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1979
 STATUS REPORT
 OAKLEIGH CREEK PROJECT
 CENTRAL TASMANIAN TUNGSTEN

REGISTERED

BY

M.J. LAWRENCE

SEREM FILE

81-1614.8

79/SYD/23
 FEBRUARY, 1979.

SEREM (AUSTRALIA) PTY. LTD.
 MINERAL EXPLORATION

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1. INTRODUCTION

Central Tasmanian Tungsten Pty. Ltd., a joint venture to exploit the old Mt. Pelion wolframite mine located near Sheffield, Tasmania, is a consortium of French and Australian mining interests, which have considerable expertise and experience. The new mine is called *OAKLEIGH CREEK*.

When the mine commences operations, probably in the first half of 1980, it will have a production of 100 tonnes per day of ore. The majority of workers will have permanent accommodation at Sheffield or other towns in the area, but there will be permanent housing on site for single men. The capital cost of the project is expected to be around \$2.7 million of which \$2.1 million will be spent in Tasmania. On current reserves the mine will have a life of not less than 5 years. Shrinkage stoping will be the mining method and ore will be treated by conventional gravity methods (jigs and tables), which also incorporate a wet high intensity magnetic separator circuit. Since physical separation techniques will be used, tailings disposal will be fairly simple. A small tailings dam will be located just north of Reid Creek.

Although quite a small enterprise it will directly employ around 28 men and involve an annual wages plus on-costs bill of about \$750,000. It will also generate useful export income from the projected production of 325 tonnes per year of wolframite concentrates (currently valued at around \$2.5 million).

The partners are acutely aware of minimising any environmental impact of this development. The mining and metallurgical techniques employed are simple and well known to have little effect on the environment. Tailings disposal is facilitated by the absence of chemical processes in the ore treatment and the uncomplicated ore and relatively unreactive ore mineralogy. Even the country rock, a hard, durable quartzite, will pose no problems as it will not readily breakdown and make erosion and landslips a visual problem. Besides, as all mining is underground there is little surface disturbance. Similarly, the mill water discharge will be low in solids and chemical impurities.

2. LOCATION AND ACCESS (SEE FIGURE 1)

The mine site is situated on the eastern side of the upper Forth River Valley in north-western Tasmania. The mine can be reached from Launceston (150 km or 3 hours) or Devonport (100 km or 2 hours). It is a sealed road as far as the Lemonthyme Power Station, but the 26 km to the mine is via a gravel road of variable quality.

Launceston and Devonport airports provide daily flights to Melbourne and Hobart. Burnie and Devonport are overseas ports, as well as providing contractors and repair shops. Mole Creek is the nearest railhead, but Railton is more convenient. A sawmill also operates at Mole Creek.

3. PROJECT OWNERSHIP

Participants in the joint venture, which will be operated through a trustee company (*Central Tasmanian Tungsten Pty. Ltd.*) are as follows :-

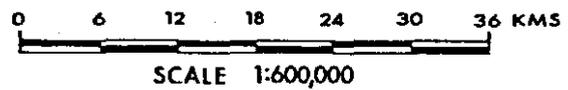
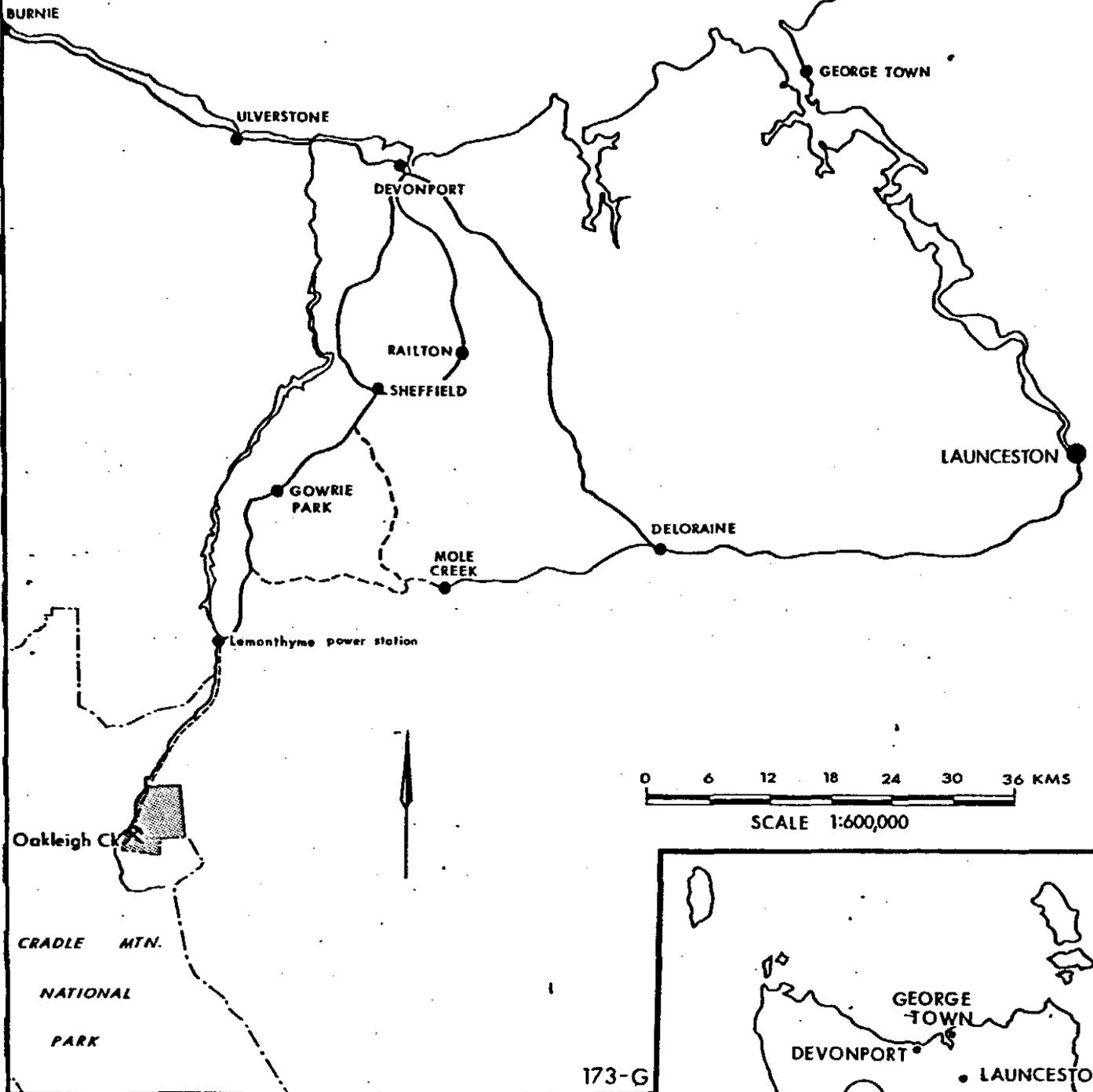
SEREM (AUSTRALIA PTY. LTD.	33 1/3%
BUKA MINERALS N.L.	25%
TRIAKO MINES N.L.	25%
AQUITAINE (AUSTRALIA & NEW ZEALAND) LTD.	16 2/3%

SEREM (AUSTRALIA) PTY. LTD. is a wholly owned subsidiary of *Société d'Etudes, de Recherches et d'Exploitations Minières* (SEREM) which is itself a wholly owned subsidiary of *Bureau de Recherches Géologiques et Minières* (BRGM), a mining and geological agency of the French Government.

BUKA MINERALS N.L. and TRIAKO MINES N.L. are both listed on the Australian Stock Exchange, but *Triako* directly and indirectly owns 63.14% of *Buka*.

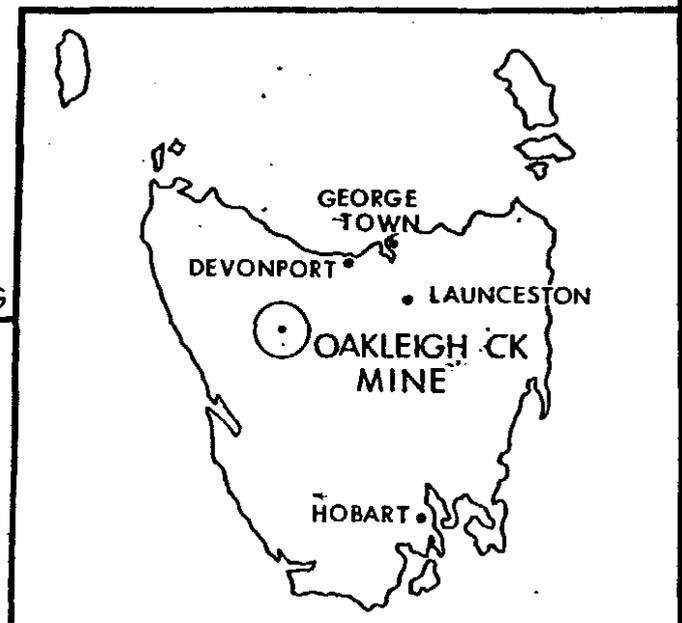
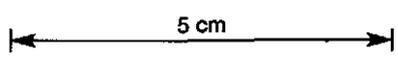
Persuant to an agreement dated April 7th, 1978, AQUITAINE (AUSTRALIA & NEW ZEALAND) LIMITED acquired a 42% shareholding in *Triako*, and has an option to increase this to 62%. The parent company of *Australian Aquitaine* (holding 92% of the shares) is *Société Nationale Elf Aquitaine* (SNEA) with the remainder of the shares held by Australian institutions and investors. SNEA is itself owned by *Enterprise de Recherches et d'Activités Pétrolières* (ERAP) 70%, and the remainder by private investors and institutions.

Bass Strait



173-G

LOCALITY MAP



006

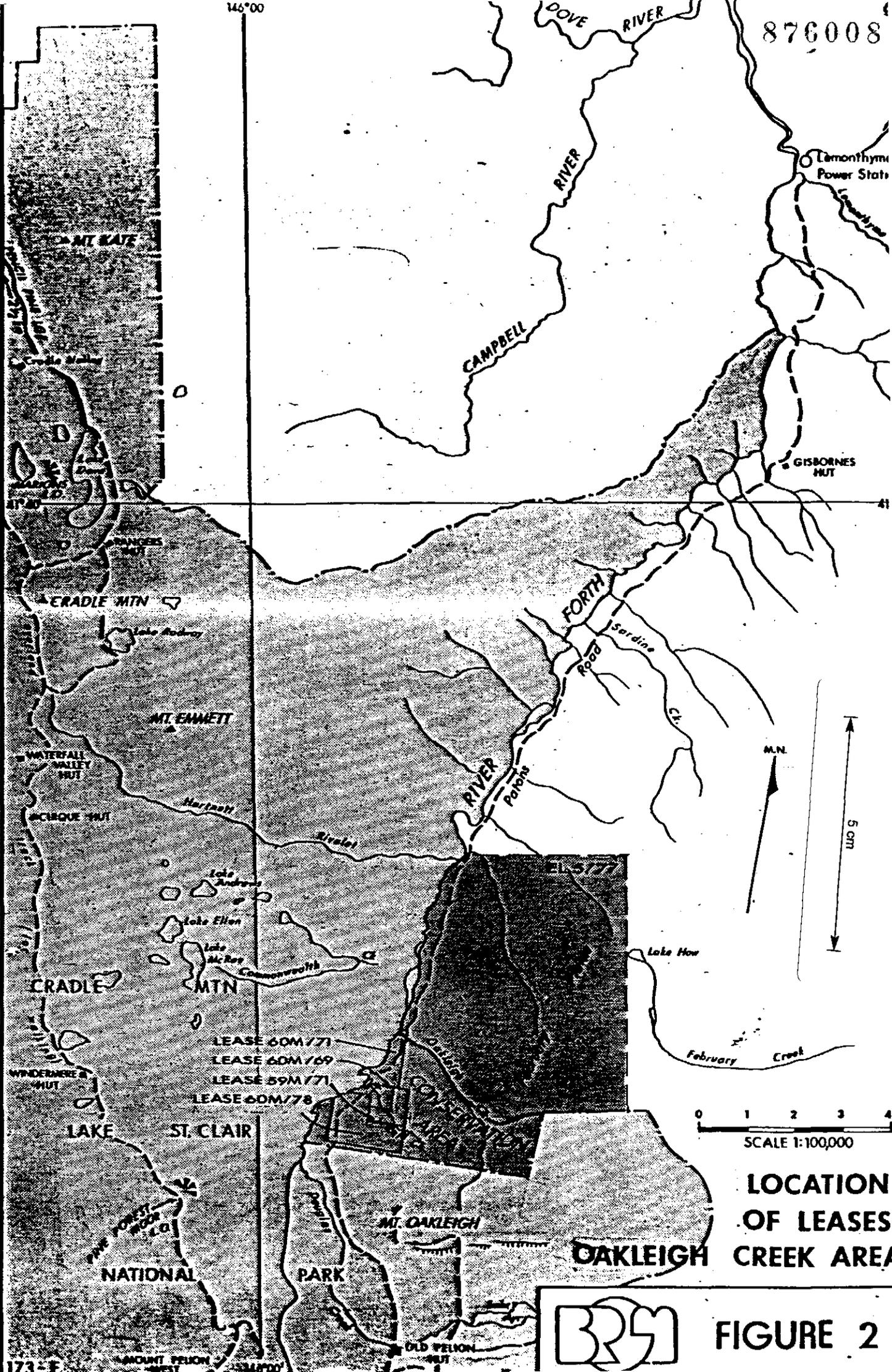
ERAP is also a French Government agency. Aquitaine took a direct 16 2/3 % equity in the project in October, 1979.

The CENTRAL TASMANIAN TUNGSTEN PTY. LTD. joint venture holds Exploration Licence E.L. 5/77 over leases which surround the known mineralized area (60M/69, 59M/71, 60M/71 and 60M/78). See Figures 2 and 3.

146°00

007

876008



Lemonthyme Power Station

GISBORNES HUT

MT. KATE

CAMPBELL RIVER

DOVE RIVER

FORTH RIVER

RIVER

CRADLE MTN

MT. EMMETT

CRADLE MTN

CRADLE MTN

EL 5177

- LEASE 60M/71
- LEASE 60M/69
- LEASE 59M/71
- LEASE 60M/78

LAKE ST. CLAIR

NATIONAL PARK

MT. OAKLEIGH

OAKLEIGH

**LOCATION
OF LEASES
OAKLEIGH
CREEK AREA**

M.N.

5 KM

0 1 2 3 4
SCALE 1:100,000



FIGURE 2

173-F

MOUNT PELION WEST

146°00

OLD PELION HUT

008

5 cm

876009

J. Hiscock
78M/77

CRADLE MOUNTAIN

LAKE ST CLAIR

NATIONAL

PARK



MN

RIVER

Oakleigh

E.L. 5/77

Oakleigh Creek Mine

C.T.T.
60M/71

60M/69



Reid

FORTH

C.T.T.
59M/71

Ck

DETAILED LEASE SITUATION
OAKLEIGH CREEK AREA

C.T.T.
60M/78

SCALE 1:10,000

173 N



FIGURE 3

009

4. GEOLOGICAL SETTING (SEE FIGURE 4)

In the Forth Valley the rock types include quartzite, mica schist and quartz mica schist of the Fisher Group with a general strike slightly east of north and dips of between 15° and 30° to the south-east. At the Oakleigh Creek mine the strike varies from 082° to 109° magnetic and dips from 15° to 27° in a northerly direction. The metasediments are abundantly veined by white quartz and locally sheared along planes trending north-north-west. These shear planes served as structural controls in the localization of copper and wolfram mineralization in the Forth Valley. Most of the rocks have been derived from orthoquartzite and siltstone and metamorphosed in greenschist facies. Undifferentiated Permian sediments unconformably overly the Precambrian metasediments and thick Jurassic dolerite caps the plateau above the mine. However on the slopes of the lower part of the valley there is thick dolerite scree, which mostly obscures the outcrop of the Pre-Mesozoic strata.

Two small granitic intrusions, called the Birthday Granite and Lone Pine Granite, (actually adamellite of mid-Devonian age), occur within the E.L. area. They are the source of the wolfram, tin and copper mineralisation in this district. The granite is discordantly intrusive into the Precambrian quartzite and quartz-mica schist of the Fisher Group. The granite contains biotite and muscovite (with the latter predominating in some exposures), pinkish white feldspar and coarse quartz. Tourmaline, molybdenite and arsenopyrite have been noted. Near its contact, the granite commonly develops large phenocrysts of feldspar and abundant biotite. The granite sometimes contains small quartz veins, which in the past were prospected for tin and wolfram (near Lone Pine and Birthday Prospects). They also contain arsenopyrite, pyrite and molybdenite.

The major structure in the Precambrian meta-sediments is a series of subparallel east-west folds. The folds are open and asymmetrical with their axial planes dipping to the north. Minor folding in many places is intense, with the less competent schists being strongly distorted between the quartzites. These schists are less favourable for development of economic vein mineralization than the quartzite.

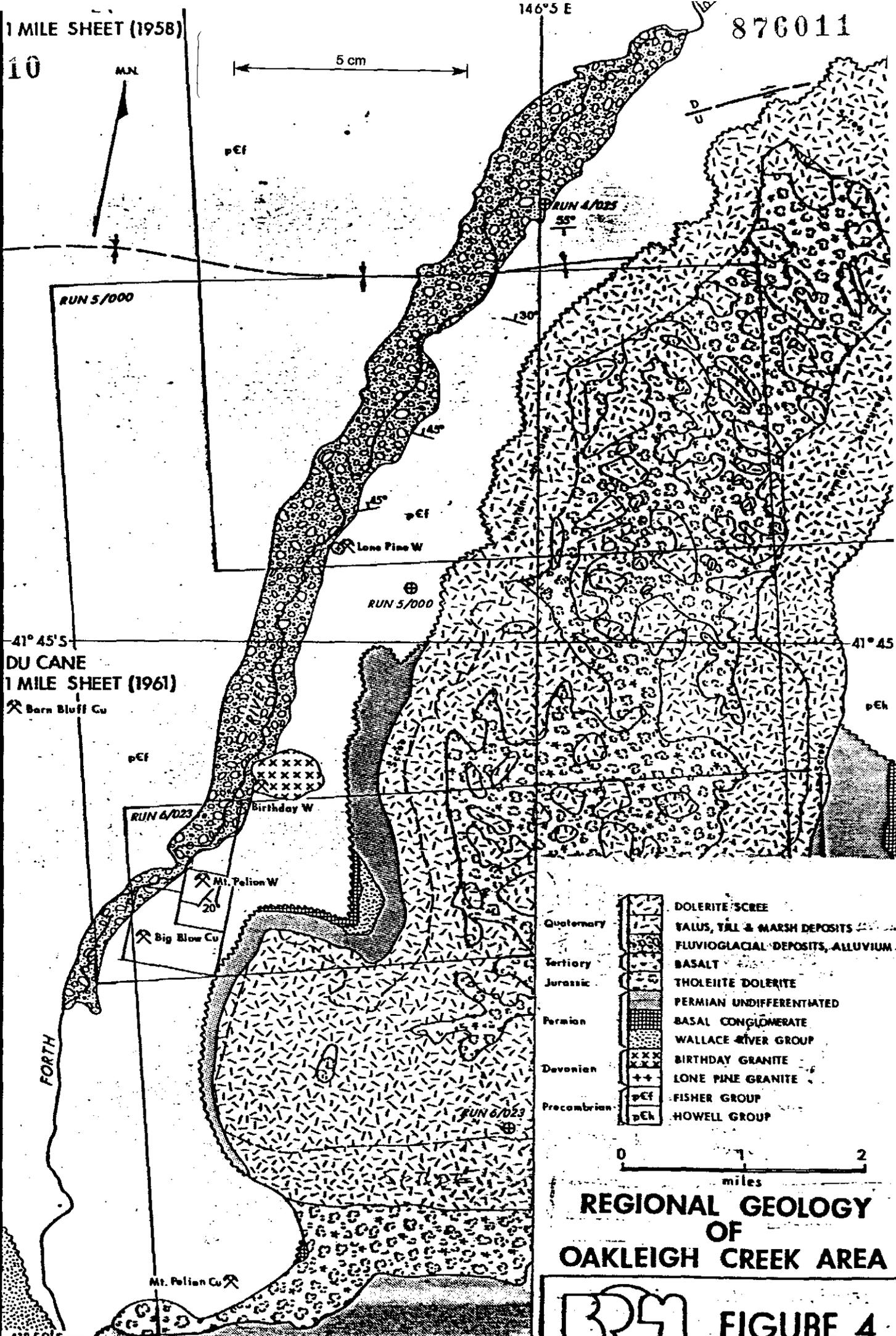
1 MILE SHEET (1958)

146°5 E

876011

010

5 cm



41° 45' S
DU CANE
1 MILE SHEET (1961)

Barn Bluff Cu

RUN 6/023

Birthday W

Mt. Pelion W

Big Blow Cu

FORTH

Mt. Pelion Cu

41° 50' S

Source: Geological Survey of Tasmania

Quaternary	DOLERITE SCREE
	TALUS, TILL & MARSH DEPOSITS
	FLUVIOGLACIAL DEPOSITS, ALLUVIUM
Tertiary	BASALT
Jurassic	THOLEIITE DOLERITE
	PERMIAN UNDIFFERENTIATED
Permian	BASAL CONGLOMERATE
	WALLACE RIVER GROUP
Devonian	BIRTHDAY GRANITE
	LONE PINE GRANITE
Precambrian	FISHER GROUP
	HOWELL GROUP

0 1 2
miles

REGIONAL GEOLOGY OF OAKLEIGH CREEK AREA



FIGURE 4

173-H

011

The vein consists of crystalline quartz gangue with inclusions of wolframite, cassiterite, fluorite, pyrite, arsenopyrite, chalcopyrite and sphalerite. The wolframite occurs in pods and patches near the edge of the vein; it has an apparently random distribution both horizontally and vertically. Some zonation of mineralization is apparent as the wolframite content decreases in a southerly direction and is replaced by arsenopyrite as the major vein mineral. Vertically the content of cassiterite is visually seen to be higher on the 280 level than the 240 level. The ore veins resemble those at *Storey's Creek* and *Rossarden*, except that they have less cassiterite and fluorite and lack muscovite and pyrite selvages along the vein. Overall, the sulphide content appears low. Table 1 gives chemical, mineralogical and sizing analyses of a test concentrate produced by A.M.D.E.L. from a 240m level adit bulk sample taken in 1978 over 150m of vein length.

TABLE 1

CHEMICAL & MINERAL COMPOSITION OF TYPICAL ORE CONCENTRATE

CHEMICAL ANALYSIS (%)			MINERALOGY			SIZING	
Element	Rossarden ⁶	Oakleigh Creek ⁺	Mineral	%	Element	UM	%
W ₂ O ₃	73.80	66.7	Wolframite	45	W, Fe, Mn	+355	24.5
Sn	0.10	0.04	Tourmaline	30	Fe	-355+250	22.0
As	0.02	0.14	Arsenopyrite	1	As, S	-250+180	17.3
Sb	0.01	0.006	Quartz	5	-	-180+125	12.5
Bi	-	0.12	-	-	-	-125+90	3.8
S	0.29	1.67	Muscovite	3		-90+63	10.1
P	0.02	0.015	Siderite	3	Fe	-63+45	7.4
Pb	0.01	0.014	Geothite	4	Fe	-45	2.2
Zn	-	0.45	Sphalerite	1	Zn, S		
Cu	0.06	0.19	Chalcopyrite	1	Cu, S		
Mo	tr	0.017	Pyrite	2	Fe, S		
Mn	8.00	4.35	Pyrrhotite	<1	Fe, S		
Fe	-	14.6	Ferrosilicon*	6	Fe		
Si	-	1.12					
Ca	0.14	0.14					

* Contamination from heavy media in cyclone test.

⁶ 1972 Production data from Aberfoyle Group. Ca is CaO, Mn is MnO.

+ Assays add to 89.6% with combined oxygen accounting for the rest.

013

Wolframite (with very minor cassiterite) mineralisation at the Oakleigh Creek mine occurs in a quartz vein, which cuts Precambrian quartzite. Reserves of run of mine ore at August 1979 (assuming a 1.2m mining width) are given in Table 2.

TABLE 2

ORE RESERVES

<u>Category</u>	<u>Tonnes</u>		<u>%W₃</u>
Proven (defined on 2 sides)	47,550	@	1.11
Probable (defined on 1 side)	38,800	@	1.32
Possible (extrapolated at least 1 block)	55,600	@	1.33
Dump	6,250	@	0.59
<u>TOTAL</u>	148,200	@	1.23%

Note : Reserves above the 240 level before development are 59,050 tonnes @ 1.15%W₃.

The strike of the quartz vein varies somewhat as it is controlled by a major joint system, but it is generally north-south (170° to 175°). The vein dips 75° to 80° to the east. The wall rock dips to the north at 10° to 15° and strikes east-west (095°). As exposed in the adit, the vein splits and rejoins several times in an en echelon fashion so that the mineralisation actually occurs in a zone rather than a single vein. However, it is not a particularly complex system with no significant post-ore faulting being observed. The average thickness of the vein is 43 cm. Lithology, which is associated with faulting, controls the development of the vein with the main part located in a massive, competent, well-jointed micaceous quartzite, which has provided defined channels for the vein to follow. At the southern end of the underground workings, a fault block of weakly jointed, well laminated, thinly bedded quartz-mica schist is encountered. Here the main vein has split into numerous thin stringers and veins up to 4cm thick, with the main vein mineral being arsenopyrite.

014

5. UNDERGROUND DEVELOPMENT (SEE FIGURES 5 & 6)

5.1 GENERAL LAYOUT

The general layout of the mine with block notation and planned development until 1980 is shown on the attached section (Figure 5). Figure 6 gives dimensions of a standard 50m stoping block. Current entrance to the mine is by way of the 240 level, which is the main ore haulage level, and by the 280 level some 40 metres above it. A decline for access below the 240 level will commence in early 1980. The only physical and visual impact of the mining will be the three underground entrances.

5.2 MINING METHOD

The method chosen is shrink stoping using 50 m long blocks. Other relevant dimensions and ore quantities are shown on the attached section (Figure 6). Mining width is planned to be 1.2 m.

5.3 1978 DEVELOPMENT

Previous operators had driven the 240 level to 154 m with dimensions of 2.1m x 2.1m. Serem enlarged the original adit by stripping and extended the level to 311 m where it was terminated when the mineralised vein split into five stringers only aggregating 27 cm in width. The dimensions of the 240 level are :

0-270 m	2.44m high x 2.74 m wide, and
270-311 m	2.44m high x 2.22 m wide. This latter interval has been widened to 2.74 m because diesel truck haulage is to be used.

The 280 level adit was terminated at 220 m, the dimensions being 2.44 m high x 2.28 m wide throughout.

When the 280 level was commenced, it became necessary to construct an ore pass so that development ore from the level could be stockpiled. A raise of approximately 40 m was therefore driven from the 240 level to the 280 level at 1905N of section averaging 1.7 m x 2.3 m.

OAKLEIGH CREEK WOLFRAMITE PROJECT

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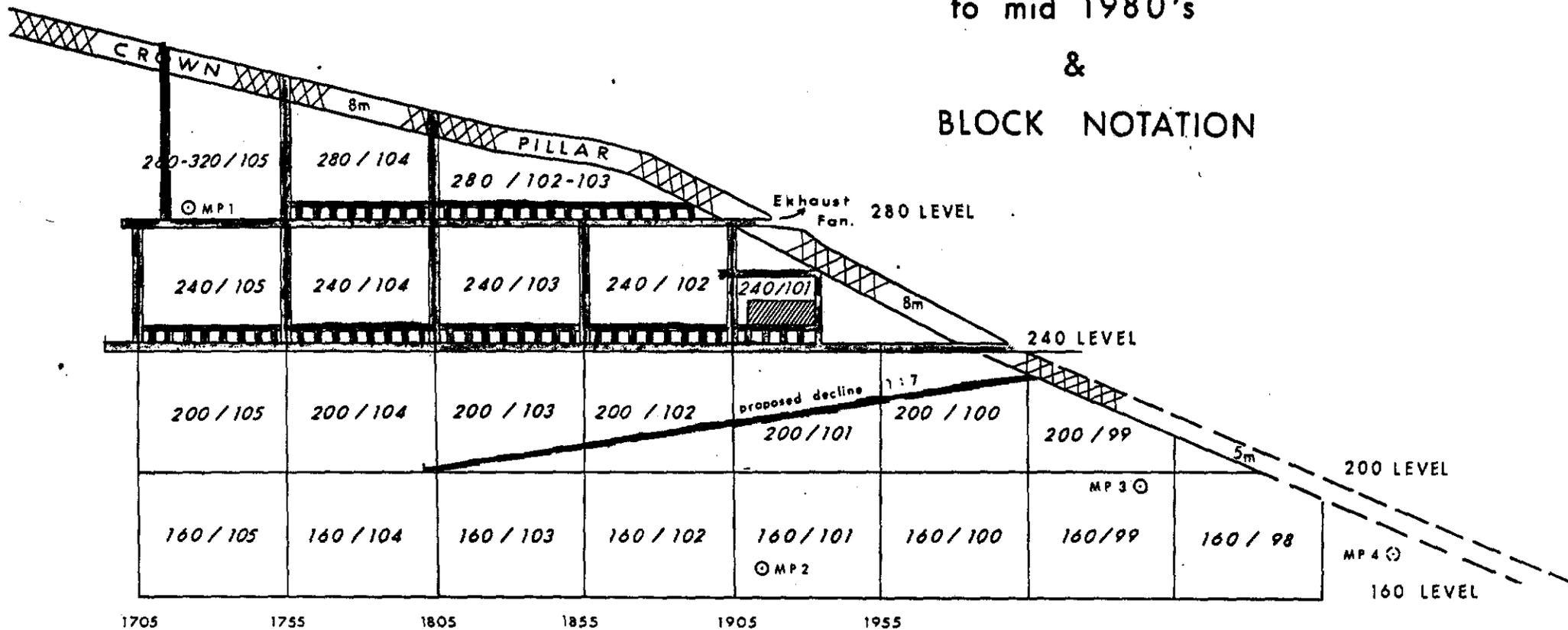
-  Stopped area (started 27-10-79)
-  Drill Holes
-  Completed
-  To Be Completed

S

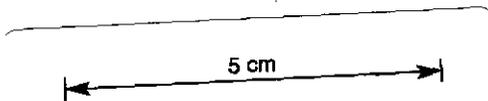
SITUATION AS AT DEC '79

LONGITUDINAL SECTION showing
completed & planned development
to mid 1980's
&
BLOCK NOTATION

N



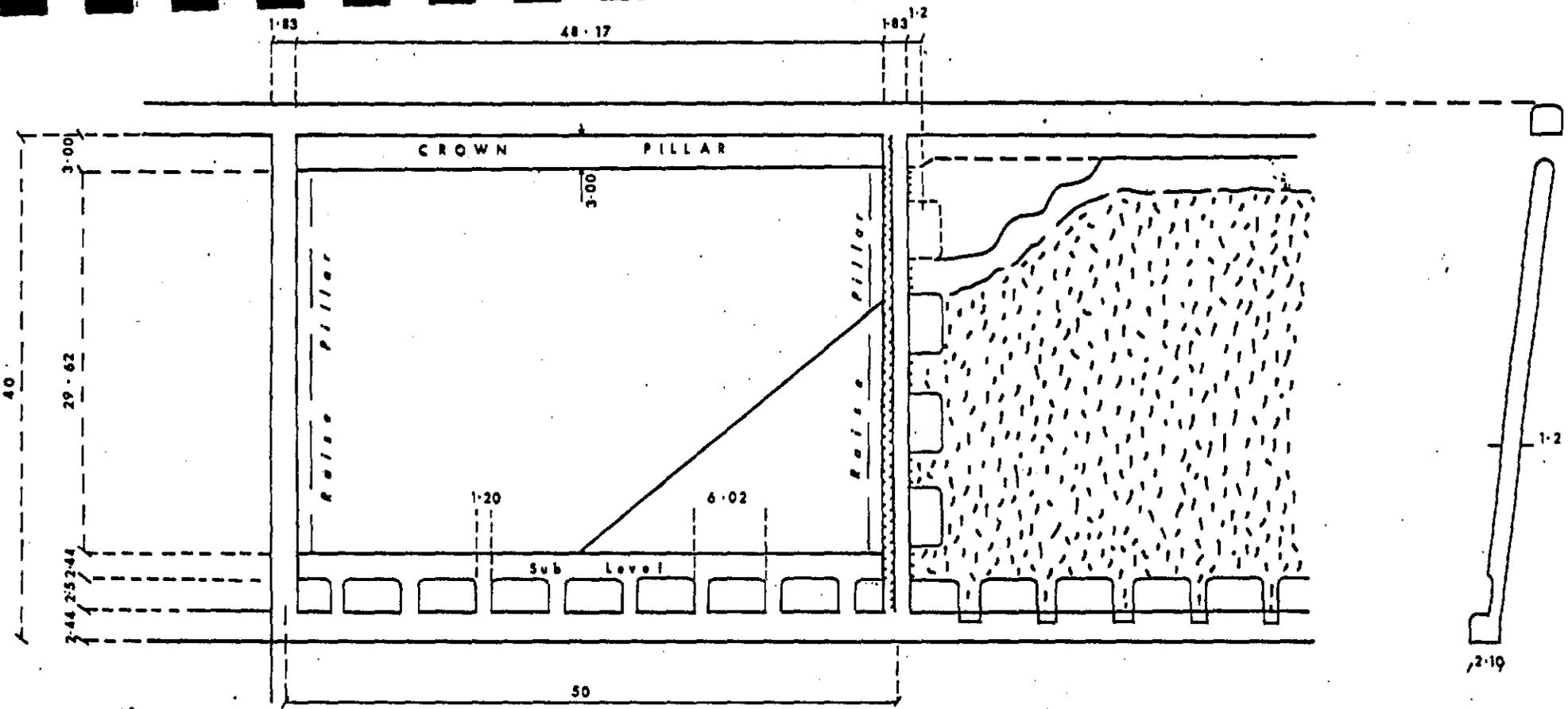
 **FIGURE 5**



SCALE 1:2000

173-E

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50 METRE STOPE BLOCK DIMENSIONS

STOPE BLOCK	Dimensions	Volume	Notes
STOPE BLOCK as main drive	50 x 37.56 x 1.2 x 2.7	6085	tonnes
SUB LEVEL DRIVE	48.17 x 2.44 x 1.2 x 2.7	381	"
MAIN RAISE (1/2 each end of block)	37.56 x 1.2 x 1.83 x 2.7	223	"
SILL PILLAR	48.17 x 2.5 x 1.2 x 2.7	390	"
CHUTE RAISE	8 x 1.20 x 1.20 x 2.5 x 2.7	78	"
CHUTE CONES	8 x 1 x 1 x 1.20 x 2.7	26	"
ADJUSTED SILL PILLAR	390 - 78 - 26	286	"
CROWN PILLAR	48.17 x 2.7 x 1.2 x 3	468	"
PART RAISE PILLAR (half) one each end	1.0 x 1.2 x 29.62 x 2.7	96	"
ORE IN STOPE	29.62 x 1.2 x 46.17 x 2.7	4431	"

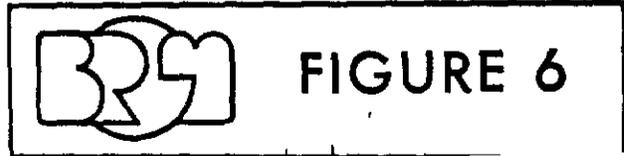
ORE DISTRIBUTION in TONNES per 50 METRE STOPE BLOCK

	DEVELOPMENT	IN SITU	RUN OF MINE
SUB LEVEL DRIVE	381		
MAIN RAISE (2 x 1/2)	223		
CHUTE RAISE (8)	78		
CHUTE CONE (8)	26		
ADJUSTED SILL PILLAR		286	
CROWN PILLAR		468	
PART RAISE PILLAR (2) remains		96	
PART RAISE PILLAR (2) extracted			96
ORE IN STOPE			4431
TOTALS	708	850	4527
TOTAL STOPE BLOCK	6085		

Tonnage factor 2.7 tonnes per cubic metre.
above figures exclude main level drives

Standard
50m
Mining
Blocks

SCALE 1:300



5.4 1979 DEVELOPMENT

This programme aimed at preparing four blocks for stope mining by the end of December (240/101, 240/103, 240/105, and 280/104). To define these blocks four 40m raises of nominal sections 1.8m x 1.2m have been completed between the 240 level and 280 level (1705N, 1755N, 1805N and 1855N). Raise 1935N (also of dimensions 1.8m x 1.2m) has been taken 22.5 m to the crown pillar to enable mining of the small triangular block of ore above the 240 level adit portal (240/101).

To define block 280/104, two raises, one of 36 m and the other of 48 m, were required.

Each block will have a sub-level driven 2.5 m above the relevant adit and will normally be equipped with 8 timbered chutes.

Ore from the wide development adits (2.74 m) has been stockpiled at the 240 level portal in the No. 1 Stockpile. Narrow width development (1.2 m) ore from raises and sublevels is being carted to a separate No. 2 Stockpile nearby.

5.5 1980 DEVELOPMENT

The remaining ore blocks above the 240 level (240/102, 240/104, 280/102-103 and 320-280/105) will be prepared for stoping during this period. Also a decline will be constructed to provide access to the blocks below the 240 level and this will commence in early 1980.

5.6 HAULAGE

It is now proposed to haul by trackless equipment all ore above the 240 level rather than by rail as previously proposed. To accommodate the Eimco 964 truck, some stripping on the 240 level was necessary.

5.7 VENTILATION

Ventilation is currently achieved by a return circuit with air entering the mine at the 240 level portal, passing through Raise 1705N and 280 level to be extracted by an exhaust fan at the 280 level portal (see Figure 5).

018

5.8 CURRENT PROGRESS (see Figure 5)

Block 240/101 has had its top and bottom sub-level driven for approximately 30 m, and four chute raises completed. Timber chute fronts and steel doors are now in position and stope mining commenced on 27.10.1979.

Block 240/103 had its sub-level driven at 2.5 m above the 240 level backs and the eight chute raises have been constructed and are being fitted with fronts and doors.

Block 240/105 has had its sub-level and eight chute raises completed. Timbering of chute fronts has been completed.

Block 280/104 has had Raise 1805N broken through to excavated topsoil at 26 m and Raise 1755N has been completed at 48 m. The sub-level is currently being driven.

019

6. MILLING METHOD (SEE FIGURE 7)

6.1 MILL TREATMENT

The ore treatment process at Oakleigh Creek is basically a gravity one with concentrate production by jigs, wet high intensity magnetics and tables.

The plant is broadly divided into the following areas :-

- * Process water supply
- * Primary crushing circuit
- * Screening - secondary crushing circuit
- * Jig - grinding circuit
- * Magnetic (WHIMS) separation circuit
- * Table concentration circuit
- * Final product upgrading-bagging
- * Tailings disposal

6.2 PROCESS WATER SUPPLY

Pumping facilities on the Forth River provide for 180 gpm supplementary water to augment the 180 gpm gravity uptake from Reid Creek into the first 32,600 gal. water tank. This tank provides the domestic camp water supply (60 gpm maximum) and is also connected to two other tanks of similar size giving a 'live' water storage of 97,800 gallons. Water loss from the circuit through the tailings dam is expected to be around 50 gpm and make up water to the circuit is 70 gpm. The circuit will require some 709 gpm.

6.3 PRIMARY CRUSHING CIRCUIT

The 50t R.O.M. ore bin takes minus 340mm ore through a grizzly. Larger pieces will be rejected if barren and all white quartz will be hand broken if necessary. A metal detector and magnet protects the Allis Chalmers 15' x 30' S-T jaw crusher. The 20 tph feed is reduced to minus 40mm and conveyed to a 120t capacity bin.

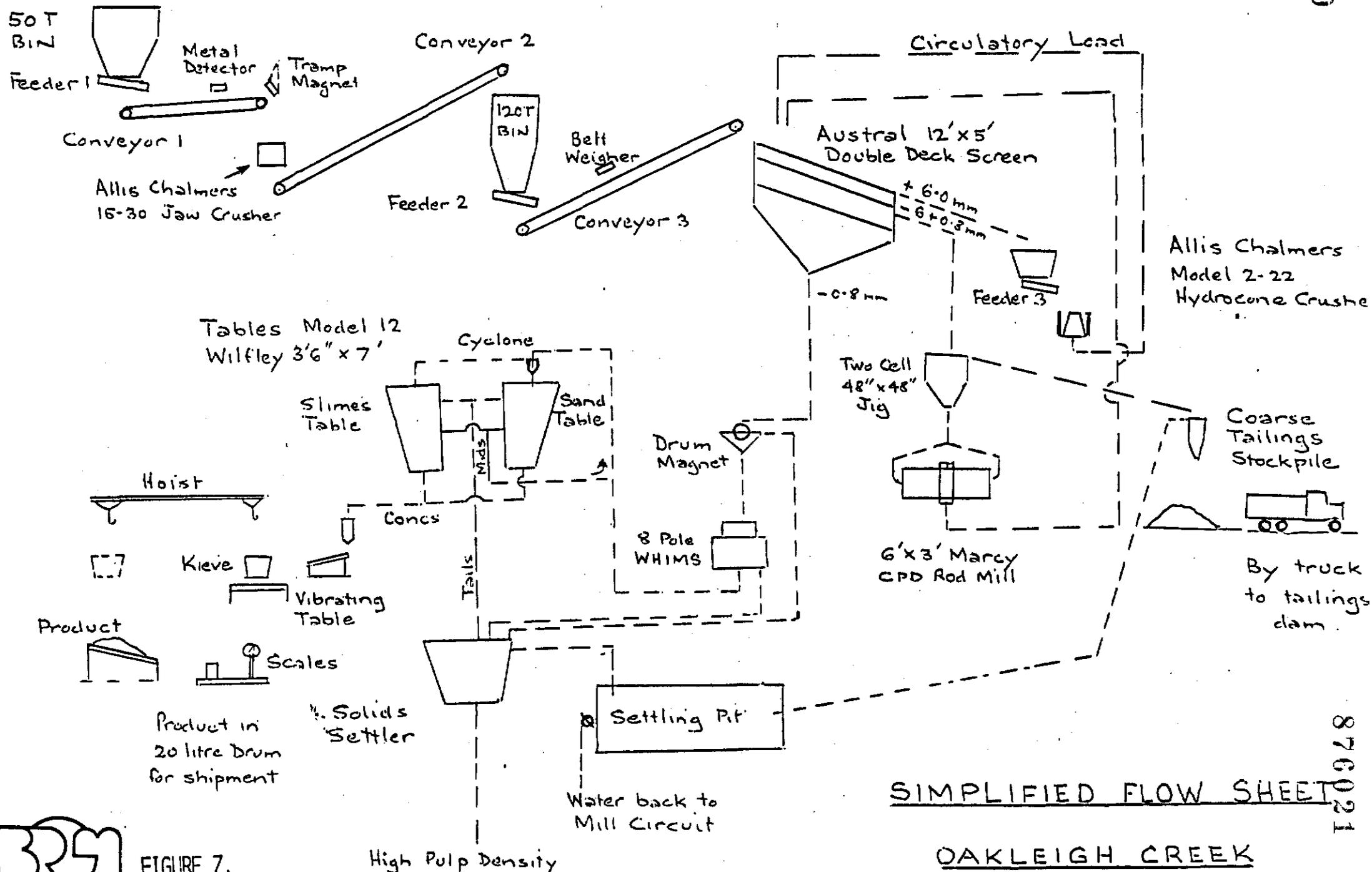


FIGURE 7.

High Pulp Density

SIMPLIFIED FLOW SHEET

OAKLEIGH CREEK

021

6.4 SCREENING - SECONDARY CRUSHING CIRCUIT

The ore is fed at 15 tph across a belt weigher to an Austral 12' x 5' double deck vibrating screen. The oversize (plus 6mm) forms the feed to the Allis Chalmers 2-22 hydrocone secondary crusher which is set at 6mm and with which it is in closed circuit. The minus 0.8mm material by-passes the crusher and directly feeds the magnetic separators (4.6 tph) the plus 0.8mm minus 6mm by passes the crusher and directly feeds the jig circuit (12 tph). The circulating load is estimated at 22 tph for this crusher.

6.5 JIG - GRINDING CIRCUIT

The 2 cell 48" Bendelari jig is fitted with screens punched with 7mm x 9mm holes. It rejects 87% of the 12 tph feed directly to a coarse tailings stockpile (10.4 tph). The concentrate (1.6 tph) is fed to a Marcy C.P.D. 6' x 3' rod mill (Clyde Caruthers 471-8), which is in closed circuit with the vibrating screen. The coarse tailings area has a capacity of about 1,000 tonnes (2 weeks' operation).

The coarse tailings are removed from stockpile by front-end loader and tip truck and are used as a filter wall in the tailings dams.

6.6 MAGNETIC WHIMS SEPARATION CIRCUIT

The ground ore (minus 0.8 mm) initially passes through a Dings Conmag (Readings XWC5) concurrent style wet drum magnetic separator (18" x 30" diameter) to remove the higher magnetic material. The remainder passes through a Readings 8 pole WHIMS with the magnetic fraction going to the table section. The volume of feed is about 0.33 tph, which goes to a sizing cyclone before feeding the 2 tables.

6.7 TABLE CONCENTRATION CIRCUIT

There are 2 Wilfrey No. 12 tables (3'6" x 7') - a sand table taking 0.2 tph and a slime table taking 0.13 tph. The tailings are rejected and the middlings recycled. The concentrate goes to the upgrading and bagging section.

022

6.8 FINAL PRODUCT UPGRADING - PACKING

The concentrates are pumped to a settling tank and recovered by gravity into a kieve. Two kieves, holding around 0.5 t concentrates, will be used for further dewatering and to upgrade them (sulphides collect at the top and can be scraped off). The concentrates will be dried then packed into 20 l. metal drums and palletized for shipment.

6.9 TAILINGS DISPOSAL

Tailings from the magnetic and table concentration sections go to a solids settling tank and the underflow pumped to a tailings dam at a rate of 50 gpm at 40% pulp density. Cyclone overflows in various parts of the upgrading, table and magnetic circuits proceed to a settling pit. Clear water flows over a weir and is recirculated through the whole circuit. (709 gpm containing 4.37 t of fines). The settled material is cleaned out from time to time by a front end loader and reintroduced into the circuit onto the vibrating screen. Any spills in the plant are conveyed by drains to tails settling pit/sump. The solids settler reduces the water to final tailings with consequent loss. This saves also the need for a water return pump and line.

023

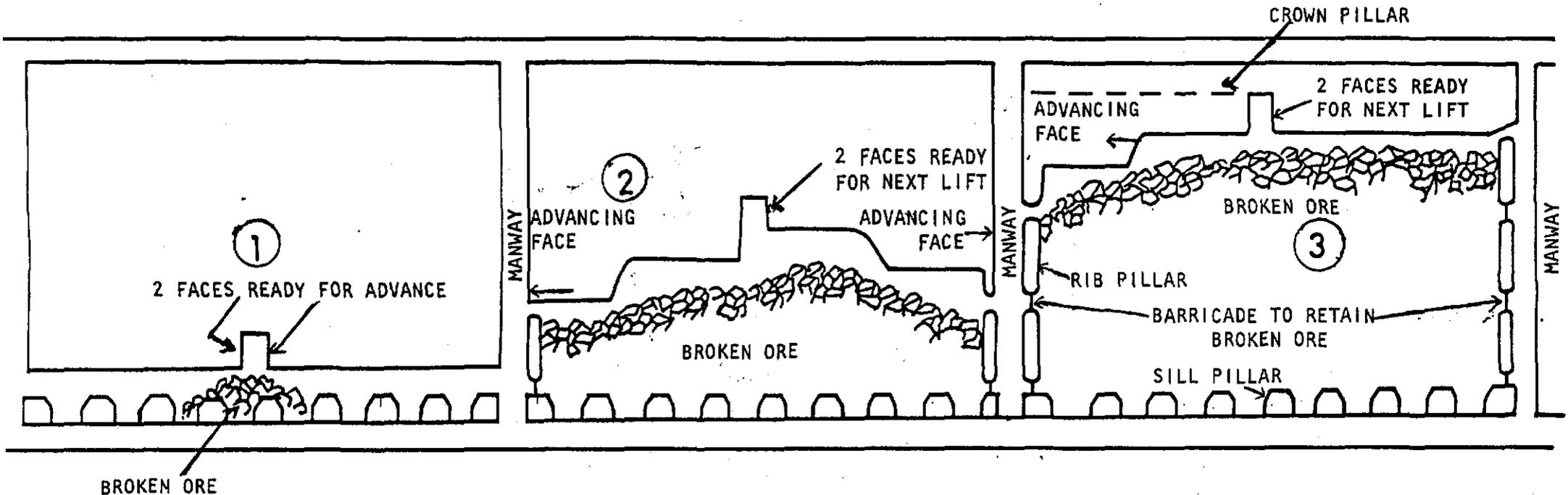
APPENDIX 1

MINING METHOD DETAILS - OAKLEIGH CREEK MINE

CTT SHRINK STOPING

THE SKETCH BELOW SHOWS 3 STOPES IN VARIOUS STAGES OF ADVANCE USING THE C.T.T. SHRINKING METHOD. NOTE ALL STOPES HAVE ACCESS AT BOTH ENDS. WHEN ONE ACCESS IS ABOUT TO BE BLOCKED WITH BROKEN ORE, A ROUGH BARRICADE IS BUILT TO PREVENT THE ORE SPILLING INTO THE MANWAY, AND A NEW ACCESS IS FORMED INTO THE MANWAY ABOVE THE OLD ONE LEAVING A PILLAR IN BETWEEN.

- ① SUBLEVEL HAS BEEN COMPLETED AND A SHORT RAISE DRIVEN TO FORM TWO BENCHES.
- ② BENCHES ARE BEING DRIVEN IN BOTH DIRECTIONS. RAISE HAS BEEN DRIVEN TO START NEW LIFT.
- ③ BENCHING ONE WAY ONLY. NEW LIFT READY.



CTT S'HRINK STOPING

UPPERS v HORIZONTAL BENCHING

UPPERS ①

DOES NOT DEPEND ON CYCLE AND THEREFORE,
NO DELAY WAITING TO BLAST. CAN BLAST
ANY TIME TO SUIT OTHER OPERATIONS.

②

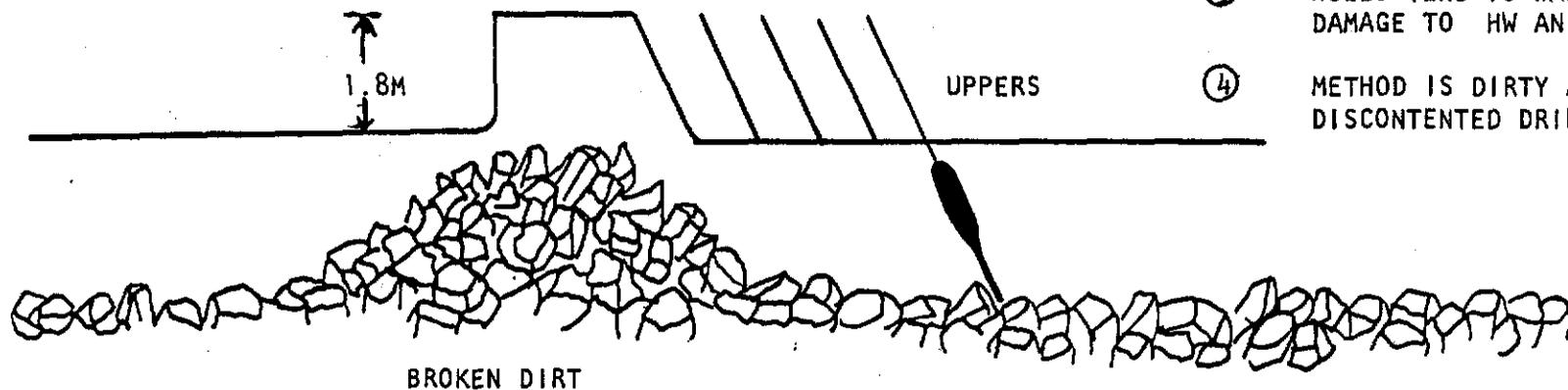
DRILLING UPPERS IS MORE DIFFICULT THAN
HORIZONTAL AND LESS DRILLING IS ACHIEVED
IN SIMILAR TIME.

③

HOLES TEND TO WANDER INTO WALLS CAUSING
DAMAGE TO HW AND FW AND DILUTION.

④

METHOD IS DIRTY AND WET AND MINERS ARE
DISCONTENTED DRILLING UPPERS.

HORIZONTAL BENCHING (BLASTING)

①

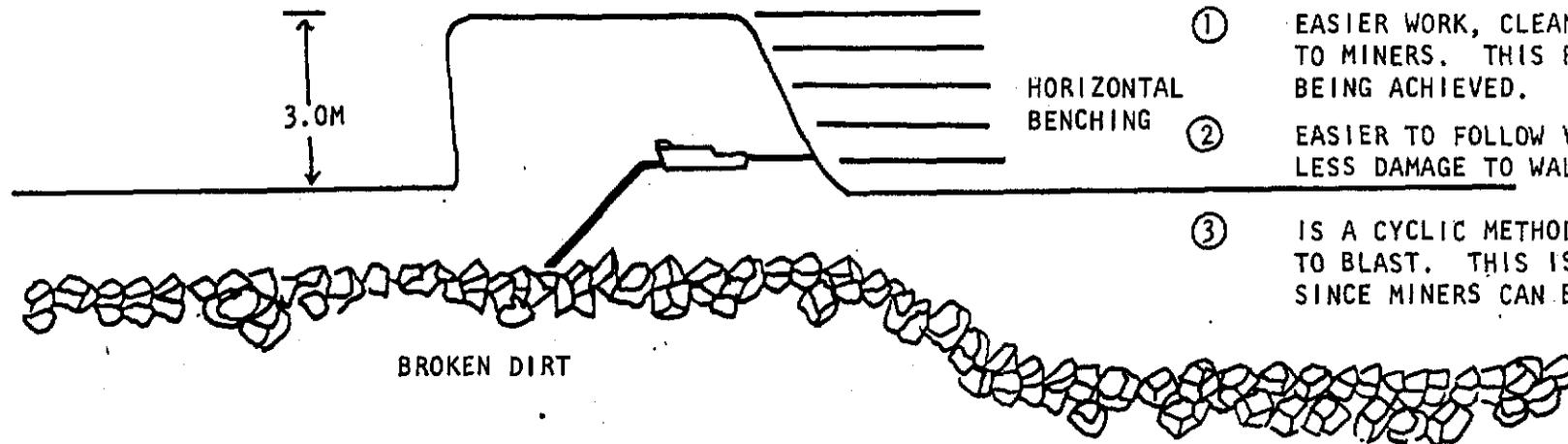
EASIER WORK, CLEANER AND MORE ACCEPTABLE
TO MINERS. THIS RESULTS IN MORE DRILLING
BEING ACHIEVED.

②

EASIER TO FOLLOW VEIN AND THEREFORE CAUSES
LESS DAMAGE TO WALLS AND LESS DILUTION.

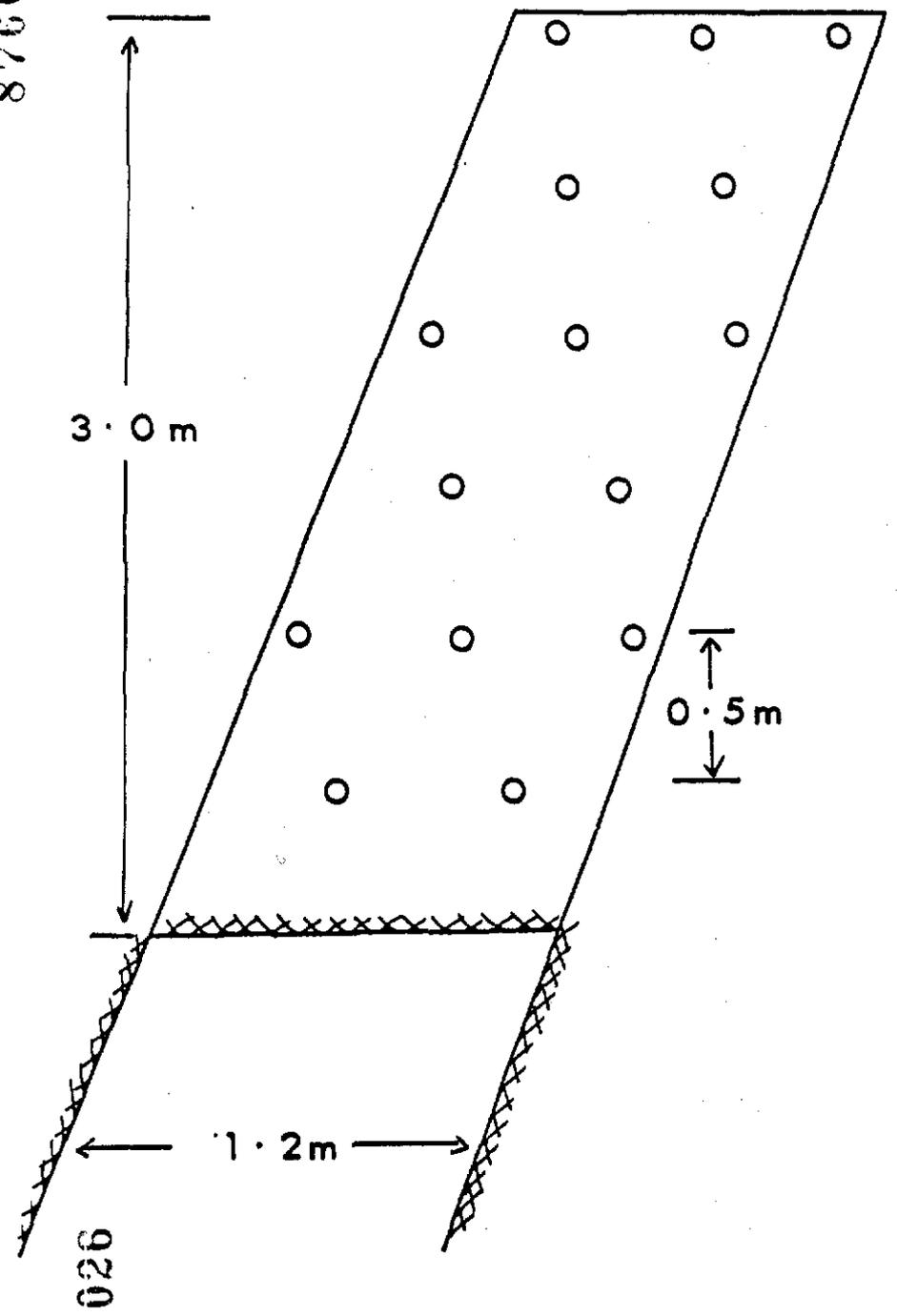
③

IS A CYCLIC METHOD, HAVING TO STOP DRILLING
TO BLAST. THIS IS NOT SERIOUS AT C.T.T.
SINCE MINERS CAN BLAST AT ANY TIME.



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CTT SHRINK STOPING



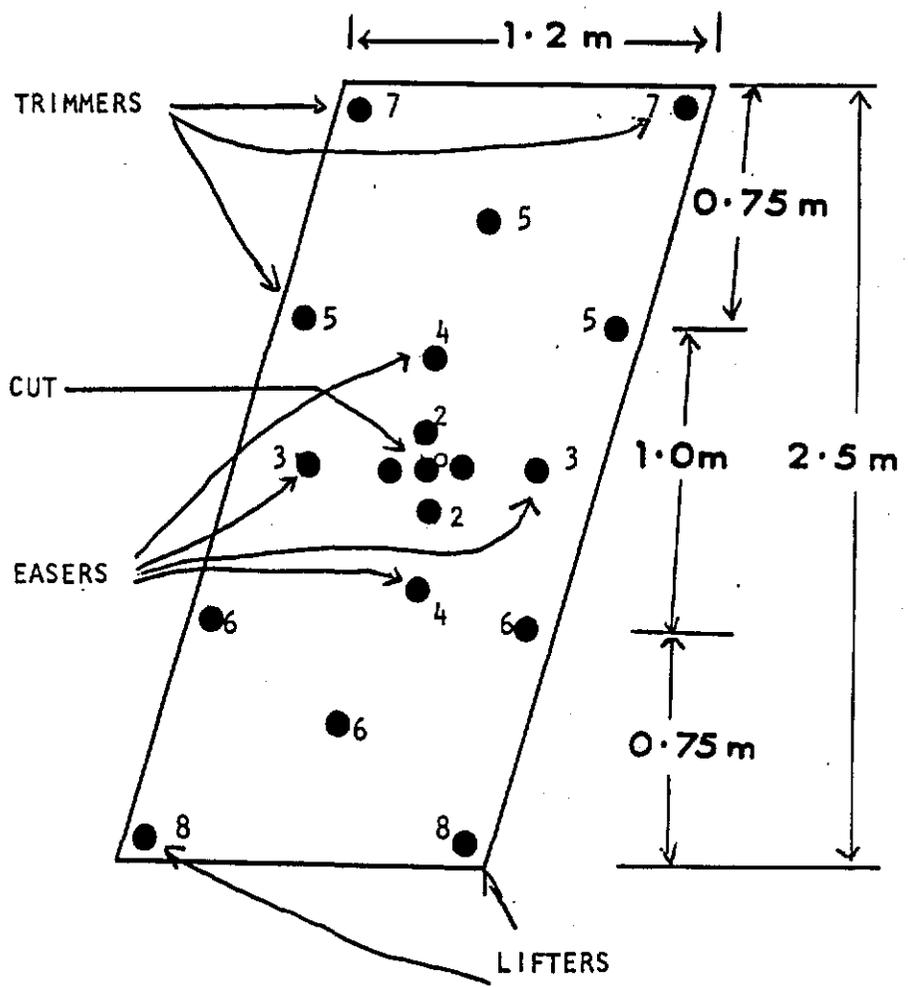
TYPICAL DRILLING PATTERN FOR HORIZONTAL BENCHING IN SHRINK STOPES. HOLES DRILLED CLOSE TO GIVE GOOD FRAGMENTATION. HOLES ARE 1.8M DEEP GIVING A TOTAL OF 18 TONNES PER BLAST.

THE SAME DRILLING PATTERN IS USED WHEN DRILLING UPPERS.

026



CTT SUB LEVEL DEVELOPMENT



TYPICAL DRILL PATTERN FOR SUBLEVEL DRIVING.

NUMBERS INDICATE DELAY SEQUENCE USING 1/2 SECOND DELAY ELECTRIC DETONATORS.