LOG FORMAT	FIELD BOREHOLE LOG	BOREHOLE NUMBER JICA- 09 /20

PROJECT NAME : THE STUDY ON GROUNDWATER DEVELOPMENT FOR CHAMPASAK AND SARAVAN PROVINCES ,LAO PEOPLE'S DEMOCRATIC REPUBLIC

LOCATION	BAN	MAISIVILAI	FIELD BOOK NO.	C-88
	PROVINCE	CHAMPASAK	TOTAL DEPTH(m)	50.0
DRILLING COMPANY		SIAM TONE Co,.LTD.	GROUND SURFACE ELEVATION(m)	85
RIG TYPE & NUMBER		TOP-500	DATE BEGUN	17/01/'95
DRILLING METHOD		Direct Rotary circulation Down The Hole Hammer(D.H.H)	DATE COMPLETED	19/01/'95
FIELD PARTY		UTAIRAAT	STATIC WATER LEVEL(B.L.S) After Boring	Depth(m) 10.18 / 9.46 / 9.34 Time Date 19/01/'95 / 26/01/'95 / 30/01/'95
GEOLOGIST		S.OHMORI		

DEPTH (m)	LITHOLOGY	LITHOLOGY DESCRIPTION	GEOPHYSICAL LOGGING (SP mv 0 200 400 / Resistivity Ω-m 0 100 200 300 / Natural Gamma cps 0 20 40)	DRILL RATE (min/m) 0 50	WELL CONSTRUCTION Casing, 6". P.V.C.
1–8		Clay with fragment. High weathered slate. high plasticity, soft, grayish brown color. (Permian to Carboniferous)			Cement Grouting
9–14		Slate. low to middle weathered , pale gray to yellowish brown, hard, phyllitic, (Permian to Carboniferous)	long normal short normal		Back Filling
15–19		Slate. siliceous and calcareous, hard, dark blue to black color. phyllitic. fissure rich,			Bentonite Seal Gravel Packing
20–25		calcite vein rich,			20m
26–34		dark blue to black color, very hard. very hard, black,			Screen Bellows pump
35–39		Fault, pale brown, weathered, quarts vein rich, very hard in some parts,			Centrallizer
40–50		50.0m			48m Bottom Plug
51–56					

LOG FORMAT	FIELD BOREHOLE LOG	BOREHOLE NUMBER JICA- 10 /20

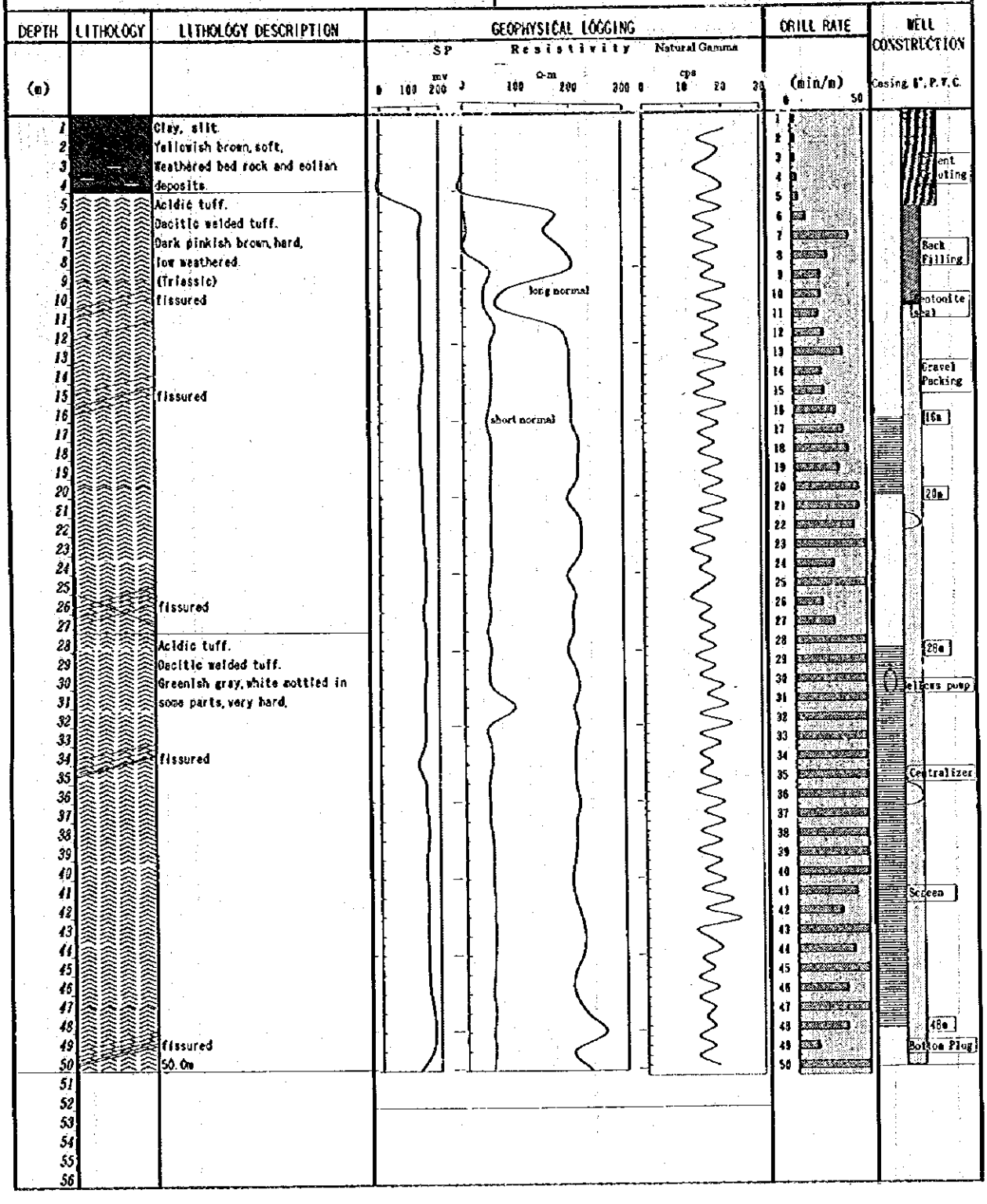
PROJECT NAME : THE STUDY ON GROUNDWATER DEVELOPMENT FOR CHAMPASAK AND SARAVAN PROVINCES ,LAO PEOPLE'S DEMOCRATIC REPUBLIC

LOCATION	BAN	NASENPHAN	
	PROVINCE	CHAMPASAK	
DRILLING COMPANY		SIAM TONE Co.,LTD.	
RIG TYPE & NUMBER		TOP-500	
DRILLING METHOD		Direct Rotary circulation	
		Down The Hole Hammer(D.H.M)	
FIELD PARTY		UTAIRAAT	
GEOLOGIST		S.OHMORI	

FIELD BOOK NO.	C-89
TOTAL DEPTH(m)	50.0
GROUND SURFACE ELEVATION(m)	88
DATE BEGUN	13/01/'95
DATE COMPLETED	16/01/'95

STATIC WATER LEVEL(B.L.S) After Boring

Depth(m)	5.42	5.3	5.29
Time			
Date	19/01/'95	26/01/'95	30/01/'95

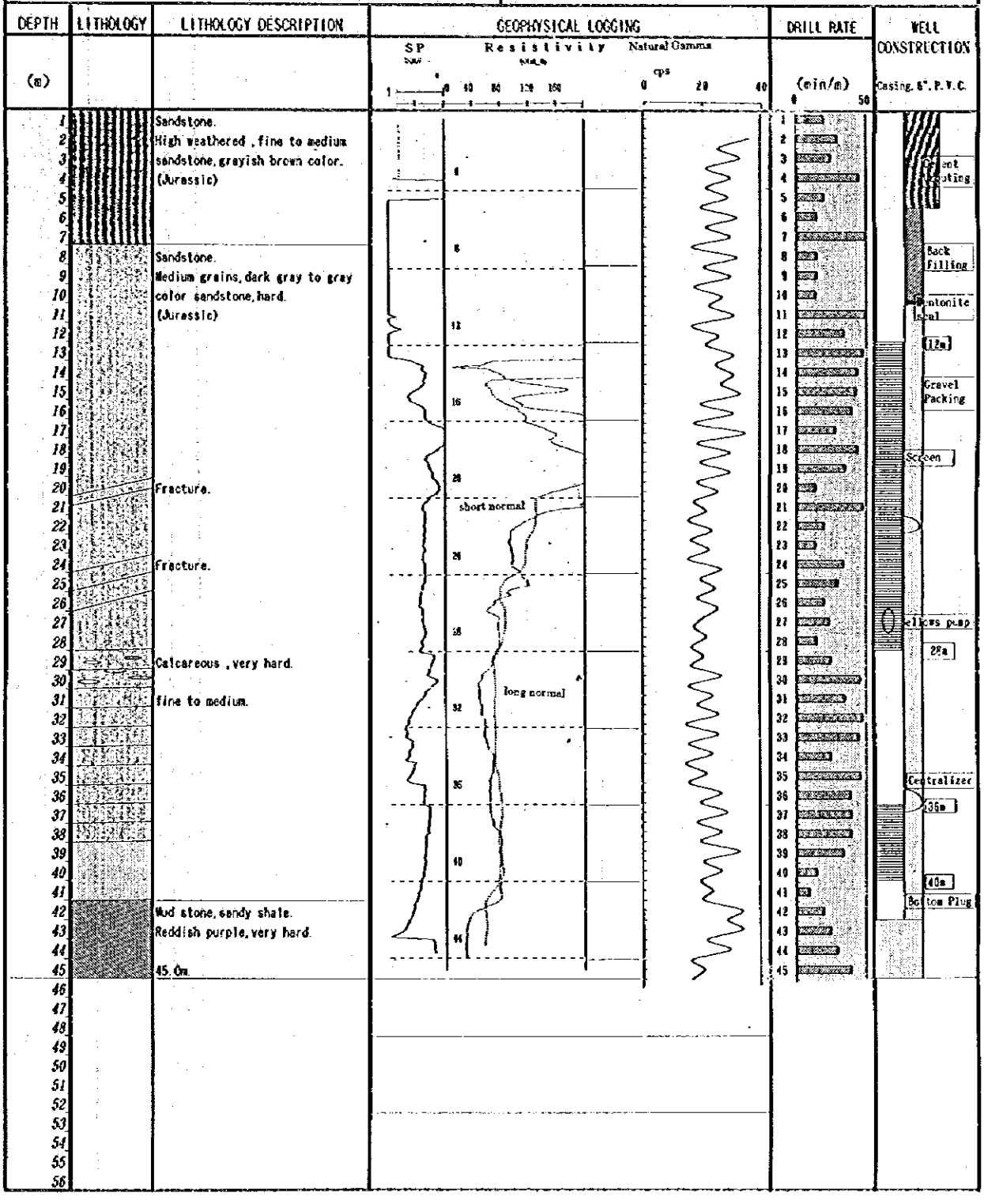


LOG FORMAT	FIELD BOREHOLE LOG	BOREHOLE NUMBER JICA- 11 /20

PROJECT NAME : THE STUDY ON GROUNDWATER DEVELOPMENT FOR CHAMPASAK AND SARAVAN PROVINCES ,LAO PEOPLE'S DEMOCRATIC REPUBLIC

LOCATION	BAN	HOUAYKAPHO	FIELD BOOK NO.	S-4
	PROVINCE	SARAVAN	TOTAL DEPTH(m)	45.0
DRILLING COMPANY		SIAM TONE Co.,LTD.	GROUND SURFACE ELEVATION(m)	160
RIG TYPE & NUMBER		TOP-300	DATE BEGUN	05/01/'95
DRILLING METHOD		Direct Rotary circulation	DATE COMPLETED	08/01/'95
		Down The Hole Hammer(D.H.H)		
FIELD PARTY		UTAIRAAT	STATIC WATER LEVEL(B.L.S)	
GEOLOGIST		S.OHMORI	After Boring	

Depth(m)	13.52	8.9	8.87
Time	0.590278		
Date	08/01/'95	8/01/'95	30/01/'95



LOG FORMAT	FIELD BOREHOLE LOG	BOREHOLE NUMBER JICA- 12 /20

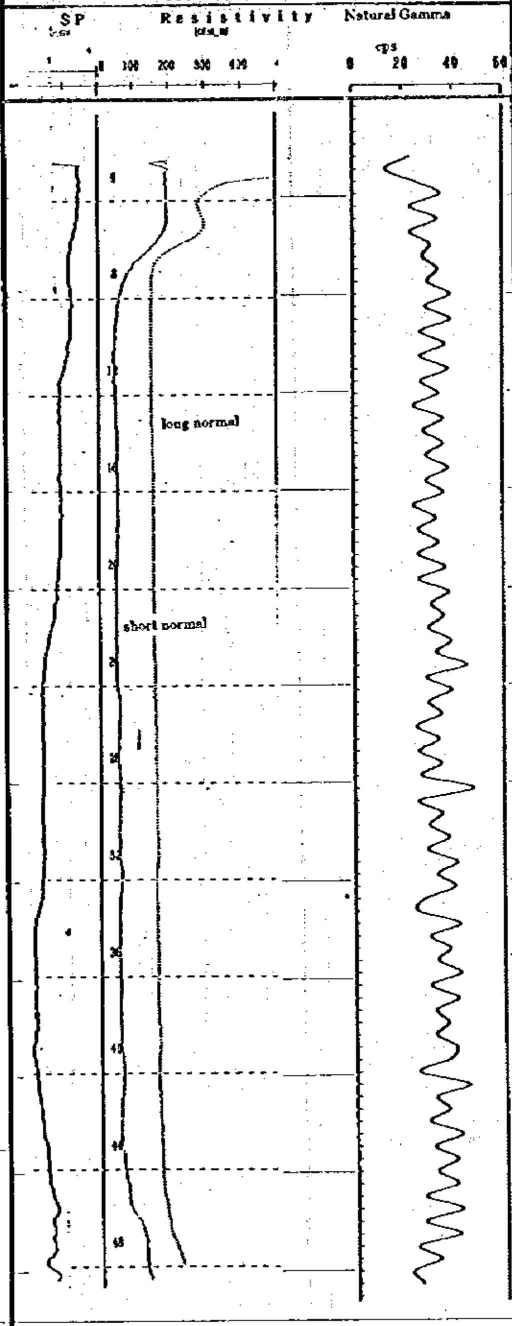
PROJECT NAME ; THE STUDY ON GROUNDWATER DEVELOPMENT FOR CHAMPASAK AND SARAVAN PROVINCES ,LAO PEOPLE'S DEMOCRATIC REPUBLIC

LOCATION	BAN	NONGSANO	FIELD BOOK NO.	S-12
	PROVINCE	SARAVAN	TOTAL DEPTH(m)	50.0
DRILLING COMPANY		SIAM TONE Co,.LTD.	GROUND SURFACE ELEVATION(m)	160
RIG TYPE & NUMBER		TOP-300	DATE BEGUN	09/01/'95
DRILLING METHOD		Direct Rotary circulation	DATE COMPLETED	12/01/'95
		Down The Hole Hammer(D.H.M)		
FIELD PARTY		UTAIRAAT		
GEOLOGIST		S.OHMORI		

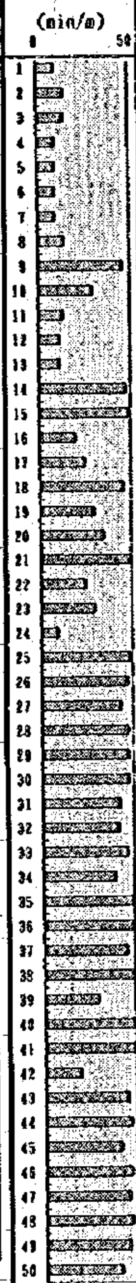
STATIC WATER LEVEL(B.L.S) After Boring				
	Depth(m)	6.95	6.5	6.43
	Time			
	Date	09/01/'95	4/01/'95	30/01/'95

DEPTH (m)	LITHOLOGY	LITHOLOGY DESCRIPTION
1–6		Clay. light brown, high plasticity, soft. Weathered Mudstone
6–43		Mud stone, sandy shale. Reddish purple, very hard. Sandstone interbeded in some parts. (Jurassic)
43–50		Sandstone. Medium grains, dark grey color, hard. (Jurassic) 50.0m

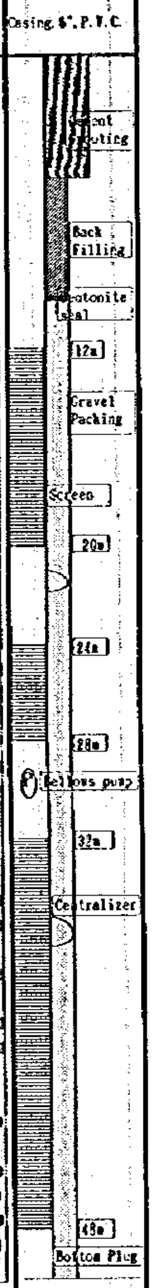
GEOPHYSICAL LOGGING



DRILL RATE (min/m)



WELL CONSTRUCTION



LOG FORMAT	FIELD BOREHOLE LOG	BOREHOLE NUMBER JICA- 13 /20

PROJECT NAME : THE STUDY ON GROUNDWATER DEVELOPMENT FOR CHAMPASAK AND SARAVAN PROVINCES ,LAO PEOPLE'S DEMOCRATIC REPUBLIC

LOCATION	BAN	DONMUANG
	PROVINCE	SARAVAN
DRILLING COMPANY		STAM TONE Co,.LTD.
RIG TYPE & NUMBER		TOP-500
DRILLING METHOD		Direct Rotary circulation
		Down The Hole Hammer(D.H.H)
FIELD PARTY		UTAIRAAT
GEOLOGIST		S.OHMORI

FIELD BOOK NO.	S-24
TOTAL DEPTH(m)	50.0
GROUND SURFACE ELEVATION(m)	130
DATE BEGUN	21/12/'94
DATE COMPLETED	22/12/'94

STATIC WATER LEVEL(B.L.S) After Boring

Depth(m)	12.77	10.24	10.3
Time			
Date	22/12/'94	30/12/'94	23/01/'95

DEPTH (m)	LITHOLOGY	LITHOLOGY DESCRIPTION
1–10		Clay. light brown, high plasticity, soft. Terrace deposits. (Quaternary)
11–14		Sandstone. weathered, dark grayish brown, fine to medium grains.
15–20		Sandstone. low weathered, dark brownish gray, medium grains, hard. (Jurassic)
21–28		Mud stone, sandy shale. Reddish purple, hard. (Jurassic)
29–39		Sandstone. dark brownish gray, medium grains, very hard. (Jurassic)
40		Mudstone. reddish purple, hard.
41–50		Sandstone. dark brownish grey, medium grains, very hard. (Jurassic) fine grains. medium grains, 50.0m
51–56		

GEOPHYSICAL LOGGING

SP (mV) | Resistivity (ohm.m) 0 40 80 120 160 | Natural Gamma (cps) 0 20 40 60

short normal

long normal

DRILL RATE (min/m) 0 20 40

WELL CONSTRUCTION

Casing 6", P.V.C.

Cement Coating

Back Filling

Gravel Packing

Centralizer

Screen

Bottom Plug

LOG FORMAT	FIELD BOREHOLE LOG	BOREHOLE NUMBER JICA- 14 /20

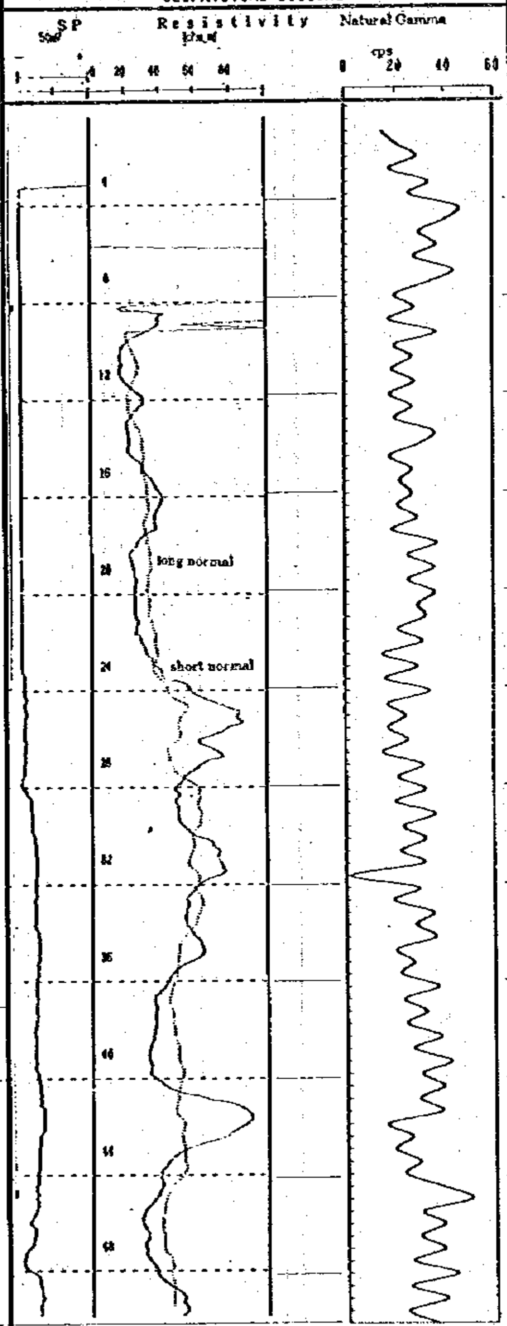
PROJECT NAME : THE STUDY ON GROUNDWATER DEVELOPMENT FOR CHAMPASAK AND SARAVAN PROVINCES , LAO PEOPLE'S DEMOCRATIC REPUBLIC

LOCATION	BAN	NONGNGONG	FIELD BOOK NO.	S-38
	PROVINCE	SARAVAN	TOTAL DEPTH(m)	50.0
DRILLING COMPANY		SIAM TONE Co.,LTD.	GROUND SURFACE ELEVATION(m)	140
RIG TYPE & NUMBER		TOP-500	DATE BEGUN	19/12/'94
DRILLING METHOD		Direct Rotary circulation Down The Hole Hammer(D.H.H)	DATE COMPLETED	20/12/'94
FIELD PARTY		UTAIRAAT	STATIC WATER LEVEL(B.L.S) After Boring	
GEOLOGIST		S.OHMORI		

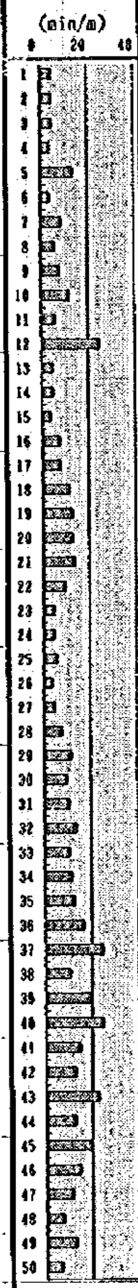
STATIC WATER LEVEL			
Depth(m)	6.61	6.95	6.33
Time			
Date	27/12/'94	09/01/'95	30/01/'95

DEPTH (m)	LITHOLOGY DESCRIPTION
1–6	Clay. light brown, medium plasticity, soft, with sand. Weathered sandstone.
7–19	Sandstone. low weathered, dark brownish gray, fine to medium grains. (Jurassic)
20–23	Mud stone, sandy shale. Reddish purple, hard. (Jurassic)
24–37	Sandstone. dark brownish gray, medium grains, very hard. (Jurassic)
38–40	Mudstone reddish purple, hard.
41–50	Sandstone. dark brownish gray, medium grains and some parts fine grains, hard. (Jurassic) 50.0m

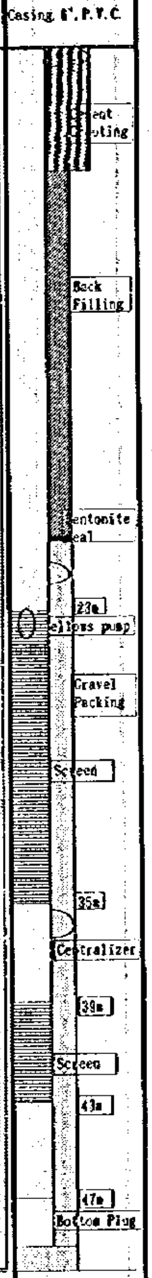
GEOPHYSICAL LOGGING



DRILL RATE (min/m)



WELL CONSTRUCTION

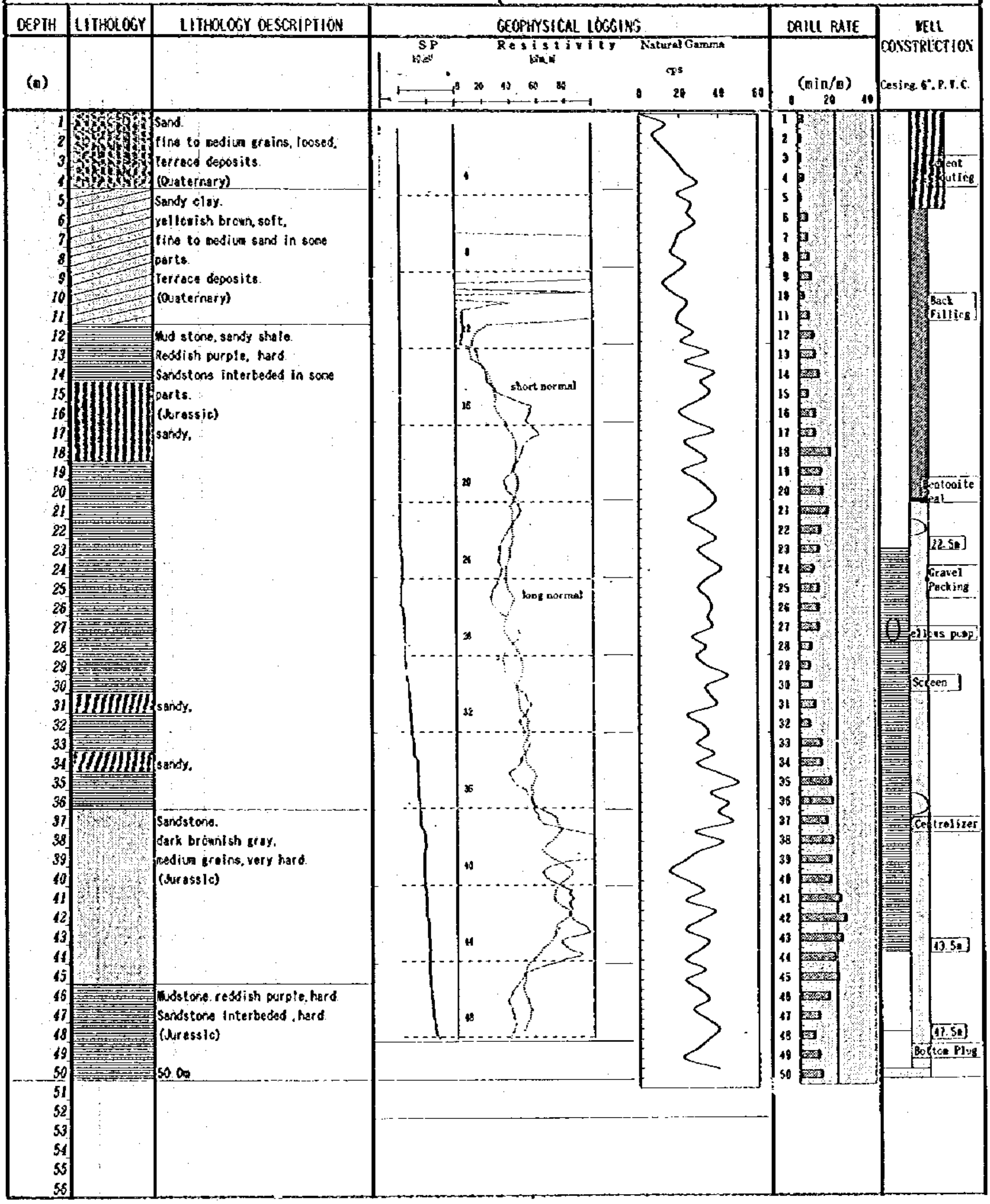


LOG FORMAT	FIELD BOREHOLE LOG	BOREHOLE NUMBER JICA- 15 /20

PROJECT NAME : THE STUDY ON GROUNDWATER DEVELOPMENT FOR CHAMPASAK AND SARAVAN PROVINCES , LAO PEOPLE'S DEMOCRATIC REPUBLIC

LOCATION	BAN	SAMIA	FIELD BOOK NO.	S-50
	PROVINCE	SARAVAN	TOTAL DEPTH(m)	50.0
DRILLING COMPANY		SIAM TONE Co.,LTD.	GROUND SURFACE ELEVATION(m)	145
RIG TYPE & NUMBER		TOP-500	DATE BEGUN	17/12/'94
DRILLING METHOD		Direct Rotary circulation Down The Hole Hammer(D.H.H)	DATE COMPLETED	18/12/'94
FIELD PARTY		UTAIRAAT	STATIC WATER LEVEL(B.L.S) After Boring	
GEOLOGIST		S.OHMORI		

Depth(m)	6.51	6.98	6.84
Time			
Date	23/12/'94	09/01/'95	23/01/'95



LOG FORMAT	FIELD BOREHOLE LOG	BOREHOLE NUMBER JICA- 16 /20

PROJECT NAME : THE STUDY ON GROUNDWATER DEVELOPMENT FOR CHAMPASAK AND SARAVAN PROVINCES ,LAO PEOPLE'S DEMOCRATIC REPUBLIC

LOCATION	BAN	CHONG	
	PROVINCE	SARAVAN	
DRILLING COMPANY		SIAM TONE Co.,LTD.	
RIG TYPE & NUMBER		TOP-500	
DRILLING METHOD		Direct Rotary circulation	
		Down The Hole Hammer(D.H.H)	
FIELD PARTY		UTAIRAAT	
GEOLOGIST		S.OHMORI	

FIELD BOOK NO.		S-56		
TOTAL DEPTH(m)		50.0		
GROUND SURFACE ELEVATION(m)		170		
DATE BEGUN		15/12/'94		
DATE COMPLETED		16/12/'94		
STATIC WATER LEVEL(B.L.S) After Boring	Depth(m)	5	4.3	4.95
	Time			
	Date	16/12/'94	22/12/'94	30/01/'95

DEPTH (m)	LITHOLOGY	LITHOLOGY DESCRIPTION
1–6		Basalt.
		High weathered lava , dark gray.
		(Neogene to Quaternary)
7–10		Basalt.
		weathered lava , dark gray.
		(Neogene to Quaternary)
		yellowish brown, weathered.
11–15		Basalt.
		Auto-brecciated lava flow.
		dark gray,
		(Neogene to Quaternary)
16–20		Mud stone, sandy shale.
		Reddish purple, hard.
		Sandstone interbeded in some
		parts.
		(Jurassic)
21–27		
28		sandy,
29–32		
33–36		Sandstone.
		dark brownish gray,
		medium to fine grains, very hard.
		(Jurassic)
37–39		
40–49		Mudstone, reddish purple, hard.
		Sandstone interbeded , hard.
		(Jurassic)
50		50.0m
51–56		

GEOPHYSICAL LOGGING

SP (mV) — Resistivity (ohm.m) — Natural Gamma (cps)

SP: 0 10 40 60 80 — Natural Gamma: 0 20 40 60

short normal

long normal

DRILL RATE (min/m): 0 20 40

WELL CONSTRUCTION

Casing 6". P.V.C.

Direct Grouting

Back Filling

Bentonite Seal

Gravel Packing

15m

Screen

23m

Bailers pump

31m

Centralizer

43m

47m

Bottom Plug

LOG FORMAT	FIELD BOREHOLE LOG	BOREHOLE NUMBER JICA- 17 /20

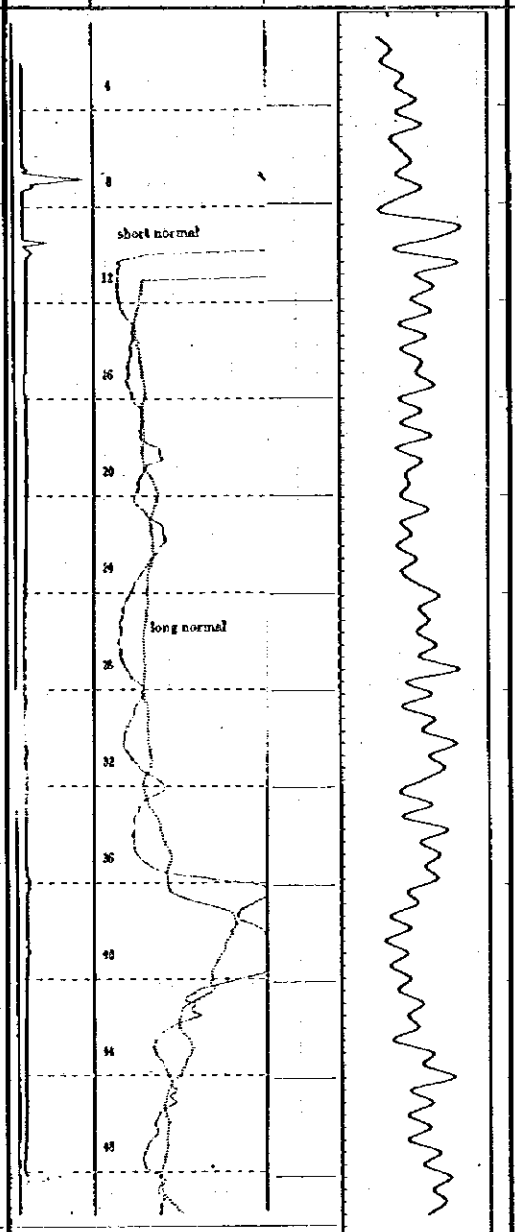
PROJECT NAME : THE STUDY ON GROUNDWATER DEVELOPMENT FOR CHAMPASAK AND SARAVAN PROVINCES ,LAO PEOPLE'S DEMOCRATIC REPUBLIC

LOCATION	BAN	PHONPHAI	FIELD BOOK NO.	s-64
	PROVINCE	SARAVAN	TOTAL DEPTH(m)	50.0
DRILLING COMPANY		SIAM TONE Co,.LTD.	GROUND SURFACE ELEVATION(m)	190
RIG TYPE & NUMBER		TOP-500	DATE BEGUN	12/12/'94
DRILLING METHOD		Direct Rotary circulation Down The Hole Hanner(D.H.H)	DATE COMPLETED	:
FIELD PARTY		UTAIRAAT	STATIC WATER LEVEL(B.L.S)	
GEOLOGIST		S.OHMORI	After Boring	

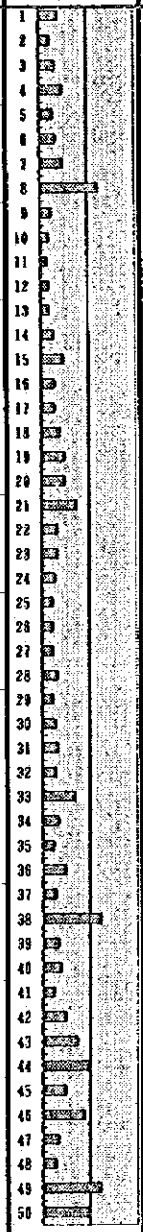
Depth(m)	9.25	9.88	10.04
Time			
Date	13/12/'94	27/12/'94	23/01/'95

DEPTH (m)	LITHOLOGY	LITHOLOGY DESCRIPTION
1–8		Sandstone. High weathered, reddish brown.
3–8		Sandstone. medium grains, hard. dark brownish gray. (Jurassic)
9–11		Shale. reddish brown, low weathered. (Jurassic)
12–35		Sandy shale. dark reddish purple, hard. Sandstone interbeded in some parts. (Jurassic)
36–41		Sandstone. dark brownish gray, medium to fine grains, very hard. (Jurassic)
42–49		Mudstone. reddish purple, very fine sandy, sandstone interbeded in some parts. (Jurassic)
50		50.0m

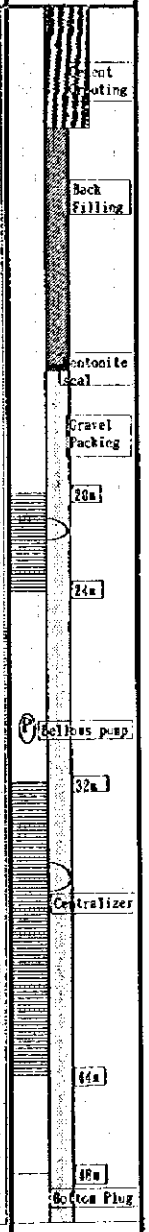
GEOPHYSICAL LOGGING: SP / Resistivity / Natural Gamma (cps)



DRILL RATE (min/m)



WELL CONSTRUCTION — Casing 6", P.V.C.



LOG FORMAT	FIELD BOREHOLE LOG	BOREHOLE NUMBER JICA- 18 /20

PROJECT NAME : THE STUDY ON GROUNDWATER DEVELOPMENT FOR CHAMPASAK AND SARAVAN PROVINCES ,LAO PEOPLE'S DEMOCRATIC REPUBLIC

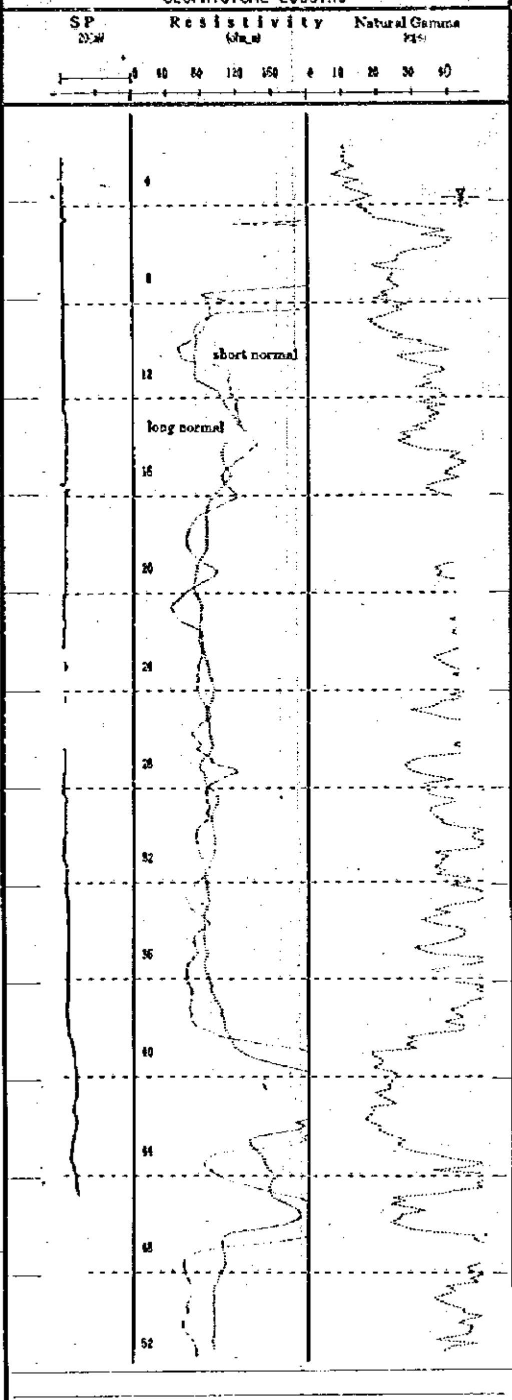
LOCATION	BAN	NAKASAO
	PROVINCE	SARAVAN
DRILLING COMPANY		SIAM TONE Co.,LTD.
RIG TYPE & NUMBER		TOP-500
DRILLING METHOD		Direct Rotary circulation Down The Hole Hammer(D.H.H)
FIELD PARTY		UTAIRAAT
GEOLOGIST		S.OHMORI

FIELD BOOK NO.	S-75
TOTAL DEPTH(m)	53.0
GROUND SURFACE ELEVATION(m)	194
DATE BEGUN	09/12/'94
DATE COMPLETED	11/12/'94

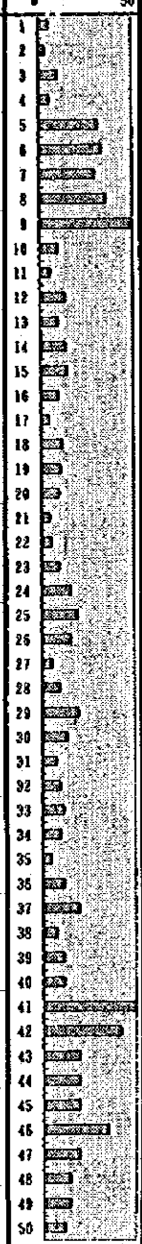
STATIC WATER LEVEL(B.L.S) After Boring				
	Depth(m)	4.22	4.36	4.62
	Time	13:00		
	Date	12/12/'94	04/01/'95	30/01/'95

DEPTH (m)	LITHOLOGY	LITHOLOGY DESCRIPTION
1–3		Clay. Yellowish brown, soft clay. weathered sandstone.
4–6		Sandstone. dark brown, high weathered, fine to very fine . (Jurassic)
7–15		Sandstone. fine to medium grains, dark brown to reddish brown, very hard . (Jurassic)
16–26		Sandy shale. dark reddish purple, hard. Sandstone interbeded in some parts. (Jurassic)
27–28		Sandstone. dark gray, medium grains.
29–37		Sandy shale. reddish purple, hard.
38–47		Sandstone. dark brownish gray, medium to fine grains, very hard. (Jurassic)
48–53		Mudstone. reddish purple, very fine sandy, sandstone interbeded in some parts. (Jurassic)
54–56		

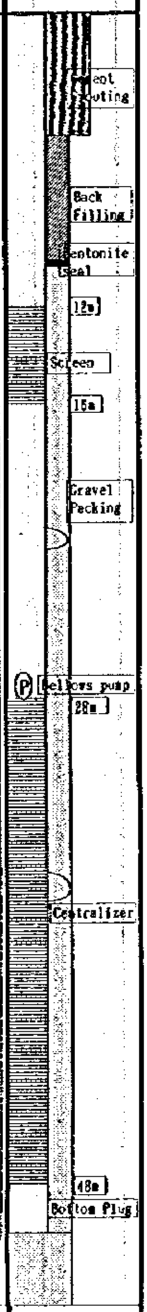
GEOPHYSICAL LOGGING



DRILL RATE (min/m)



WELL CONSTRUCTION Casing 6" P.V.C



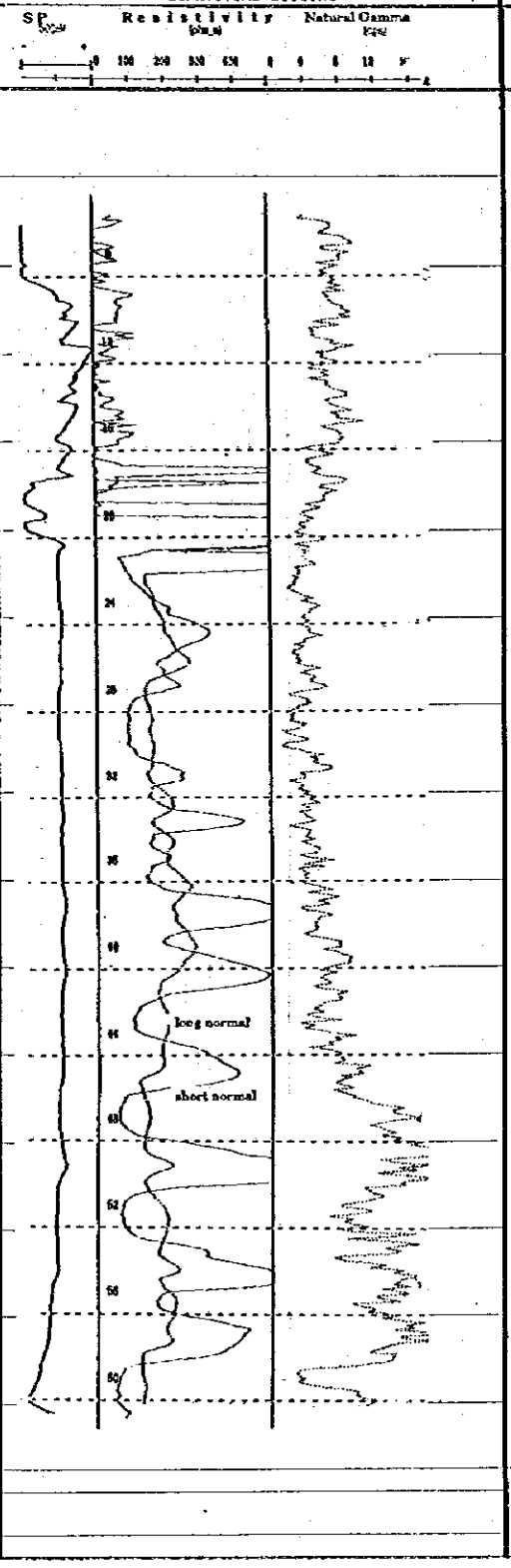
LOG FORMAT	FIELD BOREHOLE LOG	BOREHOLE NUMBER JICA- 19 /20

PROJECT NAME : THE STUDY ON GROUNDWATER DEVELOPMENT FOR CHAMPASAK AND SARAVAN PROVINCES ,LAO PEOPLE'S DEMOCRATIC REPUBLIC

LOCATION	BAN	BENG	
	PROVINCE	SARAVAN	
DRILLING COMPANY		SIAM TONE Co,.LTD.	
RIG TYPE & NUMBER		TOP-500	
DRILLING METHOD		Direct Rotary circulation	
		Down The Hole Hammer(D.H.H)	
FIELD PARTY		UTAIRAAT	
GEOLOGIST		S.OHMORI	

FIELD BOOK NO.		$-84		
TOTAL DEPTH(m)		66.0		
GROUND SURFACE ELEVATION(m)		308		
DATE BEGUN		06/12/'94		
DATE COMPLETED		08/12/'94		
STATIC WATER LEVEL(B.L.S) After Boring	Depth(m)	16.16	17.3	18.98
	Time			
	Date	08/12/'94	30/12/'94	30/01/'95

DEPTH (m)	LITHOLOGY	LITHOLOGY DESCRIPTION
1		Weathered Basalt.Lava flow.
2		Dark brownish gray,hard.
3		(Neogene to Quaternary)
4		Basalt.
5		low weathered,hard.
6		
7		fissured.
8		gray to dark gray , hard.
9		
10		fissured.
11		gray to dark gray , hard.
12		
13		
14		fissured.
15		gray to dark gray , hard.
16		
17		
18		gray to dark gray ,very hard.
19		
20		
21		
22		hard, fresh lava.
23		
24		
25		
26		
27		Weathered,brown color.
28		fissured.
29		Auto-brecciated lava.
30		Gray,reddish brown,porous,
31		weathered.
32		fissured.
33		
34		Auto-brecciated lava.
35		Gray,reddish brown,porous,
36		fissured.
37		
38		Auto-brecciated lava.
39		Gray,reddish brown,high porous,
40		
41		
42		
43		
44		
45		
46		
47		Basalt , lava flow(alkali basalt)
48		Gray to dark gray ,very hard.
49		(Paleogene to Quaternary)
50		
51		fissured
52		
53		
54		
55		
56		
57		
58		Sandstone.
59		Pale gray ,medium grains,high
60		sorting.
61		(Jura.-Cretaceous)
62		
63		
64		Sandstone.
65		Pale gray ,medium grains,high
66		sorting.
67		66.0m



DRILL RATE (min/m) 0 20 40

WELL CONSTRUCTION
Casing 6",Steel.
Cement Grouting
Back Filling
Bentonite Seal
Gravel Packing
18m
Screen
Centralizer
48m
P
PUMP
Bottom Plug

LOG FORMAT	FIELD BOREHOLE LOG	BOREHOLE NUMBER JICA- 20 /20

PROJECT NAME : THE STUDY ON GROUNDWATER DEVELOPMENT FOR CHAMPASAK AND SARAVAN PROVINCES ,LAO PEOPLE'S DEMOCRATIC REPUBLIC

LOCATION	BAN	HOUN-TAI	
	PROVINCE	SARAVAN	
DRILLING COMPANY		SIAM TONE Co.,LTD.	
RIG TYPE & NUMBER		TOP-500	
DRILLING METHOD		Direct Rotary circulation	
		Down The Hole Hammer (D.H.H)	
FIELD PARTY		UTAIRAAT	
GEOLOGIST		S.OHMORI	

FIELD BOOK NO.		S-100		
TOTAL DEPTH(m)		54.0		
GROUND SURFACE ELEVATION(m)		520		
DATE BEGUN		21/11/'94		
DATE COMPLETED		5/12/'94		
STATIC WATER LEVEL (B.L.S) After Boring	Depth(m)	18.72	19.22	20.78
	Time	10:00		
	Date	12/12/'94	30/12/'94	23/01/'95

DEPTH (m)	LITHOLOGY	LITHOLOGY DESCRIPTION
1–10		Loam. Reddish brown medium to high plasticity, soft, clayey. (Neogene to Quaternary)
11–13		High weathered basalt. reddish brown color, soft. (Neogene to Quaternary)
14–38		High weathered basalt. Yellowish brown, loam with cobble (mud flow deposits) (Neogene to Quaternary)
39–48		Basalt. high to medium weathered, dark brown color, hard.
49		Loam. High weathered, brown.
50		Basalt hard (boulder).
51–53		Basalt low weathered , dark grey, hard.
54		54.0m
55–56		

GEOPHYSICAL LOGGING: SP; Resistivity (ohm.m); Natural Gamma (cps)

DRILL RATE (min/m): 0 20 40

WELL CONSTRUCTION: Casing 6" P.V.C.

- Cement Grouting
- Back Filling Bentonite Seal
- 9m
- Screen
- Gravel Packing
- 21m
- 34m
- Centralizer
- Sellers pump
- 46m
- Bottom Plug

Text of hand pump maintenance for village caretaker.

ວົງການຮ່ວມມືສາກົນຍີ່ປຸ່ນ (JICA)

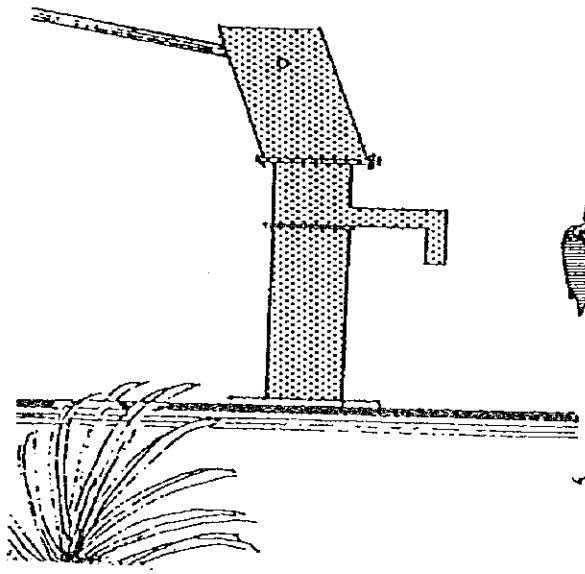
Japan International Cooperation Agency (JICA)

ຄູ່ມືການບຳລຸງຮັກສາປ້ຳນ້ຳ

Text of Hand pump Maintenance

ສຳລັບຜູ້ຮັກສາຂັ້ນໝູ່ບ້ານ

for Village Caretaker



ສະຖາບັນອະນາໄມ ແລະ ລະບາດ

National Institute of Hygiene and Epidemiology

ກະຊວງສາທາລະນະສຸກ ສ.ປ.ປ ລາວ

Ministry of Health, Lao P.D.R.

ແລະ

and

ວົງການຮ່ວມມືສາກົນຍີ່ປຸ່ນ

JICA Study Team

112
61.8
SSS

ອົງການຮ່ວມມືສາກົນຍີ່ປຸ່ນ (JICA)

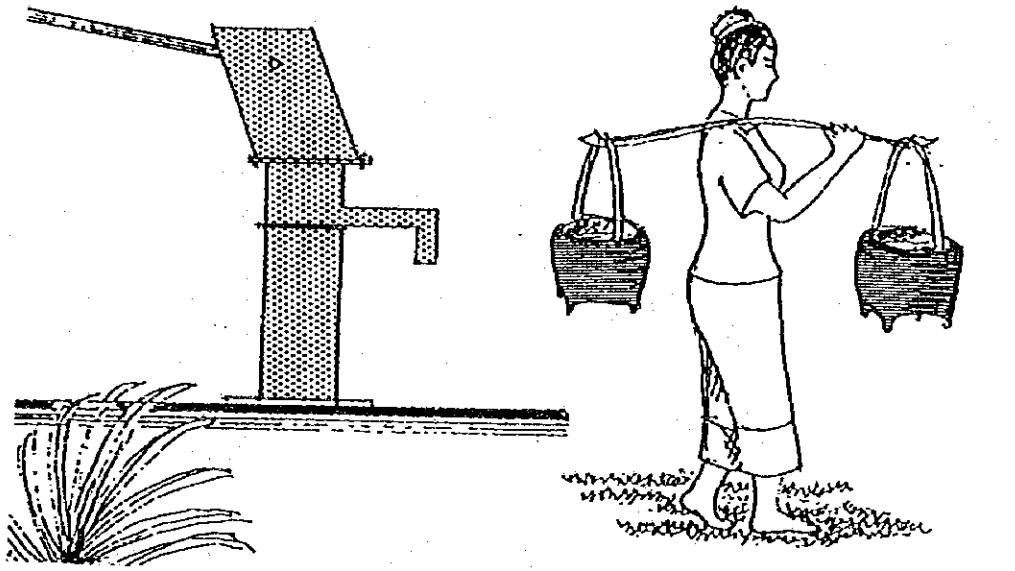
Japan International Cooperation Agency (JICA)

ຄູ່ມືການບຳລຸງຮັກສາປໍ້ານ້ຳ

Text of Hand pump Maintenance

ສຳລັບຜູ້ຮັກສາຂັ້ນໝູ່ບ້ານ

for Village Caretaker



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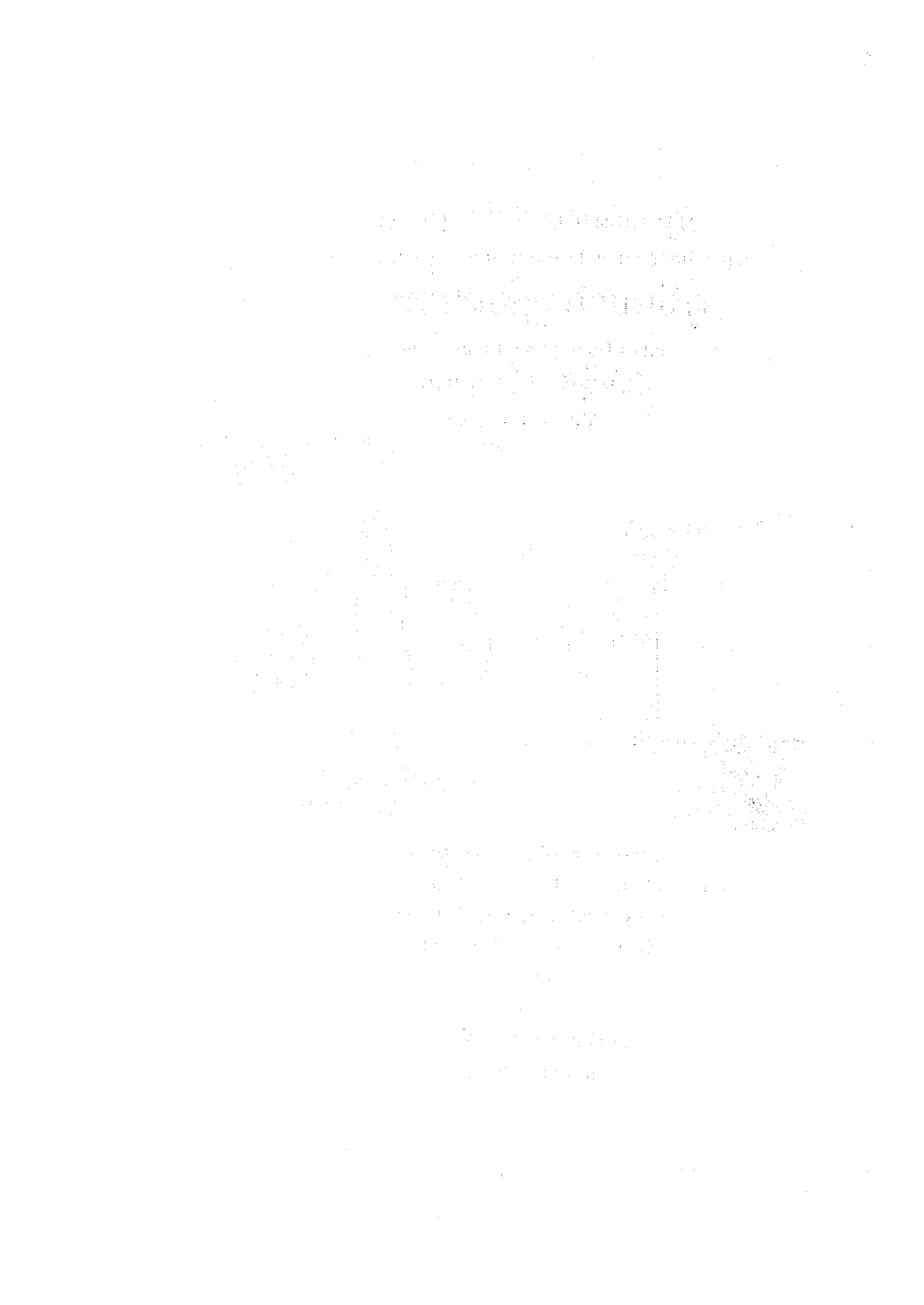
JICA Study Team



ຄຳນຳ

PREFACE

ການຈັດພິມປຶ້ມຄູ່ມືການນຳໃຊ້ນ້ຳນີ້ ຖືວ່າເປັນການຈັດພິມຄັ້ງທຳອິດ ໂດຍໄດ້ຮັບການ ອຸປະຖຳຈາກ ອົງການຮ່ວມມືສາກົນຍີ່ປຸ່ນ (JICA) ເພື່ອແນໃສ່ຮັບໃຊ້ໃຫ້ແກ່ຜູ້ທີ່ໄດ້ ນຳໃຊ້ ບຳລະບັດຮັກສາ ແລະ ສ້ອມແປງຂັ້ນໝູ່ບ້ານ ກໍຄືບັນດາສຳນັກງານອົງການທີ່ມີ ສ່ວນ ກ່ຽວຂ້ອງ ແລະປະຊາຊົນຜູ້ນຳໃຊ້ນີ້ຄວນເຂົ້າໃຈໃນການນຳໃຊ້ ບຳລະບັດ ຮັກສາ, ສ້ອມແປງໃນຂັ້ນພື້ນຖານ.
ພວກເຮົາຫວັງວ່າ ປຶ້ມຫົວນີ້ຈະສາມາດອຳນວຍຄວາມສະດວກ ແລະມີຄຸນປະໂຫຍດມາສູ່ ພວກທ່ານ ບໍ່ຫຼາຍກໍໜ້ອຍ ພ້ອມນີ້ກໍສະເໜີມາຍັງທ່ານ ທັງໄດ້ໃຫ້ການແນະນຳ ແລະ ຄຳນິຕິຊົມ ເພື່ອຈະໄດ້ນຳໄປ ປັບປຸງ ແກ້ໄຂໃນຂັ້ນຕໍ່ໄປ.

This well maintenance text book was prepared by the JICA Study Team to provide a guideline for the hand pump system in the villages.

ພ້ອມນີ້ ກໍຖືໂອກາດສະແດງຄວາມຊົມເຊີຍຕໍ່ຄະນະຮຽບຮຽງປຶ້ມ ແລະນັກວິຊາການຝ່າຍ ໂຄງການ ຈັດການນ້ຳສະອາດ ທີ່ໄດ້ຊ່ວຍສະໜອງຂໍ້ມູນເຂົ້າໃນປຶ້ມຫົວນີ້ ພ້ອມນີ້ ກໍຂໍຂອບໃຈຢ່າງສູງຕໍ່ ອົງການຮ່ວມມືສາກົນຍີ່ປຸ່ນ ທີ່ຊ່ວຍອຸປະຖຳໃນການພິມໃນຄັ້ງນີ້ ໃຫ້ສຳເລັດພິມໄປດ້ວຍດີ.

We wish to express our sincere thanks to the officials and personnel concerned of the Lao P.D.R.

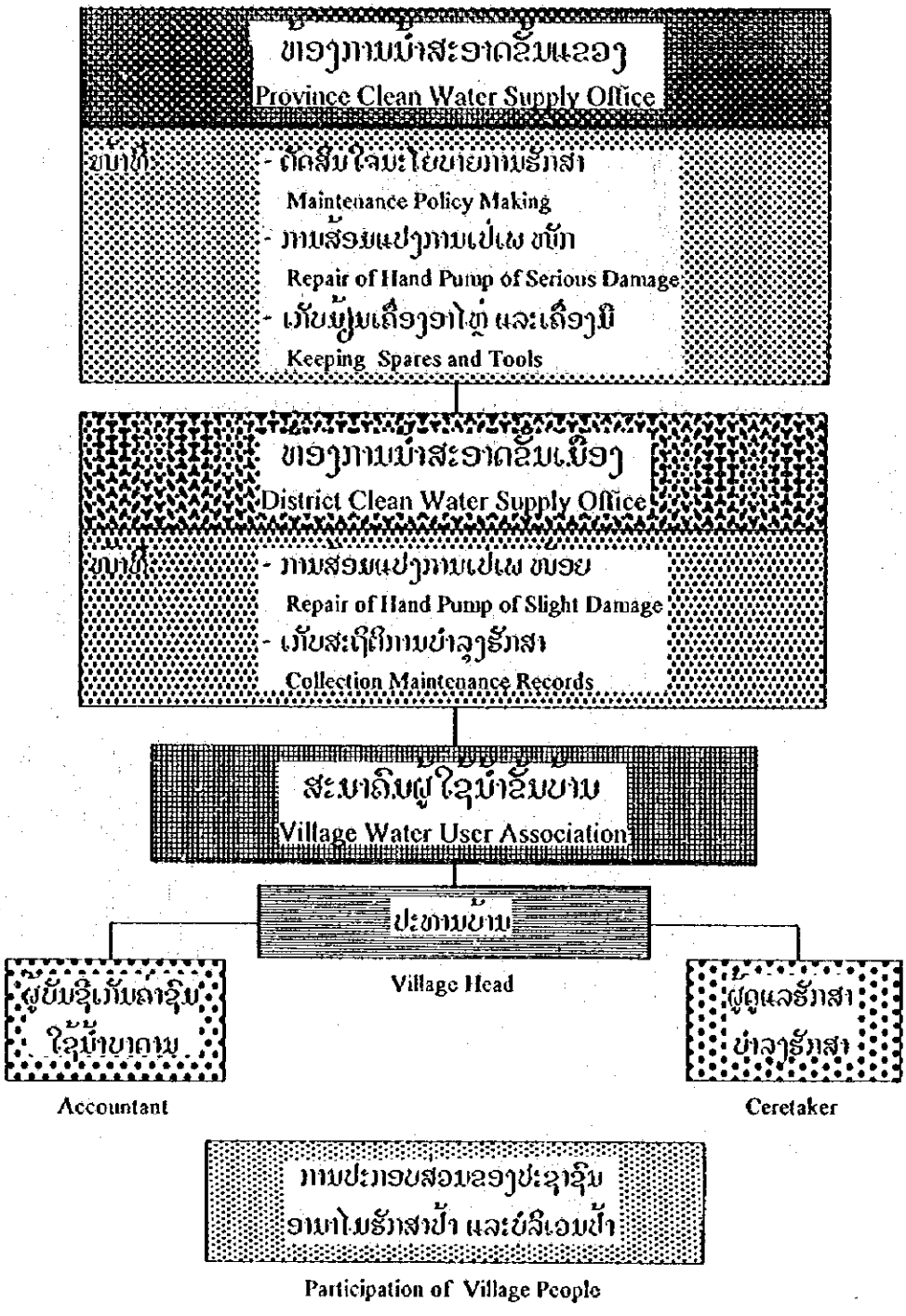
ຈັດທຳໂດຍ:

ຄະນະສຳຫຼວດຂອງ JICA 1995
The JICA Study Team. 1995.

ສາລະບານ

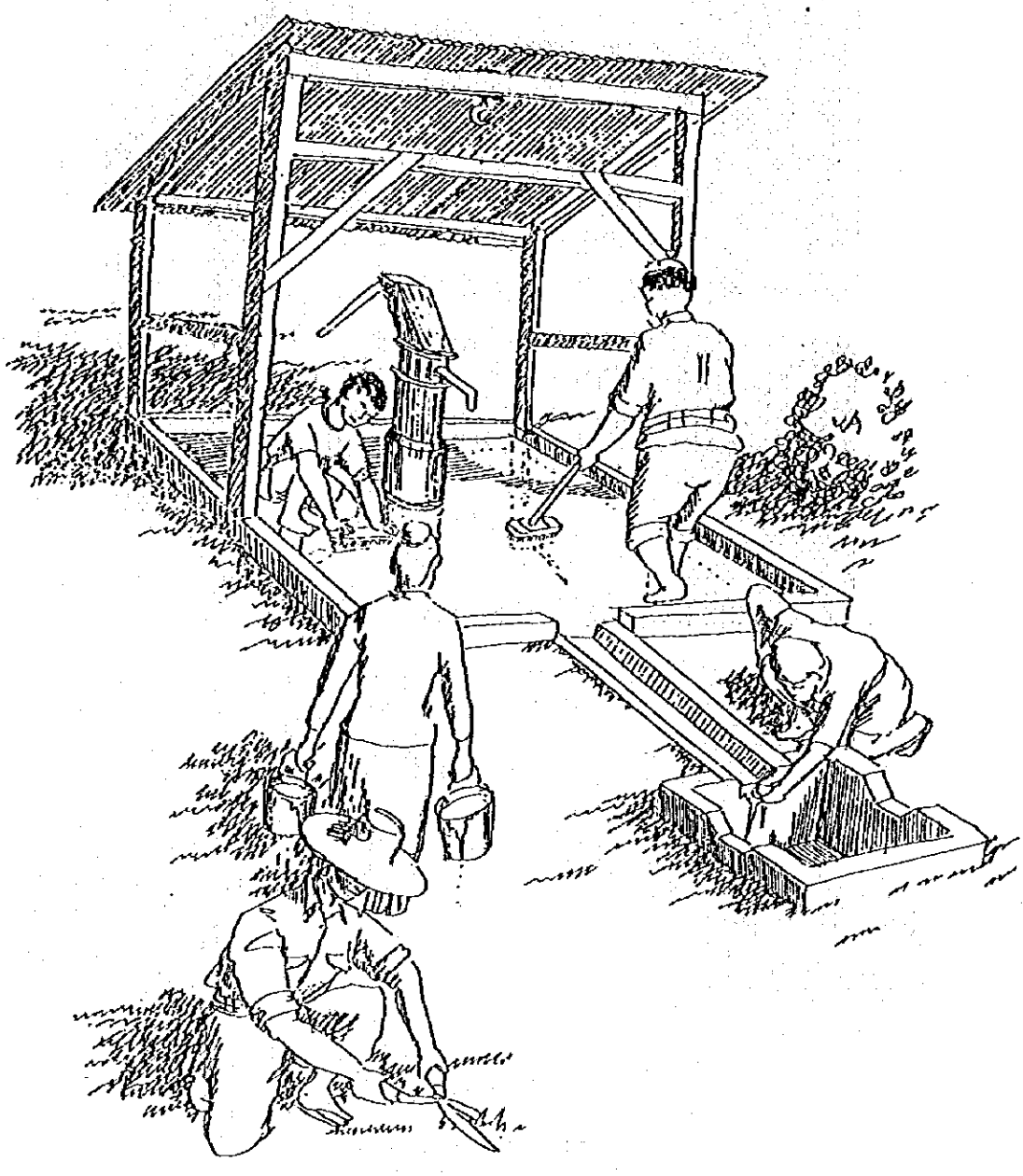
CONTENTS

ໂຄງຮ່າງສາຍການຈັດຕັ້ງ ແລະວິທີການບຳລຸງຮັກສາ
MAINTENANCE POLICY AND ORGANIZATION



• ການໃຫ້ການຮັກສາບໍລິເວນຂອງປ້ຳນ້ຳສະອາດ

KEEP THE PUMP ENVIRONS CLEAN



• ການກວດກາປະຈຳວັນຂອງປ້ຳມ້ຳ

DAILY CHECKING OF THE HAND PUMP

- ກວດເບິ່ງວ່າ:

Check:

1. ການຈັບໃຊ້ປ້ຳໄດ້ຍາກ ຫຼືງ່າຍ.

The handle is easy or difficult to operate.

- ພົ້ນໃສ່ນ້ຳມັນເຄື່ອງ.

If not, Lubricate it by applying grease.

- ກວດເບິ່ງນ໊ອດ, ຕະປູງໍ ແລະໂສ້, ຄວນຈະປ່ຽນໜ້າທີ່ການຫຼ້ຍຫຼ້ນ ຫຼືເປ່ເພ.

Check all nuts, bolts and chain, replace them if worn out / damaged parts are found.

2. ກວດເບິ່ງການໄຫຼຂອງນ້ຳໜຶ່ງພໍຕາມຄວາມຕ້ອງການ.

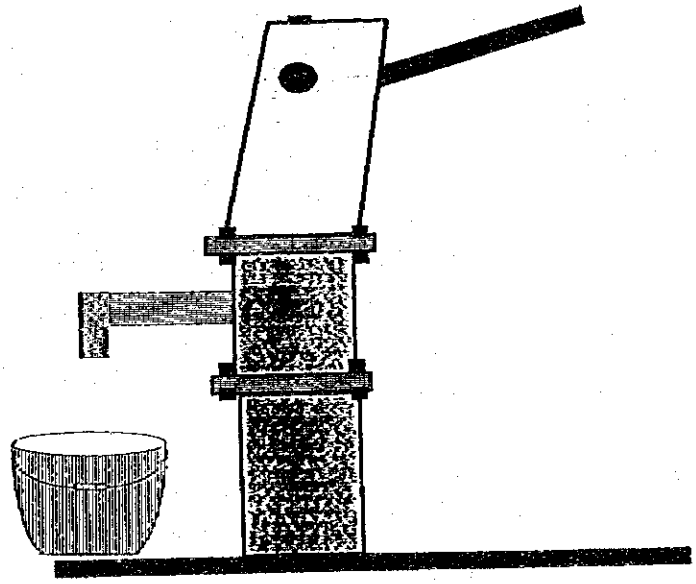
Water discharge is satisfactory.

- ຖ້າມະດາ, ຫນ້ອຍ, ຊ້ຳ ຫຼື ຢຸດ.

If it is little, delayed or stopped, check the cylinder component by yourself.

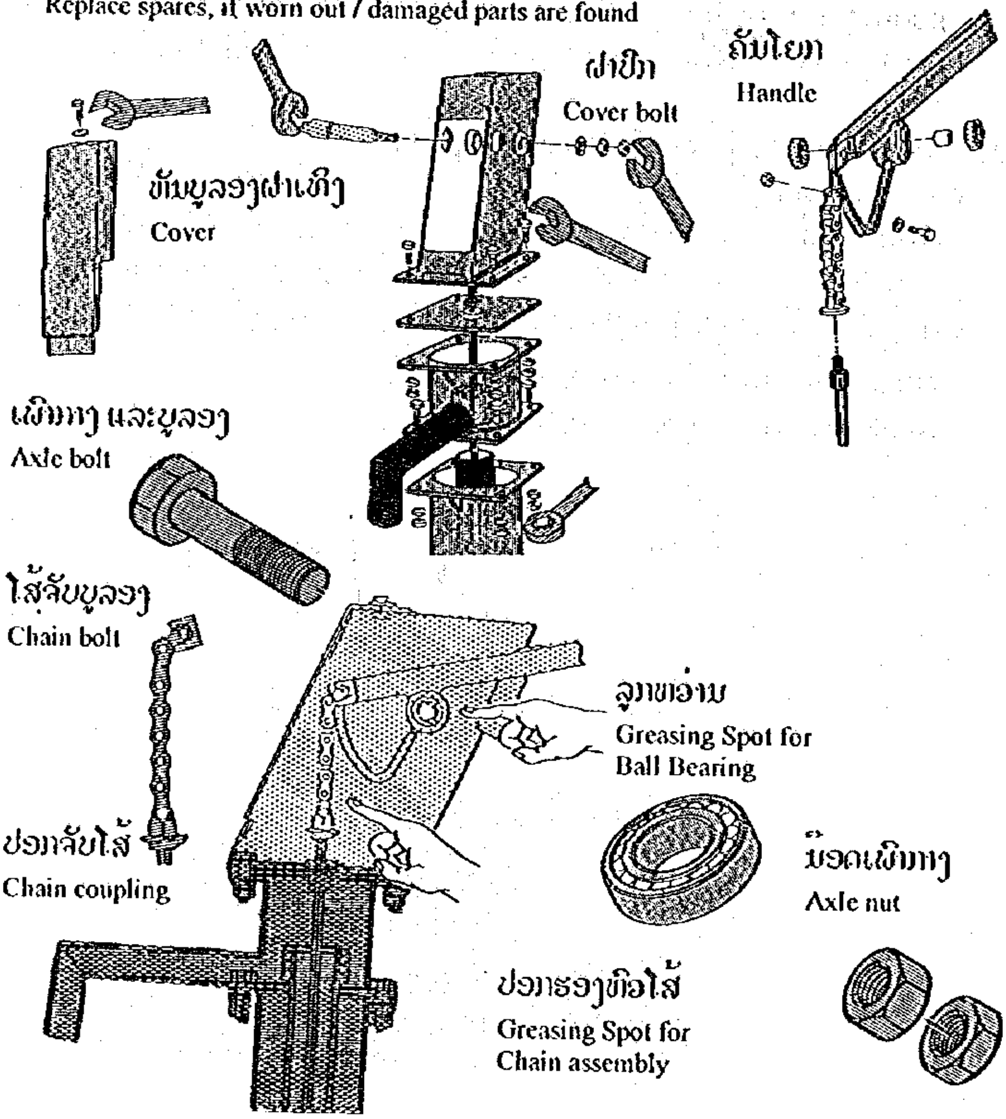
- ຖ້າຊ້ຳ ຫຼືຢຸດ ໃຫ້ກວດກາລູກສູບດ້ວຍຕົນເອງ ຫຼືຂໍຄວາມຊ່ວຍເຫຼືອຈາກ ພາກສ່ວນທ້ອງການ ນ້ຳສະອາດ ເພື່ອສ້ອມແປງ.

Ask the District Clean Water Supply Office for repair.



• ການປ່ຽນອາໄຫຼ່ໃຫ້ຫົວນ້ຳ
REPLACING SPARES FOR PUMP HEAD

- ມ້າງຝາແລະກວດເບິ່ງນ໊ອດ, ກະປູກຽວແລະໂສ້
  Dismantle the cover of pump and check all nuts, bolt and chain
- ເອົານ້ຳມັນເຄື່ອງໃສ່
  Lubricate them by applying grease
- ປ່ຽນອາໄຫຼ່ຖ້າເປ່ເພ ຫຼືຫຼູ້ຍຫຽນ
  Replace spares, if worn out / damaged parts are found



• ການປຸ່ມລະບົບອາລຸ່ມ (1)
PULLING UP OF THE PUMP ROD (1)

ການປຸ່ມວາວ Indian-Mark (3) ແມ່ນບໍ່ຈຳເປັນຖອດທໍ່ສູບນ້ຳ (Riser Pipe) ອອກ.
The valve of Indian Mark (3) can be replaced without pulling out Riser Pipe

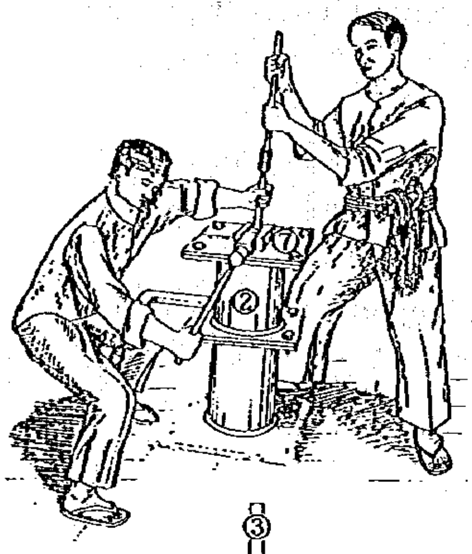
ວິທີປ່ຽນວາວ
Valve replacing procedure

1. ເອົາຫົວນ້ຳ ① ອອກຈາກຕົວນ້ຳ ②
Pump head ① is removed from pump body ②

2. ເອົາຄັນສູບ ③ ຕໍ່ເຂົ້າກັບຄັນໂຍກ ④
Rod Lifter ④ is connected with Pump rot ③

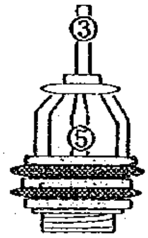
3. ໝຸນຄັນຍົກ ④ ໄປເບື້ອງຊ້າຍ ແລ້ວ ຍົກຂຶ້ນຢູ່ໃນການປະກອບຂອງລູກສູບ ເຮົາຈະເຫັນສິ້ນສ່ວນຂອງຫົວວາວ⑤ ແລະກົ້ນວາວ ⑥
When rot lifter ④ is rotated left Upper valve ⑤ and Under valve ⑥ connected in Cylinder assembly

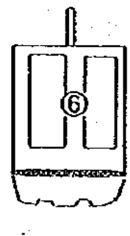
• ການປ່ຽນລະບົບວາວລຸ່ມ (2)
PULLING UP OF THE ROD (2)



4. ເອົາແຜ່ນຮອງຄັນປ້ຳ ⑦ ຕິດຕັ້ງເທິງ ຫົວປ້ຳ ② ຫຼັງຈາກນັ້ນຍົກຄັນປ້ຳຂຶ້ນ

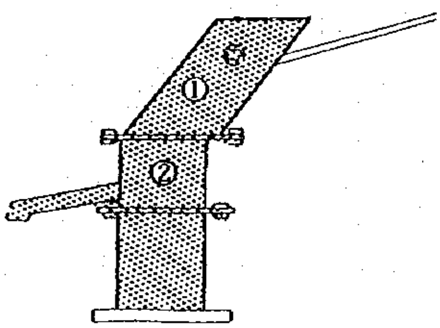
Put the Rod Vice ⑦ on the Pump Body ② and pull up the Rod





5. ກວດກາເບິ່ງຫົວວາວ ⑤ ແລະກົ້ນ ວາວ ⑥ ຖ້າວ່າຫຼຸ້ຍຫ້ຽນແລ້ວຕ້ອງ ປ່ຽນອາໄຫຼ່ໃໝ່

Upper Valve ⑤ and Under Valve ⑥ are checked. If Valve worn out, replace new valves



6. ເອົາຫົວປ້ຳ ① ຕິດຕັ້ງໃສ່ເທິງຫົວ ປ້ຳ ②

Pump head ① is installed at Pump body ②

• ການປ່ຽນອາໄຫ່ອາອຊອງປ໊ຳ

REPLACING SPARES FOR PUMP VALVE UNIT

* ຕ້ອງຫ້ຳງປ໊ຳມື ແລະດຶງຄັນປ໊ຳຂຶ້ນພ້ອມດ້ວຍລູກສູບ

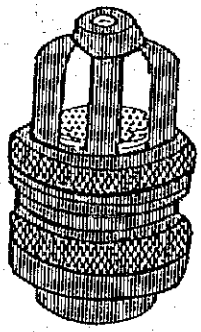
  You have to dismantle hand pump and pull up pump rod with cylinder assembly

* ຖ້າບ໋ຊ່ຳນານ, ຕ້ອງໃຫ້ທີມ (ຄະນະ) ບ໋ຳລຸງຮັກສາຂອງເມືອງ ມາຊ່ອຍ

  If you are not trained, you have to ask maintenance team of the District Clean Water Supply Office for repair

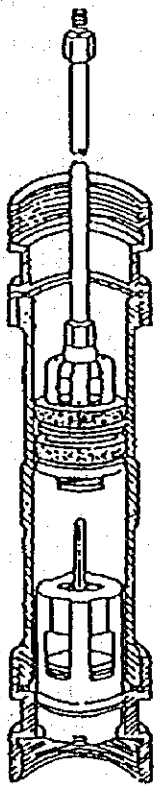
ລະບົບອາອັດນ້ຳເທິງ

Upper Valve Assembly



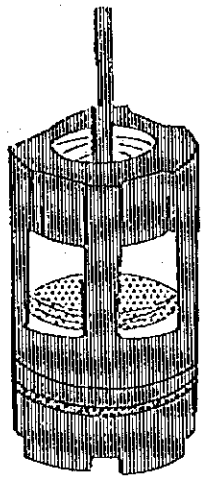
ກ໋ານສູບ

Cylinder Assembly



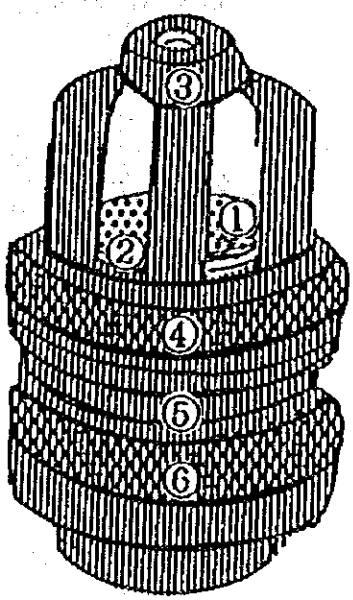
ລະບົບອາອັດນ້ຳລຸ່ມ

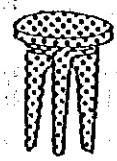
Check Valve Assembly



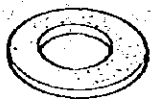
• ລະບົບອາວັດນ້ຳເທິງ
UPPER VALVE ASSEMBLY

ລະບົບອາວັດນ້ຳເທິງ ແລະ ຫ້ອຍ1ງ
Upper Valve Assembly





① ອາສິ1ງນ້ຳເທິງ
Upper Valve Guide



② ກ້ອນຢາ1ງວັດນ້ຳເທິງ
Rubber Seating

③ ຂວັນຕ໋ານສູບ
Plunger Yoke Body

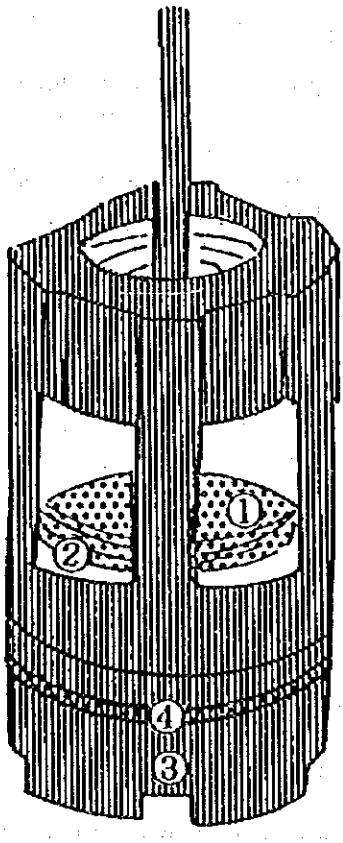
④ ຝ1ຍສູບ
Pump Bucket

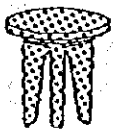
⑤ ຫວ່າ1ງຝ1ຍສູບ
Spacer

⑥ ຝ1ຍສູບ
Pump Bucket

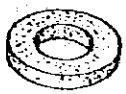
• ລະບົບອາອັດນ້ຳລຸ່ມ
CHECK VALVE ASSEMBLY

ລະບົບອາອັດນ້ຳລຸ່ມ ແລະ ຫົວຢາງ
Check Valve Assembly

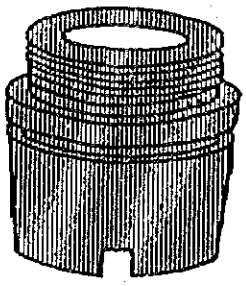




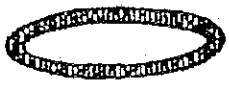
① ອາອສິ່ງນ້ຳລຸ່ມ
Check Valve



② ກ້ອນຢາງອັດນ້ຳລຸ່ມ
Rubber Seating



③ ສົ້ນອາອັດນ້ຳລຸ່ມ
Check Valve Guide



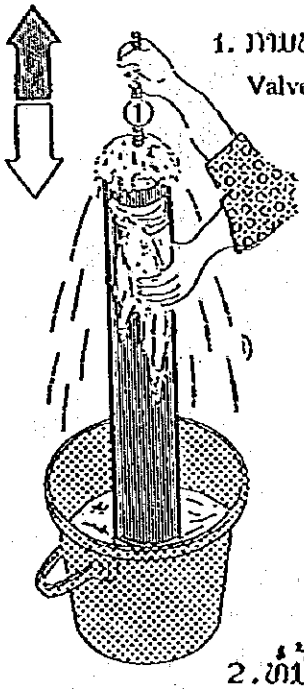
④ ອິງແຫວນອັດນ້ຳລຸ່ມ
0 Ring for Check Valve

• ວິທີທົດລອງເບິ່ງອາວ ແລະ ທໍ່

METHOD OF VALVE AND RISER PIPE TEST

1. ການທົດລອງອາວ

Valve Test

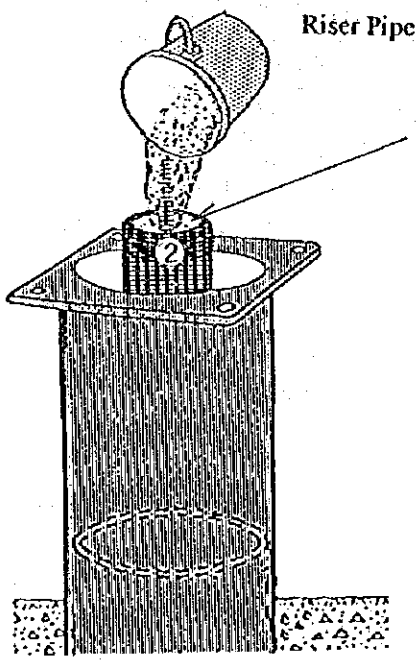


- ດຶງ ແລະຍູ້ຄັນສູ້ງອາວຂຶ້ນລົງ 2-3 ເທື່ອຢູ່ໃນຖັງນ້ຳ ຫຼືຄຸເພື່ອທົດລອງເບິ່ງການດູດໄດ້ດີຫຼືບໍ່ ?
- ໃນກໍລະນີທີ່ນ້ຳບໍ່ຂຶ້ນ ໃຫ້ກວດເບິ່ງອາວ

- Stroke the pump rod ① put in a bucket to test whether water coming up or not.
- In case water does not come up, wash check valve

2. ທໍ່ນ້ຳປ້ຳ

Riser Pipe Test



- ຖີ້ມນ້ຳໃຫ້ເຕັມໃນທໍ່ນ້ຳຂຶ້ນ
- ປະໄວ້ປະມານ 1 ຊົ່ວໂມງຖ້າລະດັບນ້ຳຕົກຕ່ຳ ໝາຍຄວາມວ່າ ນ້ຳຮົ່ວອອກຈາກທໍ່ ນ້ຳປ້ຳ

1) Fill water into the Riser Pipe ②
2) Watching water level for 1 hour

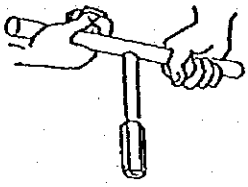
- If water level decline, water leaks from the Riser pipe joint

• ອຸປະກອນເຄື່ອງມືທີ່ສຳຄັນປະຈຳໝູ່ບ້ານ

LIST OF MAIN TOOLS

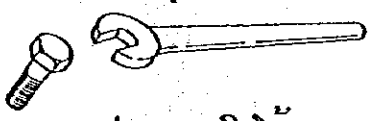
ຂອງດຶງຈັບເສັ້ນດີ

Rod Lifter



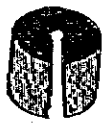
ກະແຈປາກຕາຍ

19 - Spanner



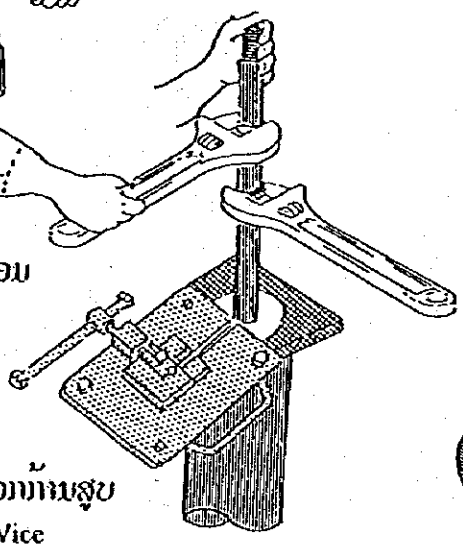
ປອກຮອງຫົວໂສ້

Chain Coupler



ກະແຈເລື່ອນ

Spanner



ອຸປະກອນປຸ່ນລູກຫ່ວ່ານ

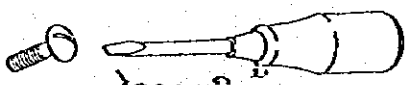
Bearing mounting tool

ກະບອງກ້ານສູບ

Rod Vice

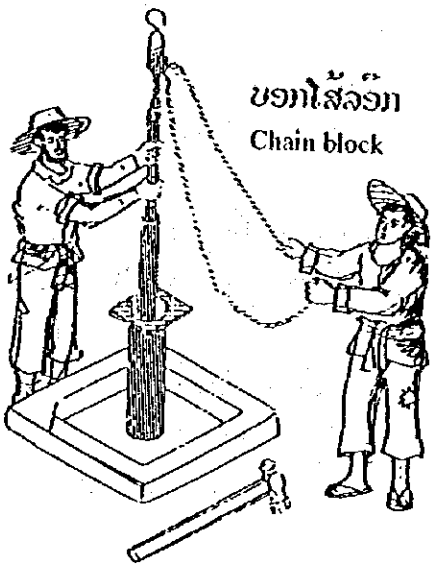
ໄຂຄວງຫົວແປ

- Screw Driver



ໄຂຄວງຫົວຈຸ້ມ

+ Screw Driver

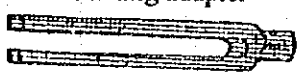


ບອກໂສ້ລ໊ອກ

Chain block

ເຄື່ອງດຶງອາອຸ່ມ

Valve lifting adapter

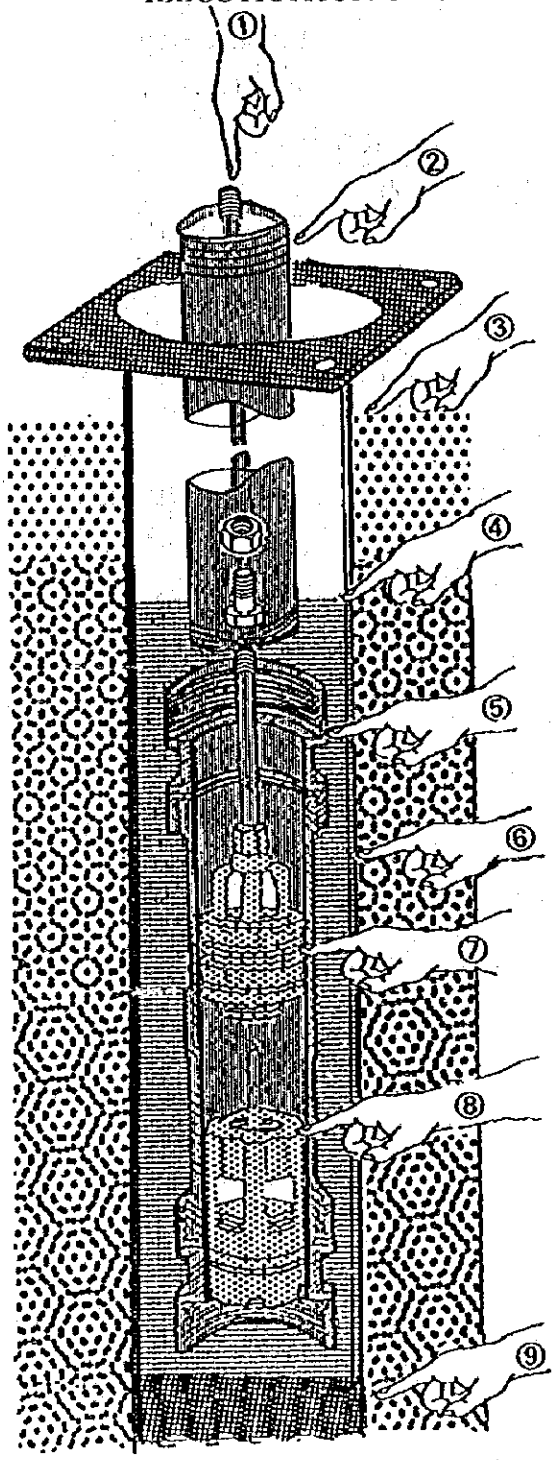


ກະແຈປາກແຂ້

Pipe Wrench

• ຮູບສະແດງຂອງປ້ຳຢູ່ໃນນ້ຳສ້າງ

ILLUSTRATION OF UNDERGROUND PUMP PART



① ກ້ານສູບ
Plunger Rod

② ທໍ່ສົ່ງນ້ຳ
Riser Pipe

③ ລະດັບດິນ
Ground Level

④ ລະດັບນ້ຳ
Water Level

⑤ ບ່ອນຳ
Cylinder assembly

⑥ ຮູສົ່ງ
Casing Pipe

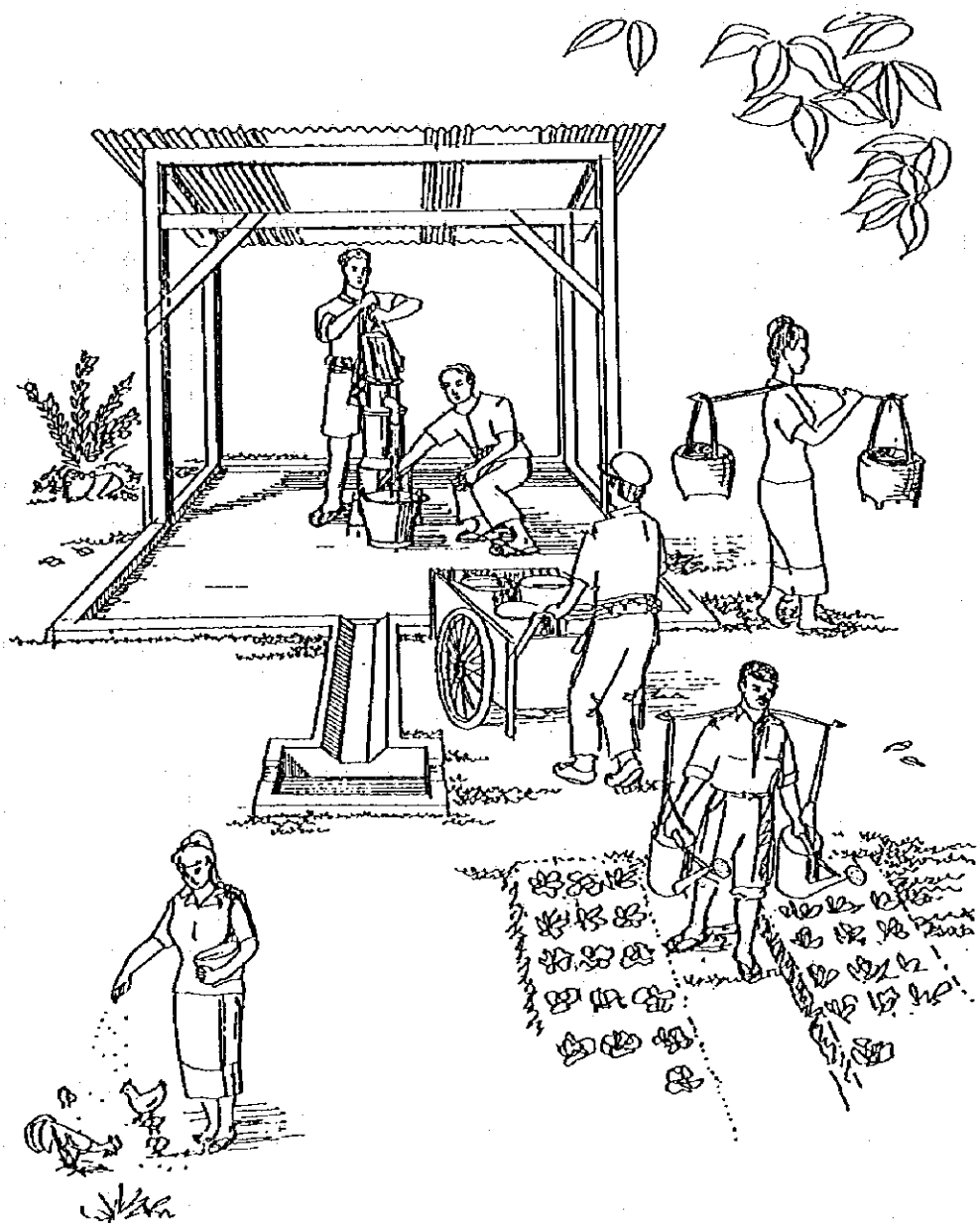
⑦ ຫົວອາວເບ້ື້ອງເທິງ
Upper valve assembly

⑧ ລະບົບອາວັດນ້ຳລຸ່ມ
Check valve assembly

⑨ ຕະແກງ (ແຜ່ນກັ້ນ)
Screen

- ຮູບສະແດງຂອງການນຳໃຊ້ນ້ຳ

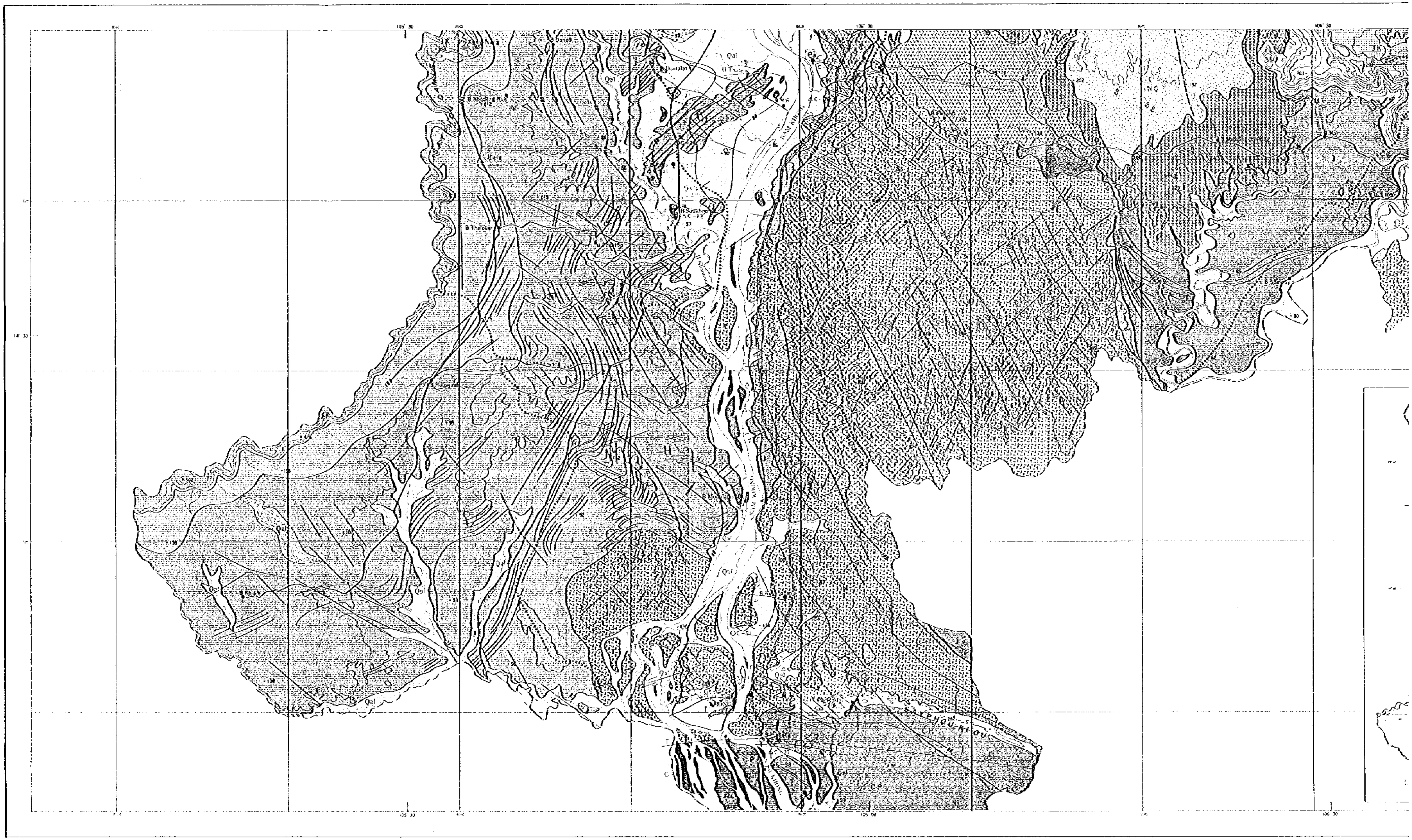
ILLUSTRATION OF WATER USE



• ສະຖິຕິການບຳລຸງຮັກສາ
MAINTENANCE HISTORY

ຊື່ບ້ານ :..... ເມືອງ :.....
Name of village District
ແຂວງ :..... ຜູ້ຮັກສາ :.....
Province Care taker

ວັນທີ່ເກີດຂັດຂ້ອງ Date of occurrence of fault	ວັນສ້ອມແປງ Date of repair	ມູນຄ່າການສ້ອມແປງ Cost of repair	ຂ່ອມແປ່ເພ Type of fault	ຜູ້ສ້ອມແປງ By whom repaired



LEGEND OF THE HYDROGEOLOGICAL MAP

A. Lithology

Symbol | Lithofacies

B. Stratigraphy

Geologic Time	Symbol	Formation

C. Groundwater potential (Shallower than 50~70m in depth)

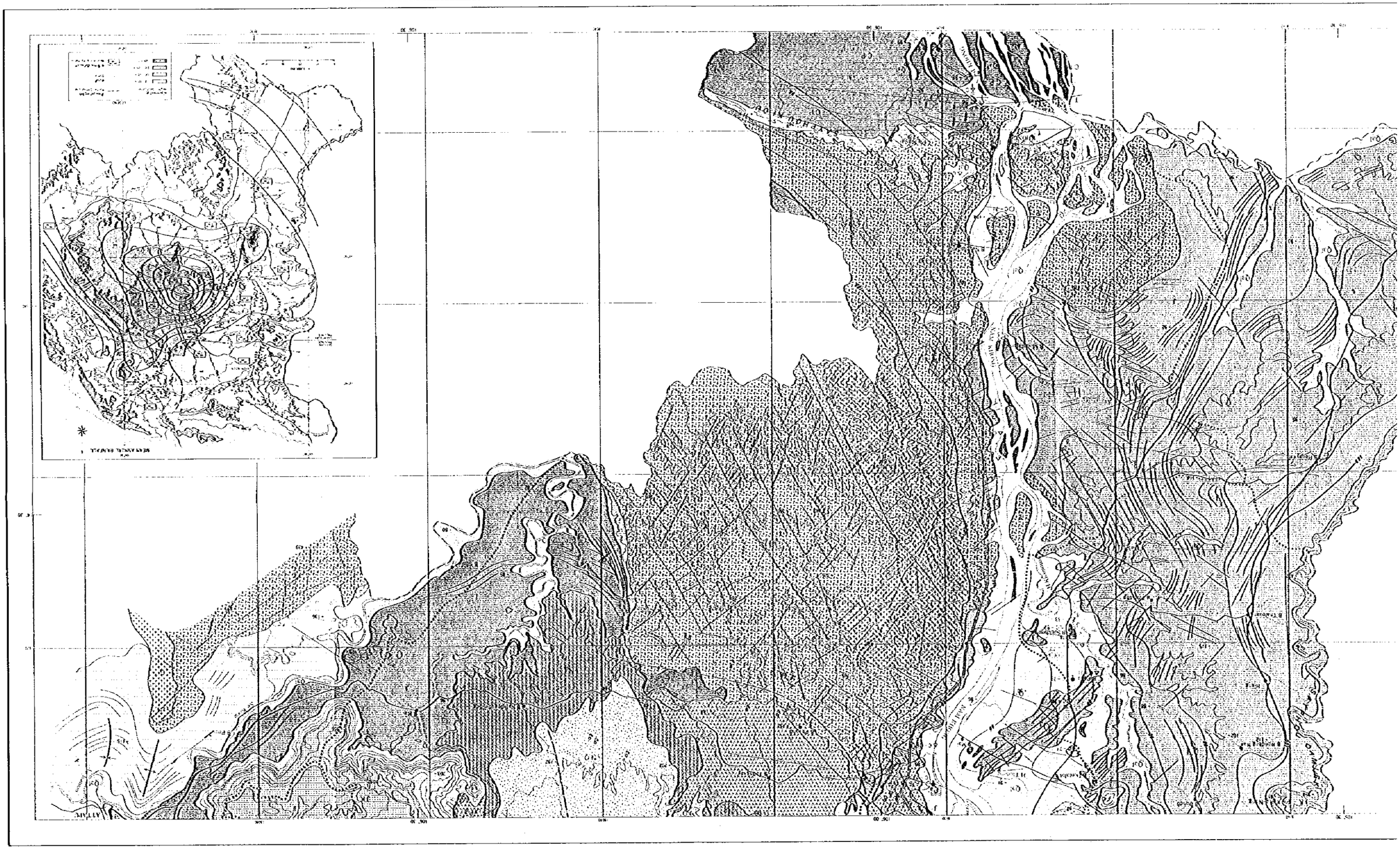
D. Geological structure

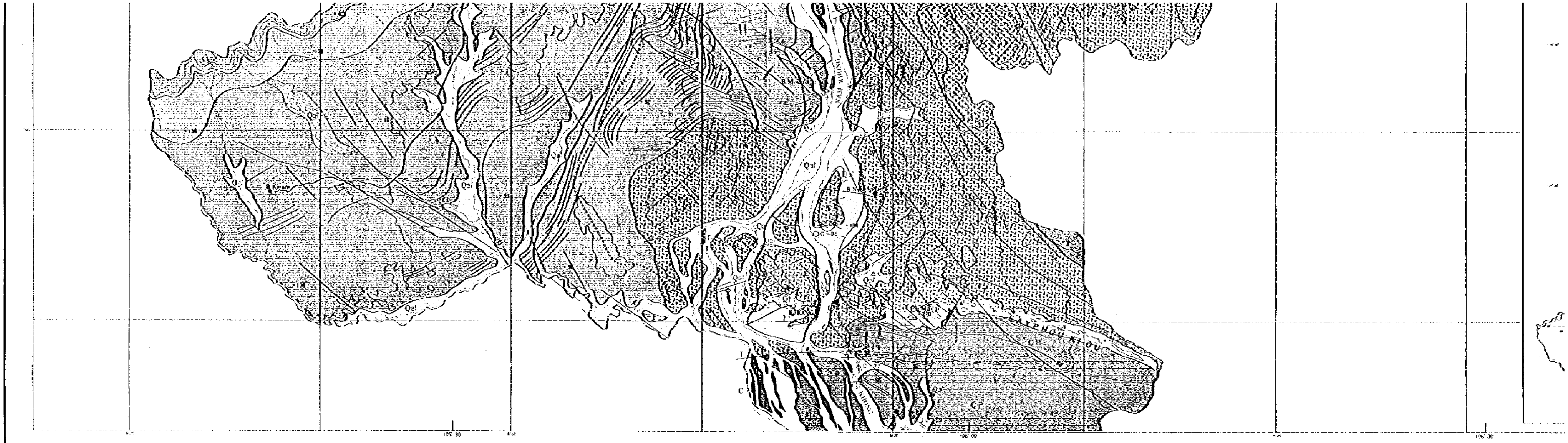
Strike and dip

F. Occurrence of surface water

Perennial river

H. Others





LEGEND OF THE HYDROGEOLOGICAL MAP

A. Lithology

Symbol — Lithofacies

- Alluvium. Unconsolidated sand silt and clay.
- Fan, talus and terrace deposits. Unconsolidated sand, silt.
- Old terrace deposits. Semiconsolidated gravel.
- Basalt lava flows, ash, loam, mudflow deposits with boulder.
- Basalt lava flows and thin mudflow deposits.
- Basalt lava flows.
- Mostly continental sandstone, pale gray. Fine to medium. Evaporite.
- Mostly red continental shale, micaceous shale, interbeded fine sandstone and shale.
- Acidic volcanics: rhyolite, welded tuff, quartz porphyry etc.
- Marine flysh sediments. Interbeded slate, sandstone and limestone.
- Basement complex: metasediments.

Plutonic Rocks

- Mostly PALEOZOIC granodiorite and monzogranite.

B. Stratigraphy

Ma B.P.	Geologic Time			Symbol	Formation
	QUATERNARY			Qal, Qt, NQ, Qte	
2		TERTIARY	Neogene	Ng	Bolaven Basalt (Basalt Folus)
			Paleogene	Pg	
65	MESOZOIC		Cretaceous		
143				JK	Champa Formation
			Jurassic	J	Se Don Formation (Jurassic shales)
212			Triassic	T	Kongsiang Formation
247	PALEOZOIC		Permian	C-P	Khong Formation
289			Carboniferous	Pz	
367			Devonian		
415			Silurian		
446			Ordovician		
500			Cambrian		
545	PRE-CAMBRIAN		Proterozoic		

C. Groundwater potential (Shallower than 50~70m in depth)

Intergranular aquifers/
- High potential area (Q:133~390m^3/day)
- Medium potential area (Q:73m^3/day)
- Low potential area

Intergranular or fissured aquifers/ Basalt lava slope/
- High potential area (Q:1,700~3,800m^3/day)
- Medium potential area (Q:116~267m^3/day)
- Medium to Low potential area (Q:20~127m^3/day)

Jurassic~Cretaceous sedimentary rocks/
- Medium potential area (Q:17~165m^3/day)
- Medium to Low potential area (Q:9~61m^3/day)
- Low potential area

Fissured aquifers/
- Medium potential area (Q:129m^3/day)
- Medium to Low potential area (Q:32m^3/day)

Fissured rocks/
- Hydrogeological basement (except in the mountain valleys)
- Difficult area for groundwater development

Q: Optimum discharge rate of the test wells.

D. Geological structure

- Strike and dip
- Fault (defined)
- Fault (approximate, assumed)
- Lineament (from air photographs)
- Axis of downwarping
- Axis of upwarping
- Structural trend (from air photographs and LANDSAT TM)
- Volcanic cone

E. Occurrence of groundwater

- Spring
- Contour line of unconfined groundwater level (m)
- Test well ('95)

F. Occurrence of surface water

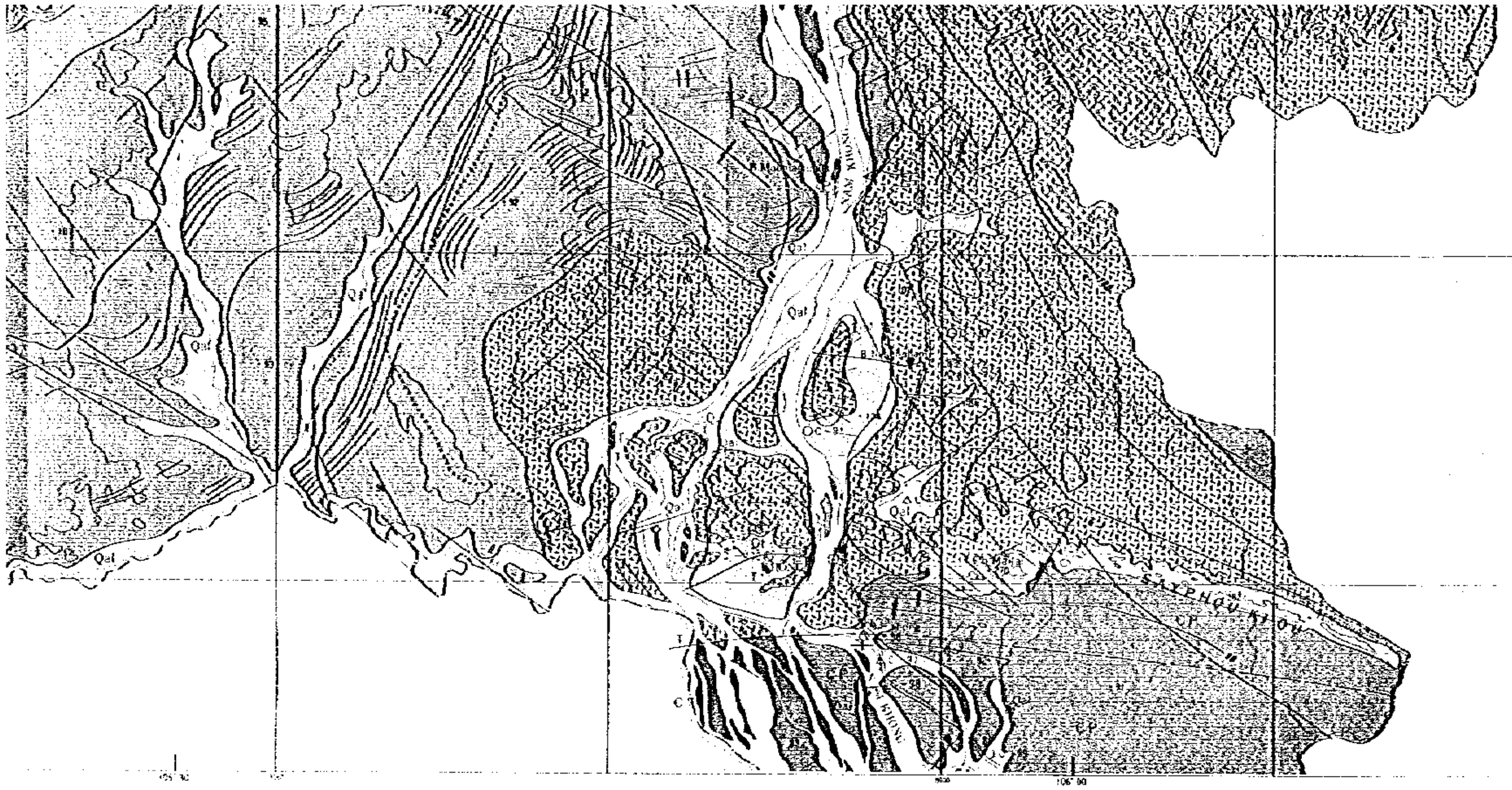
- Perennial river
- Seasonal river
- Marsh or swamp area
- Major surface water divide

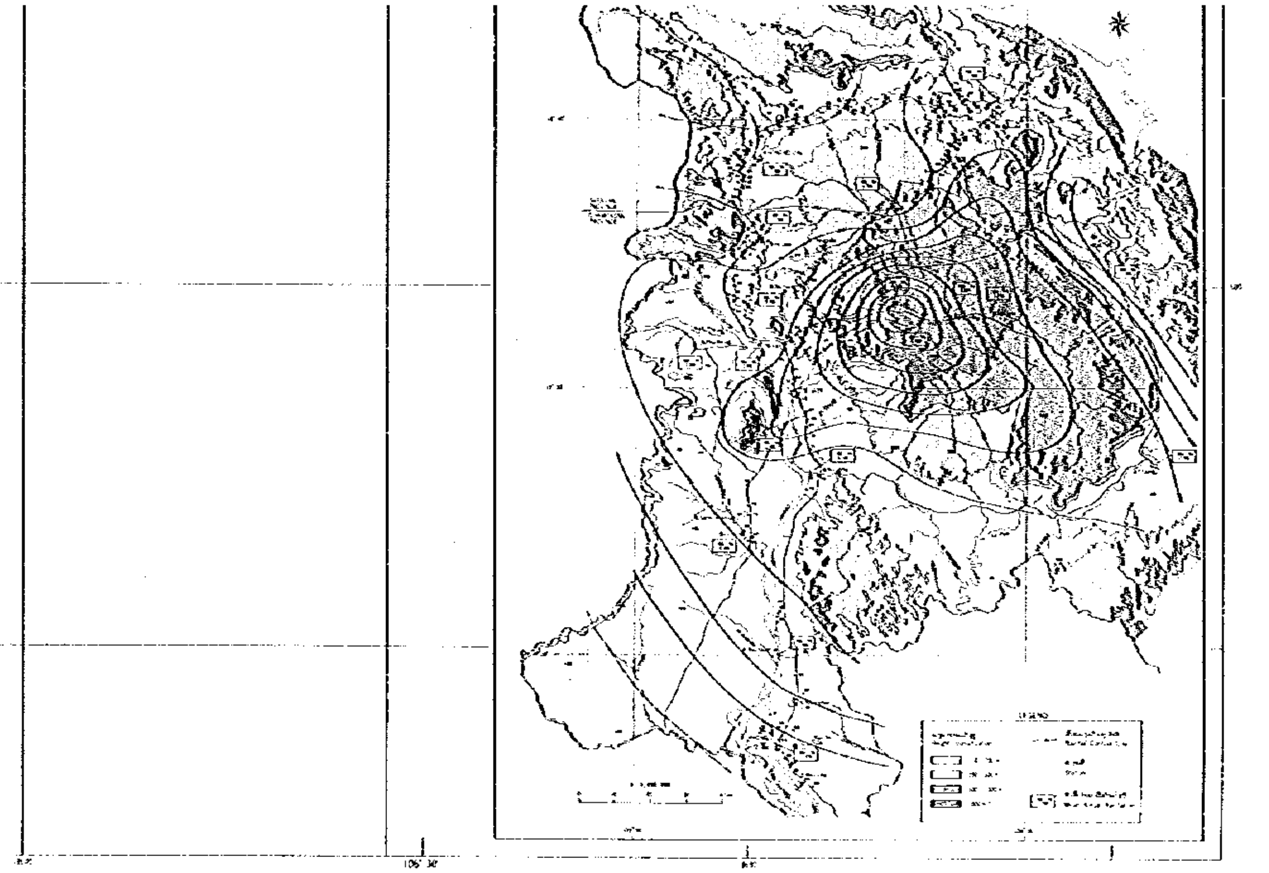
G. Hydrological observation station

- Existing river discharge gauging station
- Coefficient of river regime
- Base flow (m^3/s) 1989, 1990
- Catchment area (km^2)
- River gauge height station
- Temporary river discharge gauging station
- River discharge (m^3/s) 1994~1995
- Catchment area (km^2)
- M Meteorological station
- P Rainfall station

H. Others

- Contour line (m)
- 250 Triangulation point (m)
- 25 Spot height (m)
- National road
- Main local road
- International boundary
- Province boundary
- District boundary
- City, Town, Village
- 1,000 to 2,000 in population
- 500 to 1,000 in population
- 100 to 500 in population
- Main village
- Village number





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367		Devonian			
415		Silurian			
445		Ordovician			
500		Cambrian			
575	PRE-CAMBRIAN	Proterozoic			

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Basalt lava slope/
- High potential area (Q:1,700~3,800m^3/day)
- Medium potential area (Q:141~267m^3/day)
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- 100 to 500 in population
- Main village
- Village number

ການສຳຫຼວດ ພັດທະນານ້ຳໃຕ້ດິນ
ແຂວງຈຳປາສັກ ແລະສາລະວັນ
ສາທາລະນະລັດ ປະຊາທິປະໄຕ ປະຊາຊົນລາວ

THE STUDY ON GROUNDWATER DEVELOPMENT
FOR
CHAMPASAK AND SARAVAN PROVINCES
IN
LAO PEOPLE'S DEMOCRATIC REPUBLIC

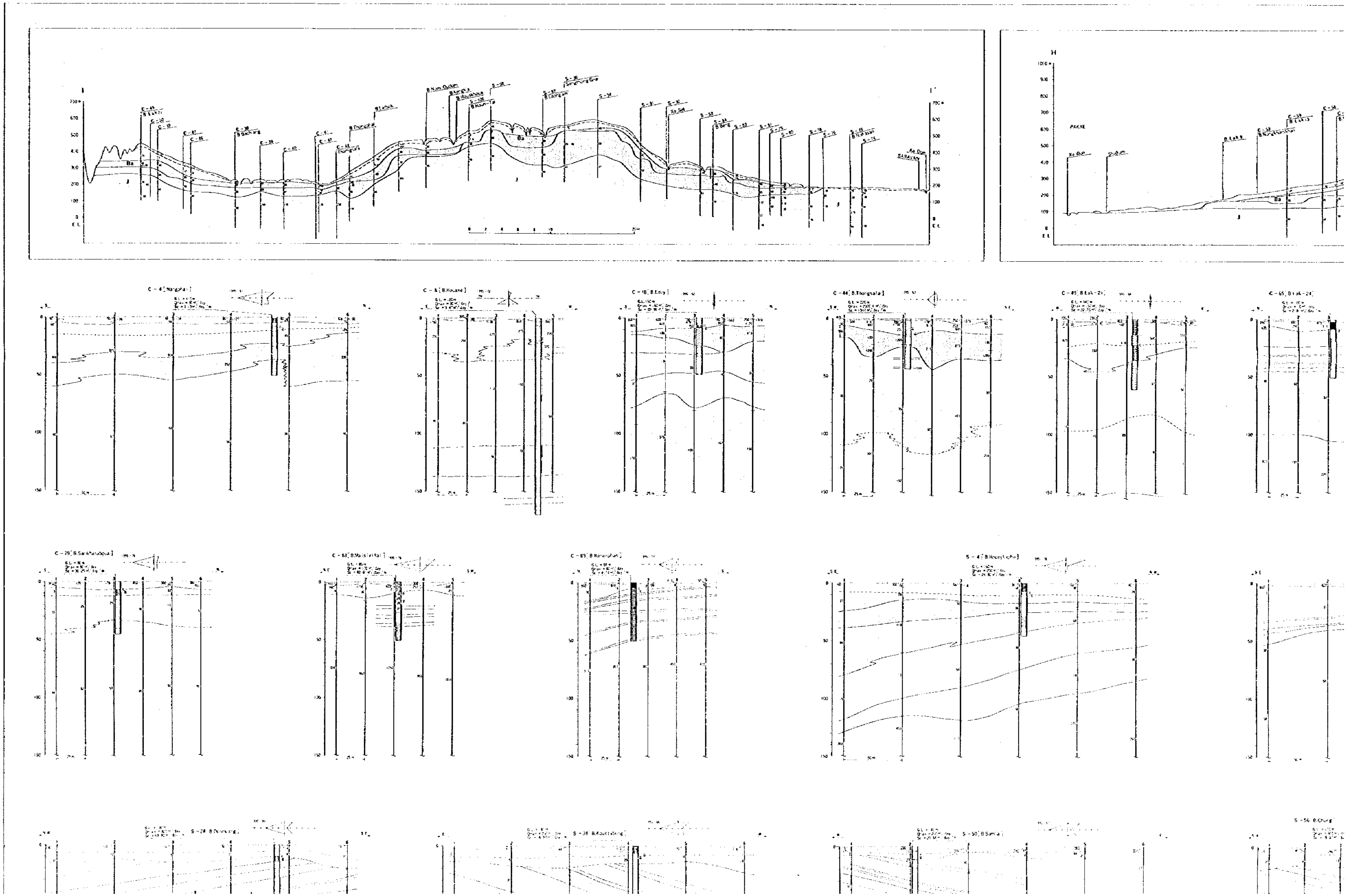
Hydrogeological Map of CHAMPASAK and SARAVAN Provinces

1 : 200,000

1995

JAPAN INTERNATIONAL COOPERATION AGENCY

MINISTRY OF HEALTH, LAO PEOPLE'S DEMOCRATIC REPUBLIC



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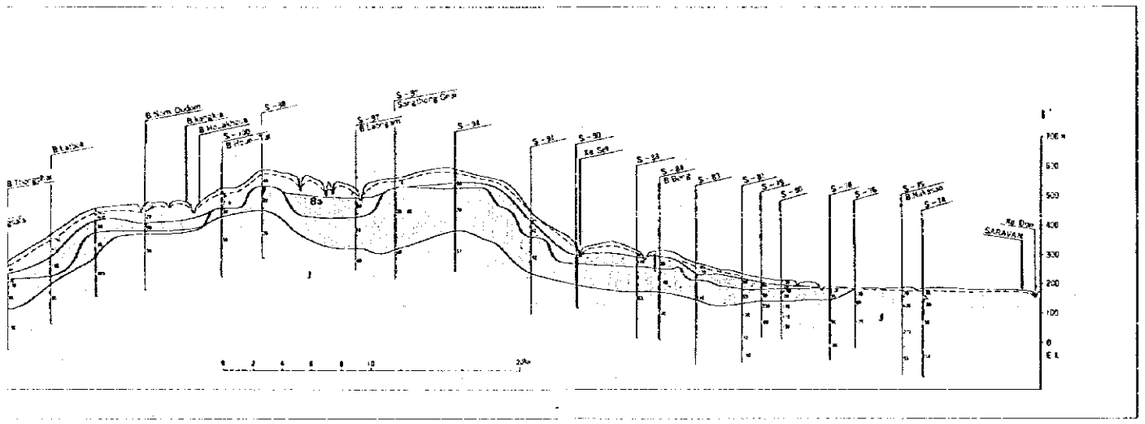

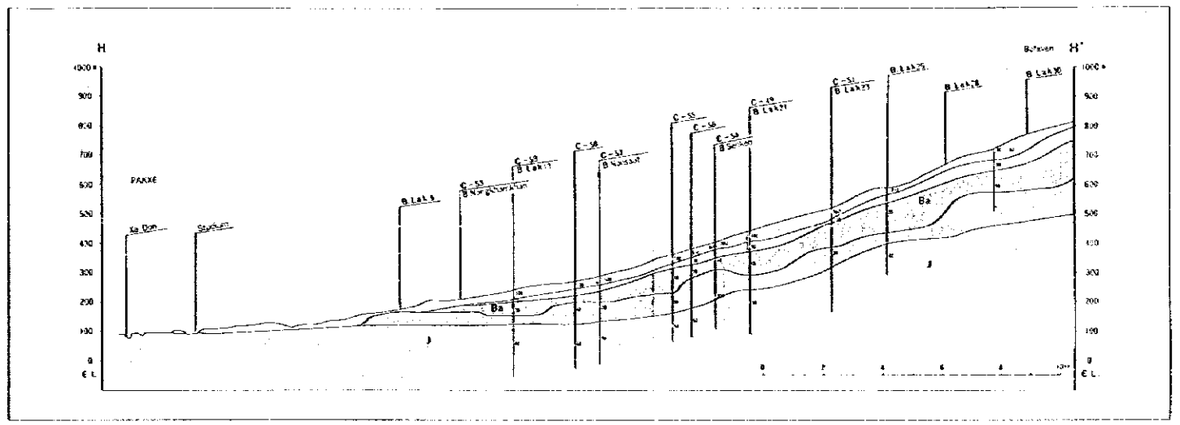
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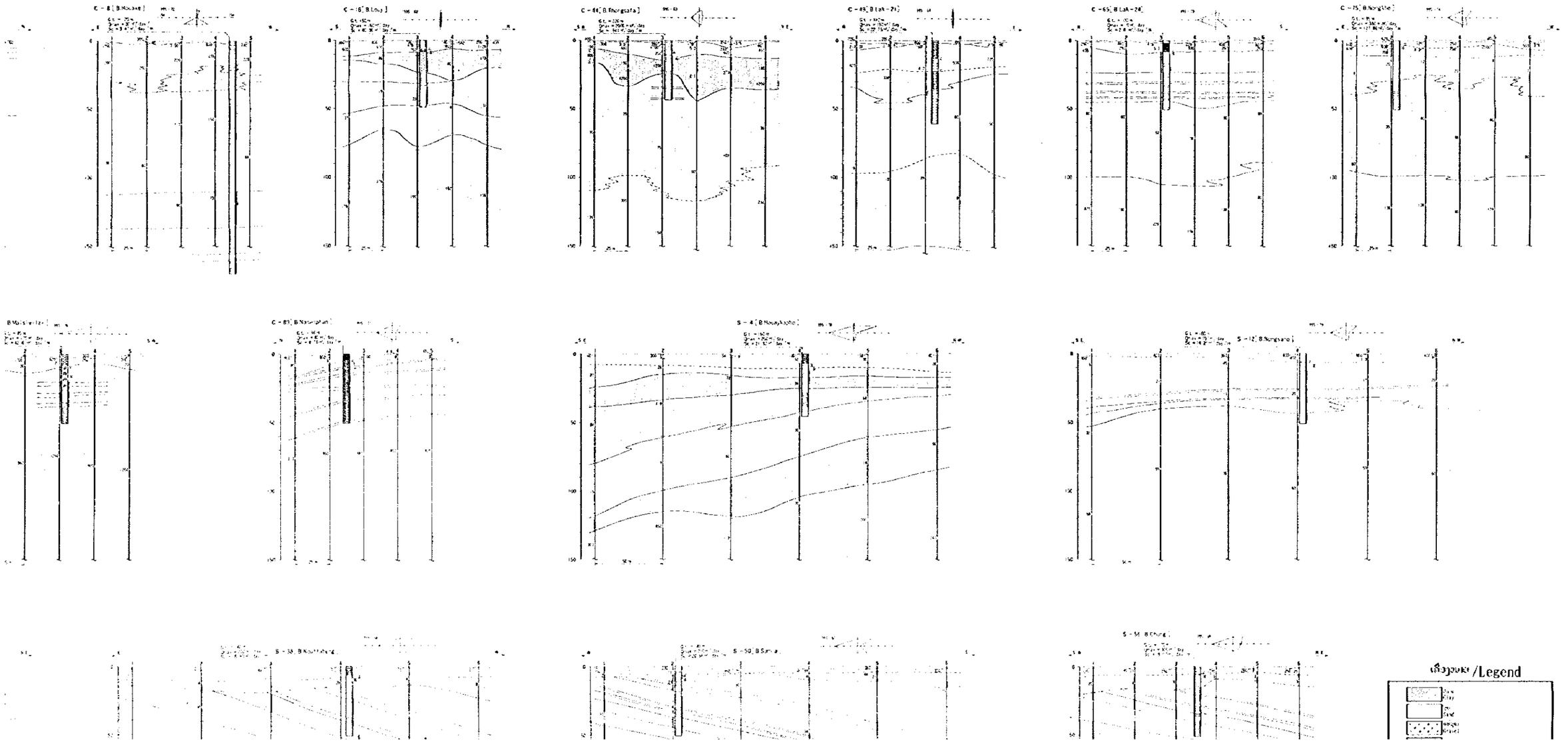
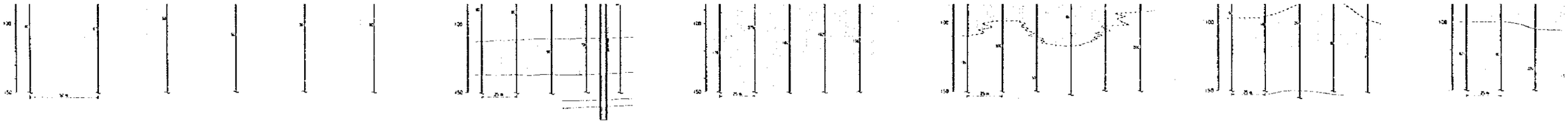
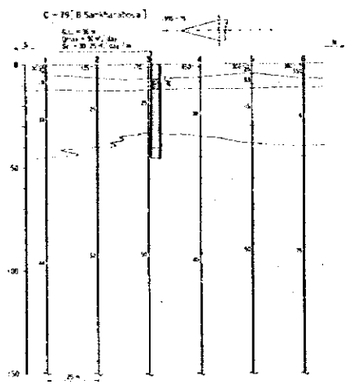
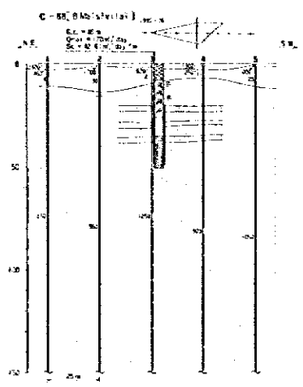
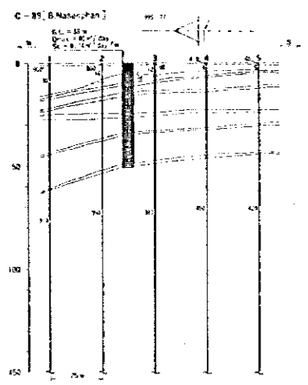


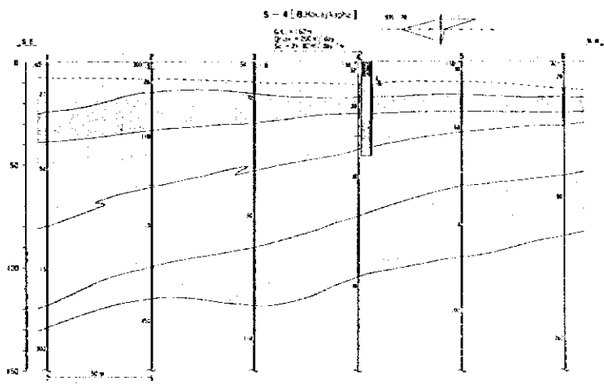
เรื่องหมาย /Legend

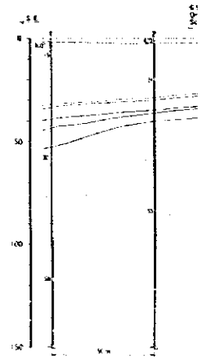


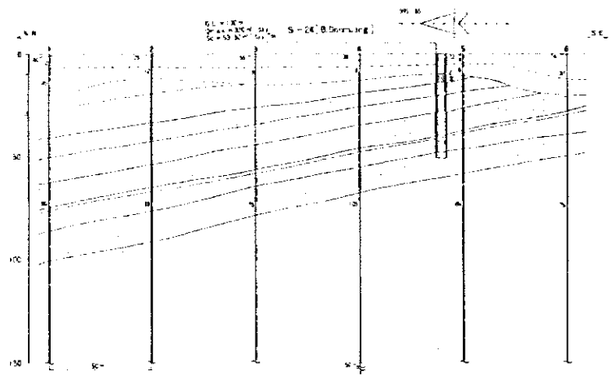


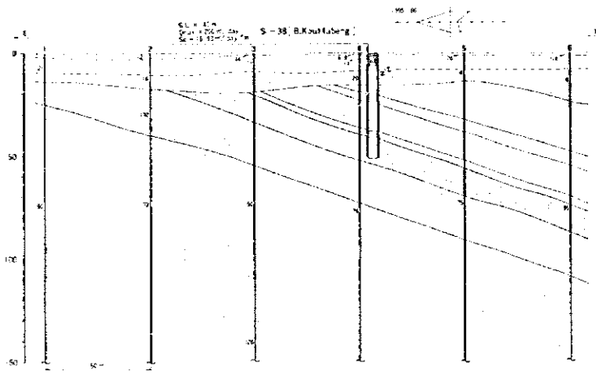


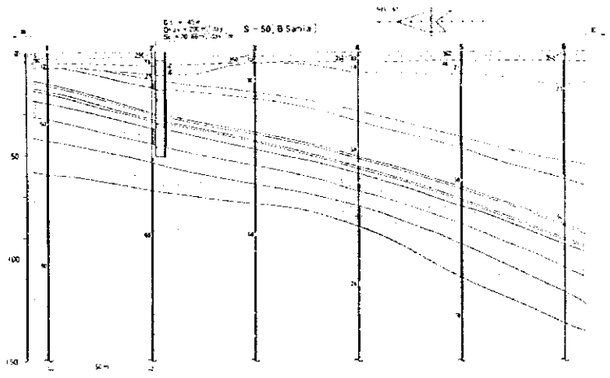


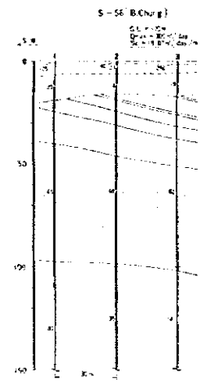


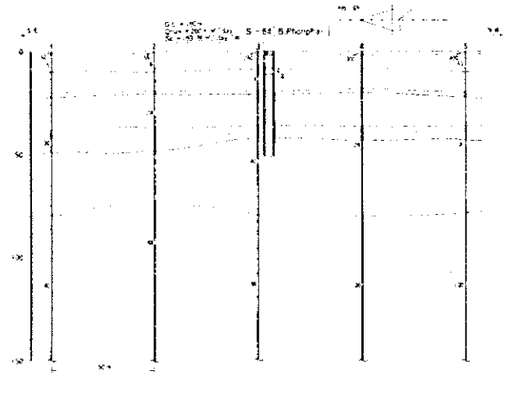


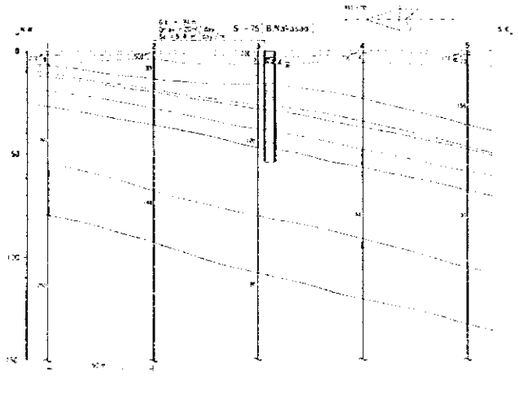


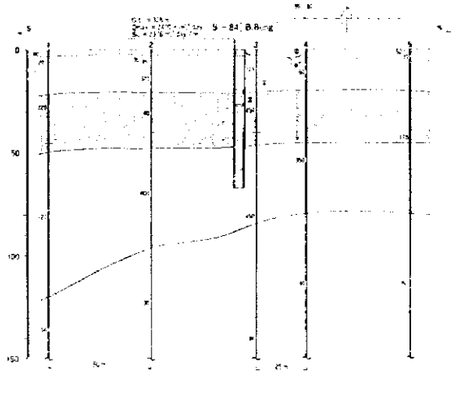


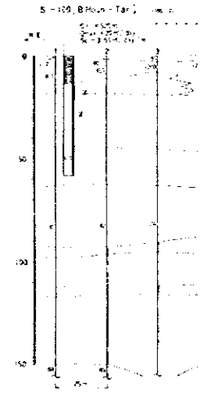


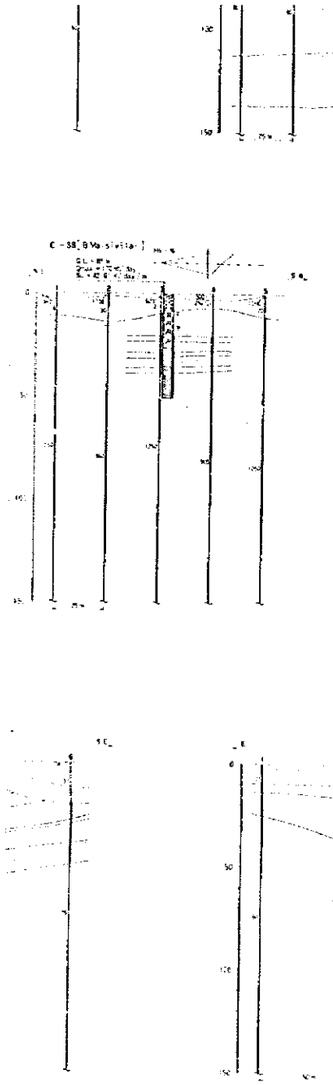


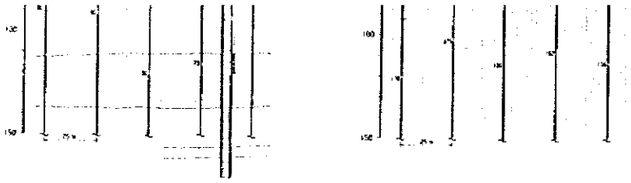


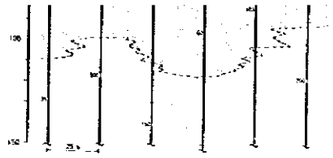


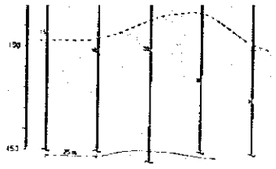


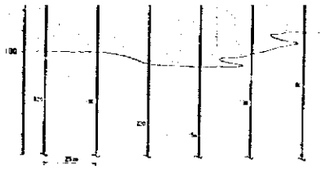


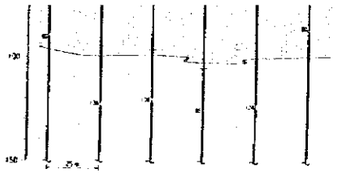


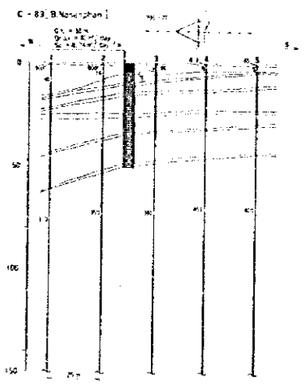


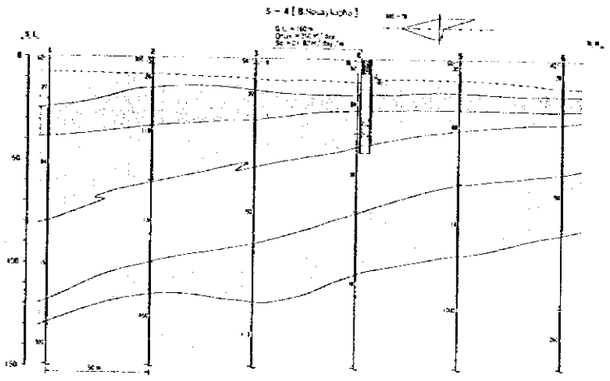


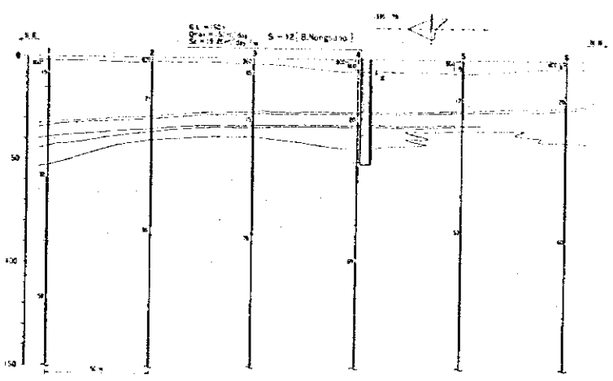


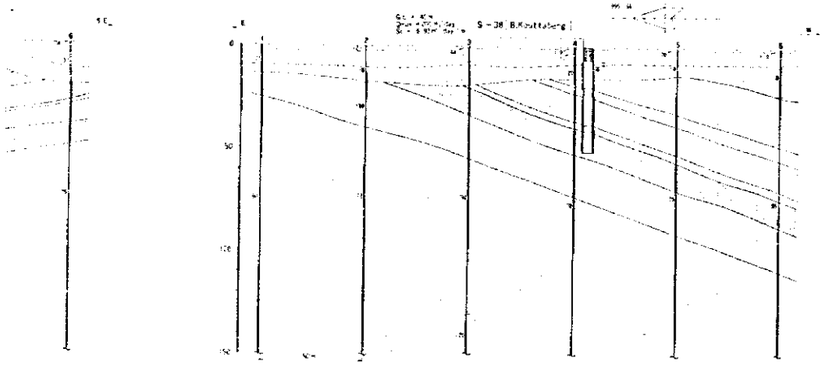


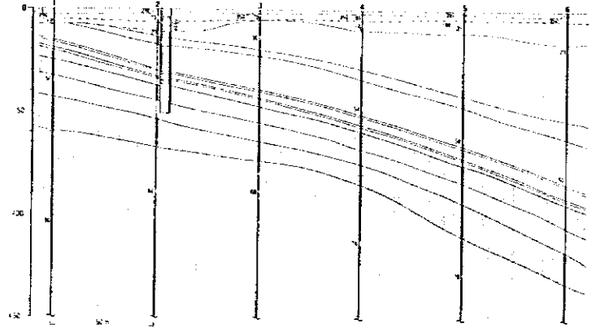


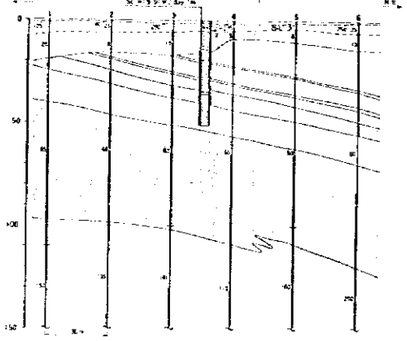


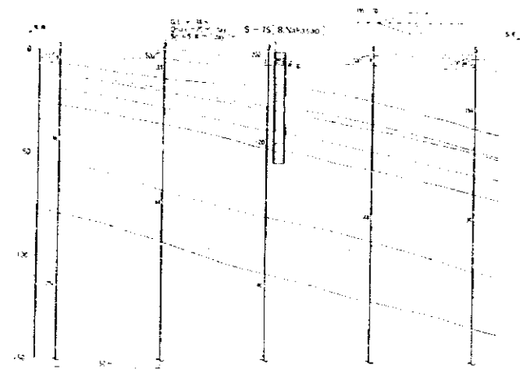


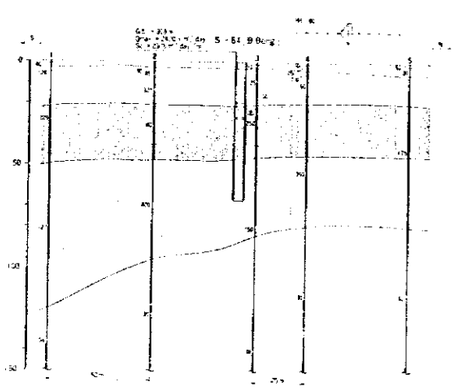


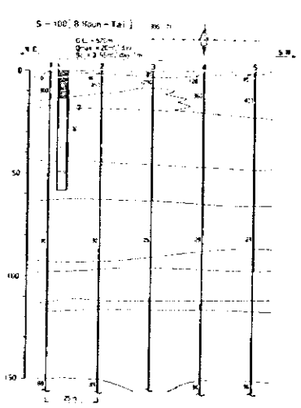


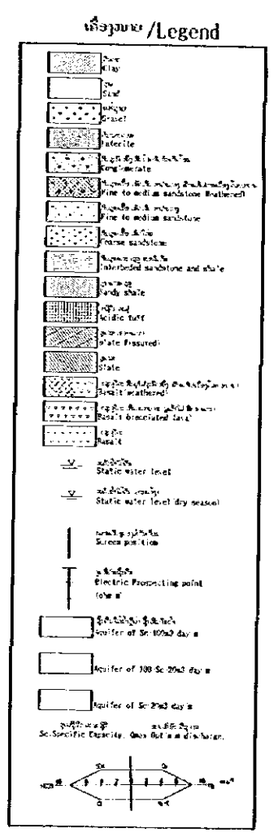










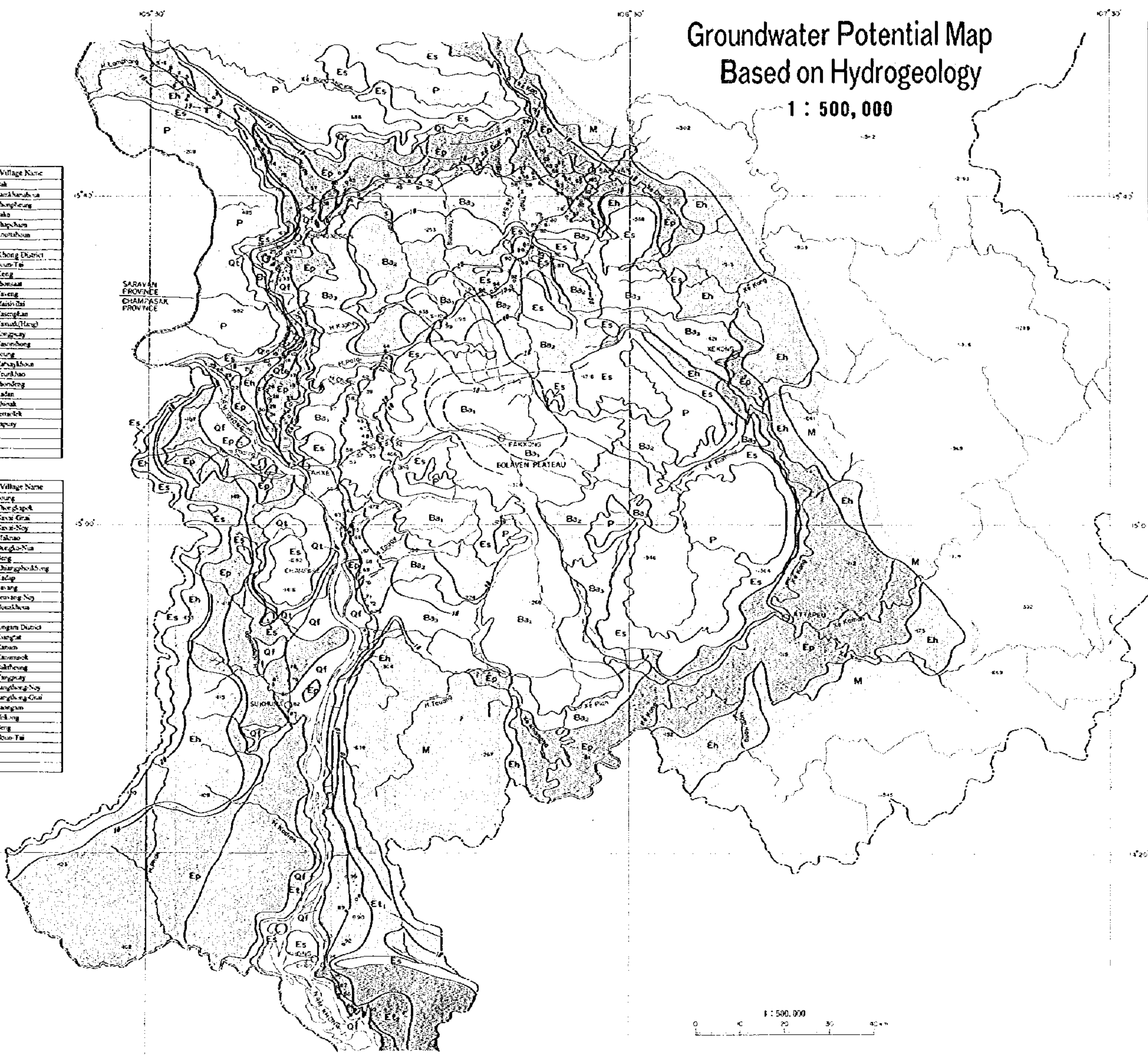

เครื่องหมาย /Legend

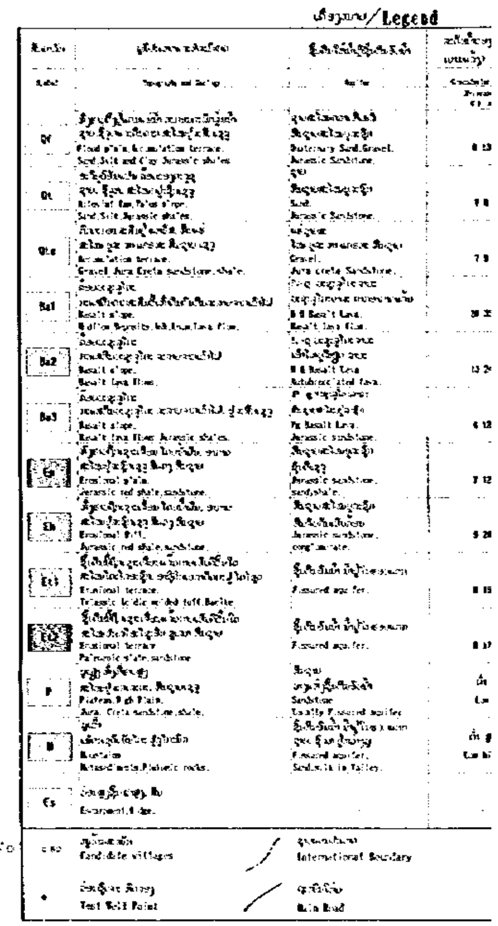
CHAMPASAK PROVINCE

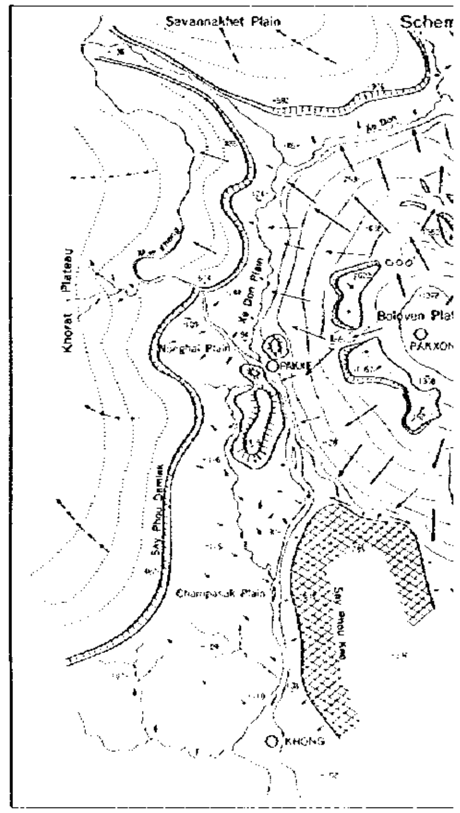
NO	Village Name	NO	Village Name	NO.	Village Name	NO	Village Name
Sanasomboun District		C-28	B Nalong	C-54	B Serkeo	C-78	B Bak
C-1	B Nakham	C-29	B Naxon	C-55	B Houaytea	C-79	B Sankhanakoua
C-2	B Phonthat	C-30	B Thangbengsivilay	C-56	B Talan(B Lak-17)	C-80	B Phongkeung
C-3	B Nonsavan	C-31	B Nonsat	C-57	B Nonsaat	C-81	B Pako
C-4	B Nongphai	C-32	B Dongkek	C-58	B Nongmak-Fak	C-82	B Thapcham
C-5	B Souvanna Adkhi	C-33	B Dua-Nua	C-59	B Lak-13	C-83	B Kouttahoun
C-6	B Nanai	C-34	B Kengkeo	C-60	B Nathouaycha		
C-7	B Nongdeu	C-35	B Ngeuadeng	C-61	B Kagno	Khong District	
C-8	B Houase	C-36	B Pakson			C-84	B Boun-Tai
C-9	B Pongsan			Pathoumphon District		C-85	B Keng
C-10	B Dong	Bachiang District		C-62	B Lak-15	C-86	B Phonsaat
C-11	B Hangam	C-37	B Nongsan	C-63	B Lak-20	C-87	B Naveng
C-12	B Nongkham	C-38	B Bachiang	C-64	B Mophon	C-88	B Maisivilai
C-13	B Khampeng	C-39	B Malingeo	C-65	B Lak-24	C-89	B Nasenphan
C-14	B Khanapoua	C-40	B Nongbok-Noy	C-66	B Sanamxaysouk(L-25)	C-90	B Namak(Hang)
C-15	B NongKhen	C-41	B Nongbok-Gnai	C-67	B Houaksoua(L-29)	C-91	B Xongmuay
C-16	B Long	C-42	B Thongkhin	C-68	B Lak-31	C-92	B Nasomhong
C-17	B Solo-Gnai	C-43	B Kenggnao	C-69	B Lak-34	C-93	B Boung
C-18	B Solo-Noy	C-44	B Thongsala	C-70	B Kheuatsay(L-36)	C-94	P Hatxaykhoun
C-19	B Xamphak	C-45	B Mouangkhai	C-71	B Tomo-Nak	C-95	B Veunkhao
C-20	B Khamhouang	C-46	B Paksong	C-72	B Tao-Tai	C-96	B Phondeng
C-21	B Sebouan	C-47	B Oudomsouk	C-73	B Nakham-Noy	C-97	B Kadan
C-22	B Mouang	C-48	B Phasouam	C-74	B Thangbeng	C-98	B Khonak
C-23	B Okamuang	C-49	B Lak-21	C-75	B Nongkhe	C-99	B Settaklek
C-24	B Boungkha	C-50	B Phin	C-76	B Napho	C-100	B Tapuay
C-25	B Latsua(Nongmek)	C-51	B Lak-23				
C-26	B Nalak	C-52	B Lak-25	Soukhouma District			
C-27	B Dongkalong	C-53	B Nongkhamkhao	C-77	B Chikhangngo		

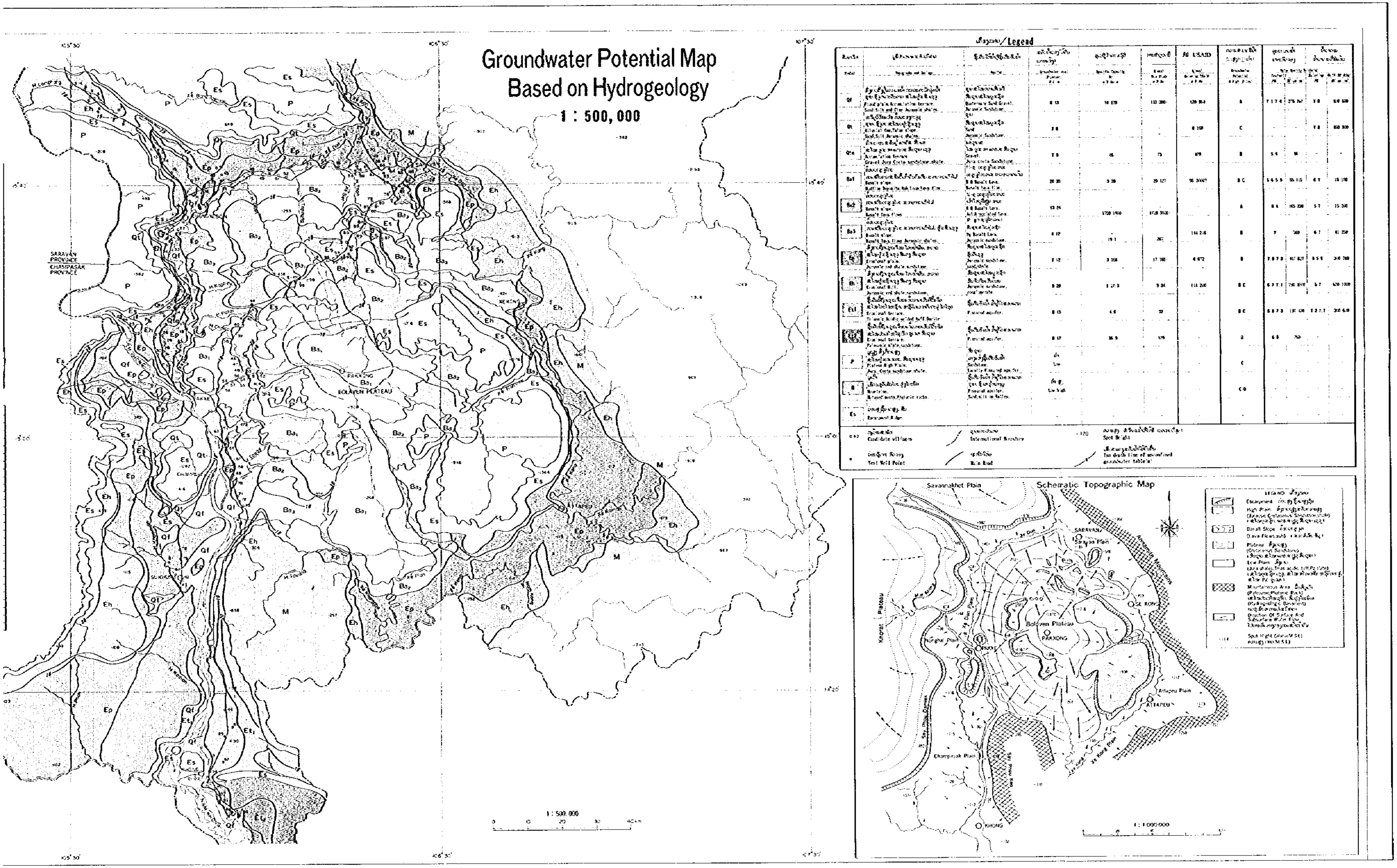
SARAVAN PROVINCE

NO.	Village Name	NO	Village Name	NO	Village Name	NO.	Village Name
Lakhsonpheng District		S-26	B Thakho	S-52	B Nongpho	S-78	B Soung
S-1	B Nonsavang	S-27	B Khok-Houavang	S-53	B Bungkham	S-79	B Thongkapek
S-2	B Nadou	S-28	B Nanouang	S-54	B Nongsai	S-80	B Navai-Gnai
S-3	B Nadounai	S-29	B Khanthong-Gnai	S-55	B Bungsai	S-81	B Navai-Noy
S-4	B Houaykaphe	S-30	B Nonsanfan	S-56	B Chong	S-82	B Maknao
S-5	B Lakhsao-Tai	S-31	B Nongkalou	S-57	B Phonthan	S-83	B Dongko-Nua
S-6	B Lakhsao-Nua	S-32	B Thaluang	S-58	B Kaomsoung	S-84	B Beng
S-7	B Khouay	S-33	B Nongteng	S-59	B Nongbou-Noy	S-85	B Khiangphoukhong
S-8	B Kengpadek	S-34	B Houaynao			S-86	B Kadap
S-9	B Nondinxay	S-35	B Hatkhu	Saravan District		S-87	B Lavang
S-10	B Nakhandai	S-36	B Nakadao	S-60	B Dong-Nong	S-88	B Seuvang-Noy
S-11	B Phoudaocheng-Noy	S-37	B Koutlamphong	S-61	B May-Sivilai	S-89	B Houakhoua
S-12	B Nongxano	S-38	B Koutsaheng	S-62	B Nakathiam		
S-13	B Phoudaocheng-Gnai			S-63	B Nathon	Laongam District	
S-14	B Thangheng	Vapy District		S-64	B Phonphai	S-90	B Kiangtat
S-15	B Bountaphan	S-39	B Nongngong	S-65	B Nadou	S-91	B Xanam
S-16	B Houaykhen	S-40	B Donkha	S-66	B Nadonkhoung	S-92	B Xanumnok
		S-41	B Naxat	S-67	B Thamuang-Kan	S-93	B Bakthoung
Khongxedon District		S-42	B Houaykhon	S-68	B Napheng-Gnai	S-94	B Vangpuay
S-17	B Napong	S-43	B Vapy-Nua	S-69	B Napheng-Noy	S-95	B Sangthong-Noy
S-18	B Vang Kan Hong	S-44	B Vapy-Tai	S-70	B Sakhoh-Tai	S-96	B Sangthong-Gnai
S-19	B Napheng-Gnai	S-45	B Nalang	S-71	B Dan-Gnai	S-97	B Laongam
S-20	B Khong-Noy	S-46	B Bangkha	S-72	B Kengsim-Tai	S-98	B Hekong
S-21	B Nongsaphang	S-47	B Saphat	S-73	B Nabon-Tai	S-99	B Beng
S-22	B Nongkouang	S-48	B Mouang	S-74	B That-Noy	S-100	B Houn-Tai
S-23	B Nongboua	S-49	B Hai	S-75	B Nakasao		
S-24	B Donmuang	S-50	B Sanla	S-76	B Ko		
S-25	B Hasion	S-51	B Khouanta-Lat	S-77	B Phao-Gnai		

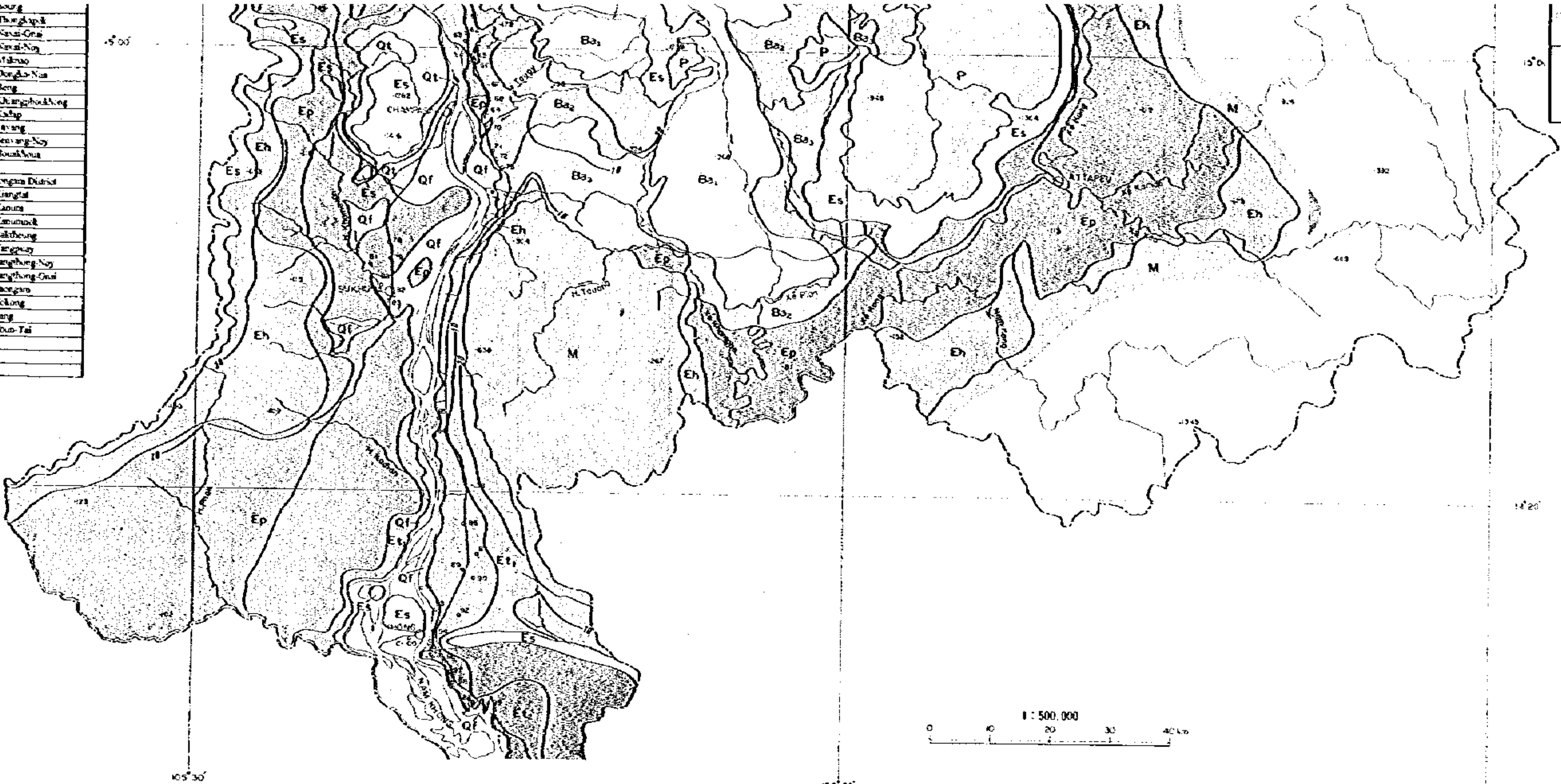


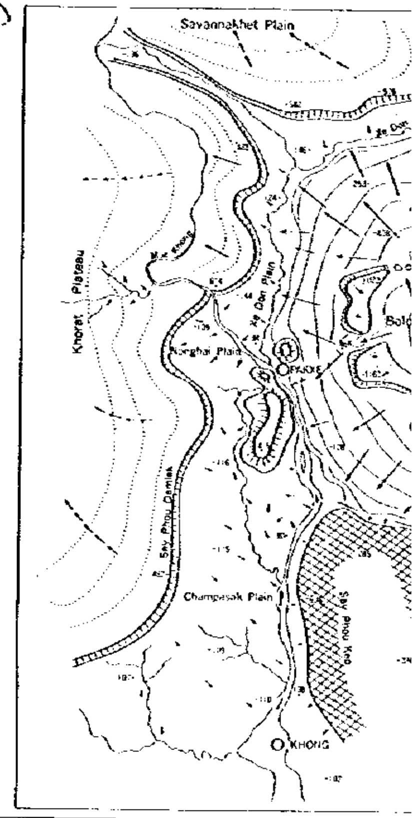




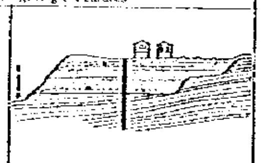
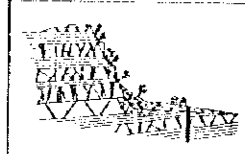
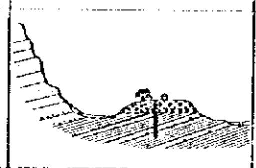
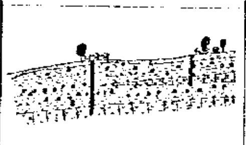

Groundwater Potential Map
Based on Hydrogeology
1 : 500,000
Legend
SARAVAN PROVINCE
CHAMPASAK PROVINCE
PAKXONG
BOLAVEN PLATEAU
XEKONG
ATTAPEU
1 : 500,000
Schematic Topographic Map
Savannakhet Plain
Saravan Plain
Bolaven Plateau
PAKXONG
SE KONG
Attapeu Plain
ATTAPEU
Khorat Plateau
Champasak Plain
KHONG
Annamite Mountains
LEGEND
Escarpment
High Plain
Basalt Slope
Plateau
Low Plain
Mountainous Area
1 : 1,000,000

S-1	B Nosavang	S-27	B Khok-Houavang	S-53	B Bengkham	S-79	B Thongkapok
S-2	B Nakou	S-28	B Namouang	S-54	B Nongsai	S-80	B Navai-Gnai
S-3	B Nakoumai	S-29	B Khamkong-Gnai	S-55	B Bengsai	S-81	B Navai-Noy
S-4	B Houaylapho	S-30	B Nonsavan	S-56	B Chong	S-82	B Makmao
S-5	B Lakhoni-Tai	S-31	B Nonghalou	S-57	B Phonkham	S-83	B Dongkho-Noi
S-6	B Lakhoni-Noi	S-32	B Thakuang	S-58	B Koutmuang	S-84	B Beng
S-7	B Khonsay	S-33	B Nongteng	S-59	B Nongkon-Noy	S-85	B Khiangphoukhong
S-8	B Kengpadek	S-34	B Houaynao			S-86	B Kafap
S-9	B Nondonsay	S-35	B Hatkon		Saravan District	S-87	B Lavang
S-10	B Nakhandai	S-36	B Nakadao	S-60	B Dong-Nong	S-88	B Semvang-Noy
S-11	B Phoudanheng-Noy	S-37	B Koutlamphong	S-61	B May-Sivilai	S-89	B Houakhoua
S-12	B Nongsano	S-38	B Koutsaheng	S-62	B Nakathian		
S-13	B Phoudanheng-Gnai			S-63	B Nadon		Laongam District
S-14	B Thangheng		Vapy District	S-64	B Phonphai	S-90	B Kiangtai
S-15	B Boutaphan	S-39	B Nongmgong	S-65	B Nadon	S-91	B Xanom
S-16	B Houaykhen	S-40	B Donkha	S-66	B Nakokhoang	S-92	B Xanumack
		S-41	B Navat	S-67	B Thamuang-Kao	S-93	B Bakthoung
	Khongsedon District	S-42	B Houaykhou	S-68	B Napheng-Gnai	S-94	B Vangpuay
S-17	B Napong	S-43	B Vapy-Noa	S-69	B Napheng-Noy	S-95	B Sanghong-Noy
S-18	B Vang Kan Hong	S-44	B Vapy-Tai	S-70	B Sackak-Tai	S-96	B Sanghong-Gnai
S-19	B Napheng-Gnai	S-45	B Nalang	S-71	B Dao-Gnai	S-97	B Laongam
S-20	B Khong-Noy	S-46	B Bangkha	S-72	B Kengsim-Tai	S-98	B Hokong
S-21	B Nongsaphang	S-47	B Saphat	S-73	B Nakon-Tai	S-99	B Beng
S-22	B Nongkhong	S-48	B Mouang	S-74	B That-Noy	S-100	B Houn-Tai
S-23	B Nongkhoua	S-49	B Hat	S-75	B Nalasao		
S-24	B Donmuang	S-50	B Sarpia	S-76	B Ko		
S-25	B Hinxiou	S-51	B Khounta-Lat	S-77	B Phao-Gnai		

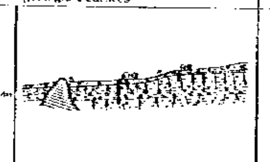
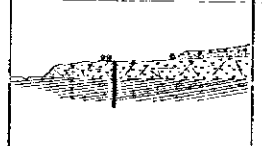
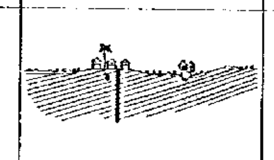




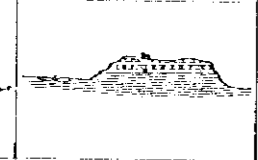
ດອກສານ ນ້ຳໃຕ້ດິນ
Groundwater Potential Based on Hydrogeologic Features

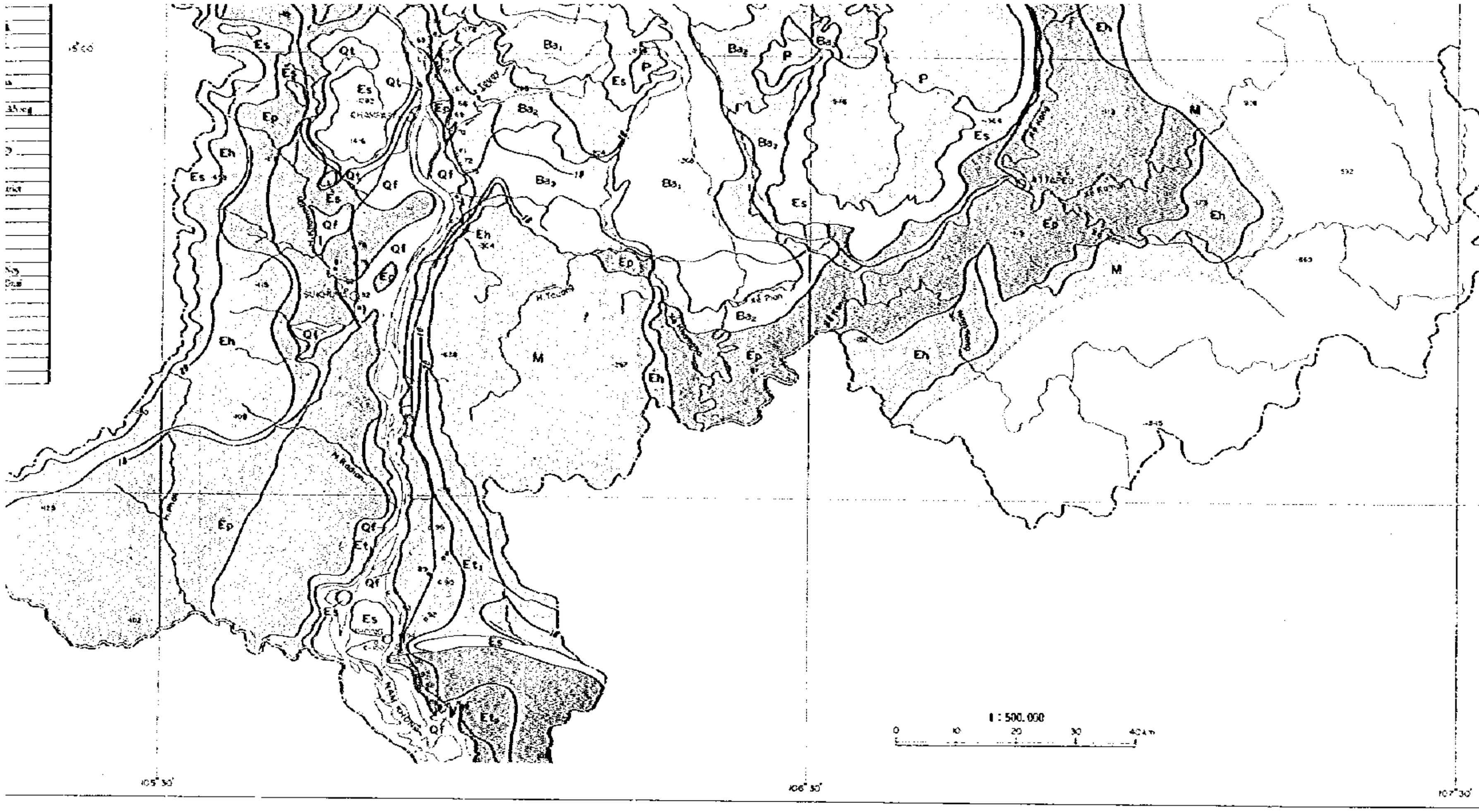
Types of Hydrogeologic Features		Province, District	Village Number ○ Test well Point
Qf		Saravan (S) / Champasak (C)	18, 20, 22, 23, 25, 26, 29, 30, 31, 32, 33, 34, 36. 42, 43, 44, 45, 47, 48, 49 / 1, 5, 17, 18, 22, 23, 24, 25, 33, 34, 35, 36. 76
Qt		Saravan (S) / Champasak (C)	[illegible]
Qte		Saravan (S) / Champasak (C)	[illegible]
Ba1		Saravan (S) / Champasak (C)	[illegible]

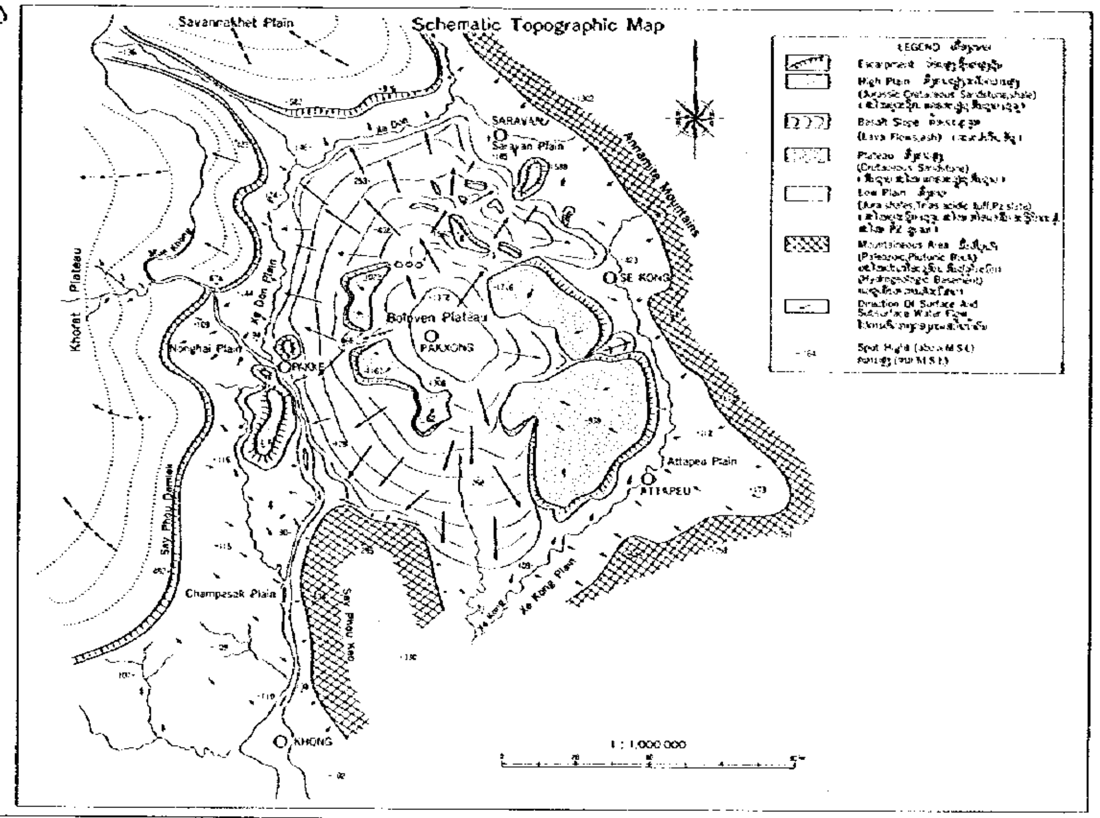
Groundwater Potential Based on Hydrogeologic Features

Types of Hydrogeologic Features		Province, District	Village Number ○ Test well Point
Ba2		Saravan (S) / Champasak (C)	[illegible]
Ba3		Saravan (S) / Champasak (C)	[illegible]
Ep		Saravan (S) / Champasak (C)	[illegible]
Eh		Saravan (S) / Champasak (C)	[illegible]

Groundwater Potential Based on Hydrogeologic Features

Types of Hydrogeologic Features		Province, District	Village Number ○ Test well Point
Es1, Es2		Saravan (S) / Champasak (C)	[illegible]
P		Saravan (S) / Champasak (C)	[illegible]
M		Saravan (S) / Champasak (C)	[illegible]





ຄວາມສາມາດນ້ຳໃຕ້ດິນອີງຕາມລັກສະນະນ້ຳໃຕ້ດິນ
Groundwater Potential Based on Hydrogeologic Features

Types of Hydrogeologic Features	Province, District	Village Number ○ Test well Point
Ba2	Saravan (S): Lakhonepheng, Khongsedon, Vapy, Saravan, Lao-ngam; Champasak (C): Sanasomboun, Bachiang, Pathoumphone, Sukhuma, Khong	[illegible]
Ba3	Saravan (S): Lakhonepheng, Khongsedon, Vapy, Saravan, Lao-ngam; Champasak (C): Sanasomboun, Bachiang, Pathoumphone, Sukhuma, Khong	[illegible]
Ep	Saravan (S): Lakhonepheng, Khongsedon, Vapy, Saravan, Lao-ngam; Champasak (C): Sanasomboun, Bachiang, Pathoumphone, Sukhuma, Khong	[illegible]
Eh	Saravan (S): Lakhonepheng, Khongsedon, Vapy, Saravan, Lao-ngam; Champasak (C): Sanasomboun, Bachiang, Pathoumphone, Sukhuma, Khong	[illegible]

ຄວາມສາມາດນ້ຳໃຕ້ດິນອີງຕາມລັກສະນະນ້ຳໃຕ້ດິນ
Groundwater Potential Based on Hydrogeologic Features

Types of Hydrogeologic Features	Province, District	Village Number ○ Test well Point
Es1, Es2	Saravan (S): Lakhonepheng, Khongsedon, Vapy, Saravan, Lao-ngam; Champasak (C): Sanasomboun, Bachiang, Pathoumphone, Sukhuma, Khong	[illegible]
P	Saravan (S): Lakhonepheng, Khongsedon, Vapy, Saravan, Lao-ngam; Champasak (C): Sanasomboun, Bachiang, Pathoumphone, Sukhuma, Khong	[illegible]
M	Saravan (S): Lakhonepheng, Khongsedon, Vapy, Saravan, Lao-ngam; Champasak (C): Sanasomboun, Bachiang, Pathoumphone, Sukhuma, Khong	[illegible]

ການສຳຫຼວດ ພັດທະນານ້ຳໃຕ້ດິນ ແຂວງຈຳປາສັກ ແລະສາລະວັນ ສາທາລະນະລັດ ປະຊາທິປະໄຕ ປະຊາຊົນລາວ

THE STUDY ON GROUNDWATER DEVELOPMENT FOR CHAMPASAK AND SARAVAN PROVINCES IN LAO PEOPLE'S DEMOCRATIC REPUBLIC

ແຜນທີ່ ສະແດງຄວາມສາມາດນ້ຳໃຕ້ດິນ ອີງຕາມລັກສະນະນ້ຳໃຕ້ດິນ

Groundwater Potential Map Based on Hydrogeology

1 : 500,000

1995

JAPAN INTERNATIONAL COOPERATION AGENCY

MINISTRY OF HEALTH LAO PEOPLE'S DEMOCRATIC REPUBLIC

GROUNDWATER QUALITY

GRO