An assessment of five (5) vertical sounding confirmation scans (VSCS) over Hardrock Coal Mining's (HRCM) coal deposits near Fingal in north-east Tasmania using Dexon Resonance Frequency Geological Technology (DRFGT)

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Compiled by: Andrew Graham
For Dexon Technology Pty Ltd
Phone: +61 (0)3 8456 6631
Email: info@dexontechnology.com.au
Web: www.dexontechnology.com.au

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The opinions expressed in this Report have been based on the information supplied to the author (Andrew Graham) by Dexon Technology Pty Ltd (Dexon) and are provided in response to a specific request from Dexon to undertake the work contained herein.

The author has exercised all due care in reviewing the information and data supplied and has been led by Dexon's technical experts in relation to the conclusions provided. The author does not accept responsibility for any errors or omissions in the supplied information and does not accept any consequential liability arising from commercial decisions or actions resulting from them.

The information in this report has been compiled by Andrew Graham who is a 20 year member of the Australasian Institute of Mining and Metallurgy. Mr. Graham has sufficient experience which is relevant to the style of mineralisation and type of deposit under consideration to qualify as Competent Persons as defined in the JORC Code 2004. Mr. Graham consents to the release of the information compiled in this report in the form and context in which it appears.

1. EXECUTIVE SUMMARY

Hardrock Coal Mining Pty Ltd (HRCM) engaged the services of Dexon Technology Pty Ltd to undertake both an aerial and ground survey over their Exploration Licence (EL 16/2010) at Fingal in north-east Tasmania and to provide follow-up work in the form of five (5) vertical sounding confirmation scans (VSCS).

The survey work and vertical soundings were conducted using Dexon Technology's revolutionary Resonance Frequency Geological Technology (DRFGT) with the vertical soundings being located over the site of five proposed drill holes (Figure 1).

Following the survey and scan work it was determined that the report for the five (5) vertical soundings should be compiled first and as such this report specifically assesses and discusses the output pertaining to these five vertical soundings.

No background information in terms of historical drill holes (i.e. petrology, mineralogy, coal quality etc.) or mining information was provided for the vertical sounding confirmation scan sites as part of the undertaking was to determine if the DRFGT provided sufficient detail to enable a "virtual borehole" to be delivered.

All five vertical soundings detected coal bearing horizons with the following characteristics:

- VR001 – three horizons at 309, 430 and 480 metres (surface RL of scan location is 828 metres). The horizons comprised 5, 1 and 1 coal seam ply respectively,

- VR002 – one horizon at 44 metres (surface RL of scan location is 625 metres). The coal horizon comprised one coal seam ply,

- VR003 – two horizons at 36 and 66 metres (surface RL of scan location is 640 metres). The coal horizons comprised 1 and 1 coal seam ply respectively,

- VR004 – two horizons at 37 and 77 metres (surface RL of scan location is 638 metres). The coal horizons comprised 1 and 2 coal seam plies respectively; and,

- VR005 – two horizons at 32 and 66 metres (surface RL of scan location is 630 metres). The coal horizons comprised 1 and 2 coal seam plies respectively,

The vertical soundings for VR002, VR003, VR004 and VR005 all occurred along an E-NE line with similar surface RLs (along a roadway) whilst VR001 was situated approximately 1,200 metres to the south of this line at a higher surface RL (~200 metres). If the upper coal horizon in VR001 equates to those which were detected in the other vertical scans it indicates that the coal seam has an overall slope of approximately 1 in 25 (2.3 degrees) to the south south-east (i.e. flat lying).

The coal horizons are of variable quality with the scans showing that there are numerous coal seam plies indicating the presence of intercalated lithic sandstone, siltstone and mudstone (i.e. "dirt bands") which would necessitate some form of washing to ensure a suitable coal product could be acquired. Dilution rates are likely to be high.

2. INTRODUCTION

The Dexon Resonance Frequency Geological Technology (DRFGT) is an innovative, completely non-invasive and highly rapid means of exploring, assessing and mapping the subsurface environment in terms of its chemical, mineralogical and structural components.

This technology has been developed over the past 20 years by undertaking geophysical work involving original research and accepted applied geodynamics. The technology has been successfully applied to the exploration and assessment of hard rock and soft rock (oil, gas and coal) resources, groundwater systems and environmental issues, such as contaminant plumes.

Hardrock Coal Mining Pty Ltd (HRCM) sought to utilise the DRFG Technology over five (5) proposed drill hole locations on their Exploration Licence (EL 16/2010) at Fingal in north-east Tasmania with a view to assessing the DRFGT and determining its potential for providing them with accurate, "virtual borehole" data (Figure 1).

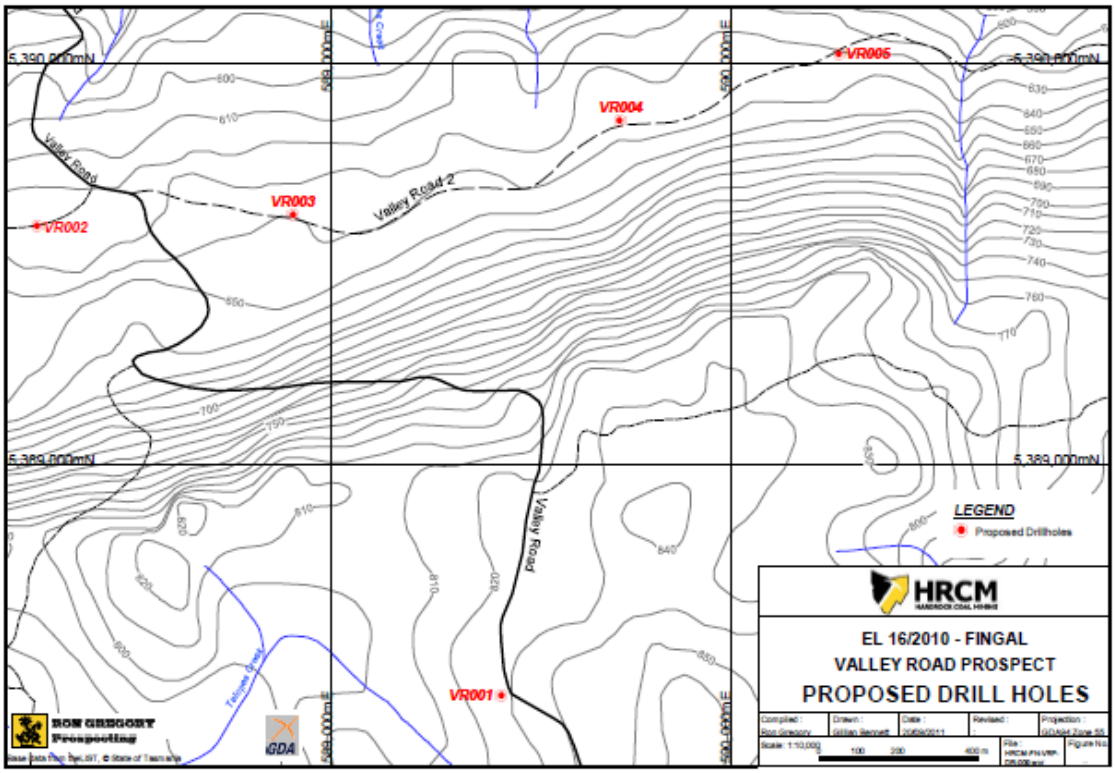

Figure 1: Location and spatial relationship for the five vertical sounding confirmation scans (from HRCM report).

The vertical sounding confirmation scans detected coal bearing horizons with the following characteristics:

- VR001 – three horizons at 309, 430 and 480 metres (surface RL of scan location is 828 metres). The horizons comprised 5, 1 and 1 coal seam ply respectively,

- VR002 – one horizon at 44 metres (surface RL of scan location is 625 metres). The coal horizon comprised one coal seam ply,

- VR003 – two horizons at 36 and 66 metres (surface RL of scan location is 640 metres). The coal horizons comprised 1 and 1 coal seam ply respectively,

- VR004 – two horizons at 37 and 77 metres (surface RL of scan location is 638 metres). The coal horizons comprised 1 and 2 coal seam plies respectively; and,

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The vertical soundings for VR002, VR003, VR004 and VR005 all occurred along an E-NE line with similar surface RLs (along a roadway) whilst VR001 was situated approximately 1,200 metres to the south of this line at a higher surface RL (~200 metres).

If the upper coal horizon in VR001 equates to those which were detected in the other vertical scans it indicates that the coal seam has an overall slope of approximately 1 in 25 (2.3 degrees) to the south south-east (i.e. flat lying).

It should be noted that this association (of coal seams) should be stated with care as recent mapping of the Tasmania Basin has indicated that litho-stratigraphic resolution even over relatively small distances is problematic due to the absence of marker beds, bio-stratigraphic zonations, repetition of similar beds and lateral thickness variations.

The coal horizons are of variable quality with the scans showing that there are numerous coal seam plies indicating the presence of intercalated lithic sandstone, siltstone and mudstone (i.e. “dirt bands”). In addition, a number of the scans show the presence of interdigitated “dirt bands” which would necessitate some form of washing to ensure a suitable coal product could be acquired. Dilution rates are likely to be high.

3. INVESTIGATION METHODOLOGY

Both aerial and ground surveys were conducted over specified areas within the current Exploration Licence (EL 16/2010) and these were then followed up with five (5) vertical sounding confirmation scans (VSCS) to provide more detailed information on the nature and make-up of the coal seams which are being targeted for extraction by Hardrock Coal Mining.

The vertical sounding confirmation scans work on the basis of monitoring, measuring and capturing the relative value of the natural electromagnetic field of the earth (NEMFE) that is generated by geologic objects and subjecting the full vector (I’), horizontal (Hxy), and vertical (Hz) components of the magnetic strength to a specific data interpretation methodology.

The information is scientifically evaluated to develop detailed plans and cross sectional maps of the subsurface to a depth of 6,000 metres.

The Dexon Resonance Frequency Geological Technology scans are conducted via light-radio frequency systems comprising:

- A control-measurement unit,

- An interface unit for electromagnetic oscillations,

- A GPS system,
- A portable CPU for data capture,
- Special antennae for sensing the entire spectrum of the NEMFE; and,
- Specialist software for data interpretation.

The output is presented in a graphical format that is dependent on the specifics of the investigation.

4. LOCAL COAL GEOLOGY AND SETTING

Coal has been mined in various areas of Tasmania with major deposits of black coal being discovered in the Fingal Valley in 1863. The completion of the railway line to St Marys in 1886 enabled the establishment of larger scale coal mining in the Fingal Valley and this area has provided the majority of Tasmania's coal since that time (Hutton, 2009).

The coal seams of Tasmania are found within the Parmeener Supergroup which is essentially flat-lying and was deposited in a structural basin, called the Tasmania Basin which covers a large part of Central and eastern Tasmania. The rocks range in age from Late Carboniferous to Late Triassic. Structurally, the Tasmania Basin has several small tectonic folds with limbs dipping at 10° or less, and drape folds over bedrock topography. The sequence has been intersected by many steeply dipping faults with displacements of less than 100 m. During the Late Cretaceous and Early Tertiary, horst and graben structures fragmented and dislocated the coal sequences (Hutton, 2009).

The Parmeener Supergroup was originally subdivided into four sequences (each composed of several formations) comprising, in stratigraphic order, the Lower Marine, Lower Freshwater, Upper Marine and Upper Freshwater Sequences. Bacon gave a revised stratigraphy and divided the Parmeener Supergroup into the Lower Parmeener Supergroup, comprising the Lower Marine and Upper Marine Sequences (marine and glacio-marine lutite, marl, minor limestone and a thick basal tillite), which is separated by the Lower Freshwater (all older than Permian) from the Upper Parmeener Supergroup, of fluvial origin, comprising the Upper Freshwater Sequence and an Above Upper Freshwater Sequence (Permo-Triassic age) – (Hutton, 2009).

The two sequences in the Upper Parmeener Supergroup are separated by a disconformity which represents a late Permian to middle Triassic hiatus between the Upper Freshwater Sequences and the younger Above Upper Freshwater Sequence.

The Parmeener Supergroups were extensively intruded by dolerite derived from tholeiitic magma during the mid-Jurassic. The dolerite mostly occurs as discordant sills, up to 550 metres thick, which form a nearly continuous body. Dykes have been recorded. The dolerite is thought to represent more than 8000 km^2 of magma (Hutton, 2009).

The discontinuous Late Triassic coal sequences cover much of eastern and southern Tasmania (including the study area). Triassic coals are found in fining upwards sequences comprising sandstone representing channel deposits and siltstone and coal representing overbank deposits which were deposited on a flood plain with many streams of moderate to low sinuosity and frequently changing direction. Overall the

coal measures have a higher proportion of sandstone, indicating classical high sinuosity meandering streams. The economic seams are within the Triassic deposits (Hutton, 2009).

Although small scale mining has occurred at many localities where the Triassic coal measures are found, the three main coalfields are the Fingal Coalfield (centred on Fingal Tier), Mt Nicholas Coalfield (in the Nicholas ranges north-east of Fingal Tier) and Dalmayne Coalfield (east of the Fingal Coalfield) which are located in the northeast corner of the state. These coalfields contain the bulk of the Tasmanian coal resources. The Lower Parmeener Supergroup is up to 120 metres thick in these coalfields and is controlled by erosion. The Upper Parmeener Supergroup which hosts the coal seams is 350 metres thick (Hutton, 2009).

Eight coal seams are found in the Fingal Coalfield, designated seams A to H although the upper two seams are very poor quality verging on being carbonaceous shale. The most economic seams are the Duncan (F) seam and the East Fingal (H) Seam which is stratigraphically 30 metres below the Duncan Seam. The Blue Seam is mined at Blackwood Colliery on Mt Nicholas and the Merrywood Seam has been mined in an open pit operation southwest of Fingal (Hutton, 2009).

Late Triassic coal is a very dull coal that formed in a dry forest moor environment, with ash 25 to 30 per cent, specific energy 20 to 24 MJ/kg (air dried); vitrinite reflectance is 0.5 to 0.6 per cent although coal affected by the dolerite sills has a much higher rank with vitrinite reflectance up to 3 per cent. Sulphur is much lower than for the Permian coals, approximately 0.5 per cent. Typical maceral analyses give 60 to 70 per cent inertinite, 10 per cent vitrinite and 5 to 10 per cent liptinite (Hutton, 2009).

The Duncan Seam comprises 2 to 3 metres of dull coal with minor claystone and mudstone interbeds. Raw ash is approximately 30 per cent and the specific energy is 22 to 24 MJ/kg. Vitrinite content in the Duncan Seam is higher than the average, up to 30 per cent. The East Fingal Seam is generally split, with 1 to 2 metres of coal with intraseam clastic rocks up to 10 metres thick. Coal quality is similar to that of the Duncan Seam (Hutton, 2009).

5. SURVEY RESULTS

The vertical sounding confirmation scan results for VR001 to VR005 comprise graphs which depict the thickness and location of the coal horizons, the number of coal seam plies present and an indication of the coal seam quality by way of a percentage of coal versus non-coal materials. This percentage essentially represents interdigitating coal and lithic sediments (sandstone, siltstone and mudstone) as opposed to coal seam plies which indicate intercalated sequences (non-coal layers between coal seams).

The graphs for each of the vertical soundings are attached below:

VERTICAL SOUNDING VR001

VR001 was located approximately 1,200 metres to the south of the line that the other vertical soundings were taken along and is situated at an RL of approximately 828 metres which is around 200 metres higher than for the other vertical soundings.

The vertical sounding for VR001 identified three (3) coal seams which were located at 309, 430 and 480 metres below ground level (mBGL) respectively. The total thickness of these 3 coal seams was recorded as being 3.54 metres with the seam at 309 mBGL

being 0.64 metres; the seam at 430 mBGL being 0.60 metres and the seam at 480 mBGL being 2.30 metres.

The coal seam at 309 mBGL comprises 5 coal seam plies indicating that the overall coal seam horizon is interbedded with lithic sediments such as sandstone, siltstone and mudstone. In addition the coal seam plies range from a low coal content of 41% to a high of 84% (average across all thicknesses is 73%) indicating that there are also non-coal components ("dirty bands") within the actual coal (intercalated). This is a common phenomenon in coal measures and is an indication that coal washing would be required and that dilution rates would be quite high.

The coal seam at 430 mBGL comprises one coal seam ply with the shape of the ply (refer to output graph) indicating that it is interdigitated with sediments and that the overall quality of the coal seam ply decreases towards the base due to intercalated sediments. The coal seam ply comprises around 73% coal indicating that coal washing will be required.

The coal seam at 480 mBGL comprises one coal seam ply with some interdigitated and intercalated sediments. This coal seam ply is more substantial than the overlying seams at this sounding location but the overall quality (average) is slightly less at around 70% coal. It is not possible to determine from the supplied graphs how continuous this particular coal seam is in a regional sense.

VERTICAL SOUNDING VR002

VR002 was the western most sounding conducted on an east north-east line containing the four remaining soundings (VR002, VR003, VR004 and VR005 from west to east). VR002 was situated at an RL of approximately 625 metres.

The vertical sounding for VR002 identified one coal seam which was located at 44 mBGL. The total thickness of the coal seam was recorded as being 0.32 metres.

The coal seam comprises 1 coal seam ply with minor interdigitated sediments. However, the coal seam ply comprised only 47% coal indicating that there are significant intercalated sediments which, when coupled to the thickness of the seam, are likely to make this particular seam sub-economic.

VERTICAL SOUNDING VR003

VR003 was located approximately 600 metres east of VR002 at an RL of approximately 640 metres.

The vertical sounding for VR003 identified two (2) coal seams which were located at 36 mBGL and 66 mBGL respectively. The total thickness of these 2 coal seams was 0.65 metres with the seam at 36 mBGL being 0.25 metres and the seam at 66 mBGL being 0.45 metres.

Both the coal seams comprise one coal seam ply.

The coal seam ply at 36 mBGL is around 70% coal indicating that some intercalated sediments are present. The coal seam ply at 66 mBGL has a shape that indicates some interdigitated sediments as well as intercalated sediments based on the quantity of coal present. The coal seam at 66 mBGL averages around 68% indicating that washing would be required to upgrade this to an acceptable level.

VERTICAL SOUNDING VR004
VR004 was located approximately 830 metres east north-east of VR003 at an RL of approximately 638 metres.

The vertical sounding for VR004 identified two (2) coal seams which were located at 37 mBGL and 77 mBGL respectively. The total thickness of these 2 coal seams was 0.68 metres with the seam at 37 mBGL being 0.30 metres and the seam at 77 mBGL being 0.38 metres.

The coal seam at 37 mBGL comprises one coal seam ply with an average coal content of 70% indicating the presence of intercalated sediments ("dirty band"). The coal seam at 77 mBGL comprises two (2) coal seam plies indicating that interbedded sediments are present whilst the coal content of the two coal plies at 60% and 70% respectively indicates the presence of intercalated sediments.

Mining coal seams of this thickness (< 0.50 metres) and quality is likely to result in major dilution effects.

VERTICAL SOUNDING VR005
VR005 was located approximately 55 metres east north-east of VR004 at an RL of approximately 630 metres.

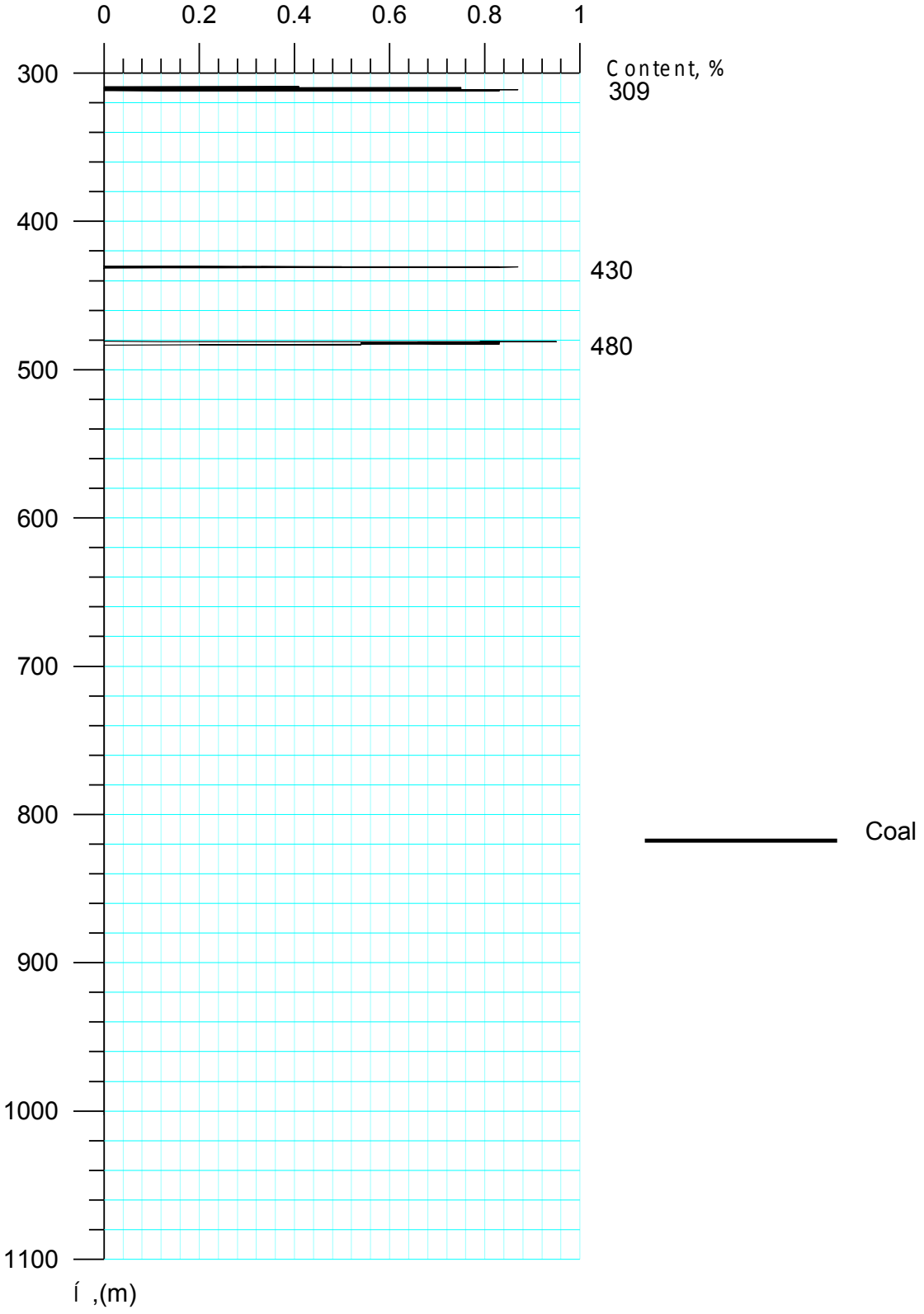
The vertical sounding for VR003 identified two (2) coal seams which were located at 33 mBGL and 66 mBGL respectively. The total thickness of these 2 coal seams was 0.68 metres with the seam at 33 mBGL being 0.23 metres and the seam at 66 mBGL being 0.45 metres.

The coal seam at 33 mBGL comprises one coal seam ply whilst the coal seam at 66 mBGL comprises two 92) coal seam plies. The coal seam ply at 33 mBGL comprises approximately 84% coal indicating that there are some intercalated sediments.

The two (2) coal seam plies at 66 mBGL indicated that there are interbedded sediments whilst the percentage of coal at 70% and 85% respectively indicated that there are intercalated sediments with the second ply being of substantially higher coal content.

HRCM, Fingal Area, NE Tasmania **Vertical Sounding VR001**
Location 41.65094 S 148.07408 E

Total thickness of coal seam plies = 354 cm



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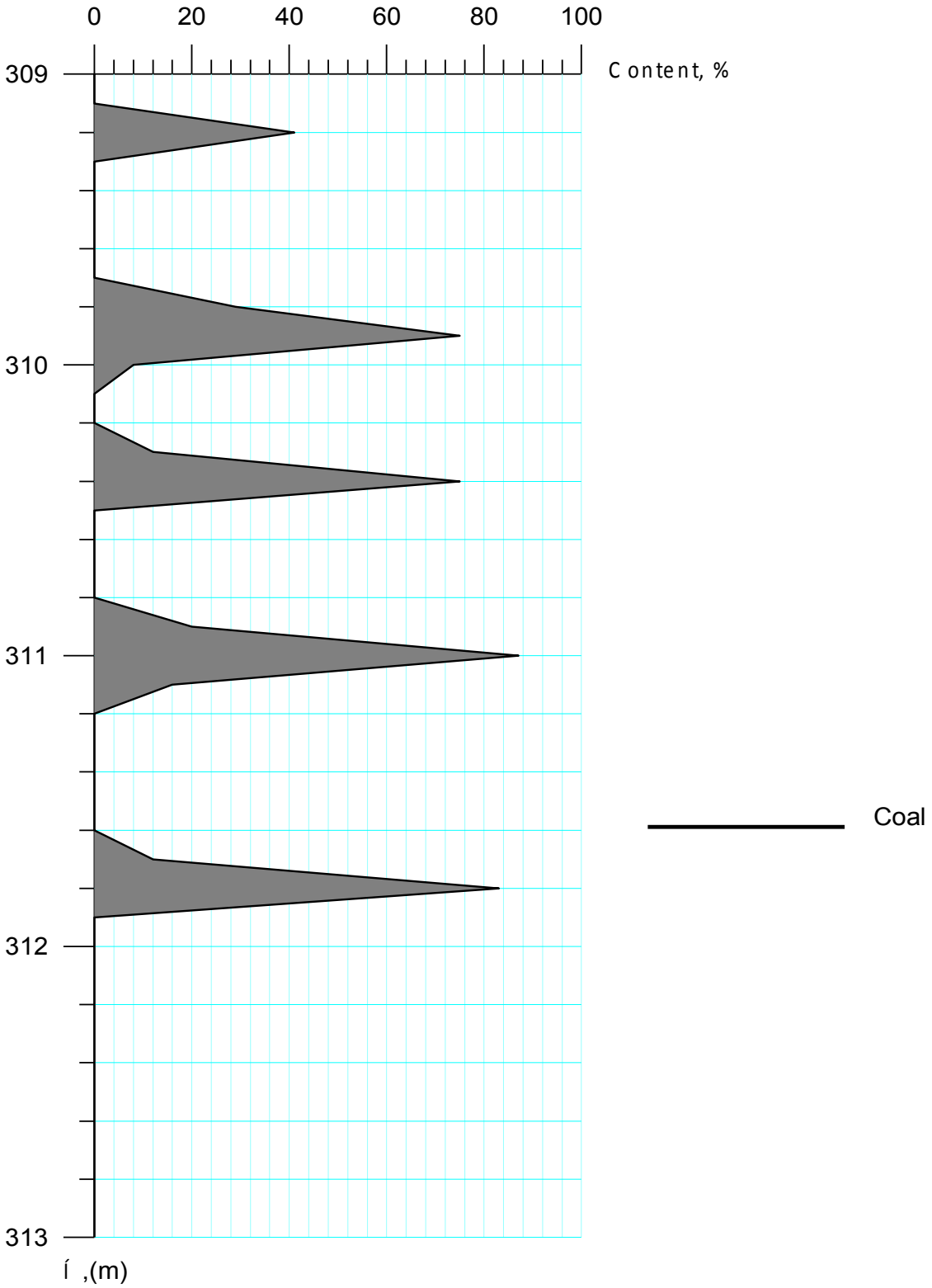
HRCM, Fingal Area, NE Tasmania **Vertical Sounding VR001**
Location 41.65094 S 148.07408 E

Coal horizon comprises 5 coal seam plies



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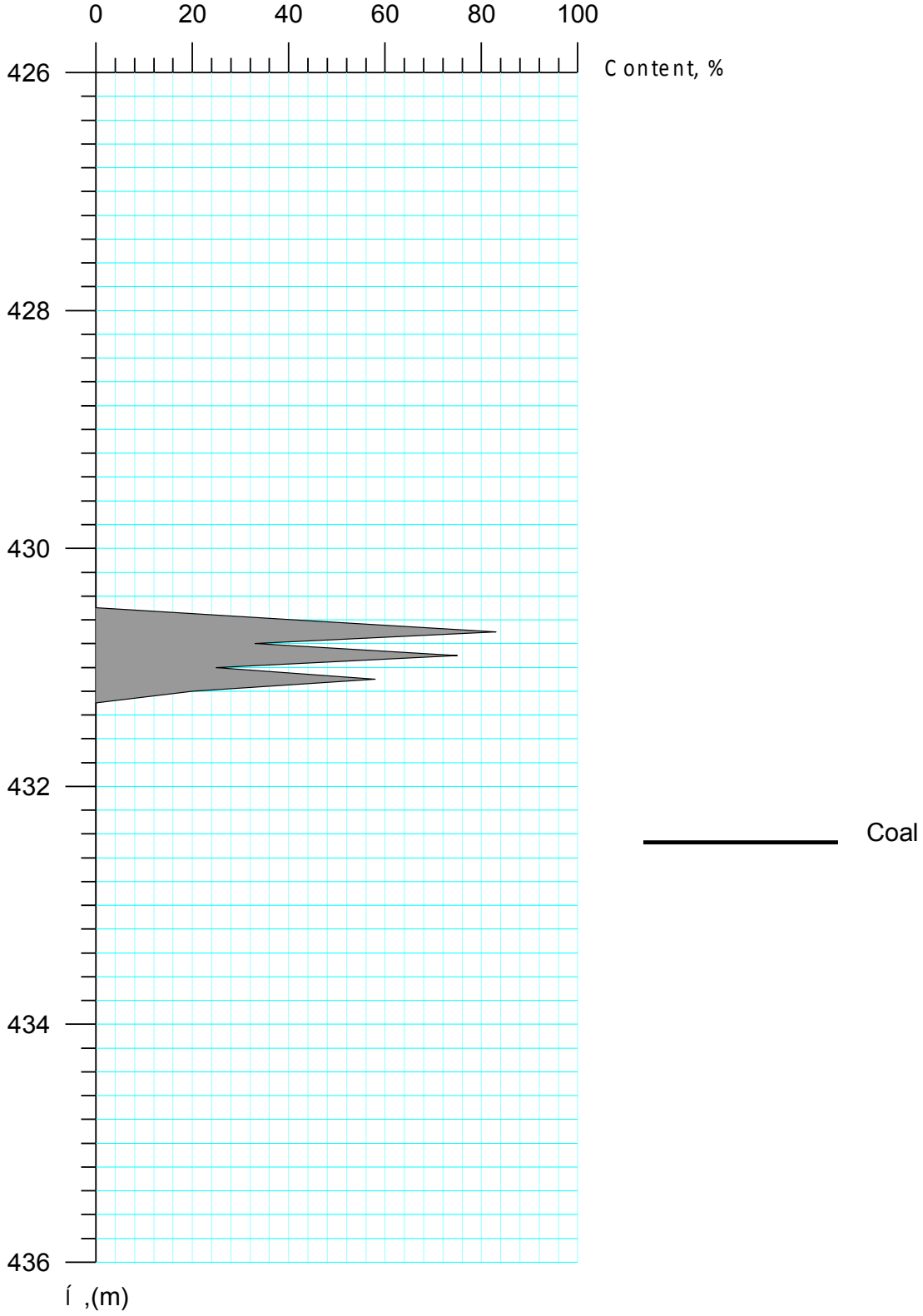
HRCM, Fingal Area, NE Tasmania **Vertical Sounding VR001**
Location 41.65094 S 148.07408 E

Coal horizon comprises 1 coal seam ply



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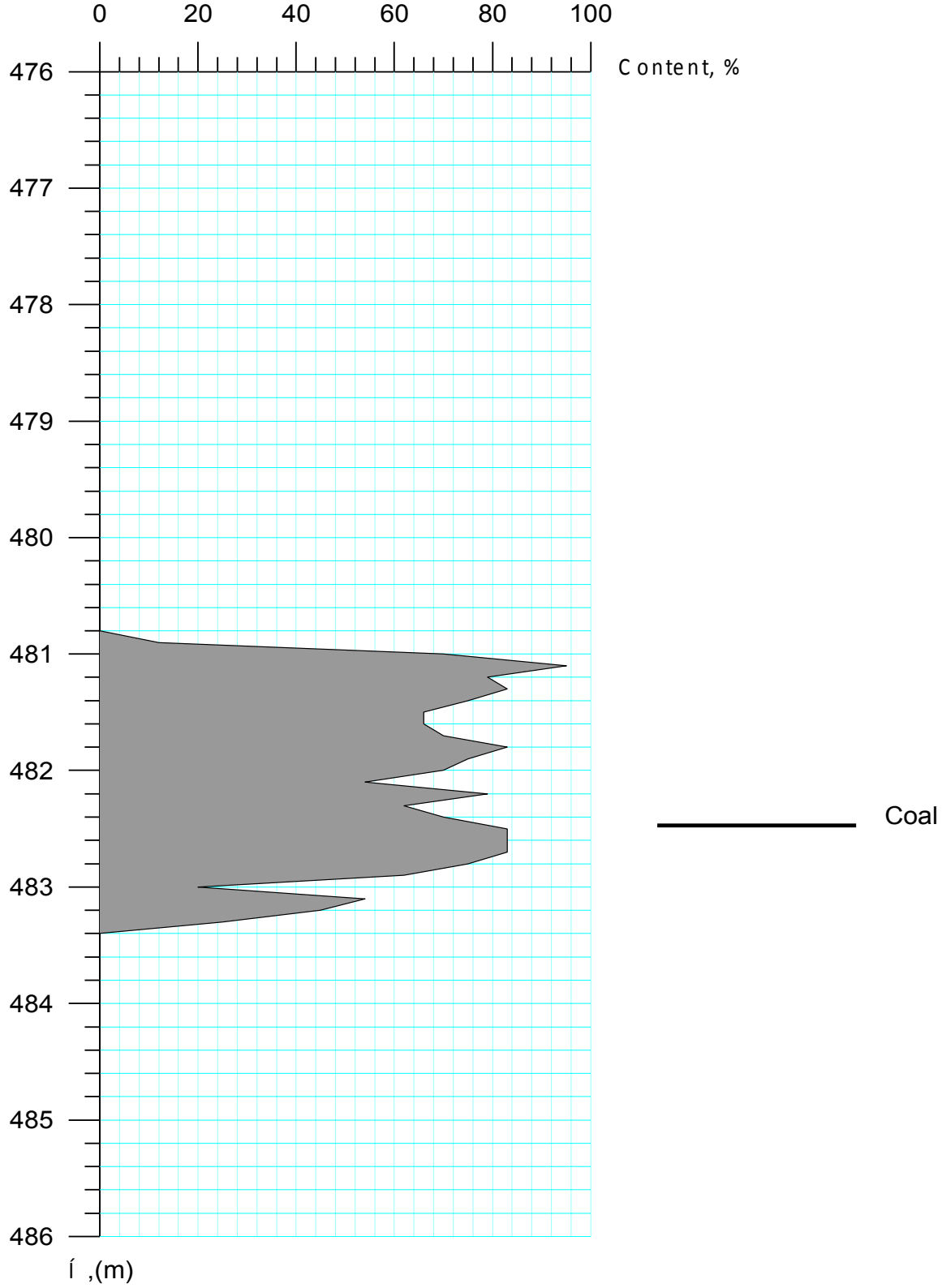
HRCM, Fingal Area, NE Tasmania **Vertical Sounding VR001**
Location 41.65094 S 148.07408 E

Coal horizon comprises 1 coal seam ply



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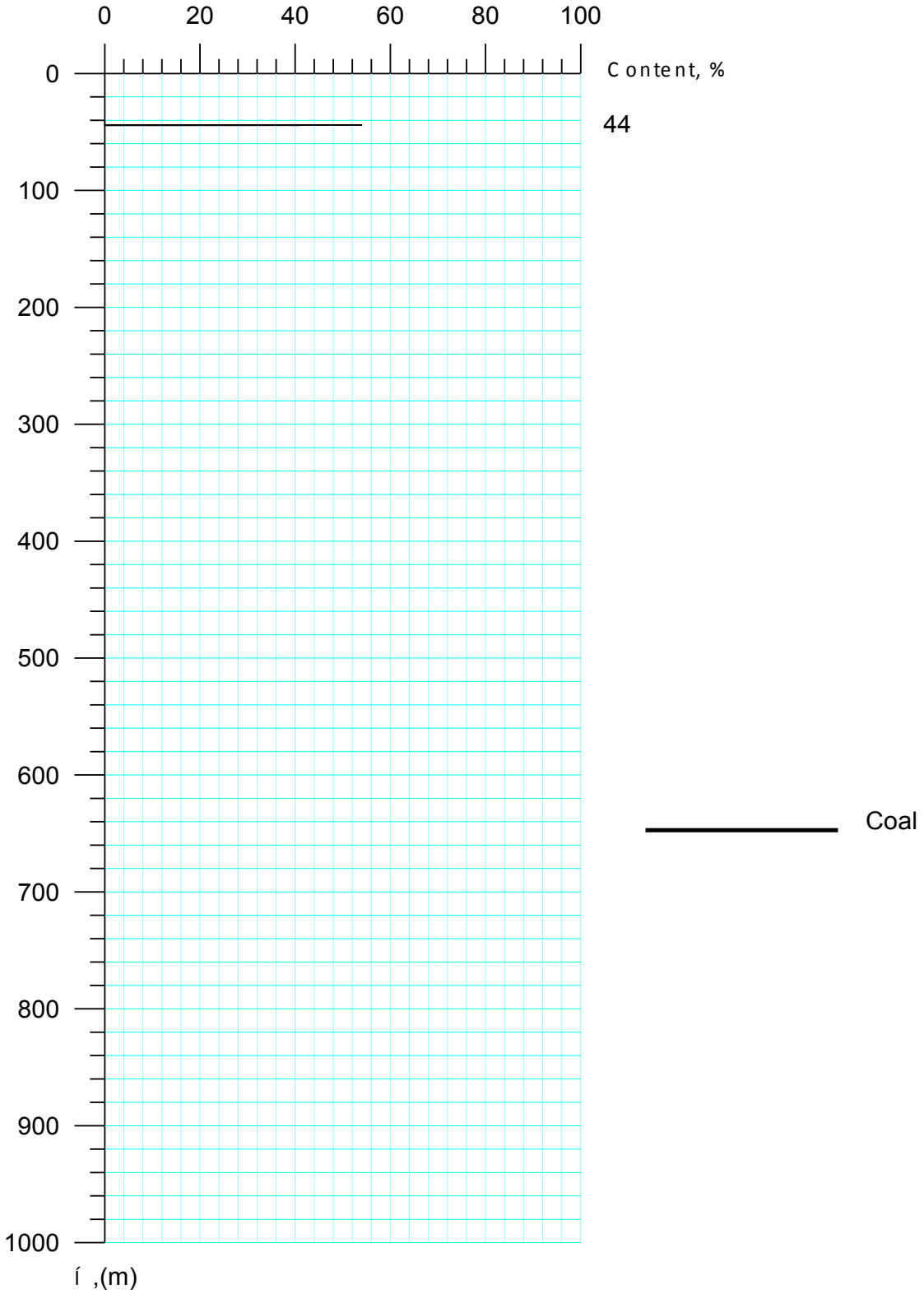
HRCM, Fingal Area, NE Tasmania **Vertical Sounding VR002**
Location 41.63643 S 148.06048 E

Total thickness of coal seam plies = 32 cm



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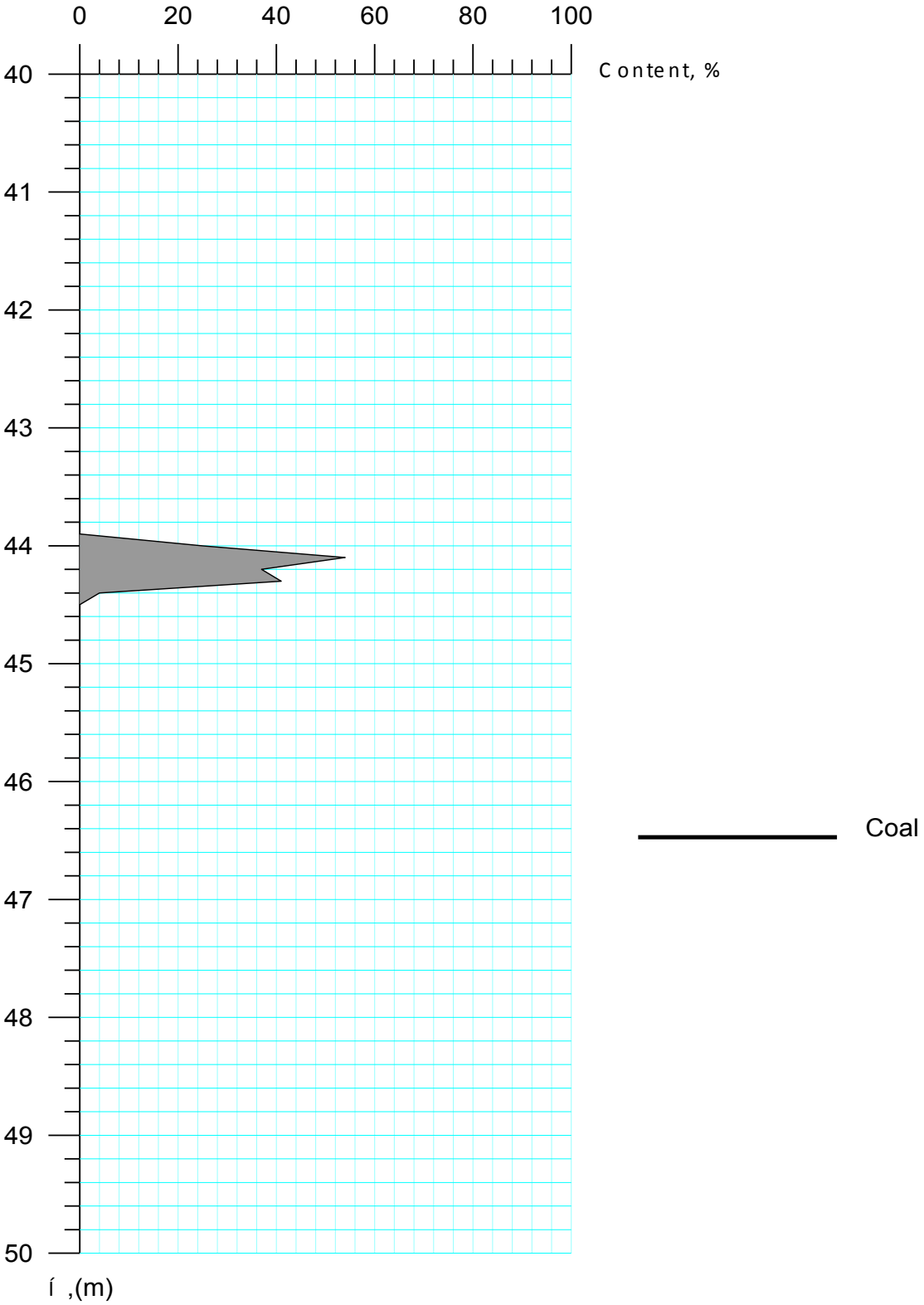
HRCM, Fingal Area, NE Tasmania **Vertical Sounding VR002**
Location 41.63643 S 148.06048 E

Coal horizon comprises 1 coal seam ply



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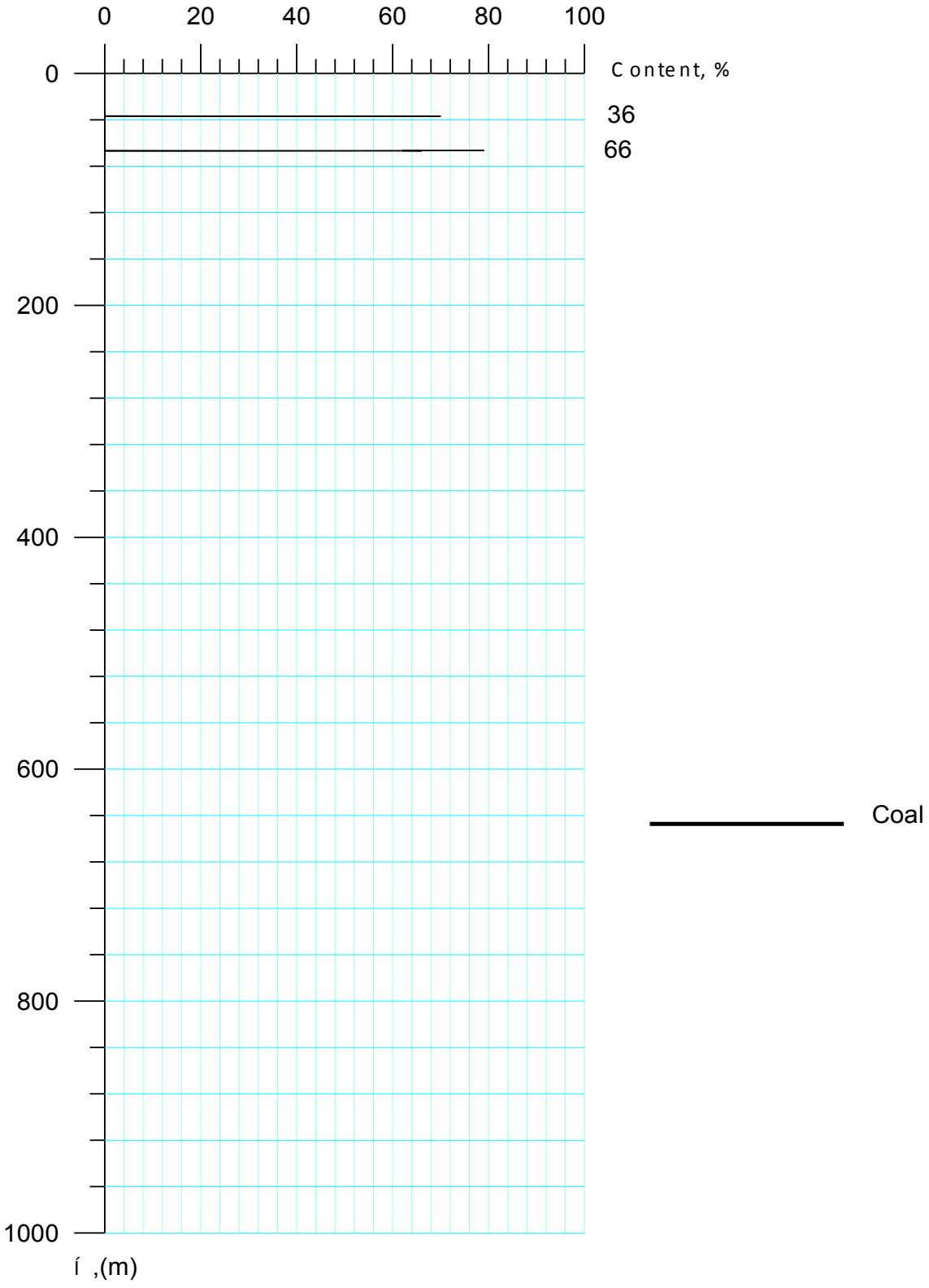
HRCM, Fingal Area, NE Tasmania **Vertical Sounding VR003**
Location 41.6405 S 148.06749 E

Total thickness of coal seam plies = 65 cm



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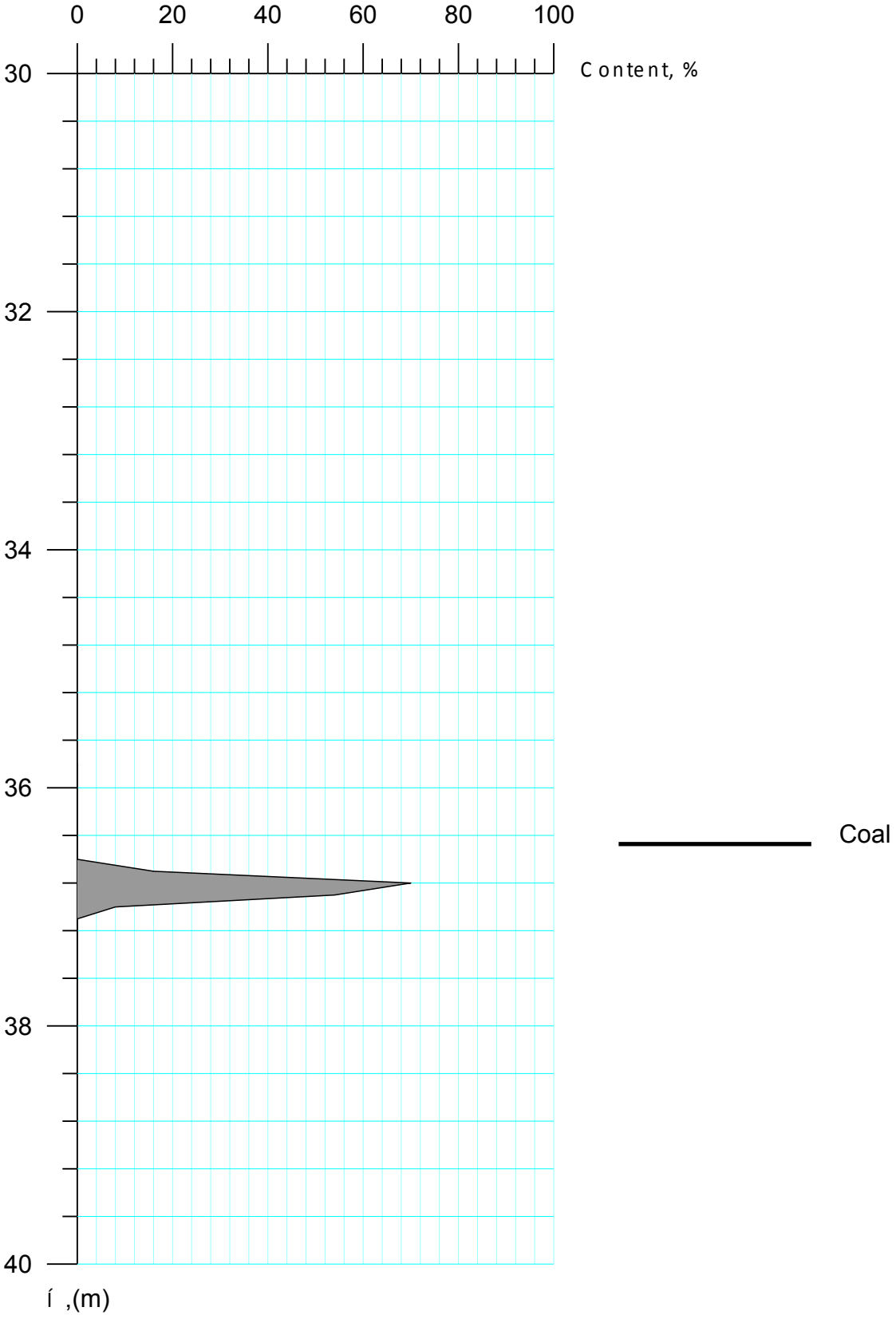
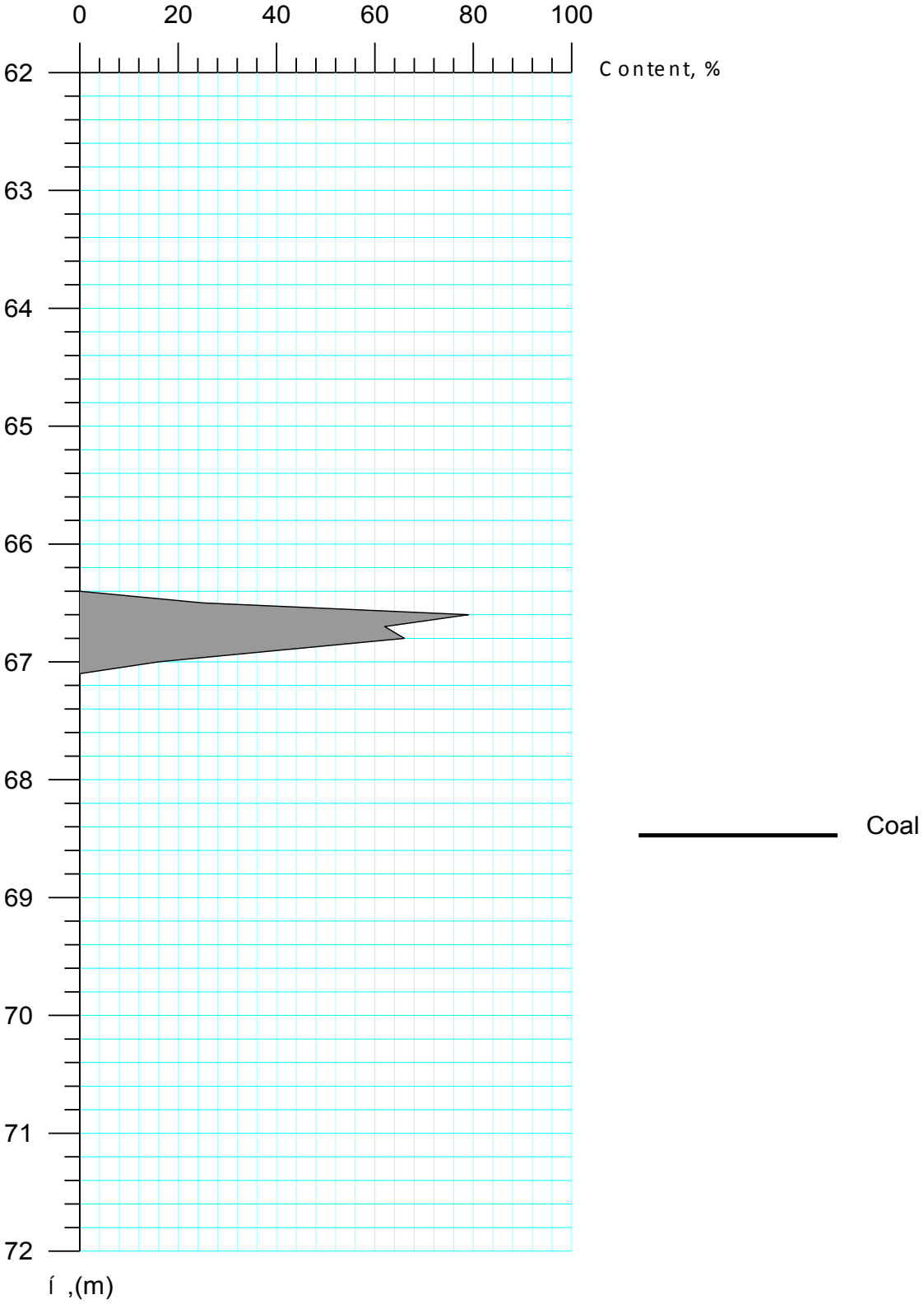
HRCM, Fingal Area, NE Tasmania **Vertical Sounding VR003**
Location 41.6405 S 148.06749 E

Coal horizon comprises 1 coal seam ply



HRCM, Fingal Area, NE Tasmania **Vertical Sounding VR003**
Location 41.6405 S 148.06749 E

Coal horizon comprises 1 coal seam ply



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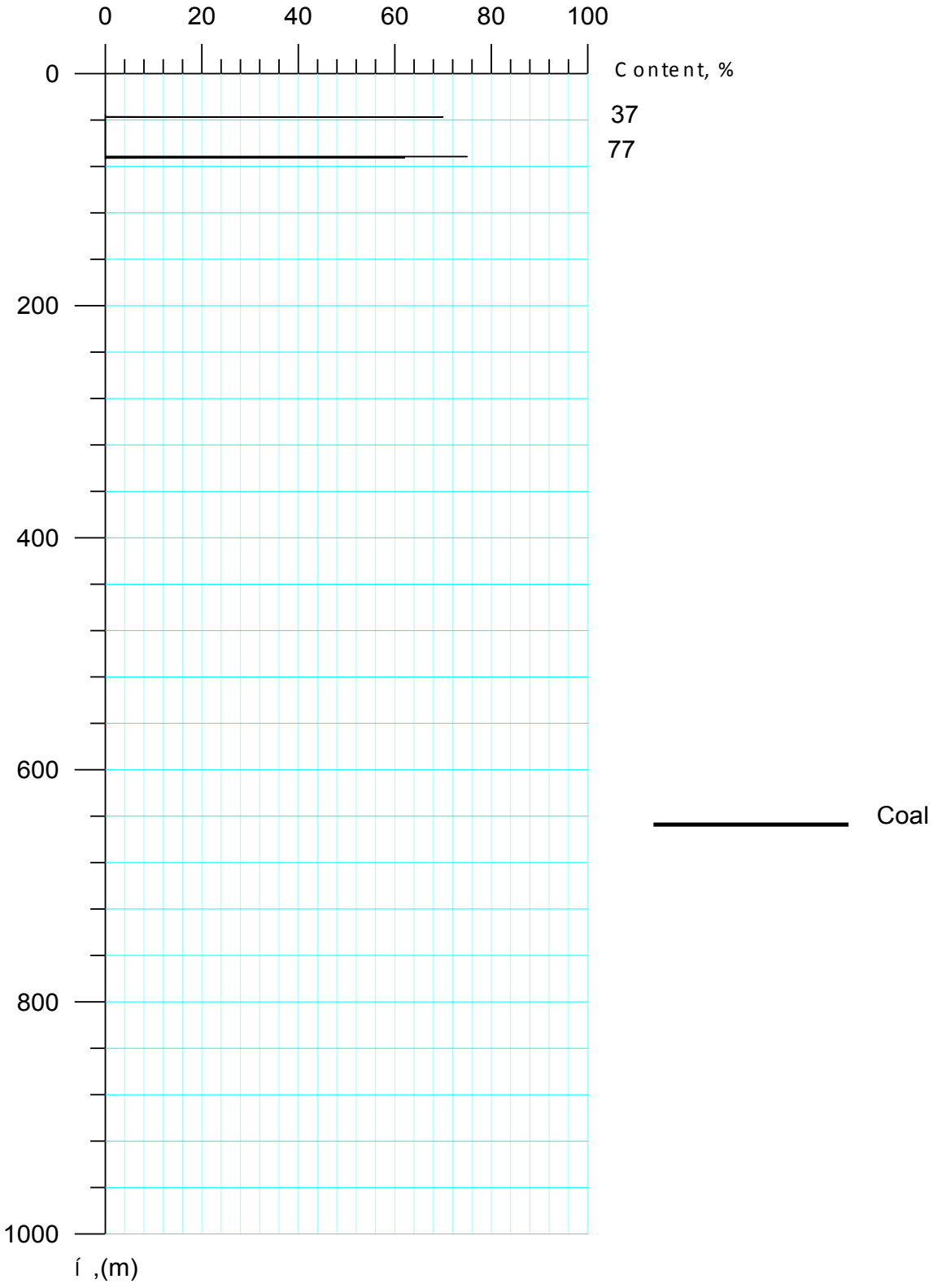
HRCM, Fingal Area, NE Tasmania **Vertical Sounding VR004**
Location 41.63942 S 148.07237 E

Total thickness of coal seam plies = 68 cm



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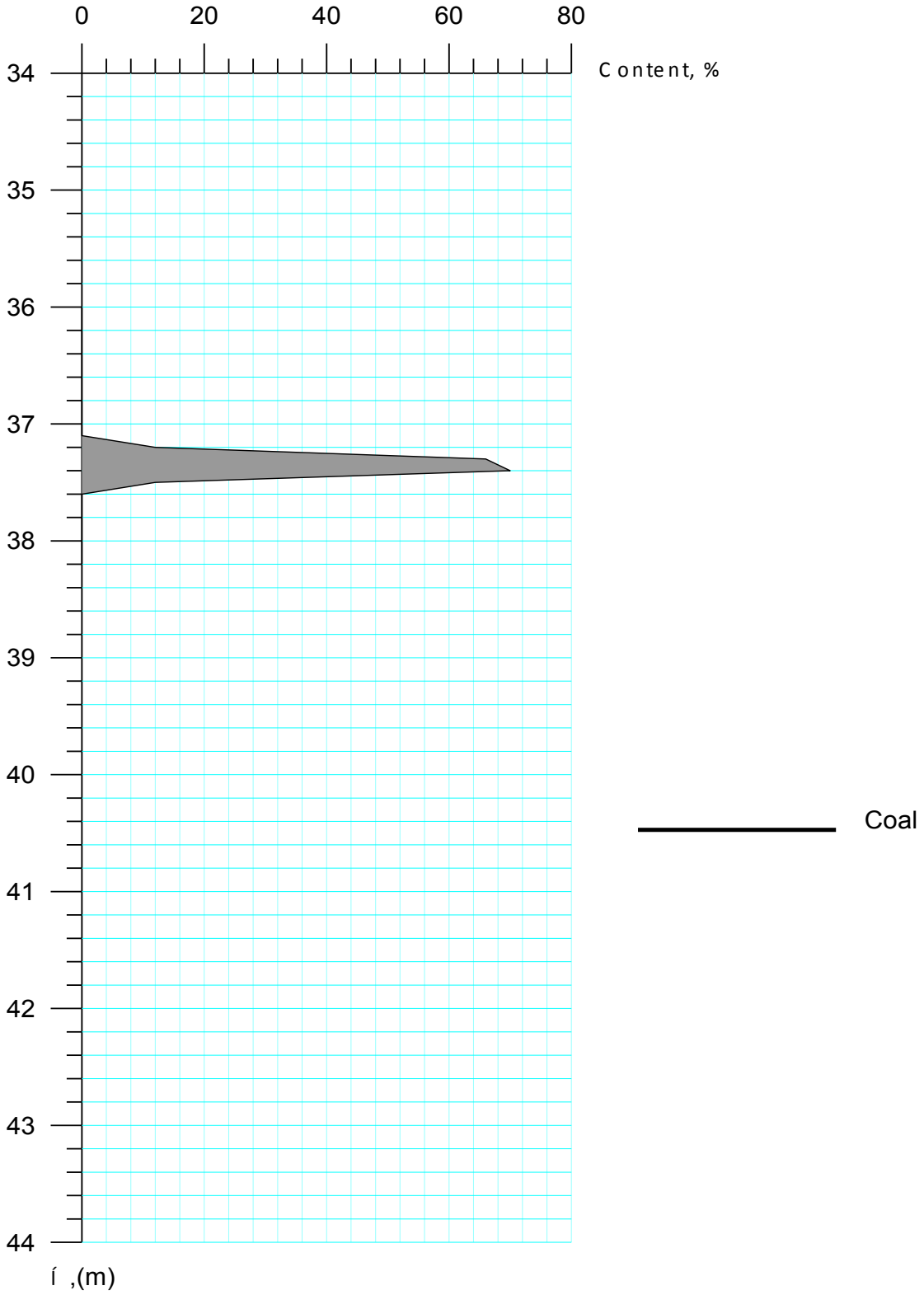
HRCM, Fingal Area, NE Tasmania **Vertical Sounding VR004**
Location 41.63942 S 148.07237 E

Coal horizon comprises 1 coal seam ply



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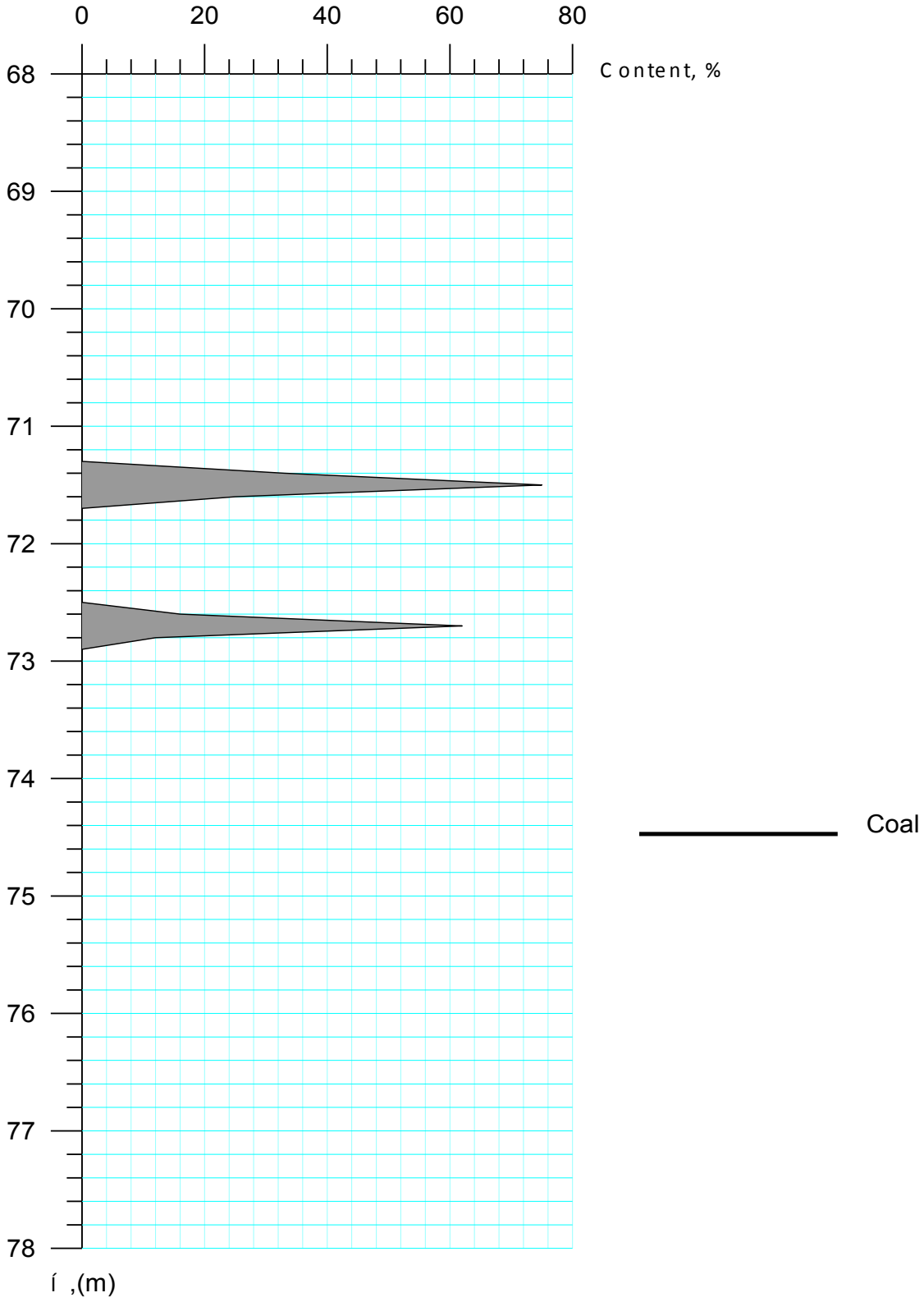
HRCM, Fingal Area, NE Tasmania **Vertical Sounding VR004**
Location 41.63942 S 148.07237 E

Coal horizon comprises 2 coal seam plies



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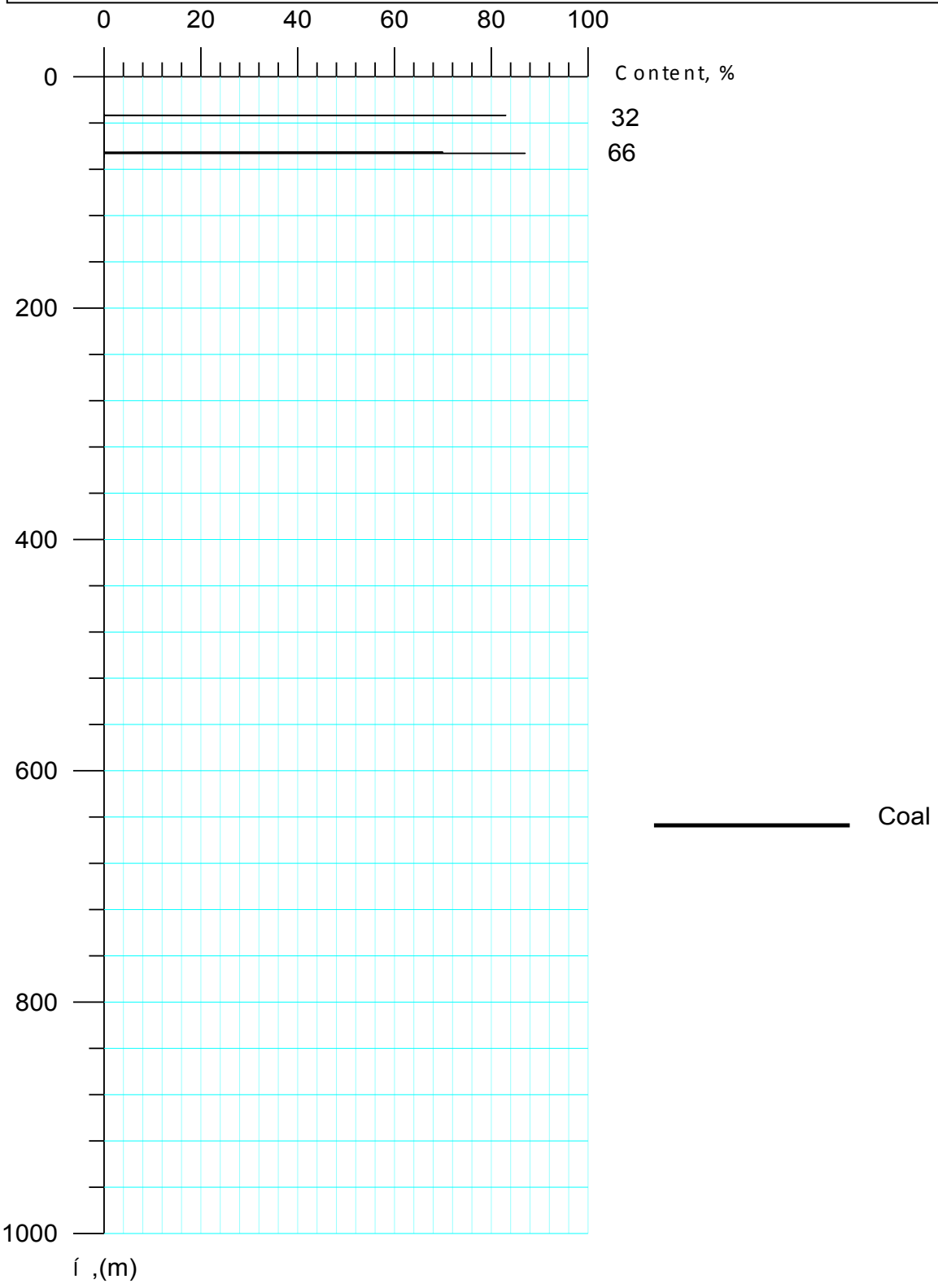
HRCM, Fingal Area, NE Tasmania **Vertical Sounding VR005**
Location 41.63636 S 148.09396 E

Total thickness of coal seam plies = 68 cm



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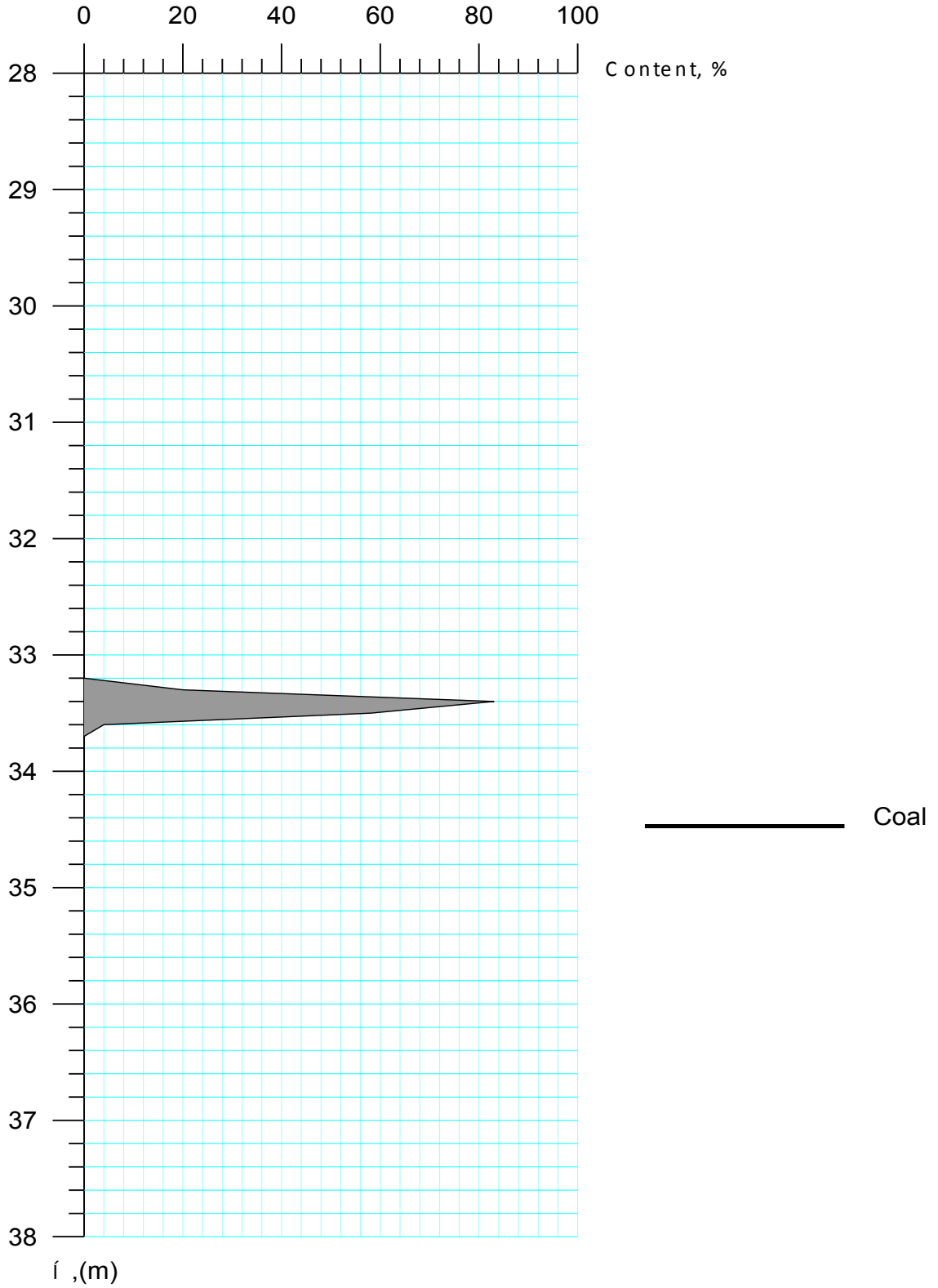
HRCM, Fingal Area, NE Tasmania **Vertical Sounding VR005**
Location 41.63636 S 148.09396 E

Coal horizon comprises 1 coal seam ply



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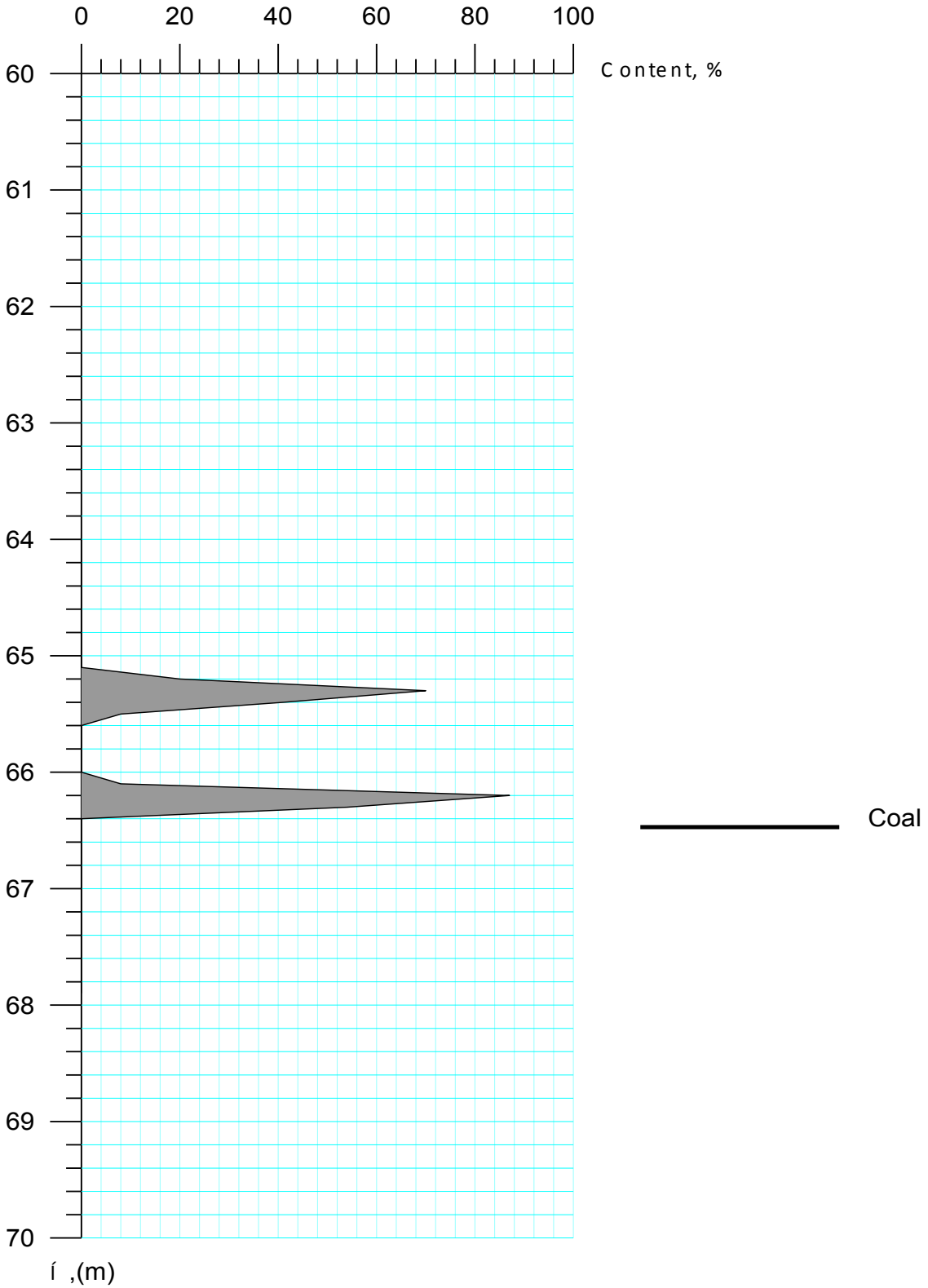
HRCM, Fingal Area, NE Tasmania **Vertical Sounding VR005**
Location 41.63636 S 148.09396 E

Coal horizon comprises 2 coal seam plies



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6. DISCUSSION

The vertical sounding confirmation scans conducted by Dexon Technology over Hardrock Coal Mining's Exploration Licence (EL 16/2010) at Fingal in north east Tasmania confirm the presence of coal seams over a reasonably extensive area.

Given that this interpretation was done without reference to any regional scan work it cannot be definitively stated that these coal seams are continuous over the entire area but on the basis of local knowledge, regional geological work (historical) and the similarity of the output for each vertical sounding it is fair to assume that they represent the same coal horizon.

The primary issues that emerge from undertaking this investigation are:

- The apparent lack of thickness to a number of the coal seams with the notable exception being the coal seam identified at 480 mBGL in the vertical sounding for VR001,

- The quality of the coal, that is, coal versus non-coal components in many of the coal seam plies which would necessitate extensive coal washing to remove intercalated sediments (i.e. sandstone, siltstone and mudstone),

- The presence of multiple coal plies in VR001, VR003 and VR005 indicating that interbedded sediments are present which will require specific attention from a mining and processing perspective,

- The variability in the amount of intercalated sediments with a range from 15% (2nd ply in coal seam at 66 mBGL in VR005) to 59% (1st ply in coal seam at 309 mBGL in VR001) within the coal seam plies; and,

- The relationship between the three (3) coal seams in VR001 and those identified in the other vertical soundings (although it does appear as though the coal seam at 309 mBGL (VR001) most closely aligns with those in the other vertical soundings).

Follow up work in the form of a number of drillholes to confirm the nature of the coal seams at these vertical sounding locations may be warranted prior to further development decisions being undertaken. Samples from these drillholes could be analysed / tested to give an accurate indication of the processing methodologies that will need to be engaged to ensure that an acceptable quality product is generated.

Andrew M Graham
BAppSc (App Geo) MEconGeol(Tas) QMCert MIQ MAusIMM

7. REFERENCES

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