DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

REPT.BK.NO. 83/24
SURVEY OF PRINCIPAL QUARRYING OPERATIONS IN METROPOLITAN ADELAIDE
VOLUME 1 (of 2)

GEOLOGICAL SURVEY

by

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VOLUME 1

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DEPARTMENT OF MINES AND ENERGY
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ABSTRACT

Thirty five quarries and pits produced 99% of the 5.6 million tonnes of construction materials produced in Metropolitan Adelaide in 1981.

A systematic review of these operations provides a concise summary of major extractive industry in Adelaide, and presents new data on history and processing.

INTRODUCTION

In response to requests for information on mining operations in the State, a survey of the major pits and quarries in the Adelaide metropolitan area was undertaken in 1977. The aim of the investigation was to provide a concise account of the principal extractive operations within the Adelaide area for use as background information by Departmental officers and as a restricted source book for non-specific enquiries from industry and the public. A draft report was subsequently prepared (Watkins and Felstead, 1979).

The current report substantially updates and expands the first especially in the areas of history, geology, processing and listing of relevant references. A total of 35 metropolitan and 3 country operations, were reviewed by consultation with quarry managers, inspections and photography of pits and processing plants, and literature review of history and geology. Specific references are, for convenience, listed at the end of the account of each operation. Brief comments on 15 smaller operations are also included. These have relatively small production or have been recently scaled down or closed. Localities are shown on Figure 39.

Flow diagrams (Figs. 1-38) are presented where appropriate. The plant represented shows typical configurations and sizes of equipment. These are sometimes varied in accordance with market conditions. The relative position of plant units has been changed, where necessary, to show more clearly the route taken by products during processing. Dimensions of equipment are as quoted by quarry managers. Reference to imperial sizes is still common within the industry, and imperial units are mentioned where still used at the plants.

GEOLOGICAL SETTING

Regional geology of the area is published on ADELAIDE (Thompson, 1969) and BARKER (Thompson and Horwitz, 1962) and in more detail for the areas covered by Adelaide, Onkaparinga and Noarlunga of the 1:50 000 resource series (Forbes 1979, 1980, 1982).

The following is a brief synopsis of the geology of the Adelaide area (after Daily et al, 1976), indicating the source of the various types of construction materials.

The oldest rocks exposed in the Adelaide form the crystalline basement of age about 1400 million years. These originally accumulated as a sedimentary pile which underwent metamorphism under pressure, in the deeper higher temperature zones of the crust. Uplift and deformation produced the schists and feldspathic and sillimanite gneisses at the Barossa Complex, exposed near anticlinal crests at Houghton, Carey Gully and Yankalilla. These rocks are a source of weathered brick shale at Inglewood.

Erosion of the uplifted basement produced a new sedimentary sequence, which accumulated between 800 and 570 million years ago in an extensive subsiding regional trough, termed the Adelaide

Geosyncline. The Adelaidean sediments begin with the Aldgate Sandstone followed by shallow marine Castambul Dolomite which became more silty, sandy and magnesetic and cherty (Montacute Dolomite). This is the source of carbonate aggregate at the Montacute and Riverview dolomite quarries. The overlying and (in some areas) equivalent Woolshed Flat Shale is the source of white brickmaking material at Francis' (Anstey Hill) Mitchell's (Houghton) and Quarry Industries' (Sandy Creek) weathered shale pits. A change to predominantly arenaceous deposition followed later by partial re-crystallization produced the Stonyfell Quartzite. This is quarried for aggregate at Smithfield, Salisbury, Para Hills, Stonyfell and Greenhill, Eagle, Riverview and Tea Tree Gully Quarries, and a metamorphosed equivalent is worked at Lobethal Quarry. Weathered shale from within the same formation is worked for brickmaking at Poulton's pit, Golden Grove, and at One Tree Hill.

The sandy and silty sequence with some dolomite which was then deposited, was metamorphosed to quartzite and shale. Weathered shale of the Saddleworth Formation at Golden Grove (Hallett, P.G.H.) Cherry Gardens (Hallett, C.S.R.) and Littlehampton and from the Belair Sub-group at Baker Gully and Birdwood is extracted from these rocks for brickmaking.

Deposition of the Sturt Tillite marked the onset of glacial conditions during which igneous and metamophic erratics were transported by ice moving eastward across exposed crystalline basement. When glaciation abated, an interval of silty deposition gave rise to the Tapley Hill Formation. The calcareous upper part of this unit is the source of aggregate at Reynella, Linwood and Noarlunga Quarries. Increasing marine influence, marked by the Brighton Limestone, was followed by a

final, weak glacial interval (Reynella Siltstone Member). The Brachina Formation, a sequence of reddish shale and sandstone was then deposited within a dominantly sandy sequence. Weathered shale for brickmaking is obtained from this unit at Pedlar Creek.

A period of deformation of the Adelaidean rocks was followed by terrestrial erosion and marine transgression at the beginning of the Cambrian, (570 million years) resulting in the deposition of the Normanville Group. The Fork Tree Limestone, formed in shallow water during this time has an archaeocyathal lower member and mottled upper member, which is quarried for aggregate by Southern Quarries at Sellick Hill. A succession of Cambrian metasandstone, metasiltstone and phyllite (Kanmantoo Group) overlies the limestone.

A major Cambro-Ordovician deformational event, the Delamerian Orogeny, took place between 450-500 million years ago. During this time tight assymetrical folding, overturned to the west, and thrust faulting (observable in White rock and Riverview Quarries) produced an extensive arcuate mountain chain. This was followed by 120 million years of erosion and, about 270 million years ago, by the Permian glaciation.

Another major period of weathering and erosion followed producing the weathered and bleached bedrock from which brickmaking shale is obtained. Earth movements along Delamerian trends in the Early Tertiary produced a complex graben, the eastern margin of which was block faulted. Uplift along these faults took place through much of the Cainozoic; and the accelerated erosion of the weathered bedrock deposited Tertiary sandy and clayey sediments in the adjacent basins, followed in some areas by marine transgressions. The basal Tertiary sand and white clay lenses are worked for construction sand and brick clay in the Hope Valley-Golden Grove Embayment, the Willunga Embayment, the Barossa Valley and at One Tree Hill.

QUARRY OPERATIONS

Dolomite and Limestone

1. GENERAL

LOCATION: Riverview Quarry, sections 5548, 5608, 755, 5407, hundred of Yatala.

OPERATOR: The Readymix Group (S.A.).

LOCAL ADDRESS: Torrens Road, Highbury, 5089. Tel. 264-2922, 264-2925.

HEAD OFFICE ADDRESS: 100 Greenhill Road, Unley, 5061. Tel. 272-1122.

MINERAL TENURE: PM 35, 31. Land owned by company.

2. PRODUCTION

MATERIAL MINED: Dolomite.

RESERVES: 8 million tonnes (approx.).

PRODUCT USES:

40 mm metal.	Quarry sand
40 mm crushed rock.	40 mm screened rubble
20 mm crushed rock.	20 mm screened rubble
20 mm screenings.	10 mm screened rubble
14 mm screenings.	Blinding
10 mm screenings.	Filling
7 mm screenings.	Spalls
3 mm screenings.	

PRODUCTION RATE (1981): 574819 tonnes

WORKFORCE: 18.

3. HISTORY

O'Neil Construction Ltd. began quarrying in 1958, and sold the operation to Readymix Concrete (S.A.) in 1962.

4. GEOLOGY (Pl. 4,5)

The quarry is located within the Montacute Dolomite Member of the Skillogalee Dolomite within the Burra Group of Torrensian age. The unit includes massive and laminated grey dolomite, and grey and brown quartzite interbedded with dolomitic and graphitic

phyllite and shaley dolomite. The main dolomite unit in the quarry area is about 200 m thick, dips about 55° westerly and is enclosed by quartzite beds.

A southeasterly trending dextral fault displaces the sequence about 250 m in the northern part of P.M.35.

The southerly extension of the dolomite across Gorge Rd. is quarried by B.M.G. at Montacute.

5. MINING

50-60, 75 mm diameter blastholes, depressed at 75° are drilled 10-16 m deep and staggered 2.5-3 m apart in lines 2 m apart. The holes are bottom-primed with Cordtex and gelignite, loaded with Anfo and detonated, using 3 point electric initiation, once or twice per week. A contractor reduces oversized rocks to jaw crusher size with a pneumatic rock breaker.

Equipment used comprises:

2 x 22 tonne Wabco dump trucks.
1 x 20 tonne Euclid dump truck.
2 x Caterpillar 966 Front End Loaders.
3 x Mercedes 15 tonne dump trucks.
2 x 10 tonne dump trucks (contractors).
1 x water truck.
2 x Caterpillar 950 Front End Loader (Sales stockpiles and roadbase plant).
2 x Wabco 35 tonne dump trucks) Overburden removal,
1 x Caterpillar 980 Front End Loader) Both Quarries
1 x Komatsu 155 (equiv. D8) bulldozer (Rehabilitation & overburden stripping, Both quarries).
1 x Atlas Copco 810H airtrack drill and compressor) Used at
3 x Gardner Denver airtrack drill and compressor) both quarries.

6. CRUSHING PLANT

a) Main Crushing Plant (Pl. 1,2 and Fig. 1)

Shot rock is tipped over a 65 mm punched plate scalping screen into a 42/30 Hadfield single toggle jaw crusher. Crusher product is fed to a 14 x 4' (4.3 x 1.2 m) double deck vibrating screen)40 and 20 mm decks) which produces 40 and 20 mm rubble. Oversize is fed, with the primary scalps, onto a 6 x 4' (1.8 x 1.2 m) 65 mm vibrating screen oversize from which is reduced in a 3' (0.9 m) Traylor gyratory crusher and conveyed with the undersize to a 10 x 4' (3 x 1.2 m) double deck (40 mm, 9 or 5 mm) vibrating screen. Products are rubble (undersize) and secondary crusher feed (intermediate and oversize).

The 40 mm rubble from the first post primary screening can be treated on a 16 x 4' (4.9 x 1.2 m) Hadwa 10 mm screen, to produce 10 mm rubble. Oversize feeds the second of two secondary Symons 4'(1.2 m) gyratories, which is also fed from the 40 mm rubble bin under the 10 x 4 screen.

The first Symons, also fed from the 40 mm rubble bin, feeds an 8 x 3' (2.4 x 0.9 m) triple deck (20, 14, 8 mm) vibrating screen which produces feed for rescreening at the gully plant, and oversize which is returned to the crusher. The second Symons feeds a 12 x 4' (3.7 x 1.2 m) triple deck (40 or 20, 14, 5 mm) brating screen. Oversize is returned to the crusher and undersize is sold as sand or rescreened at the gully plant. If the middle deck is removed, 40 or 20 mm crushed rock is produced, and if left in place products are 40 or 20 mm metal and 14 mm screenings.

b) Gully Plant (Pl. 3 and Fig. 2)

This plant is a rescreener which fractionates and cleans the screenings from the main plant. Feed is tipped onto a 8 x 4'

(2.4 x 1.2 m) triple deck (20, 14, 9 mm) vibrating screen. This produces plus and minus 20 mm and minus 9 mm material. This is further screened on a 10 x 4' (3 x 1.2 m) triple deck vibrating screen producing three fine fractions, used as topping for footpaths, tennis courts, etc., and sand. The 14 mm screenings are further reduced in a roll crusher and fed to a 10 x 4' (3 x 1.2 m) triple deck (11, 8, 5 mm) vibrating screen producing 14, 10 and 7 mm screenings and sand.

c) Mobile Crushing Plant (Pl. 4 Fig. 3)

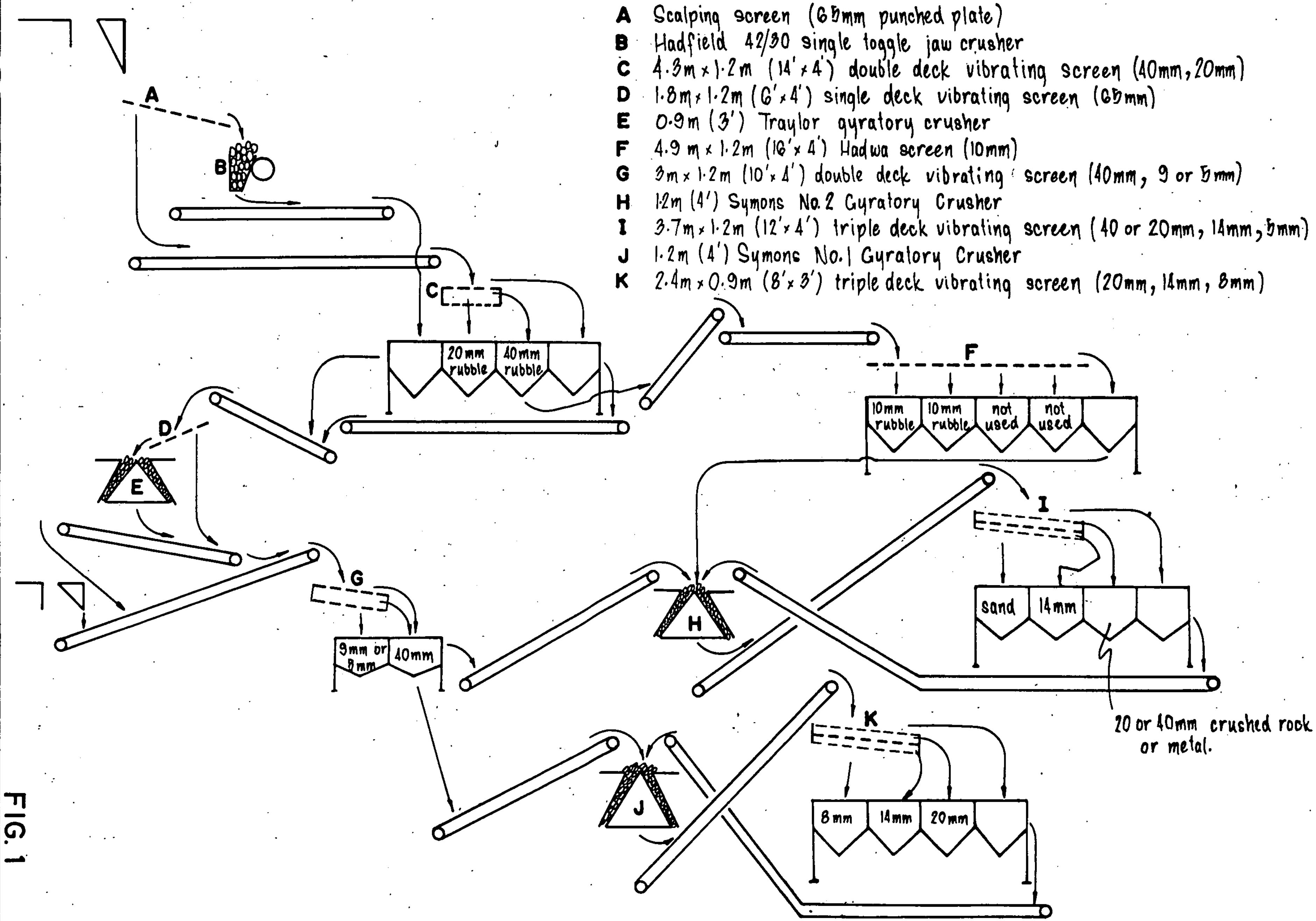
A mobile crushing plant was operating in the floor of the dolomite quarry, (2-9-82). The plant had just completed a 3 month, 100,000 tonne crushing contract with Australian National Railways to supply minus 53 mm ballast for the Adelaide-Crystal Brook railway. 20, 14, 10 and 7 mm screenings, sand and scalps were also produced during the contract. Screens were then changed to produce only 20, 14, 10 mm screenings, sand, and scalps to boost quarry stockpiles.

Quarry rock is fed to a 36/24 Jaques jaw crusher which delivers to a 14 x 5' (4.3 x 1.5 m) double deck vibrating screen (35, 20 mm). Minus 20 mm is stockpiled as scalps and the two oversize fractions crushed in a 54" (1.4 m) standard Rollercone gyratory. The product is conveyed to a 20 x 6' (6.1 x 1.8 m) triple deck vibrating screen (22.4, 16, 5 mm). Ballast was previously made at this screen during the contract using a 53 mm top deck. Oversize is reduced in a 54" (1.4 m) fine Rollercone gyratory and rescreened. Undersize is stockpiled as sand and minus 16 mm fed to a Hazemag APK 40 Impact Crusher which feeds a 20 x 6' (6.1 x 1.5 m) double deck vibrating screen (14.5, 5 mm). Products are 14 mm & 10 mm screenings and sand.

7. REFERENCE

Nixon, L.G.B., 1961. Blue Dolomite Deposit - Near Houghton Sec. 5394, 5548, Hd. Yatala. Min. Rev. Adelaide 114: 131-133.

2940



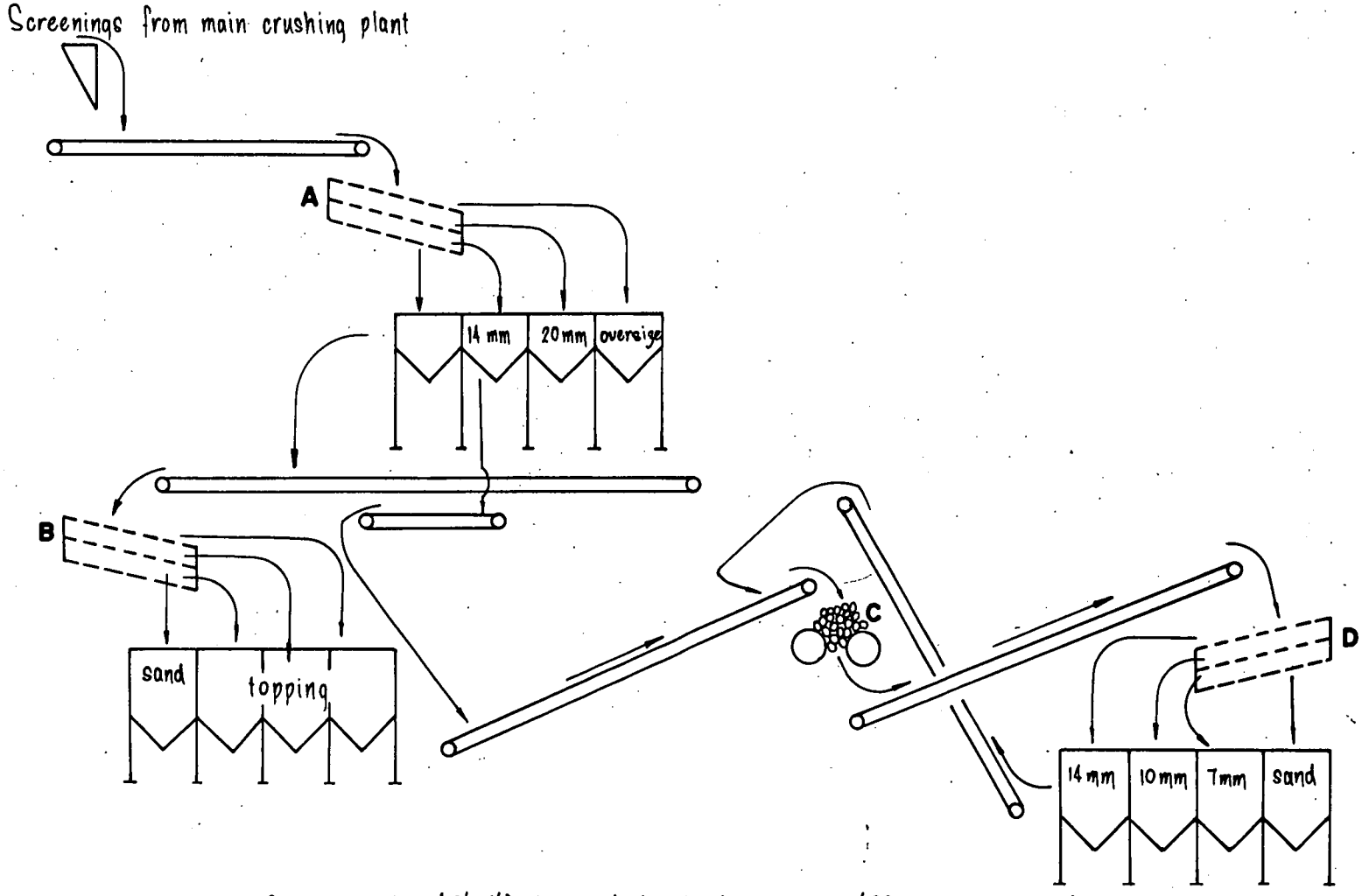
A Scalping screen (65mm punched plate)
B Hadfield 42/30 single toggle jaw crusher
C 4·3m × 1·2m (14' × 4') double deck vibrating screen (40mm, 20mm)
D 1·8m × 1·2m (6' × 4') single deck vibrating screen (65mm)
E 0·9m (3') Traylor gyratory crusher
F 4·9 m × 1·2m (16' × 4') Hadwa screen (10mm)
G 3m × 1·2m (10' × 4') double deck vibrating screen (40mm, 9 or 5mm)
H 1·2m (4') Symons No. 2 Gyratory Crusher
I 3·7m × 1·2m (12' × 4') triple deck vibrating screen (40 or 20mm, 14mm, 5mm)
J 1·2m (4') Symons No. 1 Gyratory Crusher
K 2·4m × 0·9m (8' × 3') triple deck vibrating screen (20mm, 14mm, 8mm)

FIG. 1

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

METROPOLITAN QUARRY SURVEY
READYMIX'S RIVERVIEW DOLOMITE QUARRY
CRUSHING PLANT

COMPILED J. Valentine
DRAWN E. Colabio
DATE August 1982
CHECKED
C.D.O.
DATE 21. 4. 83
SCALE not to scale
PLAN NUMBER S 16506



A 2·4m × 1·2m (8′ × 4′) triple deck vibrating screen (20mm, 14mm, 9mm)
B 3m × 1·2m (10′ × 4′) triple deck vibrating screen (6mm, 5mm, 3mm)
C Roll crusher
D 3m × 1·2m (10′ × 4′) triple deck vibrating screen (11mm, 8mm, 6mm)

FIG. 2

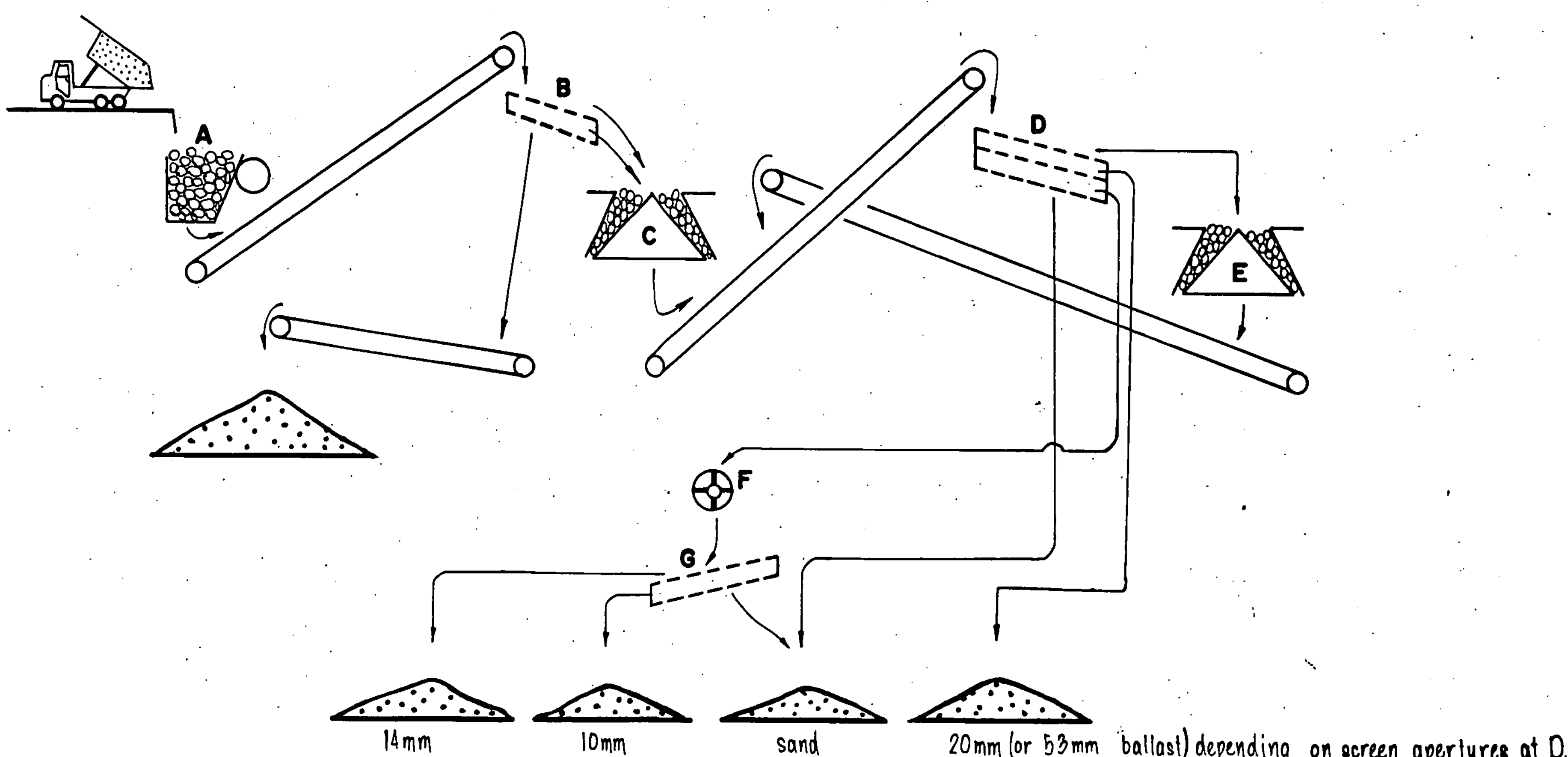
DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

METROPOLITAN QUARRY SURVEY

READYMIX'S RIVERVIEW DOLOMITE QUARRY
GULLY PLANT

COMPILED J. Valentine	DRAWN E. Calabio	DATE August 1982	CHECKED
CDO	SCALE not to scale	DATE 21·4·83	PLAN NUMBER S 16507

2948



A Jaques 36/24 Jaw Crusher
B 4·3m × 1·5m (14' × 5') double deck vibrating screen: 35mm, 20mm
C 1·4m (54") standard rollercone gyratory crusher
D 6·1m × 1·8m (20' × 6') triple deck vibrating screen: 22·4mm, 16mm, 5mm for screenings
E Fine rollercone gyratory crusher 1·4m (54")
F Hazemag APK 40 Impact Crusher
G 6·1m × 1·8m (20' × 6') double deck vibrating screen: 14·5mm, 5mm

FIG. 3

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

METROPOLITAN QUARRY SURVEY
READYMIX'S RIVERVIEW DOLOMITE QUARRY
MOBILE CRUSHING PLANT

COMPILED J. Valentine	C.D.O	DATE 21·4·83
DRAWN E. Colabio	SCALE not to scale	
DATE August 1982	PLAN NUMBER	
CHECKED	S 16508	

1. GENERAL

LOCATION: Montacute Quarry, sections 330-3, 5536, 5539, hundred of Onkaparinga.

OPERATOR: B.M.G. Resources.

LOCAL ADDRESS: Gorge Road, Castambul, Tel. 390 2281. (Weighbridge). 390 2336 (Manager).

HEAD OFFICE ADDRESS: 68 Burwood Road, Burwood, Vic. 3125.

MINERAL TENURE: P.M.135-7, held under agreement with landowners, H.R. & W.C. Smith. PM 147 company owned.

2. PRODUCTION

MATERIAL MINED: Dolomite, phyllite.

RESERVES: a) In quarry area defined by development plans (P.M. 136, 137): Dolomite, 12.1; Quartzite 0.6; Phyllite 5.8. (Johnson, 1980).

b) Area north of quarry (P.M. 135, 147): Dolomite, 22.4; Quartzite, 3.4; Phyllite 5.0. (Valentine, 1979).

PRODUCT USES:

65 mm metal	7 mm screenings
40 mm metal	3 mm screenings
40 mm crushed rock	Quarry sand
20 mm crushed rock	75 mm screened rubble
20 mm screenings	40 mm screened rubble
16-10 mm screenings	20 mm screened rubble
14 mm screenings	10 mm screened rubble
10 mm screenings	Filling

PRODUCTION RATE (1981): 268929 tonnes

WORKFORCE: 13

3. HISTORY

The Pinkerton Gully area was first exploited for copper from 1848 (Prince Alfred and David Copperfield mines). Pitt Ltd. mined 40-50 tons of limestone for lime manufacture to the east of Pinkerton Gully near the Gorge Road between 1920-22. The Torrens Barytes Co. began mining barite west of the gully in 1927.

The dolomite deposits were first considered as a source of road metal in 1950 when the area north of the present quarry was geologically mapped for the Summertown Timber and Trading Co. (Johns, 1950). In 1961 the Department of Mines drilled 3 diamond holes for Mines and Quarries Development Ltd., (Nixon, 1963) and Consolidated Gold Fields Pty. Ltd. further drilled the deposit for Blue Metal Products in 1962. The deposit was not worked however until about 1967 when Montacute Blue Metal Quarries Pty. Ltd., in consortium with Mobile Quarries, CTY Excavations and Eli Hambour, established a crushing plant. The original quarry abuts the present workings to the north. First recorded production was in 1969.

Montacute Blue Metal was bought out by the Readymix Concrete (S.A.) in 1973. Ownership was transferred to B.M.G. Resources on 1st October, 1981.

4. GEOLOGY (Pl. 9, 10)

The quarry is located within the upper part of the Skillogalee Dolomite, a unit within the Burra Group of Torrensian age. The unit comprises massive and laminated grey dolomite with massive brown and grey quartzite beds, interbedded with dolomitic and graphitic phyllite and shaley dolomite. The sequence thickens towards the east to a total in excess of 200 m. The dolomites exhibit convoluted bedding, "tepee" structures, magnesite conglomerate and sedimentary breccia.

The formation dips 5-15° southeast and is bounded by faults to the north (Castambul Fault), east and west. The more competent dolomite and quartzite member beds are gently folded in contrast to the tighter folds in the phyllitic beds. Both fold styles plunge gently southerly.

The dolomite is exposed again to the north of another east-west fault, sub-parallel and to the north of the Castambul Fault, and strikes northerly across the Gorge Road, where it is worked by Readymix at Riverview Quarry.

5. MINING

30-60, 80 mm diameter blast holes depressed at 55°, are drilled 18 m deep and 2.5 m apart in staggered lines 1.8 m apart. Each hole is bottom primed with Molanite, loaded with Anfo (one bag Nitropril per hole) and detonated by 3 point electric initiation. Firing normally takes place weekly. Oversize rocks are broken to jaw crusher size by contractors, who visit the quarry about once per month.

Equipment used comprises:

1 - Caterpillar 980 front end loader.

1 - Caterpillar 966 front end loader.

2 - Euclid 22 tonne quarry trucks.

2 - 10 tonne dump trucks.

1 - 18 tonne dump truck.

1 - Caterpillar grader.

1 - Water truck.

Gardner Denver airtrack drill and compressor. (Contractors up to 3 operating at a time).

6. CRUSHING PLANT (Pl. 6,7,8 and Fig. 4)

Shot rock is dumped into a 50 tonne bin and fed to an 8 x 4' (2.4 x 1.2 m) triple deck vibrating screen comprising a 3½"

(90 mm) grizzly over 40 mm punched plate and 20 mm wire mesh decks either of which can be removed to produce three screened rubble products as undersize. Oversize feeds a Pioneer 42/30 single toggle jaw crusher. Crusher product is conveyed to a 2" (50 mm) square-holed bypass screen, plus 2" passing through a 3' (0.9 m) Jaques gyratory crusher. Products are conveyed to a 40 and 20 mm 8 x 4' (2.4 x 1.2 m) double deck vibrating screen which produces 40 and 20 mm crushed rock, oversize being fed through a surge bin into an Allis Chalmers gyratory crusher.

Crusher product is sent to a 16 x 5' (4.3 x 1.5 m) triple deck vibrating screen (22.4, 18 and 6 x 3 mm) plus 22.4 mm being returned to the crusher, and undersize stored as sand for use as blinding and in concrete. Minus 22.4 mm is stored as 20 mm screenings and minus 18 mm is conveyed to a 14 x 5' (4.3 x 1.5 m) double deck vibrating screen (16 & 18 mm and 11.2 & 12.5 mm decks). Oversize (16 mm) and intermediate (14 mm) fractions are stored for hotmix and concrete, and undersize is screened on another double deck screen (8 & 9 mm and 6 x 3 & 5 mm). Oversize (10 mm) is stored for hotmix and concrete, intermediate (7 mm) for hotmix and undersize for concrete and crushed rock additive. Minus 53 mm ballast is also made at the triple deck by appropriate screen changes and crusher adjustments.

Closed circuit television is used to monitor feed at the Jaques gyratory and the surge bin.

7. REFERENCES

Johns, R.K., 1950. Road Metal Deposits of Lower Torrens Dolomite, Summertown Timber and Trading Company. S. Aust. Dept. Mines report 27/1 (unpublished).

Johnson, P.D., 1980. Geology of the Montacute Dolomite Quarry Sections 330, 332, 833, Hundred Onkaparinga. PM 136, 137 (The Readymix Group, S.A.). S. Aust. Dept. Mines report 80/37 (unpublished).

Nixon, L.G., 1959. Blue Dolomite Deposit, Torrens Gorge. Min. Rev. Adelaide 108:226-123.

_____,1960. Blue Dolomite Deposit, Secs. 330-332, Pt. Sec. 333, Hd. Onkaparinga Co. Adelaide (F.R.M. Drummond). S. Aust. Dept. Mines report 51/106 (unpublished).

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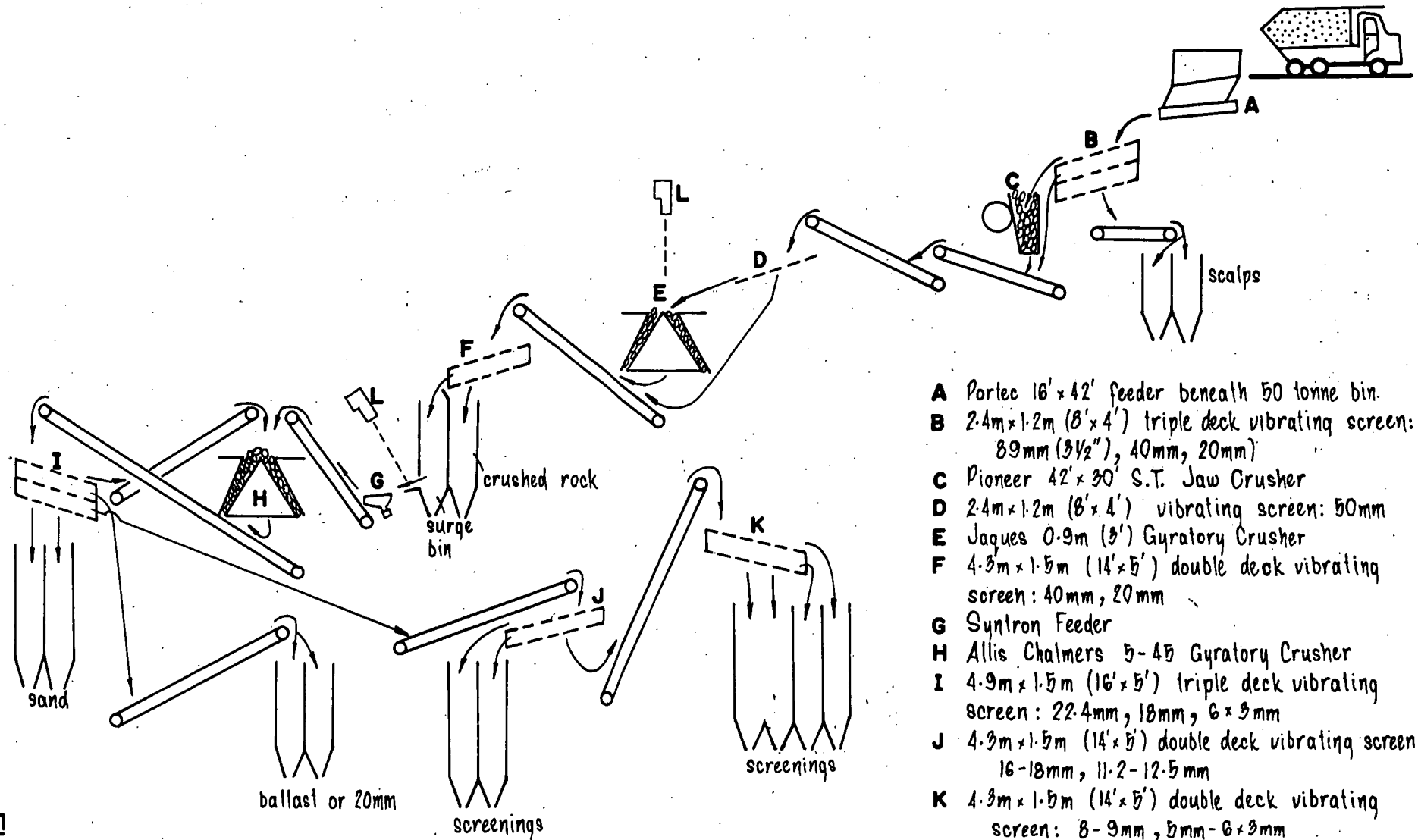
Valentine, J.T., 1979. Dolomite Deposit within the Proposed Black Hill Conservation Park. Mineral Resour. Rev., S. Aust., 146:45-53.



A Portec 16' x 42' feeder beneath 50 tonne bin.
B 2·4m x 1·2m (8' x 4') triple deck vibrating screen: 89mm (3½"), 40mm, 20mm)
C Pioneer 42' x 30' S.T. Jaw Crusher
D 2·4m x 1·2m (8' x 4') vibrating screen: 50mm
E Jaques 0·9m (3') Gyratory Crusher
F 4·3m x 1·5m (14' x 5') double deck vibrating screen: 40mm, 20mm
G Syntron Feeder
H Allis Chalmers 5-45 Gyratory Crusher
I 4·9m x 1·5m (16' x 5') triple deck vibrating screen: 22·4mm, 18mm, 6 x 9mm
J 4·3m x 1·5m (14' x 5') double deck vibrating screen: 16-18mm, 11·2-12·5mm
K 4·3m x 1·5m (14' x 5') double deck vibrating screen: 8-9mm, 5mm-6 x 9mm
L T.V. monitor

FIG. 4

METROPOLITAN QUARRY SURVEY

B.M.G. MONTACUTE QUARRY

CRUSHING PLANT

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

COMPILED J. Valentine		
DRAWN E. Calabio	SCALE not to scale	C.D.O.
DATE August 1982		DATE 21-4-83
CHECKED	PLAN NUMBER S 16509	

1. GENERAL

LOCATION: Lobethal Quarry, section 54, hundred of Onkaparinga.

OPERATOR: Boral Resources (S.A.) Pty. Ltd.

LOCAL ADDRESS: Millers Road, Lobethal, 5241.

Tel. 389 6483.

HEAD OFFICE ADDRESS: 17 Bagot St., North Adelaide, 5006

Tel. 267 3344.

MINERAL TENURE: PM87, EML4603. Land is company-owned.

2. PRODUCTION

MATERIAL MINED: Calcareous mica schist.

RESERVES: Large. Detailed drilling not yet carried out.

(Say) 20 million tonnes approx.

PRODUCT USES:

100 mm	metal	Quarry Sand
50 mm	metal	20 mm rubble
40 mm	crushed rock	40 mm rubble
20 mm	crushed rock	75 mm rubble
20 mm	screenings	Spalls
16 mm & 14 mm screenings		
10-7 mm screenings		
7-5 mm screenings		
5-3 mm screenings		

Products are marketed both inter and intra-state, and have been used at Broken Hill, Mildura and Bordertown.

PRODUCTION RATE (1981): 199401 tonnes

WORKFORCE: 7 + manager.

3. HISTORY

Rockfell Quarries opened the pit in 1965 and worked it during the summer months, carting the rock to their Woodside plant for crushing. Boral took over Rockfell Quarries in 1972.

In 1976, a crushing plant was erected in the quarry, producing minus 35 mm aggregate for use in the construction of the South Eastern Freeway, and in 1977 and 1978 the screening plant from the Woodside Quarry was relocated to Lobethal.

4. GEOLOGY (Pl. 11,12,14)

The area to the west of Lobethal is underlain by a northerly-trending metamorphic sequence of quartz-biotite-muscovite-feldspar schist with subsidiary quartz-actinolite-epidote-calcsilicate schist, derived from calcareous sandstone and siltstone of the Torrensian Burra Group. The quarry is located ajdacent and to the east of the Williamstown/Meadows Fault within rocks assigned to the Undalya (Stonyfell) Quartzite, which have been pushed up against a graphitic (?Bethel) shale member of the overlying Saddleworth Formation. Metamorphic grade and grainsize decrease toward the north, the rock in the quarry area being a black, variably siliceous fine grained calcareous mica schist. The sequence retains sedimentary layering defined by quartzite bands, 10-20 cm thick in which original, upward-facing crossbedding is preserved. The beds dip 30-80° northeasterly and are disrupted by shearing and minor drag folding.

The schist contains about 5% intergranular calcite as well as quartz and calcite veins, and patches of pyrite, chalcopyrite and siderite.

5. MINING

Blastholes are 80 mm diameter, 11 m deep and inclined at 75° from the horizontal with an average of twenty holes being shot at a time. The drill pattern consists of two rows of holes, 2.5 m apart and 2.8 m between, holes. Blasting is by Anfo with Molanite as the primer. Electric initiation is used. Secondary

breakage is achieved by a ball dropper. Bench heights are maintained at approximately 9 m.

Fractured rock is loaded by front end loader into dump trucks for transport to the crushing plant.

Equipment used includes:

1 - Gardner Denver airtrack drill

1 - Caterpillar 988 front end loader

1 - Caterpillar 950 front end loader

1 - Euclid 20 tonne dump truck

1 - Terex 35 tonne dump truck

1 - Acco water cart

1 - Harman drop ball

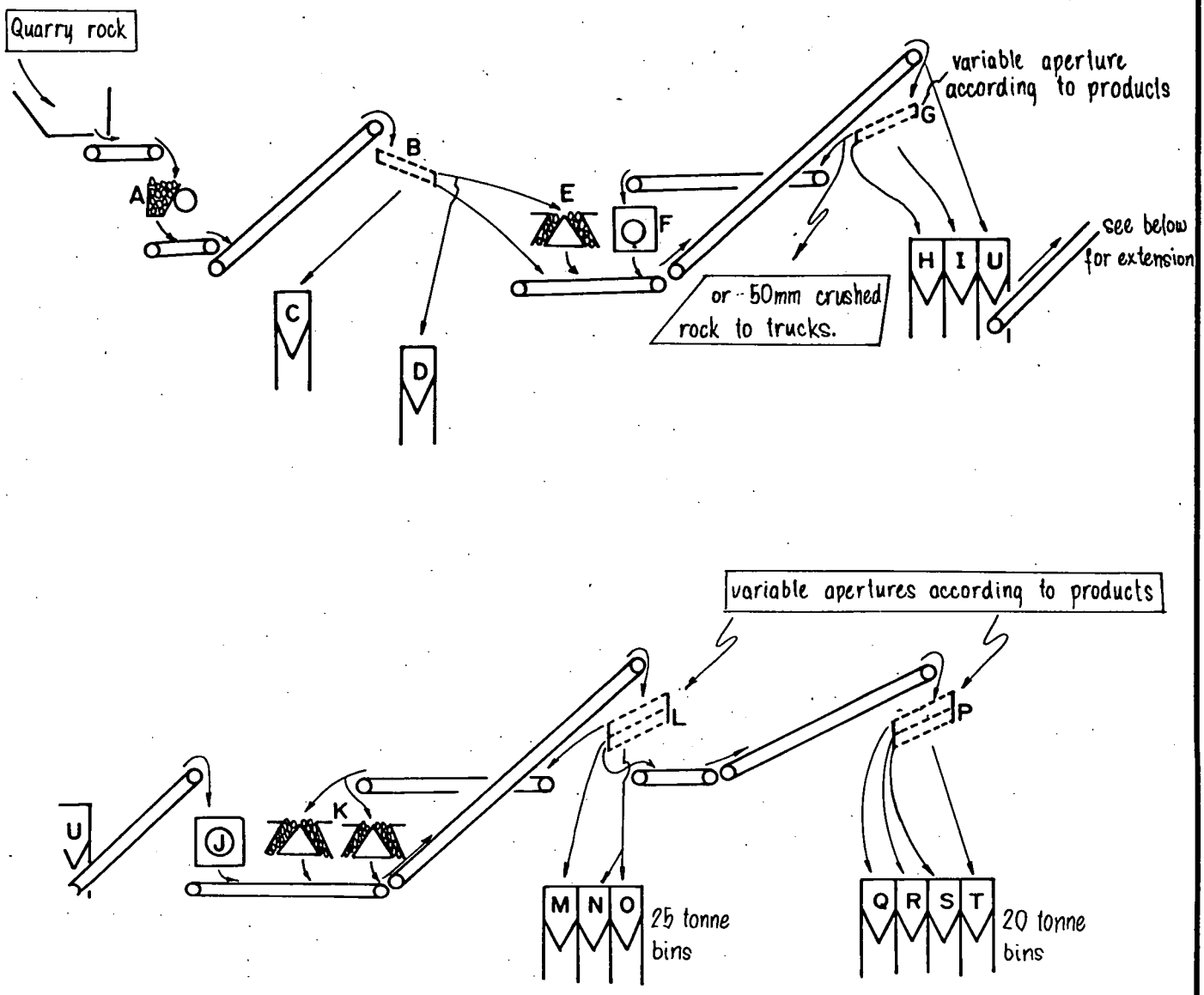
6. CRUSHING PLANT (Pl. 13 and Fig. 5)

Broken rock is dumped into an ore bin, which feeds a 42-30 Pioneer jaw crusher via an apron feeder and the crushed rock then screened on a double deck vibrating screen. The undersize is stored as rubble, and the oversize is stored as 100 mm metal or reduced in a 3'(0.9 m) Traylor gyratory and combined with the intermediate fraction.

Part of this combined fraction is passed to a double-deck vibrating screen producing 75 mm or 40 mm rubble (top deck only used) or 40 or 20 mm crushed rock and sand (for controlled blending with the crushed rock). Oversize is crushed in a Jaques impactor and rescreened or sold as 50 mm metal. The other part of the combined fraction is reduced by a Hazemag Impactor and passed to a triple deck vibrating screen which produces 20 mm screenings and sand. Oversize is re-crushed in two 2'(0.6 m) Traylor gyratories before rescreening and undersize is passed to another triple deck screen producing screenings and sand.

7. REFERENCES

Drexel, J.F., 1973. Geology of the Lobethal Area, South Australian Institute of Technology third year thesis (unpublished).



A	42-30 Pioneer Jaw Crusher (3"-6")
B	14'×5' (4.3m×1.5m) Double deck vibrating screen (100mm, 200mm)
C	40 tonne bin, 20mm rubble
D	20 tonne bin, 100mm metal
E	3' (0.9m) Traylor Gyratory Crusher
F	536 Jaques Impactor
G	14'×5' (4.3m×1.5m) Double deck vibrating screen
H	75 or 40mm rubble, 40 or 20mm crushed rock
I	Sand for mixing with crushed rock
J	Hazemag Impactor
K	Two 0.6m Traylor Gyratories
L	12'×5' (3.7m×1.5m) triple deck vibrating screen
M	20mm
N	sand
O	sand
P	10'×4' (3m×1.2m) Triple deck vibrating screen
Q, R, S, T	16, 14, 10-7, 7.5, 5-3mm screenings and sand.
U	Surge bin

FIG. 5

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

METROPOLITAN QUARRY SURVEY
LOBETHAL QUARRY
CRUSHING PLANT

COMPILED J. Valentine	C.D.O. DATE
DRAWN E. Calabio	SCALE not to scale
DATE August 1982	PLAN NUMBER S16510
CHECKED	

2946

1. GENERAL

LOCATION: Linwood Quarry, Seacliff Park, sections 195-7, 215, 247-249 hundred of Noarlunga.

OPERATOR: Quarry Industries Ltd.

LOCAL ADDRESS: Ocean Boulevard, Seacliff Park, 5049.
Tel. 296 1058.

HEAD OFFICE ADDRESS: 333 Marion Road, Plympton, 5038.
Tel. 293 2383

MINERAL TENURE: PM 3, 4, (Owned by company) PM22 held under agreement with landowner, J.A. Sheidow Pty. Ltd.

2. PRODUCTION

MATERIAL MINED: Siliceous limestone, calcareous & dolomite siltstone.

RESERVES: Approx 10 million tonnes increasing to approx 35 million tonnes if extension to south permitted. (Brook-Smith, 1977).

PRODUCT USES:

100 mm metal	7-3 mm screenings
45 mm Ballast	3 mm screenings
65, 50, 40 mm metal	1.5 mm screenings (sand)
40 mm crushed rock	Quarry sand
20 mm crushed rock	20 mm rubble
20 mm screenings	40 mm rubble
20-14 mm screenings	filling
16 mm screenings	2nd grade 50 mm metal
14 mm screenings	spalls
14-10 mm screenings	300 mm x 600 mm (12x24")
14-5 mm screenings	clay fill
10 mm screenings	Rip Rap 200 mm - 3T
10-7 mm screenings	Rip Rap 1T-3T
7 mm screenings	

PRODUCTION RATE (1981): 377136 tonnes

WORKFORCE: 26 (excluding subcontractors and delivery drivers)

3. HISTORY

In 1882, William Lewis opened a cement works on section 197 and established the Brighton Cement Works. In 1892 Shearing's Portland Cement Company was launched (later the South Australian Portland Cement Company). This company established a small works opening quarries in Brighton Limestone on section 215 and in Tapley Hill Formation on section 197, the latter supplying the silica and alumina components of cement manufacture.

In about 1914, the company opened quarries to the south on sections 507 and 521 and were also being supplied by other small quarry operators located nearer to Reynella. A four-mile aerial ropeway was built to the plant between April 1919 and October 1920. (This was extended by 1½ miles in 1943 to serve new quarries at Hallett Cove). At the same time (1914) the Brighton Council began operating the company's quarry on section 215 for road metal, agreeing to supply the company with any high grade limestone won. In 1926 this agreement was transfered to a Mr. Vic Claringbauld, a quarrying and crushing contractor who subsequently purchased the quarry in about 1930.He named his company after the site of his first country crushing contract at Linwood Bridge, near Hamley Bridge. Linwood Quarries became part of Quarry Industries on July 1st, 1939.

In 1949 the cement company bought I.C.I.'s marble quarries at Angaston and began transferring operations to that area, closing quarrying operations in the Linwood-Reynella area in 1953, (although some of the old plant was operating at Brighton until transferred to Angaston in 1958). The aerial ropeway was closed in 1952 and sold piecemeal between 1957 and the early 1960's.

The quarry on section 197 has been rehabilitated as a golf course and quarrying has since extended south and east from section 215 into sections 196, and 247.

4. GEOLOGY (Pl. 19.20)

The material is quarried from a thick westerly-dipping sequence of blue-grey siliceous limestone of the Sturtian Tapley Hill Formation. Interbeds of brown calcareous or dolomitic siltstone became more numerous to the east. Silica content of the limestone also increases eastwards. Interbeds of soft brown and orange siltstone increases depth of weathering and, consequently overburden thickness.

Overlying the Tapley Hill Formation near the western margin of the quarry area is the Brighton Limestone, 6-12 m thick, comprising pinkish oolitic slightly dolomitic limestone overlain by greyish dolomitic limestone and buff dolomite. This is succeeded to the west by laminated purple siltstone, equated with the Marinoan Angepena Formation.

Flexural folds plunging southerly are characterised by short easterly-dipping limbs with shallow dips and longer steeper westerly-dipping limbs.

5. MINING

The mining cycle consists of drilling a 3 m x 3 m square blasthole pattern with a Gardner Denver airtrack drill, blasting with ANFO, loading fractured rock with either Caterpillar 966 front end loaders or RB54 face shovels into Euclid or Terex 15 tonne dump trucks and transporting the rock to one of the five crushing plants.

Drilling is on a continuous basis. The drillholes are 80 mm diameter, 11 m - 14 m deep and inclined at 75° from the

horizontal with 12-15 holes being shot at a time. Blasting is by ANFO with half a stick of 50 mm diameter gelignite as a primer located in the bottom of the hole. Approximately 40 kg of Nitropril is used per hole. Electric initiation is used to fire the holes. Blasting is normally carried out three times per week. The final bench height is approximately 15 m and the overall pit slope averaging 45°. Secondary breakage is usually by ball drop but occassionaly large boulders are shot.

Equipment includes:

4 - Caterpillar 966 front end loaders

1 - RB54 face shovels

1 - RB22 ball drop

4 - Euclid 15 tonne dump trucks

2 - Terex 15 tonne dump trucks

2 - Sullair compressors

2 - Gardner Denver airtrack drills

6. CRUSHING PLANT

Five plants (Nos 1 and 3 to 6) are in operation at Linwood. A sixth plant (No. 2, run in conjunction with No. 1) is no longer in use, due to noise and dust nuisance to nearby residents from its Ruwolt hammer mill.

Plant No. 1 (Pl. 15 and Fig. 6)

Quarried rock (or plus 1½" (40 mm) rubble from plant 3) is tipped onto a 10x4 (3x1.2 m) scalping screen (13/16" (20 mm) square holes in winter, 1" (25 mm) round holes in summer) from which undersize is conveyed to the scalps bin and oversize to a 3' (0.9 m) Traylor gyratory crusher. Crusher product is elevated to two 10x4' 13/16" (20 mm) screens, oversize from which is further screened on 1 3/4" (45 mm) to produce 1½" (40 mm) railway ballast, plus 1 3/4" (45 mm) being returned to the Traylor.

Undersize from the 13/16" screen falls to a 10x4' triple deck vibrating screen (9/16 (14 mm), 7/16 (11 mm), and 7 mesh B.S.S.) from which 3/4" (20 mm), ½" (13 mm), 3/8" (10 mm) and sand fractions are produced for use in concrete. Scalps are treated in No. 6 plant in winter for crushed rock for road construction.

Plant No. 3 (Pl. 16 and Fig. 7)

Quarried rock is fed through a Hadfield 42x30 jaw crusher onto feeder rolls with 4" (100 mm) spacing. Plus 4" is passed over a 1½" (40 mm) screen producing waste as undersize and No. 1 plant primary feed as oversize. Minus 4" is fed over a 10x4 (3x1.2 m) double deck vibrating screen (2½" (65 mm), 13/16" (20 mm)) from which the minus 13/16" and intermediate fractions are sold or treated in Plant No. 6 for either bitumen chips (if first grade primary feed used) or road material (if second grade primary feed used). Plus 2½" is reduced in a Pegson 16B gyratory crusher and passed over a 10x4' triple deck vibrating screen (2½" (65 mm), 1½" (40 mm), 13/16" (20 mm)). The plus 2½" is stored as No. 4 plant feed, the minus 2½ plus 1½ and minus 1½ plus 13/16 fractions are either sold for road and sewer construction or stored as No. 4 feed, and the minus 13/16" is used for roadworks. Second grade primary feed produces railway ballast and recrushing feed for other plants producing concrete aggregate.

Plant No. 4 (Pl. 17 and Fig. 8)

Screenings from plant 3 are fed through a 3' (0.9 m) Traylor graytory crusher onto a 12x5 (3.7x1.5 m) triple deck vibrating screen (13/16" (20 mm), 9/16" (14 mm) and 7 mesh B.S.S.) from which oversize is returned to the Traylor. 3/4" (20 mm) and minus 7 mesh are stored and the minus 9/16 plus 7 mesh triple-screened (7/16" (11 mm), 5/16" (8 mm) and 7 mesh B.S.S.). The

products are used as bitumen chips and mixed sizes are used in hotmix. 3/4" (20 mm) screenings go to plants 5 or 6 for bitumen chips production.

Plant No. 5 (Pl. 15 and Fig. 9)

3/4" (20 mm) screenings from plant 4 are fed to a 3' (0.9 m) gyrasphere gyratory crusher and screened on a 10x4' (3.1x1.2 m) triple deck vibrating screen (7/16 (11 mm), 5/16 (8 mm) 7 mesh B.S.S.). Oversize is returned to the crusher and 3/8", ¼" and sand stored for bitumen chips or hotmix.

Plant No. 6 (Pl. 18 and Fig. 10)

3/4" (20 mm) and 2½" (63 mm) screenings from plants 3 or 4 (either first or second grade) are screened on a 4-deck vibrating screen (9/16" (14 mm), 7/16" (11 mm), 5/16" (8 mm), 7 mesh B.S.S. (2.36 mm)). Oversize is crushed in a 3' (0.9 m) Symons gyratory and bucket-elevated back to the screen. Products ½" (12 mm), 3/8" (10 mm), ¼" (7 mm) and sand) are stored as bitumen chips (summer, first grade 3/4 feed) or crushed road rubble (winter, second grade 3/4 feed).

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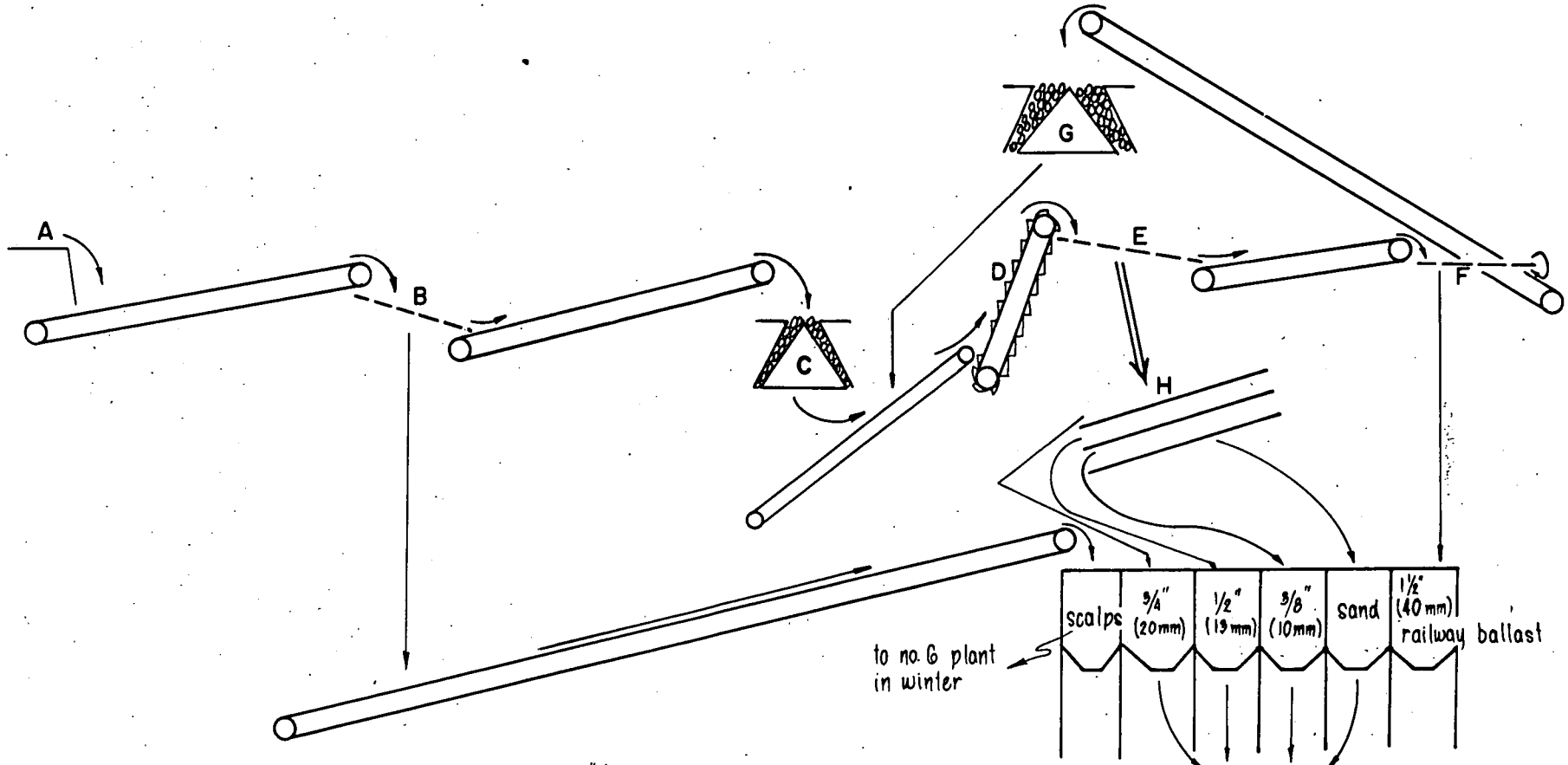
DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

METROPOLITAN QUARRY SURVEY

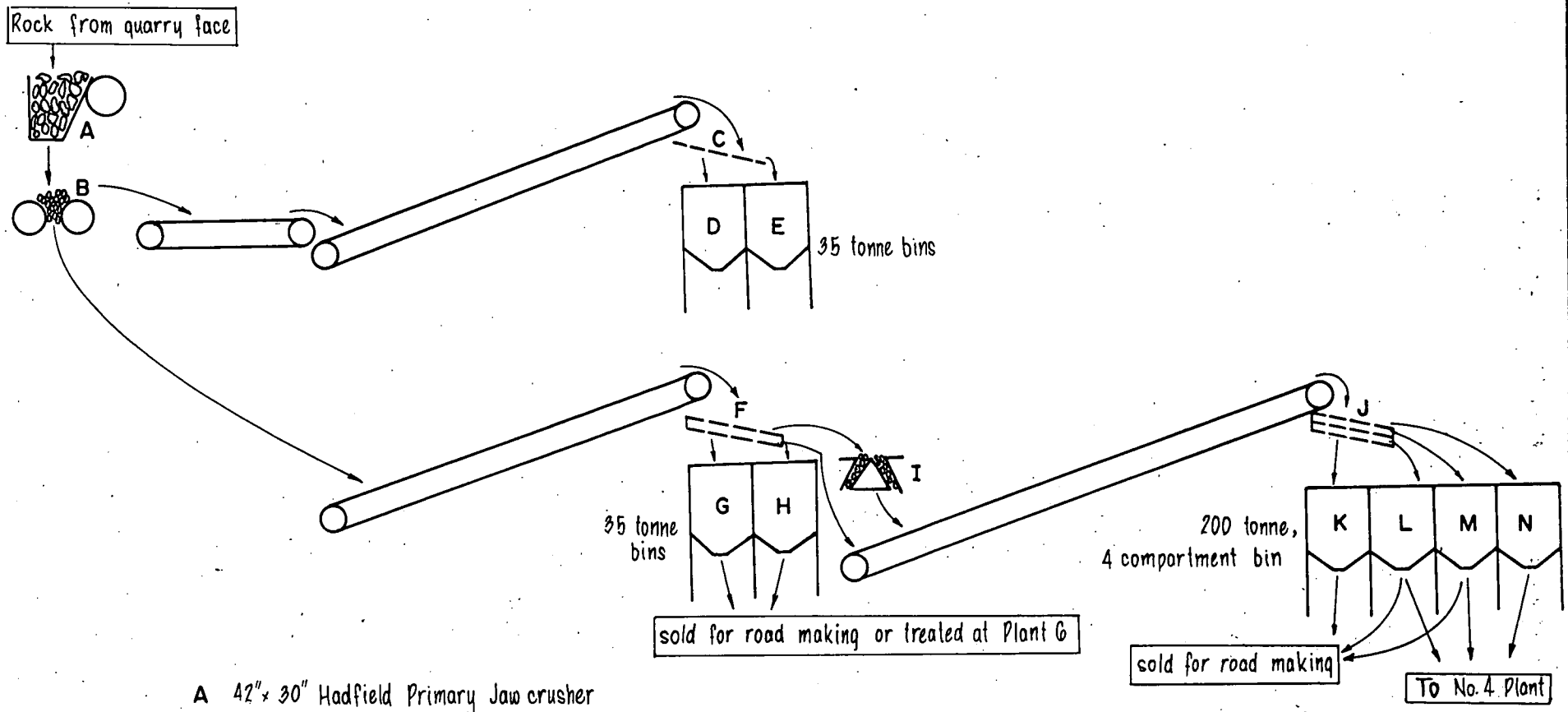
LINWOOD QUARRY
CRUSHING PLANT No.1



A Quarry rock or 1½" (40mm) rubble and second grade screenings from Plant 3.
B 10' × 4' (3m × 1·2m) vibrating screen, 1" (25mm) round in summer, 13/16" (20mm) square in winter.
C 3' (0·9m) Traylor Gyratory
D Bucket elevator
E Two 12' × 5' (3·7 × 1·5m), 13/16" (20mm) vibrating screens
F 1¾" (44mm) vibrating screen
G 2'4" Jaques Gyratory (0·7m)
H 12' × 5' (3·7m × 1·5m) triple deck vibrating screen, 9/16" (14mm), 7/16" (11mm), 7 # B.S.S.

FIG. 6

COMPILED J. Valentine	DRAWN E. Calabio	DATE August 1982 CHECKED
MC C.D.O.	21·4·83 DATE	SCALE not to scale
PLAN NUMBER S 16511		



A 42" × 30" Hadfield Primary Jaw crusher
B Grizzly Feeder Rolls 4" aperture (100mm)
C 1½" (40mm) screen
D waste, rubble
E No. 1 crusher feed
F screen 2½" (65mm), 13/16" (20mm).
G ¾" (20mm)
H 2½" (65mm)
I 16 B Pegson Gyratory Crusher
J Two 10' × 4' (3m × 1.2m) triple deck split-fed screens, 2½" (64mm), 1½" (38mm), 13/16" (20.6mm)
K ¾" (20mm)
L 1½" (40mm)
M 2½" (65mm)
N 100mm

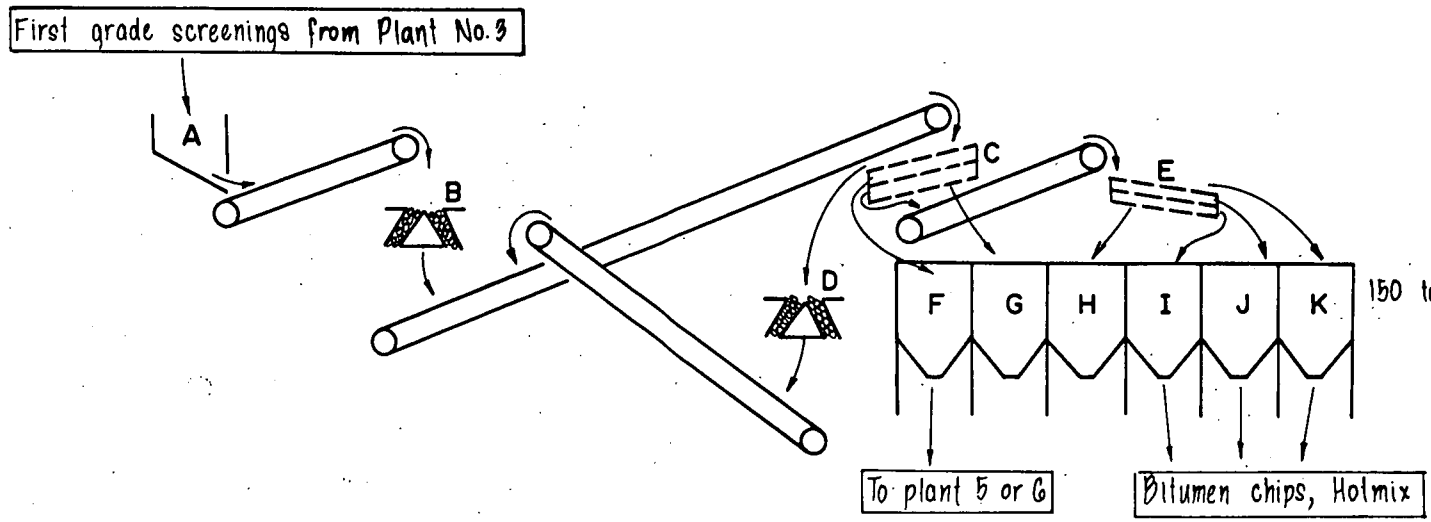
Note: Second grade primary feed produces railway ballast and screenings which are re-crushed for concrete aggregate.

FIG. 7

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

METROPOLITAN QUARRY SURVEY
LINWOOD QUARRY
CRUSHING PLANT No. 3

COMPILED J. Valentine	C.D.O	DATE 21-4-83
DRAWN E. Colabio	SCALE not to scale	
DATE August 1982 CHECKED	PLAN NUMBER S 16512	



A Feed hopper
B 3' (0·9m) Traylor Cone Crusher
C 12' x 5' (3·7m x 1·5m) triple deck screens, 13/16" (20mm), 9/16" (14mm), 7mesh sandscreen
D 4' Symons Cone Crusher
E 12' x 5' (3·7m x 1·5m) triple deck screen 7/16" (11mm), 5/16" (8mm), 7mesh sandscreen
F 3/4" (20mm)
G sand
H Sand
I 7mm (1/4")
J 10mm (3/8")
K 14mm (9/16")

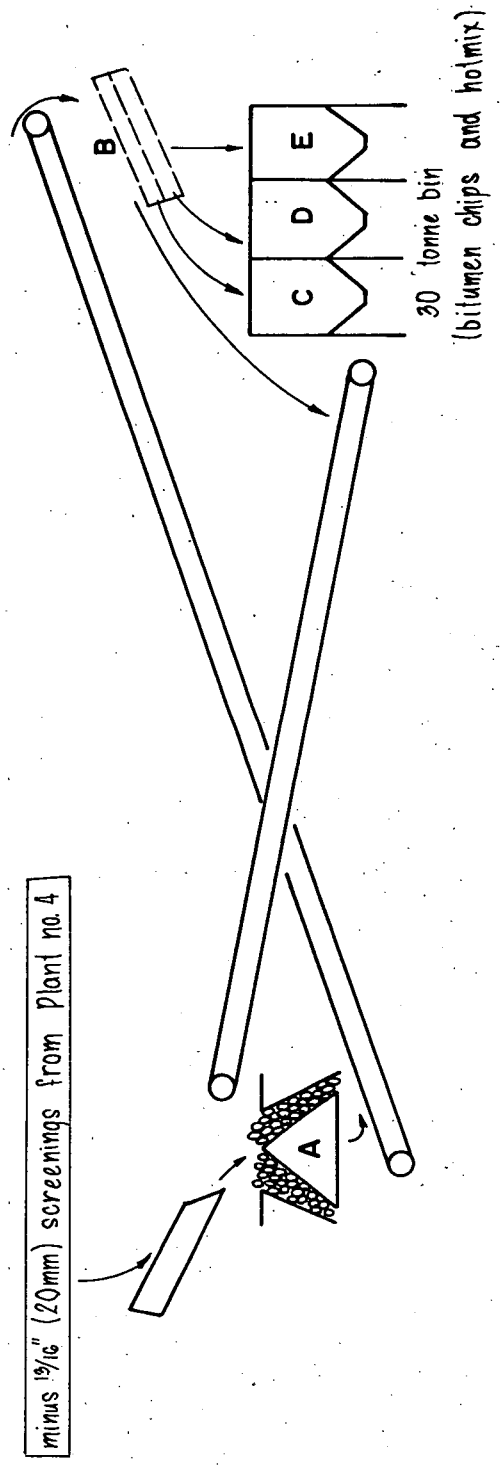
FIG. 8

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

METROPOLITAN QUARRY SURVEY

LINWOOD QUARRY
CRUSHING PLANT No. 4

COMPILED J. Valentine		MC C.D.O.	21-4-83 DATE
DRAWN E. Calabio	SCALE not to scale		
DATE August 1982 CHECKED	PLAN NUMBER S 16513		

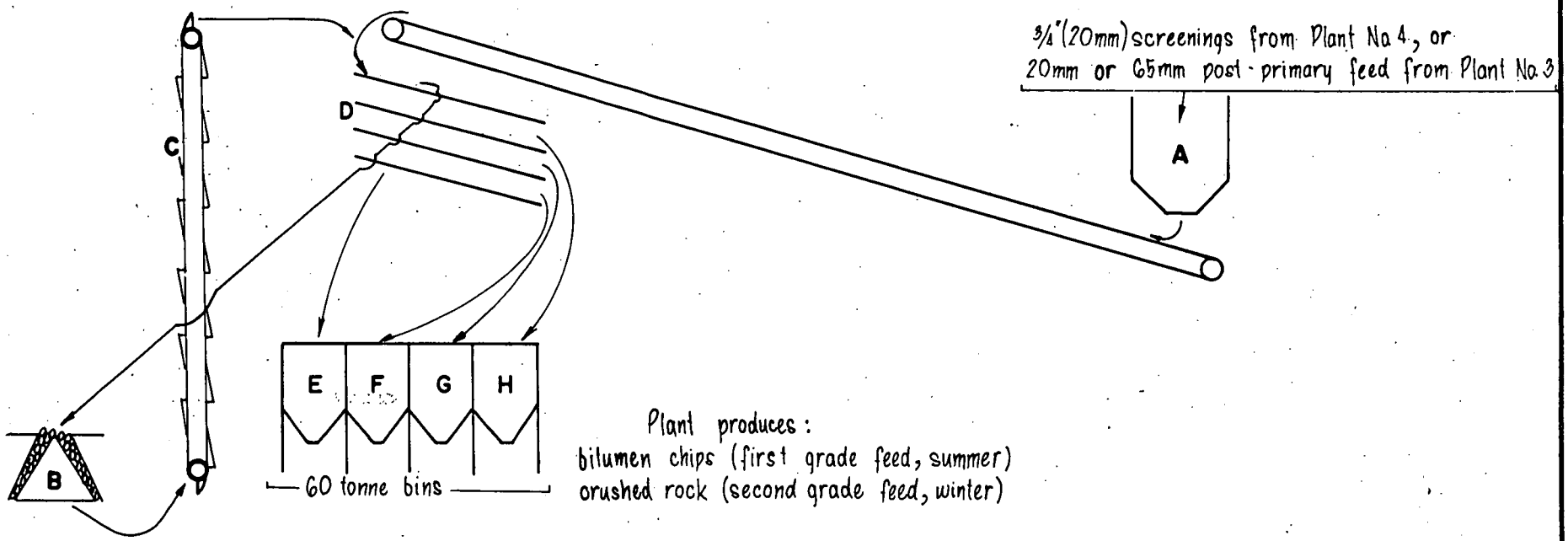


A 3' (0·9m) Gyrasphere Cone Crusher
B 10' x 4' (3·1m x 1·2m) triple deck screen, 7/16" (11mm), 5/16" (8mm), 7 mesh B.S.S.
C 3/8" (10mm)
D 1/4" (7mm)
E Sand

FIG. 9

DEPARTMENT OF MINES AND ENERGY SOUTH AUSTRALIA	COMPILED J. Valentine	C.D.O. 21·4·83 DATE
METROPOLITAN QUARRY SURVEY	DRAWN E. Calabio	SCALE not to scale
LINWOOD QUARRY	DATE August 1982	PLAN NUMBER
CRUSHING PLANT No. 5	CHECKED	S 16514

2316



Plant produces:
bilumen chips (first grade feed, summer)
orushed rock (second grade feed, winter)

- A 35 tonne hopper
- B 3' Symons Cone Crusher
- C Vertical elevator
- D Four deck vibrating screen, 9/16" (14·3mm), 7/16" (11mm), 5/16" (8mm), 7mesh (2·36mm)
- E Sand
- F 1/4" (7mm)
- G 3/8" (10mm)
- H 1/2" (12mm)

FIG. 10

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

METROPOLITAN QUARRY SURVEY

LINWOOD QUARRY
CRUSHING PLANT No.6

COMPILED J. Valentine	DRAWN E. Calabio	DATE August 1982 CHECKED
lwc 21·4·83 CDO DATE	SCALE not to scale	PLAN NUMBER S 16515

1. GENERAL

LOCATION: Reynella Quarry, sections 505, 506, 507, 519, 520, 571, 574, 533, 580, hundred of Noarlunga.

OPERATOR: Quarry Industries Ltd.

LOCAL ADDRESS: Moore Road, Reynella, 5161

Tel. 381 1855

HEAD OFFICE ADDRESS: 333 Marion Road, Plympton. 5038

Tel. 293 2383.

MINERAL TENURE: PM48, 107 (owned by Company) PM107, 222 (worked under agreement with landowners, H.H. Liston and Woodend Park Pty. Ltd. respectively)

2. PRODUCTION

MATERIAL MINED: Silty and sandy limestone and calcareous sandstone and siltstone.

RESERVES: 30 million tonnes approx. (Brooke-Smith, 1977)

PRODUCT USES:

65 mm	metal	7 mm screenings
35 mm	crushed rock	Quarry sand
20 mm	crushed rock	20 mm rubble
20 mm	screenings	Filling
20-14 mm	screenings	Clay fill
16 mm	screenings	Spalls
14 mm	screenings	300 x 600 mm
10 mm	screenings	Rip Rap 200 mm-3T
10-7 mm	screenings	Rip Rap 1T-3T

PRODUCTION RATE (1981): 173077 tonnes

WORKFORCE: 10 (9 quarry, 1 office) plus manager.

3. HISTORY

The South Australian Portland Cement Co. commenced operations in the Reynella area on sections 507 and 521 in about

1914 using an aerial ropeway to transport the stone to the Brighton plant, four miles to the north. In 1943 the ropeway was extended 1½ miles southwest to link with deposits opened in that year on sections 533 and 574 at Hallet Cove. The company began its move to Angaston in 1949 and closed the Hallett Cove quarries in 1953.

Quarry Industries took over in the late 1950's to meet contracts for the construction of Pt. Stanvac Oil Refinery. First recorded production was in 1960.

4. GEOLOGY (Pl. 22,23,24)

The material is quarried from dark green to grey thinly bedded silty and sandy limestone and calcareous siltstone and sandstone of the Sturtian Tapley Hill Formation. These rocks grade upward into the grey buff, pink and brown, dolomitic Brighton Limestone, also of Sturtian age which becomes more magnesian upwards and forms a prominent marker unit. The less magnesian parts of the limestone were extracted for cement manufacture from four, now disused, quarries to the west.

The quarry is sited on the nose of a major south-plunging anticline, marked by the Brighton Limestone. This structure includes a number of subsidiary folds, plunging 3-18° towards 205-215°. The limestone is also displaced by minor NE-SW trending faults.

5. MINING

The mining cycle consists of drilling approximately twenty blastholes with airtrack drills, blasting with ANFO, loading fractured rock with a Caterpillar 966B front-end loader into three Wabco 16 tonne capacity dump trucks and transporting the rock to the primary crushing plant.

The blastholes are 75 mm diameter, 15 m deep and inclined at

75-80°. A double row of holes is drilled with a spacing of approximately 2.5 m. These are primed with 55 mm Molanite, charged with ANFO and detonated using Nonel. The holes are stemmed with 3.0-3.6 m of rock cuttings. Toe holes approximately 2 m long are drilled horizontally at the base of the bench to be blasted. These holes are charged with Molanite. Blasting is carried out once or twice a week at varying times. Electric detonation cannot be used due to the proximity of the Reynella radio mast.

Good fragmentation is achieved and very little secondary breaking is required. A dropball is used to reduce all oversize rocks to a suitable jaw crusher size.

Equipment includes:

3 - Wabco 16 tonne dump trucks

1 - Caterpillar 966B front end loader

1 - Water truck

2 - Gardner Denver PR123 Airtrack drills

1 - Dropball

6. CRUSHING PLANT (Pl. 21 and Fig. 11)

Quarried rock is tipped onto a vibrating 100 mm (4") grizzly oversize from which moves into a 42x30" single toggle Jaques jaw (primary) crusher before falling to a conveyor belt. Grizzly undersize is screened at 25 mm, undersize (primary scalps) being stored for sub-base for road construction. 25 mm (1") oversize is fed to the head of the post-jaw crusher conveyor forming a cushion which protects the conveyor belt surface from the falling rock from the crusher.

The crushed product is fed to a vibrating double deck scalps screen comprising 65 mm punched plate over a varied size (usually 35 mm) screen. This size is varied according to the size

distribution and quality of the feed (e.g. if feed fairly clean, the 35 mm screen is covered with conveyor belting and no scalps are produced). The scalps are not considered to be saleable due to their variability. The plus 65 mm (and plus 35 mm if feed is clean) is fed through a 1'6" (0.45 m) square Hazemag impact crusher, and split-fed onto two double deck vibrating screens each with a 65 mm top deck but with 35 and 20 mm bottom decks respectively. The 65/35 screen produces 35 mm crushed rock for road base and 65 mm "metal" which is stored for further crushing or for sale as filler material for sewerage works, plus 65 mm being returned to the Hazemag. The 65/20 screen produces 20 mm crushed rock for road base and plus 65 mm which is returned to the Hazemag. The intermediate fraction from this screen is fed to a 3' (0.9 m) Symons gyratory crusher which discharges via split feed onto each of two triple deck vibrating screens, plus 20 mm being returned to the Symons. Products are straight sizes of 20, 16, 10 and 7 mm, used as bitumen chips and mixed sizes of 20+14 and 10+7 mm, used with the sand undersize in concrete. A 40 mm re-screener is used to keep the Symons choke-fed during breakdown or maintenance further up the crushing line.

Screen sizes for the plant are calculated from imperial sizes e.g. if a 16 mm product is required (i.e. minus 16 mm or 5/8"), then an 11/16" screen is ordered (but as a 17.5 mm aperture screen).

All screens are 16x6 feet. (4.9 x 1.8 m)

7. REFERENCES

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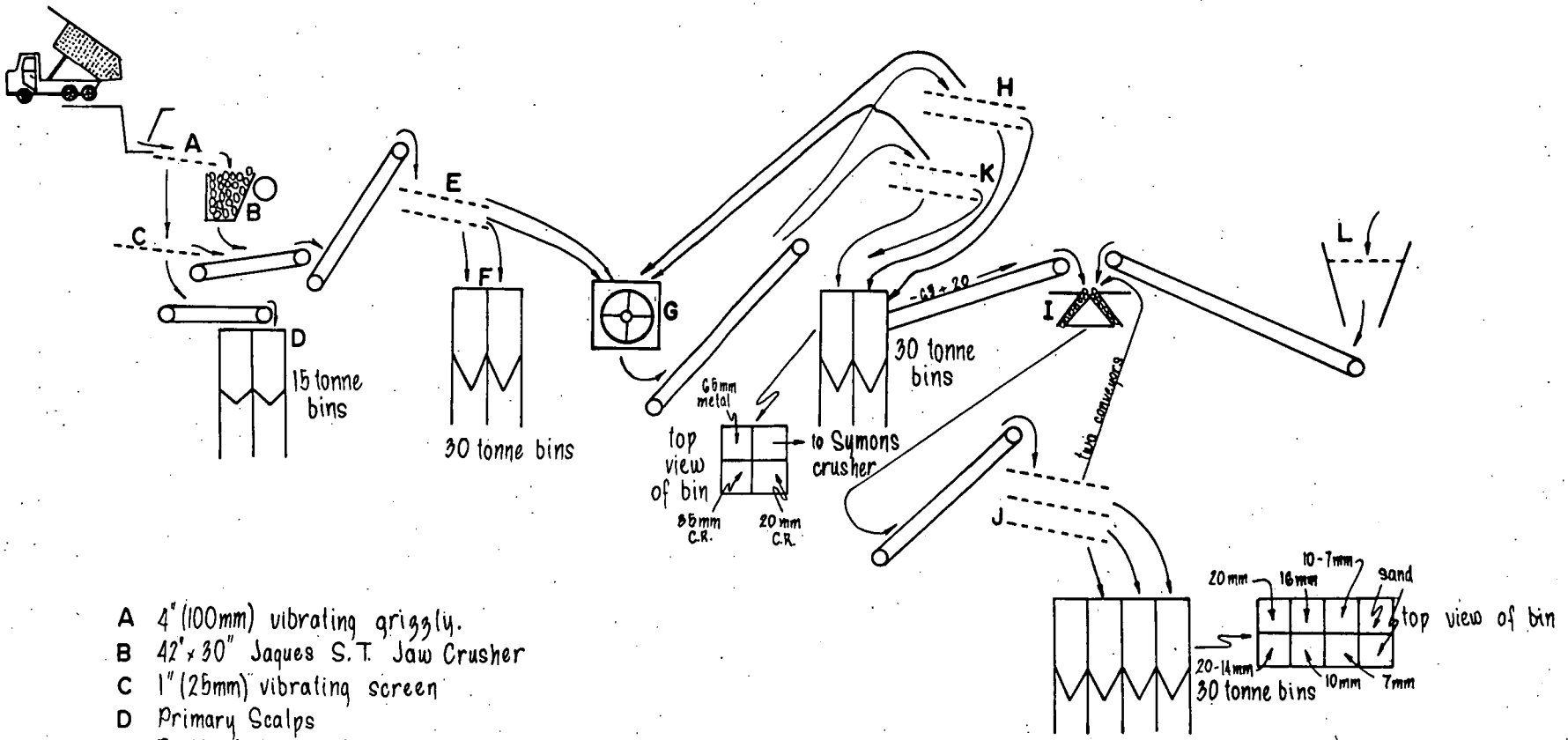

A 4" (100mm) vibrating grizzly.
B 42" x 30" Jaques S.T. Jaw Crusher
C 1" (25mm) vibrating screen
D Primary Scalps
E Double deck vibrating screen with variable apertures
F Variable products according to dirtiness of post primary product. Non-saleable.
G 1'6" x 1'6" (0.45m x 0.45m) Hazemaq Impact Crusher
H Double deck vibrating screen 65mm, 20mm.
I 3' (0.9m) Symons gyratory crusher
J Two triple deck vibrating screens, variable apertures
K Double deck vibrating screen 65mm, 35mm
L 40mm re-screener

Note: All screen decks are 6' x 16' (1.8 x 4.9m).

FIG. 11

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

METROPOLITAN QUARRY SURVEY

REYNELLA QUARRY
CRUSHING PLANT

COMPILED	DRAWN	SCALE
J. Valentine	E. Calabio	not to scale
CDO 21.4.83 DATE	DATE August 1982 CHECKED	PLAN NUMBER S 16516

1. GENERAL

LOCATION: Sellicks Hill, sections 678, 680, pt. 727, 732-3, 735, 672, hundred of Willunga.

OPERATOR: Southern Quarries Pty. Ltd.

LOCAL ADDRESS: Sellicks Hill, 5174
Tel. (085) 56 3007.

HEAD OFFICE ADDRESS: 36 Dequeteville Tce., Kent Town, 5067.
Tel. 31 1999.

MINERAL TENURE: PM 163, 151, (owned by Company) EML 5054. (part owned by company and part held under agreement with landowner, R.D. Bruce).

2. PRODUCTION

MATERIAL MINED: Limestone

RESERVES: 17 million tonnes (approx.) (Brooke-Smith, 1977).

PRODUCT USES:

100 mm	metal	Dolomite Sand
75 mm	metal	20 & 40 mm rubble
50 mm	metal	Blinding
40 mm	crushed rock	Filling
20 mm	crushed rock	Rockery and Edging
20 mm	screenings	Spalls
14 mm	screenings	
10 mm	screenings	
7 mm	screenings	
5 mm	screenings	

PRODUCTION RATE (1981): 314080 tonnes

WORKFORCE: 14

3. HISTORY

The quarry was opened in 1974. Railway ballast was extracted from Hillsley Quarries (200 m east) in 1925-26 and crushed on site.

4. GEOLOGY (Pl. 25,30,31)

The quarry is located in Cambrian Fork Tree Limestone which forms its southeastern face. This is overlain by the lower member of the Heatherdale Shale which forms the northwestern face of the quarry. The sequence is overturned and dips about 70° southeast.

The limestone is divided into two members. The lower member is a grey finely crystalline limestone, dolomitic in part which weathers to a pale grey, light brown or white and contains Archaeocyatha. The upper member is a mottled limestone in which dark grey angular lumps of limestone are surrounded by yellow brown to reddish silty limestone. Alternatively, the silty limestone forms sub-parallel layers. Total thickness is about 180 m.

The shale is laminated, characterised by distinct cleavage, and ranges in colour from black (and pyritic) when fresh to red and pink on weathered surfaces. The lower 4 m of the member is flaggy and calcareous.

5. MINING (Pl. 26)

75 mm blastholes are drilled to various depths according to the required bench height, primed with 55 mm molanite, charged with Anfo and stemmed from 2-3 m from the surface. Blast holes are in rows 2 m apart and spaced 2.5 m between holes. Benchheights vary from 3 m for overburden removal, to 15 m. Broken rock is loaded into a Euclid dump truck with a front end loader.

Equipment used includes the following:

1 - Terex front end loader (for loading from stockpiles).

1 - Caterpillar 988 front end loader

1 - 25 tonne Euclid Dump Truck

2 - bin dump trucks

2 - GD 600 Airtrack drills

1 - Drop ball

1 - waterwagon.

6. CRUSHING PLANT (Pl. 27,28,29 and Fig. 12)

Quarry rock is tipped onto a vibrating feeder, passed over a 150 mm grizzly and oversize fed to a 42/30 Hadfield jaw crusher set at 5-6" (127-152 mm). Crusher product is conveyed to a vibrating feeder and then to 180 tonne storage bin. Grizzly undersize is fed to a 8x5' (2.4x1.2 m) triple deck vibrating screen (50, 75 or 100 mm top deck, 40 mm middle deck, 20 mm bottom deck) which produces the metal, crushed rock and rubble. Oversize and minus 40 mm plus 20 mm is returned to the vibrating feeder.

The storage bin feeds a 1.2 m (4') Gyrasphere gyratory crusher which feeds a 3' Jaques hammer mill which in turn feeds a 3.7x1.2 (12x5') triple deck vibrating screen (20 mm, 14 mm and 3/16x1/8" (5 x 3 mm) sandscreen decks). Oversize is recrushed in a 3' Gyrasphere and rescreened, undersize and minus 14 mm being stored as sand and in the 7 mm bin respectively. Minus 20 mm is screened on the first of two double deck 4.3x1.5 m (14x5') screens (14 mm & 10 mm decks) producing 20 mm and 14 mm screenings. Undersize is screened on the second screen (7 mm and 3/16x1/8" (5 x 3 mm)) producing 10 mm, 7 mm and sand.

7. REFERENCES

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SMALLER OPERATIONS

Dolomite

- B.M.G.'s Noarlunga Quarry sections 58, 65, 66 hundred of Noarlunga P.Ms 61, 303.

This operation was commenced by Readymix in 1970 producing screenings and crushed rock from Brighton Limestone and Tapley Hill Formation. A mobile crushing plant was used. The operation was taken over on 1-10-81 by B.M.G. who closed the quarry operation although, still selling at a reduced rate from stockpiles.

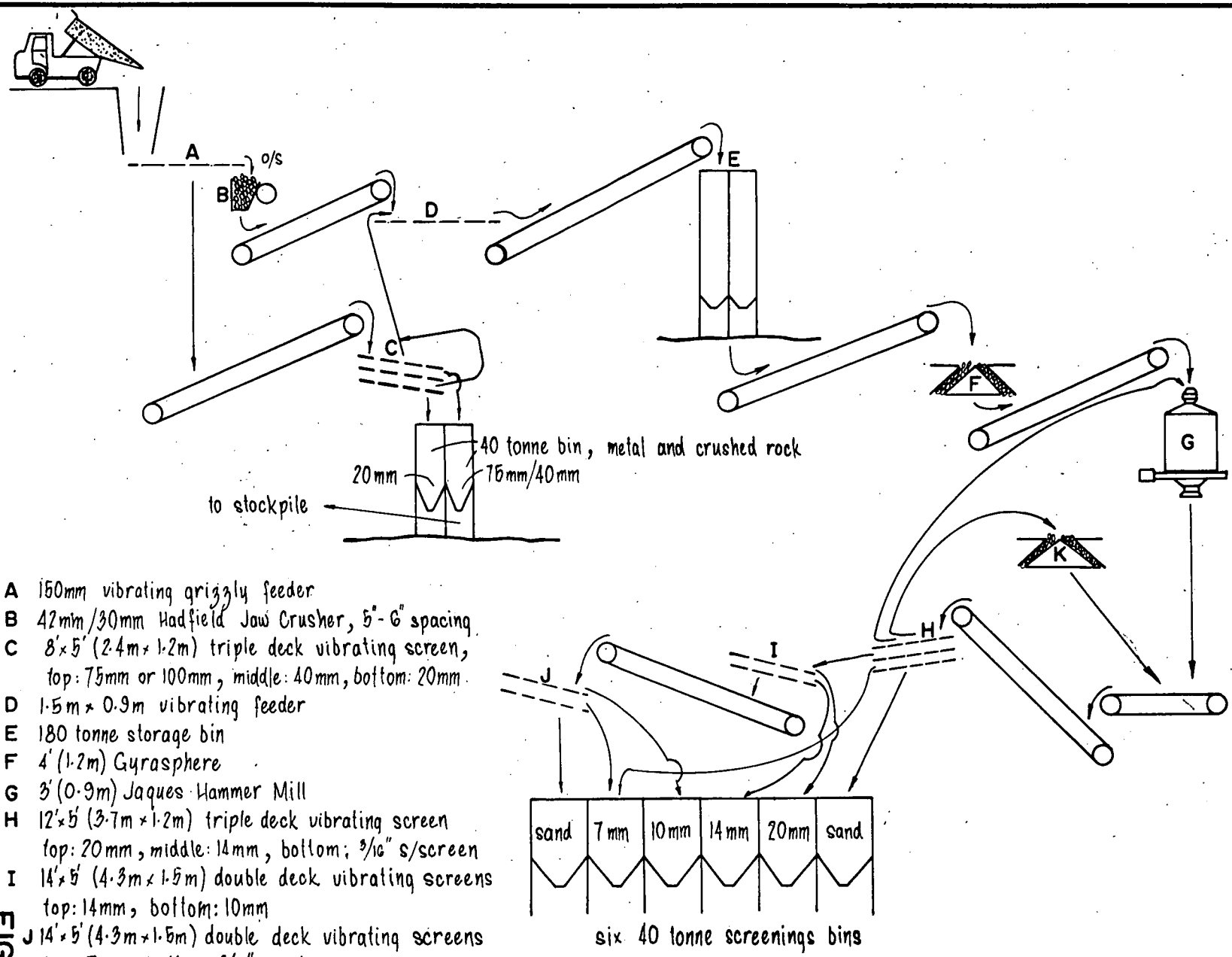
Production in 1981 totalled 54000 tonnes.

SOUTHERN QUARRIES - SELLICKS HILL
CRUSHING PLANT

METROPOLITAN QUARRY SURVEY

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

COMPILED J. Valentine
DRAWN E. Calabio
DATE August 1982
CHECKED
CDO
DATE 21-4-83
SCALE not to scale
PLAN NUMBER S 16517



A 150mm vibrating grizzly feeder
B 42mm/30mm Hadfield Jaw Crusher, 5"-6" spacing
C 8'×5' (2.4m×1.2m) triple deck vibrating screen, top: 75mm or 100mm, middle: 40mm, bottom: 20mm
D 1.5m×0.9m vibrating feeder
E 180 tonne storage bin
F 4' (1.2m) Gyrasphere
G 3' (0.9m) Jaques Hammer Mill
H 12'×5' (3.7m×1.2m) triple deck vibrating screen top: 20mm, middle: 14mm, bottom; 3/16" s/screen
I 14'×5' (4.3m×1.5m) double deck vibrating screens top: 14mm, bottom: 10mm
J 14'×5' (4.3m×1.5m) double deck vibrating screens top: 7mm, bottom: 3/16" sandscreen
K 3' (0.9m) Gyrasphere

FIG. 12

QUARRY OPERATIONS

Quartzite

1. GENERAL

LOCATION: Smithfield Quarry, sections 3302-3 hundred of Munno Para.

OPERATOR: Quarry Industries Ltd.

LOCAL ADDRESS: Medlow Road, Smithfield, 5114.

Tel. 254 6089.

HEAD OFFICE ADDRESS: 333 Marion Road, North Plympton, 5037.

Tel. 293 2383.

MINERAL TENURE: PM 45. Worked under agreement with landowner, F.G. Twelfthtree.

2. PRODUCTION

MATERIAL MINED: Quartzite, sandstone.

RESERVES: 2 million tonnes (approx.) (Brooke-Smith, 1977)

PRODUCTS:

40 mm	crushed rock
40 mm	quarry waste
20 mm	crushed rock
20 mm	quarry waste
20-14 mm	screenings
10-7 mm	screenings
Quarry sand	
Spalls	

PRODUCTION RATE (1981): 43726 tonnes.

WORKFORCE: 6 + 2 contractors when working, 2 only when selling from stockpiles.

3. HISTORY

The quarry was originally opened to supply rock products for the construction of the Salisbury Munitions Works in 1940. The quarry remained dormant until 1955 when the present crushing plant was established by Adelaide Quarries Ltd, one of the

original member companies which had merged to form Quarry Industries in 1939. The quarry began trading as Quarry Industries Ltd in 1957.

4. GEOLOGY (Pl. 33,34,35)

The quarry is located to the east of the Para Fault scarp within Adelaidean Burra Group quartzite, arkosic sandstone and phyllitic shale, equated with the Undalya (Stonyfell) Quartzite of Torrensian age. These dip at about 20-70° easterly the quarry being sited to the east of a central shale bed about 10 m thick. The sequence is overlain by shale at the western margin of the quarry. Southeasterly trending faulting has silicified the sandstone in the southeast corner of the workings.

5. MINING

Three to four rows, comprising a maximum of 40 75 mm diameter blastholes 2 m apart are drilled 9-12 m deep, bottom-primed with two sticks of 25 mm gelignite and charged with Anfo to within 2.4-2.7 m of the surface. Shot rock is loaded into a dump truck with either a diesel face shovel or front end loader. Shot rock oversize is reduced with a ball dropper.

Equipment used comprises:

2 - Ruston Bucyrus 22 diesel shovels
1 - Caterpillar 944 front end loader
1 - 10 tonne Bedford dump truck
1 - 15 tonne Albion dump truck
1 - Drop ball

6. CRUSHING PLANT (Pl. 32 and Fig. 13)

Run of quarry is tipped onto a 8x3' (2.4x0.9 m) scalping screen (20 or 40 mm aperture). Undersize is sold as quarry waste and oversize fed to a 30/18 Jaques jaw crusher (jaws at 4-5"), from which a bucket elevator feeds a 10x4' (3x1.2 m) single deck

vibrating screen (20 or 40 mm). Undersize is stored as 20 or 40 mm waste and oversize is fed to a 3' (0.9 m) Traylor gyratory crusher (jaws at 2-2½" (50-63 mm)), product from which is bucket-elevated to a 10x4' (3x1.2 m) triple deck vibrating screen. This is usually fitted with one only 20 or 40 mm deck producing 20 or 40 mm crushed rock as undersize, oversize being returned to a 18" (0.5 m) Traylor qyratory crusher with jaws at 3/8-¼" (9.5-6 mm), or to the 0.9 m Traylor. Alternatively (but rarely) better quality run-of-quarry is triple screened to produce 20-14 and 10-7 screenings.

7. REFERENCES

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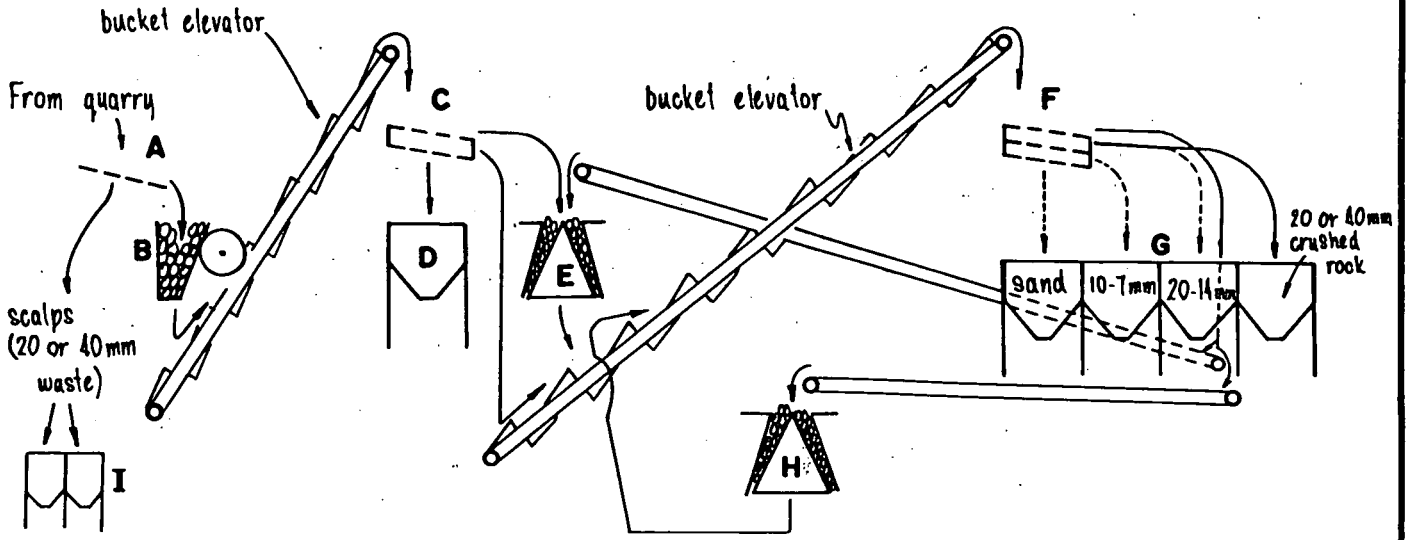


A 2·4 m x 0·9m (8' x 3') scalping screen: 20 or 40mm.
B 30" x 18" Jaques Jaw Crusher
C 3m x 1·2m (10' x 4') double deck vibrating screen: 20 or 40mm top deck, bottom deck is not used
D 16 cubic yard (12 c.m) bin: 20 or 40mm waste
E 0·9m (3') Traylor Gyratory Crusher
F 3m x 1·2m (10' x 4') triple deck vibrating screen (20 or 40mm top deck only for crushed rock).
G 70 cubic yard bin (53 c.m.)
H 0·5m (1'8") Traylor Gyratory Crusher
I 2-12 cubic yard scalp bins (9 c.m.)

FIG. 13

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

COMPILED J. Valentine | CDO | 21·4·83 DATE

METROPOLITAN QUARRY SURVEY
QUARRY INDUSTRIES - SMITHFIELD QUARRY
CRUSHING PLANT

DRAWN E. Colabio | SCALE not to scale
DATE August 1982 | PLAN NUMBER S 16518
CHECKED

2946

1. GENERAL

LOCATION: Salisbury Quarry, sections 3093-5, 3098-9, 3268, 3270-5 hundred of Munno Para.

OPERATOR: Quarry Industries Ltd.

LOCAL ADDRESS: Black Top Rd., Hillbank, 5112.
Tel. 255 6363.

HEAD OFFICE ADDRESS: 333 Marion Road, Plympton, 5037.
Tel. 293 2383.

MINERAL TENURE: PM2. Land owned by company.

2. PRODUCTION

MATERIAL MINED: Quartzite

RESERVES: 10 million tonnes (approx.). (Brooke-Smith, 1977).

PRODUCT USES:

40 mm	crushed rock
20 mm	crushed rock
40 mm	screen rubble
20 mm	screen rubble
40x20	screenings
20x14	screenings
14x10	screenings
10x7	screenings
65x40	screenings
Sand	
Wallers	
Spalls	
Shot Rock	

PRODUCTION RATE (1981): 398349 tonnes

WORKFORCE: Average of 9 (including manager). Varies from 4-12 depending on personnel required for country crushing contracts

3. HISTORY

Rockdale Quarries Ltd. a subsidiary of Quarry Industries Ltd. started production from this site in 1950.

The plant currently in use was installed in 1973.

4. GEOLOGY (Pl. 38,39)

The quarry is located to the east of the Para Fault scarp, within Adelaidean Burra Group quartzite, arkose and phyllitic shale, equated with the Undalya (Stonyfell) Quartzite of Torrensian age. The sequence dips at about 25° southeast and is gently folded about northeasterly axes. Breakage is facilitated by minor faulting and heavy jointing.

5. MINING

The quarry is worked intermittently, according to demand. Benches 15-18 m high are drilled with a single row of 75 mm diameter blastholes, 1.8-2.4 m apart. The holes are bottom-primed with 50 mm gelignite and charged with Anfo. Oversized shot rock is reduced with a drop-ball.

Equipment used comprises:

3 - W18 Westinghouse dump trucks

2 - Caterpillar 966 front end loaders

1 - Ingersoll Rand airtrack drill and compressor

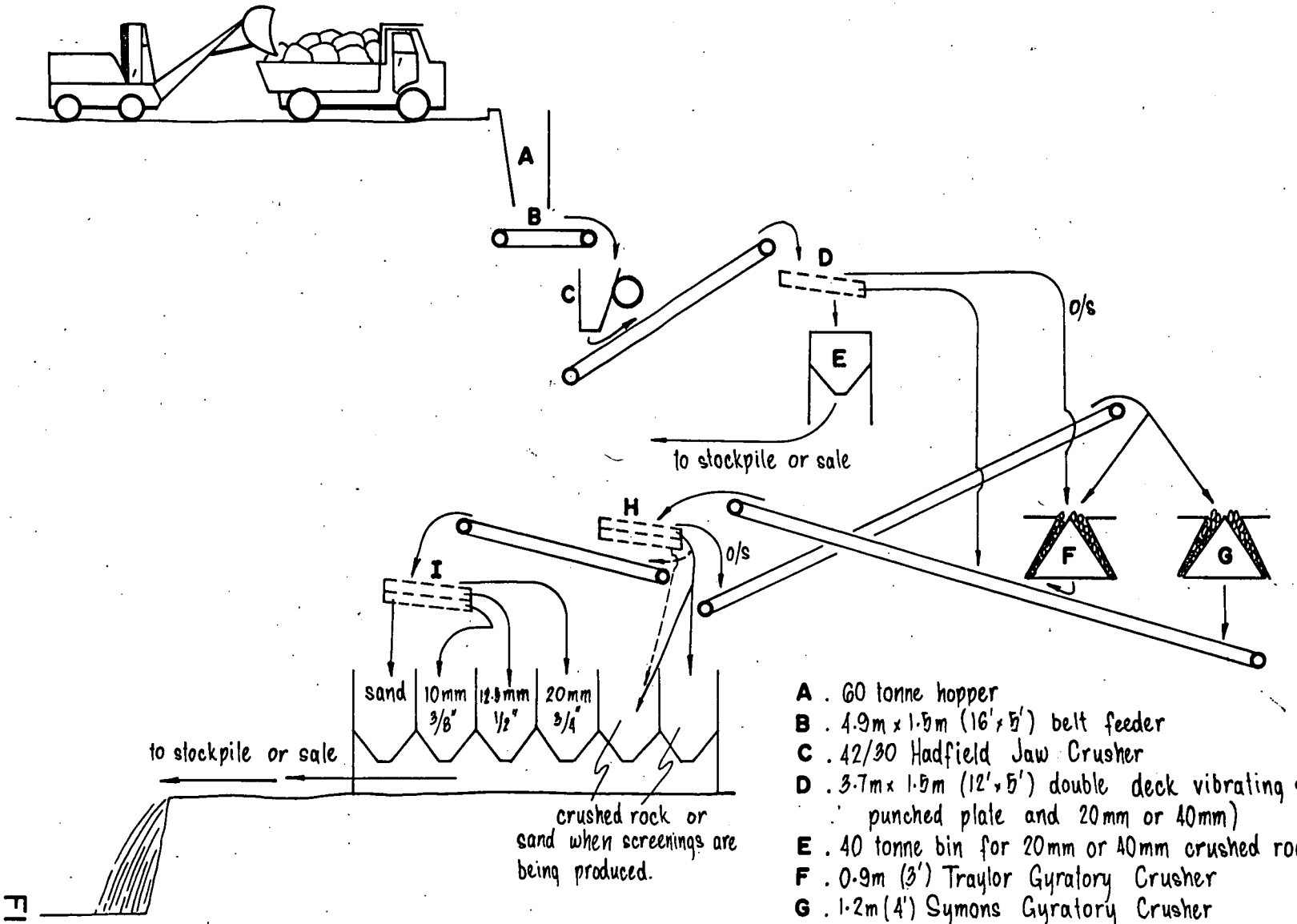
1 - Drop-ball.

6. CRUSHING PLANT (Pl. 36, 37 and Fig. 14)

Quarried rock is tipped onto a 16x5' (4.9x1.5 m) feeder, from which primary scalps are conveyed to a 30 tonne bin. The oversize continues into a 42/30 Hadfield jaw crusher which feeds a 12x5' (3.7x1.5 m) double deck (2" (50 mm) punched plate, 20 or 40 mm) vibrating screen producing 20 or 40 mm crushed rock and rubble. Oversize is fed to a 3' (0.9 m) Traylor gyratory

crusher, product from which is fed, together with the intermediate size to two 16x6' (4.9x1.8 m) triple deck vibrating screens which feed two of six 25 tonne storage bins with crushed rock. Screen sizes vary between ½-2½" (13-63 mm) for the top deck, 3/16-1½" (5-40 mm) for the middle decks with a fine sandscreen bottom deck, producing a wide variety of crushed rock products (Oversize is split fed back to the Traylor or to a 4' (1.2 m) Symons gyratory). No undersize proceeds beyond these screens when crushed rock is being made.

For screenings production, the two triple decks comprise 7/8" (22.4 mm), no middle deck, and a 3/16x1/8 (5x3 mm) sandscreen. Minus 7/8" is screened on a 16x6' (4.9x1.8 m) triple deck vibrating screen (e.g. 9/16" (14 mm), ½" (13 mm), sandscreen producing 3/4" (20 mm), ½" (12.5 mm), 3/8" (minus 12.5 mm for one specification) and sand). Other screenings can be produced by changing screens.



A . 60 tonne hopper
B . 4.9m x 1.5m (16' x 5') belt feeder
C . 42/30 Hadfield Jaw Crusher
D . 3.7m x 1.5m (12' x 5') double deck vibrating screen: 50mm (2") punched plate and 20mm or 40mm)
E . 40 tonne bin for 20mm or 40mm crushed rock or rubble
F . 0.9m (3') Traylor Gyratory Crusher
G . 1.2m (4') Symons Gyratory Crusher
H . Two 4.9m x 1.8m (16' x 6') triple deck vibrating screens (see text for aperture sizes) middle deck used only if making crushed rock.
I . 1.8m x 4.9m (16' x 6') triple deck vibrating screen: 14mm (9/16"), 13mm (1/2"), sandscreen.

FIG. 14

DEPARTMENT OF MINES AND ENERGY SOUTH AUSTRALIA

METROPOLITAN QUARRY SURVEY

QUARRY INDUSTRIES - SALISBURY QUARRY

CRUSHING PLANT

COMPILED	DRAWN	DATE	CHECKED	DATE	SCALE	PLAN NUMBER
J. Valentine	E. Calabio	August 1982	C.D.O	21.4.83	not to scale	S 16519

1. GENERAL

LOCATION: Para Hills Quarry, sections 2104-5, hundred of Yatala.

OPERATOR: Boral Resources (S.A.) Pty. Ltd.

LOCAL ADDRESS: Barker Road, Salisbury East, 5109.

Tel. 258 6288

HEAD OFFICE ADDRESS: 17 Bagot St., North Adelaide, 5006.

Tel. 267 3344

MINERAL TENURE: PM 227. Land is owned by the company.

2. PRODUCTION

MATERIAL MINED: Quartzite, sandstone.

RESERVES: 7.4 million tonnes + 4.1 million tonnes of unknown quality, 3.5 million tonnes of waste and overburden. (Martin and Pain, 1979)

PRODUCT USES

75 mm Rubble

40 mm Rubble

20 mm Rubble

40 mm Crushed rock

20 mm Crushed rock

100 mm Metal

50 mm Screenings (ballast)

40 mm Screenings

20 mm Screenings

14 mm Screenings

40 mm Biproduct (Scalp)

20 mm Biproduct (Scalp)

200 or 225 mm Metal

10 mm Screenings

7 mm Screenings

Quarry Sand

PRODUCTION RATE (1981): 577685 tonnes

WORKFORCE: 15 + 4 subcontractors.

3. HISTORY

Formerly known as Teisseries Quarry, the deposit was opened prior to 1923, producing quartzite roadmetal and building stone (freestone) until at least 1933.

The original quarries, at creek level, were used as the site for the crushing plant when Albion Reid Ltd. (now Boral Resources) re-opened the quarry and extended it southerly , from November 1974.

Quarries to the south on section 2102, opened by the Port Adelaide Council prior to 1927 and later worked intermittently by Quarry Industries Ltd are now owned by the S.A. Land Commission. Boral leases a part of this area for overburden dumping.

4. GEOLOGY (Pl. 45,46)

The quarry is located to the east of the Para Fault scarp in Adelaidean Burra Group quartzite, sandstone and phyllitic shale equated with the Undalya (Stonyfell) Quartzite of Torrensian age. Fourteen units in excess of 66 m in thickness have been recognised (Martin and Pain, 1977), of which only two, totalling 9.5 m are suitable for screenings production. Of the others two sandstone and quartzite units totalling 12.5 m are suitable for crushed rock and six interbedded sandstone and shale units totalling 31 m for crushed rock after scalping of up to 70% waste. A further two shale units totalling 6.9 m are waste material. Some of the scalped waste is sold as "by-product". The upper section of a basal quartzite of unknown thickness is of crushed rock quality.

The sequence is moderately to tightly folded about meridional axes with anticlines exhibiting long, shallow eastern limbs and short, steep to slightly overturned western limbs. The structure plunges four degrees south. Minor faulting in the cores of appressed folds affects only the shale units and not the more competent quartzite.

5. MINING (Pl. 42,43,44)

22 x 75 mm diameter blastholes fifteen metres deep and inclined at 75 degrees are drilled with G.D. airtracks in a 2x2 m staggered array. The holes are primed with 55 mm gelignite, charged with 30-40 Kg of Anfo to within 3.6 m of the surface and electrically detonated. Blasting is carried out 3 times per week at 12-12.30 pm. Oversize is reduced to jaw crusher size with a drop ball.

Equipment comprises:

1 - Caterpillar 988 front end loader
2 - Caterpillar 966 front end loader
1 - 35 tonne Euclid dump truck
1 - 35 tonne Wabco dump truck (contractor)
2 - 25 tonne Euclid dump truck
1 - water truck
1 - drop ball
2 - G.D. airtracks (contractor)

6. CRUSHING PLANT (Pl. 40,41 and Fig. 15)

Quarry rock is tipped onto an 8x4' (2.4x1.2 m) vibrating screen with 20, 40 or 75 mm aperture depending on raw material used and scalped undersize required. Scalps are sold as rubble or by-product (low quality fill) and oversize is fed to a 48/42 Jaques single toggle jaw crusher. Crusher product is fed to a surge pile of 150 mm metal. 200 mm metal or 225 mm crushed rock

is often stockpiled for sale on top of the pile, depending on rock used and jaw setting of primary crusher.

A 14x3' (4.3x0.9 m) double deck (40 or 50 mm and 20 mm) vibrating screen is fed from the base of the surge pile. Oversize is stockpiled as 100 mm metal or fed to a 12 yd^3 (9 m^3) bin and intermediate size is either stockpiled as 50 mm metal or fed to a 25 yd^3 (19 m^3) bin. The 12 yd^3 bin feeds a 36" (0.9 m) Jaques qyratory and the 25 yd^3 bin feeds both 48" (1.3 m) Symons and 40" (1 m) Jaques short head gyratory crushers.

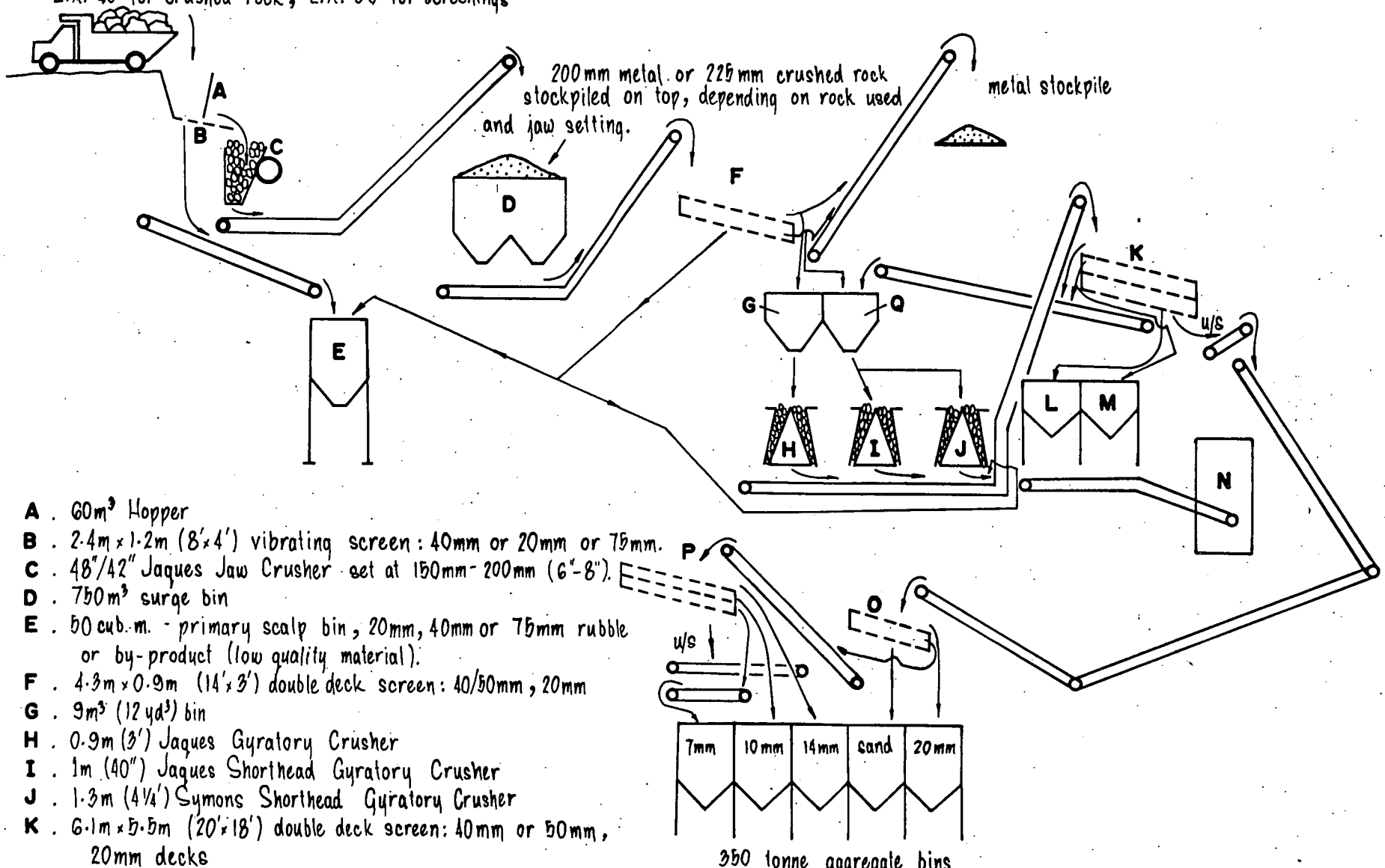
Undersize is fed either to the primary scalps bin or, together with the gyratory products, to a 20x18' (6.1x5.5 m) double deck (40 or 50 mm and 20 mm) vibrating screen. Oversize is returned to the 25 yd^3 bin, intermediate sizes are either returned to the 25 yd^3 bin or stored as 40, 50 or 75 mm crushed rock or metal, and undersize stored as 20 mm crushed rock or fed to the screenings plant. This comprises a 14x8' (4.3x2.4 m) double deck (14 mm and 3/16x1/8 (5x3 mm) vibrating screen from which oversize is stored as 20 mm screenings, undersize as sand with intermediate sizes fed to a 16x6' (4.9x1.8 m) triple deck (10, 7 mm and 3/16x1/8" vibrating screen. This produces 14 mm as oversize; 10 mm, and 7 mm screenings plus sand.

7. REFERENCES

Jack, R.L., 1923. The Building Stones of South Australia. Bull. geol. Surv. S. Aust., :10

Martin, M. and Pain, A.M., ?1979. Para Hills Quartzite Quarry. Mineral Resour. Rev. S. Aust., 147: 17-22.

L.A. 40 for crushed rock, L.A. 30 for screenings



A . 60m³ Hopper
B . 2·4m × 1·2m (8′×4′) vibrating screen: 40mm or 20mm or 75mm.
C . 48″/42″ Jaques Jaw Crusher set at 150mm-200mm (6″-8″).
D . 750m³ surge bin
E . 50 cub. m. - primary scalp bin, 20mm, 40mm or 75mm rubble or by-product (low quality material).
F . 4·3m × 0·9m (14′×3′) double deck screen: 40/50mm, 20mm
G . 9m³ (12 yd³) bin
H . 0·9m (3′) Jaques Gyratory Crusher
I . 1m (40″) Jaques Shorthead Gyratory Crusher
J . 1·3m (4¼′) Symons Shorthead Gyratory Crusher
K . 6·1m × 5·5m (20′×18′) double deck screen: 40mm or 50mm, 20mm decks
L . 20mm crushed rock
M . 40mm or 75mm crushed rock, metal or rubble, 50mm ballast
N . Stabilised crushed rock plant
O . 4·3m × 2·4m (14′×8′) double deck screen
P . 4·9m × 1·8m (16′×6′) triple deck screen: 10mm, 7mm, 3/16″ × 1/8″ sand wire. **Q**. 19m³ (25 yd³) bin.

FIG. 15

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

METROPOLITAN QUARRY SURVEY

BORAL'S PARA HILLS QUARRY

CRUSHING PLANT

COMPILED	DRAWN	DATE	CHECKED	DATE
J. Valentine	E. Calabio	August 1982	WC C.D.O.	21.4.83

SCALE not to scale

PLAN NUMBER S 16520

1. GENERAL

LOCATION: Riverview Quartzite Quarry, sections 5548, pt. 38, 5394, 5407, 5404, hundred of Yatala.

OPERATOR: The Readymix Group (S.A.).

LOCAL ADDRESS: Torrens Road, Highbury 5089 - Tel. 264 2922.

HEAD OFFICE ADDRESS: 100 Greenhill Road, Unley. Tel. 272 1122.

MINERAL TENURE: PM 31. Land owned by company.

2. PRODUCTION

MATERIAL MINED: Quartzite.

RESERVES: Approx. 43 million tonnes quartzite, 4.5 million tonnes greywacke. (Pain, 1979)

PRODUCT USES: 100 mm metal
65 mm metal
40 mm metal
40 mm crushed rock
20 mm crushed rock
20 mm screenings
14 mm screenings
20 mm split-mix
Quarry Sand
20 mm screened rubble
Filling
Spalls

PRODUCTION RATE (1981): 184000 tonnes

WORKFORCE: 13

3. HISTORY

The quarry was opened in 1947 by R. Bradbrook. O'Neil Constructions Ltd. bought the operation in 1952, working from a number of small quarries adjacent to the Gorge Road. Following changes to the Mining Act in 1954, operations were temporarily

suspended in 1955 due to excessive height of faces. Ownership was transferred to Readymix Concrete (S.A.) in 1962.

4. GEOLOGY (Pl. 49,50)

The quarry is sited within the Stonyfell (Undalya) Quartzite, a formation of Torrensian age in the Adelaidean Burra Group. The basal Wattle Park and overlying Slapes Gully Members of the formation are exposed in the quarry area. The Wattle Park Member, from which is obtained most of the quartzite suitable for high quality aggregate, consists of two medium to thickly bedded units totalling 112 m, seperated from an overlying 25 m of hard white massive to thickly bedded quartzite by 22 m of thinly bedded shaley sandstone. The Slapes Gully Member has 4 m of quartzite and sandstone at the base, overlain by 40 m of thinly bedded grey, shaley, feldspathic sandstone ("Greywacke"), suitable only for fill, rubble or blending with crushed rock.

The sequence has been synclinally folded and plunges 10° northerly to the south of the quarry area. In the quarry area, the fold is tight and overturned, and plunges 4° north with an axial plane dipping about 45° east. The adjacent anticline to the east is open with a steeply east-dipping axial plane.

Faulting is north-south oriented and is most pronounced in the core zone of the overturned fold where the incompetent shaley sandstone of the Slape Gully Member has been subjected to shearing.

5. MINING

50-60, 75 mm diameter blastholes, depressed at 75° are drilled 10-16 m deep and staggered 2.5-3 m apart in lines 2 m apart. The holes are bottom-primed with Cordtex and gelignite, loaded with Anfo and detonated, using 3 point electric initiation, once or twice per week. A contractor reduces

oversized rocks to jaw crusher-size with a pneumatic rock breaker.

Equipment used comprises:

2 - Euclid 22 tonne dump trucks.

1 - Caterpillar 966 Front End Loader.

1 - Mercedes 15 tonne dump truck.

1 - 10 tonne dump truck (contractor).

1 - Water truck.

1 - Caterpillar 966 Front End Loader (sales stockpiles).

The following equipment is used at both quarries:

2 - Wabco 35 tonne dump trucks) Overburden

1 - Caterpillar 980 Front End Loader) removal

1 - Komatsu 155 (equiv. D8) bulldozer (Rehabilitation, overburden stripping).

1 - Atlas Copco 810 H airtrack & compressor.

3 - Gardner Denver airtrack and compressor.

6. CRUSHING PLANT (Pl. 47,48 and Fig. 16)

Quarry material is tipped onto a grizzly and oversize fed to a Jaques 36/40 double toggle jaw-crusher. Crusher product and grizzly undersize are sent to a 12 x 5' (3.7 x 1.5 m) triple deck vibrating screen (100, 40, 20 mm) which scalps out -20 mm rubble which is either stored for sale or blended with the gyratory crusher product for further screening. The three oversize products from the scalping screen fall to a 300 tonne surge bin, which feeds a 3' (0.9 m) Traylor gyratory crusher. Crusher product is screened on a 16 x 5' (4.9 x 1.5 m) triple deck vibrating screen (40, 22.4, 8 mm) which produces 40 mm screenings, 20 -8 mm split mix (for re-screening at the sand plant) and sand. Oversize is fed back to a 4' (1.2 m) Symons gyratory crusher and rescreened.

Coarser Traylor product can be produced, and bypasses the 16 x 5 screen to a 10' x 4' (3 x 1.2 m) triple deck vibrating screen to produce 100, 65, 40 and 20 mm metal. 40 or 20 mm crushed rock is produced by mixing minus 20 mm scalps with the Traylor product and screening on the 10 x 4' screen.

7. REFERENCES

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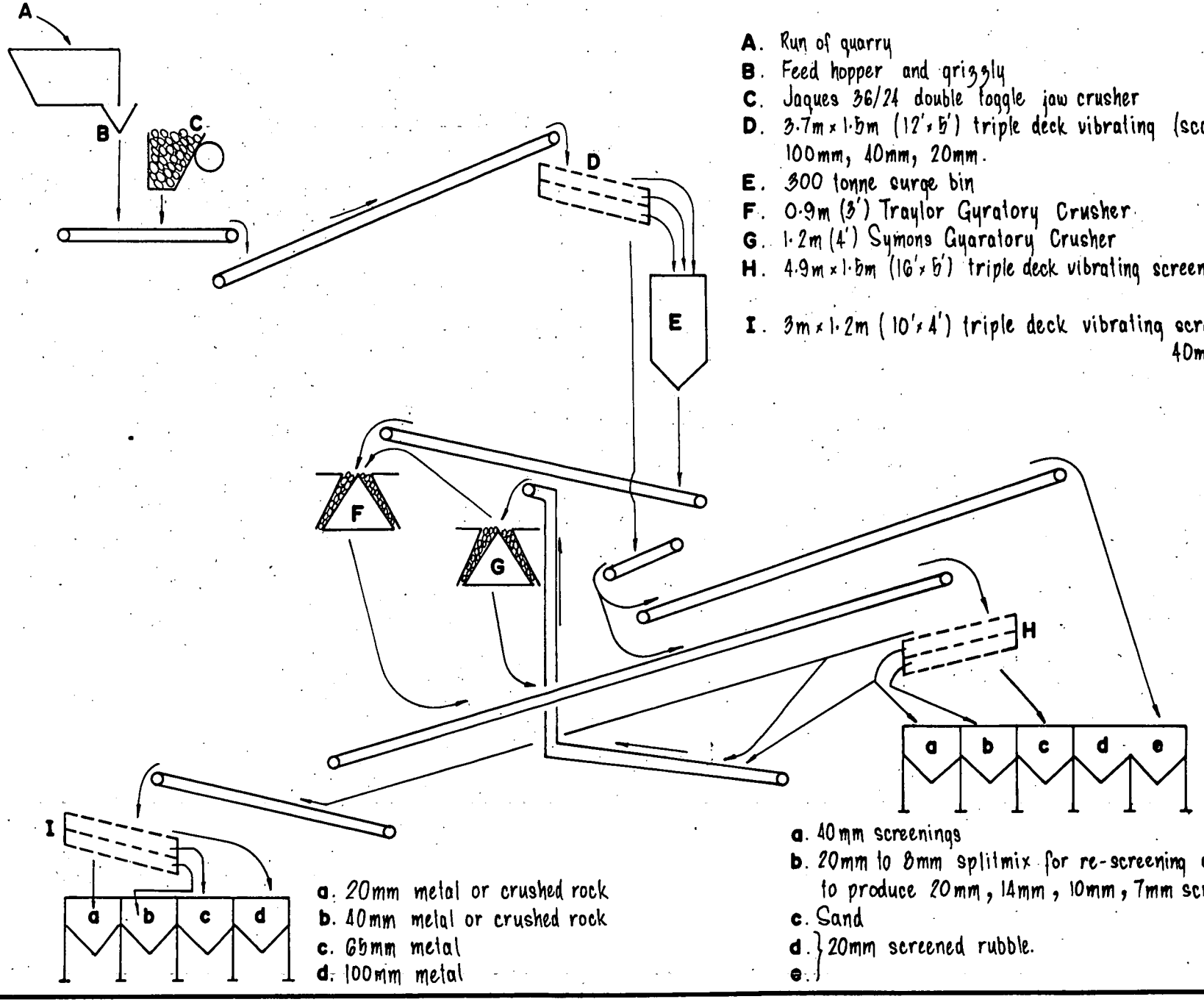

A. Run of quarry
B. Feed hopper and grizzly
C. Jaques 36/24 double toggle jaw crusher
D. 3.7m × 1.5m (12' × 5') triple deck vibrating (scalping) screen: 100mm, 40mm, 20mm.
E. 300 tonne surge bin
F. 0.9m (3') Traylor Gyratory Crusher
G. 1.2m (4') Symons Gyratory Crusher
H. 4.9m × 1.5m (16' × 5') triple deck vibrating screen: 40mm, 22.4mm, 8mm
I. 3m × 1.2m (10' × 4') triple deck vibrating screen: 75mm, 40mm, 20mm

a. 20mm metal or crushed rock
b. 40mm metal or crushed rock
c. 65mm metal
d. 100mm metal

a. 40mm screenings
b. 20mm to 8mm splitmix for re-screening at sand plant to produce 20mm, 14mm, 10mm, 7mm screenings.
c. Sand
d. } 20mm screened rubble.
e. }

FIG. 16

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

METROPOLITAN QUARRY SURVEY

READYMIX'S RIVERVIEW QUARTZITE QUARRY
CRUSHING PLANT

COMPILED J. Valentine	DRAWN E. Colabio	DATE August 1982	CHECKED
C.D.O.	SCALE not to scale	DATE 21-4-83	PLAN NUMBER S 16521

1. GENERAL

LOCATION: White Rock Quarry sections 1107, 1108, 1109,1183, hundred of Adelaide.

OPERATOR: White Rock Quarries Pty. Ltd.
Horsnell's Gully Road, Magill, 5072.
Tel. 313144 (Weighbridge), 313694 (Manager).

MINERAL TENURE: P.M. 188. Land owned by company.

2. PRODUCTION

MATERIAL MINED: Quartzite and Sandstone.

RESERVES: Approx. 5 million tonnes to north of Horsnell's Gully, 30 million tonnes to south (Company estimate 1982)

PRODUCT USES:

Washed Sand	3 mm Screenings
40 mm Crushed Rock	3 mm White Washed Sand/Aggregate
20 mm Crushed Rock	Quarry Sand
20 mm Screenings	Fine & 20 mm Rubble
14 mm Screenings	Spalls
7 mm Screenings	

PRODUCTION RATE (1981): 271761 tonnes

(50% of production is used in concrete (20 mm, 14 mm, minus 1/8 washed sand). 30% of this is batched at the quarry and the remainder at Pioneer Concrete's batching plants at Modbury and Laurel Park).

3. HISTORY

The area was first opened up for quarrying by J.J. Williams in about 1944 and was acquired by Carlo Ferraro of White Rock Quarry in 1947. The first quarries were on sections 1109 and 1180 to the south of Horsnell's Gully Road. By 1956, reserves of workable material were depleted. In 1957, the company began working the ridge to the north of the creek and acquired more

land on sections 1107, 1108 and 1109 where large deposits of high quality quartzite had been located. Extension of operations into this area was delayed by a caveat on the title to the property in favour of Quarry Industries Ltd.

Quarrying was eventually extended along the southern face of the ridge and by mid 1971, had reached the crest above the Old Norton Summit Road. Breaching of the ridge crest was prohibited by the Department of Mines following complaints from residents on the northern side.

Pioneer Concrete obtained a controlling interest in 1972.

4. GEOLOGY (Pl. 54,55)

The workings occupy the southern side of a steep-sloped ridge known as the Giles Range which is bounded to the north by the Old Norton Summit Road and to the south by Horsnell Gully.

The quarry lies within the Undalya (Stonyfell) Quartzite a formation within the Burra Group of Adelaidean (Torrensian) age. The succession passes upwards from hard white Undalya Quartzite into brown sandstone and then grey-green phyllite. The base of the quartzite is not exposed.

The axis of a major anticline, overturned to the west, strikes in a northeasterly direction transversely across the ridge. On the eastern side of the quarry Undalya Quartzite, in the flat dipping eastern limb has been displaced against the overlying sandstone by a northeasterly fault dipping about 60° southeast. The Stonyfell Fault crosses a saddle to the west of the quarry and trends towards the lower northern slopes. This fault displaces the Undalya Quartzite against an overlying phyllite sequence.

Lithology within the quartzite is variable. The upper section, which is thickest on the eastern anticlinal limb, is

hard quartzite. This is underlain by arkosic and kaolinitic quartzite and then by sandstone. The latter two rock types disintegrate to sand during blasting and crushing.

Quarry development will continue by working in a northwesterly direction until reserves are exhausted. It is then intended to open up the area to the south on section 1183 where additional reserves of Undalya Quartzite are available.

5. MINING (Pl. 53)

A single row of 8-10, 75 mm diameter drillholes, 15 m deep and depressed at 75° are drilled behind a face and each loaded with ANFO. Nonel safety fuse is used to ignite the charge. Blasting is carried out 3 times per week. Secondary breakage is achieved with a Talisker Rock Breaker, which comprises a 1,000 lb. (454 kg) weight with a free fall of 14'6" (4.4 m) mounted on a Caterpillar 950 front end loader in place of the bucket.

Equipment comprises:

1 - Caterpillar 980 front end loader.
2 - Euclid 30 tonne dump trucks.
1 - Haul Pack 20 tonne dump truck.
1 - Ingersoll-Sand airtrack drill and compressor.
1 - Gardner Denver airtrack drill and compressor.
2 - Wabco 20 tonne dump trucks.
1 - Grader.
1 - Water cart.
1 - Caterpillar 977 traxcavator (used for blending).
1 - Talisker rock breaker.

6. PROCESSING

a) Crushing Plant (Pl. 51 and Fig. 17)

Run of quarry material (quartzite and sandstone) is tipped into a bin which feeds a 36/24 Jaques double toggle jaw crusher. Crusher product is fed to a 12 x 5' (3.6 x 1.5 m) triple deck vibrating screen with 3" (80 mm), 1½" (40 mm) and 20 mm decks. Plus 3" and plus 20 mm are fed to a 3" (0.9 m) Traylor gyratory crusher and plus 1½" to a 50" (1.3 m) Jaques gyratory crusher. Undersize (scalps) is sorted as rubble in 3/4" (20 mm) 3/8" (10 mm), ¼ (6 mm) or 5/16" (8 mm) sizes depending on aperture of bottom screen which in turn depends on run of quarry being used and on weather conditions.

Gyratory products are fed to a 16 x 5' (4.9 x 1.5 m) triple deck vibrating screen with 1" (25 mm), 3/4" (20 mm) and 9/16" (14) mm decks. Minus 20 mm is stored as 20 mm screenings and the plus 20 and 25 mm returned to the Jaques gyratory. Minus 14 mm is screened on another 16 x 5' triple deck vibrating screen in which a 9/32" (7 mm) screen takes off 14 mm screenings, and a 3/16" (5 mm) deck produces 7 mm screenings as oversize and 3 mm screenings or "white sand/aggregate" (depending on whether run of quarry is quartzite or sandstone respectively) as undersize. When the latter is being produced the bottom 1/8" (3 mm) deck is not installed. The product is washed, and sold with 3 mm and 7 mm screenings, for concrete blocks and pavers. 3 mm is also used for topping and 7 mm in concrete batching. Minus 3 mm sand is washed for use in concrete batching. 40 mm and 20 mm crushed rock can be produced at the first 16 x 5' screen by changing decks.

20 mm and 14 mm screenings, minus 1/8" (3 mm) washed sand and washed sand from Monier's at Golden Grove are mixed with water and cement at an on-site batching plant to produce concrete, marketed as "Strongmix". The Monier sand is added to increase the "fattiness" of the concrete for easier pouring.

b) Washing Plant (Pl. 52 and Fig. 18)

Minus 1/8" (3 mm) or minus 3/16" (5 mm) white sand/aggregate are tipped into a bin and washed down a launder into a 12 x 12' (3.7 x 3.7 m) sump, underflow from which is pumped to a 30" (760 mm) cyclone. Cyclone product is fed to a dewatering screen and stockpiled. Dewatering screen underflow and cyclone overflow are returned to the sump.

Sump overflow is fed to a second 4 x 4' (1.5 x 1.5 m) sump, underflow from which is pumped to a ring of nine 200 mm cyclones, overflow from which is pumped to the slime dam. Underflow from the cyclone feeds a third 2' x 2' (0.61 x 0.61 m,) sump, underflow from which is pumped to a 15" (380 mm) cyclone. Cyclone underflow is fed to the dewatering screen and overflow back to the third sump, overflow from which is pumped to the slime dam.

Water is obtained from 2 bores (reportedly not very efficient), and also from local catchment and from mains. Plant capacity is 60 tonnes per hour, and has trouble meeting demand at times (overtime worked).

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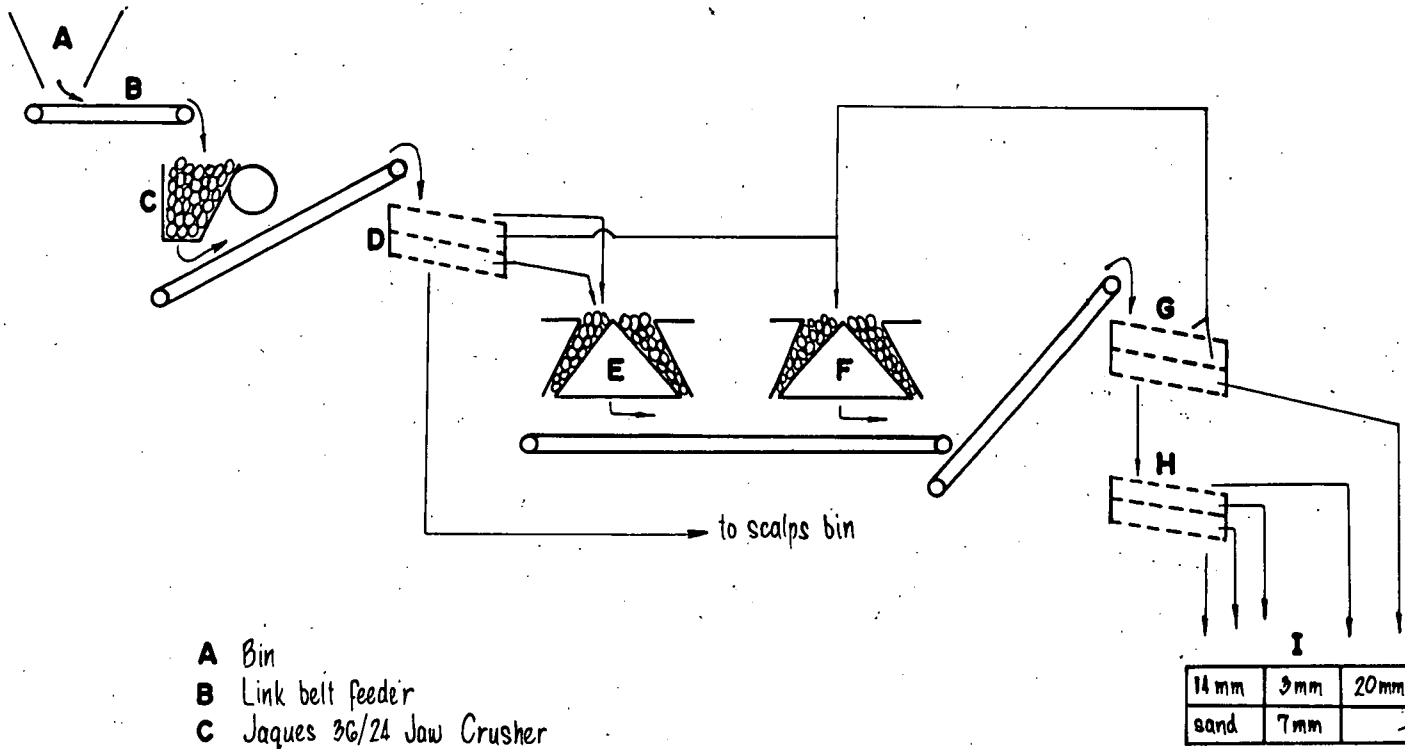


A Bin
B Link belt feeder
C Jaques 36/24 Jaw Crusher
D 3·6m × 1·5m (12′ × 5′) triple deck vibrating screen: 80 mm (3″), 40 mm (1½″), 20 mm (¾″)
E 0·9m (3′) Traylor Gyratory Crusher
F 1·3m (50″) Jaques Gyratory Crusher
G 4·9m × 1·5m (16′ × 5′) triple deck vibrating screen: 25mm (1″), 20mm or 40mm (¾″ or 1½″), 14mm (9/16″).
H 4·9m × 1·5m (16′ × 5′) triple deck vibrating screen: 7mm (9/32″), 5 mm (3/16″), 3mm (1/8″)
I 6 × 40 tonne bins

FIG. 17

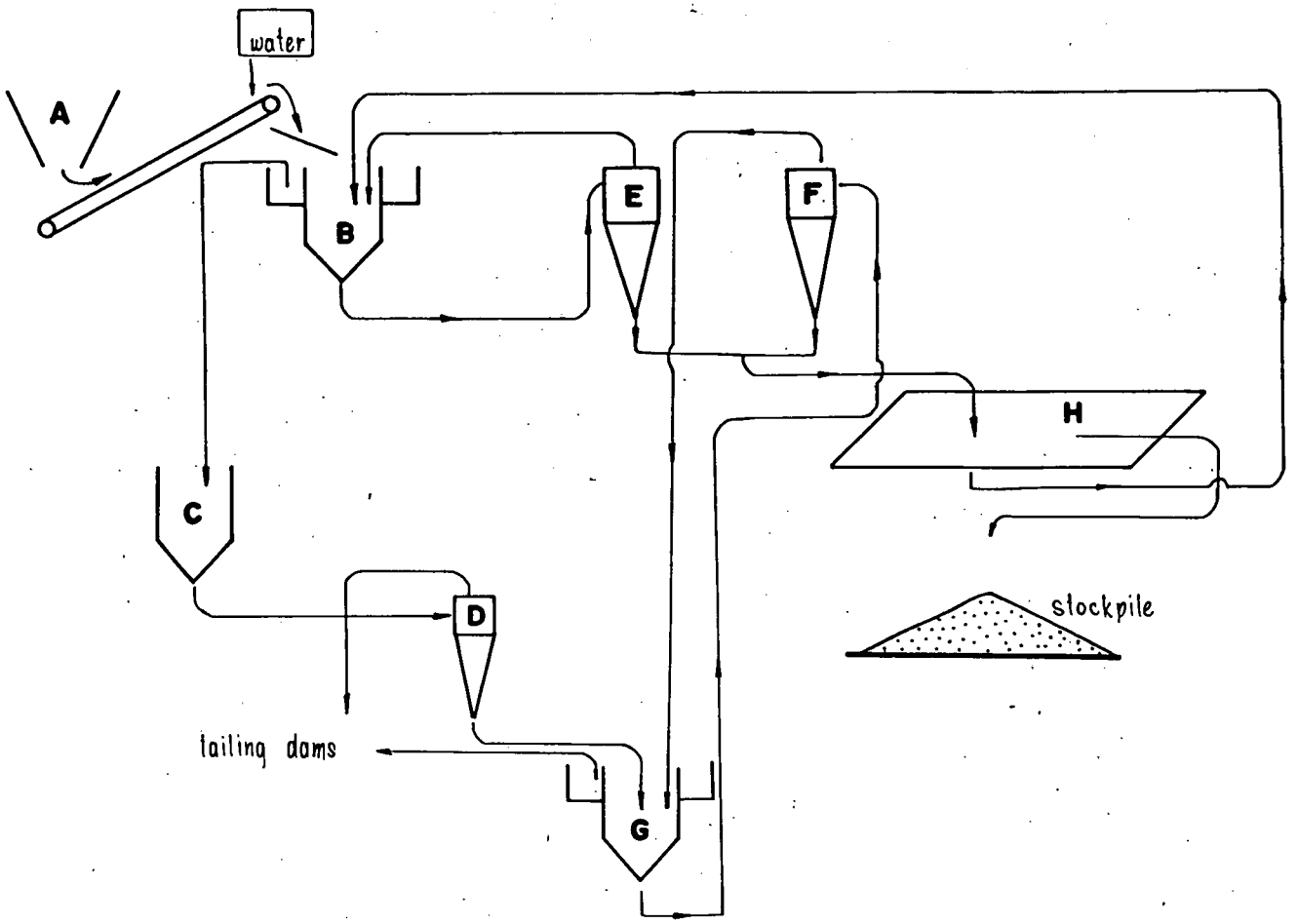
METROPOLITAN QUARRY SURVEY

WHITE ROCK QUARRY

CRUSHING PLANT

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

COMPILED	DRAWN	DATE CHECKED	SCALE	C.D.O	DATE	PLAN NUMBER
J. Valentine	E. Calabio	August 1982	not to scale	MC	21·4·83	S 16522



A 20 tonne sand bin
B 3·7m x 3·7m (12' x 12') sump
C 1·5m x 1·5m (4' x 4') sump
D Ring of 9 x 200mm (8") cyclones
E 760mm (30") cyclone
F 380mm (15") cyclone
G 0·61m x 0·61m (2' x 2') sump
H Dewatering screen.

FIG. 18

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

COMPILED J. Valentine — C.D.O — 21·4·83 DATE
DRAWN E. Calabio — SCALE not to scale
DATE August 1982
CHECKED

METROPOLITAN QUARRY SURVEY
WHITE ROCK QUARRY
SAND WASHING PLANT

PLAN NUMBER S 16523

2946

1. GENERAL

LOCATION: Stonyfell/Greenhill Quarry, sections, Pt. 1051, 1052, 1056, 906 916-7, 1178, hundred of Adelaide.

OPERATOR: Quarry Industries Ltd.

LOCAL ADDRESS: Stonyfell Road, STONYFELL, 5066. Tel. 31 9191 (the "greenhouse").

HEAD OFFICE ADDRESS: 333 Marion Road, PLYMPTON, 5038. Tel. 293 2383.

MINERAL TENURE: PM, 6,7-Stonyfell. Sects 906, 916-7, 1178, 1179, 1175-9, 1057, 1050 PM1 - Greenhill Sects 1056, 1051, 1052. Land owned by Q.I.

2. PRODUCTION

MATERIALS MINED: Quartzite, sandstone, greywacke.

RESERVES: Approx. 40 million tonnes. (Barnes and Coates, 1976).

PRODUCT USES

100 mm	Metal	7 mm screenings
65 mm	Metal	3 mm screenings
40 mm	Metal	washed sand
20 mm	crushed rock	20 mm rubble
40 mm	crushed rock	40 mm rubble
20 mm	screenings	75 mm rubble
20-14mm	screenings	225 mm rubble
14 mm	screenings	spalls
14-10 mm	screenings	rockery and edging
10 mm	screenings	Wallers
10-7 mm	screenings	
Concrete sand		
Filling sand		

PRODUCTION RATE (1981): 460,740 tonnes (Stonyfell) 140796 tonnes (Greenhill)

WORKFORCE:30-40

3. HISTORY

The first Colonial Treasurer, Sir Osmond Gilles originally noticed and appraised the quartzite deposit now being worked at Stonyfell as "eminently suitable for paving the streets of Adelaide". A quarry was opened soon after in 1837 by James Edlin to supply paving and building stone. John Borrow worked the quarry from 1852-58 when Henry Clark bought the property. Annie Martin, Clark's fiancee, named it Stonyfell after barren slopes (fells) in England. In 1867, Henry Dunstan took over the working of the quarry on a royalty basis and purchased the quarry outright in 1888.

The quarry was worked by hand mining methods until 1881 when Dunstan installed steam-driven crushing plant, thought to be the first such plant in South Australia. In 1909 Henry Dunstan formed Dunstan Ltd which worked the quarry until 1939.

On 1st July 1939, Quarry Industries was formed by a merging of Adelaide Quarries, Linwood Quarries, Torrens Valley Quarries, Rockfell Quarries, Glen Osmond Quarries, Sims' Quarries and Andersons Quarries. Dunstan Ltd refused to partake in the merger but was bought out by Quarry Industries later the same year.

The first stone was obtained by barring loose rocks and allowing them to roll into the gully where they were spalled to manageable dimensions carted in drays to roadworks sites and manually knapped to the required size. When the supply of loose rocks was exhausted, quarry faces were established using hand-drilling and blasting powder. In the early 1920's compressors, reciprocating drills and jackhammers were introduced, faces being about 120 m high and rock obtained by firing directly from the faces. In 1954 the Mining Act was amended limiting face height to 65 feet (20 m) and a benching system was introduced,

necessitating purchase of Waggon drills and later Gardner Denver air track drills and compressors.

Greenhill Quarries were opened in 1943 by J.H. Leverington on the western side of Slapes Gully. Quarry development continued at this site until 1953-54 when operations were transferred to the eastern side of the gully. Quarry Industries Pty. Ltd. acquired the quarry from J.H. Leverington in July 1969.

4. GEOLOGY (Pl. 56,58,59,66)

The Stonyfell Quartzite formation is part of the Torrensian series within the Adelaide System of Upper Proterozoic age. The formation comprises three members (Wattle Park, Slapes Gully and Greenhill) of which only the first (lower) two are considered suitable for the production of quality aggregates.

The formation has been folded into an open anticlinal structure plunging 12° westerly. The axis crosses the 350 m bench in the northern part of the quarry where dips are horizontal. The formation dips 12-20° south to southwesterly over most of the Stonyfell area increasing to 20-25° on the limb of the fold in Greenhill Quarry.

The Stonyfell Fault, a reverse fault dipping 80° southeast truncates the formation at the southern end of the Stabilized Roadbase plant. The only other major fault converges with the Stonyfell Fault southwest of the stabilized roadbase plant. This fault dips 70° east and increases dips of beds in the lower benches of Greenhill Quarry.

A lithological description of the Stonyfell Quartzite follows, beginning with the oldest unit.

WATTLE PARK MEMBER

Lower Quartzite

The lower quartzite unit conformably overlies the lateral equivalent of the Woolshed Flat Shale, and a transitional contact between these units is visible in exposures at the eastern extremity of Stonyfell Quarry. The unit is exposed in the floor and faces of the lowest working levels at Stonyfell Quarry (elevation approximately 350 m). It is a series of thinly bedded quartzites and phyllitic shales with a true thickness of some 40 metres. The phyllitic shales represent on 5% of the total unit and are spaced at approximately 60 cm intervals in 0.5 cm beds. The quartzites are medium to fine grained, white and hard, and exhibit pinch and swell structural features.

Sandstone, Freestone

This is the major unit of the Stonyfell Quartzite formation and is exposed in the old high faces of Stonyfell Quarry. The rock is a medium grained, friable, well jointed current bedded sandstone. It varies in colour from shades of reds to yellow and is only patchily silicified. The unit has a thickness of between 55 and 60 metres. Jointing forms natural blocks of sizes up to 1 metre square. The colour and ease of working made the stone an ideal building material for use in the early construction of Adelaide.

Upper Quartzite

The upper quartzite is exposed on all benches and at the top of the high faces in Stonyfell Quarry. This unit has a true thickness of 25 metres and is continuous between Stonyfell and Greenhill Quarries. In Greenhill Quarry it forms the lower benches of the quarry and was referred to by Nixon (1959) as the Lower Quartzite. The rock is a massive, well jointed quartzite, white to pinkish in colour, dense and very hard.

SLAPES GULLY MEMBER

Red Sandstone

This sandstone only appears as a distinct unit in Stonyfell Quarry where it exhibits a maximum thickness of some 15 metres. It is reddish brown in colour, medium to coarse grained and appears to represent a transitional phase between the massive quartzites and overlying greywacke. Minor greywacke bands are visible throughout the unit and silicification appears to have taken place in a random manner. The unit cannot be traced laterally between Stonyfell and Greenhill Quarries; at the top of the high face in Stonyfell Quarry it has a thickness of 1 to 2 metres. In Greenhill Quarry, the stratigraphic equivalent is represented by greywackes with interbedded quartzites, the latter forming some 50% of the rock.

Greywacke

The greywacke unit comprises interbedded greywacke and felspathic sandstones varying in thickness from 110 metres in Greenhill Quarry to 45 metres at the south eastern corner of Stonyfell Quarry. Variations in the degrees of silicification and weathering are apparent throughout the sequence.

GREENHILL MEMBER

This member is composed of two sandy quartzite units separated by a cross/bedded shaly quartzitic sandstone totally 45 m in thickness. Weathering makes this unit generally unsuitable for production of quality aggregate.

The diversity of materials produced at Stonyfell and Greenhill is the result of the large variety of lithologies and facies changes within them, the effects of Tertiary weathering, and of silicification along fault lines. Blending of raw materials thus provides a large range of products.

5. MINING (Pl. 57)

A 2.7x3 m blasthole pattern of 10-15 holes at 80 mm centres, depressed at 85° and 15-18 m deep is drilled behind the face. The holes are bottom primed with Molanite to a level just above water table and then by 55 mm AN 60 Gelignite and Cordtex detonating fuse. The holes are then loaded with Anfo and detonated using electric initiation. A batter of about 50° is produced. Blasting is carried out about three times a week but at varying times.

In 1979, a slot joining Stonyfell and Greenhill Quarries was started with the purpose of maximising extraction of the good quality rock in the northern and western parts of the area, while establishing terminal faces facing away from or out of sight of the Adelaide Plains. The higher quality more quartzitic material is now obtained mainly from the Upper Quartzite in the lower benches of Greenhill Quarry and lesser quality and sandier material from Stonyfell and the higher benches of Greenhill. Electric face shovels are used to load trucks at Stonyfell and a front end loader at Greenhill. Equipment is as follows:

1 - Dropball
2 - Ingersoll Rand Airtrack Drills
2 - Gardner Denver Compressors
3 - Caterpillar 966 front end loaders
1 - Caterpillar 988 front end loaders
2 - Ruston Bucyrus 54 Electric face shovels
9 - Wabco 22 tonne Dump Trucks (7 auto, 2 manuals)
2 -Terex 22 tonne Dump Trucks.

6. CRUSHING PLANT

As a result of the merging of the two quarries and an effort to maximise use of available plant, the number 5 plant has been dismantled, and the Greenhill plant removed to Queensland. Four crushing plants, one stabilized roadbase plant and one sandwashing plant are now in operation.

No. 1A Plant (Pl. 60 and Fig. 19)

Quarry rock is fed to a Hadfield apron feeder and 47x43 jaw crusher with jaws at 9" (229 mm). Product is conveyed to two triple deck vibrating screens (2" (50 mm) punched plate, 7/8" (22 mm) wire, 9/16" (14 mm) wire) from which some plus 2", all minus 7/8 and all minus 9/16 falls into a scalps bin as 9" crusher feed, 20 mm rubble and X6 filling sand respectively. Minus 2" and the rest of the plus 2" is fed to a vibrating feeder and then to either No. 3 Plant primary crusher (40%) or into a 600 tonne silo (60%). The silo feeds a 4' (1.2 m) Traylor Gyratory crusher, product from which is screened on one of two double decks (13/16 (20 mm), 5/16 (8 mm)). Undersize is screened on ¼ x 1/8" (6x3 mm) and stored as sand and ¼" (6 mm), and oversize is fed to a 4' (1.2 mm) Gyrasphere gyratory crusher which feeds the other double deck screen. Undersize is stored as before, oversize is returned to the Gyrasphere and intermediate sizes are fed with those from the other double deck, to two triple deck vibrating screens (9/16 (14 mm), 7/16 (11 mm) and ¼ x 1/8 (6x3 mm) and 7/16, (11 mm) 5/16 (8 mm) and ¼ x 1/8). These produce 20, 14, 10, 7 and 3 mm and sand.

Coarser screenings are sometimes re-crushed in a 4' Gyradisc gyratory crusher (to increase sand production) and fed either to

the triple decks or to two ¼ x1/8" screens, undersize from which is stored as sand, oversize being fed back to the Gyrasphere secondary crusher.

No. 2 Plant (Pl. 61 and Fig. 20)

3/4" (20 mm) and ¼" (7 mm) screenings from No. 1A Plant are fed to a Link Belt feeder and Gyradisc gyratory crusher. Crusher product is conveyed to two 10x4' (3.06x1.2 m) double deck vibrating screens (each 3/16 (5 mm) and 6x4 mesh), oversize from which returns to the crusher. The intermediate fraction is stored as 3 mm (1/8") screenings and undersize as sand.

No. 3 Plant (Pl. 62 and Fig. 21)

Quarry rock or 9" (229 mm) feed from plant 1A is fed to a 36x24 Hadfield jaw crusher with jaws set at 4" (100 mm). Product is conveyed to a 10x4' (3x1.2 m) triple deck vibrating screen (4½" (114 mm) round, 2 3/4" (71 mm) square, 1½" (40 mm) square decks) from which 'oversize' and some minus 4½ plus 2 3/4" go to a 4' Gyrasphere crusher. The rest of the minus 4½ plus 2 3/4" is delivered to the 100 mm metal bin crusher. Minus 2 3/4" plus 1½" goes either to the gyrasphere or straight to the gyratory's product conveyor together with the minus 1½". Gyrasphere settings vary between ½" (13 mm) and 1½" (40 mm) depending on raw material and product required.

The gyrasphere and triple deck products are conveyed to two double deck vibrating screens commonly with 1 3/4" (45 mm) and 3/16" (20 mm) apertures producing 65 mm metal as oversize, 40 mm metal or crushed rock as intermediate size and 20 mm as undersize. By appropriate changing of screens and crusher settings ½" (13 mm) crushed rock, 3" (80 mm) and 1½" (40 mm) rubble and X6 filling sand can be produced.

No. 6 Plant (Pl. 63 and Fig. 22)

Sandstone and greywacke from the quarry is tipped to a Hadfield apron feeder and 36x24 jaw crusher (jaws at 9") (229 mm) and gravity fed down a chute on the old quarry face into a control bin. The material is then conveyed to a 12 x 5 (3.6x1.5 m) vibrating screen (1" (25 mm) or 7/16" (11 mm) deck) producing 225 mm rubble as oversize and X6 filling sand as undersize.

Sand Washing Plant (Pl. 65 and Fig. 24)

Sand from the crushing plants is tipped into a 50 tonne bin from which it is conveyed to a Wemco screw washing tank. Screw oversize is stockpiled as washed sand and overflow is pumped to two 6 tonne classifier tanks. Tank underflow is dewatered in a 16" (400 mm) cyclone and returned to the Wemco. Cyclone overflow returns to the classifier tank, overflow from which proceeds to the slime dam.

Stabilized Roadbase Plant (Pl. 64 and Fig. 23)

½" (13 mm) crushed rock from plant #3 is fed from three hoppers onto a conveyor and ½ to 8% cement is fed to the rock as it passes under a 2 tonne cement hopper. The blend is then mixed with water in a pugmill mounted above a delivery hopper from which trucks are directly loaded for transport to roadworks sites. Alternatively bitumen - stabilized roadbase can be produced by mixing from a 5 000 gallon tank located near the pugmill.

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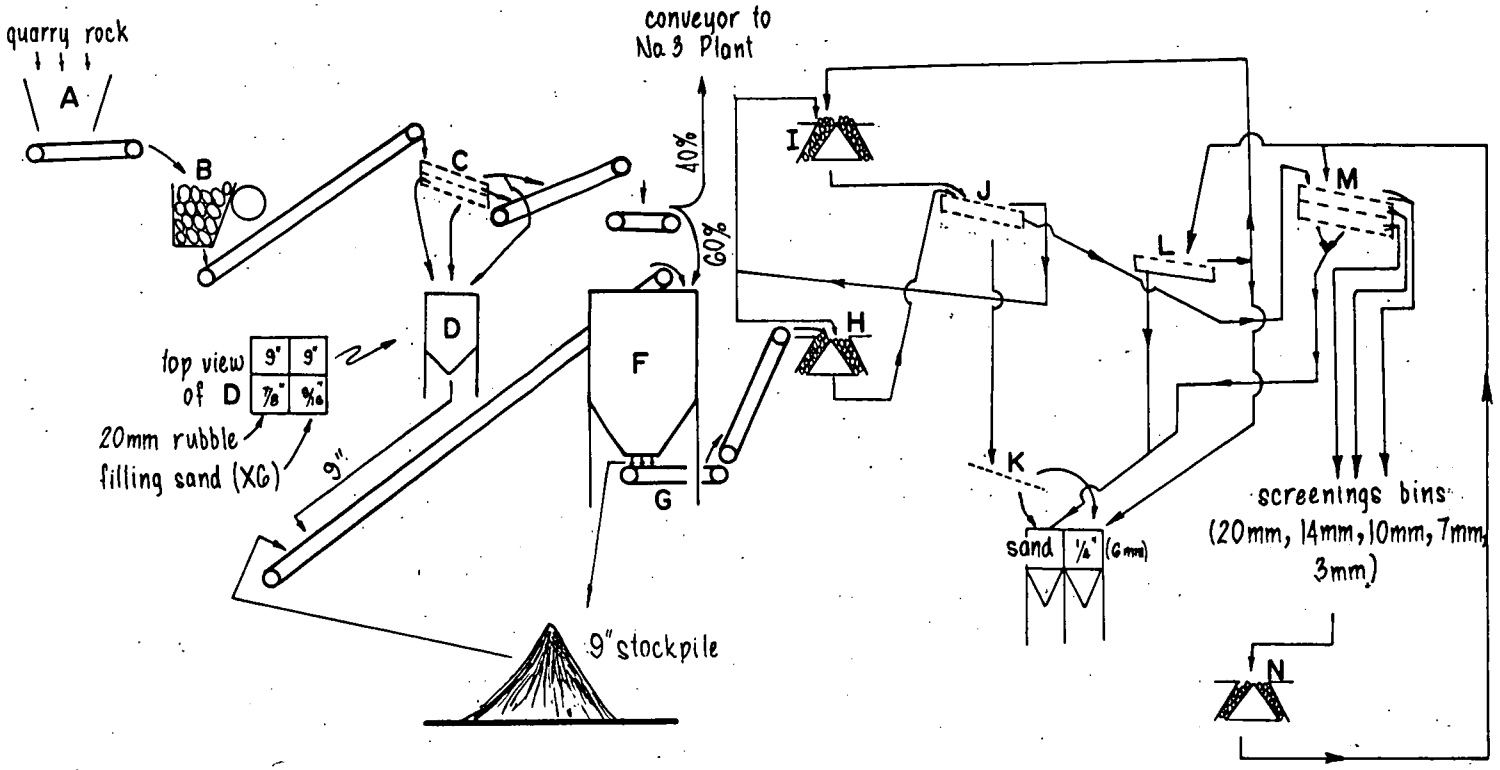


A 4'×15' (1.2m×4.6m) Hadfield Apron Feeder
B 47×43 Hadfield Jaw Crusher, jaws at 9" (229mm).
C Two 16'×5' triple deck vibrating screens, 2"(50mm), 7/8" (22mm), 9/16" (14mm)
D 500 tonne primary scalp bin, 9"(229mm), 7/8" (22mm), 9/16" (14mm)
E 6'×4' (1.8m×1.2m) vibrating link belt feeder
F 600 tonne silo
G 5', 3'6" (1.5m×1.1m) feeder
H 4'(1.2m) Traylor Gyratory Crusher
I 4'(1.2m) Gyrasphere, Gyratory Crusher
J Two 16'×5' double deck vibrating screens, 13/16" (20mm, 5/16" (8mm)
K 1/4"×1/8" (6mm×3mm) link belt screen
L Two 16'×5' link belt screen, 1/4"×1/8" (6×3mm)
M Two 16'×5' (4.9m×1.5m) triple deck link belt vibrating screens, 9/16"(14mm), 7/16"(11 mm), 1/4"×1/8" (6×3mm); 7/16" (11 mm), 5/16 (8 mm), 1/4"×1/8" (6×3mm)
N 4' (1.2m) Gyradisc, Gyratory Crusher

FIG. 19

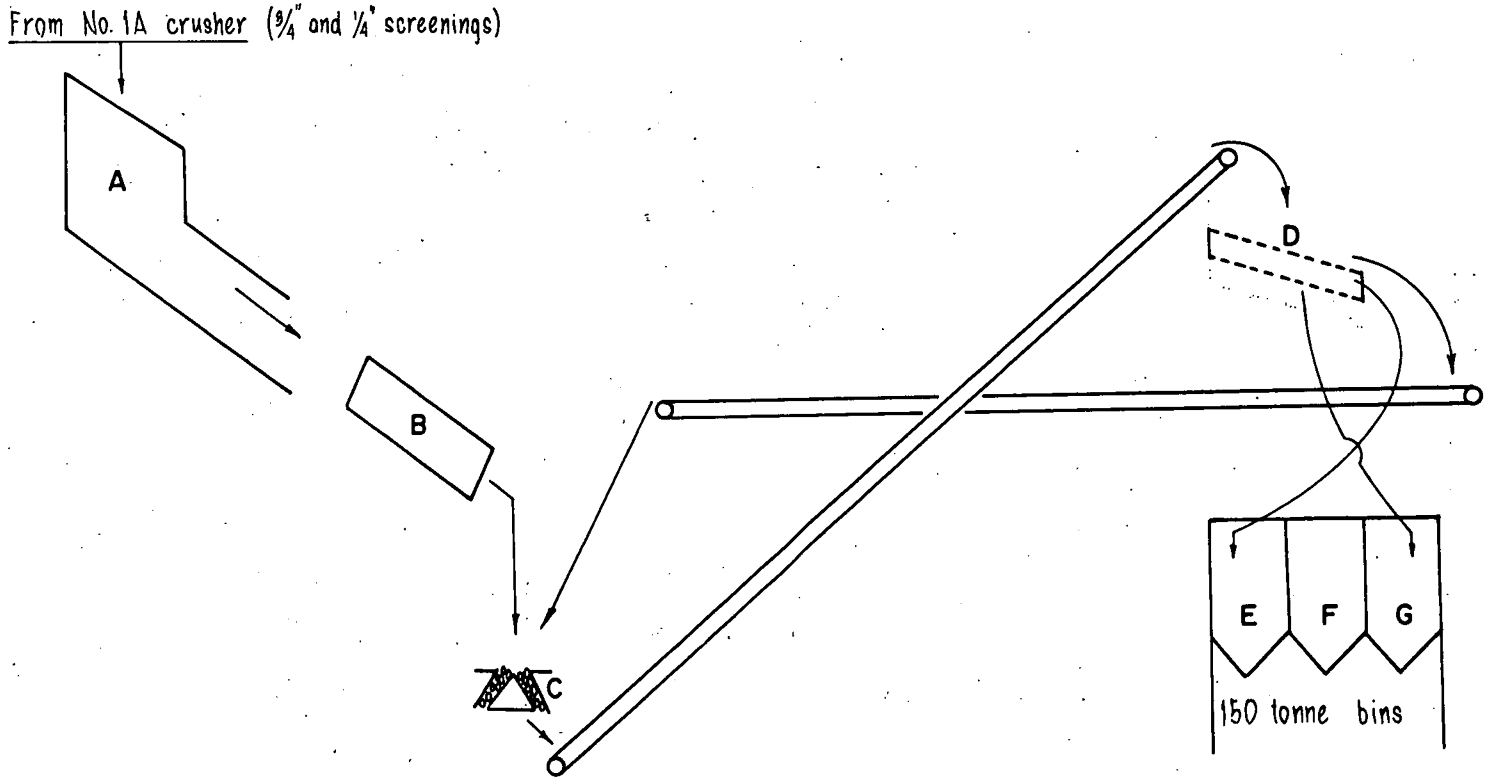
DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

METROPOLITAN QUARRY SURVEY

STONYFELL QUARRY
No. 1A CRUSHING PLANT

COMPILED J. Valentine	DRAWN E. Calabio	DATE August 1982	CHECKED
WC C.D.O.	SCALE not to scale		
21.4.83 DATE	PLAN NUMBER S 16524		

2945



A Ore bin
B 6' × 4' (1·8m × 1·2m) link belt feeder
C 3' (0·9m) Gyradisc crusher
D Two 10' × 4' (3·05m × 1·2m) double deck vibrating screens; 6' × 4' mesh sandscreen 3/16" (5mm)
E 1/8" (3mm)
F not in use
G sand

FIG. 20

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

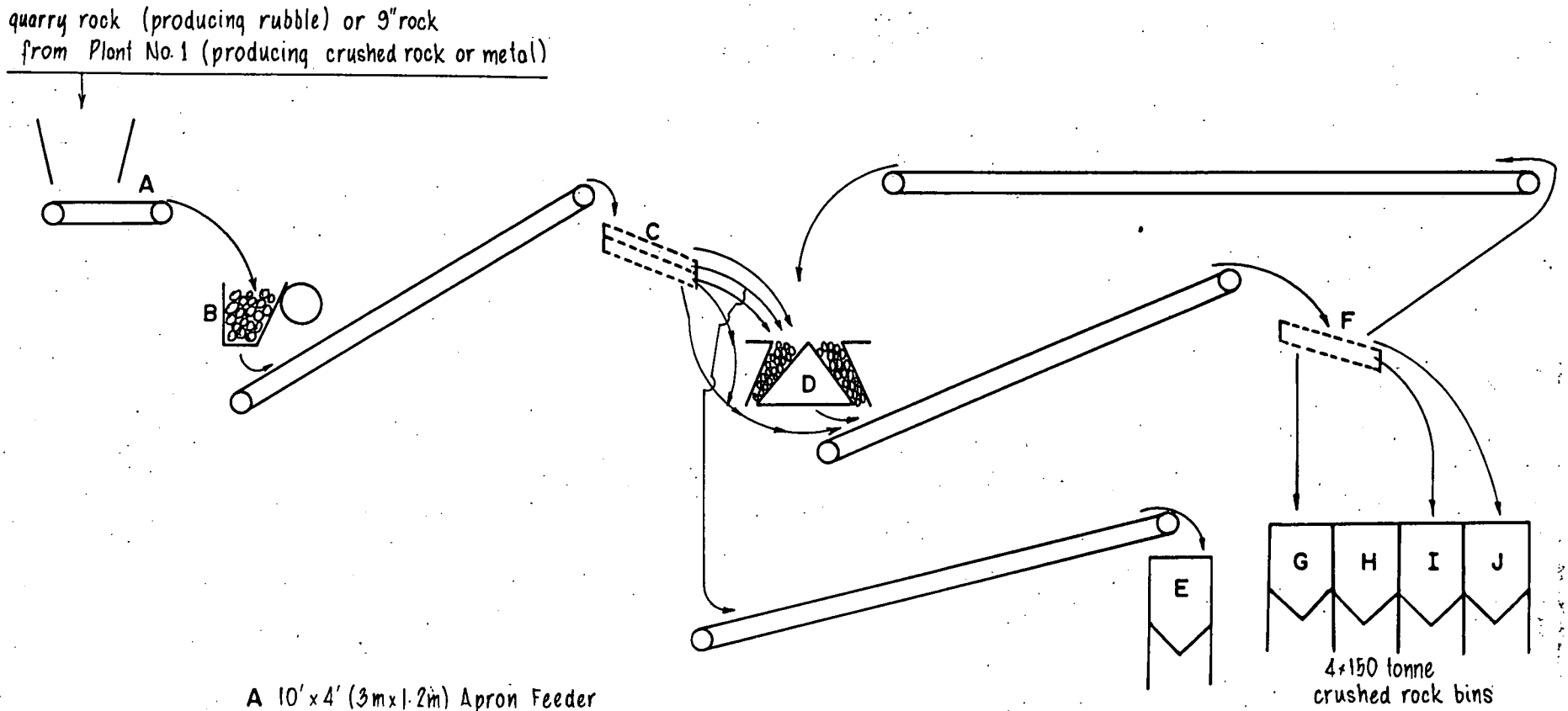
METROPOLITAN QUARRY SURVEY
STONYFELL QUARRY
No. 2 CRUSHING PLANT

COMPILED J. Valentine	C.D.O. 21·4·83 DATE
DRAWN E. Calabio	SCALE not to scale
DATE August 1982	PLAN NUMBER
CHECKED	S 16525

METROPOLITAN QUARRY SURVEY
STONYFELL QUARRY
No. 3 CRUSHING PLANT

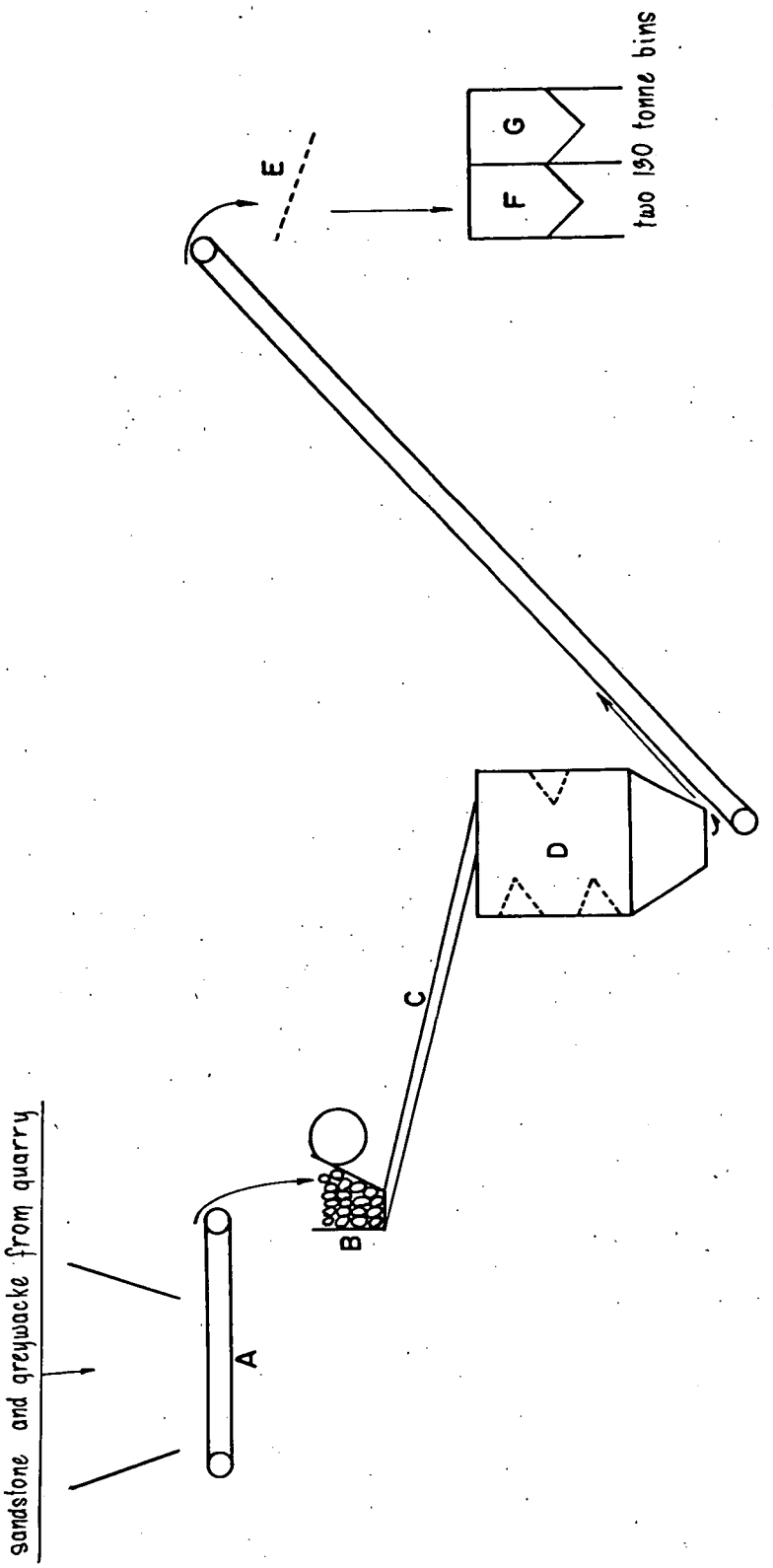
DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

COMPILED J. Valentine
DRAWN E. Colabio
DATE August 1982
CHECKED
SCALE not to scale
C.D.O. 21-4-83 DATE
PLAN NUMBER S 16526



A 10' x 4' (3m x 1.2m) Apron Feeder
B 36 x 24 Hadfield Jaw Crusher, jaws set at 4" (102mm)
C 10' x 4' (3m x 1.2m) triple deck link belt vibrating screen, 4½" (114mm), 2¾" (71 mm), 1½" (40 mm)
D 4' (1.2m) Gyratory Crusher (Gyrasphere)
E 40 tonne bin, 4" (100mm) metal
F Two 10' x 4' (3m x 1.2m) double deck link belt, 1¾" (45mm), 13/16" (20mm)
G ¾" (20mm) or ½" (13mm) C.R. or ½" x 6" sand, also 1½" (40mm) and 3" (75mm) rubble by changing screens
H spare bin
I 1½" (40mm) metal or crushed rock
J 2½" (65mm) metal

FIG. 21



A 10'x 3' (3m x 1m) Hadfield Apron Feeder
B 36 x 24 Hadfield Jaw Crusher
C Chute down quarry face
D Control bin
E 12'x 5' (3.6m x 1.5m) link belt vibrating screen, 1" (25mm) or 7/16" (11mm)
F Sand - sold as X6 filling sand
G 9" (225mm) sold as rock fill

FIG. 22

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

METROPOLITAN QUARRY SURVEY
STONYFELL QUARRY
No. 6 CRUSHING PLANT

COMPILED J. Valentine	C.D.O. 21.4.83 DATE
DRAWN E. Calabio	SCALE not to scale
DATE August 1982	PLAN NUMBER S 16527
CHECKED	

2945

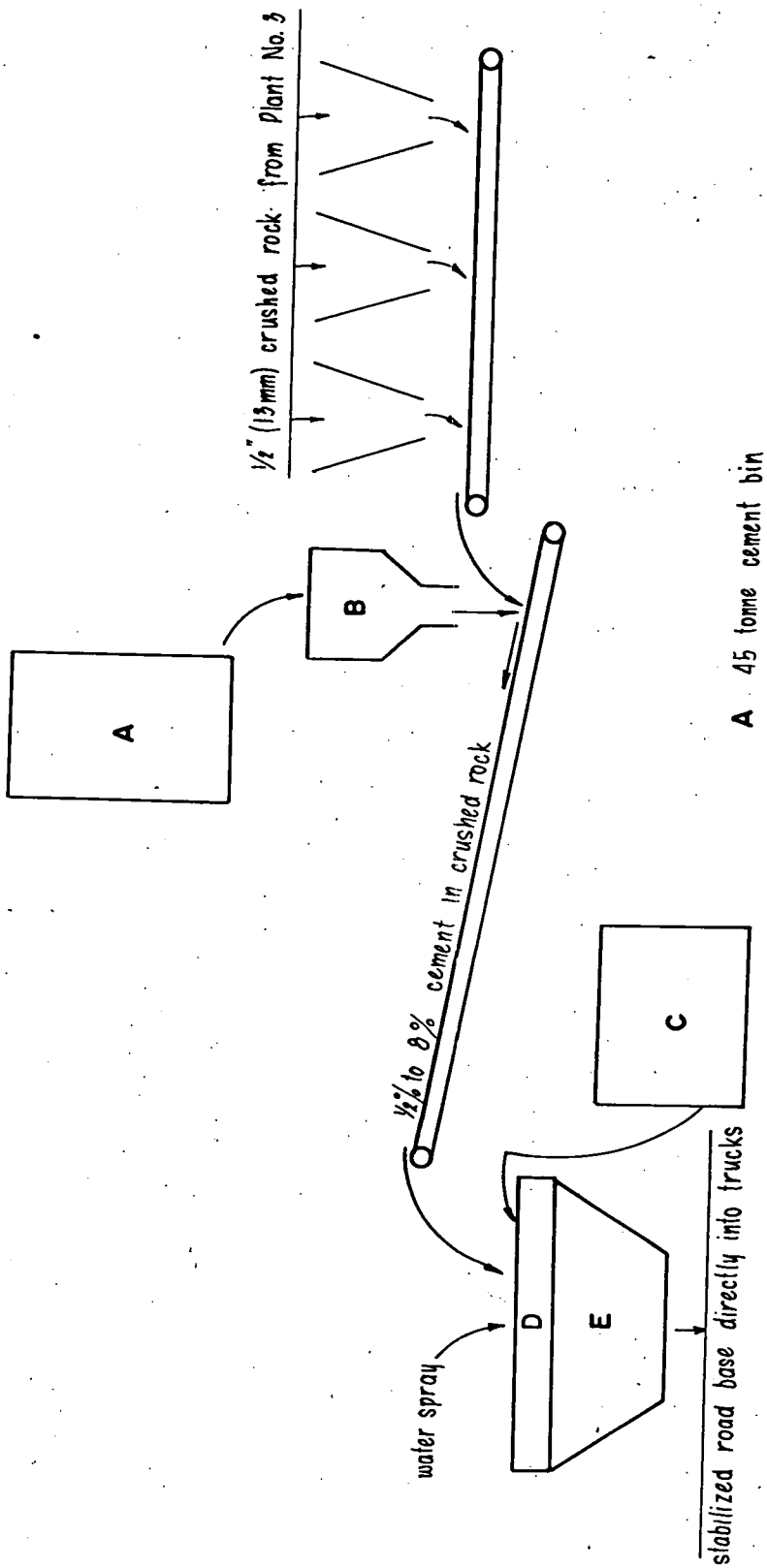


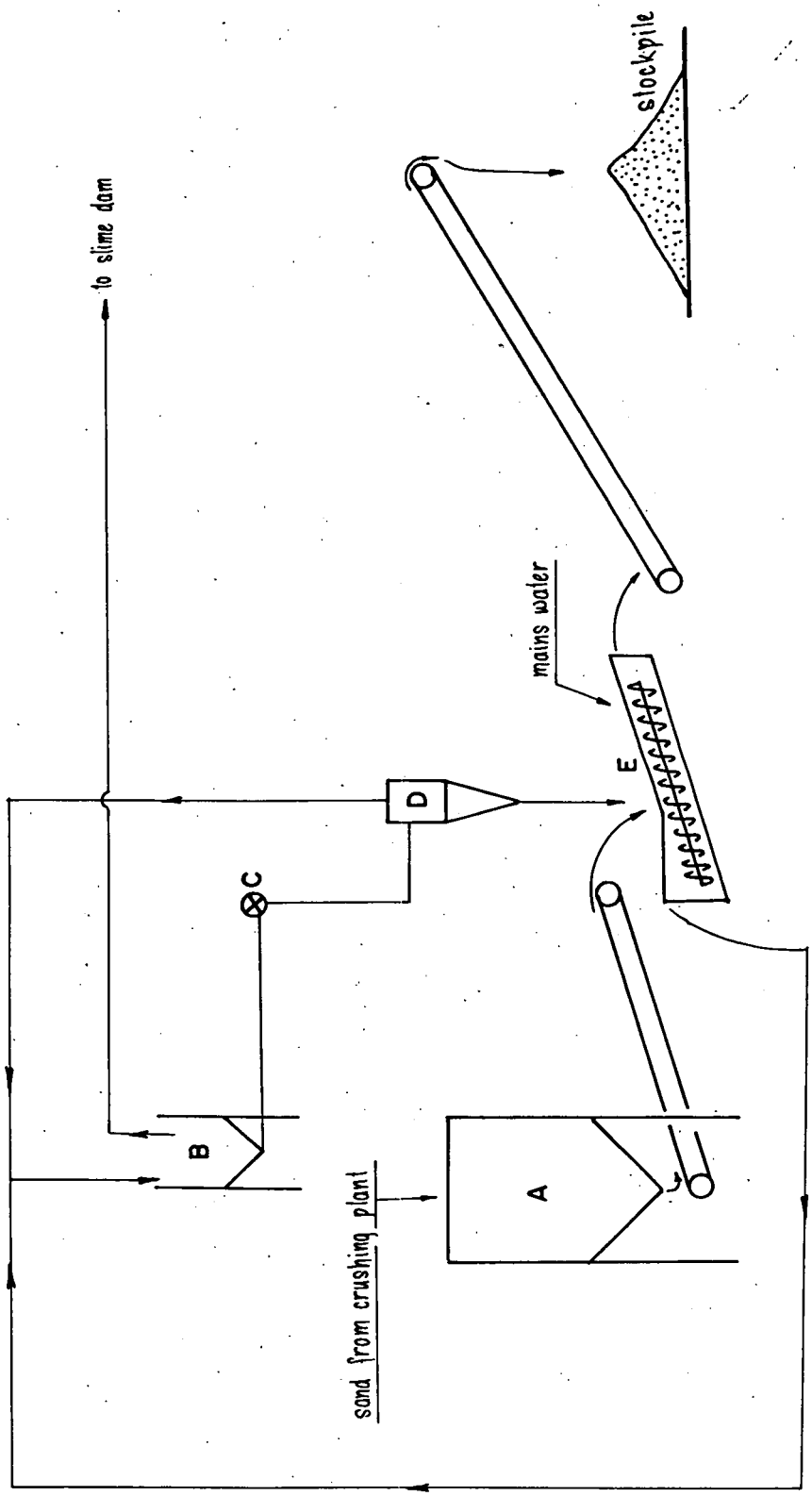
FIG. 23

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

METROPOLITAN QUARRY SURVEY
STONYFELL QUARRY
STABILIZED ROAD BASE PLANT

COMPILED J. Valentine	C.D.O. 21-4-83 DATE
DRAWN E. Calabio	SCALE not to scale
DATE August 1982	PLAN NUMBER S 16528
CHECKED	

2316



A 70 tonne sand bin
B Two 8 tonne classifier tanks
C Two Warman Sand Pumps
D 16" (400mm) cyclone
E Wemco Screw Washer

FIG. 24

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

METROPOLITAN QUARRY SURVEY
STONYFELL QUARRY
SAND WASHING PLANT

COMPILED J. Valentine	C.D.O. 21·4·83 DATE
DRAWN E. Calabio	SCALE not to scale
DATE August 1982	PLAN NUMBER S 16529
CHECKED	

2318

1. GENERAL

LOCATION: Eagle Quarry, pt. sections 922, 935, 946, 1287, hundred of Adelaide.

OPERATOR: Quarry Industries Ltd.

LOCAL ADDRESS: Mount Barker Road, Eagle on the Hill 5150
Tel. 339 1307

HEAD OFFICE ADDRESS: 333 Marion Road, NORTH PLYMPTON, 5037.
Tel. 293 2383

MINERAL TENURE: PM 5 (Land owned by Q.I.).

2. PRODUCTION

MATERIAL MINED: Quartzite, sandstone

RESERVES: (including overlying shaley sandstone) 19 million tonnes. (Townsend, 1981).

PRODUCT USES:

75 mm	rubble
40 mm	crushed rock
20 mm	crushed rock
40 mm	rubble
20 mm	rubble
20-14	screenings
	washed sand
100 mm	metal
65 mm	metal
50 mm	metal
40 mm	metal
20 mm	screenings
7 mm	screenings
225 mm	rubble

PRODUCTION RATE (1981): 63332 tonnes

WORKFORCE: 5 plus 2 trucking subcontactors.

3. HISTORY

The property was originally part of Tilley's market garden and was purchased by Mr. Mitchell of Mitchell and Holyoake, earthmoving contractors in about 1960. Installation of plant, purchased from the R.A.A.F. in Darwin and from the Radium Hill mine, began in 1963. The primary crusher began operation on 1st May 1964, producing road base material. A sand washing plant was installed in April 1964.

Quarry Industries purchased the quarry on 1st November, 1965.

4. GEOLOGY (Pl. 72,73)

The material extracted from Eagle Quarry is obtained from the Stonyfell Quartzite, a formation in the Adelaidean Burra Group, of Torrensian age. The basal Wattle Park and overlying Slapes Gully Members exposed in the quarry are folded about north and north easterly trending axes, plunging about 15° southerly. The Greenhill Member is not exposed. Two faults cross the quarry area. The east and northeasterly trending Ochre Cove fault truncates the Wattle Park Member against the underlying Woolshed Flat Shale between the quarry and crushing plant, and an easterly trending splinter fault displaces the units by 20 metres (south side down) in the quarry itself.

The Wattle Park Member comprises two quartzite units 50 (Lower) and 25 metres thick used for crushed rock screenings and metal separated by 60 metres of arkosic sandstone used for crushed rock, rubble and sand production. The Slape Gully Member is a very weathered shaley sandstone (usable for crushed rock and rubble where quartzite interbeds are more numerous).

5. MINING (Pl. 71)

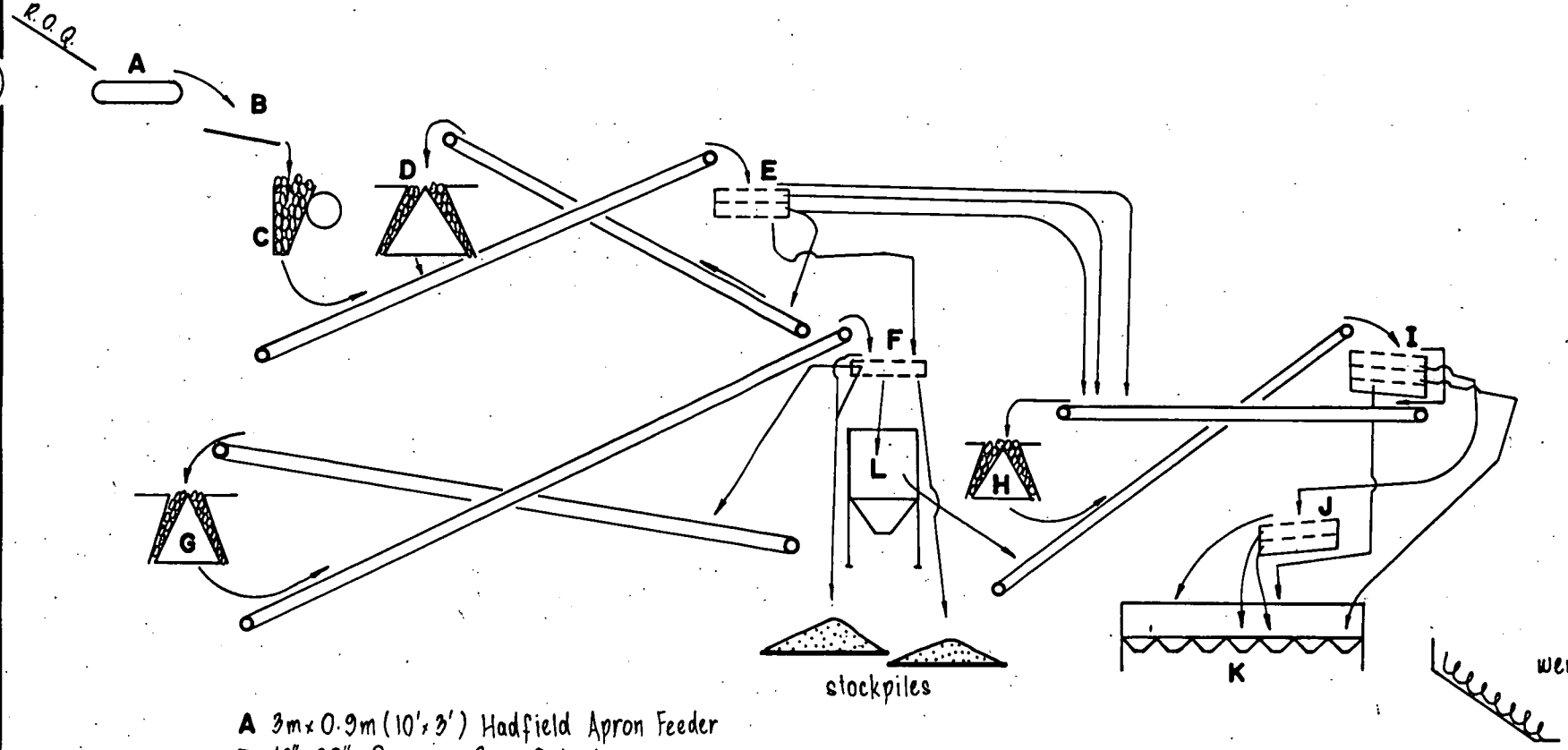
The quarry is operated intermittently with short production periods to boost stockpiles. 30-40 blastholes, 80 mm diameter, 14-17 m deep and depressed 80-85° are drilled in a rectangular 3x2.7 or 3.4 pattern. The holes are bottom-primed with 55 mm gelignite, charged with Anfo and electrically detonated.

Equipment used is as follows:

1 - Caterpillar 977 L tracked front end loader
1 - Caterpillar 966 front end loader
1 - Caterpillar 944 front end loader
1 - Albion dump truck
1 - Commer dump truck
1 - International dump truck
1 - Ingersoll Rand or Gardner Denver airtrack and compressor
1 - Drop Ball.

6. CRUSHING PLANT (Pl. 67,68,69 70 and Fig. 25)

Run of quarry material is tipped onto an apron feeder which feeds a 42/60 grizzly producing 3" (75 mm) 1½" (40 mm) and 3/4 (20 mm) rubble as undersize. Oversize is fed to a 36/24 Pegson jaw crusher which either produces 9" (225 mm) rubble or feeds a 12x5' (3.7x1.5 m) triple deck vibrating screen, in which the material is graded by changing or removing screens according to the product required. Oversize and first undersize are fed to a 3' (0.9 m) Symons gyratory crusher. Second undersize either feeds the Symons or a 2'4" (0.7 m) Traylor gyratory which returns re-crushed product to the top deck. Final undersize is fed to the Symons or to an 8x4' (2.4x1.2 m) double deck vibrating screen which produces crushed rock (one deck only used), the coarser metal sizes (4" (100 mm), 2½" (65 mm), 2" (50 mm), 1½" (40 mm))



A 3m × 0·9m (10' × 3') Hadfield Apron Feeder
B 42" × 60" Symons Bar Grizzly
C 36" × 24" Pegson Jaw Crusher
D 0·7m (2'4") Traylor Gyratory Crusher
E 3·7m × 1·5m (12' × 5') triple deck vibrating screen
F 2·4m × 1·2m (8' × 4') double deck vibrating screen
G 0·9m (3 feet) Gyrasphere Gyratory Crusher
H 0·9m (3 feet) Symons Gyratory Crusher
I Two 3m × 1·2m (10' × 4') triple deck vibrating screens
J 4·9m × 1·5m (16' × 5') double deck vibrating screen
K Bins: 6 compartments of 23m³ (30yd³) and 1 compartment of 38m³ (50yd³)
L Bin: 2 compartments of 27m³ (35yd³).

FIG.25

METROPOLITAN QUARRY SURVEY
QUARRY INDUSTRIES' EAGLE QUARRY
CRUSHING PLANT

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

COMPILED J. Valentine		MC C.D.O	21·4·83 DATE
DRAWN E. Calabio	DATE August 1982 CHECKED	SCALE not to scale	PLAN NUMBER S 16530

or feeds, (together with the Symonds product) two 10x4' (3x1.2 m) triple deck vibrating screens. Intermediate size from the double deck can be recrushed in a 3' (0.9 m) gyrasphere gyratory if required. Oversize from the two triple decks is returned to the Symons, second undersize is stored as screenings and undersize as sand. First undersize is fed to a 16x5' (4.9x1.5 m) double deck screen producing screenings and sand. Screenings produced are ¼" (7 mm), 3/8" (10 mm), ½" (13 mm) and 3/4" (20 mm). Washed sand is produced from screened sand in a Wemco screw-washer. A separate plant produces "wetmix" by mixing 8% water with 20 or 40 mm crushed rock.

7. REFERENCES

Cramsie, J.N., 1967. Quartzite Deposit - Eagle Quarry. Min. Rev. Adelaide, 121: 151-153.

Olliver, J.G., 1962. Quartzite Deposit - Part Sections 922, 935 and 946, Hundred of Adelaide. Min. Rev. Adelaide, 114: 138-140.

Townsend, I.J., 1981. The Geology of the Eagle Quartzite Quarry. Mineral Resour. Rev. S. Aust., 150: 31-38.

SMALLER OPERATIONS

Quartzite

- Tea Tree Gully Quarry, sections 1559, 5629, 5630, 5633, 5634 hundred of Yatala.

Quarrying began in the 1850's, supplying building stone and, later, material for local road construction from the Stonyfell Quartzite. From 1950, the quarry was operated by Glen Osmond Quarries Ltd., one of the companies comprising Quarry Industries Ltd. In 1971, the property was sold to the State Planning Authority, and an agreement negotiated leading to rehabilitation

and eventual closure after 10 years. 50,000 tonnes were sold in 1981 and crushing ceased in March 1982. The company is still selling from stockpiles.

QUARRY OPERATIONS

Shale

1. GENERAL

LOCATION: O'Connor's Pit. One Tree Hill, section 4357, hundred of Munno Para.

OPERATOR: P.G.H. Ceramics

LOCAL ADDRESS: One Tree Hill Road, One Tree Hill, 5114.

HEAD OFFICE ADDRESS: 11 Harrison Road, Renown Park, 5008
Tel 460291.

MINERAL TENURE: PM 88 of which about 1/6 is company-owned and the rest worked under agreement with Nyroca Stud Ltd.

2. PRODUCTION

MATERIAL MINED: Weathered Shale

RESERVES: Not known (Large)

PRODUCT USES: Brickmaking

PRODUCTION RATE (1981): 687 tonnes (Recently acquired by P.G.H., future production expected to be about 20-30,000 tonnes, annually).

WORKFORCE: 2

3. HISTORY

The deposit was first located in January 1962 by T.B. McIntosh. Quarrying of shale began on the eastern side of the deposit in May 1962. Operations were taken over in 1972 by Mineral Holdings Pty Ltd who worked the pit under agreement with the landowners, Nyroca Stud Pty Ltd. In 1981, the agreement was transferred to P.G.H. Ceramics who began carting from the deposit in January 1982. P.G.H. had previously been extracting shale from an adjacent deposit to the east, owned by Kaiser Refractories Ltd. This agreement was terminated in early 1981.

4. GEOLOGY (Pl. 74)

Basement rocks in the area consist of slate and phyllite within the Torrensian Stonyfell (Undalya) Quartzite. A long

period of weathering and erosion followed by renewed orogenic movements in the early Tertiary resulted in deposition of sand and clay. Widespread lateritization followed producing a ferruginous sandstone crust. Subsequent erosion has left the sand and clay as remnants on hilltops and ridges.

White to pale cream clay and shale is extracted from the upper bleached section of the weathered profile, which is about 12 m thick. This is underlain by a zone of weathered brown shale, about 18 m thick which grades down into less weathered material. Recent drilling by P.G.H. to the west of the present pit has disclosed a channel of plastic clay deposited as re-worked material on top of the weathered shale.

5. MINING

An elevating scraper is used to remove the thin soil and sand overburden, and then to extract the shale which is spread in layers on the stockpile. A front-end loader is then used to load trucks for cartage to the Golden Grove plant. A bulldozer is used to rip hard ground and a grader maintains the haul roads. A water truck is employed to reduce dust. Equipment used is as follows:

John Deere 860 15 yd^3 elevating scraper
Hough 60C front end loader
Caterpillar D6C bulldozer
Caterpillar 212 grader
Bedford water truck.

6. REFERENCES

Hiern, M.N., 1965. Clay Deposit - Near One Tree Hill. Min. Rev. Adelaide 118: 32-43.

Pain, A.M. and Scott, D.C., 1983. Clay and Sand Resources One Tree Hill. S. Aust. Dept. Mines and Energy report (in prep.).

1. GENERAL

LOCATION: Golden Grove, sections 5461, part 5576, 5577, 5662, hundred of Yatala.

OPERATOR: P.G.H. Ceramics.

LOCAL ADDRESS: Greenwith Road, Golden Grove.

HEAD OFFICE ADDRESS: 11 Harrison Rd, Renown Park, Tel. 460291.

MINERAL TENURE: PM206 over sec 5461, part 5576 5577, 5662, company owned
PM215 over the remainder of sec 5576, held under agreement with landowners, D.E. & D.S. Brady.

2. PRODUCTION

MATERIAL MINED: Weathered Shale

RESERVES: 12.6 million tonnes estimated (McCallum 1978).

PRODUCT USES: Brickmaking

PRODUCTION RATE (1981): 69552 tonnes

3. HISTORY

In 1958, Mineral Claims 1956, 1957, 1958, were registered over the area by B.D. Galloway, and transferred to Builders Bricks (S.A.) Pty. Ltd. the same year. In 1959 the claims were converted to Coal Leases 49, 50, 51, and in 1966 production of shale commenced from sec. 5461 and part sec. 5662. In 1970 production from sec. 5662 ceased, and all subsequent production has been from sec. 5461. In 1972 the three coal leases were sold to P.G.H. Industries Pty. Ltd. In 1974 the leases were surrendered, and PM206 was proclaimed. There has been no production from the adjacent PM215.

4. GEOLOGY (Pl. 75,76)

The western part of sec. 5461, under the brickworks, contains Tertiary sands, mainly fine grained, with some clay interbeds. The eastern margin of the Tertiary basin runs north-south through sec. 5461. To the east within sec. 5461, weathered

shale is being quarried from the Saddleworth Formation. The remainder of PMs 206 & 215 contains weathered shale, becoming less weathered to the east. Pt. sec. 5662 contains a small disused shale pit.

5. MINING

Shale is extracted by elevating and open bowl scrapers and transported at 9 loads per hour per unit on a 1.75 km round trip to stockpile. A bulldozer is used to rip the shale for the elevating scrapers and to cut haul roads and benches. The open bowl scrapers operate on unripped areas. The haul roads are constantly maintained using a grader to reduce driver fatigue and vehicle wear. Dust is controlled with a water truck.

Front end loaders are used for general plant clean up and for loading material from stockpile into the twin roll crusher and three incla pans which grid the shale prior to blending and mixing with water to form the 'green' brick body.

Equipment used is as follows:-

2 - John Deere 860 15 c. yd elevating scrapers.
1 - Terex TS14 c yd. open bowl scraper.
1 - Caterpillar 212 grader.
1 - Caterpillar D9 bulldozer.
1 - water truck.
3 - Caterpillar 950 front end loaders
1 - " 920 "
1 - Hough 65C front end loader.

6. REFERENCES

Armstrong, A.T., 1948. Report on clay and shale for brick manufacture. S. Aust. Dept. Mines report 24/39 (unpublished).

for brick clay on mineral claims held by S.A. Builders and Contractors Association at Golden Grove. S. Aust. Dept. Mines report 37/14 (unpublished).

_____, 1956. Test boring of brick shale deposit - Golden Grove. Min. Rev. Adelaide. 104:48-49, and S. Aust. Dept. Mines report 38/87 (unpublished).

McCallum, W.S. 1978. Golden Grove Construction Materials Survey Hd. Yatala Co. Adelaide S. Aust. Dept. Mines and Energy report 78/141 (unpublished).

1. GENERAL

LOCATION: Poulton's Pit, Upper Hermitage, section 5449, hundred of Yatala.

OPERATOR: Hallett Brick Industries Ltd.

LOCAL ADDRESS: Greenwith Road, Golden Grove, Tel. 251 1166.

HEAD OFFICE ADDRESS: Hallett St. Allenby Gardens, 5009. Tel 467371.

MINERAL TENURE: PM79. Land owned by company.

2. PRODUCTION

MATERIAL MINED: Weathered Shale (mainly cream)

RESERVES: Not known

PRODUCT USES: Brickmaking

PRODUCTION RATE (1981): 29022 tonnes

3. HISTORY

Property was purchased by Halletts from Mr. Poulton in 1956.

4. GEOLOGY (Pl. 77,78)

The pit lies within a large Tertiary outlier 1 km east of the main Tertiary basin. Tertiary sand and white plastic clay up to 7 m thick overlie a weathered cream and pink Adelaidean shale unit within the Torrensian Stonyfell Quartzite.

5. MINING

The shale is ripped and then scraped and stockpiled using a elevating scraper. The material is then transferred from stockpile to trucks, by front end loader and carted to the brickworks. All machinery is company-owned. Equipment used is as follows:

(used also at Golden Grove, and Denton's).

1 - Caterpillar 623 elevating scraper.

1 - Caterpillar 621 elevating scraper.

1 - Wabco scraper.

1 - Caterpillar D7 bulldozer.

1 - Caterpillar D9 bulldozer.

1 - Caterpillar 950 front end loader.

4 - Caterpillar 960 front end loaders.

6. REFERENCES

McCallum, W.S., 1978. Golden Grove Construction Materials Survey Hd. Yatala, Co. Adelaide. S. Aust. Dept. Mines and Energy report 78/141 (unpublished).

Nixon, L.G.B., 1959. White Clay Deposit, Golden Grove. Min. Rev. Adelaide 107: 27-34.

1. GENERAL

LOCATION: Golden Grove, section 5477, hundred of Yatala.

OPERATOR: Hallett Brick Industries Ltd.

LOCAL ADDRESS: Golden Grove, Tel, 251 1166.

HEAD OFFICE ADDRESS: Hallett St., Allenby Garden 5009, Telephone 467371.

MINERAL TENURE: PM 79. Land owned by company.

2. PRODUCTION

MATERIAL MINED: Weathered Shale

RESERVES: 8.4 mill. tonnes (McCallum 1978).

PRODUCT USES: Brickmaking.

PRODUCTION RATE (1981): 66926 tonnes

WORKFORCE: 2

3. HISTORY

The property was purchased by Hallett from Mr. Longmeyer in 1952 following drilling by this Department in 1951. J. Hallett and Sons commenced production in 1957.

4. GEOLOGY (Pl. 79)

A buried fault scarp, dipping steeply to the west forms the eastern margin of the Tertiary basin and trends north-south through the western part of section 5477. All of section 5477 east of the Tertiary boundary is underlain by yellow and orange weathered Adelaidean shale of the Torrensian Saddleworth Formation.

5. MINING

The shale is ripped and then scraped and stockpiled using an elevating scraper. The material is then transferred to trucks by front end loader and carted to the brickworks. All machinery is company-owned, and is as follows.

(used also at Poultons, Dentons)

1 - Caterpillar 623 elevating scraper

1 - Caterpillar 621 elevating scraper

1 - Wabco scraper

1 - Caterpillar D7 bulldozer

1 - Caterpillar D9 bulldozer

1 - Caterpillar 950 front end loader

1 - Caterpillar 960 front end loader

6. REFERENCES

Armstrong, A.T., 1948. Report on clay and shale for brick manufacture. S. Aust. Dept. Mines report 24/39 (unpublished).

Ellerton, H., 1951. Report on Golden Grove Shale. Dept. Mining, Metallurgical and Chemical Engineering, S.A. School of Mines and Industries.

_____, 1953. The brickmaking properties of shale from Golden Grove. Min. Rev. Adelaide. 98: 43-48.

McCallum, W.S., 1978. Golden Grove Construction Materials Survey, Hd. Yatala, Co. Adelaide. S. Aust. Dept. Mines and Energy report 78/141 (unpublished).

Ridgway, J.E., 1951. Brick shales, Golden Grove. S. Aust. Dept. Mines report 31/71 (unpublished).

_____, 1951. Weathered slate for brick making, Golden Grove. S. Aust. Dept. Mines report 31/123 (unpublished).

1. GENERAL

LOCATION: Birdwood, section 6397, hundred of Talunga.

OPERATOR: Kaiser Aluminium and Chemical Corporation (Australia Ltd.

LOCAL ADDRESS: Cromer Road, Birdwood, 5234.

HEAD OFFICE ADDRESS: Toogood Ave., Beverley 5009.

Tel 455677

MINERAL TENURE: EML's 4346, 4347, 4348, ML's 2917, 2951, 2994. Land is company-owned.

2. PRODUCTION

MATERIALS MINED: Kaolinitic clay-shale refractory silica, rubble.

PRODUCT USES:

Clay Products

i. M GRADE CLAY (nominally 35-40% Alumina) formerly K2 Grade - supplied to ACI - Tennant at Beverley. This, the purest kaolin, is extremely clean and white. This finely milled white clay is used as a filler in the manufacture of paper and rubber, and also in the paint-making industry.

ii. C GRADE CLAY (nominally 35% Alumina) formerly K1 Grade or R (A) Grade - Supplied to Adelaide Brighton Cement Ltd (ABC), Angaston, South Australia.

Semi-blended cream to buff coloured clay with an iron content of 0.8%. More siliceous than M Grade clay, evident when the clay is chewed. This clay is used in the production of white cement and grout.

iii. R GRADE CLAY (36% Alumina) formerly K1 Grade or R (B) Grade).

This clay is stockpiled and blended for use as a refractory grade clay at Kaiser Refractories' Beverley plant. It is similar to C Grade clay except that iron contents up to 2% are tolerated. This may occasionally

result in a slightly higher alumina content. Often, it is stockpiled during C Grade extraction when iron content becomes unsuitable for ABC. The clay is used by Kaiser Refractories Ltd as one of the basic ingredients in the manufacture of refractory bricks.

Finely milled R grade clay is used as filler in applications where pure white clay is not required, such as in rubber and vinyl, and up to 1 000 tonnes is sold to ACI - Tennant for this purpose.

Low grade, (22-27% Alumina) cream coloured micaceous and siliceous clay is found adjacent to M, C and R grade clays, both laterally and at depth, and markets are being sought for this clay.

Silica Products

i. Refractory Silica

Small quantities of clean (non iron-stained) silica are used by Kaiser for silica refractory bricks.

ii. Sand and Rubble

Local councils purchase small amounts of friable sandstone for roadmaking.

The sand is suitable for building purposes and with treatment, may be suitable for glass sand.

RESERVES

Million Tonnes indicated (Nichol, 1975)

Overburden 0.11

Waste 0.5

Silica, Quartzite 4.25

Clay-shale 3.89

PRODUCTION RATE (1981): Refractory silica - 37 tonnes

Clay-shale - 7684 tonnes.

Total production is variable and averages about 10,000 tonnes.

WORKFORCE: 4 (including manager)

3. HISTORY

The area was first mined for alluvial gold in 1870-74 south and west of the present clay pit. Underground mining of gold-bearing quartz reefs commenced in the mid 1890's, and an extensive system of underground workings developed.

Clay mining by the South Australian Portland Cement Co. Ltd. began before 1938, probably in the area of an old open cut, about 60 metres east of the present pit. The gold mining operators were also producing clay from the early 1930's.

In about 1949 D.H. Jarvis began mining clay underground and later began open cutting. By 1953, operations had moved to the area of the present pit, several adits being driven into a hillside beneath sandstone. All production has been from the present pit since opening in 1954.

In 1967, Jarvis was taken over by Newbold General Refractories who were bought out by Kaiser Refractories in 1978.

4. GEOLOGY (Pl. 80)

The operation is located in 'argillite' and quartzite of the Belair Subgroup, within the Saddleworth Formation of Sturtian age. Argillite consists of metasedimentary schist, phyllite, silty slate, and aluminous slate altered, kaolinised and bleached during the Tertiary period to white and pale-coloured clay-shale. The argillite below the weathering profile is red-brown and grey-brown in colour.

The clay-shale is overlain by friable white to pale yellow brown weathered quartzite with yellow and reddish brown iron

staining near the surface. The contact with the clay-shale is irregular and may represent an erosional unconformity. Regionally, the rocks trend north-south with moderate easterly dips, but near the quarry area the sequence is folded into a broad basinal structure. A northerly-plunging syncline is exposed in the southern face of the clay pit.

Overburden comprises ferruginous Tertiary sand, of variable thickness overlain by up to 6 m of Holocene pebbly clay.

5. MINING

Quartzite overburden is removed directly with a traxcavator, the more indurated areas being ripped or (rarely) blasted. The quartzite is stockpiled for sale as roadmaking material. Clay and silica are then extracted with the traxcavator and loaded into 15 tonne trucks for cartage to the Beverley plant.

Equipment used is as follows:

1 - Caterpillar 977L Traxcavator

2 or 3 - 15 tonne tandem-axle tippers (Scania or Inter-Acco).

6. REFERENCES

Armstrong, A.T., 1948. Clay Mine-Birdwood District. S. Aust. Dept. Mines reort 24/153 (unpublished).

Cornelius, H.S., 1938. Birdwood District. Clay Mining. Min. Rev. Adelaide. 68: 72-73.

Gaskin, A.J. and Samson, H.R., 1951. Ceramic and Refractory clays of South Australia. Bull. Geol. Surv. S. Aust., 28.

Nichol, D., 1975. Birdwood Clay and Silica Quarry, Sections 1 and 6397, hundred of Talunga County of Adelaide. S. Aust. Dept. Mines and Energy open file Env. 2648 (unpublished).

Ridgway, J.E., 1951. Birdwood Clay Deposit (D.H. Jarvis). Min. Rev. Adelaide 91: 130-133.

_____, 1953. Birdwood Clay Deposit, (D.H. Jarvis) Min. Rev. Adelaide. 95:72-74.

Tavydas, R., 1969. Birdwood White Clay Deposit. Mineral Resour. Rev. S. Aust., 130:138-151.

Wade, M.L., 1954. Birdwood White Clay Deposit - Progress Geological Report. Min. Rev. Adelaide. 97: 34-37.

1. GENERAL

LOCATION: Mitchell's pit, Houghton, sections 545 and 5541, hundred of Yatala.

OPERATOR: P.G.H. Ceramics.

LOCAL ADDRESS: North East Road Houghton.

HEAD OFFICE ADDRESS: 11 Harrison Road, Renown Park, Tel. 460291.

MINERAL TENURE: PM57. Worked under agreement with landowner, E.W. Mitchell.

2. PRODUCTION

MATERIAL MINED: White Shale

RESERVES: 104,000 tonnes (Keeling 1979)

PRODUCT USES: Brickmaking

PRODUCTION RATE (1981): 15778 tonnes

WORKFORCE: 2 (contractors)

3. HISTORY

N. Chamberlain opened the deposit in 1952. A private agreement between Wilmington Mining Pty. Ltd. and the landowner, E.W. Mitchell lapsed in 1972. An application for a Private Mine was subsequently made by Mitchell and following the granting of Private Mine 57 on 1-3-73, the current agreement was negotiated with P.G.H. Industries Ltd.

4. GEOLOGY (Pl. 81,82)

The white shale is contained within a sequence of Adelaidean grey orange and brown siltstone and shale with minor thin sandstone beds which occur within a northeasterly trending anticline. The white shale is exposed on the upthrown side of the faulted eastern limb on the eastern side of the pit. The white shale is overlain by dark grey shale which is also suitable for brick manufacture but requires selective removal of interbedded sandstone.

The faulted contact of the white shale against kaolinitic sandstone (?Aldgate Sandstone) is marked on the eastern side of the pit by a 1-2 m wide shear zone containing green ?chloritic shale, which has been responsible for collapse of the eastern face when wet.

5. MINING

The pit is worked for P.G.H. under contract by K. Levett. The shale is ripped and bulldozed from the top of the pit from two directions at an angle to the strike forming a blended stockpile adjacent to the southern face. Another contractor (E. Ross) then transfers the material with a front end loader into trucks for cartage to the company's Golden Grove plant. Equipment used is as follows:

1- 33 Challenger bulldozer (Levett) (equivalent to D7).

1 - Hough 60 C. International rubber tyred 1 3/4 c. yd front end loader.

6. REFERENCES

Ellerton, J., 1956. The Blending of alluvial clay from Hindmarsh with a weathered shale from Houghton. Min. Rev., Adelaide, 99: 35-50.

Keeling, J.L., 1980. Mitchell's Houghton Clay Pit (Private Mine 57), Section 5541 hd. Yatala (P.G.H. Industries Ltd.). S. Aust. Dept. Mines report 79/158 (unpublished).

Nixon, L.G.B., 1958. White Clay Deposit - Section 5399, Hundred of Yatala. Min. Rev., Adelaide, 105: 79.

Russ, P.J. and Tarvydas, R.K., 1969. Anstey Hill White Clay Deposit. Min. Rev., Adelaide, 126: 97-100.

1. GENERAL

LOCATION: Anstey Hill, sections 5404, 5399, hundred of Yatala.

OPERATOR: P.G.H. Ceramics.

LOCAL ADDRESS: Lower North East Road, Anstey Hill.

HEAD OFFICE ADDRESS: 11 Harrison Road, Renown Park, Tel, 460291.

MINERAL TENURE: EML 3200-2 company owned.

PM201 held under agreement with landowner C.J. Curtis.

2. PRODUCTION

MATERIAL MINED: White weathered shale

RESERVES: 3.2 million tonnes on EML,

1.6 million tonnes on PM201 (company estimates Nov. 1981).

PRODUCT USES: Cream bricks

PRODUCTION RATE (1981): 74,317 tonnes. (Some sold to Hallett Brick Industries Ltd.)

WORKFORCE: 6

3. HISTORY

The pit was opened in 1953 and operated by the two Francis brothers until sold to P.G.H. in 1981.

4. GEOLOGY (Pl. 83,84)

White grey and pale yellow weathered Woolshed Flat Shale of Torrensian age dips up to 70°E on the eastern limb of a northerly-trending ancticline. Friable sandy shale and harder shaly sandstone form lenses within the weathered shale. Pyritiferous and cupriferous quartz veins parallel the bedding.

5. MINING

The shale is ripped by bulldozer (D7E) and then scraped across strike by elevating scrapers forming a layered stockpile from which trucks are loaded by front end loader. The D7E is also used for stockpile control. Quartz veins and harder shaley sandstone layers are ripped with the D6 (or blasted in the

southern part of the pit), and the product sold to the Gumeracha Council for roadmaking. The D6 is also used in maintenance of batters on benches. Shale is loaded with a Caterpillar front end loader and trucked by contractors (Francis Bros) to Golden Grove. Equipment used is as follows:

1 - John Deere 860A 15¢ yd. elevating scraper.

1 - Wabco 11 c. yd. elevating scraper.

1 - Caterpillar D7E bulldozer.

1 - Caterpillar D6C bulldozer.

1 - Water truck.

1 - Caterpillar 950 front end loader.

6. REFERENCES

Ellerton, H., 1956. Anstey Hill Shale. Min. Rev. Adelaide 99: 44-48.

Russ, P.J. and Tarvydas, R.K., 1969. Anstey Hill White Clay Deposit - Min. Rev. Adelaide 126: 97-100.

1. GENERAL

LOCATION: Hallett's Cherry Gardens Shale Pit, sections 785 and 1080, hundred of Noarlunga.

OPERATOR: Hallett Brick Industries Ltd.

LOCAL ADDRESS: Cherry Gardens Road, Cherry Gardens

HEAD OFFICE ADDRESS: Hallett St, Allenby Gardens, 5009. Tel. No. 46 7371. Shale used at Lonsdale plant, Aldenhoven Rd, Lonsdale, 5160 Tel. No. 382 5799.

TENEMENT NOS.: PM 47. Land owned by company.

2. PRODUCTION

MATERIAL MINED: Yellow, white and grey weathered shale.

RESERVES: Not known.

PRODUCT USES: Brickmaking

PRODUCTION RATE (1981): 13 430 tonnes.

WORKFORCE: 1 plus truck and scraper drivers.

3. HISTORY

Sections 781 and 784, to the west of the present pit, were originally worked for red plastic clay by the Standard Tile Co. in the 1920's, and later by the Hallett Brick Co. (This area is now being rehabilitated by the landowner, Mr. K. Brumby using topsoil stockpiled for the purpose during early operations.)

On 5/6/56, Halletts bought section 785 and part of 1080, to the east of the original pit, from Mr. S. Hicks, a relative of Mr. Brumby, and began stripping small quantities of plastic clay for use at their Allenby Gardens plant. Private Mine 47 was subsequently proclaimed on 1/3/73. Small-scale mining continued until the company purchased the ailing Southern Brick Co's plant at Lonsdale in 1979, and began larger scale extraction of the underlying shale.

4. GEOLOGY (Pl. 85)

The pit is located in an east-west gully underlain by green and grey shale of the Saddleworth Formation, dipping at a shallow angle to the southwest. Eluvial red plastic clay overlies yellow, moderately plastic weathered shale on the lower slopes of the gully. Depth of weathering and plasticity are variable, necessitating careful blending. Relatively fresh grey shale crops out in the east of the workings. The higher, northern slopes of the gully are underlain by bleached white shale which is stockpiled and used seperately.

5. MINING (Pl. 86)

Shale is extracted by scraper and spread in layers on the stockpile. The yellow weathered shale originally extracted was found to have too high a shrinkage for brickmaking and is now blended with less plastic material from other less weathered sections of the pit. Shale is loaded from the stockpile into company owned trucks by front end loader, operated by a contractor (K. Brumby).

Equipment used includes:

Caterpillar elevating scrapers (company owned)
Hough Payloader front end loader (contractor)
Caterpillar 933 traxcavator (contractor)

1. GENERAL

LOCATION: Baker Gully, section 748, 763 hundred of Kuitpo.

OPERATOR: Mineral Holdings Pty. Ltd.

LOCAL ADDRESS: Baker Gully Road, Clarendon 5157.

HEAD OFFICE: 362 Magill Road, Kensington Park. Tel 3322299.

MINERAL TENURE: PM220. Worked under agreement with landowner, J.B. Smart.

2. PRODUCTION

MATERIALS MINED: Red and white weathered shale filling sand and loam.

RESERVES: 2.2 million tonnes of weathered shale including inferred 600,000 tonnes of low alkali shale, 100,000 tonnes filling sand, 38,000 tonnes loam. (Keeling, 1980).

PRODUCT USES: Brickmaking, cement manufacture, filling.

PRODUCTION RATE (1981): 79295 tonnes shale.

WORKFORCE: 2

3. HISTORY

The deposit was drilled by Mineral Holdings in 1973 and Private Mine 220 was granted on 10th January 1974. Approval to commence mining was granted on 9th May 1975 and the material mined until 1979 was sold to Southern Bricks Pty Ltd (now owned by Hallett Brick Industries Ltd). Following successful testing of shale by Adelaide Brighton Cement Ltd in 1979 drilling and sampling were carried out in the northern part of the Private Mine. Permission to extend the mining area was withheld pending rehabilitation of part of the existing workings.

4. GEOLOGY (Pl. 87,88)

The pit lies at the northern extremity of the Willunga Embayment, a wedge of Cainozoic sediments deposited to the northwest of the Willunga Fault. The weathered shale is correlated with Adelaidean Belair Subgroup in the upper part of the Burra Group of Sturtian age. The shale is finely laminted

and shows marked colour variations with increased leaching from olive brown through yellowish brown, red and purple to grey and white. The deposit is located on the northwestern limb of a broad southwesterly plunging syncline with limbs dipping up to 45°. Dips within the pit area range from 18-50° east and south, depending on local flexing of the beds.

Tertiary deposits of clayey gravel to fine silty sand overlie the weathered shale over half of the Private Mine, reaching thicknesses in excess of 15 m in the west and northwest. Reworking has produced white and yellow sandy loam at the surface.

5. MINING

The weathered shale is extracted with a self-loading scraper and successive loads spread in layers on a stockpile. A front end loader then transfers loads, taken by vertical scraping of the stockpile, to a screen which rejects plus 4" (100 mm) material. Undersize passes to a stacker prior to loading of trucks. Installation of a 20 tonne hopper below the screen with a belt feeder to load trucks, is in progress. Equipment used is as follows:

1 - John Deere 860, 16c yd. scraper

1 - Michigan rubber - tyred 3½ c yd. front end loader

1 - Caterpillar backhoe (for cleaning out silt dam)

1 - Watertruck

6. REFERENCES

Bishop, G.C., 1980. Quarrying in the Mount Lofty Ranges - a case history - Baker's Gully Quarry, Clarendon. Report prepared for the District Council of Meadows. S. Aust. Dept. Mines and Energy open file Env. 3765 (unpublished).

Keeling, J.L., 1980. Baker Gully Shale Deposit (Private Mines 220). Sections 748 and 763 Hd. Kuitpo (Mineral Holdings Ltd). S. Aust. Dept. Mines and Energy report 80/112 (unpublished).

1. GENERAL

LOCATION: Pedlar Creek Shale, section 139, hundred of Willunga.

OPERATOR: The Readymix Group.

LOCAL ADDRESS: Main South Road, Maslins Beach, Tel. 3833181.

HEAD OFFICE ADDRESS:100 Greenhill Road, Unley 5061, Tel. 2721122.

MINERAL TENURE: PM244 worked under agreement with landowner, Malbray Pty. Ltd.

2. PRODUCTION

MATERIAL MINED: Weathered shale.

RESERVES: 0.5 million tonnes (inferred)

PRODUCT USES: Brickmaking

PRODUCTION RATE (1981): 58959 tonnes (Sold to Hallett Brick Industries)

WORKFORCE; 5 (incl. sand pit).

3. HISTORY

Mining commenced early in 1978 following drilling by Readymix and subsequent testing by Halletts.

4. GEOLOGY (Pl. 89,90)

The pit is sited within weathered Marinoan shale of the Adelaide System. The shale is purple and grey, bleached white and yellow at the surface and interbedded with fine sandstone beds on the eastern side of the pit. The sequence is gently folded about N-S axes and dips 20-35° towards the south to southeast in the pit area. The contact with the overlying North Maslin Sand Member is exposed in the southern and western pit faces.

5. MINING

The shale is ripped with a bulldozer and the vari - coloured material blended into a stockpile to minimise inconsistencies in quality which would make it unsuitable for mechanized brickmaking. The shale is then front end - loaded onto trucks

for transport to the plant. Overlying sand is washed at the adjacent plant for construction purposes.

Equipment used is as follows:

1 - Komatsu D155A bulldozer, equivalent to D7 (also used at nearby sand pits)

1 - Caterpillar 950 Front end loader.

SMALLER OPERATIONS

Shale

- Sandy Creek Shale, sections 720, 726 hundred of Barossa

E.M.L. 4506 over white weathered Woolshed Flat Shale was granted to the landowner, D.A. Kries in March, 1976. L. R and M. Sands worked there until they sold to Quarry Industries in 1979. 300 tonnes were extracted in 1981.

- Kaiser Refractories Ltd., One Tree Hill - sections 4357, 4363, 6381, hundred of Munno Para. PM 133 EML 4493.

The material extracted at this pit is from a weathered shale and phyllite unit within the Torrensian Stonyfell (Undalya) Quartzite.

The operation was opened in 1964 by George Denton Ltd as a source of weathered shale and white plastic clay for brickmaking and refractories manufacture. Newbold General Refractories took over in 1974 and Kaiser Refractories acquired the operation in 1978.

Shale was sold to P.G.H. for brickmaking (32000 tonnes in 1981). P.G.H. have since begun operating the shale pit to the west of Kaiser's deposit, formerly operated by Mineral Holdings. Kaiser currently extracts small quantities of refractory plastic (bond) clay from PM133 for use at their Beverley plant. Remaining indicated reserves on PM133 are 76000

tonnes of clay beneath 204,000 tonnes of Tertiary sand overburden. A further 150,000 tonnes are inferred to the south on EML 4493, underlain by weathered shale and overlain by 400,000 tonnes of Tertiary sand of marginal building quality.

References

Callender, J.H., 1981. One Tree Hill Clay Quarry - Geological and Mining Report - for Kaiser Refractories. Dept. Mines and Energy open file Env. 2619 (unpublished).

Mason, M.G., 1968. Clay and Sand Deposit - One Tree Hill. Min. Rev. Adelaide 124: 118-125.

Pain, A.M. and Scott, D.C., 1983. Clay and Sand Resources, One Tree Hill. S. Aust. Dept. Mines and Energy report (in prep).

- P.G.H. Ceramics (Acmil Industries) section 4, hundred of Talunga E.M.L.'s 3611, 4376.

This deposit was opened in 1971 by City Bricks Ltd who were bought out by P.G.H. in early 1972. The material is won from weathered kaolinized schist and sandy siltstone of the Belair Subgroup. Production averaging 4500 tonnes annually has declined markedly since 1979.

- Fargo Earthmovers, section 1, hundred of Talunga EML 3601.

The deposit was opened by F.F. Bradford in May 1943 in weathered kaolinized schist and siltstone of the Belair Subgroup. The deposit was taken over in April 1946 by the Littlehampton Brick Co. who ceased production in 1967. Fargo Earthmovers began working the deposit for brick clay in 1970. Production averaging 2500 tonnes annually had declined to 230 tonnes in 1981.

- Hallett Brick Industries, sections, hundred of Talunga EML 3410.

This deposit was opened by Hallett's in 1964 in bleached, kaolinised siltstone and schist of the Belair Subgroup. Average annual production of 3500 tonnes has declined to about 600 tonnes annually since 1978.

- Hallett Brick Industries, section 6396, hundred of Talunga EML's 4702, 4703, PM231.

Kaolinised schist and siltstone of the Sturtian Belair Subgroup was discovered on this sit ein the mid 1920's and later worked by the Littlehampton Brick Co. Hallett's began working the deposit in 1974. Production averages about 6500 tonnes annually.

Reference

Gaskin, A.J. and Samson, H.R., 1951. Ceramic and Refractory Clays of South Australia. Bull. geol. Surv. S. Aust. 28.

Jack, R. Lockhart, 1926. Clay and Cement in South Australia. Bull. geol. Surv. S. Aust. 12:65.

- Inglewood Brick Co. section 5551, hundred of Para Wirra. PM141.

The operation was established by Adelaide Industries in 1973 and sold to the Inglewood Brick co. in 1977. The material is a weathered feldspar-actinolite rock of the Lower Proterozoic Barossa Complex and is used on site to make clinker bricks. Annual production rarely exceeds 4000 tonnes.

- P.G.H.'s Glen Osmond and Crafers Shale Pits, sections 1079 961 hundred of Adelaide, PM's 58, 59 respectively.

Both these operations closed in 1980 and are being rehabilitated.

References

- Glen Osmond

Armstrong, A.T., 1948. Report on estimates for clay slate brickmaking at Glen Osmond, Hd. Adelaide. Dept. Mines S. Aust. report 23/157 (unpublished).

Armstrong, A.T., 1949. City Bricks Ltd. Estimate of clay-slate available for brick making purposes. Part Section 1079, Hd. Adelaide. Min. Rev. Adelaide, 90:177-184.

Ellerton, H., 1951. Glen Osmond shale and its value in the building brick industry. Joint investigation of the C.S.I.R.O. and S.A. School of Mines and Industries. Min. Rev. Adelaide, 95: 30-40.

Jack, R. Lockhart, 1926. Clay and Cement in South Australia. City Brick Limited, Sec. 1079, Hd. Adelaide. Bull. geol. Surv. S. Aust., 12:50-52.

McCallum, W.S., 1977. Glen Osmond Shale Quarry Sec. 1079 Hd. Adelaide (PM58 - P.G.H. Industries Pty. Ltd.) Dept. Mines S. Aust. report 77/30 (unpublished).

Ridgway, J.E., 1948. Clay slate deposits for brickmaking. City Bricks Ltd. lease at Glen Osmond. Dept. Mines S. Aust. report 23/159 (unpublished).

Valentine, J.T., 1974. Glen Osmond Shale Deposits. Mineral Resources Rev. S. Aust. 136: 79-81.

- Crafers

Ellerton, H., 1955. Crafers shale. Joint investigation of the C.S.I.R.O. and the S.A. School of Mines and Technology. Min. Rev. 102: 48-51.

Gibson, A.A., 1955. Brick clay deposit near Crafers section 961, Hd. Adelaide. Dept. Mines unpublished report, RB 39/47.

McCallum, W.S., 1977. Crafers Shale Quarry. Section 961, Hd. Adelaide Co. Adelaide (PM59 - P.G.H. Industries Pty. Ltd). Dept. Mines s. Aust. report 77/32 (unpublished).

O'Driscoll, E.P., 1960. Report on Groundwater Prospects Pt. sec. 961, Hd. Adelaide, City Bricks Ltd. Dept. Mines S. Aust. report 51/57 (unpublished).

Shepherd, R.G., 1954. Preliminary report on a shale deposit, section 961, Hd. Adelaide. Dept. Mines S. Aust. report 38/102 (unpublished).

- Littlehampton Brick Co., sections 4483, 4484, 5009, hundred of Macclesfield. PM82.

Clay mining began on this site in about 1885 and production has exceeded 15000 tonnes per annum during periods of high demand. Present annual production is 3-4000 tonnes.

A variety of raw materials are obtained from weathered phyllite and slaty schist of the Saddleworth Formation. Orange plastic alluvial clay is blended with underlying grey and brown weathered phyllite to make light medium and dark red house bricks. Plastic fireclay is blended with the grey weathered phyllite to produce brown light cream and medium cream house bricks, and with Birdwood kaolin to produce firebricks. Reserves are not known.

References

Cornelius, H.S., 1933. The Nairne and Littlehampton Brickworks. Reports by the Inspector of Mines and Quarries. Min. Rev. Adelaide. 58:56-57.

Jack, R. Lockhart, 1926. Clay and Cement in South Australia. Bull. geol. Surv. S. Aust. 12:87-88.

Willington, C.M., 1953. Survey of the Brick Manufacturing Industry in South Australia. Min. Rev. Adelaide. 94:113-114.

_____, 1954. The Brick Manufacturing Industry in South Australia. During 1954 with Particular reference to Raw Material Resources. Min. Rev. Adelaide. 101:88-112.

- C.S.R.'s (Wunderlich's) Cherry Gardens Clay - Shale Pit, sections 347, 783, 786 hundred of Noarlunga PM30.

This operation produces alluvial plastic clay and weathered shale derived from the Torrensian Saddleworth Formation. The pit was opened in the early 1920's by Wunderlichs which became a subsidiary of C.S.R. in 1969. The company began trading as C.S.R. Ltd in 1978, producing up to 10,000 tonnes of clay and shale annually.

The tile factory at Edwardstown ceased operation in 1982. The pit is now being operated by Readymix, another subsidiary of C.S.R., who are currently seeking markets for the material.*

* 8 000 tonnes sold to Adelaide Brighton Cement Ltd in 6 months ending December 1982.

References

Ellerton, H., 1962. An Investigation into Raw Materials for the Manufacture of Roofing Tiles in South Australia. Min. Rev. Adelaide., 113:37-55.

Jack, R. Lockhart, 1926. Clay and Cement in South Australia. Bull. geol. Surv. S. Aust. 12:64.

Nixon, L.G., 1956. Tile Clay Deposit, sec. 786, Hd. Noarlunga, Co. Adelaide. Dept. Mines S. Aust. report 43-14 (unpublished).

Russ, P.J., 1968. Cherry Gardens Clay Deposit - Drilling Min. Rev. Adelaide. 24: 107-110.

QUARRY OPERATIONS

Clay

1. GENERAL

LOCATION: Dreckow's Pit, section 5470, hundred of Yatala.

OPERATOR: Clay and Mineral Sales Pty Ltd.

LOCAL ADDRESS: Hancock Road, Golden Grove 5125.

HEAD OFFICE: 362 Magill Road, Kensington Park, 5068. Tel. 332299

MINERAL TENURE: PM56. Land owned by company

2. PRODUCTION

MATERIALS MINED: White plastic clay and sand.

RESERVES: 4.3 million tonnes with a clay to overburden ratio of better than 2:3. A further million tonnes beneath thick overburden. (McCallum, 1978). Further reserves are available to the west on the other side of Hancock Road (Scott 1981).

PRODUCT USES: The major source of white plastic brick clay in Adelaide. Sand for filling.

PRODUCTION RATE (1981): 29026 tonnes clay, 377 tonnes sand

WORKFORCE: 4 + subcontractors

3. HISTORY

Clay and Mineral Sales commenced production in 1963 following purchase of the property from Mrs. Dreckow.

4. GEOLOGY (Pl. 91)

The Golden Grove Tertiary basin, developed within shale and quartzite of Adelaidean age, contains a sequence of interbedded gravel, sand, silt and clay deposited in a fluvio-lacustrine environment. Dreckow's pit lies near the western boundary of the basin where up to 25 m of basal Tertiary plastic clay is overlain by about 13 m of filling sand. The clay is generally white, cream or pale grey but ranges to pale pink, orange and purple and is slightly silty with occasional sandy interbeds. The clay bed deepens to the north and east, shallows and wedges out over

rising weathered bedrock shale to the west of Hancock Road (outside of PM56) and lenses out within sand and gravel beds to the south.

5. MINING

Fine sand overburden is removed with an elevating scraper. The majority of this material is spread in worked out sections of the pit and a small amount stockpiled for sale as filling sand. The clay is scraped from the face with a backhoe and loaded directly onto trucks for cartage to the brick plants. A Ruston Bucyrus face shovel is used (approximately 5% of the time) during servicing of the excavator. Equipment used is as follows:

1 - JD 860 scraper

1 - Caterpillar 225 backhoe (also used at McLaren Vale

1 - Ruston Bucyrus face shovel

6. REFERENCES

Scott, D.C., 1981. Test Drilling Clay Deposit Hancock Road, Golden Grove Section 2146 hundred Yatala, County, Adelaide S. Aust. Dept. Mines report 81/61 (unpublished).

McCallum, W.S., 1978. Golden Grove construction materials - Hd. Yatala Co. Adelaide S. Aust. Dept. Mines report 78/141 (unpublished).

1. GENERAL

LOCATION: McLaren Vale, section 97, hundred of Willunga.

OPERATOR: R. Fricker and Co. Pty. Ltd.

LOCAL ADDRESS Oliver Road, McLaren Vale.

HEAD OFFICE ADDRESS: 362 Magill Road, Kensington Park, Tel. 3322299.

MINERAL TENURE; PM279. Worked under agreement with landowners, H.H. and K.D. Oliver.

2. PRODUCTION

MATERIALS MINED: Cream and pink plastic clay, filling sand.

RESERVES: 850,000 tonnes white clay, 240,000 tonnes coloured clay, 740,000 tonnes filling sand, 890,000 tonnes overburden (Keeling, 1981).

PRODUCT USES: Brick clay, pottery clay, filling sand.

PRODUCTION RATE (1981): 12136 tonnes clay, 3868 tonnes sand.

PRODUCT DESTINATION (Clay): Hallett Brick Industries, Lonsdale.

WORKFORCE: 2

3. HISTORY

The proposed construction of a new brickworks at Lonsdale and subsequent reconnaissance drilling by R. Fricker and Co. resulted in discovery, in 1974, of white plastic and semi-plastic clay north of McLaren Vale.

Mining commenced in 1976 following close auger drilling and successful application for zoning change to extractive industry.

4. GEOLOGY

The deposit is located near the northwestern margin of the Willunga Embayment. Plastic clay, has been deposited as discontinuous lenses within the cross bedded fine to coarse grained clayey sand and silt of the Middle Eocene North Maslin Sand Member. Two lenses are currently exposed; an upper pale yellow brown lens up to 3.6 m thick and the lower (main) white to

pale green lens averaging 5 m thick which becomes pink, brown and purple in the south of the deposit. Both lenses thin rapidly at their margins. Sources of contamination are fine white sand and silt which underlie the margins of the clay lenses, iron staining on joint faces and red sand infilling desiccation cracks in the upper 1 to 2 m of the lower lens.

5. MINING (Pl. 93)

Sand overburden is removed using John Deere 860 scraper dry screened on a ¼" screen and sold as filling. Clay is extracted with a backhoe and loaded directly onto trucks. A rubber tyred front end loader is used to pick up backhoe spillage, for general cleaning up, and for feeding the dry screening plant. Equipment used is as follows:

John Deere 860 scraper

Caterpillar 225 backhoe (also used at Dreckows)

Caterpillar or Michigan rubber tyred front end loader.

6. REFERENCES

Fricker R & Co. Pty Ltd, 1975. Mining and rehabilitation proposal, McLaren Vale clay deposit Rept. submitted to State Planning authority (unpublished).

Keeling, J.L., 1981. McLaren Vale White Clay Deposit (Private Mine 279) section 97, hd Willunga (R. Fricker and Co. Pty Ltd). S. Aust. Dept. Mines report 81/56 (unpublished).

SMALLER OPERATIONS

Clay

- Sandy Creek Plastic Clay, sections 475, 476 hundred of Barossa, PM94.

In 1972, sections 475 and 576 hundred at Barossa were being worked for white shale of the Saddleworth Formation by Barrey's

Bricks whose plant was located at Torrensville. In April 1973, PM94 was granted to the landowners to A.J. and M.N. Geue, and an agreement to work the deposit negotiated with Mineral Holdings Pty Ltd. Recent production has been from a small deposit of overlying plastic clay (900 tonnes in 1981).

Reference

Scott, D.C., 1980. Test Drilling Clay/Sand Deposit near Sandy Creek - PM274 Section 68, hundred of Barossa county Adelaide. S. Aust. Dept. Mines and Energy report 80/41 (unpublished).

- Clay and Mineral Sales', Meadows Plastic Clay Pit, section 340 E, hundred of Kuitpo. EML 4426.

This lease was granted to the landowner, R.G. Bailey in April 1975. The deposit is located in Tertiary yellow plastic clay, and was worked from 1976 producing about 11,000 tonnes annually. Production ceased in 1979, and the lease was cancelled in November 1981.

QUARRY OPERATIONS

Sand

1. GENERAL

LOCATION: Rowland Flat, sections 845, 1619, 1620 hundred of Nuriootpa.

OPERATOR: Monier Ltd, Tel. (085) 244558

LOCAL ADDRESS: Golf Links Road, Rowland Flat.

HEAD OFFICE ADDRESS: Blakeney Road, Ottoway Tel. 471066

MINERAL TENURE: PM93, 192, 196. Land owned by company.

2. PRODUCTION

MATERIAL MINED: Sand

PRODUCT USES: Concrete Sand
Washed filling
Plastering Sand
Dry screened bricklaying Sand

RESERVES: 5.1 million tonnes beneath 1.4 million tonnes overburden (Olliver, 1964).

PRODUCTION RATE (1981): 32501 tonnes

WORKFORCE: 2

Markets mainly local plus Riverland, Clare, Murray Bridge. Bricklaying and plastering sand supplied to Monier Gawler.

3. HISTORY

The deposit was opened by H.R. Roesler in 1960 and a washing and dry screening operation established. In 1977, Monier purchased the property and installed a modernized washing plant. In 1980 the company acquired an adjacent sand washing operation, formerly operated by C.R. Huepauff but has yet to extract sand from the site.

4. GEOLOGY (Pl. 97,98,99)

Overburden comprising Recent fine sand, brown gravelly clay and laminated clayey silt and fine sand overlies varicoloured Tertiary (Oligo-Miocene) sand and gravel upto 25 metres thick. A

thin lateritic gravel bed at the base overlies 5 metres of silty and sandy clay with a basal ferruginised gravel bed. This overlies undulating weathered Adelaidean basement comprising white laminated clayey sandstone and sandy clay with heavy mineral banding.

5. MINING

Washing plant feed is mined from the southern pit by contractors using scrapers, and stockpiled near the chute. A bulldozer is used to clear overburden and to flatten windrows left by the scrapers. Trommel oversize is carted for backfilling by truck. Dry screening feed is mined from the northern pit by traxcavator and contract - carted to the chute by 10 tonne truck. The bricklaying sand is stockpiled by front end loader. Equipment used is as follows:-

1 - Wabco or Michigan 15 c. yd. scraper
1 - Hough H-70 2 c. yd. front end loader
1 - Euclid 2 c. yd. front end loader
1 - Caterpillar 955 traxcavator
1 - Caterpillar D6 bulldozer
1 - BMC Dump truck, 5 tonne

6. PROCESSING (Pl. 95,96 and Fig. 26)

a. Washing Plant

Sand, fed by front end loader into a steel chute, is sluiced by overhanging water jets into a 8' x 3' (2.4 x 0.9 m) trommel screen, (½" (13 mm) aperture for concrete sand 3/8" (10 mm) for plaster sand) oversize from which is used as backfilling material. The trommel undersize falls to a cone washing rank, underflow from which is pumped to an 18" (460 mm) cyclone and the spigot product stockpiled as concrete (or plaster) sand. Cyclone overflow is returned to the tank, overflow from which proceeds to

a second cone tank. This feeds a 12" (305 mm) cyclone, underflow from which is stockpiled as washed filling and overflow returned to the second tank. Overflow from the second tank is pumped to a slimes dam and is periodically dug out and dumped. Decanted dam water is re-cycled and, together with water from the North Para River (winter) and bore water (summer), makes up the 10,000 gallons per hour needed to run the plant.

Plant capacity is 30 tonnes per hour.

b. Dry Screening Plant

Sand is fed from front end loader onto an inclined vibrating steel chute equipped with a manually controlled hydraulic feeder gate. The sand passes through the gate onto a ½" (13 mm) 8' x 3' (2.4 x 0.9 m) vibrating screen. Oversize comprising clay lumps is rejected and undersize stockpile as bricklayers sand.

Plant capacity is 40 tonnes/hour. Plant used only between November and March to form a stockpile for use during winter months.

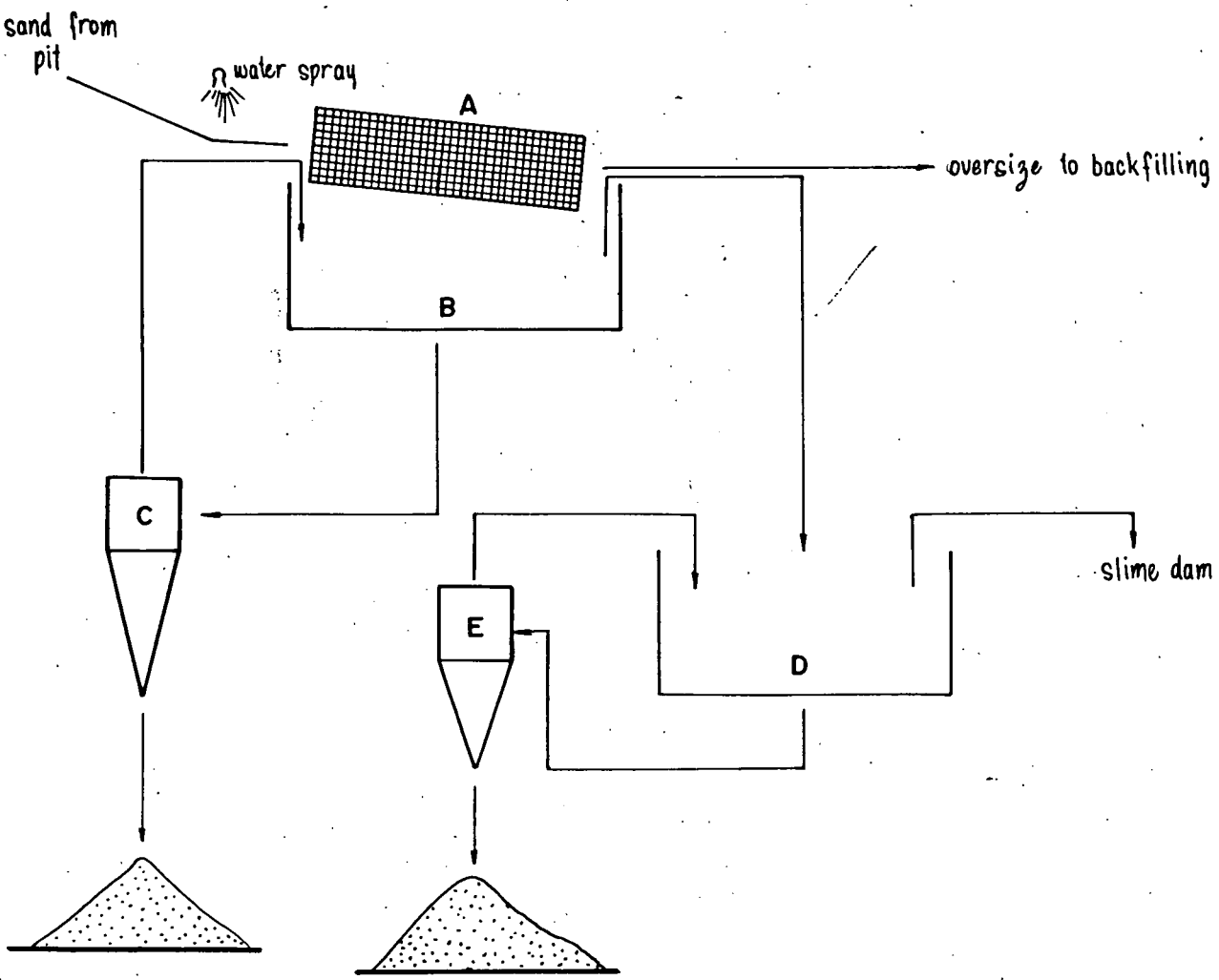
7. REFERENCES

Olliver, J.G., 1967. Test Boring Rowland Flat Sand Deposit. Min. Rev. Adelaide 121: 144-150.

Olliver, J.G. and Weir, L.J., 1967. The Construction Sand Industry in the Adelaide Metropolitan Area. Rep. Invest. geol. Surv. S. Aust., 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 76/109 (unpublished).

Weir, L.J., 1962. Flowsheet Design and Specification of Plant Equipment for Sand Deposit at Rowland Flat. Min. Rev. Adelaide 114:127-130



A 8' x 3' (2·4m x 0·9m) trommel screen, ½" (13mm) or ⅜" (10mm)
B First cone tank
C 18" (460mm) cyclone
D Second cone tank
E 12" (305mm) cyclone

FIG. 26

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

COMPILED J. Valentine	21·4·83 C.D.O DATE
DRAWN E. Calabio	SCALE not to scale
DATE August 1982	PLAN NUMBER S 16531
CHECKED	

METROPOLITAN QUARRY SURVEY
MONIER — ROWLAND FLAT
WASHING PLANT

2315

1. GENERAL

LOCATION: Gawler, sections 478, 482, 483, 3060, 3094, 3100, 3081-3084, hundred of Barossa.

OPERATOR: The Readymix Group (S.A.)

LOCAL ADDRESS: Calton Road, Gawler 5118 Tel (085) 222489.

HEAD OFFICE ADDRESS: 100 Greenhill Road, Unley, 5061. Tel 2721122

MINERAL TENURE: PMs 28, 204, 208 (worked under agreements with J. & T.D. Guley; E.M. Taylor and P.H. Jewis; and Yaringa Pty Ltd respectively)

2. PRODUCTION

MATERIALS MINED: Sand and gravel

RESERVES: 8 million tonnes inferred (Pain, 1976).

PRODUCT USES:

Washed concrete sand
Brick and plaster sand
Washed filling sand
Untreated filling sand
Dry screened sand
Road Gravel
Decorative Gravel

PRODUCTION RATE (1981): 21527 tonnes (selling from stockpiles only from November 1981).

WORKFORCE: 2

3. HISTORY

Reid's Gawler Concrete Sand Co. opened the pit in 1960, selling most of the product to Readymix. Readymix took over the operation in July 1962.

4. GEOLOGY (Pl. 102,103)

Sub-horizontal Tertiary sand and clay has been deposited on an undulating surface of Torrensian phyllite and quartzite. The

base of the Tertiary sediments is often marked by a resistant (to weathering) ferruginised quartzite boulder conglomerate which outcrops on sections 482 and 483. The succeeding cross-bedded, varicoloured sand reaches 23 metres in thickness, and contains lenses of silty plastic clay, reworked from the weathered basement. This is overlain by up to 10 metres of overburden comprising sandy clay, calcrete and loam.

5. MINING

Sand is won by contractors using an elevating scraper, which discharges loads into the feed hoppers at the washing and dry screening plants. A front end loader is also used for feeding the two plants and for loading trucks Equipment comprises:

1 - Caterpillar 621 Elevating Scraper

1 - Caterpillar 950 Front End Loader.

6. PROCESSING

a) Washing Plant (Pl. 100 and Fig. 27)

Pit sand is conveyed from a 40 tonne feed hopper to a wet double deck 10'x4' (3 x 1.2 m) vibrating screen where plus 3/4" (20 mm) is rejected. This material is used as backfilling or sold as coarse fill.

Minus 3/4" (20 mm) plus 1/4" (6 mm) is sold as decorative gravel.

Minus 1/4" (6 mm) is washed in a twin screw washer, underflow from which is stockpiled as concrete sand, or is alternatively fed to a 12' x 12' (3.7 x 3.7 m) settling tank underflow from which is pumped to a 24" (610 mm) cyclone. Cyclone underflow is returned to the screw washer overflow from which is fed, with overflows from the cyclone and first settling tank, to a second 10x10' (3 x 3 m) settling tank. Underflow from the second tank feeds an 18" (460 mm) cylcone which produces fine sand or feeds

the screw washer. Overflows from the cyclone and second tank are pumped to the tailings dams. Plant capacity is about 400 tonnes per day. Water is recycled from the tailings dams and supplemented by groundwater.

b) Dry Screening Plant (Pl. 101 and Fig. 27)

Sand is fed to a 15 x 4' (4.6 x 1.2 m) 3/8" (10 mm) vibrating screen, oversize from which is stockpiled as coarse filling. Undersize is used in hotmix.

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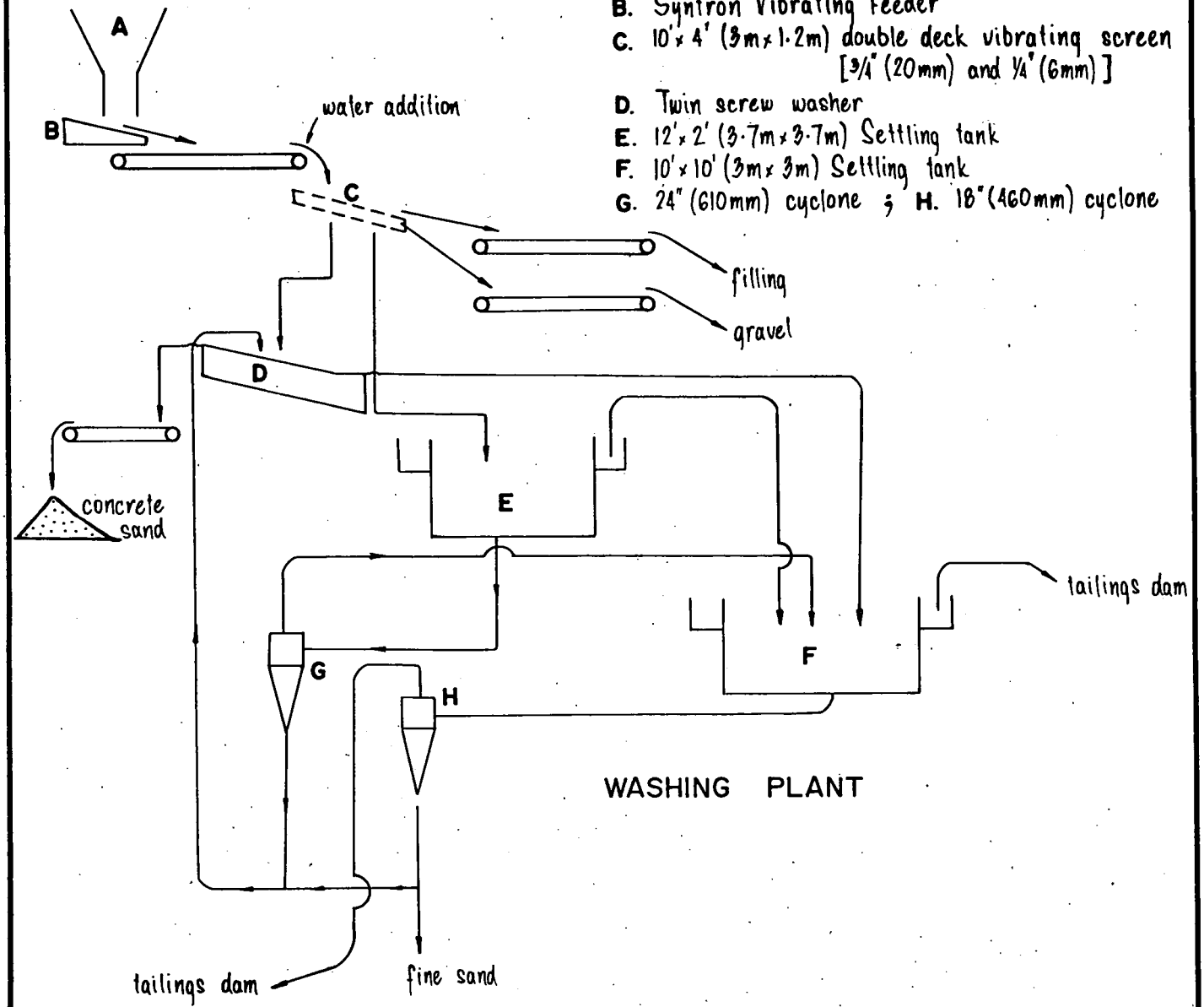
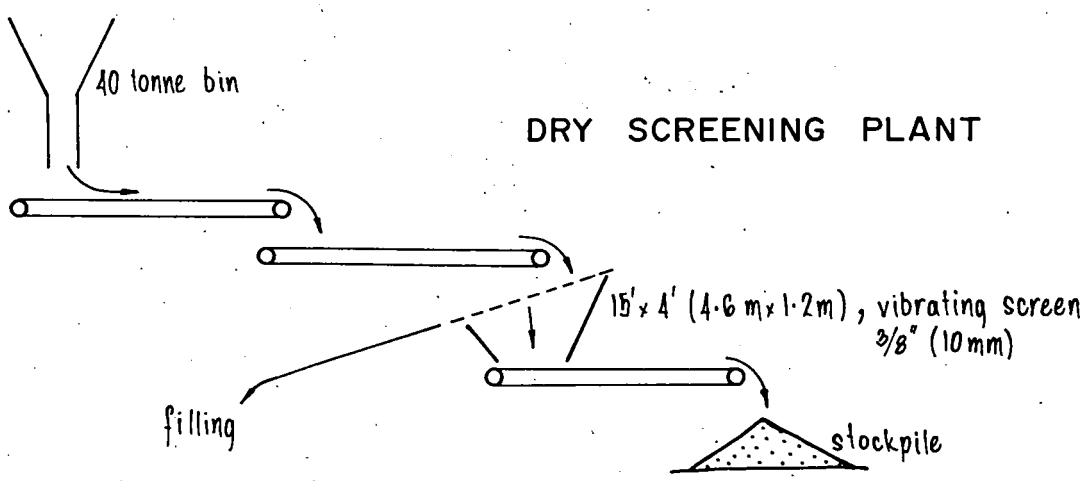
A. 40 tonne bin
B. Syntron Vibrating Feeder
C. 10' x 4' (3m x 1·2m) double deck vibrating screen [3/4" (20mm) and 1/4" (6mm)]
D. Twin screw washer
E. 12' x 2' (3·7m x 3·7m) Settling tank
F. 10' x 10' (3m x 3m) Settling tank
G. 24" (610mm) cyclone ; H. 18" (460mm) cyclone



WASHING PLANT



DRY SCREENING PLANT

FIG. 27

DEPARTMENT OF MINES AND ENERGY SOUTH AUSTRALIA	COMPILED J. Valentine	C.D.O 21·4·83 DATE
METROPOLITAN QUARRY SURVEY	DRAWN E. Calabio	SCALE not to scale
READYMIX - GAWLER	DATE August 1982	PLAN NUMBER S 16532
WASHING AND DRY SCREENING PLANT	CHECKED	

2946

1. GENERAL

LOCATION: Kalbeeba, sections 3035, 3036, 3037, hundred of Kalbeeba

OPERATOR: Quarry Industries Ltd.

LOCAL ADDRESS: Allendale Road, Kalbeeba 5118.

Tel. (085) 222766

HEAD OFFICE ADDRESS: 333 Marion Rd., North Plympton 5037.

Tel. 2932383.

MINERAL TENURE: E.M.L. 3453, 4073, 4599, 4600. Worked under aggreement with landowners. A.A., T.F., D.A. Springbett (3453), Springdale Co. Pty Ltd (4073), M, G, B, A, D & T Springbett and R. Tregenza (4599 & 4600).

2. PRODUCTION

MATERIALS MINED: Sand and well rounded quartz gravel.

RESERVES: 4 million tonnes (inferred)

PRODUCT USES:

Concrete and Block Sand

Tile Sand

White Adobe

Brick Sand

Plastering Sand

Sand & Metal Mix

Filling Sand (ex pit)

Road Gravel (ex pit)

20-14 mm Metal

Washed Filling

Oversize (+20mm)

Foundry Sand4.00 (produced from PM229 Sandy Creek Area).

PRODUCT DESTINATIONS: Adelaide and Northern Metropolitan Areas.

PRODUCTION RATE (1981): 121303 tonnes

WORKFORCE: 7 plus manager.

3. HISTORY

Land owned by the Springbett family was drilled by the Department of Mines in 1961 (Olliver, 1961). Overburden stripping by Roche Bros. began in 1965, but no production took place until 1967 when L.R. & M. Sands started operations under an agreement with the landowners, producing 200 tonnes per day. The initial washing and screening plant was replaced in 1974 by the plant presently in use. Quarry Industries Ltd. took over operations in August 1979.

4. GEOLOGY (Pl. 107,108,109)

Sub horizontal Tertiary gravel, sand and clay has been deposited unconformably on an undulating surface of folded Torrensian phyllite and interbedded feldspathic quartzite striking northerly. The base of the sand is often marked by a quartzite boulder conglomerate which resisted erosion during dissection of the Tertiary surface and forms cappings to hills and ridges.

Cross bedded yellow, red, white and brown building sand beds up to 25 metres thick are overlain by up to 5 metres of clayey sand and gravel, and about 3 metres of brown clayey loam. The sand contains lenses of white plastic clay, formed by fluvial re-deposition of bleached shale.

5. MINING (Pl. 106)

Sand is extracted using an elevating scraper and either fed directly to the plant or stockpiled by front end loader. Equipment comprises:

1 - John Deere J.D. 862 scraper

2 - Caterpillar 966 2½ m^3 front end loaders

1 - International T.D. 20C bulldozer

1 - Galion grader

6. PROCESSING

(a) Washing Plant (Pl. 104 and Fig. 28)

Sand is delivered to a 40 tonne bin from which it is elevated and washed into a 15x3½ ft (4.6x1.1 m) trommel. The bottom 25% of the trommel is 3/4" (20 mm) aperture and the remainder is varied between 1/8" (3 mm) and 3/8" (10 mm) according to the products required. (1/8" for washed filling ¼" (6 mm) for plaster sand, 5/16" (8 mm) for concrete sand, 3/8" (10 mm) for concrete block sand) Oversize is sold as gravel, for roads and decorative purposes and fine trommel undersize falls into a regulating sump, underflow from which is pumped to an 18" (460 mm) cyclone. Cyclone overflow is returned to the sump and underflow stockpiled on concrete drying aprons.

Sump overflow is fed to a slime dam from which decanted water is pumped to the first of three reclamation dams. Water from the third of these reclamation dams is gravity fed to the water supply dam which also receives water from a borehole, 110 m deep, located near the weighbridge. The plant requires 20,000 g.p.h.

(b) Dry Screening Plant (Pl. 105 and Fig. 29)

Sand is fed from a receiving hopper on the edge of the pit to a vibrating screen, from which the products fall into storage bins.

Bricklaying sand is produced by screening selectively mined fine sand through a 3/16" (5 mm) screen.

Dry screened filling sand is produced by screening selected material through a 1" (25 mm) screen.

Screen oversize (plus 1") consisting largely of semi-indurated or indurated "rock sand" fragments is stockpiled and used on site for backfilling or earthworks.

Plant Capacity

(a) Washing Plant

Reported to be approximately 500 tonnes per day.

(b) Dry Screening Plant

Reported to be approximately 300 tonnes per day depending on moisture content of the feed.

7. REFERENCES

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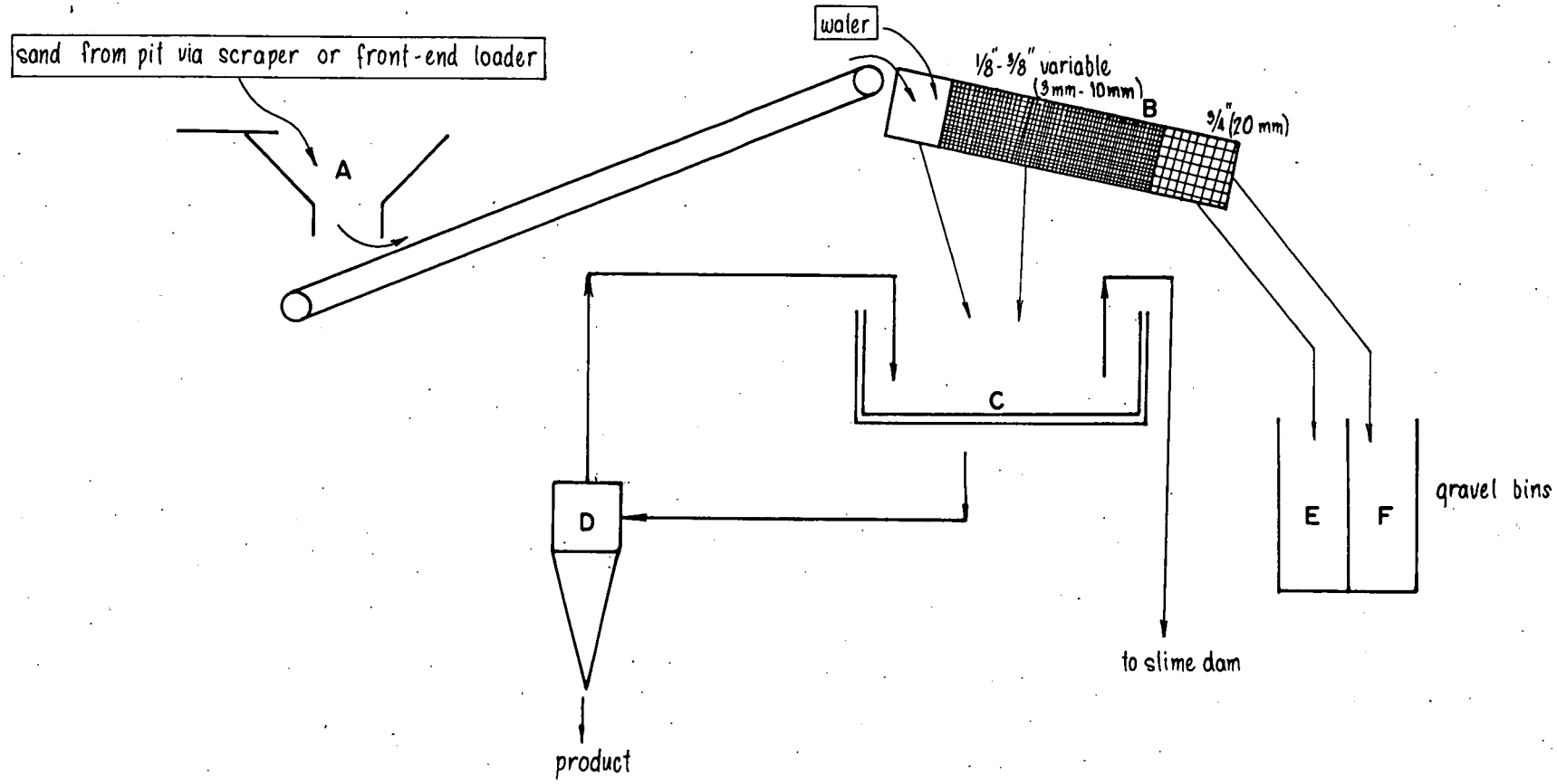

A 40 tonne bin
B 15' × 3½' (4·6m × 1·1m) Trommel screen
C 12' × 12' (3·6m × 3·6m) Regulating Sump
D 18" (460mm) cyclone
E -¾" (-20mm)
F +¾" (+20mm)

FIG. 28

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

METROPOLITAN QUARRY SURVEY

QUARRY INDUSTRIES – GAWLER
SAND WASHING PLANT

COMPILED	DRAWN	DATE	SCALE	PLAN NUMBER
J. Valentine	E. Calabio	August 1982	not to scale	S 16533
C.D.O		CHECKED		
21·4·83		DATE		

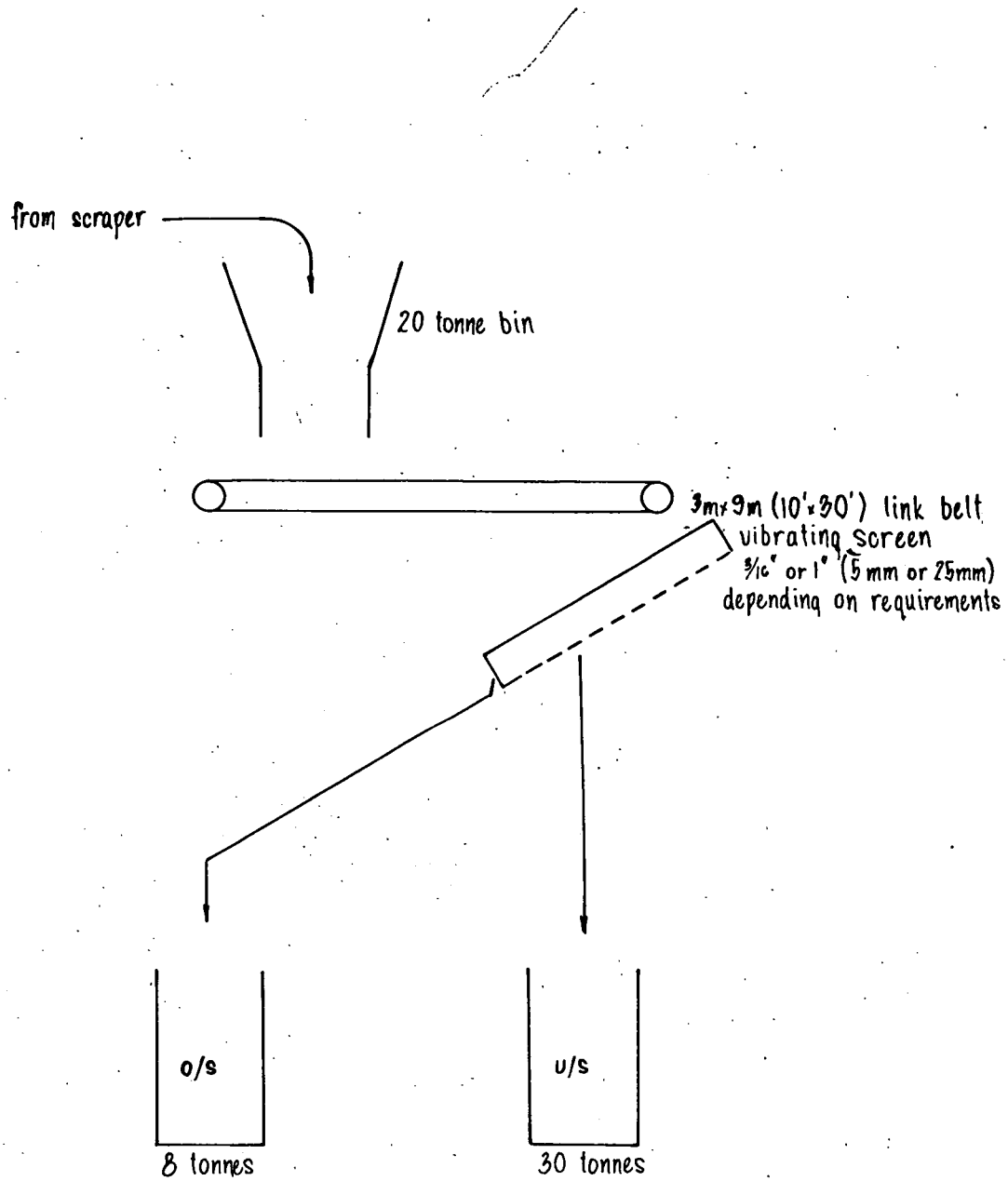

FIG. 29

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

COMPILED J. Valentine	C.D.O. 21-4-83 DATE
DRAWN E. Colabio	SCALE not to scale
DATE August 1982	PLAN NUMBER S 16534
CHECKED	

METROPOLITAN QUARRY SURVEY
QUARRY INDUSTRIES - GAWLER
DRY SCREENING PLANT

2946

1. GENERAL

LOCATION: Gawler, sections 3058-9, 3061, hundred of Barossa.

OPERATOR: Monier Ltd.

LOCAL ADDRESS: Calton Road, Gawler, Tel. (085) 222319.

HEAD OFFICE ADDRESS: Blakeney Road, Ottoway. Tel. 471 066.

MINERAL TENURE: PM80. Land owned by company.

2. PRODUCTION

MATERIALS MINED: Sand and Gravel.

RESERVES: 2.5 million tonnes (approx.) (Pain, 1976)

PRODUCT USES:

Concrete Sand

Bricklaying Sand

Plaster Sand

Concrete Sand

Mixed washed and dry screend bricklaying sand

Screened filling sand.

Washed filling sand.

Filling sand (untreated)

Unipave Sand

Rounded Gravel.

Gravel Mix.

Weathered Shale.

PRODUCTION RATE (1981): 173027 tonnes

37000 tonnes weathered shale sold to Adelaide Brighton Cement in 6 months ending December 1982.

WORKFORCE: 8, including the site manager.

3. HISTORY

The pit was opened by Screenings Pty Ltd in April 1962. Monier acquired a controlling interest in Screenings Pty Ltd in November 1967, and subsequently purchased the property.

4. GEOLOGY (Pl. 112,113,114)

Basement to the Tertiary Basin comprises Adelaidean shale and siltstone. These were subjected to low grade regional metamorphism during the early Palaeozoic and were later weathered and eroded following uplift in the Tertiary. A sequence of interbedded Tertiary gravel, sand, silt and clay was deposited on the irregular erosion surface followed, in the Pleistocene, by more alluvial clay.

Overburden in the pit area consists of up to 2 metres of soil and up to 4 metres of sandy clay or white sandy siltstone. the Tertiary sand sequence reaches a thickness of about 20 metres and includes extensive basal boulder beds. The sand above these beds is finer in the northern section of the pit but remains gravelly in the southern section. The two sections are worked separately.

5. MINING

Fine sand and gravelly sand is won from the northern and southern sections of the pit respectively, and conveyed by scraper directly into separate feed hoppers at the washing plant. A bulldozer is used to rip indurated sand and to flatten rills developed during mining. Scraper roads are maintained with a grader. Equipment is as follows:-

1 - Wabco scraper

1 - Caterpillar 966 front end loader

1 - Caterpillar D8 bulldozer

1 - Caterpillar "12" grader

1 - Bedford 10 tonne dump truck.

6. WASHING PLANT (Pl. 110,111 and Fig. 30)

Sand from the two feed bins through a 50 mm grizzly to remove oversize and is blended by means of two variable speed belt feeders before ending fed to a triple deck wet-vibrating screen. The top deck has 25 mm oversize which is crushed in a 460 mm Jacques impactor (hammer) mill and recycled.

Oversize from the 10 mm deck is fed to a 9 m x 2 m drum washer. Oversize from the 3 mm deck is fed to a single deck 3 mm vibrating screen oversize from which goes to the drum washer and undersize to a 3.7 m square wash tank.

Underflow from the drum washer is fed onto a single deck vibrating 3 mm screen from which oversize is conveyed to a 10 x 4' (3 x 1.2 m) triple deck vibrating screen with 5/8" (16 mm) 1/2" (12 mm) and 3/8" (10 mm) decks. The screened products are stored in four bins.

Underflow from the first wash tank proceeds to a 760 mm cyclone and then to a second wash tank, cyclone overflow returning to the first wash tank. The cyclone product can alternatively be fed to an upcurrent classifier and then to a 305 mm cyclone to produce "unipave" sand. Cyclone overflow returns to the classifier and classifier fines to the second wash tank. Minus 10 mm material from the overhead bins is fed to the second wash tank when the plant is producing concrete block sand.

Underflow from the second wash tank is pumped to a 690 mm cyclone and then to a Linatex dewatering screen, cyclone overflow returning to the second wash tank. Dewatered sand is stockpiled and then transferred by front end loader into two 85 tonne overhead bins.

Overflow from the first two wash tanks gravitates to a 1.2 x 1.2 m sump, from which it is pumped to eighteen 150 mm

cyclones. Underflow from these cyclones discharges to 3 m x 3 m wash tank, which feeds a 300 mm cyclone. The underflow from this cyclone is stockpiled and is sold as filling sand. Overflow from the third wash tank is recycled to the sump. The 300 mm cyclone overflows to the No. 3 wash tank. Overflow from the 150 mm cyclones is discarded and is pumped to a slimes dam, located in an abandoned pit.

Water for the plant is obtained from the South Para River in the winter and from two bores on the property during the summer. Quality control is by dry screening 3 or 4 times daily. The plant is capable of producing up to 130 tonnes per hour.

7. REFERENCES

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METROPOLITAN QUARRY SURVEY
MONIER GAWLER
WASHING PLANT

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

COMPILED	J. Valentine		
DRAWN	E. Colabio	SCALE	not to scale
DATE CHECKED	August 1982	C.D.O. DATE	21-4-83
PLAN NUMBER	S 16535		

A Grizzly
B Variable speed belt feeders
C 5'×4' (1·5m×1·2m) link belt screen, 1" (25mm), 3/8" (10mm), 1/8" (3mm)
D 18" (460mm) Jacques impactor mill
E 5'×3' (1·5m×0·9m) screen, 3mm
F First wash tank, 12'×12' (3·7m×3·7m)
G 30'×6' (9m×2m) drum washer
H 6'×3' (1·8mm×0·9mm) link belt screen, -3mm
I 4'×4' (1·2m×1·2m) sump
J Ten 6" (150mm) cyclones
K 30" (760mm) cyclone
L 40 tonne bin- 1/4" (6mm) metal
M Second wash tank, 12'×12' (3·7m×3·7m)
N Third wash tank, 10'×10' (3m×3m)
O 12" (305mm) cyclone
P 10'×4' (3m×1·2m) triple deck screen 3/8", 1/2", 3/8" (16mm, 12mm, 10mm)
Q 12" (305mm) cyclone
R 27" (690mm) cyclone
S 10'×4' (3m×1·2m) linatex dewatering screen
T Front end loader
U Two 85 tonne overhead bins
V Classifier Tank
W 5×35 tonne overhead bins

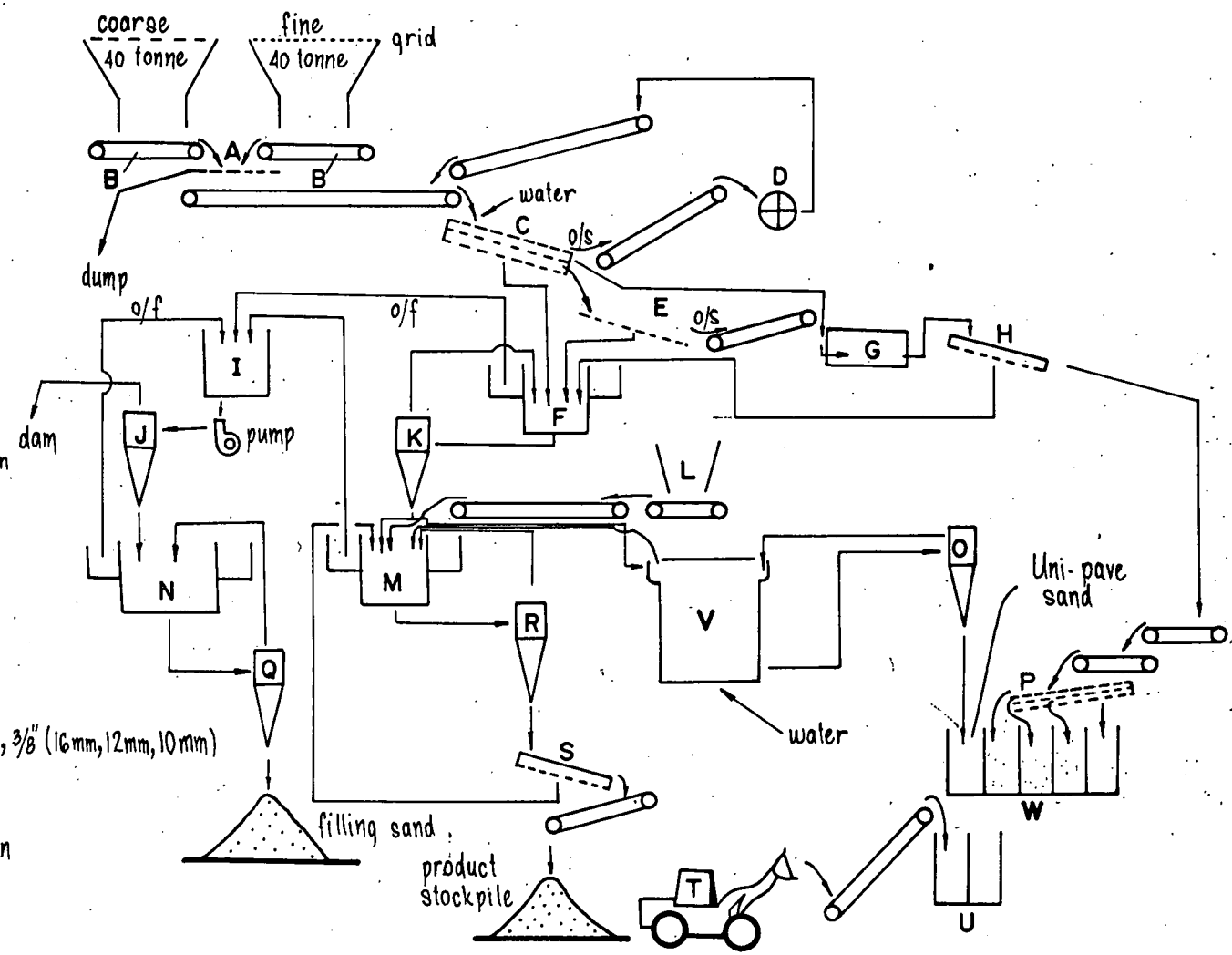

FIG. 30

1. GENERAL

LOCATION: Christies (Denton's) Pit Golden Grove, section 5459, hundred of Yatala.

OPERATOR: Christies Sands Pty. Ltd., trading as Hallett Sand Supplies.

LOCAL ADDRESS: One Tree Hill Road, Golden Grove, 5125. Tel. 251 1266.

HEAD OFFICE ADDRESS: Hallett St., Allenby Gardens, 5009. Tel. 46 7371.

MINERAL TENURE: PM 32. Land owned by company.

2. PRODUCTION

MATERIAL MINED: Sand, white plastic clay, white and coloured weathered shale.

RESERVES: 6 mill tonnes (McCallum 1978)

PRODUCT USES:

Concrete Sand
Washed Plaster Sand
Fine Washed Sand
Dry Screened Plaster Sand
Bricklaying Sand
Blended Bricklaying Sand
(dry screened sand with special washer-run sand)
1st grade filling
2nd grade filling

PRODUCTION RATE (1981): Sand; 171138: Shale, 47729: Plastic clay 239 tonnes.

WORKFORCE: 9

3. HISTORY

G.E.J. Denton commenced operation in 1954 producing sand. From 1957 smaller quantities of weathered white shale were produced from the eastern end of the quarry.

In 1973 the property was sold to Christies Sands Pty. Ltd. in which Hallett Brick Industries Ltd. had held a controlling interest since May 1965.

4. GEOLOGY (Pl. 115,116,117,120)

The pit lies in the central north of the Golden Grove Tertiary basin. Shallow Tertiary sands are bounded in the east of the pit by a north-south striking basement fault, and white weathered shale of the Saddleworth Formation is visible in the pit floor in the east. The centre of the quarry is cut by a prominent north-south striking basement fault, with the west side down thrown. Thick Tertiary sands are visible west of this fault, thinning further to the west over shallowing basement.

Products derived from re-working of the upper 3 m of the white weathered shale have been deposited as white plastic clay in a small sub-basin within the basement, adjacent and sub-parallel to the fault.

5. MINING

Mining is carried out by elevating scrapers stockpiling (for blending purposes) for later feeding to the washing and dry screening plants by front end loader. Shale and clay are removed from the eastern pit by scraper and front end loader and stockpiled. Bulldozers are used for ripping overburden indurated sandstone and shale, and also at the nearby Hallett brick shale pits.

Equipment includes:

2 Caterpillar elevating scrapers
1 Wabco elevating scraper
2 Bulldozers (Caterpillar D6 and D9)
3 Caterpillar 966 front end loaders.

6. PROCESSING PLANT

(a) Washing Plant (Pl. 118 and Fig. 31)

Material from the feed hopper is wet screened on a single deck vibrating screen, oversize from which goes to waste. Screen undersize goes to a settling cone, the underflow from which is pumped to a 686 mm (27 inch) cyclone from which the spigot product flows to an updraught water classifier tank. Overflows from the settling cone, cyclone and classifier tank proceed to a second settling cone the underflow from which is pumped to two 18 inch cyclones to produce sand which is stockpiled. Overflows from this second settling cone and the cyclone flow to the tailings dam which is formed in a natural depression.

The water velocity to the base of the classifier tank controls the fine sand content of the underflow which is further deslimed in a 686 mm (27 inch) cyclone to produce concrete sand. This sand is dewatered on a Linatex dewatering screen and then stockpiled by a belt stacker. Water and fines from the Linatex screen are returned with the cyclone overflow to the first settling cone. Two bores on the property supply the 60 litres/sec. needed to run the plant. Plant capacity is 60 tonnes per hour.

(b) Dry Screening Plant (Pl. 119)

Material from the feed bin is screened on a $^{3}/_{8}$ inch (10 mm) slotted vibrating screen, oversize being discarded. Screen undersize is used for brick sand which is blended with fine sand to produce plaster sand. Products are stockpiled.

7. REFERENCES

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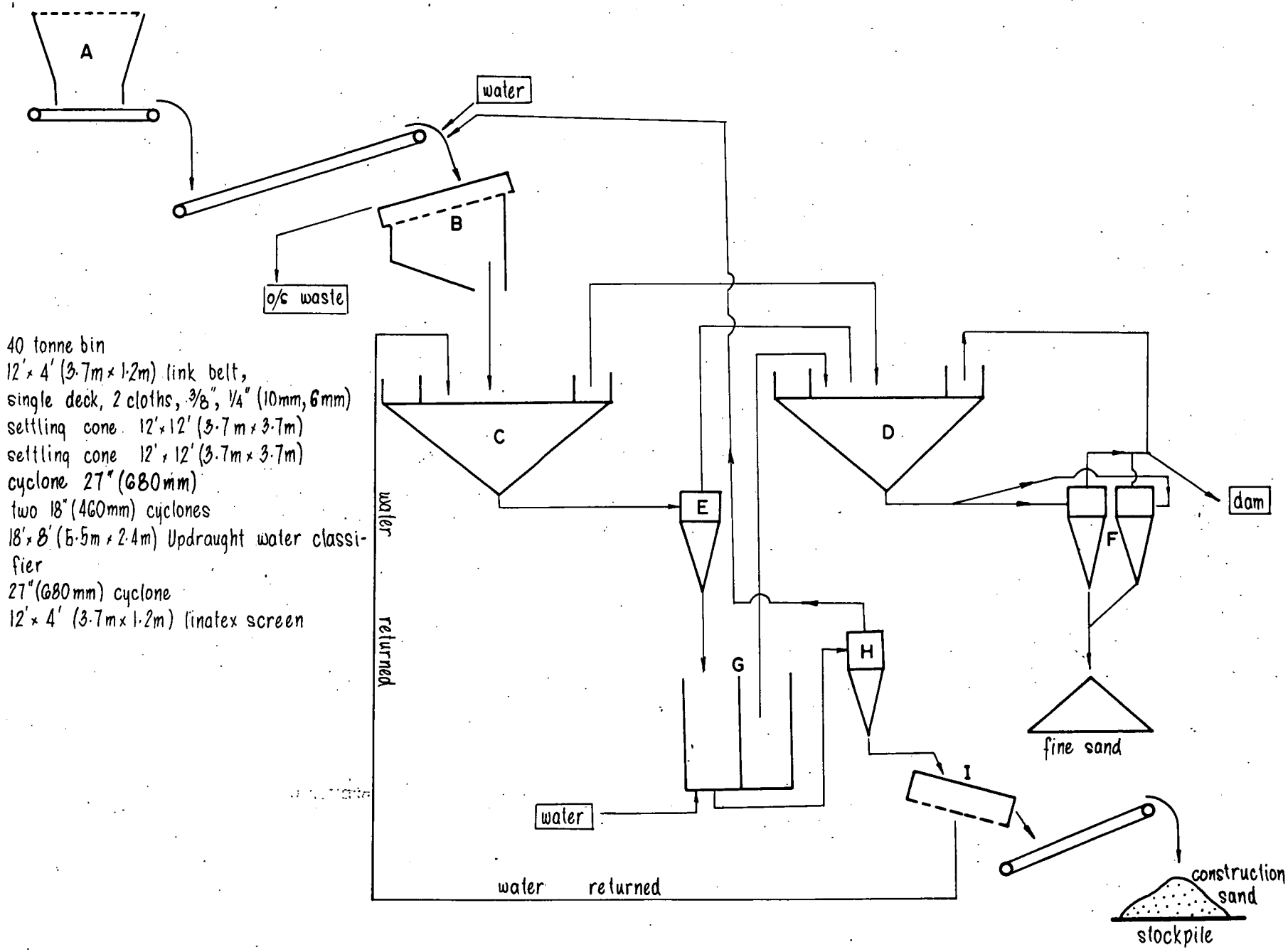

A 40 tonne bin
B 12' × 4' (3.7m × 1.2m) link belt, single deck, 2 cloths, 3/8", 1/4" (10mm, 6mm)
C settling cone 12' × 12' (3.7m × 3.7m)
D settling cone 12' × 12' (3.7m × 3.7m)
E cyclone 27" (680mm)
F two 18" (460mm) cyclones
G 18' × 8' (5.5m × 2.4m) Updraught water classifier
H 27" (680mm) cyclone
I 12' × 4' (3.7m × 1.2m) linatex screen

FIG. 31

METROPOLITAN QUARRY SURVEY

CHRISTIES - GOLDEN GROVE

WASHING PLANT

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

COMPILED	DRAWN	DATE	CHECKED	DATE
J. Valentine	E. Calabio	21.4.83		August 1982

C.D.O

SCALE not to scale

PLAN NUMBER S 16536

MAIN PIT

1. GENERAL

LOCATION: Monier's Main Pit, Golden Grove, sections 5460, 5465, hundred of Yatala.

OPERATOR: Monier Ltd.

LOCAL ADDRESS: Golden Grove Rd. Golden Grove (Tel. 251 1210).

HEAD OFFICE ADDRESS: Blakeney Road, Ottoway (Tel. 47 1066).

MINERAL TENURE: PM 76. Land owned by the company

2. PRODUCTION

MATERIAL MINED: Sand

RESERVES: 10.6 million tonnes (McCallum, 1978)

PRODUCT USES: concrete sand
Bricklaying sand
Plaster sand
Filling sand (not washed or screened)
Bricklaying sand (washed sand mixed with dry screened sand)
Screened Filling sand
Washed Filling sand
Gravel

PRODUCTION RATE (1981): 240540 tonnes

WORKFORCE: 8

3. HISTORY

In 1947 the landowner, Claude Marsson, commenced production from a pit in the north west of the property. Sand was dry screened and washed, using a flume washer. All fine tailings dams produced by this phase of operations have been rehabilitated.

A larger plant was built in 1956 situated near Monier's present dry screening plant, and tailings were stored in a small dam near the input to the present washing plant.

Jayworth Besser purchased the property on 1/11/60 and a new washing plant was built on the present site. Golden Grove Mines Pty Ltd (a subsidiary of Monier) gained control of the operation on 5-5-62.

The large pit in the west of the property was worked by monitor. Subsequent to 1971 the pit was used in three stages for tailings disposal. In 1972-1973 the three dams were joined to form one large dam.

After 1971 the two large pits in the centre of the property were developed, the northern one first.

4. GEOLOGY (Pl. 125,126)

The Golden Grove Tertiary Basin is developed within shale and quartzite of Adelaidean age and contains a sequence of interbedded fluvio-lacustrine gravel, sand, silt and clay.

The pit is located in the centre of the basin where 0-10 m of white plastic clay is overlain by about 30 m of construction sand and up to 10 m of fine (filling) sand.

5. MINING

Sand from selected areas within the pit is extracted by an elevating scraper which discharges directly into the feed hoppers at the three plants. Additional scrapers are contracted as required. Haulroads are maintained with a grader and a bulldozer is used for ripping and rill-flattening within the pit. Loading of trucks and of the brick sand plaster sand and screened filling plants is carried out by front end loader.

Slime dams are cleaned out with a dragline.

Equipment:

1 - Caterpillar 623 elevating scraper (+ some contract scrapers)

1 - Hough 65 Front end loader

1 - Caterpillar Grader

1 - Caterpillar 966 Front end loader

1 - D7 bulldozer

1 - Ruston Bucyrus Dragline

6. PROCESSING

a. Washing Plant (Pl. 121,122,123,124 and Fig. 32)

Material from the feed hopper is wetted and slurried into a trommel ¼" (6 mm), 1½" (40 mm) where plus 1½ inch is discarded. Plus ¼ inch minus 1½ inch flows to a 15 x 3½ foot (4.6 x 1.1 m) trommel which produces minus ½ inch (13 mm) minus 3/4 inch (20 mm) and plus 3/4 inch gravel fractions.

Minus ¼" (6 mm) from both trommels flows to a V box classifier tank which produces both coarse and fine underflow. The coarse underflow falls to settling tank A the underflow from which feeds a 30 inch (760 mm) cyclone from which fines are returned to tank A and underflow fed to settling tank B. Tank B feeds another 30 (760 mm) inch cyclone and receives its overflow. Cyclone underflow is dewatered on two Linatex screens and stockpiled as concrete sand.

Fine underflow from the classifier tank and overflow from tanks A and B feed three settling tanks C, D and E each of which is coupled to a 15" (380 mm) cyclone, from which overflows are returned to the respective tanks. The underflow is fed to a Linatex dewatering screen and stockpiled as fine washed sand. Overflow from tanks, C, D and E feeds settling tank F underflow from which is fed to ten 6" (152 mm) cyclones. Underflow from these proceeds to the fine sand dewatering screen and the overflow is pumped, together with that from tank F, to the slime dam.

b. Brick and Plaster Sand Plant (Fig. 33)

Material from the pit is trasnferred by scraper or front end loader to a feed hopper and then to vibrating screen which rejects the coarse fraction and produces brick sand.

Alternatively screen undersize is fed to a settling tank underflow from which is pumped to a 24" (356 mm) cyclone which produces plaster sand.

Cyclone overflow returns to the tank and tank overflow is piped to the slime dam.

c. Screened Filling. (Fig. 34)

Pit material, fed over a 10" (254 mm) grizzly into a 40 tonne hopper by scraper or front end loader, falls to a slotted dry screen. Oversize is rejected or used as rough filling and undersize marketed as screened filling.

Plant Capacities and Products

Product	Operating Capacity (tonnes/hour)
a. Washing Plants	
Concrete Sand	130
Washed filling sand	50
Plaster sand	50
Brick sand	50
b. Dry Plant	
Screened filling	80

Quality Control

Dry sizing of the concrete sand is carried out by the manager, generally once per week.

Water Supply

Water is obtained from surface catchments on the property. One borehole is available but hardly used.

SOUTH PIT

1. GENERAL

LOCATION: Monier's South Pit, Golden Grove, section 5467, hundred of Yatala.

OPERATOR: Monier Ltd.

LOCAL ADDRESS: Golden Grove Rd., Golden Grove (Tel. 251 1210).

HEAD OFFICE ADDRESS: Blakeney Road, Ottoway (Tel. 47 1066).

MINERAL TENURE: PM 71. Land owned by the company.

2. PRODUCTION

MATERIAL MINED: Sand

RESERVES: 2 million tonnes (McCallum, 1978)

PRODUCT USES: As for Monier Main.

PRODUCTION RATE (1981): NIL

3. HISTORY

C.R. Reid commenced production in 1962 transporting the sand to a washing plant on sec 5458 (Reid's). In July 1970 the property was sold to F.A. Chapman (S.A. Washed Sand), and subsequently to Concrete Industries (Monier) Ltd in early 1973.

4. GEOLOGY

The pit is located in the central part of the Golden Grove Tertiary Basin where 10 m of clay is overlain by up to 45 m of construction sand and 5 m of fine sand.

5. MINING

Sand is removed by scraper and front end loader, then transported by scraper or truck to the washing plant in Monier Main (sec 5465). The pit is approximately 400 m long, 150 m wide and 20 m deep.

6. PROCESSING

See Monier Main.

7. REFERENCES (Both pits)

Johns, R.K., 1962. Golden Grove Sand Deposit, Sections 5460, 5461 & 5465 Hundred of Yatala. Min. Rev. Adelaide 114:105-110.

McCallum W.S., 1978. Fine Tailings Investigation. Drilling of Tailings Dams and the Result of Laboratory Evaluation. Report No. 1 Golden Grove - Highbury. S. Aust. Dept. Mines report 78/92 (unpublished).

McCallum, W.S., 1979. Golden Grove Construction Materials Survey. S. Aust. Dept. Mines and Energy report 78/141 (unpublished).

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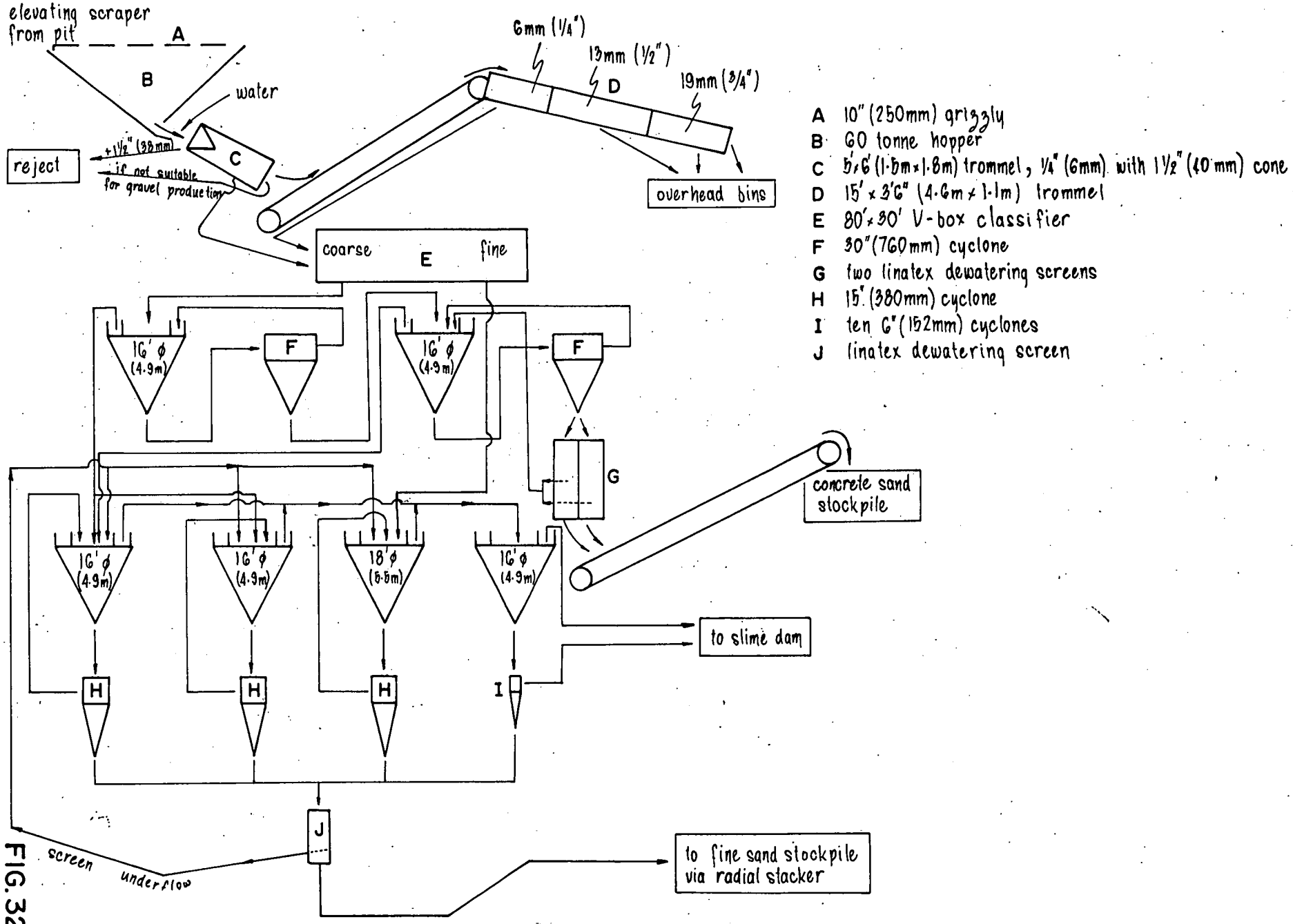


A 10" (250mm) grizzly
B 60 tonne hopper
C 5'6" (1.8m × 1.8m) trommel, ¼" (6mm) with 1½" (40mm) cone
D 15' × 3'6" (4.6m × 1.1m) trommel
E 80' × 30' V-box classifier
F 30" (760mm) cyclone
G two linatex dewatering screens
H 15" (380mm) cyclone
I ten 6" (152mm) cyclones
J linatex dewatering screen

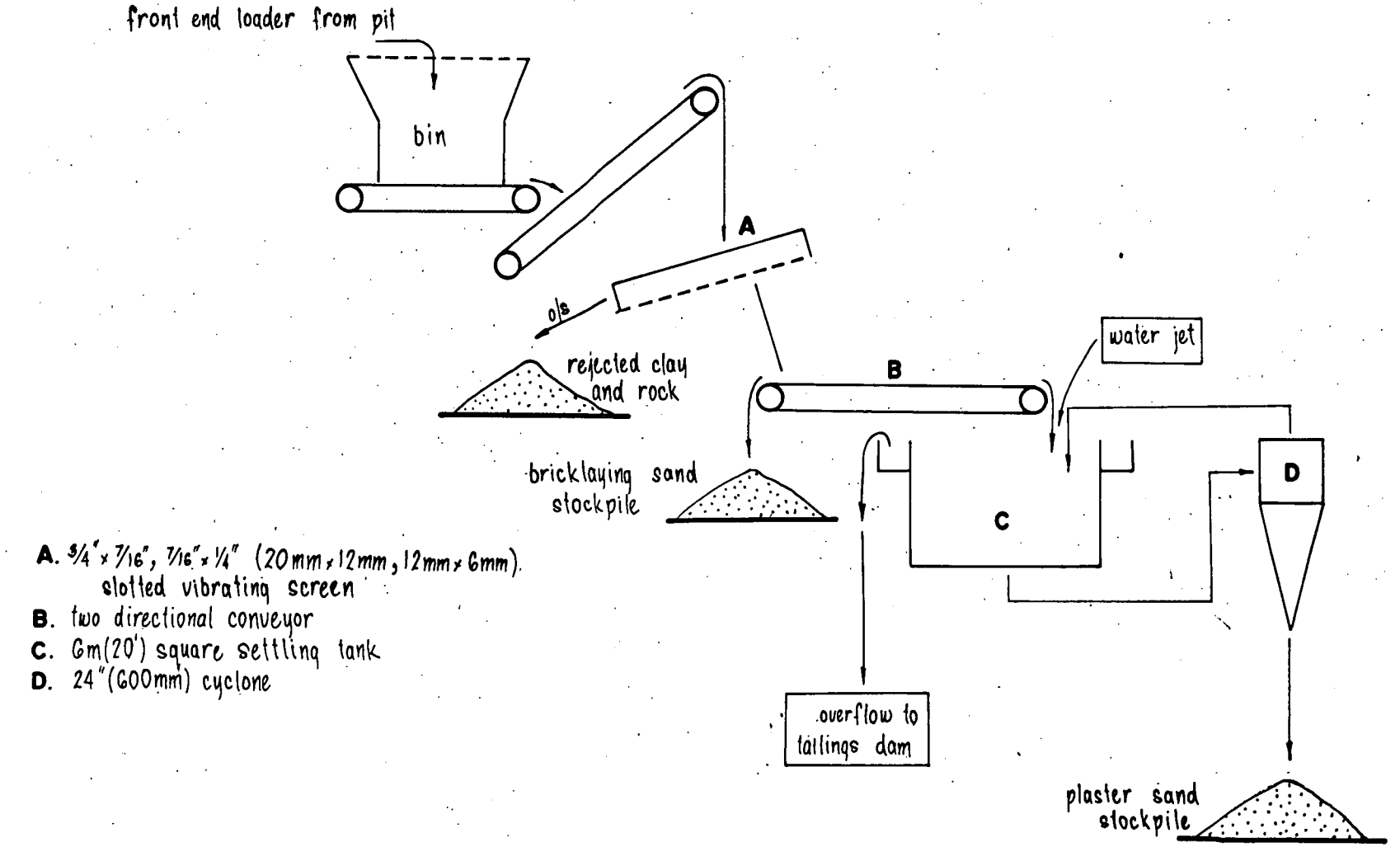
FIG. 32

METROPOLITAN QUARRY SURVEY

MONIER - GOLDEN GROVE
MAIN WASHING PLANT

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

COMPILED J. Valentine	DRAWN E. Calabio	DATE August 1982	CHECKED
C.D.O.	SCALE not to scale	PLAN NUMBER S 16537	DATE 21·4·83



A. 3/4" x 7/16", 7/16" x 1/4" (20mm x 12mm, 12mm x 6mm) slotted vibrating screen
B. two directional conveyor
C. 6m(20') square settling tank
D. 24"(600mm) cyclone

FIG. 33

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

METROPOLITAN QUARRY SURVEY
MONIER - GOLDEN GROVE
BRICK AND PLASTER SAND PLANT

COMPILED	DRAWN	DATE	CHECKED	SCALE	PLAN NUMBER
J. Valentine	E. Calabio	August 1982	MC 21-4-83 C.D.O.	not to scale	S 16538

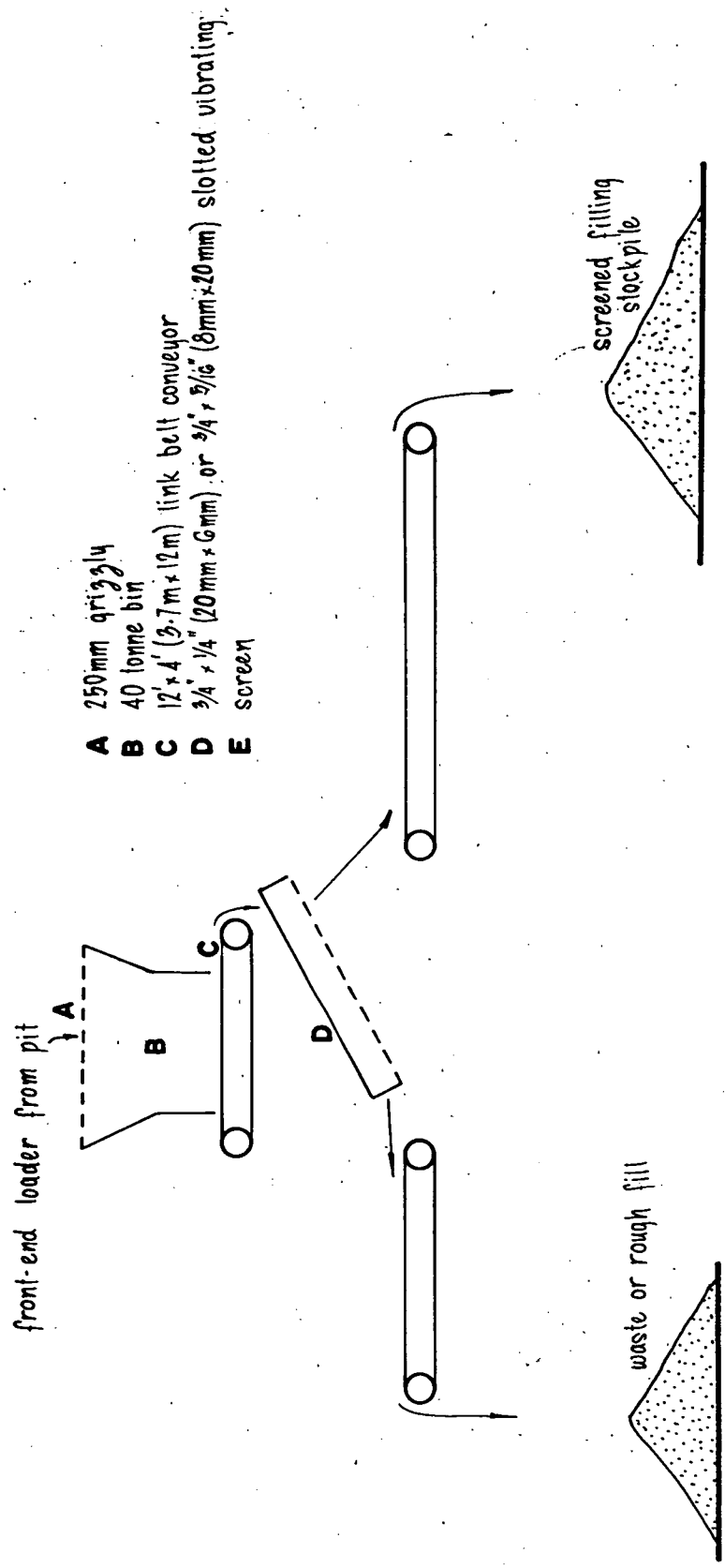


FIG. 34

DEPARTMENT OF MINES AND ENERGY SOUTH AUSTRALIA	COMPILED J. Valentine	WR 21·4·83 CDO DATE
METROPOLITAN QUARRY SURVEY MONIER - GOLDEN GROVE SCREENED FILLING PLANT	DRAWN E. Calabio	SCALE not to scale
	DATE Aug. 1982	PLAN NUMBER S 16539
	CHECKED	

2945

1. GENERAL

LOCATION: Highbury Sand Pit, section 5393, hundred of Yatala

OPERATOR: Readymix Group (S.A.).

LOCAL ADDRESS: Torrens Road, Highbury, 5089. Tel. 264-2922, 264-2925.

HEAD OFFICE ADDRESS: 100 Greenhill Road, Unley 5061.
Tel. 272-1122.

MINERAL TENURE: PM 31, land owned by company

2. PRODUCTION

MATERIAL MINED: Sand, white plastic clay

RESERVES: Not known.

PRODUCT USES: Concrete sand.
Washed quarry sand.
20 mm screenings.
14 mm screenings.
7 mm screenings.

PRODUCTION RATE (1981): sand; 114350 tonnes clay; 671 tonnes

WORKFORCE: 2

3. HISTORY

Hall Bros. opened the pit in the mid-40's and began washing sand using a decantation process to remove clay. Construction Sands Pty. Ltd. bought the operation in about 1958 and built a washing plant incorporating cyclones and settling tanks. Pearce Transport Ltd. bought the operation in 1965, and sold to Readymix in 1972. Readymix built a new washing plant in 1980.

4. GEOLOGY (Pl. 127)

The pit is located in the southeastern corner of the Highbury-Golden Grove Tertiary basin which is oriented north-south between the Para and Eden Faults. The latter seperates the workings from the Stonyfell (Undalya) Quartzite formation of Torrensian age which outcrops to the east. The fault scarp dips

steeply west and underlies the pit. Depth to basement is unknown.

The Tertiary sediments consist of fluviatile red, orange and white, fine to medium and coarse grained, variably silty and clayey sand and sandy clay. Lenses of white clay, reworked from bleached basement shales, have been deposited in areas of fluvial quiescence.

5. MINING

Sand is dozed up and blended, and then front-end loaded into trucks for transport to stockpiles adjacent to the plant's feed hopper. A front end loader is used to feed the plant from stockpiles of pit sand or of -20 +8 mm split mix or rubble from the quartzite crushing plant at Riverview Quarry. Clay lenses are extracted by bulldozer and front end loader.

Equipment used comprises:

1 - 35 tonne Wabco dump truck (used when required from main quarry area).

1 - Komatsu 155 (equiv D8) bulldozer (from main quarries).

1 - Caterpillar 980 front end loader (from main quarries).

1 - 3 c.m. Furukawa FL320A front end loader.

6. PROCESSING (Pl. 128 and Fig. 35)

Plant comprises a re-screening plant and a sand washing plant. The feed is either pit sand or crusher products (20 to 8 mm split mix) from Riverview quartzite quarry. Washed products are made from pit sand mixed with 10-15% quartzite sand (sold as concrete sand) and from quarry sand alone, and screened products from -20 +8 mm split mix and from rubble.

The feed is delivered into a hopper above a vibrating ¼" (6 mm) screen, oversize from which is conveyed to a triple deck wet vibrating screen (20 mm, 14 mm, 7 mm). There is no oversize

produced (all feed - 20 mm) and 20 mm, 14 mm and 7 mm screenings are stockpiled.

Undersize is washed to the first of two settling tanks, underflow from which is pumped to a 30" (760 mm) cyclone. Cyclone overflow is returned to the tank and underflow is split fed to a classifier tank and a dewatering screen, oversize from the latter feeding the product stockpile. Underflow from the classifier tank feeds a 24" (610 mm) cyclone, overflow from which is returned to the classifier tank, and underflow to the dewatering screen. Classifier overflow is fed to a second settling tank, together with overflow from the first tank and underflow from the dewatering screen. Underflow from the second tank is pumped to an 18" (460 mm) cyclone, overflow from which is pumped, with that from the second tank, to the slime dam. Fine sand underflow from the 18" cyclone is fed back to the dewatering screen and incorporated in the product.

Plant capacities are 60 tonnes per hour for the washing plant and 80-90 tonnes per hour for the screening plant.

A blending plant on site mixes washed concrete sand and dolomite sand for use in hotmix.

7. REFERENCES

Olliver, J.G., 1961. Sand and Quartzite Deposit, Pt. Secs. 38, 5393, 5407, Hd. Yatala (J.C. Warburton). S. Aust. Dept. Mines report 52/92 (unpublished).

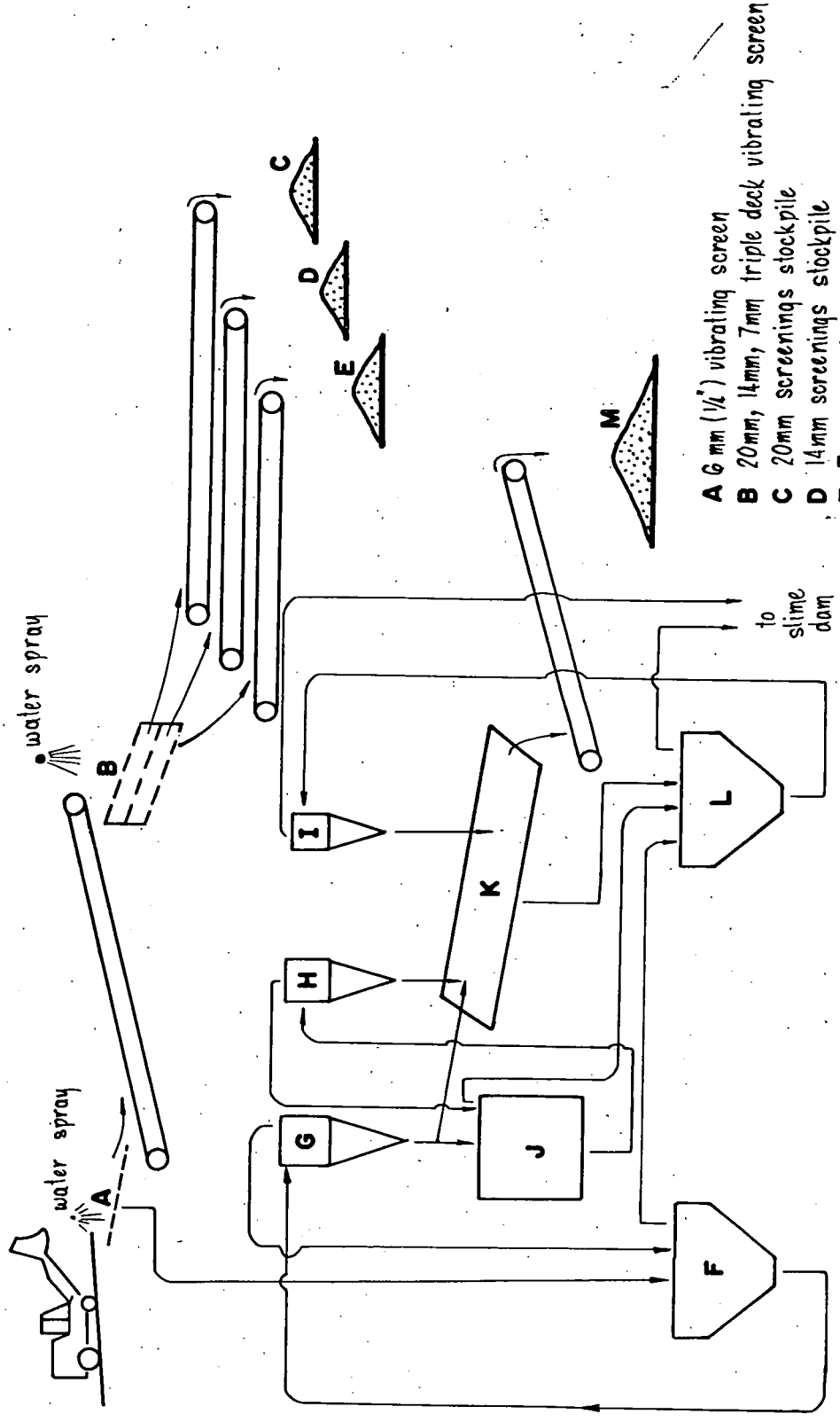


FIG. 35

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

COMPILED J. Valentine
C.D.O. 21-4-83 DATE
DRAWN E. Calabio
SCALE not to scale
DATE August 1982
CHECKED
PLAN NUMBER S 16540

METROPOLITAN QUARRY SURVEY
READYMIX'S HIGHBURY SAND PIT
SANDWASHING AND SCREENING PLANT

2946

1. GENERAL

LOCATION: Pedlar Creek Sand Pit sections 139, 140, 150, hundred of Willunga.

OPERATOR: The Readymix Group (S.A.).

LOCAL ADDRESS: Main South Road, Maslins Beach. Tel 383 3181.

HEAD OFFICE ADDRESS: 100 Greenhill Road, Unley 5061. Tel. 2721122.

MINERAL TENURE: PM17 on company owned land, PM244 worked under agreement with landowners, Malbray Pty Ltd.

2. PRODUCTION

MATERIALS MINED: Sand.

RESERVES (million tonnes)

SECTION	P.M.	Overburden & Waste	Filling Sand	Construction Sand
139	17, 244	0.45	0.73	0.99
140	244	1.57	2.27	2.01
150	244	1.64	6.10	0.24

PRODUCT USES: Washed concrete sand, Washed by product, Nursery sand Plastering sand, Filling sand, 2nd grade filling.

PRODUCTION RATE (1981): 115392 tonnes.

WORKFORCE: (including shale pit) 5

3. HISTORY

Twin Power Excavations extracted filling sand from section 139 in 1961-62. The deposit remained unworked until 1969 when International Sand Supply Ltd. took over and installed a washing plant. Unisan Pty Ltd operated the pit in 1972, but the company was liquidated. Readymix Concrete (S.A.) gained control in 1973, and installed an automated washing plant in early 1976.

4. GEOLOGY (pl. 133,134)

The area lies within the Willunga Embayment a wedge of Canozoic sediments tilted to the southeast against the Willunga Fault and overlapping Adelaidean bedrock of Marinoan age to the northwest.

The pit is located adjacent to this northwestern margin where basal Tertiary North Maslin Sand Member fills a southwesterly draining valley in Marinoan bedrock to a maximum thickness of 25 m. The bedrock is exposed immediately to the north in a weathered shale pit which spans the Tertiary/Adelaidean boundary. The sand within the valley coarsens with depth and also to the northwest and southeast as depth to bedrock decreases.

Overburden between 1 and 7 m thick comprises the finer, upper part of the North Maslin Sand Member together with clay and fine sand of younger units.

5. MINING (Pl. 132)

Overburden is removed by contractors using scrapers and used to build slime dams or for rehabilitation in the pit. Topsoil is either stockpiled for later rehabilitation work or spread over dam banks to promote vegetation and consolidation.

The sand is bulldozed and blended into stockpiles and washed by monitor into a sump. A Warman 6" gravel pump then feeds the slurry at about 12% solids through an 8" thermoplastic pipe to the plant. A certain minimum slurry velocity (and hence water requirement) is maintained to ensure that the critical sedimentation velocity of coarser particles is exceeded. The lowest practical flow rate is used to minimise power consumption and wear of pumping equipment by the sand. Water demand varies and requires constant attention.

In addition to contracted scrapers equipment includes:

1 - Caterpillar D6D bulldozer.

1 - Caterpillar 950 front end loader.

1 - " 966 "

6. PROCESSING (Trahair, 1981), (Pl. 129,130,131 and Fig. 36)

The slurry enters a boiler box lined with wear-resistant rubber, and fitted with baffles to retard the slurry before it falls on to a 12ft x 6ft (3.6 x 1.8 m) triple-deck Link belt vibrating screen, the underpan of which is lined with rubber. The screen is fitted with spraybars to each deck. The material retained on the top deck (20 mm aperture), which is a relieving deck, is oversize material, as is material retained on the second deck (7 mm). This oversize is fed into a chute directed to a ground bin, and is picked up and dumped by a front-end loader. The material retained on the bottom deck (4 mm) is fed on to a conveyor belt and thence into a metering bin, to be incorporated into the finished product if required, or to be sold separately as fine gravel (depending on the material from the pit).

Minus 4 mm material is flumed into a settling tank which discharges through eighteen valves into each side of a 35 ft. inclined divided tank containing two 44 inch (1.1 m) screws. The valves are arranged in pairs, nine feeding the product side of the screw tank and nine the by product side. Coarse sand settles at the input end of the settling tank and fine sand at the far end. Each product valve is opened and closed electrically in response to the torque exerted on a revolving paddle by sand settling around the valve openings. The total time for which each product valve is open is clocked until a preset total time is reached. The excess sand accumulated in the cell during the cycle time is voided through the byproduct valve into the by-product side of the screw tank. When all the valves have delivered the required discharges to the product, the clocks are automatically re-set and the sequence repeated.

The product is augered by one of the screws onto a vacuumed Linatex dewatering screen which reduces moisture content from 20 to 10%, and then elevated to stockpile by radial stacker. By-product is fed directly from the other screw to another radial stacker. Underflow from the dewatering screen is returned to the screw tank.

Overflows from the lower end of the screw tank and the far end of the settling tank are fed to a receiving tank from which the fines are pumped to six 9" (229 mm) cyclones. Cyclone underflow is returned either to the dewatering screen or the by-product stockpile or both. Cyclone overflow is pumped, via a float-controlled sump, to the slime dams.

Plant Capacity

Using the monitor - 60 tonnes/hour

Using dry feed - 100 tonnes/hour

Water Supply

Water is obtained from a 75 m deep bore on section 139 and from a shallow bore adjacent to Pedlar Creek. Both are used 24 hours a day in the winter but available supply is much reduced during summer. A pump in the creek is used to fill the freshwater dams from winter creek runoff to provide enough stored water to last through the drier months.

7. REFERENCES

Harris, W.K., 1964. Tertiary Sand Deposit Section 139, Hundred of Willunga. Subsurface Stratigraphy. Min. Rev. Adelaide, 116: 99-103.

Olliver, J.G., 1963. Test Drilling of Tertiary Sand Deposits, Section 139 & 150, Hundred Willunga. Min. Rev. Adelaide 115: 160-172.

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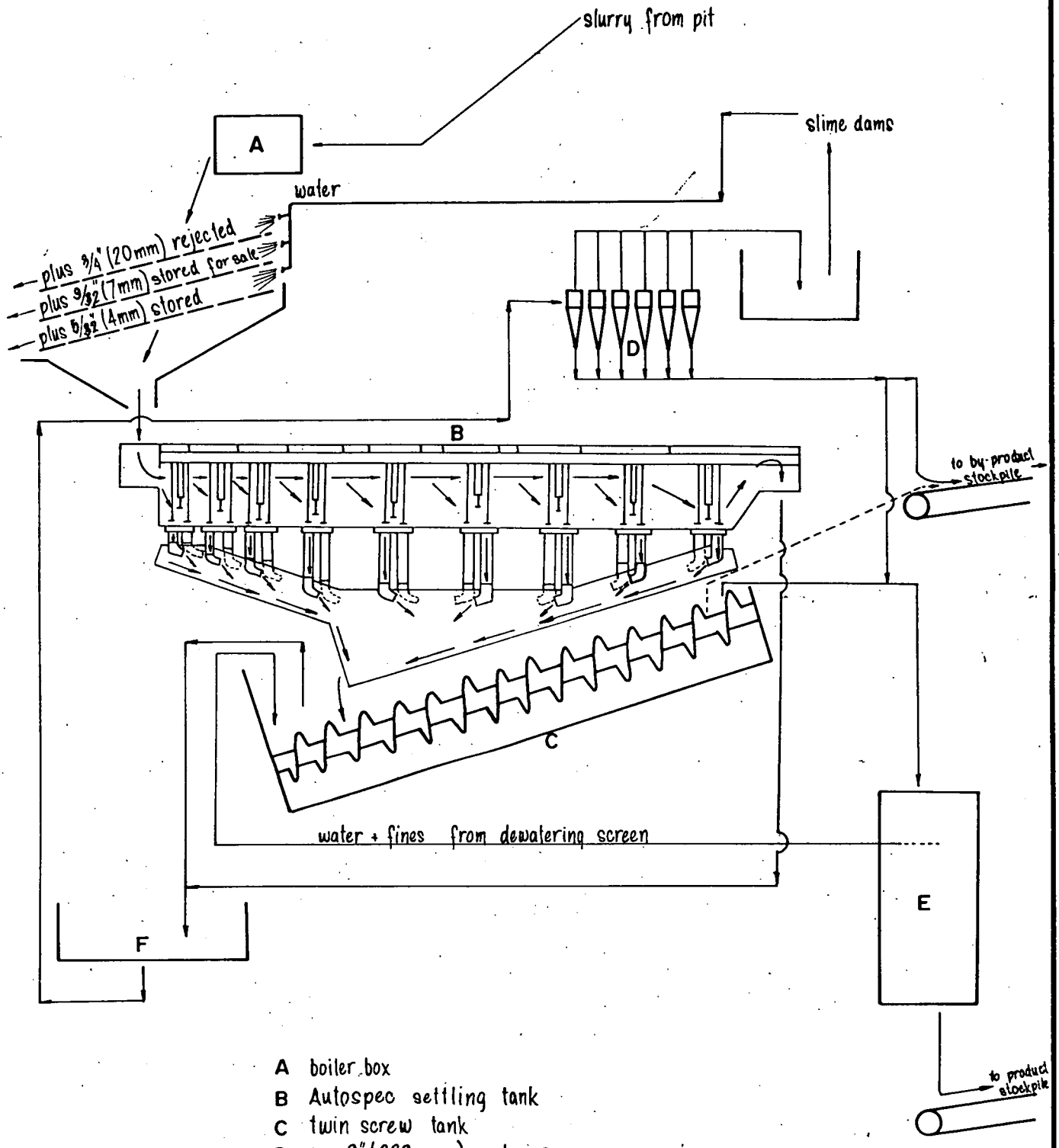
Trahair, J.W., 1981. Sand Extraction in South Australia - the Readymix Group (S.A.) Operation at Pedlar Creek. Quarry Management and Products, September 1981, Vol. 8, No. 9: 603-612.



A boiler box
B Autospec settling tank
C twin screw tank
D six 9" (229mm) cyclones
E linatex dewatering screen
F fines receiving tank

FIG. 36

DEPARTMENT OF MINES AND ENERGY SOUTH AUSTRALIA	COMPILED J. Valentine	CDO 21·4·83 DATE
METROPOLITAN QUARRY SURVEY	DRAWN E. Calabio	SCALE not to scale
READYMIX – MASLIN BEACH WASHING PLANT	DATE August 1982 CHECKED	PLAN NUMBER S 16541

2316

1. GENERAL

LOCATION: Maslins Beach, sections 149, 367, 159, hundred of Willunga,

OPERATOR: Christies Sands Pty Ltd. (Hallett Sand Supplies)

LOCAL ADDRESS: Maslins Beach, Tel: 383 3377.

HEAD OFFICE ADDRESS: Hallett Street, Allenby Gardens, 5009 Tel. 467 371.

MINERAL TENURE: PM65 (Company owned)

PM232 held under agreement with landowner, S.A.W. Sherriff

MC 1635 granted to D. & L. Smart, 1/11/82.

2. PRODUCTION

MATERIALS MINED: Sand

RESERVES (million tonnes)

SECTION	TENURE	Overburden & Waste	Filling Sand	Construction Sand
149	PM 65	0.50	0.78	0.69
159	MC1635	1.63	1.69	2.40
367	PM 232	2.50	1.59	8.38

PRODUCT USES: Concrete Sand

Fine Washed Sand

Dry Screened Plaster Sand

Bricklaying Sand

Blended Bricklaying Sand (dry screened sand mixed with special washed sand)

1st grade filling sand

2nd grade filling sand

PRODUCTION RATE (1981): 131988 tonnes

WORKFORCE: 5

3. HISTORY

The pit was opened in 1961 by D.R. Rosewall. Christies Sands Pty Ltd acquired the deposit in September 1963 and dry screened sand until the washing plant was established in 1964. Hallett Brick Industries Ltd. bought a controlling interest in the company in May 1965, and has subsequently increased its holding to 94%. The operation trades as Hallett Sand Supplies.

4. GEOLOGY (Pl. 137,138)

The area lies within the Willunga Embayment a wedge of Cainozoic sediments tilted to the SE against the Willunga Fault and overlapping Adelaidean bedrock along its NW boundary.

A southwesterly-draining bedrock valley crossing the southern third of section 149 is partially filled with more than 30 m of Permian fluvioglacials of the Cape Javis Beds. The sand is mined from the overlying Tertiary North Maslin Sand Member which reaches a recorded thickness of 26.5 m in the southeastern corner of section 149, and thins northwesterly into section 367 against a southwesterly-trending bedrock spur.

5. MINING

Fine and coarse sand is taken by scraper from selected areas in the pit and deposited in layers on stockpiles adjacent to the washing or dry screening plants. Sand is then delivered to the plants by front end loader. A bulldozer is used for general maintenance of mining areas. Equipment used is as follows:

1 - Wabco 222F scraper

1 - Caterpillar 966C front end loader

1 - Caterpillar 950 front end loader

1 - Caterpillar D7 bulldozer.

6. PROCESSING

Washing Plant (Pl. 135 and Fig. 38): Sand from the loading bin is fed to a vibrating feeder, and is then wet screened on a triple deck vibrating screen. The minus 3/16" (5 mm) material is fed to a twin screw washing tank from which the elevated coarse fraction is delivered to a vibrating Linatex dewatering screen. Oversize from the dewatering screen falls to a conveyor and is stockpiled as concrete sand, the water being returned to the washing tank. The fine fraction from the washing tank is pumped

to a 15" (380 mm) cyclone the underflow from which is stockpiled as garden sand. Cyclone overflow is returned, via a sump, to the washing tank. Sump overflow is delivered to slime dams by a pump controlled by a float switch.

The washing plant is essentially that installed in 1964 with the addition of the dewatering screen and a longer washing tank.

Dry Screening Plant (Pl. 136 and Fig. 38): Material from stockpile is fed to the loading bin and elevated by conveyor to a 3.7 x 1.5 m vibrating 3/8" (10 mm) screen, the oversize being discarded. The undersize is elevated to stockpiles as either brick or plaster sand.

Plant Capacity

a) Washing Plant

Capacity reported to be 250-300 tonnes per day.

b) Dry Screening Plant

Capacity reported to be approximately 200 tonnes per day.

Quality Control

Dry sizing is carried out by the pit manager about once per week.

Water Supply

6.3 litres/sec is pumped to the plant from a bore 56 m deep located on a small company holding 2.5 km east of the pit.

7. REFERENCES

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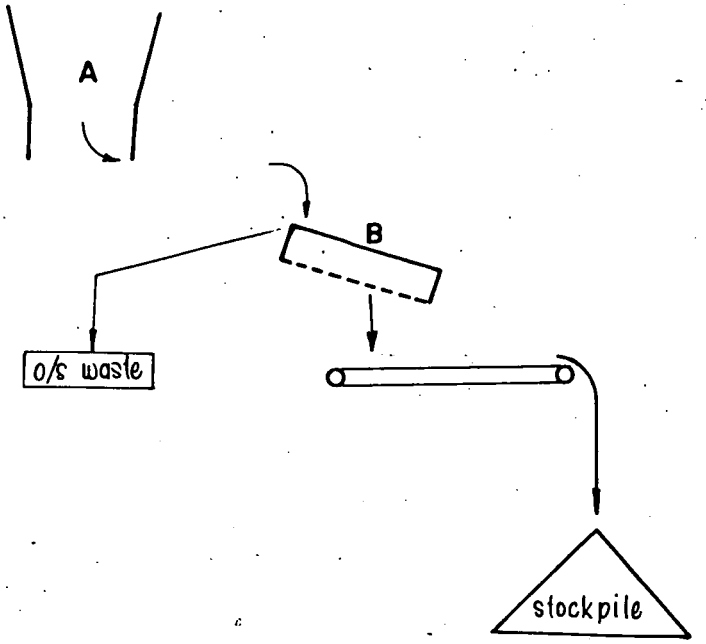
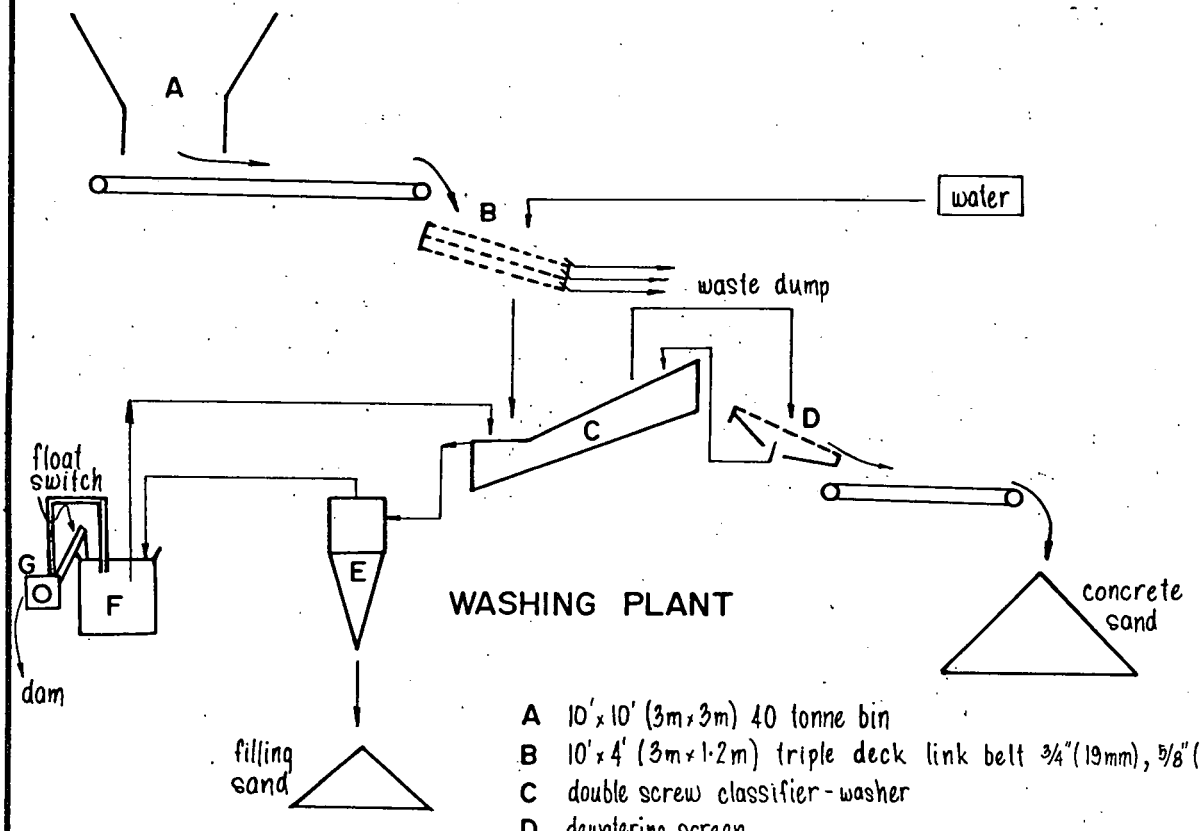


A 3m x 3m 10 tonne bin
B 3·7m x 1·5m link belt vibrating screen (5/8")

DRY SCREENING PLANT



WASHING PLANT

A 10'x10' (3m x 3m) 40 tonne bin
B 10'x4' (3m x 1·2m) triple deck link belt 3/4"(19mm), 5/8"(16mm), 5/16"(5mm)
C double screw classifier - washer
D dewatering screen
E 15"(380mm) cyclone
F sump
G pump

FIG. 38

DEPARTMENT OF MINES AND ENERGY SOUTH AUSTRALIA	COMPILED J. Valentine	C.D.O. 21-4-83 DATE
METROPOLITAN QUARRY SURVEY CHRISTIES - MASLIN BEACH DRY SCREENING AND WASHING PLANT	DRAWN E. Calabio	SCALE not to scale
	DATE August 1982	PLAN NUMBER S 16543
	CHECKED	

2946

1. GENERAL

LOCATION: Maslins Beach, hundred of Willunga, section 366, 363, 364.

OPERATOR: Monier Ltd.

LOCAL ADDRESS: Maslins Beach Tel. 383 3374, 3841741.

HEAD OFFICE ADDRESS: Blakeney Road, Ottoway 5013, Tel. 471066.

MINERAL TENURE: PM20, worked under agreement with landowner, C. Dyson.

PM43 - on land owned by company.

2. PRODUCTION

MATERIAL MINED: Sand

RESERVES (million tonnes)

SECTION	P.M.	Overburden & Waste	Filling Sand	Construction Sand
366	20	1.09	4.45	8.53
363	43	2.81	0.05	7.20
364	43	1.77	0.03	6.33

PRODUCT USES:

Concrete Sand
Tile Sand
Bricklaying Sand
Rough Filling (direct from pit)
Plaster sand
Filling Sand (untreated)
Washed filling sand
Screened filling sand

PRODUCTION RATE (1981): 197349 tonnes

WORKFORCE: 7

3. HISTORY

Albert's Sand Pit Pty Ltd began production on section 366 in 1959. The sand was dry screened until washing equipment, purchased from W. Duhne and Sons after closure of their pit at Highbury, was installed in 1972. Monier Ltd acquired the operation in 1973.

4. GEOLOGY (Pl. 140,141,142)

The area lies within the Willunga Embayment, a wedge of Cainozoic sediments tilted to the southeast against the Willunga

Fault and overlapping Adelaidean bedrock along its northwestern boundary.

The pit is located near the northwestern margin of the embayment where more than 90 m of Permian fluviogalcials of the Cape Jervis Beds have been deposited in a southwesterly-draining valley in weathered Marinoan bedrock shale. The topography of the surface of the fluvioglacials closely follows that of the bedrock. Sand is mined from the overlying basal Tertiary North Maslin Sand member which reaches 30-40 m in thickness.

Overburden is up to 22 m thick and consists of the finer upper North Maslin Sand Member and overlying South Maslin Sand member together with clay and fine sand of younger units.

5. MINING

The sand is selectively removed from the pit using an elevating scraper and spread in layers on stockpiles adjacent to the washing and dry screening plants. Sand is fed from the face of the stockpiles to the plants by front end loader. A bulldozer is used to maintain benches, scraping areas, stockpiles and to assist scraper loading in wet weather. A grader is used to maintain the haul roads and dust is minimized using a water truck.

Worked out sections of the pit are used as slime dams as mining proceeds southerly.

Equipment used is as follows:-

1 - Wabco 22G elevating scraper, 22 c. yd.

1 - 3½ c. yd. Caterpillar 966 C front end loader.

1 - 3½ c. yd. Hough 80B front end loader.

1 - Caterpillar D7E bulldozer.

1 - Caterpillar 12 Grader.

1 - Albion water truck.

6. PROCESSING

a. Washing Plant: (Pl. 139 and Fig. 37)

Sand from the feed hopper is elevated and wet trommel screened oversize being rejected. The trommel is divided into 11/32" (9 mm) 5/16 (8 mm) ¼, (7 mm) 3/16" (5 mm) sections. Trommel undersize falls to the first washing tank (A) from which the settled sand is pumped to 18" and 24" cyclones, cyclone overflow being returned to the tank. The cyclones discharge into a second washing tank (B) which feeds a 27" cyclone from which overflow is returned to the tank. Cyclone underflow falls onto two Linatex dewatering screens and is then elevated to the concrete sand stockpile. Fines from the screens are returned to the first washing tank.

Overflow from the two washing tanks is fed to a return water tank (C) which feeds five 9" (229 mm) cyclones. Fine sand underflow is returned to tank A and cyclone and return water tank overflow proceed to the slime dam.

The washed filling sand, is produced separately by washing selected raw material.

b. Dry Screening Plant:

Sand from stockpile is elevated from the loading bin to a single deck vibrating screen of four adjacent sections (two 3/16" (5 mm) and one each of ¼" (6 mm) and 3/8" (10 mm). Oversize goes to waste and undersize to stockpile. Products are brick sand (yellow), plaster sand (red) and screened filling.

Plant Capacities:

a. Washing Plant:

Capacity reported to be 80 tonnes per hour.

b. Dry Screening Plant:

Production rate rises from 80 tonnes per day in winter to 300 tonnes per day during peak summer production.

Quality Control:

Carried out by Quality Control Officer from Monier's central laboratory, once a week for concrete sand and about once a month for the dry screened sand.

Water Supply:

A supply of about 80 litres/sec. is obtained from a bore near the western boundary of section 366.

7. REFERENCES

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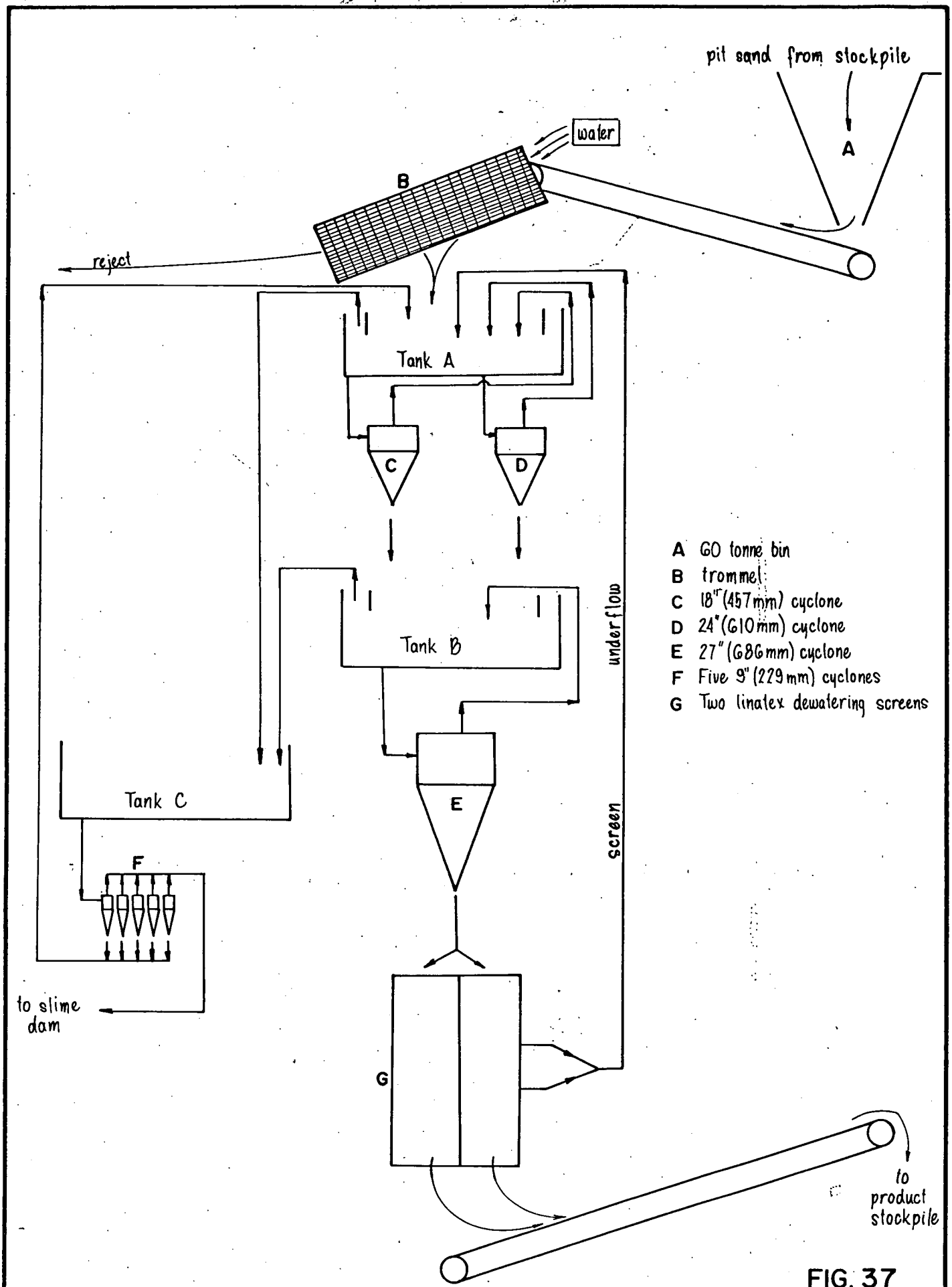

A 60 tonne bin
B trommel
C 18" (457mm) cyclone
D 24" (610mm) cyclone
E 27" (686mm) cyclone
F Five 9" (229mm) cyclones
G Two linatex dewatering screens

FIG. 37

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

COMPILED J. Valentine
C.D.O 21-4-83 DATE

DRAWN E. Calabio
SCALE not to scale

DATE August 1982
CHECKED

PLAN NUMBER S 16542

METROPOLITAN QUARRY SURVEY
MONIER - MASLIN BEACH
WASHING PLANT

2910

1. GENERAL

LOCATION: Old ABM Pit, Maslin Beach, sections 365, 368, 803, 8061, hundred of Willunga.

OPERATOR: The Readymix Group.

LOCAL ADDRESS: Maslin Beach Road, Maslin Beach. Tel. 3833181.

HEAD OFFICE ADDRESS: 100 Greenhill Road, Unley 5061, Tel 2721122.

MINERAL TENURE: ML 2569, 2570. PM40. Land owned by company

2. PRODUCTION

MATERIAL MINED: Sand

RESERVES: 300,000 tonnes of which sand 100,000 tonnes suitable for dry screening. (Company estimate)

PRODUCT USES: Concrete Sand.
Bitumen Sand.

PRODUCTION RATE: (1981) 10977 tonnes

WORKFORCE: 1

3. HISTORY

The pit has produced dry-screened sand since opened by the Noarlunga Sand Company in 1928 and was the only pit in the Maslin Beach area until 1960. The deposit was taken over by D.R. Rosewall (Noarlunga Sand Pit Ltd) in 1949 and later by Australian Blue Metal Ltd in 1962. Readymix bought out ABM in 1965.

4. GEOLOGY (Pl. 143, 144)

The pit is located near the northwestern margin of the Willunga Basin where white, grey, purple and pink pebbly silty clay of Permian age is overlain by up to 28 m of grey, brown white and red, cross bedded gravelly sand of the North Maslin Sand Member. This is overlain by Pleistocene mottled sandy & gravelly clay up to 20 m thick in places.

5. MINING

Sand was originally mined by electric dragline, elevated and screened into loading bins and transported by aerial bucket ropeway 2.8 km northeast to the Adelaide-Willunga railway. Later operators employed bulldozing and scraping. Readymix transported sand from the working face by conveyor, which was lengthened as mining proceeded away from the elevating and screening plant. Workings proceeded in a southerly direction until 1973, and thereafter in a northerly direction. Sand is currently being taken from the northeastern corner of the pit by bulldozing into stockpiles prior to delivery by front end loader to a portable dry screening plant which is transported to the pit when required. The old elevator and conveyor have now been dismantled.

Equipment used is as follows:

1 - Komatsu D155A bulldozer (approx. equiv. D7) - also used at main sand and shale pit.

1 - Caterpillar 950 front end loader - also used at main sand and shale pits.

6. REFERENCES

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SMALLER OPERATIONS

Sand

Sampson's (Tuckwell's) Sand Pit, sections 1698, 6382 hundred of Para Wirra. PM186.

This pit produces packing and filling sand and a small amount of coarser sand for domestic concreting from Tertiary deposits at One Tree Hill.

Recorded production, since granting of the private mine in 1973, has averaged 3200 tonnes, but has recently declined. (700 tonnes in 1981).

Reference

Pain, A.M. and Scott, D.C., 1983. Clay and Sand Resources, One Tree Hill. S. Aust. Dept. Mines and Energy report (in prep.).

J.T. VALENTINE

JTV/GU

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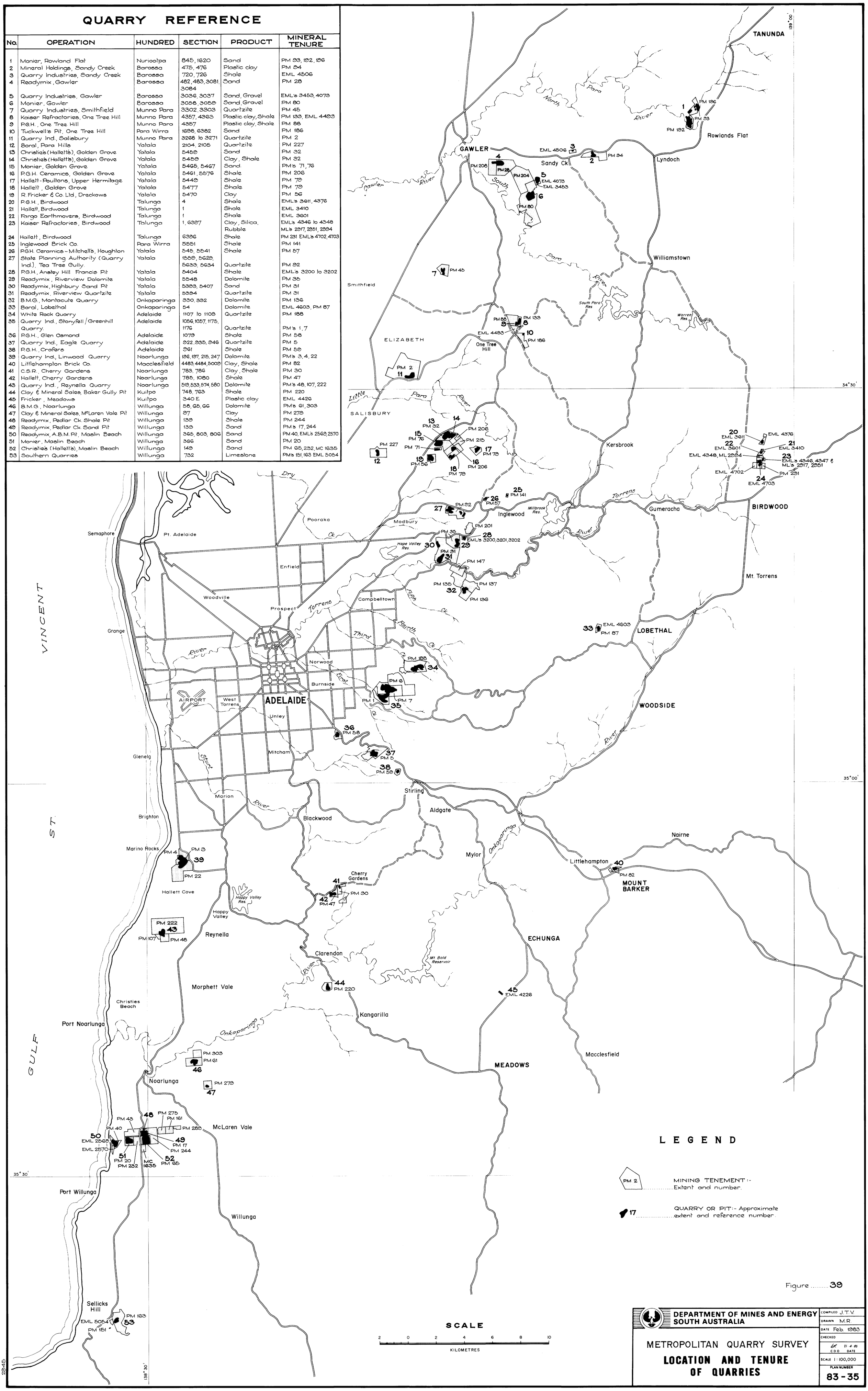
QUARRY REFERENCE

No.	OPERATION	HUNDRED	SECTION	PRODUCT	MINERAL TENURE
1	Monier, Rowland Flat	Nuriootpa	845, 1620	Sand	PM 93, 192, 196
2	Mineral Holdings, Sandy Creek	Barossa	475, 476	Plastic clay	PM 94
3	Quarry Industries, Sandy Creek	Barossa	720, 726	Shale	EML 4506
4	Readymix, Gawler	Barossa	482, 483, 3081, 3084	Sand	PM 28
5	Quarry Industries, Gawler	Barossa	3036, 3037	Sand, Gravel	EML's 3453, 4073
6	Monier, Gawler	Barossa	3058, 3059	Sand, Gravel	PM 80
7	Quarry Industries, Smithfield	Munno Para	3302, 3303	Quartzite	PM 45
8	Kaiser Refractories, One Tree Hill	Munno Para	4357, 4363	Plastic clay, Shale	PM 133, EML 4493
9	P.G.H., One Tree Hill	Munno Para	4357	Plastic clay, Shale	PM 88
10	Tuckwell's Pit, One Tree Hill	Para Wirra	1698, 6382	Sand	PM 186
11	Quarry Ind., Salisbury	Munno Para	3268 to 3271	Quartzite	PM 2
12	Boral, Para Hills	Yatala	2104, 2105	Quartzite	PM 227
13	Christie's (Hallett's), Golden Grove	Yatala	5458	Sand	PM 32
14	Christie's (Hallett's), Golden Grove	Yatala	5459	Clay, Shale	PM 32
15	Monier, Golden Grove	Yatala	5465, 5467	Sand.	PM's 71, 76
16	P.G.H. Ceramics, Golden Grove	Yatala	5461, 5576	Shale	PM 206
17	Hallett-Poultons, Upper Hermitage	Yatala	5449	Shale	PM 79
18	Hallett, Golden Grove	Yatala	5477	Shale	PM 79
19	R. Fricker & Co. Ltd, Dreckows	Yatala	5470	Clay	PM 56
20	P.G.H., Birdwood	Talunga	4	Shale	EML's 3611, 4376
21	Hallett, Birdwood	Talunga	1	Shale	EML 3410
22	Fargo Earthmovers, Birdwood	Talunga	1	Shale	EML 3601
23	Kaiser Refractories, Birdwood	Talunga	1, 6397	Clay, Silica, Rubble	EML's 4346 to 4348 ML's 2917, 2951, 2934
24	Hallett, Birdwood	Talunga	6396	Shale	PM 231 EML's 4702, 4703
25	Inglewood Brick Co.	Para Wirra	5551	Shale	PM 141
26	P.G.H. Ceramics - Mitchell's, Houghton	Yatala	545, 5541	Shale	PM 57
27	State Planning Authority (Quarry Ind.), Tea Tree Gully.	Yatala	1559, 5628, 5633, 5634	Quartzite	PM 92
28	P.G.H., Anstey Hill Francis Pit	Yatala	5404	Shale	EML's 3200 to 3202
29	Readymix, Riverview Dolomite	Yatala	5548	Dolomite	PM 35
30	Readymix, Highbury Sand Pit	Yatala	5393, 5407	Sand	PM 31
31	Readymix, Riverview Quartzite	Yatala	5394	Quartzite	PM 31
32	B.M.G., Montacute Quarry	Onkaparinga	330, 332	Dolomite	PM 136
33	Boral, Lobethal	Onkaparinga	54	Dolomite	EML 4603, PM 87
34	White Rock Quarry	Adelaide	1107 to 1109	Quartzite	PM 188
35	Quarry Ind., Stonyfell / Greenhill Quarry.	Adelaide	1056, 1057, 1175, 1176	Quartzite	PM's 1, 7
36	P.G.H., Glen Osmond	Adelaide	1079	Shale	PM 58
37	Quarry Ind., Eagle Quarry	Adelaide	922, 935, 946	Quartzite	PM 5
38	P.G.H., Crafers	Adelaide	961	Shale	PM 59
39	Quarry Ind., Linwood Quarry	Noarlunga	196, 197, 215, 247	Dolomite	PM's 3, 4, 22
40	Littlehampton Brick Co.	Macclesfield	4483, 4484, 5009	Clay, Shale	PM 82
41	C.S.R., Cherry Gardens	Noarlunga	783, 786	Clay, Shale	PM 30
42	Hallett, Cherry Gardens	Noarlunga	785, 1080	Shale	PM 47
43	Quarry Ind., Reynella Quarry	Noarlunga	519, 533, 574, 580	Dolomite	PM's 48, 107, 222
44	Clay & Mineral Sales, Baker Gully Pit	Kuitpo	748, 763	Shale	PM 220
45	Fricker, Meadows	Kuitpo	340 E.	Plastic clay	EML 4426
46	B.M.G., Noarlunga	Willunga	58, 65, 66	Dolomite	PM's 61, 303
47	Clay & Mineral Sales, McLaren Vale Pit	Willunga	97	Clay	PM 279
48	Readymix, Pedlar Ck. Shale Pit	Willunga	139	Shale	PM 244
49	Readymix, Pedlar Ck. Sand Pit	Willunga	139	Sand	PM's 17, 244
50	Readymix, A.B.M. Pit, Maslin Beach	Willunga	365, 803, 806	Sand	PM 40, EML's 2569, 2570
51	Monier, Maslin Beach	Willunga	366	Sand	PM 20
52	Christie's (Hallett's), Maslin Beach	Willunga	149	Sand	PM 65, 232, MC 1635
53	Southern Quarries	Willunga	732	Limestone	PM's 151, 163 EML 5054



LEGEND

PM 2 — MINING TENEMENT :- Extent and number.

17 — QUARRY OR PIT :- Approximate extent and reference number.

Figure 39

DEPARTMENT OF MINES AND ENERGY SOUTH AUSTRALIA

METROPOLITAN QUARRY SURVEY

LOCATION AND TENURE OF QUARRIES

COMPILED	J.T.V.
DRAWN	M.R.
DATE	Feb. 1983
CHECKED	
C.D.O. DATE	21.4.83
SCALE	1 : 100,000
PLAN NUMBER	83 - 35

2945