



Geotechnical investigations at the Comalco Aluminium site, Bell Bay

by B. D. Weldon

Geotechnical investigations were carried out at the site of a proposed carbon baking furnace at the Comalco Aluminium (Bell Bay) Ltd plant at Bell Bay. Undisturbed tube samples (50 mm diameter), grab samples and diamond-drill core obtained by contract drillers was examined and logged by geologists B. D. Weldon and D. J. Sloane. The engineering logs are attached.

Difficulty was experienced in arranging extrusion of the undisturbed tubes and it was only possible to examine the ends of the samples. In the majority of cases a high plasticity clay, sometimes with traces of sand and gritty gravel, was present. More complete logs will be provided when the tubes have been extruded.

The geological sequence at the carbon baking furnace site is:

From the surface to about one metre depth — fill and made ground.

From about one metre depth to between 6 and 10 metres depth — Tertiary age sediments, mostly high plasticity clay with traces of sand and gritty gravel, occasional basalt boulders. The lower 1–2 m of this sequence may be basalt weathered *in situ* to moderately weathered kernels in a clayey matrix.

From between 6 to 10 m depth to about 20.7 ± 0.5 m depth — fresh to slightly weathered, massive basalt.

From about 20.7 ± 0.5 m depth to 30.0 m depth — Tertiary age carbonaceous clayey silt.

The upper sequence of Tertiary age sediments is only suitable for founding lightly loaded structures. Even then, shrinkage of the clay may result in differential movement of structures. The basalt flow has very high strength and few defects, the majority of breaks occurring during handling and boxing. The basalt will prove a suitable founding material for heavily loaded piles. If rock-sockets are to be provided in the basalt, hard drilling should be expected within the basalt.

The basalt would appear to be tight and act as a barrier to groundwater movement. It therefore protects the underlying carbonaceous materials from being wetted up and losing strength (as happens elsewhere where water gains access to these sediments).

It is considered that shallow seismic refraction surveys may be able to determine the level of the top of the *in situ* fresh basalt should this be necessary. The technique could be limited near rows of piles due to the availability of alternative transmission paths for the energy wavefront.

[13 March 1987]

ENGINEERING LOG - CORED BOREHOLE

borehole no. **1**
sheet **1** of **3**

drilling information		rock substance				rock mass defects				
case-lift fluid loss water	notes	lugeons 0.3 1 3 10 30 100	metres R.L. depth	graphic log	substance description rock type: grain characteristics, colour, structure, minor components.	weathering EL L M H VH EH	strength	defect spacing mm. 30 100 300 1000 3000	defect description thickness, type, inclination, planarity, roughness, coating.	
									significant	general
			0							
			1							
			2							
			3							
			4.104							
	0		5		CORE LOSS					
			5.50							
			6.106		CLAY: orange-brown, high plasticity, with sub rounded basalt gravel (fine) BASALT, grey, medium, subrad	MW			Broken Core	
			6.45		CORE LOSS					
			7		BASALT, grey, medium grained some iron staining	MW			Broken Core 30-70mm	
	63		8		BASALT, grey, medium grained, massive but with insipient defects marked by veinlets of grey-white zeolite/calcite?	SW Fr			← brown clay lined defect to 5mm thick, almost horizontal	
			9.109							
	100		10						clay lined, brown stained joint 2mm	

Defects: planar - irregular rough joints 30° to 70° to core axis, bright usually, often with thin <1mm thick lining of ? calcite/zeolite, occasionally clay + black lustrous material

ENGINEERING LOG – CORED BOREHOLE

borehole no. **1**
sheet **2** of **3**

drilling information				rock substance			rock mass defects		
case-lift	fluid loss	water	notes	lugesons	metres	substance description	strength	defect spacing	defect description
mm	mm	mm	Rad %	0.3 3 10 30 100	R.L. depth	rock type: grain characteristics, colour, structure, minor components.	weathering	mm 30 100 300 1000 3000	thickness, type, inclination, planarity, roughness, coating. significant general
					10	BASALT grey medium grained occasional amygdules to 5-8mm massive but with insipient defects marked by veinlets of grey-green ?zeolite/calcite.	Fr		
			100		11				
					12				
			100		13				
					14				
					15				
			100		16				
					17				
					18				
			93		19	light grey colour: appears more vesicular + 'leached'	Fr SW Fr		
					20	grey colour			

Defects are commonly planar - irregular joints with rough - very rough surfaces; occasional curved joints. Most defects are lined with grey-green layers of ? zeolite/calcite commonly less than 1mm thick. Some defects lined with black lustrous substance. Defects are commonly 20°-40° + 70° to core axis

ENGINEERING LOG – CORED BOREHOLE

borehole no. **2**
sheet 1 of 3

drilling information				rock substance				rock mass defects			
case-lift	fluid loss	water	notes	lugeons	metres	graphic log	substance description	weathering	strength	defect spacing	defect description
			ROD%	0.3 1 3 10 30 100	R.L. depth		rock type: grain characteristics, colour, structure, minor components.	EL L M H VH EH		30 100 300 1000 3000	thickness, type, inclination, planarity, roughness, coating. significant general
					0						
					1						
					2						
					3						
					4						
					5						
					6						
					6.77		ASSUMED TOP OF BASALT.				
					7		CORE LOSS				
			0		7.93		BASALT. Grey. Some brown iron staining. Medium grained.	MW -SW			Broken Core 25-50mm
			90		8		BASALT. Blue-grey. medium grained. Massive	SW			Joints. Approx 25-50mm spacing. Irregular, rough. Subhorizontal. Iron stained, some clay.
			100		9.099		Minor zeolite/calcite (?) amygdules to 5mm dia.	Fr			
					10						2mm clay and iron mineral lined joint

ENGINEERING LOG - CORED BOREHOLE

borehole no. 2
sheet 2 of 3

drilling information				rock substance			rock mass defects			
case lift	fluid loss	water	notes	lugeons	metres	substance description	weathering	strength	defect spacing	defect description
				0.3 1 3 10 30 100	R.L. depth	rock type: grain characteristics, colour, structure, minor components.	EL VL W H VH		30 100 300 1000 3000	thickness, type, inclination, planarity, roughness, coating. significant general
					10					
					10.32	✓		Fr		
			100		11	✓	BASALT. Blue-grey. Medium grained. Massive. Minor zeolite/calcite amygdules to 5mm dia.			
					11.82	✓				
			100		12	✓				-30° clay and zeolite. <2mm
					13	✓				JOINTS. Planar - irregular, occasionally curved. 30° and 70° to core axis dominant. Very tight. Rough. Zeolite/calcite (?) lined to 1mm thick. N.B. Most joints appear to separate on drilling and core handling.
			100		13.32	✓				
					14	✓				
			100		14.82	✓				
					15	✓				
			100		16	✓				
					16.32	✓				
			95		17	✓				
					17.82	✓				
					18.20	✓	CORE LOSS			-Core loss due to drilling change NMLC/NQTT
			100		19	✓	BASALT. Light grey. Vesicles to 1mm dia.	Fr		
					20	✓				Vug 15mm across, zeolite lined

ENGINEERING LOG – CORED BOREHOLE

borehole no. **2**
sheet **3** of **3**

drilling information				rock substance				rock mass defects			
case lift	fluid loss	water	notes	lugesons	metres	graphic log	substance description rock type: grain characteristics, colour, structure, minor components.	weathering	strength	defect spacing mm.	defect description thickness, type, inclination, planarity, roughness, coating.
				0.3 1 3 10 30 100	R.L. depth						
			BASALT SEDIMENT		20-25		BASALT: light grey, vesicular SAND: grey, fine-medium grained, indurated SILT: black carbonaceous	SW			Broken core
					21-26		CORE LOSS				
					21-26		CORE LOSS				
					21-93		CLAYEY SILT: light brown, low plasticity, trace of mica and carbonaceous material, very stiff to hard consistency.				
					24-24		CORE LOSS				
					25-09-25		CLAYEY SILT: as above				
					26						
					27-10-27		CORE LOSS				
					28		CORE LOSS				
					28-90		CLAYEY SILT: as above				
					29						
					30						

Borehole terminated at
required depth of 30.00m

ENGINEERING LOG - CORED BOREHOLE

borehole no. 3
sheet 1 of 3

drilling information				rock substance			rock mass defects		
case-lift	fluid loss	notes	lugesons	metres	substance description	strength	defect spacing	defect description	
water	ROD %		0.3 3 10 30 100	R.L. depth	rock type: grain characteristics, colour, structure, minor components.	weathering	mm. 30 100 300 1000 3000	thickness, type, inclination, planarity, roughness, coating.	
								significant	general
				0					
				1					
				2					
				3					
				3.45					
				4	CORE LOSS				BASALT BOULDERS IN SANDY CLAY MATRIX?
		0		4.90	BASALT fragments 30-100mm. MW-SW. SANDY CLAY. SC. Yellow brown - grey mottles. Medium coarse qtz sand to 2mm dia.				
		0		5	CORE LOSS				
		0		5.90	BASALT Frag. to 50mm. CORE LOSS ASSUMED TOP OF BEDROCK	SW-MW			TOP OF BASALT.
				6.40		SW-MW			
		69		7	BASALT. Blue grey. Medium grained. Minor amygdules to 5mm.	SW			JOINTS: Planar-irregular. Rough. 50°-70°, 10°-30° to core axis common. Very tight. Zeolite filled to 1mm. Some clay filled and iron mineral to 1mm thickness.
				8					
				9					
		100		9.30		Fr			
				10					

ENGINEERING LOG – CORED BOREHOLE

borehole no. 3
sheet 2 of 3

drilling information				rock substance			rock mass defects				
case-lift	fluid loss	water	notes	lugeons	metres	substance description	weathering	strength	defect spacing	defect description	
			RQD %	0.3 1 3 10 30 100	R.L. depth	rock type: grain characteristics, colour, structure, minor components.	EL L M H VH VE		30 100 300 600 900	thickness, type, inclination, planarity, roughness, coating.	
										significant general	
					10	<p>BASALT. Blue-grey. Medium grained. Massive. Minor zeolite/calcite amygdalae to 5mm diameter.</p>					
			100		11						
					12						
					12.30						
					13						
			* NB ≈ 70		14		CORE LOSS - DRILLING ERROR? MISLATCH				Broken core close, Iron stained, irreg. joints.
					15						Broken core. Sections to 80mm. Caused by drilling problems? Driller reported * mismatch.
					15.30						
					16						
			98		17						
					18		Light grey. Vesicles < 1mm dia				Drilling Breaks?
					19						
			98		20						

JOINTS. Irregular - planar. Rough. Tight. Zeolite/calcite (?) filled to 1mm. 20, 50, 70° dominant angles to core axis.

ENGINEERING LOG - CORED BOREHOLE

borehole no.
3
sheet 3 of 3

drilling information				rock substance			rock mass defects			
case-lift	fluid loss	notes	lugesons	metres	graphic log	substance description	weathering	strength	defect spacing	defect description
	water		0.3 1 10 30 100	R.L. depth		rock type: grain characteristics, colour, structure, minor components.	EL L M H VH VE	30 100 300 1000 3000	significant	general
		RQD %		20	v		Fr			
		98		21	v					
		100		22	v	BASALT. Light grey. Vesicles to 1mm. HW angdules to 2mm.	MW			BOTTOM OF BASALT
				23	xx	SILT. Black. Low plasticity. Carbonaceous				CARBONACEOUS SEDIMENTS.
				24	xx	SILT. Dark brown. Low plasticity. Trace mica. Carbonaceous.				
				24	xx	CORE LOSS - INFERRED				
				25	xx	CLAYEY SILT. Brown. low plasticity. Trace mica and carbonaceous leaf and stem fragments. Very stiff - hard.				
				26	xx	Some layers and lenses(?) of fine clayey sand and dark brown clayey silt (to 10mm thickness)				
				27	xx					
				28	xx					
				29	xx					
				30	xx					

END AT REQUIRED DEPTH. 30.0m

ENGINEERING LOG – CORED BOREHOLE

borehole no.
4
sheet 1 of 2

project CARBON BAKING FURNACE				location COMALCO, BELL BAY					
co-ordinates		drill type BAOL		hole commenced 20/1/87					
R.L.		drill method NQT		hole completed 21/1/87					
inclination VERTICAL		drill fluid WATER		drilled by STACPOLE					
bearing				logged by DJS					
				checked by BDW					
drilling information			rock substance			rock mass defects			
case lift	fluid loss	water	notes	lugeons	metres	substance description	strength	defect spacing	defect description
			R90 %	0.3 1 3 10 30 100	R.L. depth	rock type: grain characteristics, colour, structure, minor components.	EL V L M H VH	30 100 300 1000 3000	significant general
					0				
					1				
					2				
					3				
					4	CORE LOSS			
					4.50	XXX BASALT Grey-brown. Medium grn. MW			
					5	CORE LOSS			
					6				
					7				ASSUMED TOP OF BASALT
					7.15	CORE LOSS	MW		Broken core } 30-50mm fragments.
					8	BASALT. Grey. Medium grained. Massive. Minor zeolite/calcite(?) amygdalues to 5mm dia.	SW		Broken core } Irreg. - rough joints. Iron mineral and some clay? on joints.
	50				9				Joints. Planar-irregular, Occ. curved. Rough. Zeolite lined. trace clay and iron mineral along 20°, 40°, 70° to core axis common.
					9.10		Fr		
	100				10				

ENGINEERING LOG – CORED BOREHOLE

borehole no.
4
sheet 2 of 2

drilling information				rock substance			rock mass defects				
case-lift	fluid loss	water	notes	lugesons	metres	graphic log	substance description	weathering	strength	defect spacing	defect description
			ROD %	0.3 1 3 10 30 100	R.L. depth		rock type: grain characteristics, colour, structure, minor components.	EL L V M H EH		30 100 300 1000 3000	thickness, type, inclination, planarity, roughness, coating. significant general
			100		10	V	BASALT . Grey. Medium grained. Massive. Minor amygdules of zeolite/calcite(?) to 5mm dia.				JOINTS. Planar-irregular. Rough. 70-75° 30°-50° common angle to core axis. Tight. Zeolite lined < 1mm thickness. NB. Joints appear to part on drilling.
			100		11	V					
			100		12	V					
			100		13	V					
			100		14	V					
			100		15	V					
					16	V	END. REQUIRED DEPTH				Minor defects Zeolite/calcite? veins 4mm. Irregular-planar. 30°, 70° to core axis common.
					17						

ENGINEERING LOG - CORED BOREHOLE

borehole no. **5**
sheet **1** of **2**

drilling information				rock substance			rock mass defects		
case-lift	fluid loss	notes	lugeons	metres	substance description	weathering	strength	defect spacing	defect description
	water	RQD %	0.3 1 3 10 30 100	R.L. depth	rock type: grain characteristics, colour, structure, minor components.	EL L M H VH	30 100 300 1000 3000	mm.	thickness, type, inclination, planarity, roughness, coating.
									significant general
				0					
				1					
				2					
				3					
				4					
				5					
				6					
				7.157					TOP OF BASALT
		0		7.96	BASALT. Yellow-brown, grey. Medium grained CORE LOSS - INFERRED	MW-HW			Broken core JOINTS. Irregular, rough. Iron mineral and zeolite < 1mm in thickness.
		45		8.55	BASALT. Grey. Medium grained. Massive. Minor zeolite/calcite amygdules	SW Fr			Cavity. Zeolite lined < 10mm. JOINTS. Irregular to planar. Rough. Tight. 70°, 45° to core axis common. Zeolite/calcite(?) filling to 1mm thick.
		100		9					
				10					

ENGINEERING LOG – CORED BOREHOLE

borehole no.
5
sheet 2 of 2

project		CARBON BAKING FURNACE		location		COMALCO, BELL BAY					
co-ordinates		drill type		B40L		hole commenced		19/1/87			
R.L.		drill method		NQT		hole completed		19/1/87			
inclination		drill fluid		WATER		drilled by		STALPOOLE			
bearing		VECTICAL				logged by		DJS			
						checked by		BDW			
drilling information				rock substance				rock mass defects			
case lift	fluid loss	water	notes	lugesons	metres	graphical log	substance description	weathering	strength	defect spacing	defect description
			RQD %	0.3 1 3 10 30 100	R.L. depth		rock type: grain characteristics, colour, structure, minor components.	EL L M H VH EH	30 100 300 1000 3000	thicknes, type, inclination, planarity, roughness, coating.	significant general
			100		10	V	BASALT. Grey. Medium grained. Massive. Minor amygdulcs of zeolite / calcite(?) < 5mm diameter.	Fr	[Redacted]	[Redacted]	Joints. Planar - irregular. Rough. Very tight. Zeolite/calcite(?) lined < 1mm thick. 10-20°, 45°, 70° to core axis common. NB. Joints appear to separate on drilling.
			100		11	V					
			100		11.55	V					
			100		12	F					
			100		13	V					
			100		14	V					
			100		14.55	V					Minor defects. Zeolite/calcite veins < 1mm in thickness. 45° dominant. Planar-irregular.
			100		15	V					
			100		16	V	END. REQUIRED DEPTH				
					17						

ENGINEERING LOG - CORED BOREHOLE

borehole no. **6**
sheet **1** of **2**

drilling information				rock substance				rock mass defects							
case-lift	fluid loss	water	notes	lugesons	metres	R.L.	depth	graphic log	substance description rock type: grain characteristics, colour, structure, minor components.	weathering	strength	defect spacing mm.	defect description		
													thickness, type, inclination, planarity, roughness, coating.	significant	general
			Red %	0.3 1 3 10 30 100											
							1								
							2								
							3								
							4.00	V V	BASALT, grey, medium grained, minor amygdaloids	SW -MW			massive BROKEN CORE		
			8				5		CORE LOSS						
							6.10								
			0				7		BASALT: grey, medium grained, minor amygdaloids (to 8mm)	MW- SW			Broken Core 30-50mm pieces	} irregular - rough surfaces often iron stained	
							7.20								
							7.70								
			77				8			SW					
							8.10								
			97				9			Fr				} Defects generally planar to irregular rough joints, sometimes curved, often with zeolite lining, occasionally with trace of clay. 26, 40, 70 to pore axis	
							9.10								
			100				10								

ENGINEERING LOG - CORED BOREHOLE

borehole no. **7**
sheet **1** of **2**

project		location	
CARBON BAKING FURNACE		COMALCO, BELL BAY.	
co-ordinates		drill type	hole commenced
R.L.		drill method	hole completed
inclination		drill fluid	drilled by
bearing			logged by
VERTICAL		WATER	checked by
			BDW

drilling information				rock substance			rock mass defects			
case-lift	fluid loss	water	notes	lugeons	metres	substance description	weathering	strength	defect spacing	defect description
				0.3 1 3 10 30 100	R.L. depth	rock type: grain characteristics, colour, structure, minor components.	EL VL L M H VH EH		30 100 300 1000 3000	thickness, type, inclination, planarity, roughness, coating.
			RQD %							significant general
					0					
					1					
					2					
					3					
					4					
					5					
					6.0					
					6	CORE LOSS				
					7	BASALT. Medium grained. Blue-grey. Some brown mottling. Massive.	MW-SW			Broken core MW-HW, to 25mm
			70		8	BASALT. Blue-grey. Medium grained. Massive. minor amygdules of zeolite/calcite(?) to 5mm dia.	SW			Broken core MW-HW, to 15mm
					8.50					
					9		Fr			
			98		10					

Broken core MW-HW, to 25mm
Broken core MW-HW, to 15mm
Joints. Planar-irregular. Rough. 30°, 70°, 50° to core axis. Some clay and iron mineral filling to 1mm thickness. Generally tight.

ENGINEERING LOG – CORED BOREHOLE

borehole no.
7
sheet 2 of 2

drilling information				rock substance			rock mass defects			
case-lift	fluid loss	water	notes	lugesons	metres	substance description	strength	defect spacing	defect description	
			RED %	0.3 1 3 10 30 100	R.L. depth	rock type: grain characteristics, colour, structure, minor components.	weathering	30 100 300 1000 3000	thickness, type, inclination, planarity, roughness, coating.	
									significant general	
			98		10	<p>BASALT. Blue-grey. Medium grained. Massive Minor amygdules of zeolite/calcite to 5mm dia.</p>	Fr			
					11					
					11.6					
			100		12					-70° clay and iron mineral approx 1mm
					13					
					14					
					14.75					
			100		15				Minor Zeolite/calcite(?) veins planar - irregular to 1mm in thickness.	
			END		16-16				JOINTS. Planar - irregular, occ. curved. Rough. 60°-50° to common angle to core axis. Zeolite lined 2mm thickness. NB. Most appear to separate on drilling.	
						END AT REQUIRED DEPTH				
					17					

ENGINEERING LOG - CORED BOREHOLE

borehole no.
8
sheet 1 of 2

drilling information				rock substance				rock mass defects							
case-lift	fluid loss	water	notes	lugesons	metres	graphical log	substance description	weathering	strength	defect spacing	defect description				
			ROD %	0.3 1 3 10 30 100	R.L. depth		rock type: grain characteristics, colour, structure, minor components.	EL L M H VH EH	30 100 300 1000 3000	mm.	thickness, type, inclination, planarity, roughness, coating.				
										significant	general				
					0										
					1										
					2										
					3										
					4										
					5										
					5.9										
					6	✓	BASALT. Grey. Medium grained. Massive. Occasional amygdules to 5mm dia - zeolite/calcite(?) filled.	Fr	[Solid black bar]	[Solid black bar]	TOP OF BASALT				
				7	✓									-Cavity 10-20mm? Zeolite lined	
			100	8	✓										
				9	✓										
				9.9	✓										
				10	✓										

JOINTS. Planar - irregular. Rough. Very tight. Zeolite/calcite(?) lined <1mm thick. NB. Most joints appear to separate on drilling.

ENGINEERING LOG - CORED BOREHOLE

borehole no.
8
sheet 2 of 2

drilling information				rock substance			rock mass defects					
case-lift	fluid loss	water	notes	lugesons	metres	graphical log	substance description	weathering	strength	defect spacing	defect description	
				0.3 1 3 10 30 100	R.L. depth		rock type: grain characteristics, colour, structure, minor components.	Fr	30 100 300 1000 3000	thicknes, type, inclination, planarity, roughness, coating.	significant general	
					10	✓	<p>BASALT: grey, medium grained, massive, occasional amygdaloids to 5mm filled with (?)bedite/ calcite</p>				<p><u>Joints</u> Core breaks along calcite veins or joint fillings.</p> <p>- Calcite seam. Weathered ≈ 1.5mm 30° to core axis Planar.</p> <p>- calcite seam. Weathered. 1mm. 30° to core axis. Irregular.</p> <p><u>Minor</u> Calcite veins 2mm. Irreg. - planar. 30°-45° and 60° to core axis.</p>	
					11	✓						
					12	✓						
					13	✓						
					14	✓						
					15	✓						
					16	✓						
			END		16.0	✓						
					17			<p>Borehole terminated at requested depth of 16.0m</p>				

ENGINEERING LOG - CORED BOREHOLE

borehole no. **9**
sheet **1** of **2**

project CARBON BAKING FURNACE				location COMALCO, BELL BAY							
co-ordinates		drill type B40 L		hole commenced 23/1/87							
R.L.		drill method NQTT		hole completed 23/1/87							
inclination VERTICAL		drill fluid WATER		drilled by STALPOOLE							
bearing				logged by DJS							
				checked by BDW							
drilling information				rock substance		rock mass defects					
case-lift	fluid loss	water	notes	lugeons 0.3 1 3 10 30 100	metres R.L. depth	graphic log	substance description rock type: grain characteristics, colour, structure, minor components.	weathering	strength	defect spacing mm. 30 100 300 1000 3000	defect description thickness, type, inclination, planarity, roughness, coating.
					0						
					1						
					2						
					3						RESISTANCE TO DRILLING. IRON CEMENTED SEDIMENTS?
					4						
					5						
					6						
					7						RESISTANCE TO DRILLING. IRON CEMENTED SEDIMENTS?
					8						
					8.50						TOP OF BASALT?
			94		9	V V V	BASALT. Grey-brown iron stained. Medium grained.	SW			JOINTS. R Irregular-planar Rough. Iron mineral, trace clay, <1mm thick. 20°, 70°, 40° to core axis.
					10	V V V	BASALT. Grey. Medium grained. Massive.	Fr			

ENGINEERING LOG – CORED BOREHOLE

borehole no.
10
 sheet **1** of **2**

project CARBON BAKING FURNACE				location COMALCO BELL BAY							
co-ordinates		drill type B40L		hole commenced 28/1/87							
R.L.		drill method NQTT		hole completed 29/1/87							
inclination vertical		drill fluid WATER		drilled by STACPOOLE							
bearing				logged by DJS							
				checked by BDW							
drilling information			rock substance			rock mass defects					
case-lift	fluid loss	water	notes	lugeons 0.3 1 3 10 30 100	metres R.L. depth	graphic log	substance description rock type: grain characteristics, colour, structure, minor components.	weathering	strength	defect spacing mm. 30 100 300 1000 3000	defect description thickness, type, inclination, planarity, roughness, coating.
					0						
					1						
					2						
					3						
					4						
					5						
					6						
					7						
					8						
					9						
					9.95						TOP OF BASALT?

ENGINEERING LOG – CORED BOREHOLE

borehole no. **10**
sheet **2** of **2**

project CARBON FURNA				location COMALCO BELL BAY			
co-ordinates		drill type BAOL		hole commenced 28/1/87			
R.L.		drill method NQTT		hole completed 29/1/87			
inclination vertical		drill fluid WATER		drilled by STAL POOLE			
bearing				logged by DJS			
				checked by BDW			
drilling information				rock substance		rock mass defects	
case lift	fluid loss	notes	lugesons	metres	substance description	strength	defect spacing
	water		0.3 1 3 10 30 100	R.L. depth	rock type: grain characteristics, colour, structure, minor components.	weathering	mm. 30 100 300 1000 3000
							defect description thickness, type, inclination, planarity, roughness, coating.
							significant general
↓				10	BASALT. Blue grey. Medium grained. Massive Minor zeolite amygdules to 5mm dia.	Fr	JOINTS. Planar to irregular, occasionally curved. Rough 30°, 70°, 60° to core axis are common. Zeolite/ calcite(?) lined < 1mm. Very tight. appear to largely fracture on drilling. Minor defects. Weathered amygdules to 5mm. Calcite veins to 1mm.
		100		11			
		100		12 12.1			
		100		13			
				14			
				15 15.1			
		100		16	END. REQUIRED DEPTH		