at 25 foot intervals in the area of the mine. The readings were taken at the bottom of each soil pit(i.e. at a depth of 6 inches).

Because of shortage of time and the discouraging results of the visual examination the southeastern anomaly was surveyed on a grid pattern only by the scintillometer; no soil samples being taken. The low order anomalies in the far south and southeast were tested only by single line scintillometer traverses.

The scintillometer malfunctioned because of the extremely hot conditions; increases of as much as 25% being recorded during the hotest part of the day. To offset this, critical parts of the grid were re-surveyed during the early part of the morning.

The soil samples are at present being prepared for analysis of the copper content of the -80 fraction. The scintillometer results have not yet been fully assessed. A preliminary appraisal of the results is however discouraging.

DISTRICT MAPPING

Concurrent with the drainage and soil sampling programme an area of 32 square miles around the Last Chance Mine was mapped on a scale of 800 feet to one inch. The area is structurally very complex, and mapping has not been completed. Mapping data have not yet been compiled and it is uncertain at this stage whether a meaningful structural interpretation can be made.

The rocks outcropping in the area belong largely to the Duff Creek Formation of Willouran Age. The southern and eastern areas are dominated by two large fold structures. Two previously unrecorded blocks of basement rocks have been located in the central and north-central areas - roughly on

a SSW line with the basement area shown on the published 1:63,360 Boorthana Sheet. Specimens from these basement rocks have been petrologically examined by S. Whitehead of the Australian Mineral Development Laboratories. These descriptions will be included in a later report. The central basement area is composed largely of granodiorite and granite aplite, and granite gneiss.

The north-central and north-east areas are complex crush zones. Poor outcrop and inadequate photoenlargements made detailed mapping of these areas impossible in the time available. However, a number of large blocks have been outlined. No dolomite breccia was seen. These areas may be tectonic crush zones or of diapiric origin.

RECOMMENDATIONS

Without all results to hand, and without a full assessment of data obtained so far, it is difficult to draw any conclusions or to make recommendations for the future direction of this project. However, the preliminary assessment of the data is discouraging and it is improbable that further field work will be recommended. This matter will however, be discussed more fully with the Supervising Geologist when findings are in a more complete state and all analytical data plotted.

So far only 30 working days (including contingency days) have been spent on field work concerned with this project. Project geologist is B. Leeson; field assistant is R. South.

A more complete report will be issued as soon as other committments allow.

B. Leeson

BL:JKD
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