

QUINTETTE COAL LIMITED

1976 GEOLOGICAL ASSESSMENT REPORT

GEOLOGICAL BRANCH  
ASSESSMENT REPORT

00 609

**OPEN FILE**

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Denison Coal Limited  
December, 1976

Appendices E, F and G of this report contain coal quality data, and remain confidential under the terms of the *Coal Act Regulation*, Section 2(1). They have been removed from the public version.

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## P R E F A C E

This report is intended primarily to present the geological results of the 1976 Exploration Program. As exploration continues, changes will occur in some of the interpretations presented in this report. At the present time, a complete evaluation of this geological data in conjunction with mining, environmental and economic aspects is being put into a Feasibility Study of the project.

## S U M M A R Y

The 1976 exploration of the Quintette coal licences was undertaken between May 18th and October 22nd, 1976. The Exploration Program can be summarized as follows:

1. Detailed geological mapping in the Sheriff, Frame and Roman Pits.
2. Preliminary mapping north of the Sheriff Pit and south of the Sheriff and Frame Pits.
3. Completion of 25 diamond drill holes in the Sheriff, Frame, Roman and Johnson Areas, including geophysical logging, visual logging, sampling and quality testing.
4. Completion of three adits in the Sheriff Pit and resultant bulk sampling and quality testing.
5. Surveying of drill holes and control surveying which led to new 1:2500 and 1:5000 scale topographic maps.
6. Complete geological interpretation including geology maps, cross-sections, structure contour maps and correlation charts of the four pits at Quintette.
7. Reserve calculation by computer from cross-section grids in the pits.
8. Reclamation of all 1976 disturbances and some previous disturbances.

Using the new data acquired, the program successfully confirmed the reserves in the areas explored.

## I N T R O D U C T I O N

The 1976 field exploration on the Quintette licences commenced on May 18th and ceased on October 22nd, 1976. During this period, field work was undertaken to further confirm the presence of "open pit" coal in the Roman Mountain and Murray Areas (Sheriff/Frame Pits) and to carry out additional geological investigation of coal-bearing strata adjacent to the Murray Area. At Roman Mountain, the Babcock Campsite was opened on May 30th to accommodate exploration crews. Previously built access roads to the camp and to the Pit were utilized. A total of 12 diamond drill holes were drilled in the pit area totalling 1000 metres. Further detailed geological mapping, surveying and reclamation was undertaken prior to the closure of the Babcock Camp on August 19th.

At the Murray Area, a new campsite was established on the access road to the Kerr McGee drill sites south of the Wolverine River (approximately 300 metres east of wellsite - 93P3b 60A). From this camp location, approximately 9.6 kilometres of access road were built to the Sheriff and Frame Pit areas. This road was then used to mobilize and demobilize equipment and for daily access requirements. Two diamond drills were used to complete a 22-hole program (seven at Frame and 15 at Sheriff), totalling 2469 metres. Three adits totalling 222 metres were constructed in Seams 'E-1' and 'J-2' in the Sheriff Pit. During the course of the above work, comprehensive detailed geological mapping was carried out in the pits and limited detailed mapping was undertaken immediately north and south (Johnson Area) of these proposed pits. While reclamation work at Sheriff and Frame was being completed, three "helicopter" diamond drill holes totalling 633 metres were completed in the Johnson Area prior to demobilization of the camp and cessation of field work on October 22nd, 1976.

## G E O L O G I C A L   M A P P I N G   &   C O R E   L O G G I N G

A standard format has been used to present the geological interpretations of the four pits at Quintette. Although no new geological field work was undertaken at the Windy Pit, slight modifications were made in interpretations and the same series of maps, illustrations, scales, etc. were generated and reserve calculation procedures followed as in other pits.

The format of presentation is as follows:-

1. An updated 1:50,000 regional geology map, plus geological pit maps and geological cross-sections (1:2500) are located in the back of this text.
2. Structure contour maps for each mineable seam in each pit are presented in "Appendix A".
3. General stratigraphic and detailed seam correlation charts which incorporate drill hole and trench logs are also presented in "Appendix A".

### Roman Mountain

Detailed surface mapping was undertaken to obtain additional surface information at the Pit and to check the accuracy of the transfer of the previous information from 1" - 400' to the 1:2500 metric topographic map. No major differences were found in structural interpretation from previous work, however, more detailed information was gathered on faulting, and core logs indicated that the average aggregate coal thickness of the Middle Gates had increased by 17% from 13.82 m. to 16.18 m.

### Sheriff and Frame Pits

Detailed geological mapping was started on 1" - 400' topographic maps and continued on the new map scale of 1:2500 which became available part way through the program. No major structural or stratigraphic changes were encountered from that which was previously interpreted. At Sheriff, the main thrust faults (Mesa thrust) had a more shallow dip than previously estimated, thus decreasing the amount of Gates Member on the eastern edge of the pit. However, this loss was partially compensated by the confirmation of additional outcrop of 'J' Seam (unoxidized) coal in the vicinity of drill hole QMD 7612. At Frame, it was found that the coal seams extended further to the north than what was previously mapped and that the shallow western limb was found to contain minor faulting and a warped anticlinal axis in the northeastern section of the Pit. The effects of this were to increase both reserves and stripping ratios. From core and trench logs, it was found that the average aggregate coal seam thickness in the Sheriff Pit was 17.73 metres, down 15% from last year's estimate, and that Frame Pit's new aggregate total was 13.55 metres, up 7.9% from 1975. For a complete summary of the coal seam thickness, please refer to the table on the following page.

# QUINETTE OPEN PIT

## SUMMARY OF AVERAGE TRUE COAL THICKNESS OF MINEABLE SEAMS \*

PIT	SEAM	THICKNESS (m)
WINDY	D	2.443
	E	2.057
	F	2.017
	G	1.295
	J	3.759
	K **	2.077
	TOTAL	13.648
ROMAN	D-1	1.259
	D-2	2.976
	E	2.035
	F	2.078
	I	2.960
	J	4.869
	TOTAL	16.177
SHERIFF	D	1.695
	E-1 **	6.062
	E-2	.843
	G	1.143
	J	7.983
	TOTAL	17.726
FRAME	D	2.011
	E **	3.730
	F	1.445
	G **	3.106
	J ***	3.255
	TOTAL	13.547

2.27

2.70

3.54

2.71

\* Thickness is Coal Only and does not contain in-seam or out-of-seam dilution.

\*\* Seam Contains 2 Sections (Splits)

\*\*\* Seam Contains 3 Sections (Splits)

## Geological Mapping & Core Logging - continued

### Northern Extension & Johnson Area

A limited amount of mapping was undertaken at 1" - 400' map scale in the areas immediately north and northwest of the Sheriff Pit in the Gates Member, bounded to the north by the Wolverine River and in the area immediately south of the Sheriff and Frame Pits (Johnson Area) bounded on the south by the Murray River. In the northern area it was not possible to obtain a detailed stratigraphic section or evaluation of the total coal thickness of the Gates Member, however; one seam of at least 1.5 metres was mapped in a number of locations and inferred to be continuous over at least 1000 metres. In general, it appears that the "tight" nature of the folding combined with adverse topography will preclude the discovery of large strippable reserve blocks. However, smaller pits could be found if sufficient coal thickness, continuity and quality can be confirmed by drilling. (See previous reports 1972 and 1974). Results of the mapping are found on the Regional Geology Map at the end of this text.

In the Johnson Area, two moderately tight synclines were mapped immediately south of the Frame Pit. The synclines were separated by a tight anticline having dips in the 60 to 80 degree range and were mapped largely on the basis of prominent conglomerate units originally considered to be in the Upper Gates Member. Drill Hole QJD 7641 was placed near the <sup>axis</sup>~~axis~~ of the anticline. (See Preliminary Geology Johnson Area - 1"-1000' Map at end of text.) East of the second syncline, the prominent conglomerate was intensely folded and a second drill hole was placed in this region (QJD 7642). This folded area was truncated to the east by a major fault which appears to be a continuation of the Mesa thrust system found in the Sheriff Pit. An incomplete section of Gates was mapped east of the thrust and a final drill hole (QJD 7643) was placed near the Gates/Hulcross contact. One coal seam approximately 6.6 metres thick was located in the first drill at a depth of 85 metres along with minor carbonaceous zones. Washability results of clean coal on the seam indicated 17.35% volatile with F.S.I. of 2. The lithology in the hole was predominantly conglomerate and sandstone.

In the second hole, three seams were sampled at depths of 20, 35 and 69 metres with respective true thicknesses of 6.2, 0.95 and 0.80. Lithologies were similar to the first hole but predominance of conglomerate made correlations unreliable. The clean coal volatiles and F.S.I.'s were 17.4% and 2, 17.5% and 4, and 16.5% and 1½, respectively. From a comparison with previous quality results, this strongly suggests that these coals are from the Gething Formation. Petrographic work will be undertaken on the samples. The section encountered in the third hole was intensely faulted and of the two coal zones encountered, only one having a thickness of approximately one metre at a depth of 211 metres was sampled. A volatile content of 23.4% and an F.S.I. of 7 indicate Gates coal and it is assumed a faulted section of Gates was drilled. From the results encountered to date, no viable open pits have been indicated, however, underground potential may be available if coking quality and continuity of the main Gething coal seam can be established. Further exploration for strip coal should concentrate on the basal Gething and Gates Formations in dip slopes and the "nose" areas of folds found immediately north of the Murray River.

## T R E N C H I N G

A total of seven trenches were constructed during the course<sup>e</sup> of the program, to confirm the location and development of seams within the pit limits. The location of the 1976 trenches and previous trenches can be found on the various pit maps presented. The work was undertaken by Tompkins Contracting of Fort St. John, under on-site direction of a geological staff member, and using D6 and D7 Caterpillars. Far fewer trenches were constructed than were approved in the 1976 exploration proposal due to environmental concern and all trenches which were built were completely infilled, fertilized and seeded. (See Reclamation Section.)

Logs of the trenches have been incorporated on the seam variations and correlation diagrams of the various pits in "Appendix A".



## ROAD CONSTRUCTION AND FIELD CAMPS

### Road Construction

All road construction was contracted to Tompkins Contracting Ltd. of Fort St. John and was undertaken with D6, D7 and D8 Caterpillars. Approximately ten kilometres of "main access" road were constructed from the Murray Camp to the Sheriff and Frame Pits and secondary access or trails were constructed to the drill holes. At Roman Mountain, a previously built access road was utilized to gain access to the pit area and trails were used for access to the various drill holes. Culverts and ditches were installed on all main roadways and grades were generally kept to 7% or less.

### Field Camps

Westcamp Construction Catering Ltd. of Edmonton provided services in the trailer camps established at Babcock and the Murray Area where approximately 15 and 40 men respectively were accommodated throughout the program. On completion of the exploration, most of the camps trailers were demobilized and the main access roads were "blocked off" subsequent to consultation with Forestry, Fish & Wildlife and Department of Mines & Petroleum Resources officials.

## DIAMOND DRILLING

Tonto Drilling Limited of Vancouver were contracted for all 1976 drilling services at Quintette. Three Canadian Longyear "Super 38" drills were used, two in the Murray Area and one at Roman. The rigs were equipped for wireline recovery, with triple tube core barrels and H.Q. rods and bits. Drills were skid-mounted and moved with D6 or D7 Caterpillars in both areas. Crew changes were generally made by pick-up truck in the Murray Area, and by helicopter in the Roman Area. For the Johnson drilling area, one of the drills was dismantled for mobilization by a large helicopter and fully supported by the smaller helicopter at the main Murray Camp. Previous results documented that substantially increased core recovery is obtained from drilling vertical holes and thus the majority of the holes were drilled vertically unless terrain or geological structure necessitated angle drilling. All drill core was taken to the main camps for logging and complete sampling of the coal seams. It should be noted that all diamond drill core, including previous programs up to 1970, but excluding the core from the 1972 Five Cabin Area and the 1976 Johnson Area, was removed by Department of Mines & Petroleum Resources staff and transported to the core storage facility at Charlie Lake, British Columbia. A summary of the 1976 diamond drill holes is included in the following pages.

# SUMMARY OF 1976 QUINTETTE DIAMOND DRILLING PROGRAMME

## ROMAN AREA

Hole #	Total Depth (m)	Seams Intersected	% Coal Core Recovery
QBD 76-51	12	D (U) D (L) E F	77.5 94.0 91.3 90.5
QBD 76-52	38	E	99.0
QBD 76-53	87	I J	95.0 98.7
QBD 76-54	76	I J	91.0 80.3
QBD 76-55	58	E F	96.9 86.2
QBD 76-56	(35)	D (L) E F	100.0 93.5 80.3
QBD 76-57	83	I J	94.3 93.5
QBD 76-58	172	E F I J	96.5 95.8 85.3 98.5
QBD 76-59	44	I J	78.1 87.0
QBD 76-60	124	F I J	88.4 82.4 93.5
QBD 76-61	109	I J	98.3 96.4
QBD 76-62	162	I J	100.0 100.0
TOTAL	1000		

## SHERIFF AREA

Hole #	Total Depth (m)	Seams Intersected	% Coal Core Recovery
QMD 76-01	55	D E	99.0 99.0
QMD 76-02	46	D	99.0
QMD 76-03	(193)	D E	99.0 99.0
QMD 76-04	115.5	G	91.3
QMD 76-05	48	D E G J	87.0 55.5 99.0 76.6
QMD 76-06	51.5	G J	51.4 62.6
QMD 76-07	55.5	G J	100.0 82.1
QMD 76-08	84	G J	99.0 85.0
QMD 76-09	191	D E	99.0 72.5
QMD 76-10	150.5	D E G J	84.6 74.1 70.1 61.9
QMD 76-11	152.4	E G (U) G (L) J	59.5 80.8 35.7 69.5
QMD 76-12	32.6	J	75.9
QMD 76-13	103	E (U) E (L) G J	52.5 91.0 99.0 79.0
QMD 76-15	39.6	G	41.2
QMD 76-17	83	E (U) E (L) G J	71.0 60.1 61.0 56.9
TOTAL	1380.6		

FRAME AREA

Hole #	Total Depth (m)	Seams Intersected	% Coal Core Recovery
QMD 76-14	118	F G (U) G (L)	91.0 100.0 92.0
QMD 76-16	152	D E F	91.3 98.5 75.9
QMD 76-18	177	D E (U) E (L) F G (U) F (L) J	97.0 100.0 99.0 91.0 91.8 87.5 97.0
QMD 76-19	73	E (U) E (L) F G (U) G (L)	88.0 99.0 47.0 99.0 99.0
QMD 76-20	249	D E (U) E (L) F (U) F (L) G (U) G (L)	97.0 87.0 86.0 99.0 65.0 95.0 95.9
QMD 76-21	96	F G (U) G (L) J (U) J (L)	50.4 56.3 70.5 83.0 55.0
QMD 76-22	223	E F G (U) G (L) J	96.0 83.0 92.0 72.4 97.0
TOTAL	1088		

JOHNSON AREA

Hole #	Total Depth (m)	Seams Intersected	% Coal Core Recovery
QJD 76-41	213	#1	81.0
QJD 76-42	183	#1 #2 #3	99.0 100.0 60.0
QJD 76-43	237	#1 #2	100.0 93.0
TOTAL	633		

## G E O P H Y S I C A L   L O G G I N G

All geophysical logging was contracted to Roke Oil Enterprises Ltd. of Calgary. A truck-mounted logging unit was used on all holes except those in the Johnson Area where a "helicopter unit" was required. The following list of logs were run in all holes except those in which caving prevented a logging run.

1.    Gamma Ray and Neutron                                - General Scale 1:200
2.    High Resolution Density and Chliper - General Scale 1:200
3.    High Resolution Density and Chliper - Detail Scale 1:50
4.    Temperature\*    - General Scale 1:200

\* - used occasionally

The logs were used in conjunction with visual logging of the core to confirm driller's depth markers (converted to metric depth) and to estimate the development of coal seams where recovery was poor. All geophysical logs are contained in "Appendices C and D".

## A D I T S

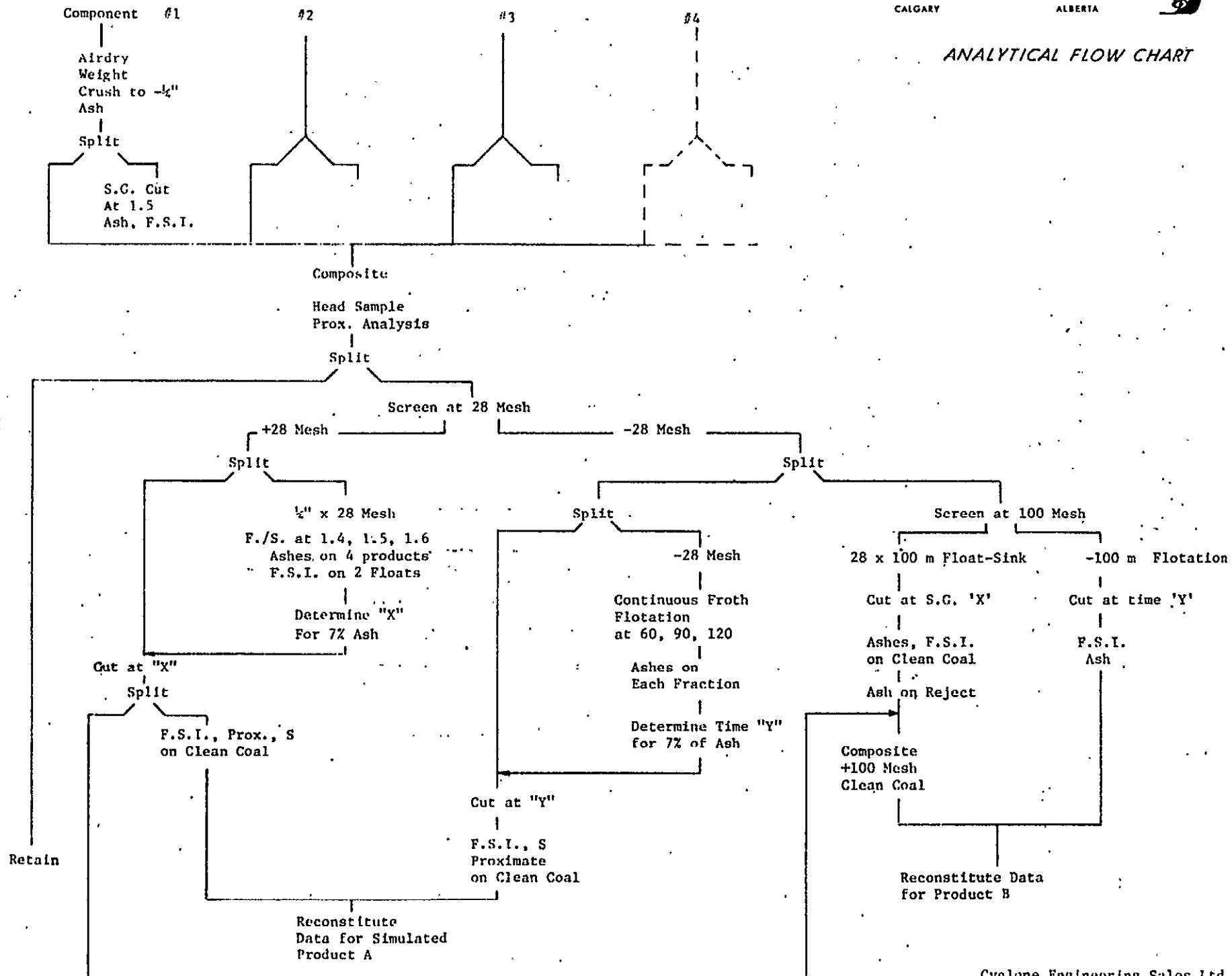
Adit driveage was contracted to A & B Contracting Ltd. of Calgary. Three adits totalling 222 metres were constructed in the Sheriff Pit. The first adit (J-1) was driven in "j" Seam at the north end of the Pit. This adit was not sampled as partially oxidized coal was found at 91 metres which was effectively the penetration limit of the equipment being used. Although an excess of 30 metres of vertical cover was estimated at the face of the adit, it was concluded that intensely jointed sandstone found above the adit created an abnormally condusive porosity through the roof strata and thus abnormally deep oxidation. The second adit was driven in 'E' Seam near the southern end of the Pit and was sampled at a length of 40 metres. The third adit was driven in 'J' Seam, immediately below the 'E' Adit and was sampled at 91 metres. A total of 53 drums were taken from each of the sampled adits. During the program, inspections of the work were made by Mr. D. Tidsbury, the Department of Mines & Petroleum Resources Inspector from Prince George. The location of the adits can be found on various maps enclosed for the Sheriff Pit and lithologic descriptions of the adit faces are included in the following page.

## Q U A L I T Y   A N A L Y S I S

Washability and analyses of all 1976 drill core from Quintette was undertaken by Cyclone Engineering Sales Ltd. of Edmonton. Washability, cleaning, analysis and coking character tests of the bulk adit samples are being undertaken by Cyclone and the Department of Energy, Mines and Resources, Clover Bar Lab. In addition to the above work, petrographic and small scale over tests of drill hole samples are currently planned or under way in Canada and Japan. The following pages include the main sample "flow chart" procedures and actual results of all drill sample washability and available adit sample analyses can be found in "Appendices E, F and G".

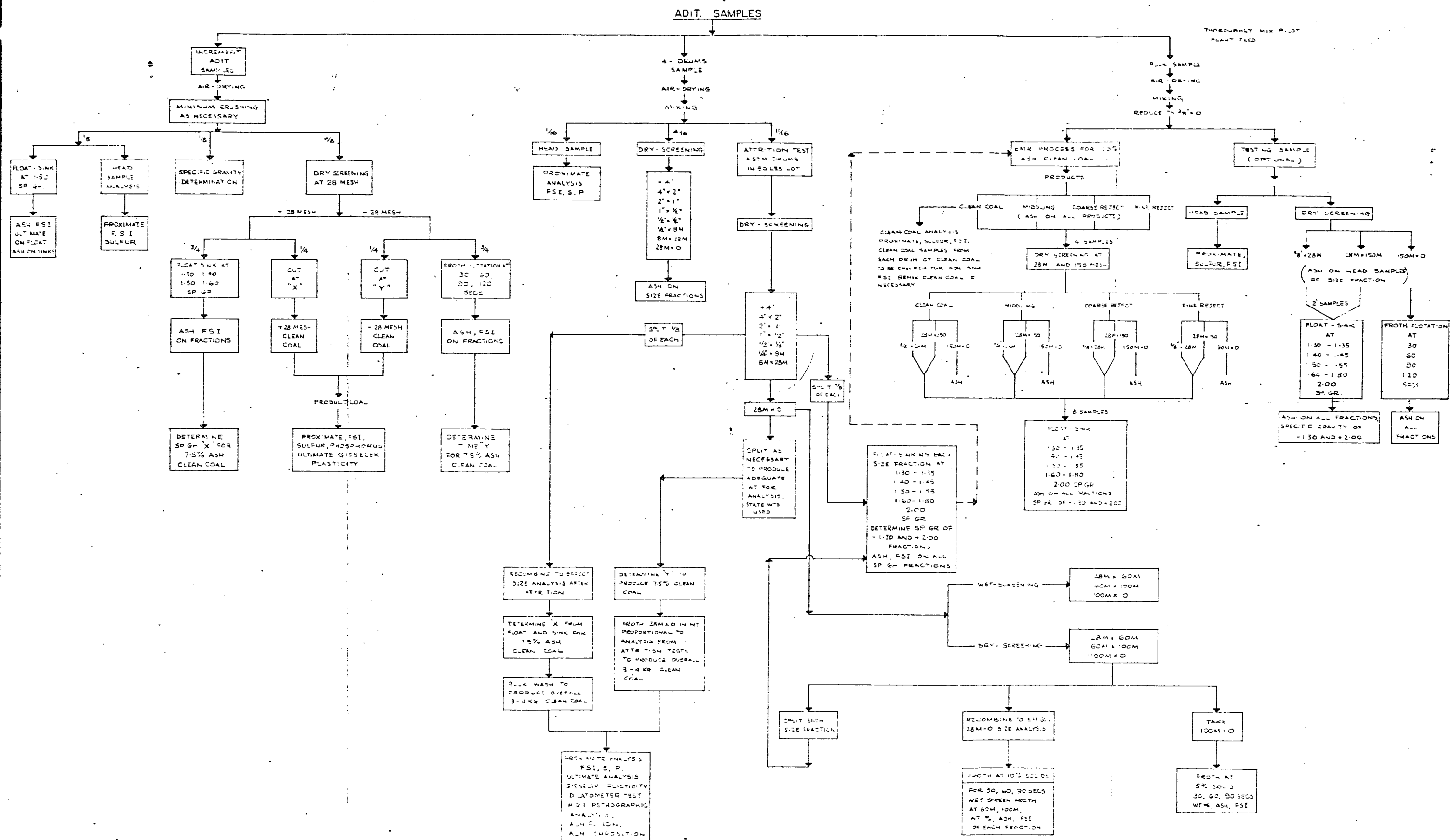


ANALYTICAL FLOW CHART

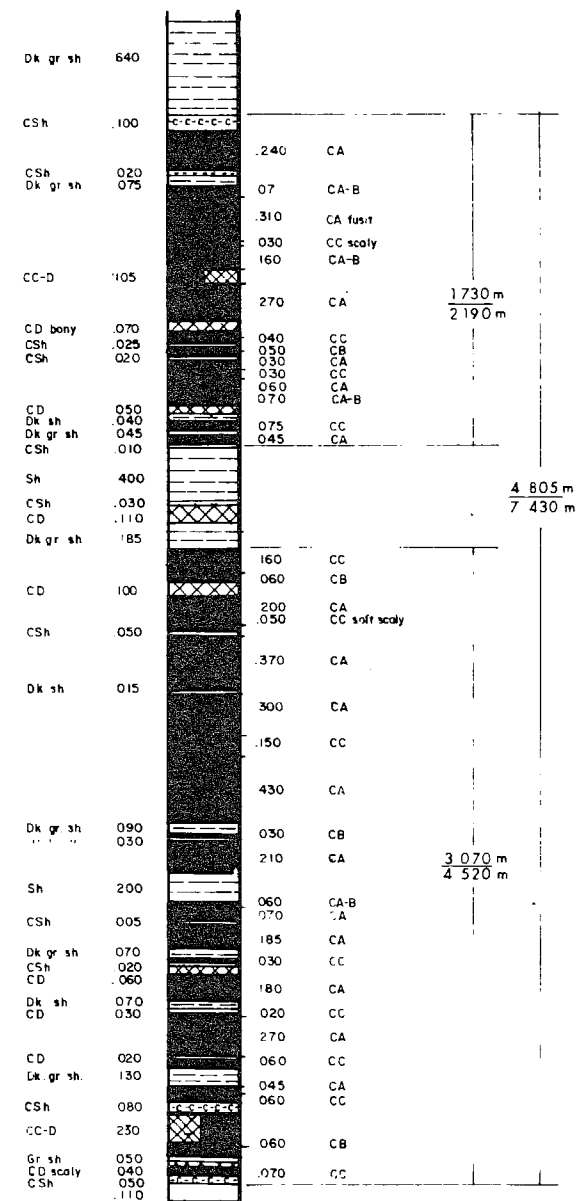




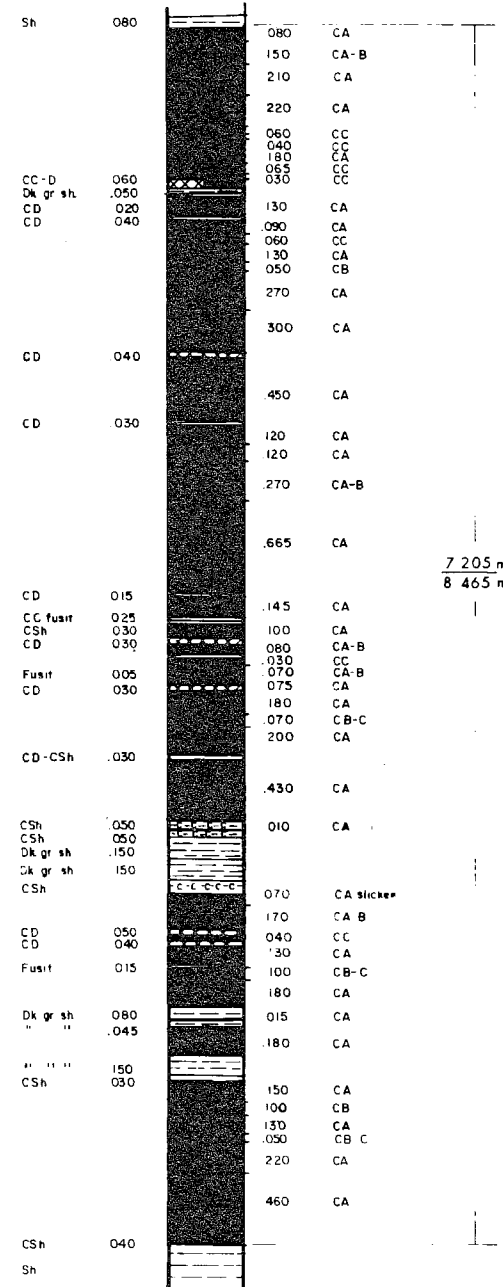
DENISON MINES LTD.



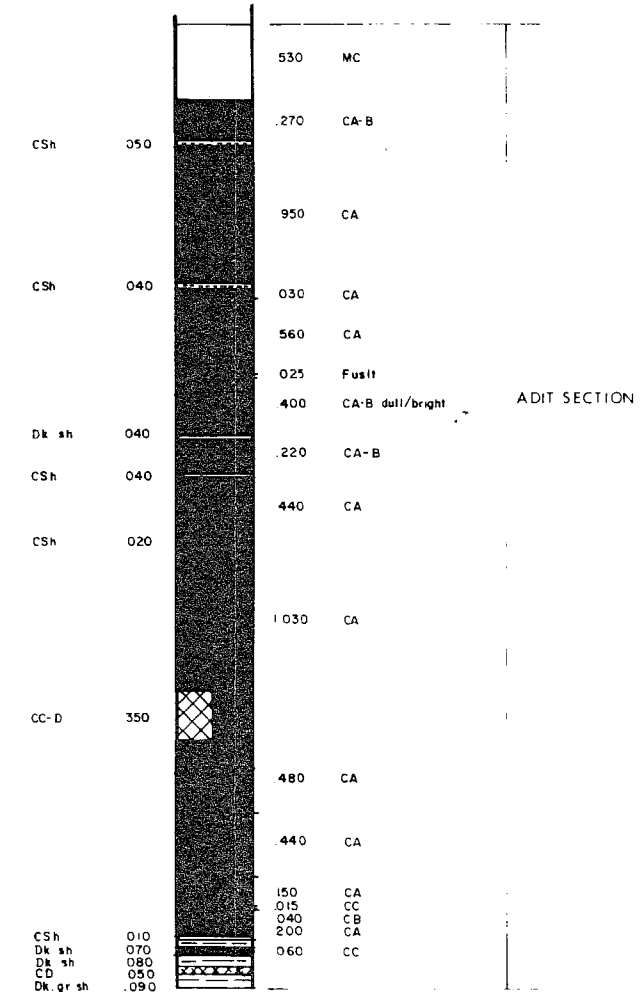
# E ADIT



# J-2 ADIT



# J-1 ADIT



QUINTETTE COAL LIMITED

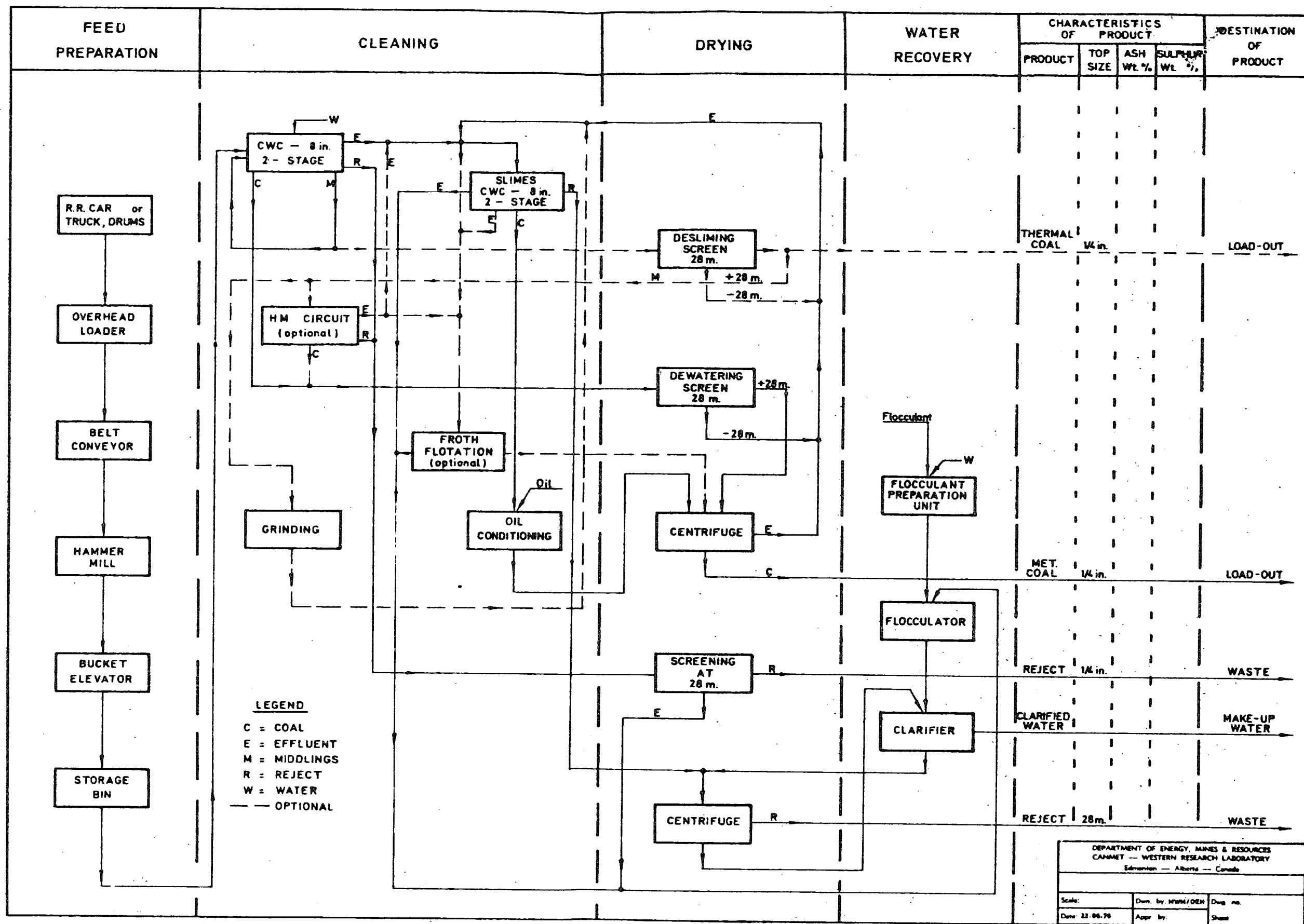
PREPARED BY:  
DENISON COAL LIMITED  
MITSUI MINING CO. LTD.



1976 ADIT SECTIONS  
SHERIFF PIT

DRAWN BY: J W K	DATE: DEC, 76	SCALE: 1:50
PREP'D BY:	DATE:	DRAWING NUMBER:
APPR'D BY:	DATE:	QNTT 76-0715-R01

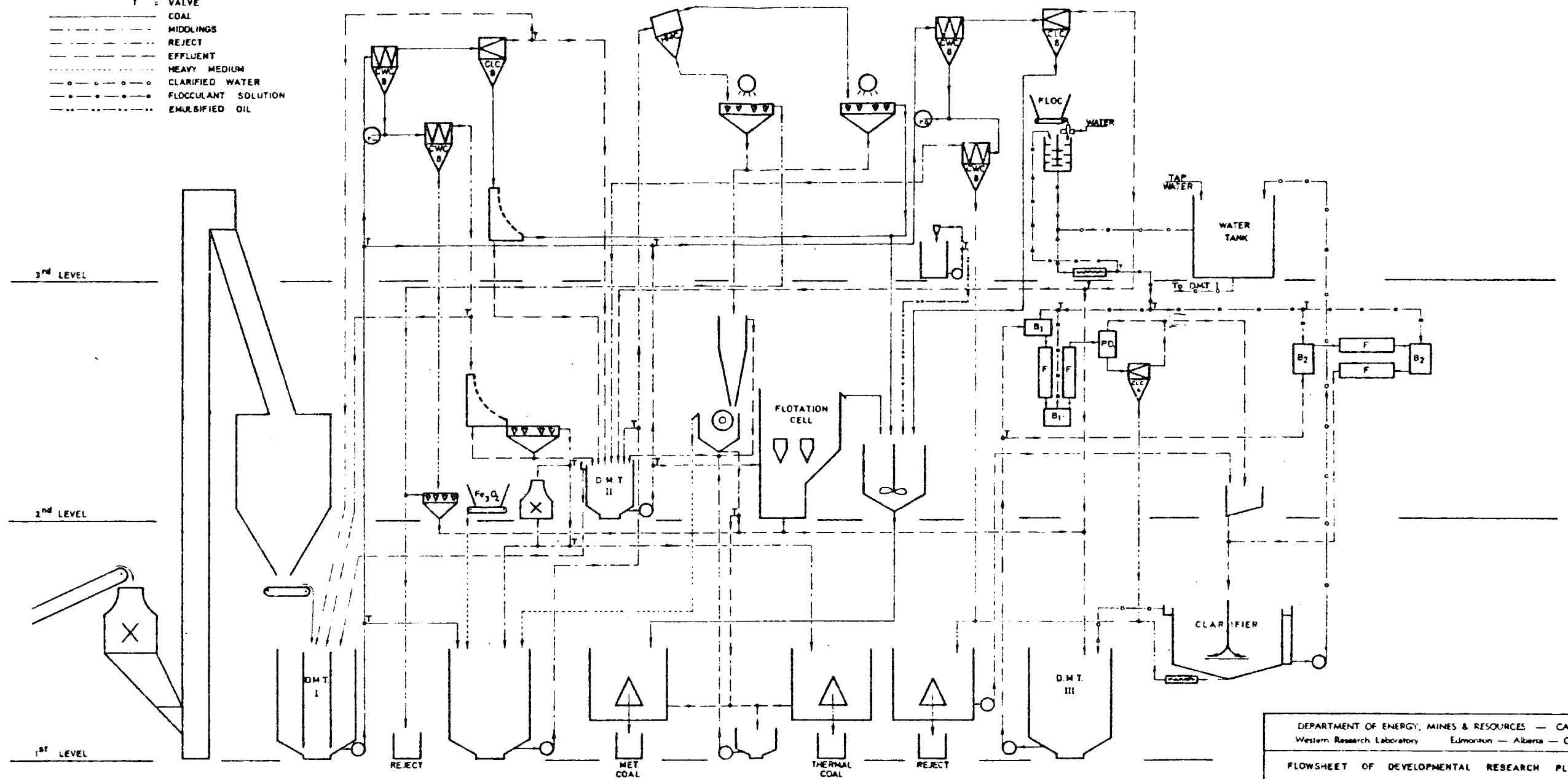
# PROCESS FLOWSHEET OF EMR PILOT PLANT ( 10 stph )



# LEGEND

- B<sub>1,2</sub> = BLENDERS (18 in. x 12 in.)
- C/C = CLASSIFIER CYCLONE
- CWC = COMPOUND WATER CYCLONE
- DMT I, II, III = DUAL MIX TANKS
- F = FLOCCULATOR PIPE
- Fe<sub>3</sub>O<sub>4</sub> = MAGNETITE
- PD = PULP DIVIDER
- T = VALVE
- COAL
- MIDDINGS
- REJECT
- EFFLUENT
- HEAVY MEDIUM
- CLARIFIED WATER
- FLOCCULANT SOLUTION
- EMULSIFIED OIL

## EMR - COAL PROCESSING PLANT (10 STPH CAPACITY)



DEPARTMENT OF ENERGY, MINES & RESOURCES — CANMET		
Western Research Laboratory Edmonton — Alberta — Canada		
FLOWSHEET OF DEVELOPMENTAL RESEARCH PLANT		
DESCRIPTION	SCALE	Drawn by
	DATE	APPROVED
	23 06 70	
	CHG. NO.	
	SHEET	

# SURVEYING, TOPOGRAPHIC MAPPING AND AERIAL PHOTOGRAPHY ---

All surveying, topographic mapping and aerial photography was carried out by Burnett Resource Surveys Ltd. and is summarized as follows:

## Surveying

1. Control surveying for 1:5000 topographic maps was undertaken to control medium (1:15000) and hi-level (1:25000 and 1:32000) air photographs obtained in 1975 over an area of approximately 64,750 hectares.
2. All 1976 drill holes and some previous data points were surveyed in the Roman, Sheriff, Frame and Babcock areas.
3. A detailed control survey of low-level photography (1:10000) from 1975 for the Sheriff and Frame areas was undertaken and "tied-in" with the primary control network. This survey covered approximately 1,200 hectares.

\*NOTE - All surveying was based on the U.T.M. System. Geodetic data was calculated using the prime Government control station at Quintette Mountain.

## Topographic Mapping and Cartography

1. Detailed topographic maps at 1:2500 scale with 2 metre contours were completed for the Sheriff and Frame Pit Areas.
2. The main infrastructure area at Quintette covering approximately 54,400 hectares is currently planned for 1:5000 (5 metre contour) maps. At present 13,000 hectares are complete.

\*NOTE - All maps are on the U.T.M. System and sheets are laid out according to the coal licence boundaries. 1:2500 scale maps are incorporated in the 1:5000 scale series.

## Aerial Photography

1. A 1:50000 scale black and white mosaic was prepared for the Quintette Area bounded to the north and south by Bullmoose Mountain and Kinuseo Creek, and to the west and east by the reserve areas and Grizzly Valley.
2. A series of nine (1:25000 scale) black and white mosaics are currently being prepared in areas of geomorphological interest.
3. Approximately one-half of the Johnson Area was covered by 1:12000 scale colour photos during the latter part of the 1976 field season.

## R E S E R V E S

Results of reserve calculations for the Quintette proposed pits are summarized on the following pages. The reserves were calculated from cross-section (mining section) grids in each of the pits. The mining sections were constructed from structure contour maps of the various seams. This system was used instead of a "planimetric" approach, since cross-sections and related tonnages were required by pit design engineers. Mining sections and detailed reserve calculations are included in "Appendix B".

The following is an explanation of the parameters and procedures as they are presented on the detailed reserve calculation tables. Please note that all units are metric.

### Coal Thickness and In-Seam Dilution Thickness (C.T. and I.D.T.):

Reliable sections (good recoveries) were selected from various drill holes, adits and trenches for each mineable seam in each pit. True coal thickness and true in-seam dilution values were then interpolated from these points to the various mining sections in the grid for each pit. The data was placed on computer cards for each mining section.

### Specific Gravity of Coal, In-Seam Dilution and Out-of-Seam Dilution (S.G.C. - S.G.I.D. and S.G.O.D.):

#### Coal S.G.

Based on extensive quality tests, it was decided to use 1.3 S.G. for Quintette coal.

#### In-Seam and Out-of-Seam Dilution S.G.

From raw ash versus specific gravity curves and on individual specific gravity testing, it was possible to estimate the specific gravity of the various carbonaceous and non-carbonaceous partings within reliable mining sections. Weighted average in-seam dilution specific gravities were then calculated for each section and a final total estimate for each seam was derived. The same specific gravity data was used to predict out-of-seam dilution S.G., however, the procedure was not as detailed as roof and floor rock were usually of a consistent lithology and thus a consistent S.G.

The specific gravities established were placed on computer cards.

### Out-of-Seam Dilution Thickness (O.D.T.):

It was consistently estimated that 5% (by weight) of a mining section should be included during mining as out-of-seam dilution. With a known specific gravity, the out-of-seam dilution thickness was then calculated on each section for each seam.

## SUMMARY REPORT(GEOLGY)

RUN TITLE: WINDY PIT DEC 06 76

PROPERTY: QUINTETTE

PIT: WINDY PIT

SEAM	*1								*2				CLEAN	
	AVG. COAL THICK:	THEORETICAL COAL RESERVES OXID	THEO. IN-PLACE COAL RESERVES OXID	THEORETICAL COAL RESERVES OXID	THEORETICAL COAL RESERVES OXID	GEO. FACTORED COAL RESERVES OXID	WT'D AVG COAL RESERVES OXID	SP:G OF PLANT FEED	PLANT FEED	AVG YIELD	COAL RESERVES	PRODUCT COAL		
D	2.443	.443	.889	.552	1.092	.579	1.146	.538	1.016	1.430	.969	.767	.6794	.7151
E	2.057	.368	1.169	.546	2.084	.679	2.188	.630	1.924	1.648	1.836	.519	.8861	.9327
F	2.017	.392	1.468	.519	1.940	.545	2.037	.506	1.785	1.461	1.703	.692	1.1109	1.1694
G	1.295	.218	1.026	.270	1.267	.284	1.330	.263	1.169	1.398	1.115	.738	.7798	.8209
J	3.759	.142	3.069	.182	3.937	.191	4.134	.179	3.682	1.445	3.512	.711	2.3613	2.4856
K	2.077	.007	1.742	.007	1.971	.008	2.069	.007	1.845	1.385	1.760	.811	1.3420	1.4126
JOK	5.620	.069	2.393	.086	2.972	.090	3.121	.081	2.653	1.429	2.531	.736	1.7576	1.8501
TOTAL		1.659	11.757	2.263	15.263	2.376	16.027	2.205	14.073	1.465	13.426	.701	8.9171	9.3865

\*1 INCLUDES IN SEAM DILUTION ONLY

\*2 INCLUDES IN SEAM AND OUT OF SEAM DILUTION  
STOP END OF RUN

## SUMMARY REPORT(GEOLGY)

RUN TITLE: ROMAN

PROPERTY: QUINTETTE

PIT: ROMAN

SEAM	*1				*2				WT'D AVG	CLEAN				
	AVG	THEORETICAL	THEO. IN-PLACE	THEORETICAL	COAL	FACTORED	SP.G OF	PLANT		AVG	COAL	PRODUCT		
	COAL	COAL	PERSEVES	INRAW	COAL	RESRVSTRAW	COAL	RESRVSTRAW	COAL	RESRVST	FEED	YIELD	RESRVES	COAL
	THICK:	OXID	UNOXID	OXID	UNOXID	OXID	UNOXID	OXID	UNOXID	OXID	UNOXID	PLANT FEED	FEED	COAL
I	2.960	.490	5.731	.530	6.219	.557	6.530	.483	5.446	1.368	5.195	.667	3.2625	3.4342
J	4.869	.869	9.724	.439	10.543	.986	11.071	.854	9.212	1.352	8.788	.845	6.9695	7.3573
E	2.035	.253	2.068	.374	2.965	.392	3.113	.350	2.621	1.554	2.500	.631	1.5029	1.5820
D-2	2.976	.292	1.990	.328	2.174	.344	2.283	.310	1.924	1.367	1.835	.827	1.4482	1.5245
F	2.078	.247	2.571	.291	3.076	.306	3.230	.273	2.710	1.416	2.586	.775	1.8659	1.9641
D-1	1.259	.016	.158	.017	.170	.018	.179	.016	.148	1.359	.142	.845	.1132	.1192
TOTAL		2.167	22.241	2.479	25.148	2.603	26.406	2.284	22.061	1.405	21.046	.751	15.1821	15.9812

\*1 INCLUDES IN SEAM DILUTION ONLY

\*2 INCLUDES IN SEAM AND OUT OF SEAM DILUTION  
STOP END OF RUN

## SUMMARY REPORT (GEOLOGY)

RUN TITLE : SHERIFF PIT REVISION 3 COMBINED WITH DEPUTY DEC 20 76

PROPERTY: QUINTETTE

PIT: SHERIFF REV 3

SEAM	*1										*2			
	AVG	THEORETICAL	THEO. IN-PLACE	THEORETICAL	GEO. FACTORED	WT'D AVG	SP.G OF	PLANT	AVG	CLEAN	PRODUCT			
	COAL	COAL RESERVES	RAW COAL RESRV	RAW COAL RESRV	RAW COAL RESRV	SP.G OF	PLANT FEED	FEED	YIELD	RESERVES	COAL			
	THICK	OXID	UNOXID	OXID	UNOXID	OXID	UNOXID	OXID	UNOXID	OXID	UNOXID	OXID	UNOXID	OXID
J	7.983	1.385	7.464	1.804	9.815	1.895	10.306	1.711	8.912	1.465	8.502	.702	5.5757	5.8691
D	1.695	.335	.362	.407	.519	.428	.545	.405	.486	1.400	.463	.707	.2787	.2934
E-1	6.062	1.489	3.085	2.256	4.639	2.369	4.871	2.182	4.276	1.476	4.079	.607	2.3384	2.4614
E-1A	1.980	.010	.032	.017	.054	.018	.057	.016	.048	1.515	.046	.537	.0234	.0247
G	1.143	.343	.851	.422	1.041	.443	1.093	.402	.946	1.400	.902	.772	.6371	.6706
E-2	.843	.184	.454	.254	.526	.267	.553	.236	.466	1.414	.445	.758	.3314	.3488
J-1	1.400	.005	.023	.010	.048	.010	.051	.010	.046	1.670	.043	.446	.0183	.0192
TOTAL		3.752	12.272	5.171	16.643	5.430	17.475	4.961	15.180	1.443	14.482	.700	9.2029	9.6873

\*1 INCLUDES IN SEAM DILUTION ONLY

\*2 INCLUDES IN SEAM AND OUT OF SEAM DILUTION  
STOP END OF RUN

## SUMMARY REPORT (GEOLOGY)

RUN TITLE : FRAME PIT REVISION 2 DEC 22 76

PROPERTY: QUINTETTE

PIT: FRAME PIT

SEAM	*1										*2			
	AVG	THEORETICAL	THEO. IN-PLACE	THEORETICAL	GEO. FACTORED	WT'D AVG	SP.G OF	PLANT	AVG	CLEAN	PRODUCT			
	COAL	COAL RESERVES	RAW COAL RESRV	RAW COAL RESRV	RAW COAL RESRV	SP.G OF	PLANT FEED	FEED	YIELD	RESERVES	COAL			
	THICK	OXID	UNOXID	OXID	UNOXID	OXID	UNOXID	OXID	UNOXID	OXID	UNOXID	OXID	UNOXID	OXID
G	3.157	.796	6.666	.925	7.807	.971	8.197	.869	6.890	1.398	6.573	.786	4.8403	5.0950
J	3.313	.631	8.064	.764	9.710	.802	10.196	.674	8.070	1.400	7.699	.761	5.5098	5.7998
E	3.495	.989	5.353	1.267	7.020	1.330	7.371	1.158	6.243	1.423	5.956	.719	3.9141	4.1201
F	1.445	.349	3.123	.554	4.725	.582	4.981	.502	4.093	1.542	3.904	.574	2.2335	2.3511
D	2.011	.659	3.351	.788	4.009	.827	4.209	.731	3.612	1.417	3.445	.740	2.4838	2.6145
TOTAL		3.425	26.557	4.298	33.271	4.513	34.934	3.933	28.907	1.434	27.578	.719	18.9814	19.9805

\*1 INCLUDES IN SEAM DILUTION ONLY

\*2 INCLUDES IN SEAM AND OUT OF SEAM DILUTION  
STOP END OF RUN



## Reserves - continued

### Mining Section Thickness:

The mining section thickness for each seam was then calculated as the sum of coal, in-seam and out-of-seam dilution thicknesses.

### Weighted Average Specific Gravity of Mining Section:

Using the thickness and S.G. of the three portions of each mining section, a weighted average specific gravity was calculated.

### Seam Length (Oxidized - L.O. and Unoxidized - L.U.):

The oxidized and unoxidized portions of each seam within the pit were measured on each mining section and transferred to the computer data cards.

\*NOTE - It should be noted that the lengths found in the detailed reserve print-outs are those within pit limited, however, the outline of the pit is not shown on respective mining sections as pit planning is not yet complete.

### Section Width (W):

The width or influence was also input and normally represented 100 metres of strike length as this was the grid spacing.

### Reserve Categories and Calculations:

#### Theoretical Coal (Oxidized and Unoxidized)

The in-place coal only tonnage with no deductions.

Calculation:  $C.T. \times S.G.C. \times L.U. \text{ or } L.O. \times W$

#### Theoretical In-Place Raw Coal (Oxidized and Unoxidized)

The in-place coal and in-seam dilution tonnage with no deductions.

Calculation:  $\text{Theoretical coal reserve} + I.D.T. \times S.G.I.D. \times L.U. \text{ or } L.O. \times W$

#### Theoretical Raw Coal Reserve (Oxidized and Unoxidized)

The in-place coal, in-seam dilution and out-of-seam dilution tonnage with no deductions.

Calculation:  $\text{Theoretical in-place Raw Coal Reserve} + O.D.T. \times S.G.O.D. \times L.U. \text{ or } L.O. \times W$

#### Raw Coal Reserve (Oxidized and Unoxidized)

The theoretical raw coal tonnage is reduced by a geological factor (g.f.) to give the raw coal reserve. At this point, 6% pit water is included with the oxidized raw reserve.

## Reserves - continued

### Reserve Categories and Calculations - continued

#### Plant Feed

Plant feed is the unoxidized raw coal tonnage received at the wash plant and is derived by including 6% pit water with unoxidized raw tonnage and reducing it by the mining factor (m.f.) (.9) to account for mining loss.

#### Clean Coal

Clean coal is an estimate of the dry coal produced by the wash plant. To obtain clean coal, the plant feed tonnage of any seam is multiplied by the estimated plant yield for that seam.

#### Plant Yield

The equation used for plant yield is as follows:

$$\frac{C.T. \times S.G.O. \times .96}{C.T. \times S.G.C. \times I.D.T. \times S.G.I.D. \times O.D.T. \times S.G.O.D.}$$

which is simply a weight ratio of coal reduced by 4% for wash plant inefficiency to the weight of the entire section. It should be noted that actual yields from reliable cored section washabilities were compared to this calculated yield and generally found to be within 5% of the actual value.

#### Product Coal

Five percent (5%) moisture was added to clean coal to obtain product coal.

## R E C L A M A T I O N

Reclamation involving slash abatement, water bar and culvert installation, ditching, recontouring, infilling and the harrowing of fertilizer and seed mixture was undertaken on all land disturbed by 1976 exploration, and on some disturbed areas from previous programs. Numerous site inspections were made by members of the Inspection and Reclamation Branches of the British Columbia Government Department of Mines and Petroleum Resources. A report dealing with 1976 reclamation has been submitted to the Department of Mines & Petroleum Resources by J. Baker who was responsible for the reclamation program.

## C O N C L U S I O N

The 1976 Quintette Exploration Program successfully improved the level of confidence of reserves in the Roman, Sheriff and Frame Pits. At present, a total of 109,000,000 metric tonnes of theoretical raw coal reserve (in-place) are within mine planning areas of the four Quintette proposed open pits. In addition to geological information further quality tests were carried out from drilling and two bulk samples from "e" and 'J' Seams in the Sheriff Pit and indicated that all coal was of acceptable metallurgical quality.

Preliminary mapping north and south of the Sheriff and Frame Pits indicated that small pits in the Gates Member may be confirmed with drilling northeast of the Sheriff Pit. With verification of quality and continuity, underground reserves in the Gething Formation may be confirmed in the Gething Formation south of the Sheriff and Frame Pits with open pit potential restricted to further exploration in the Gates and basal Gething immediately north of the Murray River.

## A C K N O W L E D G E M E N T S

Acknowledgement and thanks are extended to the following staff members and contractors whose efforts led to the successful completion of the 1976 Quintette Exploration Program.

### Denison Coal Limited Staff:

#### Geological:

J. Perry	- Geologist
A. Bak	- Geologist
D. Patterson	- Geologist
B. Wong	- Geological Engineer
C. Mankowski	- Geologist
C. Bickford	- Geology Student
D. Gatto	- Geology Student

#### Camp Management and Reclamation:

J. Baker	- Reclamation and Camp Management
L. Scorgie	- General Assistant
P. Roman	- General Assistant

### Mitsui Mining Co. Ltd. Staff:

I. Kakizaki	- Manager, Geology Section
T. Shima	- Geologist
Y. Kowaguchi	- Geologist
I. Ohwa	- Geologist

### Contractors:

#### Adits:

A & B Contracting Ltd., Calgary

#### Air Support:

McCord Helicopters, Calgary

#### Air Support:

Nahanni Helicopters, Calgary

#### Heavy Equipment:

Tompkins Contracting, Fort St. John

#### Diamond Drilling:

Tonto Drilling, Vancouver

#### Catering:

Westcamp Construction Catering, Edmonton

#### Fuel:

South Peace Petroleum, Dawson Creek

#### Surveying, Photogrammetry and Cartography:

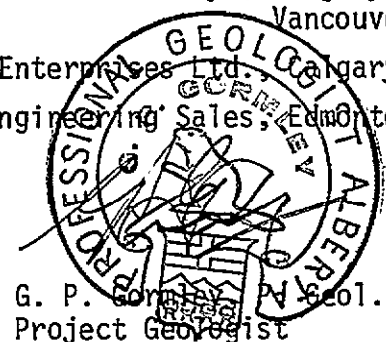
Burnett Resource Surveys, Calgary and Vancouver

#### Geophysical Logs

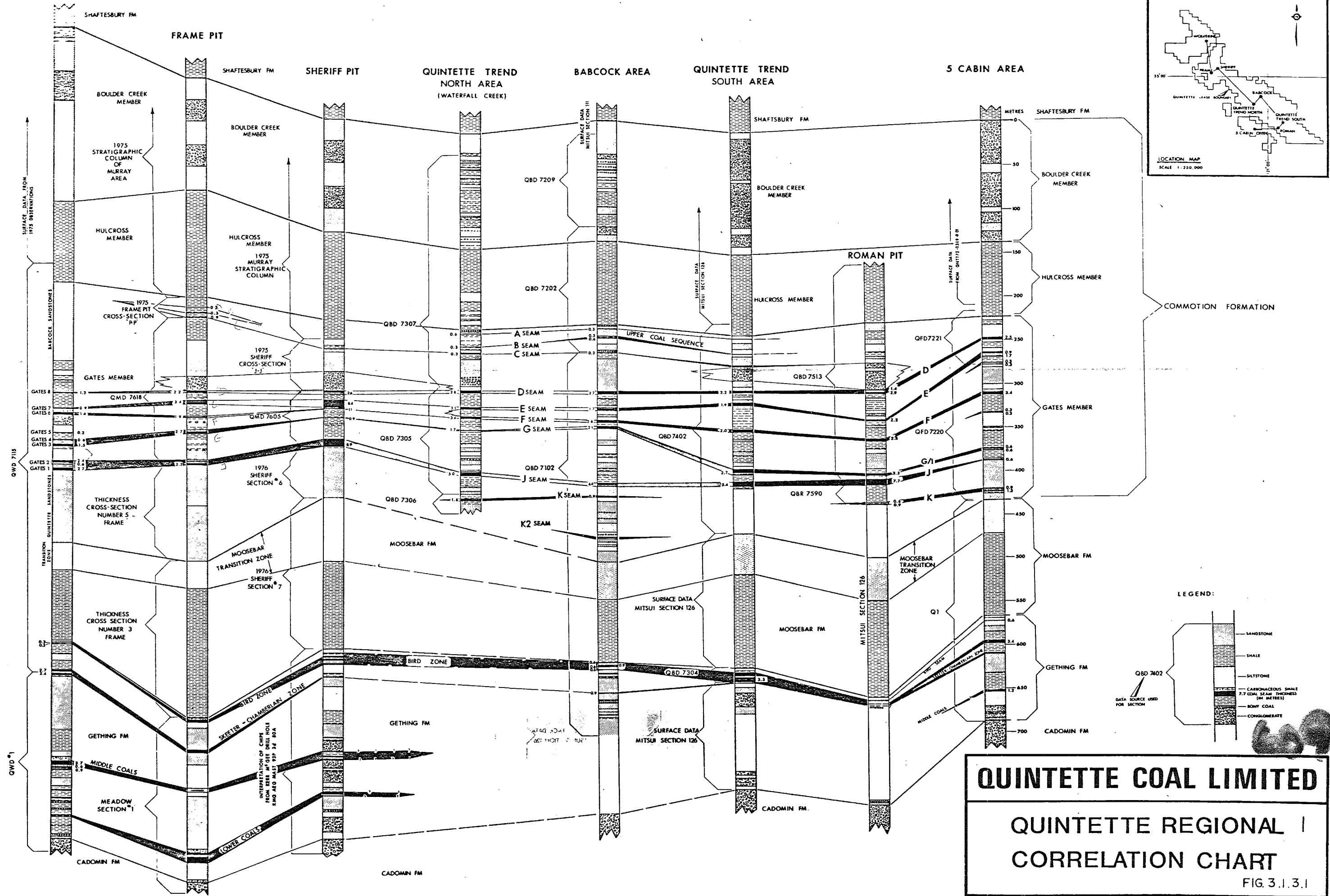
Roke Oil Enterprises Ltd., Calgary

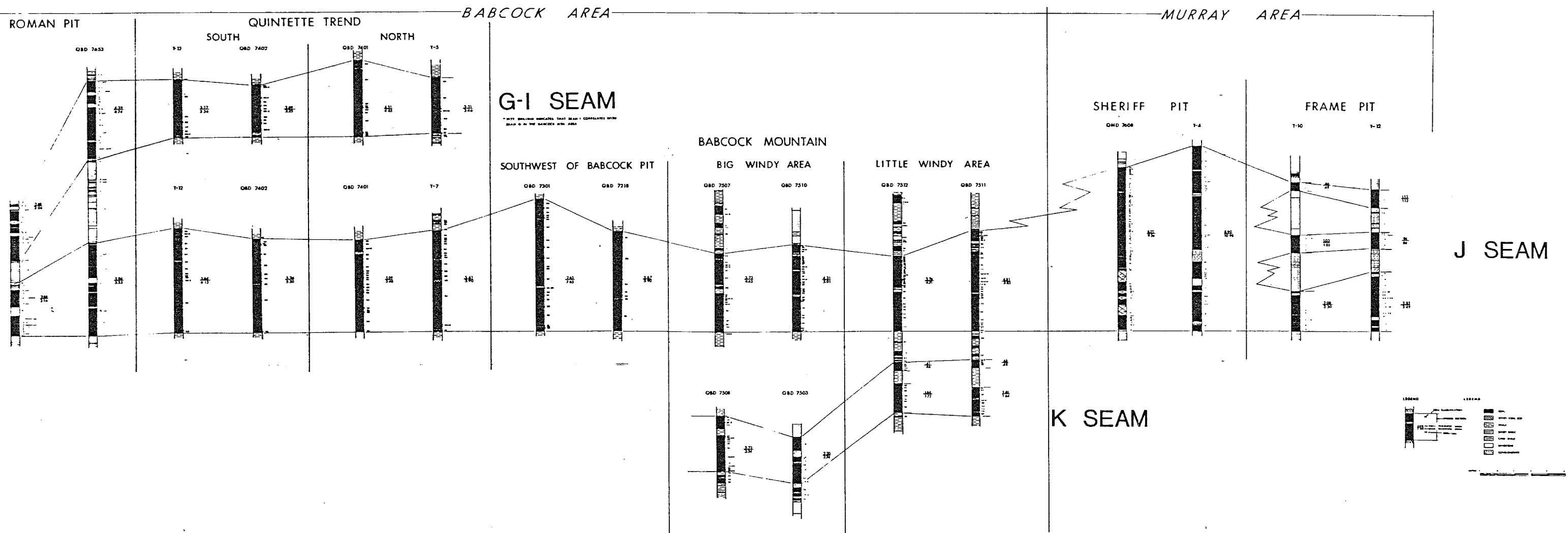
#### Analysis

Cyclone Engineering Sales, Edmonton



# WOLVERINE AREA



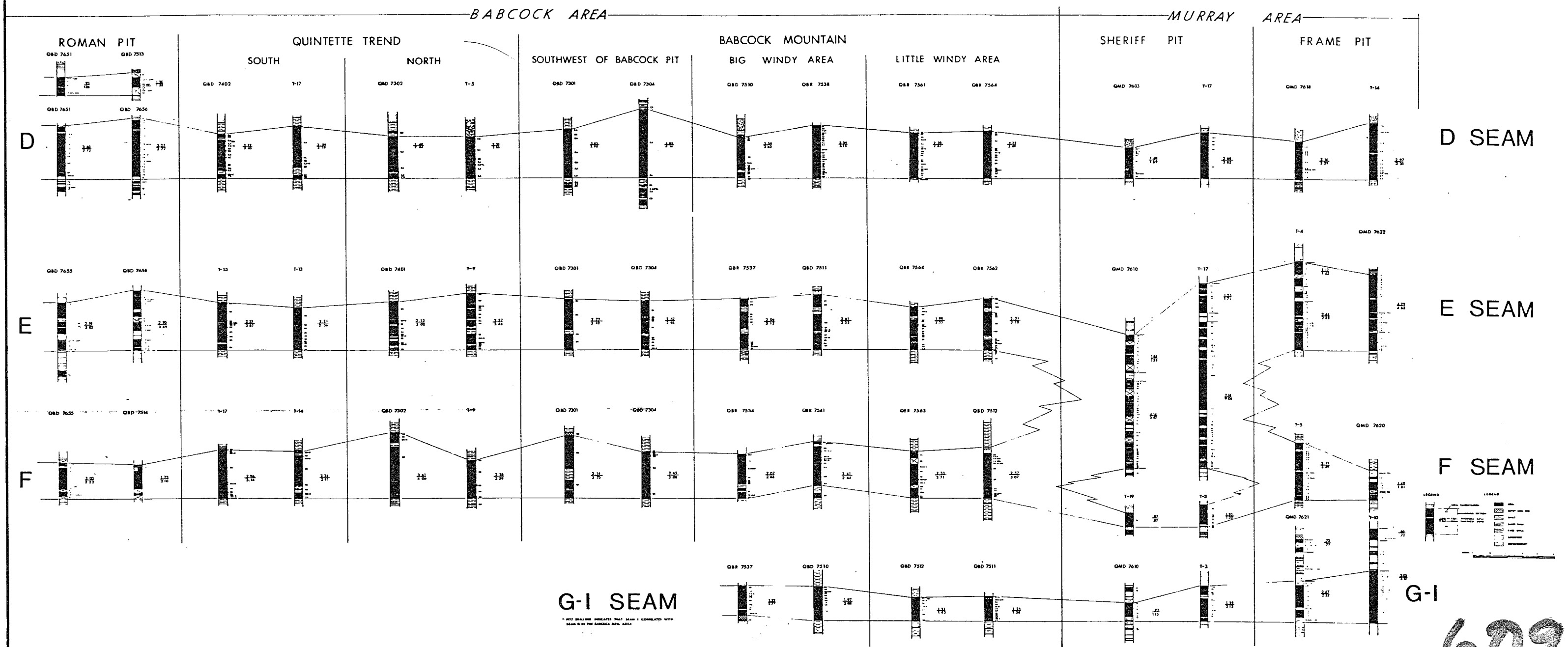


**QUINTETTE COAL LIMITED**

**REPRESENTATIVE SECTIONS**

**G-I, J & K SEAMS**

FIG. 3.1.3.3



**QUINTETTE COAL LIMITED**

**REPRESENTATIVE SECTIONS**  
**D, E, F & G-I SEAMS**

FIG. 3.1.3.2



**GEOLOGICAL BRANCH  
ASSESSMENT REPORT**

00 609

Windy.  
Cross section.  
W7606 - W7632.















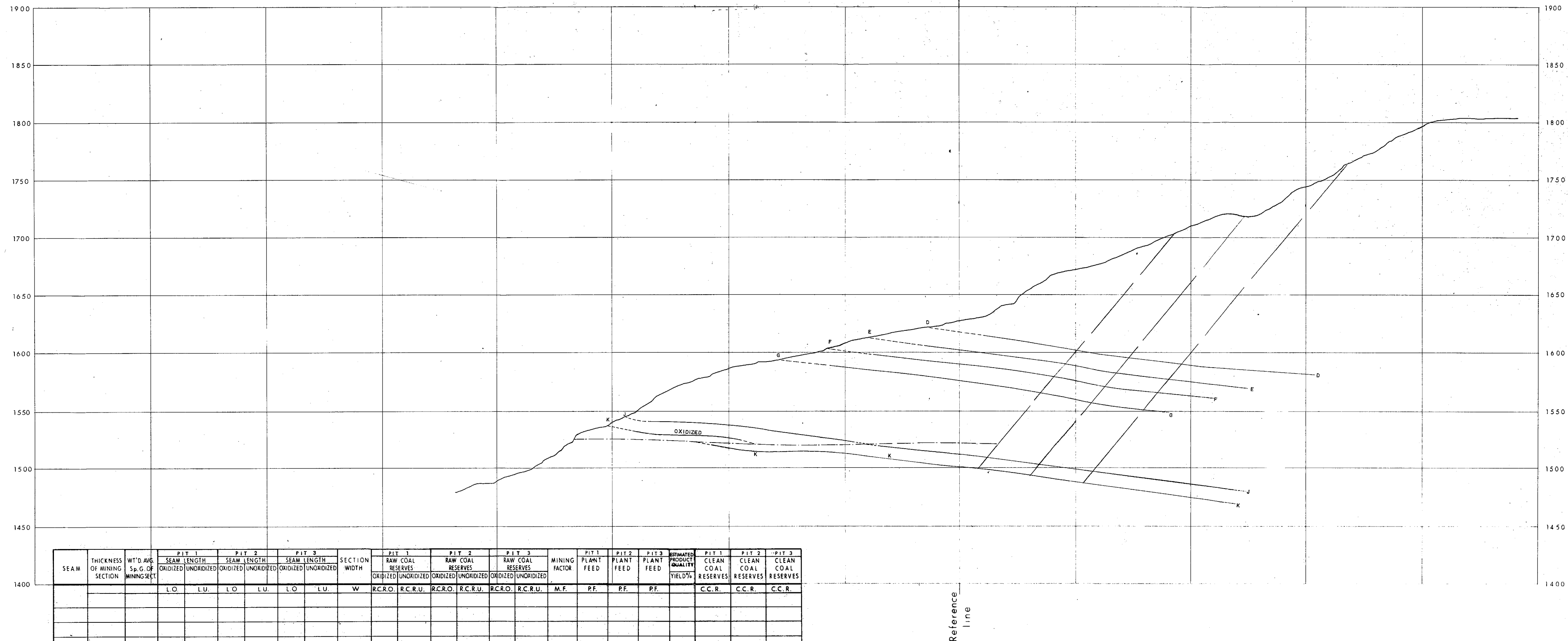












Metres above sea level

QUINTETTE COAL LIMITED		
PREPARED BY: DENISON COAL LIMITED		
CALGARY ALBERTA		
PR-Quintette 76 (2) B. WINDY		
CROSS SECTION W76.17		
DRAWN BY: E. Toth	DATE: SEPT '76	SCALE: 1:2500
APPROVED BY:	DRAWING NO: QNTT 76-0676-R01	

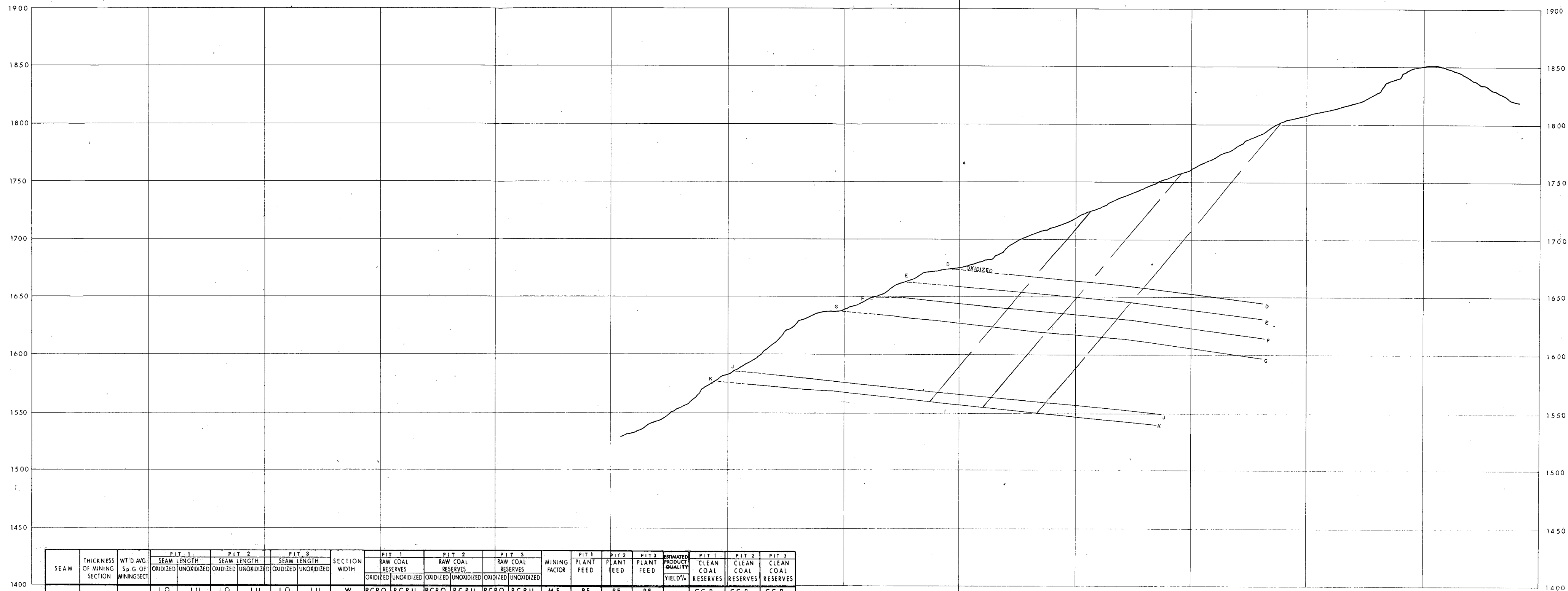












Metres above sea level

Reference  
line

QUINTETTE COAL LIMITED

PREPARED BY:  
DENISON COAL LIMITED

CALGARYALBERTA

PR-Quintette 76 (2) B

WINDY

CROSS SECTION W76.22

DRAWN BY: E. Toth

DATE: SEPT. '76

SCALE: 1:2500

APPROVED BY:

DRAWING NO: QNTT 76-0676-R01









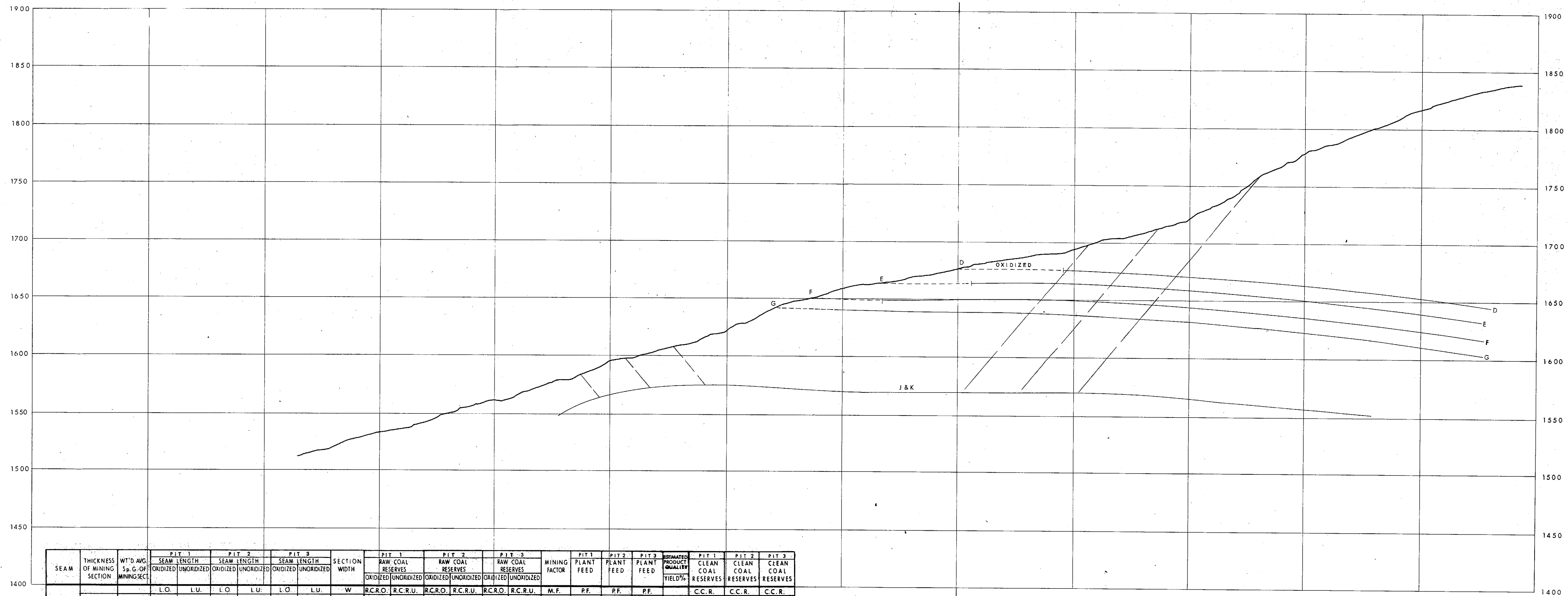










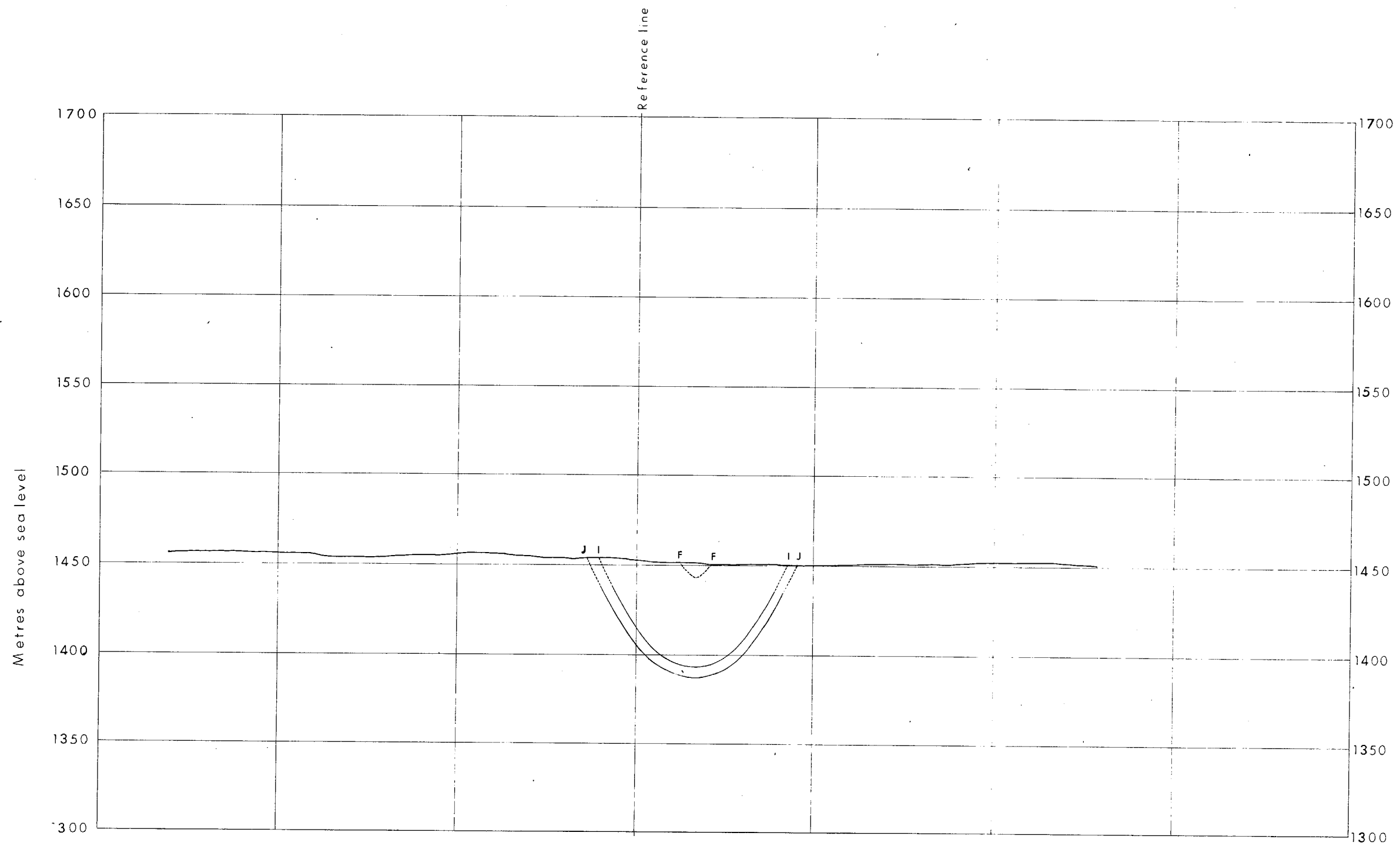


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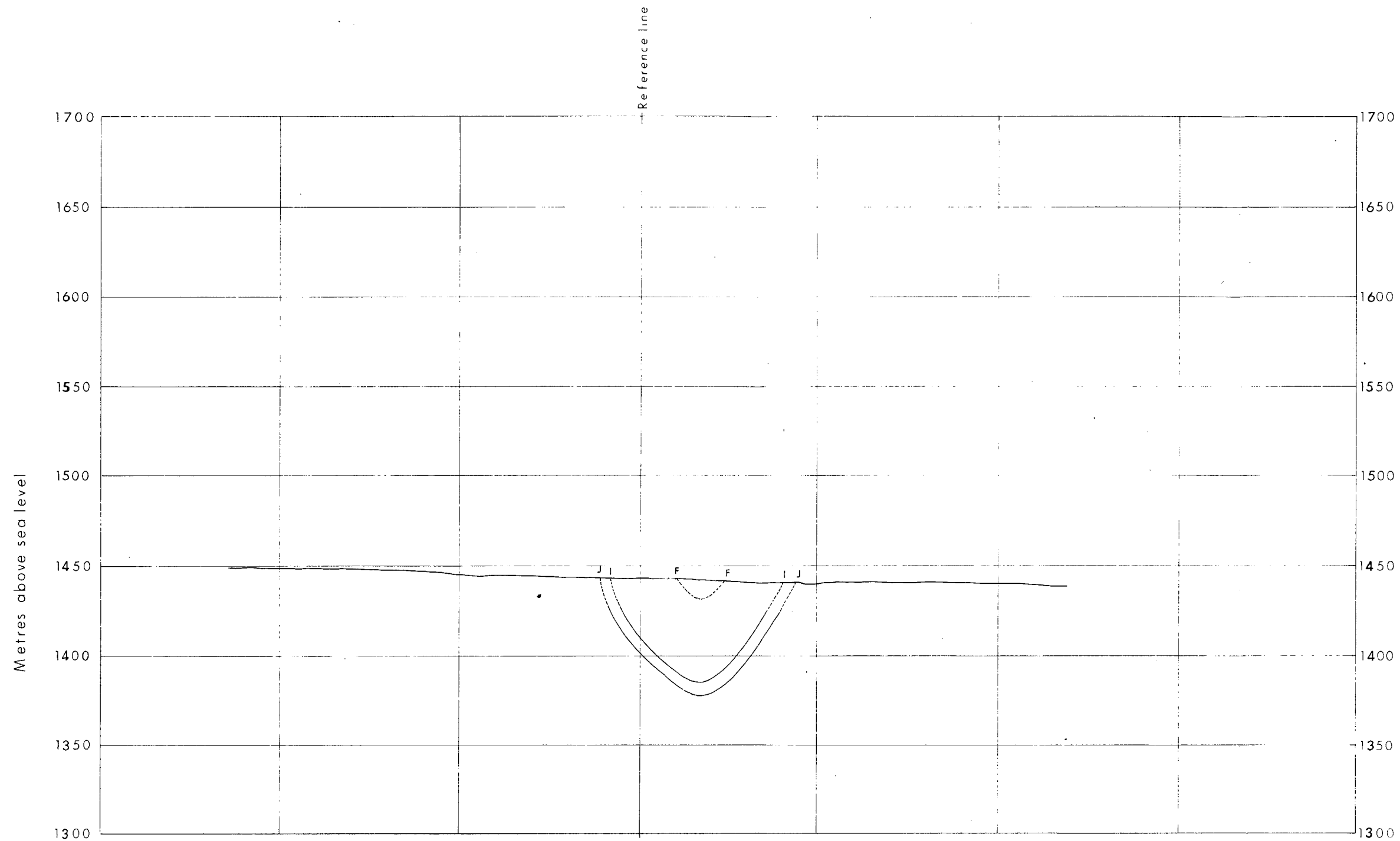
QUINTETTE COAL LIMITED		
PREPARED BY: DENISON COAL LIMITED		
CALGARY	ALBERTA	
PR-Quintette 76(2) B WINDY		
CROSS SECTION W76.31		
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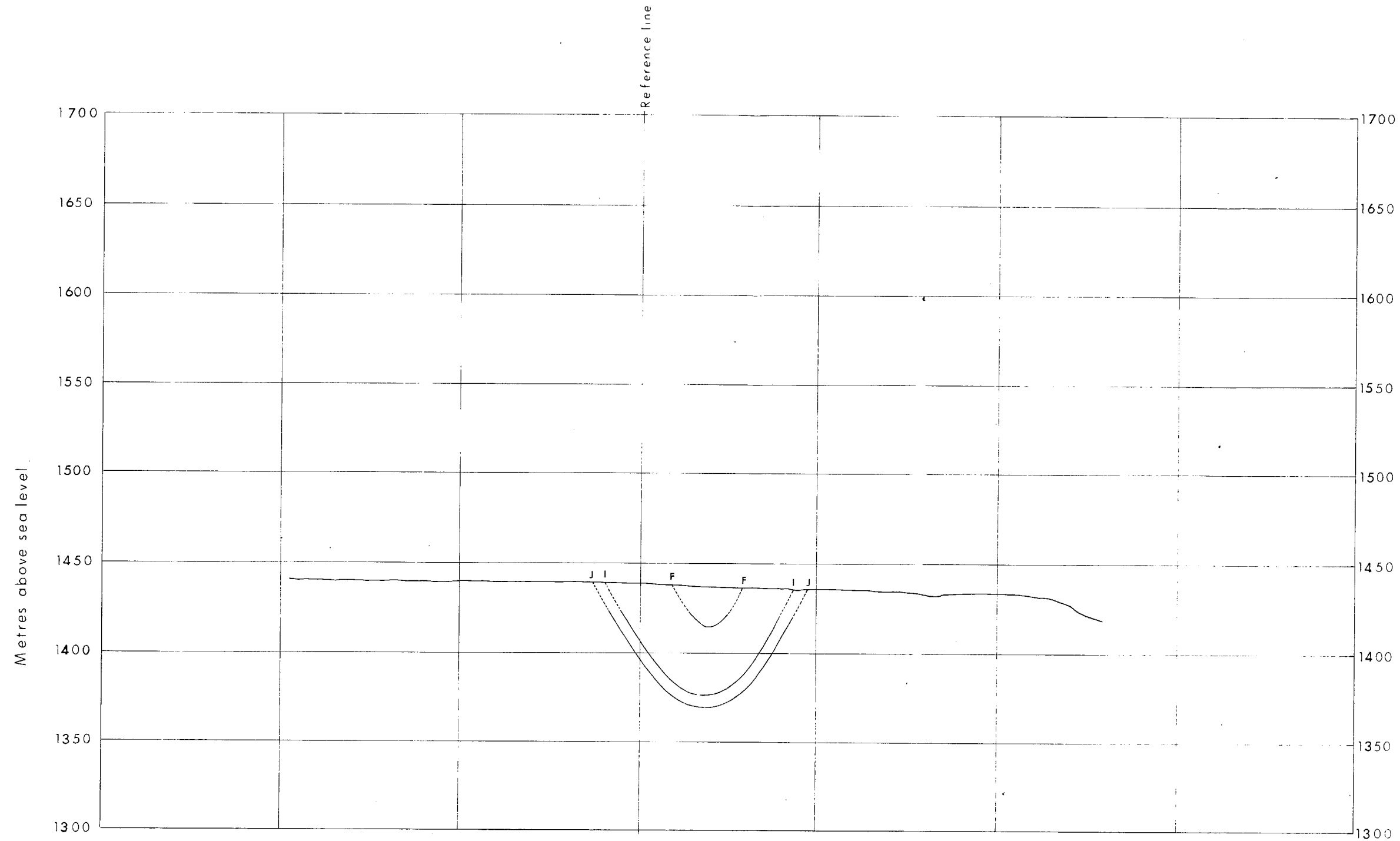
Roman Mtn.  
Cross Section.  
R7600A - R7600D.  
R7601 - R7629.



QUINTETTE COAL LIMITED		
PREPARED BY: DENISON COAL LIMITED		
CALGARY	ALBERTA	
PR-Quintette 76(2) 8 ROMAN MOUNTAIN		
CROSS SECTION R76.00A		
DRAWN BY E. Toth	DATE OCT. '76	SCALE 1:2500
APPROVED BY	DRAWING NO QNTT 76-0674-R01	



QUINTETTE COAL LIMITED		
PREPARED BY: DENISON COAL LIMITED		
CALGARY	ALBERTA	
PR- Quintette 76(2)B. ROMAN MOUNTAIN		
CROSS SECTION R76.00B		
DRAWN BY E. Toth	DATE OCT. '76	SCALE 1:2500
APPROVED BY	DRAWING NO QNTT 76 - 0674 - R01	



QUINTETTE COAL LIMITED

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DENISON COAL LIMITED

CALGARY

ALBERTA



*PR-Quintette 76(2)B.*  
ROMAN MOUNTAIN

CROSS SECTION R76 00C

DRAWN BY E. Toth

DATE OCT. '76

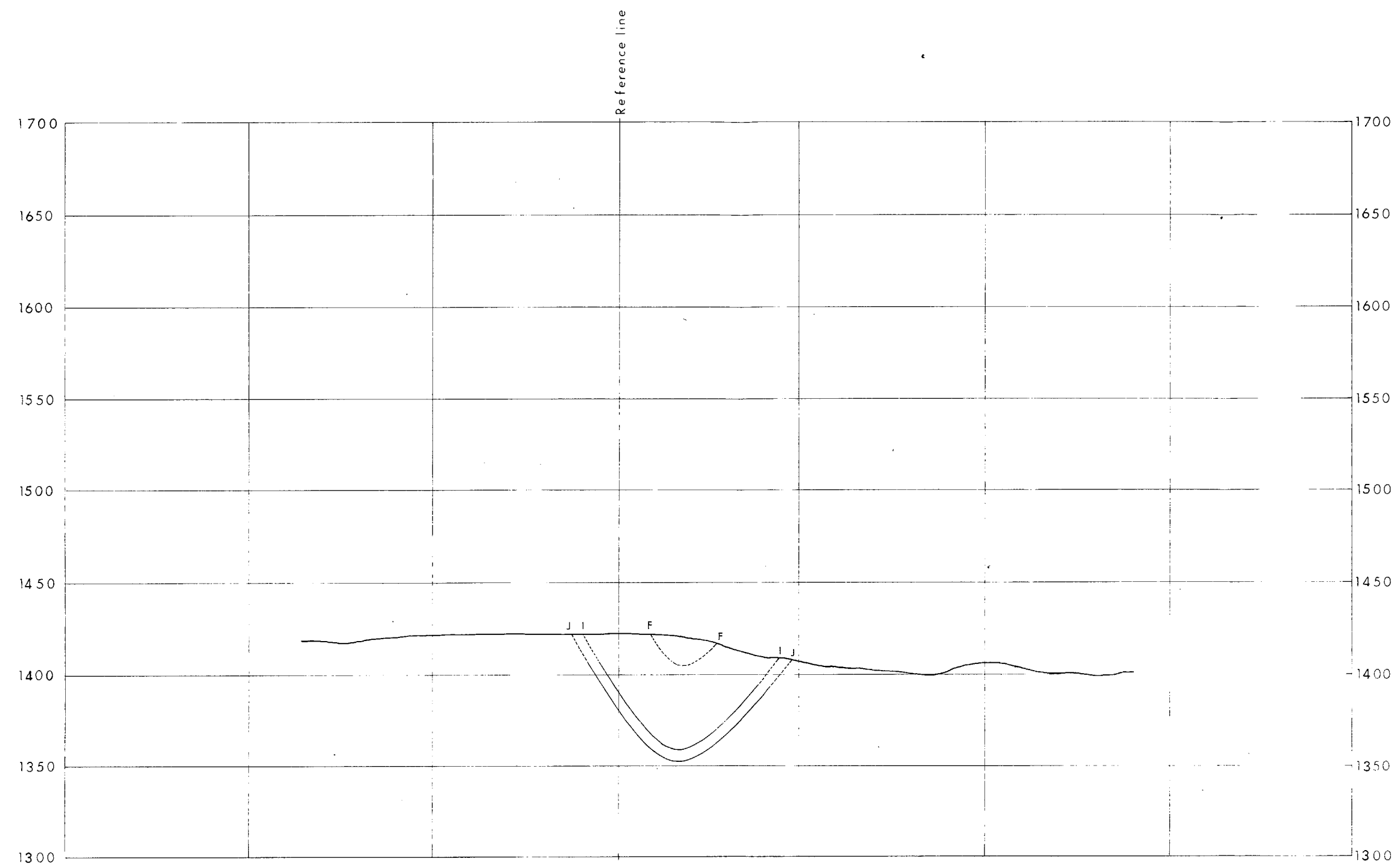
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Metres above sea level



QUINTETTE COAL LIMITED

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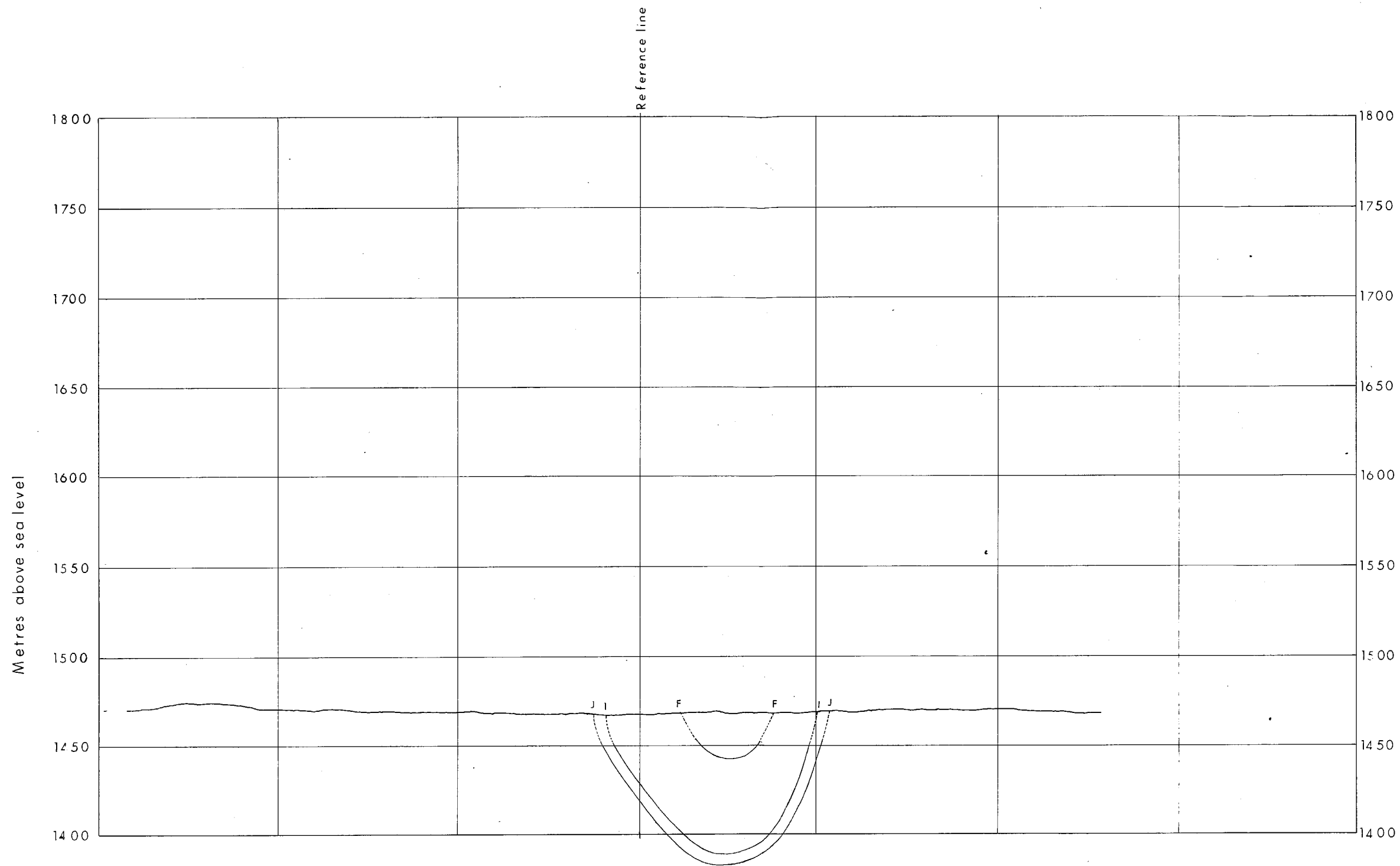


PR-Quintette 76(2) B.  
ROMAN MOUNTAIN

CROSS SECTION R76 00D

DRAWN BY E. T. O'RH DATE OCT. '76 SCALE 1:2500

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*PR-Quintette 76(2)B*  
ROMAN MOUNTAIN

CROSS SECTION R76.01

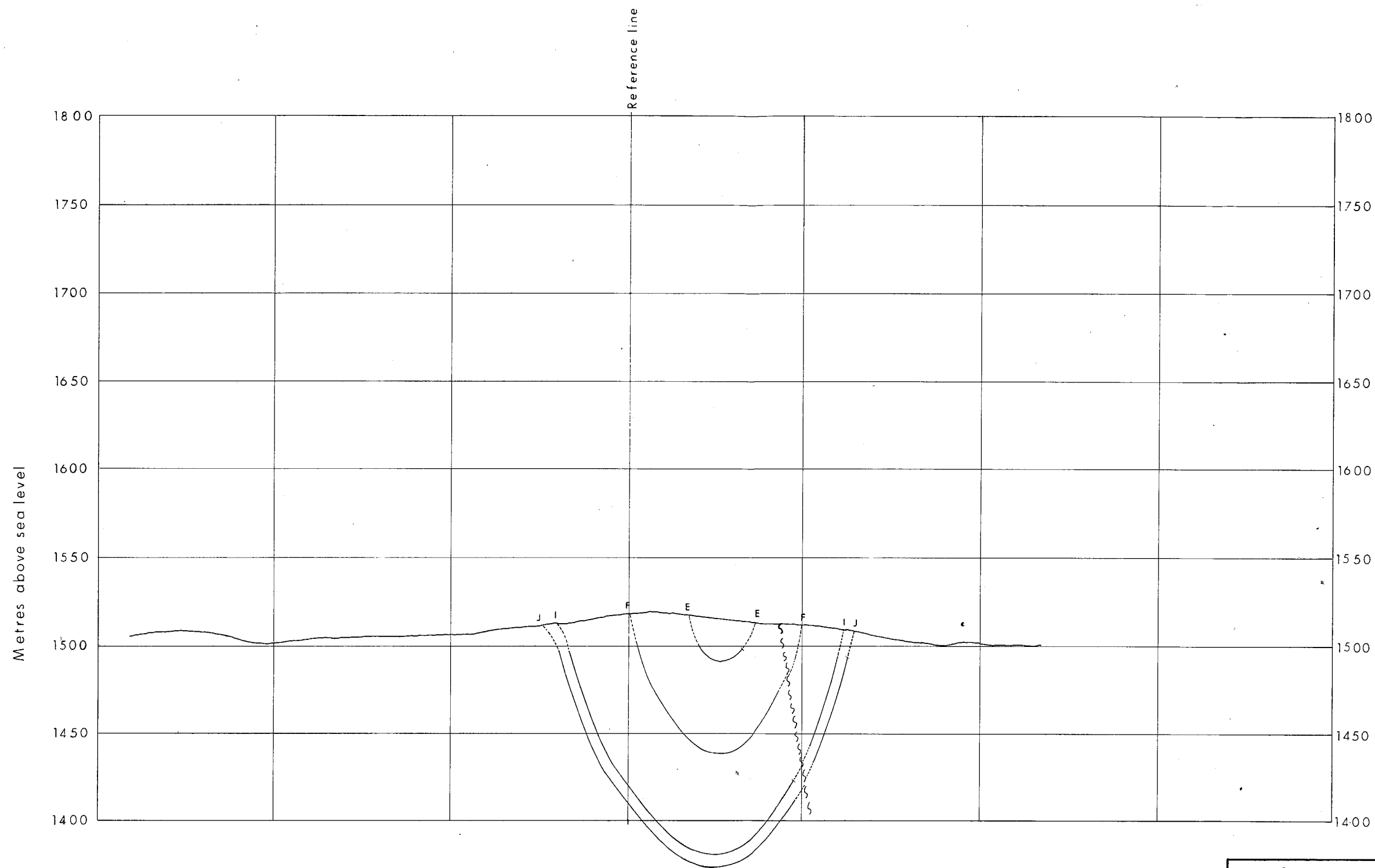
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DATE SEPT. '76

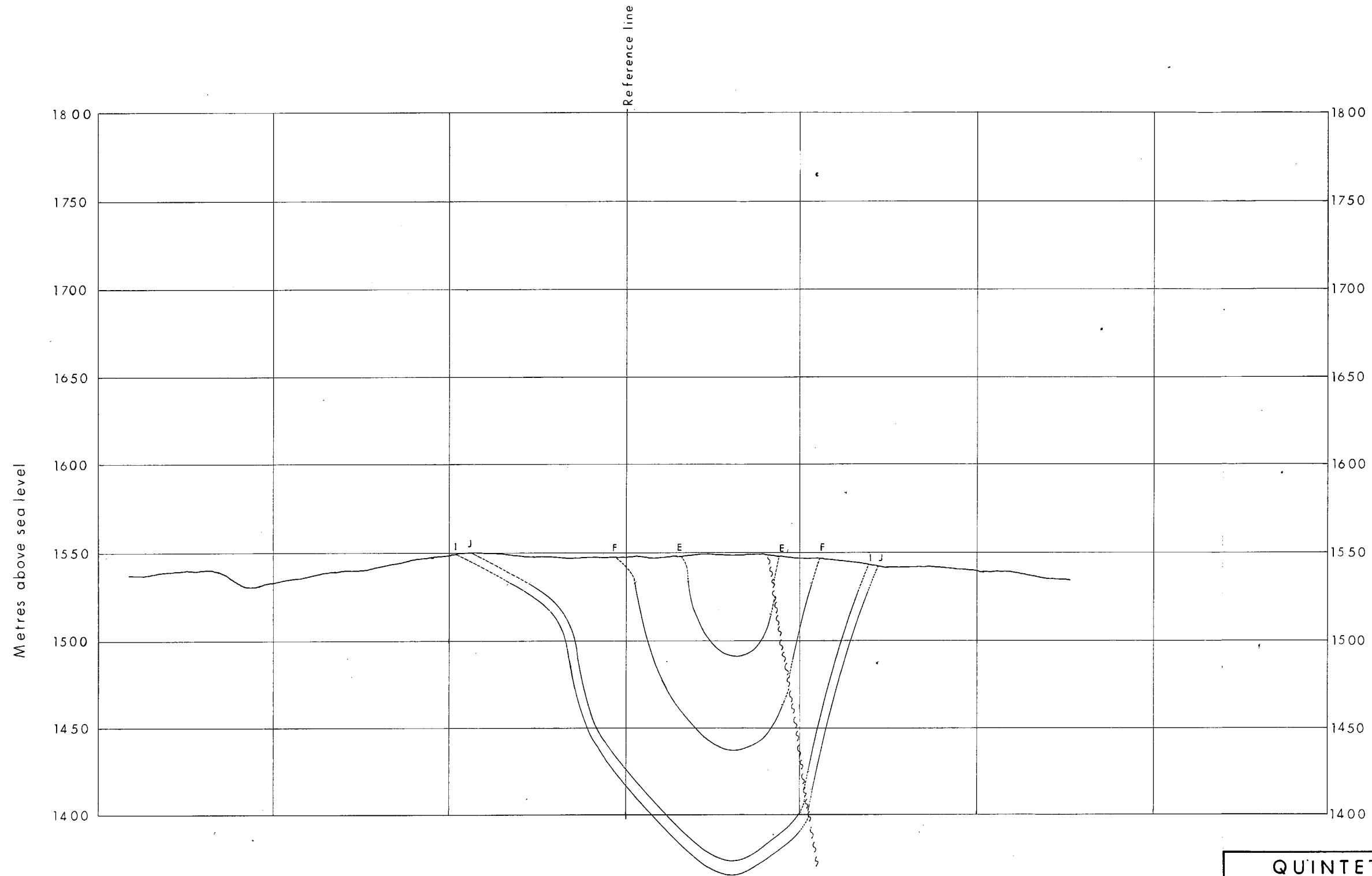
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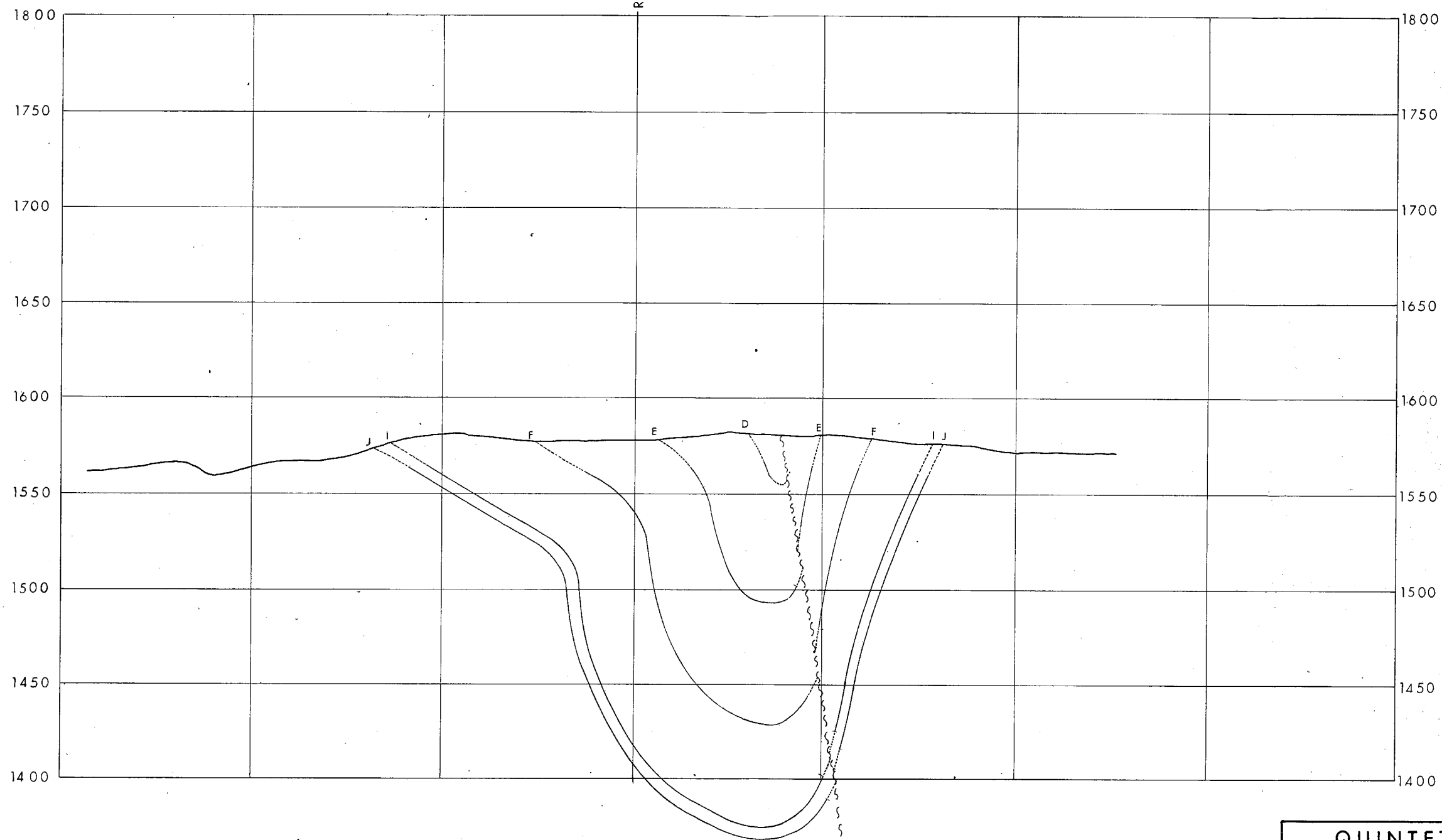


QUINTETTE COAL LIMITED		
PREPARED BY: DENISON COAL LIMITED		
CALGARY		ALBERTA
PR- Quintette 76(2) B. ROMAN MOUNTAIN		
CROSS SECTION R7602		
DRAWN BY: J. W. K.	DATE: SEPT., 76	SCALE: 1: 2500
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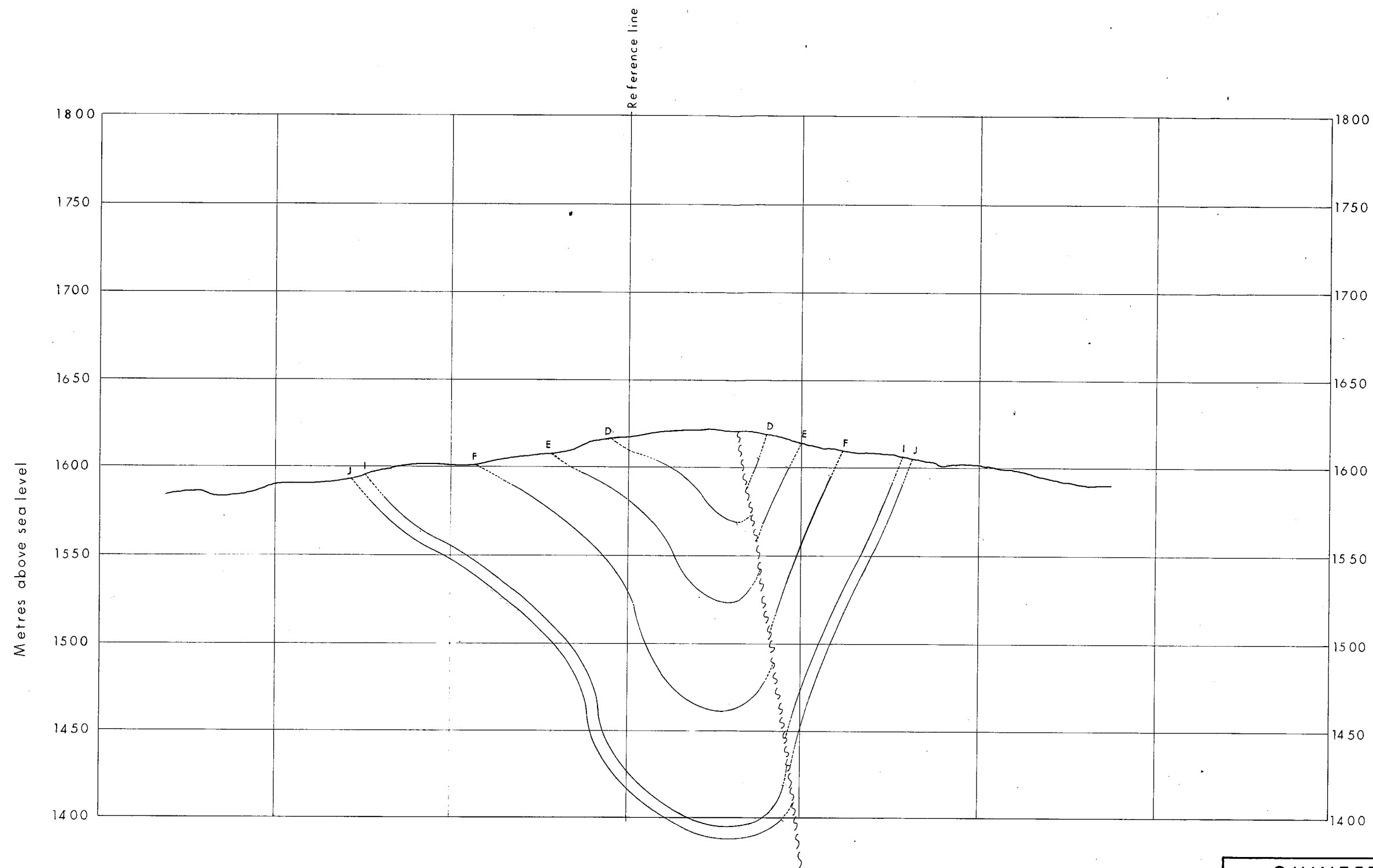


QUINTETTE COAL LIMITED		
PREPARED BY: DENISON COAL LIMITED		
CALGARY	ALBERTA	
PR-Quintette 76 (278) ROMAN MOUNTAIN		
CROSS SECTION R7603		
DRAWN BY: J.W.K.	DATE: SEPT., 76	SCALE: 1:2500
APPROVED BY:	DRAWING NO: QNTT76-0674-R01	

Metres above sea level



QUINTETTE COAL LIMITED		
PREPARED BY: DENISON COAL LIMITED		
CALGARY	ALBERTA	
PR-Quintette 76(2) B ROMAN MOUNTAIN		
CROSS SECTION R7604		
DRAWN BY: J.W.K.	DATE: SEPT., 76	SCALE: 1:2500
APPROVED BY:	DRAWING NO: QNTT76-0674-R01	



QUINTETTE COAL LIMITED

PREPARED BY:  
DENISON COAL LIMITED

CALGARY

ALBERTA



PR-Quintette 76(2) B  
ROMAN MOUNTAIN

CROSS SECTION R76.05

DRAWN BY: J.W.K.

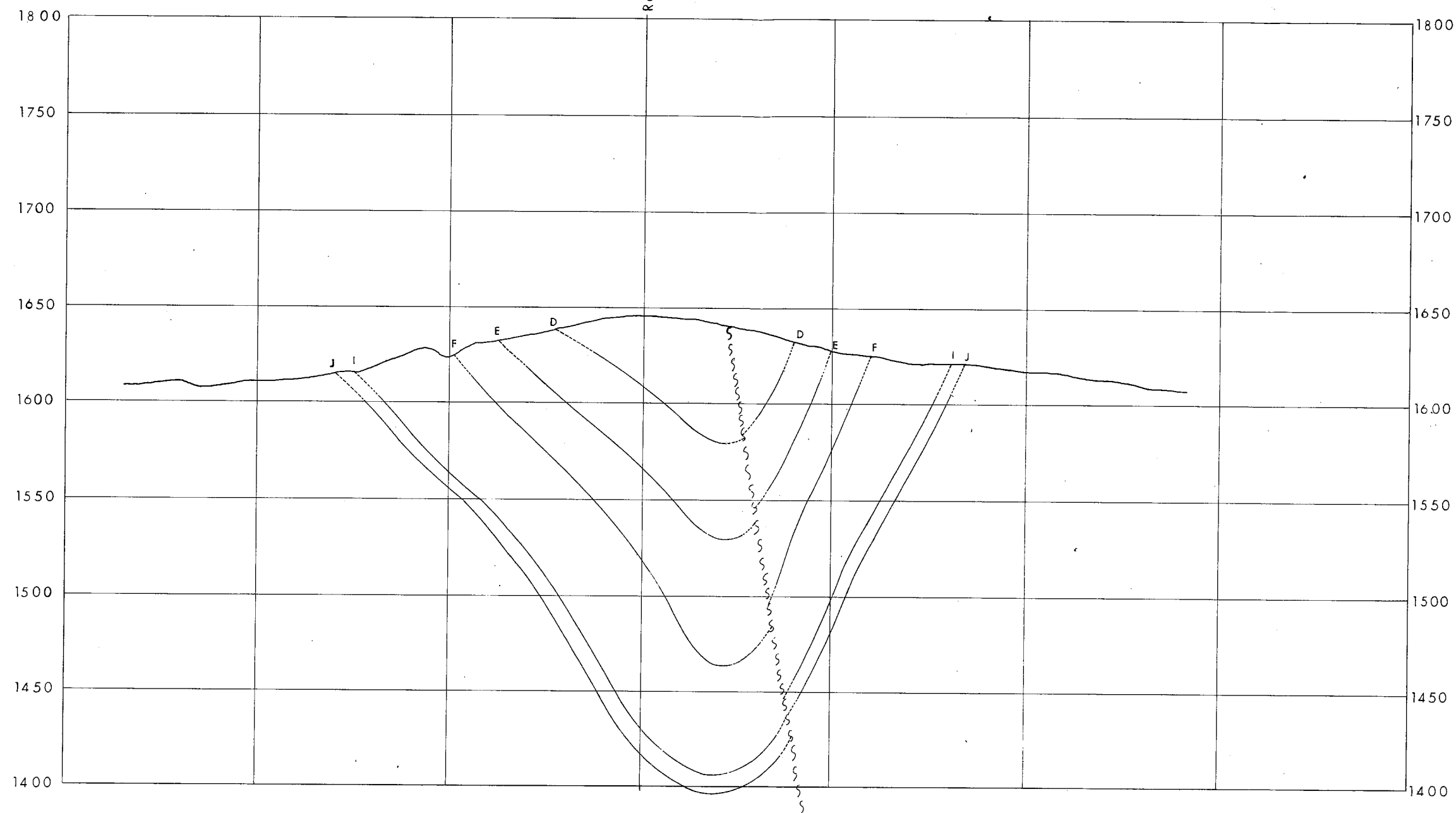
DATE: SEPT., 76

SCALE: 1:2500

APPROVED BY:

DRAWING NO: QNTT76-0674-R01

Metres above sea level



QUINTETTE COAL LIMITED

PREPARED BY:  
DENISON COAL LIMITED

CALGARY

ALBERTA



*PR-Quintette 76(2)B*  
ROMAN MOUNTAIN

CROSS SECTION R7606

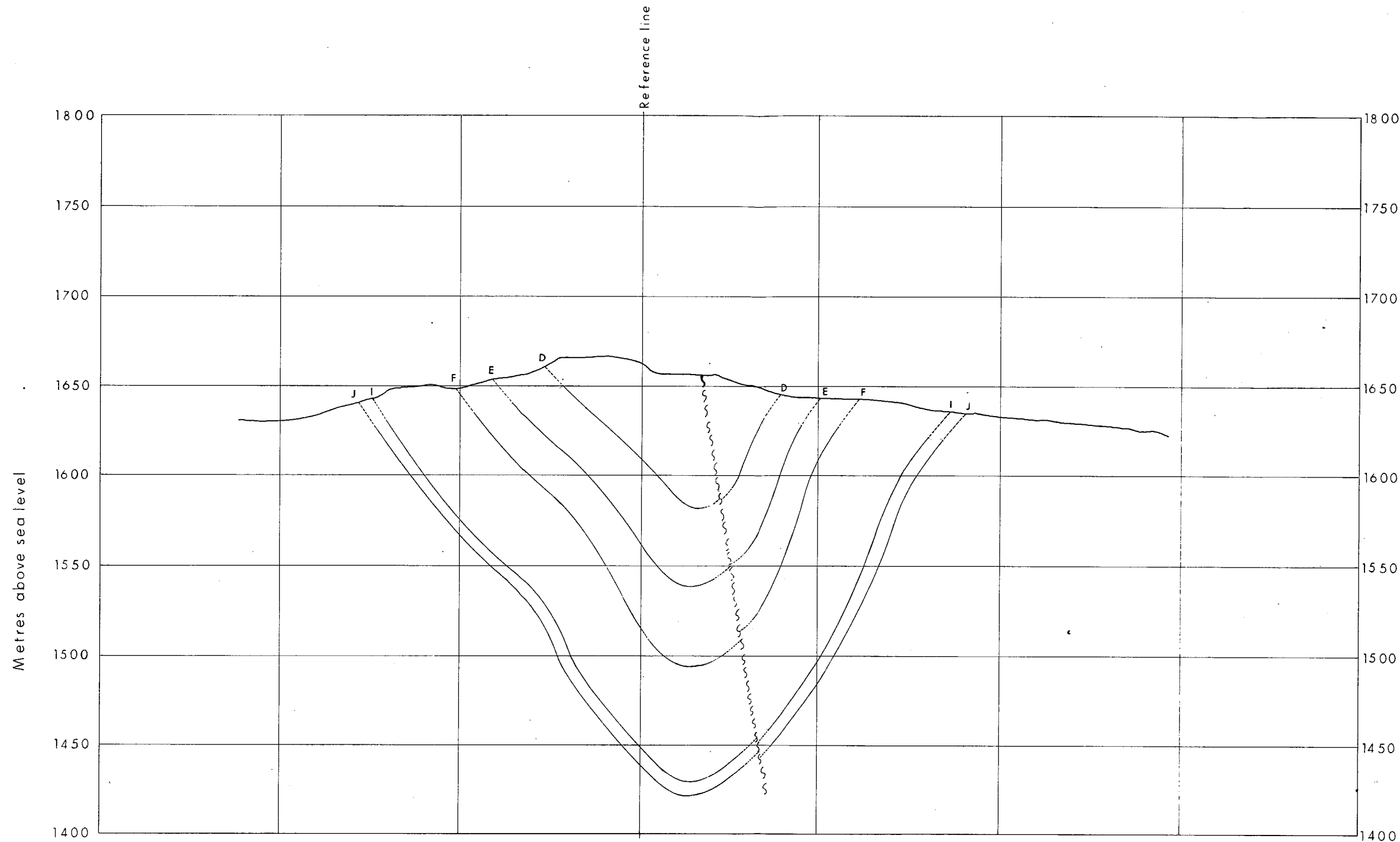
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DATE: SEPT., 76

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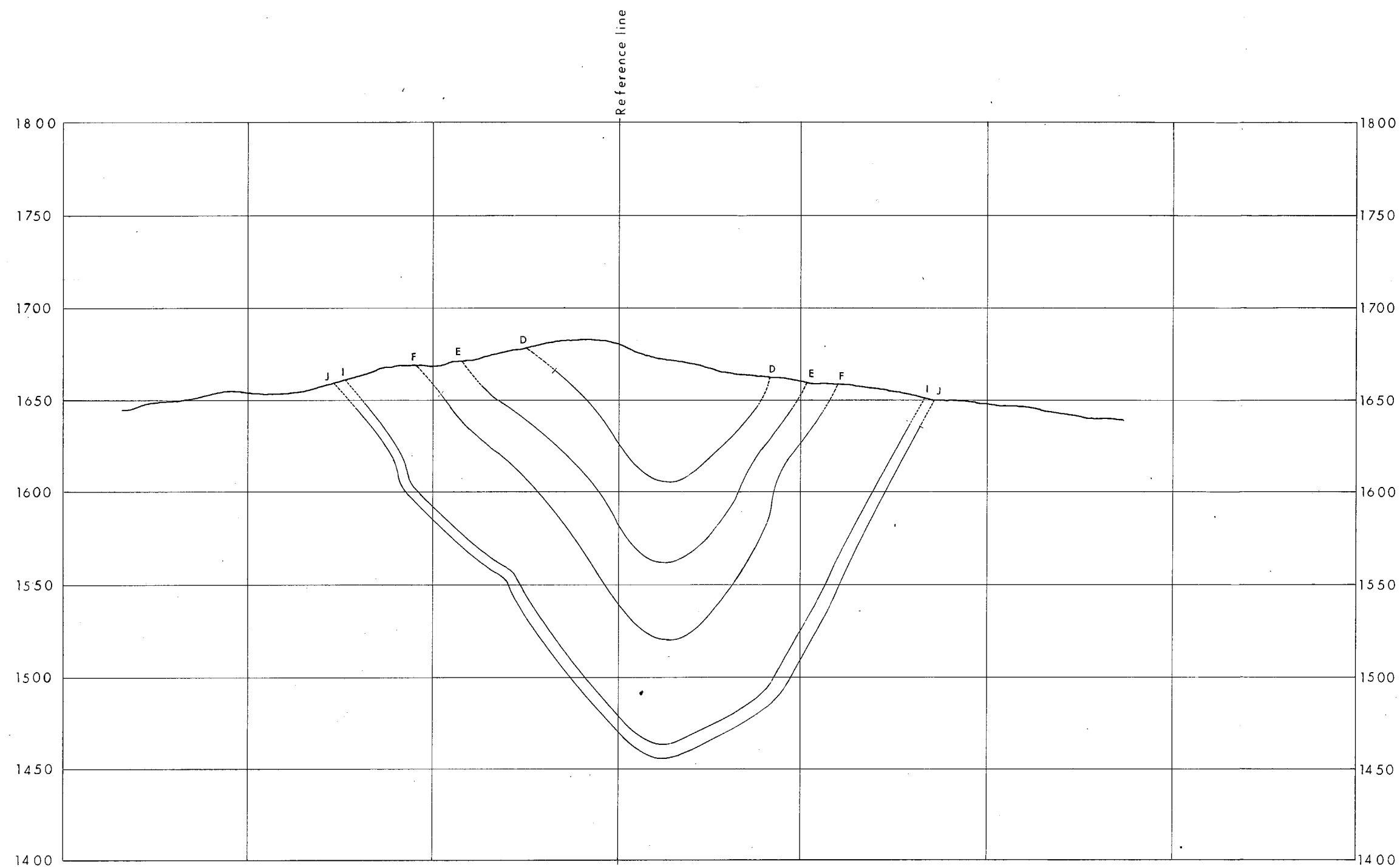
DRAWING NO: QNTT76-0674-R01



QUINTETTE COAL LIMITED		
PREPARED BY: DENISON COAL LIMITED		
CALGARY	ALBERTA	
<i>PR - Quintette 76(2) B</i> <b>ROMAN MOUNTAIN</b>		
CROSS SECTION R76.07		
DRAWN BY: J.W.K.	DATE: SEPT., 76	SCALE: 1:2500
APPROVED BY:	DRAWING NO: QNTT 76-0674-R01	



Metres above sea level



QUINTETTE COAL LIMITED

PREPARED BY:  
DENISON COAL LIMITED

CALGARY

ALBERTA



*PR - Quintette 76(2) B.*  
ROMAN MOUNTAIN

CROSS SECTION R7608

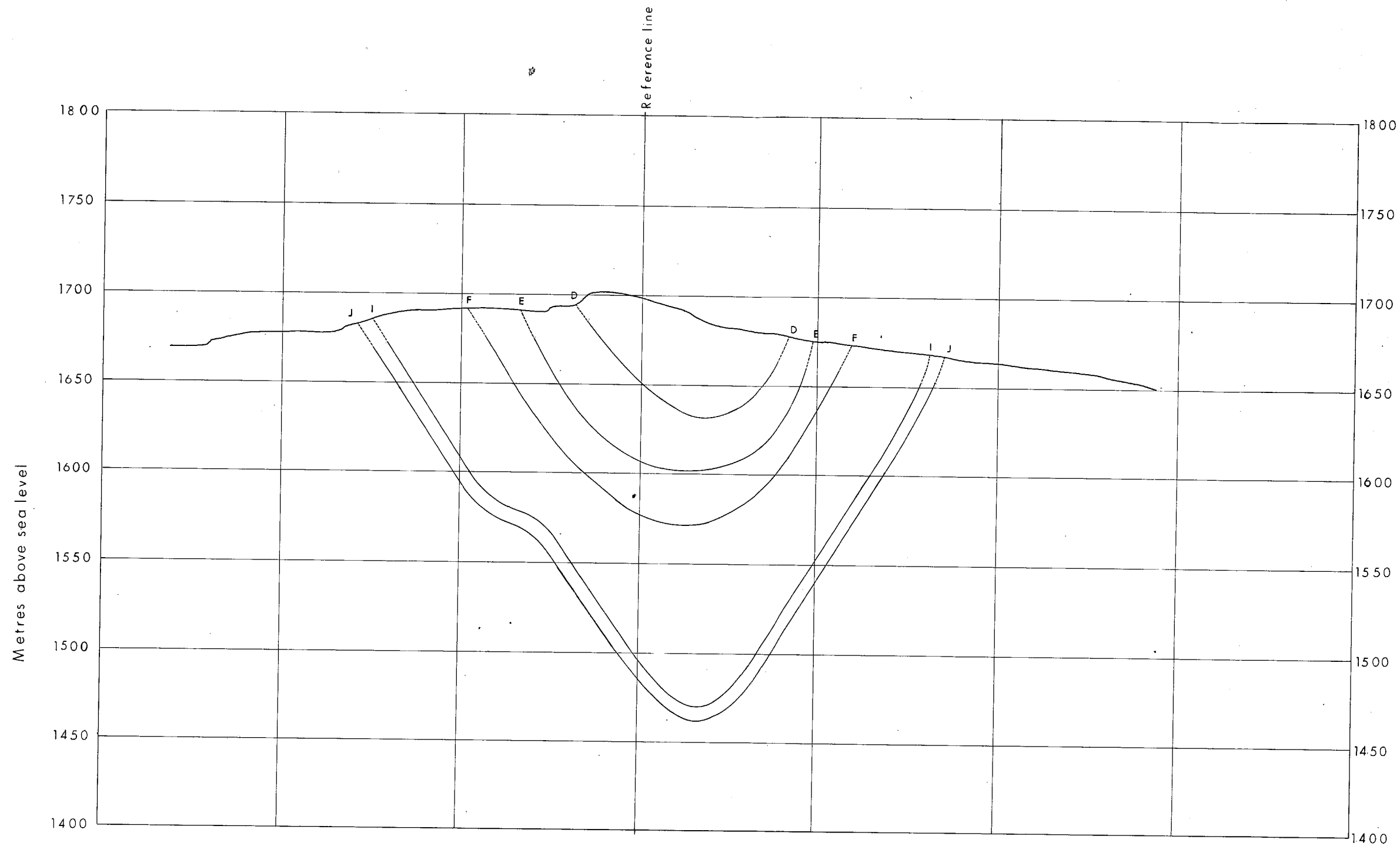
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DATE: SEPT., 76

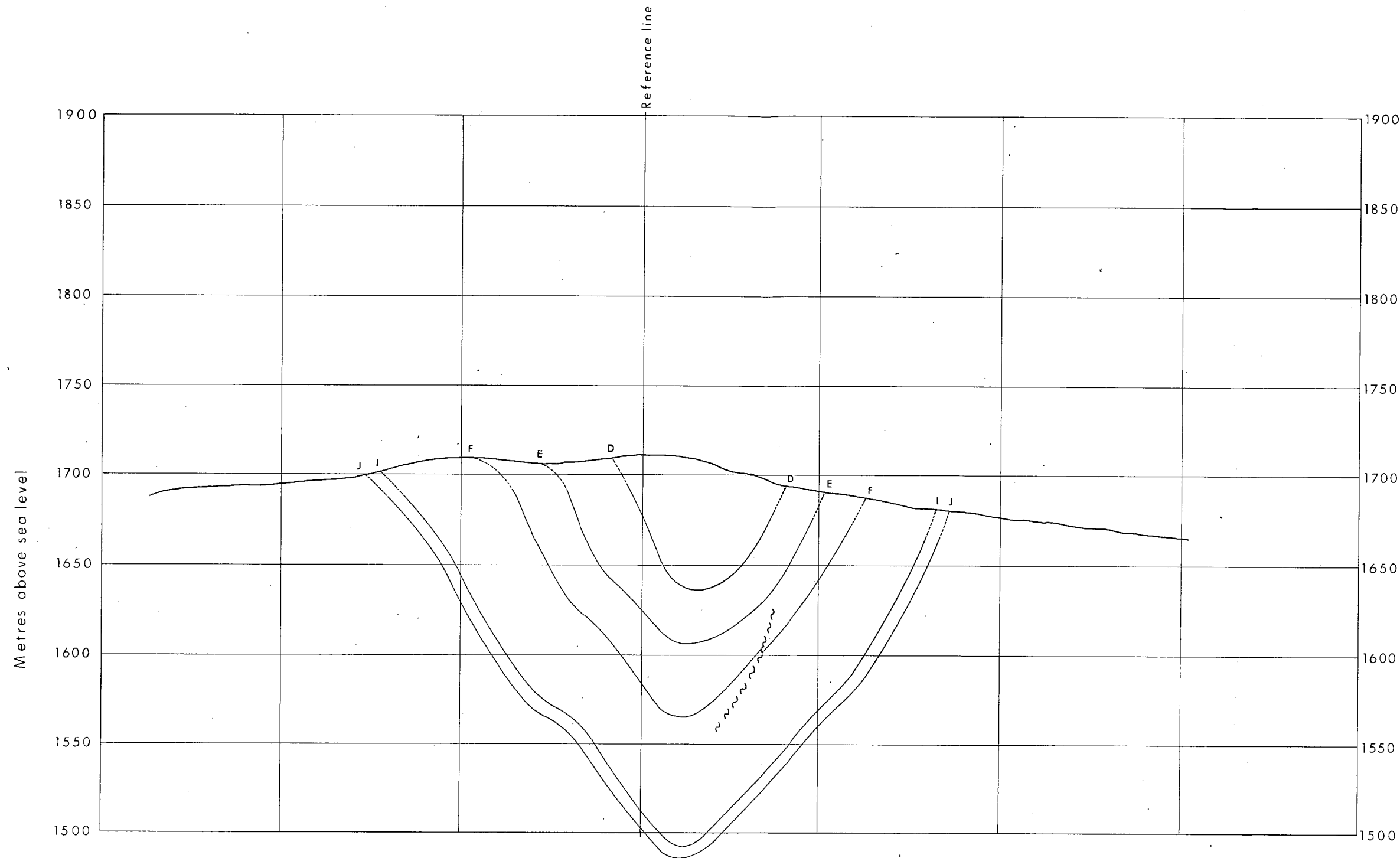
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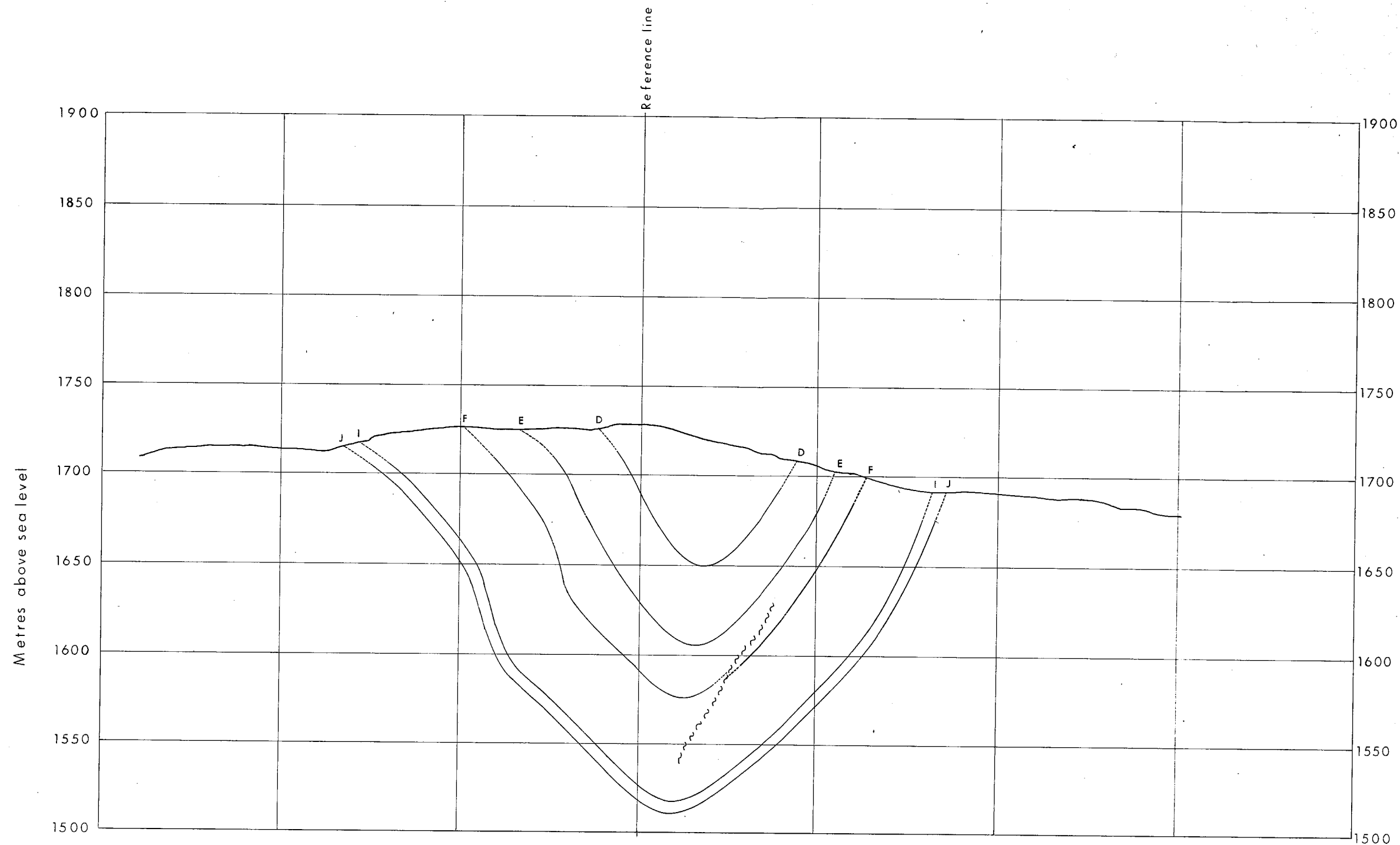
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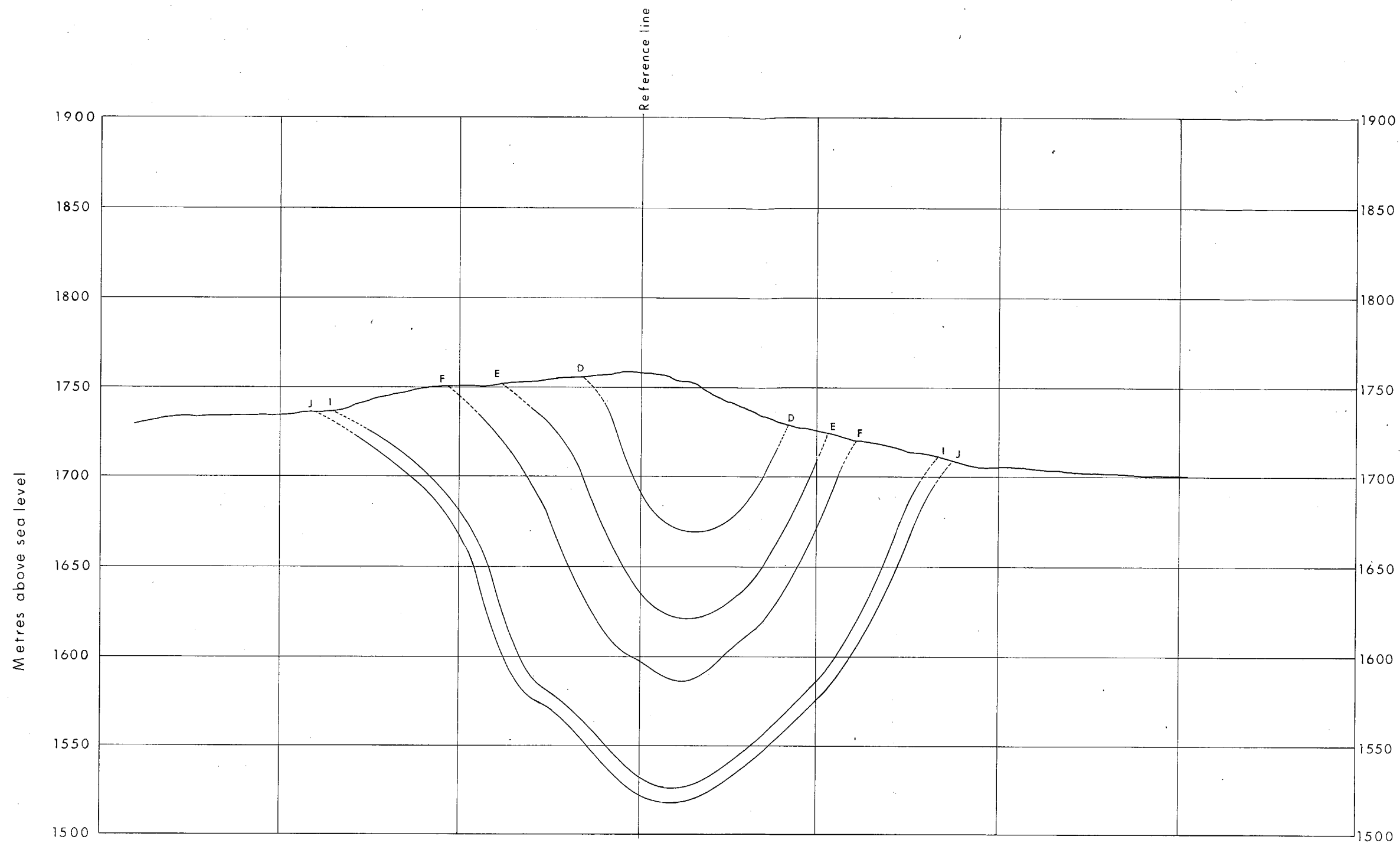
QUINTETTE COAL LIMITED		
PREPARED BY: DENISON COAL LIMITED		
CALGARY	ALBERTA	
<i>PR Quintette 76(2) B</i> <b>ROMAN MOUNTAIN</b>		
CROSS SECTION R7609		
DRAWN BY: J.W. K.	DATE: SEPT., 76	SCALE: 1:2500
APPROVED BY:	DRAWING NO: QNTT76-0674-R01	



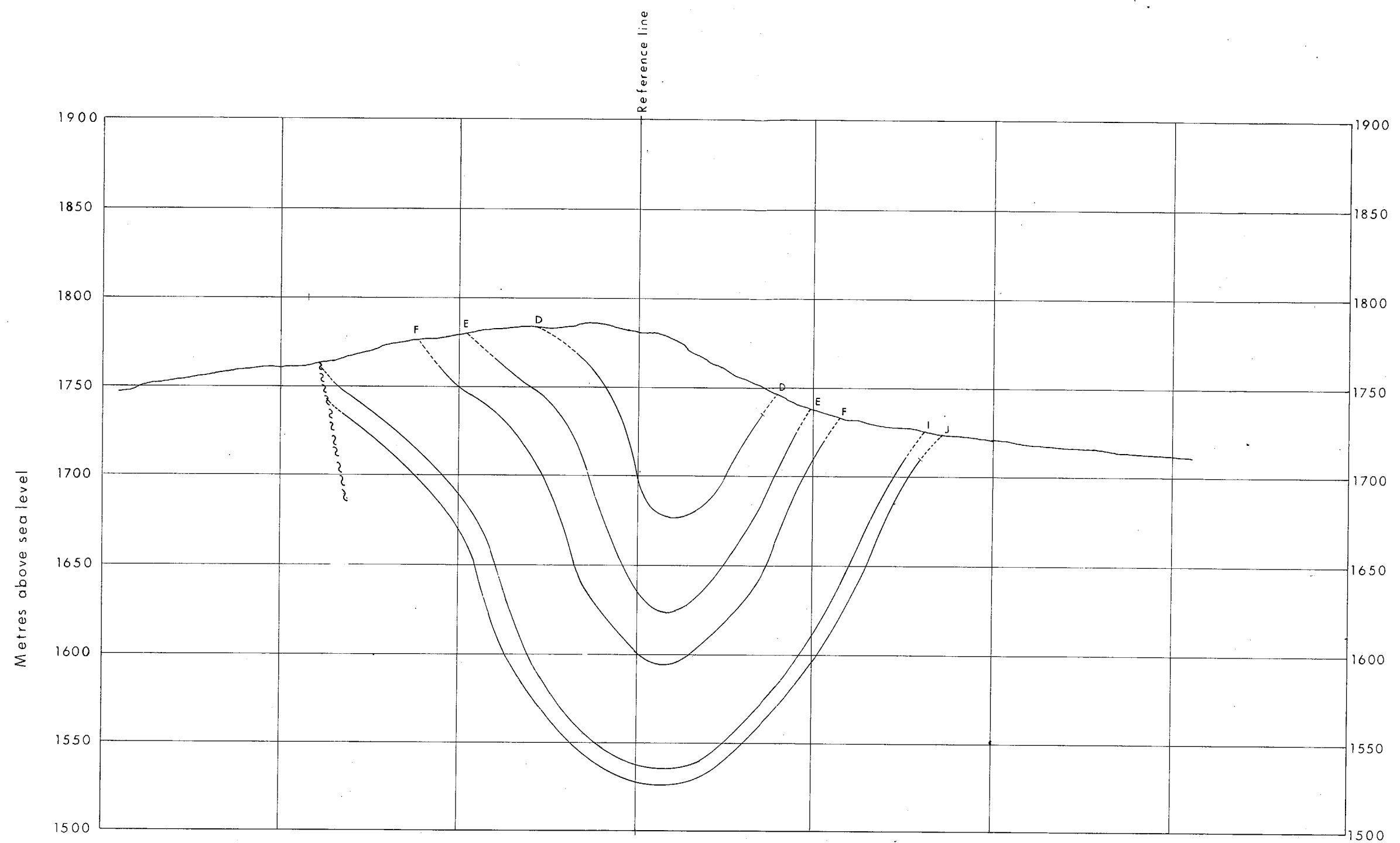
QUINTETTE COAL LIMITED		
PREPARED BY: DENISON COAL LIMITED		
CALGARY	ALBERTA	
<i>PR- Quintette 74(2) B.</i> <b>ROMAN MOUNTAIN</b>		
CROSS SECTION R7610		
DRAWN BY: J.W.K.	DATE: SEPT., 76	SCALE: 1:2500
APPROVED BY:	DRAWING NO: QNTT 76-0674-R01	



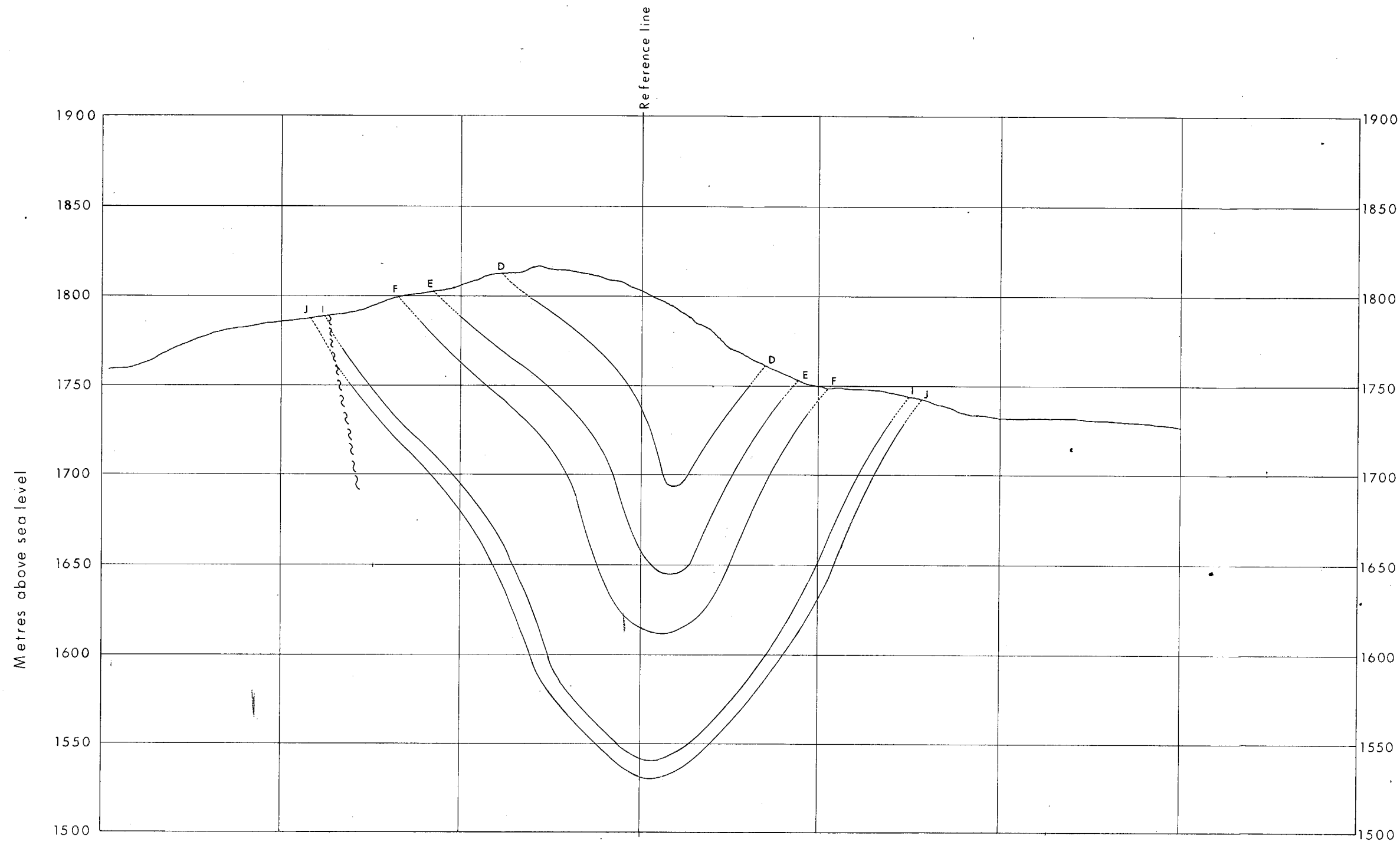
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PREPARED BY: DENISON COAL LIMITED		
CALGARY	ALBERTA	
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DRAWN BY: J. W. K.	DATE: SEPT., 76	SCALE: 1:2500
APPROVED BY:	DRAWING NO: QNTT76-0674-R01	



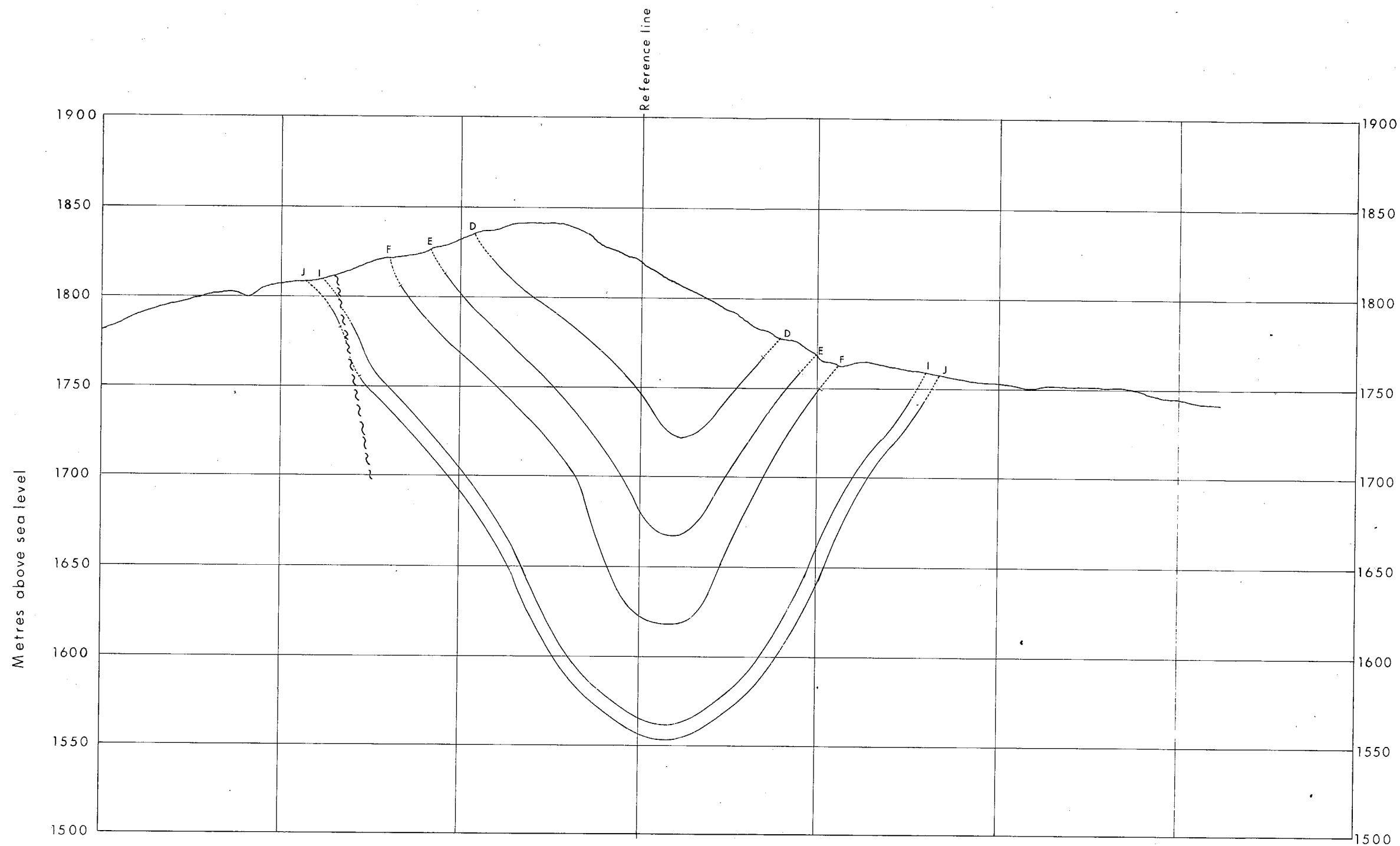
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PREPARED BY: DENISON COAL LIMITED		
CALGARY	ALBERTA	
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DRAWN BY: J. W. K.	DATE: SEPT., 76	SCALE: 1:2500
APPROVED BY:	DRAWING NO: QNTT 76-0674-R01	



QUINTETTE COAL LIMITED		
PREPARED BY: DENISON COAL LIMITED		
CALGARY	ALBERTA	
PR-Quintette 76(2) B ROMAN MOUNTAIN		
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DRAWN BY: J.W.K.	DATE: SEPT., 76	SCALE: 1:2500
APPROVED BY:	DRAWING NO: QNTT76-0674-R01	



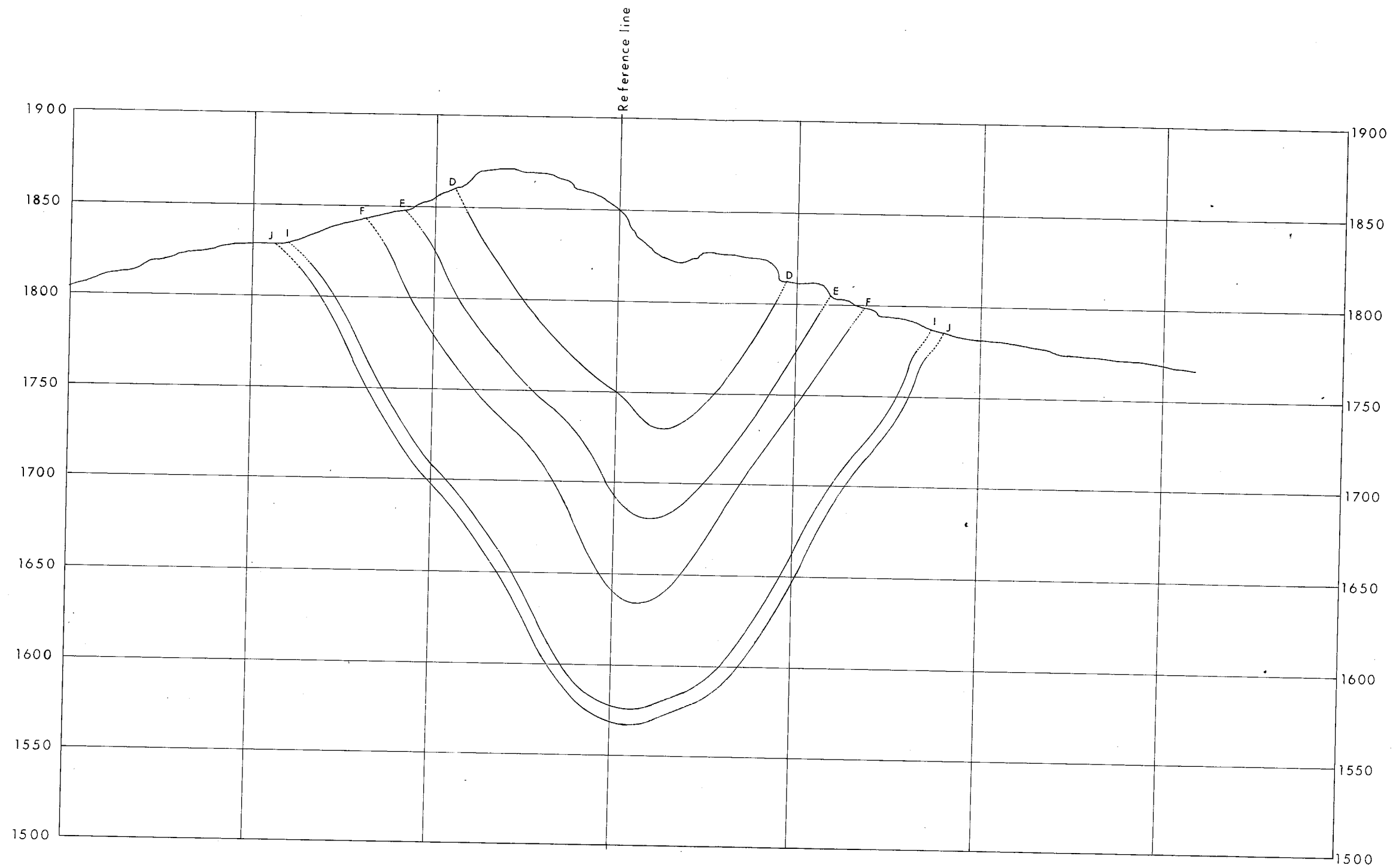
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PREPARED BY: DENISON COAL LIMITED		
CALGARY	ALBERTA	
ROMAN MOUNTAIN <i>PR-Quintette 76(2)B</i> CROSS SECTION R7614		
DRAWN BY: J.W.K.	DATE: SEPT., 76	SCALE: 1:2500
APPROVED BY:	DRAWING NO. QNTT76-0674-R01	



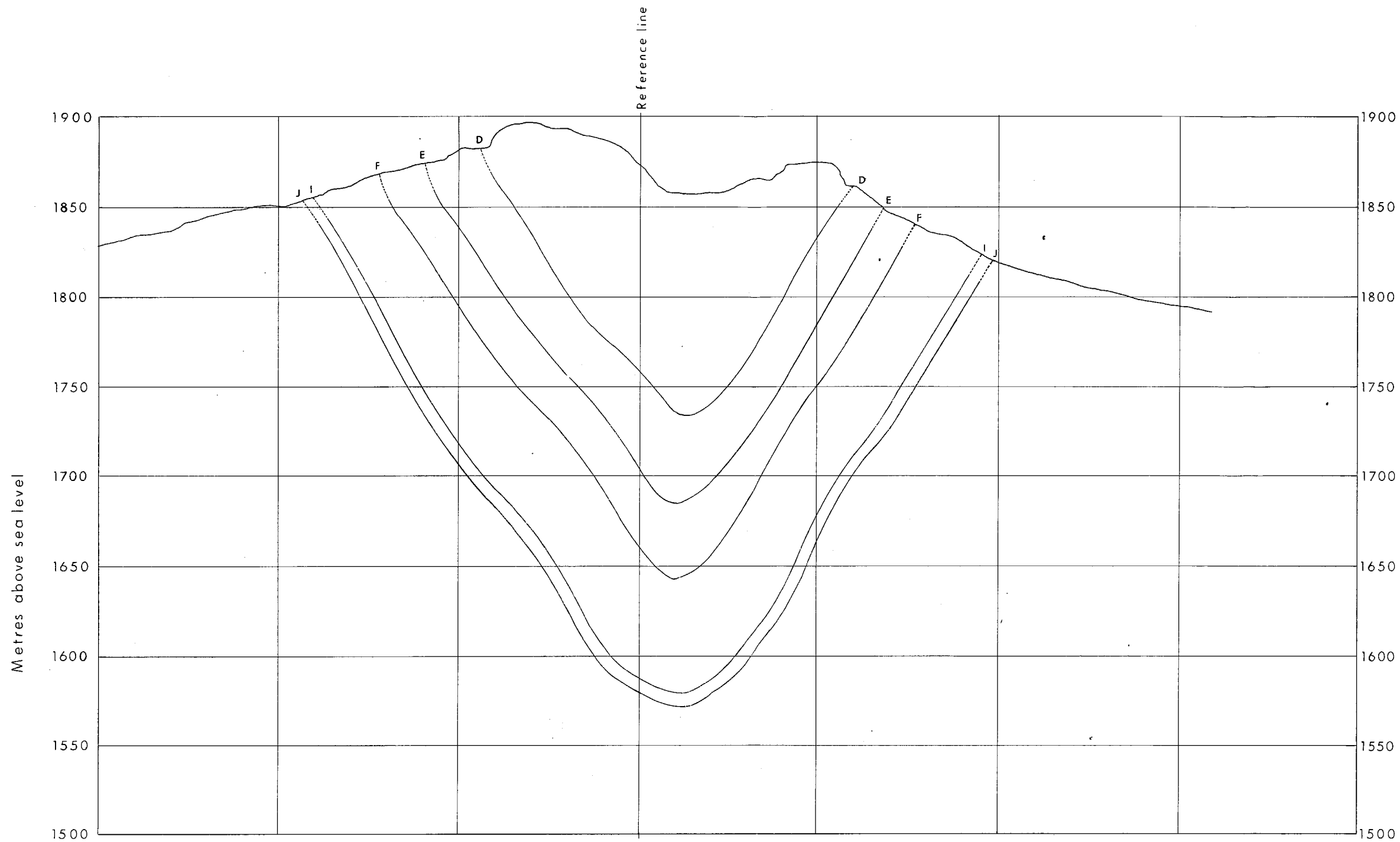
QUINTETTE COAL LIMITED		
PREPARED BY: DENISON COAL LIMITED		
CALGARY	ALBERTA	
<i>PR-Quintette 76(2) B</i> <b>ROMAN MOUNTAIN</b>		
CROSS SECTION R76 <u>15</u>		
DRAWN BY: J.W.K.	DATE: SEPT., 76	SCALE: 1:2500
APPROVED BY:	DRAWING NO: QNTT 76-0674-R01	



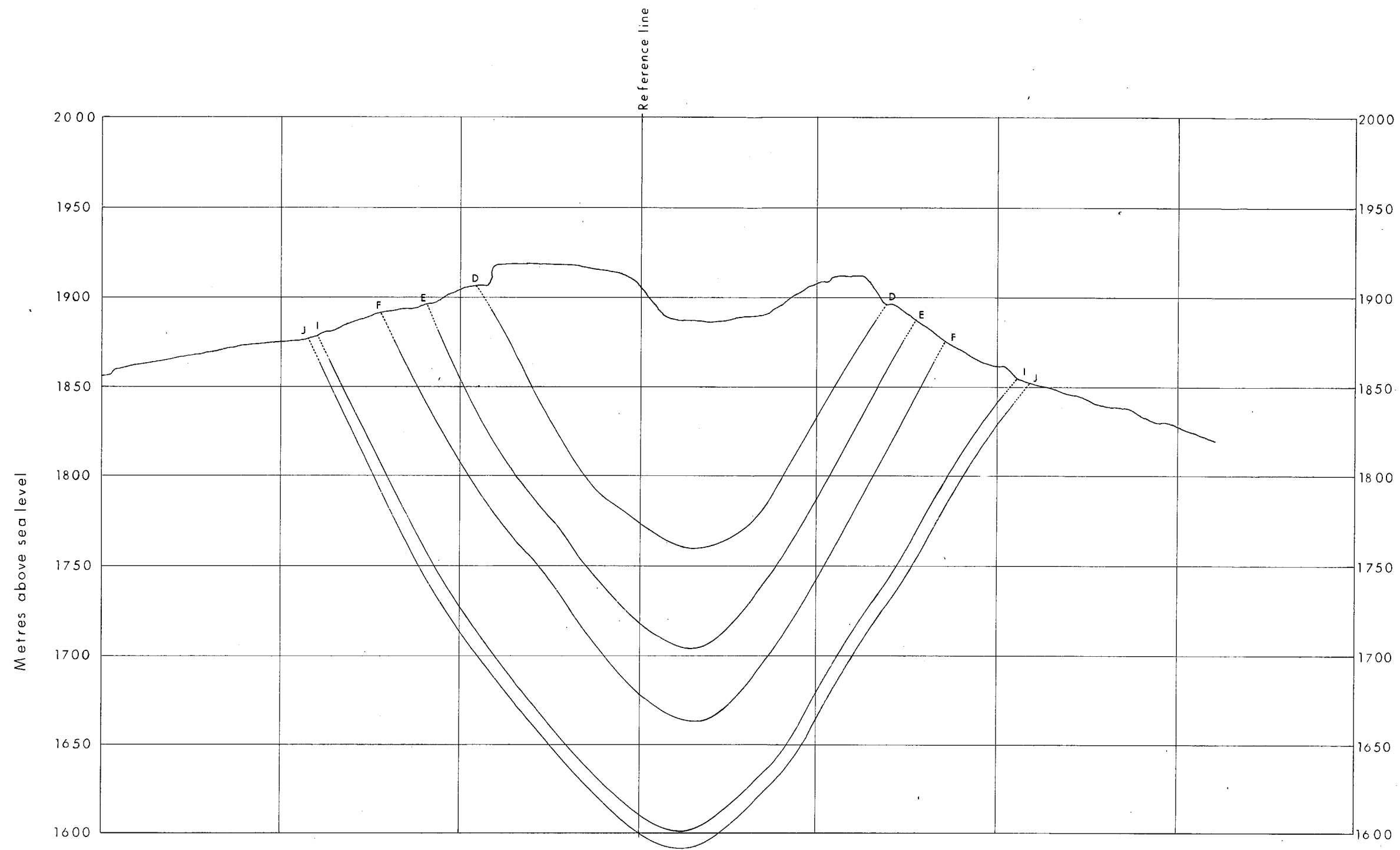
Metres above sea level



QUINTETTE COAL LIMITED		
PREPARED BY: DENISON COAL LIMITED		
CALGARY	ALBERTA	
PR-Quintette 76(2) B ROMAN MOUNTAIN		
CROSS SECTION R76.16		
DRAWN BY: J.W. K.	DATE: SEPT., 76	SCALE: 1:2500
APPROVED BY:	DRAWING NO: QNTT76-0674-R01	



QUINTETTE COAL LIMITED		
PREPARED BY: DENISON COAL LIMITED		
CALGARY	ALBERTA	
PR-Quintette 76(2) B. ROMAN MOUNTAIN		
CROSS SECTION R76.17		
DRAWN BY: J.W.K.	DATE: SEPT., 76	SCALE: 1:2500
APPROVED BY:	DRAWING NO: QNTT76-0674-R01	



QUINTETTE COAL LIMITED

PREPARED BY:  
DENISON COAL LIMITED

CALGARY

ALBERTA



PR-Quintette 76(2) B  
ROMAN MOUNTAIN

CROSS SECTION R76.18

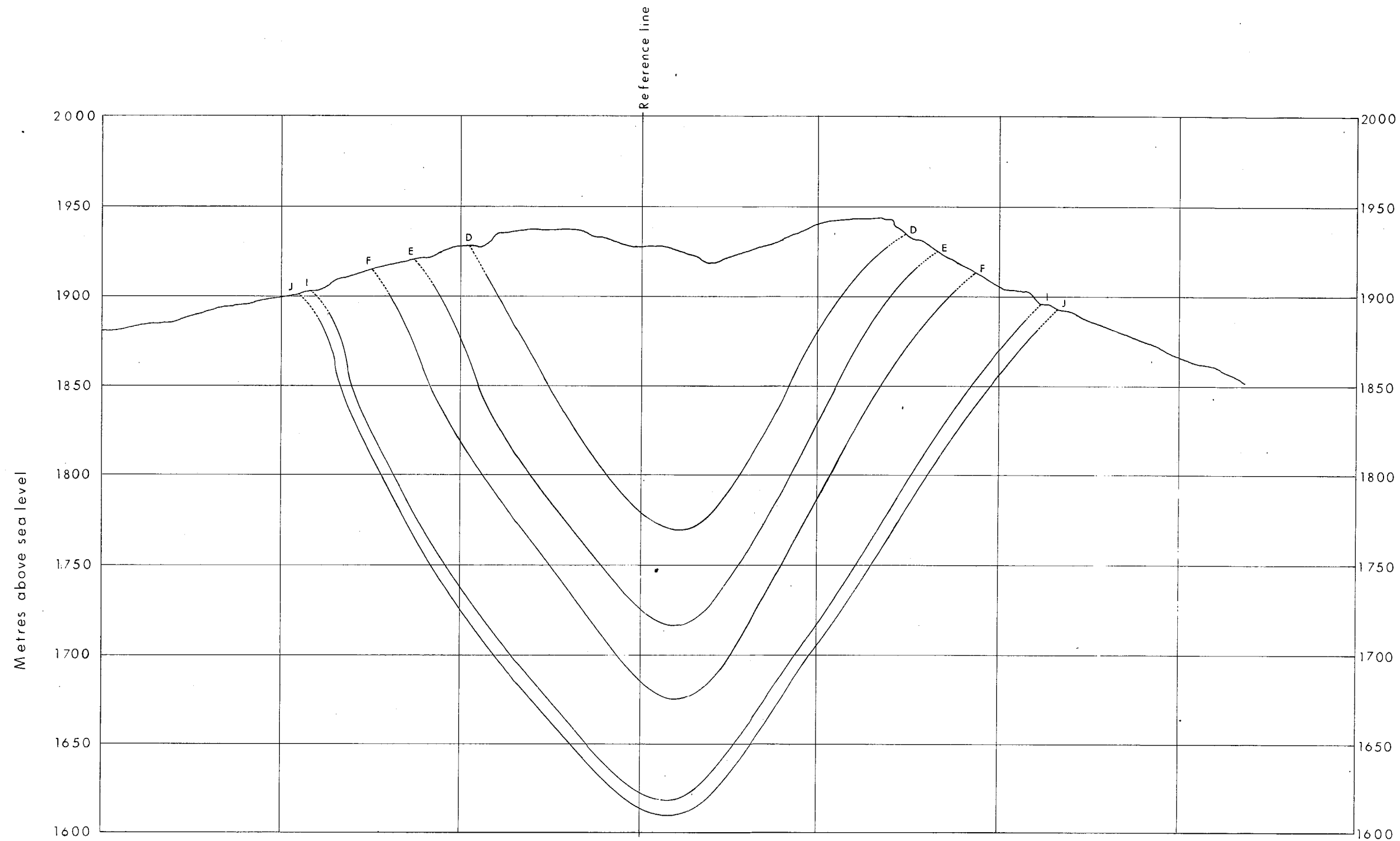
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DATE: SEPT., 76

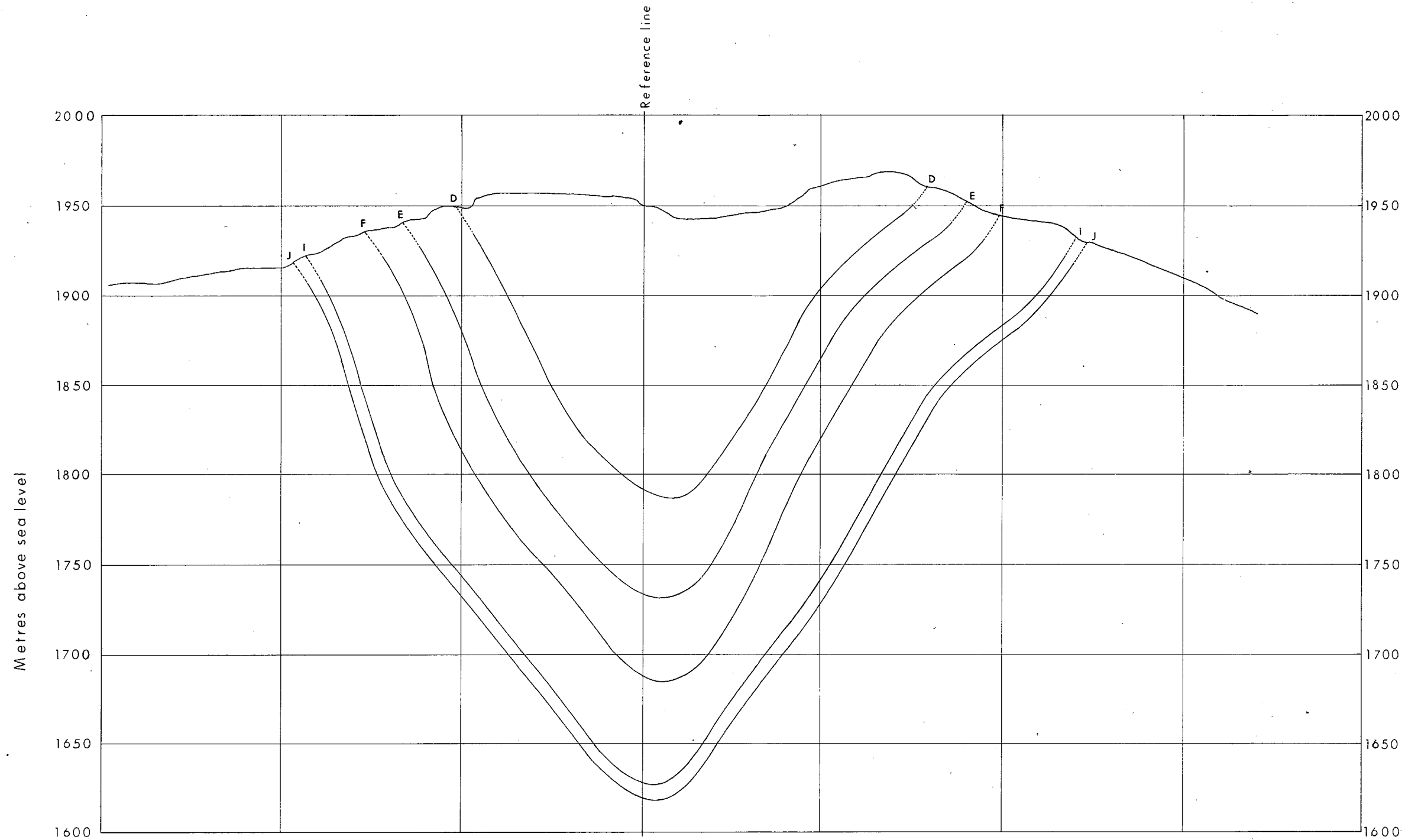
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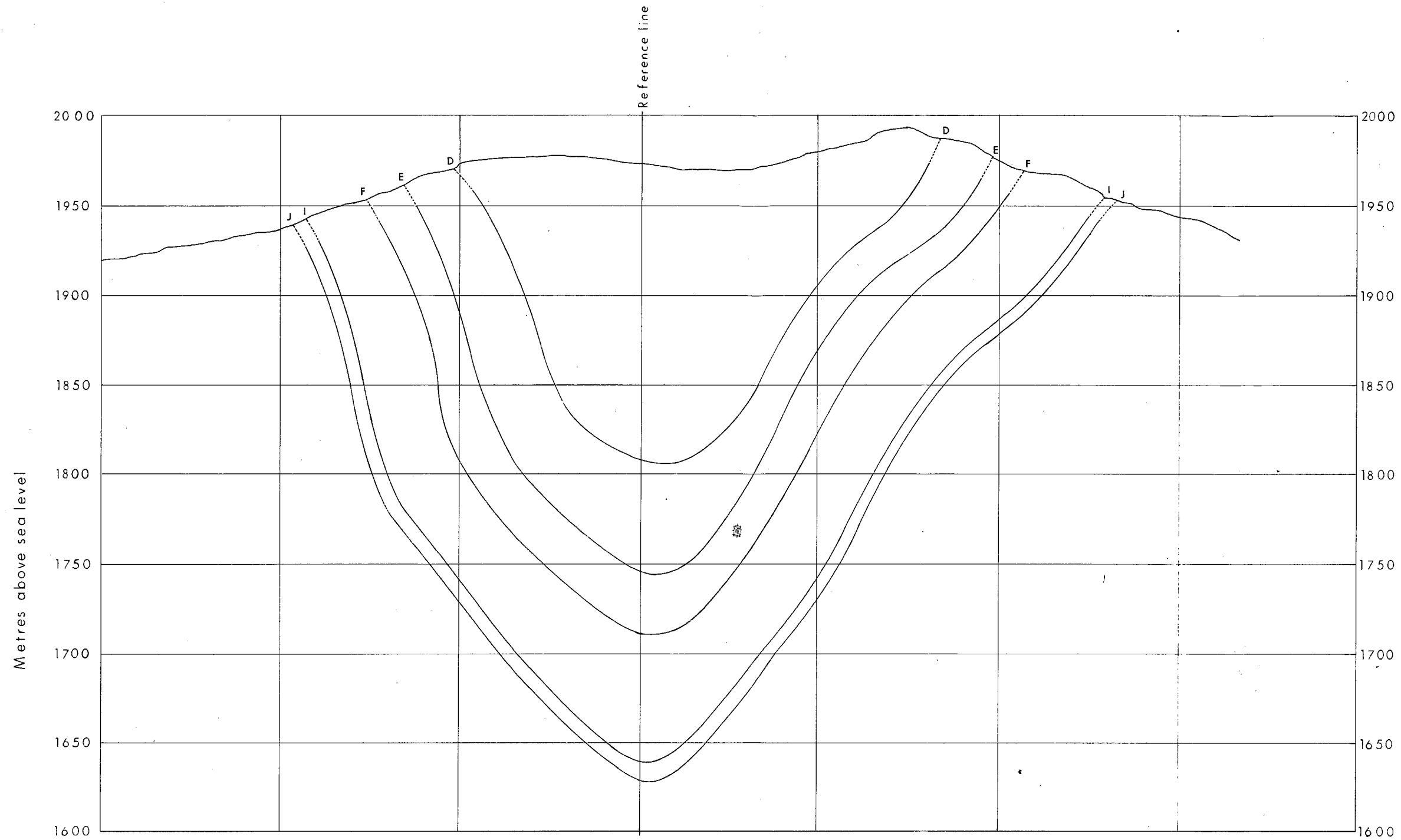
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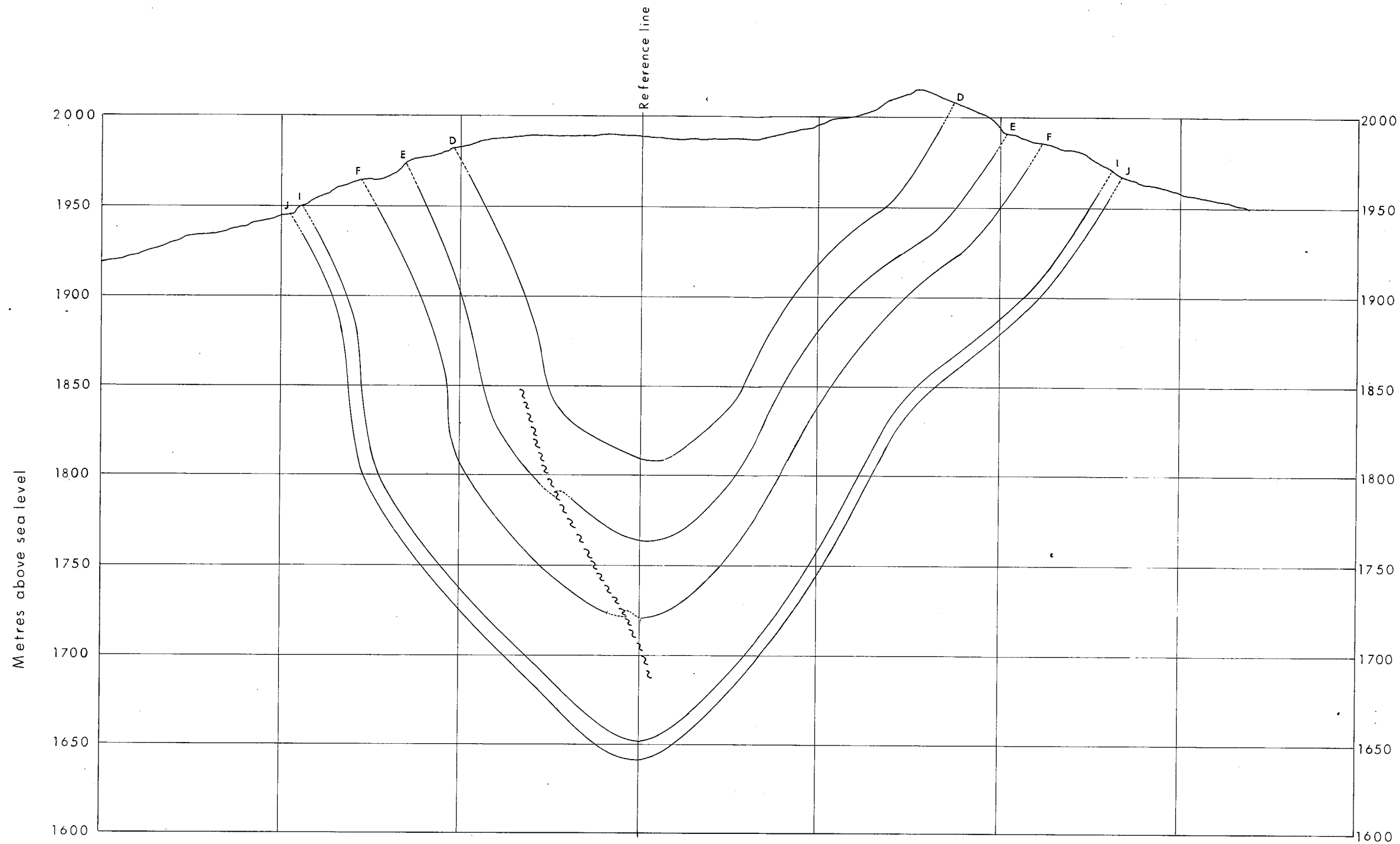
QUINTETTE COAL LIMITED		
PREPARED BY: DENISON COAL LIMITED		
CALGARY	ALBERTA	
PR-Quintette 76(2) B. <b>ROMAN MOUNTAIN</b> CROSS SECTION R76 <u>19</u>		
DRAWN BY: J.W.K.	DATE: SEPT., 76	SCALE: 1:2500
APPROVED BY:	DRAWING NO: QNTT76-0674-R01	



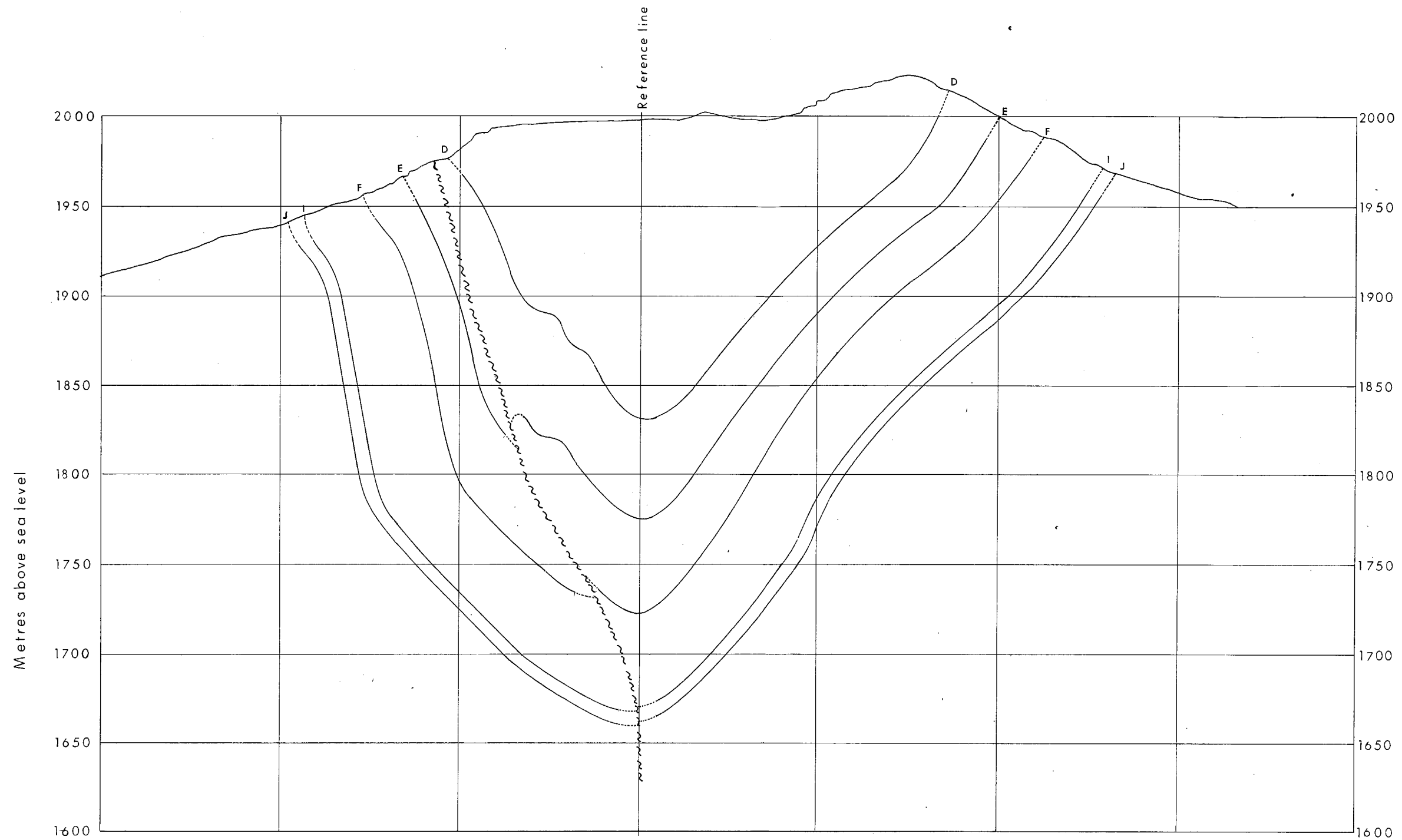
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PREPARED BY: DENISON COAL LIMITED		
CALGARY	ALBERTA	
PR-Quintette-76(2)B. ROMAN MOUNTAIN		
CROSS SECTION R7620		
DRAWN BY: J.W.K.	DATE: SEPT., 76	SCALE: 1:2500
APPROVED BY:	DRAWING NO: QNTT76-0674-R01	



QUINTETTE COAL LIMITED		
PREPARED BY: DENISON COAL LIMITED		
CALGARY	ALBERTA	
<i>PR - Quintette 76(2) B.</i> <b>ROMAN MOUNTAIN</b>		
CROSS SECTION R7621		
DRAWN BY: J. W. K.	DATE: SEPT., '76	SCALE: 1:2500
APPROVED BY:	DRAWING NO: QNTT 76- 0674-R01	



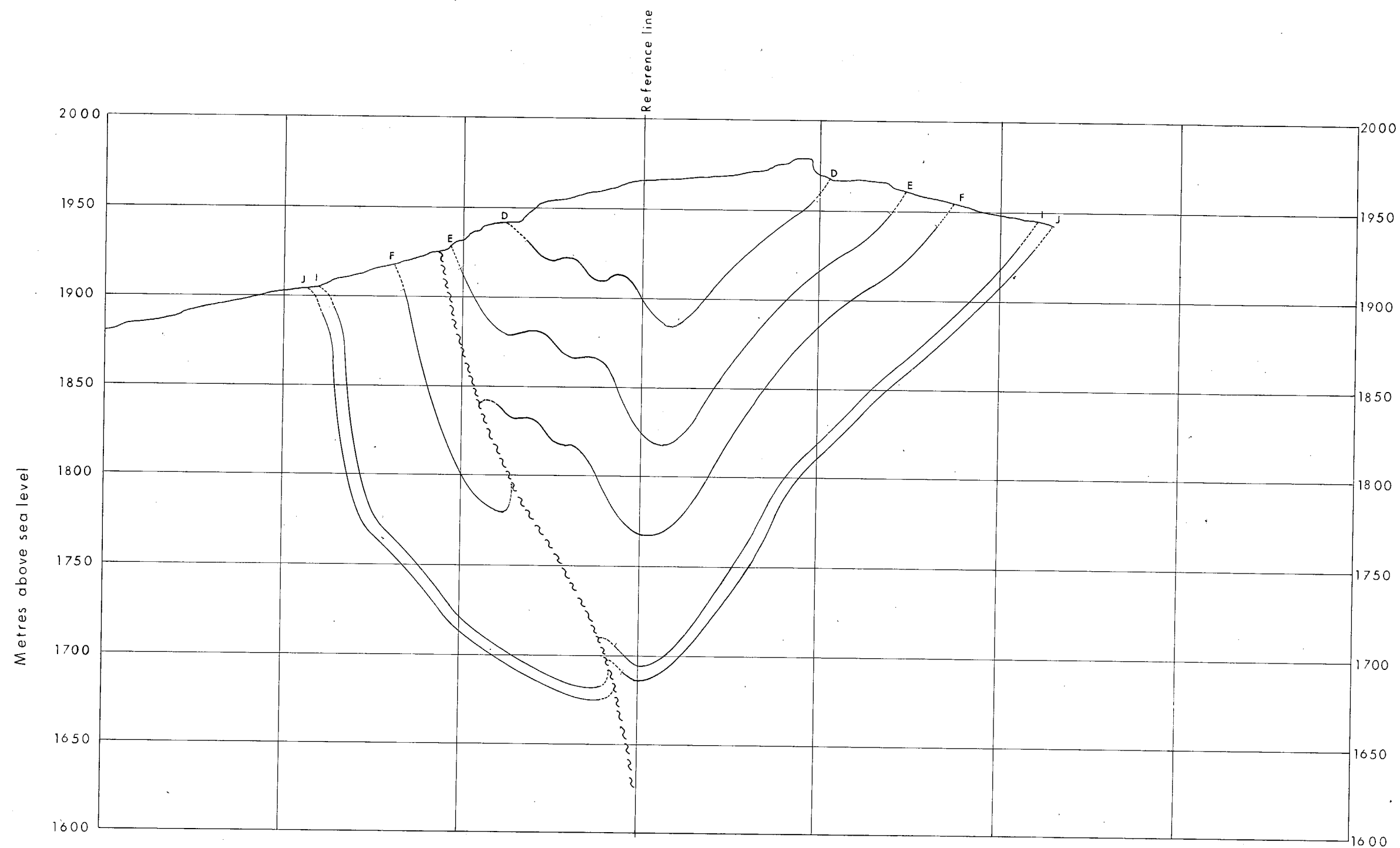
QUINTETTE COAL LIMITED		
PREPARED BY: DENISON COAL LIMITED		
CALGARY	ALBERTA	
<i>PR-Quintette 76(2) B.</i> <b>ROMAN MOUNTAIN</b>		
CROSS SECTION R7622		
DRAWN BY: J.W.K.	DATE: SEPT., 76	SCALE: 1:2500
APPROVED BY:	DRAWING NO: QNTT76-0674-R01	



QUINTETTE COAL LIMITED		
PREPARED BY: DENISON COAL LIMITED		
CALGARY	ALBERTA	
<i>PR - Quintette 76(2) B.</i> <b>ROMAN MOUNTAIN</b>		
CROSS SECTION R7623		
DRAWN BY: J.W.K.	DATE: SEPT., 76	SCALE: 1:2500
APPROVED BY:	DRAWING NO: QNTT 76-0674-R01	







QUINTETTE COAL LIMITED

PREPARED BY:  
DENISON COAL LIMITED

CALGARY

ALBERTA



PR-Quintette 76 (2) B  
ROMAN MOUNTAIN

CROSS SECTION R7625

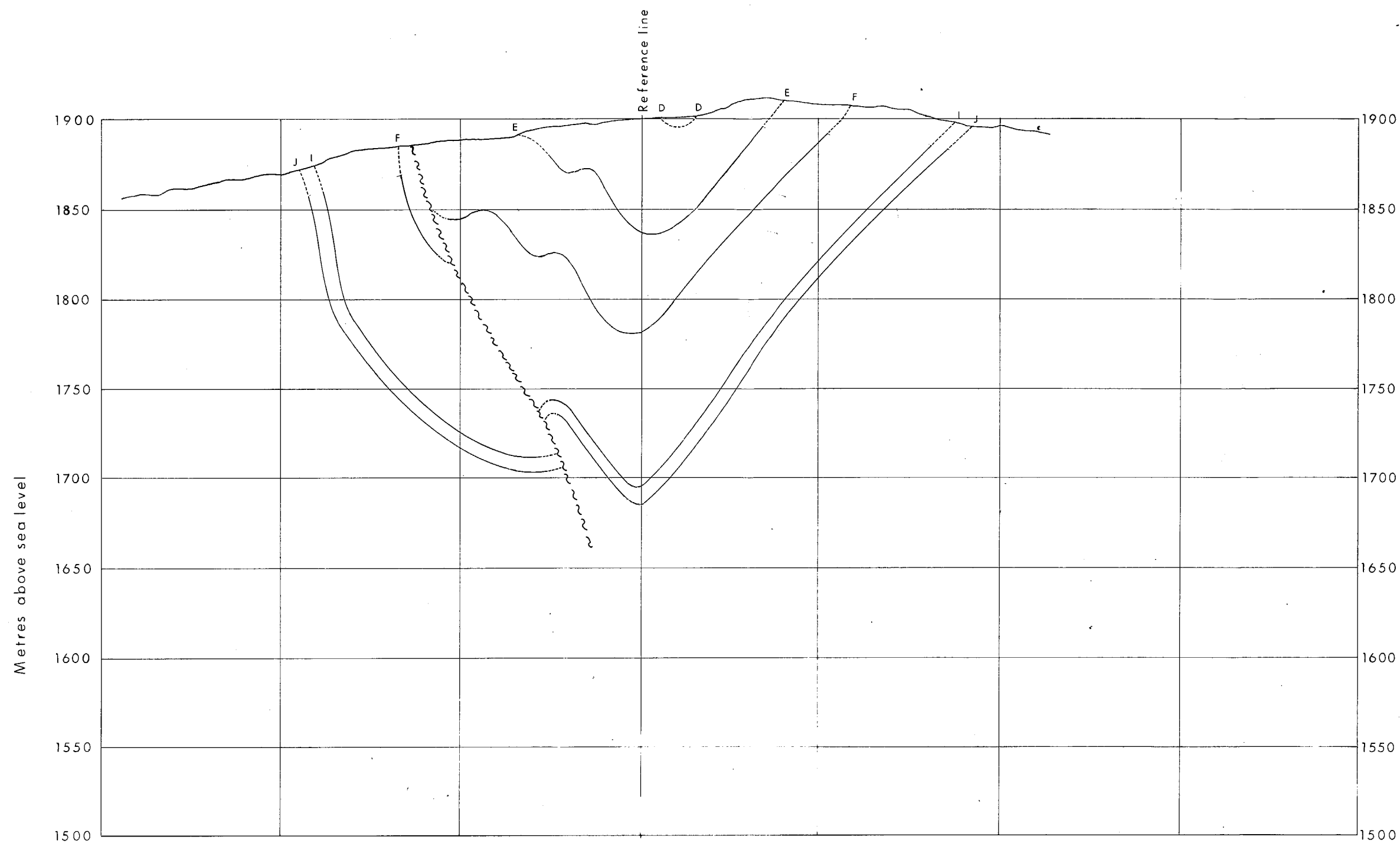
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DATE: SEPT., 76

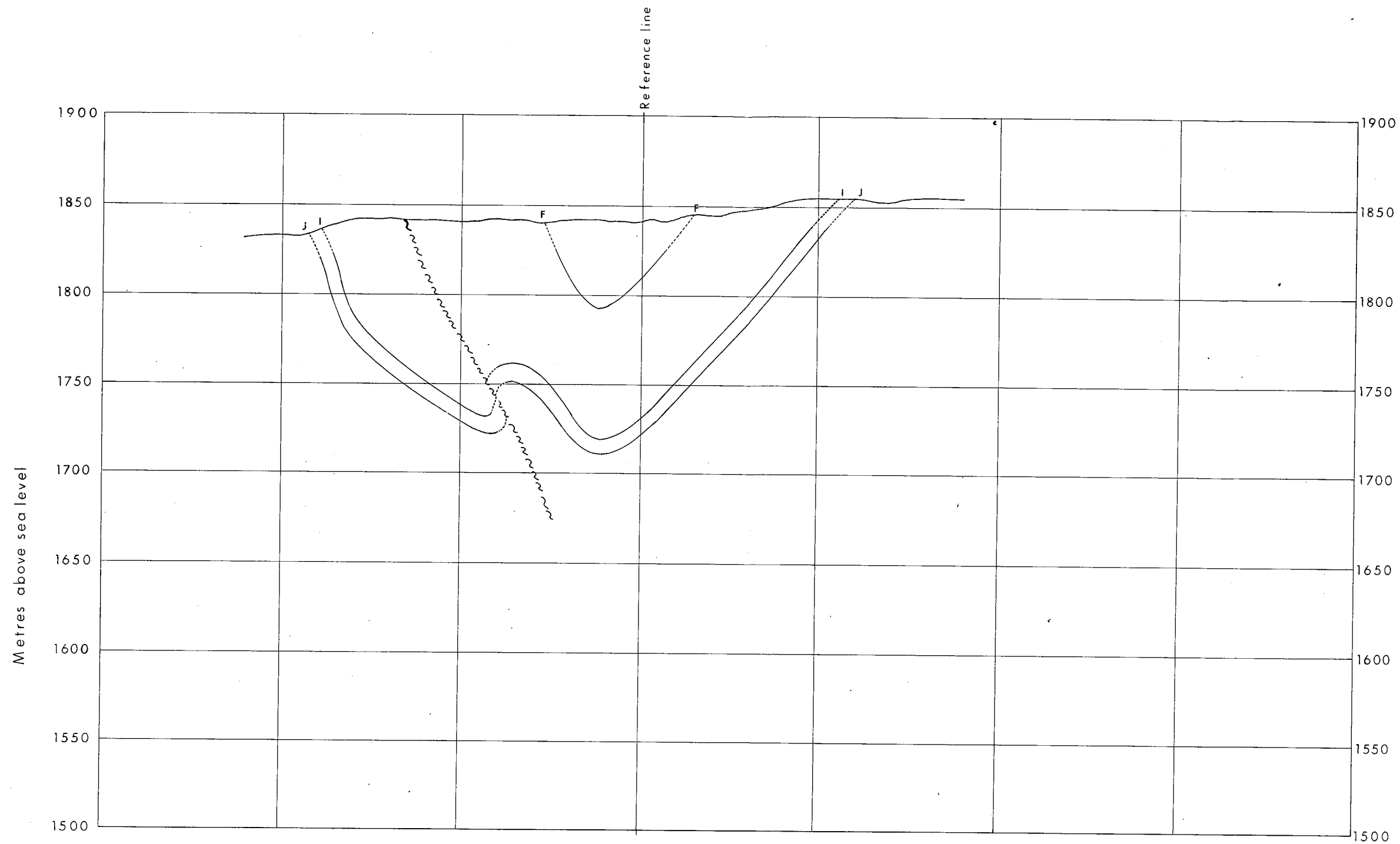
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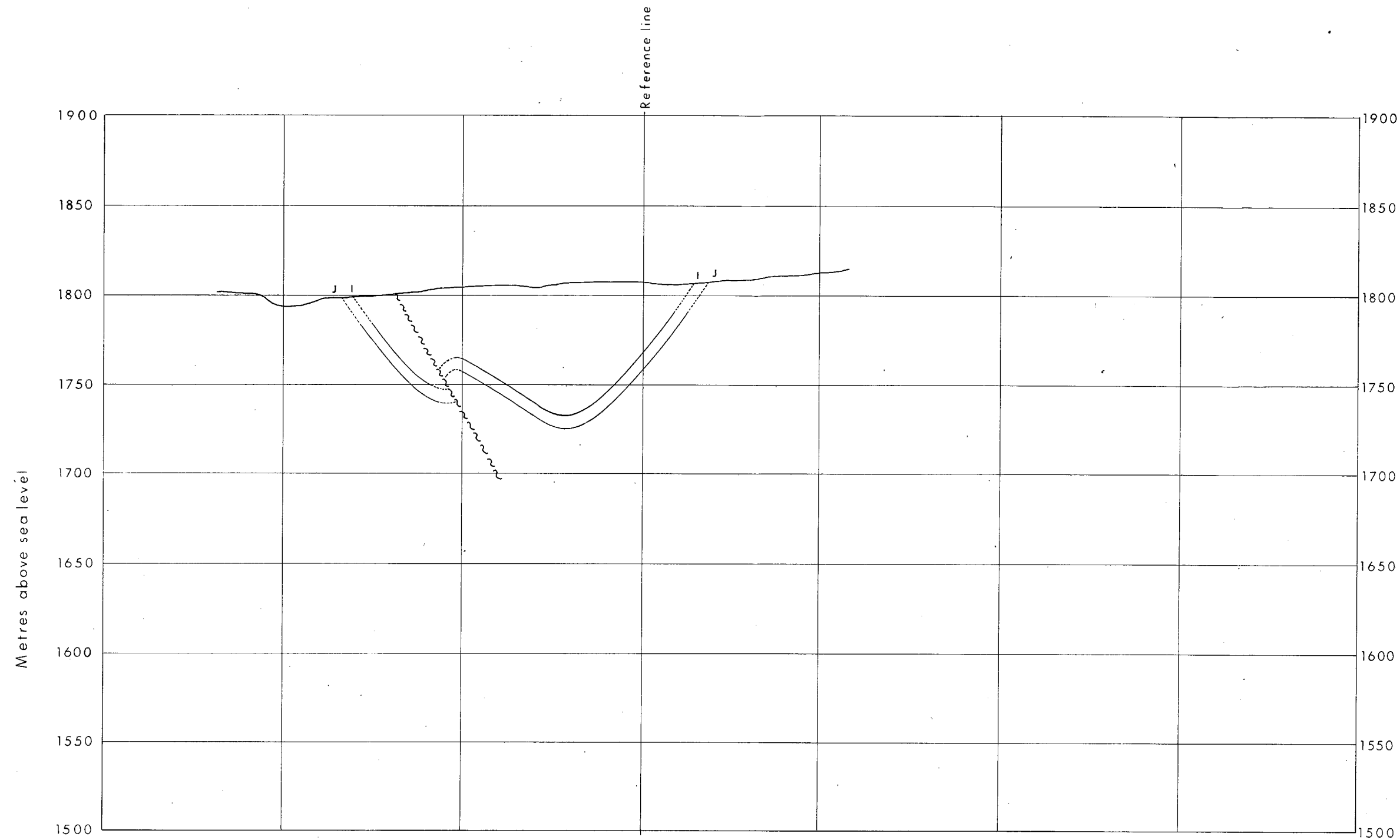
DRAWING NO: QNTT 76-06.74-R01



QUINTETTE COAL LIMITED		
PREPARED BY: DENISON COAL LIMITED		
CALGARY	ALBERTA	
		
PR-Quintette 79 (2) B. ROMAN MOUNTAIN		
CROSS SECTION R76.26		
DRAWN BY:	DATE:	SCALE:
APPROVED BY:	DRAWING NO:	



QUINTETTE COAL LIMITED		
PREPARED BY: DENISON COAL LIMITED		
CALGARY	ALBERTA	
<i>PR-Quintette 76 (2) B.</i> <b>ROMAN MOUNTAIN</b>		
CROSS SECTION R7627		
DRAWN BY: J.W.K.	DATE: SEPT., 76	SCALE: 1:2500
APPROVED BY:	DRAWING NO: QNTT76-0674-R 01	



QUINTETTE COAL LIMITED

PREPARED BY:  
DENISON COAL LIMITED

CALGARY

ALBERTA



PR-Quintette 76(2)B.  
ROMAN MOUNTAIN

CROSS SECTION R7628

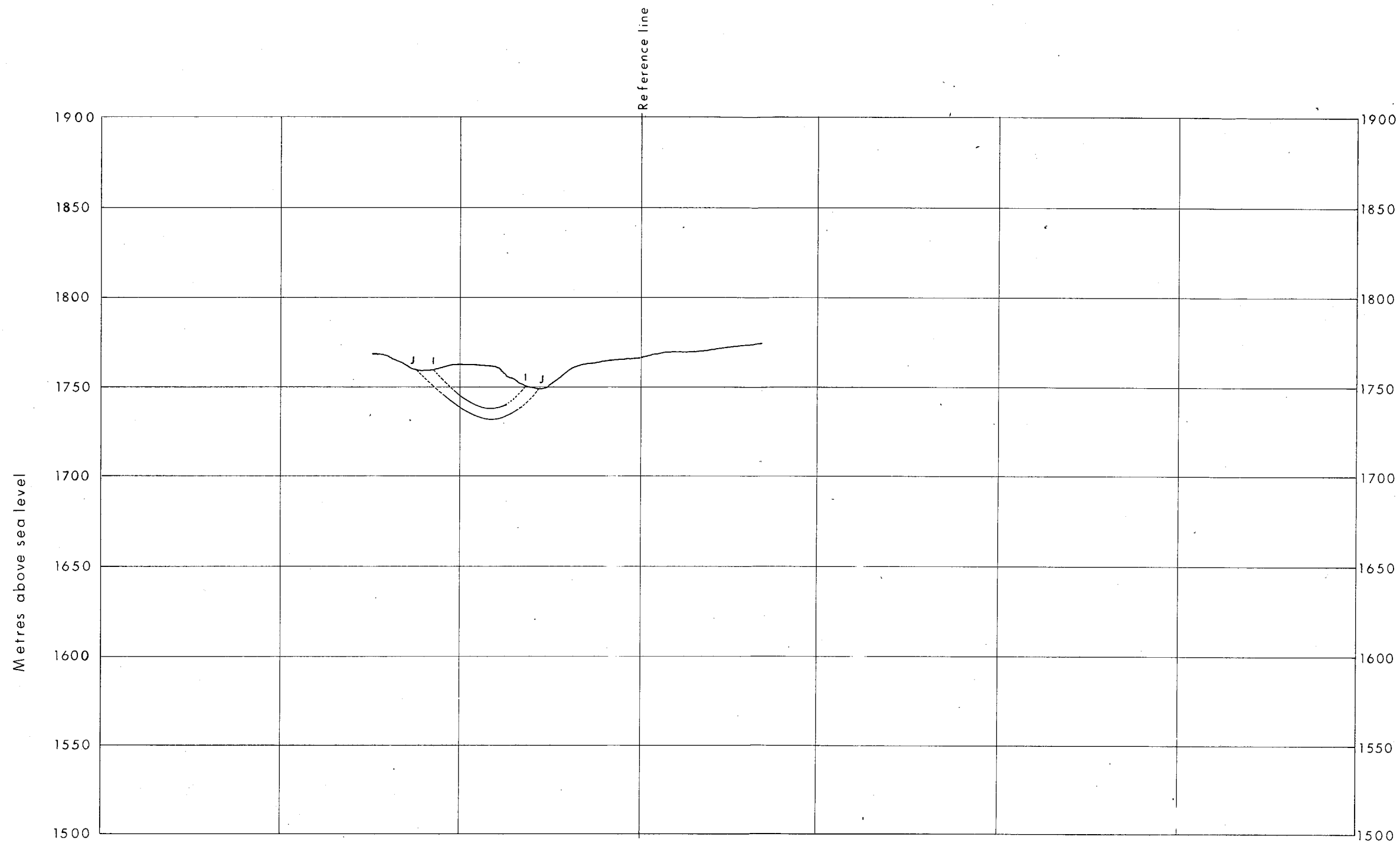
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DATE: SEPT., 76

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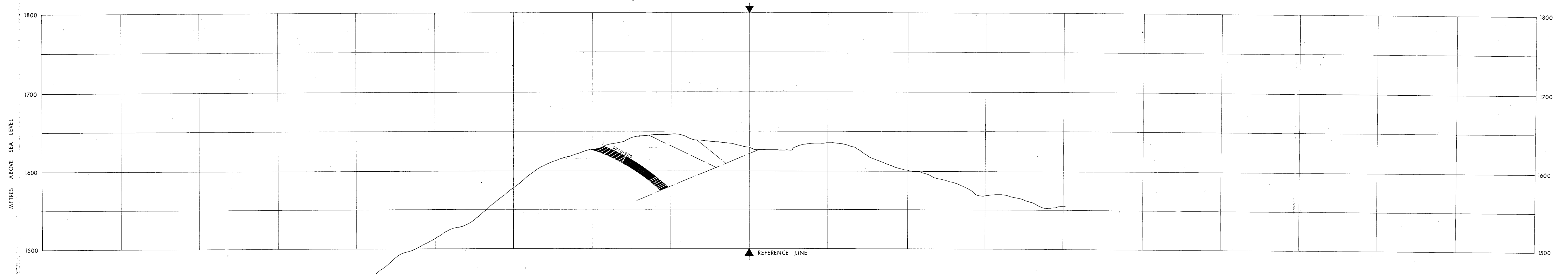
APPROVED BY:

DRAWING NO: QNTT76-0674-R01



QUINTETTE COAL LIMITED		
PREPARED BY: DENISON COAL LIMITED		
CALGARY	ALBERTA	
PR-Quintette 76 (2) B. ROMAN MOUNTAIN		
CROSS SECTION R76 29		
DRAWN BY: J.W.K.	DATE: SEPT., 76	SCALE: 1:2500
APPROVED BY:	DRAWING NO: QNTT 76-0674-R01	

Sheriff  
CROSS SECTION.  
57604 - 57626.



QUINTETTE COAL LIMITED

PREPARED BY:  
DENISON COAL LIMITED

CALGARY

ALBERTA



PR-Quintette 76(2)B

SHERIFF CROSS SECTION N° S7604

DRAWN BY J.W.K.

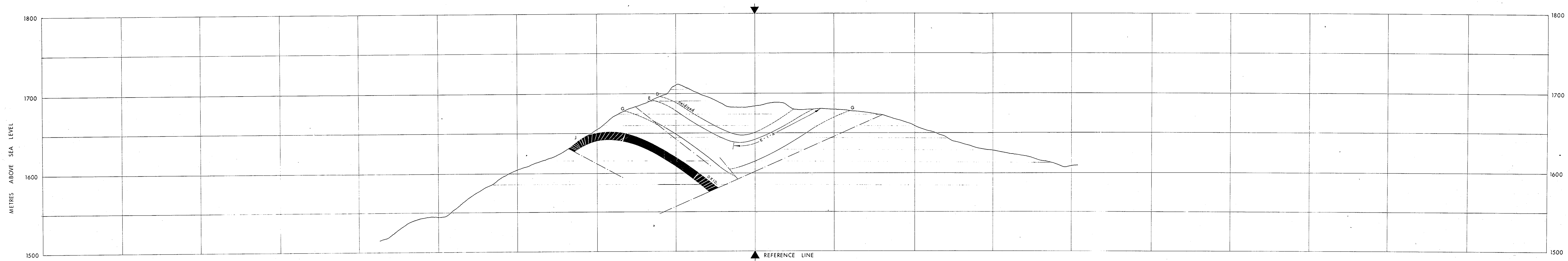
DATE SEPT. 76

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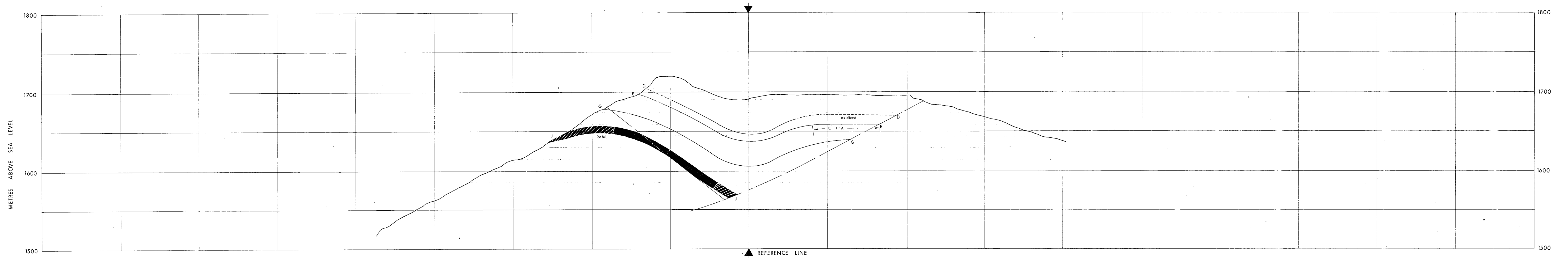
APPROVED BY

DRAWING NO QNTT76-0678-R01





QUINTETTE COAL LIMITED		
PREPARED BY: DENISON COAL LIMITED		
<div style="display: flex; justify-content: space-between;"> <span>CALGARY</span> <span>ALBERTA</span> </div>		
PR-Quintette 76(2)B		
SHERIFF CROSS SECTION N° S7605		
DRAWN BY: J VV K	DATE: SEPT. 76	SCALE: 1:2500
APPROVED BY:	DRAWING NO: QNTT 76-0678-R01	



QUINTETTE COAL LIMITED

PREPARED BY  
DENISON COAL LIMITED

CALGARY

ALBERTA



PK-Quintette T6 (2) B

SHERIFF CROSS SECTION N° S7606

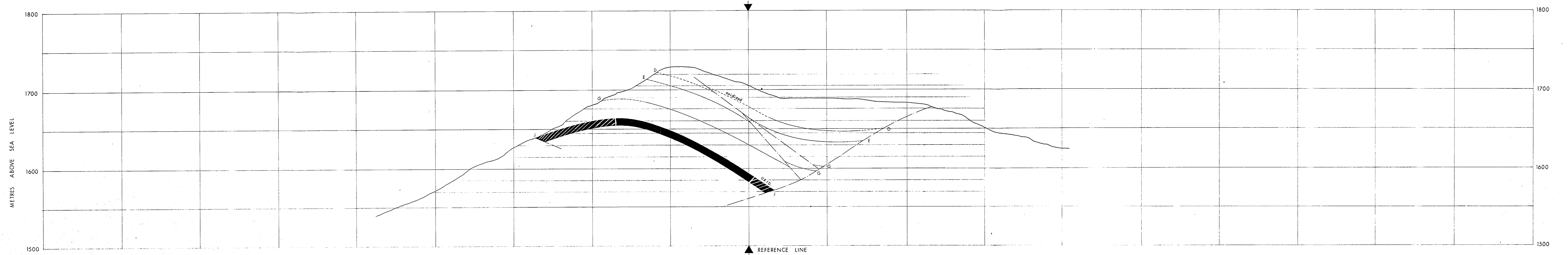
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DATE SEPT. 76

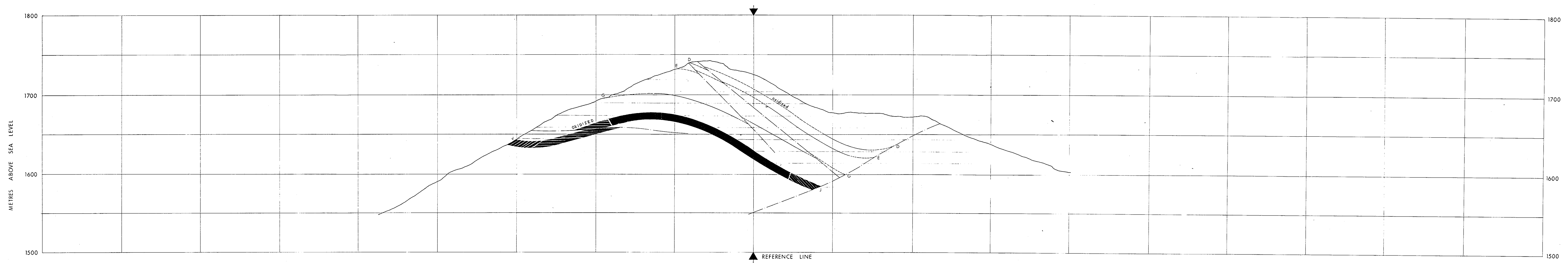
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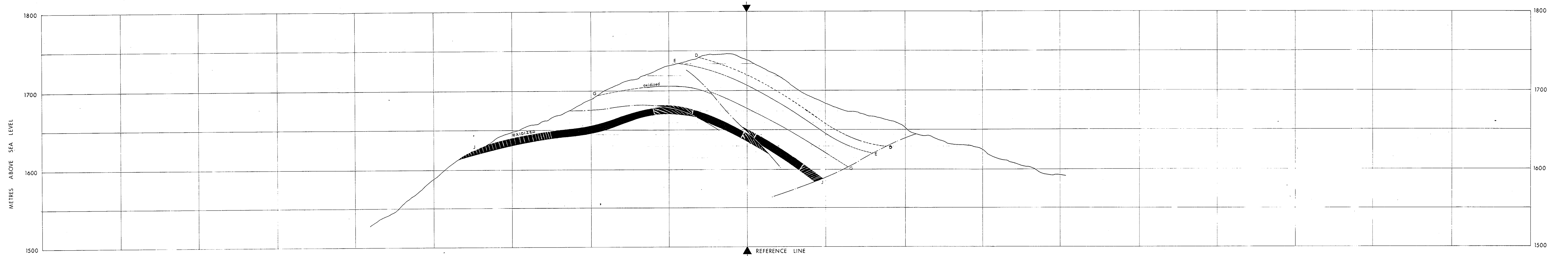
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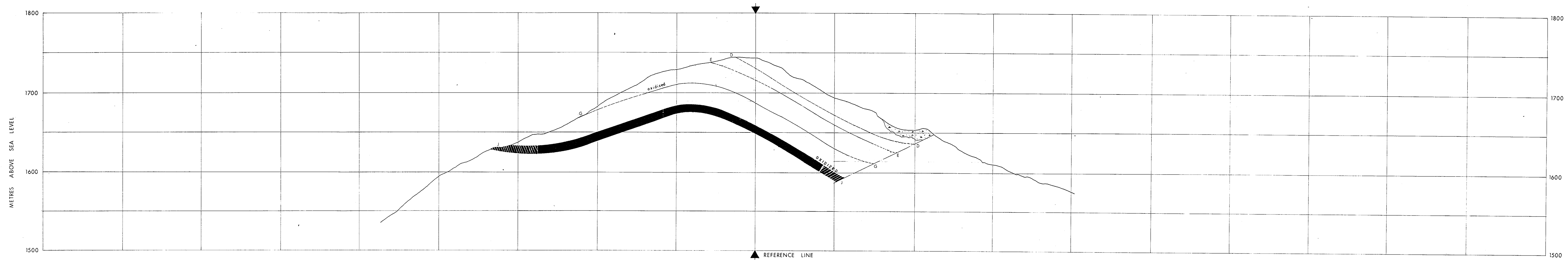
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PREPARED BY: DENISON COAL LIMITED		
CALGARY	ALBERTA	
PR-Quintette 76(2)B		
SHERIFF CROSS SECTION N° 57607		
DRAWN BY J.W.K.	DATE SEPT. 76	SCALE 1:2500
APPROVED BY	DRAWING NO. QNTT76-0678-R01	



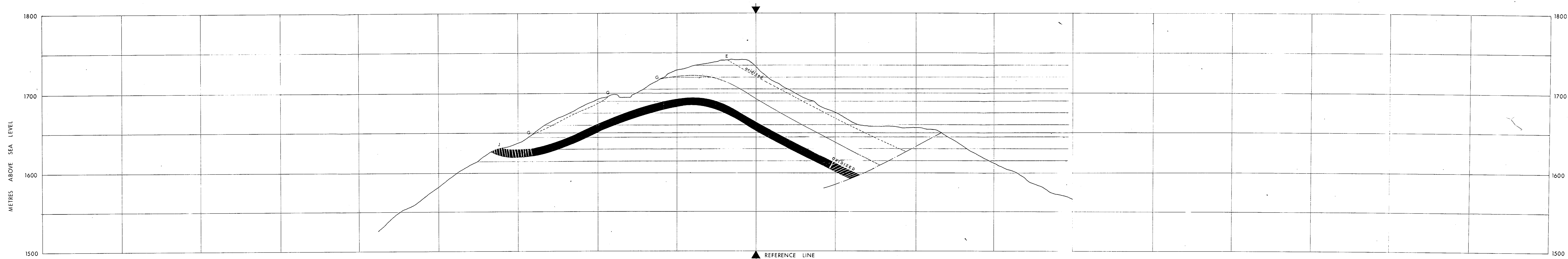
QUINTETTE COAL LIMITED		
PREPARED BY: DENISON COAL LIMITED		
CALGARY ALBERTA		
PR-Quintette 76(2)B		
SHERIFF CROSS SECTION N° S7608		
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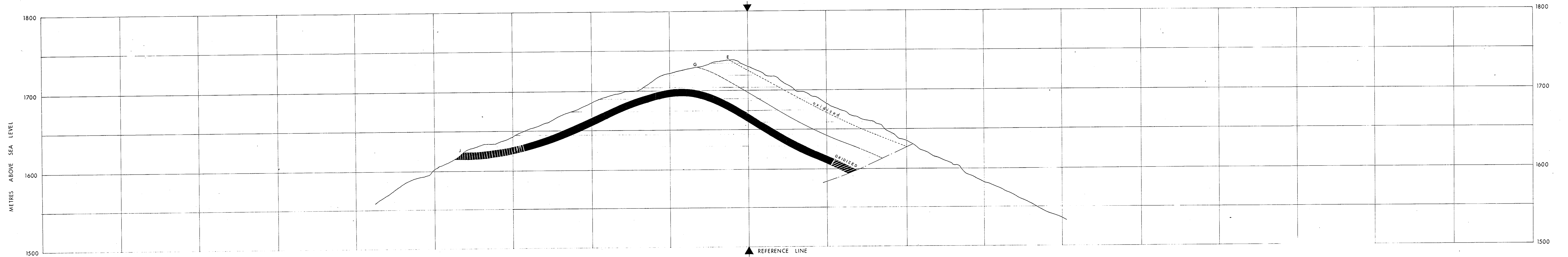
QUINTETTE COAL LIMITED		
PREPARED BY: DENISON COAL LIMITED		
CALGARY	ALBERTA	
PR-Quintette 76(2)B		
SHERIFF CROSS SECTION N <sup>o</sup> 57609		
DRAWN BY: J. W. K.	DATE: SEPT. 76	SCALE: 1:2500
APPROVED BY:	DRAWING NO. QNTT 76-0678-R01	



QUINTETTE COAL LIMITED		
PREPARED BY: DENISON COAL LIMITED		
ALBERTA		
PR-Quintette 76(2)B		
SHERIFF CROSS SECTION N° S7610		
DRAWN BY: W K	DATE: SEPT. 76	SCALE: 1:2500
APPROVED BY:	DRAWING NO: QNTT 76-0678-R01	



QUINTETTE COAL LIMITED		
PREPARED BY: DENISON COAL LIMITED		
CALGARY ALBERTA		
PR-Quintette 76(2)B		
SHERIFF CROSS SECTION N° S7611		
DRAWN BY: J. W. K.	DATE: SEPT 76	SCALE: 1:2500
APPROVED BY:	DRAWING NO: QNTT 76-0678-R01	



QUINTETTE COAL LIMITED

PREPARED BY:  
DENISON COAL LIMITED  
CALGARY ALBERTA

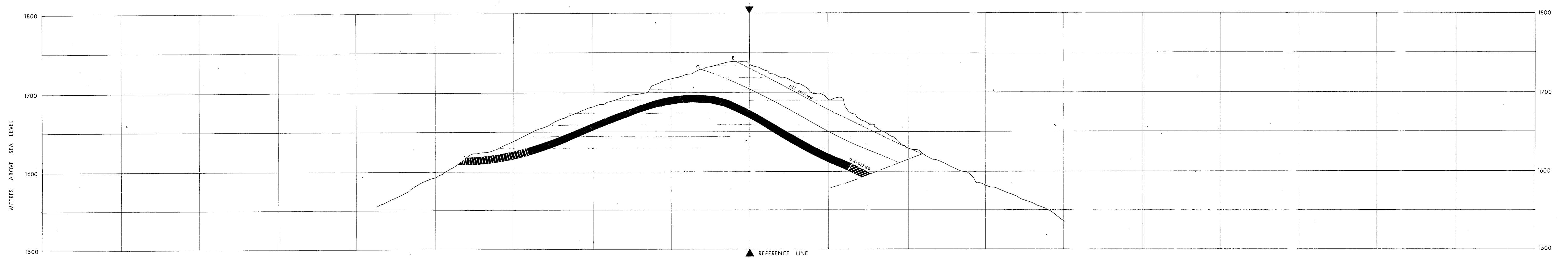


PR-Quintette 76(2)B

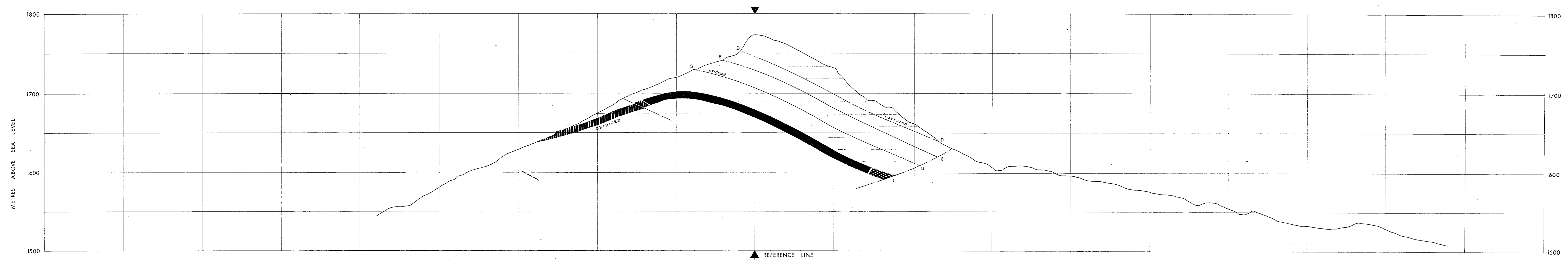
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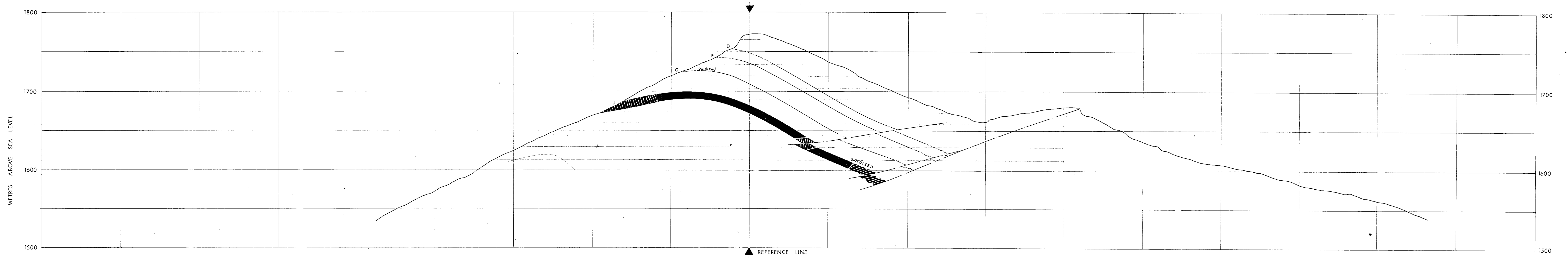




QUINTETTE COAL LIMITED		
PREPARED BY: DENISON COAL LIMITED		
<div style="display: flex; justify-content: space-between;"> <span>CALGARY</span> <span>ALBERTA</span> </div>		
<i>PR-Quintette 76(2)B</i>		
SHERIFF CROSS SECTION N° S7613		
DRAWN BY J W K	DATE SEPT 76	SCALE 1:2500
APPROVED BY	DRAWING NO QNTT76-0678-R01	



QUINTETTE COAL LIMITED		
PREPARED BY: DENISON COAL LIMITED		
ALBERTA		
PR-Quintette 76(2)D		
SHERIFF CROSS SECTION N° S7614		
DRAWN BY J W K	DATE SEPT 76	SCALE 1:2500
APPROVED BY	DRAWING NO QNTT76-0678-R01	



QUINTETTE COAL LIMITED

PREPARED BY:  
DENISON COAL LIMITED

CALGARY

ALBERTA



PR-Quintette 76(2)B

SHERIFF CROSS SECTION N° S7615

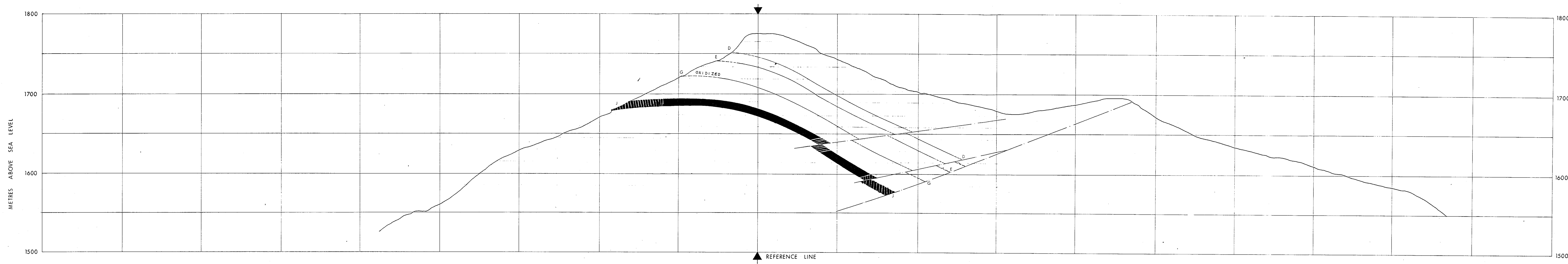
DRAWN BY J.W.K.

DATE SEPT. 76

SCALE 1:2500

APPROVED BY

DRAWING NO. QNTT 76-0678-R01



QUINTETTE COAL LIMITED

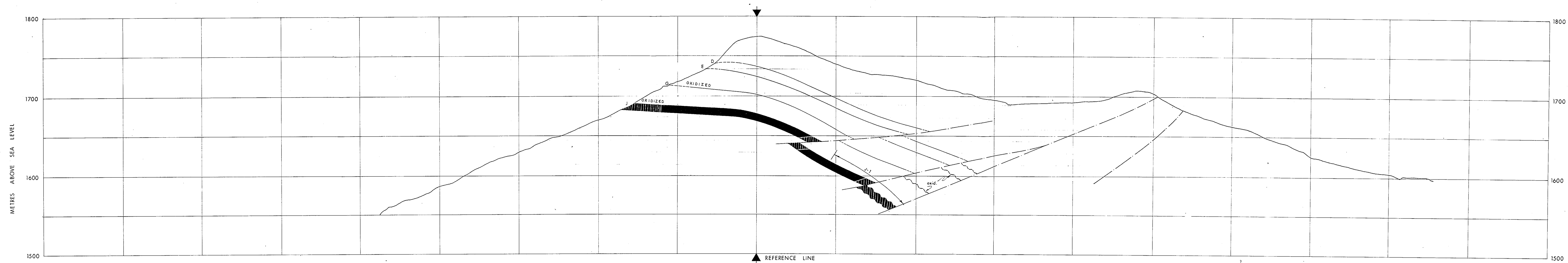
PREPARED BY:  
DENISON COAL LIMITED  
CALGARY ALBERTA

PR-Quintette 76(2)B

SHERIFF CROSS SECTION N° 57616

DRAWN BY: JLV K DATE: SEPT 76 SCALE: 1:2500

APPROVED BY: DRAWING NO: QNTT76-0678-R01



QUINTETTE COAL LIMITED

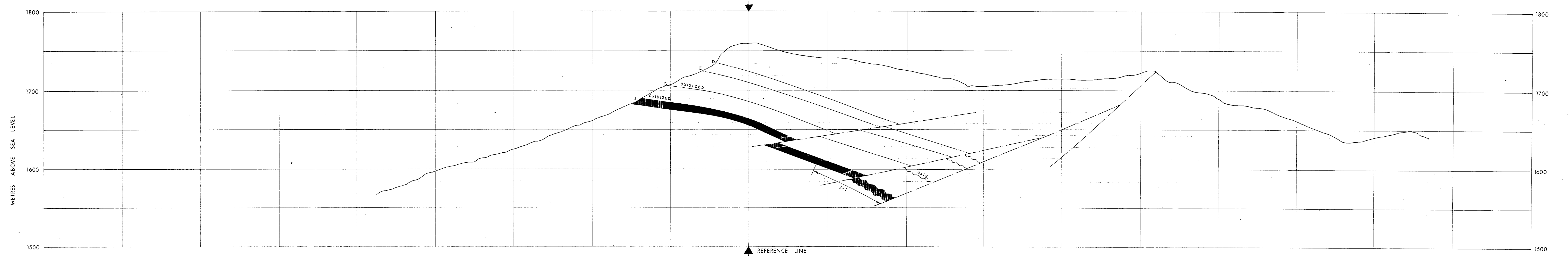
PREPARED BY:  
DENISON COAL LIMITED  
CALGARY ALBERTA



PR-Quintette 76(2)B

SHERIFF CROSS SECTION N° S7617

DRAWN BY: J W K	DATE: SEPT. 76	SCALE: 1:2500
APPROVED BY:	DRAWING NO: QNTT76-0678-R01	



QUINTETTE COAL LIMITED

PREPARED BY:  
DENISON COAL LIMITED

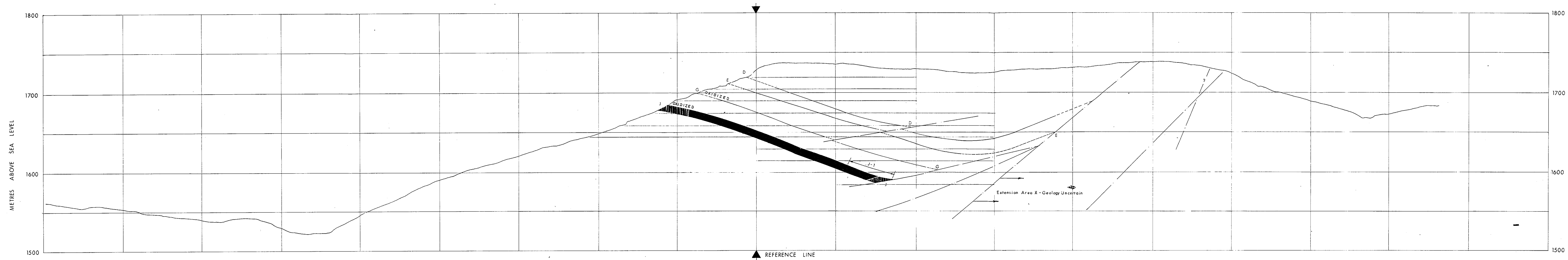
CALGARY ALBERTA


PR-Quintette 76(2) B

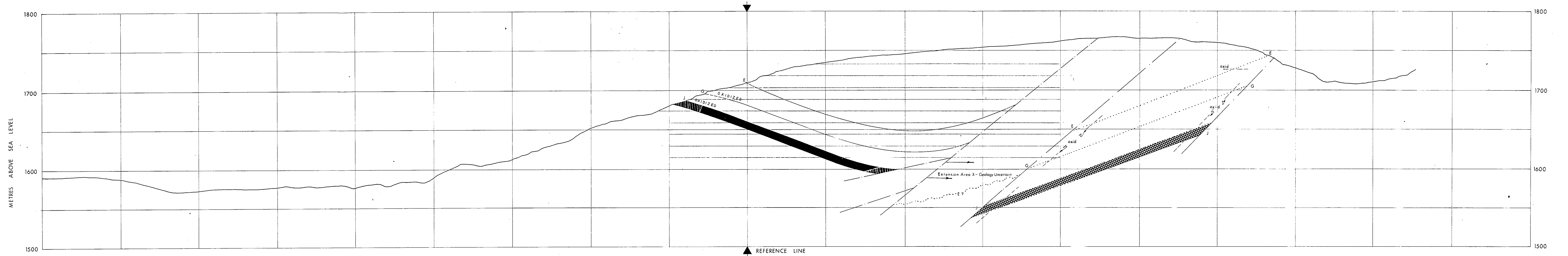
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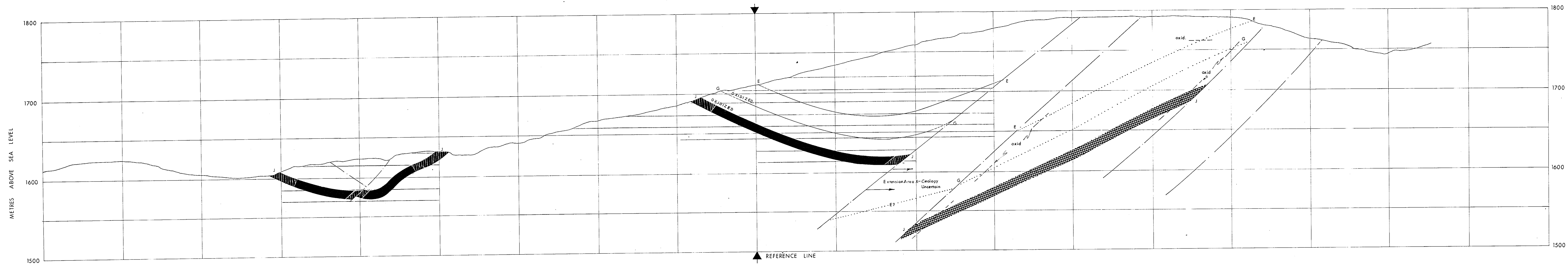


QUINTETTE COAL LIMITED		
PREPARED BY: DENISON COAL LIMITED		
CALGARY	ALBERTA	
PR-Quintette 76(2) B		
SHERIFF CROSS SECTION N° S7619		
DRAWN BY J W K	DATE SEPT 76	SCALE 1:2500
APPROVED BY	DRAWING NO QNTT 76-0678-R01	



QUINTETTE COAL LIMITED		
PREPARED BY: DENISON COAL LIMITED		
CALGARY	ALBERTA	
PR-Quintette 76(2)B		
SHERIFF CROSS SECTION N° S7620		
DRAWN BY J W K	DATE SEPT 76	SCALE 1:2500
APPROVED BY	DRAWING NO QNTT 76-0678-R01	





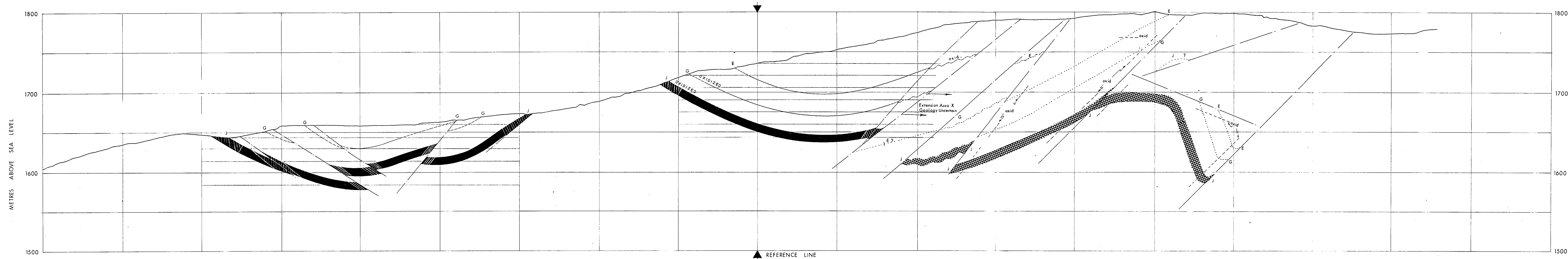
QUINTETTE COAL LIMITED

PREPARED BY:  
DENISON COAL LIMITED  
CALGARY ALBERTA

PK-Quintette 76(2)B

SHERIFF CROSS SECTION N° S7621

DRAWN BY J W K	DATE SEPT 76	SCALE 1:2500
APPROVED BY	DRAWING NO QNTT76-0678-R01	



QUINTETTE COAL LIMITED

PREPARED BY:  
DENISON COAL LIMITED

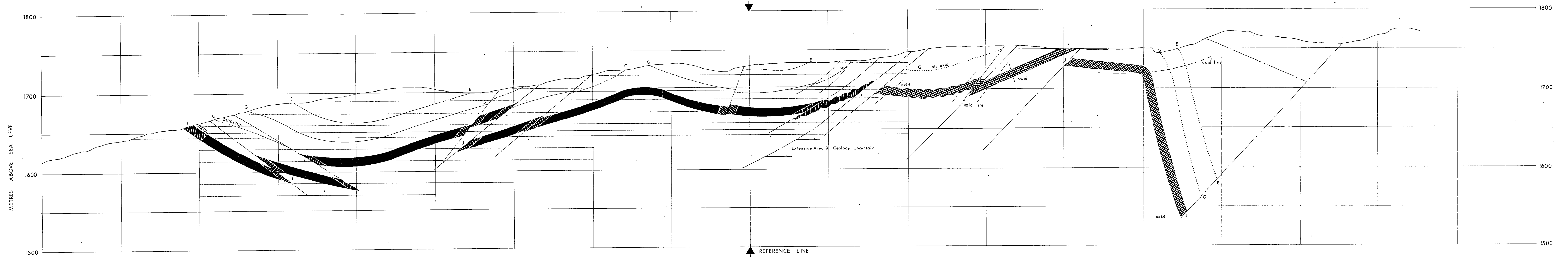
CALGARY ALBERTA

PR-Quintette 76(2)B

SHERIFF CROSS SECTION N° S7622

DRAWN BY J.W.K. DATE SEPT 76 SCALE 1:2500

APPROVED BY DRAWING NO. QNTT 76-0678-R01



QUINTETTE COAL LIMITED

PREPARED BY:  
DENISON COAL LIMITED

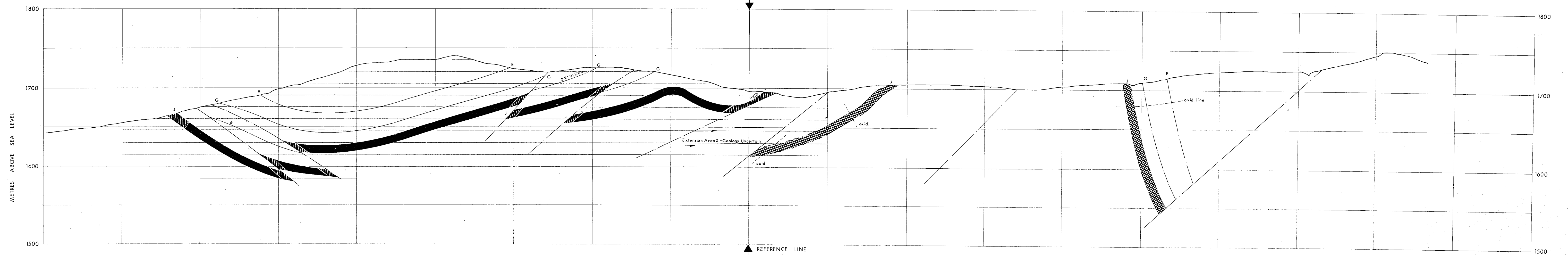
CALGARY ALBERTA



PR-Quintette 76(2)B

SHERIFF CROSS SECTION N° S7623

DRAWN BY J W K	DATE SEPT 76	SCALE 1:2500
APPROVED BY	DRAWING NO QNTT76-0678-R01	



QUINTETTE COAL LIMITED

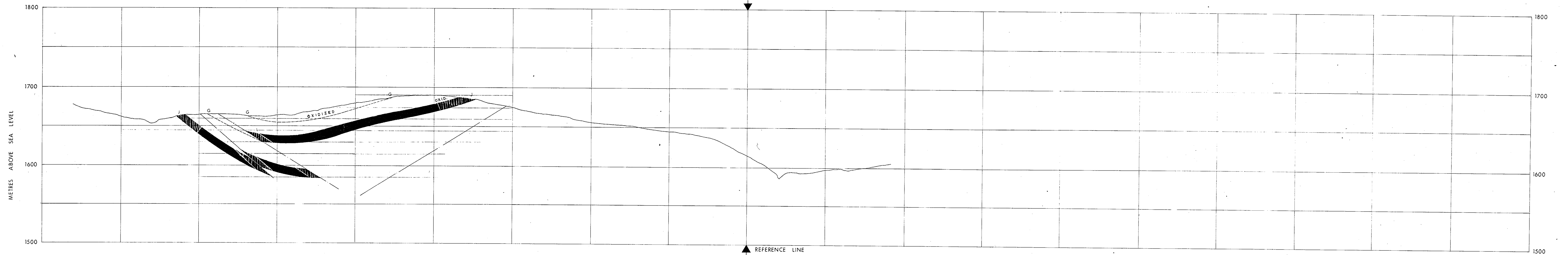
PREPARED BY:  
DENISON COAL LIMITED  
CALGARY ALBERTA



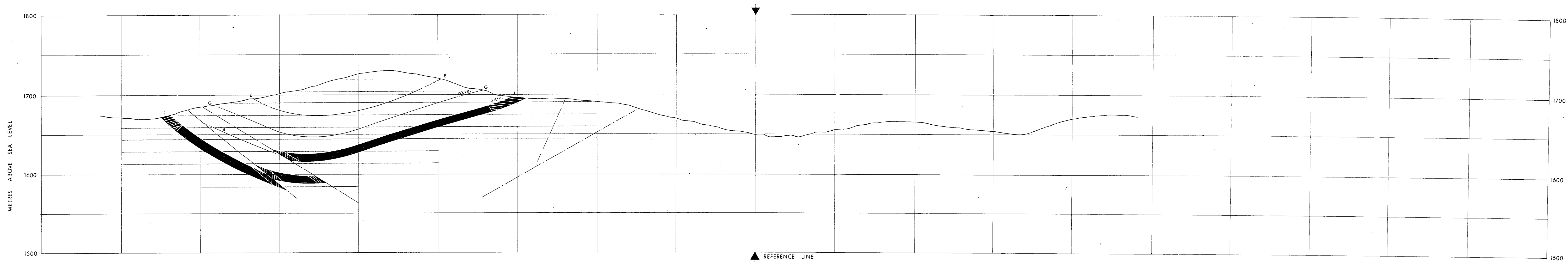
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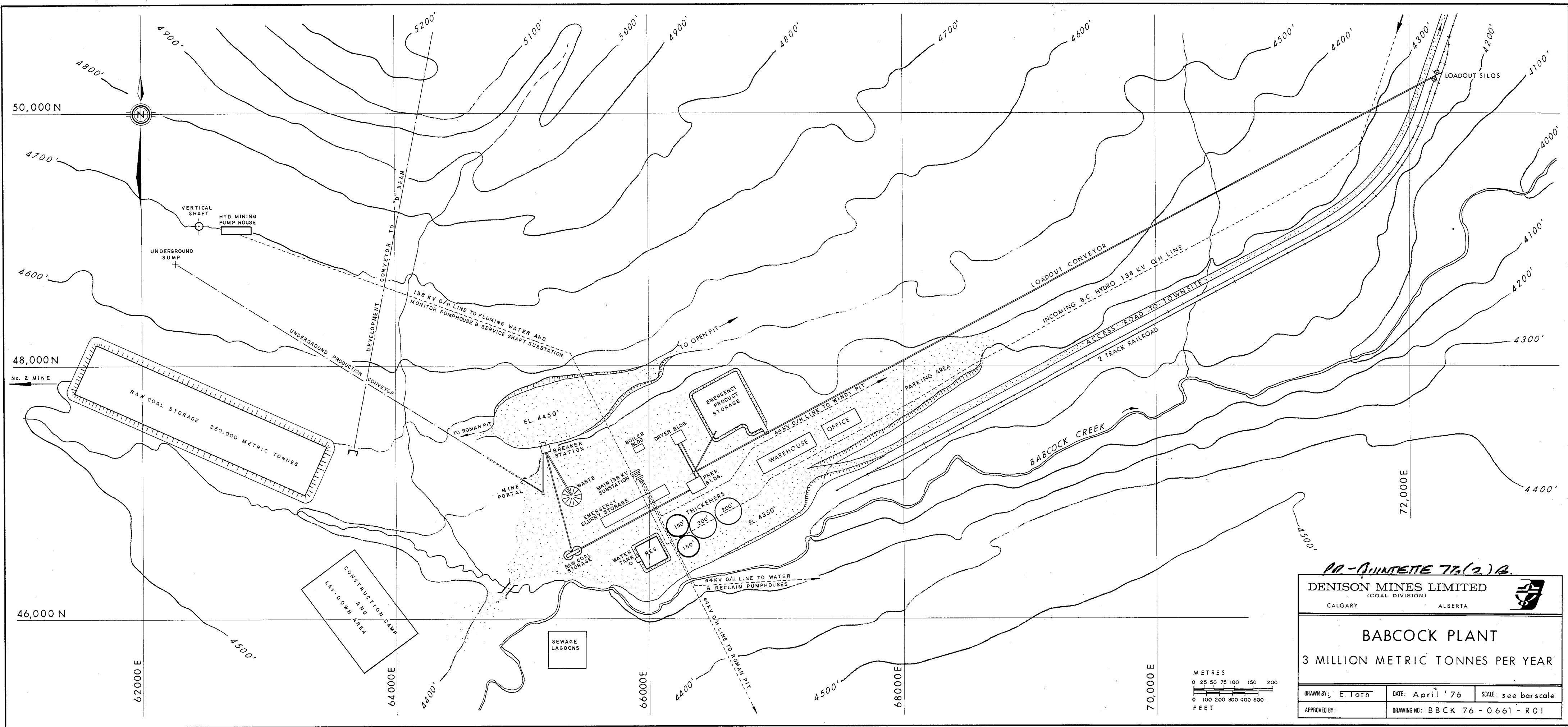
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APPROVED BY:	DRAWING NO: QNTT 76-0678-R01	



QUINTETTE COAL LIMITED		
PREPARED BY: DENISON COAL LIMITED		
CALGARY ALBERTA		
PR-Quintette 76(2)B		
SHERIFF CROSS SECTION N° S7626		
DRAWN BY J W K	DATE SEPT. 76	SCALE: 1:2500
APPROVED BY	DRAWING NO QNTT76-0678-R01	



QUINTETTE COAL LIMITED		
PREPARED BY: DENISON COAL LIMITED		
ALBERTA ALBERTA		
PR-Quintette 76(2)B.		
SHERIFF CROSS SECTION N° S7625		
DRAWN BY: J.W.K.	DATE: SEPT. 76	SCALE: 1:2500
APPROVED BY:	DRAWING NO: QNTT76-0678-R01	



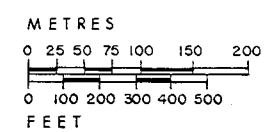
PR-QUINTETTE 76(2)B

**DENISON MINES LIMITED**  
(COAL DIVISION)

CALGARY ALBERTA

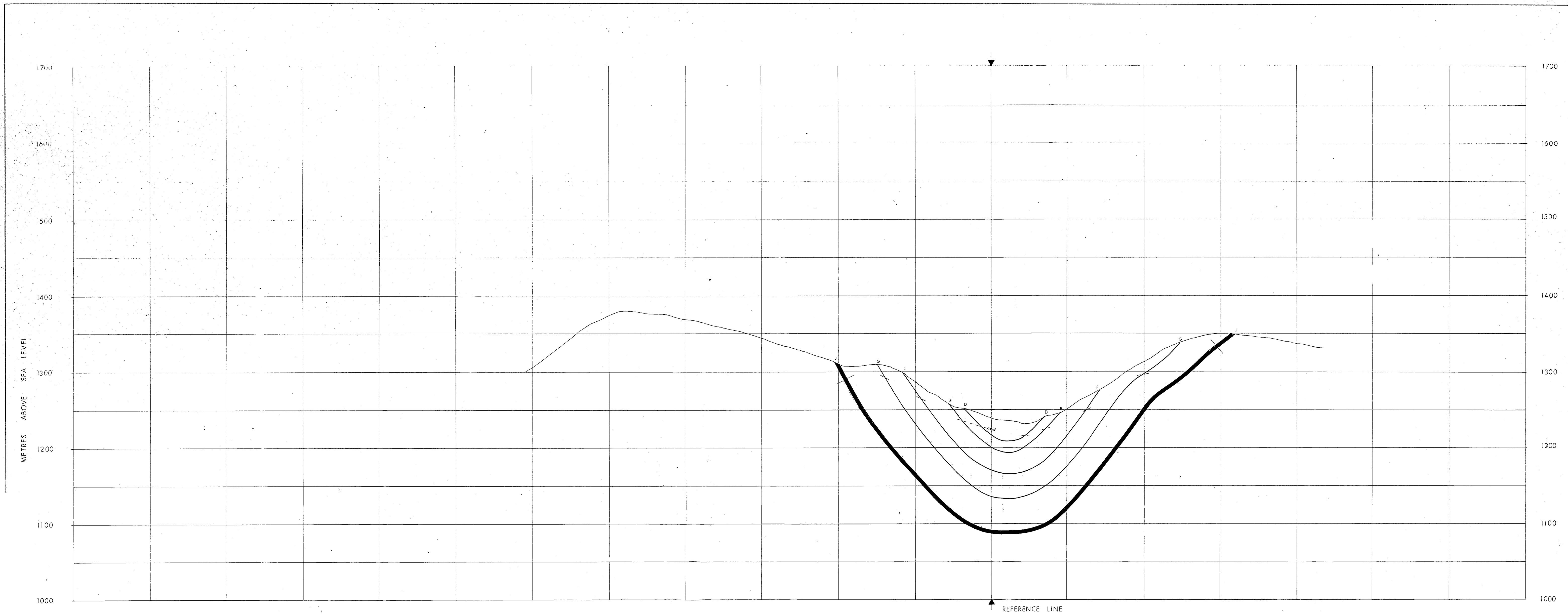
**BABCOCK PLANT**  
3 MILLION METRIC TONNES PER YEAR

DRAWN BY: E. Toth	DATE: April '76	SCALE: see barscale
APPROVED BY:	DRAWING NO: BBCK 76 - 0661 - R01	



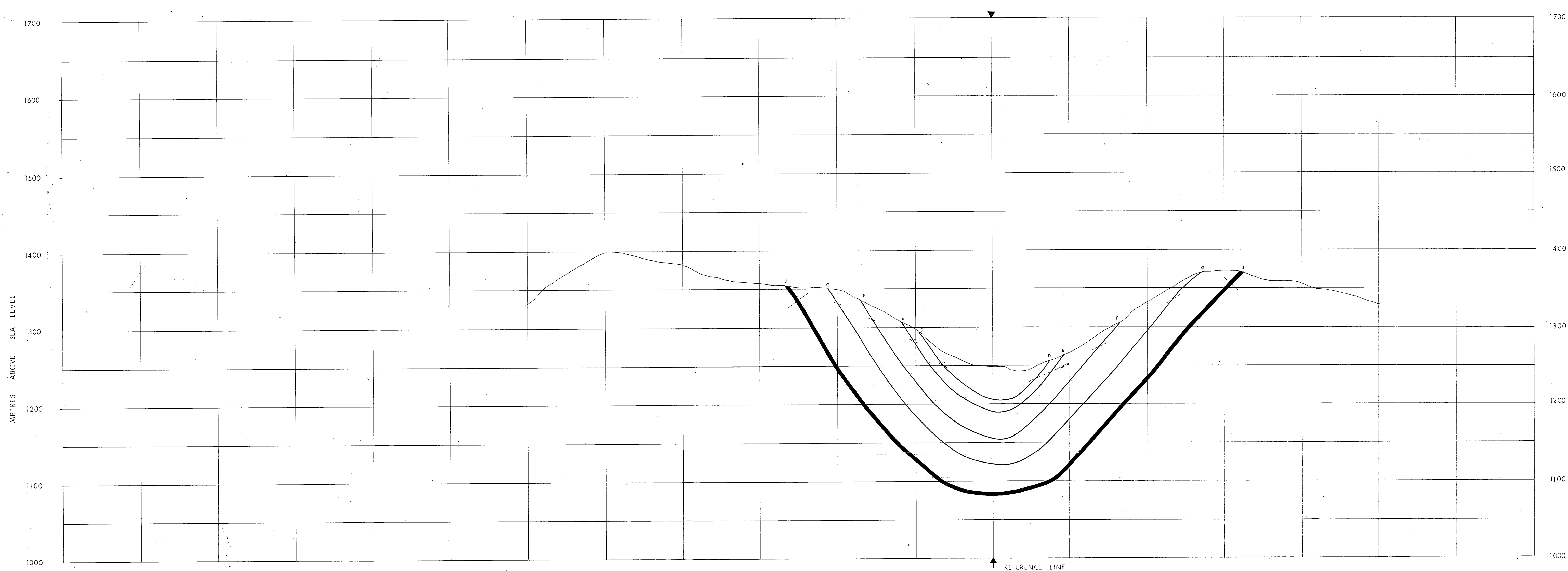






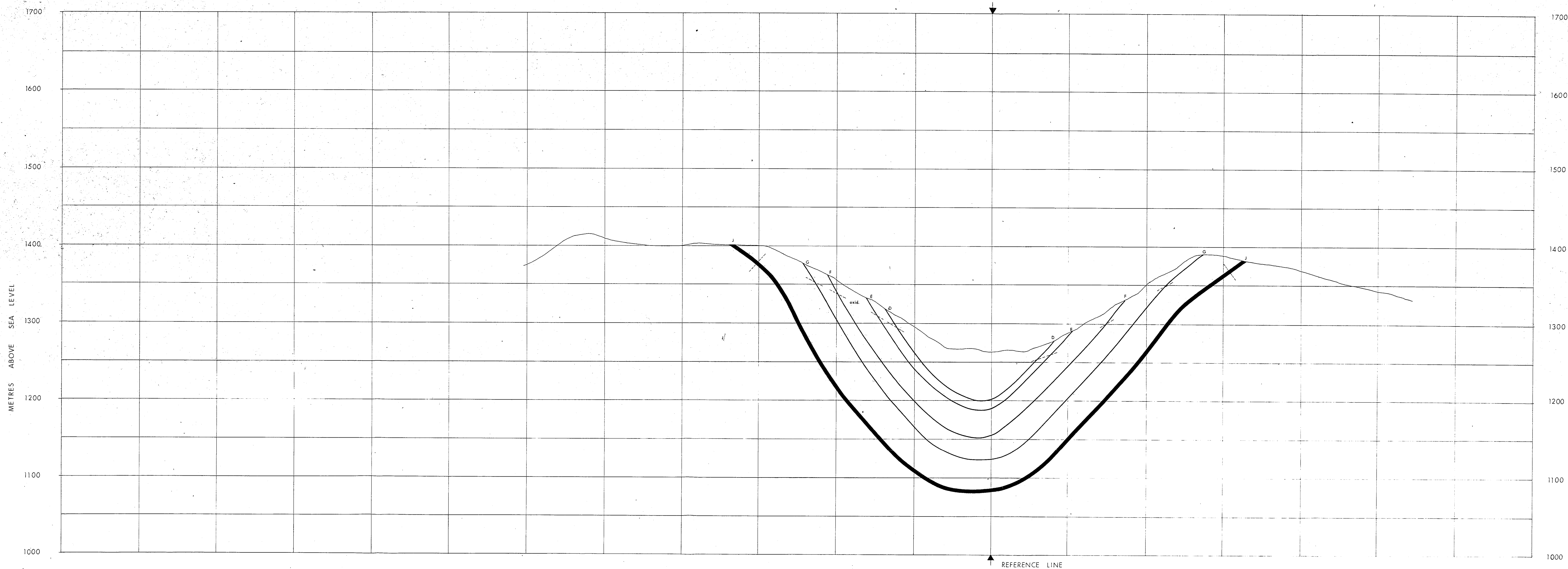
QUINTETTE COAL LIMITED		
PREPARED BY: DENISON COAL LIMITED		
CALGARY ALBERTA		
PR-Quintette 76(2)B		
FRAME CROSS-SECTION N° F7606		
DRAWN BY: J.W.K.	DATE: SEPT., 76	SCALE: 1:2500
APPROVED BY:	DRAWING NO: QNTT76-0675-R01	

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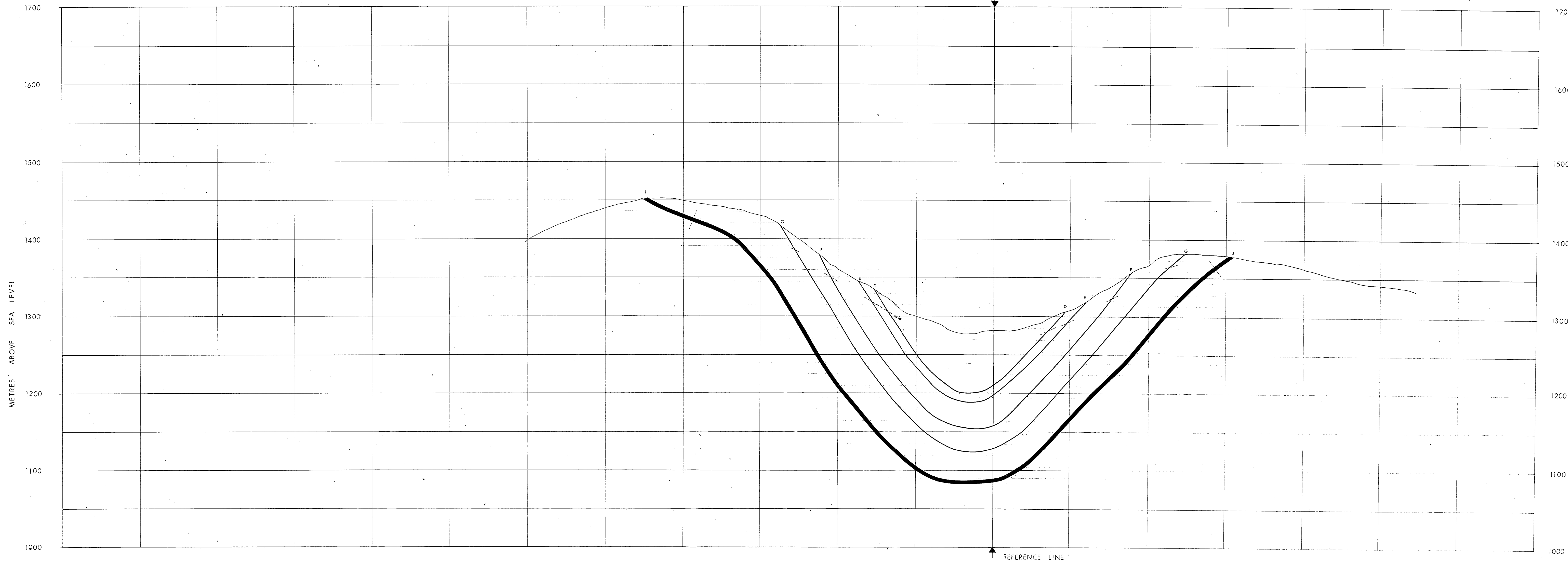


QUINTETTE COAL LIMITED		
PREPARED BY: DENISON COAL LIMITED		
CALGARY ALBERTA		
PR-Quintette 76(2)B		
FRAME CROSS-SECTION N° F7607		
DRAWN BY: J.W.K.	DATE: SEPT., 76	SCALE: 1:2500
APPROVED BY:	DRAWING NO: QNTT76-0675-R01	

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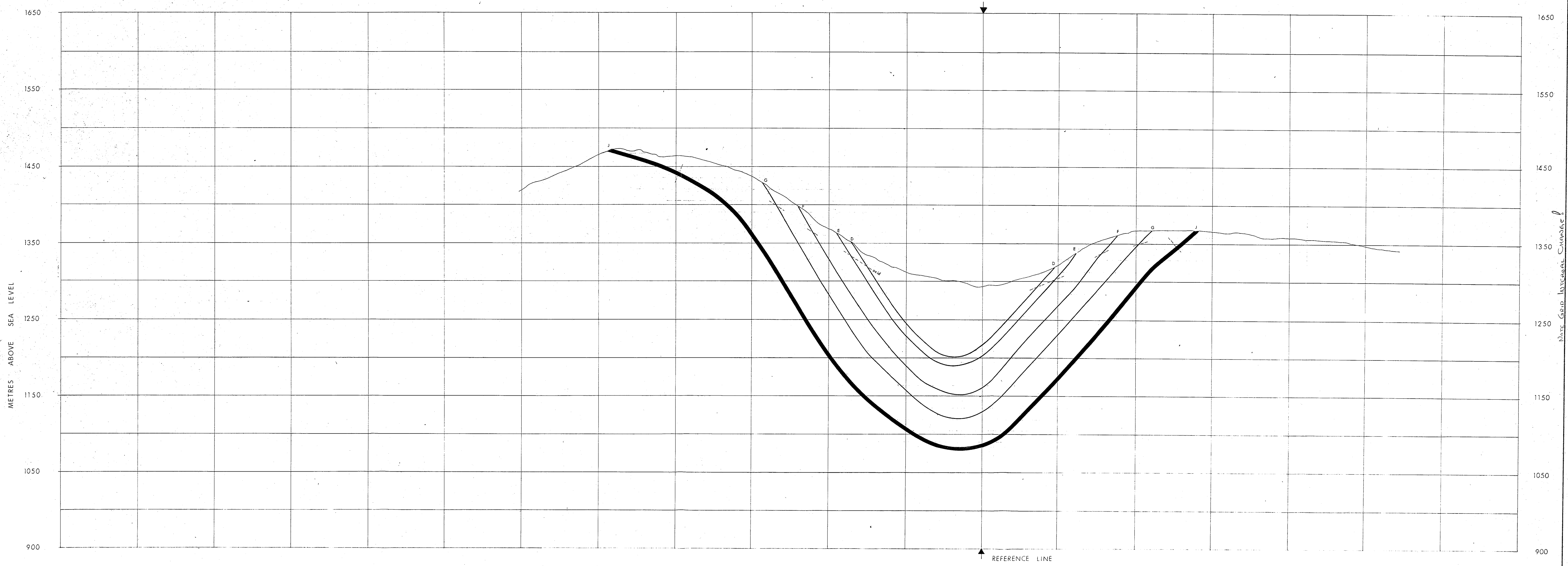


QUINTETTE COAL LIMITED		
PREPARED BY: DENISON COAL LIMITED		
CALGARY ALBERTA		
PR-Quintette 76(2)B.		
FRAME CROSS-SECTION N° F7608		
DRAWN BY: J.W.K.	DATE: SEPT., 76	SCALE: 1:2500
APPROVED BY:	DRAWING NO: QNTT 76-0675-R01	

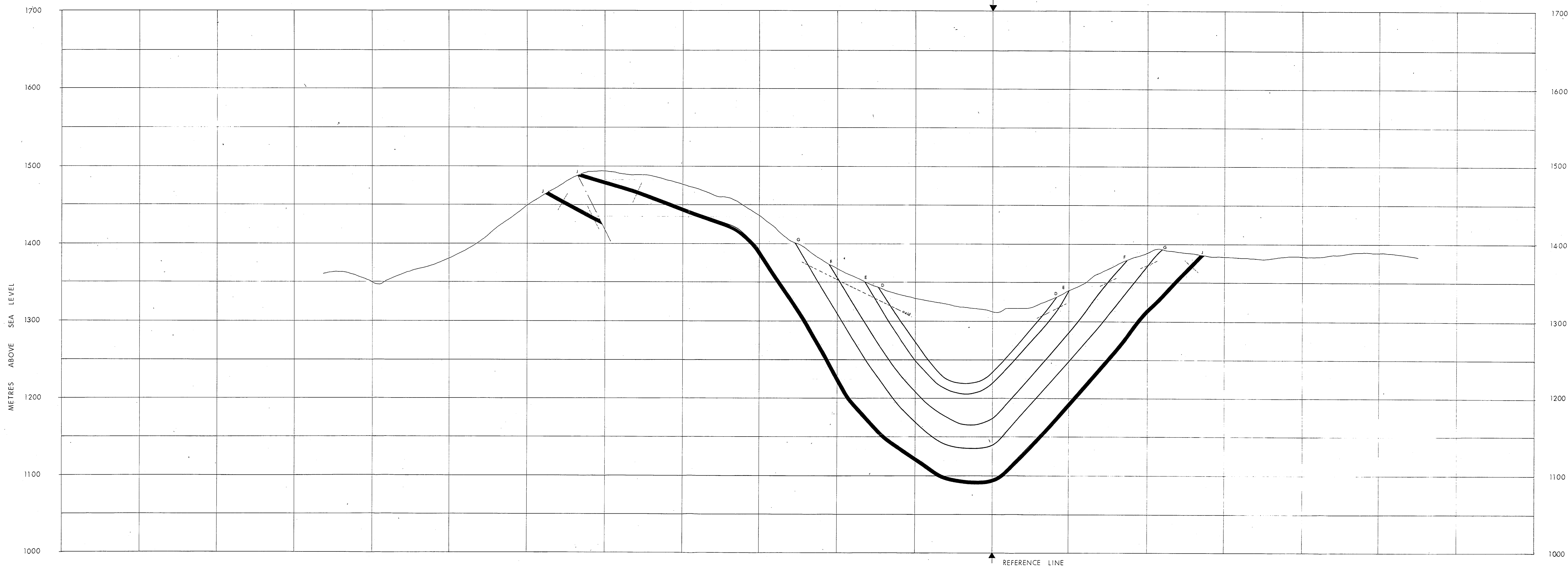


QUINTETTE COAL LIMITED		
PREPARED BY: DENISON COAL LIMITED		
CALGARY		ALBERTA
PR-Quintette 76(2)B		
FRAME CROSS-SECTION N° F7609		
DRAWN BY: J.W.K.	DATE: SEPT., 76	SCALE: 1:2500
APPROVED BY:	DRAWING NO: QNTT76-0675-R01	

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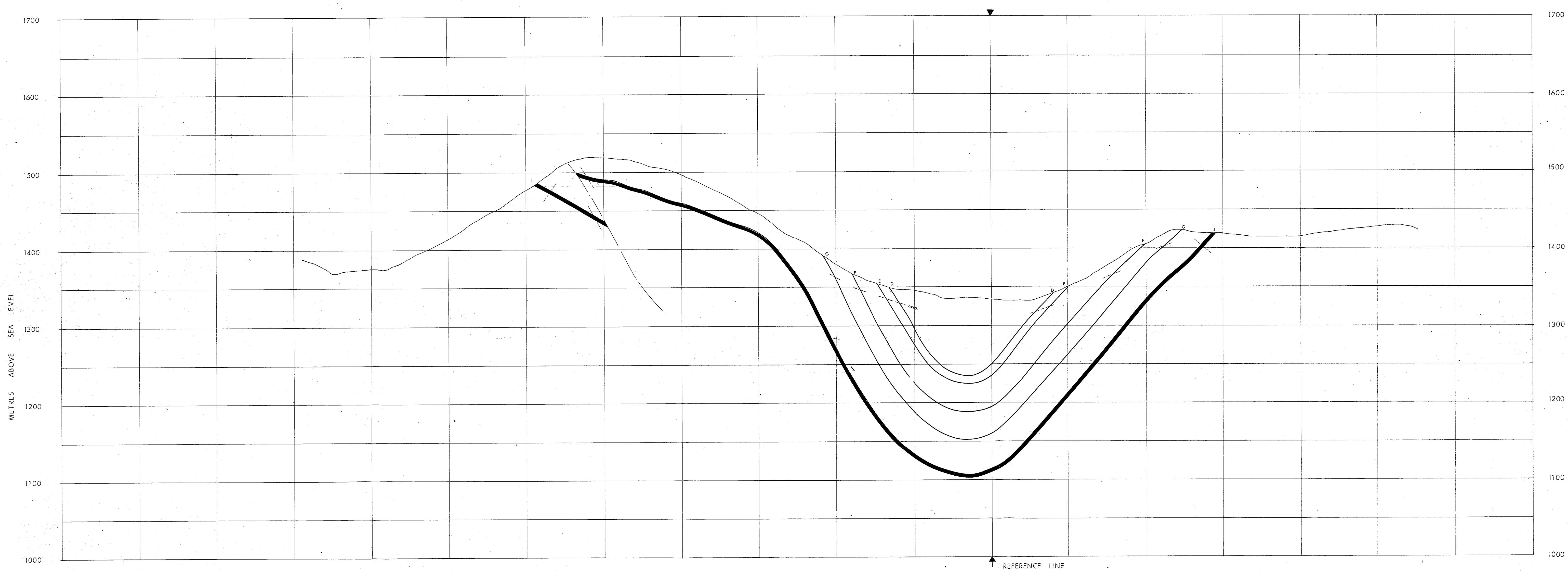


QUINTETTE COAL LIMITED		
PREPARED BY: DENISON COAL LIMITED		
DRAWN BY: J.W.K.		
DATE: SEPT. 76		
SCALE: 1:2500		
APPROVED BY:		
DRAWING NO: QNT176-0675 R01		



QUINTETTE COAL LIMITED		
PREPARED BY: DENISON COAL LIMITED		
CALGARY ALBERTA		
PR-Quintette 76(2)B		
FRAME CROSS-SECTION N° F7611		
DRAWN BY: J.W.K.	DATE: SEPT., 76	SCALE: 1:2500
APPROVED BY:	DRAWING NO: QNTT76-0675-R01	

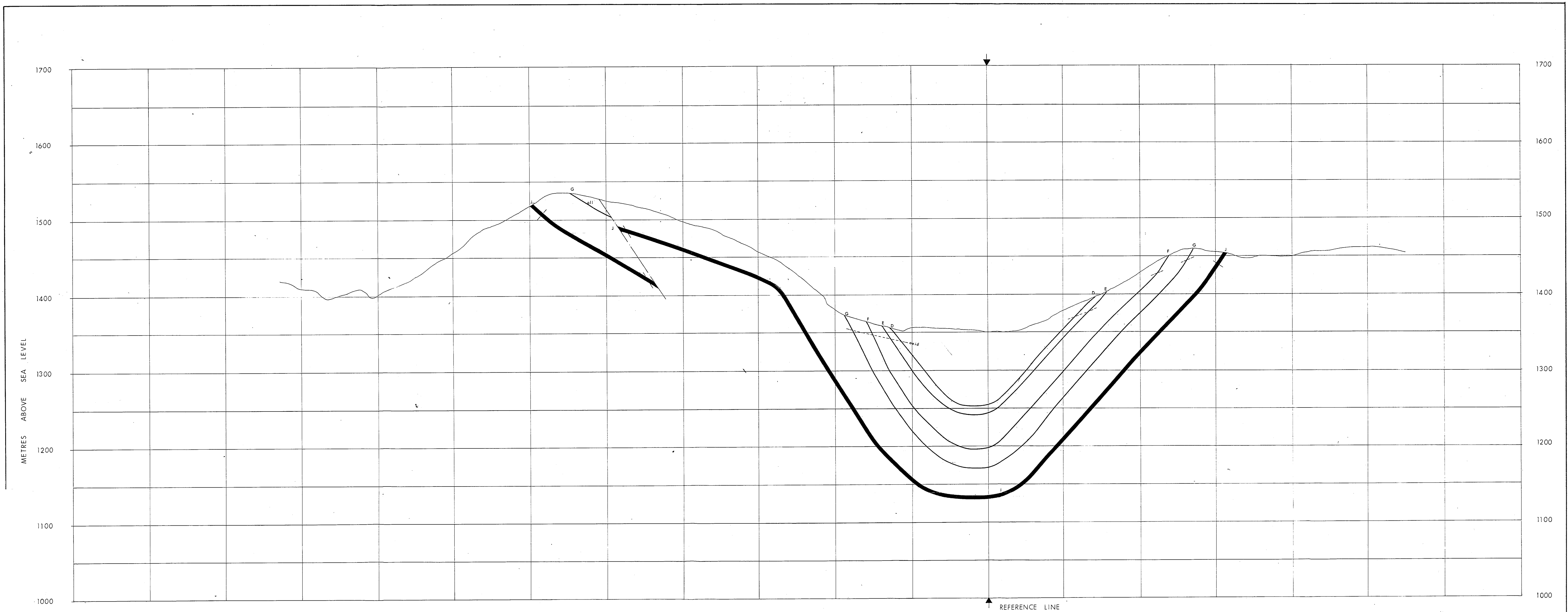
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QUINTETTE COAL LIMITED		
PREPARED BY: DENISON COAL LIMITED		
CALGARY ALBERTA		
PR. Quintette 76(2)B.		
FRAME CROSS-SECTION N° F7612		
DRAWN BY: J.W.K.	DATE: SEPT., 76	SCALE: 1:2500
APPROVED BY:	DRAWING NO: QNTT76-0675-R01	

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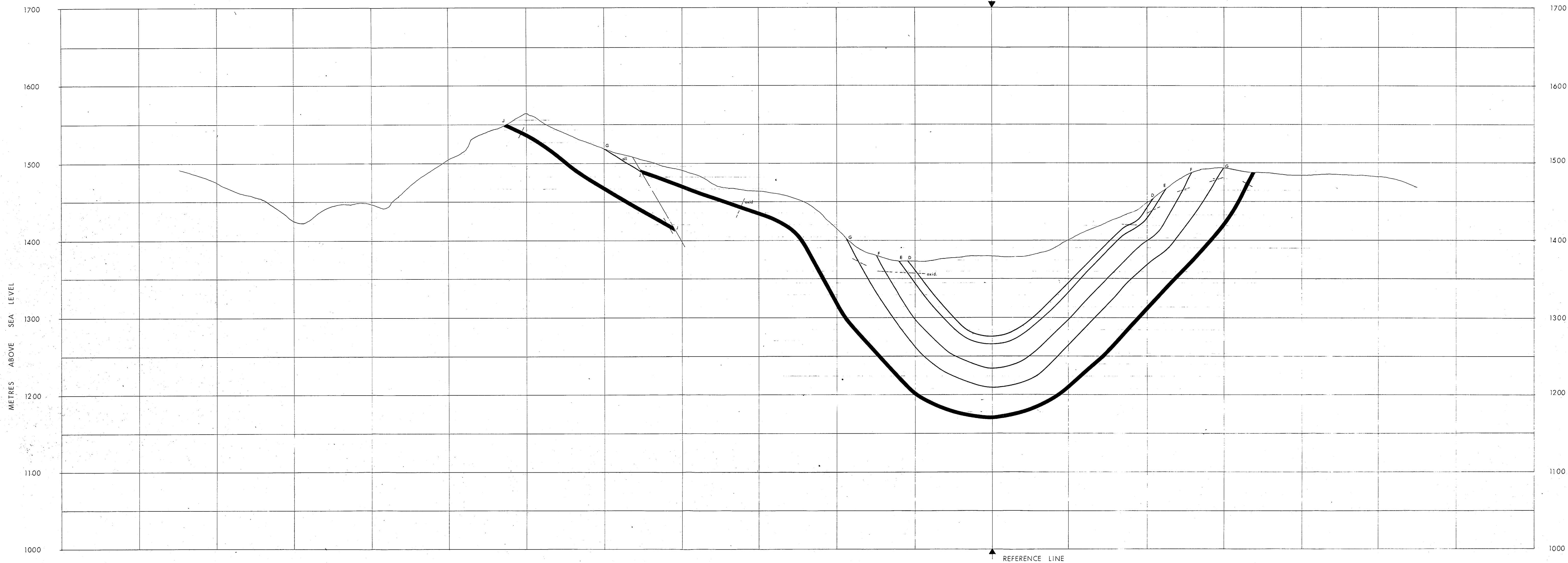




QUINTETTE COAL LIMITED		
PREPARED BY: DENISON COAL LIMITED		
CALGARY	ALBERTA	
PR-Quintette 76(2)B.		
FRAME CROSS-SECTION N° F7613		
DRAWN BY: J.W.K.	DATE: SEPT., 76	SCALE: 1:2500
APPROVED BY:	DRAWING NO: QNTT76-0675-R01	

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QUINTETTE COAL LIMITED

PREPARED BY:  
DENISON COAL LIMITED  
CALGARY ALBERTA

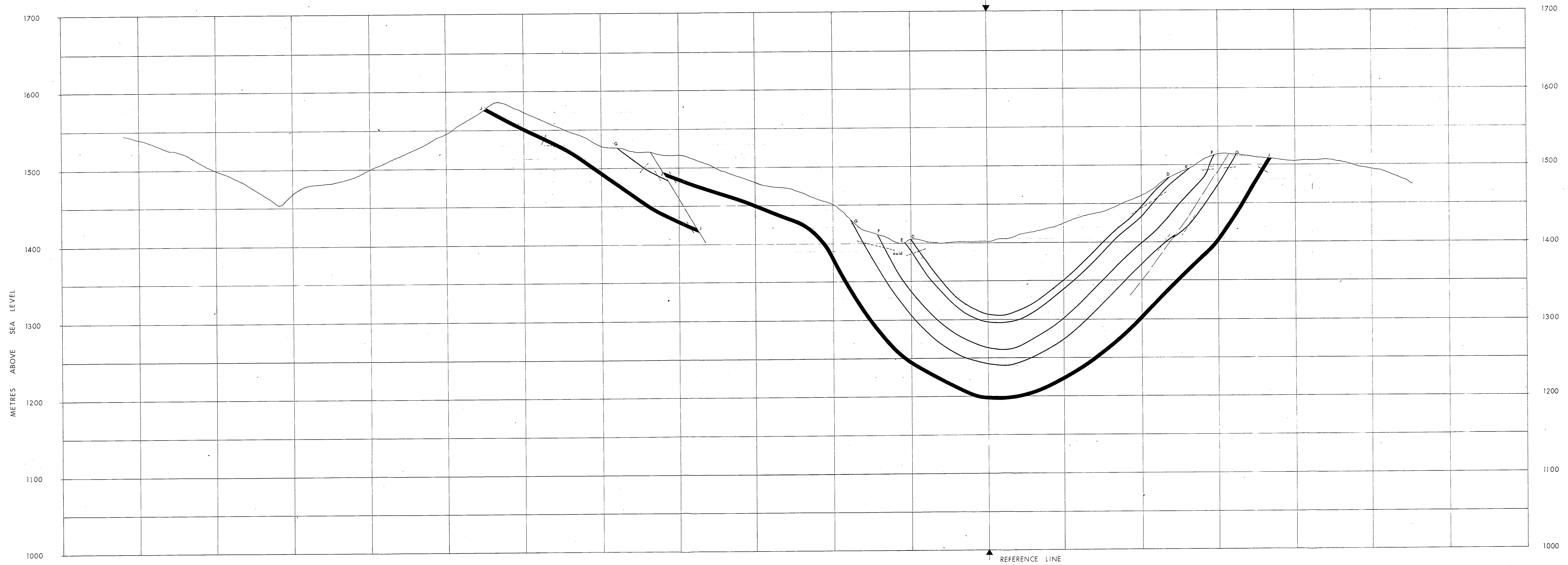



PR-Quintette-76(2)B.

FRAME CROSS-SECTION N° F7614

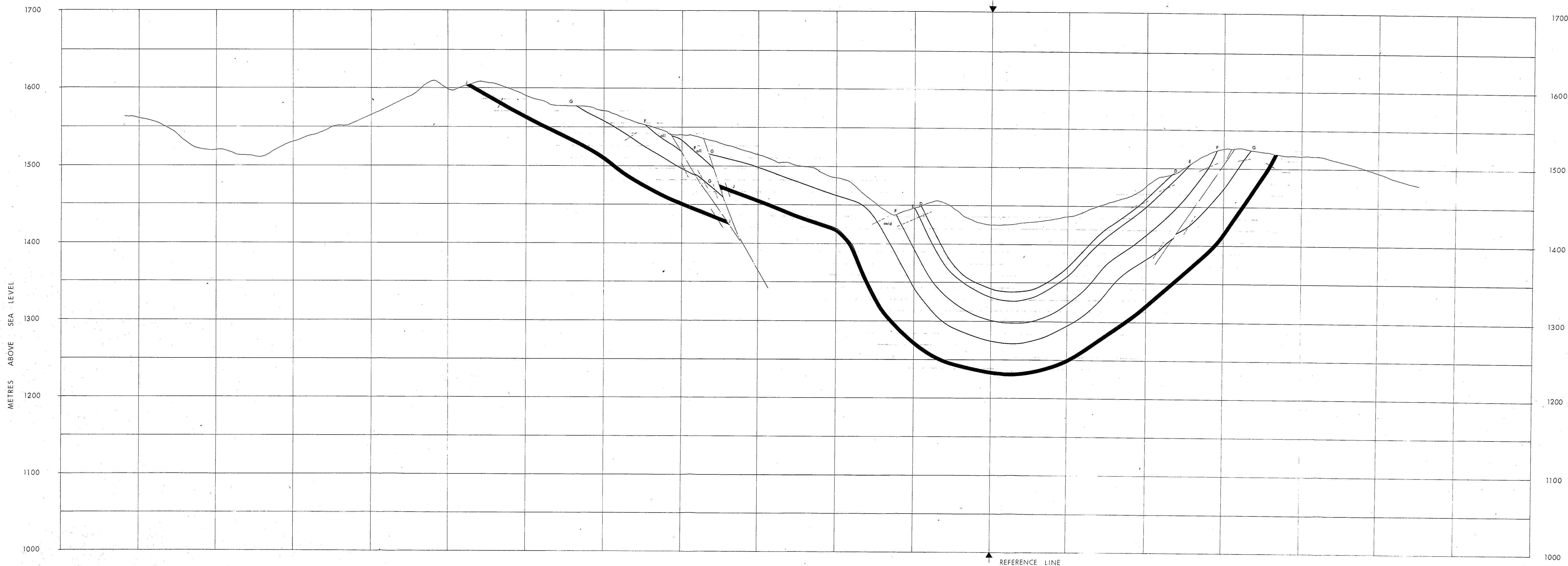
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APPROVED BY:	DRAWING NO: QNTT 76-0675-R01	

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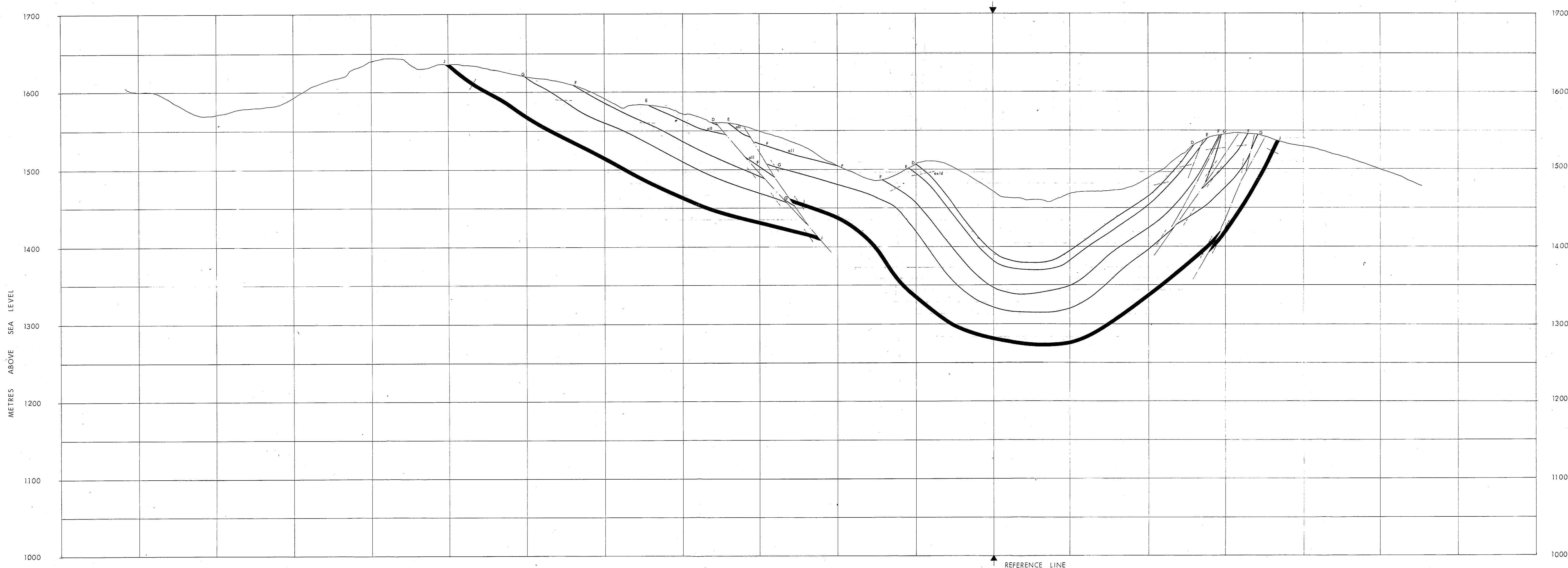
QUINTETTE COAL LIMITED		
PREPARED BY DENISON COAL LIMITED		
CALGARY	ALBERTA	
PR-Quintette 76(2)B		
FRAME CROSS-SECTION N° F7615		
DRAWN BY J.W.K.	DATE SEPT., 76	SCALE 1:2500
APPROVED BY	DRAWING NO. QNTT76-0675-R01	

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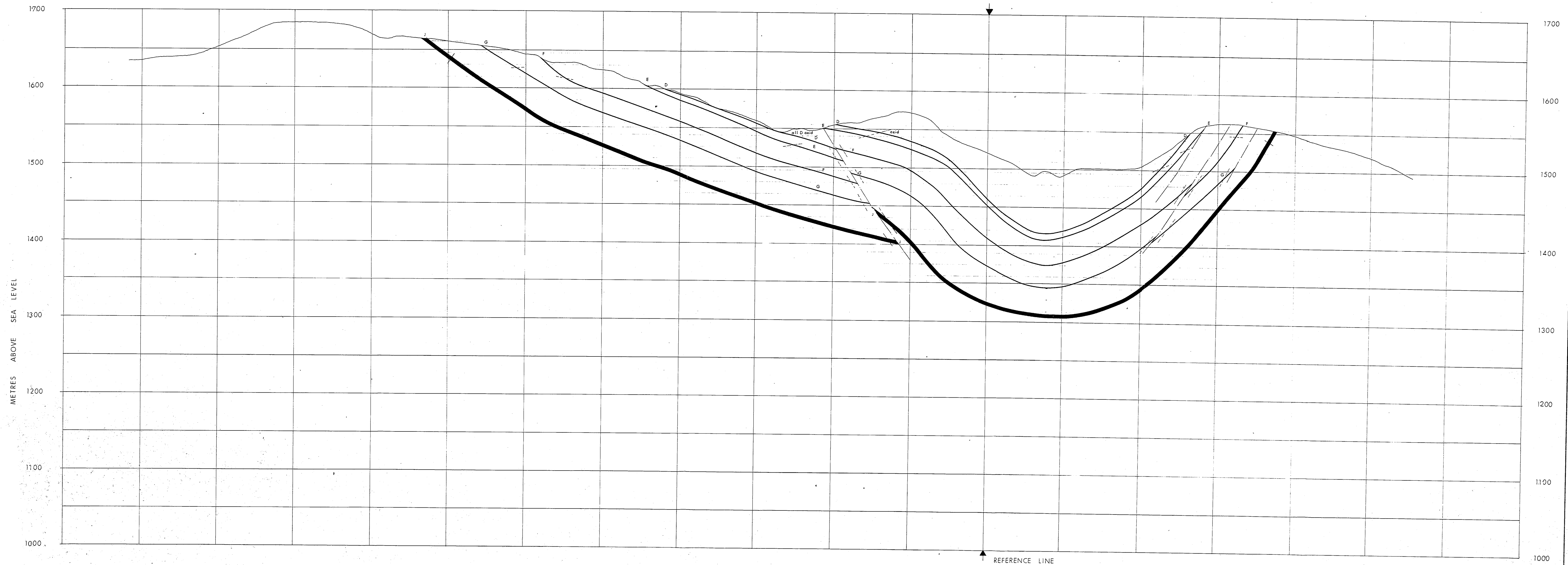
QUINTETTE COAL LIMITED		
PREPARED BY: DENISON COAL LIMITED		
CALGARY		ALBERTA
PR-Quintette 76(2)B		
FRAME CROSS-SECTION N° F7616		
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APPROVED BY:	DRAWING NO: QNTT 76-0675-R01	


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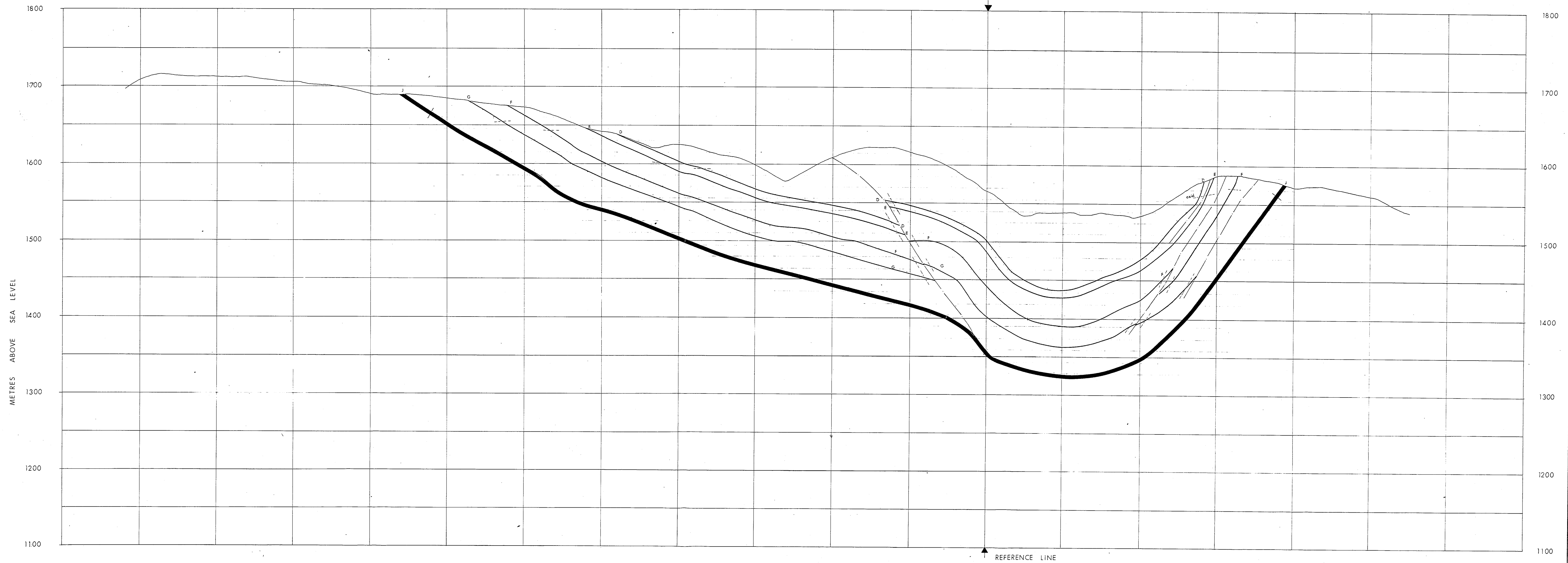
QUINTETTE COAL LIMITED		
PREPARED BY: DENISON COAL LIMITED		
CALGARY ALBERTA		
PR-Quintette 76(2) B.		
FRAME CROSS-SECTION N° F7617		
DRAWN BY: J.W.K.	DATE: SEPT., 76	SCALE: 1:2500
APPROVED BY:	DRAWING NO: QNTT76-0675-R01	

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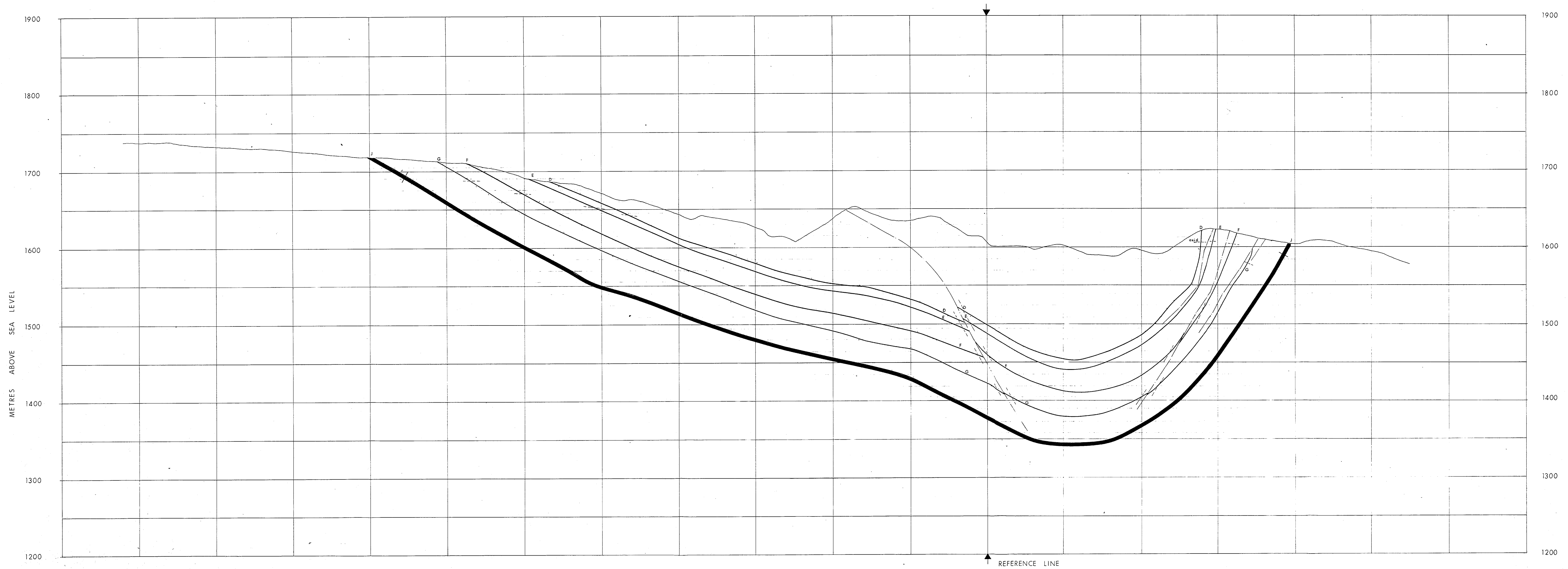
QUINTETTE COAL LIMITED		
PREPARED BY: DENISON COAL LIMITED		
CALGARY	ALBERTA	
PR-Quintette 76(2) B		
FRAME CROSS-SECTION N° F7618		
DRAWN BY: J.W.K.	DATE: SEPT. 76	SCALE: 1:2500
APPROVED BY:	DRAWING NO: QNTT76-0675-R01	


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QUINTETTE COAL LIMITED		
PREPARED BY: DENISON COAL LIMITED		
CALGARY		ALBERTA
PR-Quintette 76(2)B.		
FRAME CROSS-SECTION N° F7619		
DRAWN BY: J.W.K.	DATE: SEPT., 76	SCALE: 1:2500
APPROVED BY:	DRAWING NO: QNTT76-0675-R01	

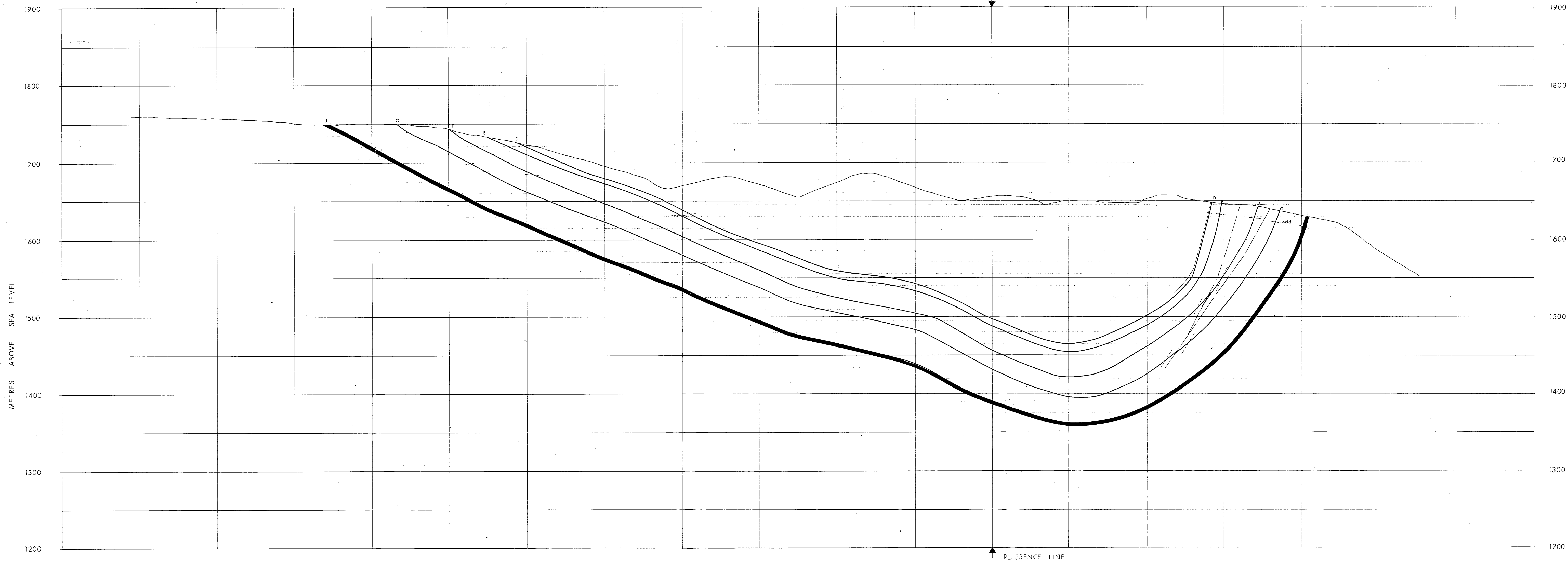
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QUINTETTE COAL LIMITED		
PREPARED BY DENISON COAL LIMITED		
CALGARY	ALBERTA	
PR-Quintette 76(2)B		
FRAME CROSS-SECTION N° F7620		
DRAWN BY: J.W.K.	DATE: SEPT. 76	SCALE: 1:2500
APPROVED BY:	DRAWING NO: QNTT 76-0675-R01	

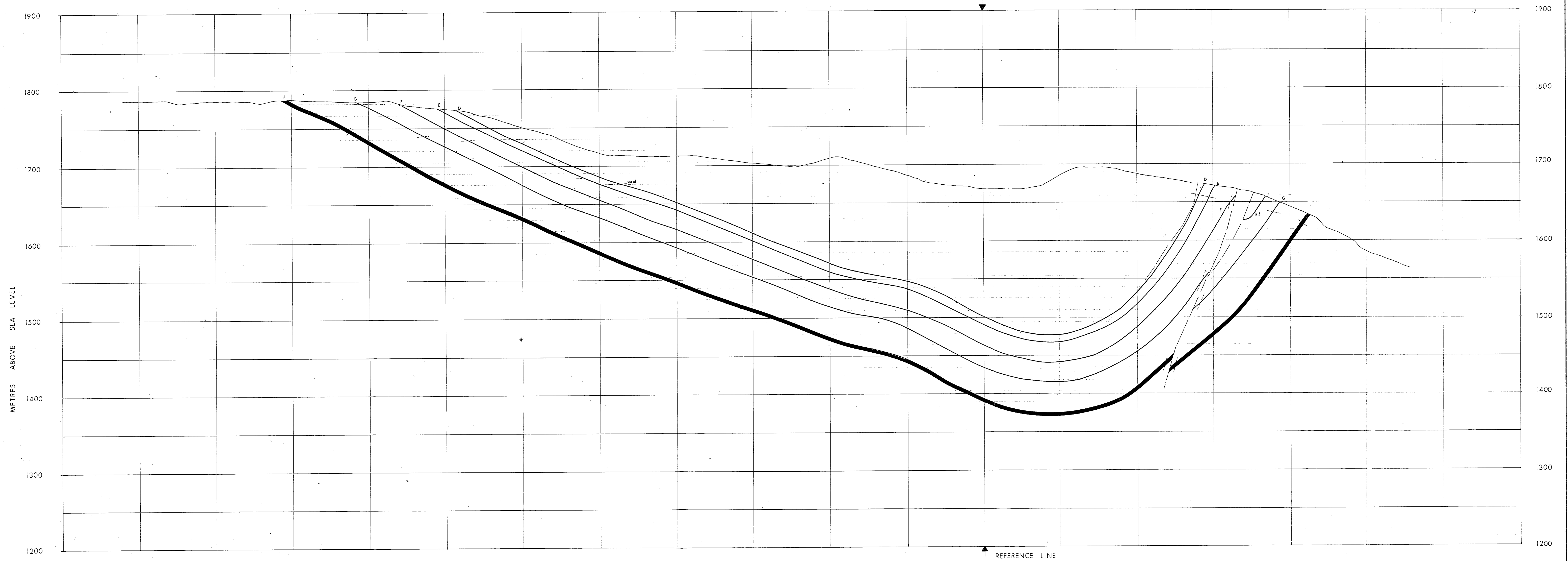
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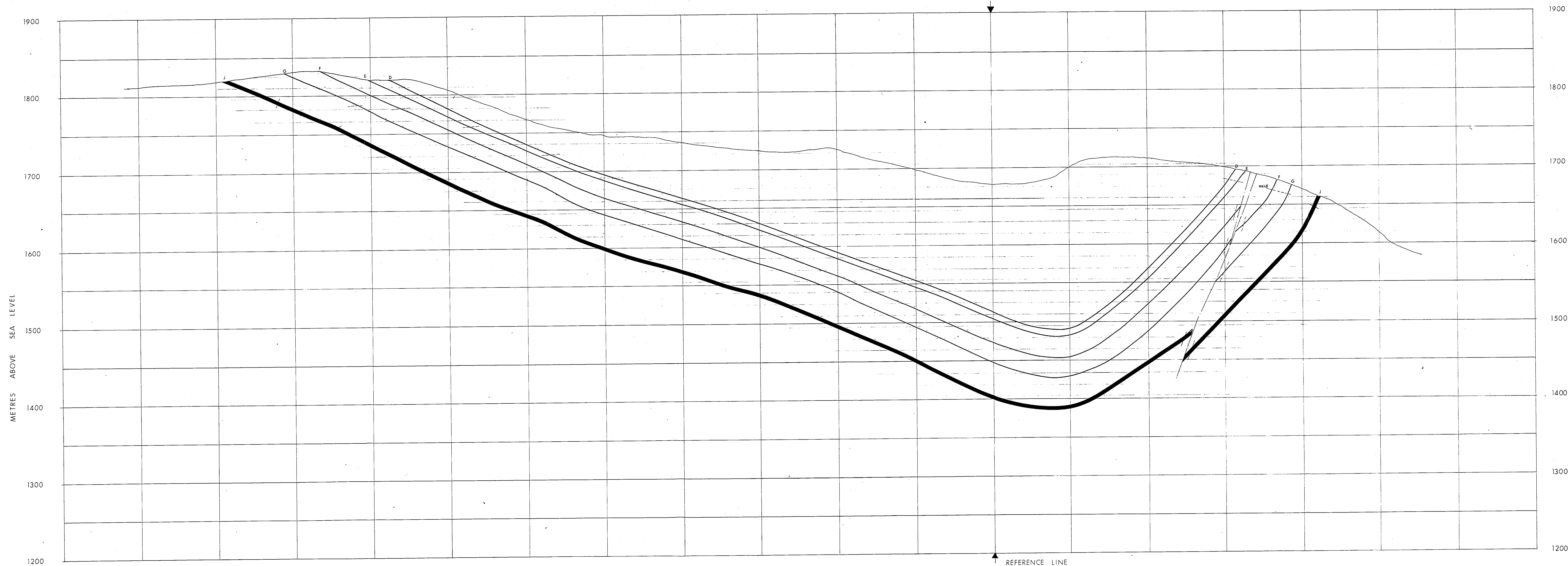
QUINTETTE COAL LIMITED		
PREPARED BY: DENISON COAL LIMITED		
CALGARY ALBERTA		
PR-Quintette 76(2)B		
FRAME CROSS-SECTION N° F7621		
DRAWN BY: J.W.K.	DATE: SEPT., 76	SCALE: 1:2500
APPROVED BY:	DRAWING NO: QNTT76-0675- R01	



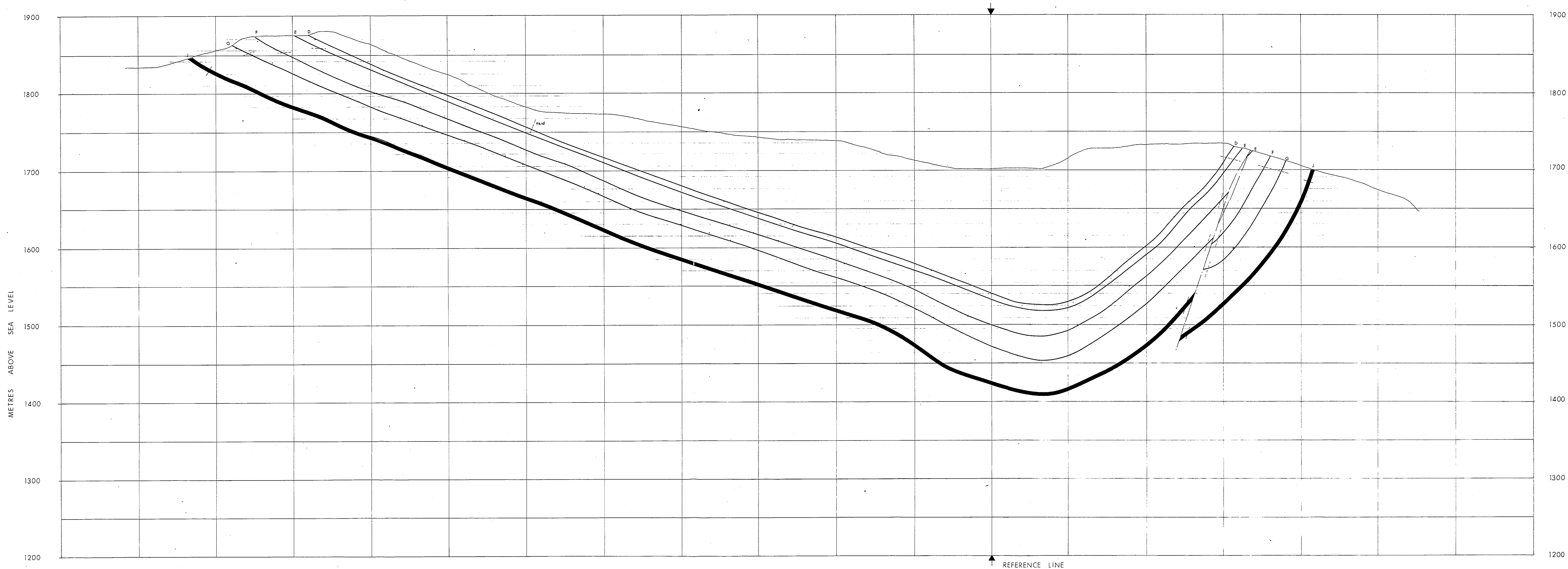


QUINTETTE COAL LIMITED		
PREPARED BY: DENISON COAL LIMITED		
CALGARY	ALBERTA	
PR-Quintette 76(2)B		
FRAME CROSS-SECTION N° F7622		
DRAWN BY: J.W.K.	DATE: SEPT., 76	SCALE: 1:2500
APPROVED BY:	DRAWING NO: QNTT76-0675-R01	

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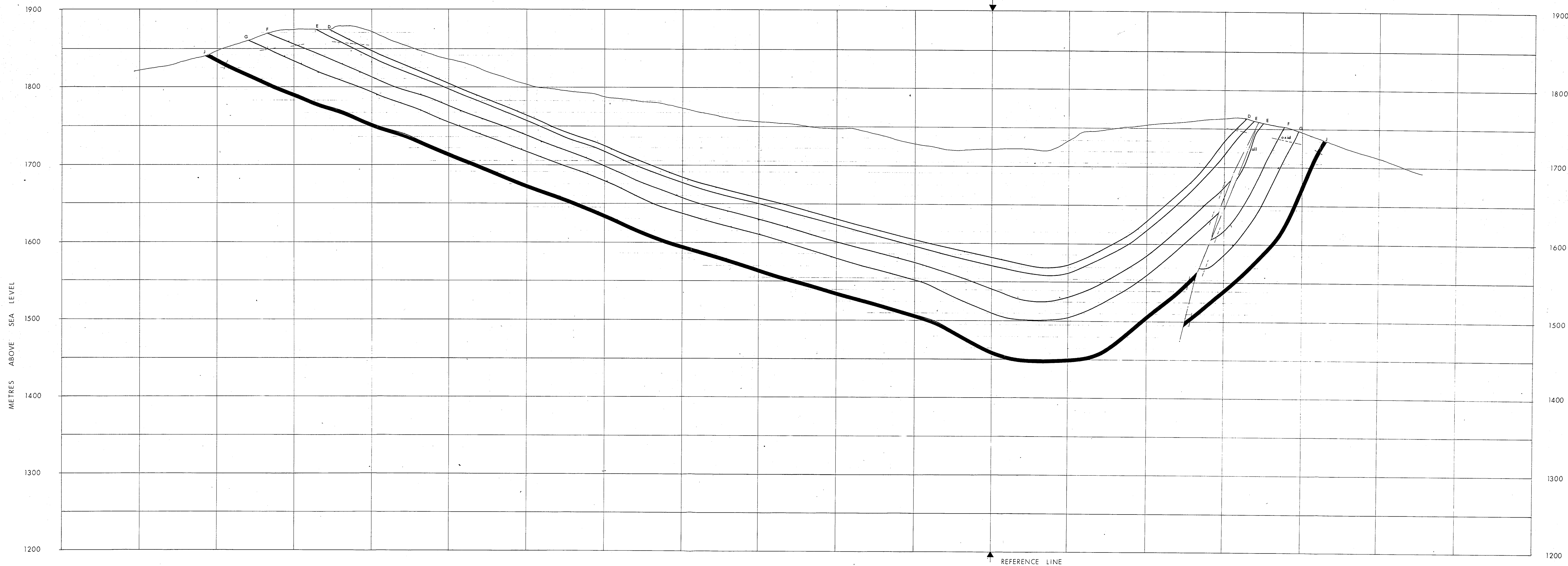



QUINTETTE COAL LIMITED		
PREPARED BY: DENISON COAL LIMITED		
CALGARY ALBERTA		
PR-Quintette 76(2)B		
FRAME CROSS-SECTION N° F7623		
DRAWN BY J.W.K.	DATE SEPT., 76	SCALE 1:2500
APPROVED BY	DRAWING NO. QNTT76-0675-R01	

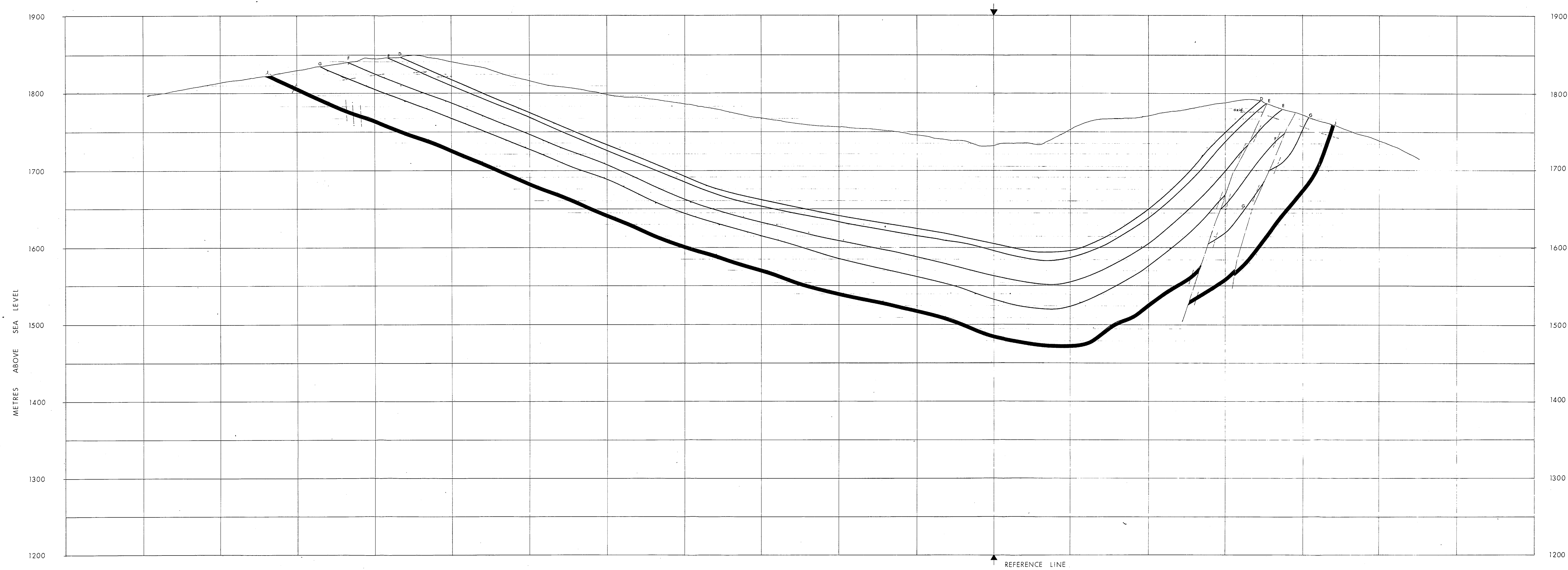


QUINTETTE COAL LIMITED		
PREPARED BY: DENISON COAL LIMITED		
CALGARY ALBERTA		
PR-Quintette 76(2)B.		
FRAME CROSS-SECTION N° F7624		
DRAWN BY: J.W.K.	DATE: SEPT., 76	SCALE: 1:2500
APPROVED BY:	DRAWING NO: QNTT76-0675-R01	

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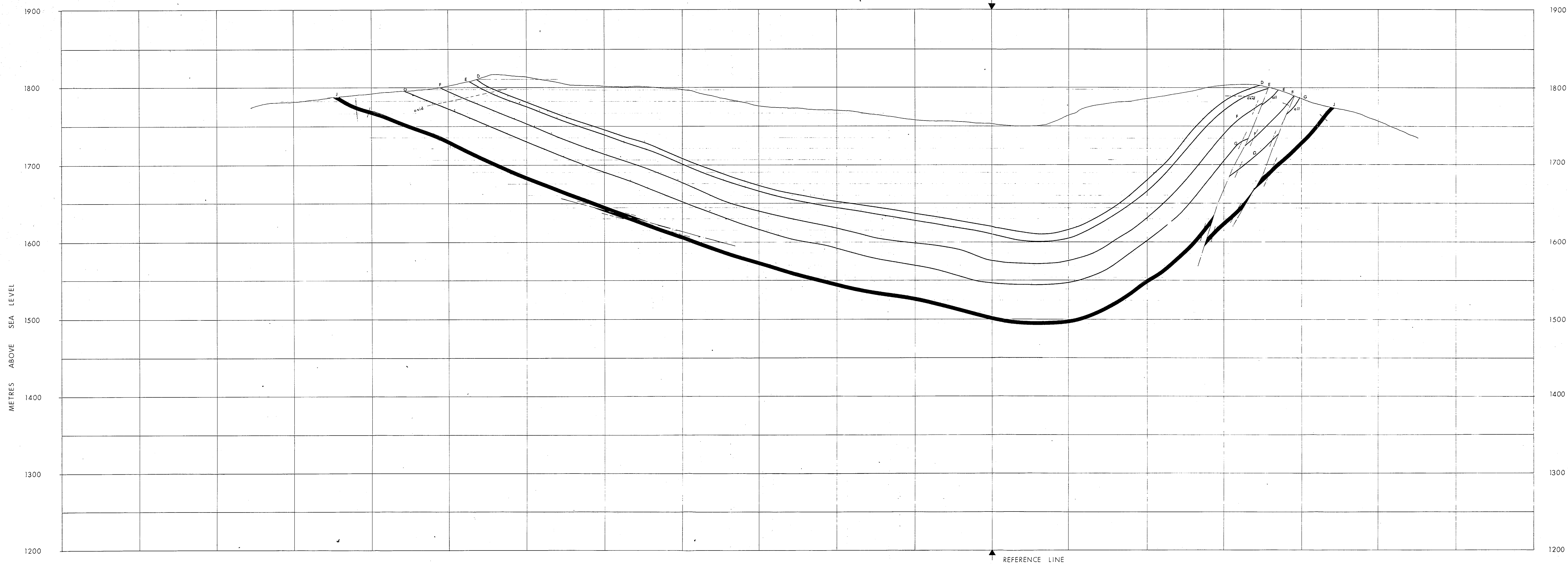



QUINTETTE COAL LIMITED		
PREPARED BY: DENISON COAL LIMITED		
CALGARY	ALBERTA	
PR-Quintette 76(2)B.		
FRAME CROSS-SECTION N° F7625		
DRAWN BY: J.W.K.	DATE: SEPT., 76	SCALE: 1:2500
APPROVED BY:	DRAWING NO: QNTT76-0675-R01	

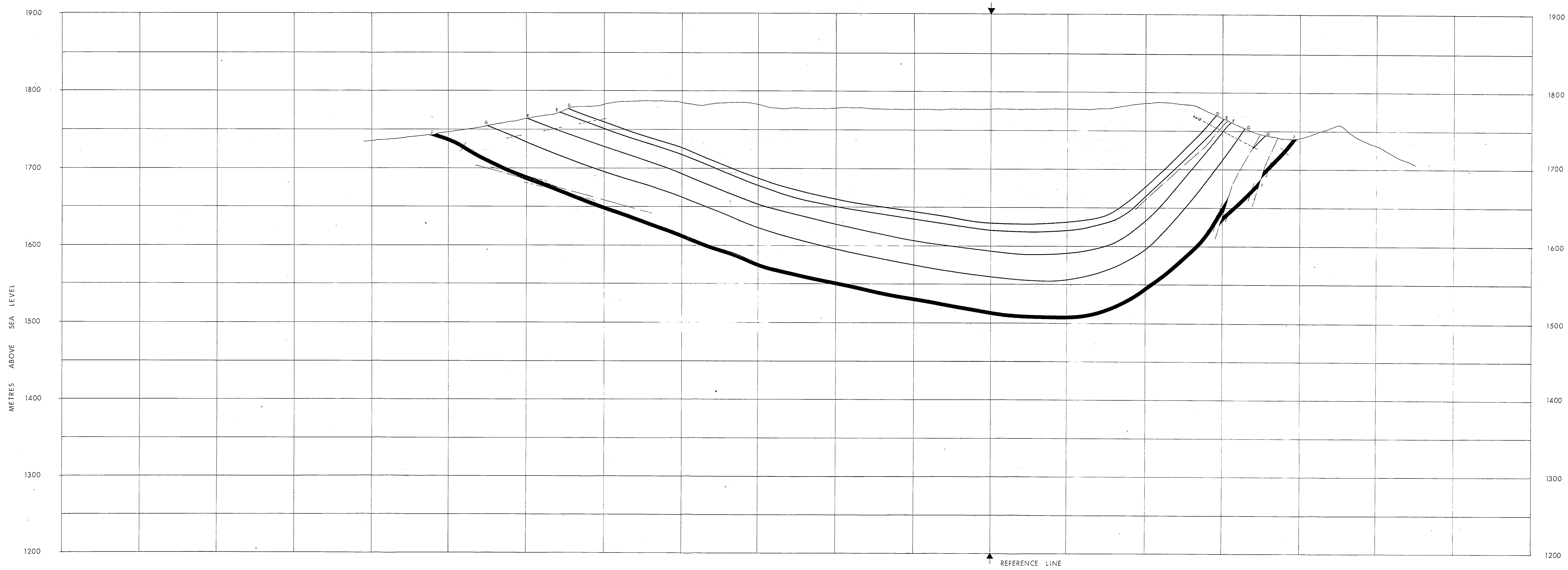


QUINTETTE COAL LIMITED		
PREPARED BY: DENISON COAL LIMITED		
CALGARY ALBERTA		
PR. Quintette 76 (a) B.		
FRAME CROSS-SECTION N° F7626		
DRAWN BY: J.W.K.	DATE: SEPT., 76	SCALE: 1:2500
APPROVED BY:	DRAWING NO: QNTT76-0675-R01	

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QUINTETTE COAL LIMITED		
PREPARED BY: DENISON COAL LIMITED		
CALGARY	ALBERTA	
PR-Quintette 76(2) B.		
FRAME CROSS-SECTION N° F7627		
DRAWN BY J.W.K.	DATE SEPT., 76	SCALE 1:2500
APPROVED BY	DRAWING NO. QNT176-0675-R01	



QUINTETTE COAL LIMITED

PREPARED BY:  
DENISON COAL LIMITED  
CALGARY ALBERTA

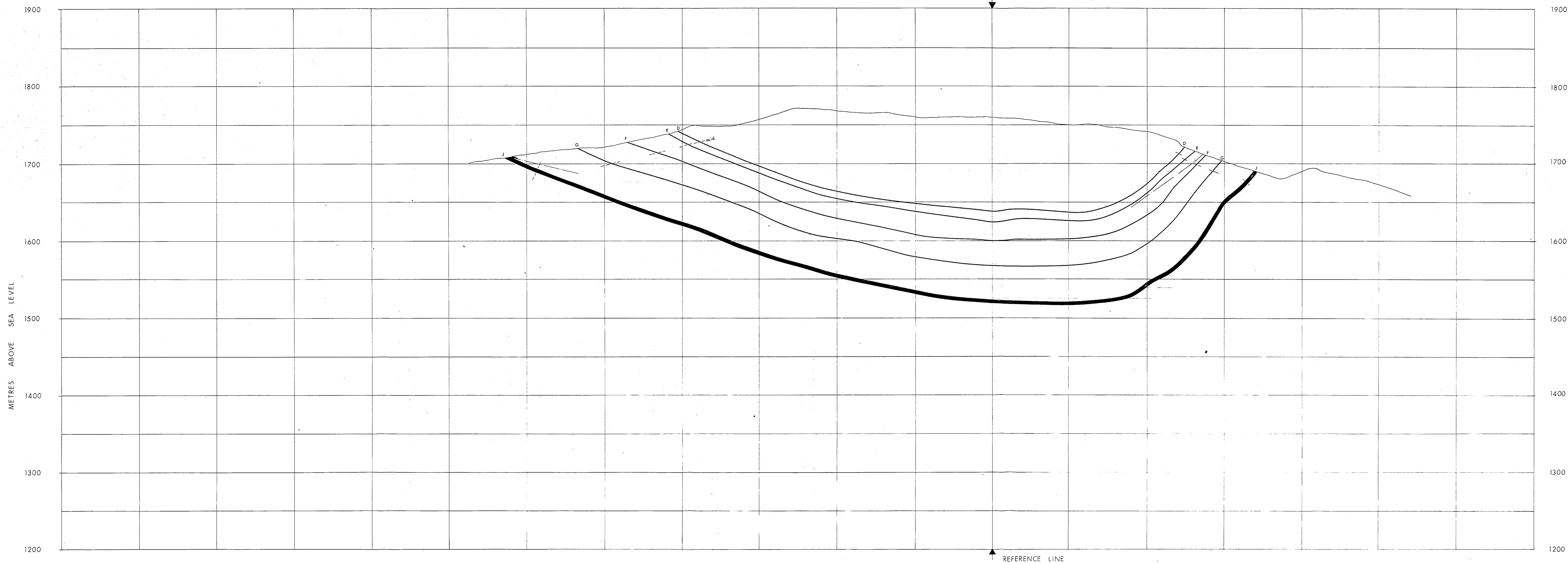
PR-Quintette-76 (2) B.

FRAME CROSS-SECTION N° F 7628

DRAWN BY J.W.K.	DATE SEPT., 76	SCALE 1:2500
APPROVED BY	DRAWING NO. QNTT 76-0675-R01	

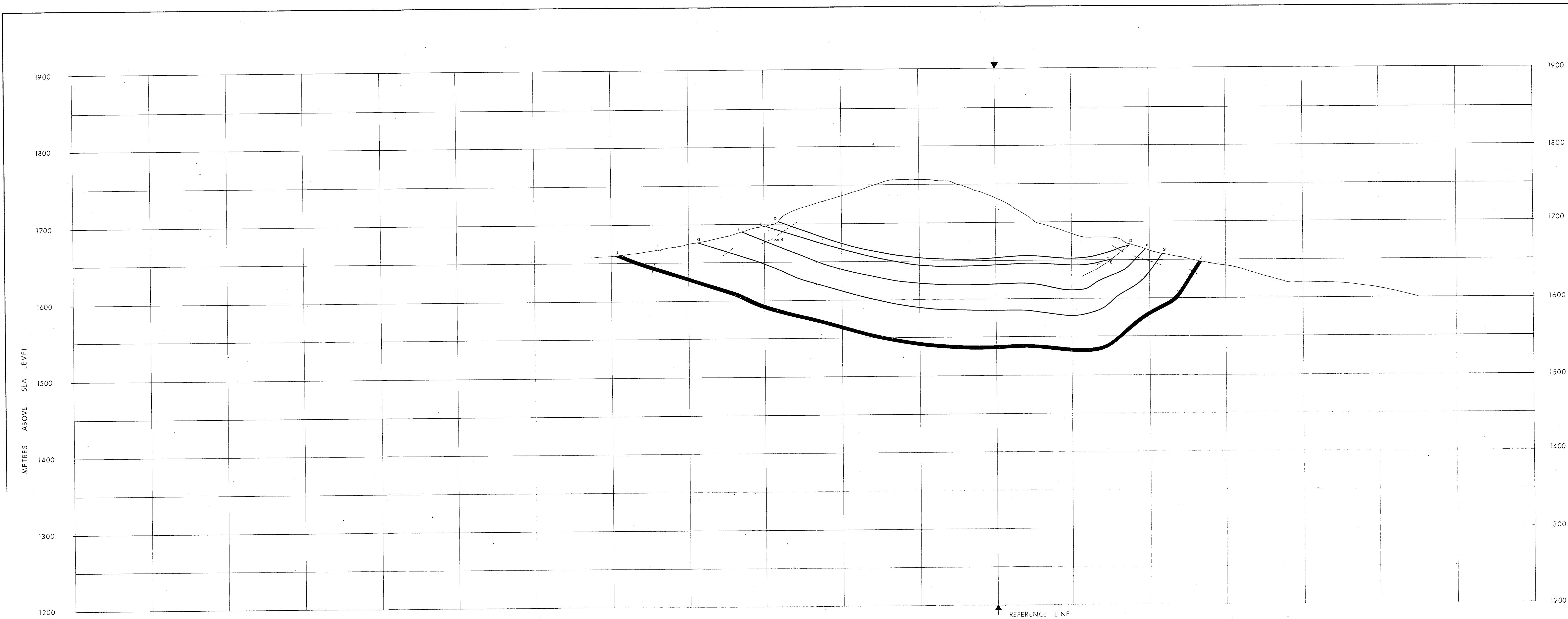
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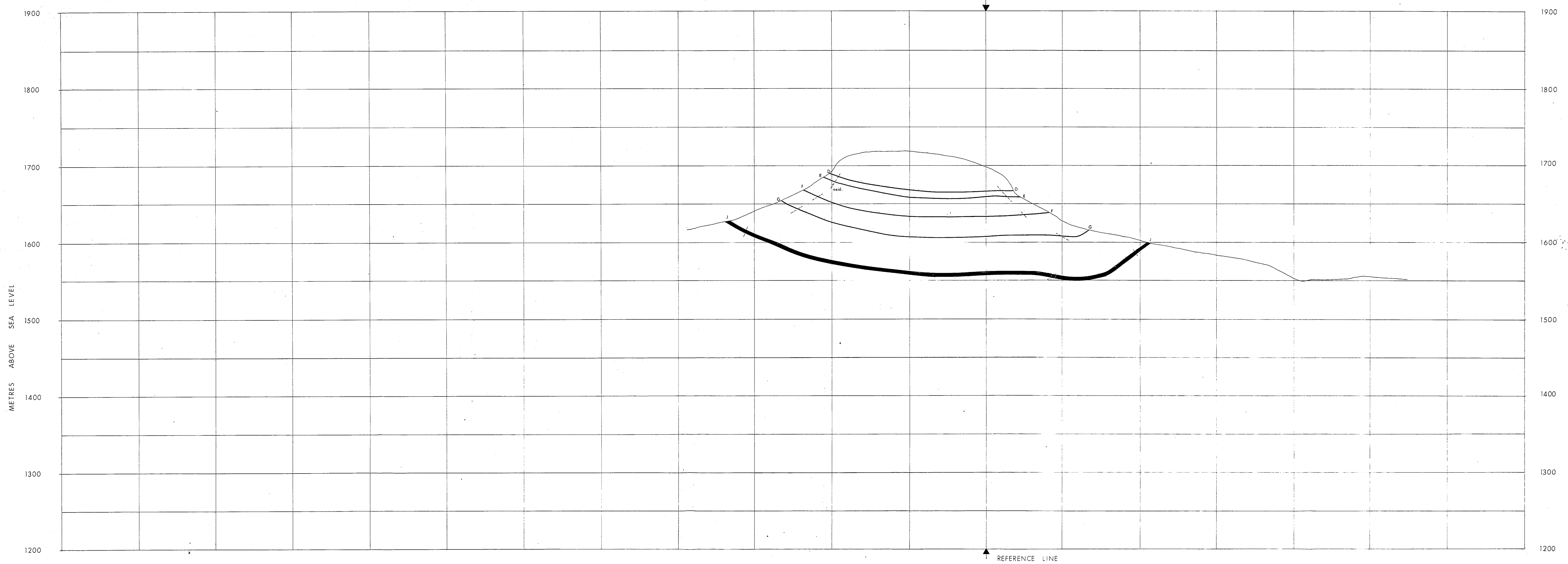
QUINTETTE COAL LIMITED		
PREPARED BY: DENISON COAL LIMITED		
CALGARY ALBERTA		
PR-Quintette 76(2)B		
FRAME CROSS-SECTION N° F7629		
DRAWN BY: J.W.K.	DATE: SEPT., 76	SCALE: 1:2500
APPROVED BY:	DRAWING NO: QNTT76-0675-R01	





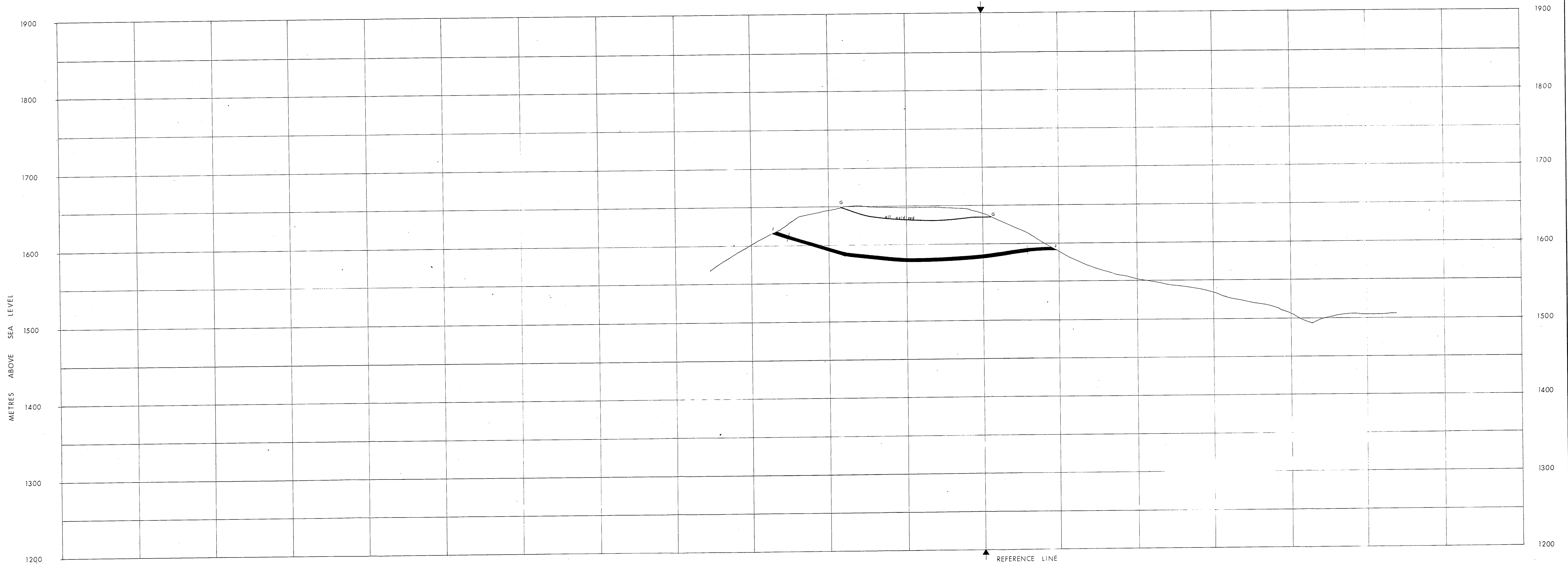
QUINTETTE COAL LIMITED		
PREPARED BY: DENISON COAL LIMITED		
CALGARY		ALBERTA
PR-Quintette 76(2) B.		
FRAME CROSS-SECTION N° F.7630		
DRAWN BY J.W.K.	DATE SEPT., 76	SCALE 1:2500
APPROVED BY	DRAWING NO. QNTT76-0675-R01	

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QUINTETTE COAL LIMITED		
PREPARED BY: DENISON COAL LIMITED CALGARY ALBERTA		
PR-Quintette 76 (2) B		
FRAME CROSS-SECTION N° F7631		
DRAWN BY: J.W.K.	DATE: SEPT., 76	SCALE: 1:2500
APPROVED BY:	DRAWING NO: QNTT 76-0675-R01	

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QUINTETTE COAL LIMITED		
PREPARED BY: DENISON COAL LIMITED		
CALGARY ALBERTA		
PR-Quintette 76(2) B.		
FRAME CROSS-SECTION N° F7632		
DRAWN BY: J.W.K.	DATE: SEPT. 76	SCALE: 1:2500
APPROVED BY:	DRAWING NO. QNTT76-0675-R01	