DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

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ANDAMOOKA OPAL FIELDS
RESULTS OF THE 1988
DRILLING PROGRAM

GEOLOGICAL SURVEY

by

D.C. SCOTT

SENIOR GEOLOGIST
MINERAL RESOURCES BRANCH

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DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

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ABSTRACT

All mineable opal at Andamooka has been found in Bulldog Shale, shallow marine sediments of Cretaceous age. Most opal has formed within a bleached profile at the contact of sandy claystone (Kopi) and underlying, grey-brown clay (Mud) near the base. Normally this interface (Level) is marked by a pebble or conglomerate layer which provided suitable crevices or permeability barriers for opal formation.

In September 1988, Olympic Dam Project management provided the services of a drill rig and crew to Andamooka Progress and Opal Miners Association (APOMA) to find prospective areas, remote from existing opal fields.

Forty one holes were drilled in the five day program for an aggregate depth of 649.6m. Although no opal or potch was encountered, eight holes, at five separate locations had good Levels which warrant further investigation, particularly an area southeast of White Dam Field.

INTRODUCTION

In May 1988, Mr R.J. Crew, Resident Manager, Olympic Dam Project, offered APOMA the services of a drill rig and crew for an exploration program to locate potential opal bearing areas, within the Precious Stones Field (P.S.F.) remote from existing workings.

This five day program, based on investigations monitored by the Department in 1976 (Carr et al., 1979) and 1984 (Scott et al., 1986), commenced on 19 September 1988. Drill sites were selected by APOMA members. Holes were logged by the author, with the Relative Level (R.L.) of collars surveyed by M.W. Flintoft (Technical Assistant). Hole locations are shown on Figure 1, with topographic contours and outlines of workings based on 1985 aerial photography on Figure 2. Details and logs of holes are presented in Appendicies A and B respectively.

An Ingersoll-Rand T-4 percussion drill, with bit diameter of 203 mm, (8 inches), was used to drill 41 holes for an aggregate depth of 649.6 m. Although Calweld holes, with a diameter of 1 m, are preferred for more accurate logging and better exposure of the Level, the superior drilling rate of slim holes is a major compensation. During the program up to 10 holes per day were drilled, which compares with up to 3 holes per day for a Calweld rig, depending on the nature and thickness of silcrete encountered.

Slim hole drilling is ideally suited for locating areas of good opal potential, based on the type of Kopi and Mud encountered, which can subsequently be investigated by Calweld drilling or bulldozing.

GEOLOGICAL SETTING

Geology of the Andamooka P.S.F., shown on Figure 1, is detailed in Carr et al., (1979) and summarised below.

Opal host rock is deeply weathered, shallow-marine, Bulldog Shale (Marree Subgroup) of Cretaceous age which overlies Algebuckina Sandstone or laps directly on the pre-Mesozoic basement. Locally three main sub-units are recognised:

- Basal, comprising up to 4 m of pale yellow to red and brown pebbly silt, called Bulldust, with quartzite boulders.
- Middle, light brown, grey or yellow claystone with minor sand content called Mud. Mortmorillonite is the dominant clay mineral, with generally less than 20% fine sand grains. Maximum known thickness is 4 m.
- Top, composed of mainly white, slightly sandy clay, called Kopi, with numerous zones of red-brown limonite staining, contains occasional sub-rounded boulders. Pre-erosional thickness was at least 30 m.

A conglomerate band, the Level, up to 0.2 m thick, generally marks the contact between Kopi and Mud. Opalisation is most common at either the Level-Mud or Kopi-Mud contact. In places a White Band of Kopi, 0.3 to 0.4m thick, is found below the Level. A poorly developed conglomerate or Second Level marks the base of the White Band and underlying Mud. Minor quantities of opal are sometimes found in this Level.

Cretaceous sediments were particularly affected by deep Tertiary weathering and the resultant highly kaolinised, bleached profiles are associated with development of extensive silcrete cappings. Silcrete has formed in situ, mainly on Bulldog Shale, only small areas of sheet silcrete now remain and are generally less than 5 m thick.

Thin brown, Quaternary soil with abundant gibbers and gypsiferous B-horizons, mantle most surfaces. Sand dunes with associated interdunal claypans cover some areas adjacent to the fields.

RESULTS OF DRILLING PROGRAM

Results are summarised in Table 1 from data listed in Appendices A and B. Hole locations are shown on Fig. 1, which has been modified from Figure 19 in Olliver et al., (1978).

TABLE 1

SUMMARY OF DRILLING PROGRAM

Type of Level	Hole No	Total
No Level or abandoned above Level	1, 5, 29, 30, 31, 32, 33.	7
Poor	2, 3, 4, 5, 7, 8, 13, 15, 16, 17, 20, 21, 22, 23, 26, 27, 28, 34.	18
Moderate	9, 11, 18, 19, 25, 36, 37, 40.	8
Good	10, 12, 14, 24, 35, 38, 39, 41.	8
		41

Assessment of holes was based on observations by Mike Freeman and other APOMA members, and the writer. Holes with poor Levels contained significant thicknesses of clayey (less weathered), highly silicified or powdery Kopi, and dry or sandy Mud, whereas good Levels were indicated by clean, porous Kopi above slightly moist Mud with minor sand content.

Depth measurements are somewhat approximate due to the delay in cuttings reaching the surface, particularly in zones with rapid penetration, as when drilling dry, powdery Kopi.

Although no opal or potch were encountered during the program, eight holes which encountered good Levels at five separate locations are listed in Table 2.

TABLE 2

LOCATION OF HOLES WITH GOOD LEVELS

Hole No	Location
10, 12.	4.5 km SE of White Dam Fields.
14.	1.5 km S of White Dam Fields.
24.	2.5 km W of Swamp Dam.
35.	0.7 km NNW of Christmas.
38, 39, 41.	1.5 to 2.0 km SW of Tea Tree Flat.

Holes 10 and 12 were the most promising. Also noted in the area were two potch shells, observed from a False Level in a nearby bulldozer cut, which had not reached the Main Level. The other four locations also warrant further investigation.

CONCLUSIONS AND RECOMMENDATIONS

During the five day program 41 holes were drilled to an average depth of 15.8m.

Eight of the holes drilled encountered promising Levels at five separate locations:

- S and SE of White Dam Fields.
- W of Swamp Dam.
- NNW of Christmas.
- SW of Tea Tree Flat.

Each of these locations warrant further investigation, particularly near holes 10 and 12, southeast of White Dam Fields. Other areas with potential are detailed in the report of the 1984 Prospecting Scheme.

Data from this program will be incorporated on a display at Head Office and Andamooka Area Office and will include:

- a plan of the P.S.F., based on enlarged aerial photographs, which outlines the Cretaceous sediments, location of Subsidised and Prospecting shafts and drillholes and R.L. of the opal Level.
- Topographic maps accompany this plan, so that depth to Level can be determined throughout most of the prospective area.
- results of Subsidised and Prospecting shafts are detailed on attached lists.

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- Bob Crew, Resident Manager, Olympic Dam Project for providing the services of the drill. The program has made a beneficial contribution to the understanding between the two diverse mining communities and added to the Department's knowledge of the P.S.F.
- the drill crew, Trevor Dixon, Ken MacDonald and Rob Rice, for their competence and willing cooperation which impressed all concerned with the program.
- The Departmental Area Officer, Phil Jones, who explained logistics of the program to APOMA members prior to my arrival, which contributed to its smooth running.

D.C. Scott

D.C. SCOTT
SENIOR GEOLOGIST
MINERAL RESOURCES

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APPENDIX A

DETAILS OF DRILLING PROGRAM

1988 DRILLING PROGRAM

HOLE NO.	LOCATION	HOLE R.L. of collar(m)	Depth	LEVEL Depth	LEVEL R.L.	COMMENTS
1	0.9 km S of Hallion	138.7	30.0	-	-	Level not reached. Kopi very clayey, moist past 21.0.
2	1.3 km S of Hallion	137.3	40.0	35.5	101.8	Poor Level. Clayey Kopi past 21.6.
3	1.8 km SSE of Hallion	119.2	22.5	19.5	99.7	Poor Level and Mud. Kopi clayey past 11.4.
4	0.8 km E of Halfway	110.7	23.0	19.6	91.1	Poor Mud. False Level at 16.5.
5	0.7 km WSW Halfway	114.8	22.0	?18.5	?96.3	Probably False Level. Main o f Level not reached. Very clayey past 20.4.
6	2.5 km ESE of White Dam	113.9	23.7	22.8	91.1	Poor Level, no Mud. False Level 21.5
7	2.2 km SE of White Dam	109.4	12.0	8.2	101.2	Weak Level. False Level 6.1.
8	3 km SE of White Dam	109.9	15.0	12.4	97.5	Poor Mud and Level.
9	3.5 km SE of	102.5	17.0	14.5	88.0	Better Level and Mud.
10	4.5 km SE of White Dam	99.8	10.2	9.3	90.5	Good Mud and Level. False Level 7.2.
11		96.8	9.6	7.8	89.0	Not as good as 10. False Level 3.6.
12		103.5	15.2	13.4	90.1	Very promising. False Levels at 9.4 and 12.5.
13	3.2 km SSE of White Dam	104.1	16.0	15.0	89.0	Poor Level. Better upper Level at 14.3.
14	1.5 km S of White Dam	105.5	13.5	12.0	93.5	Good Level and Mud. Upper Levels at 9.4 and 11.3.
15	0.5 km SW of White Dam	114.3	18.5	16.5	97.8	Poor Main Level. Upper Levels at 5.5, 11.2 and 13.6(?).
16	0.5 km SSW of White Dam		108.1	12.0	9.6	98.5Poor Level and Mud. Possible False Level at 3.4.
17	2.4 km SW of White Dam	118.2	13.0	8.7	109.5	Poor Level and Mud. Probable False Level at 7.1.
18	4 km W of White Dam	107.7	12.0	9.0	98.7	Good Mud. Moderate Level.

19	4 km W of White Dam	108.5	16.3	13.9	94.6	Similar to 18 also Levels at 8.5 (?), 10.8 and 12.8.
20		107.5	13.5	10.8	96.7	Clayey Kopi. Not as good as 18.
21	6 km W of White Dam	123.5	27.8	26.2	97.3	Clayey Kopi below False Level at 17.3.
22		121.0	24.0	23.6	97.4	Similar to 21.
23	0.4 km of Lunatic	103.8	8.8	8.2	95.6	Poor Level.
24	2.5 km W of Swamp Dam	105.6	16.0	14.8	90.8	Good Kopi and Mud. Possible False Level at 4.5.
25		101.2	15.8	12.0	89.2	Level O.K. but Kopi clayey past False Level at 4.5.
26		100.7	15.5	15.2	85.5	Clayey past possible False Level at 12.0.
27	3 km W of Swamp Dam	105.5	16.5	15.7	89.8	Poor Mud and Kopi.
28	3.5 km WSW of Swamp Dam	101.2	17.5	17.0	84.2	Clayey Kopi past 6.6. Level and Mud poor. False Levels at 4.8, 6.6 and 16.1.
29		100.0	16.5	-	-	No Main Level. Poor Kopi. Probable False Level at 5.4.
30	5.5 km SW of Swamp Dam	100.4	15.3	-	-	No Level. Sand at 13.8 to base of hole.
31		100.4	10.6	-	-	No Main Level. False Level 5.4. Poor Kopi.
32	2 km W of Christmas	112.6	6.0	-	-	Hole abandoned in sand past 4.4.
33		114.4	8.9	-	-	Sand past 5.8. Abandoned.
34	1.4 NW of Christmas	102.3	8.9	2.0	100.3	Poor Level. Mainly sand and rubble below.
35	0.7 km NNW of Christmas	104.5	8.9	6.8	97.7	Good Mud and Level. False Level 5.4.
36		104.1	13.0	10.4	93.7	Good Main Level, Mud moderate. False Level 7.7.
37	0.5 km W of Koskas	117.0	25.5	23.4	93.6	Kopi fairly clayey, Level fair. Good Mud. False Level 14.5.
38	1.5 km SW of Tea Tree.	122.0	12.5	11.8	110.2	Good Mud. False Level at 8.4.
39		119.0	8.7	7.6	111.4	Similar to 38. False Level 6.2.

40	1.8 km SW of Tea Tree	115.7	8.7	7.8	107.9	Not as good as 38. False Level at 5.6 - weak.
41	2 km SW of Tea Tree	115.5	8.7	6.7	108.8	Good Level and Mud.
		TOTAL	649.6			

APPENDIX B

LOGS OF DRILLHOLES

Abbreviations used in logs:

- Sl. Slightly
- Mod. Moderately
- V. Very
- Occ. Occasional
- EoH End of Hole

Hole No.	Depth (m) From	To		Description
1	0.0	1.8	Soil	- Red-brown sandy clay with silcrete boulders.
	1.8	5.0	Silcrete	- Yellow-brown. Hard.
	5.0	6.5	Kopi	- Yellow-brown to off white. Hard. Silicified.
	6.5	12.0		- White to off white. Some gypsum veins near 9.5. Few thin reddish zones.
	12.0	21.0		- Pale grey. Sl. moist.
	21.0	30.0		- Yellow-brown. V clayey. Moist.
			30.0 EoH	
2	0.0	0.9	Soil	- Sandy clay and boulders.
	0.9	6.5	Silcrete	- Hard. Solid.
	6.5	8.4	Kopi	- Off White. Hard, silicified.
	8.4	11.2		- Off white with some red patches.
	11.2	21.6		- Pale reddish to pale grey. Few small boulders near 13.0 - False Level (?). Sl. moist. Sl. clayey to 21.6.
	21.6	35.5		- Yellow-brown with some grey zones. Moist, clayey. Brown-grey past 25.0. Occ. boulder.
		35.5	Level	- Some quartzite boulders above. Poor.
	35.5	38.6	Mud	- Yellow-brown. Clay. Moist.
	38.6	40.0	Silty Clay	- Brown, moist.
			40.0 EoH	
3	0.0	1.0	Soil	- Red-brown with silcrete boulders.
	1.0	1.8	Silcrete	- with silicified Kopi.
	1.8	4.5	Kopi	- Off white to pale brown. Powdery.
	4.5	6.8		- Pale yellow-brown. Some hard bands with gypsum.
	6.8	19.5		- Grey-brown. Sl.moist. Clayey past 11.4. Few pebbles past 16.8 (False Level).
		19.5	Level	- Few small boulders above.
	19.5	20.4	Mud	- Grey. Silty. Poor.
	20.4	22.5	Silt	- Off white. Few small boulders and pebbles. Dry.
			22.5 EoH.	
4	0.0	0.8	Soil	and silcrete boulders.
	0.8	4.5	Kopi	- White. Silicified to 2.0. Powdery to 4.5.
	4.5	16.5		- Pale grey-brown. Some gypsum veins. Sl. Moist past 12.0. Few small boulders at base.
		16.5	False Level	
	16.5	19.6	Kopi	- Off white to pale grey brown. Sl. clayey.
		19.6	Level	
	19.6	21.5	Mud	- Poor with silt.
	21.5	23.0	Silt	- Clayey with some pebbles.
			23.0 EoH	
5	0.0	0.9	Soil	with some boulders.
	0.9	6.5	Kopi	- Pale red-brown. Mod. hard with gypsum to 4.5. Dark yellow-brown. Silty. Some gypsum zones.
	6.5	18.5		- Grey-brown. Clayey, Sl. moist. Few pebbles past 17.0. Large boulders at 18.5.
		18.5	False Level?	
	18.5	22.0	Kopi	- Off white to pale brown. V. clayey, moist past 20.4.
			22.0 EoH	

6	0.0	0.5	Soil	and silcrete boulders.
	0.5	5.3	Silcrete	- Reddish yellow to yellow brown. Few clayey seams.
	5.3	12.0	Kopi	- Off white to reddish. Hard, silicified to 7.5. Some pale yellow-brown bands. Few harder zones.
	12.0	21.5		- Softer. Dark yellow-brown, clayey past 18.0, some pink bands. Small pebbles above 21.5.
		21.5	False Level	
	21.5	22.8	Kopi	- Clayey with pebbles and sand above 22.8.
		22.8	Level	- Poor-no mud.
	22.8	23.7	Silty Sand	- Off white with quartzite chips near base. Basement.
			23.7 EoH	
7	0.0	1.2	Soil	and few quartzite boulders.
	1.2	6.1	Kopi	- Off white to reddish. Few hard, silicified bands to 4.5. Off white to pale yellow-brown. Traces gypsum. Pebbles of quartzite past 5.9.
		6.1	False Level	
	6.1	8.2	Kopi	- Pale mauve. Trace gypsum. Small pebbles near base.
		8.2	Level	- Weak.
	8.2	9.8	Mud	- Grey-brown. Sandy.
	9.8	12.0	Sandstone	- White. Silty.
			12.0 EoH	
8	0.0	0.4	Soil	and rubble.
	0.4	1.6	Silcrete	- Silicified Kopi. Hard.
	1.6	6.5	Kopi	- Off white to pale red. Silicified in part.
	6.5	12.4		- White. Traces gypsum. Thin band of small pebbles at base.
		12.4	Level	- Poor.
	12.4	13.2	Kopi	- Off white. Clayey. Sl. moist.
	13.2	15.0	Sandstone	- White.
			15.0 EoH	
9	0.0	1.1	Soil	and small boulders.
	1.1	3.5	Kopi	- White. Mod. hard with gypsum.
	3.5	10.8		- Off white to pale red to 7.0. Pale grey. Trace of gypsum. Iron stained pebbles at base.
		10.8	False Level	
	10.8	14.5	Kopi	- White. Clayey. Few small boulders near 14.5.
		14.5	Level	- Fair.
	14.5	15.4	Mud	- Reddish-brown. Sl. moist.
	15.4	17.0	Sandstone	- White. Basement.
			17.0 EoH	
10	0.0	0.8	Soil	- Sandy with some small boulders.
	0.8	6.2	Kopi	- Off white to pale red. Hard to 3.0. Gypsum abundant in part.
	6.2	7.2		- Brown. Clayey. Abundant pebbles at base.
		7.2	False Level	
	7.2	9.3	Kopi	- Yellow-brown. V. clayey. Thin pebble layer and iron staining at base.
		9.3	Level	
	9.3	9.8	Mud	- Grey-brown to yellow-brown. Moist. Good.
	9.8	10.2	Sandstone	
			10.2 EoH	

11	0.0	0.9	Soil	- Red-brown, sandy. Few small boulders.
	0.9	3.6	Kopi	- White. Mod. hard with gypsum. Boulders in silty Kopi at base.
		3.6	False Level	
	3.6	6.2	Kopi	- White. Abundant gypsum with few small boulders.
	6.2	7.8		- Grey-brown. Clayey. Sl. moist. Small boulders near 7.8.
		7.8	Level	
	7.8	8.7	Mud	- Grey-brown. Moist.
	8.7	9.6	Sandstone	
			9.6 EoH	
12	0.0	1.2	Soil	
	1.2	4.0	Kopi	- Off white. Hard. Abundant gypsum.
	4.0	6.1		- Reddish to off white. Thin red pebble band at 6.1 Level (?).
	6.1	9.4		- White. Clean. Few reddish zones. Small pebbles in red silty Kopi at 9.4.
		9.4	False Level	- Weak.
	9.4	12.5	Kopi	- As above. Few boulders and pebbles. Some boulders and pebbles at 12.5
		12.5	False Level	
	12.5	13.4	Mud	- Grey-brown. Moist. Boulders in sandy matrix at base.
		13.4	Level	- Strong.
	13.4	14.6	Mud	- Yellow-brown. Moist.
	14.6	15.2	Sandstone	
			15.2 EoH	
13	0.0	2.5	Soil	
	2.5	6.7	Kopi	- Off white to reddish. Hard, silicified.
	6.7	14.3		- Mainly off white, some red patches. Traces gypsum small boulders in clayey matrix at base.
		14.3	Level	- Fair.
	14.3	15.0	Kopi	- V. clayey. Abundant pebbles in silty sand at base.
		15.0	Level	- Poor.
	15.0	16.0	Silty Sand	- White.
			16.0 EoH	
14	0.0	2.8	Soil	
	2.8	6.2	Kopi	- Off white. hard, silicified. Reddish past 4.0.
	6.2	9.4		- White, clean. Softer with few harder bands. Few quartzite boulders near base.
		9.4	False Level	- Weak.
	9.4	11.3	Kopi	- Sl. clayey.
		11.3	False Level	
	11.3	12.0	Kopi	- Clayey. Abundant boulders, sand in clay matrix at base.
		12.0	Level	- Strong.
	12.0	13.0	Mud	- Brown to pale yellow.
	13.0	13.5	Quartzite	- Off white.
			13.5 EoH	

15	0.0	0.4	Soil	and rubble.
	0.4	5.5	Silcrete	- Pale yellow. Some gypsum zones past 4.5. Hard silicified Kopi.
		5.5	False Level	- Weak.
	5.5	7.1	Kopi	- Red. V. clayey. Mud?. Gypsum common.
	7.1	11.2		- Pale grey. Sl. moist past 8.0. Clean. Few reddish boulders at base.
		11.2	False Level	
	11.2	16.5	Kopi	- Pale grey. Clayey. Red band at 13.6 Level? Few gypsum zones. Boulders at base.
		16.5	Level	- Weak.
	16.5	17.4	Kopi	- Pale grey. Clayey.
	17.4	18.5	Quartzite	- Grey. Becoming hard at 18.5.
			18.5 EoH	
16	0.0	0.3	Soil	
	0.3	3.4	Silcrete	- Hard. Some clay seams.
		3.4	False Level?	
	3.4	5.6	Mud	- Red. Dry with abundant gypsum.
	5.6	9.6	Kopi	- Off white to pale grey. Mainly dry. Traces gypsum. Few reddish pebbles at base.
		9.6	Level	- Poor.
	9.6	10.8	Kopi	- Sl. clayey.
	10.8	12.0	Quartzite	- Hard. Grey.
			12.0 EoH	
17	0.0	0.3	Soil	
	0.3	3.5	Silcrete	- Mainly boulders and rubble.
	3.5	7.1	Kopi	- Reddish, sandy with abundant gypsum. Off white dry past 5.2. Iron stained nodules and pebbles above 7.1
		7.1	False Level	
	7.1	8.7	Kopi	- Off white to pale grey. Red iron stained zone with gypsum at base.
		8.7	Level	- Poor.
	8.7	13.0	Kopi	- Off white to pale brown silty. Dry. Sl. moist past 11.0. Some brown clayey bands.
	13.0	13.5	Quartzite	- Pale grey. Hard.
			13.5 EoH	
18	0.0	1.6	Soil	and rubble.
	1.6	6.4	Silcrete	- Solid. Hard.
	6.4	9.0	Kopi	- Red, powdery to 7.0. Off white to pale grey-brown. Few boulders above Level.
		9.0	Level	
	9.0	10.5	Mud	- Mauve-brown. Damp. Good.
	10.5	12.0		- Pale grey. silty. Dryer.
			12.0 EoH	
19	0.0	1.8	Soil	- Sandy clay.
	1.8	4.2	Silcrete	- Mainly boulders.
	4.2	5.8	Kopi	- Reddish to brown. Dry, sandy with gypsum.
	5.8	10.8		- Off white. Some hard silicified bands. Gypsum rich band at 8.5 (Level ?). Darker with few pebbles at base.
		10.8	False Level	
	10.8	12.8	Kopi	- White, clayey.
		12.8	False Level	
	12.8	13.9	Kopi	- White, powdery, clayey. Thin pebble band at base
		13.9	Level	- Weak.

	13.9	15.5	Mud	- Brown. Sl. moist. Good.
	15.5	16.3	Kopi	- Pale. Sandy.
			16.3 EoH	
20	0.0	0.5	Soil	and rubble.
	0.5	4.5	Silcrete	- Mainly boulders.
	4.5	5.4	Sand	- Reddish. Some clay. Fine.
	5.4	10.8	Kopi	- Pale grey to off white. Trace of gypsum. Clayey zones, to 8.8. Pale grey-brown, clayey. moist.
		10.8	Level	- Iron stained.
	10.8	13.5	Mud	- Brown. Moist.
			13.5 EoH	
21	0.0	0.8	Sand	- Red-brown. Few pebbles.
	0.8	2.5	Silcrete	- Silicified Kopi. Mod. hard.
	2.5	6.0	Kopi	- White with gypsum. Partly silicified.
	6.0	9.5		- Reddish, powdery. Traces gypsum.
	9.5	17.3		- White. Clean. Sl. clayey. Moist.
		17.3	False Level	- Iron stained. Weak.
	17.3	18.4	Kopi	- Off white. Clayey.
	18.4	26.2		- White to pale yellow-brown. Sl. moist. Sl. clayey to clayey.
		26.2	Level	- Weak.
	26.2	27.8	Mud	- Brown. Moist.
			27.8 EoH	
22	0.0	0.3	Soil	and rubble.
	0.3	4.0	Silcrete	- Silicified Kopi. Mod. Hard.
	4.0	6.0	Kopi	- Reddish. Partly silicified.
	6.0	20.0		- White. Clean. Sl. moist. Sl. clayey.
	20.0	23.6		- Pale yellow-brown to grey-brown. Clayey to V.clayey. Moist.
		23.6	Level	- Weak.
	23.6	24.0	Mud	- Dark yellow-brown. Moist.
			24.0 EoH	
28	0.0	1.6	Soil	and rubble.
	1.6	5.7	Silcrete	- Hard.
	5.7	7.0	Kopi	- Off white. Mod. hard with gypsum.
	7.0	8.2		- White with reddish patches. Few small pebbles at base.
		8.2	Level	
	8.2	8.8	Mud	- Dark red-brown. Sl. moist.
			8.8 EoH	
24	0.0	0.4	Soil	
	0.4	2.4	Silcrete	- Hard with boulders.
	2.4	4.5	Kopi	- Off white. Mod. hard with gypsum. Few boulders at 4.5 (Level ?).
	4.5	12.5		- White clean . Few reddish zones. Some gypsum veins.
	12.5	14.8		- Grey-brown to off white. Thin iron stained pebble band at base.
		14.8	Level	
	14.8	15.5	Mud	- Reddish. Moist. Good.
	15.5	16.0	Kopi	- Grey-brown. Clayey. Silty.
			16.0 EoH	

25	0.0	1.5	Soil	
	1.5	3.6	Silcrete	- Hard.
	3.6	4.5	Kopi	- Reddish with gypsum. Some hard bands. Red band at 4.5. False Level.
	4.5	7.0		- Grey-brown. V. clayey.
	7.0	12.0		- Pale brown. Clayey, moist. Trace of gypsum to 8.5. Mauve. Clayey. Few small iron stained boulders at base.
		12.0	Level	
	12.0	14.5	Mud	- Yellow-brown. Moist.
	14.5	15.8	Kopi	- Grey-brown. Silty. Few pebbles.
			15.8 EoH	
26	0.0	1.7	Soil	
	1.7	5.4	Silcrete	- Yellow-brown. Hard. Clayey at base.
	5.4	7.5	Kopi	- Reddish. Abundant gypsum. Mod. hard, dry.
	7.5	12.0		- Off white to pale grey. Sl. clayey to 9.5. Reddish zones with pebbles at base.
		12.0	False Level?	- Weak.
	12.0	15.2	Kopi	- Red to brown. Clayey. Moist.
		15.2	Level	- Poor.
	15.2	15.5	Mud	- Yellow-brown.
			15.5 EoH	
27	0.0	0.5	Soil	
	0.5	3.0	Silcrete	- Bouldery.
	3.0	4.0	Kopi	- Off white. Hard. Silicified.
	4.0	5.4		- Brown. Dry with gypsum. V. clayey at 5.4.
		5.4	False Level?	
	5.4	9.0	Kopi	- Yellow-brown to grey brown. Clayey. Sl. moist. Abundant gypsum. V. clayey past 8.2.
	9.0	15.7		- Brown with reddish zones. Clayey to V clayey. Thin pebble band near base. Moist. Iron stained.
		15.7	Level	- Weak.
	15.7	16.5	Mud	- Yellow-brown. Moist. Silty.
			16.5 EoH	
28	0.0	0.4	Soil	
	0.4	1.8	Silcrete	- Bouldery.
	1.8	4.8	Kopi	- Off white to pale reddish, with gypsum and clayey zones.
		4.8	False Level	- Weak.
	4.8	6.6	Kopi	- Yellow-brown to grey-brown. V clayey to 6.0. Off white, dry to 6.6.
		6.6	False Level	- Fair.
	6.6	8.2	Kopi	- Brown to pale brown. V clayey to clayey.
	8.2	14.0		- Off white to reddish. Sl. clayey. Dry.
	14.0	16.1		- Brown to off white. Clayey. Sl.moist. Dark brown band at 15.1. Thin band of red, iron stained pebbles at base.
		16.1	Level	- V weak.
	16.1	17.0	Mud?	- Reddish. Silty.
		17.0	Level	- Poor.
	17.0	17.5	Mud	- Brown. Sl. silty.
			17.5 EoH	

29	0.0	1.8	Soil	
	1.8	4.4	Silcrete	
	4.4	5.4	Kopi	- Reddish with gypsum. False Level?
	5.4	13.6		- Off white to pale grey. V clayey to clayey.
	13.6	16.5		- Off white to pale yellow-brown. Sl. moist. Sl. clayey, more clayey past 14.0.
			16.5 EoH	
30	0.0	1.2	Soil	
	1.2	4.5	Silcrete	- Boulders.
	4.5	13.8	Kopi	- Reddish to off white. Some gypsum. Dry to 8.0 Off white with some reddish patches. Sl. clayey to clayey.
	13.8	15.3	Sand	- V fine to medium grained. Clean. Yellow.
			15.3 EoH	
31	0.0	1.5	Soil	
	1.5	2.9	Silcrete	
	2.9	5.4	Kopi	- Reddish. Dry. Some gypsum to 4.5. White to pale brown. Clayey patches. Few pebbles at base.
		5.4	False Level	
	5.4	6.5	Mud	- Pale yellow-brown. Sl. moist.
	6.5	9.5	Kopi	- Off white to pale yellow-brown. Clayey. Sl. moist.
	9.5	10.6	Sand	- Fine. Pale yellow. Clean.
			10.6 EoH	
32	0.0	0.4	Soil	
	0.4	4.4	Silcrete	
	4.4	6.0	Sand	- Fine to medium grained. Pale yellow. Clean.
			6.0 EoH	
			Hole abandoned.	
33	0.0	0.4	Soil	
	0.4	5.8	Silcrete	- Hard.
	5.8	8.9	Sand	- Red. Some silcrete. Partly consolidated to 7.5.
				- Fine to medium grained. Loose. Pale reddish-yellow.
			8.9 EoH	
			Hole abandoned.	
34	0.0	0.8	Soil	- Sand and rubble.
	0.8	2.0	Conglomerate	- Round boulders. Some gypsum.
		2.0	(approx) Level	
	2.0	4.0	Sand and rubble	- Brown. (No mud).
	4.0	6.2		- Red with silt and pebbles.
	6.2	8.9	Sand	- Off white. Medium to fine grained. Silty.
			8.9 EoH	
35	0.0	0.3	Soil	
	0.3	3.2	Silcrete	- Pale grey. Hard.
	3.2	5.4	Kopi	- White to reddish. Abundant gypsum. Hard bands. Dry.
		5.4	False Level	- Weak.
	5.4	6.8	Kopi	- Reddish. Clayey. Few iron stained boulders at base.
		6.8	Level	
	6.8	7.3	Mud	- Dark red-brown. Moist. Good.
	7.3	8.9	Kopi	- Grey-brown. Sl. silty. Sandy.
			8.9 EoH	

36	0.0	2.1	Soil	and rubble.
	2.1	5.8	Silcrete	- Solid. Hard.
	5.8	7.7	Kopi	- Pink. Dry with gypsum. Some silcrete bands. Few small boulders at base.
		7.7	False Level	
	7.7	9.0	Mud	- Yellow-brown to grey-brown. Moist.
	9.0	10.4	Kopi	- Yellow-brown to brown-yellow. Silty. Clayey. Thin pebble band near 10.4.
		10.4	Level	- Moist. Good.
	10.4	11.0	Mud	- Grey-brown.
	11.0	13.0	Kopi	- Grey. Sandy zones.
			13.0 EoH	
37	0.0	0.4	Soil	
	0.4	7.2	Silcrete	- Mainly boulders, some clay seams.
	7.2	14.5	Kopi	- Off white to pale yellow-brown. Sl. moist. Sl. clayey with traces gypsum past 10.1. Thin boulder band at base.
		14.5	False Level	
	14.5	16.0	Kopi	- Pale yellow-brown. V clayey.
	16.0	23.4		- Pale brown-yellow to brown-yellow. Sl.clayey. Sl. moist. Traces gypsum past 18.5. V clayey past 19.5. Iron stained pebbles at 23.4.
		23.4	Level	- Fair.
	23.4	24.4	Mud	- Grey. Moist. Good.
	24.4	25.1	White Band	- Silty, sandy.
	25.1	25.5	Mud	- Grey. Silty.
			25.5 EoH	
38	0.0	0.3	Soil	
	0.3	5.4	Silcrete	- Hard. Mainly solid.
	5.4	6.5	Kopi	- Reddish. Dry with gypsum.
	6.5	8.4		- Pale grey-brown. Sl. clayey. Few boulders at base.
		8.4	False Level	
	8.4	9.5	Kopi or Mud	- Brown. V clayey.
	9.5	11.8	Kopi	- Off white to pale grey-brown. Sl. clayey. Moist.
		11.8	Level	
	11.8	12.5	Mud	- Red-brown. Moist. Good.
			12.5 EoH	
39	0.0	1.8	Soil	and rubble.
	1.8	5.1	Silcrete	- Mainly hard, solid.
	5.1	6.2	Kopi	- Off white to reddish. Dry with gypsum.
		6.2	False Level	
	6.2	6.8	Mud	- Red.
	6.8	7.6	Kopi	- Reddish. Clayey. Thin pebble band near 7.6, Iron stained.
		7.6	Level	
	7.6	8.7	Mud	- Dark red-brown. Sl. moist.
			8.7 EoH	

40	0.0	1.2	Soil	
	1.2	4.5	Silcrete	- Hard.
	4.5	5.6	Kopi	- White to pale red. Dry, sandy. Few pebbles near 5.6.
		5.6	False Level	- Weak.
	5.6	7.8	Kopi	- Off white. Sl. clayey. Sl. moist.
		7.8	Level	
	7.8	8.2	Mud	- Reddish. Moist.
	8.2	8.7		- Pale grey.
			8.7 EoH	
41	0.0	1.4	Soil	and rubble.
	1.4	5.8	Silcrete	- Hard.
	5.8	6.7	Kopi	- Reddish. Some gypsum. Few iron stained pebbles at base.
		6.7	Level	- Good.
	6.7	7.1	Mud	- Red, moist to 7.1.
	7.1	8.7	Kopi	- Pale yellow-brown. Moist. Silty.
			8.7 EoH	

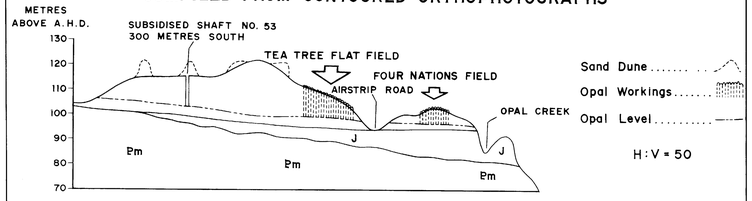
ANDAMOOKA

PRECIOUS STONES FIELD

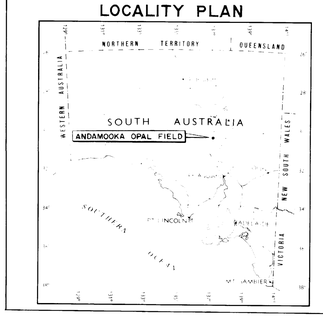
REGIONAL GEOLOGY

CROSS SECTION A—A'

COMPILED FROM CONTOURED ORTHOPHOTOGRAPHS



LOCALITY PLAN



REFERENCE

QUATERNARY		SAND DUNES
TERTIARY		Form lines of Tertiary dune system Fine grained, ferruginous, aeolian sandstone remains on most ridges.
CRETACEOUS	Kr	BULLDOG SHALE (MARREE SUBGROUP). Slightly sandy white kaolinised clay underlying iron oxide stained clay. Opalization at interface. "Erratic" boulders, cobbles throughout.
JURASSIC	J	ALGEBUCKINA SANDSTONE. Coarse sands, grits, ferruginous sands, conglomerates. Occasional plant remains.
CAMBRIAN	Ch	ANDAMOOKA LIMESTONE. Laminated and massive brown and grey limestone, Archaeocyatha.
UPPER PROTEROZOIC	Pm	TENT HILL FORMATION. ARCOONA QUARTZITE MEMBER. Cross bedded brown flaggy and platy quartzite and sandstone. YARLOO SHALE MEMBER north of Teatree Creek not differentiated.

Geological boundary
- Observed
- Approximate
- Inferred

Plant fossil

Major creek

Swamp

Claypan

Dam

Bore, Well

Road

Track

Hill

Approximate extent of workings as at May 1986 with downhill (outcrop) limits shown

Present Boundary of Precious Stone Field (Gov. Gaz. 22·7·76)

Former Boundary of Precious Stone Field (Gov. Gaz. 29·6·72)

Subsidised Shaft – 1976 scheme — o 18

Cretaceous ground – mapped prior to May 1976

Cretaceous ground – mapped after May 1976

Prospecting shaft – 1984 scheme — o PS 16

Exploration drillhole — o OFD 3, o (3)

1988 Drilling program — o 21

SCALE 1:50000

KILOMETRES 0 1 2 3 4 5 KILOMETRES

Geology by S.G. Carr

Map information interpreted from aerial photo surveys 1857 & 1439
S.A. Dept of Mines and Energy

Figure 1

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

ANDAMOOKA PRECIOUS STONES FIELD
REGIONAL GEOLOGICAL PLAN
SHOWING LOCATION OF SHAFTS & DRILLHOLES

DRAWN	D.C.Scott	DATE	25.5.89
TRACED	M.R.	SCALE	1:50000
CHECKED		PLAN No.	89-112

6336

ANDAMOOKA PRECIOUS STONES FIELD

137°04' 70 137°06' 137°08' 137°10' 71 137°12' 137°14' 137°16' 72 137°18'

30°22' 30°24' 30°26' 30°28' 30°30' 30°32'

663 662

70 0000mE 71 72

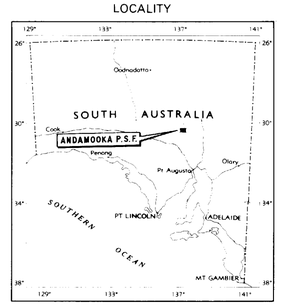
662 0000mN

North Well Dam
Bore
North Swamp
Little North Well Dam
North Swamp Wells (p.d.)
STUART CREEK
Yard
Dam
Swamp Dam
Landing Ground
Tealtee Creek
ROAD
LAKE TORRENS
BILLS LOOKOUT
Dam
Levee
CHRIS
POST STRIP
Explosives Depot
FOUR NATIONS
Rubbish Dump
Motor Cycle Track
Barnes Bore
Opal
Well No 4
STANS HILL
Station Wells
Spencers Well No 3
Gougers Well No 2
HARD HILL
BLACKBOY EXTENSION
Blue Dam
Snake Gully Dam
Landing Ground
Bore No 4 (North Well)
Bore (p.d.)
Chimney Hole Dam
Rockhole (p.d.)
WH (p.d.)
Trig WH (p.d.)
WH
Trig
TRIG BLUFF
Crozier Creek
LAKE TORRENS
TRIANGLE
YARLOO WEST
YARLOO SOUTH
Radio Mast
HALFWAY
PIMBA RIDGE 143m
PIMBA VIA ROXBY DOWNS ROAD
Bore
Three Mile Dam
Drains
Pimba Ridge Dam
TIMBER ROAD
Ethanogah Creek
WHITE DAM
EDGE HILL
Trig
TK
White Dam
Pine Ridge Dam
BOUNDARY OF ANDAMOOKA PRECIOUS STONES FIELD
BOUNDARY OF WOOMERA PROHIBITED AREA

REFERENCE

- ANDAMOOKA TOWNSHIP BOUNDARY
- MAIN ROAD
- TRACK
- FENCE
- HOSPITAL ■H
- SCHOOL ■S
- LANDING GROUND
- BOUNDARY OF WOOMERA PROHIBITED AREA
- BOUNDARY OF PRECIOUS STONES FIELD
- OPAL WORKINGS
- DRAINAGE
  - RIVER OR CREEK
  - BRAIDED STREAM WITH FLOOD CHANNEL
  - FLOOD PLAIN BOUNDARY
- PLAYA LAKE
- SALT PAN OR CLAY PAN
- SWAMP
- BORE ●B
- WELL ●W
- DAM, TANK □ ○Tk
- WATERHOLE, ROCKHOLE
- SPOT ELEVATION (VALUE IN METRES) • 143m
- ESCARPMENT
- SAND DUNE
- CONTOURS (20 METRE INTERVAL) 100

LOCALITY



SCALE — 1:50 000

METRES 1000 0 1 2 3 4 5 KILOMETRES

TRANSVERSE MERCATOR PROJECTION
AERIAL PHOTOGRAPHY — SVY. 3286 AND 3287 (1985)

Compiled by the Drafting Branch, S. A. Department of Mines and Energy, 1989.

Figure 2

ANDAMOOKA PRECIOUS STONES FIELD

TOPOGRAPHIC PLAN SHOWING OPAL WORKINGS

Plan N° 89-111

4878