

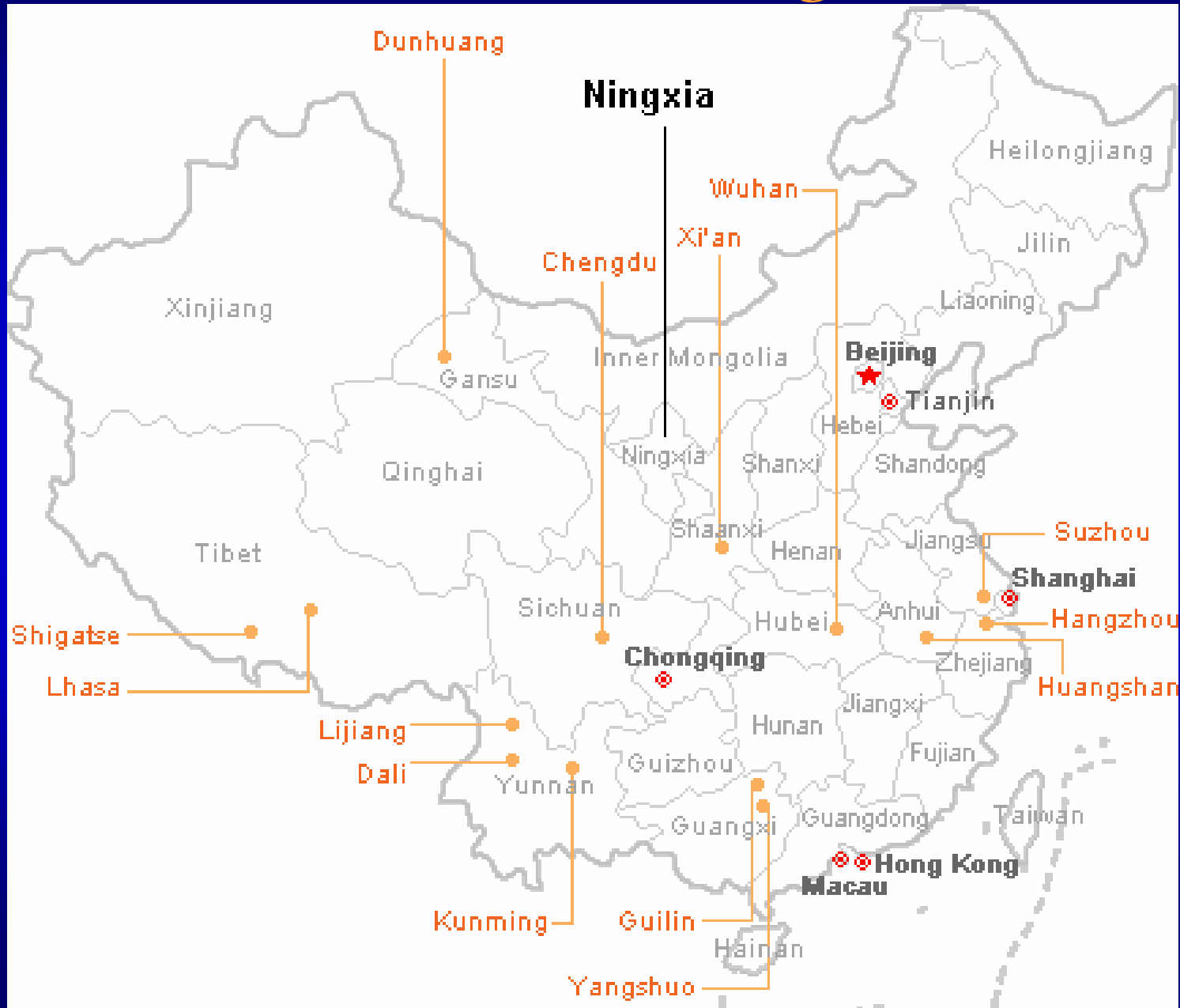
*In-Seam Directional Drilling
and Gas Drainage
Demonstration Project –
Baijigou, PR China*

*Frank Hungerford
Valley Longwall Drilling*

Baijigou Service Project

- CAMDA – AMSI hold contract to gas drain Baijigou longwall blocks
- GeoGAS consulted for gas content and drainage characteristics
- Drilling Project in 2 components
- VLD to complete the underground component
- Mitchell Drilling to complete the SIS component

Location - Ningxia



Baijigou Mine



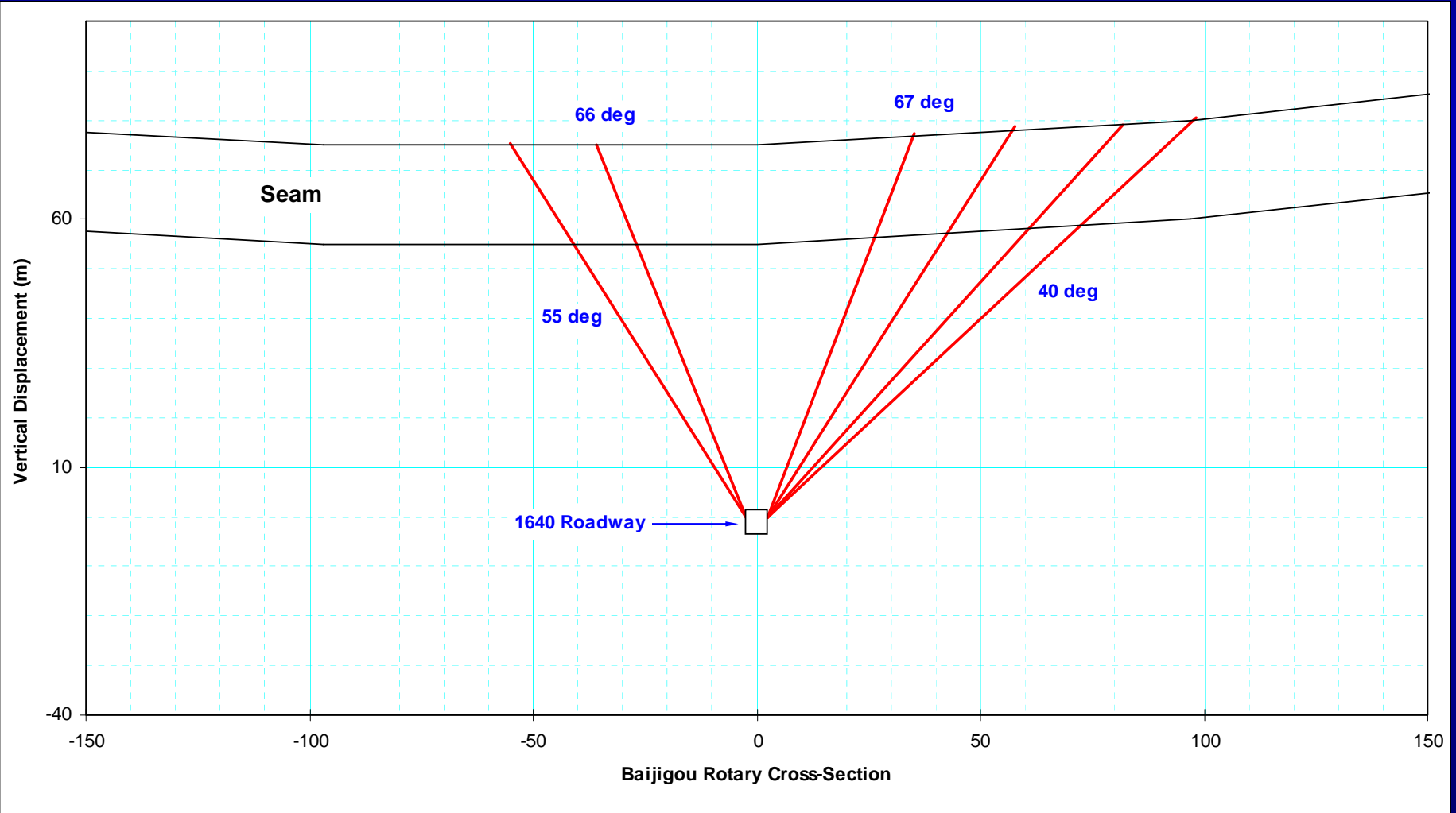
Mine Audits

- Mine Safety - safe to operate in?
- Seam conditions – is the coal drillable?
- Drilling applications
- Services – air, water, power – fittings
- Access, transport, dimensions
- Surface facilities
- Accommodation
- Location, access to mine site

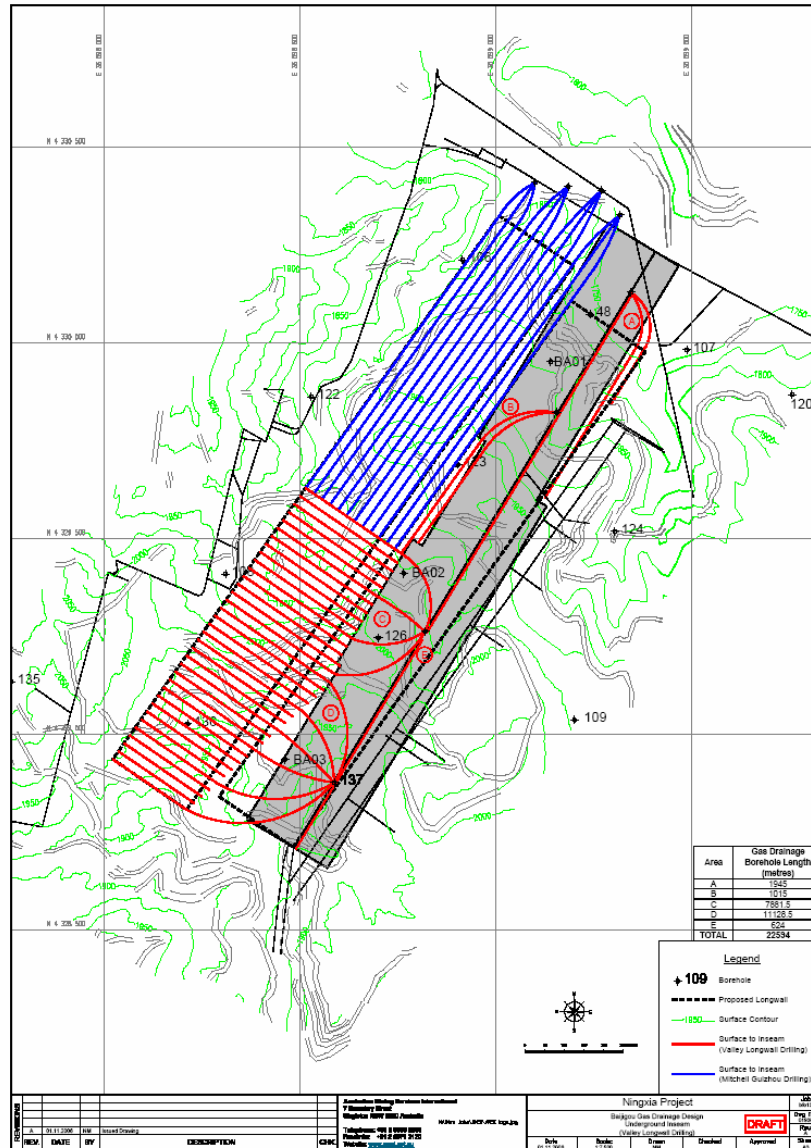
Initial Audit Results

- Cross-measure drilling from under the seam
- Stone strength apparently f2 (20 MPa)
 - Revised to f7-f12 (70-120 MPa)
- Angled drilling would require rig with vertical adjustment – Modular
- Mono-rail requirement for each site
- Design straight stone sections to allow for rotary roller-cone drilling if required

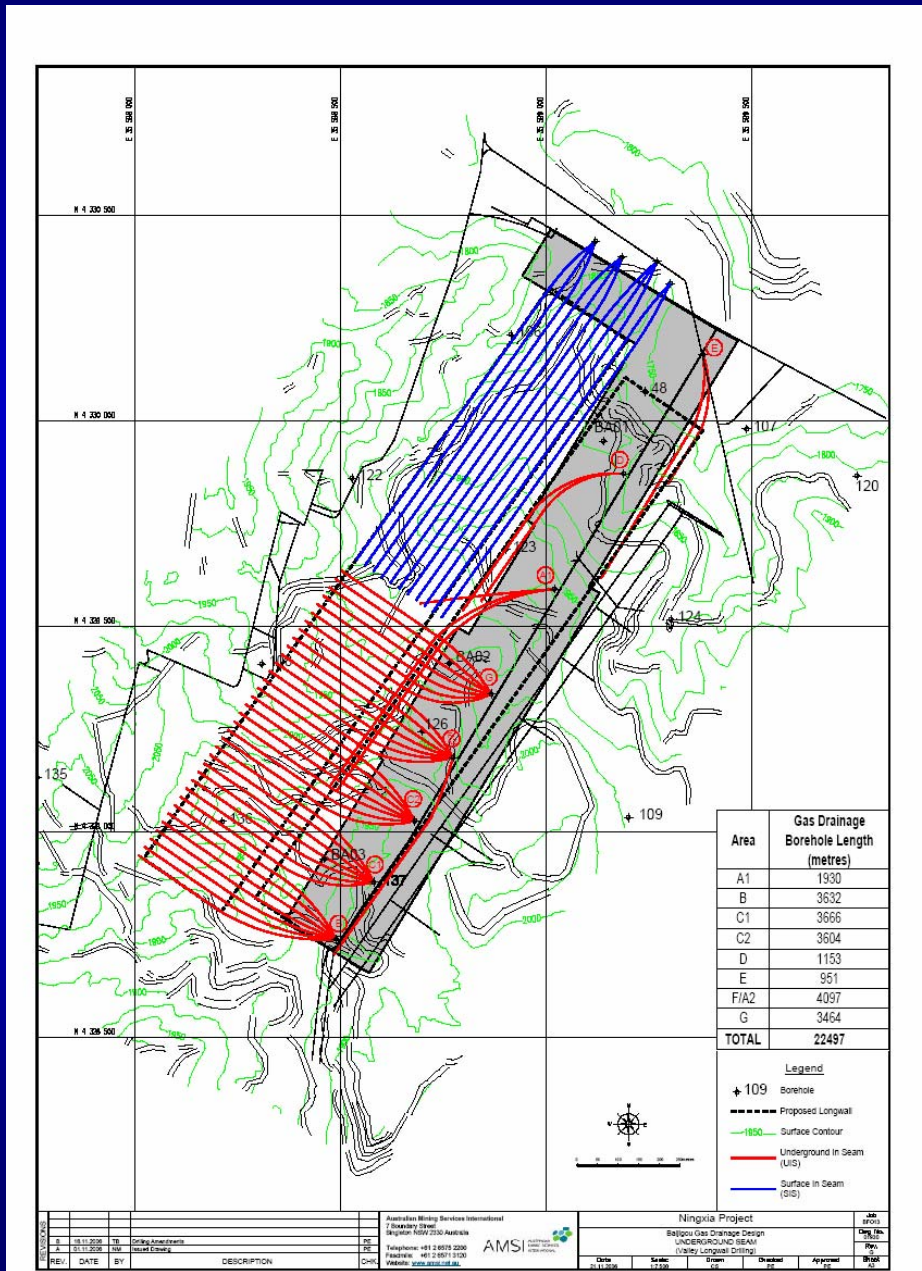
Baijigou Rotary Gas Drainage



Initial Borehole Layout - Baijigou Mine



Borehole Layout - Baijigou Mine



Modular Rig – Feed Frame



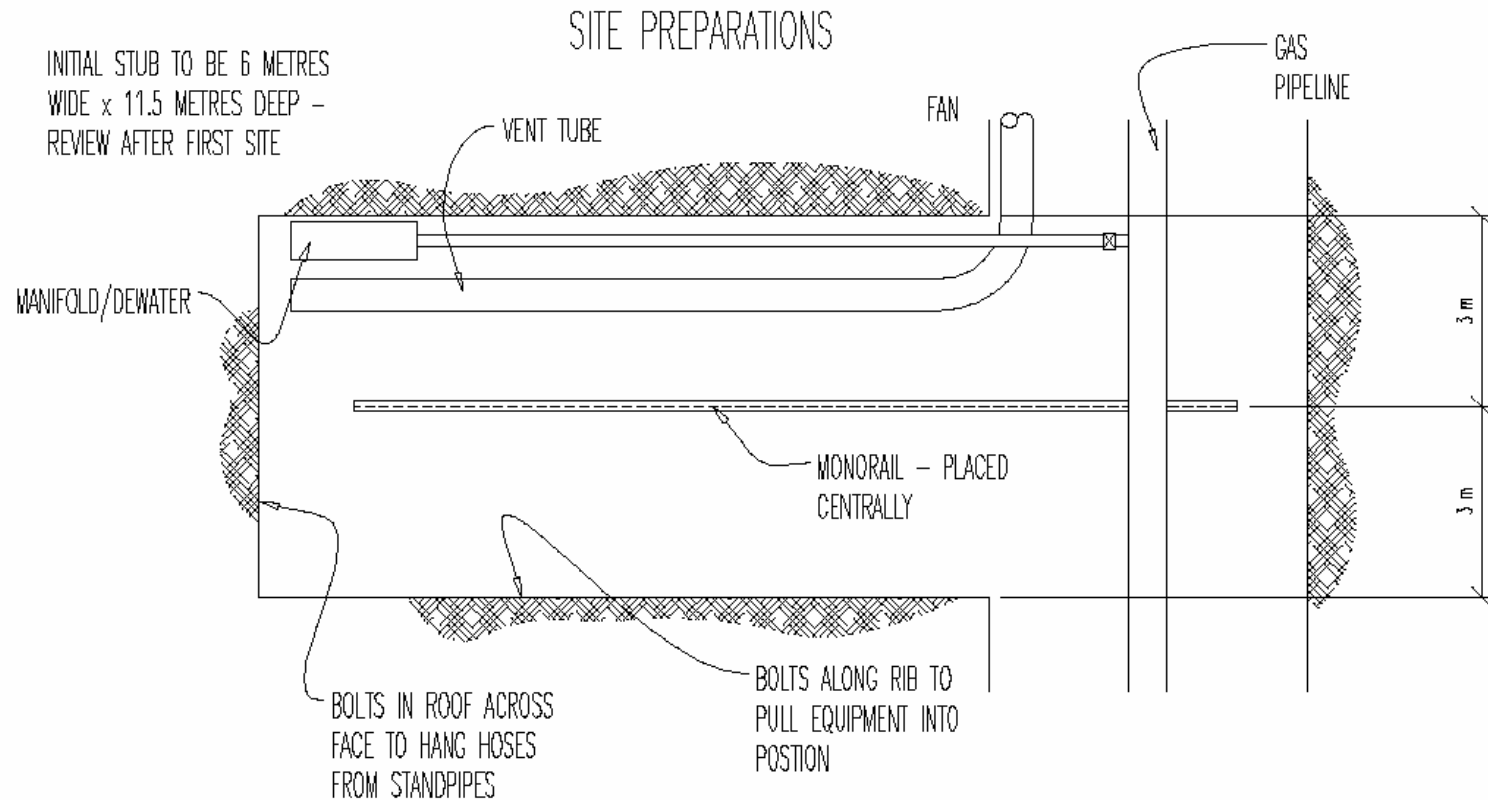
Modular Rig – Power Pack



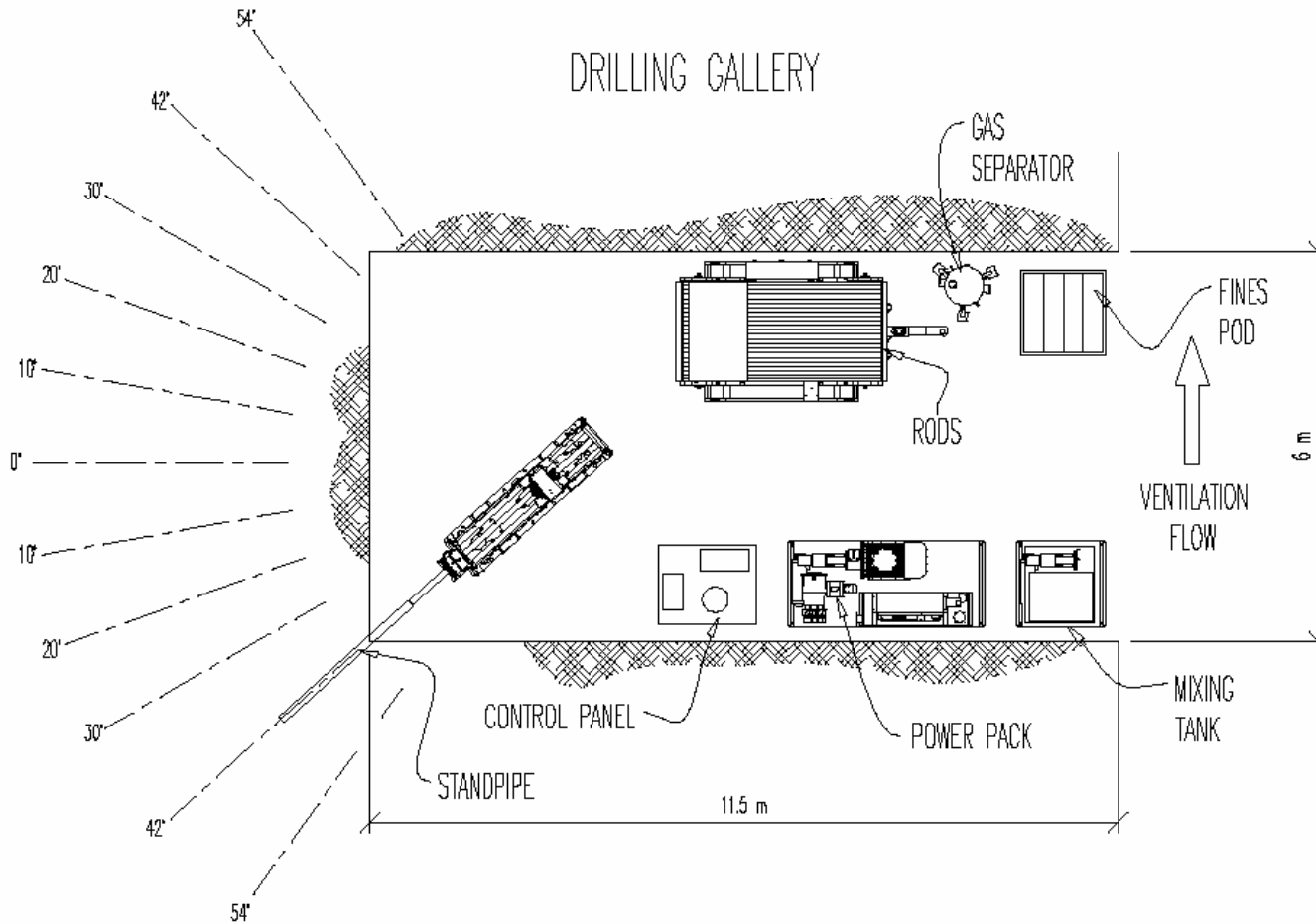
Modular Rig – Operators Console



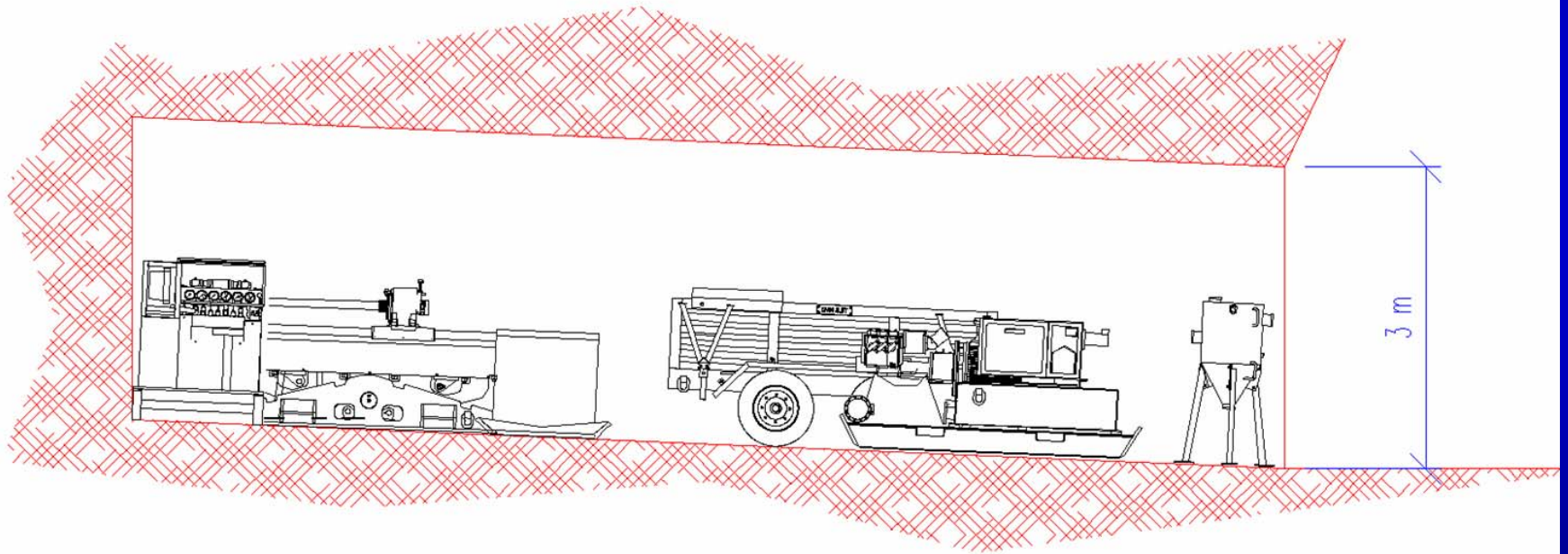
Site Preparations



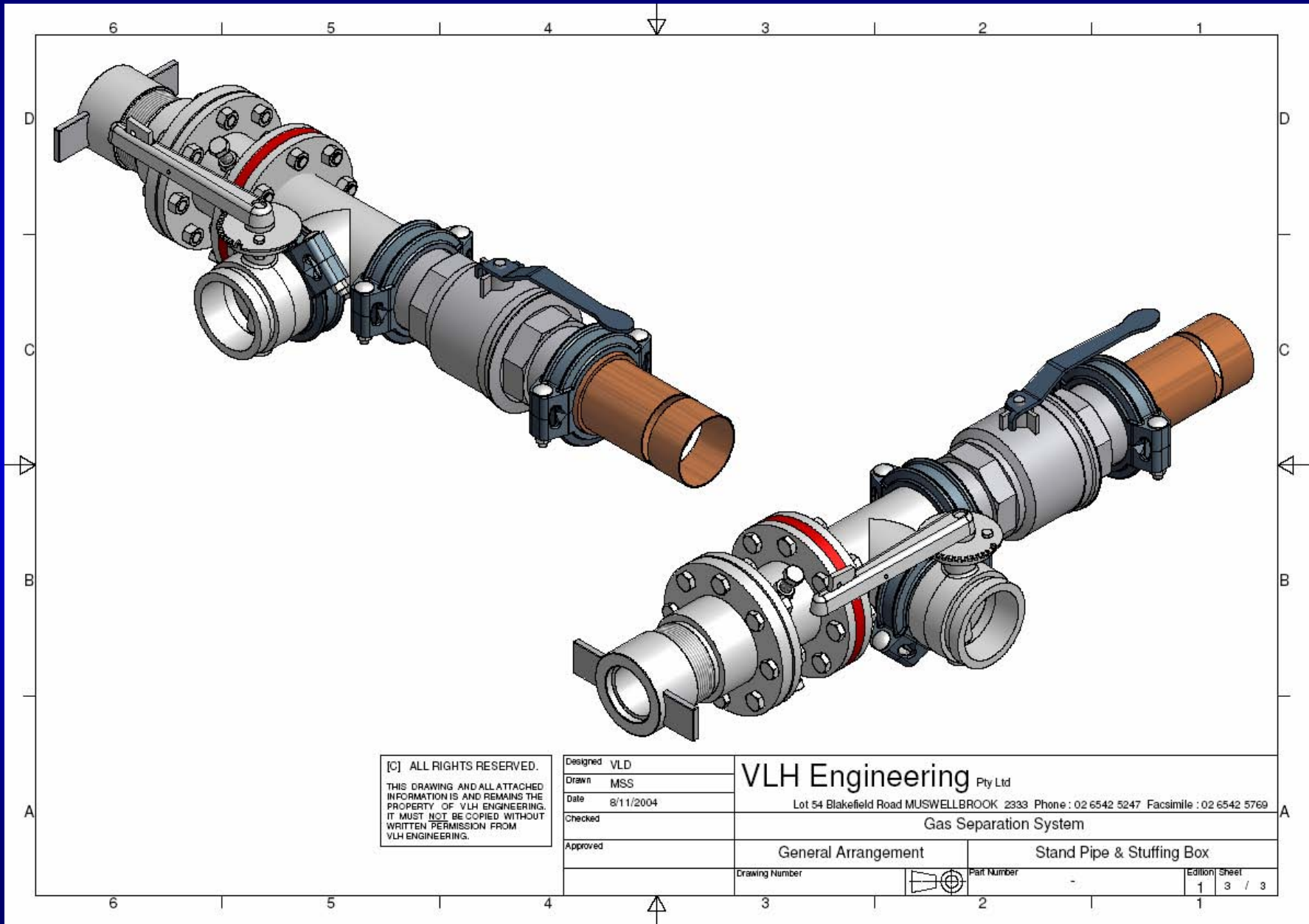
Site Layout - Baijigou Mine



Drill Site – Side View



Borehole Collar – Standpipe Fittings



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Designed VLD
 Drawn MSS
 Date 8/11/2004
 Checked
 Approved

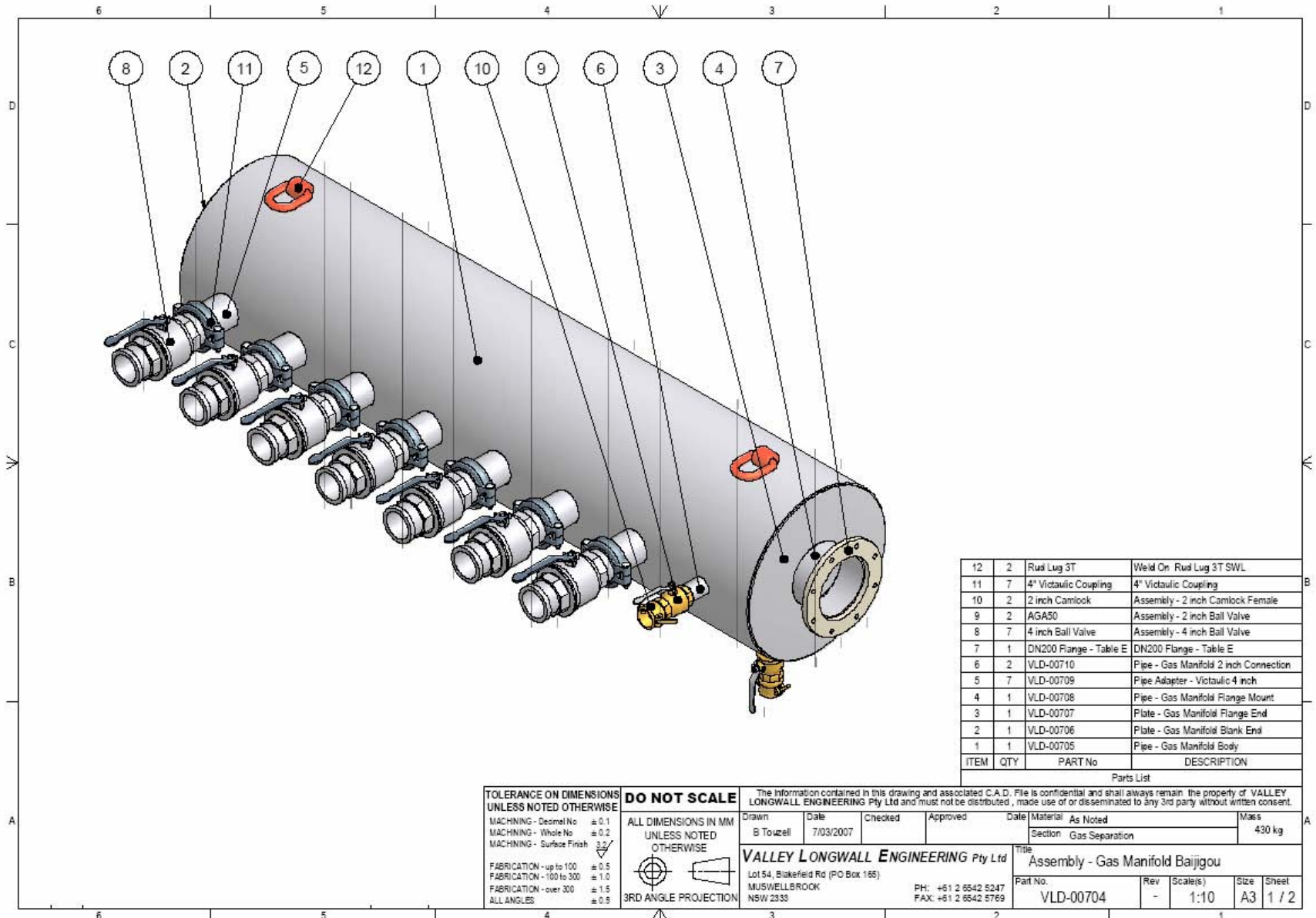
VLH Engineering Pty Ltd
 Lot 54 Blakefield Road MUSWELLBROOK 2333 Phone : 02 6542 5247 Facsimile : 02 6542 5769

Gas Separation System
 General Arrangement Stand Pipe & Stuffing Box

Drawing Number Part Number Edition Sheet
 1 3 / 3



Gas Manifold – Drill Site



ITEM	QTY	PART No	DESCRIPTION
12	2	Rud Lug 3T	Weld On Rud Lug 3T SWL
11	7	4" Victaulic Coupling	4" Victaulic Coupling
10	2	2 inch Camlock	Assembly - 2 inch Camlock Female
9	2	AGA50	Assembly - 2 inch Ball Valve
8	7	4 inch Ball Valve	Assembly - 4 inch Ball Valve
7	1	DN200 Flange - Table E	DN200 Flange - Table E
6	2	VLD-00710	Pipe - Gas Manifold 2 inch Connection
5	7	VLD-00709	Pipe Adapter - Victaulic 4 inch
4	1	VLD-00708	Pipe - Gas Manifold Flange Mount
3	1	VLD-00707	Plate - Gas Manifold Flange End
2	1	VLD-00706	Plate - Gas Manifold Blank End
1	1	VLD-00705	Pipe - Gas Manifold Body
Parts List			

TOLERANCE ON DIMENSIONS UNLESS NOTED OTHERWISE

MACHINING - Decmil No ±0.1
MACHINING - Whole No ±0.2
MACHINING - Surface Finish 3.2

FABRICATION - up to 100 ±0.5
FABRICATION - 100 to 300 ±1.0
FABRICATION - over 300 ±1.5
ALL ANGLES ±0.5

DO NOT SCALE

ALL DIMENSIONS IN MM UNLESS NOTED OTHERWISE

3RD ANGLE PROJECTION

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Drawn	Date	Checked	Approved	Date	Material	As Noted	Mass
B Touzell	7/03/2007				Section	Gas Separation	430 kg

VALLEY LONGWALL ENGINEERING Pty Ltd

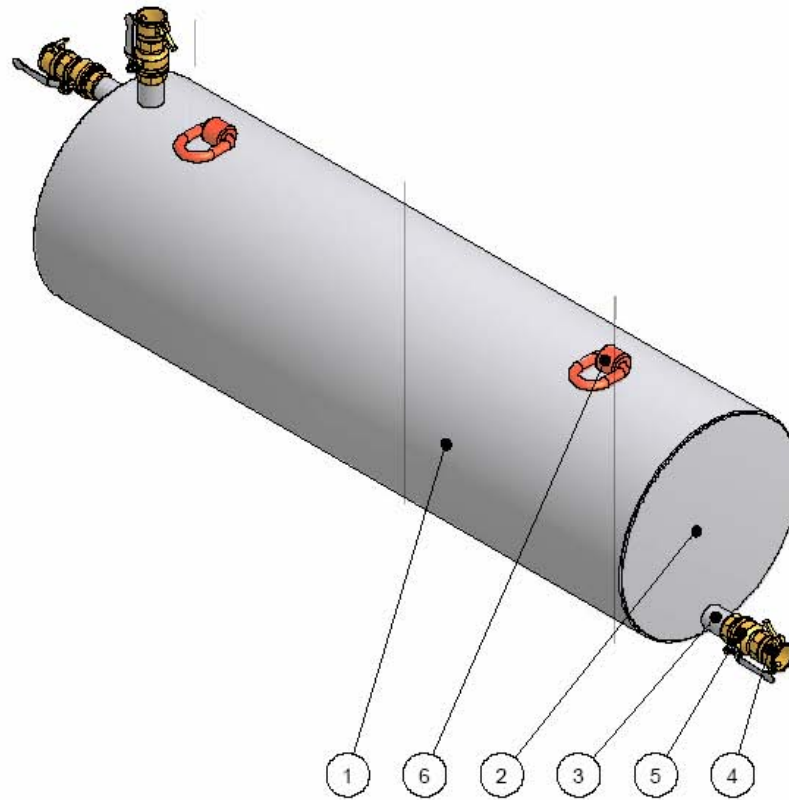
Lot 54 Blakefield Rd (PO Box 165)
MUSWELLBROOK
NSW 2333

PH: +61 2 6542 5247
FAX: +61 2 6542 5769

Title: **Assembly - Gas Manifold Baijigou**

Part No.	Rev	Scale(s)	Size	Sheet
VLD-00704	-	1:10	A3	1 / 2

Water Trap – Drill Site



ITEM	QTY	PART No	DESCRIPTION
6	2	Rud Lug 3T	Weld On Rud Lug 3T SWL
5	3	AGA50	Assembly - 2 inch Ball Valve
4	3	2 inch Camlock	Assembly - 2 inch Camlock Female
3	3	VLD-00710	Pipe - Gas Manifold 2 inch Connection
2	2	VLD-00713	Plate - Water Trap End
1	1	VLD-00712	Pipe - Water Trap Body

Parts List

TOLERANCE ON DIMENSIONS UNLESS NOTED OTHERWISE
 MACHINING - Decimal No ± 0.1
 MACHINING - Whole No ± 0.2
 MACHINING - Surface Finish 3.2
 FABRICATION - up to 100 ± 0.5
 FABRICATION - 100 to 300 ± 1.0
 FABRICATION - over 300 ± 1.5
 ALL ANGLES ± 0.5

DO NOT SCALE

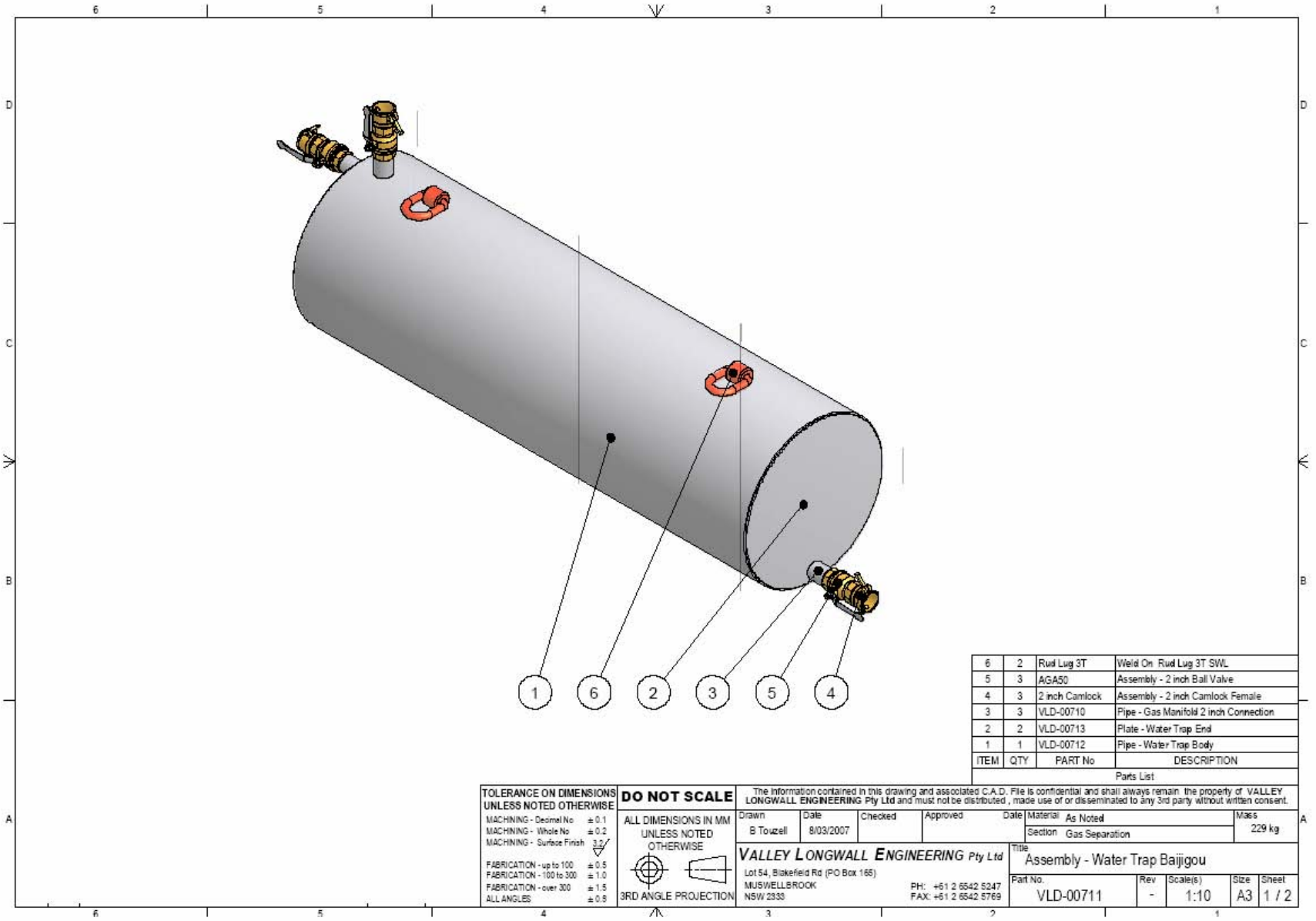
ALL DIMENSIONS IN MM UNLESS NOTED OTHERWISE



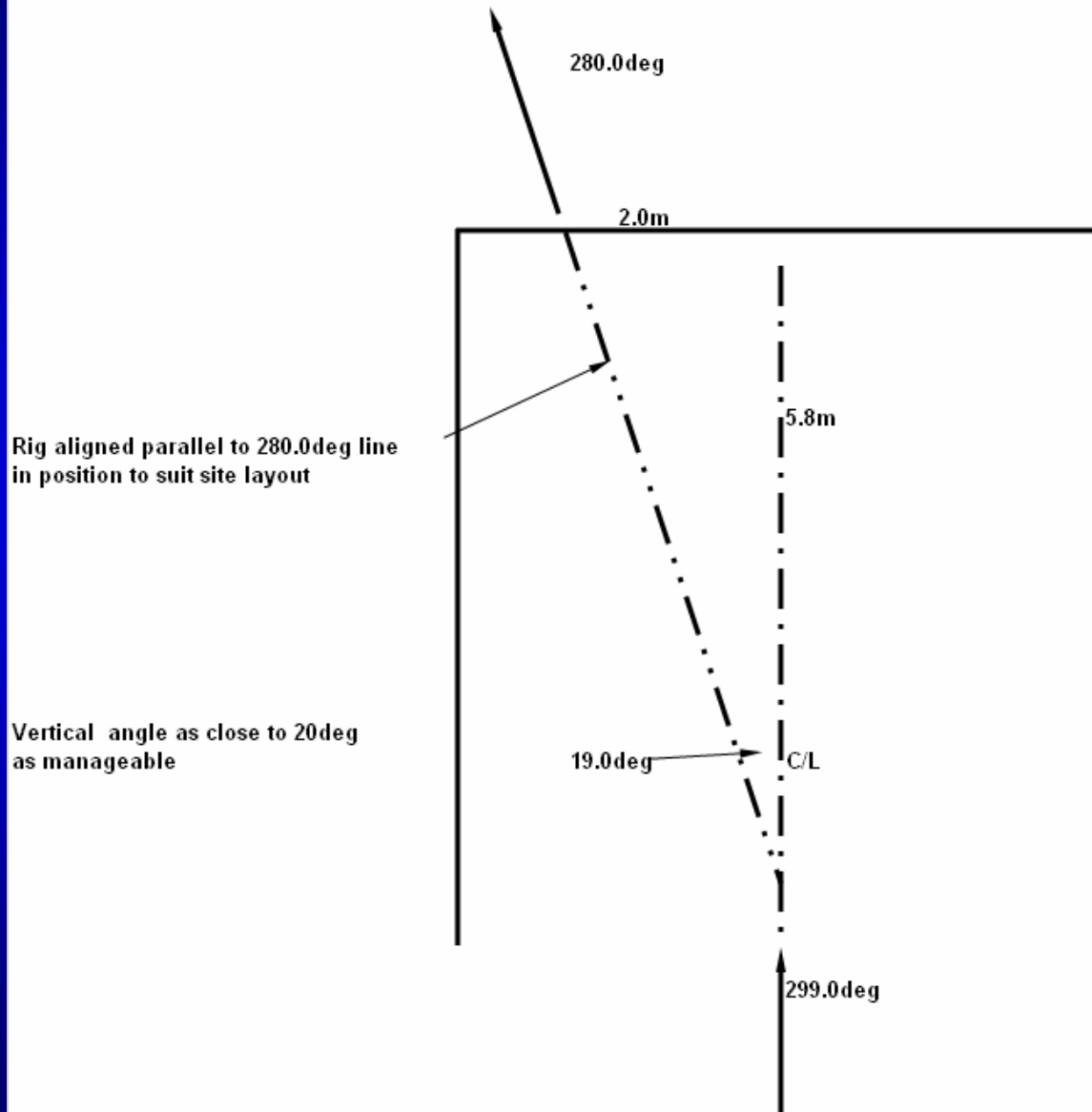
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Drawn	Date	Checked	Approved	Date	Material	As Noted	Mass
B Touzell	8/03/2007				Section	Gas Separation	229 kg

VALLEY LONGWALL ENGINEERING Pty Ltd		Title	
Lot 54, Blakefield Rd (PO Box 165) MUSWELLSBROOK NSW 2333		Assembly - Water Trap Baijigou	
Part No.	Rev	Scale(s)	Size
VLD-00711	-	1:10	A3
			Sheet
			1 / 2



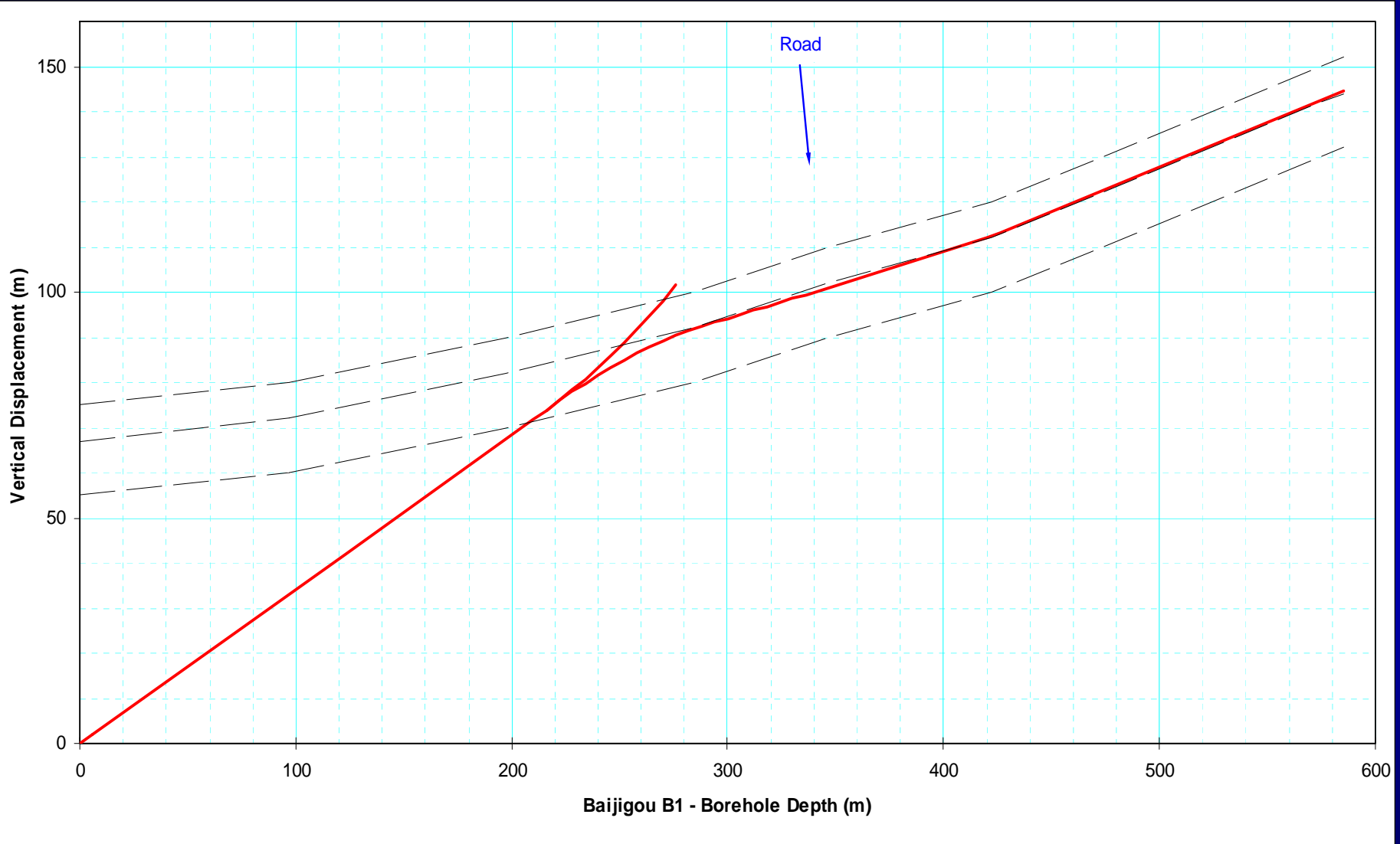
Drill Site – Rig Alignment



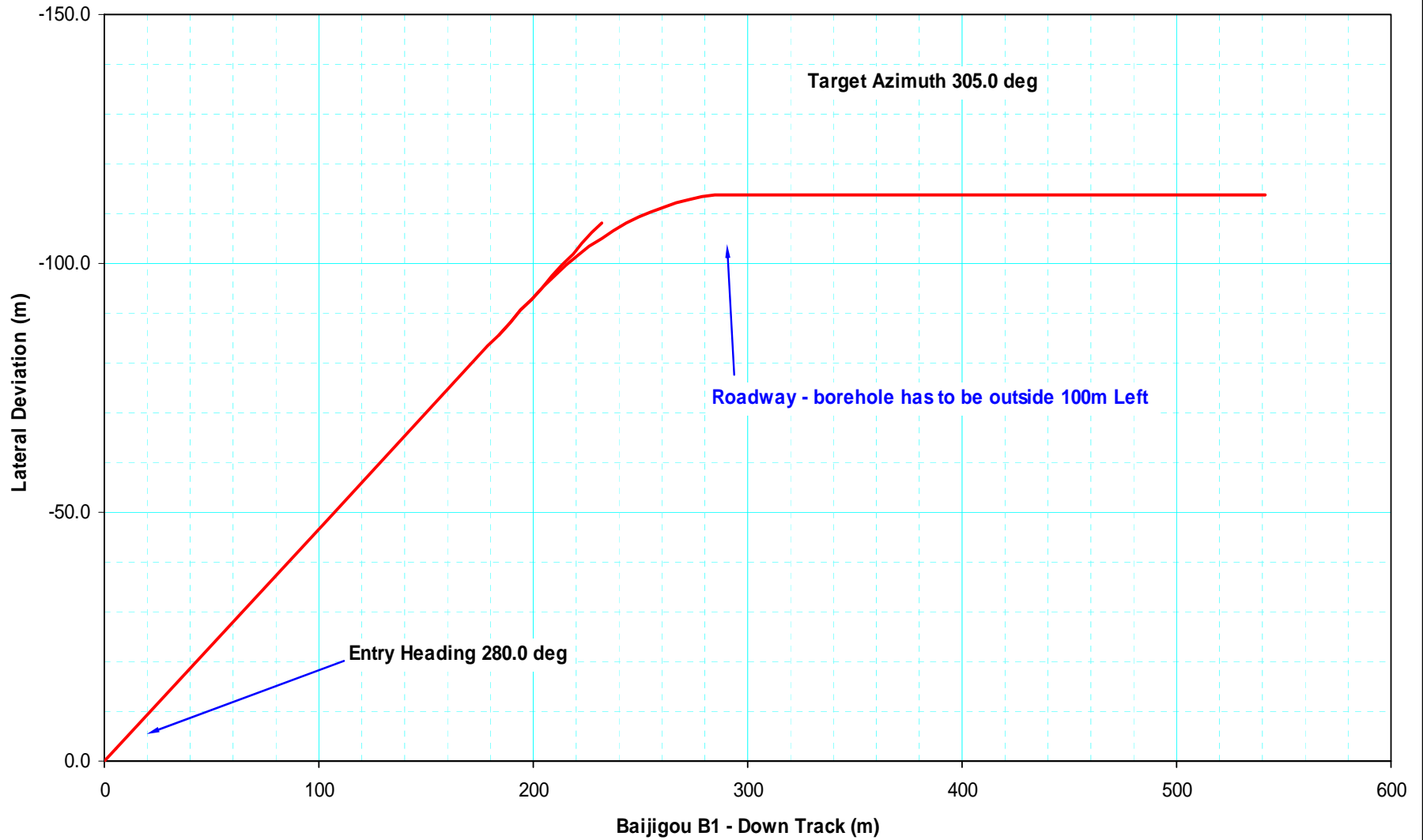
Drilling Design

- Rotary roller-cone 150mm x 3m - standpipe
- Rotary roller-cone 98mm to coal
- Directional drill up into seam roof
- Branch from coal intersect and follow 8m line below roof
- 1.5 deg/6m lateral curve and 1.0 deg/6m vertical curve (combined 1.8 deg/6m)
- Regular sharp roof intersections for profile definition – unstable upper seam coal

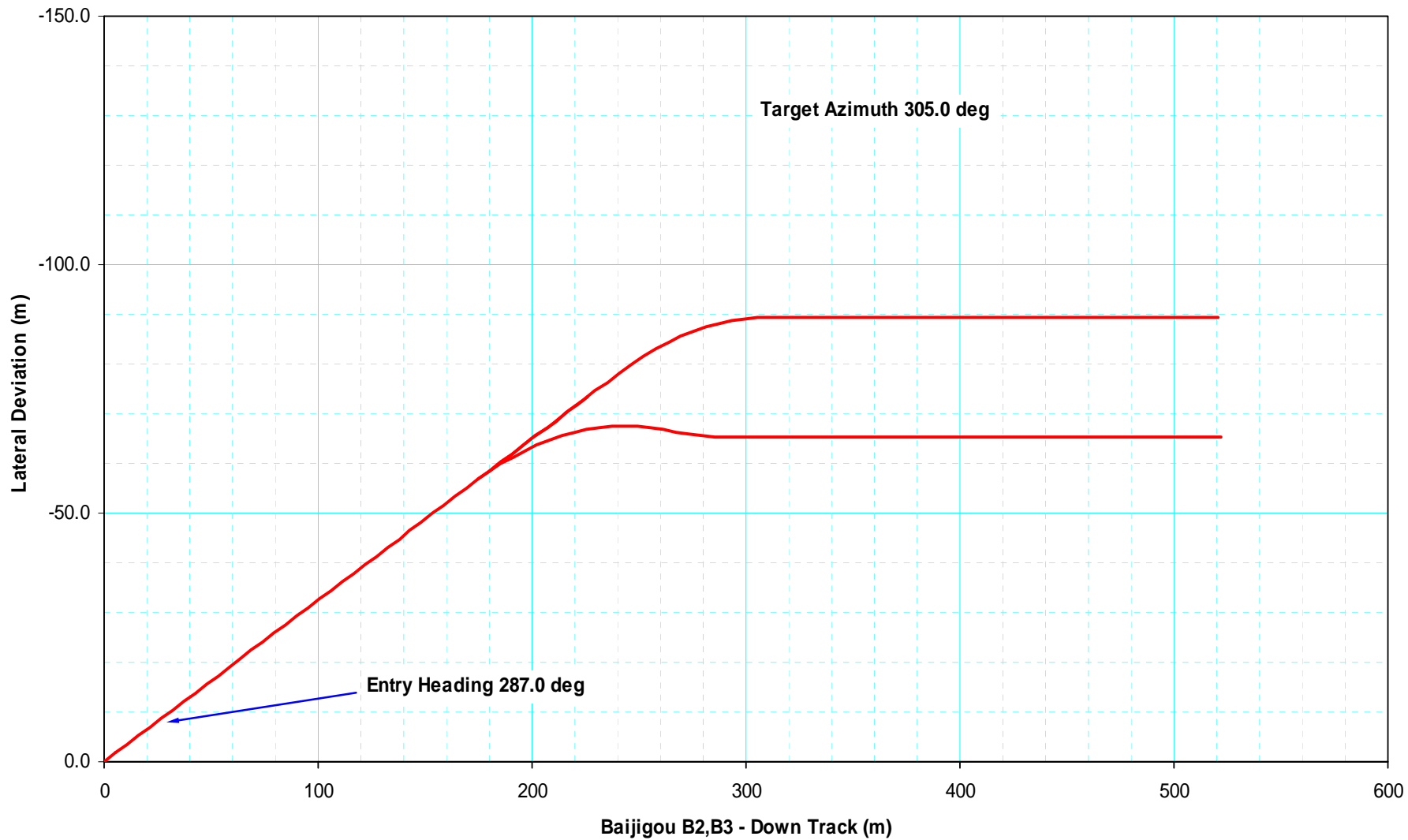
Profile Design



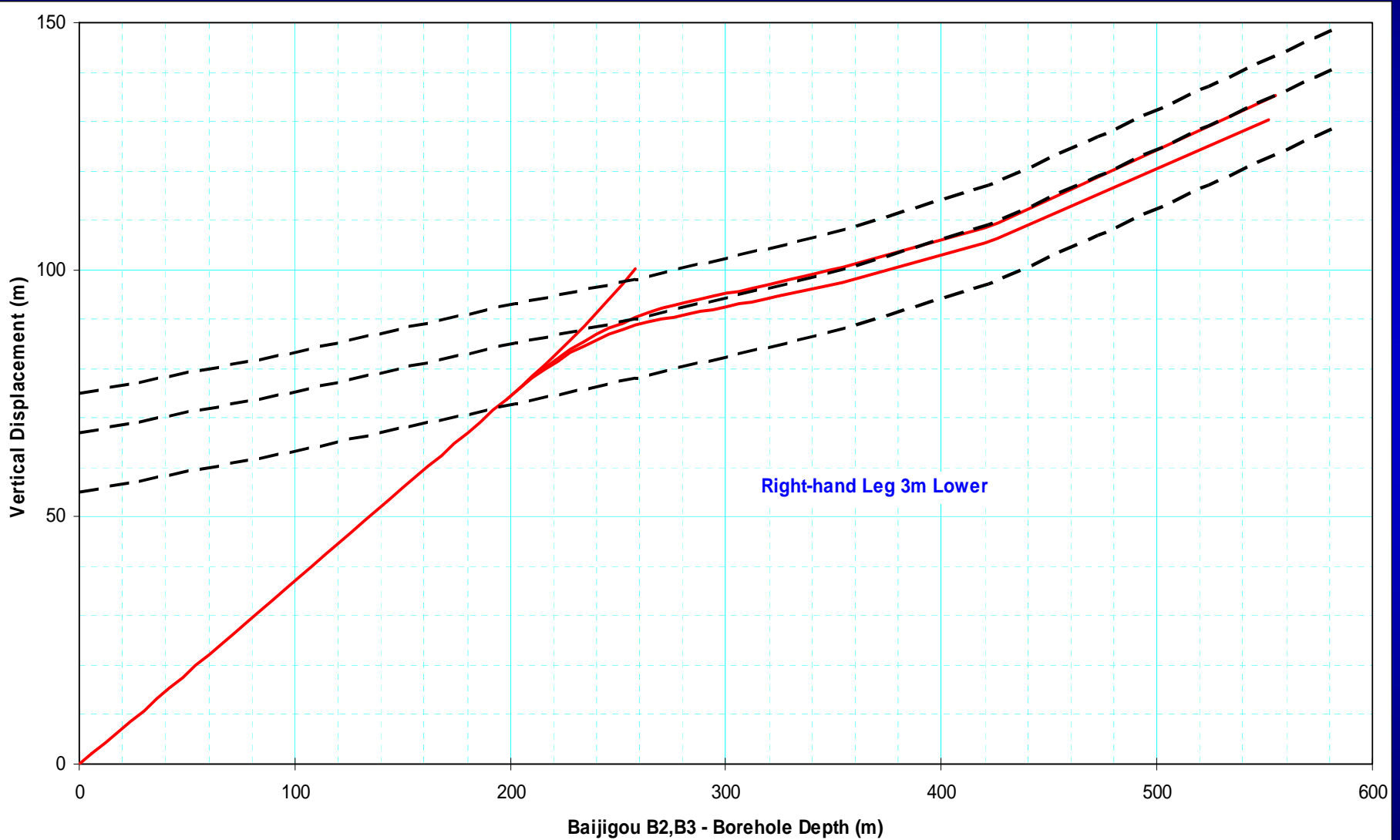
Lateral Design



Lateral Design – multiple legs



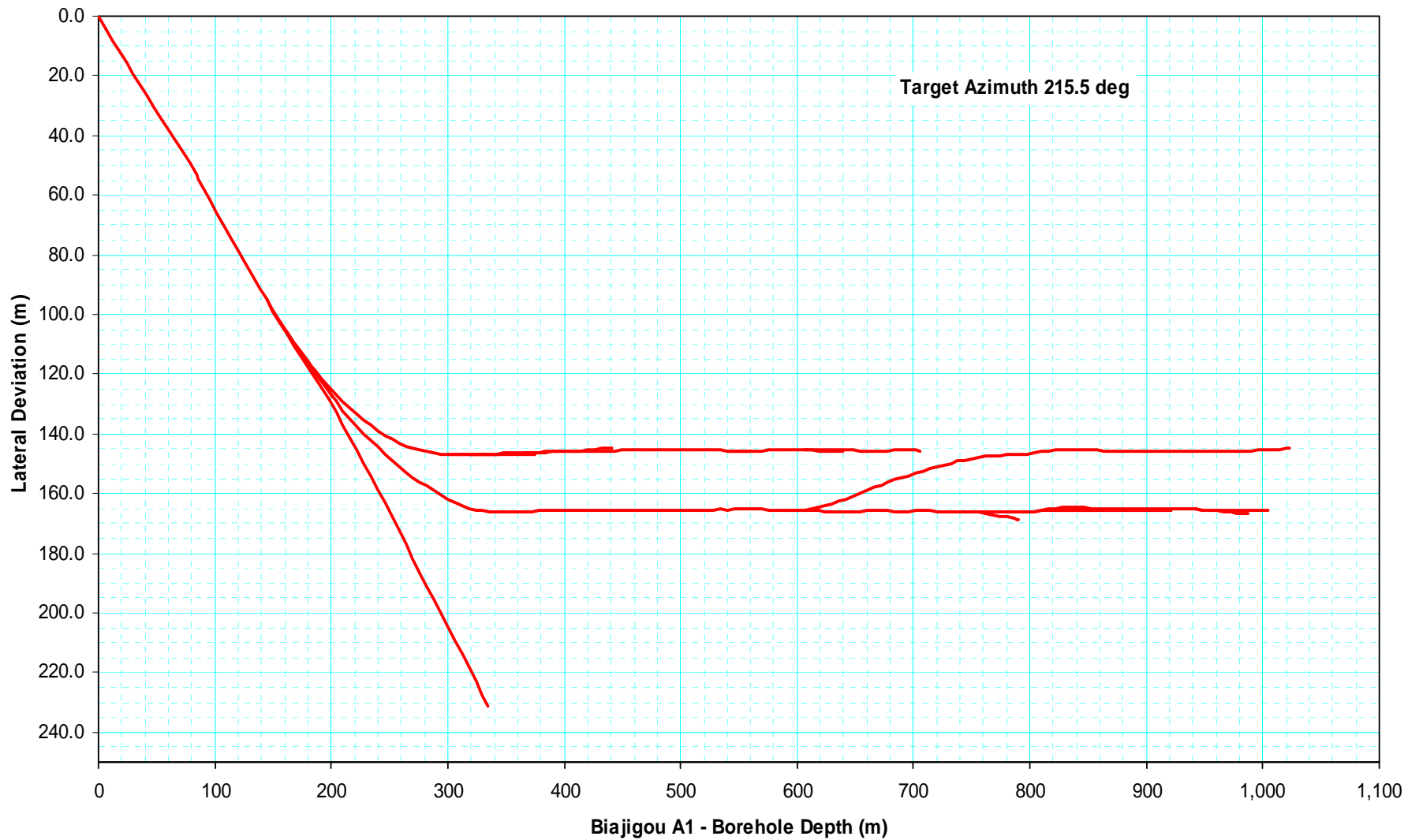
Profile Design



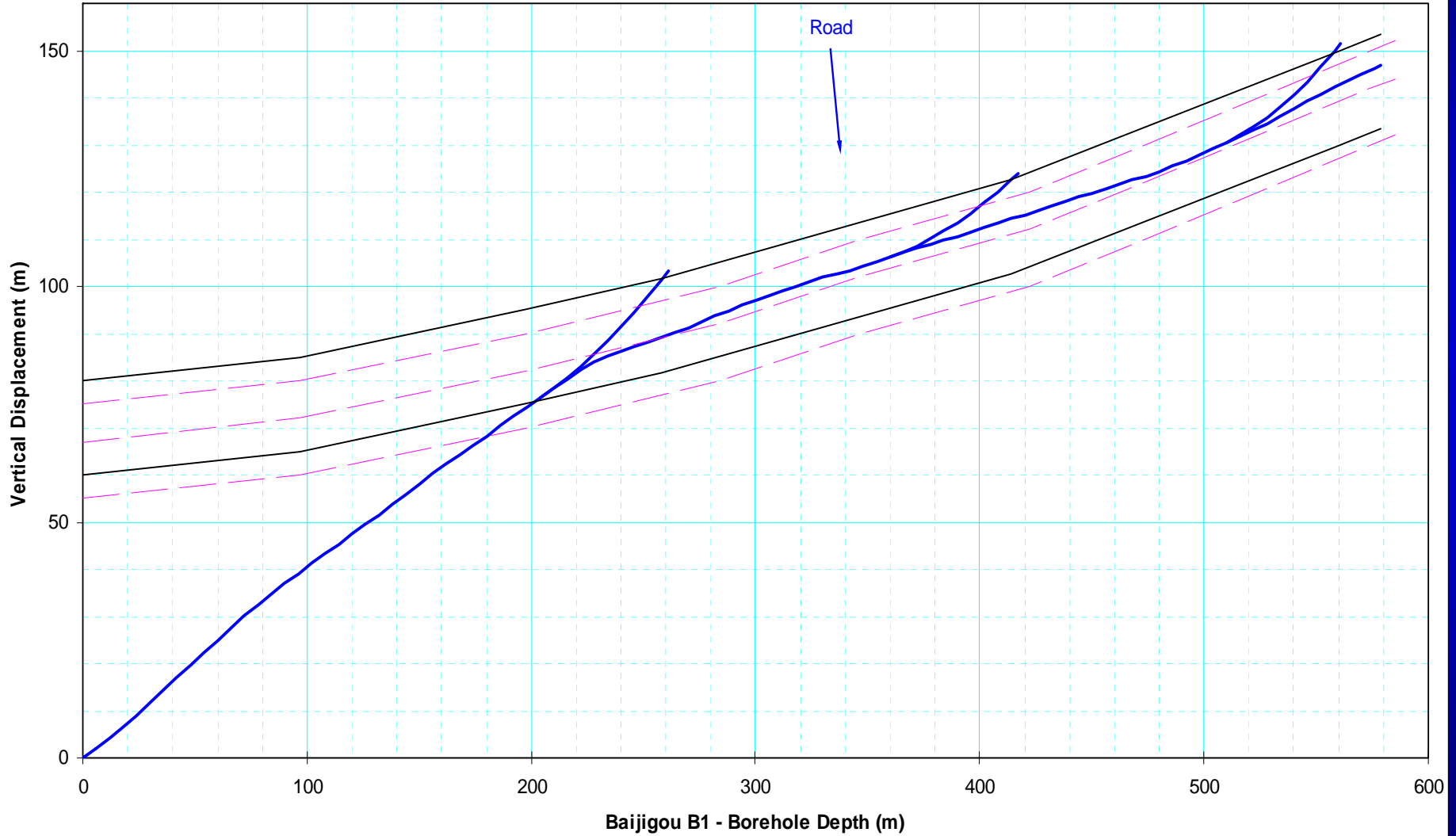
Drilling – Site A

- Directional drill with 98mm roller-cone to coal for directional control
- Tungsten tip rollers for better performance
- Seam intersected 26m up at 85m hole depth
- Upper section of seam boggy
- Drilled 2677m to maximum depth of 1023m at 89.9 m/shift
- Terminated 1st branch covered with 2nd branch

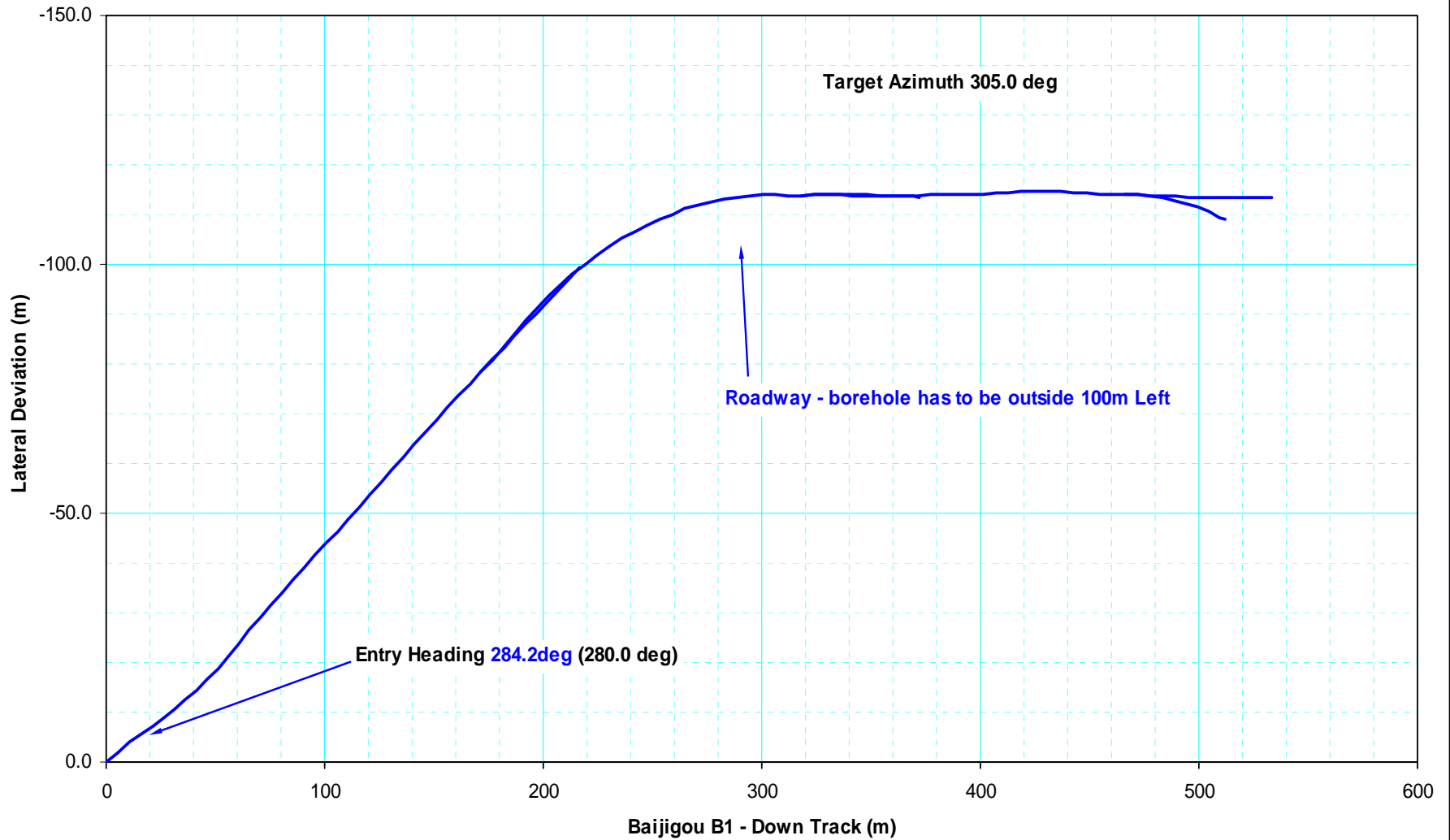
Lateral Deviation



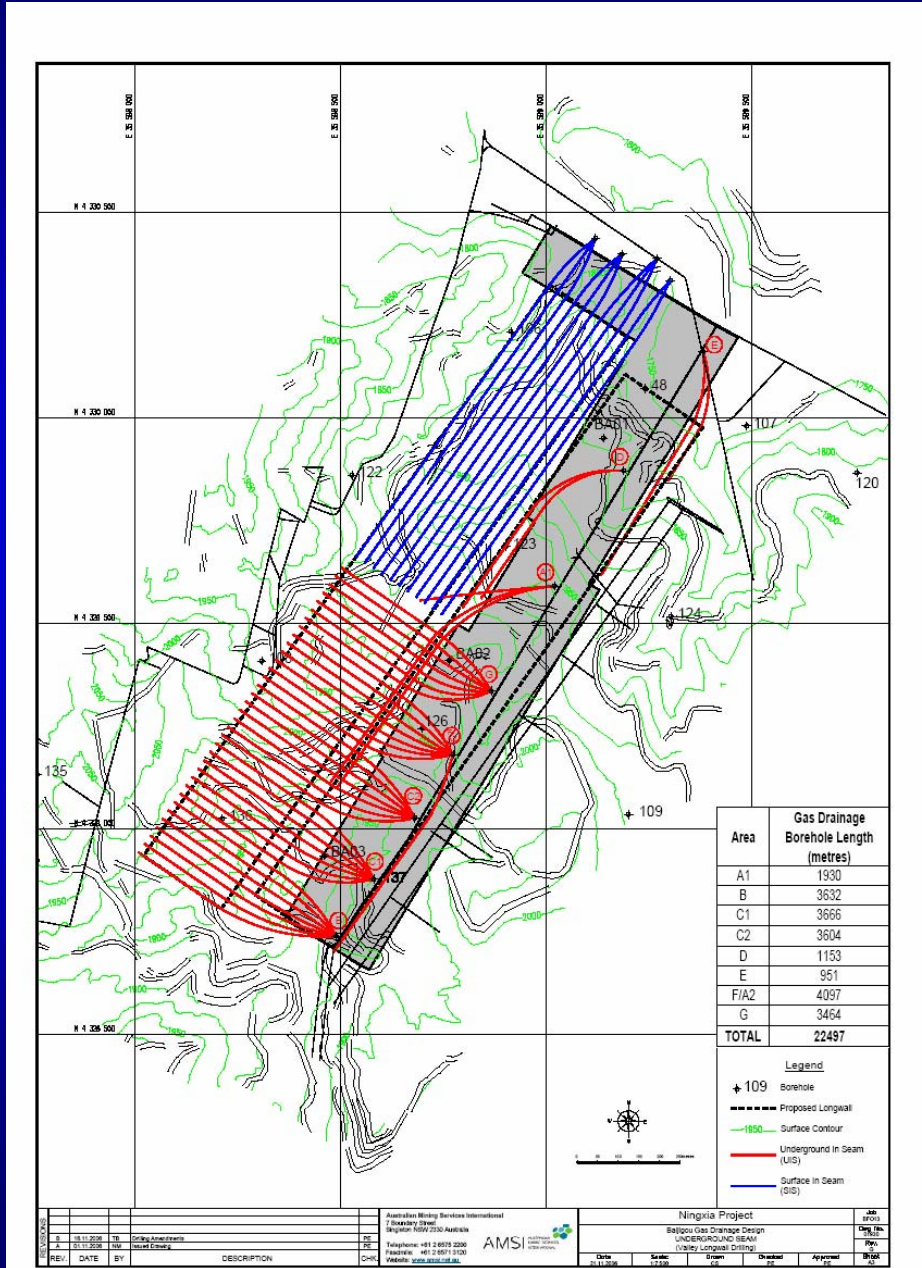
Borehole B1 Profile



Lateral Plot - Borehole B1



Borehole Layout - Baijigou Mine



Australian Mining Services International 7 Boundary Street West Perth, WA 6150 Australia Telephone: +61 8 9479 2200 Facsimile: +61 8 9471 3100 Website: www.amsi.com.au				Ningxia Project Baijigou Gas Drainage Design UNDERGROUND SEAM (Under Longwall Drift)				JWS 07/03 08/03 09/03 10/03 11/03 12/03 01/04 02/04 03/04 04/04 05/04 06/04 07/04 08/04 09/04 10/04 11/04 12/04 01/05 02/05 03/05 04/05 05/05 06/05 07/05 08/05 09/05 10/05 11/05 12/05 01/06 02/06 03/06 04/06 05/06 06/06 07/06 08/06 09/06 10/06 11/06 12/06 01/07 02/07 03/07 04/07 05/07 06/07 07/07 08/07 09/07 10/07 11/07 12/07 01/08 02/08 03/08 04/08 05/08 06/08 07/08 08/08 09/08 10/08 11/08 12/08 01/09 02/09 03/09 04/09 05/09 06/09 07/09 08/09 09/09 10/09 11/09 12/09 01/10 02/10 03/10 04/10 05/10 06/10 07/10 08/10 09/10 10/10 11/10 12/10 01/11 02/11 03/11 04/11 05/11 06/11 07/11 08/11 09/11 10/11 11/11 12/11 01/12 02/12 03/12 04/12 05/12 06/12 07/12 08/12 09/12 10/12 11/12 12/12 01/13 02/13 03/13 04/13 05/13 06/13 07/13 08/13 09/13 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Baijigou Project Time Analysis

VALLEY LONGWALL DRILLING

Baijigou Mine

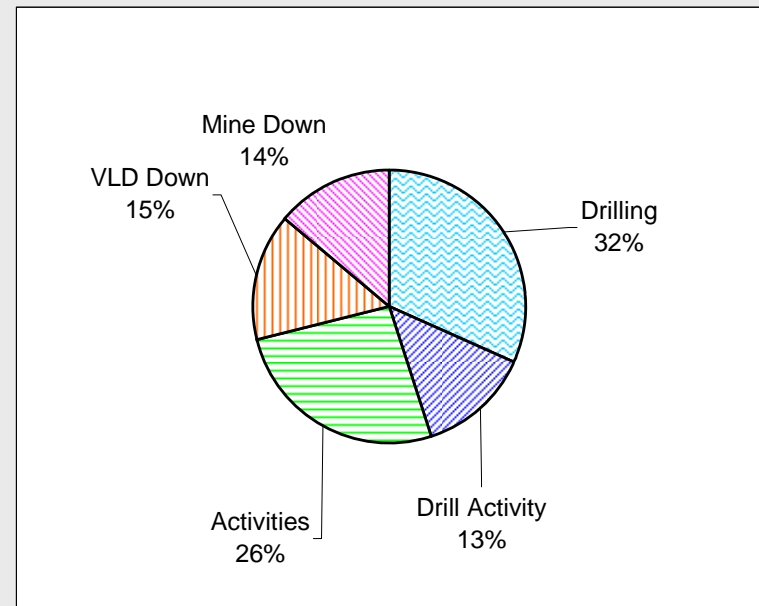
PROJECT DRILLING PERFORMANCE

From: 14-May

To: 20-Oct

Code	Activity	Stat	Time
			mins
DA	Drilling	D	41465
DB	Flushing	L	4745
DC	Pull Rods	L	7465
DD	Branching	L	2095
DE	Commission Hole	L	1025
DF	Commission Niche	L	540
DG	Reaming	L	960
1	Travel In	A	10610
1a	Travel Out	A	9960
2	Risk Assess	A	0
2a	Establishment S-U/G	A	0
3	Meetings	A	1920
4	Rig Move	A	9000
5	Ream & Grout S/pipe	A	2565
8	Waiting, Inspection	M	1820
10	Induction, RPL	A	0
11	Core	L	500
13	Rig Breakdown	V	2220
14	DGS Breakdown	V	1075
15	Mine Delays	M	13350
16	Environment	M	2235
17	Drill Niche Preps	M	790
18	VLD Delays	V	16150

Activity Group	Status	Minutes	%
Drilling	D	41465	31.8
Drill Activity	L	17330	13.3
Activities	A	34055	26.1
VLD Down	V	19445	14.9
Mine Down	M	18195	13.9



Drilling Performance to 20 October

Total Minutes	130,490
Total Shifts	181.2
Total Metres	15,267
Metres Coal	13221
Metres Stone	2,046
Metres/Shift	84.2

Surface to In-Seam

- Extremely rough surface environment
- Influences from previously excavated seams above the target Yanan #2 seam.
- Low pore pressure of the coal
- Bogged and could not recover a drill string
- Under-balanced drilling required to succeed but expensive
- Discontinued – to be replaced with underground boreholes

Conclusions

- Baijigou project has demonstrated a successful provision of gas drainage drilling services
- A project managing company (CAMDA) is crucial to providing management and interface between drillers and mine.
- The audit process is critical to the successful planning and implementation of each project
- VLD drillers offer the most extensive experience due to wide exposure in China