

Fig. 2.9.3(5) Constant flow pumping test Analysis of TCM No. 1 well

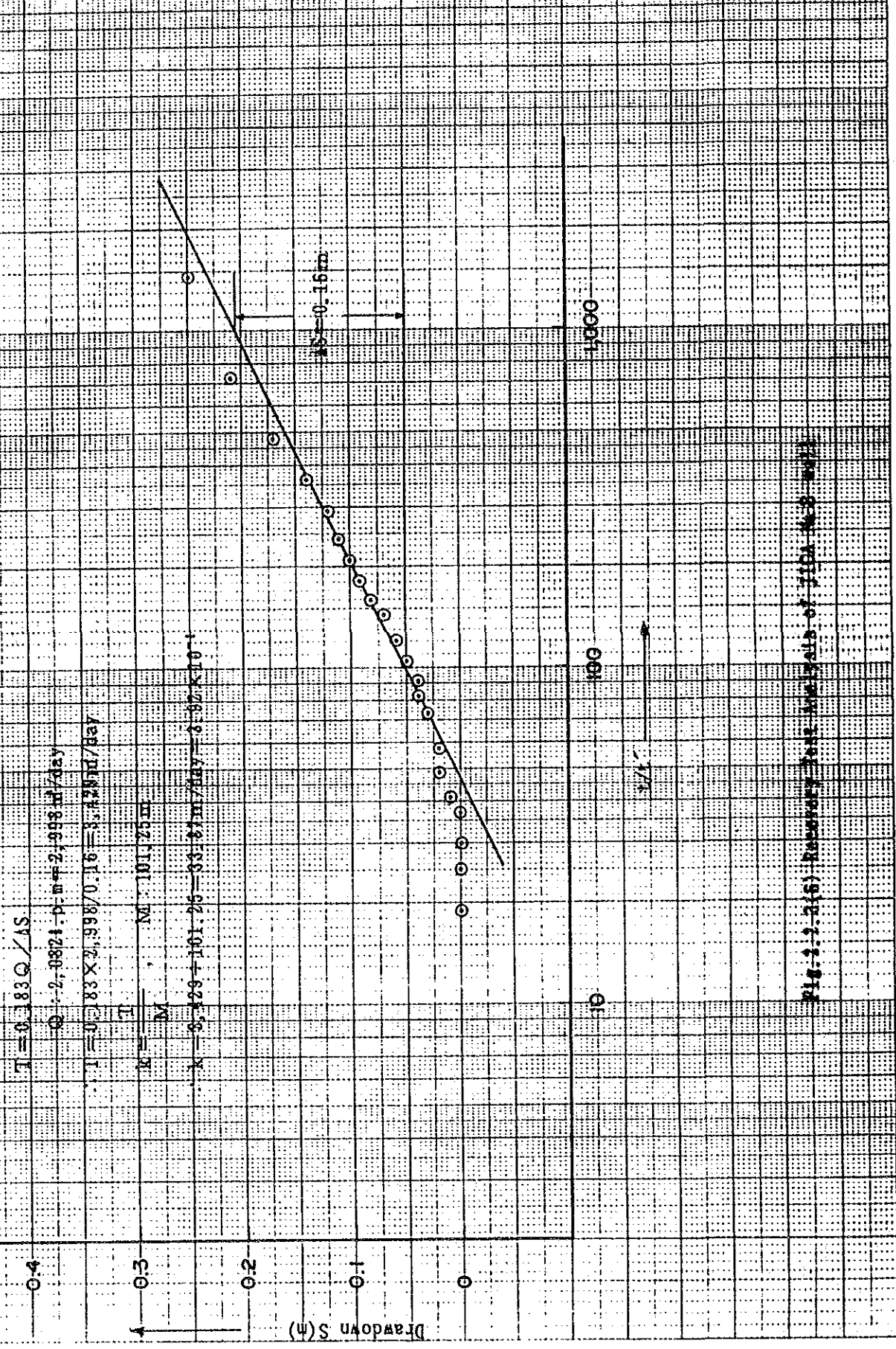


Fig. 2-2-2(6) Recovery Test Results of F10A No. 9 Well

Result of pumping test

JICA Well (JI-4)

Step Drawdown Test(Prueba de etapas sucesivas)

Date(Fecha): 15 Oct.,1992

Site No.(Sitio o lugar): JICA No.4

Depth(Profundidad): 200 m ,Diameter(Diametro):12 3/4 inches(pulgadas)

Static Water Level(Nivel estatico de agua): 94.28 m

Pump type(Tipo de bomba): 30-kw submersible pump

Inspector:Orlando Lopez Solis

Time	Time sinse pumping started	Dynamic water level	Drawdown		Notes
Hora	Hora desde comienzo de bombeo t(min)	Nivel de bombeo feet (pies)	Descenso		Notas
			feet (pies)	meter (metro)	
10:00 am	0	309.33	0.00	0.00	
	1	323.11	13.78	4.20	h=5"
	2	322.00	12.67	3.86	Q=100 gpm
	3	320.00	10.67	3.25	kgf/cm2=11
	4	319.33	10.02	3.05	Volts=400
	5	319.00	9.67	2.95	Amps=40
	6	318.83	9.50	2.90	Hz=52
	7	318.42	9.09	2.77	
	8	318.25	8.92	2.72	
	9	318.08	8.75	2.67	
	10	318.00	8.67	2.64	
	12	317.92	8.59	2.62	
	14	318.92	9.59	2.92	
	16	319.00	9.67	2.95	
	18	319.16	9.83	3.00	
	20	319.25	9.92	3.02	
	25	"	"	"	
	30	"	"	"	
	35	"	"	"	
	40	"	"	"	
	50	"	"	"	
	60	"	"	"	
	80	319.67	10.34	3.15	
	100	319.42	10.09	3.08	
12:30	120	"	"	"	
	1	324.00	14.67	4.47	h=13"
	2	325.58	16.25	4.95	Q=150 gpm
	3	326.00	16.67	5.08	Volts=400
	4	326.58	17.25	5.26	Amps=40
	5	326.83	17.50	5.33	kgf/cm2=9
	6	327.00	17.67	5.39	
	7	327.16	17.83	5.43	
	8	327.25	17.92	5.46	
	9	"	"	"	
	10	327.33	18.00	5.49	
	12	"	"	"	
	14	327.42	18.09	5.51	

	16	327.44	18.11	5.52	
	18	"	"	"	
	20	"	"	"	
	25	327.50	18.17	5.54	
	30	"	"	"	
	35	327.58	18.25	5.56	
	40	327.50	18.17	5.54	
	50	327.67	18.34	5.59	
	60	"	"	"	
	80	"	"	"	
	100	327.75	18.42	5.61	
14:00	120	"	"	"	
	1	332.00	22.67	6.91	h=23"
	2	333.43	24.00	7.32	Q=200 gpm
	3	334.00	24.67	7.52	kgf/cm2=6
	4	334.35	24.92	7.60	Volts=400
	5	334.50	25.17	7.67	
	6	334.67	25.34	7.72	
	7	334.75	25.42	7.75	
	8	335.00	25.67	7.82	
	9	335.08	25.75	7.85	
	10	"	"	"	
	12	335.16	25.83	7.87	
	14	"	"	"	
	16	"	"	"	
	18	335.08	25.75	7.85	
	20	335.00	25.67	7.82	
	25	"	"	"	
	30	"	"	"	
	35	"	"	"	
	40	"	"	"	
	50	335.08	25.75	7.85	
	60	335.16	25.83	7.87	
	80	335.25	25.92	7.90	
	100	335.33	26.00	7.92	
16:00	120	"	"	"	
	1	338.50	29.17	8.89	h=35"
	2	340.67	31.34	9.55	Q=250 gpm
	3	340.83	31.50	9.60	kgf/cm2=2
	4	342.42	33.09	10.09	
	5	342.83	33.50	10.21	
	6	343.00	33.67	10.26	
	7	343.08	33.75	10.29	
	8	343.16	33.83	10.31	
	9	343.25	33.92	10.34	
	10	343.33	34.00	10.36	
	12	343.42	34.04	10.38	
	14	"	"	"	
	16	"	"	"	
	18	"	"	"	
	20	"	"	"	
	25	343.50	34.70	10.58	
	30	343.58	34.25	10.44	
	35	"	"	"	
	40	343.67	34.34	10.47	

	50	"	"	"	
	60	343.75	34.42	10.09	
	80	343.92	34.59	10.54	
	100	344.00	34.67	10.57	
18:00	120	344.08	34.75	10.59	
	1	346.08	36.75	11.20	h=42"
	2	346.42	37.09	11.31	Q=270 gpm
	3	347.00	37.67	11.48	kgf/cm2=0
	4	347.42	38.09	11.61	Volts=400
	5	347.67	38.34	11.69	Amps=40
	6	"	"	"	
	7	347.75	38.42	11.71	
	8	347.67	38.34	11.69	
	9	347.75	38.42	11.71	
	10	"	"	"	
	12	347.83	38.50	11.73	
	14	"	"	"	
	16	"	"	"	
	18	"	"	"	
	20	"	"	"	
	25	"	"	"	
	30	347.92	38.59	11.76	
	35	348.00	38.67	11.79	
	40	348.08	38.75	11.81	
	50	348.25	38.92	11.86	
	60	"	"	"	
	80	348.33	39.00	11.89	
	100	"	"	"	
20:00	120	"	"	"	

Continuous Pumping Test(Prueba de bombeo a caudal constante)

Date(Fecha): 16 OCT.,1992

Site No.(Sitio o lugar): JICA No.4 Well

Time	Time sinse pumping started	Dynamic water level	Drawdown	Notes	
Hora	Hora desde comienzo de bombeo t(min)	Nivel de bombeo feet (pies)	Descenso feet (pies) meter (metro)	Notas	
10:00 am	0	309.33	0.00	0.00	
	1	332.92	23.59	7.19	h=42"
	2	340.00	30.67	9.35	Q=270 gpm
	3	341.16	31.83	9.70	kgf/cm2=0
	4	342.83	33.50	10.21	Volts=400
	5	343.92	34.59	10.54	Amps=40
	6	344.83	35.50	10.82	Hz=52
	7	345.75	35.92	10.95	
	8	345.67	36.34	11.08	
	9	346.00	36.67	11.18	
	10	346.16	36.83	11.23	
	12	346.42	37.09	11.31	

	14	346.58	37.25	11.35	
	16	346.67	37.34	11.38	
	18	346.83	37.50	11.43	
	20	346.92	37.59	11.46	
	25	347.16	37.83	11.53	
	30	347.25	37.92	11.56	
	35	347.50	38.17	11.63	
	40	347.58	38.25	11.66	
	50	347.67	38.34	11.69	
	60	"	"	"	
	80	348.16	38.83	11.84	
	100	348.42	39.09	11.91	
	140	"	"	"	
	160	348.58	39.25	11.96	
	180	348.67	39.34	11.99	
	220	348.83	39.50	12.04	
	240	349.00	39.67	12.09	
	300	349.16	39.83	12.14	
16:00	360	"	"	"	Temp. 30.9 C
	420	349.08	39.75	12.12	cond. 361uS/cm
18:00	480	"	"	"	
20:00	600	349.92	40.09	12.22	
22:00	720	349.58	40.25	12.27	
01:00	900	350.00	40.67	12.40	
04:00	1,080	"	"	"	
07:00	1,260	"	"	"	
10:00	1,440	"	"	"	Temp. 28.8 C
13:00	1,620	"	"	"	cond. 513uS/cm
16:00	1,800	"	"	"	
19:00	1,980	"	"	"	
22:00	2,160	"	"	"	
01:00	2,340	"	"	"	
04:00	2,520	"	"	"	
07:00	2,700	"	"	"	
10:00	2,880	"	"	"	

Recovery Test(Prueba de recuperacio'n)

Date(Fecha): 18 OCT., 1992

Site No. (Sitio o lugar): JICA No.4 Well

Time	Time sinse pumping stopped	Time sinse pumping started	Rate	Water level	Residual Drawdown	
Hora	Hora desde comienzo de recupe- racion t'(min)	Hora desde comienzo de bombeo t(min)	Razo'n t/t'	Nivel de Agua feet (pies)	Descenso residual feet (pies)	meter (metro)
10:00	0	1,440	-	350.00	40.67	12.40
	1	1,441	1,441	324.00	14.67	4.47
	2	1,442	721	317.00	7.67	2.34
	3	1,443	481	313.83	4.50	1.37
	4	1,444	361	312.75	3.42	1.04

	5	1,445	289	311.83	2.50	0.762
	6	1,446	241	311.58	2.25	0.686
	7	1,447	207	310.00	0.67	0.204
	8	1,448	181	309.92	0.59	0.180
	9	1,449	161	309.83	0.50	0.152
	10	1,450	145	309.75	0.42	0.128
	12	1,452	121	309.67	0.34	0.104
	14	1,454	104	309.58	0.25	0.076
	16	1,456	91.0	309.50	0.17	0.052
	18	1,458	81.0	309.42	0.09	0.029
	20	1,460	73.0	"	"	"
	25	1,465	58.6	"	"	"
	30	1,470	49.0	"	"	"
	35	1,475	42.1	309.33	0.00	0.00
	40	1,480	37.0	"	"	"
	50	1,490	29.8	"	"	"
	60	1,500	25.0	"	"	"
	80	1,520	19.0	"	"	"
	100	1,540	15.4	"	"	"
12:00	120	1,560	13.0	"	"	"
	150	1,590	10.6	"	"	"
	180	1,620	9.0	"	"	"
	210	1,650	7.8	"	"	"
14:00	240	1,680	7.0	"	"	"
	300	1,740	5.8	"	"	"
	360	1,800	5.0	"	"	"
	420	1,860	4.4	"	"	"
18:00	480	1,920	4.0	"	"	"

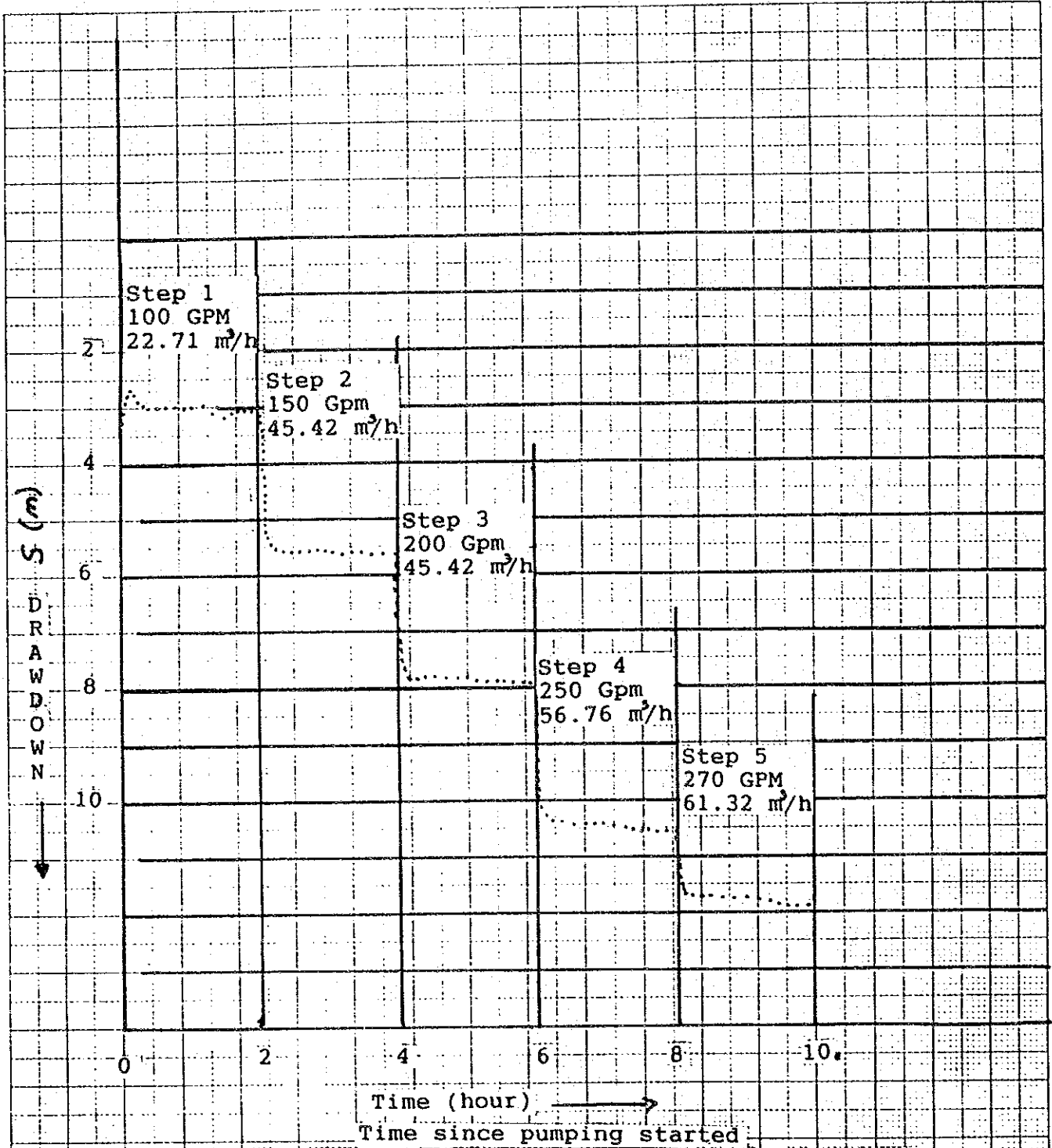


Fig. 2.2.4(1) $s \sim t$ relation of step drawdown test
(1) of JICA No. 4 Well

Q (m ³ /h)	Q (gpm)	Q (lpm)	S (m)	Q/S (m ³ /h)	S/Q (h/m)
22.71	100	378.5	3.08	7.37	0.136
34.08	150	568	5.61	6.07	0.165
45.42	200	757	7.92	5.73	0.175
56.76	250	946	10.59	5.36	0.187
61.32	270	1,022	11.89	5.16	0.194

Static water level 94.28 m

309.93 feet

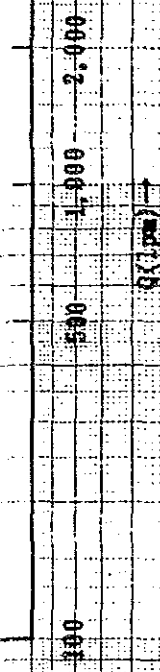
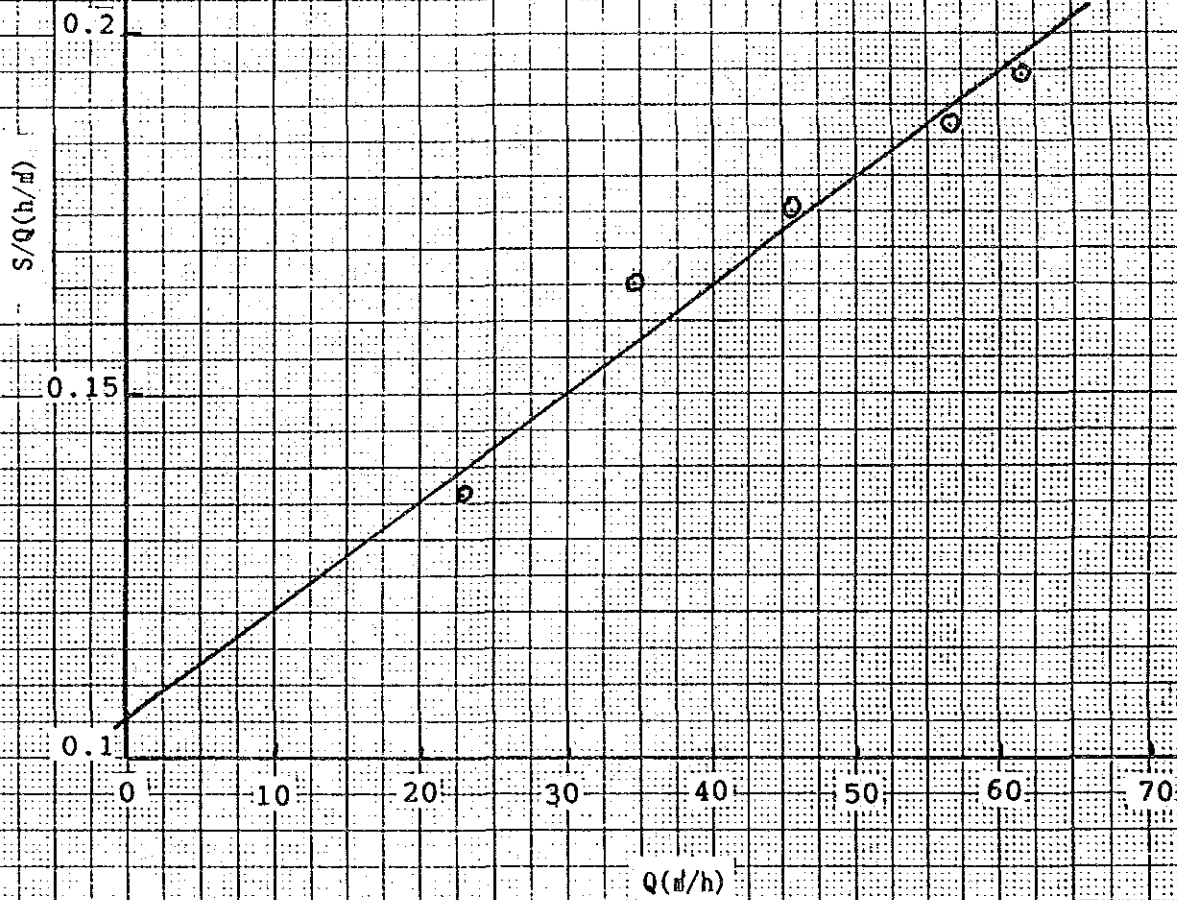


Fig. 2.2 (17) Step drawdown test analysis of WCA No. 4 Well

JICA 4



$$S=BQ+CQ^2$$

B : aquifer loss

C : well loss

$$B=0.106 \text{ h/m}^3$$

$$C=(0.18-0.106)/50=1.48 \times 10^{-3} \text{ h}^2/\text{m}^5$$

$$S=0.106Q+1.48 \times 10^{-3} Q^2$$

Fig. 2.2.4(3) Step Drawdown Test Analysis

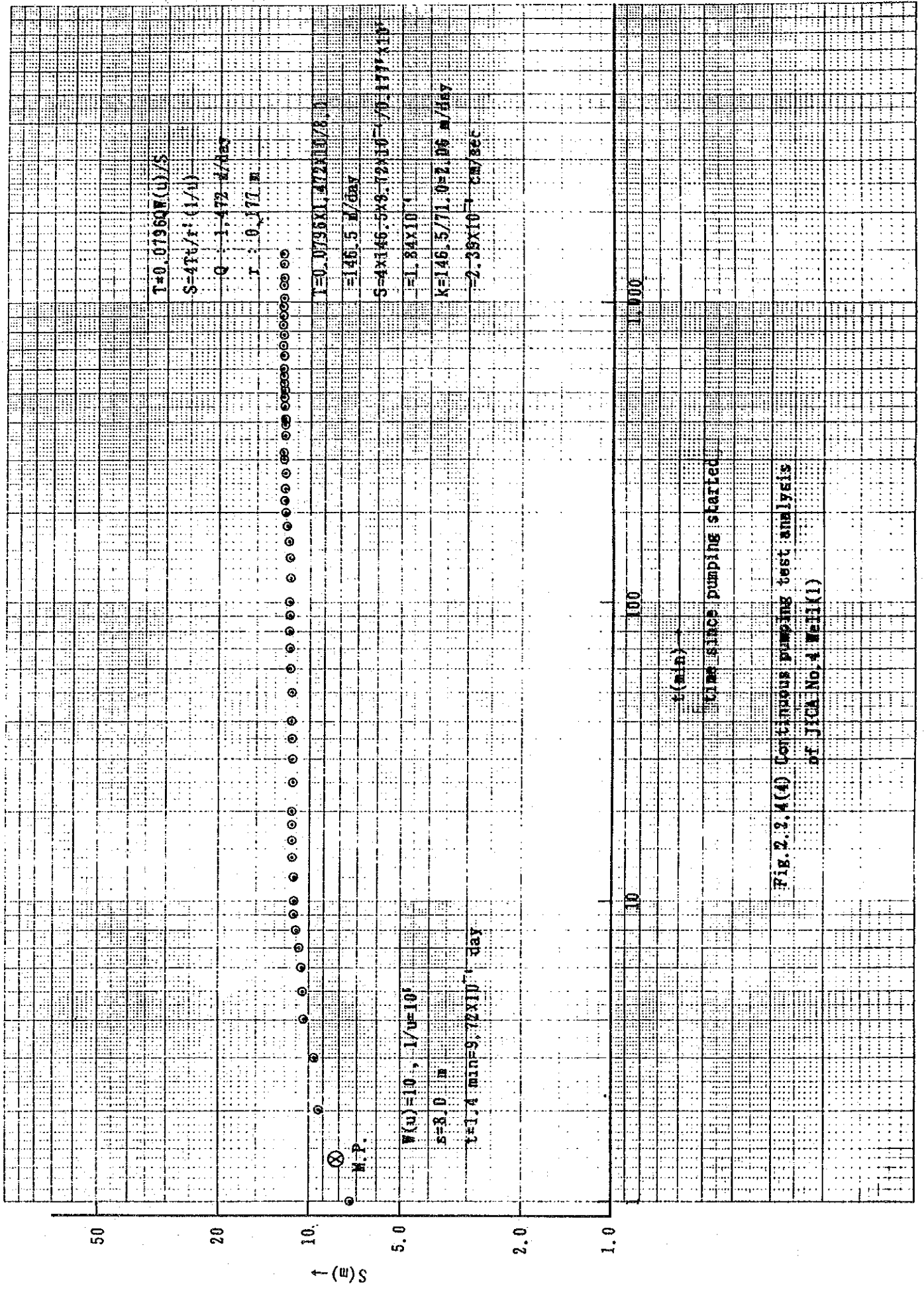
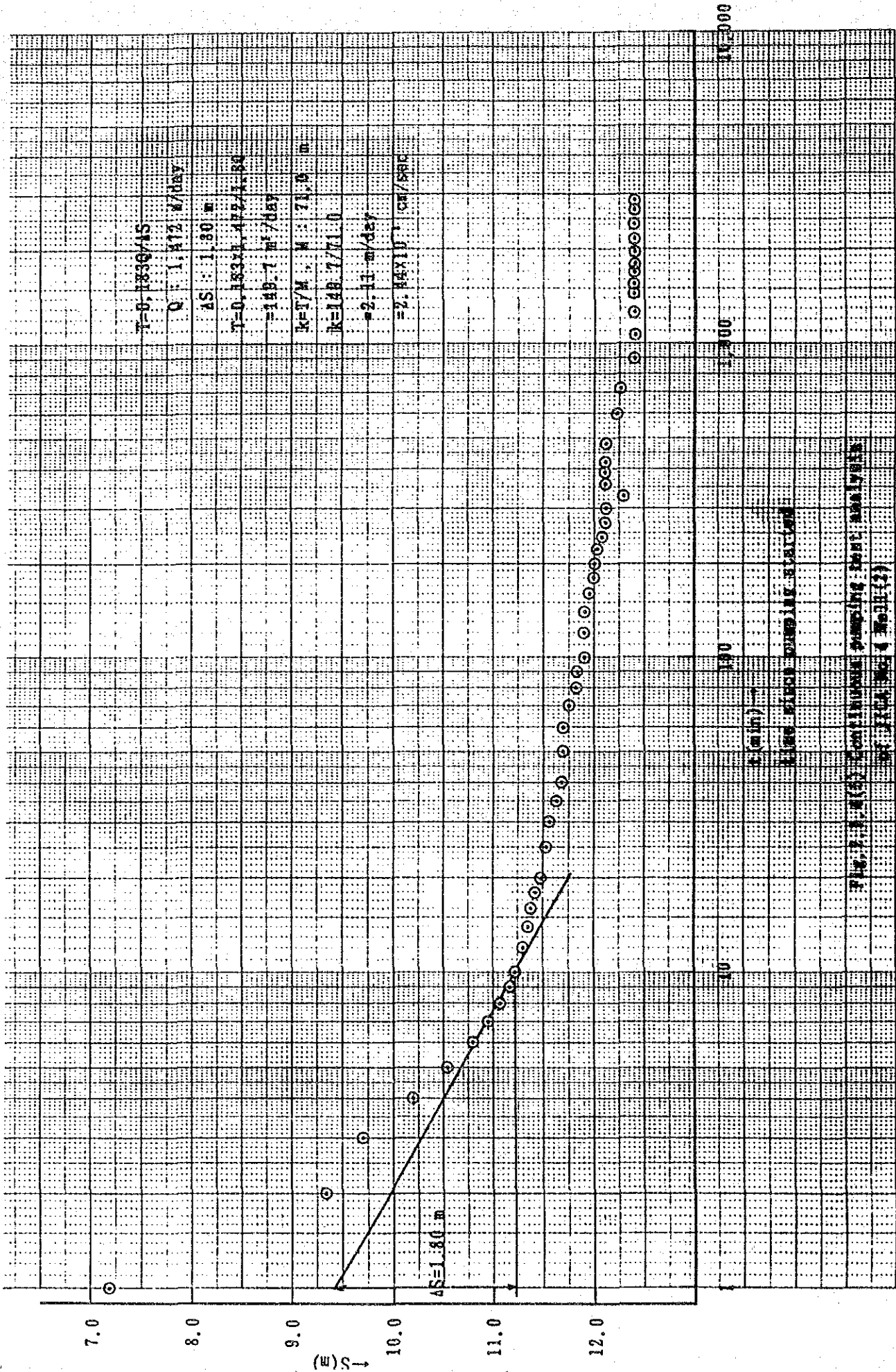


Fig. 2.3.4(4) Continuous pumping test analysis of JICA No. 4 Well(1)



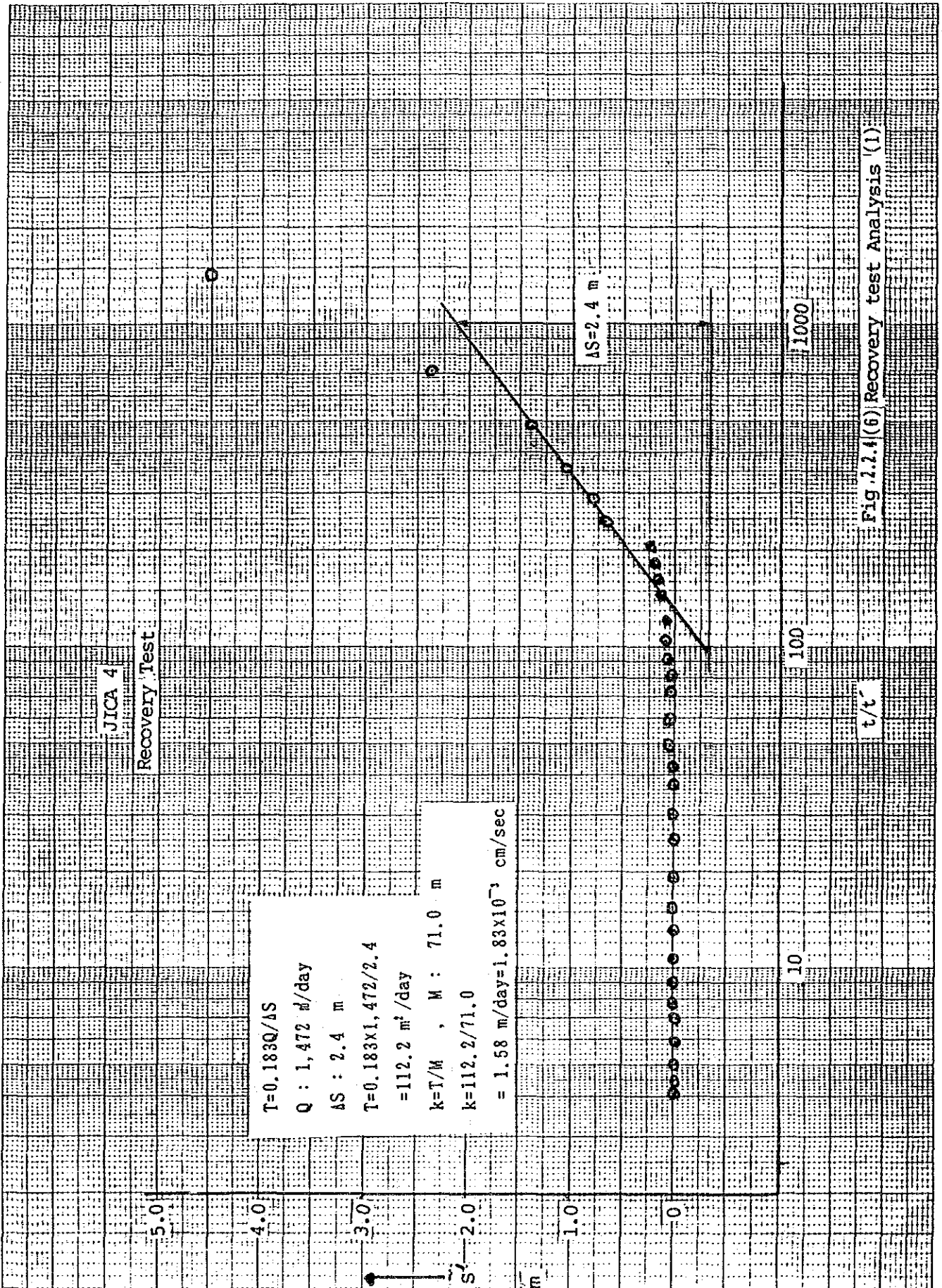


Fig. 2.2.4(6) Recovery test Analysis (1)

Result of pumping test

JICA Well (JI-5)

Step Drawdown Test(Prueba de etapas sucesivas)

Date(Fecha): 21 Oct.,1992

Site No.(Sitio o lugar): JICA No.5

Depth(Profundidad): 200 m ,Diameter(Diametro):12 3/4 inches(pulgadas)

Static Water Level(Nivel estatico de agua): 100.18 m

Pump type(Tipo de bomba): 30-kw submersible pump

Inspector:Orlando Lopez Solis

Time	Time sinse pumping started	Dynamic water level	Drawdown		Notes
Hora	Hora desde comienzo de bombeo t(min)	Nivel de bombeo feet (pies)	Descenso		Notas
			feet (pies)	meter (metro)	
09:30 am	0	328.67	0.00	0.00	
	1	331.00	2.33	0.71	h=5"
	2	"	"	"	Q=100 gpm
	3	330.83	2.16	0.66	kgf/cm2=11
	4	"	"	"	Volts=400
	5	"	"	"	Amps=40
	6	"	"	"	
	7	"	"	"	Temp.33.5C
	8	330.92	2.25	0.69	cond.1.003
	9	"	"	"	mS/cm
	10	"	"	"	
	12	"	"	"	
	14	"	"	"	
	16	"	"	"	
	18	"	"	"	
	20	"	"	"	
	25	"	"	"	
	30	"	"	"	
	35	"	"	"	
	40	"	"	"	
	50	"	"	"	
	60	"	"	"	
	80	"	"	"	
	100	"	"	"	
11:30	120	"	"	"	
	1	331.50	2.83	0.86	h=13"
	2	331.83	3.16	0.96	Q=150 gpm
	3	332.00	3.33	1.01	Volts=400
	4	"	"	"	Amps=40
	5	"	"	"	kgf/cm2=9
	6	"	"	"	
	7	"	"	"	
	8	"	"	"	
	9	"	"	"	
	10	"	"	"	
	12	"	"	"	
	14	"	"	"	

	16	"	"	"	
	18	"	"	"	
	20	"	"	"	
	25	"	"	"	
	30	"	"	"	
	35	"	"	"	
	40	"	"	"	
	50	"	"	"	
	60	"	"	"	
	80	"	"	"	
	100	"	"	"	
13:30	120	"	"	"	
	1	332.08	3.41	1.04	h=23"
	2	332.67	4.00	1.22	Q=200 gpm
	3	332.92	4.25	1.33	kgf/cm2=6
	4	333.00	4.33	1.32	Volts=400
	5	333.16	4.49	1.38	
	6	333.08	4.41	1.34	
	7	333.00	4.33	1.32	
	8	"	"	"	
	9	"	"	"	
	10	"	"	"	
	12	"	"	"	
	14	"	"	"	
	16	"	"	"	
	18	"	"	"	
	20	"	"	"	
	25	"	"	"	
	30	"	"	"	
	35	"	"	"	
	40	"	"	"	
	50	"	"	"	
	60	"	"	"	
	80	"	"	"	
	100	"	"	"	
15:30	120	"	"	"	
	1	334.20	4.75	1.45	h=35"
	2	333.75	5.08	1.55	Q=250 gpm
	3	333.92	5.25	1.60	kgf/cm2=2
	4	334.00	5.33	1.62	
	5	334.08	5.41	1.65	
	6	"	"	"	
	7	"	"	"	
	8	"	"	"	
	9	"	"	"	
	10	"	"	"	
	12	"	"	"	
	14	"	"	"	
	16	"	"	"	
	18	"	"	"	
	20	"	"	"	
	25	"	"	"	
	30	"	"	"	
	35	"	"	"	
	40	"	"	"	

	50	"	"	"	
	60	"	"	"	
	80	"	"	"	
	100	"	"	"	
17:30	120	"	"	"	
	1	334.50	5.83	1.78	h=42"
	2	334.58	5.91	1.80	Q=270 gpm
	3	334.67	6.00	1.83	kgf/cm2=0
	4	"	"	"	Volts=400
	5	"	"	"	Amps=40
	6	"	"	"	
	7	"	"	"	
	8	"	"	"	Temp.35C
	9	"	"	"	cond.
	10	"	"	"	1.00 mS/cm
	12	"	"	"	
	14	"	"	"	
	16	"	"	"	
	18	"	"	"	
	20	"	"	"	
	25	"	"	"	
	30	"	"	"	
	35	"	"	"	
	40	"	"	"	
	50	"	"	"	
	60	"	"	"	
	80	"	"	"	
	100	"	"	"	
19:30	120	"	"	"	

Continuous Pumping Test(Prueba de bombeo a caudal constante)

Date(Fecha): 22 OCT.,1992

Site No.(Sitio o lugar): JICA No.5 Well

Time	Time sinse pumping started	Dynamic water level	Drawdown	Notes	
Hora	Hora desde comienzo de bombeo t(min)	Nivel de bombeo feet (pies)	Descenso feet (pies)	Notas	
			meter (metro)		
09:00 am	0	328.67	0.00	0.00	
	1	331.08	2.41	0.735	h=42"
	2	332.67	4.00	1.219	Q=270 gpm
	3	333.67	5.00	1.524	kgf/cm2=0
	4	334.16	5.49	1.673	Volts=400
	5	334.42	5.75	1.753	Amps=40
	6	334.67	6.00	1.829	
	7	334.75	6.08	1.853	
	8	"	"	"	
	9	"	"	"	
	10	"	"	"	
	12	"	"	"	

	14	"	"	"	
	16	"	"	"	
	18	"	"	"	
	20	"	"	"	
	25	"	"	"	
	30	"	"	"	
	35	"	"	"	
	40	"	"	"	
	50	"	"	"	
	60	"	"	"	Temp. 35.1C
	80	"	"	"	cond.
	100	"	"	"	1.00mS/cm
	140	"	"	"	
	160	"	"	"	
	180	"	"	"	
	220	"	"	"	
	270	"	"	"	
	300	"	"	"	
15:00	360	"	"	"	
	420	"	"	"	
17:00	480	"	"	"	Temp. Cond.
19:00	600	"	"	"	C mS/cm
21:00	720	"	"	"	33.4 1.00
00:00	900	"	"	"	33.6 1.00
03:00	1,080	"	"	"	34.9 1.00
06:00	1,260	"	"	"	35.0 1.00
09:00	1,440	"	"	"	

Recovery Test(Prueba de recuperacio'n)

Date(Fecha): 23 OCT.,1992

Site No.(Sitio o lugar): JICA No.5 Well

Time	Time sinse pumping stopped	Time sinse pumping started	Rate	Water level	Residual Drawdown
Hora	Hora desde comienzo de recupe- racion t'(min)	Hora desde comienzo de bombeo t(min)	Razo'n t/t'	Nivel de Agua feet (pies)	Descenso residual feet (pies) meter (metro)
09:00	0	1,440	-	334.75	6.08 1.853
	1	1,441	1,441	-	-
	2	1,442	721	330.25	1.58 0.482
	3	1,443	481	329.00	0.33 0.101
	4	1,444	361	328.92	0.25 0.076
	5	1,445	289	328.83	0.16 0.049
	6	1,446	241	328.75	0.08 0.024
	7	1,447	207	"	" "
	8	1,448	181	"	" "
	9	1,449	161	328.67	0.00 0.00
	10	1,450	145	"	" "
	12	1,452	121	"	" "

	14	1,454	104	"	"	"
	16	1,456	91.0	"	"	"
	18	1,458	81.0	"	"	"
	20	1,460	73.0	"	"	"
	25	1,465	58.6	"	"	"
	30	1,470	49.0	"	"	"
	35	1,475	42.1	"	"	"
	40	1,480	37.0	"	"	"
	50	1,490	29.8	"	"	"
	60	1,500	25.0	"	"	"
	80	1,520	19.0	"	"	"
	100	1,540	15.4	"	"	"
11:00	120	1,560	13.0	"	"	"
	150	1,590	10.6	"	"	"
	180	1,620	9.0	"	"	"
	210	1,650	7.8	"	"	"
13:00	240	1,680	7.0	"	"	"
	300	1,740	5.8	"	"	"
	360	1,800	5.0	"	"	"
	420	1,860	4.4	"	"	"
17:00	480	1,920	4.0	"	"	"

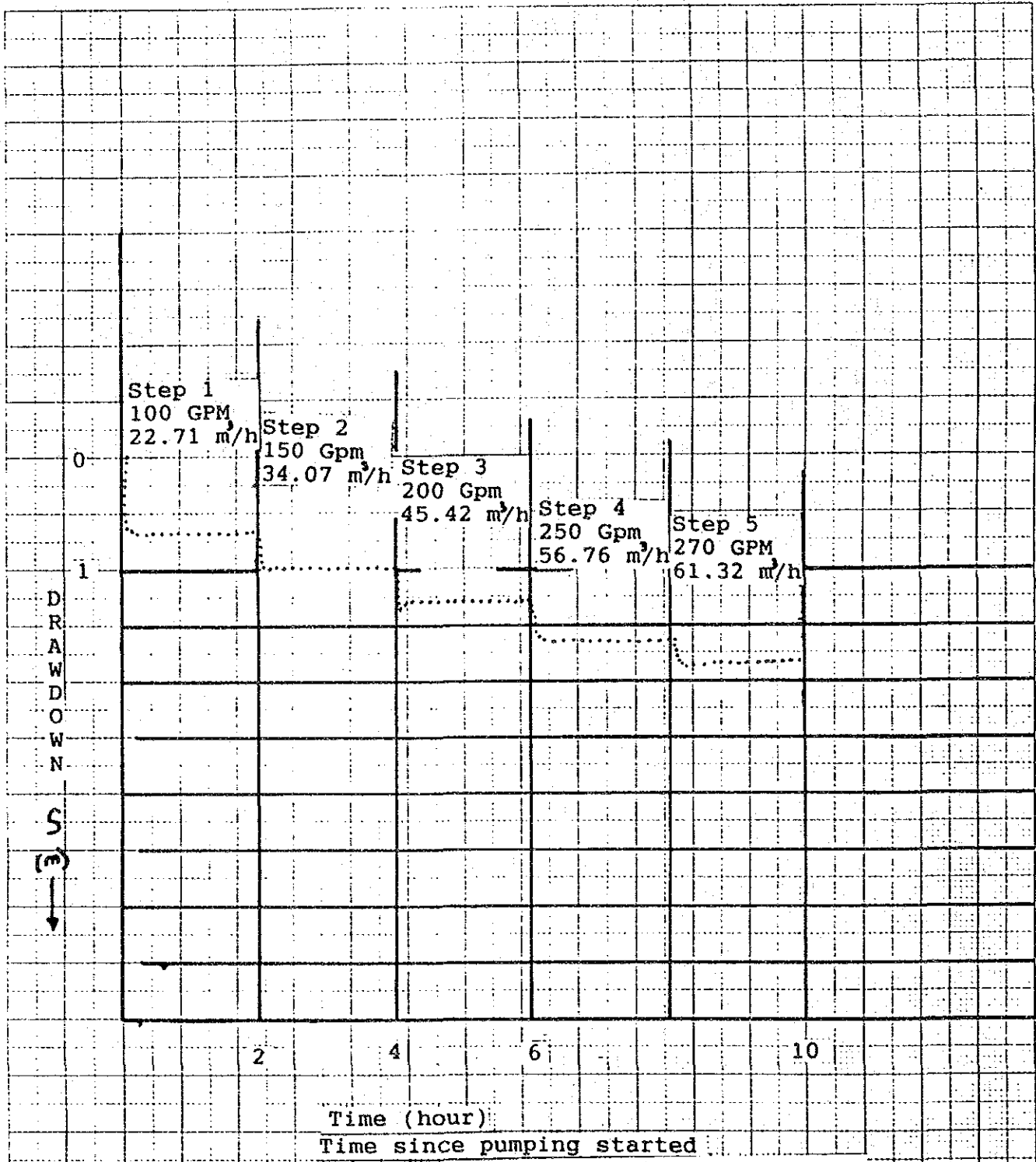


Fig. 2.2.5(1) s~t relation of step drawdown test of JICA No. 5 Well

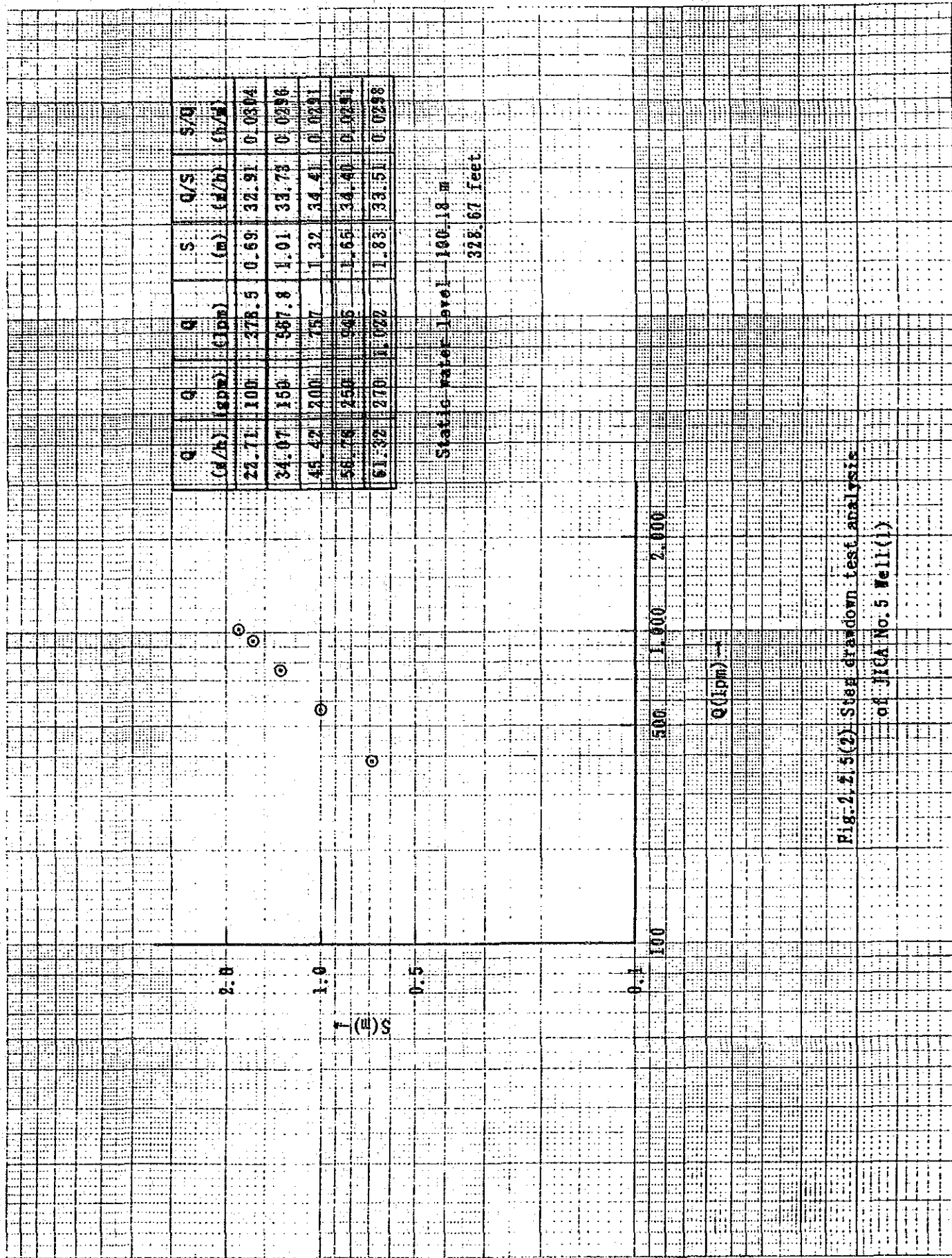


Fig. 2.5.5(2) Stage drawdown test analysis of JICA No. 5 Well (1)

JICA 5

s/Q
 h/m^3

0.04

0.03

0.02

0.01

0

10

20

30

40

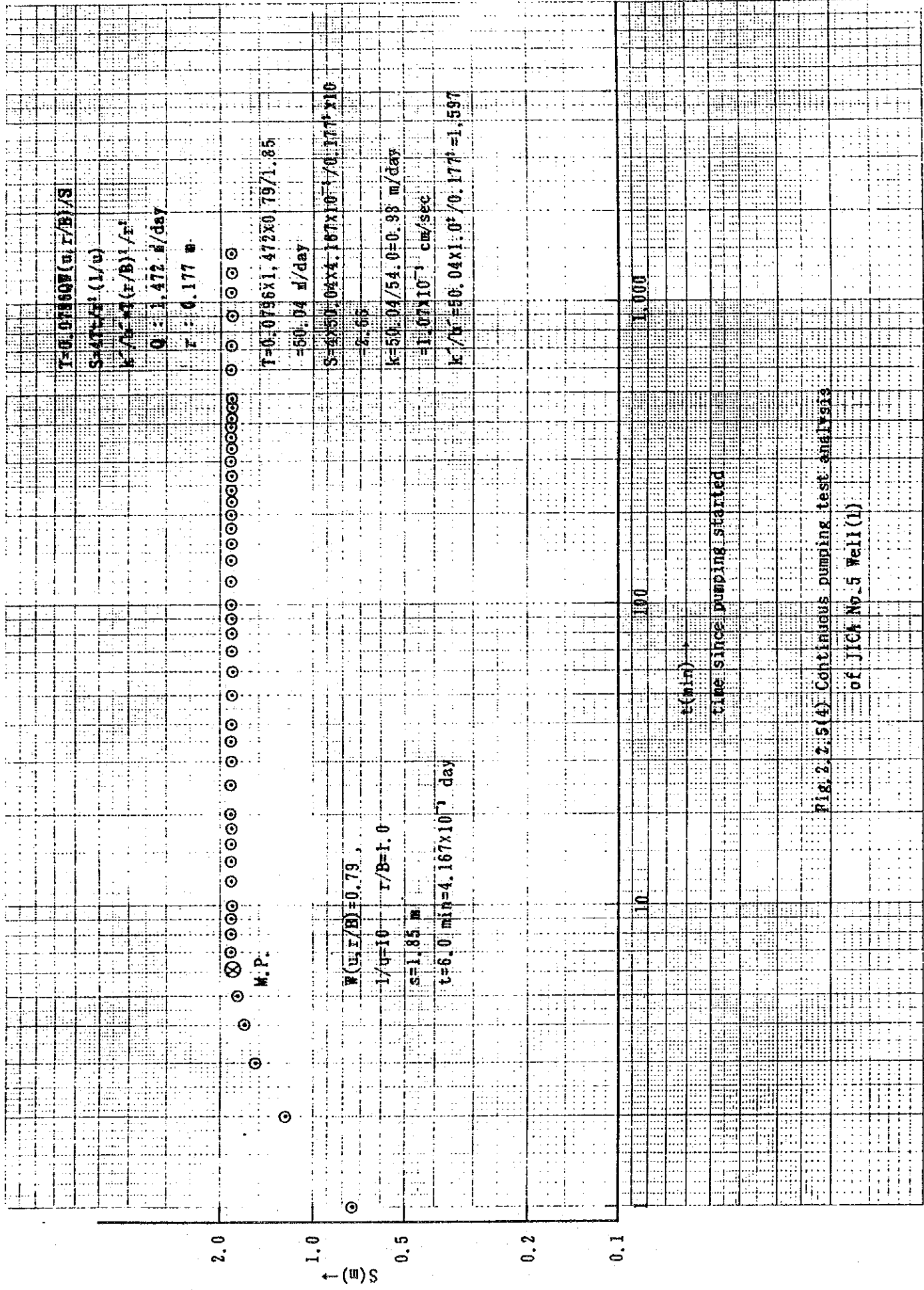
50

60

70

$Q(m^3/h)$

Fig 2.2.5(3) Step drawdown test analysis (2)



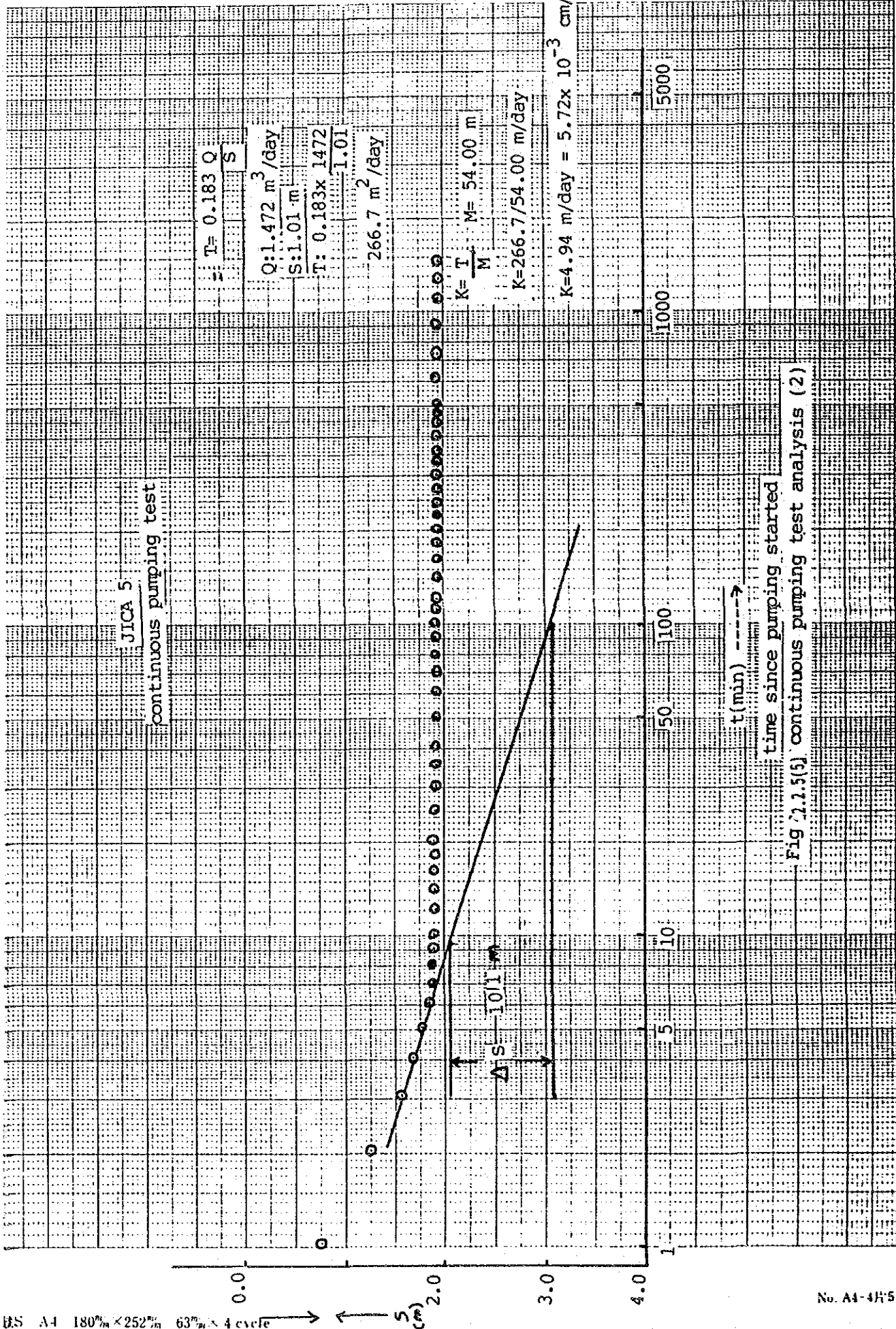
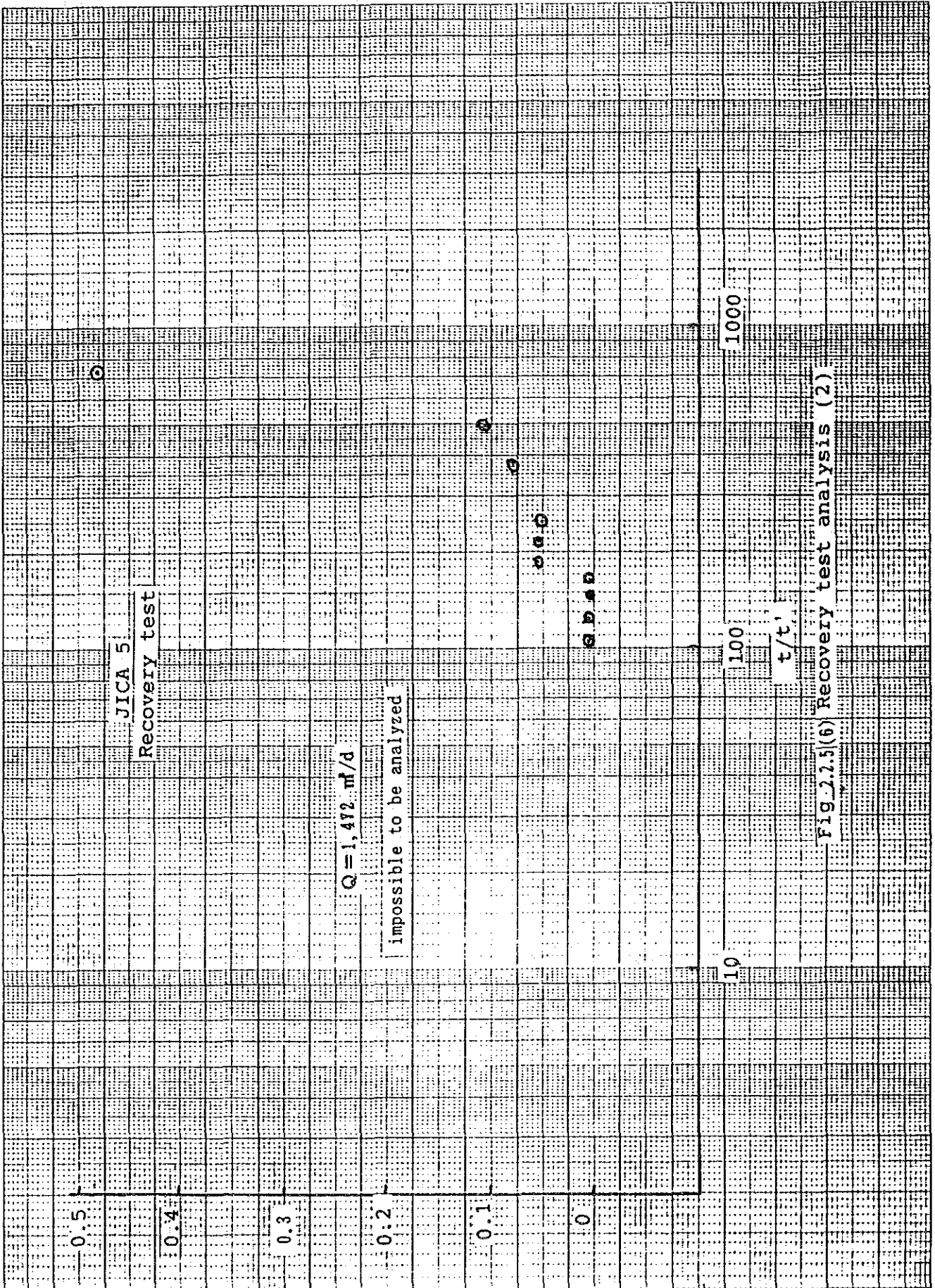


Fig 2.7.5(5) continuous pumping test analysis (2)



Result of pumping test

Joan Ramon Robles, El, Pique

Step Drawdown Test(Prueba de etapas sucesivas)

Date(Fecha): 3 Nov.,1992

Site No.(Sitio o lugar): Joan Ramon Robles,El Pique

Depth(Profundidad): 138 m ,Diameter(Diametro):13 1/2 inches(pulgadas)

Static Water Level(Nivel estatico de agua): 39.80 m

Pump type(Tipo de bomba): 110-kw turbine pump

Inspector:Orlando Lopez Solis

Time	Time sinse pumping started	Dynamic water level	Drawdown		Notes
Hora	Hora desde comienzo de bombeo t(min)	Nivel de bombeo meter (metro)	feet (pies)	meter (metro)	Notas
16:00	0	39.80		0.00	
	1	-		-	h=5"
	2	42.00		2.20	Q=146 gpm
	3	"		"	
	4	"		"	
	5	41.00		1.00	
	6	41.60		1.80	
	7	41.80		2.00	Temp.30.4C
	8	41.90		2.10	cond.0.998
	9	42.90		3.10	mS/cm
	10	43.00		3.20	
	12	"		"	
	14	"		"	
	16	"		"	
	18	"		"	
	20	"		"	
	25	"		"	
	30	"		"	
	35	"		"	
	40	"		"	
	50	"		"	
	60	"		"	
	80	"		"	
	100	"		"	
18:00	120	"		"	
	1	46.10		6.30	h=15"
	2	46.60		6.80	Q=250 gpm
	3	46.90		7.10	
	4	46.80		7.00	
	5	"		"	Temp.30.3C
	6	"		"	cond.
	7	"		"	1.003mS/cm
	8	"		"	
	9	"		"	
	10	"		"	
	12	"		"	
	14	"		"	

	16	"	"	
	18	"	"	
	20	"	"	
	25	"	"	
	30	"	"	
	35	"	"	
	40	"	"	
	50	"	"	
	60	"	"	
	80	"	"	
	100	"	"	
20:00	120	"	"	
	1	46.83	7.03	h=31"
	2	46.85	7.05	Q=351 gpm
	3	46.90	7.10	
	4	46.95	7.15	
	5	"	"	
	6	"	"	
	7	"	"	
	8	"	"	
	9	"	"	
	10	"	"	
	12	"	"	
	14	"	"	
	16	"	"	
	18	"	"	
	20	"	"	
	25	"	"	
	30	"	"	
	35	"	"	
	40	"	"	
	50	"	"	
	60	"	"	
	80	"	"	
	100	"	"	
22:00	120	"	"	
	1	47.00	7.20	h=52"
	2	47.50	7.70	Q=453 gpm
	3	47.87	8.07	
	4	47.90	8.10	
	5	47.95	8.15	
	6	47.96	8.16	
	7	47.99	8.19	
	8	48.10	8.30	
	9	48.17	8.37	
	10	"	"	
	12	"	"	
	14	"	"	
	16	"	"	
	18	"	"	
	20	"	"	
	25	"	"	
	30	"	"	
	35	"	"	
	40	"	"	

	50	"	"
	60	"	"
	80	"	"
	100	"	"
00:00	120	"	"

Continuous Pumping Test(Prueba de bombeo a caudal constante)

Date(Fecha): 4 Nov.,1992

Site No.(Sitio o lugar): Joan Ramon Robles,El Pique

Time	Time sinse pumping started	Dynamic water level	Drawdown	Notes
Hora	Hora desde comienzo de bombeo t(min)	Nivel de bombeo meter (metro)	Descenso feet (pies) meter (metro)	Notas
09:00	0	39.80	0.00	
	1	42.00	2.20	h=51"
	2	42.50	2.70	Q=451 gpm
	3	42.90	3.10	
	4	43.30	3.50	
	5	43.60	3.80	
	6	43.80	4.00	
	7	43.90	4.10	
	8	"	"	
	9	44.10	4.30	
	10	45.00	5.20	
	12	45.60	5.80	
	14	45.70	5.90	
	16	45.80	6.00	
	18	46.00	6.20	
	20	46.30	6.50	
	25	46.90	7.10	
	30	47.56	7.76	
	35	"	"	
	40	"	"	
	50	"	"	
	60	"	"	
	80	"	"	
	100	"	"	
	120	"	"	
	150	"	"	
	180	"	"	
	210	"	"	
	240	"	"	
	300	"	"	
15:00	360	"	"	
	420	"	"	
17:00	480	"	"	
19:00	600	"	"	
21:00	720	"	"	

00:00	900	"	"
03:00	1,080	"	"
06:00	1,260	"	"
09:00	1,440	"	"

Recovery Test(Prueba de recuperacio'n)

Date(Fecha): 5 Nov.,1992

Site No.(Sitio o lugar): Joan Ramon Robles,El Pique

Time	Time sinse pumping stopped	Time sinse pumping started	Rate	Water level	Residual Drawdown
Hora	Hora desde comienzo de recupe- racion	Hora desde comienzo de bombeo	Razo'n de	Nivel de Agua meter (metro)	Descenso residual feet (pies) meter (metro)
	t'(min)	t'(min)	t/t'		
09:00	0	1,440	-	47.56	10.48
	1	1,441	1,441	43.30	6.22
	2	1,442	721	42.60	5.52
	3	1,443	481	41.00	3.92
	4	1,444	361	40.30	3.22
	5	1,445	289	39.20	2.12
	6	1,446	241	38.45	1.37
	7	1,447	207	37.80	0.72
	8	1,448	181	37.60	0.52
	9	1,449	161	37.40	0.32
	10	1,450	145	37.08	0.00
	12	1,452	121	"	"
	14	1,454	104	"	"
	16	1,456	91.0	"	"
	18	1,458	81.0	"	"
	20	1,460	73.0	"	"
	25	1,465	58.6	"	"
	30	1,470	49.0	"	"
	35	1,475	42.1	"	"
	40	1,480	37.0	"	"
	50	1,490	29.8	"	"
	60	1,500	25.0	"	"
	80	1,520	19.0	"	"
	100	1,540	15.4	"	"
11:00	120	1,560	13.0	"	"
	150	1,590	10.6	"	"
	180	1,620	9.0	"	"
	210	1,650	7.8	"	"
13:00	240	1,680	7.0	"	"
	300	1,740	5.8	"	"
	360	1,800	5.0	"	"
	420	1,860	4.4	"	"
17:00	480	1,920	4.0	"	"

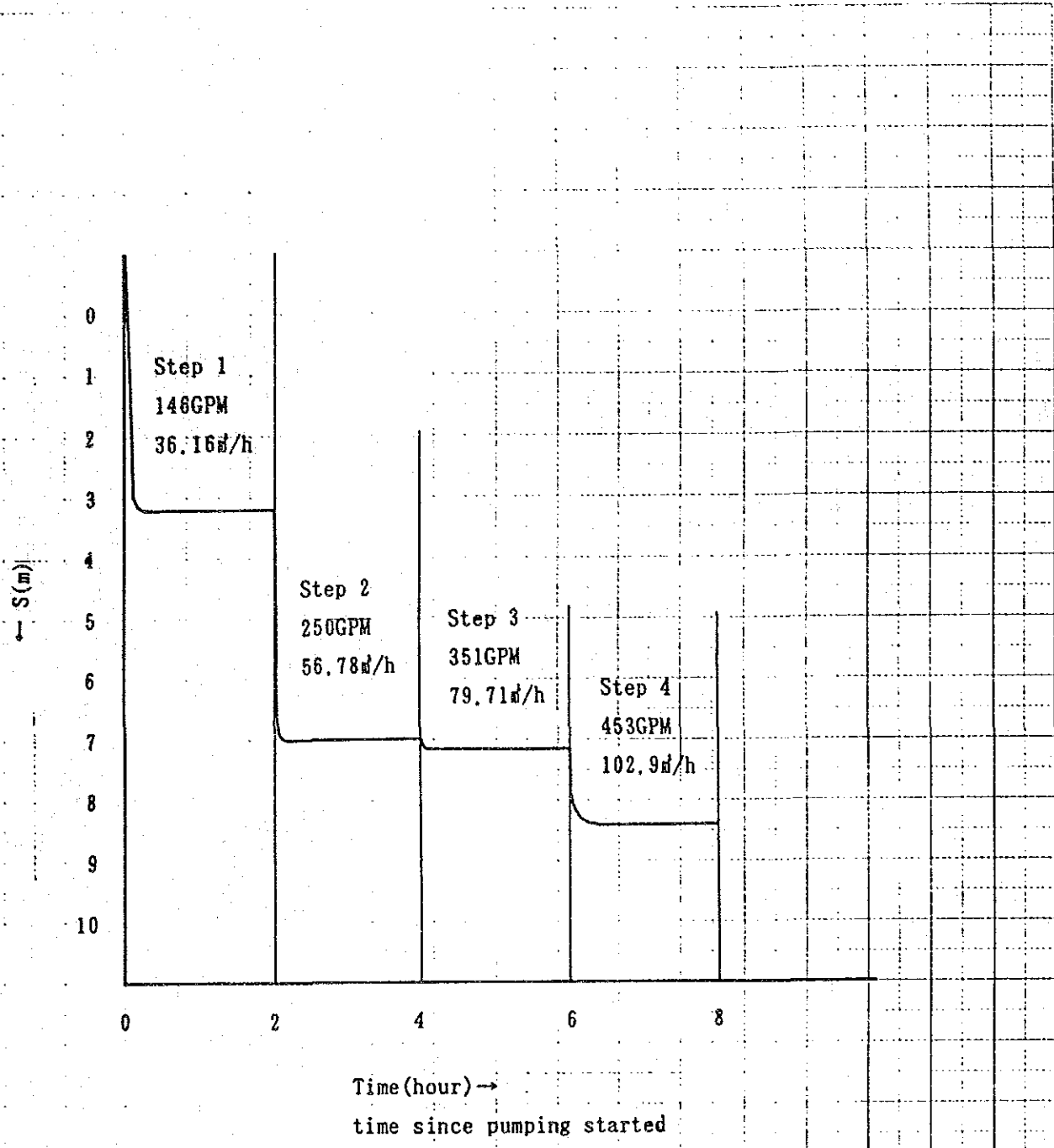


Fig.2.2.6(1) $S \sim t$ relation of step drawdown test of El Pique Well

Q (m ³ /h)	Q (lpm)	S (m)	Q/S (m/h)	S/Q (h/m)
33.16	146	3.20	10.36	0.0965
56.74	250	7.00	8.11	0.1233
79.74	351	7.15	11.15	0.0897
102.9	453	8.37	12.29	0.0813

Static water level --- 39.80 m
130.58 feet

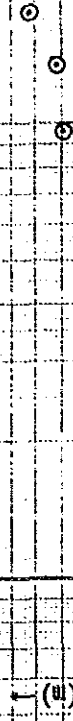
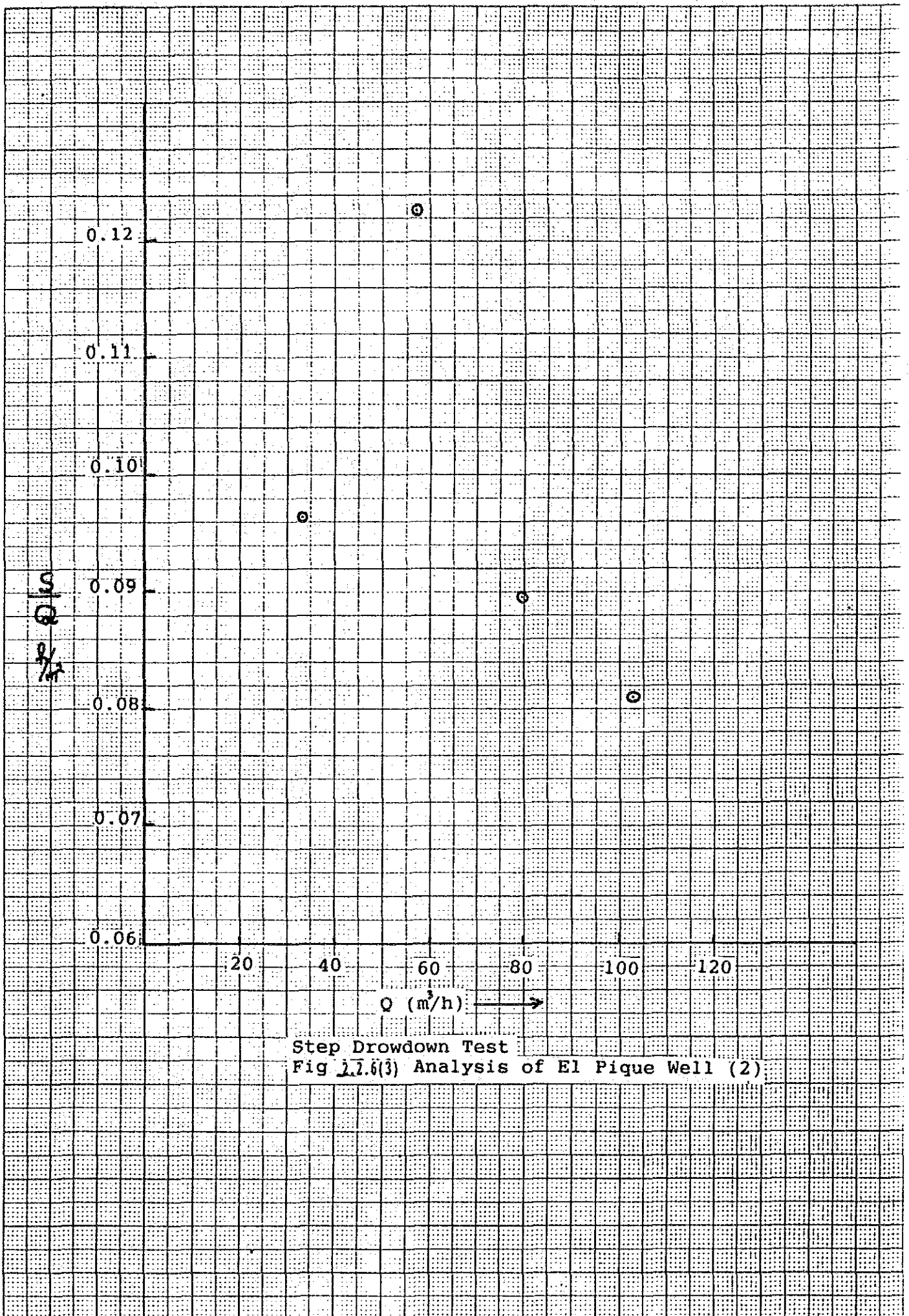


Fig. 2.6(2) Step drawdown test analysis of El Pique Well(1)



Step Drowdown Test
 Fig 2.2.6(3) Analysis of El Pique Well (2)

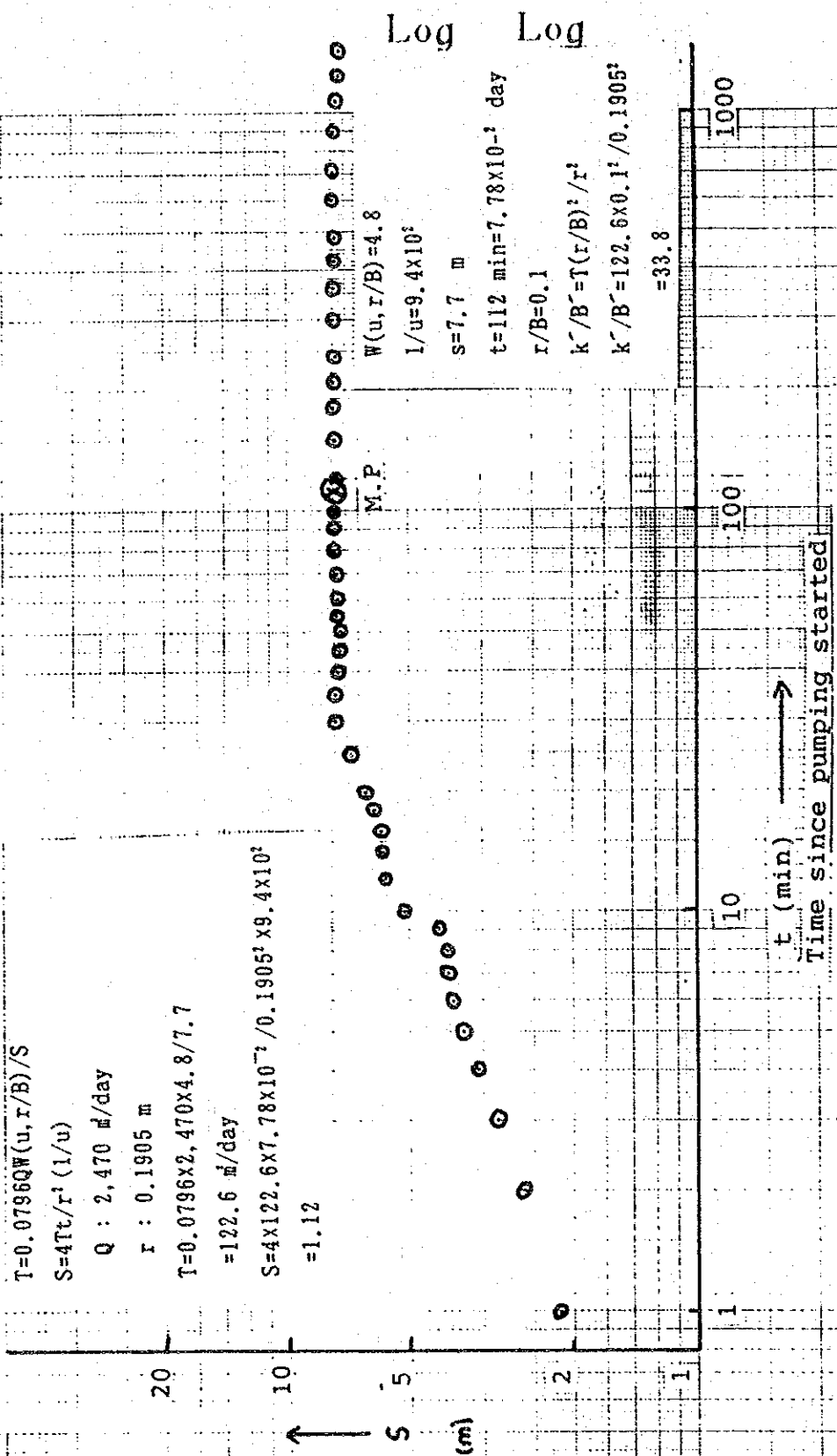


Fig 2.2.6(4) Continuous rate discharge Test
Analysis of El Pique Well (1)

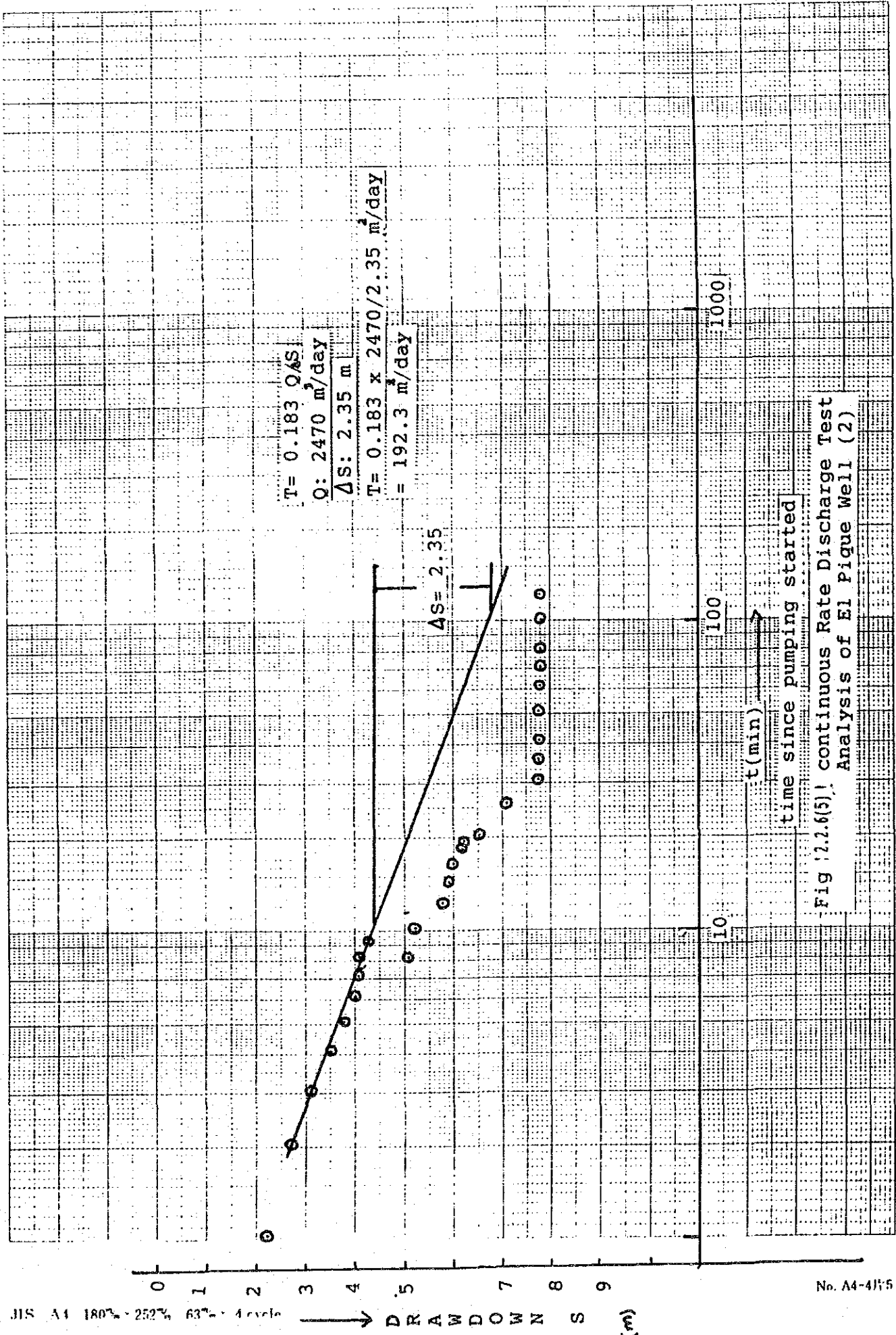
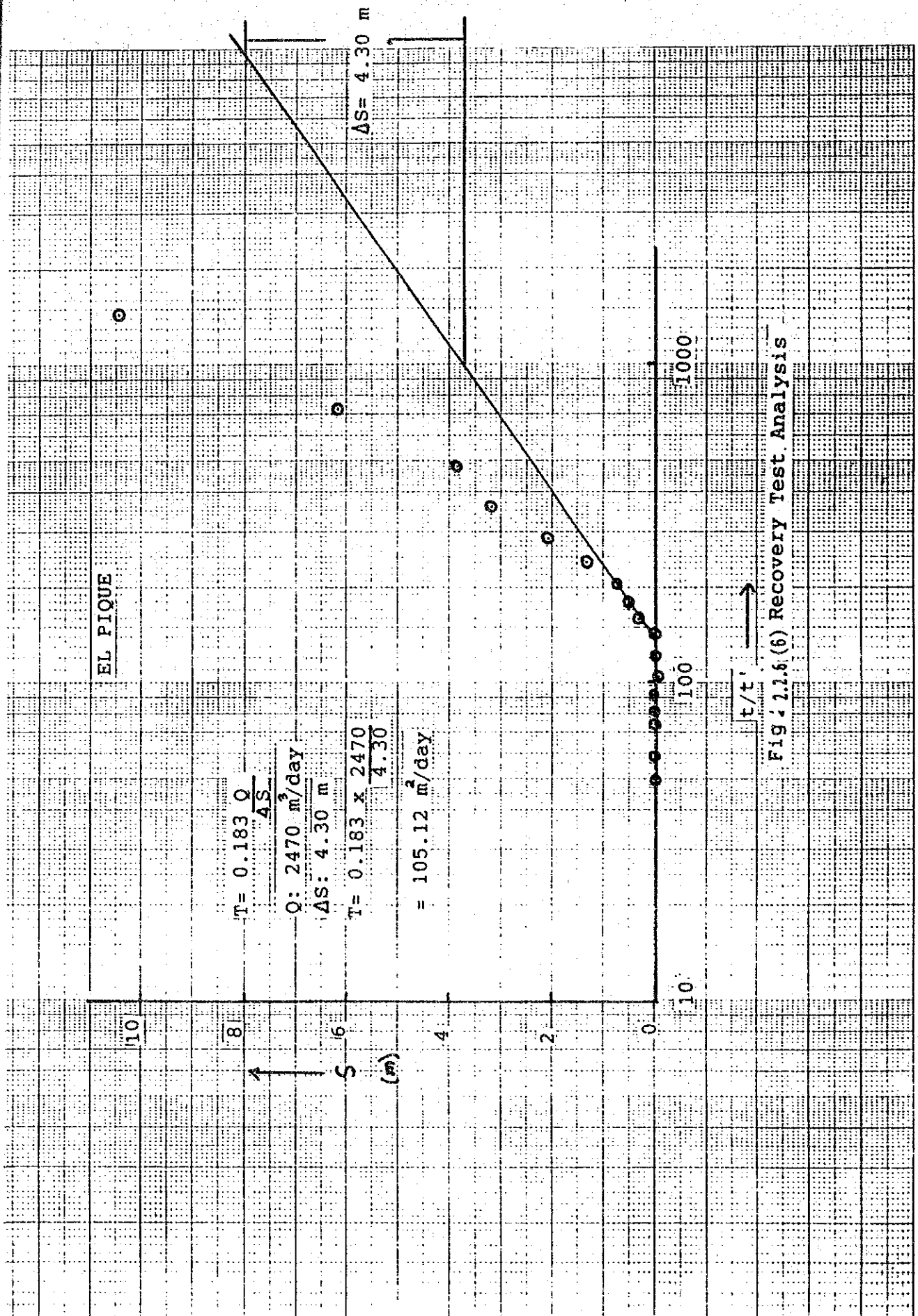


Fig (2.2.6(5)) continuous Rate Discharge Test Analysis of El Pique Well (2)



MONTHLY WATER LEVEL

LAKE MANAGUA

LAKE ASOSOSCA

Table

Monthly Water Level of Lake Managua

Unit: m.s.n.m.

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Av.
1958	39.44	39.27	39.22	39.20	39.25	39.52	39.60	39.61	39.42	39.63	39.72	39.61	39.46
1959	39.43	39.20	39.03	38.87	38.60	-	-	-	-	-	-	-	-
1960	-	-	-	-	-	-	-	-	-	-	-	-	-
1961	-	-	-	-	-	-	-	-	-	-	-	-	-
1962	-	-	-	-	-	-	-	-	-	-	-	-	-
1963	-	-	-	-	-	38.08	38.09	38.05	38.00	38.17	38.33	38.31	(38.15)
1964	38.13	37.95	-	-	-	-	-	-	-	-	-	-	-
1965	-	-	-	-	-	-	-	37.25	37.20	37.51	37.58	37.45	(37.40)
1966	37.52	37.13	36.93	36.76	36.71	37.17	37.52	37.52	37.56	37.89	38.00	37.87	37.38
1967	37.72	37.58	37.42	37.24	37.06	37.10	37.07	36.96	36.96	37.07	37.06	36.92	37.18
1968	36.79	36.63	36.49	36.32	36.27	36.71	36.88	36.78	36.86	37.29	37.74	37.62	36.87
1969	37.50	37.35	37.23	37.06	37.03	37.30	37.50	37.66	38.06	38.73	39.28	39.20	37.83
1970	39.09	38.96	38.82	38.68	38.58	38.71	38.71	38.86	39.16	39.54	39.67	39.60	39.03
1971	39.49	39.35	39.19	39.00	38.88	38.84	38.69	38.65	38.90	39.35	39.52	39.42	39.11
1972	(39.26)	(39.10)	(38.94)	(38.78)	38.62	38.67	38.57	38.42	38.31	38.27	38.18	38.05	(38.60)
1973	37.92	37.79	37.65	37.50	37.37	37.42	37.40	37.54	38.13	38.76	39.26	39.16	37.99
1974	39.03	38.87	38.71	38.54	(38.46)	(38.38)	38.30	38.18	38.50	39.18	39.11	38.98	(38.64)
1975	38.84	38.69	37.26	38.33	38.19	38.23	38.11	38.10	38.47	38.93	39.31	39.31	38.48
1976	39.18	39.03	38.82	(38.32)	(38.00)	(38.32)	38.60	38.46	38.32	38.50	38.48	38.37	28.98
1977	38.19	38.00	37.81	37.58	37.46	37.65	37.58	37.43	37.37	37.31	37.25	37.12	37.56
1978	36.94	36.78	36.59	36.32	-	-	-	-	-	-	-	-	(36.20)
1979	-	-	-	-	-	-	-	-	-	-	-	-	(36.50)
1980	-	-	36.90	36.80	36.70	37.00	37.00	36.90	36.90	37.60	-	-	(36.98)
1981	37.60	37.50	37.40	37.20	37.30	38.00	38.10	38.00	38.30	38.30	38.30	(38.25)	(37.82)
1982	38.20	38.10	(37.90)	37.70	38.20	39.90	40.00	39.90	39.70	40.00	(40.00)	(39.90)	(39.16)
1983	39.80	39.70	38.20	38.20	38.20	38.90	39.60	38.60	-	-	-	-	(38.90)
1984	38.60	38.40	38.20	38.10	37.90	-	-	-	-	-	-	-	(38.00)
1985	-	-	-	-	-	-	-	-	-	-	-	-	(38.00)
1986	-	-	-	-	37.50	38.20	38.20	38.10	38.10	38.10	38.00	37.90	(38.10)
1987	37.70	37.60	37.40	37.30	37.10	37.00	37.00	37.10	37.20	37.20	37.20	37.00	37.23
1988	36.90	36.60	-	-	-	-	-	38.90	38.80	39.20	39.10	38.00	(38.21)
1989	38.80	38.60	38.40	(38.30)	38.20	38.10	38.10	38.10	38.30	38.70	38.60	38.40	(38.38)
1990	38.30	38.20	38.20	38.00	37.00	37.80	37.70	37.40	37.70	37.70	37.90	(37.80)	(38.81)
1991	37.70	37.50	37.40	37.20	37.10	37.20	37.20	37.00	37.00	37.20	37.10	37.00	37.22

SOURCE: DIRECCION DE RECURSOS HIDRICOS DPTO. DE HIDROGRAFIA, INETER
 ESTACION: LAGO DE MANAGUA SECTOR MIRAFLORES

Table

Monthly Elevation of Laguna de Asososca

Unit: u.s.n.m.

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Av.
1954	40.49	40.44	40.34	40.25	40.36	40.53	40.53	40.49	40.56	41.17	41.12	41.02	40.608
1955	41	40.96	40.87	40.8	40.72	40.79	40.9	40.92	41.09	41.49	41.6	41.69	41.069
1956	41.67	41.67	41.6	41.53	41.57	41.62	41.59	41.52	41.62	41.64	41.55	41.53	41.592
1957	41.43	41.33	41.23	41.15	41.19	41.21	41.15	41.1	41.21	41.34	41.24	41.14	41.226
1958	41.03	40.89	40.88	40.78	40.92	41.11	41.17	41.14	41.22	41.22	41.17	41.08	41.050
1959	40.96	40.85	40.73	40.61	40.57	40.75	40.65	40.63	40.65	40.68	40.57	40.43	40.673
1960	40.3	40.26	40.14	40.08	40.19	40.3	40.32	40.44	40.5	40.74	40.66	40.57	40.375
1961	40.48	40.4	40.29	40.21	40.22	40.4	40.39	40.28	40.41	40.44	40.45	40.4	40.364
1962	40.31	40.21	40.09	40.1	39.82	40.09	40.1	40.09	40.15	40.31	40.23	40.11	40.134
1963	39.99	39.9	40.34	40.29	40.19	40.3	40.3	40.21	40.26	40.32	40.31	40.17	40.215
1964	40.04	39.94	39.84	39.85	39.76	40.02	40.07	40.09	40.05	40.17	40.08	39.98	39.990
1965	39.84	39.72	39.59	39.5	39.5	39.62	39.58	39.53	39.56	39.62	39.47	39.3	39.569
1966	39.16	30.04	38.88	38.76	38.84	39.11	39.09	39.03	39.08	39.13	38.98	38.78	38.24
1967	38.61	38.47	38.35	38.15	38.03	38.37	38.38	38.26	38.28	38.35	38.2	38	38.287
1968	37.69	37.56	37.31	37.14	37.32	37.46	37.37	37.27	37.38	37.59	37.43	37.21	37.394
1969	37	36.8	36.5	36.33	36.37	36.67	36.61	36.78	36.87	37.23	37.2	37.08	36.786
1970	36.93	36.69	36.58	36.31	36.4	36.49	36.65	36.84	37.11	37.21	37.18	37.03	36.785
1971	36.92	36.71	36.38	36.2	36.15	36.28	36.33	36.34	36.58	36.56	36.63	36.63	36.475
1972	36.64	35.44	36.18	35.89	36.03	36.11	35.98	35.84	35.74	35.59	35.49	35.57	35.875
1973	35.72	35.82	35.57	35.48	35.66	35.91	36.09	36.31	36.43	36.78	36.68	36.62	36.089
1974	36.47	36.22	36.08	35.93	36.12	36.27	36.18	36.18	36.46	36.51	36.26	36.12	36.233
1975	35.93	35.69	35.42	35.03	35.23	35.28	35.26	35.31	35.59	35.67	35.61	35.38	35.45
1976	35.04	34.77	34.52	34.23	34.18	35.02	35.32	35.34	35.4	35.84	35.83	35.93	35.118
1977	35.9	35.84	35.65	35.35	35.58	35.75	35.87	36.07	36.17	36.34	36.26	35.83	35.884
1978	35.54	35.05	34.57	34.24	34.21	34.63	34.89	35.05	35.28	35.44	35.31	35.19	34.95
1979	34.81	34.27	33.79	33.58	33.91	34.16	33.91	33.79	34.01	33.97	34.21	34.04	34.037
1980	33.99	33.99	33.89	33.87	33.81	34.43	34.65	34.72	34.8	34.95	35.04	34.93	34.422
1981	34.78	34.6	34.41	34.35	34.58	34.94	35.15	35.04	35.24	35.35	35.3	35	34.895
1982	35.06	34.87	35.76	34.27	35.2	34.88	35.22	35.48	35.61	35.87	35.88	35.77	35.322
1983	35.51	35.18	35.09	35.03	34.78	34.84	35.03	35.18	35.3	35.45	35.56	35.5	35.204
1984	35.24	34.97	34.67	34.22	33.92	34.2	34.26	34.45	34.55	34.54	34.52	34.5	34.503
1985	34.4	34.37	34.24	34.03	34.12	34.14	34.06	33.96	33.94	34.05	34.27	34.23	34.150
1986	34.3	34.25	34.11	33.98	33.9	34.24	34.45	34.39	34.3	34.28	34.21	34.08	34.207
1987	33.91	33.83	33.72	33.63	33.77	33.71	33.81	33.87	33.82	33.95	33.81	33.69	33.793
1988	33.58	33.43	33.38	33.38	33.53	34.11	34.65	34.97	35.29	35.65	35.99	36.03	34.499
1989	36.03	36.05	36.07	36	35.83	35.69	35.7	35.76	35.92	35.94	35.53	35.4	35.826
1990	35.39	35.31	35.17	35.07	34.91	34.87	34.81	34.73	34.71	35.04	35.16	35.22	35.032
1991	35.17	35.08	34.87	34.67	34.61	34.64	34.68	34.69	34.81	34.89	35.1	35.2	34.867
1992	35.27	35.3	35.19	35.09	34.95	35.12	35.47	35.72					