

*L'étude de Faisabilité Pour Le Développement des Ressources En Eau  
Par Les Barrages Moyens Dans Le Milieu Rurale Au  
Royaume Maroc  
Rapport Final  
Volume VII Livre de Donnees  
Livre de Donnees GC  
Géologie et Matériaux de Construction*

***GC3      Daiagramme de Forage et Essai Lugeon***

### Liste de les 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 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		1.75										50
	SCHISTE brunatre a grisatre altere tres fracture avec intercalations QUARTZITIQUES		2.25										75
5			4.50										
			5.00										
			6.00										
			7.50										
			8.50										
			9.50										
10			10.00										
			11.00										
			12.00										
			13.00										
			14.50										
15			15.50										
			16.50										
			17.50										
			18.50										
			19.50										
20			20.50										
			21.50										
			22.50										
			24.00										
25			25.50										
			26.50										
			27.50										
			28.50										
30			30.00										
			30.50										
			32.00										
			32.50										
			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.

SAGEO 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 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 : 40.2 m

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							
				17.00							
				18.00							
				19.00							
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			40.00								
			41.00								
			42.00								
			43.00								
			44.00								
			45.00								
			46.00								
			47.00								
			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 Lithology]	1.30									82
	SCHISTE altere tres fracture grisatre avec intercalations de quartzite		1.70									
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		2.70									
			3.20									
			5.00									
			6.00									
			7.50									
			8.50									
			10.00									
			11.00									
			13.00									
			14.20									
15			15.70									
			16.00									
			17.00									
			18.00									
			19.00									
			20.00									
			21.00									
			23.00									
		24.00										
		24.70										
25		25.00										
		26.00										
		28.00										
		28.70										
		29.00										
		29.70										
		31.00										
		32.00										
		34.00										
		37.50										
35		37.50										
		38.00										
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		54.00										
		55.00										

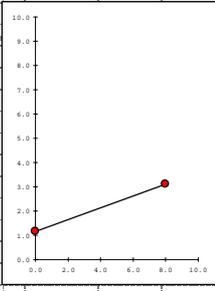
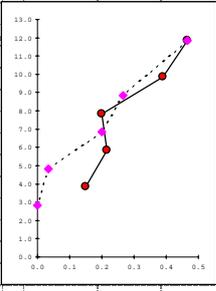
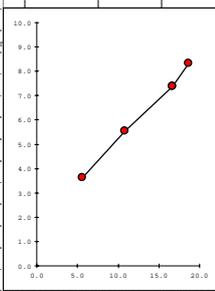
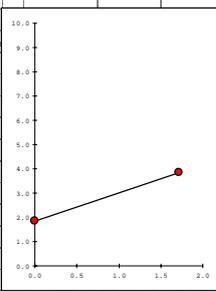
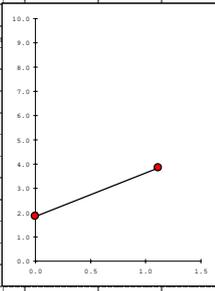
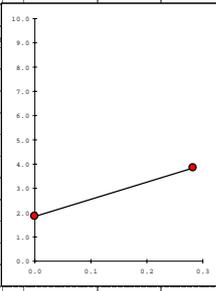
OBSERVATIONS:

MODE DE FORAGE : Carottage en Diam100-13  
Diametre Tubage: --  
Fluide Foration: EAU CLAIR  
18

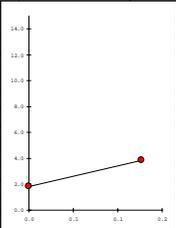
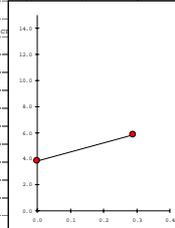
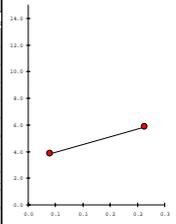
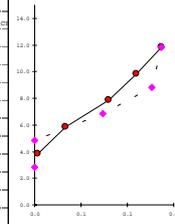
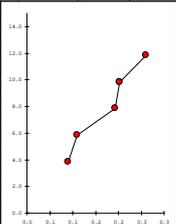
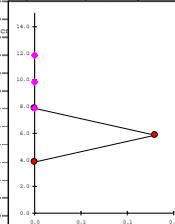
APAGED DATA EXPLOITATION SYSTEM

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

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

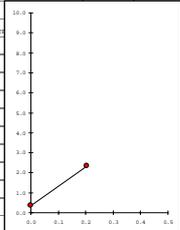
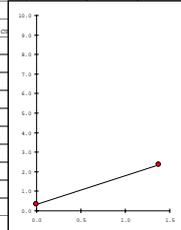
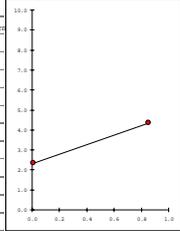
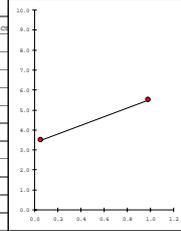
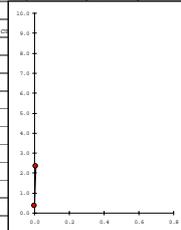
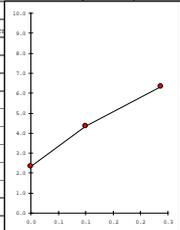
<b>Location S1</b>				<b>Location S1</b>			
<b>Injecting Section 9 ~ 12 m</b>				<b>Injecting Section 20 - 23 m</b>			
Ground Water Level Null m				Ground Water Level 17.4 m			
Height of Pressure Gauge 100.0 cm				Height of Pressure Gauge 100.0 cm			
Length of Test Section 3.0 m				Length of Test Section 3.0 m			
Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm				Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm			
Pipe Length of Injecting 10.00 m				Pipe Length of Injecting 21.00 m			
$P_0$ (kgf/cm <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (l/min/m)	$P_0$ (kgf/cm <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (l/min/m)
0.0	0.0	1.2	0.0	2.0	0.5	3.8	0.2
2.0	24.0	3.1	8.0	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
Lu' = 36.1				Lu = 0.4			
Pc = - kgf/cm <sup>2</sup>				Pc = - kgf/cm <sup>2</sup>			
							
<b>Location S1</b>				<b>Location S1</b>			
<b>Injecting Section 14 ~ 17 m</b>				<b>Injecting Section 23 - 26 m</b>			
Ground Water Level Null 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 $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm				Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm			
Pipe Length of Injecting 15.00 m				Pipe Length of Injecting 24.00 m			
$P_0$ (kgf/cm <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (l/min/m)	$P_0$ (kgf/cm <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (l/min/m)
2.0	16.8	3.6	5.6	0.0	0.0	1.8	0.0
4.0	32.4	5.5	10.8	2.0	5.1	3.8	1.7
6.0	50.0	7.4	16.7				
7.0	56.0	8.3	18.7				
Lu' = 23				Lu' = 7.0			
Pc = - kgf/cm <sup>2</sup>				Pc = - kgf/cm <sup>2</sup>			
							
<b>Location S1</b>				<b>Location S1</b>			
<b>Injecting Section 17 ~ 20 m</b>				<b>Injecting Section 26 ~ 29 m</b>			
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 $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm				Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm			
Pipe Length of Injecting 18.00 m				Pipe Length of Injecting 27.00 m			
$P_0$ (kgf/cm <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (l/min/m)	$P_0$ (kgf/cm <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (l/min/m)
0.0	0.0	1.8	0.0	0.0	0.0	1.8	0.0
2.0	3.3	3.8	1.1	2.0	0.9	3.8	0.3
Lu' = 4.5				Lu' = 1.2			
Pc = - kgf/cm <sup>2</sup>				Pc = - kgf/cm <sup>2</sup>			
							

**Résultat de l'essai lugeon du sondage SG3 (5) S1 (1)-Axe du barrage N'Fifikh**

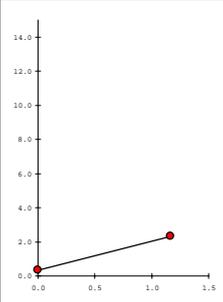
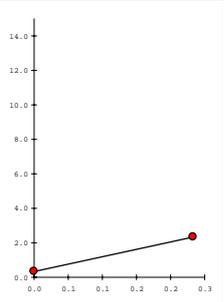
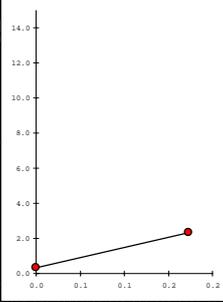
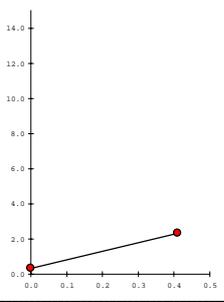
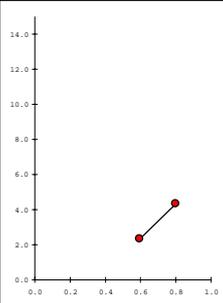
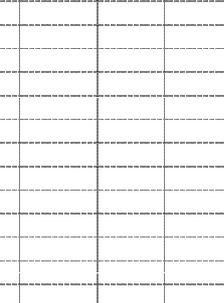
<b>Location S1</b>				<b>Location S1</b>			
<b>Injecting Section 29 - 32 m</b>				<b>Injecting Section 38 - 41 m</b>			
Ground Water Level 17.4 m				Ground Water Level 17.4 m			
Height of Pressure Gauge 100.0 cm				Height of Pressure Gauge 100.0 cm			
Length of Test Section 3.0 m				Length of Test Section 3.0 m			
Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm				Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm			
Pipe Length of Injecting P 30.00 m				Pipe Length of Injecting P 39.00 m			
$P_0$ (kgf/cm <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (l/min/m)	$P_0$ (kgf/cm <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (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 <sup>2</sup>				$P_c = -$ kgf/cm <sup>2</sup>			
							
<b>Location S1</b>				<b>Location S1</b>			
<b>Injecting Section 32 - 35 m</b>				<b>Injecting Section 41 - 44 m</b>			
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 $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm				Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm			
Pipe Length of Injecting P 33.00 m				Pipe Length of Injecting P 42.00 m			
$P_0$ (kgf/cm <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (l/min/m)	$P_0$ (kgf/cm <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (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 <sup>2</sup>				$P_c = -$ kgf/cm <sup>2</sup>			
							
<b>Location S1</b>				<b>Location S1</b>			
<b>Injecting Section 35 - 38 m</b>				<b>Injecting Section 44 - 47 m</b>			
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 $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm				Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm			
Pipe Length of Injecting P 28.00 m				Pipe Length of Injecting P 45.00 m			
$P_0$ (kgf/cm <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (l/min/m)	$P_0$ (kgf/cm <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (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 <sup>2</sup>				$P_c = -$ kgf/cm <sup>2</sup>			
							

**Résultat de l'essai lugeon du sondage SG3 (5) S1 (2)-Axe du barrage N'Fifikh**



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 <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (l/min/m)	$P_s$ (kgf/cm <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (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
							
$Lu' = 1.0$				$Lu' = 6.7$			
$P_c = -$ kgf/cm <sup>2</sup>				$P_c = -$ kgf/cm <sup>2</sup>			
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 <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (l/min/m)	$P_s$ (kgf/cm <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (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
							
$Lu' = 3.2$				$Lu' = 3.1$			
$P_c = -$ kgf/cm <sup>2</sup>				$P_c = -$ kgf/cm <sup>2</sup>			
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 <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (l/min/m)	$P_s$ (kgf/cm <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (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				
							
$Lu' = 0.4$				$Lu' = 0.0$			
$P_c = -$ kgf/cm <sup>2</sup>				$P_c = -$ kgf/cm <sup>2</sup>			

Résultat de l'essai lugeon du sondage S2 (1)-Axe du barrage N'Fifikh

<b>Location SD2</b>				<b>Location SD2</b>			
<b>Injecting Section</b>		33- 36 m		<b>Injecting Section</b>		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 <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (l/min/m)	$P_0$ (kgf/cm <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (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 <sup>2</sup>				Pc = - kgf/cm <sup>2</sup>			
							
<b>Location SD2</b>				<b>Location SD2</b>			
<b>Injecting Section</b>		36- 39 m		<b>Injecting Section</b>		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 <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (l/min/m)	$P_0$ (kgf/cm <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (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 <sup>2</sup>				Pc = - kgf/cm <sup>2</sup>			
							
<b>Location SD2</b>				<b>Location SD2</b>			
<b>Injecting Section</b>		39- 42 m		<b>Injecting Section</b>		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		40.00 m		Pipe Length of Injecting Pa		46.00 m	
$P_0$ (kgf/cm <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (l/min/m)	$P_0$ (kgf/cm <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (l/min/m)
2.0	1.8	2.3	0.6	2.0	1.8	2.3	0.6
4.0	2.4	4.3	0.8	4.0	2.4	4.3	0.8
Lu' = 1.4				Lu' = 2.0			
Pc = - kgf/cm <sup>2</sup>				Pc = - kgf/cm <sup>2</sup>			
							

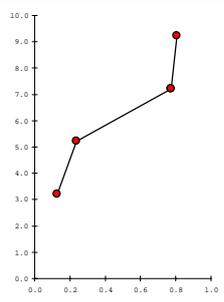
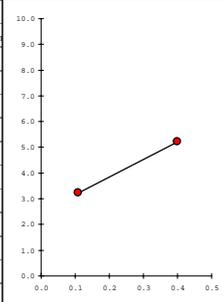
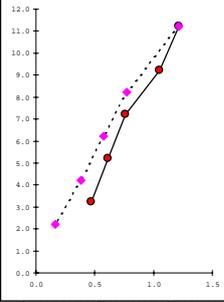
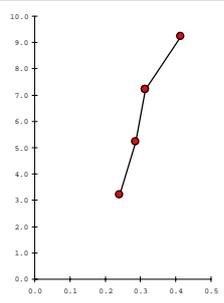
**Résultat de l'essai lugeon du sondage SD2 (2)-Axe du barrage N'Fifikh**

<b>Location S3</b>				<b>Location S3</b>			
<b>Injecting Section</b>		15 - 18 m		<b>Injecting Section</b>		47- 50 m	
<b>Ground Water Level</b>		2.2 m		<b>Ground Water Level</b>		2.2 m	
<b>Height of Pressure Gauge</b>		100.0 cm		<b>Height of Pressure Gauge</b>		100.0 cm	
<b>Length of Test Section</b>		3.0 m		<b>Length of Test Section</b>		3.0 m	
<b>Friction Loss per meter</b>		$7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm <sup>2</sup>		<b>Friction Loss per meter</b>		$7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm <sup>2</sup>	
<b>Pipe Length of Injecting Pa</b>		16.00 m		<b>Pipe Length of Injecting Pa</b>		48.00 m	
<b>P<sub>0</sub> (kgf/cm<sup>2</sup>)</b>	<b>Q<sub>av</sub> (l/min)</b>	<b>P (kgf/cm<sup>2</sup>)</b>	<b>q (l/min/m)</b>	<b>P<sub>0</sub> (kgf/cm<sup>2</sup>)</b>	<b>Q<sub>av</sub> (l/min)</b>	<b>P (kgf/cm<sup>2</sup>)</b>	<b>q (l/min/m)</b>
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 <sup>2</sup>				Pc = - kgf/cm <sup>2</sup>			
<b>Location S3</b>				<b>Location S3</b>			
<b>Injecting Section</b>		18- 21 m		<b>Injecting Section</b>			
<b>Ground Water Level</b>		2.2 m		<b>Ground Water Level</b>			
<b>Height of Pressure Gauge</b>		100.0 cm		<b>Height of Pressure Gauge</b>			
<b>Length of Test Section</b>		3.0 m		<b>Length of Test Section</b>			
<b>Friction Loss per meter</b>		$7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm <sup>2</sup>		<b>Friction Loss per meter</b>			
<b>Pipe Length of Injecting Pa</b>		19.00 m		<b>Pipe Length of Injecting Pa</b>			
<b>P<sub>0</sub> (kgf/cm<sup>2</sup>)</b>	<b>Q<sub>av</sub> (l/min)</b>	<b>P (kgf/cm<sup>2</sup>)</b>	<b>q (l/min/m)</b>	<b>P<sub>0</sub> (kgf/cm<sup>2</sup>)</b>	<b>Q<sub>av</sub> (l/min)</b>	<b>P (kgf/cm<sup>2</sup>)</b>	<b>q (l/min/m)</b>
2.0	0.9	2.3	0.3				
4.0	0.0	4.3	0.0				
6.0	0.0	6.3	0.0				
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 = 3.0			
Pc = - kgf/cm <sup>2</sup>				Pc = - kgf/cm <sup>2</sup>			
<b>Location S3</b>				<b>Location S3</b>			
<b>Injecting Section</b>		42 - 47 m		<b>Injecting Section</b>			
<b>Ground Water Level</b>		2.2 m		<b>Ground Water Level</b>			
<b>Height of Pressure Gauge</b>		100.0 cm		<b>Height of Pressure Gauge</b>			
<b>Length of Test Section</b>		5.0 m		<b>Length of Test Section</b>			
<b>Friction Loss per meter</b>		$7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm <sup>2</sup>		<b>Friction Loss per meter</b>			
<b>Pipe Length of Injecting Pa</b>		43.00 m		<b>Pipe Length of Injecting Pa</b>			
<b>P<sub>0</sub> (kgf/cm<sup>2</sup>)</b>	<b>Q<sub>av</sub> (l/min)</b>	<b>P (kgf/cm<sup>2</sup>)</b>	<b>q (l/min/m)</b>	<b>P<sub>0</sub> (kgf/cm<sup>2</sup>)</b>	<b>Q<sub>av</sub> (l/min)</b>	<b>P (kgf/cm<sup>2</sup>)</b>	<b>q (l/min/m)</b>
2.0	0.0	2.3	0.0				
4.0	0.0	4.3	0.0				
6.0	1.9	6.3	0.4				
Lu' = 1.1				Lu' = 1.1			
Pc = - kgf/cm <sup>2</sup>				Pc = - kgf/cm <sup>2</sup>			

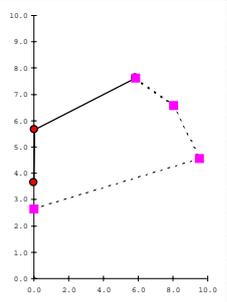
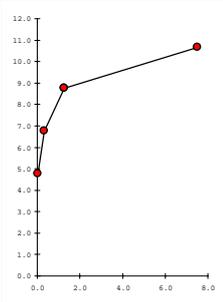
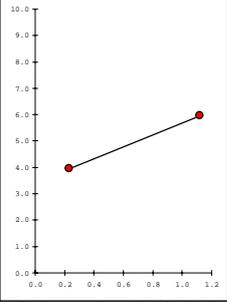
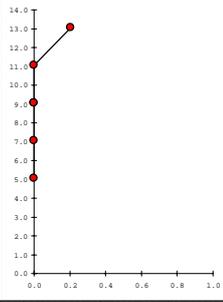
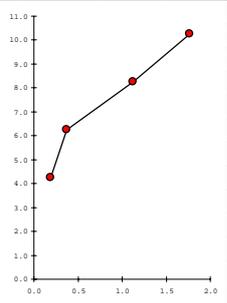
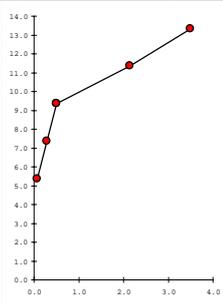
**Résultat de l'essai lugeon du sondage S3 -Axe du barrage N'Fifikh**

<b>Location S4</b>				<b>Location S4</b>			
<b>Injecting Section</b>		18- 21 m		<b>Injecting Section</b>		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 <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (l/min/m)	$P_0$ (kgf/cm <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (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 <sup>2</sup>				Pc = - kgf/cm <sup>2</sup>			
<b>Location S4</b>				<b>Location S4</b>			
<b>Injecting Section</b>		21- 24 m		<b>Injecting Section</b>		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 <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (l/min/m)	$P_0$ (kgf/cm <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (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 <sup>2</sup>				Pc = - kgf/cm <sup>2</sup>			
<b>Location S4</b>				<b>Location S4</b>			
<b>Injecting Section</b>		24- 27 m		<b>Injecting Section</b>		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 <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (l/min/m)	$P_0$ (kgf/cm <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (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 <sup>2</sup>				Pc = - kgf/cm <sup>2</sup>			

**Résultat de l'essai lugeon du sondage S4 (1)-Axe du arrage N°Fifikh**

<b>Location SG2</b>				<b>Location SG2</b>			
<b>Injecting Section</b>		37 ~ 40 m		<b>Injecting Section</b>		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 <sup>2</sup>		Friction Loss per meter		$7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm <sup>2</sup>	
Pipe Length of Injecting Pa		38.50 m		Pipe Length of Injecting Pa		47.50 m	
$P_0$ (kgf/cm <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (l/min/m)	$P_0$ (kgf/cm <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (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 =		-		Pc =		-	
<b>Location SG2</b>				<b>Location SG2</b>			
<b>Injecting Section</b>		40 ~ 43 m		<b>Injecting Section</b>		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 <sup>2</sup>		Friction Loss per meter		$7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm <sup>2</sup>	
Pipe Length of Injecting Pa		41.50 m		Pipe Length of Injecting Pa		44.50 m	
$P_0$ (kgf/cm <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (l/min/m)	$P_0$ (kgf/cm <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (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 =		-		Pc =		-	

Résultat de l'essai lugeon du sondage SG2 (2)-Axe du barrage N'Fifikh

<b>Location S5</b>				<b>Location S5</b>			
<b>Injecting Section</b>		14 ~ 17 m		<b>Injecting Section</b>		25- 28 m	
<b>Ground Water Level</b>		Null m		<b>Ground Water Level</b>		Null m	
<b>Height of Pressure Gauge</b>		100.0 cm		<b>Height of Pressure Gauge</b>		100.0 cm	
<b>Length of Test Section</b>		3.0 m		<b>Length of Test Section</b>		3.0 m	
<b>Friction Loss per meter</b>		$7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm		<b>Friction Loss per meter</b>		$7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm	
<b>Pipe Length of Injecting Pa</b>		15.00 m		<b>Pipe Length of Injecting Pa</b>		26.00 m	
$P_0$ (kgf/cm <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (l/min/m)	$P_0$ (kgf/cm <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (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 <sup>2</sup>				Pc = 8.5 kgf/cm <sup>2</sup>			
							
<b>Location S5</b>				<b>Location S5</b>			
<b>Injecting Section</b>		17 ~ 20 m		<b>Injecting Section</b>		28- 31 m	
<b>Ground Water Level</b>		Null m		<b>Ground Water Level</b>		Null m	
<b>Height of Pressure Gauge</b>		100.0 cm		<b>Height of Pressure Gauge</b>		100.0 cm	
<b>Length of Test Section</b>		3.0 m		<b>Length of Test Section</b>		3.0 m	
<b>Friction Loss per meter</b>		$7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm		<b>Friction Loss per meter</b>		$7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm	
<b>Pipe Length of Injecting Pa</b>		18.00 m		<b>Pipe Length of Injecting Pa</b>		29.00 m	
$P_0$ (kgf/cm <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (l/min/m)	$P_0$ (kgf/cm <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (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 <sup>2</sup>				Pc = 11.1 kgf/cm <sup>2</sup>			
							
<b>Location S5</b>				<b>Location S5</b>			
<b>Injecting Section</b>		20 ~ 23 m		<b>Injecting Section</b>		31- 34 m	
<b>Ground Water Level</b>		Null m		<b>Ground Water Level</b>		Null m	
<b>Height of Pressure Gauge</b>		100.0 cm		<b>Height of Pressure Gauge</b>		100.0 cm	
<b>Length of Test Section</b>		3.0 m		<b>Length of Test Section</b>		3.0 m	
<b>Friction Loss per meter</b>		$7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm		<b>Friction Loss per meter</b>		$7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm	
<b>Pipe Length of Injecting Pa</b>		21.00 m		<b>Pipe Length of Injecting Pa</b>		32.00 m	
$P_0$ (kgf/cm <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (l/min/m)	$P_0$ (kgf/cm <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (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 <sup>2</sup>				Pc = 9.3 kgf/cm <sup>2</sup>			
							

**Résultat de l'essai lugeon du sondage S5 (I)-Axe du barrage N'Fifikh**

<b>Location S5</b>				<b>Location S5</b>			
<b>Injecting Section</b>		34- 37 m		<b>Injecting Section</b>		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 <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (l/min/m)	$P_0$ (kgf/cm <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (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 <sup>2</sup>				Pc = - kgf/cm <sup>2</sup>			
<b>Location S5</b>				<b>Location S5</b>			
<b>Injecting Section</b>		37- 40 m		<b>Injecting Section</b>		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 <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (l/min/m)	$P_0$ (kgf/cm <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (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 <sup>2</sup>				Pc = - kgf/cm <sup>2</sup>			
<b>Location S5</b>				<b>Location S5</b>			
<b>Injecting Section</b>		40- 43 m		<b>Injecting Section</b>		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 <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (l/min/m)	$P_0$ (kgf/cm <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (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 <sup>2</sup>				Pc = 10.2 kgf/cm <sup>2</sup>			

**Résultat de l'essai lugeon du sondage S5 (2)-Axe du barrage N'Fifikh**

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.			RQD (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							
		13.00	CONGLOMERATS à éléments de nature GRESSEUX et à matrice silicifiée	3.00							
		14.00		3.50							
		15.00		4.00							
		20	SCHISTE très fracture à	4.50							
		25	passage fragmenté entre:	5.00							
		30	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

<b>LPEE (ACREI)</b>	<b>SONDAGE CAROTTE</b>
	DOSSIER : 00.171.I.142

SOND: SD2	SITE : BARRAGE TASKOURTE	date : du    au    /01/01	Niveau d'eau de la nappe : <i>neant</i>
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Tubage	Diam. de forage (mm)	PROF (m)	Lithologie	passe	Pourcentage recup.			AQD (pourcent)			
					25	50	75	25	50	75	
	<i>116</i>	5	BRECHE CONGLOMERATIQUE maie cimentee à éléments SCHISTEUX mm-cm noyé dans <i>matrice Sablo-Argileux</i>	1.00							
		10	SCHISTE très fracturé à fracturations  <i>généralement obliques et à remplissage de Silice avec des passages fragmenté situés</i>  <i>entre: 7,10- 8.70; 9.60- 10.00 m</i>  <i>16.95- 17.20; 22.30- 22.60m</i>  <i>26.30- 27.20 ; 29.60- 30.40 m</i>  <i>des alterations au niveau des fractures</i>  <i>entre: 18.70- 21.70; 25.30- 26.00 m</i>	1.00							
		15		1.00							
		20		1.00							
		25		1.00							
		30		1.00							
		35		1.00							
		40		1.00							
		45		1.00							
		50		1.00	Fin de sondage à: 50.00 m						

APAGEO DATA EXPLOITATION SYSTEM

OBSERVATIONS: Perte d'eau le long du forage



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

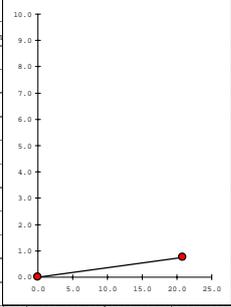
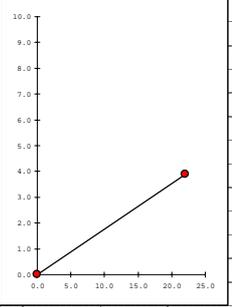
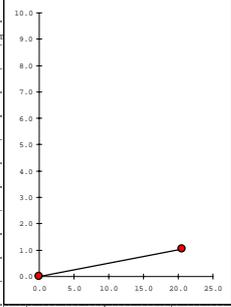
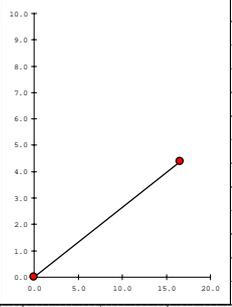
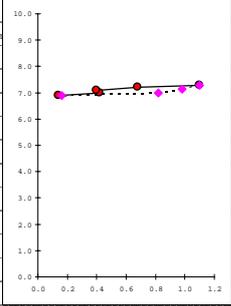
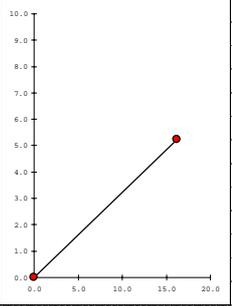
- LPEE - ACREI Km 7, route d'El Jadida - B.P 8065 //

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

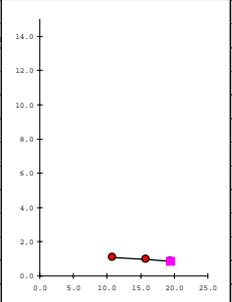
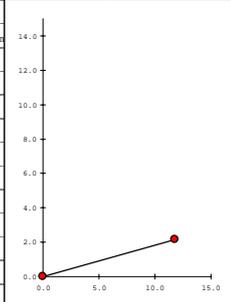
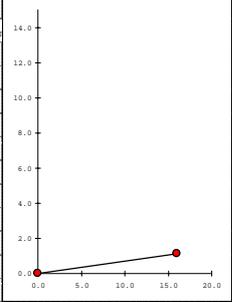
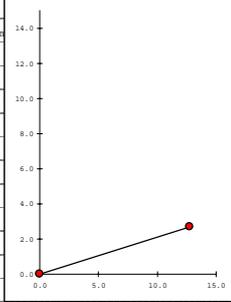
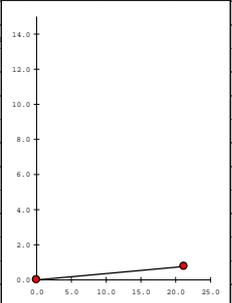
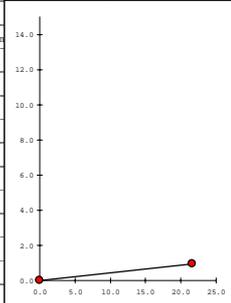
<b>LPEE (ACREI)</b>	<b>SONDAGE CAROTTE</b>
<b>SOND: SG</b>	<b>DOSSIER : 00.171.I.142</b> <b>SITE : BARRAGE TASKOURTE</b> date : du    au    /01/01      Niveau d'eau de la nappe : Neant

Profondeur (m)	Lithologie	passe	Pourcentage recup.			RQD (pourcent)		
			25	50	75	25	50	75
0.00	BARRAGE CONGRUËNT							
1.00								
2.00								
3.00								
4.00								
5.00								
6.00								
7.00								
8.00								
9.00								
10.00								
11.00								
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OBSERVATIONS: RAS

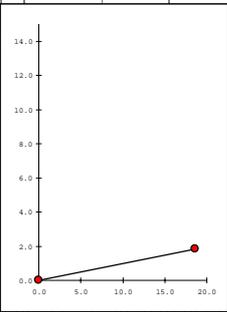
<b>Location SD1</b>				<b>Location SD1</b>			
<b>Injecting Section</b>		16- 21 m		<b>Injecting Section</b>		36- 40 m	
Ground Water Level		Null m		Ground Water Level		Null m	
Height of Pressure Gauge		100.0 cm		Height of Pressure Gauge		100.0 cm	
Length of Test Section		5.0 m		Length of Test Section		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 <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (l/min/m)	$P_0$ (kgf/cm <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (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 <sup>2</sup>				Pc = - kgf/cm <sup>2</sup>			
<b>Location SD1</b>				<b>Location SD1</b>			
<b>Injecting Section</b>		26 ~ 31 m		<b>Injecting Section</b>		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 <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (l/min/m)	$P_0$ (kgf/cm <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (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 <sup>2</sup>				Pc = - kgf/cm <sup>2</sup>			
<b>Location SD1</b>				<b>Location SD1</b>			
<b>Injecting Section</b>		31 ~ 36 m		<b>Injecting Section</b>		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 <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (l/min/m)	$P_0$ (kgf/cm <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (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 <sup>2</sup>				Pc = - kgf/cm <sup>2</sup>			

Résultat de l'essai lugeon du sondage SD1 (1)-Axe du barrage Taskourt

<b>Location SD2</b>				<b>Location SD2</b>			
<b>Injecting Section 8- 13 m</b>				<b>Injecting Section 23- 28 m</b>			
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 <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (l/min/m)	$P_0$ (kgf/cm <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (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 <sup>2</sup>				Pc = - kgf/cm <sup>2</sup>			
<b>Location SD2</b>				<b>Location SD2</b>			
<b>Injecting Section 13- 18 m</b>				<b>Injecting Section 28- 32 m</b>			
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 <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (l/min/m)	$P_0$ (kgf/cm <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (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 <sup>2</sup>				Pc = - kgf/cm <sup>2</sup>			
<b>Location SD2</b>				<b>Location SD2</b>			
<b>Injecting Section 18- 23 m</b>				<b>Injecting Section 32- 37 m</b>			
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 <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (l/min/m)	$P_0$ (kgf/cm <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (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 <sup>2</sup>				Pc = - kgf/cm <sup>2</sup>			

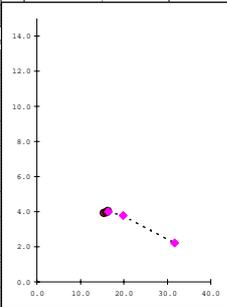
**Résultat de l'essai lugeon du sondage SD2 (1)-Axe du barrage Taskourt**

Location	SD2		
Injecting Section	37~ 42 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 Pa	38.00 m		
$P_0$ (kgf/cm <sup>2</sup> )	$Q_{av}$ (l/min)	$P_1$ (kgf/cm <sup>2</sup> )	$q$ (l/min/m)
0.0	0.0	0.0	0.0
0.1	93.0	1.8	18.6



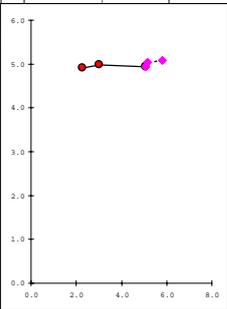
Lu' = 100.6  
Pc = - kgf/cm<sup>2</sup>

Location	SD2		
Injecting Section	42~ 45 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 Pa	43.00 m		
$P_0$ (kgf/cm <sup>2</sup> )	$Q_{av}$ (l/min)	$P_1$ (kgf/cm <sup>2</sup> )	$q$ (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/cm<sup>2</sup>

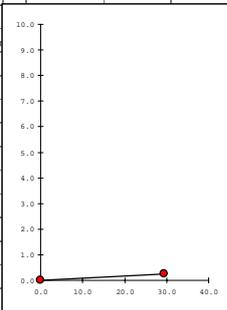
Location	SD2		
Injecting Section	45~ 50 m		
Ground Water Level	Null m		
Height of Pressure Gauge	100.0 cm		
Length of Test Section	5.0 m		
Friction Loss per meter	$7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm		
Pipe Length of Injecting Pa	46.00 m		
$P_0$ (kgf/cm <sup>2</sup> )	$Q_{av}$ (l/min)	$P_1$ (kgf/cm <sup>2</sup> )	$q$ (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/cm<sup>2</sup>

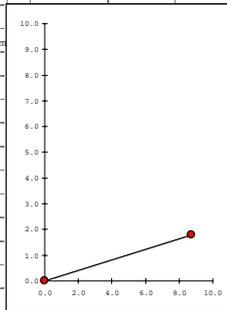
Résultat de l'essai lugeon du sondage SD2 (2)-Axe du barrage Taskourt

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 <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (l/min/m)
0.0	0.0	0.0	0.0
1.0	100.0	0.3	29.4



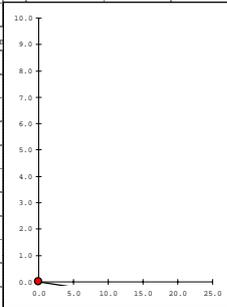
Lu' =	1,140
Pc =	0.3 kgf/cm <sup>2</sup>

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 <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (l/min/m)
0.0	0.0	0.0	0.0
2.0	43.6	1.8	8.7



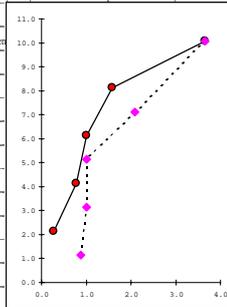
Lu' =	48.6
Pc =	- kgf/cm <sup>2</sup>

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 <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (l/min/m)
0.0	0.0	0.0	0.0
0.2	100.5	-0.8	20.1



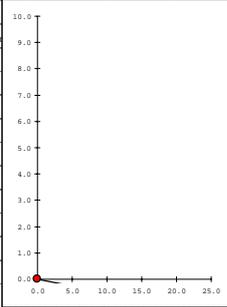
Lu' =	Leak
Pc =	- kgf/cm <sup>2</sup>

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 <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (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



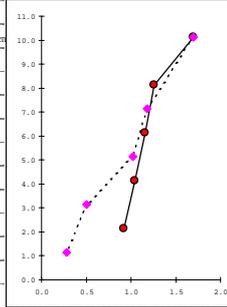
Lu' =	2.0
Pc =	8.4 kgf/cm <sup>2</sup>

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 <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (l/min/m)
0.0	0.0	0.0	0.0
0.3	100.6	-1.0	20.1



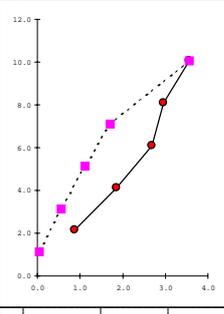
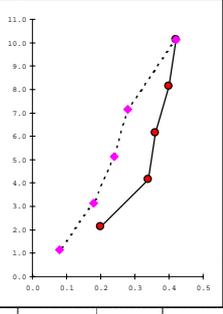
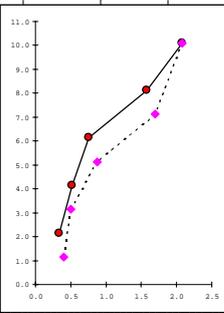
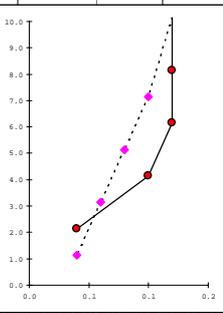
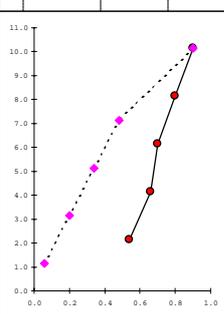
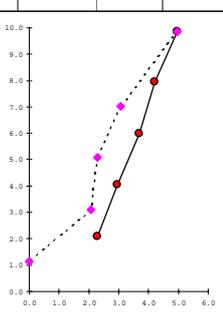
Lu' =	Leak
Pc =	- kgf/cm <sup>2</sup>

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 <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (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



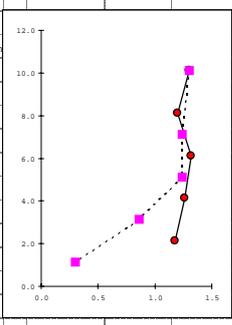
Lu' =	1.4
Pc =	8.4 kgf/cm <sup>2</sup>

Résultat de l'essai lugeon du sondage SO (1)-Axe du barrage Tasourt

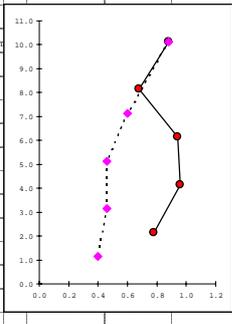
<b>Location SO</b>				<b>Location SO</b>			
<b>Injecting Section</b>		40- 45 m		<b>Injecting Section</b>		55- 60 m	
Ground Water Level		0.4 m		Ground Water Level		0.4 m	
Height of Pressure Gauge		100.0 cm		Height of Pressure Gauge		100.0 cm	
Length of Test Section		5.0 m		Length of Test Section		5.0 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 <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (l/min/m)	$P_0$ (kgf/cm <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (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 <sup>2</sup>		Pc= -		kgf/cm <sup>2</sup>	
							
<b>Location SO</b>				<b>Location SO</b>			
<b>Injecting Section</b>		45- 50 m		<b>Injecting Section</b>		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 <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (l/min/m)	$P_0$ (kgf/cm <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (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 <sup>2</sup>		Pc= -		kgf/cm <sup>2</sup>	
							
<b>Location SO</b>				<b>Location SO</b>			
<b>Injecting Section</b>		50- 55 m		<b>Injecting Section</b>		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 <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (l/min/m)	$P_0$ (kgf/cm <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (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 <sup>2</sup>		Pc= -		kgf/cm <sup>2</sup>	
							

**Résultat de l'essai lugeon du sondage SO (2)-Axe du barrage Taskourt**

Location		SO	
Injecting 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 <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (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 <sup>2</sup>	



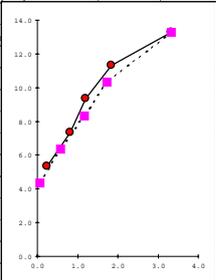
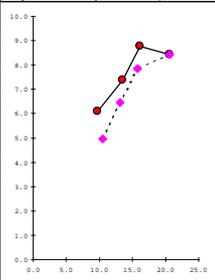
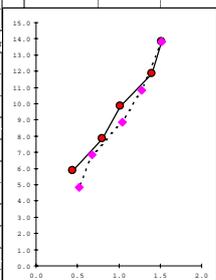
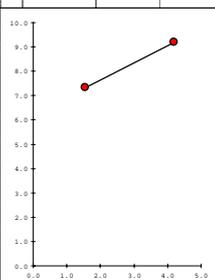
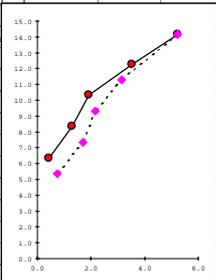
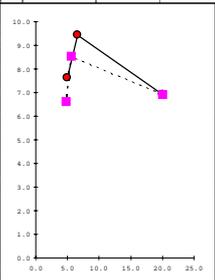
Location		SO	
Injecting Section		75- 80	m
Ground Water Level		0.4	m
Height of Pressure Gauge		100.0	cm
Length of Test Section		5.0	m
Friction Loss per meter		$7*10^{-6}*Q_{av}^2$	kgf/cm
Pipe Length of Injecting Pa		76.00	m
$P_0$ (kgf/cm <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (l/min/m)
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 <sup>2</sup>	



Résultat de l'essai lugeon du sondage SO (3)-Axe du barrage Taskourt

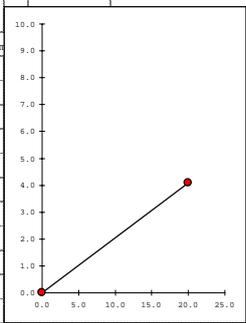
<b>Location SG</b> <b>Injecting Section</b> 1.5 - 5 m Ground Water Level Nill m Height of Pressure Gauge 100.0 cm Length of Test Section 3.5 m Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm Pipe Length of Injecting Pa 2.50 m				<b>Location SG</b> <b>Injecting Section</b> 15- 20 m Ground 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 16.00 m			
$P_0$ (kgf/cm <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (l/min/m)	$P_0$ (kgf/cm <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (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 Pc = - kgf/cm <sup>2</sup>				Lu' = 60.4 Pc = - kgf/cm <sup>2</sup>			
<b>Location SG</b> <b>Injecting Section</b> 5 - 10 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 6.00 m				<b>Location SG</b> <b>Injecting Section</b> 20- 25 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 21.00 m			
$P_0$ (kgf/cm <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (l/min/m)	$P_0$ (kgf/cm <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (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 Pc = - kgf/cm <sup>2</sup>				Lu' = 63.3 Pc = 5.6 kgf/cm <sup>2</sup>			
<b>Location SG</b> <b>Injecting Section</b> 10 - 15 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 11.00 m				<b>Location SG</b> <b>Injecting Section</b> 25 - 30 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 26.00 m			
$P_0$ (kgf/cm <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (l/min/m)	$P_0$ (kgf/cm <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (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 Pc = - kgf/cm <sup>2</sup>				Lu' = 2.5 Pc = 8.8 kgf/cm <sup>2</sup>			

Résultat de l'essai lugeon du sondage SG (1)-Axe du barrage Taskourt

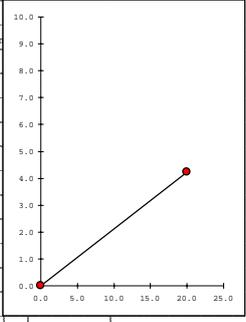
<b>Location SG</b>				<b>Location SG</b>			
<b>Injecting Section</b>		30~ 35 m		<b>Injecting Section</b>		45~ 50 m	
Ground Water Level		Nill m		Ground Water Level		Nill m	
Height of Pressure Gauge		100.0 cm		Height of Pressure Gauge		100.0 cm	
Length of Test Section		5.0 m		Length of Test Section		5.0 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				Pipe Length of Injecting			
31.00 m				46.00 m			
$P_a$ (kgf/cm <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (l/min/m)	$P_a$ (kgf/cm <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (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 <sup>2</sup>				Pc= 8.8 kgf/cm <sup>2</sup>			
							
<b>Location SG</b>				<b>Location SG</b>			
<b>Injecting Section</b>		35~ 40 m		<b>Injecting Section</b>		50~ 55 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				Pipe Length of Injecting			
36.00 m				51.00 m			
$P_a$ (kgf/cm <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (l/min/m)	$P_a$ (kgf/cm <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (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 <sup>2</sup>				Pc= - kgf/cm <sup>2</sup>			
							
<b>Location SG</b>				<b>Location SG</b>			
<b>Injecting Section</b>		40~ 45 m		<b>Injecting Section</b>		55~ 60 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				Pipe Length of Injecting			
41.00 m				56.00 m			
$P_a$ (kgf/cm <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (l/min/m)	$P_a$ (kgf/cm <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (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 <sup>2</sup>				Pc= 9.4 kgf/cm <sup>2</sup>			
							

**Résultat de l'essai lugeon du sondage SG (2)-Axe du barrage Taskourt**

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 <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (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 <sup>2</sup>	



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 <sup>2</sup> )	$Q_{av}$ (l/min)	$P$ (kgf/cm <sup>2</sup> )	$q$ (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 <sup>2</sup>	



**Résultat de l'essai lugeon du sondage SG (3)-Axe du barrage Taskourt**

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		
			eboulis & 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							
					30.00							
					32.00							
			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								
				40.00								
				41.00								
				41.00								
				42.00								
				45.00								
		35	Présentant des passages de	45.00								
				45.00								
				46.00								
				46.00								
				47.00								
				47.00								
				48.00								
				48.00								
				49.00								
				49.00								
		40	Marne calcaire à partir	50.00								
				50.00								
				50.00								
				50.00								
				50.00								
				50.00								
				50.00								
				50.00								
				50.00								
		45		de 27,00 m	50.00							
			50.00									
			50.00									
			50.00									
			50.00									
			50.00									
			50.00									
			50.00									
			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: 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	3.00						
				4.00						
				5.00						
				6.00						
				7.00						
				8.00						
				9.00						
				10.00						
				11.00						
				12.00						
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42.00										
43.00										
44.00										
45.00										
46.00										
47.00										
48.00										
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 13.78 14.75 15.72							
		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 38.60							
		40	CALCAIRE de couleur grisatre, poreux, fracture	40.10 41.20 42.30 43.40 44.50 45.60							
		45	a fracturations obliques	46.70 47.80 48.90							
		50	Fin de sondage a: 50.10 m	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: