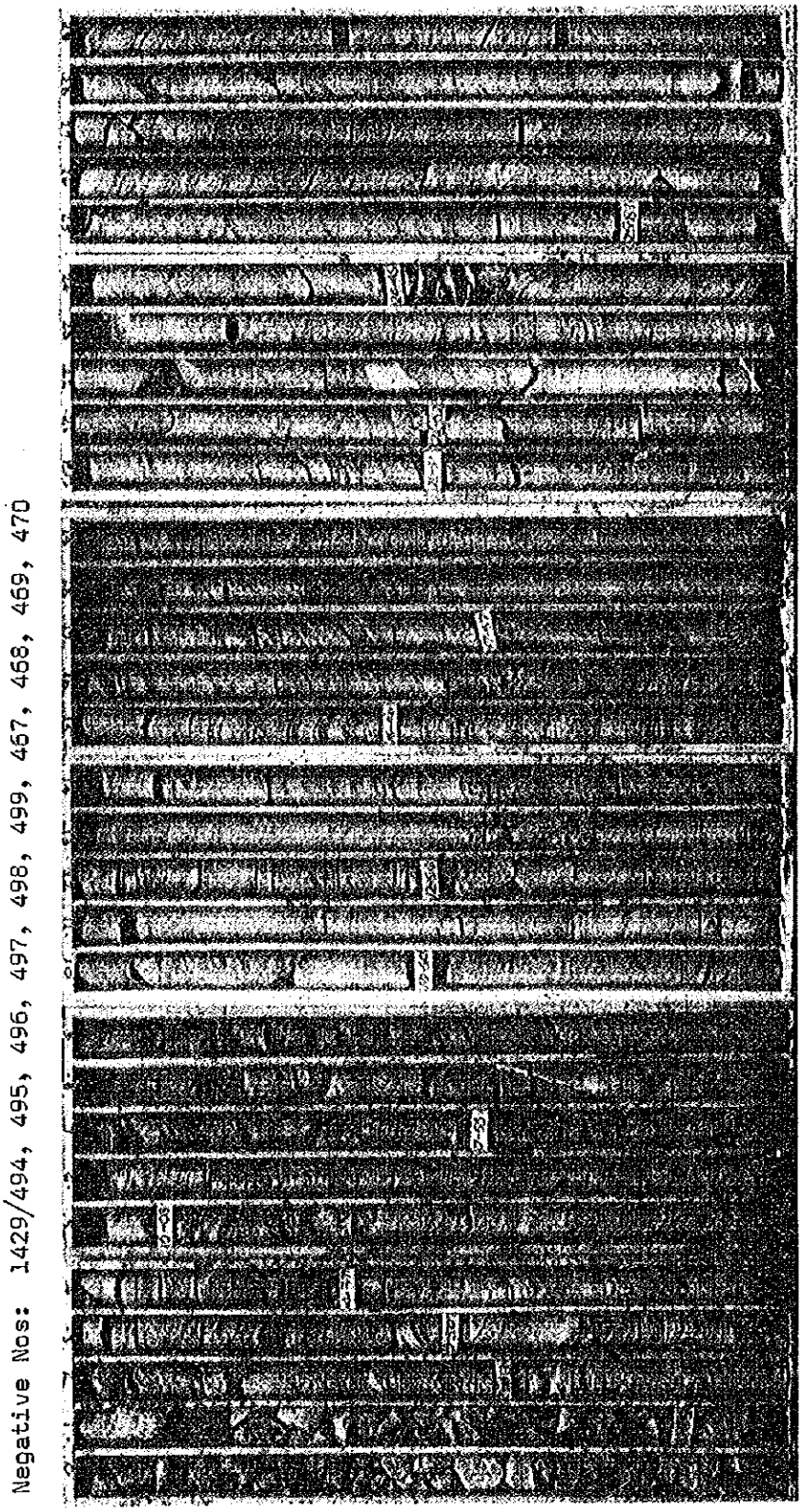
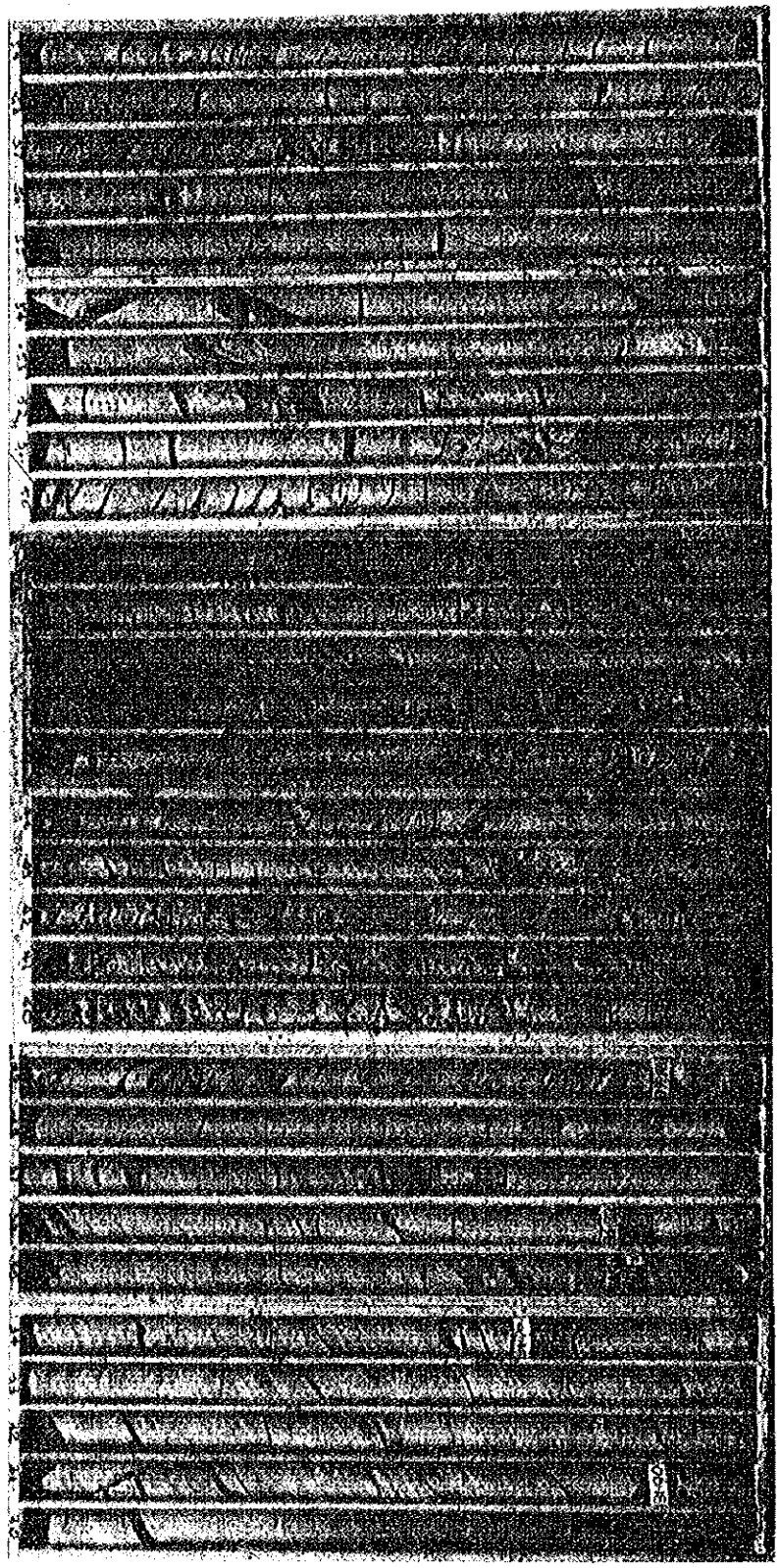


DIAMOND DRILL HOLE DD108

WABO POWER PROJECT

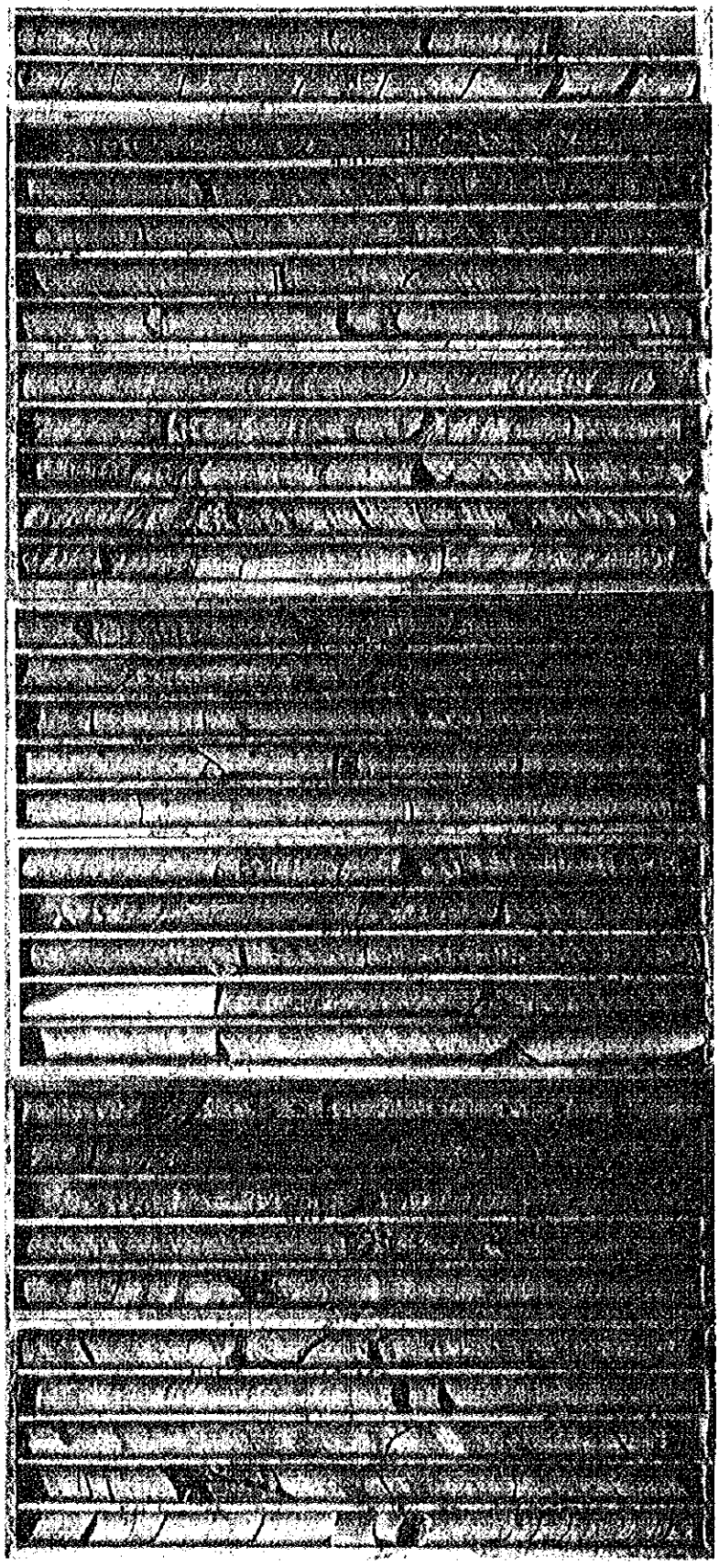
SHEET 1 of 3



DIAMOND DRILL HOLE DD108

WABO POWER PROJECT

SHEET 2 of 3



DIAMOND DRILL HOLE DD108

WABO POWER PROJECT

SHEET 3 of 3

SNOWY MOUNTAINS ENGINEERING CORPORATION

HOLE No. DD 109

SMEC – NK WABO PROJECT JOINT VENTURE STUDY

DIAMOND DRILL HOLE — GEOLOGICAL LOG

PROJECT WABO POWER PROJECT
FEATURE MAIN DAM
LOCATION Power Station

CO-ORDINATES E 285 758.1 m
N 9 226 966.6 m
SYSTEM AMG Zone 55

SURFACE ELEVATION 54.3 m
ANGLE FROM HORIZONTAL 90°
DIRECTION –

DESCRIPTION OF CORE ROCK TYPE—colour, grain size, texture, mineral composition	DEGREE OF WEATHERING FR SW MW HW CW	CORE SIZE	ELEVATION / DEPTH metres	CORE LOG	CORE LOSS % PER RUN	STRUCTURES JOINTS—spacing, attitude, smoothness, aperture, cementing, coating, filling; BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES	FRACTURE LOG	DRILL WATER LOSS	GROUNDWATER LEVEL, DATE	WATER PRESSURE TESTS LEAKAGE RATES IN LUGEON UNITS
SLIDE DEBRIS AND/OR TALUS: Clay, very silty, yellow brown with abundant MUDSTONE, SILTSTONE and SANDSTONE fragments.		NXC	50			Weak, crumbly to semi-plastic.	NOT APPLICABLE	WATER RETURN	20 January 1976 / 28 January 1976	NOT TESTED
NO CORE										
NO CORE		NMLC								
POSSIBLE SLIDE DEBRIS ? or FAULT ZONE ? SANDSTONE; MUDSTONE, silty, very weak and crumbly, with minor SANDSTONE.			45			Recovered mostly as angular fragments and a few sticks up to 0.1m long, many irregular but mostly steep fractures; minor slickensiding.				
NO CORE			40							
SILTSTONE, hard, calcareous.										
CRUDABADI BEDS: MUDSTONE, dark grey, weak, can be broken easily with fingers, very silty.						Crush zone? Close irregular multi-directional fractures not slickensided; recovered as fragments held together by clay.				
SILTSTONE, dark grey, fairly tough.			35			Joints dip 45° and 70°; bedding unclear; core recovered as fragments and sticks to 6mm long.				

DRILL
Make Mindrill
Type F20A

Driller Grech & Mulligan
Commenced 6 Jan 1976
Completed 15 Jan 1976

FRACTURE LOG — Natural breaks in core per metre. Equivalent lengths of core pieces in centimetres.

EXPLANATION

Core preserved in plastic tube.

WEATHERING
CW - Completely weathered
HW - Highly weathered
MW - Moderately weathered
SW - Slightly weathered
FrSt - Fresh, with Limonite stained joints
Fr - Fresh

ENGINEERING GEOLOGY BRANCH
Logged G.A. Frenda
Drawn D.P.
Checked

Sheet 1 of 3
Dwg. No. 1429-S3056/1

MARCH 1976

SNOWY MOUNTAINS ENGINEERING CORPORATION

HOLE No. DD 109

PROJECT MARO POWER PROJECT

DESCRIPTION OF CORE ROCK TYPE—colour, grain size, texture, mineral composition	DEGREE OF WEATHERING FR SW MW HW CW	CORE SIZE	RELEVATN / DEPTH	CORE LOSS	LOG	CORE LOSS % PER LIFT	STRUCTURES JOINTS—spacing, attitude, smoothness, aperture, cementing, coating, filling, BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES	FRACTURE LOG	GROUNDWATER LEVEL, DATE	WATER PRESSURE TESTS LEAKAGE RATES IN LUGEON UNITS
SILTSTONE, dark grey, fairly tough.			21				Bedding unclear; one 60° joint but numerous multi-directional fractures throughout mostly dipping 70° and 35°-45°; no slickensiding; crush zone or zone of intense jointing; mostly fragments with stick to 0.1m.			
SILTSTONE to silty MUDSTONE with fine SANDSTONE bands to 3mm quite common; dark grey, very crumbly throughout.			22							
			23							
			24 30							
			25							
SILTSTONE, dark grey; can be broken with fingers. SANDSTONE			26				Bedding dips 54°-60°, one 70° joint; many tight fractures, mostly steep.			
			27							
			28				Zone of close jointing or shearing. No slickensides. Joints tight and mostly dip 65°-70° and 45°; bedding indistinct.			
MUDSTONE, silty, grading to SILTSTONE in places; dark grey; can be powdered easily between fingers.			25 29							NOT TESTED
			30							
			31							
			32							
			33							
			34 20				Contact dips 20°.			
			35				Bedding dips 60°; very few natural joints but Core broken during drilling.			
MUDSTONE, grading to SILTSTONE in places, minor SANDSTONE bands to 10mm wide; dark grey.			36							
			37				Broken to pieces during drilling due to 60° fractures.			
Weak crumbly			38							
			15 39				Bedding dips 55°-60°; a few joints sub-parallel to bedding dip 50°-55°.			
SILTSTONE, sandy in part, dark grey. SANDSTONE bands to 10mm common.			40							
			41							
			42							
			43				60° joint, rough, clean. Broken to fragments due to sub-vertical joint.			
			44							

ORUBADI BEDS

NMLC

50% WATER RETURN

WATER RETURN

FOR LOCATION OF DRILL HOLE AND OTHER RELEVANT INFORMATION, SEE SHEET 1

Sheet 2 of 3

Dwg. No. 1429-S3056/2

SNOWY MOUNTAINS ENGINEERING CORPORATION

HOLE No. DD 109

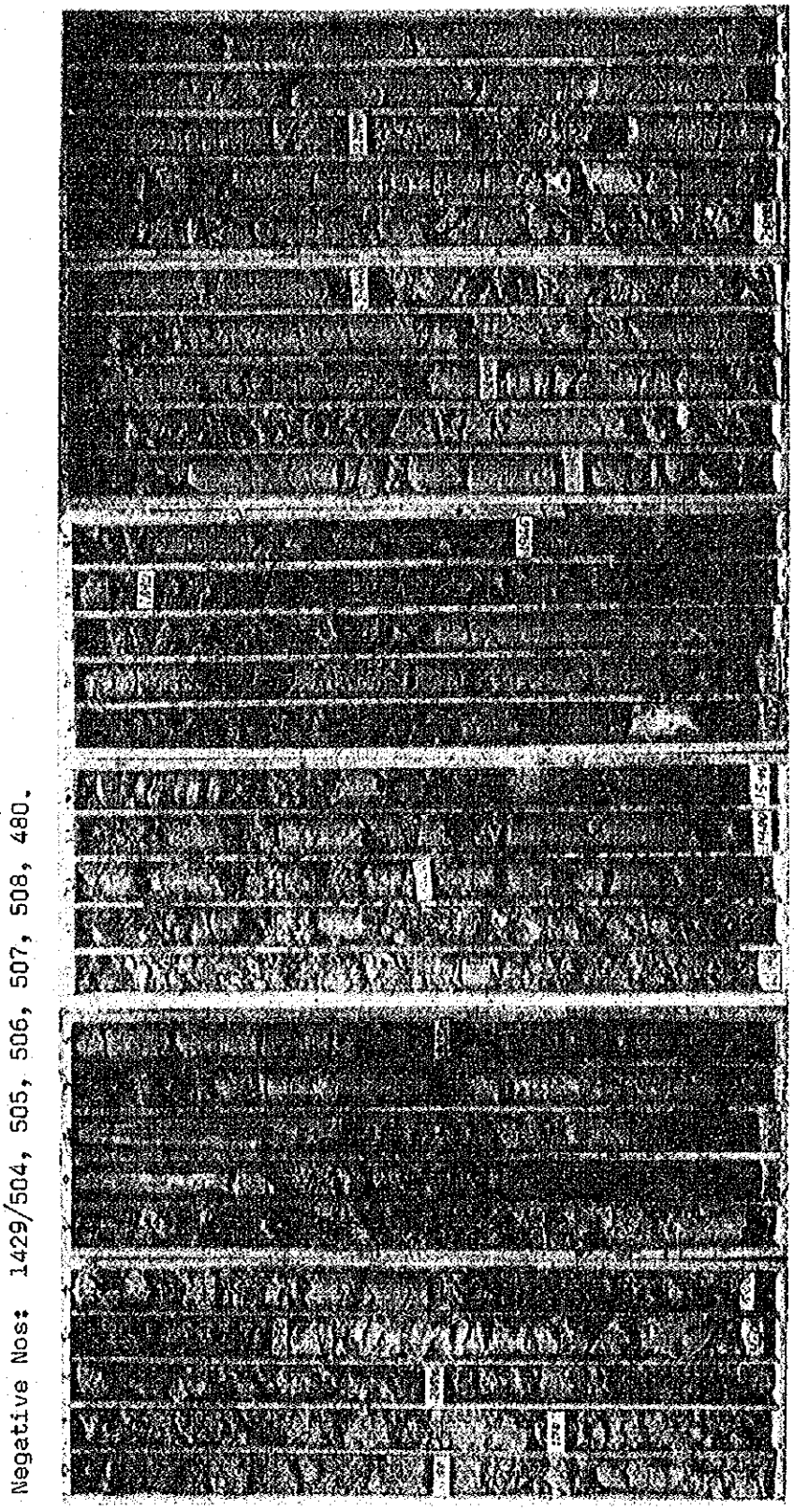
PROJECT WADO POWER PROJECT

DESCRIPTION OF CORE ROCK TYPE—colour, grain size, texture mineral composition	DEGREES OF WEATHERING FR SW MW CW	CORE SIZE	ELEVATION metres DEPTH metres	LOG	CORE LOSS % PER LIFT	STRUCTURES JOINTS—spacing, attitude, smoothness aperture, cementing, coating, filling, BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES	FRACTURE LOG	OVAL WATER LOSS	GROUNDWATER LEVEL, DATE	WATER PRESSURE TESTS LEAKAGE RATES IN LUGEON UNITS
SILTSTONE, sandy in part, dark grey. SANDSTONE, bands to 10mm common.		NMLC	45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60			Broken to fragments due to sub-vertical joint. ← BEDDING dips 30°. ← Sub-vertical joints. Below 45m: slump folding well developed. Average dip 75°. Few joints sub-parallel to bedding. ← Two 65° joints. ← 60° joint. ← 60° joint. ← 45° joint. ← 60° joint. ← 45° joint.		50% to 70% WATER RETURN		NOT TESTED
ORUBADI BEDS Average width of bands 2mm. Gradational boundary Silty MUDSTONE.										
END OF HOLE 60.00m. (RL-5.7m)										

FOR LOCATION OF DRILL HOLE AND OTHER RELEVANT INFORMATION, SEE SHEET 1

Sheet 3 of 3

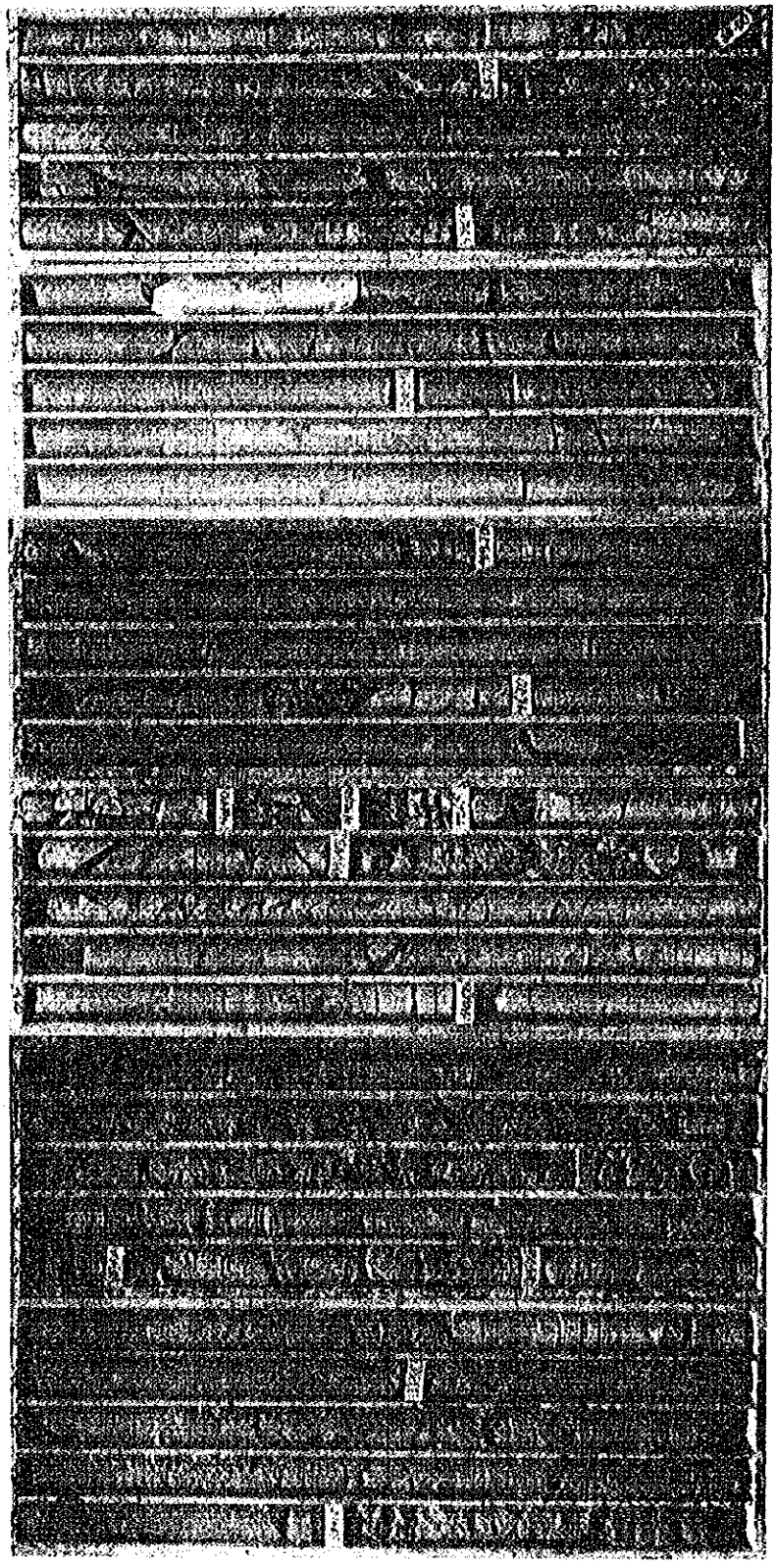
Dwg. No.



DIAMOND DRILL HOLE DD109

WABO POWER PROJECT

SHEET 1 of 2



DIAMOND DRILL HOLE DD109

WABO POWER PROJECT

SHEET 2 of 2

SNOWY MOUNTAINS ENGINEERING CORPORATION
SMEC - NK WADO POWER PROJECT JOINT VENTURE STUDY

HOLE No. DD 110

DIAMOND DRILL HOLE — GEOLOGICAL LOG

PROJECT WADO POWER PROJECT
FEATURE MAIN DAM
LOCATION Power Station

CO-ORDINATES E 285 700.9 m
N 9 226 941.3 m
SYSTEM A.M.G. Zone 55

SURFACE ELEVATION 54.4 m
ANGLE FROM HORIZONYAL 45°
DIRECTION 067°

DESCRIPTION OF CORE ROCK TYPE—colour, grain size, texture, mineral composition	DEGREE OF WEATHERING	CORE SIZE	RELATIVE DEPTH	LOG	CORE LOSS % PER UNIT	STRUCTURES JOINTS—spacing, attitude, smoothness, aperture, cementing, coating, filling. BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES	FRACTURE LOG	DRILL WATER LOSS	GROUNDWATER LEVEL, DATE	WATER PRESSURE TESTS LEAKAGE RATES IN LUGEON UNITS
SLIDE DEBRIS or TALUS Sandstone rubble to loose debris.		NXC	1	Δ			NOT APPLICABLE		10 Feb 1976	
Clay, sandy; dark grey.			4			Recovered as slurry.			HOLE BLOCKED	
MUDSTONE, silty, dark grey, fine sandy lenticles common. Rock is friable, can be broken easily with the fingers.			5			Fragments.				
NO CORE			7			Bedding uncertain, but probably 0° to 10°. Most fracturing caused by steep joints.				
			8			Fragments.				
MUDSTONE, grading into SILTSTONE towards base of this section.			9						FULL WATER RETURN	NOT TESTED
ORIMBAH BEDS SANDSTONE, medium grained, light grey.			11			Broken to fragments, probably due to jointing and possible minor faulting.				
MUDSTONE, silty, friable.		NMLC	12			Bedding dips 36° to 45°, may be slumping.				
SANDSTONE			13			Joints at 65° to 80° Several joints at 60°				
SANDSTONE, light grey.			14			Broken to fragments during drilling.				
SILTSTONE to MUDSTONE, friable.			15			Broken to fragments, due to joints.				
SILTSTONE with minor MUDSTONE bands up to 3mm wide.			16			Bedding horizontal.				
MUDSTONE, very silty, dark grey, fairly crumbly.			17			Minor tight fault zone; dip 50° no natural fractures.				
SILTSTONE with silty mudstone bands common. Locally grading into MUDSTONE.			18			Fragments. Bedding unclear. DRILLER'S NOTE: Hole caving.				
			19			Bedding dips 10° No natural fractures.				
			20							

DRILL
Make Mindrill
Type F20L
Driller Grech & Mulligan
Commenced 11 Dec 1975
Completed 22 Dec 1975

FRACTURE LOG
Natural breaks in core per metre.
Equivalent lengths of core pieces in centimetres.
Core preserved in plastic tube.

EXPLANATION

WEATHERING
CW - Completely weathered
HW - Highly weathered
MW - Moderately weathered
SW - Slightly weathered
FrSt - Fresh, with limonite stained joints
Fr - Fresh

ENGINEERING GEOLOGY B'CH
Logged G.A. Frenda
Drawn D.P.
Checked
Sheet 1 of 4
Dwg. No. 1429-S3057/1

MARCH 1978

PROJECT WABO POWER PROJECT

DESCRIPTION OF CORE ROCK TYPE – colour, grain size, texture mineral composition	DEGREE OF WEATHERING	CORE SIZE	ELEVATION (metres)	DEPTH	LOG	CORE LOSS % PER LIFT	STRUCTURES JOINTS – spacing, attitude, aperture, cementing, coating, filling; BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES	FRACTURE LOG	GROUNDWATER LEVEL, DATE	WATER PRESSURE TESTS LEAKAGE RATES IN LUGEON UNITS
			40	20			BEDDING dips 5°–15°.			
				21			Joint at 65°, clean, rough.			
				22						
Mostly MUDSTONE				23			2 joints at 45°			
							3 joints at 45°			
SILTSTONE, with silty MUDSTONE bands common. Locally grading into MUDSTONE.				24–26			Core broken since drilling mostly along bedding into average 40mm pieces.			
			35	27						
		NMLC		28			2 joints at 60°		FULL WATER RETURN	
				29			Joint at 60°			
SANDSTONE bands to 3mm common.				30			BEDDING locally dips 20°.			
				31			Fragmented during drilling.			NOT TESTED
				32						
MUDSTONE, very silty, grading to SILTSTONE in part.				33			Joint at 45°			
			30	34			Joint at 60° Fractured due to joint.			
SILTSTONE to MUDSTONE, core locally fretted, a few sandy bands up to 3mm thick. Soft MUDSTONE. Friable.				35–36			Rock softened along subvertical joints, spaced 5mm.			
				37			Minor slickensiding on subvertical joint.			
							2 joints at 65°, tight.			
				38–39			5 joints at 60°, possibly minor faulting.			
							BEDDING locally dips 45°			
MUDSTONE to SILTSTONE, dark grey; a few SANDSTONE bands to 30mm. SILTSTONE bands common.				40			BEDDING dips 0°			
			25	41						
				42			Joint at 60°			
				43			Zone of close irregular fracturing at 60° to 75°. Minor slickensiding.			
Friable				44						

ORUBADI BEDS

FOR LOCATION OF DRILL HOLE AND OTHER RELEVANT INFORMATION, SEE SHEET 1

SNOWY MOUNTAINS ENGINEERING CORPORATION

HOLE No. DD110

PROJECT WABO POWER PROJECT

DESCRIPTION OF CORE (ROCK TYPE - colour, grain size, texture, mineral composition)	DEPTH (m)	STRUCTURES (JOINTS, BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES)
Friable		Zone of close irregular fracturing at 60° to 70°. Minor slickensiding.
MUDSTONE to SILTSTONE, dark grey; a few SANDSTONE bands up to 30mm thick; SILTSTONE bands common.	45–47	Ten joints at 60°, clean.
	47–48	BEDDING dips 0°.
	48–49	Vertical joint.
Friable	49–50	Bedding dips 30°; minor crush zone; numerous sub-vertical to 65° fractures.
	50	Joint at 65°
Fine silty SANDSTONE	51–52	
Clay and MUDSTONE fragments.	53	Possibly broken by drilling.
	54	Two joints at 60°
	54	Joint at 70°
	54–55	BEDDING dips 0° to 10°
	55	Two joints at 70°, some crushing.
Friable	55–56	Minor crushing, probably due to close steep joints. No slickensiding.
SILTSTONE, fine sandy; dark grey.	56–57	BEDDING dips 10°
	57–58	Broken to fragments due to close 70° and vertical joints.
MUDSTONE to SILTSTONE; dark grey, lighter SILTSTONE bands to 0.5mm wide, very common.	58	Joint at 65°
Clay and MUDSTONE fragments.	60–61	Crush zone, irregular fractures, minor slickensiding; contact dips 20°.
	62	Joint at 65°, rough, clean.
	64	Two joints at 40°
	64–66	Broken after drilling into sticks, average 80mm long.
Minor air-slacking.	67	Slump structures.
SANDSTONE	67–68	No natural fractures. Average bedding dip 10°

Stratigraphic unit: ORUBADI BEDS

Core size: NMLC / NMLC; Core recovery marks: 120, 115, 110

Water loss: FULL WATER RETURN

Water pressure tests: NOT TESTED

FOR LOCATION OF DRILL HOLE AND OTHER RELEVANT INFORMATION, SEE SHEET 1

Dwg. No. 1429-S3057/3

SNOWY MOUNTAINS ENGINEERING CORPORATION

HOLE No. BD110

PROJECT WABO POWER PROJECT

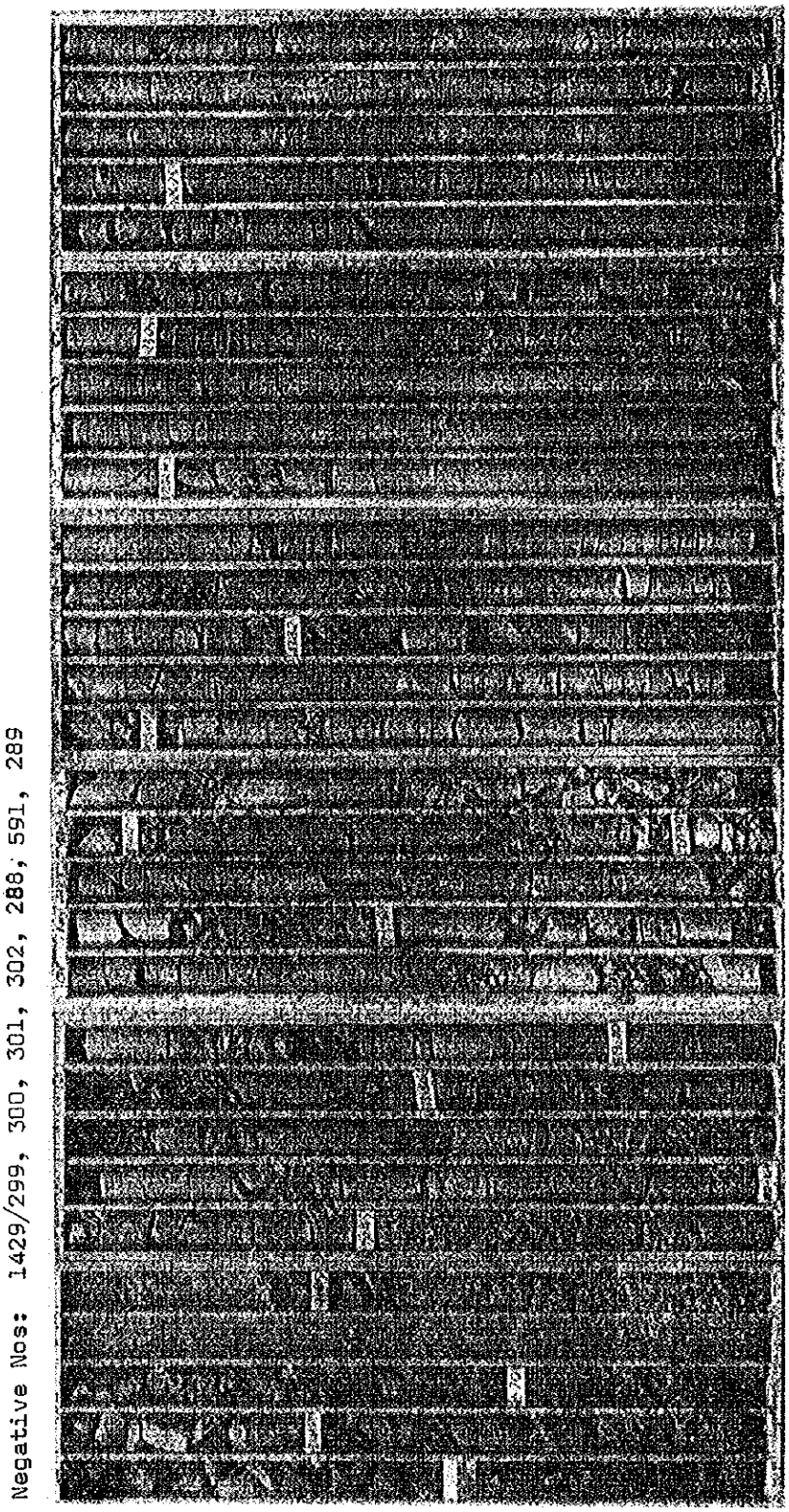
DESCRIPTION OF CORE ROCK TYPE - colour, grain size, texture mineral composition	DEPTH	STRUCTURES JOINTS - spacing, attitude, smoothness aperture, cementing, coating, filling, BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES	DRILL WATER LOSS	WATER PRESSURE TESTS LEAKAGE RATES IN LUGEON UNITS
SANDSTONE, light grey medium with many SILTSTONE bands.		Bedding dips 10°, no natural fractures.	FULL WATER RETURN	NOT TESTED
SILTSTONE and MUDSTONE bands with lesser SANDSTONE bands; fairly tough;	69 70	One 45° joint; bedding dips 0°.		
END OF HOLE 70.00m. (RL4.9m)				

ORUBADI BEDS

FOR LOCATION OF DRILL HOLE AND OTHER RELEVANT INFORMATION, SEE SHEET 1

Sheet 4 of 4

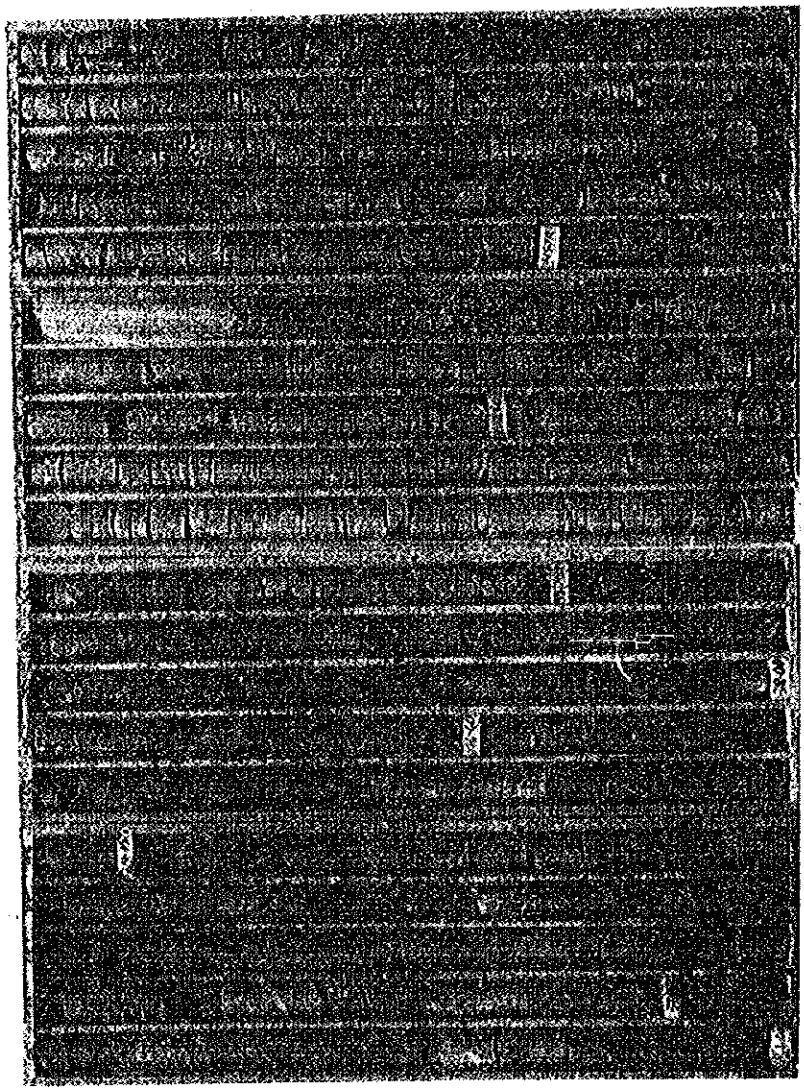
Dwg. No. 1429-S3059/4



DIAMOND DRILL HOLE DD110

WABO POWER PROJECT

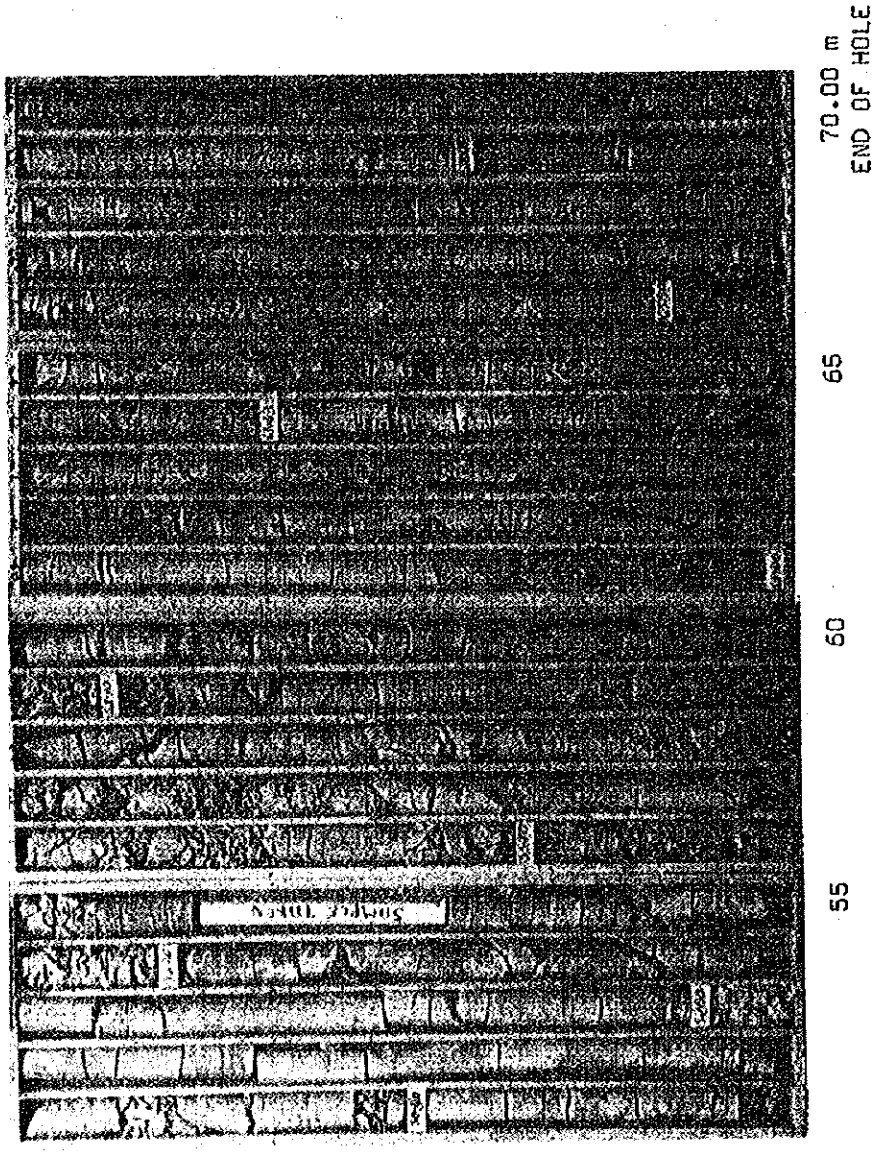
SHEET 1 of 3



DIAMOND DRILL HOLE DD110

WABO POWER PROJECT

SHEET 2 of 3



DIAMOND DRILL HOLE DD110

WABO POWER PROJECT

SHEET 3 of 3

SNOWY MOUNTAINS ENGINEERING CORPORATION

SHEC-NK WADO PROJECT JOINT VENTURE STUDY

HOLE No. DD 111

DIAMOND DRILL HOLE — GEOLOGICAL LOG

PROJECT WADO POWER PROJECT

FEATURE MAIN DAM

LOCATION Diversion Tunnel and Spillway, right bank

CO-ORDINATES E 285 822.9 m, N 9 226 341.5 m

SYSTEM AMG Zone 55

SURFACE 76.0 m

ELEVATION 45°

ANGLE FROM HORIZONTAL 060°

DIRECTION

DESCRIPTION OF CORE ROCK TYPE—colour, grain size, texture mineral composition	DEGREE OF WEATHERING	CORE SIZE	ELEVATN / DEPTH metres	LOG	CORE LOSS % PER LIFT	STRUCTURES JOINTS—spacing, attitude, smoothness aperture, cementing, coating, filling, BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES	FRACTURE LOG	DRILL WATER LOSS	GROUNDWATER LEVEL, DATE	WATER PRESSURE TESTS LEAKAGE RATES IN LUGEON UNITS
SLOPEWASH, brown.			75				NOT APPLICABLE			
SILTSTONE, sandy brown. Probable bedrock.		NMC				Core highly broken due to drilling. Bedding is visible in core pieces, but appears to be non-planar, contorted.			21 JANUARY 1976	NOT TESTED
As above, grey with limonite staining.						Joints clean, planar, fairly smooth, dips 36° sub-parallel to bedding which dips 26°.				
Core irregularly fretted during drilling.						Probable sheared zones.				
						Joint, limonite stained clayey filling.				
			70			Joints are rough curved or wavy, clean; dip is close to bedding plane.				PACKER WOULD NOT SEAL IN SOFT GROUND NOT TESTED.
						Bedding dips 35°, laminated, often with organic traces between laminae.				
ERA BEDS						Core broken by drilling. Possible shearing.		FULL WATER RETURN		
		NMC				Joints, smooth, planar, dip 70°–80°.				29
						Possible shears.				
			65			Fractures caused by drilling, by crush zones, and by bedding plane partings. Bedding planes dipping 20°.				
										18

DRILL
Make Mindrill
Type F 30
Driller Grech & Mulligan
Commenced 13 Jan 1976
Completed 28 Jan 1976

FRACTURE LOG
cm

EXPLANATION
Natural breaks in core per metre.
Equivalent lengths of core pieces in centimetres.
Core preserved in plastic tube.
Core fragmentation caused by drilling.

WEATHERING
CW - Completely weathered
HW - Highly weathered
MW - Moderately weathered
SW - Slightly weathered
FrSt - Fresh, with Limonite stained joints
Fr - Fresh

ENGINEERING GEOLOGY B'CH
Logged B.V. Radford
Drawn D.P.
Checked
Sheet 1 of 5
Dwg. No. 1429-S3058/1

MARCH 1975

SNOWY MOUNTAINS ENGINEERING CORPORATION

HOLE No. DD 111

PROJECT WABO POWER PROJECT

DESCRIPTION OF CORE ROCK TYPE—colour, grain size, texture mineral composition	DEGREE OF WEATHERING F.W. S.W. M.W. S.W. F.W.	CORE SIZE	RELATIVE LEVEL	DEPTH	CORE LOSS	LOG	CORE LOSS % PER UNIT	STRUCTURES JOINTS—opening, orientation, smoothness, aperture, cementing, coating, filling, BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES	FRACTURE LOG	DRILL FLUID LOSS	GROUNDWATER LEVEL DATE	WATER PRESSURE TESTS LEAKAGE RATE IN LUGEON UNITS
Very fine, sandy, dark grey.				21				Joints near 90°.				18
Becomes locally sandier.				22								
Core fretted during drilling.			60	23				Laminar bedding, dip 20°.				9.5
				24								
Rock is less inclined to fretting and air-slacking.				25				Near 90° joint.				
				26								4.3
				27				Fractures appear to be drilling breaks and bedding plane partings only.				
				28				Bedding laminar, dip 20°.				
		NMLC	165	29								
				30				Fragmented, possible shear.				
				31				Joint, smooth, clean, planar, dip 70°.				13
				32				Joint dip 50°, tight, planar.				
				33				Bedding laminar, dip 20°.				
				34				Fragmented, possible shear.				
								Joint, smooth and clean, dip 60°.				
				35								
				36								
			150	37				Fragmented, possible shear.				4.2
				38								
				39								
				40								
				41				Joint, smooth, clean, planar, dip 65°.				
				42								NOT TESTED
				43				Fragmented, possible shears.				
			45	44								

ERA BEDS - SILTSTONE.

FULL WATER RETURN

FOR LOCATION OF DRILL HOLE AND OTHER RELEVANT INFORMATION, SEE SHEET 1

Sheet 2 of 5

Dwg. No. 1429-S3058/2

SNOWY MOUNTAINS ENGINEERING CORPORATION

HOLE No. DD 111

PROJECT. WADO POWER PROJECT

DESCRIPTION OF CORE ROCK TYPE—colour, grain size, texture, mineral composition	DEGREE OF WEATHERING	CORE SIZE	RL	DEPTH	LOG	CORE LOSS % PER UNIT	STRUCTURES JOINTS—spacing, attitude, smoothness, aperture, cementing, coating, filling BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES	FRACTURE LOG	FULL WATER LOSS	GROUNDWATER LEVEL, DATE	WATER PRESSURE TESTS LEAKAGE RATES IN LUGEON UNITS
ERA BEDS - SILTSTONE		NMLC		45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68			Fragmented, possible shears. No joints visible. Fractures, mainly at 0°, are drilling breaks. Fragmented, possible shears. No joints visible. Fractures near 0° are drilling breaks, bedding plane partings, and crush zones. Fragmented, possible shears. Possible shear, 30mm wide. No joints identifiable. Fractures are drilling breaks and bedding plane partings. Bedding mainly laminar, dip 20°. Joint rough, planar, clean, dip 0°. Two near vertical, clean sub-planar, smooth joints.		FULL WATER RETURN		NOT TESTED 36 0.4 0.6 ARTESIAN AFTER TESTING. 8.5

Rock is slightly more competent, fretting during drilling is much reduced.

Rock locally softer.

Rock is somewhat harder, more competent.

Zone of softer rock, frets during drilling.

Rock becomes harder, more competent with depth. Little or no fretting.

Rock becomes softer, frets during drilling.

Amount of fretting varies locally.

FOR LOCATION OF DRILL HOLE AND OTHER RELEVANT INFORMATION, SEE SHEET 1

SNOWY MOUNTAINS ENGINEERING CORPORATION

HOLE No. DD 111

PROJECT. WADO POWER PROJECT

DESCRIPTION OF CORE ROCK TYPE - colour, grain size, texture, mineral composition	DEGREE OF WEATHERING	CORE SIZE	RL ELEVATN / DEPTH	LOG	CORE LOSS % PER LIFT	STRUCTURES JOINTS - spacing, attitude, smoothness, aperture, cementing, coating, filling; BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES	FRACTURE LOG	WATER LOSS	GROUNDWATER LEVEL, DATE	WATER PRESSURE TESTS LEAKAGE RATES IN LUGEON UNITS

ERA BEDS - SITSTONE

Siltstone, very weak.

Core generally smooth, not much fretting.

Seams of weaker, more shaly rock at intervals from 0.4m to 1m. Seams are less than 30mm thick.

Slightly sandy SILTSTONE, dark grey. Core generally smooth, not much fretting.

Core severely fretted.

Weak shaly zone, crushed in places.

SILTSTONE becomes more competent, very little fretting

NMLC

69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92

Joints, dip 30°, and nearly parallel to bedding plane which dips 20°.

Two smooth, clean, planar joints dip 50°.

Joints at 90° sub-planar to curved, smooth, clean.

Bedding plane dips 20°.

Joint, smooth, clean, planar dips 40°.

Bedding plane dips 20°.

No joints identifiable. Fractures are mainly bedding plane partings dipping 20°, breaks due to drilling and thin seams of weaker rock, most probably crushed during drilling.

Joint, 70°, clean, curved.

Traces of near 90° jointing.

Fossil plant remains on bedding planes.

Joints smooth, clean, planar, 20°-60°.

FULL WATER RETURN

ARTESIAN AFTER TESTING

8.5

2.1

2.9

2.5

NOT TESTED

FOR LOCATION OF DRILL HOLE AND OTHER RELEVANT INFORMATION, SEE SHEET 1

Sheet 4 of 5

Dwg. No. 1429-S3058/4

SNOWY MOUNTAINS ENGINEERING CORPORATION

HOLE No. DD 111

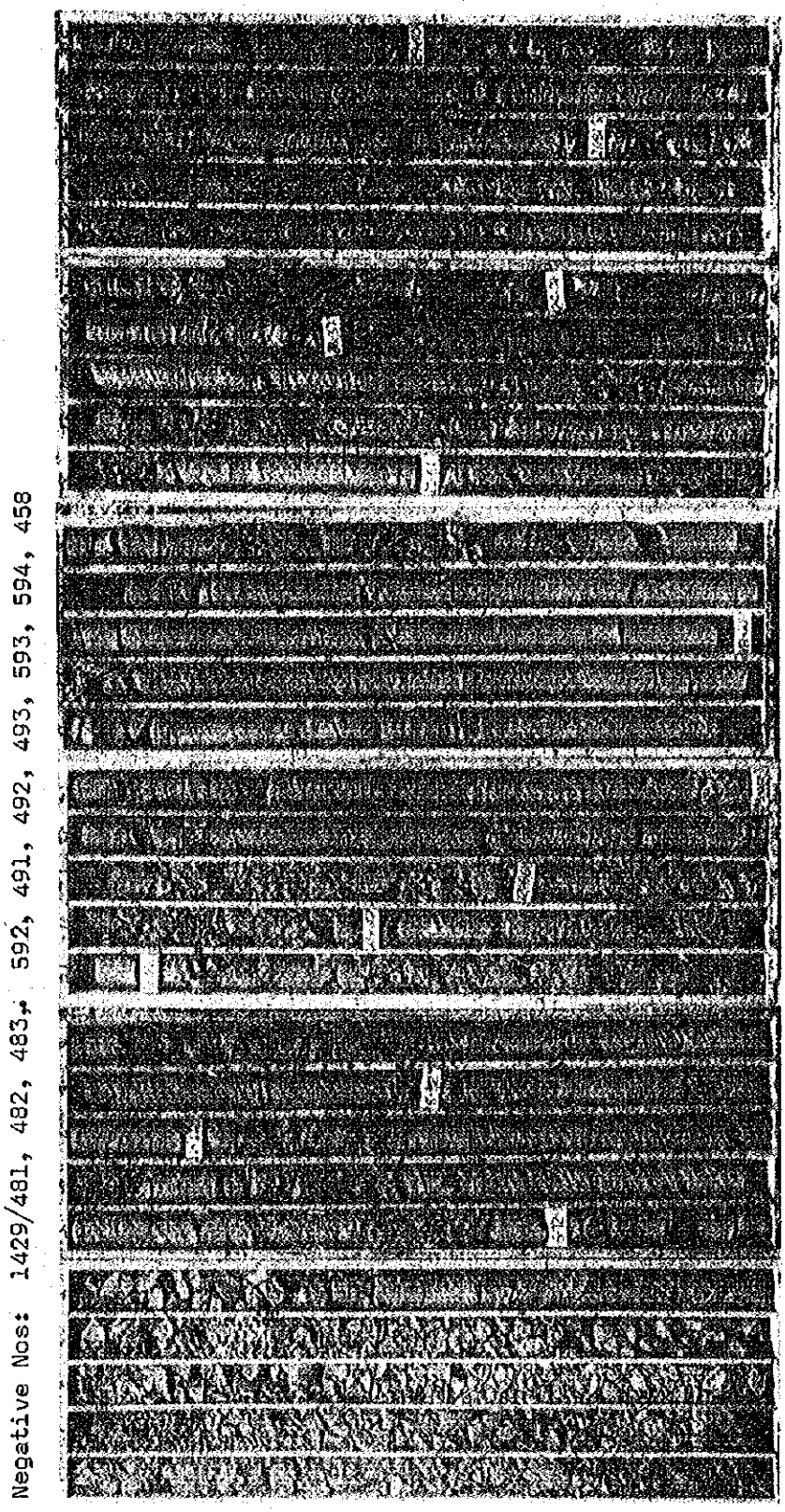
PROJECT MARO POWER PROJECT

DESCRIPTION OF CORE ROCK TYPE—colour, grain size, texture mineral composition	DEGREE OF WEATHERING	CORE SIZE	ELEVATION	DEPTH CORED	LOG	CORE LOSS % PER LIFT	STRUCTURES JOINTS—spacing, attitude, smoothness aperture, cementing, coating, filling, BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES	FRACTURE LOG	DRILL WATER LOSS	GROUNDWATER LEVEL, DATE	WATER PRESSURE TESTS LEAKAGE RATES IN LUGEON UNITS
SILTSTONE is fairly competent, showing very little fretting. ERA BEDS		NMLC	110	93 94 95 96 97 98 99			Curved near 90° joint. Many drilling breaks and bedding plane partings dipping 20°. Air-slacking common below 93.6m. Joint near 90° curved. Joint, near vertical, rough, curved.		NO APPRECIABLE DRILL WATER LOSS		NOT TESTED
END OF HOLE 99.6m (RL5.6m)											

FOR LOCATION OF DRILL HOLE AND OTHER RELEVANT INFORMATION, SEE SHEET 1

Sheet 5 of 5

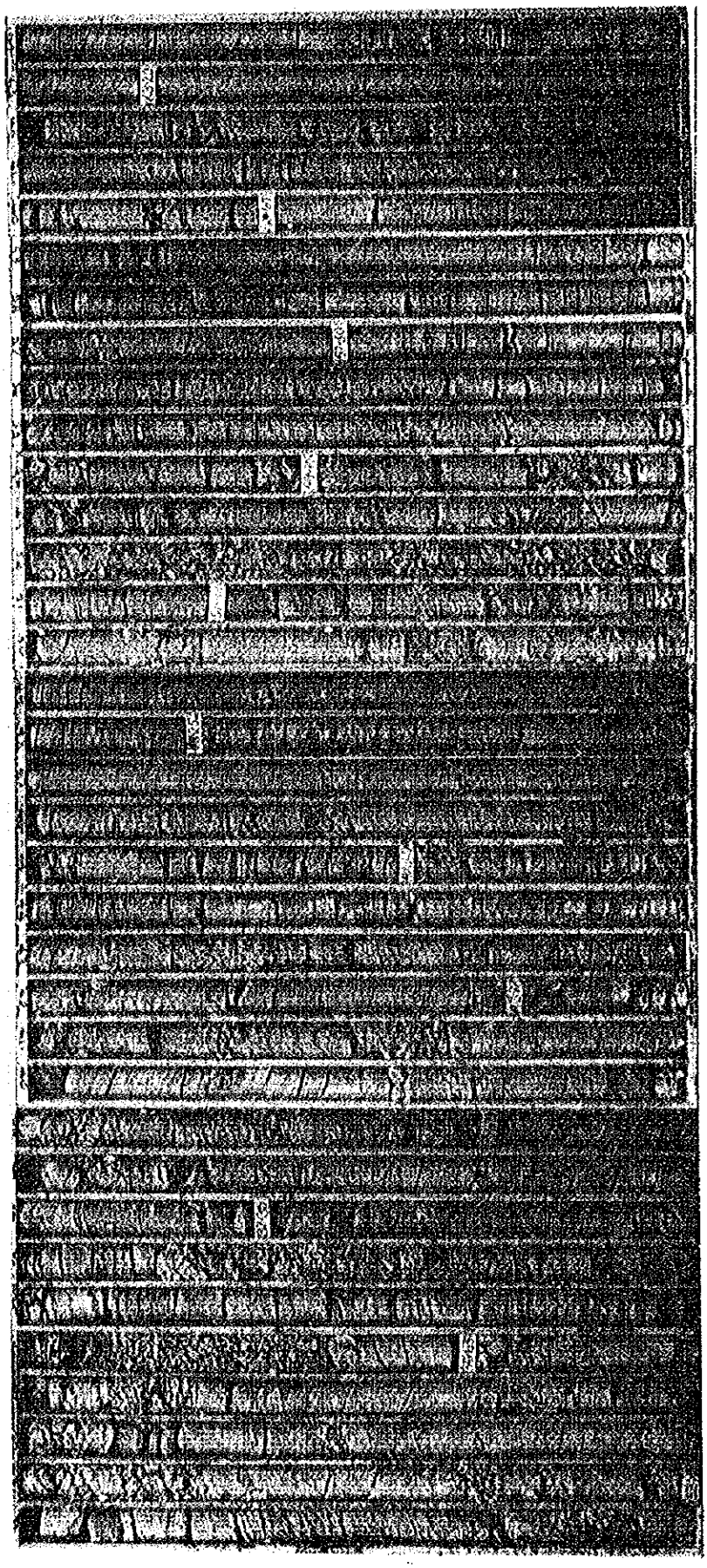
Dwg. No. 1429-S3058/5



DIAMOND DRILL HOLE DD111

WABO POWER PROJECT

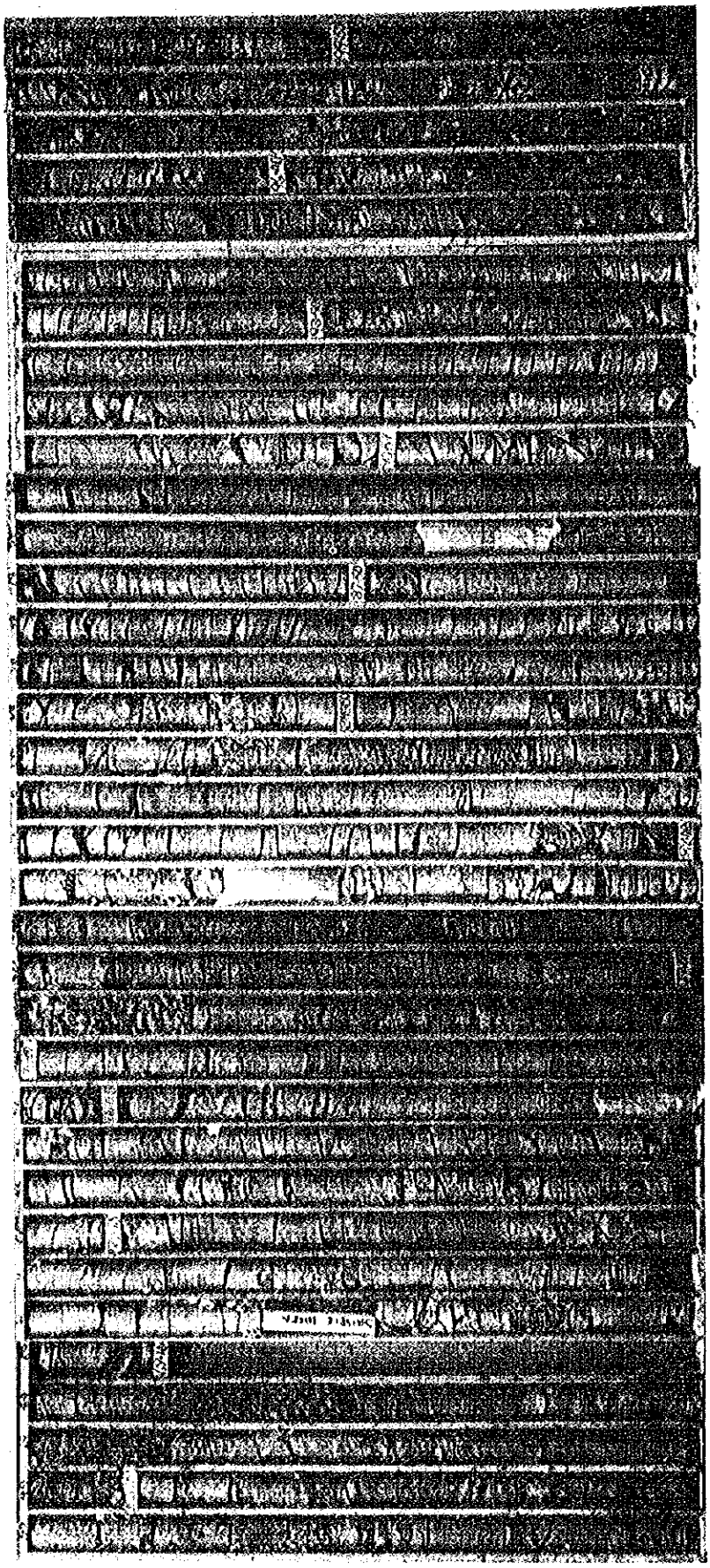
SHEET 1 of 3



DIAMOND DRILL HOLE DD111

WABO POWER PROJECT

SHEET 2 of 3



DIAMOND DRILL HOLE DD111

WABO POWER PROJECT

SHEET 3 of 3

SNOWY MOUNTAINS ENGINEERING CORPORATION

HOLE No. DD 112

SNEC-NK MADO PROJECT JOINT VENTURE STUDY

DIAMOND DRILL HOLE — GEOLOGICAL LOG

PROJECT: MADO POWER PROJECT
FEATURE: MAIN DAM
LOCATION: Dangite left Abutment

CO-ORDINATES: E 285 398.6 m, N 9 226 510.1 m
SYSTEM: AMG Zone 55

SURFACE ELEVATION: 34.2 m
ANGLE FROM HORIZONTAL: 90°
DIRECTION: -

DESCRIPTION OF CORE ROCK TYPE—colour, grain size, structure, mineral composition	DEGREE OF WEATHERING	CORE SIZE	RELEVANCE	DEPTH (metres)	SCALE	LOG	CORE LOSS % PER LIFT	STRUCTURES JOINTS—spacing, attitude, smoothness, aperture, cementing, coating, filling. BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES	FRACTURE LOG	DRILL WATER LOSS	GROUNDWATER LEVEL DATE	WATER PRESSURE TESTS LEAKAGE RATES IN LUGEON UNITS
Surface soil and scree; yellow brown.		NXC		1					NOT APPLICABLE			
NO CORE				2								
SANDSTONE, silty dark grey; soft and friable.				3				Core fretted and broken during drilling.	S			NOT TESTED
Fine grained.				4	30			BEDDING INDISTINCT				
Medium grained.				5				Broken to fragments by drilling. Joint 60°, open.				
SILTSTONE, sandy, dark grey.				6								
SANDSTONE, fine, and thin SILTSTONE bands average 2mm wide approximately 25% of rock; several nodules of calcareous SANDSTONE.				7				60° joint, open. 60° joint, rough. BEDDING 40°-45°. 60° joint.			28 January 1976	
				8								
				9	25			BEDDING 40°-43°; partings along bedding common, some may be open.				
				10								10
				11								
SANDSTONE, similar to above but wider bands of SILTSTONE to fine SANDSTONE; light grey, medium grained SANDSTONE dominant; average 5mm wide bands.				12				BEDDING dips 40°-43°.				
				13								5.3
				14	20			60° rough joints.				
				15								
Massive medium grained SANDSTONE. Locally friable.				16				60° rough joint.				
				17				Two 60° joints.				
				18								
				19	15			65° joint.				
				20								10.0

FULL WATER RETURN

NOTE: WATER FLOWED FROM HOLE AFTER PRESSURE TESTING.

DRILL
Make: Hindrill
Type: E1000
Driller: Creeh & Mulligen.
Commenced: 19 Jan 1976
Completed: 25 Jan 1976

FRACTURE LOG
cm

EXPLANATION
Natural breaks in core per metre.
Equivalent lengths of core pieces in centimetres.
S (in fracture column) = Air slacking of rock common.
Core preserved in plastic tube.

WEATHERING
CW - Completely weathered
HW - Highly weathered
MW - Moderately weathered
SW - Slightly weathered
FrSt - Fresh, with Limonite stained joints
Fr - Fresh

ENGINEERING GEOLOGY B'CH
Logged: G.A. Frenda
Drawn: D.P.
Checked:

Sheet 1 of 3
Dwg. No. 1429-S3059/1

MARCH 1976

SNOWY MOUNTAINS ENGINEERING CORPORATION

HOLE No. DD 112

PROJECT MARO POWER PROJECT

DESCRIPTION OF CORE ROCK TYPE—colour, grain size, texture, mineral composition	DEGREE OF WEATHERING	CORE SIZE	ELEVATION / DEPTH	LOG	CORE LOSS % PER LIFT	STRUCTURES JOINTS—spacing, attitude, smoothness, aperture, cementing, coating, filling. BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES	FRACTURE LOG	WATER LOSS	GROUNDWATER LEVEL DATE	WATER PRESSURE TESTS LEAKAGE RATES IN LUGEON UNITS
SANDSTONE and dark grey silty SANDSTONE and SILTSTONE bands.			21 22 23			BEDDING dips 40°. Joint dips 50°, rough, clean.				0.3
SILTSTONE to very fine SANDSTONE, dark grey.			24 25 26			No natural breaks.				
SANDSTONE, light grey, medium and numerous dark grey fine SANDSTONE to SILTSTONE bands to 15mm wide, average 5mm.		MWLC	27 28 29 30 31 32 33			BEDDING dips 40°. Joint dips 50°, rough. Joint dips 50°, rough. Joint dips 70°, rough. Joint dips 70°, rough.		FULL WATER RETURN		1.5 2.2
SANDSTONE as above but silty bands more pronounced.			34 35 36							
SILTSTONE, fine sandy, dark grey; minor MUDSTONE lenticles; SANDSTONE bands, light grey, common, average 2mm thick.			37 38			BEDDING dips 40°. Joint dips 60°				0.6
SILTSTONE, dark grey banded throughout.			39 40 41 42 43 44			Incipient air - slacking.	S			0.7

ERA BEDS

FOR LOCATION OF DRILL HOLE AND OTHER RELEVANT INFORMATION, SEE SHEET 1

Sheet 2 of 3

Dwg. No. 1429-S3059/2

SNOWY MOUNTAINS ENGINEERING CORPORATION

HOLE No. DD 112

PROJECT WADO POWER PROJECT

DESCRIPTION OF CORE ROCK TYPE—colour, grain size, texture, mineral composition	DEGREE OF WEATHERING	CORE SIZE	RL / DEPTH (metres)	LOG	CORE LOSS % PER LIFT	STRUCTURES JOINTS—spacing, inclination, smoothness, aperture, cementing, coating, filling; BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES	FRACTURE LOG	WATER LOSS	WATER PRESSURE TESTS LEAKAGE RATES IN LUGEON UNITS
See sheet 2 SANDSTONE-SILTSTONE interbands. MUDSTONE SANDSTONE, fine, silty and MUDSTONE bands to 10mm. MUDSTONE MUDSTONE and SILTSTONE with bands of SANDSTONE to 80mm, average 5mm.		NMLC	-10 45 46 47 48		89 88	BEDDING dips 40°. Joint dips 60°; rough. BEDDING 40° Joint dips 60°; rough. Joint dips 45°; rough. Incipient air slacking. BEDDING dips 40°.		FULL WATER RETURN	0.7 1.9

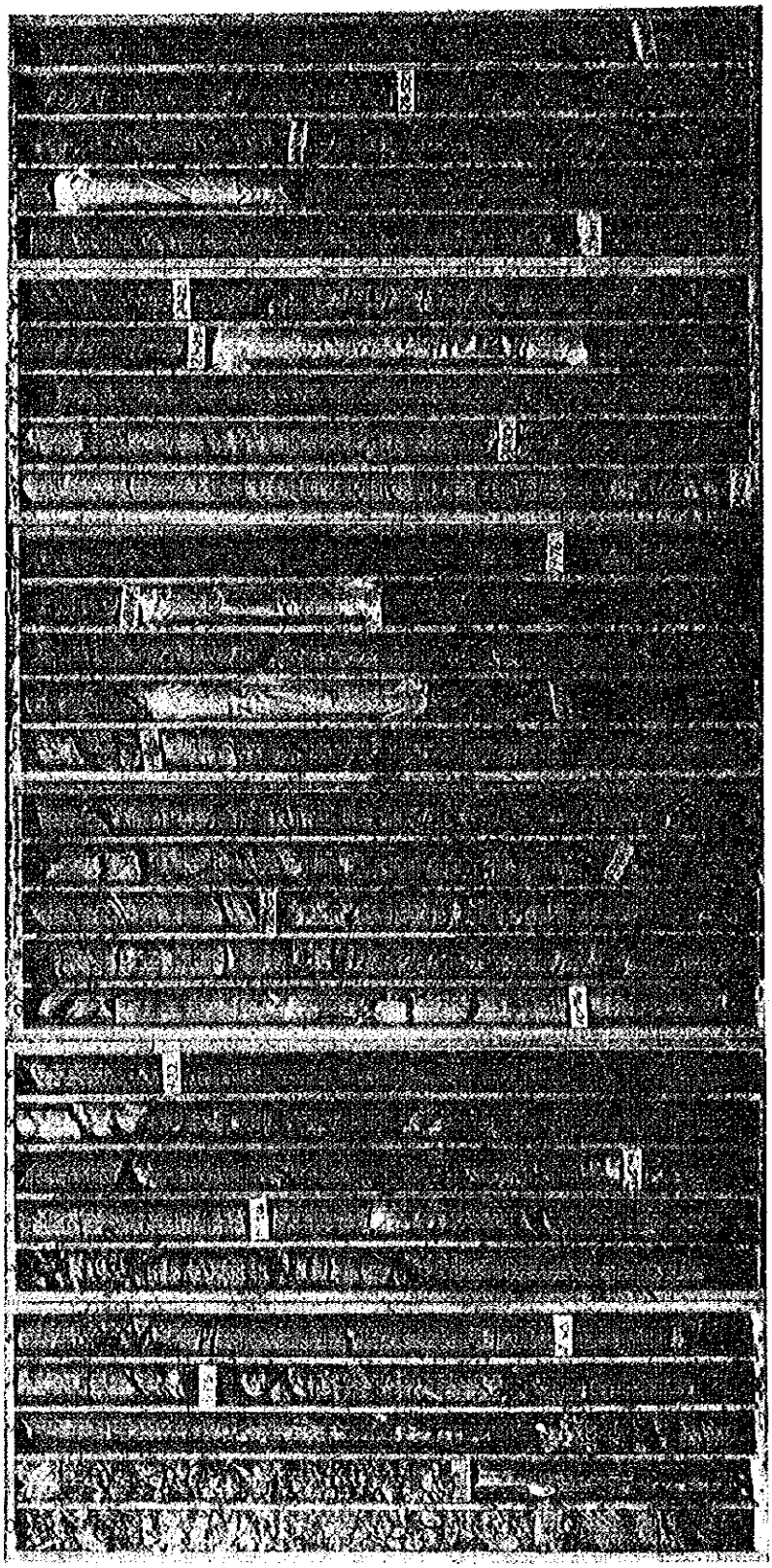
ERA: BEDS

END OF HOLE 48.87m. (RL-14.7m)

FOR LOCATION OF DRILL HOLE AND OTHER RELEVANT INFORMATION, SEE SHEET 1

Sheet 3 of 3

Dwg. No. 1429-S3099/3

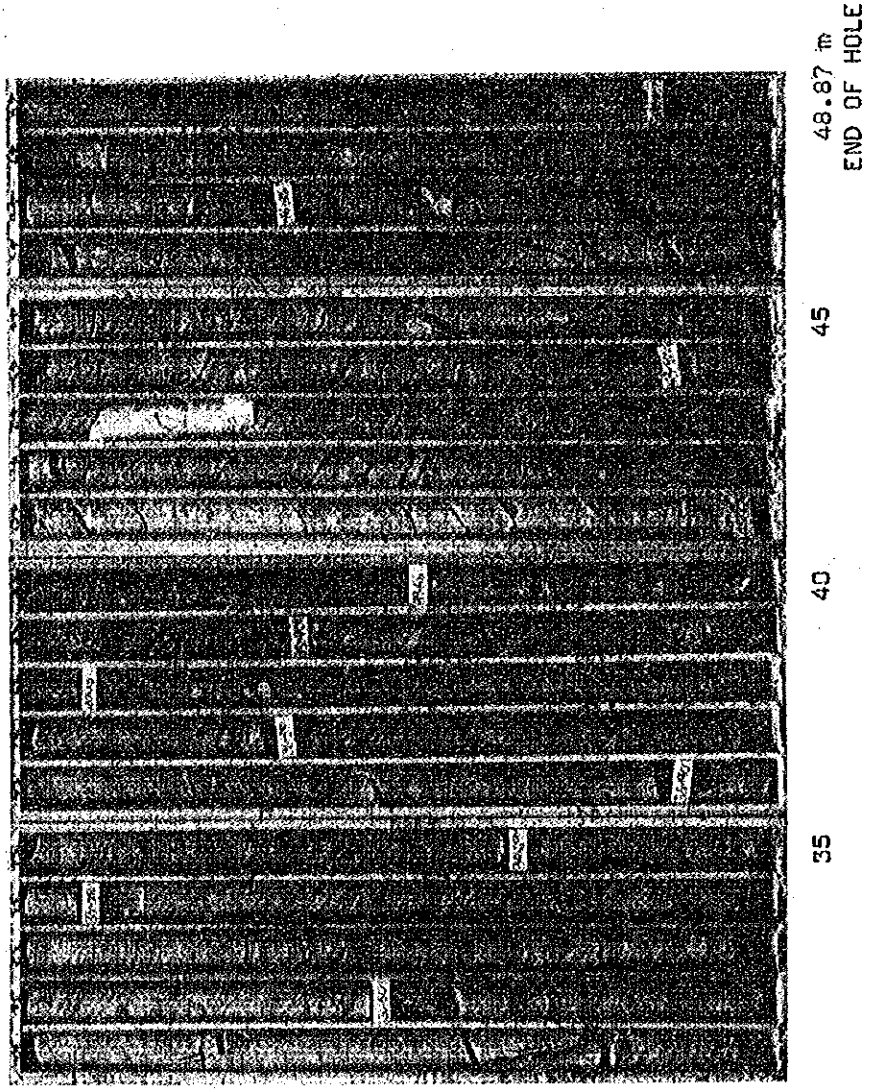


Negative Nos: 1429/446, 451, 452, 453, 454.

DIAMOND DRILL HOLE DD112

WABO POWER PROJECT

SHEET 1 of 2



DIAMOND DRILL HOLE DD112

WABO POWER PROJECT

SHEET 2 of 2

SNOWY MOUNTAINS ENGINEERING CORPORATION

SMEC-NK WABO PROJECT JOINT VENTURE STUDY

DIAMOND DRILL HOLE — GEOLOGICAL LOG

HOLE No. DD 113

PROJECT: WABO POWER PROJECT
FEATURE: MAIN DAM
LOCATION: Power Station (Tailbay)

CO-ORDINATES: E 205 754.8 m; N 9 226 783.6 m
SYSTEM: AMG Zone 55

SURFACE ELEVATION: 30.5 m
ANGLE FROM HORIZONTAL: 90°
DIRECTION: –

Column headings: DESCRIPTION OF CORE (ROCK TYPE—colour, grain size, texture, mineral composition) | DEGREE OF WEATHERING (Fr FrSt SW MW HW CW) | CORE SIZE | ELEVATION metres | DEPTH | LOG | S | CORE LOSS % PER LIFT | STRUCTURES (JOINTS—spacing, attitude, smoothness, aperture, cementing, coating, filling; BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES) | FRACTURE LOG | DRILL WATER LOSS | GROUNDWATER LEVEL DATE | WATER PRESSURE TESTS (LEAKAGE RATES IN LUGEON UNITS)

Depth (m)	Description of core	Structures
0 – 6.3	Silt, clayey, yellow brown.	Moderate to low plasticity.
6.3 – 8.8	SILT and clayey to fine SAND, dark grey.	Low plasticity.
8.8 – 10.2	SANDSTONE rubble in silt, Dark grey. Yellow-brown.	Weak.
10.2 – 11.4	Sand, medium to fine, clayey; dark grey	
11.4 – 12.6	Clay, dark grey, sandy.	Moderately plastic.
12.6 – 15.0	SANDSTONE and SILTSTONE rubble; mostly yellow brown.	Recovered as loose fragments.
15.0 – 16.1	MUDSTONE BRECCIA; mudstone fragments in clay matrix; dark grey.	Weak.
16.1 – 16.8	SILTSTONE rubble; yellow brown.	
16.8 – 18.7	MUDSTONE BRECCIA.	
18.7 – 19.5	NO CORE	
19.5 – 19.9	MUDSTONE BRECCIA.	Weak.
19.9 – 20	MUDSTONE, light to mid grey.	

Geological units (left margin): ALLUVIUM (0 – 12.6 m); SLIDE DEBRIS and/or TALUS (12.6 m –).

Core size: NXC (0 – 2.2 m); NMLC (from 2.2 m).

Elevation marks: 30, 25, 20, 15.

Groundwater level: 28 January 1976.

Fracture log: NOT APPLICABLE. Drill water loss: NOT RECORDED. Water pressure tests: NOT TESTED.

DRILL	
Make	Mindrill
Type	F20A
Driller	Grech & Mulligan
Commenced	17 Jan 1976
Completed	24 Jan 1976

EXPLANATION

FRACTURE LOG: Natural breaks in core per metre. Equivalent lengths of core pieces in centimetres.

S (in fracture column) = Air-slacking of rock common.

Core preserved in plastic tube.

WEATHERING

CW - Completely weathered
HW - Highly weathered
MW - Moderately weathered
SW - Slightly weathered
FrSt - Fresh, with limonite stained joints
Fr - Fresh

ENGINEERING GEOLOGY B'CH

Logged: O.A. Frenda
Drawn: D.P.
Checked:
Sheet 1 of 3
Dwg. No. 1429-S3060/1

MARCH 1976

SNOWY MOUNTAINS ENGINEERING CORPORATION

HOLE No. DD 113

PROJECT WABO POWER PROJECT

Column headings: DESCRIPTION OF CORE (ROCK TYPE—colour, grain size, texture, mineral composition) | DEGREE OF WEATHERING | CORE SIZE | ELEVATION (metres) | DEPTH | LOG | CORE LOSS % PER LIFT | STRUCTURES (JOINTS—spacing, attitude, smoothness, aperture, cementing, coating, filling; BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES) | FRACTURE LOG | DRILL WATER LOSS | GROUNDWATER LEVEL DATE | WATER PRESSURE TESTS (LEAKAGE RATES IN LUGEON UNITS)

Stratigraphic unit: ORUBADI BEDS. Core size: NMLC.

Depth scale 21 to 44; elevation marks 10, 5, 0, -5, -10.

- MUDSTONE, dark grey, soft. — BEDDING INDISTINCT; steep tight incipient fractures quite common; weak.
- SILTSTONE, dark grey, fairly friable. — BEDDING approximately 30°; tight steep joints common throughout but no natural breaks.
- MUDSTONE and SILTSTONE bands, firm. — BEDDING dips 20°-25°. 60° joint. Incipient air slacking. Minor fault zone at 28°
- SILTSTONE banded with silty MUDSTONE, average 4mm wide; relatively strong. — BEDDING dips 50°; very faint air slacking. Two 65° joints, tight. No other natural fractures.
- MUDSTONE, silty and SILTSTONE bands. More friable zone. — Incipient air slacking. BEDDING dips 50°.
- MUDSTONE, dark grey, silty gradings in part to very clayey SILTSTONE; can be crumbled between fingers. — BEDDING dips 45°. 45° joint. DRILLERS RECORD HOLE CAVING. Fragments possibly during drilling. Core broken normal to axis. Friable. Air slacking. Fragments, possibly caused by drilling. Sub-vertical joint.
- MUDSTONE, silty, dark grey; as above but stronger, can be broken with some difficulty between fingers. — BEDDING dips 45°-50°. Core broken into discs normal to axis. BEDDING dips 50°. Incipient air slacking throughout

Fracture log: S

Drill water loss: NOT RECORDED; 40% loss

Water pressure tests: NOT TESTED

FOR LOCATION OF DRILL HOLE AND OTHER RELEVANT INFORMATION, SEE SHEET 1

Sheet 2 of 3

Dwg. No. 1429-S3060/2

SNOWY MOUNTAINS ENGINEERING CORPORATION

HOLE No. DD 113

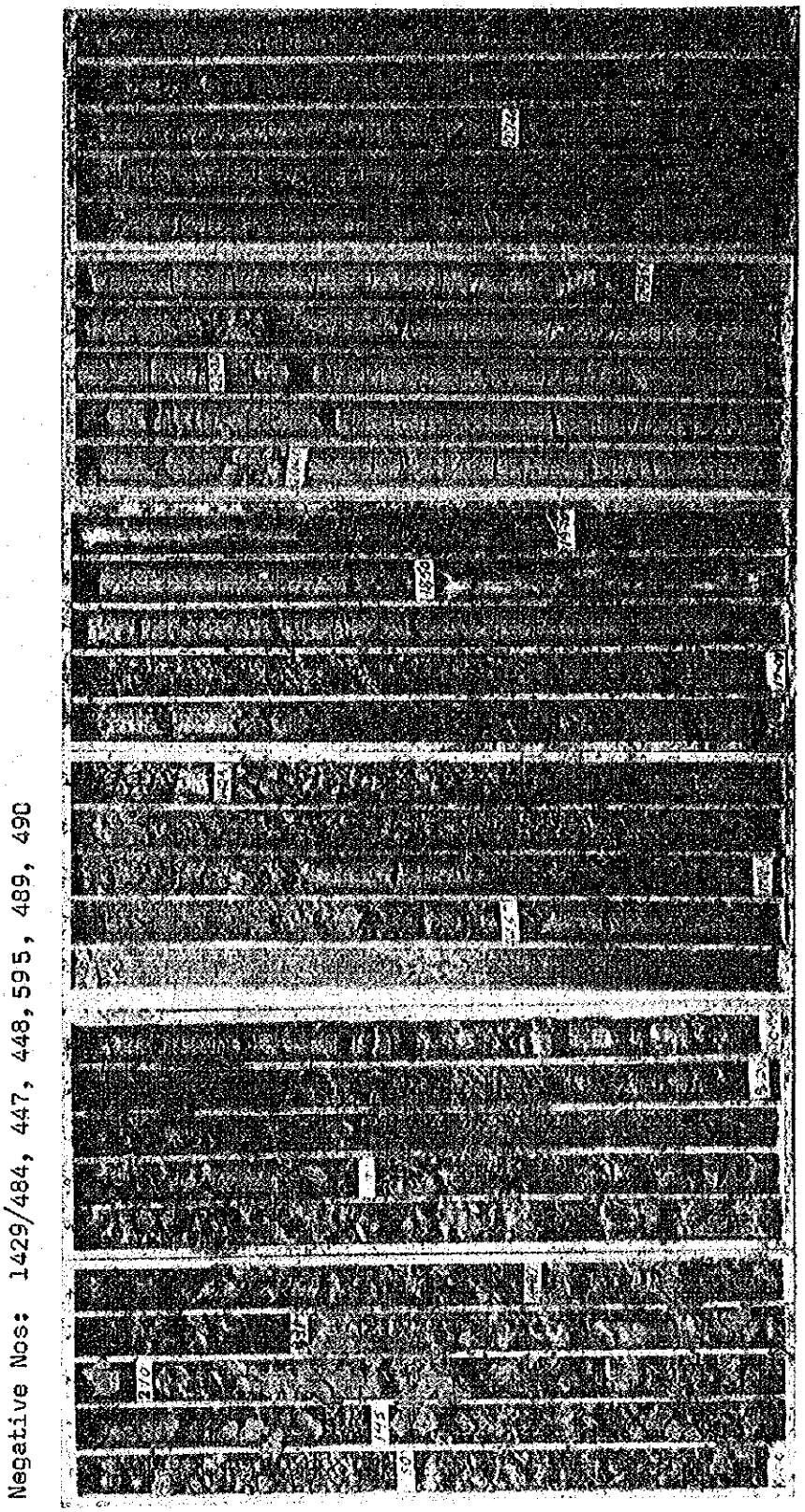
PROJECT WADO POWER PROJECT

DESCRIPTION OF CORE ROCK TYPE- colour, grain size, texture mineral composition	DEGREE OF WEATHERING	CORE SIZE	ELEVATION / DEPTH	LOG	CORE LOSS % PER LIFT	STRUCTURES JOINTS—spacing, attitude, smoothness aperture, cementing, coating, filling. BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES	FRACTURE LOG	DRILL WATER LOSS	CHROMATOGRAPH LEVEL, DATE	WATER PRESSURE TESTS LEAKAGE RATES IN LUGEON UNITS
MUDSTONE, can be broken with some difficulty between fingers. Carbonaceous flecks along bedding. ORUSADI BEDS		NMLC	46 47 48 49 -20 51 52 53 54 -25 56 57 58 59 60			Recovered as angular fragments possibly due to drilling. Subvertical joint. BEDDING dips 50°. Partings common along bedding. Broken during drilling to average 10mm discs.	S Mostly fragments Mostly fragments Mostly fragments	60% WATER RETURN		NOT TESTED
END OF HOLE 60.00m.(RL-29.5m)										

FOR LOCATION OF DRILL HOLE AND OTHER RELEVANT INFORMATION, SEE SHEET 1

Sheet 3 of 3

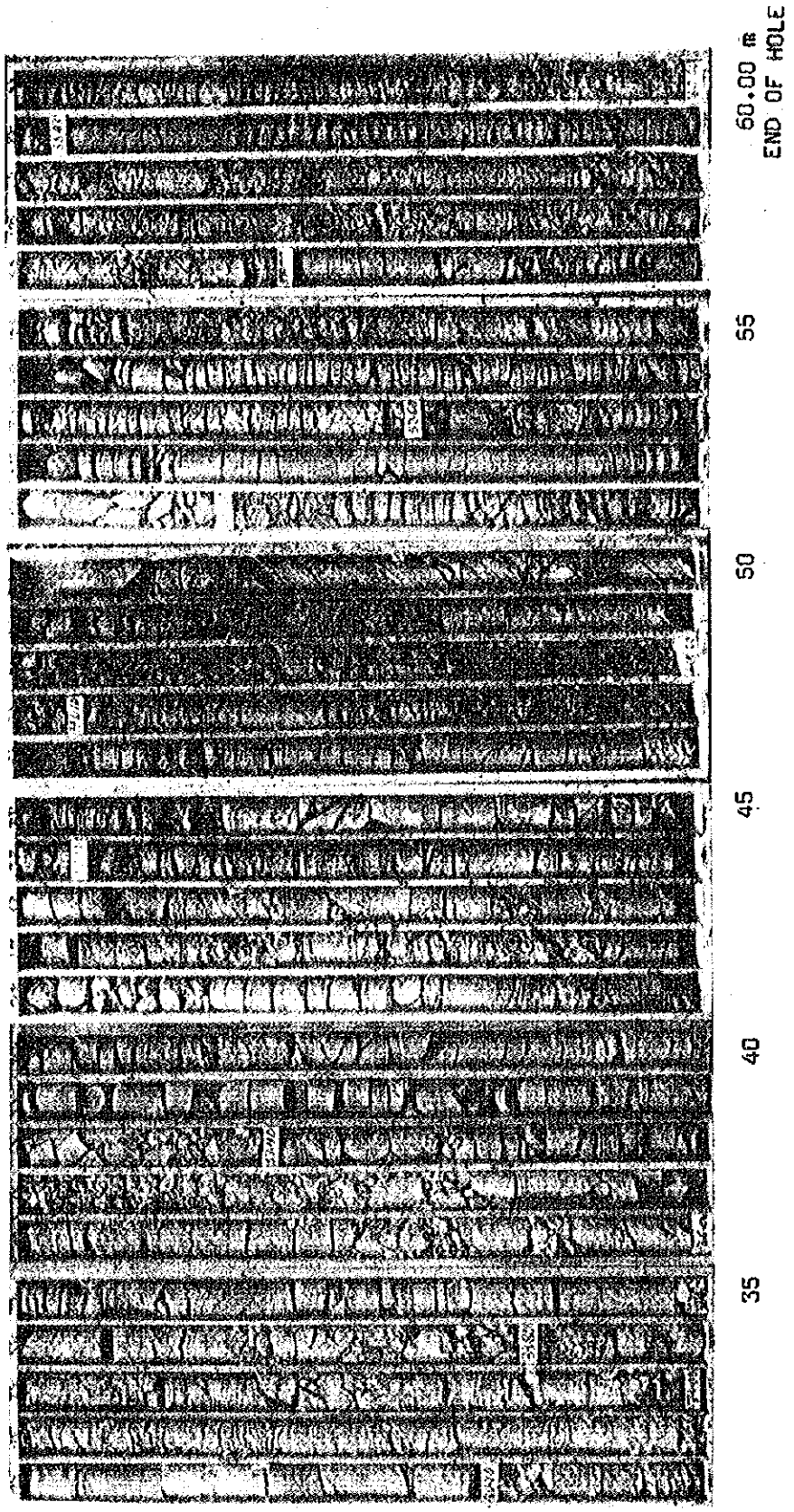
Dwg. No. 1429-S3060/3



DIAMOND DRILL HOLE DD113

WABO POWER PROJECT

SHEET 1 of 2



DIAMOND DRILL HOLE DD113

WABO POWER PROJECT

SHEET 2 of 2

SNOWY MOUNTAINS ENGINEERING CORPORATION

HOLE No. DD 114

SMEC-NK WABO PROJECT JOINT VENTURE STUDY

DIAMOND DRILL HOLE — GEOLOGICAL LOG

PROJECT: WABO POWER PROJECT
FEATURE: MAIN DAM
LOCATION: Dunsite Right Bank

CO-ORDINATES: E 285 527.3 m, N 9 226 215.3 m
SYSTEM: AMG Zone 55

SURFACE ELEVATION: 874.7 m
ANGLE FROM HORIZONTAL: 90°
DIRECTION: -

DESCRIPTION OF CORE ROCK TYPE—colour, grain size, texture, mineral composition	DEGREE OF WEATHERING CW, HW, MW, SW, Fr	CORE SIZE	ELEVATION metres	DEPTH metres	LOG	CORE LOSS % PER LIFT	STRUCTURES JOINTS—spacing, attitude, smoothness, aperture, cementing, coating, filling; BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES	FRACTURE LOG	DRILL WATER LOSS	GROUNDWATER LEVEL DATE	WATER PRESSURE TESTS LEAKAGE RATES IN LUGEON UNITS
SLOPEWASH, Silty sandy clay with HW SANDSTONE fragments, brown, firm.		NXC		1				NOT APPLICABLE	FULL WATER RETURN		NOT TESTED
NO CORE				2							
CLAY, brown, silty, sandy.			85	3			Friable				
SILTSTONE, grey.				4			Joints, rough, clean, 45°.				
SANDSTONE, grey, fine grained, silty.				5							
				6			Joints, rough to smooth, clean, 60°-70°, other fractures are drilling breaks and bedding plane partings dipping 35°.				
SILTSTONE, dark grey, locally sandy.				7							
			60	8							
				9							
				10			Joint, clean, planar, 60°.				
				11			Soft clayey, possibly bedding plane fault. Slickensides.				
				12							
			25	13							VERY HIGH 160 - 260 ESTIMATED
				14			Joints dip 45°-60°, mostly smooth, planar, bedding dips 35°.				
				15							
				16							
				17					NO WATER RETURN		
			20	18			Joint, 60°, clean. Joint, 60°, clean.				4.4
				19			Joint, vertical, smooth.				
				20			Joint, 60°.				

ERA BEDS

DRILL
Make: Hindrill
Type: E 1000
Driller: Grech & Mulligan
Commenced: 31 Jan 1976
Completed: 5 Feb 1976

FRACTURE LOG

EXPLANATION
Natural breaks in core per metre.
Equivalent lengths of core pieces in centimetres.

Core preserved in plastic tube.

WEATHERING
CW - Completely weathered
HW - Highly weathered
MW - Moderately weathered
SW - Slightly weathered
FrSt - Fresh, with limonite stained joints
Fr - Fresh

ENGINEERING GEOLOGY B'CH
Logged: B.V. Radford
Drawn: D.P.
Checked:

Sheet 1 of 3
Dwg. No. 1429-S3061/1

MARCH 1978

SNOWY MOUNTAINS ENGINEERING CORPORATION

HOLE No. DD 114

PROJECT ...WADO POWER PROJECT.....

DESCRIPTION OF CORE ROCK TYPE—colour, grain size, texture mineral composition	DEGREE OF WEATHERING FRESH / SLIGHTLY / MODERATELY / HIGHLY / COMPLETELY	CORE RUN	RELATIVE DEPTH	DEPTH	LOG	CORE LOSS % PER LIFT	STRUCTURES JOINTS—spacing, attitude, orientation, aperture, cementing, coating, infilling, BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES	FRACTURE LOG	SMALL WATER	GROUNDWATER LEVEL DATE	WATER PRESSURE TESTS LEAKAGE RATES IN LUGEON UNITS
As before.				21			Joints, 60°, rough, non planar, clean.				VERY HIGH ABOVE 250 ESTIMATED
SANDSTONE, dark grey, silty, fine grained.			65	22							
Silt contents increasing with depth.				23							
				24							
				25							
				26							
SILTSTONE, very dark grey.			60	27			Other fractures are drilling breaks and bedding plane partings dipping 35°.				
				28							
				29							1.5
SANDSTONE, medium dark grey, fine grained.				30			Joints, 45° rough, planar and clean. Very few drilling breaks and no bedding plane partings.				
				31							
			55	32							
				33							
				34							50
SILT contents increasing with depth.				35			No reconisable joints. Fractures are mostly bedding plane partings dipping 35°. Very few sub-horizontal drilling breaks.				
				36							
Thinly interbedded SANDSTONE and SILTSTONE.				37							
			50	38							
SILTSTONE, dark grey.				39			Drilling breakage, possibly caused by joint.				INCONCLUSIVE
				40							
				41			Joints, 85°, curved, rough.				
				42							
Becomes sandy.			45	43			Many bedding partings dipping 30°.				13
				44			Joint 60° rough.				

NO WATER RETURN

GREATER THAN 30.0m on 10 FEBRUARY 1976

23A BEDS

FOR LOCATION OF DRILL HOLE AND OTHER RELEVANT INFORMATION, SEE SHEET 1

Sheet 2 of 3

Dwg. No. 1429-S3061/2

SNOWY MOUNTAINS ENGINEERING CORPORATION

HOLE No. DD 114

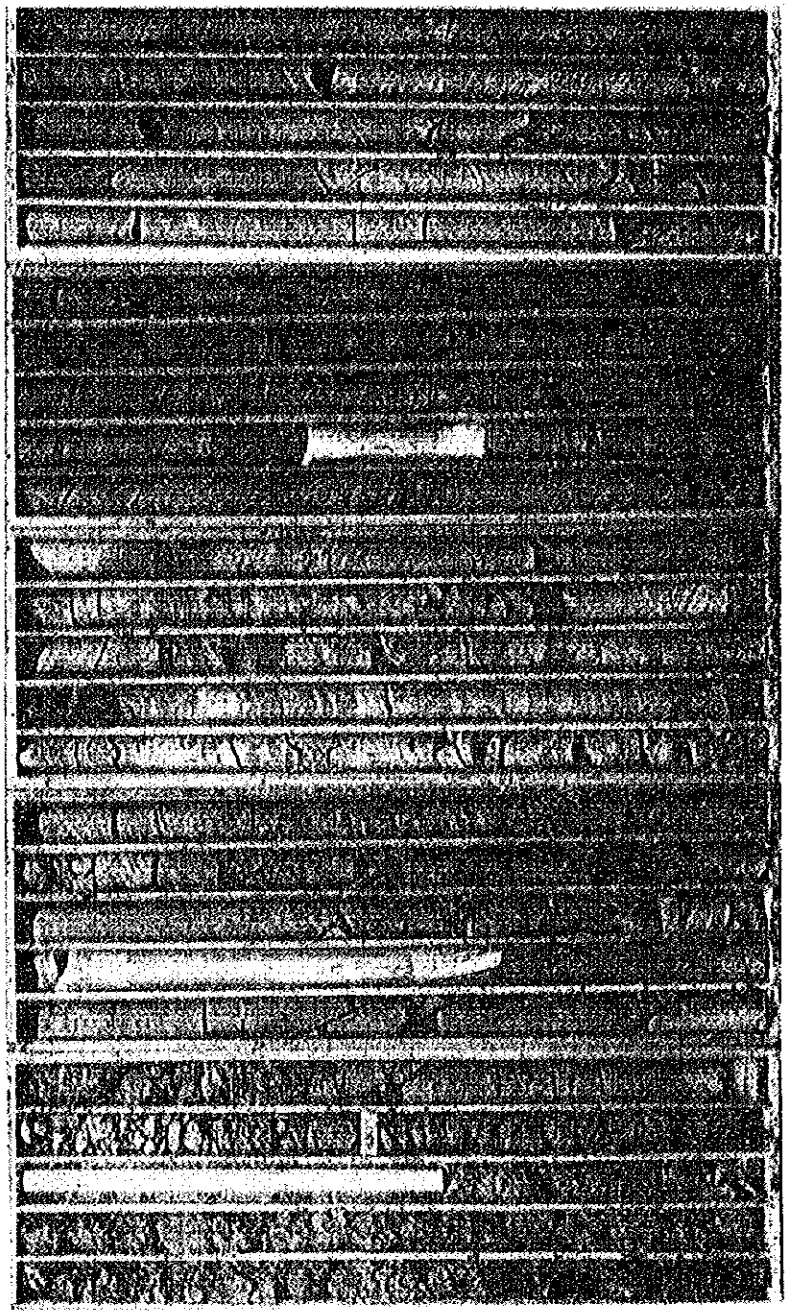
PROJECT. WABO POWER PROJECT

DESCRIPTION OF CORE (ROCK TYPE - colour, grain size, texture, mineral composition)	CORE SIZE	ELEVATION	DEPTH	STRUCTURES (JOINTS - spacing, attitude, smoothness, aperture, cementing, coating, filling. BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES)	DRILL WATER LOSS	WATER PRESSURE TESTS (LEAKAGE RATES IN LUGEON UNITS)
SILTSTONE, dark grey.	NMLC		45	Joint, dip 85°, smooth.	NO WATER RETURN	13
ERA BEDS			46			
			47	Joint, dip 60°, rough, planar, Other fractures are drilling breaks and bedding plane partings dipping 30°.		8
Sand content decreases.		40	48			
			49			
END OF HOLE 49.41m. (RL38.3m)						

FOR LOCATION OF DRILL HOLE AND OTHER RELEVANT INFORMATION, SEE SHEET 1

Sheet. 3 of 3

Dwg. No. 1429-S3061/3

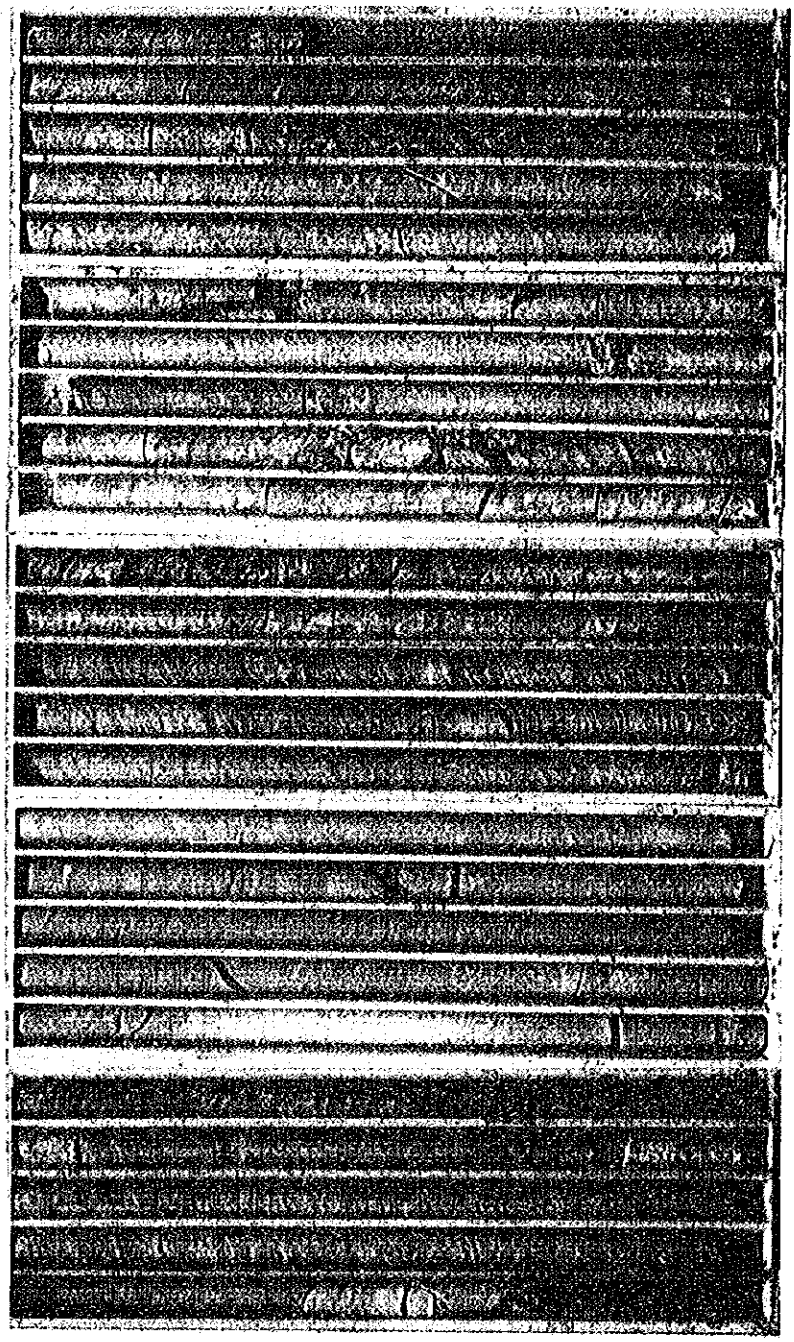


Negative Nos: 1429/477, 478, 455, 456, 457.

DIAMOND DRILL HOLE DD114

WABO POWER PROJECT

SHEET 1 of 2



DIAMOND DRILL HOLE DD114

WABO POWER PROJECT

SHEET 2 of 2

SNOWY MOUNTAINS ENGINEERING CORPORATION

SMEC-NK WADO PROJECT JOINT VENTURE STUDY

HOLE No. DD 115

DIAMOND DRILL HOLE — GEOLOGICAL LOG

PROJECT: WADO POWER PROJECT

FEATURE: MAIN DAM

LOCATION: Power Station (Tailbay)

CO-ORDINATES: E 285 834.7 m, N 9 226 926.4 m

SYSTEM: AMG Zone 55

SURFACE ELEVATION: 33.5 m

ANGLE FROM HORIZONTAL: 90°

DIRECTION: ↓

DESCRIPTION OF CORE — ROCK TYPE—colour, grain size, texture mineral composition	DEGREE OF WEATHERING	CORE SIZE	ELEVATN / DEPTH / CORING	LOG	CORE LOSS % PER METRE	STRUCTURES — JOINTS—spacing, attitude, smoothness aperture, cementing, coating, filling, BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES	FRACTURE LOG	DRILL WATER LOSS	GROUNDWATER LEVEL DATE	WATER PRESSURE TESTS — LEAKAGE RATES IN LUGEON UNITS
MUDSTONE fragments, yellow-brown to mid grey, soft, crumbly.		NXC	30			Recovered as fragments and up to 0.1m lengths of core.		DRY DRILLING	4 FEBRUARY 1976	
MUDSTONE BRECCIA, dark grey, clayey.			25			Carbonaceous inclusions tend to be near horizontal. Material very weak and slightly plastic. Irregular fractures.	NOT APPLICABLE	70% WATER RETURN		NOT TESTED
SILTSTONE to MUDSTONE, dark grey.		NMLC	20			Broken to fragments.				
			15			Joint, dip 45°.				
						60° joint, clean.				
						Two sub-vertical joints.				
						BEDDING dips 45°–50°.				
						Slightly sheared (?)				
						Calcite filled joint, dip 75°				

SLIDE BEDS

ORUBADI BEDS

DRILL
Make: Hindrill
Type: F 20A
Driller: Grech & Mulligan
Commenced: 28 Jan 1976
Completed: 4 Feb 1976

FRACTURE LOG (in fracture log)
Core fragmentation caused by drilling.
Core preserved in plastic tube.

EXPLANATION
Natural breaks in core per metre.
Equivalent lengths of core pieces in centimetres.

WEATHERING
CW - Completely weathered
HW - Highly weathered
MW - Moderately weathered
SW - Slightly weathered
FrSt - Fresh, with Limonite stained joints
Fr - Fresh

ENGINEERING GEOLOGY B'CH
Logged: G.A. Frenda
Drawn: D.P.
Checked:
Sheet: 1 of 3
Dwg. No. 1429-S3062/1

MARCH 1976

SNOWY MOUNTAINS ENGINEERING CORPORATION

HOLE No. DD 115

PROJECT WADO POWER PROJECT

DESCRIPTION OF CORE ROCK TYPE—colour, grain size, texture, mineral composition	STRUCTURES JOINTS—spacing, attitude, smoothness, aperture, cementing, coating, filling, BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES
SILTSTONE to MUDSTONE, dark grey.	Joint at 45° Slickensided joint at 30° 45°, 35°, 65° Joints at : BEDDING INDISTINCT Two joints at 65°
MUDSTONE, dark grey.	BEDDING dips 30°. Joint at 60°
SILTSTONE to MUDSTONE, dark grey.	BEDDING dips 45°-50°. Joint at 45° Joints at 60° Slightly sheared at 60° and 45°. Two joints at 45°
MUDSTONE, silty, dark grey grades to SILTSTONE in part.	BEDDING dips 50° Core left in covered and moderate air slacking occurred Joint at 45° parallel to bedding. Core fragmented, possibly due to drilling; no slickensiding. Several partings along bedding; bedding dips 45°-50°. Slightly sheared. 10mm crushed zone dips 65° along bedding. Several partings along bedding. Broken during drilling to pieces with average size of about 80mm. 50mm crush zone, (possibly due to drilling).

ORUBADI BEDS

NMC

FRACTURE LOG

SWL WATER RETURN

WATER PRESSURE TESTS
LEAKAGE RATES IN LUGEON UNITS

NOT TESTED

FOR LOCATION OF DRILL HOLE AND OTHER RELEVANT INFORMATION, SEE SHEET 1

Sheet 2 of 3

Dwg. No. 1429-S3062/2

SNOWY MOUNTAINS ENGINEERING CORPORATION

HOLE No. DD 115

PROJECT WABO POWER PROJECT

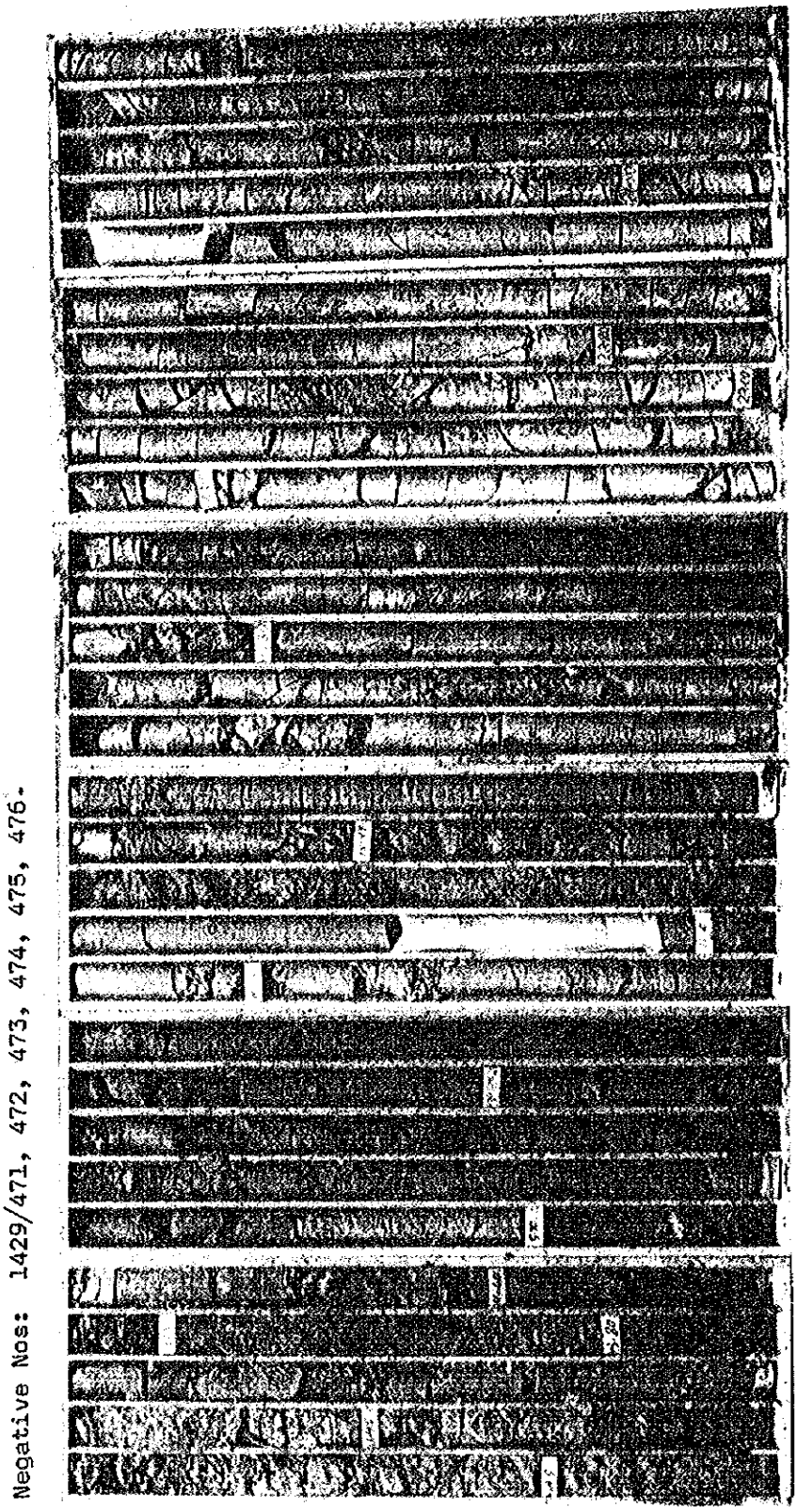
DESCRIPTION OF CORE ROCK TYPE—colour, grain size, texture mineral composition	DEPTH	STRUCTURES JOINTS—spacing, attitude, smoothness aperture, cementing, coating, filling. BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES	DRILL WATER LOSS	WATER PRESSURE TESTS LEAKAGE RATES IN LUGEON UNITS
ORUBADI BEDS — MUDSTONE, silty, dark grey, grading into SILTSTONE locally.	45	Fracture zone.	FULL WATER RETURN	0.7
	46–47	Fracture zone. Close incipient fractures in several directions, dip 35°, 45° and 70°.		
	48	Joint at 45°		
	49	Fracture zone, incipient.		
	50	Fracture zone, incipient.		
	51	BEDDING dips 45°.		0.6
	52–53	Rough sub-vertical joint.		
	54	NO NATURAL FRACTURES EXCEPT AS SHOWN.		
	57	Joint at 45°		NOT TESTED
	58	40mm crush zone.		
	59	60mm crush zone.		
END OF HOLE 59.75m. (RL-26.3m)				

Elevation: NMLC; -15, -20, -25

FOR LOCATION OF DRILL HOLE AND OTHER RELEVANT INFORMATION, SEE SHEET 1

Sheet 3 of 3

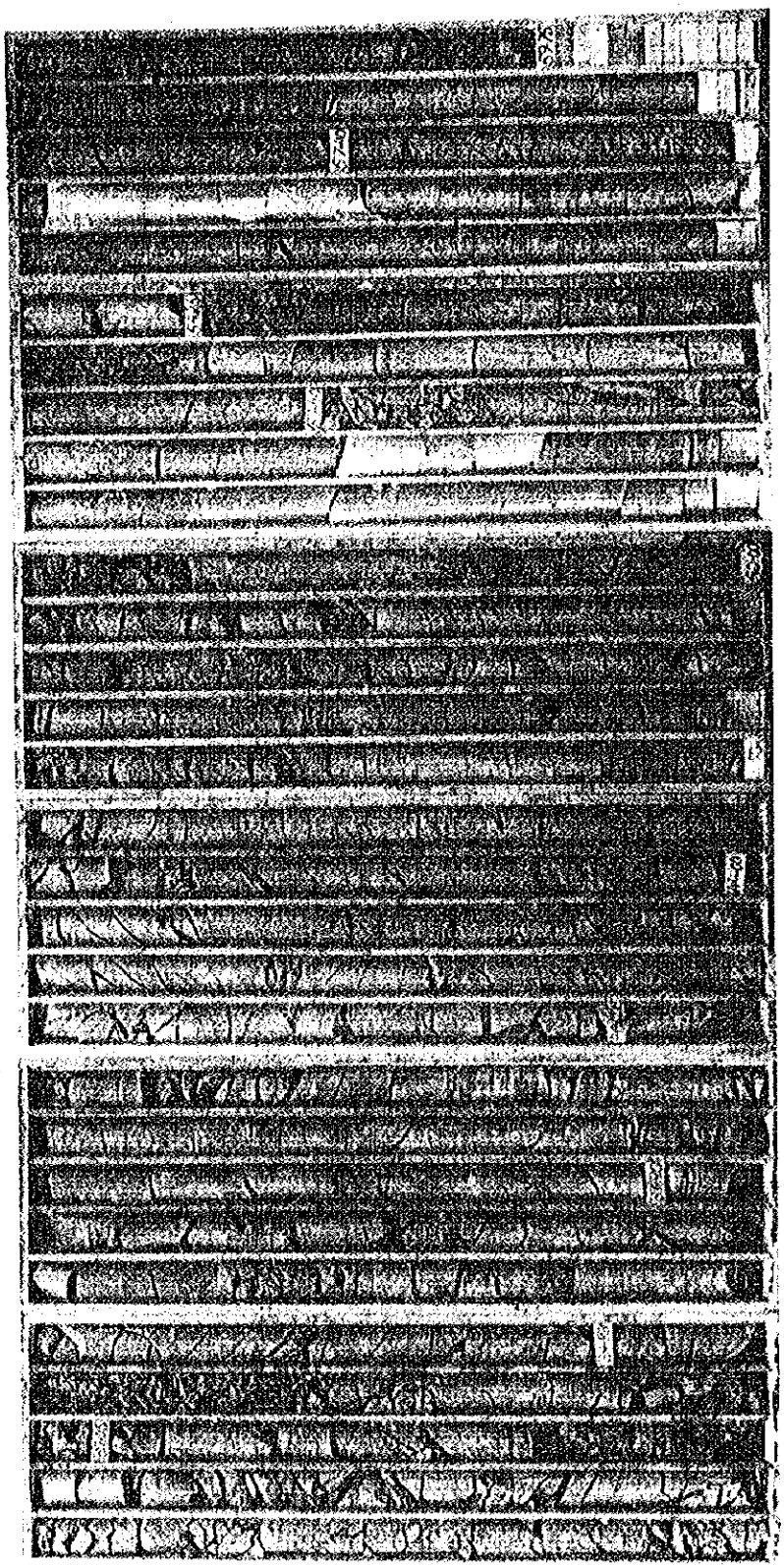
Dwg. No. 1429-S3062/3



DIAMOND DRILL HOLE DD115

WABO POWER PROJECT

SHEET 1 of 2



DIAMOND DRILL HOLE DD115

WABO POWER PROJECT

SHEET 2 of 2

SNOWY MOUNTAINS ENGINEERING CORPORATION

SMEC-NK WABO PROJECT JOINT VENTURE STUDY

DIAMOND DRILL HOLE — GEOLOGICAL LOG

HOLE No. DD 116

PROJECT: WABO POWER PROJECT
FEATURE: MAIN DAM
LOCATION: Left Abutment

CO-ORDINATES: E 285 505.8 m; N 9 226 661.8 m
SYSTEM: AMG Zone 55

SURFACE ELEVATION: 66.1 m
ANGLE FROM HORIZONTAL: 90°
DIRECTION: –

Description of core (Rock type — colour, grain size, texture, mineral composition)	Elevation	Depth (m)	Structures (joints, bedding, foliation, veins, seams, faults, crushed zones)
NO CORE			
CLAY, yellow-brown and no core. NO CORE	65	1	
NO CORE		2–3	
NO CORE		4–5	
SILT, clayey, yellow-brown, with SANDSTONE fragments.	60	6	Recovered as semi-plastic sticks.
NO CORE		7	
SILT.			
NO CORE		8	
SILT, clayey, brownish-yellow.		9	
NO CORE			
Silty, clayey, sandy material with SANDSTONE fragments, dark grey and yellowish.		10	Core soft, low-plasticity material.
NO CORE	55	11	
SAND, grey, medium grained.			Uncemented.
CLAY, SILT, yellow-grey.		12	Friable.
NO CORE			
CLAY, silty, with SILTSTONE and SANDSTONE fragments.		13	
NO CORE			
CLAY, very silty, dark grey with yellow-brown staining.		14	
NO CORE			
SANDSTONE, light grey, tough		15	Possible boulder ?
NO CORE		16	
SAND, dark grey, fine grained.	50		Uncemented.
SANDSTONE, light grey.		17	Possibly boulder ?
SAND, dark grey.			Uncemented.
NO CORE		18	
SANDSTONE, light grey, medium grained.		19	Possible boulder ?
NO CORE HOLE COMPLETED AT 20m.		20	

Units (left margin): 0–14.5 m SLIDE DEBRIS and TALUS.; 14.5–20 m BEDROCK and/or SLIDE DEBRIS.

Core size: AMLC

Fracture log: NOT APPLICABLE (0–14.5 m); NOT APPLICABLE (15.3–16.5 m); NOT APPLICABLE (17.3–18.5 m); NOT APPLICABLE (19.3–20 m)

Drill water loss: NOT RECORDED. Groundwater level: NOT RECORDED.

Water pressure tests: NOT TESTED

DRILL
Make: Winkie
Type: Portable
Driller: A.Usek
Commenced: 12 Jan 1976
Completed: 15 Jan 1976

FRACTURE LOG / EXPLANATION
Natural breaks in core per metre.
Equivalent lengths of core pieces in centimetres.

WEATHERING
CW - Completely weathered
HW - Highly weathered
MW - Moderately weathered
SW - Slightly weathered
FrSt - Fresh, with Limonite stained joints
Fr - Fresh

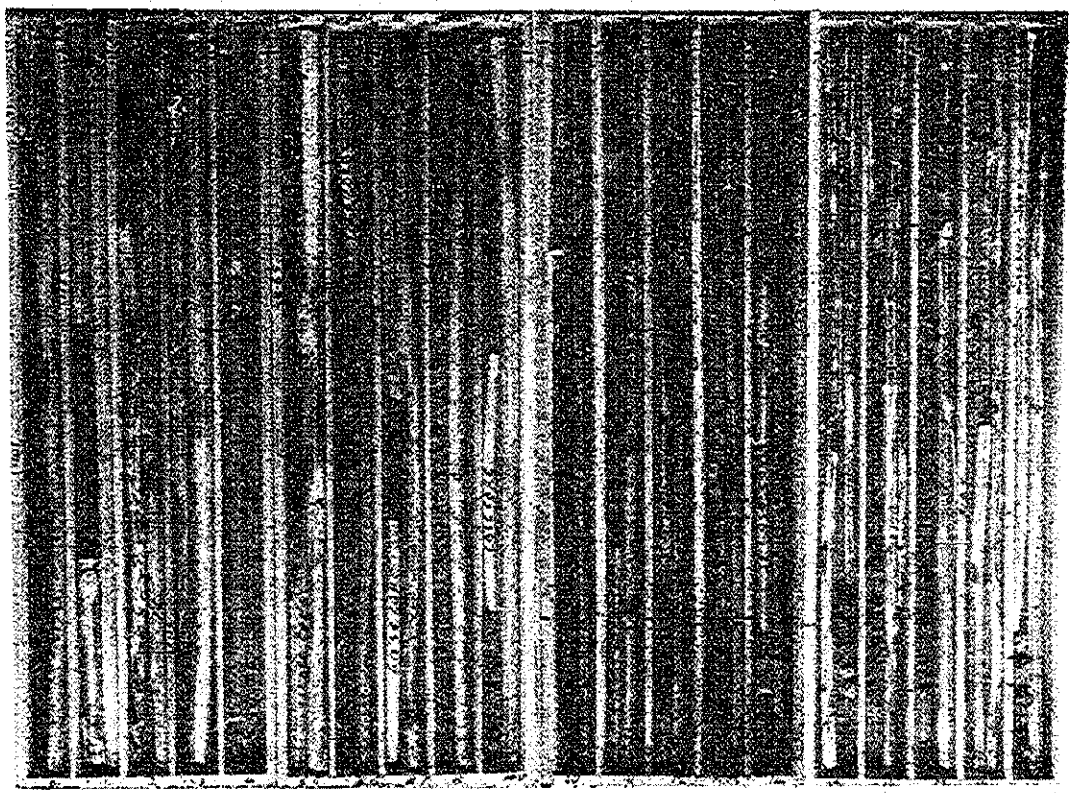
ENGINEERING GEOLOGY B'CH
Logged: G.A.Frenda
Drawn: D.P.
Checked:
Sheet 1 of 1
Dwg. No. 1429-S3063

ARCH 1976

DIAMOND DRILL HOLE DD116

WABO POWER PROJECT

Negative Nos: 1429/449, 450



SNOWY MOUNTAINS ENGINEERING CORPORATION

SMEC-NK WABO PROJECT JOINT VENTURE STUDY

DIAMOND DRILL HOLE — GEOLOGICAL LOG

HOLE No. OD 117

PROJECT: WABO POWER PROJECT
FEATURE: MAIN DAM
LOCATION: Damsite, left abutment, downstream toe.

CO-ORDINATES: E. 285 647.0 m; N. 9 226 714.6 m
SYSTEM: AMG Zone 55

SURFACE ELEVATION: 28.3 m
ANGLE FROM HORIZONTAL: 90°
DIRECTION: –

Depth (m)	Description of core	Structures
0 – 7	DRILLED WITH HAND AUGER, MATERIAL PENETRATED NOT RECORDED.	
7 – 8	SILT, clayey, grey, with yellowish staining.	
	NO CORE	
	SILT, clayey grey, possibly HW SILTSTONE fragments.	
	NO CORE	
	SILT, clayey, possibly HW SILTSTONE fragments.	
	NO CORE	
	SAND, clayey, friable.	
	NO CORE	
	SILT, yellowish-grey, friable.	
	NO CORE	
	SILT.	
	NO CORE	
	SAND, fine grained, to SILT, dark grey, friable.	
	NO CORE	
	CLAY, silty, dark grey, has the appearance of river mud.	Semi – plastic.
	NO CORE	
	SILT, with SANDSTONE pieces.	
	SILTSTONE, grading into fine grained SANDSTONE, grey.	Core in pieces, average 25mm. Most breaks caused by drilling.
	NO CORE	
	SILTSTONE to SANDSTONE.	
	NO CORE	
– 20	SILTSTONE, soft, friable	Fragmentation of core caused by drilling.

Units (left margin): ALLUVIUM and SLOPEWASH (?) (to approx. 16.5 m); Probable BEDROCK (below).

Elevation marks: 25, 20, 15, 10. AMLC at approx. 13.5 m.

Fracture log: NOT APPLICABLE (to 16.5 m); NOT APPLICABLE (18–18.5 m; 19–19.5 m).
Drill water loss / Groundwater: NOT RECORDED; NOT RECORDED.
Water pressure tests: NOT TESTED.

DRILL	
Make	Winkie
Type	Portable
Driller	A. Usek
Commenced	16 Jan 1976
Completed	22 Jan 1976

EXPLANATION
Fracture log: Natural breaks in core per metre. Equivalent lengths of core pieces in centimetres.
Core fragmentation caused by drilling.

WEATHERING
CW - Completely weathered
HW - Highly weathered
MW - Moderately weathered
SW - Slightly weathered
FrSt - Fresh, with Limonite stained joints
Fr - Fresh

ENGINEERING GEOLOGY B'CH
Logged: G.A. Frenda
Drawn: D.P.
Checked:
Sheet 1 of 2
Dwg. No. 1429-S3064/1

MARCH 1976

SNOWY MOUNTAINS ENGINEERING CORPORATION

HOLE No. DD 117

PROJECT WADO POWER PROJECT

DESCRIPTION OF CORE ROCK TYPE—colour, grain size, texture mineral composition	DEGREE OF WEATHERING	CORE SIZE	ELEVATION / DEPTH (metres)	LOG	CORE LOSS % PER LIFT	STRUCTURES JOINTS—spacing, attitude, smoothness aperture, cementing, coating, filling BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES	FRACTURE LOG	CORE YIELD %	GROUNDWATER LEVEL, DATE	WATER PRESSURE TESTS LEAKAGE RATES IN LUGEON UNITS
Probable BEDROCK. SILT and MUD, possibly churned up SILTSTONE.		AMLC	21				NOT APPLICABLE	NOT RECORDED	NOT RECORDED	NOT TESTED
NO CORE										
SILTSTONE, muddy at base.						Fragmentation of core caused by drilling.				
END OF HOLE 21.7m (RL6.6m)										

FOR LOCATION OF DRILL HOLE AND OTHER RELEVANT INFORMATION, SEE SHEET 1

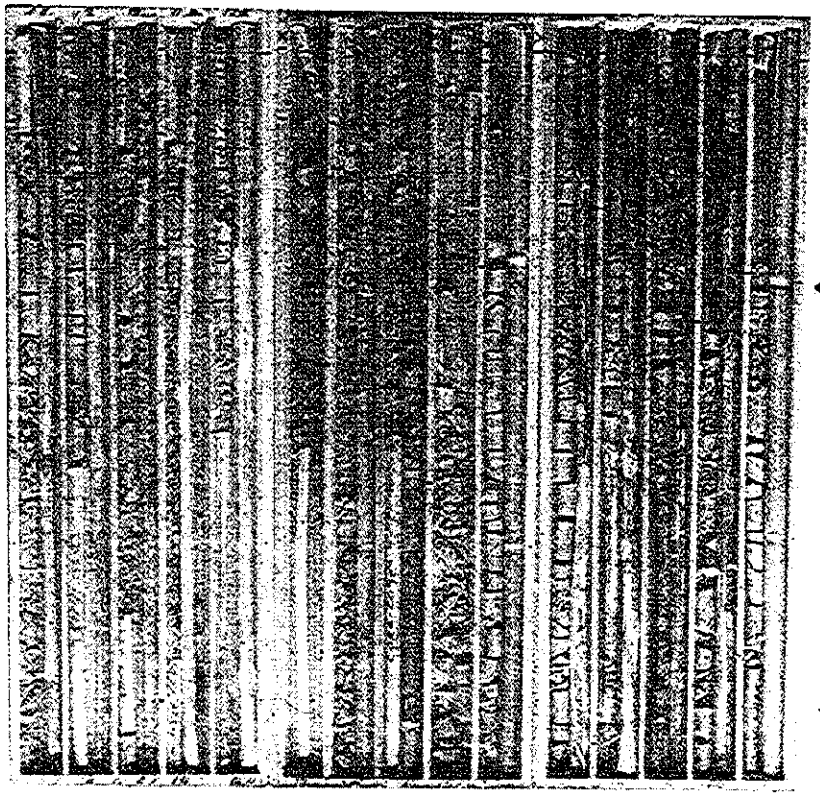
Sheet 2 of 2

Dwg. No. 1429-S 3064 2

DIAMOND DRILL HOLE DD117

WABO POWER PROJECT

Negative Nos: 1429/459, 460.



SNOWY MOUNTAINS ENGINEERING CORPORATION
on behalf of the
SMEC-NK WADO PROJECT JOINT VENTURE STUDY

HOLE No. DD 118

DIAMOND DRILL HOLE — GEOLOGICAL LOG

PROJECT WADO POWER PROJECT
FEATURE MAIN DAM
LOCATION Damsite, Left Bank, Downstream Toe.

CO-ORDINATES E 285 613.7 m
N 9 226 758.6 m
SYSTEM AMG Zone 55

SURFACE ELEVATION 43.1 m
ANGLE FROM HORIZONTAL 90°
DIRECTION -

DESCRIPTION OF CORE — ROCK TYPE—colour, grain size, texture, mineral composition	DEGREE OF WEATHERING (FR, SW, MW, HW, CW) / CORE SIZE	metres ELEVATION / DEPTH / CASING / LOG	CORE LOSS % PER CENT	STRUCTURES — JOINTS—spacing, attitude, smoothness, aperture, cementing, coating, filling, BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES	FRACTURE LOG	DRILL WATER LOSS / GROUNDWATER LEVEL DATE	WATER PRESSURE TESTS — LEAKAGE RATES IN LUGEON UNITS
Drilled with hand auger. Material penetration not recorded.							
SANDSTONE, light grey, very large boulder.				Few natural breaks. Core in pieces and fragments from less than 0.1m up to 0.5m. Most breaks caused by drilling.		20 FEBRUARY 1976	
SLIDE DEBRIS and TALUS: SILT, dark grey, clayey. NO CORE		140			NOT APPLICABLE		NOT TESTED
NO CORE							
NO CORE		135 AMC					
NO CORE						NOT RECORDED	
SILT with MUDSTONE fragments, yellow-brown. NO CORE							
SILT, dark grey, clayey, and fine sandy.				Semi plastic.			
SILT, dark grey, with faint yellowish staining.				Soft, semi-plastic.			
NO CORE		130					
SILT, with rock fragments. NO CORE							
SILT, dark grey.				Many fractures, probably caused by drilling.			
SILTSTONE, dark grey.				BEDDING dips 40°.			
END OF HOLE 15.7m (RL27.4m)							

DRILL
Make Winkie
Type Portable
Driller A. Usek
Commenced 23 Jan 1976
Completed 28 Jan 1976

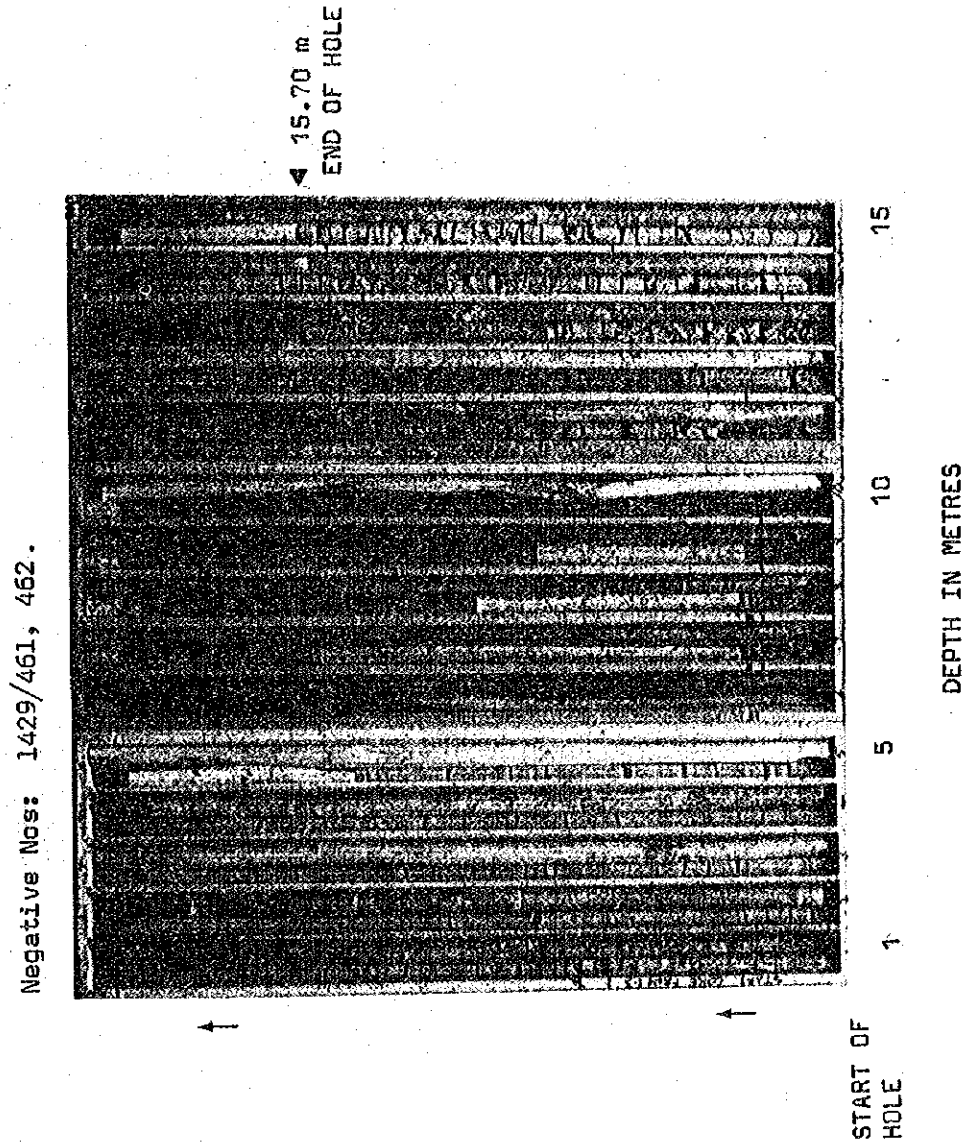
FRACTURE LOG
cm

EXPLANATION
Natural breaks in core per metre.
Equivalent lengths of core pieces in centimetres.

WEATHERING
CW - Completely weathered
HW - Highly weathered
MW - Moderately weathered
SW - Slightly weathered
FrSt - Fresh, with Limonite stained joints
Fr - Fresh

ENGINEERING GEOLOGY B'CH
Logged G.A. Frenda
Drawn D.F.
Checked
Sheet 1 of 1
Dwg. No. 1429-S3065

BCH 1976



DIAMOND DRILL HOLE DD118

WABO POWER PROJECT

SNOWY MOUNTAINS ENGINEERING CORPORATION

HOLE No. DD 119

SMEC-NK WABO PROJECT JOINT VENTURE STUDY

DIAMOND DRILL HOLE — GEOLOGICAL LOG

PROJECT: WABO POWER PROJECT
FEATURE: MAIN DAM
LOCATION: Diversion Tunnel Downstream Portal (left bank)

CO-ORDINATES: E 285 729.8 m, N 9 227 093.5 m
SYSTEM: AMG Zone 55

SURFACE ELEVATION: 68.8 m
ANGLE FROM HORIZONTAL: 90°
DIRECTION: –

Column headings: DESCRIPTION OF CORE (ROCK TYPE—colour, grain size, texture, mineral composition) | DEGREE OF WEATHERING (Fr, FrSt, SW, MW, HW, CW) | CORE SIZE | ELEVATION (metres) | DEPTH | CASING | LOG | LIFTS | CORE LOSS % PER LIFT | STRUCTURES (JOINTS—spacing, attitude, smoothness, aperture, cementing, coating, filling; BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES) | FRACTURE LOG | DRILL WATER LOSS | GROUNDWATER LEVEL DATE | WATER PRESSURE TESTS (LEAKAGE RATES IN LUGEON UNITS)

Depth (m)	Description of core	Structures
0 – 5.5	Drilled with hand auger. Material penetration not recorded.	
~5.5	NO CORE	
	CLAY, sandy, grey, with wood fragments.	
	NO CORE	
	SANDSTONE, fine grained, grey.	
	NO CORE	
	SILTSTONE, sandy.	
	NO CORE	
	SANDSTONE and SILTSTONE, sandy.	
	NO CORE	
	NO CORE	
	SILTSTONE and SANDSTONE.	
	NO CORE	
	SILTSTONE.	
	NO CORE	
12.6 – 13.9	SILTSTONE BRECCIA, siltstone fragments in clay matrix.	
	NO CORE	
14.9 – 16.27	SILTSTONE, grey.	Core in fragments. Clean joints at 20°, 60°, and 80°. Bedding dip 55°

Interval ~5.5 – 12.6 m (side note): SLIDE DEBRIS and/or TALUS. Core recovered is in fragments and sticks of rock types as noted.

Elevation marks: 65 (at ~3.8 m), 60 (at ~8.8 m), 55 (at ~13.8 m). Casing: AMC.

Fracture log: NOT APPLICABLE. Drill water loss: NOT RECORDED. Groundwater level: NOT RECORDED. Water pressure tests: NOT TESTED.

END OF HOLE 16.27m (RL 2.5m)

Depth scale: 1 – 20 m

DRILL
Make: Winkie
Type: Portable
Driller: A. Usek
Commenced: 2 Feb 1976
Completed: 6 Feb 1976

FRACTURE LOG: 1, 2, 5, 10, 20, 50, 100, 200 / 100, 50, 20, 10, 5, 2, 1, 0.5 cm

EXPLANATION
Natural breaks in core per metre.
Equivalent lengths of core pieces in centimetres.

WEATHERING
CW - Completely weathered
HW - Highly weathered
MW - Moderately weathered
SW - Slightly weathered
FrSt - Fresh, with Limonite stained joints
Fr - Fresh

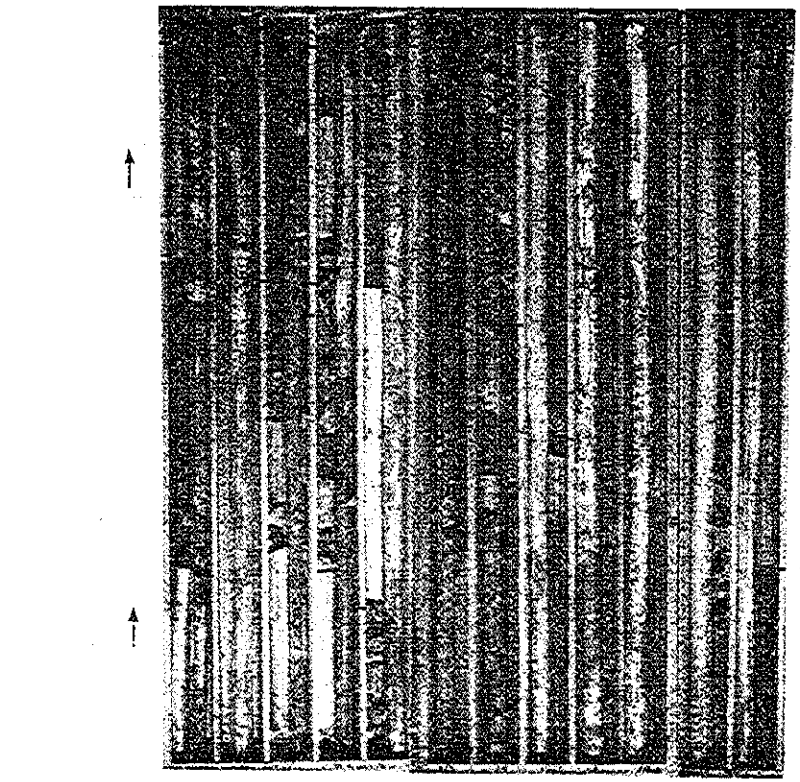
ENGINEERING GEOLOGY B'CH
Logged: B.V. Radford
Drawn: D.P.
Checked:
Sheet 1 of 1
Dwg. No. 1429-S3066

MCH 1976

DIAMOND DRILL HOLE DD119

WÁBO POWER PROJECT

Negative Nos: 1429/464, 465.



SNOWY MOUNTAINS ENGINEERING CORPORATION

SMEC-NK WABO PROJECT JOINT VENTURE STUDY

HOLE No. DD 120

DIAMOND DRILL HOLE — GEOLOGICAL LOG

PROJECT: WABO POWER PROJECT
FEATURE: POWER STATION
LOCATION: Tail Bay

CO-ORDINATES: E 285 862.4 m; N 9 226 913.6 m
SYSTEM: A.M.G. zone 55

SURFACE ELEVATION: 29.6 m
ANGLE FROM HORIZONTAL: 90°
DIRECTION: -

DESCRIPTION OF CORE (ROCK TYPE—colour, grain size, texture, mineral composition)	DEGREE OF WEATHERING (FR, FrSt, SW, MW, HW, CW)	CORE SIZE	ELEVATION / DEPTH (metres)	LOG	CORE LOSS % PER RUN	STRUCTURES (JOINTS—spacing, attitude, smoothness, aperture, cementing, coating, filling; BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES)	FRACTURE LOG	SWEL WATER LOSS	GROUNDWATER LEVEL, DATE	WATER PRESSURE TESTS (LEAKAGE RATES IN LUGEON UNITS)
SILT, dark grey clayey and minor river gravel			1 2 3 4 5 6 7 8			DRILLED WITH HAND AUGER			10 FEBRUARY 1976	NOT TESTED
ALLUVIUM										
MUDSTONE, dark grey,		AXLC	9			Broken to fragments.		NOT RECORDED		
NO CORE										
MUDSTONE, dark grey,			10			Broken to fragments.				
NO CORE										
MUDSTONE, silty, dark grey,						Broken to fragments.				
NO CORE			11			BEDDING dips 45°, broken during drilling to fragments.				
MUDSTONE, dark grey: quite strong.			12			Core fragmentation due to drilling.				
END OF HOLE 12.80m (RL16.8m)			13 14 15 16 17 18 19 20							

DRILL
Make: Winkie
Type: Portable
Driller: A. Usek
Commenced: 28 Jan 1976
Completed: 2 Feb 1976

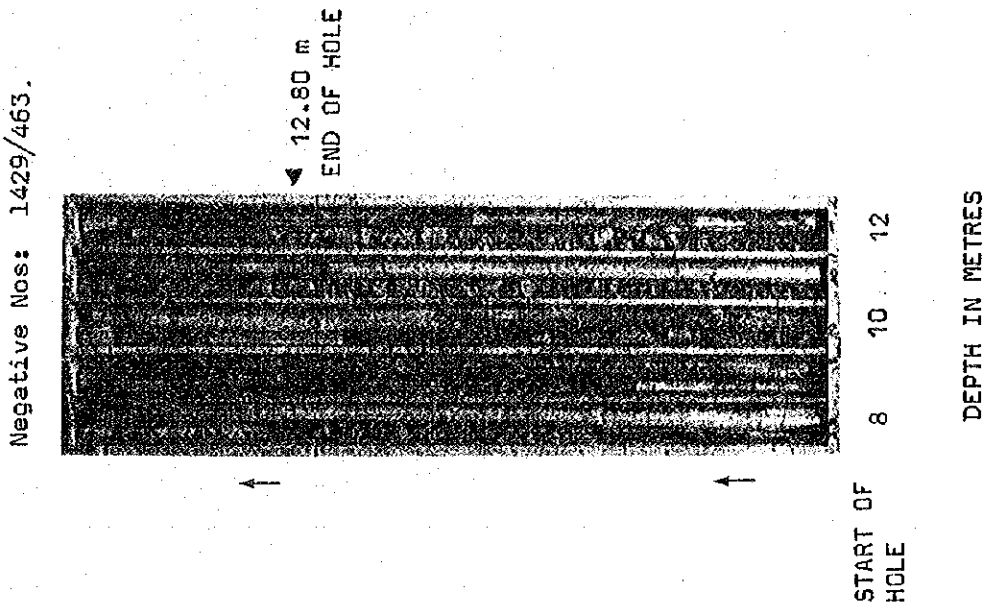
FRACTURE LOG
cm

EXPLANATION
Natural breaks in core per metre.
Equivalent lengths of core pieces in centimetres.
Core fragmentation caused by drilling.

WEATHERING
CW - Completely weathered
HW - Highly weathered
MW - Moderately weathered
SW - Slightly weathered
FrSt - Fresh, with Limonite stained joints
Fr - Fresh

ENGINEERING GEOLOGY B'CH
Logged: G.A. Frenda
Drawn: D.P.
Checked:
Sheet: 1 of 1
Dwg. No. 1429-S3067

RCH 1976



DIAMOND DRILL HOLE DD120

WABO POWER PROJECT

SNOWY MOUNTAINS ENGINEERING CORPORATION
SMEC - NK WABO PROJECT JOINT VENTURE STUDY

HOLE No. DD 121

DIAMOND DRILL HOLE — GEOLOGICAL LOG

PROJECT WABO POWER PROJECT
FEATURE MAIN DAM
LOCATION Spillway

CO-ORDINATES E 285947.0 m, N 9 226 389.7 m
SYSTEM AMG zone 55

SURFACE ELEVATION 70.6 m
ANGLE FROM HORIZONTAL 90°
DIRECTION -

DESCRIPTION OF CORE (ROCK TYPE—colour, grain size, texture, mineral composition)	DEPTH	LOG	STRUCTURES (JOINTS—spacing, attitude, smoothness, aperture, cementing, coating, filling; BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES)	FRACTURE LOG	DRILL WATER LOSS	GROUNDWATER LEVEL	WATER PRESSURE TESTS (LEAKAGE RATES IN LUGEON UNITS)
CLAY, sandy, orange-brown, becoming grey with depth, contains fragments, mainly of SANDSTONE.	0–3.7		DRILLED WITH HAND AUGER				
SLIDE DEBRIS. Grey silty and sandy clay, and crushed SILTSTONE, containing fragments and boulders of mainly fresh SANDSTONE and bedded SILTSTONE. NO CORE (several intervals)	3.7–20			NOT APPLICABLE	NOT RECORDED	NOT RECORDED	NOT TESTED

Elevation marks: 70, 65, 60, 55. AMLC.

DRILL	
Make	Winkie
Type	Portable
Driller	A. Usak
Commenced	7 Feb 76
Completed	11 Feb 76

EXPLANATION
Fracture log: Natural breaks in core per metre. Equivalent lengths of core pieces in centimetres.

WEATHERING
CW - Completely weathered
HW - Highly weathered
MW - Moderately weathered
SW - Slightly weathered
FrSt - Fresh, with Limonite stained joints
Fr - Fresh

ENGINEERING GEOLOGY B'CH
Logged R.V.Radford
Drawn D.P.
Checked
Sheet 1 of 2
Dwg. No. 1429-S3068/1

SNOWY MOUNTAINS ENGINEERING CORPORATION

HOLE No. DD 121

PROJECT MAIDO POWER PROJECT

DESCRIPTION OF CORE ROCK TYPE—colour, grain size, texture mineral composition	DEGREE OF WEATHERING	CORE SIZE	RL / DEPTH	LOG	CORE LOSS % PER LIFT	STRUCTURES JOINTS—spacing, attitude, presence or aperture, cementing, coating, filling; BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES	FRACTURE LOG	WATER LOSS	PIEZOMETER INSTAL. DATE	WATER PRESSURE TESTS LEAKAGE RATES IN LUGEON UNITS
SLIDE DEBRIS (see sheet 1) NO CORE		NQ	21 22 23				NOT APPLICABLE	NOT RECORDED	NOT RECORDED	NOT TESTED
END OF HOLE 23.20m. (RL47.4m)										

FOR LOCATION OF DRILL HOLE AND OTHER RELEVANT INFORMATION, SEE SHEET 1

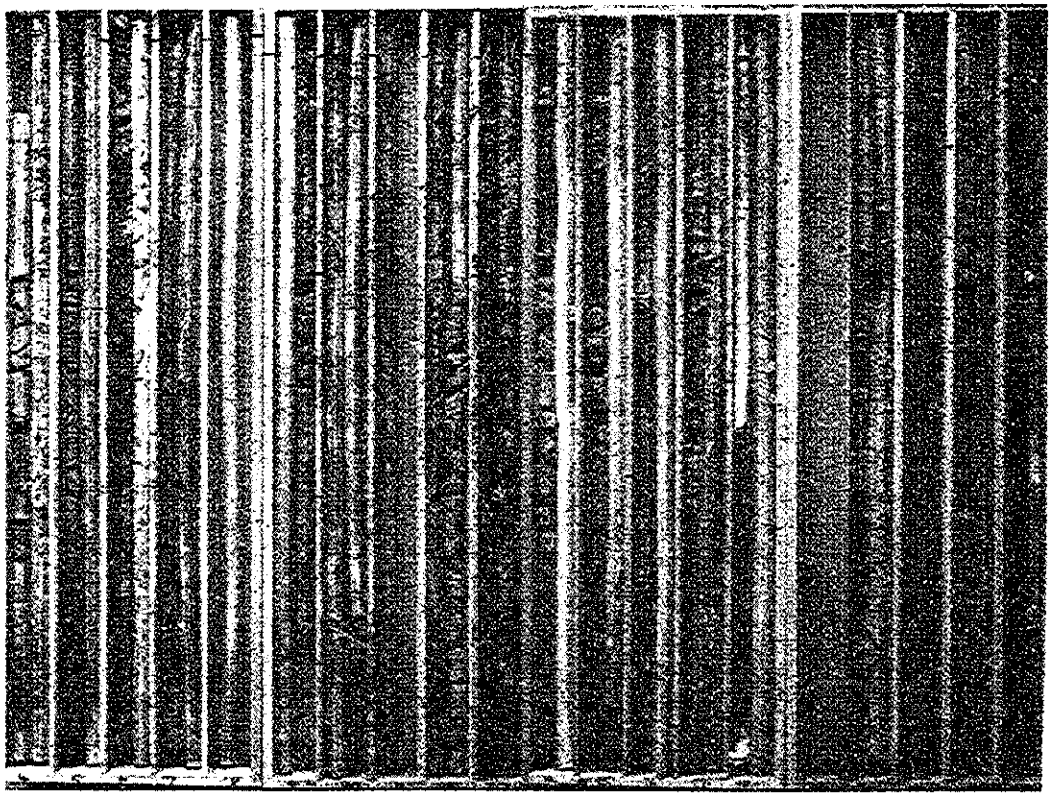
Sheet 2 of 2

Dwg. No. 1429-S3068/2

DIAMOND DRILL HOLE DD121

WABO POWER PROJECT

Negatives Nos: 1429/573,594.



SNOWY MOUNTAINS ENGINEERING CORPORATION
SMEC - NK WABO PROJECT JOINT VENTURE STUDY

HOLE NO. UG1/1P

PROJECT ..WABO POWER PROJECT.....
FEATURE ..MAIN DAM FOUNDATION.....
LOCATION..River channel.....

CO-ORDINATES E ...285 582.9..... m
N ...9 226 472.7..... m
SURFACE ELEVATION ....11.0..... m

GEOLOGICAL DESCRIPTION Soil/rock type weathering, colour structure	ELEVATION m	DEPTH	LOG	GROUP SYMBOL	MAX. SIZE mm	DESCRIPTION AND ENGINEERING PROPERTIES OF SOIL Plasticity, in situ moisture and density, field test data	SAMPLE NUMBER	WATER LEVEL DATE
ALLUVIUM								
SAND, gravelly, well graded. Material consists mostly of sound limestone, with minor amounts of basalt and sandstone. Gravel particles are rounded, mostly white and grey. Sand particles rounded to angular, mostly grey.	10	1		GW - SW (lab)	37.5		1D	
GRAVEL, well graded, some sand.		2		GW (lab)	53	Clean, compact.	2D	
		3					3D	
		4					4D	
SAND, gravelly, well graded.	5	5		GW - SW (lab)			5D	
		6						
Mostly SAND, medium fine grained and silty sand.		7		SP - SM (lab)	6	Mostly passing 1mm, predominantly 1.2 - 0.6mm, clean sand.	6D	
		8						
		9				7 SPT, N=6		
		10				8 SPT, N=6	9D	
	0	11		SM (lab)	2	Sand finer than above, mostly passing 0.6mm.	10D	
		12						
		13		SP -SM (lab)		11SPT, N=18	12D 13D 14D	
SILT and fine grained SAND, Grey.		14		ML (lab)	1	Mostly passing 0.6mm.	15D	
		15					16B 18	
	-5	16				17 SPT, N=11		

DRILL
Make Norwood Bagshaw.....
Type Percussion.....

DRILLER ..Mines Dept...
Commenced 19.Nov.1975..
Completed 23.Nov.1975..

NOTES
- Unified soil classification system used
- SPT - Standard Penetration Test
- (Lab) - Laboratory test results
- Grading analysis of gravel-sands refer to the broken returns from chop-pump. Grading in-situ would thus be coarser than indicated. SW may in fact be GW.

MATERIALS BRANCH
Logged...G.E.M.....
Drawn ...G.E.M.....
Checked .....

Sheet ..1.. of ..2....
SMEC Dwg No.1429-S6007/1

SNOWY MOUNTAINS ENGINEERING CORPORATION
SMEC - BK WABO PROJECT JOINT VENTURE STUDY

HOLE NO. UG1/1P

PROJECT ..WABO POWER PROJECT.....
FEATURE ..MAIN DAM FOUNDATION.....
LOCATION..River channel.....

CO-ORDINATES E ..285 582.9..... m
N ..9 226 472.7..... m
SURFACE ELEVATION ....11.0..... m

GEOLOGICAL DESCRIPTION Soil/rock type weathering, colour structure	ELEVATION m	DEPTH	LOG	GROUP SYMBOL	MAX. SIZE mm	DESCRIPTION AND ENGINEERING PROPERTIES OF SOIL: Plasticity, in situ moisture and density, field test data	SAMPLE NUMBER	WATER LEVEL DATE
SILT and fine grained SAND, grey.	17			ML (lab)	1	Mostly passing 0.6mm.	18D	
	18			ML				
	19			CL (lab)	0.6 1.2	19 SPT, N 12	20D 21U	
SILT, some CLAY, grey, low plasticity.	20			ML	1		22D	
	-10 21			CL (lab)	0.1		23U	
	22					24 SPT, N=10		
ALLUVIUM	23			ML	0.6	Mostly passing 0.6mm. 25% fine sand.	25D	
	24			CL (lab)			26U	
	25			CL - ML (lab)	1	26: Dry density 1.55 t/m³. Moisture content 24.4%	27D	
	-15 26							
	27			ML				
	28						28D	
	29							
MUDSTONE, fresh, grey.	30						29D	
END OF HOLE 30.6m (RL-19.6m)								

DRILL
Make .....
Type .....
DRILLER .....
Commenced .....
Completed .....

NOTES
See sheet 1

MATERIALS BRANCH
Logged.....
Drawn .....
Checked .....
Sheet .2... of .2.....
SMEC Dwg No. 1429-S600//2.

SNOWY MOUNTAINS ENGINEERING CORPORATION
SMEC - NK WADO PROJECT JOINT VENTURE STUDY

HOLE NO. UG1/2P

PROJECT WADO POWER PROJECT
FEATURE MAIN DAM FOUNDATION
LOCATION River Channel

CO-ORDINATES E 285 646.0 m
N 9 226 543.1 m
SURFACE ELEVATION 11.4 m

GEOLOGICAL DESCRIPTION Soil/rock type weathering, colour structure	ELEVATION / DEPTH m	DESCRIPTION AND ENGINEERING PROPERTIES OF SOIL: LOG	GROUP SYMBOL	MAX. SIZE mm	Plasticity, in situ moisture and density, field test data	SAMPLE NUMBER	WATER LEVEL DATE
ALLUVIUM GRAVEL and SAND Well graded.	1		GW (Lab)	75	Clean, sound gravel and sand. 60% gravel.	1D	
Poorly graded.	2		GP (Lab)	38		2D	
SAND, poorly graded, some gravel. Material consists mostly of sound limestone with minor amounts of basalt and sandstone. Gravel particles are rounded, mostly white and grey. Sand particles rounded to angular, mostly grey.	3 4			19	30% gravel,	3D	
	5 6		SP (Lab)	38	4 SPT, N=37 Mostly 2 - 0.6 mm, some gravel particles.	5D	
	7 8				7 SPT, N=10 6D→		
SAND, fine grained and SILT, grey.	9 10 11		SM (Lab)	9.5		8D	
	12		SM-ML			9D	
SILT and fine grained SAND.	13 14 15 16		ML		10 SPT, N=37 Finer than above, 20%-40% fine sand. Slightly finer at 16 m.	11D	

DRILL
Make Norwood Bagshaw
Type Percussion
DRILLER Vince Pent
Commenced 26 Nov. 1975
Completed 30 Nov. 1975

NOTES
1. Unified soil classification system used.
2. SPT - Standard Penetration Test
3. (Lab) - Laboratory test results
4. Grading analysis of gravel - sands refer to broken returns from chop-pump. Grading in-situ would thus be coarser than indicated. SW may in fact be GW.

MATERIALS BRANCH
Logged G.E.H.
Drawn G.E.H.
Checked
Sheet 1 of 2
SMEC Dwg No. 1429-S6008/1

SNOWY MOUNTAINS ENGINEERING CORPORATION
SMEC - NK WADO PROJECT JOINT VENTURE STUDY

HOLE NO. UG1/2P

PROJECT WADO POWER PROJECT
FEATURE MAIN DAM FOUNDATION
LOCATION River channel

CO-ORDINATES E 285 646.0 m
N 2 226 543.1 m
SURFACE ELEVATION 11.4 m

GEOLOGICAL DESCRIPTION Soil/rock type weathering, colour structure	ELEVATION m / DEPTH	LOG	GROUP SYMBOL	MAX. SIZE mm	DESCRIPTION AND ENGINEERING PROPERTIES OF SOIL Plasticity, in situ moisture and density, field test data	SAMPLE NUMBER	WATER LEVEL DATE
ALLUVIUM SILT and fine grained SAND.	-6 17 18 19 20 21		ML	2.4	20% sand. 12 SPT, N=20	11D 13D	
SILT and CLAY-SILT.	-10 22 23 24 25		CL-ML (lab)	1.2		14D	
END OF HOLE 25.5m (RL-14.1m) (Could not advance.)							

DRILL
Make .....
Type .....
DRILLER .....
Commenced .....
Completed .....

NOTES
See sheet 1

MATERIALS BRANCH
Logged.....
Drawn .....
Checked .....
Sheet 2 of 2
SMEC Dwg No. 1429-S6008/2

SNOWY MOUNTAINS ENGINEERING CORPORATION
SMEC - NK WAHO PROJECT JOINT VENTURE STUDY

HOLE NO. UG1/4P

PROJECT WAHO POWER PROJECT
FEATURE MAIN DAM FOUNDATION
LOCATION River channel
CO-ORDINATES E 265,460.6 m
N 9,226,400.6 m
SURFACE ELEVATION 9.2 m

GEOLOGICAL DESCRIPTION Soil/rock type weathering, colour structure	ELEVATION m	DEPTH m	LOG	DESCRIPTION AND ENGINEERING PROPERTIES OF SOIL: GROUP SYMBOL	MAX. SIZE mm	Plasticity, in situ moisture and density, field test data	SAMPLE NUMBER	WATER LEVEL DATE
SAND, coarse grained, well graded, some gravel.		1		SW (lab)	38	30% gravel.	1D	
		2						
		3		SW			2D	
GRAVEL, well graded, some sand, coarse grained. Material consists mostly of sound limestone with minor amounts of basalt and sandstone. Gravel particles are rounded, mostly white and grey, sand particles rounded to angular, mostly grey.	5	4		GW (lab)	38	Coarse gravel and 15% - 20% coarse sand, mostly retained 1mm.	3D	
		5						
		6						
ALLUVIUM SILT, some fine grained sand, grey.		7		ML		About 20% sand, mostly passing 0.6mm.	4D	
	0	8						
		9						
		10						
		11		ML (lab)	0.6		5D	
		12				6 SPT, N=32		
		13			4.75		7D	
CLAY, silty.	-5	14		CL (lab)	0.6		8D	
		15						
SILT, some fine grained sand, grey.		16		ML				

DRILL
Make Norwood, Bagshaw
Type Percussion
DRILLER Mines Dept.
Commenced 3 Dec 1975
Completed 8 Dec 1975

NOTES
1. Unified soil classification system used.
2. SPT - Standard Penetration Test.
3. (lab) - Laboratory test result.
4. Grading analysis of gravel-sands refer to the broken returns from chop-pump. Grading in-situ would thus be coarser than indicated. SW may in fact be GW.

MATERIALS BRANCH
Logged G.E.N.
Drawn G.E.N.
Checked
Sheet 1 of 2
SMEC Dwg No. 1429-S6009/1

SNOWY MOUNTAINS ENGINEERING CORPORATION
SMEC & NK WABO PROJECT JOINT VENTURE STUDY

HOLE NO. UG1/4P

PROJECT WABO POWER PROJECT
FEATURE MAIN DAM FOUNDATION
LOCATION River channel

CO-ORDINATES E 285,460.5 m
N 9,226,400.0 m
SURFACE ELEVATION 9.2 m

GEOLOGICAL DESCRIPTION Soil/rock type weathering, colour structure	ELEVATION m	DEPTH	LOG	GROUP SYMBOL	MAX. SIZE mm	DESCRIPTION AND ENGINEERING PROPERTIES OF SOIL Plasticity, in situ moisture and density, field test data	SAMPLE NUMBER	WATER LEVEL DATE
ALLUVIUM								
SILT, some fine grained sand, grey.		17		ML (lab)	0.6	About 20% sand, coarser than above.	9U	
		18		ML				
SAND, some gravel and some silt. Poorly graded.	-10	19		SP (lab)	38	Sand, coarse grained, 20% - 30% gravel.	10D	
		20						
Well graded.		21		SW		Sand, medium to coarse grained, 20% gravel.	11D	
		22						
GRAVEL, poorly graded.		23		GP		Coarse gravel with silt and fine grained sand matrix.	12D	
SAND, poorly graded, some gravel.	-16	24		SP (lab) SP	19	Coarse grained sand, high percentage retained 2mm, 16% gravel.	13D	
GRAVEL, poorly graded, and sand.		25		GP (lab)	3	Coarse gravel and sand. Sand fraction mostly retained 1mm, clean, sound.	14D	
		26						
		27					15D	
MUDSTONE, fresh.							16D	
END OF HOLE 27.2m (RL-18m)								

DRILL
Make .....
Type .....
DRILLER .....
Commenced .....
Completed .....

NOTES
See sheet 1

MATERIALS BRANCH
Logged .....
Drawn .....
Checked .....
Sheet 2 of 2
SMEC Dwg No. 1422-S6009/2

SNOWY MOUNTAINS ENGINEERING CORPORATION

S.N.E.C.- N.K. WADO PROJECT JOINT VENTURE STUDY

HOLE No. BH1

DIAMOND DRILL HOLE — GEOLOGICAL LOG

PROJECT WADO POWER PROJECT

FEATURE SADDLE DAM No1

LOCATION Near peg PWD4 and trench T13.

CO-ORDINATES E 218 256 m, N 9 231 379 m, SYSTEM A.M.G. Zone 55

SURFACE ELEVATION 92 m

ANGLE FROM HORIZONTAL 90°

DIRECTION —

DESCRIPTION OF CORE (ROCK TYPE—colour, grain size, texture, mineral composition)	DEGREE OF WEATHERING (FR, SW, MW, HW, CW)	CORE SIZE	ELEVATION	DEPTH (metres)	LOG	CORE LOSS % PER UNIT	STRUCTURES (JOINTS—spacing, activity, smoothness, aperture, cementing, coating, filling; BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES)	FRACTURE LOG	DRILL WATER LOSS	GROUNDWATER LEVEL DATE	WATER PRESSURE TESTS (LEAKAGE RATES IN LUGEON UNITS)
Firm, brown.				1							
CLAY											
Firm, grey-blue.			90	2							
NO CORE				3							
				4							
NO CORE				5							
				6							
			85	7							
Blue-grey, soft.				8			← Nodular. ← Subvertical fracture.	NOT RECORDED	GOOD WATER RETURN	NOT RECORDED	NOT TESTED
NO CORE				9							
MUDSTONE				10			← Nodular. ← Nodular with calcite vein.				
				11			Possible bedding plane fractures dipping at 30°.				
			180	12							
				13			Some oily partings along possible bedding planes, indicate dip approximately 45°.				
NO CORE				14			← Complex fracture.				
Slightly sandy, bituminous, grey.				15			← Smooth faced, irregular subvertical, oily partings.				
END OF HOLE 15.24m (RL76.8m)											

DRILL

Make Mindrill

Type F2

Driller G. Wimpey Co. Ltd.

Commenced 25 Aug 1959

Completed 27 Aug 1959

FRACTURE LOG (cm)

EXPLANATION

Natural breaks in core per metre.

Equivalent lengths of core pieces in centimetres.

WEATHERING

CW - Completely weathered

HW - Highly weathered

MW - Moderately weathered

SW - Slightly weathered

FrSt - Fresh, with Limonite stained joints

Fr - Fresh

ENGINEERING GEOLOGY B'CH

Logged

Drawn D.P.

Checked

Sheet 1 of 1

Dwg. No. 1429-S3107

MARCH 1975

SNOWY MOUNTAINS ENGINEERING CORPORATION

HOLE No. BH2

S.M.E.C. - N.K. WADO PROJECT JOINT VENTURE STUDY

DIAMOND DRILL HOLE — GEOLOGICAL LOG

PROJECT WADO POWER PROJECT

FEATURE SADDLE DAM No 1

LOCATION Near peg PWD3, trench T12 and trench T119.

CO-ORDINATES E 278 257 m, N 9 231 436 m

SYSTEM A.M.G. Zone 55

SURFACE ELEVATION 82 m

ANGLE FROM HORIZONTAL 90°

DIRECTION -

DESCRIPTION OF CORE (ROCK TYPE—colour, grain size, texture, mineral composition)	DEGREE OF WEATHERING	CORE SIZE	ELEVATN / DEPTH (metres)	CORE LOG	CORE LOSS % PER LIFT	STRUCTURES (JOINTS—spacing, attitude, smoothness, aperture, cementing, coating, filling; BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES)	FRACTURE LOG	DRILL WATER LOSS	GROUNDWATER LEVEL, DATE	WATER PRESSURE TESTS (LEUGEON UNITS)
Firm, brown.										
NO CORE										
Firm, grey-brown.										
NO CORE										
Soft, blue-grey with mudstone fragments. (CLAY)		BX								
NO CORE							NOT RECORDED	GOOD WATER RETURN	NOT RECORDED	NOT TESTED
NO CORE										
NO CORE										
Slightly sandy, blue-grey. (MUDSTONE)						Possible bedding plane fractures, dipping at 60°.				
NO CORE										
Blue-grey.		AX				Incipient fractures, possibly bedding plane at 60°.				
						Incipient fractures, possibly bedding plane at 60°.				
END OF HOLE 12.19m (RL69.8m)										

DRILL
Make Hindrill
Type F2
Driller G. Wimpey Co. Ltd.
Commenced 27 Aug 1959
Completed 28 Aug 1959

FRACTURE LOG — cm

EXPLANATION
Natural breaks in core per metre.
Equivalent lengths of core pieces in centimetres.

WEATHERING
CW - Completely weathered
HW - Highly weathered
MW - Moderately weathered
SW - Slightly weathered
FrSt - Fresh, with Limonite stained joints
Fr - Fresh

ENGINEERING GEOLOGY B'CH
Logged
Drawn D.P.
Checked
Sheet 1 of 1
Dwg. No. 1429-S3108

MARCH 1976

SNOWY MOUNTAINS ENGINEERING CORPORATION

HOLE No. DH3

S.M.E.C. - N.K. WADO PROJECT JOINT VENTURE STUDY

DIAMOND DRILL HOLE — GEOLOGICAL LOG

PROJECT WADO DAM PROJECT

FEATURE SADDLE DAM No1

LOCATION South of peg PWD1, near trench T11.

CO-ORDINATES E 278 248 m, N 9 231 514 m

SYSTEM A.M.G. Zone 55

SURFACE ELEVATION 24 m

ANGLE FROM HORIZONTAL 90°

DIRECTION -

DESCRIPTION OF CORE — ROCK TYPE—colour, grain size, texture, mineral composition	DEGREE OF WEATHERING	CORE SIZE	ELEVATION / DEPTH metres	CASING	LOG	CORE LOSS % PER UNIT	STRUCTURES — JOINTS—spacing, attitude, smoothness, aperture, cementing, coating, filling; BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES	FRACTURE LOG	DRILL WATER LOSS	GROUNDWATER LEVEL DATE	WATER PRESSURE TESTS — LEAKAGE RATES IN LUGEON UNITS
CLAY: Firm, brown, with fragments and nodules of mudstone. NO CORE			1								
NO CORE			2								
NO CORE			3								
NO CORE			4				Slickensided oily bedding plane partings.				
MUDSTONE: Slightly sandy, bedded, moderately hard, blue-grey. Carbonaceous bands and occasional nodular bands. Fractures in core show conchoidal surfaces.		EX	5								
			6								
			7				Fractures at 60°.	NOT RECORDED	GOOD WATER RETURN	NOT RECORDED	NOT TESTED
			8								
			9								
			10				Irregular, sub-horizontal fracture.				
NO CORE			11				Fracture at 60°.				
			12				BEDDING AT 52°				
NO CORE			13								
NO CORE			14				Oily-surfaced, sub-horizontal parting intersected by oily surfaced bedding plane partings.				
			15								
END OF HOLE 15.24m (RL 8.8m)											

DRILL
Make Mindrill
Type F2
Driller G. Wimpey Co. Ltd.
Commenced 30 Aug 1959
Completed 1 Sep 1959

FRACTURE LOG

EXPLANATION
Natural breaks in core per metre.
Equivalent lengths of core pieces in centimetres.

WEATHERING
CW - Completely weathered
HW - Highly weathered
MW - Moderately weathered
SW - Slightly weathered
FrSt - Fresh, with limonite stained joints
Fr - Fresh

ENGINEERING GEOLOGY B'CH
Logged
Drawn D.P.
Checked
Sheet 1 of 1
Dwg. No. 1429-S3109

MARCH 1976

SNOWY MOUNTAINS ENGINEERING CORPORATION

S.M.E.C. - N.K. WABO PROJECT JOINT VENTURE STUDY

DIAMOND DRILL HOLE — GEOLOGICAL LOG

HOLE No. BH4

PROJECT WABO POWER PROJECT
FEATURE SADDLE DAM No1
LOCATION Near peg PWD30+20 and trench T15.

CO-ORDINATES E 278 265 m, N 9 231 612 m
SYSTEM A.M.G. Zone 55

SURFACE ELEVATION 84 m
ANGLE FROM HORIZONTAL 90°
DIRECTION —

DESCRIPTION OF CORE (ROCK TYPE—colour, grain size, texture, mineral composition)	DEPTH (metres)	ELEVATION	STRUCTURES (JOINTS—spacing, attitude, smoothness, aperture, cementing, coating, filling, BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES)	FRACTURE LOG	DRILL WATER LOSS / GROUNDWATER	WATER PRESSURE TESTS (leakage rates in Lugeon units)
CLAY: Firm, brown.	0–~0.9					
NO CORE	~0.9–2.5		Bedding approximately at 40°.			
NO CORE	~3.2–3.8	80				
NO CORE	~4.4					
MUDSTONE: Moderately hard, blue-grey, occasional nodular bands and carbonaceous bands. Fractures and partings of the core show conchoidal surfaces and oily surfaces.				NOT RECORDED	GOOD WATER RETURN; NOT RECORDED	NOT TESTED
NO CORE	~6.4					
NO CORE	~7.1					
	~9	75	Fractures at 60°.			
	~10.5–10.8		Sub-horizontal fracture. Fracture at 60°.			
NO CORE	~11.2					
NO CORE	~12.0					
END OF HOLE 12.19m (RL71.8m)	12.19					

Core size: BX

DRILL	FRACTURE LOG	EXPLANATION	WEATHERING	ENGINEERING GEOLOGY B'CH
Make Mindrill		Natural breaks in core per metre.	CW - Completely weathered	Logged
Type F2		Equivalent lengths of core pieces in centimetres.	HW - Highly weathered	Drawn D.P.
Driller G.Wimpey Co. Ltd.			MW - Moderately weathered	Checked
Commenced 2 Sep 1959			SW - Slightly weathered	Sheet 1 of 1
Completed 3 Sep 1959			FrSt - Fresh, with Limonite stained joints	Dwg. No. 1429-S3110
			Fr - Fresh	

MARCH 1976

SNOWY MOUNTAINS ENGINEERING CORPORATION

HOLE No. BH5

S.M.E.C. - N.K. WADO PROJECT JOINT VENTURE STUDY

DIAMOND DRILL HOLE — GEOLOGICAL LOG

PROJECT: WADO POWER PROJECT

FEATURE: SADDLE DAM No1

LOCATION: South of P.W.D. peg 32

CO-ORDINATES: E 278 303 m, N 2 231 692 m

SYSTEM: A.M.G. Zone 56

SURFACE ELEVATION: 96 m

ANGLE FROM HORIZONTAL: 90°

DIRECTION: -

DESCRIPTION OF CORE (ROCK TYPE—colour, grain size, texture, mineral composition)	DEGREE OF WEATHERING	CORE SIZE	RL / DEPTH	LOG	CORE LOSS % PER UNIT	STRUCTURES (JOINTS—spacing, attitude, smoothness, aperture, cementing, coating, filling; BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES)	FRACTURE LOG	DRILL WATER LOSS	GROUNDWATER LEVEL DATE	WATER PRESSURE TESTS (LEAKAGE RATES IN LUGEON UNITS)
CLAY: Firm, brown.										
NO CORE			95 1							
NO CORE			2							
NO CORE			3			Possible bedding plane fracture indicates bedding at 40°.				
NO CORE			4			Irregular sub-horizontal fractures.				
			5							
Blue-grey. Foraminifera fossils distributed throughout section of core.			90 6				NOT RECORDED	GOOD WATER RETURN	NOT RECORDED	NOT TESTED
NO CORE		EX	7			Irregular sub-horizontal fractures.				
MUDSTONE			8							
NO CORE			9							
NO CORE			10							
			85 11			Fractures at 75°.				
						Slightly oily surfaced fracture at 60°.				
			12			Oily surfaced fracture at 45°.				
NO CORE			13							
						Fractures at 75°.				
Replacement of plant remains by pyrite.			14							
						Slightly oily surfaced fracture at 60°. Oily surfaced fractures at 45°.				
			15							
END OF HOLE 15.24m (RL80.8m)										

DRILL

Make: Hindrill

Type: F2

Driller: O. Wimpey Co. Ltd.

Commenced: 3 Sep 1959

Completed: 4 Sep 1959

FRACTURE LOG

cm

EXPLANATION

Natural breaks in core per metre.

Equivalent lengths of core pieces in centimetres.

WEATHERING

CW - Completely weathered

HW - Highly weathered

MW - Moderately weathered

SW - Slightly weathered

FrSt - Fresh, with Limonite stained joints

Fr - Fresh

ENGINEERING GEOLOGY B'CH

Logged:

Drawn: D.P.

Checked:

Sheet 1 of 1

Dwg. No. 1429-S311

ACH1976

SNOWY MOUNTAINS ENGINEERING CORPORATION

HOLE No. BH6

S.M.E.C. - N.K. WABO PROJECT JOINT VENTURE STUDY

DIAMOND DRILL HOLE — GEOLOGICAL LOG

PROJECT: WABO POWER PROJECT

FEATURE: SADDLE DAM No1

LOCATION: South of peg PWP35, near trench T107.

CO-ORDINATES: E 278 319 m, N 9 231 811 m

SYSTEM: A.M.G. Zone 55

SURFACE ELEVATION: 112 m

ANGLE FROM HORIZONTAL: 90°

DIRECTION: -

DESCRIPTION OF CORE (ROCK TYPE—colour, grain size, texture, mineral composition)	DEGREE OF WEATHERING	CORE SIZE	ELEVATION / DEPTH (metres)	LOG	CORE LOSS % PER LIFT	STRUCTURES (JOINTS—spacing, attitude, smoothness, aperture, cementing, coating, filling; BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES)	FRACTURE LOG	GROUNDWATER LEVEL: DRILL WATER LOSS	GROUNDWATER LEVEL: DATE	WATER PRESSURE TESTS: LEAKAGE RATES IN LUGEON UNITS
CLAY: Firm, brown with fragments and nodules of mudstone. NO CORE										
NO CORE										
NO CORE										
NO CORE										
MUDSTONE: Blue-grey. NO CORE										
NO CORE										
NO CORE						Bedding plane parting.				
						Carbonaceous band at 70° indicates bedding.				
						Bedding plane parting.				
NO CORE										
						Bedding plane parting.				
						Bedding plane parting.				
END OF HOLE 15.24m (RL 96.8m)							NOT RECORDED	GOOD WATER RETURN	NOT RECORDED	NOT TESTED

DRILL

Make: Mindrill

Type: F2

Driller: G. Wimpey Co. Ltd.

Commenced: 7 Sep 1959

Completed: 8 Sep 1959

FRACTURE LOG

cm

EXPLANATION

Natural breaks in core per metre.

Equivalent lengths of core pieces in centimetres.

WEATHERING

CW - Completely weathered
HW - Highly weathered
MW - Moderately weathered
SW - Slightly weathered
FrSt - Fresh, with Limonite stained joints
Fr - Fresh

ENGINEERING GEOLOGY B'CH

Logged:

Drawn: D.P.

Checked:

Sheet 1 of 1

Dwg. No. 1429-S312

MARCH 1975

SNOWY MOUNTAINS ENGINEERING CORPORATION

S.M.E.C. - N.K. WABO PROJECT JOINT VENTURE STUDY

DIAMOND DRILL HOLE — GEOLOGICAL LOG

HOLE No. BH7

PROJECT: WABO POWER PROJECT
FEATURE: SADDLE DAM No1
LOCATION: West of P.W.D. peg 36

CO-ORDINATES: E 278 309 m, N 9 231 876 m
SYSTEM: A.M.G. Zone 55

SURFACE ELEVATION: 112 m
ANGLE FROM HORIZONTAL: 90°
DIRECTION: –

Description of core (Rock type—colour, grain size, texture, mineral composition)	Depth (m)	Structures (Joints—spacing, attitude, smoothness, aperture, cementing, coating, filling; bedding, foliation, veins, seams, faults, crushed zones)
NO CORE	1	
NO CORE	2	Bedding at 60°
NO CORE	4	
NO CORE	4.5	
	5.5	Fracture at 70°
NO CORE	6.5	
	7	Bedding at 60°
MUDSTONE Blue-grey. NO CORE	8	Some fractures and partings of the core show oily surfaces.
NO CORE	9.5	
NO CORE	11	Bedding at 60°
NO CORE	12.5	
END OF HOLE 15.24m (RL96.8m)		

Core size: BX. Elevation markers: 110, 105, 100.

Fracture log: NOT RECORDED
Drill water loss: GOOD WATER RETURN
Groundwater level: NOT RECORDED
Water pressure tests (leakage rates in Lugeon units): NOT TESTED

DRILL
Make: Mindrill
Type: F2
Driller: G.Wimpey Co.Ltd.
Commenced: 9 Sep 1969
Completed: 9 Sep 1969

FRACTURE LOG
EXPLANATION
Natural breaks in core per metre.
Equivalent lengths of core pieces in centimetres.

WEATHERING
CW - Completely weathered
HW - Highly weathered
MW - Moderately weathered
SW - Slightly weathered
FrSt - Fresh, with Limonite stained joints
Fr - Fresh

ENGINEERING GEOLOGY B'CH
Logged:
Drawn: D.P.
Checked:
Sheet 1 of 1
Dwg. No. 1429-S3113

MARCH 1976

SNOWY MOUNTAINS ENGINEERING CORPORATION

S.M.E.C. - N.K. WADO PROJECT JOINT VENTURE STUDY

HOLE No. BH8

DIAMOND DRILL HOLE — GEOLOGICAL LOG

PROJECT WADO POWER PROJECT

FEATURE SADDLE DAM No1

LOCATION Between P.W.D. pegs 38 and 39

CO-ORDINATES E 278 388 m, N 9 231 942 m

SYSTEM A.M.G. Zone 55

SURFACE ELEVATION 103 m

ANGLE FROM HORIZONTAL 90°

DIRECTION -

DESCRIPTION OF CORE — ROCK TYPE—colour, grain size, texture, mineral composition	DEGREE OF WEATHERING (FR, SW, MW, HW, CW)	CORE SIZE	ELEVATION (metres)	DEPTH (metres)	LOG	CORE LOSS % PER LIFT	STRUCTURES — JOINTS—spacing, attitude, smoothness, aperture, cementing, coating, filling, BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES	FRACTURE LOG	WATER LOSS	GROUNDWATER LEVEL DATA	WATER PRESSURE TESTS — LEAKAGE RATES IN LUGEON UNITS
MUDSTONE Blue-grey.								NOT RECORDED	GOOD WATER RETURN	NOT RECORDED	NOT TESTED
NO CORE				1							
				2							
				3							
			100	4							
NO CORE		BX		5							
NO CORE				6			Fractures at 60°-70°, some oily surfaced, probably indicate bedding.				
NO CORE				7							
NO CORE			195	8							
				9			← Sub-horizontal, fracture, oily surfaced fracture.				
NO CORE				10							
NO CORE				11							
				12							
NO CORE		AX	90	13							
				14			← Prismatic calcite crystal, ← Sub-horizontal, oily surfaced fracture.				
NO CORE				15			← Fracture at 60°-70°.				
END OF HOLE 15.24m (RL87.8m)											

DRILL

Make Mindrill

Type F2

Driller G.Wimpey Co. Ltd.

Commenced 10 Sep 1959

Completed 11 Sep 1959

FRACTURE LOG

EXPLANATION

Natural breaks in core per metre.

Equivalent lengths of core pieces in centimetres.

WEATHERING

CW - Completely weathered

HW - Highly weathered

MW - Moderately weathered

SW - Slightly weathered

FrSt - Fresh, with Limonite stained joints

Fr - Fresh

ENGINEERING GEOLOGY B'CH

Logged

Drawn D.P.E.

Checked

Sheet 1 of 1

Dwg. No. 1429-S3114

MARCH 1975

SNOWY MOUNTAINS ENGINEERING CORPORATION

S.M.E.C. - N.K. WADO PROJECT JOINT VENTURE STUDY

HOLE No. DD 201

DIAMOND DRILL HOLE - GEOLOGICAL LOG

PROJECT WADO POWER PROJECT

FEATURE SADDLE DAM No.1

LOCATION 1.0m from P.W.D. peg 1 at 285°

CO-ORDINATES E 278 245.0 m, N 9 231 624.6 m, SYSTEM AMG Zone 55

SURFACE ELEVATION 95.2 m

ANGLE FROM HORIZONTAL 90°

DIRECTION -

DESCRIPTION OF CORE ROCK TYPE - colour, grain size, texture, mineral composition	DEGREE OF WEATHERING	CORE SIZE	metres ELEVATION	DEPTH	LOG	CORE LOSS % PER UNIT	STRUCTURES JOINTS - spacing, attitude, smoothness, aperture, cementing, coating, filling BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES.	FRACTURE LOG	WATER LOSS	WATER LEVEL, date	WATER PRESSURE TESTS LEAKAGE RATES IN LUGEON UNITS
Yellow-brown fragments.			95	1							
NO CORE											
Grey-yellow fragments. Grey.				2			Not visible through plastic.				
Mid grey, weak.				3			Bedding not visible. Fractures at 30° to 45°				
				4			Not visible through plastic.				
Minor siltstone, mid grey.			90	5			Crushed zone. Fractures at 30° & 45°. Some air slacking.				
SILTSTONE. Mid grey, some carbonaceous flecks. Relatively tough.				6			Irregular, slickensided fracture at 60°				
MUDSTONE. Weak, saturated core.				7			Crushed zone. Core breaks easily to angular, slickensided fragments.				
SILTSTONE. Mid grey.				8			Bedding at 65° Fractures at 65°.				
				9			Not visible through plastic.				
Mid grey. Weak. Core in fragments.			85	10			Fractures at 30° & at 80° at base. Some air slacking.				
MUDSTONE & SILTSTONE bands. Carbonaceous lenticles.		NMLC		11			Bedding at 65° Slickensided fractures at 65° & 45°.				
				12			Crushed zone at 30° approx.				
				13			Bedding at 60° Slickensided fractures at 45° & 66°				
Mid grey. Very weak, breaks easily to angular fragments			80	14			Not visible through plastic. Soft in lower 0.4m.				
				15							
				16			Abundant slickensiding, mostly at 60° to 70° and near horizontal.				
				17							
				18							
With siltstone bands. Core relatively strong.				19			Bedding at 20° A few slickensided partings at 65 to 45°.				
Weak core.				20							

11 Oct 1975

NOT RECORDED

Appreciably high leakage rate at the highest pressure applied.

NOT TESTED

10.3

Water back flow after testing.

1.0

MUDSTONE

MUDSTONE

MUDSTONE

DRILL

Make Hindrill

Type E 1000 i

Driller Grech & Mulligan

Commenced 14 Jul 1975

Completed 20 Jul 1975

FRACTURE LOG

N 10 20 30 40 50 60 80 100 200

100 50 20 10 5 2 1 cm

EXPLANATION

Natural breaks in core per metre.

Equivalent lengths of core pieces in centimetres.

Core preserved in plastic sheath.

WEATHERING

CW - Completely weathered

HW - Highly weathered

MW - Moderately weathered

SW - Slightly weathered

FrSt - Fresh, with limonite stained joints

Fr - Fresh

ENGINEERING GEOLOGY BRANCH

Logged G.A.Frenda

Drawn D.P.

Checked

Sheet 1 of 2

S.M.E.C. Dwg No. 429-S3000/1

SNOWY MOUNTAINS ENGINEERING CORPORATION

HOLE No. DD 201

PROJECT WARD POWER PROJECT

DESCRIPTION OF CORE ROCK TYPE—colour, grain size, texture mineral composition	DEGREE OF WEATHERING FR SW MW HW CW	CORE SIZE	RELEVATN metres DEPTH CORING	LOG	CORE LOSS % PER LIFT	STRUCTURES JOINTS—spacing, attitude, smoothness aperture, cementing, coating, filling, BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES	FRACTURE LOG 2 6 20 60 200	CORE WASHED LOSS	GROUNDWATER LEVEL DATE	WATER PRESSURE TESTS LEAKAGE RATES IN LUGEON UNITS 0.2 0.6 2 6 20 60 200
MUDSTONE With irregular siltstone bands up to 30mm wide. CLAY CLAY and fragments.		WIRE LINE	175 21 22 23 24 25 170 26 27 28 29 30 165			Fracture at 70°, slickensided. Crushed zone near horizontal. Crushed zone. Fractures at 30° to 45°. Crushed zone. Crushed zone. Fractures at 30° to 45°. Crushed zone. Crushed zone. Crushed zone at 20° approx. Crushed zone. Crushed zone. Crushed zone. Crushed zone at 60°. Bedding at 30°, core showing incipient air slacking.		NOT RECORDED		2.0 1.0
END OF HOLE 30.40m. (RL64.8m)										

FOR LOCATION OF DRILL HOLE AND OTHER RELEVANT INFORMATION, SEE SHEET 1

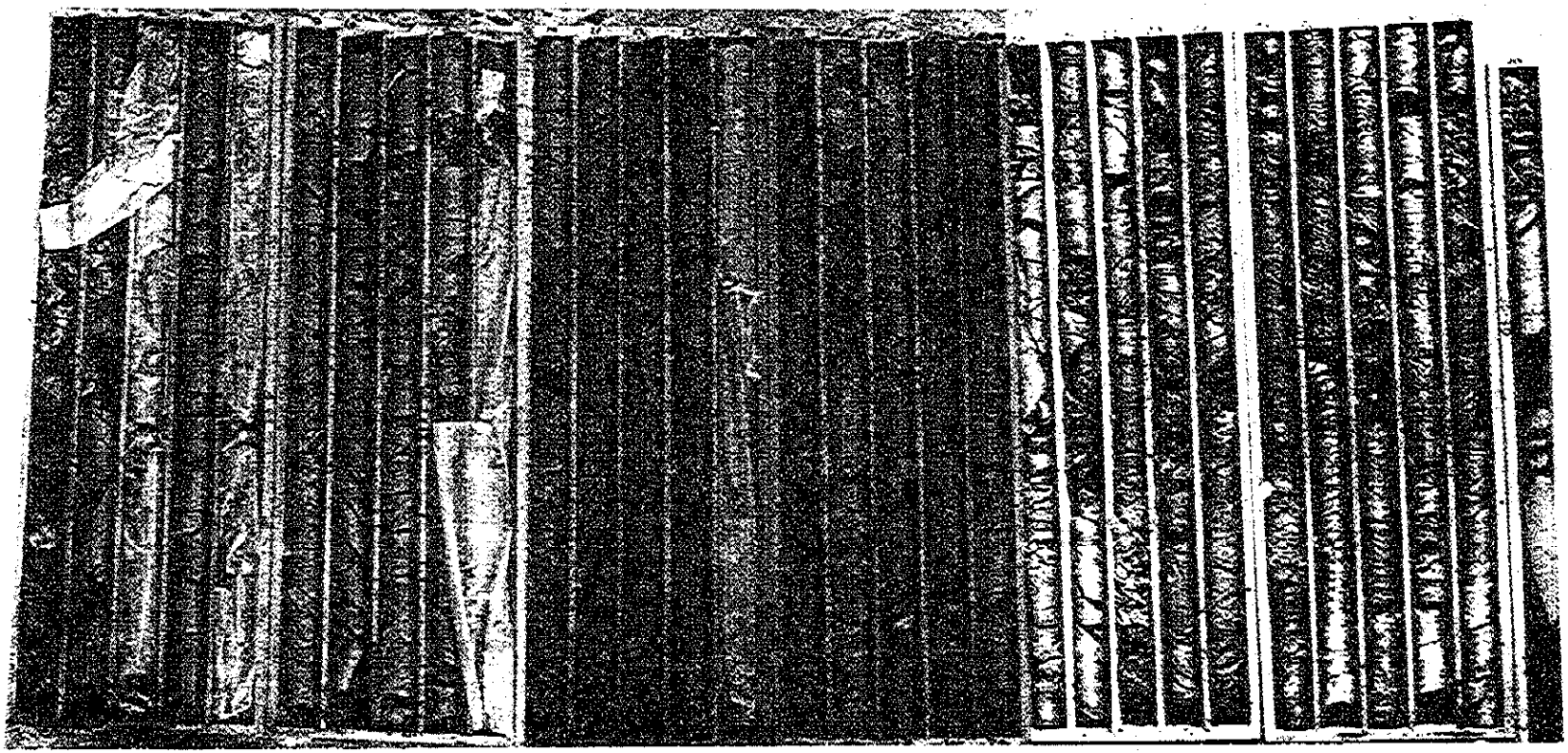
Sheet 2 of 2

Dwg. No 1429-S3000/2

Negative Nos. 1429/205, 203, 200 .

DIAMOND DRILL HOLE DD201

WABO POWER PROJECT



5 10 15 20 25 30.40 m
END OF HOLE

DEPTH IN METRES

SNOWY MOUNTAINS ENGINEERING CORPORATION

S.M.E.C. - N.K. MARO PROJECT JOINT VENTURE STUDY

HOLE No. DD202

DIAMOND DRILL HOLE - GEOLOGICAL LOG

PROJECT MARO POWER PROJECT

FEATURE SADDLE DAM No.1

LOCATION 25.3m from P.W.D. peg 3 at 363°

CO-ORDINATES E 278 250.6 m, N 9 231 460.7 m, SYSTEM AMG Zone 55

SURFACE ELEVATION 83.9 m

ANGLE FROM HORIZONTAL 45°

DIRECTION 186°

DESCRIPTION OF CORE ROCK TYPE - colour, grain size, texture, mineral composition	DEGREE OF WEATHERING	CORE SIZE	metres	LOG	CORE LOSS % PER LIFT	STRUCTURES JOINTS - spacing, attitude, smoothness, aperture, cementing, coating, filling. BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES.	FRACTURE LOG	WATER LOSS	GROUNDWATER LEVEL DATE	WATER PRESSURE TESTS LEAKAGE RATES IN LUGEON UNITS
Yellow-brown.										
Grey & yellow mottling										
Dark grey.						Crushed zone. Core breaks easily to slickensided fragments.				
Dark grey with sandy siltstone bands up to 10mm thick.						Bedding at 30° to 35°. Most fractures at 45° slickensided, some at 60°. Incipient air slacking.				
Mid grey.						Crushed zone.				
Silty.						Incipient air slacking.				
NO CORE						Crushed zone at 45° ?				
Mid grey.						One fracture at 80°, several at 45°.				
NO CORE						Crushed zone.				
Mid grey, silty.						Incipient air slacking.				
Mid grey with bands of fine grained sandstone.						Incipient air slacking.				
Mid grey.						Crushed zone.				
MUDSTONE - SILTSTONE. Mid grey.						Fractures at 60° and at 45°.				
Silty, mid grey.						Bedding at 35°. Very closely jointed. Joints at 35° & 65°.				
						Crushed zone.				
						Fractures at 45°.				
						Crushed zone. Slickensided fragments.				
						Close, slickensided fractures at 45° & 60°.				

MUDSTONE

MUDSTONE

NMC

MWC

80

175

170

11 Oct 1975

3 Nov 1975

FULL WATER RETURN

NOT TESTED

1.2

1.4

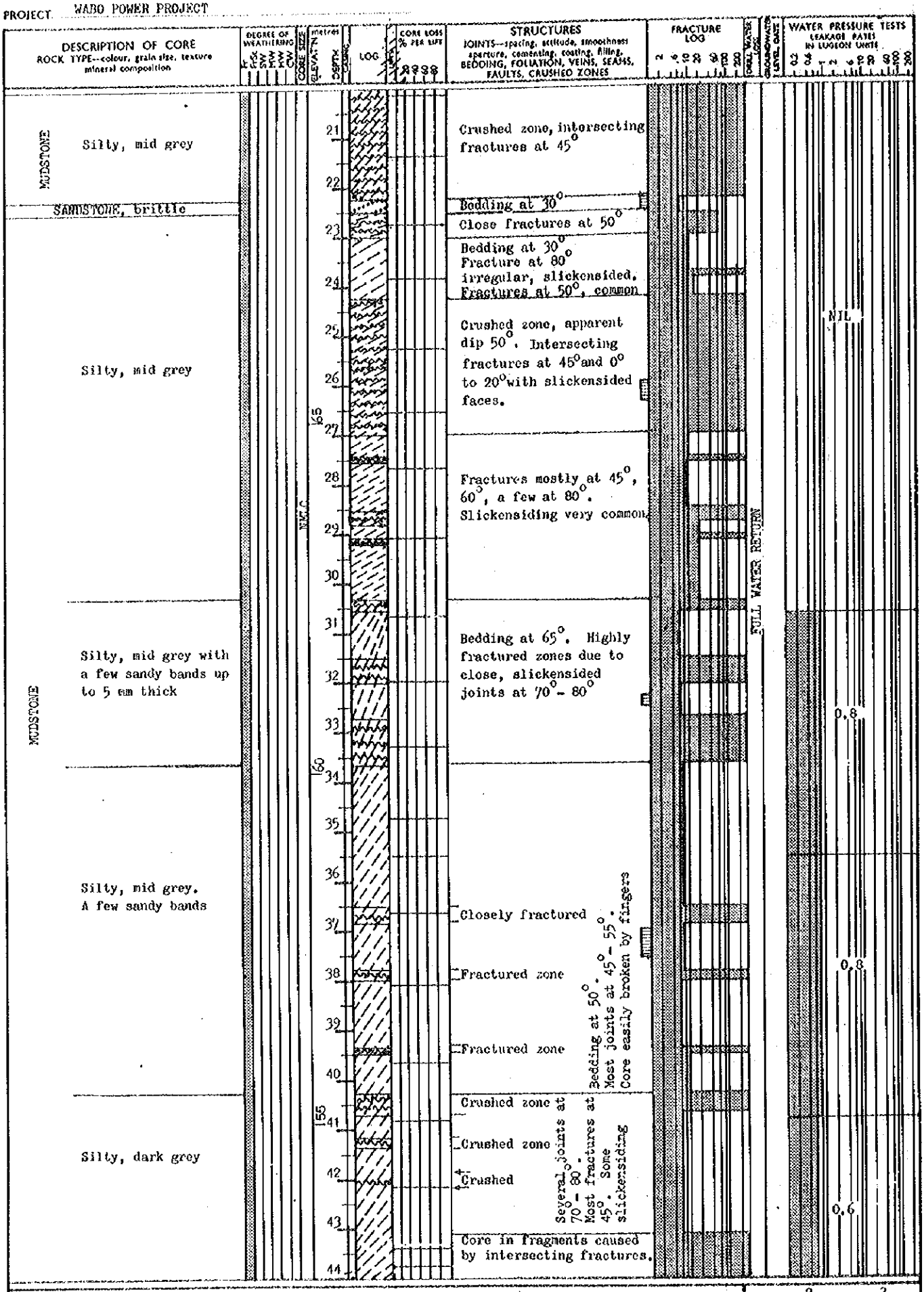
NIL

DRILL	EXPLANATION	WEATHERING	ENGINEERING GEOLOGY BRANCH
Make Mindrill	FRACTURE LOG: Natural breaks in core per metre.	CW - Completely weathered	Logged O.A. Frenda
Type E 1000	Equivalent lengths of core pieces in centimetres.	HW - Highly weathered	Drawn D.P.
Driller R. Grech	Core preserved in plastic sheath.	MW - Moderately weathered	Checked
Commenced 21 Jul 1976.		SW - Slightly weathered	Sheet 1 of 3
Completed 28 Jul 1976.		Fr - Fresh	S.M.E.C. Dwg. No. 1429-S300

SNOWY MOUNTAINS ENGINEERING CORPORATION

HOLE No. DD 202

PROJECT WABO POWER PROJECT



FOR LOCATION OF DRILL HOLE AND OTHER RELEVANT INFORMATION, SEE SHEET 1

SNOWY MOUNTAINS ENGINEERING CORPORATION

HOLE No. DD 202

PROJECT WADO POWER PROJECT

DESCRIPTION OF CORE ROCK TYPE—colour, grain size, texture mineral composition	DEGREE OF WEATHERING F CW SW MW HW CW	CORE SIZE	ELEVATN / DEPTH	CASING	LOG	CORE LOSS % PER LIFT	STRUCTURES JOINTS—spacing, attitude, smoothness aperture, cementing, coating, filling. BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES	FRACTURE LOG	BALL WATER LOSS	GROUNDWATER LEVEL, DATE	WATER PRESSURE TESTS LEAKAGE RATES IN LUGEON UNITS
MUDSTONE Silty, dark grey		NMLC	45 46 47 48 49 50			88 98	Core in fragments caused by intersecting fractures Bedding at 35° Several fractures at 45° Close fractures at 45°-55°, slickensided Bedding at 35° Fractures at 45°		FULL WATER RETURN		0.6 0.6
END OF HOLE 50.00m (RL48.5m)											

FOR LOCATION OF DRILL HOLE AND OTHER RELEVANT INFORMATION, SEE SHEET 1

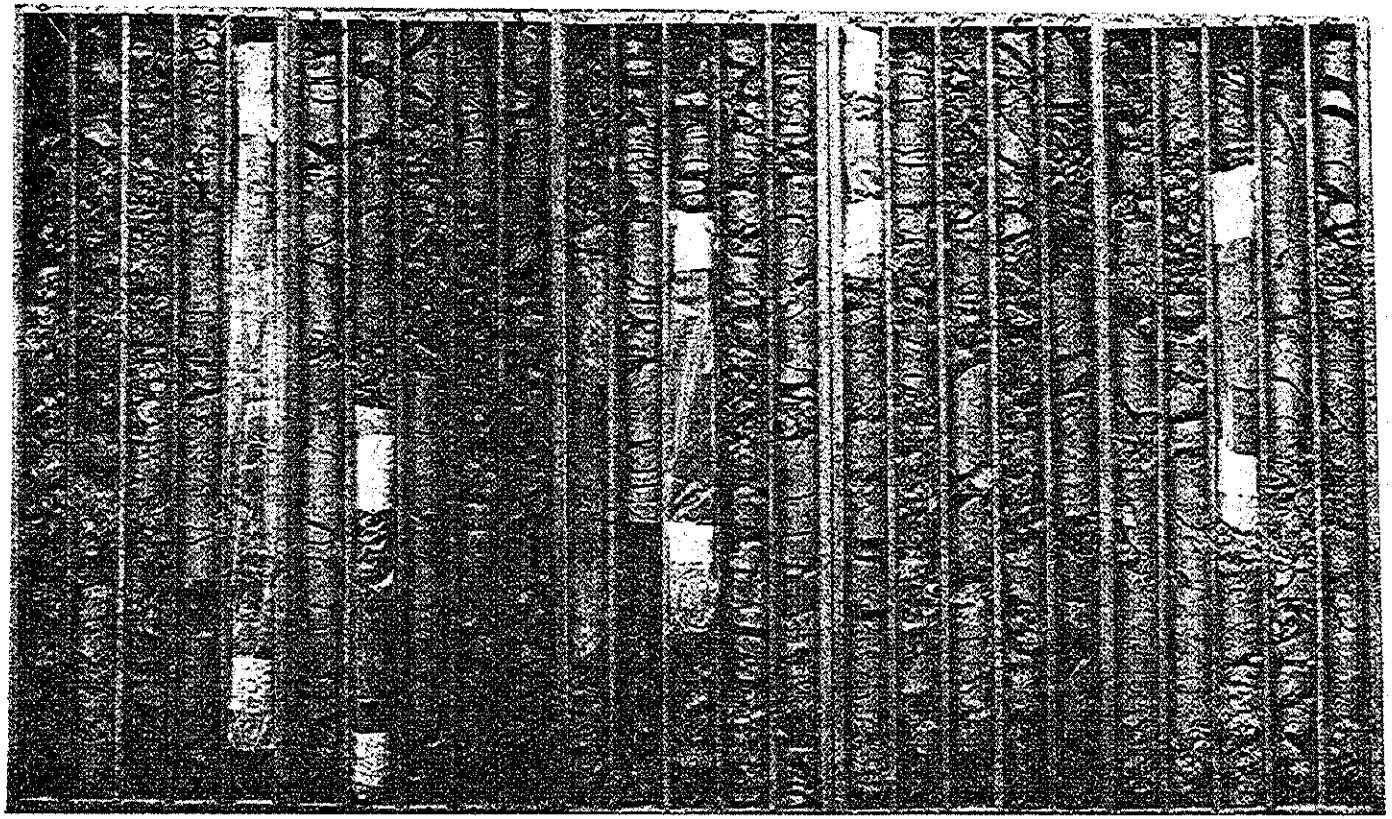
Sheet 3 of 3

Dwg. No. 1429-S3001/3

DIAMOND DRILL HOLE DD202

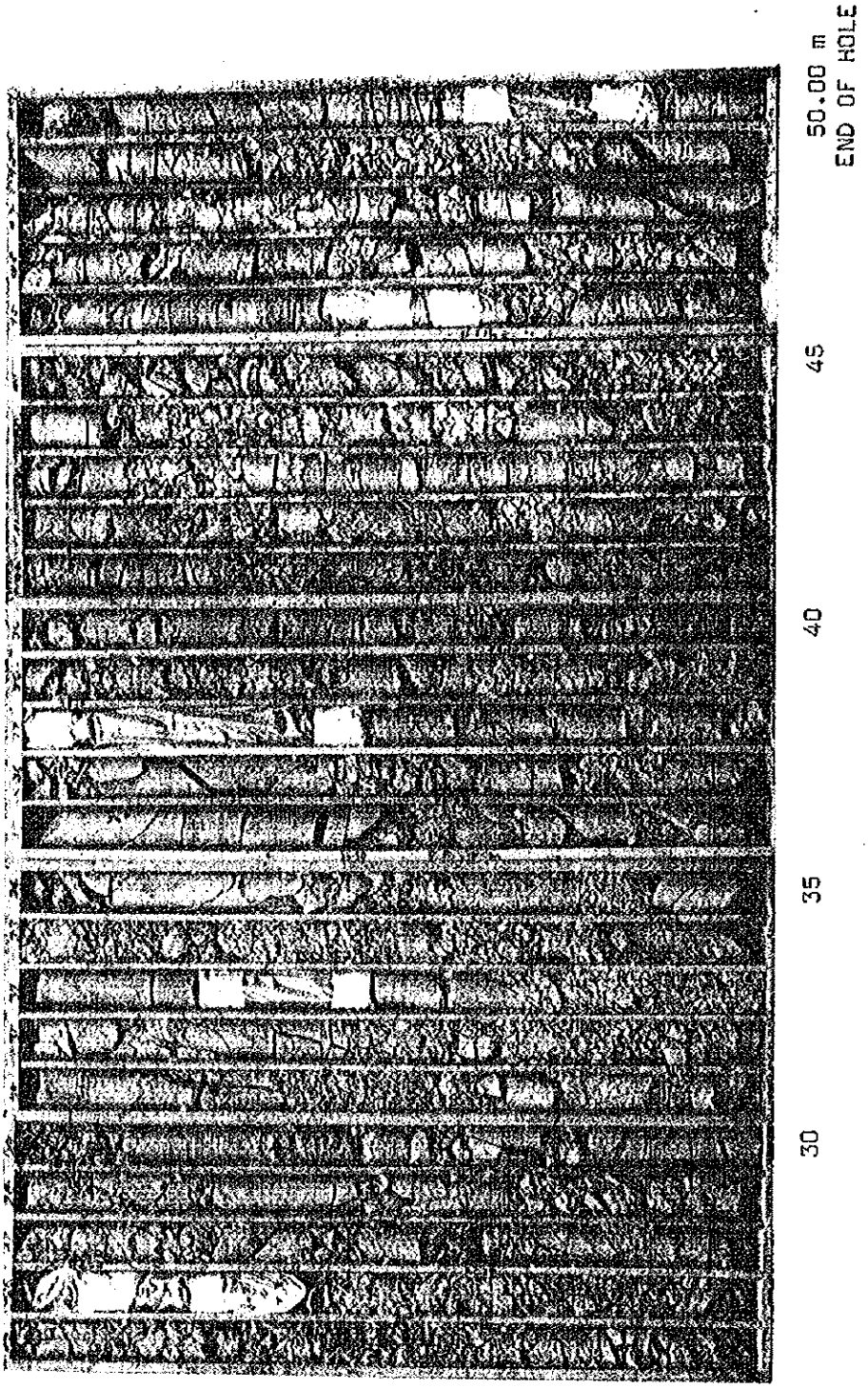
WABO POWER PROJECT

Negative Nos. 1429/371, 372, 373, 374, 375.



5 10 15 20 25

DEPTH IN METRES



DIAMOND DRILL HOLE DD202

WABO POWER PROJECT

SHEET 2 of 2

SNOWY MOUNTAINS ENGINEERING CORPORATION

S.M.E.C. - N.K. WARO PROJECT JOINT VENTURE STUDY

HOLE No. DD 203

DIAMOND DRILL HOLE - GEOLOGICAL LOG

PROJECT WARO POWER PROJECT

FEATURE SADDLE DAM No.1

LOCATION 17.4m from P.N.D. peg 3 at 174°

CO-ORDINATES E 278 265.4 m, N 9 231 418.3 m

SYSTEM AMG Zone 55

SURFACE ELEVATION 84.7 m

ANGLE FROM HORIZONTAL 90°

DIRECTION -

DESCRIPTION OF CORE ROCK TYPE - colour, grain size, texture, mineral composition	DEGREE OF WEATHERING	CORE SIZE	ELEVATION	Metres DEPTH	CASING	LOG	CORE LOSS % PER LIFT	STRUCTURES JOINTS - spacing, attitude, smoothness, aperture, cementing, coating, filling. BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES.	FRACTURE LOG	DRILL WATER LOSS	GROUNDWATER LEVEL, DATE	WATER PRESSURE TESTS LEAKAGE RATES IN LUGEON UNITS
CLAY Yellow brown.		NMLC	180	1				Completely disturbed			11 Oct 1975	
Mid grey.				2							12 Nov 1975	
NO CORE												
CLAY and SILTSTONE				3				Siltstone may not be in-situ				
NO CORE												
MUDSTONE and MUDSTONE BRECCIA Material has consistency of stiff clay				4				Very close, multi-directional shearing.			3 Nov 1975	
NO CORE				5								
MUDSTONE BRECCIA, Plastic, with consistency of stiff clay				6								NOT TESTED
NO CORE												
MUDSTONE BRECCIA and MUDSTONE				7				Crushed zone				
NO CORE				8								
MUDSTONE BRECCIA, Plastic												
NO CORE				9								
MUDSTONE and MUDSTONE BRECCIA Plastic to crumbly			175									
NO CORE				10								
MUDSTONE.				11								
NO CORE				12				Mudstone fragments in clay matrix				
MUDSTONE BRECCIA Plastic												
NO CORE				13								0.1
MUDSTONE and MUDSTONE BRECCIA. Soft			170	14				Near horizontal, coaly partings.				
NO CORE				15								
MUDSTONE BRECCIA, Soft plastic												
MUDSTONE				16				Horizontal fractures				
NO CORE												
MUDSTONE and CLAY. Very soft				17				Horizontal fracture				
MUDSTONE and SANDSTONE				18				Bedding at 50°. Fracturing increases towards base				0.4
MUDSTONE			165	19				Crushed zone. Plastic in part				
				20								

SLIDE DEBRIS

FULL WATER RETURN

DRILL

Make Mindrill

Type E 1000

Driller Grech & Mulligan

Commenced 29 Jul 1975

Completed 3 Aug 1975

FRACTURE LOG

Natural breaks in core per metre.

Equivalent lengths of core pieces in centimetres.

Core preserved in plastic sheath

EXPLANATION

WEATHERING

CW - Completely weathered

HW - Highly weathered

MW - Moderately weathered

SW - Slightly weathered

FrSt - Fresh, with limonite stained joints

Fr - Fresh

ENGINEERING GEOLOGY BRANCH

Logged G.A. Frenda

Drawn D.P.

Checked

Sheet 1 of 2

S.M.E.C. Dwg No 1429-S3002/1

SNOWY MOUNTAINS ENGINEERING CORPORATION

HOLE No. DD 203

PROJECT WADO POWER PROJECT

DESCRIPTION OF CORE ROCK TYPE—colour, grain size, texture mineral composition	DEGREE OF WEATHERING	CORE SIZE	ELEVATN / DEPTH metres	LOG	CORE LOSS % PER LIFT	STRUCTURES JOINTS—spacing, attitude, smoothness aperture, cementing, coating, filling, BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES	FRACTURE LOG	WATER PRESSURE TESTS LEAKAGE RATES IN LUGEON UNITS
MUDSTONE						As above		
MUDSTONE and SILTSTONE		NMLC	21			Irrigular, slickensided fractures common. Core in fragments at base		
			22			Crushed zone. Core in fragments		1.0
SILTSTONE			23			Closely jointed. Some clay seams	FULL WATER RETURN	
			24					
		60	25			Crushed zone and clay		
END OF HOLE 25.00m (RL59.7m)								

FOR LOCATION OF DRILL HOLE AND OTHER RELEVANT INFORMATION, SEE SHEET 1

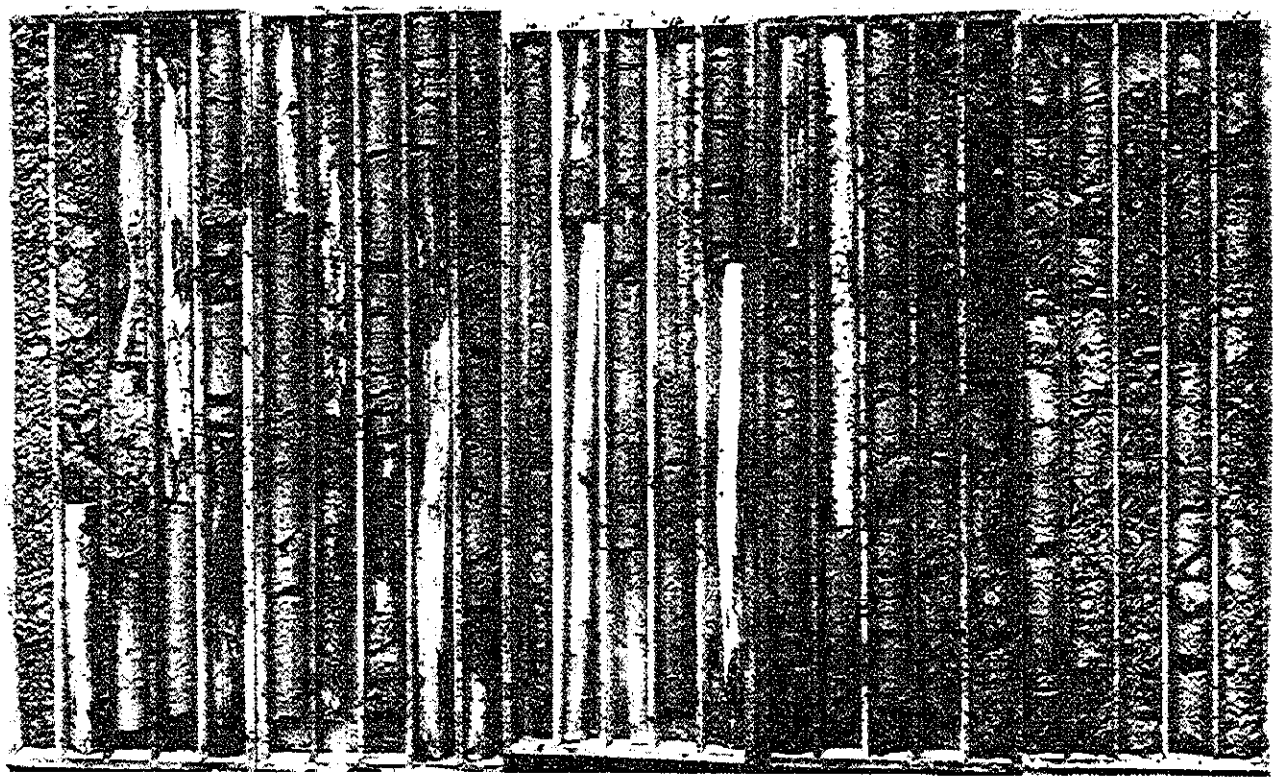
Sheet 2 of 2

Dwg. No 1429-S3002/2

DIAMOND DRILL HOLE DD203

WABO POWER PROJECT

Negative Nos. 1429/207, 180, 208.



5 10 15 20 25.00 m
END OF HOLE

DEPTH IN METRES

SNOWY MOUNTAINS ENGINEERING CORPORATION

S.M.E.C. – N.K. WADO PROJECT JOINT VENTURE STUDY

HOLE No. DD 204

DIAMOND DRILL HOLE – GEOLOGICAL LOG

PROJECT WADO POWER PROJECT

FEATURE SADDLE DAM No.1

LOCATION 18.5m from P.W.D. peg 6 at 206°

CO-ORDINATES E 278 246.8 m, N 9 231 276.7 m, SYSTEM AMG Zone 55

SURFACE ELEVATION 123.5 m

ANGLE FROM HORIZONTAL 90°

DIRECTION –

DESCRIPTION OF CORE ROCK TYPE - colour, grain size, texture, mineral composition	DEGREE OF WEATHERING FR / SW / MW / HW / CW	CORE SIZE	metres ELEVATION / DEPTH	LOG	CORE LOSS % PER LIFT	STRUCTURES JOINTS - spacing, attitude, smoothness, aperture, cementing, coating, filling. BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES.	FRACTURE LOG	DRILL WATER LOSS	PIEZOMETER LEVEL, DATE	WATER PRESSURE TESTS LEAKAGE RATES IN LUGEON UNITS
CLAY with MUDSTONE fragments. Yellow-brown						Drilled with auger				
NO CORE										
SANDSTONE at base										
NO CORE										
SANDSTONE Medium grained, yellow-brown						Dip at 65°				
SANDSTONE and SILTSTONE fragments in CLAY, Soft										
NO CORE										
MUDSTONE and SANDSTONE fragments						Very close jointing				
NO CORE										
CLAY and SANDSTONE fragments										
MUDSTONE, Silty, dark grey. Core in fragments.						Some slickensiding				
NO CORE										
MUDSTONE Dark grey, Core mostly in fragments, soft						Joints vertical, slickensided.				
NO CORE										
MUDSTONE Mid grey, carbonaceous flecks common. 50mm calcite pod at base. Core semi-plastic to friable						Bedding very indistinct, may be near horizontal. Slickensided joint faces at 20°– 30° common. Incipient air-slacking.				
SANDSTONE, Light grey						Strong, with silty flecks				
MUDSTONE, silty, to SILTSTONE. Dark grey, core in 0.1m sticks and in fragments. Friable						Bedding indistinct				
SILTSTONE to fine grained SANDSTONE Dark grey Core tougher than average						Bedding at 30°– 35°. A few joints at 45° and 60°.				

HOLE BLOCKED 3 Nov 1975 – FULL WATER RETURN – NO WATER RETURN

NOT TESTED

TEST RESULTS UNRELIABLE

DRILL
Make Mindrill
Type E 1000
Driller Grech & Mulligen
Commenced 6 Aug 1975
Completed 12 Aug 1975

FRACTURE LOG – Equivalent lengths of core pieces in centimetres.

EXPLANATION
Natural breaks in core per metre.
Core preserved in plastic sheath

WEATHERING
CW - Completely weathered
HW - Highly weathered
MW - Moderately weathered
SW - Slightly weathered
FrSt - Fresh, with limonite stained joints
Fr - Fresh

ENGINEERING GEOLOGY BRANCH
Logged G.A. Frenda
Drawn D.F.
Checked
Sheet 1 of 2
S.M.E.C. Dwg No. 1429-S3003/1

SNOWY MOUNTAINS ENGINEERING CORPORATION

HOLE No. DD 204

PROJECT WARD POWER PROJECT

DESCRIPTION OF CORE ROCK TYPE—colour, grain size, texture mineral composition	CORE SIZE	ELEVATN	DEPTH metres	STRUCTURES JOINTS—spacing, attitude, smoothness aperture, cementing, coating, filling. BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES	DRILL WATER LOSS	WATER PRESSURE TESTS LEAKAGE RATES IN LUGEON UNITS
SILTSTONE						FAULTY TEST
CLAY with Siltstone fragments			21			
SILTSTONE: Dark grey with lighter sandstone bands up to 20mm thick. Core can be broken with fingers	NMLC	1100	22–25	Bedding at 40° - 45°. Most fractures at 45°, two subvertical. No slickensiding	NO WATER RETURN	20
END OF HOLE 25.00m (RL98.5m)						

FOR LOCATION OF DRILL HOLE AND OTHER RELEVANT INFORMATION, SEE SHEET 1

Sheet 2 of 2

Dwg. No 1429-S3003/2

DIAMOND DRILL HOLE DD204

WABO POWER PROJECT

SNOWY MOUNTAINS ENGINEERING CORPORATION
S.M.E.C. – N.K. WABO PROJECT JOINT VENTURE STUDY

HOLE No DD 205

DIAMOND DRILL HOLE – GEOLOGICAL LOG

PROJECT WABO POWER PROJECT
FEATURE SADDLE DAM No.1
LOCATION 33.5m from P.W.D.peg 11 at 113°

CO-ORDINATES E 278 336.9 m N 9 231 121.7 m
SYSTEM AMG Zone 55

SURFACE ELEVATION 134.5 m
ANGLE FROM HORIZONTAL 45°
DIRECTION 360°

Rock type	Description of core (rock type – colour, grain size, texture, mineral composition)	Depth (metres)	Structures (joints – spacing, attitude, smoothness, aperture, cementing, coating, filling; bedding, foliation, veins, seams, faults, crushed zones)
	CLAY. Yellow-brown, with roots. Soft.	0–1 (AUGER)	Drilled with auger
	NO CORE	1–2.6	
	Rounded fragments		
	NO CORE		
	Yellow-brown, clayey. Core in fragments, soft.	3–4	
	NO CORE		
	Yellow-brown to dark grey, clayey. Core mostly in fragments and sticks up to 50mm.	4–5.5	Fractures at 45° – 60°
	NO CORE	6	
SILTSTONE	Core mostly in fragments — Yellow-brown / Dark grey	6.5–7	One Fracture at 60°, limonite stained.
	NO CORE	7	
	Dark grey. Core in fragments, weak	8–9	Bedding at 20°. Very closely jointed. Fractures horizontal and at 45°. Some slickensiding.
	Dark grey	9.5	
	NO CORE	10	
	Sandy — Soft fragments dark grey	10.5	Poorly cemented
	NO CORE	11	
	Very sandy, dark grey, very soft core.	11–12.5	Close, irregular fractures. Very poorly cemented. Calcite vein.
	Dark grey, relatively hard	12.5	Joint at 60°.
	NO CORE	13	
	Dark grey. Very soft.	13	
	Fine grained, very silty. Carbonaceous blebs. Very soft.	13.5–14.5	Bedding at 35°.
SANDSTONE	Fine grained, very silty, dark grey. Friable, can be broken easily with fingers.	14.5–17	Bedding indistinct.
	Fine grained, silty, mid to dark grey. Irregular silty and sandy blebs. Rock relatively hard.	17–20	Bedding indistinct. Three fractures at 60°, rough. Minor incipient air slacking.

Core size: NMLC. Elevation: 130 (approx. 6 m), 125 (approx. 13 m).

Drill water loss: FULL WATER RETURN (0 – approx. 11 m); WATER LOSS; NO RETURN; SLIGHT WATER RETURN (approx. 16.5 – 20 m).

Groundwater: 11 Oct 1975; 3 Nov 1975.

Water pressure tests (leakage rates in Lugeon units): NOT TESTED (to approx. 7.5 m); 190; 95; 120; 160.

DRILL	
Make	Mindrill
Type	E 1000
Driller	Boswell
Commenced	16 Aug. 1975
Completed	18 Aug. 1975

FRACTURE LOG: Natural breaks in core per metre. Equivalent lengths of core pieces in centimetres.

EXPLANATION: Core preserved in plastic sheath

WEATHERING
CW - Completely weathered
HW - Highly weathered
MW - Moderately weathered
SW - Slightly weathered
FrSt - Fresh, with limonite stained joints
Fr - Fresh

ENGINEERING GEOLOGY BRANCH
Logged G.A. Frenda
Drawn D.P.
Checked
Sheet 1 of 2
S.M.E.C. Dwg. No. 1429-S3004/1

SNOWY MOUNTAINS ENGINEERING CORPORATION

HOLE No. DD 205

PROJECT WABO POWER PROJECT

DESCRIPTION OF CORE ROCK TYPE—colour, grain size, texture mineral composition	DEGREE OF WEATHERING CORE SIZE	ELEVATION metres DEPTH metres	LOG	CORE LOSS % PER UNIT	STRUCTURES JOINTS—spacing, attitude, smoothness aperture, cementing, coating, filling. BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES	FRACTURE LOG	WATER LOSS	GROUNDWATER LEVEL, DATE	WATER PRESSURE TESTS LEAKAGE RATES IN LUGEON UNITS
As above					As above				
SANDSTONE Fine grained, silty, dark grey. Rock relatively hard.	NMLC	120 21 22 23 24 25			Bedding indistinct ← Calcite vein ← Two fractures at 45° ← Calcite vein		OCCASIONALLY SLIGHT WATER RETURN		110
END OF HOLE 25.00m (RL116.8m)									

FOR LOCATION OF DRILL HOLE AND OTHER RELEVANT INFORMATION, SEE SHEET 1

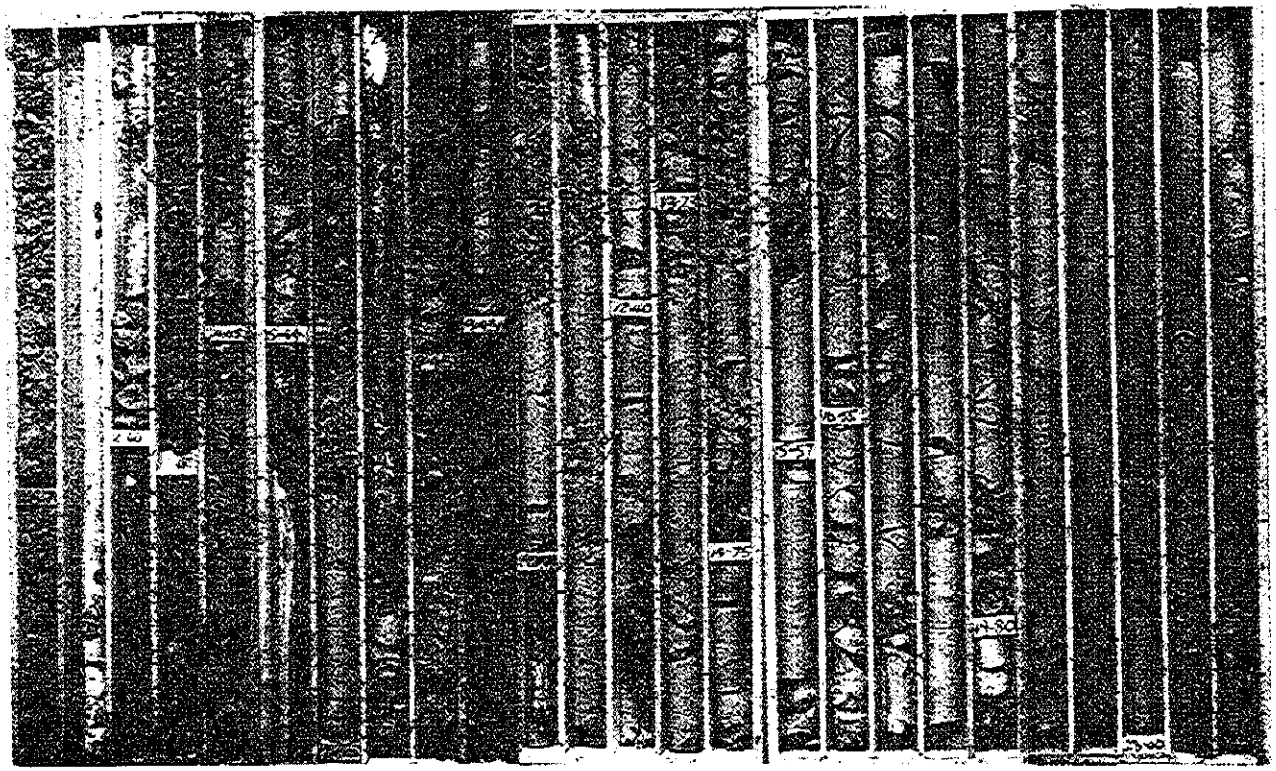
Sheet 2 of 2

Dwg. No. 1429-S3004/2

DIAMOND DRILL HOLE DD205

WABO POWER PROJECT

Negative Nos. 1429/174, 173, 175.



5 10 15 20 25.00 m
END OF HOLE

DEPTH IN METRES

SNOWY MOUNTAINS ENGINEERING CORPORATION

S.M.E.C. – N.K. WABO PROJECT JOINT VENTURE STUDY

HOLE No. DD 206

DIAMOND DRILL HOLE – GEOLOGICAL LOG

PROJECT WABO POWER PROJECT

FEATURE SADDLE DAM No.1

LOCATION 14.3m from P.W.D. peg 18 at 176°

CO-ORDINATES E 278 492.0 m, N 9 230 929.8 m

SYSTEM AMG Zone 55

SURFACE ELEVATION 122.1 m

ANGLE FROM HORIZONTAL 45°

DIRECTION 167°

DESCRIPTION OF CORE ROCK TYPE - colour, grain size, texture, mineral composition.	DEGREE OF WEATHERING	CORE SIZE	metres ELEVATION	metres DEPTH	CASING	LOG	CORE LOSS % PER LIFT	STRUCTURES JOINTS - spacing, attitude, smoothness, aperture, cementing, coating, filling. BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES.	FRACTURE LOG	DRILL WATER LOSS	GROUNDWATER LEVEL, DATE	WATER PRESSURE TESTS LEAKAGE RATES IN LUGEON UNITS
Yellow-brown		AUGER	120	1				Drilled with auger			11 Oct 1975	
NO CORE				2								
Soft, plastic.				3								NOT TESTED
MUDSTONE Dark grey, A few siltstone bands up to 10mm thick. Clay cement.		NMLC		4				Bedding at 45°. A few fractures at 45° and 60°. Core intact, but can readily be broken by hand				
				5								
				6								
				7								
NO CORE				8								
Silty, dark grey				9								
Dark grey			115	10				Numerous, irregular, tight, discontinuous fractures. Incipient crushed zone.				6.0
				11								
				12								
SILTSTONE Dark grey, relatively hard, tending to silty mudstone.				13								0.2
				14							FULL WATER RETURN	
				15				Bedding at top at 45°, not visible elsewhere. A few fractures at 45°, joints at 60° and 75°.				
				16								
			110	17								2.4
				18								
				19								
				20								2.8

DRILL

Make Hindrill

Type E 1000 I

Driller Grech & Mulligan

Commenced 21 Aug 1976

Completed 28 Aug 1976

FRACTURE LOG

Natural breaks in core per metre.

Equivalent lengths of core pieces in centimetres.

Core preserved in plastic sheath

EXPLANATION

WEATHERING

CW - Completely weathered

HW - Highly weathered

MW - Moderately weathered

SW - Slightly weathered

FrSt - Fresh, with limonite stained joints

Fr - Fresh

ENGINEERING GEOLOGY BRANCH

Logged G.A. Freuds

Drawn D.P.

Checked

Sheet 1 of 2

S.M.E.C. Dwg. No. 1429-S3005/1

PROJECT WABO POWER PROJECT

DESCRIPTION OF CORE (ROCK TYPE—colour, grain size, texture, mineral composition)	DEPTH (metres)	STRUCTURES (JOINTS—spacing, attitude, smoothness, aperture, cementing, coating, filling. BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES)	WATER PRESSURE TESTS (LEAKAGE RATES IN LUGEON UNITS)
SILTSTONE relatively hard. Dark grey, tending to silty mudstone.	21–22	Bedding not visible. A few fractures at 45°, joints at 60°, one at 75°.	2.8
MUDSTONE: Dark grey to black	22–24.9	Parts readily at right angles to the axis of core, possibly due to drilling stresses. A few fractures at 45°. Incipient air slacking	
NO CORE	24.9–25.1		
SILTSTONE-MUDSTONE bands. Very dark grey, carbonaceous. Soft.	25.1–26	Close fractures	
SILTSTONE, dark grey. Core broken due to drilling. Fairly friable.	26–27.3		
MUDSTONE. Core recovered as fragments →	27.3–29.74	Numerous irregular fractures through core. Incipient crushed zone.	2.0

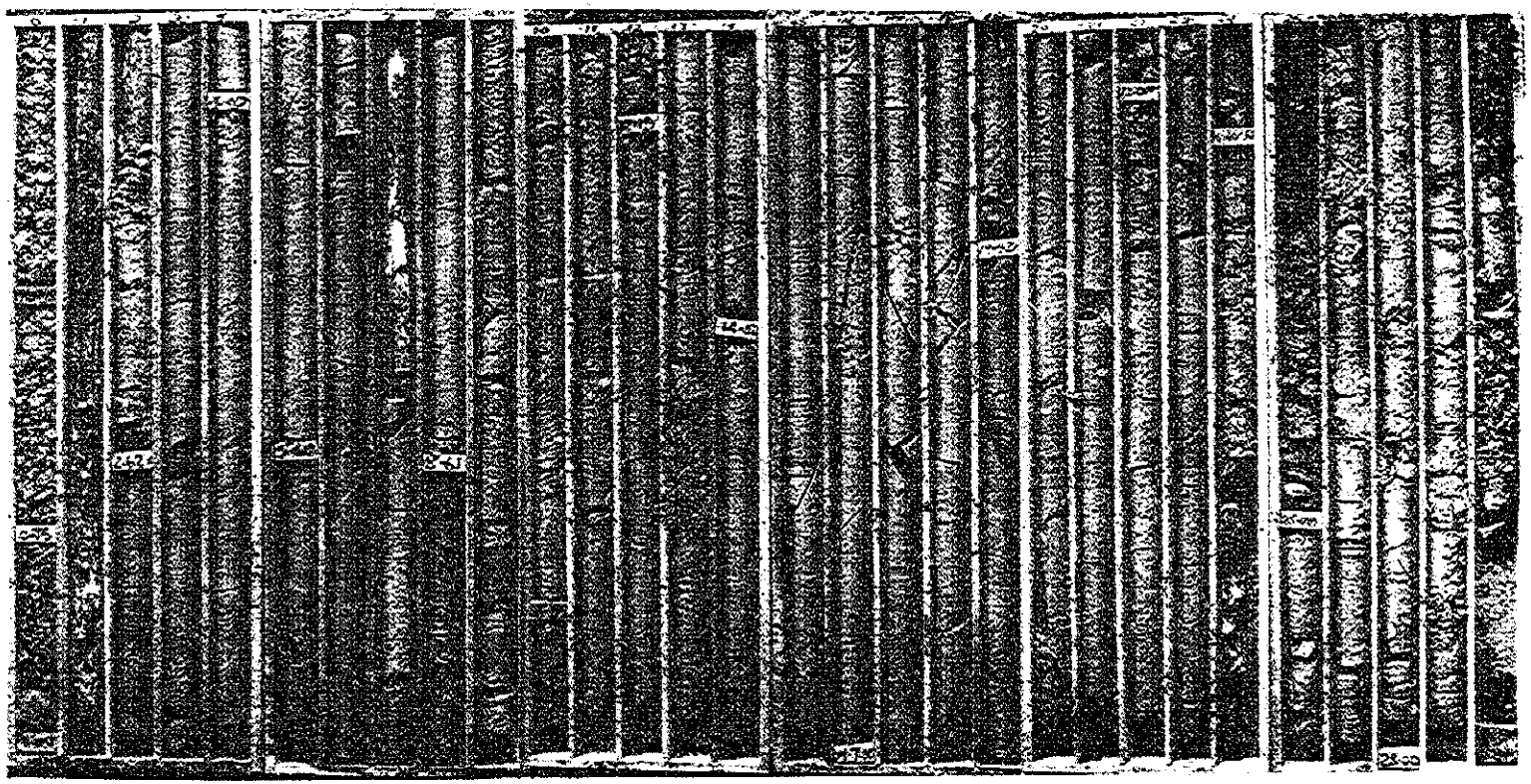
Core size: NMC. Elevation: 105. Fluid: FULL WATER RETURN

END OF HOLE 29.74m (RL101.1m)

DIAMOND DRILL HOLE DD206

WABO POWER PROJECT

Negative Nos. 1429/188, 192, 190.



5 10 15 20 25 29.74 m
END OF HOLE

DEPTH IN METRES

SNOWY MOUNTAINS ENGINEERING CORPORATION

S.M.E.C. – N.K. WADO PROJECT JOINT VENTURE STUDY

DIAMOND DRILL HOLE – GEOLOGICAL LOG

HOLE No. DD 207

PROJECT WADO POWER PROJECT

FEATURE SADDLE DAM No.1

LOCATION 6.8m from P.M.D. peg 27 at 229°

CO-ORDINATES E 278 607.0 m, N 9 230 661.2 m

SYSTEM AMG Zone 55

SURFACE ELEVATION 142.4 m

ANGLE FROM HORIZONTAL 90°

DIRECTION –

DESCRIPTION OF CORE (ROCK TYPE – colour, grain size, texture, mineral composition)	DEPTH (m)	STRUCTURES (JOINTS – spacing, attitude, smoothness, aperture, cementing, coating, filling. BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES)
SILTSTONE and SANDSTONE Yellow-brown. Core in fragments.	0–2	Drilled with auger.
NO CORE		
SILTSTONE. Yellow-brown.	3	Crushed zone.
NO CORE		
MUDSTONE. Dark grey. Core soft and saturated	4	Crushed zone.
NO CORE	5	
SILTSTONE relatively hard. Dark grey	6	Crushed zone. Very close, intersecting fractures.
NO CORE		
Core saturated but locally relatively hard.	7	Crushed zone.
NO CORE	8	
Dark grey, soft.	9	Crushed zone.
NO CORE		
Soft.	10	Crushed zone.
Dark grey, silty.	11	Closely jointed. Tight intersecting joints, mostly at 60°– 70°.
NO CORE		
Dark grey	12	Crushed zone
Silty, relatively hard.		Bedding at 45°. Close fractures.
	13	Crushed zone.
Dark grey. Soft		Close fractures.
SILTSTONE and MUDSTONE bands. Relatively hard.	14–15	Bedding at 45°. Core broken by two sets of joints at 75°.
SILTSTONE. A few thin mudstone bands. Core relatively hard.	16	Bedding at 45°. Core parts readily along bedding planes.
SANDSTONE, fine grained, very silty to SILTSTONE. Mid to dark grey.	17–20	Bedding at 45°. A few partings along bedding, otherwise sound. Two joints at 70°.
END OF HOLE 20.00m (RL122.4m)		

MUDSTONE (approx. 5–13 m)

Core size: AUGER (0–2.5 m); NMLC

Elevation: 140, 135, 130, 125

Water level: 11 Oct 1975; 3 Nov 1975

Drill water loss: FULL WATER RETURN

Water pressure tests (leakage rates in Lugeon units): NOT TESTED; 75; 10; 0.6

DRILL	
Make	Mindrill
Type	E 1 000
Driller	Grech & Mulligan
Commenced	29 Aug 1975
Completed	1 Sep 1975

EXPLANATION

FRACTURE LOG: Natural breaks in core per metre. Equivalent lengths of core pieces in centimetres.

Core preserved in plastic sheath

WEATHERING

CW – Completely weathered
HW – Highly weathered
MW – Moderately weathered
SW – Slightly weathered
FrSt – Fresh, with limonite stained joints
Fr – Fresh

ENGINEERING GEOLOGY BRANCH

Logged G.A. Frenda
Drawn D.P.
Checked
Sheet 1 of 1
S.M.E.C. Dwg. No. 1429-S3006/1

DIAMOND DRILL HOLE DD207

WABO POWER PROJECT

SNOWY MOUNTAINS ENGINEERING CORPORATION

S.M.E.C. – N.K. WARD PROJECT JOINT VENTURE STUDY

HOLE No. DD 208

DIAMOND DRILL HOLE – GEOLOGICAL LOG

PROJECT WARD POWER PROJECT

FEATURE SADDLE DAM No.1

LOCATION 8.4m from P.W.D. peg 33 at 343°

CO-ORDINATES E 278 300.1 m, N 9 231 760.8 m

SYSTEM AMG Zone 56

SURFACE ELEVATION 98.4 m

ANGLE FROM HORIZONTAL 45°

DIRECTION 203°

DESCRIPTION OF CORE ROCK TYPE – colour, grain size, texture, mineral composition	DEGREE OF WEATHERING	CORE SIZE	ELEVATION metres	DEPTH metres	LOG	CORE LOSS % PER LIFT	STRUCTURES JOINTS – spacing, attitude, smoothness, aperture, cementing, coating, filling. BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES.	FRACTURE LOG	DRILL WATER LOST	GROUNDWATER LEVEL RATE	WATER PRESSURE TESTS LEAKAGE RATES IN LUGEON UNITS
SOIL and MUDSTONE, light brown, plastic.				1			Featureless				
NO CORE				2							
Light brown, plastic							Featureless				
NO CORE				3							
Brown				4			Joint at 60°, rough. Joint at 50°, curved, slickensided.				
NO CORE											
Mainly brown but some grey				5			Joint at 20°, curved, smooth, clean. Joints at 50°, 70°, slickensided.				
NO CORE				6							
Brown to grey							Some crushing but core is locally intact				
NO CORE				7							
Orange – brown to grey with limonite staining							Many core breaks caused by drilling. Some crushing				
NO CORE				8							
				9			3 joints at 30°, closely spaced, smooth, clean.				
NO CORE				10							
							Much crushing. Joints at 70°, slickensided.				
Grey, silty, a few carbonaceous flecks.				11							
				12			Fractures are mostly horizontal partings or drilling breaks, spaced approximately 0.1m. Joints mainly at 40°– 50°, a few at 70°– 80°, spaced 0.3m. Rough faces, irrigular.				
				13							
				14							
NO CORE				15							
				16							
				17			Bedding at 35°. A few joints at 60°. Most fractures are due to drilling. Incipient air slacking.				
				18							
				19							
Dark grey				20							

MUDSTONE

195 NMLC 190 185

FULL WATER RETURN

HOLE BLOCKED 12 NOV 1975

NOT TESTED

26

150

28

DRILL
Make Mindrill
Type E 1000

Driller L. Buswell
Commenced 2 Sept 1975
Completed 12 Sept 1975

FRACTURE LOG
Natural breaks in core per metre.
Equivalent lengths of core pieces in centimetres.

Core preserved in plastic sheath

EXPLANATION

WEATHERING
CW - Completely weathered
HW - Highly weathered
MW - Moderately weathered
SW - Slightly weathered
FrSt - Fresh, with limonite stained joints
Fr - Fresh

ENGINEERING GEOLOGY BRANCH
Logged Radford & Frenda
Drawn D.P.
Checked

Sheet 1 of 3

S.M.E.C. Dwg. No. 1429-S3007/1

SNOWY MOUNTAINS ENGINEERING CORPORATION

HOLE No. DD 208

PROJECT WABO POWER PROJECT

Rock type	Description of core	Depth (metres)	Structures
MUDSTONE	Recovered as plastic fragments; soft.	20–22	Structures indistinct. Minor slickensiding.
MUDSTONE	Dark grey, weak. Core caked with mud by drilling.	22–23	Bedding indistinct.
MUDSTONE	Dark grey, weak. Core recovered as angular fragments, broken by drilling.	23–25	Minor slickensiding.
MUDSTONE	Dark grey	25–30	←Subvertical joint. Crushed zone. Crushed zone. Close, irregular jointing. Crushed zone, slickensided. Joints mostly subvertical and at 45°– 65°, closely spaced. Core fretted by drilling. Bedding indistinct. Crushed zone, slickensided, saturated.
SILTSTONE	SILTSTONE, clayey, dark grey	30–30.3	Subvertical joint. Core broken.
MUDSTONE	MUDSTONE Dark grey, weak	30.3–31.5	Few joints, but numerous irrigular fractures, coated with mud.
SILTSTONE	With mudstone bands, dark grey, clayey	31.5–34.5	Bedding at 30°– 35° Very few joints. Minor irrigular fractures. common. Core stronger than above. Crushed zone.
MUDSTONE	MUDSTONE, silty and SILTSTONE Dark grey. Core fragments soft and saturated.	34.5–36.7	Minor crushed zone, core fragmented, possibly due to sub-parallel joints. Minor calcite and slickensiding. Centre of anticline.
MUDSTONE	Minor siltstone bands, dark grey. Core in longer sticks and stronger	36.7–39.5	Bedding at 80° ← A few subvertical joints cause greater local fracturing.
MUDSTONE	Very silty, dark grey.	39.5–40.6	Core in fragments due to sub-vertical joint.
MUDSTONE	Silty, dark grey	40.6–44	Moderately crushed zone. Core recovered as slickensided fragments. Bedding at 80°– 90°. Core mostly in unbroken sticks.

Core size: NMLC. Elevation (metres): 80 (at approx. 26 m), 75 (at approx. 33 m), 70 (at approx. 40 m).

Drill water: FULL WATER RETURN (to approx. 25 m); NO WATER RETURN (approx. 25–30 m).

Water pressure tests (leakage rates in Lugeon units): 29; 22; 6.0; 2.2; 3.2

FOR LOCATION OF DRILL HOLE AND OTHER RELEVANT INFORMATION, SEE SHEET 1

Sheet 2 of 3

Dwg. No. 1429-S3007/2

SNOWY MOUNTAINS ENGINEERING CORPORATION

HOLE No. DD 208

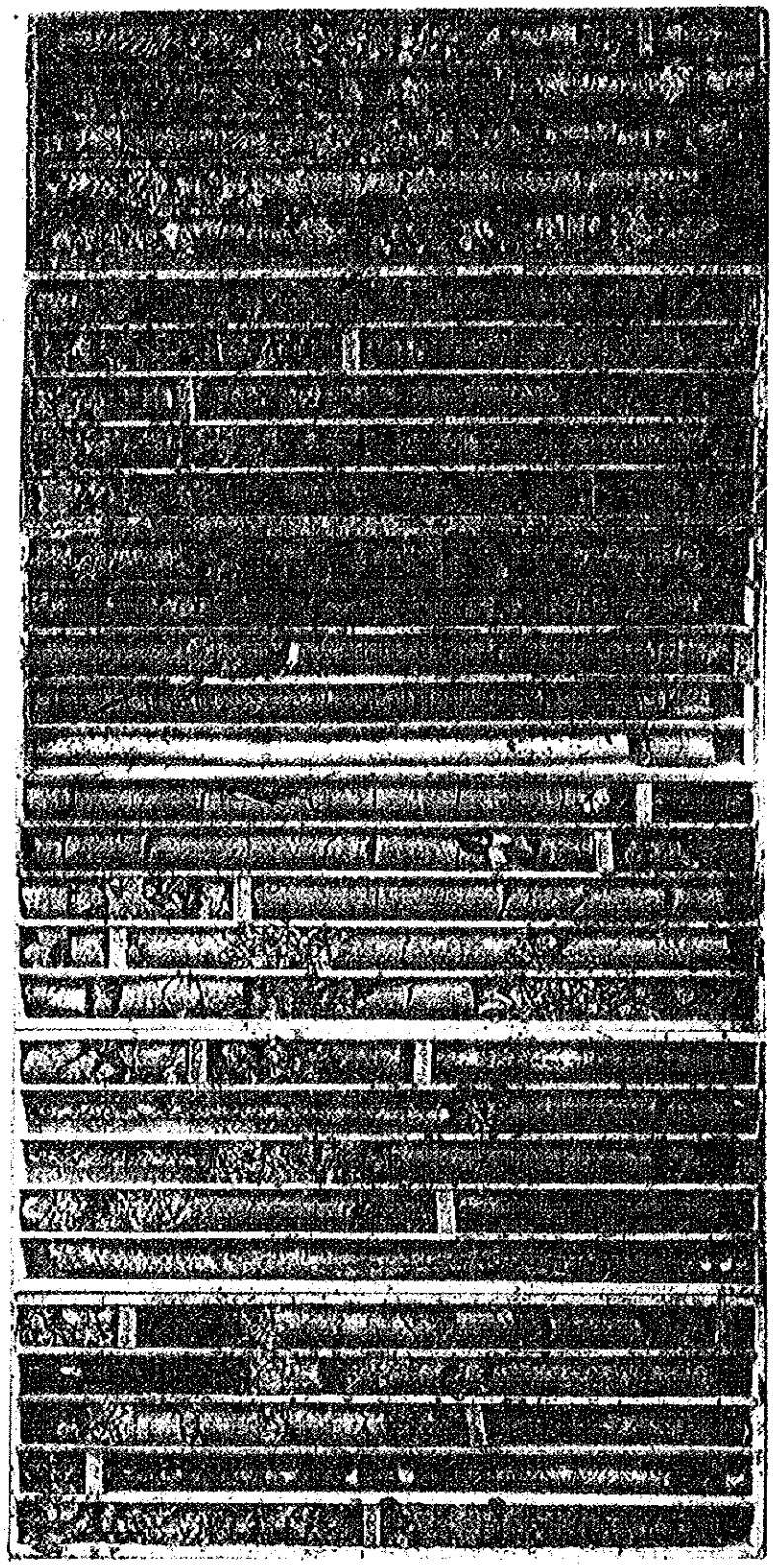
PROJECT WABO POWER PROJECT

DESCRIPTION OF CORE ROCK TYPE—colour, grain size, texture mineral composition	DEGREE OF WEATHERING FR SW MW HW CW	CORE SIZE	ELEVATION metres DEPTH metres	LOG	CORE LOSS % PER LIFT	STRUCTURES JOINTS—spacing, attitude, smoothness aperture, cementing, coating, filling, BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES	FRACTURE LOG	WATER LOSS	GROUNDWATER LEVEL, DATE	WATER PRESSURE TESTS LEAKAGE RATES IN LUGEON UNITS
MUDSTONE Silty, dark grey Core mostly in unbroken sticks		NMLC	45			Bedding at 80° – 90° Fracture at 80°		NO WATER RETURN		3.2
Core in fragments			46			Fractures steep, slickensided. Minor calcite.				
			47							
			48			Bedding at 60°				2.4
			49			Fragmented zones due to steeply dipping fractures				
NO CORE			50			Core slipped out of barrel during pulling.				
END OF HOLE 50.00m (RL63.0m)										

FOR LOCATION OF DRILL HOLE AND OTHER RELEVANT INFORMATION, SEE SHEET 1

Sheet 3 of 3

Dwg. No. 1429-S300//3

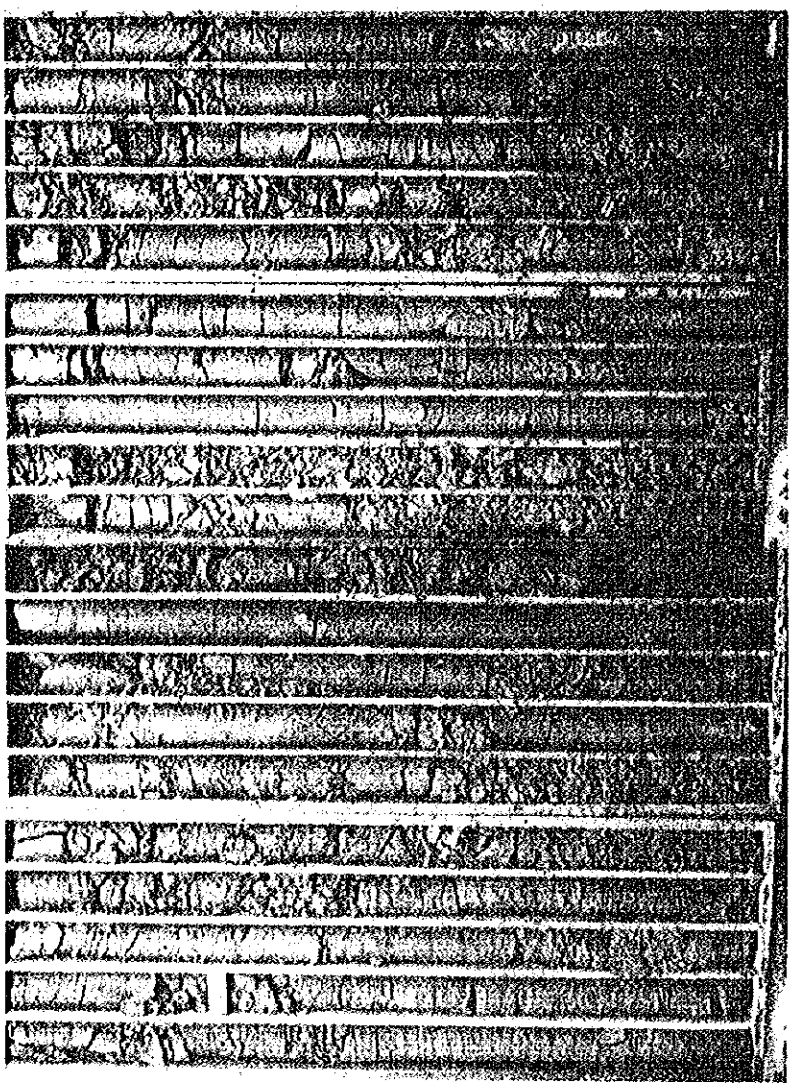


Negative Nos. 1429/198, 199, 385, 386.

DIAMOND DRILL HOLE DD208

WABO POWER PROJECT

SHEET 1 of 2



DIAMOND DRILL HOLE DD208

WABO POWER PROJECT

SHEET 2 of 2

SNOWY MOUNTAINS ENGINEERING CORPORATION

S.M.E.C. – N.K. WABO PROJECT JOINT VENTURE STUDY

DIAMOND DRILL HOLE – GEOLOGICAL LOG

HOLE No. DD 209

PROJECT: WABO POWER PROJECT

FEATURE: SADDLE DAM No.1

LOCATION: 27.8m from P.W.D. peg 41 at 356°

CO-ORDINATES E 278 412.0 m; N 9 232 054.6 m

SYSTEM A.M.G. Zone 55

SURFACE ELEVATION 122.3 m

ANGLE FROM HORIZONTAL 45°

DIRECTION 180°

Columns: DESCRIPTION OF CORE (ROCK TYPE - colour, grain size, texture, mineral composition) | DEGREE OF WEATHERING | CORE SIZE | ELEVATION (metres) | DEPTH | LOG | CORE LOSS % PER LIFT | STRUCTURES (JOINTS - spacing, attitude, smoothness, aperture, cementing, coating, filling. BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES.) | FRACTURE LOG | DRILL WATER | GROUNDWATER LEVEL/DATE | WATER PRESSURE TESTS (LEAKAGE RATES IN LUGEON UNITS)

Depth (m)	Description of core	Structures
0–3.4	Silty, yellow-brown. Recovered as soft, plastic core.	
3.4–5.6	Silty, dark grey. Semi-plastic core	On breaking, core shows close limonite stained fractures, commonly steep dipping. Clay cemented.
5.6–7.0	Silty, dark grey. Recovered as weak fragments	
7.0–8.4	Weak rock	One steeply dipping joint
8.4–10.0		Crushed zone. Fractures are steep and at 45°, slickensided.
10.0–10.3	Very silty	Bedding indistinct
10.3–10.7		Crushed zone
10.7–11.9		Fractures due to steep, sub-parallel joints
11.9–12.6		Crushed zone. Close, irregular fractures
12.6–14.5	Rock weak, crumbly	Incipient, close fractures. Cracks, normal to core axis, may be due to drilling. Steep joints sub-parallel to core axis
14.5–15.5	Core in fragments	Closely spaced fractures
15.5–20	Rock weak, breaks easily to fragments	Bedding indistinct. Several fractures at 65°. Incipient fractures at 45° and 0°. Very little slickensiding. Core fretted and sheared during drilling

Rock type from 7.0 m: MUDSTONE. Silty, dark grey. Carbonaceous flecks common.

Core size: NXC (to ~8 m), NMLC (below). Elevation marks: 120, 115, 110.

Groundwater: HOLE BLOCKED 11 OCT 1975 (from ~1.5 m); WATER LOST (~7.5–10.5 m); NO WATER RETURN (below ~10.5 m).

Water pressure tests: NOT TESTED (to ~7 m); 50; 75; 27; 7.5

DRILL	
Make	Mindrill
Type	E 1 000
Driller	L. Buswell
Commenced	12 Sep 1975
Completed	15 Sep 1975

EXPLANATION

FRACTURE LOG: Natural breaks in core per metre. Equivalent lengths of core pieces in centimetres.

Core preserved in plastic sheath

WEATHERING: CW - Completely weathered; HW - Highly weathered; MW - Moderately weathered; SW - Slightly weathered; FrSt - Fresh, with limonite stained joints; Fr - Fresh

ENGINEERING GEOLOGY BRANCH

Logged G.A. Frenda

Drawn D.P.

Checked

Sheet 1 of 2

S.M.E.C. Dwg. No. 1429-SJ008/1

SNOWY MOUNTAINS ENGINEERING CORPORATION

HOLE No. DD 209

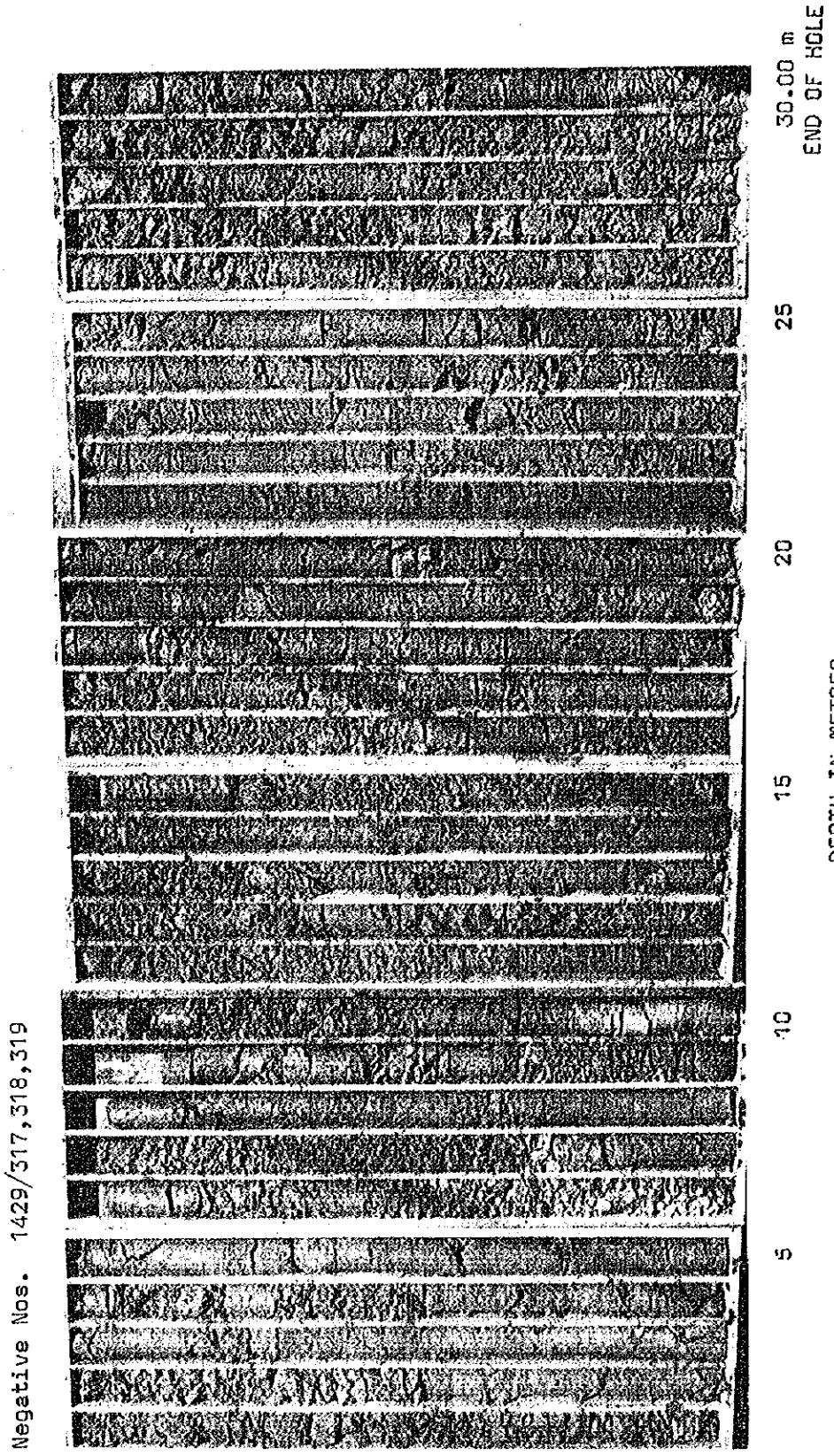
PROJECT WADO POWER PROJECT

DESCRIPTION OF CORE ROCK TYPE—colour, grain size, texture mineral composition	DEGREE OF WEATHERING CORE SIZE ELEVATION metres DEPTH metres GEOLOGIC UNITS LOG	CORE LOSS % PER UNIT	STRUCTURES JOINTS—spacing, attitude, smoothness aperture, cementing, coating, filling, BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES	FRACTURE LOG	WATER LOSS DRILL WATER	GROUNDWATER LEVEL, DATE	WATER PRESSURE TESTS LEAKAGE RATES IN LUGEON UNITS	
MUDSTONE Dark grey, silty. Minor carbonaceous blebs.	21 22 23 24 25		Bedding indistinct. Several fractures at 65°. Incipient fractures at 45° and 0°. Very little slickensiding. Core fretted and sheared during drilling		NO WATER RETURN		9.5	
Core in fragments	26		Closely spaced joints					
Weak, crumbly	27 28						4.4	
Core in fragments	29		Closely spaced joints					
	30		Bedding indistinct					
END OF HOLE 30.00m (RL101.1m)								

FOR LOCATION OF DRILL HOLE AND OTHER RELEVANT INFORMATION, SEE SHEET 1

Sheet 2 of 2

Dwg. No. 1429-S3008/2



DIAMOND DRILL HOLE DD209

WABO POWER PROJECT

SNOWY MOUNTAINS ENGINEERING CORPORATION

S.M.E.C. – N.K. WABO PROJECT JOINT VENTURE STUDY

HOLE No. DD 210

DIAMOND DRILL HOLE – GEOLOGICAL LOG

PROJECT: WABO POWER PROJECT

FEATURE: SADDLE DAM No. 2

LOCATION: 17.7m from P.W.D. peg 54 at 286°

CO-ORDINATES (scaled): E 278 576.3 m, N 9 232 465.6 m

SYSTEM: AMG Zone 55

SURFACE ELEVATION: 147.9 m

ANGLE FROM HORIZONTAL: 45°

DIRECTION: 225°

DESCRIPTION OF CORE – ROCK TYPE – colour, grain size, texture, mineral composition	DEGREE OF WEATHERING	CORE SIZE	ELEVATION metres	DEPTH metres	LOG	LIFTS	CORE LOSS % PER LIFT	STRUCTURES – JOINTS – spacing, attitude, smoothness, aperture, cementing, coating, filling. BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES.	FRACTURE LOG	DRILL WATER LOSS	PIEZOMETER WATER LEVEL RATE	WATER PRESSURE TESTS – LEAKAGE RATES IN LUGEON UNITS
TOP SOIL. Clayey, brown, with roots.												
MUDSTONE, brown. Core in fragments.												
NO CORE				3								
Sandy, very fine grained.				4								NOT TESTED
NO CORE				5								
Sandy very fine grained, Fragments in sandy clay.				5								
SANDY SILTSTONE – SILTY SANDSTONE. Grey				6				Crushed, slickensided, closely jointed				
Brown, fine grained, friable				7				Rough, irregular joints				
Grey, very silty, fine grained				8				Joints at 30°, spaced 0.1m. Joints at 80°, spaced 1–1.5m. Much crushing and slickensiding.				
Brown, very silty, very fine grained				10				Limonite staining on cores has formed after the core was recovered.				
NO CORE				11								
SANDSTONE												
Grey, silty, friable				12				Joints at 50° are clean, smooth, and perpendicular to bedding. Spacing 50–300mm. Joints at 30°, rough and clean, spaced at irregular intervals. Joints at 80° are clean, smooth, spaced 1m. Frequent bedding plane partings. Crushed zones are common, frequently showing slickensiding.				
Sand content gradually decreases.				16								
SILTSTONE												
Grey, very fine grained, sandy				18								
Sand content decreases				20								

NO WATER RETURN – FULL WATER RETURN – 3 NOV 1975

80

85

100

0.7

DRILL

Make: Mindrill

Type: E 1 000

Driller: Grech & Mulligan

Commenced: 17 Sep 1975

Completed: 24 Sep 1975

FRACTURE LOG

Natural breaks in core per metre.

Equivalent lengths of core pieces in centimetres.

Core preserved in plastic sheath

EXPLANATION

WEATHERING

CW – Completely weathered

HW – Highly weathered

MW – Moderately weathered

SW – Slightly weathered

FrSt – Fresh, with limonite stained joints

Fr – Fresh

ENGINEERING GEOLOGY BRANCH

Logged: B.V. Radford

Drawn: D.P.

Checked:

Sheet 1 of 3

S.M.E.C. Dwg. No. 1429-S3009/1

SNOWY MOUNTAINS ENGINEERING CORPORATION

HOLE No. DD 210

PROJECT: WABO POWER PROJECT

DESCRIPTION OF CORE ROCK TYPE—colour, grain size, texture mineral composition	DEGREE OF WEATHERING (Fr, SW, MW, HW, CW)	CORE SIZE	ELEVAT'N	DEPTH	LOG	LIFTS	CORE LOSS % PER LIFT	STRUCTURES JOINTS—spacing, attitude, smoothness aperture, cementing, coating, filling, BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES	FRACTURE LOG	DRILL WATER LOSS	GROUNDWATER LEVEL, DATE	WATER PRESSURE TESTS LEAKAGE RATES IN LUGEON UNITS
SILTSTONE Grey		NMLC	130	21–25				Joints at 20° and 70°, spaced 0.25m, clean, curved, rough to smooth. Bedding plane partings frequent. Slickensided crushed zones 0.1 to 0.6m wide also occur.		NO WATER RETURN		0.7
				25–30				Two joints at 70° - 80°, fairly rough, clean, curved, spaced 1m. All other breaks are drilling breaks or bedding plane partings at 45°.				0.1
			125	31				Crushed zone				
				32–33				Two curved joints, near vertical, fairly rough.				1.1
SILTSTONE, fine sandy or SANDSTONE, silty, fine grained. Grey.				35–36				Two near vertical joints, curved, fairly rough.				
				37–38				Near vertical joints, curved, rough.				150
SILTSTONE Grey			120	41–42				Crushed zone				
				42–44				Rough, curved near vertical joints.				5.3

Core broken by drilling along bedding planes at 45° and also sub-horizontally

FOR LOCATION OF DRILL HOLE AND OTHER RELEVANT INFORMATION, SEE SHEET 1

Sheet 2 of 3

Dwg. No. 1429-S3009/2

SNOWY MOUNTAINS ENGINEERING CORPORATION

HOLE No. DD 210

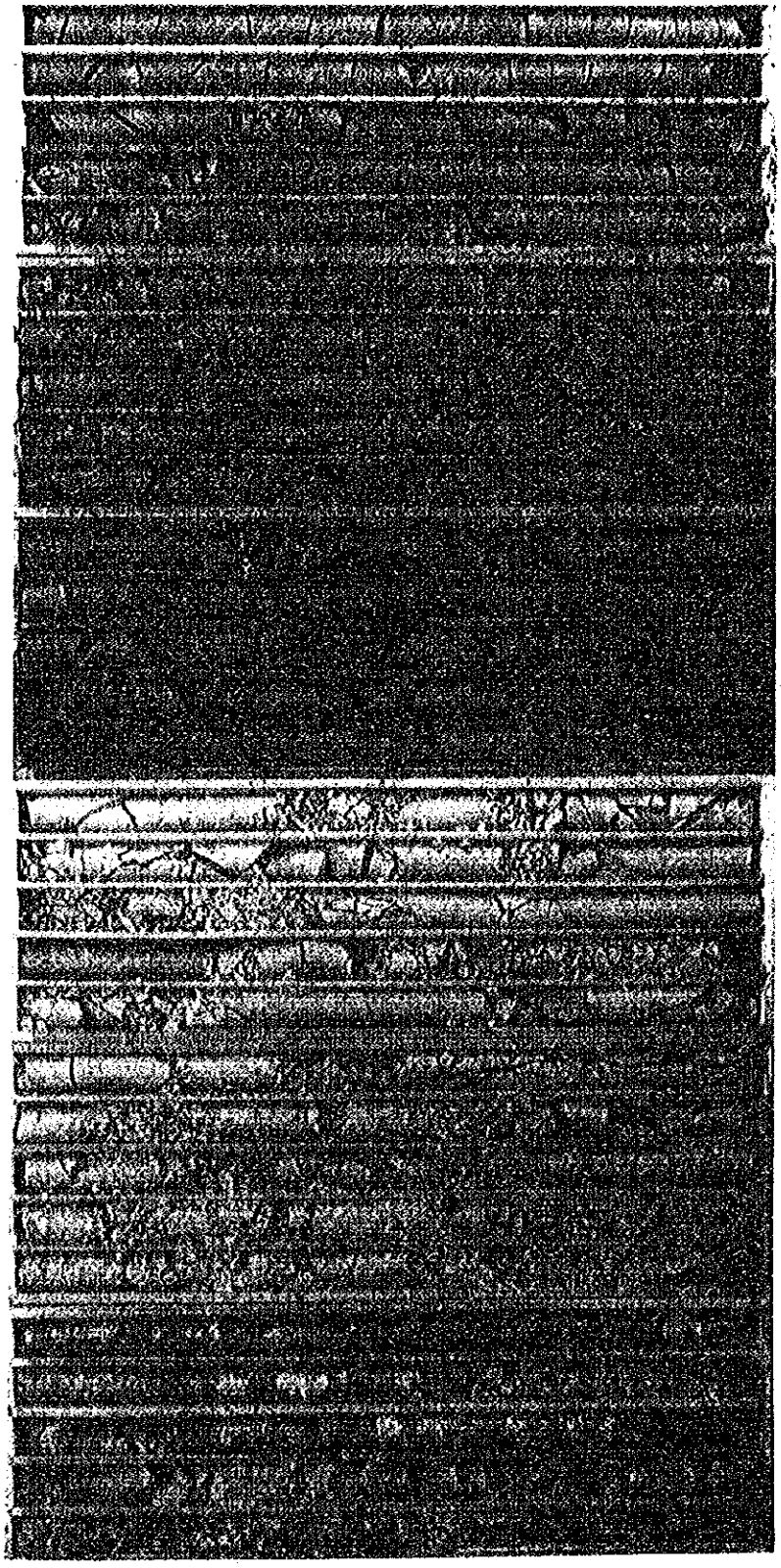
PROJECT WADO POWER PROJECT

DESCRIPTION OF CORE ROCK TYPE—colour, grain size, texture mineral composition	DEGREE OF WEATHERING	CORE SIZE	RELEVANT DEPTH	LOG	CORE LOSS % PER LIFT	STRUCTURES JOINTS—spacing, attitude, smoothness aperture, cementing, coating, filling. BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES	FRACTURE LOG	DRILL WATER LOSS	GROUNDWATER LEVEL DATE	WATER PRESSURE TESTS LEAKAGE RATES IN LUGEON UNITS
SILTSTONE, grey.		NMLC	45 46 47 48 49 50			Three joints at 70°, perpendicular to bedding, rough, curved.		NO WATER RETURN		5.3
SANDSTONE, silty, grey, fine grained, friable.						Joint at 60°, rough, curved, clean.				
SILTSTONE grey						Calcite vein 10mm thick.				
END OF HOLE 50.00m (RL112.5m)										

FOR LOCATION OF DRILL HOLE AND OTHER RELEVANT INFORMATION, SEE SHEET 1

Sheet 3 of 3

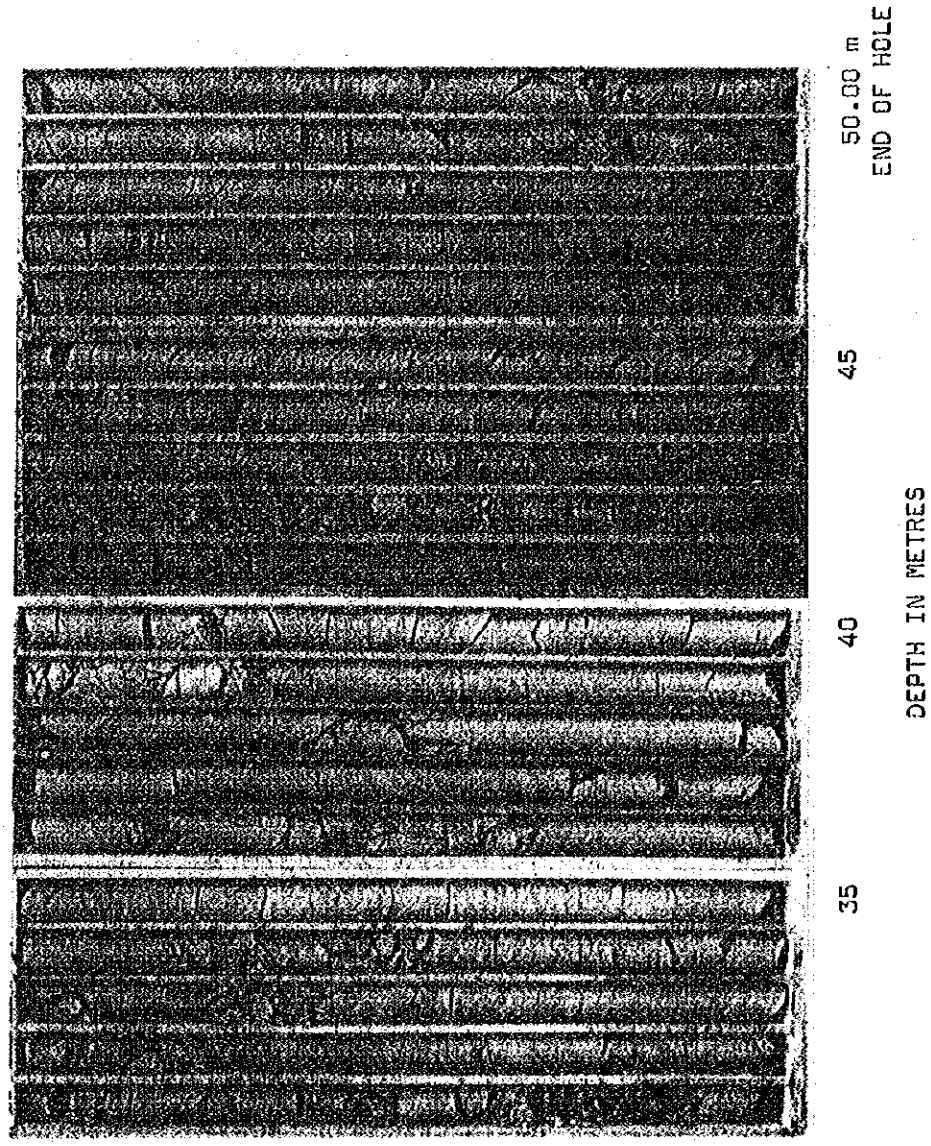
Dwg. No. 1429-S3009/3



Negative Nos. 1429/323,324,325,326

DIAMOND DRILL HOLE DD210

WABO POWER PROJECT



DIAMOND DRILL HOLE DD210

WABO POWER PROJECT

SHEET 2 of 2

SNOWY MOUNTAINS ENGINEERING CORPORATION

S.M.E.C. - N.K. WABO POWER PROJECT JOINT VENTURE STUDY

HOLE No. OD 211

DIAMOND DRILL HOLE - GEOLOGICAL LOG

PROJECT WABO POWER PROJECT

FEATURE SADDLE DAM No. 2

LOCATION 6.2m from P.W.D. peg 9 at 008°

CO-ORDINATES E 278 696.8 m, N 9 232 580.8 m

SYSTEM AMG Zone 55

SURFACE ELEVATION 123.4 m

ANGLE FROM HORIZONTAL 45°

DIRECTION 208°

DESCRIPTION OF CORE ROCK TYPE - colour, grain size, texture, mineral composition	DEGREE OF WEATHERING	CORE SIZE	ELEVATION (metres)	DEPTH (metres)	LOG	CORE LOSS % PER LIFT	STRUCTURES JOINTS - spacing, attitude, smoothness, aperture, cementing, coating, filling. BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES.	FRACTURE LOG	DRILL WATER LOSS	GROUNDWATER LEVEL (date)	WATER PRESSURE TESTS LEAKAGE RATES IN LUGEON UNITS
Yellow-brown, recovered as fragments		AUGER		1			Drilled by hand auger				
NO CORE				2							
Yellow clay, soft, plastic				3							
Yellow, weak fragments											
NO CORE				4							
Mid-grey and yellow mottling, weak core and fragments			120	5			Highly fractured		WATER LOST	HOLE BLOCKED 11 Oct 1975	NOT TESTED
NO CORE											
Very weak core				6			Crushed zone. Fractures at 45° common				
NO CORE				7							
Dark grey				8			Crushed zone. Bedding at 0°. Fracturing parallel to bedding common.				
NO CORE											
Dark grey. A few sandy bands. Inherently weak material				9			Crushed zone. Bedding at 0°. Fracturing at 45° common.				
NO CORE				10							175
				11							
		NMLC	115	12			Crushed zone. Direction of fracturing indistinct, possibly at 45° towards base.		NO WATER RETURN	HOLE BLOCKED 12 Nov 1975	
				13							
				14							160
				15							
Mid-grey, silty. Core much stronger than above.				16			← Sub-parallel fractures				
				17			Bedding unclear. Close, subhorizontal fractures.				
Dark grey. Weak core				18			Bedding at 35°.				7.5
Dark grey, silty. Core stronger			110				Bedding at 50° - 60°. A few fractures at 65° and 45°, calcite cemented. Faint incipient air slacking.				
Clayey, dark grey. Rock stronger				19							
				20							

MUDSTONE

SILTSTONE

DRILL

Make Mindrill

Type E 1 000

Driller Grech & Mulligan

Commenced 27 Sep 1975

Completed 8 Oct 1975

FRACTURE LOG

Equivalent lengths of core pieces in centimetres.

Core preserved in plastic sheath

EXPLANATION

Natural breaks in core per metre.

WEATHERING

CW - Completely weathered

HW - Highly weathered

MW - Moderately weathered

SW - Slightly weathered

FrSt - Fresh, with limonite stained joints

Fr - Fresh

ENGINEERING GEOLOGY BRANCH

Logged G.A. Frenda

Drawn D.P.

Checked

Sheet 1 of 3

S.M.E.C. Dwg. No. 1429-S3010/1

SNOWY MOUNTAINS ENGINEERING CORPORATION

HOLE No. DD 211

PROJECT MABO POWER PROJECT

DESCRIPTION OF CORE ROCK TYPE—colour, grain size, texture mineral composition	DEGREE OF WEATHERING FR SW MW HW CW	CORE SIZE	ELEVATION metres	DEPTH metres	LOG	SCALE	CORE LOSS % PER LIFT	STRUCTURES JOINTS—spacing, attitude, smoothness aperture, cementing, coating, filling, BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES	FRACTURE LOG	WATER LOSS	GROUNDWATER LEVEL, DATE	WATER PRESSURE TESTS LEAKAGE RATES IN LUGEON UNITS
SILTSTONE As above								As above				7.5
MUDSTONE, silty, dark grey. Fairly strong core.				21				Bedding at 65° and 45°. Two joints at 75°.				
Mid-grey. Sandstone lenticles up to 5mm, clayey. Core in fragments				22 23				Bedding at 45°.				16.7
				24				Two sub-vertical joints. Three joints at 45°.				
				25				Incipient air slacking.				
			105	26								
				27								
				28				Bedding at 45°- 50°.				3.3
				29				A few fractures at 45°. Subvertical joints.				
				30								
				31								
		NMC		32				Fracture at 45°				
Mid-grey, a few sandstone lenticles. Very clayey.			100	33				Two fractures at 45° Bedding at 50°				3.7
				34								
				35								
				36								
				37								3.0
				38								
SILTSTONE, clayey or MUDSTONE, silty, dark grey.			95	39 40				Bedding at 50°. Core fretted and broken, possibly due to drilling				3.0
Silty, dark grey. Siltstone bands and lenticles up to 5mm common. Relatively strong core.				41				Bedding at 50°.				
				42				Three fractures at 45°. Core shows many sub-horizontal tension fractures, possibly due to drilling stresses and drying.				2.0
				43								
				44				Sub-vertical fracture				

SILTSTONE, relatively strong.

MUDSTONE

WATER RETURN — NO WATER RETURN

FOR LOCATION OF DRILL HOLE AND OTHER RELEVANT INFORMATION, SEE SHEET 1

SNOWY MOUNTAINS ENGINEERING CORPORATION

HOLE No. DD 211

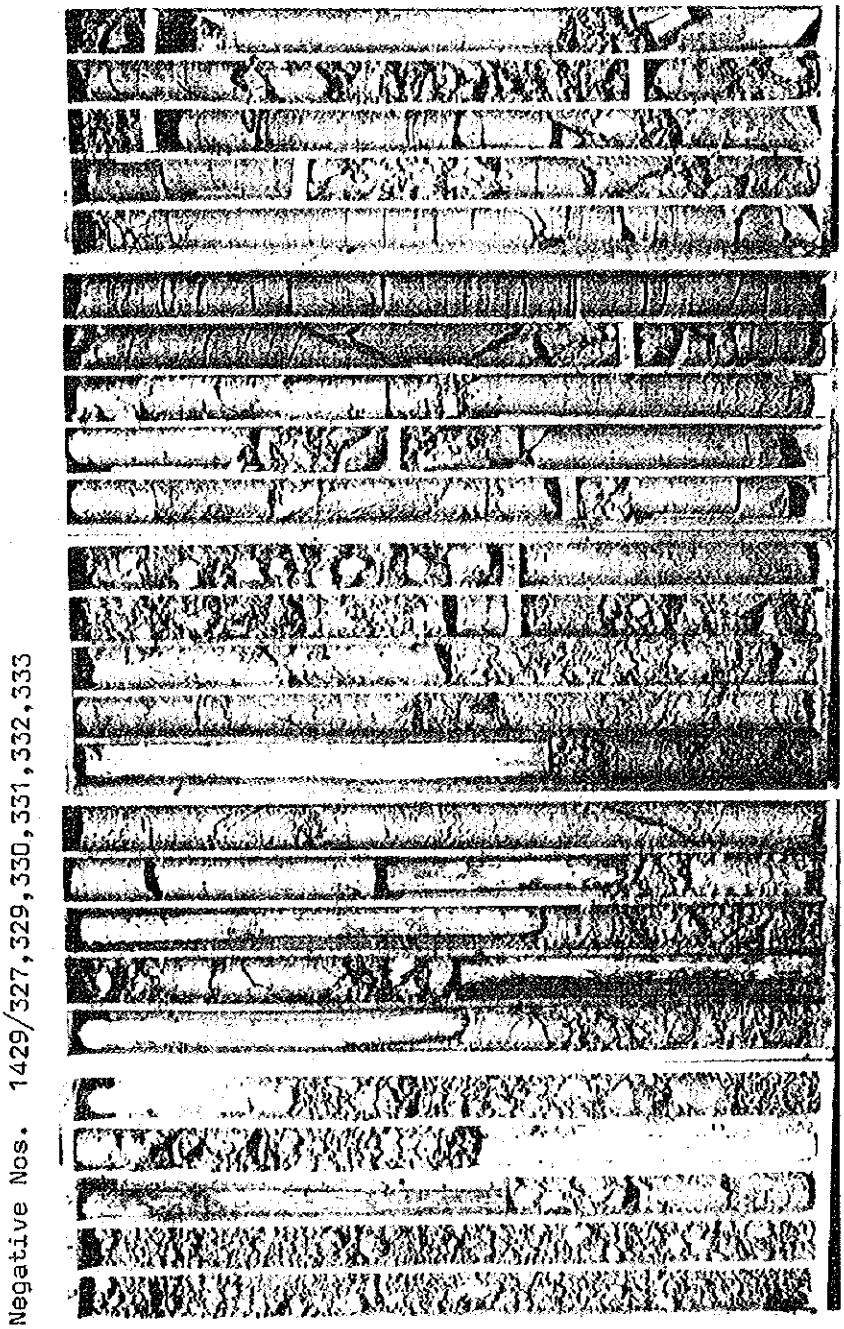
PROJECT...WADO POWER PROJECT

DESCRIPTION OF CORE ROCK TYPE—colour, grain size, texture, mineral composition	DEGREE OF WEATHERING	CORE SIZE	ELEVATION / DEPTH	LOG	CORE LOSS % PER LIFT	STRUCTURES JOINTS—spacing, attitude, roughness, aperture, cementing, coating, filling, BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES	FRACTURE LOG	DRILL WATER LOSS	GROUNDWATER LEVEL, DATE	WATER PRESSURE TESTS LEAKAGE RATES IN LUGEON UNITS
MUDSTONE Silty, dark grey. Siltstone bands and lenticles up to 5mm common. Relatively strong core.		NMLC	45 46 47 48 49			Sub-vertical fracture Bedding at 50°. Three fractures at 45°. Core shows many sub-horizontal tension fractures, possibly due to drilling stresses and drying.		WATER RETURN		2.0 5.5
END OF HOLE 49.68m (RL88.3m)										

FOR LOCATION OF DRILL HOLE AND OTHER RELEVANT INFORMATION, SEE SHEET 1

Sheet 3 of 3

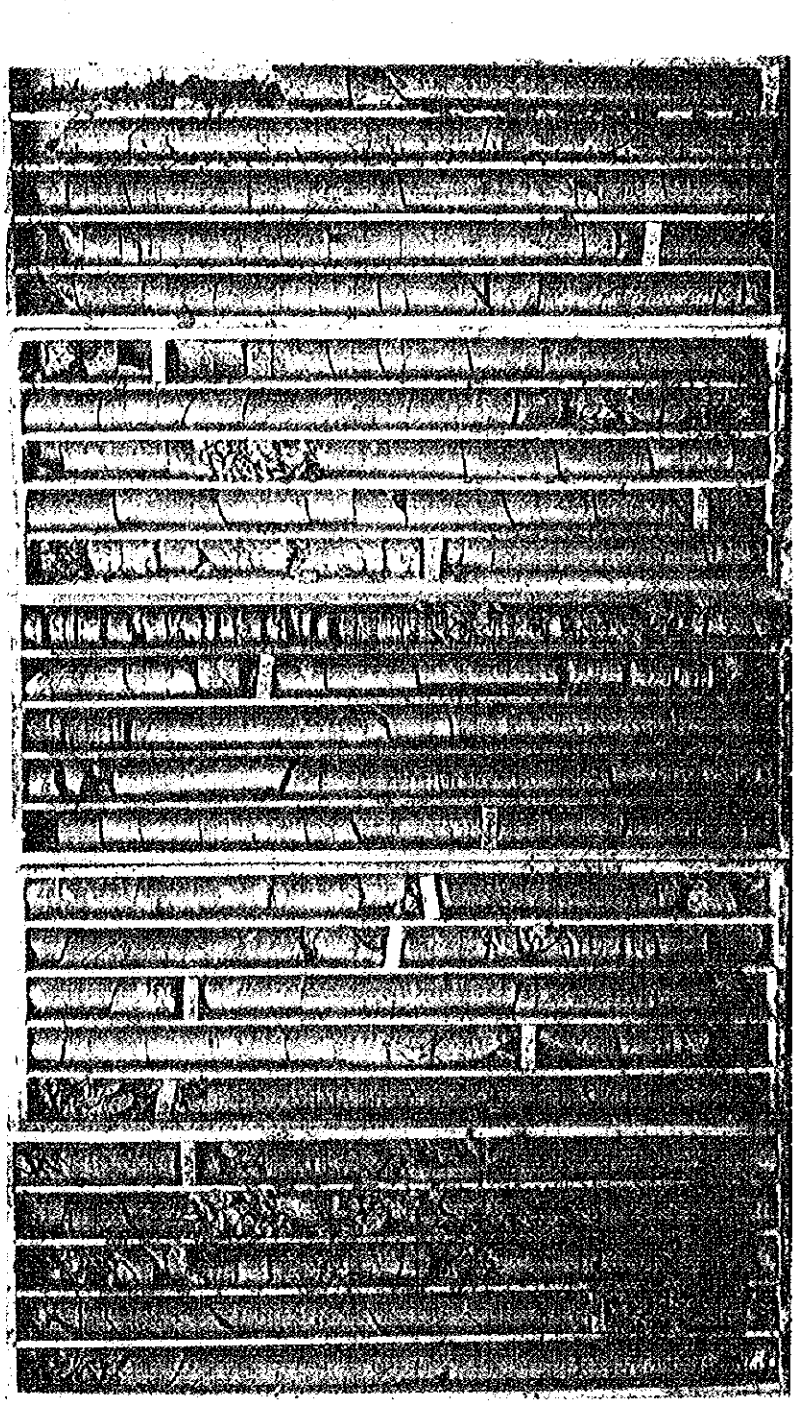
Dwg. No. 1429-S3010/3



DIAMOND DRILL HOLE DD211

WABO POWER PROJECT

SHEET 1 of 2



DIAMOND DRILL HOLE DD211

WABO POWER PROJECT

SHEET 2 of 2

SNOWY MOUNTAINS ENGINEERING CORPORATION

S.M.E.C. – N.K. WABO PROJECT JOINT VENTURE STUDY

HOLE No. DD 212

DIAMOND DRILL HOLE – GEOLOGICAL LOG

PROJECT: WABO POWER PROJECT
FEATURE: SADDLE DAM No. 2
LOCATION: 7.3m from P.W.D. peg 71 at 231°

CO-ORDINATES: E 279 109.0 m; N 9 232 637.4 m
SYSTEM: AMG Zone 55

SURFACE ELEVATION: 151.8 m
ANGLE FROM HORIZONTAL: 45°
DIRECTION: 212°

Column headings: DESCRIPTION OF CORE — ROCK TYPE - colour, grain size, texture, mineral composition | DEGREE OF WEATHERING | CORE SIZE | ELEVATION metres | DEPTH | CASING | LOG | LIFTS | CORE LOSS % PER LIFT | STRUCTURES — JOINTS - spacing, attitude, smoothness, aperture, cementing, coating, filling. BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES | FRACTURE LOG | DRILL WATER LOSS | GROUNDWATER LEVEL | LEVEL DATE | WATER PRESSURE TESTS — LEAKAGE RATES IN LUGEON UNITS

Rock type	Description of core	Depth (m)	Structures
MUDSTONE	Yellow-brown. Core in weak fragments	0–2.6	Recovery from casing reamer
MUDSTONE	NO CORE	2.6–3.6	
MUDSTONE	Yellow-brown, weak, semi-plastic	3.6–3.9	
MUDSTONE	NO CORE	3.9–5.3	
MUDSTONE	Dark grey. Weak	5.3–5.5	Highly fractured
MUDSTONE	NO CORE	5.5–6.8	
MUDSTONE	Dark grey	6.8–10.4	Crushed zone; Core breaks readily into small slickensided fragments; Crushed zone
MUDSTONE and SILTSTONE		10.4–10.8	Bedding at 30°
SANDSTONE	Mid-grey with dark grey siltstone lenticles up to 5mm. Moderately tough to friable.	10.8–13.3	Bedding poorly developed. Three fractures at 60°, and 45°.
SILTSTONE	Very clayey, dark grey. Relatively strong core.	13.3–16.3	Bedding at top at 35°–40°, indistinct at base. Slickensided fractures common at 60°, 45° and subvertical
SILTSTONE	Very clayey	16.3–17.3	Several crushed zones up to 70mm wide.
SANDSTONE, medium grained, mid-grey.		17.3–18.3	Bedding at 60°. Most fractures at 60°, some at 45°.
SILTSTONE. Dark grey.		18.3–18.6	Crushed zone
SILTSTONE to MUDSTONE Mid grey.		18.6–20	Bedding at 20°. Fractures mostly at 35°–45°.

Core size: NMLC. Elevations marked: 150, 145, 140.

Drill water loss: DRY DRILLING (to approx. 4 m); NO WATER RETURN (approx. 4–13 m); WATER RETURNS FROM CASING, ALSO FROM TRENCH (13–20 m).

Groundwater level: HOLE BLOCKED 3 Nov 1975; 12 Nov 1975.

Water pressure tests: NOT TESTED; 180; 0.4

DRILL	
Make	Mindrill
Type	E 1 000
Driller	Grech & Mulligan
Commenced	3 Oct 1975
Completed	8 Oct 1975

EXPLANATION

FRACTURE LOG: Natural breaks in core per metre. Equivalent lengths of core pieces in centimetres.

Core preserved in plastic sheath

WEATHERING
CW - Completely weathered
HW - Highly weathered
MW - Moderately weathered
SW - Slightly weathered
FrSt - Fresh, with limonite stained joints
Fr - Fresh

ENGINEERING GEOLOGY BRANCH
Logged: G.A. Frenda
Drawn: D.P.
Checked:
Sheet 1 of 2
S.M.E.C. Dwg. No. 429-S3011/1

SNOWY MOUNTAINS ENGINEERING CORPORATION

HOLE No. DD 212

WABO POWER PROJECT

DESCRIPTION OF CORE ROCK TYPE—colour, grain size, texture mineral composition	DEGREE OF WEATHERING CORE SIZE ELEVATION DEPTH	LOG	CORE LOSS % PER CUT	STRUCTURES JOINTS—spacing, attitude, smoothness aperture, cementing, coating, filling. BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES	FRACTURE LOG	WATER PRESSURE TESTS LEAKAGE RATES IN LUGEON UNITS
SILTSTONE to MUDSTONE. As above				As above		0.1
SILTSTONE				Crushed zone		
SANDSTONE. Medium grained with siltstone inclusions	21			Fractures mostly at 60°, slickensided		
MUDSTONE	22			Crushed zone		
SILTSTONE	23			Fractures common, mostly at 45°.		7.0
MUDSTONE to SILTSTONE in part	24			Crushed zone to zone of close fracturing.		
Fine sandy, mid grey Relatively strong. SILTSTONE	25 26 27			Bedding at 45°. Fractures at 45° and 65° Fractured zone		
	28			Fractured zone. Calcite vein.		
	29			Bedding at 40° - 45°. Most fractures at 45°.		1.5
	30					
END OF HOLE 30.0m (RL130.6m)						

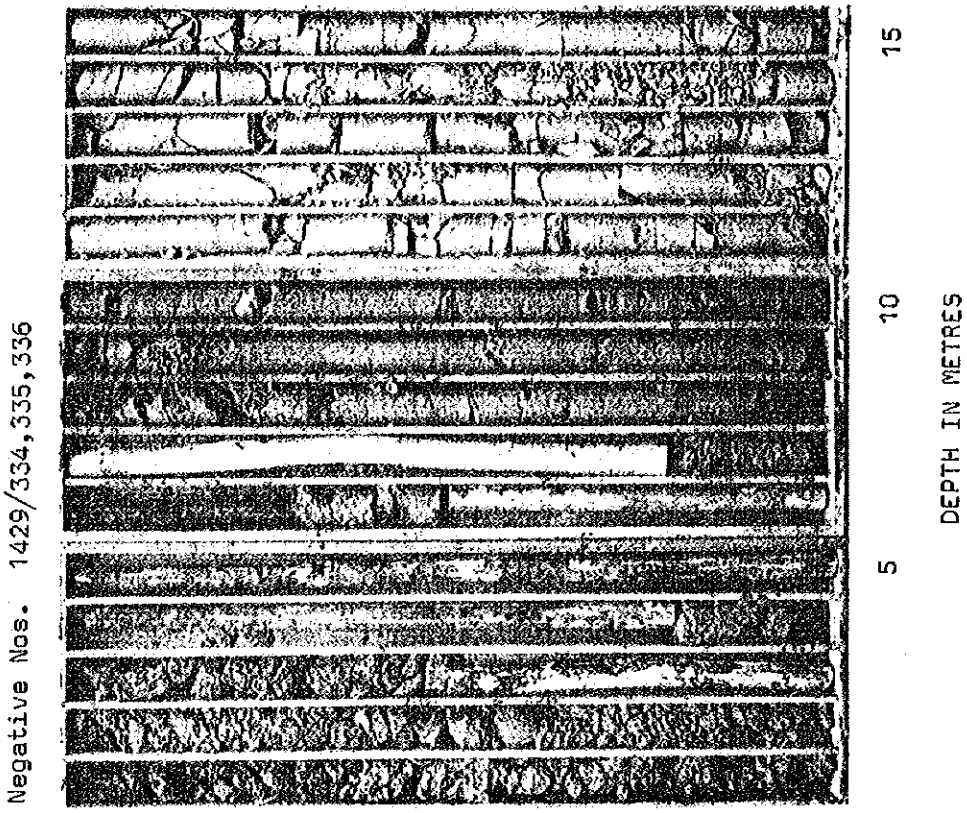
WATER RETURN FROM CASING AND TRENCH

FULL WATER RETURN

FOR LOCATION OF DRILL HOLE AND OTHER RELEVANT INFORMATION, SEE SHEET 1

Sheet 2 of 2

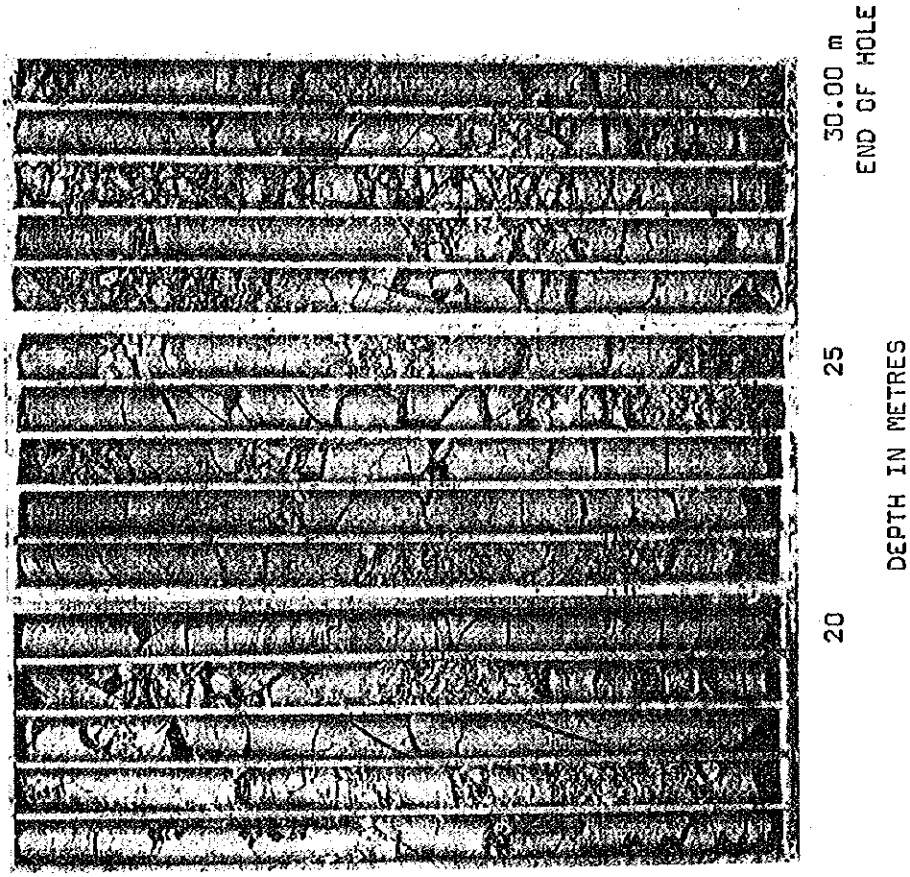
Dwg. No. 1429-S3011/2



DIAMOND DRILL HOLE DD212

WABO POWER PROJECT

SHEET 1 of 2



DIAMOND DRILL HOLE DD212

WABO POWER PROJECT

SHEET 2 of 2

SNOWY MOUNTAINS ENGINEERING CORPORATION

S.M.E.C. - N.K. WABO PROJECT JOINT VENTURE STUDY

HOLE No. DD213

DIAMOND DRILL HOLE - GEOLOGICAL LOG

PROJECT: WABO POWER PROJECT

FEATURE: SADDLE DAM No.2 AREA

LOCATION: 32.2m from P.W.D. peg 79 at 267

CO-ORDINATES: E 297 299.7 m; N 9 232 733.3 m; SYSTEM: AMG Zone 55

SURFACE ELEVATION: 149 m

ANGLE FROM HORIZONTAL: 90°

DIRECTION: -

DESCRIPTION OF CORE (ROCK TYPE - colour, grain size, texture, mineral composition)	DEGREE OF WEATHERING	CORE SIZE	ELEVATION metres	DEPTH metres	LOG	CORE LOSS % PER LIFT	STRUCTURES (JOINTS - spacing, attitude, smoothness, aperture, cementing, coating, filling. BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES)	FRACTURE LOG	DRILL WATER LOSS	GROUNDWATER LEVEL, DATE	WATER PRESSURE TESTS LEAKAGE RATES IN LUGEON UNITS
Yellow-brown.							Fragments recovered with casing reamer.				
Dark grey with yellow mottling. Soft, broken core.											
			145	4			A few joints, mostly at 45°. Slickensided partings common.				
NO CORE				5					LOST WATER RETURNS 3 and 12 Nov 1975		NOT TESTED
MUDSTONE: Dark grey. Core mostly in weak fragments		NMLC		6			Crushed zone, with generally close fracturing.				
			140	9			Bedding at 60°. A few fractures at 60° and 45°.		NO WATER RETURN		3½
SILTSTONE: Very clayey			135	13			A few fractures at 45°				40
END OF HOLE 14.96m (RL134.7)											

DRILL: Make Hindrill; Type E 1 000

Driller Grech & Mulligan; Commenced 10 Oct 1975; Completed 11 Oct 1975

FRACTURE LOG: Natural breaks in core per metre. Equivalent lengths of core pieces in centimetres.

EXPLANATION: Core preserved in plastic sheath

WEATHERING: CW - Completely weathered; HW - Highly weathered; MW - Moderately weathered; SW - Slightly weathered; FeSt - Fresh, with limonite stained joints; Fr - Fresh

ENGINEERING GEOLOGY BRANCH

Logged G.A. Fronda; Drawn D.P.; Checked

Sheet 1 of 1

S.M.E.C. Dwg. No. 1429-S3012

DIAMOND DRILL HOLE DD213

WABO POWER PROJECT

SNOWY MOUNTAINS ENGINEERING CORPORATION
S.M.E.C. – N.K. WABO PROJECT JOINT VENTURE STUDY

HOLE No. DD 214

DIAMOND DRILL HOLE – GEOLOGICAL LOG

PROJECT WABO POWER PROJECT
FEATURE SADDLE DAM No.3
LOCATION 7.2m from P.W.D. peg 95 at 303°

CO-ORDINATES E 280 044.1 m
N 9 232 844.6 m
SYSTEM AMG Zone 55

SURFACE ELEVATION 145.8 m
ANGLE FROM HORIZONTAL 45°
DIRECTION 045°

DESCRIPTION OF CORE (ROCK TYPE – colour, grain size, texture, mineral composition)	LOG	STRUCTURES (JOINTS – spacing, attitude, smoothness, aperture, cementing, coating, filling. BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES)
Yellow-brown, Semi-plastic		Recovered with coring reamer as angular fragments
Yellow-brown, Mostly solid core but breaks easily into fragments.		
NO CORE		
Mud		
Dark grey.		Mostly fragments, due to close fracturing.
NO CORE		
MUDSTONE Dark grey		Close, slickensided joints in several directions but dominantly at 45°. Semi-crushed zone, core breaks easily to fragments but mostly unbroken when recovered.
NO CORE		
		Crushed zone
SILTSTONE Very clayey, fairly weak rock, mostly unbroken core		Close fractures at 65° and 45°, slickensided. Several subvertical fractures
		Bedding at 90°
		Bedding at 60°

NMLC

HOLE BLOCKED 12 NOV 1975 (WATER COMES OUT OF TRENCH BELOW DRILL)
NO WATER RETURN

WATER PRESSURE TESTS – LEAKAGE RATES IN LUGEON UNITS
NOT TESTED

DRILLERS NOTE: Water came out of ground below drill site, at gauge reading of 10psi.

DRILL
Make Hindrill
Type E 1 000

Driller Grech & Mulligan
Commenced 10 Oct 1975
Complete 15 Oct 1975

FRACTURE LOG
Natural breaks in core per metre.
Equivalent lengths of core pieces in centimetres.
Core preserved in plastic sheath

EXPLANATION

WEATHERING
CW - Completely weathered
HW - Highly weathered
MW - Moderately weathered
SW - Slightly weathered
FrSt - Fresh, with limonite stained joints
Fr - Fresh

ENGINEERING GEOLOGY BRANCH
Logged G.A. Frenda
Drawn D.P.
Checked
Sheet 1 of 2
S.M.E.C. Dwg No. 1429-S3013/1

SNOWY MOUNTAINS ENGINEERING CORPORATION

HOLE No. DD 214

PROJECT WADO POWER PROJECT

DESCRIPTION OF CORE ROCK TYPE - colour, grain size, texture mineral composition	DEGREE OF WEATHERING FR SW HW CW	CORE SIZE	RELEVATN (metres) DEPTH (metres)	LOG	CORE LOSS % PER LIFT	STRUCTURES JOINTS - spacing, attitude, smoothness, aperture, cementing, coating, filling. BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES	FRACTURE LOG	WATER LOSS	GROUNDWATER LEVEL, DATE	WATER PRESSURE TESTS LEAKAGE RATES IN LUGEON UNITS
SILTSTONE Very clayey, sandy towards base. Fairly weak rock, mostly unbroken core.			130 21 22 23 24 25			Bedding at 60°. Close fractures at 65° and 45°, slickensided.		NO WATER RETURN		1.7
Dark grey. Core broken to fragments			26 27			Fragments due to close jointing, predominantly at 45°				
SANDSTONE Very fine grained, silty, dark grey			125 28 29 30			Bedding at 65° - 70°. A few fractures parallel to bedding.				0.6
END OF HOLE 30.20m (RL124.6m)										

FOR LOCATION OF DRILL HOLE AND OTHER RELEVANT INFORMATION, SEE SHEET 1

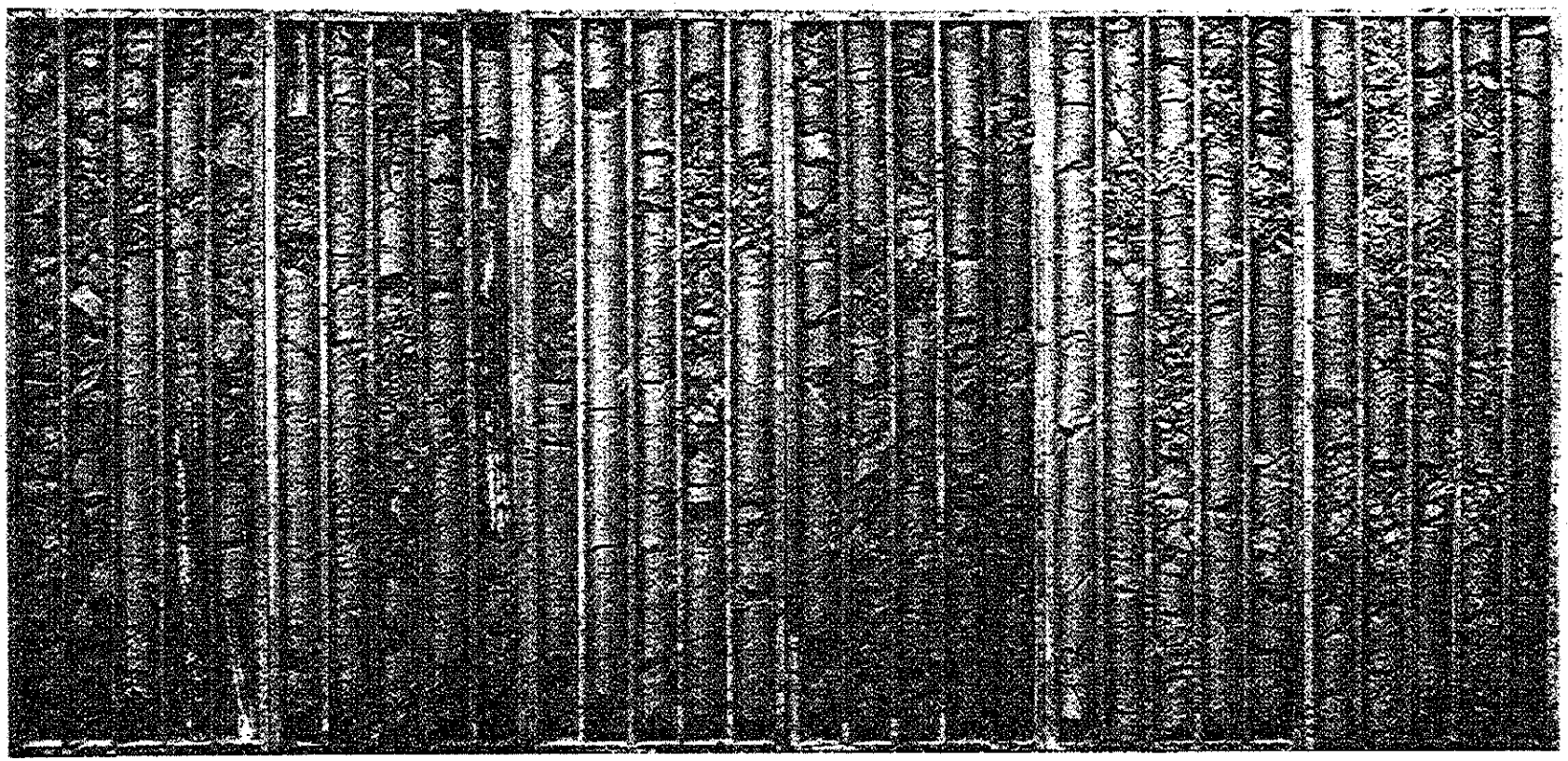
Sheet 2 of 2

Dwg. No. 1429-S3013/2

Negative Nos. 1429/340,341,342

DIAMOND DRILL HOLE DD214

WABO POWER PROJECT



5 10 15 20 25 30.20 m
END OF HOLE

DEPTH IN METRES

SNOWY MOUNTAINS ENGINEERING CORPORATION

S.M.E.C. - N.K. WABO PROJECT JOINT VENTURE STUDY

DIAMOND DRILL HOLE - GEOLOGICAL LOG

HOLE No. DD 215

PROJECT WABO POWER PROJECT
FEATURE SADDLE DAM No.3
LOCATION 10.8m from P.W.D. peg 103 at 020°

CO-ORDINATES E 280 293.0 m, N 9 233 039.9 m
SYSTEM AMG Zone 55

SURFACE ELEVATION 141.7 m
ANGLE FROM HORIZONTAL 90°
DIRECTION -

Rock type	Description of core	Depth (m)	Structures	Remarks
MUDSTONE	Yellow-brown	0–2	Recovered from casing reamer	DRY DRILLING; 12 Nov 1975
MUDSTONE	Silty, dark grey. Core soft, crumbly.	~2		
MUDSTONE	Silty to very silty	~2–5	Bedding at 30°? but not clear. Sub-vertical and sub-horizontal fractures common. Penetrometer readings 2.5 to more than 5 kg/cm²	Water pressure tests: NOT TESTED
SILTSTONE to MUDSTONE	Siltstone very clayey	~5–10.5	Fractures very common at 60° to sub-vertical. Minor slickensiding. Penetrometer reading >5 kg/cm².	Leakage 1.0 Lugeon
MUDSTONE	Core recovered in angular fragments	~10.5–13.9	Possible crushed zone, fragments slickensided.	FULL WATER RETURN
MUDSTONE		~13.9–15	Broken due to many steep and sub-horizontal fractures.	Leakage 0.1 Lugeon

Core size: NMLC. Elevation marks: 140, 135, 130.

END OF HOLE 15.00m (RL126.7m)

DRILL
Make Mindrill
Type E 1 000
Driller Grech & Mulligan
Commenced 16 Oct 1975
Completed 18 Oct 1975

EXPLANATION

FRACTURE LOG: Natural breaks in core per metre. Equivalent lengths of core pieces in centimetres.

Sample preserved in plastic sheath

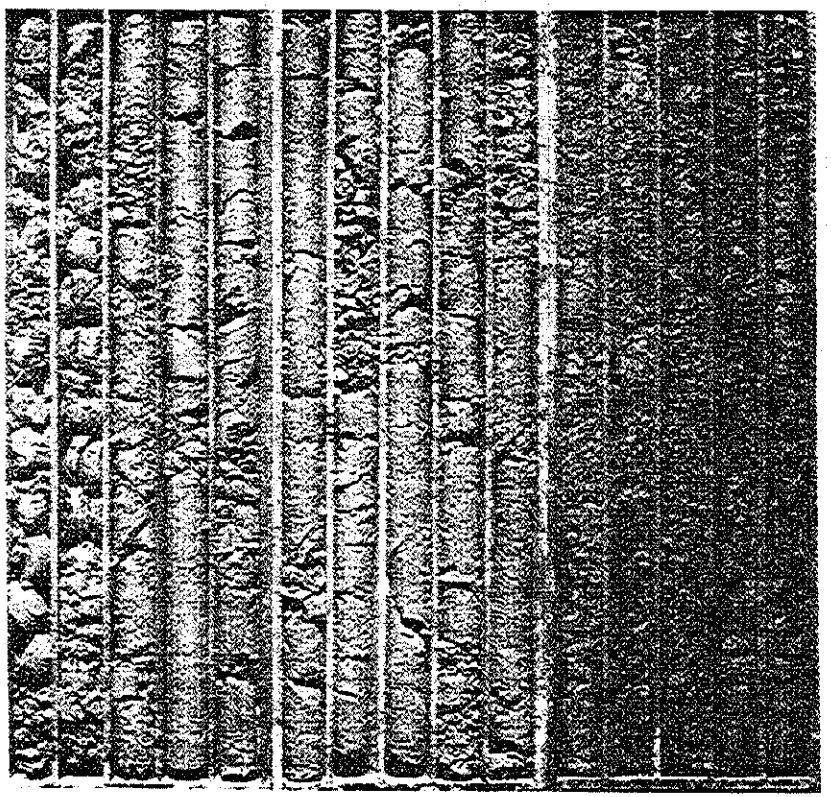
WEATHERING
CW - Completely weathered
HW - Highly weathered
MW - Moderately weathered
SW - Slightly weathered
FrSt - Fresh, with limonite stained joints
Fr - Fresh

ENGINEERING GEOLOGY BRANCH
Logged G.A. Frenda
Drawn D.P.
Checked
Sheet 1 of 1
S.M.E.C. Dwg. No. 1429-S3014

DIAMOND DRILL HOLE DD215

WABO POWER PROJECT

Negative Nos. 1429/349,351



5 10 15.00 m
END OF HOLE

DEPTH IN METRES

SNOWY MOUNTAINS ENGINEERING CORPORATION

S.M.E.C. – N.K. WADO PROJECT JOINT VENTURE STUDY

HOLE No. DD 216

DIAMOND DRILL HOLE – GEOLOGICAL LOG

PROJECT WADO POWER PROJECT

FEATURE FUSE PLUG EMBANKMENT

LOCATION 4.3m from N.K. peg 31 at 276°

CO-ORDINATES E 280 521.3 m, N 9 233 760.1 m, SYSTEM AMG Zone 55

SURFACE ELEVATION 144.6 m

ANGLE FROM HORIZONTAL 46°

DIRECTION 019°

DESCRIPTION OF CORE – ROCK TYPE – colour, grain size, texture, mineral composition.	DEGREE OF WEATHERING	CORE SIZE	metres ELEVATION	metres DEPTH	LOG	CORE LOSS % PER LIFT	STRUCTURES – JOINTS – spacing, attitude, smoothness, aperture, cementing, coating, filling. BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES	FRACTURE LOG	DRILL WATER LOSS	PIEZOMETER LEVEL DATE	WATER PRESSURE TESTS – LEAKAGE RATES IN LUGEON UNITS
Yellow-brown				1			Recovered with casing reamer as plastic fragments				
NO CORE				2							
Yellow-brown, plastic				3							
NO CORE											
Yellow-brown. Core mostly in fragments. Weak.				4			Breaks easily. Joint at 60°.				NOT TESTED
NO CORE				5							
Yellow-brown to dark grey. Weak				6			A few fractures at 45°				
NO CORE											
Dark grey. Semi plastic to crumbly				7							
NO CORE				8			Bedding unclear				
SILTSTONE. Dark to mid grey. A few fine sandy bands. Crumbly.				9			Bedding at 15°. Several healed fractures at 45°.				
Silty, dark grey, crumbly.				10							
Dark grey. Core recovered mostly in fragments				11							
				12			Crushed zone, slickensiding not pronounced.				
				13							
				14							110
SILTSTONE				15							
Dark grey				16			A few fractures especially towards base, mostly at 45°.				
				17							
				18							100
				19							
				20			Crushed zone. Core in slickensided fragments and weak plastic clay				

MUDSTONE

MUDSTONE

NMLC

1.40

1.35

FULL WATER RETURN

WATER LOST

NO WATER RETURN

DRILL
Make Hindrill
Type E 1 000
Driller Grech & Mulligan
Commenced 18 Oct 1976
Completed 24 Oct 1976

FRACTURE LOG
cm

EXPLANATION
Natural breaks in core per metre.
Equivalent lengths of core pieces in centimetres.

WEATHERING
CW - Completely weathered
HW - Highly weathered
MW - Moderately weathered
SW - Slightly weathered
FrSt - Fresh, with limonite stained joints
Fr - Fresh

ENGINEERING GEOLOGY BRANCH
Logged G.A. Frenda
Drawn D.P.
Checked
Sheet 1 of 2
S.M.E.C. Dwg No 429-S3015/1

SNOWY MOUNTAINS ENGINEERING CORPORATION

HOLE No. DD 216

PROJECT MADO POWER PROJECT

DESCRIPTION OF CORE ROCK TYPE—colour, grain size, texture mineral composition	DEGREE OF WEATHERING F C SW MW HW CW	CORE SIZE	metres RELEVATION	DEPTH	CASING	LOG	CORE LOSS % PER UNIT 0 50 100	STRUCTURES JOINTS—spacing, attitude, smoothness, aperture, cementing, coating, filling, BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES	FRACTURE LOG 0 5 10 15 20	WATER LOSS FULL WATER RETURN	GROUNDWATER LEVEL DATE	WATER PRESSURE TESTS LEAKAGE RATES IN LUGEON UNITS 0 5 10 15 20
MUDSTONE Dark grey		NWC	1.30	21 22 23				Crushed zone. Core in slickensided fragments and weak plastic clay		NO WATER RETURN		NOT TESTED
DRILLING DISCONTINUED AT 23.89m (RL 127.7m) DUE TO COLLAPSE OF HOLE. (SPECIFIED DEPTH WAS 26m)												

FOR LOCATION OF DRILL HOLE AND OTHER RELEVANT INFORMATION, SEE SHEET 1

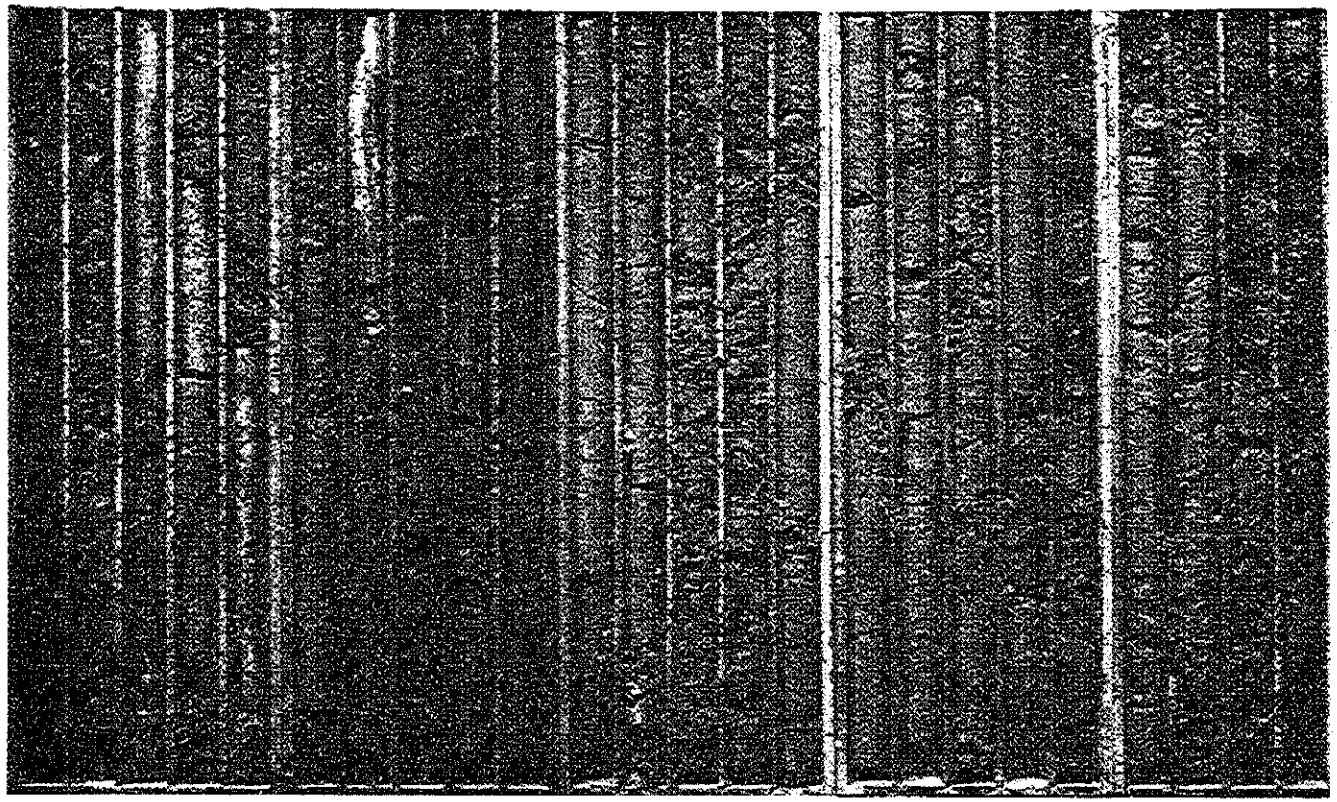
Sheet 2 of 2

Dwg. No. 1429-S3015/2

DIAMOND DRILL HOLE DD216

WABO POWER PROJECT

Negative Nos. 1429/352,353,354



5 10 15 20 23.89 m
END OF HOLE

DEPTH IN METRES

SNOWY MOUNTAINS ENGINEERING CORPORATION

S.M.E.C. – N.K. WADO PROJECT JOINT VENTURE STUDY

HOLE No. DD 217

DIAMOND DRILL HOLE – GEOLOGICAL LOG

PROJECT: WADO POWER PROJECT

FEATURE: FUSE PLUG EMBANKMENT

LOCATION: 7.8m from N.K. peg 33 at 176°

CO-ORDINATES: E 280,643.5 m; N 9 233 798.2 m

SYSTEM: AMG Zone 55

SURFACE ELEVATION: 145.4 m

ANGLE FROM HORIZONTAL: 45°

DIRECTION: 017°

DESCRIPTION OF CORE – ROCK TYPE – colour, grain size, texture, mineral composition	STRUCTURES – JOINTS – spacing, attitude, smoothness, aperture, cementing, cooling, filling. BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES	FRACTURE LOG
TOPSOIL and RUBBLE	Recovered with hand auger as fragments	NOT APPLICABLE
Silty, yellow-brown		
NO CORE		
NO CORE		
MUDSTONE: Dark grey, soft, plastic	Bedding unclear. Penetrometer reading 2.4 kg/cm².	
	Close fractures, irregular, tight. Penetrometer reading 2.5 kg/cm²	
SANDSTONE: Silty, dark grey	A few fractures at 65° and 45°. Penetrometer reading >5 kg/cm².	
SILTSTONE: Dark grey, massive	One fracture at 45°	
SILTSTONE and MUDSTONE: Bands average 10mm in width	Bedding at 35°. A few fractures mostly at 40°.	
SANDSTONE: 5mm COAL Lens		
SANDSTONE: Mid grey, medium grained, crumbly, argillaceous matrix	Faint bedding at 60°. A few irregular, limonite stained fractures at 0°, 45° and 60°.	
SILTSTONE to MUDSTONE	A few fractures at 45°	
SANDSTONE: Medium grained, mid grey	Fractures at 0° and 45°.	

Water loss. HOLE BLOCKED 12 NOV 1975

NO WATER RETURN

FULL RETURN

Water loss.

NO WATER RETURN

WATER PRESSURE TESTS – LEAKAGE RATES IN LUGEON UNITS: NOT TESTED; 80.0; 18.5; 11.2

DRILL: Make Hindrill; Type E 1 000

Driller Grech & Mulligan

Commenced 14 Oct 1975

Completed 17 Oct 1975

FRACTURE LOG: Natural breaks in core per metre. Equivalent lengths of core pieces in centimetres.

EXPLANATION

WEATHERING: CW - Completely weathered; HW - Highly weathered; MW - Moderately weathered; SW - Slightly weathered; FrSt - Fresh, with limonite stained joints; Fr - Fresh

ENGINEERING GEOLOGY BRANCH

Logged G.A. Frenda

Drawn D.P.

Checked

Sheet 1 of 2

S.M.E.C. Dwg No. 1429-S.3016/1

SNOWY MOUNTAINS ENGINEERING CORPORATION

HOLE No. DD 217

PROJECT. WAHO POWER PROJECT

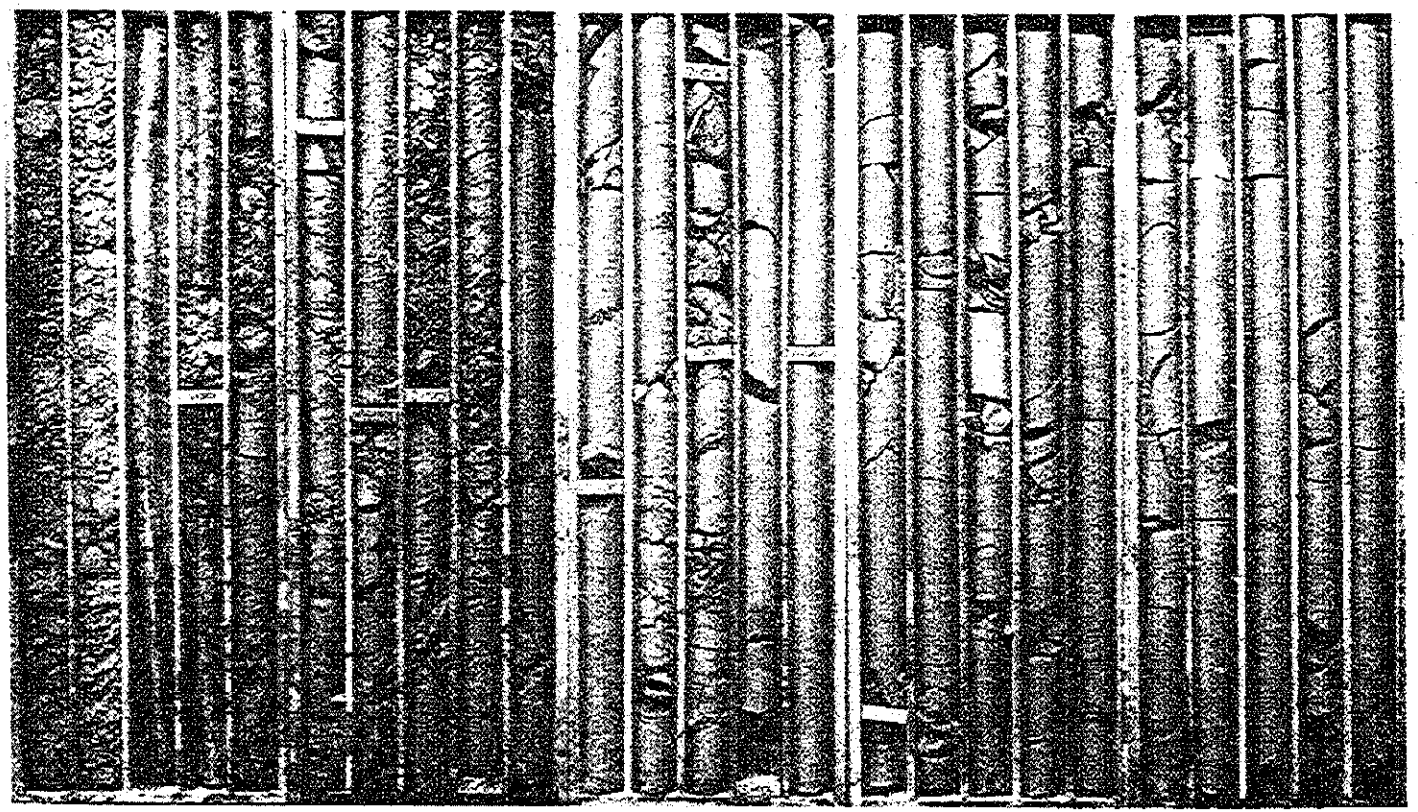
DESCRIPTION OF CORE ROCK TYPE—colour, grain size, texture mineral composition	DEGREE OF WEATHERING CORE SIZE ELEVATN (metres) DEPTH (metres)	LOG	CORE LOSS % PER LIFT	STRUCTURES JOINTS—spacing, attitude, smoothness aperture, cementing, coating, filling, BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES	FRACTURE LOG	WATER LOSS	GROUNDWATER LEVEL, DATE	WATER PRESSURE TESTS LEAKAGE RATES IN LUGEON UNITS
SANDSTONE Medium grained, mid grey	130 21 22 23 24 25			Faint bedding at 65°. Fractures at 0° and 45°.		NO WATER RETURN		11.2 14.5
END OF HOLE 25.00m (RL127.7m)								

FOR LOCATION OF DRILL HOLE AND OTHER RELEVANT INFORMATION, SEE SHEET 1

Sheet 2 of 2

Dwg. No. 1429-S3016/2

Negative Nos. 1429/343,344,345



5 10 15 20 25.00 m
END OF HOLE

DEPTH IN METRES

DIAMOND DRILL HOLE DD217

WABO POWER PROJECT

SNOWY MOUNTAINS ENGINEERING CORPORATION

S.M.E.C. – N.K. WABO PROJECT JOINT VENTURE STUDY

DIAMOND DRILL HOLE – GEOLOGICAL LOG

HOLE No. DD 218

PROJECT: WABO POWER PROJECT

FEATURE: SADDLE DAM No.4

LOCATION: 12.6m from N.K. peg 52 at 026°

CO-ORDINATES: E 280 420.3 m; N 9 234 285.8 m

SYSTEM: AMG Zone 55

SURFACE ELEVATION: 138.2 m

ANGLE FROM HORIZONTAL: 45°

DIRECTION: 356°

ROCK TYPE	DESCRIPTION OF CORE (ROCK TYPE – colour, grain size, texture, mineral composition)	DEPTH (metres)	STRUCTURES (JOINTS – spacing, attitude, smoothness, aperture, cementing, coating, filling. BEDDING, FOLIATION, VEINS, SEAMS, FAULTS, CRUSHED ZONES)
MUDSTONE	Recovered with hand auger as plastic clay	0–1.8	Drilled with hand auger
MUDSTONE	NO CORE	1.8–2.3	
MUDSTONE	Dark grey to yellow-brown. Very weak	2.3–3.3	Crushed zone. Penetrometer reading 0.8–1.2 kg/cm².
MUDSTONE	NO CORE	3.3–4.0	
MUDSTONE	Dark grey. Very weak	4.0–5.0	Crushed zone. Penetrometer reading 0.8–1.2 kg/cm².
MUDSTONE	NO CORE	5.0–5.9	
SANDSTONE	SANDSTONE. Mid grey, very fine grained, clayey, crumbly, but stronger than mudstone above	5.9–6.5	Bedding at 15°.
	NO CORE	6.5–7.1	
MUDSTONE	Dark grey, weak	7.1–7.8	Crushed zone. Penetrometer reading 1–1.5 kg/cm².
MUDSTONE	NO CORE	7.8–8.9	
MUDSTONE	Dark grey, weak	8.9–10.3	Crushed zone
SILTSTONE	Dark grey, clayey, friable. Can be broken easily between fingers	10.3–14.6	Bedding at 15°. A few fractures at 45°. Penetrometer reading > 5 kg/cm².
MUDSTONE	MUDSTONE. Dark grey	14.6–15.3	Crushed zone. Penetrometer reading 0.8–1.5 kg/cm².
SILTSTONE	With bands of very fine grained sandstone. Very clayey. Core broken to fragments by drilling.	15.3–19.7	Bedding at 10°–15°. Several fractures at 45°. Penetrometer reading >5 kg/cm².
	MUDSTONE and SILTSTONE Very weak	19.7–20	Crushed zone.

Core size: AUGER 6 inch (152mm) to 8.9 m; NMLC below.

Elevation marks: 135, 130, 125.

Water level: 3 Nov 1975 (at approx. 4.5 m).

Water/remarks: WATER RETURNS ON THE OUTSIDE OF THE CASING. ALSO IN TRENCH DOWNHILL FROM DRILL SITE. ← WATER LOST (at approx. 14.6 m). DRILLING WATER STILL FLOWING IN TRENCH BELOW DRILL SITE.

WATER PRESSURE TESTS (LEAKAGE RATES IN LUGEON UNITS): NOT TESTED (0–11.8 m); 4.2 (11.8–15.3 m); NOT TESTED (15.3–16.8 m); 3.9 (16.8–20 m).

DRILL
Make: Mindrill
Type: E 1 000
Driller: Grech & Mulligan
Commenced: 21 Oct 1975
Completed: 26 Oct 1975

EXPLANATION
FRACTURE LOG: Natural breaks in core per metre. Equivalent lengths of core pieces in centimetres.
Core preserved in plastic sheath

WEATHERING
CW – Completely weathered
HW – Highly weathered
MW – Moderately weathered
SW – Slightly weathered
FrSt – Fresh, with limonite stained joints
Fr – Fresh

ENGINEERING GEOLOGY BRANCH
Logged: O.A. Frenda
Drawn: D.P.
Checked:
Sheet 1 of 2
S.M.E.C. Dwg. No 1429-S3017/1

SNOWY MOUNTAINS ENGINEERING CORPORATION

HOLE No. DD 218

PROJECT WADO POWER PROJECT

DESCRIPTION OF CORE ROCK TYPE—colour, grain size, texture mineral composition	DEGREE OF WEATHERING FR SW HW CW	CORE SIZE	ELEVATN	DEPTH	LOG	CORE LOSS % PER RUN	STRUCTURES JOINTS—spacing, attitude, smoothness aperture, cementing, coating, filling. BEDDING, FOLIATION, VEINS, SEATS, FAULTS, CRUSHED ZONES	FRACTURE LOG	DRILL WATER LOSS	GROUNDWATER LEVEL, DATE	WATER PRESSURE TESTS LEAKAGE RATES LUGEON UNITS
MUDSTONE and SILTSTONE				21			Crushed zone				3.9
SILTSTONE and lesser MUDSTONE. Core weak, soft broken.		NMLC		22 23 24 25			Bedding at 45°? Several crushed zones up to 0.4m wide.		NO WATER RETURN AT COLLAR OF HOLE, BUT IN TRENCH BELOW DRILL SITE		1.3
END OF HOLE 25.40m (RL120.2m)											

FOR LOCATION OF DRILL HOLE AND OTHER RELEVANT INFORMATION, SEE SHEET 1

Sheet 2 of 2

Dwg. No. 1429-S3017/2

DIAMOND DRILL HOLE DD218

WABO POWER PROJECT

Negative Nos. 1429/346,347,348