

*Feasibility Study on Water Resources Development in
Rural Area in the
Kingdom of Morocco
Final Report
Volume VII Data Book
Data Book GC
Geology and Construction Material*

GC3 Drilling Log and Lugeon Test

Liste of Drill Holes

Name of Dam Site	No.	Depth (m)	Hole Inclination	Location
N'Fifikh	S1	50	Vertical	Dam axis, Left abut
	S2	50	-ditto-	Dam axis, Riverbed
	S3	50	-ditto-	Dam axis, Riverbed
	S4	50	-ditto-	Dam axis, Right abut
	S5	50	-ditto-	Dam axis, Right abut
Taskourt	SD1	50	Vertical	Dam axis, Right abut
	SD2	50	-ditto-	Dam axis, Right abut
	SO	80	-ditto-	Dam axis, Riverbed
	SG	70	-ditto-	Dam axis, Left abut
Timkit	SD	50	Vertical	Dam axis, Right abut
	SO	50	-ditto-	Dam axis, Riverbed
	SG1	50	-ditto-	Dam axis, Left abut
	SG2	50	-ditto-	Left bank, Rim
	SG3	50	-ditto-	Left bank, Rim
Azghar (conducted by DGH in 2000)	SD1	80	Vertical	Dam axis, Right abut
	SD2	80	-ditto-	Dam axis, Right abut
	SO1	70	-ditto-	Dam axis, Riverbed
	SO2	69	-ditto-	Dam axis, Riverbed
	SO3	27	-ditto-	30m downstream of axis
	SO4	27	-ditto-	35m downstream of axis
	SG1	80	-ditto-	Dam axis, Left abut
	SG2	80	15 ° to SE	Dam axis, Left abut
	SG3	80	-ditto-	20m downstream of axis



LPEE
(ACREI)

SONDAGE (SPT)

Exploitation conforme à la Norme ASTM D1586-84

DOSSIER : 00.171.I.142

SONDAGE: S1

Chantier : BARRAGE OUED NFIFIKH

date : du 07 au 20/02/01

Prof. Nappe (m/T.N.) =

Prof m/T.N.	Nature du sol	Lithe	Passe (m)	Recuperation (en %)				R.O.D (en %)				Nombre de coups N
				20	40	60	80	20	40	60	80	
	ARGILE LIMONNE GRAVELEUSE de couleur brunâtre		0.00 1.50 3.00 4.50 6.00 7.50									22
5	SCHISTE altere gris brunâtre à fracturations intense entre 3.00-5.00 m avec présence de zones très altéré entre 11.40 / 12.80 m		9.00 10.50 12.00 13.50 15.00 16.50 18.00 19.50 21.00 22.50 24.00 25.50 27.00 28.50 30.00									
15	SCHISTE grisâtre à fracturations obliques caractérisé par des zones à trace d'altération et fracturation subhorizontale entre 12.80 / 19.00 m • Passage friable entre 21.50/22.00 et 24.50 / 25.70/26.00 et 34.40 / 35.00 m • Intercallation dm de quartzite • Zone broyée entre 35.40/36.00 • Intrusions mm de quartz		31.50 33.00 34.50 36.00 37.50 39.00 40.50 42.00 43.50 45.00 46.50 48.00 49.50 51.00 52.50 54.00 55.50 57.00 58.50									
25			59.00 60.50 62.00 63.50 65.00 66.50 68.00 69.50 71.00 72.50 74.00 75.50 77.00 78.50 80.00									
30			81.50 83.00 84.50 86.00 87.50 89.00 90.50 92.00 93.50 95.00 96.50 98.00 99.50									
35			100.00									
40												
45												
50												

OBSERVATIONS.

MODE DE FORAGE : Carottage en Diamétrie-12
Diamètre Tubage : --
Fluide Foration : EAU CLAIR
SB

APAGED DATA EXPLOITATION SYSTEM

- LPEE - ACREI Km 7, route d'E) Jadjida - B.P. 8066 //

Te) : 1021 23 07 28/30/32 Fax : 23.19.95



LPEE
(ACREI)

SONDAGE (SPT)

Exploitation conforme a la Norme ASTM D1586-84

DOSSIER : 00.171.I.142

CLIENT: CES

SONDAGE: S2

Chantier : BARRAGE NFIFIKH

date : 20/01/00 au 07/02/00 Prof. Nappe (m/T.N.) = 2.40 m

Prof m/1.N	Nature du sol	litho	Passe (m)	Recuperation (en %)				R.O.D (en %)				Nombre de coups N
				20	40	60	80	20	40	60	80	
	SABLE GRAVELEUX au sommet		1.50									
	BLOCS ET GRAVIERES QUARTZITIQUES a matrice ARENEUSE au sommet		2.75									50 75
5	SCHISTE brunatre a grisatre altere tres fracture avec intercalations QUARTZITIQUES		4.50									
			5.00									
			6.00									
			7.50									
			9.00									
10			10.00									
			11.00									
			12.00									
			13.00									
			14.50									
15			15.75									
			16.50									
			17.50									
			18.50									
20			19.50									
			21.00									
			21.75									
			22.50									
			24.00									
25			25.50									
			26.25									
			27.00									
			28.50									
30			30.00									
			31.00									
			32.00									
			33.00									
			34.00									
35			35.00									
			36.00									
			37.00									
			38.00									
40			39.00									
			40.00									
			41.00									
			42.00									
			43.00									
			44.00									
45			45.00									
			46.00									
			47.00									
			48.00									
			49.00									
50			50.00									

SCHISTE grisatre caracterise
par des intercalations
quartzitiques, des
des fracturations obliques
par endroit; friabilite par
endroit; presence de
venule mm. cm de quartz
plus quelques passages
broyés.

SAGEP-DATA-EXPLOITATION-SYSTEM

OBSERVATIONS:

MODE DE FORAGE : Carottage en Diamant
Diametre Tubage: 128 L: 7.50 m
Fluide Foration: Eau polymer
18



LPEE
(ACREI)

SONDAGE (SPT)

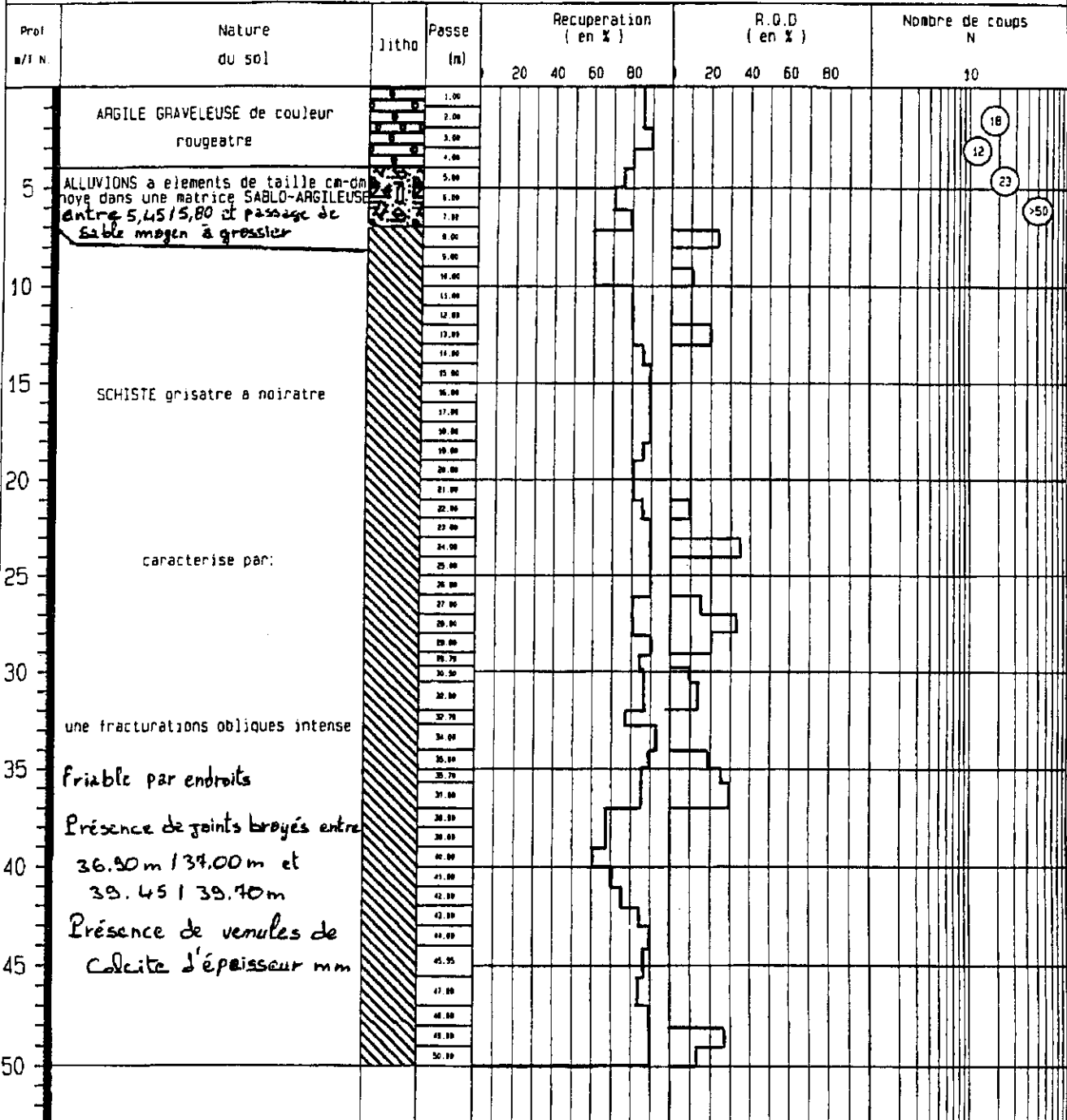
Exploitation conforme a la Norme ASTM D1586-B4

DOSSIER : 00.173.I.130

SONDAGE: S3

Chantier : BARRAGE OUED NFIFIKH

date : du 19/12/00 au 19/01/01 Prof. Nappe (m/T.N.) =



APAGED DATA EXPLOITATION SYSTEM

OBSERVATIONS:

MODE DE FORAGE : Carottage en Diam 101mm-13
Diametre Tubage: --
Fluide Foration: EAU CLAIR
124

- LPEE - ACREI Km 7, route d'El Jadida - B.P 8066 //

Tel : (02) 23 07 28/30/32 Fax : 23.19.95

LPEE
(ACREI)

SONDAGE CAROTTE

DOSSIER : 00.173.I.130

SOND: S4

SITE : BARRAGE OUED NFIFIKH

date : 8 /11 Au 15 /12 /00 Niveau d'eau de la nappe : non mesuré

Tubage	Diam. de forage (mm)	PROF (m)	Lithologie	passe	Pourcentage recup.			RGD (pourcent)			
					25	50	75	25	50	75	
	131	5	ARGILE GRAVELEUSE rougeatre	1.00							
		10	SCHISTE grisatre caracterise par - une alterations très intenses entre: 2.00 et 17.00 m. - une fracturations obliques - une fracturations intenses entre: 17.00 - 19.70 m. 23.00 - 23.40 m 42.00 - 42.70 m. 46.40 - 48.00 m 49.00 - 50.00 m - Presence de veinules à remplissage calcitique. - Presence de brèches entre: 37.00 - 44.30 m Fin de sondage a: 50.00 m	2.00							
		15		3.00							
		20		4.00							
		25		5.00							
		30		6.00							
		35		7.00							
		40		8.00							
		45		9.00							
		50		10.00							
				11.00							
				12.00							
				13.00							
				14.00							
				15.00							
				16.00							
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			48.00								
			49.00								
			50.00								

APAGEU DATA EXPLOITATION SYSTEM

OBSERVATIONS: RAS



LPEE
(ACREI)

SONDAGE (SPT)

Exploitation conforme a la Norme ASTM D1586-84

DOSSIER : 00.171.I.142

SONDAGE: S5

Chantier : BARRAGE OUED NFIFIKH

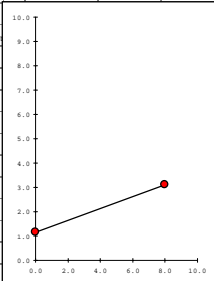
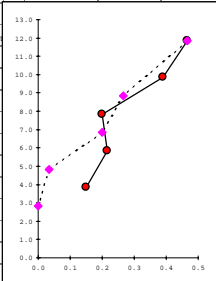
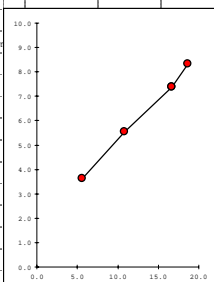
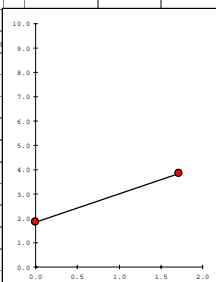
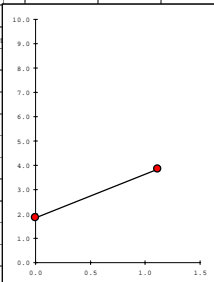
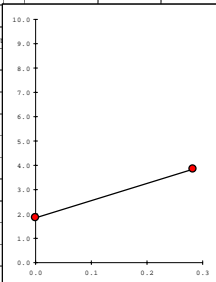
date : du 23/01/01 AU /02/01 Prof. Nappe (m/T.N.) =

Prof m/T.N.	Nature du sol	litho	Passe (m)	Recuperation (en %)				R.O.D (en %)				Nombre de coups N	
				20	40	60	80	20	40	60	80		
5	SCHISTE GRAVELEUX tres altere de couleur verdatre a grisatre	[Hatched litho pattern]	1.50										
	SCHISTE altere tres fracture grisatre avec intercalations de quartzite		1.75									82	
10	SCHISTE grisatre a fracturations obliques caracterise par des zones a trace d'alteration au sommet intercallation de bancs dm de quartzite intrusion mm de quartz friabilite et fracturation intense entre 37.50/46.00m		2.75										
			3.25										
			5.00										
			6.00										
			7.50										
			8.50										
			10.00										
			11.00										
			13.00										
			14.20										
15			15.00										
20			15.75										
			16.00										
			17.00										
			18.00										
			20.00										
			21.00										
			23.00										
		24.00											
		24.75											
		25		25.00									
30		26.00											
		26.75											
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		31.00											
		32.00											
		34.00											
		35		35.00									
		40		37.00									
38.00													
40.00													
41.00													
42.00													
43.00													
44.00													
45				45.00									
50				46.00									
				47.00									

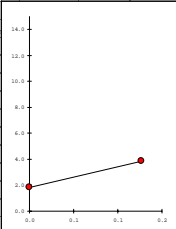
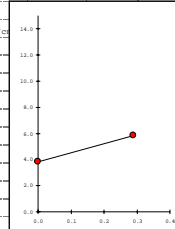
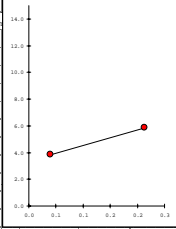
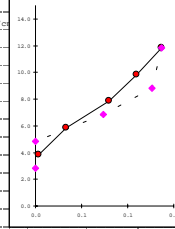
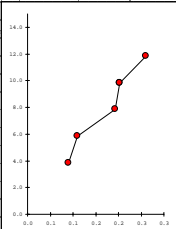
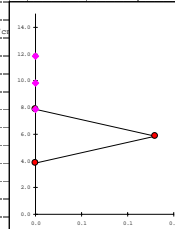
APAGED DATA EXPLOITATION SYSTEM

OBSERVATIONS:

MODE DE FORAGE : Carottage en Diam100mm-13
 Diametre Tubage: --
 Fluide Foration: EAU CLAIR
 18

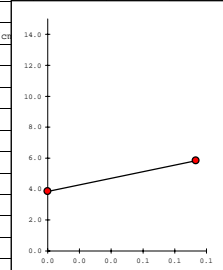
Location S1 Injecting Section 9 ~ 12 m Ground Water Level Null m Height of Pressure Gauge 100.0 cm Length of Test Section 3.0 m Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm Pipe Length of Injecting 10.00 m				Location S1 Injecting Section 20 - 23 m Ground Water Level 17.4 Height of Pressure Gauge 100.0 cm Length of Test Section 3.0 m Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm Pipe Length of Injecting 21.00 m																																																			
<table border="1"> <thead> <tr> <th>P_0 (kgf/cm²)</th> <th>Q_{av} (l/min)</th> <th>P (kgf/cm²)</th> <th>q (l/min/m)</th> </tr> </thead> <tbody> <tr> <td>0.0</td> <td>0.0</td> <td>1.2</td> <td>0.0</td> </tr> <tr> <td>2.0</td> <td>24.0</td> <td>3.1</td> <td>8.0</td> </tr> </tbody> </table>	P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)	0.0	0.0	1.2	0.0	2.0	24.0	3.1	8.0		<table border="1"> <thead> <tr> <th>P_0 (kgf/cm²)</th> <th>Q_{av} (l/min)</th> <th>P (kgf/cm²)</th> <th>q (l/min/m)</th> </tr> </thead> <tbody> <tr> <td>2.0</td> <td>0.5</td> <td>3.8</td> <td>0.2</td> </tr> <tr> <td>4.0</td> <td>0.7</td> <td>5.8</td> <td>0.2</td> </tr> <tr> <td>6.0</td> <td>0.6</td> <td>7.8</td> <td>0.2</td> </tr> <tr> <td>8.0</td> <td>1.2</td> <td>9.8</td> <td>0.4</td> </tr> <tr> <td>10.0</td> <td>1.4</td> <td>11.8</td> <td>0.5</td> </tr> <tr> <td>7.0</td> <td>0.8</td> <td>8.8</td> <td>0.3</td> </tr> <tr> <td>5.0</td> <td>0.6</td> <td>6.8</td> <td>0.2</td> </tr> <tr> <td>3.0</td> <td>0.1</td> <td>4.8</td> <td>0.0</td> </tr> <tr> <td>1.0</td> <td>0.0</td> <td>2.8</td> <td>0.0</td> </tr> </tbody> </table>	P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)	2.0	0.5	3.8	0.2	4.0	0.7	5.8	0.2	6.0	0.6	7.8	0.2	8.0	1.2	9.8	0.4	10.0	1.4	11.8	0.5	7.0	0.8	8.8	0.3	5.0	0.6	6.8	0.2	3.0	0.1	4.8	0.0	1.0	0.0	2.8	0.0	
P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)																																																				
0.0	0.0	1.2	0.0																																																				
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3.0	0.1	4.8	0.0																																																				
1.0	0.0	2.8	0.0																																																				
Lu' = 36.1	Pc = - kgf/cm ²	Lu = 0.4	Pc = - kgf/cm ²																																																				
Location S1 Injecting Section 14 ~ 17 m Ground Water Level Null m Height of Pressure Gauge 100.0 cm Length of Test Section 3.0 m Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm Pipe Length of Injecting 15.00 m				Location S1 Injecting Section 23 - 26 m Ground Water Level 17.4 Height of Pressure Gauge 100.0 cm Length of Test Section 3.0 m Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm Pipe Length of Injecting 24.00 m																																																			
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0.0	0.0	1.8	0.0																																																				
2.0	5.1	3.8	1.7																																																				
Lu' = 23	Pc = - kgf/cm ²	Lu' = 7.0	Pc = - kgf/cm ²																																																				
Location S1 Injecting Section 17 ~ 20 m Ground Water Level 17.4 m Height of Pressure Gauge 100.0 cm Length of Test Section 3.0 m Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm Pipe Length of Injecting 18.00 m				Location S1 Injecting Section 26 ~ 29 m Ground Water Level 17.4 Height of Pressure Gauge 100.0 cm Length of Test Section 3.0 m Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm Pipe Length of Injecting 27.00 m																																																			
<table border="1"> <thead> <tr> <th>P_0 (kgf/cm²)</th> <th>Q_{av} (l/min)</th> <th>P (kgf/cm²)</th> <th>q (l/min/m)</th> </tr> </thead> <tbody> <tr> <td>0.0</td> <td>0.0</td> <td>1.8</td> <td>0.0</td> </tr> <tr> <td>2.0</td> <td>3.3</td> <td>3.8</td> <td>1.1</td> </tr> </tbody> </table>	P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)	0.0	0.0	1.8	0.0	2.0	3.3	3.8	1.1		<table border="1"> <thead> <tr> <th>P_0 (kgf/cm²)</th> <th>Q_{av} (l/min)</th> <th>P (kgf/cm²)</th> <th>q (l/min/m)</th> </tr> </thead> <tbody> <tr> <td>0.0</td> <td>0.0</td> <td>1.8</td> <td>0.0</td> </tr> <tr> <td>2.0</td> <td>0.9</td> <td>3.8</td> <td>0.3</td> </tr> </tbody> </table>	P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)	0.0	0.0	1.8	0.0	2.0	0.9	3.8	0.3																													
P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)																																																				
0.0	0.0	1.8	0.0																																																				
2.0	3.3	3.8	1.1																																																				
P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)																																																				
0.0	0.0	1.8	0.0																																																				
2.0	0.9	3.8	0.3																																																				
Lu' = 4.5	Pc = - kgf/cm ²	Lu' = 1.2	Pc = - kgf/cm ²																																																				

Result of Lugeon Test at Boreholes S1(1)-N'Fifikh Dam Axis

Location S1				Location S1			
Injecting Section 29 - 32 m				Injecting Section 38 - 41 m			
Ground Water Level 17.4 m				Ground Water Level 17.4 m			
Height of Pressure Gauge 100.0 cm				Height of Pressure Gauge 100.0 cm			
Length of Test Section 3.0 m				Length of Test Section 3.0 m			
Friction Loss per meter $7 \cdot 10^{-4} \cdot Q_{av}^2$ kgf/cm				Friction Loss per meter $7 \cdot 10^{-4} \cdot Q_{av}^2$ kgf/cm			
Pipe Length of Injecting P 30.00 m				Pipe Length of Injecting P 39.00 m			
P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)	P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)
0.0	0.0	1.8	0.0	2.0	0.0	3.8	0.0
2.0	0.4	3.8	0.1	4.0	0.9	5.8	0.3
$L_{lu}' = 0.5$				$L_{lu}' = 0.9$			
$P_c = -$ kgf/cm ²				$P_c = -$ kgf/cm ²			
							
Location S1				Location S1			
Injecting Section 32 - 35 m				Injecting Section 41 - 44 m			
Ground Water Level 17.4 m				Ground Water Level 17.4 m			
Height of Pressure Gauge 100.0 cm				Height of Pressure Gauge 100.0 cm			
Length of Test Section 3.0 m				Length of Test Section 3.0 m			
Friction Loss per meter $7 \cdot 10^{-4} \cdot Q_{av}^2$ kgf/cm				Friction Loss per meter $7 \cdot 10^{-4} \cdot Q_{av}^2$ kgf/cm			
Pipe Length of Injecting P 33.00 m				Pipe Length of Injecting P 42.00 m			
P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)	P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)
2.0	0.1	3.8	0.0	2.0	0.0	3.8	0.0
4.0	0.6	5.8	0.2	4.0	0.1	5.8	0.0
$L_{lu}' = 0.6$				$L_{lu}' = 0.1$			
$P_c = -$ kgf/cm ²				$P_c = -$ kgf/cm ²			
							
Location S1				Location S1			
Injecting Section 35 - 38 m				Injecting Section 44 - 47 m			
Ground Water Level 17.4 m				Ground Water Level 17.4 m			
Height of Pressure Gauge 100.0 cm				Height of Pressure Gauge 100.0 cm			
Length of Test Section 3.0 m				Length of Test Section 3.0 m			
Friction Loss per meter $7 \cdot 10^{-4} \cdot Q_{av}^2$ kgf/cm				Friction Loss per meter $7 \cdot 10^{-4} \cdot Q_{av}^2$ kgf/cm			
Pipe Length of Injecting P 28.00 m				Pipe Length of Injecting P 45.00 m			
P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)	P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)
2.0	0.3	3.8	0.1	2.0	0.0	3.8	0.0
4.0	0.3	5.8	0.1	4.0	0.4	5.8	0.1
6.0	0.6	7.8	0.2	6.0	0.0	7.8	0.0
8.0	0.6	9.8	0.2	8.0	0.0	9.8	0.0
10.0	0.8	11.8	0.3	10.0	0.0	11.8	0.0
$L_{lu} = 0.2$				$L_{lu} = 0.0$			
$P_c = -$ kgf/cm ²				$P_c = -$ kgf/cm ²			
							

Result of Lugeon Test at Boreholes S1(2)-N'Fifikh Dam Axis

Location	S1		
Injecting Section	47- 50 m		
Ground Water Level	17.4 m		
Height of Pressure Gauge	100.0 cm		
Length of Test Section	3.0 m		
Friction Loss per meter	$7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm		
Pipe Length of Injecting P	48.00 m		
P_1 (kgf/cm ²)	Q_{av} (l/min)	P_2 (kgf/cm ²)	q (l/min/m)
2.0	0.0	3.8	0.0
4.0	0.3	5.8	0.1
$Lu' =$	0.3		
$Pc =$	- kgf/cm ²		



Flow Rate (Q) [l/min]	Pressure (P) [kgf/cm ²]
0.0	3.8
0.1	5.8

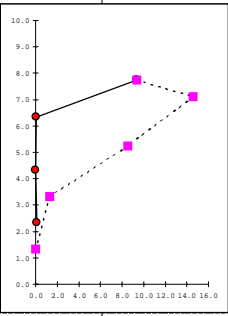
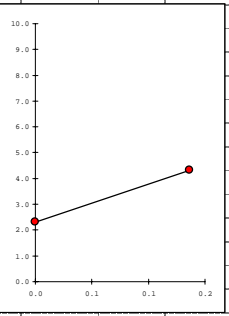
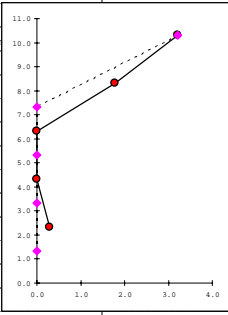
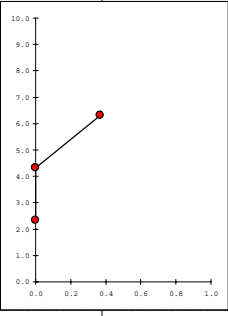
Result of Lugeon Test at Boreholes S1(3)-N'Fifikh Dam Axis

Location S2				Location S2			
Injecting Section 12 - 15 m				Injecting Section 24 - 27 m			
Ground Water Level 2.4 m				Ground Water Level 2.4 m			
Height of Pressure Gauge 100.0 cm				Height of Pressure Gauge 100.0 cm			
Length of Test Section 3.0 m				Length of Test Section 3.0 m			
Friction Loss per meter $7 \cdot 10^{-4} \cdot Q_{av}^2$ kgf/cm				Friction Loss per meter $7 \cdot 10^{-4} \cdot Q_{av}^2$ kgf/cm			
Pipe Length of Injecting P. 13.20 m				Pipe Length of Injecting P. 25.00 m			
P_s (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)	P_s (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)
0.0	0.0	0.3	0.0	0.0	0.0	0.3	0.0
2.0	0.6	2.3	0.2	2.0	4.1	2.3	1.4
Lu' = 1.0				Lu' = 6.7			
Pc = - kgf/cm ²				Pc = - kgf/cm ²			
Location S2				Location S2			
Injecting Section 18 - 21 m				Injecting Section 27- 30 m			
Ground Water Level 2.4 m				Ground Water Level 13.9 m			
Height of Pressure Gauge 100.0 cm				Height of Pressure Gauge 100.0 cm			
Length of Test Section 3.0 m				Length of Test Section 3.0 m			
Friction Loss per meter $7 \cdot 10^{-4} \cdot Q_{av}^2$ kgf/cm				Friction Loss per meter $7 \cdot 10^{-4} \cdot Q_{av}^2$ kgf/cm			
Pipe Length of Injecting P. 19.00 m				Pipe Length of Injecting P. 28.00 m			
P_s (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)	P_s (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)
2.0	0.0	2.3	0.0	2.0	0.2	3.5	0.1
4.0	2.6	4.3	0.9	4.0	3.0	5.5	1.0
Lu' = 3.2				Lu' = 3.1			
Pc = - kgf/cm ²				Pc = - kgf/cm ²			
Location S2				Location S2			
Injecting Section 21 - 24 m				Injecting Section 30- 33 m			
Ground Water Level 2.4 m				Ground Water Level 2.4 m			
Height of Pressure Gauge 100.0 cm				Height of Pressure Gauge 100.0 cm			
Length of Test Section 3.0 m				Length of Test Section 3.0 m			
Friction Loss per meter $7 \cdot 10^{-4} \cdot Q_{av}^2$ kgf/cm				Friction Loss per meter $7 \cdot 10^{-4} \cdot Q_{av}^2$ kgf/cm			
Pipe Length of Injecting P. 22.00 m				Pipe Length of Injecting P. 31.00 m			
P_s (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)	P_s (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)
2.0	0.0	2.3	0.0	0.0	0.0	0.3	0.0
4.0	0.3	4.3	0.1	2.0	0.0	2.3	0.0
6.0	0.7	6.3	0.2				
Lu' = 0.4				Lu' = 0.0			
Pc = - kgf/cm ²				Pc = - kgf/cm ²			

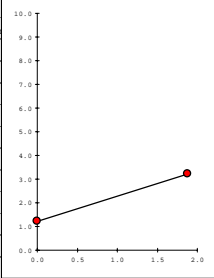
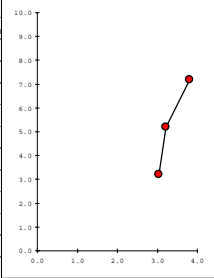
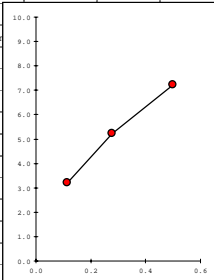
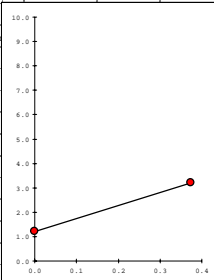
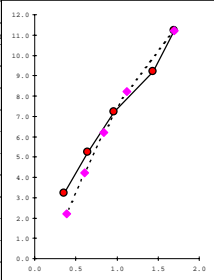
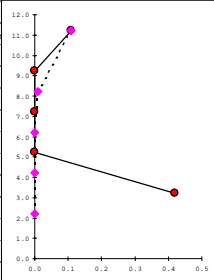
Result of Lugeon Test at Boreholes S2(1)-N'Fifikh Dam Axis

Location SD2				Location SD2			
Injecting Section 33- 36 m				Injecting Section 42- 45 m			
Ground Water Level 2.4 m				Ground Water Level 2.4 m			
Height of Pressure Gauge 100.0 cm				Height of Pressure Gauge 100.0 cm			
Length of Test Section 3.0 m				Length of Test Section 3.0 m			
Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm				Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm			
Pipe Length of Injecting Pa 34.00 m				Pipe Length of Injecting Pa 43.00 m			
P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)	P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)
0.0	0.0	0.3	0.0	0.0	0.0	0.3	0.0
2.0	3.5	2.3	1.2	2.0	0.7	2.3	0.2
Lu' = 5.6				Lu' = 1.1			
Pc = - kgf/cm ²				Pc = - kgf/cm ²			
Location SD2				Location SD2			
Injecting Section 36- 39 m				Injecting Section 45- 48 m			
Ground Water Level 2.4 m				Ground Water Level 2.4 m			
Height of Pressure Gauge 100.0 cm				Height of Pressure Gauge 100.0 cm			
Length of Test Section 3.0 m				Length of Test Section 3.0 m			
Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm				Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm			
Pipe Length of Injecting Pa 37.00 m				Pipe Length of Injecting Pa 46.00 m			
P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)	P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)
0.0	0.0	0.3	0.0	0.0	0.0	0.3	0.0
2.0	0.5	2.3	0.2	2.0	1.2	2.3	0.4
Lu' = 0.8				Lu' = 2.0			
Pc = - kgf/cm ²				Pc = - kgf/cm ²			
Location SD2				Location SD2			
Injecting Section 39- 42 m							
Ground Water Level 2.4 m							
Height of Pressure Gauge 100.0 cm							
Length of Test Section 3.0 m							
Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm							
Pipe Length of Injecting Pa 40.00 m							
P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)				
2.0	1.8	2.3	0.6				
4.0	2.4	4.3	0.8				
Lu' = 1.4							
Pc = - kgf/cm ²							

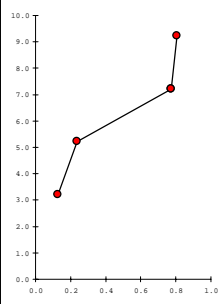
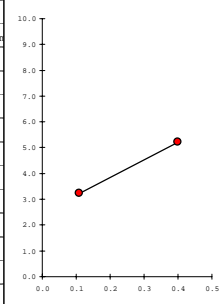
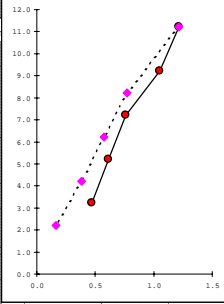
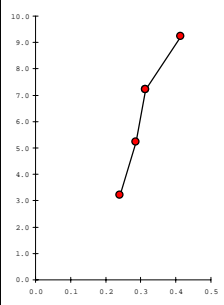
Result of Lugeon Test at Boreholes S2(2)-N'Fifikh Dam Axis

Location S3				Location S3			
Injecting Section		15 ~ 18 m		Injecting Section		47~ 50 m	
Ground Water Level		2.2 m		Ground Water Level		2.2 m	
Height of Pressure Gauge		100.0 cm		Height of Pressure Gauge		100.0 cm	
Length of Test Section		3.0 m		Length of Test Section		3.0 m	
Friction Loss per meter		$7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm ²		Friction Loss per meter		$7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm ²	
Pipe Length of Injecting Pa		16.00 m		Pipe Length of Injecting Pa		48.00 m	
P₀(kgf/cm²)	Q_{av}(l/min)	P(kgf/cm²)	q(l/min/m)	P₀(kgf/cm²)	Q_{av}(l/min)	P(kgf/cm²)	q(l/min/m)
2.0	0.3	2.3	0.1	2.0	0.0	2.3	0.0
4.0	0.0	4.3	0.0	4.0	0.4	4.3	0.1
6.0	0.1	6.3	0.0				
7.5	28.1	7.7	9.4				
7.0	43.7	7.1	14.6				
5.0	25.6	5.3	8.5				
3.0	3.9	3.3	1.3				
1.0	0.0	1.3	0.0				
Lu' =		0.0		Lu' =		0.5	
Pc =		6.3 kgf/cm ²		Pc =		- kgf/cm ²	
							
Location S3				Location S3			
Injecting Section		18- 21 m		Injecting Section		42 ~ 47 m	
Ground Water Level		2.2 m		Ground Water Level		2.2 m	
Height of Pressure Gauge		100.0 cm		Height of Pressure Gauge		100.0 cm	
Length of Test Section		3.0 m		Length of Test Section		5.0 m	
Friction Loss per meter		$7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm ²		Friction Loss per meter		$7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm ²	
Pipe Length of Injecting Pa		19.00 m		Pipe Length of Injecting Pa		43.00 m	
P₀(kgf/cm²)	Q_{av}(l/min)	P(kgf/cm²)	q(l/min/m)	P₀(kgf/cm²)	Q_{av}(l/min)	P(kgf/cm²)	q(l/min/m)
2.0	0.9	2.3	0.3	2.0	0.0	2.3	0.0
4.0	0.0	4.3	0.0	4.0	0.0	4.3	0.0
6.0	0.0	6.3	0.0	6.0	1.9	6.3	0.4
8.0	5.4	8.3	1.8				
10.0	9.7	10.3	3.2				
7.0	0.0	7.3	0.0				
5.0	0.0	5.3	0.0				
3.0	0.0	3.3	0.0				
1.0	0.0	1.3	0.0				
Lu =		3.0		Lu' =		1.1	
Pc =		- kgf/cm ²		Pc =		- kgf/cm ²	
							

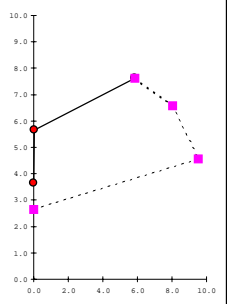
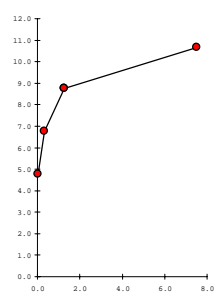
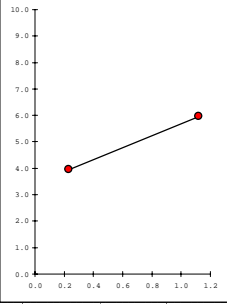
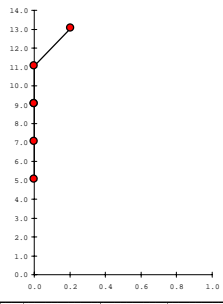
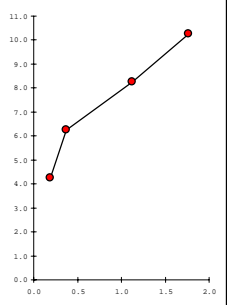
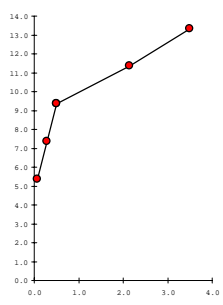
Result of Lugeon Test at Boreholes S3-N'Fifikh Dam Axis

Location S4				Location S4			
Injecting Section		18- 21 m		Injecting Section		27- 30 m	
Ground Water Leve		11.2 m		Ground Water Leve		11.2 m	
Height of Pressure Gauge		100.0 cm		Height of Pressure Gauge		100.0 cm	
Length of Test Section		3.0 m		Length of Test Section		3.0 m	
Friction Loss per meter $7*10^{-6}*Q_{av}^2$		kgf/cm		Friction Loss per meter $7*10^{-6}*Q_{av}^2$		kgf/cm	
Pipe Length of Injecting		19.00 m		Pipe Length of Injecting		28.00 m	
P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)	P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)
0.0	0.0	1.2	0.0	2.0	9.1	3.2	3.0
2.0	5.6	3.2	1.9	4.0	9.7	5.2	3.2
				6.0	11.4	7.2	3.8
							
Lu' = 8.3				Lu' = 4.6			
Pc = - kgf/cm ²				Pc = - kgf/cm ²			
Location S4				Location S4			
Injecting Section		21- 24 m		Injecting Section		30- 33 m	
Ground Water Leve		11.2 m		Ground Water Leve		11.2 m	
Height of Pressure Gauge		100.0 cm		Height of Pressure Gauge		100.0 cm	
Length of Test Section		3.0 m		Length of Test Section		3.0 m	
Friction Loss per meter $7*10^{-6}*Q_{av}^2$		kgf/cm		Friction Loss per meter $7*10^{-6}*Q_{av}^2$		kgf/cm	
Pipe Length of Injecting		22.00 m		Pipe Length of Injecting		31.00 m	
P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)	P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)
2.0	0.3	3.2	0.1	0.0	0.0	1.2	0.0
4.0	0.8	5.2	0.3	2.0	1.1	3.2	0.4
6.0	1.5	7.2	0.5				
							
Lu' = 0.7				Lu' = 1.6			
Pc = - kgf/cm ²				Pc = - kgf/cm ²			
Location S4				Location S4			
Injecting Section		24- 27 m		Injecting Section		33- 36 m	
Ground Water Leve		11.2 m		Ground Water Leve		11.2 m	
Height of Pressure Gauge		100.0 cm		Height of Pressure Gauge		100.0 cm	
Length of Test Section		3.0 m		Length of Test Section		3.0 m	
Friction Loss per meter $7*10^{-6}*Q_{av}^2$		kgf/cm		Friction Loss per meter $7*10^{-6}*Q_{av}^2$		kgf/cm	
Pipe Length of Injecting		25.00 m		Pipe Length of Injecting		34.00 m	
P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)	P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)
2.0	1.1	3.2	0.4	2.0	1.3	3.2	0.4
4.0	1.9	5.2	0.6	4.0	0.0	5.2	0.0
6.0	2.9	7.2	1.0	6.0	0.0	7.2	0.0
8.0	4.3	9.2	1.4	8.0	0.0	9.2	0.0
10.0	5.1	11.2	1.7	10.0	0.3	11.2	0.1
7.0	3.4	8.2	1.1	7.0	0.0	8.2	0.0
5.0	2.5	6.2	0.8	5.0	0.0	6.2	0.0
3.0	1.8	4.2	0.6	3.0	0.0	4.2	0.0
1.0	1.2	2.2	0.4	1.0	0.0	2.2	0.0
Lu = 1.5				Lu = 0.0			
Pc = - kgf/cm ²				Pc = - kgf/cm ²			
							

Result of Lugeon Test at Boreholes S4(1)-N'Fifikh Dam Axis

Location SG2				Location SG2			
Injecting Section 37 ~ 40 m				Injecting Section 46- 49 m			
Ground Water Level 11.2 m				Ground Water Level 11.2 m			
Height of Pressure Gauge 100.0 cm				Height of Pressure Gauge 100.0 cm			
Length of Test Section 3.0 m				Length of Test Section 3.0 m			
Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm ²				Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm ²			
Pipe Length of Injecting Pa 38.50 m				Pipe Length of Injecting Pa 47.50 m			
P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)	P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)
2.0	0.4	3.2	0.1	2.0	0.3	3.2	0.1
4.0	0.7	5.2	0.2	4.0	1.2	5.2	0.4
6.0	2.3	7.2	0.8				
8.0	2.4	9.2	0.8				
							
Lu' = 1.5				Lu' = 1.1			
Pc = - kgf/cm ²				Pc = - kgf/cm ²			
Location SG2				Location SG2			
Injecting Section 40 ~ 43 m				Injecting Section 43 ~ 46 m			
Ground Water Level 11.2 m				Ground Water Level 11.2 m			
Height of Pressure Gauge 100.0 cm				Height of Pressure Gauge 100.0 cm			
Length of Test Section 3.0 m				Length of Test Section 3.0 m			
Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm ²				Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm ²			
Pipe Length of Injecting Pa 41.50 m				Pipe Length of Injecting Pa 44.50 m			
P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)	P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)
2.0	1.4	3.2	0.5	2.0	0.7	3.2	0.2
4.0	1.8	5.2	0.6	4.0	0.9	5.2	0.3
6.0	2.3	7.2	0.8	6.0	0.9	7.2	0.3
8.0	3.2	9.2	1.1	8.0	1.2	9.2	0.4
10.0	3.7	11.2	1.2				
7.0	2.3	8.2	0.8				
5.0	1.7	6.2	0.6				
3.0	1.2	4.2	0.4				
1.0	0.5	2.2	0.2				
							
Lu = 1.1				Lu = 0.5			
Pc = - kgf/cm ²				Pc = - kgf/cm ²			

Result of Lugeon Test at Boreholes SG2(2)-N'Fifikh Dam Axis

Location S5				Location S5			
Injecting Section		14 ~ 17 m		Injecting Section		25- 28 m	
Ground Water Level		Nill m		Ground Water Level		Nill m	
Height of Pressure Gauge		100.0 cm		Height of Pressure Gauge		100.0 cm	
Length of Test Section		3.0 m		Length of Test Section		3.0 m	
Friction Loss per meter		$7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm		Friction Loss per meter		$7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm	
Pipe Length of Injecting Pa		15.00 m		Pipe Length of Injecting Pa		26.00 m	
P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)	P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)
2.0	0.0	3.6	0.0	2.0	0.1	4.7	0.0
4.0	0.2	5.6	0.1	4.0	1.0	6.7	0.3
6.0	17.6	7.6	5.9	6.0	3.8	8.7	1.3
5.0	24.1	6.6	8.0	8.0	22.6	10.7	7.5
3.0	28.5	4.6	9.5				
1.0	0.0	2.6	0.0				
Lu' = 0.1				Lu' = 0.8			
Pc = 5.6 kgf/cm ²				Pc = 8.5 kgf/cm ²			
							
Location S5				Location S5			
Injecting Section		17 ~ 20 m		Injecting Section		28- 31 m	
Ground Water Level		Nill m		Ground Water Level		Nill m	
Height of Pressure Gauge		100.0 cm		Height of Pressure Gauge		100.0 cm	
Length of Test Section		3.0 m		Length of Test Section		3.0 m	
Friction Loss per meter		$7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm		Friction Loss per meter		$7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm	
Pipe Length of Injecting Pa		18.00 m		Pipe Length of Injecting Pa		29.00 m	
P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)	P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)
2.0	0.7	3.9	0.2	2.0	0.0	5.1	0.0
4.0	3.4	5.9	1.1	4.0	0.0	7.1	0.0
				6.0	0.0	9.1	0.0
				8.0	0.0	11.1	0.0
				10.0	0.6	13.0	0.2
Lu' = 2.9				Lu = 0.0			
Pc = - kgf/cm ²				Pc = 11.1 kgf/cm ²			
							
Location S5				Location S5			
Injecting Section		20 ~ 23 m		Injecting Section		31- 34 m	
Ground Water Level		Nill m		Ground Water Level		Nill m	
Height of Pressure Gauge		100.0 cm		Height of Pressure Gauge		100.0 cm	
Length of Test Section		3.0 m		Length of Test Section		3.0 m	
Friction Loss per meter		$7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm		Friction Loss per meter		$7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm	
Pipe Length of Injecting Pa		21.00 m		Pipe Length of Injecting Pa		32.00 m	
P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)	P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)
2.0	0.6	4.2	0.2	2.0	0.2	5.3	0.1
4.0	1.1	6.2	0.4	4.0	0.9	7.3	0.3
6.0	3.4	8.2	1.1	6.0	1.5	9.3	0.5
8.0	5.3	10.2	1.8	8.0	6.5	11.3	2.2
				10.0	10.5	13.3	3.5
Lu' = 0.7				Lu' = 0.6			
Pc = 6.2 kgf/cm ²				Pc = 9.3 kgf/cm ²			
							

Result of Lugeon Test at Boreholes S5(1)-N'Fifikh Dam Axis

Location S5				Location S5			
Injecting Section		34- 37 m		Injecting Section		43- 46 m	
Ground Water Level		Null m		Ground Water Level		Null m	
Height of Pressure Gauge		100.0 cm		Height of Pressure Gauge		100.0 cm	
Length of Test Section		3.0 m		Length of Test Section		3.0 m	
Friction Loss per meter		$7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm		Friction Loss per meter		$7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm	
Pipe Length of Injecting Pa		35.00 m		Pipe Length of Injecting Pa		44.00 m	
P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)	P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)
2.0	0.6	5.6	0.2	0.0	0.0	4.6	0.0
4.0	1.2	7.6	0.4	2.0	0.6	6.5	0.2
6.0	2.2	9.6	0.7				
Lu' = 0.6				Lu' = 0.5			
Pc = - kgf/cm ²				Pc = - kgf/cm ²			
Location S5				Location S5			
Injecting Section		37- 40 m		Injecting Section		37- 40 m	
Ground Water Level		Null m		Ground Water Level		Null m	
Height of Pressure Gauge		100.0 cm		Height of Pressure Gauge		100.0 cm	
Length of Test Section		3.0 m		Length of Test Section		3.0 m	
Friction Loss per meter		$7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm		Friction Loss per meter		$7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm	
Pipe Length of Injecting Pa		38.00 m		Pipe Length of Injecting Pa		38.00 m	
P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)	P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)
2.0	0.1	5.9	0.0	2.0	0.1	5.9	0.0
4.0	0.1	7.9	0.0	4.0	0.1	7.9	0.0
6.0	0.1	9.9	0.0	6.0	0.1	9.9	0.0
8.0	0.2	11.9	0.1	8.0	0.2	11.9	0.1
Lu = 0.0				Lu = 0.0			
Pc = - kgf/cm ²				Pc = - kgf/cm ²			
Location S5				Location S5			
Injecting Section		40- 43 m		Injecting Section		40- 43 m	
Ground Water Level		Null m		Ground Water Level		Null m	
Height of Pressure Gauge		100.0 cm		Height of Pressure Gauge		100.0 cm	
Length of Test Section		3.0 m		Length of Test Section		3.0 m	
Friction Loss per meter		$7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm		Friction Loss per meter		$7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm	
Pipe Length of Injecting Pa		40.00 m		Pipe Length of Injecting Pa		40.00 m	
P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)	P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)
2.0	0.3	6.2	0.1	2.0	0.3	6.2	0.1
4.0	3.2	8.2	1.1	4.0	3.2	8.2	1.1
6.0	5.1	10.2	1.7	6.0	5.1	10.2	1.7
8.0	12.3	12.2	4.1	8.0	12.3	12.2	4.1
10.0	18.2	14.2	6.1	10.0	18.2	14.2	6.1
Lu = 1.6				Lu = 1.6			
Pc = 10.2 kgf/cm ²				Pc = 10.2 kgf/cm ²			

Result of Lugeon Test at Boreholes S5(2)-N'Fifikh Dam Axis

LPEE
(ACREI)

SONDAGE CAROTTE

DOSSIER : 00.173.I.130

SOND: SD1

SITE : BARRAGE TASKOURTE

date : du au 13/01/01

Niveau d'eau de la nappe : -----

Tubage	Diam. de forage (mm)	PROF (m)	Lithologie	passe	Pourcentage recup.			RGD (pourcent)			
					25	50	75	25	50	75	
		0		1.00							
		5	BLOCS de SCHISTES de taille cm 3 dm et de SABLE GRAVELEUX.	1.50							
		10	Légèrement ARGILEUX	2.00							
		12.00	ALLUVIONS à éléments cm-dm GRES-SCHISTEUX	2.50							
		14.00	CONGLOMERATS à éléments de nature GRESSEUX et à matrice silicifiée	3.00							
		15.00		3.50							
		20		4.00							
		25	SCHISTE très fracture à	4.50							
		30	passage fragmenté entre:	5.00							
		33.00	18.20 - 19.20; 38.20 - 40.40 m	5.50							
		35	48.60 - 48.20 m	6.00							
		40	devenant Compacte et grisâtre à partir de 33.00 m	6.50							
		45		7.00							
		50	Fin de sondage à: 50.00 m	7.50							

OBSERVATIONS: Perte d'eau le long du forage

APAGED DATA EXPLOITATION SYSTEM

- LPEE - ACREI Km 7, route d'El Jadida - B.P 8066 //

Tel : (02) 23 07 28/30/32 Fax : 23.19.95

LPEE
(ACREI)

SONDAGE CAROTTE

DOSSIER : 00.171.I.142

SOND: SD2

SITE : BARRAGE TASKOURTE

date : du au /01/01

Niveau d'eau de la nappe : *neant*

Tubage	Diam. de forage (mm)	PROF (m)	Lithologie	passe	Pourcentage recup.			AQD (pourcent)		
					25	50	75	25	50	75
		5	BRECHE CONGLOMERATIQUE mâle cimenté à éléments SCHISTEUX mm-cm noyé dans matrice Sablo-Argileux	1.00 1.00 1.00 1.00						
		10	SCHISTE très fracturé à fracturations généralement obliques et à remplissage de Silice avec des passages fragmenté situés entre : 7.10- 8.70 ; 9.60- 10.00 m 16.95- 17.20 ; 22.30- 22.60 m 26.30- 27.20 ; 29.60- 30.40 m des alterations au niveau des fractures entre : 18.70- 21.70 ; 25.30- 26.00 m	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00						
		15								
		20								
		25								
		30								
		35								
		40								
		45								
		50		Fin de sondage à : 50.00 m						

APAGEO DATA EXPLOITATION SYSTEM

OBSERVATIONS: Perte d'eau le long du forage

- LPEE - ACREI Km 7, route d'El Jadida - B.P 8066 //

Tel : (02) 23 07 28/30/32 Fax : 23 19 95



**LPEE
(ACREI)**

SONDAGE (SPT)

Exploitation conforme a la Norme ASTM D1586-84

DOSSIER : 00.171.I.142

CLIENT: CES

SONDAGE: SO

Chantier : BARRAGE TASKOURTE

date : 28/01/01 au 18/02/01 Prof. Nappe (m/T.N.) = 0.40 m

Prof m/T.N.	Nature du sol	litho	Passe (m)	Recuperation (en %)				R.Q.D. (en %)				Nombre de coups N	
				20	40	60	80	20	40	60	80		
0	ALLUVIONS a elements de taille cm a matrice de SABLE grossiers legerement ARGILEUX		1.00									24	50
5	ALLUVIONS a elements de taille cm et a matrice de SABLE grossiers		2.00									50	71
10	SCHISTE grisatre tres fracture a fracturations obliques avec des passages fragmentés entre 11.83 / 11.95 12.15 / 13.00 16.30 / 15.50 20.40 / 20.80 22.20 / 22.50 29.30 / 28.60 35.25 / 40.85 avec des passages de quartz au niveau des quelques fracturation obliques et des filonets de quartz mm		3.00										
15			4.00										
20			5.00										
25			6.00										
30			7.00										
35			8.00										
40			9.00										
45			10.00										
50			11.00										
55			12.00										
60			13.00										
65			14.00										
70			15.00										
75			16.00										
80			17.00										

APAGED DATA EXPLOITATION SYSTEM

OBSERVATIONS:

MODE DE FORAGE : Carottage en Diamètre.
Diametre Tubage: 120 L: 7.50 m
Fluide Peration: Eau +polymer
18

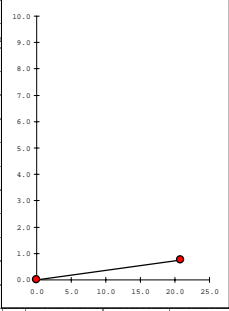
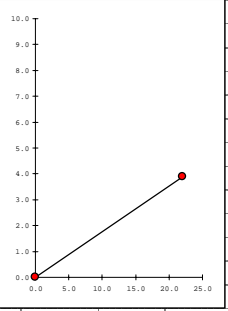
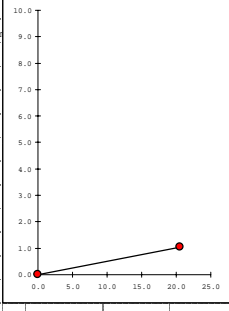
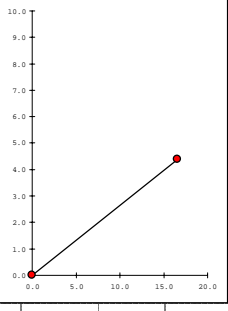
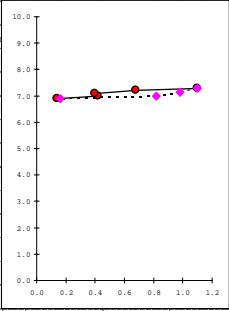
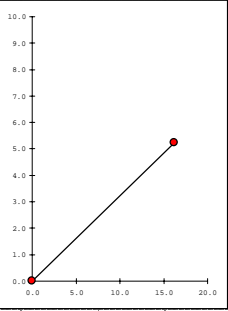
- LPEE - ACREI Km 7, route d'El Jadida - B.P 8065 //

Tel : (02) 23 07 28/30/32 Fax : 23.19.95

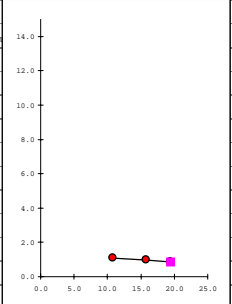
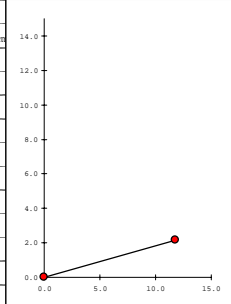
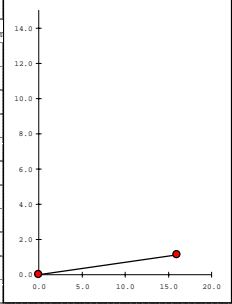
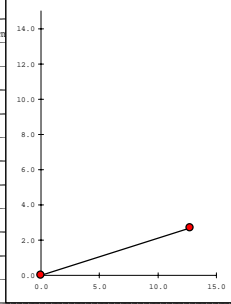
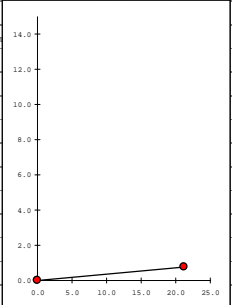
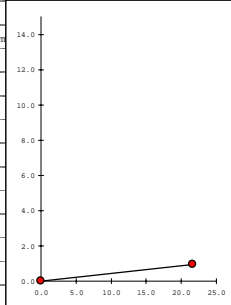
LPEE (ACREI)	SONDAGE CAROTTE
SOND: SG	DOSSIER : 00.171.I.142 SITE : BARRAGE TASKOURTE date : du au /01/01 Niveau d'eau de la nappe : Neant

Profondeur (m)	Lithologie	passe	Pourcentage recup.			RQD (pourcent)		
			25	50	75	25	50	75
0.00	PROFOND. CONG. LIBERTATIQUE	0.00						
1.00		1.00						
2.00		2.00						
3.00		3.00						
4.00		4.00						
5.00		5.00						
6.00		6.00						
7.00		7.00						
8.00		8.00						
9.00		9.00						
10.00		10.00						
11.00		11.00						
12.00		12.00						
13.00		13.00						
14.00		14.00						
15.00		15.00						
16.00		16.00						
17.00		17.00						
18.00		18.00						
19.00		19.00						
20.00		20.00						
21.00		21.00						
22.00		22.00						
23.00		23.00						
24.00		24.00						
25.00		25.00						
26.00		26.00						
27.00		27.00						
28.00		28.00						
29.00		29.00						
30.00		30.00						
31.00		31.00						
32.00		32.00						
33.00		33.00						
34.00		34.00						
35.00		35.00						
36.00		36.00						
37.00		37.00						
38.00		38.00						
39.00		39.00						
40.00		40.00						
41.00		41.00						
42.00		42.00						
43.00		43.00						
44.00		44.00						
45.00		45.00						
46.00		46.00						
47.00		47.00						
48.00		48.00						
49.00		49.00						
50.00		50.00						
51.00		51.00						
52.00		52.00						
53.00		53.00						
54.00		54.00						
55.00		55.00						
56.00		56.00						
57.00		57.00						
58.00		58.00						
59.00		59.00						
60.00		60.00						
61.00		61.00						
62.00		62.00						
63.00		63.00						
64.00		64.00						
65.00		65.00						
66.00		66.00						
67.00		67.00						
68.00		68.00						
69.00		69.00						
70.00		70.00						

OBSERVATIONS: RAS

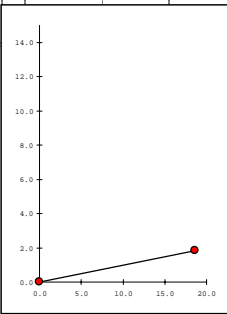
Location SD1				Location SD1			
Injecting Section 16- 21 m				Injecting Section 36- 40 m			
Ground Water Level Null m				Ground Water Level Null m			
Height of Pressure Gauge 100.0 cm				Height of Pressure Gauge 100.0 cm			
Length of Test Section 5.0 m				Length of Test Section 4.0 m			
Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm				Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm			
Pipe Length of Injecting Pa 17.00 m				Pipe Length of Injecting Pa 37.00 m			
P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)	P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.1	104.0	0.8	20.8	2.0	88.0	3.9	22.0
Lu' = 273				Lu' = 56.5			
Pc = - kgf/cm ²				Pc = - kgf/cm ²			
							
Location SD1				Location SD1			
Injecting Section 26 ~ 31 m				Injecting Section 40- 45 m			
Ground Water Level Null m				Ground Water Level Null m			
Height of Pressure Gauge 100.0 cm				Height of Pressure Gauge 100.0 cm			
Length of Test Section 5.0 m				Length of Test Section 5.0 m			
Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm				Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm			
Pipe Length of Injecting Pa 27.00 m				Pipe Length of Injecting Pa 41.00 m			
P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)	P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.1	103.0	1.0	20.6	2.0	83.0	4.4	16.6
Lu' = 197				Lu' = 38.0			
Pc = - kgf/cm ²				Pc = - kgf/cm ²			
							
Location SD1				Location SD1			
Injecting Section 31 ~ 36 m				Injecting Section 45- 50 m			
Ground Water Level Null m				Ground Water Level Null m			
Height of Pressure Gauge 100.0 cm				Height of Pressure Gauge 100.0 cm			
Length of Test Section 5.0 m				Length of Test Section 5.0 m			
Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm				Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm			
Pipe Length of Injecting Pa 32.00 m				Pipe Length of Injecting Pa 46.00 m			
P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)	P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)
0.1	0.7	6.9	0.1	0.0	0.0	0.0	0.0
0.2	2.1	7.0	0.4	2.5	81.0	5.2	16.2
0.3	2.0	7.1	0.4				
0.4	3.4	7.2	0.7				
0.5	5.5	7.3	1.1				
0.4	4.9	7.1	1.0				
0.2	4.1	7.0	0.8				
0.1	0.8	6.9	0.2				
Lu' = 7.7				Lu' = 30.9			
Pc = - kgf/cm ²				Pc = - kgf/cm ²			
							

Result of Lugeon Test at Boreholes SD1(1)-Taskourt Dam Axis

Location SD2				Location SD2			
Injecting Section 8- 13 m				Injecting Section 23- 28 m			
Ground Water Level Nill m				Ground Water Level Nill m			
Height of Pressure Gauge 100.0 cm				Height of Pressure Gauge 100.0 cm			
Length of Test Section 5.0 m				Length of Test Section 5.0 m			
Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm				Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm			
Pipe Length of Injecting Pa 9.00 m				Pipe Length of Injecting Pa 24.00 m			
P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)	P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)
0.1	54.0	1.1	10.8	0.0	0.0	0.0	0.0
0.2	79.0	1.0	15.8	0.1	59.0	2.2	11.8
0.3	97.0	0.9	19.4				
							
Lu' = Leak				Lu' = 54.5			
Pc = - kgf/cm ²				Pc = - kgf/cm ²			
Location SD2				Location SD2			
Injecting Section 13- 18 m				Injecting Section 28- 32 m			
Ground Water Level Nill m				Ground Water Level Nill m			
Height of Pressure Gauge 100.0 cm				Height of Pressure Gauge 100.0 cm			
Length of Test Section 5.0 m				Length of Test Section 4.0 m			
Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm				Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm			
Pipe Length of Injecting Pa 14.00 m				Pipe Length of Injecting Pa 29.00 m			
P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)	P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.1	80.0	1.1	16.0	0.1	51.0	2.7	12.8
							
Lu' = 142.5				Lu' = 47.7			
Pc = - kgf/cm ²				Pc = - kgf/cm ²			
Location SD2				Location SD2			
Injecting Section 18- 23 m				Injecting Section 32- 37 m			
Ground Water Level Nill m				Ground Water Level Nill m			
Height of Pressure Gauge 100.0 cm				Height of Pressure Gauge 100.0 cm			
Length of Test Section 5.0 m				Length of Test Section 5.0 m			
Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm				Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm			
Pipe Length of Injecting Pa 19.00 m				Pipe Length of Injecting Pa 33.00 m			
P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)	P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.1	106.0	0.8	21.2	0.1	108.0	1.0	21.6
							
Lu' = 280.6				Lu' = 226.0			
Pc = - kgf/cm ²				Pc = - kgf/cm ²			

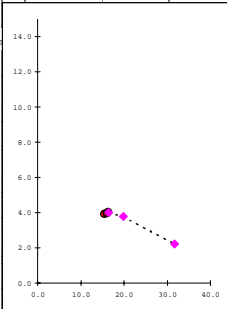
Result of Lugeon Test at Boreholes SD2(1)-Taskourt Dam Axist

Location	SD2		
Injecting Section	37~ 42 m		
Ground Water Level	Nill m		
Height of Pressure Gauge	100.0 cm		
Length of Test Section	5.0 m		
Friction Loss per meter	$7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm		
Pipe Length of Injecting Pa	38.00 m		
P_0 (kgf/cm ²)	Q_{av} (l/min)	P_1 (kgf/cm ²)	q (l/min/m)
0.0	0.0	0.0	0.0
0.1	93.0	1.8	18.6



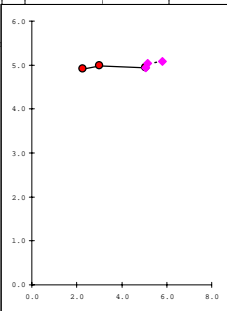
Lu' = 100.6
Pc = - kgf/cm²

Location	SD2		
Injecting Section	42~ 45 m		
Ground Water Level	Nill m		
Height of Pressure Gauge	100.0 cm		
Length of Test Section	3.0 m		
Friction Loss per meter	$7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm		
Pipe Length of Injecting Pa	43.00 m		
P_0 (kgf/cm ²)	Q_{av} (l/min)	P_1 (kgf/cm ²)	q (l/min/m)
0.1	46.5	3.9	15.5
0.2	48.4	3.9	16.1
0.3	49.2	4.0	16.4
0.4	59.5	3.8	19.8
0.5	95.0	2.2	31.7



Lu' = Leak
Pc = - kgf/cm²

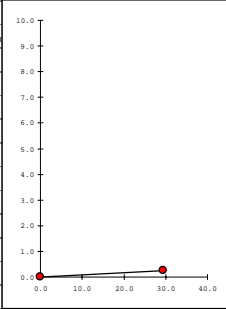
Location	SD2		
Injecting Section	45~ 50 m		
Ground Water Level	Nill m		
Height of Pressure Gauge	100.0 cm		
Length of Test Section	5.0 m		
Friction Loss per meter	$7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm		
Pipe Length of Injecting Pa	46.00 m		
P_0 (kgf/cm ²)	Q_{av} (l/min)	P_1 (kgf/cm ²)	q (l/min/m)
0.1	11.4	4.9	2.3
0.2	15.1	5.0	3.0
0.3	25.3	4.9	5.1
0.4	25.8	5.0	5.2
0.5	29.1	5.1	5.8
0.4	27.1	5.0	5.4
0.2	24.5	4.9	4.9
0.1	22.2	4.8	4.4



Lu' = 57.3
Pc = - kgf/cm²

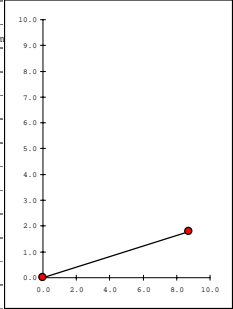
Result of Lugeon Test at Boreholes SD2(2)-Taskourt Dam Axist

Location SO			
Injcting Section	12 ~ 15 m		
Ground Water Level	0.4 m		
Height of Pressure Gauge	100.0 cm		
Length of Test Section	3.4 m		
Friction Loss per meter	$7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm		
Pipe Length of Injecting Pa	12.60 m		
P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)
0.0	0.0	0.0	0.0
1.0	100.0	0.3	29.4



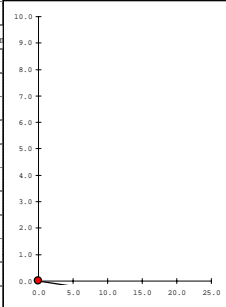
Lu' =	1,140
Pc =	0.3 kgf/cm ²

Location SO			
Injcting Section	25- 30 m		
Ground Water Level	0.4 m		
Height of Pressure Gauge	100.0 cm		
Length of Test Section	5.0 m		
Friction Loss per meter	$7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm		
Pipe Length of Injecting Pa	26.00 m		
P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)
0.0	0.0	0.0	0.0
2.0	43.6	1.8	8.7



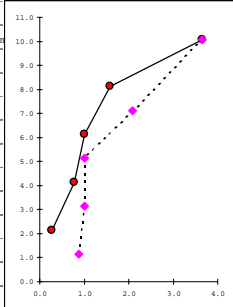
Lu' =	48.6
Pc =	- kgf/cm ²

Location SO			
Injcting Section	15- 20 m		
Ground Water Level	0.4 m		
Height of Pressure Gauge	100.0 cm		
Length of Test Section	5.0 m		
Friction Loss per meter	$7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm		
Pipe Length of Injecting Pa	16.00 m		
P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)
0.0	0.0	0.0	0.0
0.2	100.5	-0.8	20.1



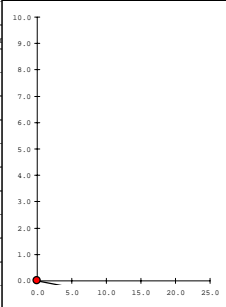
Lu' =	Leak
Pc =	- kgf/cm ²

Location SO			
Injcting Section	30- 35 m		
Ground Water Level	0.4 m		
Height of Pressure Gauge	100.0 cm		
Length of Test Section	5.0 m		
Friction Loss per meter	$7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm		
Pipe Length of Injecting Pa	31.00 m		
P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)
2.0	1.4	2.1	0.3
4.0	3.9	4.1	0.8
6.0	5.0	6.1	1.0
8.0	7.9	8.1	1.6
10.0	18.3	10.1	3.7
7.0	10.4	7.1	2.1
5.0	5.0	5.1	1.0
3.0	5.0	3.1	1.0
1.0	4.4	1.1	0.9



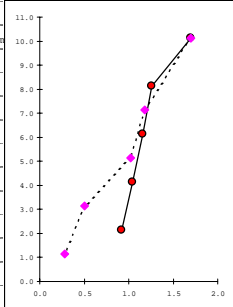
Lu' =	2.0
Pc =	8.4 kgf/cm ²

Location SO			
Injcting Section	20- 25 m		
Ground Water Level	0.4 m		
Height of Pressure Gauge	100.0 cm		
Length of Test Section	5.0 m		
Friction Loss per meter	$7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm		
Pipe Length of Injecting Pa	20.00 m		
P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)
0.0	0.0	0.0	0.0
0.3	100.6	-1.0	20.1



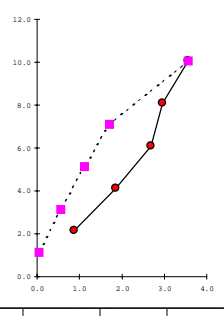
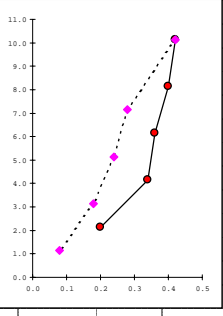
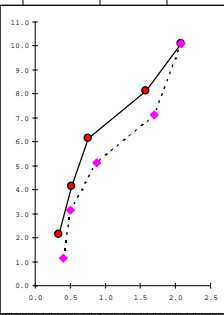
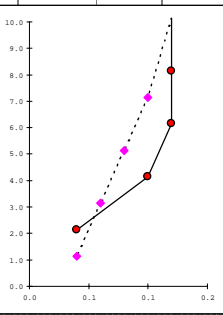
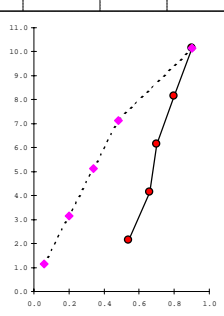
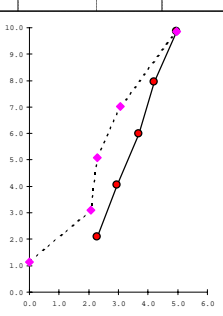
Lu' =	Leak
Pc =	- kgf/cm ²

Location SO			
Injcting Section	35- 40 m		
Ground Water Level	0.4 m		
Height of Pressure Gauge	100.0 cm		
Length of Test Section	5.0 m		
Friction Loss per meter	$7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm		
Pipe Length of Injecting Pa	36.00 m		
P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)
2.0	4.6	2.1	0.9
4.0	5.2	4.1	1.0
6.0	5.8	6.1	1.2
8.0	6.3	8.1	1.3
10.0	8.5	10.1	1.7
7.0	5.9	7.1	1.2
5.0	5.1	5.1	1.0
3.0	2.5	3.1	0.5
1.0	1.4	1.1	0.3



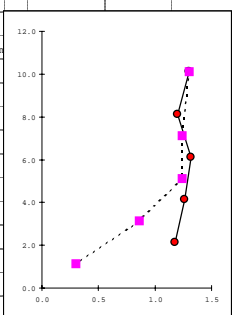
Lu' =	1.4
Pc =	8.4 kgf/cm ²

Result of Lugeon Test at Boreholes SO(1)-Taskourt Dam Axist

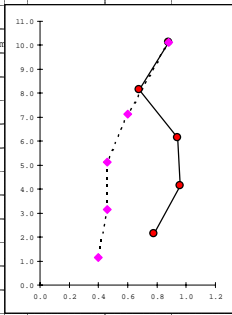
Location SO				Location SO			
Injecting Section 40- 45 m				Injecting Section 55- 60 m			
Ground Water Level 0.4 m				Ground Water Level 0.4 m			
Height of Pressure Gauge 100.0 cm				Height of Pressure Gauge 100.0 cm			
Length of Test Section 5.0 m				Length of Test Section 5.0 m			
Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm				Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm			
Pipe Length of Injecting Pa 41.00 m				Pipe Length of Injecting Pa 56.00 m			
P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)	P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)
2.0	4.4	2.1	0.9	2.0	1.0	2.1	0.2
4.0	9.3	4.1	1.9	4.0	1.7	4.1	0.3
6.0	13.4	6.1	2.7	6.0	1.8	6.1	0.4
8.0	14.8	8.1	3.0	8.0	2.0	8.1	0.4
10.0	17.8	10.0	3.6	10.0	2.1	10.1	0.4
7.0	8.5	7.1	1.7	7.0	1.4	7.1	0.3
5.0	5.6	5.1	1.1	5.0	1.2	5.1	0.2
3.0	2.8	3.1	0.6	3.0	0.9	3.1	0.2
1.0	0.2	1.1	0.0	1.0	0.4	1.1	0.1
Lu= 3.5				Lu= 0.4			
Pc= - kgf/cm ²				Pc= - kgf/cm ²			
							
Location SO				Location SO			
Injecting Section 45- 50 m				Injecting Section 60- 65 m			
Ground Water Level 0.4 m				Ground Water Level 0.4 m			
Height of Pressure Gauge 100.0 cm				Height of Pressure Gauge 100.0 cm			
Length of Test Section 5.0 m				Length of Test Section 5.0 m			
Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm				Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm			
Pipe Length of Injecting Pa 46.00 m				Pipe Length of Injecting Pa 61.00 m			
P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)	P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)
2.0	1.7	2.1	0.3	2.0	0.2	2.1	0.0
4.0	2.6	4.1	0.5	4.0	0.5	4.1	0.1
6.0	3.8	6.1	0.8	6.0	0.6	6.1	0.1
8.0	7.9	8.1	1.6	8.0	0.6	8.1	0.1
10.0	10.4	10.1	2.1	10.0	0.6	10.1	0.1
7.0	8.5	7.1	1.7	7.0	0.5	7.1	0.1
5.0	4.4	5.1	0.9	5.0	0.4	5.1	0.1
3.0	2.5	3.1	0.5	3.0	0.3	3.1	0.1
1.0	2.0	1.1	0.4	1.0	0.2	1.1	0.0
Lu'= 1.2				Lu= 0.1			
Pc= 6.4 kgf/cm ²				Pc= - kgf/cm ²			
							
Location SO				Location SO			
Injecting Section 50- 55 m				Injecting Section 65- 70 m			
Ground Water Level 0.4 m				Ground Water Level 0.4 m			
Height of Pressure Gauge 100.0 cm				Height of Pressure Gauge 100.0 cm			
Length of Test Section 5.0 m				Length of Test Section 5.0 m			
Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm				Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm			
Pipe Length of Injecting Pa 50.00 m				Pipe Length of Injecting Pa 66.00 m			
P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)	P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)
2.0	2.7	2.1	0.5	2.0	11.4	2.1	2.3
4.0	3.3	4.1	0.7	4.0	14.8	4.0	3.0
6.0	3.5	6.1	0.7	6.0	18.4	6.0	3.7
8.0	4.0	8.1	0.8	8.0	21.0	7.9	4.2
10.0	4.5	10.1	0.9	10.0	24.8	9.9	5.0
7.0	2.4	7.1	0.5	7.0	15.3	7.0	3.1
5.0	1.7	5.1	0.3	5.0	11.4	5.1	2.3
3.0	1.0	3.1	0.2	3.0	10.4	3.1	2.1
1.0	0.3	1.1	0.1	1.0	0.0	1.1	0.0
Lu= 0.9				Lu= 5.0			
Pc= - kgf/cm ²				Pc= - kgf/cm ²			
							

Result of Lugeon Test at Boreholes SO(2)-Taskourt Dam Axist

Location		SO	
Injcting Section		70- 75	m
Ground Water Level		0.4	m
Height of Pressure Gauge		100.0	cm
Length of Test Section		5.0	m
Friction Loss per meter		$7*10^{-6}*Q_{av}^2$	kgf/cm
Pipe Length of Injecting Pa		71.00	m
P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)
2.0	5.9	2.1	1.2
4.0	6.3	4.1	1.3
6.0	6.6	6.1	1.3
8.0	6.0	8.1	1.2
10.0	6.5	10.1	1.3
7.0	6.2	7.1	1.2
5.0	6.2	5.1	1.2
3.0	4.3	3.1	0.9
1.0	1.5	1.1	0.3
Lu=	1.3		
Pc=	-	kgf/cm ²	



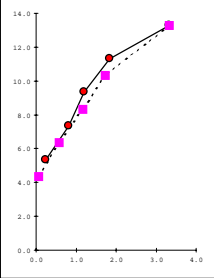
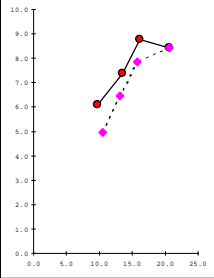
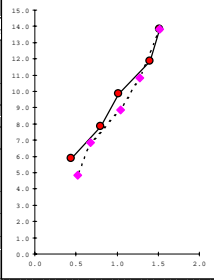
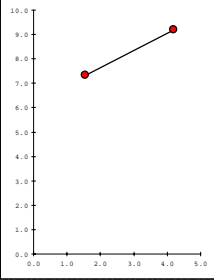
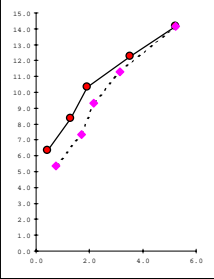
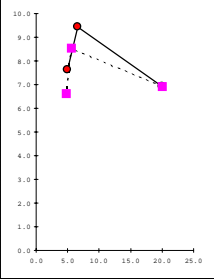
Location		SO	
Injcting Section		75- 80	m
Ground Water Level		0.4	m
Height of Pressure Gauge		100.0	cm
Length of Test Section		5.0	m
Friction Loss per meter		$7*10^{-6}*Q_{av}^2$	kgf/cm
Pipe Length of Injecting Pa		76.00	m
P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)
2.0	3.9	2.1	0.8
4.0	4.8	4.1	1.0
6.0	4.7	6.1	0.9
8.0	3.4	8.1	0.7
10.0	4.4	10.1	0.9
7.0	3.0	7.1	0.6
5.0	2.3	5.1	0.5
3.0	2.3	3.1	0.5
1.0	2.0	1.1	0.4
Lu=	0.9		
Pc=	-	kgf/cm ²	



Result of Lugeon Test at Boreholes SO(3)-Taskourt Dam Axist

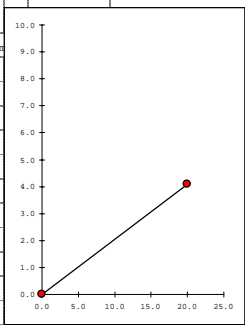
Location SG				Location SG			
Injecting Section 1.5 ~ 5 m				Injecting Section 15- 20 m			
Ground Water Level Nill m				Ground Water Level Nill m			
Height of Pressure Gauge 100.0 cm				Height of Pressure Gauge 100.0 cm			
Length of Test Section 3.5 m				Length of Test Section 5.0 m			
Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm				Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm			
Pipe Length of Injecting Pa 2.50 m				Pipe Length of Injecting Pa 16.00 m			
P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)	P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)
0.0	0.0	0.0	0.0	2.0	0.9	3.8	0.2
0.5	94.6	0.8	27.0	4.0	71.1	5.3	14.2
Lu' = 351.8				Lu' = 60.4			
Pc = - kgf/cm ²				Pc = - kgf/cm ²			
Location SG				Location SG			
Injecting Section 5 ~ 10 m				Injecting Section 20- 25 m			
Ground Water Level Nill m				Ground Water Level Nill m			
Height of Pressure Gauge 100.0 cm				Height of Pressure Gauge 100.0 cm			
Length of Test Section 5.0 m				Length of Test Section 5.0 m			
Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm				Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm			
Pipe Length of Injecting Pa 6.00 m				Pipe Length of Injecting Pa 21.00 m			
P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)	P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)
0.0	0.0	0.0	0.0	2.0	0.9	4.3	0.2
2.0	28.0	2.8	5.6	4.0	71.1	5.6	14.2
Lu' = 19.9				Lu' = 63.3			
Pc = - kgf/cm ²				Pc = 5.6 kgf/cm ²			
Location SG				Location SG			
Injecting Section 10 ~ 15 m				Injecting Section 25 ~ 30 m			
Ground Water Level Nill m				Ground Water Level Nill m			
Height of Pressure Gauge 100.0 cm				Height of Pressure Gauge 100.0 cm			
Length of Test Section 5.0 m				Length of Test Section 5.0 m			
Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm				Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm			
Pipe Length of Injecting Pa 11.00 m				Pipe Length of Injecting Pa 26.00 m			
P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)	P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)
2.0	16.2	3.3	3.2	2.0	2.7	4.8	0.5
3.5	94.5	4.2	18.9	4.0	6.5	6.8	1.3
Lu' = 128.7				Lu' = 2.5			
Pc = - kgf/cm ²				Pc = 8.8 kgf/cm ²			

Result of Lugeon Test at Boreholes SG(1)-Taskourt Dam Axist

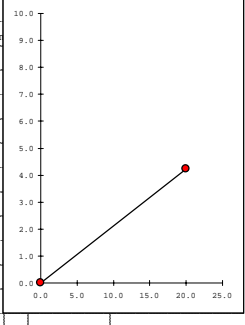
Location SG				Location SG			
Injecting Section				Injecting Section			
30~ 35 m				45~ 50 m			
Ground Water Level				Ground Water Level			
Nill m				Nill			
Height of Pressure Gauge				Height of Pressure Gauge			
100.0 cm				100.0 cm			
Length of Test Section				Length of Test Section			
5.0 m				5.0 m			
Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$				Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$			
kgf/cm				kgf/cm			
Pipe Length of Injecting				Pipe Length of Injecting			
31.00 m				46.00 m			
P_a (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)	P_a (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)
2.0	1.2	5.3	0.2	2.0	48.7	6.1	9.7
4.0	4.1	7.3	0.8	4.0	67.5	7.4	13.5
6.0	6.0	9.3	1.2	6.0	80.5	8.8	16.1
8.0	9.2	11.3	1.8	7.0	103.3	8.4	20.7
10.0	16.6	13.3	3.3	5.0	78.7	7.9	15.7
7.0	8.6	10.3	1.7	3.0	65.6	6.5	13.1
5.0	5.8	8.3	1.2	1.0	52.6	5.0	10.5
3.0	2.9	6.3	0.6				
1.0	0.3	4.3	0.1				
Lu= 0.8				Lu'= 19.0			
Pc= 11.3 kgf/cm ²				Pc= 8.8 kgf/cm ²			
							
Location SG				Location SG			
Injecting Section				Injecting Section			
35~ 40 m				50~ 55 m			
Ground Water Level				Ground Water Level			
Nill m				Nill			
Height of Pressure Gauge				Height of Pressure Gauge			
100.0 cm				100.0 cm			
Length of Test Section				Length of Test Section			
5.0 m				5.0 m			
Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$				Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$			
kgf/cm				kgf/cm			
Pipe Length of Injecting				Pipe Length of Injecting			
36.00 m				51.00 m			
P_a (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)	P_a (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)
2.0	2.2	5.8	0.4	2.0	7.8	7.3	1.6
4.0	4.0	7.8	0.8	4.0	21.0	9.2	4.2
6.0	5.1	9.8	1.0				
8.0	7.0	11.8	1.4				
10.0	7.6	13.8	1.5				
7.0	6.4	10.8	1.3				
5.0	5.2	8.8	1.0				
3.0	3.4	6.8	0.7				
1.0	2.6	4.8	0.5				
Lu= 1.3				Lu'= 5.3			
Pc= - kgf/cm ²				Pc= - kgf/cm ²			
							
Location SG				Location SG			
Injecting Section				Injecting Section			
40~ 45 m				55~ 60 m			
Ground Water Level				Ground Water Level			
Nill m				Nill			
Height of Pressure Gauge				Height of Pressure Gauge			
100.0 cm				100.0 cm			
Length of Test Section				Length of Test Section			
5.0 m				5.0 m			
Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$				Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$			
kgf/cm				kgf/cm			
Pipe Length of Injecting				Pipe Length of Injecting			
41.00 m				56.00 m			
P_a (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)	P_a (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)
2.0	2.1	6.3	0.4	2.0	24.7	7.6	4.9
4.0	6.5	8.3	1.3	4.0	32.9	9.4	6.6
6.0	9.6	10.3	1.9	5.0	100.0	6.9	20.0
8.0	17.6	12.3	3.5	3.0	28.0	8.5	5.6
10.0	26.2	14.2	5.2	1.0	23.7	6.6	4.7
7.0	15.7	11.3	3.1				
5.0	10.8	9.3	2.2				
3.0	8.5	7.3	1.7				
1.0	3.7	5.3	0.7				
Lu= 1.8				Lu'= 7.1			
Pc= 10.3 kgf/cm ²				Pc= 9.4 kgf/cm ²			
							

Result of Lugeon Test at Boreholes SG(2)-Taskourt Dam Axist

Location SG			
Injecting Section		60~ 65	m
Ground Water Level		Null	m
Height of Pressure Gauge		100.0	cm
Length of Test Section		5.0	m
Friction Loss per meter		$7 \cdot 10^{-6} \cdot Q_{av}^2$	kgf/cm
Pipe Length of Injecting Pe		61.00	m
P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)
0.0	0.0	0.0	0.0
2.0	100.0	4.1	20.0
Lu' = 49.0			
Pc =	-	kgf/cm ²	



Location SG			
Injecting Section		65~ 70	m
Ground Water Level		Null	m
Height of Pressure Gauge		100.0	cm
Length of Test Section		5.0	m
Friction Loss per meter		$7 \cdot 10^{-6} \cdot Q_{av}^2$	kgf/cm
Pipe Length of Injecting Pe		66.00	m
P_0 (kgf/cm ²)	Q_{av} (l/min)	P (kgf/cm ²)	q (l/min/m)
0.0	0.0	0.0	0.0
2.0	100.0	4.2	20.0
Lu' = 47.3			
Pc =	-	kgf/cm ²	



Result of Lugeon Test at Boreholes SG(3)-Taskourt Dam Axist

LPEE
(ACREI)

SONDAGE CAROTTE

DOSSIER : 00.171.I.142

SOND: SD

SITE : BARRAGE TIMKITE

date :

Niveau d'eau de la nappe :

Tubage	Diam. de forage (mm)	PROF (m)	Lithologie	passe	Pourcentage recup.			ROD (pourcent)				
					25	50	75	25	50	75		
			éboulis & BLOCS ca et SABLE ARGILEUX	1.00								
		5	CALCAIRE DOLOMITIQUE fracturé à	1.50								
				2.00								
				2.50								
				3.00								
				3.70								
				5.00								
				6.00								
				7.30								
				9.00								
		10		fracturations obliques et à	10.70							
			12.00									
			12.50									
			13.70									
			15.00									
			16.00									
			18.00									
			18.00									
			20.10									
		20	et à remplissage calcaire		21.00							
				23.00								
				23.70								
				24.00								
				27.00								
		25		Altéré entre: 6.00 - 6.90 m	27.00							
					27.00							
					28.00							
					29.00							
					30.00							
			32.00									
			33.00									
			35.00									
			35.00									
			36.00									
		30	et 15.00 - 15.40 m.	37.00								
				37.00								
				38.00								
				39.00								
				39.00								
				41.00								
				41.00								
				42.00								
				45.00								
				45.00								
			46.00									
			48.00									
			48.00									
			49.00									
			50.00									
		50	Fin de sondage à: 50.00 m									

OBSERVATIONS:

APAGEO DATA EXPLOITATION SYSTEM

- LPEE - ACREI Km 7, route d'El Jadida - B.P 8066 //

Tel : (02) 23 07 28/30/32 Fax : 23.19.95

LPEE
(ACREI)

SONDAGE CAROTTE

DOSSIER : 00.171.I.142

SOND: SO

SITE : Sondage Hydrogéologique BARRAGE TIMKITE
date : du 20 au 29/01/01 Niveau d'eau de la nappe : 3.20 m

Tubage	Diam. de forage (mm)	PROF (m)	Lithologie	passe	Pourcentage recup.			ROD (pourcent)			
					25	50	75	25	50	75	
<p>12.8</p> <p>11.3</p> <p>10.0</p> <p>13.1</p>		5	ALLUVIONS: éléments cm-dm de nature CALCAIRE, noyé dans une matrice SABLEUSE	2.00							
		10									
		15	CALCAIRE grisâtre présentant des petites géodes à remplissages calcitique et des joints à remplissage Argileux	11.00							
		12.00									
		13.00									
		14.00									
		15.00									
		16.00									
		17.00									
		18.00									
		19.00									
		20.00									
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41.00											
42.00											
43.00											
44.00											
45.00											
46.00											
47.00											
48.00											
49.00											
50.00											
			Fin de sondage à: 50.00 m								

OBSERVATIONS: Vide entre 15.40 à 15.70 m + Perte d'eau totale

APAGED DATA EXPLOITATION SYSTEM

- LPEE - ACREI Km 7, route d'El Jadida - B.P 8066 //

Tel : (02) 23 07 28/30/32 Fax : 23.19.95

LPEE
(ACREI)

SONDAGE CAROTTE

DOSSIER : 00.171.I.142

SOND: SG1

SITE : Sondage Hydrogeologique BARRAGE TIMKITE
date : du 14 au 18/01/01 Niveau d'eau de la nappe : 24.80 m

Tubage	Diam. de forage (mm)	PROF (m)	Lithologie	passe	Pourcentage recup.			RQD (pourcent)				
					25	50	75	25	50	75		
12.8	131	5	CALCAIRE tres fracture avec des poches a remplissage de LIMON ARGILEU	1.00								
				2.00								
40.1		5	CALCAIRE grisâtre fracture par endroit avec présence de petites geodes et joints	3.20								
				4.00								
				5.20								
				7.20								
				10.00								
				13.00								
				15.00								
				17.20								
				20.20								
				23.00								
				25.00								
				28.20								
				30.00								
				31.00								
				34.00								
				36.00								
				37.00								
				40.00								
43.00												
45.00												
47.00												
49.00												
50.00												
Fin de sondage a: 50.00 m												

OBSERVATIONS: Perte d'eau totale a 3.40 m

APAGEO DATA EXPLOITATION SYSTEM

- LPEE - ACREI Km 7, route d'EJ Jadida - B.P 8066 //

Tel : (02) 23 07 28/30/32 Fax : 23.19.95

LPEE
(ACREI)

SONDAGE CAROTTE

DOSSIER : 00.171.I.142

SOND: SG2

SITE : BARRAGE TIMKITE

date :

Niveau d'eau de la nappe :

Tubage	Diam. de forage (mm)	PROF (m)	Lithologie	passe	Pourcentage recup.			ROD (pourcent)			
					25	50	75	25	50	75	
		5	CALCAIRE tres fracture generalement poreux, grisatre a rougeatre presentant des gèodes a remplissage de calcite et de karsts	0.00 1.48 2.30 4.00 4.88 5.76 6.64 7.52 8.40 9.28 10.16 11.04 11.92							
		10	CALCAIRE grisatre caracterise par presence des pores entre 11.00-11.30 m zone a remplissage de calcite entre 13.28/13.30 et 13.37/13.45 fracture verticale et karst a remplissage de limon brunatre et de marnes = N.G.P./M.K. calcaire poreux Punachillique	12.30 13.76 14.75 15.35							
		15	passage de LIMON ARGILEUX avec blocs CALCAIRE taille cm de calcite	16.30							
		20	CALCAIRE poreux fracture tres altere CALCAIRE compacte de couleur grisatre CALCAIRE altere argileux avec remplissage ARGILEUX entre 20.80-21.00 a fracture oblique a 21.30 m	21.30 22.60							
		25	CALCAIRE grisatre compacte LIMON SILTEUX brunatre	24.30 25.30							
		30	CALCAIRE grisatre poreux avec veinules calcitiques avec cavite a remplissage argileux entre 29.70 / 29.80 m a fracture oblique	27.30 30.30							
		35	CALCAIRE poreux, tres altere, tres fracture a fracturations obliques entre 29.90/33.00 et 33.50/37.80 m et fracturation verticale entre 33.10 / 33.40 et 34.20 / 34.80 et 34.80 / 36.20 m Passage de calcite entre 36.60/37.00 et 37.80 / 38.40	33.10 34.20 35.30 36.40 37.50							
		40	CALCAIRE de couleur grisatre, poreux, fracture a fracturations obliques	38.10 42.10							
		45		43.00 44.00 45.00 46.00							
		50	Fin de sondage a: 50.10 m	47.00 48.00 49.00 50.10							

OBSERVATIONS:

APAGED DATA EXPLOITATION SYSTEM

LPEE
(ACREI)

SONDAGE CAROTTE

DOSSIER : 00.171.I.142

SOND: SG3

SITE : BARRAGE TIMKITE

date :

Niveau d'eau de la nappe :

Tubage	Diam. de forage (mm)	PROF (m)	Lithologie	passe	Pourcentage recup.			RQD (pourcent)		
					25	50	75	25	50	75
		5	CALCAIRE fragmente presentant des veines a remplissage calcitiques	1.00 2.00 3.00 3.50 5.00 6.00						
		10	CALCAIRE DOLOMITIQUE fracture a	6.00 7.00 8.00 9.00 10.00 11.00 12.00 13.00 14.00 15.00						
		15	fracturations obliques a	16.00 17.00 18.00 19.00 20.00 21.00 22.00 23.00 24.00 25.00						
		25	passages de MARNE bariolée	26.00 27.00 28.00 29.00 30.00 31.00 32.00 33.00 34.00 35.00						
		30	alteré entre :	36.00 37.00 38.00 39.00 40.00 41.00 42.00 43.00 44.00 45.00						
		35	8.00 / 10.00 ; 12.40 / 12.90	46.00 47.00 48.00 49.00 50.00 51.00 52.00 53.00 54.00 55.00						
		40	13.50 / 15.00 ; 15.90 / 17.30	56.00 57.00 58.00 59.00 60.00 61.00 62.00 63.00 64.00 65.00						
		45	18.00 / 22.70 ; 24.50 / 27.60	66.00 67.00 68.00 69.00 70.00 71.00 72.00 73.00 74.00 75.00						
		50	33.10 / 34.10 ; 34.70 / 36.00	76.00 77.00 78.00 79.00 80.00 81.00 82.00 83.00 84.00 85.00						
		50	Fin de sondage a: 50.20 m							

APAGED DATA EXPLOITATION SYSTEM

OBSERVATIONS: