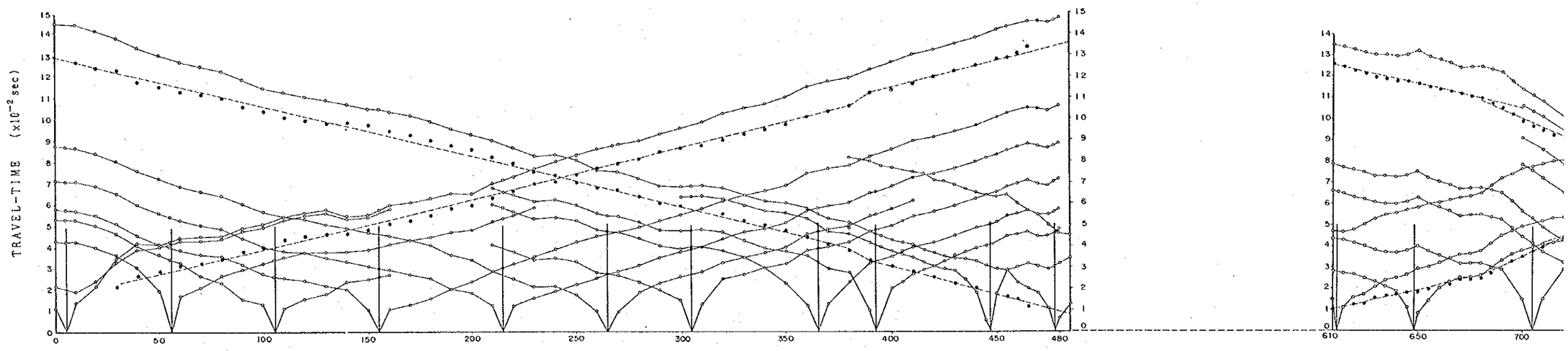
3.2 Data of Seismic Prospecting Survey

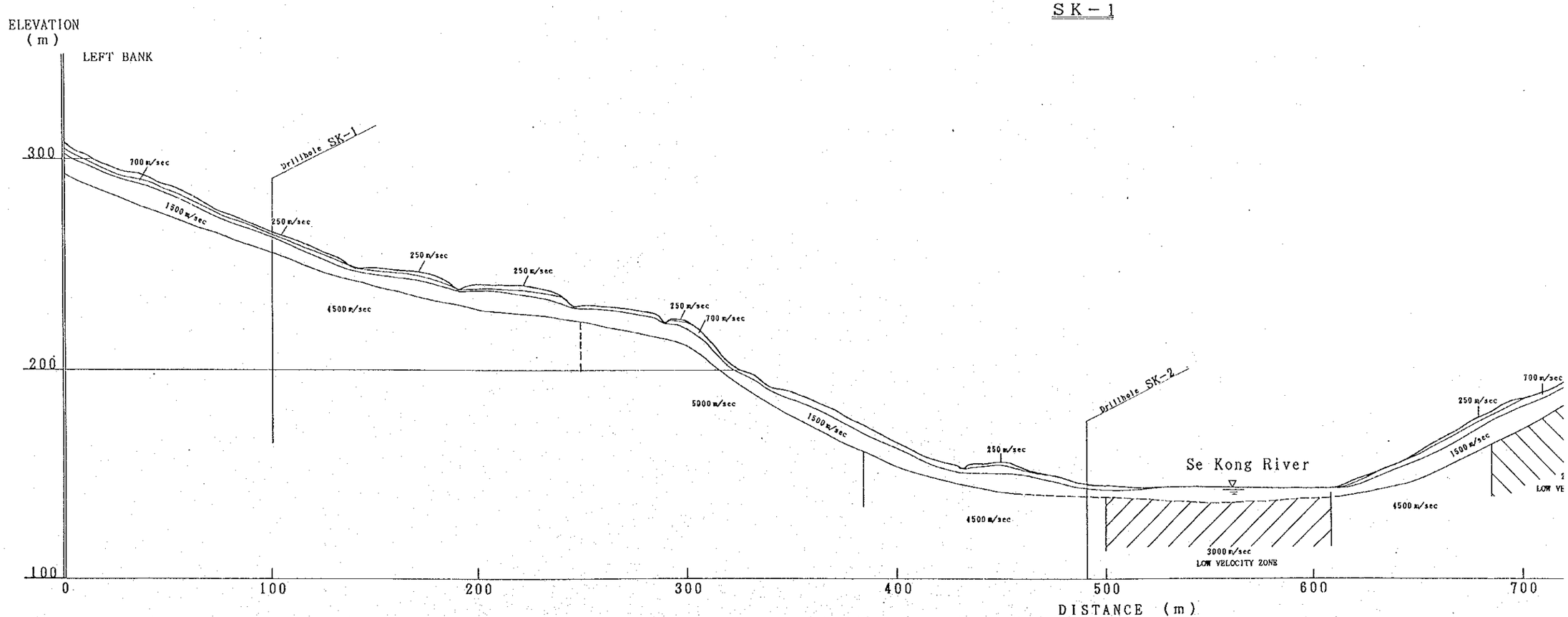
Fig. 1 Velocity Layer Profiles and Travel Time Curves at Se Kong No. 4 Dam Site

Fig. 2 Velocity Layer Profiles and Travel Time Curves at Xe Kaman No. 1 Dam Site

Fig. 3 Velocity Layer Profiles and Travel Time Curves at Xe Namnoy Midstream Dam Site



SK－1



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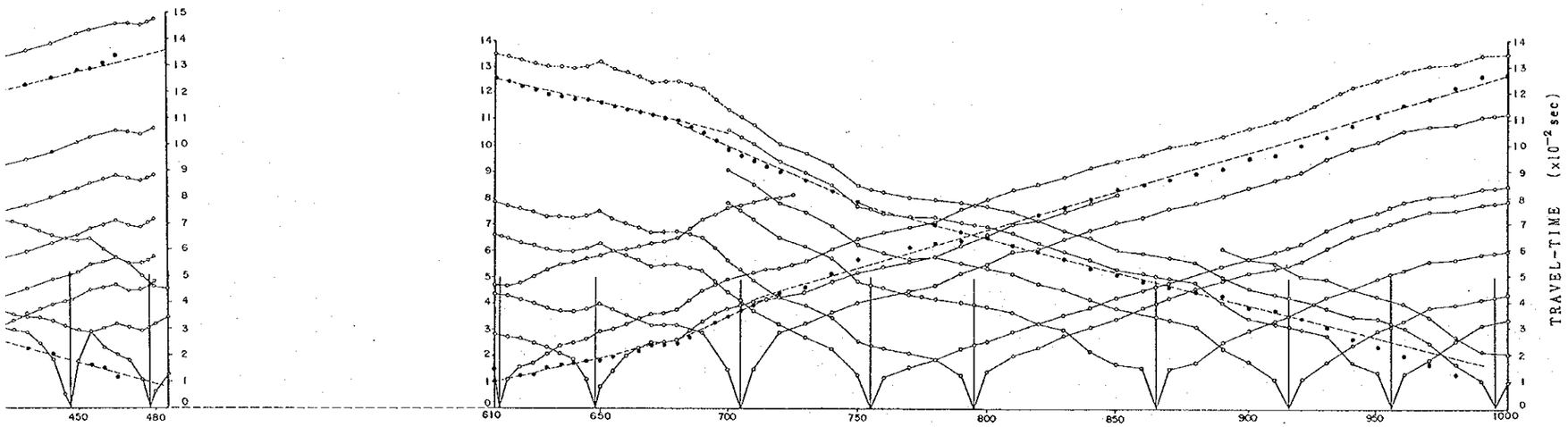


SK－1

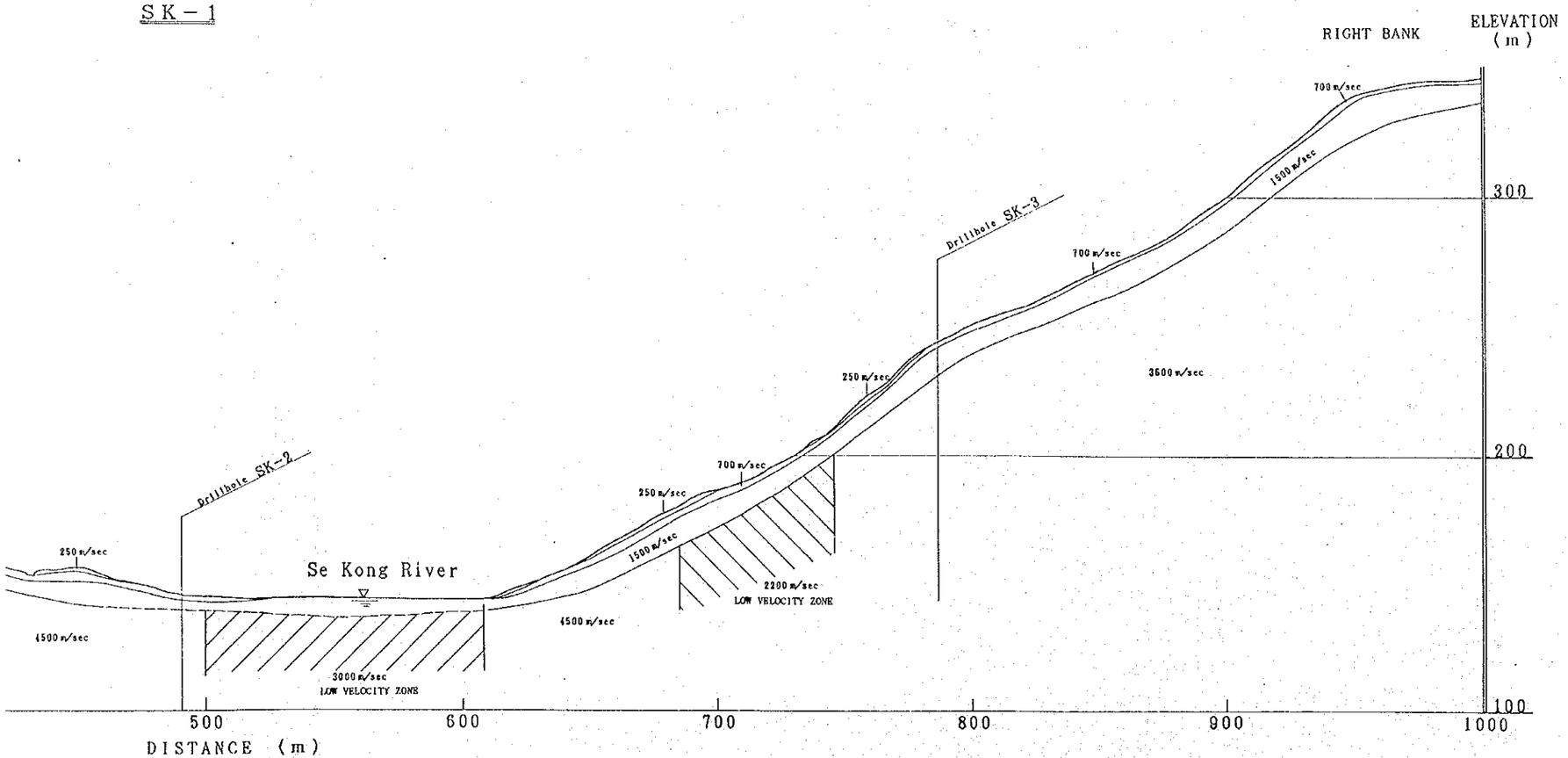
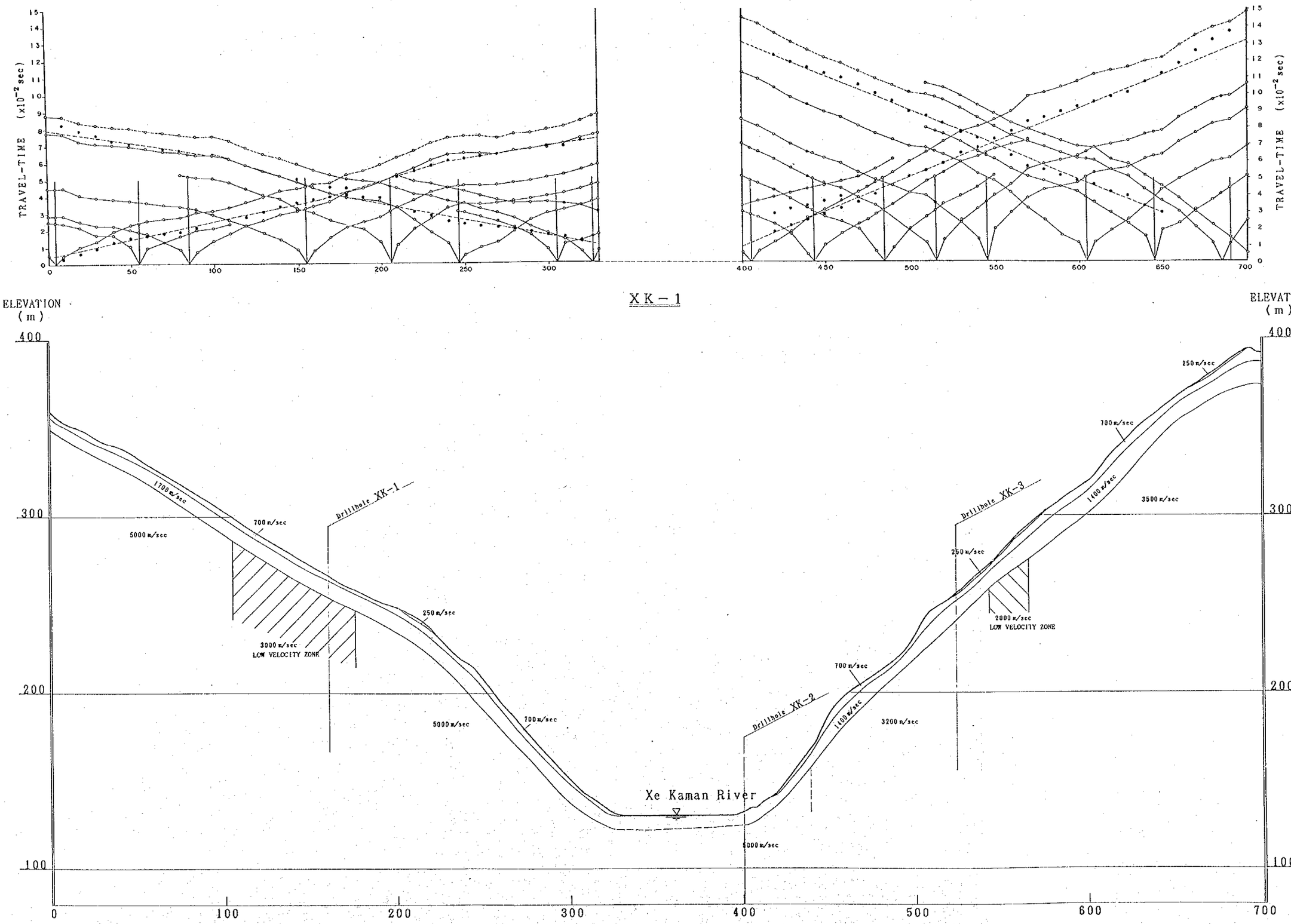
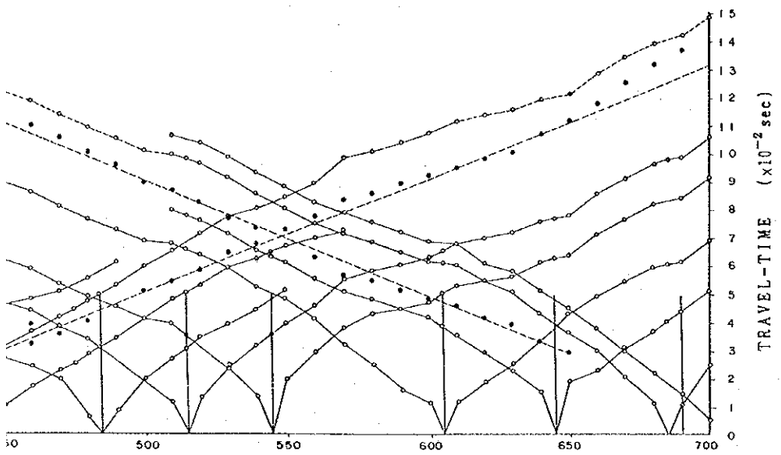
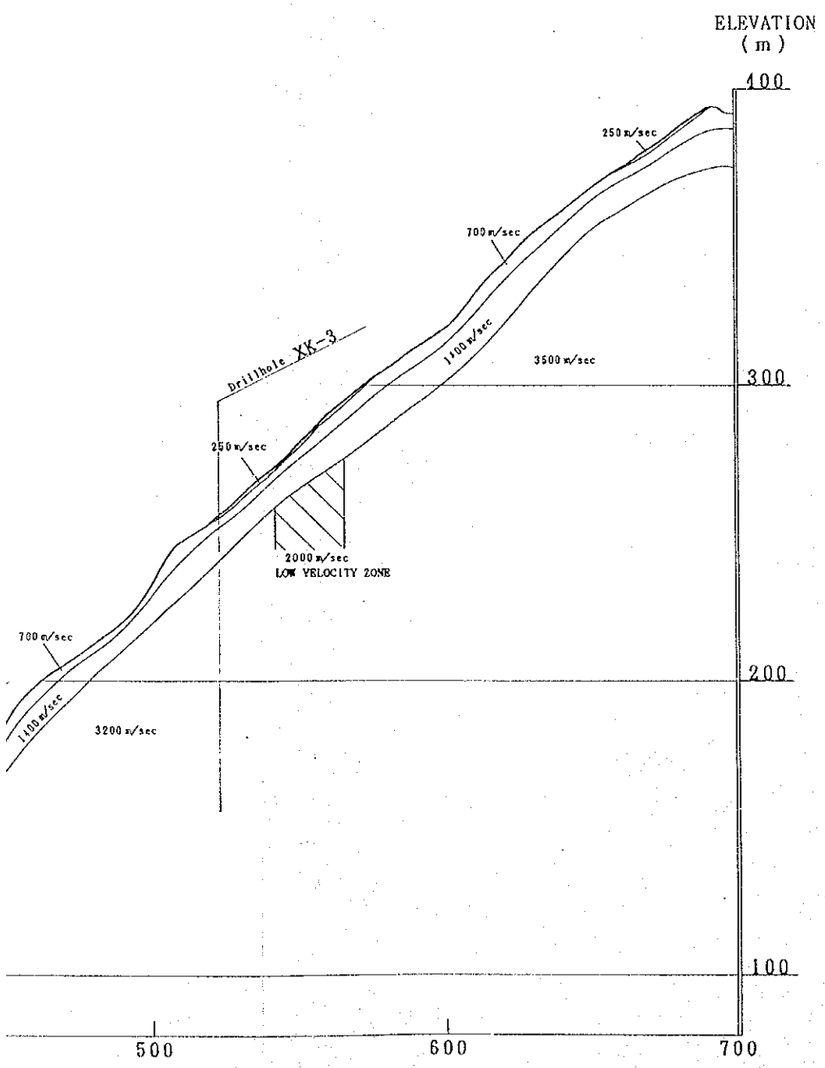


Fig. 1

Velocity Layer Profiles and Travel Time Curves at Se Kong №4 Dam Site


TRAVEL-TIME (x10^{-2}sec)
XK-1
ELEVATION (m)
400
300
200
100
1700 m/sec
5000 m/sec
700 m/sec
Drillhole XK-1
250 m/sec
3000 m/sec
LOW VELOCITY ZONE
5000 m/sec
700 m/sec
Xe Kaman River
5000 m/sec
Drillhole XK-2
700 m/sec
1400 m/sec
3200 m/sec
Drillhole XK-3
250 m/sec
2000 m/sec
LOW VELOCITY ZONE
250 m/sec
700 m/sec
1400 m/sec
3500 m/sec
0
50
100
150
200
250
300
400
450
500
550
600
650
700
DISTANCE (m)





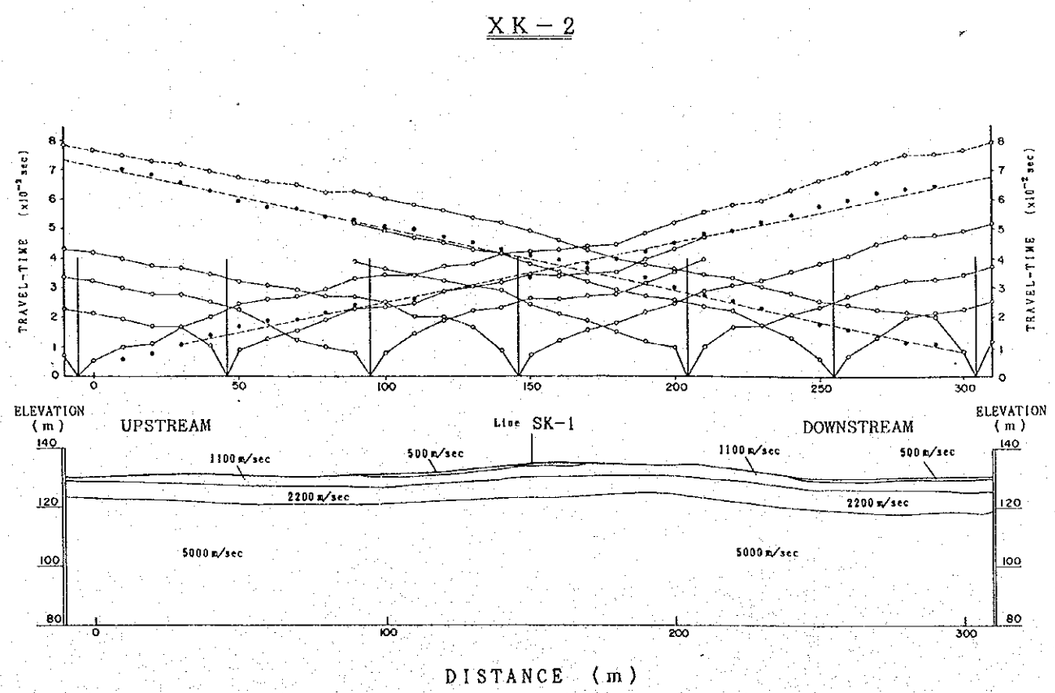
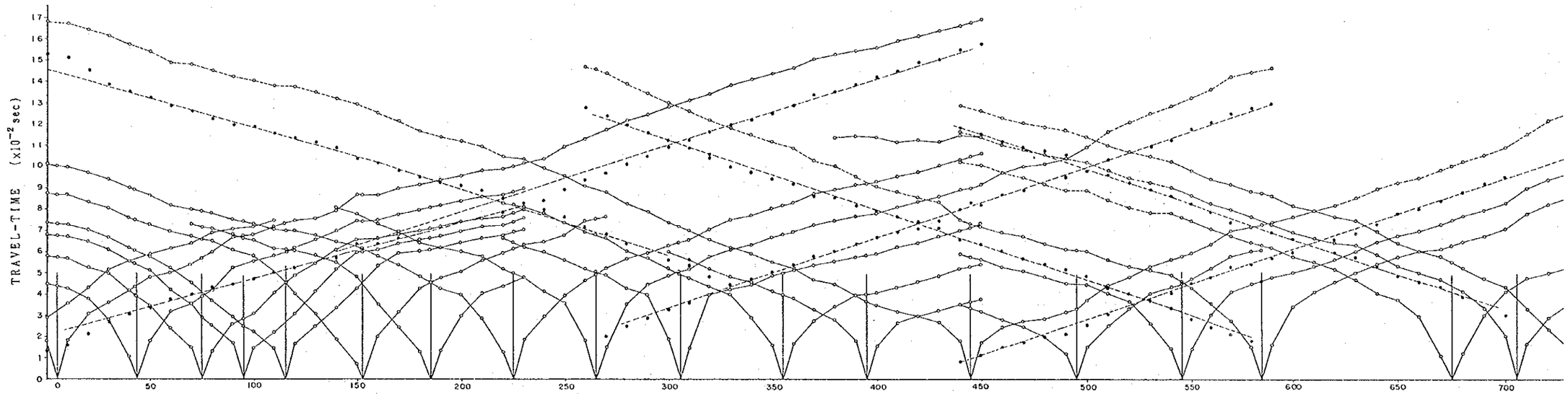
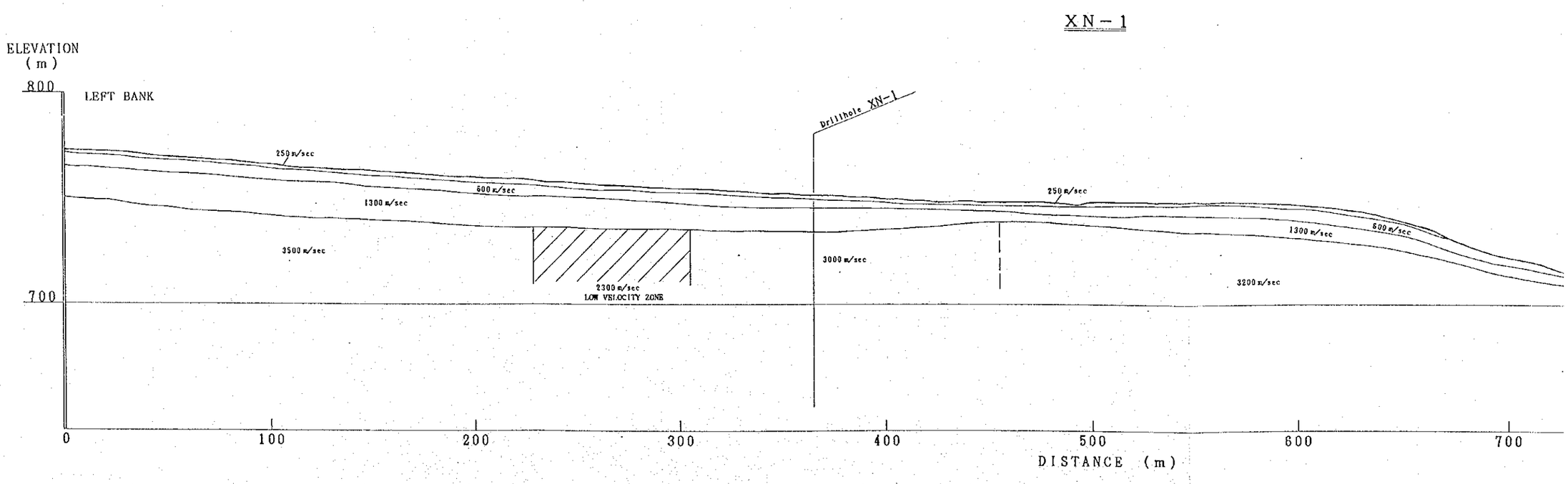


Fig. 2

Velocity Layer Profiles and Travel Time Curves at Xe Kaman No.1 Dam Site





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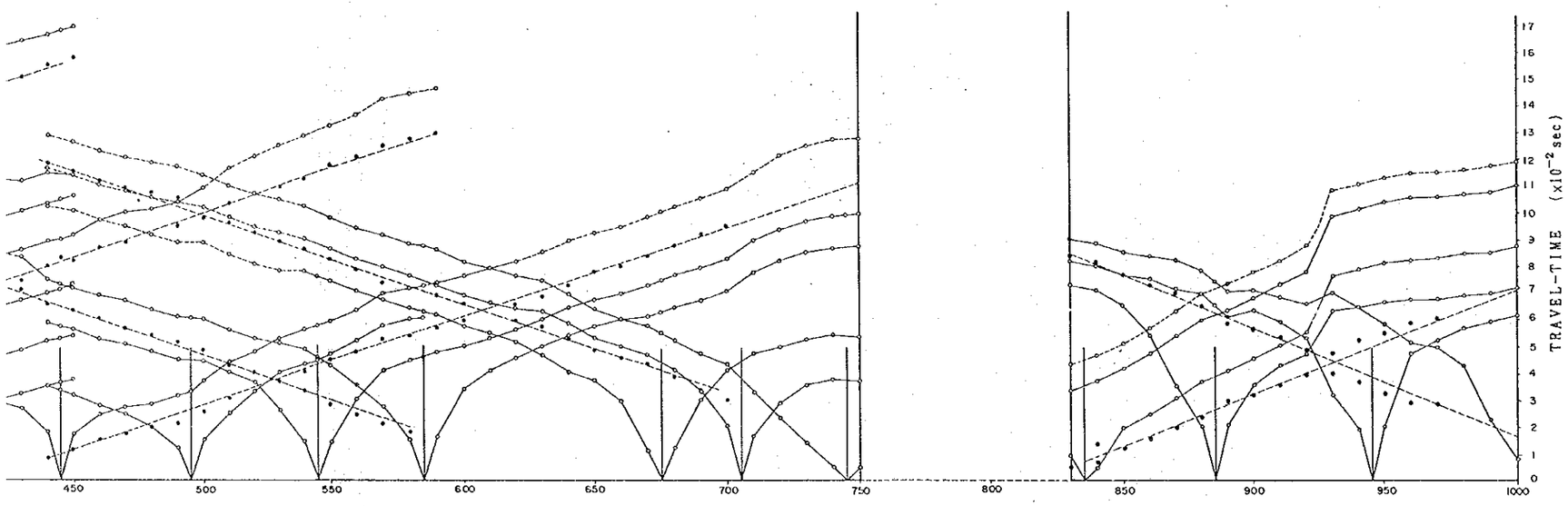

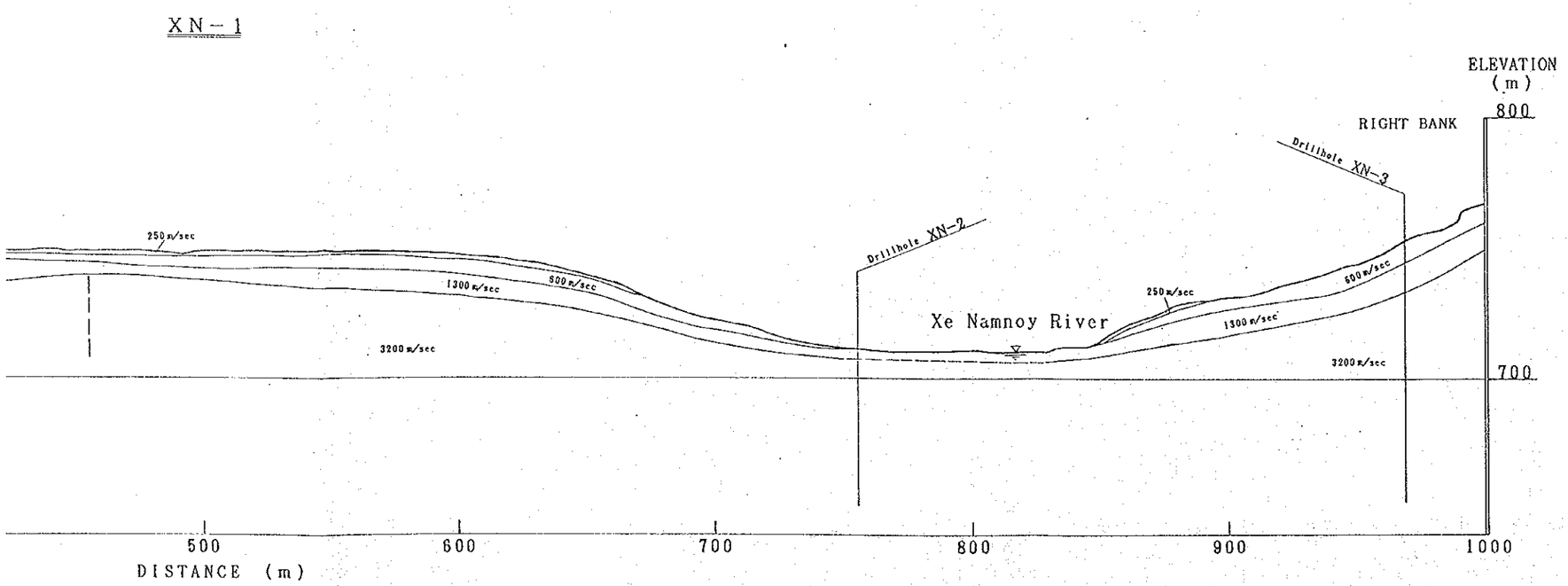

Fig. 3

Velocity Layer Profiles and Travel Time Curves in the Vicinity of Xe Namnoy Midstream Dam Site

3.3 Data of Core Drilling Work

Tables:

1. List of Core Drilling
2. Standard of Classification for Drilled Core
3. Standard of Rock Mass Evaluation
4. Relation of Rock Mass Evaluation and Classification for Drilled Core

Geologic Log of Drillholes:

1. Se Kong No. 4 Dam Site

SK-1	5 sheets
SK-2	3 sheets
SK-3	5 sheets

2. Xe Kaman No. 1 Dam Site

XK-1	5 sheets
XK-2	3 sheets
XK-3	5 sheets

3. Xe Namnoy Dam site

XN-1	4 sheets
XN-2	2 sheets
XN-3	3 sheets
XN-4	4 sheets
XN-5	3 sheets
XN-6	3 sheets

List of Core Drilling

Project	Drillhole Number	Length (m)	Coordinates	
			N	E
Se Kong No. 4	SK-1	100	1,715,122	692,132
	SK-2	60	1,715,512	692,112
	SK-3	100	1,715,808	692,102
Xe Kaman No. 1	XK-1	100	1,654,608	732,180
	XK-2	60	1,654,826	732,279
	XK-3	100	1,654,937	732,330
Xe Namnoy Midstream	XN-1	80	1,663,482	673,317
	XN-2	40	1,663,766	673,584
	XN-3	60	1,663,921	673,730
	XN-4	80	1,664,760	672,460
	XN-5	60	1,664,870	672,760
	XN-6	60	1,664,840	672,980
Total	12 holes	900		

Standard of Classification for Drilled Core

Weathering		Hardness		Crack spacing	
1	Very fresh. No weathering of mineral component.	1	Very hard. Broken into knifeedged pieces by strong hammer blow.	1	Over 30 cm
2	Fresh. Some minerals are weathered slightly. Usually no brown crack.	2	Hard. Broken into pieces by strong hammer blow.	2	10 - 30 cm
3	Fairly fresh. Some minerals are weathered. Cracks are stained and with weathered material.	3	Brittle. Broken into pieces by medium hammer blow.	3	3 - 10 cm
4	Weathered. Fresh portions still remain partially.	4	Very brittle. Easy broken into pieces by medium hammer blow.	4	1 - 3 cm
5	Strongly weathered. Most minerals are weathered and altered to second minerals.	5	Soft. Able to dig with hammer.	5	Under 1 cm

This standard has been used by EPDC.

Standard of Rock Mass Evaluation

Class	Rock Mass Condition
a.	Fresh, sound, cracky in part
b.	Weathered, brittle, cracky
c.	Strongly weathered, soft or very cracky

Relatiion of Rock Mass Evaluation and Classification for Drilled Core

		Grade of Weathering and Hardness				
		1	2	3	4	5
Grade of Crack Spacing	1	a	a	b	c	c
	2	a	a	b	c	c
	3	a	a	b	c	c
	4	b	b	b	c	c
	5	c	c	c	c	c

GEOLOGIC LOG OF DRILL HOLE

Page

Se Kong River Basin PROJECT — HOLE No. SK-1 — (SHEET 1 of 5)

LOCATION	Se Kong No.4 Damsite	DEPTH OF HOLE	100.0 m	COMMENCED	1-1-1994
ELEVATION	265.7 m	DIRECTION OF HOLE	90°	COMPLETED	25-1-1994
COORDINATE	X:E692132	CORE RECOVERY	99.7 %	DRILLED BY	Thongsay
	Y:N1715122	DRILLING MACHINE	KT-100	LOGGED BY	Hoshino

ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	LUGEON	Pmax (Kgf/cm²)	Pc	DEPTH / RESULT	BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN (%)	G.W.L (Dpt.H)	DEPTH
	0m			0 → 100%																0m
265.70		Te								SOIL with ang.gravel										
		Tuff								Sandy TUFF										
	1							4		Color changed yellowish SILT fill cracks Broken with hammer blow										1
					y.gr	3	3													
	2							3												2
	3				grey	2 1 3	2	2 1 3	b	Cracks stained to brown	—	—	—							3
	4				yxg	3	3	3		Green lapilli up to 5cm										4
	5									5.5 to 5.8m purple										5
	6				grey	2 1 3		2 1 3		6.5m: brown stain 10cm thick 6.3m: clay 2cm thick										6
	7																			7
	8										Lu=14.3	5.16	—	8.05m At-17H 8.70m Ac>1270						8
	9																		9m (9.30m)	9
	10									20cm green grey block at 8.5m						—			3m (10.30m)	10
	1																			1
	2									Graded corse-fine										2
	3				purplish grey	2	2	2	a	Lamina are horizontal to 20° Few calcite vein <2mm	—	—	—						7.5m (13.10m)	3
	4									Fine purplish										4
	5									Corse with green & purple spot(up to 2mm)									3m (16.90m)	5
	6									Lapilla up to 5cm across at 16.3m Upward fining at 16.5m										6
	7									Lapili Tuff like at 16.7m	Lu=0.1	5.26	7.76	17.15m Ac 1400					4.9m (17.80m)	7
	8									Calcite vein 70°-90° up to 2mm thick										8
	9																			9
245.70	20																			20

> driller's note <
1 (stick), 2 (substick), 3 (piece), 4 (fragment), 5 (grain)
1 (hard) - 5 (soft)
1 (fresh) - 5 (decomposed)

core loss
RQD

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GEOLOGIC LOG OF DRILL HOLE

Page

Se Kong River Basin PROJECT — HOLE No. SK-1 — (SHEET 2 of 5)

LOCATION	Se Kong No.4 Damsite	DEPTH OF HOLE	100.0 m	COMMENCED	1-1-1994
ELEVATION	265.7 m	DIRECTION OF HOLE	90°	COMPLETED	25-1-1994
COORDINATE	X:E692132	CORE RECOVERY	99.7 %	DRILLED BY	
	Y:N1715122	DRILLING MACHINE	KT-100	LOGGED BY	

ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	OBSERVATION OF CORE: COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	TESTING: LUGEON	Pmax	Pc	DEPTH / RESULT	BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN	G.W.L (Dpt.H)	DEPTH
	20m			0 → 100%								Kgf/cm²						%		20m
245.70		Tuff			pink grey	2	2			Sandy TUFF				20.33m σc=510 σt=173						
	1				pink grey+green					Lapilli(up to 2cm across) rich Purplish matrix	Lu=0.3	7.87	—							
	2																			
	3									Crack stained from 22.9m to 24.5m Solution vein from 23.3m to 24.3m										
	4					2				Opening up to 0.5cm across										
	5							2												
	6				greenish grey	1				Dissolved stained vein at from 25.1m to 25.3m and from 25.5m to 25.7m up to 0.5cm wide										
	7										Lu=0.9	7.93	5.43						8.2m (27.00m) 2.5m (27.70m)	
	8					3				29.6~30.0m purple fine 28.7~28.9m purple fine										
	9									White spot up to 2mm across Green irregular net in purple fine layer between 28.2m and 28.5m										
	30						2		a										5m (30.10m)	
	1							3												
	2				reddish purple					Fine sandy	Lu=1	7.97	5.47							
	3							2												
	4							3												
	5					2					—	—	—							
	6																			
	7				greenish red			2		Greenish sandy with some fine purplish layer from 10cm to 20cm thick at 4cm interval	Lu=0	8.09	—							
	8																			
	9									Some calcite vein at 80° Upward fining										
225.70	40																			40

core less

RQD

▸ driller's note ◂
1 (stick), 2 (substick), 3 (piece), 4 (fragment), 5 (grain)

1 (hard)~5 (soft)

1 (fresh)~5 (decomposed)

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GEOLOGIC LOG OF DRILL HOLE

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Se Kong River Basin PROJECT — HOLE No. SK-1 — (SHEET 3 of 5)

LOCATION	Se Kong No.4 Damsite	DEPTH OF HOLE	100.0 m	COMMENCED	1-1-1994
ELEVATION	265.7 m	DIRECTION OF HOLE	90°	COMPLETED	25-1-1994
COORDINATE	X:E692132	CORE RECOVERY	99.7 %	DRILLED BY	
	Y:N1715122	DRILLING MACHINE	KT-100	LOGGED BY	

ELEVATION	DEPTH	ROCK NAME	L.O.G	CORE RECOVERY	OBSERVATION OF CORE: COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	TESTING: LUGEON	Pmax	Pc	DEPTH / RESULT	BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN	G.W.L (Dpt.H)	DEPTH
	40m			0 → 100%								Kgf/cm²						%		40m
225.70																				
	1									Coarse sandy TUFF and medium grained sandy Tuff										1
	2										Lu=1.9	7.92	5.42						41.9m (Final)	2
	3																			3
	4				greenish red	2														4
	5									Purple fine at 47.3m lam at 15°. 47.65m.5cm thick at 30°										5
	6							2												6
	7									Stained crack from 47.7m to 49.0m some with calcite vein										7
	8									Few 0.5cm fragments in Coarse TUFF	Lu=13.4	8.02	—							8
	9									Coarse sandy TUFF Few lapilli up to 1cm across at 51.8m										9
	50	Tuff					2		8	Purple shale fine with calcite lamina at 75° at 49.5m										50
	1																			1
	2					2				Purple Tuff(fine) band of 2mm wide at 52.1m at 45°									7m (51.90m)	2
	3							1		Calcite vein Solution of calsite vein from 50.6m to 50.8m and from 67.7m to 67.8m	Lu=0.45	7.76	5.26							3
	4				purplish grey	1		1												4
	5					3		2												5
	6									Fine sandy TUFF										6
	7							2		Vein stained										7
	8							1		Irregular calcite vein or lens from 56.0m to 57.2m	Lu=5.4	11.3	8.8							8
	9							3		Coarse sandy TUFF										9
										Vertical calcite vein dissolved and brown stain 5mm wide										
						2		2		Fine sandy TUFF Purple fine band at 70°									37m	
205.70	60																			60

core loss — RQD

driller's note: 1 (stick), 2 (cube stick), 3 (piece), 4 (fragment), 5 (grain)

1 (hard)–5 (soft)

1 (fresh)–5 (decomposed)

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GEOLOGIC LOG OF DRILL HOLE

Page

Se Kong River Basin PROJECT — HOLE No. SK-1 — (SHEET 4 of 5)

LOCATION	Se Kong No.4 Damsite	DEPTH OF HOLE	100.0 m	COMMENCED	1-1-1994
ELEVATION	265.7 m	DIRECTION OF HOLE	90°	COMPLETED	25-1-1994
COORDINATE	X:E692132	CORE RECOVERY	99.7 %	DRILLED BY	
	Y:N1715122	DRILLING MACHINE	KT-100	LOGGED BY	

ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	OBSERVATION OF CORE: COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	TESTING: LUGEON	Pmax	Pc	DEPTH / RESULT	BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN	G.W.L (Dpt.H)	DEPTH
	60m			0 → 100%								Kgf/cm²						%		60m
205.70										Solution vein at 50.8m Cracks stain brown									(60.08m)	
	1									Coarse TUFF										1
	2				reddish purple					Lepilli up to 1cm 3cm lappilli at 62.8m	Lu=0.45	7.95	—							2
	3						2			Fine TUFF Calcite vein at 70°. 1-2mm thick										3
	4									Coarse sandy TUFF										4
	5									Vertical calcite vein 5mm thick below 68m										5
	6																			6
	7									SHALE Dark red porsion Laminated at 10° Dark porsion is concse Irregular calcite net										7
	8				dark red															8
	9									Purple net from 67.5m to 68.0m	Lu=0.7	7.78	—							9
	70	Tuff				2		2	e											70
	1									Fine TUFF Vertical vein from 68.9m to 68.3m										1
	2									Easily broken by hammer blow										2
	3						3													3
	4				purplish red					72.2-72.8m Coarse lapilli TUFF Broken by hammer blow	Lu=0.5	7.91	5.41							4
	5									Sandy lam at 76m, at 10° from 76.0m to 77.25m										5
	6									Calcit net dense from 77.3m to 77.8m Lapilli TUFF like breccia										6
	7																			7
	8									Small spot. (phenocryst?)	Lu=0.55	8.47	—							8
	9									10cm sandy lamina at 78.5m Lamina by 20° at 79.5m										9
185.70	80																			80

core loss

RQD

> driller's note <
1 (stick), 2 (substick), 3 (piece), 4 (fragment), 5 (grain)

1 (hard) - 5 (soft)

1 (fresh) - 5 (decomposed)

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GEOLOGIC LOG OF DRILL HOLE

Page

Se Kong River Basin PROJECT — HOLE No. SK-1 — (SHEET 5 of 5)

LOCATION	Se Kong No.4 Damsite	DEPTH OF HOLE	100.0 m	COMMENCED	1-1-1994
ELEVATION	265.7 m	DIRECTION OF HOLE	90°	COMPLETED	25-1-1994
COORDINATE	X:E692132	CORE RECOVERY	99.7 %	DRILLED BY	
	Y:N1715122	DRILLING MACHINE	KT-100	LOGGED BY	

ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	OBSERVATION OF CORE: COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	TESTING: LUGEON	Pmax	Pc	DEPTH / RESULT	BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN	G.W.L (Dpt.H)	DEPTH
	80m			0 → 100%								Kgf/cm²						%		80m
185.70		Tuff			purplish red	2	3	2	a	Not SHALE, becouse of existance of lapilli TUFF and lack of SANDSTONE beds	Lu=0.1	8.16	5.66							
	4									Coarse and dark below 85m										
	5									Calcite vein and small lens										
	8				greenish grey		2			Fine TUFF Small green spot (1mm) thin calcite vein	Lu=2.3	9.69	7.19							
	90					2 1 3	2 1 3	4	b	Cracks stained brown										
	1									Clay film from 80.5m to 80.8m										
	2				ppl	2		3		TUFF Crack stained	Lu=2.13	10.06	7.56							
	3				grn					From 91.6m to 91.8m Lapilli TUFF										
	4				purple	2 1 3		2		From 92.4m to 93.1m greenish sandy TUFF										
	5						2	1	a	From 93.4m to 93.7m greenish sandy TUFF	—	—	—							
	7				grn			3		Fine TUFF Few cracks stained	Lu=0.95	11.28	8.78							
	8				ppl	2				Laminated at 26°										
	9				grn			2		White spot at 99.9m										
185.70	100				ppl					Coarse TUFF-Lapilli TUFF 2cm lapilli										

core loss — RQD

* driller's note *
1 (stick), 2 (substick), 3 (piece), 4 (fragment), 5 (grain)
1 (hard) - 5 (soft)
1 (fresh) - 5 (decomposed)

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GEOLOGIC LOG OF DRILL HOLE

Page

Se Kong River Basin PROJECT — HOLE No. SK-2 — (SHEET 1 of 3)

LOCATION	Se Kong No.4 Damsite	DEPTH OF HOLE	60.0 m	COMMENCED	17-12-1993
ELEVATION	146.4 m	DIRECTION OF HOLE	90°	COMPLETED	30-12-1994
COORDINATE	X:E692112	CORE RECOVERY	92.8 %	DRILLED BY	Thongsay
	Y:N1715512	DRILLING MACHINE	KT-100	LOGGED BY	Hoshino

ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	OBSERVATION OF CORE: COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	TESTING: LUGEON	Pmax	Pc	DEPTH / RESULT	BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN	G.W.L. (Dpt.H)	DEPTH
	0m			0 → 100%								Kgf/cm²						%		0m
146.40	1	Topsoil	△							SOIL with angular gravel	—	—	—			—				1
	2		△																	2
	3		△																3m (Final)	3
	4		△																	4
	5		△																	5
	6		△																	6
	7		△																	7
	8		△																	8
	9		△																	9
	10		△																	10
	1		△																	1
	2		△																	2
	3		△															

GEOLOGIC LOG OF DRILL HOLE

Page

Se Kong River Basin PROJECT — HOLE No. SK-2 — (SHEET 2 of 3)

LOCATION	Se Kong No.4 Damsite	DEPTH OF HOLE	60.0 m	COMMENCED	17-12-1993
ELEVATION	146.4 m	DIRECTION OF HOLE	90°	COMPLETED	30-12-1994
COORDINATE	X:E692112	CORE RECOVERY	92.8 %	DRILLED BY	
	Y:N1715512	DRILLING MACHINE	KT-100	LOGGED BY	

ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	LUGEON	Pmax	Pc	DEPTH / RESULT	BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN	G.W.L (Dpt.H)	DEPTH
	20m			0 → 100%								Kgf/cm²						%		20m
126.40	1	Sandstone			grey	2	2	2	b	Medium grained SANDSTONE with SHALE lamina Irregular dark lens 20cm across at 20.8m	Lu=3	7.73	5.23	20.78m σc=250 σt=159						
					bk		5	3												
					gr		2	4		Hard sheared slate from 21.0m to 21.3m										
	2									No core from 21.85m to 22.3m										
	3				grey	2	2	3		Lamina at 20°										
	4						3	4		Easily separate into 1cm pieces										
	5						2	3												
	6						2	3		Sheared from 26.5m to 26.6m	Lu=7.7	7.75	—						1.45m (26.00m)	
	7						3	1												
	8				blk		3	4		Sheared from 27.3m to 27.4m										
		Sh					2			Sandy SHALE										
	9	Sandstone			grey					m.grained SANDSTONE with shale lamina										
	30							3											1.8m (30.00m)	30
	1				dark grey	2	2	5	a	15cm black shale band at 40° at 30.3m,sheared	Lu=3.16	7.8	—							
	2						5	4		32.2m to 33.2m shale dom. 10cm black clay at 32.4m lam at 50°										
	3						3			Bottom surface irregular										
	4					2				Downward coarsing from lam SHALE to f.m.g.Ss 10cm clay+brec. at 34.4m										
	5																			
	6							3		SANDSTONE with irregular shale lamina	Lu=6.86	7.79	5.29						2.5m (36.80m) 2.4m (37.40m)	
	7						2													
	8																			
	9																			
106.40	40																			40

▸ driller's note ◂
1 (stick), 2 (substick), 3 (piece), 4 (fragment), 5 (grain)
1 (hard) ~ 5 (soft)
1 (fresh) ~ 5 (decomposed)

core loss
RQD

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GEOLOGIC LOG OF DRILL HOLE

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Se Kong River Basin PROJECT — HOLE No. SK-2 — (SHEET 3 of 3)

LOCATION	Se Kong No.4 Damsite	DEPTH OF HOLE	60.0 m	COMMENCED	17-12-1993
ELEVATION	146.4 m	DIRECTION OF HOLE	90°	COMPLETED	30-12-1994
COORDINATE	X:E692112	CORE RECOVERY	92.8 %	DRILLED BY	
	Y:N1715512	DRILLING MACHINE	KT-100	LOGGED BY	

ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	LUGEON	Pmax (Kgf/cm²)	Pc	DEPTH/RESULT	BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN (%)	G.W.L (Dpt.H)	DEPTH
	40m			0 → 100%																40m
106.40		Ss			D.gr			3												
	1	Shale			black			2		Sandy SHALE with sandstone lamina Lamina at 50°										1
	2	Ss			d.gy			1		Medium grained SANDSTONE with shale lamina	—	—	—						2.5m (42.75m)	2
	3	Shale			black			3		SHALE With sandstone lamina Pylite lens at 43.7m Lamina at 60°										3
	4																			4
	5	Sandstone			d.grey					Medium grained SANDSTONE										5
	6																			6
	7										Lu=5.4	7.76	5.26							7
	8	Shale			dark grey/black		2			SHALE dominant with Sandstone lamina										8
	9																			9
	50					2		2	a	SANDSTONE from 49.25m to 49.7m										50
	1									51.7m to 53.7m pure SHALE				51.33m dc=510 st=166						1
	2										Lu=9.4	7.96	—							2
	3																			3
	4																			4
	5				blk		3	4		Carbonaceous SHALE with sandstone lamina with luster (graphyte?)										5
	6	Sandstone			grey															6
	7							2		Medium grained SANDSTONE Brecciated at 58.5m to 59.2m	Lu=13.78	7.88	—							7
	8						2	1		Irregular carbonaceous shale lamina										8
	9							3		Lamina at 70° at 56.1m 50° at 56.5m 30° at 59.3m										9
86.40	60																		2.6m	60

core loss — RQD

> driller's note <
1 (static), 2 (substick), 3 (piece), 4 (fragment), 5 (grain)
1 (hard) ~ 5 (soft)
1 (fresh) ~ 5 (decomposed)

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GEOLOGIC LOG OF DRILL HOLE

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Se Kong River Basin PROJECT — HOLE No. SK-3 — (SHEET 1 of 5)

LOCATION	Se Kong No.4 Damsite	DEPTH OF HOLE	100.0 m	COMMENCED	27-1-1994
ELEVATION	244.2 m	DIRECTION OF HOLE	90°	COMPLETED	9-2-1994
COORDINATE	X:E692102	CORE RECOVERY	97.5 %	DRILLED BY	Thongsay
	Y:N1715808	DRILLING MACHINE	KT-100	LOGGED BY	Hoshino

ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	LUGEON	Pmax	Pc	DEPTH / RESULT	BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN	G.W.L (Dpt.H)	DEPTH
	0m			0 → 100%								Kgf/cm²						%		0m
244.20	1	Talus								TALUS deposits										1
	2	Tuff			light brownish grey	3	3	3		Fine TUFF - lapilli TUFF Fragmental core										2
	3									Crack stained										3
	4					1	1	1	b	Rock inside stained in some portion										4
	5					4	4	4		10cm thick lapilli TUFF at 30° at 7.0m										5
	6																			6
	7				pplxgrey					Fine TUFF, very hard and spark like chert 10cm lapilli TUFF at 40° at 7.3m										7
	8						2	3												8
	9				grey	3				Sandy TUFF, white spot										9
	10				pxgrey		3	4		Fine TUFF										10
	1																			1
	2				grey	2	2	2		Sandy TUFF Solution along cracks but no calcareous (no Hcl reaction)	Lu=3.83	5.55	3.55							2
	3								a											3
	4				light brown					Fine TUFF Solution along cracks but not calcareous										4
	5																	4m (14.88m)		5
	6	Tuff breccia					2	2		TUFF BRECCIA Pale brown fragment and pale matrix Pale grey matrix between 15.7m and 16.5m										6
	7					3	1	1		Brecciated - cataclastic	Lu=5.2	5.38	3.58							7
	8						3	3		Brown cracks										8
	9																			9
224.20	20																			20

core loss

RQD

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GEOLOGIC LOG OF DRILL HOLE

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Se Kong River Basin PROJECT — HOLE No. SK-3 — (SHEET 2 of 5)

LOCATION	Se Kong No.4 Damsite	DEPTH OF HOLE	100.0 m	COMMENCED	27-1-1994
ELEVATION	244.2 m	DIRECTION OF HOLE	90°	COMPLETED	9-2-1994
COORDINATE	X:E692102	CORE RECOVERY	97.5 %	DRILLED BY	
	Y:N1715808	DRILLING MACHINE	KT-100	LOGGED BY	

ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	LUGEON	Pmax	Pc	DEPTH / RESULT	BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN	G.W.L (Dpt.H)	DEPTH
	20m			0 → 100%								Kgf/cm²						%		20m
224.20		Tb			light brown	3	2 / 1 / 3	2 / 1 / 3		Same as above Sandy TUFF	Lu=9.8	8.07	—							
		Tuff			grey	2	2	2												
					light brown	3	2 / 1 / 3	2 / 1 / 3		2-6cm Quartz vein at 26.8m	Lu=0.93	8.17	—							
					grey	2	2	2	a	Few cracks stained calcite thin vein and net of veins	Lu=0.6	8.12	—							
					l.br	3	2~3	3			Lu=1.7	8.24	—						36.2m (Final)	
					grey	2	2	2												
204.20	40					3	2~3	3												40

core loss — RQD

> driller's note <
1 (stick), 2 (substick), 3 (piece), 4 (fragment), 5 (grain)
1 (hard) - 5 (soft)
1 (fresh) - 5 (decomposed)

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GEOLOGIC LOG OF DRILL HOLE

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Se Kong River Basin PROJECT — HOLE No. SK-3 — (SHEET 3 of 5)

LOCATION	Se Kong No.4 Damsite	DEPTH OF HOLE	100.0 m	COMMENCED	27-1-1994
ELEVATION	244.2 m	DIRECTION OF HOLE	90°	COMPLETED	9-2-1994
COORDINATE	X:E692102	CORE RECOVERY	97.5 %	DRILLED BY	
	Y:N1715808	DRILLING MACHINE	KT-100	LOGGED BY	

ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	OBSERVATION OF CORE: COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	TESTING: LUGEON	Pmax	Pc	DEPTH / RESULT	BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN	G.W.L (Dpt.H)	DEPTH
	40m			0 → 100%								Kgf/cm²						%		40m
204.20		Tuff								Sandy TUFF	—	—	—							
	1									Crack stained from 40.1m to 41.7m, at 46.0m										1
	2									Calcite vein										2
	3										Lu=1.7	8.25	—							3
	4																			4
	5									Red vein from 45.0m to 47.5m										5
	6									Some cracks stained										6
	7									25° lamina at 48.5m										7
	8										Lu=3.2	8.9	—							8
	9	Lapilli Tuff								Lapilli TUFF or coarse TUFF										9
	50				grey	2	2	2	a	Red round fragmenyt of 3mm across scattered										50
	1									1-2cm lapilli										1
	2									White astoric spot of calcite (HCl reaction)										2
	3										Lu=0.4	8.43	5.93							3
	4																			4
	5									Some cracks stained										5
	6																			6
	7										Lu=2.6	8.27	—							7
	8																			8
	9																			9
184.20	60										—	—	—							60

core loss — RQD

▸ driller's note ◂ 1 (stick), 2 (substick), 3 (piece), 4 (fragment), 5 (grain)

1 (hard) - 5 (soft)

1 (fresh) - 5 (decomposed)

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GEOLOGIC LOG OF DRILL HOLE

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Se Kong River Basin PROJECT — HOLE No. SK-3 — (SHEET 4 of 5)

LOCATION	Se Kong No.4 Damsite	DEPTH OF HOLE	100.0 m	COMMENCED	27-1-1994
ELEVATION	244.2 m	DIRECTION OF HOLE	90°	COMPLETED	9-2-1994
COORDINATE	X:E692102	CORE RECOVERY	97.5 %	DRILLED BY	
	Y:N1715808	DRILLING MACHINE	KT-100	LOGGED BY	

ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	OBSERVATION OF CORE: COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	TESTING: LUGEON	Pmax	Pc	DEPTH / RESULT	BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN	G.W.L (Dpt.H)	DEPTH
	60m			0 → 100%								Kgf/cm²						%		60m
184.20		Lapilli Tuff			grey			2		Lapilli TUFF or coarse TUFF	Lu=0.87	10.06	—							
	1																			1
	2																			2
	3																			3
	4																			4
	5																			5
	6										Lu=0.8	10.38	7.88							6
	7																			7
	8																			8
	9									Few stained cracks										9
	70					2	2		a											70
	1																			1
	2									73.4m to 73.6m purple	Lu=6.8	10.74	8.24							2
	3									Sandy lamina at 50° cut by calcite vein at 50°										3
	4	Tuff			purplish grey			2		Fine TUFF Calcite vein cutting the lamina at 73.8m Bluish spot(not sharp) HCl reaction										4
	5																			5
	6							1		Lined calcite spot at 30° at 75.1m										6
	7							3		No stained cracks below 76m Reddish vein from 75m to 79m	Lu=3.8	10.55	8.1							7
	8				grey															8
	9							2		Sandy below 77.7m										9
164.20	80																			80

▸ driller's note ◂
1 (stick), 2 (substick), 3 (piece), 4 (fragment), 5 (grain)
1 (hard)–5 (soft)
1 (fresh)–5 (decomposed)
core loss
RQD

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GEOLOGIC LOG OF DRILL HOLE

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Se Kong River Basin PROJECT — HOLE No. SK-3 — (SHEET 5 of 5)

LOCATION	Se Kong No.4 Damsite	DEPTH OF HOLE	100.0 m	COMMENCED	27-1-1994
ELEVATION	244.2 m	DIRECTION OF HOLE	90°	COMPLETED	9-2-1994
COORDINATE	X:E692102	CORE RECOVERY	97.5 %	DRILLED BY	
	Y:N1715808	DRILLING MACHINE	KT-100	LOGGED BY	

ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	OBSERVATION OF CORE: COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	TESTING: LUGEON	Pmax (Kgf/cm²)	Pc	DEPTH/RESULT	BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN (%)	G.W.L (Dpt.H)	DEPTH
	80m			0 → 100%																80m
164.20																				
	1	Tuff			grey		2	2		Sandy TUFF										1
	2				l.ppl		2 ~ 3	3		Laminated fine TUFF	Lu=2.7	10.61	8.1							2
	3	Lapilli Tuff																		3
	4																			4
	5									Lapilli TUFF and corse grained TUFF with veins of calcite										5
	6																			6
	7										Lu=10.1	12.17	9.7							7
	8							2		Broken vein at 91.7m										8
	9				grey					Upward fining										9
	90					2			a	minor fault cut a red vein.	—	—	—							90
	1						2													1
	2																			2
	3										Lu=2.6	11.4	—							3
	4	Tuff								Fine TUFF										4
	5									Black shale band below 95.8m										5
	6							2		Black shale intrude into grey tuff and core appeared brecciated										6
	7				grey/dark grey															7
	8							3			Lu=0.6	11.2	—							8
	9									This hole has few purple layers which are dominant in SK-1										9
144.20	100									End of Hole 100.0m										100

core loss — RQD

driller's note: 1 (solid), 2 (substitute), 3 (piece), 4 (fragment), 5 (grain); 1 (hard) – 5 (soft); 1 (fresh) – 5 (decomposed)

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GEOLOGIC LOG OF DRILL HOLE

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Se Kong River Basin PROJECT — HOLE No. XK-1 — (SHEET 1 of 5)

LOCATION	Xe Kaman Damsite	DEPTH OF HOLE	100.0 m	COMMENCED	5-3-1994
ELEVATION	266.4 m	DIRECTION OF HOLE	90°	COMPLETED	15-3-1994
COORDINATE	X:E732180	CORE RECOVERY	94.4 %	DRILLED BY	Thongsay
	Y:N1654608	DRILLING MACHINE	KT-100	LOGGED BY	Hoshino

ELEVATION	DEPTH (0m)	ROCK NAME	LOG	CORE RECOVERY (0 → 100%)	OBSERVATION OF CORE: COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	TESTING: LUGEON	Pmax (Kgf/cm²)	Pc	DEPTH / RESULT	BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN (%)	G.W.L (Dpt.H)	DEPTH (0m)
266.40	0	Talus			light reddish grey					Talus deposit red, grey, clayey; wethered SANDSTONE fragments										
	10	Shale			redxgrey					Strongly wethered SHALE; No sandstone fragment from 9.5m to 11.0m										
					l.redxgrey	5	5	5												
					l.b	4	4	4		Pale grey SANDSTONE from 12.9m to 13.5m										
									c	No core from 13.5m to 15.4m										
					L.br	3~4	3~4	4		Sheared and reconsolidated from 15.4m to 15.7m										
					l.br	4	3~4	4		Core loss from 15.7m to 16.5m; Stained cracks										
										No core from 17.2m to 18.3m										
					l.b		3~4	4												
										No core from 18.7m to 19.7m										
246.40	20					4	3~4	4												

4.8m (Final)

▸ driller's note ◂
1 (sticks), 2 (substicks), 3 (piece), 4 (fragment), 5 (grain)
1 (hard) - 5 (soft)
1 (fresh) - 5 (decomposed)

core loss
RQD

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GEOLOGIC LOG OF DRILL HOLE

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Se Kong River Basin PROJECT — HOLE No. XK-1 — (SHEET 2 of 5)

LOCATION	Xe Kaman Damsite	DEPTH OF HOLE	100.0 m	COMMENCED	5-3-1994
ELEVATION	266.4 m	DIRECTION OF HOLE	90'	COMPLETED	15-3-1994
COORDINATE	X:E732180	CORE RECOVERY	94.4 %	DRILLED BY	
	Y:N1654608	DRILLING MACHINE	KT-100	LOGGED BY	

ELEVATION	DEPTH (20m)	ROCK NAME	LOG	CORE RECOVERY (0 → 100%)	OBSERVATION OF CORE: COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	TESTING: LUGEON	Pmax (Kgf/cm)	Pc	DEPTH / RESULT	BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN (%)	G.W.L (Dpt.H)	DEPTH (20m)
246.40		Sandstone			1b	4	3/4	4	c											
	1				greenish grey					Alternation of greenish grey and purplish grey medium grained SANDSTONE at 80° to 90°										1
	2					3	3		b											2
	3							3			—	—	—							3
	4									24.3-24.7m purple band										4
	5				purplish grey	2														5
	6					1														6
	7					3														7
	8						2			Stained cracks few below 28m	Lu=0.64	5.43	—							8
	9							2		Calcite vein, weak HCl reaction										9
	30						1		a											30
	1							1		A boundary between purple coarse grained SANDSTONE and purple medium grained SANDSTONE continues from 31.7m to 33.5m									5.38m (30.90m)	1
	2																			2
	3						3	3												3
	4				grey	2				Calcite vein	Lu=0.32	7.84	—							4
	5				grnxgrey					35.0-37.0m Pale green fine matrix with gravel and red fragment supposed to be altered zone along sheared zone										5
	6																			6
	7				purplish grey															7
	8						3	3	b	Sheared and reconsolidated lens at 60° to 70°, like shist from 37.0m to 40.0m	Lu=0.42	8.14	5.64						18.7m (38.40m)	8
	9									Easily broken to flat fragments										9
226.40	40																			40

▶ driller's note ◀
1 (stick), 2 (substick), 3 (piece), 4 (fragment), 5 (grain)
1 (hard) ~ 5 (soft)
1 (fresh) ~ 5 (decomposed)

core loss
RQD

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GEOLOGIC LOG OF DRILL HOLE

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Se Xong River Basin PROJECT — HOLE No. XK-1 — (SHEET 3 of 5)

LOCATION	Xe Kaman Damsite	DEPTH OF HOLE	100.0 m	COMMENCED	5-3-1994
ELEVATION	266.4 m	DIRECTION OF HOLE	90°	COMPLETED	15-3-1994
COORDINATE	X:E732180	CORE RECOVERY	94.4 %	DRILLED BY	
	Y:N1654608	DRILLING MACHINE	KT-100	LOGGED BY	

ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	OBSERVATION OF CORE: COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	TESTING: LUGEON	Pmax	Pc	DEPTH / RESULT	BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN	G.W.L (Opt.H)	DEPTH
	40m			0 → 100%								Kgf/cm²						%		40m
226.40	1	Sandstone			purplish grey	2	2	3	a	Purplish coarse grained SANDSTONE	Lu=0.68	8.21	—							1
	2																			2
	3							2		0.5cm rock fragments included										3
	4							1												4
								3												
	5							3												5
	6									No crack stained below 42.0m										6
	7										Lu=0.46	7.86	5.36							7
	8							2												8
	9							1		Core loss from 48.9m to 49.5m										9
	50							3												50
	1																			1
	2							3												2
	3										Lu=1.36	8.18	—							3
	4	Conglomerate						2												4
	5							1												5
	6							3		CONGLOMERATE upper surface traced from 52.5m to 53.5m 2-30cm gravel mixed, white gravel rich, sandy matrix										6
	7										Lu=1.88	8.28	—							7
	8									53.4-53.8m sampled for laboratory tests										8
	9							3		Coarse grained SANDSTONE from 53.7m to 54.5m and from 57.4m to 59.2m										9
206.40	60																			60

core loss

RQD

* driller's note *
1 (stick), 2 (substick), 3 (piece), 4 (fragment), 5 (grain)
1 (hard) ~ 5 (soft)
1 (fresh) ~ 5 (decomposed)

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GEOLOGIC LOG OF DRILL HOLE

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Se Kong River Basin PROJECT — HOLE No. XK-1 — (SHEET 4 of 5)

LOCATION	Xe Kaman Damsite	DEPTH OF HOLE	100.0 m	COMMENCED	5-3-1994
ELEVATION	266.4 m	DIRECTION OF HOLE	90°	COMPLETED	15-3-1994
COORDINATE	X:E732180	CORE RECOVERY	94.4 %	DRILLED BY	
	Y:N1654608	DRILLING MACHINE	KT-100	LOGGED BY	

ELEVATION	DEPTH (60m)	ROCK NAME	LOG	CORE RECOVERY (0 → 100%)	OBSERVATION OF CORE: COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	TESTING: LUGEON	Pmax (Kgf/cm²)	Pc	DEPTH / RESULT	BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN (%)	G.W.L (Dpt.H)	DEPTH (60m)
206.40	0	Conglomerate			purplish grey					CONGLOMERATE Gravel up to 5cm across										0
	1																			1
	2									20cm gravel at 61.5m	Lu=1.11	8.44	5.94							2
	3	Sandstone								Purple medium to coarse grained SANDSTONE										3
	4																			4
	5							2												5
	6																			6
	7							1			Lu=0.97	8.53	—							7
	8																			8
	9																			9
	70					2	2	3	B	70.4-72.5m granule CONGLOMERATE										70
	1																			1
	2									Lamina at 80° at 73.2m	Lu=1.8	8.47	5.97							2
	3																			3
	4																			4
	5									Few veins										5
	6									Gravel at 76.6m 5cm purplish grey sandstone										6
	7							3		5cm shale gravel at 77.7m	Lu=0.76	9.33	6.83							7
	8									Purple SHALE from 79.7m to 79.8m										8
	9																			9
186.40	80																			80

core loss
RQD

driller's note
1 (stick), 2 (substick), 3 (piece), 4 (fragment), 5 (grain)
1 (hard) - 5 (soft)
1 (fresh) - 5 (decomposed)

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GEOLOGIC LOG OF DRILL HOLE

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Se Kong River Basin PROJECT — HOLE No. XK-1 — (SHEET 5 of 5)

LOCATION	Xe Kaman Damsite	DEPTH OF HOLE	100.0 m	COMMENCED	5-3-1994
ELEVATION	266.4 m	DIRECTION OF HOLE	90°	COMPLETED	15-3-1994
COORDINATE	X:E732180	CORE RECOVERY	94.4 %	DRILLED BY	
	Y:N1654608	DRILLING MACHINE	KT-100	LOGGED BY	

ELEVATION	DEPTH (80m)	ROCK NAME	LOG	CORE RECOVERY (0 → 100%)	OBSERVATION OF CORE: COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	TESTING: LUGEON	Pmax (Kgf/cm²)	Pc (Kgf/cm²)	DEPTH / RESULT	BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN (%)	G.W.L (Dpt.M)	DEPTH (80m)
186.40	80m	Sandstone		0 → 100%	purplish grey	2	2	2 1 3	n	Course grained SANDSTONE	Lu=1.09	8.59	6.09							1
	1							3												2
	2																			3
	3							2 1 3		5cm purple siltstone gravel at 83.3m										4
	4																			5
	5										—	—	—							6
	6																			7
	7							3												8
	8									Slicken side on some crack surfaces	Lu=0.8	8.84	—							9
	9																			90
	90							2 1 3		Purple grey medium grained SANDSTONE										1
	1									HCl reaction in sandstone matrix										2
	2							3												3
	3									Thick anlcite band from 90.4m to 90.7m	Lu=0.53	8.07	—							4
	4																			5
	5																			6
	6							2 1 3			Lu=0.4	8.18	5.68							7
	7																			8
	8																			9
	9									End of Hole 100.0m										100
166.40	100																			

core loss — RQD

* driller's note *
1 (stick) 2 (substick) 3 (piece) 4 (fragment) 5 (grain)
1 (hard) - 5 (soft)
1 (fresh) - 5 (decomposed)

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GEOLOGIC LOG OF DRILL HOLE

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Se Kong River Basin PROJECT — HOLE No. XK-2 — (SHEET 1 of 3)

LOCATION	Xe Kaman Damsite	DEPTH OF HOLE	60.0 m	COMMENCED	24-2-1994
ELEVATION	132.7 m	DIRECTION OF HOLE	90°	COMPLETED	5-3-1994
COORDINATE	X:E732279	CORE RECOVERY	98.3 %	DRILLED BY	Thongsay
	Y:N1654826	DRILLING MACHINE	D-900	LOGGED BY	Hoshino

ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	OBSERVATION OF CORE: COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	TESTING: LUGEON	Pmax	Pc	DEPTH / RESULT	BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN	G.W.L (Dpt.H)	DEPTH
	0m			0 → 100%								Kgf/cm²						%		0m
132.70		Sandstone			purplish grey			3												
	1																			1
	2									Granule CONGLOMERATE to medium grained SANDSTONE										2
	3							2												3
	4					2	2													4
	5									Core loss from 5.95m to 6.05m, from 7.3m to 7.4m, from 7.6m to 7.7m, from 9.0m to 9.2m, from 12.3m to 12.7m									5.3m (Final)	5
	6							3												6
	7									Bedding plane at 60° at 7.9m										7
	8					3	3			Some portion with rough core surface Crack stained										8
	9							2		Medium grained SANDSTONE lamina from 8.5m to 9.0m										9
	10								e											10
	1							3												1
	2							2 / 3		No core from 12.3m to 12.7m										2
	3				purplish grey	2	2	2												3
	4					3	3	3												4
	5									Medium grained SANDSTONE										5
	6																			6
	7					2	2	2			Lu=0.52	5.72	3.72							7
	8									Few cracks stained										8
	9									19.2-19.6m sampled for laboratory tests										9
112.70	20																			20

> driller's note <
1 (stick), 2 (substick), 3 (piece), 4 (fragment), 5 (grain)
1 (hard) – 5 (soft)
1 (fresh) – 5 (decomposed)
core loss
RQD

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ELECTRIC POWER DEVELOPMENT CO., LTD.

GEOLOGIC LOG OF DRILL HOLE

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Se Kong River Basin PROJECT — HOLE No. XK-2 — (SHEET 2 of 3)

LOCATION	Xe Kaman Damsite	DEPTH OF HOLE	60.0 m	COMMENCED	24-2-1994
ELEVATION	132.7 m	DIRECTION OF HOLE	90°	COMPLETED	5-3-1994
COORDINATE	X:E732279	CORE RECOVERY	98.3 %	DRILLED BY	
	Y:N1654826	DRILLING MACHINE	D-900	LOGGED BY	

ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	OBSERVATION OF CORE: COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	TESTING: LUGEON	Pmax	Pc	DEPTH / RESULT	BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN	G.W.L (Dpt.H)	DEPTH
	20m			0 → 100%								Kgf/cm²						%		20m
112.70		Sandstone			purplish grey	2	2	2 1 3	a	Medium grained SANDSTONE	Lu=3.59	5.65	3.65						(20.10m)	
								2		Crack stained at 24.2m										
										Coarse grained SANDSTONE with granule									5.5m (25.20m)	
								2 1 3			Lu=0.5	8.06	5.56							
											—	—	—						5.4m (29.60m)	
										Medium grained SANDSTONE with granule	Lu=3.41	8.26	—							
										Some cracks stained between 32.7m and 35.6m										
								2		33.9-34.3m purple fine sandy with few veins minor offsetted veins										
										Laminated Coarse grained SANDSTONE Laming at 65° at 36.1m	Lu=0.81	8.2	—						5.8m (36.50m)	
92.70	40																			

core loss
RQD

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GEOLOGIC LOG OF DRILL HOLE

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Se Kong River Basin PROJECT — HOLE No. XK-2 — (SHEET 3 of 3)

LOCATION	Xe Kaman Damsite	DEPTH OF HOLE	60.0 m	COMMENCED	24-2-1994
ELEVATION	132.7 m	DIRECTION OF HOLE	90°	COMPLETED	5-3-1994
COORDINATE	X:E732279	CORE RECOVERY	98.3 %	DRILLED BY	
	Y:N1654826	DRILLING MACHINE	D-900	LOGGED BY	

ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	OBSERVATION OF CORE: COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	TESTING: LUGEON	Pmax	Pc	DEPTH / RESULT	BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN	G.W.L (Dpt.H)	DEPTH
	40m			0 → 100%								Kgf/cm²						%		40m
92.70		Sandstone			purplish grey	2	2	2	a	Laminated coarse grained SANDSTONE	Lu=2.01	8.11	5.61							
										Medium grained SANDSTONE with granule										
										Lamina at 65° at 41.3m										
										Sheared zone 2cm thick, greenish in color at 45° at 46.2m										
											Lu=5.13	8.18	5.65						5.3m (48.30m)	
										Granule gravel dance between 52.1m and 53.3m										
										1 to 2cm vein at 75° at 54.4m	Lu=10.04	8.19	5.69							
										Veins in this hole has HCl reaction										
										1cm thick greenish shear at 50° at 57.2m	Lu=5.29	8.14	5.64							
72.70	60									End of Hole 60.0m										

driller's note: 1 (stiff), 2 (substiff), 3 (piece), 4 (fragment), 5 (grain)

1 (hard) - 5 (soft)

1 (fresh) - 5 (decomposed)

core loss

RQD

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GEOLOGIC LOG OF DRILL HOLE

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Se Kong River Basin PROJECT — HOLE No. XK-3 — (SHEET 1 of 5)

LOCATION	Xe Kaman Damsite	DEPTH OF HOLE	100.0 m	COMMENCED	15-2-1994
ELEVATION	256.0 m	DIRECTION OF HOLE	90'	COMPLETED	25-2-1994
COORDINATE	X:E732330	CORE RECOVERY	99.6 %	DRILLED BY	Thongsay
	Y:N1654937	DRILLING MACHINE	KT-100	LOGGED BY	Hoshino

ELEVATION	DEPTH (Om)	ROCK NAME	LOG	CORE RECOVERY (0 → 100%)	OBSERVATION OF CORE: COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	TESTING: LUGEON	Pmax (Kgf/cm²)	Pc (Kgf/cm²)	DEPTH / RESULT	BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN (%)	G.W.L (Dpt.M)	DEPTH (Om)
256.00	0	Talus			redxbrown					Talus deposits										
	1																			
	2																			
	3	Sandstone			yellowish brown			3		Coarse grained SANDSTONE										
	4							4		Gravelly portion and sandy portion coexist										
	5					3	2													
	6					5	1		b	6.6-8.0m grey sandy										
	7									Cracks stained										
	8					4	3	3												
	9																			
	10																			
	1				ppl&grn x grey					Fine grained SANDSTONE Purple fine green sandy										
	2					2				Irregular SANDSTONE lens 0.5cm to 1cm gravel from 11.2m to 11.8m										
	3					5	2				Lu=10.96	5.68	3.68							
	4					3		2												
	5				yellowish brown	3				Coarse grained SANDSTONE with gravel										
	6					5	3	1	a	Solution along cracks, but no HCl reaction										
	7					4		3												
	8				yelxbrn+grey		2			Coarse to medium grained SANDSTONE	Lu=10.6	7.14	5.14							
	9					3	5													
236.00	20						3													

> driller's note <
1 (stick), 2 (substick), 3 (piece), 4 (fragment), 5 (grain)
1 (hard) - 5 (soft)
1 (fresh) - 5 (decomposed)
core loss
RQD

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GEOLOGIC LOG OF DRILL HOLE

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Se Kong River Basin PROJECT — HOLE No. XK-3 — (SHEET 2 of 5)

LOCATION	Xe Kaman Damsite	DEPTH OF HOLE	100.0 m	COMMENCED	15-2-1994
ELEVATION	256.0 m	DIRECTION OF HOLE	90°	COMPLETED	25-2-1994
COORDINATE	X:E732330	CORE RECOVERY	99.6 %	DRILLED BY	
	Y:N1654937	DRILLING MACHINE	KT-100	LOGGED BY	

ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	OBSERVATION OF CORE: COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	TESTING: LUGEON	Pmax	Pc	DEPTH / RESULT	BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN	G.W.L (Dpt.H)	DEPTH
	20m			0 → 100%								Kgf/cm²						%		20m
236.00					br	3	2~3	3		Bottom surface at 80°										
	1	Sandstone			purplish grey	2 1 3				Purplish fine SANDSTONE with 2-3cm thick greenish medium grained sandstone bands, wound and vertical										1
	2						2	2												2
	3					2					Lu=11.45	8.59	4.59							3
	4					2 1 3	2 1 3	2 1 3		Purplish SANDSTONE										4
	5																			5
	6				br	3	3	3		SANDSTONE stained to brown										6
	7				grey					Purple f.g.SANDSTONE / green m.g.SANDSTONE 1-3cm alt. at 70° Cracks stained from 26.4m to 27.3m										7
	8										Lu=13.39	5.18	3.18							8
	9									Purplish irregular shaped shale gravel from 29.3m to 30.0m up to 10cm across										9
	30				purplish grey	2		2	a											30
	1									Most cracks stained										1
	2					1	2	1		Granule Conglomerate from 30.9m to 31.6m										2
	3									Purple f.g.SANDSTONE with green c.g.sandstone bands at 86°	Lu=15.3	7.05	5.05							3
	4	Conglomerate				3		3		1-5cm green sheared zone at 10° to 20° with stained crack on the top surface										4
	5																			5
	6									Granule CONGLOMERATE including 2cm shale gravels										6
	7	Sandstone								Coarse grained SANDSTONE										7
	8						2			Solution from 37.9m to 38.2m, 38.8m, 39.0m to 39.4m	Lu=8.5	8	6							8
	9					3	1 3	3		No HCl reaction										9
216.00	40																			40

▸ driller's note ◂
1 (stick), 2 (substick), 3 (piece), 4 (fragment), 5 (grain)
1 (hard) ~ 5 (soft)
1 (fresh) ~ 5 (decomposed)

core loss
RQD

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GEOLOGIC LOG OF DRILL HOLE

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Se Kong River Basin PROJECT — HOLE No. XK-3 — (SHEET 3 of 5)

LOCATION	Xe Kaman Damsite	DEPTH OF HOLE	100.0 m	COMMENCED	15-2-1994
ELEVATION	256.0 m	DIRECTION OF HOLE	90°	COMPLETED	25-2-1994
COORDINATE	X:E732330	CORE RECOVERY	99.6 %	DRILLED BY	
	Y:N1654937	DRILLING MACHINE	KT-100	LOGGED BY	

ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	OBSERVATION OF CORE: COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	TESTING: LUGEON	Pmax (Kgf/cm²)	Pc (Kgf/cm²)	DEPTH / RESULT	BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN (%)	G.W.L (Opt.H)	DEPTH
	40m			0 → 100%																40m
216.00		Sandstone			purplish grey	3		3		Granule CONGLOMERATE or Coarse grained SANDSTONE	Lu=8.86	8.09	—						(Final)	
	5					2				Granule CONGLOMERATE from 44.9m to 45.4m	—	—	—							
	7						2	2		Granule CONGLOMERATE or coarse grained SANDSTONE with gravels	Lu=5.95	9.33	7.33							
	50					1	1	1	8											
	1					3				Irregular shaped purple shale up to 2cm across	Lu=1.42	11.74	9.24							
	3						3	3												
	5									Most cracks stained above 56.5m										
	7					2					Lu=1.71	8.92	—							
196.00	60																			80

Legend: ▸ driller's note ◂ 1 (stick), 2 (cubestick), 3 (piece), 4 (fragment), 5 (grain); 1 (hard) - 5 (soft); 1 (fresh) - 5 (decomposed); core loss; RQD

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GEOLOGIC LOG OF DRILL HOLE

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Se Kong River Basin PROJECT — HOLE No. XK-3 — (SHEET 4 of 5)

LOCATION	Xe Kaman Damsite	DEPTH OF HOLE	100.0 m	COMMENCED	15-2-1994
ELEVATION	256.0 m	DIRECTION OF HOLE	90°	COMPLETED	25-2-1994
COORDINATE	X:E732330	CORE RECOVERY	99.6 %	DRILLED BY	
	Y:N1654937	DRILLING MACHINE	KT-100	LOGGED BY	

ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	OBSERVATION OF CORE: COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	TESTING: LUGEON	Pmax	Pc	DEPTH / RESULT	BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN	G.W.L (Dpt.H)	DEPTH
	60m			0 → 100%								Kgf/cm²						%		60m
196.00	1	Sandstone			purplish grey			2		Medium to coarse grained SANDSTONE with gravels										1
	2							1		Few calcareous veins at 60°	Lu=5.41	8.6	6.6							2
	3							3												3
	4																			4
	5																			5
	6							3		Dissolved veins at 66.2m and 66.6m										6
	7					2	2													7
	8										Lu=3.66	8.84	6.84							8
	9																			9
	70								n											70
	1							2												1
	2										Lu=7.49	8.91	—							2
	3																			3
	4																			4
	5					2	2			Medium grained SANDSTONE below 74.7m										5
	6					1	1	3												6
	7	Conglomerate				3	3				—	—	—							7
	8							2		Granule CONGLOMERATE										8
	9					2	2	1												9
								3												
176.00	80	Se			gn					M.g.Ss 79.7m to 80.0m		8.97	6.97							80

> driller's note <
1 (stick), 2 (substick), 3 (piece), 4 (fragment), 5 (grain)
1 (hard) - 5 (soft)
1 (fresh) - 5 (decomposed)

core loss
RQD

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GEOLOGIC LOG OF DRILL HOLE

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Se Kong River Basin PROJECT — HOLE No. XK-3 — (SHEET 5 of 5)

LOCATION	Xe Kaman Damsite	DEPTH OF HOLE	100.0 m	COMMENCED	15-2-1994
ELEVATION	256.0 m	DIRECTION OF HOLE	90°	COMPLETED	25-2-1994
COORDINATE	X:E732330	CORE RECOVERY	99.6 %	DRILLED BY	
	Y:N1654937	DRILLING MACHINE	KT-100	LOGGED BY	

ELEVATION	DEPTH (80m)	ROCK NAME	LOG	CORE RECOVERY (0 → 100%)	OBSERVATION OF CORE: COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	TESTING: LUGEON	Pmax (Kgf/cm²)	Pc	DEPTH/RESULT	BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN (%)	G.W.L (Dpt.H)	DEPTH (80m)
176.00	1	Sandstone			purplish grey					Fine purple SANDSTONE above 80.8m										1
	2									Medium grained SANDSTONE										2
	3							2		Dissolved vein at 50° at 81.4m,3mm thick	Lu=3.15	8.97	6.97							3
	4					2	2	1		Three purplish 1cm thick bands at 80° at 83.8m										4
	5							3		5cm gravel bed at 50° at 85.7m										5
	6				grn					Medium to coarse grained greenish SANDSTONE from 85.6m to 86.5m										6
	7				purplish grey						Lu=3.65	9.8	7.8							7
	8					3	2 3	3		Coarse grained SANDSTONE										8
	9																			9
	90							3	a	1-2cm thick green shear with calcite vein at 70° at 90.2m										90
	1									90.2-95.3m medium grained SANDSTONE with purple fine grained sandstone bands at 75°										1
	2							2			Lu=6.43	8.97	6.97							2
	3																			3
	4					2	2													4
	5							3		Lamina at 70° at 95.3m										5
	6									Slightly greenish and finer below 95.3m										6
	7							2		3cm purple shale patch at 95.6m	Lu=6.27	9.83	—							7
	8							1												8
	9							3		Cracks stained down to the bottom										9
156.00	100									End of Hole 100.0m										100

> driller's note 1 (stick), 2 (substick), 3 (piece) 4 (fragment) 5 (grain)

1 (hard) - 5 (soft)

1 (fresh) - 5 (decomposed)

core less

RQD

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GEOLOGIC LOG OF DRILL HOLE

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Se Kong River Basin PROJECT — HOLE No. XN-1 — (SHEET 1 of 4)

LOCATION	Xe Namnoy Damsite	DEPTH OF HOLE	80.0 m	COMMENCED	3-12-1993
ELEVATION	752 m	DIRECTION OF HOLE	90°	COMPLETED	25-12-1993
COORDINATE	X:E673317	CORE RECOVERY	91.9 %	DRILLED BY	Thongsay
	Y:N1663482	DRILLING MACHINE	D-900	LOGGED BY	Hoshino

ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	OBSERVATION OF CORE: COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	TESTING: LUGEON	Pmax	Pc	DEPTH / RESULT	BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN	G.W.L (Dpt.H)	DEPTH
	0m			0 → 100%								Kgf/cm²						%		0m
752.00	1	Topsoil	△																	1
	2	Basalt	V		reddish brown	5	5	5	c	Strongly wethered BASALT Residual soil like Few hard fragments	—	—	—							2
	3																			3
	4																			4
	5																			5
	6				black	2	2	3	a	BASALT										6
	7									Fresh, hard, many pore up to 1cm across down to 10m										7
	8									Core is 5 to 30cm long										8
	9									Crack surface stained	Lu=0.55	5.37	3.37							9
	10									Brown but only surface										10
	1																			1
	2																			2
	3										Lu=0.3	8.26	5.76							3
	4																			4
	5																			5
	6																			6
	7										Lu=0.14	8.26	—							7
	8																			8
	9													19.08m 19.59m Δc=880						9
732.00	20										—	—	—							20

core loss
RQD

Driller's note
1 (stick), 2 (substick), 3 (piece), 4 (fragment), 5 (grain)
1 (hard) - 5 (soft)
1 (fresh) - 5 (decomposed)

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GEOLOGIC LOG OF DRILL HOLE

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Se Kong River Basin PROJECT — HOLE No. XN-1 — (SHEET 2 of 4)

LOCATION	Xe Namnoy Damsite	DEPTH OF HOLE	80.0 m	COMMENCED	3-12-1993
ELEVATION	752 m	DIRECTION OF HOLE	90°	COMPLETED	25-12-1993
COORDINATE	X:E673317	CORE RECOVERY	91.9 %	DRILLED BY	Thongsay
	Y:N1663482	DRILLING MACHINE	D-900	LOGGED BY	Hoshino

ELEVATION	DEPTH (20m)	ROCK NAME	LOG	CORE RECOVERY (0 → 100%)	OBSERVATION OF CORE: COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	TESTING: LUGEON	Pmax (Kgf/cm²)	Pc	DEPTH / RESULT	BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN (%)	G.W.L (Dpt.H)	DEPTH (20m)
732.00	0–10	Basalt			black	2	2	3	a	BASALT; 27.5-28.3m filled pore; 28.4-31.0m very porous	Lu=1.84	8.18	5.68	20.54m, σc=2120						
					black					Pore shape is oval, up to 2cm in diameter	Lu=1.03	8.57	6.07							
	10–20				dark grey					White coated at 28.9m, from 30.2m to 30.35m; Porous below 34.4m	Lu=41.4	4.37	—	32.89m, σc=1228, σt=147						
					black	2; 1; 3	3	4	b	Very porous and cracky; White material on the crack surface; Pore up to 0.5cm in diameter	Lu=41.7	4.37	—							
712.00	20–40					2; 2; 1; 3	5; 3			38.7-38.9m black silt; 39.85-39.9m black silt										

core loss — RQD

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GEOLOGIC LOG OF DRILL HOLE

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Se Kong River Basin PROJECT — HOLE No. XN-1 — (SHEET 3 of 4)

LOCATION	Xe Namnoy Damsite	DEPTH OF HOLE	88.0 m	COMMENCED	3-12-1993
ELEVATION	752 m	DIRECTION OF HOLE	90°	COMPLETED	25-12-1993
COORDINATE	X:E673317	CORE RECOVERY	91.9 %	DRILLED BY	Thongsay
	Y:N1663482	DRILLING MACHINE	D-900	LOGGED BY	Hoshino

ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	OBSERVATION OF CORE: COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	TESTING: LUGEON	Pmax	Pc	DEPTH / RESULT	BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN	G.W.L (Dpt.H)	DEPTH
	40m			0 → 100%								Kgf/cm²						%		40m
712.00		Basalt			black	2 ~ 3	2 ~ 3	3 ~ 4	b	BASALT										
	1									Core loss from 41.1m to 41.9m										1
	2				black					From 41.9m to 42.0m Silt,dark grey,hard shaly material broken by hands	Lu=40	4.8	—							2
	3						2	3												3
	4						1	4												4
	5							3		Cracky										5
	6						3			Brownish grey material on some crack surfaces Porous										6
	7					2		4			Lu=50.7	4.18	—							7
	8				dark grey					Pore is poor										8
	9					1		3	a	Crack stained										9
	50									Brown material at 51.4m										50
	1					3														1
	2						2	4			Lu=47.7	4.23	—							2
	3													53.51m / 41=660						3
	4							3												4
	5																			5
	6																			6
	7	Sand			yxgy				b	Silt and clay with basalt Core loss above 57.3m fragment and sand (River Sand)	Lu=49.3	4.71	—							7
	8																			8
	9	Sandstone			redxppl	5	5	5	c	Alternation of SANDSTONE and SHALE Silty and clayey										9
692.00	60																			60

core loss

RQD

▸ driller's note ◂
1 (stick), 2 (substick), 3 (piece), 4 (fragment), 5 (grain)
1 (hard) ~ 5 (soft)
1 (fresh) ~ 5 (decomposed)

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GEOLOGIC LOG OF DRILL HOLE

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Se Kong River Basin PROJECT — HOLE No. XN-1 — (SHEET 4 of 4)

LOCATION	Xe Namnoy Damsite	DEPTH OF HOLE	80.0 m	COMMENCED	3-12-1993
ELEVATION	752 m	DIRECTION OF HOLE	90°	COMPLETED	25-12-1993
COORDINATE	X:E673317	CORE RECOVERY	91.9 %	DRILLED BY	Thongsay
	Y:N1663482	DRILLING MACHINE	D-900	LOGGED BY	Hoshino

ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	LUGEON	Pmax	Pc	DEPTH / RESULT	BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN	G.W.L (Dpt.H)	DEPTH
	60m			0 → 100%								Kgf/cm²						%		60m
692.00	1	Sandstone			redxppl	5	5	5	c	Wethered SANDSTONE AND SHALE SHALE from 61.1m to 61.6m										1
	2				purple	4	4	4		Purple SANDSTONE flat lamina from 61.9m to 62.25m Core loss										2
	3																			3
	4	Sh			ppl	3	3	3		SHALE No core from 63.8m to 64.0m										4
	5	Ss			grey	2 1 3	2 1 3	2 1 3		63.4m-63.7m purple sandy shell 63.7m-65.1m m.g.Ss lamina at 20°										5
	6	FSs			reddish purple	2 1 3	3	2		Fine grained SANDSTONE Clayes at 61.9m-66.5m about 10cm thick Lamina at 10° to 15° No core from 65.05m to 65.35m										6
	7																			7
	8																			8
	9	Sandstone			yellowish brown	4	3 1 4	4	b	Medium grained SANDSTONE Color changed to brown 2-3cm thick clayey layere at 73.8m,74.2m and 74.5m 74.5m is reddish										9
	70																			70
	1																			1
	2	FSs			pplxgrey		3	3		Fine grained SANDSTONE										2
	3																			3
	4	Sandstone			grey	2 1 3	2 1 3	2	a	Medium grained SANDSTONE Laminated										4
	5																			5
	6	FSs			pplxgrey		2	1		Fine grained SANDSTONE 76.8-77.4m 10cm thick shale No core from 77.6m to 78.0m										6
	7																			7
	8	Ss			m	2-3	2	3		Medium grained SANDSTONE No core from 78.2m to 78.6m from 79.1m to 79.3m										8
	9				m	2 1 3	2	2	b											9
		Sh				3	4	5		SHALE										
672.00	80	Ss			A					M.g.Ss calcite lens										80

driller's note
1 (stick), 2 (substick), 3 (piece), 4 (fragment), 5 (grain)
1 (hard) - 5 (soft)
1 (fresh) - 5 (decomposed)
core loss
RQD

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GEOLOGIC LOG OF DRILL HOLE

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Se Kong River Basin PROJECT — HOLE No. XN-2 — (SHEET 1 of 2)

LOCATION	Xe Namnoy Damsite	DEPTH OF HOLE	40.0 m	COMMENCED	26-12-1993
ELEVATION	711 m	DIRECTION OF HOLE	90°	COMPLETED	2-1-1994
COORDINATE	X:E673584	CORE RECOVERY	100 %	DRILLED BY	Thongsay
	Y:N1663766	DRILLING MACHINE	D-900	LOGGED BY	Hoshino

ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	OBSERVATION OF CORE: COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	TESTING: LUGEON	Pmax	Pc	DEPTH / RESULT	BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN	G.W.L (Dpt.H)	DEPTH
	0m			0 → 100%								Kgf/cm						%		0m
711.00		Sandstone			purplish grey			4	b	Medium grained SANDSTONE and purplish grey fine grained SANDSTONE									1.2m (Final)	
	1																			1
	2									Lamina at 5° to 10°										2
	3							2												3
	4									Above 1.4m splited along lamina										4
	5				grey															5
	6							2		Lamina at 30°	Lu=125									6
	7						2	1		Calcareous below 4.5m (strong HCl reaction)										7
	8							1		100m thick purple SHALE at 8.0m Shale gravel below 8.3m										8
	9	Sh			ppl			3		SHALE										9
	10	Sandstone			grey	2	1		a	Medium grained SANDSTONE Lamina at 5°	Lu=13.61	5.32	3.32						1.3m (10.10m)	10
	1									Virtical calcite vein										1
	2							1		Storong HCl reaction below 14.1m down to the end of hole										2
	3						3			Purple shale gravel up to 5cm across at 10.3m										3
	4										Lu=43.75	5.28								4
	5	Shale			reddish purple					Calcareous SHALE White irregular lens and lamina									1.2m (14.75m)	5
	6							2												6
	7																			7
	8	Sandstone			purplish grey					SANDSTONE with dense shale lamina (spacing less the 1cm)	Lu=0.94	5.28	3.28							8
	9							1		Laminated medium to fine grained SANDSTONE										9
691.00	20																			20

core loss — RQD

▸ driller's note ◂ 1 (stick), 2 (substick), 3 (piece), 4 (fragment), 5 (grain)

1 (hard) ~ 5 (soft)

1 (fresh) ~ 5 (decomposed)

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GEOLOGIC LOG OF DRILL HOLE

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Se Kong River Basin PROJECT — HOLE No. XN-2 — (SHEET 2 of 2)

LOCATION	Xe Namnoy Damsite	DEPTH OF HOLE	40.0 m	COMMENCED	26-12-1993
ELEVATION	711 m	DIRECTION OF HOLE	90°	COMPLETED	2-1-1994
COORDINATE	X:E673584	CORE RECOVERY	100 %	DRILLED BY	Thongsay
	Y:N1663766	DRILLING MACHINE	D-900	LOGGED BY	

ELEVATION	DEPTH (20m)	ROCK NAME	LOG	CORE RECOVERY (0 → 100%)	COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	LUGEON	Pmax (Kgf/cm²)	Pc (Kgf/cm²)	DEPTH / RESULT	BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN (%)	G.W.L (Dpt.H)	DEPTH (20m)
691.00	1	Sandstone			purplish grey					Lamina fine to medium SANDSTONE above 21.3m	Lu=0.94	5.28	3.28						1.2m (21.40m)	1
	2									SHALE lens below 20.8m	—	—	—							2
	3							1		Medium grained SANDSTONE with purple SHALE lens lamina less than 5'										3
	4	Shale								SHALE with dense calcareous patches	Lu=0.25	7.23	5.23							4
	5	Ss								F.g.Ss purple shale lens										5
	6	Shale			reddish purple/purplish grey		2	3		SHALE with calcareous patches										6
	7																			7
	8							1											1.2m (28.70m)	8
	9																			9
	30					2	1	1	8		Lu=0.3	5.32	—							30
	1							2												1
	2																			2
	3	Sandstone			pplxgrey		3			Laminated SANDSTONE										3
	4									Cross lamina										4
	5									33.1-33.2m purple shale										5
	6				gy/d.gy			2		Laminated medium grained SANDSTONE Dark grey lamina less than 5'	—	—	—						1.2m (36.90m)	6
	7	Shale			pplxgrey					Purple SHALE with calcite										7
	8									Irregular shaped patch up to 5cm across										8
	9																			9
671.00	40									SANDSTONE lamina less than 3'										40

Driller's note: 1 (static), 2 (subtatic), 3 (piece), 4 (fragment), 5 (grain)

Other: 5 (soft)

Fresh: 5 (decomposed)

core loss

RQD

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GEOLOGIC LOG OF DRILL HOLE

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Se Kong River Basin PROJECT — HOLE No. XN-3 — (SHEET 1 of 3)

LOCATION	Xe Namnoy Damsite	DEPTH OF HOLE	60.0 m	COMMENCED	2-12-1993
ELEVATION	753 m	DIRECTION OF HOLE	90°	COMPLETED	13-12-1993
COORDINATE	X:E673730	CORE RECOVERY	88.9 %	DRILLED BY	Thongsay
	Y:N1663921	DRILLING MACHINE	KT-100	LOGGED BY	Hoshino

ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	LUGEON	Pmax	Pc	DEPTH / RESULT	BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN	G.W.L (Dpt.H)	DEPTH
	0m			0 → 100%								Kgf/cm²						%		0m
753.00		Ta			br					Topsoil										
	1	Talus			brownish grey					Talus deposits Sandstone blocks Silt,clay and block										1
	2																			2
	3																			3
	4																			4
	5	Shale			purplish red	4	4 1 5	5	c	SHALE Core recovery is about 30% from 4.8m to 6.4m mudcake like										5
	6																			6
	7					3	4			Fragmental core with cray. core recovery 60% from 6.4m to 8.2m										7
	8																			8
	9																			9
	10	Sandstone			purplish grey	2	2 1 3	2	a	Medium grained SANDSTONE Stick core Corse grained portion near 10.3m is broken by finger Brown crack below 13.7m	Lu=34.4									10
	1																			1
	2																			2
	3																			3
	4																			4
	5	Sandy shale				3		3		Sandy SHALE Spotted sand above 15.8m										5
	6				pplxred	4	4	4 1 5	c	Core recovery is about 30% below 15.8m Fragment core or mudcake core below 15.8m	Lu=24.0									6
	7																			7
	8	Shale				2	2 1 3	2	b	SHALE Fragment with clay from 18.2m to 18.3m										8
	9																			9
733.00	20					3	3	4				6.45							14.8m	20

▸ driller's note ◂
1 (stick), 2 (substick), 3 (piece), 4 (fragment), 5 (grain)
1 (hard) ~ 5 (soft)
1 (fresh) ~ 5 (decomposed)

core loss
RQD

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GEOLOGIC LOG OF DRILL HOLE

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Se Kong River Basin PROJECT — HOLE No. XN-3 — (SHEET 2 of 3)

LOCATION	Xe Namnoy Damsite	DEPTH OF HOLE	60.0 m	COMMENCED	2-12-1993
ELEVATION	753 m	DIRECTION OF HOLE	90°	COMPLETED	13-12-1993
COORDINATE	X:E673730	CORE RECOVERY	88.9 %	DRILLED BY	
	Y:N1663921	DRILLING MACHINE	KT-100	LOGGED BY	

ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	LUGEON	Pmax (Kgf/cm²)	Pc (Kgf/cm²)	DEPTH/RESULT	BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN (%)	G.W.L (Dpt.H)	DEPTH
733.00	20m	Sh		0 → 100%				4												20m
	1	Sandstone			purplish grey	3	3	2	b	Medium grained SANDSTONE Broken with light hammer blow Mica rich Irrgular lens	Lu=20.32	6.45	—							1
	2																			2
	3	Shale								SHALE										3
	4					4	5	5		Core recovery is 60cm/170cm Clay with fragment No hard fragment										4
	5								c	SHALE										5
	6				pplxred	3	3 1 4	4 1 5		Core recovery is low with dark irregular band Fragment core	Lu=18.62	6.7	4.7							6
	7																			7
	8	Ss			pxgy			2		Medium grained SANDSTONE										8
	9	Shale			redxppl		2 1 3	2 1 3		SHALE Porous near 29.5m Core recovery is about 60% from 27.5m to 30.0m								28.7m (27.90m)		9
	30										—	—	—							30
	1				pxgy			3		With black band Sandstone lamina										1
	2	Sandstone			gnxgy			2		Medium grained SANDSTONE 5cm irregular shale lens at 33.2m Brown crack at 33.3m Upwared fining at 33.55m	Lu=10.24	7.83	5.63							2
	3	Sh				2			e	1-4cm Ss lens,5cm zone of frag. with clay at 33.95m										3
	4	Sandstone			pxg					Laminated SANDSTONE										4
	5																			5
	6				grey		2			With purple shale patch about 1cm in diameter Grey below 35.5m Bedding at 10° to 20°										6
	7							1												7
	8										Lu=1.6	8.04	—					28.7m (37.90m)		8
	9									2cm shale at 38.75m										9
713.00	40									1cm shale at 39.7m										40

core loss — RQD

driller's note: 1 (latic), 2 (subatic), 3 (piece), 4 (fragment), 5 (grain)

1 (hard) - 5 (soft)

1 (fresh) - 5 (decomposed)

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GEOLOGIC LOG OF DRILL HOLE

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Se Kong River Basin PROJECT — HOLE No. XN-3 — (SHEET 3 of 3)

LOCATION	Xe Namnoy Damsite	DEPTH OF HOLE	60.0 m	COMMENCED	2-12-1993
ELEVATION	753 m	DIRECTION OF HOLE	90°	COMPLETED	13-12-1993
COORDINATE	X:E673730	CORE RECOVERY	88.9 %	DRILLED BY	
	Y:N1663921	DRILLING MACHINE	KT-100	LOGGED BY	

ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	OBSERVATION OF CORE: COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	TESTING: LUGEON	Pmax. (Kgf/cm²)	Pc	DEPTH/RESULT	BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN (%)	G.W.L (Dpt.H)	DEPTH
	40m			0 → 100%																40m
713.00	1	Sandstone			grey		2			Laminated SANDSTONE with shale patch Shale band between 41.65m and 41.75m Calcareous	Lu=1.43	8.01	6.01						29.2m (41.20m)	1
	2	Shale			pplxred	2	2	1		SHALE SANDSTONE lamina between 44.0m and 44.3m Correlate to the depth around 18m of XN-2 Hole Calcareous										2
	3						1													3
	4						3													4
	5	Sandstone																		5
	6				grey	2	2			Medium grained SANDSTONE With shale patch mica 10cm thick purple shale bed from 45.5m to 45.7m	Lu=2.53	7.93	5.93						29.5m (46.70m)	6
	7																			7
	8				pxgy					Fine grained SANDSTONE										8
	9				purplish grey			1		Medium grained SANDSTONE Laminated	—	—	—							9
	50								a											50
	1							1		Laminated at 20° to 30°	Lu=1.82	8.05	6.05							1
	2																			2
	3																			3
	4							2												4
	5																			5
	6																		28.5m (56.00m)	6
	7									5cm shale at 57.5m	Lu=2.37	10.49	7.99							7
	8	Shale			pplxred					SHALE with calcite patch White irregular shaped patch up to 3cm										8
	9							2												9
693.00	60																			60

▸ driller's note ◂ 1 (slick), 2 (subslick), 3 (pieces), 4 (fragment), 5 (grain)

1 (hard) - 5 (soft)

1 (fresh) - 5 (decomposed)

core loss

RQD

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GEOLOGIC LOG OF DRILL HOLE

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Se Kong River Basin PROJECT — HOLE No. XN-4 — (SHEET 1 of 4)

LOCATION	Xe Namnoy Damsite	DEPTH OF HOLE	80.00 m	COMMENCED	3-1-1994
ELEVATION	754.00 m	DIRECTION OF HOLE	90°	COMPLETED	21-1-1994
COORDINATE	X:E672460	CORE RECOVERY	76.6 %	DRILLED BY	Thongsay
	Y:N1664760	DRILLING MACHINE	D-900	LOGGED BY	Hoshino

ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	OBSERVATION OF CORE: COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	TESTING: LUGEON	Pmax	Pc	DEPTH / RESULT	BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN	G.W.L (Dpt.H)	DEPTH
	0m			0 → 100%								Kgf/cm²						%		0m
754.00										Strongly weathered BASALT										
										Residual soil										
	1				red	5														1
	2																			2
					brngrey	4	5	5	c	Few hard fragments below 1.9m Strongly weathered										
	3					5														3
	4															1				4
	5									BASALT										5
	6							2		Cracks stained to yellowish brown or greenish grey										6
	7																			7
	8										Lu=0.26	5.6	—							8
	9					2														9
	10	Basalt			dark grey			3												10
	1					1	2		a											1
	2										Lu=0.5	5.7	—						4.8m (12.70m)	2
	3					3														3
	4																			4
	5							2		Porous below 15.2m										5
	6				black					Pore is bigger up to 3cm across below 15.5m										6
	7							3			Lu=16.8	5.7	3.7							7
	8				br	4	3			5cm thick black silt at 18.65m										8
					blk	2 ~ 3	2 ~ 3			White coating on some pores										
	9							4		No HCl reaction										9
									b	No core from 19.2m to 19.7m										
734.00	20					2~3	2	3												20

> driller's note <
1 (stick), 2 (substick), 3 (piece), 4 (fragment), 5 (grain)
1 (hard) - 5 (soft)
1 (fresh) - 5 (decomposed)
core loss
RQD

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GEOLOGIC LOG OF DRILL HOLE

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Se Kong River Basin PROJECT — HOLE No. XN-4 — (SHEET 2 of 4)

LOCATION	Xe Namnoy Damsite	DEPTH OF HOLE	80.00 m	COMMENCED	3-1-1994
ELEVATION	754.00 m	DIRECTION OF HOLE	90°	COMPLETED	21-1-1994
COORDINATE	X:E672460	CORE RECOVERY	76.6 %	DRILLED BY	
	Y:N1664760	DRILLING MACHINE	D-900	LOGGED BY	

ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	LUGEON	Pmax	Pc	DEPTH RESULT	BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN	G.W.L (Dpt.H)	DEPTH
	20m			0 → 100%								Kgf/cm²						%		20m
734.00		Basalt			blk	2~3	2	2~3	b	BASALT Black silty from 21.6m to 21.7m 5cm orange silt at 20.9m	—	—	—							
	1				br	3~4	3	4												1
	2				black	2	2	2		Porous above 21.4m	Lu=22.79	6.84	4.84							2
	3						1			Dry surface is dark grey below 23m									17.10m (22.70m) 23.25m (Final)	3
	4					1	3	3	a	Porous below 23.7m Pore 1cm across dense										4
	5					3		2												5
	6						4	3		Black silty porous Basalt from 25.9m to 26.4m										6
	7						3	2		Below 27.4m core recovery is bad										7
	8									Very porous above 28.5m										8
	9				bl	2~3	2	3		White cont. at some cracks										9
	30				bl	2~3	2~3	4												30
	1																			1
	2				bl	2~3	2~3	4												2
	3									Porous Crack surfaces are white or yellow grey	—	—	—							3
	4								b	2-3, 2-3, 4										4
	5									No core from 27.4m to 27.9m from 28.0m to 28.4m from 29.2m to 30.1m from 30.7m to 31.5m from 32.4m to 33.9m from 34.0m to 35.5m from 36.8m to 37.4m										5
	6				black	2~3	2~3	4												6
	7																			7
	8				black	2~3	2~3	3												8
	9							1												9
714.00	40																			40

core loss
RQD

driller's note
1 (stick), 2 (substick), 3 (piece), 4 (fragment), 5 (grain)
1 (hard) - 5 (soft)
1 (fresh) - 5 (decomposed)

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GEOLOGIC LOG OF DRILL HOLE

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Se Kong River Basin PROJECT — HOLE No. XN-4 — (SHEET 3 of 4)

LOCATION	Xe Namnoy Damsite	DEPTH OF HOLE	80.00 m	COMMENCED	3-1-1994
ELEVATION	754.00 m	DIRECTION OF HOLE	90°	COMPLETED	21-1-1994
COORDINATE	X:E672460	CORE RECOVERY	76.6 %	DRILLED BY	
	Y:N1664760	DRILLING MACHINE	D-900	LOGGED BY	

ELEVATION	DEPTH (40m)	ROCK NAME	LOG	CORE RECOVERY (0 → 100%)	OBSERVATION OF CORE: COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	TESTING: LUGEON	Pmax (Kgf/cm²)	Pc	DEPTH / RESULT	BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN (%)	G.W.L (Opt.H)	DEPTH (40m)
714.00		Basalt			black	2~3	2~3	3~4		BASALT										
	1									Pores are not dense and small										1
	2				bl	2~3	1~2	4		Yellow green coat on some cracks										2
	3				bl	2~3	2~3	4												3
	4				bl	2~3	2~3	4		Breccia like at 40.4m										4
	5				bl	2~3	2~3	4		No core from 41.5m to 42.0m from 42.75m to 42.85m from 43.4m to 43.7m from 44.2m to 44.5m from 45.1m to 45.6m from 46.25m to 46.8m from 48.0m to 48.6m										5
	6				bl	2~3	2~3	3~4	b											6
	7				bl	2~3	2~3	3~4												7
	8				g	2~3	2~3	4												8
	9	Sandstone			g	2~3	2~3	3		Medium grained SANDSTONE										9
	50				grey	3	3	3		Clayey shale band below 50.2m										50
		Sh				4	4	4		SHALE										
	1	Sandstone			oxi.y	3	3~4	2		SANDSTONE laminated and medium grained Yellow stained in part										1
	2				oxgy					No core from 52.2m to 52.6m										2
	3				light grey	2	2	4		Medium to Coarse grained SANDSTONE										3
	4							2		Laminated										4
	5						1													5
	6						3	3	a	Yellow SANDSTONE band up to 3cm thick near 57.2m and 57.85m										6
	7				grey					Yellow grey SANDSTONE of 15cm thick at 58.2m										7
	8									No core from 58.2m to 58.4m										8
	9				grey	2	2~3	3		Cracks stained brown at 58.7m										9
694.00	60							2~3												60

▸ driller's note ◂ 1 (stick), 2 (substick), 3 (piece), 4 (fragment), 5 (grain)

1 (hard)–5 (soft)

1 (fresh)–5 (decomposed)

core loss

RQD

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GEOLOGIC LOG OF DRILL HOLE

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Se Kong River Basin PROJECT — HOLE No. XN-4 — (SHEET 4 of 4)

LOCATION	Xe Namnoy Damsite	DEPTH OF HOLE	80.00 m	COMMENCED	3-1-1994
ELEVATION	754.00 m	DIRECTION OF HOLE	90°	COMPLETED	21-1-1994
COORDINATE	X:E672460	CORE RECOVERY	76.6 %	DRILLED BY	
	Y:N1664760	DRILLING MACHINE	D-900	LOGGED BY	

ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	LUGEON	Pmax	Pc	DEPTH/RESULT	BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN	G.W.L (Dpt.H)	DEPTH
	60m			0 → 100%								Kgf/cm²						%		60m
694.00		Sandstone			grey	2	2	2	a	Medium to coarse grained SANDSTONE lamina at 20°										
	1																			1
					l.gry					No HCl reaction above 62.6m										
	2																			2
	3									No core from 62.6m to 64.4m										3
	4																			4
						2	3	4												
	5									Fine SANDSTONE with purple shale patch and calcareous patch										5
						2	2	3		No core from 64.7m to 65.4m										
	6				pxr	2	2 1 3	4												6
	7							2		Upward fining from SHALE to fine grained SANDSTONE										7
										with pale calcite patch										
	8									Strong HCl reaction										8
					d.r		2~3			No core from 67.0m to 68.3m										
	9	Shale			pxr	2	3	3		SHALE										9
	70									Core shape is like torted										70
	1	Sandstone							b	No core from 70.25m to 71.75m										1
					pxr															
	2					2	2~3	2~3		Fine grained SANDSTONE with irregular sand lens										2
	3							4												3
	4				l.gy	2	2 1 3	2 1 3		Medium grained SANDSTONE lamina at 20° Cross lamina in part No HCl reaction										4
	5																			5
	6				d.r	2	2 1 3	2 1 3		Fine grained SANDSTONE (Muddy)										6
	7									Few irregular calcite patch										7
	8				gy	2	2 1 3	2 1 3												8
								2												
	9									Medium grained SANDSTONE										9
					gy	2	2~3	3		Dark grey lamina										
674.00	80				gy	2	2~3	3		Strong HCl reaction										80

core loss — RQD

driller's note: 1 (stick), 2 (substick), 3 (piece), 4 (fragment), 5 (grain)

(hard) - 5 (soft)

(fresh) - 5 (decomposed)

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GEOLOGIC LOG OF DRILL HOLE

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Se Kong River Basin PROJECT — HOLE No. XN-5 — (SHEET 1 of 3)

LOCATION	Xe Namnoy Damsite	DEPTH OF HOLE	60.0 m	COMMENCED	22-11-1993
ELEVATION	735 m	DIRECTION OF HOLE	90°	COMPLETED	2-12-1993
COORDINATE	X:E672760	CORE RECOVERY	91.5 %	DRILLED BY	Thongsay
	Y:N1664870	DRILLING MACHINE	D-900	LOGGED BY	Hoshino

ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	LUGEON	Pmax (Kgf/cm²)	Pc	DEPTH / RESULT	BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN (%)	G.W.L (Dpt.H)	DEPTH
	0m			0 → 100%																0m
735.00										SHALE										
					brown					No water drilling										
	1																			1
	2									No fragment above 2.2m										2
										From 2.2m to 2.5m few fragment										
	3	Shale			purplish red	5	5	5	c											3
	4																			4
	5									Fragmental core below 5.0m										5
	6				pxr+y															6
	7									SANDSTONE										7
		Sandstone			pxgrey	3 ~ 4	3 ~ 4	4		Core recovery is about 50%										
	8																			8
	9	Sh			pxr		4			SHALE Broken by hand,slaky										9
									b	Medium grained SANDSTONE Laminated										
	10				pxgrey	3	3 ~ 4	3												10
	1																			1
	2				l.grey															2
	3									Purple grey lamina.	Lu=6.6	5.5	3.5							3
	4	Sandstone																		4
	5				purplish grey	2	2	2	a	purple shale lenses of 0.5cm thick near 13.5m deep										5
	6																			6
	7									Lamina at 20°	Lu=0.68	5.81	3.81							7
	8																			8
	9				l.gy															9
715.00	20																			20

▸ driller's note ◂
1 (stiff), 2 (substiff), 3 (piece), 4 (fragment), 5 (grain)
1 (hard) – 5 (soft)
1 (fresh) – 5 (decomposed)

core loss
RQD

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GEOLOGIC LOG OF DRILL HOLE

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Se Kong River Basin PROJECT — HOLE No. XN-5 — (SHEET 2 of 3)

LOCATION	Xe Namnoy Damsite	DEPTH OF HOLE	60.0 m	COMMENCED	22-11-1993
ELEVATION	735 m	DIRECTION OF HOLE	90°	COMPLETED	2-12-1993
COORDINATE	X:E672760	CORE RECOVERY	91.5 %	DRILLED BY	
	Y:N1664870	DRILLING MACHINE	D-900	LOGGED BY	

ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	LUGEON	Pmax (Kgf/cm²)	Pc (Kgf/cm²)	DEPTH/RESULT	BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN (%)	G.W.L. (Dpt.H)	DEPTH
715.00	20m	Ss		0→100%	l.gy	2	2	2	a	20.3-20.5m gravel band Lamina from 15_ to 20°		5.81	3.81							20m
	1	Shale			l.gy	2~3	2~3	3		SHALE										1
	2								b	Fragmental Low core recovery Soft in part	Lu=0.5	5.69	3.69							2
	3				l.gy	2~3	2~3	4		No core from 21.35m to 22.75m SANDSTONE between 23.3m and 23.6m										3
	4				rxgy	2~3	2~3			Pale irregular lens No HCl reaction Laminated,sandy below 24.2m										4
	5	Sandstone			light grey			2		SANDSTONE Dark grey laminated Fragment with clay between 24.7m and 24.75m										5
	6																			6
	7						2			Laminated thin(1cm thick) shale with clay film at 26.8m	Lu=0.38	5.5	3.5						27.7m (Final)	7
	8									Dark shale patch at 27.3m										8
	9																			9
	30	Shale			d.pxgy		2~3	3		SHALE Soft at 29.5m shows slaking Clay coat between 29.1m and 29.2m										30
	1									Irregular white lens or bands	—	—	—							1
	2	Sandstone			grey	2		2	a	SANDSTONE Laminated at 33.3m and 33.8m	Lu=1.28	6.6	4.8							2
	3																			3
	4																			4
	5	Shale			d.pxred		2			SHALE Wound lamina or irregular lens of sandstone rich										5
	6							1												6
	7				pplxred			1		White irregular lenses show HCl strong reaction below 35.3m	—	—	—							7
	8							2		Purplish red shale between 38.2m and 38.5m										8
	9																			9
695.00	40																			40

▸ driller's note ◂
1 (solid), 2 (subsolid), 3 (piece), 4 (fragment), 5 (grain)

1 (hard) - 5 (soft)
1 (fresh) - 5 (decomposed)

core loss
RQD

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GEOLOGIC LOG OF DRILL HOLE

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Se Kong River Basin PROJECT — HOLE No. XN-5 — (SHEET 3 of 3)

LOCATION	Xe Namnoy Damsite	DEPTH OF HOLE	60.0 m	COMMENCED	22-11-1993
ELEVATION	735 m	DIRECTION OF HOLE	90°	COMPLETED	2-12-1993
COORDINATE	X:E672760	CORE RECOVERY	91.5 %	DRILLED BY	
	Y:N1664870	DRILLING MACHINE	D-900	LOGGED BY	

ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	LUGEON	Pmax	Pc	DEPTH/RESULT	BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN	G.W.L (Dpt.H)	DEPTH
	40m			0 → 100%								Kgf/cm²						%		40m
695.00		Shale			reddish purple	2	2	1 1 2 3 1 3 4 2	8	SHALE Irregular white patch is calcareous showing strong HCl reaction Sandy materials along cracks Sandy from 41.7m to 41.8m showing HCl reaction Shale at 43m shows slight slaking Clay with fragment between 49.1m and 49.2m Greenish yellow and grey patch between 49.2m and 54.0m Showing no HCl reaction	Lu=0.1 Lu=1.99	8.51 10.4	—						26m (50.50m)	
		Se			pxsy			3		Medium grained SANDSTONE No HCl reaction	Lu=3.72	8.76	6.26							
		Shale			reddish purple			1		SHALE Purple SANDSTONE between 53.1m and 55.5m Laminated SANDSTONE below 59.35m Lamina is inclined at 5° degree from 59.75m to 60.0m	Lu=0.52	8.54	6.04							
675.00	60	Ss								SANDSTONE laminated at 5°										60

» driller's note «
1 (stick), 2 (substick), 3 (piece), 4 (fragment), 5 (grain)
1 (hard) - 5 (soft)
1 (fresh) - 5 (decomposed)

core loss
RQD

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GEOLOGIC LOG OF DRILL HOLE

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Se Kong River Basin PROJECT — HOLE No. XN-6 — (SHEET 1 of 3)

LOCATION	Xe Namnoy Damsite	DEPTH OF HOLE	60.0 m	COMMENCED	22-11-1993
ELEVATION	735 m	DIRECTION OF HOLE	90°	COMPLETED	30-11-1993
COORDINATE	X:E672980	CORE RECOVERY	94.6 %	DRILLED BY	Thongsay
	Y:N1664840	DRILLING MACHINE	KT-100	LOGGED BY	Hoshino

ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	OBSERVATION OF CORE: COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	TESTING: LUGEON	Pmax	Pc	DEPTH/RESULT	BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN	G.W.L (Opt.H)	DEPTH
	0m			0 → 100%								Kgf/cm²						%		0m
735.00		Ta	△		brn					Talus deposits										
	1	Sh				5	5			Strongly weaeared SHALE										1
	2	Sandstone			pxgy	4	4	5	c	SANDSTONE Broken by hand										2
	3				pxgy	4	4	3 1 4		No core from 2.45m to 3.0m	—	—	—			—				3
	4				light grey															4
	5					3	3	2	b	Medium to corse grained										5
	6																			6
	7																			7
	8									The sections 5.3-5.5m 9.7-9.9m, 10.0-10.2m provide no core and supposed to be softened grey shale	Lu=49.3	5.08	—							8
	9																			9
	10							1												10
	1						2	1												1
	2									Crack at 12.4m stained brown Dark grey lamina at 20°	Lu=16.52	5.76	3.76						7.23m (12.00m)	2
	3					2		2	a											3
	4																			4
	5										—	—	—							5
	6	Shale			dark grey		2			SHALE										6
	7						1 3	3		Green shale patch										7
	8	Sandstone			grey/d.grey			1		White medium grained SANDSTONE at lower portion grades to grey muddy dark SANDSTONE at upper portion	Lu=22.6	5.76	3.76							8
	9						2	1 2											19.4m (Final)	9
715.00	20																			20

core loss

RQD

> driller's note <
1 (stick), 2 (substick), 3 (piece), 4 (fragment), 5 (grain)
1 (hard) – 5 (soft)
1 (fresh) – 5 (decomposed)

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GEOLOGIC LOG OF DRILL HOLE

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Se Kong River Basin PROJECT — HOLE No. XN-6 — (SHEET 2 of 3)

LOCATION	Xe Namnoy Damsite	DEPTH OF HOLE	60.0 m	COMMENCED	22-11-1993
ELEVATION	735 m	DIRECTION OF HOLE	90°	COMPLETED	30-11-1993
COORDINATE	X:E672980	CORE RECOVERY	94.6 %	DRILLED BY	
	Y:N1664840	DRILLING MACHINE	KT-100	LOGGED BY	

ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	OBSERVATION OF CORE: COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	TESTING: LUGEON	Pmax	Pc	DEPTH / RESULT	BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN	G.W.L (Dpt.H)	DEPTH
	20m			0 → 100%								Kgf/cm²						%		20m
715.00	1	Sandstone			light grey			1, 3, 2		Virtical crack between 20.6m and 21.3m	—	—	—							1
	2	Shale			pplxred/dark red			2		SHALE with irregular patches in upper part Purple Sandstone in lower part (Upward fining) Irregular white patches are poor above 23.0m	Lu=1.31	6.13	4.13							2
	6										—	—	—							6
	7	Sandstone			light grey			5, 3		SANDSTONE Brown crack HCl reaction above 26.8m	Lu=6.75	6.09	4.09							7
	30	Shale			pplxred/dark red	2	2		8	SHALE From 29.3m to 30.70m dark purple shale to 30.75m Sandstone to 31.10m d.p.shale to 31.70m shale with irregular lens to 32.1 m No core to 32.5 m d.p.shale to 32.6 m white Ss	Lu=2.7	6.13	4.13						13.5m (32.00m)	30
	5							1, 5, 2		to 35.7 m purple shale with irregular spot and sandy layer										5
	6	Sandstone			pplxred			1		SANDSTONE Laminated at 15°	Lu=5.73	6.15	—							6
	9	Ss.sh			pplxgrey			2		Change from top to bottom from SHALE through muddy SANDSTONE to medium grained SANDSTONE										9
695.00	40																			40

core loss — RQD

* driller's note *
1 (stick), 2 (substick), 3 (piece), 4 (fragment), 5 (grain)
1 (hard) - 5 (soft)
1 (fresh) - 5 (decomposed)

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GEOLOGIC LOG OF DRILL HOLE

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Se Kong River Basin PROJECT — HOLE No. XN-6 — (SHEET 3 of 3)

LOCATION	Xe Namnoy Damsite	DEPTH OF HOLE	60.0 m	COMMENCED	22-11-1993
ELEVATION	735 m	DIRECTION OF HOLE	90°	COMPLETED	30-11-1993
COORDINATE	X:E672980	CORE RECOVERY	94.6 %	DRILLED BY	
	Y:N1664840	DRILLING MACHINE	KT-100	LOGGED BY	

ELEVATION	DEPTH	ROCK NAME	LOG	CORE RECOVERY	OBSERVATION OF CORE: COLOR	WEATHERING	HARDNESS	CRACK SPACING	ROCK EVALUATION	DESCRIPTION	TESTING: LUGEON	Pmax (Kgf/cm²)	Pc (Kgf/cm²)	DEPTH / RESULT	BIT TYPE	CASING	CEMENTATION	DRILL WATER RETURN (%)	G.W.L. (Dpt.H)	DEPTH
	40m			0 → 100%																40m
695.00	1	Ss.sh			pplxgrey			8		Same as above										1
	2	Shale			pxred			2		SHALE Sandstone lens and lamina (up to 1cm thick) above 42.9m	Lu=0.18	6.13	4.13							2
	3				dark.pplxred			2												3
	4							1												4
	5							3												5
	6	Sandstone			light grey					SANDSTONE Greenish										6
	7										Lu=0.51	6.02	—							7
	8							1		Lamina at 5°										8
	9																			9
	50					2	2		a										13.2m (49.60m)	50
	1							1												1
	2	Shale			pxred/d.pxred			2		SHALE Dark purple SHALE with white irregular sandstone lens with strong HCl reaction above 54.0m Purple irregular band between 54.0m and 54.5m Purple SHALE below 55.7m	Lu=1.84	6.12	—							2
	3																			3
	4																			4
	5																			5
	6	Sandstone			grey					SANDSTONE										6
	7									Laminated Block patch									14m (57.30m)	7
	8							1		Erosion surface at 58.05m										8
	9									Lamina up to 10°										9
675.00	60									END of HOLE										60

core loss
RQD

> driller's note <
1 (stick), 2 (substick), 3 (piece), 4 (fragment), 5 (grain)
1 (hard) – 5 (soft)
1 (fresh) – 5 (decomposed)

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3.4 Data of Environmental Impact and Compensation Survey

Table 1 Land Use Classification in the Project Areas

Table 2 Agricultural Land in the Reservoir Area

Table 3 Village in the Se Kong Reservoir

Table 4 Village in the Xe Kaman Reservoir

Table 5 Village in the Xe Namnoy Reservoir

Table 6 Wildlife in the Project Area

Table 7 Results of Water Quality Analysis (1)

Table 8 Results of Water Quality Analysis (2)

Table 9 Results of Water Quality Analysis (3)

Table 1 **Land use classification in the Project Areas (Hectares)**

Features	Xenamnoi		Sekong No 4		Xe kaman No1	
	Catchment	Reservoir Elev. 780 m	Catchment	Reservoir Elev. 320 m	Catchment	Reservoir Elev. 300
I. Current Forest	**53960**	**2912 (35.16)**	**323921**	**11974(55.14)**	**83570**	**16199(66.93)**
Dry Dipterocarp	5700	1000	15680	4268	0	0
Dry Evergreen	0	0	27400	0	0	0
Mixed Decidous	5520	452	280841	7706	83570	16107
Gallery forest	37240	1460	0	0	0	92
Coniferous and Mixed	0	0	0	0	0	0
Coniferous/broad leave	5500	0	0	0	0	0
II. Potential forest	**920**	**72 (0.86)**	**75620**	**4052(18.65)**	**5680**	**1429(5.9)**
Bamboo	0	0	70840	4002	2640	1080
Ray (Slush and burn cultivation)	920	72	4780	50	3040	349
III. Temporely Unstocked	**0**	**3836(46.32)**	**59524**	**4531(20.86)**	**77700**	**6483(26.78)**
IV. Rice paddy						
V. Others	**22510**	**1460(17.63)**	**2840**	**1160(5.34)**	**1240**	**92(0.38)**
Total	**77390**	**8280**	**461905**	**21717**	**138190**	**24203**

Notes: 1. The forest area in the reservoir is not include in the catchment area.
2. The number in parentheses shown the percentage of each land use type versus the reservoir area.

Table 2 Agriculture Land in the Reservoir Areas

Features	Unit	Xe Namnoi	Sekong No 4	Sekaman No1
Lowland Rice	Ha	0	0	0
Upland Rice	Ha	110	597	65
Coffee plantation	Ha	45	0	3
Tabacco	Ha	12	0	0
Maize	Ha	4	36	5
Potatoes	Ha	3	12	0
Cotton	Ha	4	6	0

Table 3 Villages in the Sekong Reservoir

No.	Village name	Province	District	Household	Population	Northing	Easthing	Elev(m)	Map.No.	Remark
1	Ban pakkayong	Sekong	Lanam	26	190	17 16 500	186 93 200	160	D48-22	Surveyed
2	Ban hungtai	Sekong	Lanam	15	92	17 21 400	186 90 200	180	-"-	
3	Ban hungkang	Sekong	Lanam	16	142	17 21 900	186 91 100	180	-"-	
4	Ban hungnua	Sekong	Lanam	15	104	17 23 500	186 90 400	180	-"-	
5	Ban houaylang	Sekong	Kaleum	25	162	17 23 300	186 99 700	240	-"-	
6	Ban tangkat	Sekong	Kaleum	13	117	17 23 900	187 00 000	240	-"-	
7	Ban sathong	Sekong	Kaleum	13	118	17 24 450	187 09 200	260	-"-	
8	Ban hatvy	Sekong	Kaleum	28	338	17 29 400	186 90 900	200	-"-	
9	Ban hanong	Sekong	Kaleum	23	155	17 33 000	186 98 100	280	D48-10	
10	Ban paktray	Sekong	Kaleum	20	99	17 34 000	186 96 200	240	-"-	
11	Ban hatpe	Sekong	Kaleum	12	237	17 35 500	186 92 600	280	-"-	
12	Ban pakphoung	Sekong	Kaleum	24	126	17 39 000	186 93 400	240	-"-	
13	Ban trak	Sekong	Kaleum	21	133	17 38 400	186 90 100	240	-"-	
14	Ban kongtrak	Sekong	Kaleum	27	255	17 41 200	186 88 200	240	-"-	
15	Ban kaleum	Sekong	Kaleum	23	250	17 40 800	186 87 700	240	-"-	
16	Ban bountan	Sekong	Kaleum	17	109	17 42 600	186 87 700	280	-"-	
17	Ban kloung	Sekong	Kaleum	6	110	17 44 700	186 89 800	280	-"-	
18	Ban tongkay	Sekong	Kaleum	15	98	17 42 300	186 82 900	240	-"-	
19	Ban paksay	Sekong	Kaleum	28	85	17 42 700	186 81 100	280	-"-	
20	Ban bak	Sekong	Kaleum	12	172	17 48 600	186 88 300	240	-"-	
21	Ban longkong	Sekong	Kaleum	7	99	17 53 200	186 90 000	280	-"-	
22	Ban ploynua	Sekong	Kaleum	17	45	17 50 400	186 88 200	280	-"-	
23	Ban ploytai	Sekong	Kaleum	18	211	17 50 300	186 84 700	280	-"-	
24	Ban kado	Sekong	Kaleum	17	110	17 51 900	187 01 500	280	-"-	
	Total			438	3557					

Table 4 Villages in the Xe Kaman Reservoir

No.	Village name	Province	District	Household	Population	Northing	Easthing	Elev(m)	Map.No.	Remark
1	Ban hindam	Attapu	Sanexay	20	151	16 57 400	187 33 550	150	D48-35	
2	Ban donkhen 1	Attapu	Sanexay	8	93	16 63 300	187 39 500	140	-"-	
3	Ban donkhen 2	Attapu	Sanexay	10	103	16 63 300	187 39 550	140	-"-	
4	Ban donkhen 3	Attapu	Sanexay	7	75	16 63 700	187 40 150	140	-"-	
5	Ban daklom	Attapu	Sanexay	29	167	16 68 200	187 32 500	200	-"-	Surveyed
	Total			74	589					

Table 5 Villages in the Xenamnoy Reservoir

No.	Village name	Province	District	Household	Population	Northing	Easthing	Elev(m)	Map.No.	Remark
1	Ban xenamnoy	Champasak	Paksong	24	108	16 95 800	186 72 400	760	D48-34	
2	Ban namtiang loum	Champasak	Paksong	25	150	16 63 500	186 76 900	760	-"-	
3	Ban namkong	Champasak	Paksong	42	171	16 57 500	186 89 700	740	D48-46	Surveyed
4	Ban nonghom	Champasak	Paksong	26	150	16 52 500	186 70 300	760	-"-	
5	Ban keokounmouang	Champasak	Paksong	21	89	16 55 900	186 74 500	740	-"-	
6	Ban houaysoy	Champasak	Paksong	72	350	16 56 300	186 68 000	760	-"-	
	Total			210	1018					

Table 6 Wildlife in the Project Area
(Interviewed with local residents)

Wildlife Habtat	Wildlife Species
Se Kong No. 4 Area Regrowth and savannah forest, riparian vegetation and water. Dense forest cover in upper basin; declared as conserved areas (Vietnam border)	Common species Elephant, gaur, banteng, green peaflow, primates deer, wild pig, tiger, black bear python, birds. Rare species (in upper basin) Kouprey, wild water buffalo, rhinocers, gaur, banteng. Mekong dolphin (very rare in Se Kong river downstream area).
Xe Kaman No. 1 Area Regrowth and savannah forest, bamboo. Dense ever green and mixed deciduous species.	Common species Wild dog, tiger, leopard, python deer, birds. Rare species Some rare species expected in upper basin.
Xe Namnoy Area Regrowth and savannah forest, riparian vegetation and water.	Common species Deer, wild pig, tiger, black bear, python, birds. Rare species Not existed.

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Ministry of Agriculture - Forestry
Dept. of Irrigation & Micro Hydropower
Laboratory of W.Q.A.

Vientiane, 16/08/93
No. 086/WQA

RESULT OF WATER QUALITY ANALYSIS

Parameter		1	2	3	4
Date		20/7/93	30/7/93	31/7/93	1/8/93
pH		7.06	6.50	7.03	7.19
TSS	mg/l	33	12	50	126
Turbidity	ppm	4	3	7	12
Color	ppm	0	0	1	2
Conductivity	mS/m	4.57	0.50	3.60	4.30
Ca	meq/l	0.189	0.00?	0.169	0.202
Mg	"	0.173	0.049	0.128	0.169
Na	"	0.075	0.010	0.061	0.072
K	"	0.026	0.006	0.028	0.028
Alkalinity	"	0.209	0.019	0.108	0.354
Cl	"	0.041	0.013	0.042	0.043
SO_4	"	0.254	0.022	0.220	0.128
Tot. Hardness	"	0.371	0.049	0.297	0.371
Tot. Fe	mg/l	0.062	0.146	0.102	0.129
NH_4-N	"	0.027	0.015	0.017	0.018
PO_4-P	"	0.010	0.006	0.012	0.009
Tot. P	"	0.020	0.014	0.016	0.016
Si	"	5.3	1.8	4.4	5.5
COD_{Mn}	"	2.620	1.684	2.100	4.050
$KMnO_4$	"	10.352	6.653	8.297	16.002

Laboratory of W.Q.A.

Laboratory of Water Quality Analysis
Vientiane, Lao PDR

Remark:
1. Xekong No.4
2. Xe Namnoy at Ban Latsasim
3. Xekong No.3
4. Xe Kaman No.1

Lao People's Democratic Republic
Peace Independence Democracy Unity Prosperity
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Ministry of agriculture & Forestry
Dept. of Irrigation
Laboratory of WQA

Vientiane,.24./01/94
No: .6./94/WQA

RESULT OF WATER QUALITY ANALYSIS

LOCATION: H E C
DATE OF SAMPLING: 6/01/94

Parameter		Sekong	Se Nam Noy	Sekhaman
pH		6.77	6.51	7.21
Cond.	mS/m	3.55	1.10	6.7
Alk	meq/l	0.285	0.061	0.649
Hardness	"	0.340	0.106	0.589
Carbon dio.	mg/l	5.242	2.040	4.326

Laboratory of WQA

Lao People's Democratic Republic
Peace Independence Democracy Unity Prosperity.

Ministry of Agriculture - Forestry
Dept. of Irrigation
Laboratory of W.Q.A.

Vientiane, 25/2/1994
No. 18/94/WQA

RESULT OF WATER QUALITY ANALYSIS

Parameters	Xekong at Xekong town	Xekaman Old WL station	Xe nam noy at B. Lasasin	Xe nam noy at Xe Katam
Date	29.1.94	30.1.94	26.1.94	27.1.94
Temperature	19	21	17	14.5
pH	7.34	7.43	6.55	6.64
TSS mg/l	6	8	2	8
Turbidity mg/l	0	0	1	0
Color mg/l	0	0	0	0
Conductivity mS/m	5.04	8.46	1.31	4.41
Ca meq/l	0.236	0.393	0.078	0.167
Mg meq/l	0.212	0.344	0.061	0.225
Alkalinity meq/l	0.320	0.819	0.052	0.408
Cl meq/l	0.073	0.109	0.038	0.027
SO4 meq/l	0.109	0.042	0.040	0.023
Tot.hardness meq/l	0.448	0.737	0.139	0.392
Tot.Fe mg/l	0.022	0.067	0.081	0.085
NH4-N mg/l	0.020	0.045	0.014	0.020
PO4-P mg/l	0.003	0.002	0.003	0.002
Tot.-P mg/l	0.004	0.003	0.004	0.003
Si mg/l	6.000	8.000	2.600	6.200
CODMn mg/l	0.475	0.467	0.554	0.316
KMnO4 mg/l	5.000	4.000	6.000	4.000

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Vientiane, Lao PDR