APPENDIX C.3

Seismic Refraction Survey

- Calculation Sheet

- T-X Graph

Calculation Sheet

SEISMIC DATA CALCULATION SHEET

PROJECT : WARSAMSON HEPP
LOCATION : SITE D
LINE : SA SPREAD : I
APPENDIX : 4-II.

	0,40 KM/S							V1 B =	0,30 KM/S					
	1,00 KM/S		T1 A-B ---		MS			V2 B =	1,00 KM/S			T1 A-B =	---	MS
DISTANCE (m)	0	2,50	5,00	10,00	15,00	20,00	25,00	30,00	32,50	35,00	40,00	45,00	50,00	55,00
P E G	0		1	2	3	4	5	6		7	8	9	10	11
GEOPHONE	GP1	SHT A	GP2	GP3	GP4	GP5	GP6	GP7	SHT B	GP8	GP9	GP10	GP11	GP12
(TAP)														
(TBP)			Cross Line S-D											
TD		3,00							3,00					
TAP'														
TBP'														
V1 EFF	1,04	1,04	0,93	0,82	0,71	0,59	0,48	0,37	0,31	0,32	0,32	0,33	0,34	0,34
Z1		3,12							0,94					
	3,60 KM/S							V3 A =	3,60 KM/S					
T2 A-E =	58,00 MS							T2 A-E	58,00 MS					
(TAP)	10,00	14,00	18,00	18,50	20,00	22,00	24,00	25,00	26,00	27,00	31,00	36,00	40,00	41,00
(TBP)	58,00	57,00	56,00	51,00	50,00	53,00	55,00	56,00	55,50	55,00	52,00	50,00	49,00	48,00
TD	5,00	6,50	8,00	5,75	6,00	8,50	10,50	11,50	11,75	12,00	12,50	14,00	15,50	15,50
TAP'	5,00	7,50	10,00	12,75	14,00	13,50	13,50	13,50	14,25	15,00	18,50	22,00	24,50	25,50
TBP'	53,00	50,50	48,00	45,25	44,00	44,50	44,50	44,50	43,75	43,00	39,50	36,00	33,50	32,50
V2 EFF	1,04	1,04	0,99	0,95	0,90	0,86	0,81	0,76	0,76	0,77	0,80	0,82	0,84	0,86
DEPTH	5,20	6,77	7,96	5,45	5,41	7,27	8,50	8,78	8,97	9,29	9,96	11,47	13,04	13,39

				V1 D =	0,35 KM/S							V1 E =	0,35	KM/S
				V2 D =	1,00 KM/S		T1 A-E ---		MS			V2 E =	1,20	KM/S
DISTANCE (m)	60,00	65,00	70,00	75,00	77,50	80,00	85,00	90,00	95,00	100,00	105,00	110,00	112,50	115,00
P E G	12	13	14	15		16	17	18	19	20	21	22		23
GEOPHONE	GP13	GP14	GP15	GP16	SHT C	GP17	GP18	GP19	GP20	GP21	GP22	GP22	SHT D	GP24
(TAP)														
(TBP)														
TD					2,00								2,00	
TAP'														
TBP'														
V1 EFF	0,35	0,36	0,36	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37
Z1					0,75								0,73	
				V3 D =	3,60 KM/S							V3 D =	3,00	KM/S
				T2 A-E	58,00 MS							T2 A-E =	58,00	MS
(TAP)	44,00	47,50	50,00	52,00	53,50	55,00	58,50	57,00	50,00	53,00	54,00	56,00	57,00	58,00
(TBP)	49,00	48,00	47,00	45,00	42,50	41,00	41,50	38,00	35,00	30,00	26,00	24,50	25,00	26,00
TD	17,50	18,75	19,50	19,50	19,00	19,00	21,00	18,50	13,50	12,50	11,00	11,25	12,00	13,00
TAP'	26,50	28,75	30,50	32,50	34,50	36,00	37,50	38,50	36,50	40,50	43,00	44,75	45,00	45,00
TBP'	31,50	29,25	27,50	25,50	23,50	22,00	20,50	19,50	21,50	17,50	15,00	13,25	13,00	13,00
V2 EFF	0,89	0,91	0,93	0,95	0,96	0,98	1,00	1,03	1,05	1,08	1,11	1,13	1,14	1,16
DEPTH	15,50	17,03	18,14	18,58	18,31	18,56	21,05	19,02	14,23	13,49	12,16	12,72	13,72	15,04

SEISMIC DATA CALCULATION SHEET

PROJECT : WARSAMSON HEPP
LOCATION: SITE D
LINE : SA SPREAD : II
APPENDIX: 4.1.2

	V1A =	0,60	KM/S						V1 B =	0,50	KM/S				
	V2A =	1,30	KM/S						V2 B =	1,20	KM/S				
DISTANCE (m)	0	2,50	5,00	10,00	15,00	20,00	25,00	30,00	35,00	37,50	40,00	45,00	50,00	55,00	
PEG	0		1	2	3	4	5	6	7		8	9	10	11	
GEOPHONE	GP1	SHT A	GP2	GP3	GP4	GP5	GP6	GP7	GP8	SHT B	GP9	GP10	GP11	GP12	
(TAP)															
(TBP)															
TD		2,00					Cross line S-D			2,00					
TAP'															
TBP'															
V1 EFF	0,68	0,68	0,66	0,64	0,62	0,60	0,59	0,57	0,55	0,55	0,56	0,56	0,57	0,57	
Z1		1,35								1,11					
		3,20	KM/S						V3 B =	3,20	KM/S				
	T2 A-D =	57,00	MS						T2 B-D	57,00	MS				
(TAP)	12,50	10,00	10,00	12,00	16,00	19,00	23,00	21,00	23,00	25,00	27,00	30,00	30,00	34,00	
(TBP)	57,00	55,00	54,00	52,00	50,00	48,00	49,00	51,00	50,00	49,00	48,00	46,00	43,00	44,00	
TD	6,25	4,00	3,50	3,50	4,50	5,00	7,50	7,50	8,00	8,50	9,00	9,50	8,00	10,50	
TAP'	6,25	6,00	6,50	8,50	11,50	14,00	15,50	13,50	15,00	16,50	18,00	20,50	22,00	23,50	
TBP'	50,75	51,00	50,50	48,50	45,50	43,00	41,50	43,50	42,00	40,50	39,00	36,50	35,00	33,50	
V2 EFF	0,96	0,97	0,98	1,00	1,02	1,04	1,06	1,07	1,09	1,09	1,05	1,00	0,95	0,91	
DEPTH	6,03	3,89	3,44	3,50	4,58	5,19	7,92	8,05	8,73	9,28	9,41	9,49	7,62	9,51	

				V1 C =	0,48	KM/S						V1 D =	0,55	KM/S	
				V2 C =	0,80	KM/S		T1 C-E ---		MS		V2 D =	0,80	KM/S	
DISTANCE (m)	60,00	65,00	70,00	75,00	77,50	80,00	85,00	90,00	95,00	100,00	105,00	110,00	112,50	115,00	
PEG	12	13	14	15		16	17	18	19	20	21	22		23	
GEOPHONE	GP13	GP14	GP15	GP16	SHT C	GP17	GP18	GP19	GP20	GP21	GP22	GP23	SHT D	GP24	
(TAP)															
(TBP)															
TD					3,00								4,00		
TAP'															
TBP'															
V1 EFF	0,58	0,59	0,59	0,60	0,60	0,61	0,63	0,66	0,68	0,70	0,72	0,75	0,76		
Z1					1,80								3,03		
				V3 D =	3,20	KM/S						V3 D =	3,20	KM/S	
				T2 A-E	57,00	MS						T2 A-D =	57,00	MS	
(TAP)	37,00	40,00	44,00	43,00	42,00	40,00	37,50	44,00	45,00	54,00	56,00	55,00	52,00	57,00	
(TBP)	43,00	42,00	40,00	36,00	34,50	33,00	30,00	29,00	27,00	25,00	22,50	20,00	20,00	22,50	
TD	11,50	12,50	13,50	11,00	9,75	8,00	5,25	8,00	7,50	11,00	10,75	9,00	7,50	11,25	
TAP'	25,50	27,50	30,50	32,00	32,25	32,00	32,25	36,00	37,50	43,00	45,25	46,00	44,50	45,75	
TBP'	31,50	29,50	26,50	25,00	24,75	25,00	24,75	21,00	19,50	14,00	11,75	11,00	12,50	11,25	
V2 EFF	0,86	0,81	0,77	0,72	0,70	0,69	0,68	0,67	0,66	0,66	0,65	0,64	0,63	0,63	
DEPTH	9,88	10,16	10,35	7,92	6,79	5,54	3,59	5,39	4,98	7,21	6,95	5,73	4,74	7,06	

SEISMIC DATA CALCULATION SHEET

PROJECT : WARSAMSON HEPP
LOCATION: SITE D
LINE : SB SPREAD : I

APPENDIX: 4.1.3

V1A = 0,40 KM/S V1 B = 0,40 KM/S
V2A = 0,65 KM/S T1 A-B = --- MS V2 B = 0,60 KM/S

DISTANCE (m)	0	5,00	7,50	10,00	15,00	20,00	25,00	30,00	35,00	37,50	40,00	45,00	50,00	55,00
P E G	0	1		2	3	4	5	6	7		8	9	10	11
GEOPHONE	GP1	GP2	SHT A	GP3	GP4	GP5	GP6	GP7	GP8	SHT B	GP9	GP10	GP11	GP12
(TAP)														
(TBP)														
TD			3,00							3,00				
TAP'					Cross Line S-D									
TBP'														
V1 EFF	0,38	0,40	0,40	0,42	0,44	0,46	0,48	0,51	0,53	0,54	0,52	0,50	0,48	0,46
Z1			1,20							1,61				
		V3 A =	3,00 KM/S						V3 B =	4,80 KM/S				
		T2 A-D =	69,00 MS						T2 B-D	69,00 MS				
(TAP)	17,50	17,50	18,00	20,00	27,00	30,00	38,00	38,00	36,00	34,00	32,00	33,00	35,00	37,00
(TBP)	70,00	67,00	66,50	66,00	67,00	69,00	71,00	67,00	63,00	61,50	60,00	57,00	54,50	55,00
TD	9,25	7,75	7,75	8,50	12,50	15,00	20,00	18,00	15,00	12,25	12,00	11,50	11,25	11,50
TAP'	8,25	9,75	10,25	11,50	14,50	15,00	18,00	20,00	21,00	21,75	20,00	21,50	23,75	25,50
TBP'	60,75	59,25	58,75	57,50	54,50	54,00	51,00	49,00	48,00	49,25	48,00	45,50	43,25	43,50
V2 EFF	0,55	0,57	0,57	0,58	0,60	0,62	0,64	0,66	0,67	0,67	0,65	0,63	0,61	0,59
DEPTH	5,06	4,38	4,45	4,96	7,53	9,29	12,75	11,80	10,11	8,26	7,85	7,29	6,91	6,84

V1 C = 0,30 KM/S V1 D = 0,60 KM/S
V2 C = 0,50 KM/S T1 A-E --- MS V1 D = 0,90 KM/S

DISTANCE (m)	60,00	65,00	70,00	75,00	77,50	80,00	85,00	90,00	95,00	100,00	105,00	110,00	112,50	115,00
P E G	12	13	14	15		16	17	18	19	20	21	22		23
GEOPHONE	GP13	GP14	GP15	GP16	SHT C	GP17	GP18	GP19	GP20	GP21	GP22	GP23	SHT D	GP24
(TAP)														
(TBP)														
TD					2,00								4,00	
TAP'														
TBP'														
V1 EFF	0,44	0,42	0,40	0,38	0,38	0,41	0,47	0,53	0,59	0,65	0,71	0,77	0,80	
Z1					0,00								3,22	
				V3 C =	3,40 KM/S							V3 D =	3,00	KM/S
				T2 A-D =	69,00 MS							T2 A-D =	69,00	MS
(TAP)	39,00	41,00	43,00	47,00	46,50	44,00	46,00	61,00	62,00	67,00	70,00	69,00	68,50	69,00
(TBP)	57,00	59,00	61,00	59,00	58,50	57,00	55,00	56,00	55,00	41,00	26,00	25,00	22,50	25,00
TD	13,50	15,50	17,50	18,50	16,75	16,00	16,00	24,00	24,00	19,50	13,50	12,50	11,00	12,50
TAP'	25,50	25,50	25,50	28,50	29,75	28,00	30,00	37,00	38,00	47,50	56,50	56,50	57,50	56,50
TBP'	43,50	43,50	43,50	40,50	41,75	41,00	39,00	32,00	31,00	21,50	12,50	12,50	11,50	12,50
V2 EFF	0,57	0,56	0,54	0,52	0,51	0,53	0,57	0,61	0,65	0,69	0,73	0,77	0,79	0,81
DEPTH	7,76	8,60	9,37	9,53	8,47	8,41	9,05	14,53	15,49	13,36	9,79	9,57	8,64	10,06

SEISMIC DATA CALCULATION SHEET

PROJECT : WARSAMSON HEPP
LOCATION: SITE D
LINE : SB SPREAD : II

APPENDIX: 4.1.4

V1A =	0,40	KM/S							V1 B =	0,50	KM/S			
V2A =	1,40	KM/S		T1 A–B =	---	MS			V2 B =	1,20	KM/S			
DISTANCE (m)	0	2,50	5,00	10,00	15,00	20,00	25,00	30,00	35,00	37,50	40,00	45,00	50,00	55,00
P E G	0		1	2	3	4	5	6	7		8	9	10	11
GEOPHONE	GP1	SHT A	GP2	GP3	GP4	GP5	GP6	GP7	GP8	SHT B	GP9	GP10	GP11	GP12
(TAP)														
(TBP)														
TD		3,00					Cross Line S–D			3,00				
TAP'														
TBP'														
V1 EFF	0,39	0,40	0,41	0,43	0,45	0,48	0,50	0,52	0,54	0,55	0,57	0,58	0,60	0,62
Z1		1,20								1,65				
	3,60	KM/S							V3 B =	3,60	KM/S			
T2 A–D =	62,00	MS							T2 B–D =	62,00	MS			
(TAP)	15,00	12,50	15,00	14,00	17,00	19,00	22,00	24,50	28,00	31,00	34,00	37,00	41,00	42,00
(TBP)	62,00	60,00	59,00	55,00	53,00	51,00	50,00	55,00	52,00	51,00	50,00	47,00	48,00	48,00
TD	7,50	5,25	6,00	3,50	4,00	4,00	5,00	8,75	9,00	11,50	12,50	13,00	14,00	14,00
TAP'	7,50	7,25	9,00	10,50	13,00	15,00	17,00	15,75	19,00	19,50	21,50	24,00	27,00	28,00
TBP'	54,50	54,75	53,00	51,50	49,00	47,00	45,00	46,25	43,00	39,50	37,50	34,00	34,00	34,00
V2 EFF	0,89	0,89	0,88	0,86	0,84	0,83	0,81	0,79	0,78	0,78	0,90	1,02	1,14	1,26
DEPTH	6,70	4,65	5,26	3,01	3,38	3,31	4,05	6,95	7,00	8,95	11,22	13,23	15,93	17,61

				V1 C =	0,65	KM/S						V1 D =	0,40	KM/S
				V2 C =	1,80	KM/S		T1 A–D	---	MS		V2 D =	1,20	KM/S
DISTANCE (m)	60,00	65,00	70,00	75,00	77,50	80,00	85,00	90,00	95,00	100,00	105,00	110,00	112,50	115,00
P E G	12	13	14	15		16	17	18	19	20	21	22		23
GEOPHONE	GP13	GP14	GP15	GP16	SHT C	GP17	GP18	GP19	GP20	GP21	GP22	GP23	SHT D	GP24
(TAP)														
(TBP)														
TD					3,00								3,00	
TAP'														
TBP'														
V1 EFF	0,64	0,65	0,67	0,69	0,70		0,64	0,60	0,56	0,52	0,48	0,44	0,42	
Z1					2,09								1,27	
				V3 C =	3,60	KM/S						V3 D =	3,60	KM/S
				T2 A–D =	62,00	MS						T2 A–D =	62,00	MS
(TAP)	44,00	46,00	49,00	51,00	53,00	55,00	59,00	55,00	51,00	54,00	57,00	58,00	59,50	62,00
(TBP)	46,00	44,00	42,00	40,00	39,00	38,00	34,00	26,00	21,00	15,00	12,00	12,50	10,00	12,50
TD	14,00	14,00	14,50	14,50	16,00	15,50	15,50	9,50	5,00	3,50	3,50	4,25	3,75	6,25
TAP'	30,00	32,00	34,50	36,50	37,00	39,50	43,50	45,50	46,00	50,50	53,50	53,75	55,75	55,75
TBP'	32,00	30,00	27,50	25,50	23,00	22,50	18,50	16,50	16,00	11,50	8,50	8,25	6,25	6,25
V2 EFF	1,38	1,50	1,62	1,74	1,80	1,71	1,53	1,35	1,17	0,99	0,81	0,63	0,54	0,45
DEPTH	19,29	20,97	23,46	25,20	28,77	26,48	23,69	12,81	5,84	3,46	2,83	2,67	2,02	2,81

SEISMIC DATA CALCULATION SHEET

PROJECT : WARSAMSON HEPP
LOCATION : SITE D
LINE : SC SPREAD : I

APPENDIX : 4.1.5

V1A = 0,50 KM/S V1 B = 0,40 KM/S
V2A = 1,40 KM/S T1 A-B = --- MS V2 B = 0,80 KM/S T1 A-B = --- MS

DISTANCE (m)	0	2,50	5,00	10,00	15,00	20,00	25,00	30,00	35,00	37,50	40,00	45,00	50,00	55,00
PEG	0		1	2	3	4	5	6	7		8	9	10	11
GEOPHONE	GP1	SHT A	GP2	GP3	GP4	GP5	GP6	GP7	GP8	SHT B	GP9	GP10	GP11	GP12
(TAP)														
(TBP)														
TD		2,00								3,00				
TAP'														
TBP'														
V1 EFF	0,50	0,50	0,49	0,49	0,48	0,48	0,47	0,47	0,46	0,46	0,47	0,48	0,49	0,50
Z1		1,00								1,39				
	V3B =	4,00 KM/S							V3 B =	3,00 KM/S				
T2	49,00	MS						T2	49,00	MS				
(TAP)	12,50	10,00	12,50	14,00	16,00	17,00	15,00	20,00	24,00	25,00	27,00	32,00	35,00	37,50
(TBP)	49,00	46,00	45,00	44,00	40,00	38,00	38,00	39,00	44,00	45,50	48,00	45,00	42,00	44,00
TD	6,25	3,50	4,25	4,50	3,50	3,00	2,00	5,00	9,50	10,75	13,00	14,00	14,00	16,25
TAP'	6,25	6,50	8,25	9,50	12,50	14,00	13,00	15,00	14,50	14,25	14,00	18,00	21,00	21,25
TBP'	42,75	42,50	40,75	39,50	36,50	35,00	36,00	34,00	34,50	34,75	35,00	31,00	28,00	27,75
V2 EFF	0,96	0,93	0,88	0,82	0,76	0,70	0,65	0,59	0,53	0,53	0,54	0,54	0,55	0,55
DEPTH	6,02	3,27	3,72	3,68	2,66	2,11	1,29	2,94	5,04	5,04	6,97	7,58	7,67	8,99

V1 C = 0,45 KM/S V1 D = 0,40 KM/S
V2 C = 0,80 KM/S T1 A-D = --- MS V1 D = 1,10 KM/S

DISTANCE (m)	60,00	65,00	70,00	75,00	77,50	80,00	85,00	90,00	95,00	100,00	105,00	110,00	112,50	115,00
PEG	12	13	14	15		16	17	18	19	20	21	22		23
GEOPHONE	GP13	GP14	GP15	GP16	SHT C	GP17	GP18	GP19	GP20	GP21	GP22	GP23	SHT D	GP24
(TAP)														
(TBP)														
TD					8,00								2,00	
TAP'														
TBP'														
V1 EFF	0,51	0,52	0,53	0,54	0,54		0,52	0,50	0,49	0,47	0,45	0,44	0,43	
Z1					4,35								0,86	
				V3 D =	4,00 KM/S							V3 D =	4,00 KM/S	
				T2 A-D =	49,00 MS							T2 A-D =	49,00 MS	
(TAP)	43,00	45,00	45,00	42,00	44,00	45,00	46,00	42,00	46,00	48,00	49,00	47,00	48,00	49,00
(TAB)	41,00	39,00	38,00	34,00	34,50	35,00	36,00	29,00	26,00	22,00	17,50	12,00	11,00	15,00
TD	17,50	17,50	17,00	13,50	14,75	15,50	16,50	11,00	11,50	10,50	8,75	5,00	5,00	7,50
TAP'	25,50	27,50	28,00	28,50	29,25	30,50	25,50	35,00	34,50	37,50	40,25	42,00	43,00	41,50
TBP'	23,50	21,50	21,00	20,50	19,75	19,50	19,50	18,00	14,50	11,50	8,75	7,00	6,00	7,50
V2 EFF	0,56	0,56	0,57	0,58	0,58	0,60	0,63	0,67	0,70	0,74	0,77	0,81	0,83	0,84
DEPTH	9,78	9,89	9,70	7,78	8,55	9,26	10,44	7,35	8,09	7,76	6,77	4,05	4,14	6,34

SEISMIC DATA CALCULATION SHEET

PROJECT : WARSAMSON HEPP
LOCATION: SITE D
LINE : SC SPREAD : II

APPENDIX : 4.1.6

V1A = 0,50 KM/S V1 B = 0,40 KM/S
V2A = 1,40 KM/S T1 A–B = --- MS V2 B = 0,80 KM/S T1 A–B = --- MS

DISTANCE (m)	0	2,50	5,00	10,00	15,00	20,00	25,00	30,00	35,00	37,50	40,00	45,00	50,00	55,00
P E G	0		1	2	3	4	5	6	7		8	9	10	11
GEOPHONE	GP1	SHT A	GP2	GP3	GP4	GP5	GP6	GP7	GP8	SHT B	GP9	GP10	GP11	GP12
(TAP)														
(TBP)														
TD		3,00					Cross line S–D			3,00				
TAP'														
TBP'														
V1 EFF	0,50	0,50	0,49	0,49	0,48	0,48	0,47	0,47	0,46	0,46	0,47	0,48	0,49	0,50
Z1		1,50								1,39				
	V3B =	3,10 KM/S							V3 B =	3,10 KM/S				
T2 A–D =	54,00	MS						T2 B–D =	54,00	MS				
(TAP)	15,00	12,50	12,50	13,00	16,00	20,00	25,50	31,00	34,00	35,00	35,00	40,00	42,00	46,00
(TBP)	55,00	53,00	51,00	53,00	55,00	52,00	55,00	54,00	53,00	47,50	44,00	48,00	49,00	48,00
TD	8,00	5,75	4,75	6,00	8,50	9,00	13,25	15,50	16,50	14,25	12,50	17,00	18,50	20,00
TAP'	7,00	6,75	7,75	7,00	7,50	11,00	12,25	15,50	17,50	20,75	22,50	23,00	23,50	26,00
TBP'	47,00	47,25	46,25	47,00	46,50	43,00	41,75	38,50	36,50	33,25	31,50	31,00	30,50	28,00
V2 EFF	1,05	1,02	0,97	0,92	0,87	0,81	0,76	0,71	0,66	0,66	0,67	0,68	0,69	0,70
DEPTH	8,40	5,88	4,61	5,50	7,35	7,31	10,07	10,97	10,82	10,82	8,33	11,51	12,73	13,97

V1 C = 0,45 KM/S V1 D = 0,50 KM/S
V2 C = 0,80 KM/S T1 A–D = --- MS V2 D = 0,80 KM/S

DISTANCE (m)	60,00	65,00	70,00	75,00	77,50	80,00	85,00	90,00	95,00	100,00	105,00	110,00	112,50	115,00
P E G	12	13	14	15		16	17	18	19	20	21	22		23
GEOPHONE	GP13	GP14	GP15	GP16	SHT C	GP17	GP18	GP19	GP20	GP21	GP22	GP23	SHT D	GP24
(TAP)														
(TBP)														
TD					3,00								3,00	
TAP'														
TBP'														
V1 EFF		0,52	0,53	0,54	0,54		0,56	0,58	0,59	0,61	0,62	0,63	0,64	
Z1					1,63								1,92	
				V3 D =	3,10 KM/S							V3 D =	3,10 KM/S	
				T2 A–D =	54,00 MS							T2 A–D =	54,00 MS	
(TAP)	42,00	45,00	48,00	49,00	50,00	51,00	52,00	54,00	57,00	60,00	53,00	51,00	53,00	54,00
(TAB)	42,00	43,00	42,00	39,00	37,00	35,00	32,00	29,00	23,00	19,00	15,00	15,00	12,50	15,00
TD	15,00	17,00	18,00	17,00	16,50	16,00	15,00	14,50	13,00	12,50	7,00	6,00	5,75	7,50
TAP'	27,00	28,00	30,00	32,00	33,50	36,00	39,00	42,50	44,00	47,50	46,00	45,00	47,25	46,50
TBP'	27,00	26,00	24,00	22,00	20,50	19,00	17,00	14,50	10,00	6,50	8,00	9,00	6,75	7,50
V2 EFF	0,71	0,72	0,73	0,74	0,75	0,74	0,72	0,70	0,68	0,66	0,64	0,63	0,62	0,61
DEPTH	10,64	12,24	13,15	12,61	12,32	11,80	10,78	10,15	8,86	8,28	4,51	3,75	3,54	4,55

SEISMIC DATA CALCULATION SHEET

PROJECT : WARSAMSON HEPP
LOCATION: SITE D
LINE : SD SPREAD : I

APPENDIX : 4.1.7

V1A =	0,30	KM/S						V1 B =	0,33	KM/S				
V2A =	0,60	KM/S	T1 A-B =	---	MS			V2 B =	0,80	KM/S	T1 A-B	---	MS	
DISTANCE (m)	0	2,50	5,00	10,00	15,00	20,00	25,00	30,00	35,00	37,50	40,00	45,00	50,00	55,00
P E G	0		1	2	3	4	5	6	7		8	9	10	11
GEOPHONE	GP1	SHT A	GP2	GP3	GP4	GP5	GP6	GP7	GP8	SHT B	GP9	GP10	GP11	GP12
(TAP)														
(TBP)												Cross Line S-A		
TD		2,00								3,00				
TAP'														
TBP'														
V1 EFF	0,30	0,30	0,31	0,32	0,33	0,34	0,34	0,35	0,36	0,36	0,36	0,36	0,36	0,36
Z1		0,60								1,09				
	V3B =	4,50	KM/S						V3 B =	4,30	KM/S			
T2 A-D =	50,00	MS						T2 B-D =	50,00	MS				
(TAP)	13,00	15,00	16,00	18,00	19,00	18,00	20,00	22,00	26,00	25,00	25,00	29,00	33,00	35,00
(TBP)	50,00	47,50	46,00	45,00	48,00	46,00	39,00	38,00	38,00	36,50	34,00	36,00	40,00	43,00
TD	6,50	6,25	6,00	6,50	8,50	7,00	4,50	5,00	7,00	5,75	4,50	7,50	11,50	14,00
TAP'	6,50	8,75	10,00	11,50	10,50	11,00	15,50	17,00	19,00	19,25	20,50	21,50	21,50	21,00
TBP'	43,50	41,25	40,00	38,50	39,50	39,00	34,50	33,00	31,00	30,75	29,50	28,50	28,50	29,00
V2 EFF	0,51	0,51	0,50	0,49	0,48	0,46	0,45	0,44	0,43	0,43	0,46	0,50	0,53	0,56
DEPTH	3,34	3,18	2,98	3,16	4,04	3,25	2,04	2,22	3,03	3,03	2,09	3,72	6,07	7,84

				V1 C =	0,33	KM/S						V1 D =	0,33	KM/S
				V2 C =	0,90	KM/S	T1 A-D =	50,00	MS			V1 D =	1,00	KM/S
DISTANCE (m)	60,00	65,00	70,00	75,00	77,50	80,00	85,00	90,00	95,00	100,00	105,00	110,00	112,50	115,00
P E G	12	13	14	15		16	17	18	19	20	21	22		23
GEOPHONE	GP13	GP14	GP15	GP16	SHT C	GP17	GP18	GP19	GP20	GP21	GP22	GP23	SHT D	GP24
(TAP)														
(TBP)													Cross Line S-B	
TD					3,00								3,00	
TAP'														
TBP'														
V1 EFF	0,36	0,36	0,36	0,36	0,35	0,35	0,35	0,35	0,35	0,35	0,35	0,35	0,35	
Z1					1,06								1,05	
				V3 D =	4,30	KM/S						V3 D =	4,30	KM/S
			T2 A-D =		50,00	MS						T2 A-D	50,00	MS
(TAP)	36,00	38,00	32,00	36,00	38,00	41,00	44,00	45,00	42,00	40,00	44,00	46,00	47,50	50,00
(TAB)	35,00	34,00	28,00	30,00	29,50	29,00	27,50	27,00	24,00	23,00	24,00	25,00	25,00	25,00
TD	10,50	11,00	5,00	8,00	8,75	10,00	10,75	11,00	8,00	6,50	9,00	10,50	11,25	12,50
TAP'	25,50	27,00	27,00	28,00	29,25	31,00	33,25	34,00	34,00	33,50	35,00	35,50	36,25	37,50
TBP'	24,50	23,00	23,00	22,00	20,75	19,00	16,75	16,00	16,00	16,50	15,00	14,50	13,75	12,50
V2 EFF	0,59	0,62	0,66	0,69	0,70	0,71	0,73	0,75	0,77	0,79	0,80	0,82	0,83	0,84
DEPTH	6,22	6,86	3,28	5,50	6,16	7,13	7,86	8,24	6,14	5,11	7,24	8,64	9,36	10,51

SEISMIC DATA CALCULATION SHEET

PROJECT : WARSAMSON HEPP
LOCATION: SITE D
LINE : SD SPREAD : II

APPENDIX : 4.1.8

V1A =	0,40	KM/S							V1 B =	0,40	KM/S			
V2A =	1,00	KM/S		T1 A-B =	---	MS			V2 B =	1,00	KM/S	T1 A-B =	---	MS
DISTANCE (m)	0	2,50	5,00	10,00	15,00	20,00	25,00	30,00	35,00	37,50	40,00	45,00	50,00	55,00
P E G	0		1	2	3	4	5	6	7		8	9	10	11
GEOPHONE	GP1	SHT A	GP2	GP3	GP4	GP5	GP6	GP7	GP8	SHT B	GP9	GP10	GP11	GP12
(TAP)														
(TBP)														
TD		3,00					Cross line S-B			3,50				
TAP'														
TBP'														
V1 EFF	0,44	0,44	0,44	0,44	0,44	0,44	0,44	0,44	0,44	0,44	0,44	0,43	0,43	0,43
Z1		1,31								1,53				
	V3B =	3,10	KM/S						V3 B =	3,10	KM/S			
T2 A-D =	62,00	MS						T2 B-D	62,00	MS				
(TAP)	16,00	17,50	19,00	21,00	19,00	22,00	24,00	26,00	29,00	30,00	31,00	34,00	37,00	37,50
(TBP)	62,00	60,00	59,00	59,00	55,00	51,00	52,00	57,00	54,00	52,50	52,00	49,00	48,00	46,00
TD	8,00	7,75	8,00	9,00	6,00	5,50	7,00	10,50	10,50	10,25	10,50	10,50	11,50	10,75
TAP'	8,00	9,75	11,00	12,00	13,00	16,50	17,00	15,50	18,50	19,75	20,50	23,50	25,50	26,75
TBP'	54,00	52,25	51,00	50,00	49,00	45,50	45,00	46,50	43,50	42,25	41,50	38,50	36,50	35,25
V2 EFF	0,79	0,78	0,77	0,75	0,74	0,72	0,71	0,69	0,68	0,68	0,72	0,76	0,81	0,85
DEPTH	6,33	6,07	6,14	6,77	4,42	3,97	4,94	7,25	7,09	7,09	7,55	8,02	9,29	9,15

				V1 C =	0,40	KM/S						V1 D =	0,30	KM/S
				V2 C =	1,20	KM/S		T1 A-D =		MS		V1 D =	1,50	KM/S
DISTANCE (m)	60,00	65,00	70,00	75,00	77,50	80,00	85,00	90,00	95,00	100,00	105,00	110,00	112,50	115,00
P E G	12	13	14	15		16	17	18	19	20	21	22		23
GEOPHONE	GP13	GP14	GP15	GP16	SHT C	GP17	GP18	GP19	GP20	GP21	GP22	GP23	SHT D	GP24
(TAP)														
(TBP)														
TD	Cross line S-A:				4,00		Cross line S-C:						2,00	
TAP'	BH-2													
TBP'														
V1 EFF	0,43	0,43	0,43	0,42	0,42	0,42	0,40	0,38	0,37	0,35	0,33	0,31	0,31	0,30
Z1					1,70								0,61	
				V3 D =	3,10	KM/S						V3 D =	3,10	KM/S
				T2 A-D =	62,00	MS						T2 A-D =	62,00	MS
(TAP)	37,50	41,50	46,00	49,00	51,00	53,00	57,50	51,00	49,00	55,00	58,00	59,00	60,00	61,00
(TAB)	45,00	44,00	43,00	42,00	41,00	40,00	36,00	28,00	26,00	28,00	29,00	25,00	25,50	26,50
TD	10,25	11,75	13,50	14,50	15,00	15,50	15,75	8,50	6,50	10,50	12,50	11,00	11,75	12,75
TAP'	27,25	29,75	32,50	34,50	36,00	37,50	41,75	42,50	42,50	44,50	45,50	48,00	48,25	48,25
TBP'	34,75	32,25	29,50	27,50	26,00	24,50	20,25	19,50	19,50	17,50	16,50	14,00	13,75	13,75
V2 EFF	0,90	0,94	0,98	1,03	1,05	1,08	1,14	1,20	1,26	1,32	1,38	1,44	1,47	1,50
DEPTH	9,18	11,04	13,28	14,90	15,74	16,73	17,95	10,20	8,19	13,86	17,25	15,84	17,27	19,12

SEISMIC DATA CALCULATION SHEET

PROJECT : WARSAMSON HEPP
LOCATION: SITE D
LINE : SE SPREAD : II

APPENDIX : 4.1.9

V1A = 0,40 KM/S V1 B = 0,40 KM/S
V2A = 1,10 KM/S T1 A–B = --- MS V2 B = 1,10 KM/S

DISTANCE (m)	0	2,50	5,00	10,00	15,00	20,00	25,00	30,00	35,00	37,50	40,00	45,00	50,00	55,00
PEG	0		1	2	3	4	5	6	7		8	9	10	11
GEOPHONE	GP1	SHT A	GP2	GP3	GP4	GP5	GP6	GP7	GP8	SHT B	GP9	GP10	GP11	GP12
(TAP)														
(TBP)														
TD		3,00								2,00				
TAP'														
TBP'														
V1 EFF	0,40	0,40	0,40	0,41	0,41	0,41	0,42	0,42	0,43	0,43	0,38	0,33	0,28	0,23
Z1		1,20								0,86				

3,00 KM/S V3 B = 3,00 KM/S
T2 A–D = 52,00 MS T2 B–D = 52,00 MS

(TAP)	12,00	12,50	13,00	15,00	18,00	23,00	25,00	22,00	24,00	25,00	26,00	28,00	30,00	34,00
(TBP)	50,00	51,50	52,50	49,00	46,00	42,00	39,00	35,00	36,00	36,00	36,00	33,00	31,00	30,00
TD	5,00	6,00	6,75	6,00	6,00	6,50	6,00	2,50	4,00	5,00	6,00	5,50	6,50	6,00
TAP'	7,00	6,50	6,25	9,00	12,00	16,50	19,00	19,50	20,00	20,00	20,00	22,50	23,50	28,00
TBP'	45,00	45,50	45,75	43,00	40,00	35,50	33,00	32,50	32,00	31,00	30,00	27,50	24,50	24,00
V2 EFF	0,81	0,80	0,78	0,75	0,73	0,70	0,67	0,64	0,61	0,61	0,67	0,72	0,77	0,82
DEPTH	4,05	4,78	5,28	4,53	4,36	4,54	4,02	1,61	2,46	3,07	4,00	3,96	5,02	4,95

V1 C = KM/S V1 D = 0,50 KM/S
V2 C = 1,00 KM/S T1 A–D = --- MS V1 D = 1,50 KM/S

DISTANCE (m)	60,00	65,00	70,00	75,00	77,50	80,00	85,00	90,00	95,00	100,00	105,00	110,00	112,50	115,00
PEG	12	13	14	15		16	17	18	19	20	21	22		23
GEOPHONE	GP13	GP14	GP15	GP16	SHT C	GP17	GP18	GP19	GP20	GP21	GP22	GP23	SHT D	GP24
(TAP)														
(TBP)														
TD													2,00	
TAP'														
TBP'														
V1 EFF													0,53	
Z1													1,06	

V3 C = 3,00 KM/S V3 D = 3,00 KM/S
T2 A–D = 52,00 MS T2 A–D = 52,00 MS

(TAP)	37,00	40,00	38,00	39,00	39,50	40,00	42,00	45,00	47,00	49,00	50,00	51,00	52,00	52,00
(TBP)	29,00	24,00	21,00	20,00	21,50	22,00	24,00	20,00	17,50	16,00	15,00	13,00	12,50	12,00
TD	7,00	6,00	3,50	3,50	4,75	5,00	7,00	6,50	6,25	6,50	6,50	6,00	6,25	6,00
TAP'	30,00	34,00	34,50	35,50	34,75	35,00	35,00	38,50	40,75	42,50	43,50	45,00	45,75	46,00
TBP'	22,00	18,00	17,50	16,50	16,75	17,00	17,00	13,50	11,25	9,50	8,50	7,00	6,25	6,00
V2 EFF	0,88	0,93	0,98	1,03	1,06	1,08	1,12	1,15	1,19	1,23	1,27	1,30	1,32	1,34
DEPTH	6,14	5,58	3,44	3,62	5,04	5,40	7,82	7,50	7,45	7,99	8,23	7,82	8,26	8,04

SEISMIC DATA CALCULATION SHEET

PROJECT : WARSAMSON HEPP
LOCATION: SITE A
LINE : SB SPREAD : I
APPENDIX : 4.1.10

V1A = 0,40 KM/S V1 B = 0,50 KM/S
V2A = 1,00 KM/S T1 A-B = --- MS V2 B = 1,80 KM/S T1 A-B = --- MS

DISTANCE (m)	0	2,50	5,00	10,00	15,00	20,00	25,00	30,00	35,00	37,50	40,00	45,00	50,00	55,00
PEG	0		1	2	3	4	5	6	7		8	9	10	11
GEOPHONE	GP1	SHT A	GP2	GP3	GP4	GP5	GP6	GP7	GP8	SHT B	GP9	GP10	GP11	GP12
(TAP)														
(TBP)														
TD		2,50								3,00				
TAP'														
TBP'														
V1 EFF	0,43	0,44	0,44	0,45	0,46	0,48	0,49	0,50	0,51	0,52	0,53	0,53	0,54	0,55
Z1		1,09								1,53				

Cross Line S-D

V3 B = 3,20 KM/S
T2 A-E = 68,00 MS T2 B-D 68,00 MS

(TAP)	12,50	9,00	10,00	12,00	14,00	12,50	15,00	20,00	27,00	29,00	31,00	29,00	27,00	30,00
(TBP)	68,00	67,50	66,00	70,00	67,00	65,00	62,00	60,00	57,00	59,00	61,00	58,00	53,00	57,00
TD	6,25	4,25	4,00	7,00	6,50	4,75	4,50	6,00	8,00	10,00	12,00	9,50	6,00	9,50
TAP'	6,25	4,75	6,00	5,00	7,50	7,75	10,50	14,00	19,00	19,00	19,00	19,50	21,00	20,50
TBP'	61,75	63,25	62,00	63,00	60,50	60,25	57,50	54,00	49,00	49,00	49,00	48,50	47,00	47,50
V2 EFF	1,14	1,13	1,13	1,12	1,12	1,11	1,10	1,10	1,09	1,08	1,09	1,09	1,10	1,10
DEPTH	7,11	4,82	4,52	7,87	7,26	5,27	4,96	6,57	8,71	10,85	13,07	10,40	6,60	10,49

V1 C = 0,38 KM/S V1 D = 0,40 KM/S
V2 C = 1,40 KM/S T1 A-E --- MS V2 D = 1,50 KM/S

DISTANCE (m)	60,00	65,00	70,00	75,00	77,50	80,00	85,00	90,00	95,00	100,00	105,00	110,00	112,50	115,00
PEG	12	13	14	15		16	17	18	19	20	21	22		23
GEOPHONE	GP13	GP14	GP15	GP16	SHT C	GP17	GP18	GP19	GP20	GP21	GP22	GP23	SHT D	GP24
(TAP)														
(TBP)														
TD					5,00								4,00	
TAP'														
TBP'														
V1 EFF	0,44	0,43	0,42	0,40	0,39	0,40	0,40	0,40	0,40	0,41	0,41	0,41	0,42	
Z1					1,97								1,66	

V3 D = 3,20 KM/S V3 D = 3,20 KM/S
T2 A-D = 69,00 MS T2 A-D = 69,00 MS

(TAP)	34,00	32,00	35,00	41,00	45,00	49,00	54,00	55,00	56,00	61,00	61,00	65,00	67,00	69,00
(TBP)	52,00	48,00	47,00	50,00	52,00	53,00	48,00	43,00	40,00	38,00	37,00	35,00	34,00	33,00
TD	8,50	5,50	6,50	11,00	14,00	16,50	16,50	14,50	13,50	15,00	14,50	15,50	16,00	16,50
TAP'	25,50	26,50	28,50	30,00	31,00	32,50	37,50	40,50	42,50	46,00	46,50	49,50	51,00	52,50
TBP'	43,50	42,50	40,50	39,00	38,00	36,50	31,50	28,50	26,50	23,00	22,50	19,50	18,00	16,50
V2 EFF	1,11	1,12	1,12	1,13	1,12	1,14	1,18	1,21	1,24	1,28	1,31	1,35	1,36	1,38
DEPTH	9,44	6,13	7,28	12,38	15,74	18,83	19,40	17,55	16,80	19,18	19,04	20,89	21,84	22,80

SEISMIC DATA CALCULATION SHEET

PROJECT : WARSAMSON HEPP
LOCATION : SITE A
LINE : SB SPREAD : II APPENDIX : 4..1.11

V1A =	0,60	KM/S						V1 B =	0,60	KM/S				
V2A =	1,00	KM/S		T1 A-B =	---	MS		V2 B =	1,30	KM/S		T1 A-B =	---	MS
DISTANCE (m)	0	2,50	5,00	10,00	15,00	20,00	25,00	30,00	35,00	37,50	40,00	45,00	50,00	55,00
P E G	0		1	2	3	4	5	6	7		8	9	10	11
GEOPHONE	GP1	SHT A	GP2	GP3	GP4	GP5	GP6	GP7	GP8	SHT B	GP9	GP10	GP11	GP12
(TAP)														
(TBP)														
TD		3,00					Cross Line S-D			2,00				
TAP'														
TBP'														
V1 EFF	0,75	0,75	0,75	0,74	0,73	0,72	0,71	0,70	0,69	0,68	0,67	0,67	0,66	0,65
Z1		2,25								1,37				
	3,30	KM/S						V3 B =	3,30	KM/S				
T2 A-E =	48,00	MS						T2 B-D	48,00	MS				
(TAP)	15,00	16,00	17,00	17,00	19,00	21,00	22,00	26,00	28,00	27,00	29,00	30,00	31,00	30,00
(TBP)	48,00	47,00	46,00	45,50	45,00	44,00	43,00	42,00	38,00	37,00	36,00	33,00	34,00	32,00
TD	7,50	7,50	7,50	7,25	8,00	8,50	8,50	10,00	9,00	8,00	8,50	7,50	8,50	7,00
TAP'	7,50	8,50	9,50	9,75	11,00	12,50	13,50	16,00	19,00	19,00	20,50	22,50	22,50	23,00
TBP'	40,50	39,50	38,50	38,25	37,00	35,50	34,50	32,00	29,00	29,00	27,50	25,50	25,50	25,00
V2 EFF	0,81	0,83	0,86	0,92	0,97	1,03	1,08	1,13	1,19	1,19	1,17	1,16	1,14	1,12
DEPTH	6,04	6,25	6,46	6,64	7,78	8,73	9,20	11,38	10,74	9,55	9,99	8,67	9,67	7,83

				V1 C =	0,60	KM/S						V1 D =	0,60	KM/S
				V2 C =	1,25	KM/S		T1 A-E	---	MS		V2 D =	---	KM/S
DISTANCE (m)	60,00	65,00	70,00	75,00	77,50	80,00	85,00	90,00	95,00	100,00	105,00	110,00	112,50	115,00
P E G	12	13	14	15		16	17	18	19	20	21	22		23
GEOPHONE	GP13	GP14	GP15	GP16	SHT C	GP17	GP18	GP19	GP20	GP21	GP22	GP23	SHT D	GP24
(TAP)														
(TBP)														
TD					2,00									
TAP'													5,25	
TBP'														
V1 EFF	0,65	0,68	0,68	0,68	0,68	0,68	0,67	0,66	0,65	0,64	0,63	0,62	0,61	0,60
Z1					1,37								3,20	
				V3 D =	3,30	KM/S						V3 D =	3,30	KM/S
				T2 A-D =	48,00	MS						T2 A-D =	48,00	MS
(TAP)	31,00	33,00	35,00	36,00	36,50	37,00	38,00	36,00	39,00	44,00	46,00	47,00	47,50	48,00
(TBP)	29,00	26,00	23,00	23,00	22,00	21,00	20,00	18,00	19,00	18,00	17,00	15,00	14,50	14,00
TD	6,00	5,50	5,00	5,50	5,25	5,00	5,00	3,00	5,00	7,00	7,50	7,00	7,00	7,00
TAP'	25,00	27,50	30,00	30,50	31,25	32,00	33,00	33,00	34,00	37,00	38,50	40,00	40,50	41,00
TBP'	23,00	20,50	18,00	17,50	16,75	16,00	15,00	15,00	14,00	11,00	9,50	8,00	7,50	7,00
V2 EFF	1,10	1,08	1,06	1,04	1,03	0,99	0,91	0,83	0,75	0,67	0,59	0,51	0,47	0,43
DEPTH	6,60	5,95	5,31	5,74	5,43	4,97	4,57	2,50	3,76	4,71	4,44	3,58	3,30	3,02

SEISMIC DATA CALCULATION SHEET

PROJECT : WARSAMSON HEPP
LOCATION : SITE A
LINE : SC SPREAD : I

APPENDIX : 4.1-12

V1A = 0,50 KM/S V1 B = 0,40 KM/S
V2A = 1,50 KM/S V2 B = 1,00 KM/S

T1 A-B --- MS

DISTANCE (m)	0	0	2,50	5,00	10,00	15,00	20,00	25,00	30,00	32,50	35,00	40,00	45,00	50,00
PEG	0	1		2	3	4	5	6	7		8	9	10	11
GEOPHONE		GP2	SHT A	GP3	GP4	GP5	GP6	GP7	GP8	SHT B	GP9	GP10	GP11	GP12
(TAP)														
(TBP)														
TD			7,50							8,00				
TAP'														
TBP'														
V1 EFF		0,53	0,53	0,52	0,50	0,49	0,47	0,46	0,44	0,44	0,45	0,46	0,48	0,49
Z1			3,98							3,49				

V3 B = 2,80 KM/S
T2 A-D = 66,00 MS T2 B-D = 66,00 MS

(TAP)		32,00	32,00	35,00	36,00	43,00	44,00	42,00	43,00	43,00	43,00	45,00	47,00	49,00
(TBP)		66,00	65,00	64,00	63,00	62,00	59,00	57,00	53,00	52,50	51,00	49,00	47,00	45,00
TD		16,00	15,50	16,50	16,50	19,50	18,50	16,50	15,00	14,75	15,00	15,00	15,00	14,00
TAP'		16,00	16,50	18,50	19,50	23,50	25,50	25,50	28,00	28,25	28,00	30,00	32,00	35,00
TBP'		50,00	49,50	47,50	46,50	42,50	40,50	40,50	38,00	37,75	36,00	34,00	32,00	31,00
V2 EFF		0,76	0,75	0,75	0,74	0,73	0,72	0,71	0,70	0,70	0,74	0,79	0,83	0,83
DEPTH		12,15	11,69	12,36	12,19	14,21	13,30	11,69	10,48	10,30	11,15	11,82	12,49	12,28

V1 C = 0,50 KM/S V1 D = 0,41 KM/S
V2 C = 1,20 KM/S T1 A-D --- MS V2 D = -- KM/S

DISTANCE (m)	55,00	60,00	65,00	70,00	72,50	75,00	80,00	85,00	90,00	95,00	100,00	105,00	107,50	110,00
PEG	12	13	14	15		16	17	18	19	20	21	22		23
GEOPHONE	GP13	GP14	GP15	GP16	SHT C	GP17	GP18	GP19	GP20	GP21	GP22	GP23	SHT D	GP24
(TAP)														
(TBP)														
TD					4,50								17,00	
TAP'														
TBP'														
V1 EFF	0,50	0,52	0,53	0,54	0,55	0,54	0,52	0,50	0,48	0,46	0,44	0,42	0,41	0,40
Z1					2,48								7,05	

V3 C = 2,80 KM/S V3 D = 2,80 KM/S
T2 A-D = 66,00 MS T2 A-D = 66,00 MS

(TAP)	51,00	52,00	56,00	58,00	58,50	59,00	59,00	56,00	57,00	59,00	61,00	64,00	65,00	66,00
(TBP)	44,00	43,00	41,00	40,00	39,00	38,50	36,00	33,50	32,00	32,00	33,00	35,00	35,00	36,00
TD	14,50	14,50	15,50	16,00	16,00	15,75	14,50	11,75	11,50	12,50	14,00	16,50	17,00	18,00
TAP'	36,50	37,50	40,50	42,00	42,50	43,25	44,50	44,25	45,50	46,50	47,00	47,50	48,00	48,00
TBP'	29,50	28,50	25,50	24,00	23,00	22,75	21,50	21,75	20,50	19,50	19,00	18,50	18,00	18,00
V2 EFF	0,92	0,97	1,01	1,06	1,08	1,03	0,94	0,84	0,75	0,65	0,56	0,46	0,41	0,37
DEPTH	13,37	14,02	15,68	16,90	17,26	16,24	13,58	9,89	8,58	8,15	7,79	7,62	7,05	6,61

SEISMIC DATA CALCULATION SHEET

PROJECT : WARSAMSON HEPP
LOCATION : SITE A
LINE : SC SPREAD : II

APPENDIX : 4.1.13

V1A = 0,60 KM/S V1 B = 0,60 KM/S
V2A = 1,20 KM/S T1 A-B = --- MS V2 B = 1,00 KM/S

DISTANCE (m)	0	2,50	5,00	7,50	12,50	17,50	22,50	27,50	32,50	35,00	37,50	42,50	47,50	52,50
P E G	0		1	2	3	4	5	6	7		8	9	10	11
GEOPHONE	GP1	SHT A	GP2	GP3	GP4	GP5	GP6	GP7	GP8	SHT B	GP9	GP10	GP11	GP12
(TAP)														
(TBP)							Cross Line S-D							
TD		4,00								4,00				
TAP'														
TBP'														
V1 EFF	0,69	0,69	0,70	0,70	0,71	0,72	0,73	0,74	0,75	0,75	0,75	0,74	0,74	0,73
Z1		2,77								3,00				

V3 A = 3,50 KM/S V3 B = 3,50 KM/S
T2 A-D = 49,00 MS T2 B-D = 49,00 MS

(TAP)	12,00	13,00	14,00	18,00	22,00	24,00	26,00	28,00	30,00	31,50	32,00	35,00	36,00	38,00
(TBP)	49,00	49,00	49,00	46,00	45,00	43,00	44,00	41,00	39,00	38,00	37,00	36,00	35,00	35,00
TD	6,00	6,50	7,00	7,50	9,00	9,00	10,50	10,00	10,00	10,50	11,50	11,50	12,00	12,00
TAP'	6,00	6,50	7,00	10,50	13,00	15,00	15,50	18,00	20,00	21,00	20,50	23,50	24,00	26,00
TBP'	43,00	42,50	42,00	38,50	36,00	34,00	33,50	31,00	29,00	27,50	25,50	24,50	23,00	23,00
V2 EFF	0,81	0,81	0,81	0,81	0,80	0,80	0,80	0,79	0,79	0,79	0,81	0,83	0,84	0,86
DEPTH	4,87	5,26	5,66	6,05	7,23	7,20	8,36	7,93	7,90	8,29	9,29	9,50	10,13	10,35

V1 C = 0,60 KM/S V1 D = 0,60 KM/S
V2 C = 1,10 KM/S T1 A-D = --- MS V2 D = 1,50 KM/S

DISTANCE (m)	57,50	62,50	67,50	72,50	75,00	77,50	82,50	87,50	92,50	97,50	102,50	107,50	110,00	112,50
P E G	12	13	14	15		16	17	18	19	20	21	22		23
GEOPHONE	GP13	GP14	GP15	GP16	SHT C	GP17	GP18	GP19	GP20	GP21	GP22	GP23	SHT D	GP24
(TAP)														
(TBP)														
TD					4,00								3,00	
TAP'														
TBP'														
V1 EFF	0,73	0,73	0,72	0,72	0,72	0,71	0,70	0,69	0,69	0,68	0,67	0,66	0,65	
Z1					2,86								1,96	

V3 C = 3,50 KM/S V3 D = 3,50 KM/S
T2 A-D = 49,00 MS T2 A-D = 49,00 MS

(TAP)	40,00	38,00	41,00	44,00	45,00	46,00	48,00	40,00	40,00	42,00	44,00	46,00	47,50	49,00
(TBP)	35,00	31,00	31,00	29,00	27,00	26,00	25,00	20,00	16,00	14,00	13,00	13,00	12,00	11,00
TD	13,00	10,00	11,50	12,00	12,00	11,50	12,00	5,50	3,50	3,50	4,00	5,00	5,25	5,50
TAP'	27,00	28,00	29,50	32,00	33,00	34,50	36,00	34,50	36,50	38,50	40,00	41,00	42,25	43,50
TBP'	22,00	21,00	19,50	17,00	15,00	14,50	13,00	14,50	12,50	10,50	9,00	8,00	6,75	5,50
V2 EFF	0,88	0,90	0,92	0,93	0,94	0,95	0,96	0,97	0,98	0,99	1,00	1,01	1,01	1,02
DEPTH	11,44	8,98	10,54	11,21	11,32	10,91	11,50	5,33	3,43	3,46	4,00	5,05	5,33	5,61

SEISMIC DATA CALCULATION SHEET

PROJECT : WARSAMSON HEPP
LOCATION: SITE A
LINE : SD SPREAD : I

APPENDIX : 4.1.14

	0,40 KM/S							V1 B =	0,40 KM/S						
	1,40 KM/S			T1 A-B =	---	MS		V2 B =	1,80 KM/S			T1 A-B =	---	MS	
DISTANCE (m)	0	2,50	5,00	10,00	15,00	20,00	25,00	30,00	35,00	37,50	40,00	45,00	50,00	55,00	
P E G	0		1	2	3	4	5	6		7	8	9	10	11	
GEOPHONE	GP1	SHT A	GP2	GP3	GP4	GP5	GP6	GP7	GP8	SHT B	GP9	GP10	GP11	GP12	
(TAP)															
(TBP)								Cross Line S-B					Cross Line S-A		
TD		3,00								2,00			Bore Hole 6		
TAP'															
TBP'															
V1 EFF	0,42	0,42	0,42	0,42	0,41	0,41	0,41	0,41	0,41	0,43	0,45	0,48	0,52	0,55	
Z1		1,25								0,82					
	3,10 KM/S								V3 A =	3,10 KM/S					
T2 A-D =	68,00 MS								T2 A-D =	68,00 MS					
(TAP)	19,00	19,50	20,00	22,00	23,50	25,50	28,00	29,50	33,00	34,00	35,00	38,00	40,00	43,00	
(TBP)	68,00	67,00	65,00	62,00	57,50	57,00	60,00	55,00	53,00	56,00	55,50	54,00	56,00	54,50	
TD	9,50	9,25	8,50	8,00	6,50	7,25	10,00	8,25	9,00	11,00	11,25	12,00	14,00	14,75	
TAP'	9,50	10,25	11,50	14,00	17,00	18,25	18,00	21,25	24,00	23,00	23,75	26,00	26,00	28,25	
TBP'	58,50	57,75	56,50	54,00	51,00	49,75	50,00	46,75	44,00	45,00	44,25	42,00	42,00	39,75	
V2 EFF	1,16	1,18	1,19	1,23	1,26	1,30	1,33	1,37	1,40	1,40	1,39	1,38	1,36	1,35	
DEPTH	11,03	10,90	10,16	9,83	8,21	9,41	13,32	11,27	12,60	15,40	15,61	16,51	19,09	19,93	

				V1 C =	0,65	KM/S						V1 D =	0,64	KM/S	
				V2 C =	1,60	KM/S		T1 A-D	---	MS		V2 D =	1,80	KM/S	
DISTANCE (m)	60,00	65,00	70,00	75,00	77,50	80,00	85,00	90,00	95,00	100,00	105,00	110,00	112,50	115,00	
P E G	12	13	14	15		16	17	18	19	20	21	22		23	
GEOPHONE	GP13	GP14	GP15	GP16	SHT C	GP17	GP18	GP19	GP20	GP21	GP22	GP23	SHT D	GP24	
(TAP)															
(TBP)															
TD					5,00	Cross Line S-C							7,00		
TAP'															
TBP'															
V1 EFF	0,59	0,62	0,66	0,69	0,71	0,71	0,71	0,70	0,70	0,69	0,69	0,69	0,68		
Z1					3,56								4,79		
				V3 C =	3,10	KM/S						V3 D =	3,10	KM/S	
				T2 A-D =	68,00	MS						T2 A-D =	68,00	MS	
(TAP)	43,50	40,50	44,00	46,00	47,50	48,00	49,00	53,50	61,00	58,50	59,50	64,00	66,00	68,00	
(TBP)	52,00	48,00	46,00	44,00	43,00	40,00	39,00	44,00	45,00	38,00	39,00	41,00	42,50	41,00	
TD	13,75	10,25	11,00	11,00	11,25	10,00	10,00	14,75	19,00	14,25	15,25	18,50	20,25	20,50	
TAP'	29,75	30,25	33,00	35,00	36,25	38,00	39,00	38,75	42,00	44,25	44,25	45,50	45,75	47,50	
TBP'	38,25	37,75	35,00	33,00	31,75	30,00	29,00	29,25	26,00	23,75	23,75	22,50	22,25	20,50	
V2 EFF	1,34	1,33	1,31	1,30	1,30	1,32	1,37	1,42	1,47	1,52	1,57	1,62	1,65	1,67	
DEPTH	18,41	13,60	14,46	14,32	14,58	13,21	13,71	20,97	27,96	21,69	23,98	30,01	33,36	34,29	

SEISMIC DATA CALCULATION SHEET

PROJECT : WARSAMSON HEPP
LOCATION : SITE A
LINE : SD SPREAD : II

APPENDIX : 4.1.15

V1A =	0,60	KM/S						V1 B =	0,60	KM/S					
V2A =	1,00	KM/S		T1 A–B =	---	MS		V2 B =	1,10	KM/S					
DISTANCE (m)	0	2,50	5,00	7,50	12,50	17,50	22,50	27,50	32,50	35,00	37,50	42,50	47,50	52,50	
P E G	0		1	2	3	4	5	6	7		8	9	10	11	
GEOPHONE	GP1	SHT A	GP2	GP3	GP4	GP5	GP6	GP7	GP8	SHT B	GP9	GP10	GP11	GP12	
(TAP)															
(TBP)															
TD		3,00						Cross Line S–B		4,00					
TAP'															
TBP'															
V1 EFF	0,75	0,75	0,75	0,74	0,74	0,73	0,73	0,72	0,72	0,72	0,74	0,76	0,78	0,81	
Z1		2,25								2,86					
	V3 A =	3,50	KM/S						V3 B =	3,50	KM/S				
	T2 A–D =	50,00	MS						T2 B–D =	50,00	MS				
(TAP)	17,00	18,00	19,00	23,00	27,00	28,00	32,00	33,00	34,00	34,00	34,00	36,00	38,00	40,00	
(TBP)	49,00	48,00	48,00	46,00	45,00	43,00	43,00	42,00	40,00	39,00	38,00	37,00	36,00	35,00	
TD	8,00	8,00	8,50	9,50	11,00	10,50	12,50	12,50	12,00	11,50	12,00	12,50	13,00	12,50	
TAP'	9,00	10,00	10,50	13,50	16,00	17,50	19,50	20,50	22,00	22,50	22,00	23,50	25,00	27,50	
TBP'	41,00	40,00	39,50	36,50	34,00	32,50	30,50	29,50	28,00	27,50	26,00	24,50	23,00	22,50	
V2 EFF	0,24	0,29	0,35	0,41	0,52	0,64	0,75	0,87	0,98	0,98	0,95	0,92	0,89	0,86	
DEPTH	1,89	2,35	2,99	3,88	5,76	6,71	9,43	10,87	11,81	11,32	11,44	11,53	11,59	10,75	

				V1 C =	0,60	KM/S						V1 D =	0,60	KM/S	
				V2 C =	0,80	KM/S		T1 A–D	---	MS		V2 D =	0,90	KM/S	
DISTANCE (m)	57,50	62,50	67,50	72,50	75,00	77,50	82,50	87,50	92,50	97,50	102,50	107,50	110,00	112,50	
P E G	12	13	14	15		16	17	18	19	20	21	22		23	
GEOPHONE	GP13	GP14	GP15	GP16	SHT C	GP17	GP18	GP19	GP20	GP21	GP22	GP23	SHT D	GP24	
(TAP)															
(TBP)															
TD	Cross Line S–A				4,00	Cross Line S–C							3,00		
TAP'															
TBP'															
V1 EFF	0,83	0,85	0,87	0,90	0,91	0,90	0,89	0,87	0,86	0,84	0,83	0,81	0,80		
Z1					3,63								2,41		
				V3 C =	3,50	KM/S						V3 D =	3,50	KM/S	
				T2 A–D =	50,00	MS						T2 A–D	50,00	MS	
(TAP)	38,00	41,00	44,00	45,00	46,00	47,00	48,00	40,00	41,00	42,00	45,00	46,00	47,00	50,00	
(TBP)	35,00	32,00	32,00	30,00	28,00	26,00	25,00	20,00	17,00	17,00	17,00	17,00	16,00	15,00	
TD	11,50	11,50	13,00	12,50	12,50	11,50	11,50	5,00	4,00	4,50	6,00	6,50	6,50	7,50	
TAP'	26,50	29,50	31,00	32,50	33,50	35,50	36,50	35,00	37,00	37,50	39,00	39,50	40,50	42,50	
TBP'	23,50	20,50	19,00	17,50	15,50	14,50	13,50	15,00	13,00	12,50	11,00	10,50	9,50	7,50	
V2 EFF	0,83	0,80	0,77	0,74	0,72	0,72	0,72	0,73	0,73	0,73	0,73	0,73	0,73	0,74	
DEPTH	9,53	9,18	9,97	9,20	9,00	8,30	8,32	3,63	2,91	3,28	4,39	4,77	4,78	5,52	

SEISMIC DATA CALCULATION SHEET

PROJECT : WARSAMSON HEPP
LOCATION : BH-13
LINE : PENSTOK SPREAD : I

APPENDIX : 4.1.16

	V1 A =	0,35	KM/S					V1 B =	0,30	KM/S				V1 C =	0,35	KM/S
	V2 A =	1,25	KM/S	T1 A-B ---		MS		V2 B =	1,20	KM/S				V2 C =	1,25	KM/S
DISTANCE (m)	0	2,50	5,00	10,00	15,00	20,00	25,00	27,50	30,00	35,00	40,00	45,00	50,00	52,50	52,50	
P E G	0		1	2	3	4	5		6	7	8	9	10		11	
GEOPHONE	GP1	SHT A	GP2	GP3	GP4	GP5	GP6	SHT B	GP7	GP8	GP9	GP10	GP11	SHT C	GP12	
(TAP)																
(TBP)																
TD		6,00						9,00	Bore Hole 13					9,00		
TAP'																
TBP'																
V1 EFF	1,47	1,38	1,27	1,06	0,84	0,63	0,42	0,31	0,30	0,29	0,28	0,28	0,27	0,36	0,59	
Z1		8,25						2,79						3,28		
		3,00	KM/S				V3 B =	3,00	KM/S				V3 C =	3,00	KM/S	
	T2 A-C =	53,00	MS				T2 A-C =	53,00	MS				T2 A-C =	53,00	MS	
(TAP)	22,50	23,50	24,50	29,00	32,00	34,00	37,50	39,00	41,00	43,50	46,00	48,00	52,50	51,50	51,00	
(TBP)	53,00	51,00	50,00	52,50	50,00	49,00	49,00	48,50	47,50	45,50	43,50	40,50	38,00	37,00	36,50	
TD	11,25	10,75	10,75	14,25	14,50	15,00	16,75	17,25	17,75	18,00	18,25	17,75	18,75	17,75	17,25	
TAP'	11,25	12,75	13,75	14,75	17,50	19,00	20,75	21,75	23,25	25,50	27,75	30,25	33,75	33,75	33,75	
TBP'	41,75	40,25	39,25	38,25	35,50	34,00	32,25	31,25	29,75	27,50	25,25	22,75	19,25	19,25	19,25	
V2 EFF	2,08	2,02	1,95	1,83	1,71	1,58	1,46	1,40	1,40	1,42	1,44	1,46	1,47	1,48	1,48	
DEPTH	23,37	21,67	21,00	26,07	24,73	23,72	24,41	24,07	24,92	25,59	26,27	25,86	27,64	26,32	25,58	

SEISMIC DATA CALCULATION SHEET

PROJECT : WARSAMSON HEPP
LOCATION : BH
LINE : BH 10 TO BH 9 SPREAD : I

APPENDIX : 4.1.17

	V1A = KM/S					V1 B = KM/S			V1 C = KM/S						
	V2A = 1,80					V2 B = 1,80			V2 C = 1,80 KM/S						
				T1 A–B = --- MS					T1 B–C --- MS						
DISTANCE (m)	0	2,50	5,00	10,00	15,00	17,50	20,00	25,00	30,00	32,50	35,00	40,00	45,00	50,00	50,00
PEG	0		1	2	3		4	5	6		7	8	9	10	11
GEOPHONE	GP1	SHT 1	GP2	GP3	GP4	SHT B	GP5	GP6	GP7	SHT C	GP8	GP9	GP10	GP11	GP12
(TAP)															
(TBP)															
TD															
TAP'															
TBP'															
V1 EFF															
Z1															
	V3 A = 3,60 KM/S					V3 B = 3,60 KM/S			V3 C = 3,60 KM/S						
	T2 A–C 45,00 MS					T2 B–D 45,00 MS			T2 C–D 45,00 MS						
(TAP)	10,00	8,50	8,00	10,00	12,00	12,50	13,00	15,00	16,00	17,50	20,00	20,00	19,00	20,00	21,00
(TBP)	45,00	43,00	41,00	40,00	37,00	36,50	36,00	34,00	33,00	32,00	31,00	30,00	30,00	30,00	27,50
TD	5,00	3,25	2,00	2,50	2,00	2,00	2,00	2,00	2,00	2,25	3,00	2,50	2,00	2,50	1,75
TAP'	5,00	5,25	6,00	7,50	10,00	10,50	11,00	13,00	14,00	15,25	17,00	17,50	17,00	17,50	19,25
TBP'	40,00	39,75	39,00	37,50	35,00	34,50	34,00	32,00	31,00	29,75	28,00	27,50	28,00	27,50	25,75
V2 EFF	1,80	1,80	1,80	1,80	1,80	1,80	1,80	1,80	1,80	1,80	1,78	1,73	1,69	1,64	1,64
DEPTH	9,01	5,85	3,60	4,50	3,60	3,60	3,60	3,60	3,60	4,05	5,34	4,34	3,38	4,11	2,88

				V1 D = KM/S								V1 E = 0,50 KM/S			
				V2 D = 1,30 KM/S				T1 A–E --- MS				V2 E = 1,00 KM/S			
DISTANCE (m)	55,00	60,00	65,00	70,00	72,50	75,00	80,00	85,00	90,00	95,00	100,00	105,00	107,50	107,50	
PEG	12	13	14	15		16	17	18	19	20	21	22		23	
GEOPHONE	GP13	GP14	GP15	GP16	SHT C	GP17	GP18	GP19	GP20	GP21	GP22	GP23	SHT E	GP24	
(TAP)															
(TBP)			Cross Line BH 10 – BH 13												
TD				BH–10									2,00		
TAP'															
TBP'															
V1 EFF													0,58		
Z1													1,15		
				V3 C = 3,00 KM/S								V3 D = 3,00 KM/S			
				T2 A–D = 45,00 MS								T2 A–D = 45,00 MS			
(TAP)	25,00	27,00	29,00	30,00	31,00	31,00	32,00	34,00	36,00	40,00	40,00	43,00	44,00	45,00	
(TBP)	26,00	24,00	22,00	20,00	20,00	20,00	18,50	17,00	16,00	17,00	17,00	15,00	13,00	12,00	
TD	3,00	3,00	3,00	2,50	3,00	3,00	2,75	3,00	3,50	6,00	6,00	6,50	6,00	6,00	
TAP'	22,00	24,00	26,00	27,50	28,00	28,00	29,25	31,00	32,50	34,00	34,00	36,50	38,00	39,00	
TBP'	23,00	21,00	19,00	17,50	17,00	17,00	15,75	14,00	12,50	11,00	11,00	8,50	7,00	6,00	
V2 EFF	1,60	1,55	1,51	1,46	1,44	1,40	1,32	1,23	1,15	1,06	0,98	0,89	0,85	0,85	
DEPTH	4,80	4,66	4,53	3,66	4,33	4,20	3,62	3,69	4,01	6,37	5,86	5,80	5,10	5,10	

SEISMIC DATA CALCULATION SHEET

PROJECT : WARSAMSON HEPP
LOCATION : POWER HOUSE
LINE : BH 10–13 SPREAD : I

APPENDIX 4.1.18

V1 A = 0,64 KM/S
T1 A–B --- V2 A = 1,10 KM/S
T1 A–B = --- MS

DISTANCE (m)	0	5,00	10,00	15,00	20,00	25,00	27,50	30,00	35,00	40,00	45,00	50,00	55,00	60,00
P E G	2	3	4	5	6	7		8	9	10	11	12	13	14
GEOPHONE	GP2	GP3	GP4	GP5	GP6	GP7	SHT B	GP8	GP9	GP10	GP11	GP12	GP13	GP14
(TAP)														
(TBP)	Cross Line BH 10–BH 9													
TD	BH – 10						3,00							
TAP'														
TBP'														
V1 EFF	1,01	0,97	0,93	0,89	0,85	0,81	0,79	0,77	0,73	0,69	0,65	0,61	0,57	0,53
Z1							2,36							
						V3 A =	3,20	KM/S						
						T2 A–E =	60,00	MS						
(TAP)	5,00	7,00	10,00	13,00	15,00	23,00	20,00	18,00	27,00	29,00	32,00	38,00	42,00	44,00
(TBP)	60,00	57,00	54,00	51,00	48,00	57,00	53,50	52,00	57,00	57,00	55,00	53,00	50,00	49,00
TD	2,50	2,00	2,00	2,00	1,50	10,00	6,75	5,00	12,00	13,00	13,50	15,50	16,00	16,50
TAP'	2,50	5,00	8,00	11,00	13,50	13,00	13,25	13,00	15,00	16,00	18,50	22,50	26,00	27,50
TBP'	57,50	55,00	52,00	49,00	46,50	47,00	46,75	47,00	45,00	44,00	41,50	37,50	34,00	32,50
V2 EFF	1,01	0,99	0,97	0,95	0,93	0,90	0,89	0,88	0,86	0,84	0,82	0,80	0,78	0,76
DEPTH	2,55	1,98	1,94	1,89	1,39	9,04	6,03	4,42	10,35	10,93	11,07	12,38	12,44	12,48

V1 B = 0,40 KM/S
V2 B = 1,10 KM/S
T1 A–E --- V1 C = 0,40 KM/S
V2 C = 1,00 KM/S

DISTANCE (m)	65,00	70,00	72,50	75,00	80,00	85,00	90,00	95,00	100,00	105,00	107,50	110,00
P E G	15	16		17	18	19	20	21	22	23		24
GEOPHONE	GP15	GP16	SHT C	GP17	GP18	GP19	GP20	GP21	GP22	GP23	SHT C	GP24
(TAP)												
(TBP)												
TD			8,00								8,00	
TAP'												
TBP'												
V1 EFF	0,49	0,45	0,43	0,43	0,43	0,43	0,43	0,43	0,43	0,44	0,44	0,44
Z1			3,44								3,49	
		V3 B =	3,20	KM/S						V3 C =	3,20	KM/S
		T2 A–E	60,00	MS						T2 A–E	60,00	MS
(TAP)	46,00	45,50	47,00	48,00	50,00	52,50	54,50	57,00	59,50	62,00	61,50	60,00
(TBP)	44,00	42,00	41,00	41,00	39,00	38,00	36,00	34,00	30,50	27,00	25,00	24,00
TD	15,00	13,75	14,00	14,50	14,50	15,25	15,25	15,50	15,00	14,50	12,25	13,00
TAP'	31,00	31,75	33,00	33,50	35,50	37,25	39,25	41,50	44,50	47,50	49,25	47,00
TBP'	29,00	28,25	27,00	26,50	24,50	22,75	20,75	18,50	15,50	12,50	12,75	11,00
V2 EFF	0,74	0,71	0,70	0,70	0,68	0,66	0,65	0,63	0,62	0,60	0,59	0,59
DEPTH	11,03	9,82	9,85	10,09	9,86	10,13	9,89	9,81	9,26	8,72	7,27	7,61

SEISMIC DATA CALCULATION SHEET

PROJECT : WARSAMSON HEPP
LOCATION : BH – 11 APPENDIX: 4.1.19
LINE : SADDLE DAM SPREAD : I

	V1A =	0,20	KM/S									V1 B =	0,20	KM/S
	V2A =	0,30	KM/S	T1 A–B ---		MS						V2 B =	0,30	KM/S
DISTANCE (m)	0	2,50	5,00	7,50	12,50	17,50	22,50	27,50	32,50	37,50	42,50	47,50	52,50	55,00
PEG	0		1	2	3	4	5	6	7	8	9	10	11	
GEOPHONE	GP1	SHT A	GP2	GP3	GP4	GP5	GP6	GP7	GP8	GP9	GP10	GP11	GP12	SHT B
(TAP)														
(TBP)														
TD		7,00												7,50
TAP'														
TBP'														
V1 EFF	0,27	0,27	0,27	0,27	0,27	0,27	0,27	0,27	0,27	0,27	0,27	0,27	0,27	0,27
Z1		1,88												2,01
	V3 A =	1,30	KM/S									V3 B =	1,30	KM/S
	T2 A–D =	142,00	MS									T2 B–D	142,00	MS
(TAP)	45,00	45,00	47,00	48,00	58,00	68,00	60,00	64,00	70,00	74,00	80,00	80,00	84,00	85,00
(TBP)	142,00	140,00	138,00	132,00	138,00	126,00	120,00	116,00	112,00	108,00	102,00	98,00	94,00	92,00
TD	22,50	21,50	21,50	19,00	27,00	26,00	19,00	19,00	20,00	23,00	20,00	20,00	18,50	17,50
TAP'	22,50	23,50	25,50	29,00	31,00	42,00	41,00	45,00	50,00	51,00	60,00	60,00	65,50	67,50
TBP'	119,50	118,50	116,50	113,00	111,00	100,00	101,00	97,00	92,00	85,00	82,00	78,00	75,50	74,50
V2 EFF	0,27	0,26	0,26	0,25	0,23	0,22	0,20	0,19	0,18	0,16	0,15	0,13	0,31	0,11
DEPTH	6,10	5,65	5,49	4,71	6,31	5,70	3,89	3,61	3,51	3,70	2,93	2,64	5,70	1,93

												V1 C =	0,20	KM/S
							T1 A–D ---		MS			V2 C =	0,40	KM/S
DISTANCE (m)	57,50	62,50	67,50	72,50	77,50	82,50	87,50	92,50	97,50	102,50	107,50		110,00	112,50
PEG	12	13	14	15	16	17	18	19	20	21	22			23
GEOPHONE	GP13	GP14	GP15	GP16	GP17	GP18	GP19	GP20	GP21	GP22	GP23/1		SHT D	GP24/2
(TAP)														
(TBP)														
TD													11,50	
TAP'														
TBP'														
V1 EFF	0,26	0,27	0,27	0,27	0,27	0,27	0,27	0,27	0,27	0,27	0,27		0,23	
Z1													2,66	
												V3 B =	1,30	KM/S
				T2 A–D	MS							T2 B–D	142,00	MS
(TAP)	86,00	92,00	96,00	102,00	112,00	118,00	114,00	125,00	128,00	136,00	136,00		138,00	140,00
(TBP)	90,00	88,00	80,00	74,00	80,00	70,00	67,00	64,00	60,00	50,00	47,00		43,00	40,00
TD	17,00	19,00	17,00	17,00	25,00	23,00	19,50	23,50	23,00	22,00	20,50		19,50	19,00
TAP'	69,00	73,00	79,00	85,00	87,00	95,00	94,50	101,50	105,00	114,00	115,50		118,50	121,00
TBP'	73,00	69,00	63,00	57,00	55,00	47,00	47,50	40,50	37,00	28,00	26,50		23,50	21,00
V2 EFF	0,30	0,14	0,15	0,17	0,18	0,20	0,21	0,23	0,24	0,26	0,27		0,27	0,29
DEPTH	5,17	2,66	2,63	2,88	4,61	4,59	4,18	5,38	5,61	5,69	5,61		5,34	5,48

SEISMIC DATA CALCULATION SHEET

PROJECT : WARSAMSON HEPP
LOCATION: BH – 11 APPENDIX: 4.1.20
LINE : SADDLE DAM SPREAD : II

T1 A–E --- MS

V1 A = 0,20 KM/S
V2 A = 0,30 KM/S

DISTANCE (m)	117,50	122,50	127,50	132,50	137,50	142,50	147,50	152,50	157,50	162,50	167,50	170,00	172,50	177,50
PEG	0	1	2	3	4	5	6	7	8	9	10		11	12
GEOPHONE	GP2	GP3	GP4	GP5	GP6	GP7	GP8	GP9	GP10	GP11	GP12	SHT B	GP13	GP14
(TAP)														
(TBP)														
TD												11,50		
TAP'														
TBP'														
V1 EFF	0,27	0,27	0,27	0,27	0,27	0,27	0,27	0,27	0,27	0,27	0,27	0,27	0,27	0,27
Z1												3,09		

V3 A = 1,50 KM/S
T2 A–B 164,00 MS

(TAP)	45,00	45,00	45,00	50,00	60,00	62,00	73,00	78,00	80,00	86,00	100,00	108,00	118,00	128,00
(TBP)	134,00	130,00	134,00	125,00	115,00	110,00	100,00	94,00	92,00	86,00	92,00	93,00	96,00	100,00
TD	7,50	5,50	7,50	5,50	5,50	4,00	4,50	4,00	4,00	4,00	14,00	34,50	41,00	43,00
TAP'	37,50	39,50	37,50	44,50	54,50	58,00	68,50	74,00	76,00	82,00	86,00	73,50	77,00	85,00
TBP'	126,50	124,50	126,50	119,50	109,50	106,00	95,50	90,00	88,00	82,00	78,00	58,50	55,00	57,00
V2 EFF	0,40	0,39	0,37	0,36	0,35	0,33	0,32	0,31	0,29	0,28	0,27	0,26	0,25	0,24
DEPTH	3,00	2,13	2,80	1,98	1,91	1,33	1,44	1,23	1,17	1,12	3,73	8,97	10,38	10,32

T1 A–E --- MS

V1 B = 0,20 KM/S
V2 B = 0,30 KM/S

DISTANCE (m)	182,50	187,50	192,50	197,50	202,50	207,50	212,50	217,50	222,50	225,00	227,50
PEG	12	13	14	15	16	17	18	19	20	21	22
GEOPHONE	GP15	GP16	GP17	GP18	GP19	GP20	GP21	GP22	GP23	SHT B	GP24
(TAP)											
(TBP)											
TD										12,50	
TAP'											
TBP'											
V1 EFF	0,18	0,27	0,27	0,27	0,27	0,27	0,27	0,27	0,27	0,27	0,27
Z1										3,35	

V3 B = 1,50 KM/S
T2 A–E 164,00 MS

(TAP)	138,00	152,00	112,00	164,00	144,00	140,00	130,00	134,00	138,00	142,00	146,00
(TBP)	104,00	110,00	112,00	90,00	62,00	50,00	45,00	40,00	38,00	40,00	35,00
TD	39,00	49,00	30,00	45,00	21,00	13,00	5,50	5,00	6,00	9,00	8,50
TAP'	99,00	103,00	82,00	119,00	123,00	127,00	124,50	129,00	132,00	133,00	137,50
TBP'	65,00	61,00	82,00	45,00	41,00	37,00	39,50	35,00	32,00	31,00	26,50
V2 EFF	0,27	0,27	0,27	0,27	0,27	0,27	-0,27	0,27	0,27	0,11	0,27
DEPTH	10,46	13,15	8,05	12,07	5,63	3,49	1,48	1,34	1,61	1,02	2,28

SEISMIC DATA CALCULATION SHEET

PROJECT : WARSAMSON HEPP
LOCATION : BORROW AREA
LINE : BH – 12 SPREAD : I

APPENDIX : 4.1.21

	V1A =	0,50	KM/S						V1 B =	0,50	KM/S			
	V2A =	1,00	KM/S	T1 A–B ---		MS			V2 B =	1,00	KM/S			
DISTANCE (m)	0	2,50	5,00	10,00	15,00	20,00	25,00	30,00	35,00	37,50	40,00	45,00	50,00	55,00
P E G	0		1	2	3	4	5	6	7		8	9	10	11
GEOPHONE	GP1	SHT A	GP2	GP3	GP4	GP5	GP6	GP7	GP8	SHT B	GP9	GP10	GP11	GP12
(TAP)														
(TBP)														
TD		6,00								7,50				
TAP'														
TBP'														
V1 EFF	0,58	0,58	0,58	0,58	0,58	0,58	0,58	0,58	0,58	0,58	0,57	0,55	0,53	0,52
Z1		3,46								4,33				
	V3 A =	2,10	KM/S						V3 B =	2,10	KM/S			
	T2 A–D =	67,00	MS						T2 B–D	67,00	MS			
(TAP)	20,00	22,00	23,00	26,00	27,00	30,00	33,00	36,00	38,00	40,00	42,00	45,00	46,00	47,00
(TBP)	68,00	67,00	66,00	63,00	61,00	59,00	56,00	55,00	54,00	51,00	49,00	48,00	46,00	44,00
TD	10,50	11,00	11,00	11,00	10,50	11,00	11,00	12,00	12,50	13,00	13,50	13,50	13,00	12,00
TAP'	9,50	11,00	12,00	15,00	16,50	19,00	22,00	24,00	25,50	27,00	28,50	31,50	33,00	35,00
TBP'	57,50	56,00	55,00	52,00	50,50	48,00	45,00	43,00	41,50	38,00	35,50	34,50	33,00	32,00
V2 EFF	0,76	0,76	0,75	0,75	0,75	0,75	0,74	0,74	0,74	0,73	0,75	0,77	0,79	0,82
DEPTH	7,96	8,32	8,30	8,27	7,86	8,20	8,17	8,87	9,20	9,55	10,07	10,39	10,30	9,79

				V1 C =	0,40	KM/S						V1 D =	0,30	KM/S
				V2 C =	1,00	KM/S	T1 A–D ---			MS		V2 D =	0,70	KM/S
DISTANCE (m)	60,00	65,00	70,00	75,00	77,50	80,00	85,00	90,00	95,00	100,00	105,00	110,00	107,50	
P E G	12	13	14	15		16	17	18	19	20	21	22		
GEOPHONE	GP13	GP14	GP15	GP16	SHT C	GP17	GP18	GP19	GP20	GP21	GP22	GP23/1	SHT D	
(TAP)														
(TBP)														
TD					2,50								2,00	
TAP'													BH-12	
TBP'														
V1 EFF	0,66	0,67	0,69	0,71	0,44	0,45	0,46	0,48	0,50	0,51	0,53	0,55	0,33	
Z1					1,09								0,66	
				V3 B =	2,10	KM/S						V3 B =	2,30	KM/S
				T2 C–D	67,00	MS						T2 D–D	67,00	KM/S
(TAP)	49,00	52,00	53,00	55,00	54,00	55,00	57,00	61,00	61,00	62,00	63,00	65,00	67,00	
(TBP)	43,00	39,00	36,00	33,00	31,00	29,00	27,00	26,00	25,00	23,00	21,00	19,00	18,00	
TD	12,50	12,00	11,00	10,50	9,00	8,50	8,50	10,00	9,50	9,00	8,50	8,50	9,00	
TAP'	36,50	40,00	42,00	44,50	45,00	46,50	48,50	51,00	51,50	53,00	54,50	56,50	58,00	
TBP'	30,50	27,00	25,00	22,50	22,00	20,50	18,50	16,00	15,50	14,00	12,50	10,50	9,00	
V2 EFF	0,84	0,86	0,89	0,91	0,92	0,90	0,85	0,80	0,75	0,70	0,65	0,61	0,63	
DEPTH	10,49	10,35	9,74	9,54	8,28	7,61	7,20	7,99	7,13	6,32	5,56	5,14	5,67	

SEISMIC DATA CALCULATION SHEET

PROJECT : WARSAMSON HEPP
LOCATION : BORROW AREA
LINE : BH-12 SPREAD : II

APPENDIX: 4.1.22

V1 A = 0,50 KM/S
T1 A-E --- MS V2 A = 1,00 KM/S

DISTANCE (m)	110,00	115,00	120,00	125,00	130,00	135,00	140,00	145,00	147,50	150,00	155,00	160,00	165,00	170,00
PEG	0	1	2	3	4	5	6	7		8	9	10	11	12
GEOPHONE	GP24/2	GP3	GP4	GP5	GP6	GP7	GP8	GP9	SHT A	GP10	GP11	GP12	GP13	GP14
(TAP)														
(TBP)														
TD									2,00					
TAP'														
TBP'														
V1 EFF	0,35	0,38	0,41	0,44	0,47	0,50	0,53	0,56	0,58	0,59	0,62	0,65	0,68	0,72
Z1									1,15					

V3 A = 2,60 KM/S
T2 A-B 64,00 MS

(TAP)	20,00	21,00	23,00	24,00	26,00	26,00	27,00	28,00	29,00	31,00	34,00	37,00	42,00	44,00
(TBP)	63,00	62,00	60,00	58,00	56,00	54,00	52,00	49,00	49,00	50,00	46,00	44,00	42,00	41,00
TD	9,50	9,50	9,50	9,00	9,00	8,00	7,50	6,50	7,00	8,50	8,00	8,50	10,00	10,50
TAP'	10,50	11,50	13,50	15,00	17,00	18,00	19,50	21,50	22,00	22,50	26,00	28,50	32,00	33,50
TBP'	53,50	52,50	50,50	49,00	47,00	46,00	44,50	42,50	42,00	41,50	38,00	35,50	32,00	30,50
V2 EFF	0,65	0,68	0,71	0,75	0,78	0,81	0,85	0,88	0,90	0,92	0,96	1,00	1,03	1,07
DEPTH	6,14	6,46	6,78	6,72	7,02	6,51	6,35	5,73	6,28	7,80	7,65	8,46	10,34	11,27

V1 B = 0,40 KM/S V1 C = 0,50 KM/S
V2 B = 1,00 KM/S MS V2 C = 1,00 KM/S

DISTANCE (m)	175,00	177,50	180,00	185,00	190,00	195,00	200,00	205,00	210,00	215,00	217,50	220,00
PEG	13	14	15		16	17	18	19	20	21	22	23
GEOPHONE	GP15	GP16	GP17	SHT B	GP18	GP19	GP20	GP21	GP22	GP23	SHT C	GP24
(TAP)												
(TBP)												
TD				3,50							2,50	
TAP'												
TBP'												
V1 EFF	0,47	0,46	0,46	0,44	0,72	0,74	0,76	0,79	0,81	0,83	0,58	0,85
Z1				1,53							1,44	

V3 B = 2,60 KM/S V3 B = 2,60 KM/S
T2 A-D 64,00 MS T2 A-D = 64,00 MS

(TAP)	46,00	47,00	48,00	49,00	50,00	53,00	56,00	58,00	60,00	62,00	63,00	64,00
(TBP)	38,00	34,00	35,00	33,00	32,00	30,00	28,00	26,00	25,00	23,00	22,00	20,00
TD	10,00	8,50	9,50	9,00	9,00	9,50	10,00	10,00	10,50	10,50	10,50	10,00
TAP'	36,00	38,50	38,50	40,00	41,00	43,50	46,00	48,00	49,50	51,50	52,50	54,00
TBP'	28,00	25,50	25,50	24,00	23,00	20,50	18,00	16,00	14,50	12,50	11,50	10,00
V2 EFF	1,13	1,13	1,13	0,80	0,82	0,84	0,86	0,88	0,90	0,92	0,93	0,94
DEPTH	11,32	9,62	10,75	7,19	7,37	7,97	8,59	8,79	9,44	9,64	9,75	9,38

SEISMIC DATA CALCULATION SHEET

PROJECT : WARSAMSON HEPP
LOCATION : BORROW AREA
LINE : BH – 14 SPREAD : I

APPENDIX: 4.1.23

	V1A =	0,50	KM/S						V1 B =	0,50	KM/S				
	V2A =	1,00	KM/S	T1 A–B ---		MS			V2 B =	1,00	KM/S				
DISTANCE (m)	0	2,50	5,00	7,50	12,50	17,50	22,50	27,50	32,50	37,50	42,50	47,50	52,50	55,00	
PEG	0		1	2	3	4	5	6		7	8	9	10	11	
GEOPHONE	GP1	SHT A	GP2	GP3	GP4	GP5	GP6	GP7	SHT B	GP8	GP9	GP10	GP11	GP12	
(TAP)															
(TBP)															
TD		2,00							8,00						
TAP'															
TBP'															
V1 EFF	0,58	0,58	0,58	0,58	0,58	0,58	0,58	0,58	0,58	0,56	0,55	0,53	0,51	0,51	
Z1		1,15							4,62						
	V3 A =	2,00	KM/S						V3 B =	2,00	KM/S				
	T2 A–D =	68,00	MS						T2 B–D	68,00	MS				
(TAP)	10,00	11,00	13,00	14,00	17,00	23,00	29,00	33,00	30,00	28,00	29,00	37,00	40,00	35,00	
(TBP)	68,00	67,00	65,00	60,00	65,00	67,00	68,00	67,00	62,00	56,00	53,00	58,00	56,00	50,00	
TD	5,00	5,00	5,00	3,00	7,00	11,00	14,50	16,00	12,00	8,50	11,00	15,00	11,50	8,50	
TAP'	5,00	6,00	8,00	11,00	10,00	12,00	14,50	17,00	18,00	19,50	18,00	22,00	28,50	26,50	
TBP'	63,00	62,00	60,00	57,00	58,00	56,00	53,50	51,00	50,00	47,50	42,00	43,00	44,50	41,50	
V2 EFF	0,89	0,87	0,85	0,84	0,81	0,77	0,74	0,71	0,68	0,69	0,70	0,71	0,73	0,73	
DEPTH	4,43	4,35	4,27	2,51	5,64	8,51	10,76	11,37	8,15	5,87	7,73	10,72	8,36	6,23	

				V1 C =	0,40	KM/S						V1 D =	0,30	KM/S	
				V2 C =	1,00	KM/S		T1 A–D ---		MS		V2 D =	0,80	KM/S	
DISTANCE (m)	57,50	62,50	67,50	72,50	77,50	82,50	87,50	92,50	97,50	102,50	107,50	112,50	110,00		
PEG	12	13	14	15		16	17	18	19	20	21	22			
GEOPHONE	GP13	GP14	GP15	GP16	SHT C	GP17	GP18	GP19	GP20	GP21	GP22	GP23/1	SHT D		
(TAP)															
(TBP)															
TD					3,00								3,00		
TAP'															
TBP'															
V1 EFF	0,66	0,67	0,69	0,70	0,44	0,45	0,47	0,49	0,51	0,52	0,54	0,56	0,32		
Z1					1,31								0,97		
				V3 B =	2,00	KM/S						V3 B =	2,00	KM/S	
				T2 C–D	68,00	MS						T2 D–E	68,00	MS	
(TAP)	37,00	40,00	43,00	44,00	45,00	47,00	48,00	52,00	55,00	56,00	61,00	66,00	68,00		
(TBP)	48,00	45,00	38,00	37,00	36,00	34,00	31,00	28,00	25,00	23,00	21,00	20,00	18,00		
TD	8,50	8,50	6,50	6,50	6,50	6,50	5,50	6,00	6,00	5,50	7,00	9,00	9,00		
TAP'	28,50	31,50	36,50	37,50	38,50	40,50	42,50	46,00	49,00	50,50	54,00	57,00	59,00		
TBP'	39,50	36,50	31,50	30,50	29,50	27,50	25,50	22,00	19,00	17,50	14,00	11,00	9,00		
V2 EFF	0,68	0,68	0,68	0,68	0,79	0,71	0,70	0,69	0,69	0,68	0,67	0,67	0,67		
DEPTH	5,77	5,77	4,41	4,41	5,11	4,61	3,86	4,17	4,13	3,74	4,72	6,00	6,03		

SEISMIC DATA CALCULATION SHEET

PROJECT : WARSAMSON HEPP
LOCATION : BORROW AREA
LINE : BH-14 SPREAD : II

APPENDIX: 4.1.24

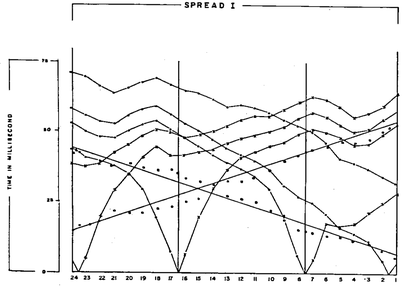
V1 A = 0,30 KM/S
T1 A-E === MS V2 A = 1,00 KM/S

DISTANCE (m)	115,00	120,00	125,00	130,00	135,00	140,00	145,00	150,00	152,50	155,00	160,00	165,00	170,00	175,00
PEG	0	1	2	3	4	5	6	7		8	9	10	11	12
GEOPHONE	GP2	GP3	GP4	GP5	GP6	GP7	GP8	GP9	SHT A	GP10	GP11	GP12	GP13	GP14
(TAP)														
(TBP)														
TD									2,00					
TAP'														
TBP'														
V1 EFF	0,32	0,32	0,32	0,32	0,32	0,32	0,32	0,32	0,31	0,32	0,34	0,37	0,39	0,41
Z1									0,63					
								V3 A =	1,50 KM/S					
								T2 A-B	89,00 MS					
(TAP)	20,00	21,00	23,00	25,00	27,00	28,00	34,00	37,00	38,00	41,00	45,00	48,00	52,00	56,00
(TBP)	87,00	83,00	81,00	81,00	78,00	74,00	70,00	66,00	64,00	63,00	59,00	55,00	51,00	47,00
TD	9,00	7,50	7,50	8,50	8,00	6,50	7,50	7,00	6,50	7,50	7,50	7,00	7,00	7,00
TAP'	11,00	13,50	15,50	16,50	19,00	21,50	26,50	30,00	31,50	33,50	37,50	41,00	45,00	49,00
TBP'	78,00	75,50	73,50	72,50	70,00	67,50	62,50	59,00	57,50	55,50	51,50	48,00	44,00	40,00
V2 EFF	0,65	0,64	0,62	0,61	0,59	0,58	0,56	0,54	1,01	1,01	0,99	0,97	0,96	0,94
DEPTH	5,89	4,79	4,67	5,16	4,73	3,74	4,20	3,81	6,59	7,55	7,42	6,81	6,70	6,58

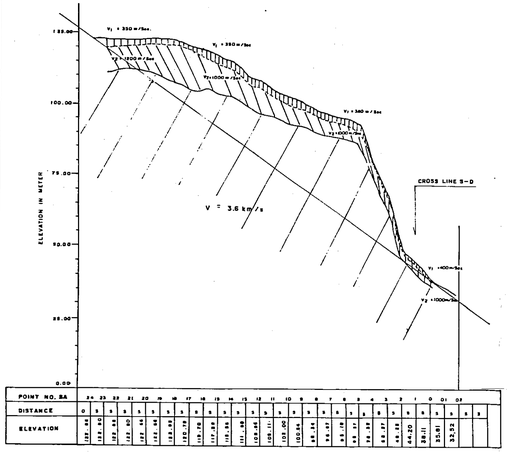
V1 B = 0,40 KM/S V1 C = 0,50 KM/S
V2 B = 1,00 KM/S T1 A-E --- MS V2 C = 1,00 KM/S

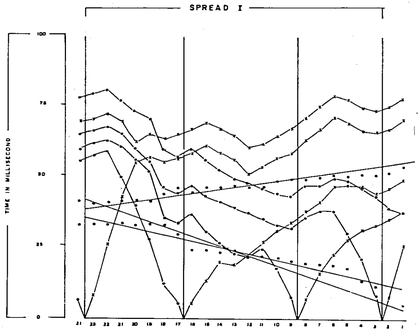
DISTANCE (m)	180,00	182,50	185,00	190,00	195,00	200,00	205,00	210,00	215,00	220,00	222,50	225,00
PEG	13		14	15	16	17	18	19	20	21	22	23
GEOPHONE	GP15	SHT B	GP16	GP17	GP18	GP19	GP20	GP21	GP22	GP23	SHT C	GP24
(TAP)												
(TBP)												
TD		3,50									2,50	
TAP'												
TBP'												
V1 EFF	0,43	0,44	0,55	0,57	0,59	0,60	0,62	0,64	0,66	0,67	0,58	0,69
Z1		1,53									1,44	
	V3 B =	1,50 KM/S								V3 B =	2,00 KM/S	
	T2 A-D	89,00 MS								T2 A-D =	89,00 MS	
(TAP)	61,00	63,00	65,00	68,00	73,00	78,00	82,00	84,00	85,00	87,00	88,00	89,00
(TBP)	47,00	42,00	40,00	37,00	34,00	30,00	28,00	26,00	23,00	22,00	22,00	21,00
TD	9,50	8,00	8,00	8,00	9,00	9,50	10,50	10,50	9,50	10,00	10,50	10,50
TAP'	51,50	55,00	57,00	60,00	64,00	68,50	71,50	73,50	75,50	77,00	77,50	78,50
TBP'	37,50	34,00	32,00	29,00	25,00	20,50	17,50	15,50	13,50	12,00	11,50	10,50
V2 EFF	0,58	0,92	0,92	0,93	0,94	0,95	0,95	0,96	0,97	0,98	0,98	0,99
DEPTH	5,49	7,32	7,36	7,43	8,43	8,98	10,02	10,11	9,23	9,80	10,34	10,39

T-X Graph

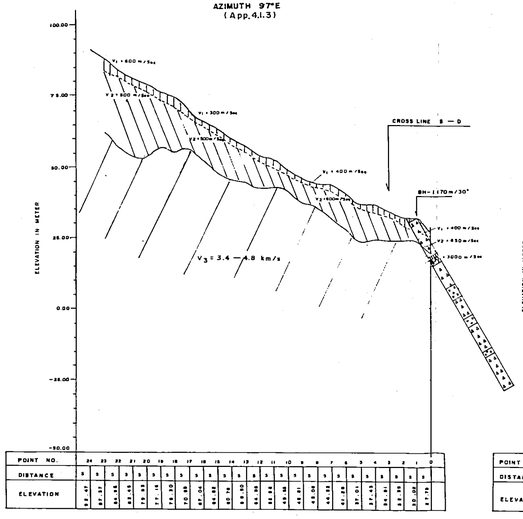


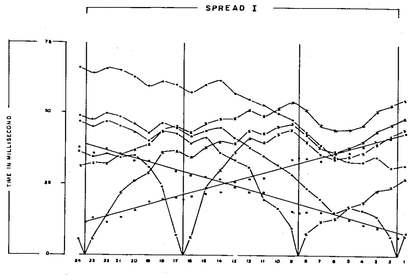
SITE — D LINE : S A
AZIMUTH 97°E
(App. 4.1.1)



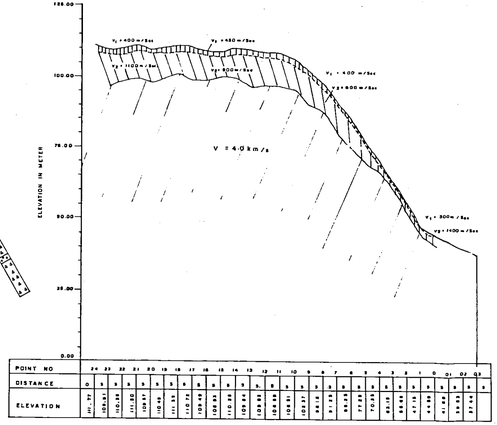


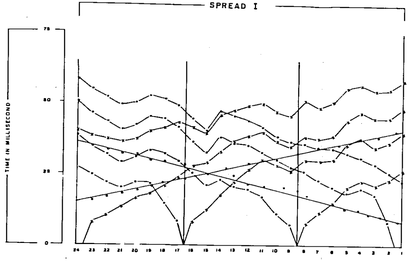
SITE — D LINE : S B
AZIMUTH 97°E
(App. 4.1.3)



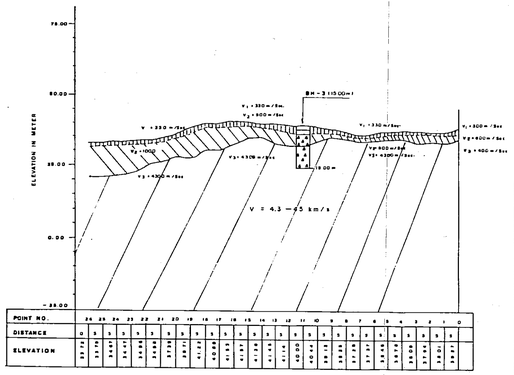


SITE — D LINE : S C
AZIMUTH 97°E
(App. 4.1.5)





SITE — D LINE SD
AZIMUTH 180°E
(App. 4.1.7)



LEGEND :

- Top soil, Sandy SILT (Completely Weathered Lava Breccia)
- Highly ~ Moderately Weathered Lava Breccia / Andesite
- Slightly weathered Lava Breccia / Andesite
- Estimated Velocity Boundary / Inferred Velocity Boundary
- Velocity Travel Time
- Reversed Shot
- Forward Shot
- Geophone number (1 2 3 4 5)

DEPARTEMEN PERTAMBANGAN DAN ENERGI
P.T. PLN (PERSERO)
DIREKTORAT PERENCANAAN SISTEM
PROYEK INDUK SARANA FISIK DAN PENUNJANG | DIVISI PERENCANAAN SISTEM

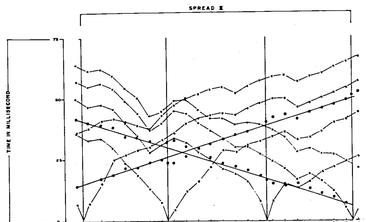
THE FEASIBILITY STUDY ON THE WARSAMSON HYDRO-ELECTRIC POWER DEVELOPMENT PROJECT SORONG, IRIAN JAYA

T-X GRAPH AND SEISMIC SECTION AT SITE D (RIGHT SIDE)
LINE: SA, SB, SC AND SD (SPREAD I)

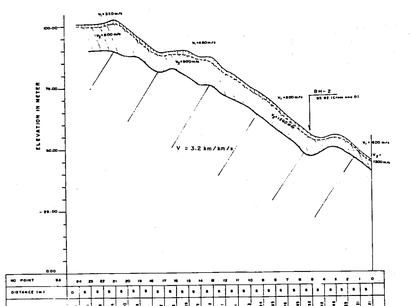
SCALE:
V = 1 : 1000
H = 1 : 1000

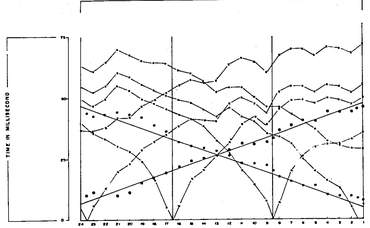
P.T. PONDASI KISOCON RAYA

JAPAN INTERNATIONAL COOPERATION AGENCY

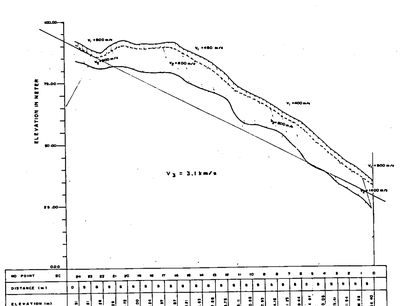


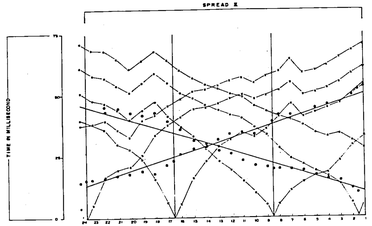
SITE D LINE SA
(Azimuth 277° E)
(App. 4.1-2)



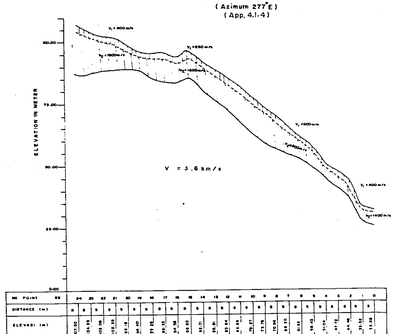


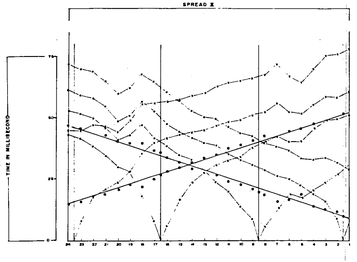
SITE D LINE SC
(Azimuth 277° E)
(App. 4.1-6)



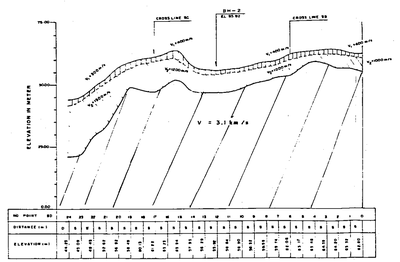


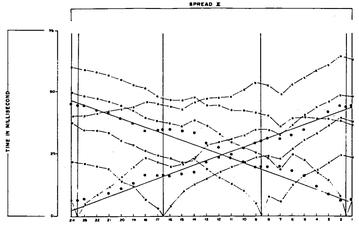
SITE D LINE SB
(Azimuth 277° E)
(App. 4.1-4)



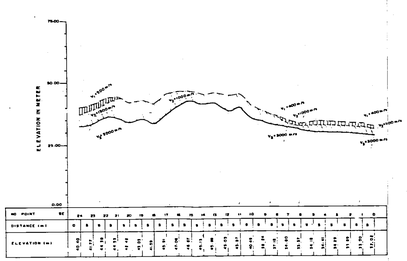


SITE - D LINE D
(Azimuth 347° E)
(App. 4.1-8)





SITE - D LINE E
(Azimuth 57° E)
(App. 4.1-9)



LEGEND

- Top soil, Sandy silt (Completely Weathered Lava Breccia)
- Highly ~ Moderately Weathered Lava Breccia/Andesite
- Slightly Weathered Lava Breccia/Andesite
- Estimated Velocity Boundary
- Inferred Velocity Boundary
- Velocity Travel Time
- Reversed Shot
- Forward Shot
- Geophone number

DEPARTEMEN PERTAMBANGAN DAN ENERGI
P.T. PLN (PERSERO)
DIREKTORAT PERENCANAAN SISTEM
PROYEK INDUK SARANA FISIK DAN PENUNJANG | DIVISI PERENCANAAN SISTEM

THE FEASIBILITY STUDY ON THE WARSAMSON HYDRO-ELECTRIC POWER DEVELOPMENT PROJECT SORONG, IRIAN JAYA

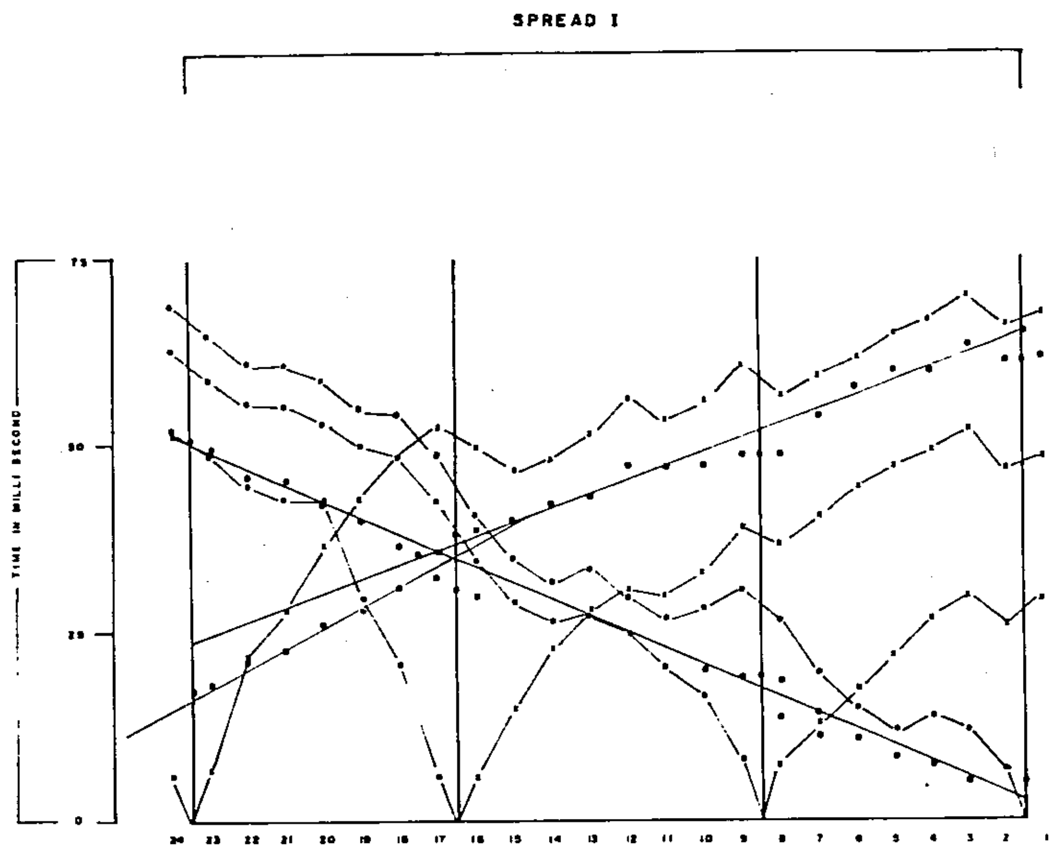
T-X GRAPH AND SEISMIC SECTION AT SITE D (LEFT SIDE)
LINE: SA, SB, SC, SD AND SE (SPREAD II)

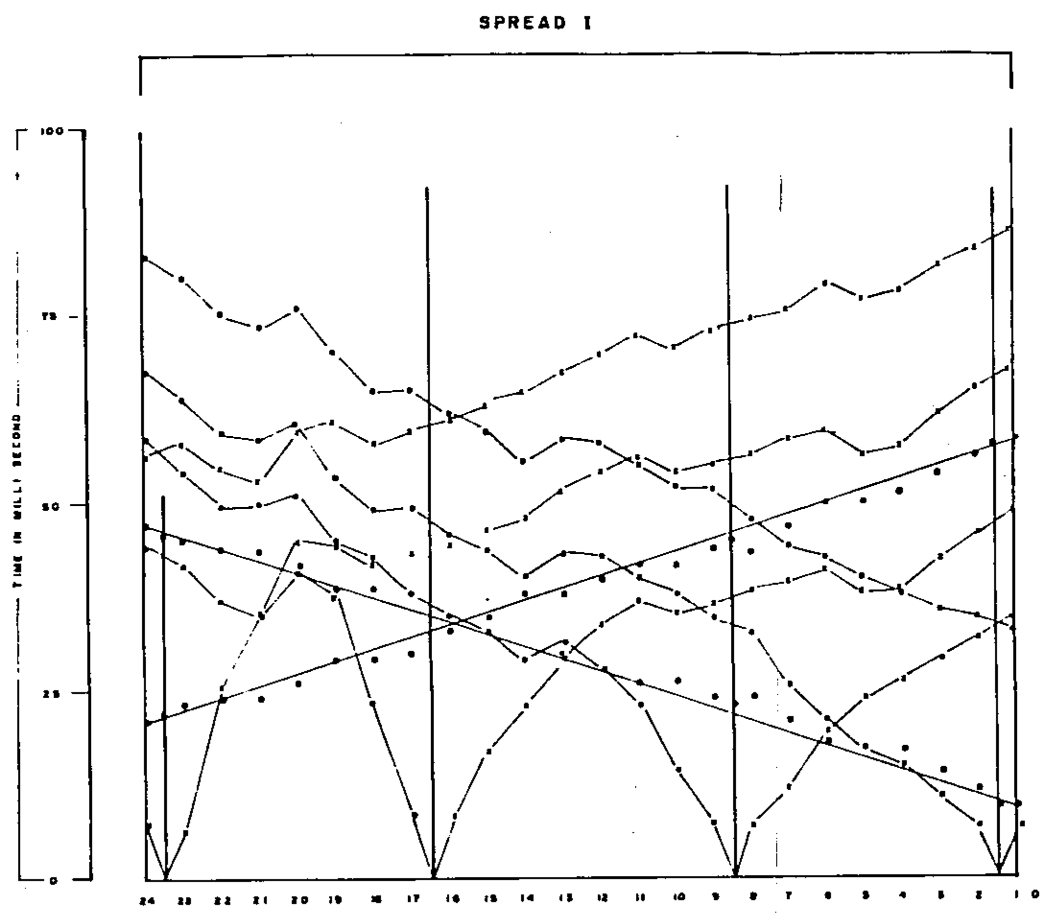
SCALE:
V = 1 : 1000
H = 1 : 1000

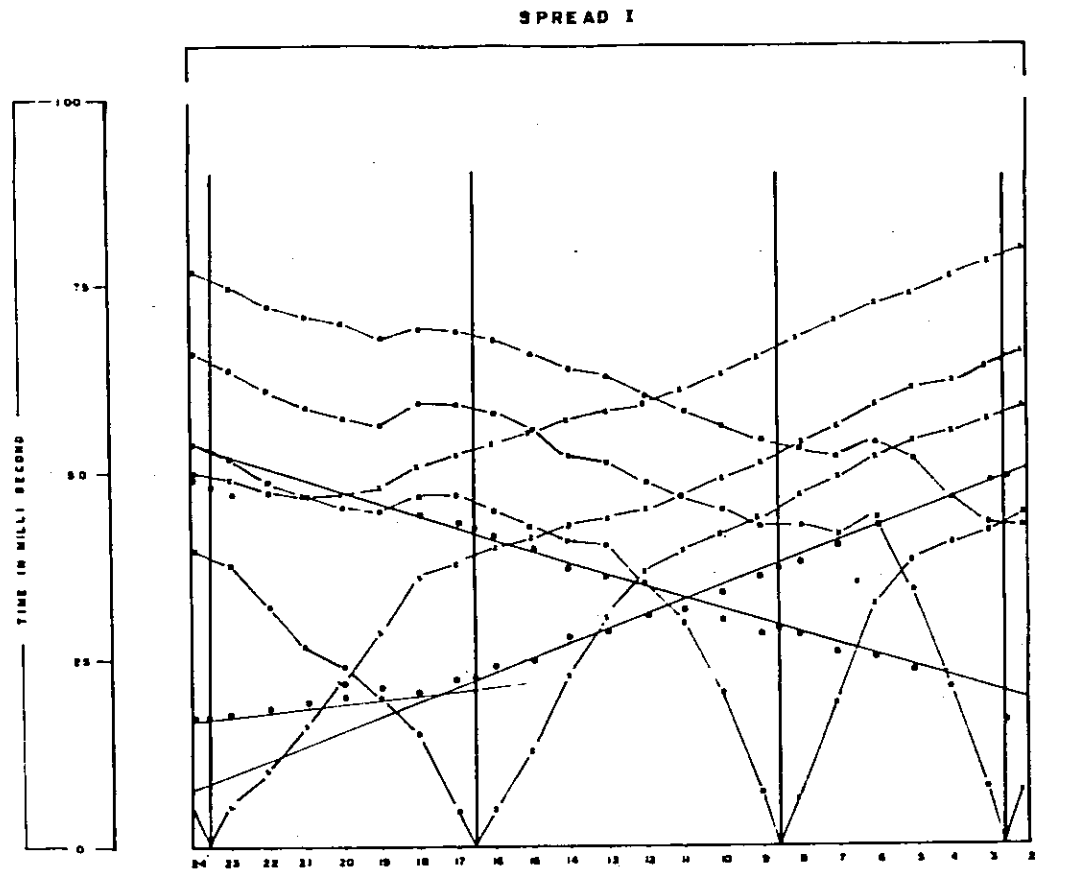
P.T. PONDASI KISOCON RAYA

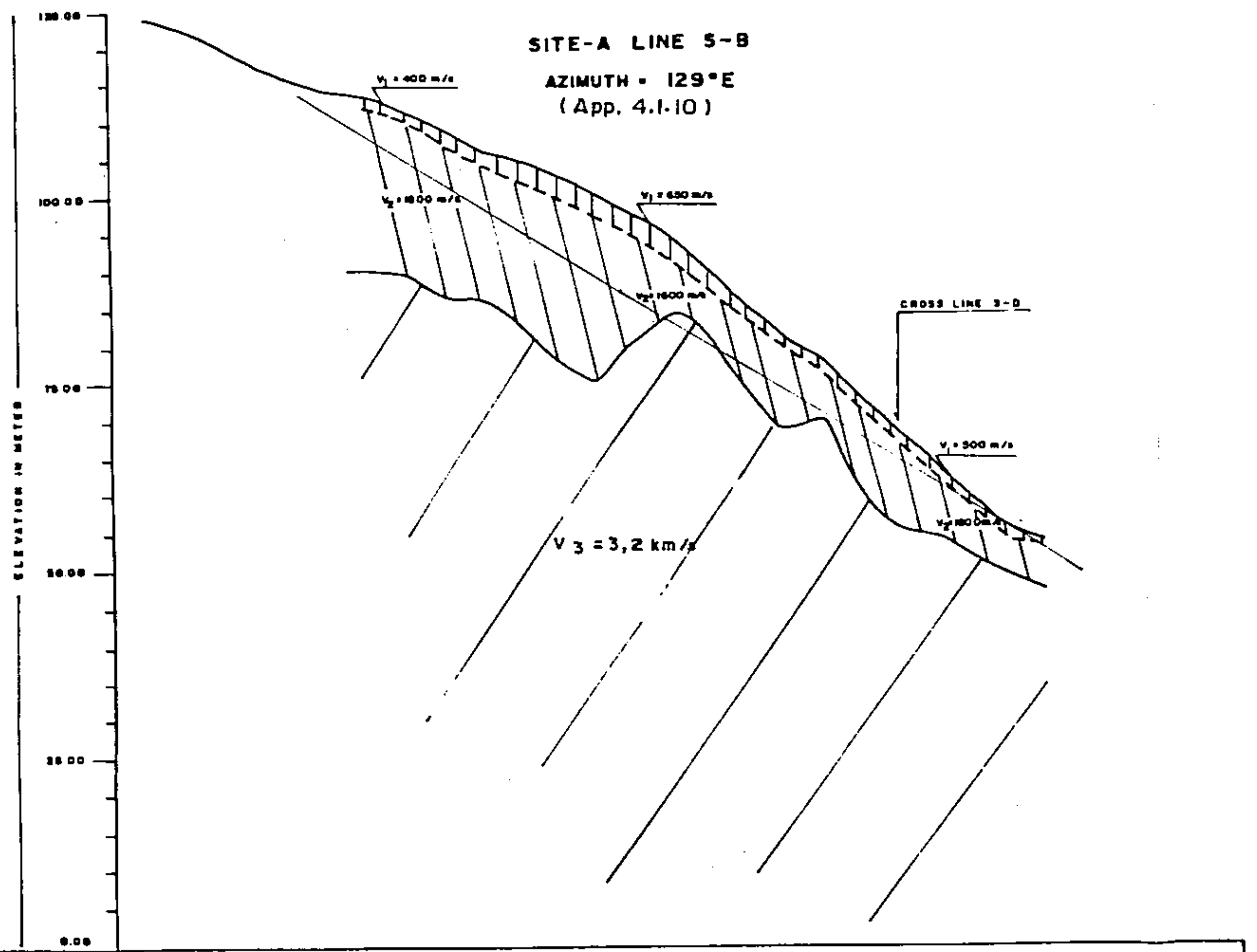
JAPAN INTERNATIONAL COOPERATION AGENCY

App. 4.2.3

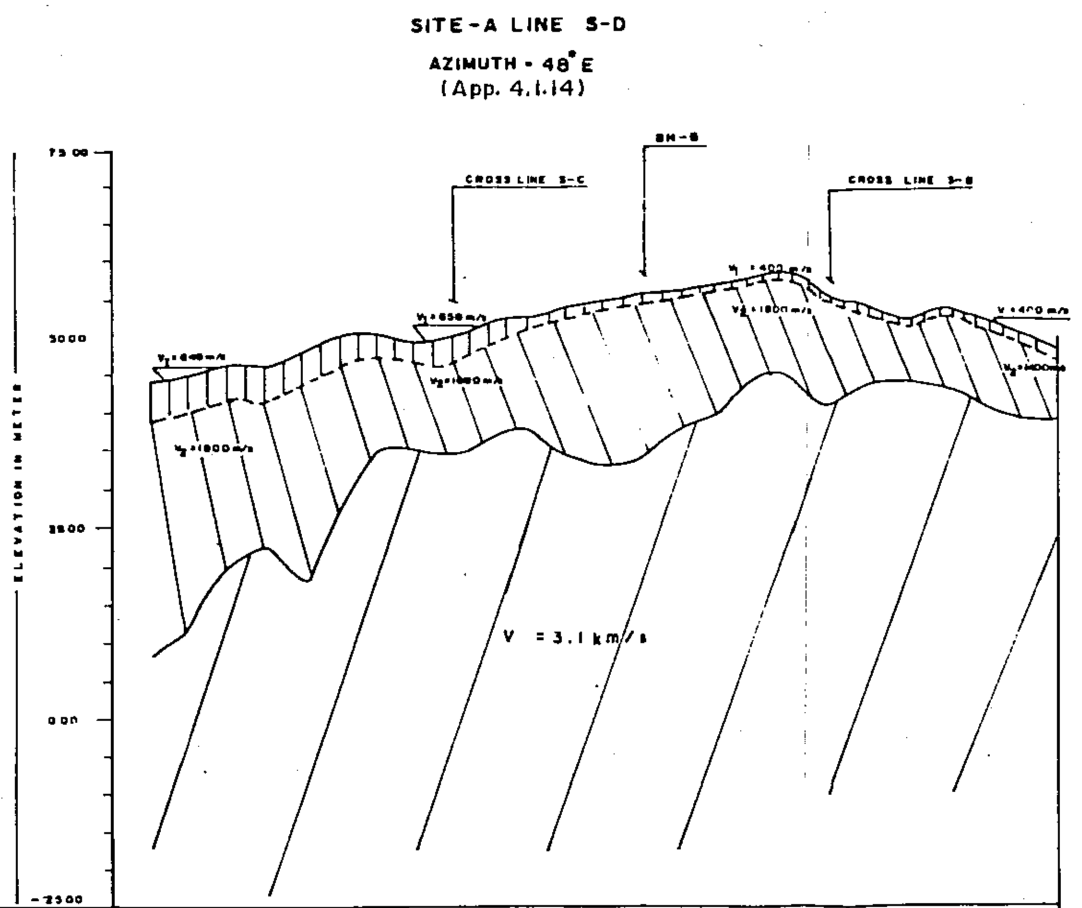




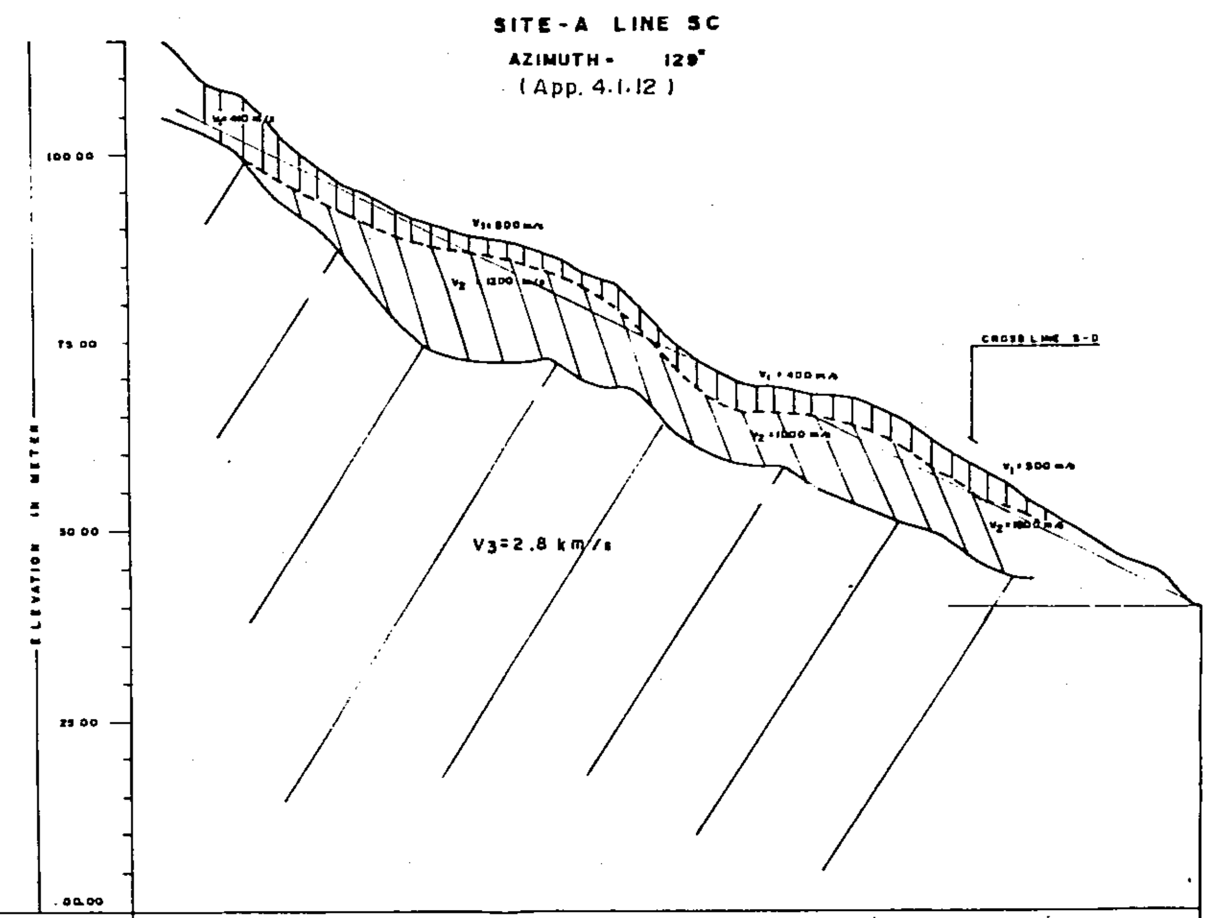




NO POINT	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
DISTANCE	0	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
ELEVATION	124.88	122.89	121.06	118.39	118.87	114.74	113.75	111.88	109.34	108.87	105.87	103.47	100.81	98.08	94.72	90.19	86.18	81.89	78.06	73.83	69.43	64.63	60.26	55.47	54.11					



NO. POINT	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
DISTANCE	0	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
ELEVATIONS	44.82	45.72	47.08	48.55	48.74	50.90	50.86	48.79	50.01	52.85	53.24	54.65	54.84	56.22	57.01	57.85	58.66	58.90	55.47	54.11	52.33	54.30	52.68	50.68	48.15



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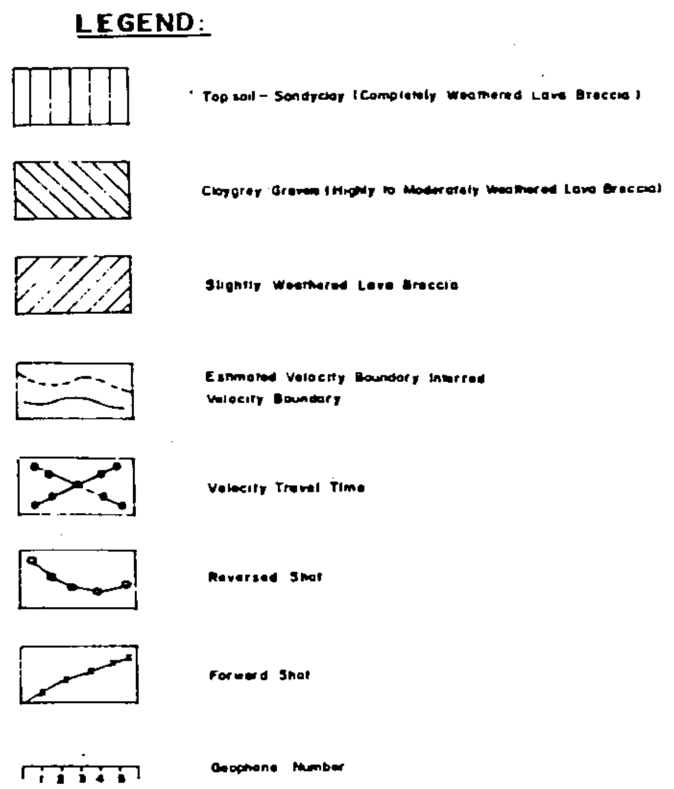
DISTANCE	0	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
ELEVATION	114.50	108.40	107.46	102.27	96.17	94.95	92.41	90.81	89.17	88.37	87.37	84.09	80.56	76.82	72.85	69.60	69.33	67.50	67.38	65.80	62.19	59.81	56.00	57.89	47.23	46.48	44.88	40.80



DEPARTEMEN PERTAMBANGAN DAN ENERGI
P.T. PLN (PERSERO)

DIREKTORAT PERENCANAAN SISTEM

PROYEK INDUK SARANA FISIK DAN PENUNJANG | DIVISI PERENCANAAN SISTEM

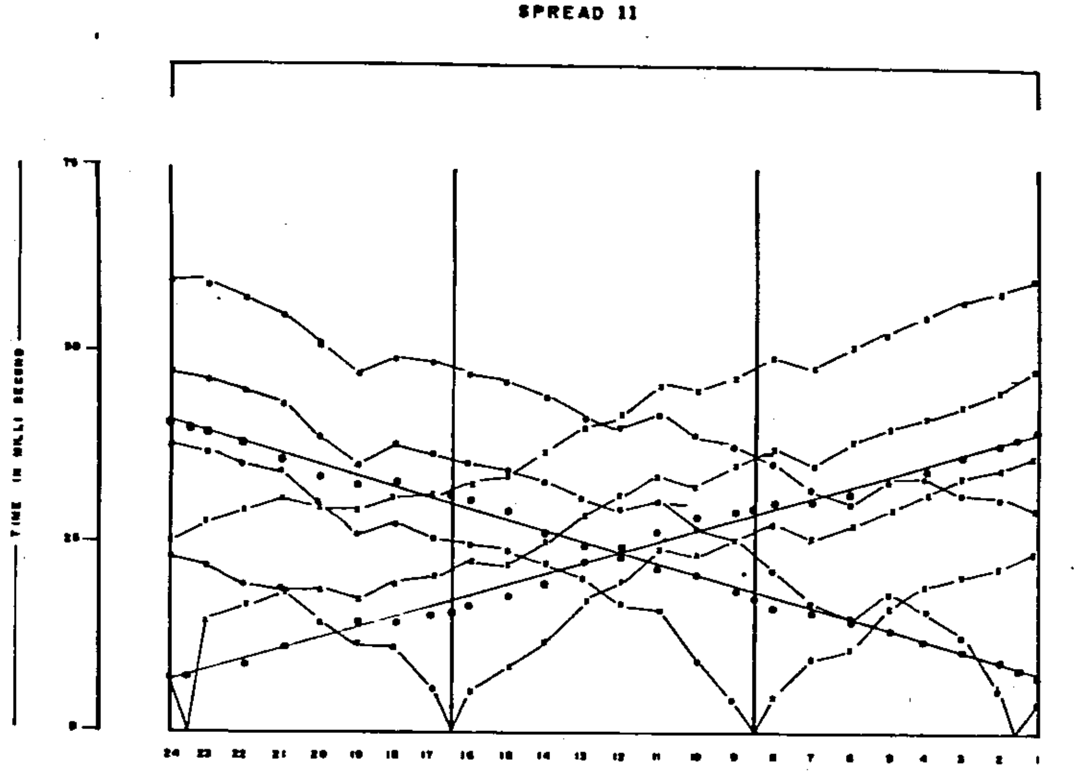
THE FEASIBILITY STUDY ON THE WARSAMSON HYDRO–ELECTRIC POWER DEVELOPMENT PROJECT SORONG, IRIAN JAYA

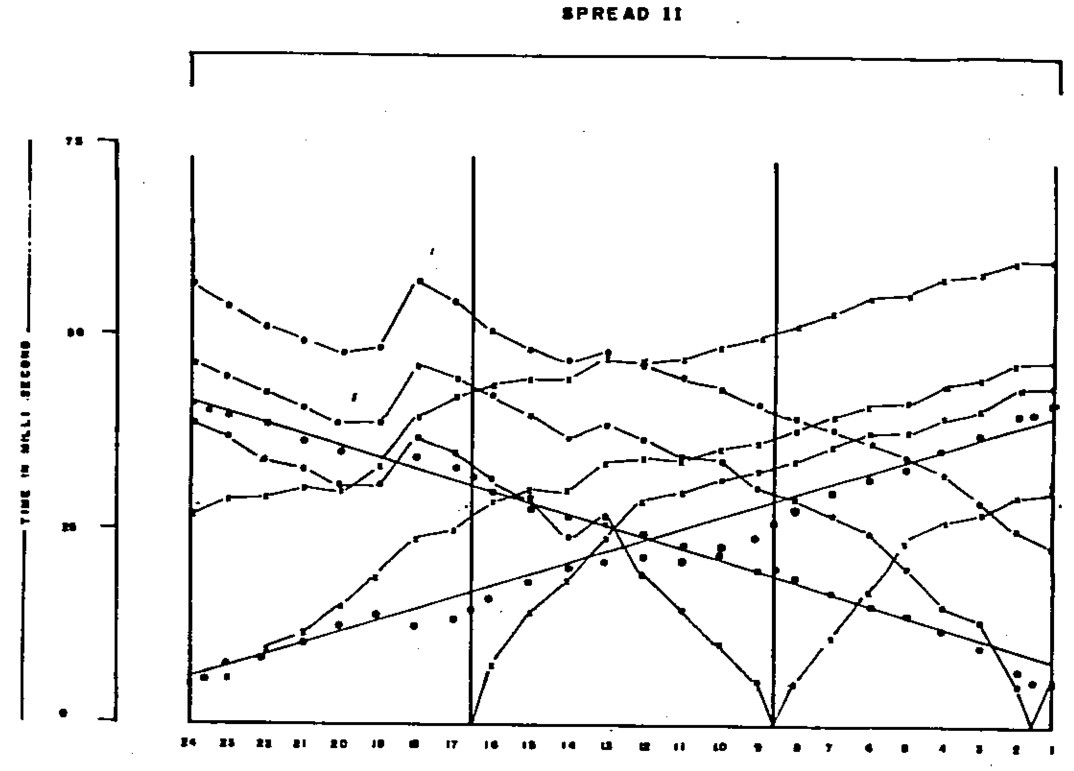
T–X GRAPH AND SEISMIC SECTION AT SITE A (RIGHT SIDE)
LINE: SB, SC AND SD (SPREAD I)

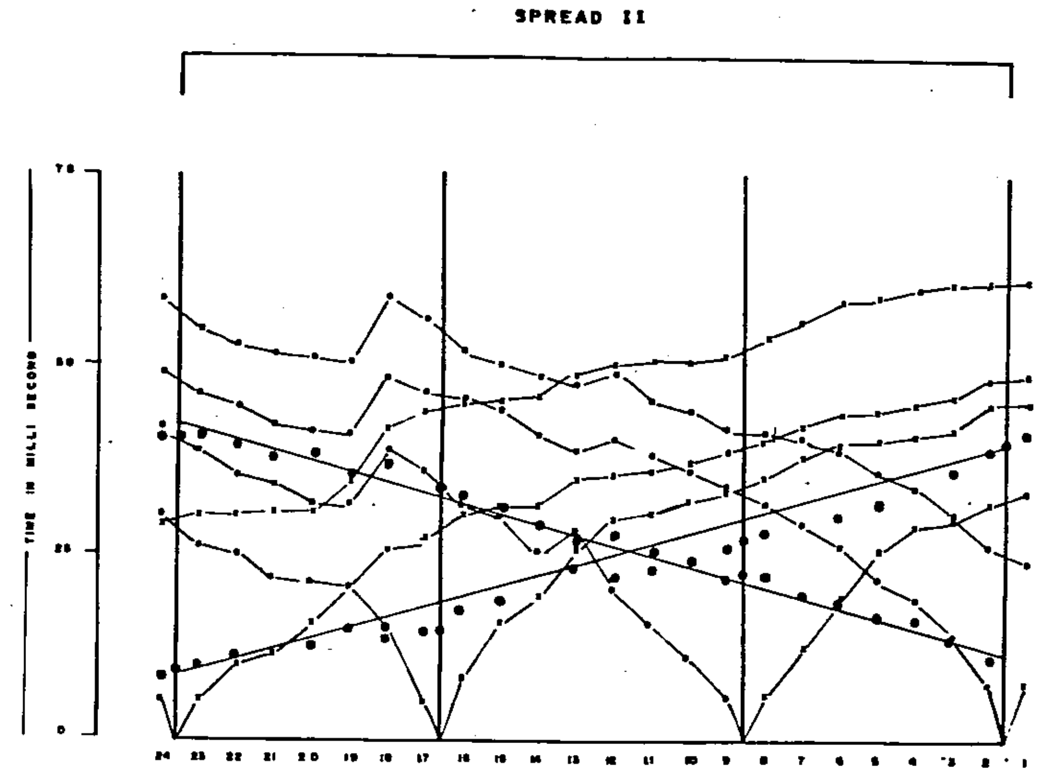
SCALE:
V = 1 : 1000
H = 1 : 1000

P.T. PONDASI KISOCON RAYA

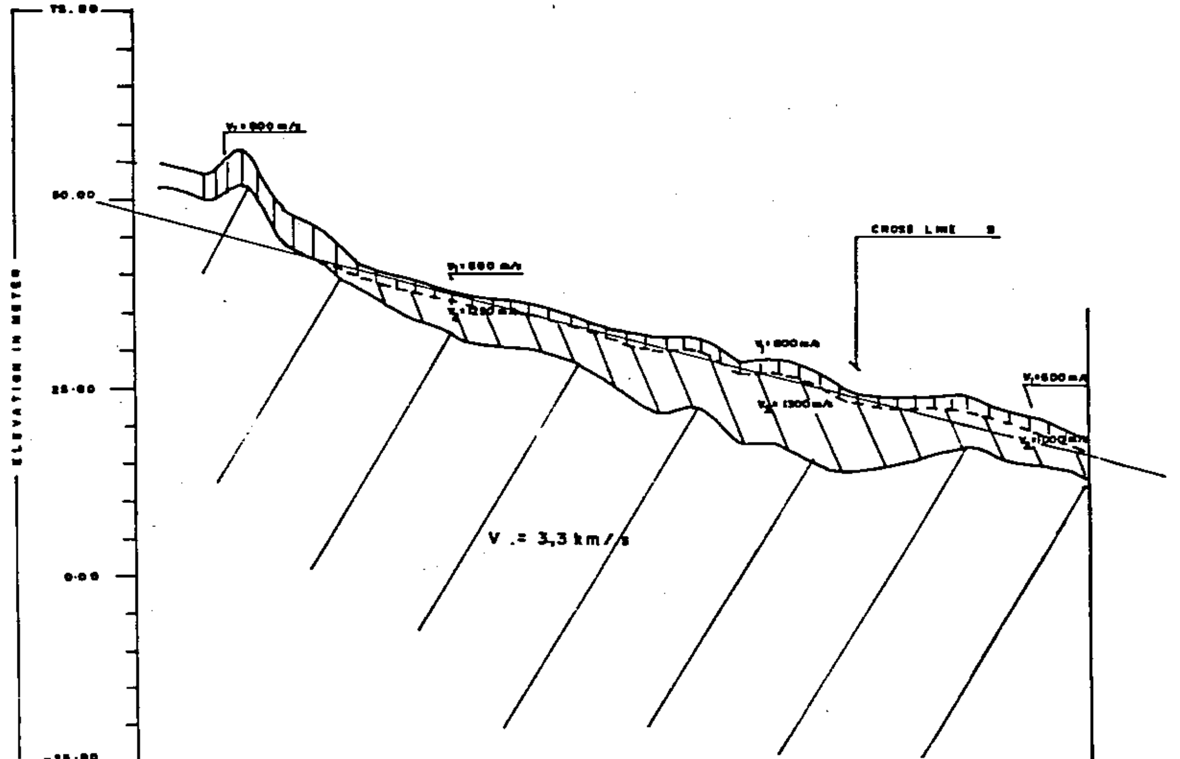
JAPAN INTERNATIONAL COOPERATION AGENCY





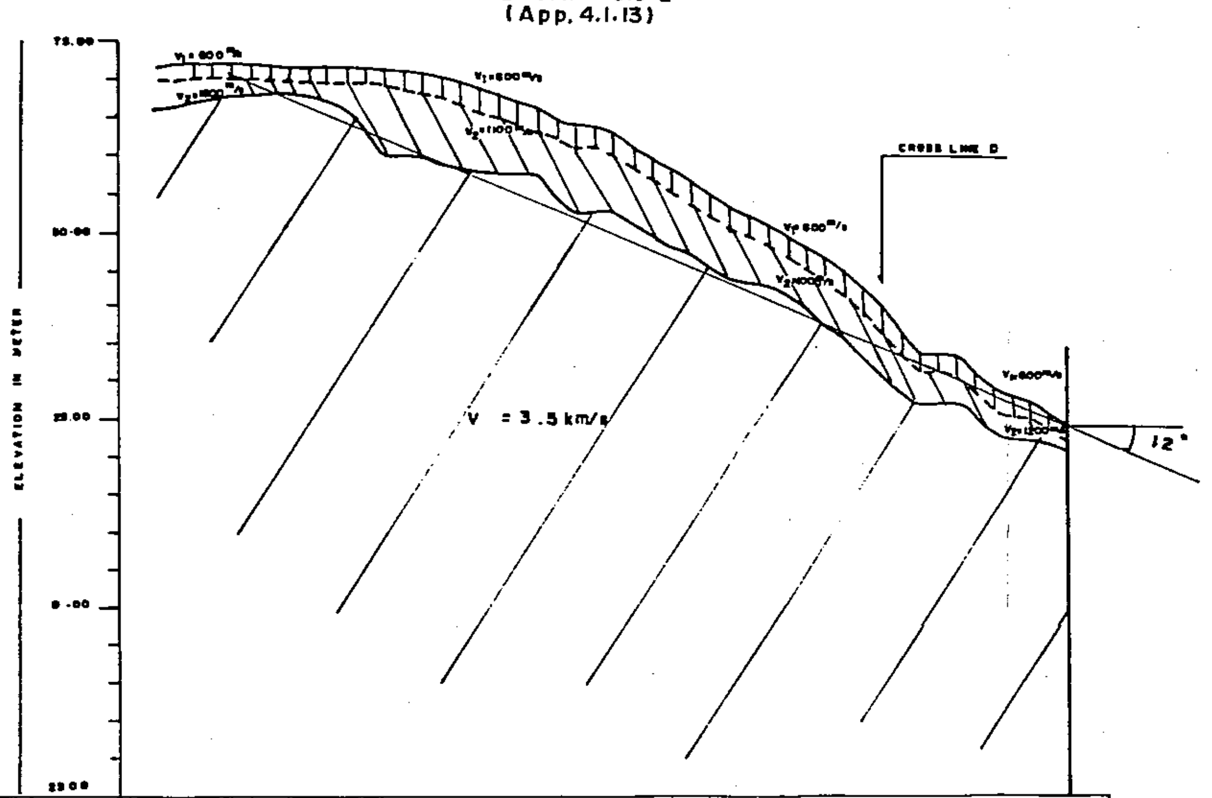


SITE - A LINE S-B
AZIMUTH = 310°E
(App. 4.1.11)



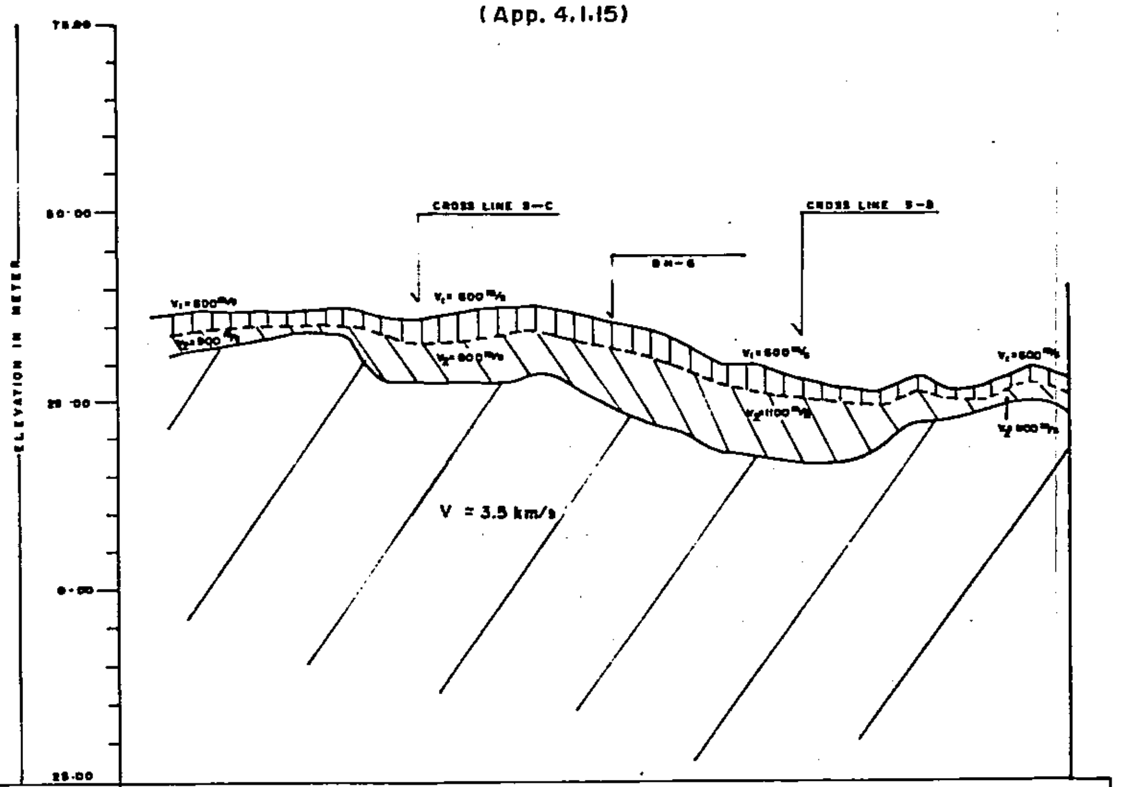
NO. POINT	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
DISTANCE	0	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	
ELEVATION	56.30	54.30	51.94	49.21	47.16	46.20	42.23	39.17	38.08	37.14	36.25	34.40	33.06	32.59	32.07	28.88	28.50	27.55	24.32	24.22	24.74	24.18	22.60	20.71	18.34

SITE - A LINE S-C
AZIMUTH = 310°E
(App. 4.1.13)



NO. POINT	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
DISTANCE	0	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	
ELEVATION	70.91	71.96	71.33	71.46	71.31	71.02	71.39	70.96	69.46	67.90	66.09	63.50	62.77	58.57	56.26	51.50	50.36	47.84	44.39	39.30	35.91	33.11	28.69	26.78	25.62

SITE - A LINE D
AZIMUTH = 46°E
(App. 4.1.15)



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DISTANCE	0	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	
ELEVATION	28.96	28.29	27.01	27.10	27.38	27.57	26.77	26.09	26.01	27.57	27.96	26.57	25.76	24.76	22.40	19.96	20.81	20.10	24.92	26.50	26.47	26.47	27.10	24.99	28.31

LEGEND:

- Topsoil, Sandysilt Withsome Clay (Completely Weathered Lava Breccia)
- Lava Breccia (Highly – Moderately Weathered)
- Lava Breccia (Slightly Weathered)
- Estimated Velocity Boundary Inferred Velocity Boundary
- Velocity Travel Time
- Reversed Shot
- Forward Shot
- Geophone Number

DEPARTEMEN PERTAMBANGAN DAN ENERGI
P.T. PLN (PERSERO)
DIREKTORAT PERENCANAAN SISTEM

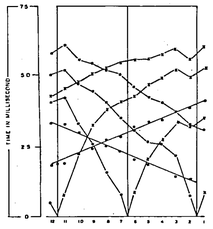
PROYEK INDUK SARANA FISIK DAN PENUNJANG	DIVISI PERENCANAAN SISTEM

THE FEASIBILITY STUDY ON THE WARSAMSON HYDRO-ELECTRIC POWER DEVELOPMENT PROJECT SORONG, IRIAN JAYA

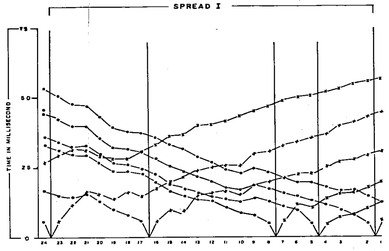
T-X GRAPH AND SEISMIC SECTION AT SITE A (LEFT SIDE) LINE: SB, SC AND SD (SPREAD II)	SCALE: V = 1 : 1000 H = 1 : 1000

P.T. PONDASI KISOCON RAYA

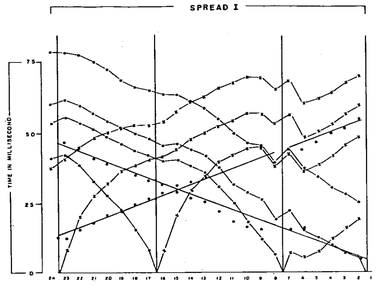
JAPAN INTERNATIONAL COOPERATION AGENCY



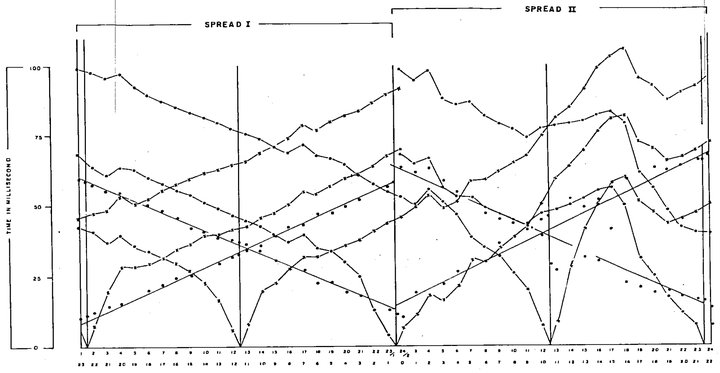
SURGE TANK
AZIMUTH 95°E
(App. 4.1-16)



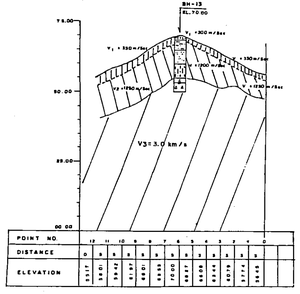
POWER HOUSE
AZIMUTH 110°E
BH-10
(App. 4.1-17)

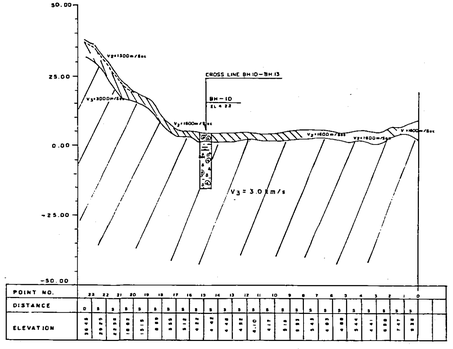


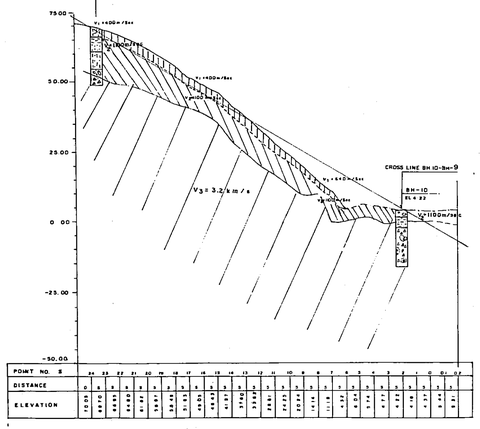
POWER HOUSE
AZIMUTH 228°E
BH. 10 — BH.13
(App. 4.1-18)

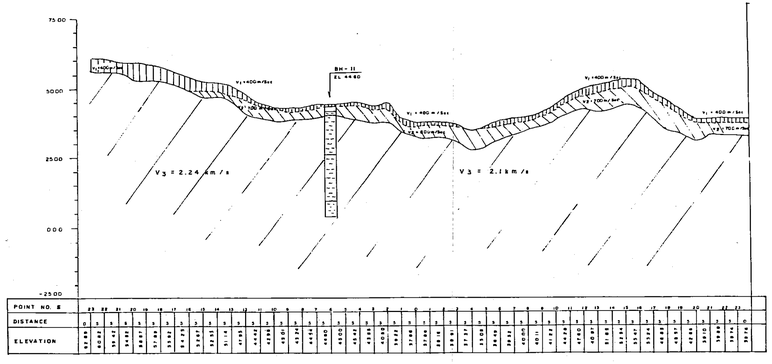


SADDLE DAM
AZIMUTH 337°E
(App. 4.1-19 & 4.1-20)









LEGEND :

- Top Soil – Silty Clay (Completely weathered)
- Gravely Silt (Highly Weathered Shale & Lava Breccia)
- Shale, Lava (Moderately to Slightly Weathered)
- Estimated Velocity Boundary / Inferred Velocity Boundary
- Velocity Travel Time
- Reversed Shot
- Forward Shot
- Geophone number

DEPARTEMEN PERTAMBANGAN DAN ENERGI	
P.T. PLN (PERSERO)	
DIREKTORAT PERENCANAAN SISTEM	
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THE FEASIBILITY STUDY ON THE WARSAMSON HYDRO-ELECTRIC POWER DEVELOPMENT PROJECT SORONG, IRIAN JAYA

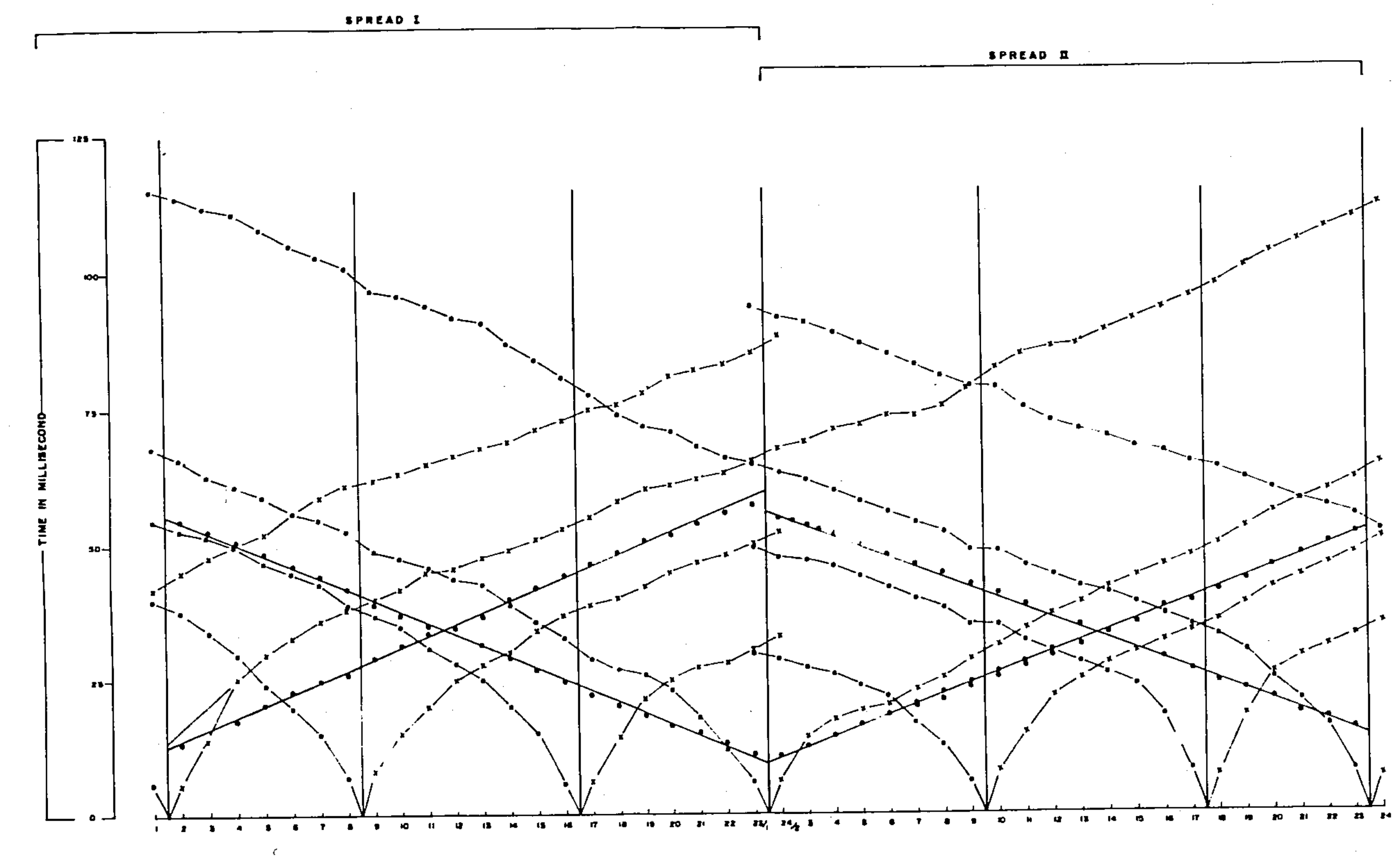
T-X GRAPH AND SEISMIC SECTION AT POWER HOUSE, SURGE TANK AND SADDLE DAM

SCALE: V = 1 : 1000, H = 1 : 1000

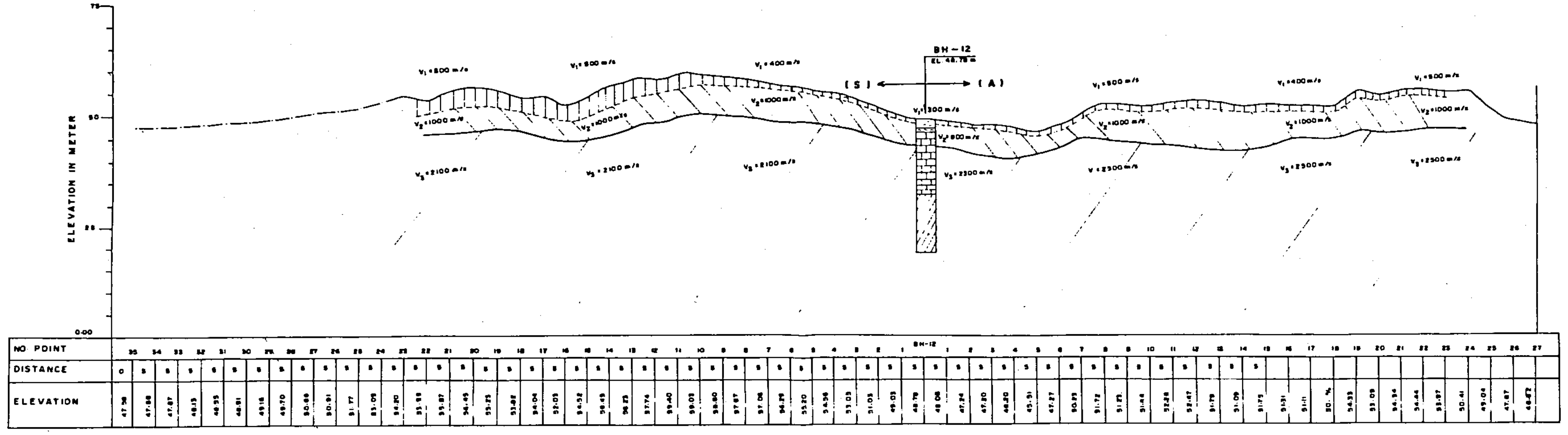
P.T. PONDASI KISCCON RAYA

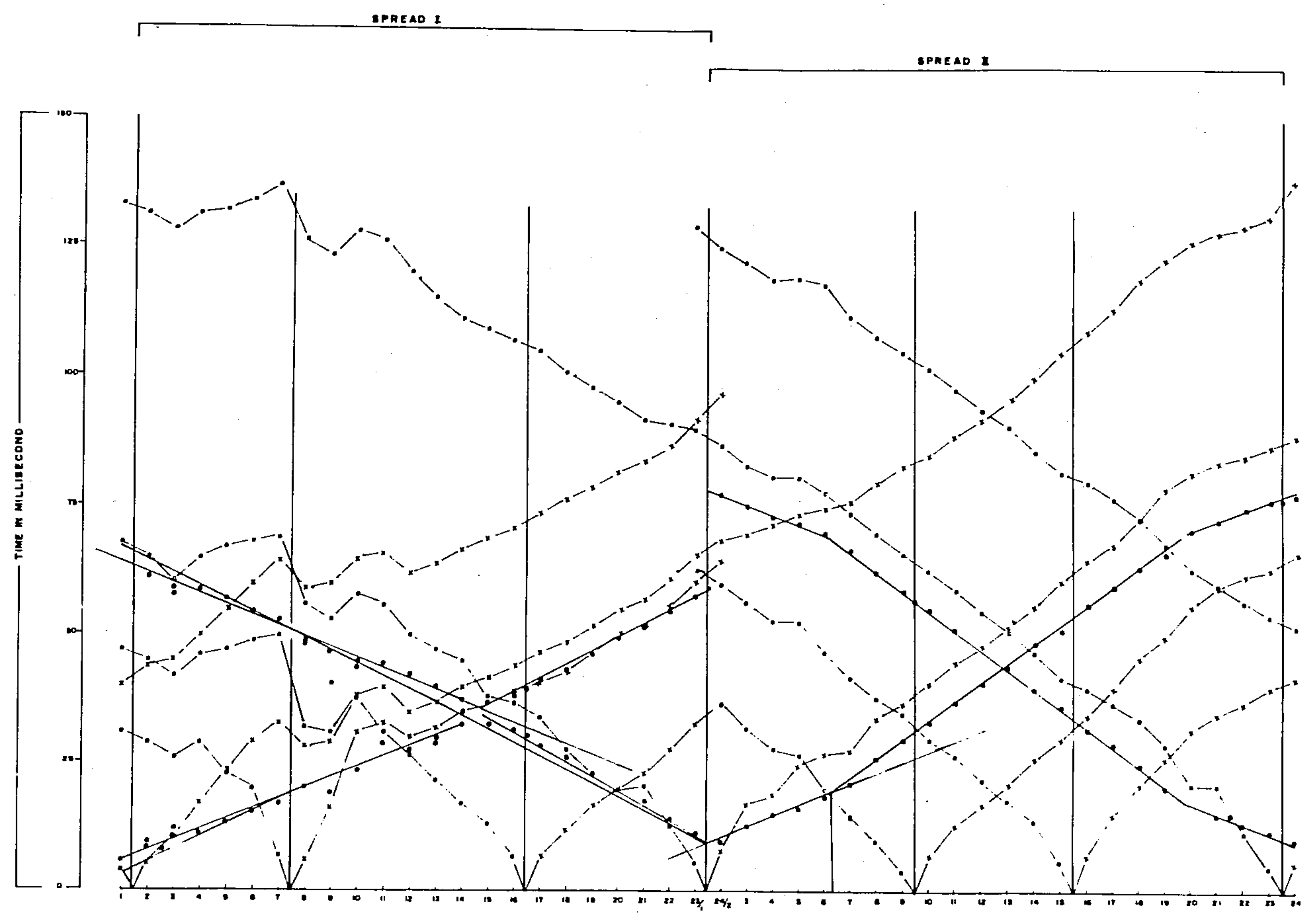
JAPAN INTERNATIONAL COOPERATION AGENCY

App. 4.2.6

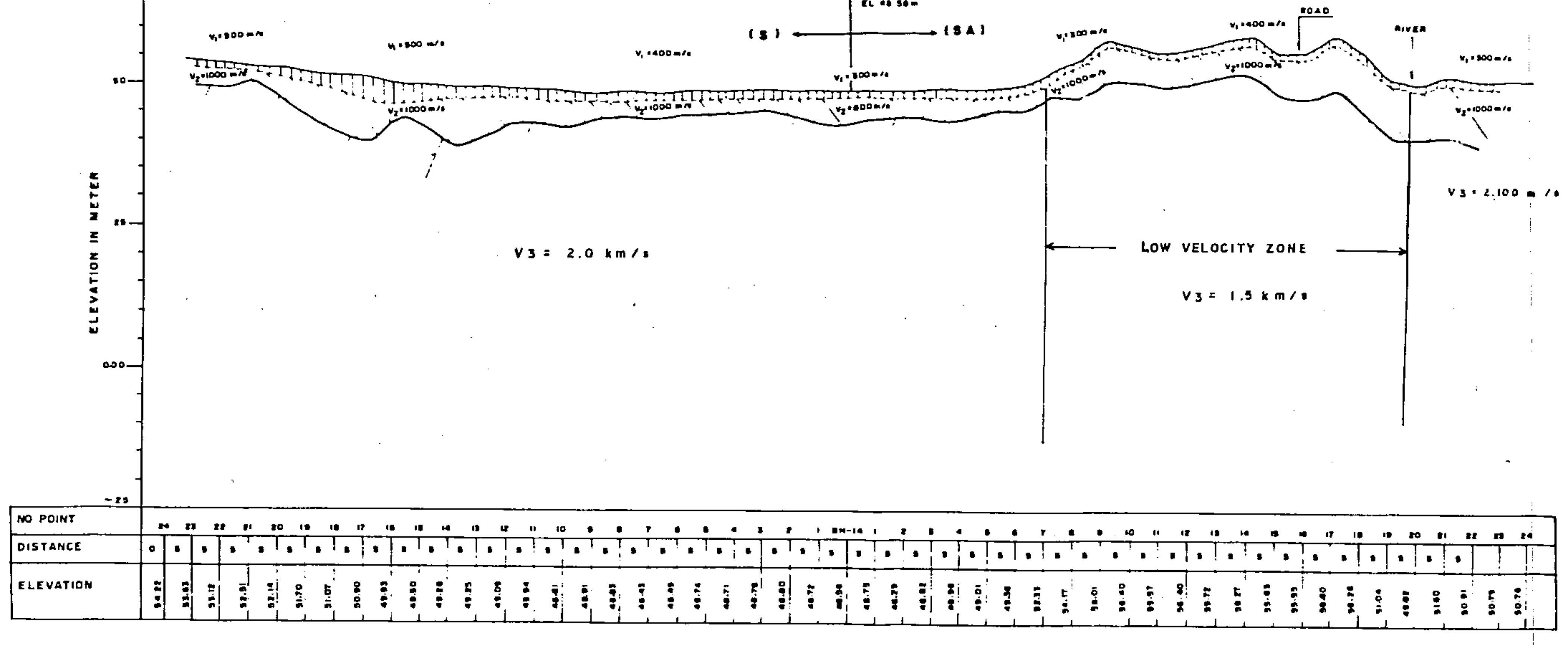


BORROW AREA
Azimuth 226° E (A)
Azimuth 46° E (S)
(App. 4.1.21 & 4.1.22)

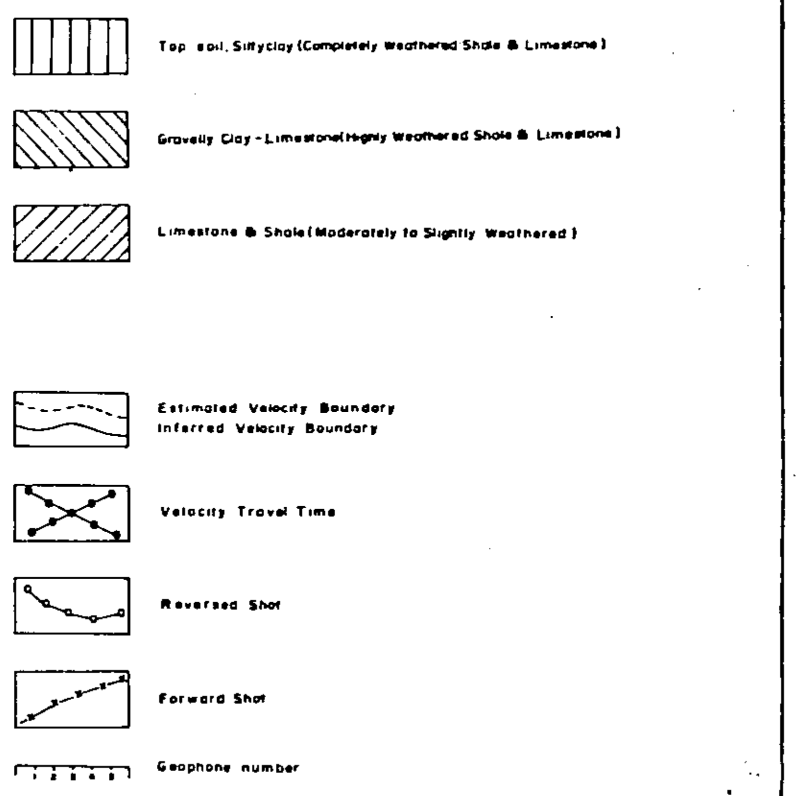




BORROW AREA
Azimuth 317° (SA)
Azimuth 137° (S)
(App. 4.1.23 & 4.1.24) BH-14



LEGEND



DEPARTEMEN PERTAMBANGAN DAN ENERGI
P.T. PLN (PERSERO)

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PROYEK INDUK SARANA FISIK DAN PENUNJANG	DIVISI PERENCANAAN SISTEM

THE FEASIBILITY STUDY ON THE WARSAMSON HYDRO-ELECTRIC POWER DEVELOPMENT PROJECT SORONG, IRIAN JAYA

T-X GRAPH AND SEISMIC SECTION AT BORROW AREA LINE: BH-12 AND BH-14	SCALE: V = 1 : 1000 H = 1 : 1000

P.T. PONDASI KISOCON RAYA

JAPAN INTERNATIONAL COOPERATION AGENCY

APPENDIX D

Results of Laboratory Tests

D.1 Rock Core Samples

D.2 Disturbed Soil Samples

D.3 Concrete Aggregate Samples

APPENDIX D.1

Rock Core Samples

- Specific Gravity and Absorption
- Ultrasonic Velocity Test
- Unconfined Compression Test
- Indirect Tensile Strength Test

ROCK MECHANICAL PROPERTIES DETERMINATION

REQUEST BY	:	PT GEO ACE	RECEIVED BY	:	
PROJECT	:	WARSAMSON	TEST DATE	:	FEBRUARY 5, 1995
LOCATION	:	SORONG, IRIAN JAYA	TESTED BY	:	
DATE RECEIVED	:		APPROVED BY	:	

No	SAMPLE	NATURAL DENSITY d	NATURAL WATER CONTENT	SATURAT. DENSITY s	ABSORPT. ST. WTR. CONTENT	DRY DENSITY d	DEG. OF SATURAT. S	POROSITY n	AP. SPEC. GRAVITY	TRUE SPEC. GRAVITY	VOID RATIO
		gr/cm3	%	gr/cm3	%	gr/cm3	%	%	-	-	-
1	BH - 1 (3.08 - 3.33 m)	2.370	0.43	2.397	1.56	2.360	27.23	3.69	2.3599	2.4502	0.038
2	BH - 1 (17.00 - 17.25 m)	2.574	2.62	2.599	3.65	2.508	71.92	9.15	2.5078	2.7605	0.101
3	BH - 2 (4.60 - 4.90 m)	2.713	1.18	2.724	1.60	2.682	73.91	4.28	2.6816	2.8016	0.045
4	BH - 2 (12.65 - 12.95 m)	2.803	0.38	2.819	0.96	2.792	40.00	2.68	2.7919	2.8690	0.028
5	BH - 4 (2.35 - 2.52 m)	2.508	1.03	2.568	3.47	2.482	29.82	8.60	2.4819	2.7154	0.094
6	BH - 4 (7.70 - 7.95 m)	2.366	1.35	2.511	6.107	2.334	22.038	14.493	2.3340	2.7670	0.169
7	BH - 5 (2.75 - 3.00 m)	2.806	1.00	2.836	2.11	2.778	47.37	5.86	2.7778	2.9508	0.062
8	BH - 5 (18.08 - 18.38 m)	2.770	0.45	2.795	1.35	2.758	33.33	3.73	2.7578	2.8645	0.039
9	BH - 6 (4.00 - 4.25 m)	2.772	0.17	2.804	1.32	2.767	13.04	3.64	2.7674	2.8719	0.038
10	BH - 6 (6.70 - 6.90 m)	2.822	0.47	2.843	1.23	2.809	38.46	3.46	2.8085	2.9091	0.036
11	BH - 8 (9.70 - 9.90 m)	2.460	1.16	2.559	5.19	2.432	22.27	12.62	2.4323	2.7836	0.144
12	BH - 10 (4.77 - 5.00 m)	2.555	2.28	2.611	4.50	2.498	50.68	11.24	2.4985	2.8148	0.127
13	BH - 10 (5.00 - 5.25 m)	2.622	1.50	2.663	3.06	2.583	48.93	7.91	2.5835	2.8055	0.086
14	BH - 12 (3.00 - 3.30 m)	2.556	1.10	2.590	2.45	2.528	44.83	6.18	2.5283	2.6949	0.066
15	BH - 13 (16.86 - 17.00 m)	2.456	1.80	2.537	5.19	2.412	34.66	12.53	2.4121	2.7575	0.143
16											
17											
18											
19											
20											

REMARK :

ULTRASONIC VELOCITY TEST

REQUEST BY	:	RECEIVED BY	:
PROJECT	: Warsamson	TEST DATE	: February 4, 1995
LOCATION	:	TESTED BY	: cb
DATE RECEIVED	:	APPROVED BY	:

No	SAMPLE	COMPR. W P (VP) m/sec.	SHEAR W. S (VS) m/sec.	POIS. RAT. (U) -	YOUNG'S MOD. (E) kg/cm²	MODULUS RIG. (G) kg/cm²
1	BH - 1, 3.08 - 3.33	3,133.33	1,566.67	0.3333	1.55E+05	5.82E+04
2	BH - 1, 17.00 - 17.25	3,102.86	1,551.43	0.3333	1.89E+05	7.08E+04
3	BH - 2, 4.60 - 4.90	3,185.71	1,858.33	0.2421	2.32E+05	9.36E+04
4	BH - 2, 12.65 - 12.95	3,142.86	1,692.31	0.2958	2.08E+05	8.02E+04
5	BH - 4, 2.35 - 2.52	3,600.00	1,661.54	0.3647	1.89E+05	6.92E+04
6	BH - 4, 7.70 - 7.95	3,085.71	1,542.86	0.3333	1.53E+05	5.73E+04
7	BH - 5 2.75 - 3.00	2,333.33	1,354.84	0.2457	1.29E+05	5.16E+04
8	BH - 5 18.08 - 18.38	2,678.95	1,566.15	0.2404	1.69E+05	6.79E+04
9	BH - 6 4.00 - 4.25	3,375.00	1,800.00	0.3012	2.34E+05	8.97E+04
10	BH - 6 6.70 - 6.90	2,815.00	1,671.88	0.2278	1.94E+05	7.88E+04
11	BH - 8, 9.70 - 9.90	1,740.00	949.09	0.2882	5.71E+04	2.22E+04
12	BH - 10, 4.77 - 5.00	3,040.00	1,636.92	0.2958	1.77E+05	6.85E+04
13	BH - 10, 5.00 - 5.25	3,456.67	1,481.43	0.3875	1.60E+05	5.75E+04
14	BH - 12, 3.00 - 3.30	3,185.71	1,858.33	0.2421	2.19E+05	8.83E+04
15	BH - 13, 16.86 - 17.00	3,696.00	1,540.00	0.3950	1.63E+05	5.82E+04
16						
17						
18						
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21						
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27						
28						

REMARK:

UNCONFINED COMPRESSION TEST

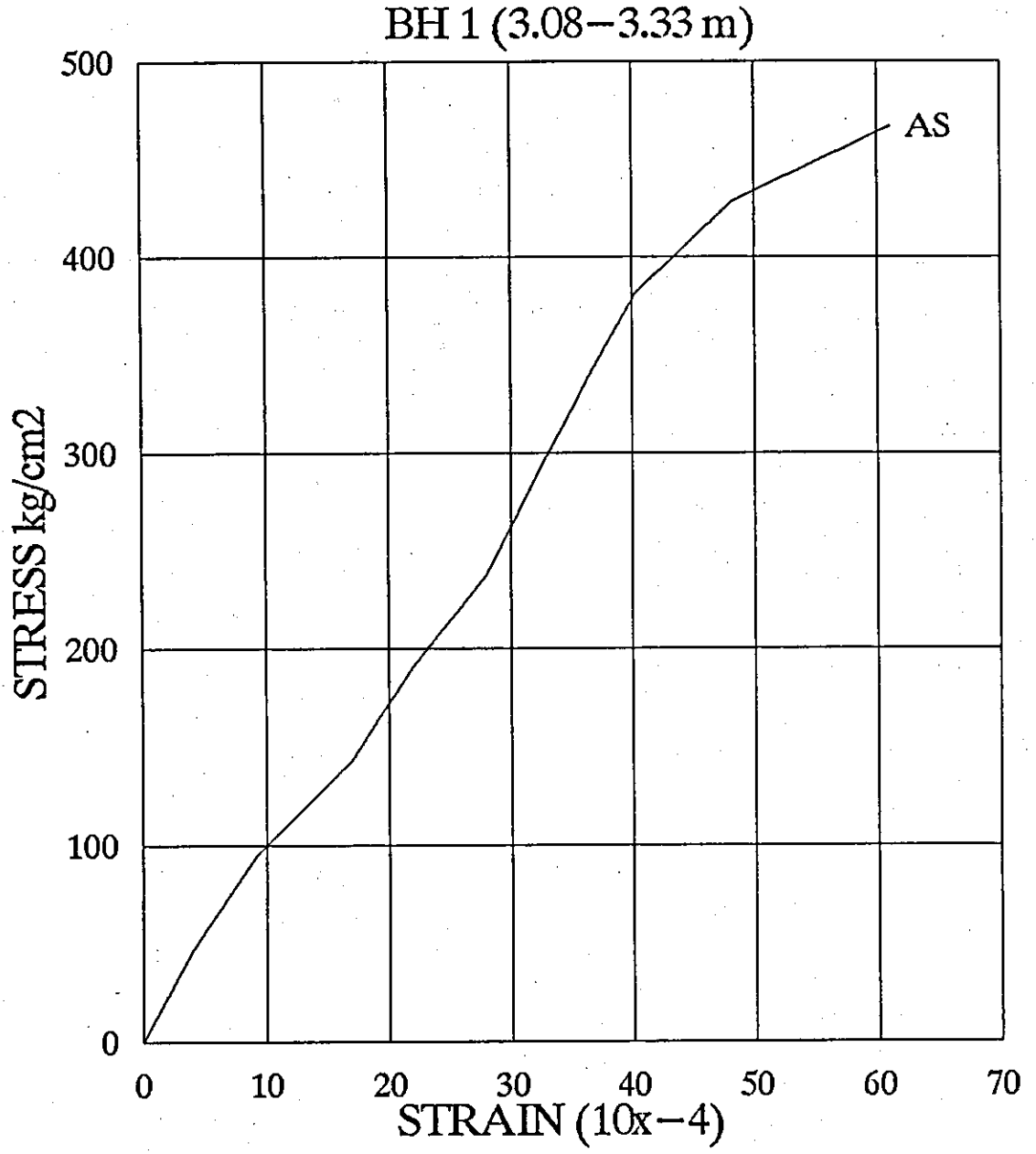
REQUEST BY	: ACE	DRILL HOLE	: BH - 1
PROJECT	:	DEPTH	: 3.08 - 3.33 m
LOCATION	: WARSAMSON	TYPE OF ROCK	:
DATE	: January 25, 1995	TEST CONDITION	:
SIZE OF SPECIMENT	: HEIGHT 9.38 cm		
	DIAMETER 5.15 cm		
	AREA 20.831 cm²		
L/D CORRECTION	: 0.9920065		

No	LOAD	STRESS	DIAL READING (X 10^-3) mm			STRAIN (x 10^-4)		NOTE
			AXIAL	DIAMETRAL		AXIAL	DIAMETRAL	
	(kg)	(kg/cm²)	d	d1	d2	a	d1 + d2	
1	0	0.000	0	-	-	0.000	-	
2	1000	47.622	38	-	-	4.051	-	
3	2000	95.245	86	-	-	9.168	-	
4	3000	142.867	159	-	-	16.951	-	
5	4000	190.489	206	-	-	21.962	-	
6	5000	238.111	263	-	-	28.038	-	
7	6000	285.734	299	-	-	31.876	-	
8	7000	333.356	337	-	-	35.928	-	
9	8000	380.978	378	-	-	40.299	-	
10	9000	428.601	452	-	-	48.188	-	
11	9800	466.698	573	-	-	61.087	-	

REMARK :

SAMPLE FAILURE AT c : 466.6983 kg/cm²

UNCONFINED GRAPH



__AS = Axial Strain

UNCONFINED COMPRESSION TEST

REQUEST BY	: ACE	DRILL HOLE	: BH - 1
PROJECT	:	DEPTH	: 17.00 - 17.25 m
LOCATION	: WARSAMSON	TYPE OF ROCK	:
DATE	: January 25, 1995	TEST CONDITION	:
SIZE OF SPECIMENT	: HEIGHT 10.87 cm		
	DIAMETER 5.18 cm		
	AREA 21.074 cm²		
L/D CORRECTION	: 1.0158259		

No	LOAD	STRESS	DIAL READING (X 10^-3) mm			STRAIN (x 10^-4)		NOTE
			AXIAL	DIAMETRAL		AXIAL	DIAMETRAL	
	(kg)	(kg/cm²)	d	d1	d2	a	d1 + d2	
1	0	0.000	0	-	-	0.000	-	
2	1000	48.203	37	-	-	3.404	-	
3	2000	96.405	93	-	-	8.559	-	
4	3000	144.608	137	-	-	12.603	-	
5	4000	192.810	163	-	-	14.995	-	
6	5000	241.013	198	-	-	18.215	-	
7	6000	289.215	211	-	-	19.411	-	
8	7000	337.418	239	-	-	21.987	-	
9	8000	385.620	287	-	-	26.403	-	
10	9000	433.823	312	-	-	28.703	-	
11	10000	482.025	336	-	-	30.911	-	
12	11000	530.228	357	-	-	32.843	-	
13	12000	578.430	376	-	-	34.591	-	
14	13000	626.633	392	-	-	36.063	-	
15	13200	636.273	424	-	-	39.006	-	

REMARK :

SAMPLE FAILURE AT c : 636.2735 kg/cm²

UNCONFINED COMPRESSION TEST

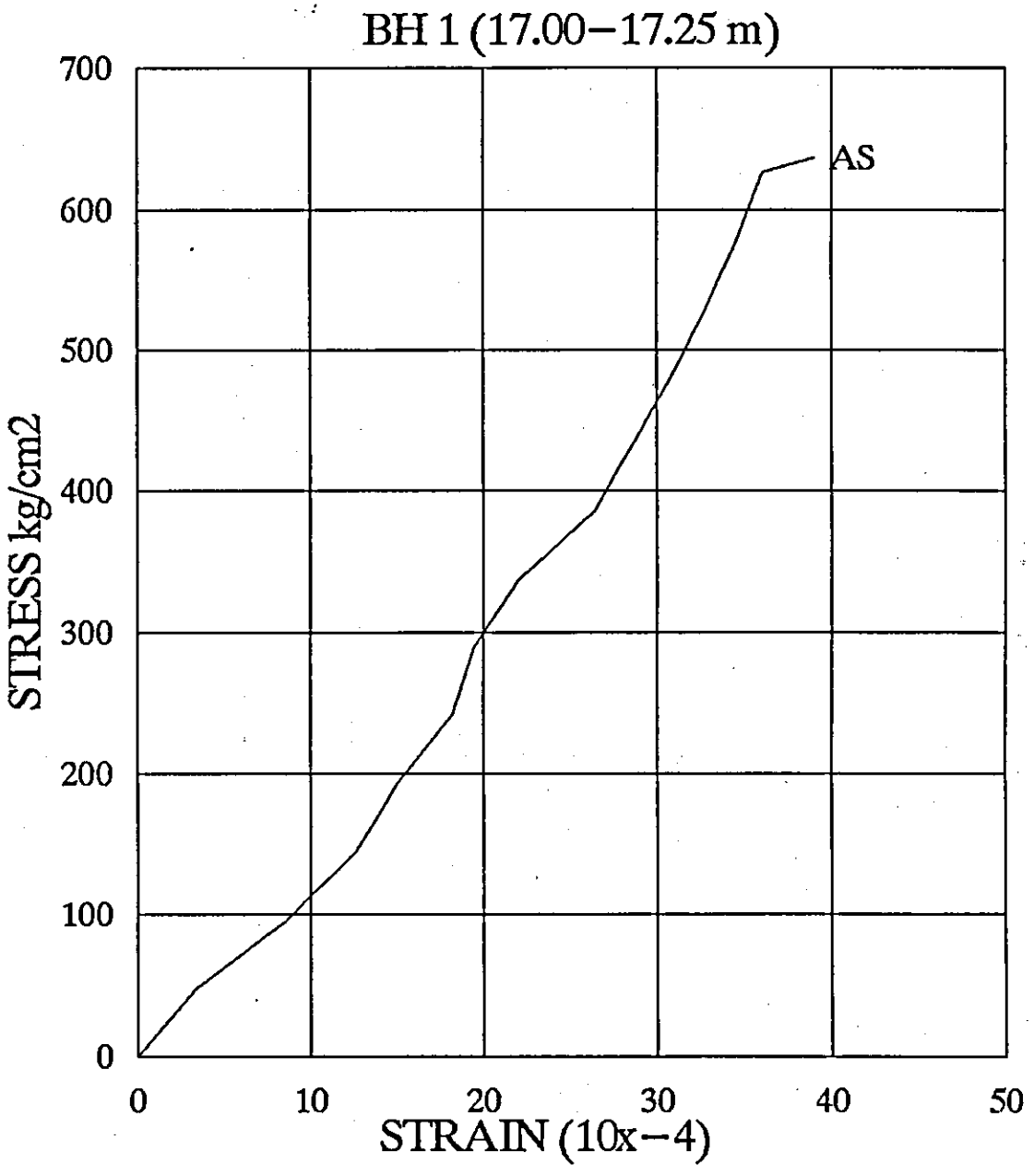
REQUEST BY	:	DRILL HOLE	: BH 2
PROJECT	: Warsamson Hepp	DEPTH	4.60 – 4.90 M
LOCATION	: Sorong, Irja	TYPE OF ROCK	:
DATE	: February 2, 1995	TEST CONDITION	:
SIZE OF SPECIMENT	: HEIGHT 11,15 cm		
	DIAMETER 5,6 cm		
	AREA 24,630 cm2		
L/D CORRECTION	: 1,0073571		

No.	LOAD	STRESS	DIAL READING (X10–3)mm			STRAIN (x10–4)		NOTE
			AXIAL	DIAMETRAL		AXIAL	DIAMETRAL	
	(Kg)	(kg/cm2)	d	d.1	d.2	a	d1+ d2	
1	0	0,000	0	0	0	0,000	0,000	
2	1000	40,899	135	0	0	12,108	0,000	
3	2000	81,799	254	0	0	22,780	0,000	
4	3000	122,698	290	0	0	26,009	0,000	
5	4000	163,598	358	0	0	32,108	0,000	
6	5000	204,497	382	0	0	34,260	0,000	
7	6000	245,397	438	0	0	39,283	0,000	
8	7000	286,296	472	0	0	42,332	0,000	
9	8000	327,196	502	0	0	45,022	0,000	
10	9000	368,095	552	0	0	49,507	0,000	
11	10000	408,995	608	0	0	54,529	0,000	
12	11000	449,894	648	0	0	58,117	0,000	
13	12000	490,793	674	0	0	60,448	0,000	
14	13000	531,693	725	0	0	65,022	0,000	
15	14000	572,592	768	0	0	68,879	0,000	
16	15000	613,492	798	0	0	71,570	0,000	
17	16200	662,571	838	0	0	75,157	0,000	

REMARK : SAMPLE FAILURE AT c : 662,571 kg/cm^2

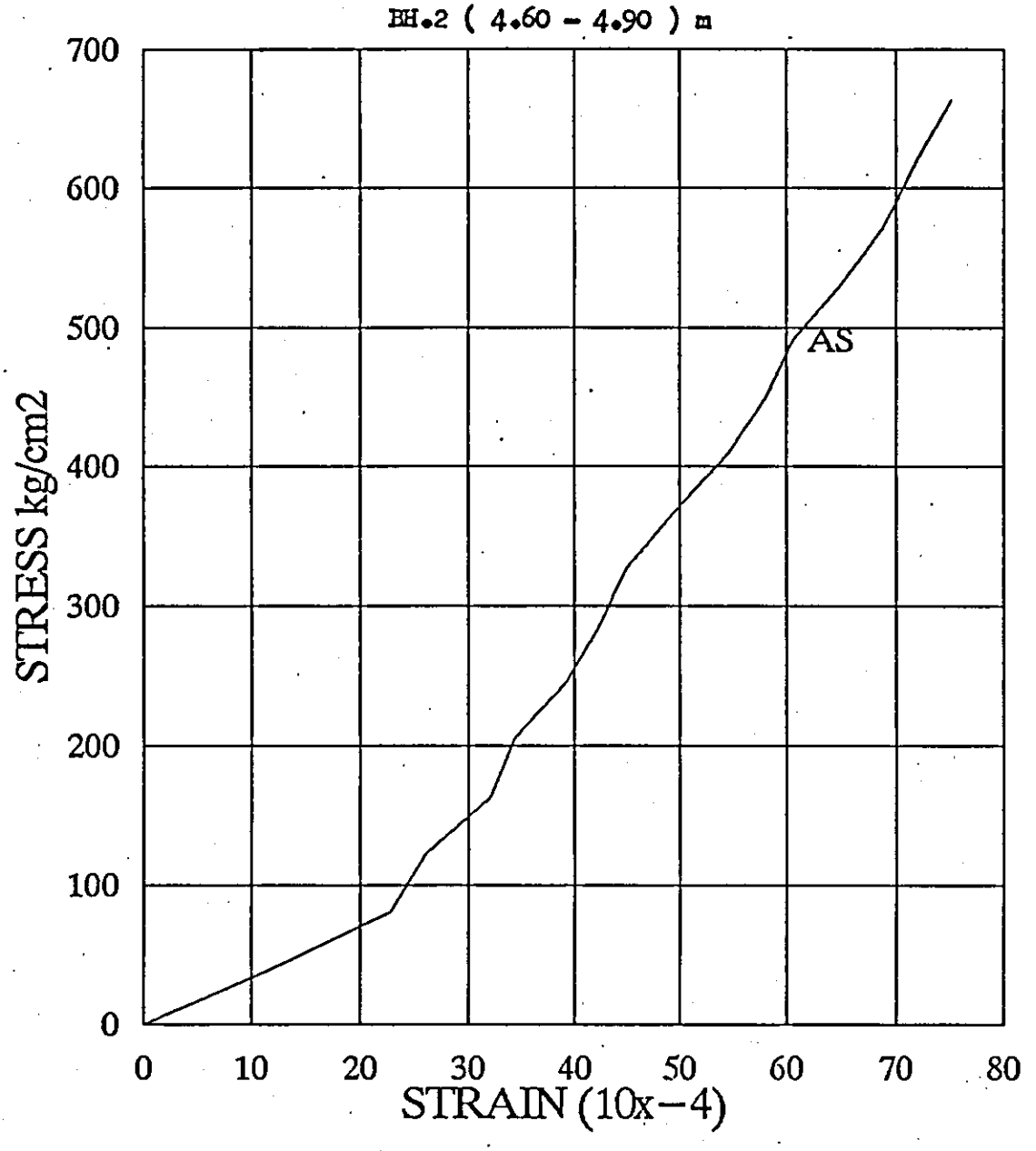
UN-DIS

UNCONFINED GRAPH



__AS = Axial Strain

UNCONFINED GRAPH



__AS = Axial Strain __DS = Diametral Strain

UNCONFINED COMPRESSION TEST

REQUEST BY :
PROJECT : Warsamson Hepp
LOCATION : Sorong, Irja
DATE : February 2, 1995
SIZE OF SPECIMENT : HEIGHT 11 cm
DIAMETER 5,5 cm
AREA 23,758 cm2
L/D CORRECTION : 1,008098

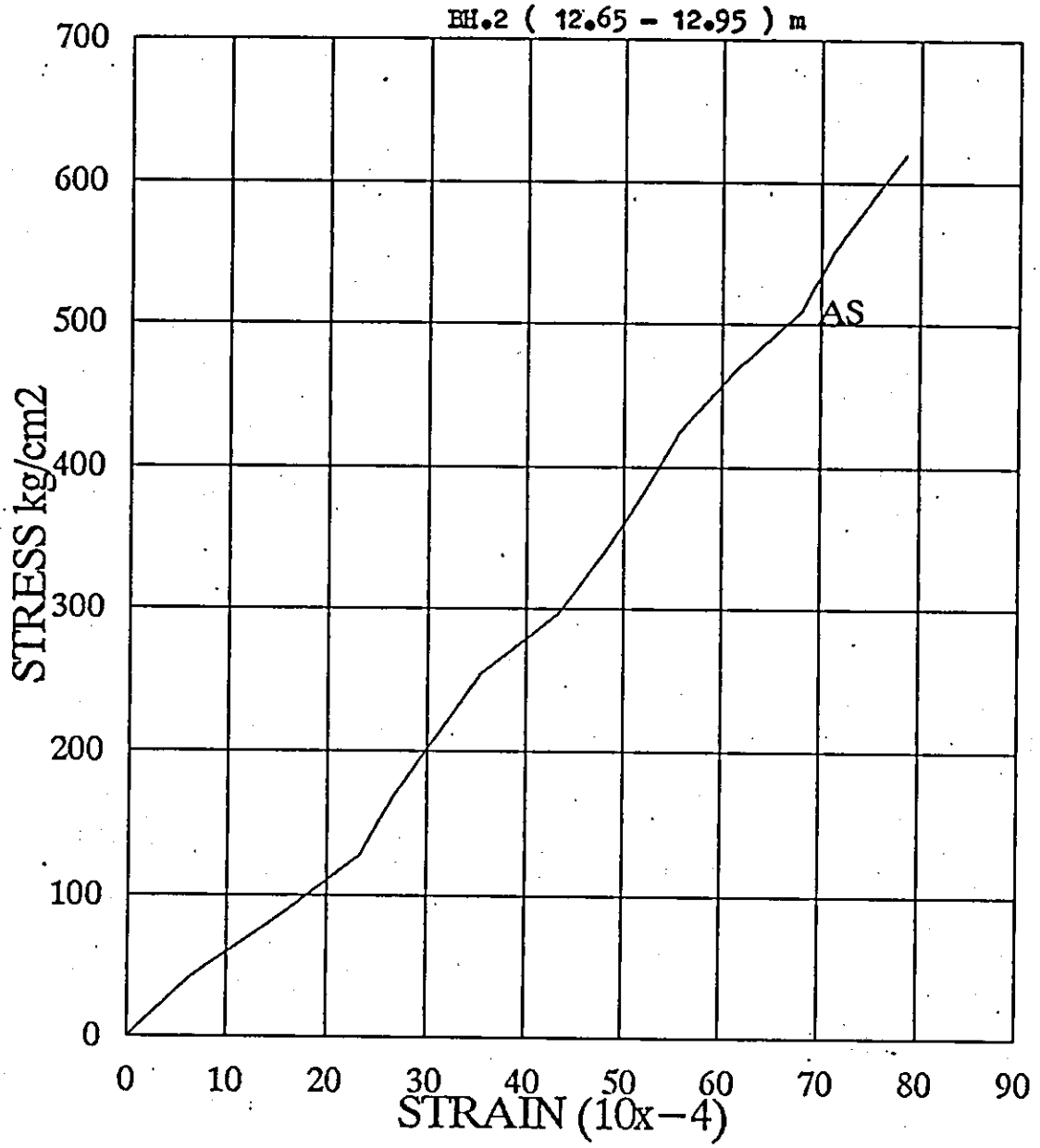
DRILL HOLE : BH 2
DEPTH 12.65 – 12.95 M
TYPE OF ROCK :
TEST CONDITION :

No.	LOAD	STRESS	DIAL READING (X10–3)mm			STRAIN (x10–4)		NOTE
			AXIAL	DIAMETRAL		AXIAL	DIAMETRAL	
	(Kg)	(kg/cm2)	d	d.1	d.2	a	d1+ d2	
1	0	0,000	0	0	0	0,000	0,000	
2	1000	42,431	70	0	0	6,364	0,000	
3	2000	84,863	166	0	0	15,091	0,000	
4	3000	127,294	256	0	0	23,273	0,000	
5	4000	169,726	294	0	0	26,727	0,000	
6	5000	212,157	342	0	0	31,091	0,000	
7	6000	254,588	390	0	0	35,455	0,000	
8	7000	297,020	476	0	0	43,273	0,000	
9	8000	339,451	527	0	0	47,909	0,000	
10	9000	381,883	573	0	0	52,091	0,000	
11	10000	424,314	614	0	0	55,818	0,000	
12	11000	466,746	674	0	0	61,273	0,000	
13	12000	509,177	748	0	0	68,000	0,000	
14	13000	551,608	784	0	0	71,273	0,000	
15	14000	594,040	833	0	0	75,727	0,000	
16	14600	619,499	864	0	0	78,545	0,000	

REMARK : SAMPLE FAILURE AT c : 619,499 kg/cm^2

UN-DIS

UNCONFINED GRAPH



__AS = Axial Strain __DS = Diametral Strain

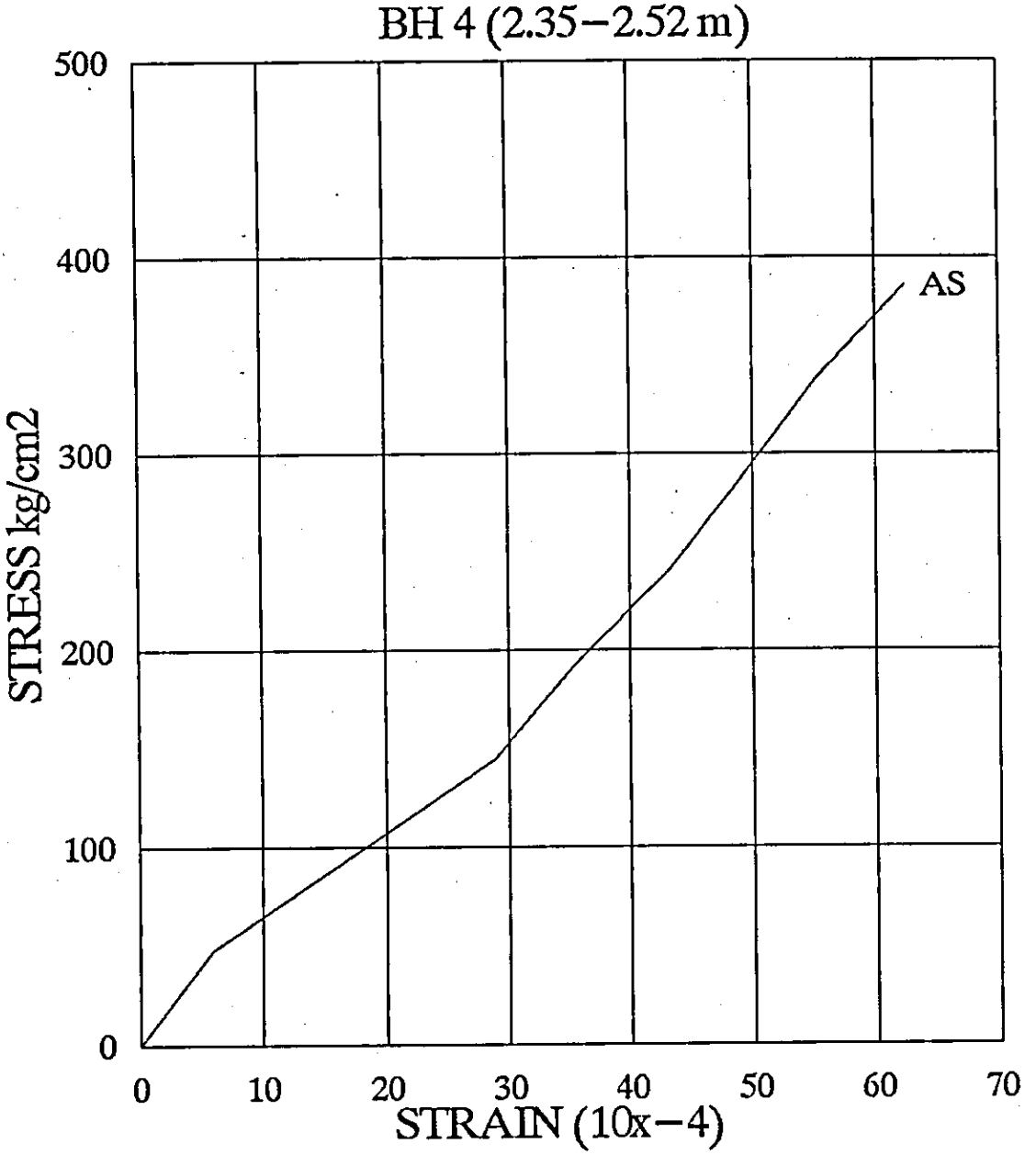
UNCONFINED COMPRESSION TEST

REQUEST BY	: ACE	DRILL HOLE	: BH - 4
PROJECT	:	DEPTH	: 2.35 - 2.52 m
LOCATION	: WARSAMSON	TYPE OF ROCK	:
DATE	: January 25, 1995	TEST CONDITION	:
SIZE OF SPECIMENT	: HEIGHT 10.8 cm		
	DIAMETER 5.18 cm		
	AREA 21.074 cm²		
L/D CORRECTION	1.0148132		

No	LOAD	STRESS	DIAL READING (X 10^-3) mm			STRAIN (x 10^-4)		NOTE
			AXIAL	DIAMETRAL		AXIAL	DIAMETRAL	
	(kg)	(kg/cm²)	d	d1	d2	a	d1 + d2	
1	0	0.000	0	-	-	0.000	-	
2	1000	48.154	64	-	-	5.926	-	
3	2000	96.309	189	-	-	17.500	-	
4	3000	144.463	312	-	-	28.889	-	
5	4000	192.618	383	-	-	35.463	-	
6	5000	240.772	467	-	-	43.241	-	
7	6000	288.927	532	-	-	49.259	-	
8	7000	337.081	596	-	-	55.185	-	
9	8000	385.236	674	-	-	62.407	-	

REMARK : SAMPLE FAILURE AT c : 385.2359 kg/cm²

UNCONFINED GRAPH



__AS = Axial Strain

UNCONFINED COMPRESSION TEST

REQUEST BY : ACE
PROJECT :
LOCATION : WARSAMSON
DATE : January 25, 1995
SIZE OF SPECIMENT : HEIGHT 10.87 cm
DIAMETER 5.18 cm
AREA 21.074 cm²
L/D CORRECTION : 1.0148132

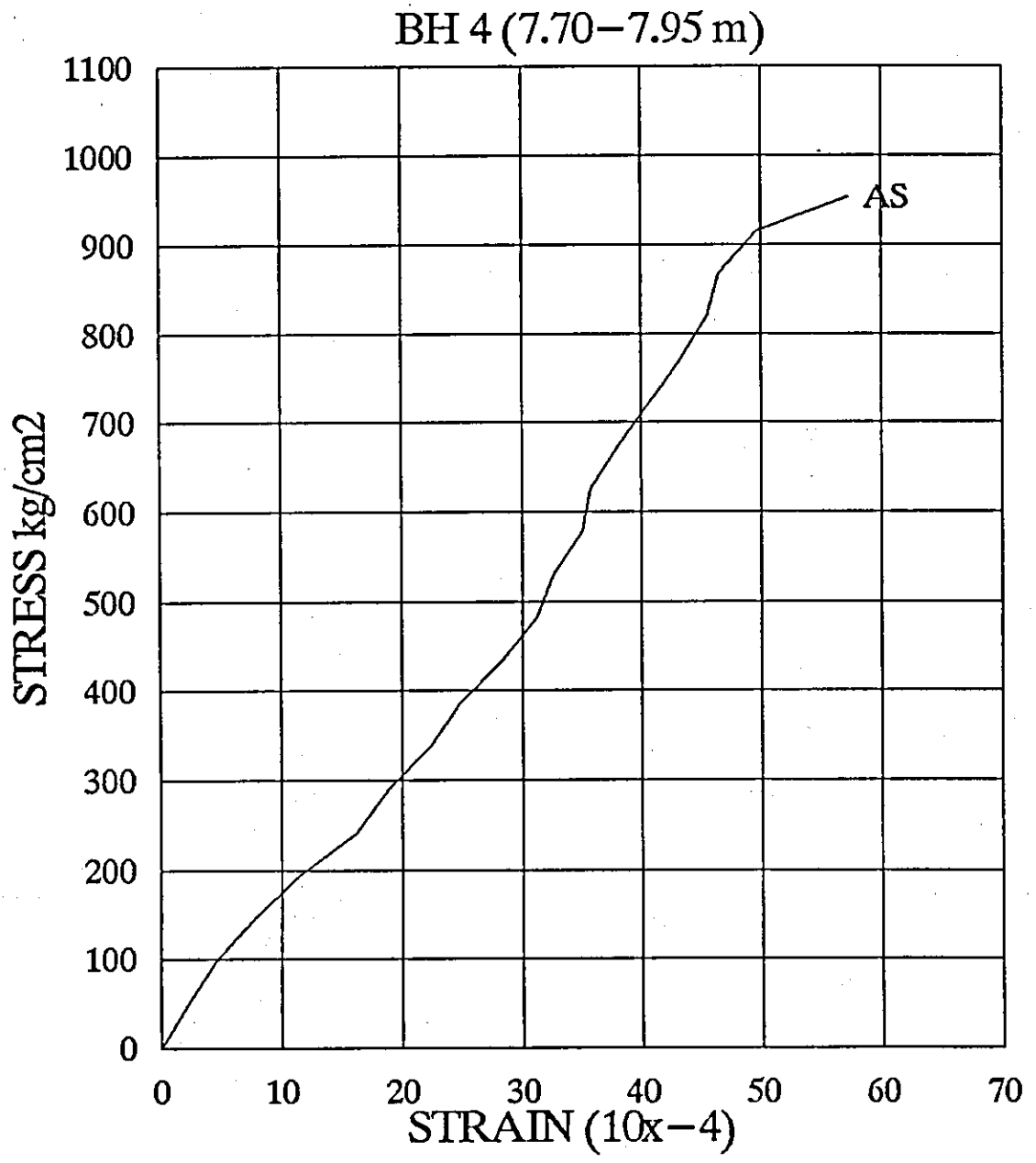
DRILL HOLE : BH - 4
DEPTH : 7.70 - 7.95 m
TYPE OF ROCK :
TEST CONDITION :

No	LOAD (kg)	STRESS (kg/cm²)	DIAL READING (X 10^-3) mm AXIAL d	DIAMETRAL d1	DIAMETRAL d2	STRAIN (x 10^-4) AXIAL a	STRAIN (x 10^-4) DIAMETRAL d1 + d2	NOTE
1	0	0.000	0	-	-	0.000	-	
2	1000	48.154	24	-	-	2.222	-	
3	2000	96.309	48	-	-	4.444	-	
4	3000	144.463	82	-	-	7.593	-	
5	4000	192.618	123	-	-	11.389	-	
6	5000	240.772	175	-	-	16.204	-	
7	6000	288.927	203	-	-	18.796	-	
8	7000	337.081	241	-	-	22.315	-	
9	8000	385.236	268	-	-	24.815	-	
10	9000	433.390	306	-	-	28.333	-	
11	10000	481.545	337	-	-	31.204	-	
12	11000	529.699	352	-	-	32.593	-	
13	12000	577.854	379	-	-	35.093	-	
14	13000	626.008	386	-	-	35.741	-	
15	14000	674.163	412	-	-	38.148	-	
16	15000	722.317	440	-	-	40.741	-	
17	16000	770.472	467	-	-	43.241	-	
18	17000	818.626	491	-	-	45.463	-	
19	18000	866.781	502	-	-	46.481	-	
20	19000	914.935	537	-	-	49.722	-	
21	19800	953.459	618	-	-	57.222	-	

REMARK :

SAMPLE FAILURE AT c : 953.4587 kg/cm²

UNCONFINED GRAPH



__AS = Axial Strain

UNCONFINED COMPRESSION TEST

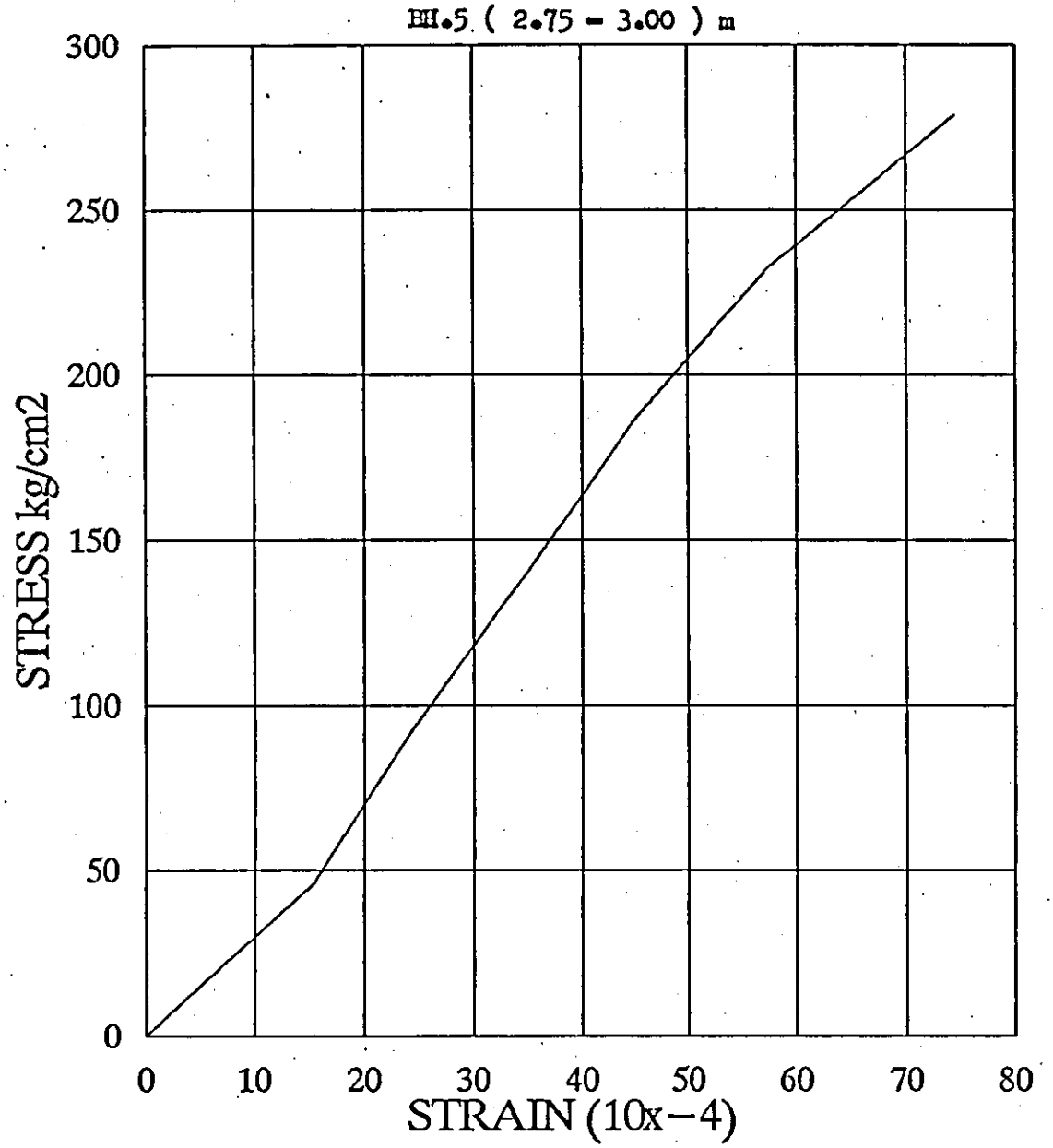
REQUEST BY	:	DRILL HOLE	: BH 5
PROJECT	: Warsamson Hepp	DEPTH	: 2.75 – 3.00 M
LOCATION	: Sorong, Irja	TYPE OF ROCK	:
DATE	: February 2, 1995	TEST CONDITION	:
SIZE OF SPECIMENT	: HEIGHT 8,2 cm		
	DIAMETER 5,15 cm		
	AREA 20,831 cm2		
L/D CORRECTION	: 0,9674608		

No.	LOAD	STRESS	DIAL READING (X10–3)mm			STRAIN (x10–4)		NOTE
			AXIAL	DIAMETRAL		AXIAL	DIAMETRAL	
	(Kg)	(kg/cm2)	d	d.1	d.2	a	d1+ d2	
1	0	0,000	0	0	0	0,000	0,000	
2	1000	46,444	127	0	0	15,488	0,000	
3	2000	92,888	201	0	0	24,512	0,000	
4	3000	139,332	285	0	0	34,756	0,000	
5	4000	185,776	368	0	0	44,878	0,000	
6	5000	232,220	471	0	0	57,439	0,000	
7	6000	278,664	610	0	0	74,390	0,000	

REMARK : SAMPLE FAILURE AT c : 278,664 kg/cm^2

UN-DIIS

UNCONFINED GRAPH



__AS = Axial Strain __DS = Diametral Strain

UNCONFINED COMPRESSION TEST

REQUEST BY :
PROJECT : Warsamson Hepp
LOCATION : Sorong, Irja
DATE : February 2, 1995
SIZE OF SPECIMENT : HEIGHT 10,18 cm
DIAMETER 5,15 cm
AREA 20,831 cm2
L/D CORRECTION : 1,0061505

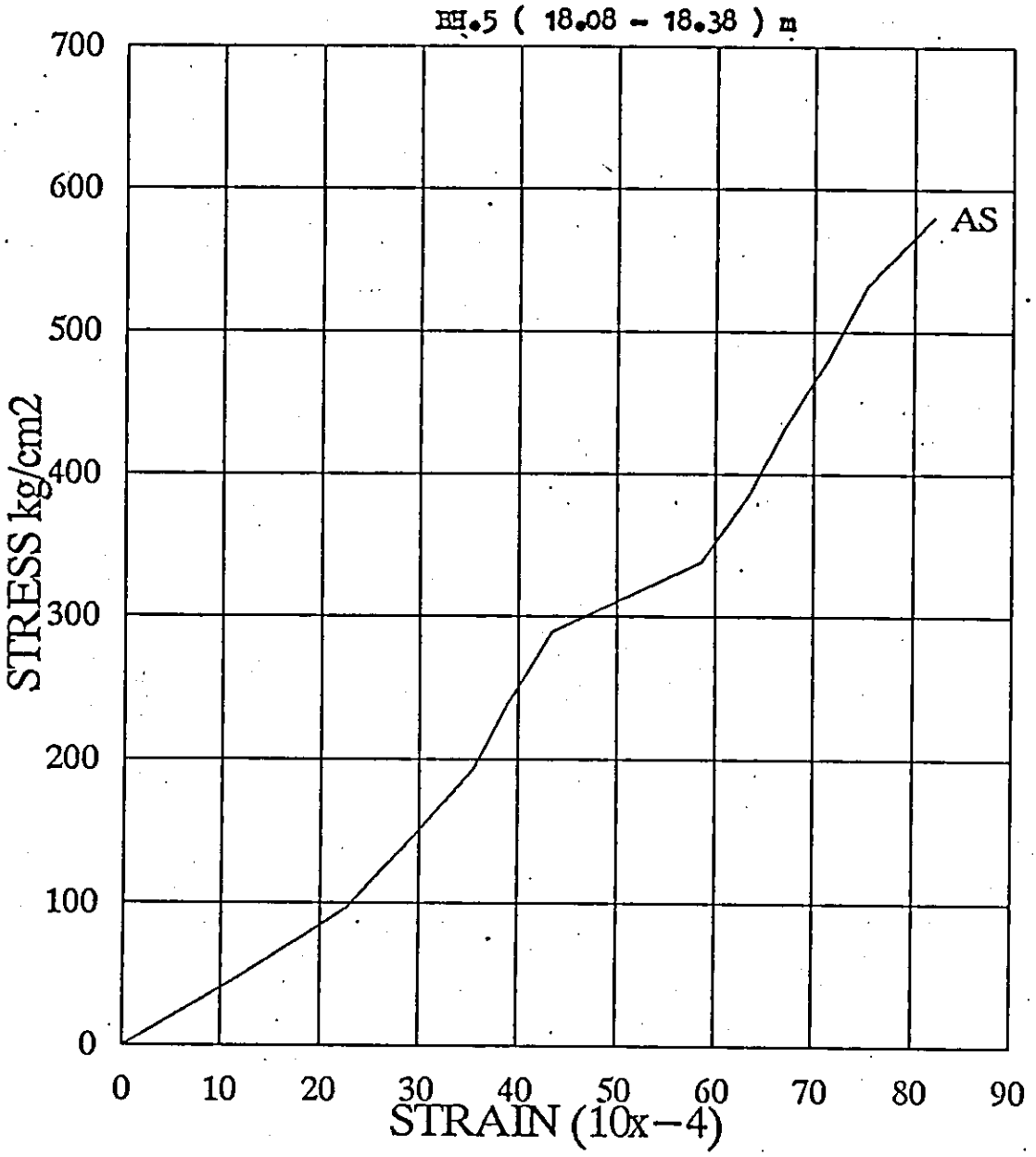
DRILL HOLE : BH 5
DEPTH : 18.08 – 18.38 M
TYPE OF ROCK :
TEST CONDITION :

No.	LOAD	STRESS	DIAL READING (X10–3)mm			STRAIN (x10–4)		NOTE
			AXIAL	DIAMETRAL		AXIAL	DIAMETRAL	
	(Kg)	(kg/cm2)	d	d.1	d.2	a	d1+ d2	
1	0	0,000	0	0	0	0,000	0,000	
2	1000	48,301	120	0	0	11,788	0,000	
3	2000	96,603	231	0	0	22,692	0,000	
4	3000	144,904	298	0	0	29,273	0,000	
5	4000	193,205	362	0	0	35,560	0,000	
6	5000	241,506	398	0	0	39,096	0,000	
7	6000	289,808	442	0	0	43,418	0,000	
8	7000	338,109	596	0	0	58,546	0,000	
9	8000	386,410	647	0	0	63,556	0,000	
10	9000	434,711	685	0	0	67,289	0,000	
11	10000	483,013	728	0	0	71,513	0,000	
12	11000	531,314	765	0	0	75,147	0,000	
13	12000	579,615	835	0	0	82,024	0,000	

REMARK : SAMPLE FAILURE AT c : 579,615 kg/cm^2

UN-DIS

UNCONFINED GRAPH



__AS = Axial Strain __DS = Diametral Strain

UNCONFINED COMPRESSION TEST

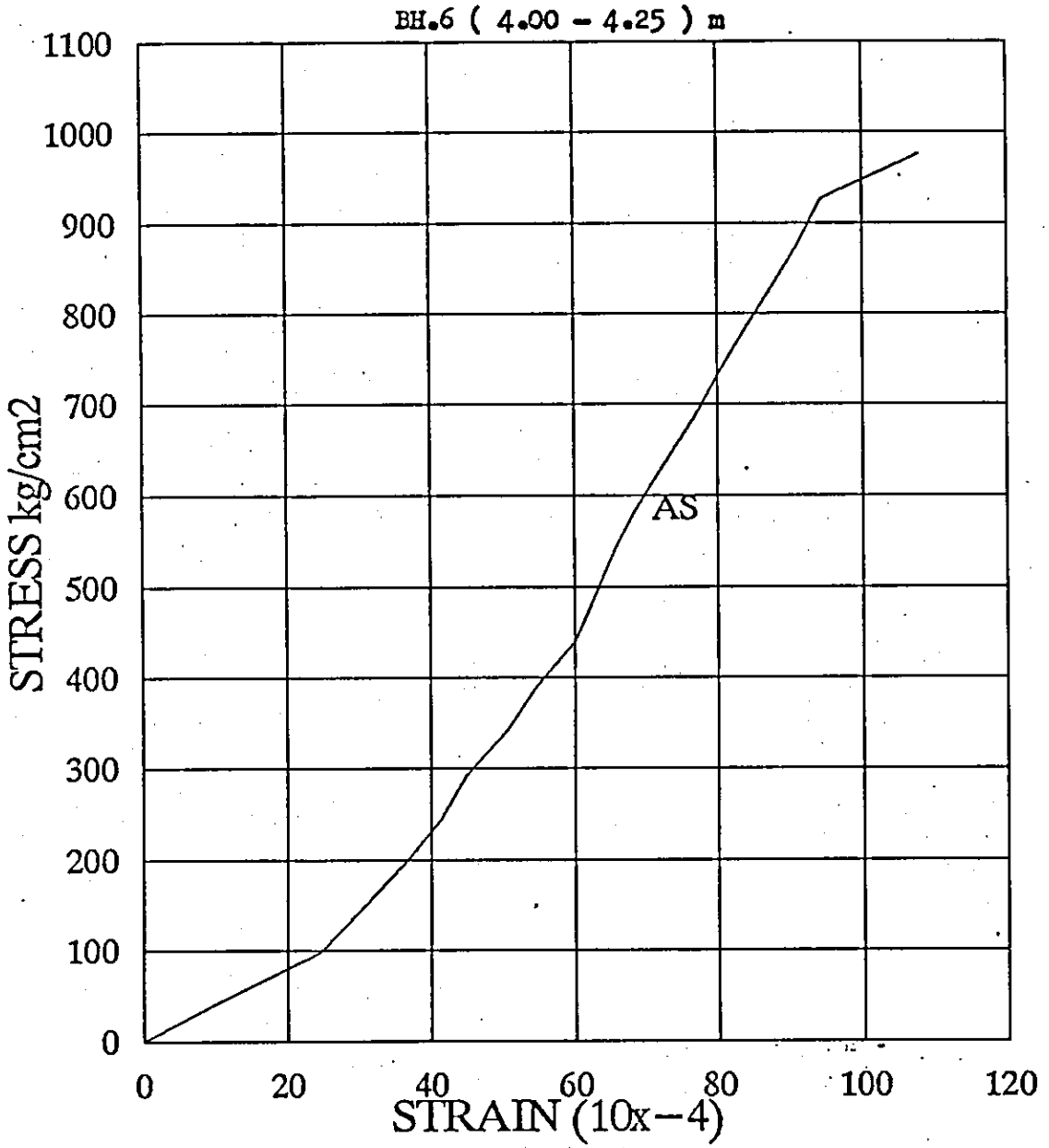
REQUEST BY	:	DRILL HOLE	: BH 6
PROJECT	: Warsamson Hepp	DEPTH	: 4.00 – 4.25 m
LOCATION	: Sorong, Irja	TYPE OF ROCK	:
DATE	: February 2, 1995	TEST CONDITION	:
SIZE OF SPECIMENT	: HEIGHT 10,8 cm		
	DIAMETER 5,15 cm		
	AREA 20,831 cm2		
L/D CORRECTION	: 1,0157241		

No.	LOAD	STRESS	DIAL READING (X10–3)mm			STRAIN (x10–4)		NOTE
			AXIAL	DIAMETRAL		AXIAL	DIAMETRAL	
	(Kg)	(kg/cm2)	d	d.1	d.2	a	d1+ d2	
1	0	0,000	0	0	0	0,000	0,000	
2	1000	48,761	126	0	0	11,667	0,000	
3	2000	97,522	264	0	0	24,444	0,000	
4	3000	146,283	330	0	0	30,556	0,000	
5	4000	195,043	390	0	0	36,111	0,000	
6	5000	243,804	446	0	0	41,296	0,000	
7	6000	292,565	486	0	0	45,000	0,000	
8	7000	341,326	548	0	0	50,741	0,000	
9	8000	390,087	592	0	0	54,815	0,000	
10	9000	438,848	648	0	0	60,000	0,000	
11	10000	487,609	677	0	0	62,685	0,000	
12	11000	536,370	708	0	0	65,556	0,000	
13	12000	585,130	742	0	0	68,704	0,000	
14	13000	633,891	782	0	0	72,407	0,000	
15	14000	682,652	826	0	0	76,481	0,000	
16	15000	731,413	864	0	0	80,000	0,000	
17	16000	780,174	904	0	0	83,704	0,000	
18	17000	828,935	945	0	0	87,500	0,000	
19	18000	877,696	985	0	0	91,204	0,000	
20	19000	926,456	1019	0	0	94,352	0,000	
21	20000	975,217	1164	0	0	107,778	0,000	

REMARK : SAMPLE FAILURE AT c : 975,217 kg/cm^2

UN-DIS

UNCONFINED GRAPH



__AS = Axial Strain __DS = Diametral Strain

UNCONFINED COMPRESSION TEST

REQUEST BY :
PROJECT : Warsamson Hepp
LOCATION : Sorong, Irja
DATE : February 2, 1995
SIZE OF SPECIMENT : HEIGHT 10,7 cm
DIAMETER 5,15 cm
AREA 20,831 cm2
L/D CORRECTION : 1,0142619

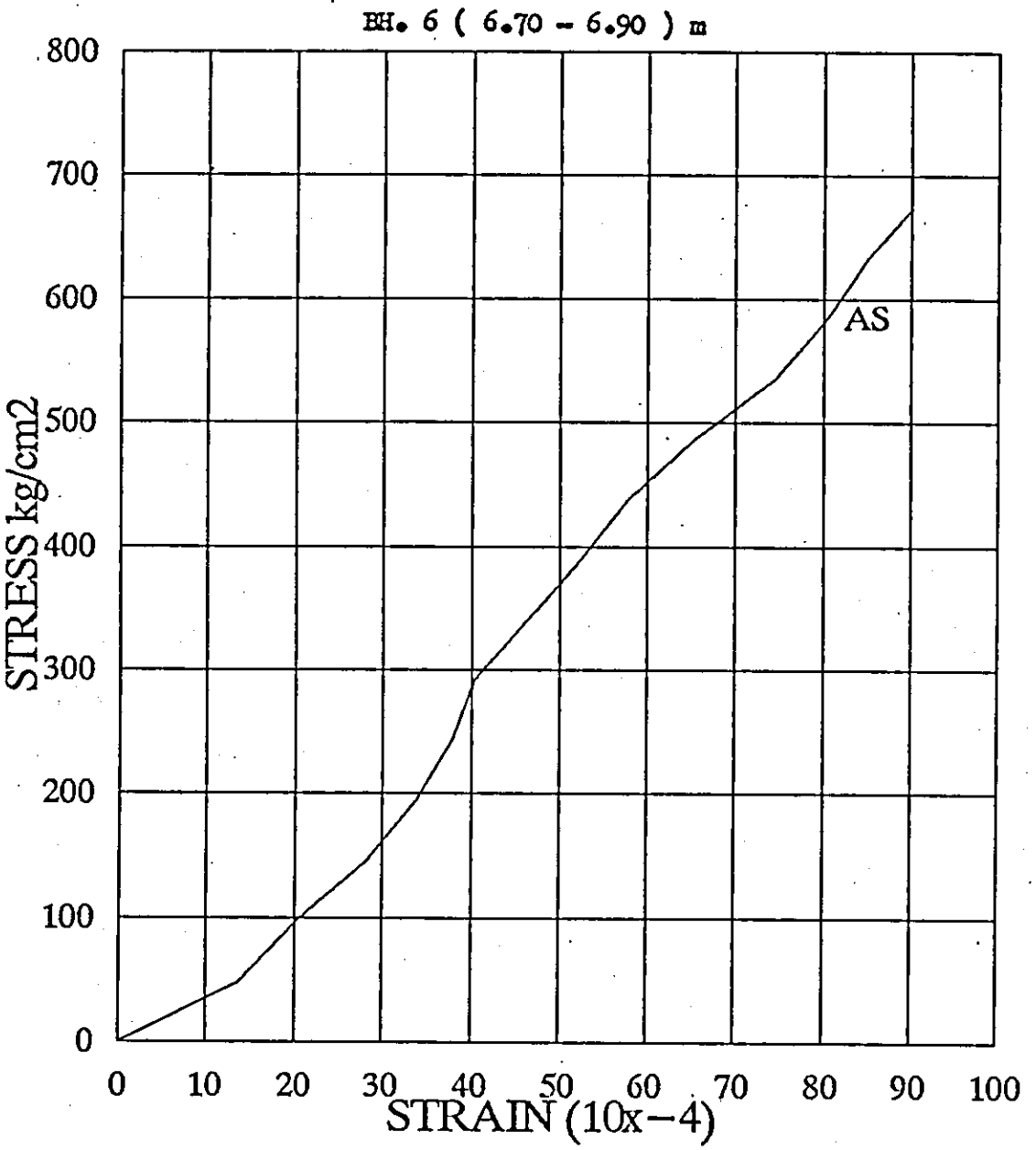
DRILL HOLE : BH 6
DEPTH : 6.70 – 6.90 M
TYPE OF ROCK :
TEST CONDITION :

No.	LOAD	STRESS	DIAL READING (X10–3)mm			STRAIN (x10–4)		NOTE
			AXIAL	DIAMETRAL		AXIAL	DIAMETRAL	
	(Kg)	(kg/cm2)	d	d.1	d.2	a	d1+ d2	
1	0	0,000	0	0	0	0,000	0,000	
2	1000	48,691	145	0	0	13,551	0,000	
3	2000	97,381	215	0	0	20,093	0,000	
4	3000	146,072	301	0	0	28,131	0,000	
5	4000	194,763	362	0	0	33,832	0,000	
6	5000	243,453	405	0	0	37,850	0,000	
7	6000	292,144	431	0	0	40,280	0,000	
8	7000	340,835	496	0	0	46,355	0,000	
9	8000	389,525	561	0	0	52,430	0,000	
10	9000	438,216	620	0	0	57,944	0,000	
11	10000	486,907	701	0	0	65,514	0,000	
12	11000	535,597	798	0	0	74,579	0,000	
13	12000	584,288	861	0	0	80,467	0,000	
14	13000	632,979	911	0	0	85,140	0,000	
15	13800	671,931	961	0	0	89,813	0,000	

REMARK : SAMPLE FAILURE AT c : 671,931 kg/cm^2

UN-DIS

UNCONFINED GRAPH



__AS = Axial Strain __DS = Diametral Strain

UNCONFINED COMPRESSION TEST

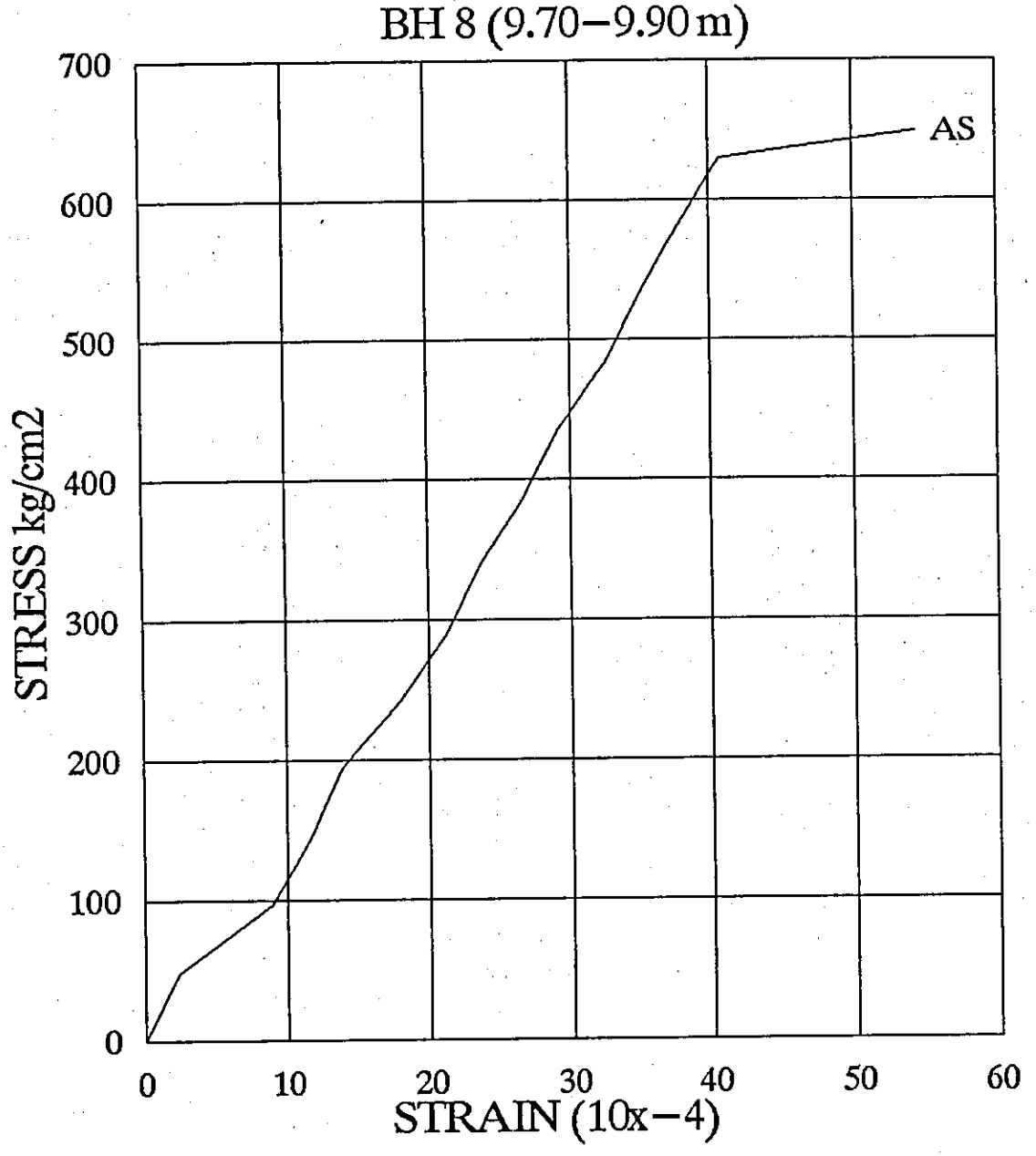
REQUEST BY	: ACE	DRILL HOLE	: BH - 8
PROJECT	:	DEPTH	: 9.70 - 9.90 m
LOCATION	: WARSAMSON	TYPE OF ROCK	:
DATE	: January 25, 1995	TEST CONDITION	:
SIZE OF SPECIMENT	: HEIGHT 10.35 cm		
	DIAMETER 5.15 cm		
	AREA 20.831 cm²		
L/D CORRECTION	: 1.0088961		

No	LOAD	STRESS	DIAL READING (X 10^-3) mm			STRAIN (x 10^-4)		NOTE
			AXIAL	DIAMETRAL		AXIAL	DIAMETRAL	
	(kg)	(kg/cm²)	d	d1	d2	a	d1 + d2	
1	0	0.000	0	-	-	0.000	-	
2	1000	48.433	24	-	-	2.319	-	
3	2000	96.866	92	-	-	8.889	-	
4	3000	145.299	121	-	-	11.691	-	
5	4000	193.732	143	-	-	13.816	-	
6	5000	242.165	186	-	-	17.971	-	
7	6000	290.598	221	-	-	21.353	-	
8	7000	339.032	245	-	-	23.671	-	
9	8000	387.465	277	-	-	26.763	-	
10	9000	435.898	302	-	-	29.179	-	
11	10000	484.331	338	-	-	32.657	-	
12	11000	532.764	362	-	-	34.976	-	
13	12000	581.197	391	-	-	37.778	-	
14	13000	629.630	422	-	-	40.773	-	
15	13400	649.003	563	-	-	54.396	-	

REMARK :

SAMPLE FAILURE AT c : 649.0033 kg/cm²

UNCONFINED GRAPH



__AS = Axial Strain

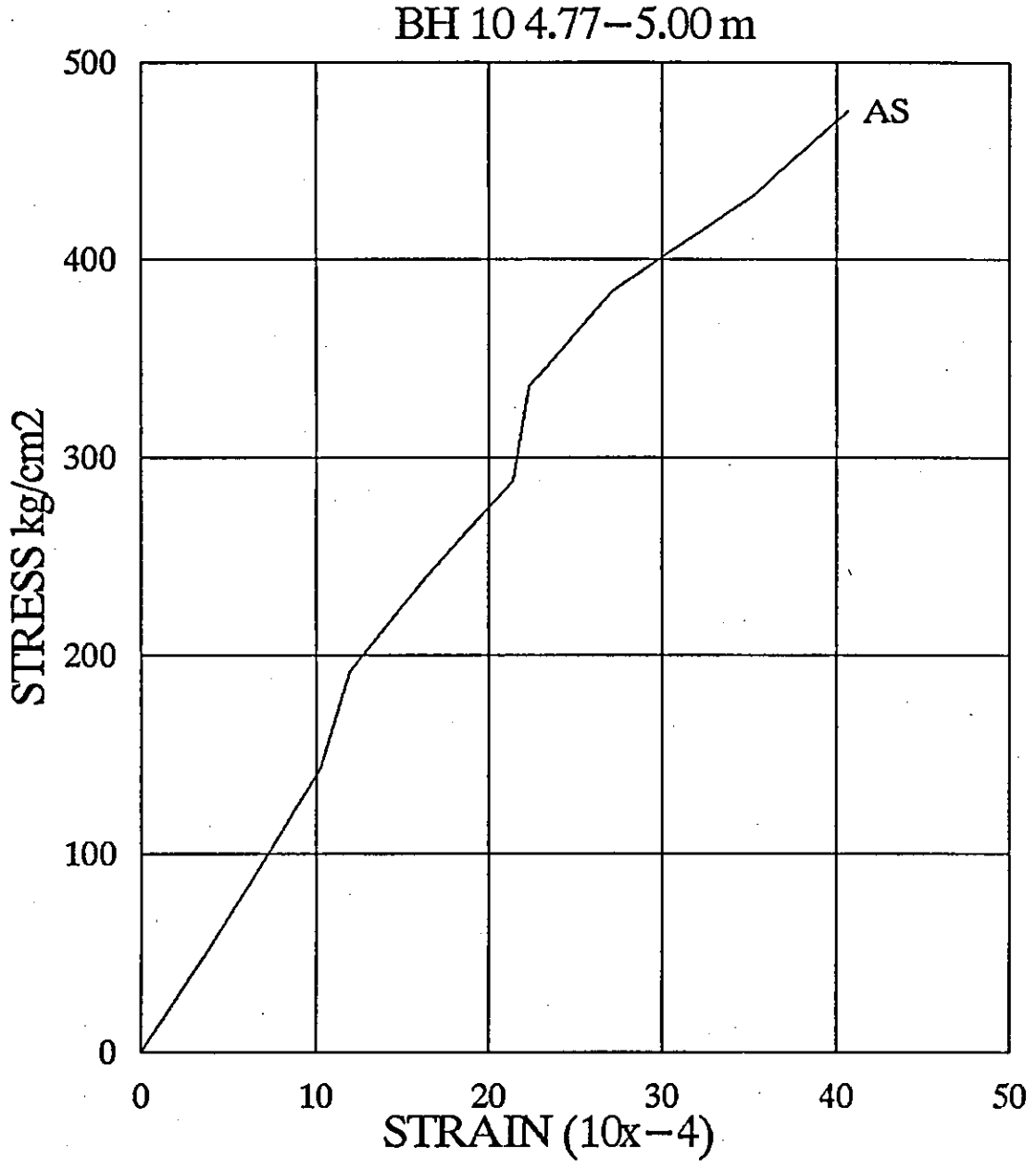
UNCONFINED COMPRESSION TEST

REQUEST BY	: ACE	DRILL HOLE	: BH - 10
PROJECT	:	DEPTH	: 4.77 - 5.00 m
LOCATION	: WARSAMSON	TYPE OF ROCK	:
DATE	: January 25, 1995	TEST CONDITION	:
SIZE OF SPECIMENT	: HEIGHT 10.55 cm		
	DIAMETER 5.18 cm		
	AREA 21.074 cm²		
L/D CORRECTION	1.0110718		

No	LOAD	STRESS	DIAL READING (X 10^-3) mm			STRAIN (x 10^-4)		NOTE
			AXIAL	DIAMETRAL		AXIAL	DIAMETRAL	
	(kg)	(kg/cm²)	d	d1	d2	a	d1 + d2	
1	0	0.000	0	-	-	0.000	-	
2	1000	47.977	38	-	-	3.602	-	
3	2000	95.954	74	-	-	7.014	-	
4	3000	143.931	109	-	-	10.332	-	
5	4000	191.908	126	-	-	11.943	-	
6	5000	239.885	173	-	-	16.398	-	
7	6000	287.862	225	-	-	21.327	-	
8	7000	335.839	235	-	-	22.275	-	
9	8000	383.816	286	-	-	27.109	-	
10	9000	431.792	372	-	-	35.261	-	
11	9900	474.972	429	-	-	40.664	-	

REMARK : SAMPLE FAILURE AT c : 474.9717 kg/cm²

UNCONFINED GRAPH



__AS = Axial Strain

UNCONFINED COMPRESSION TEST

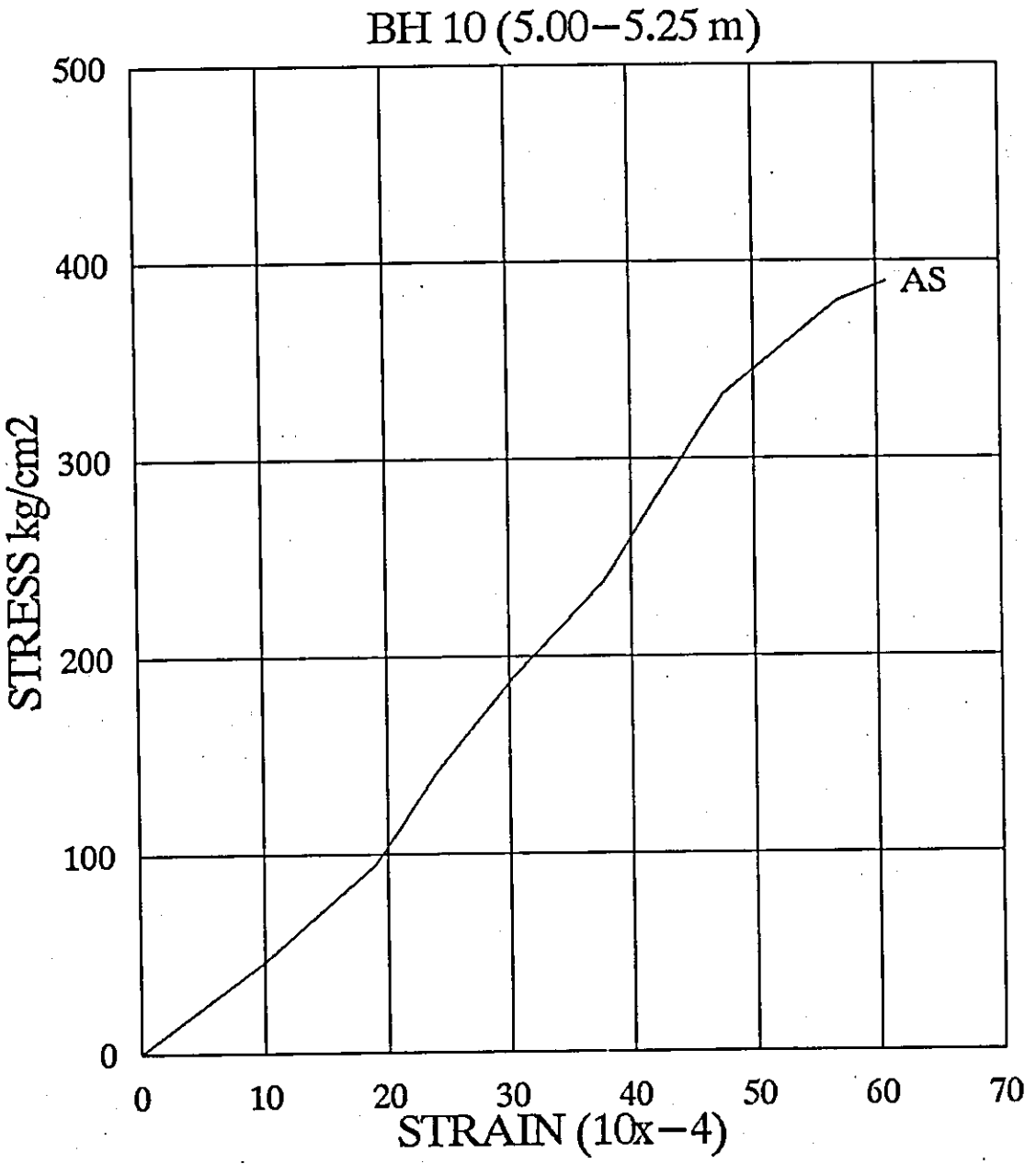
REQUEST BY	: ACE	DRILL HOLE	: BH - 10
PROJECT	:	DEPTH	: 5.00 - 5.25 m
LOCATION	: WARSAMSON	TYPE OF ROCK	:
DATE	: January 25, 1995	TEST CONDITION	:
SIZE OF SPECIMENT	: HEIGHT 10.4 cm		
	DIAMETER 5.2 cm		
	AREA 21.237 cm²		
L/D CORRECTION	: 1.008098		

No	LOAD	STRESS	DIAL READING (X 10^-3) mm			STRAIN (x 10^-4)		NOTE
			AXIAL	DIAMETRAL		AXIAL	DIAMETRAL	
	(kg)	(kg/cm²)	d	d1	d2	a	d1 + d2	
1	0	0.000	0	-	-	0.000	-	
2	1000	47.469	107	-	-	10.288	-	
3	2000	94.937	198	-	-	19.038	-	
4	3000	142.406	252	-	-	24.231	-	
5	4000	189.874	316	-	-	30.385	-	
6	5000	237.343	392	-	-	37.692	-	
7	6000	284.811	442	-	-	42.500	-	
8	7000	332.280	494	-	-	47.500	-	
9	8000	379.749	592	-	-	56.923	-	
10	8200	389.242	632	-	-	60.769	-	

REMARK :

SAMPLE FAILURE AT c : 389.2423 kg/cm²

UNCONFINED GRAPH



__AS = Axial Strain

UNCONFINED COMPRESSION TEST

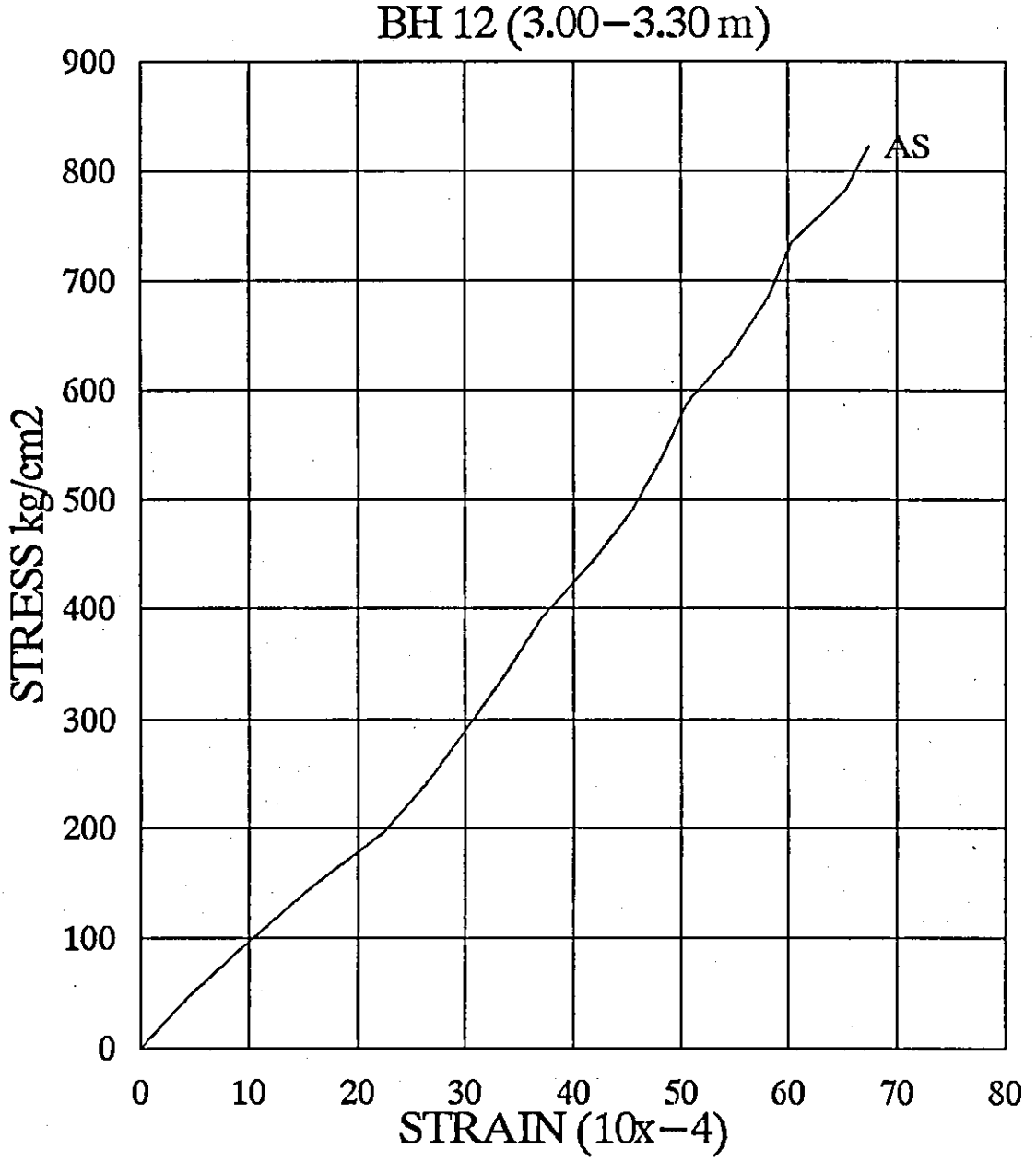
REQUEST BY	: ACE	DRILL HOLE	: BH - 12
PROJECT	:	DEPTH	: 3.00 - 3.30 m
LOCATION	: WARSAMSON	TYPE OF ROCK	:
DATE	: January 25, 1995	TEST CONDITION	:
SIZE OF SPECIMENT	: HEIGHT 11.12 cm		
	DIAMETER 5.15 cm		
	AREA 20.831 cm²		
L/D CORRECTION	: 1.0201911		

No	LOAD	STRESS	DIAL READING (X 10^-3) mm			STRAIN (x 10^-4)		NOTE
			AXIAL	DIAMETRAL		AXIAL	DIAMETRAL	
	(kg)	(kg/cm²)	d	d1	d2	a	d1 + d2	
1	0	0.000	0	-	-	0.000	-	
2	1000	48.975	52	-	-	4.676	-	
3	2000	97.951	112	-	-	10.072	-	
4	3000	146.926	176	-	-	15.827	-	
5	4000	195.901	249	-	-	22.392	-	
6	5000	244.877	296	-	-	26.619	-	
7	6000	293.852	337	-	-	30.306	-	
8	7000	342.827	376	-	-	33.813	-	
9	8000	391.802	412	-	-	37.050	-	
10	9000	440.778	462	-	-	41.547	-	
11	10000	489.753	505	-	-	45.414	-	
12	11000	538.728	536	-	-	48.201	-	
13	12000	587.704	562	-	-	50.540	-	
14	13000	636.679	611	-	-	54.946	-	
15	14000	685.654	647	-	-	58.183	-	
16	15000	734.630	671	-	-	60.342	-	
17	16000	783.605	727	-	-	65.378	-	
18	16800	822.785	749	-	-	67.356	-	

REMARK :

SAMPLE FAILURE AT c : 822.7852 kg/cm²

UNCONFINED GRAPH



__AS = Axial Strain

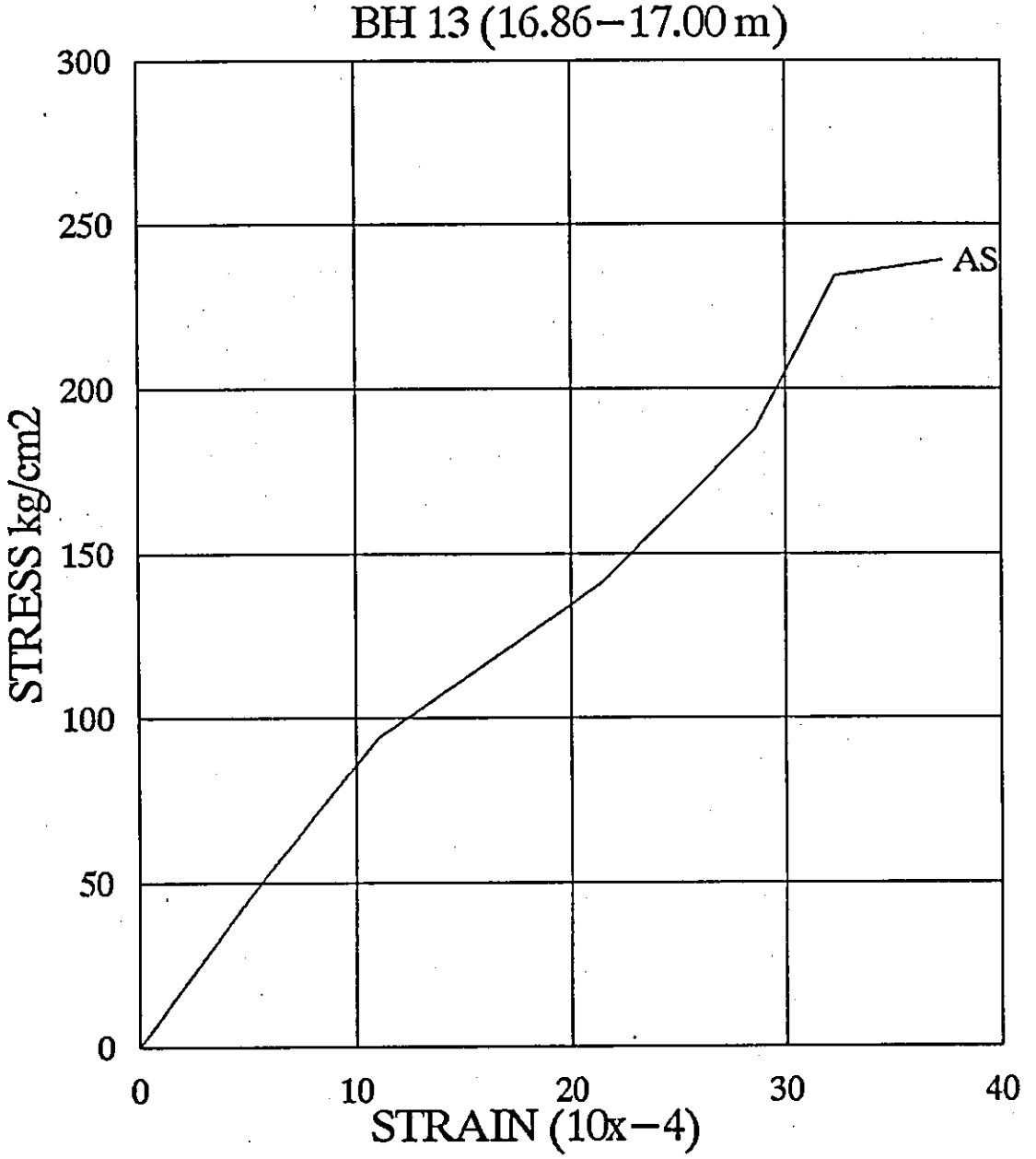
UNCONFINED COMPRESSION TEST

REQUEST BY	: ACE	DRILL HOLE	: BH - 13
PROJECT	:	DEPTH	: 16.86 - 17.00 m
LOCATION	: WARSAMSON	TYPE OF ROCK	:
DATE	: January 25, 1995	TEST CONDITION	:
SIZE OF SPECIMENT	: HEIGHT 9.2 cm		
	DIAMETER 5.18 cm		
	AREA 21.074 cm²		
L/D CORRECTION	0.9875021		

No	LOAD	STRESS	DIAL READING (X 10^-3) mm			STRAIN (x 10^-4)		NOTE
			AXIAL	DIAMETRAL		AXIAL	DIAMETRAL	
	(kg)	(kg/cm²)	d	d1	d2	a	d1 + d2	
1	0	0.000	0	-	-	0.000	-	
2	1000	46.859	48	-	-	5.217	-	
3	2000	93.717	102	-	-	11.087	-	
4	3000	140.576	197	-	-	21.413	-	
5	4000	187.434	263	-	-	28.587	-	
6	5000	234.293	297	-	-	32.283	-	
7	5100	238.978	343	-	-	37.283	-	

REMARK : SAMPLE FAILURE AT c : 238.9785 kg/cm²

UNCONFINED GRAPH



__AS = Axial Strain

INDIRECT TENSILE STRENGTH TEST

REQUEST BY	:	RECEIVED BY	:
PROJECT	: Warsamson	TEST DATE	: January 15, 1995
LOCATION	:	TESTED BY	:
DATE RECEIVED	:	APPROVED BY	:

No	SAMPLE	THICKNESS (cm)	DIAMETER (cm)	EFFECTIVE LOAD (lbs)	TENSITE STRENGTH (kg/cm²)	REMARK
1	BH - 1 (3.08 - 3.33 m)	5.720	5.170	3730	36.4230	
2	BH - 1 (17.00 - 17.25 m)	5.180	5.170	3450	37.2008	
3	BH - 2 (4.60 - 4.90 m)	5.820	5.180	2653.56	56.0300	L = 47.36 cm²
4	BH - 2 (12.65 - 12.95 m)	5.640	5.170	2041.2	44.5700	L = 45.80 cm²
5	BH - 4 (2.35 - 2.52 m)	5.220	5.170	4600	49.2209	
6	BH - 4 (7.70 - 7.95 m)	5.380	5.180	3360	34.8161	
7	BH - 5 (2.75 - 3.00 m)	5.260	5.180	1179.36	27.5600	L = 42.80 cm²
8	BH - 5 (18.08 - 18.38 m)	5.170	5.160	2154.6	51.4200	L = 41.90 cm²
9	BH - 6 (4.00 - 4.25 m)	5.230	5.170	2494.8	58.7400	L = 42.47 cm²
10	BH - 6 (6.70 - 6.90 m)	4.950	5.170	3787.56	94.2200	L = 40.20 cm²
11	BH - 8 (9.70 - 9.90 m)	5.440	5.180	8600	88.1298	
12	BH - 10 (4.77 - 5.00 m)	5.310	5.170	4150	43.6532	
13	BH - 10 (5.00 - 5.25 m)	6.020	5.180	4200	38.8934	
14	BH - 12 (3.00 - 3.30 m)	5.880	5.170	3640	34.5770	
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						

REMARK :

APPENDIX D.2

Disturbed Soil Samples

- Specific Gravity
- Grain Size Analysis
- Atterberg Limits (LL and PL)
- Compaction Test
- Permeability Test

SPECIFIC GRAVITY TEST

DATE : 14 - 02 - 1995

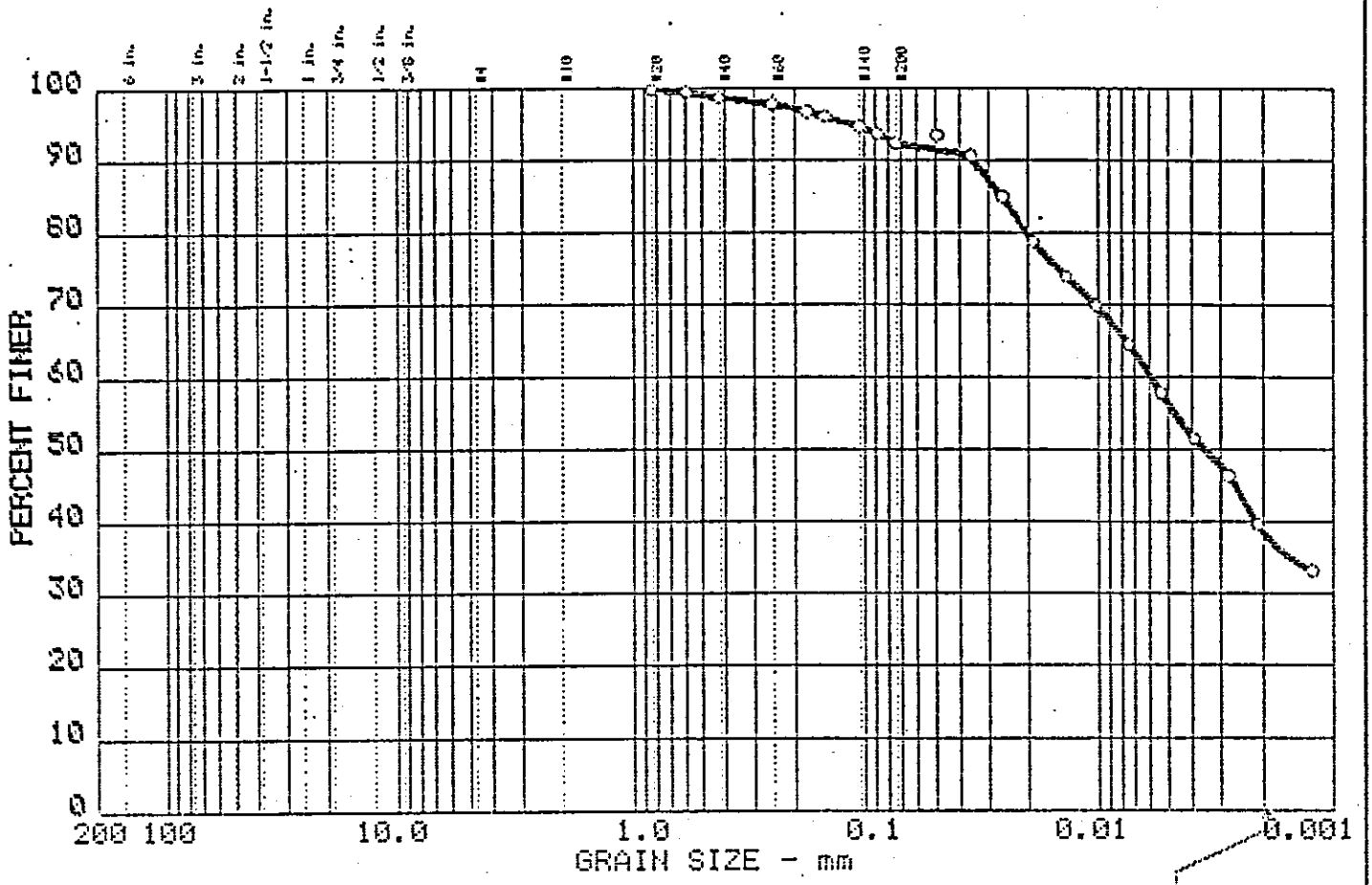
PROJECT :

TESTED BY : HERNA CS

CHECKED BY : SUDIRMAN

SAMP.NO/DEPTH	BH-11 0.00 - 0.50 M		BH-12 0.00 - 0.50 M		BH-13 0.00 - 0.50 M		BH-14 0.00 - 0.50 M		BH-14 A 0.00 - 0.50 M	
PICN.NO.	6C	2	N	4	60	5	6	D	9	4A
WT OF PICN.+SAMPLE W1	25.50	27.56	28.21	28.32	29.66	27.75	32.11	39.95	27.69	32.43
WT OF PICN. W2	20.50	22.56	23.21	23.32	24.66	22.75	27.11	34.95	22.69	27.43
WT OF SAMPLE WT= W1-W2	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
WT OF PICN+WATER										
TEMP. T1 DEG. C										
WT PICN.+WATER+SAMPLE W3	73.98	76.37	74.30	76.60	77.18	73.98	78.74	87.78	73.64	80.61
TEMP. TX DEG. C	27.60	27.60	24.70	24.70	28.00	28.00	24.50	24.60	24.50	24.50
WT OF PICN.+WATER TX DEG. C W4	70.84	73.22	71.09	73.41	74.04	70.85	75.67	84.70	70.44	77.43
W5= W1-W2+W4	75.84	78.22	76.09	78.41	79.04	75.85	80.67	89.70	75.44	82.43
VOL. OF SAMPLE W5-W3	1.86	1.85	1.79	1.81	1.86	1.87	1.93	1.92	1.80	1.82
SPEC.GRAV WT/(W5-W3)	2.688	2.703	2.793	2.762	2.688	2.674	2.591	2.604	2.778	2.747
AVERAGE		2.695		2.778		2.681		2.597		2.763

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
o	3	0.0	0.0	7.6	53.8	38.6

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
o	64.8	25.36			0.00					

MATERIAL DESCRIPTION	USCS	AASHTO
o CLAYEY SILT / REDISH BROWN	MH	A-7-5(30.1)

Project No.: GA.02/95
Project: WARSAMSON
o Location: BH. 11 DEPTH : 0.00 - 0.50 M.

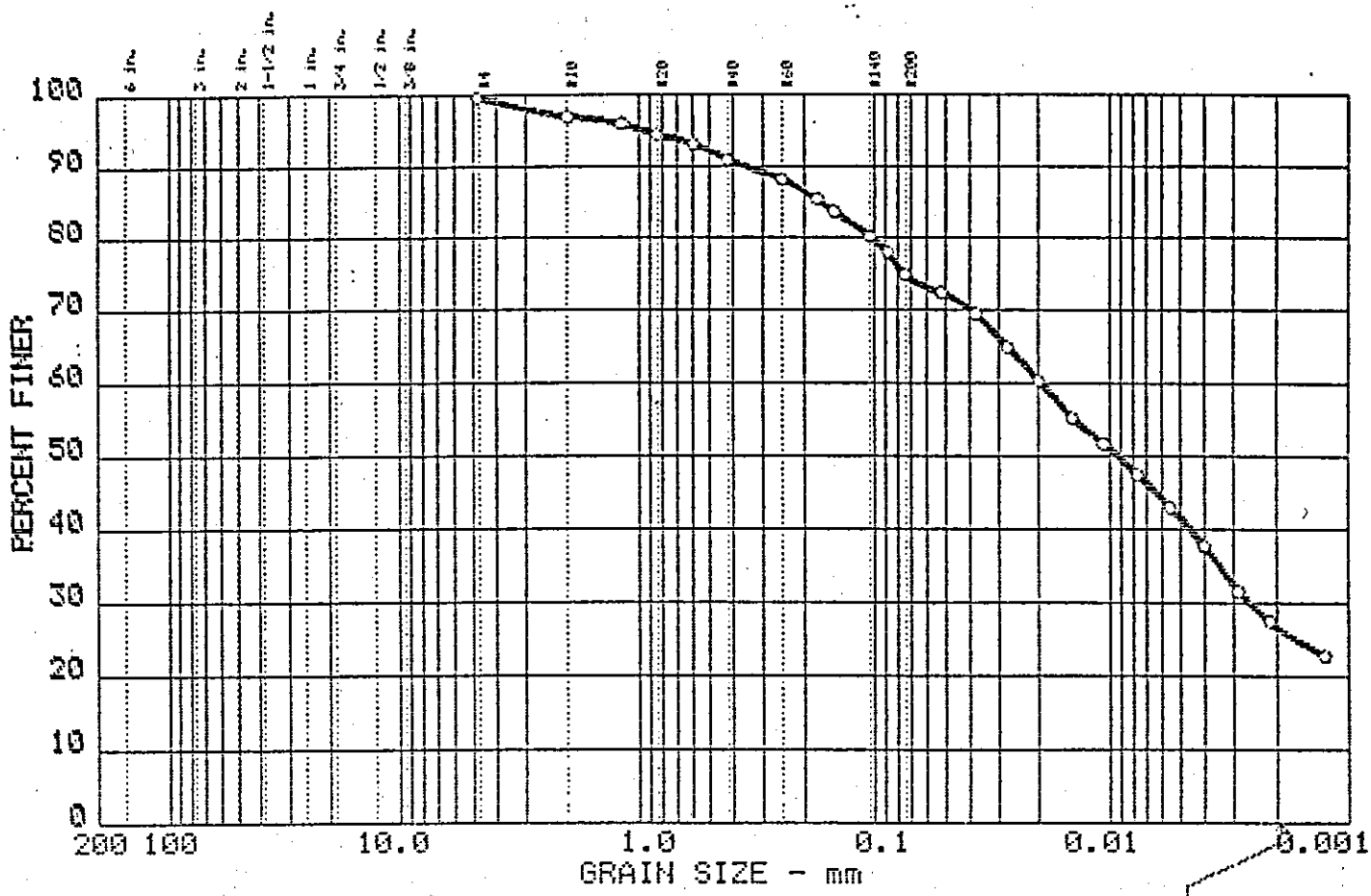
Date: 06-02-1995

GRAIN SIZE DISTRIBUTION TEST REPORT

Remarks:
TESTED BY : IWAN RH
CHECKED BY : SUDIRMAN

Figure No._____

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
o	4	0.0	3.0	22.2	48.0	26.8

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
o	66.45	42.35	0.17		0.01	0.003				

MATERIAL DESCRIPTION	USCS	AASHTO
o SANDY CLAYEY SILT / BLACKISH BROWN	CH	A-7-6(32.4)

Project No.: GA.02/95
Project: WARSAMSON
o Location: BH. 12 DEPTH : 0.00 - 0.50 M.

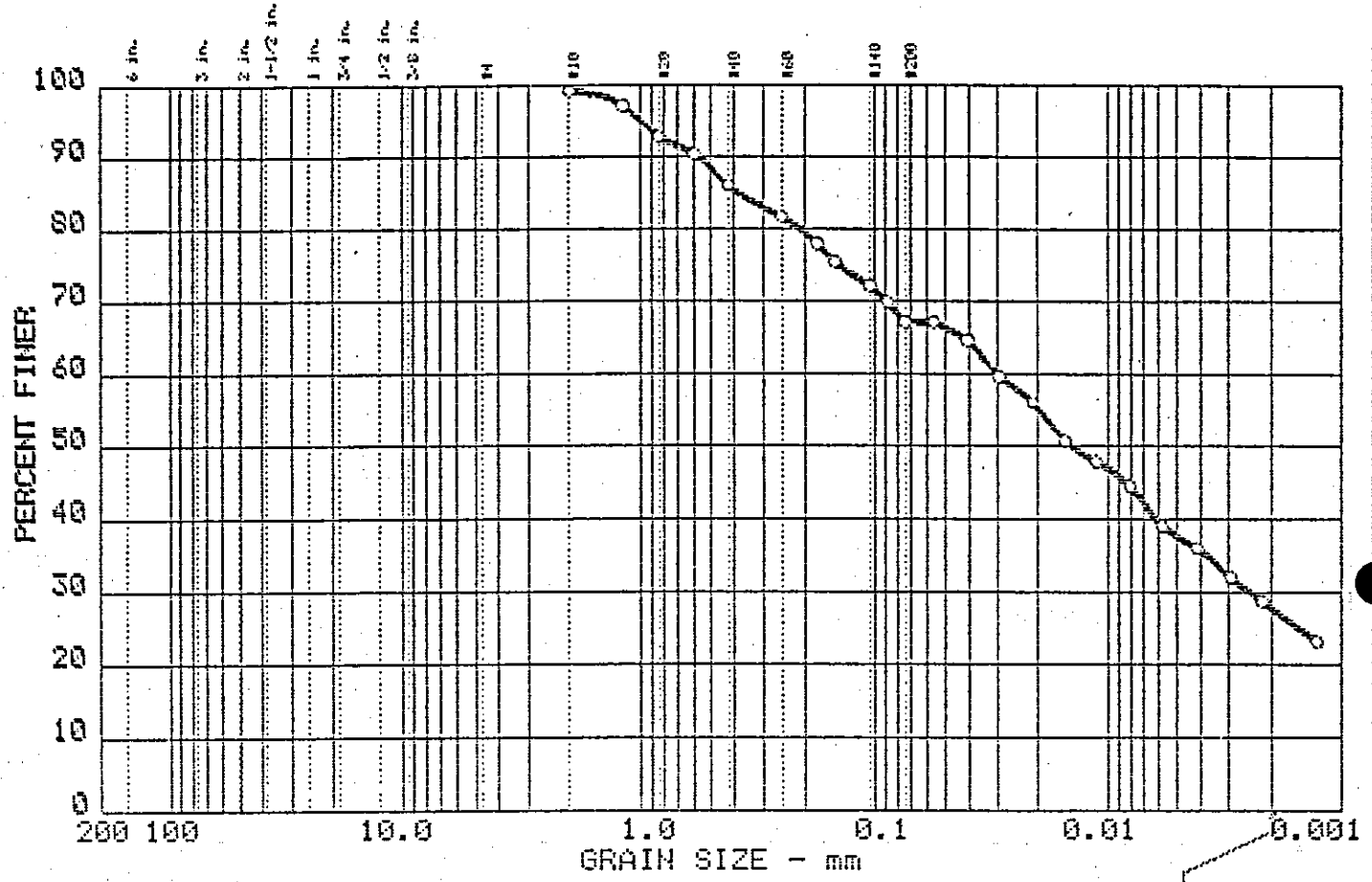
Date: 06-02-1995

GRAIN SIZE DISTRIBUTION TEST REPORT

Remarks:
TESTED BY : ROSSELY
CHECKED BY : SUDIRMAN

Figure No._____

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
o	5	0.0	0.8	32.0	39.4	27.8

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
o	60.8	18.71	0.38		0.01	0.002				

MATERIAL DESCRIPTION	USCS	AASHTO
o CLAYEY SANDY SILT / YELLOWISH BROWN	MH	A-7-5(14.4)

Project No.: GA.02/95
Project: WARSAMSON
o Location: BH. 13 DEPTH : 0.00 - 0.50 M.

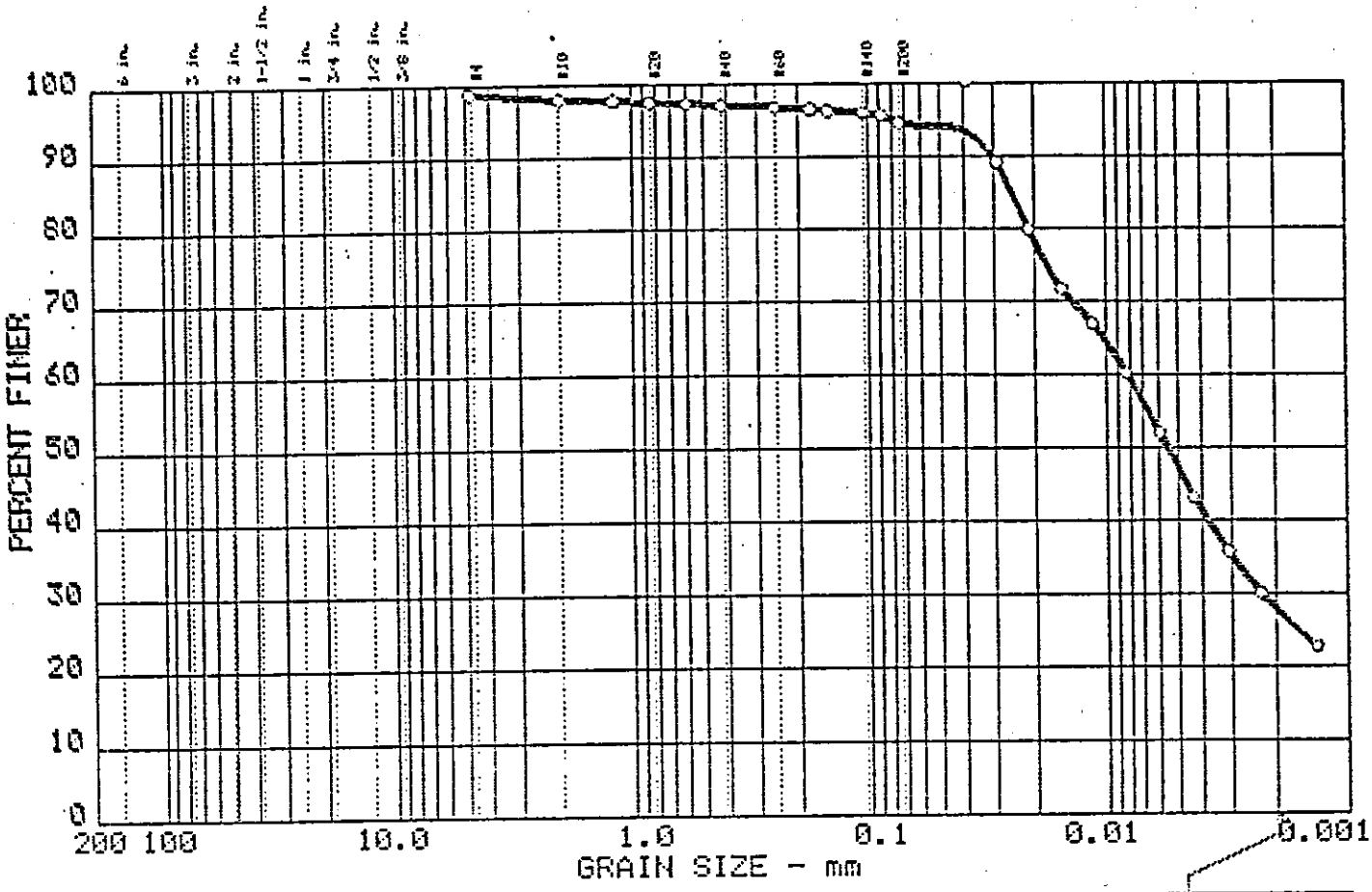
Date: 06-02-1995

GRAIN SIZE DISTRIBUTION TEST REPORT

Remarks:
TESTED BY : BEBEN
CHECKED BY : SUDIRMAN

Figure No._____

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
o	-7	0.0	2.1	3.3	66.8	27.8

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
o	97.20	68.02			0.01	0.002				

MATERIAL DESCRIPTION	USCS	AASHTO
o CLAYEY SILT / BLACK	CH	A-7-6(75.5)

Project No.: GA.02/95
Project: WARSAMSON
o Location: BH. 14 DEPTH : 0.00 - 0.50 M.

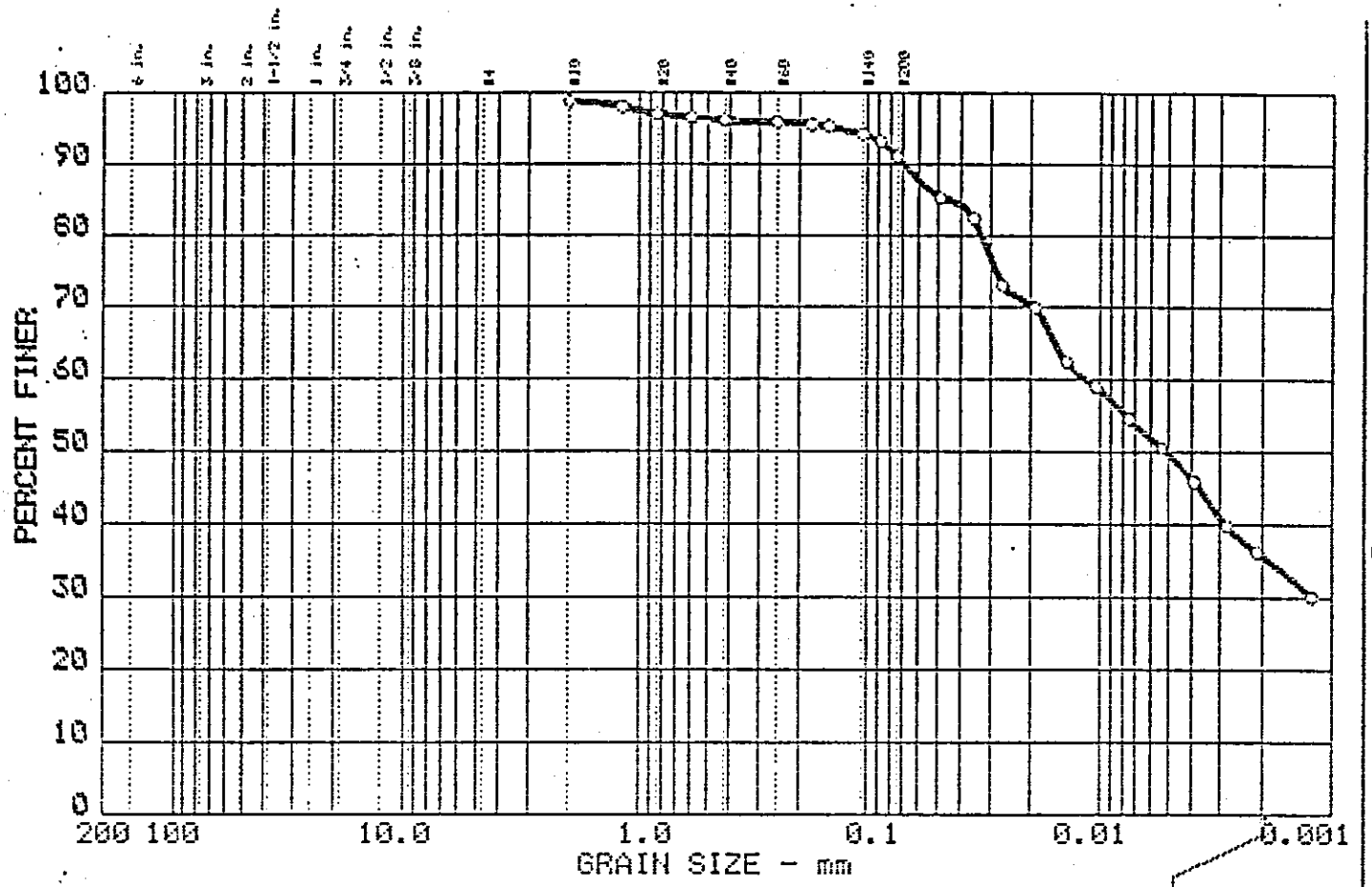
Date: 06-02-1995

GRAIN SIZE DISTRIBUTION TEST REPORT

Remarks:
TESTED BY : ROSSELY
CHECKED BY : SUDIRMAN -

Figure No._____

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% SILT	% CLAY
o	S	0.0	1.3	7.7	55.3	35.7

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
o	93.10	48.87			0.01					

MATERIAL DESCRIPTION	USCS	AASHTO
o CLAYEY SILT / BROWN	MH	A-7-5(55.7)

Project No.: GA.02/95
Project: WARSAMSON
o Location: BH. 14.A DEPTH : 0.00 - 0.50 M.

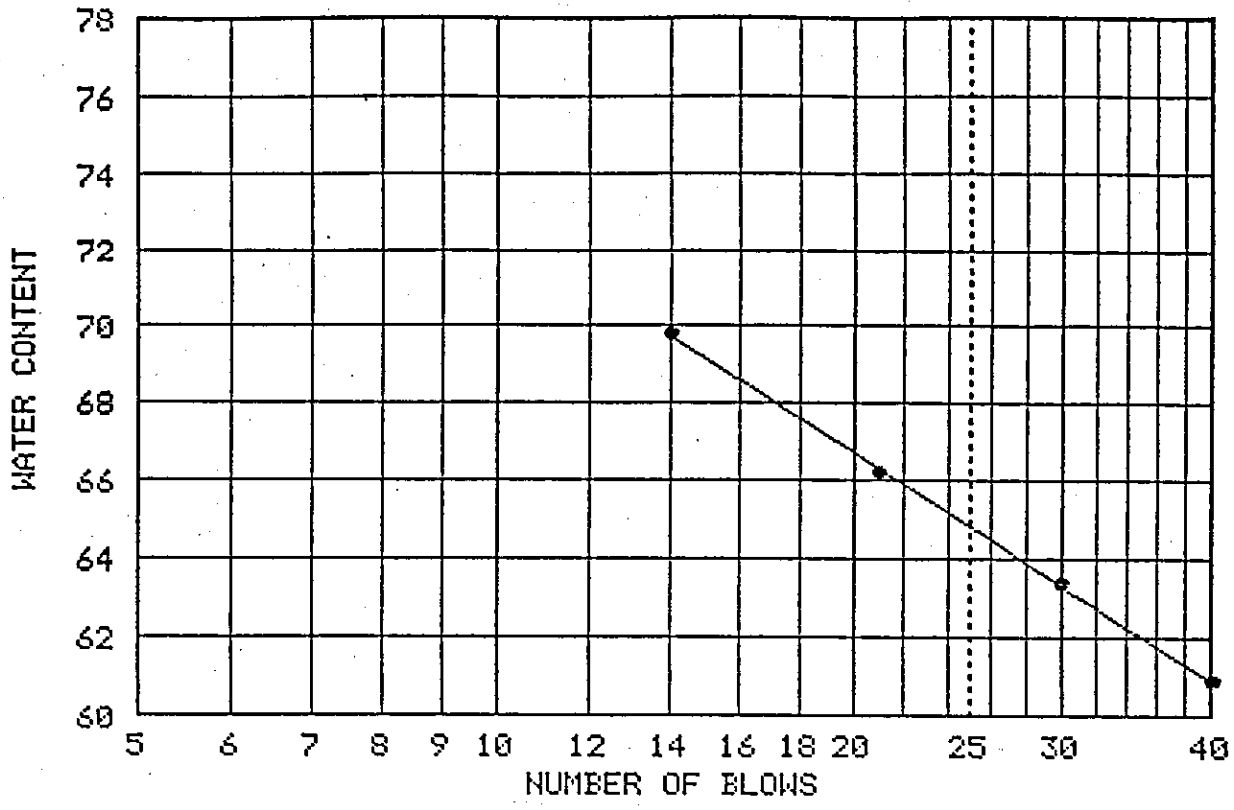
Date: 06-02-1995

GRAIN SIZE DISTRIBUTION TEST REPORT

Remarks:
TESTED BY : ROSSELY
CHECKED BY : SUDIRMAN

Figure No._____

LIQUID AND PLASTIC LIMITS TEST REPORT



	Location + Description	LL	PL	PI	-200	USCS	AASHTO
*	BH.11 DEPTH : 0.00-0.50 M REDISH BROWN / CLAY	65	39	26	92.4	MH	A-7-5(30)

Project No.: BTC-021995
Project: WARSAMSON HEPP, SORONG

Client:
Location: BH. 11 DEPTH : 0.00 - 0.50 M
REDISH BROWN / CLAY

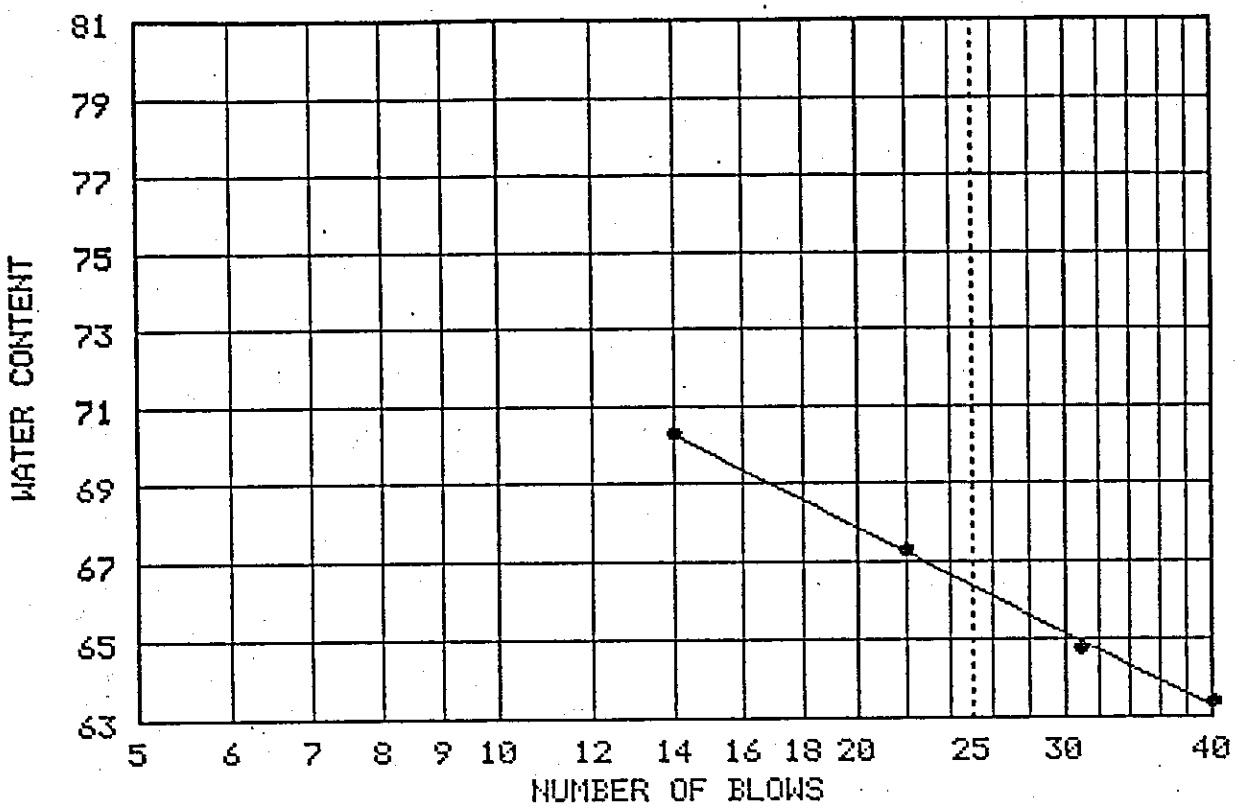
Date: 14-02-1995

LIQUID AND PLASTIC LIMITS TEST REPORT

Remarks:
TESTED BY : IWAN
CHECKED BY : SOEDIRMAN

Fig. No._____

LIQUID AND PLASTIC LIMITS TEST REPORT



	Location + Description	LL	PL	PI	-200	USCS	AASHTO
•	BH.12 DEPTH : 0.00-0.50 M DAARK BROWN / SANDY CLAY	66	24	42	74.8	CH	A-7-6(32)

Project No.: BTC-021995
Project: WARSAMSON HEPP, SORONG

Client:
Location: BH. 12 DEPTH : 0.00 - 0.50 M
DARK BROWN / SANDY CLAY

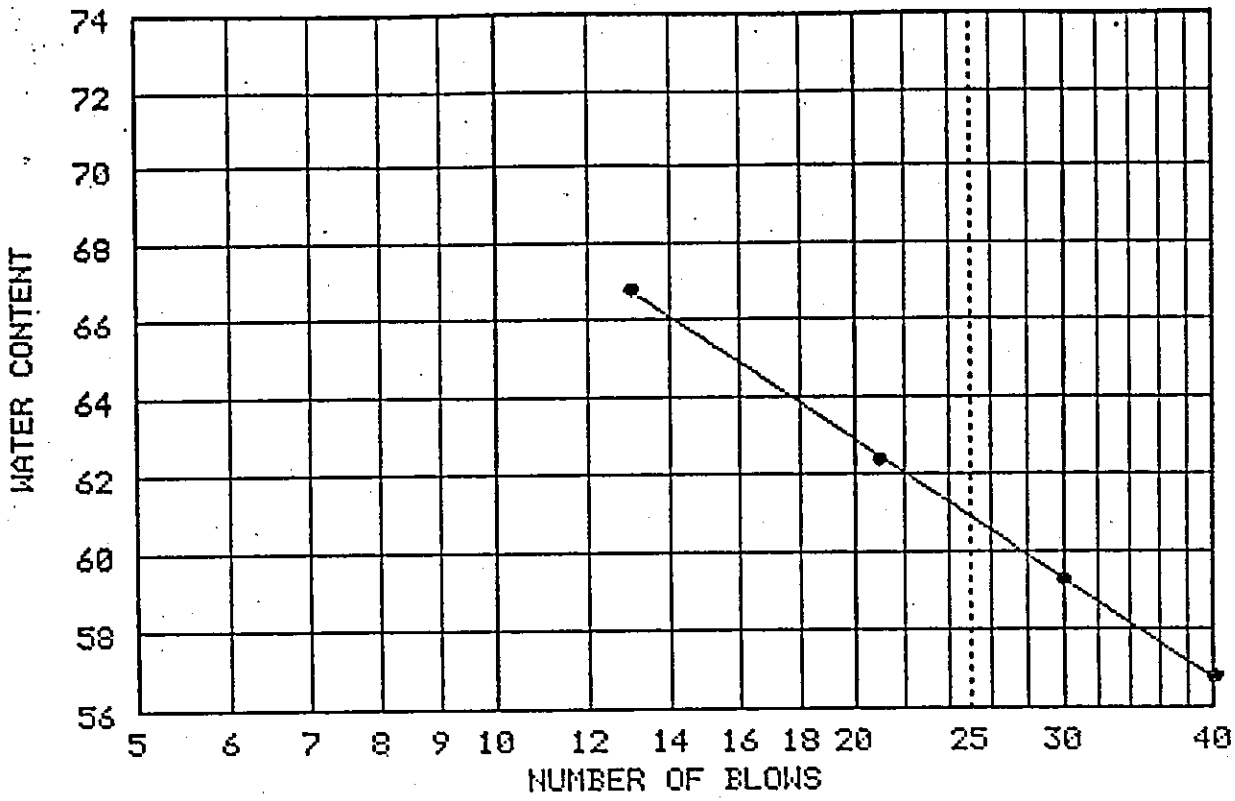
Date: 14-02-1995

LIQUID AND PLASTIC LIMITS TEST REPORT

Remarks:
TESTED BY : BAMBANG
CHECKED BY : SOEDIRMAN

Fig. No._____

LIQUID AND PLASTIC LIMITS TEST REPORT



	Location + Description	LL	PL	PI	-200	USCS	AASHTO
*	BH.13 DEPTH : 0.00-0.50 M LIGHT BROWN / CLAY	61	42	19	67.1	MH	A-7-5(14)

Project No.: BTC-021995
Project: WARSAMSON HEPP, SORONG

Client:
Location: BH. 13 DEPTH : 0.00 - 0.50 M
LIGHT BROWN / CLAY

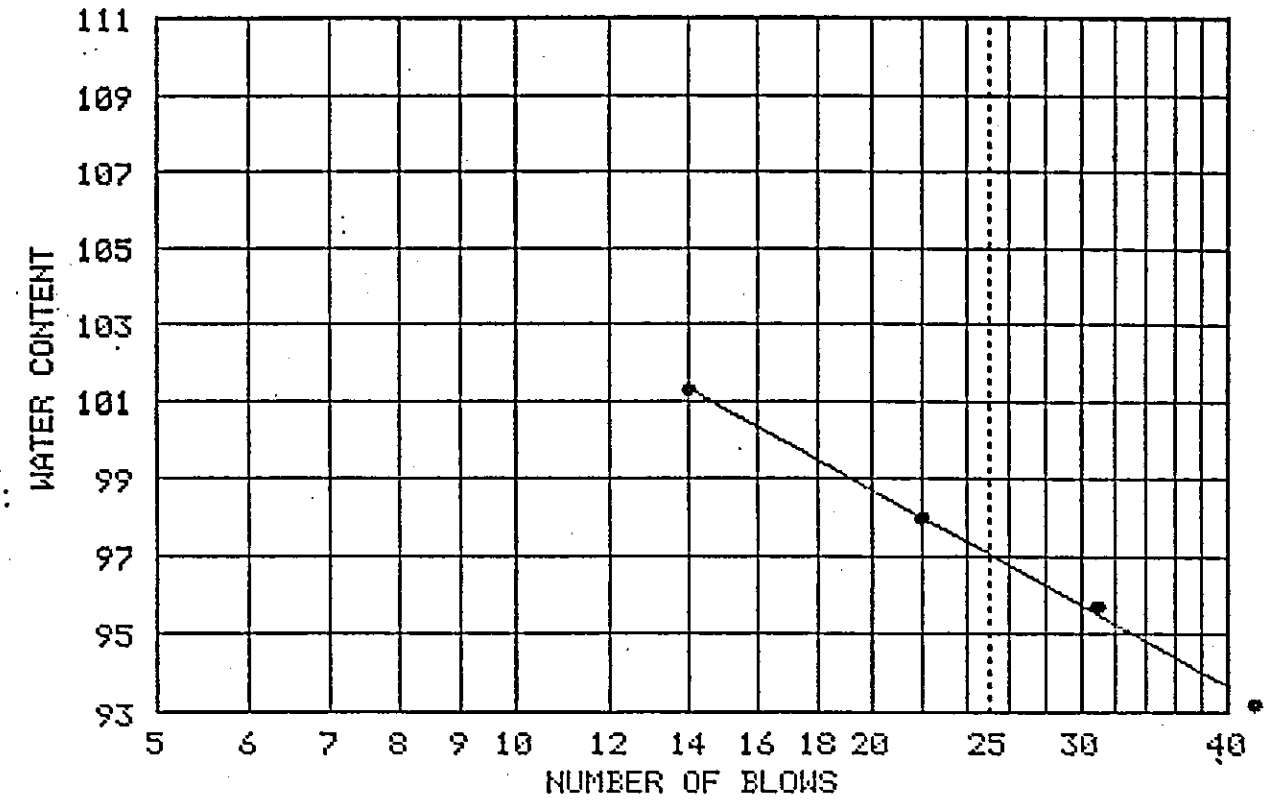
Date: 14-02-1995

LIQUID AND PLASTIC LIMITS TEST REPORT

Remarks:
TESTED BY : IWAN
CHECKED BY : SOEDIRMAN

Fig. No._____

LIQUID AND PLASTIC LIMITS TEST REPORT



	Location + Description	LL	PL	PI	-200	USCS	AASHTO
●	BH.14 DEPTH ; 0.00-0.50 M GREY / CLAY	97	29	68	94.2	CH	A-7-6(74)

Project No.: BTC-021995
Project: WARSAMSON HEPP, SORONG

Client:
Location: BH. 14 DEPTH : 0.00 - 0.50 M
GREY / CLAY

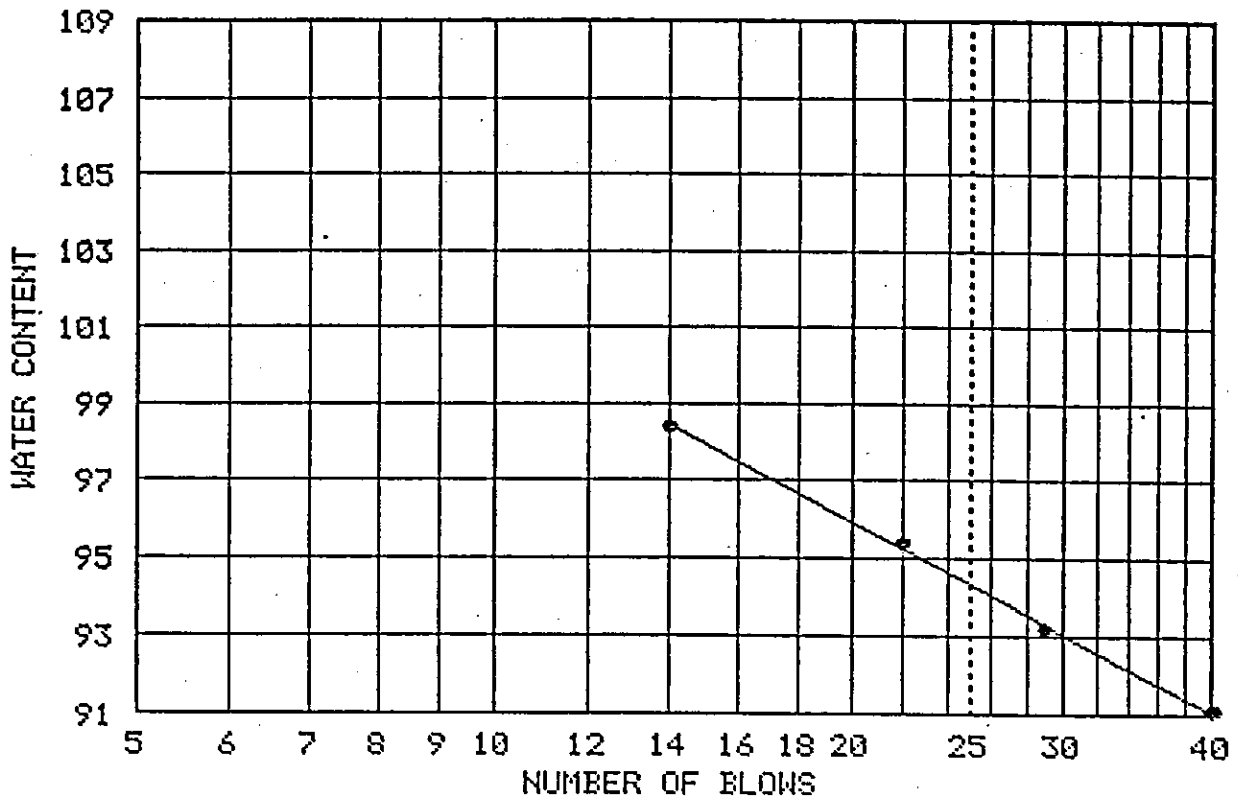
Date: 14-02-1995

LIQUID AND PLASTIC LIMITS TEST REPORT

Remarks:
TESTED BY : BAMBANG
CHECKED BY : SOEDIRMAN

Fig. No._____

LIQUID AND PLASTIC LIMITS TEST REPORT



	Location + Description	LL	PL	PI	-200	USCS	AASHTO
•	BH.14A DEPTH : 0.0-0.50 M LIGHT BROWN / SILTY CLAY	94	44	50	91	MH	A-7-5(57)

Project No.: BTC-021995
Project: WARSAMSON HEPP, SORONG

Client:
Location: BH. 14A DEPTH : 0.00 - 0.50 M
LIGHT BROWN / SILTY CLAY

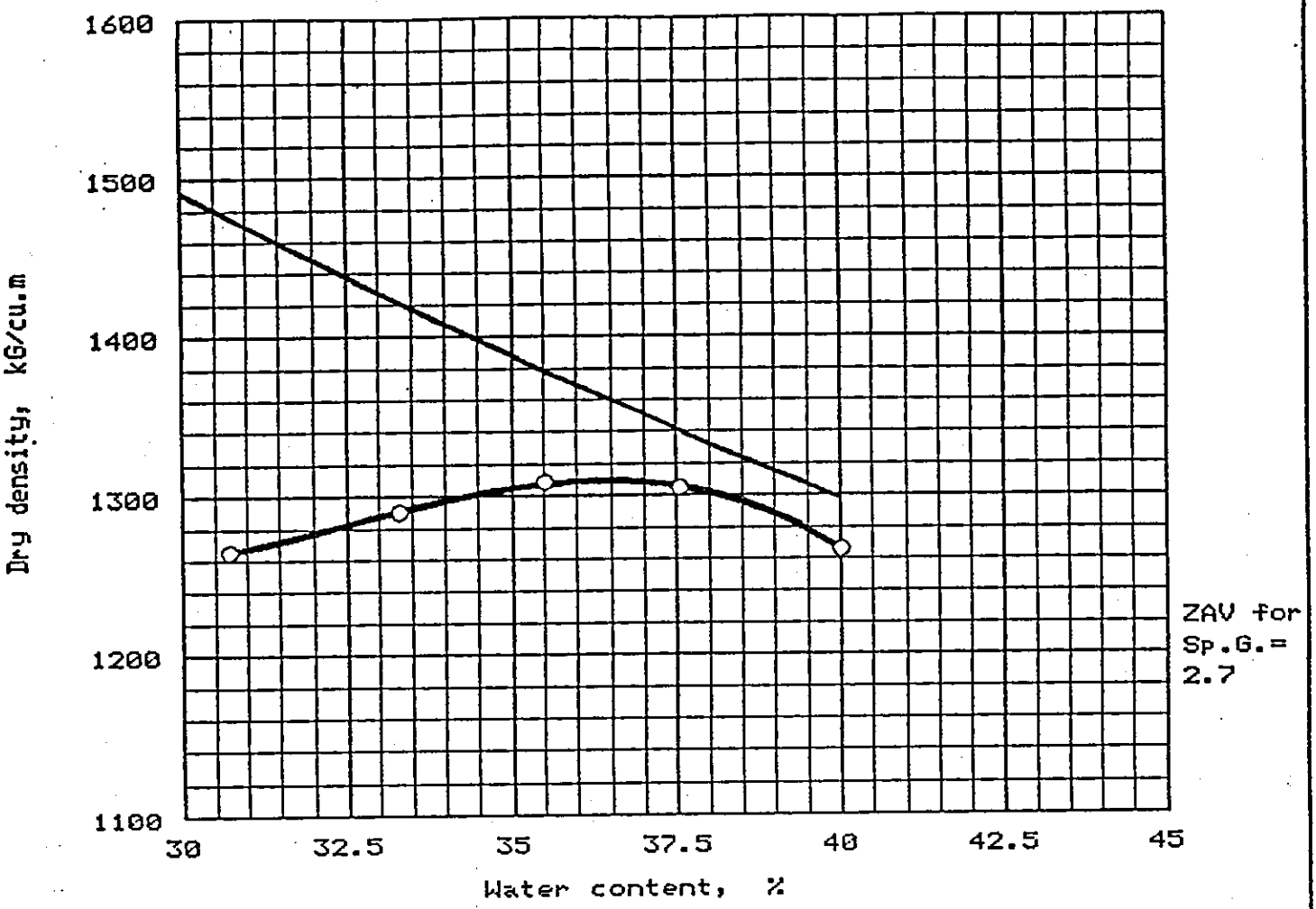
Date: 14-02-1995

LIQUID AND PLASTIC LIMITS TEST REPORT

Remarks:
TESTED BY : BEBEN
CHECKED BY : SOEDIRMAN

Fig. No._____

PROCTOR TEST REPORT



"Standard" Proctor, ASTM D 698, Method A

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
	MH	A-7-5(30.1)		2.7	65	25		93 %

TEST RESULTS	MATERIAL DESCRIPTION
Optimum moisture = 36.4 % Maximum dry density = 1309 kG/cu.m	SILTY CLAY, BROWN

Project No.: WARSAMSON - SORONG
Project: WARSAMSON - SORONG
Location: BH. 11 DEPTH: 0,00-0,50 M

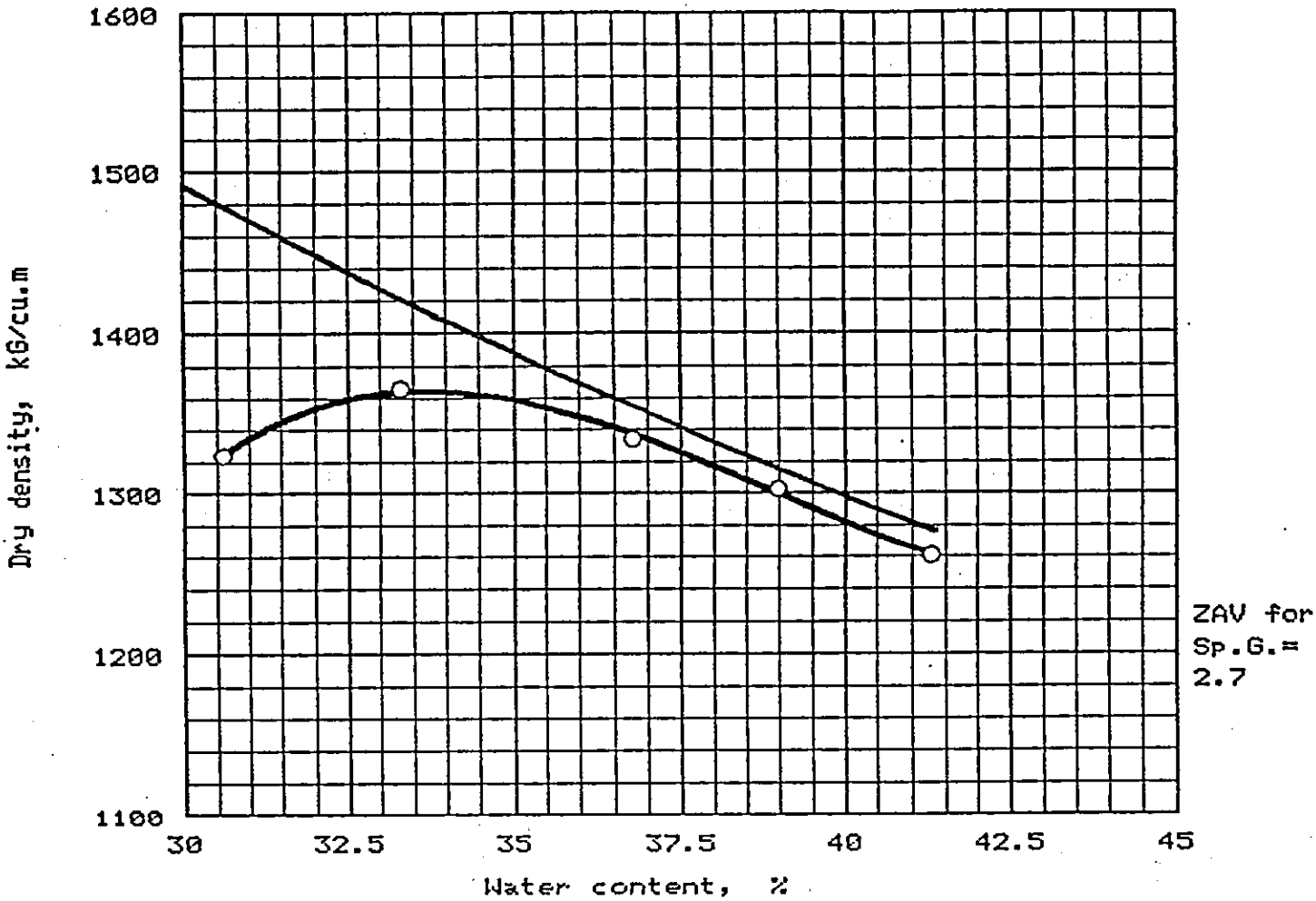
Date: 2-14-1995

PROCTOR TEST REPORT

Remarks:
TESTED BY : DEDY
CHECKED BY: SUDIRMAN

Figure No._____

PROCTOR TEST REPORT



Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
	MH	A-7-5(30.1)		2.7	65	25		93 %

TEST RESULTS	MATERIAL DESCRIPTION
Optimum moisture = 33.7 % Maximum dry density = 1364 kG/cu.m	CLAYEY SILT, REDISHBROWN

Project No.: BH-11 M
Project: WARSAMSON HEPP - SORONG
Location: BH. 11 DEPTH: 0,00 - 0,50 M

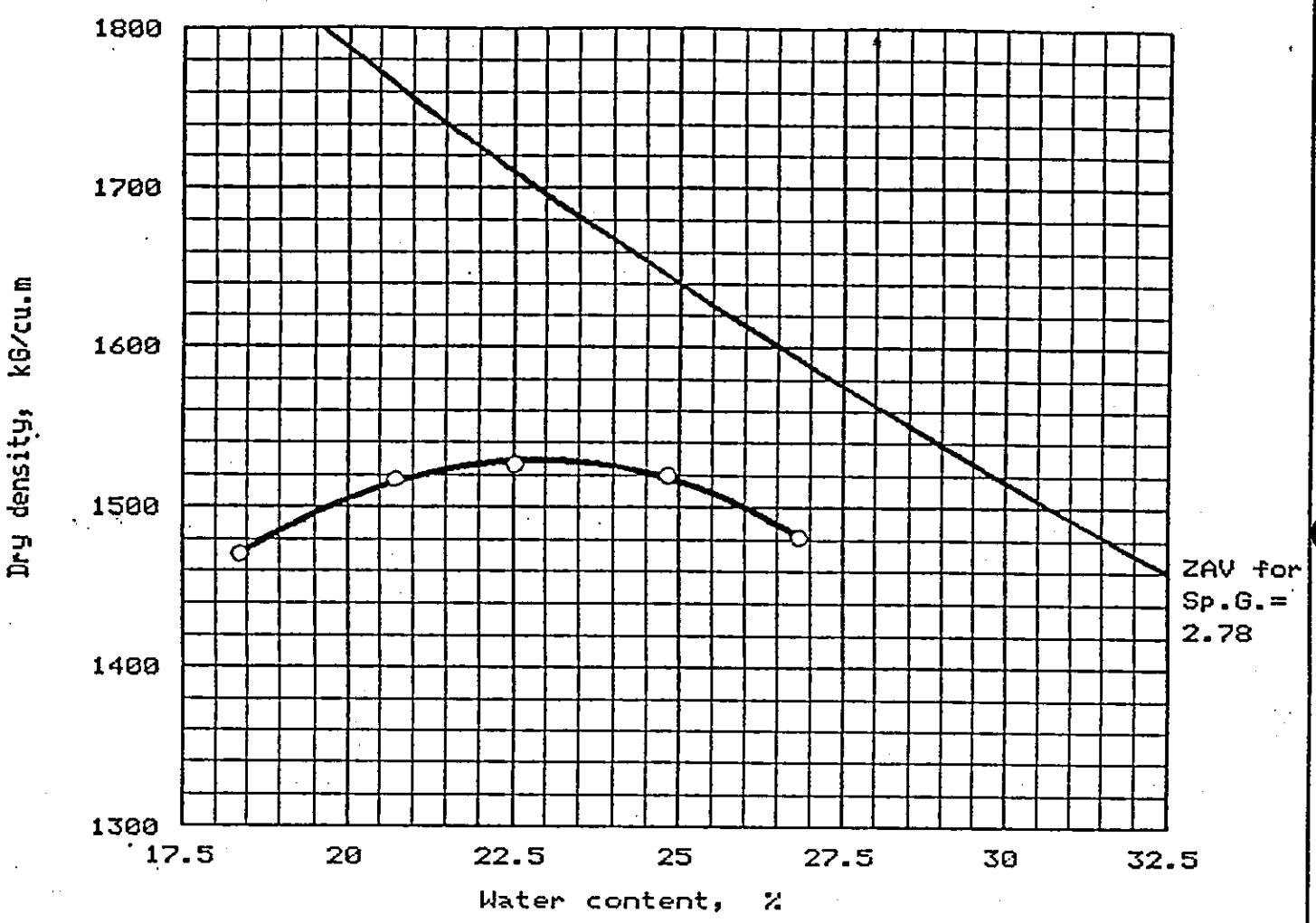
Date: 2-14-1995

PROCTOR TEST REPORT

Remarks:
MODIFIED PROCTOR
TESTED BY : DEDY
CHECKED BY: SUDIRMAN

Figure No._____

PROCTOR TEST REPORT



"Standard" Proctor, ASTM D 698, Method A

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
	CH	A-7-6(32.4)		2.78	66	42		75 %

TEST RESULTS	MATERIAL DESCRIPTION
Optimum moisture = 22.9 % Maximum dry density = 1530 kG/cu.m	SANDY CLAYEY SILT DARK BROWN

Project No.: WARSAMSON - SORONG
Project: WARSAMSON HEPP - SORONG
Location: BH. 12 DEPTH: 0,00-0,50 M

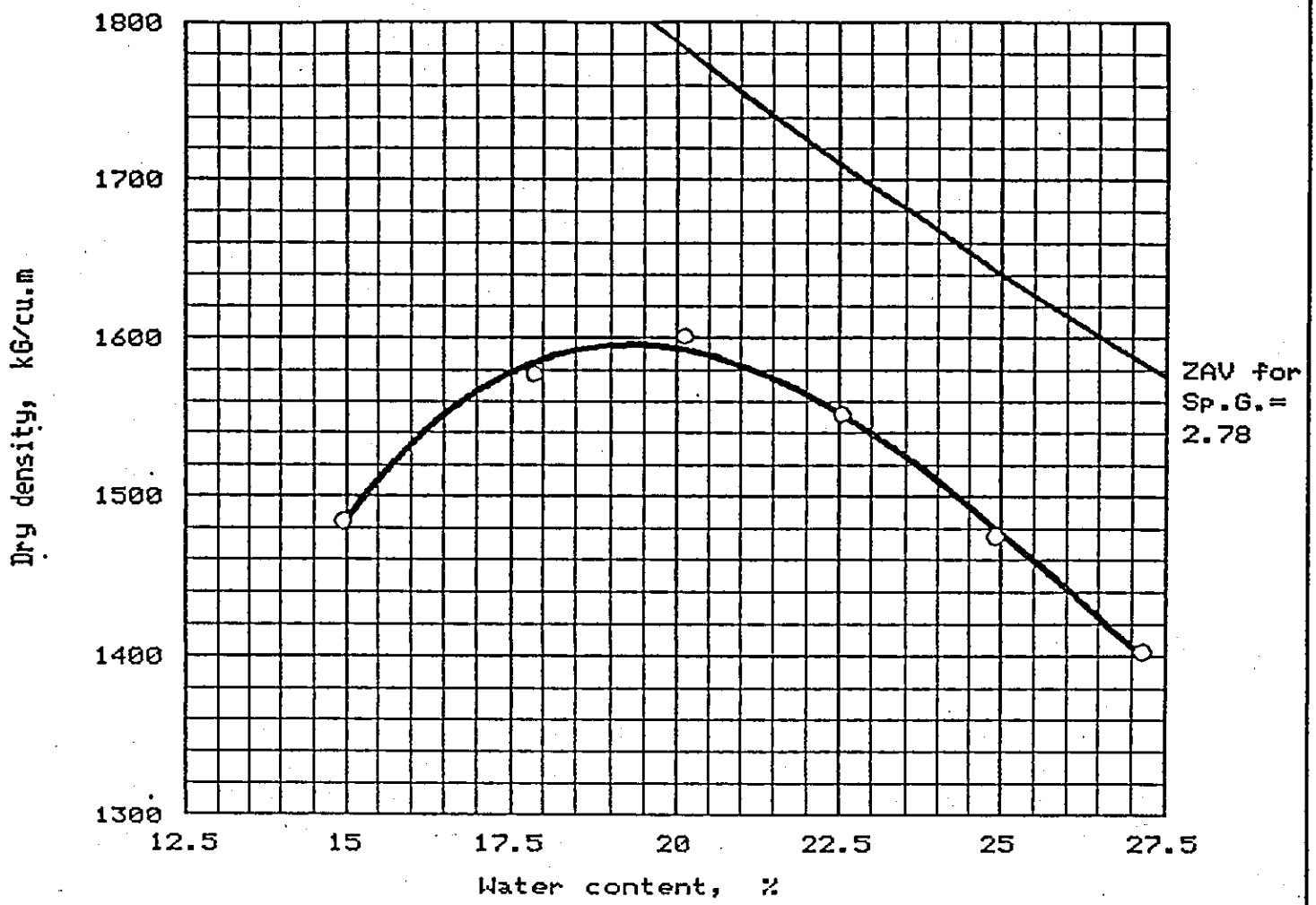
Date: 2-14-1995

Remarks:
TESTED BY : DEDY
CHECKED BY: SUDIRMAN

PROCTOR TEST REPORT

Figure No._____

PROCTOR TEST REPORT



Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
	CH	A-7-5(32.40)		2.78	66	42		75 %

TEST RESULTS	MATERIAL DESCRIPTION
Optimum moisture = 19.3 % Maximum dry density = 1596 kG/cu.m	SANDY CLAYEY SILT DARK BROWN

Project No.: BH-12/MODIFIED
Project: WARSAMSON HEPP - SORONG
Location: BH. 12 DEPTH: 0,00 - 0,50 M

Date: 14-02-1995

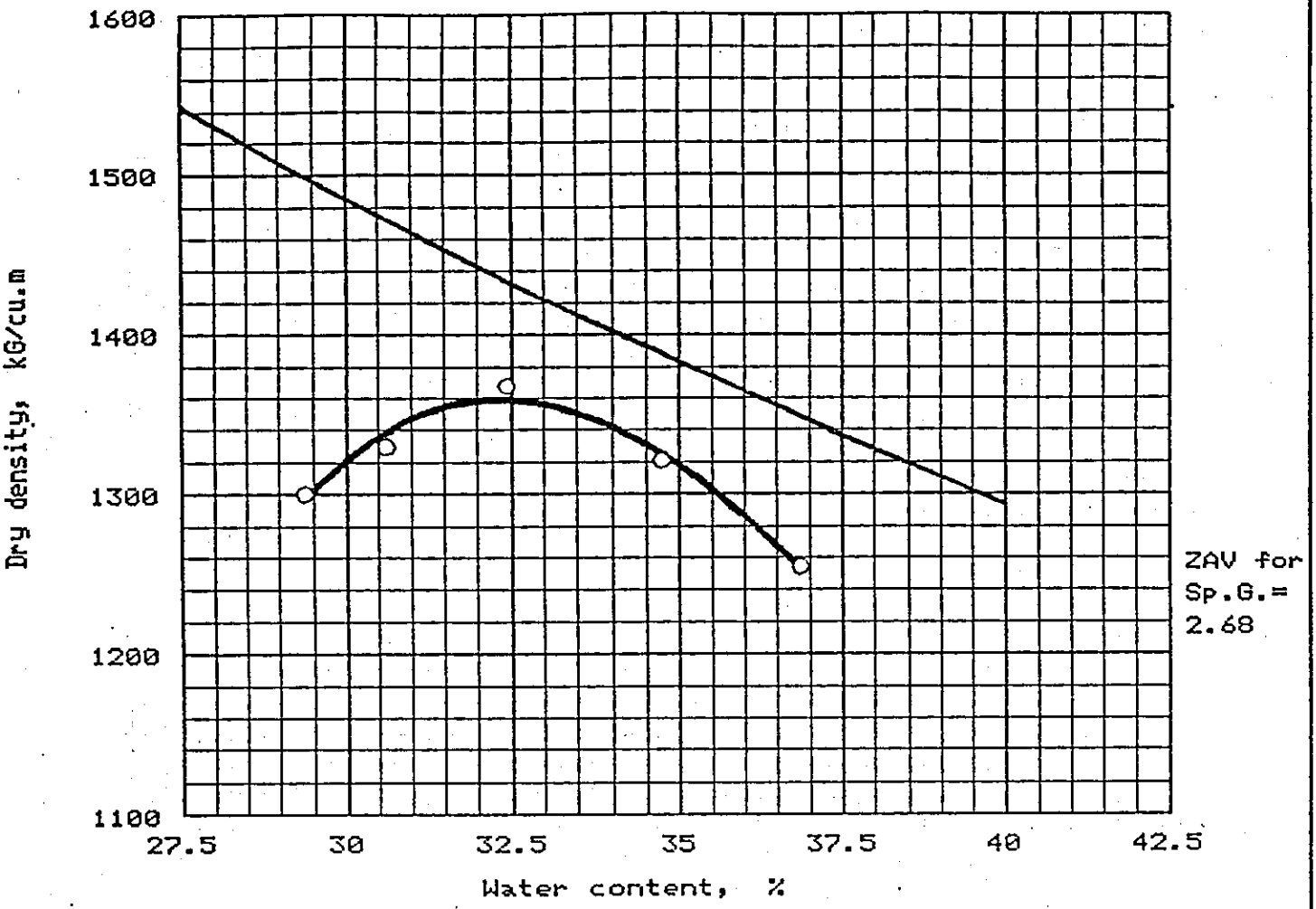
PROCTOR TEST REPORT

Remarks:

MODIFIED
TESTED BY: DEDY

Figure No._____

PROCTOR TEST REPORT



"Standard" Proctor, ASTM D 698, Method A

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
	MH	A-7-5(14.4)		2.68	61	19		67 %

TEST RESULTS	MATERIAL DESCRIPTION
Optimum moisture = 32.3 % Maximum dry density = 1359 kG/cu.m	CLAYEY SANDY SILT YELLOWISH BROWN

Project No.: WARSAMSON - SORONG
Project: WARSAMSON HEPP - SORONG
Location: BH. 13 DEPTH : 0,00 - 0,50 M

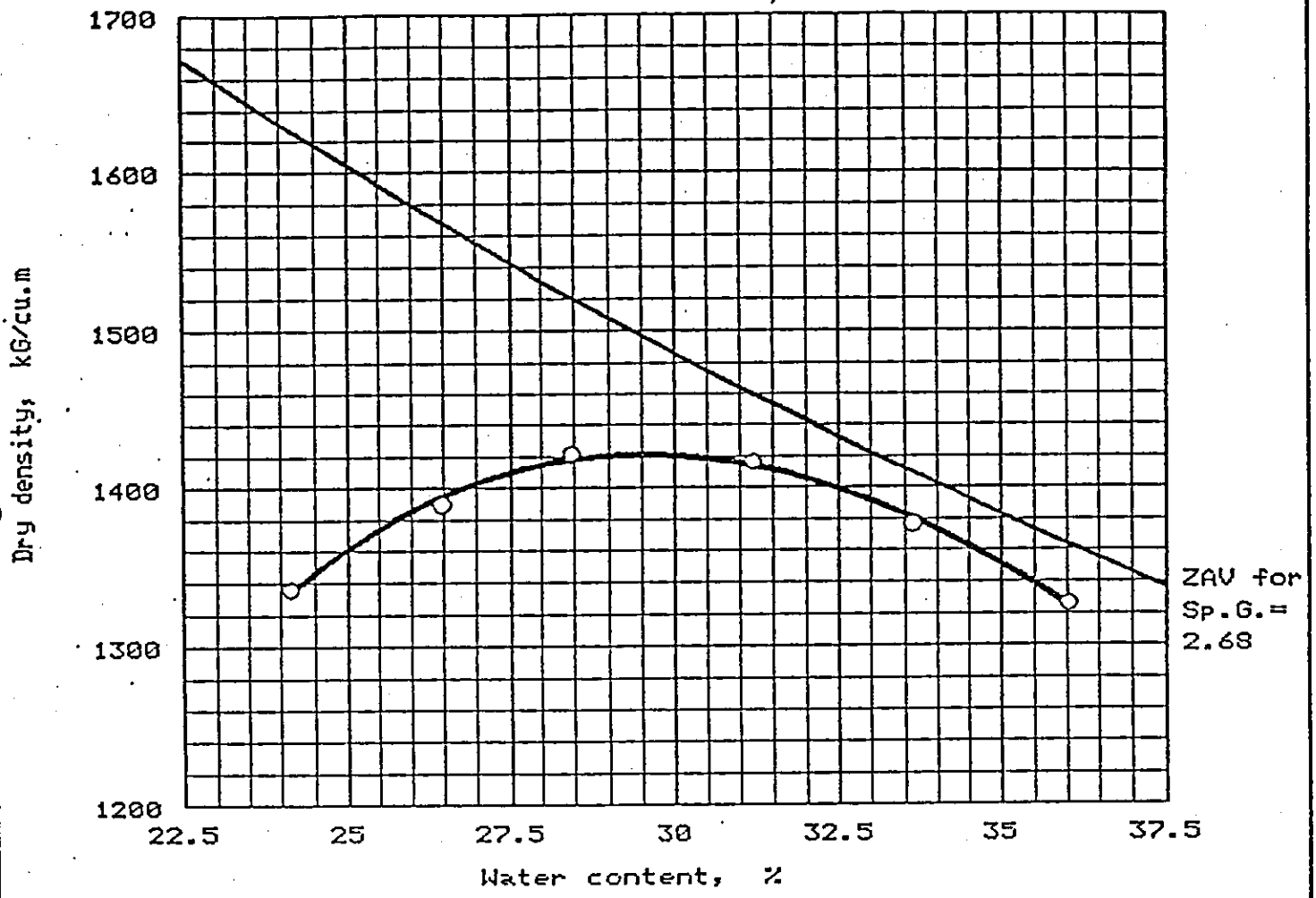
Date: 2-14-1995

PROCTOR TEST REPORT

Remarks:
TESTED BY : DEDY
CHECKED BY: SUDIRMAN

Figure No._____

PROCTOR TEST REPORT



Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
	MH	A-7-5(14.40)		2.68	61	19		67 %

TEST RESULTS	MATERIAL DESCRIPTION
Optimum moisture = 29.5 % Maximum dry density = 1421 kG/cu.m	CLAYEY SANDY SILT YELLOWISH BROWN

Project No.: BH-13 M
Project: WARSAMSON HEPP - SORONG
Location: BH. 13 DEPTH: 0,00 - 0,50 M

Date: 14-05-1995

PROCTOR TEST REPORT

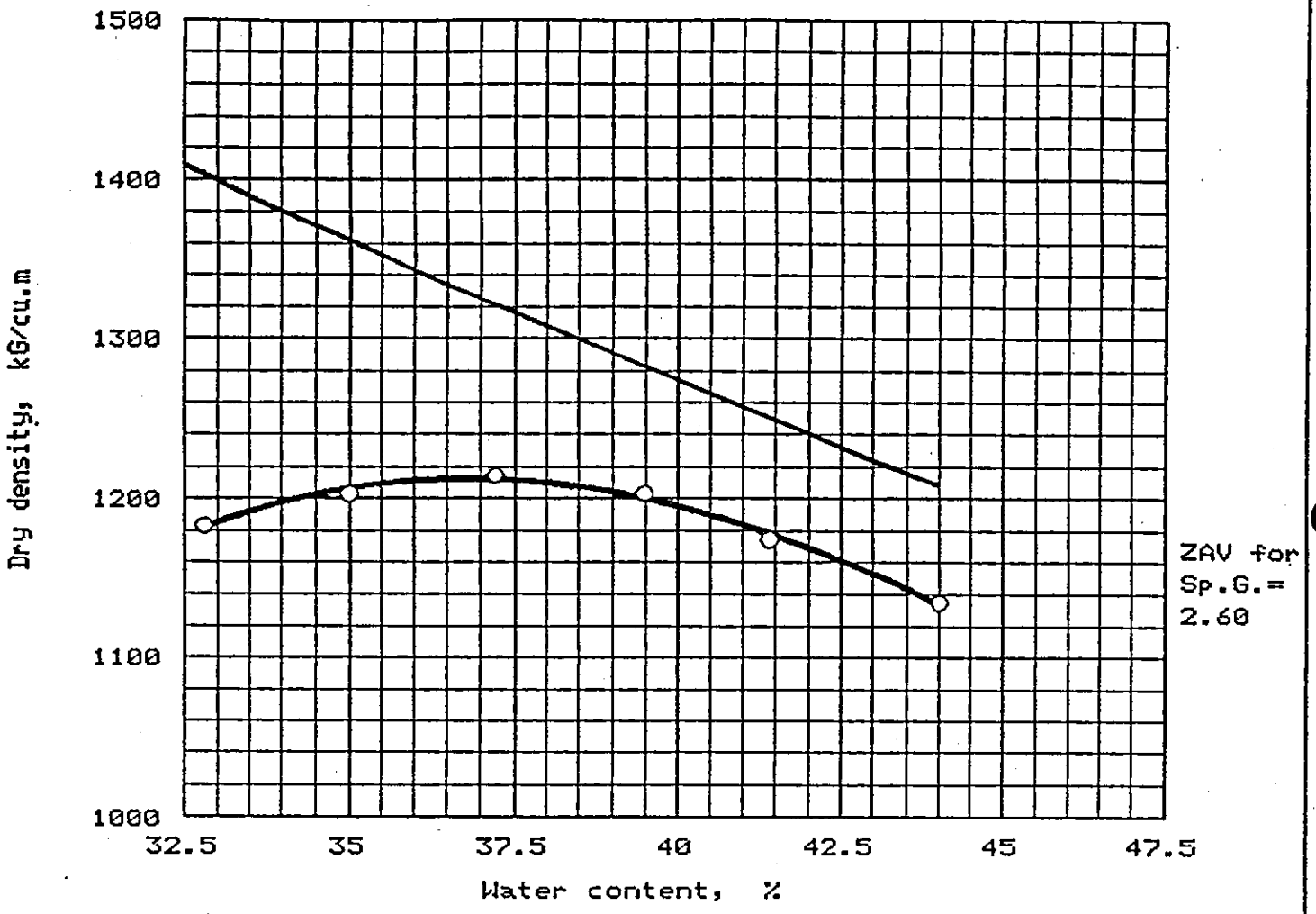
Remarks:

MODIFIED PROCTOR

CHECKED BY : SUDIRMAN

Figure No._____

PROCTOR TEST REPORT



"Standard" Proctor, ASTM D 698, Method A

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
	CH	A-7-5(75.50)		2.60	97.0	68	98 %	94.0 %

TEST RESULTS	MATERIAL DESCRIPTION
Optimum moisture = 36.8 % Maximum dry density = 1212 kG/cu.m	CLAYEY SILT/ DARK BROWN

Project No.: BH.14;ST
Project: WARSAMSON HEPP, SORONG
Location: BH. 14 DEPTH: 0,00-0,50 M

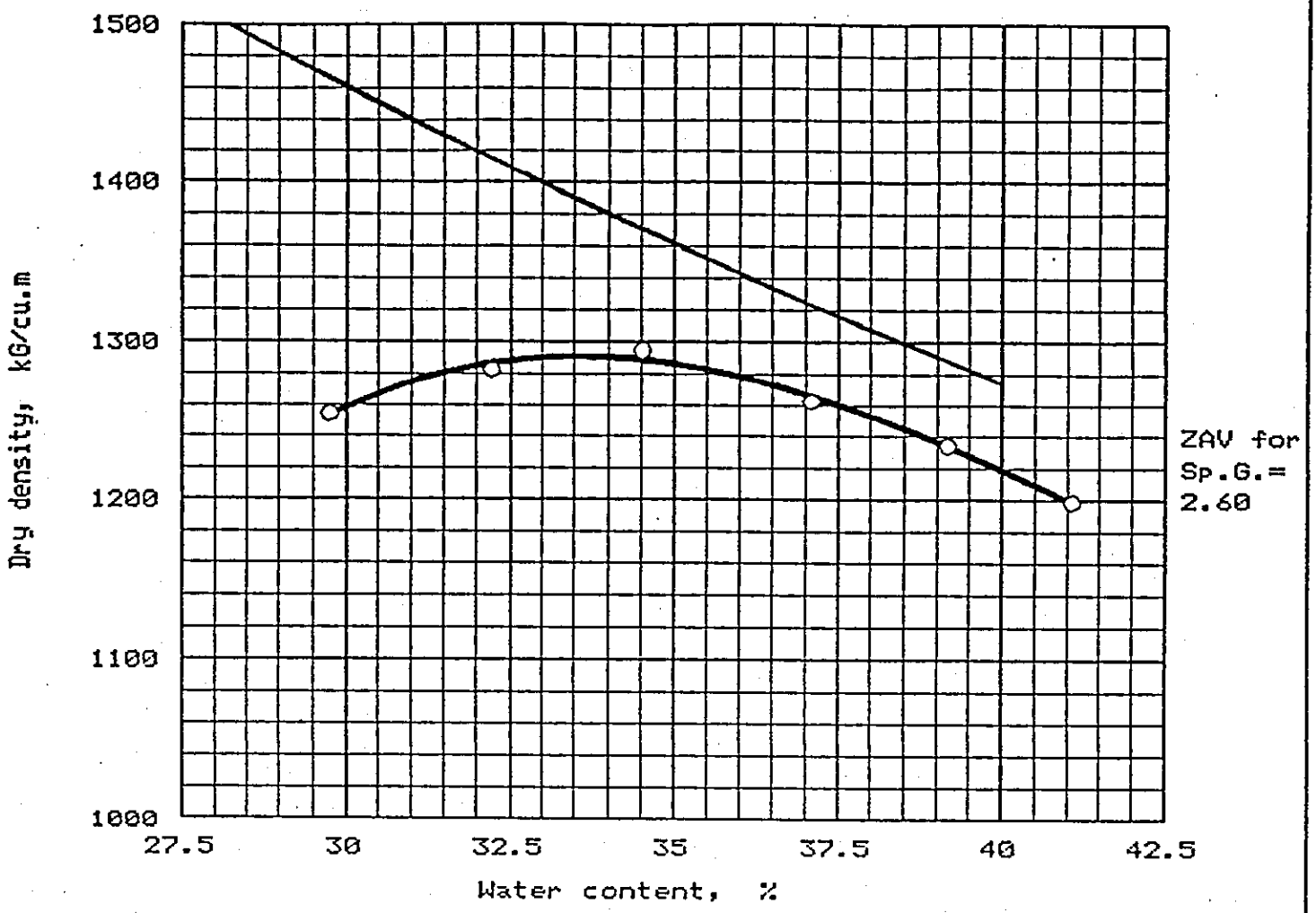
Date: 14-02-1995

PROCTOR TEST REPORT

Remarks:
TESTED BY : TRIADI
CHECKED BY : SUDIRMAN

Figure No.____

PROCTOR TEST REPORT



Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
	CH	A-7-6(75.50)		2.60	97	68	98.5 %	94.0 %

TEST RESULTS	MATERIAL DESCRIPTION
Optimum moisture = 33.5 % Maximum dry density = 1291 kG/cu.m	CLAYEY SILT/DARK BROWN

Project No.: BH.14 M
Project: WARSAMSON HEEP, SORONG
Location: BH. 14 DEPTH: 0,00-0,50 M

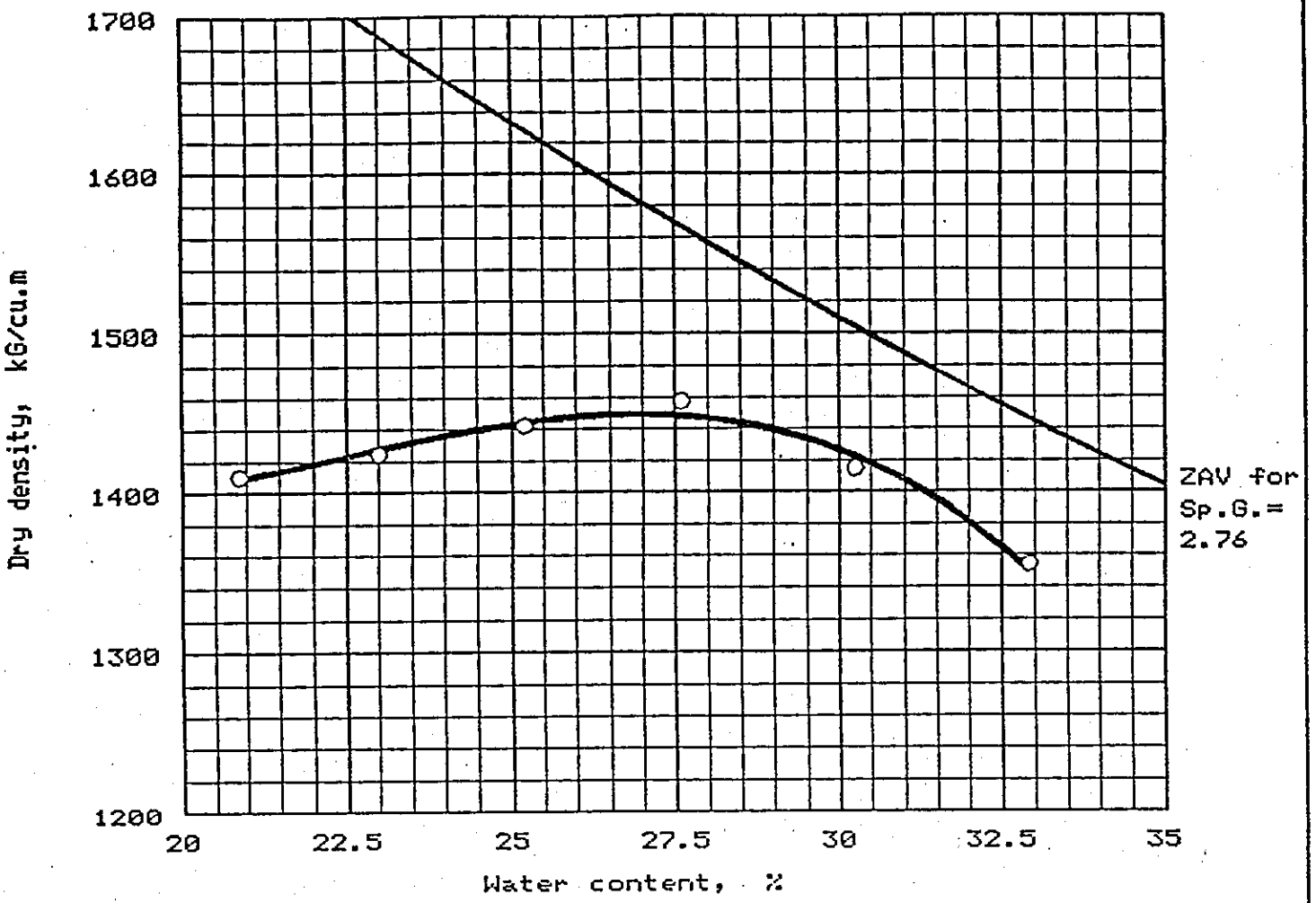
Date: 15-02-1995

PROCTOR TEST REPORT

Remarks:
MODIFIED PROCTOR
TESTED BY : DEDY
CHECKED BY: SUDIRMAN

Figure No._____

PROCTOR TEST REPORT



"Standard" Proctor, ASTM D 698, Method A

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
	MH	A-7-5(55.7)		2.76	93	49		91 %

TEST RESULTS	MATERIAL DESCRIPTION
Optimum moisture = 26.9 % Maximum dry density = 1449 kG/cu.m	CLAYEY SILT, BROWN

Project No.: BH.14A-ST
Project: WARSAMSON HEPP, SORONG
Location: BH. 14 A DEPTH: 0,00-0,50 M

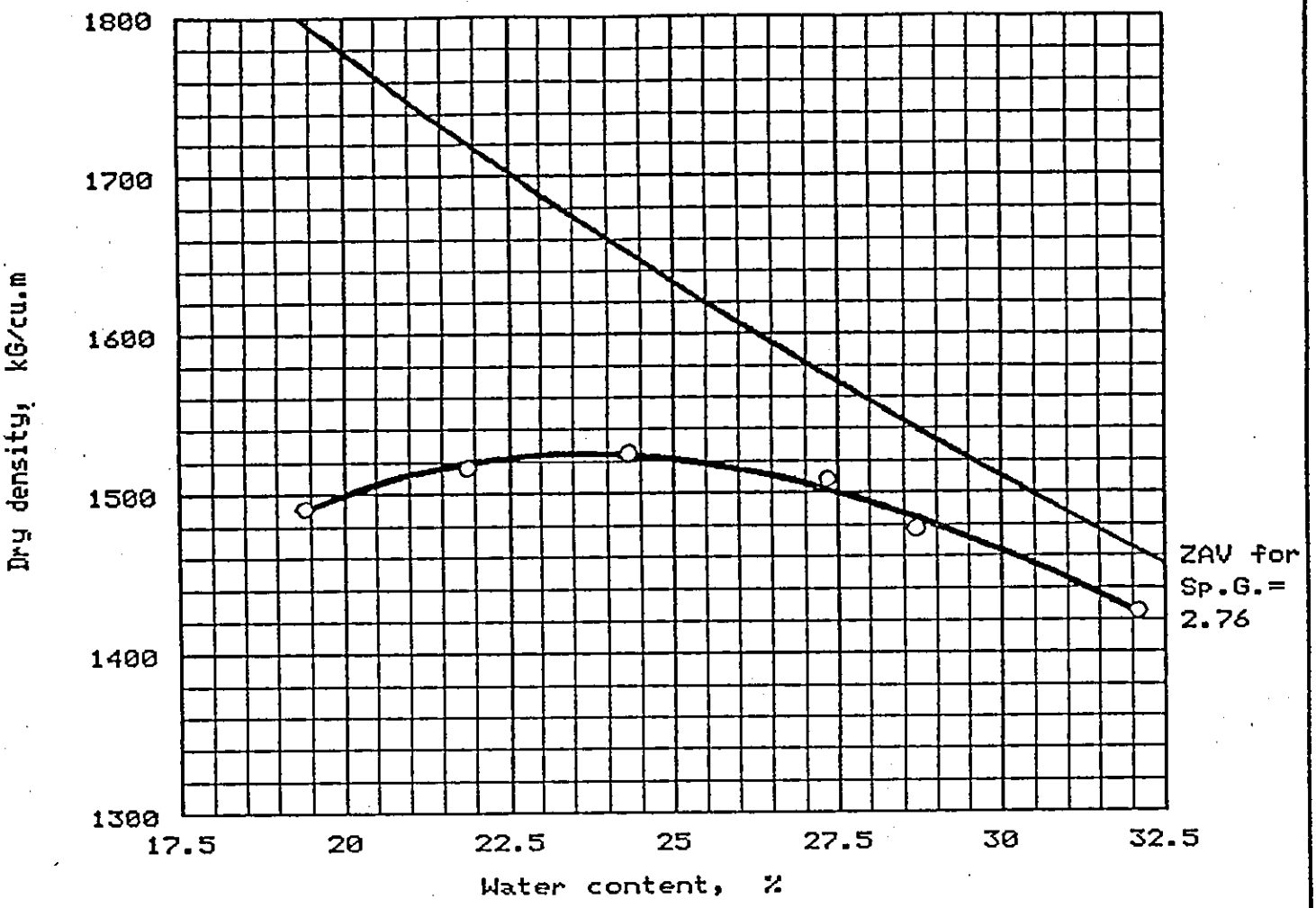
Date: 14-02-1995

PROCTOR TEST REPORT

Remarks:
TESTED BY : TRIADI
CHECKED BY : SUDIRMAN

Figure No._____

PROCTOR TEST REPORT



Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
	MH	A-7-5(55.70)		2.76	93	49		91 %

TEST RESULTS	MATERIAL DESCRIPTION
Optimum moisture = 23.6 % Maximum dry density = 1525 kG/cu.m	CLAYEY SILT/ BROWN

Project No.: BH.14AM
Project: WARSAMSON HEPP, SORONG
Location: BH. 14 A DEPTH: 0,00-0,50 M

Date: 14-02-1995

PROCTOR TEST REPORT

Remarks:

MODIFIED PROCTOC

Figure No._____

CONSTANT HEAD PERMEABILITY TEST

SAMPLE NO. :
LOCATION : BH.11 / 95% MDD ; OMC+2%
SOIL TYPE : SILTY CLAY
DEPTH : 0.00 - 0.50 M
COLOUR : BROWN

SOIL PARAMETER :

DIAMETER (D) :	5.200	(CM)	MOIST.CONT (Wn) :	38.400	(%)
LENGTH (L) :	3.000	(CM)	SPECIFIC GRAVITY (Gs) :	2.700	(-)
AREA (A) :	21.226	(CM^2)	UNIT WEIGHT (γn) :	1.721	(GR/CM^3)
VOLUME (V) :	63.679	(CM^3)	DRY UNIT WEIGHT (γd) :	1.244	(GR/CM^3)

CONSTANT HEAD :

h1 = 200 CM
h1 = 0 CM

HIDROULIC GRADIENT (i) =(h1-h2)/L = 66.667 (-)

TIME FROM START	TIME INTERNAL t MIN	MEASURED FLOW Q ml	RATE OF FLOW q ML / MIN	1 t	REMARKS
	0.5	11.2			
	0.5	11.2			
	0.5	11.1			
	0.5	11			
	0.5	11			
	0.5	11			
	0.5	11			
	0.5	11			
	0.5	11			
	0.5	11	22		

KOEF OF PERMEABILITY =q/(A*i*60) = 0.00025911 cm/sec.

CONSTANT HEAD PERMEABILITY TEST

SAMPLE NO. :

LOCATION : BH.12 / 95% MDD ; OMC+2%
DEPTH : 0.00 - 0.50 M
SOIL TYPE : SANDY CLAYEY SILT
COLOUR : DARK BROWN

SOIL PARAMETER :

DIAMETER (D) :	5.200	(CM)	MOIST.CONT (Wn) :	24.900	(%)
LENGTH (L) :	3.000	(CM)	SPECIFIC GRAVITY (Gs) :	2.780	(-)
AREA (A) :	21.226	(CM^2)	UNIT WEIGHT (γn) :	1.815	(GR/CM^3)
VOLUME (V) :	63.679	(CM^3)	DRY UNIT WEIGHT (γd) :	1.454	(GR/CM^3)

CONSTANT HEAD :

h1 = 200 CM
h1 = 0 CM

HIDROULIC GRADIENT (i) =(h1-h2)/L = 66.667 (-)

TIME FROM START	TIME INTERNAL t MIN	MEASURED FLOW Q ml	RATE OF FLOW q ML / MIN	I t	REMARKS
	0.5	7			
	0.5	7			
	0.5	7			
	0.5	6.5			
	0.5	6.5			
	0.5	6.5			
	0.5	6.5			
	0.5	6.5			
	0.5	6.5			
	0.5	6.5			
	0.5	6.5	13		

KOEF OF PERMEABILITY = q/(A*i*60) = 0.00015311 cm/sec.

CONSTANT HEAD PERMEABILITY TEST

SAMPLE NO. :

LOCATION : BH.13 / 95% MDD ; OMC+2%

DEPTH : 0.00 - 0.50 M

SOIL TYPE : CLAYEY SANDY SILT

COLOUR : YELLOWISH BROWN

SOIL PARAMETER :

DIAMETER (D) :	5.200 (CM)	MOIST.CONT (Wn) :	34.300 (%)
LENGTH (L) :	3.000 (CM)	SPECIFIC GRAVITY (Gs) :	2.680 (-)
AREA (A) :	21.226 (CM^2)	UNIT WEIGHT (γn) :	1.732 (GR/CM^3)
VOLUME (V) :	63.679 (CM^3)	DRY UNIT WEIGHT (γd) :	1.290 (GR/CM^3)

CONSTANT HEAD :

h1 = 200 CM

h1 = 0 CM

HIDROULIC GRADIENT (i) =(h1-h2)/L = 66.667 (-)

TIME FROM START	TIME INTERNAL t MIN	MEASURED FLOW Q ml	RATE OF FLOW q ML / MIN	1 t	REMARKS
	0.5	8			
	0.5	8			
	0.5	8			
	0.5	7			
	0.5	7			
	0.5	7			
	0.5	7			
	0.5	7			
	0.5	7			
	0.5	7	14		

KOEF OF PERMEABILITY = q/(A*i*60) = 0.00016489 cm/sec.

CONSTANT HEAD PERMEABILITY TEST

SAMPLE NO. :
LOCATION : BH.14 / 95% MDD ; OMC+2%
DEPTH : 0.00 - 0.50 M
SOIL TYPE : CLAYEY SILT
COLOUR : DARK BROWN

SOIL PARAMETER :

DIAMETER (D) :	5.200	(CM).	MOIST.CONT (Wn) :	38.800	(%)
LENGTH (L) :	3.000	(CM)	SPECIFIC GRAVITY (Gs) :	2.600	(-)
AREA (A) :	21.226	(CM^2)	UNIT WEIGHT (γn) :	1.598	(GR/CM^3)
VOLUME (V) :	63.679	(CM^3)	DRY UNIT WEIGHT (γd) :	1.151	(GR/CM^3)

CONSTANT HEAD :

h1 = 200 CM
h1 = 0 CM

HIDROULIC GRADIENT (i) =(h1-h2)/L = 66.667 (-)

TIME FROM START	TIME INTERNAL t MIN	MEASURED FLOW Q ml	RATE OF FLOW q ML / MIN	1 t	REMARKS
	0.25	17.5			
	0.25	17.5			
	0.25	17.5			
	0.25	17			
	0.25	17			
	0.25	17			
	0.25	17			
	0.25	17			
	0.25	17			
	0.25	17	68		

KOEF OF PERMEABILITY =q/(A*i*60) = 0.00080089 cm/sec.

CONSTANT HEAD PERMEABILITY TEST

SAMPLE NO. :

LOCATION : BH.14A / 95% MDD ; OMC+2%
SOIL TYPE : CLAYEY SILT
DEPTH : 0.00 - 0.50 M
COLOUR : BROWN

SOIL PARAMETER :

DIAMETER (D) :	5.200	(CM)	MOIST.CONT (Wn) :	28.900	(%)
LENGTH (L) :	3.000	(CM)	SPECIFIC GRAVITY (Gs) :	2.760	(-)
AREA (A) :	21.226	(CM^2)	UNIT WEIGHT (γn) :	1.774	(GR/CM^3)
VOLUME (V) :	63.679	(CM^3)	DRY UNIT.WEIGHT (γd) :	1.377	(GR/CM^3)

CONSTANT HEAD :

h1 = 200 CM
h1 = 0 CM

HIDROULIC GRADIENT (i) =(h1-h2)/L = 66.667 (-)

TIME FROM START	TIME INTERNAL t MIN	MEASURED FLOW Q ml	RATE OF FLOW q ML / MIN	1 t	REMARKS
	0.25	12			
	0.25	12			
	0.25	11.7			
	0.25	11.7			
	0.25	11.5			
	0.25	11.5			
	0.25	11.5			
	0.25	11.5			
	0.25	11.5			
	0.25	11.5	46		

KOEF OF PERMEABILITY =q/(A*i*60) = 0.00054178 cm/sec.

APPENDIX D.3

Concrete Aggregate Samples

- Specific Gravity and Absorption
- Grain Size Analysis
- Alkali Reactivity Test
- Sulphate Soundness Test
- LA Abrassion Test
- Crushing Test
- Organic Impurities
- Mud and Clay Content

SPECIFIC GRAVITY TEST

Project : Warsamson HEPP
Location : Sorong, Irian jaya
Type : Makbon - 1 (SP - 1)
Date of test : February 13th, 1995

	A	B	Average	Remark
Weight of dry Sample - Saturated surface (S S D) --------- 250	250	250	250	gr
Weight of dried sample ---------- Bk	240.14	240.16	240.15	gr
Pycnometer + water (25° C) ---------- B	357.8	358.0	357.9	gr
Sample (SSD) + Water (25 ° C) + pycnometer ---------- Bt	505.41	505.43	505.42	gr

	A	B	Average	Remark
Specific Gravity : $\frac{Bk}{B + 250 - Bt}$	2.35	2.34	2.35	
Dry density - Saturated Surface : $\frac{250}{B + 250 - Bt}$	2.44	2.43	2.44	
Apperent Specific Gravity : $\frac{Bk}{B + Bk - Bt}$	2.60	2.59	2.60	
Absorption : $\frac{(250 - Bk)}{Bk} \times 100\ \%$	4.11	4.10	4.11	%

SPECIFIC GRAVITY TEST

Project : Warsamson HEPP
Location : Sorong, Irian jaya
Type : Makbon - 2 (SP - 2)
Date of test : February 13th, 1995

	A	B	Average	Remark
Weight of dry Sample - Saturated surface (S S D) --------- 250	250	250	250	gr
Weight of dried sample ---------- Bk	239.47	239.45	239.46	gr
Pycnometer + water (25° C) ---------- B	355.6	355.7	355.7	gr
Sample (SSD) + Water (25 ° C) + pycnometer -------- Bt	503.06	503.05	503.06	gr

	A	B	Average	Remark
Specific Gravity : $\frac{Bk}{B + 250 - Bt}$	2.34	2.33	2.34	
Dry density - Saturated Surface : $\frac{250}{B + 250 - Bt}$	2.44	2.44	2.44	
Apperent Specific Gravity : $\frac{Bk}{B + Bk - Bt}$	2.60	2.60	2.60	
Absorption : $\frac{(250 - Bk)}{Bk} \times 100\ \%$	4.40	4.40	4.40	%

SPECIFIC GRAVITY TEST

Project : Warsamson HEPP
Location : Sorong, Irian jaya
Type : Makbon - 3 (SP - 3)
Date of test : February 13th, 1995

	A	B	Average	Remark
Weight of dry Sample - Saturated surface (S S D) --------- Bj	250	250	250	gr
Weight of dried sample ---------- Bk	216.06	216.08	216.07	gr
Pycnometer + water (25° C) ---------- B	340.69	340.71	340.70	
Sample (SSD) + Water (25 ° C) + pycnometer ---------- Bt	486.52	486.54	486.53	gr

	A	B	Average	Remark
Specific Gravity : $\frac{Bk}{B + 250 - Bt}$	2.07	2.07	2.07	
Dry density - Saturated Surface : $\frac{250}{B + 250 - Bt}$	2.40	2.40	2.40	
Apperent Specific Gravity : $\frac{Bk}{B + Bk - Bt}$	3.08	3.07	3.08	
Absorption : $\frac{(250 - Bk)}{Bk} \times 100\ \%$	15.71	15.70	15.71	%

SPECIFIC GRAVITY TEST

Project : Warsamson HEPP
Location : Sorong, Irian jaya
Type : Warsamson (SP - 4)
Date of test : February 13th, 1995

	A	B	Average	Remark
Weight of dry Sample - Saturated surface (S S D) --------- 250	250	250	250	gr
Weight of dried sample ---------- Bk	244.60	244.62	244.61	gr
Pycnometer + water (25° C) ---------- B	358.00	358.02	358.01	gr
Sample (SSD) + Water (25 ° C) + pycnometer ---------- Bt	511.87	511.85	511.86	gr

	A	B	Average	Remark
Specific Gravity : $\frac{Bk}{B + 250 - Bt}$	2.54	2.54	2.54	
Dry density - Saturated Surface : $\frac{250}{B + 250 - Bt}$	2.60	2.60	2.60	
Apperent Specific Gravity : $\frac{Bk}{B + Bk - Bt}$	2.70	2.69	2.70	
Absorption : $\frac{(250 - Bk)}{Bk} \times 100\ \%$	2.21	2.20	2.21	%

SPECIFIC GRAVITY TEST

Project : Warsamson HEPP
Location : Sorong, Irian jaya
Type : BH - 6 Area / Site A
Date of test : February 13th, 1995

	A	B	Average	Remark
Weight of dry Sample - Saturated surface (S S D) --------- Bj	2690	2692	2691	gr
Weight of dried sample ---------- Bk	2657	2658	2658	gr
Sample (SSD) + Water (25 ° C) ---- Ba	1669	1671	1670	gr

	A	B	Average	Remark
Specific Gravity : $\frac{Bk}{Bj - Ba}$	2.60	2.60	2.60	
Dry density - Saturated Surface : $\frac{Bj}{Bj - Ba}$	2.63	2.64	2.64	
Apperent Specific Gravity : $\frac{Bk}{Bk - Ba}$	2.69	2.69	2.69	
Absorption : $\frac{(Bj - Bk)}{Bk}$ x 100 %	1.24	1.24	1.24	%

SPECIFIC GRAVITY TEST

Project : Warsamson HEPP
Location : Sorong, Irian jaya
Type : Limestone (Warsamson River)
Date of test : February 13th, 1995

	A	B	Average	Remark
Weight of dry Sample - Saturated surface (S S D) --------- Bj	1768	1770	1769	gr
Weight of dried sample ---------- Bk	1744	1746	1745	gr
Sample (SSD) + Water (25 ° C) ---- Ba	1103	.1105	1104	gr

	A	B	Average	Remark
Specific Gravity : $\frac{Bk}{Bj - Ba}$	2.62	2.62	2.62	
Dry density - Saturated Surface : $\frac{Bj}{Bj - Ba}$	2.66	2.66	2.66	
Apperent Specific Gravity : $\frac{Bk}{Bk - Ba}$	2.72	2.72	2.72	
Absorption : $\frac{(Bj - Bk)}{Bk} \times 100\ \%$	1.38	1.37	1.38	%

SPECIFIC GRAVITY TEST

Project : Warsamson HEPP
Location : Sorong, Irian jaya
Type : Breccia (near Batu Lubang Village)
Date of test : February 13th, 1995

	A	B	Average	Remark
Weight of dry Sample - Saturated surface (S S D) --------- Bj	2667	2669	2668	gr
Weight of dried sample ---------- Bk	2552	2554	2553	gr
Sample (SSD) + Water (25 ° C) ---- Ba	1620	1622	1621	gr

	A	B	Average	Remark
Specific Gravity : $\frac{Bk}{Bj - Ba}$	2.43	2.44	2.44	
Dry density - Saturated Surface : $\frac{Bj}{Bj - Ba}$	2.55	2.55	2.55	
Apperent Specific Gravity : $\frac{Bk}{Bk - Ba}$	2.74	2.74	2.74	
Absorption : $\frac{(Bj - Bk)}{Bk} \times 100\ \%$	4.51	4.50	4.51	%

SIEVE ANALYSIS ON FINE AGGREGATE

Project : Warsamson HEPP
Location : Sorong - Irian Jaya
Tested by : Ar
Date : 13 February 1995

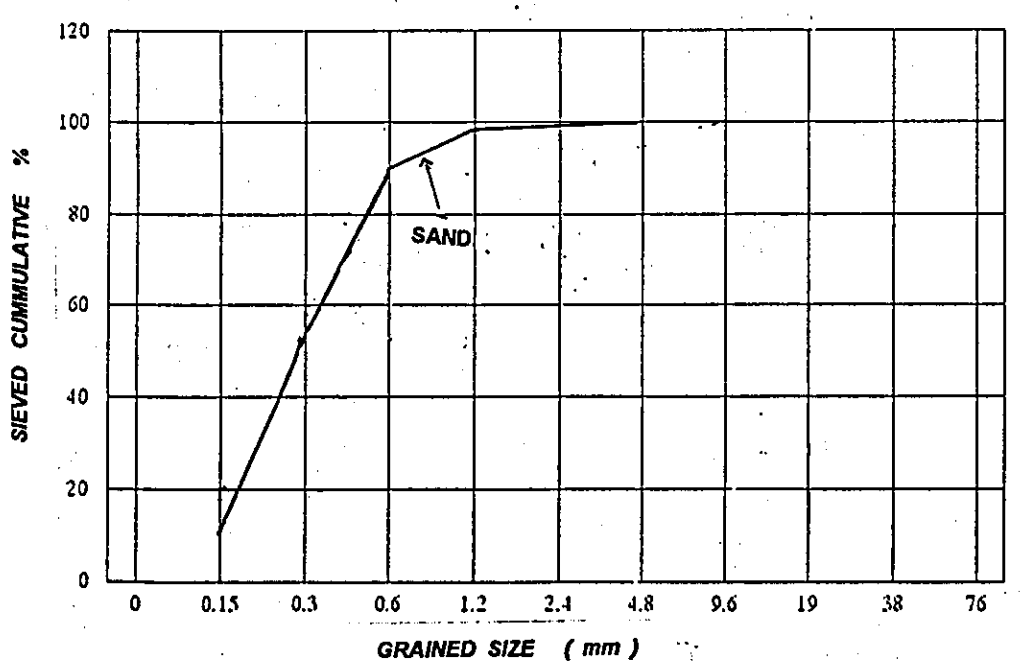
Type/ No. : Makbon-1 (SP-1)
Checked by :
Date :
Signature :

SIEVE (mm) Sand	SIEVE (mm) Gravels	Retained Weigh (gr) x		% of Retained Weight (gr) 100%		% of Retained Cummulative (gr) Sand	% of Retained Cummulative (gr) Gravels	% of Sieved Cummulative (gr) Sand	% of Sieved Cummulative (gr) Gravels	Remarks Sand	Remarks Gravels
9.6	76										
4.8	38					0.0		100.0			
2.4	25	10		0.1		0.1		99.9			
1.2	19	70		0.7		0.8		99.2			
0.6	12.5	960		9.6		10.4		89.6			
0.3	9.5	3500		35		45.4		54.6			
0.15	4.8	4200		42		87.4		12.6			
0	2.4	1260		12.6		-		0.0			
	1.2										
	0.6										
	0.3										
	0.15										
	0										
	1 =	10,000			2 =	144.1					

FINENESS : 1.44

Note :

Graph does not belong to zone 4 of gradation (BS-882)



SIEVE ANALYSIS ON FINE AGGREGATE

Project : Warsamson HEPP
Location : Sorong - Irian Jaya
Tested by : Ar
Date : 13 February 1995

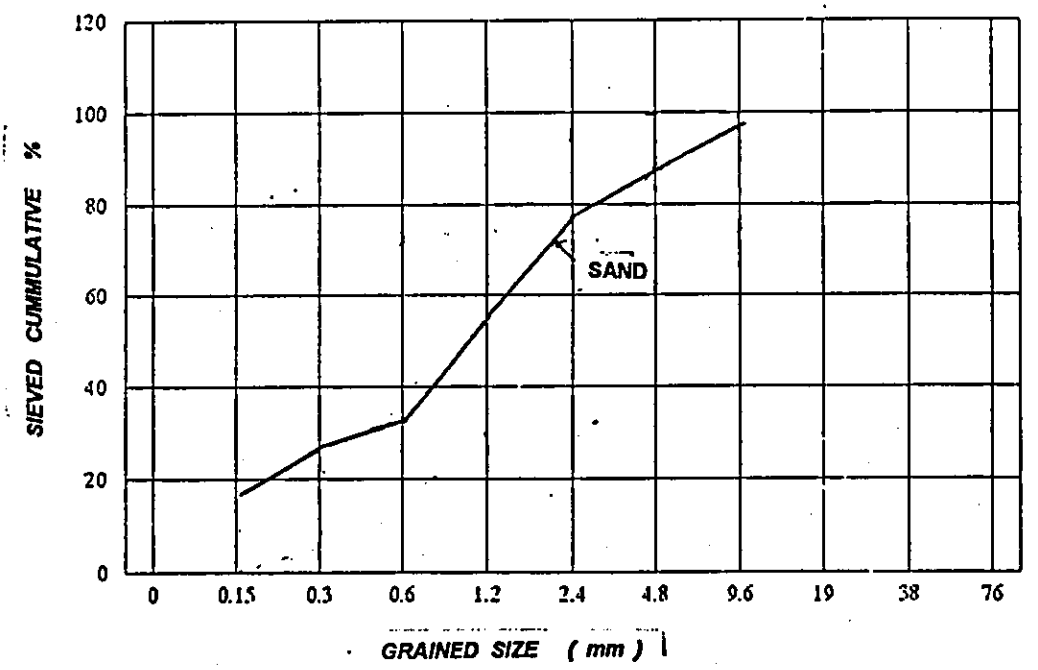
Type / No. : Makbon-2 (SP-2)
Checked by :
Date :
Signature :

SIEVE (mm)		Retained Weigh (gr)		% of Retained Weight (gr)		% of Retained Cummulative (gr)		% of Sieved Cummulative (gr)		Remarks	
Sand	Gravels	x		100%		Sand	Gravels	Sand	Gravels	Sand	Gravels
9.6	76	350.35		3.5		3.5		96.5			
4.8	38	1051.05		10.5		14.0		86.0			
2.4	25	770.77		7.7		21.7		78.3			
1.2	19	2172.17		21.7		43.4		56.6			
0.6	12.5	2372.57		23.7		67.1		32.9			
0.3	9.5	450.45		4.5		71.6		28.4			
0.15	4.8	1011.01		10.1		81.7		18.3			
0	2.4	1841.84		18.4		-		0.0			
	1.2										
	0.6										
	0.3										
	0.15										
	0										
	1 =	10010.00			2 =	303.0					

FINENESS : 3.03

Note :

Graph does not belong to zone 1 (BS-882)



SIEVE ANALYSIS ON FINE AGGREGATE

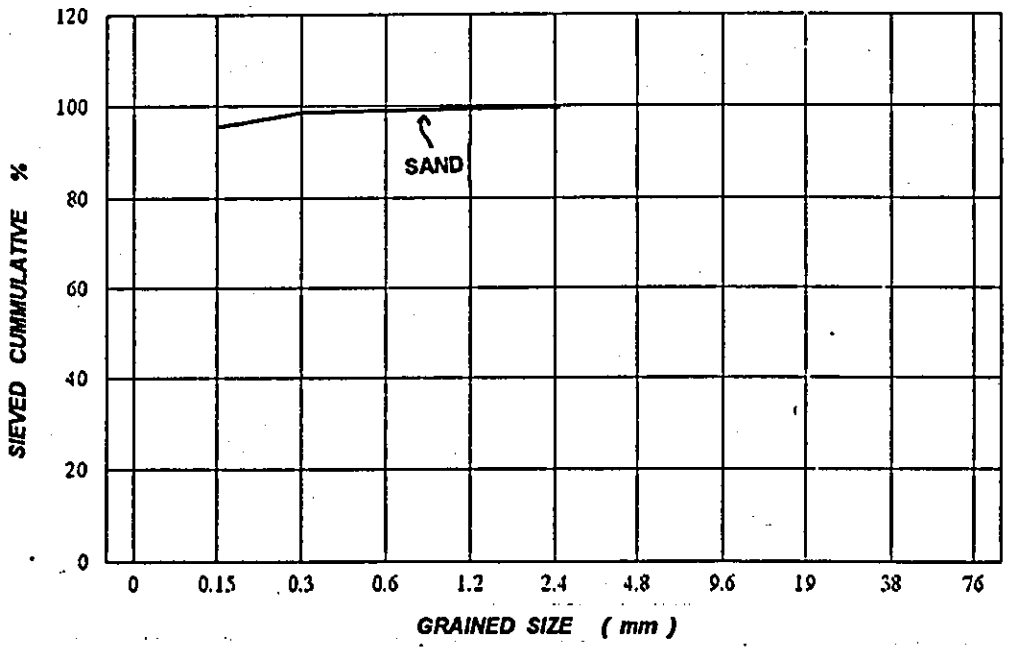
Project	: **Warsamson HEPP**		**Type / No.**	: **Makbon - 3 (SP - 3)**
Location	: **Sorong - Irian Jaya**		**Checked by**	:
Tested by	: **Ar**		**Date**	:
Date	: **13 February 1995**		**Signature**	:

SIEVE (mm)		Retained Weigh (gr)		% of Retained Weight (gr)		% of Retained Cummulative (gr)		% of Sieved Cummulative (gr)		Remarks	
Sand	Gravels	x			100%	Sand	Gravels	Sand	Gravels	Sand	Gravels
9.6	76										
4.8	38										
2.4	25	20		0.2		0.2		99.8			
1.2	19	10		0.1		0.3		99.7			
0.6	12.5	20		0.2		0.5		99.5			
0.3	9.5	40		0.4		0.9		99.1			
0.15	4.8	360		3.6		4.5		95.5			
0	2.4	9550		95.5		-					
	1.2										
	0.6										
	0.3										
	0.15										
	0										
	1 =	10,000			2 =	64.0					

FINENESS : 0.64

Note :

Graph does not belong to zone of gradation.



SIEVE ANALYSIS ON FINE AGGREGATE

Project : Warsamson HEPP
Location : Sorong - Irian Jaya
Tested by : Ar
Date : 13 February 1995

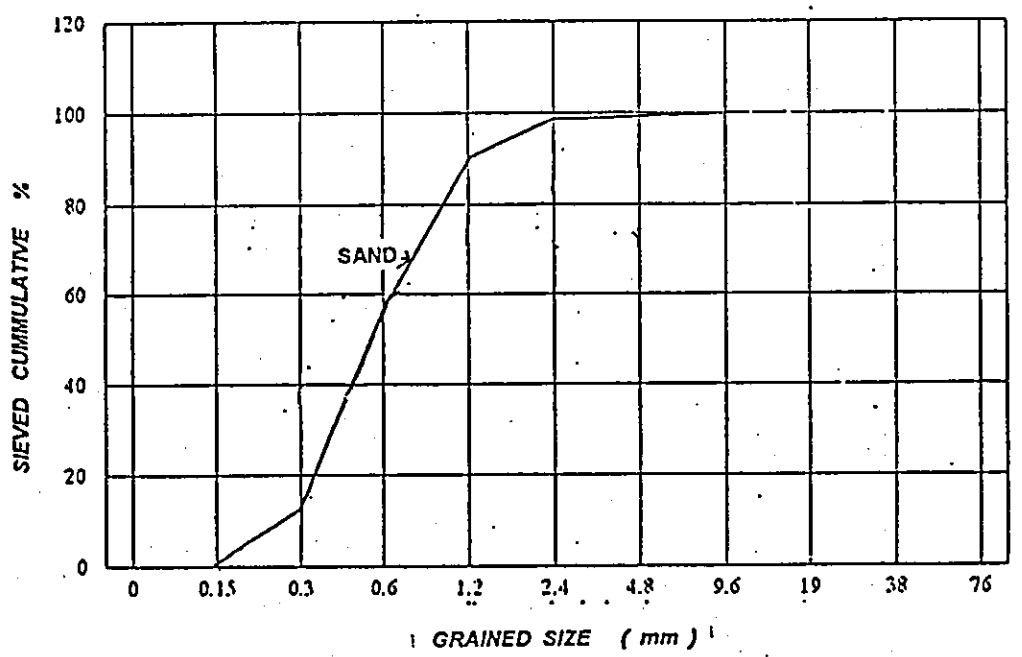
Type / No. : Warsamson (SP-4)
Checked by :
Date :
Signature :

SIEVE (mm)		Retained Weigh (gr)		% of Retained Weight (gr)		% of Retained Cummulative (gr)		% of Sieved Cummulative (gr)		Remarks	
Sand	Gravels	x			100%	Sand	Gravels	Sand	Gravels	Sand	Gravels
9.6	76							100.0			
4.8	38	30		0.3		0.3		99.7			
2.4	25	80		0.8		1.1		98.9			
1.2	19	600		6		7.1		92.9			
0.6	12.5	3500		35		42.1		57.9			
0.3	9.5	4440		44.4		86.5		13.5			
0.15	4.8	1250		12.5		99.0		1.0			
0	2.4	100		1		-					
	1.2										
	0.6										
	0.3										
	0.15										
	0										
	1 =	10,000			2 =	236.1					

FINENESS : 2.36

Note :

Sand belongs to zone 3
of gradation (BS-882)



SIEVE ANALYSIS ON COARSE AGGREGATE

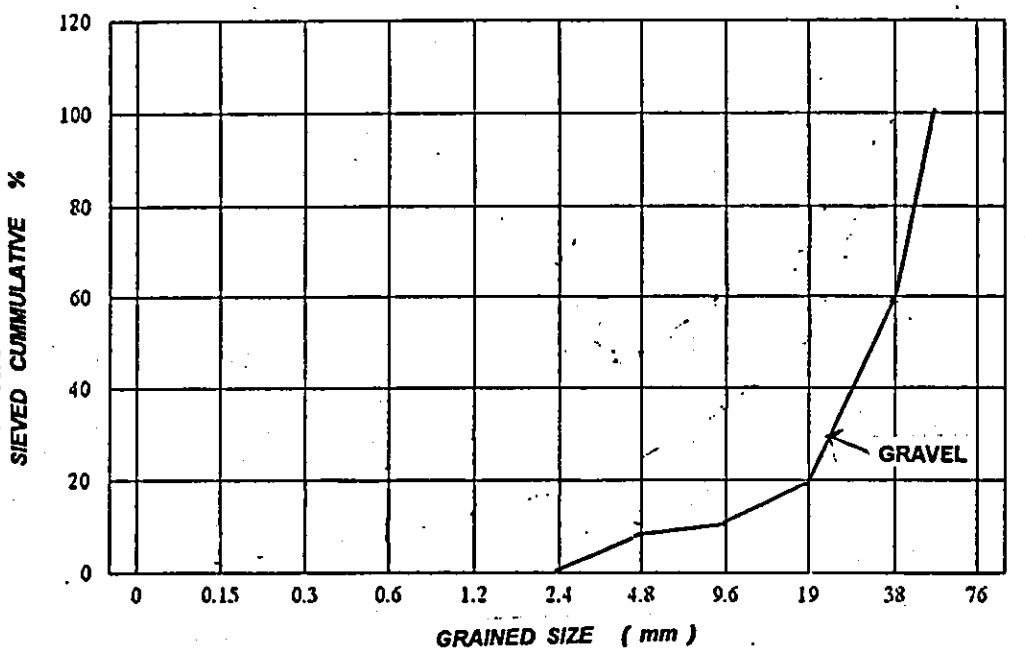
Project	: Warsamson HEPP		Type / No.	: BH - 6
Location	: Sorong - Irian Jaya		Checked by	:
Tested by	: Ar		Date	:
Date	: 13 February 1995		Signature	:

SIEVE (mm)		Retained Weigh (gr)		% of Retained Weight (gr)	% of Retained Cummulative (gr)		% of Sieved Cummulative (gr)		Remarks	
Sand	Gravels	x		100%	Sand	Gravels	Sand	Gravels	Sand	Gravels
9.6	76					0.0		100.0		
4.8	38		4945	41.4		41.4		58.6		
2.4	25		3882	32.5		73.9		26.1		
1.2	19		792	6.6		90.5		19.5		
0.6	12.5		623	5.2		85.7		14.3		
0.3	9.5		407	3.4		89.1		10.9		
0.15	4.8		495	4.2		93.3		6.7		
0	2.4		795	6.7		100.0		5.0		
	1.2					100.0				
	0.6					100.0				
	0.3					100.0				
	0.15					100.0				
	0									
	1 =		11,939	2 =		804.3				

FINENESS : 8.04

Note :

Graph of rock is outside the graph of sand + gravels mixture.



SIEVE ANALYSIS ON COARSE AGGREGATE

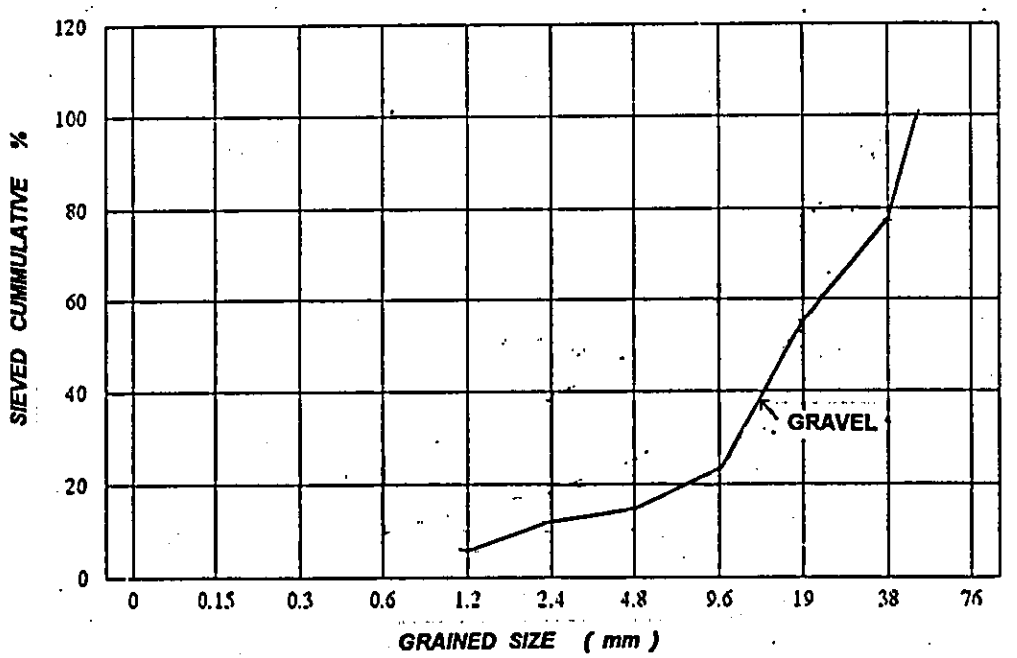
Project	: **Warsamson HEPP**	**Type / No.**	: **Limestone**
Location	: **Sorong - Irian Jaya**	**Checked by**	:
Tested by	: **Ar**	**Date**	:
Date	: **13 February 1995**	**Signature**	:

SIEVE (mm)		Retained Weigh (gr)		% of Retained Weight (gr)	% of Retained Cummulative (gr)		% of Sieved Cummulative (gr)		Remarks	
Sand	Gravels	x		100%	Sand	Gravels	Sand	Gravels	Sand	Gravels
9.6	76							100.0		
4.8	38		2361	22.85		22.9		77.1		
2.4	25		4670	45.20		68.0		54.8		
1.2	19		1002	9.70		77.8		22.2		
0.6	12.5		787	7.62		85.4		14.6		
0.3	9.5		298	2.88		88.3		11.7		
0.15	4.8		603	5.80		94.1		5.9		
0	2.4		612	5.92		100.0				
	1.2					100.0				
	0.6					100.0				
	0.3					100.0				
	0.15					100.0				
	1 =		10,333	2 =		783.1				

FINENESS : 7.83

Note :

Graph of rock, outside the zone of sand + gravels mixture.



SIEVE ANALYSIS ON COARSE AGGREGATE

Project : Warsamson HEPP
Location : Sorong - Irian Jaya
Tested by : Ar
Date : 13 February 1995

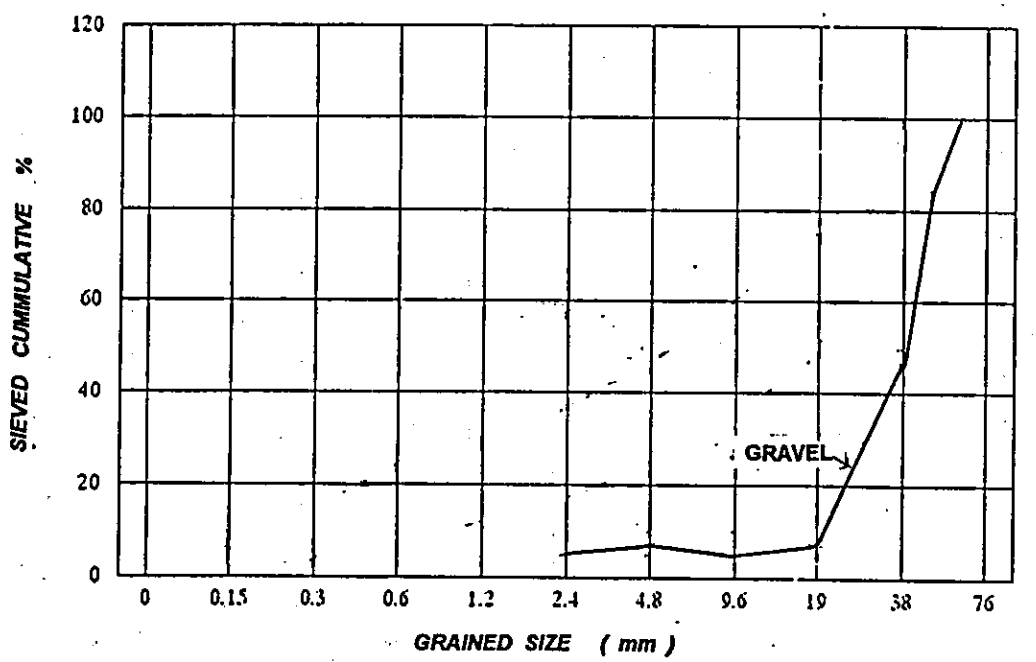
Type / No. : Breccia
Checked by :
Date :
Signature :

SIEVE (mm)		Retained Weigh (gr)		% of Retained Weight (gr)	% of Retained Cummulative (gr)		% of Sieved Cummulative (gr)		Remarks	
Sand	Gravels	x		100%	Sand	Gravels	Sand	Gravels	Sand	Gravels
9.6	50		2476	17.2		-		82.8		
4.8	38		5195	36.0		53.2		46.8		
2.4	25		4850	33.6		86.8		13.2		
1.2	19		698	4.8		91.6		8.4		
0.6	12.5		440	3.0		94.6		5.4		
0.3	9.5		140	1.0		95.6		4.4		
0.15	4.8		211	1.5		92.1		7.9		
0	2.4		419	2.9		95.0		5.0		
	1.2					100.0				
	0.6					100.0				
	0.3					100.0				
	0.15					100.0				
	0									
	1 =		14.429	2 =		827.5				

FINENESS : 8.28

Note :

Graph of rock, outside the zone of sand + gravels mixture.



RESULT OF
ALKALI REACTIVITY TEST

Project : Warsamson HEPP
Location : Sorong, Irian Jaya
Date of test :

No.	Sample No.	Rc	Sc	Unit	Remark
1	SP - 1	170.10	84.42	mmol / L	Fine Aggregate
2	SP - 2	187.11	65.93	mmol / L	Fine Aggregate
3	SP - 3	277.83	62.60	mmol / L	Fine Aggregate
4	SP - 4	170.10	102.90	mmol / L	Fine Aggregate
5	BH - 6	170.10	34.63	mmol / L	Coarse Aggregate
6	Limestone (S. Warsamson)	96.39	41.96	mmol / L	Coarse Aggregate
7	Breccia (Near Batu Lubang Village)	277.83	95.90	mmol / L	Coarse Aggregate

SOUNDNESS TEST

PROJECT : WARSAMSON HEPP
LOCATION : Sorong - Irian Jaya

Solution used for the test : Na2SO4

NO OF SAMPLE	SIEVE SIZE (mm)	WEIGHT (gr)	WEIGHT OF TESTED FRACTIONS BEFORE TEST (gr)	WEIGHT PERCENTAGE PASSING DESIGNATED SIEVE AFTER TEST	WEIGHT PERCENTAGE LOSS
SP - 1	2.36-1.18	100	100	17.9	1.59
(sand)	1.18 - 0.60	100	100	30.0	4.74
SP - 2	4.8 - 2.4	100	100	30.6	3.66
(sand)	2.4 - 1.2	100	100	24.1	2.14
	1.2 - 0.6	100	100	4.4	2.7
	0.6 - 0.3	100	100	3.3	0.1
SP - 4	2.4 - 1.2	100	100	18.2	0.05
(sand)	1.2 - 0.6	100	100	4.5	0.04
	0.6 - 0.3	100	100	13.0	9.9
BH - 6	63 - 50	1990	1990	2.81	0.55
(coarse aggregate)	50 - 38	2980	2980	3.75	0.62
LIMESTONE	30 - 19	1500	1500	0.67	0.44
(coarse aggregate)	19 - 9.5	1000	1000	2.00	1.79
LAVA BRECCIA (coarse aggregate)	36 - 25	1650	1650	5.7	2.65

NOTE :

A:\lab\soundnes

LOS ANGELES ABRASSION TEST

Project : Warsamson HEPP
Location : Sorong - Irian Jaya
Tested by : Ar
Date of test : February 13, 1995 Type : BH - 6

No.	Sieve No. (mm)		Weight of Sample After Oven (gram)		Weight of Sample After Tested (gram)		Weight Difference (gram)	Abrasion After Tested (%)
	Passing	Retained	a	b	a	b	(4) - (6) o (5) - (7)	(8) / (4) or (5) x 100 %
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	50.00 37.50	37.50 25.00	5000 5009					
			10009		8223		1786	17.8

SUSTAIN TO ABRASION USING RUDELOFF CONTAINER

Sieve Diameter (mm)	Weight of Sample on vol. of 1.1 l (gr)	Weight of Retained Sample on sieve dia. of more than 2.0 mm	Weight of Passing Sample on dia. 2 mm	
			(gr)	(%)
30 - 19	1,369.50	1290	79.5	5.8

LOS ANGELES ABRASSION TEST

Project : Warsamson HEPP
Location : Sorong - Irian Jaya
Tested by : Ar
Date of test : February 13, 1995 Type : Limestone

No.	Sieve No. (mm)		Weight of Sample After Oven (gram)		Weight of Sample After Tested (gram)		Weight Difference (gram)	Abrasion After Tested (%)
	Passing	Retained	a	b	a	b	(4) - (6) or (5) - (7)	(8) / (4) or (5) x 100 %
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	50.00 37.50	37.50 25.00	5002 5010 10012		7103		2909	29.6

SUSTAIN TO ABRASION USING RUDELOFF CONTAINER

Sieve Diameter (mm)	Weight of Sample on vol. of 1.1 l (gr)	Weight of Retained Sample on sieve dia. of more than 2.0 mm	Weight of Passing Sample on dia. 2 mm	
			(gr)	(%)
30 - 19	1,471.80	1210	261.8	17.78

LOS ANGELES ABRASSION TEST

Project : Warsamson HEPP
Location : Sorong - Irian Jaya
Tested by : Ar
Date of test : February 13, 1995

Type : Breccia

No.	Sieve No. (mm)		Weight of Sample After Oven (gram)		Weight of Sample After Tested (gram)		Weight Difference (gram)	Abrasion After Tested (%)
	Passing	Retained	a	b	a	b	(4) - (6) or (5) - (7)	(8) / ---------- x 100 % (4) or (5)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	50.00 37.50	37.50 25.00	5008 5000 10008		6236		3772	37.7

SUSTAIN TO ABRASION USING RUDELOFF CONTAINER

Sieve Diameter (mm)	Weight of Sample on vol. of 1.1 l (gr)	Weight of Retained Sample on sieve dia. of more than 2.0 mm	Weight of Passing Sample on dia. 2 mm	
			(gr)	(%)
30 - 19	1,369.50	1170	199.5	14.57

HARDNESS INDEX OF FINE AGGREGATE USING THE CRUSHING METHODE

No : Makbon - 1 (SP - 1)

Description	Sample A	Standard B
Weight of Sample (gr)	100	100
Weight after crushed :		
- Retained in sieve diameter 0.3 mm (gr)	13.7	60.4
- Passing the sieve diameter of 0.3 mm (gr)	86.3	39.6
Hardness Index : A / B	2.18	

No : Makbon - 2 (SP - 2)

Description	Sample A	Standard B
Weight of Sample (gr)	100	100
Weight after crushed :		
- Retained in sieve diameter 0.3 mm (gr)	79.7	92.7
- Passing the sieve diameter of 0.3 mm (gr)	20.3	7.3
Hardness Index : A / B	2.78	

No : Warsamson (SP - 4)

Description	Sample A	Standard B
Weight of Sample (gr)	100	100
Weight after crushed :		
- Retained in sieve diameter 0.3 mm (gr)	83.1	85.4
- Passing the sieve diameter of 0.3 mm (gr)	16.9	14.6
Hardness Index : A / B	1.16	

TEST OF SAND
ON ORGANIC CONTENT

Project	: WARSAMSON HEPP	Checked by	:
Location	: Sorong - Irja	Date	:
Tested by	: Ar	Signature	:
Date	: 13 February 1995	Type	: Fine Aggregate

No	Type	Volume of sample in the Erlenmayer (cm^3)	Volume No. OH 3% in the Erlenmayer (cm^3)	Sample's Color after 24 hours compared with Standard's Color (tanmin solution)
SP - 1	Sand	130	200	The color is brighter
		130	200	than the standard (No. 2)
		130	200	No, Organic matter
SP - 2	Sand	130	200	The color is brighter
		130	200	than the standard (No. 2)
		130	300	No, Organic matter
SP - 3	Sand	130	200	The color is brighter
		130	200	than the standard (No. 2)
		130	200	No, Organic matter
SP - 4	Sand	130	200	The color is brighter
		130	200	than the standard (No. 2)
		130	200	No, Organic matter

Remarks :

MUD AND CLAY CONTENT OF SAND / GRAVELS

Project : Warsamson HEPP
Location : Sorong - Irian Jaya
Tested by : Ar
Date : February 13, 1995
Type : Fine Aggregate

No	Type	Dried Weight in Oven (gr)		%	Remarks
		Sample Before cleaned	Sample After Cleaned	Mud & Clay Content	
1	SP - 1	200	191.84	4.08	
		200	191.70	4.15	
		200	191.86	4.07	
				Avg = 4.10	
2	SP - 2	200	191.50	4.25	
		200	191.70	4.15	
		200	191.60	4.20	
				Avg = 4.20	
3	SP - 3	100	62.10	37.90	
		100	62.30	37.70	
				Avg = 37.80	
4	SP - 4	200	198.00	1.00	
		200	197.20	1.40	
		200	197.00	1.50	
				Avg = 1.30	

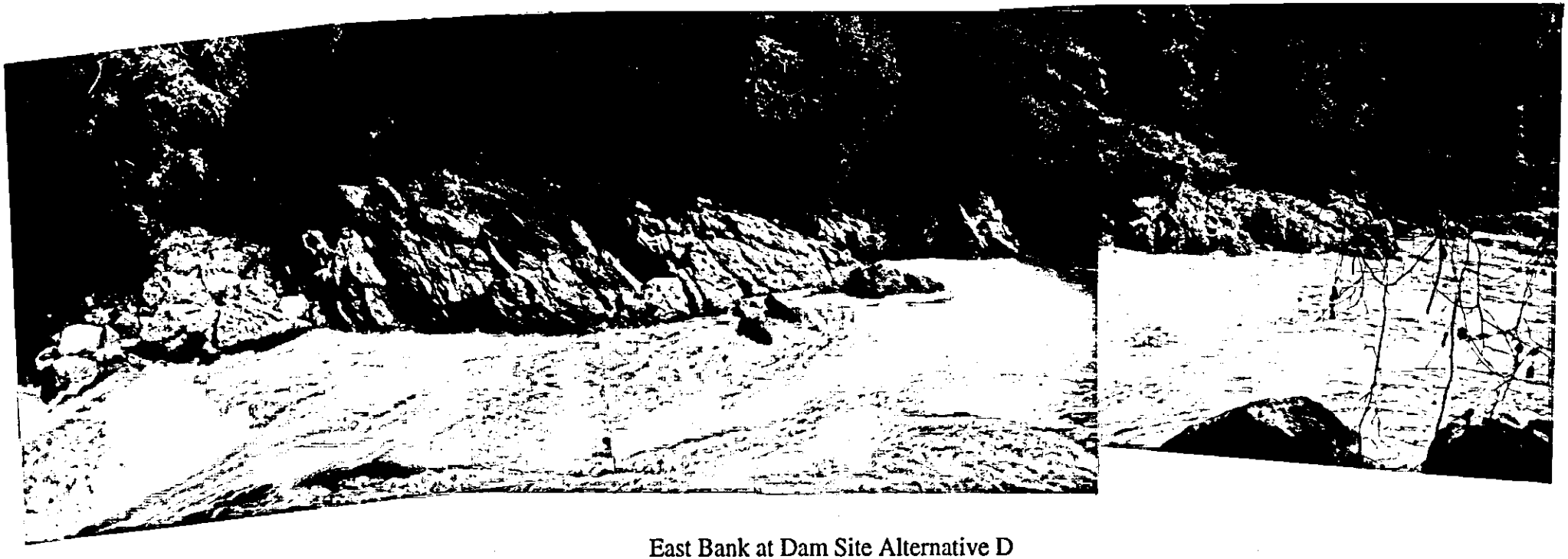
APPENDIX E

Photographs of Field Work Activities

SITE CONDITION

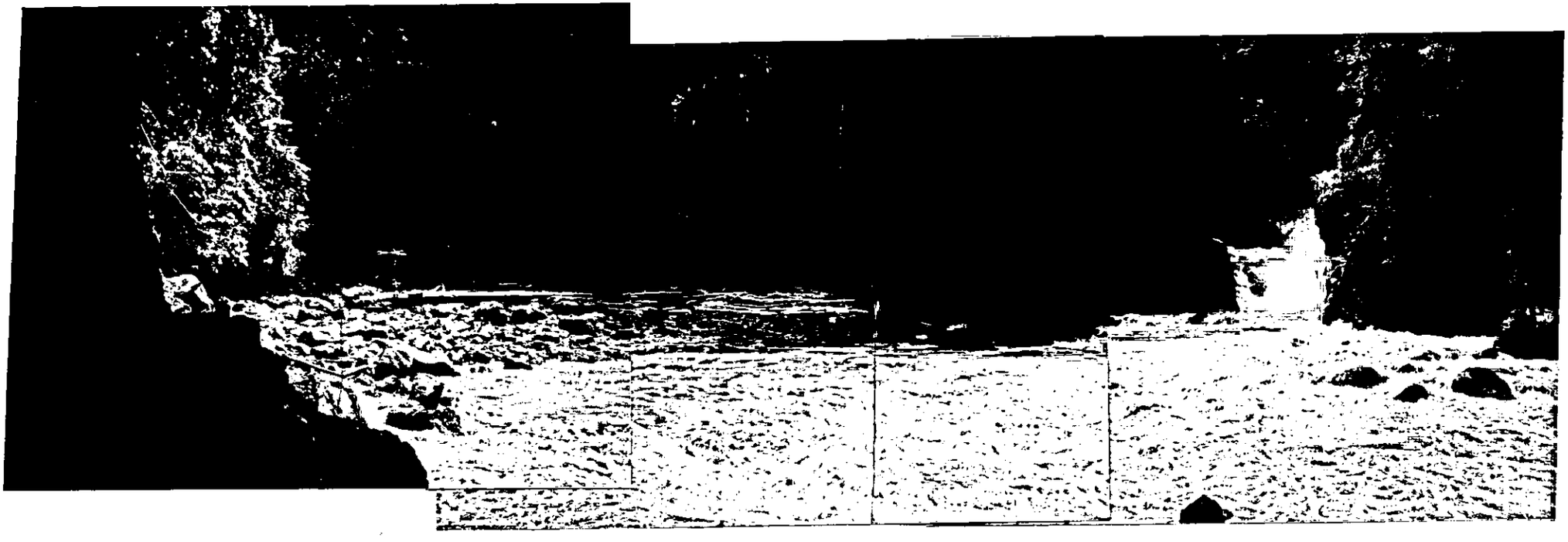
West Bank at Dam Site Alternative D

SITE CONDITION



East Bank at Dam Site Alternative D

SITE CONDITION

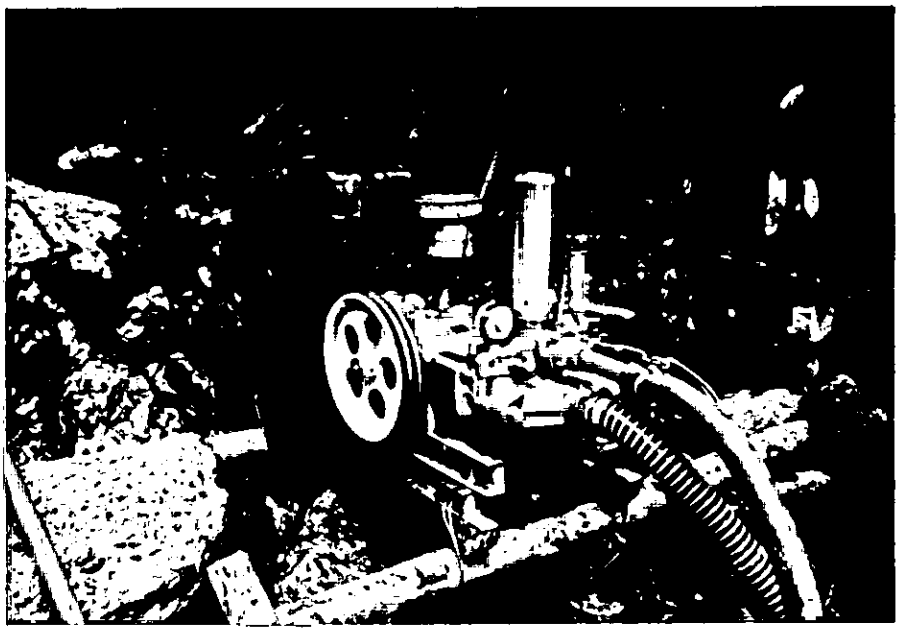


Power House Area (Southward View)

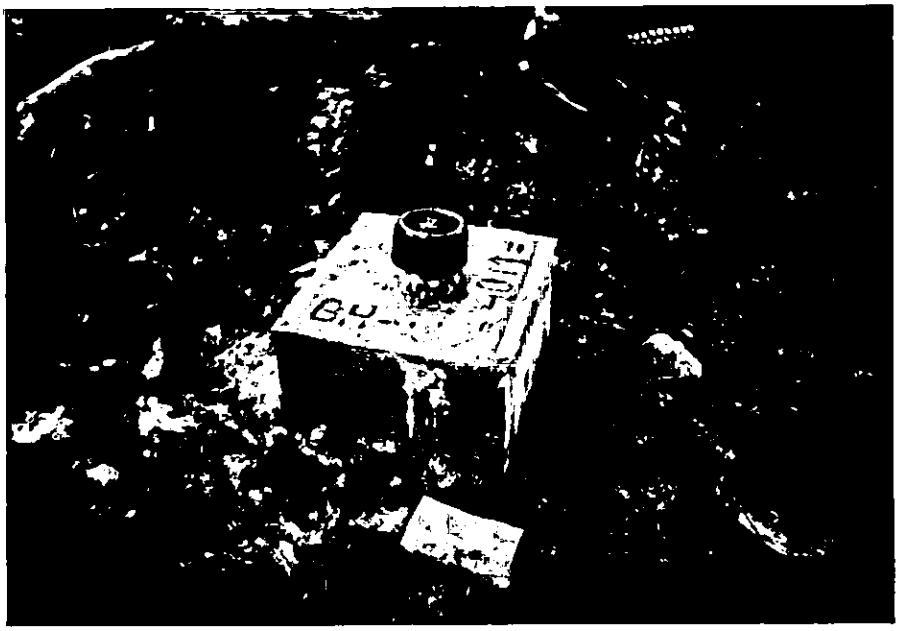
EXPLORATORY DRILLING

Vertical Drilling at Borehole BH -14

Inclined Drilling at Borehole BH -5 (40 degrees)

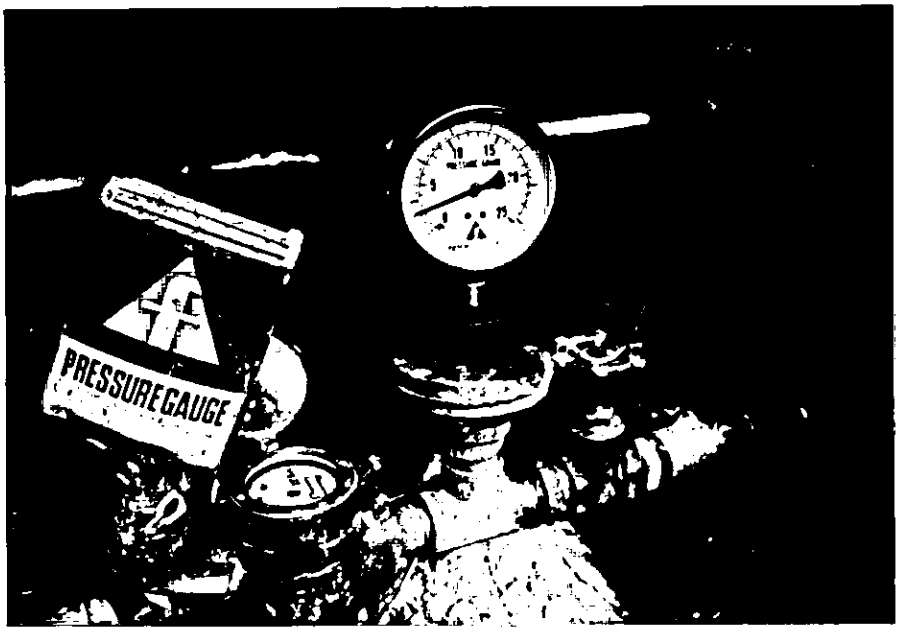


The Water Pump for Supplying the Drilling Water



Concrete Block at the Location of Completed Borehole (BH -11)

The Expandable Packer, High Pressure Tubing and Air Pump



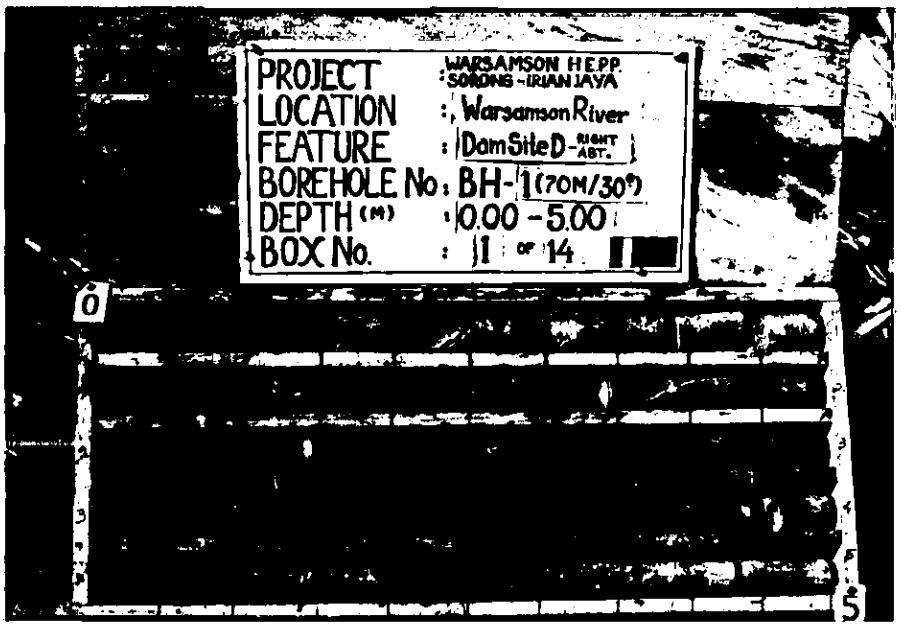
The Pressure Gauge

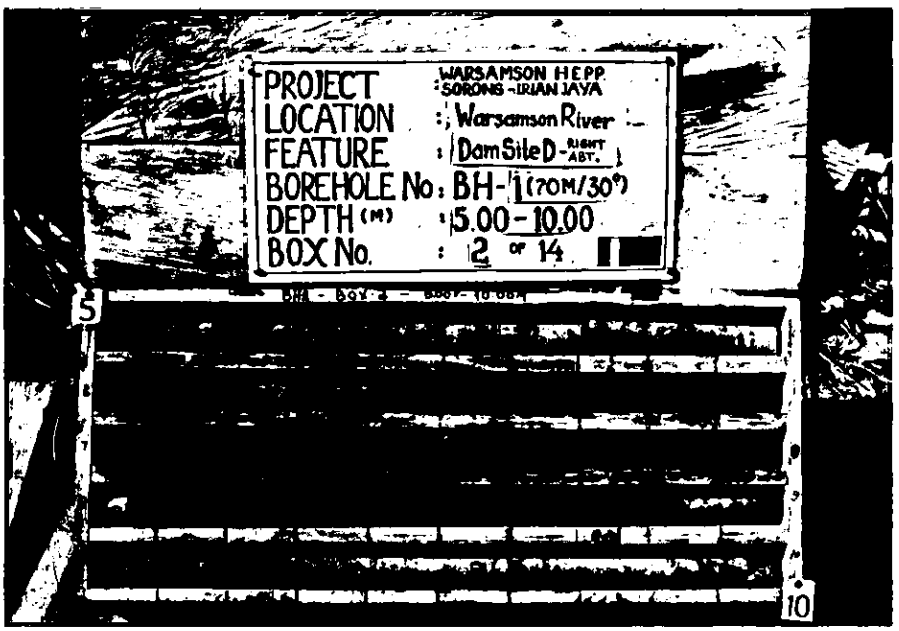
The Field Graph, Seismic Amplifier and Blaster

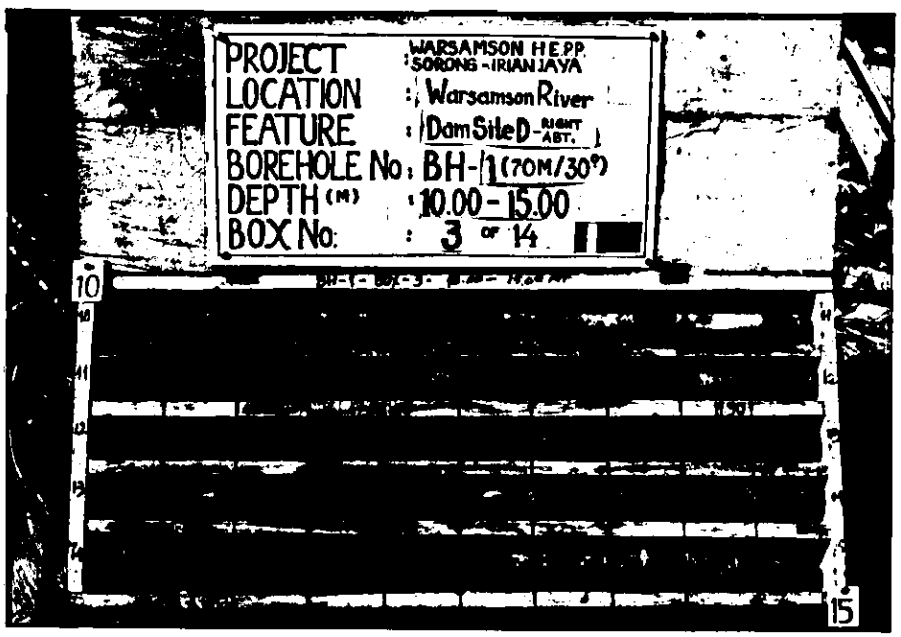
The Geophone

APPENDIX F

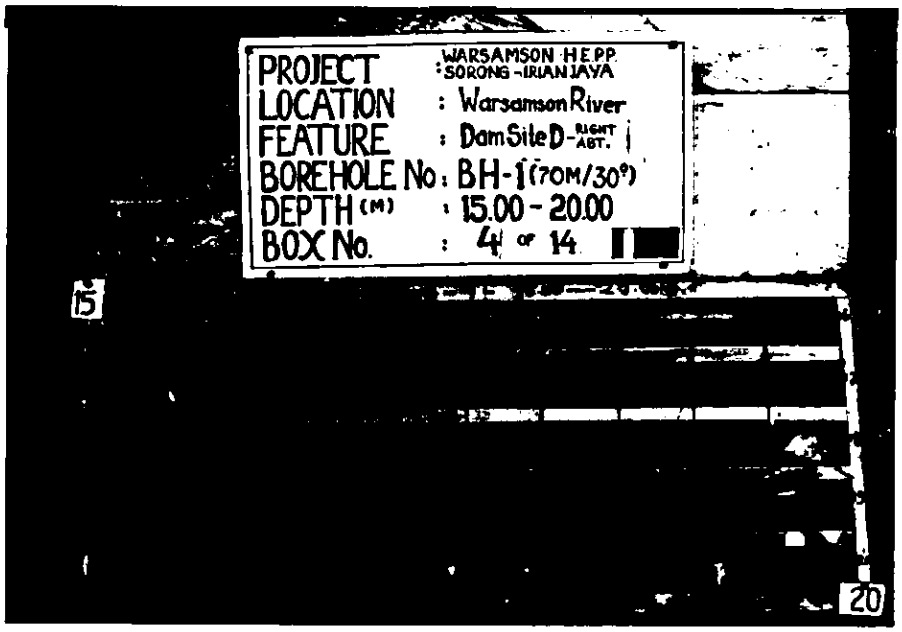
Photographs of Core Samples

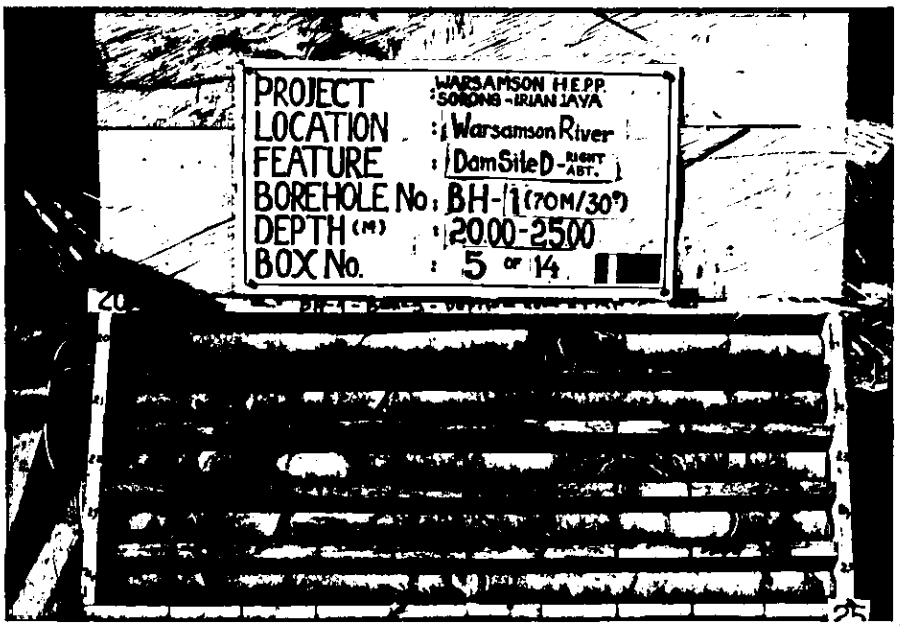


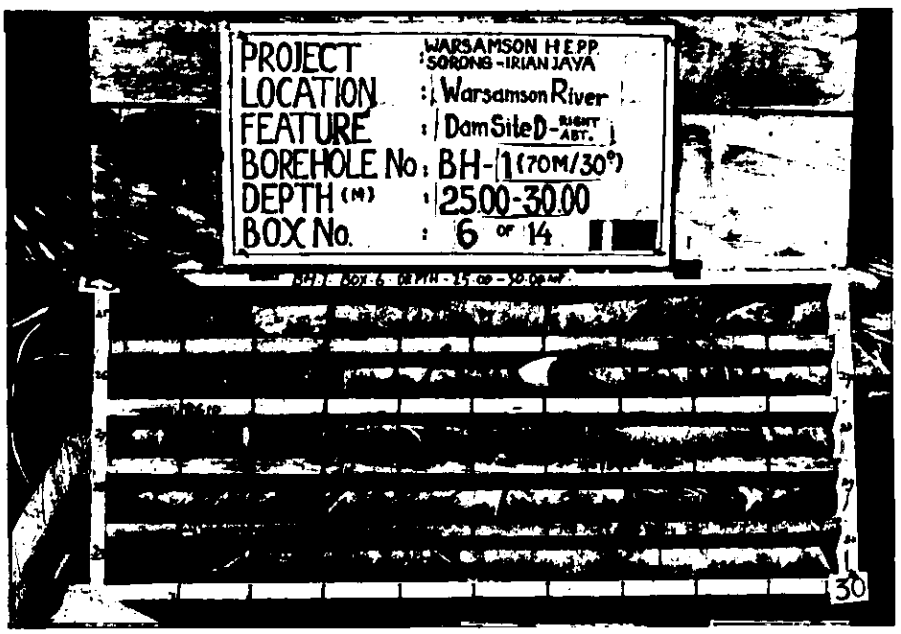




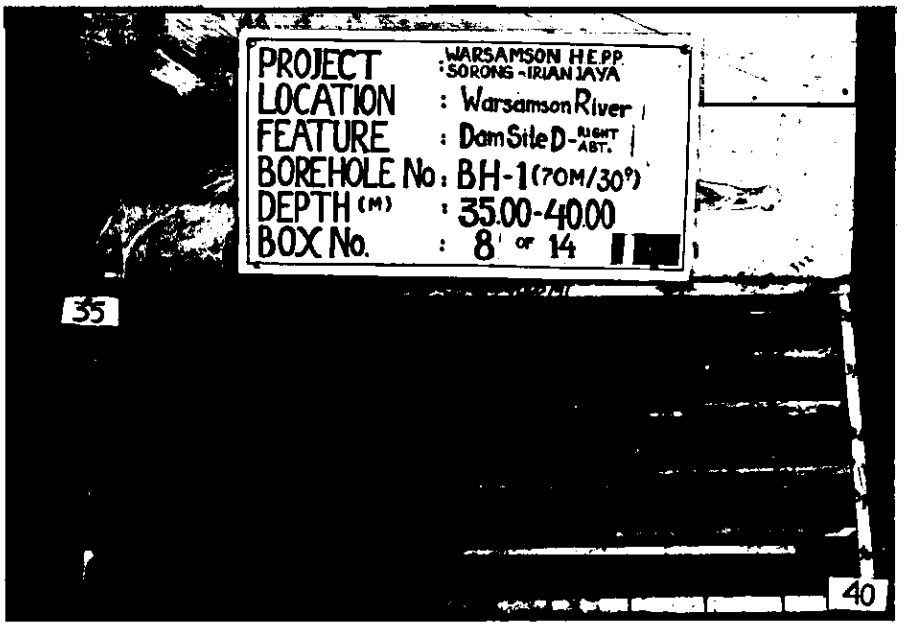
Core Box BH - 1 , Total Depth : 70.00m
Box No. 1 ~ 3 (0.00 - 15.00) m

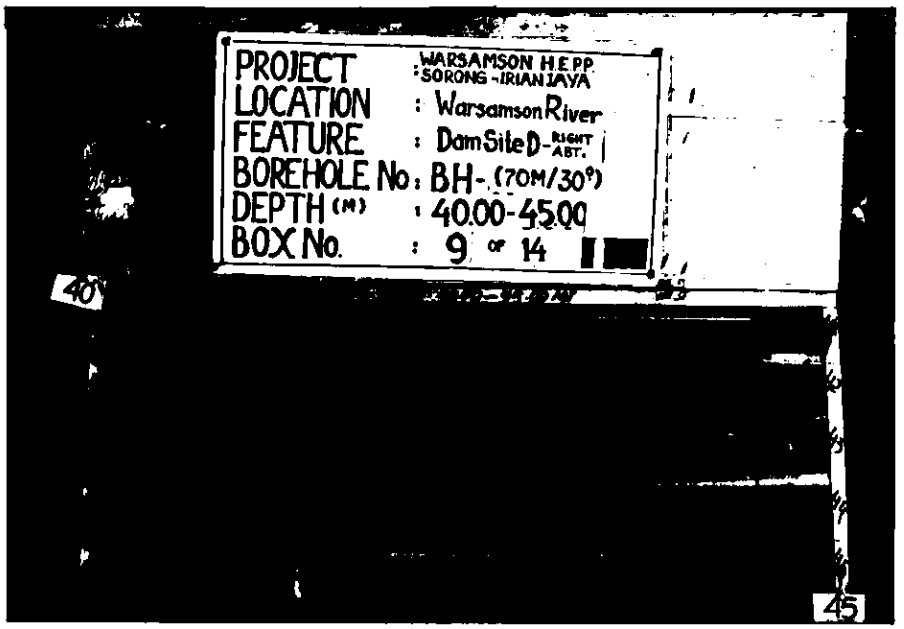




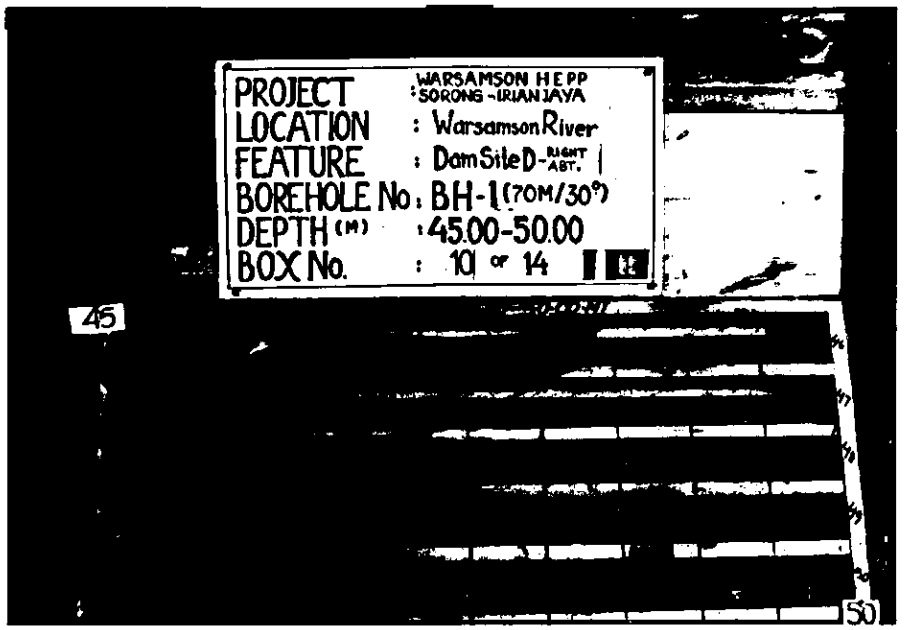


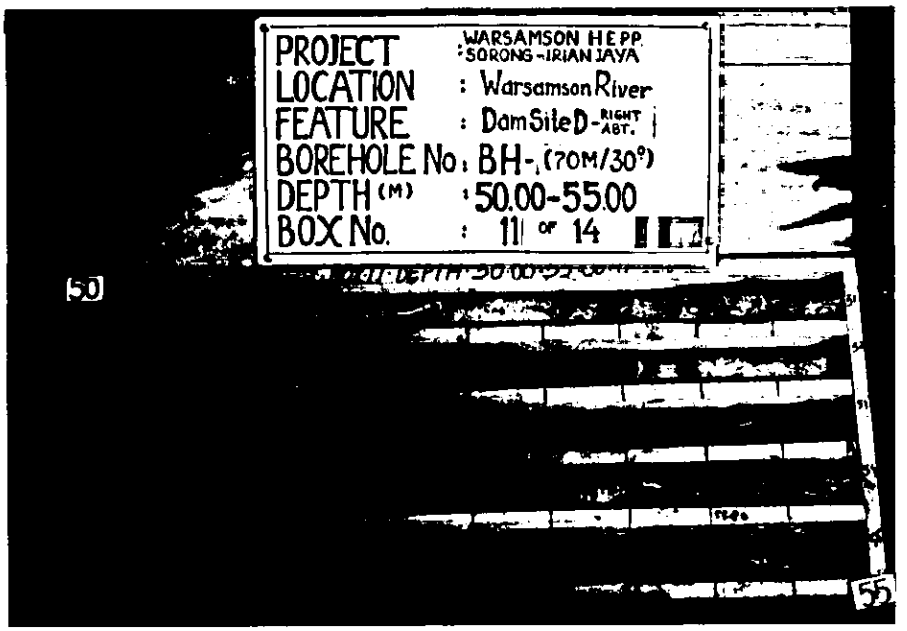
Core Box BH - 1 , Total Depth : 70.00m
Box No. 4 ~ 6 (15.00 - 30.00) m

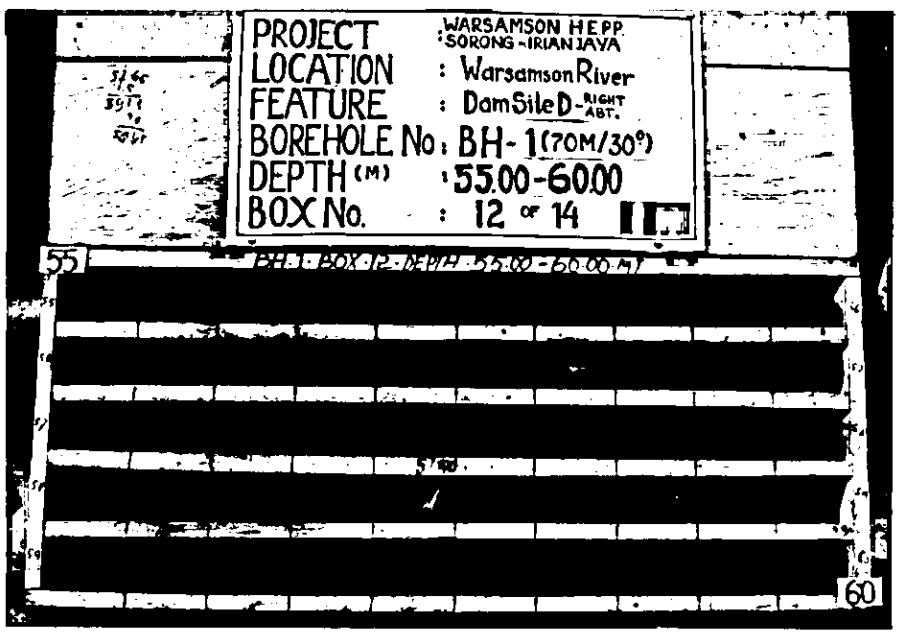




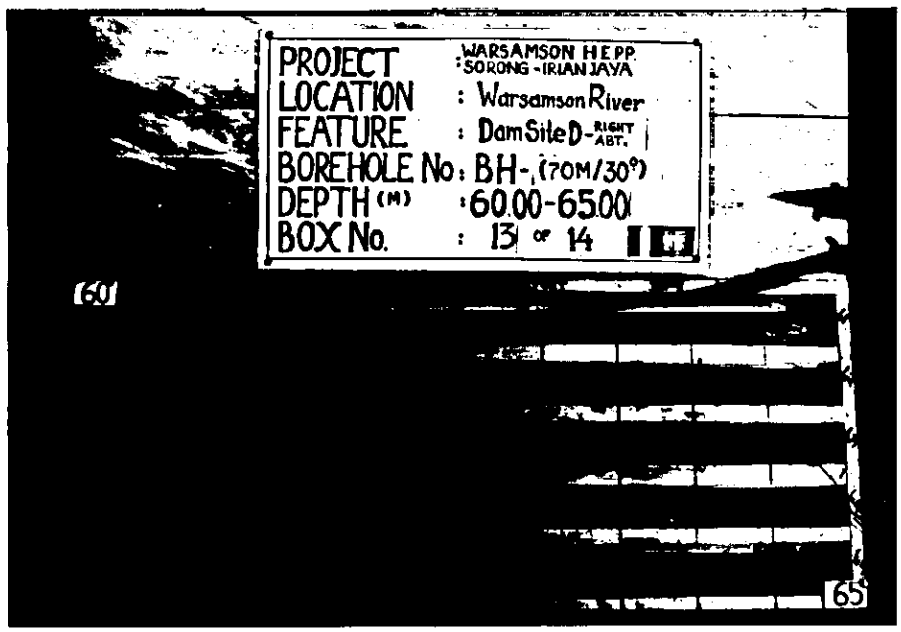
Core Box BH - 1 , Total Depth : 70.00m
Box No. 7 ~ 9 (30.00 - 45.00) m



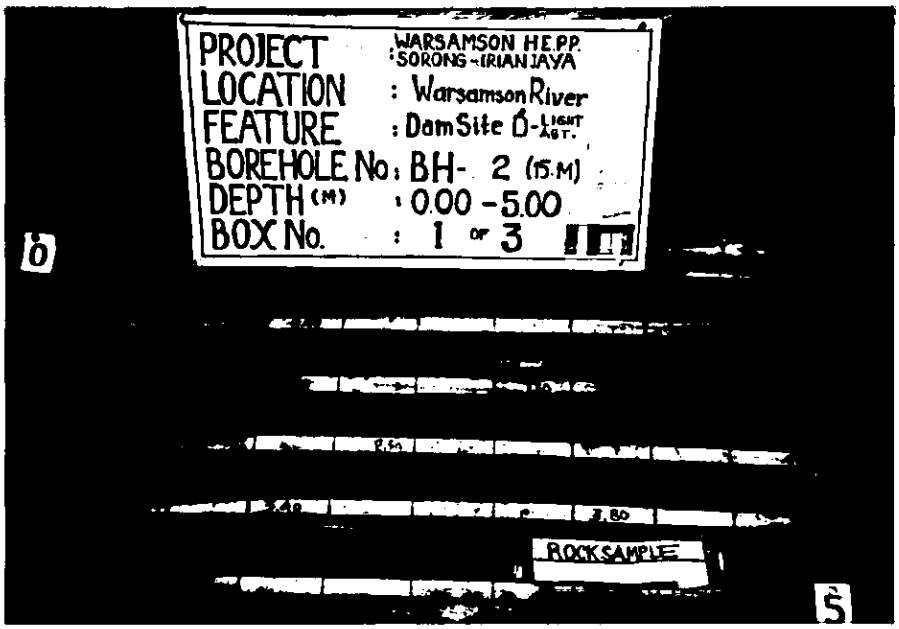


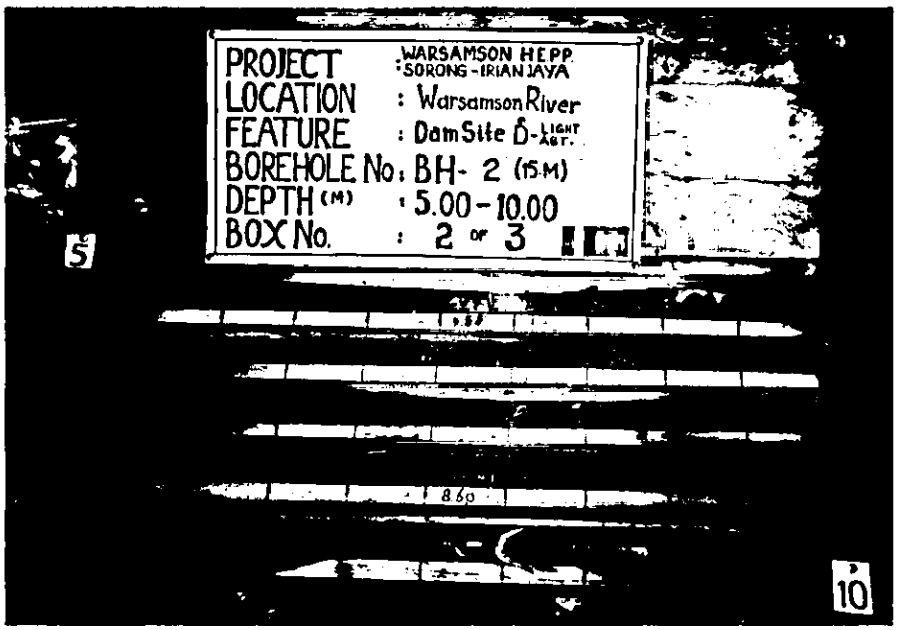


Core Box BH - 1 , Total Depth : 70.00m
Box No. 10 ~ 12 (45.00 - 60.00) m

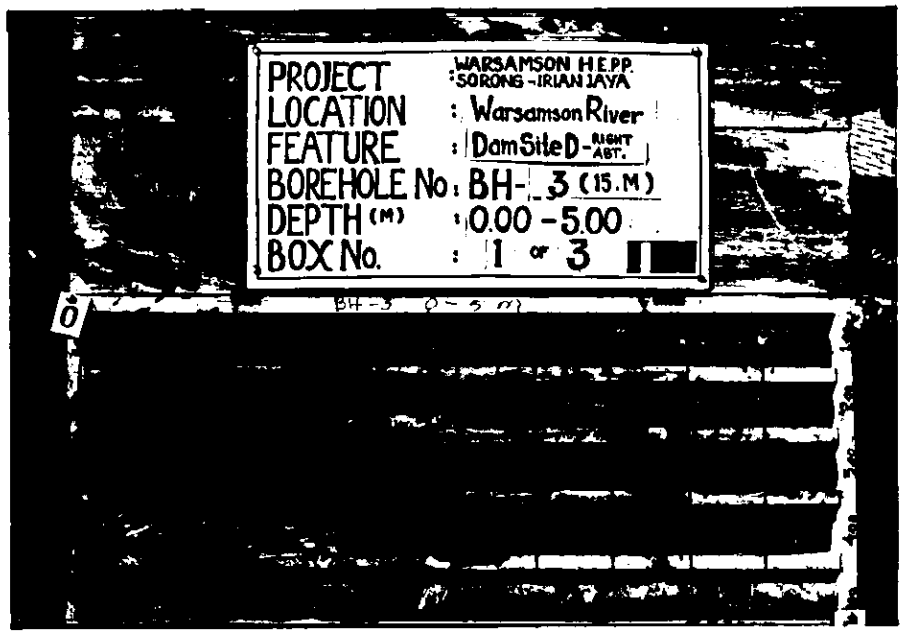


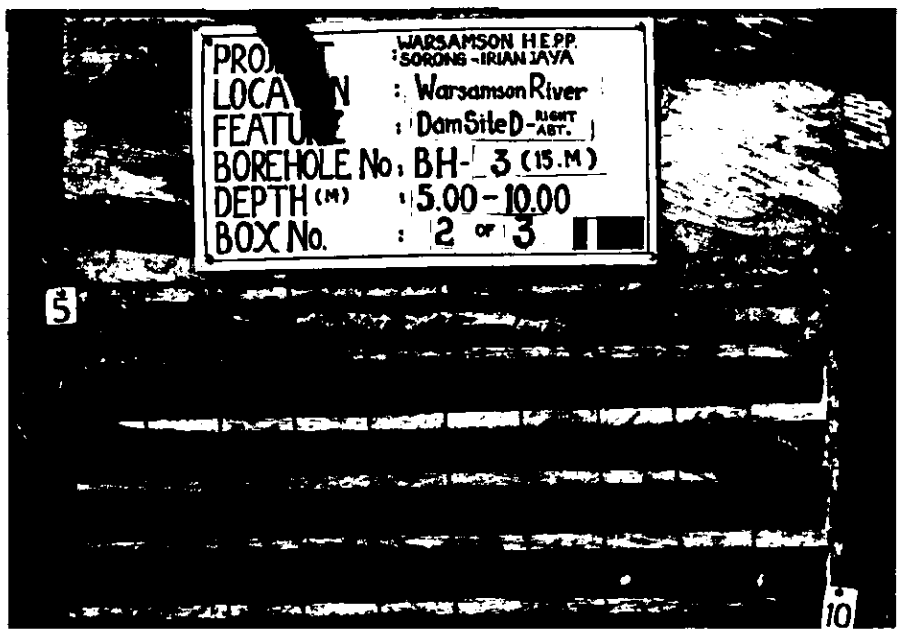
Core Box BH - 1 , Total Depth : 70.00m
Box No. 13 ~ 14 (60.00 - 70.00) m

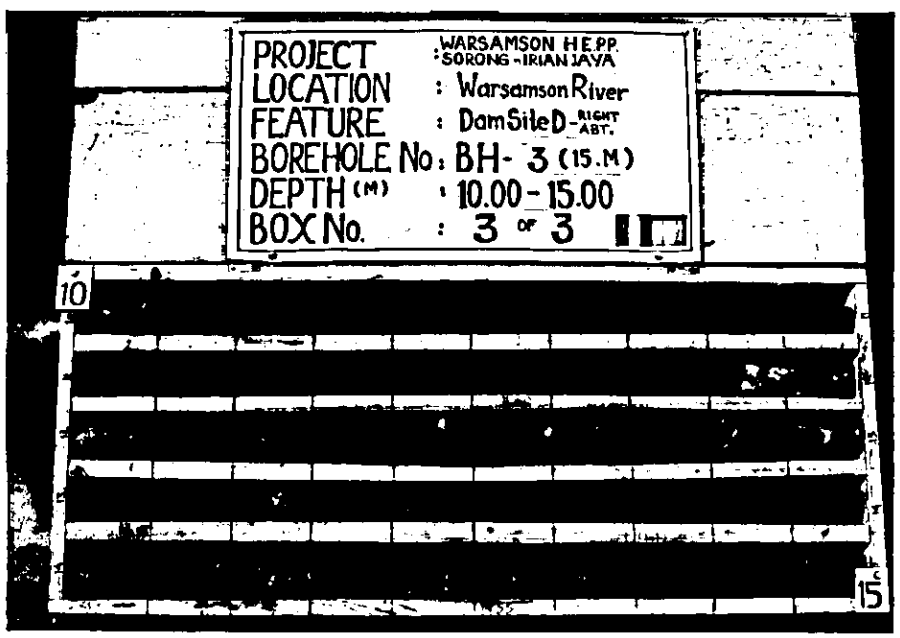




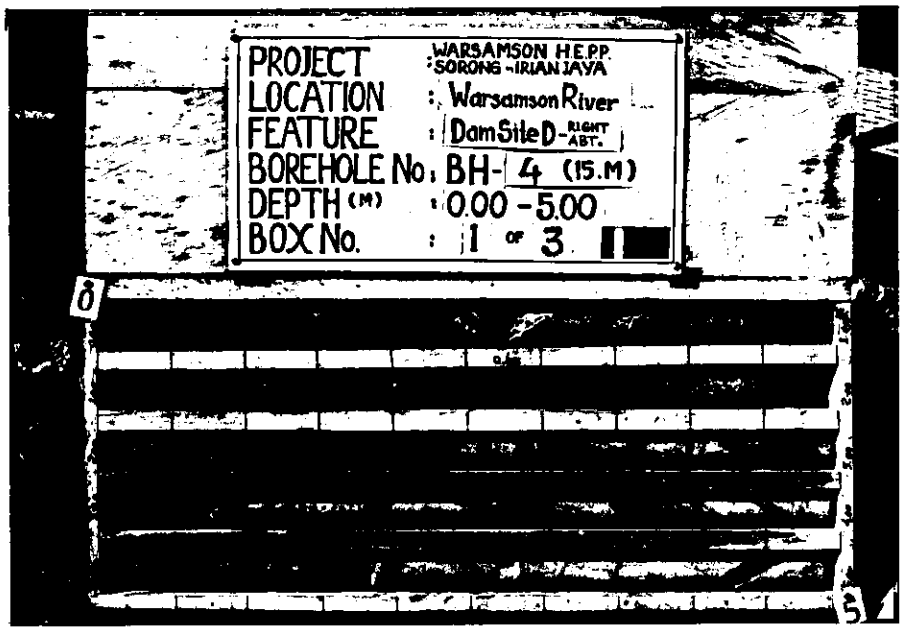
Core Box BH - 2 , Total Depth : 15.00m
Box No. 1 ~ 3 (0.00 - 15.00) m

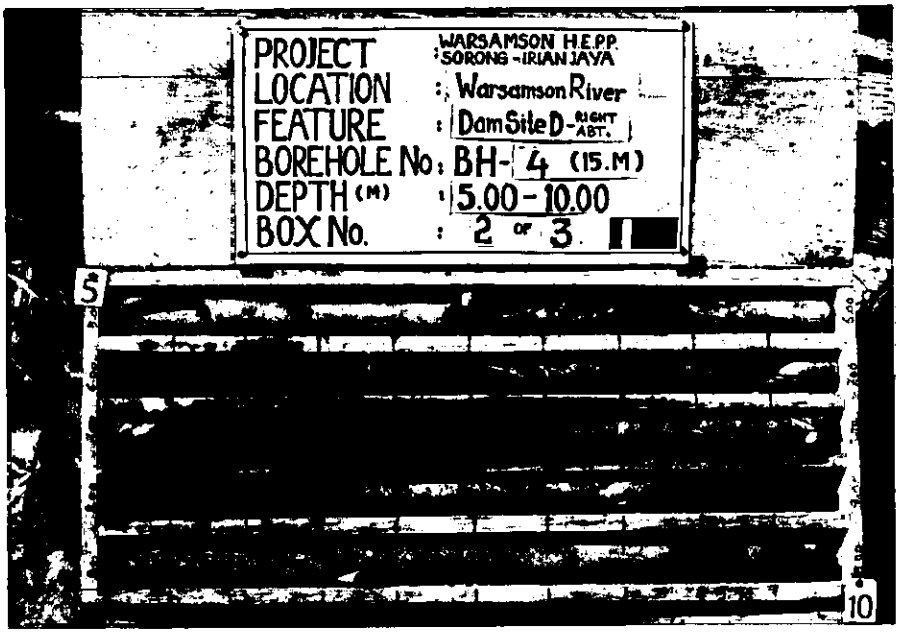




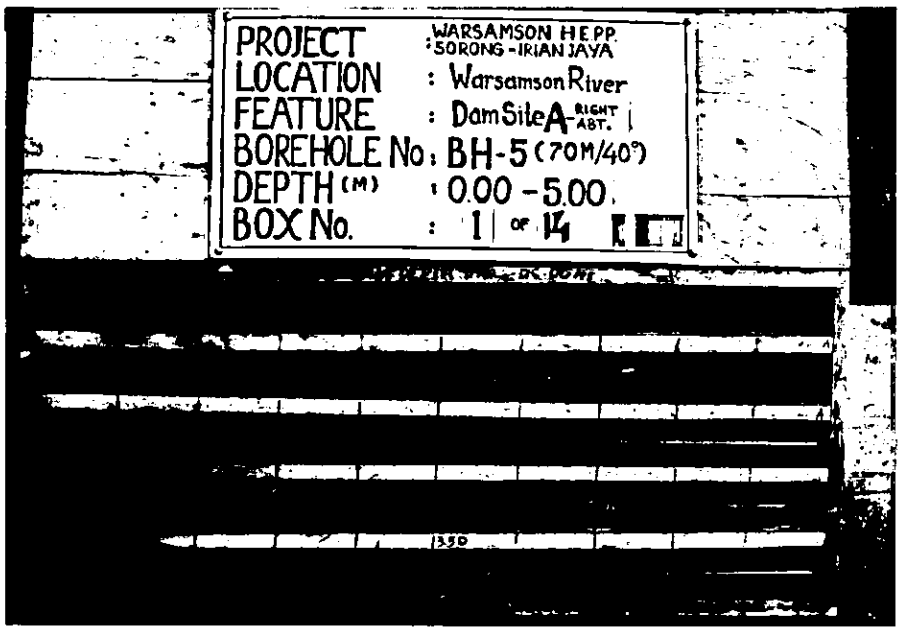


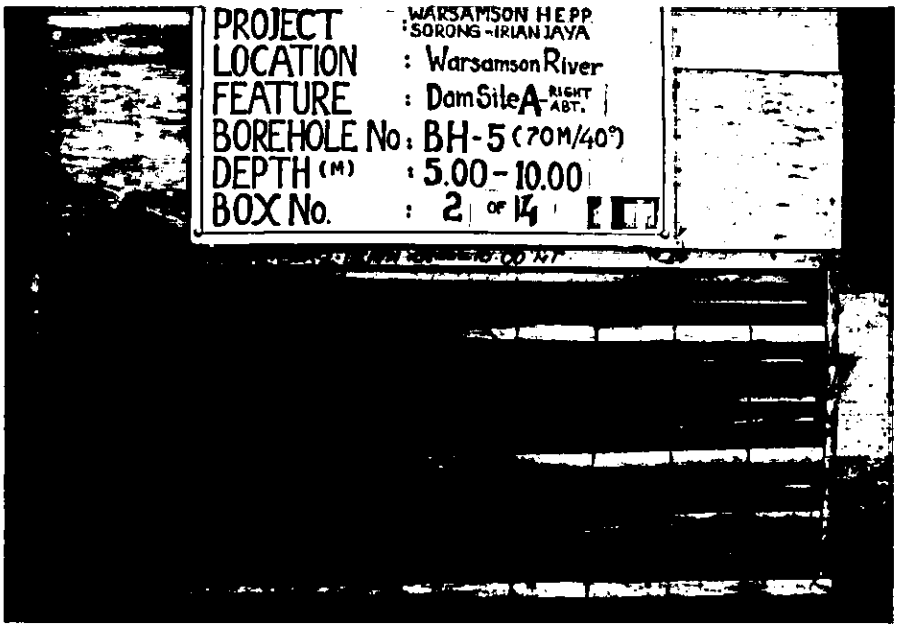
Core Box BH - 3 , Total Depth : 15.00m
Box No. 1 ~ 3 (0.00 - 15.00) m

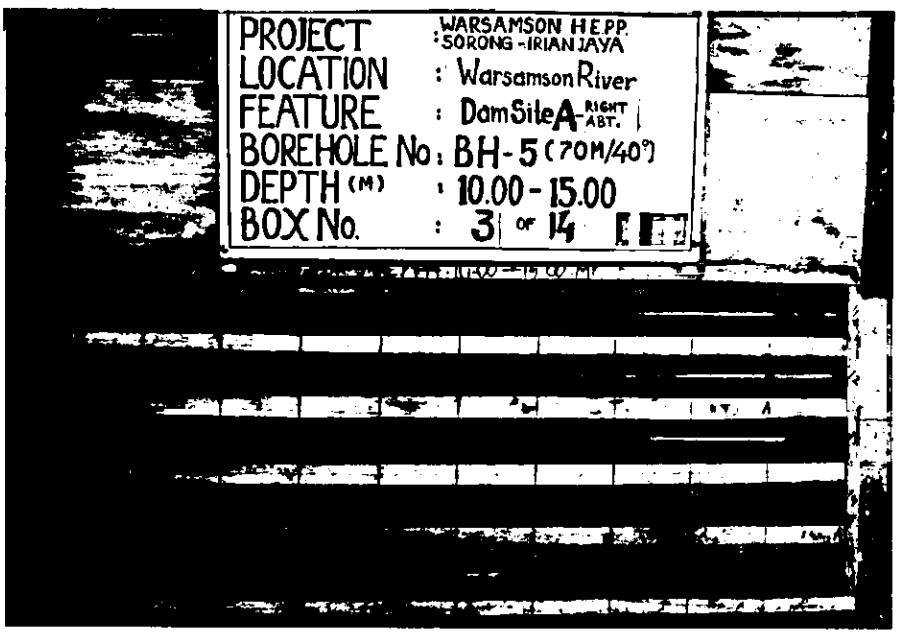




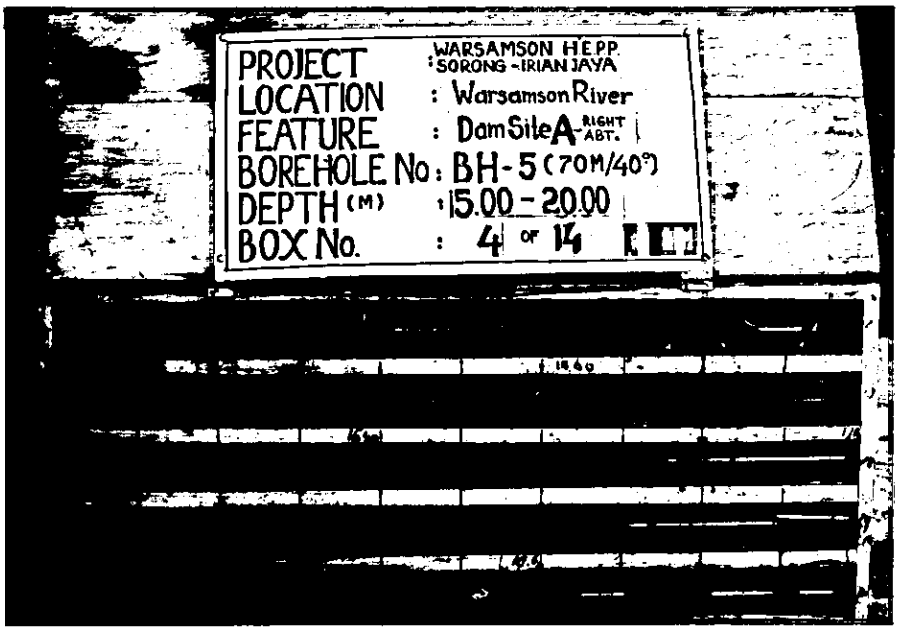
Core Box BH - 4 , Total Depth : 15.00m
Box No. 1 ~ 3 (0.00 - 15.00) m

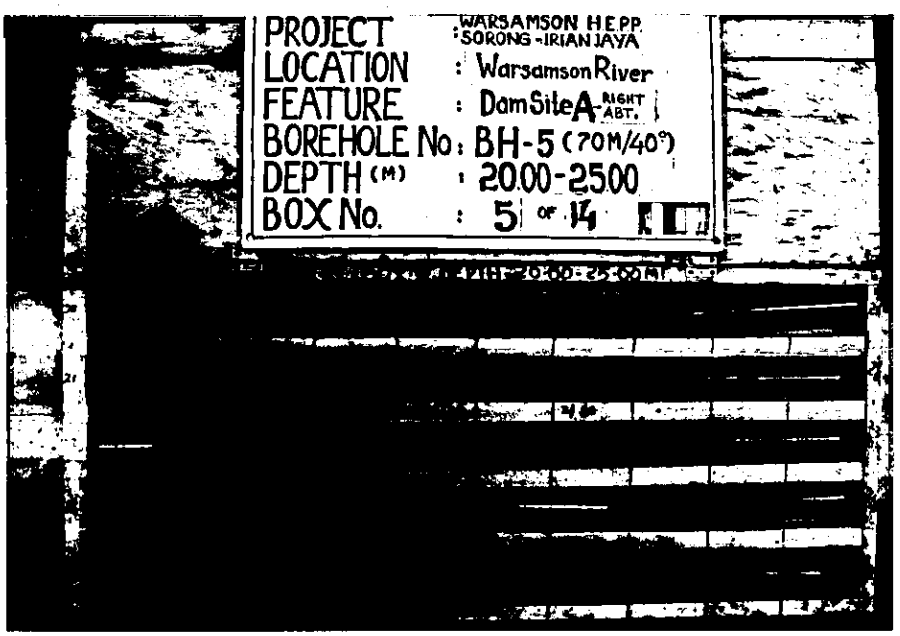


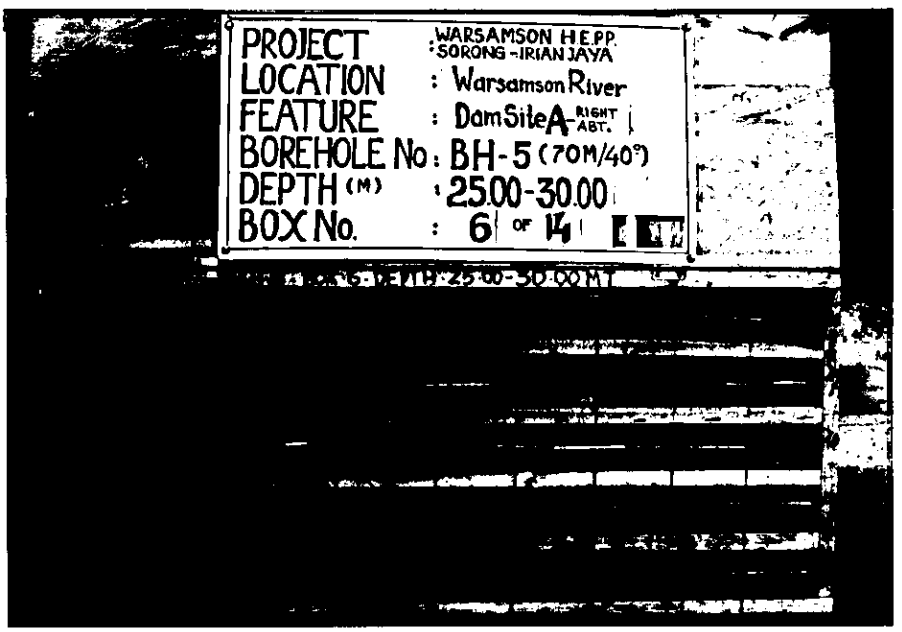




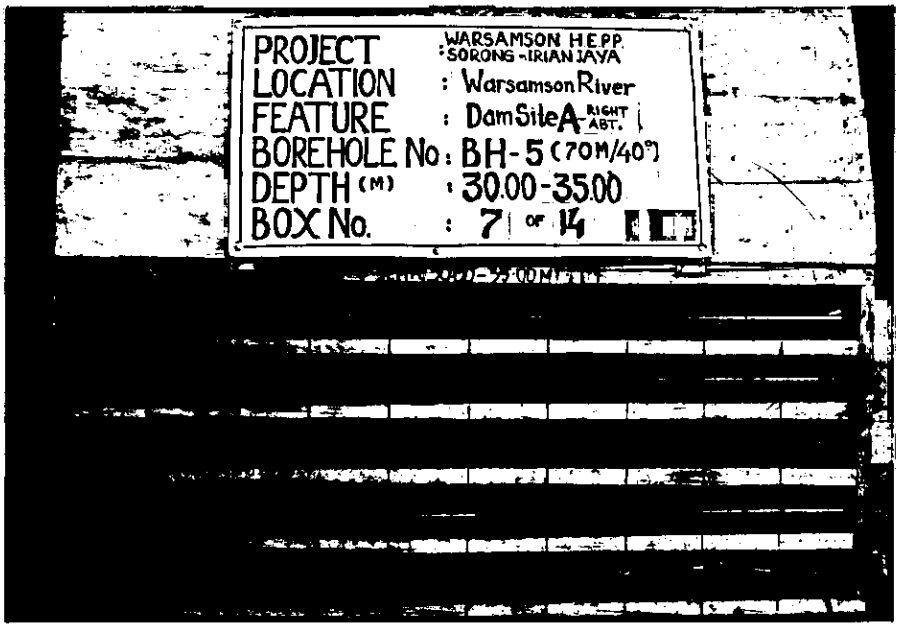
Core Box BH - 5 , Total Depth : 70.00m
Box No. 1 ~ 3 (0.00 - 15.00) m

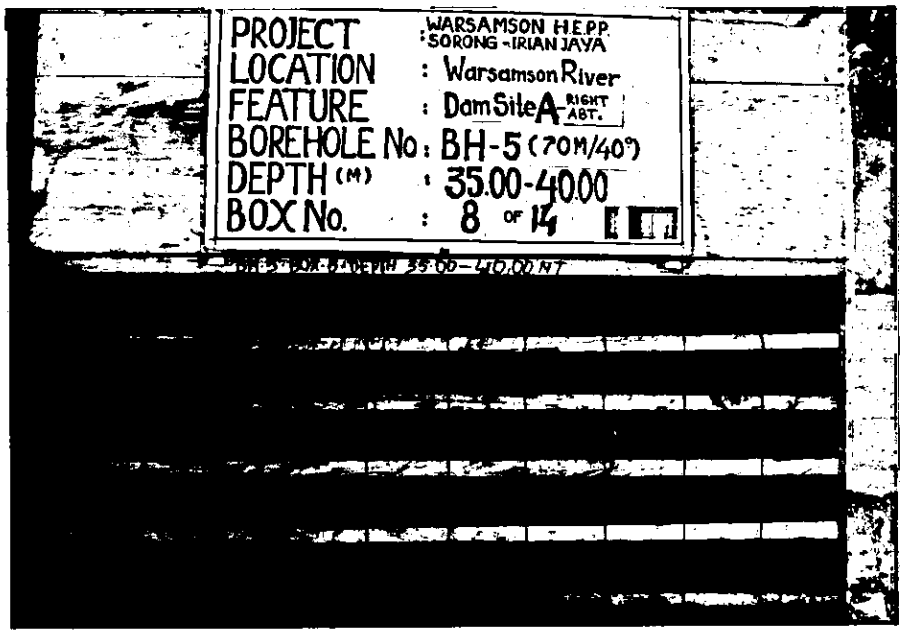


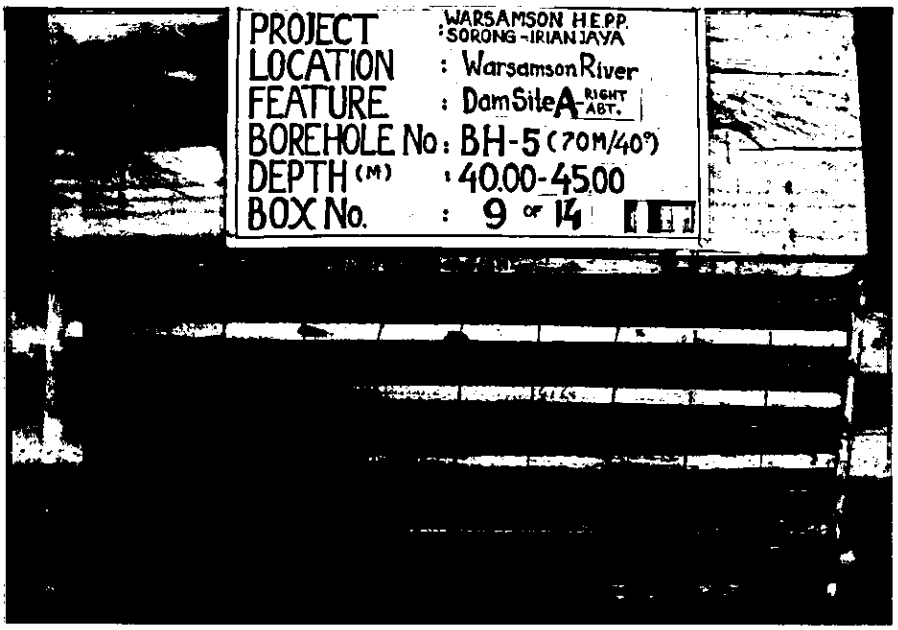




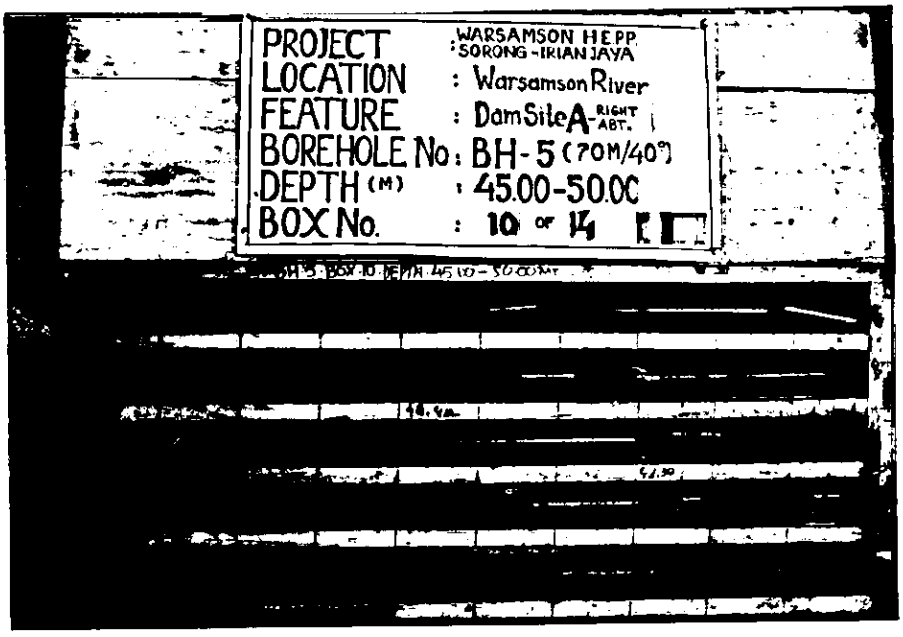
Core Box BH - 5 , Total Depth : 70.00m
Box No. 4 ~ 6 (15.00 - 30.00) m

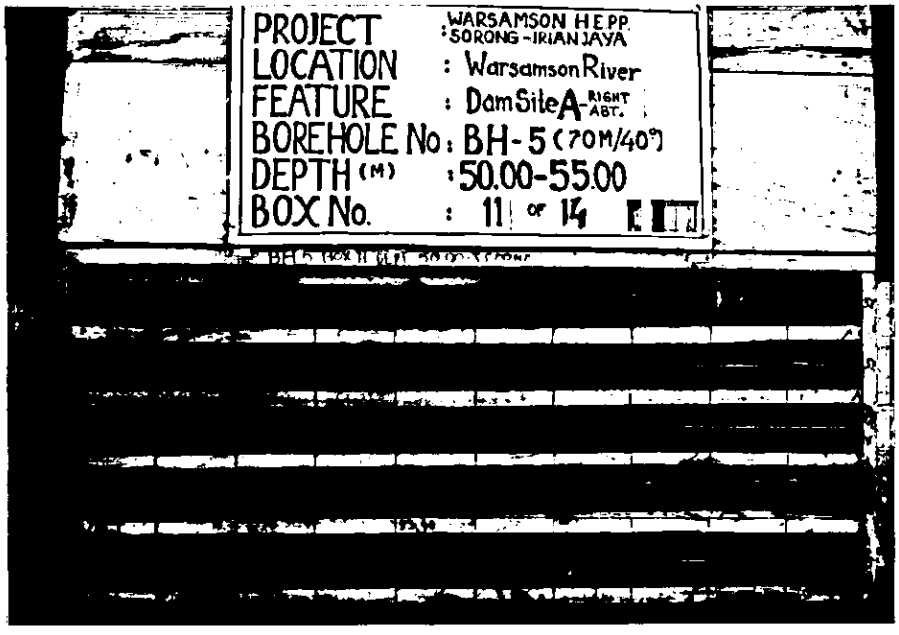


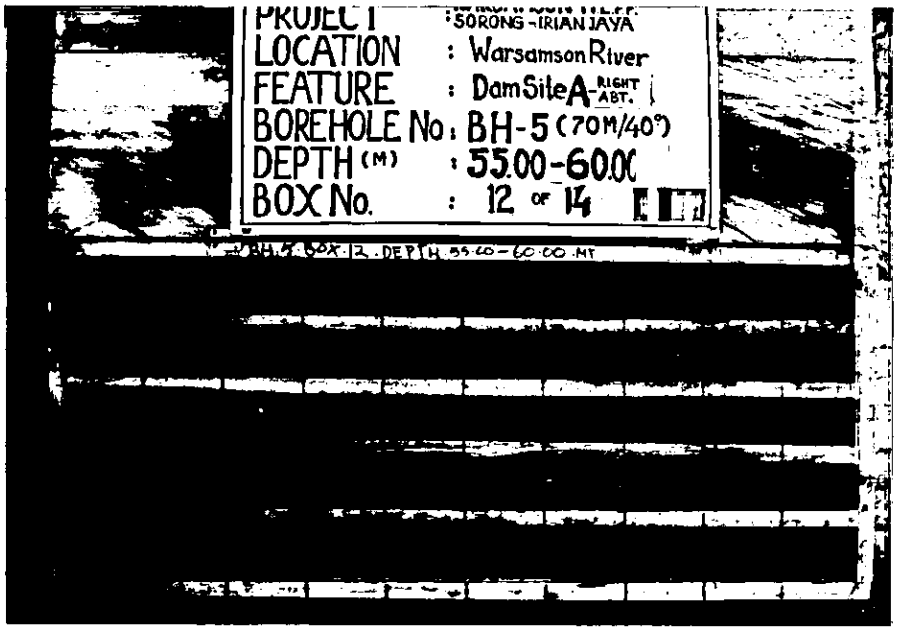




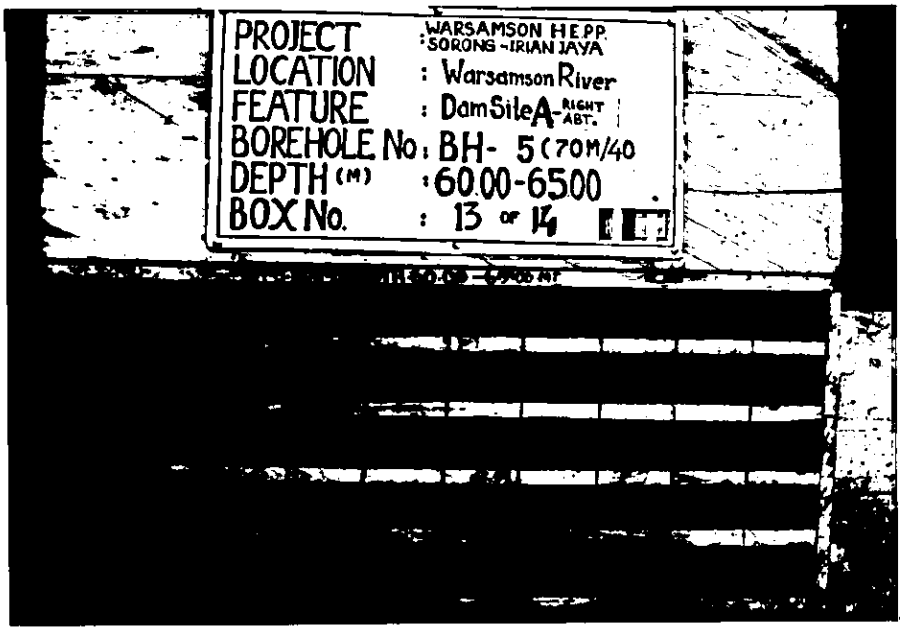
Core Box BH - 5 , Total Depth : 70.00m
Box No. 7 ~ 9 (30.00 - 45.00) m

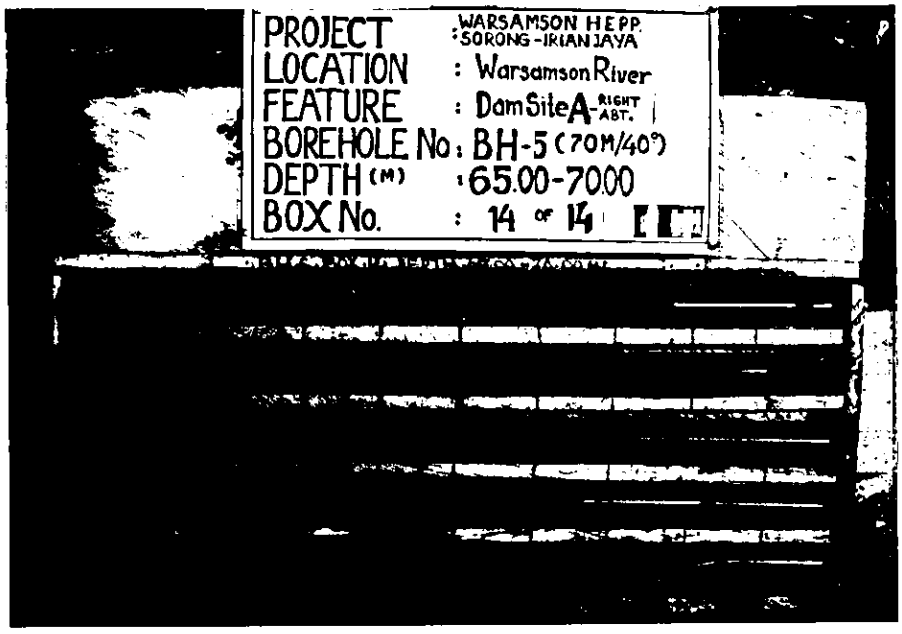




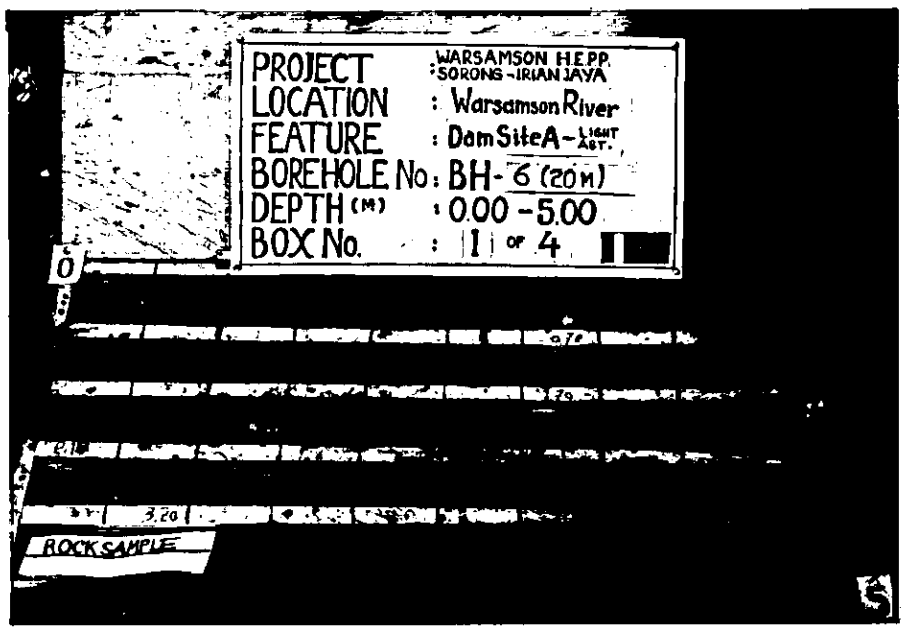


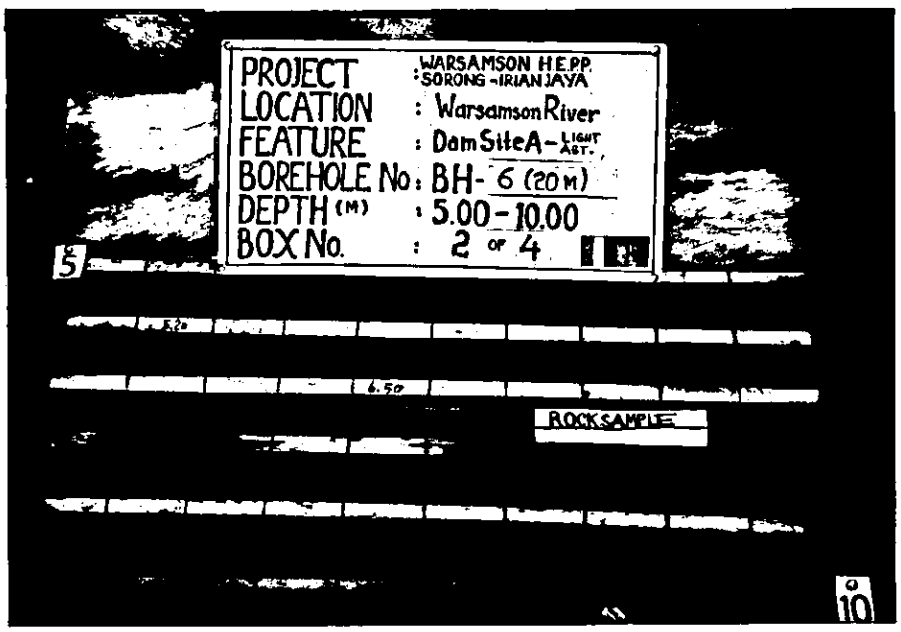
Core Box BH - 5 , Total Depth : 70.00m
Box No. 10 ~ 12 (45.00 - 60.00) m



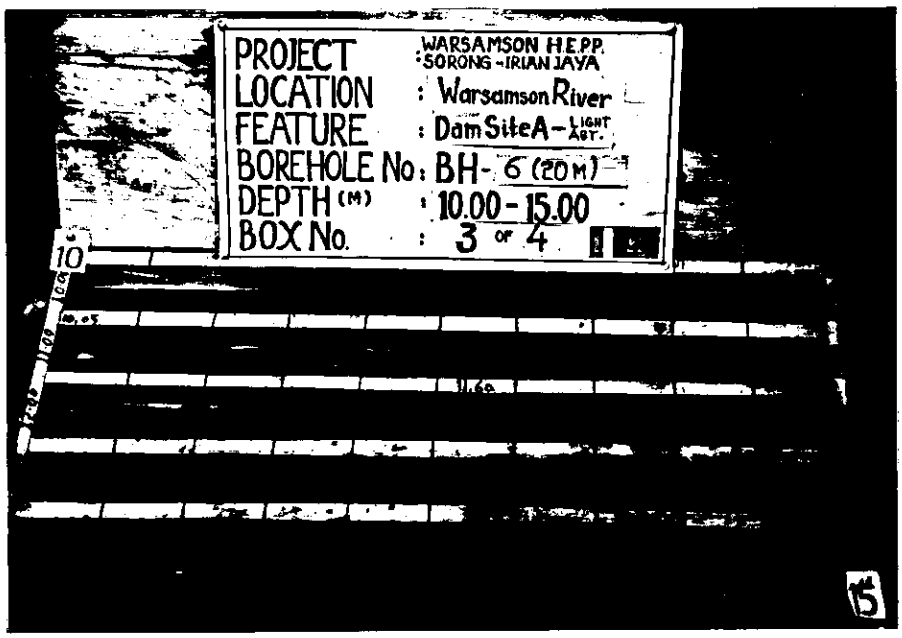


Core Box BH - 5 , Total Depth : 70.00m
Box No. 13 ~ 14 (60.00 - 70.00) m

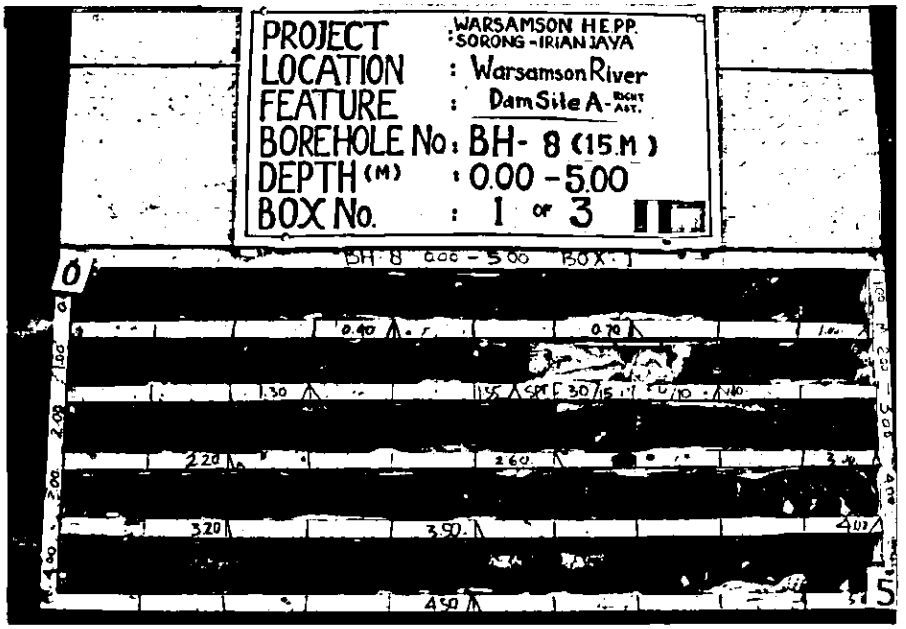


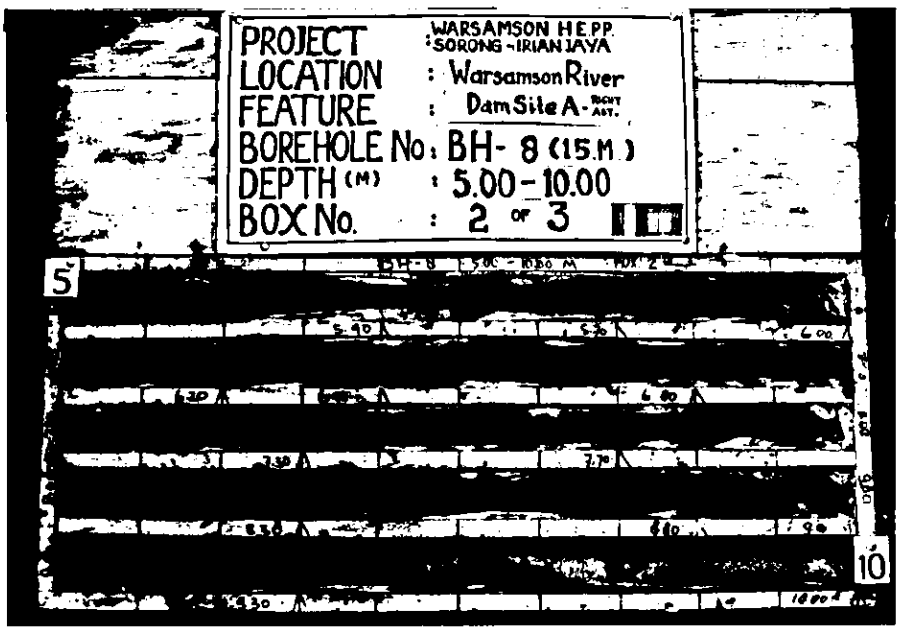


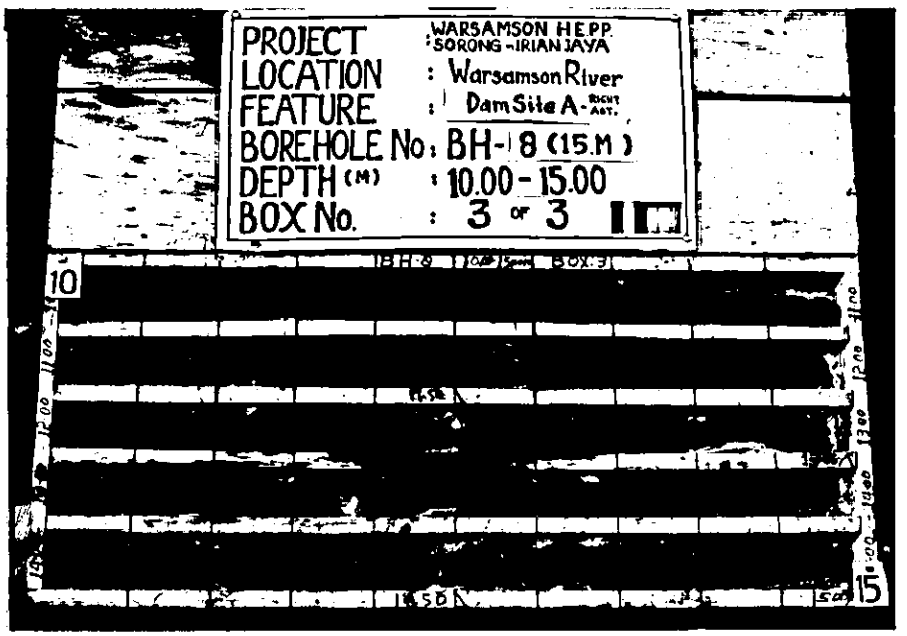
Core Box BH - 6 , Total Depth : 20.00m
Box No. 1 ~ 2 (0.00 - 10.00) m



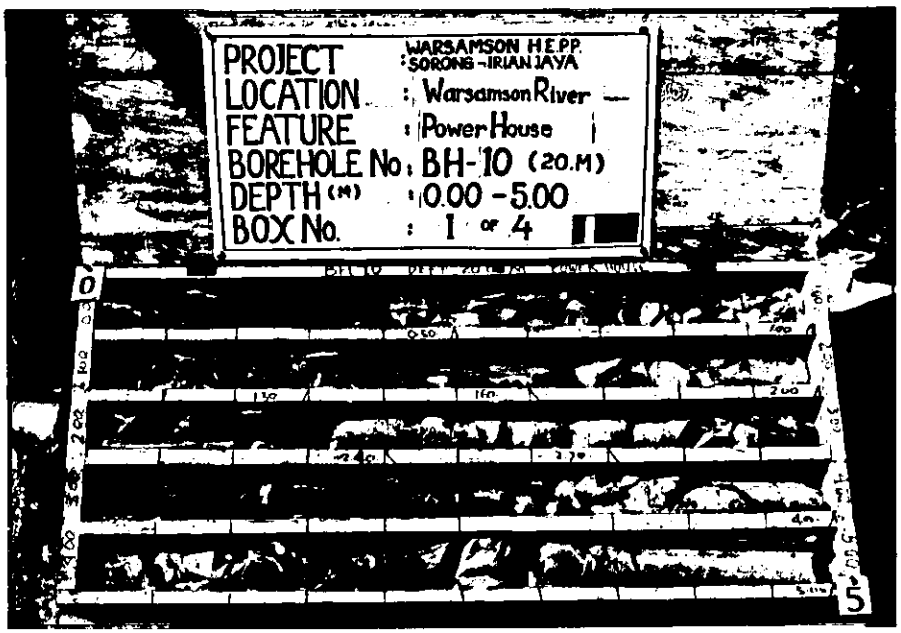
Core Box BH - 6 , Total Depth : 20.00m
Box No. 3 ~ 4 (10.00 - 20.00) m

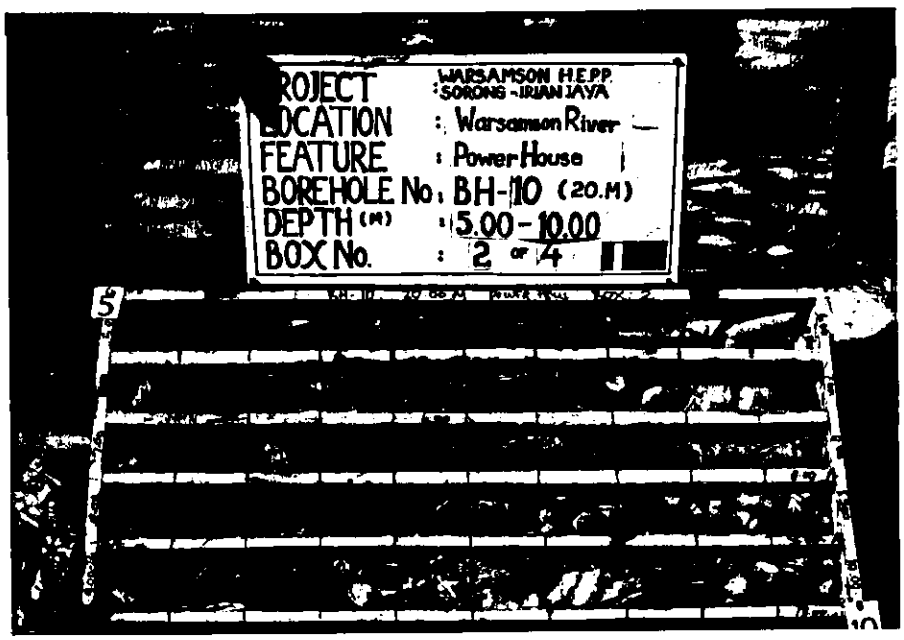




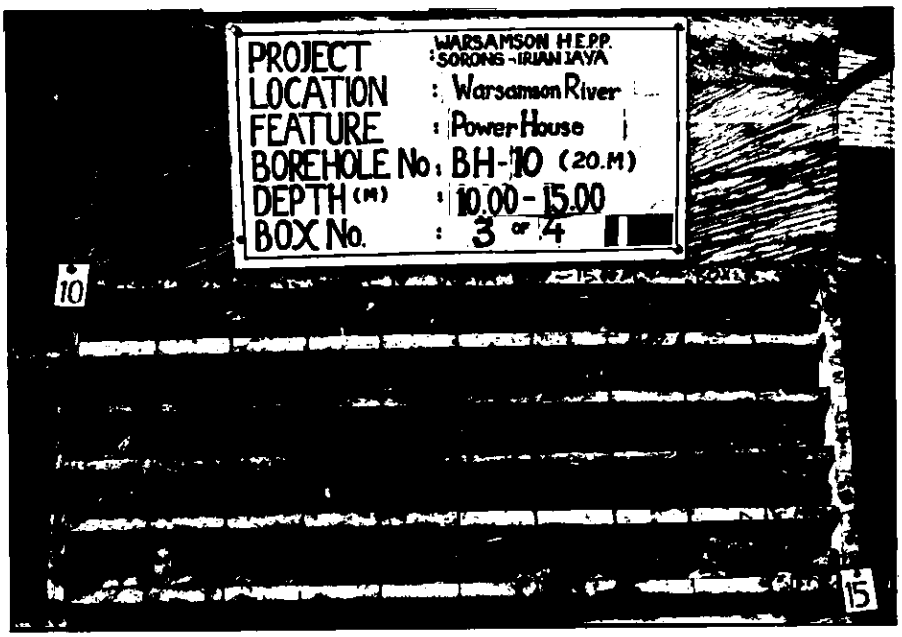


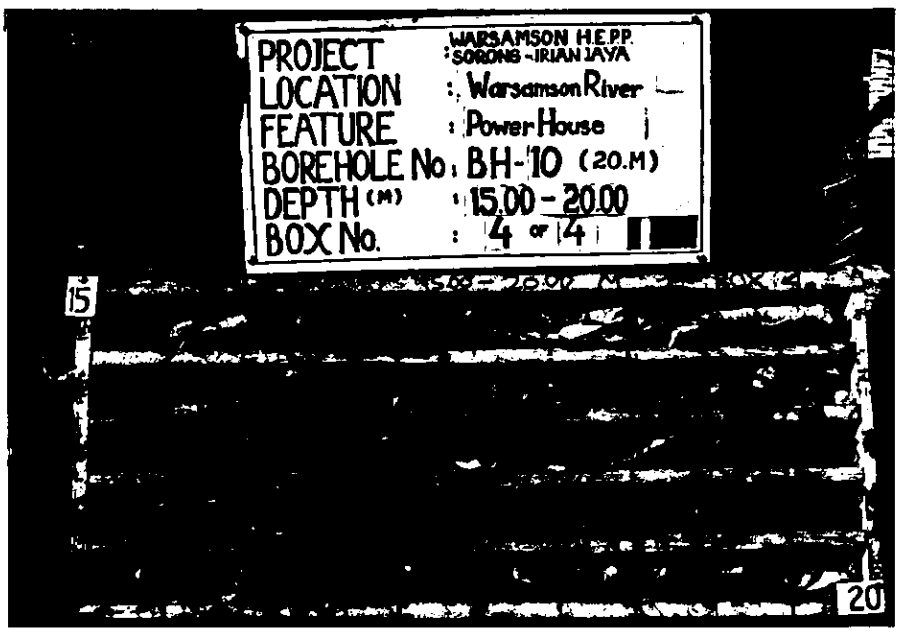
Core Box BH - 8 , Total Depth : 15.00m
Box No. 1 ~ 3 (0.00 - 15.00) m



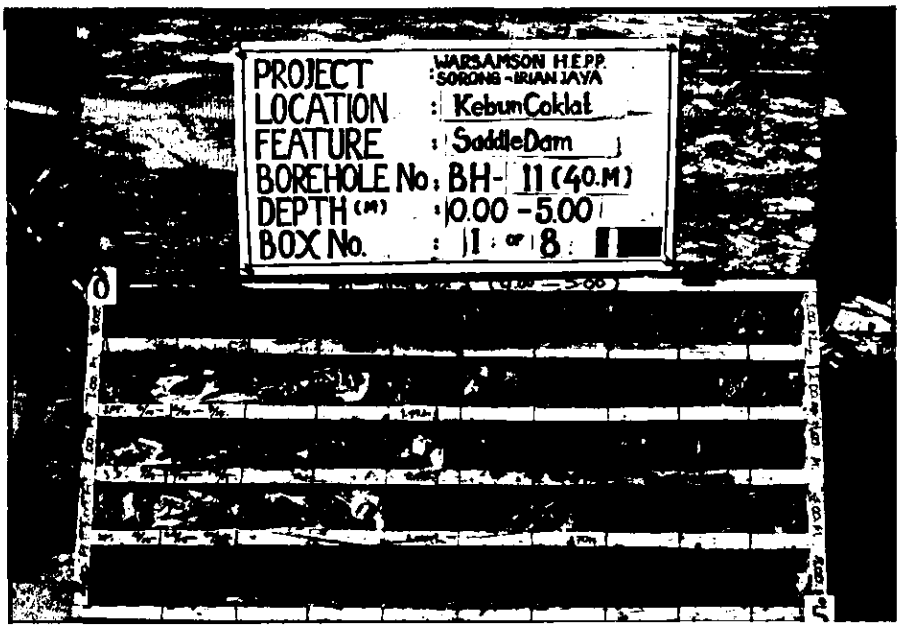


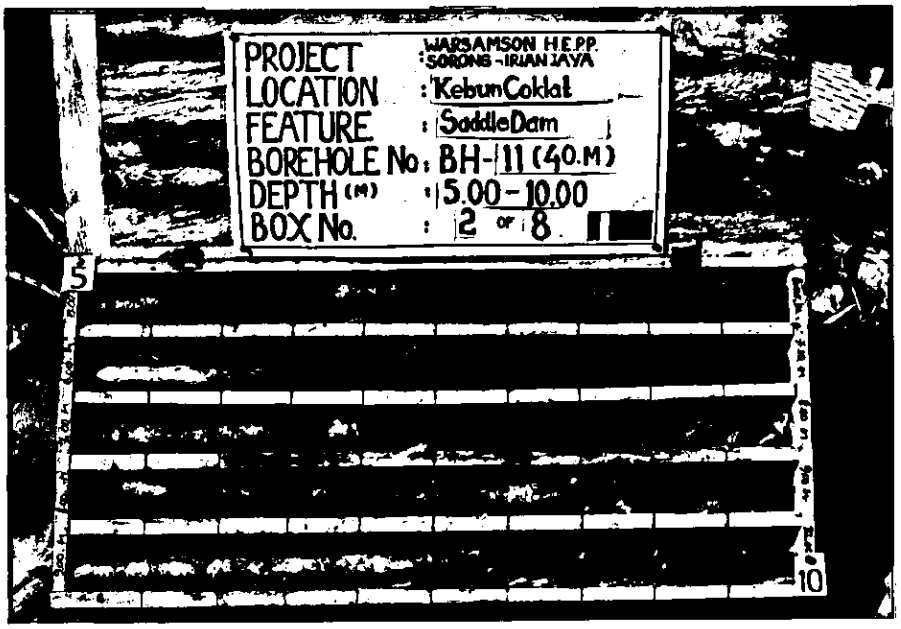
Core Box BH - 10 , Total Depth : 20.00m
Box No. 1 ~ 2 (0.00 - 10.00) m

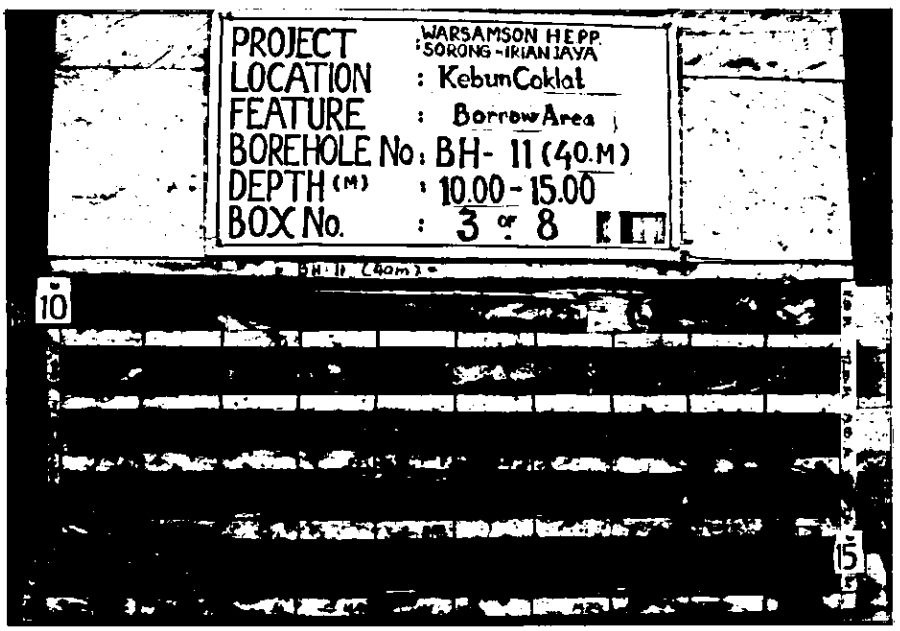




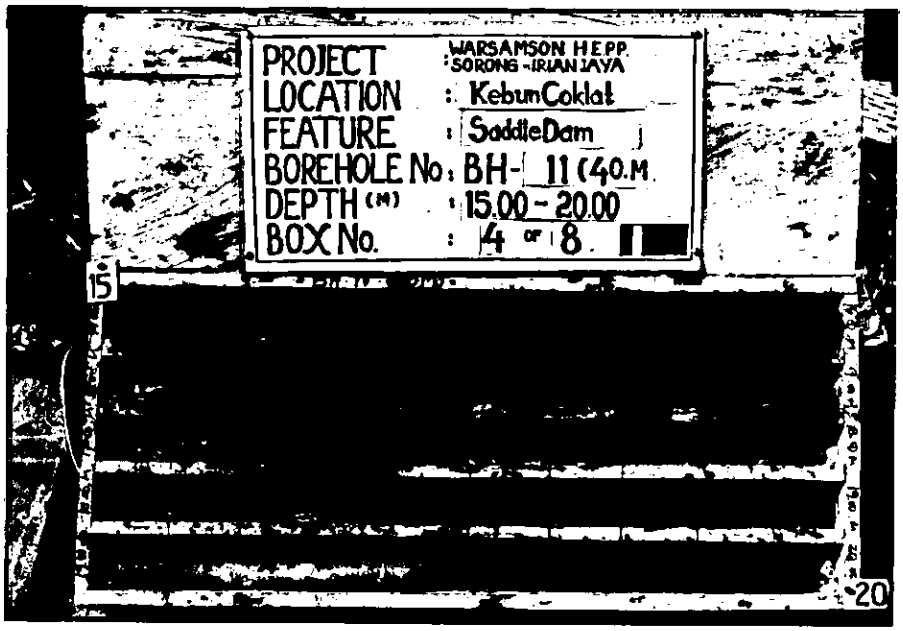
Core Box BH - 10 , Total Depth : 20.00m
Box No. 3 ~ 4 (10.00 - 20.00) m

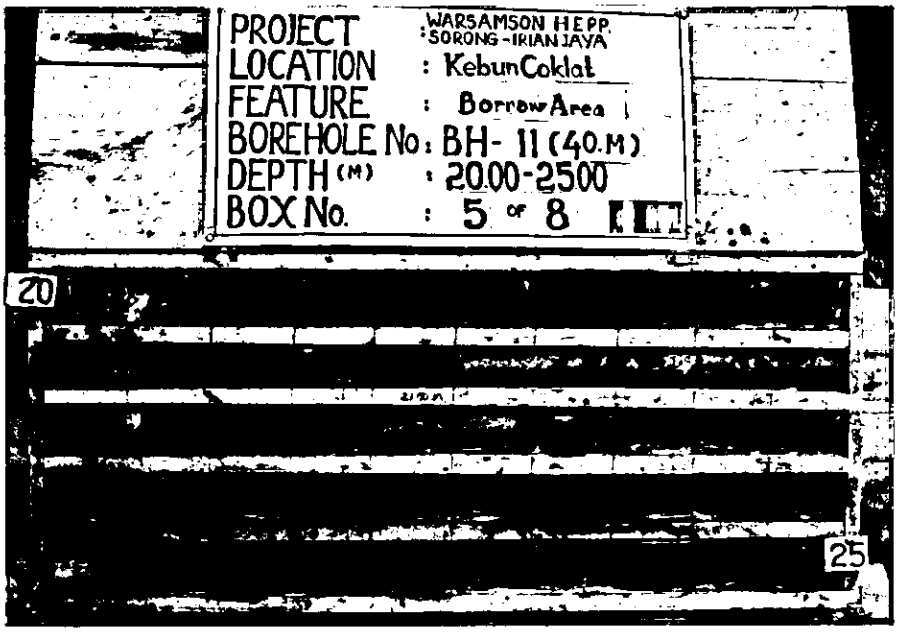


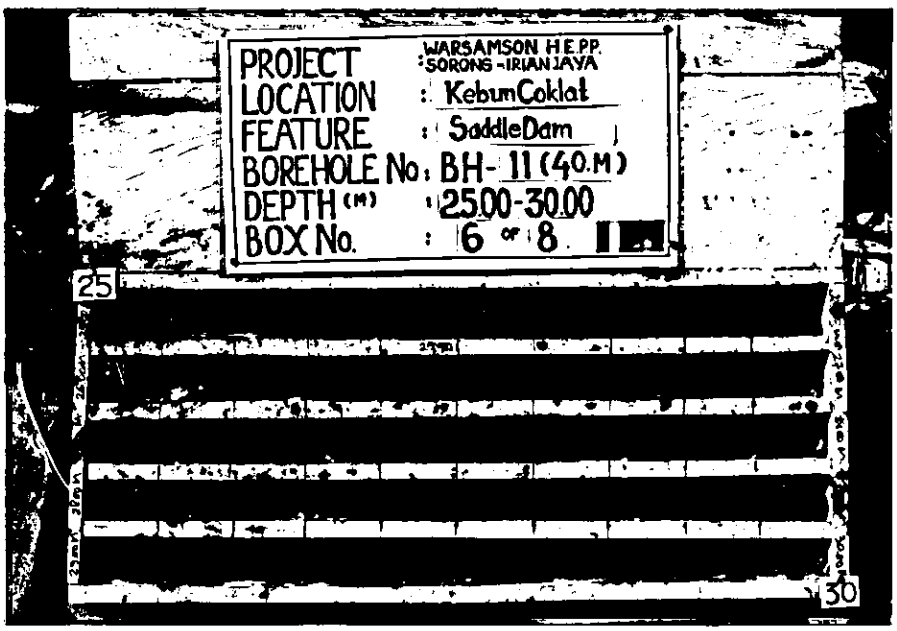




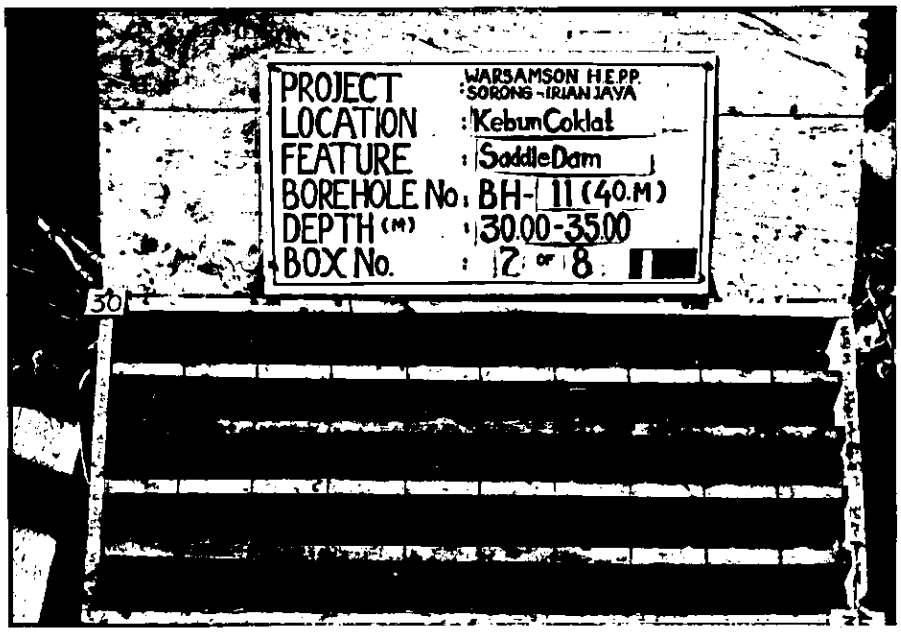
Core Box BH - 11 , Total Depth : 40.00m
Box No. 1 ~ 3 (0.00 - 15.00) m

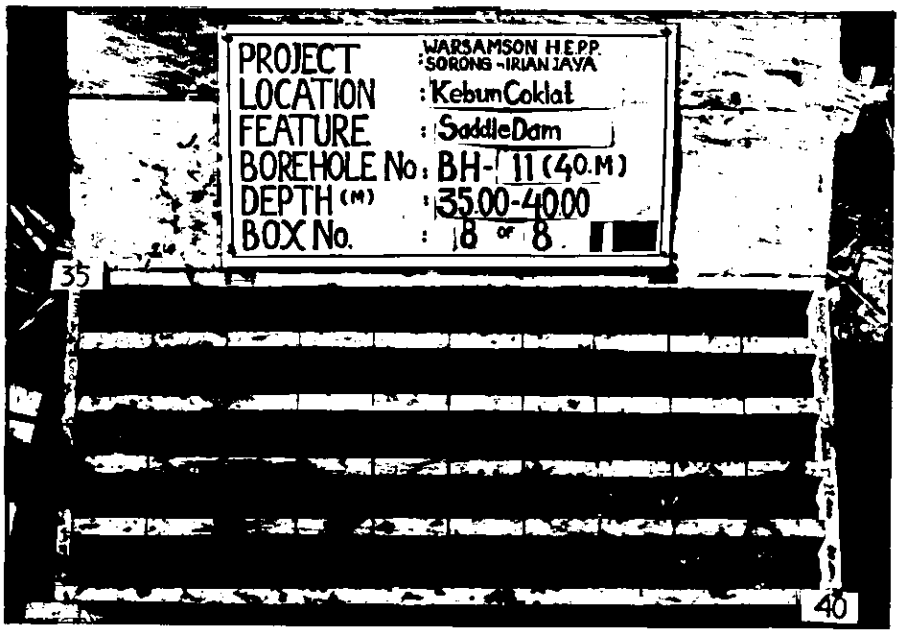




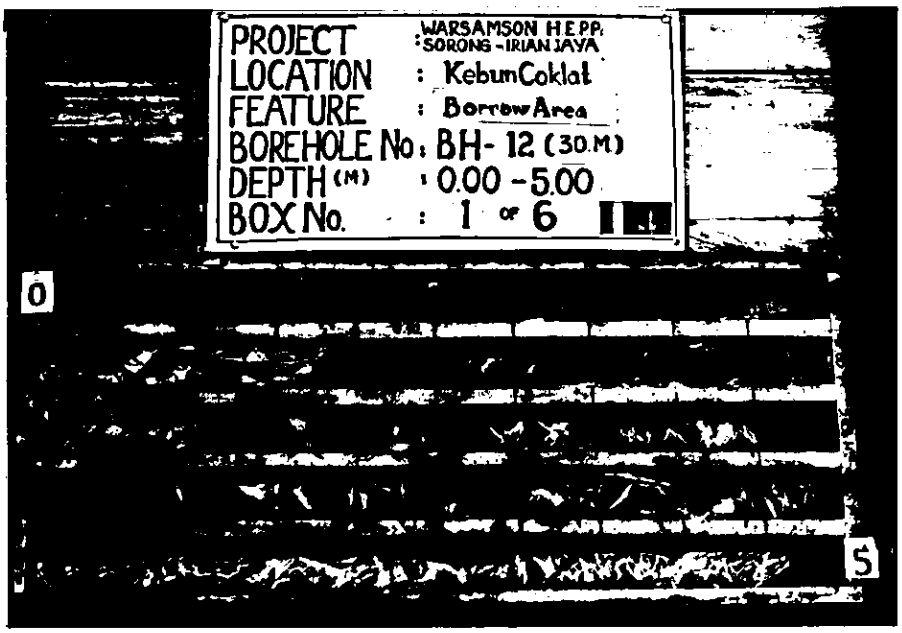


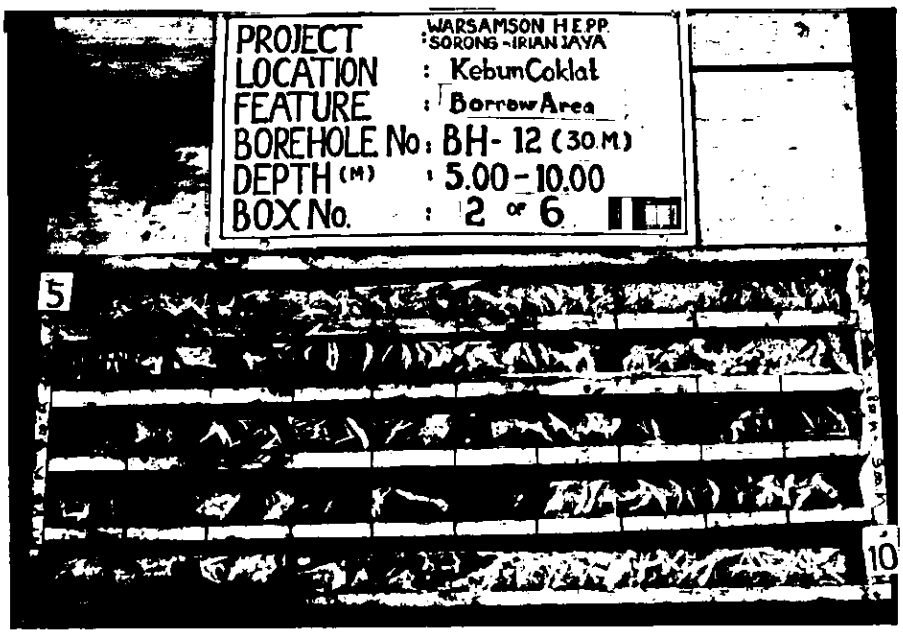
Core Box BH - 11 , Total Depth : 40.00m
Box No. 4 ~ 6 (15.00 - 30.00) m

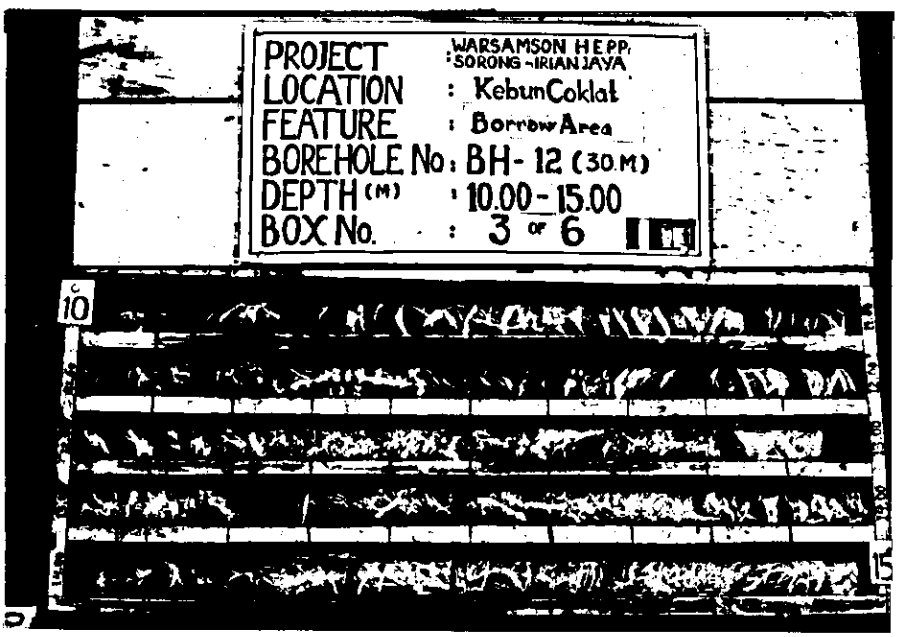




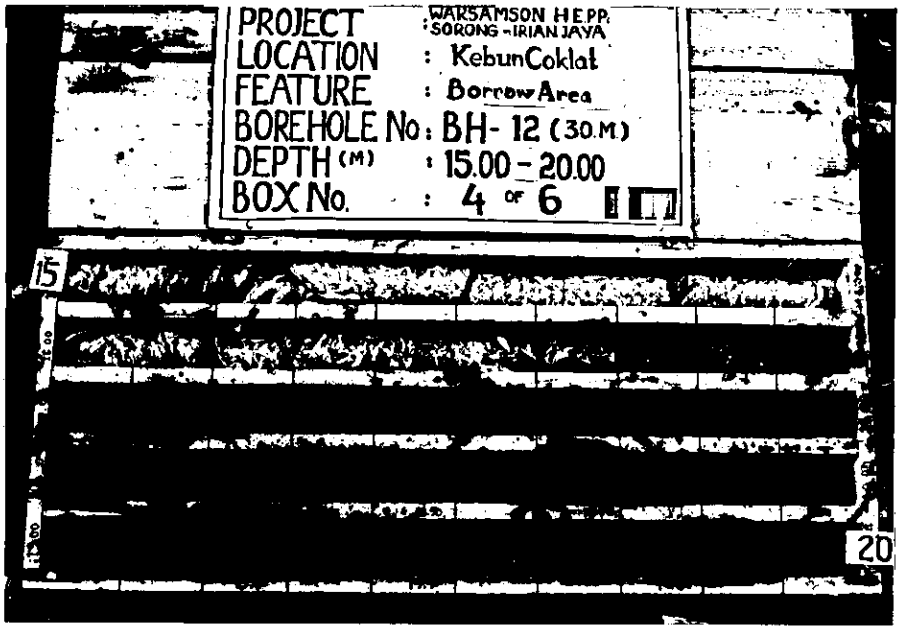
Core Box BH - 11 , Total Depth : 40.00m
Box No. 7 ~ 8 (30.00 - 40.00) m

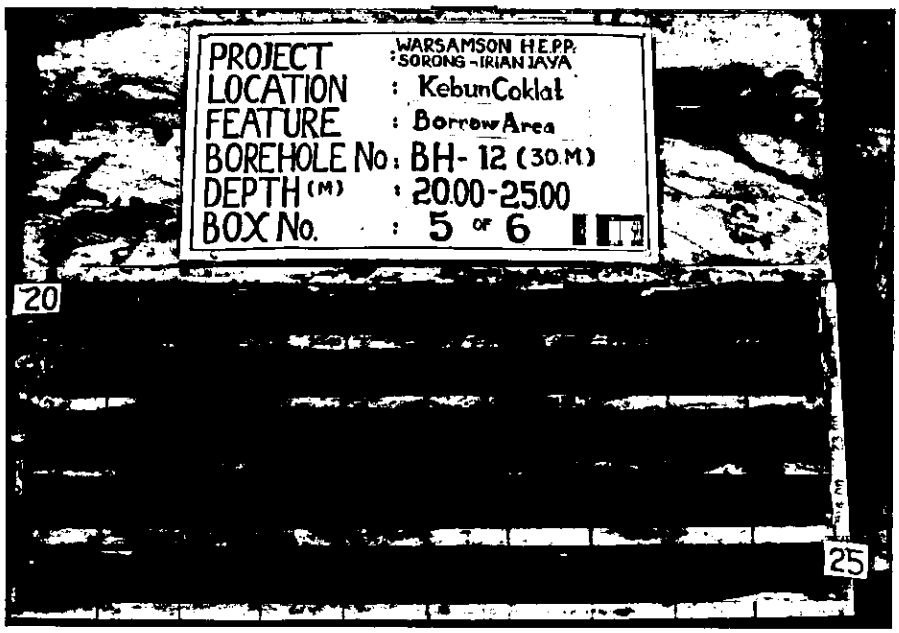


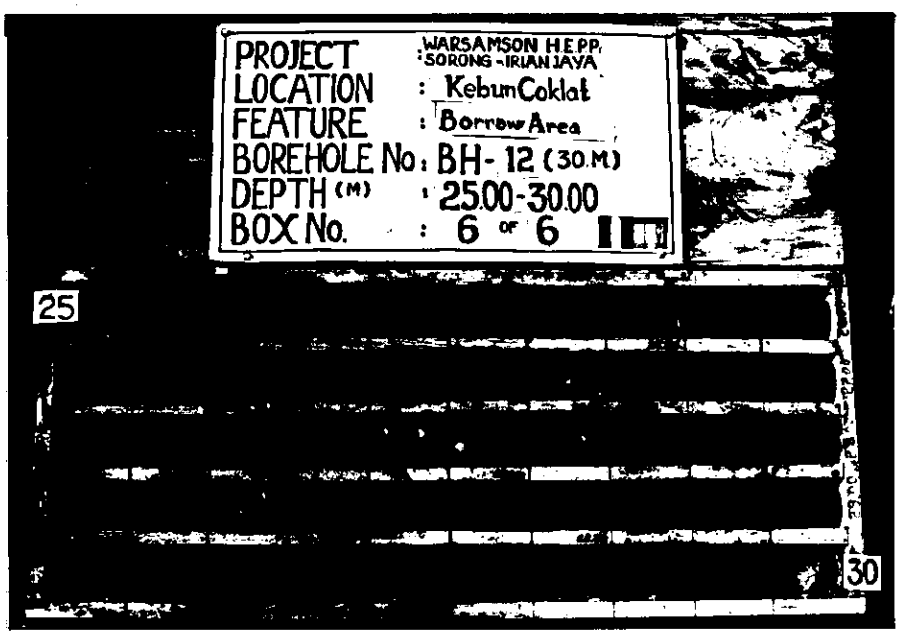




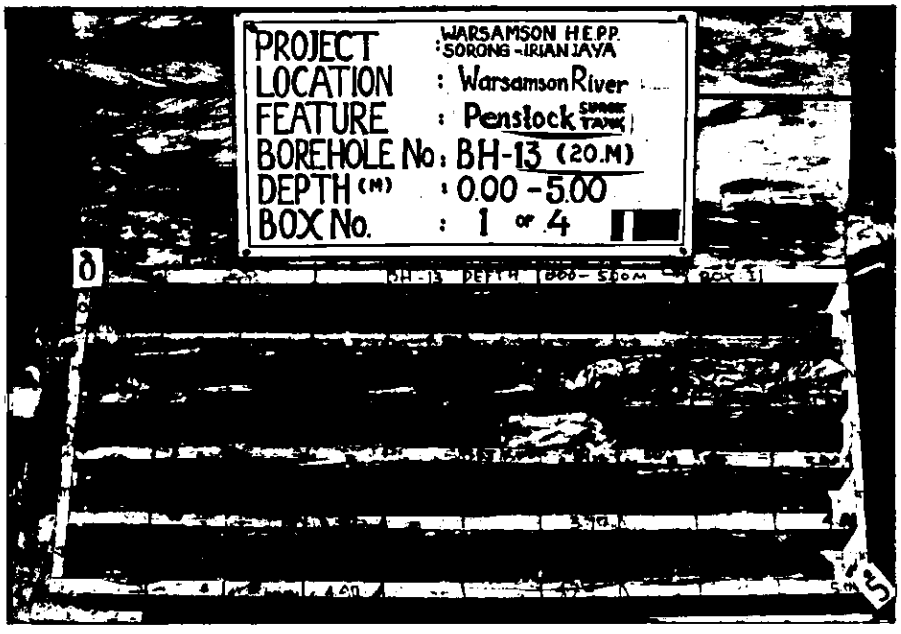
Core Box BH - 12 , Total Depth : 30.00m
Box No. 1 ~ 3 (0.00 - 15.00) m

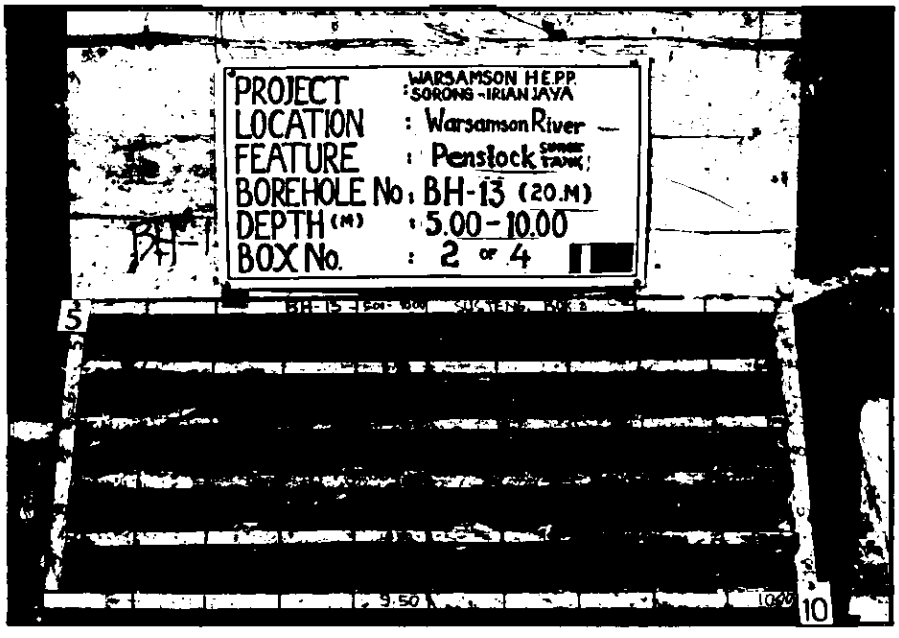




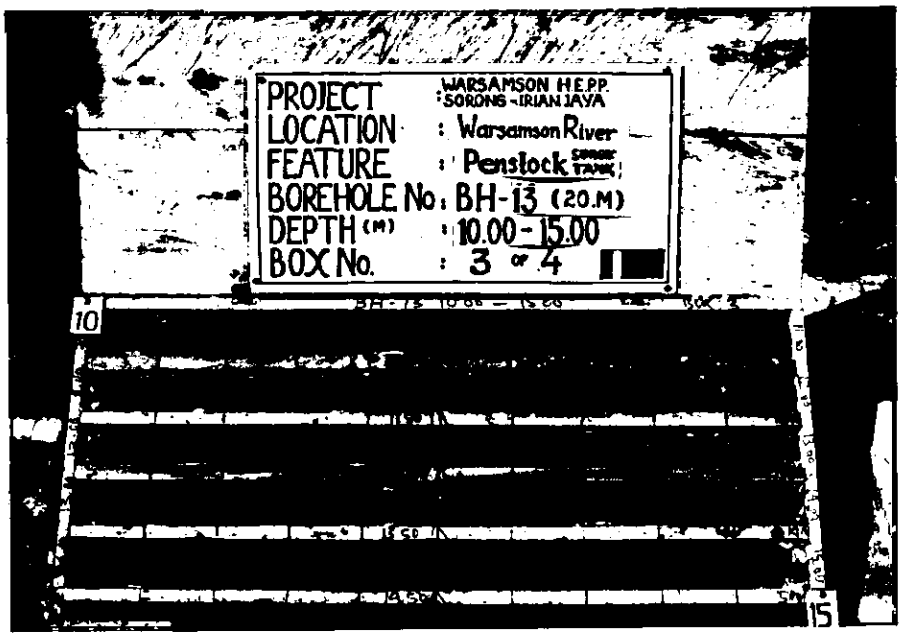


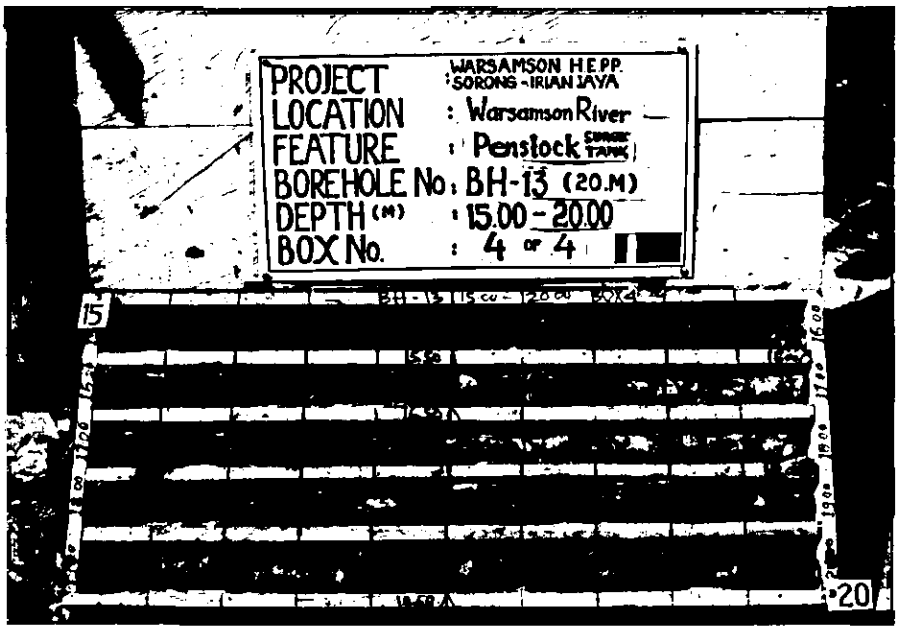
Core Box BH - 12 , Total Depth : 30.00m
Box No. 4 ~ 6 (15.00 - 30.00) m



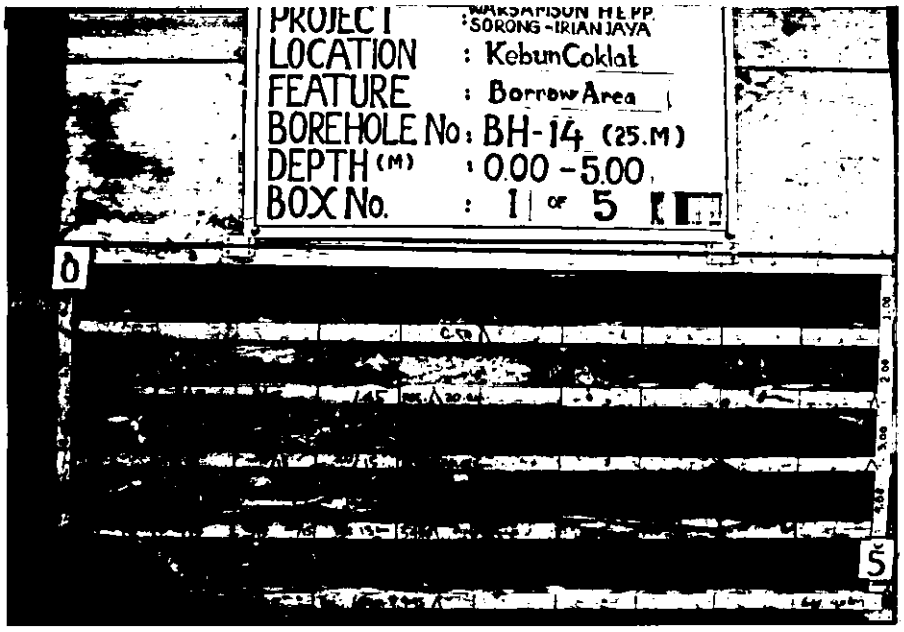


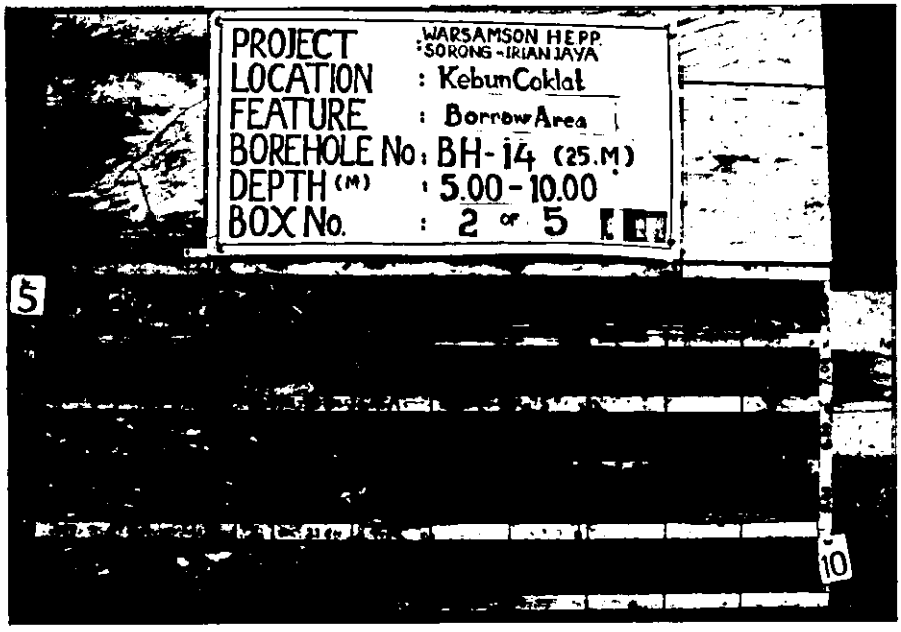
Core Box BH - 13 , Total Depth : 20.00m
Box No. 1 ~ 2 (0.00 - 10.00) m

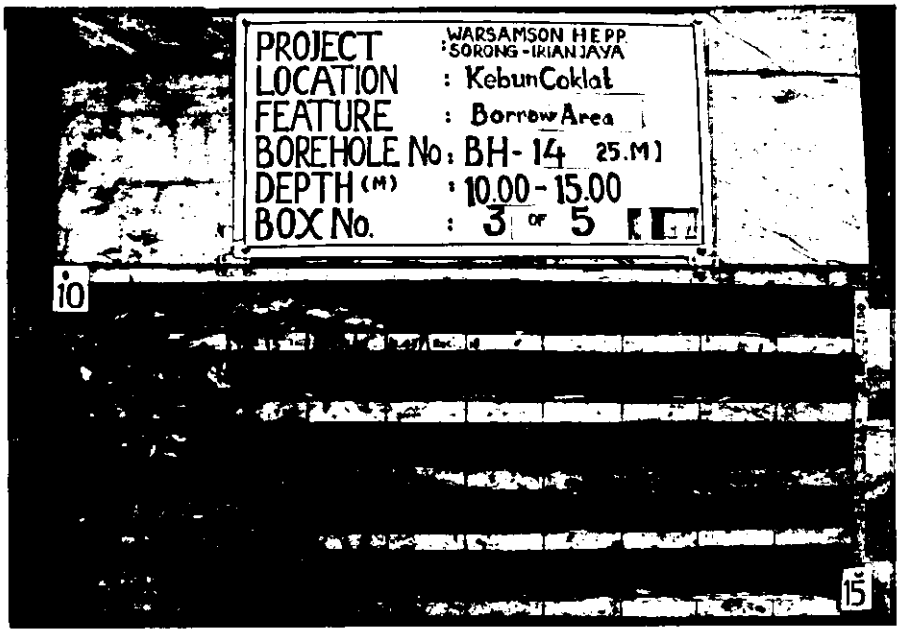




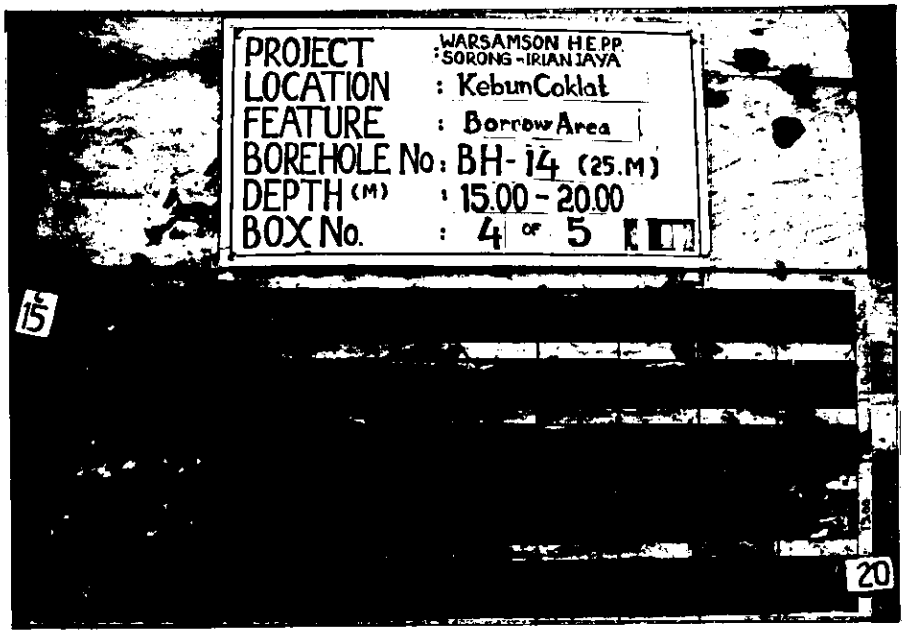
Core Box BH - 13 , Total Depth : 20.00m
Box No. 3 ~ 4 (10.00 - 20.00) m

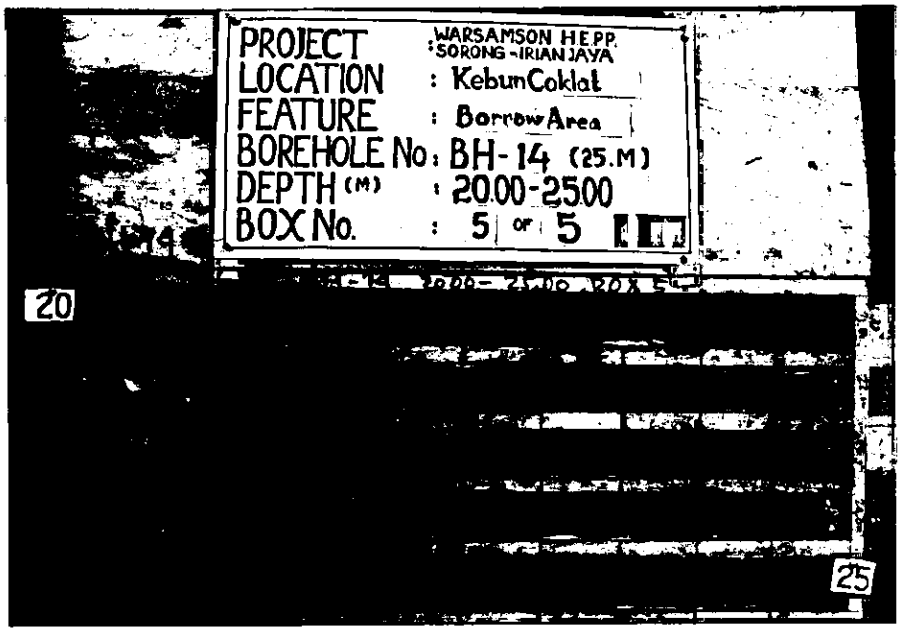






Core Box BH - 14 , Total Depth : 25.00m
Box No. 1 ~ 3 (0.00 - 15.00) m





Core Box BH - 14 , Total Depth : 25.00m
Box No. 4 ~ 5 (15.00 - 25.00) m

APPENDIX G

Rock Mass Classification by the CRIEPE

Table G.1 *Rock Mass Classification by the CRIEPI*

(Dr. H. Tanaka)

	Description
A	The rock mass is very fresh, and the rock forming minerals and grains undergo neither weathering nor alteration. Joints are extremely tight and their surfaces have no visible sign of weathering. Sound by hammer blow is clear.
B	The rock mass is solid. There is no opening joint and crack (even of 1 mm). But rock forming minerals and grains undergo a little weathering and alteration in partly. Sound by hammer blow is clear.
C_H	The rock mass is relatively solid. The rock forming minerals and grains undergo weathering except for quartz. The rock is contaminated by limonite, etc. The cohesion of joints and cracks is slightly decreased and rock blocks are separated by firm hammer blow along joints. Clay minerals remain on the separation surface. Sound by hammer blow is a little dim.
C_M	The rock mass is somewhat soft. The rock forming minerals and grains are somewhat softened by weathering, except for quartz. The cohesion of joints and cracks is somewhat decreased and rock blocks are separated by ordinary hammer blow along the joints. Clay materials remain on the separation surface. Sound by hammer blow is somewhat dim.
C_L	The rock mass is soft. The rock forming minerals and grains are softened by weathering. The cohesion of joints and cracks is decreased and rock blocks are separated by hammer blow along the joints. Clay materials remain on the separation surface. Sound by hammer blow is dim.
D	The rock mass is remarkably soft. The rock forming minerals and grains are softened by weathering. The cohesion of joints and cracks is almost absent. The rock mass collapses by light hammer blow. Clay materials remain on the separation surface. Sound by hammer blow is remarkably dim.

Table G.2 *Physical Property and CRIEPI Classification*

(By K. Kikuchi)

Rock Grade	Deformability (kg/cm^2)	Modulus of Elasticity (kg/cm^2)	Cohesion (kg/cm^2)	Internal Friction Angle (°)	Seismic Velocity (km/sec)
A - B	over 50,000	over 80,000	over 40	65 - 55	over 3.7
C_H	50,000 - 20,000	80,000 - 40,000	40 - 20	55 - 40	3.7 - 3
C_M	20,000 - 5,000	40,000 - 15,000	20 - 10	45 - 30	3 - 1.5
C_L - D	less than 5,000	less than 15,000	less than 10	38 - 15	less than 1.5

APPENDIX H

Earthquake Data and Calculations

1. Earthquake Data

The present study uses earthquake data collected by the Meteorological and Geophysical Institute, Jakarta and additional data compiled by Beca Carter Holding and Ferner (1980). A total of 350 events was recorded during the period of 1923 to 1994. From all the available 350 records, 202 earthquakes with magnitude (M) of greater than 5 Richter scale were used for the recurrence analysis.

From the above records, seismic intensity at the project site was deduced based on the following Kawasumi's formulas:

$$Ij = M - 0.00183\,(d - 100) - 4.605 \log d/100 \quad (\text{for } d > 100 \text{ km})$$
$$Ij = M + 4.605 \log Do/D + 2\,k\,(D - Do) \log e \quad (\text{for } d < 100 \text{ km})$$

where:

Ij	: Intensity at project site
M	: Magnitude of the earthquake
d	: The distance from epicentre to project site (km)
D	: The distance from hypocentre to project site (km)
Do	: The distance from hypocentre to a point of d = 100 km
k	: The damping rate of s-wave (0.0192/km)

The relationship between the intensity "Ij" and peak ground acceleration "a" can be approximated by the following equation:

$$\text{Log } a = \frac{Ij}{3} - 0.5 \quad \text{(Richter 1980, in Indonesian Earthquake study)}$$

The 202 earthquake data and the results of the calculations are given in Table H.1.

2. Recurrence Analysis by Plotting Position Method

In this method, the 202 earthquake records were rearranged with decreasing magnitude as shown in Table H.2. The recurrence interval for each earthquake was then calculated with the following formula:

$$Tr = \frac{P}{M}$$

where:

Tr : the recurrence interval (in years)

P : the period in which the series of data were obtained (= 72 years) - from 1923 to 1994

M : the sequential number of each earthquake data in Table H.2 which was arranged with decreasing magnitude

From the plot of the recurrence interval "Tr" versus the peak ground acceleration "a" in a log-log scale as shown in Figure H.1, the following relationship was obtained:

$$\text{Log } a = 0.9857 \log Tr + 0.1423$$

Based on the above equation, the peak ground acceleration (a) for a return period of 100 years is 130 gals or equivalent to a seismic coefficient (k) of 0.13 g.

3. Frequency Analysis by Kawasumi Method

The frequency of occurrence for each intensity range (1 to 2, 2 to 3, 3 to 4, 4 to 5, 5 to 6, 6 to 7 and greater than 7) in the period of 72 years is calculated from Table H.2. The frequency for 100 years return period is then calculated by multiplying the above frequencies by 100/72. The cumulative frequency (Nc) is later computed by adding the 100 years return period frequencies. Table H.3 shows the results of the calculations.

From the plot of intensity "Ij" versus cumulative frequency "Nc" in a semi-log scale as shown in Figure H.2, the following relationship is obtained:

$$Ij = 8.040 - 2.625 \log Nc$$

Based on the above, the probable intensity (Ij) for the return period of 100 years is 8.040 Richter scale. This intensity corresponds to the peak ground acceleration (a) of 151.36 gals, or seismic coefficient (k) of 0.15 g.

Table H.1

SEISMICITY CATALOGUE AREA FOR EASTERN PART INDONESIA
125 - 138 EAST LONGITUDE AND 4 NORTH LATITUDE - 4 SOUTH LATITUDE
YEAR 1923 - 1994, INTENSITY > 5

Sheets 1/4

No.	DATE	TIME	LATITUDE	LONGITUDE	DEPTH (KM)	INTENSITY (RICHTER)	SOURCE	DISTANCE TO SITE (KM)	INTENSITY AT SITE
1	940722	17.02.26	(2.98)	130.96	150	6	BMG	552.80	1.75
2	940614	21.01.56	1.34	126.26	88	5.6	BMG	531.22	1.47
3	940604	00.52.33	(2.76)	129.20	60	5.2	BMG	564.88	0.89
4	940503	08.06.53	(3.08)	127.53	78	5.8	BMG	682.87	0.89
5	940420	23.42.25	(2.73)	129.84	47	5.2	BMG	540.59	1.02
6	940417	14.07.29	(2.13)	131.30	74	5.1	BMG	459.64	1.39
7	940416	15.16.34	(1.64)	127.15	170	5.2	BMG	588.11	0.76
8	940415	20.17.59	(3.31)	135.36	102	6.2	BMG	762.64	0.92
9	940415	17.53.41	(3.30)	129.32	250	5.5	BMG	617.15	0.91
10	940410	15.09.11	1.95	129.90	200	5.3	BMG	122.23	4.86
11	940410	12.47.10	(2.33)	131.88	250	5.2	BMG	490.46	1.31
12	940322	20.26.28	(2.36)	129.30	70	5.1	BMG	519.45	1.04
13	940322	18.20.18	0.67	127.53	54	5.1	BMG	412.49	1.69
14	940314	11.39.53	1.42	127.53	33	5.4	BMG	390.51	2.14
15	940394	00.05.49	1.30	131.46	310	5.2	BMG	92.98	5.36
16	940307	04.47.19	2.76	131.37	225	5.6	BMG	93.83	5.74
17	940303	05.51.46	0.50	126.17	144	5.6	BMG	561.39	1.31
18	940223	23.43.56	2.46	129.16	206	5.3	BMG	210.53	3.61
19	940223	19.19.48	3.38	131.30	250	5.2	BMG	156.76	4.20
20	940220	09.14.29	3.81	131.92	160	5.6	BMG	225.37	3.75
21	940220	01.54.43	0.72	126.32	130	5.8	BMG	538.56	1.63
22	940208	00.19.42	1.50	126.77	93	5.1	BMG	472.80	1.31
23	940206	14.25.39	(0.82)	131.42	110	5.1	BMG	316.47	2.40
24	940204	11.26.53	0.88	128.30	121	5.2	BMG	324.46	2.44
25	940201	22.20.31	3.42	127.50	174	5.2	BMG	419.26	1.75
26	940201	03.40.27	2.20	127.86	250	5.2	BMG	349.25	2.24
27	940125	00.05.33	1.30	127.88	66	5.5	BMG	354.93	2.50
28	940124	17.21.24	1.05	128.05	84	5.2	BMG	344.01	2.28
29	940124	16.17.25	1.21	127.92	70	5.2	BMG	352.95	2.21
30	940124	16.10.59	1.74	129.12	68	5.3	BMG	210.67	3.61
31	940122	23.52.50	1.20	128.03	60	5.6	BMG	341.42	2.70
32	940121	18.23.24	0.80	127.71	60	5.1	BMG	388.72	1.86
33	940121	18.13.53	1.05	127.70	43	5.4	BMG	381.18	2.21
34	940121	02.31.30	0.84	127.25	95	5.1	BMG	435.71	1.54
35	940121	02.24.23	1.20	127.80	60	6.7	BMG	366.13	3.62
36	940113	20.27.04	0.07	126.98	150	5.2	BMG	494.98	1.28
37	940110	16.10.36	(3.85)	126.80	276	5.9	BMG	799.37	0.46
38	940104	23.55.02	2.30	129.83	300	5.1	BMG	134.07	4.45
39	931229	08.46.08	(2.70)	130.37	112	5.7	BMG	526.37	1.60
40	931224	05.25.34	(2.64)	130.33	233	5.4	BMG	520.38	1.33
41	931215	00.23.18	0.90	126.38	159	5.1	BMG	527.16	0.99
42	931210	03.58.18	0.73	137.63	60	5.6	BMG	749.31	0.38
43	931119	11.45.49	(3.04)	130.23	300	5.2	BMG	565.93	0.88
44	931101	12.31.00	(2.97)	130.50	300	5.2	BMG	554.45	0.94
45	931010	07.21.37	(2.86)	130.47	119	5.1	BMG	542.66	0.91

Note : latitude in bracket indicate South

Table H.1 (continued)

No.	DATE	TIME	LATITUDE	LONGITUDE	DEPTH (KM)	INTENSITY (RICHER)	SOURCE	DISTANCE TO SITE (KM)	INTENSITY AT SITE
46	931002	06.52.52	1.23	126.67	117	5.3	BMG	488.17	1.42
47	930914	01.34.10	0.53	126.98	90	5.5	BMG	475.12	1.70
48	930912	03.40.05	(2.33)	129.84	272	5.9	BMG	497.58	1.96
49	930911	19.47.11	(2.60)	127.34	245	5.1	BMG	652.50	0.34
50	930910	19.29.56	(2.90)	127.84	250	5.5	BMG	647.19	0.76
51	930902	14.07.09	1.71	128.26	262	5.3	BMG	305.84	2.69
52	930830	16.09.51	(3.88)	131.40	70	5.1	BMG	654.19	0.33
53	930819	13.38.20	(3.74)	132.84	278	5.3	BMG	669.08	0.46
54	930804	19.08.25	(3.13)	127.98	91	5.3	BMG	660.77	0.50
55	930713	08.38.34	(1.13)	131.32	70	5.7	BMG	349.24	2.74
56	930713	06.16.07	(1.37)	131.24	70	5.1	BMG	375.02	1.95
57	930703	19.43.58	(2.97)	129.37	87	5.5	BMG	580.58	1.10
58	930607	00.07.40	(0.70)	130.10	130	5.1	BMG	315.91	2.40
59	930530	17.13.24	0.98	126.82	86	5.6	BMG	477.59	1.78
60	930530	17.08.56	1.07	127.01	103	6.3	BMG	454.76	2.62
61	930522	05.01.13	(2.38)	129.25	160	5.1	BMG	523.55	1.01
62	930517	12.05.20	0.03	130.44	38	5.6	BMG	227.33	3.72
63	930502	08.52.50	(3.37)	131.54	84	5.2	BMG	599.08	0.71
64	930326	01.10.39	1.11	129.53	86	5.2	BMG	190.75	3.74
65	930325	17.15.52	(1.20)	129.40	90	5.6	BMG	397.13	2.30
66	930317	14.48.36	2.22	127.52	165	5.2	BMG	387.05	1.97
67	930224	02.44.41	0.76	129.32	71	5.4	BMG	231.77	3.48
68	930204	16.31.29	1.88	129.41	300	5.1	BMG	176.99	3.82
69	930203	03.28.22	1.55	127.92	54	5.2	BMG	345.51	2.27
70	930103	17.08.11	3.95	129.50	90	5.4	BMG	273.08	3.07
71	921217	11.18.31	(3.24)	130.60	18	5.1	BMG	583.33	0.69
72	920802	05.50.11	(0.88)	127.58	19	5.8	BMG	496.29	1.87
73	920606	01.58.29	(0.60)	133.91	26	5.1	BMG	433.16	1.56
74	920404	18.46.09	(2.02)	128.38	41	5.1	BMG	532.62	0.96
75	920401	01.38.03	(3.13)	129.02	33	5.2	BMG	610.37	0.65
76	910811	14.43.53	(3.18)	130.31	33	5.6	BMG	580.06	1.21
77	910407	18.55.19	(3.14)	130.31	31	5.6	BMG	575.66	1.23
78	910325	15.24.18	(2.96)	127.98	33	5.4	BMG	644.58	0.68
79	901231	17 56 59	0.91	126.70	33	5.3	BMG	492.40	1.39
80	901226	01.59.35	(0.72)	127.23	33	5.1	BMG	516.02	1.06
81	901225	22.59.20	(0.76)	127.41	33	5.2	BMG	502.64	1.23
82	901120	09.03.37	0.17	127.01	114	5.6	BMG	487.25	1.72
83	900825	15.47.58	0.49	126.02	44	6	BMG	577.63	1.62
84	900822	22.31.49	2.94	127.28	33	5.1	BMG	425.90	1.61
85	900810	15.44.29	0.32	126.16	38	5.9	BMG	568.68	1.57
86	900718	16.38.01	0.93	126.92	10	5.20	BMG	468.20	1.44
87	900704	07.31.31	(2.87)	127.09	33	5.10	BMG	693.24	0.14
88	900625	19.53.39	(3.47)	130.99	33	5.20	BMG	607.17	0.66
89	900622	22.59.57	1.77	127.20	33	5.40	BMG	422.57	1.93
90	900620	15.17.28	(1.12)	126.77	33	5.50	BMG	583.43	1.09
91	900525	02.03.27	(2.87)	130.34	15	5.80	BMG	545.51	1.59
92	900503	19.14.26	(0.44)	126.77	23	5.20	BMG	542.04	1.01
93	900418	16.23.31	(1.95)	126.05	33	5.20	BMG	702.95	0.20
94	900414	10.29.45	2.09	127.80	33	5.20	BMG	355.34	2.20
95	900312	13.32.55	(3.16)	128.84	26	5.20	BMG	620.92	0.59

Note : latitude in bracket indicate South

Table H.1 (continued)

Sheets 3/4

No.	DATE	TIME	LATITUDE	LONGITUDE	DEPTH (KM)	INTENSITY (RITCHER)	SOURCE	DISTANCE TO SITE (KM)	INTENSITY AT SITE
96	900220	11.07.54	0.83	127.25	212	5.10	BMG	436.04	1.54
97	900211	01.12.19	0.90	125.96	57	5.10	BMG	572.61	0.75
98	900121	05.26.52	1.78	127.28	140	5.10	BMG	413.64	1.69
99	891227	04.19.43	0.96	126.13	62	5.10	BMG	552.78	0.85
100	891226	17.41.04	2.25	126.73	56	5.30	BMG	474.78	1.50
101	891217	02.12.21	(3.51)	127.65	24	5.20	BMG	715.78	0.14
102	891218	09.40.47	(3.61)	131.18	36	6.60	BMG	623.03	1.98
103	891124	00.35.07	0.99	126.01	26	5.70	BMG	565.12	1.39
104	891101	09.49.26	2.49	128.14	37	5.50	BMG	322.09	2.75
105	891018	18.41.24	2.09	126.58	53	5.20	BMG	490.72	1.30
106	890924	02.00,52	2.85	128.34	38	5.10	BMG	309.97	2.45
107	890914	19.10.25	1.64	127.32	103	6.00	BMG	410.43	2.61
108	890906	14.45.51	0.89	126.11	37	5.80	BMG	556.60	1.53
109	890812	00.40.10	0.80	126.82	51	5.70	BMG	482.72	1.85
110	890806	07.43.39	1.09	126.31	50	5.30	BMG	530.30	1.18
111	890803	02.24.20	1.01	126.10	66	5.30	BMG	554.89	1.04
112	890802	03.37.28	(2.69)	127.31	29	5.60	BMG	662.40	0.79
113	890722	05.02.11	2.30	128.14	142	6.40	BMG	319.20	3.68
114	890521	19.30.07	2.55	126.54	77	5.40	BMG	498.81	1.46
115	890521	19.23.41	2.59	126.70	58	5.30	BMG	481.77	1.46
116	890515	18.16.16	1.55	127.27	106	5.50	BMG	417.03	2.06
117	890514	09.10.25	(2.92)	127.67	33	5.40	BMG	659.45	0.60
118	890510	08.23.24	2.69	128.42	54	5.20	BMG	296.44	2.67
119	890508	062002	0.02	126.70	76	5.10	BMG	525.47	1.00
120	890409	12.47.22	2.68	128.53	33	5.10	BMG	284.37	2.67
121	890401	11.34.38	(3.15)	127.91	33	5.10	BMG	666.65	0.27
122	890328	16.47.30	(1.95)	128.93	53	5.30	BMG	495.01	1.38
123	890323	03.10.44	2.40	128.25	95	5.10	BMG	308.46	2.47
124	890319	07.59.55	1.70	127.16	116	5.20	BMG	427.54	1.69
125	890319	02.38.52	1.57	126.66	71	5.20	BMG	484.10	1.34
126	890308	11.44.32	1.03	126.19	32	5.90	BMG	544.66	1.70
127	890228	05.59.31	2.26	127.93	53	5.20	BMG	341.99	2.30
128	890228	01.25.34	2.26	127.99	58	5.30	BMG	335.35	2.45
129	890228	00.51.27	2.29	127.92	58	5.70	BMG	343.39	2.79
130	890227	23.39.10	2.30	128.01	54	5.80	BMG	333.56	2.96
131	890227	170229	2.21	126.59	88	5.10	BMG	490.06	1.21
132	890226	15.56.06	2.23	127.93	69	5.30	BMG	341.72	2.40
133	890225	04.42.18	1.93	127.99	69	5.30	BMG	334.20	2.46
134	890218	00.49.41	2.42	126.81	33	5.10	BMG	467.42	1.34
135	890217	01.14.27	0.46	126.35	39	5.30	BMG	543.72	1.10
136	890216	19.42.45	2.57	126.64	56	5.10	BMG	488.08	1.22
137	890213	11.25.41	2.35	126.73	33	5.20	BMG	475.56	1.39
138	890213	02.02.12	1.31	127.36	122	5.20	BMG	411.24	1.80
139	890211	04.05.20	2.44	126.69	33	5.20	BMG	480.90	1.36
140	890211	01.57.06	2.38	125.60	66	5.20	BMG	600.88	0.70
141	890211	01.35.30	2.37	126.61	60	5.30	BMG	489.02	1.41
142	890210	21.39.45	2.32	126.57	33	5.10	BMG	493.01	1.19
143	890210	20.29.43	2.39	126.65	33	5.30	BMG	484.79	1.44
144	890210	19.56.54	2.45	126.61	33	5.50	BMG	489.84	1.61
145	890210	16.30.40	2.46	126.66	33	5.10	BMG	484.44	1.24
146	890210	15.23.55	2.46	126.69	38	5.50	BMG	481.13	1.66
147	890210	14.06.29	2.37	126.56	40	5.30	BMG	494.55	1.38

Note : latitude in bracket indicate South

Table H.1 (continued)

No.	DATE	TIME	LATITUDE	LONGITUDE	DEPTH (KM)	INTENSITY (RICHTER)	SOURCE	DISTANCE TO SITE (KM)	INTENSITY AT SITE
148	890210	13.33.53	2.17	126.58	33	5.20	BMG	490.98	1.30
149	890210	12.50.30	2.43	126.70	33	5.60	BMG	479.68	1.77
150	890210	12.27.44	2.38	126.65	33	5.20	BMG	484.69	1.34
151	890210	12.16.48	2.45	126.64	33	5.30	BMG	486.53	1.43
152	890210	12.12.05	2.25	126.60	47	5.60	BMG	489.19	1.71
153	890210	12.07.43	2.40	126.63	42	5.30	BMG	487.10	1.43
154	890110	11.47.37	2.44	126.53	33	5.30	BMG	498.57	1.36
155	890210	11.38.05	2.24	126.58	33	5.40	BMG	491.34	1.50
156	890210	11.37.15	2.44	126.57	33	5.40	BMG	494.15	1.48
157	890210	11.36.26	2.32	126.57	33	5.40	BMG	493.01	1.49
158	890210	11.26.07	2.25	126.78	33	5.30	BMG	469.24	1.53
159	890210	11.15.24	2.31	126.76	44	6.20	BMG	471.90	2.42
160	890206	00.40.40	(2.83)	129.99	40	5.10	BMG	547.73	0.88
161	890114	08.11.40	(3.34)	130.60	33	5.10	BMG	594.40	0.63
162	890113	04.14.59	(3.38)	130.49	33	5.10	BMG	599.86	0.60
163	890110	06.25.44	(3.28)	130.52	33	5.10	BMG	588.50	0.66
164	890110	06.14.42	(3.05)	130.58	33	5.10	BMG	562.49	0.80
165	890110	05.55.01	(3.16)	130.56	47	5.90	BMG	574.84	1.53
166	871005	18.57.59	(0.06)	129.86	33	5.40	BMG	159.58	4.36
167	870903	01.15.35	(2.98)	129.42	33	5.60	BMG	273.58	3.27
168	870128	09.12.29	(1.19)	129.71	49	5.50	BMG	140.82	4.74
169	831012	02.23.57	(2.95)	128.43	31	5.50	BMG	374.74	2.36
170	830412	18.25.30	(2.04)	128.81	35	5.30	BMG	261.83	3.08
171	820622	14.55.56	(2.86)	129.41	27	5.40	BMG	264.27	3.16
172	800116	23.26.15	(2.05)	128.02	33	5.20	BMG	341.05	2.31
173	790921	01.26.57	(2.46)	129.30	33	5.10	BMG	242.02	3.07
174	760817	18.07.39	(3.00)	129.52	33	5.40	BMG	268.71	3.11
175	750228	02.05.19	(2.90)	129.40	67	5.20	BMG	268.27	2.92
176	750228	01.53.02	(3.00)	129.20	59	5.50	BMG	290.60	3.02
177	660822	17.02.04	(1.80)	134.00	17	5.90	CGS	335.32	3.05
178	630914	00.18.33	(3.00)	131.00	33	5.50	CGS	216.00	3.75
179	630425	16.35.53	(1.44)	128.70	-	5.80	BMT	252.90	3.66
180	630416	20.00.44	(1.40)	128.90	11	5.80	BMT	230.88	3.89
181	630416	01.55.14	(1.10)	128.00	51	6.60	BMT	324.18	3.84
182	621101	17.52.20	(1.90)	132.00	36	6.00	BMT	145.30	5.17
183	600905	06.07.30	1.00	129.00	-	6.10	CGS	305.47	3.49
184	600615	23.27.40	(0.50)	133.50	-	7.40	CGS	275.35	5.05
185	600525	13.28.26	(1.00)	129.00	-	5.80	BMT	305.47	3.19
186	600511	18.36.00	(3.00)	131.00	-	6.00	CGS	216.00	4.25
187	600306	02.22.06	1.00	129.00	-	6.00	BRO	305.47	3.39
188	600305	13.49.18	1.00	129.00	-	6.75	CGS	305.47	4.14
189	590225	20.08.06	(1.80)	128.00	116	5.75	ISS	335.32	2.90
190	491102	02.32.29	(3.00)	134.00	-	6.50	BSA	389.40	3.25
191	460616	18.19.15	(2.00)	128.00	-	6.75	GR	341.53	3.85
192	440427	14.38.09	(0.50)	133.50	50	7.40	GR	275.35	5.05
193	440426	01.54.15	(1.00)	134.00	50	7.20	GR	324.00	4.44
194	420729	22.49.45	(2.00)	128.50	35	7.00	GR	290.80	4.52
195	410912	07.02.40	(0.50)	132.60	90	7.00	GR	170.76	5.80
196	370405	06.56.41	(1.00)	133.00	-	6.90	GR	216.00	5.15
197	340719	01.27.26	(0.50)	133.00	-	7.00	GR	222.65	5.17
198	301109	19.08.38	(0.50)	132.00	-	6.90	GR	120.75	6.48
199	270810	11.36.15	(1.00)	131.00	-	7.10	GR	-	
200	270611	02.32.09	(1.50)	130.00	60	6.50	GR	120.75	6.08
201	251110	13.50.36	(1.00)	129.50	-	7.40	GR	162.00	6.32
202	231007	03.29.34	(1.75)	128.75	-	7.50	GR	256.14	5.33

Note : latitude in bracket indicate South

F : warplot

Table H.2

WARSAMSON H.E.P.P SURROUNDING AREA
125 - 138 EAST LONGITUDE AND 4 NORTH LATITUDE - 4 SOUTH LATITUDE
YEAR 1923 - 1994

Sheets 1/3

No	Intensity (Ii)	Peak Ground Acceleration	Recurrence Interval
1	7.10	73.56	72.00
2	6.48	45.88	36.00
3	6.32	40.48	24.00
4	6.08	33.75	18.00
5	5.80	27.13	14.40
6	5.74	25.88	12.00
7	5.36	19.33	10.29
8	5.33	18.96	9.00
9	5.17	16.78	8.00
10	5.17	16.72	7.20
11	5.15	16.44	6.55
12	5.05	15.29	6.00
13	5.05	15.29	5.54
14	4.86	13.16	5.14
15	4.74	12.03	4.80
16	4.52	10.12	4.50
17	4.45	9.63	4.24
18	4.44	9.54	4.00
19	4.36	8.96	3.79
20	4.25	8.24	3.60
21	4.20	7.93	3.43
22	4.14	7.59	3.27
23	3.89	6.25	3.13
24	3.85	6.08	3.00
25	3.84	6.01	2.88
26	3.82	5.92	2.77
27	3.75	5.61	2.67
28	3.75	5.60	2.57
29	3.74	5.59	2.48
30	3.72	5.51	2.40
31	3.68	5.32	2.32
32	3.66	5.27	2.25
33	3.62	5.08	2.18
34	3.61	5.05	2.12
35	3.61	5.04	2.06
36	3.49	4.61	2.00
37	3.48	4.56	1.95
38	3.39	4.27	1.89
39	3.27	3.89	1.85
40	3.25	3.84	1.80
41	3.19	3.66	1.76
42	3.16	3.56	1.71
43	3.11	3.45	1.67
44	3.08	3.36	1.64
45	3.07	3.35	1.60
46	3.07	3.34	1.57
47	3.05	3.29	1.53
48	3.02	3.21	1.50
49	2.96	3.07	1.47
50	2.92	2.97	1.44
51	2.90	2.93	1.41
52	2.79	2.69	1.38
53	2.75	2.62	1.36
54	2.74	2.60	1.33
55	2.70	2.52	1.31
56	2.69	2.49	1.29
57	2.67	2.46	1.26
58	2.67	2.45	1.24
59	2.62	2.37	1.22
60	2.61	2.34	1.20
61	2.50	2.15	1.18
62	2.47	2.10	1.16
63	2.46	2.09	1.14
64	2.45	2.08	1.13
65	2.45	2.07	1.11
66	2.44	2.05	1.09
67	2.42	2.02	1.07
68	2.40	2.00	1.06
69	2.40	2.00	1.04
70	2.40	1.99	1.03
71	2.36	1.93	1.01
72	2.31	1.86	1.00
73	2.30	1.85	0.99
74	2.30	1.85	0.97
75	2.28	1.82	0.96
76	2.27	1.81	0.95
77	2.24	1.77	0.94
78	2.21	1.73	0.92

Table H.2 (continued)

No.	Intensity (Ij)	Peak Ground Acceleration	Recurrence Interval
79	2.21	1.72	0.91
80	2.20	1.71	0.90
81	2.14	1.64	0.89
82	2.06	1.54	0.88
83	1.98	1.45	0.87
84	1.97	1.43	0.86
85	1.96	1.43	0.85
86	1.95	1.42	0.84
87	1.93	1.39	0.83
88	1.87	1.33	0.82
89	1.86	1.31	0.81
90	1.85	1.31	0.80
91	1.80	1.26	0.79
92	1.78	1.24	0.78
93	1.77	1.23	0.77
94	1.75	1.21	0.77
95	1.75	1.21	0.76
96	1.72	1.19	0.75
97	1.71	1.18	0.74
98	1.70	1.16	0.73
99	1.70	1.16	0.73
100	1.69	1.16	0.72
101	1.69	1.16	0.71
102	1.69	1.15	0.71
103	1.66	1.13	0.70
104	1.63	1.11	0.69
105	1.62	1.10	0.69
106	1.61	1.09	0.68
107	1.61	1.08	0.67
108	1.60	1.08	0.67
109	1.59	1.07	0.66
110	1.57	1.05	0.65
111	1.56	1.05	0.65
112	1.54	1.03	0.64
113	1.54	1.03	0.64
114	1.53	1.03	0.63
115	1.53	1.03	0.63
116	1.53	1.02	0.62
117	1.50	1.00	0.62
118	1.50	1.00	0.61
119	1.49	0.99	0.61
120	1.48	0.99	0.60
121	1.47	0.98	0.60
122	1.46	0.97	0.59
123	1.46	0.97	0.59
124	1.44	0.95	0.58
125	1.44	0.95	0.58
126	1.43	0.95	0.57
127	1.43	0.94	0.57
128	1.42	0.94	0.56
129	1.41	0.94	0.56
130	1.39	0.92	0.55
131	1.39	0.92	0.55
132	1.39	0.92	0.55
133	1.39	0.92	0.54
134	1.38	0.91	0.54
135	1.38	0.91	0.53
136	1.36	0.90	0.53
137	1.36	0.90	0.53
138	1.34	0.89	0.52
139	1.34	0.89	0.52
140	1.34	0.88	0.51
141	1.33	0.88	0.51
142	1.31	0.86	0.51
143	1.31	0.86	0.50
144	1.31	0.86	0.50
145	1.30	0.86	0.50
146	1.30	0.86	0.49
147	1.28	0.84	0.49
148	1.24	0.82	0.49
149	1.23	0.82	0.48
150	1.23	0.81	0.48
151	1.22	0.81	0.48
152	1.21	0.80	0.47
153	1.21	0.80	0.47
154	1.19	0.79	0.47
155	1.18	0.78	0.46
156	1.10	0.74	0.46
157	1.10	0.74	0.46
158	1.09	0.73	0.46
159	1.06	0.71	0.45
160	1.04	0.70	0.45
161	1.04	0.70	0.45
162	1.02	0.69	0.44

Table H.2 (continued)

No.	Intensity (Ij)	Peak Ground Acceleration	Recurrence Interval
163	1.01	0.69	0.44
164	1.01	0.69	0.44
165	1.00	0.68	0.44
166	0.99	0.68	0.43
167	0.96	0.66	0.43
168	0.94	0.65	0.43
169	0.92	0.64	0.43
170	0.91	0.64	0.42
171	0.91	0.63	0.42
172	0.89	0.63	0.42
173	0.89	0.62	0.42
174	0.88	0.62	0.41
175	0.88	0.62	0.41
176	0.85	0.61	0.41
177	0.80	0.58	0.41
178	0.79	0.58	0.40
179	0.76	0.57	0.40
180	0.76	0.57	0.40
181	0.75	0.56	0.40
182	0.71	0.54	0.40

No.	Intensity (Ij)	Peak Ground Acceleration	Recurrence Interval
183	0.70	0.54	0.39
184	0.69	0.54	0.39
185	0.68	0.53	0.39
186	0.66	0.53	0.39
187	0.66	0.53	0.39
188	0.65	0.52	0.38
189	0.63	0.51	0.38
190	0.60	0.50	0.38
191	0.60	0.50	0.38
192	0.59	0.50	0.38
193	0.50	0.46	0.37
194	0.46	0.45	0.37
195	0.46	0.45	0.37
196	0.38	0.42	0.37
197	0.34	0.41	0.37
198	0.33	0.41	0.36
199	0.27	0.39	0.36
200	0.20	0.37	0.36
201	0.14	0.35	0.36
202	0.14	0.35	0.36

File : warplot

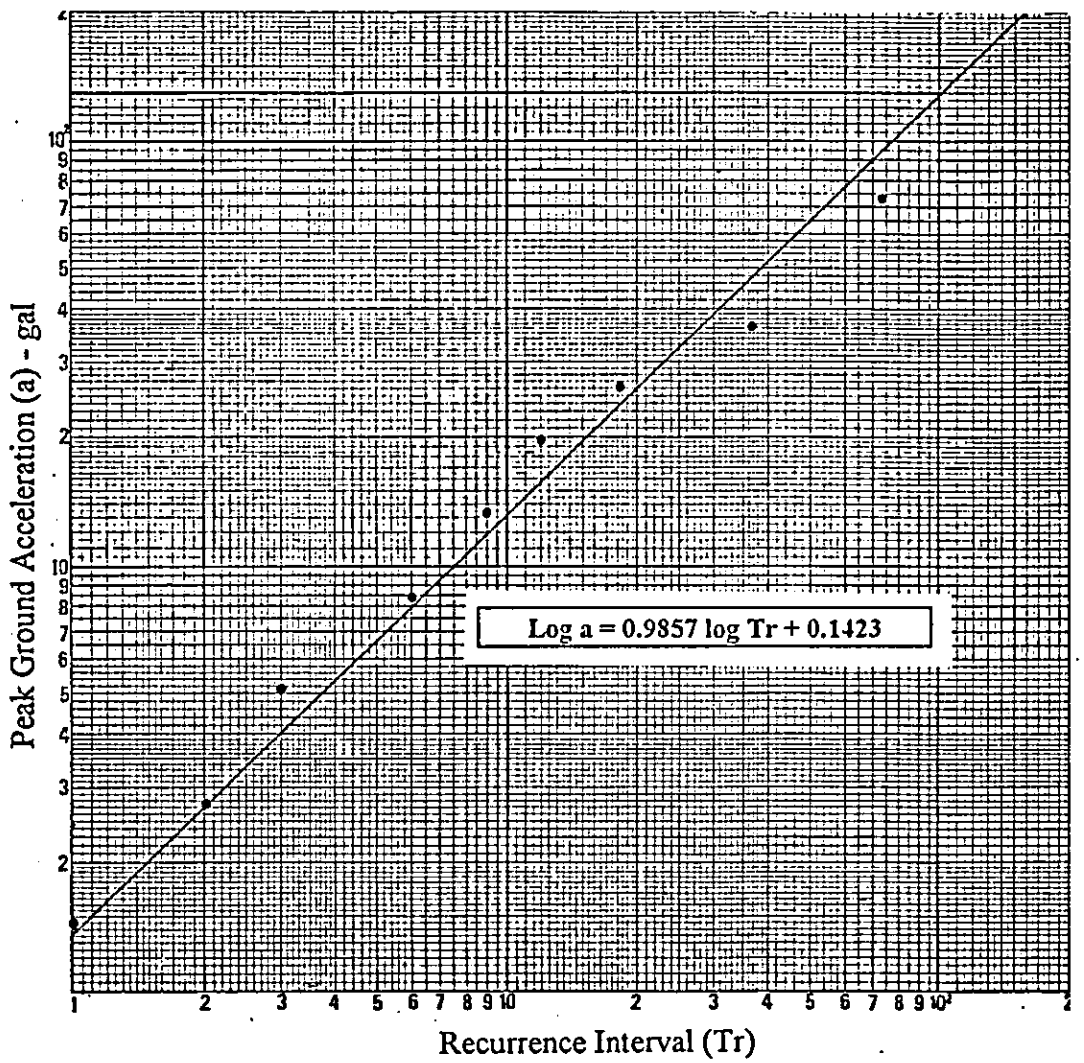


Figure H.1 : Plotting Position Curve and Recurrence Interval

Table H.3

FREQUENCY ANALYSIS

Intensity Ij	Frequency		
	72 Yr	100 Yr	Cummulative
> 7	1	1.338	1.338
6 - 7	3	4.167	5.505
5 - 6	9	12.5	18.005
4 - 5	9	12.5	30.505
3 - 4	26	36.111	66.616
2 - 3	34	47.222	113.838
1 - 2	84	116.666	230.504

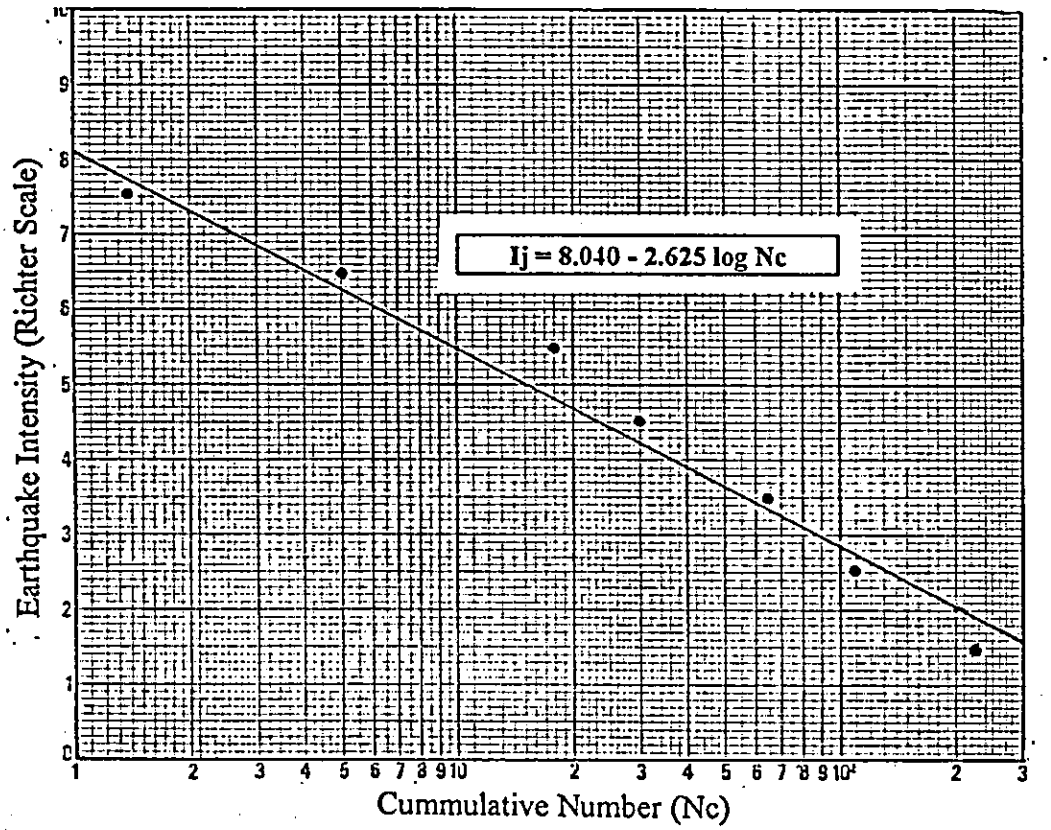


Figure H.2 : Frequency Analysis Curve
Relation between Intensity (Ij) and Cumulative Number (Nc)