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DEPARTMENT OF MINES
SOUTH AUSTRALIA

REPORT
ON
OPAL OCCURRENCE
Myall Creek Station, County Manchester

by

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NON METALLICS SECTION

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Rept. Bk. No. 60/130
G.S. No. 3177
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25th June, 1965.

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ABSTRACT

Common opal occurs in bleached (pallid zone) Precambrian sediments beneath a porcellanite capping. Workings are not extensive and no precious opal is known to have been found. The deposit is significant because the opal is associated with the Tertiary laterite profile and the host rocks are not of Mesozoic age, as is the case with most other Australian occurrences.

INTRODUCTION

An occurrence of opal on Myall Creek Station, 24 miles west of Port Augusta, was reported to the author by Mr. W. Back of 19 Caroona Road, Port Augusta West and was inspected in company with him on 3rd February, 1965.

Located at latitude 32°32'30" and longitude 137°20'30" the deposit lies 2 miles south east of Myall Creek Homestead. This area is covered by the Corunna one mile map sheet of the Geological Atlas of South Australia.

Mr. Back recalled that in 1906 a boundary rider named Ern Murphy sank a number of shallow shafts on the deposit. Murphy, an amateur prospector, showed him several pieces of opal but he cannot now remember their quality. Mr. Back is acquainted with the varieties of opal as he possesses a number of specimens from other opal fields.

Some further work has been done in the last ten years, as two shafts, still in good condition, have been sunk since Mr. Back last visited the workings in 1955.

GEOLOGICAL SETTING

Gently undulating plains extend over a wide area to the north, east and south east of Myall Creek Homestead. To the west the country is hilly and the dominant topographic feature in this direction is the Corunna Range, seven miles distant.

Precambrian rocks form the hilly country and lie at shallow depth beneath a veneer of soil on the undulating plain. The higher rises of the plain are capped by a thin bed of water rounded pebbles and boulders of Tertiary age. The Koopena Fault Scarp terminates about 1½ miles south-east of the workings.

The undulating plain represents the remnants of an extensive late Tertiary land surface which is dissected by a mature drainage system draining to the south east towards Spencer Gulf. Minor erosional scarps, 20 to 30 feet high are common in the head waters of the drainage lines and the opal diggings are located on flat ground at the base of one of these scarps.

THE OPAL DEPOSIT

A bed of kaolinitic sandstone containing conglomeratic bands is exposed in the scarp, the topmost 10 feet of which is silicified. A bleached pebble of Gawler Range Porphyry was observed in the conglomerate. Underlying the sandstone at the base of the scarp, and exposed in a shaft to a depth of eight feet, are pale green faintly laminated shales with thin white sandstone interbeds. The sequence is horizontally bedded and is equated with grits of the Pandurra locality.

The silicified porcellanite capping and the bleached kaolinitic rocks suggest that the formation forms part of the pallid zone of an extensive laterite profile which developed in Tertiary times.

The principal workings comprise about 10 shallow shafts situated 100 yards from the base of the scarp. The contact between sandstone and underlying shale is exposed in the workings; opal appears to have come from this zone. Further south, three other shafts at a slightly higher elevation have been sunk in sandstone, the deepest to 10 feet.

Only a brown semi transparent variety of common opal is present. None was seen in situ but pieces of both sandstone and shale containing thin seams of opal were found on the dumps. One sample of sandstone taken from the southern workings showed a vertical and an oblique joint face and a bedding plane (?) with a thin layer of opal on each.

Little work has been done on the field and this suggests that no precious opal was found, although at the time of working (1906) no South Australian fields were known, production at White Cliffs had declined and the Lightning Ridge field was being established. On all of the producing fields there is a gradation from clear monochromatic potch through milky potch with colour to precious opal. Careful search at the deposit under discussion revealed no such variation in the type of opal present. It is therefore concluded that precious opal is unlikely to occur at Myall Creek.

Petrological descriptions of five samples are attached as an appendix. The location of these is shown on the accompanying section.

The occurrence is similar to that at Andamooka and Lightning Ridge where opal occurs at the contact between an arenaceous bed and an underlying impermeable clay bed. It differs from the producing fields in that the host rocks are of older than Mesozoic age, but it is noteworthy that opal occurs in the pallid zone of the laterite profile. There is no apparent relationship between the deposit and the Koopenna Fault.

SUMMARY AND CONCLUSIONS

The deposit has no economic significance but is a further example of the association of opal with a Tertiary laterite profile.

Opal occurs in rocks of Precambrian age at the contact between porous kaolinitic arenaceous beds and underlying impermeable argillaceous beds. This suggests that downward moving surface water has some genetic significance in opal formation.

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APPENDIX

PETROLOGICAL DESCRIPTIONS OF OPAL-BEARING SPECIMENS FROM MYALL CREEK

Investigation and report by: D. Smale

Officer in Charge - Mineralogy Section: M.W. Fander

P83/65: 1: TS15653

This is a coarse, poorly-sorted lateritic sandstone with a grain size varying from 0.06 to 3 mm. The grains are sub-angular to rounded, and consist mainly of quartz, but rock fragments are common among the larger grains. They are of the following types:

1. Felsites with a small unit size and relict hyalopilitic texture.
2. Quartz mosaic with highly crenulate intergranular boundaries.
3. Quartzite with numerous fine-grained inclusions, and somewhat elongated grains.

Almost euhedral zircon is accessory, testifying the closeness of an igneous source rock.

The matrix consists partly of fine grains of the framework which grades into it, but most is ferruginous clay, dominantly kaolin, with accessory illite, showing more or less colleform structure in its lining of cavities. Material with a grain size of less than 2 microns forms 2% of the rock. Around some cavities the inner material is less stained than the other.

Opal in any form does not appear to be present.

P84/65: 2: TS15654

This is a poorly-sorted clay-cemented pebbly sandstone with a grain size varying from 0.25 to 10 mm. The grains vary from angular to rounded. A large flattened pebble or possibly a "raft" of fine quartz sandstone about 10 mm thick is present. Quartz grains are dominant in the framework, but a large number of rock fragments are present, most of which are richly sericitic quartz sandstones, or felsites with relict hyalopilitic texture. Minor potassium feldspar grains are present, some of which are microcline. The matrix is almost all clay, in which kaolin is dominant and illite subdominant. Material with a grain size of less than 2 microns forms about 50% of the rock.

The large fragment of fine sandstone is similar mineralogically to the rest of the rock, the main differences being in sorting and grain size.

Opal was not observed.

P85/65: 3: TS15655

This is a clay-cemented quartz sandstone with a grain size of 0.05 - 0.25 mm. Some secondary overgrowth has taken place on the framework grains, and many of the juxtaposed grains have been sutured. Their angular shape appears to be due to overgrowths rather than sedimentary processes. A few grains are microcline, claystone or chert; detrital muscovite flakes are rare, and green detrital tourmaline, perthite, rounded zircon and sphene are accessory.

The framework forms 50 - 60 % of the rock. The matrix consists almost entirely of clay, which is kaolin with a trace of illite.

Material with a grain size of less than 2 microns forms about 12 % of the rock.

A very small amount of opal is present in the matrix, irregularly distributed about certain centres in shapeless masses.

P86/65: 4: TS15656

This is an opaline clay-cemented quartz sandstone with a grain size of 0.05 - 0.2 mm. The framework forms only about 50 % of the rock, the rest being clay and cloudy opal. The grains are angular to subrounded, but are fairly well sorted; most are quartz, but some are fragments of claystone. Clear opal occurs along sub-parallel veins about 1-2 mm thick. They generally extend only a short distance, and may stop abruptly. They are fairly commonly fractured and the fractures have been filled with a pale brown, slightly colloform clay. (see figures 3 and 4). A little of the material of the rock itself may extend part of the way into these fractures, but never in such a way as to suggest that the rock was fluid after the opal had fractured. The clay was presumably deposited from a suspension in percolating water; x-ray analysis showed kaolin to be dominant and illite subdominant. Material with a grain size of less than 2 microns forms about 9 % of the rock.

87/65: 5: TS15657

This is a fine-grained silty claystone, about 20 % of which consists of silt grains 0.01 - 0.06 mm across; most are angular to rounded quartz grains. The rest of the rock is almost all brownish illite, and is aligned presumably parallel to the bedding. The more elongated quartz grains are also aligned. Rare small muscovite flakes are present. Kaolin is accessory. Material with a grain size of less than 2 microns forms about 5 % of the rock.

Opal does not appear to be present in the body of the rock, but it is present in more or less colourless veins up to 2 mm in thickness. Though fractures are present as in P86/65 they are much rarer, but are nevertheless filled with brownish clay. This is not colloform, and may have been deposited more abruptly than in P86/65.

Summary of P85 - P87

Opal is present in three specimens: P85, P86 and P87. Nothing was observed in the samples that might be related to the presence of opal. In previous samples features that have appeared possibly related to opal occurrence have been the presence of alunite and the absence of montmorillonite. However in P85-P87 both montmorillonite and alunite are absent. The clay minerals present are kaolin and illite, but the concentrations of these minerals do not appear to be related to the presence of opal, and at least in P86 and P87 some of the clay was obviously emplaced after the opal (see figures 3 and 4).

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