JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

ARUSHA REGIONAL DEVELOPMENT DIRECTORATE
THE UNITED REPUBLIC OF TANZANIA

THE FEASIBILITY STUDY ON MONDULI TOWN AND THE SURROUNDING AREA WATER SUPPLY IN ARUSHA REGION

HYDROGEOLOGICAL MAP AND DATA

MARCH 1996

SANYU CONSULTANTS INC.
JAPAN ENGINEERING CONSULTANTS CO., LTD

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Figure -1 HYDROGEOLOGICAL MAP OF THE STUDY AREA

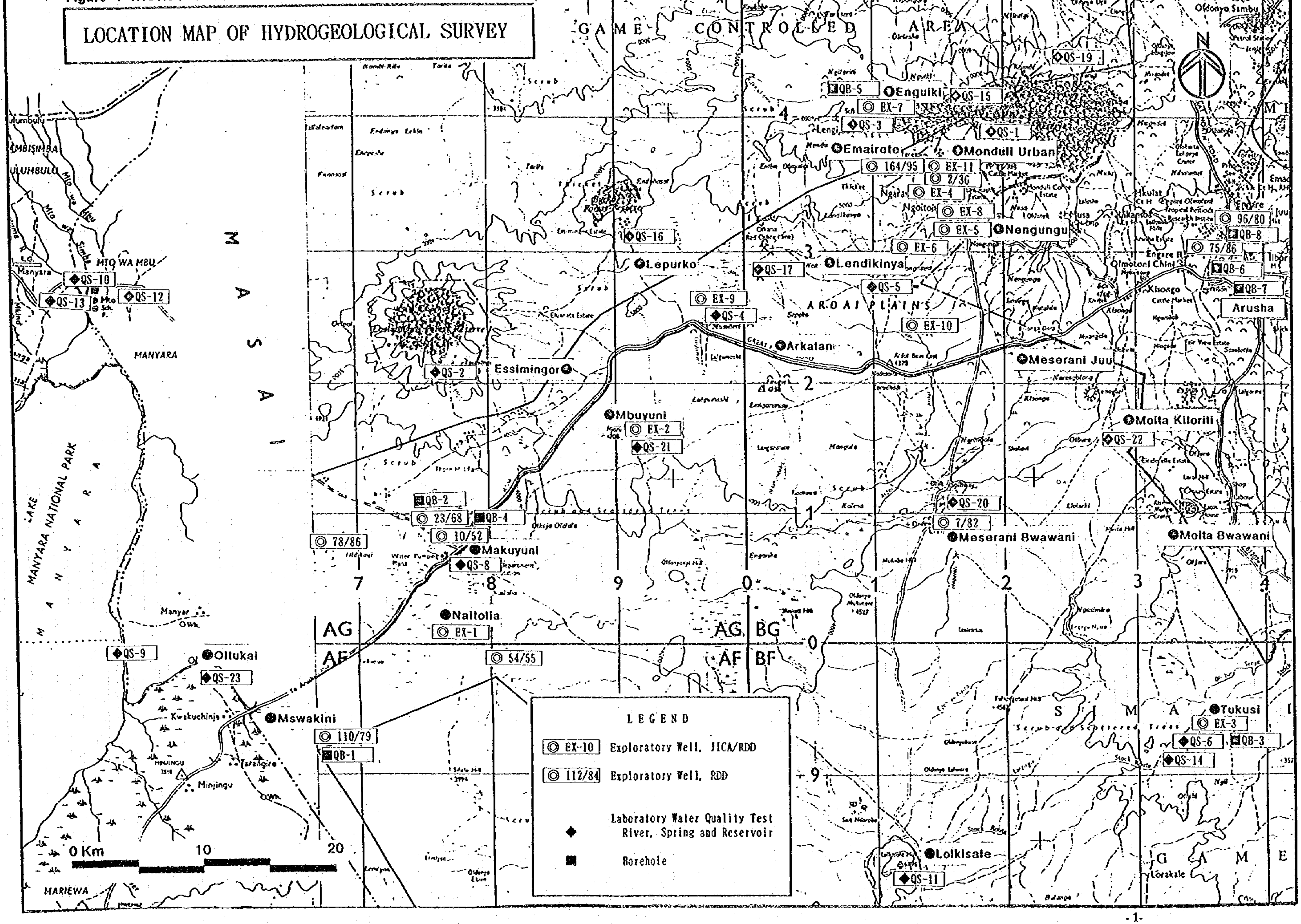
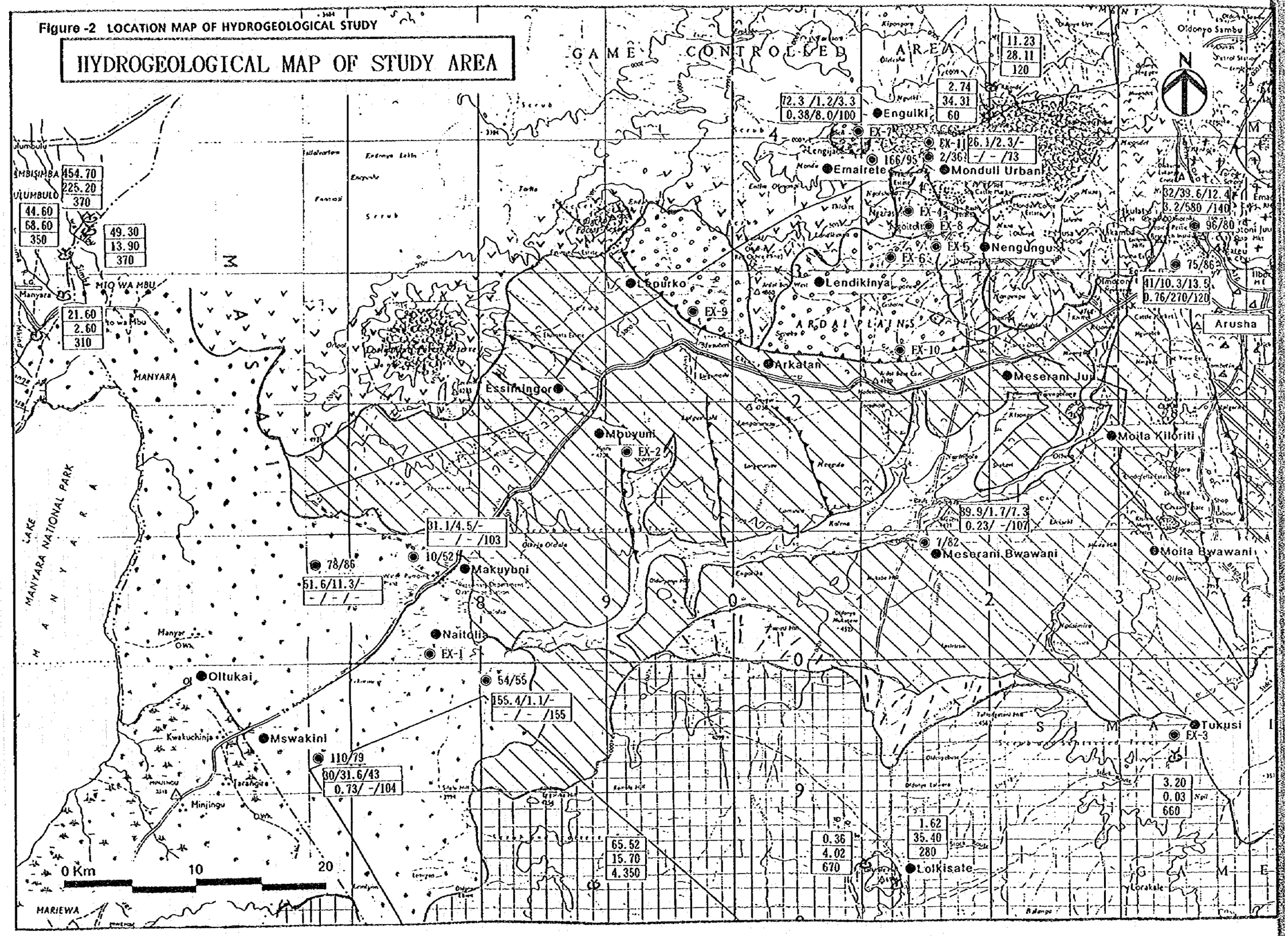
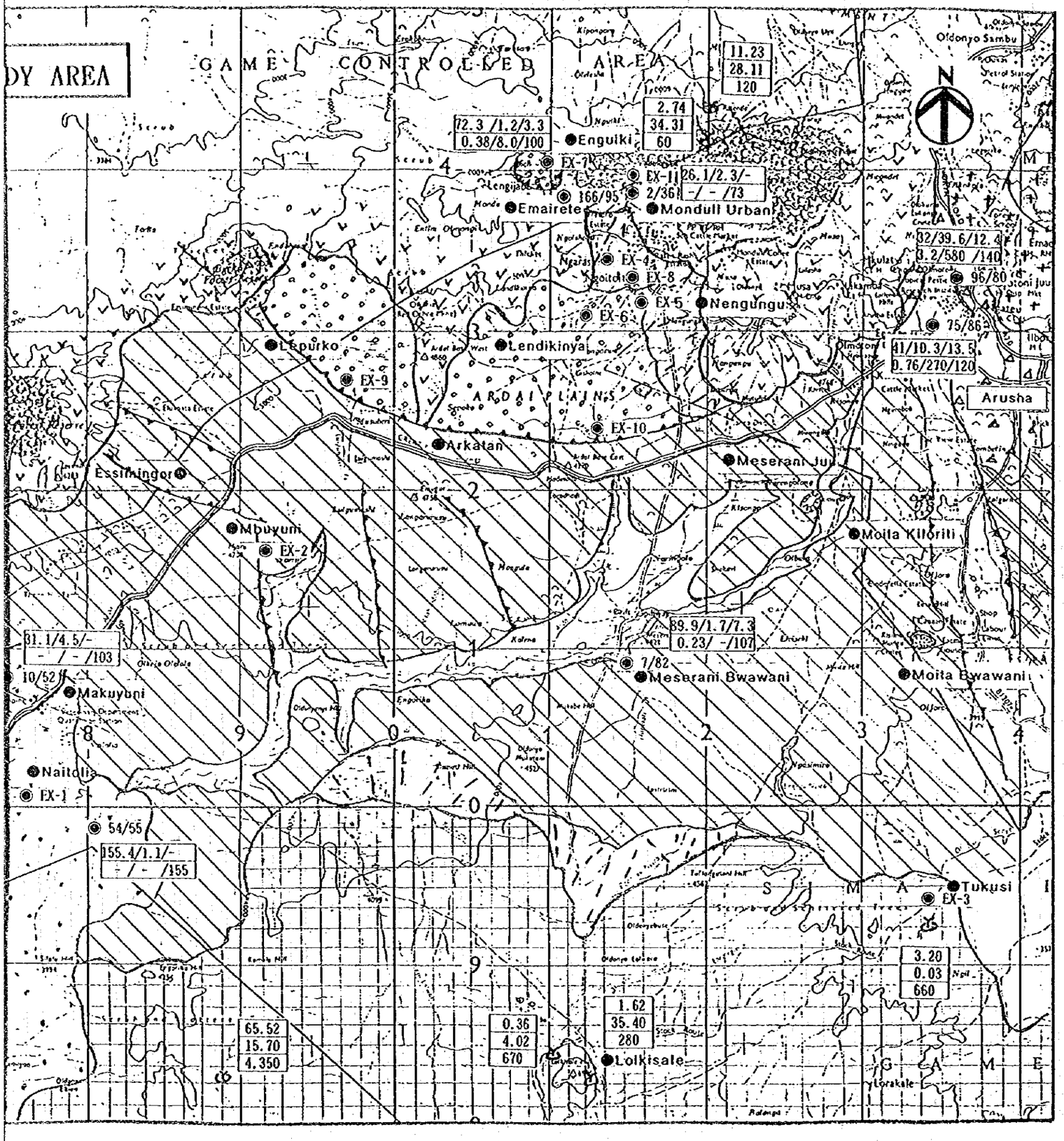


Figure -2 LOCATION MAP OF HYDROGEOLOGICAL STUDY

HYDROGEOLOGICAL MAP OF STUDY AREA





LEGEND

Symbol	Lithology	Hydrogeology
	RECENT River beds Clay, sand and gravels	Small scale shallow groundwater
	Fan, Talus Clay, volcanic sand & fragments	Small scale shallow groundwater
	Volcanic talus Clay, volcanic sand & fragments	Large scale groundwater in Engare Olmoton
	Colluviuo Clay, volcanic sand & fragments	Large scale groundwater only in Monduli Juu
	NEOGENE Lake Nanyara Bed	Large scale groundwater, but inferior quality in EC and fluorine
	Younger Extrusive	Fructured aquifer with small scale quantity
	Plateau Lava	Fructured aquifers and pressure gas in volcanic caves. Depth to water level is more than 250 m
	PRECAMBRIAN Basement Rocks Gneiss, migmatite, granulite and metaigneous	Aquifer in weather part of Basement rocks
	Escarpments	

Explanation of Symbol and Figure		Remark
◉ 7/82	Exploratory Well of RDD	SWL=S.W.L. in mbgs Q =Well discharge in m3/hr Dd =Drawdown in m SC =Specific capacity in m3/hr/m T =Transmissivity in m2/day WD =Well Depth in m S.R=Specific discharge
◉ EX-10	Exploratory Well of JICA/RDD	
19.3 /4.7/7.5 0.62/10 /36	Well Potential SWL/Q/Dd SC/ T/WD	
⌀	Spring	
3.2 0.032 300	Spring discharge Q (m3/hr) S.R(mm/ann) E.C.(μS/cm)	

Figure -3 TRILINEAR PLOTTING OF WATER SAMPLES OF SURFACE WATER-1

Project : ARUSHA WATER DEVELOPMENT
Organization : JICA/RDD

Label	Seq.No	Sample Identification
1	1	KILIMANI SPRING
2	2	LOSIMINGOR SPRING
3	3	MONDULI JUU SPRING
4	4	NANJA SWAMP
5	5	LASHAINE DAM
6	6	TUKUSI SPRING
7	7	MERU SPRING
8	8	MAKUYUNI RIVER
9	9	LAKE MANYARA
A	10	KIRURUMO RIVER
B	11	LOLKISALE SPRING
C	12	MTO WA MBU RIVER
D	13	INGULUPANI RIVER

SURFACE RIVER, SPRING AND RESERVOIR -1

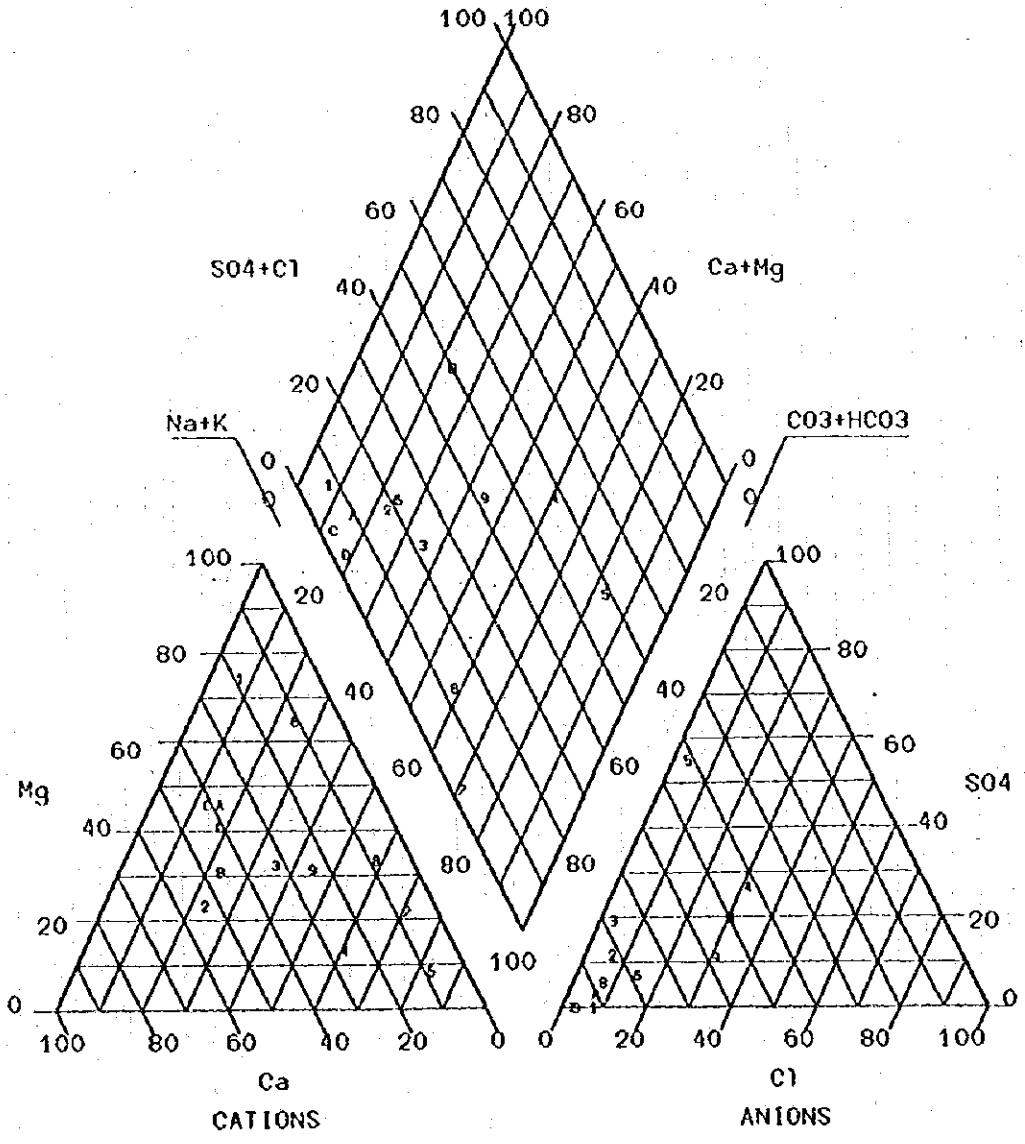


Figure -4 TRILINEAR PLOTTING OF WATER SAMPLES OF SURFACE WATER-2

Project : MONDULI GROUNDWATER
Organization : JICA/RDD

Label	Seq.No	Sample Identification
1	1	TUKUSI SR
2	2	ENGUIK SPRING
3	3	LEPURKO DAM
4	4	LENDIKINYA DAM
5	5	EMAOI SPRING
6	6	MFEREJI SR
7	7	MESERANI BWAWANI
8	8	MBUYUNI DAM
9	9	MOITA KILORITI DAM
A	10	OLTUKAI DUG WELL

SURFACE RIVER, SPRING AND RESERVOIR -2

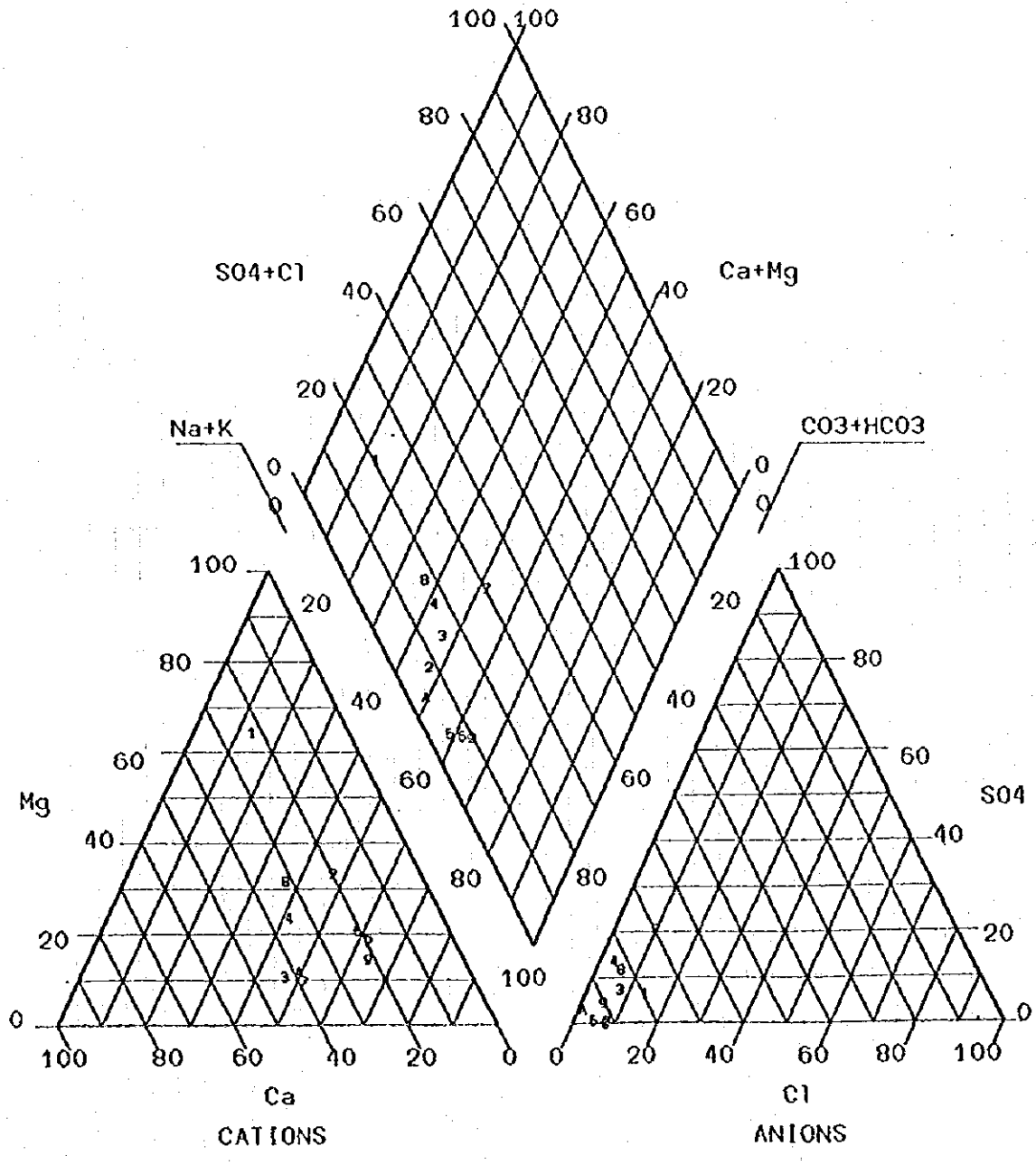
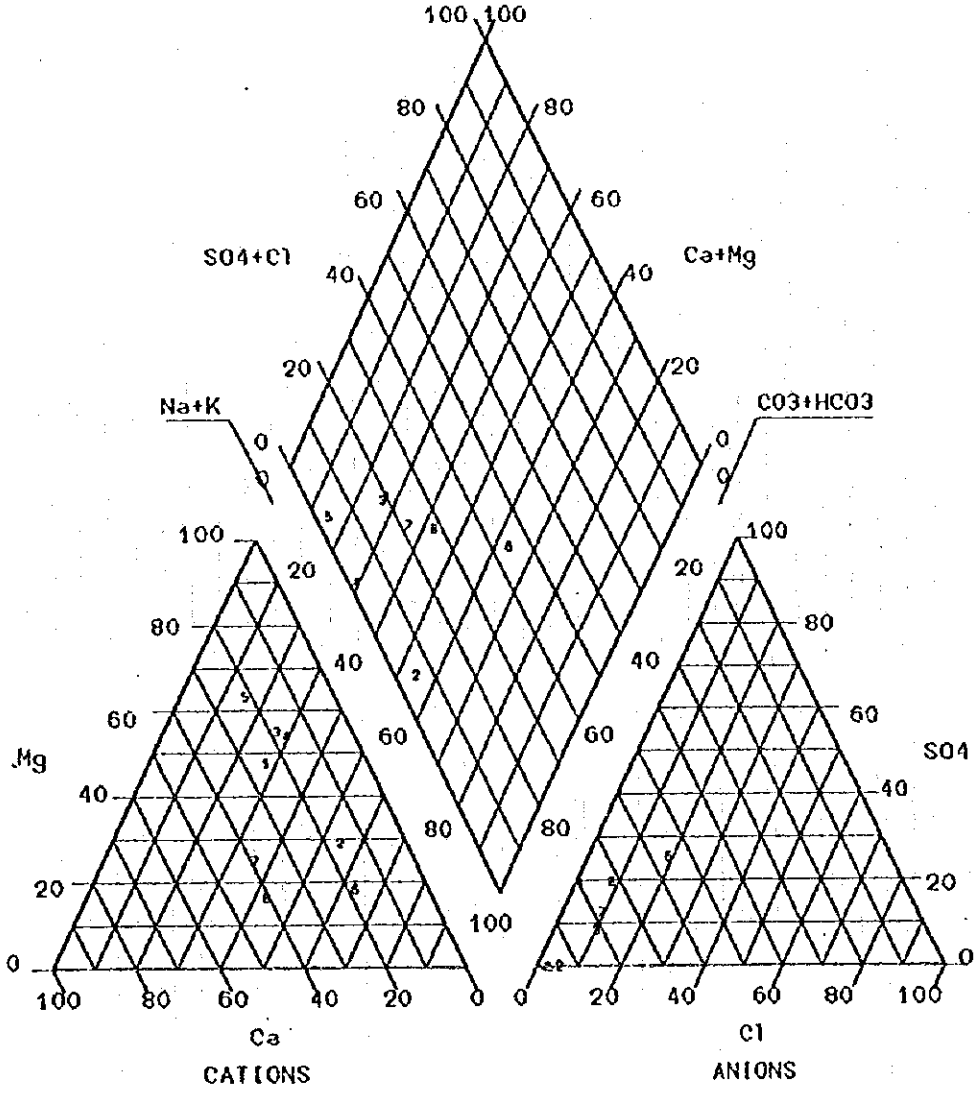


Figure -5 TRILINEAR PLOTTING OF WATER SAMPLES OF BOREHOLES

Project : ARUSHA WATER DEVELOPMENT
Organization : JICA/RDD

Label	Seq.No	Sample Identification
1	1	MSWAKINI BH 110/29
2	2	MAKUYUNI BH 10/52
3	3	EX-3 TUKUSI
4	4	MAKIYUNI BH23/68
5	5	EMAIRETE EX-7
6	6	BURKO BH-2
7	7	SELIAN BH
8	8	BURKA BH-14

MONDULI BOREHOLE
Project : ARUSHA WATER DEVELOPMENT
Organization : JICA/RDD



MONDULI BOREHOLE

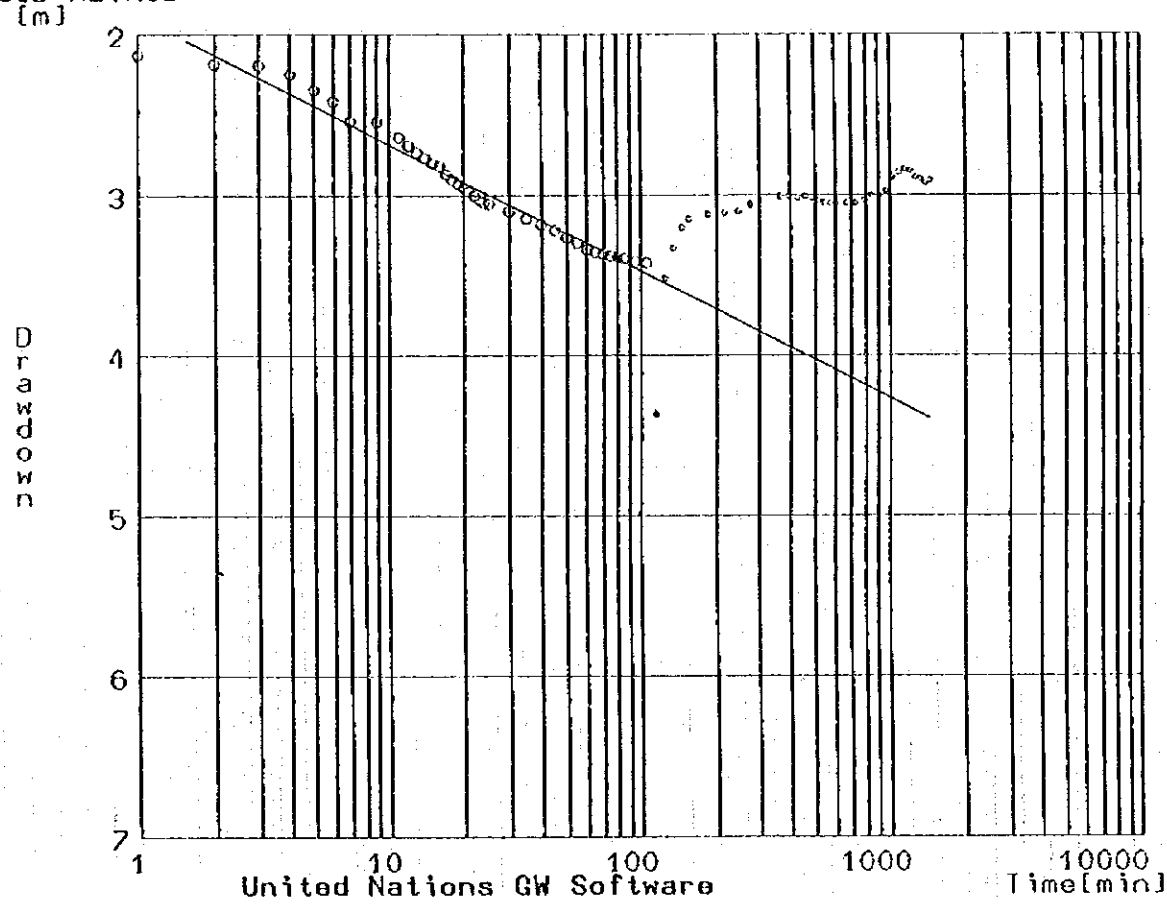
PUMPING TEST

Project : MONDULI GROUNDWATER
Organization : JICA/RDD

Test : BX-7 CONSTANT

Constant Pumping Rate = 29.7 [m3/day]
Distance from Pumping Well = 0.08 [m]
Type of Aquifer = UNCONFINED
Initial Saturated Thickness = 20.00 [m]
Type of Input Data = DRAWDOWN
Well Type = STANDARD

JACOB METHOD



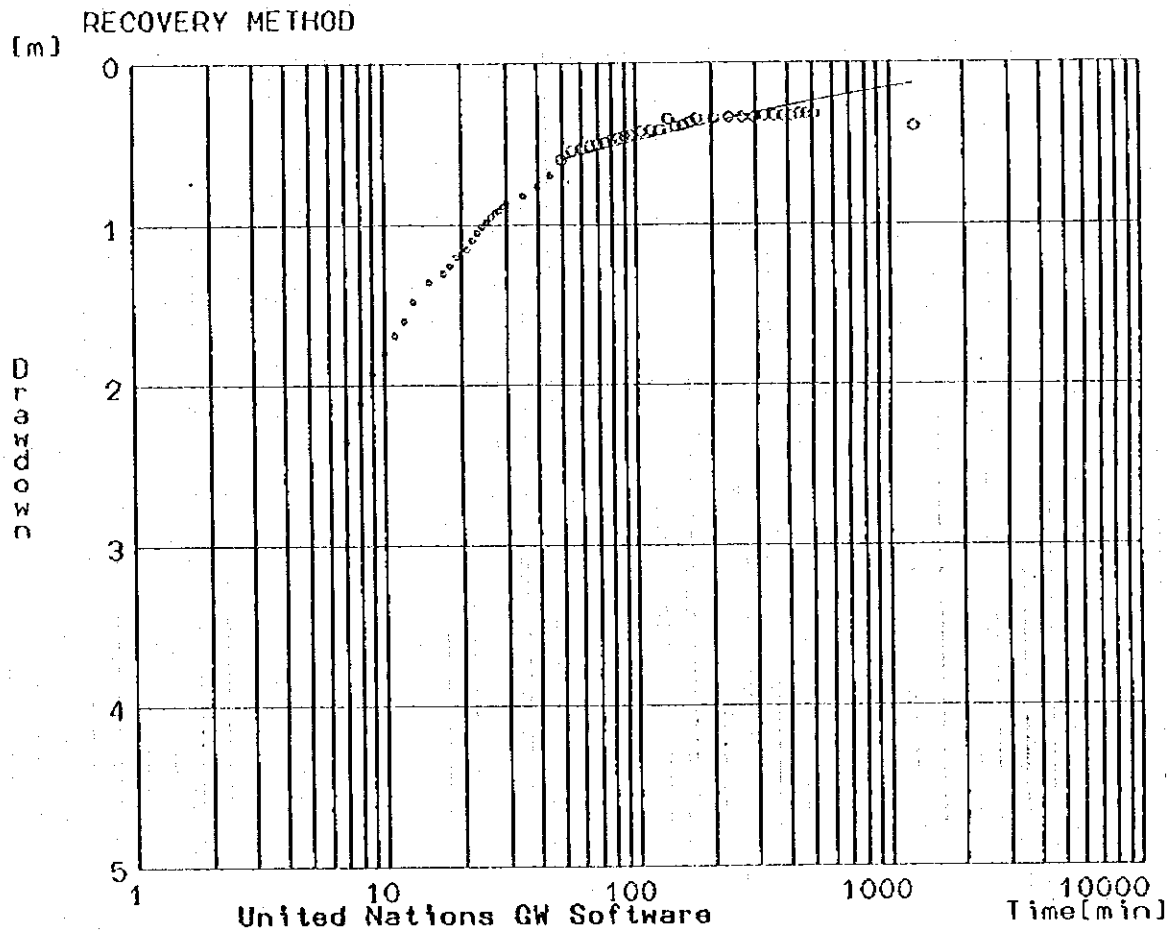
Transmissivity = 6.87424 [m2/day]

Standard Deviation = 0.0649 [m]
A0 = 0.189097E+01
A1 = 0.791978E+00
Number of Points = 37 of 69

Project : MONDULI GROUNDWATER
Organization : JICA/RDD

Test : EX-7 REC

Constant Pumping Rate = 29.7 [m3/day]
Distance from Pumping Well = 0.08 [m]
Type of Aquifer = UNCONFINED
Initial Saturated Thickness = 20.00 [m]
Type of Input Data = DRAWDOWN
Well Type = STANDARD



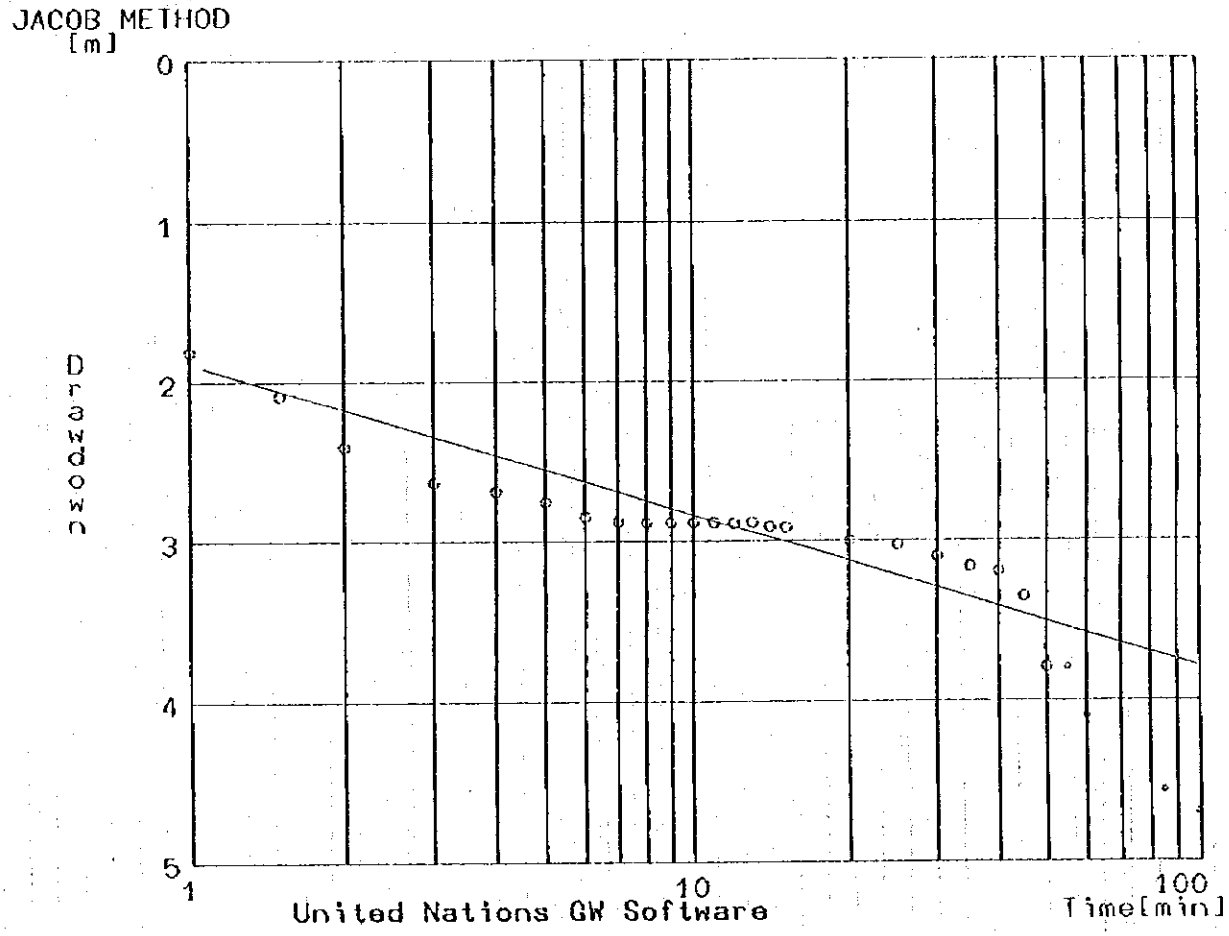
Transmissivity = 13.47150 [m2/day]

Standard Deviation = 0.0646 [m]
A0 = 0.000000E+00
A1 = 0.000000E+00
Number of Points = 30 of 55

Project : MONDULI GROUNDWATER
Organization : JICA/RDD

Test : MAKUYUNI 10/52

Constant Pumping Rate = 78.20 [lit/min]
Distance from Pumping Well = 0.10 [m]
Type of Aquifer = UNCONFINED
Initial Saturated Thickness = 10.00 [m]
Type of Input Data = DRAWDOWN
Well Type = STANDARD



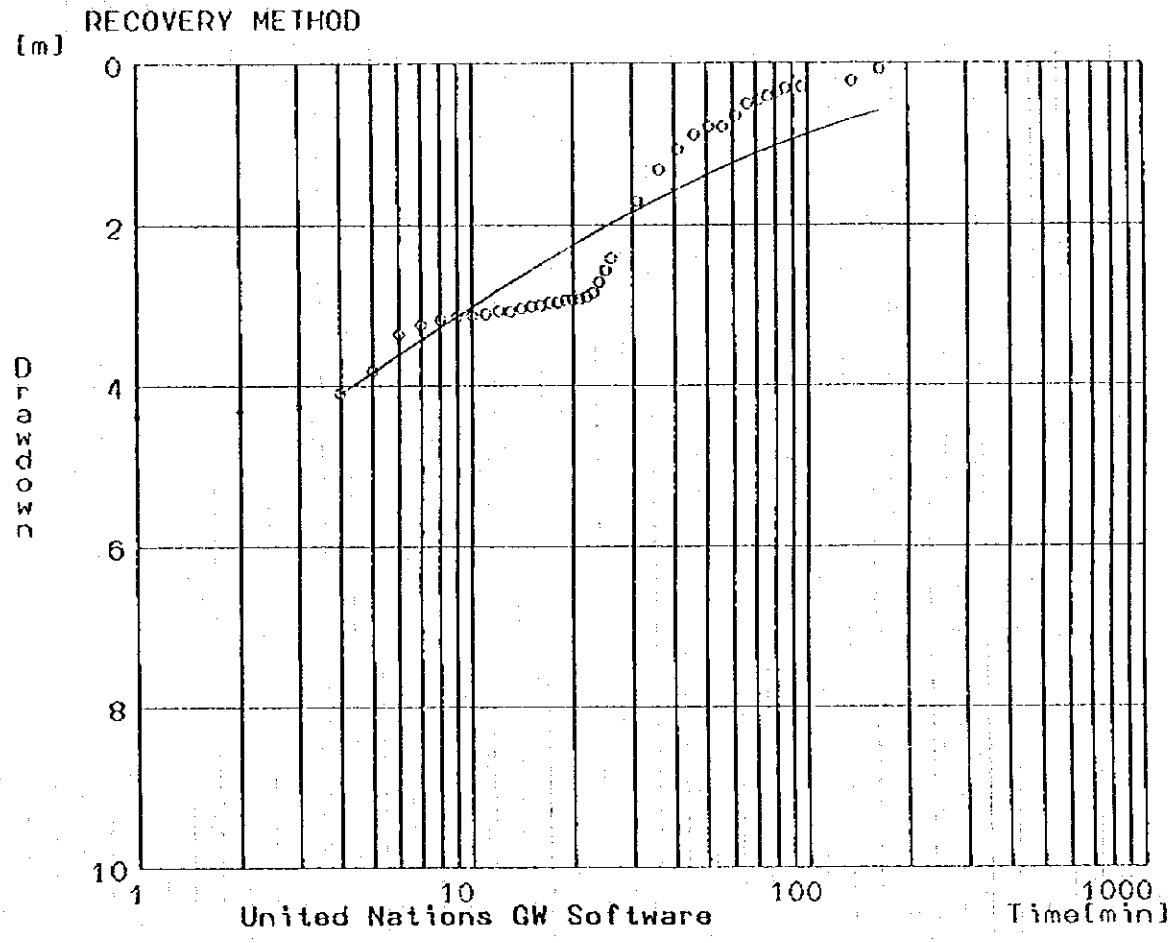
Transmissivity = 22. [m2/day]

Standard Deviation = 0.2110 [m]
A0 = 0.188785E+01
A1 = 0.951019E+00
Number of Points = 24 of 28

Project : MONDULI GROUNDWATER
Organization : JICA/RDD

Test : MAKUYUNI-REC

Constant Pumping Rate = 78.20 [lit/min]
Distance from Pumping Well = 0.10 [m]
Type of Aquifer = UNCONFINED
Initial Saturated Thickness = 10.00 [m]
Type of Input Data = DRAWDOWN
Well Type = STANDARD



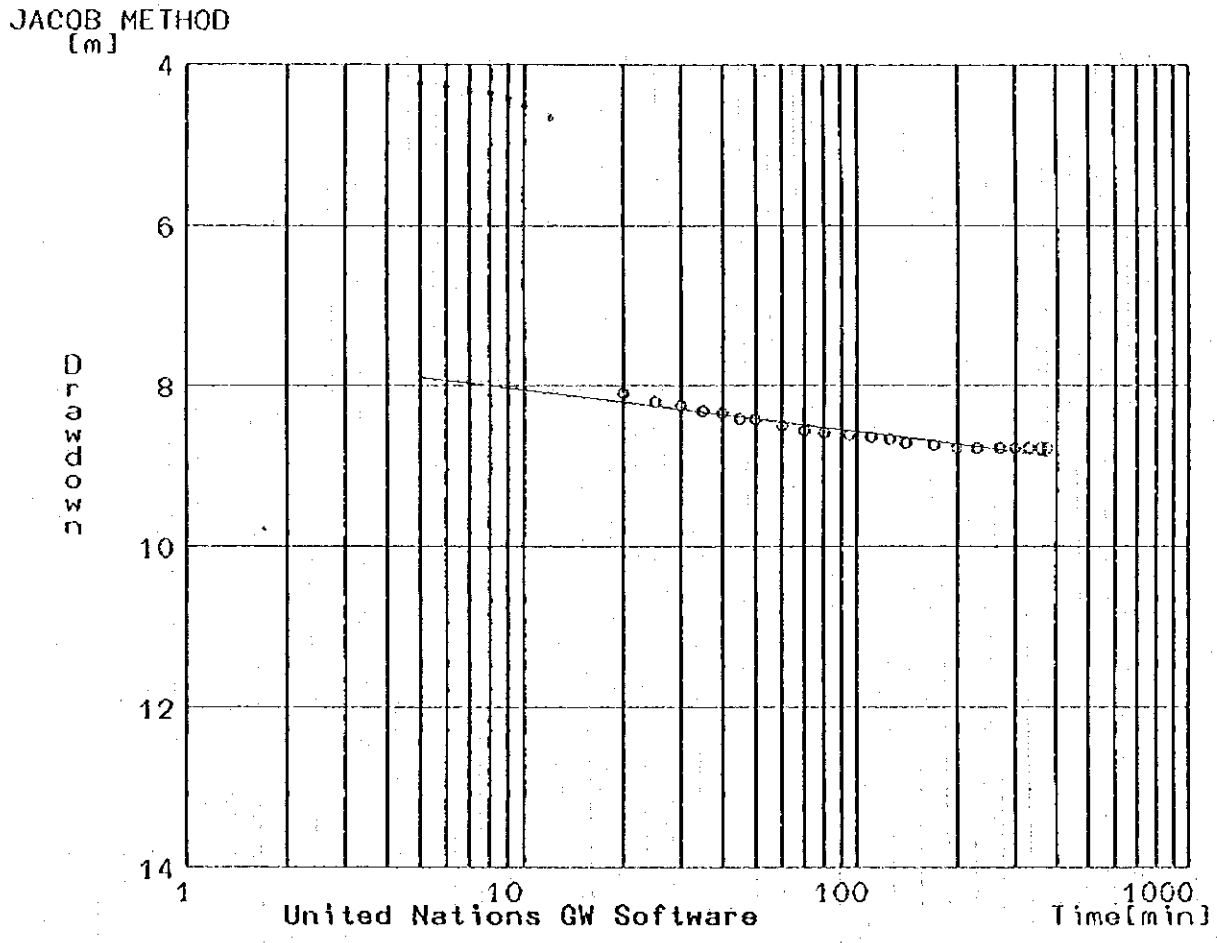
Transmissivity = 7. [m2/day]

Standard Deviation = 0.5019 [m]
A0 = 0.188785E+01
A1 = 0.951019E+00
Number of Points = 38 of 41

Project : MONDULI GROUNDWATER
Organization : JICA/RDD

Test : 142/79 KIRANY MISSION

Constant Pumping Rate = 2138.4 [m3/day]
Distance from Pumping Well = 0.08 [m]
Type of Aquifer = UNCONFINED
Initial Saturated Thickness = 29.30 [m]
Type of Input Data = DRAWDOWN
Well Type = STANDARD



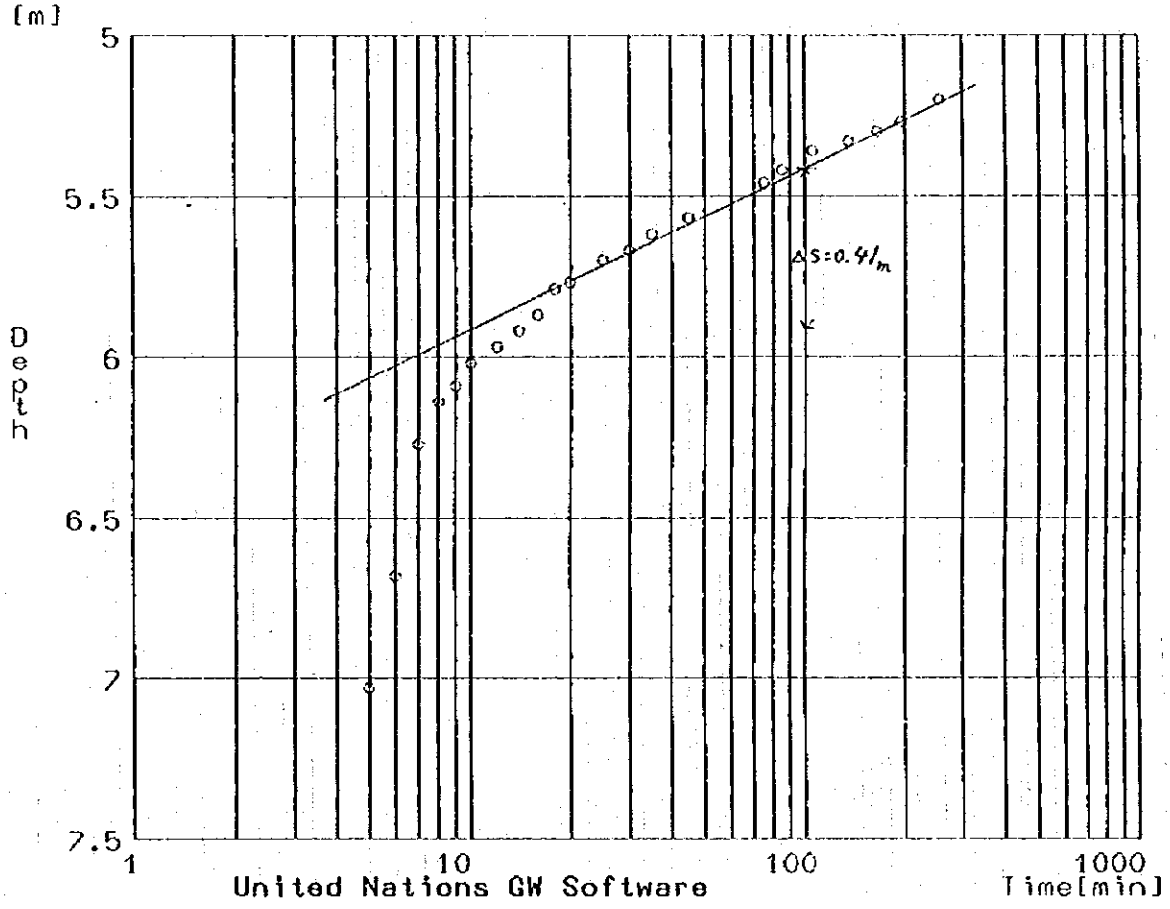
Transmissivity = 752. [m2/day]

Standard Deviation = 0.0570 [m]
A0 = 0.753228E+01
A1 = 0.520620E+00
Number of Points = 22 of 29

Project : MONDULI GROUNDWATER
Organization : JICA/RDD

Test : 142/79 RE

Constant Pumping Rate = 2138.4 [m3/day]
Distance from Pumping Well = 0.08 [m]
Type of Aquifer = UNCONFINED
Initial Saturated Thickness = 29.30 [m]
Type of Input Data = DRAWDOWN
Well Type = STANDARD

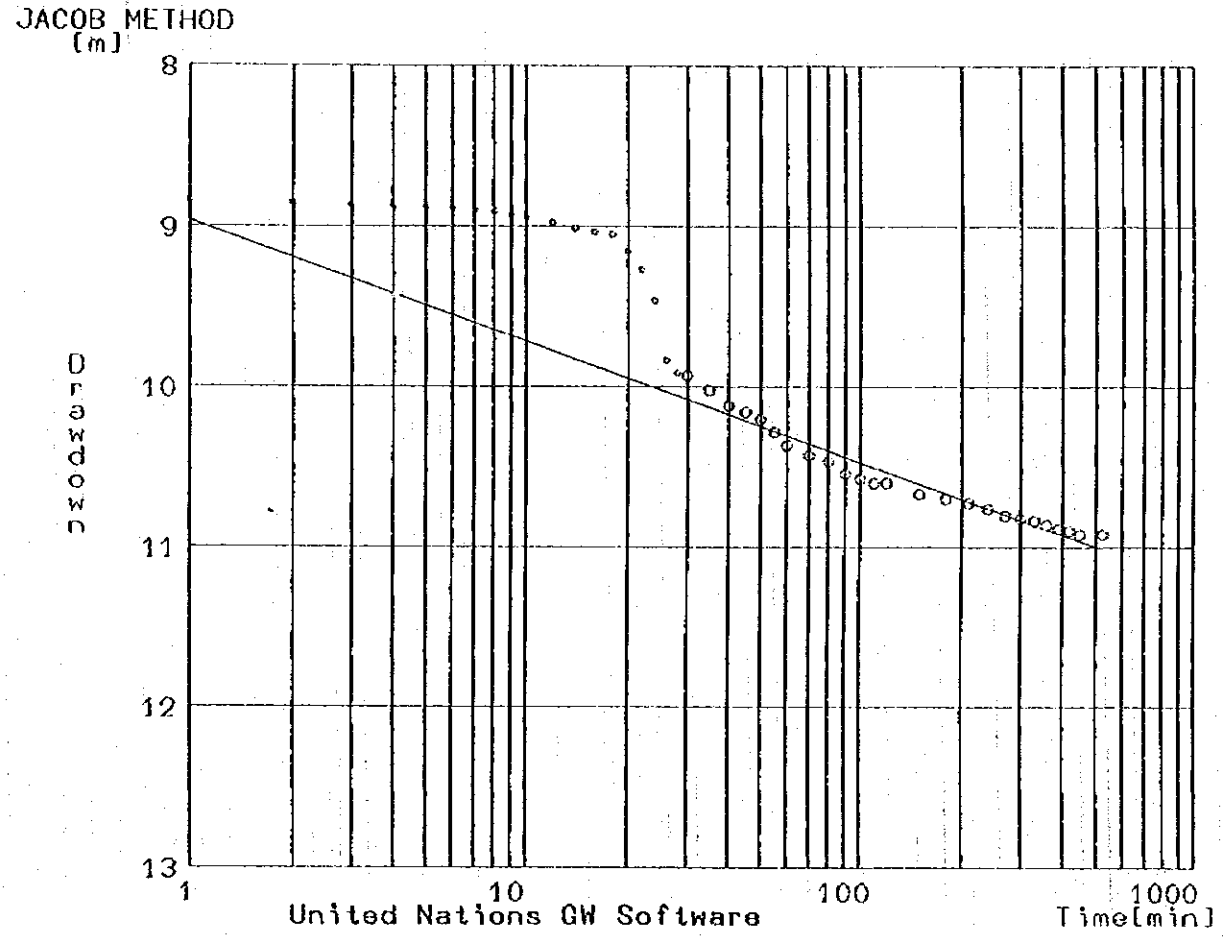


T= 954 m²/day

Project : MONDULI GROUNDWATER
Organization : JICA/RDD

Test : 75/86 ESTATE

Constant Pumping Rate = 1110.8 [m3/day]
Distance from Pumping Well = 0.15 [m]
Type of Aquifer = UNCONFINED
Initial Saturated Thickness = 35.00 [m]
Type of Input Data = DRAWDOWN
Well Type = STANDARD



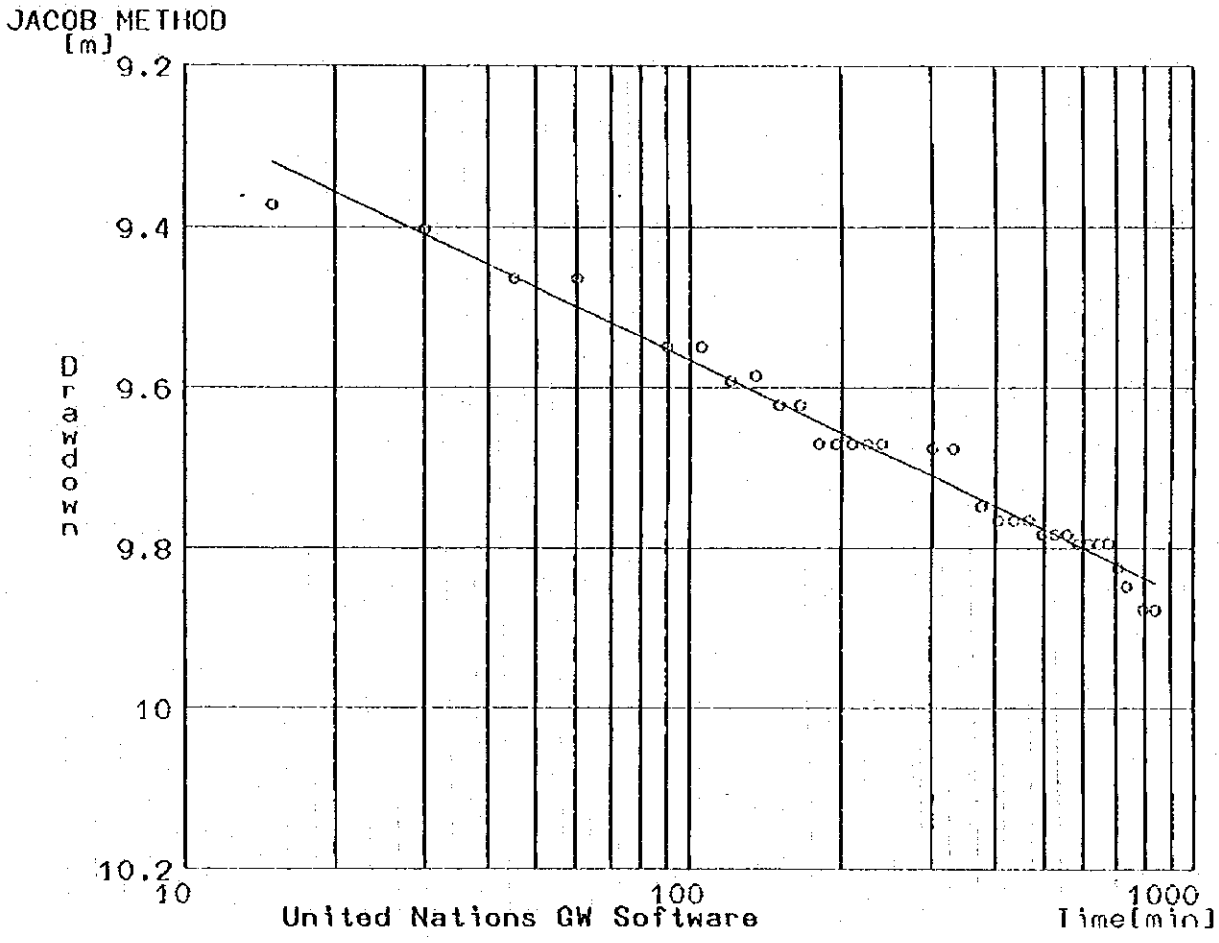
Transmissivity = 270. [m2/day]

Standard Deviation = 0.0661 [m]
A0 = 0.896617E+01
A1 = 0.752914E+00
Number of Points = 25 of 44

Project : MONDULI GROUNDWATER
Organization : JICA/RDD

Test : 96/80 SEED FARM

Constant Pumping Rate = 950.4 [m3/day]
Distance from Pumping Well = 0.10 [m]
Type of Aquifer = UNCONFINED
Initial Saturated Thickness = 30.20 [m]
Type of Input Data = DRAWDOWN
Well Type = STANDARD



Transmissivity = 578. [m2/day]

Standard Deviation = 0.0210 [m]
A0 = 0.896510E+01
A1 = 0.300712E+00
Number of Points = 32 of 32