Appendix 1

LOGS OF CORE DRILLING FOR THE DETAILED DESIGN

DRILL LOG

HOLE Nº DP-93-1 SHEET Nº 1 OF 1

PROJECT	THE DETAILED DESIGN ON TRANSBASIN CHONE - PORTOVIEJO BASIN			DEPTH	30.00 m	ELEVATION	83.56 m
SITE	EST. MULATOS	COORDINATES	N. 9906453 - E. 619388	INCLINATION	VERT	DRILL RIG	ACKER H. BILLY
AVERAGE CORE RECOVERY	100%	DATE	FROM 26/11/93 TO 30/11/93	DRILLED	A. QUIROZ	LOGGED	R. BURGOS

DATE	DEPTH	ELEVATION	FORMATION	ROCK TYPE	COLUMN SECTION	DESCRIPTION	ROCK GRADE	ROCK TEST
26/11/93	1	83.56	COLLUVIUM	Colluvium		Blackish silty clay with weathered debris	STIFF	
		82.16		Mudstone		Withish Mudstone		
	2			fine grained sandstone		Grayish brown silty fine grained sandstone, slightly weathered		
	3					Dark gray color with oxidated levels		
	4					Massive but friable	III IV	
	5					levels of fine grained sandstone alternating with Mudstone	CL	
	6					Dark gray silty fine grained sandstone, some soft		
	7					Gray silty fine grained sandstone Bedding = horizontal		
	8							
	9					some soft		
27/11/93	10	73.66		Medium grained sandstone		Greenish gray fine and medium grained sandstone Massive	III CM	
	11							
	12					microconglomeratic		
	13							
	14	69.06	LOJA	Fine grained sandstone		Light gray fine grained sandstone soft rock siliceous level	IV CL	
	15			Mudstone		brown Mudstone, tufaceous Bedding - horizontal	III	
	16	67.56				Moderately cemented	CM	
28/11/93	17	66.25		Fine grained sandstone		Dark gray fine and medium grained sandstone, some soft	IV CL	
	18	65.06		Mudstone		Brown massive, moderately cemented	III CM	
	19			Fine grained sandstone		Greenish gray silty fine grained sandstone Bedding - horizontal	III	
	20							
	21	ZL30 ROCK TEST					CM	21.30
	22	ZL00						21.80
	23	60.26						
29/11/93	24			Medium grained sandstone		dark gray fine and medium grained sandstone, some soft beeding - horizontal	III	
	25							
	26						IV CM	
	27							
	28	55.26						
30/11/93	29			Coarse grained sandstone		medium and coarse grained sandstone, soft rock (conglomeratic)	IV CM-CL	
	30	53.76		Conglomer.		conglomerat, soft rock		

CORE RECOVERY % / cm — R.Q.D. % — SPT (N30) ○ LUGEON TEST — DEPTH

10 20 30 40 50

Kg/cm²

K=5.8 x 10⁻⁵ cm/sec

Lu = 4.7

Kg/cm²

K=3.1 x 10⁻⁴ cm/sec

Lu = 26

0 5 10 15 20

HOLE Nº DP-93-1

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DRILL LOG

HOLE N°DP-93-2 SHEET N° 1 OF 1

PROJECT	THE DETAILED DESIGN ON TRANSBASIN CHONE – PORTOVIEJO BASIN			DEPTH	30.00 m	ELEVATION	88.08 m
SITE	EST. CANALES	COORDINATES	N. 9908206 - E. 624907	INCLINATION	VERT.	DRILL RIG	ACKER H. BILLY
AVERAGE CORE RECOVERY	87%	DATE	FROM 28/11/93 TO 7/12/93	DRILLED	A. QUIROZ	LOGGED	R. BURGOS

DATE	DEPTH	ELEVATION	FORMATION	ROCK TYPE	COLUMN SECTION	DESCRIPTION	ROCK GRADE	ROCK TEST
28/11/93	0	87.68		Sand		sand and gravel		
						coarse grained sandstone,conglomeratic	IV	
	1			Sandstone		Greenish gray silty fine grained sandstone	III CL	
	2	85.33				Gray fine grained sandstone some soft Bedding – horizontal		
	3							
	4			medium and coarse grained sandstone		dark brown medium and coarse grained sandstone Bedding – horizontal	IV CL	
27/11/93	5					Massive, soft/compact		
	6	81.38						
	7			Mudstone		Greenish gray Mudstone, with some breach	III CL	
	8	80.28				Greenish gray silty fine and medium grained sandstone		
28/11/93	9			fine and medium grained sandstone		Bluish gray medium grained sandstone, some soft Bedding – horizontal	IV CL	
	10							
	11							
	12	76.08						
	13			Conglomerat		coarse grained conglomeratic in coarse grained sandstone		
29/11/93	14	73.93						
						Gray Mudstone, Tufaceous		
30/11/93	15			fine and medium grained sandstone		greenish gray, silty fine and medium grained sandstone	III CM	
	16							
	17					medium and coarse grained		
	18							
	19					gray color		
1/12/93	20					conglomeratic		
	21					fine and medium grained	IV III CL-CM	
	22							
	23	64.88						23.35 23.75
15/12/93	24	23.35 23.75	ROCK TEST	Mudstone		Greenish gray Mudstone, with some sandstone Bedding – horizontal		
	25					gray color tufaceous		
	26	61.58						
4/12/93	27			fine grained sandstone		greenish gray fine and medium grained sandstone medium and coarse grained	III CM	
	28	59.93				conglomeratic		
7/12	29			Mudstone		Greenish gray Mudstone, with some sandy parts		
	30	58.08				gray color, tufaceous		

CORE RECOVERY % / cm — R.Q.D. % — SPT (N30) O — LUGEON TEST — DEPTH

10 20 30 40 50

Kg/cm2

K= 4.6 x 10⁻⁴ cm/sec
Lu= 3.7

Kg/cm2 5 10 15 20

K= 8.1 x 10⁻⁵ cm/sec
Lu= 0.7

Kg/cm2 0.1 0.2 0.3 0.4

K= 5.8 x 10⁻⁵ cm/sec
Lu= 4.8

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DRILL LOG

HOLE N°DP-93-3 SHEET N° 1 OF 1

PROJECT	THE DETAILED DESIGN ON TRANSBASIN CHONE – PORTOVIEJO BASIN			DEPTH	30.00 m	ELEVATION	89.68 m
SITE	CONGUILLO	COORDINATES	N. 9909173 - E. 626541	INCLINATION	VERT.	DRILL RIG	ACKER H. BILLY
AVERAGE CORE RECOVERY	100%	DATE	FROM 18/11/93 TO 23/11/93	DRILLED	A. QUIROZ	LOGGED	R. BURGOS

DATE	DEPTH	ELEVATION	FORMATION	ROCK TYPE	COLUMN SECTION	DESCRIPTION	ROCK GRADE	ROCK TEST	CORE RECOVERY %	CORE RECOVERY cm	R.Q.D. %	SPT (N30) o LUGEON TEST DEPTH
18/11/93	1	89.68	ONZOLE	Weathered Mudstone		brown Mudstone with siliceous conglomeratic debris(breach)	IV CL					
	1	88.48										
	2			sandstone		brown fine grained sandstone, with joints	III CL					
	3	86.68				brown medium grained coarse grained						
	4			Mudstone		brown Mudstone with conglomeratic debris(breach)						
	4	85.08				Dark brown						
	5					Greenish gray fine grained sandstone with traces of shell, silty	II CM					
	6					croconglomeratic level						
	7			fine grained sandstone								
	8											
	9					brown color	II CM					
	10	79.48										
20/11/93	11					Dark brown medium and coarse grained sandstone, some soft						
	12			sandstone		medium grained	III IV CL-CM					
	13	76.13										
	14			Mudstone		sandy and conglomeratic greenish Mudstone	II CM					
	15	74.08										
	16					Greenish gray silty fine grained sandstone						
	17											
	18			fine grained sandstone		dark brown color breach-level Greenish gray color	II CM					
21/11/93	19											
	20	60.18										
	21			Mudstone		Greenish gray Mudstone with breach debris	III CM	22.00				
22/11/93	22	22.80		ROCK TEST								
	22	22.57						22.57				
	23			Mudstone		Greenish gray Mudstone with traces of shell, some sandy						
	23	66.08										
	24					Greenish gray fine and medium grained sandstone with traces of shell, muddy						
	25											
	26			sandstone			II CM					
	27					microconglomeratic						
23/11/93	28	61.78				Coarse, massive						
	28	60.88		Mudstone		Greenish gray Mudstone						
	29			fine grained sandstone		Greenish gray muddy fine grained sandstone microconglomeratic						
	30	59.68										

SPT (N30) o LUGEON TEST

10 20 30 40 50

Kg/cm2 0 2 4 6 8 10

K= 7.5 x 10⁻⁴ cm/sec
Lu = 61

Kg/cm2 0 5 10 15 20 25

K= 1.7 x 10⁻⁴ cm/sec
Lu = 14

Kg/cm2 0 2 4 6 8 10

K= 7.0 x 10⁻⁶ cm/sec
Lu = 0.6

0 0.2 0.4 0.6 0.8 1.0

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DRILL LOG

HOLE N°SR-93-1 **SHEET N° 1 OF 2**

PROJECT	THE DETAILED DESIGN ON TRANSBASIN CHONE – PORTOVIEJO BASIN			PROFUNDIDAD	55.00 m	ELEVATION	95.87 m
SITE	ESTACION DE BOMBEO	COORDINATES	N. 9892673 - E. 607600	INCLINACION	VERT.	DRILL RIG	ACKER M. BILLY
AVERAGE CORE RECOVERY	100%	DATE	FROM 9/12/93 TO 17/12/93	PERFORADO	A. QUIROZ	LOGGED	F. VASCONEZ

DATE	DEPTH	ELEVATION	FORMATION	ROCK TYPE	COLUMN SECTION	DESCRIPTION	ROCK GRADE	ROCK TEST	CORE RECOVERY %	CORE RECOVERY cm	R.Q.D. %	SPT (N30) / LUGEON TEST	DEPTH
9/12/93	1	95.87	COLLUVIUM	Colluvium		stiff blackish clayey silt with organic material	DURO						
		94.37											
10/12/93	2		ONZOLE	fine grained sandstone		Greenish gray fine grained sandstone, moderately cemented	IV-D						
	3												
	4						III CL						
	5												
	6												
	7	88.87											
	8			fine and medium grained sandstone		yellowish green fine and medium grained sandstone with shells, stiff rock and oxidated joints							
	9					weathered	III CL						
	10	85.37											
	11			coarse grained sandstone		Bluish gray medium and coarse grained sandstone, moderately cemented	III CL						
	12					Dark brown coarse grained conglomeratic soft rock							
	13						IV CL D						
	14	81.87											
11/12/93	15			medium ant fine grained sandstone		Gray medium grained sandstone stiff, with conglomeratic levels	III CM						
	16					Cronish brown fine grained							
	17												
	18					microconglomeratic							
	19	76.57											
	20			medium and coarse grained sandstone		Gray medium and coarse grained sandstone, moderately cemented with microconglomeratic levels	III CM						
	21					Dark brown, some soft							
	22	73.87				fine and medium grained							
	23			fine grained sandstone		Light gray silty and fine grained sandstone, stiff rock	II CM						
	24												
	25	70.77				coarse grained level, Greenish							
12/12/93	26			fine and medium grained sandstone		yellowish green fine and medium grained sandstone	III CM						
	27					microconglomeratic levels							
	28												
	29					Light gray fine grained							
	30					levels of Mudstone	CM II						

SPT (N30) O
LUGEON TEST
10 20 30 40 50

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DRILL LOG

HOLE N°SR-93-1 SHEET N° 2 OF 2

PROJECT	THE DETAILED DESIGN ON TRANSBASIN CHONE – PORTOVIEJO BASIN			DEPTH	55.00 m	ELEVATION	95.87 m
SITE	ESTACION DE BOMBEO	COORDINATES	N. 9892673 - E. 607600	INCLINATION	VERT.	DRILL RIG	ACKER H. BILLY
AVERAGE CORE RECOVERY	100%	DATE	FROM 9/12/93 TO 17/12/93	DRILLED	A. QUIROZ	LOGGED	F. VASCONEZ

DATE	DEPTH	ELEVATION	FORMATION	ROCK TYPE	COLUMN SECTION	DESCRIPTION	ROCK GRADE	ROCK TEST	CORE RECOVERY %	CORE RECOVERY cm	R.Q.D. %	SPT (N30) / LUGEON TEST	DEPTH
12/12/93	31			fine and medium grained sandstone		Homogeneous and massive Sub-vertical joint at 31.4 ~32.3m	H CM					10 20 30 40 50	
	32					the levels of Mudstone disappear Bluish grey color, a rock some soft	H CM						
	33												
	34	61.97											
13/12/93	35			medium grained sandstone		Gray medium grained sandstone	H CM						
	36					Bluish grey color							
	37					fine grained							
	38	57.67											
14/12/93	39			medium grained sandstone		Gray fine and medium grained sandstone, friable	H CM						
	40												
	41					Dark gray color some soft							
	42	52.17				fine grained							
	43			Mudstone and sandstone		levels of Mudstone alternating with fine grained sandstone, stiff rock	H CM						
	44												
	45	50.77	ONZOLE										
15/12/93	46			Siltstone		Gray siltstone with levels of light gray silty fine grained sandstone	H						
	47					Compact, massive	H CM						
	48							48.34					
	49	48.34 ROCK 48.92 TEST						48.92					
		46.67				Greenish gray Mudstone, sound stiff rock							
16/12/93	50			Mudstone		level with shells	H CM						
	51												
	52												
17/12/93	53												
	54												
	55	40.87				level with shells							
						END OF BORE HOLE 55.00m							

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DRILL LOG

HOLE N°SR-93-2 **SHEET N° 1 OF 1**

PROJECT	THE DETAILED DESIGN ON TRANSBASIN CHONE – PORTOVIEJO BASIN			DEPTH	25.00 m	ELEVATION	107.06 m
SITE	SUBESTACION	COORDINATES	N. 9892688 - E. 607727	INCLINATION	VERT.	DRILL RIG	ACKER H. BILLY
AVERAGE CORE RECOVERY	99%	DATE	FROM 17/12/93 TO 20/12/93	DRILLED	A. QUIROZ	LOGGED	F. V.

DATE	DEPTH	ELEVATION	FORMATION	ROCK TYPE	COLUMN SECTION	DESCRIPTION	ROCK GRADE	ROCK TEST	CORE RECOVERY %	CORE RECOVERY cm	R.Q.D. %	SPT (N30) LUGEON TEST	DEPTH
17/12/93		107.06	COLLUVIUM			blackish vegetal soil							
	1			Colluvium		weathered debris in grayish brown silty clay							
	2	104.76											
	3					yellowish brown very weathered Mudstone	IV D						
	4	103.06											
18/12/93	5			Mudstone		Greenish yellow very weathered siltstone with sandy layers	IV D						
	6												
	7	99.76		Sandstone		including granules	III CL						
	8			fine grained Sandstone		Weathered light brown fine grained sandstone	III CL						
	9	98.16											
	10			fine to medium grained sandstone		Greenish yellow medium grained sandstone, soft rock	IV D						
19/12/93	11					Brown-stained on horizontal bedding planes							
	12	95.31	ONZOLE			Greenish gray fine grained sandstone with medium and coarse grained levels, stiff rock							
	13					with cross – beddings							
	14					with some of shell							
	15			fine grained sandstone			III CM						
	16												
	17												
	18	18.26 ROCK TEST 88.16				Below 17.5m Dark gray, sandy Mudstone		18.26 18.64					
20/12/93	19	18.84				Yellowish green fine grained sandstone, with oxidated joints	III IV CL						
	20			fine grained sandstone									
	21	85.76											
	22			medium to coarse sandstone		Bluish grey, compact medium and coarse grained sandstone, with conglomeratic levels	III CM						
	23												
	24					rock some soft , in parts							
	25	82.06											
						END OF BORE HOLE 25.00m							

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DRILL LOG

HOLE N°SR-93-3 SHEET N° 1 OF 1

PROJECT	THE DETAILED DESIGN ON TRANSBASIN CHONE – PORTOVIEJO BASIN			DEPTH	30.00 m	ELEVATION	128.85 m
SITE	CANA DULCE	COORDINATES	N. 9888662 - E. 603634	INCLINATION	VERT.	DRILL RIG	ACKER ACE
AVERAGE CORE RECOVERY	99%	DATE	FROM 18/12/93 TO 7/01/94	DRILLED	E. CEVALLOS	LOGGED	R. BURGOS

DATE	DEPTH	ELEVATION	FORMATION	ROCK TYPE	COLUMN SECTION	DESCRIPTION	ROCK GRADE	ROCK TEST
18/12/93	1–3	128.85 / 125.85	COLLUVIUM	Colluvium		yellowish brown silty clay with weathered rock derbis	STIFF	
	4–6	122.65		Completely Weathered Mudstone		Completely weathered yellowish brown Mudstone	V D E	
20/12/93	7–9	119.95		Weathered Mudstone		weathered greenish gray Mudstone with traces of shells Core samples are fragmental or distorted clayey material	IV D E	
21/12/93	10–12		ONZOLE	Sandy Mudstone		Greenish gray Mudstone with traces of shell and levels of siltstone, some sandstone Bedding – horizontal Massive and compact	III CL CM	
4/01/94	13–19					Grey in lower zone stiff some of shells traces of shells some of shells with numerous shells		
5/01/94	20–25	28.36 / 28.72 ROCK TEST				some of shells the sandy character disappear with sandy character with numerous shells siliceous level		20.36 / 20.72
6/01/94	26–28					some of shells with numerous shells		
7/01	29–30	98.85				some of shells, dark gray color		

CORE RECOVERY % / cm

R.Q.D. %

SPT (N30) o LUGEON TEST 10 20 30 40 50 DEPTH

Kg/cm2 K=6.9x10⁻⁴ cm./sec Lu=40

Kg/cm2 K=2.6 x 10⁻⁴ cm./sec Lu=21

Kg/cm2 K=3.7 x 10⁻⁴ cm./sec Lu=30

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DRILL LOG

HOLE N°SR-93-4 **SHEET Nº 1 OF 2**

PROJECT	THE DETAILED DESIGN ON TRANSBASIN CHONE – PORTOVIEJO BASING			DEPTH	40.00 m	ELEVATION	135.03 m
SITE	P. HONDA PATA DE PAJARO	COORDINATES	N. 9897919 1 - E. 597600	INCLINATION	VERT.	DRILL RIG	ACKER TEREDO
AVERAGE CORE RECOVERY	100%	DATE	FROM 29/11/93 TO 7/12/93	DRILLED	F. LINDAO	LOGGED	R. BURGOS

DATE	DEPTH	ELEVATION	FORMATION	ROCK TYPE	COLUMN SECTION	DESCRIPTION	ROCK GRADE	ROCK TEST
29/11/93	1	135.03 133.03	COLLUVIUM	Colluvium		weathered Mudstone fragments brown silty matrix	STIFF	
	2–8	126.73	CONZOLE	Completely weathered Mudstone		Very weathered yellowish brown Mudstone residual clay	W E D	
30/11/93	9–13	121.23		Mudstone		Greenish gray Mudstone, sound rock with traces of shell and levels of siltstone Bedding – horizontal some shells included	III CL	
1/12/93	14–21	113.83		fine grained sandstone		Greenish gray shaly fine grained sandstone with traces of shells Massive and compact some shells included	III IV CL CM	
	22–23	111.53		Mudstone		Greenish gray Mudstone with traces of shells and levels of siltstone Bedding – horizontal	III CL CM	
2/12/93	24–28			Sandy Mudstone		Greenish dark gray horizontally laminated to the depth of 28m with sandy character	III CL CM	
3/12/93	29–30					Massive		

CORE RECOVERY % / cm — R.Q.D. % — SPT (N30) 0 — LUGEON TEST 10 20 30 40 50 — DEPTH

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DRILL LOG

HOLE N°SR-93-4 SHEET N° 2 OF 2

PROJECT	THE DETAILED DESIGN ON TRANSBASIN CHONE – PORTOVIEJO BASING			DEPTH	40.00 m	ELEVATION	135.03 m
SITE	P. HONDA PATA DE PAJARO	COORDINATES	N. 9897919 1 - E. 597600	INCLINATION	VERT.	DRILL RIG	ACKER TEREDO
AVERAGE CORE RECOVERY	100%	DATE	FROM 29/11/93 TO 7/12/93	DRILLED	F. LINDAO	LOGGED	R. BURGOS

DATE	DEPTH	ELEVATION	FORMATION	ROCK TYPE	COLUMN SECTION	DESCRIPTION	ROCK GRADE	ROCK TEST	CORE RECOVERY %	CORE RECOVERY cm	R.Q.D. %	SPT (N30) / LUGEON TEST	DEPTH
4/12/93	31					Massive, moderately cemented						10 20 30 40 50	
	32					32.3 ~ 32.5 soft							
	33	33.00 ROCK 33.50 TEST		Sandy Mudstone			III CM	33.00 33.50					
5/12/93	34												
	35	100.23											
6/12/93	36		O N Z O L E			Greenish gray, silty fine grained sandstone, with traces of shell Bedding – horizontal, compact							
	37			fine grained sandstone			III CM						
	38												
7/12/93	39												
	40	95.03				END OF BORE HOLE 40.00m							

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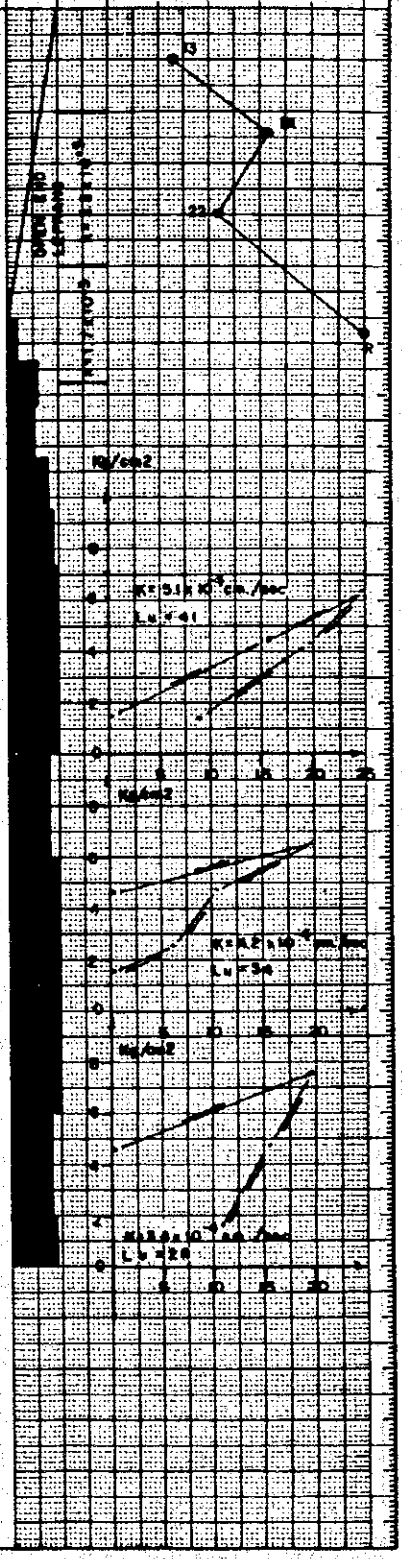
DRILL LOG

HOLE N°SR-93-5 **SHEET N° 1 OF 1**

PROJECT	THE DETAILED DESIGN ON TRANSBASIN CHONE - PORTOVIEJO BASIN			DEPTH	25.00 m	ELEVATION	118.96 m
SITE	TANQUE DE CARGA	COORDINATES	N. 9892502 - E. 607595	INCLINATION	VERT.	DRILL RIG	ACKER H. BILLY
AVERAGE CORE RECOVERY	100%	DATE	FROM 3/01/94 TO 8/01/94	DRILLED	A. QUIROZ	LOGGED	R. BURGOS

DATE	DEPTH	ELEVATION	FORMATION	ROCK TYPE	COLUMN SECTION	DESCRIPTION	ROCK GRADE	ROCK TEST
3/01/94	0	118.96	COLUVIUM	Colluvium		blackish vegetal soil		
	1					yellowish brown clayey silt with plant roots	STIFF	
	2							
	3	115.46				numerous rock fragments		
4/01/94	4			Completely Weathered Mudstone		Brown residual soil with shells and rock debris	IV D	
	5							
	6	112.76						
	7			fine grained sandstone		Greenish gray fine grained sandstone with shells, stiff	IV III	
	8	111.16		Mudstone		Light brown Mudstone with levels of shells	IV	
5/01/94	9	8.79		Mudstone		Dark gray color		8.79
	9.77	ROCK TEST						9.77
	10		ONZOLE	Muddy fine grained sandstone		Dark gray fine grained with shells and levels of Mudstone	III CL	
	11					Moderately cemented		
	12					shell presence is increased		
6/01/94	13							
	14					shell presence is increased		
	15	104.11						
	16			Siltstone		Dark gray siltstone with levels of sandstone, with shells	III CL CM	
7/01/94	17	101.13				Moderately cemented		
	18			Muddy fine grained sandstone		Greenish gray fine grained sandstone with some of shell, stiff	III CM	
	19	99.11						
8/01/94	20			fine and medium grain sandstone		Dark gray fine and medium grained sandstone	III IV CL	
	21					Moderately cemented to 22.85m		
	22							
	23					yellowish green color, compact		
	24					medium grained, some soft		
	25	93.96						
						END OF BORE HOLE 25.00M		

CORE RECOVERY % | cm — R.Q.D. % — SPT (N30) O LUGEON TEST — DEPTH



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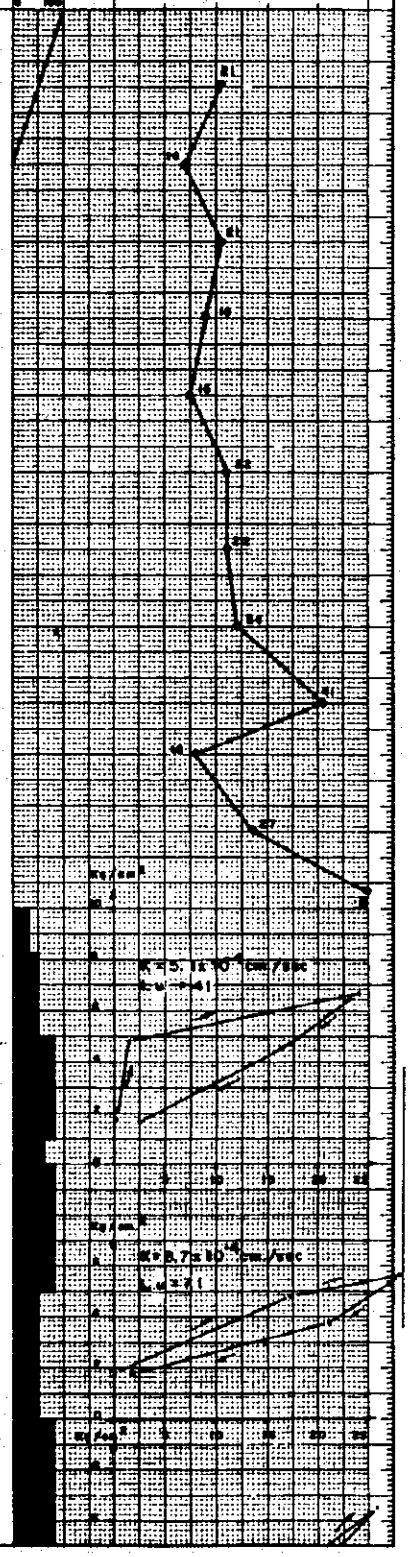
DRILL LOG

HOLE N° MG-93-1 SHEET N° 1 OF 2

PROJECT	THE DETAILED DESIGN ON TRANSBASIN CHONE – PORTOVIEJO BASIN			DEPTH	35.00 m	ELEVATION	117.62 m
SITE	P. HONDA – EST. GUAJABE	COORDINATES	N. 9878507 - E. 590569	INCLINATION	VERT.	DRILL RIG	ACKER TEREDO
AVERAGE CORE RECOVERY	100%	DATE	FROM 21/11/93 TO 27/11/93	DRILLED	F. LINDAO	LOGGED	R. BURGOS

DATE	DEPTH	ELEVATION	FORMATION	ROCK TYPE	COLUMN SECTION	DESCRIPTION	ROCK GRADE	ROCK TEST
21/11/93	1	117.62	COLLUVIUM	Colluvium		vegetal soil Weathered and oxidated clastic of brown silty fine grained sandstone in sandy silt matrix	STIFF	
	2							
	3	114.62						
	4			Completely Wheathered fine grained sandstone		Weathered yellowish brown silty fine grained sandstone Bedding – horizontal	V E	
	5							
	6					Intensively weathered and disintegrated		
	7							
22/11/93	8		ONZOLE	Completely Weathered Mudstone		Completely weathered yellowish brown Mudstone in clayey silt matrix Decomposed into residual soil	V E	
	9							
	10							
	11					sandy character		
	12					the sandy character disappear		
	13					Drilled without water circulation		
23/11/93	14			Highly Weathered Mudstone		Highly weathered greenish gray Mudstone, with trace of shells	IV D	
	15							
	16					oxidated levels		
	17	100.12						
24/11/93	18			Mudstone		Sound greenish gray Mudstone Bedding – horizontal		
	19							
	20					sandy character and traces of shells	IV	
	21							
	22					the sandy character disappear Bedding – horizontal, compact	III CL D	
	23							
	24	93.62						24.10
25/11/93	24.55	24.55		fine grained sandstone		gray sound muddy sandstone, compact	IV III CL	24.55
	25							
	26							
	27	90.27						
26/11/93	28			Mudstone		Greenish gray Mudstone with traces of shells, some sandy Bedding – horizontal Moderately cemented	III CL	
	29							
	30							

CORE RECOVERY % / cm | R.Q.D. % | SPT (N30) o LUGEON TEST 10 20 30 40 50 | DEPTH



HOLE N° MG-93-1

hidrosuelos Cia. Ltda.

JAPAN INTERNATIONAL COOPERATION AGENCY
J I C A

DRILL LOG

HOLE N° MG-93-1 **SHEET N° 2 OF 2**

PROJECT	THE DETAILED DESIGN ON TRANSBASIN CHONE – PORTOVIEJO BASIN			DEPTH	35.00 m	ELEVATION	117.62 m
SITE	P. HONDA – EST. GUAJABE	COORDINATES	N. 9878507 - E. 590569	INCLINATION	VERT.	DRILL RIG	ACKER TEREDO
AVERAGE CORE RECOVERY	100%	DATE	FROM 21/11/93 TO 27/11/93	DRILLED	F. LINDAO	LOGGED	R. BURGOS

DATE	DEPTH	ELEVATION	FORMATION	ROCK TYPE	COLUMN SECTION	DESCRIPTION	ROCK GRADE	ROCK TEST
		87.52						
26/11/93	31		ONZOLE	Muddy, fine grained sandstone		Greenish gray Muddy fine grained sandstone Bedding – horizontal, compact	III CL	
	32							
	33					Massive		
27/11/93	34							
	35	82.62						
						END OF BORE HOLE 35.00m		

CORE RECOVERY % / cm; R.Q.D. %; SPT (N30) LUGEON TEST 10 20 30 40 50; DEPTH

HOLE N° MG-93-1

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JAPAN INTERNATIONAL COOPERATION AGENCY
J I C A

DRILL LOG

HOLE N° MG-93-2 **SHEET N° 1 OF 2**

PROJECT	THE DETAILED DESIGN ON TRANSBASIN CHONE – PORTOVIEJO BASIN			DEPTH	45.00 m	ELEVATION	122.98 m
SITE	MANCHA GRANDE	COORDINATES	N. 9882195 - E. 589395	INCLINATION	VERT	DRILL RIG	ACKER TEREDO
AVERAGE CORE RECOVERY	94%	DATE	FROM 18/12/93 TO 8/01/94	DRILLED	F. LINDAO	LOGGED	R. BURGOS

DEPTH	ELEVATION	FORMATION	ROCK TYPE	DESCRIPTION	ROCK GRADE	CORE RECOVERY %	CORE RECOVERY cm	R.Q.D. %
0	122.98	COLLUVIUM		vegetal soil				
1–5			Colluvium	Yellowish gray clayey silt with some fine grained sand and numerous weathered rock debris; block of weathered fine grained sandstone	STIFF			
5	117.38			Weathered yellowish gray debris of sandstone and siltstone				
6–8	115.18		Completely Weathered Mudstone	Weathered brown silty fine grained sandstone, residual. Decomposed into soil. Drilled without water				
8–17		BOLO NO	Completely Weathered Mudstone	Grayish brown weathered shale with sandy levels; sandy levels disappear; Decomposed and disintegrated into residual soil; very weathered and oxidated. Drilled without water circulation	V D; V IV D			
18–25	105.18		Highly Weathered fine grained Sandstone	Weathered Yellowish brown silty fine grained sandstone. Drilling cores are mostly fragmental; Weathered; Soft, core samples are crushed at places	V IV; D CL; IV			
26–27	95.48		Weathered fine Sandstone	Muddly Core samples are broken into fragments or short cores	IV D CL			
28–30			Weathered Mudstone	Yellowish brown Mudstone, Weathered, with oxidated joints	IV CL			

SPT (N30) 0 — LUGEON TEST — 10 20 30 40 50 — DEPTH

HOLE N° MG- 93-2

hidrosuelos Cia. Ltda.

JAPAN INTERNATIONAL COOPERATION AGENCY
J I C A

DRILL LOG

HOLE N° MG-93-2 **SHEET N° 2 OF 2**

PROJECT	THE DETAILED DESIGN ON TRANSBASIN CHONE - PORTOVIEJO BASIN			DEPTH	45.00 m	ELEVATION	122.98 m
SITE	MANCHA GRANDE	COORDINATES	N. 9882195 - E. 589395	INCLINATION	VERT	DRILL RIG	ACKER TEREDO
AVERAGE CORE RECOVERY	94%	DATE	FROM 10/12/93 TO 9/01/94	DRILLED	F. LINDAO	LOGGED	R. BURGOS

DEPTH	ELEVATION	FORMATION	ROCK TYPE	COLUMN SECTION	DESCRIPTION	ROCK GRADE	ROCK TEST
31	92.88	ONZOLE	Mudstone		Greenish gray Mudstone with yellowish oxidated levels Compact Core samples are broken	IV III D	
32							
33							
34	89.28						
35					Greenish sound gray Mudstone with traces of shells and sandy levels Sound Intensively laminated along horizontal Bedding		
36						III	36.32
37	36.32 ROCK TEST 37.80		Mudstone			IV	37.0
38						D	
39						CL	
40							
41							
42							
43							
44							
45	77.98				END OF BORE HOLE 45.00m		

CORE RECOVERY % / cm — R.Q.D. % — SPT (N30) — LUGEON TEST — DEPTH

K = 5.4 x 10⁻⁴ cm/sec
Lu = 44

K = 2.1 x 10⁻⁴ cm/sec
Lu = 17

K = 2.2 x 10⁻⁴ cm/sec
Lu = 17

HOLE N° MG-93-2

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JAPAN INTERNATIONAL COOPERATION AGENCY
J I C A

DRILL LOG

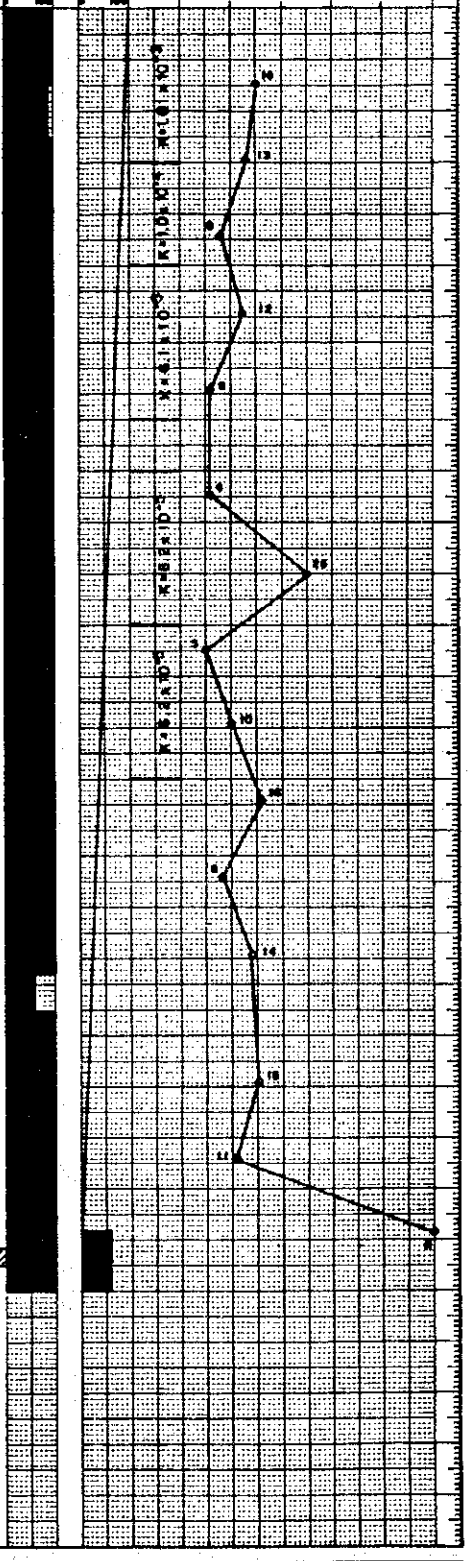
HOLE Nº MG-93-3 SHEET Nº1 OF 1

PROJECT	THE DETAILED DESIGN ON TRANSBASIN CHONE – PORTOVIEJO BASIN			DEPTH	25.00 m	ELEVATION	95.00 m
SITE	MANCHA GRANDE	COORDINATES	N. 9682339 - E. 589277	INCLINATION	VERT	DRILL RIG	ACKER TEREDO
AVERAGE CORE RECOVERY	99%	DATE	FROM 10/12/93 TO 15/12/93	DRILLED	F. LINDAO	LOGGED	R. BURGOS

DATE	DEPTH	ELEVATION	FORMATION	ROCK TYPE	COLUMN SECTION	DESCRIPTION	ROCK GRADE	ROCK TEST
10/12/93	1–5	95.00	ALUVIAL	Silt		Grayish brown sandy silt with some of weathered rock debris; Numerous debris and gravels	STIFF	
				Clayey		Grayish brown fine grained silty sand; Clayey levels; level of debris; some debris		
11/12/93	6–10	8.50 8.80 SOILTEST	OLD COLLUVIAL DEPOSIT	Muddy Sand		Gray containing rock fragments	STIFF	
				Silt		Greenish gray sandy silt	SOFT	
						block of volcanic rock		
				Sand		Grayish brown silty fine grained sand		
				Silt		dark gray sandy soft silt		
12/12/93	11–13			Sand		Greenish gray silty fine grained sand with some of gravel blocks	STIFF	
				Silt		Greenish gray sandy soft silt	SOFT	
13/12/93	14–18	76.10		Sand		Brown silty fine sand with debris and gravel; Greenish gray silty sand with some gravels; Grayish brown silty fine grained sand with weathered rock debris and gravel	STIFF	
14/14/93	19–23		ONZOLE	Completely Weathered Sandstone		Weathered blocks and rock fragments; Weathered debris of siltstone and fine grained sandstone in yelowish brown silty sand matrix; Greenish gray color; Drilled without water circulation	VI D	
15/12/93	24–25	71.28 24.20 24.32 ROCK TEST 70.00		fine grained sandstone		Greenish gray silty fine grained sandstone, some soft	IV D-CL	24.20 24.32
						END OF BORE HOLE 25.00m		

CORE RECOVERY % / cm; R.Q.D. %

SPT (N30) 0 LUGEON TEST 10 20 30 40 50 DEPTH



HOLE Nº MG-93-3

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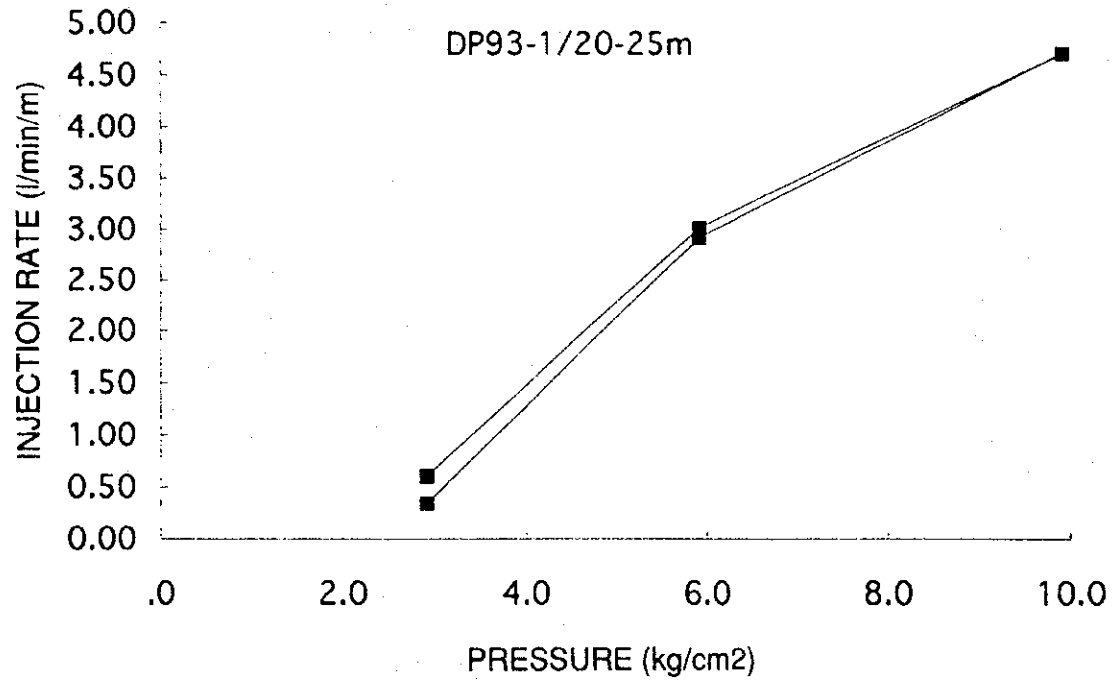
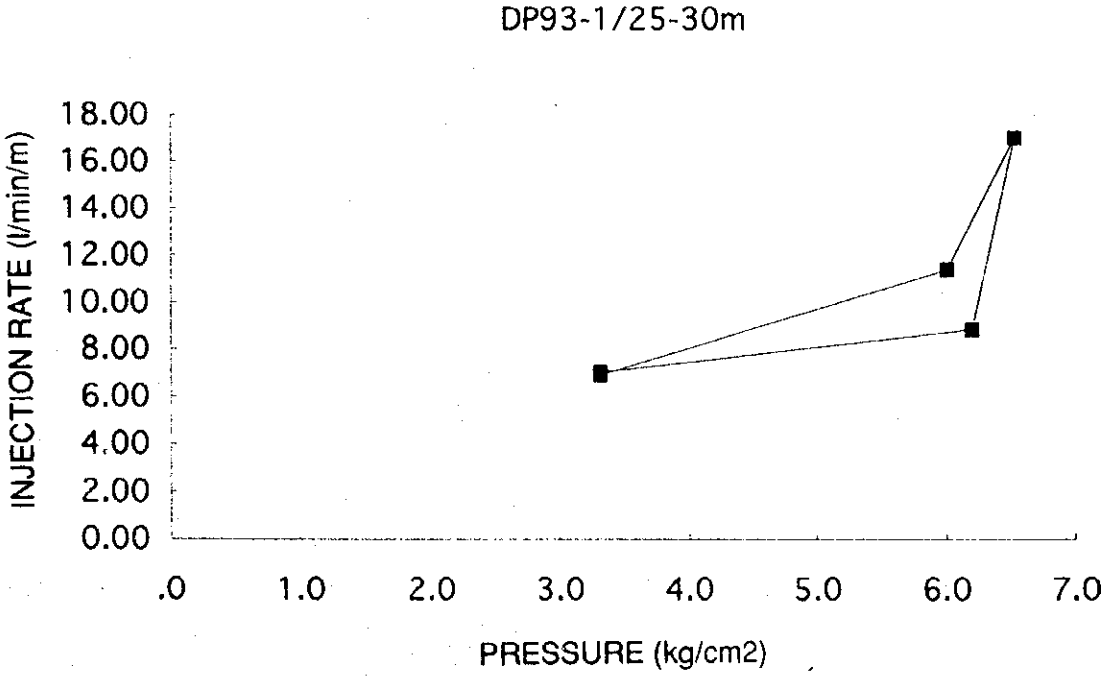
Appendix 2

LUGEON TEST

FIGURE

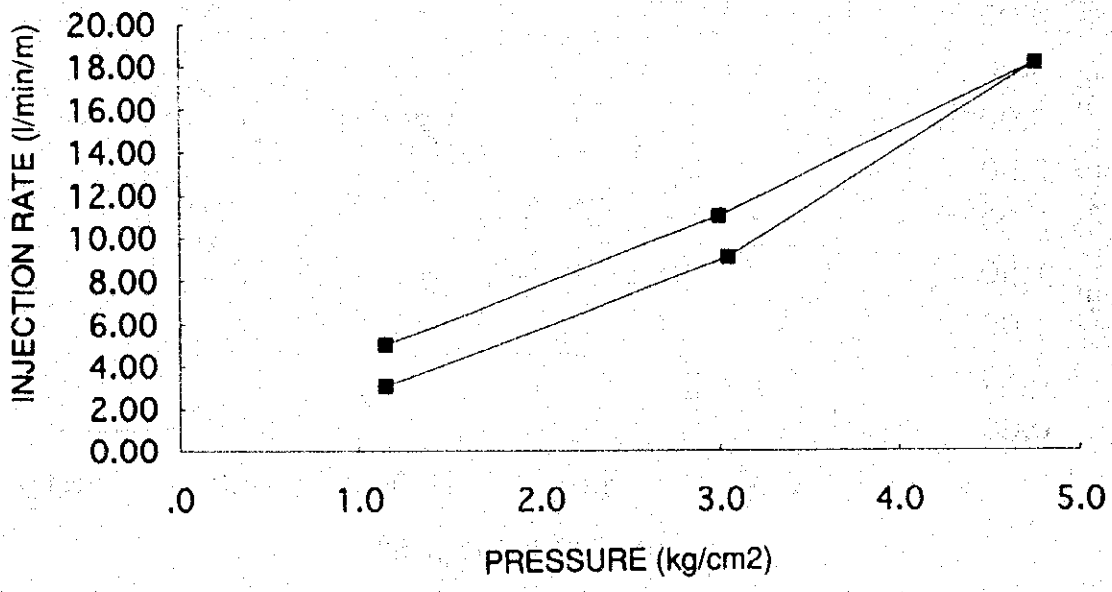




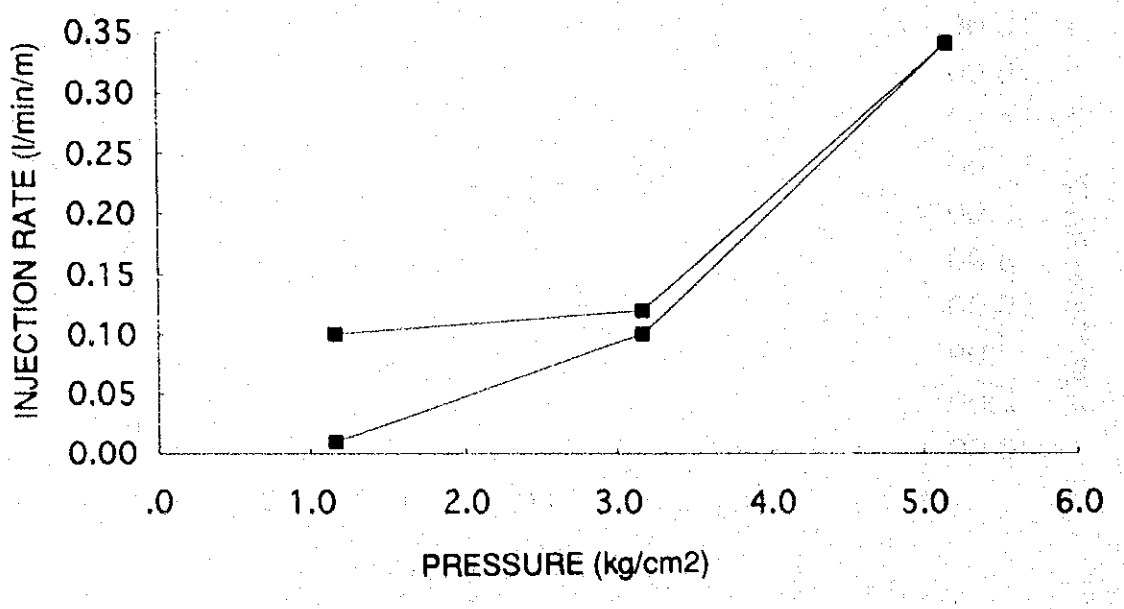
GOVERNMENT OF THE REPUBLIC OF ECUADOR CENTRO DE REHABILITACION DE MANABI (CRM) ***THE DETAILED DESIGN STUDY ON THE WATER TRANSBASIN SCHEMES FOR CHONE-PORTOVIEJO RIVER BASINS*** JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Pressure–Injection Rate Graph DP93–1

FIGURE

DP93-2/10-15m

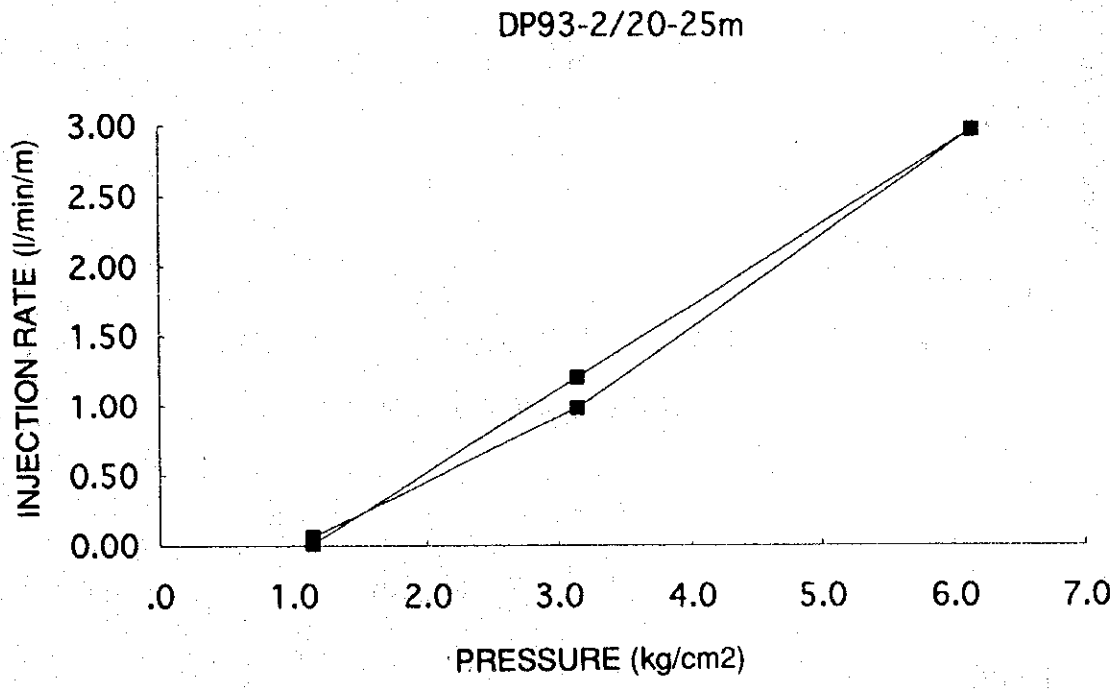


DP93-2/15-20m



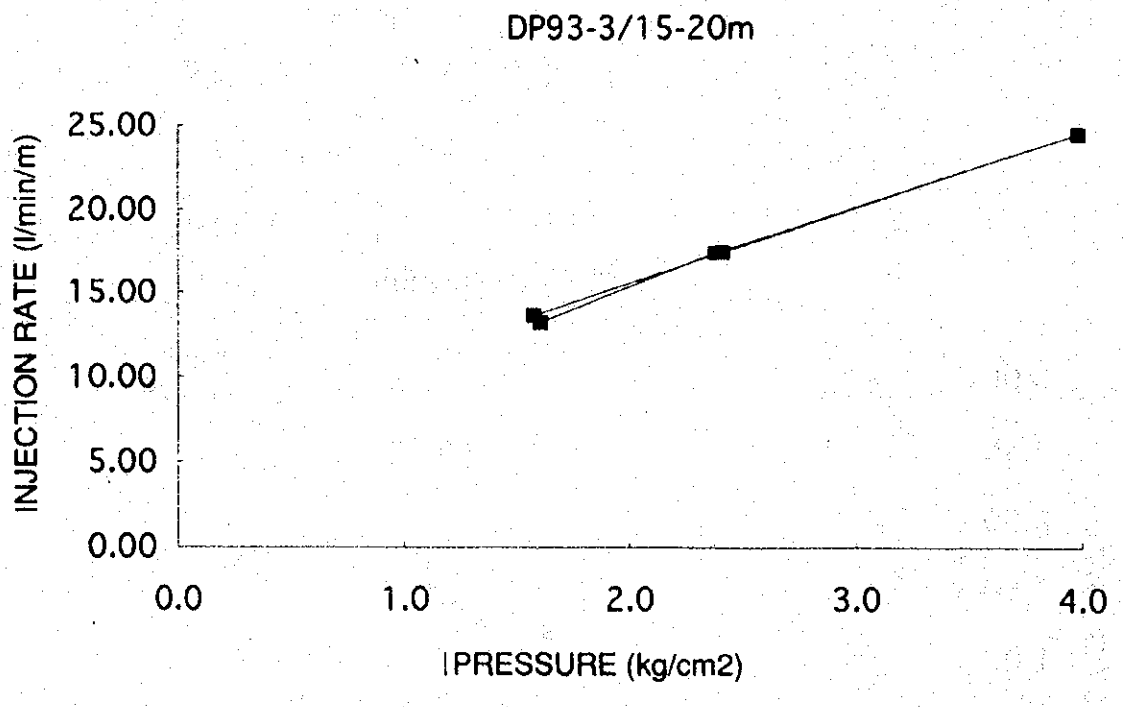
GOVERNMENT OF THE REPUBLIC OF ECUADOR CENTRO DE REHABILITACION DE MANABI (CRM) *THE DETAILED DESIGN STUDY ON THE WATER TRANSBASIN SCHEMES FOR CHONE-PORTOVIEJO RIVER BASINS* JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE **Pressure–Injection Rate Graph DP93–2(1/2)**

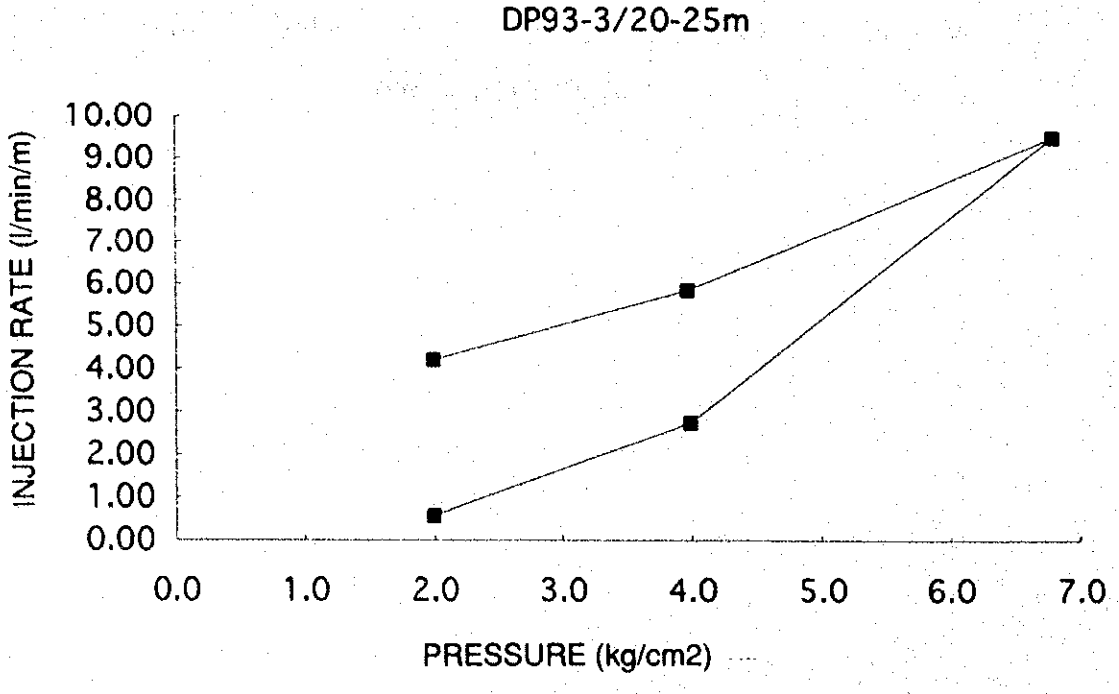
FIGURE



GOVERNMENT OF THE REPUBLIC OF ECUADOR CENTRO DE REHABILITACION DE MANABI (CRM) ***THE DETAILED DESIGN STUDY ON THE WATER TRANSBASIN SCHEMES FOR CHONE-PORTOVIEJO RIVER BASINS*** JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Pressure–Injection Rate Graph DP93–2(2/2)

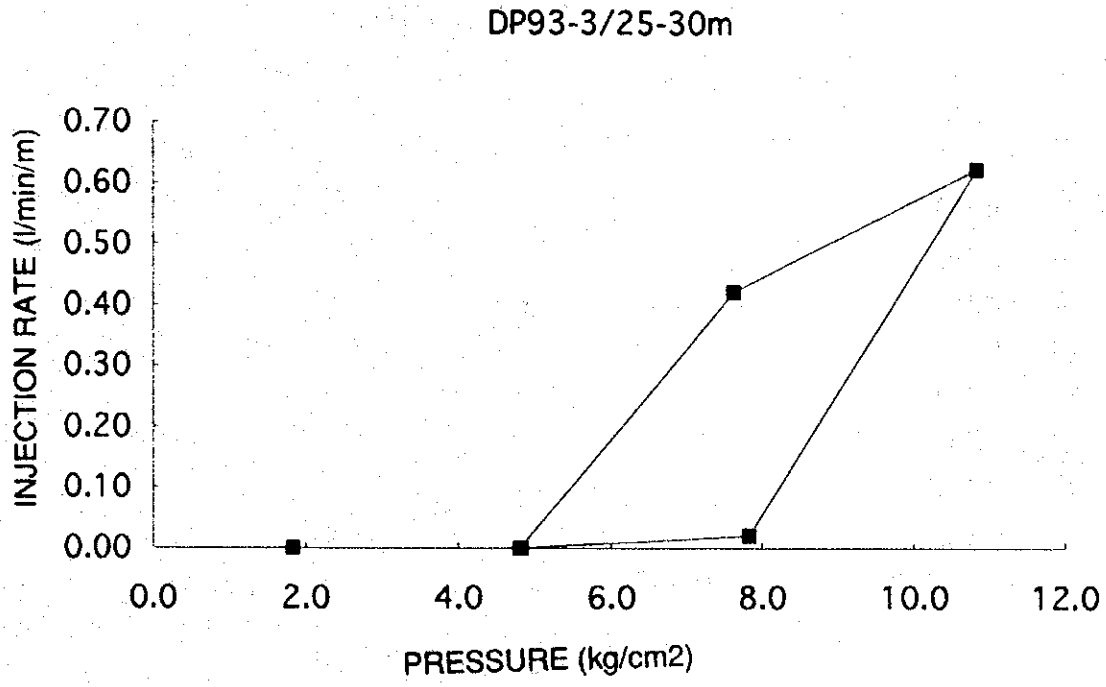
FIGURE





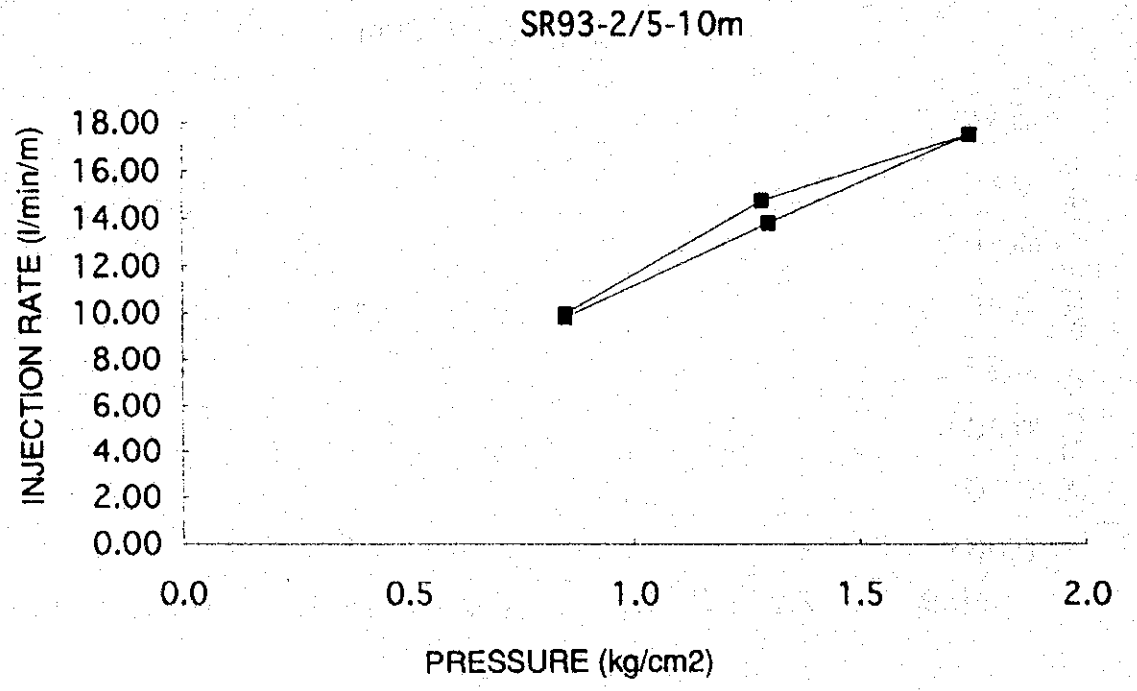
GOVERNMENT OF THE REPUBLIC OF ECUADOR CENTRO DE REHABILITACION DE MANABI (CRM) ***THE DETAILED DESIGN STUDY ON THE WATER TRANSBASIN SCHEMES FOR CHONE-PORTOVIEJO RIVER BASINS*** JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE **Pressure–Injection Rate Graph** **DP93–3(1/2)**

FIGURE



GOVERNMENT OF THE REPUBLIC OF ECUADOR CENTRO DE REHABILITACION DE MANABI (CRM) ***THE DETAILED DESIGN STUDY ON THE WATER TRANSBASIN SCHEMES FOR CHONE-PORTOVIEJO RIVER BASINS*** JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE **Pressure–Injection Rate Graph DP93–3(2/2)**

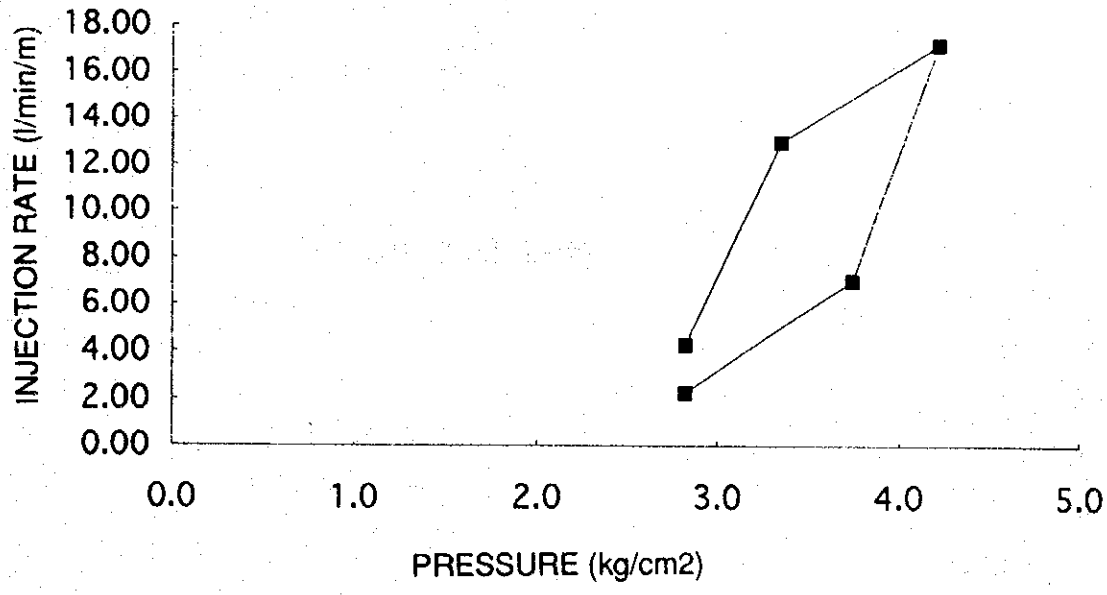
FIGURE



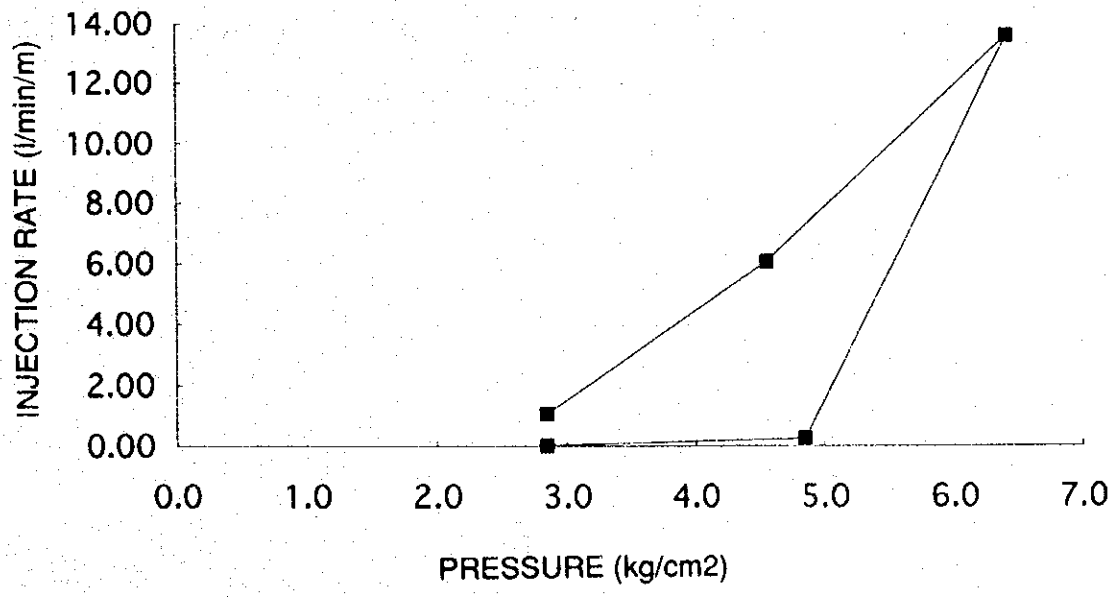
GOVERNMENT OF THE REPUBLIC OF ECUADOR CENTRO DE REHABILITACION DE MANABI (CRM) ***THE DETAILED DESIGN STUDY ON THE WATER TRANSBASIN SCHEMES FOR CHONE-PORTOVIEJO RIVER BASINS*** JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE **Pressure–Injection Rate Graph SR93–2**

FIGURE

SR93-3/15-20m



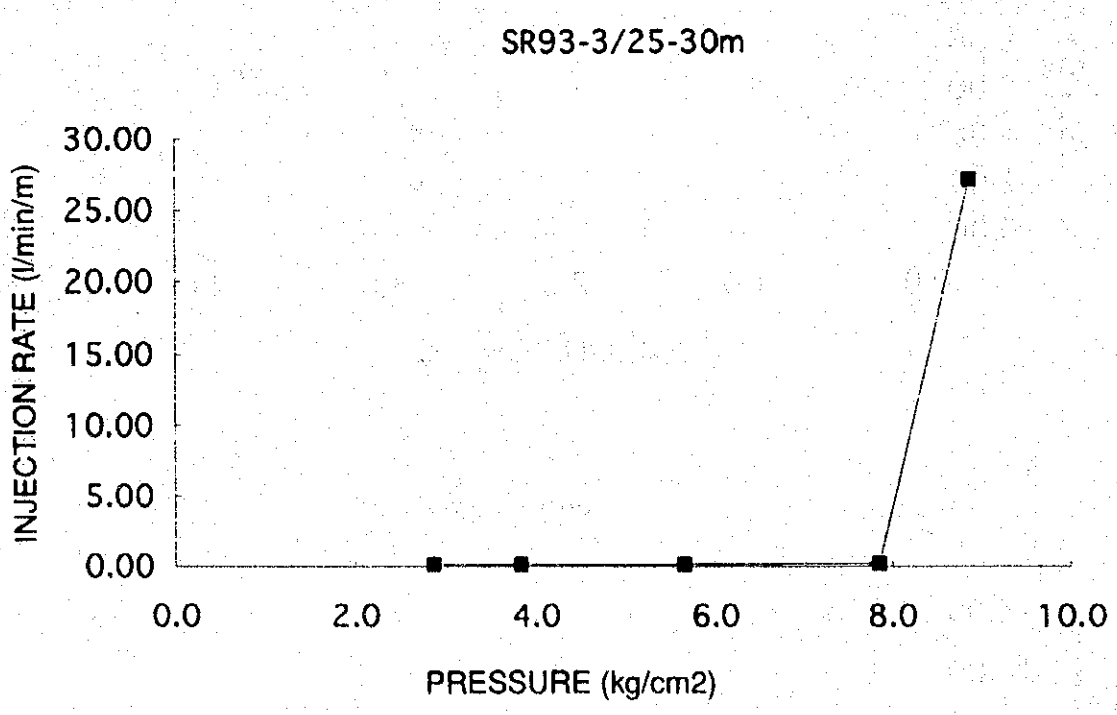
SR93-3/20-25m



GOVERNMENT OF THE REPUBLIC OF ECUADOR
CENTRO DE REHABILITACION DE MANABI (CRM)
THE DETAILED DESIGN STUDY ON THE WATER TRANSBASIN SCHEMES FOR CHONE-PORTOVIEJO RIVER BASINS
JAPAN INTERNATIONAL COOPERATION AGENCY

TITLE
Pressure–Injection Rate Graph
SR93–3(1/2)

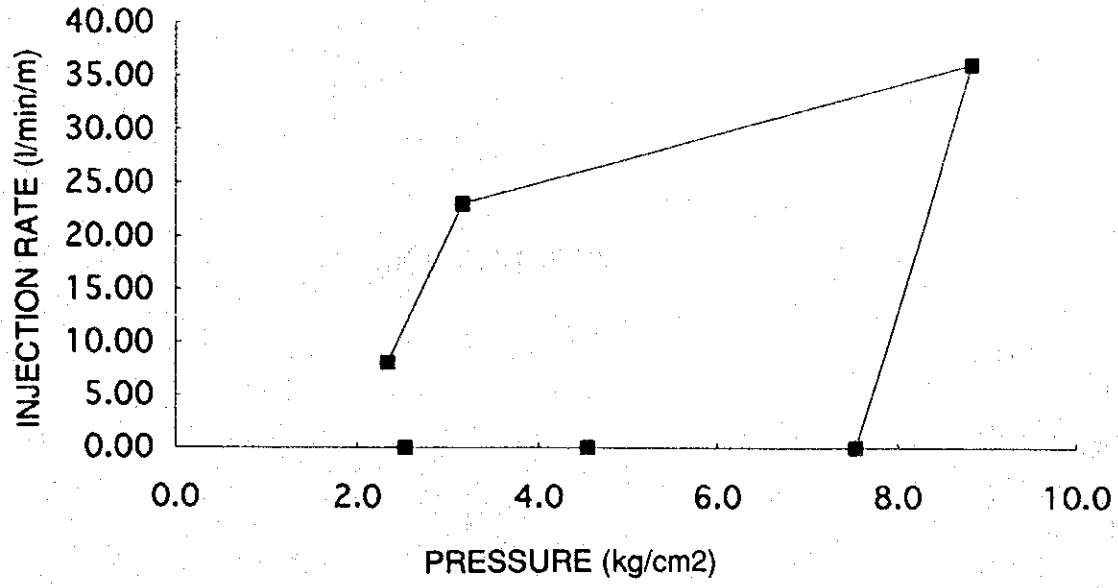
FIGURE



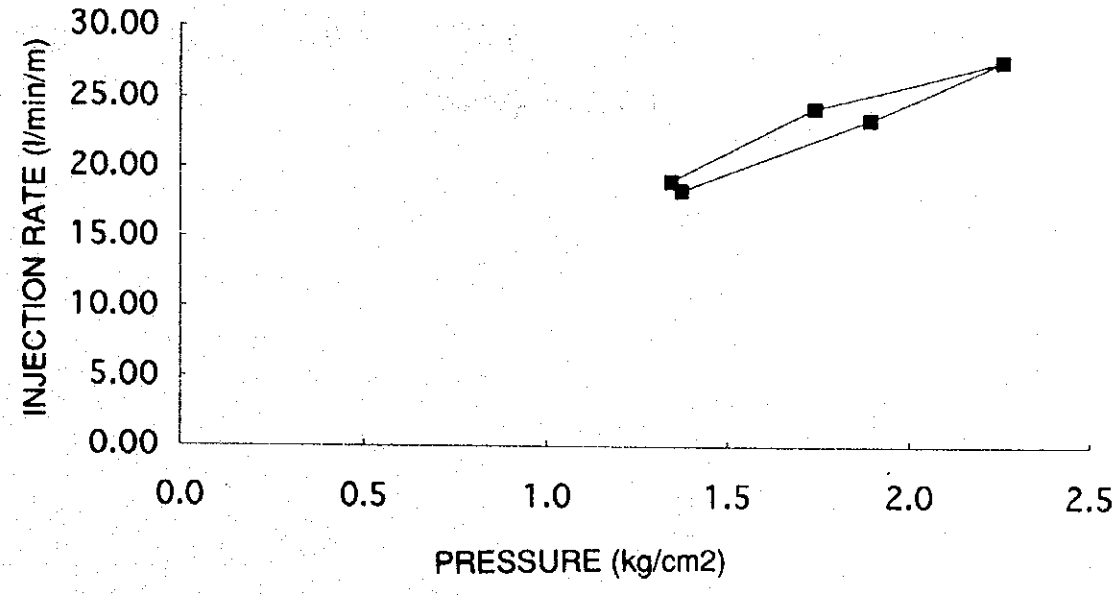
GOVERNMENT OF THE REPUBLIC OF ECUADOR CENTRO DE REHABILITACION DE MANABI (CRM) ***THE DETAILED DESIGN STUDY ON THE WATER TRANSBASIN SCHEMES FOR CHONE-PORTOVIEJO RIVER BASINS*** JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE **Pressure–Injection Rate Graph SR93–3(2/2)**

FIGURE

SR93-4/25-30m



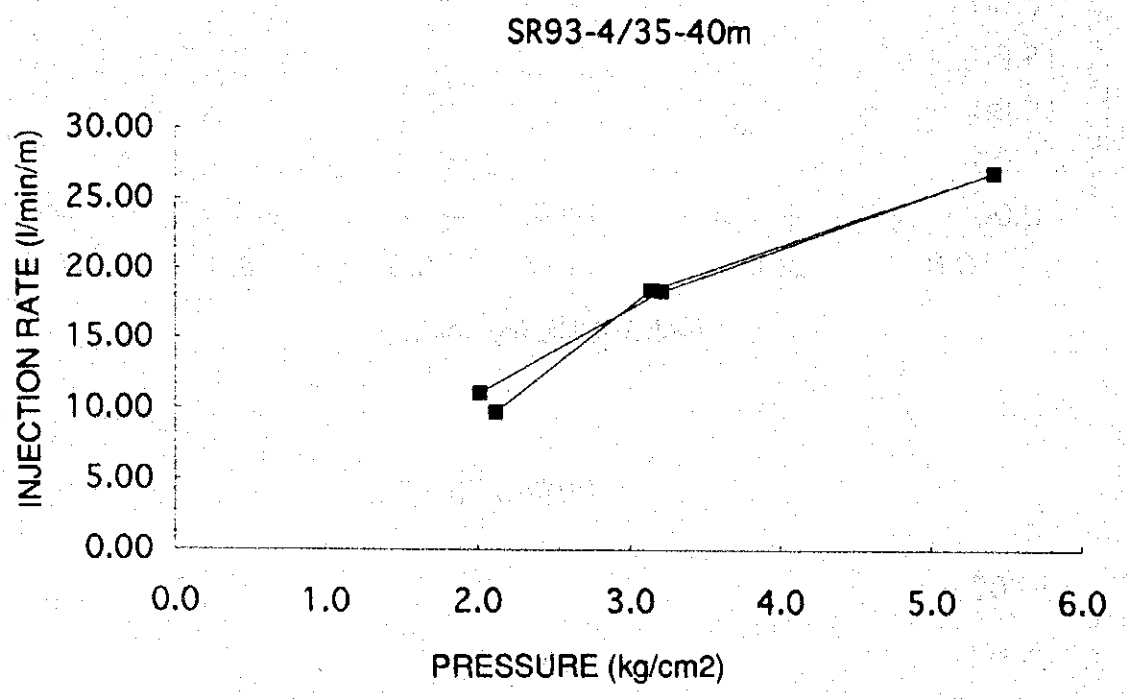
SR93-4/30-35m



GOVERNMENT OF THE REPUBLIC OF ECUADOR
CENTRO DE REHABILITACION DE MANABI (CRM)
THE DETAILED DESIGN STUDY ON THE WATER TRANSBASIN SCHEMES FOR CHONE-PORTOVIEJO RIVER BASINS
JAPAN INTERNATIONAL COOPERATION AGENCY

TITLE
Pressure–Injection Rate Graph
SR93–4(1/2)

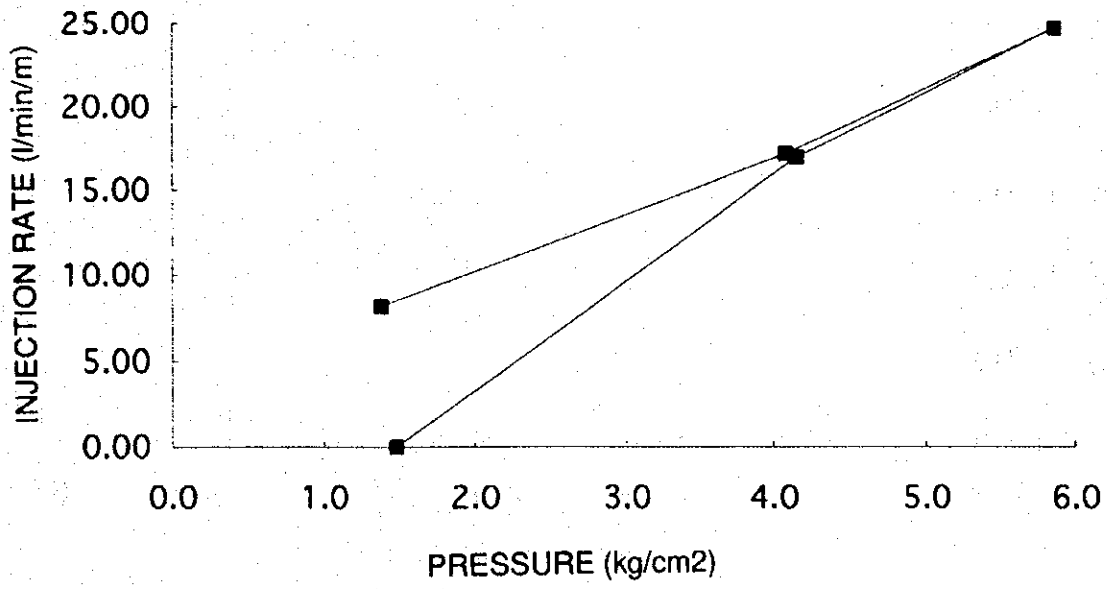
FIGURE



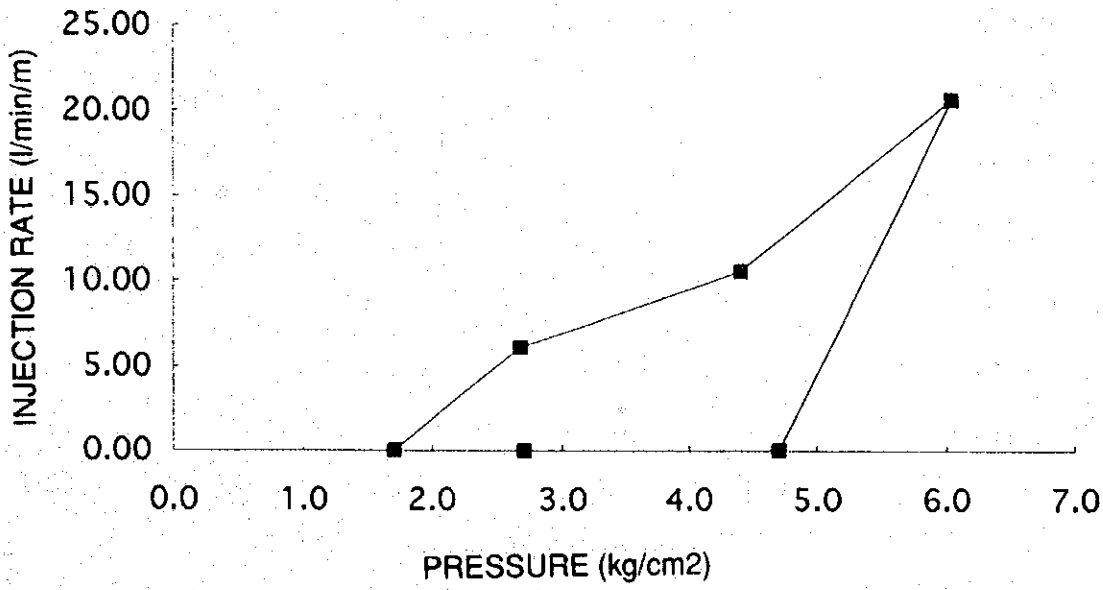
GOVERNMENT OF THE REPUBLIC OF ECUADOR CENTRO DE REHABILITACION DE MANABI (CRM) *THE DETAILED DESIGN STUDY ON THE WATER TRANSBASIN SCHEMES FOR CHONE-PORTOVIEJO RIVER BASINS* JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE **Pressure–Injection Rate Graph SR93–4(2/2)**

FIGURE

SR93-5/10-15m



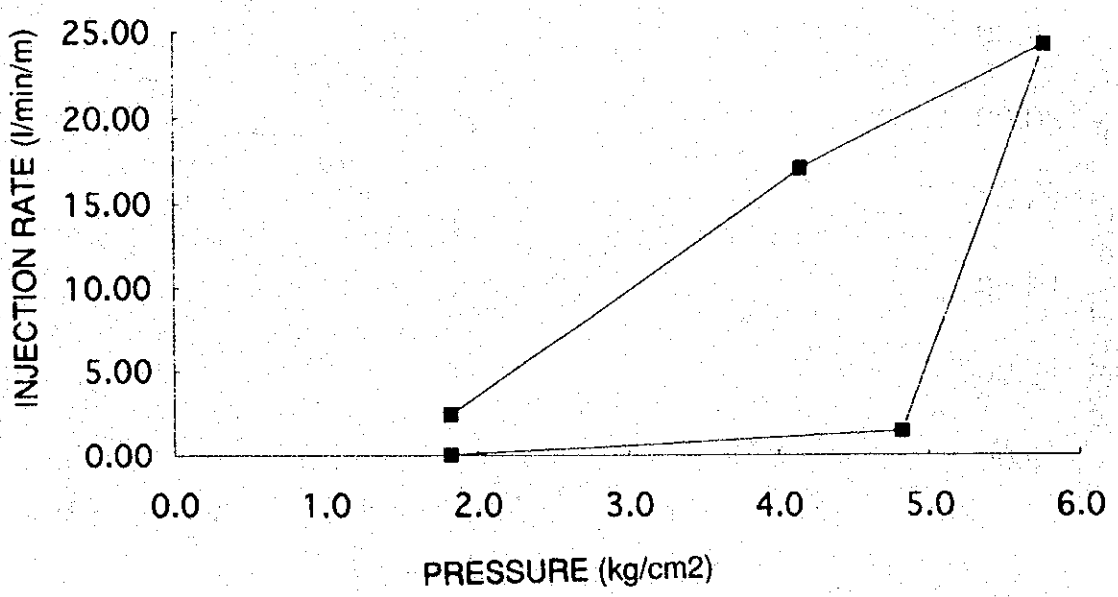
SR93-5/15-20m



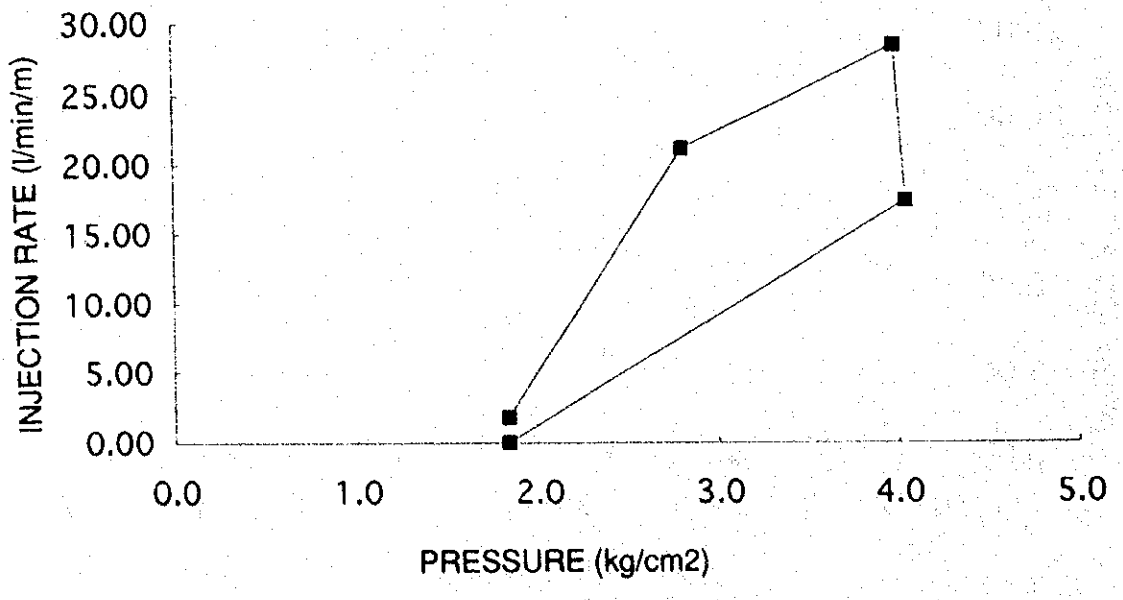
GOVERNMENT OF THE REPUBLIC OF ECUADOR CENTRO DE REHABILITACION DE MANABI (CRM) ***THE DETAILED DESIGN STUDY ON THE WATER TRANSBASIN SCHEMES FOR CHONE-PORTOVIEJO RIVER BASINS*** JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE **Pressure–Injection Rate Graph SR93–5**

FIGURE

MG93-1/17.5-22.5m

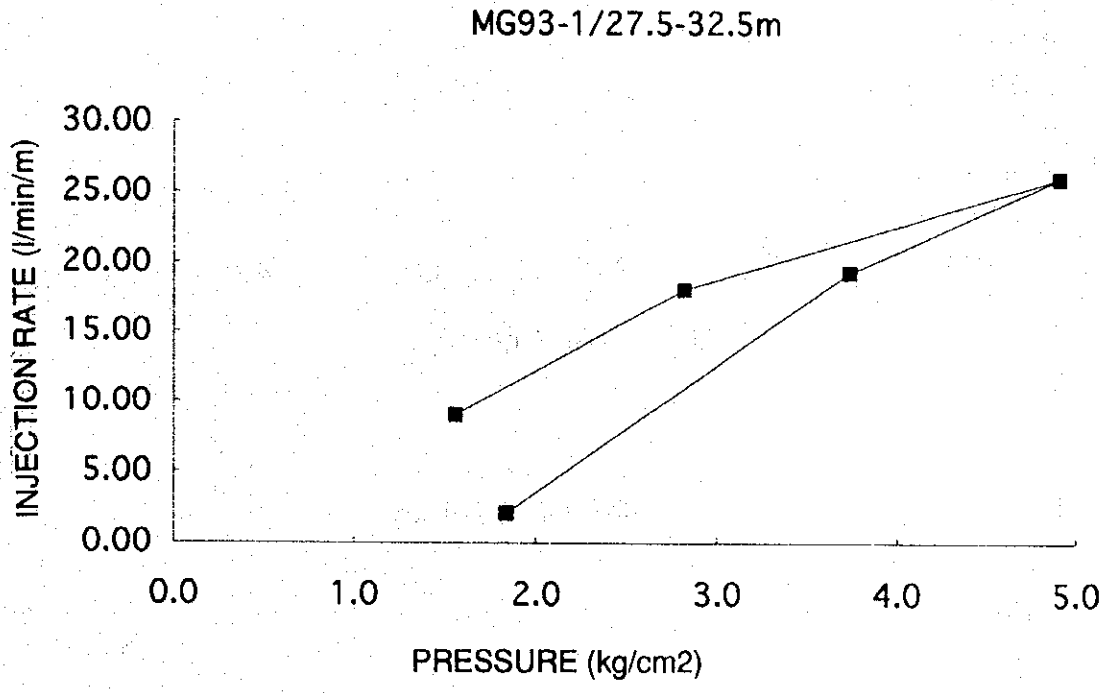


MG93-1/22.5-27.5m



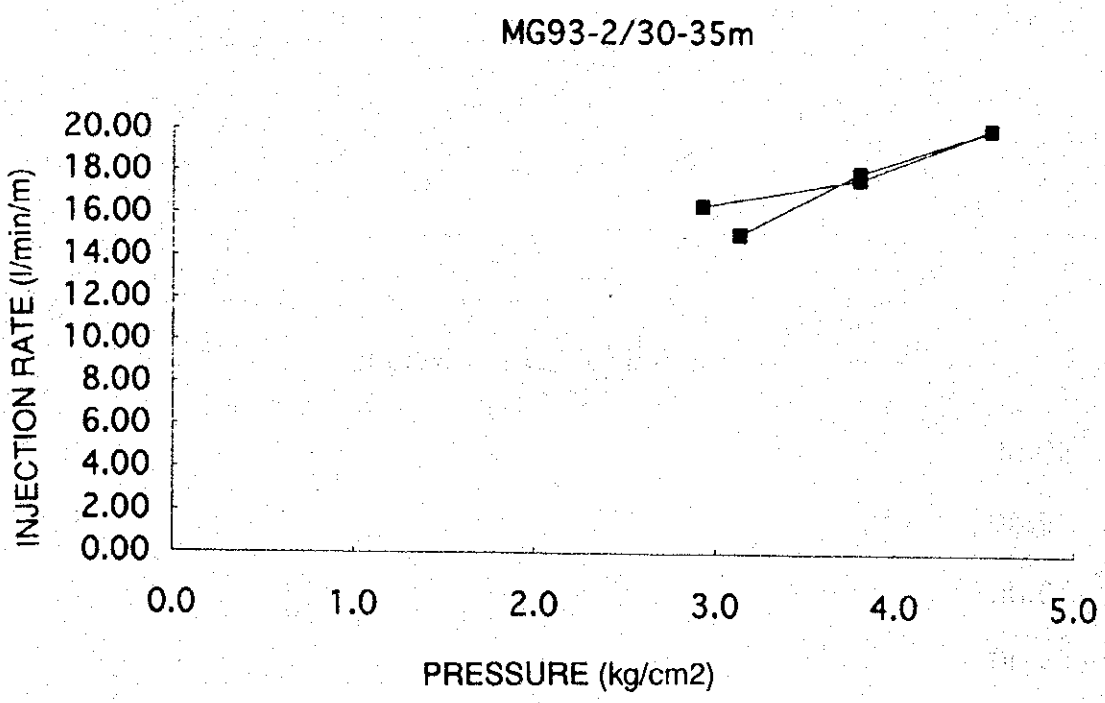
GOVERNMENT OF THE REPUBLIC OF ECUADOR CENTRO DE REHABILITACION DE MANABI (CRM) *THE DETAILED DESIGN STUDY ON THE WATER TRANSBASIN SCHEMES FOR CHONE-PORTOVIEJO RIVER BASINS* JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE **Pressure–Injection Rate Graph MG93–1(1/2)**

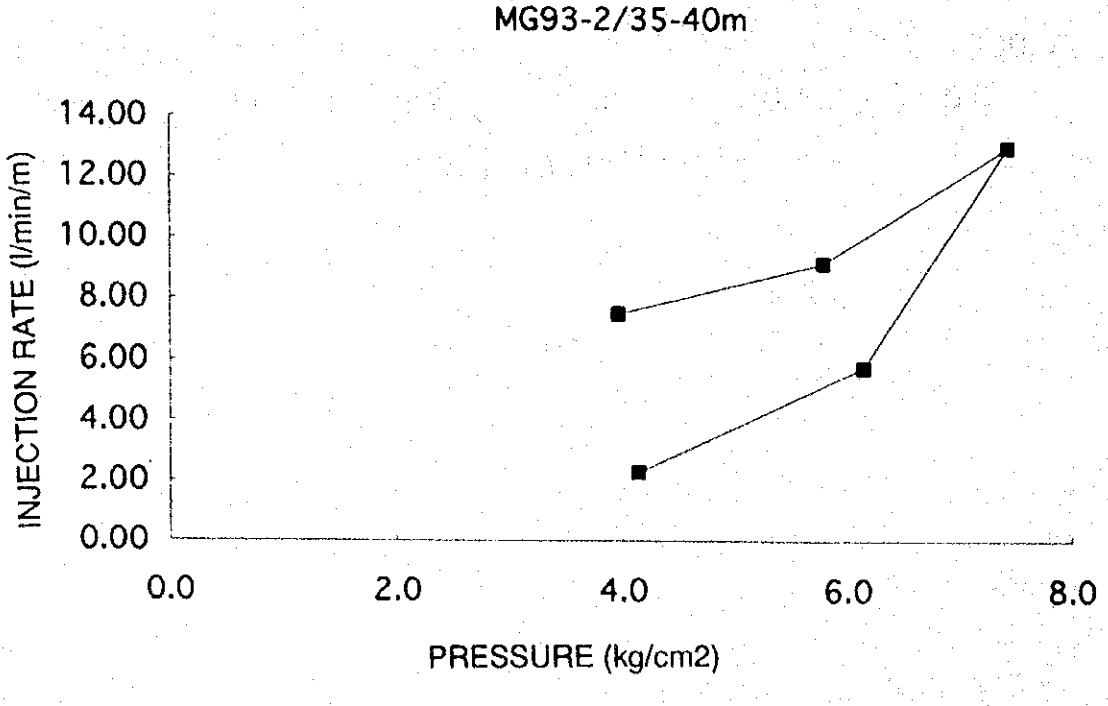
FIGURE



GOVERNMENT OF THE REPUBLIC OF ECUADOR CENTRO DE REHABILITACION DE MANABI (CRM) ***THE DETAILED DESIGN STUDY ON THE WATER TRANSBASIN SCHEMES FOR CHONE-PORTOVIEJO RIVER BASINS*** JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE **Pressure–Injection Rate Graph** **MG93–1(2/2)**

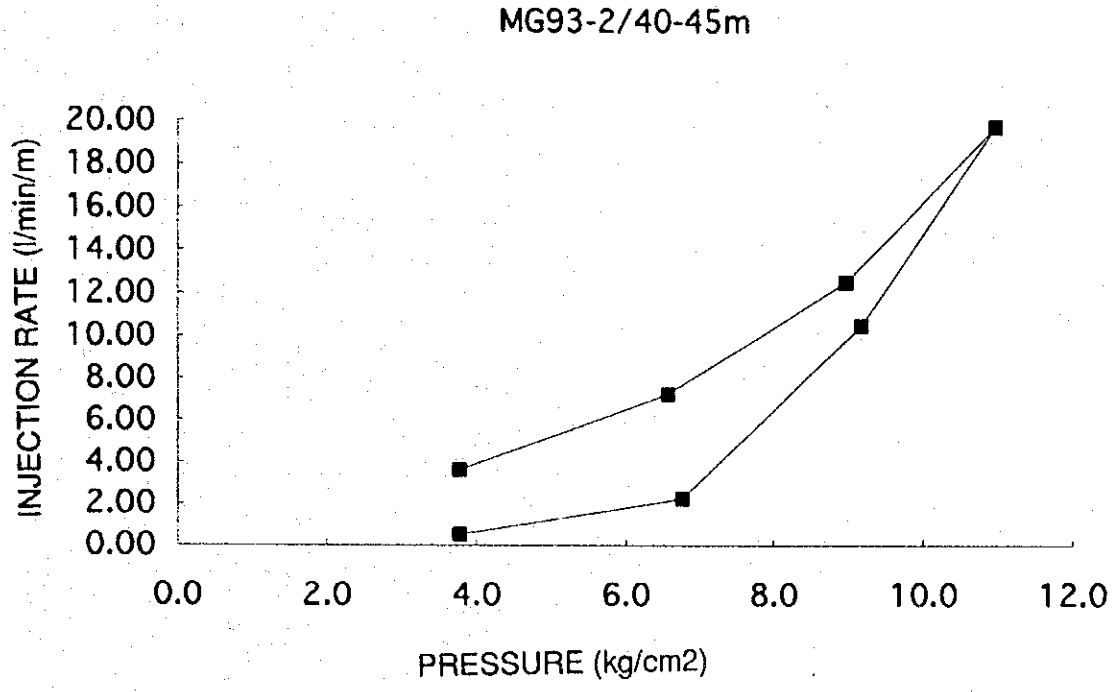
FIGURE





GOVERNMENT OF THE REPUBLIC OF ECUADOR CENTRO DE REHABILITACION DE MANABI (CRM) ***THE DETAILED DESIGN STUDY ON THE WATER TRANSBASIN SCHEMES FOR CHONE-PORTOVIEJO RIVER BASINS*** JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE **Pressure–Injection Rate Graph MG93–2(1/2)**

FIGURE



GOVERNMENT OF THE REPUBLIC OF ECUADOR CENTRO DE REHABILITACION DE MANABI (CRM) ***THE DETAILED DESIGN STUDY ON THE WATER TRANSBASIN SCHEMES FOR CHONE-PORTOVIEJO RIVER BASINS*** JAPAN INTERNATIONAL COOPERATION AGENCY	TITLE Pressure–Injection Rate Graph MG93–2(2/2)