

**Aberfoyle Resources Limited**

Incorporated in Victoria

**EXPLORATION DIVISION**

Brookfield 61

**ADELAIDE OFFICE:**  
 91 BEULAH ROAD  
 NORWOOD S.A. 5067  
 Phone: (08) 363 1836  
 Facsimile: (08) 363 1409

1st Floor  
 123 Camberwell Road  
 Hawthorn East  
 Victoria 3123  
 Australia  
 Telephone: (03) 882 2226  
 Facsimile: (03) 813 1086  
 Telex: AA38646

The Director General  
 Department of Mines and Energy  
 PO Box 151  
 EASTWOOD SA 5063

16th May 1989

Dear Sir

RE: Exploration Licence 1558 "Brookfield"

PROGRESS REPORT FOR THE FIRST QUARTER  
 ended 8th April 1989.

No field work has been undertaken on this licence area during the First Quarter. Exploration has comprised study of Landsat data and topographic maps to assist in identifying and evaluating presumed marine strand lines in the area.

A RAB drilling programme is planned to be carried out to assess the Tertiary sediments of the area for heavy mineral sand accumulations.

A statement of expenditure is attached.

Yours faithfully  
 ABERFOYLE RESOURCES LIMITED  
 Exploration Division

*M. G. Teakle*

MG Teakle  
 Senior Geologist

MGT/maf  
 Att 1  
 cc KERD

*John C. Anderson*  
 JA Anderson  
 Regional Manager



EXPLORATION LICENCE1558 "BROOKFIELD"

SUMMARY OF EXPENDITURE FOR THE FIRST QUARTER  
ended 9th April, 1989.

GEOLOGY	9.42
TENURE	4.00
OTHER SERVICES	12.66
INDIRECT COSTS	2.60
 TOTAL COSTS	 28.68

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The Director General  
Department of Mines and Energy  
PO Box 151  
EASTWOOD SA 5063

22nd August 1989

Dear Sir

RE: Exploration Licence 1558 "Brookfield"

PROGRESS REPORT ON EXPLORATION  
FOR THE SECOND QUARTER  
ended 8th July 1989

A RAB drilling programme was carried out during the Quarter, comprising fifty-five holes along four traverse lines for a total of 933m.

Heavy minerals were generally noted only in trace amounts, to an estimated maximum 0.2%. The drilling encountered widespread calcrete and calcareous fossiliferous sand interpreted to be the Norwest Bend Formation, a horizon not considered prospective for accumulation of heavy minerals.

Results are being assessed and a technical report is in preparation.

A statement of expenditure is attached.

Yours faithfully  
ABERFOYLE RESOURCES LIMITED  
Exploration Division



MG Teakle  
Senior Geologist

MGT/maf  
Att 1  
cc KERD

EXPLORATION LICENCE 1558 "BROOKFIELD"SUMMARY OF EXPENDITURE  
FOR THE SECOND QUARTER  
ended 8th July 1989

GEOLOGY	397.69
RAB DRILLING	10,233.27
TENURE	40.00
OTHER SERVICES	439.32
INDIRECT COSTS	1,110.98
TOTAL COSTS	\$12,221.26

**Aberfoyle Resources Limited**

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**EXPLORATION DIVISION****ADELAIDE OFFICE:**  
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Victoria 3123  
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Telex: AA38646

Brookfield 61

The Director-General  
Department of Mines and Energy  
PO Box 151  
EASTWOOD SA 5063

13th November 1989

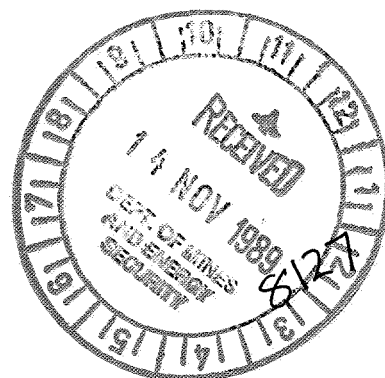
Dear Sir

RE: Exploration Licence 1558 "Brookfield"REPORT ON EXPLORATION  
FOR THE THIRD QUARTER  
ended 8th October 1989

No field work was undertaken during the Quarter.

Results of past work are being assessed with a view to  
surrendering the licence.

A statement of expenditure is attached.

Yours faithfully  
ABERFOYLE RESOURCES LIMITED  
Exploration DivisionMG Teakle  
Senior GeologistMGT/mafc  
Att 1  
cc KERD

EL 1558 "BROOKFIELD"

SUMMARY OF EXPENDITURE  
FOR THE THIRD QUARTER  
ended 8th October 1989

GEOLOGY	517.50
TENURE	20.00
INDIRECT COSTS	53.75
 TOTAL COSTS	 \$591.25

ABERFOYLE RESOURCES LIMITEDEXPLORATION LICENCE 1558 "BROOKFIELD"

FINAL REPORT ON EXPLORATION  
FOR THE PERIOD  
9th January 1988 to 28th November 1989

Distribution:

SADME Adelaide (1)  
ARL Hawthorn (1)  
ARL Adelaide (1)

Prepared By:

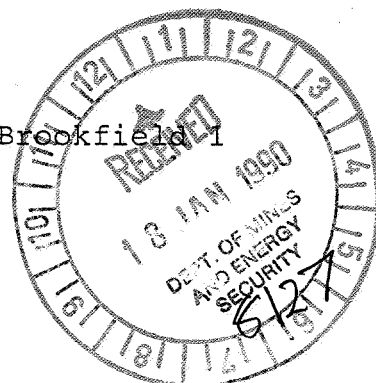
*JAC Painter*  
JAC Painter  
Geologist

Issued By:

*M.G. Teakle*  
MG Teakle  
Senior Geologist

January 1990

Report No: Brookfield 1



S U M M A R Y

Exploration was carried out on Exploration Licence 1558 "Brookfield" with the objective of locating economic concentrations of heavy minerals in Pliocene sand.

A RAB drilling programme was completed consisting of 55 holes along 21.6 km of traverse in four lines for a total of 933m. The drilling encountered a geological sequence thought to be the Norwest Bend Formation, a horizon not considered prospective for heavy mineral accumulation.

Heavy minerals were not noted in panned samples. It is concluded that drilling has adequately tested the licence area, that the occurrence of an economic deposit in the area is unlikely, and that further work is not warranted.



C O N T E N T S

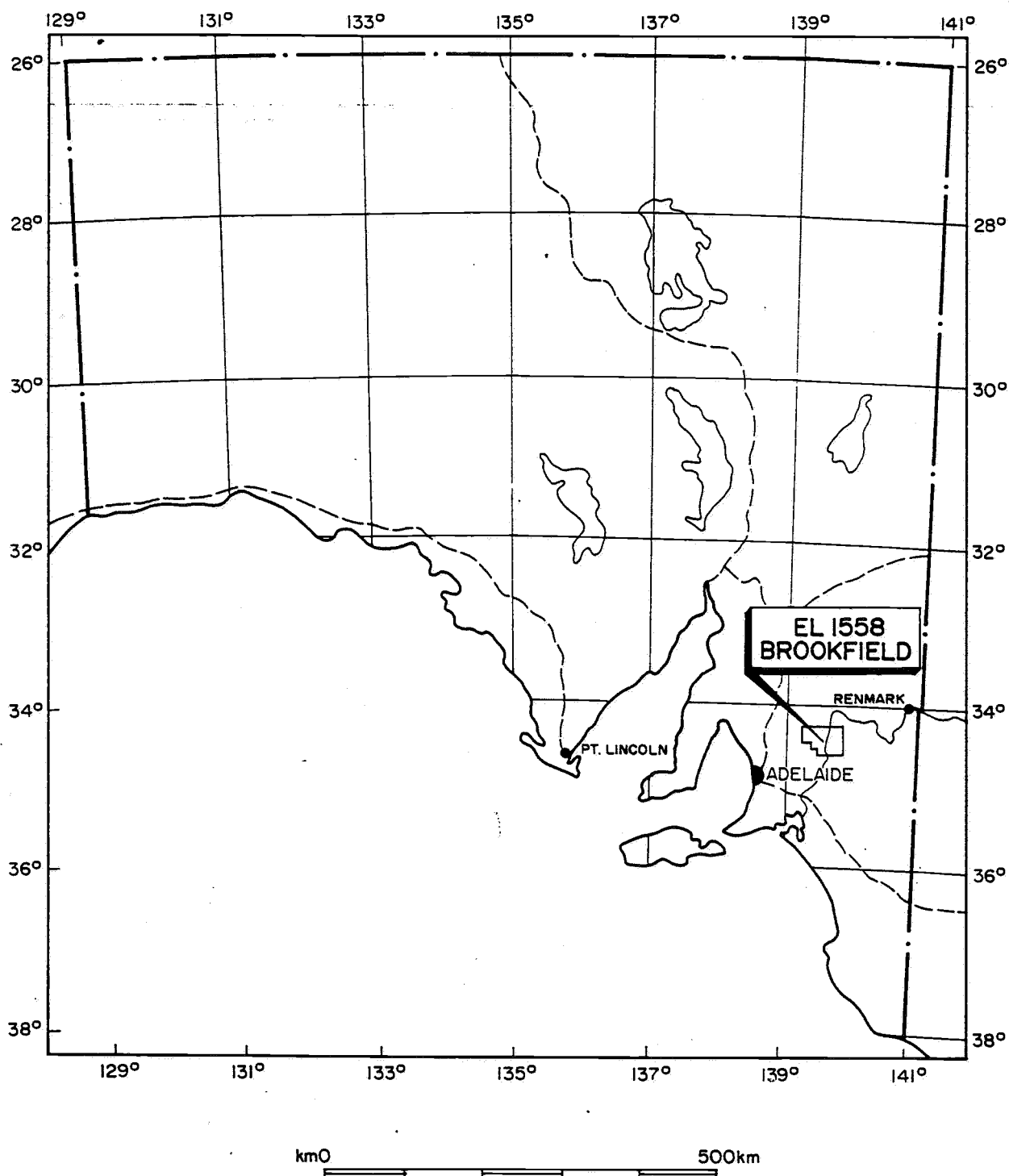
	SUMMARY	Page
1	INTRODUCTION	1
2	TENURE AND LOCATION	1
3	GEOLOGICAL SETTING	1
4.	EXPLORATION PROGRAMME	
4.1	RESEARCH	3
4.2	DRILLING AND SAMPLING	3
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F I G U R E S

Figure 1:	EL 1553 Brookfield LOCALITY PLAN (BK-2)	(in text)
Figure 2:	EL 1558 Brookfield LICENCE DETAILS (BK-3)	(in text)
Figure 3:	EL 1558 Brookfield Location of RAB Traverses (BK-1)	1:100,000

A P P E N D I C E S

Appendix I	Drill-hole cross sections
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# Aberfoyle Resources Limited

## EXPLORATION DIVISION

FIGURE 1

REVISIONS			
Init.	Date	Init.	Date

SOUTH AUSTRALIA

EL 1558 — BROOKFIELD

LOCALITY PLAN

Compiled : JACP

Drawn :

Traced : EAC

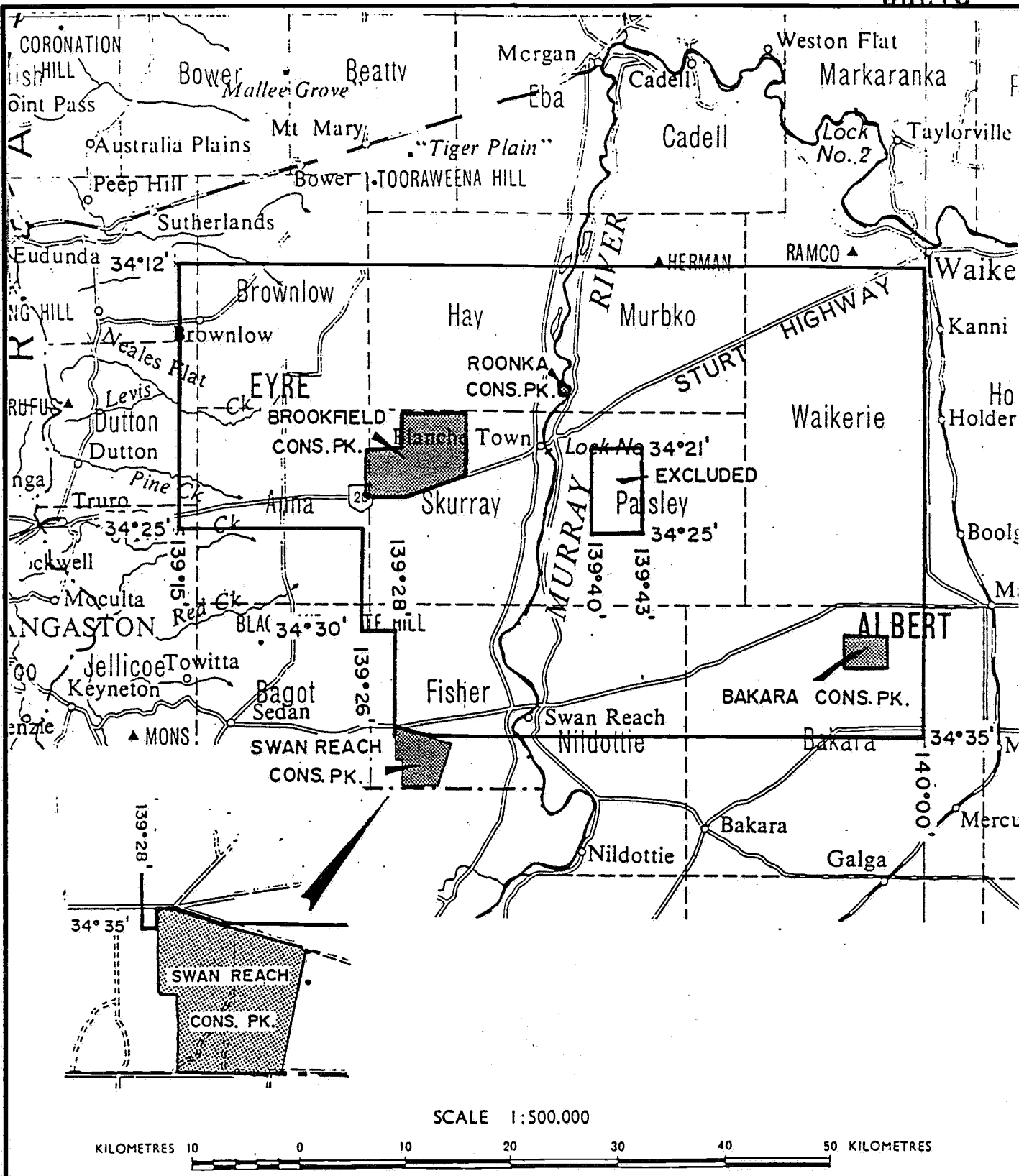
Checked :

Plate No. : BK-2

Location Code :

Scale : AS SHOWN

Date : AUGUST 1989



# Aberfoyle Resources Limited

EXPLORATION DIVISION

FIGURE 2

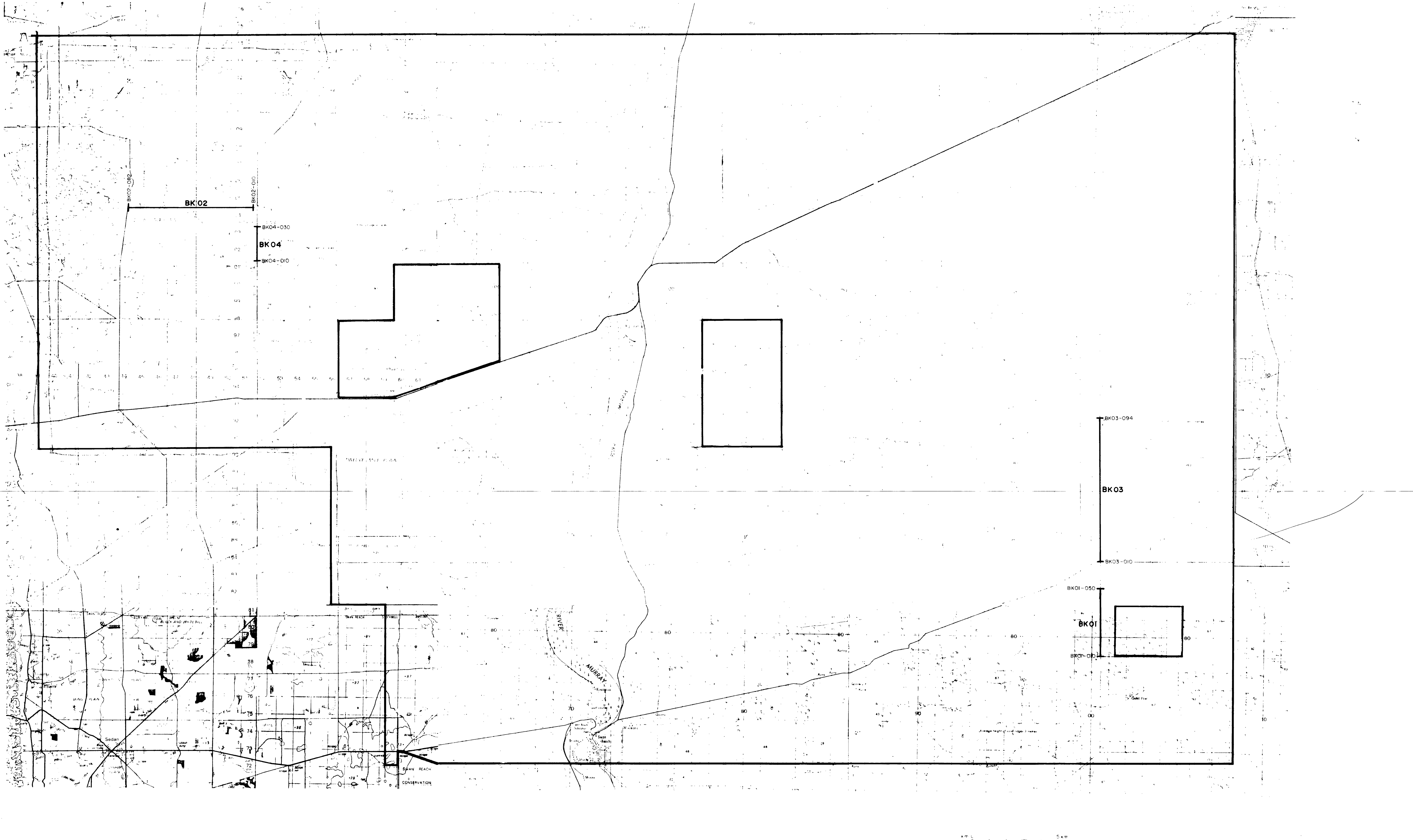
REVISIONS			
Init.	Date	Init.	Date

SOUTH AUSTRALIA

EL 1558 — BROOKFIELD

LICENCE DETAILS

Compiled :
Drawn :
Traced : EAC
Checked :



BK02  
BK02-082 BK02-010

COMPLETED RAB TRAVERSE showing first & last hole numbers

8127-1

Aberfoyle Resources Limited				FIGURE 3	
EXPLORATION DIVISION					
SOUTH AUSTRALIA					
BROOKFIELD - EL 1558					
LOCATION OF RAB TRAVERSES					
REVISIONS		Compiled BFR			
Init.	Date	Init.	Date		
		Drawn			
		Traced JB			
		Checked			
Location Code		Scale 1:100,000		Date JUNE 1989	
				Plate No BK-1	

--1--

## 1. INTRODUCTION:

This final report describes exploration carried out by Aberfoyle Resources Limited on Exploration Licence 1558 "Brookfield" during the term of the licence from 9 January to 28 November 1989.

The licence was secured by Aberfoyle to explore for heavy minerals. The potential for accumulation of heavy minerals in sediments of the Murray Basin has recently been recognised. Upper Tertiary Loxton Sands - Parilla sand, which occur at shallow depth over much of the south-western half of the basin, have been identified as having most potential. Marine regression during the Pliocene resulted in deposition of these sands and the formation of a prograding series of beach dunes at successively stranded coastlines. Conditions under which the dunes formed were also favourable for the accumulation and concentration of heavy minerals. The stranded coastlines are reflected in modern topographic expression by a series of long arcuate ridges, and are a major target feature in exploration.

Exploration by Aberfoyle has consisted of study of Landsat data and topographic maps to identify palaeoshorelines and strandline ridges, followed by RAB drilling along four traverse lines across inferred shoreline features.

## 2. TENURE AND LOCATION:

Exploration Licence 1558 "Brookfield" was granted to Aberfoyle on 9 January 1989 for a term of 12 months. The licence covers approximately 2489 square kilometres and is located immediately south-west of Waikerie (Figs 1 & 2).

## 3. GEOLOGICAL SETTING:

The Exploration Licence is located at the western margin of the Murray Basin. The geology of the area is shown mainly on the Renmark 1:250,000 geological sheet (Firman, 1972), and partly on Adelaide (Thomson, 1969)

A succession of Quaternary and Tertiary sediments more than 100m thick rests unconformably on Mesozoic and Palaeozoic sediments, which in turn overlie Proterozoic basement.

--2--

Oldest Tertiary sediments are Paleocene and Eocene marine carbonaceous sand and sandy clay of the Renmark Beds and Buccleuch Beds. They are overlain by fossiliferous marine sediments of Oligocene to Lower Pliocene Age, consisting of the Ettrick Formation, Mannum Formation, Pata Limestone (Morgan Limestone) and Bookpurnong Beds. These sediments, mainly calcareous silty sands and limestones, are often clayey and generally glauconitic. Pliocene sands complete the Tertiary sequence. These are the Loxton sands, Norwest Bend Formation and Parilla Sand which are commonly fine to medium and coarse grained sands with some clayey sand. Firman (1972) describes the Parilla sand as fluviolacustrine. However a substantial marine component which hosts near-shore heavy mineral concentrations is now recognised.

Miocene sediments, including Pata Limestone and Morgan Limestone, and the Upper Pliocene Norwest Bend Formation, outcrop in the steep walls of the Murray River Valley, which transects the licence area from north to south. These sediments, together with ? Parilla Sand (Firman 1986), also occur in limited outcrop near the western boundary of the licence, where the tertiary sequence laps onto and may be faulted against Upper Proterozoic basement.

However throughout most of the area the older sequences are overlain by a variable veneer of Pleistocene sediments. West of the Murray River the ground surface is formed mainly by Bakara Soil, a calcareous fine sandy fossil soil commonly with Ripon Calcrete at the base. Blanchetown Clay occurs in limited outcrop associated with the outcropping Tertiary sediments. East of the river the surface is mainly covered by Woorinen Formation, a pale red-brown quartz sand commonly forming linear east-west trending dunes. Recent Bunyip Sand occurs in places as a veneer over Woorinen Formation and as "blow-outs" from the eastern river valley walls. A small area of aeolian gypsiferous dunes and lake sediments occurs near the western boundary.

The Pliocene Parilla Sand and Loxton Sands are considered the most likely horizon for accumulations of heavy minerals, and were the main target of the drilling programme.

--3--

#### 4. EXPLORATION PROGRAMME:

##### 4.1 Research

Initial work comprised study of Landsat data, aerial photography and topographic maps, with the aim of identifying areas potentially prospective for heavy minerals. As a result, topographic features were identified which were presumed to represent dune ridges developed at palaeo-shorelines and hence to be likely sites for accumulation of heavy minerals.

RAB drilling was planned to take place with holes at 200m spacings along traverse lines oriented approximately at right angles to the trend of interpreted palaeo-shoreline features. The intended depth was 18m, since it was reasoned that the deposit sought would not be economic under any greater overburden.

##### 4.2 Drilling and Sampling

RAB drilling was carried out during May 1989 by HA and JE Wilson of Cobar, NSW. The drill used was an Investigator MK5 air rig rated at 250cfm and 120psi. Holes were drilled vertically to an intended depth of 18m using a 100mm blade bit.

Most holes reached 18m. A few were abandoned at depths as shallow as 7m when strongly indurated layers prevented further progress.

Holes were spaced at 400m intervals along four traverse lines ranging in length from 2.0 to 8.4 km. Traverses were located along the sides of mainly secondary roads. Traverse locations are shown on Figure 3.

Fifty five holes were drilled along 21.6 line km for a total of 933m.

Grab samples of 100-150 grams were collected from 2m intervals. One sample from each interval was bagged and retained for subsequent heavy mineral determination. A second sample was panned on site and heavy mineral concentration was visually estimated.

--4--

#### 4.3 Heavy Liquid Separations

Experience gained in earlier work has resulted in the practice of submitting samples for heavy mineral determination when visual estimates of panned samples indicate more than 0.5% heavy minerals in the sample. In addition adjacent samples may also be submitted in order to clearly define the limits of mineral concentration.

In this investigation only trace amounts of heavy minerals were observed in panned samples, and no samples were submitted for analysis.

#### 5. RESULTS:

The results of drilling are presented as cross sections along traverse lines, and are included as Appendix I. Estimated heavy mineral contents are shown on the cross sections.

Lines BK01 and BK03 near the eastern licence boundary encountered a surface horizon of fine to medium sand with a common calcrete layer up to 5m thick, followed by a nearly continuous clay horizon 2 to 4m thick. The remainder of the sequence to 18m is variable clayey sand and sandy clay with lesser clean sand. The sediments are mainly calcareous and fossiliferous with common indurated layers, in places sufficiently hard to stop drilling penetration. The sands are generally fine to medium grained, but in the northern half of line BK03 become coarse to very coarse grained and gravelly. This sequence is thought to be Pleistocene sand and calcrete over Norwest Bend Formation, with the coarse grained section representing beach gravels.

Lines BK02 and BK04 near the western boundary encountered mainly fine to medium sandy clay and clayey sand 8 to 16m thick overlying a nearly continuous clay or sandy clay horizon in which most holes bottomed. The sediments are calcareous and fossiliferous with common shell fragments, and as in the east contain indurated layers. This sequence is also thought to be Pleistocene sands over Norwest Bend formation. Holes at the western end of line BK04 encountered common layers of gravel and rock fragments which are thought to represent colluvium and alluvial outwash from the adjacent foothills of the Mt. Lofty Ranges.



--5--

Heavy minerals were not noted, or were noted only in trace amounts up to an estimated maximum of 0.2%. No samples were submitted for analysis.

6. DISCUSSION

Reconnaissance RAB drilling on EL1558 "Brookfield" has not located economic concentrations of heavy minerals. Although the drilling has been concentrated in two widely separated locations near the eastern and western licence boundaries, at both locations the work indicates the presence of the Norwest Bend Formation, a horizon not prospective for accumulation of heavy minerals. Norwest Bend Formation overlying Miocene limestones is also exposed in the valley of the Murray River which runs north - south through the centre of the area. It is therefore concluded that the entire licence area is underlain by Norwest Bend Formation, and that the occurrence of an economic deposit of heavy minerals is unlikely. It was concluded that further work was not warranted.

On 28th november 1989 the licence was surrendered.

7. EXPENDITURE:

Expenditure on Exploration Licence 1558 "Brookfield" to 9th October 1989, as previously reported, was \$12,841.19.

Additional expenditure to 28th November 1989 was \$366.59, for a total of \$13,207.78.

A statement of expenditure appears on the page following References.

8. REFERENCES:

Firman, J.B. (Compiler) 1972

RENMARK, South Australia.  
Explanatory Notes,  
1:250,000 geological  
series.  
Geological Survey, South  
Australia.

Firman, J.B. (Compiler) 1986

Adelaide Region  
Palaeosols.  
Geological Atlas Special  
Series, 1:250,000.  
S.A. Department of Mines  
and Energy.

Thomson, B. A. (Compiler) 1969

ADELAIDE, South  
Australia 1:250,000  
geological series. Sheet  
SI54-9 Geological Survey  
South Australia.

EXPLORATION LICENCE 1558 "BROOKFIELD"

SUMMARY OF EXPENDITURE  
9TH OCTOBER 1989 TO 28TH OCTOBER 1989

GEOLOGY	112.50
OTHER SERVICES	327.58
INDIRECT COSTS	(73.49)
TOTAL COSTS	\$366.59

Brookfield 1: Final report on exploration (9/1/89 to 28/11/89):

APPENDIX I

DRILL-HOLE CROSS SECTIONS

LEGEND:

/ CA - calcrete  
/ C - clay  
/ CS - clayey sand  
/ S - sand  
/ SC - sandy clay

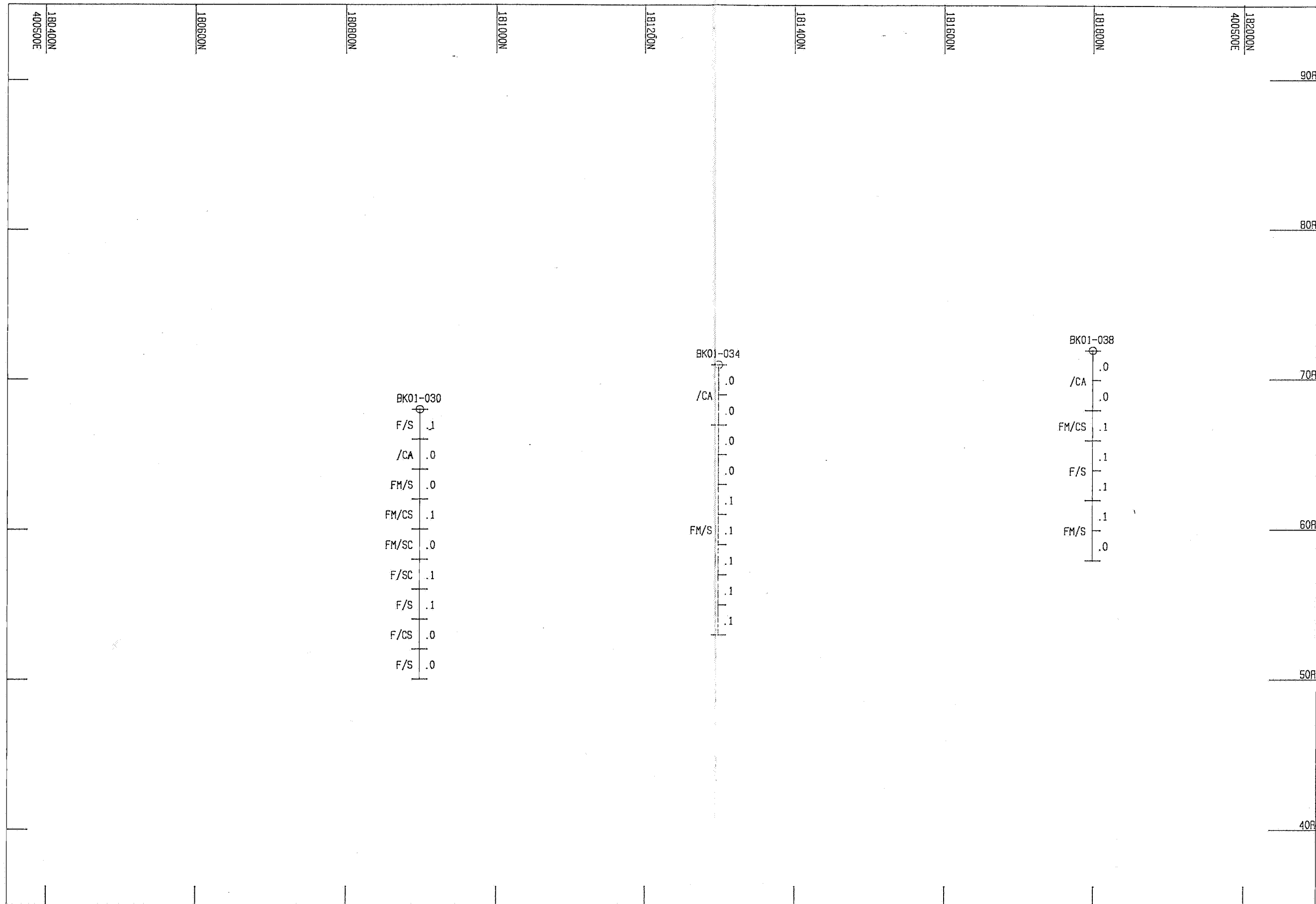
F / - fine  
FM / - fine to medium  
M / - medium  
MC / - medium to coarse  
C / - coarse  
VC / - very coarse



LEGEND

1.0/1.23 % Heavy Mineral Values  
Estimate / Actual

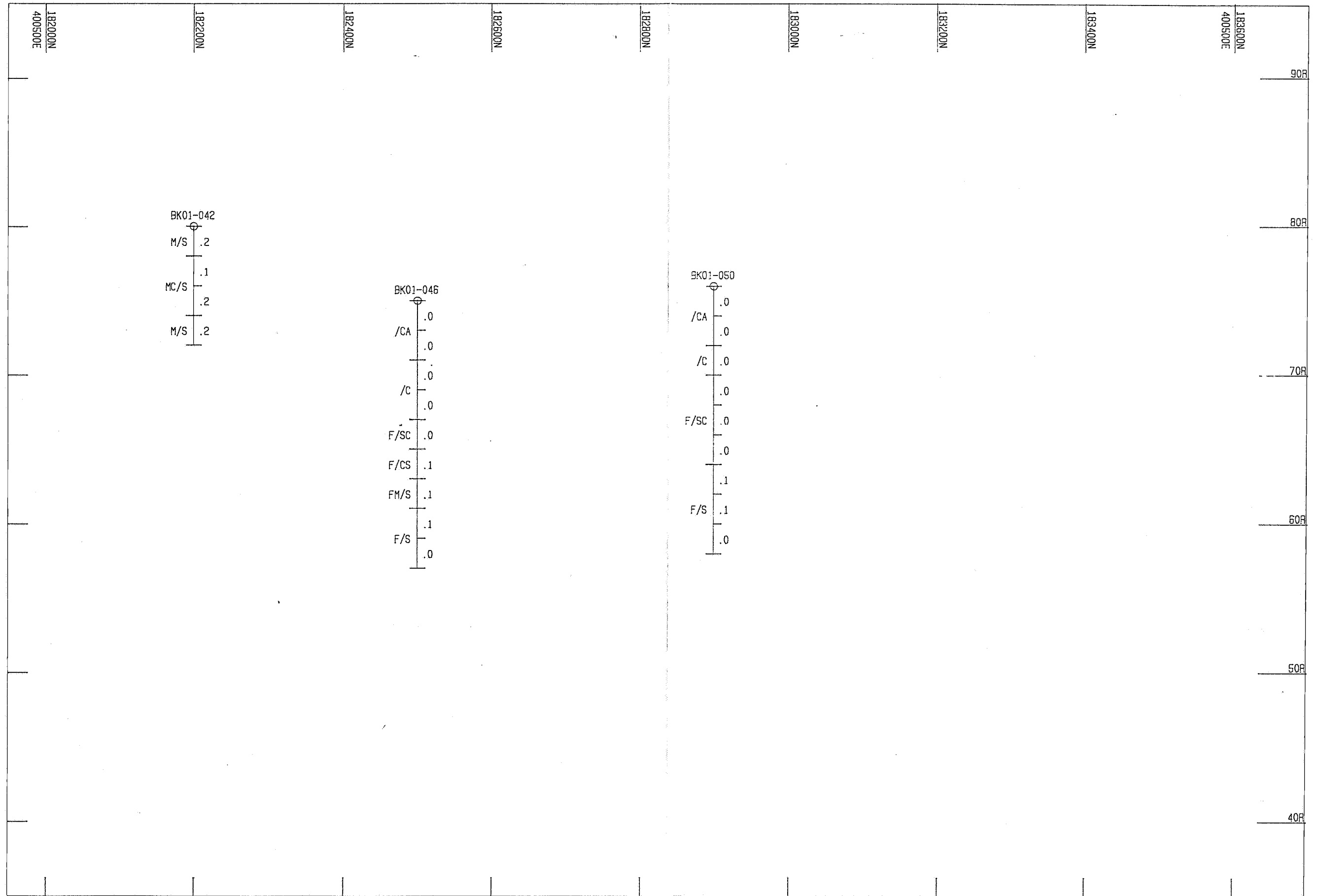
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BROOKFIELD SA  
Borehole Section LINE 01  
X Scale = 1 : 5000. // Y Scale = 1 : 250.  
Section Bearing: 0 Date: 04/06/89 Comp. BFR



LEGEND

1.0/1.23 % Heavy Mineral Values  
Estimate / Actual

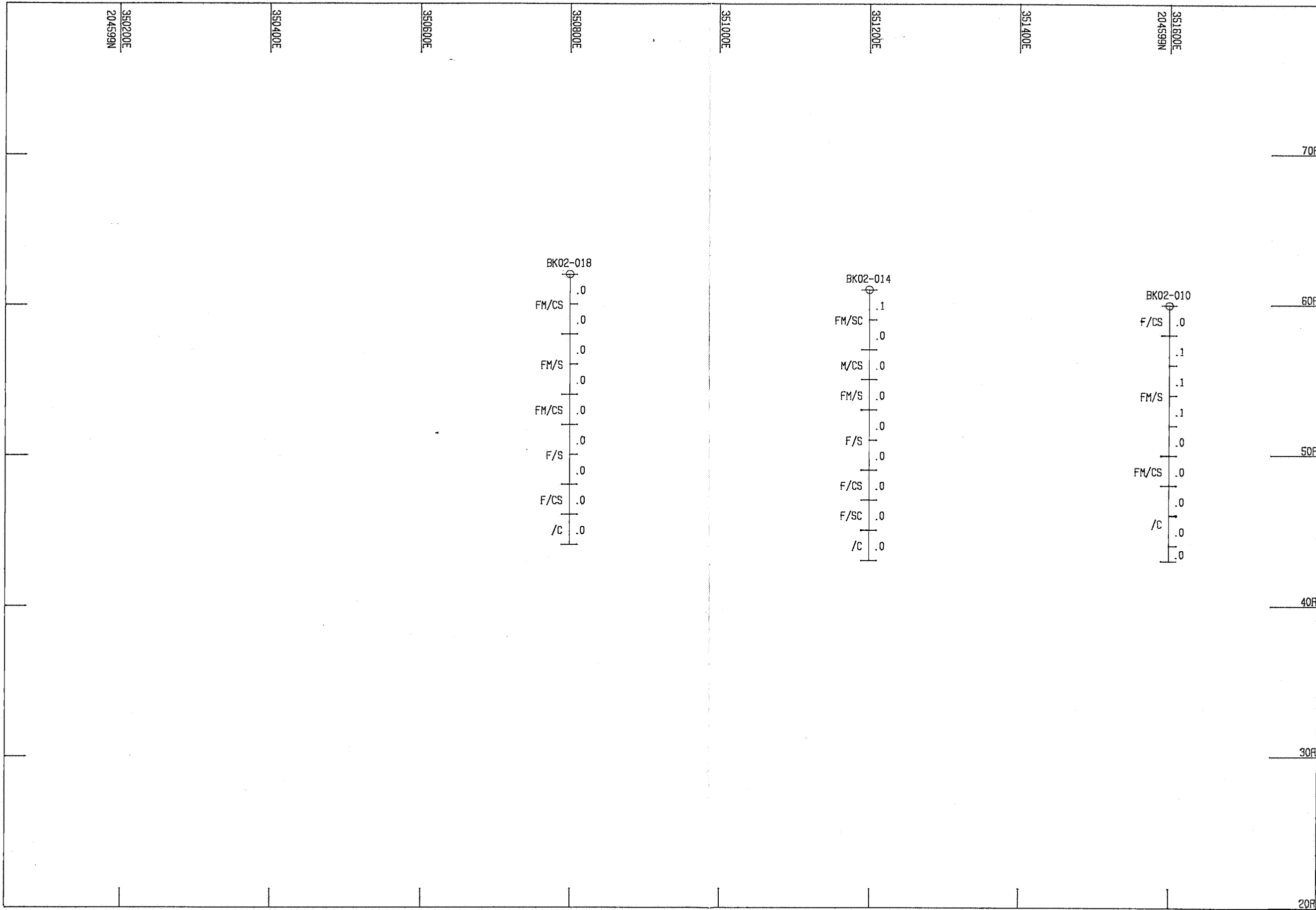
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Section Bearing: 0 Date: 04/06/89 Comp: BFR



LEGEND

1.0/1.23 % Heavy Mineral Values  
Estimate / Actual

ABERFOYLE RESOURCES LTD  
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Borehole Section LINE 01  
X Scale = 1 : 5000. // Y Scale = 1 : 250.  
Section Bearing: 0 Date: 04/06/89 Comp. BFR

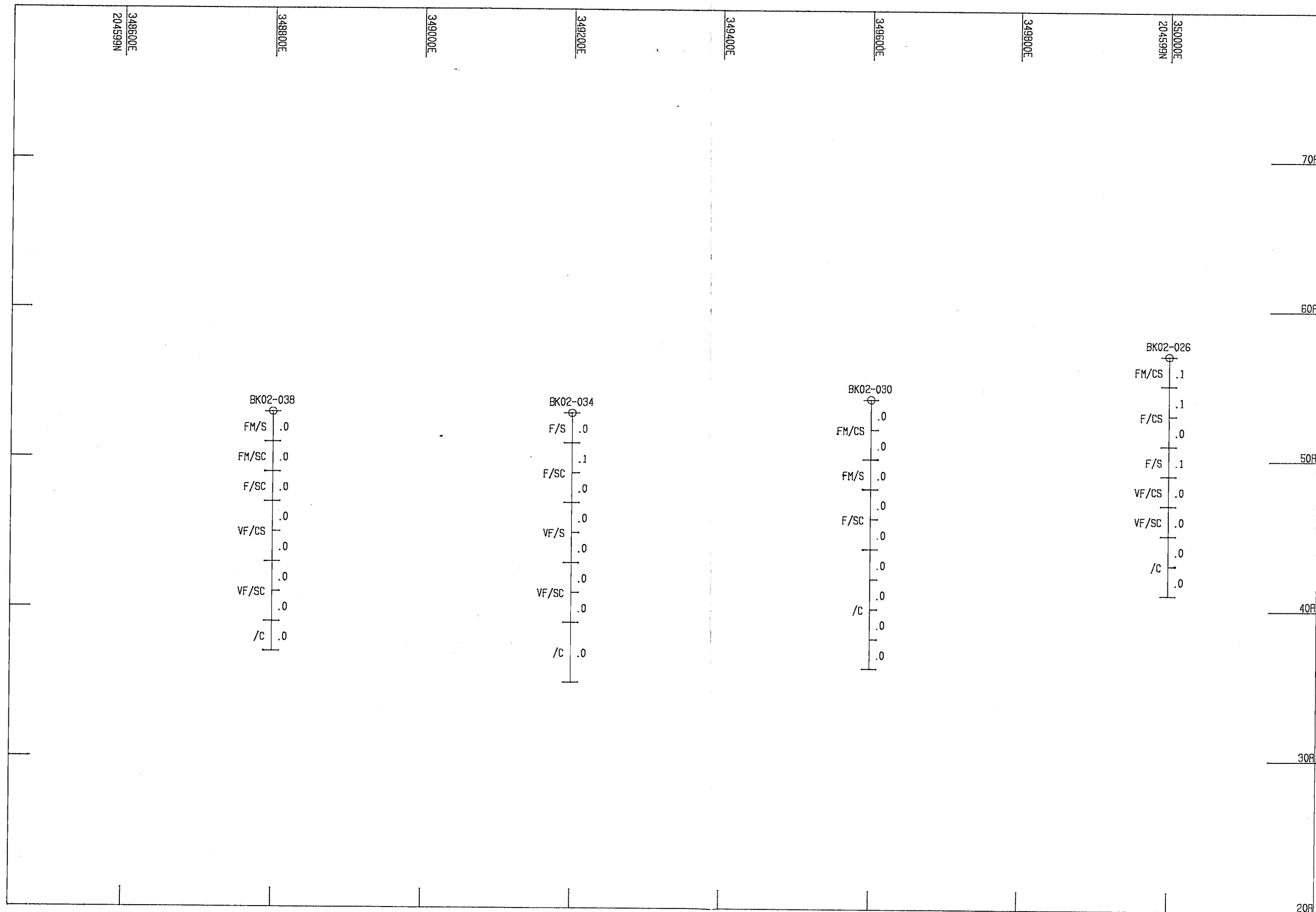


LEGEND

1.0/1.23 % Heavy Mineral Values  
Estimate / Actual

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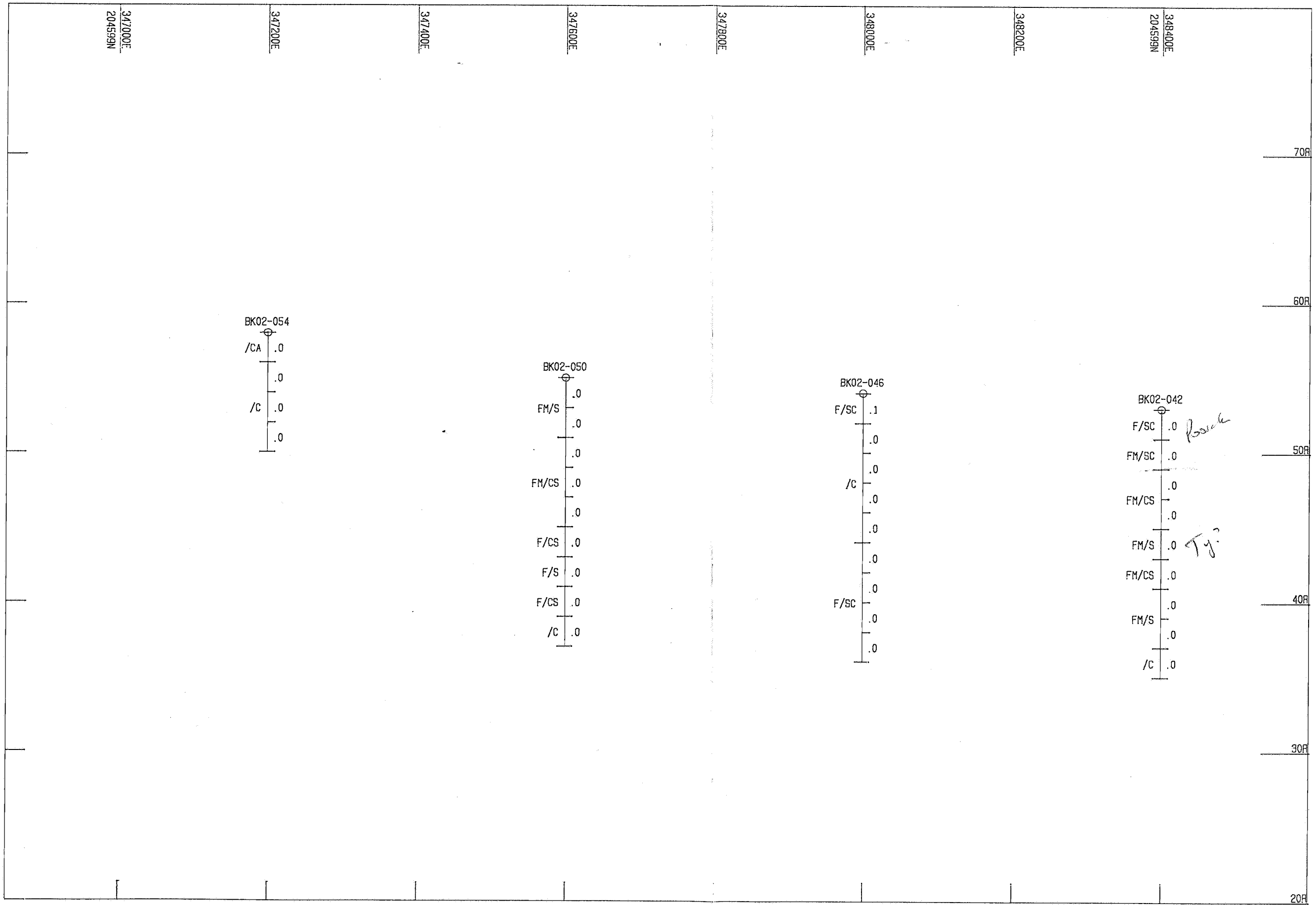




LEGEND

1.0/1.23 % Heavy Mineral Values  
Estimate / Actual

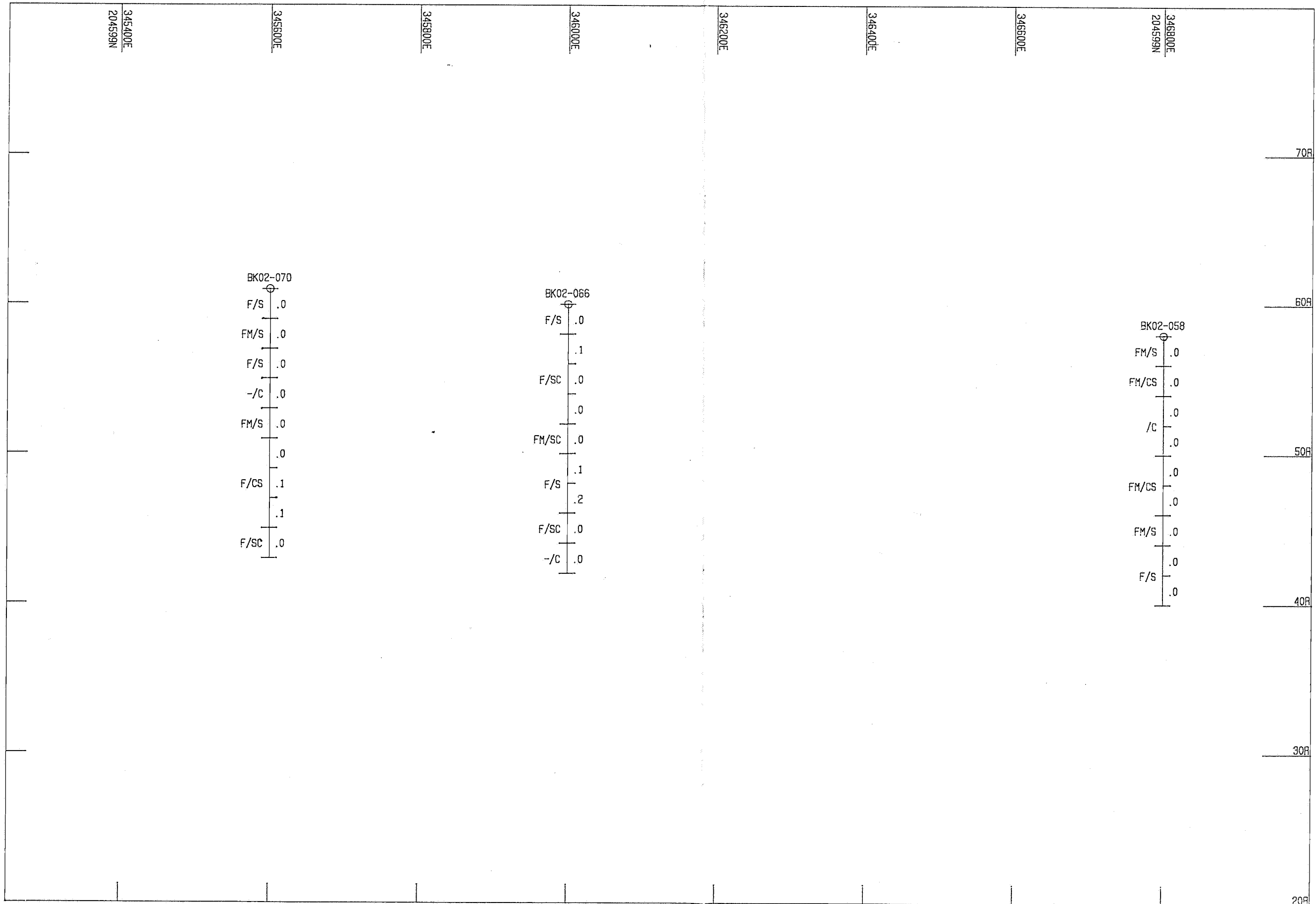
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LEGEND

1.0/1.23 % Heavy Mineral Values  
Estimate / Actual

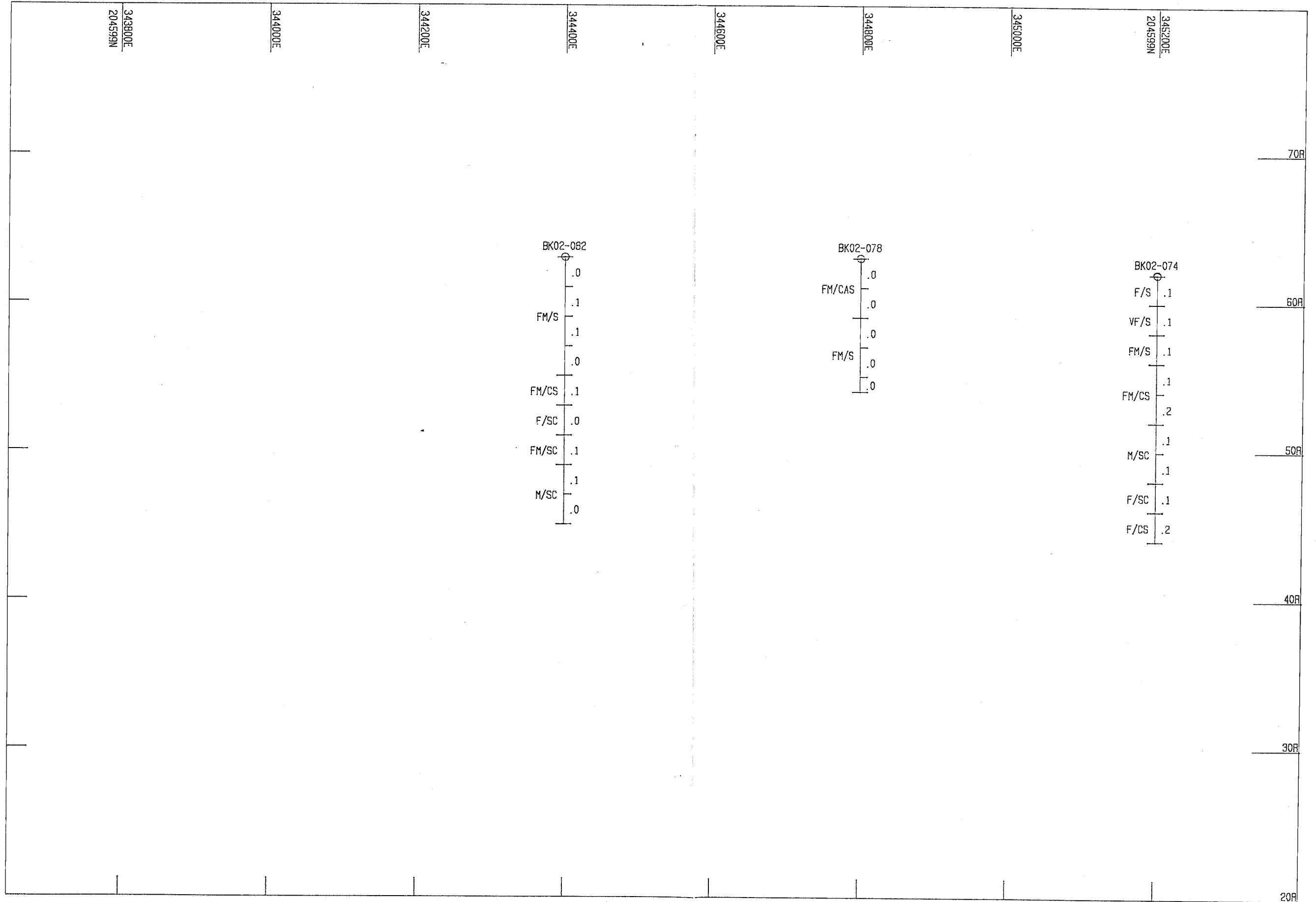
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Section Bearing: 90 Date: 04/06/89 Comp: BFR



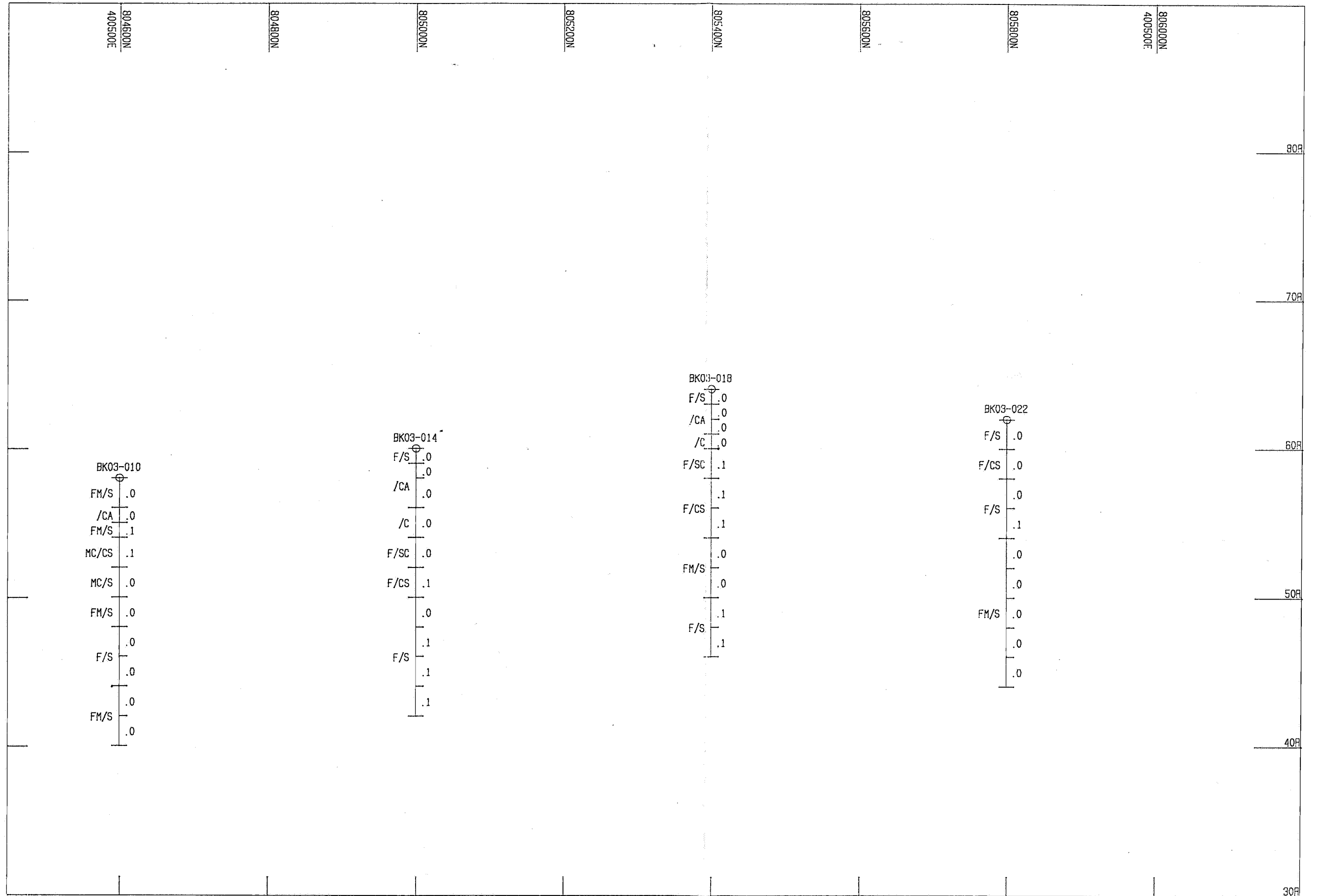
LEGEND

1.0/1.23 % Heavy Mineral Values  
Estimate / Actual

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Section Bearing: 90 Date: 04/06/89 Comp: BFR



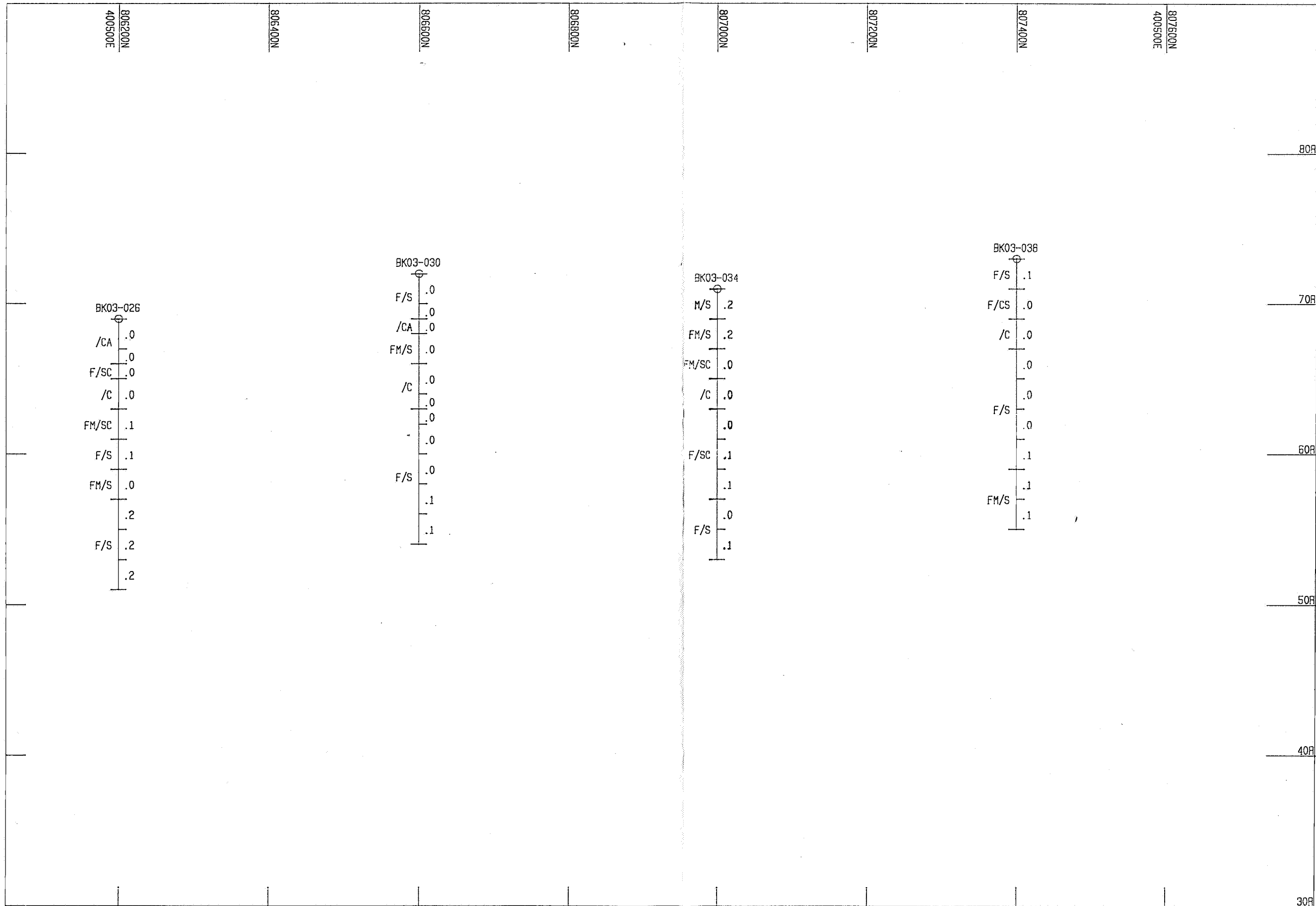
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# LEGEND

1.0/1.23 % Heavy Mineral Values  
Estimate / Actual

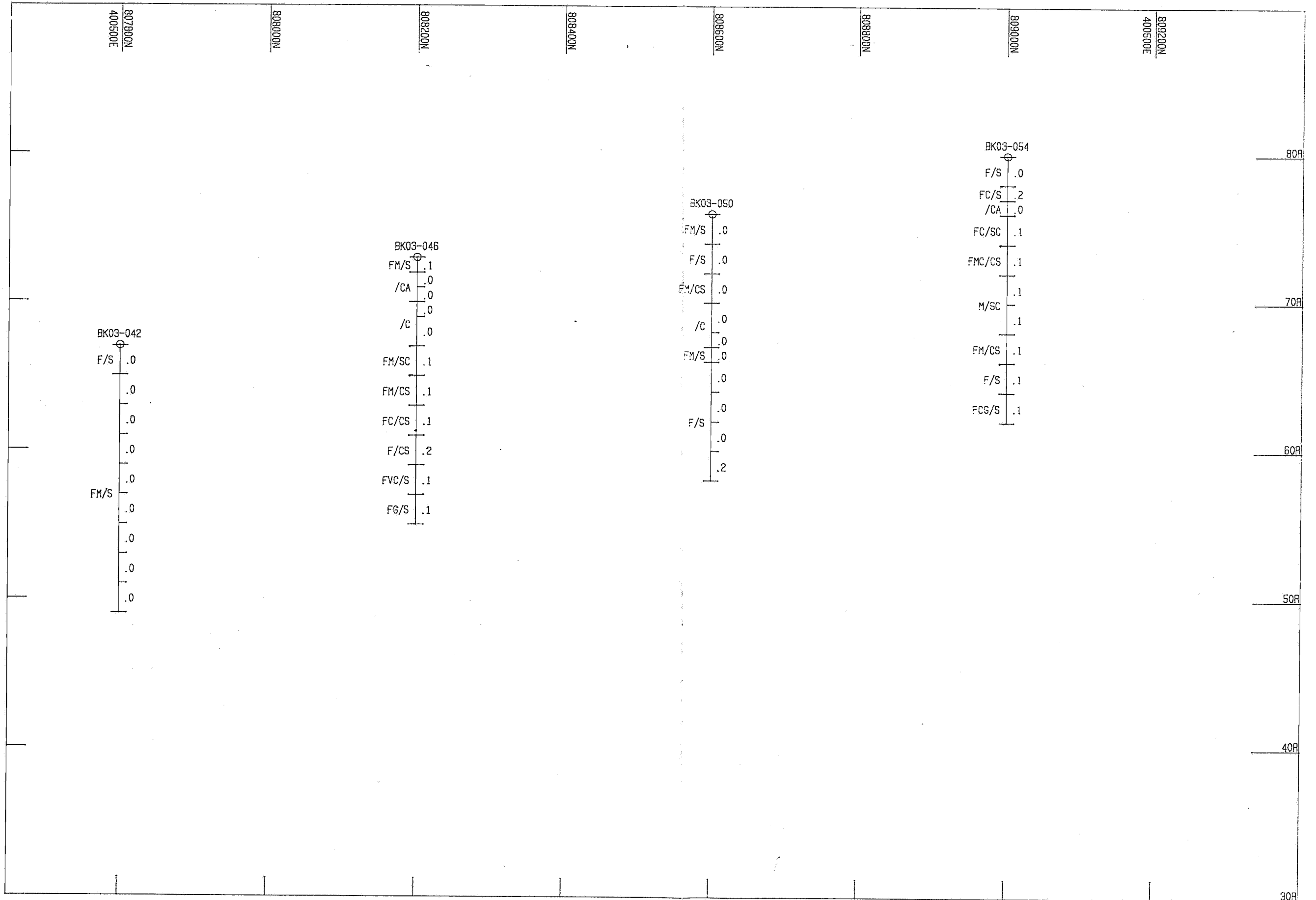
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LEGEND

1.0/1.2: % Heavy Mineral Values  
Estimate / Actual

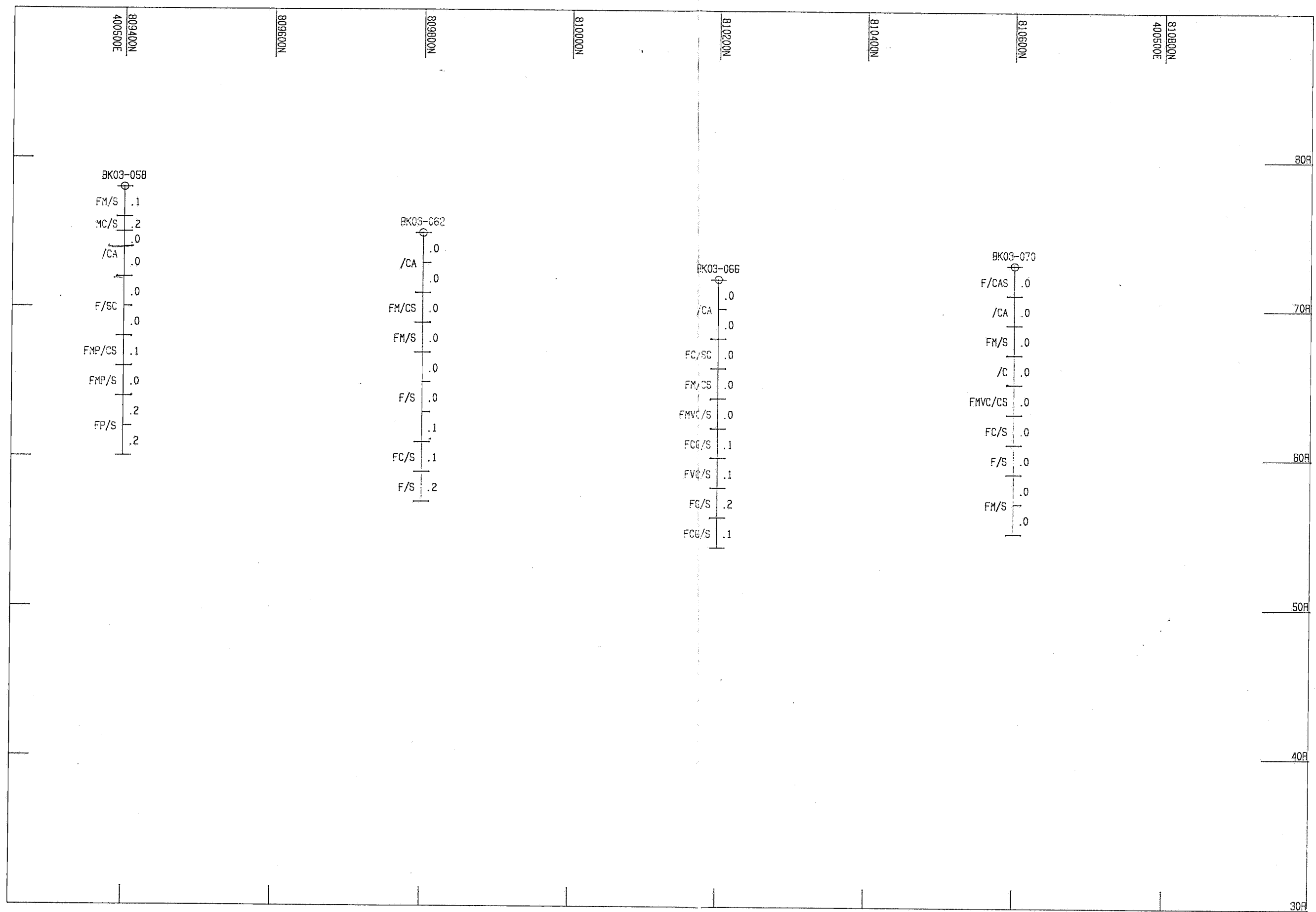
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Borehole Section LINE 03  
X Scale = 1 : 5000. // Y Scale = 1 : 250.  
Section Bearing: 0 Date: 04/06/89 Comp: BFR



LEGEND

1.0/1.23 % Heavy Mineral Values  
Estimate / Actual

ABERFOYLE RESOURCES LTD  
BROOKFIELD SA  
Borehole Section LINE 03  
X Scale = 1 : 5000. // Y Scale = 1 : 250.  
Section Bearing: 0 Date: 04/06/89 Comp: BFR

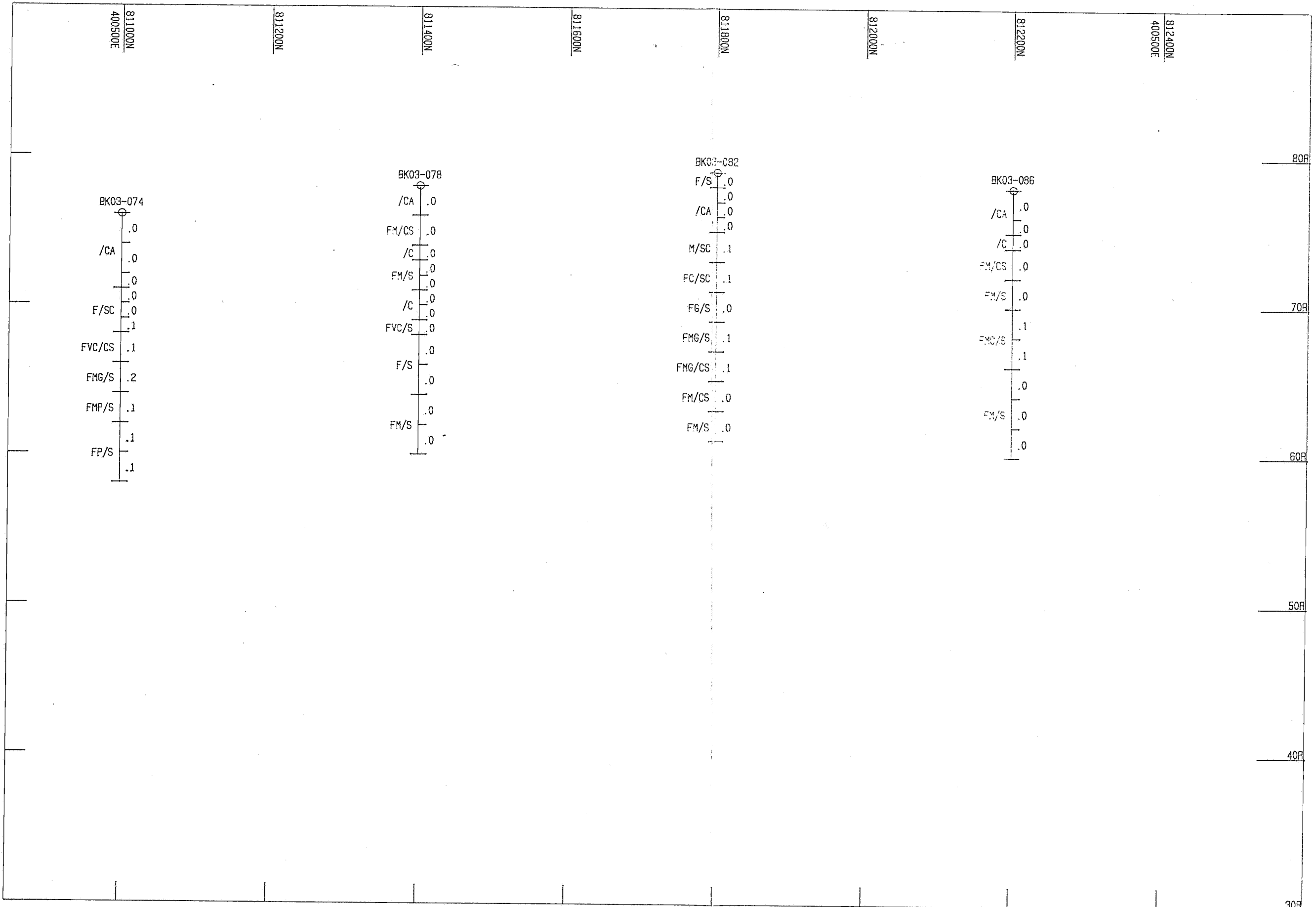


LEGEND

1.0/1.23 \* Heavy Mineral Values  
Estimate / Actual

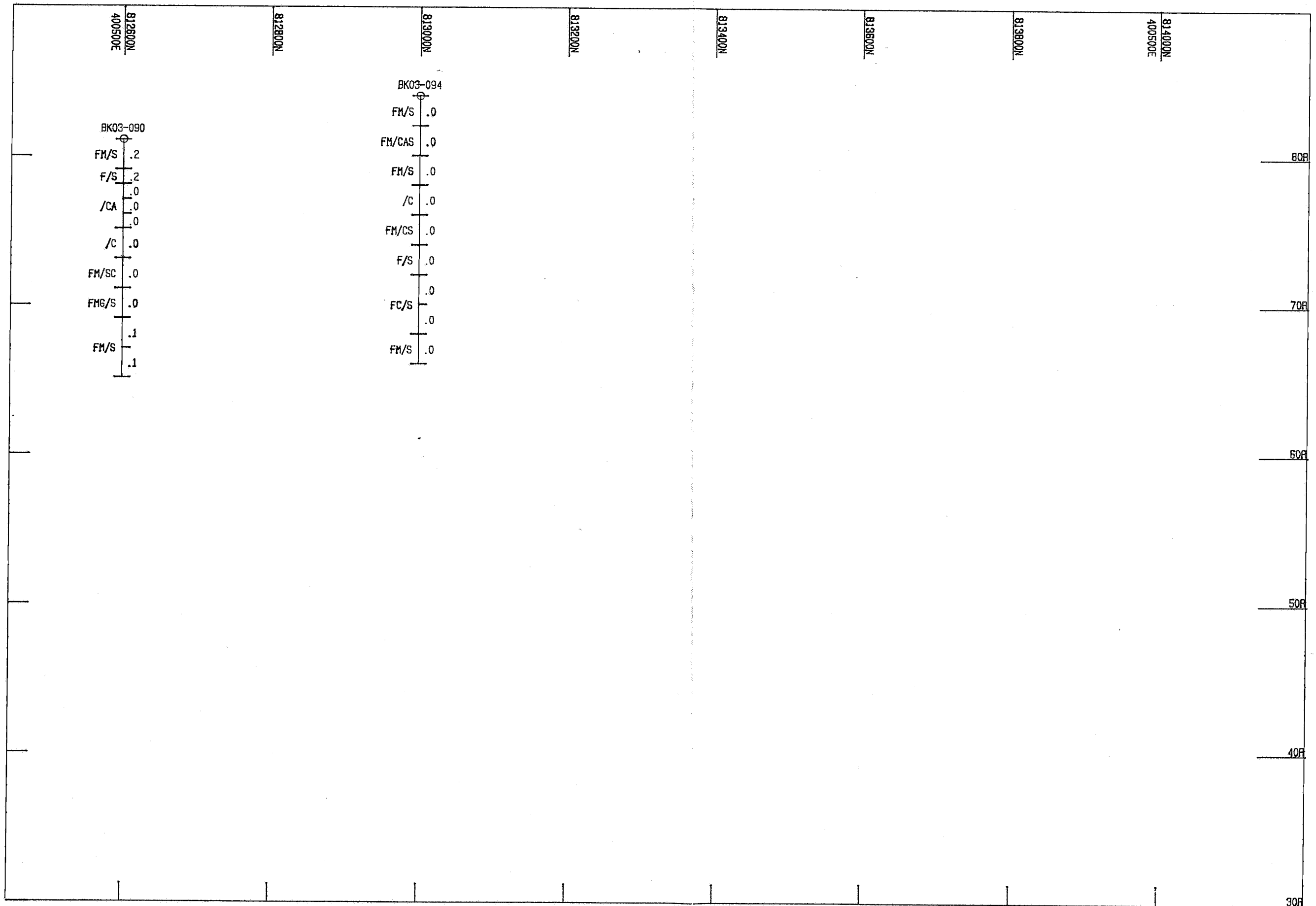
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BROOKFIELD SA  
Borehole Section LINE 03  
X Scale = 1 : 5000. // Y Scale = 1 : 250.  
Section Bearing: 0 Date: 04/06/89 Comp. BFR





LEGEND  
 1.0/1.23 Heavy Mineral Values  
 Estimate / Actual

ABERFOYLE RESOURCES LTD  
 BROCKFIELD SA  
 Borehole Section LINE 03  
 X Scale = 1 : 5000. // Y Scale = 1 : 250.  
 Section Bearing: 0 Date: 04/06/89 Comp: BFR



# LEGEND

1.0/1.23 % Heavy Mineral Values  
Estimate / Actual

ABERFOYLE RESOURCES LTD  
BROOKFIELD SA  
Borehole Section LINE 03  
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Section Bearing: 0 Date: 04/06/89 Comp: BFR

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351600E

201600N

201800N

202000N

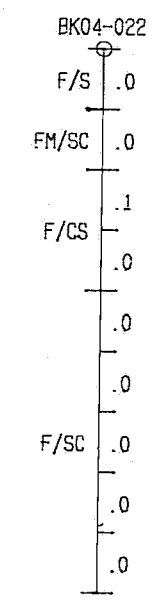
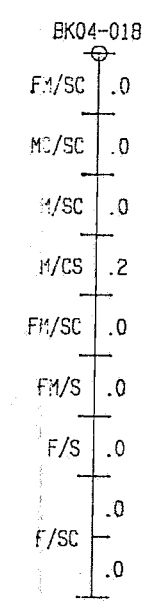
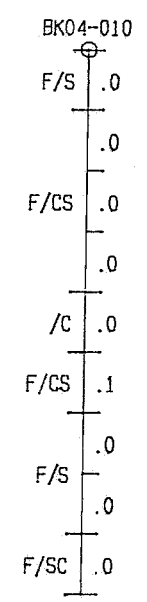
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202400N

202600N

202800N

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351600E

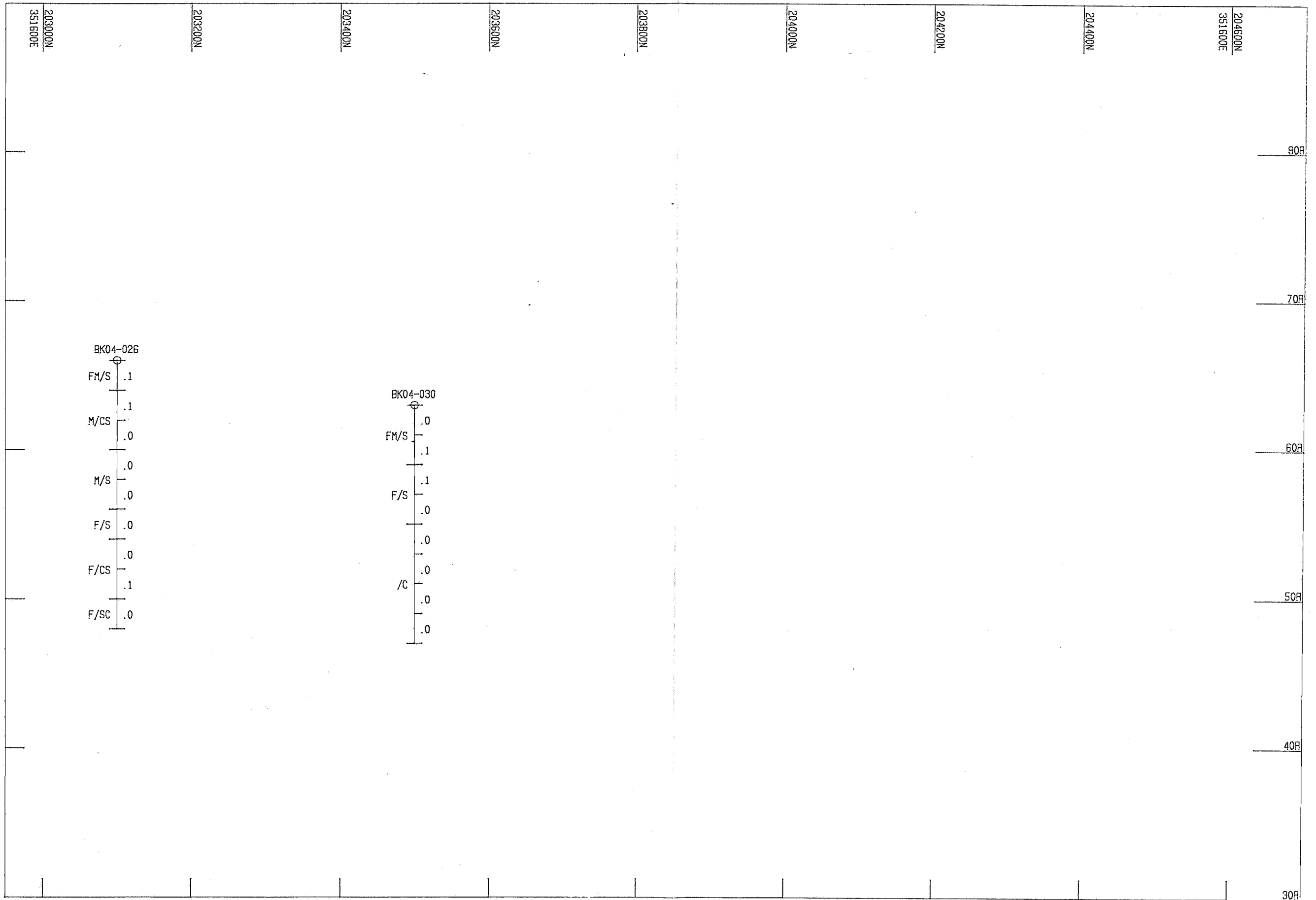


80R  
70R  
60R  
50R  
40R  
30R

LEGEND

1.0/1.23 % Heavy Mineral Values  
Estimate / Actual

ABERFOYLE RESOURCES LTD  
BROOKFIELD SA  
Borehole Section LINE 04  
X Scale = 1 : 5000. // Y Scale = 1 : 250.  
Section Bearing. 0 Date. 04/06/89 Comp: BFR



LEGEND

1.0/1.23 % Heavy Mineral Values  
Estimate / Actual

ABERFOYLE RESOURCES LTD  
BROOKFIELD SA  
Borehole Section LINE 04  
X Scale = 1 : 5000. // Y Scale = 1 : 250.  
Section Bearing: 0 Date: 04/06/89 Comp: BFR