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CONCEPTUAL MINING STUDY

PROPOSED OPEN CUT MINE

HAREFIELD, TASMANIA

PROGRESS REPORT

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26.3.82

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94-3661

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ABSTRACT

It must be stressed that this report is very much a preliminary report
and presents a concept of a possible future mining method for the Harefield
deposit. In initial drilling completed in the past six months, four areas
have been outlined in the Harefield area, these being the Eastern, Central
Eastern, Central Western, and Western areas. Of these, only the Central
Eastern Area showed enough promise and was drilled sufficiently to warrant
labelling as having possible reserves. The original drilling grid had a
spacing of 1km and while some areas were further drilled later on, the
boreholes remain very sparse.

Currently there is a far more exhaustive drilling programme taking place
at Harefield with all holes being cored and logged. The holes are on a
400m grid and coal quality and washability tests will be completed giving
a far more accurate picture of Harefield. This report deals only with
information already at hand and as such can only be considered conceptual
in character. The current drilling programme is expected to be completed
at approximately the end of 1982.

The Harefield deposit (Central Eastern) is proposed to be mined in conjunction
with the Mt. Nicholas U/G mine adjacent to Harefield. The Harefield deposit
would have sufficient longevity to produce 100,000 to 200,000 tonnes per
year and this production would be combined with the Mt. Nicholas production
to gain a sale blend.

Harefield could be used to supplement the production from Mt. Nicholas'
early years, although with the proposal for the mining of Harefield coal
with contractors, it is suggested that the contractors would not appreciate
this, especially if high production is required initially which falls away
over time. The contractors would be attracted by the prospect of a long
term steady contract to gain maximum economic life from their machinery. An
assurance given by a Caterpillar Marketing representative in Melbourne is
that there is no contractor presently in Tasmania which would be able to
handle the Harefield volumes without obtaining extra equipment.

Mine Location

The deposit, which is very close to St. Marys is also relatively close
to the Tasmania East Coast, however, the valley containing the deposit
dips to the West. The mine is related geologically to the Mt. Nicholas
deposits in the adjacent ranges. Since the township of St. Marys is very
close to the minesite, noise from large operating machines may be a
problem. The closest distance to mine from town is 2½km. This may need
further study in the future, however for the moment it will be assumed
that noise volumes can be neglected. The mine will probably only operate
from 8 a.m. to 4 p.m. during weekdays anyway at this stage.

The Minesite is located in a relatively flat valley with sharply rising
ranges on either side i.e. North and South side. The valley dips to the
West with St. Marys located East of the site. This is interesting in
relation to the problem of water handling, however water drainage will be
dealt with in the future.

Mine Geology

The geology of the deposits is best described in the Harefield Interim
Geological Report by Ian Wollff. Here follows a brief summary.

There are three main seams, which dip South East at approximately 30 metres
in 1km. The top seam averages 2 metres in thickness but is of poor quality.
The two lower seams' average thickness is less than 1 metre with the middle
seam being of inbetween, and bottom seam being of relatively good quality,
though still not good in terms of export grade steaming coal.

The overburden (O/B) varies between 5 and 10 metres in between seams. The
subcrops are assumed to be at the base of weathering which is also assumed
to occur at the base of the Topsoil, below which minable coal exists.

The O/B sediments are Topsoil which covers clay containing dolerite scree
boulders and Weathered mudstone. Interburden (I/B) sediments between the
seams are predominantly sandstone and mudstone. It is assumed at this stage
that these sediments are rippable, however, Caterpillar representatives have
already been arranged to do some research in this area.

St. Marys Weather Patterns

St. Marys over the years from 1909 to 1973 has the yearly average rainfall
frequency:-

Spring	226mm
Summer	229mm
Autumn	269mm
Winter	295mm
Year	1019mm

The following rainfall figures have also been obtained:-

Rain in one day (mm)	Days Per Year
0.2 or more	95
1 " "	81
2 " "	69
5 " "	42
10 " "	25
20 " "	13
50 " "	4
100 " "	1

The frequency of morning fog (9 a.m.) is 6 days per year.

It is assumed that there is enough daylight available during winter months to operate machinery from 8 a.m. to 4 p.m. daily (Eastern Standard Time).

It would appear that rainfall and fog could prove disruptive to mining for 50 days per year. This will eventually be taken into account in production and machine requirement calculations.

FACTORS STILL TO BE ASSESSED AT HAREFIELD

Although some work has been completed to date and a mining proposal has been put forward later, by far the majority of work still needs to be started.

The following points are most of the things yet to be evaluated:-

- Manpower Requirements

- Accommodation and Facilities for Employees and their families

- Infrastructure Requirements around mine including

  - land requirements
  - roads
  - washplant at Mt. Nicholas adaption
  - offices
  - maintenance services and stores
  - workshops and machine shelters
  - bathrooms and cribrooms

- Vehicles required

  - Graders
  - Dozers and Rippers
  - Scrapers
  - Trucks
  - Front End Loaders
  - Water Trucks
  - Cars
  - 4WD Vehicles

- Also Electricity Supply and System
- Water Supply
- Sewerage
- Tailings Dumping - from Mt. Nicholas Washery
- Ground and O/B swell factor
- Workable Days in Year
- Equivalent Work Hours per Day
- Machine Availabilities
- Environmental Impact
- Rehabilitation
- Soil Slippage
- O/B Dump Slippage
- Construction Camp Facilities
- Availability of Specialist Tradesmen
    - electricians
    - fitters
    - turners
    - mechanics
    - boilermakers
- Water Management
- Security Requirements, Fencing, Gates, etc.
- Safety Requirements
- Wages and Salaries

As yet no costings have been done on any aspect of the mining operation. This will no doubt take on importance as the study progresses.

WORK DONE TO DATE - HAREFIELD

The drilling work completed to date has indicated that the Central Eastern portion of the deposit is worth further study at present. From the Geological drawings showing subcrops (see diagram 1) a grid system of 100m sides was drawn with lines approximating the strike and dip directions. An arbitrary grid system was then associated with the grid lines (see diagram 2). Cross sections parallel to the dip lines were also drawn along selected dip directions which appeared to be boundaries between variations in the deposit. The cross sections cover as much of the deposit as the geological information will allow (see diagram 3).

FIG. I

M 35 N Scale 1cm² = 100 m². O 45 P Scale 1:2000 Horiz and 1:500 Vertical. Q 55 R. 60

40 50

G451

fault

810 m² 1220 m²

120 m² 1420 m² 1380 m² 1560 m² 1·5 150 m² 1·50 m²

760 m² 430 m²

60 m² 70 m² 75 m² 80 m² 90 m² 105 m²
0·7 0·75 0·8 0·9 1·0

90 m² 890 m² 880 m² 720 m² 910 m² 860 m²

150 m² 155 m² 180 m² 180 m² 180 m² 180 m²
1·6 1·7 1·8 1·9 1·0

600 m² 850 m²

110 m² 180 m² 1150 m²

10 m² 1760 m² 1860 m² 1170 m² 960 m² 180 m²

650 m²

60 m² 65 m² 70 m² 80 m² 90 m² 100 m²
80 m² 1·0

670 m² 610 m² 640 m² 610 m²

60 m² 90 m² 90 m² 90 m² 90 m² 800 m²
0·7 0·7 0·9 1·0 110 m²
1·1

110 m² 2·510 m² 810 m²
80 m² 210 m²

330 m² 610 m² 930 m² 780 m² 2·0 20 m² 1050 m²
90 m² 65 m² 2·0 200 m²

1020 m² 990 m² 830 m² 80 m² 750 m² 770 m²
0·8 760 m² 0·65 90 m²

90 m² 90 m² 90 m² 720 m² 710 m²
0·7 0·7 0·9 90 m² 90 m²
0·7

III (i)

Hanfield

I   J   K   L   M

(Craig MacLaren)

N   O   P   Q   R

890 m² · 65
780 m²

360 m²   760 m²   1150 m²
690 m²   1400 m²
630 m²   180 m²   180 m²
870 m²   710 m²   760 m²
630 m²   870 m²
90 m²   90 m²   90 m²   900 m²   600 m²
90 m²

810 m²   360 m²   520 m²   1050 m²   1570 m²
60 m²   850 m²   180 m²
360 m²   700 m²   810 m²   830 m²
90 m²   390 m²   660 m²   550 m²   630 m²

550 m²   800 m²   1300 m²   1670 m²   2330 m²
180 m²   180 m²   180 m²
470 m²   700 m²   890 m²   1770 m²
60 m²   90 m²   840 m²   670 m²
380 m²   105 m²   110 m²   480 m²
100 m²   380 m²

710 m²   850 m²   1020 m²   1580 m²   2260 m²
180 m²   980 m²
460 m²   520 m²   550 m²   29.9%
75 m²   90 m²   720 m²   430 m²   25.1%
610 m²   250 m²   360 m²   690 m²   20.8%
105 m²   110 m²   110 m²

III (ii)

Following this, volume calculations were made for the cross sections and these led to a stripping ratio figure calculated for each Block. The stripping ratios eventually used were Volume of Overburden removed divided by Product Tonnes (i.e. mined and washed). Allowances were taken for mining losses and washing yield.

Stripping ratio figures were calculated for each possible configuration of seams mined (see diagrams 4 (i),(ii), (iii), (iv)) and it was decided that no appreciable advantage was gained over mining all three seams, by mining any other combination of them. The table showing calculations of stripping ratios down the various cross sections is seen in Figure 5. The cross sections were limited on the up dip side by the subcrops and on the down dip side by the proposed mining limit of 10 metres depth to the top seam. The stripping ratio diagram of all three seams (DD, D2 and D3) were used to find where the easiest coal to mine was situated and the general idea would be to start there and work steadily into the more difficult-to-mine coal.

Mining Method

The conceptual mining method which has been proposed is as follows. Mining will commence in a down dip fashion starting from the South West end, i.e. blocks K340 to R340 and will then proceed to build up to a steady state situation resembling that of diagram 6 which is hand-drawn. This system will allow the blending of coal from each seam. The conceptual method involves using scrapers to remove O/B and I/B, and coal extraction be done with trucks and front end loaders. The use of two di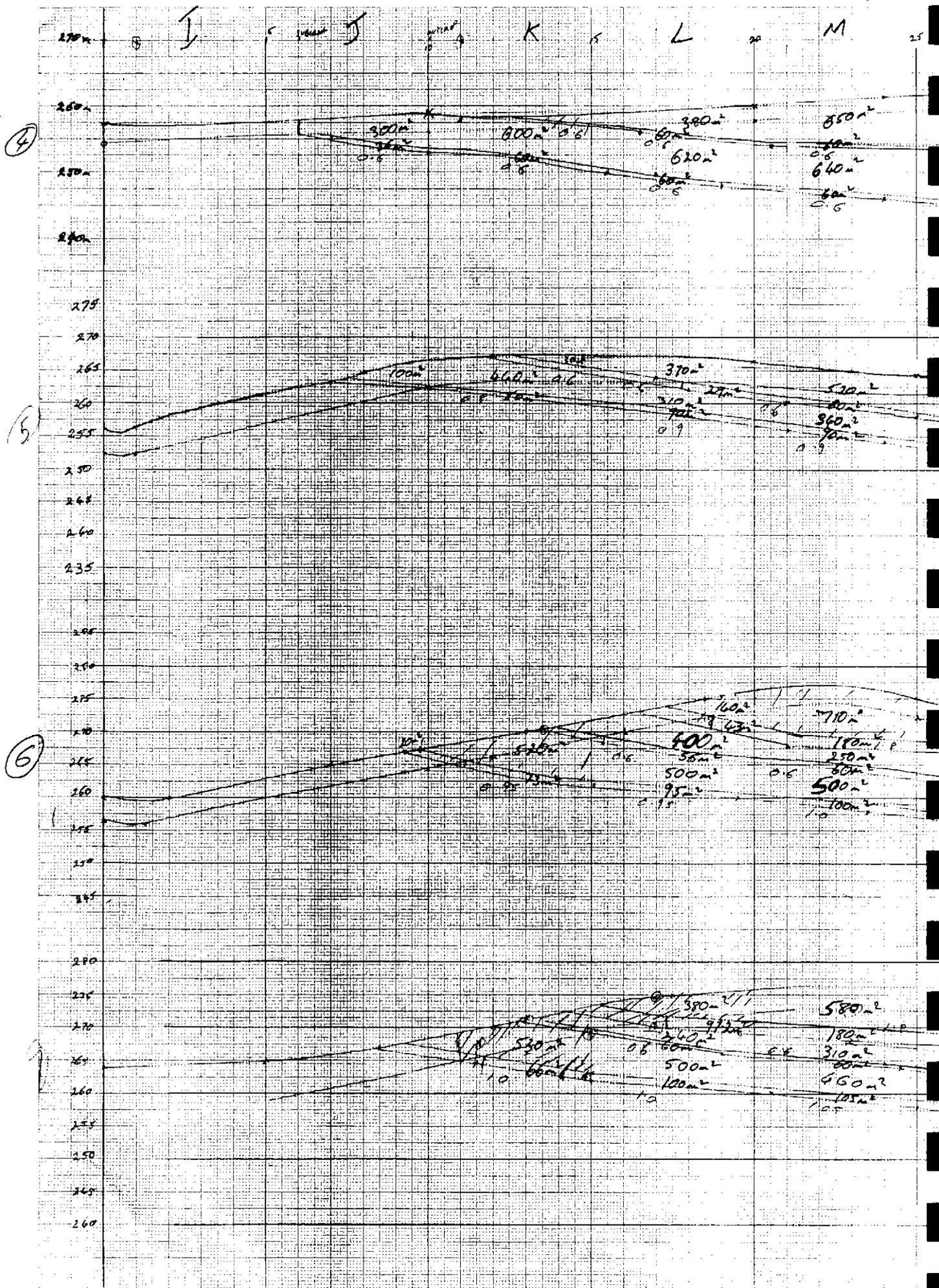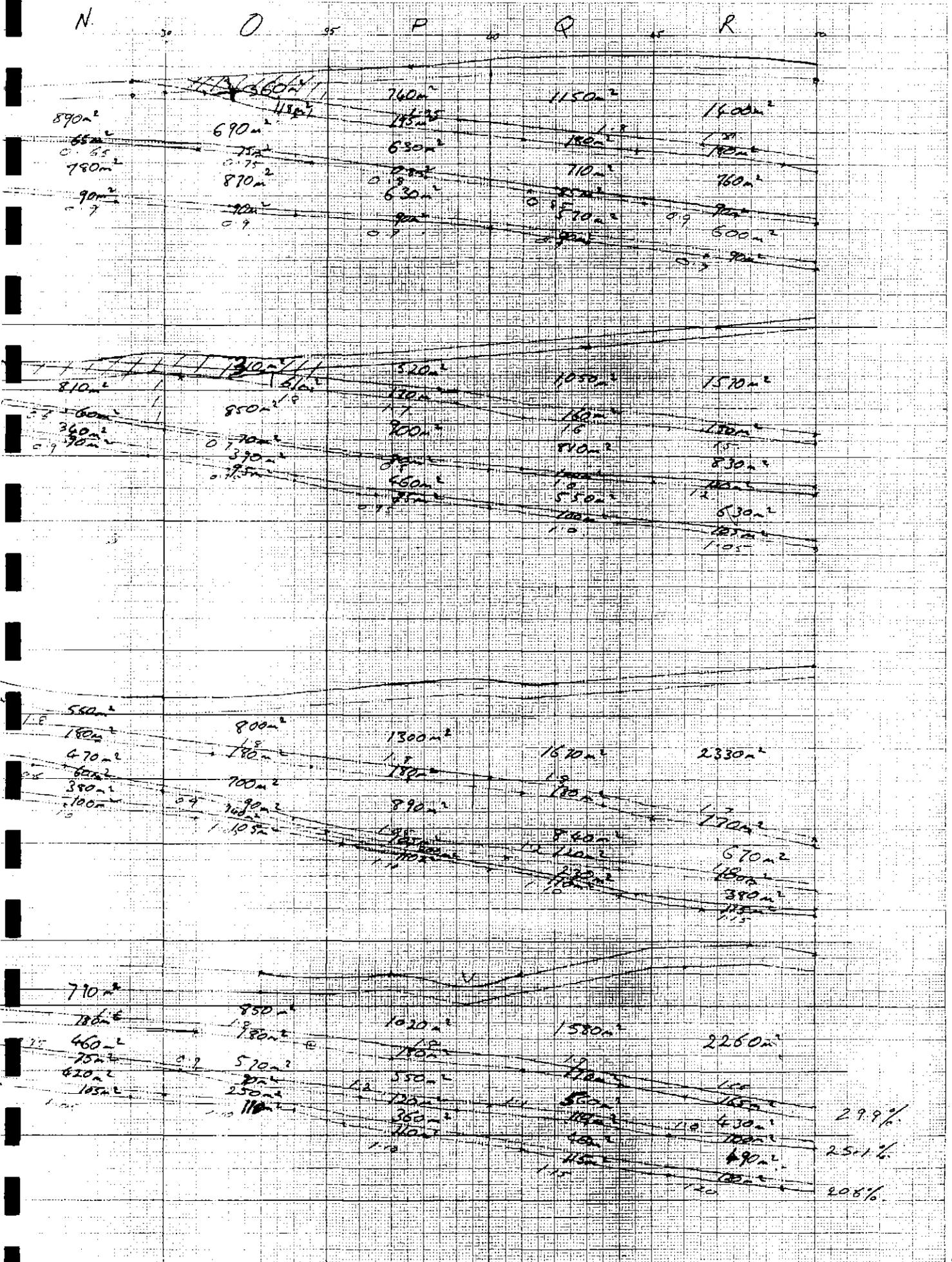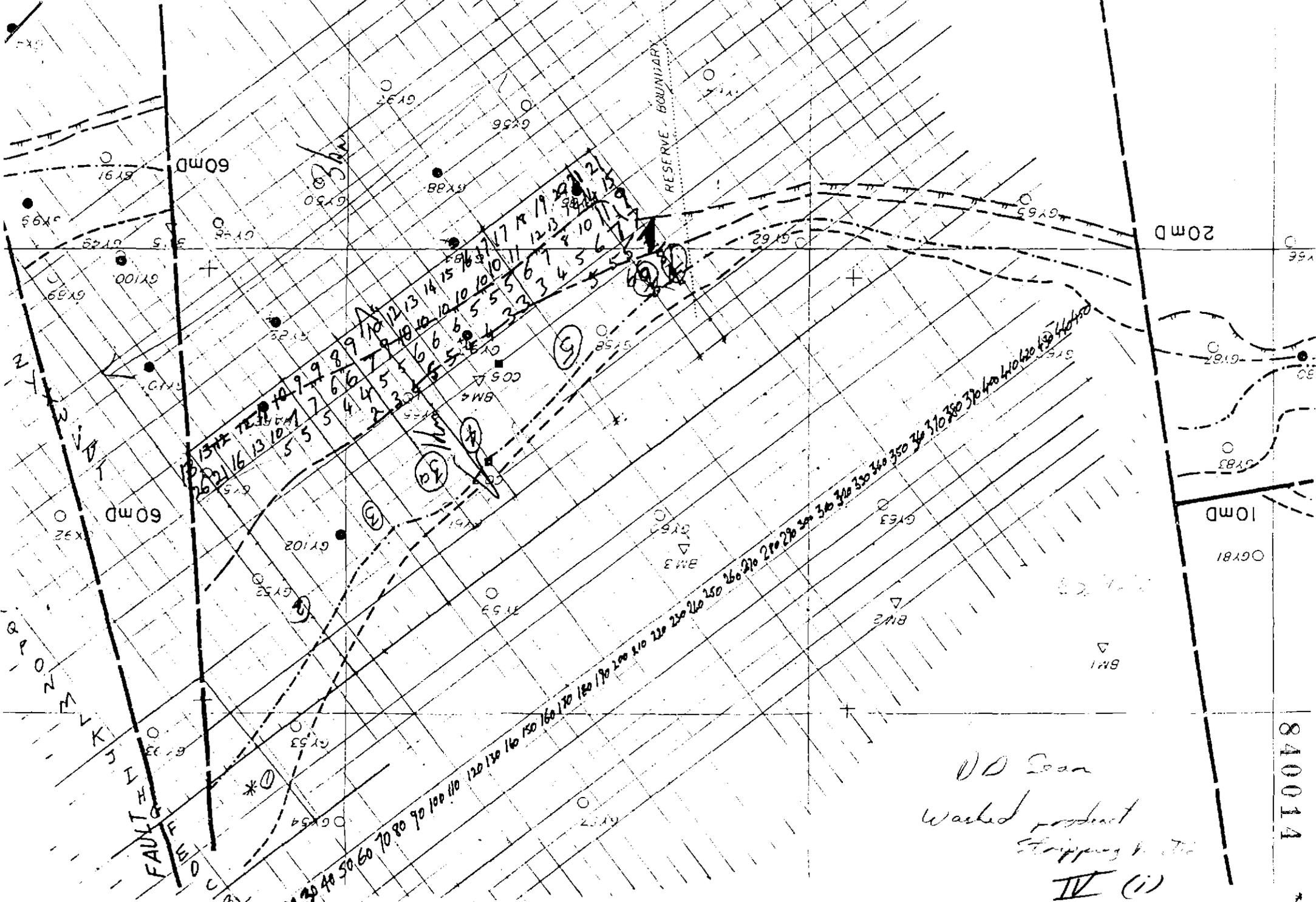fferent types of equipment is considered necessary as each type can do its allotted task better than the other type can. Although, as mentioned previously there is a good deal of rainfall in the region and scrapers find conditions difficult during and soon after wet periods. The shovels and trucks used for coal removal should be adaptable to removal of O/B when required, and as such it is suggested that there is some spare capacity in trucks and shovels above the designated coal production.

To maximise the use of scrapers in the operation i.e. to get most economical use of them, it is necessary to have them work in as repetitive a situation as possible combined with a cyclic programme with as short a cycle as possible to get maximum production. These factors, along with the assumption that a blend of coal will be required to be washed from the three seams, have meant that a mining plan will be required with a number of different operations going on in various parts of the pit (see diagram 6).

IV (i)

BLOCK #	SEAM #	ΣI/B ΣI/B (m³)	SEAM WIDTH	COAL VOLUME (m³)	SEAM DENS (t/m³)	T IN SITU (TONNES)	STRIPPING RATIO	MINING RECOVERY %	ROM TONNES (t)	WASHPLANT RECOVERY %	W/PLANT PRODUCT	W/PLANT PRODUCT STRIPPING RATIO	ASH PRODUCT
H400	D3	72000	0.9	9000	1.56	14040	5.12	84%	11623	77%	9104	7.91	20.6
100	D2	28000	0.6	2400	1.65	?960	7.07	77%	3046	69%	2077	13.36	25.1
T100	D3	95000	1.05	10500	1.56	16380	5.80	86%	14146	77%	10876	8.72	20.6
CUM		123000				20340	6.05		17192		12993	9.47	
J100	D2	72000	0.6	6000	1.65	9900	7.27	77%	7615	69	5269	13.72	25.1
100	D3	91000	1.2	12000	1.56	18,720	4.86	88	16474	77%	12686	7.17	20.6
CUM		163000				28620	5.70		24089		17935	9.1	
K100	D2	105000	0.6	6000	1.65	9900	10.6	77%	7617	69%	5268	20.0	25.1
100	D3	85000	1.35	13500	1.56	21060	4.0	89%	18803	77%	14480	5.07	20.6
CUM		190000				30960	6.14		26420		19728	9.63	
100	D2	128000	0.6	6000	1.65	9900	1.3	77%	7615	69%	5267	24.6	25.1
L100	D3	92000	1.5	15000	1.56	23400	3.9	90%	21135	77%	16276	5.7	20.6
CUM		220000				23300	6.6		28750		21523	10.2	
M100	D2	142000	0.6	6000	1.65	9900	14.3	77%	7615	69	5247	27.1	25.1
M100	D3	89000	1.5	15000	1.56	23400	3.8	90%	21135	77%	16276	5.5	20.6
CUM		231000				33300	6.9		28740		21523	10.7	
N100	D2	142000	0.7	7000	1.65	11550	12.3	80%	9260	69%	6275	22.3	25.
100	D3	89000	1.65	16500	1.56	25740	3.5	91	23469	77%	18071	4.9	20.6
CUM		231000				37290	6.2		32709		24446	9.4	
100	D2	138000	.75	7500	1.65	12375	11.2	81	10055	69%	6938	19.9	25.1
100	D3	88000	1.8	18000	1.56	28080	3.1	92	25803	77	19869	4.6	20.6
CUM		226000				40455	5.6		35858		26807	8.4	
100	D2	156000	0.8	8000	1.65	13200	11.8	82	10871	69	7501	20.8	25.1
P100	D3	92000	1.8	18000	1.56	28080	3.3	92	25803	77	19868	4.6	20.6
CUM		248,000				41280	6.0		36673		27369	9.1	
Q100	OD	81000	1.5	5000	1.76	8800	9.2	90	7968	40	3179	25.5	29.9
100	D2	74000	0.9	9000	1.65	14850	5.0	84	12505	69	8628	8.6	25.1
CUM		155000				23650	6.6		20453		11807	13.1	
Q100	D3	91000	1.8	18000	1.56	28080	3.2	92	25803	77	19868	4.6	20.6
CUM		246000				51730	4.8		46256		31675	7.8	
R100	DO	722000	1.5	15000	1.76	26400	4.6	90	23845	40	9538	12.8	29.
100	D2	43000	1.05	10500	1.65	17325	2.5	86	14962	69	10324	4.2	25.
CUM		165000				43725	3.8		38807		19862	8.3	
100	D3	86000	1.8	18000	1.56	28080	3.1	92	25803	77	19868	4.3	20.6
CUM		257000				71805	3.5		64610		39730	6.3	

Cumulative D2's and D3's

Q100	D2&D3	1251000				42930	3.8				28496	8.8	
A100	D2&D3	266000				46405	5.7				30192	8.8	

BLOCK	SEAM	O/B l I/B (m³)	SEAM WIDTH (m)	COAL VOLUME (m³)	SEAM DENSITY (t/m³)	INSITU COAL (Tonnes)	INSITU STRIPPING RATIO	MINING RECOVERY	ROM COAL (Tonnes)	WSHPLNT RECOVERY	WSHPLNT PRODUCT (Tonnes)	PRODUCT STRIPPING RATIO	ASH PRDCT
L150	D3	23000	0.6	1900	1.56	2964	7.8	77	2280	77	1755	13.1	20.6
J50	03	97000	0.6	6000	1.56	9360	10.4	77	7200	77	5544	17.5	20.6
K50	02	50000	0.6	4200	1.65	6930	7.2	77	5331	69	3678	13.6	25.1
K150	03	117000	0.6	6000	1.56	9360	12.5	77	7200	77	5544	21.1	20.6
CUM		167006				16290	10.3		12531		9222	18.1	
L150	D2	84000	0.6	6000	1.65	9900	8.5	77	7615	69	5255	16.0	25.1
L50	03	109000	0.6	6000	1.56	9360	11.6	77	7200	77	5544	19.7	20.6
		193000				19260	10.10		14815		10799	17.9	
M50	D2	141000	0.5	6000	1.65	9900	14.2	77	7615	69	5254	26.8	25.1
M50	D3	89000	0.6	6000	1.56	9360	9.4	77	7200	77	5544	15.9	20.6
CUM		229000				19260	11.7		14815		10794	21.2	
N50	02	174000	0.55	6500	1.65	10725	16.2	79	8427	69	5814	29.9	25.1
N150	03	67000	0.9	9000	1.56	14040	4.8	84	11823	77	9103	7.4	20.6
		241000				20765	11.6		20250		14917	16.2	
O150	02	186000	0.7	7000	1.65	11550	15.9	80	9240	69	6375	28.9	25.1
O50	03	61000	0.9	7000	1.56	14060	4.3	84	11823	77	9106	6.7	20.6
		265000				26590	9.2		21063		15479	15.8	
P150	DO	60000	1.8	18000	1.76	31680	1.9	92	29,111	40	11646	5.2	27.7
A	02	117000	.80	8000	1.65	13200	8.9	82	10,870	69	7500	15.6	25.1
		177000				44880	3.9		39981		19144	7.2	
	03	64000	.9	9000	1.56	14060	4.6	84	11,823	77	9104	7.0	20.6
		241000				58920	4.1		51924		28248	8.5	
R150	DO	85000	1.8	18000	1.76	31680	2.7	92	29111	40	11644	7.3	29.9
?50	02	96000	0.9	9000	1.65	14850	6.3	84	12505	69	8628	10.9	25.1
CUM		178000				46530	3.8		41616		20272	8.8	
?50	03	61000	1.0	10,000	1.56	15600	3.9	86	13371	77	10296	5.9	20.6
CUM		240000				62130	3.9		54987		30568	7.9	
?50	DO	115000	1.8	18000	1.76	31680	3.6	92	29111	40	11646	9.9	29.9
R50	02	65000	1.0	10000	1.65	16500	3.9	86	14743	69	9758	6.7	25.1
CUM		180000				49180	3.7		43254		21402	8.4	
R	03	80000	1.1	11000	1.56	17160	4.7	87	14921	77	11689	7.0	20.6
		260000				65340	4.0		58175		32891	7.9	
P150	02&03	259000				27240	9.5				16604	15.6	
?50	02&03	258000				30450	8.5				18924	13.6	
?50	02&03	278000				33660	8.3				22247	13.1	

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J180	D3	37000	0.6	4500	1.56	7020	5.3	77	5400	77	4158	8.9	20.6
K180	D3	82000	0.6	6000	1.56	9360	8.8	77	7200	77	5544	14.8	20.6
180	D3	98000	.75	7500	1.56	11700	8.4	81	9506	77	7319	13.6	20.6
M180	D2	33000	0.6	6000	1.65	9900	3.3	77	7615	69	5254	6.3	25.1
180	D3	104000	0.9	9000	1.56	14040	7.4	84	11823	77	9104	11.6	20.6
CUM		137000				23940	5.7		19438		14358	7.5	
180	D2	61000	0.85	6500	1.65	10725	5.7	79	8426	69	5814	10.5	25.1
M180	D3	99000	0.9	9000	1.56	14060	7.1	84	11823	77	7103	10.9	20.6
CUM		160000				24765	6.5		20249		14917	10.7	
180	D0	110000	2.7	8400	1.76	14784	0.7	93	13752	39.8	5473	2.0	29.9
O180	D2	93000	0.7	7000	1.65	11550	8.1	80	9260	68.9	6366	14.6	25.1
CUM		104000				26334	3.9		22992		11839	8.8	
O180	D3	83000	0.9	9000	1.56	14060	5.9	84	11832	77.0	9103	9.1	20.6
CUM		187000				40374	4.6		34824		20942	8.9	
P180	D0	51000	2.1	21000	1.76	36960	1.4	93	34381	39.8	13683	3.7	29.9
P180	D2	78000	0.9	8000	1.65	13200	5.9	82	10870	68.9	7489	10.6	25.1
CUM		129000				50160	2.6		45251		21172	6.1	
P180	D3	76000	0.9	9000	1.56	14060	5.6	84	11823	77.0	9103	8.3	20.6
CUM		205000				64200	3.2		57074		30275	6.8	
Q180	D0	81000	2.1	21000	1.76	36960	2.2	93	34381	37.8	13686	5.9	29.9
Q180	D2	75000	.85	8500	1.65	14025	5.3	83	11687	68.9	8052	9.3	25.1
CUM		156000				50985	3.1		46068		21736	7.3	20.6
Q180	D3	72000	.9	9000	1.56	14060	5.1	84	11823	77.0	9104	7.9	20.6
CUM		228000				65025	3.5		52891		30840	7.4	
R180	D0	105000	2.0	20000	1.76	35200	3.0	93	32624	39.8	12984	8.1	29.9
R180	D2	27000	0.9	9000	1.65	14850	5.2	84	12205	68.9	8816	8.9	25.1
R180	D3	182000	.9	9000	1.56	50050	3.66	76	11823	77.0	25600	8.2	20.6
R180	D3	74000	.9	9000	1.56	14060	5.1	84	11793	77.0	9080	7.8	20.6
		253060				64090	3.9		56922		30680	8.2	
O180	D2&D3	195,400				25590	7.6				15469	12.6	
P180	D2&D3	226000				27240	8.3				15592	14.5	
Q180	D2&D3	269000				28065	8.9				17156	16.5	
R180	D2&D3	273000				28890	9.4				17696	13.4	

210	D3	30000	06	3600	1.56	5616.	5.3	77	4320	77	3326	9.0	20.6
K210	D3	60000	06	6000	1.56	9360	6.4	97	7200	77	5546	10.8	20.6
210	D2	38000	06	6000	1.65	9900	3.8	77	76155	68.9	5247	7.2	25.1
L210	D3	62000	06	6000	1.56	9360	6.6	77	7200	77	5544	11.2	20.6
		100000				19260	5.2		14815		10791	9.3	
210	D2	65000	06	6000	1.65	9900	6.6	77	7615	68.9	5247	12.4	25.
M210	D3	64000	0.6	6000	1.56	9360	6.8	77	7200	77	5544	11.5	20.6
		129000				19260	6.7		14815		10791	12.0	
N210	D2	89000	.65	6500	1.65	10725	8.3	79	8427	68.9	5806	15.3	25
210	D3	78000	.9	9000	1.56	14060	5.6	84	11823	77	9104	8.6	20.
		167000				24765	6.7		20250		14910	11.2	
210	D0	86000	2.1	11800	1.76	20768	1.7	93	19319	398	7689	4.7	29.9
210	D2	69000	.75	7500	1.65	12375	5.6	81	10055	689	6928	10.0	25.
		105000				33143	3.2		29374		14617	7.2	
210	D3	87000	.9	9000	1.56	14060	6.2	84	11823	77	9104	9.6	20.
		192000				47183	4.1		41197		23721	8.1	
210	00	74000	1.95	19500	1.76	34320	2.2	93	31746	398	12635	5.9	29.9
P210	D2	63000	0.8	8000	1.65	13200	4.8	82	10871	68.9	7490	8.6	25.1
		137000				67520	2.9		42617		20125	6.8	
210	P3	63000	0.9	9000	1.56	14060	4.5	84	11823	77	9104	6.9	20.6
		200000				61560	3.2		54440		29229	6.8	
120	00	115000	18	18000	1.76	31680	3.6	92	29111	398	11586	9.9	29.9
Q120	02	71000	.85	8500	1.65	14025	5.4	83	11698	68.9	8053	8.8	25.1
	03	186000				45705	4.1		40799		19639	1.5	
120	D3	57000	0.9	9000	1.56	14060	4.1	84	11823	77.0	9104	6.3	20.6
		263000	15	15000	1.76	59765	4.1		52624		28243	8.5	18.9
210	00	160000	1.8	18000	1.76	31650	4.4	9.2	29114	39.8	11586	12.7	27.9
R210	02	76000	0.9	9000	1.65	16850	5.1	84	12505	68.9	8646	818	25.1
		216000				46530	34.6		44646	770	20232	10.7	20.6
R210	D3	380000	0.9	6000	1.56	9860	6.4	84	7882	770	6069	9.9	20.6
		276000				55890	4.9		49478		26274	10.5	
O210	02C03	203800				26415	7.7				16032	12.7	
210	02C03	219500				27240	8.4				16596	13.2	
Q210	02C03	261000				28065	9.3				17157	15.2	
210	02C03	276000				24210	12.1				16685	20.0	

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260	03	64000	0.8	8000	1.56	12680	3.5	82	10278	77	7916	5.6	20
L260	02	20000	0.6	2900	1.65	4785	4.2	77	3681	68.9	2535	7.9	25
260	03	48000	0.9	9000	1.56	16060	3.4	86	11823	77	9104	5.3	20
		68000				18825	3.6				11640	5.8	
M260	02	52000	0.6	6000	1.65	9900	5.3	77	7615	68.9	5267	9.9	25
M260	03	36000	0.9	9000	1.56	16060	2.4	84	11823	77	9104	3.7	20
		86000				23940	3.6				14351	6.0	
260	02	81000	0.8	6000	1.65	9900	8.2	77	7615	68.9	5267	15.4	25
N260	03	36000	0.9	9000	1.56	14060	2.6	86	11823	77	9104	3.7	20
		115000				23940	6.8				16351	8.0	
O260	00	11000	1.8	6100	1.76	10736	1.0	92	9866	39.8	3926	2.8	29
O260	02	105000	0.7	7000	1.65	11550	9.1	80	9260	68.9	6366	16.5	25
	02	116000	8		1.6	22286	5.2				10292	11.3	
O260	03	39000	.95	9500	1.56	14820	2.6	85	12597	77	9700	6.0	20
		155000	1.0	20000	1.56	37106	4.2				18992	7.8	
P260	00	52000	1.7	17000	1.76	29920	1.7	91	27355	39.8	10887	4.8	29
P260	02	90000	0.8	8000	1.65	13200	6.8	82	10871	68.9	7480	12.0	25
		162000				43120	3.3				18377	7.7	
P260	03	66000	0.95	9500	1.56	14820	3.1	85	12597	77	9700	4.7	20
		188000				57940	3.2			7	28077	6.7	
Q260	00	105000	1.6	16000	1.76	28160	3.7	91	25600	39.8	10189	10.3	299
260	02	81000	1.0	10000	1.65	16500	4.9	86	16163	68.9	9244	8.3	25
	03	186000				46660	4.2			8	19933	9.3	
Q260	03	55000	1.0	10000	1.56	15600	3.5	86	13371	77.0	10276	5.3	20
	03	241000		11000		60260	4.0			77	30229	8.0	
R260	00	157000	1.5	15000	1.76	26600	5.9	90	23845	39.8	9696	18.5	29.9
260	02	183000	1.2	12000	1.65	19800	4.23	88	17420	68.9	12045	6.8	25
		240000	1.2	12000	1.65	46200	5.4				21495	16.2	25
260	03	162000	1.05	10500	1.56	16380	3.8	86	14146	77.0	10871	5.8	20
260	03	303000	1.1	11000	1.56	62580	4.8	87	16720	77.0	32380	7.0	20
												7.7	
O260	02,03	161500			1.65	26370	16.1				16066	10.1	
260		205000				28020	17.3				17190	11.9	
Q260		257000				32100	8.0				20040	12.8	
260		318000				36180	8.08				22878	13.9	

K310	D3	52000	·95	7300	1·56	11358	4·6	85	9680	77	7653	7·0	20·8
L310	D0	14000	1·8	4300	1·76	7568	1·8	92	6954	39·8	2768	5·1	29·9
L310	D2	40000	0·6	5500	1·65	9075	4·4	77	6981	68·9	4810	8·3	25·1
		54000				16643	3·2				7578	7·1	
L310	D3	50000	·95	9500	1·56	16820	3·4	85	12597	77	9700	5·2	20·8
		104000				31463	3·3				17278	6·0	
M310	D0	71000	1·8	18000	1·76	31680	2·2	92	29111	39·8	11586	6·1	29·9
M310	D2	25000	0·6	6000	1·65	9900	2·5	77	7615	68·9	5247	4·8	25·1
		96000				41580	2·3				16833	5·7	
M310	D3	50000	1·0	10000	1·56	15600	3·2	86	13371	77	10296	4·9	20·6
		146000				57180	2·6				27129	5·4	
N310	D0	55000	1·8	18000	1·76	31680	1·7	92	29111	39·8	11586	4·7	29·9
N310	D2	47000	0·6	6000	1·65	9900	4·7	77	7615	68·9	5247	9·0	25·1
		102000				41580	2·5				16833	6·1	
N310	D3	38000	1·0	10000	1·56	15600	2·9	86	13371	77	10296	3·7	20·6
		140000				57180	2·6				27129	5·2	
O310	D0	80000	1·8	18000	1·76	31680	2·5	92	29111	39·8	11586	6·9	29·9
O310	D2	70000	0·9	9000	1·65	14850	4·7	84	12505	68·9	8616	8·1	25·1
		150000				46530	3·2				20202	7·4	
O310	D3	14000	1·05	10500	1·56	16380	0·9	86	14146	77	10893	1·3	20·6
		164000				62910	2·6				31095	5·3	
P310	D0	130000	1·8	18000	1·76	31680	4·1	92	29111	39·8	11586	11·2	29·9
P310	D2	89000	1·05	10500	1·65	17325	5·1	86	14963	68·9	10309	8·6	25·1
		219000				49005	3·3				21895	10·0	
P310	D3	20000	1·1	11000	1·56	17160	1·2	87	16922	77	11490	1·7	20·6
		239000				66165	3·6				33385	7·2	
Q310	D0	167000	1·8	18000	1·76	31680	5·3	92	29118	39·8	11586	16·4	29·9
Q310	D2	86000	1·2	12000	1·65	19800	4·2	88	17426	68·9	12005	7·0	25·1
		251000				51480	4·9				23591	10·6	
Q310	D3	23000	1·1	11000	1·56	17160	1·3	87	14922	77·0	11490	2·0	20·6
		274000				69640	6·0				35081	7·8	
R310	D0	233000	1·7	17000	1·76	29920	7·8	91	27355	39·8	10887	21·4	29·9
R310	D2	67000	1·0	10000	1·65	16500	4·1	86	14143	68·9	9744	6·9	25·1
		300000				46420	6·5				20631	14·5	
R310	D3	38000	1·15	11500	1·56	17940	2·1	88	15698	77·0	12087	3·1	20·6
		338000				64360	5·3				32718	10·3	
L310		108300				23895	4·5				14510	7·5	
M310		164000				25500	6·4				15543	10·6	
N310		158600				25500	6·2				15543	10·2	
O310		182000				31230	5·8				19509	9·3	
P310		257000				34495	7·5				21100	11·8	
Q310		292000				36960	7·9		840023		23495	12·4	
R310		355000				36660	10·3				21831	16·3	

|													
L320	03	53000	1.0	6600	1.56	10296	5.1	86	8825	77.0	6795	7.8	20.6
L320	00	25000	1.8	9720	1.76	17107	1.5	92	15720	39.8	6257	4.0	29.9
L320	02	37000	0.6	6000	1.65	9900	3.7	77	7615	68.9	5247	7.1	25.1
		62000				27007	2.3				12504	5.0	
L320	03	50000	1.0	10000	1.56	15600	3.2	86	13371	77.0	10298	4.9	20.6
		112000				42607	2.6				22800	4.9	
M320	00	59000	1.8	18000	1.76	31680	1.8	92	29111	39.8	11586	5.0	29.9
M320	02	31000	0.6	6000	1.65	9900	3.1	77	7615	68.9	5247	5.9	25.1
		81000				41580	2.1				16833	5.3	
M320	03	46000	1.05	10500	1.56	16350	2.8	86	14166	77.0	10893	4.2	20.6
		135000				57960	2.3				27726	4.9	
N320	00	79000	1.8	18000	1.76	31680	2.5	92	29111	39.8	11586	6.8	29.9
N320	02	66000	0.75	7500	1.65	12375	3.7	81	10055	68.9	8928	6.6	25.1
		125000				44055	2.8				18514	6.8	
N320	03	62000	1.05	10500	1.56	16380	2.6	86	14166	77.0	10893	3.9	20.6
		167000				60435	2.8				29407	5.7	
O320	00	85000	1.8	18000	1.76	31680	2.7	92	29111	39.8	11586	7.3	29.9
O320	02	57000	0.9	9000	1.65	16850	3.8	84	12505	68.9	8616	6.6	25.1
		142000				46530	3.1				20202	7.0	
O320	03	25000	1.10	11000	1.56	17160	1.5	87	16922	77.0	11690	2.2	20.6
		167000				63690	2.6				31692	5.3	
P320	00	102000	1.8	18000	1.76	31680	3.2	92	29111	39.8	11586	8.8	29.9
P320	02	55000	1.2	12000	1.65	19800	2.8	88	17426	68.9	12005	4.6	25.1
		157000				51480	3.0				23591	6.7	
P320	03	36000	1.10	11000	1.56	17160	2.1	87	14922	77.0	11690	3.1	20.6
		193000				68640	2.8				35081	5.5	
Q320	00	158000	1.7	17000	1.76	29920	5.3	91	27355	39.8	10887	14.5	29.9
Q320	02	56000	1.1	11000	1.65	18150	3.1	87	15783	68.9	10876	5.1	25.1
		214000				68070	4.5				21761	9.8	
Q320	03	66000	1.15	11500	1.56	17940	2.6	88	15698	77.0	12087	3.8	20.6
		260000				66010	3.9				33848	7.7	
R320	00	226000	1.65	16500	1.76	29040	7.8	91	26478	39.8	10538	21.4	29.9
R320	02	43000	1.0	10000	1.65	16500	2.6	86	14163	68.9	9744	4.4	25.1
		269000				65540	5.9				20282	13.3	
R320	03	49000	1.20	12000	1.56	18720	2.6	88	16476	77.0	12685	3.9	20.6
		318000				64260	4.9				32967	9.6	
L320		121720				25500	4.8				15563	7.8	
M320		143000				26280	5.6				16140	8.9	
N320		186000				28755	6.5				17821	10.6	
O320		165000				32010	5.8				20106	9.2	
P320		211000				36960	5.7				23495	9.0	
Q320		277000				36090	7.7				22961	12.1	
R320		336500				35220	9.5				22429	16.7	
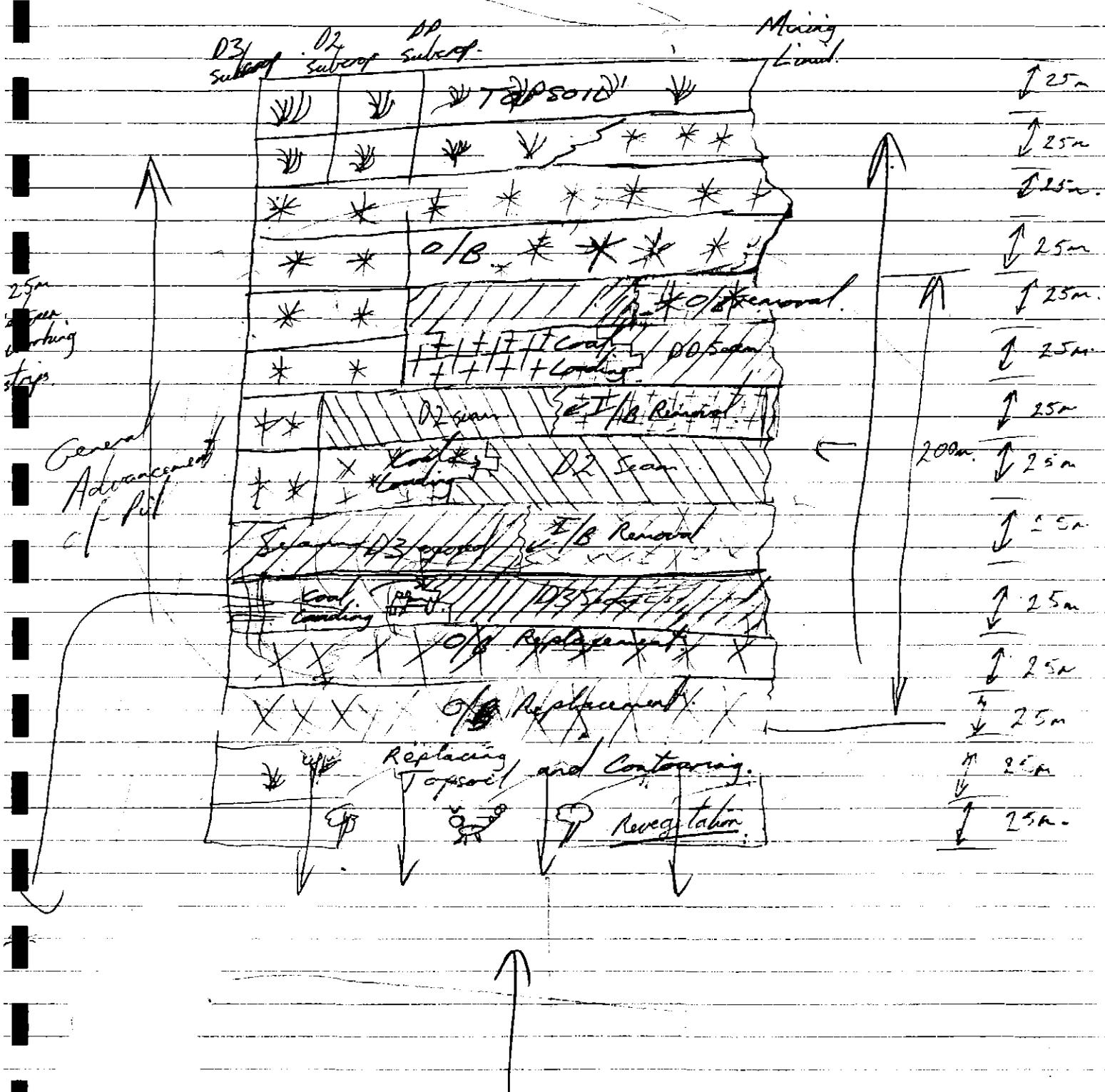
FIGURE VI

The proposed plan (with actual strip widths in the range of 25→50m) yet
to be decided will have entire strips from subcrop to mining limit under-
going one operation only and the operation in each strip will be in sequence
with the operation in the strip either side of the original. The strip
lengths will be quite long unfortunately - of the order of 1km - and this
will reduce the efficiency of the scrapers,but this cannot be helped.

At the base of the pit there will be a depth of approximately 27m, and it
is proposed that the scrapers will enter the strip from the mining limit
end and scrape off a downward slope of O/B, climbing out of the pit at the
subcrops end on a light grade and travelling back to the strip where O/B
dupming is taking place, enter from the subcrop end, dump in a downward
slope also after running along the top of previously dumped O/B continue
down the slight grade of pit to the mining limit end where a ramp will have
been constructed to cater for empty scrapers to climb out of the pit at a
reasonable grade. The scrapers would then continue back around the mining
limit end road and back into the O/B removal pit to repeat the cycle. Actual
cycle times for this method are yet to be calculated, but they could be
expected to be very competitive with any other possible O/B removal methods,
and has the advantage that this method is very basic, well set out with no
foreseeable complications, and no two operations getting in the way of each
other, i.e. coal handling and O/B removal.

Please Note: The method of dumping O/B as stated will quite probably be
refined to maximise use of equipment. However, the general principle of
the mining method, as envisaged at this stage should remain unchanged.

Production from the mine, depending on a number of factors will most probably
be within the range 100,000 to 200,000 tonnes per year, with a likely figure
of 150,000 tpy. The 200,000 tpy level would mean that the equivalent of
1 strip would be taken per year, although this equivalent strip would be
spread out over 6 to 8 operational strips. This is not beyond possibility
and the actual level of production is still open for discussion and will
depend on a number of parameters. This would be a washed product coal and
due to a general low quality overall insitu coal, it would necessitate
production of approximately 1½ times the washed product of Insitu coal. This
production would require an initial O/B stripping rate approaching 1,000,000
cubic metres per year for the first five years and gradually increasing in
following years. It is suggested that due to the many operations involving
the uncovering, mining and blending of the three seams, in the individual
strips and the necessity of each strip to reach the proposed mining limit
at the same point in time, a fairly sharp thinking scheduling Engineer -
perhaps armed with computer and Programming Analyst be employed full time
to ensure the mine operates in synchronisation. The Engineer should be ready
to direct men and machinery as required to the strips where work may need
to be more concentrated. The equipment should also be flexible enough to
adjust for this.

Actual Equipment Requirements in terms of numbers and types and capacities have yet to be calculated in detail. Representatives of the Caterpillar Company have been arranged to meet at the Shell offices with interested persons to help with machine calculations and requirements. Information such as mine plan, i.e. distances, volumes, gradients, passages, and rock types, road surfaces etc. etc. will be supplied to them as requested and it is hoped the representatives will be very helpful in calculation of machine requirements.

Product

The product which will be sold has properties which have only been based on very limited borehole information, and as such will be subject to refinement when compared with the results found from the current core drilling in the Harefield Area. However, from the limited Geological information we have, it can be concluded that Ash content will be around 25% when blended as produced from the three seams. This washing figure was obtained from floats at 1.7 which is also quite high, and the washing experiments were still only obtaining a relatively small yield.

One would hope that the current exploration still to be carried out (as at 25/3/82) will produce more encouraging figures than this.

Actual Costings have not been calculated for any part of the mine operation as yet. It is expected that these figures will be estimated in the near future but will remain with a degree of uncertainty, perhaps up to 40%, until current reserve drilling and surveying is completed.

At this stage, with all the work yet to be carried out, it is expected that the mine would not be able to come on stream within two years. With current drilling going on for the most part of this year, and perhaps even early 1983, and full scale feasibility studies to be also completed following that taking yet another twelve months, the eventual decision on the go-ahead itself with which contractor and subsequent arrangements are approximately 24 months away at least.