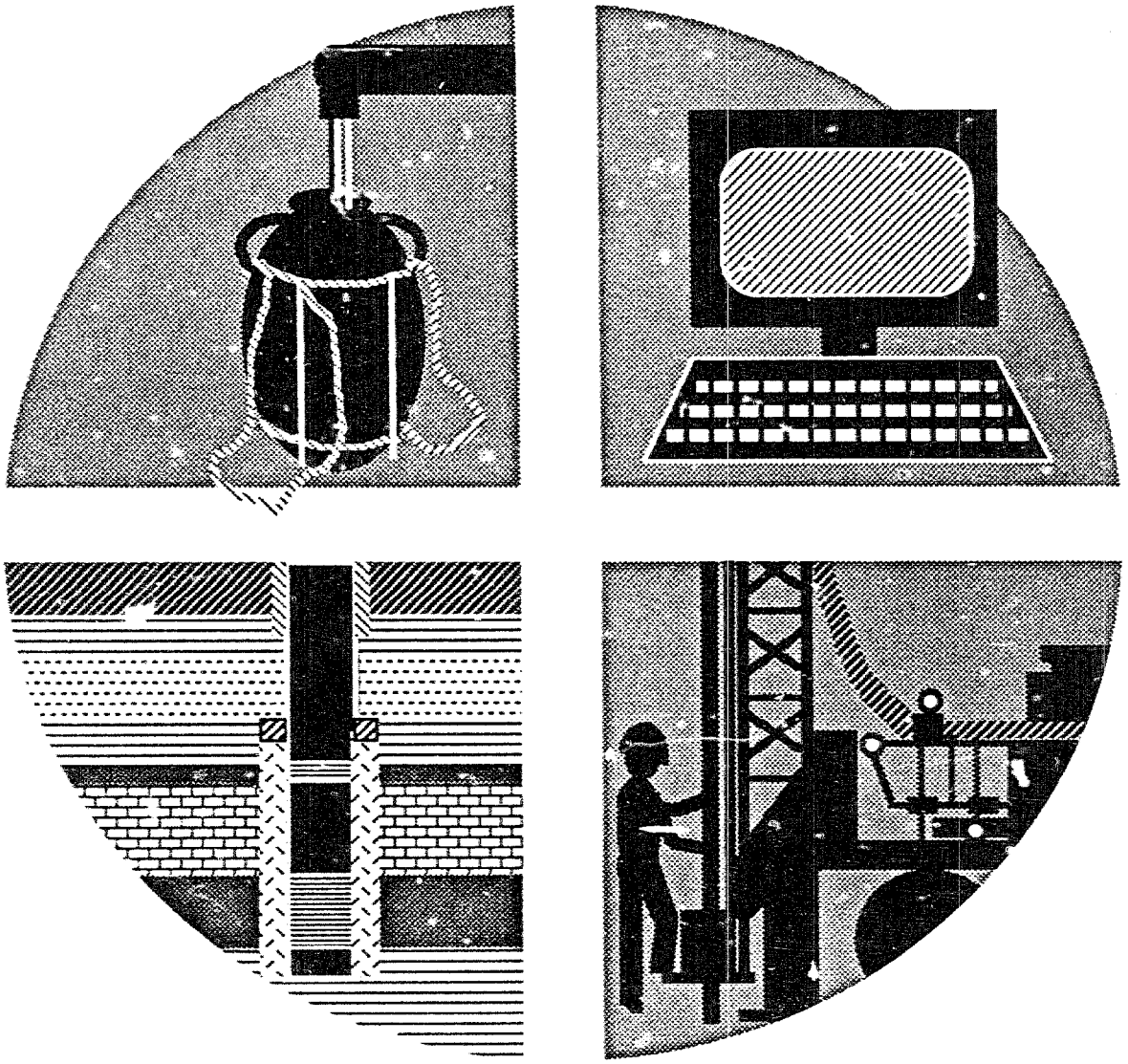
SOMALI DEMOCRATIC REPUBLIC

MINISTRY OF MINERALS AND WATER RESOURCES
WATER DEVELOPMENT AGENCY

Comprehensive Groundwater Development Project



Volume V

Appendices to Volume III

End of Project Report

LOUIS BERGER INTERNATIONAL, Inc.

ROSCOE MOSS Co.

END OF PROJECT REPORT

COMPREHENSIVE GROUNDWATER DEVELOPMENT PROJECT

VOLUME V

APPENDICES TO VOLUME III

HYDROGEOLOGY

PREPARED FOR: THE WATER DEVELOPMENT AGENCY
MINISTRY OF MINERALS AND WATER RESOURCES
SOMALI DEMOCRATIC REPUBLIC.

PREPARED BY: LOUIS BERGER INTERNATIONAL, INC.,
ROSCOE MOSS COMPANY
JUNE 1986.

FUNDED BY: UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT

VOLUME V

APPENDIX A

BASIC WELL DATA: BAY REGION

BASIC WELL DATA: CENTRAL RANGE

APPENDIX B

AS-BUILT DRAWINGS AND LOGS OF BOREHOLES: BAY REGION

AS-BUILT DRAWINGS AND LOGS OF BOREHOLES: CENTRAL RANGE

APPENDIX C

PUMPING TEST DATA: BAY REGION

PUMPING TEST DATA: CENTRAL RANGE

APPENDIX D

WATER QUALITY DATA: BAY REGION

WATER QUALITY DATA: CENTRAL RANGE

APPENDIX A

BASIC WELL DATA: BAY REGION

Volume V. Appendix A: List of All CGDP Boreholes, Bay Region

Refer. number	Location	Map Co-ord's Long. (hhmmss)	Latit. (hmmss)N	Elev-ation (m)	Date Completed	Well Depth (m)	Screen depth 1: Start/end (m)	2: Start/end (m)	Static Water level (m)	Specific conduct-ivity umhos/cm	Total dissolved solids mg/l	Yield CuM/hr	Specific capacity CuM/hr/M	Pump depth (m)	Pump type	Remarks	PI	CD	GL
B 1	Boonkay 1	433900	30700	510	04.02.82	18									E	Aband. dry			
B 2	Bonkay 2	433900	30700	510	27.02.82	201	30	201	48.5	2300					E	Aband. observ. well			GL
B 3	Bonkay 3	433900	30700	510	13.04.82	160	74	160	30	2700	2216	6.6	0.33	114	M	In use	PI	CD	GL
B 4	Tugerew 1	434230	30701	390	10.06.82	42	5 26	12 32	3	1700	1348	3.7	0.21	29	M	In use	PI	CD	GL
B 5	Gasarta	434812	30736	350	21.03.82	42	6	42	12						E	Aband. low yield			GL
B 6	Waraji 1	433230	25448	475	28.03.82	80	6	80	67						E	Aband. low yield			GL
B 7	Waraji 2	433230	25312	430	29.03.82	39	1	39							E	Aband. dry			GL
B 8	Tugerew 2	434142	30654	400	29.03.82	48		48							E	Aband. dry			GL
B 9	Bur Malab	440632	30412	280	30.03.82	32		35							E	Aband. dry			GL
B 10	Sarman Dheere	432124	31636	450	10.04.82	85	30	50.4	12.9	3300	3000	26.6	140.2	50	M	In use	PI	CD	GL
B 11	Bardoa Aid Camp	433854	30718	460	02.06.82	137	48	140	7	1500	1360	13.3	28.9		E	Aband. surface seal	PI	CD	GL
B 12	Hareero Jirfo	432512	31354	478	09.07.82	166	51	73	29.5	3900	3544	11.4	0.53	77	M	In use	PI	CD	GL
B 13	Shabelle Dugsill	431300	31712	420	14.07.82	172	44	172	11	24000	19772				E	Aband. exc. salinity		CD	GL
B 14	Warta Jaffay	430830	31900	390	03.08.82	91	2	91	17.5	10000	9188				E	Aband. exc. salinity		CD	GL
B 15	Dansax Dwane	430224	31954	365	17.08.82	174		174	165	24000	16436				E	Aband. exc. salinity		CD	GL
B 16	Taflow	431124	30354	435	16.08.82	154	72	153	35.4	1580	1528	11.4	1.69	67	M	In use	PI	CD	GL

Best Available Copy

	Ay Badood	451864	24616	440 27.08.82	142	48	88	22.7	1280	1024	11.4	0.2	88 H	In use	PT CD GL
B 18	Gaja Bhaanle	431548	24730	430 29.09.82	73	16	64	25.5	3800	1932	11.4	0.9	50 M	In use	PT CD GL
B 19	Buula Fur	416530	25318	435 20.08.82	94		94						E	Aband. dry	GL
B 20	Burr Ali Gall	425554	24954	405 11.10.82	116	82	100	69.4	2000	1816	11.4	0.34	88 H	In use	PT CD GL
B 21	Baidoa Aid Co	433942	30724	460 16.12.82	42	19.6	36.4	8.5	2500	1928	5.5		40 M	In use	CD GL
B 22	Buula Badoo	473824	20724	260 04.01.83	189		189						E	Aband. dry	GL
B 23	Furaan	425118	22854	350 10.01.83	148	30	54	20	2400	1868	3.6	0.12	48 H	In use	PT CD GL
B 24	Yaaq Baraawe	431406	15700	160 24.01.83	10	5	10	1					E	Aband. low yield	GL
B 25	Dodole	433354	21818	190 13.01.83	24	17	24	12	900	660			E	Aband. low yield	CD GL
B 26	Shidallow 1	441612	25336	195 20.01.83	67	3	67	36	33000	32042			E	Aband. exc. salinity	CD GL
B 27	Shidallow 2	441612	25336	195 22.01.83	80	2	80	37	34000	33376			E	Aband. exc. salinity	CD GL
B 28	Bur Akaba 1	441136	24836	200 25.01.83	54	1	54	22	14000				E	Aband. exc. salinity	GL
B 29	Bur Akaba 2	441136	24836	200 26.01.83	24	1.5	24	7	34000				E	Aband. exc. salinity	
B 30	Bur Akaba 3	441136	24836	200 01.02.83	30	1	30	22	22000				E	Aband. exc. salinity	GL
B 31	Bur Akaba 4	440506	24730	200 02.02.83	63	1	63	20	49000				E	Aband. exc. salinity	GL
B 32	Bur Akaba 5	440506	24730	200 15.02.83	89	6 31	31 89	17	1140	916			45 H	Low yield	CD GL
B 33	Bur Heibi 1	442954	25836	230 10.03.83	26			18					E	Aband. low yield	GL
B 34	Bur Heibi 2	442600	25848	230 23.02.83	73	8	20	16	1320	952			52 H	Low yield	CD GL

Best Available Copy

B 35	Bur Heibi 3	442654	25836	230	23.02.83	60	2	60						E	Aband. dry	GL
B 36	Bue Heibi 4	442654	25848	230	15.03.83	25	1	25						E	Aband. dry	
B 37	Bur Heibi 5	442654	25848	230	15.03.83	26	1	26						E	Aband. dry	
B 38	Bur Heibi 6	442654	25848	230	16.03.83	36	2	36						E	Aband. dry	GL
B 40	Limestone Depres	441524	31112	360	23.02.83	32	1.5	32						E	Aband. dry	GL
B 41	Dolondole	441412	31606	480	02.03.83	166	5.4 10.8	10.8 166	1.9	1040	564			E	Well destroyed	CD GL
B 42	Buulo Tuur 2	430500	25348	435	03.05.83	130	64.5 98	98 130	56.2	2050	1640	11.4	1.73	92 M	In use	PT CD GL
B 45	Baidoa AID Comp.	433854	30718	460	20.07.83	120	65	117	6.5	1770		10.9	0.22	E	Aband. defect. seal	PT GL
B 46	Quansaxdheere	425718	25530	405	11.05.83	103	60	103	30.2	1900	1772	11.4	0.87	92 M	In use	PT CD GL
B 47	Awshiri	432330	31212	475	30.06.83	143	56 90	86 143	29.8	3100	2740	11.4	0.72	89 M	In use	PT CD GL
B 50	Bonkay seed farm	433636	31148	510	22.09.83	200			30.1	11400		11.4	0.21	E	Aband. high salinity	PT GL
B 51	Mintano	433312	32048	490	02.10.83	132	51 99	93 132	40.2	1400	1164	11.3	0.7	60 H	In use	PT CD GL
B 52	Maleel	433512	32612	495	07.12.83	130	51 99	93 130	48.5	670	608	25.2	23.77	92 M	In use	PT CD GL
B 54	Isqeed	433312	32648	490	19.12.83	150	90 120	114 150	37.1	1350	992	17	0.76	92 M	In use	PT CD GL
B 55	Martimoog	432848	33400	490	23.01.84	147	76 120	114 147	32.8	1150	964	22.7	0.83	91 M	In use	PT CD GL
B 56	Jimcada Dheen	442124	24542	175	03.03.84	41								E	Aband. dry	
B 57	Hagarkaa	431842	25342	470	09.03.84	154	54	114						E	Aband. dry	PT CD GL
B 58	Buur Hakaba 6	440848	24430	190	20.03.84	27			20	48000				E	Aband. saline	

Best Available Copy

B 59	Shawka	433148	30030	485	18.03.84	138	45.8 91.6	[illegible] 132	30	13500	10224	11.4	0.27		P	Awaits investigation	PT CD GL
B 60	Kannanax	432400	21224	200	27.03.84	15	9	15	8.6						E	Aband. low yield	GL
B 61	Huday	425848	23818	405	05.04.84	152	60 108	108 152	17	2550	1348	3.56	0.1		E	Low yield	PT CD GL
B 62	War Caasha	433236	30236	485	29.04.84	201		201	120	1250	1200				E	Aband. low yield	CD GL
B 63	Bonkay extension	433636	31148	510	30.04.84	153	117	147	25.6	2200	1476	9.1	0.1		W	Experim. windmill	PT CD GL
B 64	B [illegible]lo Yuusuf	432748	30342	480	15.05.84	85	58.5	85	18.2	2900	2456	15.9	3.6	55	M	In use	PT CD GL
B 66	Buulo Haawo	430636	30342	415	07.06.84	142	66.2 83	77.4 142	33.5	1825	1408	14.5	0.43	76	M	In use	PT CD GL
B 68	Dhaabaxi AAlin	432654	30536	475	26.06.84	126	49 98.5	71 126	17.7	1675	1456	14.1	0.18	96	M	In use	PT CD GL
B 69	Togaal	435536	33124	625	18.07.84	92	37	64.5	18.7	970	576	15.3			E	Low yield	PT CD
B 70	Garilmay	435212	33854	600	16.09.84	135	60 90	72 114	60	1420	964				A		O PT CD
B 71	Uusle	433006	32342	465	19.08.84	102	50	80	36	1420	1252				A		O PT CD GL
B 73	Fajir-Lowger	435506	34148	605	12.09.84	4									E	Aband. as directed	
B 74	Migdalow	435030	33624	605	13.10.84	130	58 70	64 88	74.7	1700	1088				A		O PT CD
B 75	-1 Labaatan Jiro	435054	33136	595	18.10.84	132	60 90	72 108	40.1						E	Aband. low yield	PT CD
B 75	-2 Ufurow	425306	24536	395	28.12.84	85	49	73	49.5	2200	2068	4.7	0.24		H	Replac. well for WDA	PT CD
B 76	Dhuuboy	435300	24130	375	20.12.84	124	52 88	64 100	19.2	3500	2344	15.9	0.51	90	M		O PT CD
B 77	Dhorhabay	425548	23354	390	28.12.84	200			46.5					50	H		O
B 79	2. Buulo Caddey	424806	30030	315	11.02.85	50	3 18	26 50							E	Aban.	

Best Available Copy

B 79	I. Boulo Caddey	424806	25912	315 27.12.84	26									E	Aband. dry		
B 80	Tugere Hoosle	425436	23800	395 04.03.85	212			57	3900	2248			90	H		0	CD GL
B 83	Misra	432418	23512	390 17.04.85	170	62 152	74 170	21.1	9400	6640	5.8	0.14	50	H	T = 3M³/day step	PT CD	
B 85	Buklaabow	432418	30112	490 30.05.85	130	88	106	14	2900	2232				P		0	CD
B 88	Kooban Heegan	430400	24000	395 16.06.85	294			28	4800	3540	4.7			E	Aband. constr.supply		CD GL
B 90	BRADP CMPD	433954	30718	460 27.06.85	30	6	18	5.6	790	639	23.2	34.8		A		0 PT	CD GL
B 91	Xaarre	433348	33048	500 13.07.85	115	44 72	50 83	42	1100	876	18.2	1.57		P	Needs retest		PT CD GL
B 92	Caasha Fartow	433400	31560	505 18.07.85	120	54 84	72 102	46.4	1400	899	15.3	0.96		A		0 PT	CD GL
B 94	Bagalley	431312	31418	470 18.07.85	66	48	66	18	1300	980	23.5	0.35		A		0 PT	CD GL
B 95	Kurtin	431242	30100	470 05.08.85	130	76 100	100 130	34	2400		1.78	0.05	50	H	Low yield		PT CD GL
B 96	Qansaxdheere 2	425718	25530	405 08.08.85	136	82 124	100 130	48	1900	1260	4.1	0.05		A		0 PT	CD GL
B 97	Toosilow	431112	30812	445 22.08.85	140	68 92	80 110	32	2250	1550	12.2	0.34	50	H		0 PT	CD GL
B 98	Duralow	431605	30200	477 11.09.85	120	41.6	69.6	39	3320	2092	2.59	0.05		A	Low yield - handpump	PT	CD GL
B 99	Hareere Jiifo-2	432512	31354	478 11.09.85	120	63.8 103	80.6 114	35						P		0	GL
B 101	Hobishole	432100	25848	482 02.10.85	120	36	114	26.5	1520	1112	2	0.09		A	Aquifer 40-90m		PT CD GL
B 102	Caliyo Marayle	431954	25554	478 12.10.85	88	20.8 37.6	32 54.4	14.3	3500	2300	8.3	2.32		A	Screen 65.6 - 71.2		PT CD GL
B 103	Gras Mood	431624	25230	455 27.11.85	94	26.8 49.2	43.6 54.8	25.4	1500	912	18.2	0.69		A	Screen 60.4 - 66.0		PT CD GL
B 104	Ceel Jaalle	434960	30236	300 27.11.85	30			15.4	21800	14080				E	Aband. high salinity		CD

Best Available Copy

B 105	Coorar	430754	31306	398	12.12.85	102	30	34	11.7	6900	4940	P		0	CD
B 106	Asha Gab SE	433800	31518	510	07.01.86	96			36.4			E	Low yield		GL
B 107	Hartiqanle	433118	31724	525	30.12.85	84	40 60	52 72	24.2	910	740	P	Screen 78 - 84		CD
B 110	Dhejtile	430800	30700	420	18.03.86	90	54 72	66 78	37			A		0	
B 112	Bottis	432342	25142	462	22.03.86	96	34 62	46 74	35			P		0	
B 114	Eeg	432712	30206	0	00.01.00	0						D		0	

Total: 94

Key:

M	Wells with diesel pump	16	17%
H	Wells with hand pump	13	14%
W	Wells with windmill	1	1%
A	Wells awaiting pump	12	13%
P	Wells awaiting pump test	7	7%
E	Exploratory boreholes	44	47%
D	Under construction	1	1%

PT - Pumptest Data Available
CD - Chemical Data Available
GL - Geophysical Log Available

Best Available Copy

APPENDIX A

BASIC WELL DATA: CENTRAL RANGE

Volume V. Appendix A: List of All CGDP Boreholes, Central Rangelands

Refer. number	Location	Map Coord's Long. (hhmmss)	Map Coord's Latit. (hmmss)N	Elevation (m)	Date Completed	Well Depth (m)	Screen depth 1: Start (m)	Screen depth 1: end (m)	Screen depth 2: Start (m)	Screen depth 2: end (m)	Static Water Level (m)	Specific conductivity umhos/cm	Total dissolved solids mg/l	Yield CuM/hr	Specific capacity CuM/hr/M	Pump depth (m)	Pump type	Remarks	PT	CD	GL
CR0	Afgoi	450910	20625	95	15.04.85	158	96	114			70.2	1950		5.45	0.35		A	Awaiting Pump	PT	CD	GL
CR43	Aborey 1	465112	35730	435	03.05.83	130	2	120									E	Not deep enough			GL
CR44	Afar Irdood	465124	35930	284	21.05.83	174	37.8	81									E	Not deep enough			GL
CR48	More Ari	460212	35130	180	23.06.83	102	60	96			36	3700					E	PVC casing rupt 45m			GL
CR47	Maxaas Jeejo 1	461005	44006	200	09.09.83	190	9	190									E	Dry, not deep enough			GL
CR49	Maxaas Jeejo 2	461036	44036	200	15.10.83	180	6	180									E	dry, not deep enough			GL
CR53	Aboorey 2	455048	35054	285	11.12.83	133	3	133									E	Aband. dry			GL
CR65	Aboorey 3	455048	35854	285	19.05.84	210	3	210									E	Aban.not deep enough			GL
CR67	Warqaloh	473112	61548	205	25.07.84	252	165 178	177 252			100	3200	3156	11.4		134	H	In use	PT	CD	GL
CR72	Afgaduudle	435812	55730	125	17.11.84	204					17	12000	5245				E	Aband. exc. salinity		CD	
CR78	Dajimaale	481300	61830	110	19.01.85	177	56.8 86.8	68.8 176			69.6	4800	6720	12.5	8.33	90	M	In use	PT	CD	
CR81	Budbud	484042	61036	70	11.03.85	60	24	60			25.9	12000	10128	0.65	0.03	40	H	In use	PT	CD	
CR82	Saadaal	473048	40642	50	25.04.85	75	46	73			40.1	6100	4352	10.3	0.93	54	H	In use	PT	CD	
CR84	Cagacadde	472260	42442	360	02.06.85	133											E	Aband.			GL
CR86	Xasan Afrax	470736	40742	290	30.05.85	200											E	Aband. dry			GL
CR87	Calyabaal	470560	35818	229	09.07.85	250	216	240			220						E	Low yield,obser.well			GL

Best Available Copy

Volume V. Appendix A: List of All CGDP Boreholes, Central Rangelands

CR89	Xarardheere	475118	43918	235	20.07.85	28	15	21	13.5	2800				21	H		CD E
CR93	Calytun	471842	44654	185	23.10.85	114	78	113	82.6	6600	3996	6	0.35	108	M	Backfilled from 122m PI	CD
CR100	Darr Shadoor	471512	35542	55	00.01.00	50				32000	23192				E	Aband. high salinity	CD
CR108	Duracley	471148	50342	160	18.01.86	230									E	Aband. dry	
CR107	More Arie 2	460236	35130	180	10.03.86	110	74	104	69					90	M	0	
CR111	Hobbio NR4	483130	52042	12	04.03.86	11	7	11	7						A	Saline water	
CR113	Hobbio 2	433106	52112	17	22.03.86	19	13	19	17						A	.0	
CR115	Bulo Burde Nurse	453448	35000	140	00.01.00	54									D	0	

Total: 24

Key:			
M	Wells with diesel pump	4	17%
H	Wells with hand pump	3	13%
W	Wells with windmill	0	0%
A	Wells awaiting pump	3	13%
P	Wells awaiting pump test	0	0%
E	Exploratory boreholes	13	54%
D	Under construction	1	4%

PI - Pumptest Data Available
CD - Chemical Data Available
GL - Geophysical Log Available

Best Available Copy

APPENDIX B

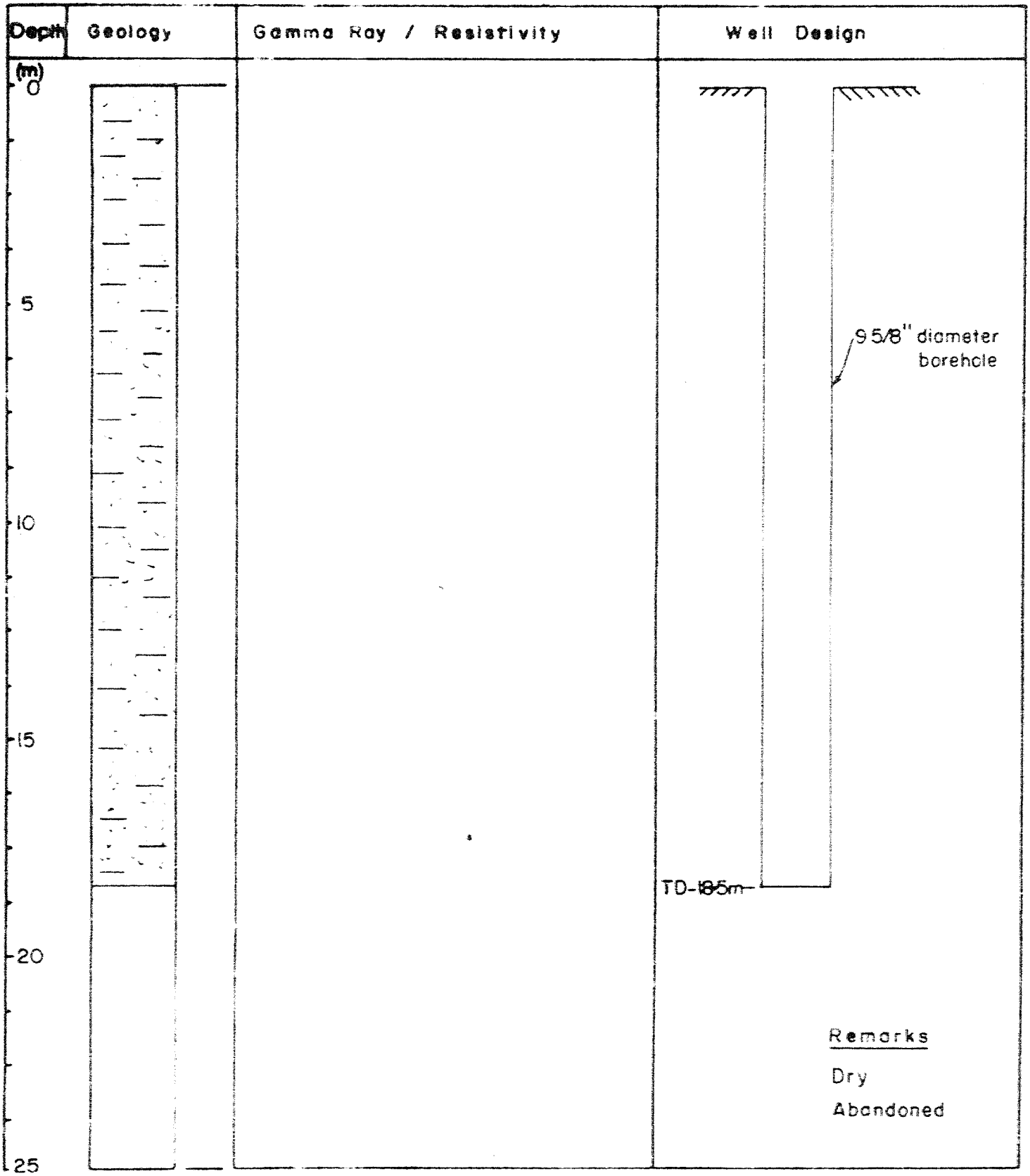
AS-BUILT DRAWINGS AND LOGS OF BOREHOLES: BAY REGION

Water Development Agency

Well Nº 1

CGDP - 104 Bay Region Well

Location Bonkay I



LEGEND

Clay or Shale | Sand | Limestone | Marl

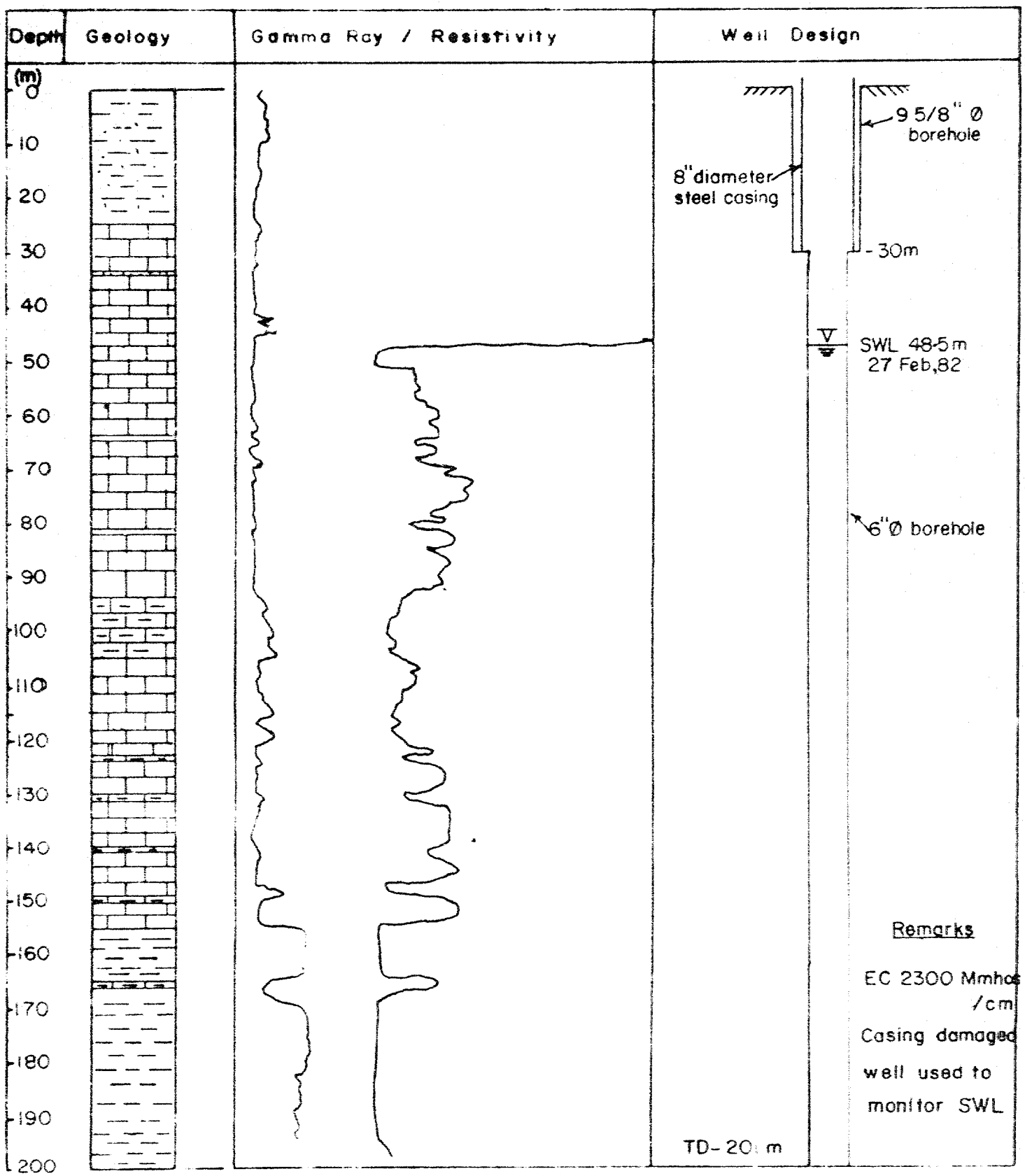
Clayey Sand | Sandstone | Karst Limestone | Basement

Water Development Agency

Well Nº 2

CGDP - 104 Bay Region Well

Location Bonkay II



LEGEND

Clay or Shale | Sand | Limestone | Marl

Clayey Sand | Sandstone | Karst Limestone | Basement

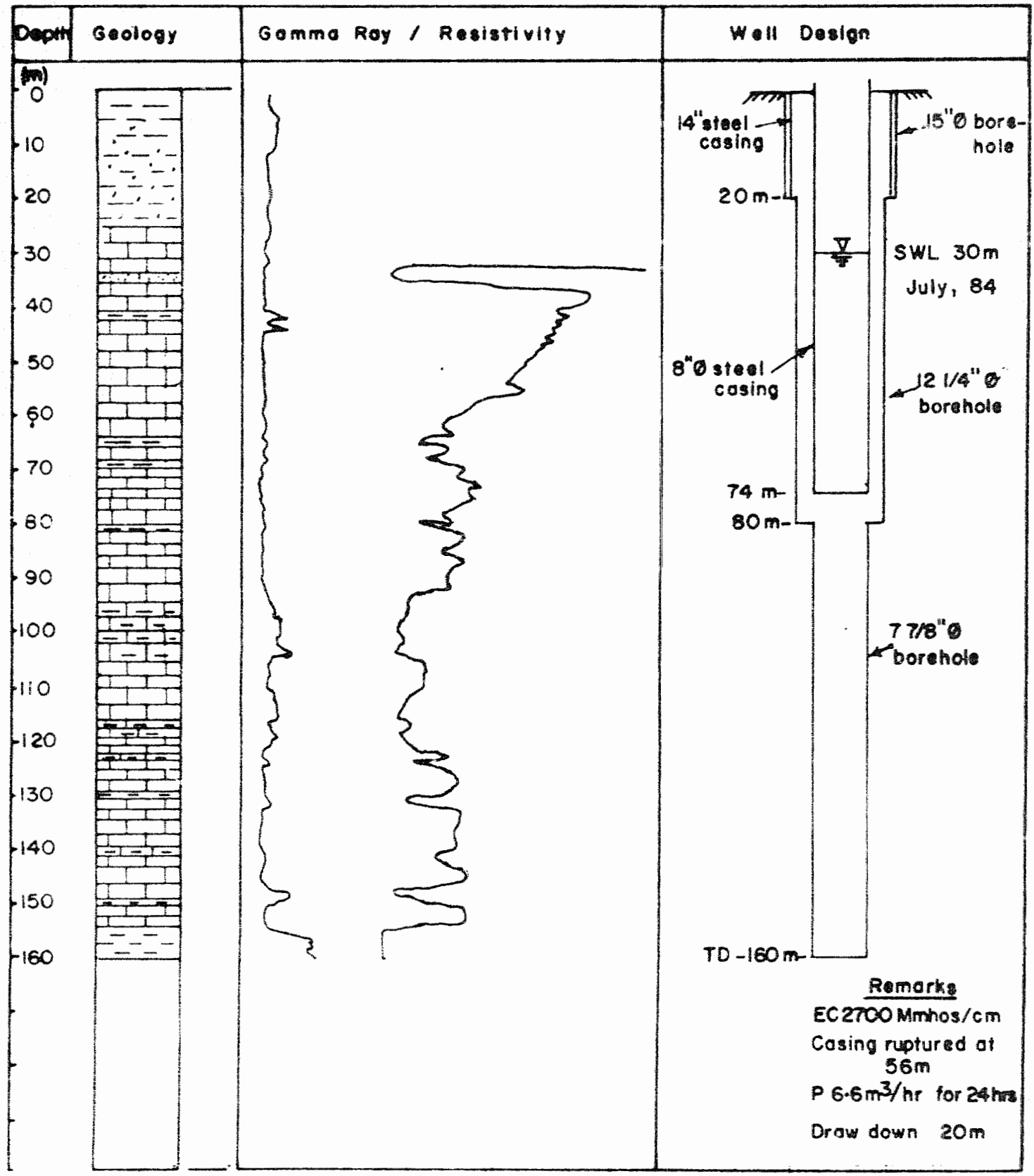
Water Development Agency

Well Nº 3

CGDP - 104

Bay Region Well

Location Bonkay III



LEGEND

Clay or Shale | Sand | Limestone | Marl

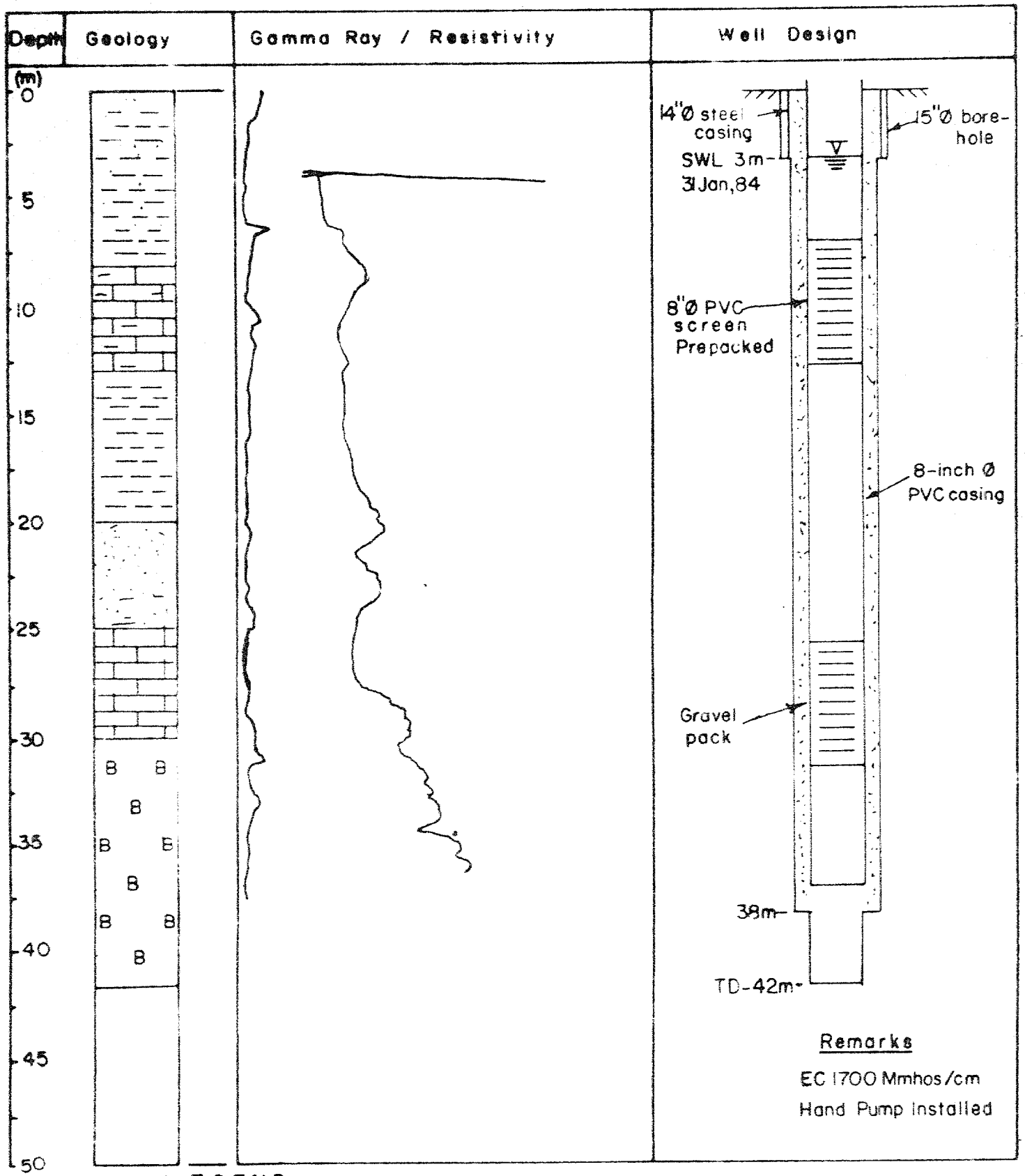
Clayey Sand | Sandstone | Karst Limestone | Basement

Water Development Agency

CGDP - 104 Bay Region Well

Well Nº 4

Location Tugerew I



LEGEND

Clay or Shale | Sand | Limestone | Marl

Clayey Sand | Sandstone | Karst Limestone | Basement

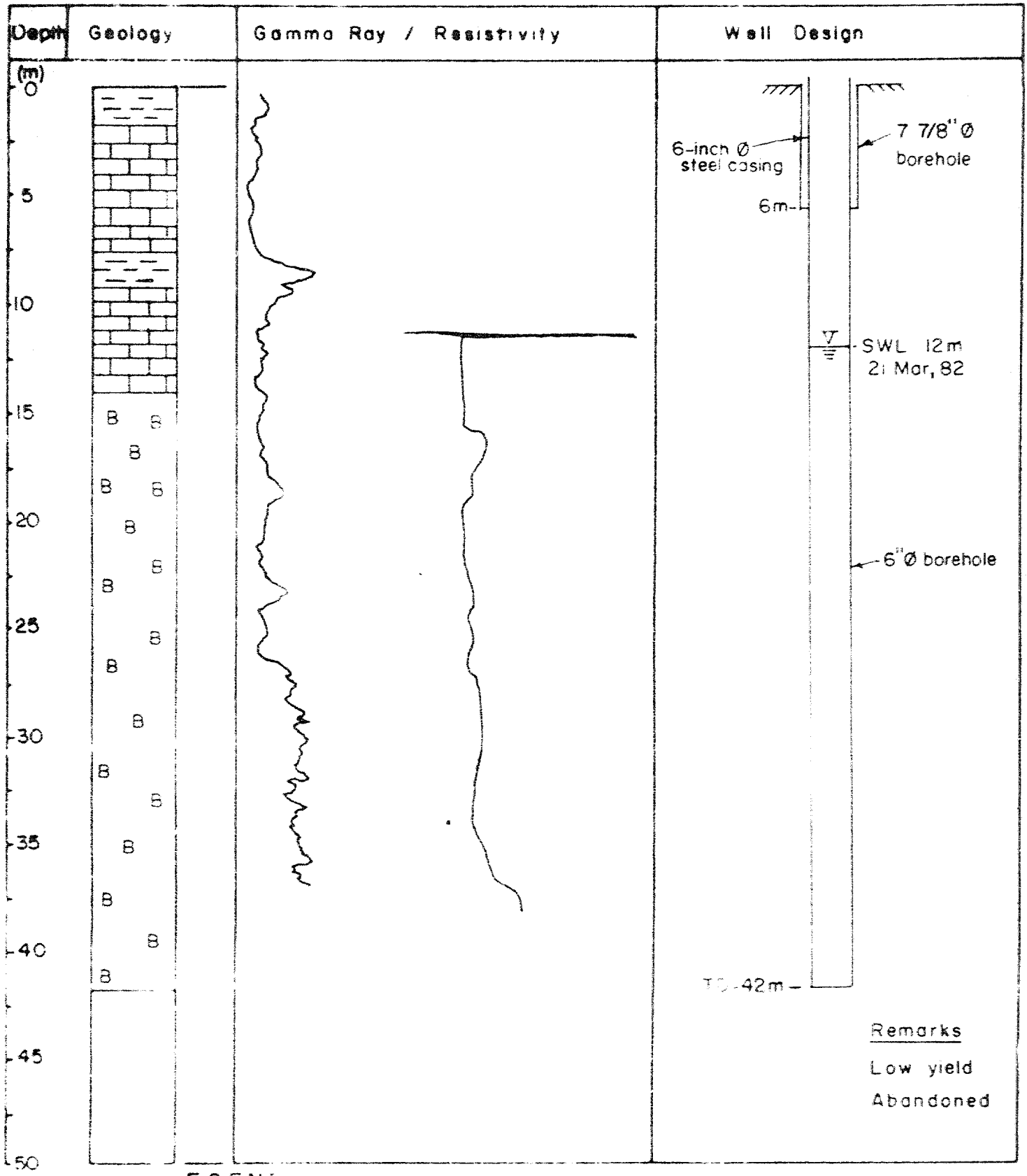
Water Development Agency

Well Nº 5

CGDP - 104

Bay Region Well

Location Gasarta



LEGEND

Clay or Shale | Sand | Limestone | Marl

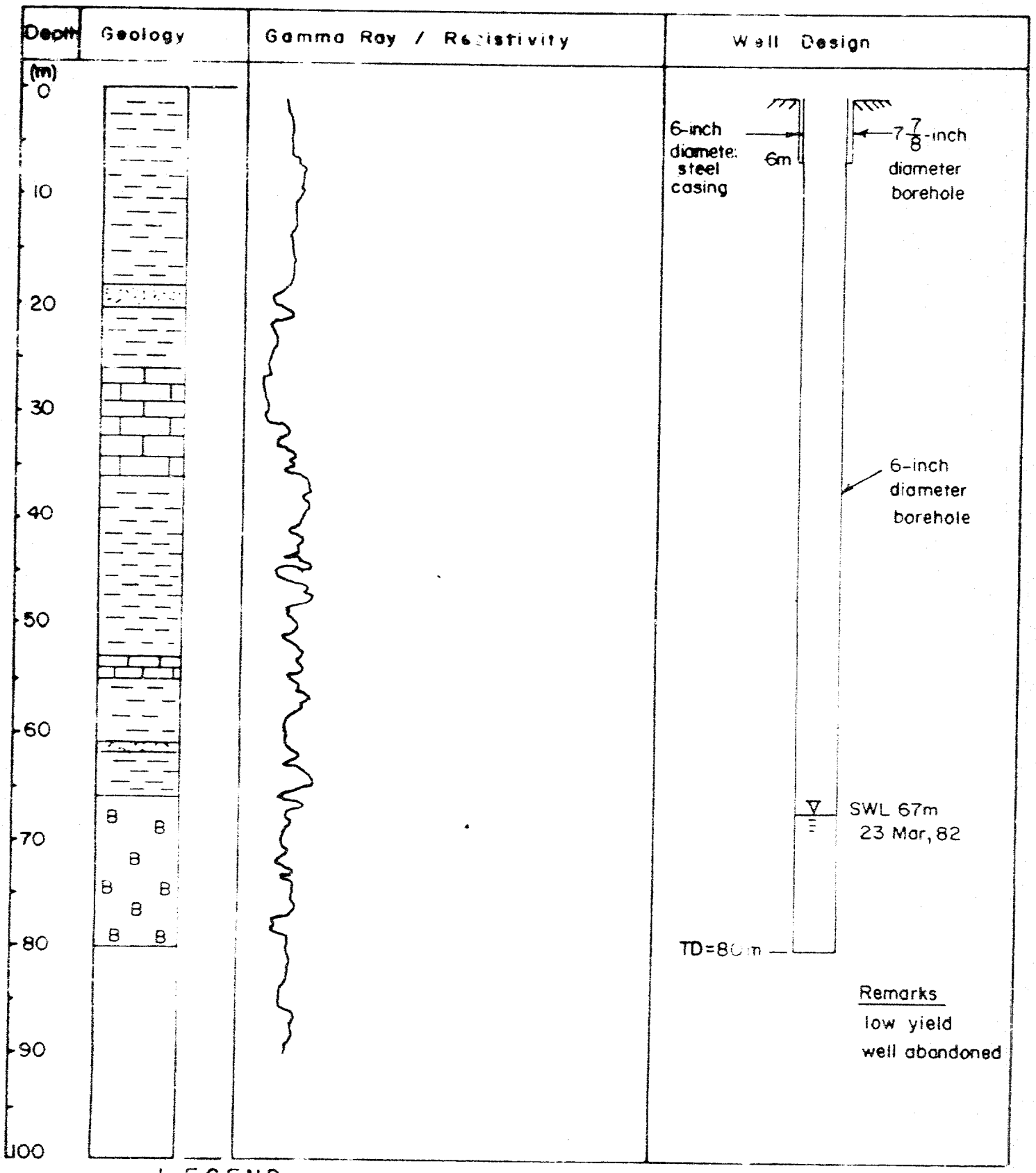
Clayey Sand | Sandstone | Karst Limestone | Basement

Water Development Agency

CGDP - 104 Bay Region Well

Well Nº 6

Location Waraji I



LEGEND

Clay or Shale | Sand | Limestone | Marl

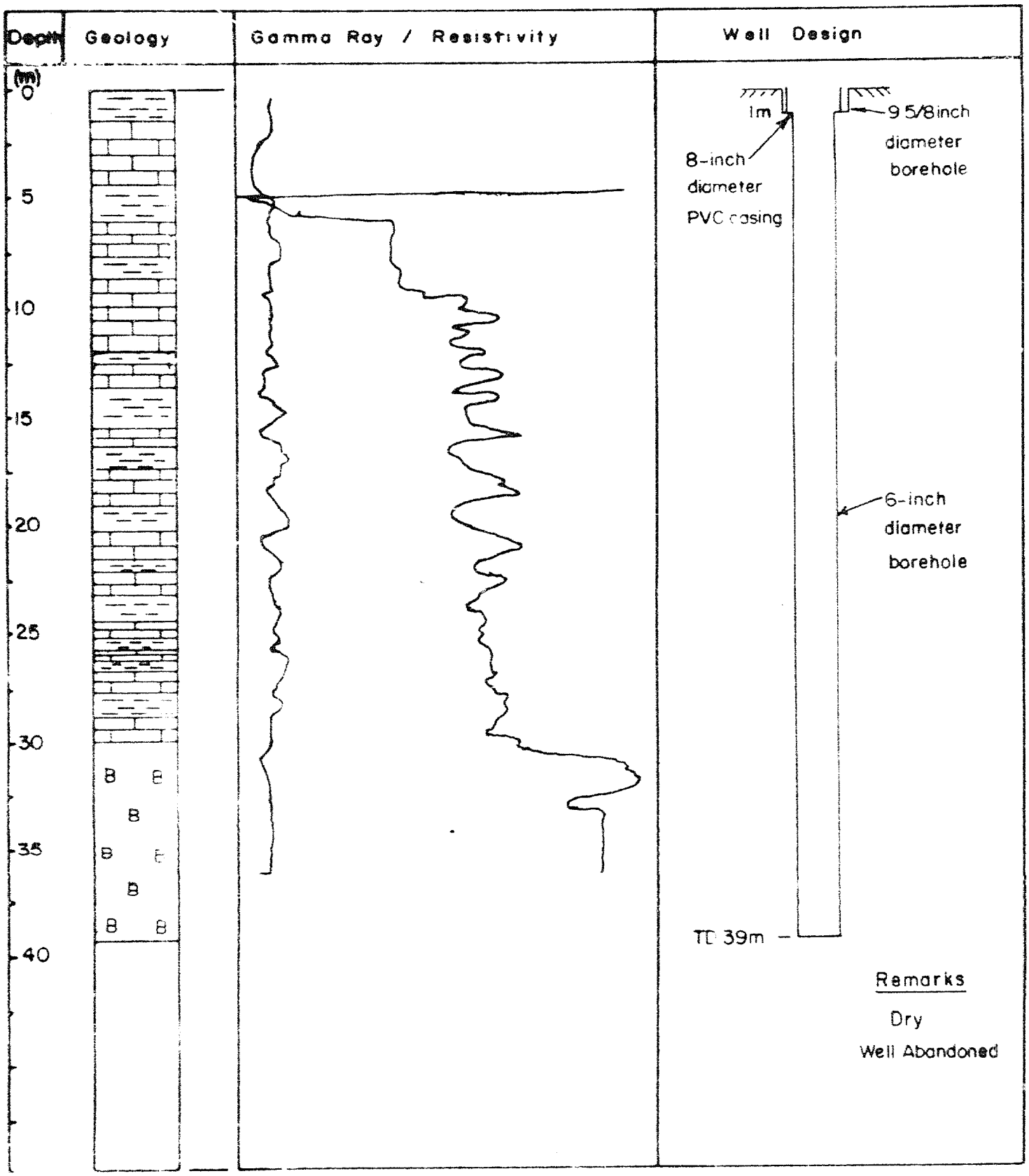
Clayey Sand | Sandstone | Karst Limestone | Basement

Water Development Agency

Well Nº 7

CGDP - 104 Bay Region Well

Location Waraji II



LEGEND

Clay or Shale | Sand | Limestone | Marl

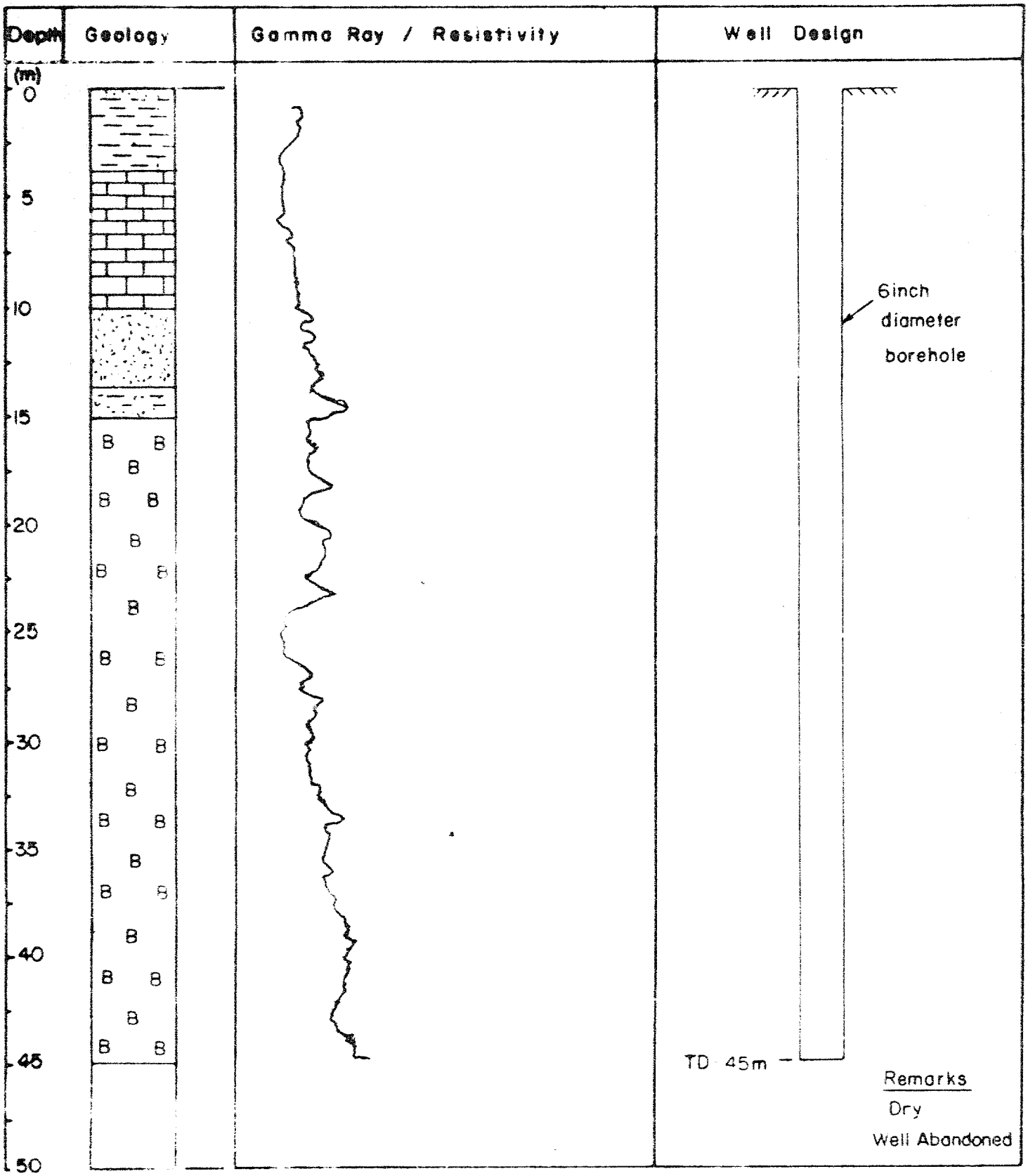
Clayey Sand | Sandstone | Karst Limestone | Basement

Water Development Agency

CGDP - 104 Bay Region Well

Well Nº 8

Location Tugerew II

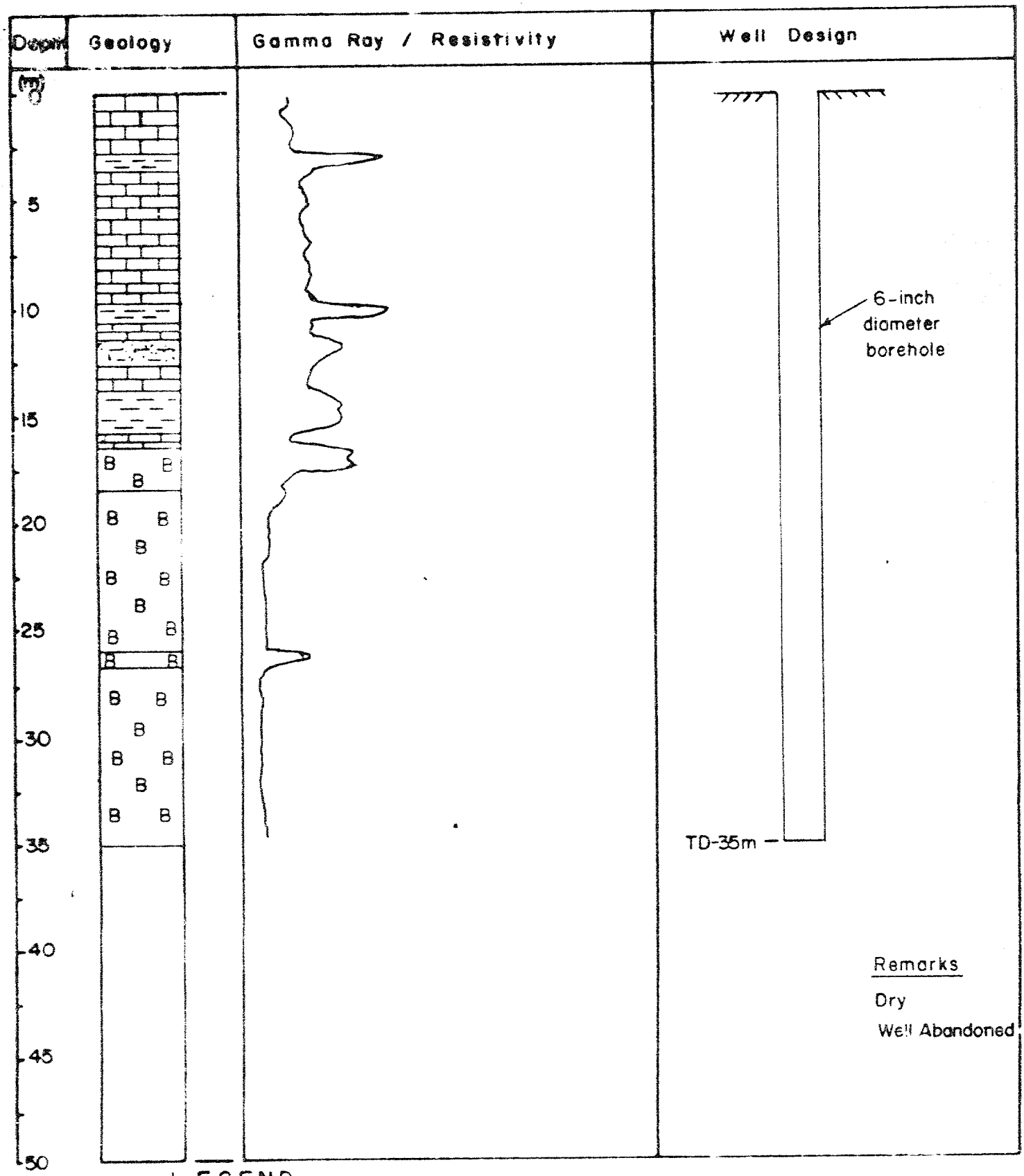


Water Development Agency

Well Nº 9

CGDP - 104 Bay Region Well

Location Bur Halab



LEGEND

Clay or Shale | Sand | Limestone | Marl

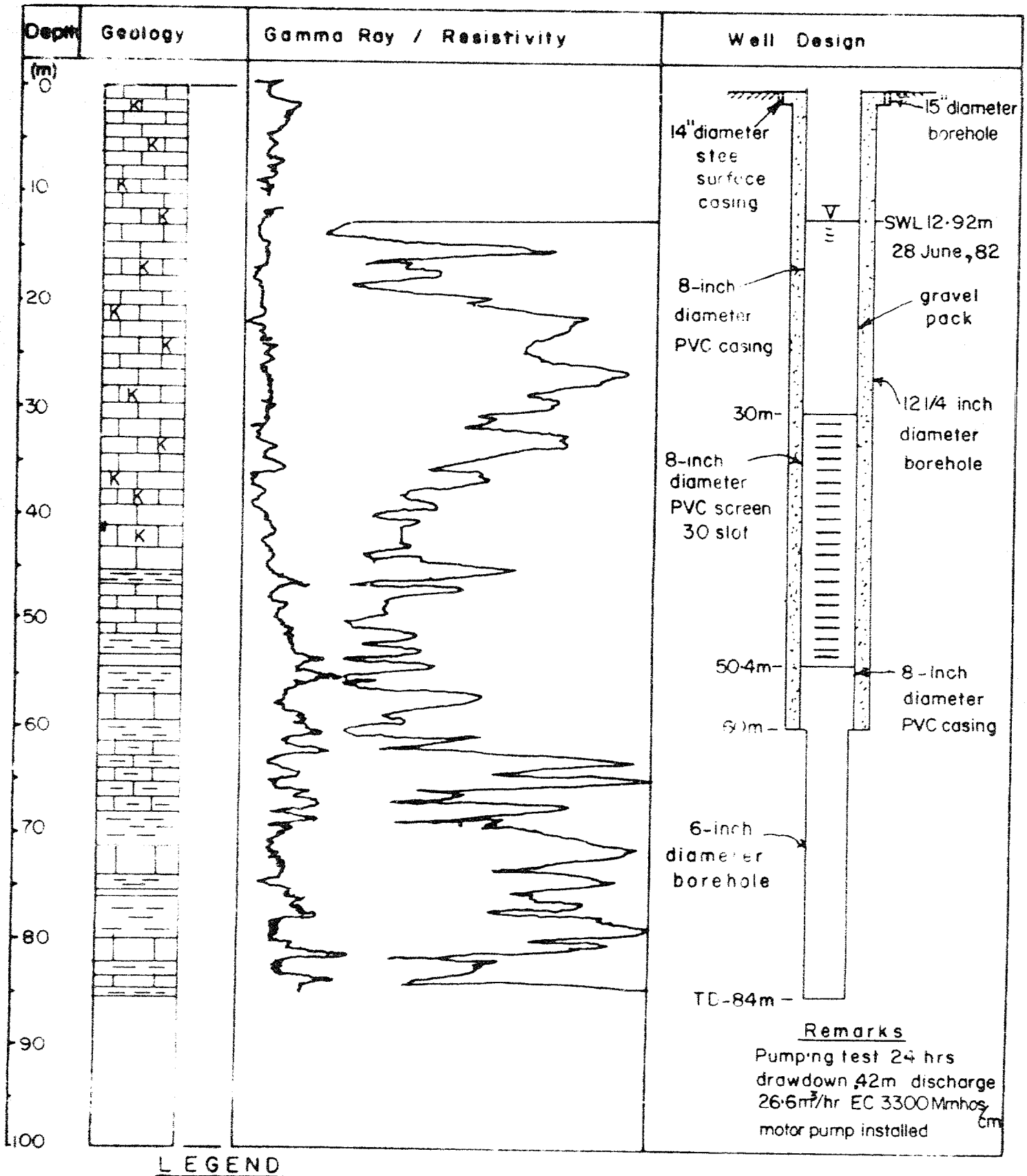
Clayey Sand | Sandstone | Karst Limestone | Basement

Water Development Agency

CGDP - 104 Bay Region Well

Well Nº 10

Location Sarmaan Dheere



LEGEND

Clay or Shale | Sand | Limestone | Marl

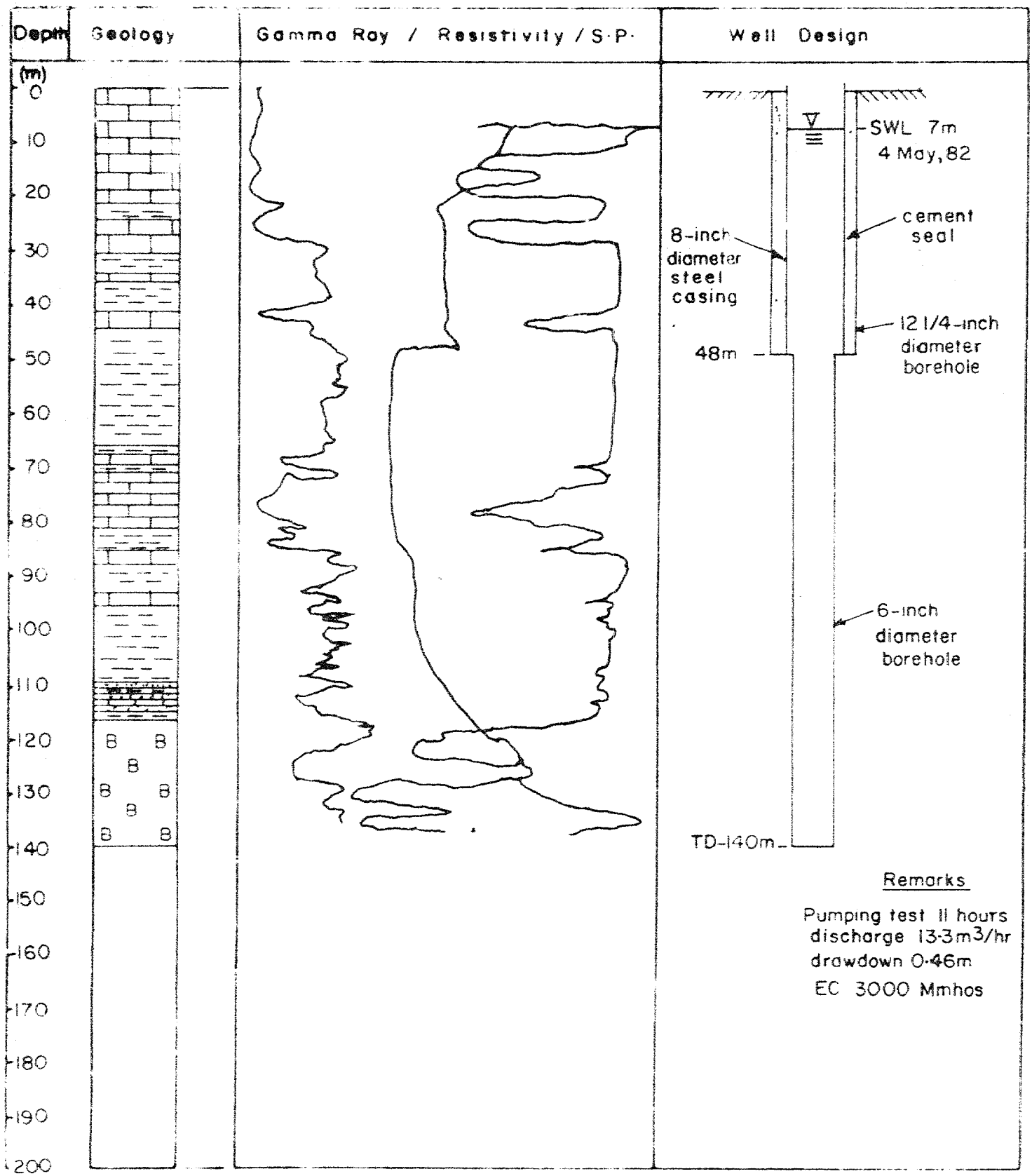
Clayey Sand | Sandstone | Karst Limestone | Basement

Water Development Agency

CGDP - 104 Bay Region Well

Well Nº 11

Location Baidoa Compound I



LEGEND

Clay or Shale | Sand | Limestone | Marl

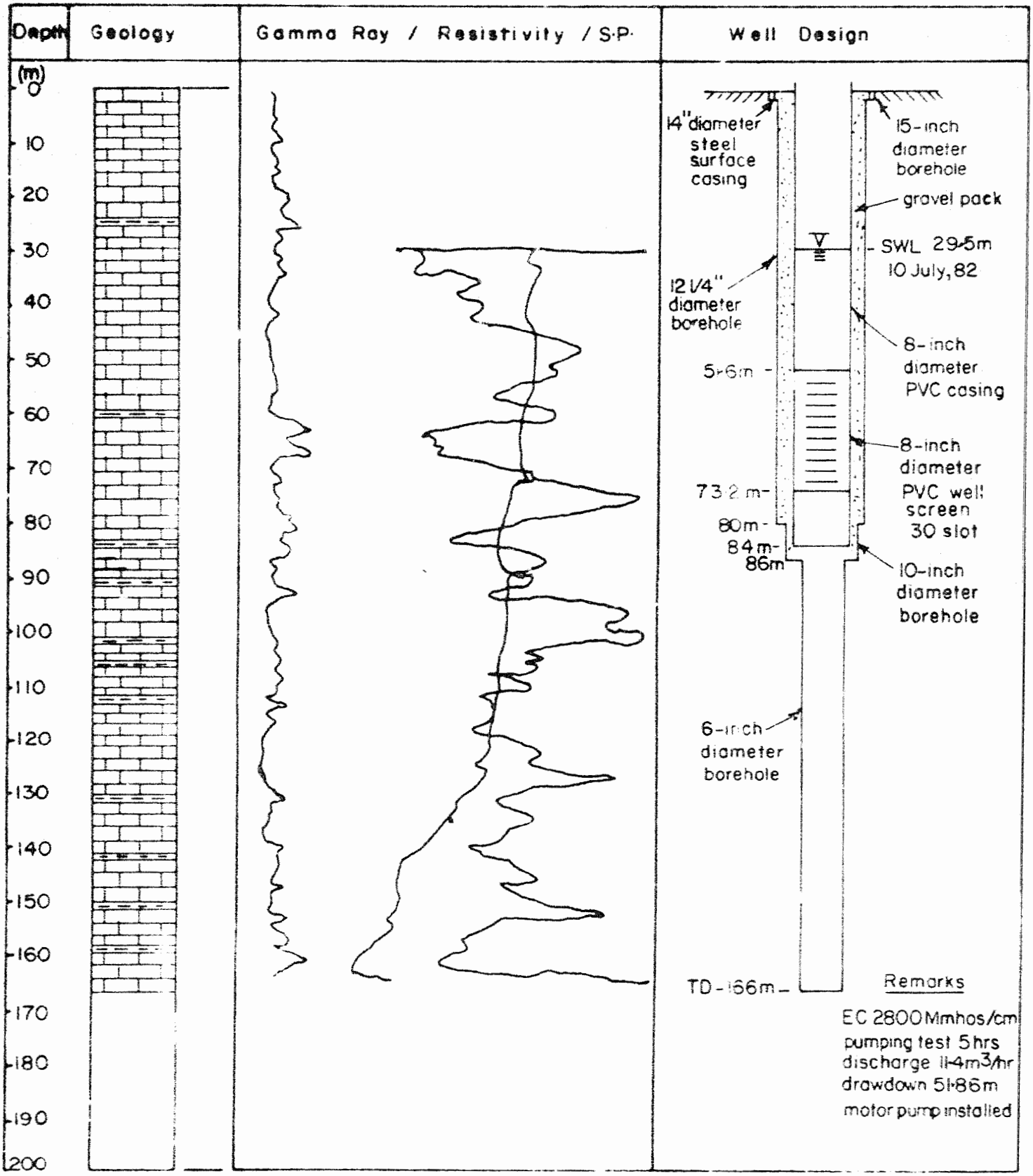
Clayey Sand | Sandstone | Karst Limestone | Basement

Water Development Agency

CGDP - 104 Bay Region Well

Well № 12

Location Hareero Jiifo



LEGEND

Clay or Shale | Sand | Limestone | Marl

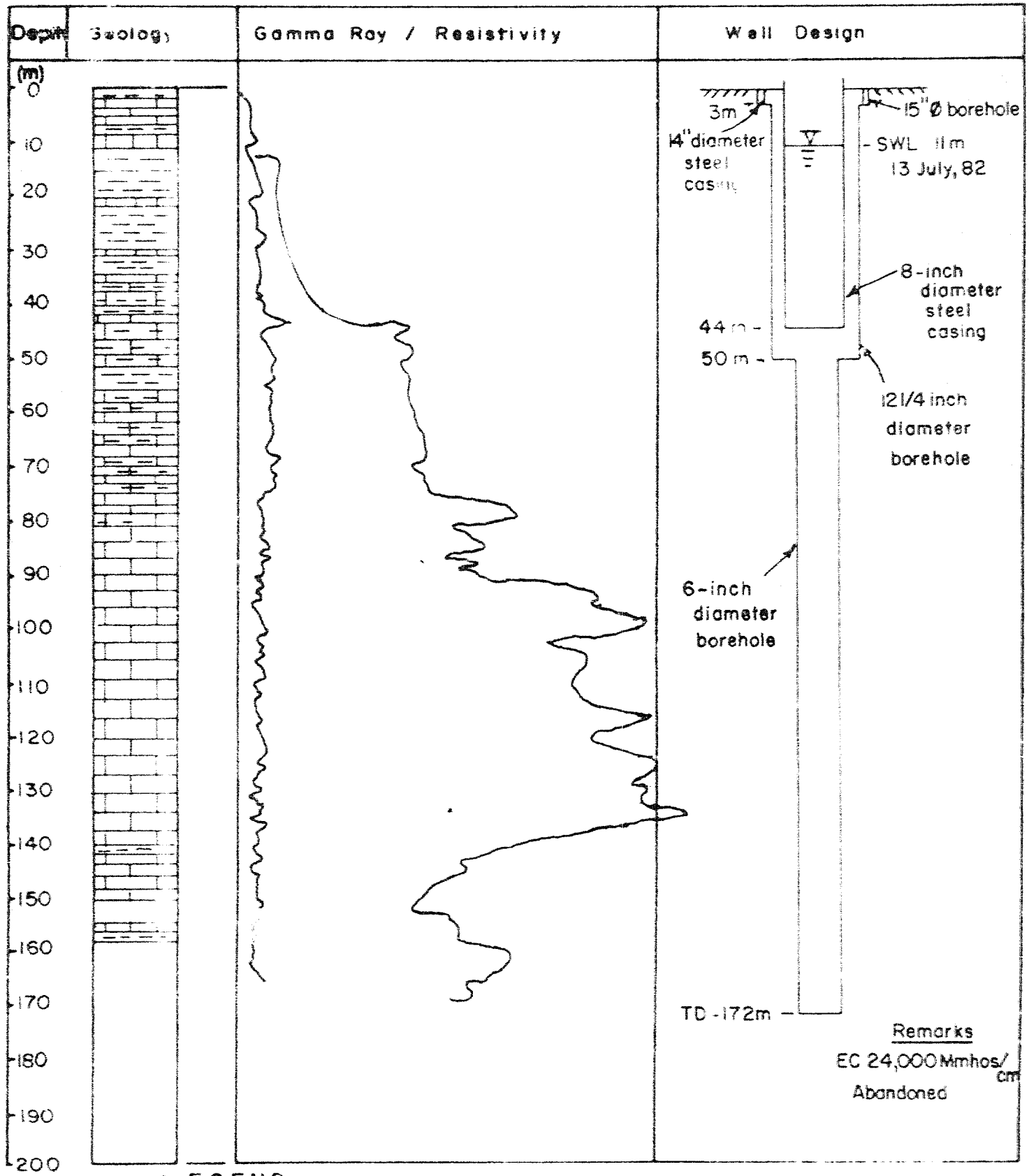
Clayey Sand | Sandstone | Karst Limestone | Basement

Water Development Agency

CGDP - 104 Bay Region Well

Well Nº 13

Location Shabelle Dugsilow



LEGEND

Clay or Shale | Sand | Limestone | Marl

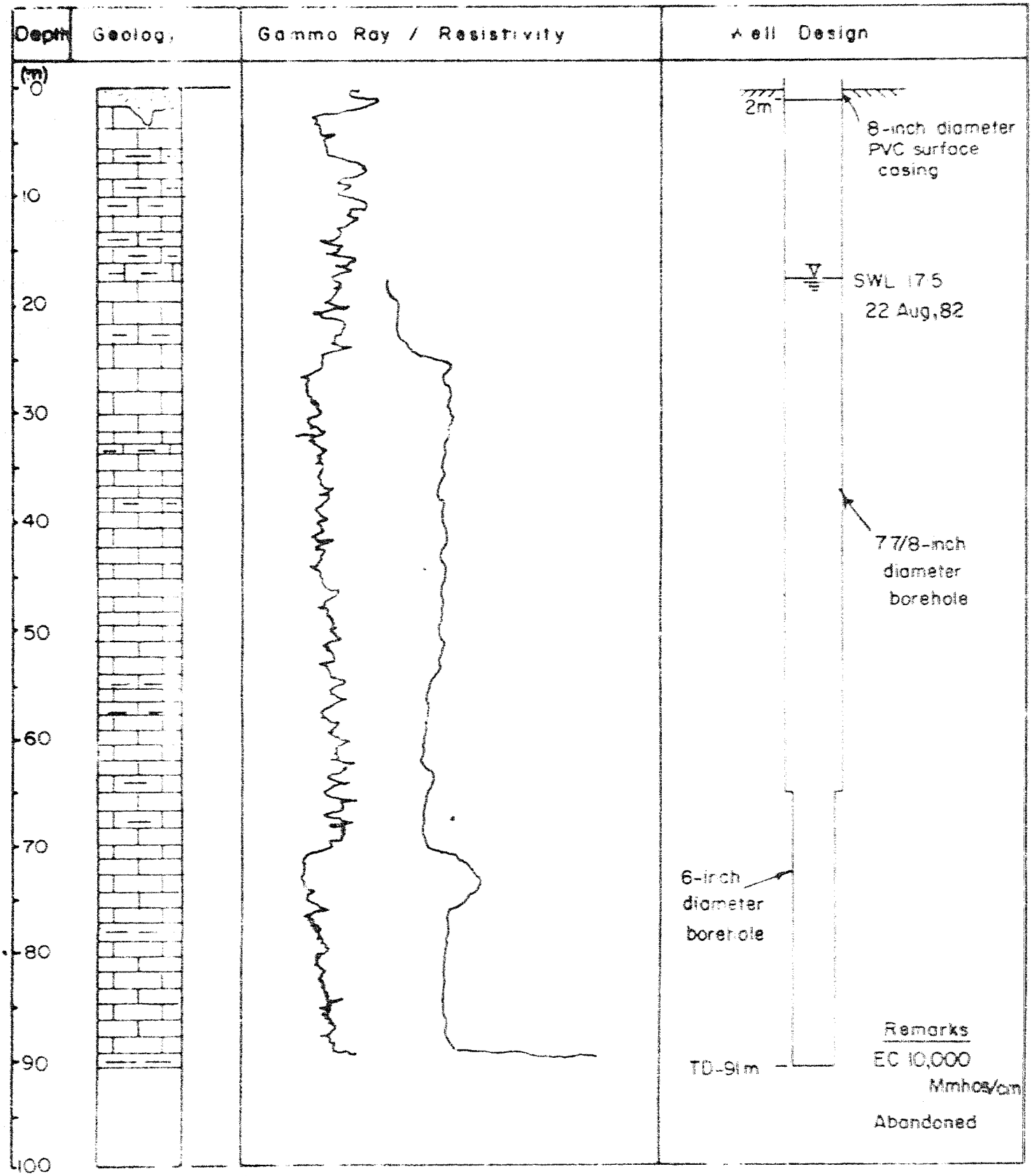
Clayey Sand | Sandstone | Karst Limestone | Basement

Water Development Agency

CGDP - 104 Bay Region Well

Well Nº 14

Location Warta Jaffay



LEGEND

Clay or Shale | Sand | Limestone | Marl

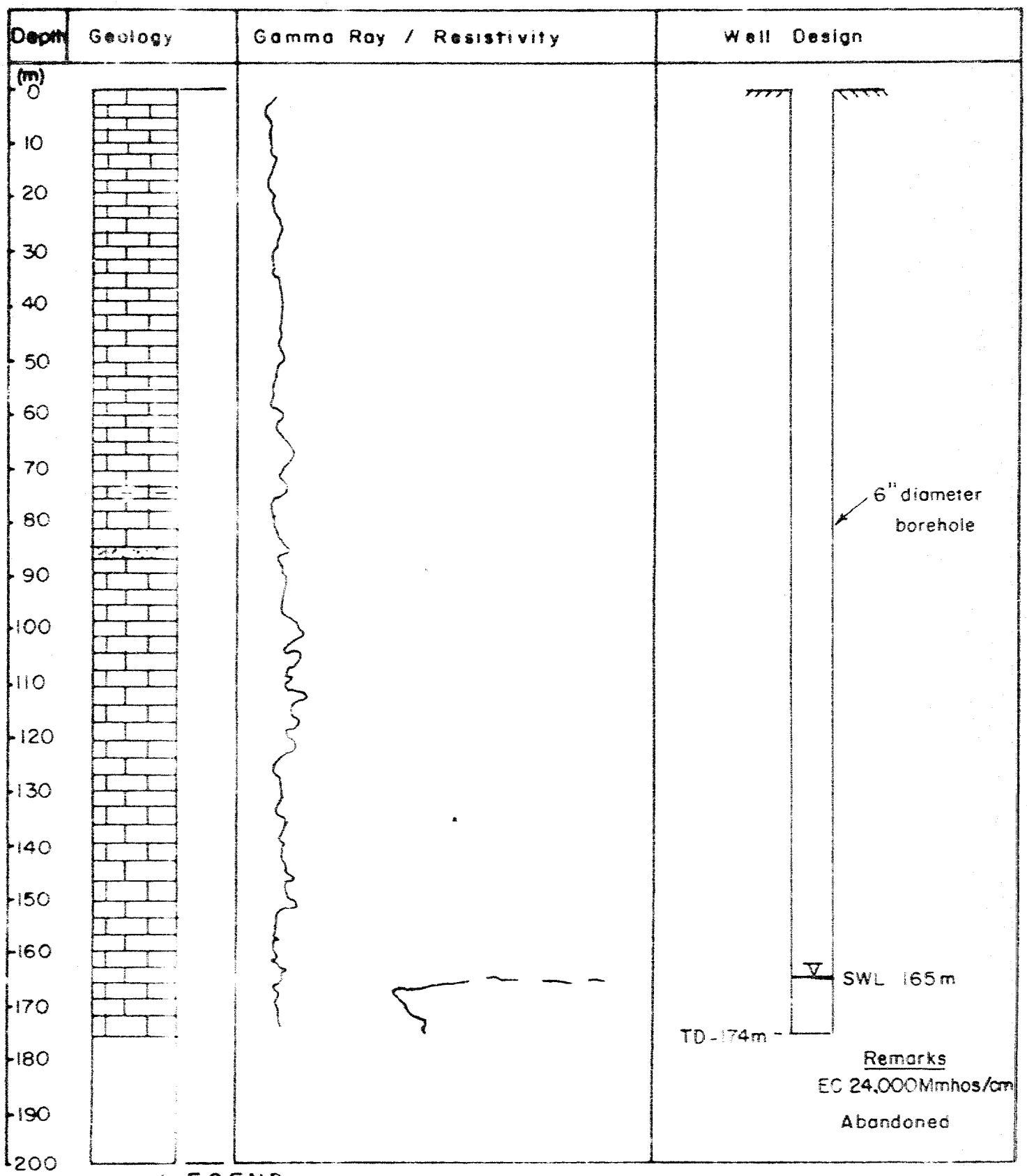
Clayey Sand | Sandstone | Karst Limestone | Basement

Water Development Agency

Well Nº 15

CGDP - 104 Bay Region Well

Location Qansax Omane



LEGEND

Clay or Shale | Sand | Limestone | Marl

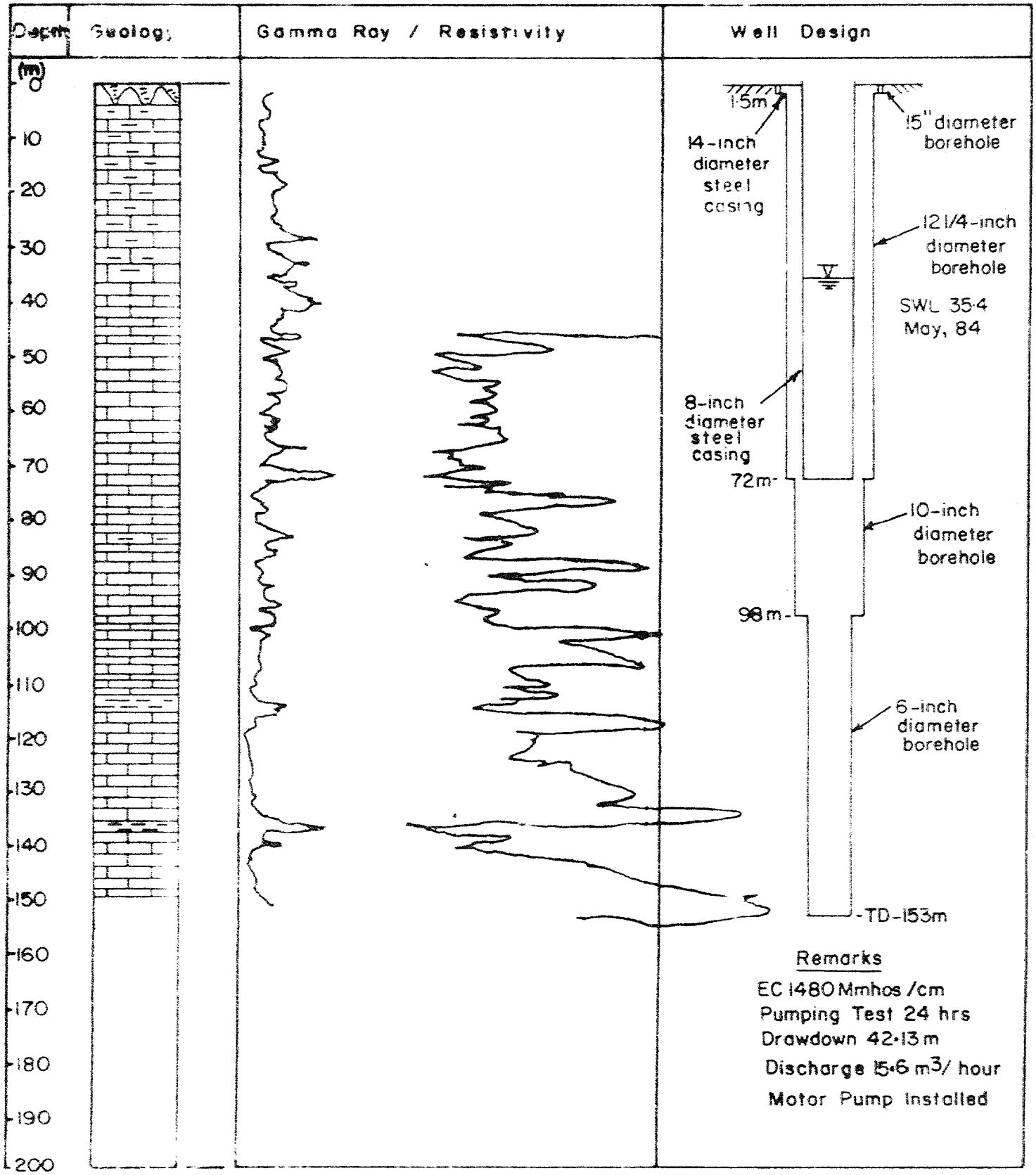
Clayey Sand | Sandstone | Karst Limestone | Basement

Water Development Agency

CGDP - 104 Bay Region Well

Well Nº 16

Location Taflow



LEGEND

Clay or Shale | Sand | Limestone | Marl

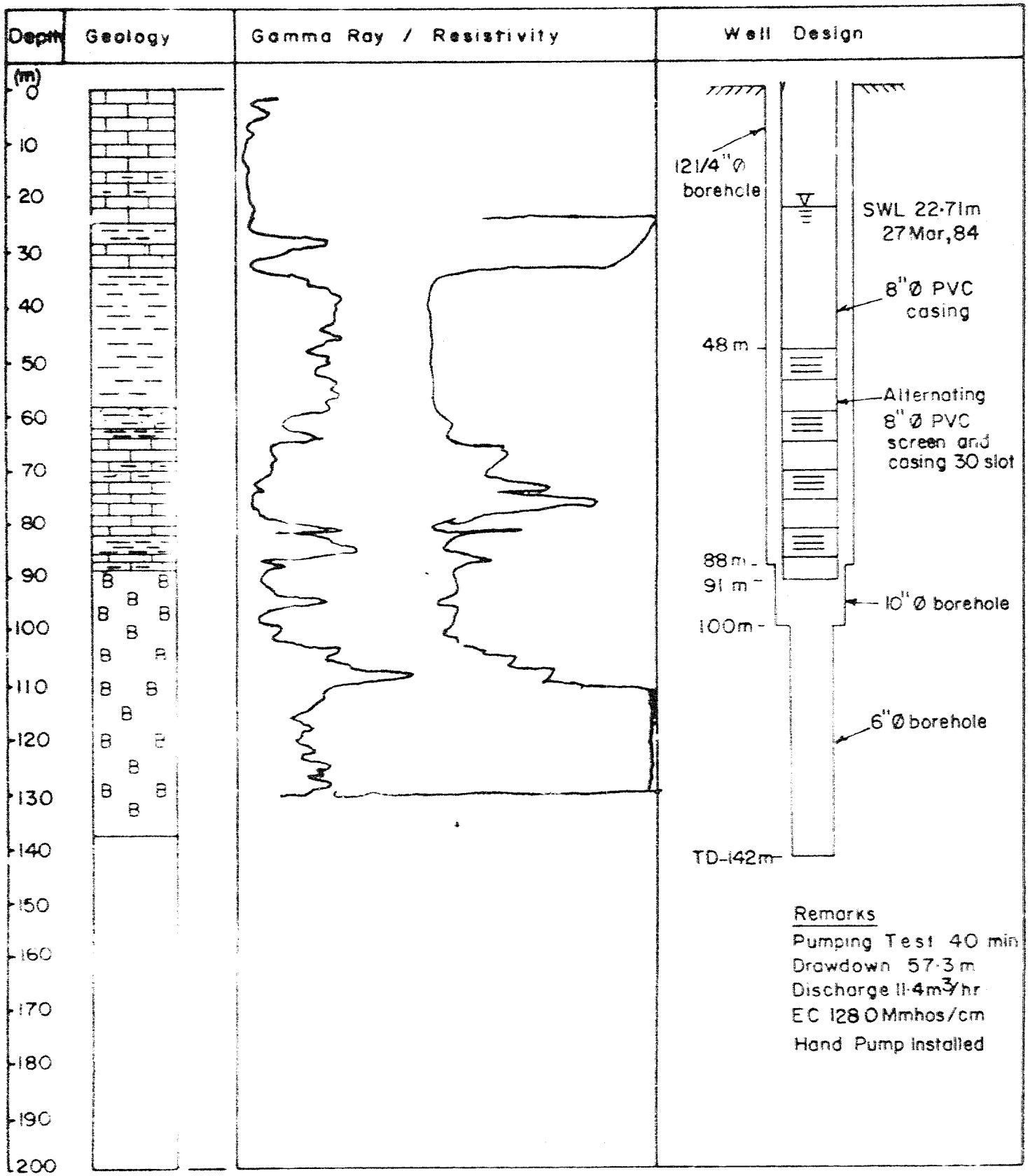
Clayey Sand | Sandstone | Karst Limestone | Basement

Water Development Agency

CGDP - 104 Bay Region Well

Well Nº 17

Location Roobey Gaduud



LEGEND

Clay or Shale | Sand | Limestone | Marl

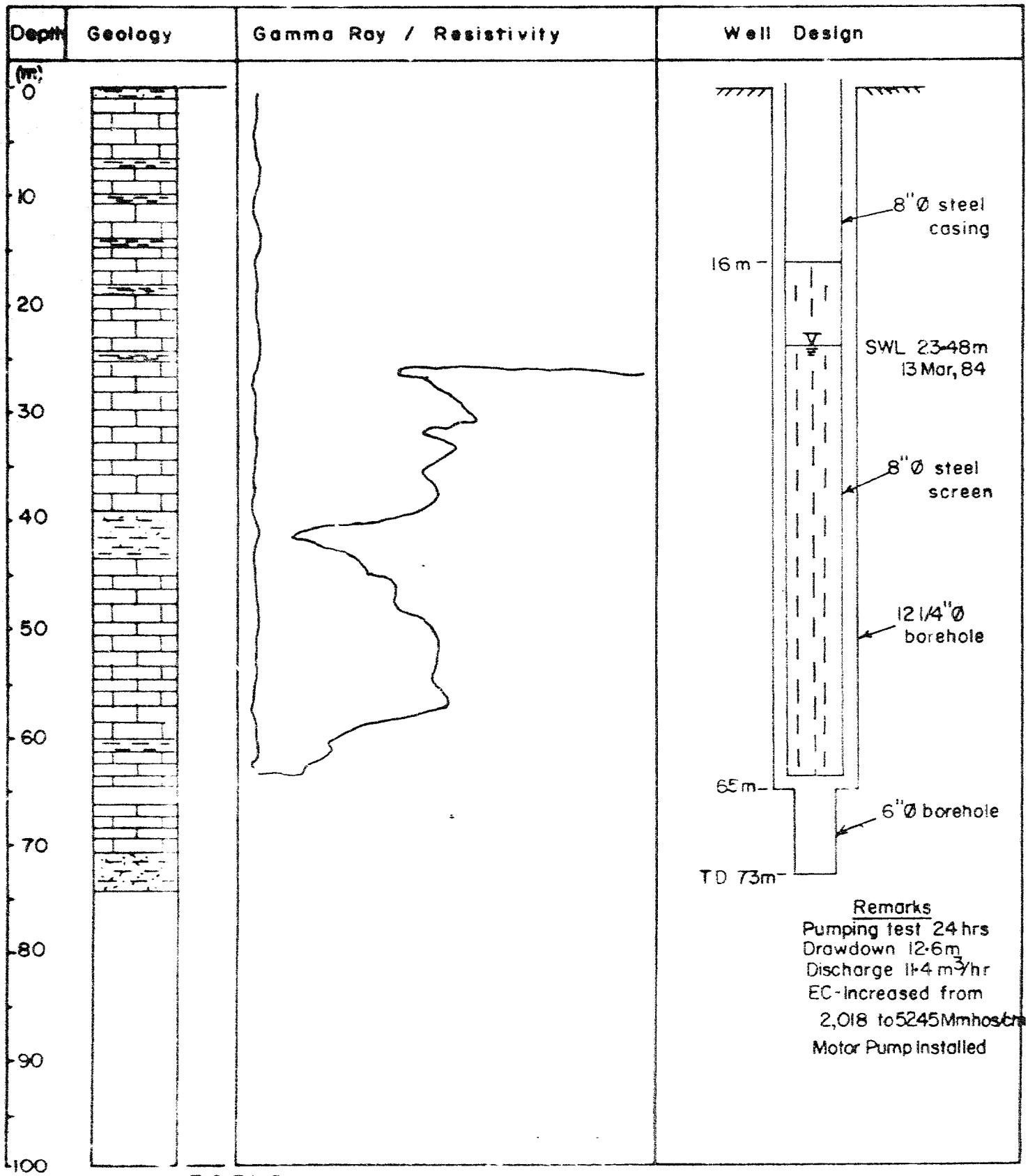
Clayey Sand | Sandstone | Karst Limestone | Basement

Water Development Agency

CGDP - 104 Bay Region Well

Well Nº 18

Location Gaduudo Dhunte



LEGEND

Clay or Shale | Sand | Limestone | Marl

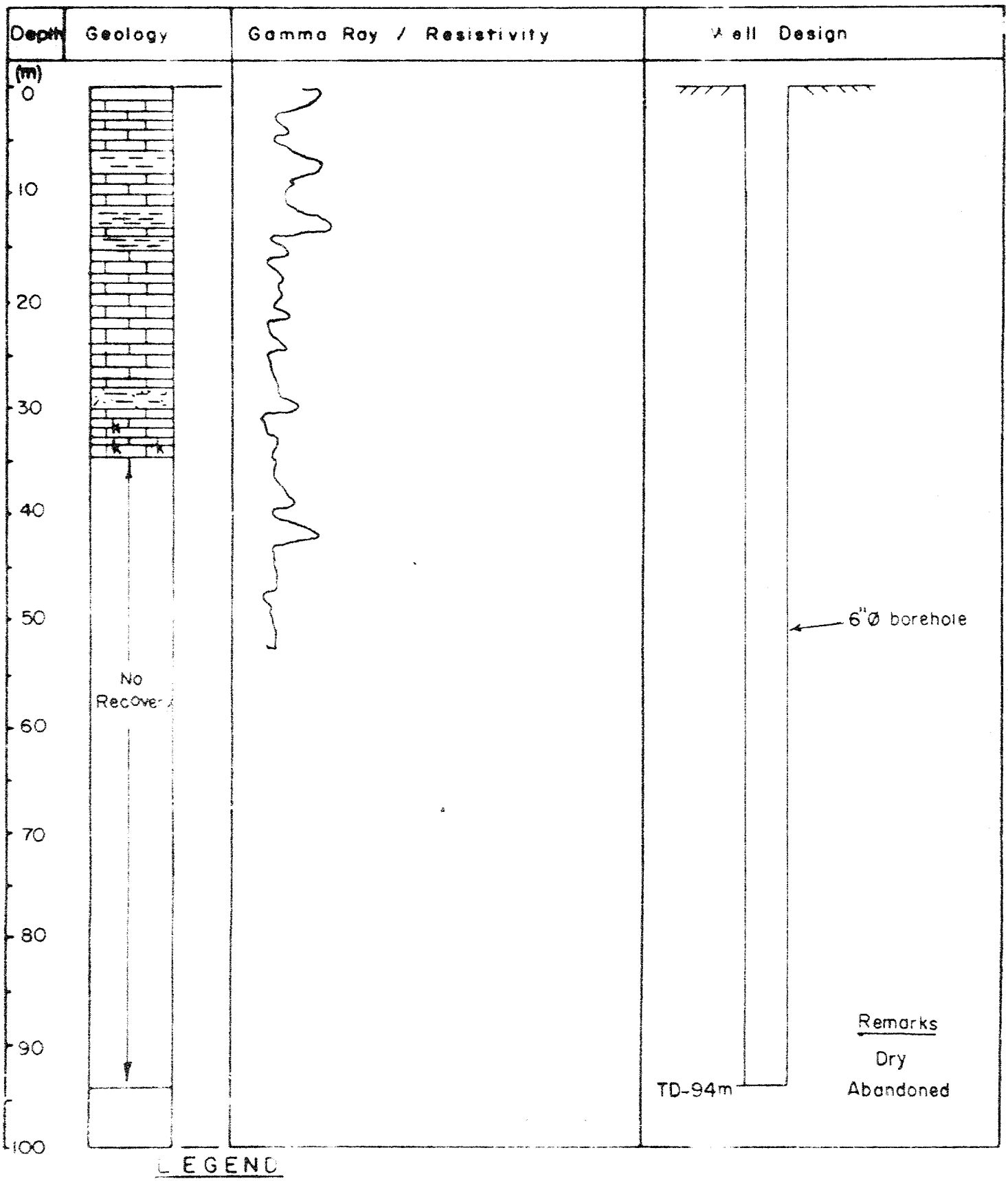
Clayey Sand | Sandstone | Karst Limestone | Basement

Water Development Agency

CGDP - 104 Bay Region Well

Well Nº 19

Location Buulo Fuur I

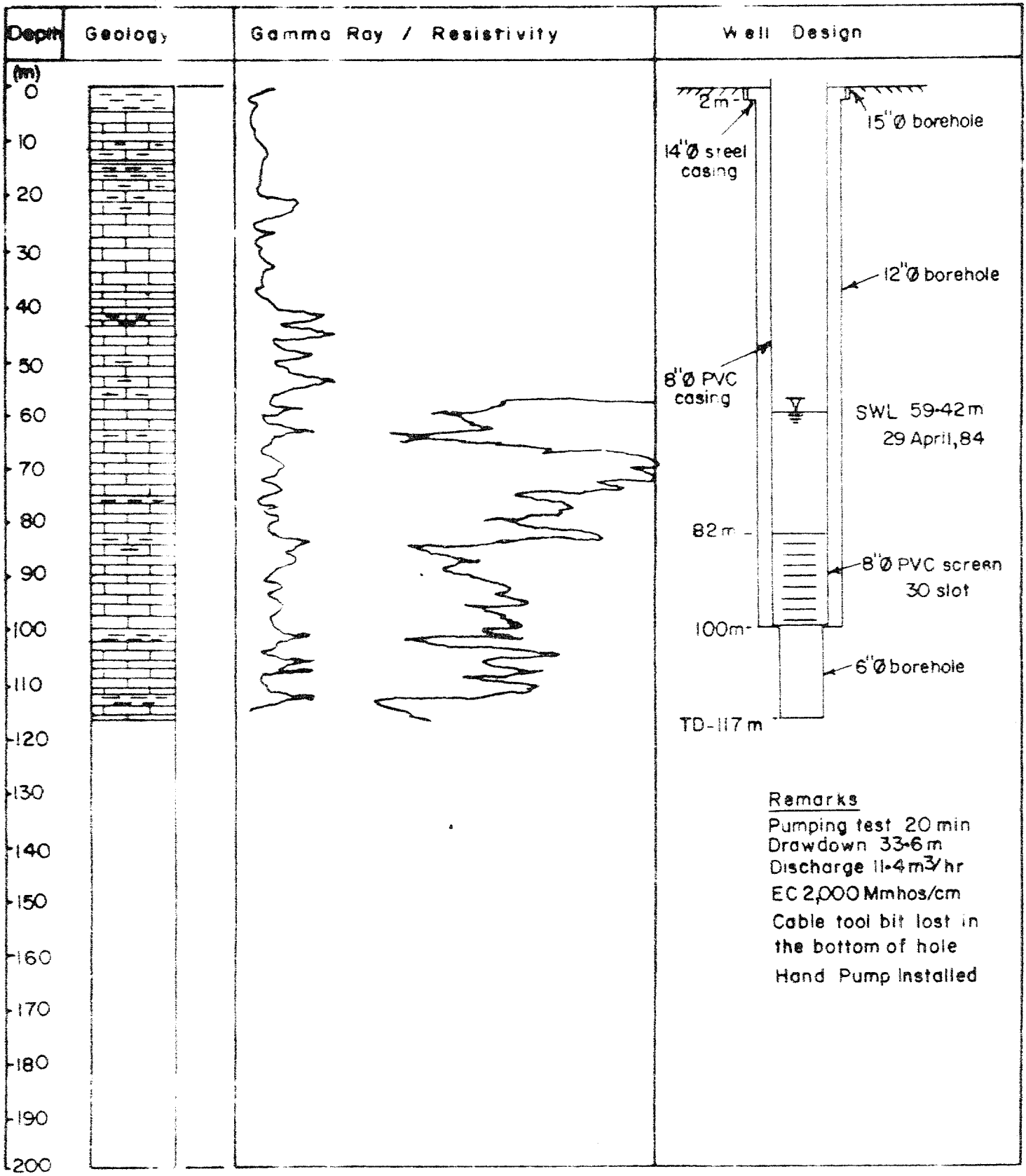


Water Development Agency

CGDP - 104 Bay Region Well

Well Nº 20

Location Durei Ali Galle



Remarks

Pumping test 20 min
Drawdown 33·6m
Discharge 11·4m³/hr
EC 2,000 Mmhos/cm
Cable tool bit lost in the bottom of hole
Hand Pump Installed

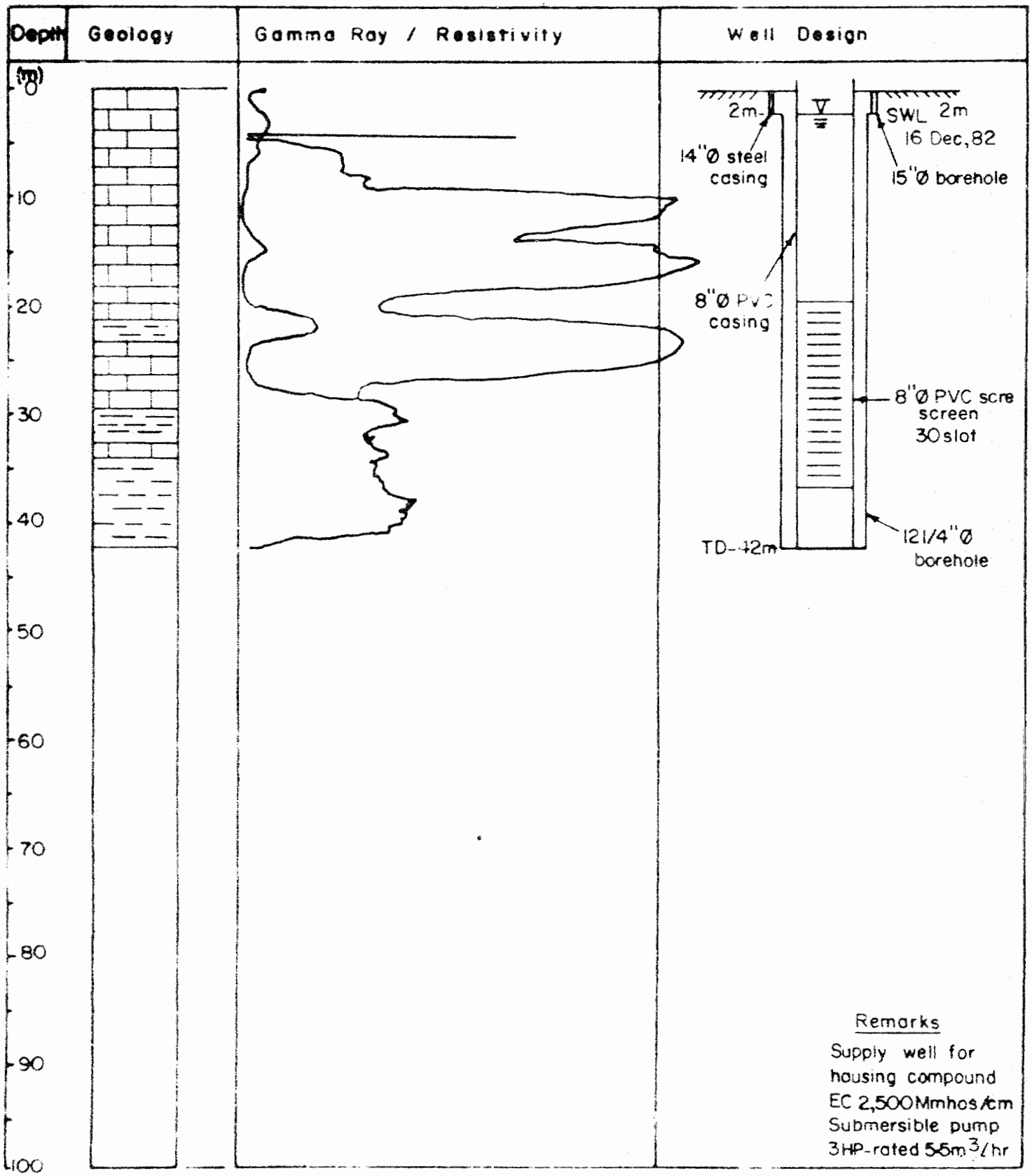
LEGEND

Clay or Shale | Sand | Limestone | Marl

Clayey Sand | Sandstone | Karst Limestone | Basement

Water Development Agency — **Well Nº** 21

CGDP - 104 — **Bay Region Well** — **Location** USAID-Compound Baidoa II



LEGEND

Clay or Shale — Sand — Limestone — Marl

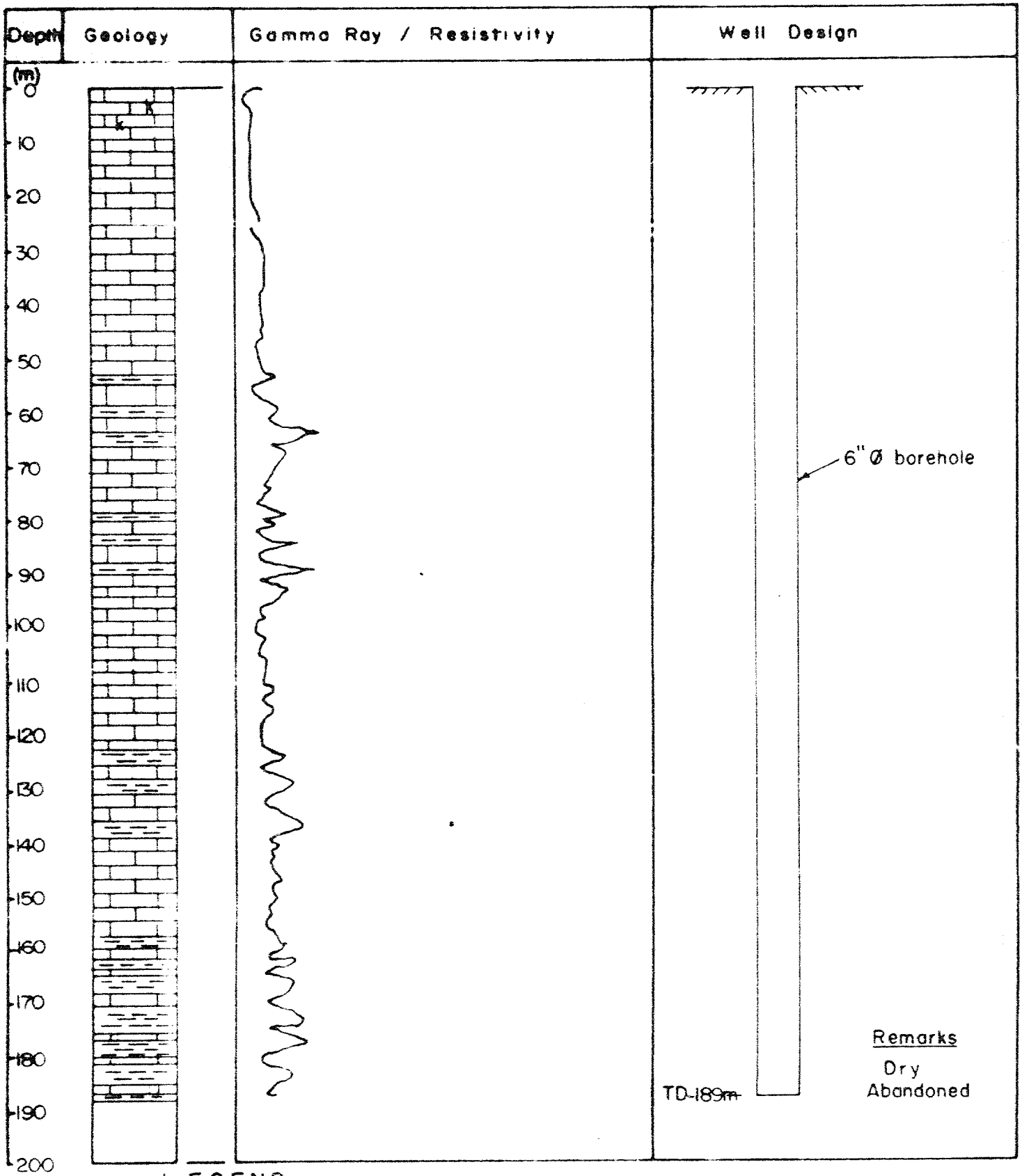
Clayey Sand — Sandstone — Karst Limestone — Basement

Water Development Agency

CGDP - 104 Bay Region Well

Well № 22

Location Buulo Gaduud



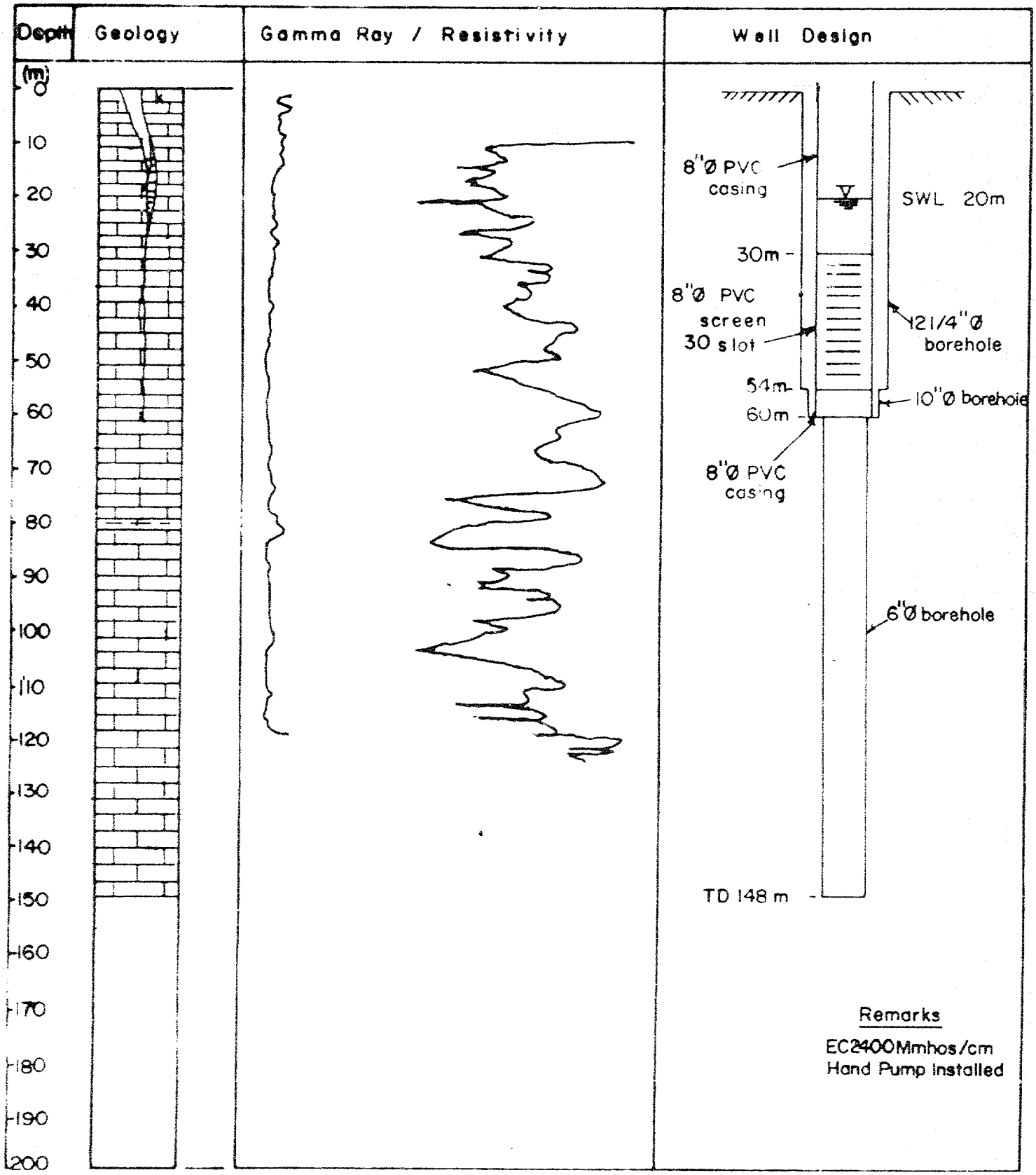
LEGEND

Clay or Shale | Sand | Limestone | Marl

Clayey Sand | Sandstone | Karst Limestone | Basement

Water Development Agency — **Well № 23**

CGDP - 104 — **Bay Region Well** — **Location Kurman**



LEGEND

Clay or Shale — Sand — Limestone — Marl

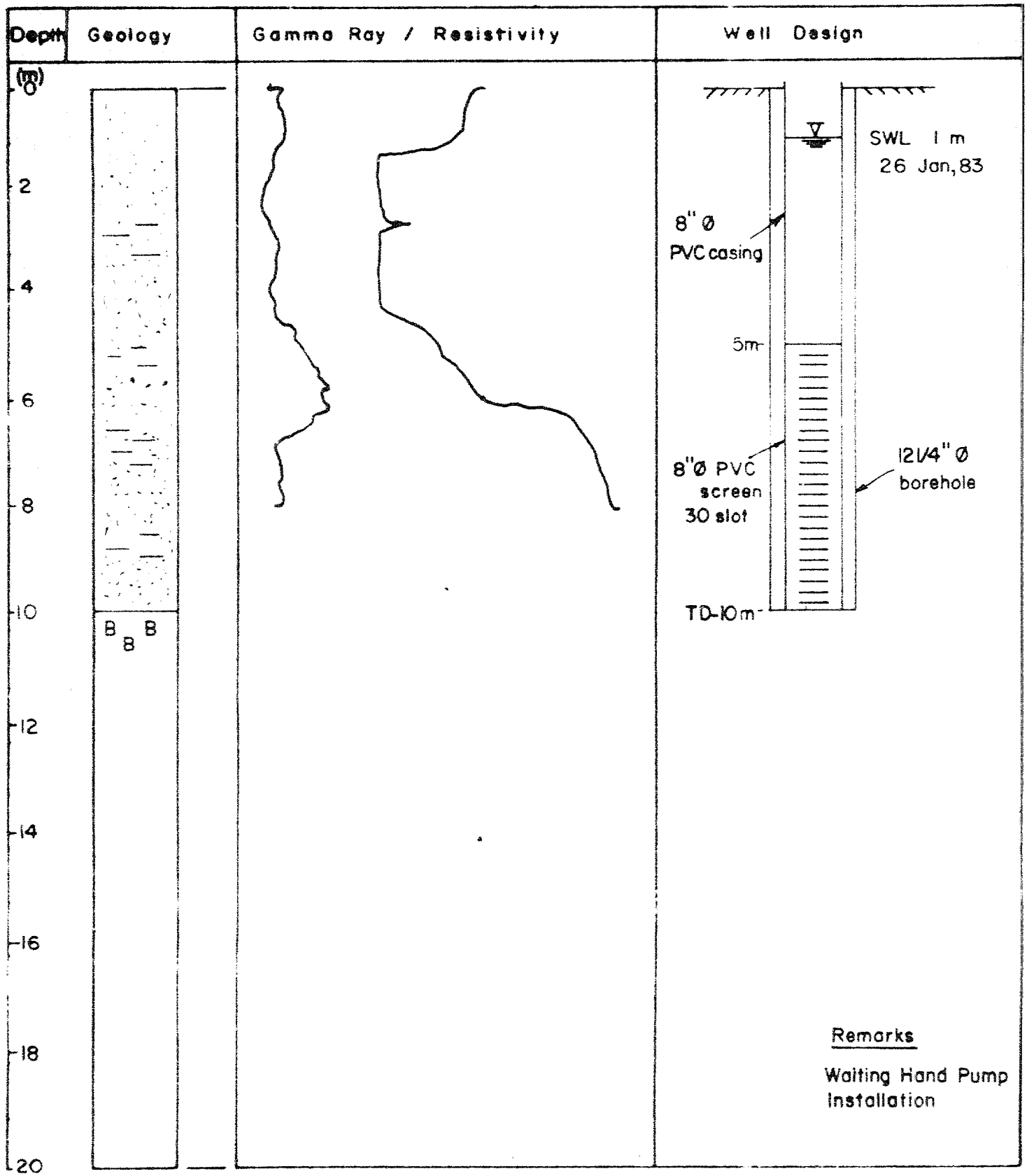
Clayey Sand — Sandstone — Karst Limestone — Basement

Water Development Agency

CGDP - 104 Bay Region Well

Well Nº 24

Location Yaaq Braawe



LEGEND

Clay or Shale | Sand | Limestone | Marl

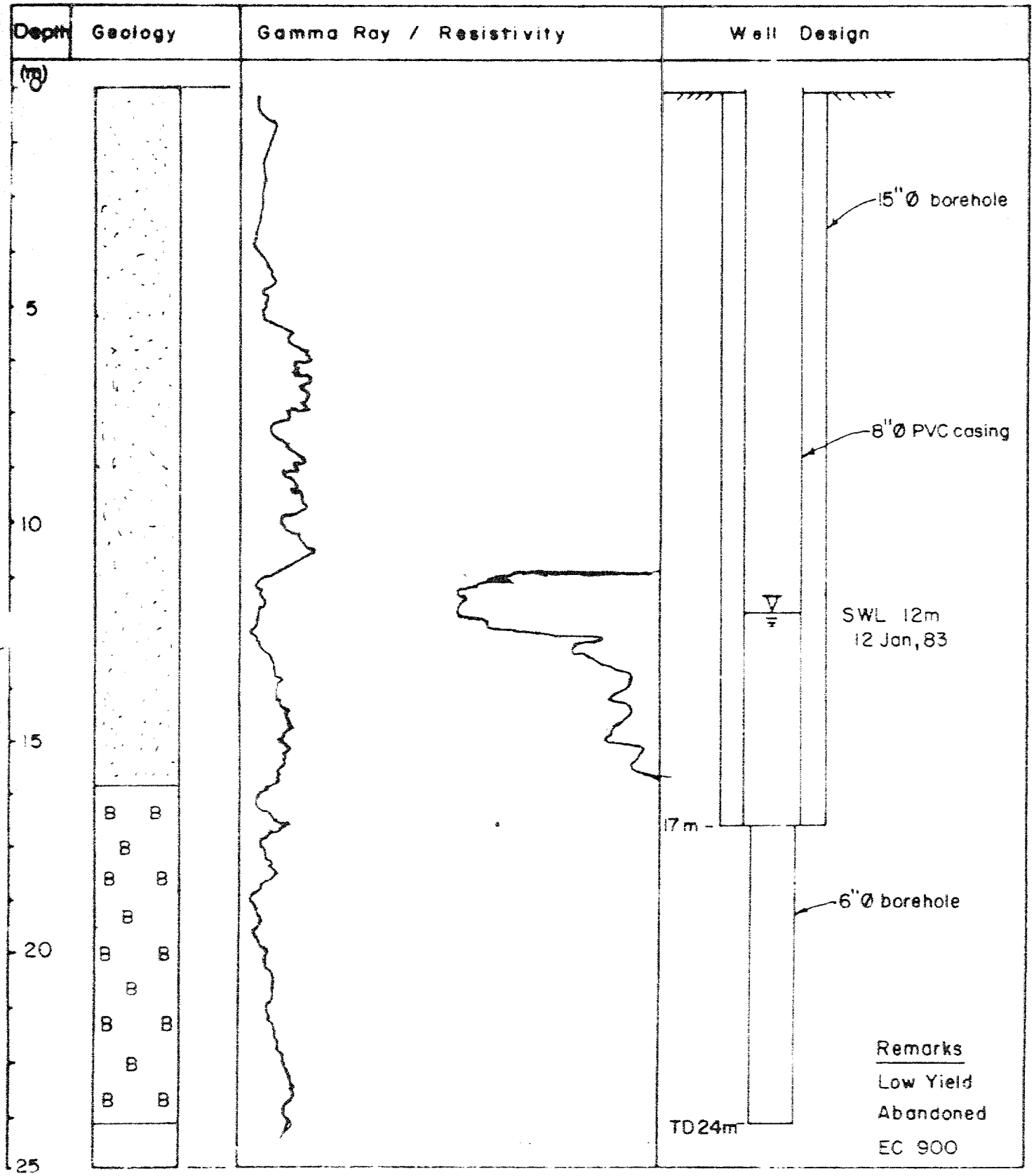
Clayey Sand | Sandstone | Karst Limestone | Basement

Water Development Agency

CGDP - 104 Bay Region Well

Well Nº 25

Location Dodole



LEGEND

Clay or Shale | Sand | Limestone | Marl

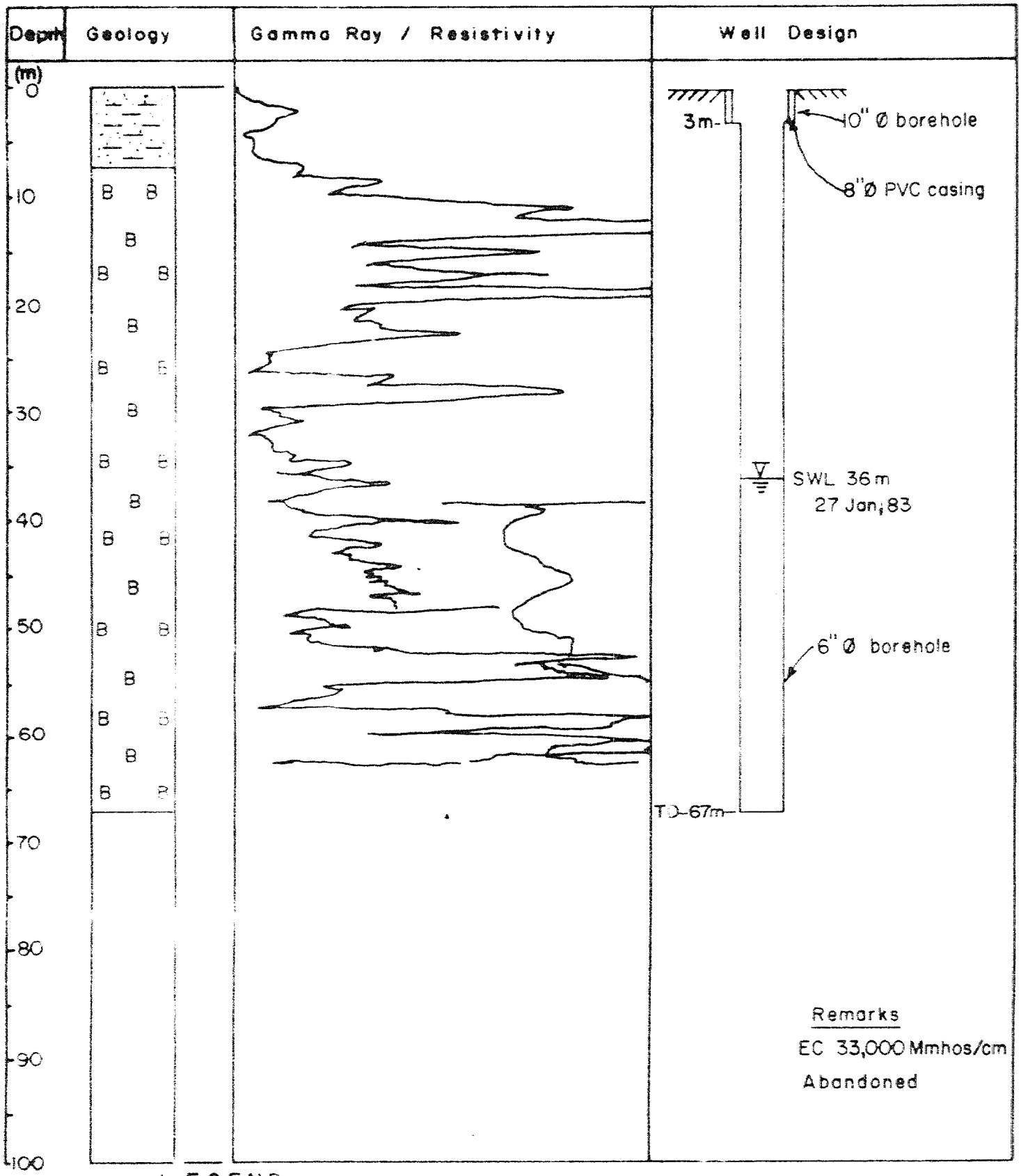
Clayey Sand | Sandstone | Karst Limestone | Basement

Water Development Agency

CGDP - 104 Bay Region Well

Well Nº 26

Location Shidaalow I



LEGEND

Clay or Shale | Sand | Limestone | Marl

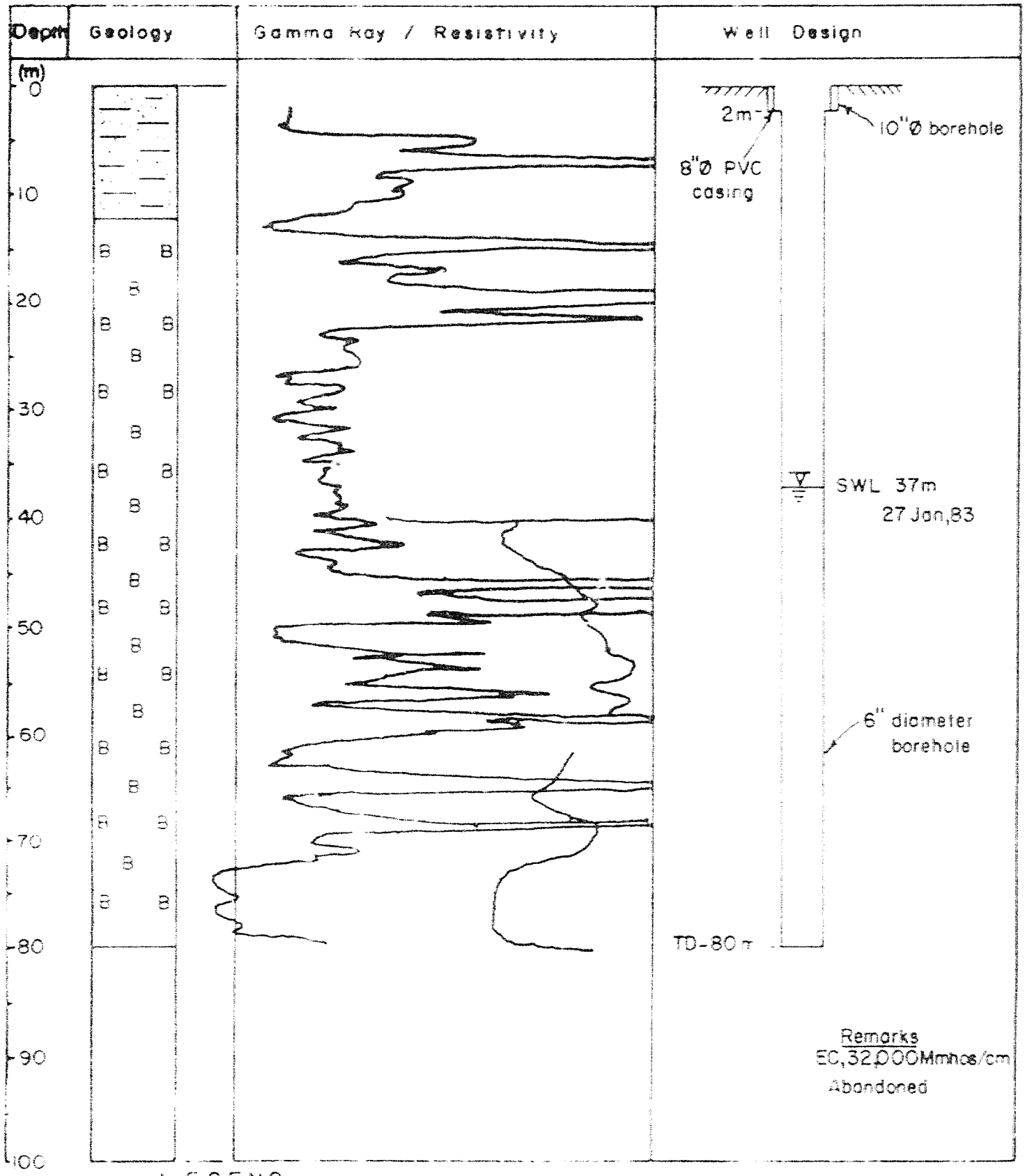
Clayey Sand | Sandstone | Karst Limestone | Basement

Water Development Agency

Well Nº 27

CGDP - 104 Bay Region Well

Location Shidaalow II



LEGEND

Clay or Shale | Sand | Limestone | Marl

Clayey Sand | Sandstone | Karst Limestone | Basement

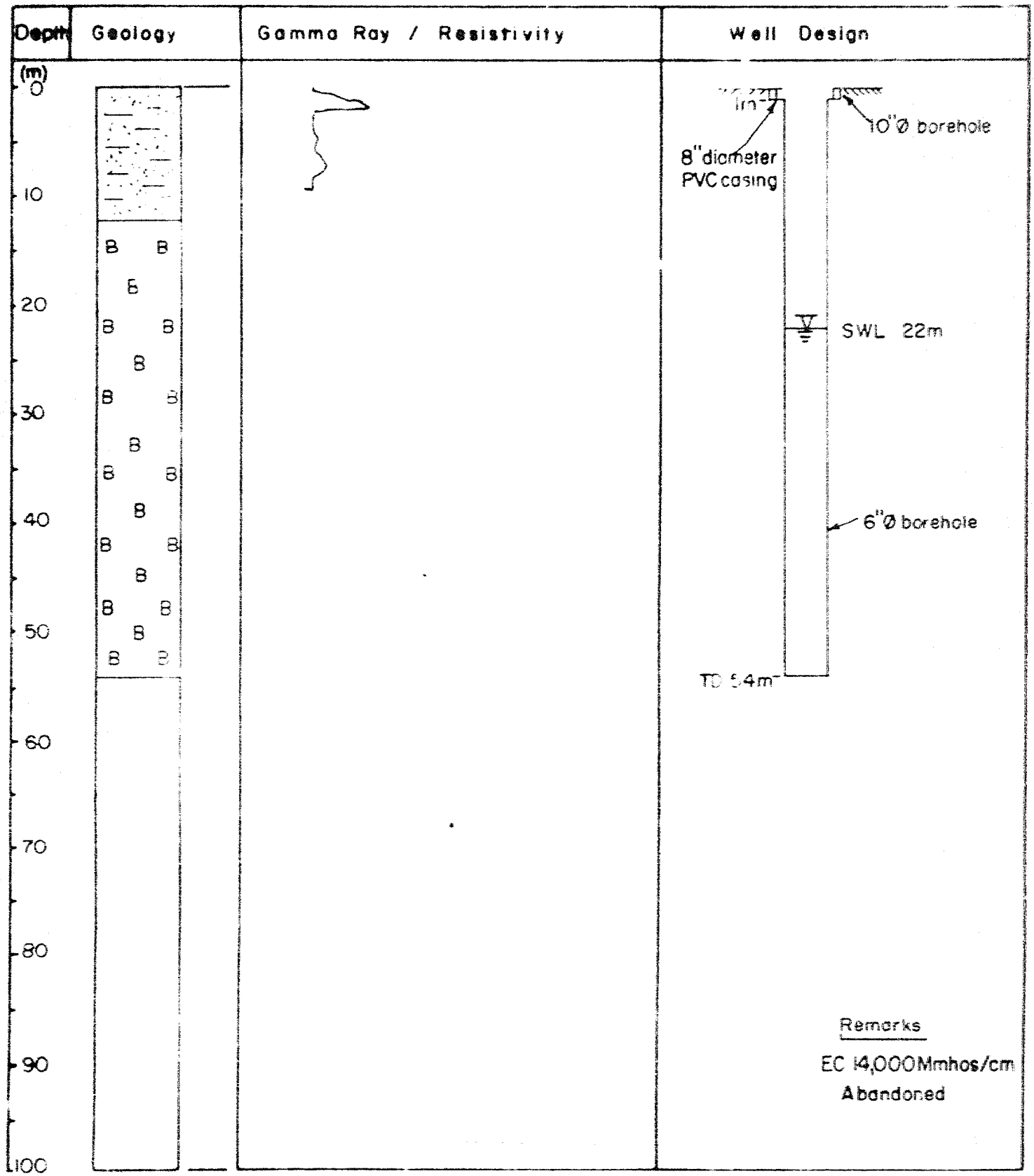
Water Development Agency

Well Nº 28

CGDP - 104

Bay Region Well

Location Bur Akaba I



LEGEND

Clay or Shale | Sand | Limestone | Marl

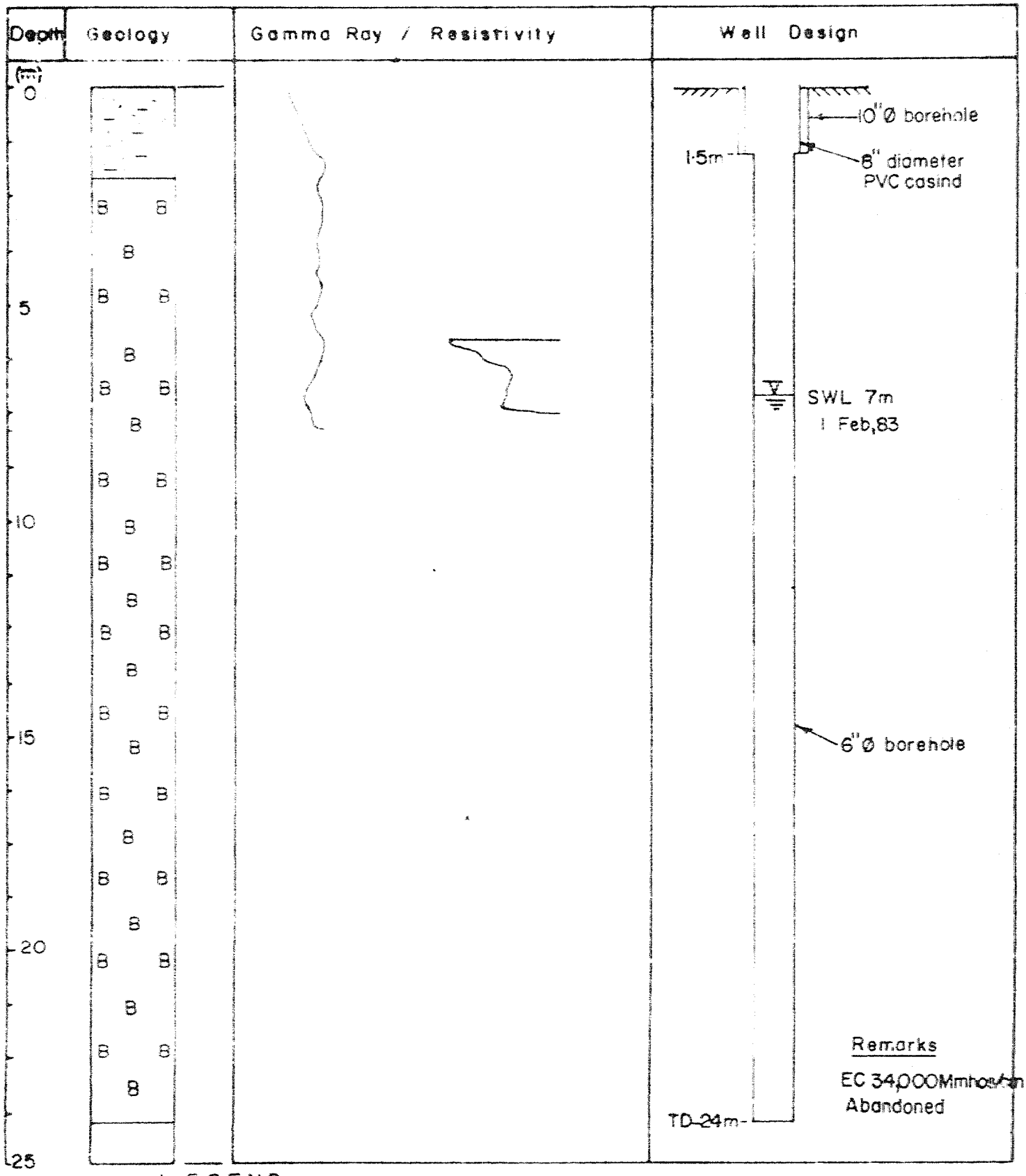
Clayey Sand | Sandstone | Karst Limestone | Basement

Water Development Agency

CGDP - 104 Bay Region Well

Well Nº 29

Location Bur Akaba II WDA yard



LEGEND

Clay or Shale | Sand | Limestone | Marl

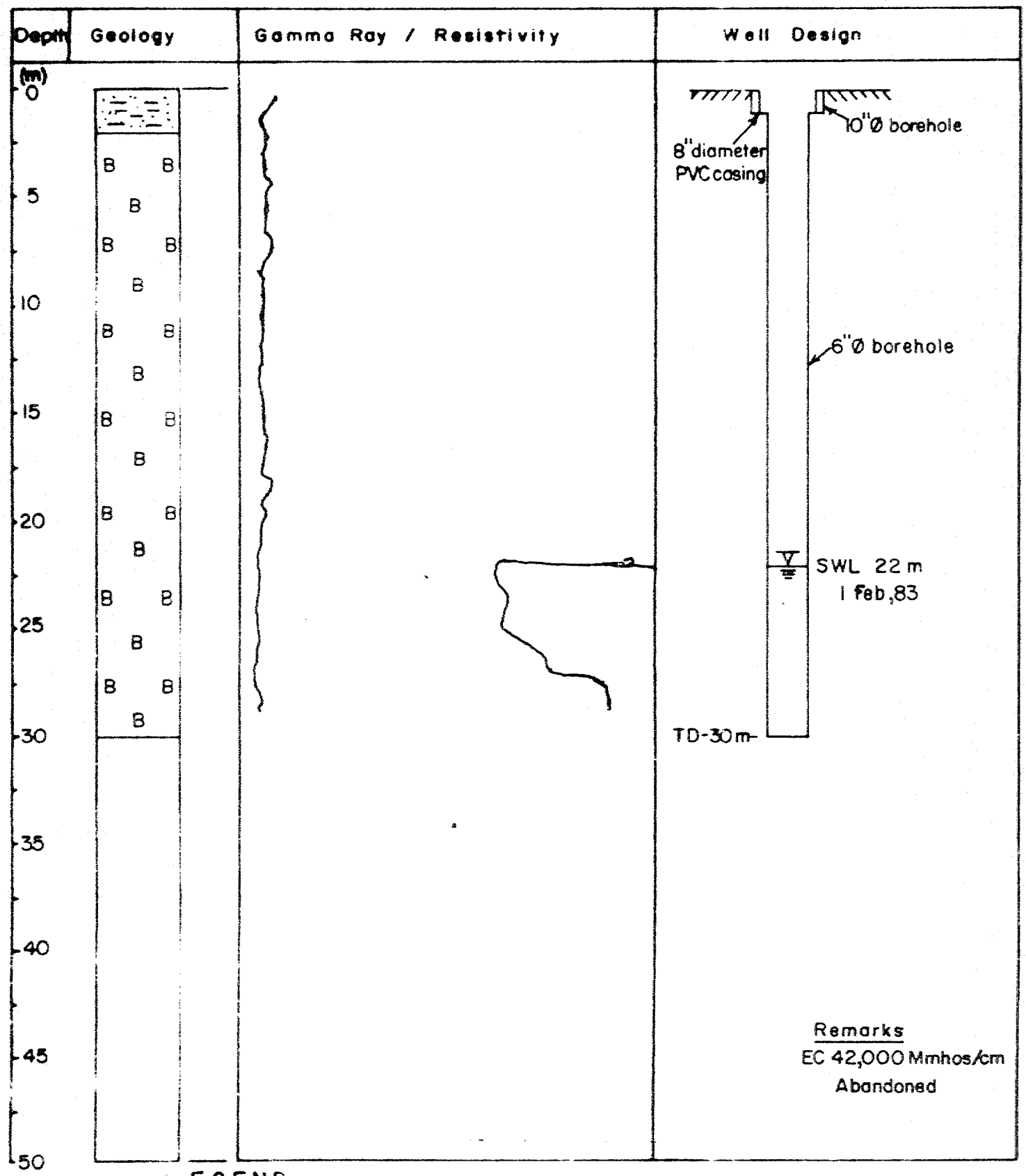
Clayey Sand | Sandstone | Karst Limestone | Basement

Water Development Agency

CGDP - 104 Bay Region Well

Well Nº 30

Location Bur Akaba III



LEGEND

Clay or Shale | Sand | Limestone | Marl

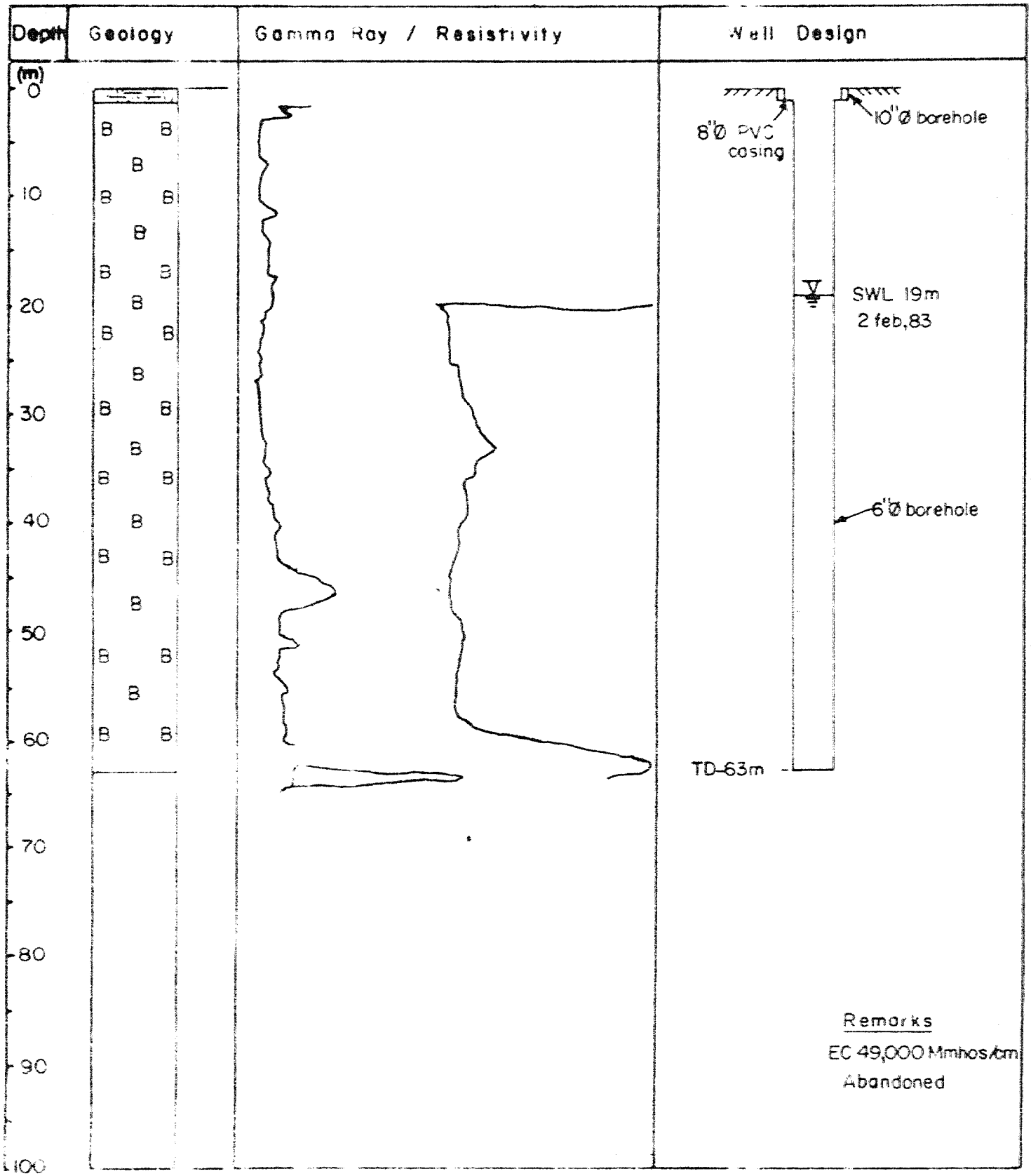
Clayey Sand | Sandstone | Karst Limestone | Basement

Water Development Agency

CGDP - 104 Bay Region Well

Well № 31

Location Bur Akaba IV



LEGEND

Clay or Shale | Sand | Limestone | Marl

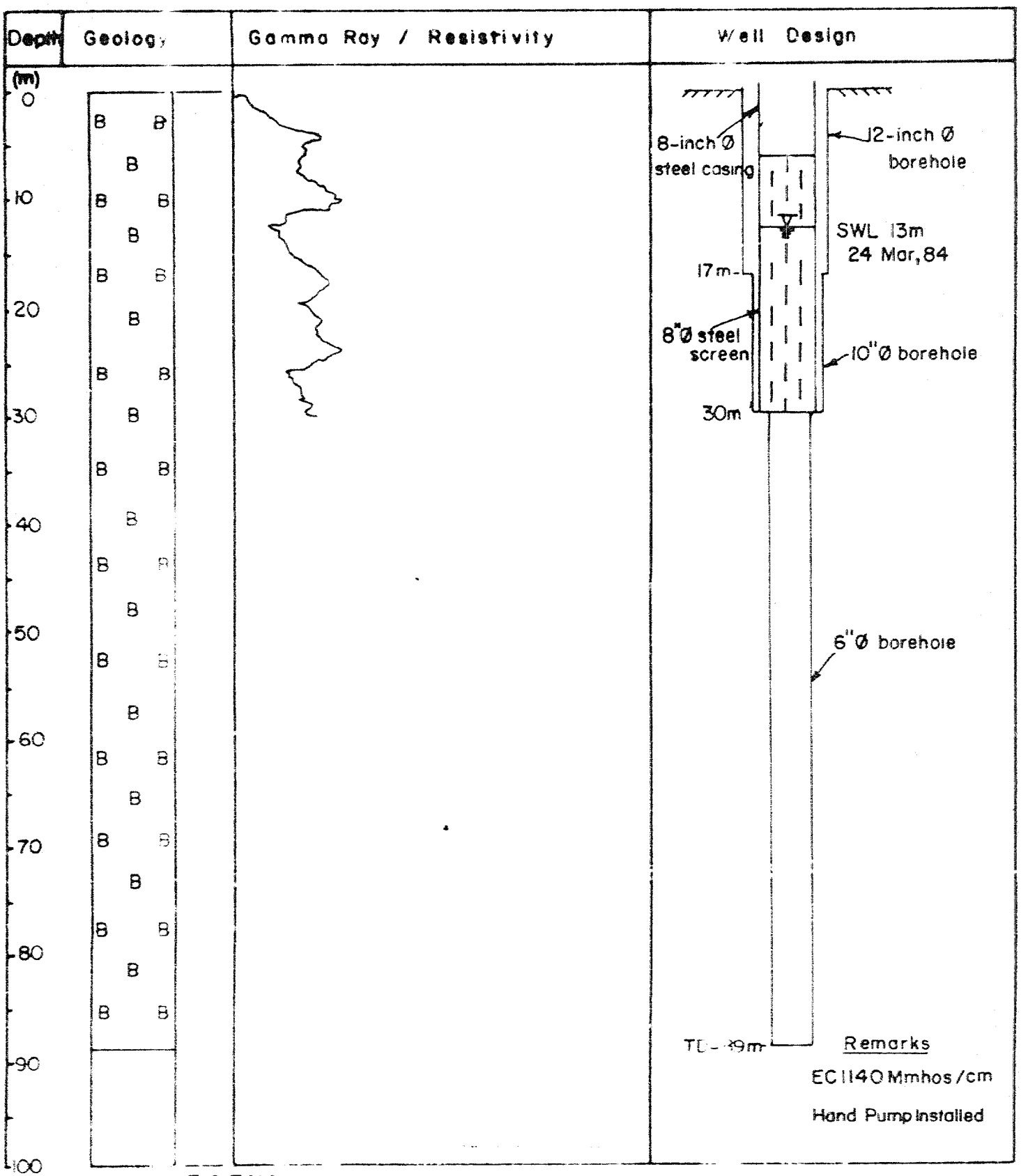
Clayey Sand | Sandstone | Karst Limestone | Basement

Water Development Agency

CGDP - 104 Bay Region Well

Well № 32

Location Bur Akaba V WDA yard



LEGEND

Clay or Shale | Sand | Limestone | Marl

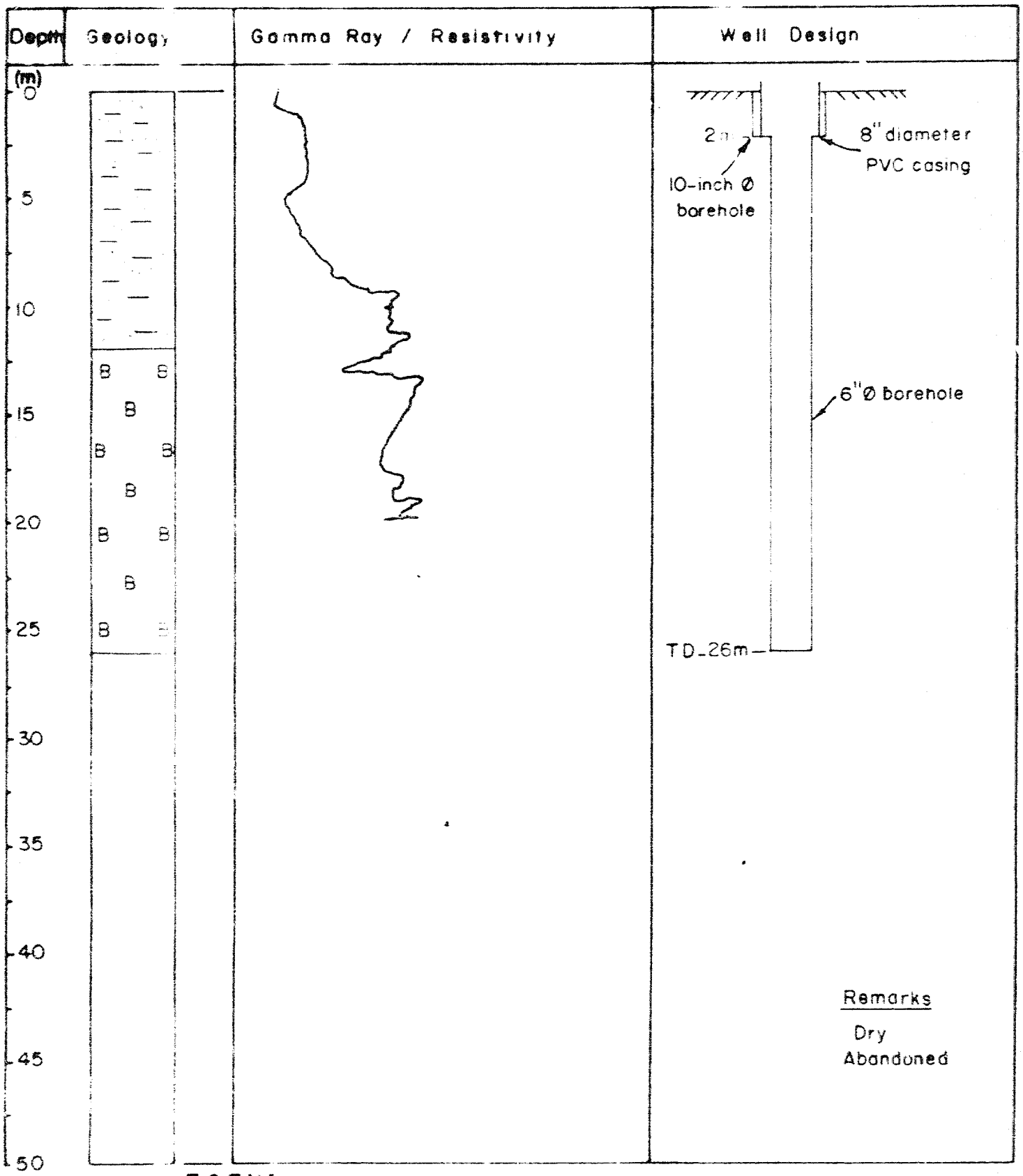
Clayey Sand | Sandstone | Karst Limestone | Basement

Water Development Agency

Well Nº 33

CGDP - 104 Bay Region Well

Location Bur Heibo I



LEGEND

Clay or Shale | Sand | Limeston | Marl

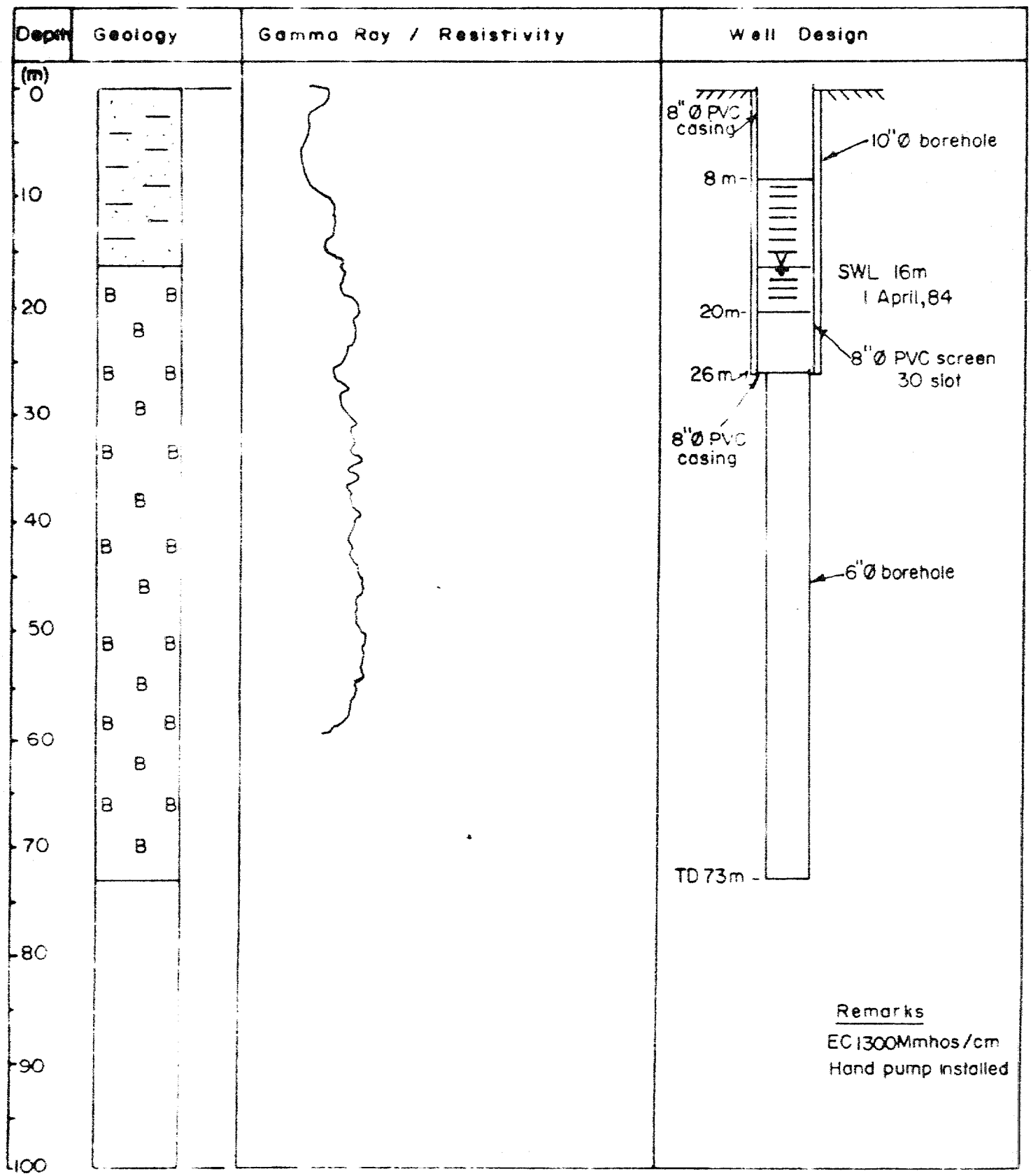
Clayey Sand | Sandstone | Karst Limestone | Basement

Water Development Agency

CGDP - 104 Bay Region Well

Well Nº 34

Location Bur Heibo II



LEGEND

Clay or Shale | Sand | Limestone | Marl

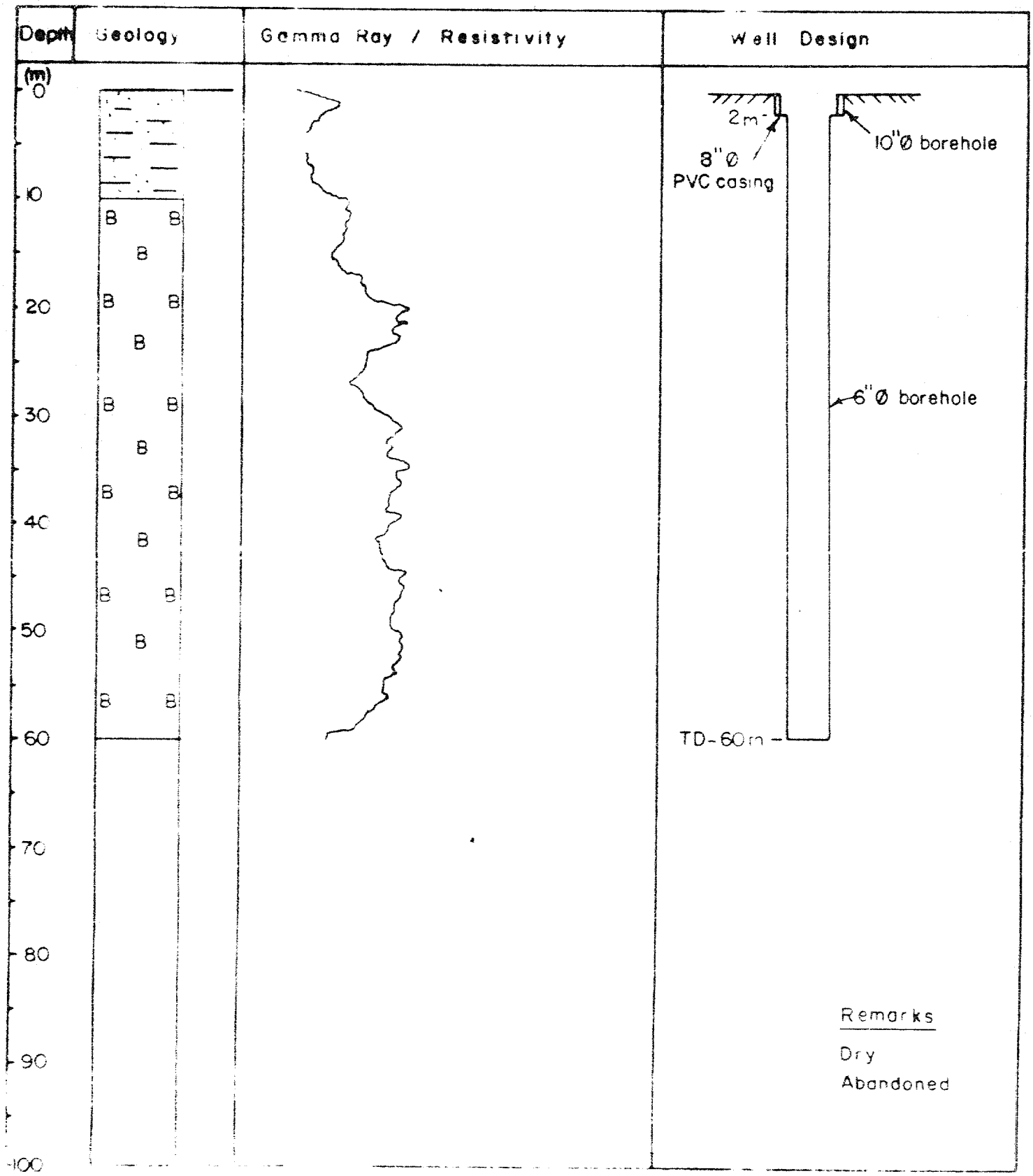
Clayey Sand | Sandstone | Karst Limestone | Basement

Water Development Agency

CGDP - 104 Bay Region Well

Well Nº 35

Location Bur Heibo III



LEGEND

Clay or Shale | Sand | Limestone | Marl

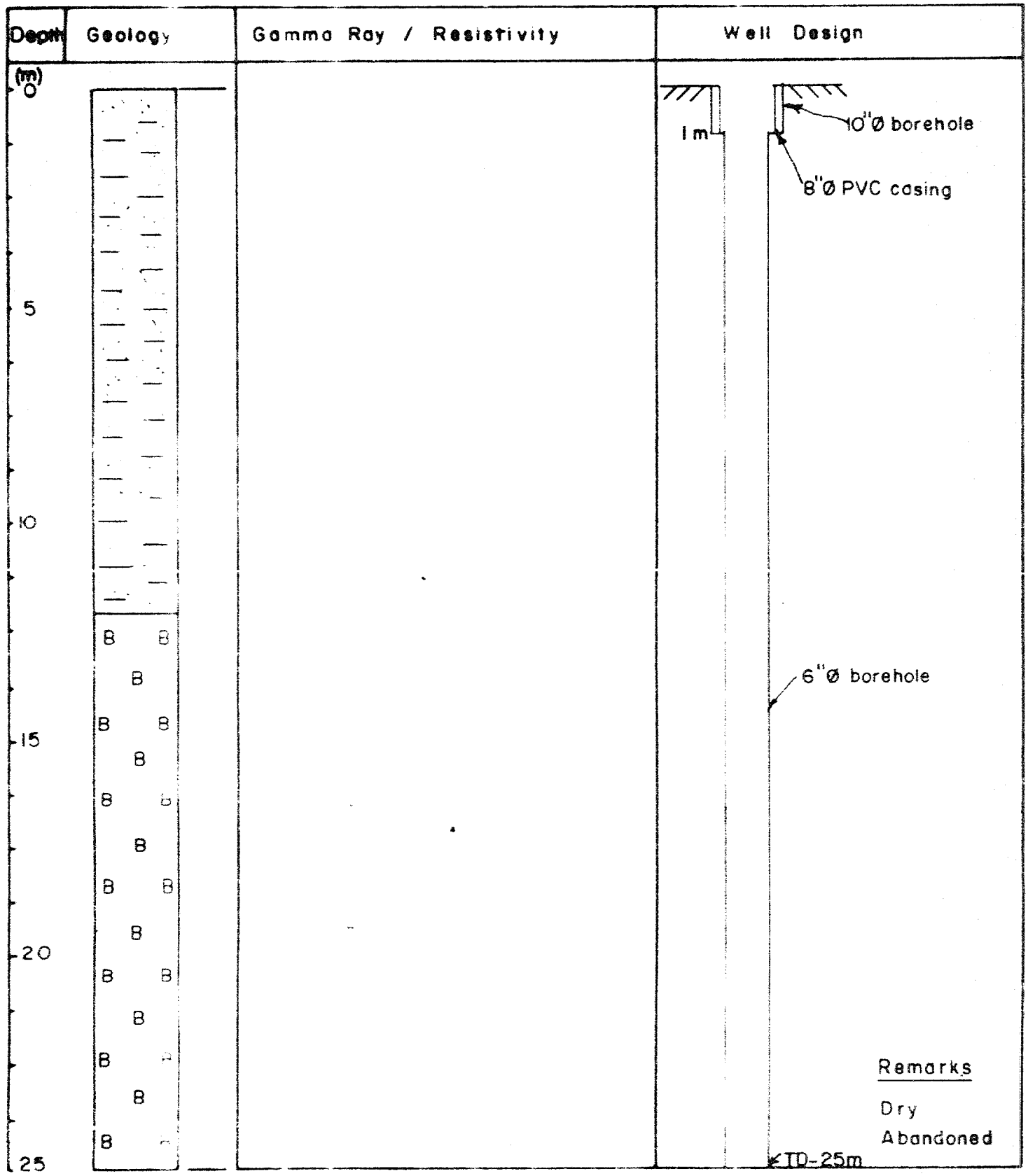
Clayey Sand | Sandstone | Karst Limestone | Basement

Water Development Agency

CGDP - 104 Bay Region Well

Well Nº 36

Location Bur Heibo IV



LEGEND

Clay or Shale | Sand | Limestone | Marl

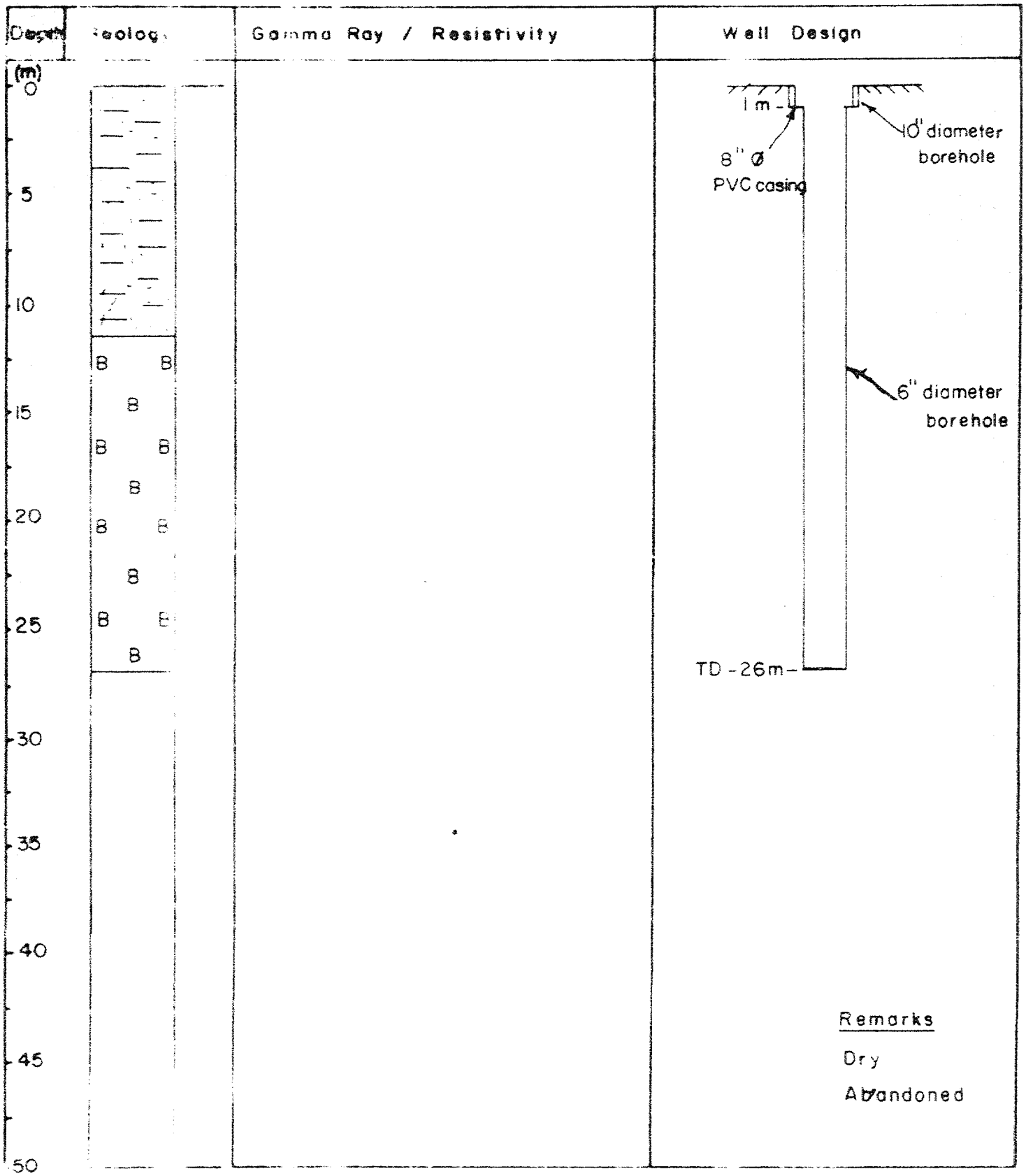
Clayey Sand | Sandstone | Karst Limestone | Basement

Water Development Agency

CGDP - 104 Bay Region Well

Well Nº 37

Location Bur Heibo V



EGEND

Clay or Shale | Sand | Limestone | Marl

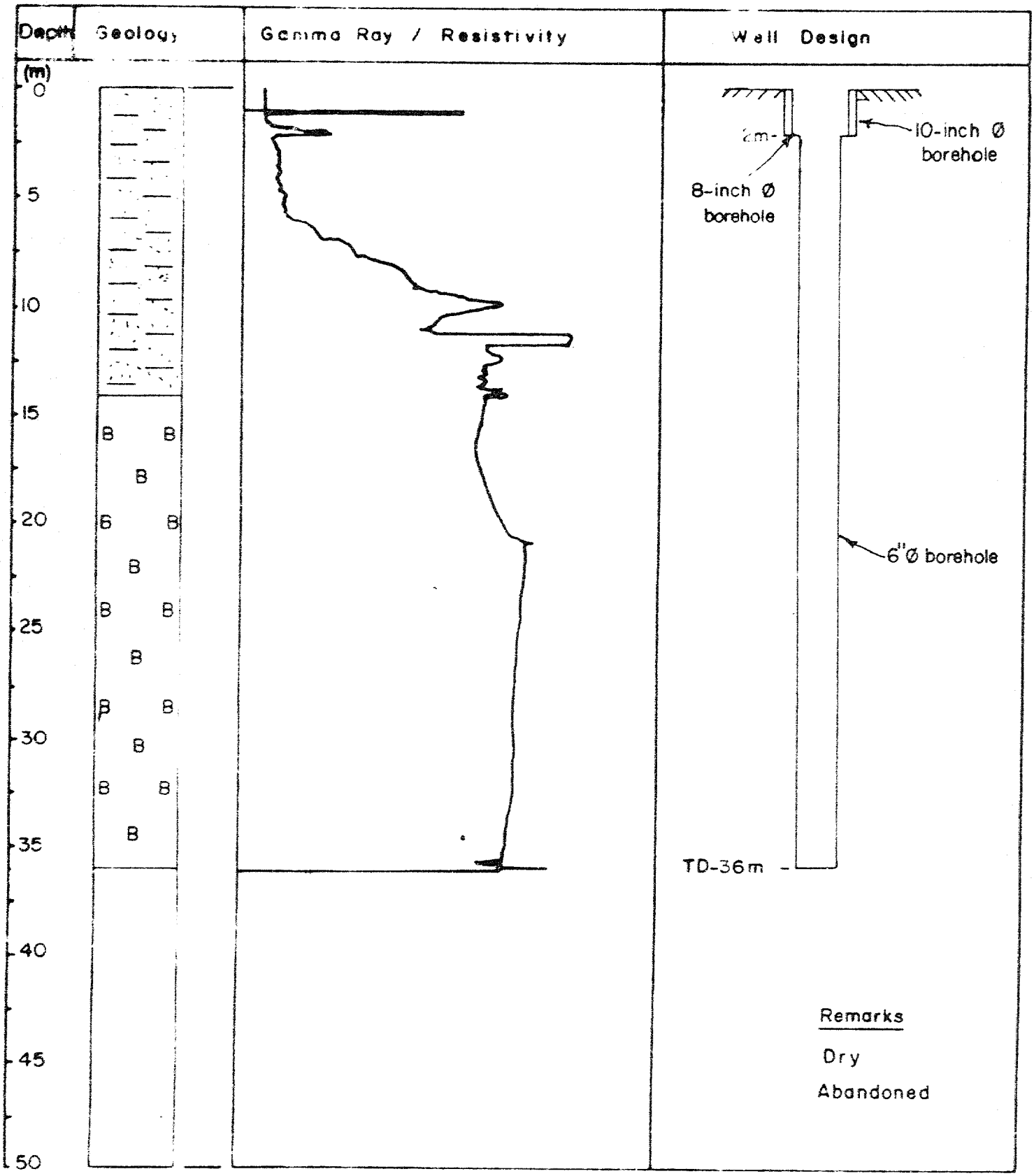
Clayey Sand | Sandstone | Karst Limestone | Basement

Water Development Agency

CGDP - 104 Bay Region Well

Well Nº 38

Location Bur Heibo VI



LEGEND

Clay or Shale | Sand | Limestone | Marl

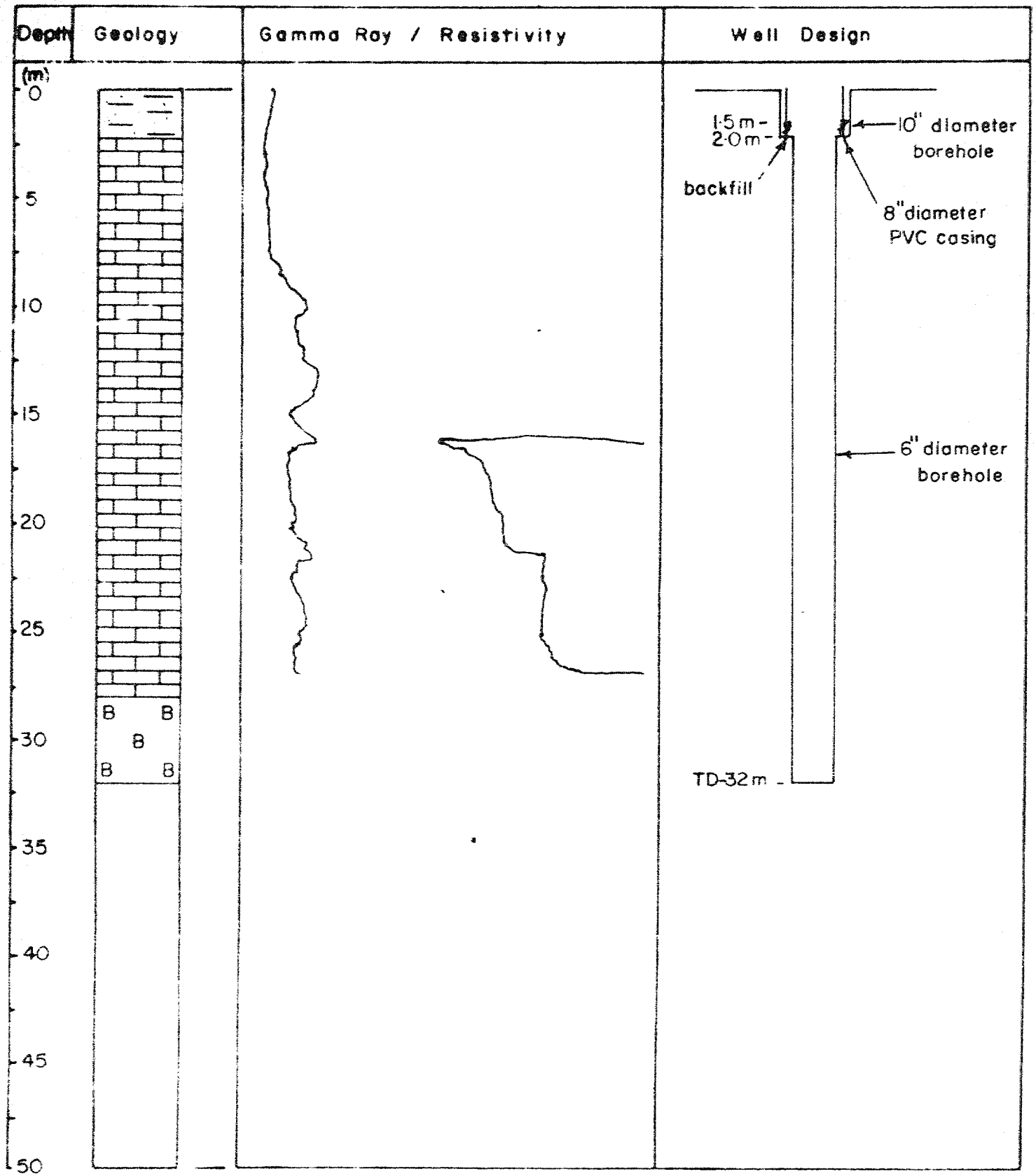
Clayey Sand | Sandstone | Karst Limestone | Basement

Water Development Agency

CGDP - 104 Bay Region Well

Well Nº 40

Location Limestone Depression "A"



LEGEND

Clay or Shale | Sand | Limestone | Marl

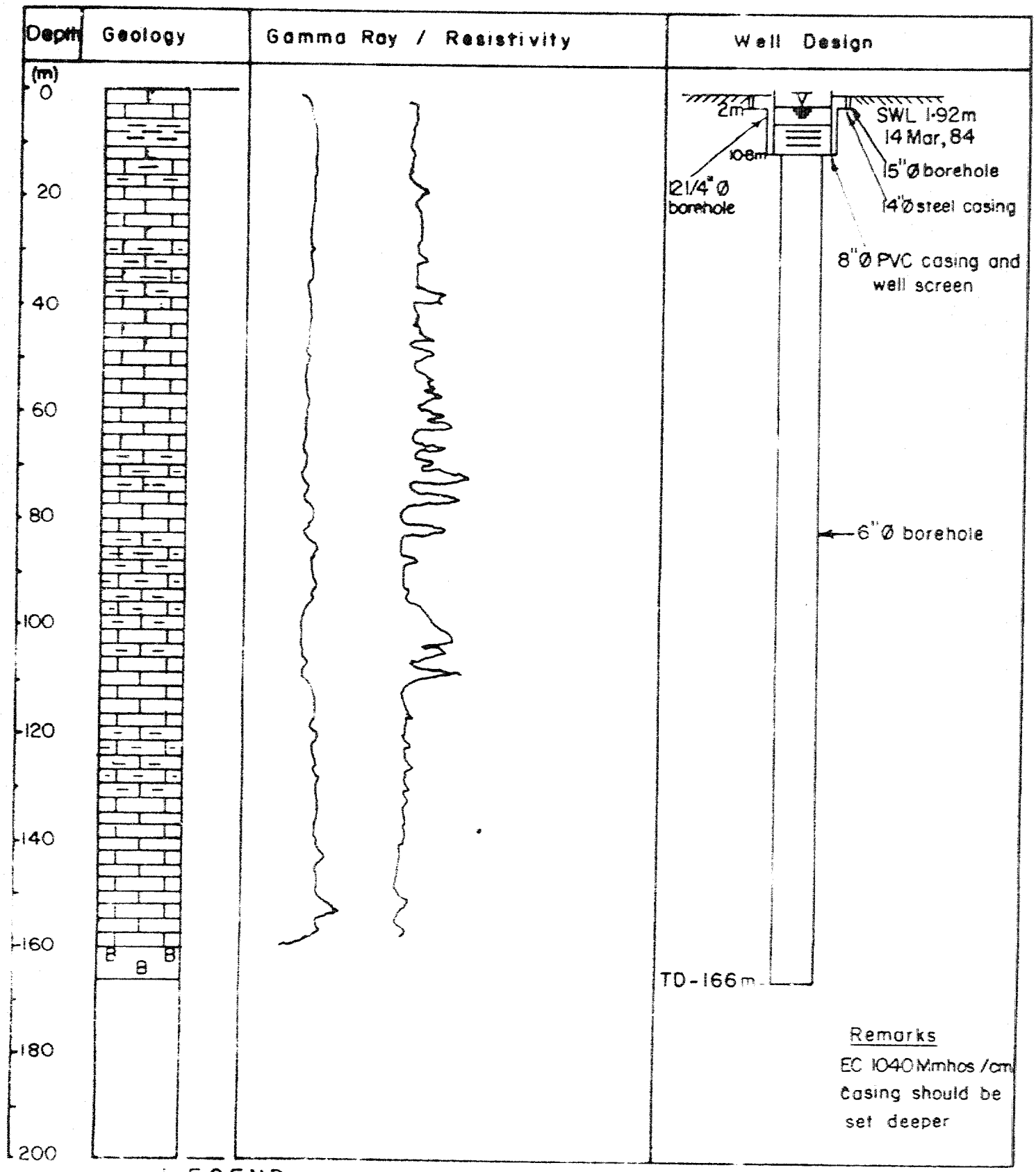
Clayey Sand | Sandstone | Karst Limestone | Basement

Water Development Agency

CGDP - 104 Bay Region Well

Well Nº 41

Location Dolondole



LEGEND

Clay or Shale | Sand | Limestone | Marl

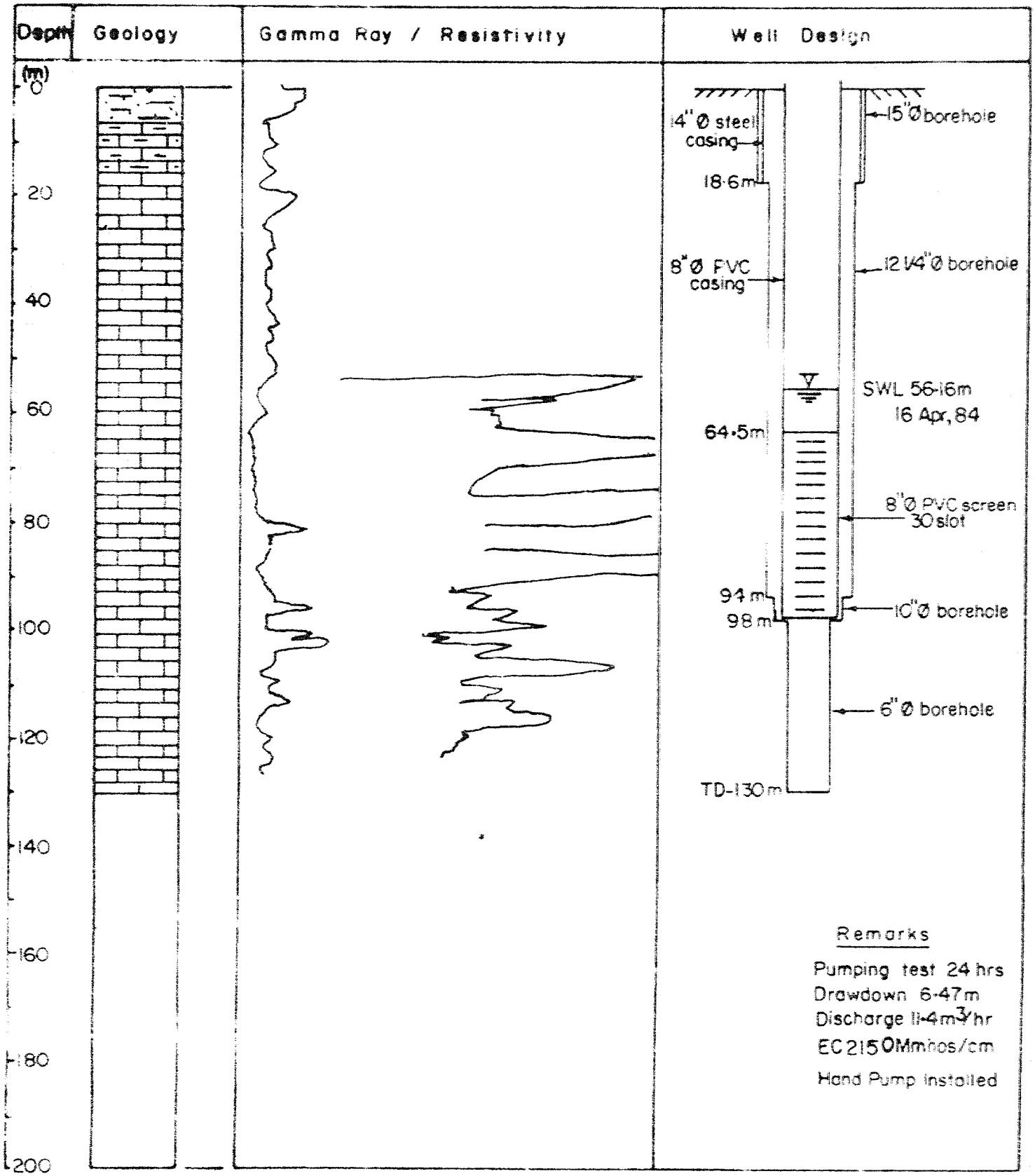
Clayey Sand | Sandstone | Karst Limestone | Basement

Water Development Agency

CGDP - 104 Bay Region Well

Well Nº 42

Location Buulo Fuur II



Remarks

Pumping test 24 hrs
Drawdown 6·47m
Discharge 11·4m³/hr
EC 2150 Mmhos/cm
Hand Pump Installed

LEGEND

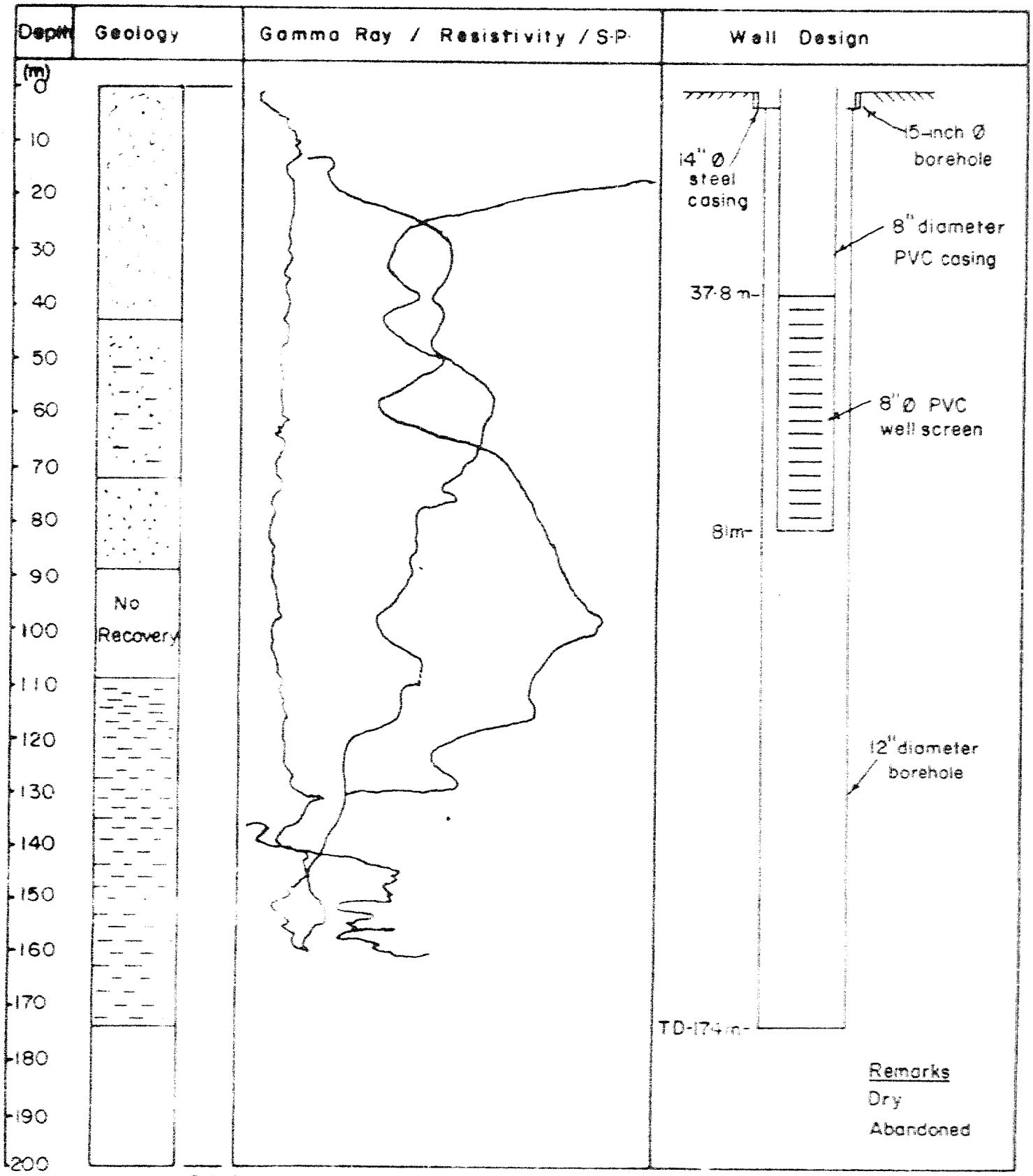
Clay or Shale
Sand
Limestone
Marl
Clayey Sand
Sandstone
Karst Limestone
Basement

Water Development Agency

Well Nº 44

CGDP - 104 Bay Region Well

Location Afar Irdood



LEGEND

Clay or Shale | Sand | Limestone | Marl

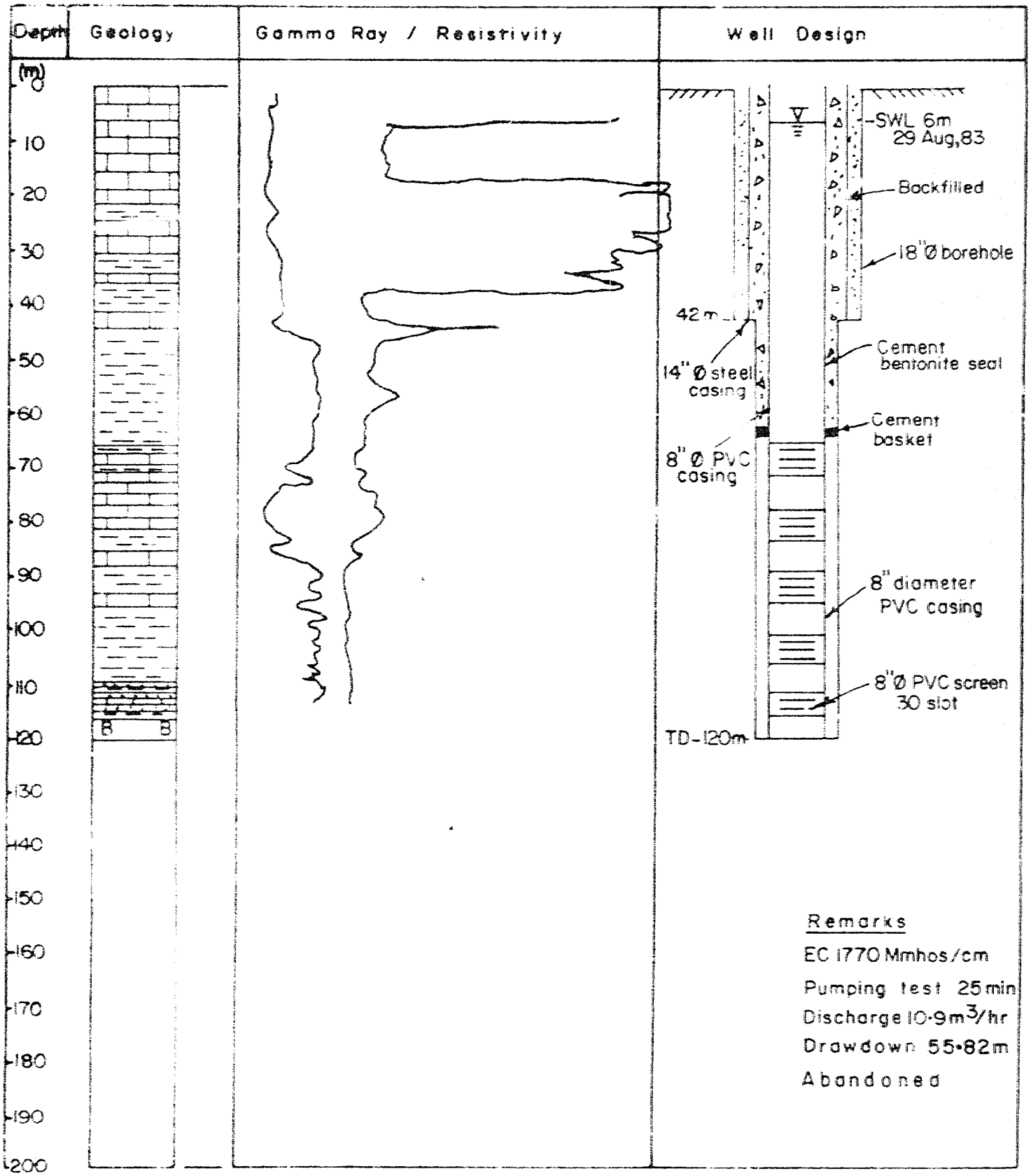
Clayey Sand | Sandstone | Karst Limestone | Basement

Water Development Agency

CGDP - 104 Bay Region Well

Well Nº 45

Location USAID Compound Baidoc III



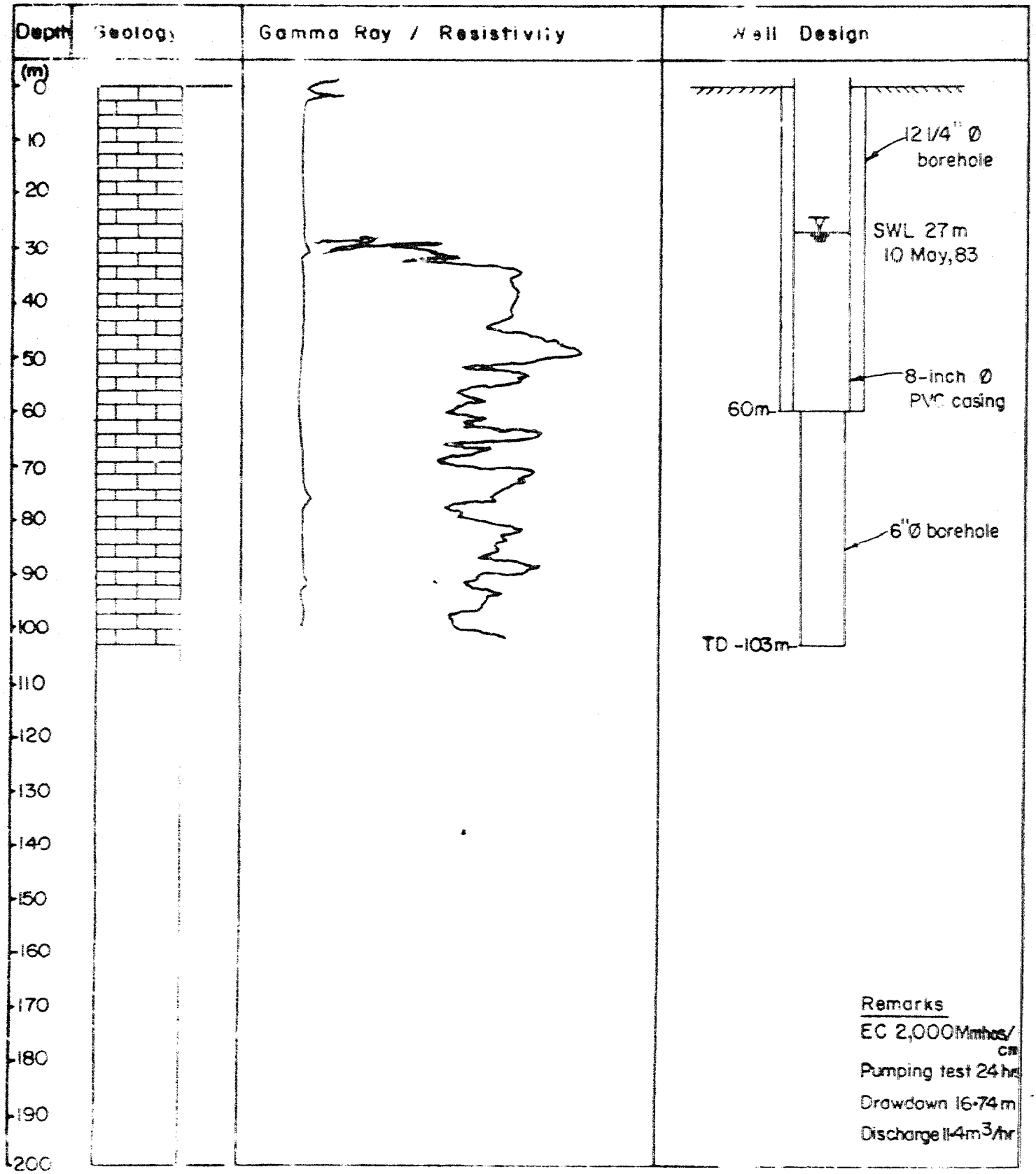
LEGEND

Clay or Shale | Sand | Limestone | Marl

Clayey Sand | Sandstone | Karst Limestone | Basement

Water Development Agency — **Well Nº 46**

CGDP - 104 — **Bay Region Well** — **Location** Qansax Dheere Road Well



LEGEND

Clay or Shale — Sand — Limestone — Marl

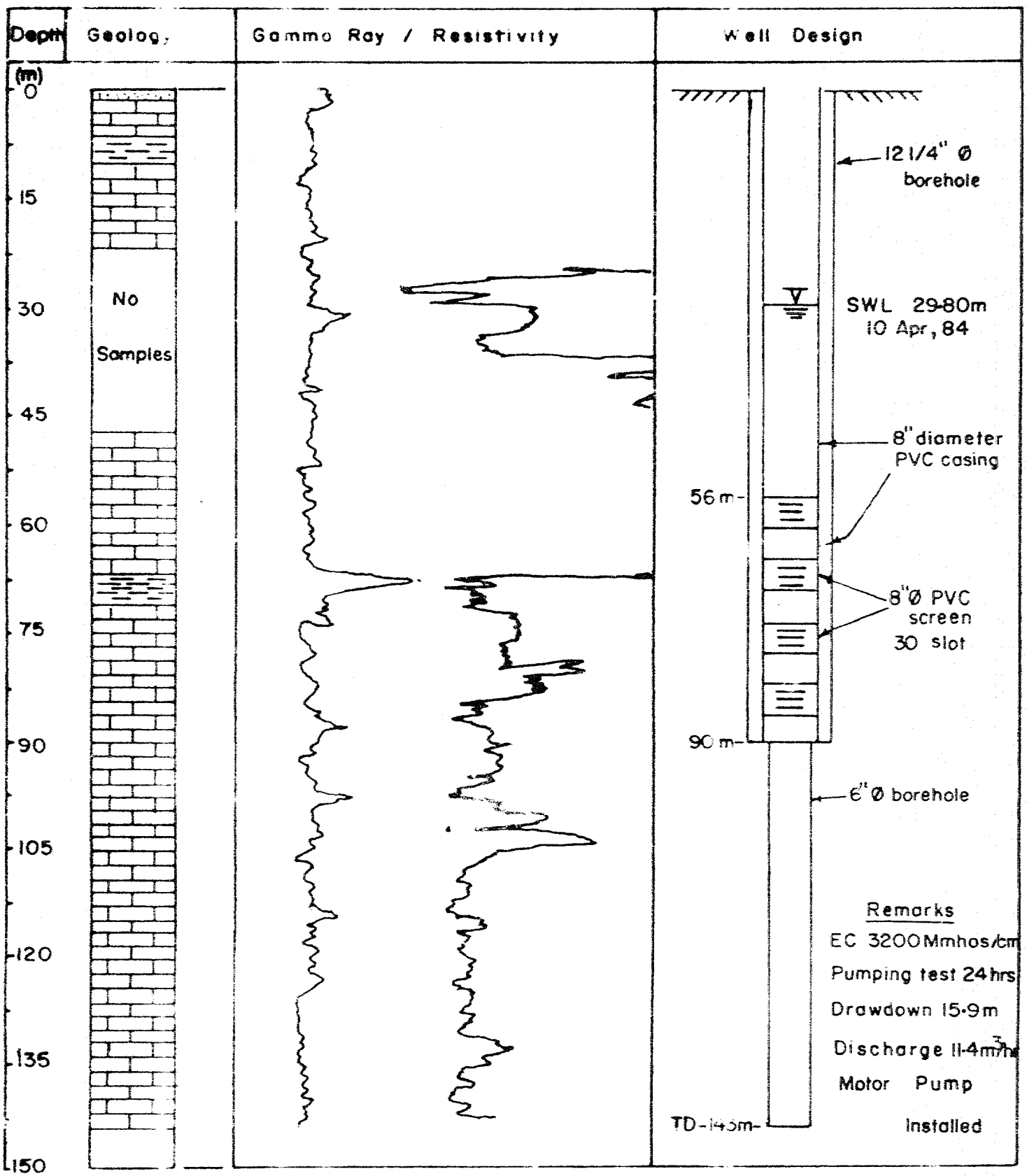
Clayey Sand — Sandstone — Karst Limestone — Basement

Water Development Agency

Well Nº 47

CGDP - 104 Bay Region Well

Location Awshini



LEGEND

Clay or Shale | Sand | Limestone | Marl

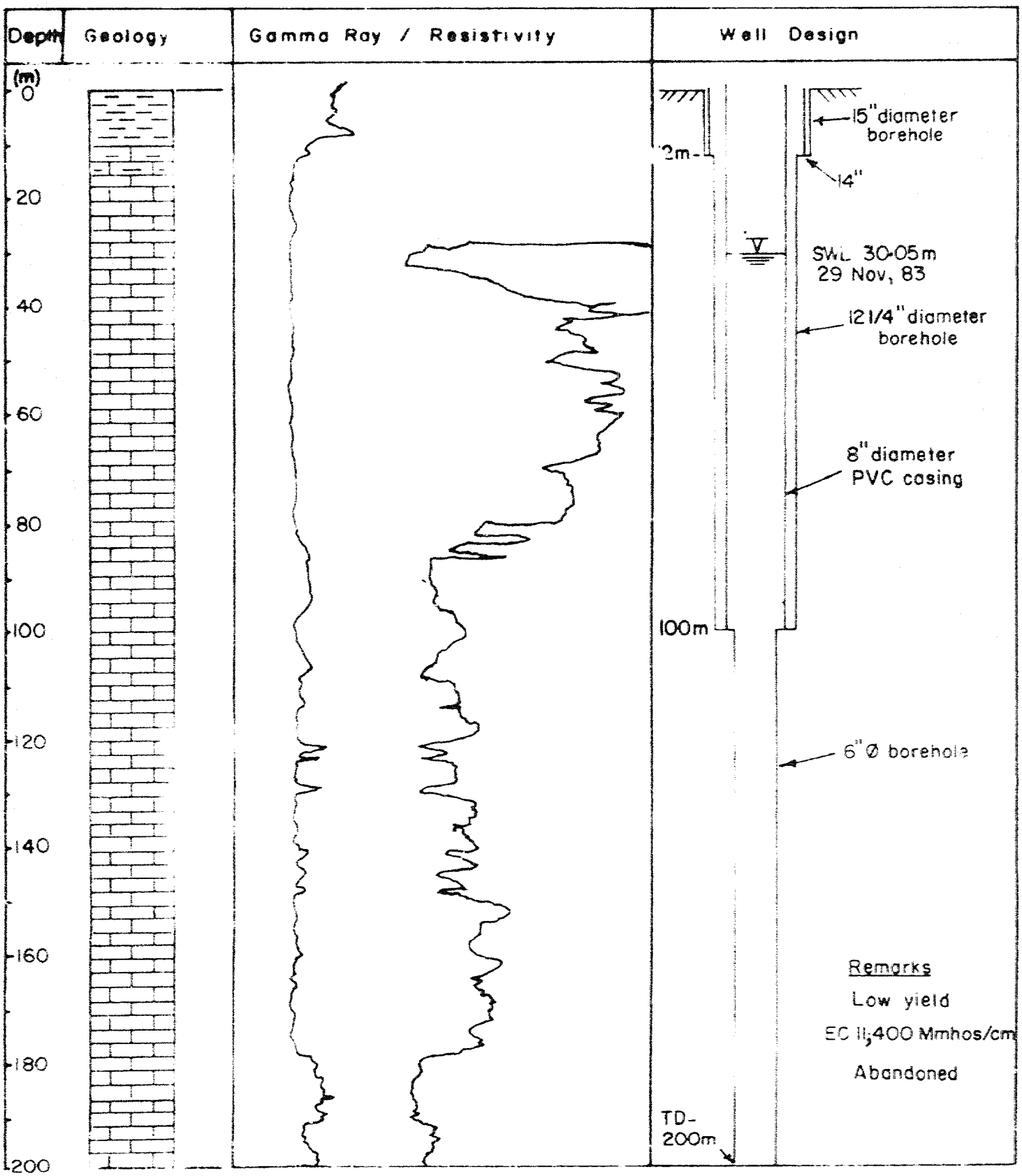
Clayey Sand | Sandstone | Karst Limestone | Basement

Water Development Agency

CGDP - 104 Bay Region Well

Well Nº 50

Location Seed Farm Bonkay



LEGEND

Clay or Shale | Sand | Limestone | Marl

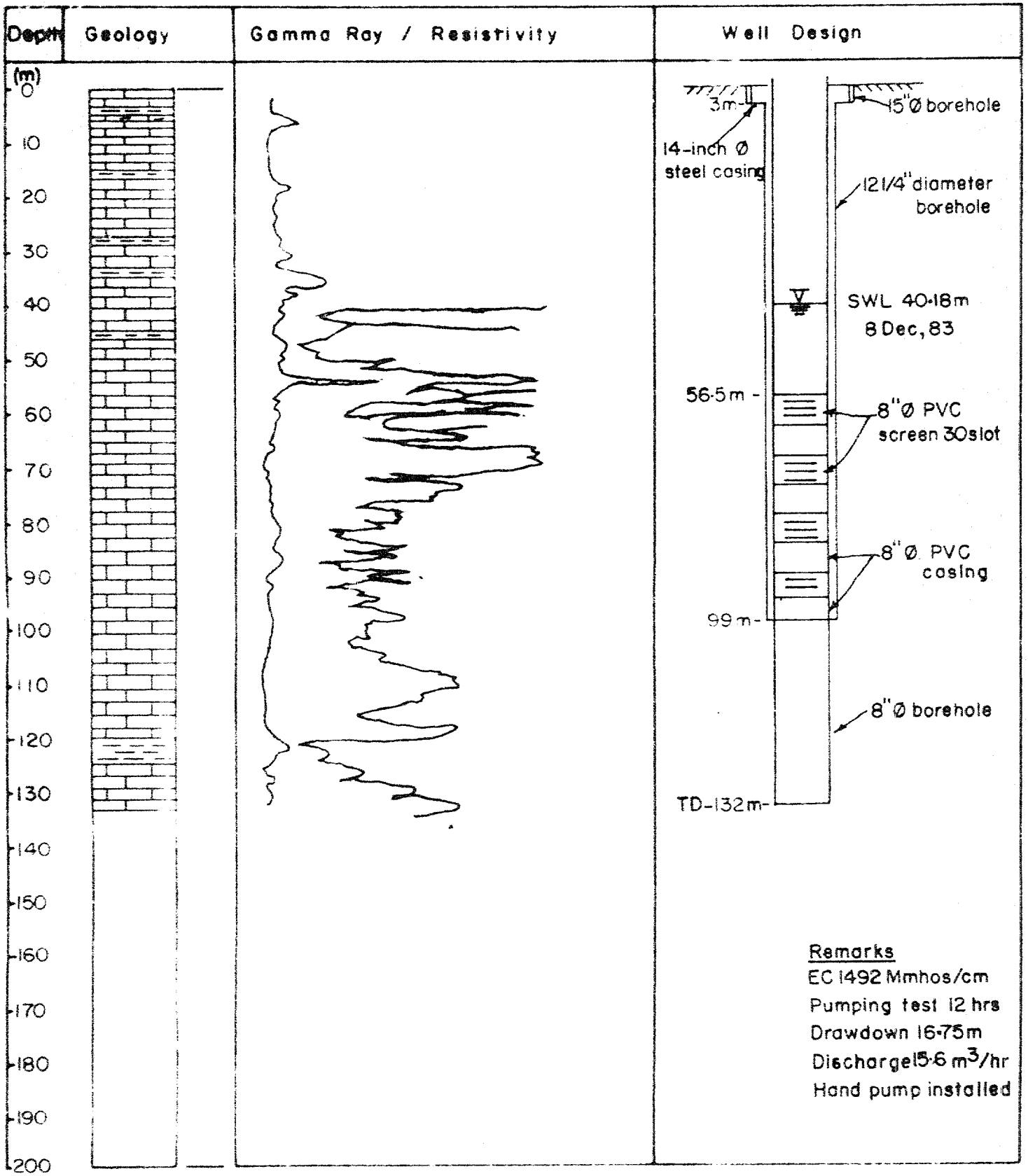
Clayey Sand | Sandstone | Karst Limestone | Basement

Water Development Agency

CGDP - 104 Bay Region Well

Well № 51

Location Mintaan



LEGEND

Clay & Shale | Sand | Limestone | Marl

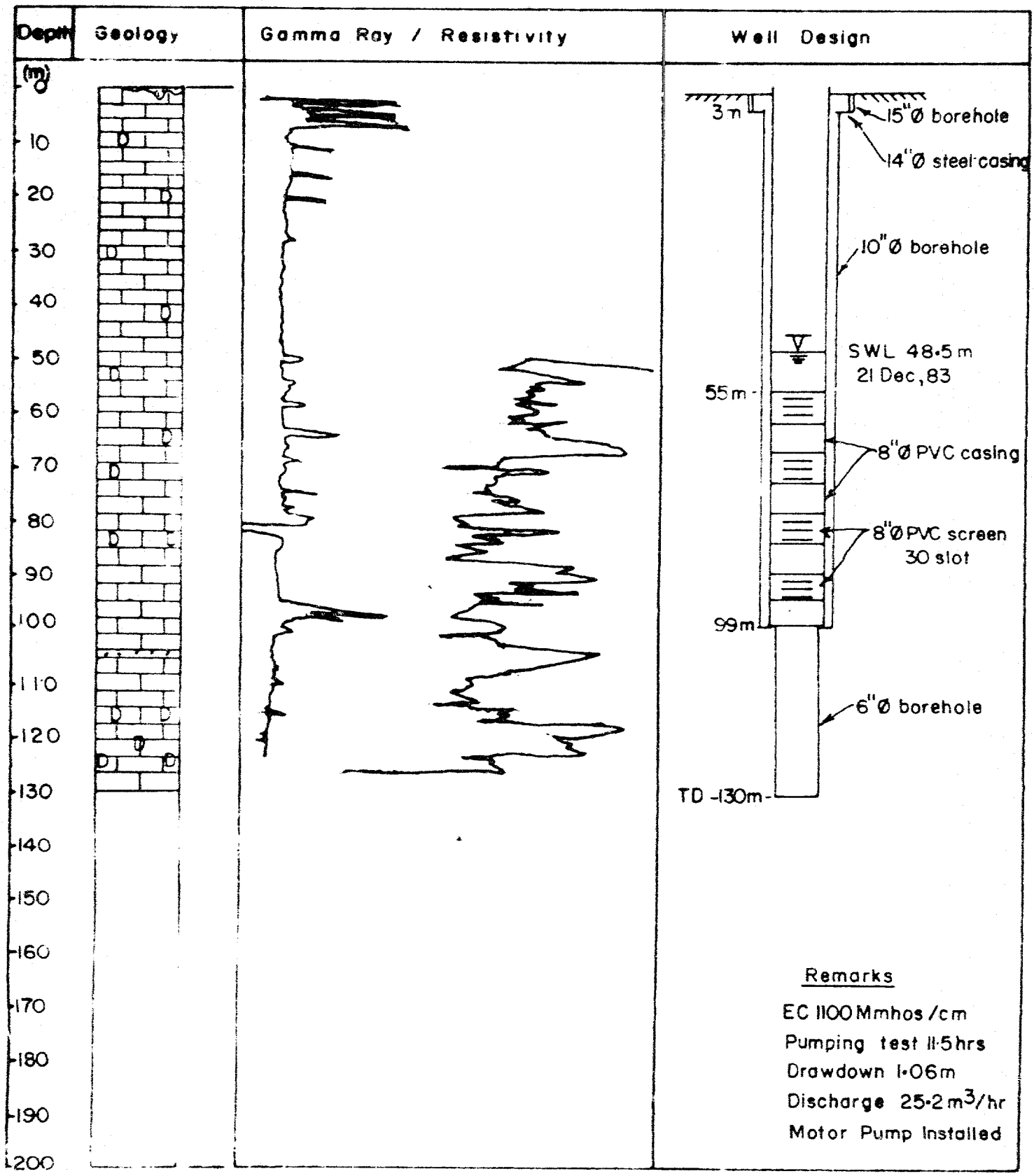
Clayey Sand | Sandstone | Karst Limestone | Basement

Water Development Agency

CGDP - 104 Bay Region Well

Well Nº 52

Location Maleel



LEGEND

Clay or Shale | Sand | Limestone | Marl

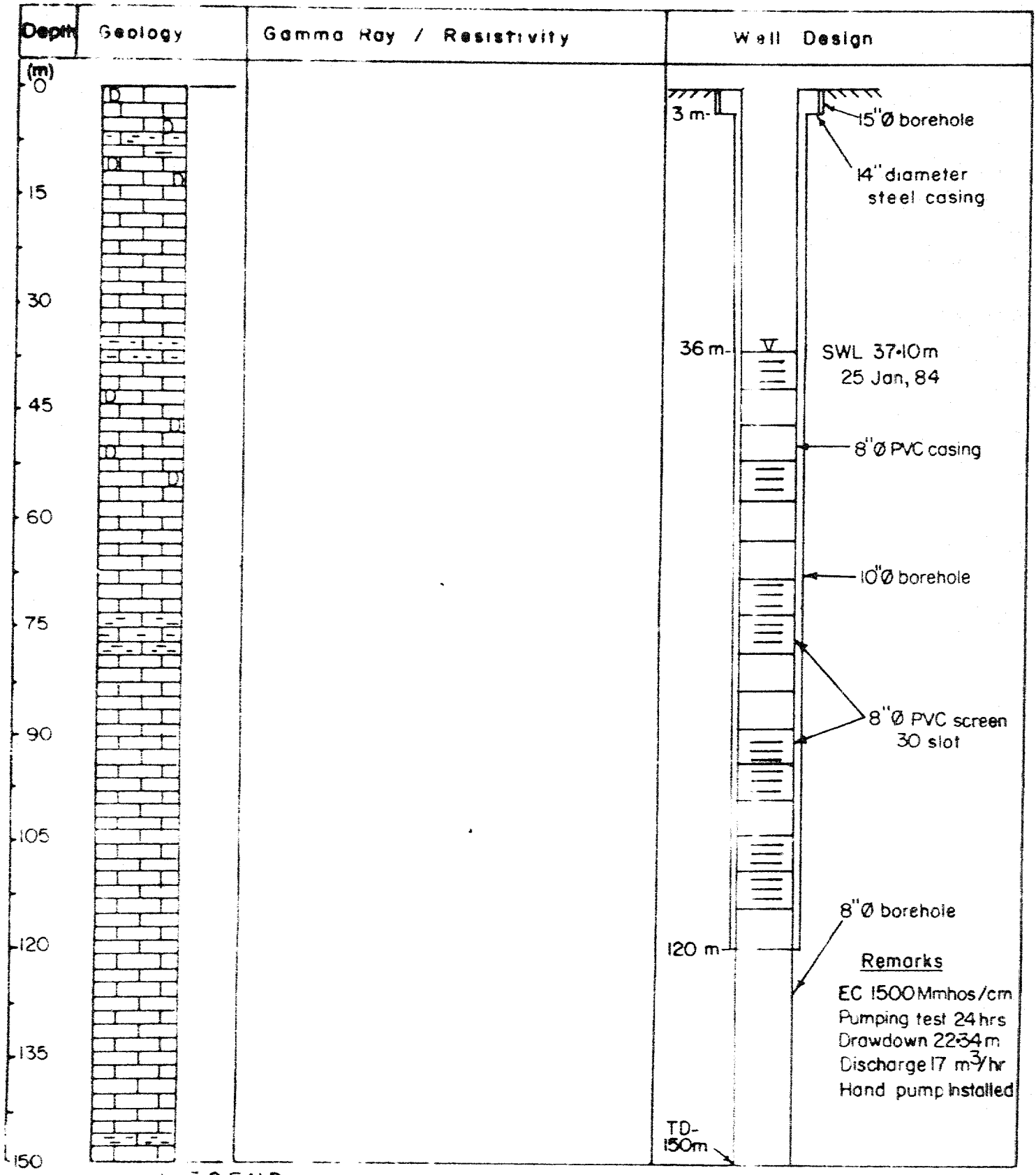
Clayey Sand | Sandstone | Karst Limestone | Dolomite

Water Development Agency

CGDP - 104 Bay Region Well

Well Nº 54

Location Isgeed



LEGEND

Clay or Shale | Sand | Limestone | Marl

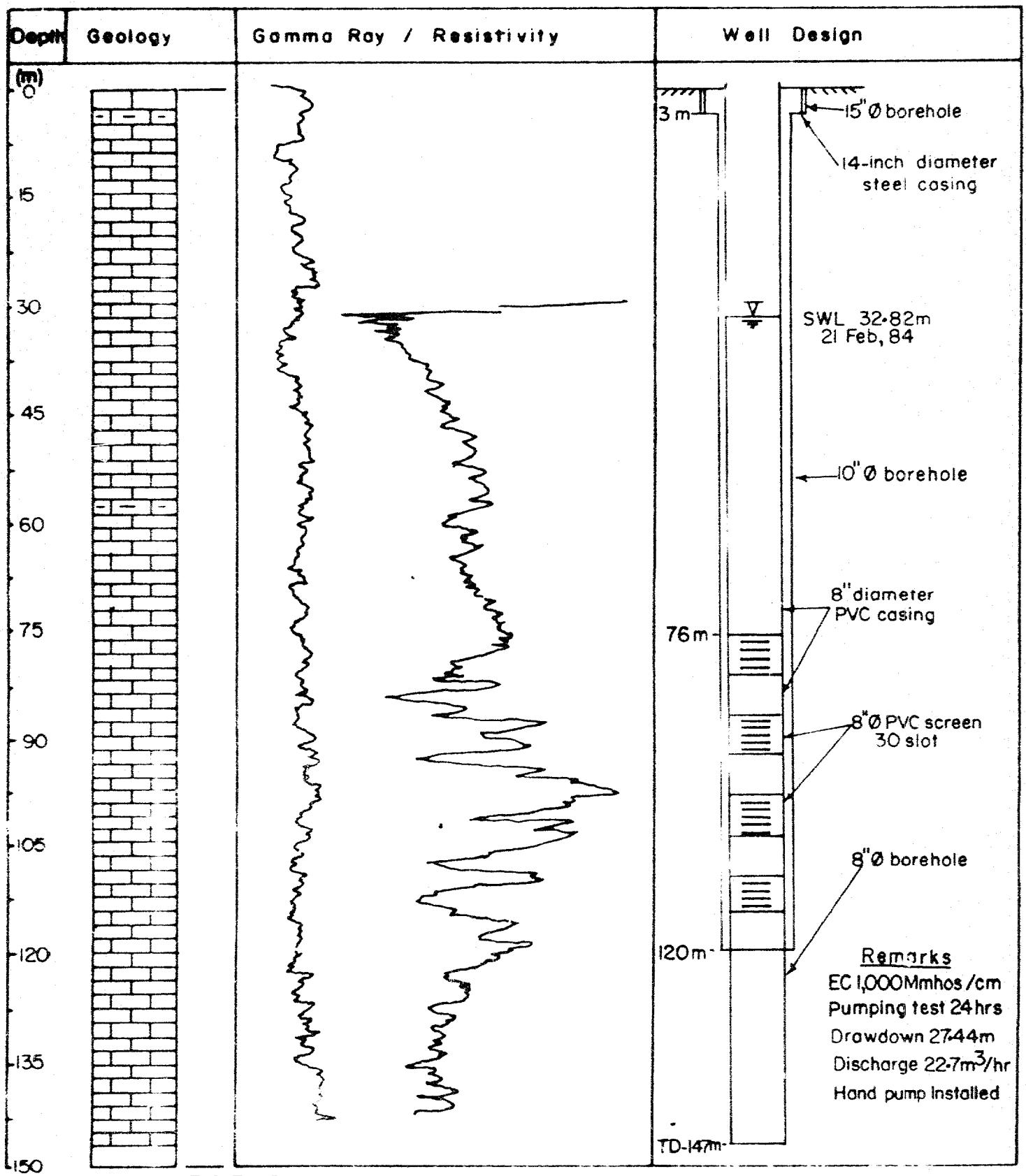
Clayey Sand | Sandstone | Karst Limestone | Dolomite

Water Development Agency

Well Nº 55

CGDP - 104 Bay Region Well

Location Banbusul



LEGEND

Clay or Shale | Sand | Limestone | Marl

Clayey Sand | Sandstone | Karst Limestone | Basement

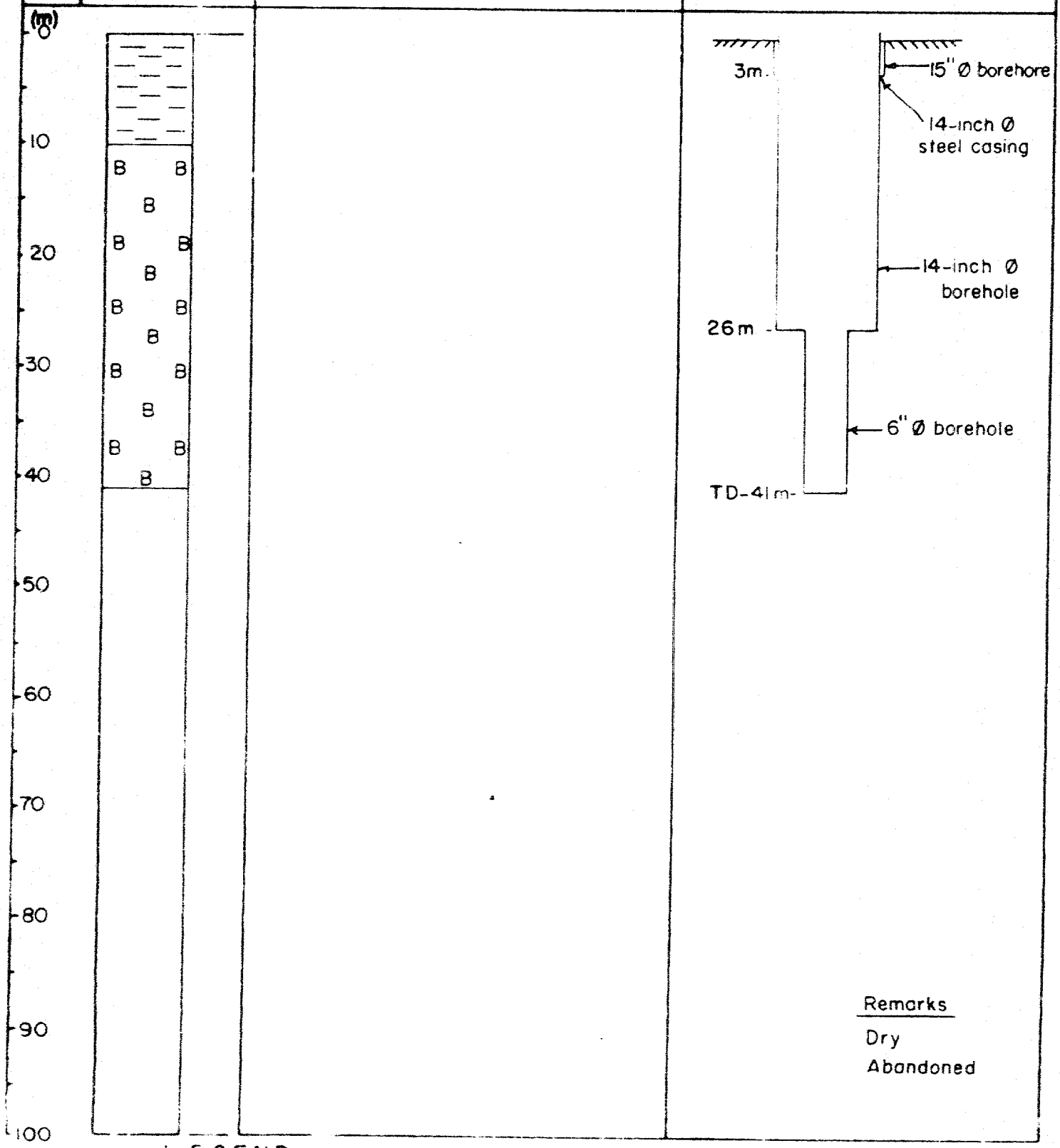
Water Development Agency

CGDP - 104 Bay Region Well

Well Nº 56

Location Jimcada dheen

Depth (m)	Geology	Gamma Ray / Resistivity	Well Design



LEGEND

Clay or Shale | Sand | Limestone | Marl

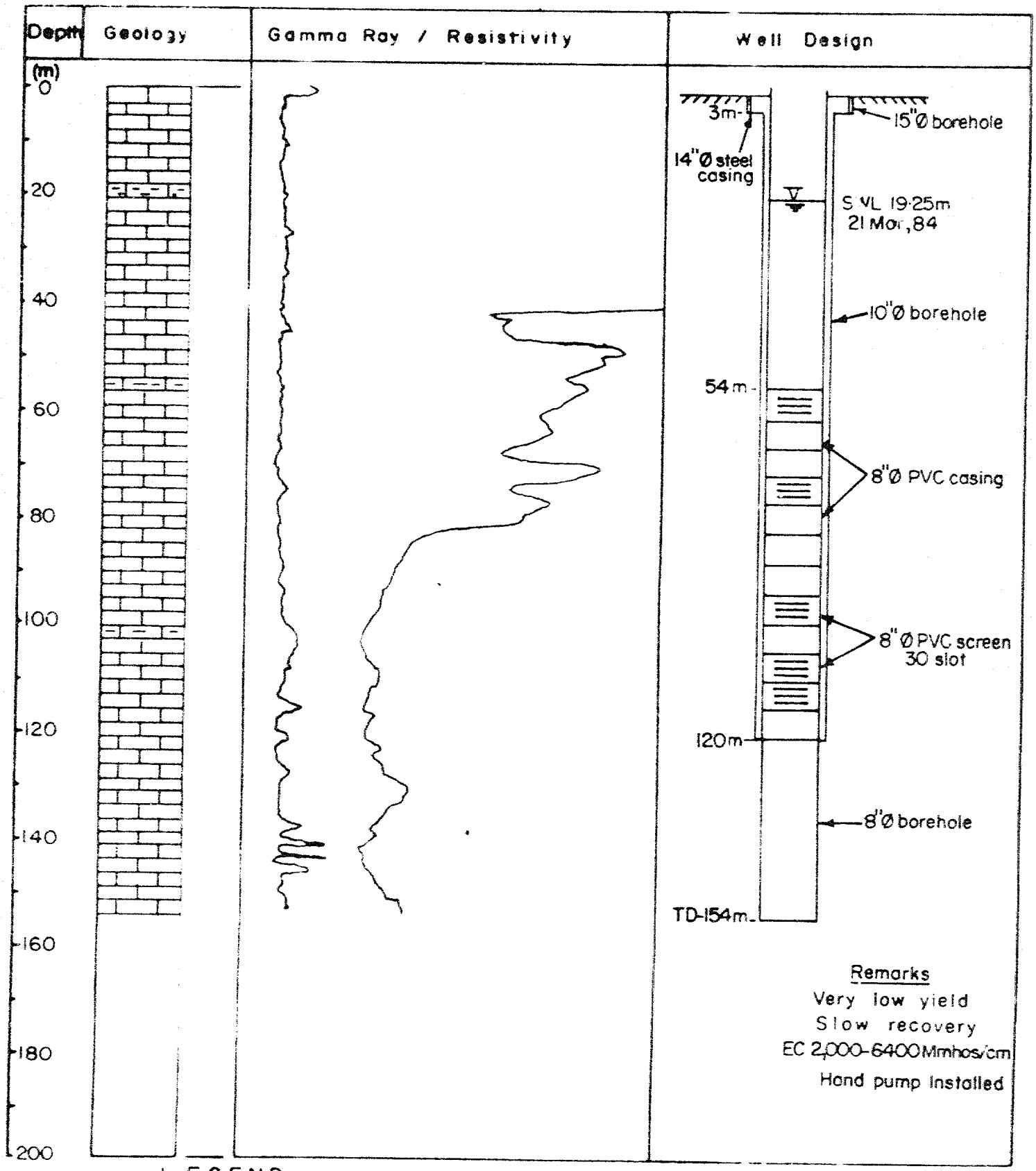
Clayey Sand | Sandstone | Karst Limestone | Basement

Water Development Agency

CGDP - 104 Bay Region Well

Well Nº 57

Location Hagarka



LEGEND

Clay or Shale | Sand | Limestone | Marl

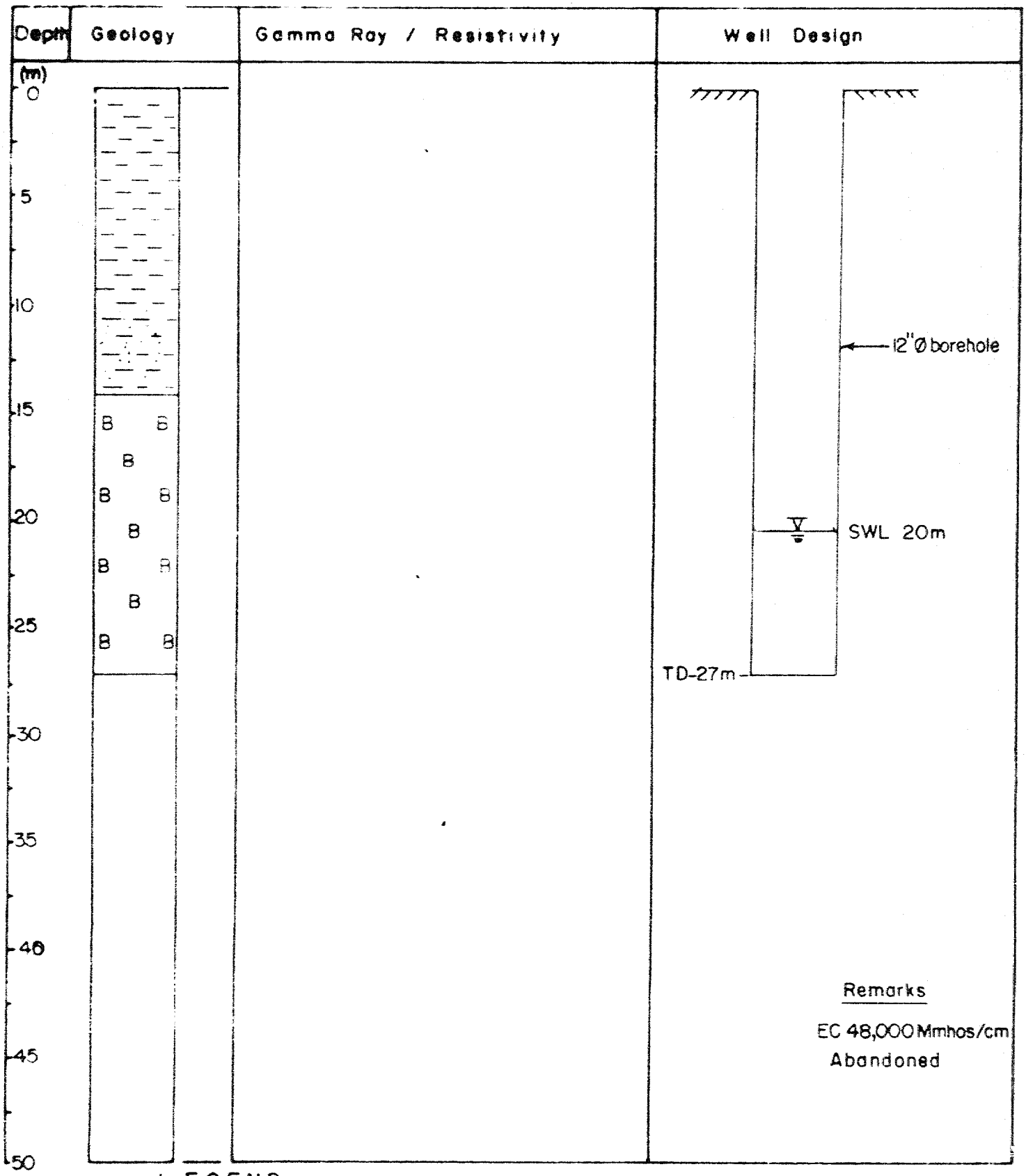
Clayey Sand | Sandstone | Karst Limestone | Basement

Water Development Agency

CGDP - 104 Bay Region Well

Well Nº 58

Location Bur Akaba



LEGEND

Clay or Shale | Sand | Limestone | Marl

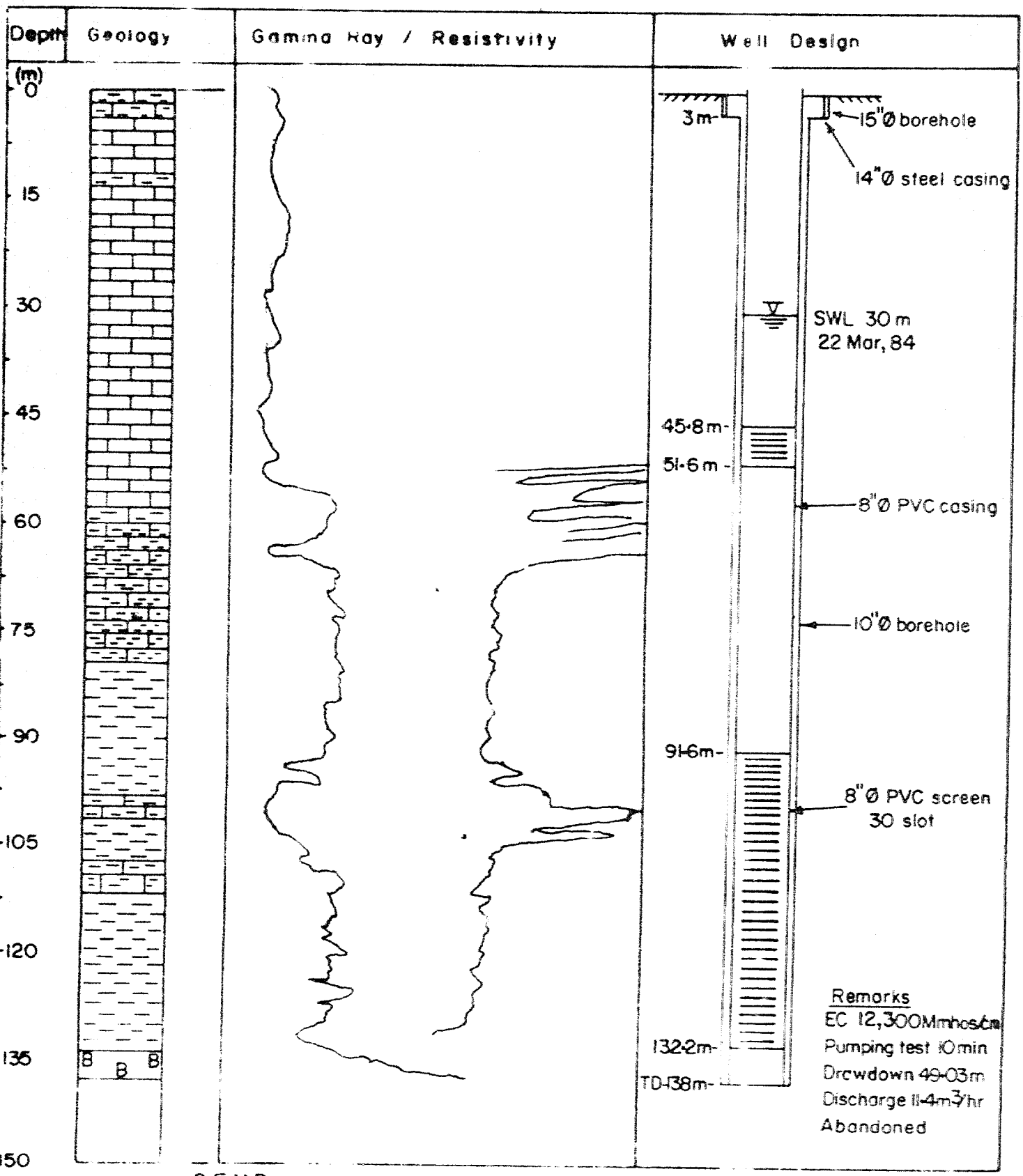
Clayey Sand | Sandstone | Karst Limestone | Basement

Water Development Agency

CGDP - 104 Bay Region Well

Wel Nº 59

Location Showka



LEGEND

Clay, or Shale | Sand | Limestone | Marl

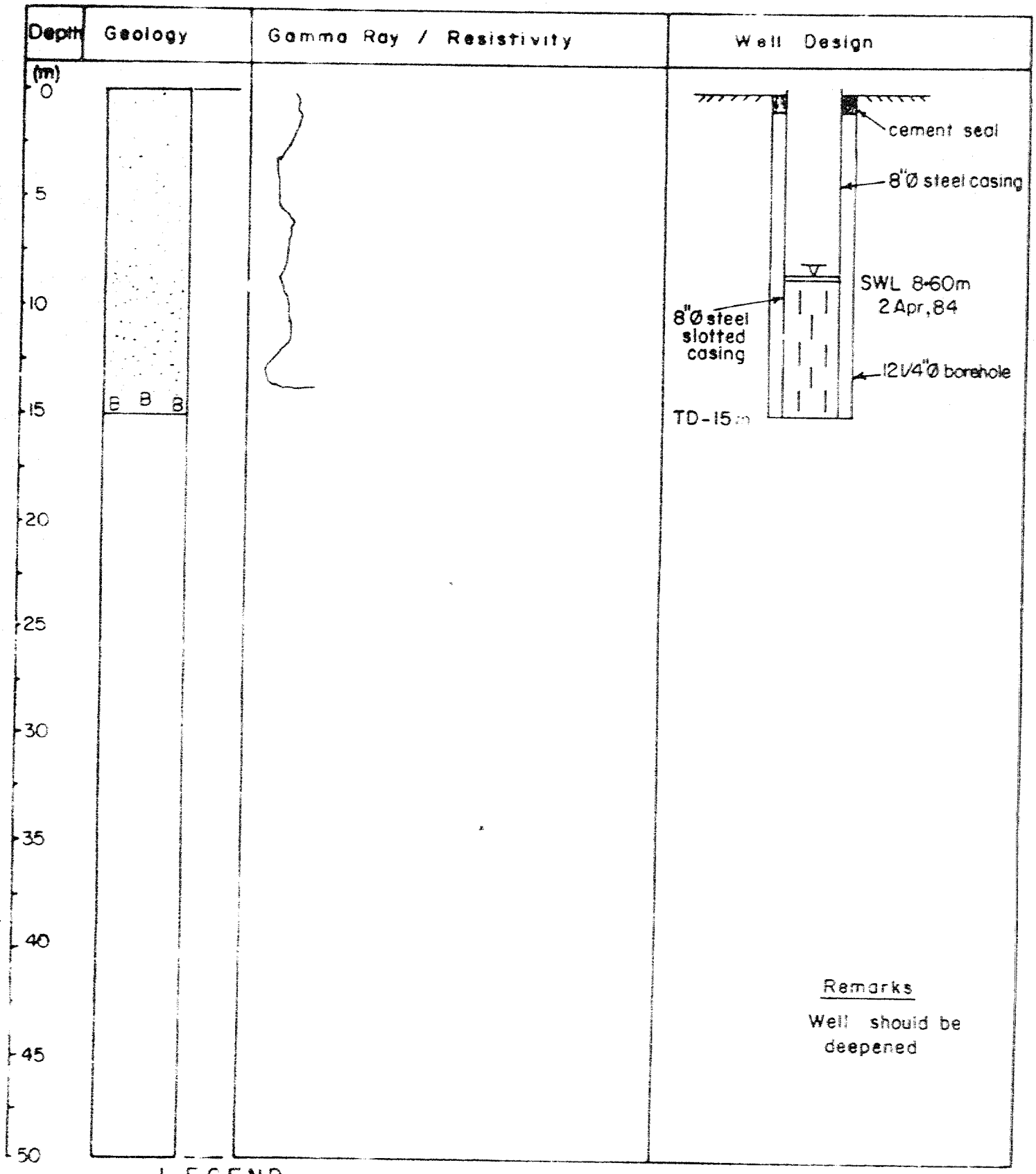
Clayey Sand | Sandstone | Karst Limestone | Basement

Water Development Agency

CGDP 104 Bay Region Well

Well № 60

Location Kannanax



LEGEND

Clay or Shale

Sand

Limestone

Marl

Clayey Sand

Sandstone

Karst Limestone

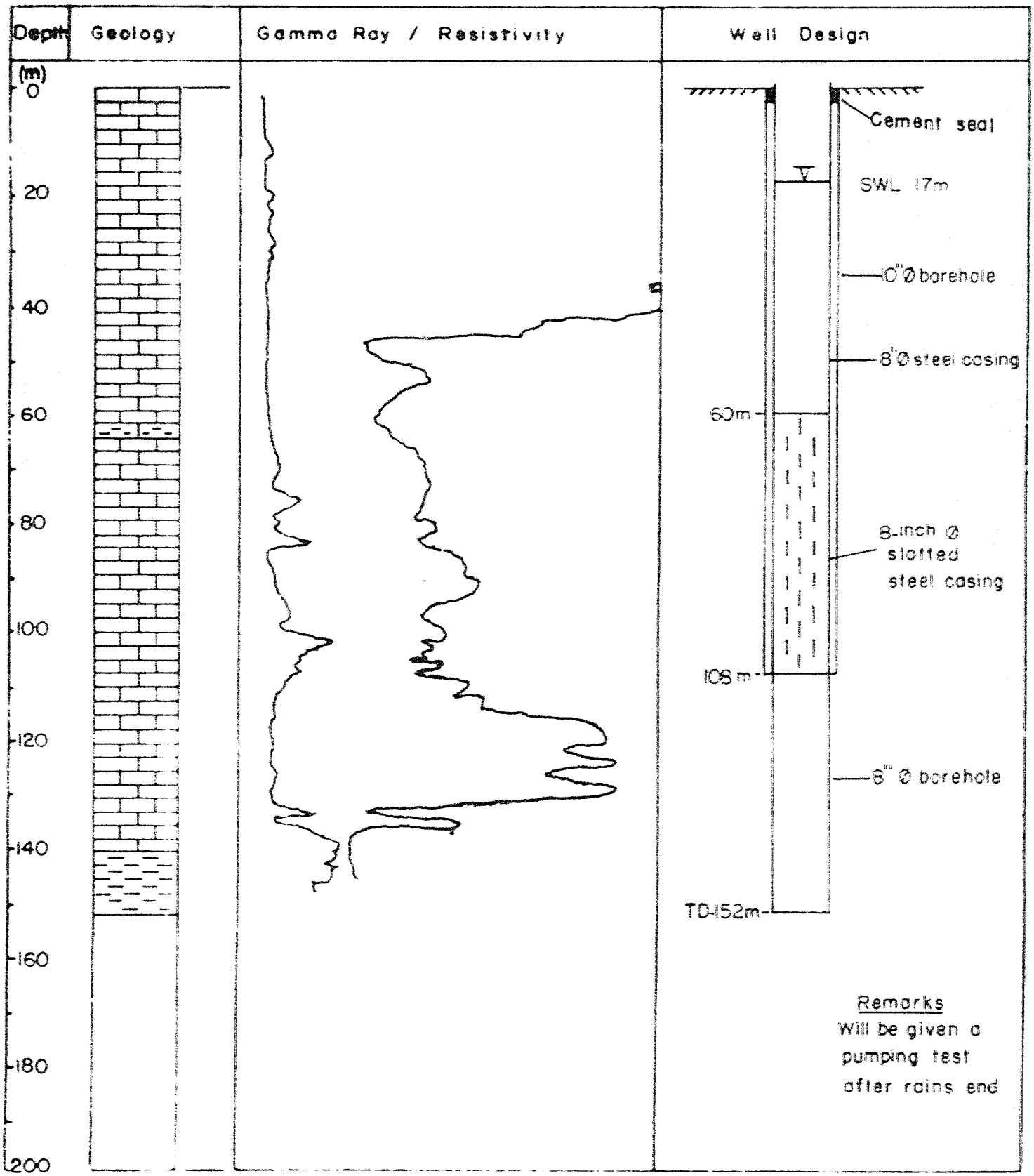
Basement

Water Development Agency

CGDP - 104 Bay Region Well

Well Nº 61

Location Hubay



LEGEND

Clay or Shale | Sand | Limestone | Marl

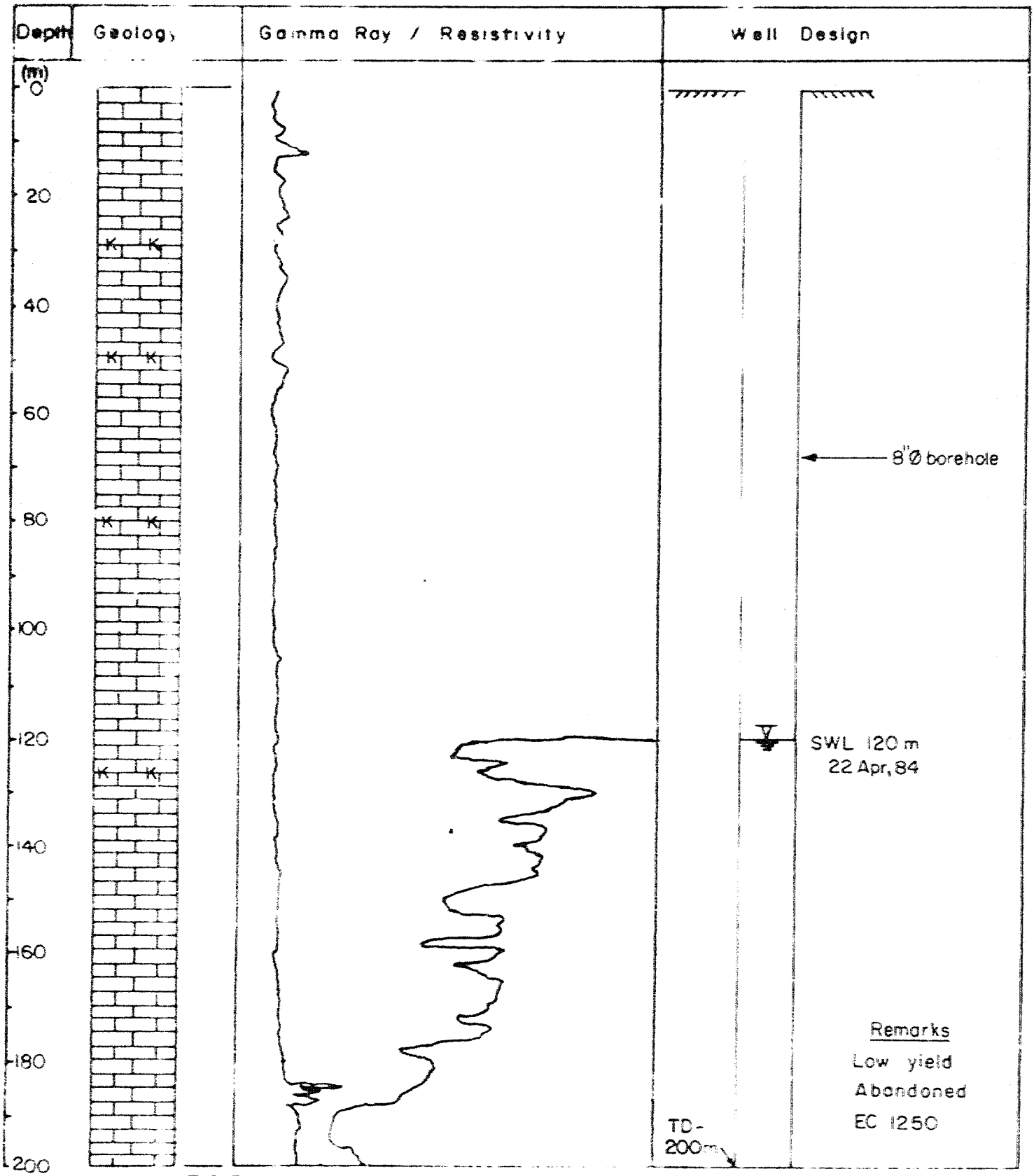
Clayey Sand | Sandstone | Karst Limestone | Basement

Water Development Agency

Well Nº 62

CGDP - 104 Bay Region Well

Location War Asha

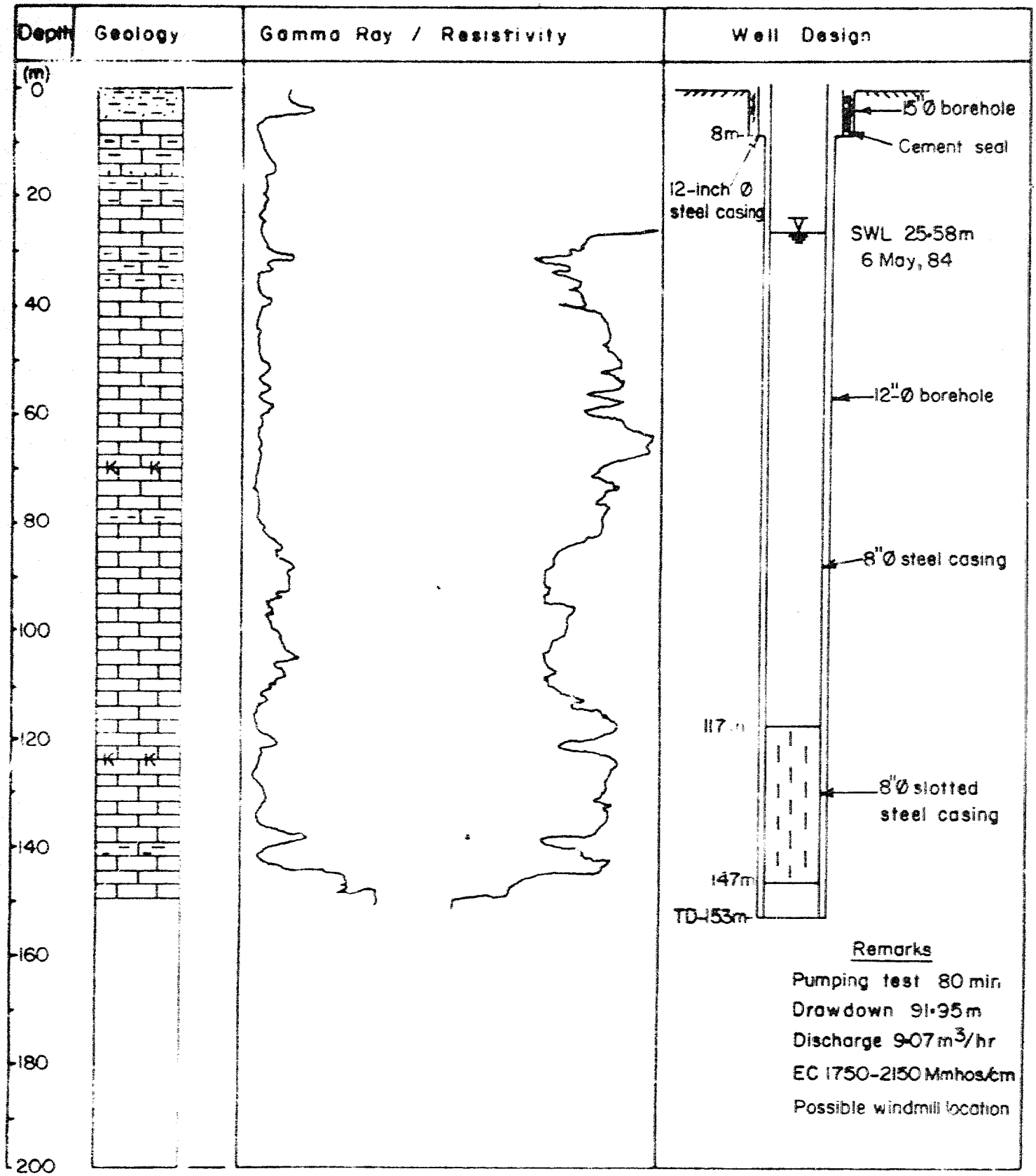


Water Development Agency

GGDP - 104 Bay Region Well

Well № 63

Location Bonkay



LEGEND

Clay or Shale | Sand | Limestone | Marl

Clayey Sand | Sandstone | Karst Limestone | Basement

Region Bay Region Rig Nº 100 Page 1 of 1

Well Location Buulo Yousuf Coord 3°03.7'N 43°27.8'E Hydrogeologist Eckhardt Drilling Method Air Hammer

Well Number B64 Driller Bit Size 8-10

Completion Date 15.5.84

Depth (m)	Graphic Log	Lithologic Description	Well Complt.	Remarks
0	480 m ASL	Limestone, white, weathered, soft		8-inch steel casing to 58 m
		Limestone, dark-gray, soft, weathered		
10		Limestone, yellow, brown, red, fractured, karst zone		
		Limestone, white to gray, dense, fractured with some clay		Static water level 18.2 m 10.8.84 E.C. 2900 Micromhos/cm 10.8.84
20				
		Clay and limestone, dark gray and white, water at 25 m		
30		Limestone, dark-gray and red-brown, dense but fractured		
		Limestone, white, brown, and dark-gray, soft, fractured, water at 38 m		
40				
50				Diesel drive Mono pump at 55 m
60		Limestone, red, white and brown, fractured with large cavities, karst zone		Open hole, 58 to 85 m
70				
80				
		85 m Total Depth		85 m Total depth

Best Available Copy

Region BAY REGION

Rig Nº 102 Page 1 of 1

Well Location BUULO HAWO Coord _____ Hydrogeologist _____ Drilling Method ROTARY

Well Number B66 Driller MUSSE Bit Size 14-10

Completion Date 7/6/84

Depth (m)	Graphic Log	Lithologic Description	Well Complt.	Remarks
0		Limestone, white-buff, and red silt and clay		12-inch steel surface casing to 4 m.
10		Limestone, white to buff, weathered, with clay		8-inch PVC casing to 83 m
20		Limestone, white to gray, with sparse clay		
30		Limestone, gray, soft porous (Karstic), with yellow clay		Static water level 33.49 m, 29/8/84
40		Limestone, white, oolitic, karstic with yellow silty clay		
50		Limestone, white to gray, oolitic, arenaceous at base, soft, porous		
60		Shale, gray-brown, with clay		
70		Limestone, white to buff and light-gray, oolitic, oxidized, with oxidized fracture surfacees and sparse clay, water 70 to 80 m		8-inch Perforated PVC casing 66.2 to 77.4m
80				
90		Shale and marl, gray, soft		Borehole Back-filled from 140 to 83 m
100				
110		Limestone, buff to light-gray, with thin shale beds		
120		Shale, gray, with marl		
130		Shale, gray, red, and variegated, with layers of marl		
140		140 m Total Depth		140 m Total Depth

Best Available Copy

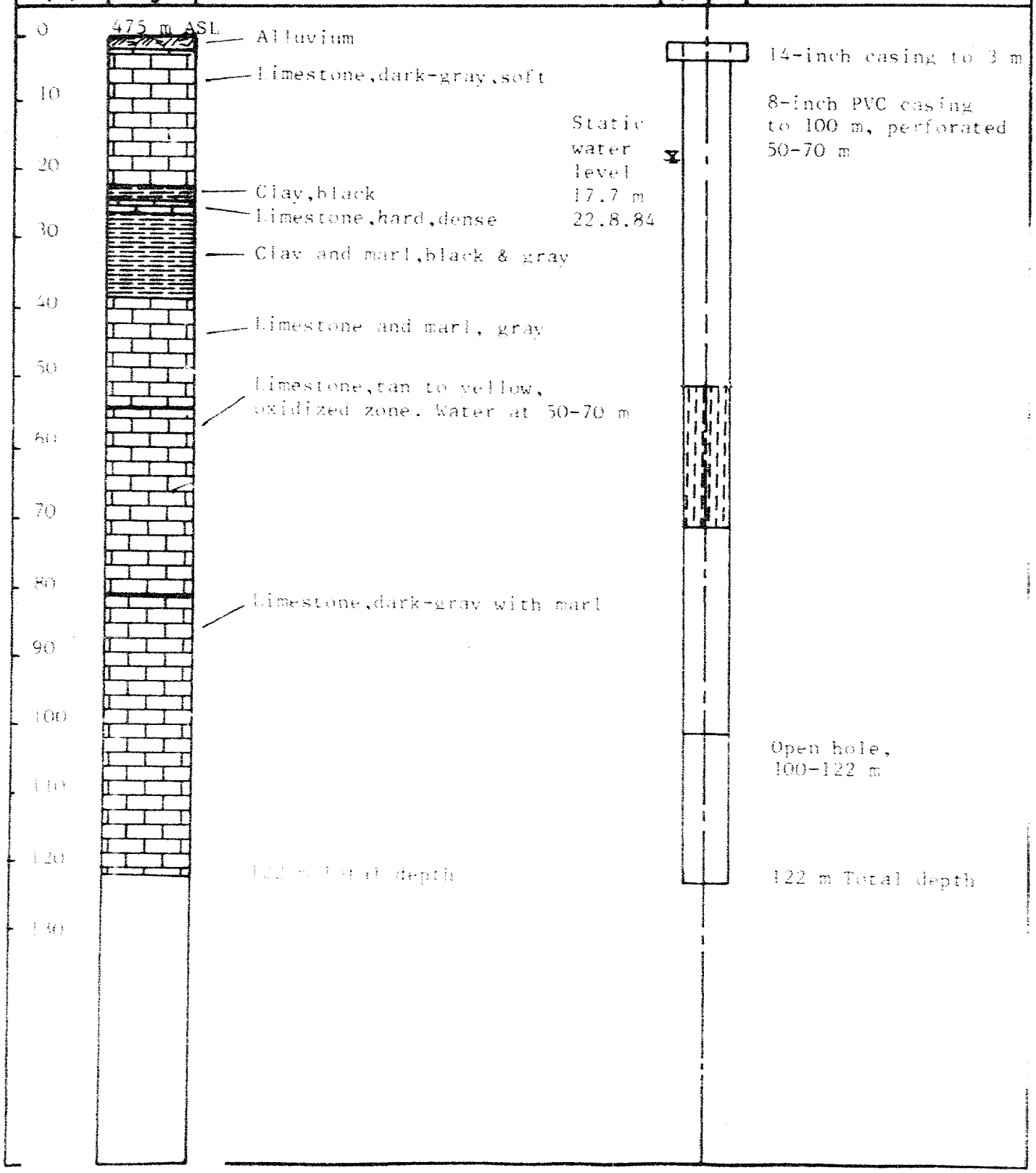
Region Bay Region **Rig Nº** 102 **Page** 1 **of** 1

Well Location Dambal Aalin **Coord** 30°05.6'N 43°26.9'E **Hydrogeologist** B.Carpenter **Drilling Method** Rotary

Well Number B68 **Driller** Musse **Bit Size** 15-10

Completion Date 26.6.84

Depth (m)	Graphic Log	Lithologic Description	Well Complt.	Remarks
0	475 m ASL	Alluvium		14-inch casing to 3 m
10		Limestone, dark-gray, soft		8-inch PVC casing to 100 m, perforated 50-70 m
20		Clay, black	Static water level 17.7 m 22.8.84	
30		Limestone, hard, dense		
40		Clay and marl, black & gray		
50		Limestone and marl, gray		
60		Limestone, tan to yellow, oxidized zone. Water at 50-70 m		
70				
80		Limestone, dark-gray with marl		
90				
100				Open hole, 100-122 m
110				
120		122 m Total depth		122 m Total depth
130				



Best Available Copy

Region BAY REGION

Well Location TOGAAL Coord 3°31.4'N 43°51.6'E Rig № 102 Page 1 of 1

Hydrogeologist L.A.C. Drilling Method ROTARY

Well Number B69 Driller MUSSE Bit Size 15-10

Completion Date 18/7/84

Depth (m)	Graphic Log	Lithologic Description	Well Compit.	Remarks
0		Limestone, cherty with dendrites		14-inch steel surface casing to 1.5 m
10		Limestone, white-buff, dendritic, some oxidation		8-inch PVC casing to 92 m
		Same as above, some clay		Static water level 16.5 m 18/7/84
20		Limestone, arenaceous, with highly oxidized cuttings at 40 m		
30				
40		Limestone, gray-white, hard with conchoidal fractures		Perforated PVC casing 37-64.5 m
		Limestone, soft, some clay some oxydation		
50		Limestone, hard, cherty, with some oxidized pieces		
60		Limestone, arenaceous, black and white sand grains, some oxidized pieces		
70		Limestone, with clay and grit		
80				
90		92 m Total Depth		Cement Plug 92 m Total Depth

Best Available Copy

Region BAY REGION Rig Nº _____ Page 1 of 1

Well Location GARIMAY Coord 3°38.9'N 43°52.2'E Hydrogeologist J.D.G Drilling Method ROTARY

Well Number B70 Driller _____ Bit Size 10

Completion Date 16.9.84

Depth (m)	Graphic Log	Lithologic Description	Well Complt.	Remarks
0		Soil, Red		No surface casing
10				8-inch steel casing to 126 m
20		Limestone (No lithologic log)		
30				
40				
50				
60		Karstic limestone (driller)	Static water level 60 m 16.9.84	Perforated casing, 1/8x2 inch slots, 216 per 6 m length of casing
70				
80		Limestone		
90				Perforated casing, 1/8x2 inch slots
100				
110		Karstic limestone(driller)		
120				
130		Limestone		Open hole 126-135 m
140		135 m Total Depth		135 m Total Depth

Best Available Copy

Region Bay Region Rig Nº _____ Page 1 of 1

Well Location Usle Coord 3°23.7'N 43°30.1'E Hydrogeologist J.D.G Drilling Method Rotary

Well Number B71 Driller _____ Bit Size 16-10

Completion Date 19.8.84

Depth (m)	Graphic Log	Lithologic Description	Well Compit.	Remarks
0		Soil and weathered limestone, red		14-inch surface casing to 1 m
10		Limestone, gray to olive-gray		8-inch PVC casing to 103 m
20				
30		Lost circulation, no returns (Karstic limestone)		
40			Static water level 36m 28.8.84	
50				
60		Limestone, light-gray		Perforated PVC casing 35 to 85 m
70		Lost circulation, no returns (Karstic limestone)		
80				
90				
100		103 m Total depth		103 total depth

Best Available Copy

Region BAY REGION

Well Location MIGDALOO Coord 3°36.4'N 43°50.5'E

Rig Nº _____ Page 1 of 1

Hydrogeologist _____ Drilling Method ROTARY

Well Number B 74

Driller _____ Bit Size 14 - 10

Completion Date 13.10.84

Depth (m)	Graphic Log	Lithologic Description	Well Complt.	Remarks
0		Soil, red		12-inch surface casing to 2 m
10		Clay, yellow		
20		Limestone, weathered sparse chert, and interbedded yellow clay		8-inch PVC casing to 100 m
30		Limestone, olive-gray sparse chert and clay, some weathering		
40				
50		Limestone, olive-gray iron-stained, with chert and secondary calcite		Perforated casing 58-64 m
60				
70			Static water level 74.7 m 3.10.84	Perforated casing 70-88 m
80				
90		Karstic limestone		
100		Limestone, weathered iron stained		Open hole 100-130 m.
110				
120		Karstic limestone		
130		130 m Total Depth		130 m Total Depth

Best Available Copy

Region BAY REGION LABATAN Rig Nº 102 Page 1 of 1

Well Location JIROW Coord 3°31.6'N 43°50.9'E Hydrogeologist J.D.G. Drilling Method ROTARY

Well Number B 75 Driller MLSSE Bit Size 15 - 10

Completion Date 18.10.84

Depth (m)	Graphic Log	Lithologic Description	Well Compit.	Remarks
0		Limestone, red weathered		12-inch surface casing to 2 m
10				
20		Limestone, yellow to olive-gray		8-inch PVC casing to 132 m
30				
40			Static water level 40.1 m 18.10.84	
50				
60		Limestone, weathered, karstic zone		Perforated casing 60-72
70		Limestone, gray with red and yellow stains, sparse yellow clay and chert		
80				
90		Limestone, gray, karstic		Perforated casing 90-108
100				
110		Limestone, gray		
120				
130		132 m TD		132 m Total Depth
140				

Best Available Copy

Region Bay Region 2°41.5'N Rig Nº 102 Page 1 of 1

Well Location Dhuboi Coord 42°53.0'E Hydrogeologist J.D.G. Drilling Method Rotary

Well Number B76 Driller M.A.Rage Bit Size 16-10

Completion Date 28.12.84

Depth (m)	Graphic Log	Lithologic Description	Well Complt.	Remarks
0	375 ASL	Limestone, pink, medium-gray, moderately weathered		14-inch surface casing to 3 m
10				8-inch casing to 100 m, all steel
20		Limestone, medium-gray, and medium to dark gray	Static water level 19.15 26.11.84	
30				
40				
50		Limestone, medium-gray with thin black shale, iron-stained fractures, water at 52 m		1/8-inch perforations in 8-inch casing
60		Limestone, light brown, ironstained fractures		31 m drawdown after 3 hours at 15.9 m^3/hr, recovered in 2.8 hours
70		Limestone, medium to dark-gray, oxidized at 72 m, water at 80 m		
80				
90				Motor-powered Mono pump at 90 m
100		Limestone, medium to dark-gray, very-fine pyrite, hydrogen-sulfide at 103 m, water at 112 m		Open hole 100-124 m
110		Limestone, white to light-gray, karstic, water at 118-120 m		
120		Total depth 124 m		124 m Total depth
130				

Best Available Copy

Region Bay Region

Rig № 102 Page 1 of 1

Well Location Dhorhaby Coord 2°33.9'N 42°55.7'E Hydrogeologist J.D.G. Drilling Method Rotary

Well Number B77 Driller M.M.Rage Bit Size 14-10-8

Completion Date 28.12.84

Depth (m)	Graphic Log	Lithologic Description	Well Compit.	Remarks
	390 m ASL			
0		Soil		12-inch casing to 2m, steel, grouted and sealed
10		Limestone, light to medium-gray, slightly weathered		8-inch casing to 24m, steel
20		Lost circulation, No sample (Karst zone)		
		Water cascades from 26 m		
30		Limestone, light-gray, oolitic, iron-stained fractures		Static water level 27.5 m, 3.3.85
40				5-inch steel casing to 200 m, preforated casing in lieu of blank casing
50		Limestone, medium-gray, slight weathering		Static water level 46.51 m 28.12.84
60				
70				
80		Limestone, light to medium-gray, karst 114-116 m		
90				
100				
110				
120		Limestone light-gray, karst 126-128 m.		
130				
140		Limestone, medium-gray, partly oolitic		
		Limestone, light-gray, oolitic		
150		Limestone, dark-gray, pyritic		
160		Limestone, light-gray, oolitic		
170		Limestone, medium-gray, foliated		
180				
190		Limestone, gray, oolitic		
200 TD		No sample		200 m Total depth

Best Available Copy

Region BAY REGION | Rig № 100 | Page 1 of 1

Well Location BULLO CADDAY | Coord A 2°59.2'N 42°48.1'E | Hydrogeologist J.D.C. | Drilling Method ROTARY

Well Number B 79A&B | B 2°59.5'N 42°48.1'N | Driller TALL ABDI | Bit Size 44-10

Completion Date A. 27.12.84 B. 11.2.85

BOREHOLES ABOUT 2Km APART

Depth (m)	Graphic Log	Lithologic Description	Well Compit.	Remarks
0	79A	Soil	79A	12-inch surface casing to 3 m, no seal
10		Limestone, medium grav, oolitic fragments at top, dendrites throughout		10-inch open hole to 26 m
20		conglomerate derived from granitic complex		26m, Total Depth, no water
30		Granitic rock 26m, Total Depth, No water, Abandoned		
0	79B	Soil and clay, medium grav	79B	12-inch surface casing to 18 m
10		alluvium, sand-pebble conglomerate, weathered feldspar and clay matrix		10-inch open hole to 50 m, No seal
20		Shale, red, silty		
30		Limestone, dark grav, argillaceous		
40		Conglomerate, with siltstone, sparse quartz grains, becomes finer toward top		
50		Granitic complex, meta-sediments, ferro-magnesian minerals, some quartz and feldspar		50 m, Total Depth No water
		50 m, Total Depth, No water, abandoned		

Best Available Copy

Region Bay Region

Well Location Toogere Hoosle Coord 2°38.0'N 42°54.6'E

Rig Nº _____ Page 1 of 1

Hydrogeologist J.D.C. Drilling Method Rotary

Well Number B80

Driller _____ Bit Size 14-10

Completion Date 4.3.85

Depth (m)	Graphic Log	Lithologic Description	Well Complt.	Remarks
	395 m ASL			
0		Soil & Limestone, light olive-gray, weathered		12-inch casing to 3 m grouted and sealed
10		Limestone, medium greenish-gray, argillaceous, slightly weathered		
20		Limestone, medium-gray, argillaceous, oolitic		8-inch steel casing to 212 m, perforated 86-98 m and 194-206 m
30		Limestone, light-gray, oolitic		
40		Limestone, white to light-gray, oolitic		
50		Limestone, medium-gray, argillaceous, pyritic, very fine		Static water level 57.08 m
60		Limestone, white to light greenish-gray, oolitic		
70		Limestone, light-gray, very fine		
80		Limestone, white to light-gray, oolitic, with thin medium-gray limestone, oxidized 88-90 m, water at 80-90 m		Hand pump to be installed at 90 m
90				
100				
110		Limestone, medium-gray, oolitic & very fine		
120		Limestone, white to light-gray very fine, slightly oxidized 130-134 m		
130				
140		Shale, red-brown to dark-gray, slightly fissile, silty, limy		
150				
160		Limestone, dark-gray, argillaceous, shaley		
170		Siltstone, red-brown to green gray, some sand, granitic conglomerate		
180				
190				
200		No sample		
		Conglomerate of granitic & Metasedimentary material		
212		Granitic complex		Total depth 212 m

Best Available Copy

Region Bay Region Rig Nº 102 Page 1 of 1

Well Location Misra Coord 2°35.2'N 43°24.3'E Hydrogeologist J.D.G. Drilling Method

Well Number B83 Driller Abdi Warsame Bit Size 14-10

Completion Date 17.4.85

Depth (m)	Graphic Log	Lithologic Description	Well Compit.	Remarks
	390 m ASL			
0		Clay soil, brown		12-inch casing to 12 m, cement seal
10		Limestone, white to light-gray, oolitic, moderately weathered		
		Static water level, 21.18 m 17.4.85		8-inch steel casing to 170 m, perforated 62-74 m and 152-170m
20				
30		Limestone, white to light-gray, oolitic, some dark-gray, argillaceous, and purple siltstone		
40		Limestone, dark-gray, argillaceous		
50		Limestone, white to light-gray oolitic weathered surfaces iron-stained		
60				
70		Limestone, medium to dark-gray, oolitic, partly lithographic		
80		Limestone medium-gray very dense, sparse dark-gray fragments Water		
90		Limestone, light to medium-gray, oolitic, sparse bioclasts		
100		Limestone, white to medium-gray, very fine, argillaceous, sparse fine pyrite		
110				
120		Limestone, medium greenish gray, argillaceous, pyritic		
		Shale, reddish-brown, silty, fissile		
130		Limestone, medium to dark-gray argillaceous, calcite in fractures, pyrite traces		
140		Limestone medium-gray, argillaceous		
150		Limestone, medium-gray, argillaceous, sandy		
160		Siltstone, greenish-gray, some reddish-brown, sparse sandstone, fine		
170		Conglomerate, granitic and metasedimentary components, fresh granitic rock in final sample, water at 170 m		170 m, total depth
		170 m, total depth		

Best Available Copy

Region BAY REGION

Rig № 102 Page 1 of 1

Well Location Buklaabow Coord 3°01.2'N 43°24.3'E Hydrogeologist J.D.Gillespie Drilling Method Rotary

Well Number B 85 Driller Abdi Warsame Bit Size 14 - 10

Completion Date 30.5.85

Depth (m)	Graphic Log	Lithologic Description	Well Complt.	Remarks
0		Limestone, Weathered, iron stain decreases downward		12 Inch surface casing to 3.5m, cement seal
10		Limestone, light-gray to light-buff, fine, slight to moderate weathering		8 Inch PVC casing to 106, perforated from 88 to 106 M.
20		Static water level 14.0 M 30.5.85		
30				
40		Limestone, medium-gray, fine, slightly argillaceous sparse weathered surfaces		
		Limestone, light to medium-gray, oolitic		
50		Limestone, white to medium-gray, chalky, platy		
60		Limestone, medium-gray, fine, argillaceous		
70		Limestone, white to light-gray chalky, platy, oxidized surfaces 64 to 68 M		
		Limestone, medium gray, fine dense, argillaceous		
80		Limestone, light gray, oolitic		
90		Limestone, light-medium-gray, sparse oolites, slightly argillaceous, slightly oxidized surfaces 88' to 94 M		8 Inch PVC perforated csing 88 to 106 M
		Limestone, medium-gray, sparse black fossil fragments, very fine.		
100		Limestone light to medium-gray, fine, sparse fossils		
110		Limestone, light-gray, fine, platy cuttings		10 Inch open hole 106 to 130 M
120		Limestone, light to medium gray, fine sparse fossils.		
130		130 M Total depth		130 M Total depth

Best Available Copy

Region: Bay Region

Well Location: Copan Hagan

Coord: 2°40.0'N 43°04.0'E

Rig Nº: 102

Page: 1 of 1

Hydrogeologist: J.D.G.

Drilling Method: Rotary

Well Number: B88

Driller: Abdi Warsame

Bit Size: 14-6

Completion Date: 16.6.85

Depth (m)	Graphic Log	Lithologic Description	Well Complt.	Remarks
0	395 m ASL	Soil, clay, dark-brown to gray		Cement to 4 m 12-inch surface casing to 9 m Sand backfill to 10 m Cement to 20 m 6-inch pilot hole to 294 m, uncased, with sand backfill to 294 m, hole abandoned
10		Limestone, light-brown to gray, weathered		
20				
30		Shale, gray, limy, weathered	Static water level 28 m 26.6.85	
40		Limestone, light-brown to gray fine, oolitic 50-52 m, weathered		
50				
60				
70		Limestone, light-gray, fine weathered, secondary calcite vugs 76-78 m		
80				
90				
100		Limestone, light to dark-gray, fine and oolitic in part		
110				
120				
130				
140		Limestone, light to medium-gray, fine		
150				
160				
170				
180				
190				
200				
210		Shale, red-brown		
220				
230				
240				
250		Shale, dark-gray, limy and marl		
260				
270		Limestone, medium-gray, argillaceous		
280		No sample		
290		Shale, dark-gray with sand & metamorphic rock		
300		No sample 294 m Total depth		Backfilled with sand to 294 m Total depth

Best Available Copy

Region BAY REGION Rig № 101 Page 1 of 1

Well Location BRADP COMPOUND Coord 3°07.3'N 43°38.9'E Hydrogeologist J D.G. Drilling Method ROTARY

Well Number B90 Driller Shire Bit Size 14-10

Completion Date 27.6.85

"Chinese Well"

Depth (m)	Graphic Log	Lithologic Description	Well Complt.	Remarks
0		Limestone, Buff, weathered		12-inch surface casing to 1.5m 8-inch PVC casing to 18m
10		Limestone, white to light-gray light-gray, moderately weathered		
		Limestone, white to light-gray		Static water level 5.6m, 27.6.85
20		Shale, medium-gray, limy		
30		Limestone, light-gray, platy, argillaceous, limy		Perforated PVC casing 6-18m
40		Shale, medium to dark-gray, limy		Open hole 18-30m
50				
60		30m Total Depth		30m Total Depth

Best Available Copy

Region BAY REGION Rig Nº 101 Page 1 of 1

Well Location HARE Coord 3°30.8'N 43°33.8'E Hydrogeologist J.D.G. Drilling Method ROTARY

Well Number B91 Driller Shire Bit Size 16-10

Completion Date 13.7.85

Depth (m)	Graphic Log	Lithologic Description	Well Compit.	Remarks
0		Limestone, red, highly weathered		14-inch surface casing to 1.5m
10				
		Limestone, light-brown to gray moderately weathered		8-inch PVC casing to 116m
20				
30		Limestone, light-gray sparse iron stain, medium-grained		
40				Static water level 44.2m 9.7.85
		Limestone, white to light-gray, oolitic, oxidized, water		Perforated casing 44-50m
50				
		Limestone, medium-gray, argillaceous		
60				
70		Limestone, medium-gray, oxidized, water		Perforated casing 72-84m
80				
90		No sample		
		Limestone, medium-gray, fine		
100		Limestone light-brown to medium gray, oxidized, water		Perforated casing 104-116m 116m Total Depth
110		Limestone, medium-gray, fine		
120		No sample 116m Total Depth		

Best Available Copy

Region BAY REGION Rig № 102 Page 1 of 1

Well Location ASHA FARTOW Coord 3°15.1'N 43°34.0'E Hydrogeologist J.D.G. Drilling Method ROTARY-AIR

Well Number B92 Driller ABDI WARSAME Bit Size 14-10

Completion Date 18.7.85

Depth (m)	Graphic Log	Lithologic Description	Well Complt.	Remarks
0		Soil and brown-to-yellow clay		12-inch casing to 24m
10				
20				8-inch PVC casing to 118m
		Limestone, white to light-yellow, weathered, some clay		
30				
		Limestone, white to light-brown, deeply weathered, fractures with clay fillings. Water at 58m		
40				
			Static water level 46.48m 16.7.85	
50				
60		Limestone, medium to dark brownish-gray, argillaceous		1/8-inch perforations in 8-inch PVC casing
70		Limestone, white to light-yellow calcite vuglinings, water		
80		Limestone, light-gray, weathers chalky, water		
90		Limestone, light-gray, soft with much clay		
100		Limestone, light to medium-gray		
		Limestone, dark-gray, very fine		
110		Limestone, medium-gray, Fossiliferous		
120		Limestone, white to light-gray weathered		120 total depth open hole 118-120m
		120m Total Depth		

Best Available Copy

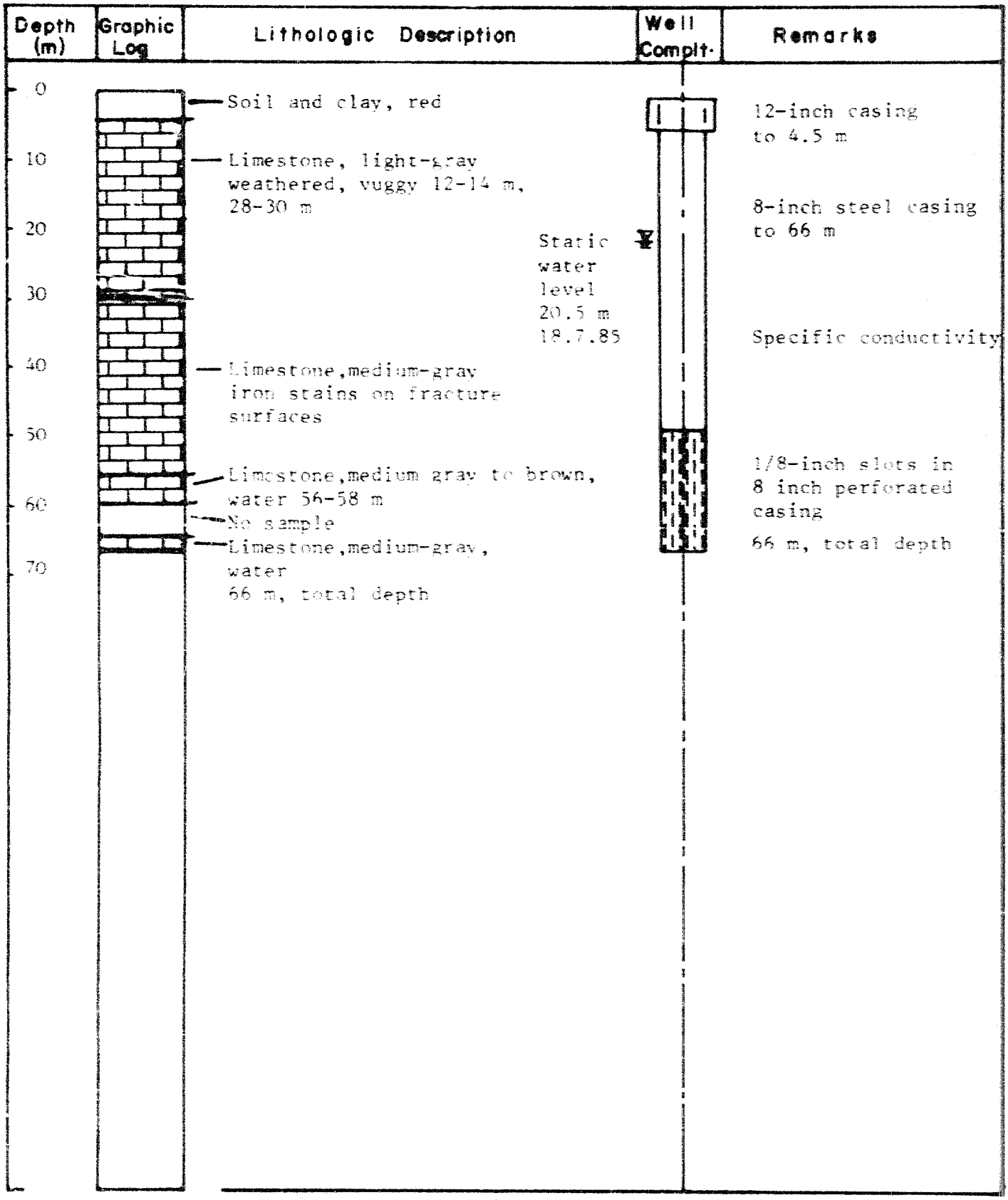
Region BAY REGION Rig № 101 Page 1 of 1

Well Location BAQALLEY Coord 3°14.3'N 43°13.2'E Hydrogeologist J.D.G. Drilling Method ROTARY-AIR

Well Number B 94 Driller SHIRE Bit Size 14-10

Completion Date 20.7.85

Depth (m)	Graphic Log	Lithologic Description	Well Complt.	Remarks
0		Soil and clay, red		12-inch casing to 4.5 m
10		Limestone, light-gray weathered, vuggy 12-14 m, 28-30 m		8-inch steel casing to 66 m
20			Static water level 20.5 m 18.7.85	
30				Specific conductivity
40		Limestone, medium-gray iron stains on fracture surfaces		
50				1/8-inch slots in 8 inch perforated casing
60		Limestone, medium gray to brown, water 56-58 m No sample		
70		Limestone, medium-gray, water 66 m, total depth		66 m, total depth



Best Available Copy

Region BAY REGION

Well Location KURTIN Coord 3°01.0'N 43°12.7'E

Rig Nº 101 Page 1 of 1

Hydrogeologist J.D.G. Drilling Method ROTARY

Well Number B95

Driller ABDI WARSAME Bit Size 14-10-6

Completion Date 5.8.85

Depth (m)	Graphic Log	Lithologic Description	Well Compit.	Remarks
0		Limestone, light yellow to dark red, weathered		12 inch surface casing to 3.5 m
10				
20		Limestone, light-gray, oolitic, weathered with clay		8 inch steel casing to 130 m
30		Clay, yellow and gray oolitic limestone		
40		Limestone olive-gray to gray fine moderately weathered		Static water level 43 m 3.8.85
50				
60		Limestone, gray, argillaceous, partly oolitic, some oxidized strata with clay		
70				
80				Perforated casing, 1/8x2-inch slots, 216 per 6 m length, 76-100 m
90				
100		Limestone, dark-gray, with chert		
110		Limestone, gray, argillaceous some oxidized strata with clay		
120				
130		Limestone, gray, oxidized		Perforated casing 1/8x2-inch slots, 124-130 m
140		Limestone, gray, argillaceous, with sparse interbeds of dark-gray shale		6 inch open hole, 130-160 m
150				
160		160 m total depth		160 m total depth

Best Available Copy

Region Bay Region Rig Nº 101 Page 1 of 1

Well Location Qansax Dheere 2 Coord 2°55.5'N 42°57.3'E Hydrogeologist J.D.G. Drilling Method Rotary

Well Number B96 Driller Shire Bit Size 14-10

Completion Date 8.8.85

Depth (m)	Graphic Log	Lithologic Description	Well Compit.	Remarks
0		Soil, clay and weathered limestone, red		12-inch surface casing to 2 m
10		Limestone, yellow-brown, weathered		8-inch steel casing to 136 m
20				
30		Clay and limestone, yellow		
40		Limestone, white to brown weathered, oxidized with clay.		
50			Static water level 48.04 m 8.8.85	
60		Limestone, light to dark-gray weathered to clay, limonitic vugs in some intervals.		
70				
80		Shale, dark gray, with some yellow-brown limestone		Perforated casing, 1/8 x 2 inch slots, 216 per 6 m length, 82-100 m
90		Limestone, light-brown moderately weathered		
100		Limestone, light-gray to dark-brown, argillaceous		
110				
120				Perforated casing 124-130 m
130				
140		136 m total depth		136 m total depth

Best Available Copy

Region Bay Region Rig № 102 Page 1 of 1

Well Location Toosilow Coord 3°08.6'N 43°11.6'E Hydrogeologist J.D.G. Drilling Method Rotary

Well Number B97 Driller Abdi Warsame Bit Size 14-10

Completion Date 22.8.85

Depth (m)	Graphic Log	Lithologic Description	Well Complt.	Remarks
0		Limestone, white to light-gray, highly weathered		12-inch surface casing to 2 m
10				8-inch steel casing to 140 m
20				
28		Limestone, light-gray, weathered		
30				Static water level 32 m 23.8.85
40				
50				
52		Limestone, light-green to medium gray, weathered		
54		Limestone, gray and brown, weathered, water at 60 m		
60				
62				
66		Clay, green-gray to dark gray		
70		Limestone, light-gray to light-brown, weathered, iron-staubed fractures.	68	Perforated casing, 1/8 x 2" slots 216 slots per 6m length, 68-80 m.
80			80	
82		Limestone light green-gray to gray		
90			92	Perforated casing, 92-110 m.
94		Limestone light-gray to gray, argillaceous		
100				
		Limestone, light-gray to gray, oxidized fragments		
110			110	
120				
124		Limestone, green-gray, argillaceous		
130				
140	140	140 m total depth		140 m total depth
150				

Best Available Copy

Region BAY REGION

Well Location QURALOW Coord 3°02.0'N 43°16.5'E

Rig № 101 Page 1 of 1

Hydrogeologist J.D.G Drilling Method ROTARY

Well Number B98 Driller SHIRE Bit Size 14-10

Completion Date 11/9/85

Depth (m)	Graphic Log	Lithologic Description	Well Complt.	Remarks
0		Limestone, red, weathered with minor soil		12-inch steel surface casing to 2.5 m
10		Limestone, light-gray to light-brown, weathers buff, iron-stained fractures		8-inch PVC casing to 69.6 m
20		Limestone, medium-gray, fine to medium grained, sparsely oolitic, moderately weathered		Static water level 39 m, 5/9/85
30		Clay, yellow		
40		Limestone, medium-gray to medium-brown, very fine-grained, weathered along fractures, platy, argillaceous		Perforated PVC casing 41.6 to 69.6 m
50		Limestone, light to medium gray, chalky, argillaceous, some gypsum		
60				
70				Open hole 69.6 to 120 m
80		Limestone, medium-gray, fine-grained, argillaceous with sparse thin dark-gray limestone beds, minor oxidation		
90				
100				
110		Limestone, medium-gray, fine-grained, oolitic, argillaceous at base		
120		120 m Total Depth		120 m Total Depth

Best Available Copy

Region BAY REGION Rig № 102 Page 1 of 1

Well Location HAREERO JIIFO 2 Coord 3°13.9'N 43°25.2'E Hydrogeologist J.D.G. Drilling Method ROTARY

Well Number B99 Driller ABDI NUR Bit Size 14-10

Completion Date 11.9.85

Depth (m)	Graphic Log	Lithologic Description	Well Complt.	Remarks
0		Soil, Red clay		12-inch steel surface casing to 3.5 m.
		Limestone, medium-Gray, with vugs of red clay.		
10		Limestone, light to medium-gray, weathered, with clay		8-inch PVC casing to
20				
		Limestone, dark-gray, argillaceous, iron-stained fractures		
30				Static water level 35 m, 7/9/85
		Limestone, light to medium-gray, weathered, coarsely crystalline 36-42m		
40				
50		Limestone, medium-gray, with much yellow-green clay, water		
		Shale, black, and gray limestone interbedded		
60				
70		Limestone, medium-gray, fine-grained, argillaceous, iron-staining on fractures		Perforated PVC casing 63.8 to 80.6m
80				
		Limestone, dark-gray, fine-grained, platy at base		
90				
		Limestone, light-gray, fine-grained, iron-stained fractures, water		
100				
		Limestone, medium-gray fine-grained, argillaceous		Perforated PVC casing 103.2 to 114.4 m
110				
				Open hole 114.4 to 120 m
120		120 m Total Depth		120 m Total Depth

Best Available Copy

Region Bay Region Rig № 101 Page 1 of 1

Well Location Hobishole Coord 2°58.8'N 43°21.0'E Hydrogeologist JDC Drilling Method Rotary

Well Number B101 Driller Shire Bit Size 14-10

Completion Date 2.10.85

Depth (m)	Graphic Log	Lithologic Description	Well Complt.	Remarks
0	475 m	Limestone, weathered, sparse ferruginous chert		12-inch steel surface casing to 3 m, with grout seal for surface, 8-inch & 12-inch.
10		Limestone, light-yellow to light gray, weathered		
20		Limestone, medium to dark-gray, weathered, with clay		
		Limestone, pink to light-gray		Static water level 26.5 m 29.9.85
30		Limestone, light-gray to light-brown, weathered, with iron-stained fractures		
40		Limestone, light-gray and dark-gray, interbedded		
50		Limestone, light to dark gray, weathered		
60		Limestone, tan to light-gray, weathered, oxidation on fracture surfaces		
70		Limestone, light to medium-gray, weathered, with iron-stained fractures		
80				
90		Limestone, medium to dark-gray, and dark-gray to black, argillaceous, platy, oxidation on fracture surfaces, less porosity below 90 m		
100				
110				
120		120 m Total Depth		PVC casing to 120 m Total Depth

Best Available Copy

Region Bay Region

Well Location Caliyo Marayle Coord 2°55.9'N 43°19.9'E Rig № 102 Page 1 of 1

Hydrogeologist JDC Drilling Method Rotary

Well Number B102 Driller Abdi Warsame Bit Size 15-10

Completion Date 12.10.85

Depth (m)	Graphic Log	Lithologic Description	Well Compit.	Remarks
0	478 m	Soil, red, residue of limestone pebbles to cobbles		12-inch steel surface casing to 18 m, 8-inch PVC casing to 88 m, grout and seal to 3 m. Static water level 14.3 m 11.10.85
		Limestone, highly weathered gravel residuum		
10		Limestone, light-gray, weathered with chert and limonite concretions		
		Limestone, light-gray, moderately weathered		
20		Limestone, light-gray, iron-stained fractures, water		
		Limestone, light-gray, sparse fossils, platy near base		
30		Limestone, medium-gray, fine-grained, slightly argillaceous with thin interbeds of dark-gray limestone		
40		Limestone as above, water		
50		Limestone, medium-gray, fine-grained, argillaceous, oxidized		
60				
70		Limestone, dark-gray, argillaceous, platy		
80				
		88 total depth		88 m total depth
90				

Best Available Copy

Region: Bay Region

Rig Nº: 101 Page: 1 of 1

Well Location: Gras Mood Coord: 5°52.5'N 43°16.4'E Hydrogeologist: J.D.G. Drilling Method: Hammer

Well Number: B103 Driller: Shire Bit Size: 15-10

Completion Date: 27.11.85

Depth (m)	Graphic Log	Lithologic Description	Well Complt.	Remarks
	455 m ASL			
0		Soil, red sand and clay		12-inch steel casing to 4.5 m, grouted & sealed
		Soil, buff calcareous sand, sparse clay		
10		Limestone, light-buff to light-gray highly weathered, sparse iron stains		8-inch PVC casing to 94 m, perforated as shown
20		Limestone, medium to light-gray, oolitic, moderately weathered, sparse secondary calcite, slight iron stains on fractures		Static water level 25.46 m, 23.11.85
30				
40		Limestone, light-gray, sparse thin interbeds medium gray, oolitic, moderately weathered, sparse secondary calcite, slight iron stains on fractures		
50		Limestone, medium-gray, slightly argillaceous		
60		Limestone, light-gray, oolitic, slightly weathered, sparse iron stains		
70				
80		Limestone, light-gray, argillaceous, slight iron stains (uphole contamination)		
90		Limestone, dark-gray slightly argillaceous (uphole contamination)		
		Limestone, dark-gray, argillaceous 94 m Total depth		94 m Total depth
100				

Best Available Copy

Region Bay Region Rig № 102 Page 1 of 1

Well Location Ceel Jaalle Coord 3°02.6'N 43°49.0'E Hydrogeologist J.D.G. Drilling Method Hammer

Well Number B104 Driller Abdi Warsame Bit Size 17-6

Completion Date 27.11.85

Depth (m)	Graphic Log	Lithologic Description	Well Complt.	Remarks
0	300 m ASL	Soil, red, silty with clay		14-inch and 8-inch steel casing to 9 m, retrieved on abandonment, hole backfilled with mixture of bentonite and well cuttings, below 4 m of cement plug
10		Granite, medium-coarse grained biotite, pyroxene, hornblende and accessory minerals		
20		Gneiss, granitic, medium-grained, with moderately abundant ferro-magnesian minerals		
30				Static water level 15.4 m, 26.11.85 Spec. cond. more than 20000 micromhos at 31°C, hole abandonded for salinity
40		Gneiss, schistose, fine-grained quartz and feldspar, abundant biotite and minor pyroxene and hornblende, water intercept at about 24 m		
50				
60		30 m Total depth		30 m Total depth

Best Available Copy

Region: Bay Region | Rig Nº: 102 | Page: 1 of 1

Well Location: Cooraar | Coord: 3°13'.'N 43°07.9'E | Hydrogeologist: Osman Abdullahi Ali, J.D.C. | Drilling Method: Rotary Air-Foam

Well Number: B105 | Driller: Abdi Warsame | Bit Size: 17-1/2-6

Completion Date: 12.12.85

Depth (m)	Graphic Log	Lithologic Description	Well Compit.	Remarks
0	398 m ASL	No sample		12-inch steel casing to 4.5 m, grouted and sealed
		Clay, light-yellow		
10		Limestone, red, with clay		
		Limestone, light-gray, chalky, weathered, water		Static water level 11.77 m, 11.12.85
20		Limestone, shaly, light-gray to gray, sparse clay nodules, chalky moderately weathered		8-inch steel casing to 54 m
30		Limestone, argillaceous with brown clay, chalky		Perforations, 1/8-in., 7 lines, rolled
40		Limestone, shaly, light-gray to gray, slightly weathered, water		
		Limestone, argillaceous, with very-fine selenite and calcite crystals		
50		Limestone, light-gray, argillaceous, slightly weathered, sparse clay, chalky		
60		Limestone, light-gray, oolitic, moderately weathered, sparse selenite and calcite, water		6-inch open hole to 102 m
70		Limestone, gray, argillaceous		
80		Limestone, light-gray, oolitic, slightly weathered		
90		Limestone, gray, argillaceous		
100		102 m Total Depth		102 m Total depth

Water intercepts:

at 12 m, 6200 to 7500 micromhos,
at 30 m, 7500 micromhos,
at 62 to 102 m, 1600 to 2200 micromhos,
Composite at completion,
4500 micromhos

Best Available Copy

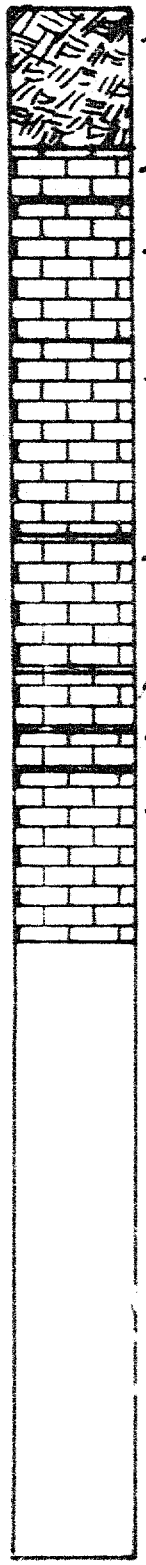
Region Bay Region Rig № 102 Page 1 of 1

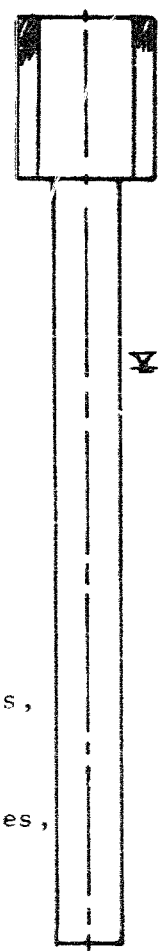
Well Location Asha Gab Coord 3°15.__'N 43°38.0'E Hydrogeologist J.D.G. Drilling Method Air Foan, Hammer

Well Number B106 Driller Abdi Nuur Bit Size 15-8

Completion Date 7.1.86

Depth (m)	Graphic Log	Lithologic Description	Well Complt.	Remarks
	510 m ASL			
0		Soil, clay, red		12-inch steel casing to 17 m, grouted at surface
10		Limestone, light-tan to light gray, weathered, iron-stained		
20		Limestone, tan to light-gray, weathered		8-inch open hole to 96 m
30				
40		Limestone, tan to light-gray weathered, iron stains on fractures, water at 45 m		Static water level 36.41 m, 7.1.86
50				
60		Limestone, medium-gray		
70		Limestone, medium-gray to tan, weathered Limestone, medium-gray, argillaceous,		
80		Limestone, medium--gray, argillaceous, some tan interbeds, some secondary calcite in fractures, some oxdation		
90				
100		96 m Total depth		96 m Total depth





Best Available Copy

Region Bay Region **Rig Nº** 101 **Page** 1 **of** 1

Well Location Hartigan1 **Coord** 3°17.4'N 43°31.3'E **Hydrogeologist** J.D.G. **Drilling Method** Air Foam Hammer

Well Number B107 **Driller** Shire **Bit Size** 15-10

Completion Date 30.12.85

Depth (m)	Graphic Log	Lithologic Description	Well Compit.	Remarks
0	525 m ASL	Soil, red limestone		12-inch steel casing to 3 m, grouted and sealed
		Limestone, red-light gray, deeply weathered		
10		Limestone, yellow-light gray, weathered		8-inch steel casing to 84 m, perforated 40 to 52 m, 60 to 72 m, 78 to 84 m
		Limestone, light-gray, sparsely yellow, weathered		
20				Static water level 28.12.85 24.20 m
		Limestone, light-gray, weathered, oolitic, water at 40 m		
40				
50		Limestone, light-brown to light-gray, argillaceous, oxidized from 60 to 62 m, lightly weathered		
60				
70		No sample, lost circulation		
		Limestone, light to medium-gray, argillaceous		
80		No sample, lost circulation		
		84 TD		
90				

Best Available Copy

Region Bay Region **Rig Nº** 101 **Page** 1 **of** 1

Well Location Dheiiile **Coord** 3°07.0'N 43°08.0'E **Hydrogeologist** JDG **Drilling Method** Air Foam Hammer

Well Number B110 **Driller** Mahad M.Abdi **Bit Size** 15-10

Completion Date 18.3.86

Depth (m)	Graphic Log	Lithologic Description	Well Compit.	Remarks
0	420 m ASL	Limestone, light-gray to Buff, oolitic, moderately weathered		12-inch steel casing to 1.5 m, grouted and sealed
10		Limestone, medium-gray, platy, argillaceous, iron stains on fractures, some secondary calcite		8-inch steel casing to 90 m, perforated 54-66, 72-78
20		Limestone, white to light-brown, some light-gray, oolitic, deeply weathered, much secondary calcite		
30				
40				Static water level 37 m 17.3.86 EC 1450 micromhos at 25°C
50				
		Limestone, light-gray, granular crystalline, oxidized		
60		Limestone, medium-gray, some thin black shale		
70				
80				
		No log		
90		90 m Total Depth		90 m Total Depth

Best Available Copy

Region Bay Region **Rig Nº** 102 **Page** 1 **of** 1

Well Location Bottis **Coord** 2°51.7'N 43°23.7'E **Hydrogeologist** JDG **Drilling Method** Air-Foam Hammer

Well Number B112 **Driller** Ciid Abdi Dini **Bit Size** 15-10

Completion Date 22.3.86

Depth (m)	Graphic Log	Lithologic Description	Well Compit.	Remarks
0		Soil, dark-brown clay		12-inch steel casing to 4.5 m, grouted and sealed
		Limestone, medium-gray, silty, deeply weathered		
10				8-inch steel casing to 96 m, perforated 34-46, 62-74
		Limestone, dark-gray, silty, some shale		
20		Limestone, medium-gray, silty, platy		
		Limestone medium to dark gray, with thin carbsnaceous shale		
30		Limestone, medium-gray, weathered 36-38, 44-46		Static water level 35.08 m 19.3.86
40				
		Limestone, light to medium-gray, weathered 58-64, 70-72 some purple siltstone, sparse oolites		
50				
60				
70				
		Siltstone and shale, red-brown		
80				
90				
		96 m Total Depth		96 m Total Depth

Best Available Copy

Region BAY REGION

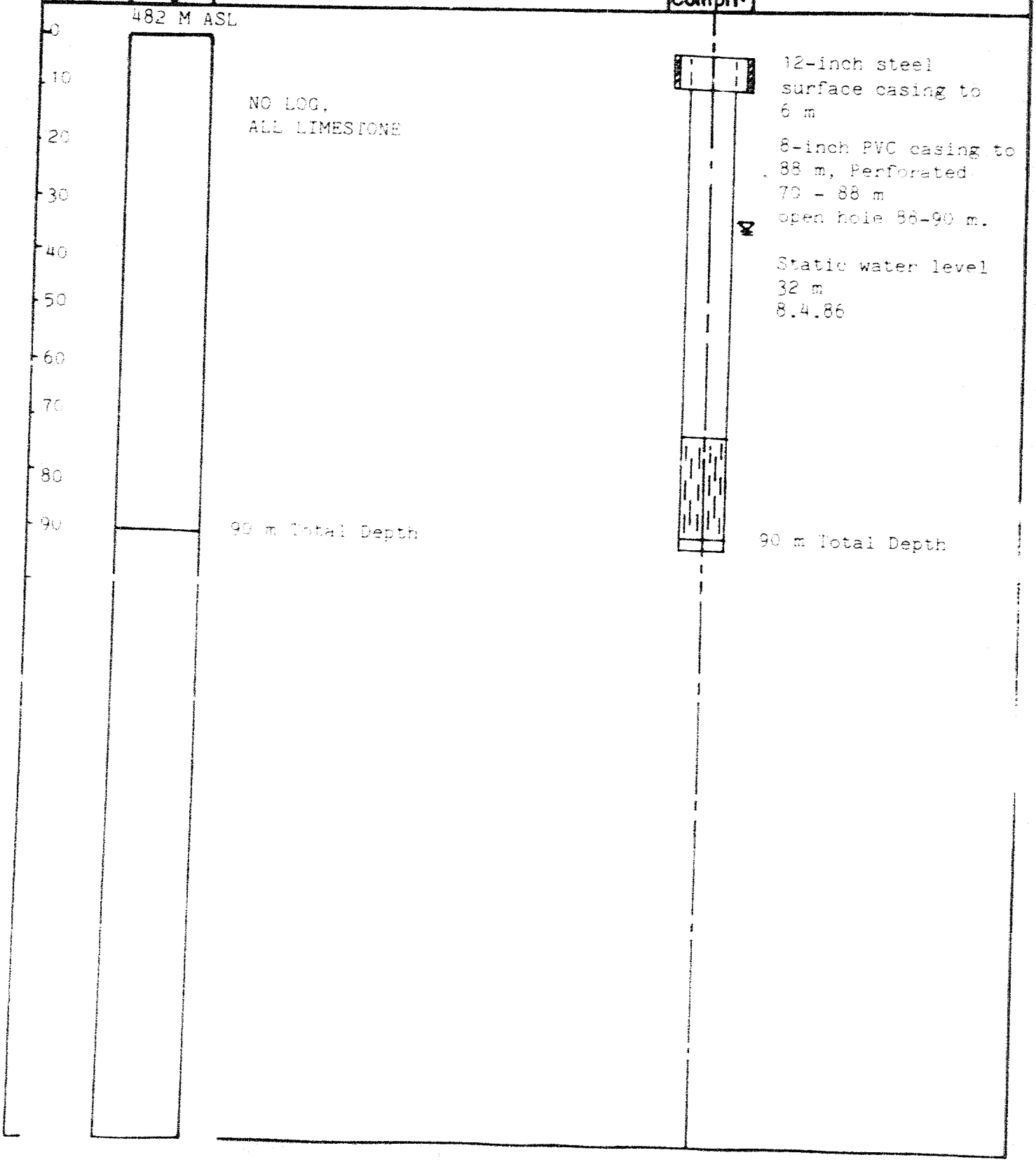
Rig Nº 102 Page 1 of 1

Well Location EEG Coord 3°02.1'N 43°27.2'E Hydrogeologist _____ Drilling Method _____

Well Number B114 Driller _____ Bit Size 14-10

Completion Date 3.4. 86

Depth (m)	Graphic Log	Lithologic Description	Well Compit.	Remarks
0	482 M ASL			
10		NO LOG, ALL LIMESTONE		12-inch steel surface casing to 6 m
20				8-inch PVC casing to 88 m, Perforated 70 - 88 m open hole 88-90 m.
30				
40				Static water level 32 m 8.4.86
50				
60				
70				
80				
90		90 m Total Depth		90 m Total Depth



Best Available Copy

Region CENTRAL RANGE BULO BURDE

Rig Nº 100 Page 1 of 1

Well Location NURSERY Coord 3°50.0'N 45°34.8'E Hydrogeologist _____ Drilling Method MUD ROTARY

Well Number CR 115 Driller TALL ABDI Bit Size 18-10

Completion Date 26.3.86

Depth (m)	Graphic Log	Lithologic Description	Well Complt.	Remarks
0	140 M ASL	Sand and silt, fine, alluvial and aeolian		16-inch steel surface casing to 3 m
		Sand, fine to coarse, ill sorted		8-inch steel casing to 50 m, perforated 32-50 m, gravel-packed, back-filled 50-54 m
20		Sand, fine, with silt and some clay		
		Sand, fine to coarse, with some clay, water at 25 m		
		Sand, fine, well sorted, aeolian		Static water level 29 m 10.4.86
30		Sand, fine to coarse, angular grains slightly rounded		
40		Sand, fine to coarse, and fine gravel, lost circulation at 47 m		
50		54 m Total Depth		54 m Total Depth
60				

Best Available Copy

APPENDIX B

AS-BUILT DRAWINGS AND LOGS OF BOREHOLES: CENTRAL RANGE

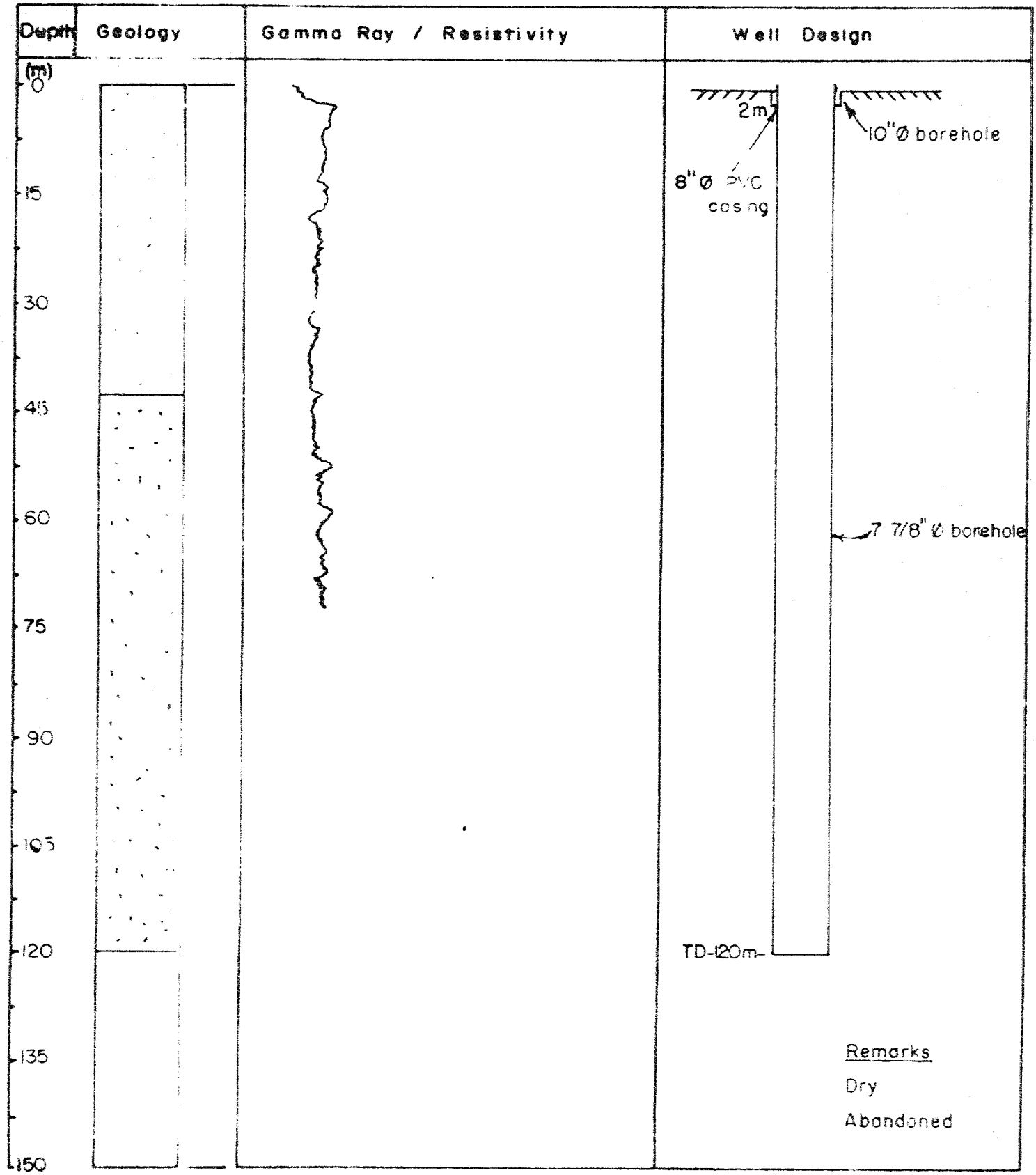
Water Development Agency

Well Nº 43

CGDP - 104

Central Range Well

Location Aborey I



LEGEND

Clay or Shale | Sand | Limestone | Marl

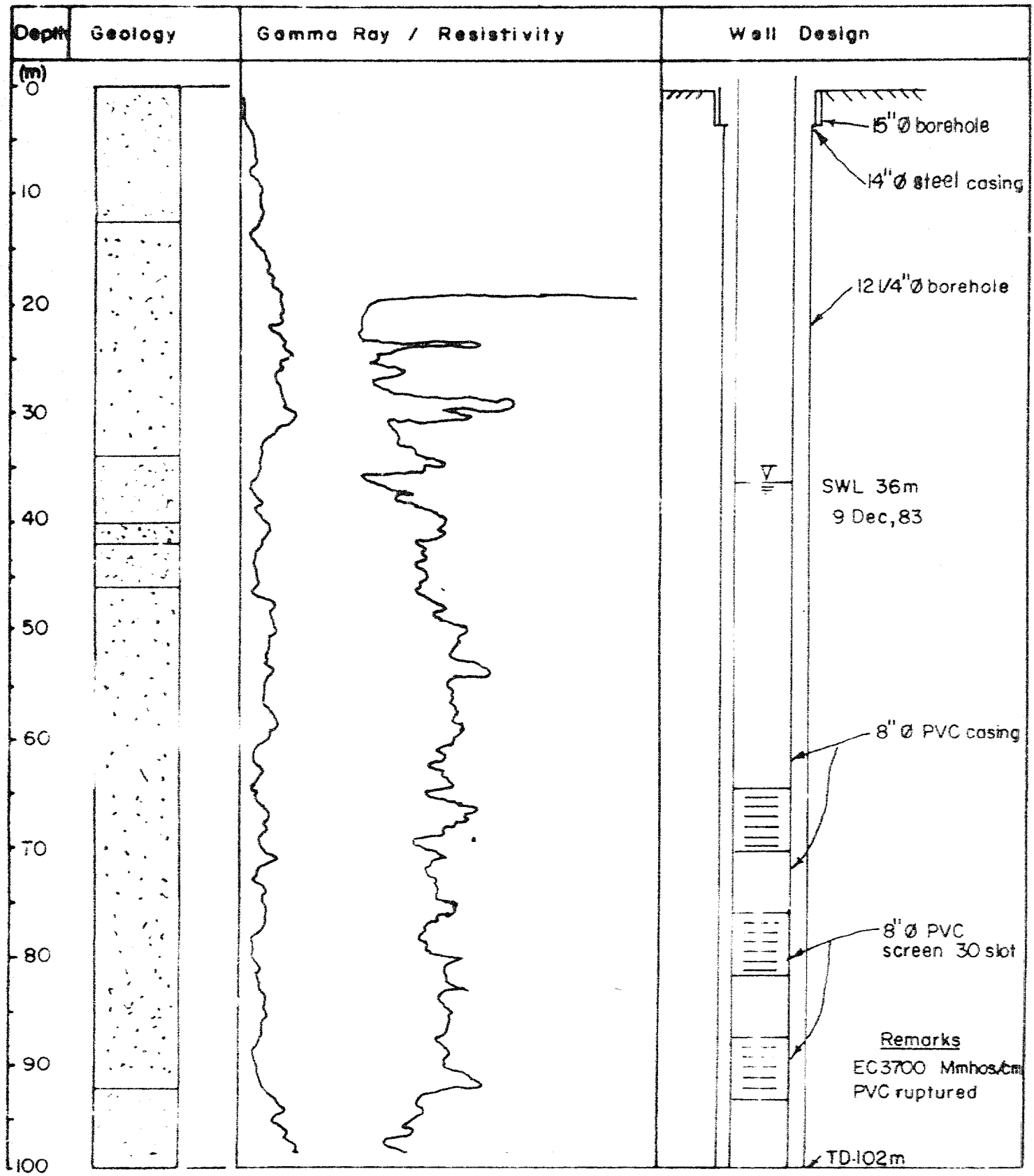
Clayey Sand | Sandstone | Karst Limestone | Basement

Water Development Agency

CGDP - 104 Central Range Well

Well Nº 48

Location More Ari



LEGEND

Clay or Shale | Sand | Limestone | Marl

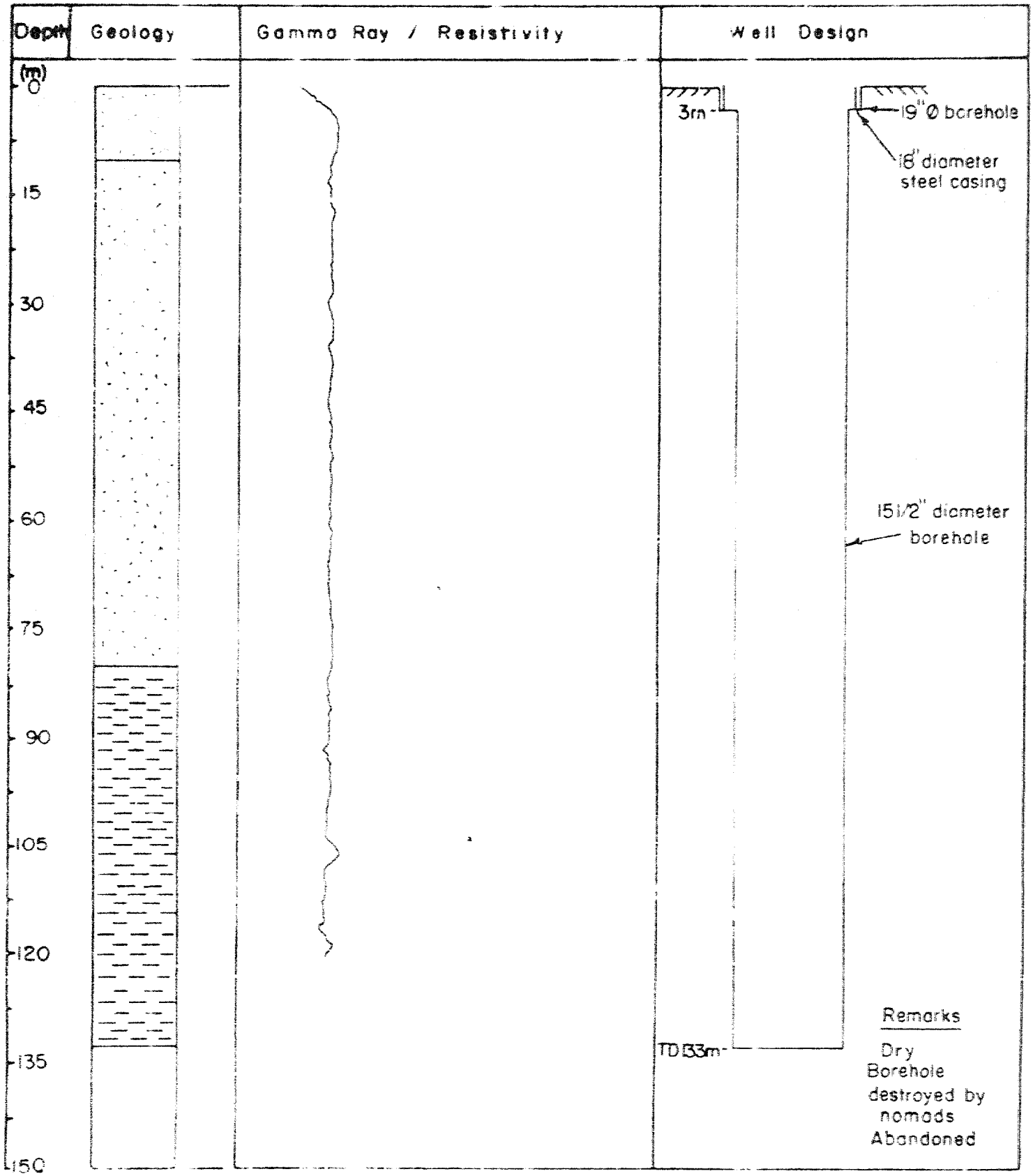
Clayey Sand | Sandstone | Karst Limestone | Basement

Water Development Agency

CGDP - 104 Central Range Well

Well Nº 53

Location Aborey II



LEGEND

Clay or Shale | Sand | Limestone | Marl

Clayey Sand | Sandstone | Karst Limestone | Basement

Region Central Range Rig № 101 Page 1 of 1

Well Location Aborey 3 Coord 3°58.9'N 45°50.8'E Hydrogeologist _____ Drilling Method Rotary-mud

Well Number CR 65 Driller Hassan Bit Size 18-30

Completion Date 19.5.84

Depth (m)	Graphic Log	Lithologic Description	Well Compit.	Remarks
0	285 m ASL			
10		Sand, silt and clay, red-brown, some chert		16-inch steel casing to 3 m
20		Sand, red, quartz with chert, with silt, weakly indurated		Open hole to 210 m, No water, hole capped and abandoned
30				
40		No sample		
50		Sand, medium to coarse, pink to clear quartz, sparse fragments of weathered feldspar as kaolin, well indurated		
60				
70				
80		Clay, light-tan, sandy		
90				
100				
110				
120				
130		Clay, tan, light-gray and gray, cohesive, sparse layers of white marl		
140				
150				
160				
170				
180				
190				
200				
210		210 m Total depth		210 m Total depth

Best Available Copy

Region CENTRAL RANGELAND

Well Location WARGALOH Coord 6°15.8'N 47°31.2'E

Rig № 100 Page 1 of 1

Hydrogeologist L.A.Cerillo HASSAN HUSSEIN Drilling Method ROTARY-MUD

Well Number CR 67

Driller OMER Bit Size 17½-12¼-7⅞

Completion Date 25.7.84

Depth (m)	Graphic Log	Lithologic Description	Well Complt.	Remarks
0		Limestone:white, soft		14-inch surface casing to 3 m with cement seal
10				
20		No sample		8⅝ inch steel casing
30		Sand; fine to medium,with clay		
40		Sand,as above with interbedded Gypsum		
50				11.5 inch centering guides
60		No sample		17½ inch hole to 3m 12¼ inch hole to 176.9 m 7⅞ inch hole to 252m
70				
80				
90		Clay with sand,subrounded to rounded, medium to coarse grained,with fine gravel and hematite pebbles		
100				Static water level 98.4 m, 19.9.84 Drawdown 0.2' m after 2:30 Hrs at 11.4 m³/hr
110				
120				
130				
140				
150				Mono pump installed at 134 m
160		Sand,medium to coarse,with clay and fine gravel		
170				20 slot Johnson screen screen 164.9 to 170.9 m,all 8 inch
180		Basalt		10 slot Johnson screen 170.9 to 176.9 m, all 8 inch
190				
200		Basalt with sand,fine to medium, with clay hematite,and gypsum fragments		1 m Blank casing steel, 8 inch
210				
220				7⅞ inch open hole to 252 m, Total Depth
230		Limestone,yellow,soft,with clay		
240				
250				
		252 m, Total Depth		252 m

Best Available Copy

Well Location AFGAGUUDLE Coord 47°58.2'E Hydrogeologist MARSHALE Drilling Method ROTARY-MUD

Well Number CR 72 Driller HASSAN HUSSEIN OMAR Bit Size 17½-12¼-7⅞-6

Completion Date 1.12.84

Depth (m)	Graphic Log	Lithologic Description	Well Compit.	Remarks
0		Limestone, gray		14-inch surface casing to 6 m, with cement seal
10		Conglomerate, brown-red		
20			Static water level 17m, 18.11.84	8⅝ inch blank steel casing to 97 m
30		Limestone, gray		
40		Water at 40 m, 26000 micromhos		17½ inch to 6 m 12¼ inch to 94 m 7⅞ inch to 164 m 6 inch to 204 m
50		No sample		
60		Sand, very fine, brown		
70		Lost circulation at 66 m		
80		Clay, sandy with Gypsum crystals		
90				
100				97 m, end of blank steel casing driven 3 m in clay to seal off water at 40 m
110				
120				
130				
140		Sand, fine, with some clay		
150				
160		Water at 164 m, 12000 micromhos, well abandoned for excessive salinity		
170				7⅞ inch open hole to 164 m 6 inch open hole to 204 m
180				
190				
200		204 m, Total Depth		204 m, Total Depth

Best Available Copy

Region CENTRAL RANGELAND Rig Nº 101 Page 1 of 1

Well Location DHAJIMALE Coord 6°18.5'N 48°13.0'E Hydrogeologist D.DOUGLAS Drilling Method ROTARY-MUD

Well Number CR 78 Driller SHIRE TAHLIL Bit Size 15-1/4

Completion Date 19.1.85

Depth (m)	Graphic Log	Lithologic Description	Well Complt.	Remarks
0		Gypsum		14-inch casing to 3 m
10		Sand with clay, Gypsiferous		8-inch blank casing to 56.8 m
20		Sand with clay		
30				
40		Clay, sandy, gypsiferous		
50		Sand, medium to coarse, well-rounded, well sorted		
60				8-inch perforated casing 56.8 to 68.8 m, 1/8-inch slots, used in lieu of blank casing
70		Static water level 69.65 m 19.1.85		
80		Sand, medium, with clay — 4800 micromhos, drawdown 1.5 m after 11 hrs at 16.4 m^3/hr		8-inch blank casing
90				8-inch perforated casing 86.8 to 176.8m, 1/8 inch slots
100		Sand, medium to coarse, well-rounded		
110		Sand, fine to medium, with clay and gypsum		Mono pump installed at 90 m.
120		Sand, coarse, moderately well sorted and rounded		
130				
140				
150		Sand, fine to medium, with clay and gypsum		
160				
170		Limestone Clay 176.8 m		176.8 m
180				

Best Available Copy

Region CENTRAL RANGELAND

Well Location BUDBUD Coord 6°10.6'N 48°40.7'E Hydrogeologist D.DOUGLAS Drilling Method ROT.AIR/MUD

Rig Nº 101 Page 1 of 2

Well Number CR 81 Test Driller SHIRE TAHLIL Bit Size 12½-6½

Completion Date 2.3.85

Depth (m)	Graphic Log	Lithologic Description	Well Compit.	Remarks
0		Aeolian sand, loose		8-inch surface casing to 4 m.
10		Calcrete with Gypsum		6½-inch open hole To 133.5 m
		Water		
20		Clay, red, sandy, soft, expansive		
		Water		
			Static water level 17.65 m 2.3.85	
30		Water		12½-inch to 4 m
		Limestone, karstic		6½-inch to 133.5 m
		Shale, red, hard, gypsiferous		Pilot Bore hole
40		Limestone		
		Shale, red, hard, gypsiferous		
50		Dolomite		
		Gypsum		
		Shale, gray-white, soft, calcareous		
60		Conglomerate, well cemented		
		Limestone		
		Shale, gray-white, soft gypsiferous		
70		Limestone		
		Shale, gray-white, gypsiferous		
		Gypsum		
80		Limestone with seams of red gypsiferous shale		
90				
		Gypsum		
100		Limestone		
110		Gypsum, karstic, much water, 11000 micromnos		
120				
130		Sand, very fine, well-sorted, weakly cemented		133.5m, Total Depth, Open hole
		133.5m, Total Depth		
140				

Best Available Copy

Region CENTRAL RANGELAND Rig № 101 Page 2 of 2

Well Location BUDBUD Coord 6°10.6'N 48°40.7'E Hydrogeologist D.DOUGLAS Drilling Method ROTARY-AIR

Well Number CR 81 Completion Driller SHIRE TAHLIL Bit Size 15½-10

Completion Date 11.3.85

Depth (m)	Graphic Log	Lithologic Description	Well Complt.	Remarks
0		Aeolian sand, loose		12-inch blank casing to 24 m
		Calcrete, gypsiferous		
10		Clay, sandy expansive, soft		
		Limestone		
20		Clay, sandy, expansive, soft		Cement seal, with 5 percent Bentonite, 19 to 24m, and sand fill to 19 m
		Static water level 23.5 m 11.3.85		
30		Limestone, karstic 7400 micromhos 23.1 m draw-dawn after 2:10 hrs at 1 m^3/hr		8-inch slotted steel casing to 61 m 1/8-inch slots, All slotted casing, no blank casing available
		Shale, red, hard, gypsiferous		
		Limestone		Hand-powered Mono Pump at 40 m
40		Shale, red, hard		
		Dolomite, karstic		
50				
		Shale, Gypsiferous		
60		Conglomerate, well cemented		
		61 m, Total Depth		61 m, Total Depth

Best Available Copy

Region CENTRAL RANGELAND Rig Nº CABLE TOOL Page 1 of 1

Well Location SADDEL Coord 4°06.4'N 47°30.8'E Hydrogeologist D.DOUGLAS Drilling Method CABLE TOOL

Well Number CR 82 Driller MUHYADIN NUR Bit Size 16-12-7

Completion Date 25.4.85

Depth (m)	Graphic Log	Lithologic Description	Well Complt.	Remarks
0		Sand and silt, pink aeolian		14-inch surface casing to 8 m, Cement seal backed with sand
		Silt and fine sand, pink, aeolian		
		Silt, white, aeolian		
10		Calcrete, hard, pink to brown		8-inch blank casing to 48 m
20		Sandstone, fine, gray-white, calcareous cement		
		Sandstone, fine, pink		
30		Silt and fine sand, pink, aeolian		
		Sandstone moderately hard, pink, calcareous cement		
40		Sand and silt, pink, aeolian		
		Static water level 40.4 m, 5.4.85.		Static water level 40.4 m, 25.4.85
50		Limestone, white, moderately hard		27 m of 6 inch perforated casing to 75 m, 1/8 inch slots
60				Mono Hand pump at 54 m.
70				
		75 m Total Depth		

Best Available Copy

Region CENTRAL RANGELAND

Rig Nº 101 Page 1 of 1

Well Location CAGACADE Coord _____ Hydrogeologist D.DOUGLAS Drilling Method ROTARY-MUD

Well Number CR 84

Driller SHIRE TAHLIL Bit Size 6"

Completion Date 1.6.1985

Depth (m)	Graphic Log	Lithologic Description	Well Complt.	Remarks
0		Sand, medium to fine grained, well sorted, lateritic, red		
10		Limestone, sandy, moderately hard, white		
20				
30				
40				
50				
60				
70				
80				
90				
100		Sandstone, very fine grained, slightly clayed, moderately well cemented, calcareous, white-red		
110		Sandstone, very fine grained, clayey, weakly cemented, calcareous, white-red		
120		Limestone, hard, with chert modules, fractured, white		Minor loss of circulation
		Clay, soft, expansive red		Lost circulation 132.5 m 18.5.85
130		Limestone, hard, with chert modules, fractured, white		
134.5		Clay, soft, expansive, red		Lost circulation 134.5 m 1.6.85
		Limestone, hard, with chert modules, fractured, white		Bore hole abandoned
		TD= 134.5		No water encountered

Best Available Copy

Region CENTRAL RANGE HASSAN Rig Nº 101 Page 1 of 1

Well Location AFRAH Coord 4°07.7'N 47°07.6'E Hydrogeologist D.DOUGLAS Drilling Method ROTARY

Well Number CR 86 Driller ABDI DHEERE Bit Size 6

Completion Date 29.5.85

Depth (m)	Graphic Log	Lithologic Description	Well Compit.	Remarks
0		Sand, red, fine to medium, lateritic, and calcrete		6-inch open hole to 201.3 m
10				
20		Limestone, white, with stringers of fine, well-cemented sandstone		
30				
40				
50				
60				
70				
80				
90				
100				
110		Sand with clay, red-brown fine to medium		
120				
130				
140				
150				
160				
170		Sand, Brown, fine, well sorted, well rounded		Minor circulation loss from 163 m to total depth, no water found, dry hole, Abandoned
180		Sand fine, with clay, brown		
190		Sand, Brown, fine, well sorted, well rounded		
200		Sand fine with clay, brown 201.3 Total depth		201.3 m Total depth

Best Available Copy

Region CENTRAL RANGELAND Rig Nº 101 Page 1 of 1

Well Location ALYCABAL Coord 3°58.3'N 47°05.1'E Hydrogeologist D.DOUGLAS Drilling Method CABLE TOOL ROTARY

Well Number CR 87 Driller ABDI DHEERE Bit Size 16-12

Completion Date 6.7.85

Depth (m)	Graphic Log	Lithologic Description	Well Compit.	Remarks
0		Sand red,fine,well-sorted, lateritic		14-inch surface casing to 6 m
10				
20		Sand,white,medium to fine,well-sorted, calcareous		6-inch steel casing to 245.5 m.
		Sand,white,fine,well sorted		
30		Sand,brown,fine to gravel,poorly sorted(to 1 cm diameter)		Perforated casing from 0-132 m in lieu of blank casing
40				
50		Sand,tan,fine to medium,well-sorted		
60				
70		Sandstone,red-brown,silty to medium, poorly sorted,calcareous cement		
80		Clay traces at 76-78 m,85-89 m, 100-103 m		
90				
100				
110		Sandstone, red-brown silty to very-fine, poorly sorted,calcareous cement, some clay		
120				
130				
140		Sandstone,white,silty to very-fine poorly sorted,calcareous cement		
150				
160				
170		Sandstone,red-brown,silty to very-fine,poorly sorted,calcareous cement		
180				
190		Sandstone with clay,red-brown,silty to very-fine,poorly sorted, calcareous cement		
200				1/8x2-inch slot perforated casing 216-240 m
210		Sandstone,red-brown,silty to medium, calcareous cement		
220				Static water level 220 m 6.7.85
230		Sandstone,red-brown,fine to medium well rounded		
240		Sand with clay,red-brown,silty to fine		
250		250 Total Depth		245.5 m cased, 45 m caved

Best Available Copy

Region CENTRAL RANGELAND Rig № C.T Page 1 of 1

Well Location XARADHEERE Coord 4°39.3'N 47°51.3'E Hydrogeologist DAVID D. Drilling Method CABLETOOL

Well Number CR 89 Driller Mohudin Bit Size 28-12

Completion Date 20.7.85

Depth (m)	Graphic Log	Lithologic Description	Well Compit.	Remarks
0		Sand, medium, lateritic with silt, red		14-inch surface casing to 4m
		Calcrete, white, hard		8-inch PVC casing to 21m
		Sand, ill-sorted Fine to gravel, red	Static water level 13.5m 20.7.85	Perforated casing 15-21m
		Sandstone, white, calcareous, hard		Open hole 21-28m, with lost drill bit 21-28m
		28m Total Depth		28m Total Depth

Best Available Copy

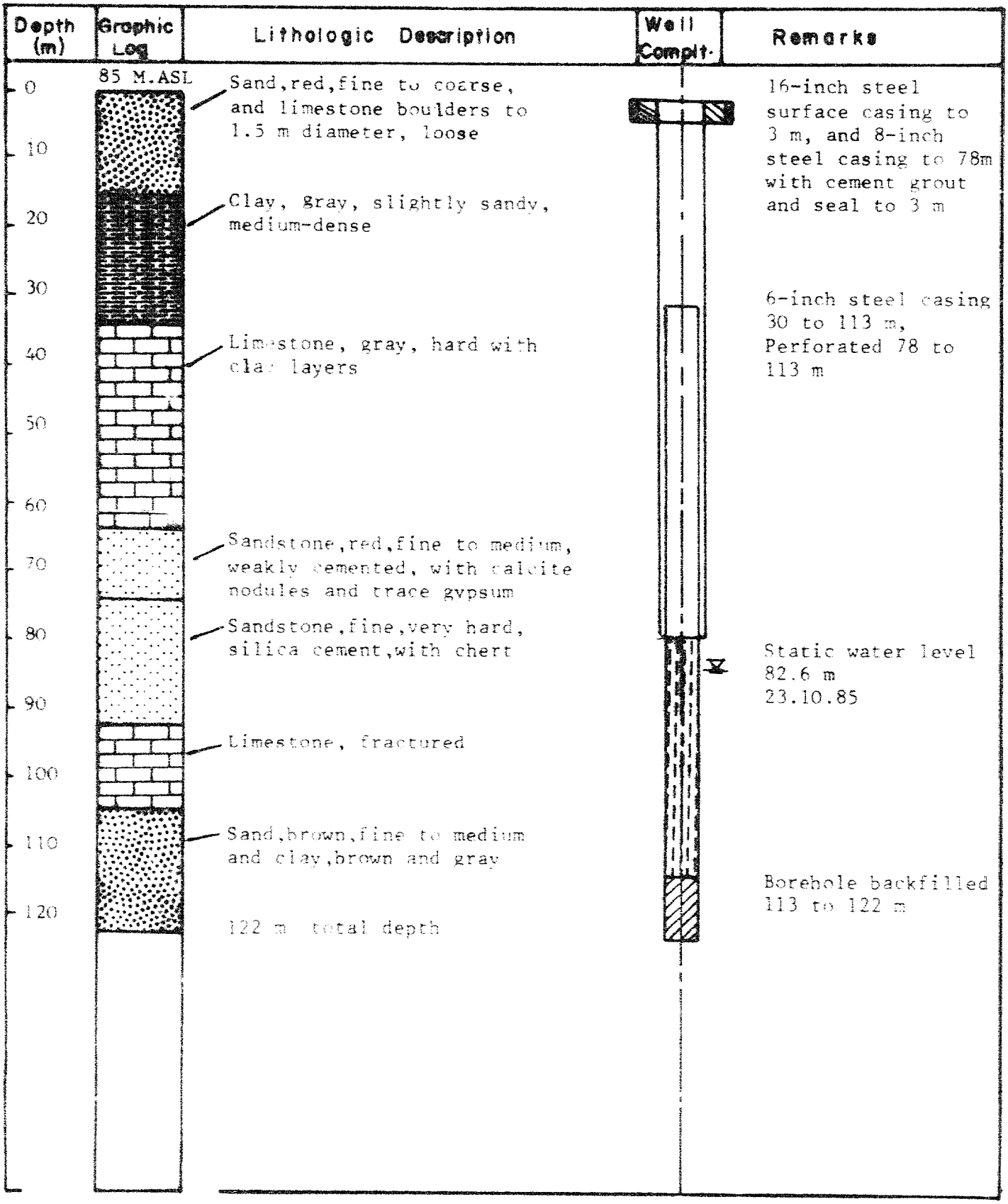
Region Central Range Rig Nº 100 Page 1 of 1

Well Location Calay Tun Coord 4°46.9'N 47°18.7'E Hydrogeologist D.Douglas Drilling Method Rotary

Well Number CR 93 Driller Abdidheere Bit Size 17.12.8

Completion Date 23.10.85

Depth (m)	Graphic Log	Lithologic Description	Well Complt.	Remarks
0	85 M.ASL	Sand, red, fine to coarse, and limestone boulders to 1.5 m diameter, loose		16-inch steel surface casing to 3 m, and 8-inch steel casing to 78m with cement grout and seal to 3 m
10				
20		Clay, gray, slightly sandy, medium-dense		
30				6-inch steel casing 30 to 113 m, Perforated 78 to 113 m
40		Limestone, gray, hard with clay layers		
50				
60				
70		Sandstone, red, fine to medium, weakly cemented, with calcite nodules and trace gypsum		
80		Sandstone, fine, very hard, silica cement, with chert		Static water level 82.6 m 23.10.85
90				
100		Limestone, fractured		
110		Sand, brown, fine to medium and clay, brown and gray		Borehole backfilled 113 to 122 m
120		122 m total depth		



Best Available Copy

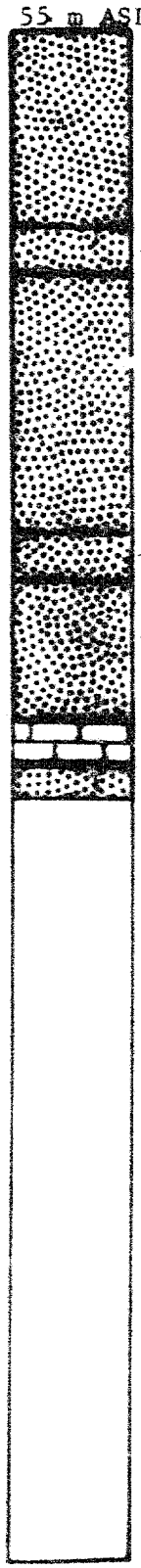
Region Central Range **Rig Nº** Cable Tool **Page** 1 **of** 1

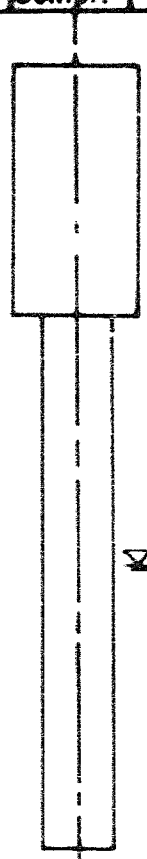
Well Location Daar Shadoor **Coord** 3°55.7'N 47°15.2'E **Hydrogeologist** D.Douglas **Drilling Method** Cable Tool

Well Number CR 100 **Driller** Muhedin **Bit Size** 9

Completion Date 16.10.85

Depth (m)	Graphic Log	Lithologic Description	Well Compit.	Remarks
0	55 m ASL	Sand, brown, fine with silt, loose, dry		16-inch steel casing to 16 m
10		Sand, fine to coarse, calcareous		
20		Sand, fine calcareous, gypsiferous		9-inch open hole to 50 m
30				Static water level 32 m E.C. 22000 Micromhos/cm
		Sand, fine, with clay and silt, calcareous		
40		Sand, fine to medium, red, some clay, gypsiferous		Well bailed at 60 liters/minute with no drawdown
		Limestone, hard, gypsiferous		
50		Sand, red, medium 50 m Total depth		50 m Total depth
				Well abandonded for salinity





Best Available Copy

Region Central Range **Rig Nº** 100 **Page** 1 **of** 1

Well Location Buracley **Coord** 5°03.7'N 47°11.8'E **Hydrogeologist** D.Douglas **Drilling Method** Mud Rotary

Well Number CR 108 **Driller** Abdi dheere **Bit Size** 12-8

Completion Date 18.1.86

Depth (m)	Graphic Log	Lithologic Description	Well Compit.	Remarks
0	160 m ASL	Calcrete, hard		16-inch steel casing to 57 m, sealed and capped
10		Clay, red-brown, sandy		
20		Clay, red, indurated, hard		8-inch steel casing to 170.5 m
30				
40		Clay, dark-brown, silty		
50		Clay, as above with basalt fragments		
60		Sand, quartz, fine to medium, basalt fragments		
70		Clay, gray and brown, calcareous with gypsum, basalt fragments in basal 4 m.		
80				
90				
100				
110				
120				
130				
140				
150				
160		Very small yield of water at 170 m, sp.c. 16,000 micromhos		
170				
180		Basalt, black, olivine, weathered on upper surface, fractured at base, dry		6-inch open borehole to 230 m, Total depth
190				
200		Clay, gray, calcareous		
210				
220		Basalt, black, olivine, dry		
230		230 m total depth		230 m Total depth

Best Available Copy

Region Central Range | Rig Nº 100 | Page 1 of 1

Well Location More Ariel | Coord _____ | Hydrogeologist _____ | Drilling Method Mud Rotary

Well Number CR 109 | Driller Tall Abdi | Bit Size 16-12

Completion Date 5.3.86

Depth (m)	Graphic Log	Lithologic Description	Well Compit.	Remarks
0	180 m ASL			
10		Sand		14-inch steel surface casing to 6 m
20		Sandstone		
30				8-inch Steel casing to 110 m
40				
50		Sand, water at 69 m		
60				
70				Static water level 69 m, 5.3.86
80		Sandstone		Perforated PVC casing 74-104 m
90		No log		
100				
110		110 m Total Depth		110 m Total Depth

Best Available Copy

Region Central Range

Well Location Hobbie 1 Coord 5°20.7'N 48°31.5'E

Well Number CR 111

Completion Date 4.3.86

Rig Nº C.T. Page 1 of 1

Hydrogeologist

Driller

Drilling Method Cable tool

Bit Size 16-10

Depth (m)	Graphic Log	Lithologic Description	Well Compit.	Remarks
0	12 m ASL	Sand, loose at surface grading downward into weakly cemented sandstone at depth		14-inch steel surface casing to 3m
				8-inch PVC casing to 11 m perforated 7-11 m
				Static water level 7 m. 4.3.86
10				
		13 m Total Depth		11 m Total Depth backfilled from 13-11 m

Best Available Copy

Region Central Range Rig Nº C.T. Page 1 of 1

Well Location Hobbio 2 Coord 5°21.2'N 48°31.1'E Hydrogeologist _____ Drilling Method Cable Tool

Well Number CR 113 Driller _____ Bit Size 16-10

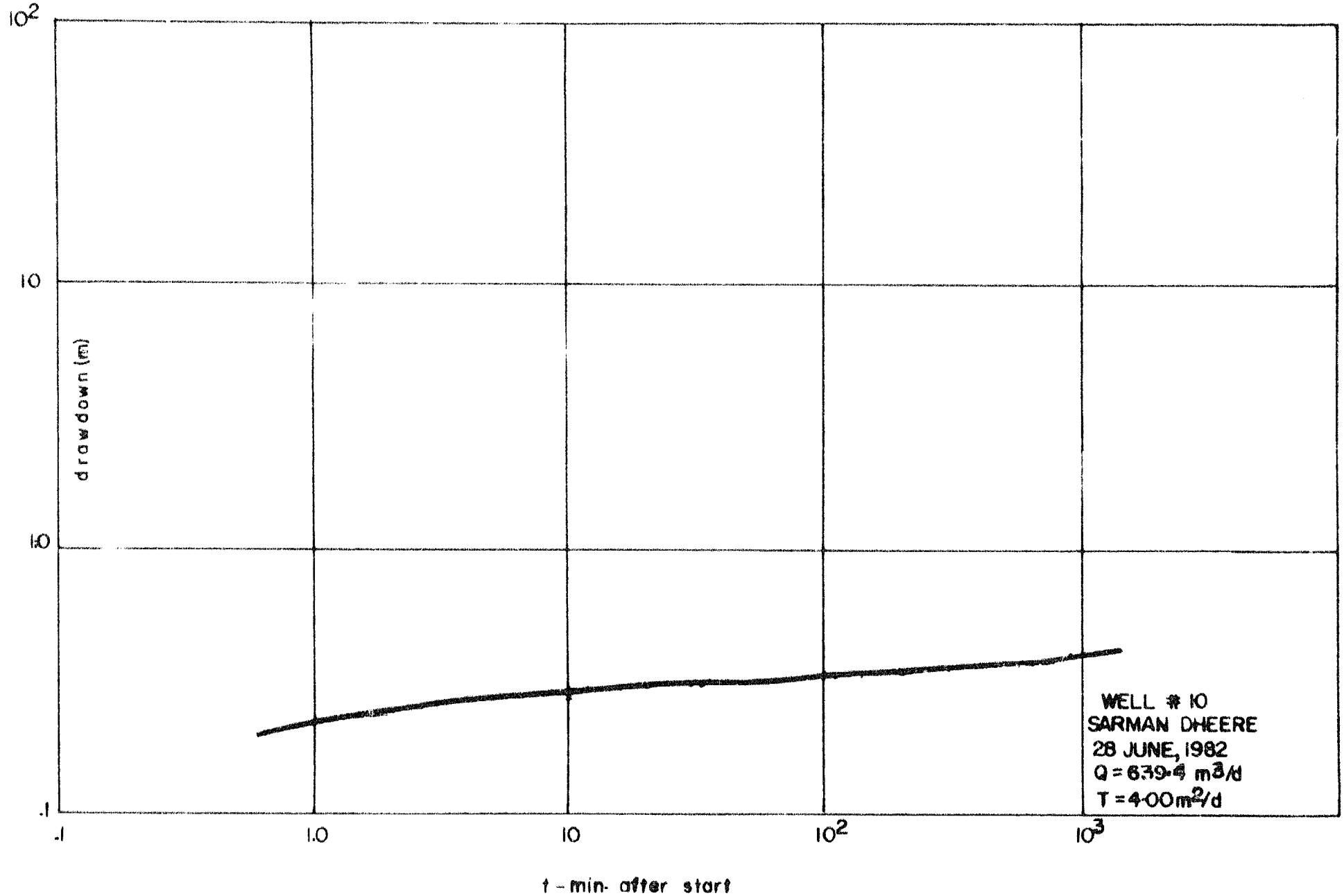
Completion Date 22.3.86

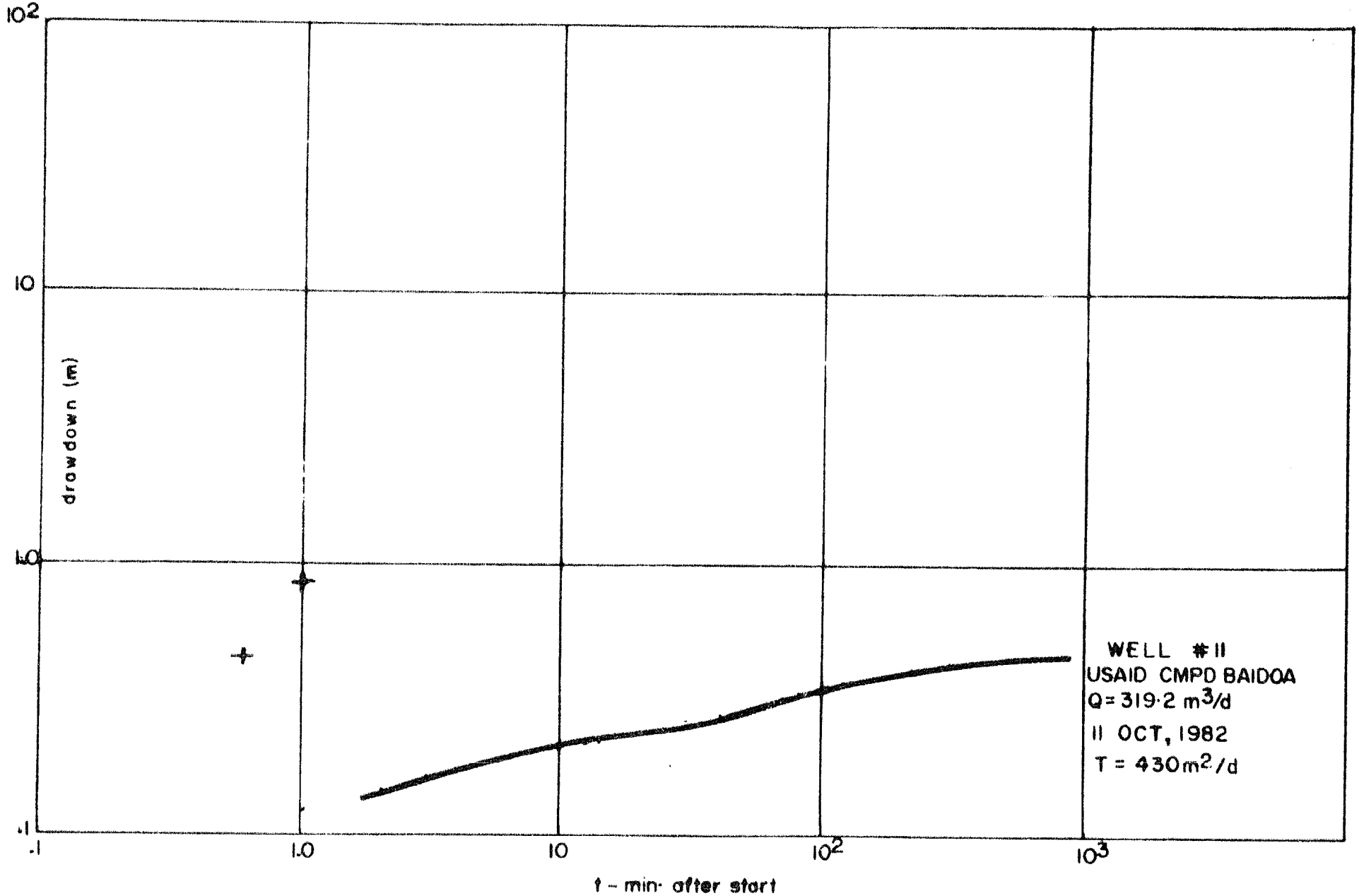
Depth (m)	Graphic Log	Lithologic Description	Well Complt.	Remarks
	17 m ASL			
0				14-inch steel casing to 6 m, grouted and sealed
		No log, mostly sand and sandstone		8-inch PVC casing to 19 m, perforated 13-19
10				
				Static water level 17 m, 20.3.86
		19 m Total Depth		19 m Total Depth
20				

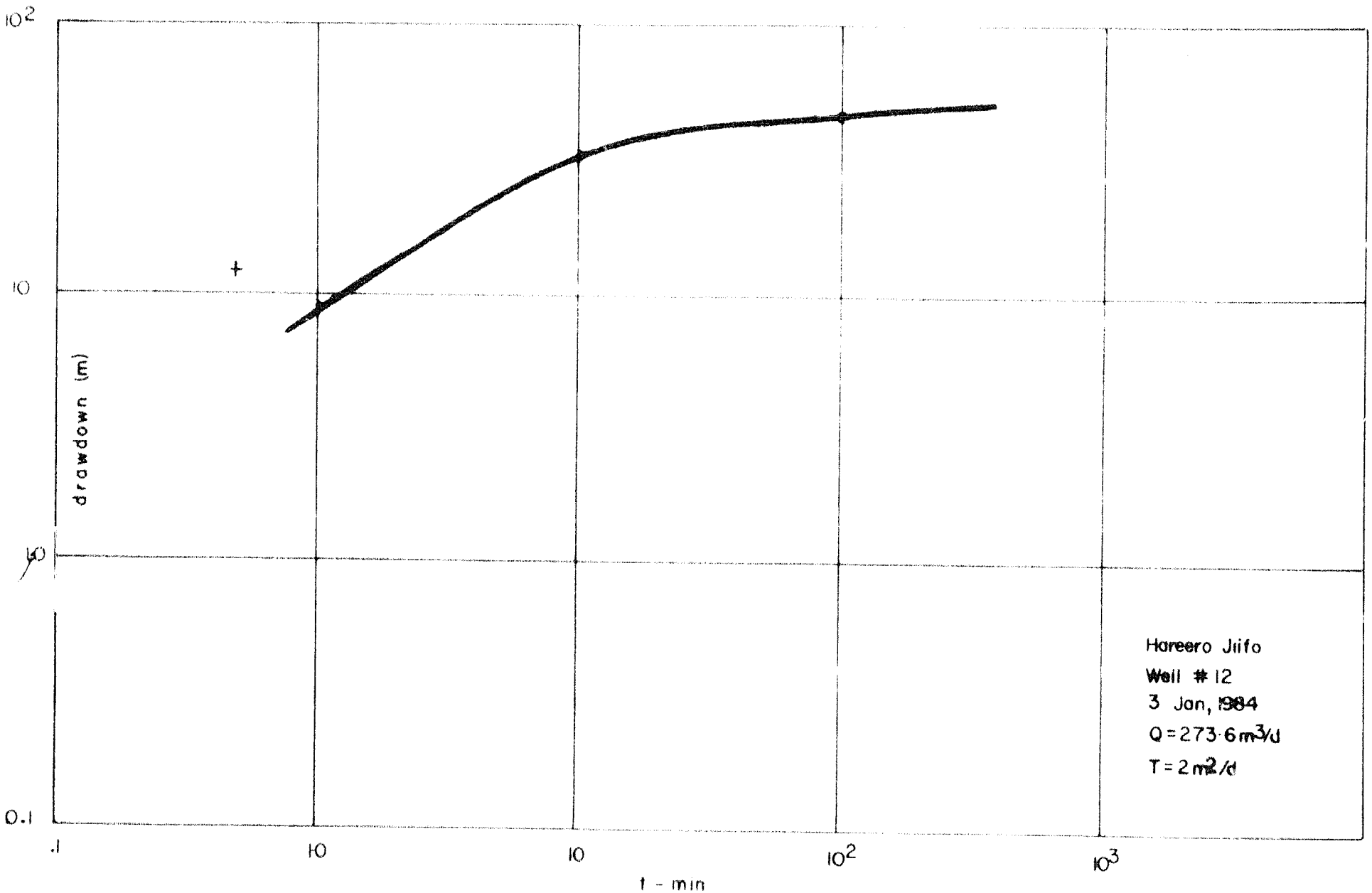
Best Available Copy

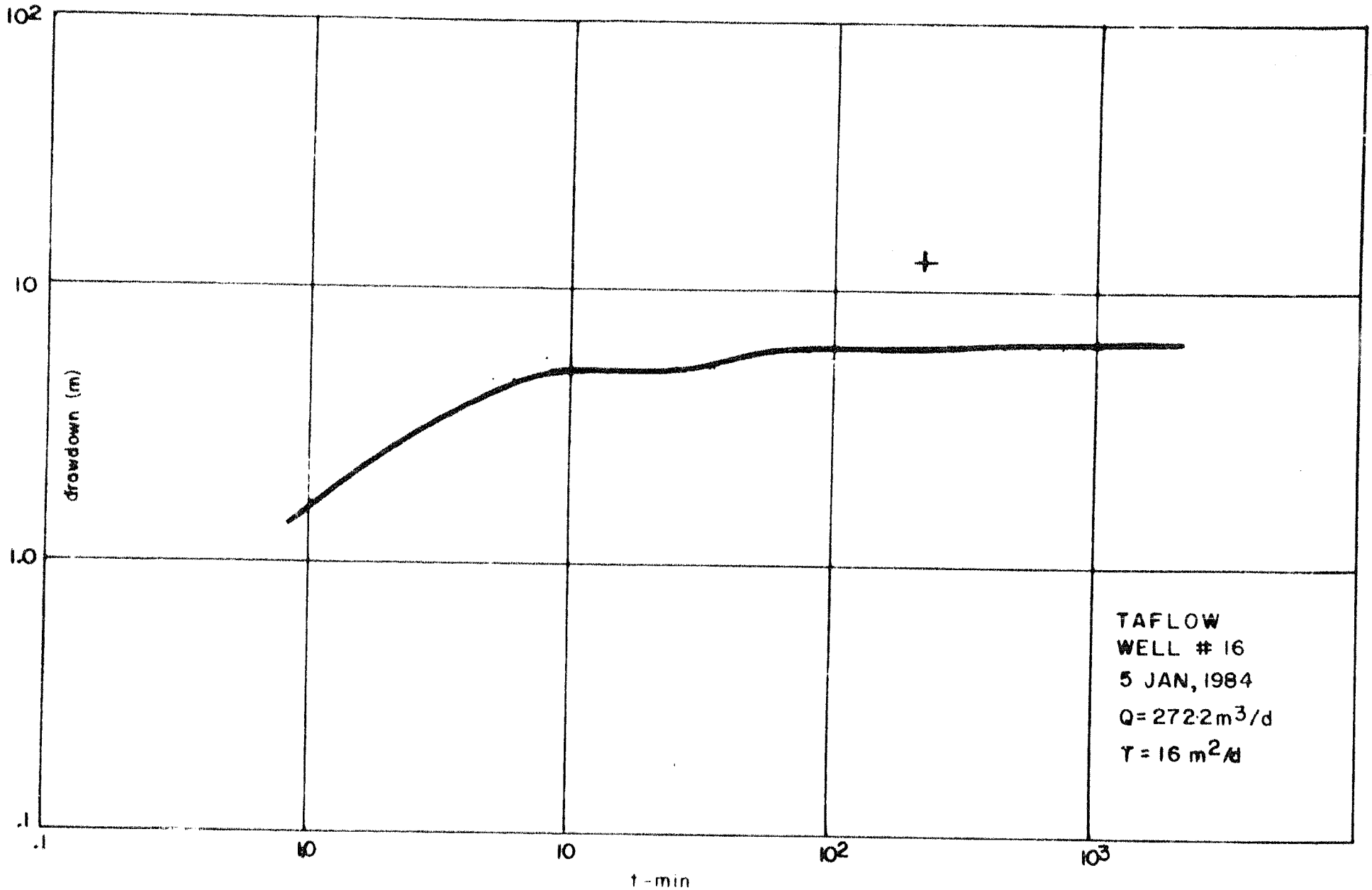
APPENDIX C

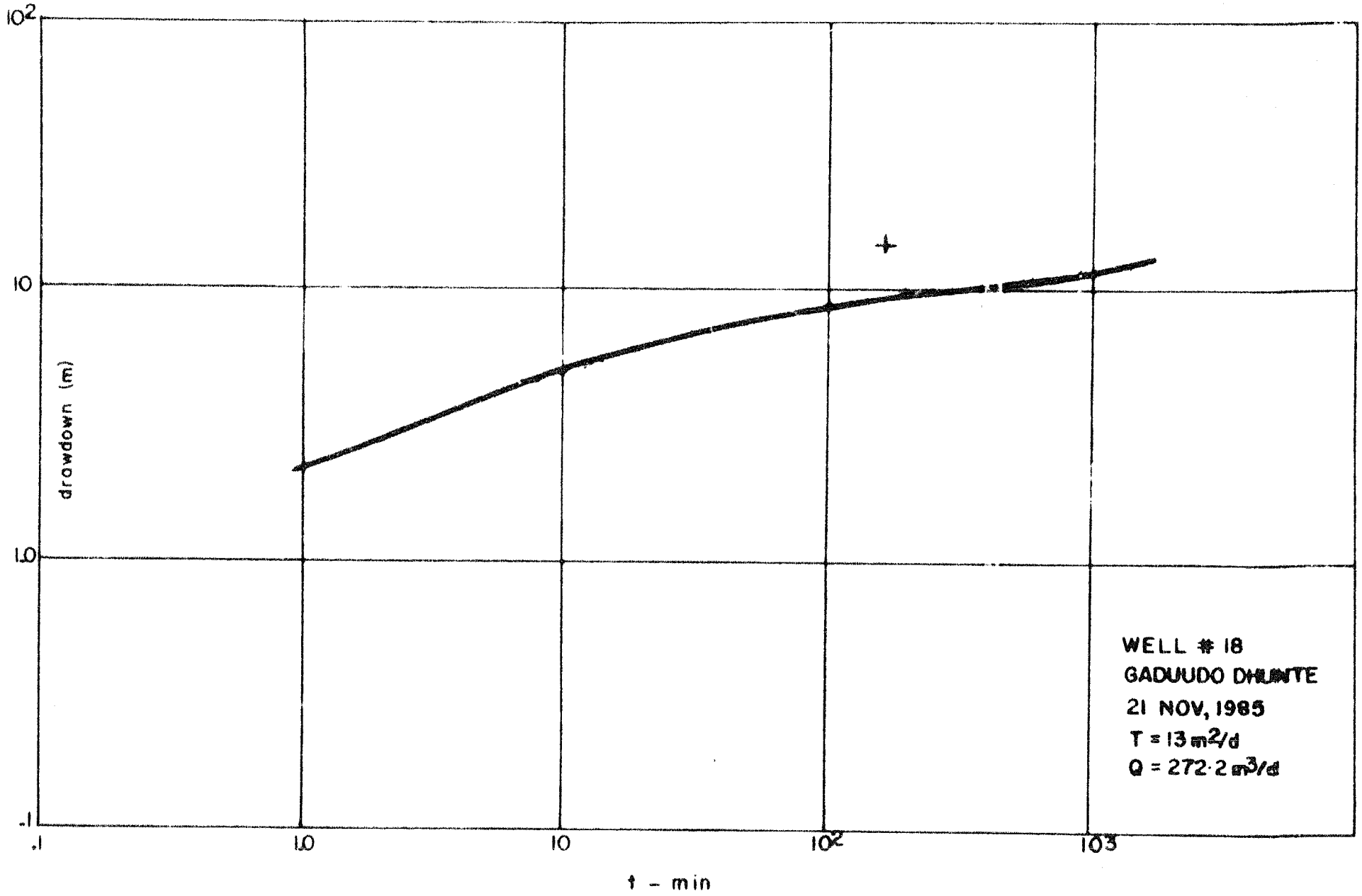
PUMPING TEST DATA: BAY REGION

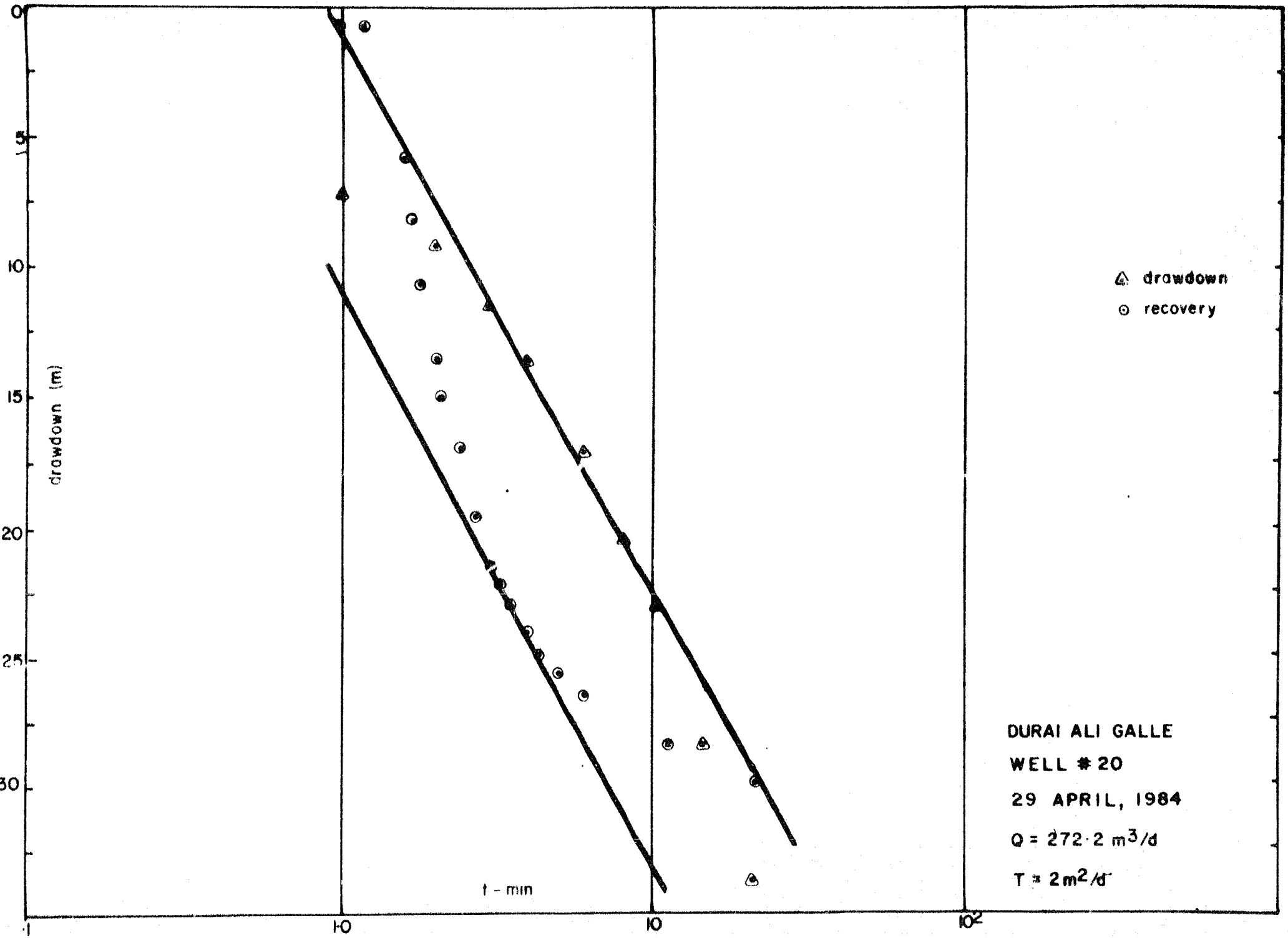

10^2
10
1.0
.1
drawdown (m)
.1
1.0
10
10^2
10^3
t - min. after start
WELL # 10
SARMAN DHEERE
28 JUNE, 1982
Q = 639.4 m³/d
T = 4.00 m²/d

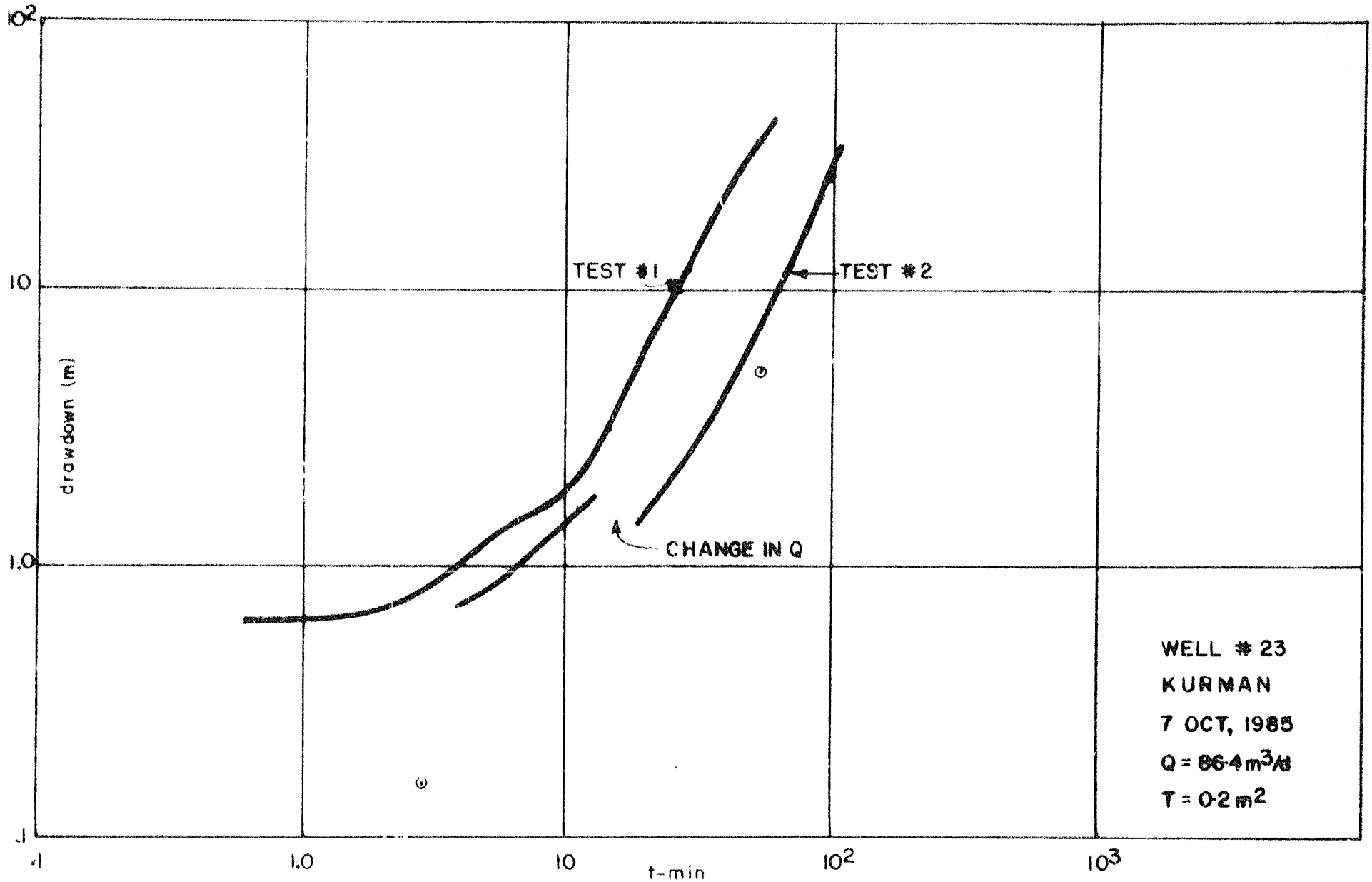

10²
10
1.0
.1
drawdown (m)
.1
1.0
10
10²
10³
t - min. after start
WELL #11
USAID CMPD BAIDOA
Q = 319·2 m³/d
11 OCT, 1982
T = 430 m²/d

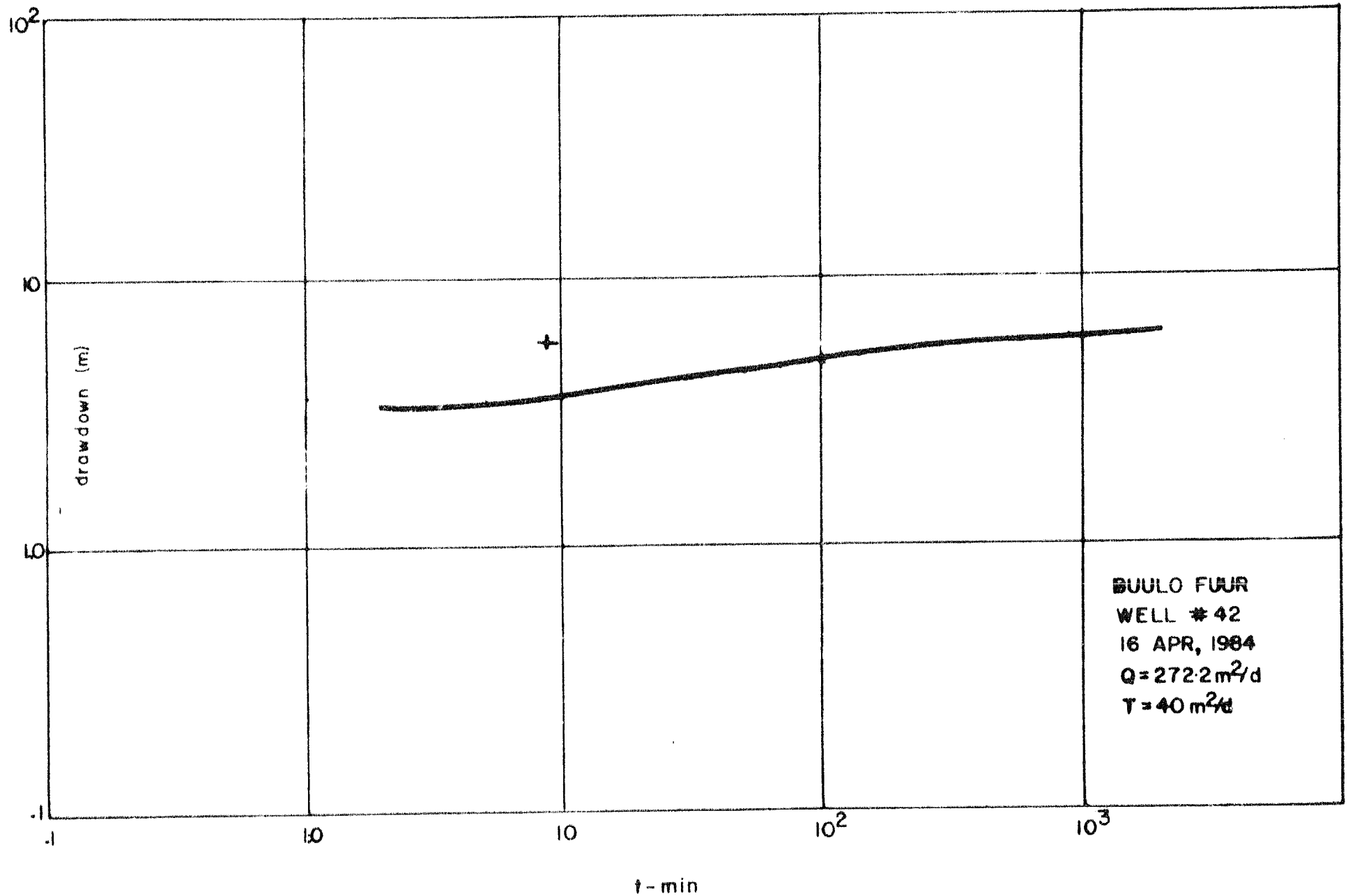

10^2
10
1.0
0.1
drawdown (m)
.1
10
10
10^2
10^3
t - min
Hareero Jiifo
Well # 12
3 Jan, 1984
Q = 273·6 m³/d
T = 2 m²/d

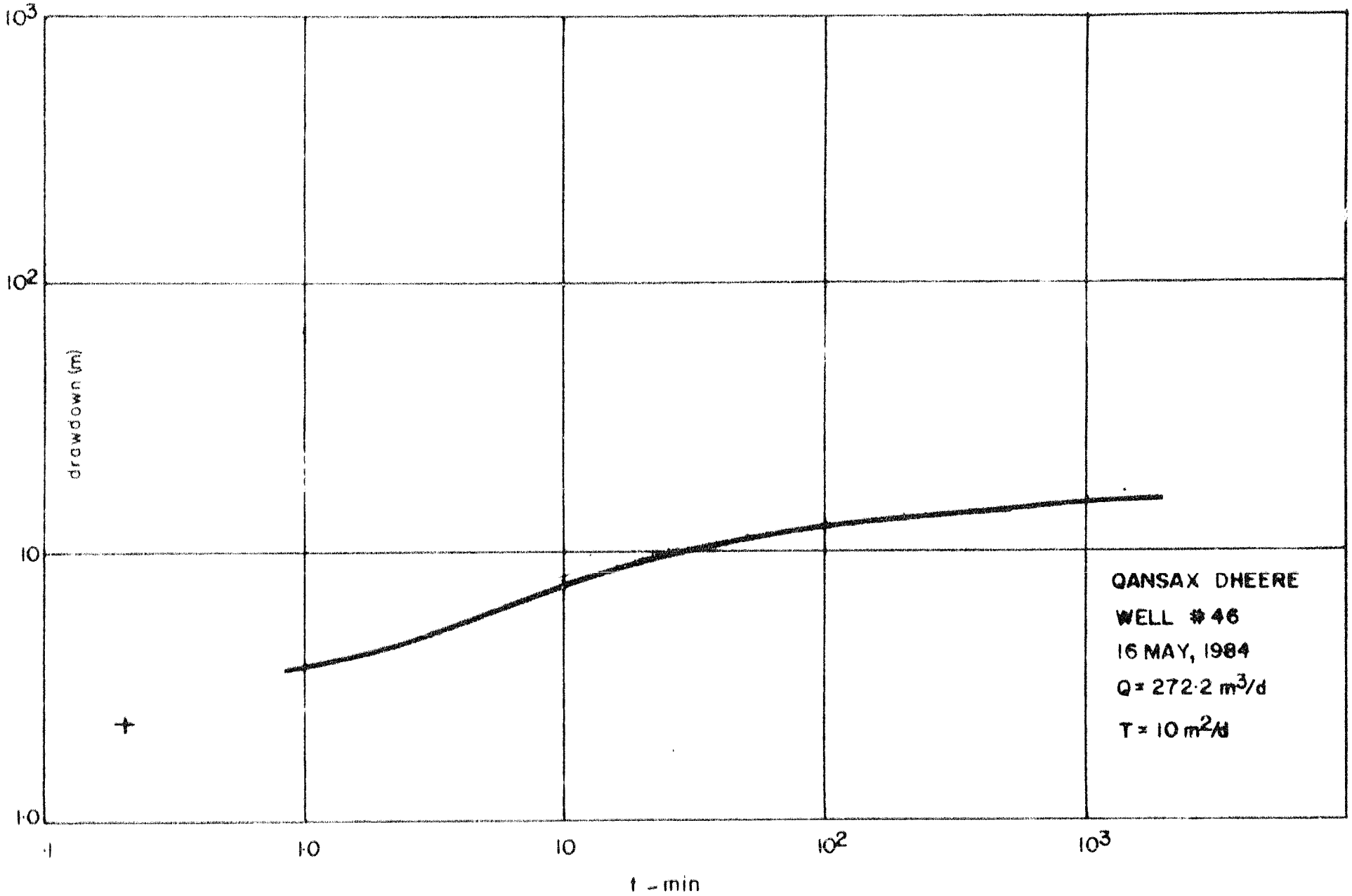

10²
10
1.0
.1
drawdown (m)
.1
1.0
10
10²
10³
t - min
TAFLOW
WELL # 16
5 JAN, 1984
Q = 272.2 m³/d
T = 16 m²/d

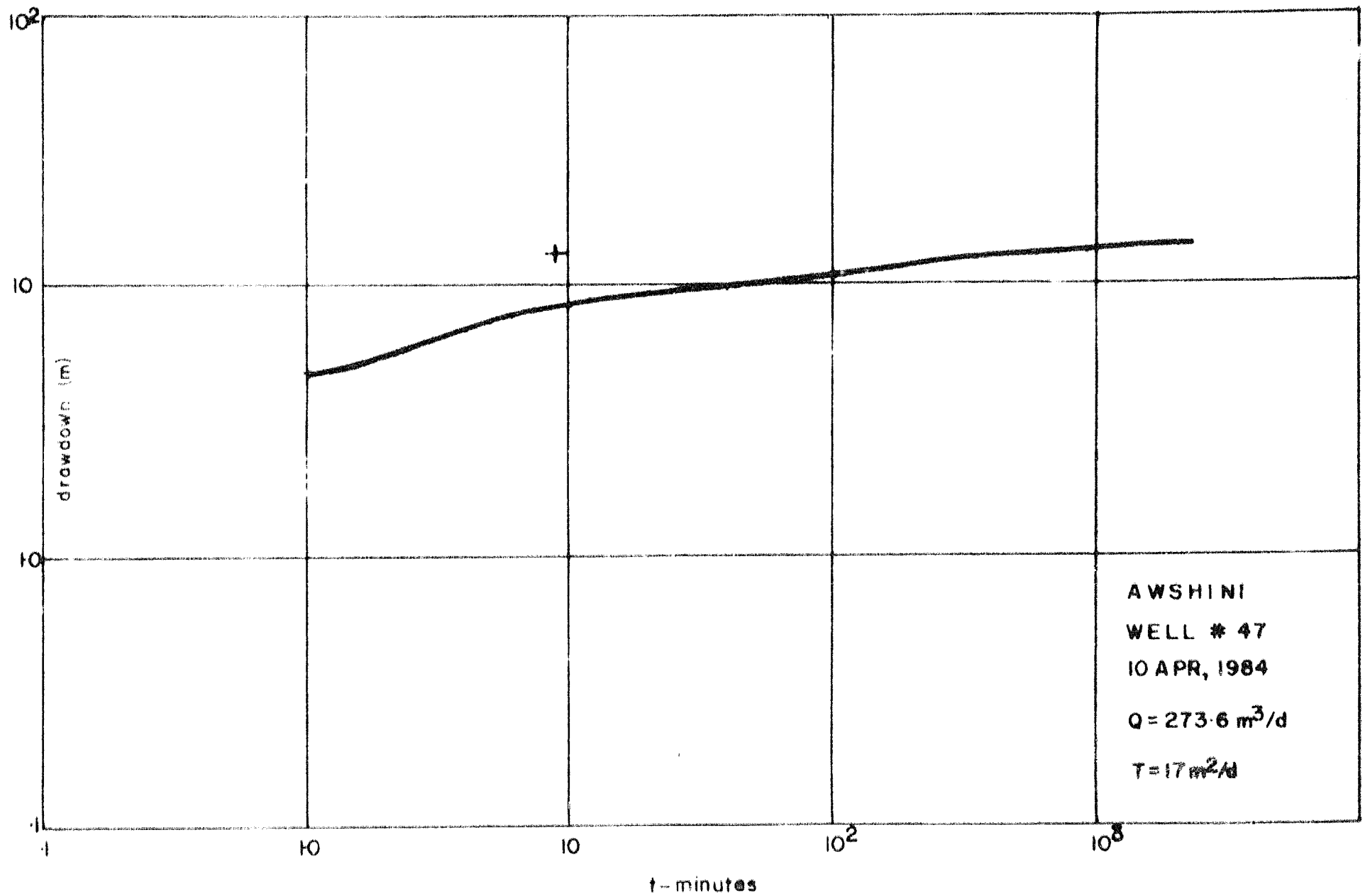

10²
10
1.0
.1
drawdown (m)
.1
1.0
10
10²
10³
t - min
WELL # 18
GADUUDO DHUNTE
21 NOV, 1985
T = 13 m²/d
Q = 272·2 m³/d

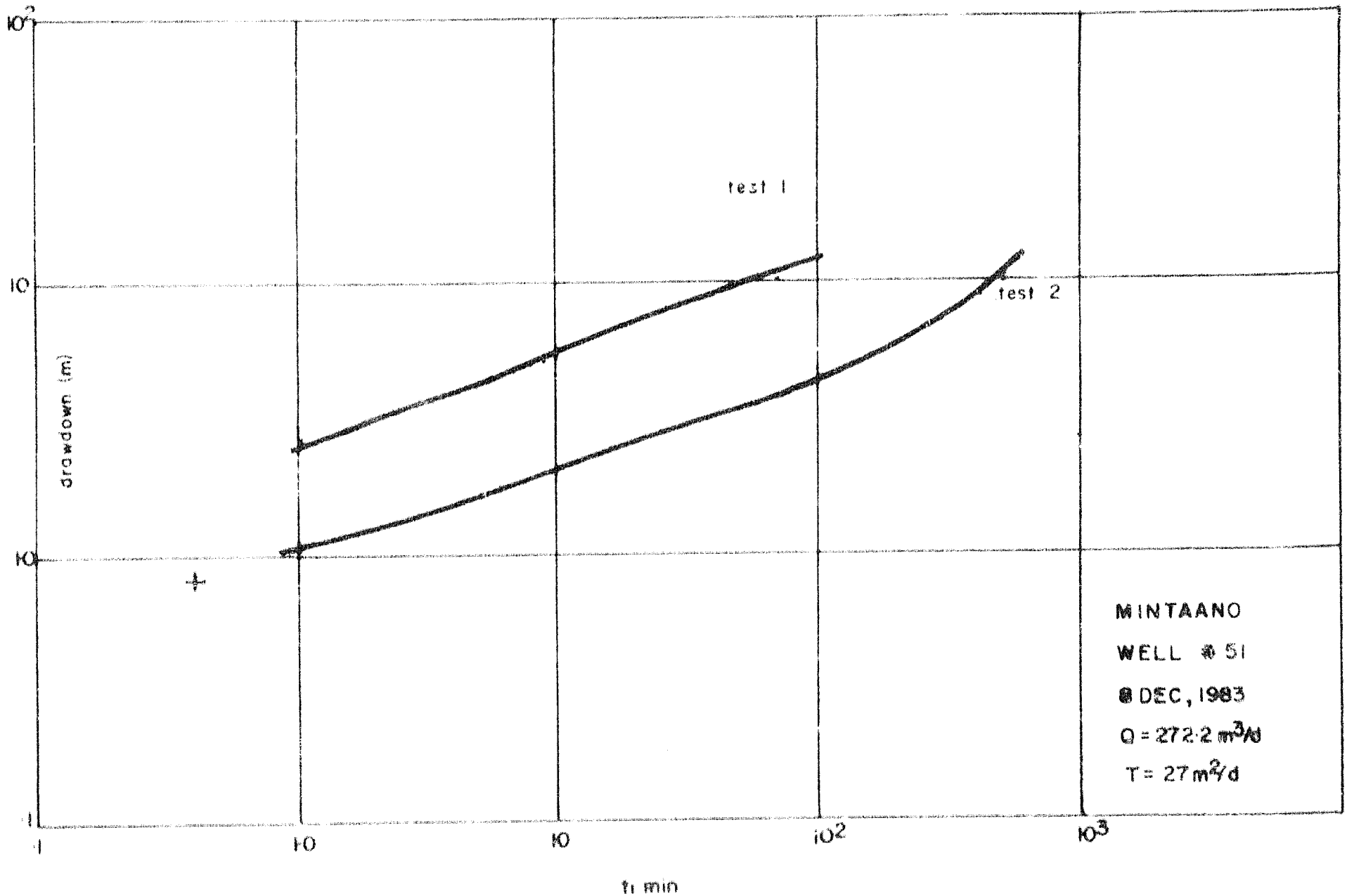

drawdown (m)
0
5
10
15
20
25
30
t - min
·1
1·0
10
10²
drawdown
recovery
DURAI ALI GALLE
WELL # 20
29 APRIL, 1984
Q = 272·2 m³/d
T = 2 m²/d

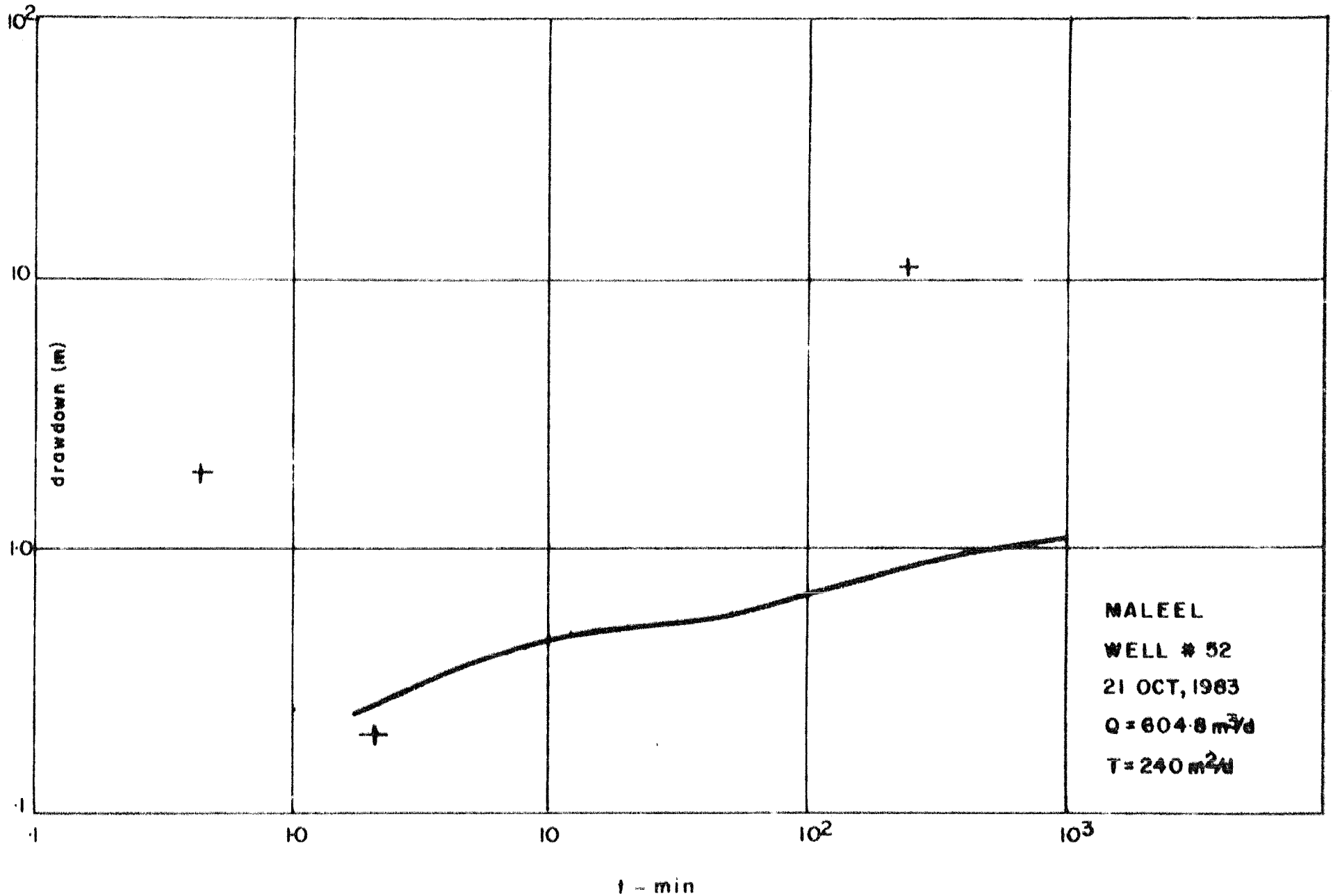

10^2
10
1.0
.1
drawdown (m)
.1
1.0
10
10^2
10^3
t-min
TEST #1
TEST #2
CHANGE IN Q
WELL # 23
KURMAN
7 OCT, 1985
Q = 86.4 m³/d
T = 0.2 m²

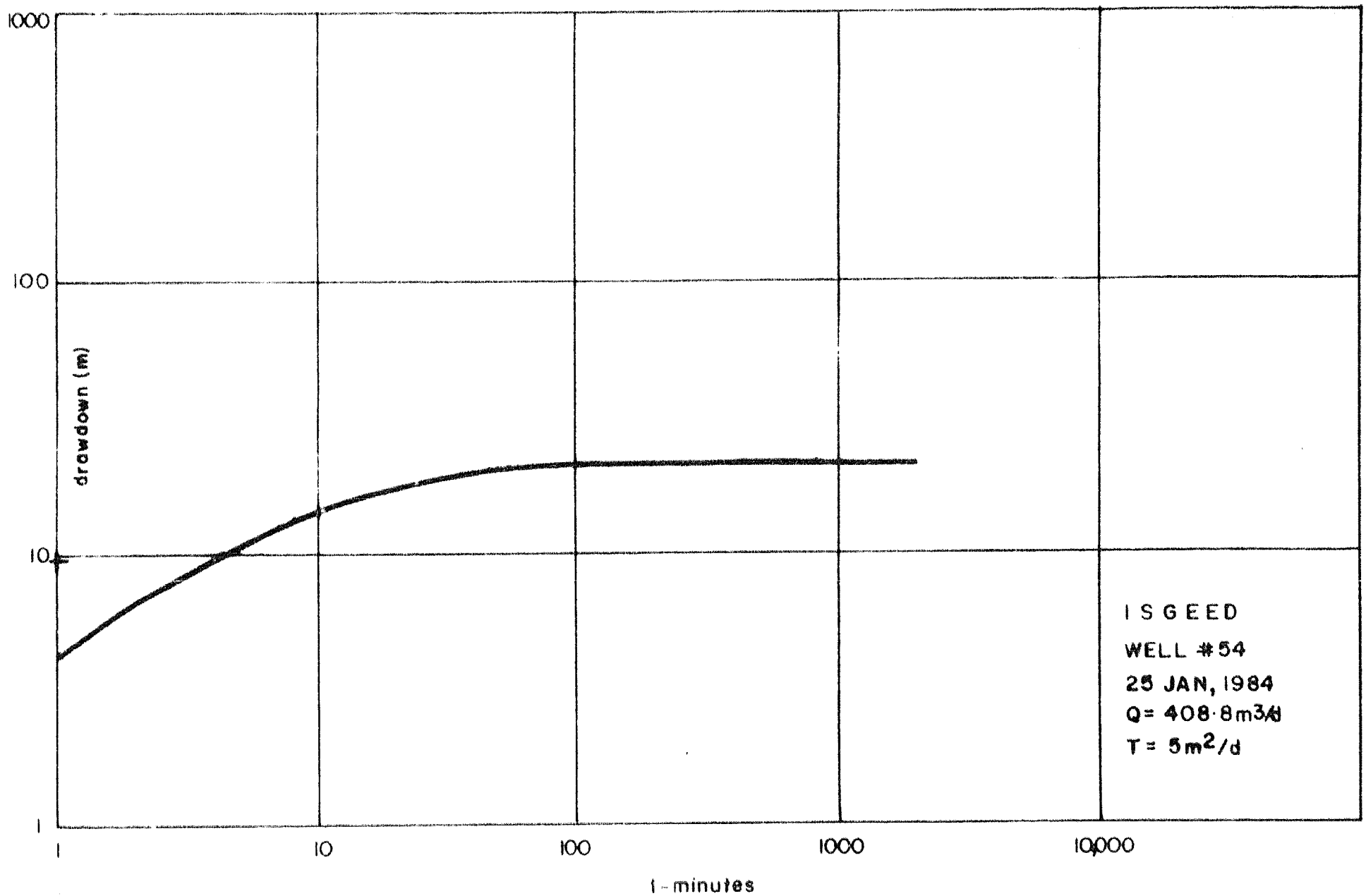

10^2
10
1.0
.1
drawdown (m)
.1
1.0
10
10^2
10^3
t - min
BUULO FUUR
WELL # 42
16 APR, 1984
Q = 272.2 m²/d
T = 40 m²/d

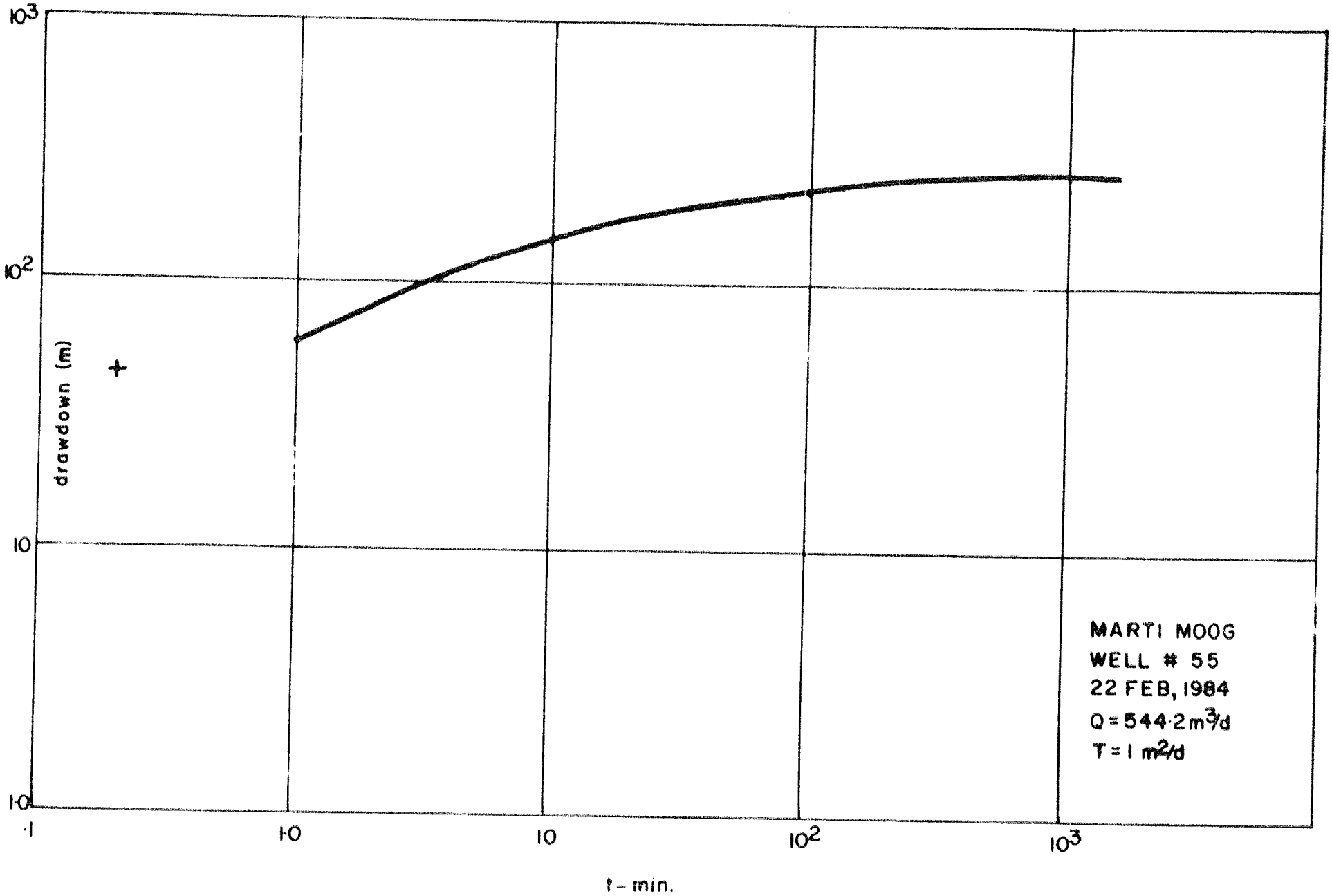

10^3
10^2
10
1·0
drawdown (m)
·1
1·0
10
10^2
10^3
t – min
QANSAX DHEERE
WELL #46
16 MAY, 1984
Q = 272·2 m^3/d
T = 10 m^2/d

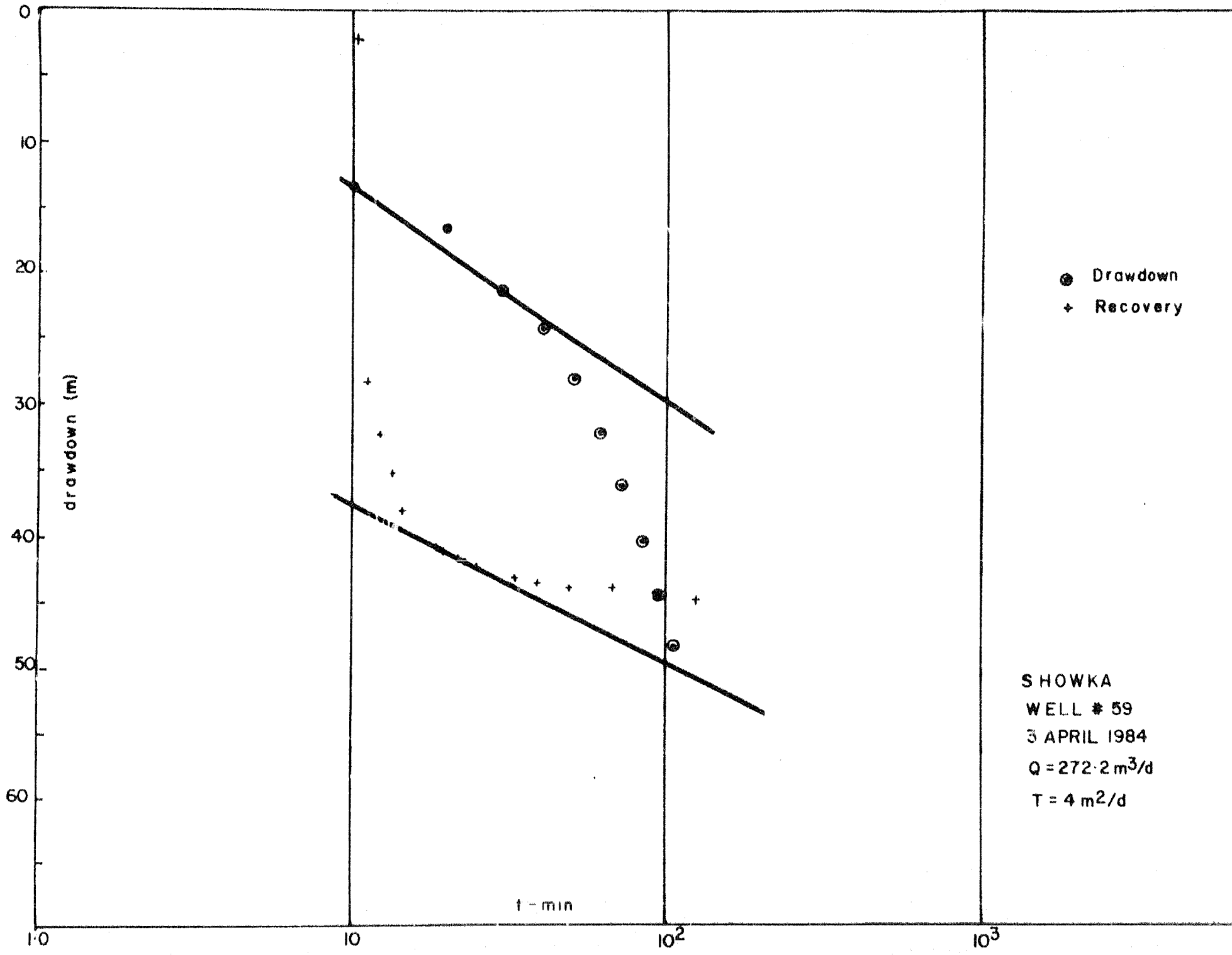

10²
10
1·0
·1
drawdown (m)
·1
1·0
10
10²
10³
t – minutes
AWSHINI
WELL # 47
10 APR, 1984
Q = 273·6 m³/d
T = 17 m²/d

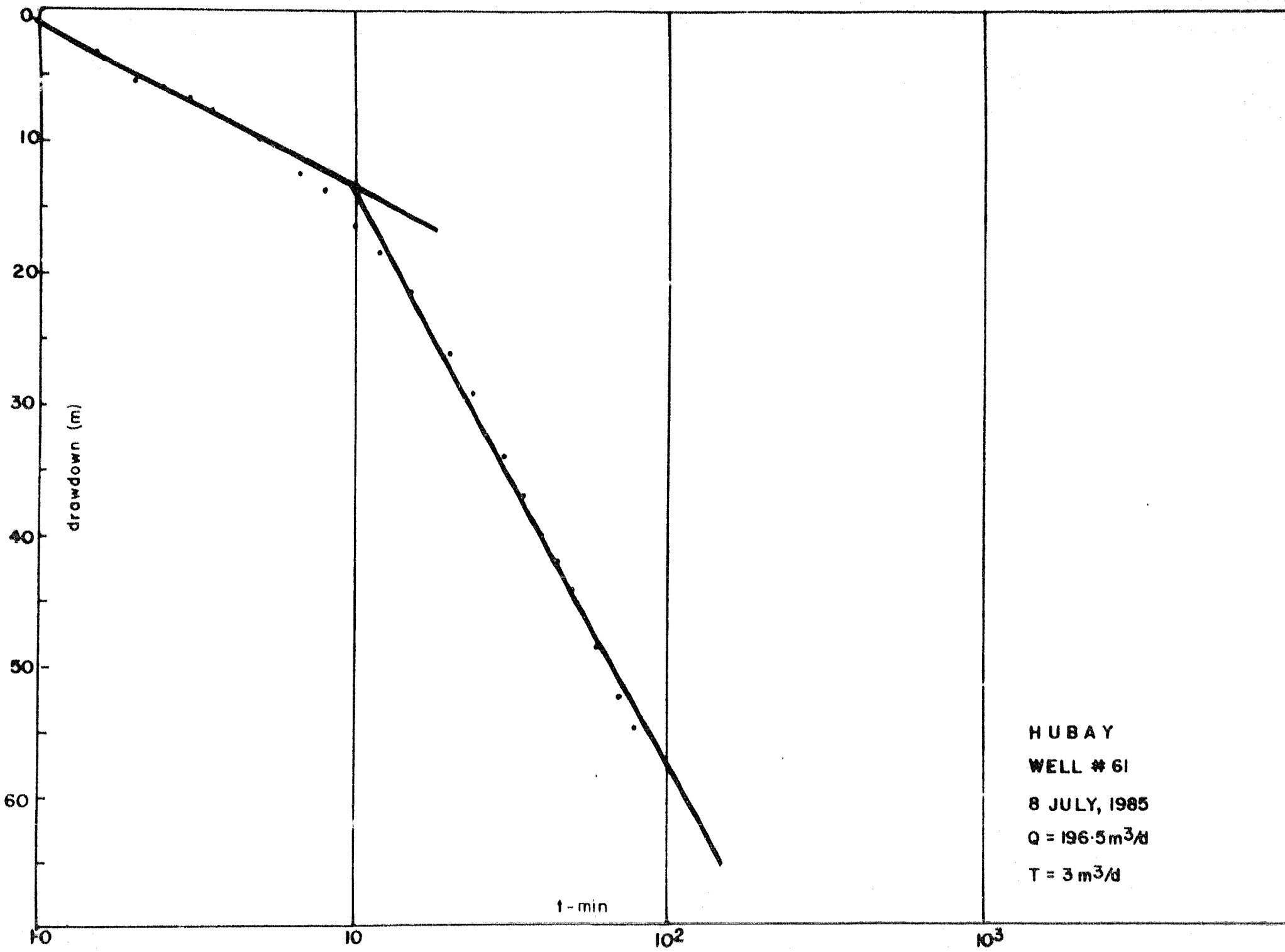

10^2
10
1
1
10
10
10^2
10^3
drawdown (m)
t, min
test 1
test 2
MINTAANO
WELL # 51
DEC, 1983
Q = 272.2 m³/d
T = 27 m²/d

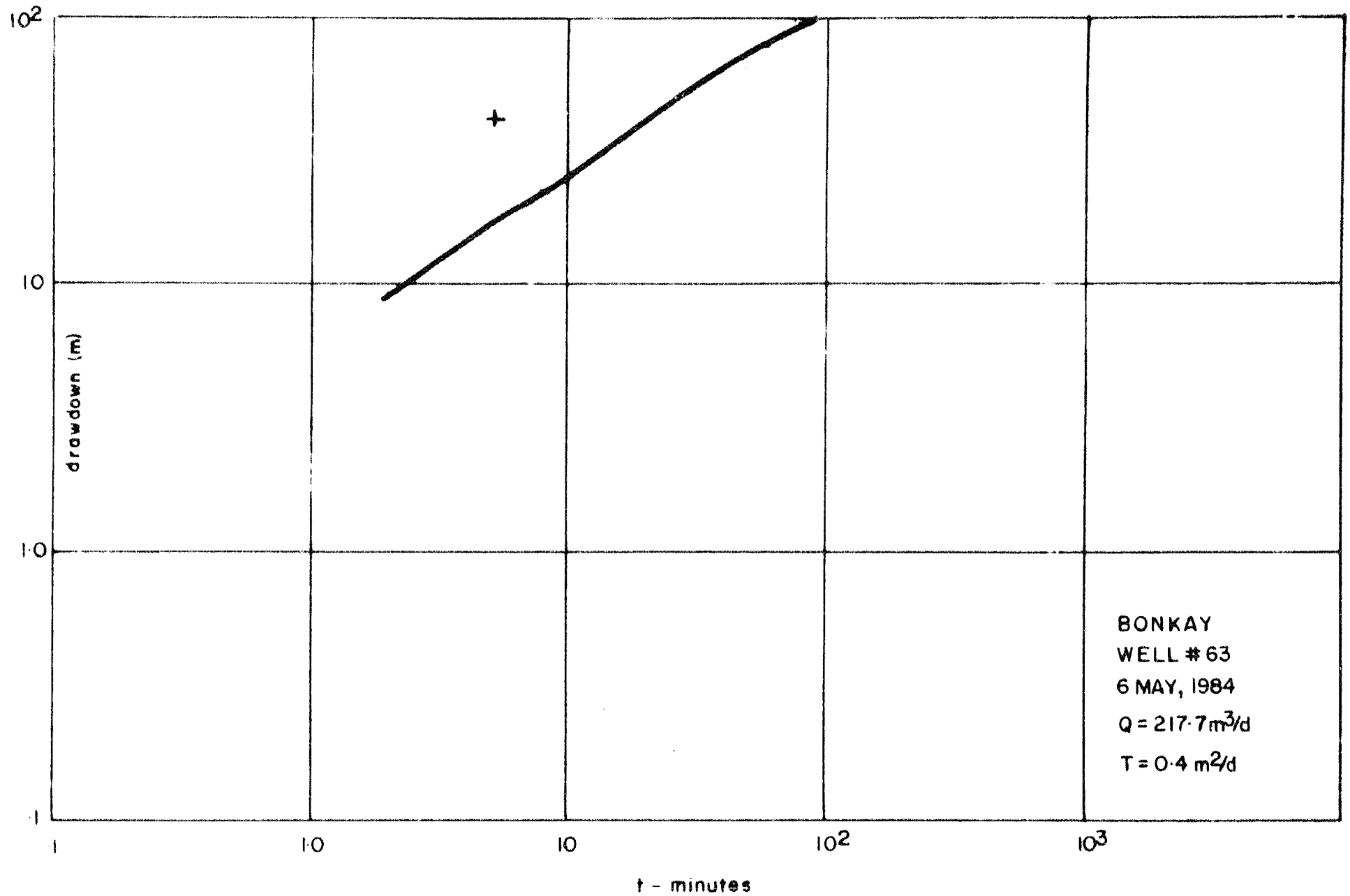

10^2
10
1·0
·1
drawdown (m)
·1
1·0
10
10^2
10^3
t – min
MALEEL
WELL # 52
21 OCT, 1983
Q = 604·8 m^3/d
T = 240 m^2/d

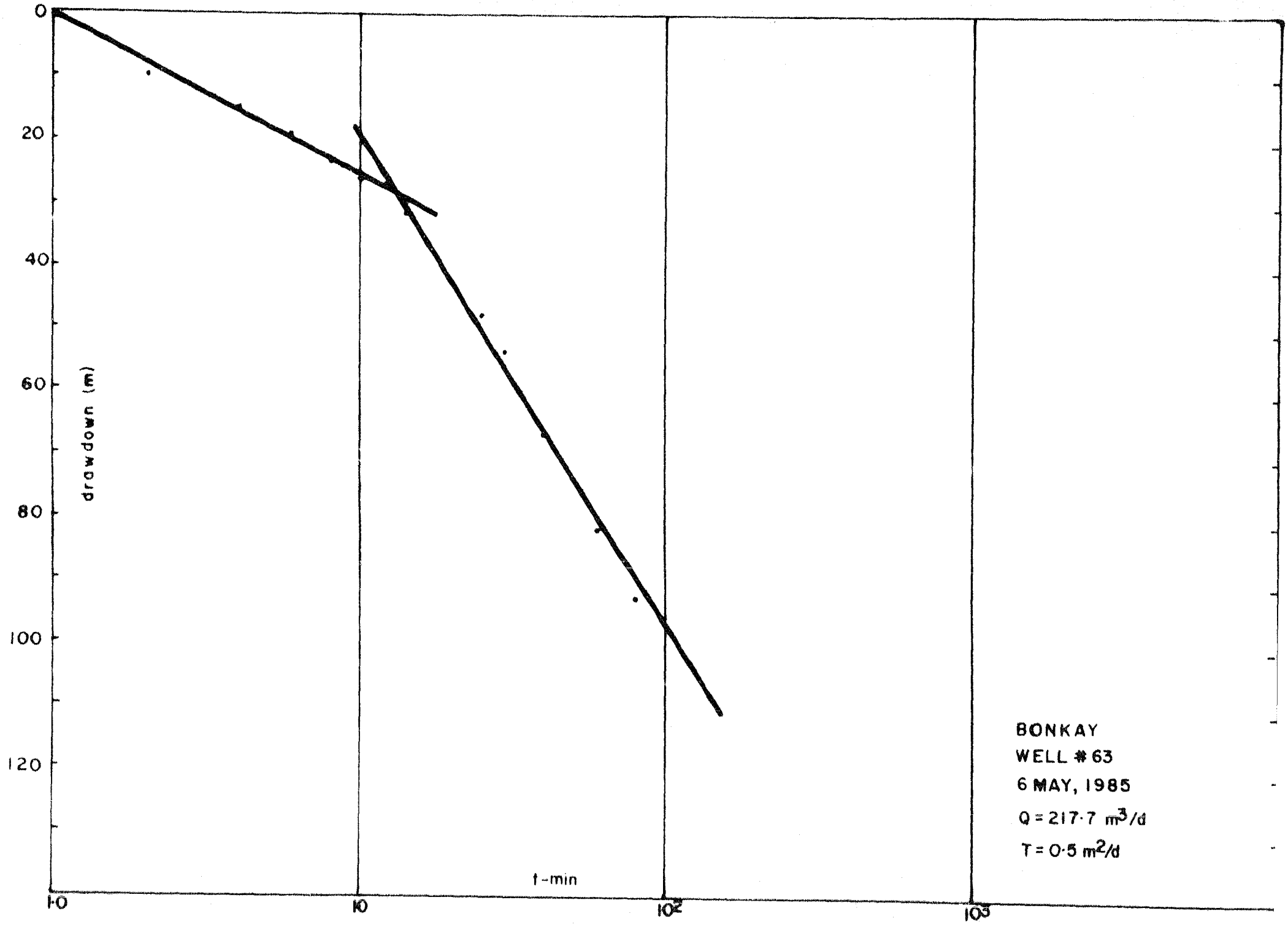

1000
100
10
1
drawdown (m)
1
10
100
1000
10,000
t - minutes
I S G E E D
WELL #54
25 JAN, 1984
Q= 408·8m3/d
T= 5m2/d

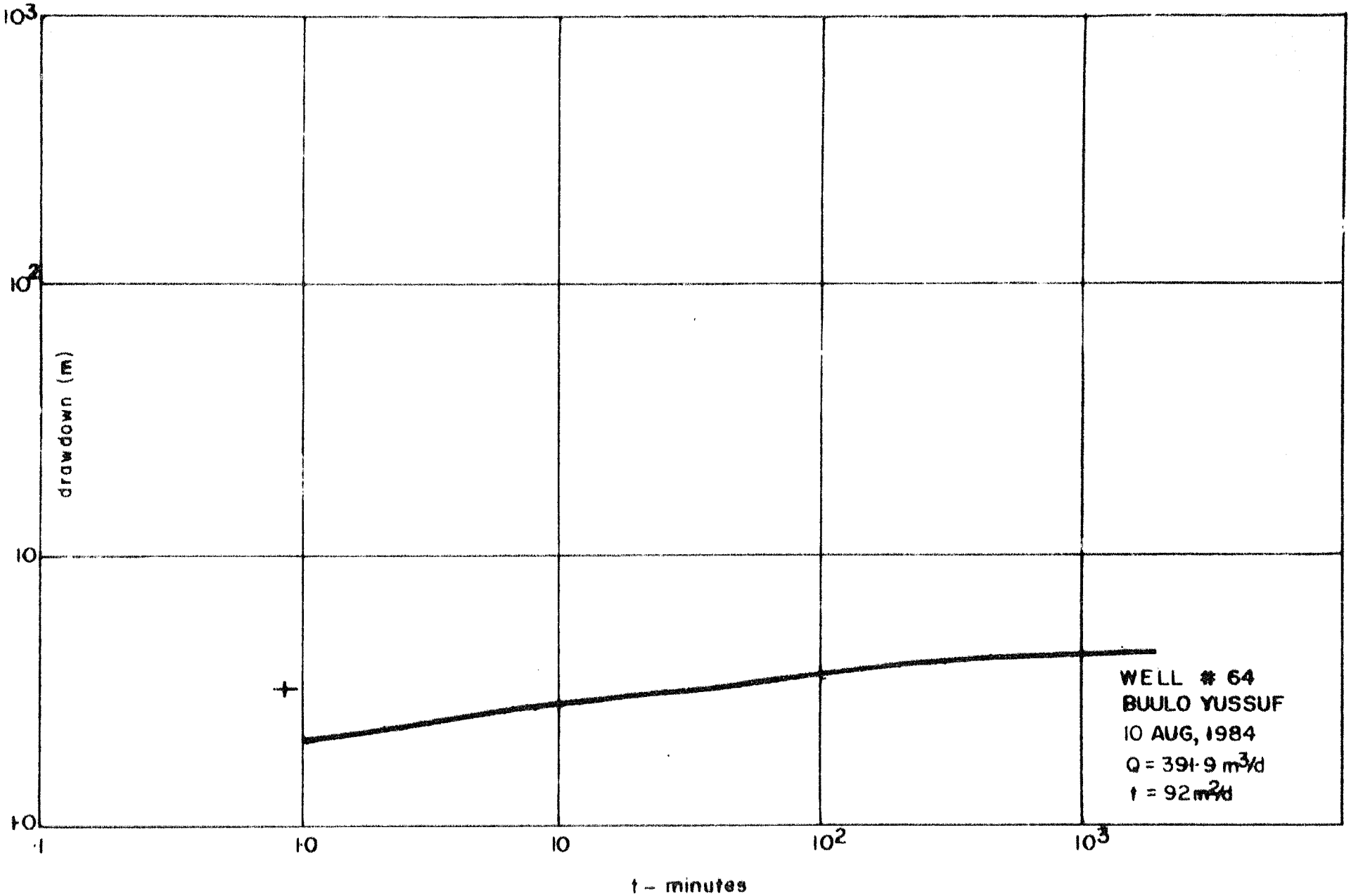

10^3
10^2
10
1·0
drawdown (m)
·1
1·0
10
10^2
10^3
t – min.
MARTI MOOG
WELL # 55
22 FEB, 1984
Q = 544·2 m³/d
T = 1 m²/d

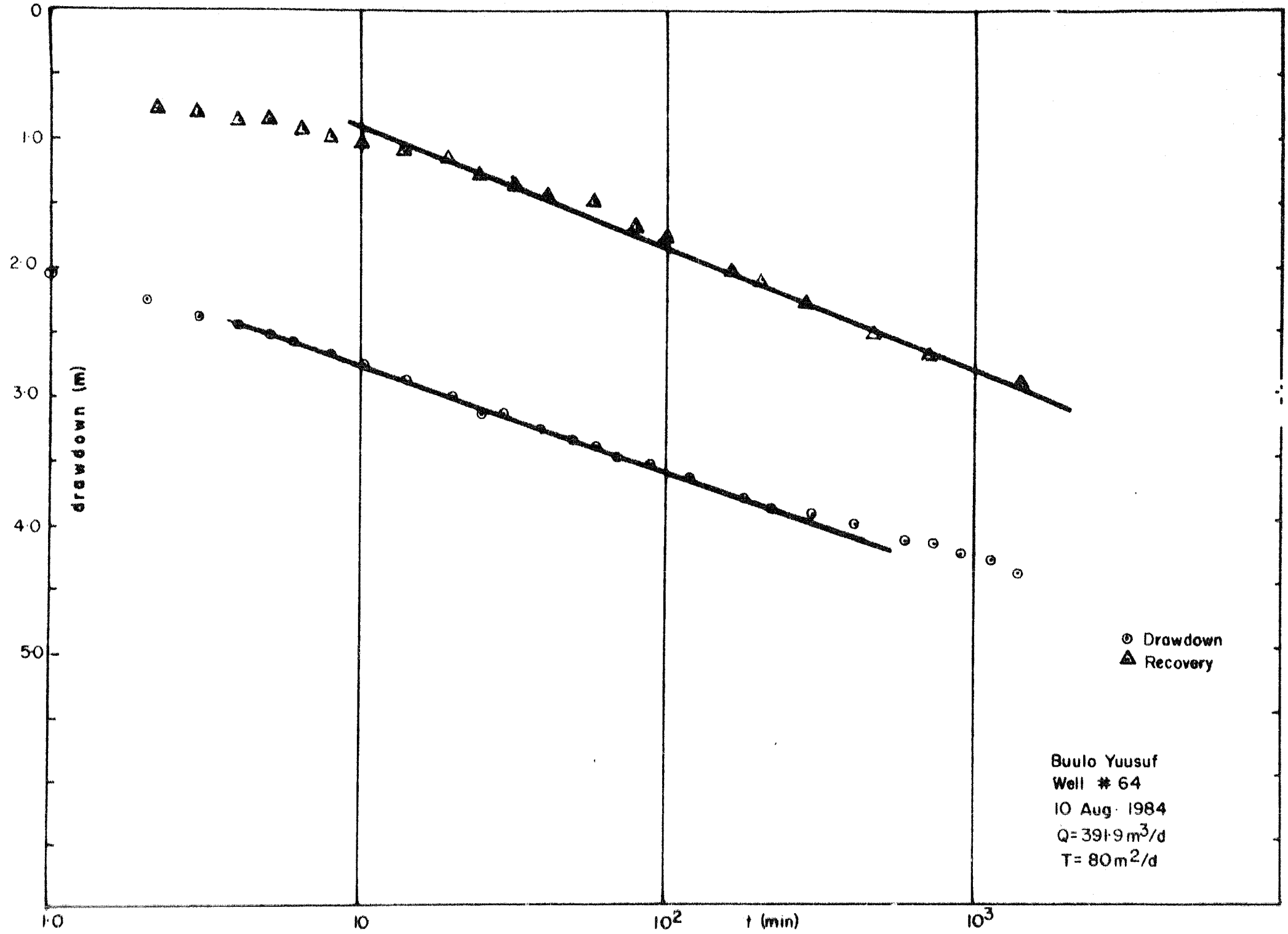

0
10
20
30
40
50
60
drawdown (m)
1·0
10
10^2
10^3
t - min
Drawdown
Recovery
SHOWKA
WELL # 59
3 APRIL 1984
Q = 272·2 m³/d
T = 4 m²/d

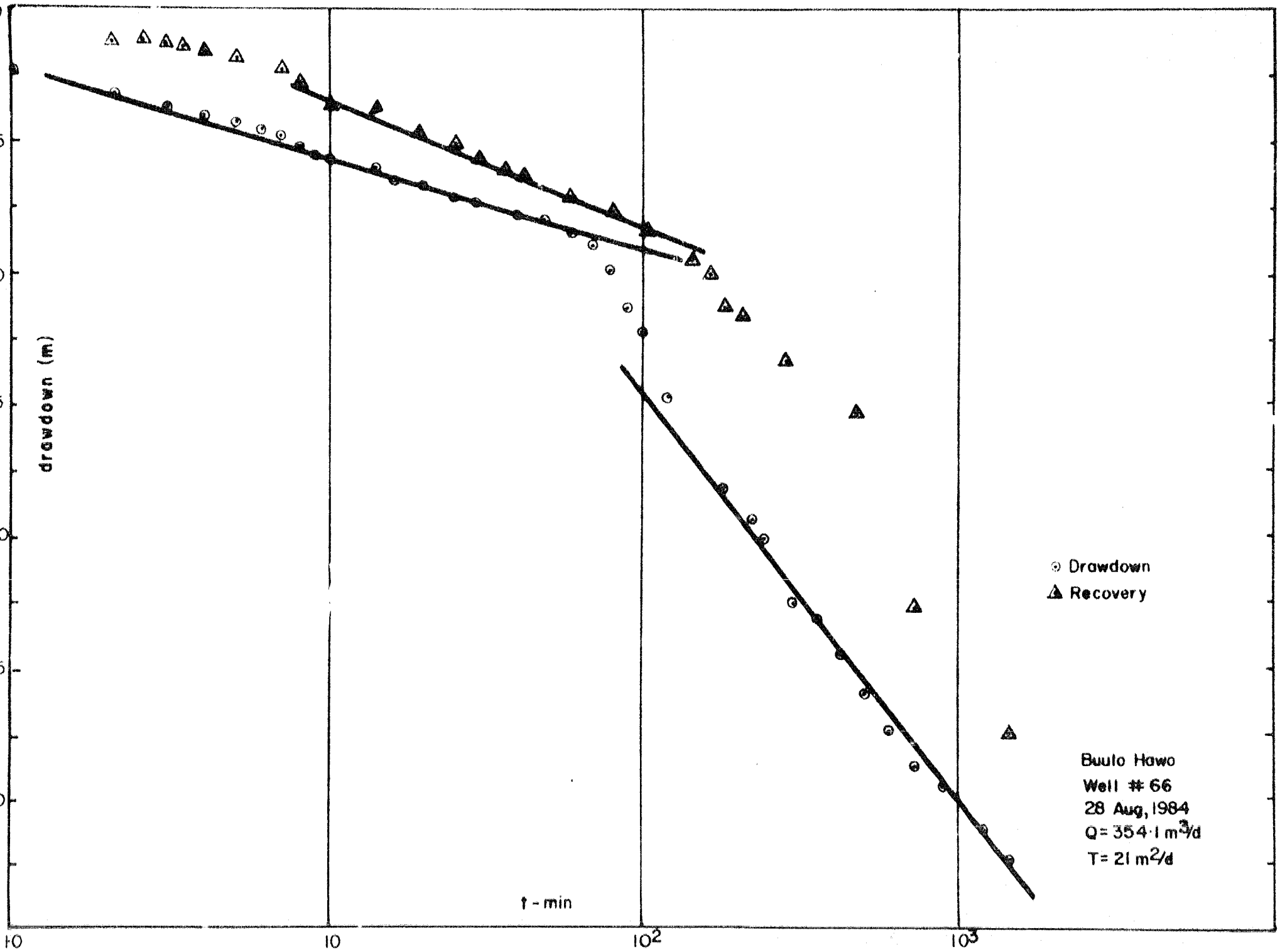

0
10
20
30
40
50
60
drawdown (m)
1·0
10
10^2
10^3
t - min
HUBAY
WELL # 61
8 JULY, 1985
Q = 196·5 m^3/d
T = 3 m^3/d

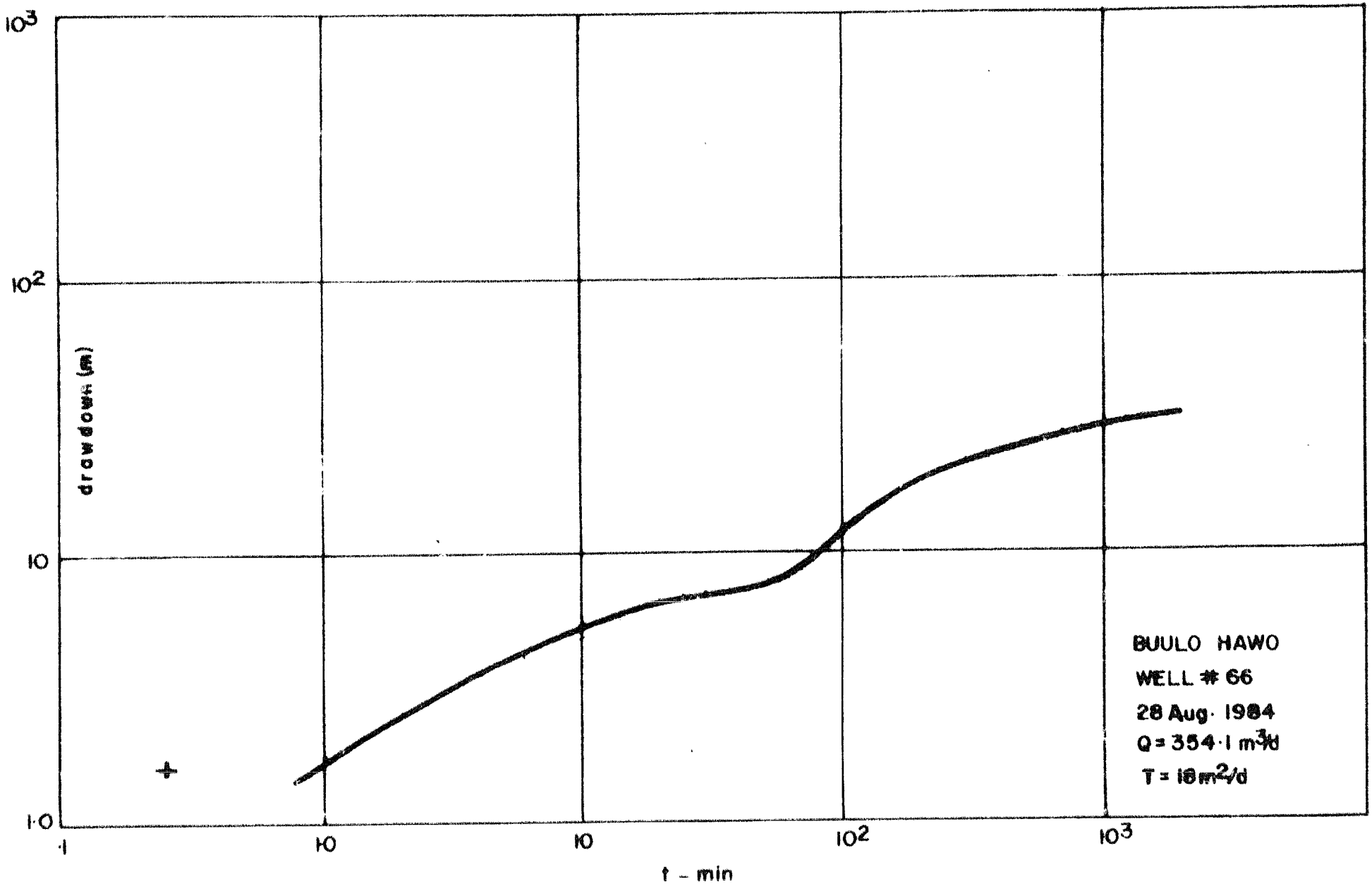

10^2
10
1·0
·1
drawdown (m)
1
1·0
10
10^2
10^3
t - minutes
BONKAY
WELL # 63
6 MAY, 1984
Q = 217·7 m^3/d
T = 0·4 m^2/d

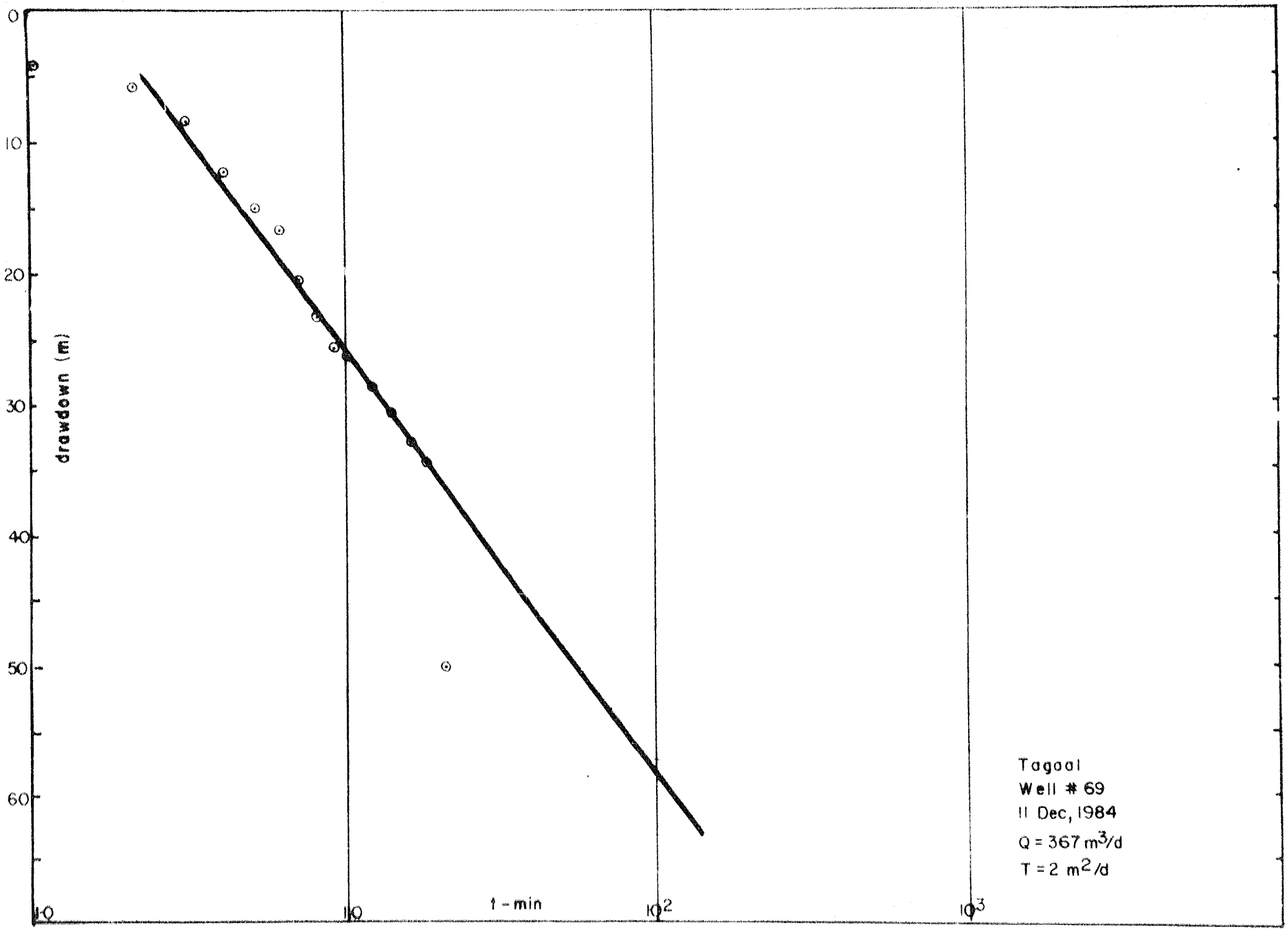

0
20
40
60
80
100
120
drawdown (m)
1·0
10
10²
10³
t-min
BONKAY
WELL # 63
6 MAY, 1985
Q = 217·7 m³/d
T = 0·5 m²/d

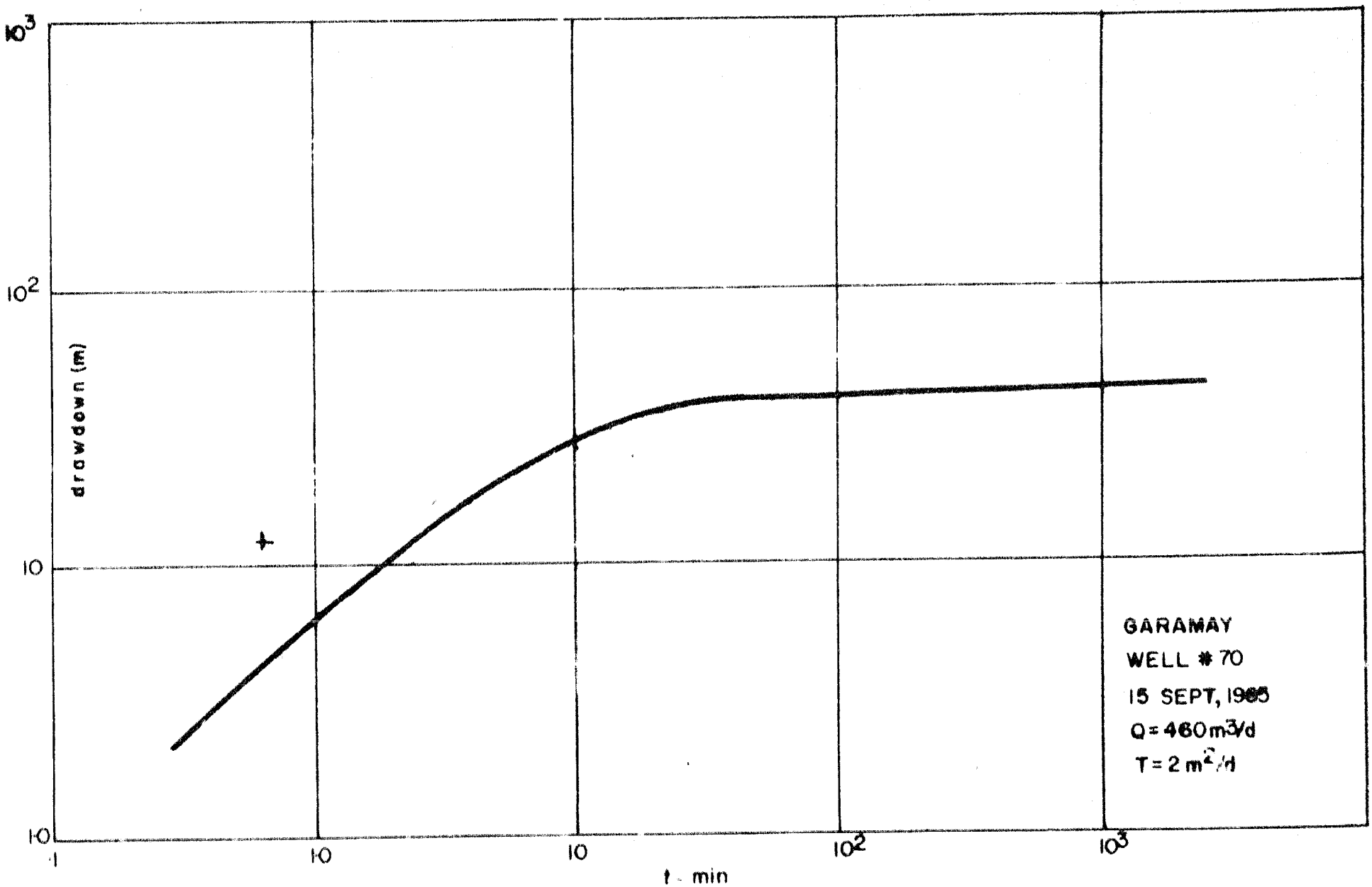

10³
10²
10
1·0
drawdown (m)
·1
1·0
10
10²
10³
t – minutes
WELL # 64
BUULO YUSSUF
10 AUG, 1984
Q = 391·9 m³/d
t = 92 m²/d

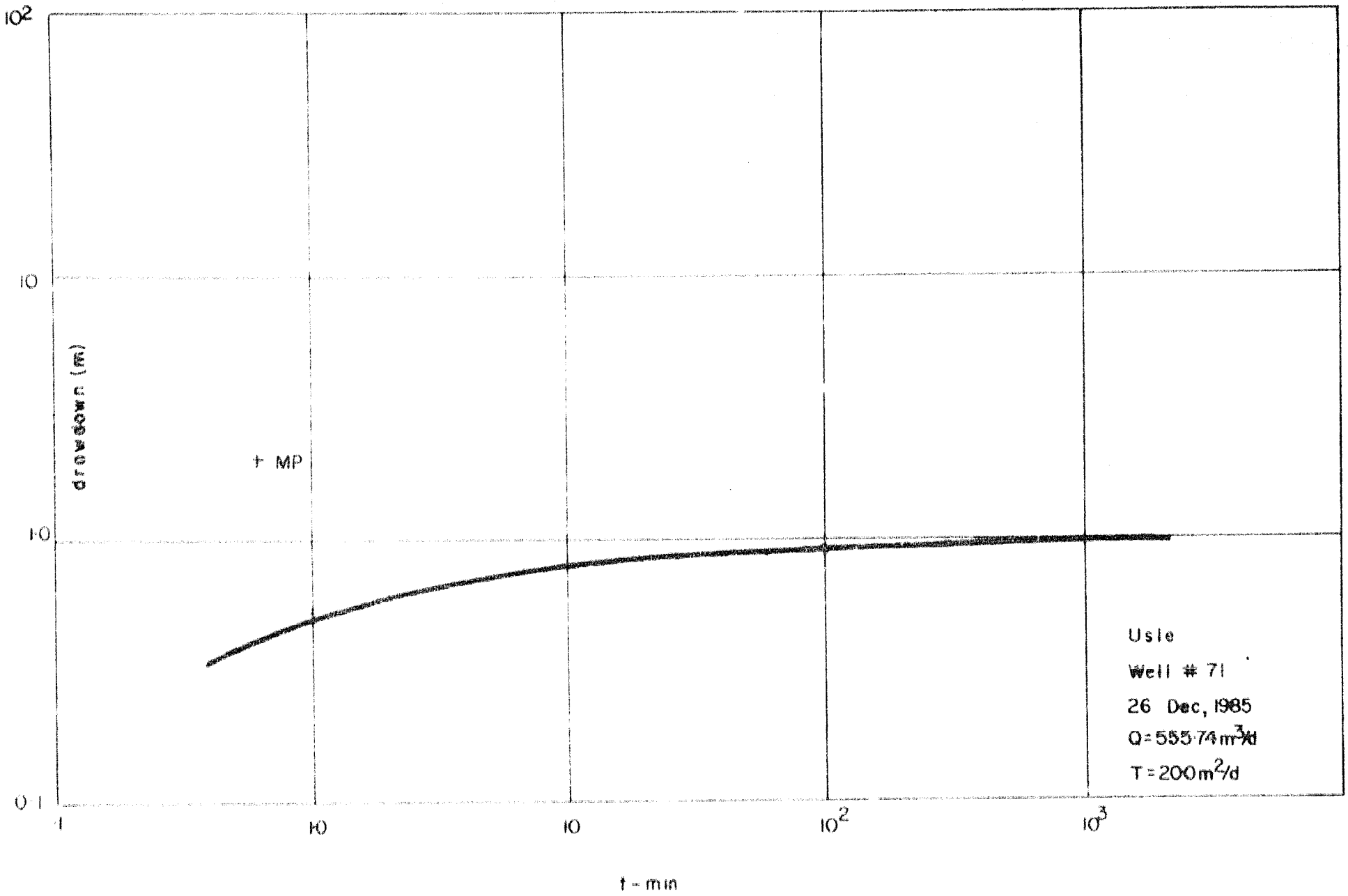

0
1·0
2·0
3·0
4·0
5·0
drawdown (m)
1·0
10
10^2
t (min)
10^3
Drawdown
Recovery
Buulo Yuusuf
Well # 64
10 Aug. 1984
Q= 391·9 m^3/d
T= 80 m^2/d

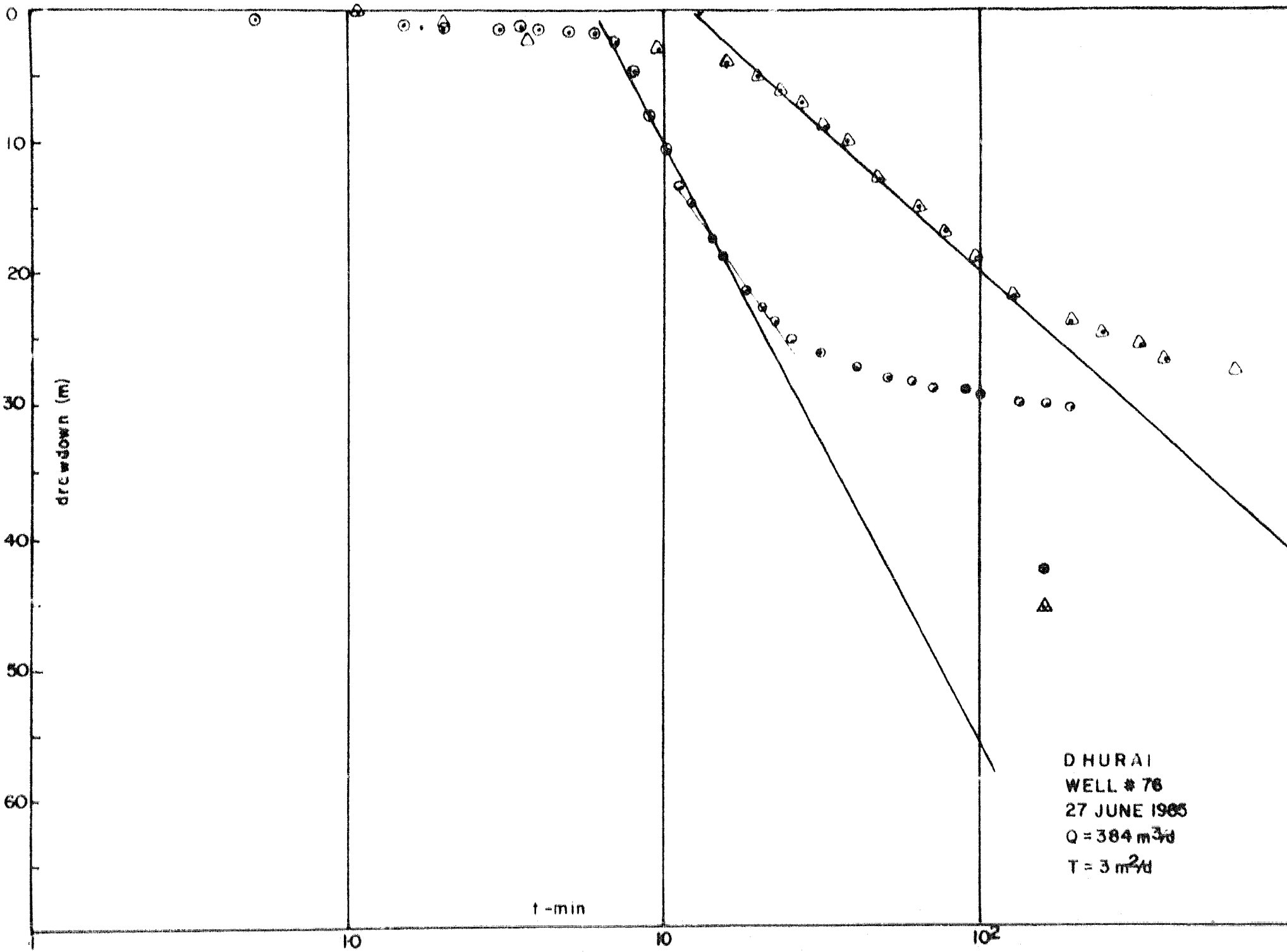

drawdown (m)
t - min
10
10^2
10^3
Drawdown
Recovery
Buulo Hawo
Well # 66
28 Aug, 1984
Q = 354·1 m^3/d
T = 21 m^2/d

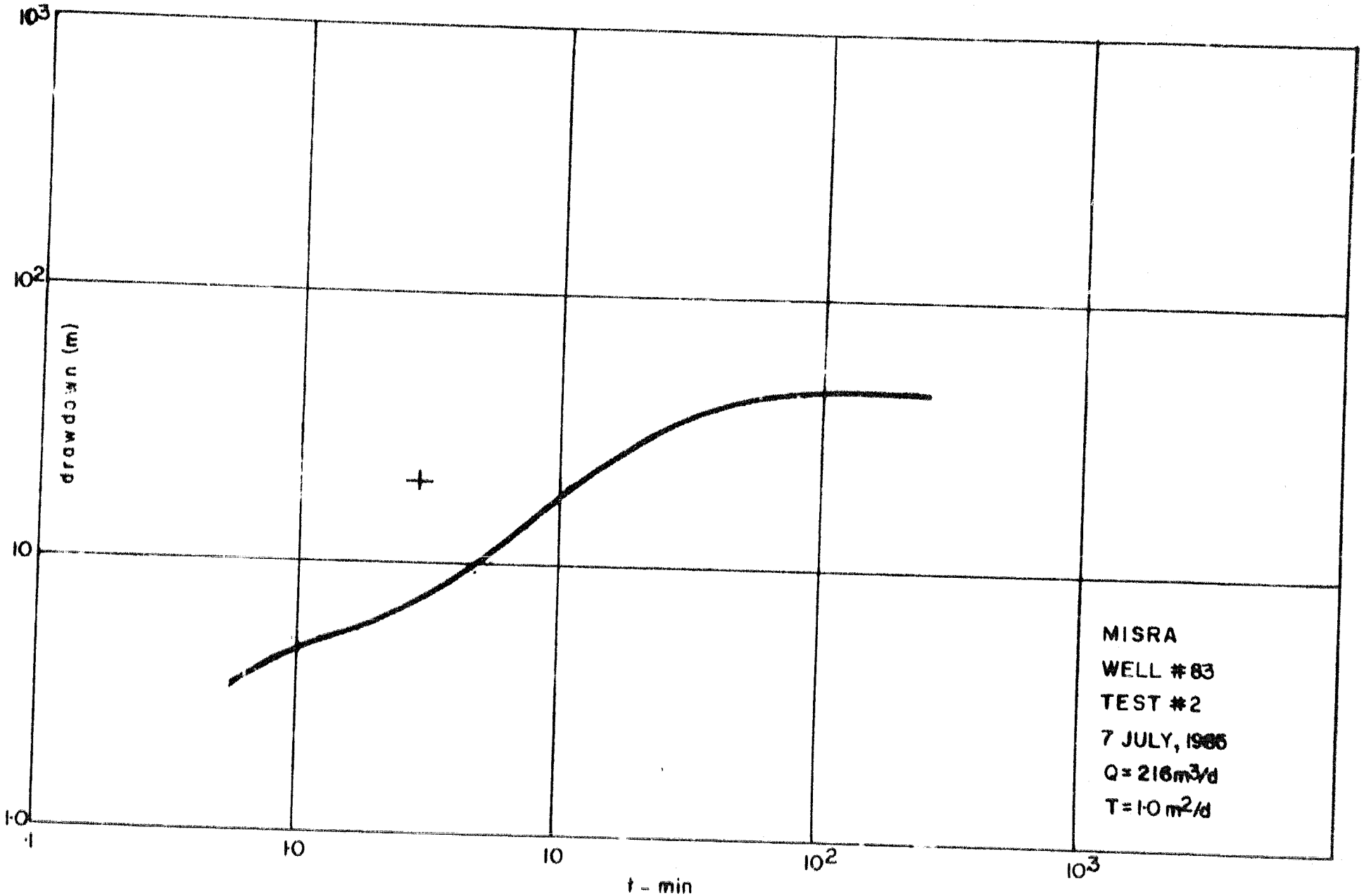

10^3
10^2
10
1·0
drawdown (m)
·1
1·0
10
10^2
10^3
t – min
BUULO HAWO
WELL # 66
28 Aug. 1984
Q = 354·1 m^3/d
T = 18 m^2/d

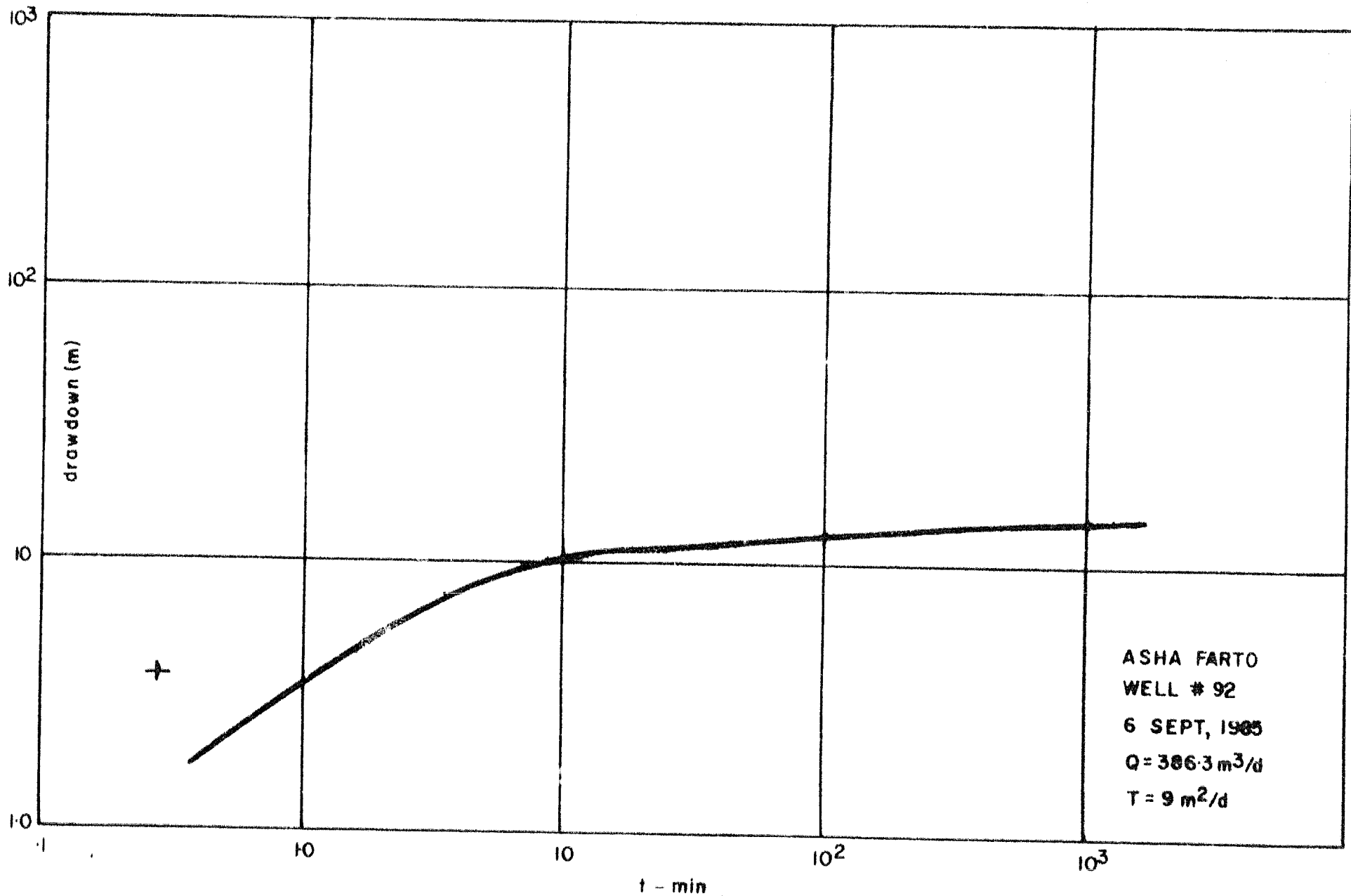

0
10
20
30
40
50
60
drawdown (m)
10^{-1}
10^{0}
10^{2}
10^{3}
t - min
Tagoal
Well # 69
11 Dec, 1984
Q = 367 m^3/d
T = 2 m^2/d

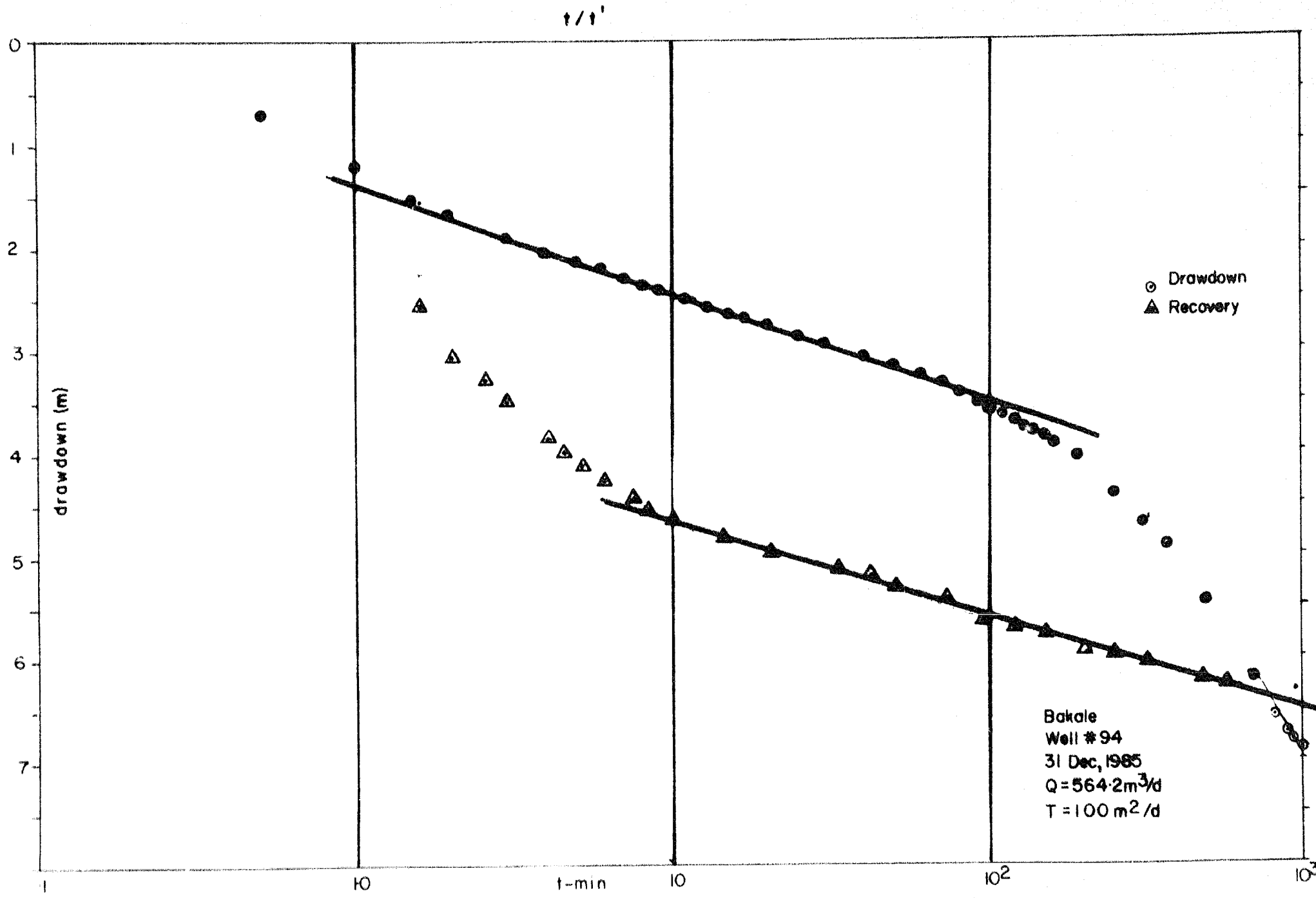

10^3
10^2
10
1·0
drawdown (m)
·1
1·0
10
10^2
10^3
t - min
GARAMAY
WELL # 70
15 SEPT, 1985
Q = 460 m³/d
T = 2 m²/d

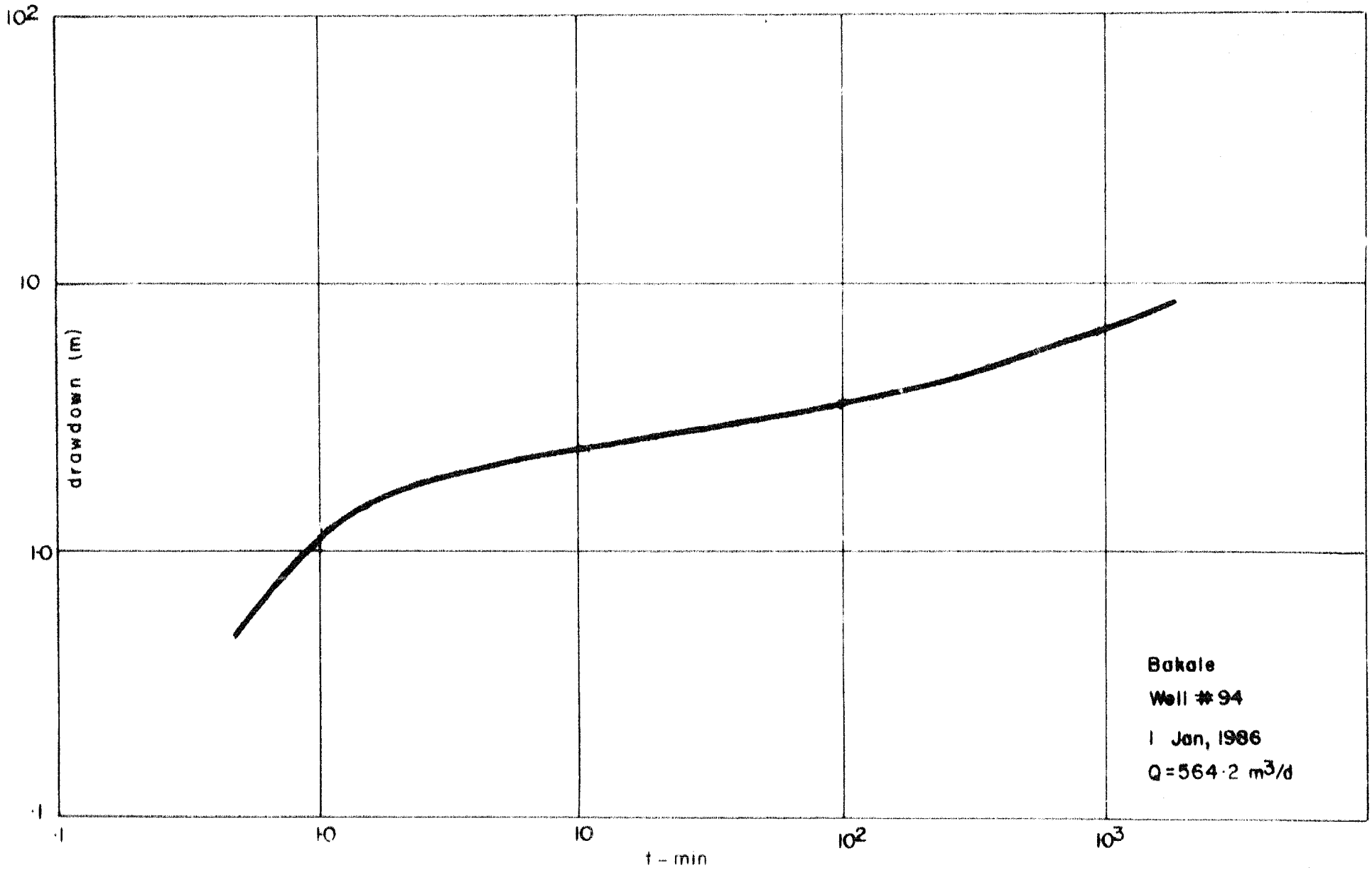

10^2
10
1·0
0·1
drawdown (m)
+ MP
1
10
10
10^2
10^3
t - min
Usie
Well # 71
26 Dec, 1985
Q = 555·74 m³/d
T = 200 m²/d

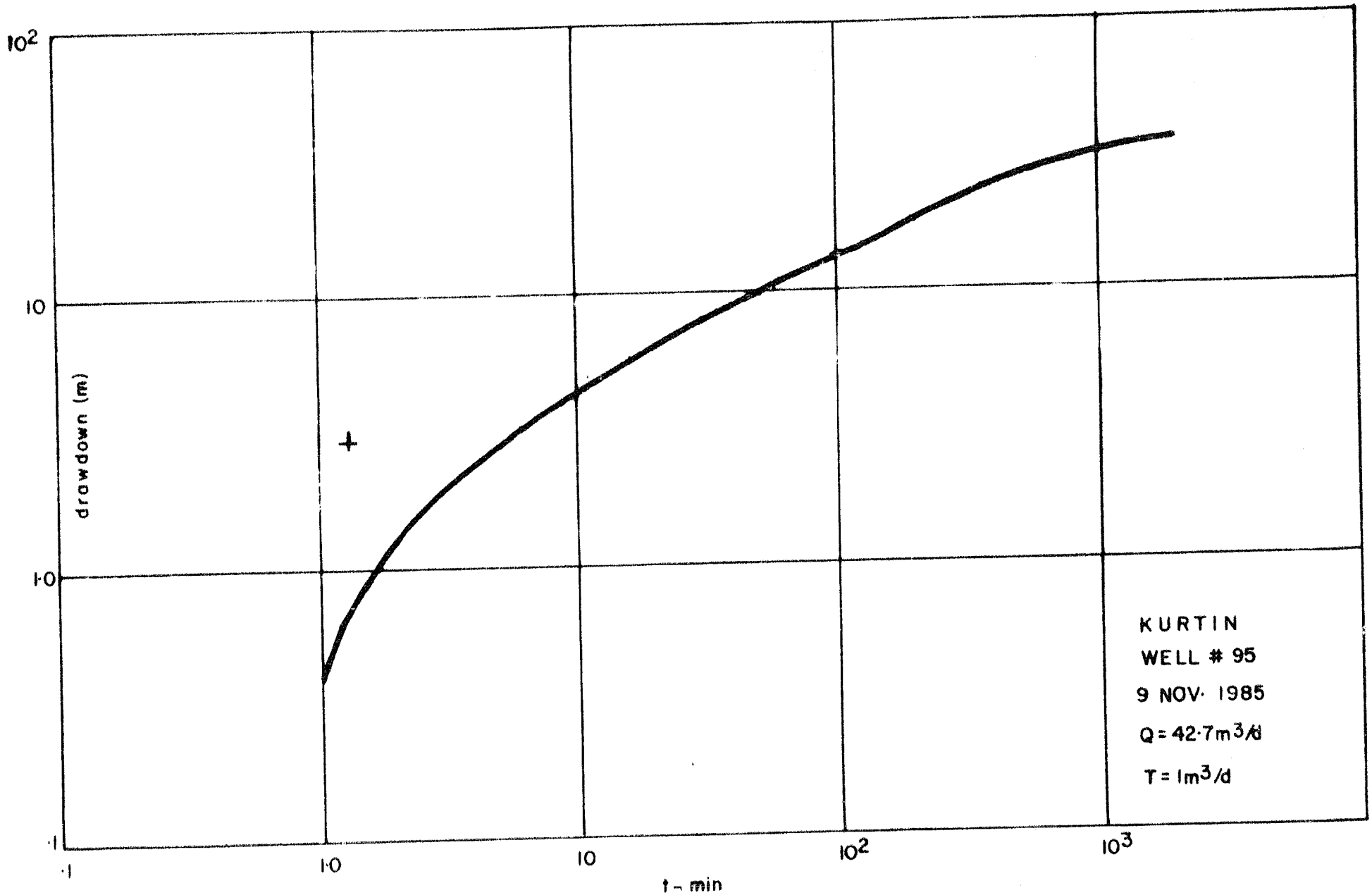

0
10
20
30
40
50
60
drawdown (m)
1
10
10
10^2
t -min
DHURAI
WELL # 76
27 JUNE 1985
Q = 384 m^3/d
T = 3 m^2/d

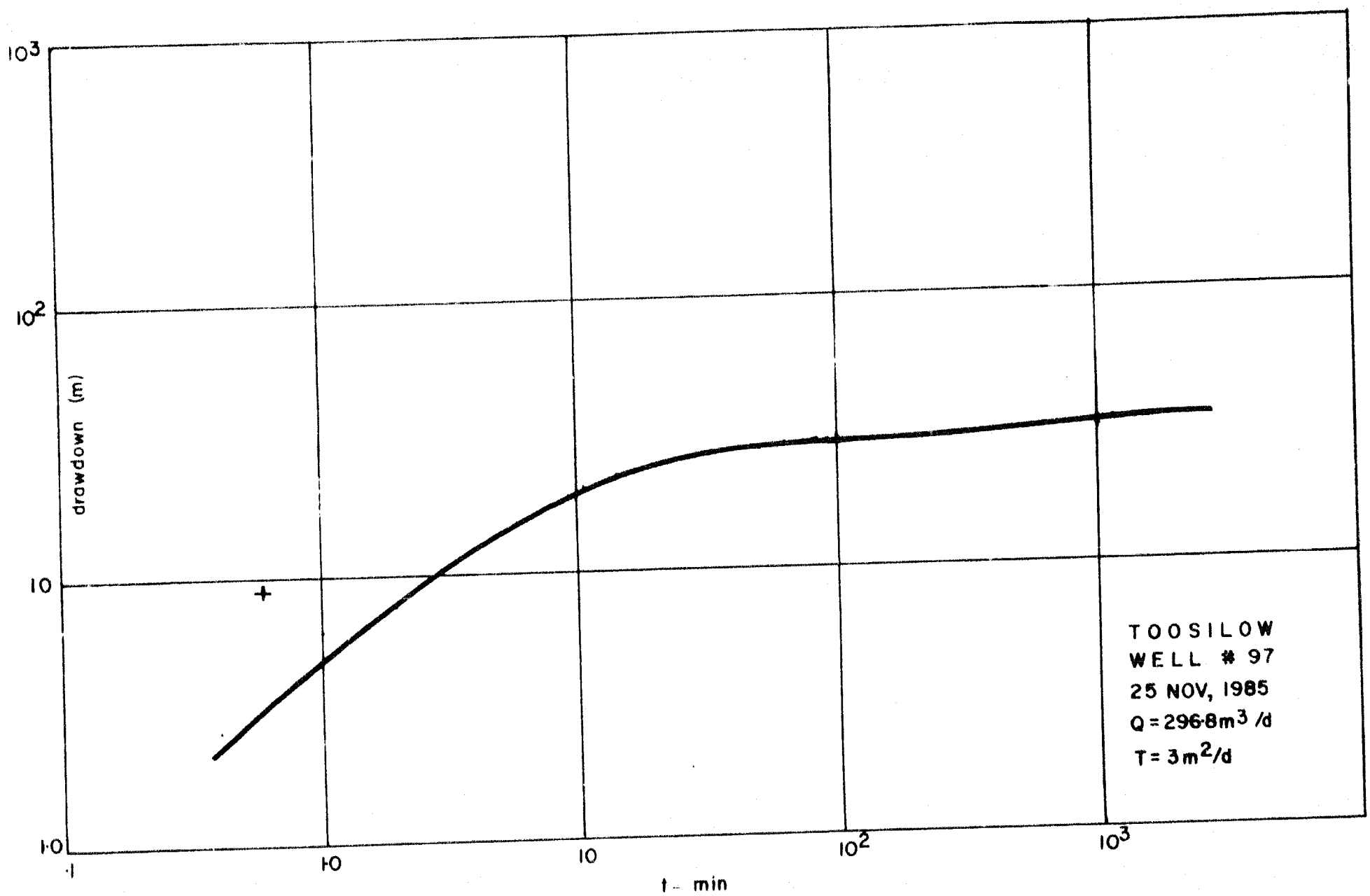

10^3
10^2
10
1·0
drawdown (m)
·1
1·0
10
10^2
10^3
t - min
MISRA
WELL #83
TEST #2
7 JULY, 1986
Q = 216 m³/d
T = 1·0 m²/d

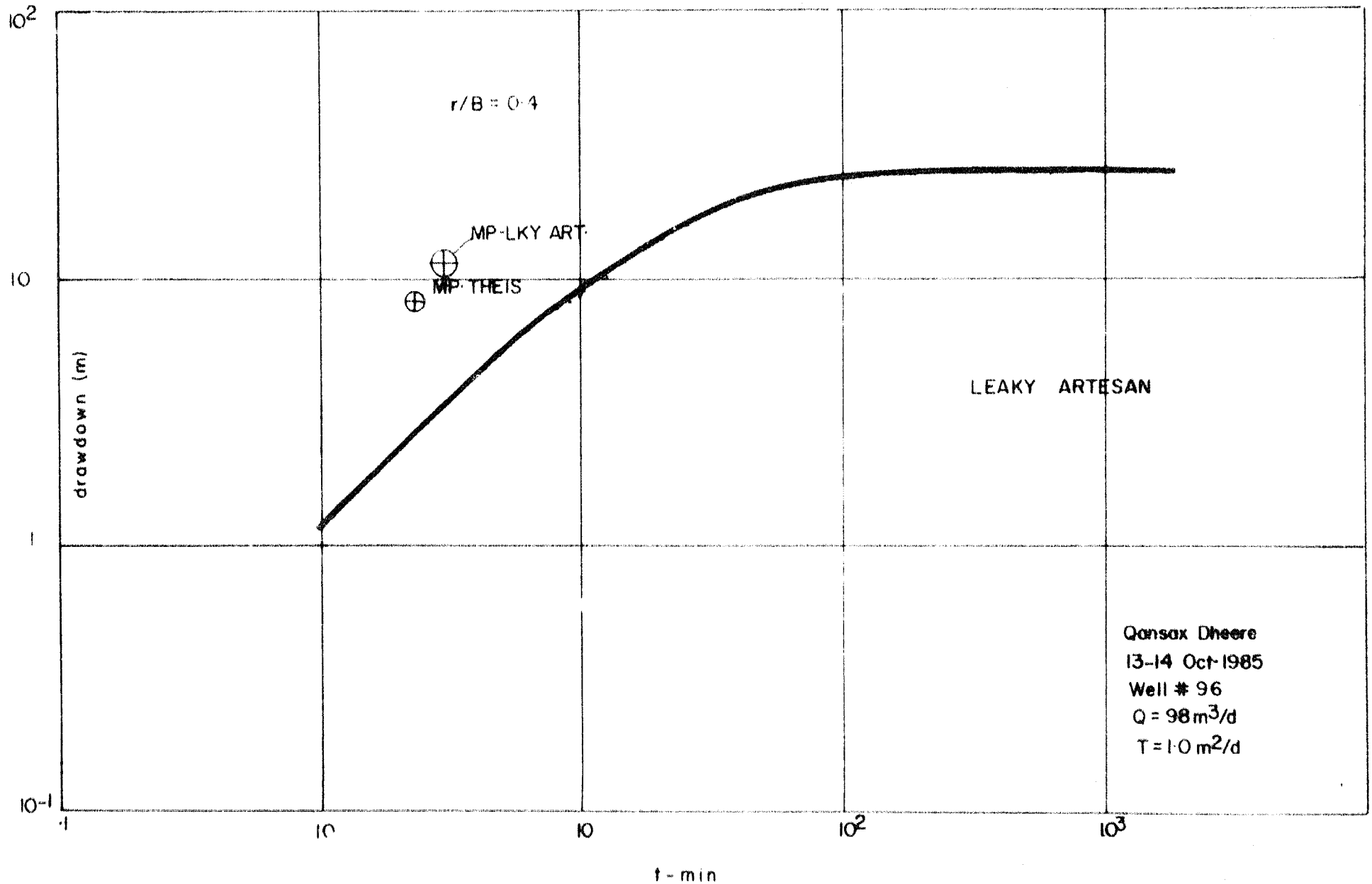

10^3
10^2
10
1·0
drawdown (m)
·1
1·0
10
10^2
10^3
t – min
ASHA FARTO
WELL # 92
6 SEPT, 1985
Q = 386·3 m³/d
T = 9 m²/d

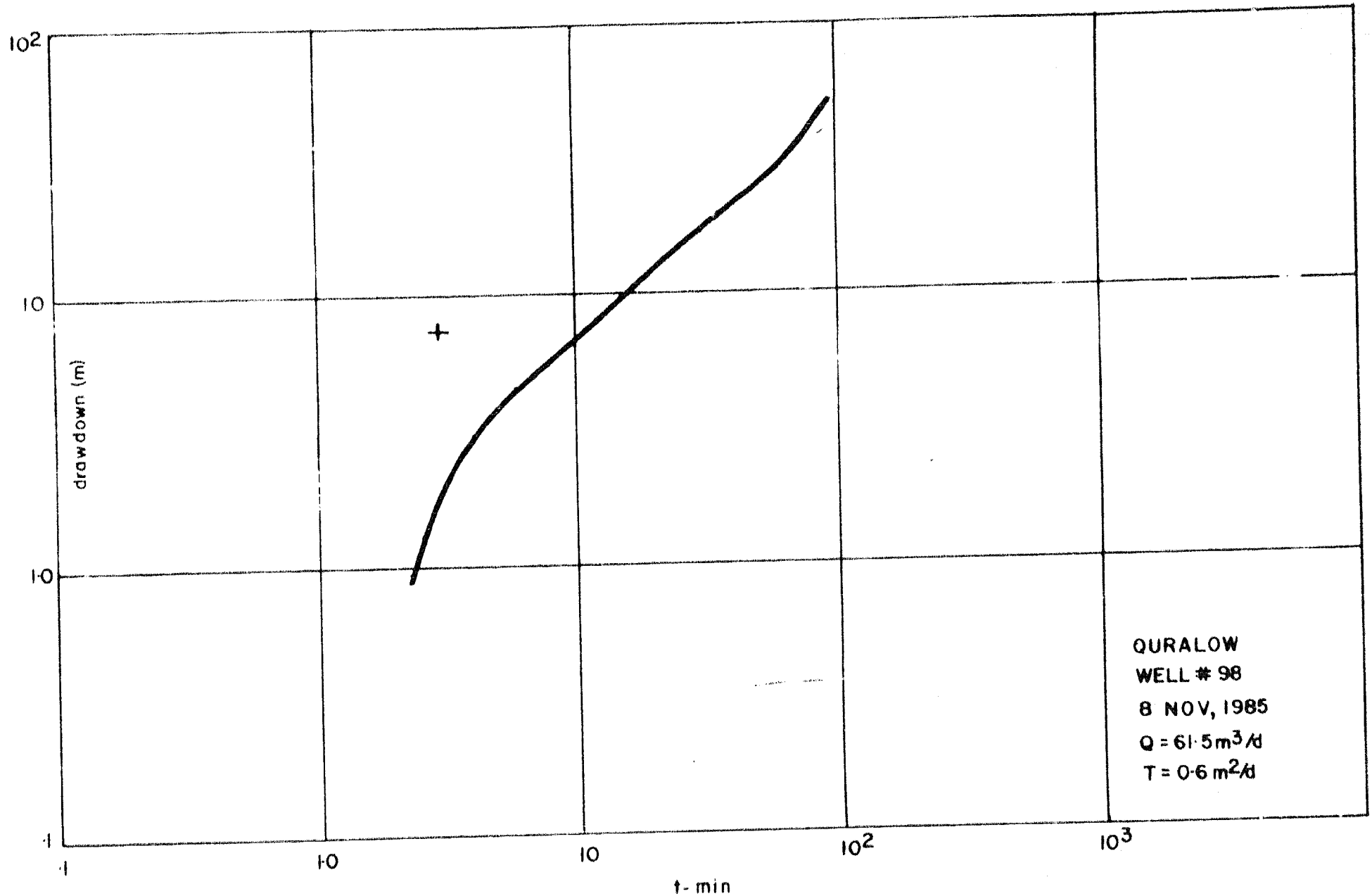

t/t'
0
1
2
3
4
5
6
7
drawdown (m)
1
10
t-min
10
10^2
10^3
Drawdown
Recovery
Bakale
Well # 94
31 Dec, 1985
Q = 564·2 m³/d
T = 100 m²/d

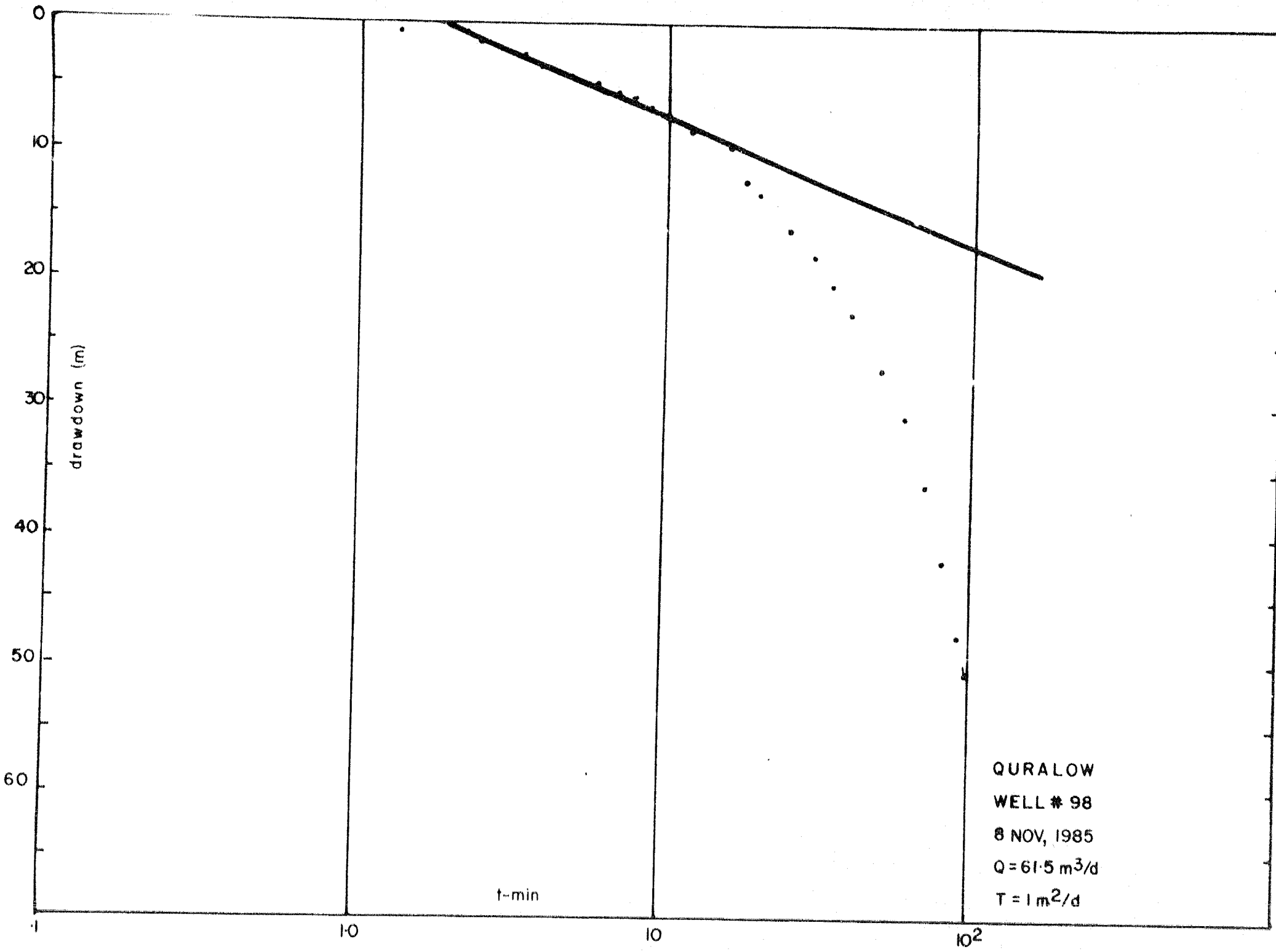

10^2
10
1·0
·1
drawdown (m)
·1
1·0
10
10^2
10^3
t – min
Bakale
Well # 94
1 Jan, 1986
Q = 564·2 m^3/d

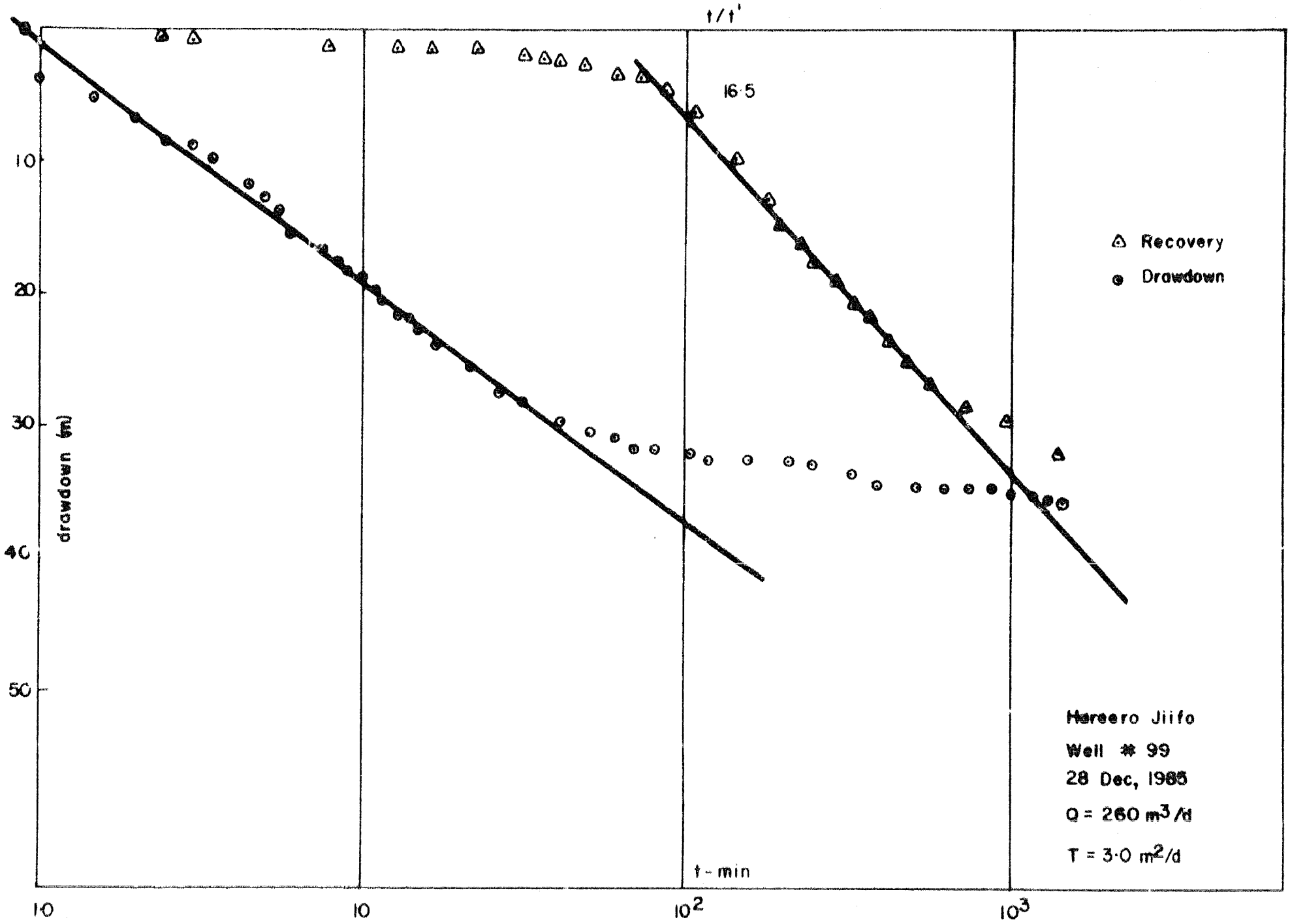

10²
10
1·0
·1
drawdown (m)
·1
1·0
10
10²
10³
t - min
KURTIN
WELL # 95
9 NOV· 1985
Q = 42·7m³/d
T = 1m³/d

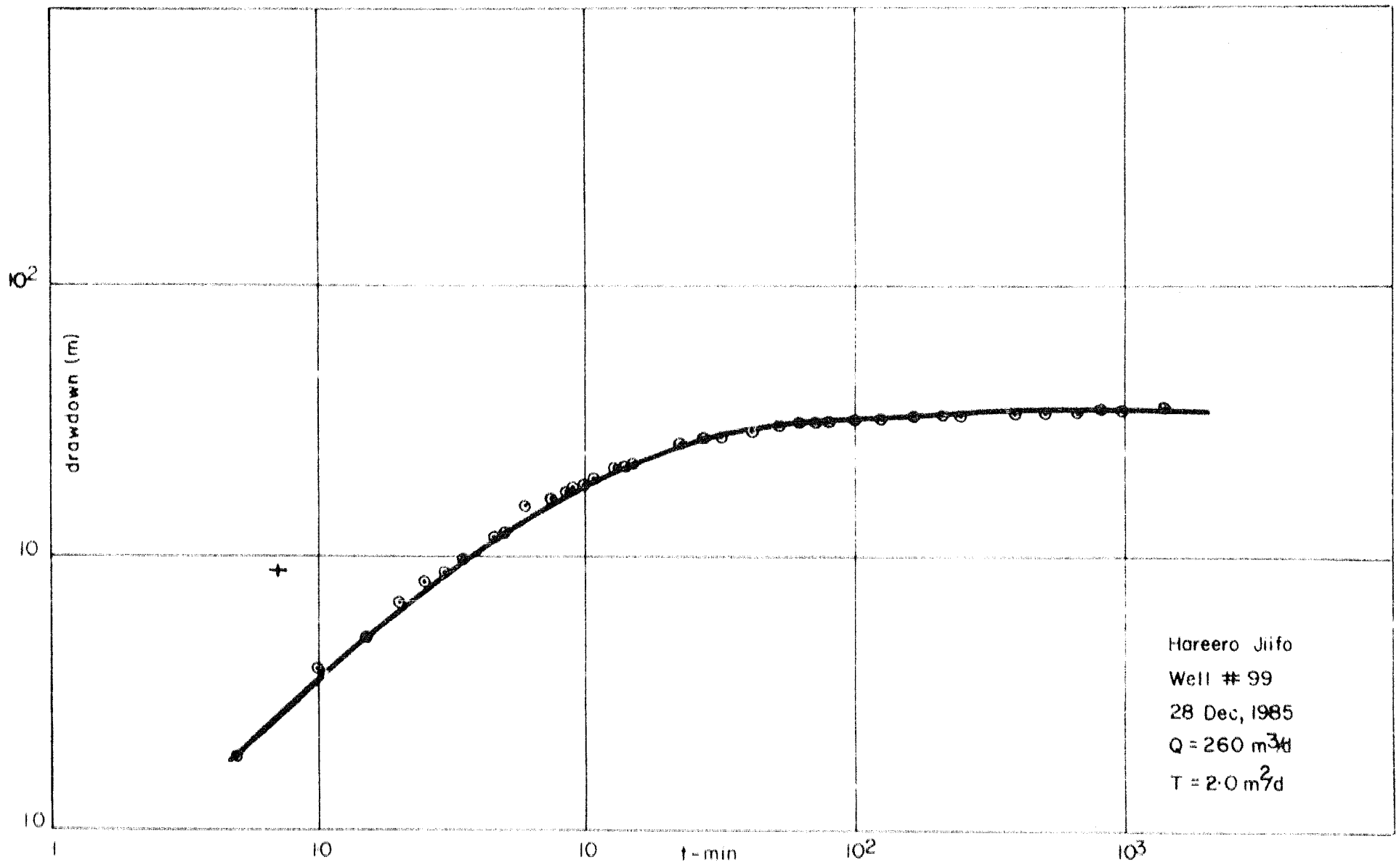

10^3
10^2
10
1·0
drawdown (m)
·1
1·0
10
10^2
10^3
t - min
TOOSILOW
WELL # 97
25 NOV, 1985
Q = 296·8m³ /d
T = 3m²/d

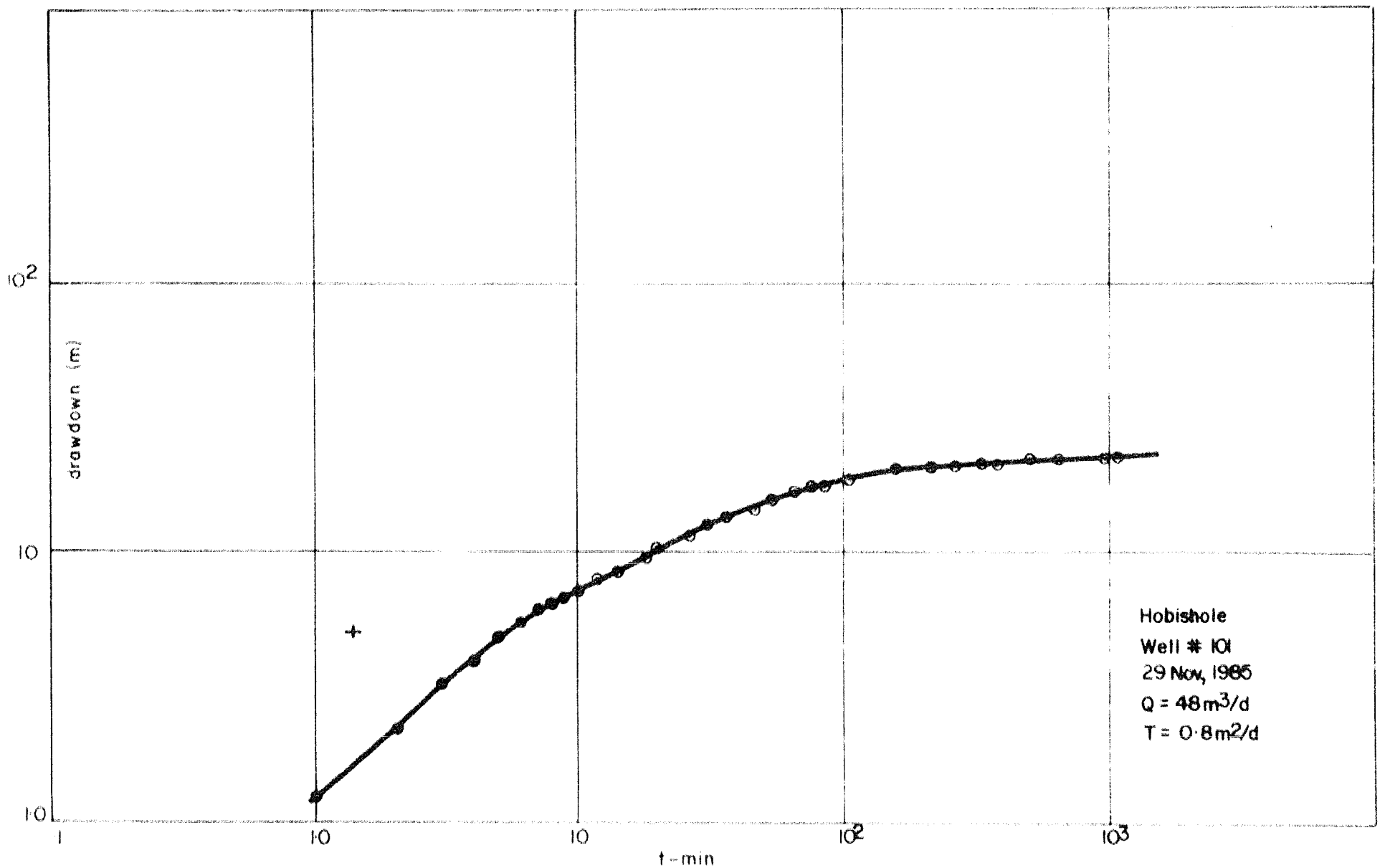

r/B = 0·4
MP-LKY ART.
MP-THEIS
LEAKY ARTESAN
Qansax Dheere
13-14 Oct-1985
Well # 96
Q = 98 m3/d
T = 1·0 m2/d
drawdown (m)
t - min
10-1
1
10
10²
10³

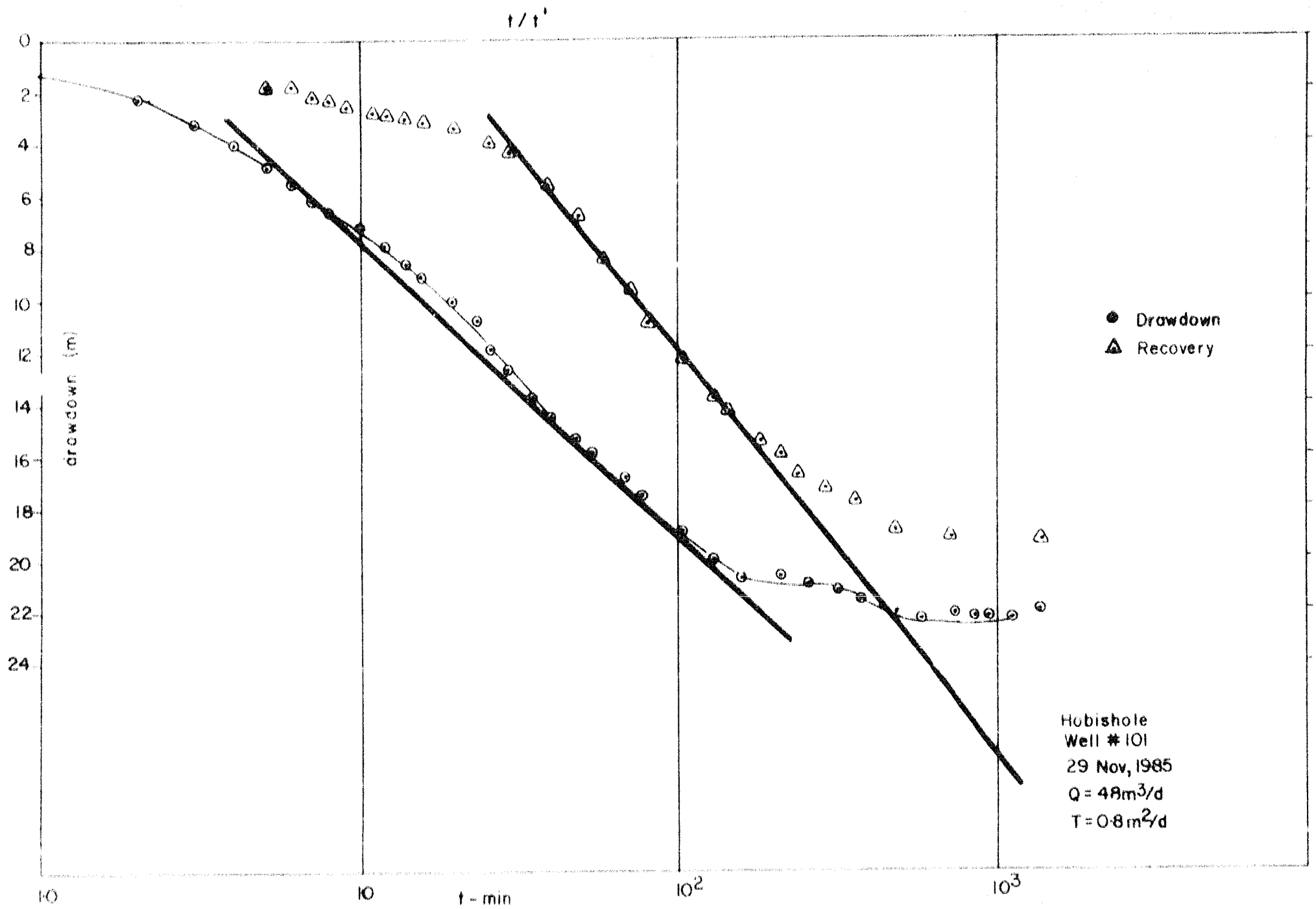

10²
10
1·0
·1
drawdown (m)
·1
1·0
10
10²
10³
t - min
QURALOW
WELL # 98
8 NOV, 1985
Q = 61·5 m³/d
T = 0·6 m²/d

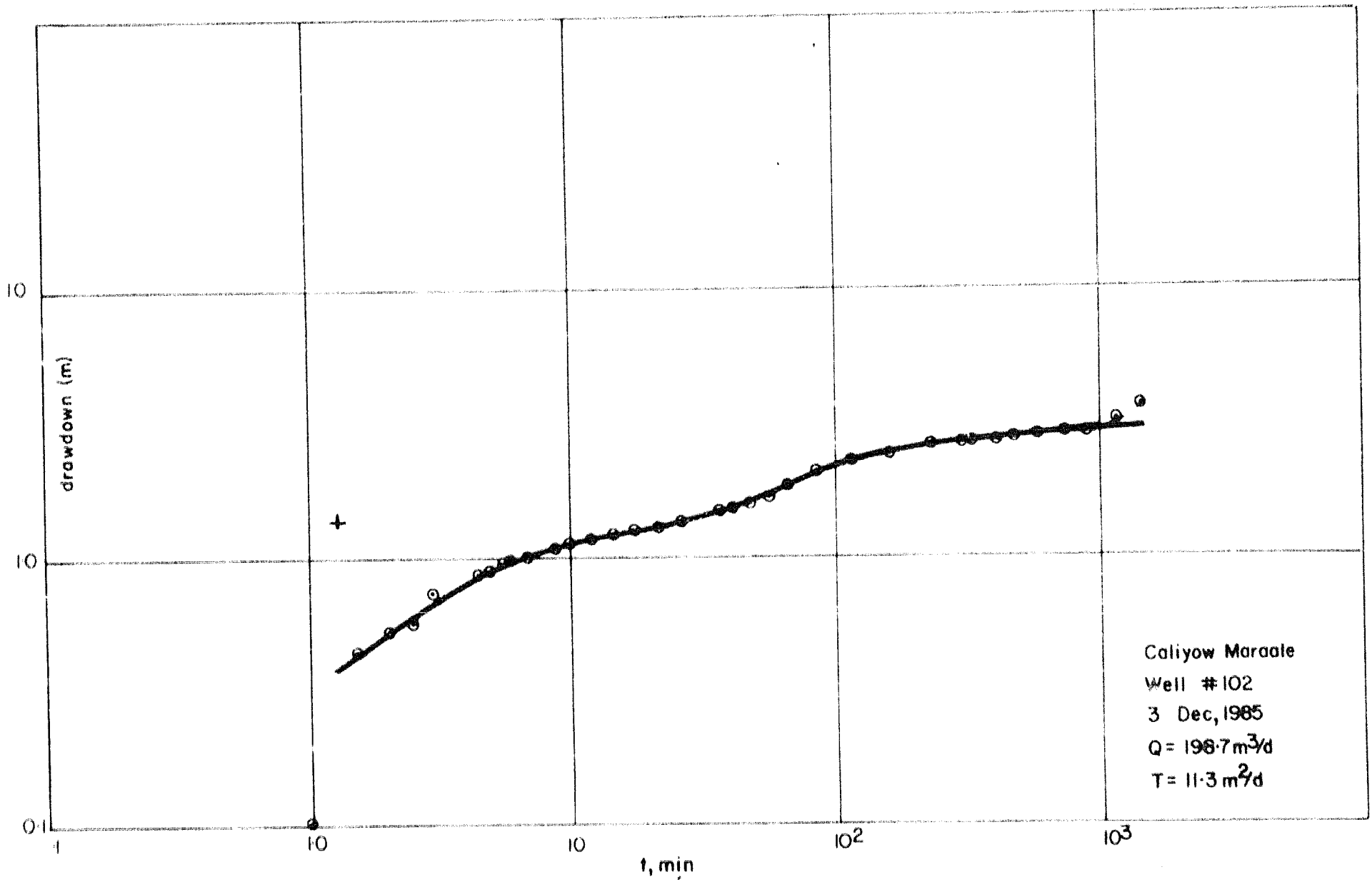

0
10
20
30
40
50
60
drawdown (m)
·1
1·0
10
10²
t-min
QURALOW
WELL # 98
8 NOV, 1985
Q = 61·5 m³/d
T = 1 m²/d

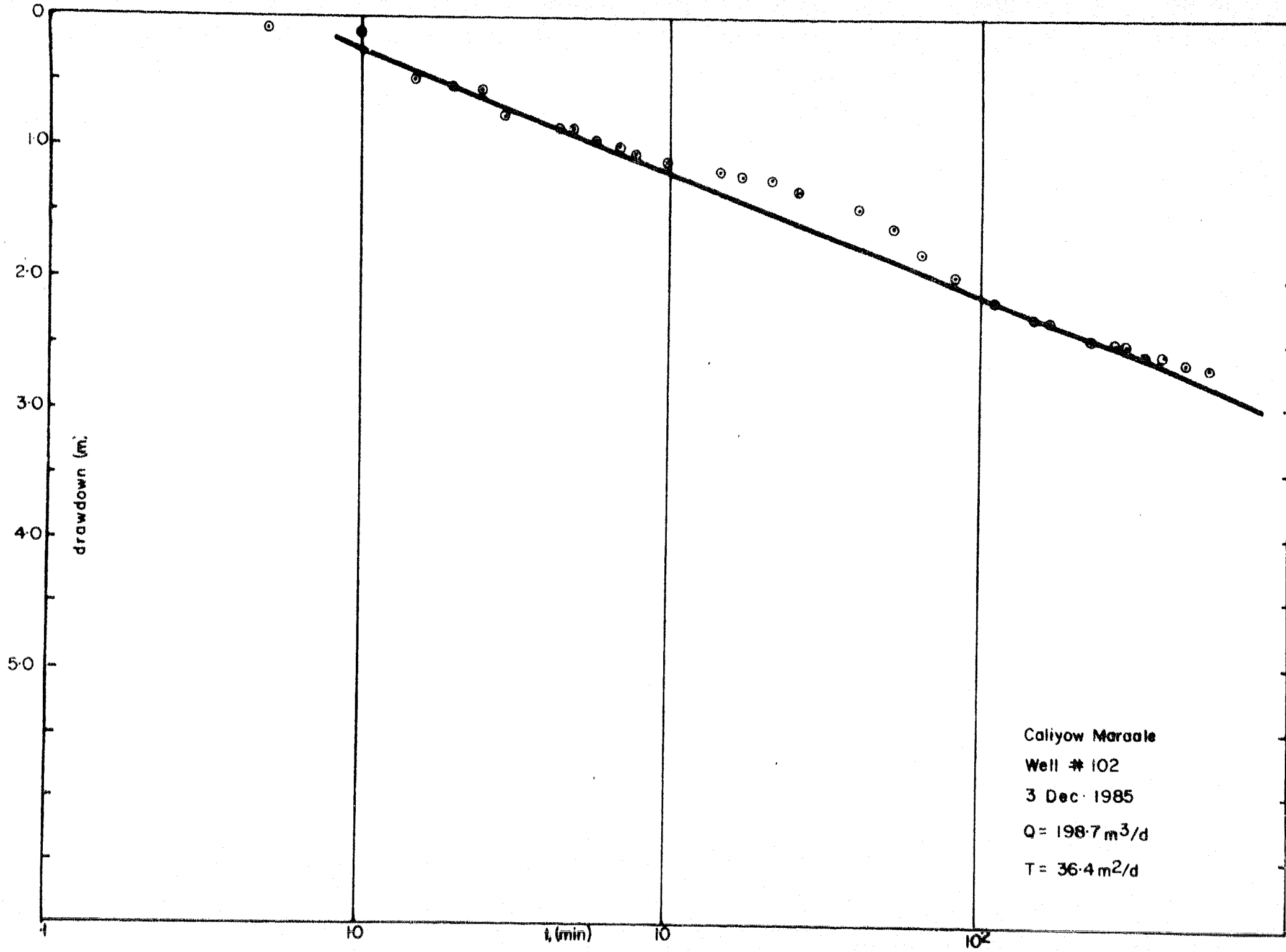

t/t'
16·5
Recovery
Drawdown
drawdown (m)
10
20
30
40
50
t - min
1·0
10
10²
10³
Hareero Jiifo
Well # 99
28 Dec, 1985
Q = 260 m³/d
T = 3·0 m²/d

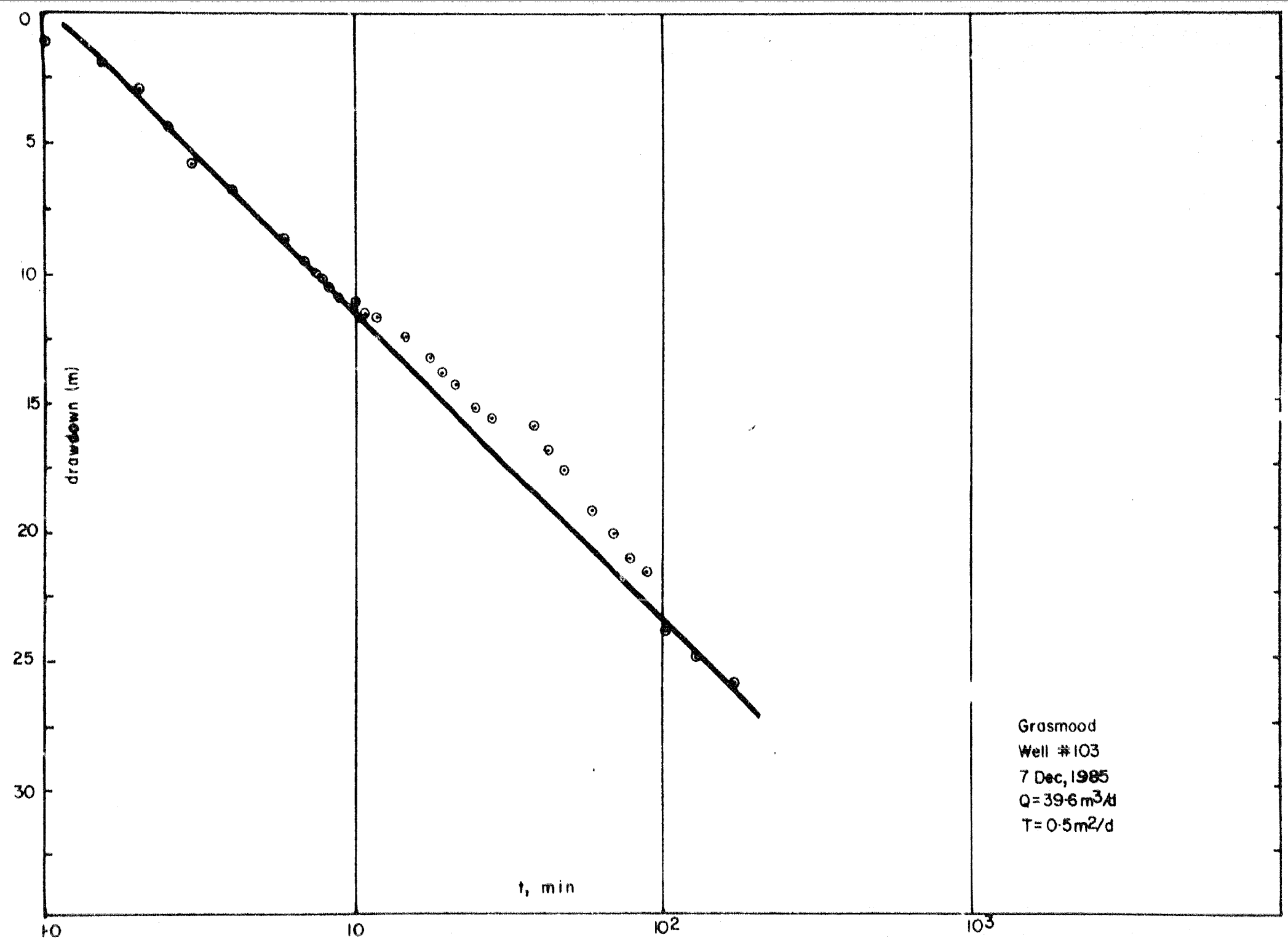

drawdown (m)
10^2
10
10
1
10
10
t - min
10^2
10^3
Hareero Jiifo
Well # 99
28 Dec, 1985
Q = 260 m^3/d
T = 2·0 m^2/d


drawdown (m)
10^2
10
1·0
1
1·0
10
10^2
10^3
t - min
Hobishole
Well # 101
29 Nov, 1985
Q = 48 m³/d
T = 0·8 m²/d


t / t'
0
2
4
6
8
10
12
14
16
18
20
22
24
drawdown (m)
1·0
10
t - min
10²
10³
Drawdown
Recovery
Hobishole
Well # 101
29 Nov, 1985
Q = 48m³/d
T = 0·8 m²/d

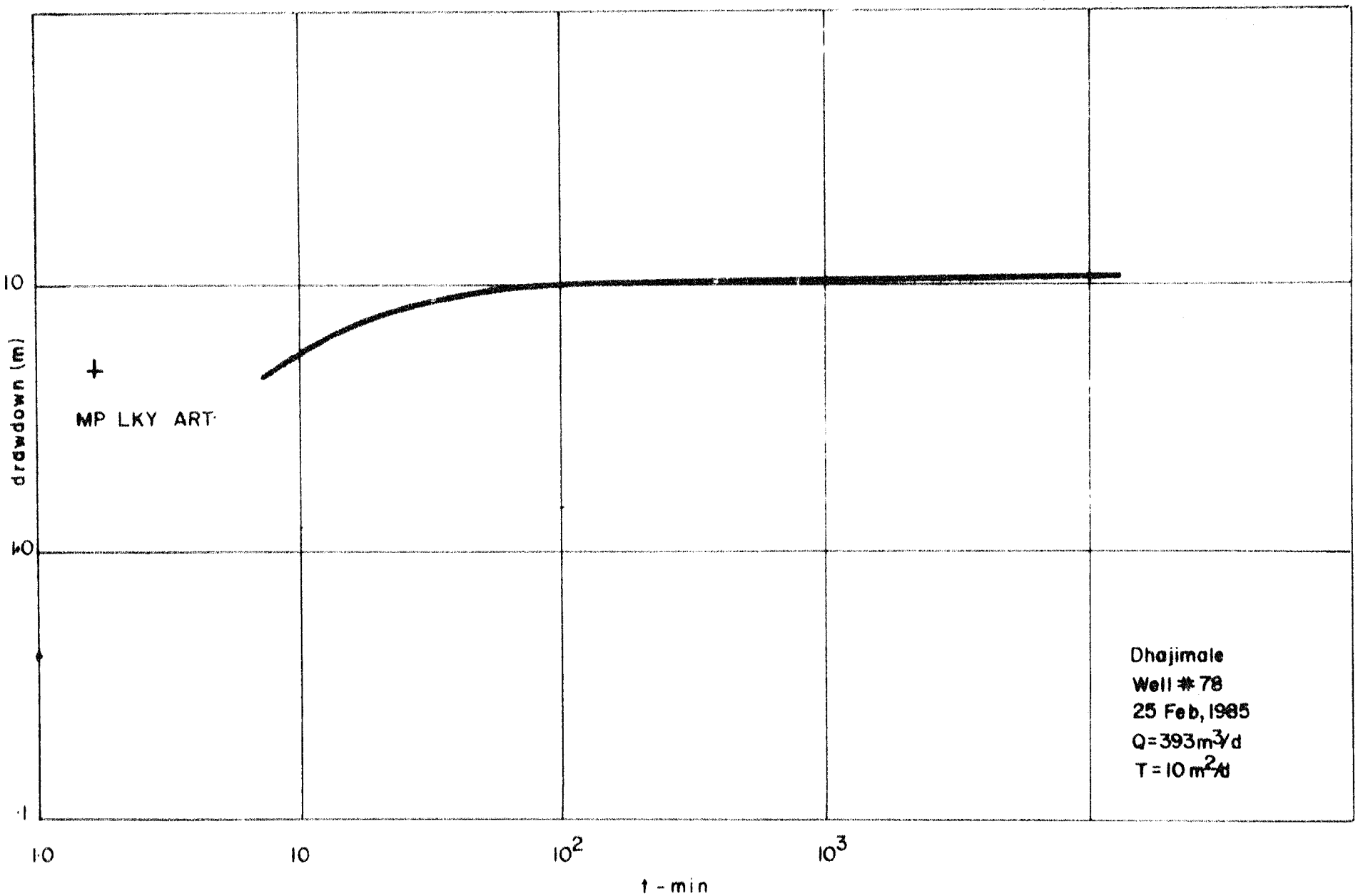

10
10
0·1
drawdown (m)
1
10
10
10²
10³
t, min
Caliyow Maraale
Well #102
3 Dec, 1985
Q = 198·7 m³/d
T = 11·3 m²/d

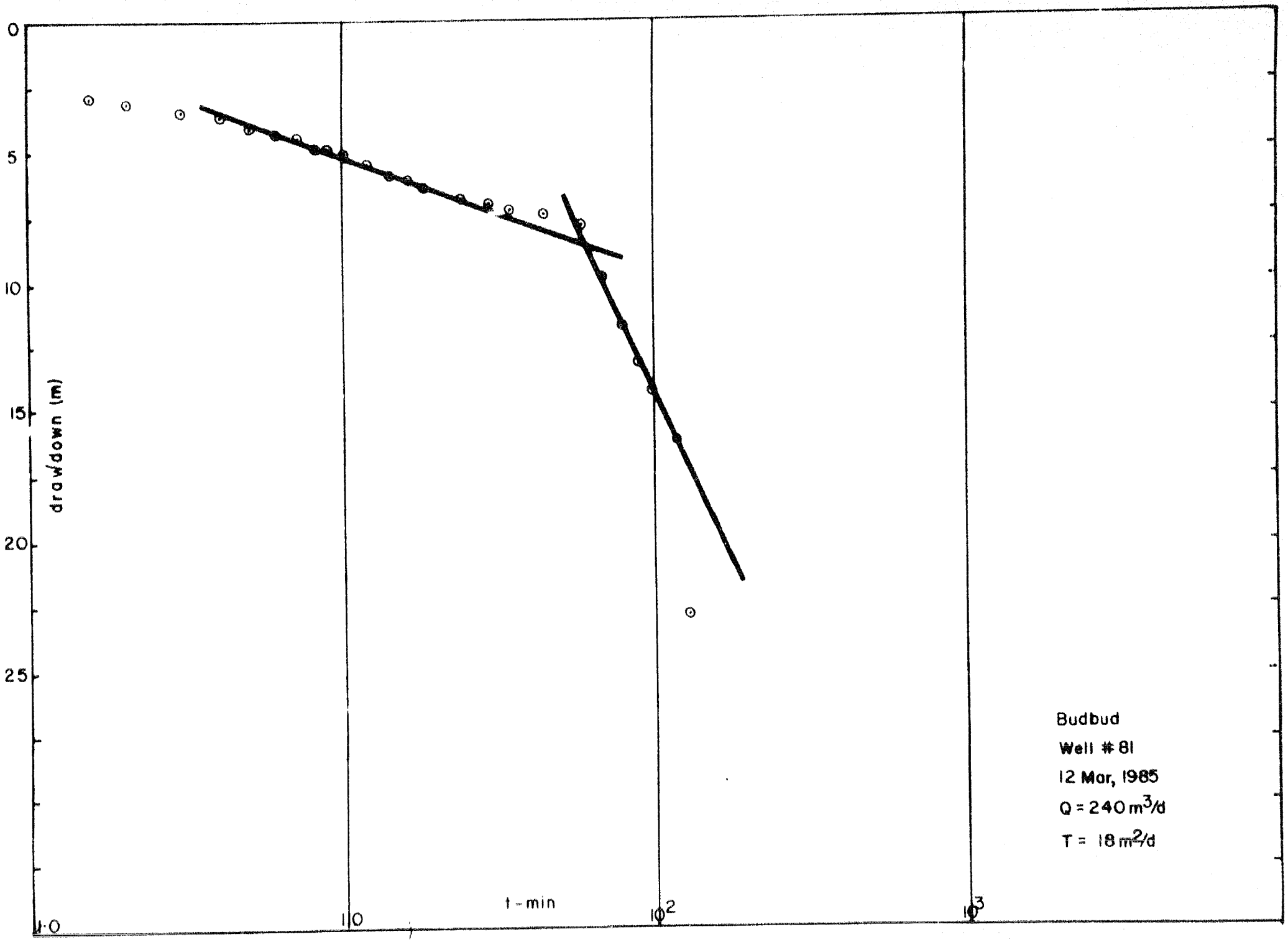

0
1·0
2·0
3·0
4·0
5·0
drawdown (m)
1
10
t, (min)
10
10²
Caliyow Maraale
Well # 102
3 Dec · 1985
Q = 198·7 m³/d
T = 36·4 m²/d

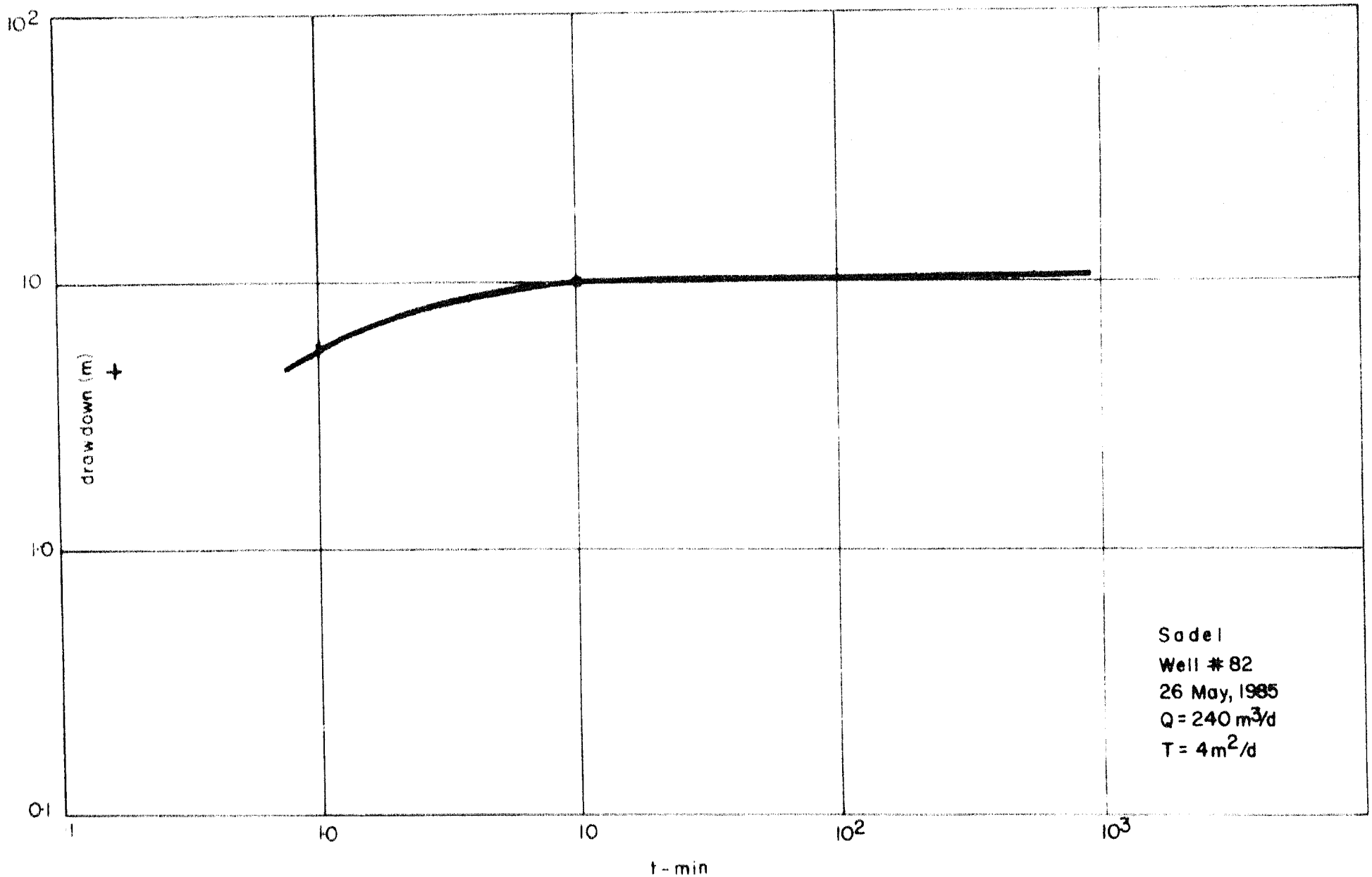

0
5
10
15
20
25
30
drawdown (m)
1
10
10^2
10^3
t, min
Grasmood
Well #103
7 Dec, 1985
Q = 39·6 m³/d
T = 0·5 m²/d

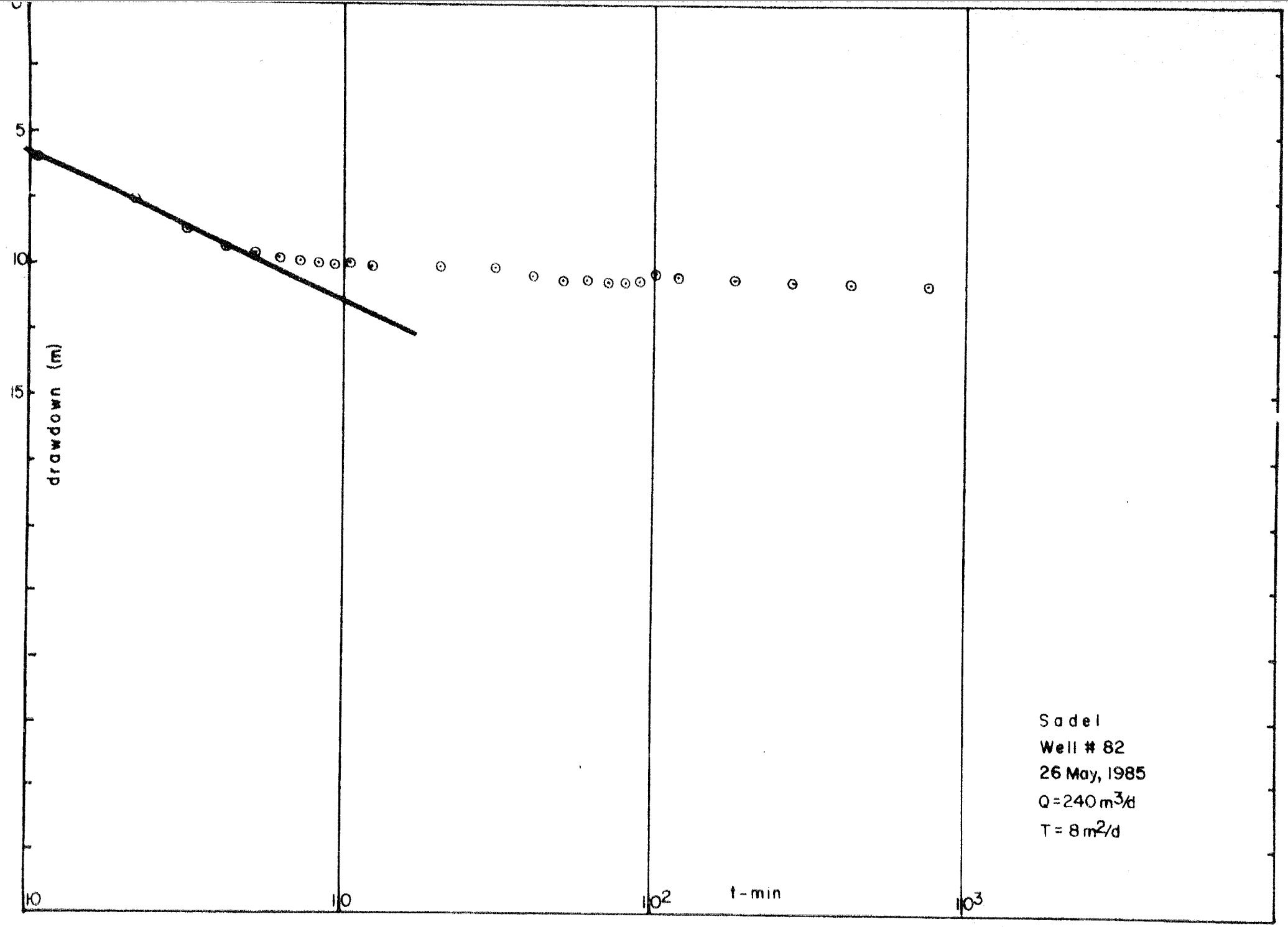
APPENDIX C

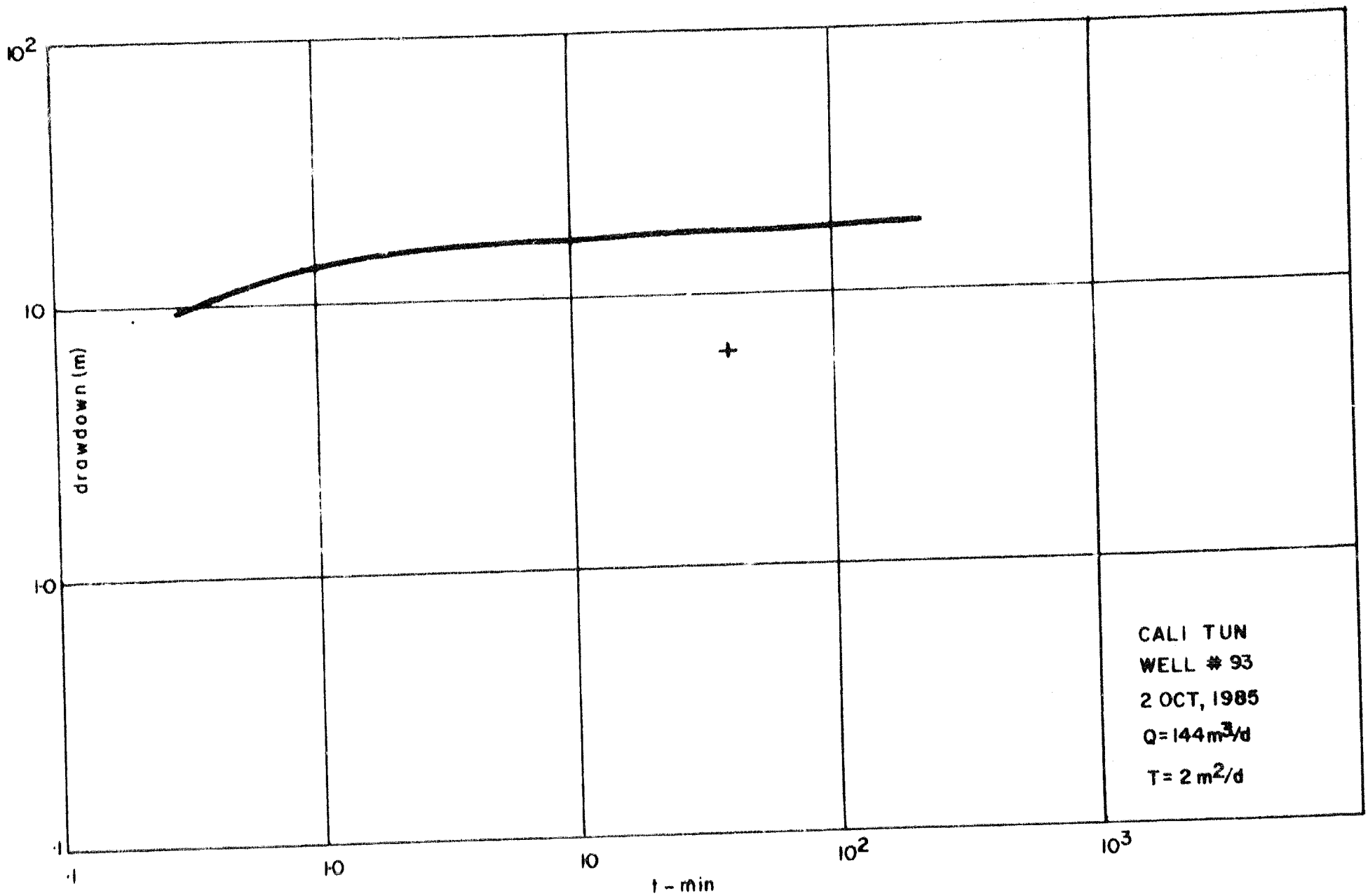
PUMPING TEST DATA: CENTRAL RANGE

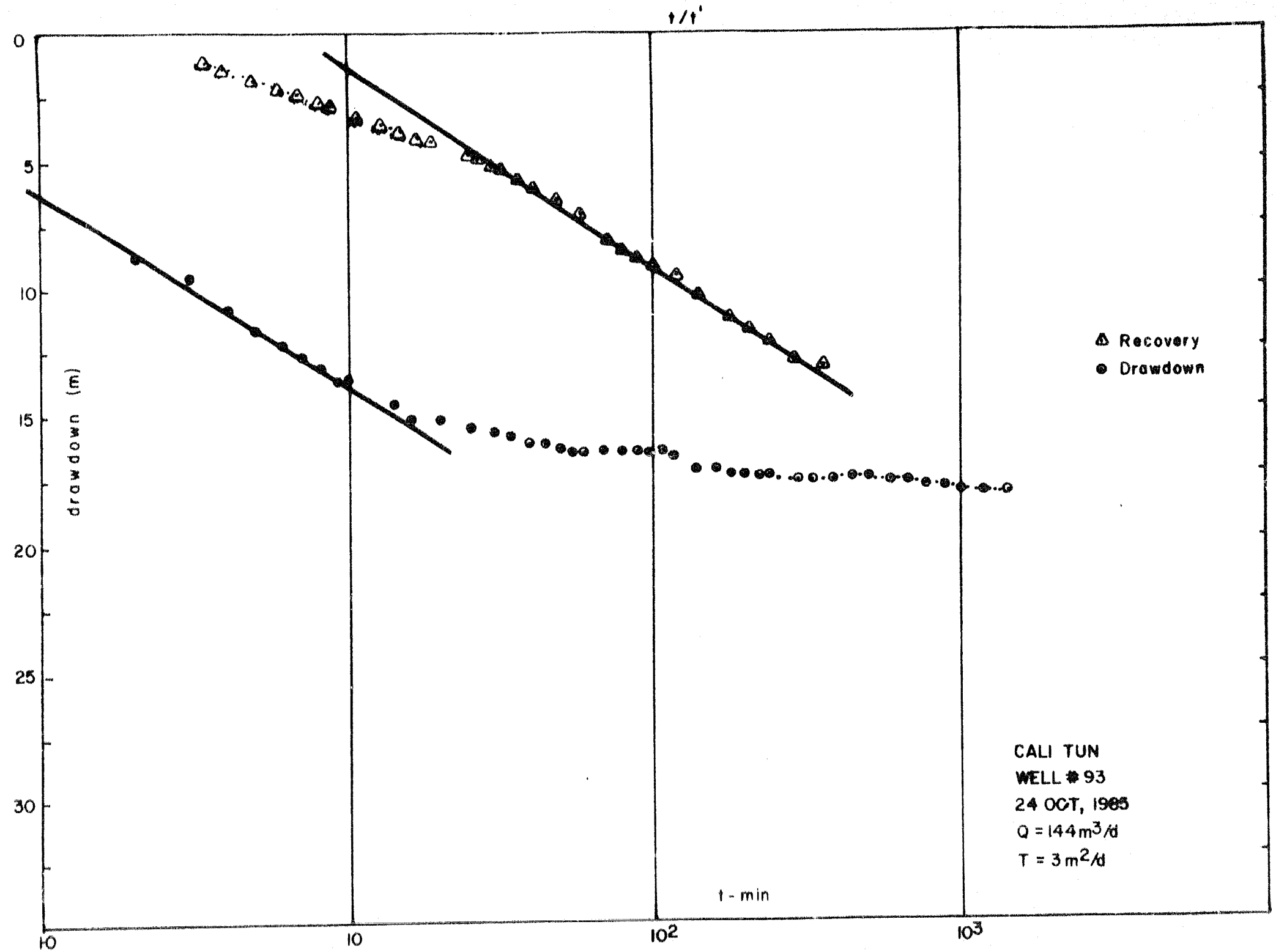

10
1·0
·1
drawdown (m)
MP LKY ART
1·0
10
10^2
10^3
t - min
Dhajimale
Well # 78
25 Feb, 1985
Q = 393 m³/d
T = 10 m²/d


0
5
10
15
20
25
drawdown (m)
1·0
10
t - min
10²
10³
Budbud
Well # 81
12 Mar, 1985
Q = 240 m³/d
T = 18 m²/d


10^2
10
1·0
0·1
draw down (m)
1
10
10
10^2
10^3
t - min
Sadel
Well # 82
26 May, 1985
Q = 240 m^3/d
T = 4 m^2/d


5
10
15
drawdown (m)
10
10
10²
10³
t - min
Sadel
Well # 82
26 May, 1985
Q = 240 m³/d
T = 8 m²/d


10^2
10
1·0
·1
drawdown (m)
·1
1·0
10
10^2
10^3
t - min
CALI TUN
WELL # 93
2 OCT, 1985
Q = 144 m³/d
T = 2 m²/d


t/t'
0
5
10
15
20
25
30
drawdown (m)
Recovery
Drawdown
CALI TUN
WELL # 93
24 OCT, 1985
Q = 144 m3/d
T = 3 m2/d
t - min
10
10
10²
10³

APPENDIX D

WATER QUALITY DATA: BAY REGION

Bay Region Water Quality Data

Id	Location	Longitude (HHMMSS) UTM-East (km.)	Latitude (HHMMSS) UTM-North (km.)	Type	Date	Ph	HCO3 (mg/l) (meq/l)	SO4 (mg/l) (meq/l)	CL (mg/l) (meq/l)	CA (mg/l) (meq/l)	MG (mg/l) (meq/l)	NA (mg/l) (meq/l)	K (mg/l) (meq/l)	NA+K (mg/l) (meq/l)	Total Dissolved Solids (mg/l)	Electrical Conductivity (umhos/cm)	Cations	Anions	Percentage Difference %
B 3	Bonkay III	433900 8,350.0	30700 344.9		10-Sep-82	7	427 7.00	12 0.25	533 15.04	229 11.43	35 2.88	135 5.87	3 0.08	138 6.13	2,216	3,100	20.44	22.28	4.3%
B 8	Tugerew	434140 8,354.4	30650 344.0		02-Feb-84	7.4	536 8.79	55 1.15	461 13.00	218 10.88	45 3.70	98 4.26	2 0.05	100 4.44	1,348	1,700	19.02	22.93	9.3%
B 10	Sarman Dheere	432124 8,317.0	31636 362.2		29-Jun-82	7.1	484 7.93	53 1.10	632 17.83	272 13.57	89 7.32	100 4.35	5 0.13	105 4.67	2,888	2,300	25.56	26.86	2.5%
B 10	Sarman Dheere	432124 8,317.0	31636 362.2		29-Jun-82	7.3	489 8.01	47 0.98	632 17.83	256 12.77	107 8.80	105 4.57	5 0.13	110 4.89	2,912	2,800	26.46	26.82	0.7%
B 10	Sarman Dheere	432124 8,317.0	31636 362.2		29-Jun-82	7.1	509 8.34	47 0.98	649 18.31	269 13.42	97 7.98	102 4.44	8 0.20	110 4.89	3,004	2,400	26.29	27.63	2.5%
B 12	Hareero Jitto	432509 8,324.1	31358 357.0		10-Sep-83	7.8	610 10.00	92 1.92	454 12.81	192 9.58	99 8.14	180 7.83	14 0.36	194 8.62	0	2,800	26.34	24.72	3.2%
B 12	Hareero Jitto	432509 8,324.1	31358 357.0		10-Jan-84	7.6	482 7.90	217 4.52	638 18.00	205 10.23	231 19.00	110 4.78	7 0.18	117 5.20	0	2,500	34.43	30.42	6.2%
B 13	Shabelle Dugsilo	431300 8,301.7	31709 363.5		26-Jun-82	6.8	351 5.75	284 5.91	9,618 271.32	2,761 137.77	1,291 106.20	250 10.88	34 0.87	284 12.62	19,772	24,000	256.59	282.99	4.9%
B 14	Warta Jaffay	430829 8,292.9	31900 367.0		10-Sep-83	7.1	445 7.29	105 2.19	3,024 85.31	599 29.89	381 31.34	750 32.63	23 0.59	773 34.34	9,188	10,000	95.58	94.79	0.4%
B 16	Tarlow	431125 8,298.4	30353 338.5		10-Sep-83	7.6	232 3.80	130 2.71	265 7.48	35 1.75	81 6.66	100 4.35	13 0.33	113 5.02	1,528	1,480	13.43	13.98	2.0%
B 16	Tarlow	431125 8,298.4	30353 338.5		25-Feb-84	7.5	631 10.34	123 2.56	391 11.03	205 10.23	83 6.83	100 4.35	11 0.28	111 4.93	1,452	1,650	21.99	23.93	4.2%
B 17	Robay Gaduud	431845 8,311.8	24615 306.5		27-Mar-84	8.2	79 1.29	73 1.52	319 9.00	93 4.64	19 1.56	113 4.92	2 0.05	115 5.11	1,060	1,220	11.31	11.81	2.2%
B 17	Robay Gaduud	431845 8,311.8	24615 306.5		27-Mar-84	8.2	104 1.70	76 1.58	355 10.01	99 4.94	19 1.56	125 5.44	1 0.03	126 5.60	1,408	1,600	12.10	13.30	4.7%
B 17	Robay Gaduud	431845 8,311.8	24615 306.5		04-Apr-84	7.8	186 3.05	89 1.85	355 10.01	122 6.09	14 1.15	138 6.00	3 0.08	141 6.26	1,024	1,280	13.50	14.92	5.0%
B 18	Gaduudo Dhunte	431545 8,306.2	24750 308.6		13-Mar-84	8.2	115 1.86	204 4.25	1,148 32.39	231 11.53	148 12.17	240 10.44	2 0.05	242 10.75	1,932	3,800	34.45	38.52	5.6%

Bay Region Water Quality Data

Id	Location	Longitude (HHMMSS) UTM-East (km.)	Latitude (HHMMSS) UTM-North (km.)	Type	Date	Ph	HCO3 (mg/l) (meq/l)	SO4 (mg/l) (meq/l)	CL (mg/l) (meq/l)	CA (mg/l) (meq/l)	MG (mg/l) (meq/l)	NA (mg/l) (meq/l)	K (mg/l) (meq/l)	NA+K (mg/l) (meq/l)	Total Dissolved Solids (mg/l)	Electrical Conductivity (ohmos/cm)	Cations	Anions	Percentage Difference
B 18	Gaduudo Dhunte	431545 8,306.2	24730 308.6		13-Mar-84	7.9 *	210 3.44	102 2.12	1,148 32.39	234 11.68	140 11.52	250 10.88	2 0.05	252 11.20	3,380	3,800	34.39	37.95	4.9%
B 18	Gaduudo Dhunte	431545 8,306.2	24730 308.6		13-Mar-84	7.7	388 6.36	99 2.06	567 16.00	167 8.33	116 9.54	114 4.96	1 0.03	115 5.11	1,796	1,900	22.98	24.42	3.0%
B 18	Gaduudo Dhunte	431545 8,306.2	24730 308.6		21-Mar-84	7.8	163 2.67	79 1.64	1,008 28.44	228 11.38	121 9.95	194 8.44	2 0.05	196 8.71	2,812	3,400	30.04	32.75	4.3%
B 20	Durei Ali Galle	435550 8,380.6	24950 312.6		07-Mar-84	8.4	252 4.13	109 2.27	496 13.99	87 4.34	97 7.98	125 5.44	5 0.13	130 5.78	1,584	1,800	18.10	20.39	6.0%
B 20	Durei Ali Galle	425550 8,269.1	24950 312.6		29-Apr-84	7.5	430 7.05	100 2.08	448 12.64	159 7.93	104 8.56	115 5.00	7 0.18	122 5.42	1,816	2,000	21.91	21.77	0.3%
B 20	Durei Ali Galle	425550 8,26[illegible]	24950 312.6		29-Apr-84	7.5	472 7.74	203 4.23	448 12.64	35 1.75	192 15.79	120 5.22	6 0.15	126 5.60	1,964	2,200	23.14	24.60	3.1%
B 21	USAID Compound	433938 8,350.7	30724 345.3		15-Jan-83	7.5	243 3.98	64 1.33	341 9.62	183 9.13	35 2.88	8 0.35	0 .00	8 0.36	1,928	2,300	12.37	14.93	9.4%
B 23	Turaan	425115 8,261.1	22857 274.1		29-Feb-84	7.6	251 4.11	132 2.75	756 21.33	144 7.19	113 9.30	167 7.26	8 0.20	175 7.78	1,868	2,400	24.26	28.19	7.5%
B 25	Dodole	433355 8,339.8	21820 254.9		19-Jan-83	7.2	384 6.29	36 0.75	52 1.47	96 4.79	19 1.56	45 1.96	0 0.01	45 2.02	660	900	8.37	8.51	0.8%
B 25	Dodole	433355 8,339.8	21820 254.9		30-Mar-84	8	344 5.64	68 1.42	84 2.37	77 3.84	17 1.40	56 2.44	14 0.36	70 3.11	744	595	8.35	9.42	6.0%
B 41	Dolondole	0 3,4[illegible]	0 [illegible]		10-Sep-83	7.9	634 10.39	72 1.50	71 2.00	135 6.74	42 3.45	29 1.26	20 0.51	49 2.18	564	1,040	12.37	13.89	5.8%
B 46	Qansax Dheere	435719 8,383.8	25527 323.3		19-Oct-83	7.1	592 9.70	70 1.46	390 11.00	196 9.78	69 5.68	89 3.87	2 0.04	91 4.02	0	2,000	19.48	22.16	6.4%
B 46	Qansax Dheere	425719 8,272.5	25527 323.3		16-May-84	7.3	378 6.20	63 1.31	308 8.69	58 2.89	105 8.64	80 3.48	4 0.10	84 3.73	1,376	1,550	15.26	16.20	3.0%
B 47	Awshinle	432331 8,320.6	31212 354.3		10-Sep-83	7.5	592 9.70	189 3.93	601 16.95	199 9.93	126 10.36	250 10.88	11 0.28	261 11.60	2,704	3,200	31.89	30.59	2.1%
B 47	Awshinle	432331 8,320.8	31212 354.3		10-Apr-84	8	241 3.95	300 6.25	815 22.99	218 10.88	62 5.10	257 11.18	13 0.33	270 12.00	2,604	2,800	27.97	33.19	8.5%

Bay Region Water Quality Data

Id	Location	Longitude (HHMMSS) UTM-East (km.)	Latitude (HHMMSS) UTM-North (km.)	Type	Date	Ph	HCO3 (mg/l) (meq/l)	SO4 (mg/l) (meq/l)	CL (mg/l) (meq/l)	CA (mg/l) (meq/l)	MG (mg/l) (meq/l)	NA (mg/l) (meq/l)	K (mg/l) (meq/l)	NA+K (mg/l) (meq/l)	Total Dissolved Solids (mg/l)	Electrical Conductivity (mhos/cm)	Cations	Anions	Percentage Difference
B 47	Awshinie	432331 8,320.8	31212 354.3		10-Apr-84	7.7	294 4.82	371 7.72	851 24.01	202 10.08	113 9.30	257 11.18	11 0.28	268 11.91	2,740	3,100	31.28	36.55	7.8%
B 47	Awshinie	432331 8,320.8	31212 354.3		11-Apr-84	8	199 3.26	251 5.23	840 23.70	192 9.58	99 8.14	250 10.88	11 0.28	261 11.60	2,280	3,000	29.32	32.18	4.7%
B 50	Bonkay Seed Farm	433636 8,345.1	31150 353.2		20-Nov-83	7	478 7.83	222 4.62	4,000 112.8#	1,055 52.64	260 21.39	738 32.10	7 0.18	745 33.10	8,290	11,400	107.13	125.30	7.8%
B 51	Mintaan	433309 8,339.0	32045 369.7		20-Nov-83	6.8	676 11.08	40 0.83	248 7.00	196 9.78	43 3.54	57 2.48	12 0.31	69 3.07	1,164	1,400	16.38	18.91	7.2%
B 51	Mintaan	433309 8,339.0	32045 369.7		20-Nov-83	7.1	584 9.57	55 1.15	213 6.01	192 9.58	51 4.20	116 5.05	2 0.05	118 5.24	756	1,440	19.02	16.73	6.4%
B 52	Maleel	433512 8,342.8	32612 380.1		20-Nov-83	7.5	531 8.70	40 0.83	106 2.99	90 4.49	70 5.76	43 1.87	3 0.08	46 2.04	595	1,000	12.29	12.53	0.9%
B 54	Isgeed	433310 8,339.0	32650 380.8		28-Jan-84	7.8	652 10.69	40 0.83	283 7.98	109 5.44	130 10.69	57 2.48	2 0.05	59 2.62	992	1,350	18.75	19.50	2.0%
B 54	Isgeed	433310 8,339.0	32656 380.8		28-Jan-84	7.6	629 10.31	40 0.83	284 8.01	179 8.93	80 6.58	60 2.61	2 0.05	62 2.75	1,008	1,400	18.27	19.15	2.4%
B 55	Marti Moog	432848 8,330.4	33400 394.7		22-Feb-84	7	573 9.39	21 0.44	142 4.01	166 8.28	40 3.29	36 1.57	2 0.05	38 1.69	964	1,150	13.26	13.83	2.1%
B 55	Marti Moog	432848 8,330.4	33400 394.7		22-Feb-84	7	631 10.34	18 0.37	178 5.02	170 8.48	60 4.94	39 1.70	2 0.05	41 1.82	960	1,150	15.24	15.74	1.6%
B 57	Iagarka	431842 8,311.7	25342 319.9		05-Mar-84	8	157 2.57	1,814 37.77	1,276 36.00	340 16.97	268 22.05	833 36.24	19 0.49	852 37.85	4,584	6,400	76.87	76.34	0.3%
B 57	Iagarka	431842 8,311.7	25342 319.9		05-Apr-84	7.3	220 3.61	187 3.89	560 15.80	218 10.88	52 4.28	194 8.44	7 0.18	201 8.93	1,656	2,600	24.09	23.30	1.7%
B 59	Showka	433150 8,336.0	30030 332.6		04-Mar-84	7.8	231 3.79	782 16.28	4,760 134.28	410 20.46	278 22.87	2,000 87.00	14 0.36	2,014 89.48	10,224	13,500	152.61	154.35	7.5%
B 59	Showka	433150 8,336.0	30030 332.6		04-Mar-84	7.6	184 3.02	898 18.70	4,816 135.86	439 21.91	276 22.70	2,710 117.89	15 0.38	2,725 121.07	10,536	12,300	165.68	157.57	2.5%
B 61	Bonkay Seed Farm	433636 8,345.1	31150 353.2		06-May-84	7.7	315 5.16	324 6.75	420 11.85	61 3.04	93 7.65	221 9.61	11 0.28	232 10.31	1,476	2,200	21.00	23.76	6.2%

Id	Location	Longitude (HHMMSS) UTM-East (km.)	Latitude (HHMMSS) UTM-North (km.)	Type	Date	Ph	HCO3 (mg/l) (meq/l)	SO4 (mg/l) (meq/l)	CL (mg/l) (meq/l)	CA (mg/l) (meq/l)	MG (mg/l) (meq/l)	NA (mg/l) (meq/l)	K (mg/l) (meq/l)	NA+K (mg/l) (meq/l)	Total Dissolved Solids (mg/l)	Electrical Conductivity (uhmos/cm)	Cations	Anions	Percentage Difference
B 66	Buulo Hawo	430635 8,289.3	30341 338.3		25-Feb-84	8	210 3.44	124 2.58	364 10.27	58 2.89	82 6.75	90 3.92	11 0.28	101 4.49	0	1,500	14.13	16.29	7.1%
B 70	Garriway	435212 8,374.4	33854 403.0	dw	16-Sep-85	6.9	604 9.90	17 0.35	249 7.02	231 11.53	43 3.54	50 2.10	4 0.10	54 2.40	964	1,420	17.46	17.28	0.5%
B 71	Usle	435006 8,333.4	32342 375.2	dw	24-Aug-85	6.9	652 10.69	100 2.08	249 7.07	163 8.13	75 6.17	71 3.09	3 0.08	74 3.29	1,252	1,420	17.59	19.79	5.9%
B 74	Migdaloo	435030 8,371.0	35624 398.8	dw	17-Sep-85	7.3	604 9.90	42 0.87	355 10.01	248 12.38	63 5.18	125 5.44	3 0.08	128 5.63	1,088	1,700	23.24	20.79	-5.6%
B 75	Ufurow	425306 8,264.6	24436 305.0	dw	07-May-85	7.1	385 6.31	41 0.85	178 5.02	102 5.09	33 2.71	85 3.70	6 0.15	91 4.04	790	1,180	11.85	12.19	1.4%
B 75	Labatan Jirrow	435054 8,371.4	33136 389.8	dw	19-Sep-85	7.1	725 11.88	20 0.42	178 5.02	192 9.58	77 6.33	43 1.87	2 0.05	45 2.00	772	1,230	17.91	17.32	1.7%
B 76	Dhubai	425300 8,264.5	24130 297.5	dw	26-Jun-85	6.8	483 7.92	596 12.41	452 12.75	275 13.72	135 11.11	164 7.13	6 0.15	170 7.55	2,344	2,400	32.38	33.08	1.1%
B 80	Tugere Hoosle	425436 8,267.0	23800 291.4	dw	04-Mar-85	7.5	290 4.75	141 2.94	1,164 32.84	80 3.99	70 5.76	615 26.75	8 0.20	623 27.68	2,248	3,900	37.43	40.53	4.0%
B 83	Misra	4[illegible]418 8,3[illegible]4	23512 286.1	dw	16-Jul-85	6.9	628 10.29	196 4.08	3,515 99.16	352 17.56	302 24.84	1,286 55.94	4 0.10	1,290 57.31	6,640	9,400	99.72	113.53	6.5%
B 85	Bukiaabow	4[illegible]418 8,3[illegible].4	30112 334.1	dw	27-May-85	7.4	580 9.51	158 3.29	533 15.04	186 9.28	104 8.56	250 10.88	3 0.08	253 11.24	2,232	2,710	29.08	27.83	2.2%
B 88	Copan Hagan	0 3,483.6	0 0.2	dw	24-Jun-85	7.9	507 8.31	340 7.08	905 25.55	93 4.64	106 8.72	648 28.19	12 0.31	660 29.32	3,540	4,900	[illegible].68	40.92	2.1%
B 90	BRADP Compound	0 3,483.6	0 0.2	dw	02-Jul-85	6.9	483 7.92	26 0.54	105 2.96	160 7.98	4 0.33	43 1.87	1 0.03	44 1.95	639	900	10.27	11.42	5.3%
B 91	Hare	4[illegible]348 8,339.7	33048 386.2	dw	22-Aug-85	6.9	676 11.08	66 1.37	178 5.02	160 7.98	71 5.84	46 2.00	3 0.08	49 2.18	810	1,100	16.00	17.48	4.4%
B 92	Asha Farlow	4[illegible]400 8,340.7	31506 359.8	dw	03-Sep-85	7	531 8.70	9 0.19	288 8.12	198 9.89	50 4.11	57 2.48	3 0.08	60 2.67	899	1,400	16.66	17.01	1.1%
B 94	Bagaller	0 3,483.6	0 0.2	dw	18-Jul-85	7.6	387 6.34	68 1.42	249 7.02	106 5.29	46 3.78	93 4.05	8 0.20	101 4.49	980	1,300	13.56	14.78	4.3%

Id	Location	Longitude (HHMMSS) UTM-East (km.)	Latitude (HHMMSS) UTM-North (km.)	Type	Date	Ph	HCO3 (mg/l) (meq/l)	SO4 (mg/l) (meq/l)	CL (mg/l) (meq/l)	CA (mg/l) (meq/l)	MG (mg/l) (meq/l)	NA (mg/l) (meq/l)	K (mg/l) (meq/l)	NA+K (mg/l) (meq/l)	Total Disolved Solids (mg/l)	Electrical Conductivity (uhmos/cm)	Cations	Anions	Percentage Difference
B 95	Kurtin	431242	30100	Exp	17-Oct-85	7.5	435	1,215	320	403	143	87	11	98	2,040	2,900			
		8,300.6	333.8				7.13	25.30	9.03	20.11	11.76	3.78	0.28	4.35			36.23	41.45	6.7%
B 96	Dansarcheere 2	425718	25530	Awg	13-Oct-85	7.5	242	147	462	115	154	79	9	88	1,260	1,900			
		8,272.3	323.3				3.97	3.06	13.03	5.74	12.67	3.44	0.23	3.91			22.32	20.06	5.3%
B 97	Toosilow	0	0	dw	30-Aug-85	7.5	459	905	288	26[illegible]	154	103	10	113	1,550	2,250			
		3,483.0	0.2				7.52	18.84	8.12	13.42	12.67	4.48	0.26	5.02			31.11	34.49	5.1%
B 98	Doralow	0	0	dw	01-Sep-85	7.2	362	1,403	533	480	188	147	10	157	2,092	3,320			
		3,483.0	0.2				5.93	29.21	15.04	23.95	15.46	6.39	0.26	6.98			46.39	50.18	3.9%
B 99	Hareero Jirfo 2	432512	31354	Pen	29-Dec-85	7.3	270	59	391	156	75	122	5	127	1,612	1,700			
		8,324.2	357.5				4.43	1.23	11.03	7.78	6.17	5.31	0.13	5.64			19.60	16.68	8.0%
B 101	Hoorishole	432100	25848	Awg	01-Oct-85	7.3	387	132	335	99	83	132	3	135	1,112	1,520			
		8,316.5	329.2				6.34	2.75	9.45	4.94	6.83	5.74	0.08	6.00			17.77	18.54	2.1%
B 102	Caliyo Maravie	431954	25554	Awg	06-Dec-85	6.9	531	165	959	444	51	338	4	342	2,300	3,500			
		8,313.8	323.8				8.70	3.44	27.05	22.16	4.20	14.70	0.10	15.20			41.55	39.19	2.9%
B 103	Gras Mood	431624	25326	Awg	07-Dec-85	7.4	270	31	745	180	72	185	4	189	912	1,500			
		8,307.7	317.8				4.43	0.65	21.02	8.98	5.92	8.05	0.10	8.40			23.30	26.09	5.6%
B 104	Ceel Jaalle	434980	30236	Exp	26-Nov-85	7.3	435	942	9,798	1,436	1,335	3,571	72	3,643	14,080	21,800			
		8,368.6	336.4				7.13	19.61	276.40	71.66	109.82	155.34	1.84	161.86			343.33	303.14	6.2%
B 105	Coorsar	32[illegible]754	31306	Pen	06-Dec-85	7.3	411	247	2,556	548	259	990	7	997	4,940	6,900			
		8,365.0	356.1				6.74	5.14	72.10	27.35	21.31	43.07	0.18	44.30			92.[illegible]	85.[illegible]8	5.1%
B 107	Hartiqanle	433118	31724	Pen	10-Jan-86	7.4	349	68	178	90	46	57	6	63	740	910			
		8,335.4	363.8				5.72	1.42	5.02	4.49	3.78	2.48	0.15	2.80			11.07	12.16	4.7%
B/00A	Awdirole	0	0		29-Jun-82	6.7	465	140	1,059	285	330	125	8	133	3,564	3,900			
		3,483.0	0.2				7.62	2.91	29.87	14.22	27.15	5.44	0.20	5.91			47.28	40.41	7.8%

APPENDIX D

WATER QUALITY DATA: CENTRAL RANGE

Central Rangelands Water Quality Data

Id	Location	Longitude (HHMMSS) UTM-East (km.)	Latitude (HHMMSS) UTM-North (km.)	Type	Date	Ph	HCO3 (mg/l) (meq/l)	SO4 (mg/l) (meq/l)	CL (mg/l) (meq/l)	CA (mg/l) (meq/l)	MG (mg/l) (meq/l)	NA (mg/l) (meq/l)	K (mg/l) (meq/l)	NA+K (mg/l) (meq/l)	Total Dissolved Solids (mg/l)	Electrical Conductivity (mhos/cm)	Cations	Anions	Percentage Difference	Region
CR0	Afgoi-NIEC	450900	20600	dw	14-May-85	7.1	240	612	213	170	27	215	6	221	1,780	1,980				
		8,517.2	232.5				3.93	12.74	6.01	8.48	2.22	9.35	0.15	9.82			20.52	22.68	5.0%	
CR48	Mori Ari	460237	35133		04-Jul-83	7	599	[illegible]	488	224	78	177	8	185	0	3,700				
		8,616.4	426.6				9.82	[illegible]	13.77	11.18	6.42	7.70	0.20	8.22			25.81	28.77	5.4%	
CR67	WARGALOH	473200	61600	dw	27-Sep-84	7.2	290	1,352	418	438	133	146	13	159	3,156	3,200				1
		8,783.0	693.3				4.75	28.15	11.79	21.86	10.94	6.35	0.33	7.06			39.86	44.69	5.7%	
CR72	AFGADUDLE	475900	[illegible]	DW	01-Nov-84	8.2	387	1,711	2,192	163	148	2,334	74	2,408	5,245	12,000				1
		8,631.3	658.4				6.34	35.62	61.84	8.13	12.17	101.53	1.89	106.99			127.30	103.80	10.2%	
CR76	DHAJIMAALE	481300	61830	hdw	20-Mar-85	7.6	316	1,929	2,367	640	274	938	52	990	7,924	9,500				1
		8,859.2	697.5				5.18	40.16	66.77	31.94	22.54	40.80	1.33	43.99			98.46	112.11	6.5%	
CR81	BUDBUD	484042	61036	sw	12-Mar-85	7.2	336	2,916	3,508	872	317	1,614	113	1,727	10,128	12,000				4
		8,910.1	682.9				5.51	60.71	98.96	43.51	26.08	70.21	2.89	76.73			146.32	165.18	6.1%	
CR82	SADDEL	473048	40642	dw	22-Apr-85	7.8	287	515	1,633	211	4[illegible]	1,044	20	1,064	4,352	6,100				4
		8,780.1	454.4				4.70	10.72	46.07	10.53	3.45	45.41	0.51	47.27			61.26	61.49	0.2%	
CR89	Jarardheere	475118	43918	DW	11-Jul-85	7.5	338	320	533	74	50	400	7	407	1,880	2,700				4
		8,818.6	514.8				5.54	6.66	15.04	3.69	4.11	17.40	0.18	18.08			25.89	27.24	2.5%	
CR93	Cali-Tun	471842	44654	DW	26-Oct-85	8	338	720	1,953	282	131	977	42	1,019	3,996	6,600				5
		8,757.7	528.4				5.54	14.99	55.09	14.07	10.78	42.50	1.07	45.27			70.12	75.62	3.8%	
CR100	Darr Shadoor	471512	35541	Exp	17-Oct-85	7.5	193	3,065	14,555	935	906	6,810	188	6,998	23,192	32,000				
		8,751.6	434.2				3.16	63.81	410.60	46.66	74.53	296.23	4.81	310.92			432.11	477.57	5.0%	
C701	[illegible]	0	0		23-Jun-85	7	507	1,045	178	240	206	86	12	98	1,888	2,380				
		3,483.0	0.2				8.31	21.76	5.02	11.98	16.95	3.74	0.31	4.35			33.28	35.09	2.7%	
C 0	BUULO BERDI	453300	35100	DW	14-May-84	7.7	231	893	252	289	69	125	6	131	2,144	2,150				8
		8,561.8	426.0				3.79	18.59	7.11	14.42	7.3[illegible]	5.44	0.15	5.82			27.56	29.49	3.4%	
C 534	BUULO BERDI HOSPI	453300	35100	HDW	14-Feb-84	7.7	287	1,045	71	387	65	40	7	47	1,828	1,900				8
		8,561.8	426.0				4.70	21.76	2.00	19.31	5.35	1.74	0.18	2.09			26.75	28.46	3.1%	
C 535	SHABELLI RIVER	453300	35100	SW	09-Feb-83	8.3	16	286	195	108	85	16	10	26	960	1,000				
		8,561.8	426.0				0.26	5.95	5.50	5.39	6.99	0.70	0.26	1.16			13.54	11.72	7.2%	
C 536	BUSEM	444600	40000	HDW	10-Feb-83	8	20	1,638	88	629	85	45	35	80	3,060	3,100				6
		8,474.5	442.6				0.33	34.10	2.48	31.39	6.99	1.96	0.89	3.55			41.93	36.91	6.4%	

Id	Location	Longitude (HHMMSS) UTM-East (km.)	Latitude (HHMMSS) UTM-North (km.)	Type	Date	Ph	HCO3 (mg/l) (meq/l)	SO4 (mg/l) (meq/l)	CL (mg/l) (meq/l)	CA (mg/l) (meq/l)	MG (mg/l) (meq/l)	NA (mg/l) (meq/l)	K (mg/l) (meq/l)	NA+K (mg/l) (meq/l)	Total Disolved Solids (mg/l)	Electrical Conductivity (mhos/cm)	Cations	Anions	Percentage Difference	Region
C 537	BUGDA II	444600	40000	HDW	10-Feb-83	8.1	20	1,749	88	633	54	50	35	85	3,108	3,100				6
		8,474.5	442.6				0.33	36.41	2.48	31.57	4.44	2.18	0.89	3.78			39.81	39.22	0.7%	
C 538	MAIAAS	460600	42300	HDW	15-May-83	7.2	238	440	1,392	278	288	375	50	425	0	4,250				6
		8,623.2	485.0				3.90	9.16	39.27	13.87	23.69	16.31	1.28	18.88			56.45	52.33	3.8%	
C 539	BAJEEIE	474200	54800	HDW	26-Sep-83	7.6	225	1,560	96	715	17	42	17	59	3,790	2,800				2
		8,801.6	641.7				3.69	32.48	2.71	35.68	1.40	1.83	0.43	2.62			39.70	38.88	1.0%	
C 540	B9	475700	60100	HDW	26-Sep-83	7.7	342	3,000	436	869	119	751	120	871	7,460	6,940				2
		8,829.4	665.6				5.61	62.46	12.30	43.36	9.79	32.67	3.07	38.70			91.85	80.36	6.7%	
C 541	EL OHERE	471500	35000	HDW	15-Feb-84	7.6	459	82	266	115	58	125	42	167	1,156	1,470				4
		8,751.4	424.2				7.52	1.71	7.50	5.74	4.77	5.44	1.07	7.42			17.93	16.73	3.4%	
C 542	GABOE	484000	82000	DW	22-Feb-84	7.8	143	1,854	213	614	113	93	12	105	3,760	3,250				1
		8,909.3	921.9				2.34	38.60	6.01	30.64	9.30	4.05	0.31	4.67			44.60	46.95	2.6%	
C 543	GALCAID	472600	64500	HDW	22-Feb-84	7.5	172	1,697	249	701	83	68	17	85	3,000	3,100				1
		8,771.8	746.8				2.82	35.33	7.02	34.98	6.83	2.96	0.43	3.78			45.58	45.17	0.5%	
C 544	WARIRIF	453200	24900	HDW	18-Feb-84	7.1	315	314	107	71	41	130	5	135	736	1,200				
		8,569.0	311.7				5.16	6.54	3.02	3.54	3.37	5.66	0.13	6.00			12.91	14.72	6.5%	
C 545	GORGOIE	473000	65000	HDW	01-Apr-82	7.2	184	1,922	270	651	125	135	36	171	0	3,400				1
		8,779.3	756.0				3.02	40.02	7.62	32.48	10.28	5.87	0.92	7.60			50.36	50.65	0.3%	
C 546	GAAG FALLE	474300	70300	HDW	01-Apr-82	7	173	1,637	178	702	61	62	39	101	0	2,800				1
		8,816.6	779.9				2.84	34.08	5.02	35.03	5.02	2.70	1.00	4.49			44.54	41.94	3.0%	
C 547	MASHONWEIN	470000	35000	HDW	04-Sep-83	8	445	26	138	83	54	100	25	125	1,016	1,370				4
		8,722.5	424.2				7.29	0.54	3.89	4.14	4.44	4.35	0.64	5.55			14.14	11.73	9.3%	
C 549	SAGUIFO	482200	51500	HDW	22-Sep-83	7.6	182	27	24	48	23	7	6	13	272	650				2
		8,875.9	580.9				2.98	0.56	0.68	2.40	1.89	0.30	0.15	0.58			4.86	4.22	7.1%	
C 551	HOBIO II	483200	52100	HDW	01-Apr-82	7.9	135	532	718	122	154	274	76	350	0	3,500				4
		8,694.5	591.9				2.21	11.08	20.25	6.09	12.67	11.92	1.94	15.55			34.31	33.54	1.1%	
C 552	FINGOO	462600	61500	HDW	23-Sep-83	7.7	243	1,470	23	683	4	27	24	51	3,060	2,750				4
		8,983.3	691.5				3.98	30.61	0.65	34.08	0.33	1.17	0.61	2.27			36.68	35.24	2.0%	
C 554	EL GIBIR	482000	55500	HDW	24-Sep-83	7.3	281	1,580	59	673	31	63	48	111	2,910	3,070				5
		8,872.2	656.5				4.61	32.90	1.66	33.58	2.55	2.74	1.23	4.93			41.06	39.17	2.4%	

Central Rangelands Water Quality Data

Id	Location	Longitude (HHMMSS) UTM-East (km.)	Latitude (HHMMSS) UTM-North (km.)	Type	Date	pH	HCO3 (mg/l) (meq/l)	SO4 (mg/l) (meq/l)	Cl (mg/l) (meq/l)	Ca (mg/l) (meq/l)	Mg (mg/l) (meq/l)	Na (mg/l) (meq/l)	K (mg/l) (meq/l)	Na+K (mg/l) (meq/l)	Total Dissolved Solids (mg/l)	Electrical Conductivity (mhos/cm)	Cations	Anions	Percentage Difference	Region
C 555	DUSA MARLB	462200 8,652.9	53200 612.2	HDW	01-Apr-82	7.9	173 2.84	306 6.37	522 14.73	50 2.50	69 5.68	274 11.92	28 0.72	302 13.-2	0	2,250	21.59	23.93	5.1%	7
C 556	MARGALEH	473200 8,783.0	61600 693.3	DW	13-May-84	7.6	283 4.64	1,806 37.60	168 4.74	641 31.99	113 9.30	60 2.61	20 0.51	80 3.55	3,468	2,900	44.84	46.98	2.3%	4
C 557	MARGALEH	473200 8,783.0	61600 693.3	HDW	13-May-84	7.3	367 6.02	1,957 40.74	1,260 35.54	869 43.36	222 18.26	316 13.75	28 0.72	344 15.28	7,095	5,850	76.91	82.30	3.4%	4
C 559	GARDE	484000 8,909.3	82000 921.9	HDW	22-Feb-84	7.8	229 3.75	2,107 43.87	586 16.53	339 16.92	369 30.35	243 10.57	34 0.87	277 12.31	3,800	4,700	59.58	64.15	3.7%	1
C 560	JAARIBAN	465200 8,531.6	71300 798.4	HDW	01-Apr-82	7.8	258 4.23	96 2.00	233 6.57	93 4.64	23 1.89	98 4.26	21 0.54	119 5.29	0	1,200	11.82	12.80	4.0%	1
C 562	AFBARWAAGO	484500 8,918.6	63000 719.1	HDW	01-Apr-82	7.7	168 2.75	2,118 44.10	750 21.16	689 34.38	156 12.83	306 13.31	68 1.74	374 16.62	0	7,000	63.83	68.01	3.2%	1
C 564	HUBEID	483500 8,896.3	57200 653.8	HDW	01-Apr-82	7.9	135 2.21	532 11.08	718 20.25	122 6.09	154 12.67	274 11.92	76 1.94	350 15.55	0	3,500	34.31	33.54	1.1%	4
C815	HELI UEN UNICEF #	451700 8,522.8	44500 525.6	DW	14-Feb-84	7.8	344 5.64	1,180 24.69	426 12.02	365 18.21	133 10.94	193 8.40	10 0.26	203 9.02	2,488	3,200	38.17	42.35	5.2%	8
C815	BELET UEN UNICEF#	451700 8,522.8	44500 525.6	DW	14-May-84	7.7	256 4.20	689 14.34	112 3.16	273 13.62	56 4.61	44 1.91	7 0.18	51 2.27	1,612	1,525	20.50	21.70	2.9%	8
C [illegible]	Goc God	0 3,483.0	0 [illegible]	DW	10-Jul-84	7.7	266 4.36	145 3.02	391 11.03	138 6.89	40 3.29	150 6.53	13 0.33	163 7.24	1,584	1,800	17.42	18.41	2.8%	6
C [illegible]	Massajio/Ali Gad	0 3,483.0	0 [illegible]	DW	10-May-85	7.2	387 6.34	1,317 27.42	1,882 53.09	432 21.56	173 14.23	923 40.15	32 0.82	955 42.43	6,068	6,000	78.22	86.85	5.2%	4
C [illegible]	Ali Gaduud	0 3,483.0	0 [illegible]	DW	10-May-85	7.2	387 6.34	1,317 27.42	1,882 53.09	432 21.56	173 14.23	923 40.15	32 0.82	955 42.43	6,068	6,000	78.22	86.85	5.2%	4
C [illegible]	Hobbio	483200 8,894.5	52100 591.9	HDW	25-May-85	7.6	145 2.38	502 10.45	710 20.03	96 4.79	146 12.01	265 11.53	39 1.00	304 13.51	2,444	2,910	30.31	32.86	4.0%	4
C [illegible]	Hobbio dist office	483200 8,894.5	52100 591.9	HDW	17-[illegible]-85	7.6	218 3.57	582 12.12	4,509 127.20	195 9.73	298 24.51	2,110 91.79	140 3.58	2,250 99.97	9,408	12,000	134.21	142.89	3.1%	4
C [illegible]	Cowaye	473615 8,[illegible]	45100 5[illegible]	HDW	10-Jul-85	8	411 6.74	14 0.29	29 0.82	23 1.15	6 0.66	114 4.96	5 0.13	119 5.29	430	600	7.09	7.85	5.0%	5

Id	Location	Longitude (HHMMSS) UTM-East (km.)	Latitude (HHMMSS) UTM-North (km.)	Type	Date	PH	HCO3 (mg/l) (meq/l)	SO4 (mg/l) (meq/l)	CL (mg/l) (meq/l)	CA (mg/l) (meq/l)	MG (mg/l) (meq/l)	NA (mg/l) (meq/l)	K (mg/l) (meq/l)	NA+K (mg/l) (meq/l)	Total Dissolved Solids (mg/l)	Electrical Conductivity (mhos/cm)	Cations	Anions	Percentage Difference	Region
C 0	Garable	470900 8,740.2	44030 516.9	DW	20-Jul-85	7	580 9.51	340 7.08	639 18.03	205 10.23	110 9.05	250 10.88	4 0.10	254 11.29	1,920	2,800	30.56	34.61	6.2%	5
C 0	Lindheere	0 3,483.0	0 0.2	DW	10-Aug-85	6.9	338 5.54	2,406 50.09	6,461 182.26	871 43.46	616 50.67	2,564 111.53	167 4.27	2,731 121.34	14,028	16,650	215.47	237.90	4.9%	3
C 0	Lindheere Galgadu	0 3,483.0	0 0.2	dw	05-Oct-85	6.9	338 5.54	2,406 50.09	6,461 182.26	871 43.46	616 50.67	2,564 111.53	167 4.27	2,731 121.34	14,028	16,650	215.47	237.90	4.9%	3
C 0	Jacar	465130 8,707.3	42415 487.1	DW	09-Oct-85	7.6	435 7.13	341 7.10	994 28.04	189 9.43	106 8.72	364 15.83	25 0.64	389 17.28	2,748	3,650	35.43	42.27	8.8%	5
C 0	Dahar Shadoor	471512 8,751.6	35542 434.2	DW	19-Oct-85	7.6	242 3.97	2,942 61.25	13,561 382.56	771 38.47	889 73.13	6,781 294.97	188 4.81	6,969 309.63	21,908	31,800	421.23	447.77	3.1%	4
G 5	DUSA MAREB	462200 8,652.9	53200 612.2	DW	15-Feb-83	7.7	487 7.98	284 5.91	497 14.02	147 7.34	61 5.02	243 10.57	18 0.46	261 11.60	1,400	2,400	23.95	27.92	7.6%	7
G 5	DUSA MAREB	462200 8,652.9	53200 612.2	DW	15-May-84	7.6	294 4.82	270 5.62	532 15.01	147 7.34	82 6.75	207 9.00	19 0.49	226 10.04	1,088	2,350	24.12	25.45	2.7%	5
G 8	CADADU	463600 8,678.9	60800 678.5	DW	01-Apr-82	7.7	124 2.03	589 12.26	1,211 34.16	211 10.53	159 13.08	500 21.75	39 1.00	539 23.95	0	4,900	47.56	48.46	0.9%	3
G 8	CADADU	463600 8,678.9	60800 678.5	DW	15-Feb-84	7.4	344 5.64	576 11.99	1,402 39.55	285 14.22	152 12.50	430 18.71	17 0.43	447 19.86	4,132	5,200	46.59	57.18	10.2%	3
G 9	GEHLIMSOK	464200 8,699.1	62500 709.9	DW	01-Apr-82	7.9	159 2.61	374 7.79	517 14.58	125 6.24	88 7.24	209 9.09	22 0.56	231 10.26	0	2,400	23.74	24.98	2.5%	3
G 9	GEHLIMSOK	464200 8,699.1	62500 709.9	DW	16-Feb-84	8	201 3.29	360 7.50	568 16.02	141 7.04	102 8.39	214 9.31	17 0.43	231 10.26	1,280	2,400	25.69	26.81	2.1%	3
G 16	DOCOL	473700 8,792.3	65500 765.2	DW	13-May-84	7.5	252 4.13	1,418 29.52	336 9.48	391 19.51	191 15.71	148 6.44	14 0.36	162 7.20	2,944	3,050	42.42	43.13	0.8%	1
G 558	EL GAL	451500 8,528.4	45100 536.6	HDW	23-Feb-84	7.9	229 3.75	428 8.91	142 4.01	166 8.28	90 7.40	27 1.17	8 0.20	35 1.56	1,388	1,280	17.24	16.67	1.7%	6
H 3	ABOOREY	454200 8,578.6	40100 444.4	DW	09-Feb-83	8	37 0.61	506 10.53	1,420 40.06	261 13.02	109 8.97	690 30.02	50 1.28	740 32.88	3,808	4,200	54.87	51.20	3.5%	6
H 4	HALGAN VILLAGE	463400 8,675.2	41700 464.7	DW	14-Feb-84	7.5	373 6.11	406 8.45	1,047 29.54	173 8.63	136 11.19	407 17.70	11 0.28	418 18.57	2,616	3,950	38.39	44.10	6.9%	8

Central Rangelands Water Quality Data

Id	Location	Longitude (HHMMSS) UTM-East (km.)	Latitude (HHMMSS) UTM-North (km.)	Type	Date	Ph	HCO3 (mg/l) (meq/l)	SO4 (mg/l) (meq/l)	CL (mg/l) (meq/l)	CA (mg/l) (meq/l)	MG (mg/l) (meq/l)	NA (mg/l) (meq/l)	K (mg/l) (meq/l)	NA+K (mg/l) (meq/l)	Total Dissolved Solids (mg/l)	Electrical Conductivity (mhos/cm)	Cations	Anions	Percentage Difference	Region
N 815	SIGALOW	451200	44500	DW	14-Feb-84	7.8	344	1,186	426	365	133	193	10	203	2,498	3,200				8
		8,522.8	525.6				5.64	24.69	12.02	18.21	10.94	8.40	0.26	9.02			38.17	42.35	5.2%	
N10	BUULO BUERDI	453300	35100	DW	09-Feb-83	8.2	24	1,130	213	284	75	113	11	124	2,508	2,700				8
		8,561.8	426.0				0.39	23.53	6.01	14.17	6.17	4.92	0.28	5.51			25.85	29.93	7.3%	
N 3	GOWLALLO	470700	64200	DW	01-Apr-82	7.5	134	614	668	310	167	191	19	210	0	3,400				2
		8,736.5	741.2				2.20	12.78	18.84	15.47	13.74	8.31	0.49	9.33			38.54	33.82	6.5%	
N 4	GALGAIO	472600	64500	DW	14-May-84	7.7	189	1,916	224	494	216	100	13	113	3,504	3,200				1
		8,771.8	746.8				3.10	39.89	6.32	24.65	17.77	4.35	0.33	5.02			47.44	49.31	1.9%	
N 8	BALLI BUSLE	481100	70500	DW	01-Apr-82	7	332	756	975	321	150	284	17	301	0	4,000				1
		8,855.4	783.6				5.44	15.74	27.50	16.02	12.34	12.35	0.43	13.37			41.73	48.69	7.7%	