DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

Rept.Bk.No. 79/3

FINE TAILINGS INVESTIGATION
DRILLING OF TAILINGS DAMS AND THE RESULTS OF LABORATORY EVALUATION

Report No. 2: Gawler

GEOLOGICAL SURVEY
NON METALLIC RESOURCES DIVISION

By

W.S. McCALLUM
GEOLOGIST

A.M. PAIN
SENIOR GEOLOGIST

and

W.G. SPENCER
SENIOR MATERIALS SCIENTIST
MATERIALS DIVISION

G.S. No. 6122
D.M. No. 492/76

CONTENTS

APPENDICES

DESCRIPTION, RESERVES, DRILL HOLE LOGS AND RESULTS OF LABORATORY EVALUATION.

PHOTOGRAPHS

PLANS

Plan No.		Title	Scale
S 13248	FIG. 1.	Highbury - Golden Grove and Gawler area. Location and Regional Geology (In text).	1: 250 000
S 13250	FIG. 2.	Gawler Area. Locality Map (In text).	1: 50 000
78-311	FIG. 3.	Monier Sands, Fine Tailings Dams (in Appendix 1).	1: 1 000
78-312	FIG. 4.	Ready Mixed Concrete, Fine Tailings Dams (In Appendix 2).	1: 1 000
78-313	FIG. 5.	L.R. and M. Sands, Fine Tailings Dam (In Appendix 3).	1: 1 000
-	-	Log of Drillholes SD 45 to SD 62 (In Appendix 1).	-
-	-	Log of Drillholes SD 63 to SD 75 (In Appendix 2).	-
-	-	Log of Drillholes SD 76 to SD 82 (In Appendix 3).	-

TABLES

Table No.	Title
1.	Sizing Analyses of Composite Samples.
2.	Chemical Analyses of Composite Samples.
3.	Mineralogical Composition of Composite Samples.
4.	Comparison of Drying and Firing Properties.
5.	Quantities of Fine Tailings.
-	Results of Testing.
	- Composite Samples CE 5181, CE 5182, CE 5183 in Appendix 1.
	- Composite Samples CE 5184, CE 5185 in Appendix 2.
	- Composite Sample CE 5186 in Appendix 3.

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

Rept.Bk.No. 79/3
G.S. No. 6122
D.M. No. 492/76

FINE TAILINGS INVESTIGATION
DRILLING OF TAILINGS DAMS AND THE RESULTS OF LABORATORY EVALUATION

Report No. 2: Gawler

ABSTRACT

A total of 0.5 million m^3 of fine tailings, weighing 0.7 million tonnes, and averaging 44.8% solids, are impounded in 10 tailings dams at three sand deposits at Gawler, 35 km north east of Adelaide. The dams are still in use, and pose a major problem in rehabilitation, and in places, sterilize adjacent sand resources.

Composite samples obtained by a pontoon mounted Gemco drilling rig were found suitable for brick making, being plastic, low maturing, strong and firing terra cotta or paler. Only in RMC Dam B is the clay unsuitable for brick making.

Further research is required into mining, drying and other uses of fine tailings.

INTRODUCTION

Specification AS1465-1974 limits the content of material finer than 75 micron (200 mesh) in natural fine aggregate to 5%. Today, sands containing more than 20% silt and clay are routinely processed in washing plants to meet this specification.

Sand production from metropolitan pits is approximately 2 million tonnes per annum, most of which is treated in washing plants. At some pits, materials which had been dumped as "overburden" because of high fines content is now being washed.

The growth in sand production and the ability of modern plants to cope with more clayey feed is causing a rapid increase in the quantity of fine tailings impounded in dams in the major sand producing areas. In places, the tailings dams sterilize underlying or adjacent sand resources.

Tertiary sand is mined from open cuts in the Gawler area which is one of the three major sources of construction sand for Metropolitan Adelaide, the others being at Golden Grove and Maslins Beach. Sand pits are operated at Gawler by Concrete Industries (Monier), the Readymix Group (SA) (R.M.C.) and L.R. and M. Sands.

This report details volumes, tonnages, depths, moisture content and ceramic properties of composite samples from each of the major dams at Gawler. Reports Nos. 1 and 3 deal with Golden Grove and Maslin Beach respectively.

The data presented herein will form the basis for future investigations into methods of treatment, potential uses and reclamation of tailings.

Sampling and volume calculations were carried out by geologists from the Non-Metallic Resources Division of the S.A. Department of Mines and Energy. Analyses and firing tests were undertaken by the Australian Mineral Development Laboratories (AMDEL).

LOCATION

The dams which were sampled in the current programme are 2-6 km east of Gawler, 5 km northeast of the City of Adelaide. Their locations are shown on Figures 1 and 2. The dams are situated in sections 3036, 3058, 3059 and 3081, Hd. Barossa, Co. Adelaide within the District Council of Barossa, part of the Outer Metropolitan Planning Area. Zoning regulations have not been proclaimed for the area.

Detailed plans of each dam showing drill-hole locations are included in Appendices 1-3.

PREVIOUS INVESTIGATIONS

A joint Department of Mines and Energy-AMDEL project on the treatment and disposal of fine tailings was initiated in 1973.

Leane (1974), described sand washing plants, sizing characteristics of feed and products, and sizing and mineralogical compositions of fine tailings. Preliminary estimates of the cost of dry processing sand were presented. A separate project to assess the technical feasibility of dry processing resulted.

Falconer (1976), described the pilot scale dewatering of fine tailings at two sand washing plants using lamella and conventional thickeners. With the addition of flocculant, the solids content of tailings could be increased from 7% to 25% using a conventional thickener.

Since June 1976, experimental work by AMDEL has continued on thickening, centrifuging and solar drying.

CURRENT USAGE

In early 1977, R.M.C. removed and stock piled several thousand tonnes of tailings from a dam between Dam A and Dam D (see Figure 4, in Appendix 2). Approximately 500 tonnes were sold to Kreig's Brickworks in Nuriootpa, but after drying in stockpiles for several months, water content was still too high for brick manufacture.

No tailings have been removed or sold from either Monier or L.R. and M. dams.

SAMPLING METHODS

A modified Gemco auger drill was mounted on two pontoons, each 4.65 m x 1.60 m and positioned on the dam by wireline attached to winches on the banks.

HQ casing, 75 mm internal diameter, was lowered gently from the pontoons, and where possible, the casing shoe was embedded

100-200 mm into the dam floor. The fine tailings isolated within the casing were then bailed out in approximately 1 m intervals using a sampling tube with a flap valve at the base.

Adjustment of the sampling intervals was required owing to the high viscosity of the tailings. As the casing was lowered, the level of tailings inside became progressively lower than the level outside. Recovery inside the casing was usually less than 100% and decreased as the viscosity and solids content increased with depth. The measured sample intervals were corrected for this progressive decrease in recovery by measuring the depression of the surface level inside the casing after each length was lowered. Corrected sample intervals have been used in volume calculations and in the logs in Appendices 1-3.

The samples were split on site. One fraction was sent to AMDEL for testing and the remainder stored by the Department of Mines and Energy.

In "wet" dams, apparently clear water in the top 0.1-0.3m is not recorded in the logs due to mixing in the top 1m.

In the abandoned dams, the top 0.2m of relatively dry hard "crust" was pushed aside by the casing and was not sampled.

TESTING PROCEDURES

Solids Content

About 1 kg of each sample was weighed, dried at 105^{o}C and reweighed to determine the solids content.

The S.G. of the original sample was calculated from the solids content by assuming an S.G. of 2.65 for the solids using the formula:-

$$S.G. = \frac{265}{265 - 1.65S}$$

where S is % solids

Analyses

Composite samples were prepared from representative quantities of individual dried samples and split into four for analyses and testing.

Sizing analyses were carried out by wet screening and sedimentation methods.

Chemical composition was determined by x-ray fluorescence and wet chemical methods.

Mineralogical composition was determined by x-ray diffractometry.

Firing Tests

Each composite sample was dried and ground to the nominal size of -1.2mm (-14 mesh B.S.S.). About 2 kg was moistened, worked to maximum workability (plasticity) and sealed in a polythene bag to mature for 2-5 days.

Samples were extruded using a Boulton laboratory deairing extruder, producing a cylindrical column of diameter about 25 mm. Extrusion properties were noted and moisture content determined by moisture balance. Specimens for firing were dried under moderate (40°C) and severe (105°C) conditions and shrinkages and behaviour recorded.

Specimens for firing were air-dried for 2 days, oven-dried at 40°C and finally oven-dried at 105°C for twelve hours. They were fired in an oil-fuelled Major Kiln over the temperature range 800-1 200°C in 50°C intervals with a 30 minute soak at each temperature. Specimens were removed from the furnace to a holding kiln at 600°C. After all specimens had been fired, the holding kiln was switched off and the sample allowed to cool overnight to room temperature.

Shrinkages for dried and fired specimens were determined by measuring with a travelling microscope the spacing of a set of marks inscribed immediately after extrusion with a pair of knife

edges set 20 mm apart. Water absorptions of the fired specimens were determined by weighing specimens dry and after soaking for 24 hours in water with removal of surface water. The appearance of all specimens was recorded. Colours were assessed using Munsell Rock Colour Chart.

The unused portions of each sample were retained for further testing.

RESULTS OF TESTING

Solids Content

Solids content profiles of the drillholes are included in the logs in Appendices 1-3 and the average solids content of each dam is listed in Table 5.

In general, solids content increases gradually with depth due to settling. Rapid increases to more than 60% solids near the dam floors are common, probably due to loss of water through porous sandy materials underlying the dams. The importance of drainage in dewatering tailings is demonstrated by Sparrow (1978a) and (1978b) and Sparrow and Ihle, 1978.

Solids content is highest near the point of discharge into the dam due to rapid settling of larger particles. Quartz (silica) content is probably highest at this point with kaolin content increasing with distance.

At Monier and R.M.C., where tailings are deposited in a series of dams, the first dams are higher in average solids content than the final dams.

Where the surfaces of abandoned dams have dried out, the "crust" is generally less than 0.3 m in thickness and does not safely support the weight of a man.

Sizing Analysis

The fraction finer than 2 microns varies from 35% to 70%, and the fraction coarser than 75 microns varies from 1.4% to 28.1%, as detailed in Table 1.

R.M.C. Dam B contains the highest percentage of 28.1% of material coarser than 75 microns, and the lowest percentage of 35.5% of material finer than 2 microns. The overflow from this dam enters Dam C, which contains only 2.3% coarser than 75 microns and 66.4% finer than 2 microns.

Monier Dams B and C contain coarser material than Dam A. Dam E which receives the overflow from Dam D (not tested), has a size grading comparable to Dam A.

All tailings at L.R. and M. are contained in one dam.

Although Monier Dam D, and R.M.C. Dam A were not tested, material therein is expected to be coarser than any of the tested dams.

Chemical Analysis

Silica contents, as detailed in Table 2, range from 50.82% to 70.40% SiO_2. Monier Dams B/C and R.M.C. Dam B, which contain the coarser material as outlined above, show the highest silica and lowest alumina contents. R.M.C. Dam C recorded the highest iron content of 9.12% Fe_2O_3.

In general, the samples contain more silica, and less alumina, than in the tailings dams at Golden Grove and Highbury (Pain et. al. 1978). They also have a higher soluble salt, Cao and MgO content.

Mineralogical Analysis

The main minerals in each dam are kaolinite, quartz and muscovite as listed in Table 5. Accessory or trace amounts of talc, feldspar, and calcite are recorded in some but not all samples.

Monier Dam B/C and R.M.C. Dam B contain dominant quartz

TABLE 1

SIZING ANALYSES OF COMPOSITE SAMPLES

	MONIER			RMC		L.R. & M.
	DAM A CE 5181	DAM B/C CE 5182	DAM E CE 5183	DAM B CE 5184	DAM C CE 5185	CE 5186
Screening						
+ 75 µm (+ 200 mesh)	1.4	12.6	4.8	28.1	2.3	14.5
- 75 +53 µm (-200 + 300 mesh)	0.5	2.9	1.9	3.6	1.4	3.8
Sedimentation Wt% finer than						
44 µm	97.1	82.8	91.4	64.2	95.3	78.4
31 µm	97.1	78.6	86.8	59.4	92.4	75.2
22 µm	94.1	71.8	81.2	54.0	89.6	71.1
16 µm	91.2	66.8	76.5	49.9	85.7	67.0
8 µm	84.4	58.3	69.0	44.4	79.0	60.5
4 µm	76.5	51.5	62.5	40.3	70.3	52.3
2 µm	70.6	49.0	58.8	37.6	66.4	48.2
1 µm	64.7	45.6	55.0	35.5	60.7	43.3
0.5 µm	55.9	40.6	48.5	32.1	53.0	35.9

TABLE 2

CHEMICAL ANALYSES OF COMPOSITE SAMPLES

	MONIER			RMC		L.R. & M.
	DAM A CE 5181	DAM B/C CE 5182	DAM E CE 5183	DAM B CE 5184	DAM C CE 5185	CE 5186
SiO_2	50.82	64.72	58.52	70.40	52.16	63.31
TiO_2	0.98	0.94	0.99	0.70	0.97	0.98
Al_2O_3	26.13	18.71	22.57	13.10	22.08	19.99
Fe_2O_3	5.20	3.81	4.64	5.52	9.12	3.45
FeO	0.26	0.19	0.22	0.20	0.22	0.18
MnO	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
MgO	0.98	0.84	0.80	0.92	1.22	0.82
CaO	0.84	0.71	0.40	0.35	0.51	0.63
Na_2O	0.26	0.21	0.23	0.26	0.53	0.34
K_2O	1.27	1.11	1.18	0.92	1.17	1.16
P_2O_5	0.04	0.03	0.04	0.04	0.06	0.03
H_2O^+	10.11	6.69	8.11	5.26	8.70	7.46
H_2O^-	2.29	1.96	1.92	1.14	2.77	1.17
TOTAL	99.18	99.93	99.63	99.09	99.51	99.52
Water Soluble Salts	0.30	0.19	0.28	0.31	0.67	0.36

TABLE 3

MINERALOGICAL COMPOSITION OF COMPOSITE SAMPLES

	MONIER			RMC		L.R. & M.
	DAM A CE 5181	DAM B/C CE 5182	DAM E CE 5183	DAM B CE 5184	DAM C CE 5185	CE 5186
Quartz	A	D	SD	D	A-SD	SD
Kaolinite	D	SD	D	SD	D	D
Mica	A	A	A	A	A	SD
Calcite	Tr?	Tr?	Tr?	-	-	-
Talc	Tr	A	A	A	A	A
K Feldspar	Tr?	Tr?	Tr?	Tr	-	Tr?

Key:

D dominant

SD sub dominant (15-30%)

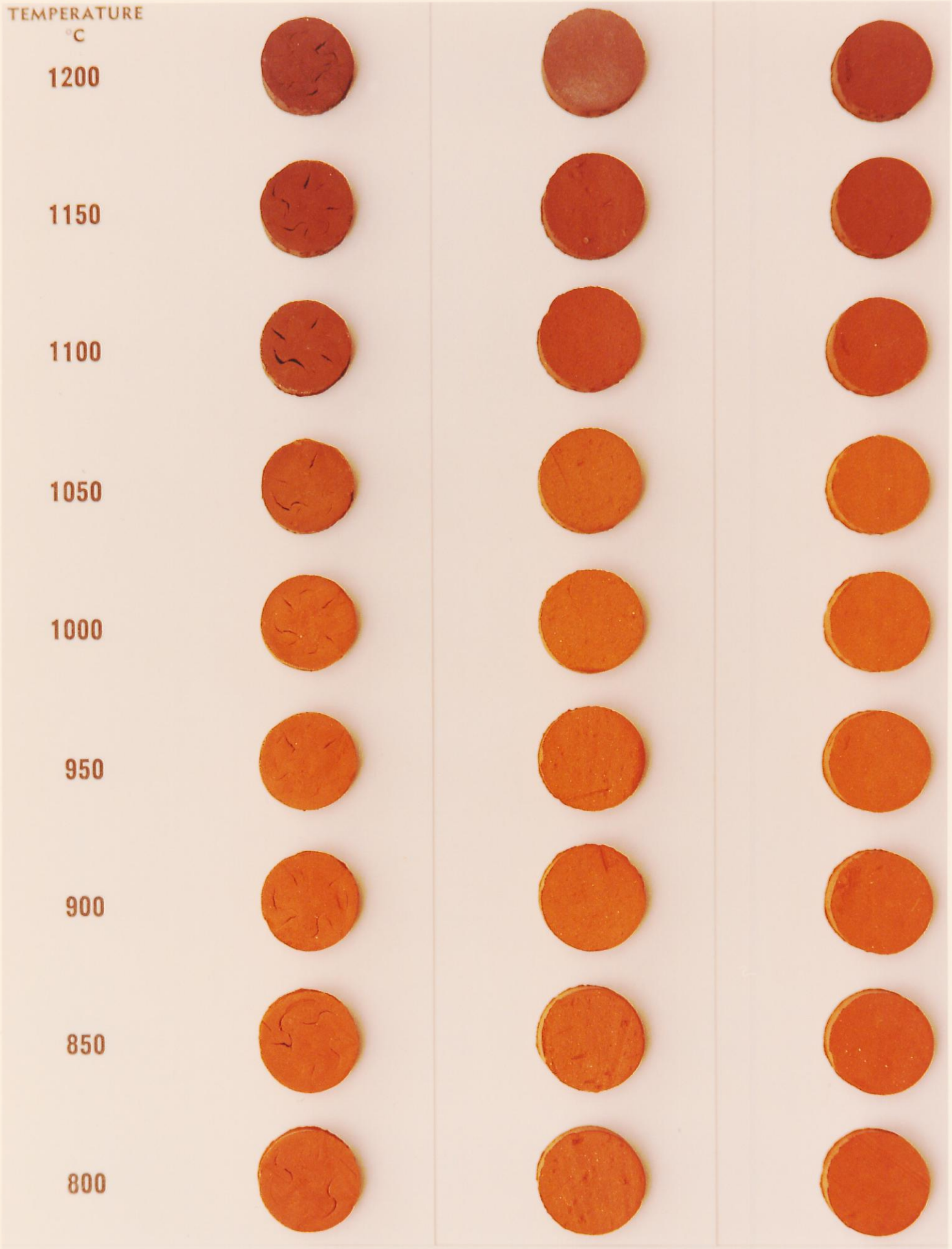
A accessory (5-15%)

Tr trace (<5%)

TABLE 4

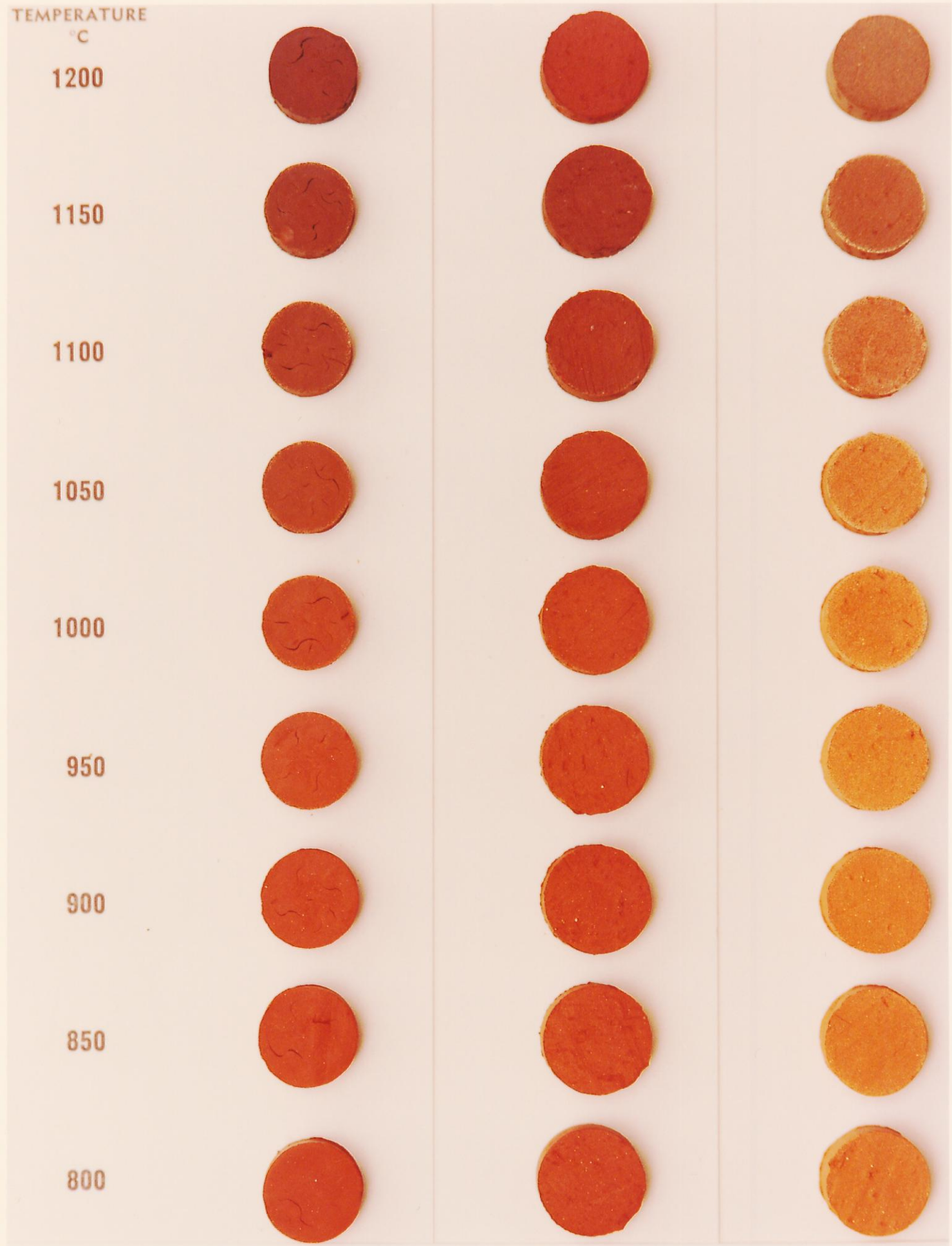
COMPARISON OF DRYING AND FIRING PROPERTIES

	MONIER			RMC		L.R. & M.
	DAM A CE 5181	DAM B/C CE 5182	DAM E CE 5183	DAM B CE 5184	DAM C CE 5185	CE 5186
% moisture for extrusion	28.3	21.8	24.4	18.9	28.6	22.9
% less than 2 μm	70.6	49.0	58.8	37.6	66.4	48.2
% drying shrinkage, 40°C	7.5	6.8	6.8	6.6?	8.2	6.9
temperature °C, to give water absorption less than 15% + hard samples	900	950	1000	1150	950	950
% total shrinkage to above temperature	9.6	7.7	9.1	8.8	10.3	8.1
Colour for firing to above temp.	t.c. (terra cotta)	t.c.	t.c.	t.c.	t.c.	t.c.
Appearance	some cracking	good	good	good	some cracking	some scumming
total iron as % Fe_2O_3	5.49	4.02	4.88	5.74	9.36	3.65



MONIER	MONIER	MONIER
DamA Sec3058	DamsB&C Sec3059	DamE Sec3059
CE 5181	CE 5182	CE 5183

FIRED CLAY BUTTONS - GAWLER TAILINGS DAMS



RMC	RMC	LR&M
DamB Sec3081	DamC Sec3081	Sec3036
CE 5184	CE 5185	CE 5186

FIRED CLAY BUTTONS - GAWLER TAILINGS DAMS

with sub-dominant kaolinite. The remaining four dams contain

This confirms the trend indicated by the sizing analyses and chemical analyses.

The muscovite content in the L.R. and M. Dam is higher than in the other 5 dams.

Firing Tests

Drying and firing properties of the six composite samples are summarised in Table 4, from Appendices 1-3.

Each of the clays except for R.M.C. Dam B is plastic, strong, low-maturing, and red-burning although the fired colours are terra cotta or paler rather than traditional red-brick colour.

With the exception of R.M.C. Dam B, all material is useful for brickmaking. However, those subject to high drying and/or firing shrinkage should be used in low proportions in brick blends. Those less prone to drying and/or firing cracks can be used as a major component and represent a potential brickmaking resource material.

Each sample, except for R.M.C. Dam B, vitrifies at around 1050-1100^{o}C but holds shape to 1200^{o}C, showing no sign of bloating or softening. These samples are fairly strong and the fired appearance of some is good, while several show evidence of cracking or scumming.

Three samples are suitable for use in significant proportions in brickmaking. These are Monier Dams B/C and E, and L.R. and M. The two samples which tended to crack on firing, Monier Dam A and R.M.C. Dam C, are potentially useful as small components in a blend. R.M.C. Dam B with its high silica content of 70.4% SiO_2 is not particularly useful for brickmaking.

The suitability of each sample will depend to some extent on the other materials used by the brickmaker and testing of blends is required.

RESERVES

Reserves of fine tailings in situ and average solids content as listed in Table 5 are based on

- areas of influence as outlined on Figures 3-5
- overall slopes of 45 degrees for dam walls
- where only one hole was drilled, areas of influence are assumed to be the whole dam.

Tonnages which would result from drying the tailings to moisture contents of zero, 10% and 20% are also tabulated.

For comparison, the total consumption of all raw materials for brick, tile and pipe manufacture in Metropolitan Adelaide approximates 0.9 million tonnes per year.

TABLE 5

QUANTITIES OF FINE TAILINGS, GAWLER

	MATERIAL IN SITU			TONNES		
	Volume (m^3)	Tonnes	Average % Solids	Dry	@ 90% Solids	@ 80% Solids
Monier, Dam A	202 700	269 300	39.6	106 600	118 400	133 200
Monier, Dam B	38 400	63 500	63.5	40 300	44 800	50 400
Monier, Dam C	8 400	11 600	44.0	5 100	5 700	6 400
Monier, Dam D	29 200	45 700	58.0	26 500	29 500	33 200
Monier, Dam E	57 000	74 200	37.2	27 600	30 700	34 500
TOTAL	335 700	464 300	44.4	206 100	229 100	257 700
RMC, Dam A	7 600	12 900	65.9	8 500	9 400	10 600
RMC, Dam B	21 500	36 300	65.1	23 600	26 200	29 500
RMC, Dam C	66 900	88 000	38.4	33 800	37 500	42 200
RMC, Dam D	11 200	15 600	44.9	8 100	9 000	10 100
TOTAL	107 200	152 800	48.2	74 000	82 100	92 400
L.R. and M.	63 000	84 200	40.4	34 000	37 800	42 500
TOTAL	505 900	701 300	44.8	314 100	349 000	392 600

The suitability of each sample will depend to some extent on the other materials used by the brickmaker and testing of blends is required.

RESERVES

Reserves of fine tailings in situ and average solids content as listed in Table 5 are based on

- areas of influence as outlined on Figures 3-5
- overall slopes of 45 degrees for dam walls
- where only one hole was drilled, areas of influence are assumed to be the whole dam.

Tonnages which would result from drying the tailings to moisture contents of zero, 10% and 20% are also tabulated.

For comparison, the total consumption of all raw materials for brick, tile and pipe manufacture in Metropolitan Adelaide approximates 0.9 million tonnes per year.

TABLE 5

QUANTITIES OF FINE TAILINGS, GAWLER

	MATERIAL IN SITU			TONNES		
	Volume (m^3)	Tonnes	Average % Solids	Dry	@ 90% Solids	@ 80% Solids
Monier, Dam A	202 700	269 300	39.6	106 600	118 400	133 200
Monier, Dam B	38 400	63 500	63.5	40 300	44 800	50 400
Monier, Dam C	8 400	11 600	44.0	5 100	5 700	6 400
Monier, Dam D	29 200	45 700	58.0	26 500	29 500	33 200
Monier, Dam E	57 000	74 200	37.2	27 600	30 700	34 500
TOTAL	335 700	464 300	44.4	206 100	229 100	257 700
RMC, Dam A	7 600	12 900	65.9	8 500	9 400	10 600
RMC, Dam B	21 500	36 300	65.1	23 600	26 200	29 500
RMC, Dam C	66 900	88 000	38.4	33 800	37 500	42 200
RMC, Dam D	11 200	15 600	44.9	8 100	9 000	10 100
TOTAL	107 200	152 800	48.2	74 000	82 100	92 400
L.R. and M.	63 000	84 200	40.4	34 000	37 800	42 500
TOTAL	505 900	701 300	44.8	314 100	349 000	392 600

CONCLUSIONS AND RECOMMENDATIONS

Ten dams containing fine tailings from three sand washing plants at Gawler have been sampled using a modified Gemco drilling rig mounted on pontoons.

Solids content increases with depth to over 60% where the dam floor comprises permeable sand. Solids content generally decreases away from the discharge point. Particle size, clay content and consequently ceramic and other properties will vary throughout individual dams. Tailings consist essentially of kaolinite and quartz, with muscovite.

Six composite samples from seven dams were tested for drying and firing properties. The remaining three dams were not tested, due to poor sample recovery.

All samples except R.M.C. Dam B are plastic, strong, low maturing and fire terra cotta or paler. Monier Dams B/C and E, and L.R. and M. are suitable for use in significant proportions in brick making. Monier Dam A and RMC Dam C are useful as small components in a blend.

Since only one composite was made from each dam, additional testing will be required if mining is proposed.

The total reserves impounded in dams at Gawler are 0.5 million m^3, equivalent to 0.7 million tonnes with solids content averaging 44.3%.

Further investigations into the following aspects are recommended:

: methods of mining of tailings.

: evaluation of drying and dewatering techniques.

: detailed ceramic testing of dams selected for mining.

: evaluation of fine tailings for non ceramic uses, such as fillers.

W.S. McCALLUM
Geologist

A.M. PAIN
Senior Geologist

W.G. SPENCER
Senior Materials Scientist
Materials Division, AMDEL.

26.3.79
GU

REFERENCES

Ambrose, G.J., 1972. Sand and clay deposits, Gawler - Sandy Creek Area. S. Aust. Dept. Mines report 72/36 (unpub.).

Cramsie, J.H., 1965. Test drilling, sand and gravel deposit south east of Gawler. Section 3058, Hundred Barossa. (Screenings Pty. Ltd.). Min. Rev. Adelaide, 124:126.

Dalgarno, C.R., 1961. Geology of the Barossa Valley. M.Sc. Thesis Uni. of Adelaide (unpub.).

Falconer, A.J., 1976. Fine tailings disposal, Part II. Amdel report No. 1116 (unpub.).

Leane, T.W., 1974. Fine tailings disposal. Amdel report No. 1027. (unpub.).

Nixon, L.G., 1961. Tertiary sand deposit. Secs. 482, 483, 3081, 3084, Hd. Barossa, Co. Adelaide. (Ready Mixed Concrete (SA) Pty. Ltd.) S. Aust. Dept. Mines report 53/113 (unpublished).

Olliver, J.G., 1961. Test drilling of a tertiary sand deposit. Secs. 3035, 3036. Hd. Barossa (J.A. Jenssen). S. Aust. Dept. Mines report 53/41 (unpublished).

_____, 1963. Test boring of a sand deposit near Gawler. Secs. 3082, 3083, Hd. Barossa (F.A. Taylor). Min. Rev. Adelaide 118: 134-144.

_____, and Weir, L.J., 1967. The construction sand industry in the Adelaide Metropolitan area. Rep. Invest., geol Surv. S. Aust. No. 30.

Pain, A.M., 1976. Sand, gravel and clay resources of the Barossa District, Gawler to Rowland flat. (State Planning Authority). S. Aust. Dept. Mines report 76/108 (unpub.).

_____, McCallum W.S., and Spencer, W.G., 1978. Fine tailings investigation. Drilling of tailings dams and the results of laboratory evaluation. Report No. 1 : Golden Grove - Highbury. S. Aust. Dept. Mines report 78/92 (unpub.).

Sparrow, G.J., 1978 (a). Drainage. An aid to dewatering clay slimes. Proc. Australas. Inst. Min. Metall., No. 265 : 33 - 39.

_____, 1978 (b). Dewatering Tailing Slurries : When can drainage be used? In: North Queensland Conference, 1978. Australas. Inst. Min. Metall., Melbourne, pp 293-305.

_____, and Ihle, S.W., 1978. Dewatering clay slimes. An approach to the problem. C.S.I.R.O. Minerals Research Laboratories Investigation Report 126.

Standards Association of Australia, 1974. Australian Standard 1465-1974. Dense natural aggregates for concrete.

Wade, M.L., 1954. Sand for cement bricks. Min, Rev. Adelaide, 96 : 42-44.

Willington, C.M., 1954. Rock products, sand and gravel resources in the metropolitan area of Adelaide. Min. Rev. Adelaide. 97 : 142-167.

APPENDICES 1-3

DESCRIPTION, RESERVES, DRILLHOLE LOGS AND LABORATORY RESULTS

APPENDIX 1

Concrete Industries (Monier) Pty. Ltd.

Gawler Sand Pit.

Sections 3058, 3059, Hd. Barossa.

OPERATOR: Monier Sands

HUNDRED: Barossa

MINERAL TENURE: Private Mine 80

SECTIONS: 3058, 3059

AREA OF TAILINGS: 6.7 ha

DATE DRILLED: 25/5/77 to 5/8/77

MAXIMUM DEPTH: 9.2m in Dam A.

DRILL HOLES: SD45-SD62

RESERVES

	Vol. (m^3)	Tonnes (Wet)	Solids %	S.G.	Tonnes (Dry)
Dam A	202 700	269 300	39.6	1.33	106 600
Dam B	38 400	63 500	63.5	1.65	40 300
Dam C	8 400	11 600	44.0	1.38	5 100
Dam D	29 200	45 700	58.0	1.57	26 500
Dam E	57 000	74 200	37.2	1.30	27 600
	335 700	464 300	44.4	1.38	201 100

HISTORY

Screenings Pty. Ltd. commenced sand mining and washing operations on section 3058 in April, 1962. The deposit was taken over by Concrete Industries (Monier) Ltd. in 1967, using the existing washing plant, which has subsequently been gradually replaced and rebuilt.

DESCRIPTION OF DAMS

Dams A to E occupy two disused pits, the largest of which contains Dams A, B and C (see Fig. 3), with Dams D and E within a smaller pit. A water storage dam in the south west of the larger pit is separated from the tailings by an artificial bank.

Tailings from the washing plant enter Dam B. Some settle in Dams B and C, which are both partially dry, but the bulk of the tailings flow through into Dam A, with no settling until the tailings reach the wet portion of Dam A.

A temporary pipe feeds tailings into the south of Dam D, which is dry, and overflow enters Dam E.

PREVIOUS REPORTS

Cramsie, J.N., 1965.

Leane, T.W., 1974.

Olliver, J.G., and Weir, L.J., 1967.

Pain, A.M., 1976.

CERAMIC TESTING

Composite samples were prepared for Dams A, B/C, and E. Sample return from drill holes in Dam D was insufficient to prepare a composite sample.

Dam A — Composite No. CE 5181

The material was extruded at a moisture content of 28.3% to produce a smooth, soft column of moderate to high plasticity. The extrusion rate was fast and the column wire-cut cleanly.

Drying at 40°C was satisfactory with a shrinkage of 7.5%. However, severe drying produced moderate cracking and a skrinkage of 7.2%.

On firing, the light to moderate brown clay changed to terra cotta colours at 800°C becoming browner above 1050°C. Firing shrinkage is high at and above 1050°C and vitrification is further evidenced by the very low water absorption (2%).

Full details are shown in the accompanying table.

The material is a plastic red-burning, low-maturing clay with a high drying and firing shrinkage, suitable for brickmaking but use is limited to blends. This material would increase plasticity, strength and vitrification.

Dam B/C — Composite No. CE 5182

The material was extruded at a moisture content of 21.8% to produce a soft, smooth column of moderate plasticity. The

extrusion rate was fast and the column wire-cut cleanly.

Drying under moderate conditions was satisfactory with a shrinkage of 6.8%. Drying under severe conditions at 105°C produced cracking with a shrinkage of 5.8%.

The light to moderate brown clay fired to terra cotta shades at 800°C becoming lighter with increasing temperature to 1050°C, but thereafter darker and browner. The fired specimens were of good appearance, free of cracking. Specimens fired to 1000°C were hard with a water absorption of 11.0% and a total shrinkage of 8.2% i.e. a low firing shrinkage.

Full details are given in the accompanying table.

The material is a plastic, red-burning, low maturing clay free of major defects and well suited for brickmaking. It could be used alone if care were taken in drying, or as a major component in blends, contributing plasticity, strength and some vitrification.

Dam E Composite No. CE 5183

The material was extruded at a moisture content of 24.4% to produce a soft, smooth column of moderate to high plasticity. The extrusion rate was slow and the column wire cut cleanly.

Drying under moderate conditions was satisfactory with a drying shrinkage of 6.8%. Drying at 105°C produced severe cracking and a shrinkage of 6.0%.

The brown clay fired to terra cotta colours becoming paler with increasing firing temperatures to 1050° and thereafter darker and browner. The fired specimens are free of defects except for a slight trace of kiln scum on edges. Specimens fired to 1000°C were hard with a water absorption of 12.2% and a dry to fired shrinkage of 2.3%, total shrinkage 9.12%.

Full details are shown in the accompanying table.

The material is a plastic, red-burning, low-maturing clay, well suited to use in brick making. Drying shrinkage is moderate fired shrinkage is low. Use as a major component in blends would contribute plasticity, strength and some vitrification.

MONIER SANDS, GAWLER

Sections 3058, 3059, Hd. Barossa. DAM A

Composite Sample No. CE 5181

DRYING AND FIRING PROPERTIES

Temp. °C	% Total Shrinkage	% Absorption	Relative Hardness	Munsell Colour	Comments
40	7.5	-	-	Light moderate brown 5 YR 5/4	Satisfactory
105	7.2	-	-	Light moderate brown 5 YR 5/4	Internal cracking
800	8.4	17.7	Moderate	Moderate reddish orange 10 R 6/6	Internal cracking
850	9.0	16.9	Moderate	Moderate reddish orange 10 R 6/6	Internal cracking
900	9.6	14.5	Hard	Moderate reddish orange 10 R 6/6	Internal cracking
950	10.3	13.2	Hard	Moderate reddish orange 10 R 6/6	Internal cracking
1 000	11.5	8.9	Hard	Moderate orange 10 R 7/6	Internal cracking
1 050	13.2	1.7	Hard	Light brown 5 YR 5/6	Internal cracking
1 100	13.7	1.0	Hard	Light moderate brown 5 YR 5/4	Internal cracking
1 150	13.9	1.3	Hard	Moderate brown 5 YR 4/4	Internal cracking
1 200	15.1	1.2	Hard	Pale greyish brown 5 YR 4/2	Internal cracking

SIZING ANALYSIS

Screening	%
+75µ m (+200 mesh)	1.4
-75 + 53 µm (-200+300 mesh)	0.5

Sedimentation

Wt % finer than	
44 µm	97.1
31 µm	97.1
22 µm	94.1
16 µm	91.2
8 µm	84.4
4 µm	76.5
2 µm	70.6
1 µm	64.7
0.5 µm	55.9

CHEMICAL ANALYSIS

	%
SiO_2	50.82
TiO_2	0.98
Al_2O_3	26.13
Fe_2O_3	5.20
FeO	0.26
MnO	<0.01
MgO	0.98
CaO	0.84
Na_2O	0.26
K_2O	1.27
P_2O_5	0.04
H_2O+	10.11
H_2O-	2.29
TOTAL	99.18
Water Soluble Salts	0.30

MINERALOGICAL COMPOSITION

Quartz	A
Kaolinite	D
Mica	A
Calcite	Tr?
Talc	Tr
K Feldspar	Tr?

Key:-

D	Dominant
SD	Sub-dominant (15-30%)
A	Accessory (5-15%)
Tr	Trace (< 5%)

MONIER SANDS, GAWLER

Sections 3058, 3059, Hd. Barossa, DAM B/C

Composite Sample No. CE 5182

DRYING AND FIRING PROPERTIES

Temp. °C	% Total Shrinkage	% Absorption	Relative Hardness	Munsel Colour	Comments
40	6.8	-	-	Light moderate brown 5 YR 5/4	Satisfactory
105	5.8	-	-	Light moderate brown 5 YR 5/4	Internal cracking
800	6.8	14.9	Moderate	Reddish orange 10 R 7/6	Satisfactory
850	7.1	14.6	Moderate	Reddish orange 10 R 7/6	Satisfactory
900	7.2	13.6	Moderate	Reddish orange 10 R 7/6	Satisfactory
950	7.7	13.1	Hard	Reddish orange 10 R 7/6	Satisfactory
1 000	8.2	11.0	Hard	Reddish orange 10 R 7/6	Satisfactory
1 050	9.5	7.0	Hard	Orange Brown 5 YR 7/4	Satisfactory
1 100	9.7	6.0	Hard	Light brown 5 YR 5/6	Satisfactory
1 150	9.7	6.0	Hard	Greyish pale brown 5 YR 6/2	Satisfactory
1 200	10.2	5.2	Hard	Pale brown 5 YR 5/2	Satisfactory

SIZING ANALYSIS

Screening	%
+75 µm (+200 mesh)	12.6
-75 µm +53 µm (-200 +300 mesh)	2.9

Sedimentation
Wt % finer than

44 µm	82.8
31 µm	78.6
22 µm	71.8
16 µm	66.8
8 µm	58.3
4 µm	51.5
2 µm	49.0
1 µm	45.6
0.5 µm	40.6

CHEMICAL ANALYSIS

	%
SiO_2	64.27
TiO_2	0.94
Al_2O_3	18.71
Fe_2O_3	3.81
FeO	0.19
MnO	< 0.01
MgO	0.84
CaO	0.71
Na_2O	0.21
K_2O	1.11
P_2O_5	0.03
H_2O+	6.69
H_2O-	1.96
TOTAL	99.93
Water Soluble Salts	0.19

MINERALOGICAL COMPOSITION

Quartz	D
Kaolinite	SD
Mica	A
Calcite	Tr?
Talc	A
K Feldspar	Tr?

Key:-

D	Dominant
SD	Sub dominant (15-30%)
A	Accessory (5-15%)
Tr	Trace (<5%)

MONIER SANDS, GAWLER

Sections 3058, 3059, Hd. Barossa. DAM E.

Composite Sample No. CE 5183

DRYING AND FIRING PROPERTIES

Temp. °C	% Total Shrinkage	% Absorption	Relative Hardness	Munsell Colour	Comments
40	6.8	-	-	Brown 5 YR 6/6	Satisfactory
105	6.0	-	-	Brown 5 YR 6/6	Cracked severely internally
800	6.9	17.0	Moderate	Moderate reddish orange 10 R 6/6	Satisfactory
850	7.6	16.6	Moderate	Moderate reddish orange 10 R 6/6	Satisfactory
900	7.9	15.8	Moderate	Moderate reddish orange 10 R 6/6	Satisfactory
950	8.3	15.1	Hard	Reddish orange 10 R 7/6	Satisfactory
1 000	9.1	12.2	Hard	Reddish orange 10 R 7/6	Satisfactory
1 050	11.3	6.5	Hard	Reddish orange 10 R 7/6	Satisfactory
1 100	12.4	3.9	Hard	Light moderate brown 5 YR 5/4	Satisfactory
1 150	12.4	3.6	Hard	Moderate brown 5 YR 4/4	Satisfactory
1 200	12.3	3.4	Hard	Pale brown 5 YR 5/2	Satisfactory

SIZING ANALYSIS

Screening	%
+75 µm (+200 mesh)	4.8
-75 + 53 m (-200 + 300 mesh)	1.9

Sedimentation

Wt % finer than

44 µm	91.4
31 µm	86.8
22 µm	81.2
16 µm	76.5
8 µm	69.0
4 µm	62.5
2 µm	58.8
1 µm	55.0
0.5 µm	48.5

CHEMICAL ANALYSIS

	%
SiO_2	58.52
TiO_2	0.99
Al_2O_3	22.57
Fe_2O_3	4.64
FeO	0.22
MnO	< 0.01
MgO	0.80
CaO	0.40
Na_2O	0.23
K_2O	1.18
P_2O_5	0.04
H_2O^+	8.11
H_2O^-	1.92
TOTAL	99.63
Water Soluble Salts	0.28

MINERALOGICAL COMPOSITION

Quartz	SD
Kaolinite	D
Mica	A
Calcite	Tr?
Talc	A
K Feldspar	Tr?

Key:-

D	Dominant
SD	Sub Dominant (15-30%)
A	Accessory (5-15%)
Tr	Trace (<5%)

DEPARTMENT OF MINES — SOUTH AUSTRALIA

FINE TAILINGS SURVEY

LOG OF DRILL HOLE

D.M. No. 492/76 | HOLE No. SD45

PLAN REF. 76/311 | LOCALITY MONIER GAWLER SAND PIT | DEPTH 0.9m

R.B. No. 79/3 | FINE TAILINGS DAM "A" | R.L. 140.8m

BORE S.No. | HUNDRED. BAROSSA SEC. 305B | RIG Gemco

DEPTH metres	SOLIDS CONTENT 0 20 40 60 80 100 %	DENSITY Tonnes/m³	INTERVAL metres	From	To	COMMENTS
		Not sampled.				Grey-brown clay, with rotten vegetation.
1						0.9m Rubble. Dark red-brown clay, sand and gravel.
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

DEPARTMENT OF MINES — SOUTH AUSTRALIA

FINE TAILINGS SURVEY

LOG OF DRILL HOLE

D.M. No. 492/76 | HOLE No. SD46

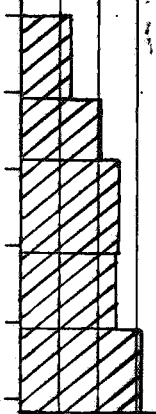
PLAN REF. 78/311 | DEPTH 9.2m

R.B. No. 79/3 | R.L. 139.6 m

BORE S.No. | HUNDRED. BAROSSA SEC. 3058 | RIG Gemco

LOCALITY MONIER GAWLER SAND PIT FINE TAILINGS DAM "A"

DEPTH metres	SOLIDS CONTENT %	DENSITY Tonnes/m³	INTERVAL metres	From	To	COMMENTS
1						
2		1·0	4	0	4	0-4·0m No sample. Water, Solids < 1% (est)
3						
4	13·1	1·09	1·1	4	5·1	
5	20·2	1·14	0·8	5·1	5·9	
6	25·8	1·19	1·2	5·9	7·1	
7	24·8	1·18	1·0	7·1	8·1	
8	31·0	1·24	1·1	8·1	9·2	
9						9·2m - white, silty plastic clay. Bottom of Dam.
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						



DEPARTMENT OF MINES — SOUTH AUSTRALIA

FINE TAILINGS SURVEY
LOG OF DRILL HOLE

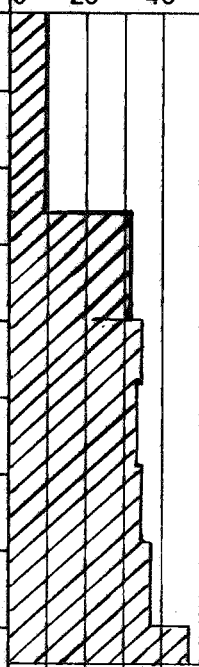
D.M. No. 492/76 | HOLE No. SD47

PLAN REF. 73/311 | DEPTH 8.5m

LOCALITY MONIER. GAWLER SAND PIT. FINE TAILINGS DAM "A" | R.L. 139.6 m.

R.B. No. 79/3 | RIG . Gemco

BORE S.No. | HUNDRED. BAROSSA SEC. 3058



DEPTH metres	SOLIDS CONTENT %	DENSITY Tonnes/m³	INTERVAL metres	INTERVAL From	INTERVAL To	COMMENTS
1						0-1.0m Water, Solids <1% (est).
	9.8	1.06	2.6	0	2.6	
2						
3	31.6	1.24	1.4	2.6	4.0	
4						
	34.4	1.27	0.8	4.0	4.8	
5						
	33.7	1.27	1.1	4.8	5.9	
6						
	35.2	1.28	1.0	5.9	6.9	
7						
	37.0	1.30	1.1	6.9	8.0	
8						
	47.4	1.42	0.5	8.0	8.5	
9						8.5m Hard clay. Bottom of Dam.
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

DEPARTMENT OF MINES — SOUTH AUSTRALIA

FINE TAILINGS SURVEY

LOG OF DRILL HOLE

D.M. No. 492/76 ..... HOLE No. SD 48 ....

PLAN REF. 78/311 .... LOCALITY MONIER GAWLER SAND PIT DEPTH 7.6m .....

FINE TAILINGS DAM "A"

R.B. No. 79/3 ..... R.L. 139.6 m .....

BORE S.No. ..... HUNDRED. BAROSSA ..... SEC. 3058 RIG . Gemco .....

DEPTH metres	SOLIDS CONTENT 0 20 40 60 80 100 %	DENSITY Tonnes/m³	INTERVAL metres	From	To	COMMENTS
1						0–1.9m No sample. Water, solids <1% (est).
2	18	1.13	1.0	1.9	2.9	
3	23.3	1.17	1.0	2.9	3.9	
4	27.9	1.21	1.0	3.9	4.9	
5	22.1	1.16	1.0	4.9	5.9	
6	30.6	1.24	1.0	5.9	6.9	
7	38.1	1.31	0.7	6.9	7.6	
8						7.6m. - sandy, rounded quartz gravel. Bottom of Dam.
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

DEPARTMENT OF MINES — SOUTH AUSTRALIA

FINE TAILINGS SURVEY
LOG OF DRILL HOLE

D.M. No. 492/76
PLAN REF. 78/311
R.B. No. 79/3
BORE S.No.

LOCALITY MONIER GAWLER SAND PIT FINE TAILINGS DAM "A"
HUNDRED BAROSSA SEC. 3058

HOLE No. SD49
DEPTH 7.4m
R.L. 139.6 m
RIG Gemco

DEPTH metres	SOLIDS CONTENT 0 20 40 60 80 100 %	DENSITY Tonnes/m³	INTERVAL metres	INTERVAL From	INTERVAL To	COMMENTS
1	33·7	1·27	1·3	0	1·3	
2	38·9	1·32	1·1	1·3	2·4	
3	38·7	1·32	1·1	2·4	3·5	
4	47·1	1·41	1·2	3·5	4·7	3.5-4.7m Some decomposed reeds
5	47·7	1·42	1·1	4·7	5·8	
6	51·3	1·47	0·8	5·8	6·6	
7	56·2	1·54	0·8	6·6	7·4	
8						7.4m. Fine gravel Bottom of Dam
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

DEPARTMENT OF MINES — SOUTH AUSTRALIA

FINE TAILINGS SURVEY
LOG OF DRILL HOLE

D.M. No. 492/76

PLAN REF. 78/311

R.B. No. 79/3

BORE S.No.

LOCALITY MONER GAWLER SAND PIT
FINE TAILINGS DAM "A"

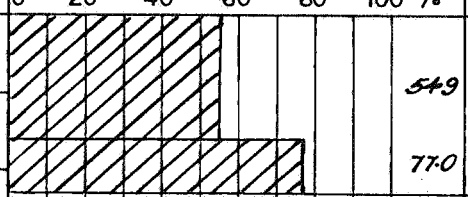
HUNDRED BAROSSA SEC. 3058

HOLE No. SD.50

DEPTH 2.3m

R.L. 141.0 m

RIG Gemco



DEPTH metres	SOLIDS CONTENT %	DENSITY Tonnes/m³	INTERVAL metres	INTERVAL From	INTERVAL To	COMMENTS
1	54.9	1.52	1.6	0	1.6	0-1.6m - Abundant decomposing reeds.
2	77.0	1.41	0.7	1.6	2.3	
3						2.3m. sand and gravel, poorly sorted, pale brown, slightly clayey. Bottom of Dam.
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

DEPARTMENT OF MINES — SOUTH AUSTRALIA

FINE TAILINGS SURVEY

LOG OF DRILL HOLE

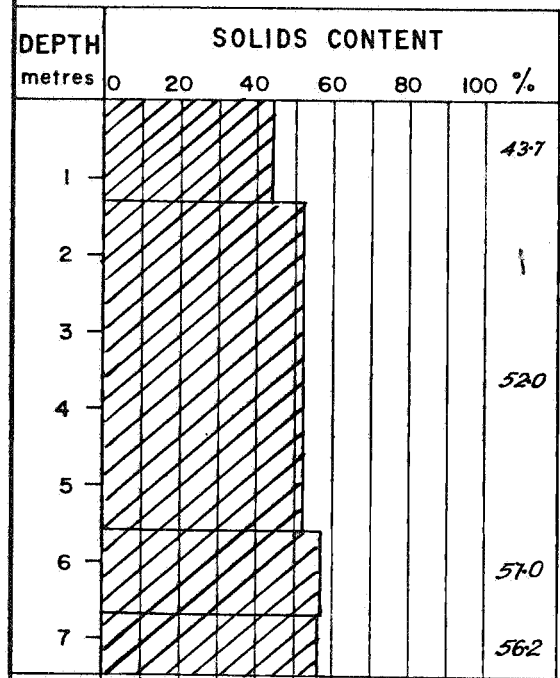
D.M. No. 492/76 | HOLE No. SD 51

PLAN REF. 78/311 | DEPTH 7.5m

LOCALITY MONIER GAWLER SAND PIT, FINE TAILINGS DAM "A" | R.L. 141.1m

R.B. No. 79/3 | RIG Gemco

BORE S.No. | HUNDRED. BAROSSA SEC. 3058



DENSITY Tonnes/m³	INTERVAL metres	From	To	COMMENTS
43·7 1·37	1·4	0	1·4	0-1.4m. Decomposing reeds, and thin sandy interbeds.
52·0 1·48	4·2	1·4	5·6	
51·0 1·55	1·1	5·6	6·7	
56·2 1·54	0·8	6·7	7·5	7.5m. Sand and gravel, poorly sorted, grey. Bottom of Dam.

DEPARTMENT OF MINES — SOUTH AUSTRALIA

FINE TAILINGS SURVEY

LOG OF DRILL HOLE

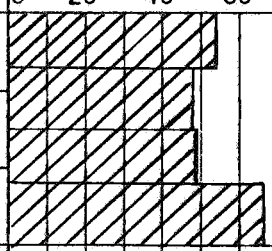
D.M. No. 492/76 | HOLE No. SD.52

PLAN REF. 78/311 | DEPTH 3.0m

R.B. No. 79/3 | R.L. 140.4m

BORE S.No. | HUNDRED BAROSSA SEC 3058 | RIG Gemco

LOCALITY MONIER GAWLER SAND PIT. FINE TAILINGS DAM "A"



DEPTH metres	SOLIDS CONTENT %	DENSITY Tonnes/m³	INTERVAL metres	From	To	COMMENTS
	53.7	1.5	0.7	0	0.7	
1	48.3	1.43	0.8	0.7	1.5	
2	49.1	1.44	0.7	1.5	2.2	
	66.2	1.70	0.8	2.2	3.0	2.2-3.0m. Silty and decomposing reeds.
3						3.0m. Bottom of Dam.
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

DEPARTMENT OF MINES – SOUTH AUSTRALIA

FINE TAILINGS SURVEY

LOG OF DRILL HOLE

D.M. No. 492/76 | HOLE No. S.D.53

PLAN REF. 78/311 | DEPTH 2.4m

R.B. No. 79/3 | R.L. 140.6m

LOCALITY MONIER GAWLER SAND PIT FINE TAILINGS DAM "A"

BORE S.No. | HUNDRED BAROSSA SEC 3058 | RIG Gemco

DEPTH metres	SOLIDS CONTENT 0 20 40 60 80 100 %	DENSITY Tonnes/m³	INTERVAL metres	From	To	COMMENTS
1	48·7	1·44	1·0	0	1·0	0-1.0m. Slightly silty.
1	50·3	1·46	0·7	1·0	1·7	1.0-1.7m Decomposing reeds.
2	68·2	1·74	0·7	1·7	2·4	1.7-2.4m Sand, v.f., silt, clayey.
3						2.4m Fine gravel and sand, very fine – coarse, red-brown. Bottom of Dam.
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

DEPARTMENT OF MINES — SOUTH AUSTRALIA

FINE TAILINGS SURVEY

LOG OF DRILL HOLE

D.M. No. 492/76 | HOLE No. SD54

PLAN REF. 78/311 | DEPTH 5.65m

LOCALITY MONIER GAWLER SAND PIT FINE TAILINGS DAM "B" | R.L. 141.1m

R.B. No. 79/3 | RIG Gemco

BORE S.No. | HUNDRED BAROSSA | SEC. 3059

DEPTH metres	SOLIDS CONTENT %	DENSITY Tonnes/m³	INTERVAL metres	From	To	COMMENTS
0	58.9	1.58	1.0	0	1.0	0-2.3m very silty.
1	59.7	1.59	1.3	1.0	2.3	
2	61.1	1.61	0.8	2.3	3.1	2.3-3.1m Moderately silty.
3	58.6	1.57	0.7	3.1	3.8	
4	65.7	1.69	0.8	3.8	4.6	
5	60.8	1.61	1.1	4.6	5.7	
6						5.65m. Bottom of Dam.
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

DEPARTMENT OF MINES — SOUTH AUSTRALIA

FINE TAILINGS SURVEY
LOG OF DRILL HOLE

D.M. No. 492/76

PLAN REF. 78/311

R.B. No. 79/3

BORE S.No.

LOCALITY MONIER GAWLER SAND PIT FINE TAILINGS DAM "B"

HUNDRED. BAROSSA SEC. 3059

HOLE No. SD 55

DEPTH 6·2m

R.L. 141·3m

RIG Gemco

DEPTH metres	SOLIDS CONTENT 0 20 40 60 80 100 %	DENSITY Tonnes/m³	INTERVAL metres	From	To	COMMENTS
1	64·5	1.67	0·9	0	0·9	0-0·9m. Silty.
2	69·1	1·76	3·0	0·9	3·9	0·9-3·8m. Silt, with some sand, very fine.
3						
4						
5	71·8	1·81	2·3	3·9	6·2	3·8-6·2m. Silt, sand very fine, and clay.
6						
7						6·2m. Sand, fine to medium. Bottom of Dam.
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

DEPARTMENT OF MINES — SOUTH AUSTRALIA

FINE TAILINGS SURVEY

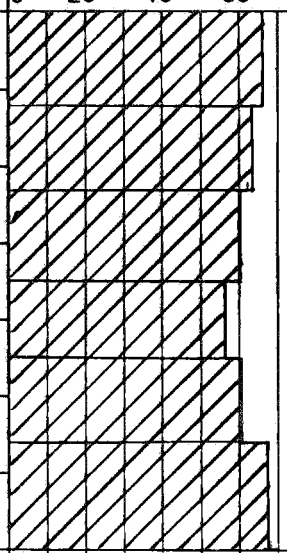
LOG OF DRILL HOLE

D.M. No. 492/76 | PLAN REF. 78/311 | R.B. No. 79/3 | BORE S.No. .....

LOCALITY MONIER GAWLER SAND PIT, FINE TAILINGS DAM "B"

HUNDRED BAROSSA | SEC. 3059

HOLE No. S.D.56 | DEPTH 7.0m | R.L. 141.2 m. | RIG Gemco



DENSITY Tonnes/m³	INTERVAL metres	From	To	COMMENTS
65·8 1·69	1·2	0	1·2	0-1.2m. Very silty.
63·4 1·65	1·1	1·2	2·3	1.2-2.3m. + sandy layers.
60·1 1·60	1·2	2·3	3·5	3.5-4.5m. silty.
55·9 1·53	1·0	3·5	4·5	
60·2 1·60	1·1	4·5	5·6	
66·8 1·71	1·4	5·6	7·0	Sandy, very fine to medium, below 6.2m.
				7m. Clay-sand, very fine - coarse, brown. Bottom of Dam.

DEPARTMENT OF MINES — SOUTH AUSTRALIA

FINE TAILINGS SURVEY
LOG OF DRILL HOLE

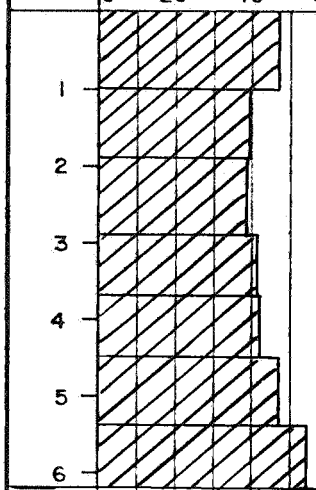
D.M. No. 492/76 | HOLE No. SD57

PLAN REF. 78/311 | DEPTH. 6.2m

LOCALITY MONIER GAWLER SAND PIT FINE TAILINGS DAM "C" | R.L. 141.0m

R.B. No. 79/3 | RIG. Gemco

BORE S.No. | HUNDRED. BAROSSA SEC. 3059.



SOLIDS CONTENT %	DENSITY Tonnes/m³	INTERVAL metres	From	To	COMMENTS
47.3	1.42	1.0	0	1.0	
39.7	1.33	0.9	1.0	1.9	
38.7	1.32	1.0	1.9	2.9	
41.5	1.35	0.8	2.9	3.7	
41.6	1.35	0.8	3.7	4.5	
47.0	1.41	0.9	4.5	5.4	
54.3	1.51	0.8	5.4	6.2	
					6.2m. Very silty clay, white to orange. Bottom of Dam.

DEPARTMENT OF MINES — SOUTH AUSTRALIA

FINE TAILINGS SURVEY
LOG OF DRILL HOLE

D.M. No. 492/76 | HOLE No. SD58

PLAN REF. 78/311 | DEPTH 7.1m

LOCALITY MONIER GAWLER SAND PIT FINE TAILINGS DAM "D" | R.L. 141.4m

R.B. No. 79/3 | RIG Gemco

BORE S.No. | HUNDRED BAROSSA SEC. 3059

DEPTH metres	SOLIDS CONTENT 0 20 40 60 80 100 %	DENSITY Tonnes/m³	INTERVAL metres	From	To	COMMENTS
1–7	63.7	1.66	7.1	0	7.1	
8						7.1m White plastic clay, and sand, fine-medium. Bottom of Dam.
9–22						

DEPARTMENT OF MINES — SOUTH AUSTRALIA

FINE TAILINGS SURVEY
LOG OF DRILL HOLE

D.M. No. 492/76

PLAN REF. 78/311

R.B. No. 79/3

BORE S.No.

LOCALITY MONIER GAWLER SAND PIT FINE TAILINGS DAM "D"

HUNDRED BAROSSA SEC 3059

HOLE No. SD 59

DEPTH 3·8 m

R.L. 141·3 m

RIG Gemco

DEPTH metres	SOLIDS CONTENT 0 20 40 60 80 100 %	DENSITY Tonnes/m³	INTERVAL metres	INTERVAL From	INTERVAL To	COMMENTS
1–3	47·4	1·42	3·8	0	3·8	0 – 3·8m. Very silty, sandy, fine.
4						3·8m. Sand, medium – coorse, with some white clay. Bottom of Dam.
5–22						

DEPARTMENT OF MINES — SOUTH AUSTRALIA

FINE TAILINGS SURVEY

LOG OF DRILL HOLE

D.M. No. 492/76 | HOLE No. SD60

PLAN REF. 78/311 | DEPTH 4.3m

LOCALITY MONIER GAWLER SAND PIT, FINE TAILINGS DAM "E" | R.L. 140.2m

BORE S.No. | HUNDRED BAROSSA | SEC. 3059 | RIG Gemco

DEPTH metres	SOLIDS CONTENT 0 20 40 60 80 100 %	DENSITY Tonnes/m³	INTERVAL metres	From	To	COMMENTS
	22.7	1.16	0.6	0	0.6	
1	22.7	1.16	1.1	0.6	1.7	
2	22.7	1.16	1.0	1.7	2.7	
3	24.8	1.18	1.2	2.7	3.9	
4	37.2	1.30	0.4	3.9	4.3	4.3m Sand, fine-medium, and white clay. Bottom of Dam.
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

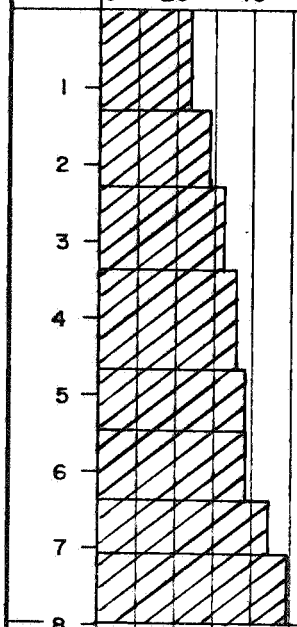
DEPARTMENT OF MINES — SOUTH AUSTRALIA

FINE TAILINGS SURVEY
LOG OF DRILL HOLE

D.M. No. 492/76
PLAN REF. 78/311
R.B. No. 79/3
BORE S.No.

LOCALITY MONIER GAWLER SAND PIT
FINE TAILINGS DAM "E"
HUNDRED BAROSSA SEC. 3059

HOLE No. SD 61
DEPTH 8.0m
R.L. 140.2m
RIG Gemco



DENSITY Tonnes/m³	INTERVAL metres	From	To	COMMENTS
23.9	1.17	1.3	0	1.3	0 - 0.2m. Water, solids < 1% (est.
29.1	1.22	1.0	1.3	2.3	
33.4	1.26	1.1	2.3	3.4	
36.4	1.29	1.3	3.4	4.7	
37.6	1.31	0.8	4.7	5.5	
38.2	1.31	0.9	5.5	6.4	
44.0	1.38	0.7	6.4	7.1	
49.0	1.44	0.9	7.1	8.0	7.1 - 8.0m S silty, sandy, very fine.
					8.0m Sand, fine - medium. Bottom of Dam.

DEPARTMENT OF MINES — SOUTH AUSTRALIA

FINE TAILINGS SURVEY
LOG OF DRILL HOLE

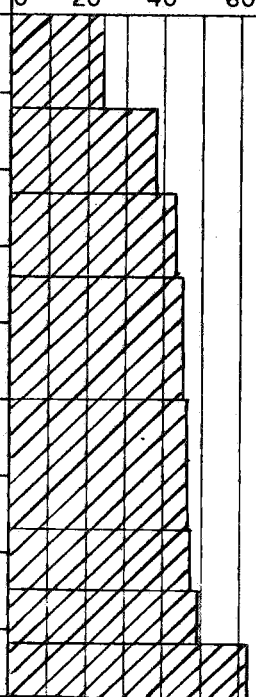
D.M. No. 492/76 | HOLE No. SD62

PLAN REF. 78/311 | DEPTH 8.9m

LOCALITY MONIER GAWLER SAND PIT FINE TAILINGS DAM "E" | R.L. 140.2m

R.B. No. 79/3 | RIG Gemco

BORE S.No. | HUNDRED BAROSSA SEC 3059



DEPTH metres	SOLIDS CONTENT %	DENSITY Tonnes/m³	INTERVAL metres	From	To	COMMENTS
	24·3	1·18	1·2	0	1·2	0-0·2m. Water, solids <1% (est).
1	37·8	1·31	1·1	1·2	2·3	
2						
3	43·4	1·37	1·1	2·3	3·4	
4	44·8	1·39	1·6	3·4	5·0	
5						
6	46·3	1·41	1·7	5·0	6·7	
7	47·2	1·42	0·8	6·7	7·5	
	48·7	1·44	0·7	7·5	8·2	
8	62·3	1·63	0·7	8·2	8·9	8.2-8.9m. V.silty, sandy, v.fine
9						8.9m. Sand, fine. Bottom of Dam.
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

APPENDIX 2

Ready Mixed Concrete (SA) Pty. Ltd. (R.M.C.)

Gawler Sand Pit

Section 3081, Hd. Barossa.

OPERATOR: The Readymix Group (SA)

MINERAL TENURE: Private Mines 23, 208

AREA OF TAILINGS: 2.1 ha

MAXIMUM DEPTH: 11.5 m in Dam C

HUNDRED: Barossa

SECTIONS: 482, 483, 3081, 3084, 3082, 3083.

DATE DRILLED: 9/8/77 to 19/8/77

DRILL HOLES: SD63-SD75

RESERVES

	Vol. (m^3)	Tonnes (Wet)	Solids %	S.G.	Tonnes (Dry)
Dam A	7 600	12 900	65.9	1.70	8 500
Dam B	21 500	36 300	65.1	1.69	23 600
Dam C	66 900	88 000	38.4	1.32	33 800
Dam D	11 200	15 600	44.9	1.39	3 100
	107 200	152 800	48.2	1.43	74 000

HISTORY

Reids Gawler Concrete Sand Company commenced mining from section 3081 in 1959 and used a rake classifier to wash the sand In July 1962, the deposit was taken over by Readymixed Concrete (SA) Pty. Ltd. and a new washing plant was installed. In 1971, R.M.C. opened a new pit in section 3082, using the old pit in section 3081 for fine tailings disposal.

DESCRIPTION OF DAMS

Dams B and C occupy a disused pit (see Fig. 4). Dams A, D and the surrounding 5 disused or dry dams are on a hillside, sloping towards the southwest.

Tailings enter Dam A and flow into Dam B. Dam A reaches 5.1 m in depth and contains sand, silt and coarse oversize from the plant.

Dam B is full and a channel has been cut through the partially dried tailings into Dam C, which has 0.5m of water overlying up to 11.5m of tailings. Overflow from Dam C enters Dam D, which has a maximum depth of 4.8 m with up to 2 m of water above the tailings. Clear water from Dam D overflows into the adjacent water storage dam.

PREVIOUS REPORTS

Leane, T.W., 1974

Nixon, L.G., 1961

Olliver, J.G., 1963

Olliver, J.G., and Weir, L.J., 1967

Pain, A.M., 1976

CERAMIC TESTING

Composite samples were prepared for Dams B and C. The volume of tailings in Dams A and D is small, and sample return for drill holes in Dam A was poor.

Dam B — Composite No. CE 5184

The material was extruded at a moisture content of 18.9% to produce a smooth, soft column of moderate plasticity. The extrusion rate was fast and the column wire-cut cleanly.

Air-drying of the material produced a shrinkage of 6.6%. Drying at 40°C was satisfactory but drying at 105°C produced severe cracking.

The light brown material fired to terra cotta colours becoming slightly paler with increasing firing temperatures to 1000°C and thereafter darker and browner until 1200°C when the colour becomes a brick red. The fired specimens are of good appearance apart from some kiln scum on edges, more evident above

1050°C. A strong body is not produced until fired at 1150°C, owing to the high quartz content of 70% SiO_2.

Full details are given in the accompanying table.

This material is not particularly suited for brick-making. Small amounts could be tolerated in blends as a filler. However plasticity and vitrification would not be improved.

Dam C — Composite No. CE 5185

The material was extruded at a moisture content of 28.6% to produce a smooth hard column of moderate to high plasticity. The extrusion rate was slow and the column wire cut cleanly.

Drying at 40°C produced cracking and a shrinkage of 8.2%. Drying at 105°C produced severe cracking and a shrinkage of 7.0%.

The brown clay fired to terra cotta colours at 800°C becoming browner above 1000°C. Fired specimens showed some surface scumming. Samples fired to 1000°C were hard with a water absorption of 6.1% and a total shrinkage of 12.6%. The indicated firing range is probably 950-1000°C.

Full details are shown in the accompanying table.

The material is plastic, low-maturing, red-burning with a high drying and firing shrinkage, suitable for brickmaking. Use in blends would improve colour, plasticity and fired strength although proportions would be limited by shrinkage and associated drying difficulties.

READY MIXED CONCRETE, GAWLER

Section 3081, Hd. Barossa, DAM B

Composite Sample No. CE 5184

DRYING AND FIRING PROPERTIES

Temp. °C	% Total Shrinkage	% Absorption	Relative Hardness	Munsell Colour	Comments
Air dried	6.6	-	-	-	-
40	-	-	-	Light brown 5 YR 4/6	Satisfactory
105	-	-	-	Light brown 5 YR 4/6	Longitudinal external cracks
800	6.4	14.6	Moderate	Moderate orange brown 10 R 5/6	Satisfactory
850	6.5	14.2	Moderate	Moderate orange brown 10 R 5/6	Satisfactory
900	6.8	13.9	Moderate	Moderate orange brown 10 R 5/6	Satisfactory
950	7.1	13.4	Moderate	Moderate orange brown 10 R 5/6	Satisfactory
1 000	7.7	12.1	Moderate	Moderate orange brown 10 R 5/6	Satisfactory
1 050	8.4	10.5	Moderate	Light moderate brown 5 YR 5/4	Satisfactory
1 100	8.6	9.9	Moderate	Moderate brown 5 YR 4/4	Satisfactory
1 150	8.8	9.9	Hard	Pale brown 5 YR 5/2	Satisfactory
1 200	8.9	9.6	Hard	Pale dark reddish brown. 10 R 3/4	Satisfactory furnace cool

SIZING ANALYSIS

Screening	%
+75 m (+200 mesh)	28.1
-75 m +53 m (-200 + 300 mesh)	3.6

Sedimentation
Wt % finer than

44 µm	64.2
31 µm	59.4
22 µm	54.0
16 µm	49.9
8 µm	44.4
4 µm	40.3
2 µm	37.6
1 µm	35.5
0.5 µm	32.1

CHEMICAL ANALYSIS

	%
SiO_2	70.40
TiO_2	0.70
Al_2O_3	13.10
Fe_2O_3	5.52
FeO	0.20
MnO	< 0.01
MgO	0.92
CaO	0.35
Na_2O	0.26
K_2O	0.92
P_2O_5	0.04
H_2O+	5.26
H_2O-	1.41
TOTAL	99.09

Water Soluble Salts 0.31

MINERALOGICAL COMPOSITION

Quartz	D
Kaolinite	SD
Mica	A
Calcite	-
Talc	A
K Feldspar	Tr

Key:-

D	Dominant
SD	Sub Dominant (15-30%)
A	Accessory (5-15%)
Tr	Tr (<5%)

READY MIXED CONCRETE, GAWLER

Section 3081, Hd. Barossa. DAM C

Composite sample No. CE 5185

DRYING AND FIRING PROPERTIES

Temp. °C	% Total Shrinkage	% Absorption	Relative Hardness	Munsell Colour	Comments
40	8.2	-	-	Brown 5 YR 6/6	Internal cracking
105	7.0	-	-	Brown 5 YR 6/6	Internal cracking, scummed.
800	9.0	18.1	Moderate	Moderate reddish brown 10 R 4/6	Internal cracking
850	9.4	17.0	Moderate	Moderate reddish brown 10 R 4/6	Internal cracking
900	9.3	14.4	Moderate	Moderate orange brown 10 R 5/6	Internal cracking
950	10.3	12.4	Hard	Moderate orange brown 10 R 5/6	Internal cracking
1 000	12.6	6.1	Hard	Moderate orange brown 10 R 5/6	Internal cracking
1 050	13.7	2.0	Hard	Light moderate brown 5 YR 5/4	Internal cracking
1 100	13.9	1.7	Hard	Moderate brown 5 YR 4/4	Internal cracking
1 150	13.4	1.5	Hard	Pale greyish brown 5 YR 4/2	Internal cracking
1 200	13.3	1.7	Hard	Greyish brown 5 YR 3/2	Internal cracking

SIZING ANALYSIS

Screening

+75 µm (+200 mesh)	2.3
-75 + 53µ m (-200 + 300 mesh)	1.4

Sedimentation

Wt % finer than

44 µm	95.3
31 µm	92.4
22 µm	89.6
16 µm	85.7
8 µm	79.0
4 µm	70.3
2 µm	66.4
1 µm	60.7
0.5 µm	53.0

CHEMICAL ANALYSIS

	%
SiO_2	52.16
TiO_2	0.97
Al_2O_3	22.08
Fe_2O_3	9.12
FeO	0.22
MnO	<0.01
MgO	1.22
CaO	0.51
Na_2O	0.53
K_2O	1.17
P_2O_5	0.06
H_2O+	8.70
H_2O-	2.77
TOTAL	99.51
Water Soluble Salts	0.67

MINERALOGICAL COMPOSITION

Quartz	A-SD
Kaolinite	D
Mica	A
Calcite	-
Talc	A
K Feldspar	-

Key:-

D	Dominant
SD	Sub Dominant (15-30%)
A	Accessory (5-15%)
Tr	Trace (<5%)

DEPARTMENT OF MINES — SOUTH AUSTRALIA

FINE TAILINGS SURVEY
LOG OF DRILL HOLE

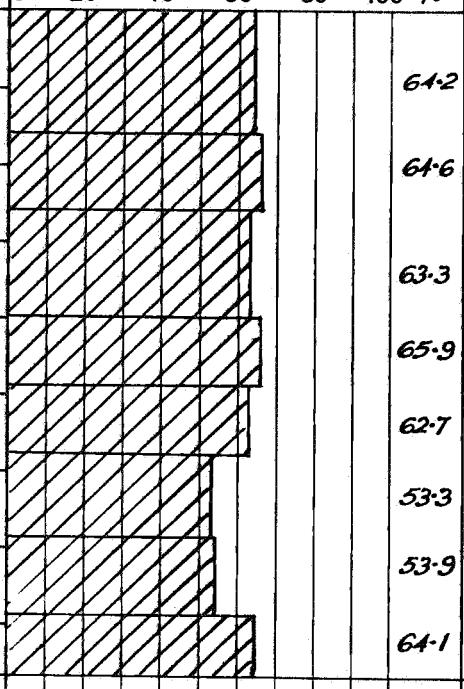
D.M. No. 492/76 | HOLE No. SD63

PLAN REF. 78/312 | DEPTH 8·7m

R.B. No. 79/3 | R.L. 112·7m

BORE S.No. | HUNDRED. BAROSSA SEC. 3081. | RIG. Gemco

LOCALITY RMC GAWLER SAND PIT
FINE TAILINGS DAM "B"



DEPTH metres	SOLIDS CONTENT %	DENSITY Tonnes/m³	INTERVAL metres	From	To	COMMENTS
1	64·2	1·67	1·6	0	1·6	
2	64·6	1·67	1·0	1·6	2·6	1·6 - 5·8m. Very sandy, very fine - fine.
3	63·3	1·65	1·4	2·6	4·0	
4	65·9	1·70	0·9	4·0	4·9	
5	62·7	1·64	0·9	4·9	5·8	5·8 - 7·9m. Very silty.
6	53·3	1·5	1·1	5·8	6·9	
7	53·9	1·51	1·0	6·9	7·9	
8	64·1	1·66	0·8	7·9	8·7	7·9 - 8·7m. Very sandy. v.f. - m.
9						8·7m Sand, very fine - coarse, ? gravel, very clayey, red-brown. Bottom of Dam.
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

DEPARTMENT OF MINES — SOUTH AUSTRALIA

FINE TAILINGS SURVEY
LOG OF DRILL HOLE

D.M. No. 492/76

PLAN REF. 78/312

R.B. No. 79/3

BORE S.No.

LOCALITY R.M.C. GAWLER SAND PIT FINE TAILINGS DAM "B"

HUNDRED BAROSSA SEC. 3081

HOLE No. SD64

DEPTH 0.5m

R.L. 112.7 M

RIG Gemco

DEPTH metres	SOLIDS CONTENT 0 20 40 60 80 100 %	DENSITY Tonnes/m³	INTERVAL metres	From	To	COMMENTS
	56.0	1.54	0.5	0	0.5	0-0.5m. Silty, sandy, very fine
1						0.5m. Sand, very fine-coarse very clayey, red. Bottom of Dam.
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

DEPARTMENT OF MINES — SOUTH AUSTRALIA

FINE TAILINGS SURVEY

LOG OF DRILL HOLE

D.M. No. 492/76 ..... HOLE No. SD65 .....

PLAN REF. 78/312 ... LOCALITY R.M.C. GAWLER SAND PIT ... DEPTH . 3·3m .....

FINE TAILINGS DAM "B"

R.B. No. 79/3 ..... R.L. 112·7m .....

BORE S.No. ..... HUNDRED . BAROSSA ..... SEC 3081 . RIG Gemco .....

DEPTH metres	SOLIDS CONTENT %	DENSITY Tonnes/m³	INTERVAL metres	From	To	COMMENTS
1	56·7	1·55	3·0	0	3·0	0-3.3m. Very sandy, very fin
2						
3	70·1	1·77	0·3	3·0	3·3	3.3m sand, very fine-mediu very clayey, red. Bottom of Dam.
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

DEPARTMENT OF MINES — SOUTH AUSTRALIA

FINE TAILINGS SURVEY

LOG OF DRILL HOLE

D.M. No. 492/76 | HOLE No. SD66

PLAN REF. 78/312 | DEPTH 8.0m

R.B. No. 79/3 | LOCALITY R.M.C. GAWLER SAND PIT, FINE TAILINGS DAM "B" | R.L. 112.7 m

BORE S.No. | HUNDRED BAROSSA | SEC 3081 | RIG Gemco

DEPTH metres	SOLIDS CONTENT % (0 20 40 60 80 100)	DENSITY Tonnes/m³	INTERVAL metres	From	To	COMMENTS
1–6						
3	75.5	1.89	6.8	0	6.8	0–6.8m. Clay, silt, and sand, very fine-fine.
7	61.8	1.63	0.5	6.8	7.3	6.3–7.3m. Silty, sandy, very f.
8	70.0	1.77	0.7	7.3	8.0	7.3–8.0m. Clay, sand, v.f – coarse.
8						8.0m. Clay sand, very fine-fine – red brown-white. Bottom of Dam.
9–22						

DEPARTMENT OF MINES — SOUTH AUSTRALIA

FINE TAILINGS SURVEY

LOG OF DRILL HOLE

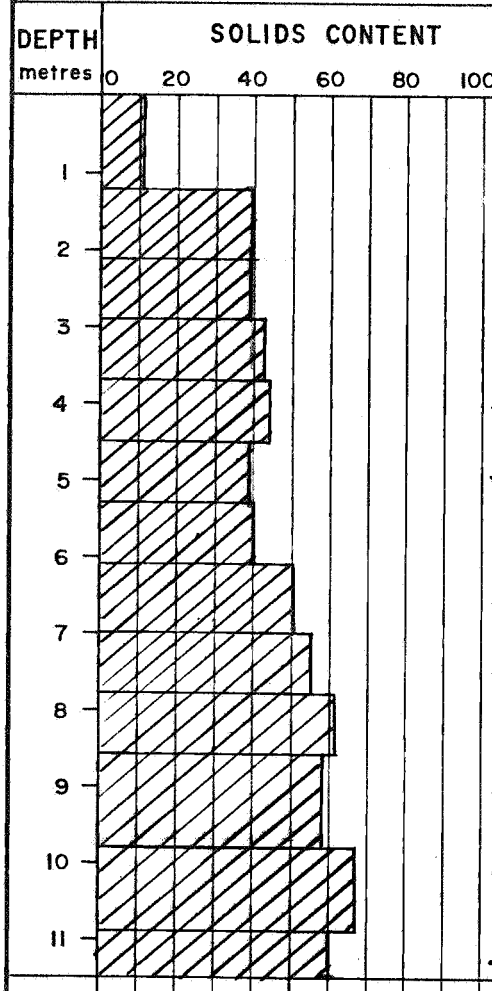
D.M. No. 492/76 | HOLE No. SD67

PLAN REF. 78/312 | DEPTH 11.5 m

LOCALITY R.M.C. GAWLER SAND PIT, FINE TAILINGS DAM "C" | R.L. 111.4 m

R.B. No. 79/3

BORE S.No. | HUNDRED BAROSSA | SEC. 3081 | RIG Gemco



DENSITY Tonnes/m³	INTERVAL metres	From	To	COMMENTS
11·3	1·08	1·2	0	1·2	0–1·0 m. Water, solids < 2% (est).
39·9	1·33	0·8	1·2	2·0	2·0–2·9 m. slightly silty
39·3	1·32	0·9	2·0	2·9	
42·6	1·36	0·8	2·9	3·7	
44·0	1·38	0·8	3·7	4·5	
38·9	1·32	0·8	4·5	5·3	
40·1	1·33	0·8	5·3	6·1	
50·7	1·46	0·9	6·1	7·0	
55·0	1·52	0·8	7·0	7·8	
60·9	1·61	0·8	7·8	8·6	
58·0	1·57	1·2	8·6	9·8	
67·1	1·72	1·1	9·8	10·9	9·8–10·9 m. Sand, very fine–medium; very clayey.
59·9	1·59	0·6	10·9	11·5	
					11·5 m. Bottom of Dam.

DEPARTMENT OF MINES – SOUTH AUSTRALIA

FINE TAILINGS SURVEY
LOG OF DRILL HOLE

D.M. No. 492/76
PLAN REF. 78/312
R.B. No. 79.3
BORE S.No.

LOCALITY R.M.C. GAWLER SAND PIT FINE TAILINGS DAM "C"
HUNDRED BAROSSA SEC. 3081.

HOLE No. SD68
DEPTH 8·1m
R.L. 111·4m.
RIG Gemco

DEPTH metres	SOLIDS CONTENT (0–100 %)	DENSITY Tonnes/m3	INTERVAL metres	From	To	COMMENTS
						0-0·2m. Water, solids <2% (est).
1	29·6	1·23	1·6	0	1·6	
2	35·8	1·29	1·5	1·6	3·1	
4	34·9	1·28	2·3	3·1	5·4	
6	34·7	1·28	1·3	5·4	6·7	
7	43·9	1·38	0·7	6·7	7·4	
	55·8	1·53	0·7	7·4	8·1	
8						8·1m. Sand, fine-medium, very clayey, orange-brown. Bottom of Dam.

DEPARTMENT OF MINES — SOUTH AUSTRALIA

FINE TAILINGS SURVEY
LOG OF DRILL HOLE

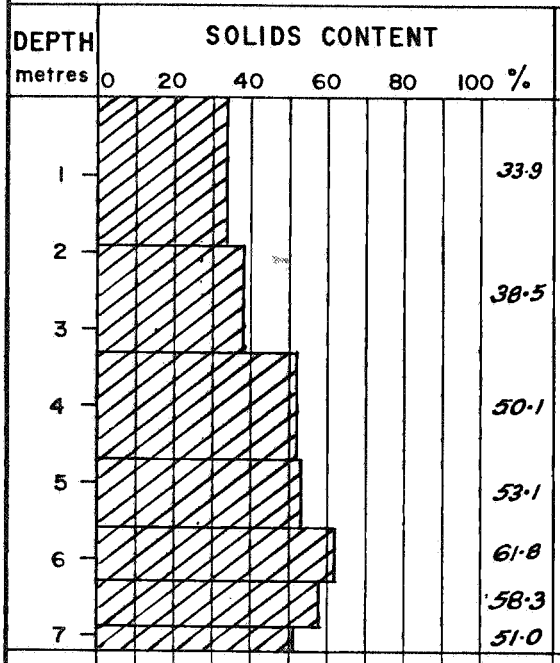
D.M. No. 492/76 | HOLE No. SD69

PLAN REF. 78/312 | DEPTH 7.2 m

R.B. No. 79/3 | R.L. 111.4 m

BORE S.No. | HUNDRED BAROSSA SEC 3081 | RIG Gemco

LOCALITY R.M.C. GAWLER SAND PIT
FINE TAILINGS DAM "C"



DENSITY Tonnes/m³	INTERVAL metres	From	To	COMMENTS
				0 - 0.2 m. Water, solids < 2% (est)
33.9 1.27	1.9	0	1.9	
38.5 1.32	1.4	1.9	3.3	1.9 - 3.3 m. Slightly silty.
50.1 1.45	1.4	3.3	4.7	
53.1 1.49	0.9	4.7	5.6	
61.8 1.63	0.7	5.6	6.3	
58.3 1.57	0.6	6.3	6.9	
51.0 1.47	0.3	6.9	7.2	
				7.2 m. Bottom of Dam.

DEPARTMENT OF MINES — SOUTH AUSTRALIA

FINE TAILINGS SURVEY
LOG OF DRILL HOLE

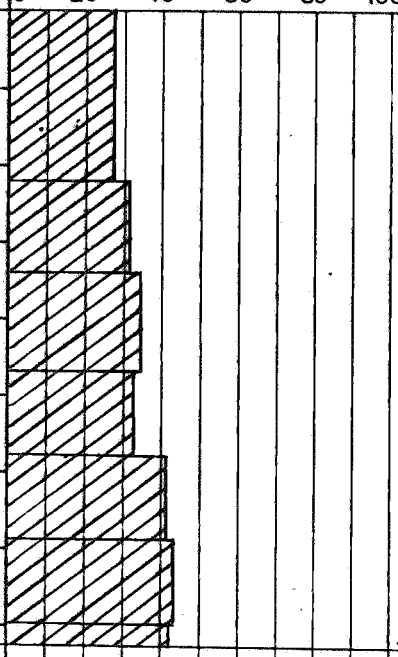
D.M. No. 492/76 | HOLE No. SD 70

PLAN REF. 78/312 | DEPTH 8.3 m

R.B. No. 79/3 | R.L. 111.4 m

BORE S.No. | LOCALITY R.M.C. GAWLER SAND PIT, FINE TAILINGS DAM "C" | RIG Gemco

HUNDRED BAROSSA SEC. 3081



DENSITY Tonnes/m³	INTERVAL metres	From	To	COMMENTS
				0-0.3m. Water, solids <2% (est).
1.21	2.2	0	2.2	
1.24	1.2	2.2	3.4	2.2-3.4m. slightly silty
1.27	1.3	3.4	4.7	
1.26	1.1	4.7	5.8	
1.35	1.1	5.8	6.9	
1.37	1.1	6.9	8.0	6.9-8.0m. sandy, very fine.
1.35	0.3	8.0	8.3	8.0-8.3m. Clay-sand, v.f.-m.
				8.3m. Clay sand, v.fine-med. Bottom of Dam.

9
10
11
12
13
14
15
16
17
18
19
20
21
22

DEPARTMENT OF MINES — SOUTH AUSTRALIA

FINE TAILINGS SURVEY

LOG OF DRILL HOLE

D.M. No. 492/76

PLAN REF. 78/312

R.B. No. 79/3

BORE S.No.

LOCALITY R.M.C. GAWLER SAND PIT FINE TAILINGS DAM "C"

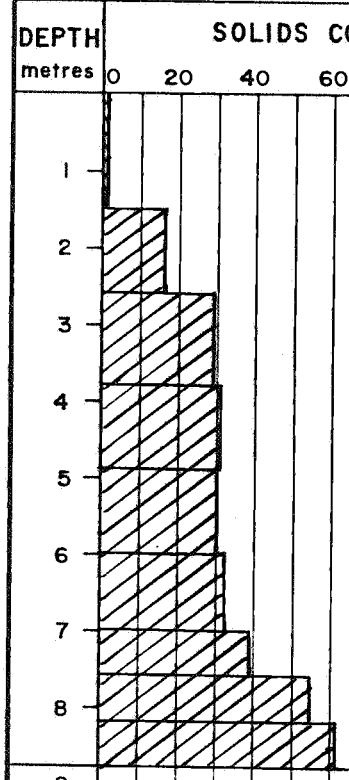
HUNDRED BAROSSA SEC. 3081

HOLE No. SD 71

DEPTH 8·8m

R.L. 111·4m

RIG Gemco



DENSITY Tonnes/m³	INTERVAL metres	From	To	COMMENTS
1·01	1·5	0	1·5	
1·12	1·1	1·5	2·6	
1·23	1·2	2·6	3·8	
1·24	1·1	3·8	4·9	
1·23	1·1	4·9	6·0	4·9-6·0m Trace of decomposing reeds
1·26	1·0	6·0	7·0	
1·32	0·6	7·0	7·6	
1·51	0·6	7·6	8·2	
1·61	0·6	8·2	8·8	
				8·8m Sand, fine. Bottom of Dam.

DEPARTMENT OF MINES — SOUTH AUSTRALIA

FINE TAILINGS SURVEY
LOG OF DRILL HOLE

D.M. No. 492/76 | HOLE No. SD 72

PLAN REF. 78/312 | DEPTH 3.4 m

LOCALITY R.M.C. GAWLER SAND PIT, FINE TAILINGS DAM "D" | R.L. 105.5 m

R.B. No. 79/3 | RIG Gemco

BORE S.No. | HUNDRED BAROSSA | SEC. 3081

DEPTH metres	SOLIDS CONTENT 0 20 40 60 80 100 %	DENSITY Tonnes/m³	INTERVAL metres	From	To	COMMENTS
1						0-1.0m. Water, solids < 2% (est).
2	52.4	1.48	2.7	0.3	3.0	1.0-3.0m. Silty, + decomposing reeds.
3	79.9	1.99	0.4	3.0	3.4	3.0-3.4m. Clay, silt, & sand, v. fine.
4						3.4m. Bottom of Dam.
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

DEPARTMENT OF MINES — SOUTH AUSTRALIA

FINE TAILINGS SURVEY
LOG OF DRILL HOLE

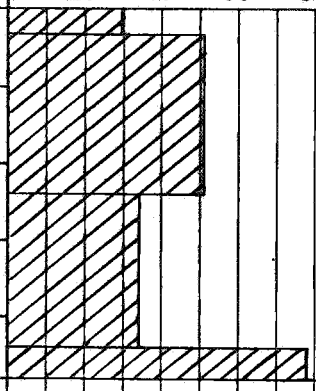
D.M. No. 492/76 | HOLE No. SD.73

PLAN REF. 78/312 | DEPTH 4.8m

R.B. No. 79/3 | LOCALITY R.M.C. GAWLER SAND PIT, FINE TAILINGS DAM "D" | R.L. 105.5m

BORE S.No. | HUNDRED BAROSSA SEC 3081 | RIG Gemco

DEPTH metres	SOLIDS CONTENT %	DENSITY Tonnes/m³	INTERVAL metres	From	To	COMMENTS
0–1	29.8	1.23	0.3	0	0.3	
1–2	50.1	1.45	2.1	0.3	2.4	
2–3	33.7	1.27	2.0	2.4	4.4	2.4–4.4m Abundant decomposed reeds
3–4	77.7	1.94	0.4	4.4	4.8	4.3m Fragments of green weathered slate. Bottom of Dam.
4–22						



DEPARTMENT OF MINES — SOUTH AUSTRALIA

FINE TAILINGS SURVEY

LOG OF DRILL HOLE

D.M. No. 492/76

PLAN REF. 78/312

R.B. No. 79/3

BORE S.No.

LOCALITY: R.M.C. GAWLER SAND PIT FINE TAILINGS DAM "A"

HUNDRED BAROSSA SEC 3081

HOLE No. SD 74

DEPTH 2.6m

R.L. 113.5m

RIG Gemco

DEPTH metres	SOLIDS CONTENT 0 20 40 60 80 100 %	DENSITY Tonnes/m³	INTERVAL metres	INTERVAL From	INTERVAL To	COMMENTS
	67.1	1.72	0.3	0	0.3	0-1.5m. Clay-silt, sandy, V. fine - medium.
1	68.7	1.75	1.2	0.3	1.5	
2	62.2	1.63	1.0	1.5	2.5	1.5-2.6m. Clay-silt
	80.3	2.00	0.1	2.5	2.6	
3						2.6m. Bottom of Dam.
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

DEPARTMENT OF MINES — SOUTH AUSTRALIA

FINE TAILINGS SURVEY
LOG OF DRILL HOLE

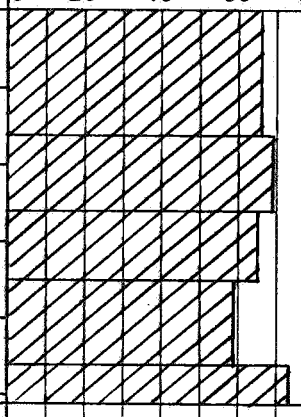
D.M. No. 492/76 | HOLE No. SD75

PLAN REF. 78/312 | DEPTH 5.1m

R.B. No. 79/3 | R.L. 113.5m

LOCALITY R.M.C. GAWLER SAND PIT FINE TAILINGS DAM "A"

BORE S.No. | HUNDRED BAROSSA SEC. 3081. | RIG Gemco



DEPTH metres	SOLIDS CONTENT %	DENSITY Tonnes/m³	INTERVAL metres	From	To	COMMENTS
						0-0.1m. Water, solids < 2% (est).
1	65.6	1.69	1.6	0	1.6	0.1-1.6m. Clay-silt-sand, v.fine.
2	69.2	1.76	1.0	1.6	2.6	1.6-2.6m. Clay, silty, sand, v.fine.
3	65.3	1.69	0.9	2.6	3.5	2.6-3.5m. Clay, silty.
4	58.6	1.57	1.1	3.5	4.6	
5	72.6	1.82	0.5	4.6	5.1	
6						5.1m. Bottom of Dam.
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

APPENDIX 3

L.R. and M. Sands Pty. Ltd.

Gawler Sand Pit.

Sections 3036, 3037. Hd. Barossa

OPERATOR: L.R. and M. Sands Pty. Ltd.

MINERAL TENURE: Extractive Mineral Leases 3453, 4073.

AREA OF TAILINGS: 1.1 ha

MAXIMUM DEPTH: 8.5m

HUNDRED: Barossa

SECTIONS: 3036, 3037

DATE DRILLED: 22/8/77 to 23/8/77

DRILL HOLES : SD76-SD82.

RESERVES

Vol. (m^3)	Tonnes (Wet)	Solids %	S.G.	Tonnes (Dry)
63 000	84 200	40.4	1.34	34 000

HISTORY

Following drilling by the Mines Department in 1961 on sections 3056, 3036 to the south (Olliver, 1961), Roche Brothers drilled and tested the present pit area in 1964. In 1966, Mr. McCormack opened a small pit producing up to 40 tonnes per day. A washing plant fed tailings into the small dams in the north of the property. In 1967, L.R. and M. Sands Pty. Ltd. commenced operations and in 1968-1969 began disposing of tailings in a dam at the base of the main pit using the existing washing plant. A new washing plant was commissioned in 1973. As the main quarry developed southwards the tailings dam was extended. The area of the original dam in the pit bottom has now been back filled and is used for stockpiles.

DESCRIPTION OF DAMS

The main dam, in the floor of the operating pit, is up to 8.5m deep, with up to 0.5m of clear water on top. Overflow is pumped into two small dams east of the main dam which are drained and cleaned out periodically. Water is recycled to the washing plant through a water storage dam to the north (see Fig. 5).

Several small fine tailings dams to the north are estimated to be up to 6m deep. These dams which were not sampled, are dry, with a hard crust, and have been partially backfilled.

PREVIOUS REPORTS

Leane, T.W., 1974

Olliver, J.G., 1961

Olliver, J.G., and Weir, L.J., 1967

Pain, A.M., 1976

CERAMIC TESTING

A composite sample was prepared for the main dam in the pit floor.

Composite No. CE 5186

The material was extruded at a moisture content of 22.9% to produce a soft smooth column of moderate plasticity. The extrustion rate was fast and the column wire-cut cleanly.

Drying at 40°C was satisfactory with a shrinkage of 6.9%. Drying under severe conditions led to slight scumming with a shrinkage of 6.7%.

The greyish orange clay fired to terra cotta shades at 800°C becoming lighter with increasing temperature to 1050°C but thereafter darker and browner. The fired specimens were free of cracking but those fired above 900° showed signs of scumming which increased with increasing temperatures. Specimens fired to 1000°C were hard with a water absorption of 12.4% and a total shrinkage of only 8.8%.

Full details are given in the accompanying table.

The material is a plastic, pale, red-burning, low-maturing clay of low shrinkage, well-suited for brickmaking. Use as a major component in blends would contribute plasticity, strength and some vitrification. The scumming is deleterious but is within acceptable limits.

L.R. AND M. SANDS, GAWLER

Sections 3036, 3037, Hd. Barossa

Composite Sample No. CE 5186

DRYING AND FIRING PROPERTIES

Temp. °C	% Total Shrinkage	% Absorption	Relative Hardness	Munsell Colour	Comments
40	6.9	-	-	Greyish orange 10 YR 7/4	Satisfactory
105	6.7	-	-	Greyish orange 10 YR 7/4	Lightly scummed
800	6.8	17.1	Moderate	Moderate reddish orange 10 R 6/6	Satisfactory
850	7.0	17.1	Moderate	Moderate reddish orange 10 R 6/6	Satisfactory
900	7.7	15.8	Moderate	Reddish orange 10 R 7/6	Satisfactory
950	8.1	14.8	Hard	Reddish orange 10 R 7/6	Light flecking by white particles.
1 000	8.8	12.4	Hard	Reddish orange 10 R 7/6	Light flecking by white particles.
1 050	10.6	5.2	Hard	Reddish orange 10 R 7/6	Light flecking by white particles.
1 100	11.3	5.5	Hard	Light brown 5 YR 6/4	Flecked by white particles.
1 150	11.5	5.0	Hard	Light brown 5 YR 6/4	Flecked by white particles.
1 200	11.6	4.3	Hard	Pale yellowish brown 10 YR 6/2	Flecked by white particles.

SIZING ANALYSIS

Screening	%
+75 µm (+200 mesh)	14.5
-75 µm +53 m (-200 +300 mesh)	3.8

Sedimentation
Wt % finer than

44 µm	78.4
31 µm	75.2
22 µm	71.1
16 µm	67.0
8 µm	60.5
4 µm	52.3
2 µm	48.2
1 µm	43.3
0.5 µm	35.9

CHEMICAL ANALYSIS

	%
SiO_2	63.31
TiO_2	0.98
Al_2O_3	19.99
Fe_2O_3	3.45
FeO	0.18
MnO	<0.01
MgO	0.82
CaO	0.63
Na_2O	0.34
K_2O	1.16
P_2O_5	0.03
H_2O+	7.46
H_2O-	1.17
TOTAL	99.52
Water Soluble Salts	0.36

MINERALOGICAL COMPOSITION

Quartz	SD
Kaolinite	D
Mica	SD
Calcite	-
Talc	A
K Feldspar	Tr?

Key:-

D	Dominant
SD	Sub Dominant (15-30%)
A	Accessory (5-15%)
Tr	Trace (<5%)

DEPARTMENT OF MINES – SOUTH AUSTRALIA

FINE TAILINGS SURVEY

LOG OF DRILL HOLE

D.M. No. 492/76 | HOLE No. S.D. 76

PLAN REF. 78/313 | LOCALITY L.R. & M. GAWLER SAND PIT | DEPTH 3.6 m

R.B. No. 79/3 | FINE TAILINGS DAM | R.L. 140.7 m

BORE S.No. | HUNDRED BAROSSA | SEC. 3036 | RIG GEMCO

DEPTH metres	SOLIDS CONTENT %	DENSITY Tonnes/m³	INTERVAL metres	From	To	COMMENTS
1	26·1	1·19	1·5	0	1·5	0–0.4m. Water, solids < 2% (est)
2	31·6	1·24	1·4	1·5	2·9	
3	36·2	1·24	0·7	2·9	3·6	
4						3.6m. Sand, fine. Bottom of Dam.
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

DEPARTMENT OF MINES – SOUTH AUSTRALIA

FINE TAILINGS SURVEY

LOG OF DRILL HOLE

D.M. No. 492/76

PLAN REF. 78/313

R.B. No. 79/3

BORE S.No.

LOCALITY L.R&M. GAWLER SAND PIT

FINE TAILINGS DAM

HUNDRED BAROSSA SEC. 3036

HOLE No. SD.77

DEPTH 7.2 m

R.L. 140.7m

RIG GEMCO

DEPTH metres	SOLIDS CONTENT 0 20 40 60 80 100 %	DENSITY Tonnes/m³	INTERVAL metres	From	To	COMMENTS
1	25.4	1.19	1.5	0	1.5	
2	27.6	1.21	1.1	1.5	2.6	
3	27.7	1.21	1.6	2.6	4.2	
4						
5	29.9	1.23	0.9	4.2	5.1	
6						
7	33.0	1.26	2.1	5.1	7.2	7.2m. Sand, fine-medium. Bottom of Dam.
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

DEPARTMENT OF MINES — SOUTH AUSTRALIA

FINE TAILINGS SURVEY

LOG OF DRILL HOLE

D.M. No. 492/76 | HOLE No. S.D. 78

PLAN REF. 78/313 | DEPTH 7.3 m

LOCALITY L.R.& M. GAWLER SAND PIT | R.L. 140.7 m

FINE TAILINGS DAM

R.B. No. 79/3

BORE S.No. | HUNDRED BAROSSA SEC. 3036 | RIG GEMCO

DEPTH metres	SOLIDS CONTENT %	DENSITY Tonnes/m³	INTERVAL metres	From	To	COMMENTS
	22·5	1·16	0·8	0	0·8	0–0·1m. Water, solids < 2% (est).
1	23·5	1·17	1·2	0·8	2·0	
2	23·6	1·17	1·3	2·0	3·3	
3	31·1	1·24	1·2	3·3	4·5	
4	51·2	1·47	1·2	4·5	5·7	4·5–6·8m. Slightly sandy, fine – medium.
5	45·9	1·40	1·1	5·7	6·8	
6	57·7	1·56	0·5	6·8	7·3	6·8–7·3m. Very sandy, v.f–m.
7						7·3m. Sand, very fine-medium, and gravel. Bottom of Dam.
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

DEPARTMENT OF MINES – SOUTH AUSTRALIA

FINE TAILINGS SURVEY

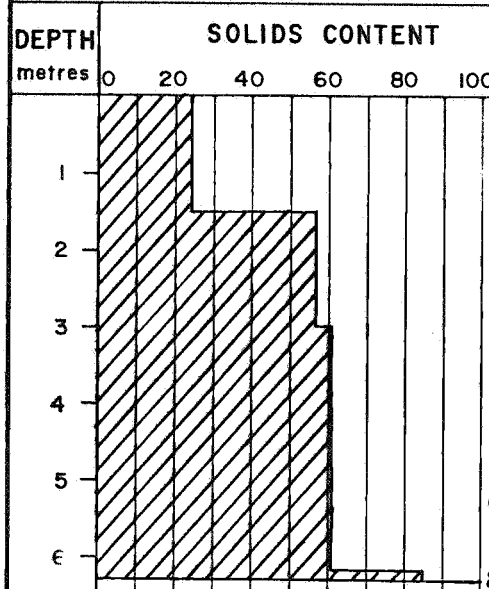
LOG OF DRILL HOLE

D.M. No. 492/76 | HOLE No. S.D. 79

PLAN REF. 78/313 | LOCALITY L.R&M. GAWLER SAND PIT | DEPTH 6.3 m

R.B. No. 79/3 | FINE TAILINGS DAM. | R.L. 140.7m.

BORE S.No. | HUNDRED BAROSSA SEC. 3036 | RIG GEMCO



DEPTH metres	SOLIDS CONTENT %	DENSITY Tonnes/m³	INTERVAL metres	From	To	COMMENTS
						0–0.7m. Water, Solids < 2% (est).
1	24.1	1.18	1.5	0	1.5	0.7–1.5m. Slightly sandy, v.f.
2	56.7	1.55	1.5	1.5	3.0	1.5–3.0m. Sandy, v.fine-medium.
3						
4	60.5	1.60	2.4	3.0	5.4	3.0–5.4m. Clay-sand, v.fine.
5	60.8	1.61	0.8	5.4	6.2	6.2–6.3m. Sand fine, v. clayey.
6	84.3	2.10	0.1	6.2	6.3	6.3m. Sand, fine-coarse, and gravel. Bottom of Dam.
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

DEPARTMENT OF MINES — SOUTH AUSTRALIA

FINE TAILINGS SURVEY

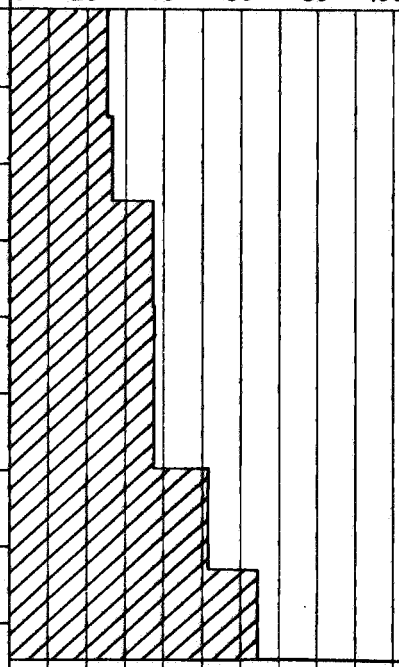
LOG OF DRILL HOLE

D.M. No. 492/76 | HOLE No. SD80

PLAN REF. 78/313 | LOCALITY L. R&M. GAWLER SAND PIT | DEPTH 8.5m

R.B. No. 79/3 | FINE TAILINGS DAM | R.L. 140.7m

BORE S.No. | HUNDRED BAROSSA SEC.3036 | RIG GEMCO



DEPTH metres	SOLIDS CONTENT %	DENSITY Tonnes/m³	INTERVAL metres	From	To	COMMENTS
						0-0.2m. Water, solids <2% (est).
1	25.8	1.19	1.4	0	1.4	
2	26.3	1.20	1.1	1.4	2.5	
3	37.3	1.30	1.4	2.5	3.9	2.5-3.9m. slighly sandy, v.fine
4						
5	36.8	1.30	2.1	3.9	6.0	
6						
7	51.8	1.48	1.3	6.0	7.3	6.0-7.3m. slightly sandy, v.f.
8	64.2	1.67	1.2	7.3	8.5	7.3-8.5m. Clay-sand, v.fine.
9						8.5m. Bottom of Dam.
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

DEPARTMENT OF MINES — SOUTH AUSTRALIA

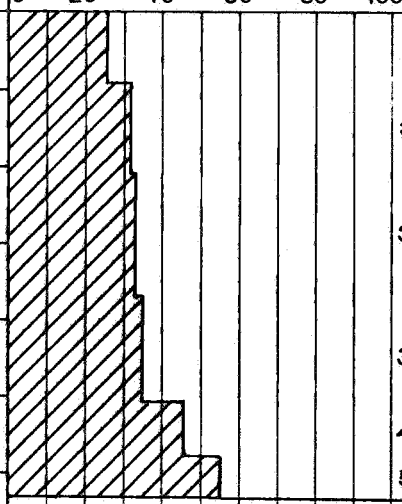
FINE TAILINGS SURVEY
LOG OF DRILL HOLE

D.M. No. 492/76 | HOLE No. S.D.81

PLAN REF. 78/313 | DEPTH 6.3m

R.B. No. 79/3 | LOCALITY L.R&M. GAWLER SAND PIT — FINE TAILINGS DAM | R.L. 140.7m

BORE S.No. | HUNDRED BAROSSA SEC. 3036 | RIG GEMCO



DEPTH metres	SOLIDS CONTENT %	DENSITY Tonnes/m³	INTERVAL metres	From	To	COMMENTS
	25.2	1.19	0.9	0	0.9	0-0.2m. Water, solids<2% (est).
1						
	31.2	1.24	1.2	0.9	2.1	
2						
	32.4	1.25	1.6	2.1	3.7	
3						
4						
	34.4	1.27	1.4	3.7	5.1	
5						
	45.6	1.40	0.7	5.1	5.8	5.1-5.8m. Slightly sand, v.f.-f.
6	54.2	1.51	0.5	5.8	6.3	5.8-6.3m. Slightly silty sandy,
7						6.3m. Clay - sand, v.f.-coarse, with some gravel. Bottom of Dam.
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

DEPARTMENT OF MINES — SOUTH AUSTRALIA

FINE TAILINGS SURVEY
LOG OF DRILL HOLE

D.M. No. 492/76 | HOLE No. S.D.82

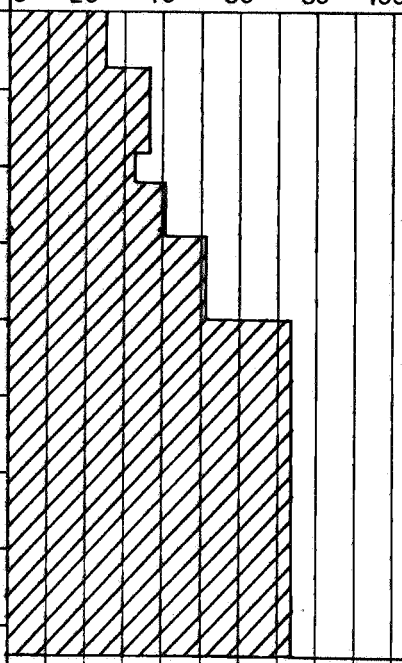
PLAN REF. 78/313 | DEPTH 8.4 m

R.B. No. 79/3 | R.L. 140.7m

BORE S.No. | RIG GEMCO

LOCALITY L.R.&M. GAWLER SAND PIT — FINE TAILINGS DAM

HUNDRED BAROSSA SEC. 3036



DENSITY Tonnes/m³	INTERVAL metres	From	To	COMMENTS
25.7	1.19	0.7	0	0.7	0-0.2m. Water, solids < 2% (est).
36.9	1.30	1.1	0.7	1.8	0.7-4.0m. slightly sandy, v.fine
33.2	1.26	0.4	1.8	2.2	
40.8	1.34	0.7	2.2	2.9	
51.7	1.47	1.1	2.9	4.0	
73.9	1.85	4.4	4.0	8.4	4.0-8.4m. Sand, fine, and clay.
					8.4m. Sand, fine-coarse, orange. Bottom of Dam.

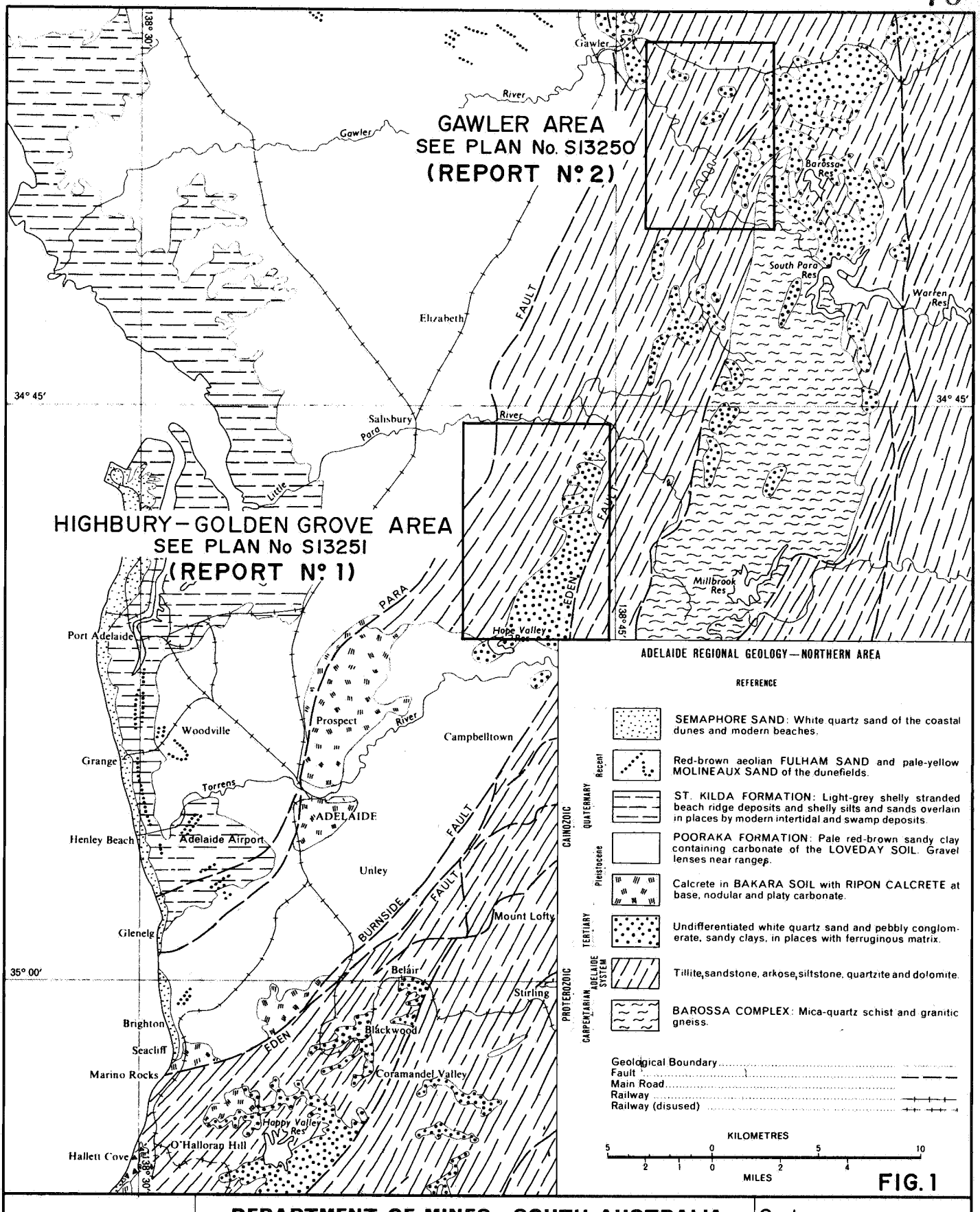


FIG. 1

	DEPARTMENT OF MINES—SOUTH AUSTRALIA	Scale: 1:250 000
Compiled: A.M.P.	FINE TAILINGS INVESTIGATION	Date: FEB. 1978
Drn. A.F. | Ckd.	HIGHBURY–GOLDEN GROVE AND GAWLER AREAS	Drg. No.
Geology from Adelaide and Barker 1:250 000 Geological Atlas Series	LOCATION AND REGIONAL GEOLOGY	S13248

PF No S9992 GH

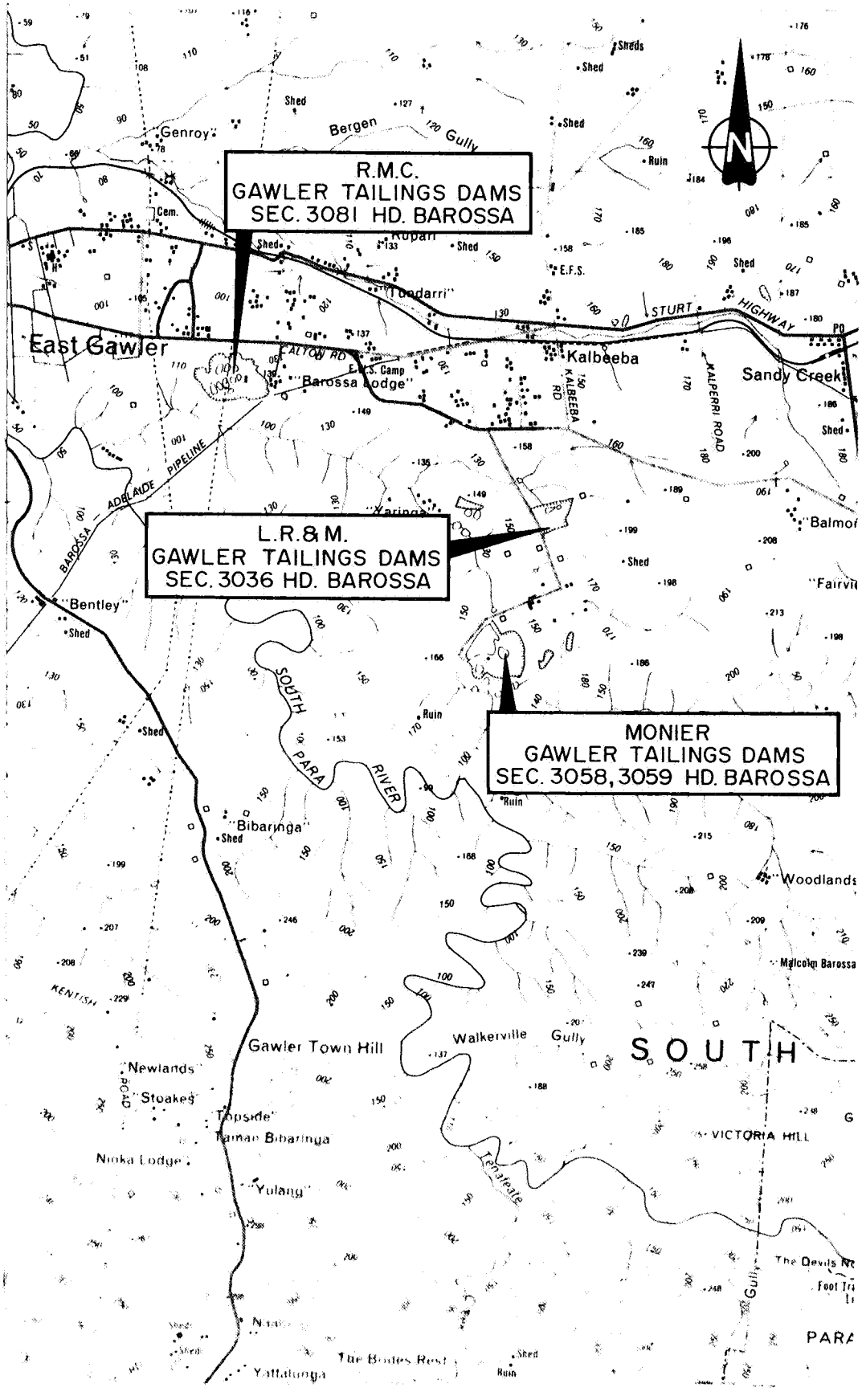


FIG. 2

EXPLORATIVE MINERALS SECTION
Compiled A.M.PAIN
Drn. A.F. | Ckd.

DEPARTMENT OF MINES SOUTH AUSTRALIA

FINE TAILINGS INVESTIGATION
GAWLER AREA
LOCALITY MAP

Scale: 1:50000
Date: FEB 1978
Drg. No.
S13250

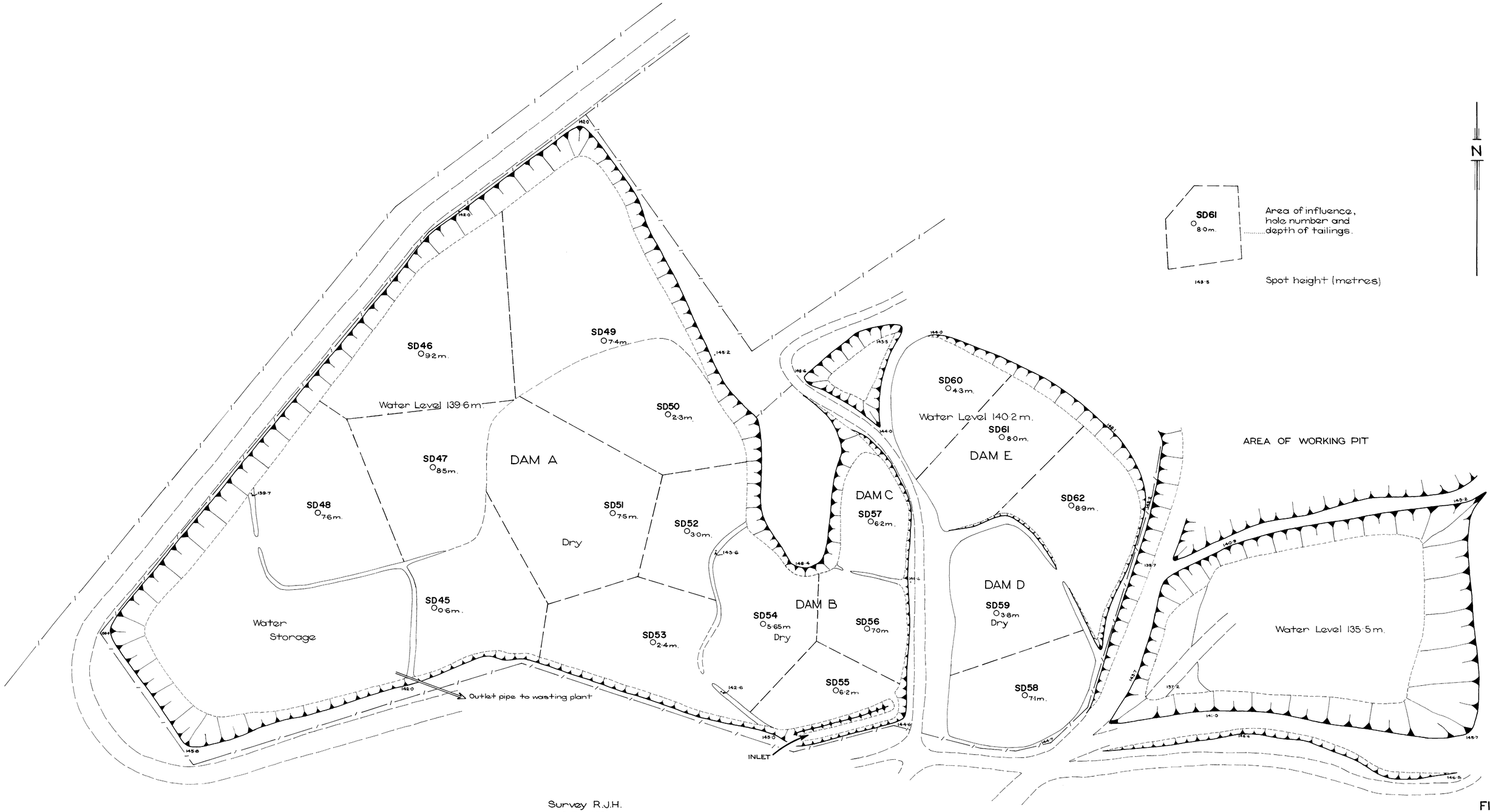


FIG. 3

DEPARTMENT OF MINES AND ENERGY — SOUTH AUSTRALIA

MONIER SANDS FINE TAILINGS DAM

GAWLER SECS. 3058, 3059 HD. BAROSSA

LOCATION OF BOREHOLES

NON-METALLIC RESOURCES DIVISION	COMPILED: W.S.M.	DRN: J.W.	SCALE: 1:1000	PLAN NUMBER
DIRECTOR GENERAL		CKD:	DATE: MARCH '78	78-311

JOB 636

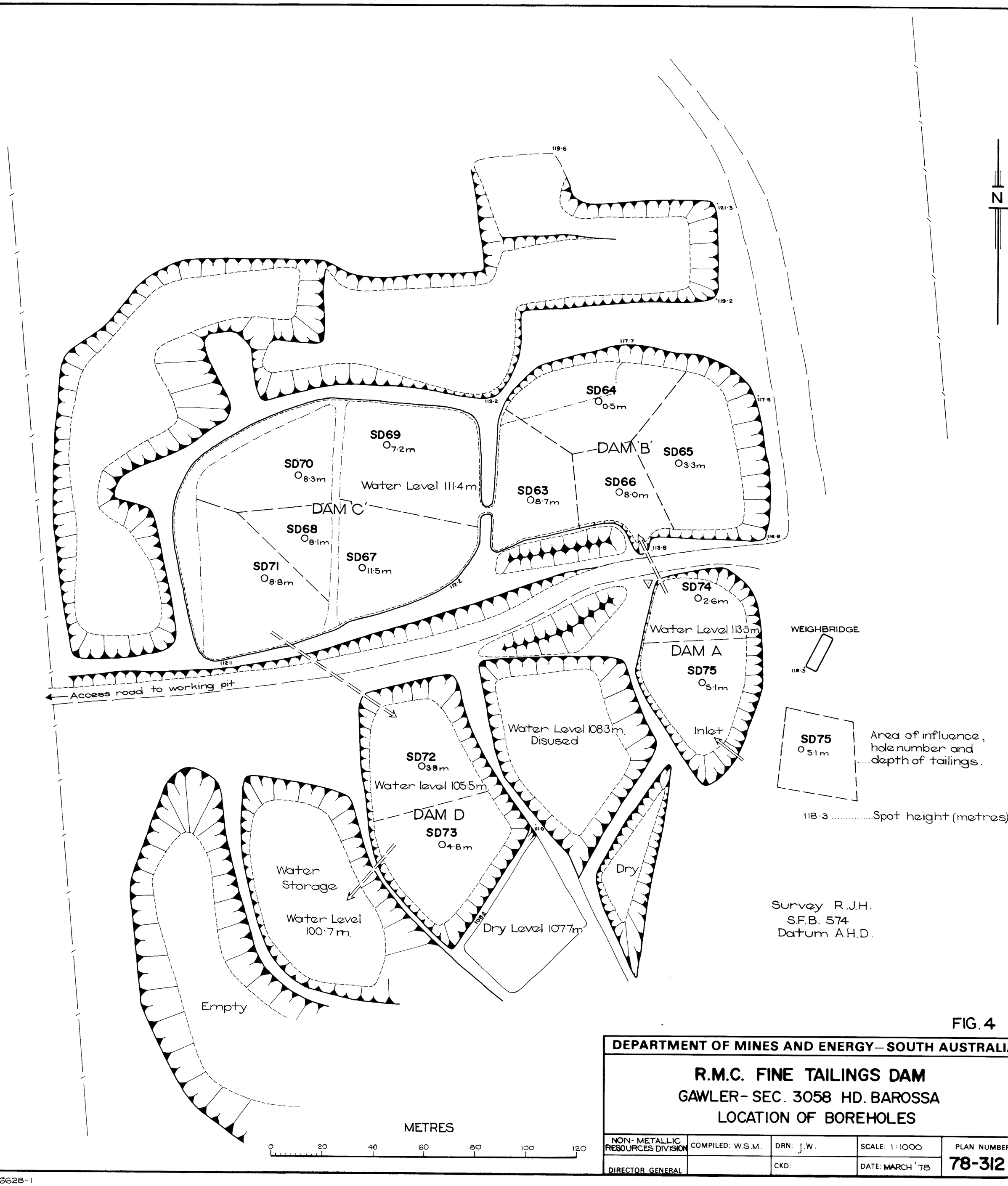


FIG. 4

DEPARTMENT OF MINES AND ENERGY—SOUTH AUSTRALIA

R.M.C. FINE TAILINGS DAM
GAWLER—SEC. 3058 HD. BAROSSA
LOCATION OF BOREHOLES

NON-METALLIC RESOURCES DIVISION	COMPILED: W.S.M.	DRN: J.W.	SCALE: 1:1000	PLAN NUMBER
DIRECTOR GENERAL		CKD:	DATE: MARCH '78	78-312

JOB G36

6628-1

Disused Fine Tailings Dams Backfilled

Backfilled

Water Storage

Overburden Dump

Weigh Bridge Office

Stockpiles

Stockpiles

Stockpiles

Stockpiles

WASHING PLANT

SD82 ○8·4m

SD81 ○6·3m.

SD80 ○8·5m

SD79 ○6·3m.

SD76 ○3·6m

SD77 ○7·2m

SD78 ○7·3m.

Outlet

Inlet

Water Level 140·7m

Inlet

Shallow Tailings Dams (Not Drilled)

N

Stripped Area

Overburden Dump

Working Faces

Stripped Area

142·5 148·7 153·0 142·4 149·0 144·5 148·6 141·9 142·2 155·0 143·5 148·8 141·9 139·2 148·9 133·8 154·1 136·5 149·5 139·9 145·2 149·4 160·6 149·8

SD78 ○7·3m — Area of influence, hole number and depth of tailings.

149·5 — Spot height (metres).

Survey R.J.H.
S.F.B. 574
Datum A.H.D.

METRES
0 20 40 60 80 100

FIG.5

DEPARTMENT OF MINES AND ENERGY – SOUTH AUSTRALIA

L.R.&M SANDS FINE TAILINGS DAM

GAWLER SEC. 3058 HD. BAROSSA

LOCATION OF BOREHOLES

NON-METALLIC RESOURCES DIVISION	COMPILED: W.S.M.	DRN: J.W.	SCALE: 1:1000	PLAN NUMBER 78-313
DIRECTOR GENERAL		CKD:	DATE: MARCH '78	

JOB 636

6628-1