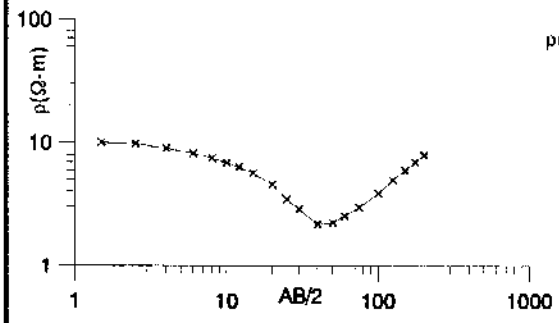
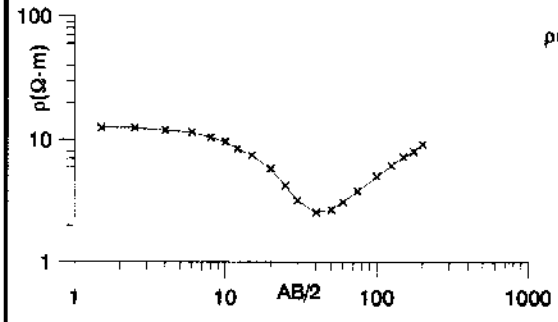
B-11



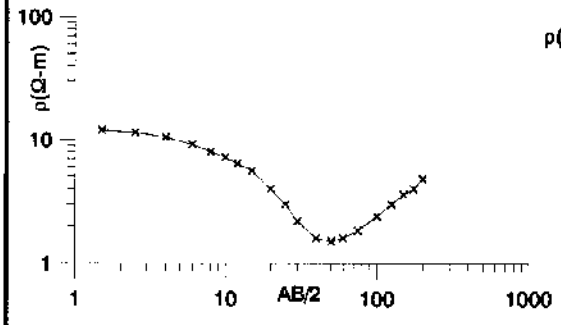
ρ(Ω-m)	d(m)
9.9	2.5
7.2	8.2
1.2	26.4
37.6	INF.

B-12



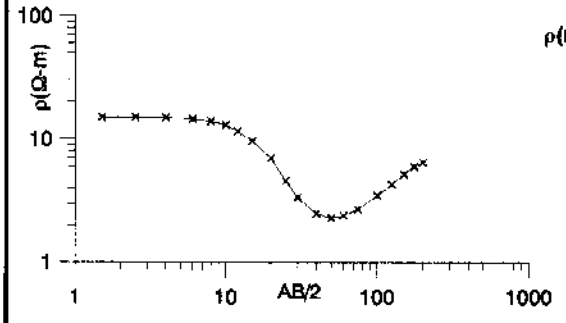
ρ(Ω-m)	d(m)
12.7	1.7
11.6	7.6
1.2	20.1
30.4	INF.

B-13



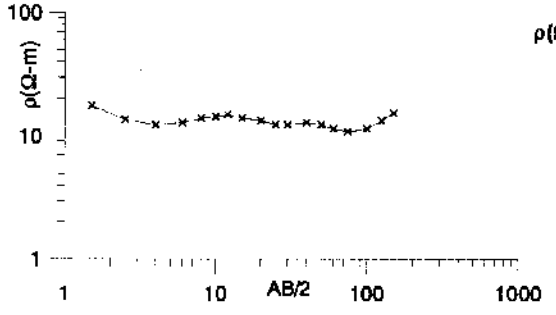
ρ(Ω-m)	d(m)
12.8	1.9
7.5	8.8
0.8	27.3
20.0	INF.

B-14



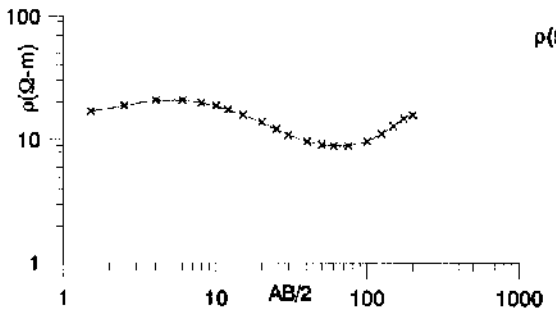
ρ(Ω-m)	d(m)
15.4	7.0
6.5	5.9
1.0	23.6
49.0	INF.

B-15



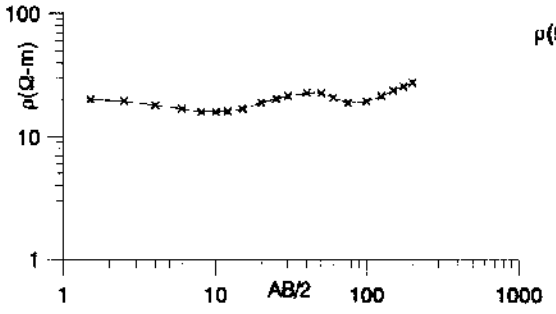
ρ(Ω-m)	d(m)
23.2	0.8
9.5	1.9
17.8	6.4
10.1	8.4
13.7	17.4
6.5	38.0
41.8	INF.

B-16



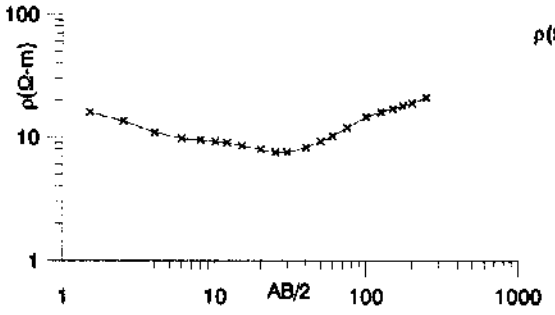
ρ(Ω-m)	d(m)
17.2	1.3
27.3	2.5
14.1	10.8
6.9	58.8
48.9	INF.

B-17



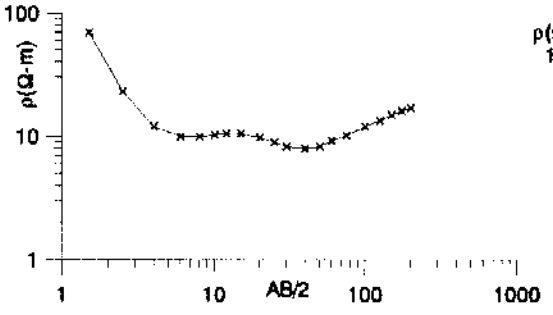
ρ(Ω-m)	d(m)
20.5	2.2
13.0	5.8
30.9	19.5
10.5	34.9
48.6	INF.

B-18



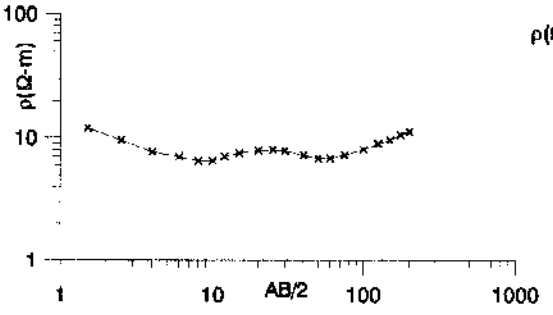
ρ(Ω-m)	d(m)
18.0	1.0
9.4	7.7
5.5	16.1
20.3	53.9
35.6	INF.

B-19



ρ(Ω-m)	d(m)
164.4	0.7
7.4	2.7
15.8	5.9
5.4	24.1
26.0	INF.

B-20



ρ(Ω-m)	d(m)
13.7	1.1
6.0	5.6
10.1	11.8
4.0	25.4
16.4	INF.

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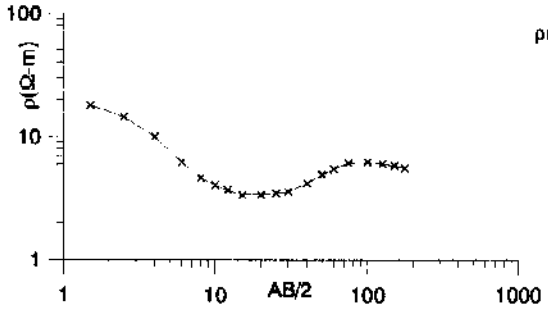
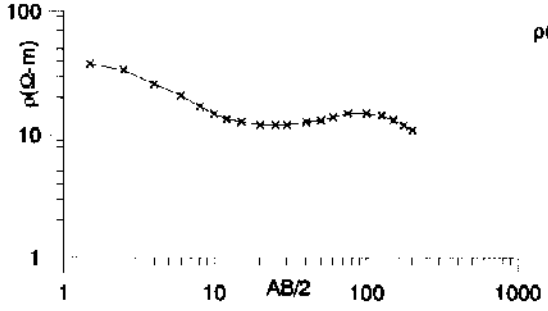
Appendix 4. 61 VES Curves (B-11 to B-20)
Desa Lubuhan Lalar (NTB#14)

B-01



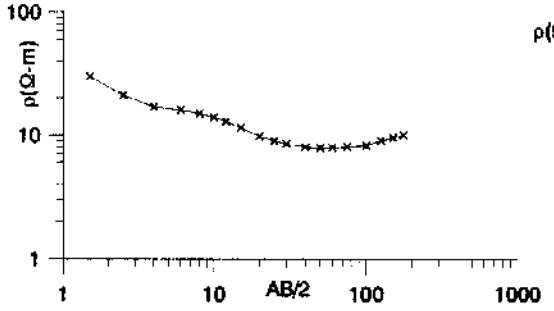
ρ(Ω-m)	d(m)
18.2	2.0
3.1	21.5
15.9	22.3
4.7	INF.

B-02



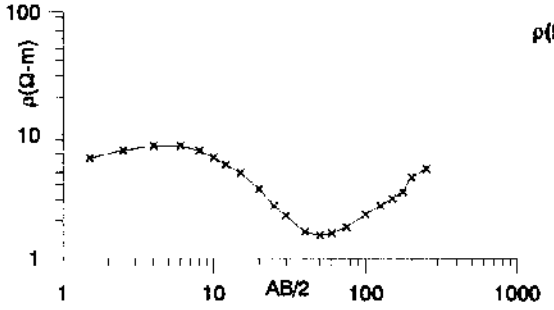
ρ(Ω-m)	d(m)
38.0	2.2
11.7	29.0
23.6	49.0
5.2	INF.

B-03



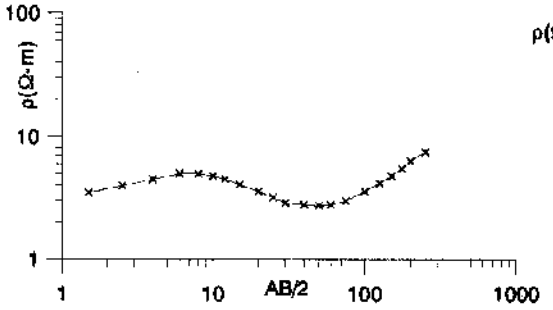
ρ(Ω-m)	d(m)
41.0	0.8
15.3	8.0
6.0	17.5
9.6	INF.

B-04



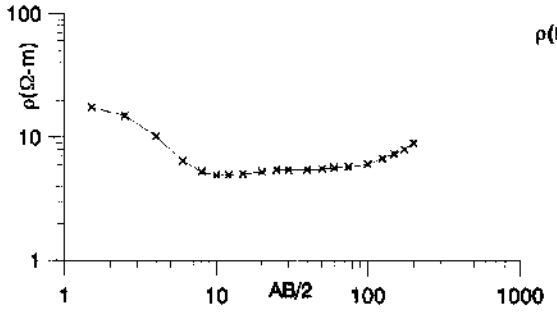
ρ(Ω-m)	d(m)
6.8	2.2
11.9	4.1
1.3	44.5
3.9	27.7
29.5	INF.

B-05



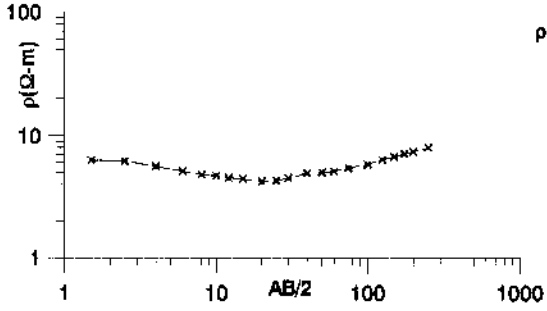
ρ(Ω-m)	d(m)
3.2	1.3
6.9	4.7
2.3	49.2
14.6	INF.

B-06



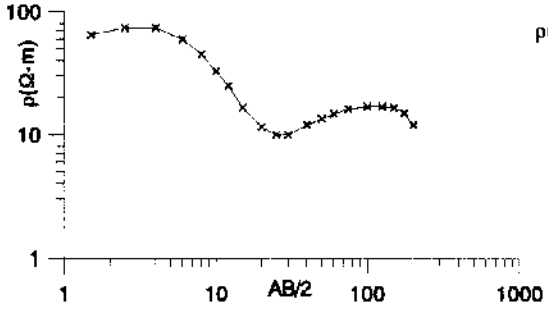
ρ(Ω-m)	d(m)
19.9	1.6
4.8	9.0
5.7	42.7
8.7	INF.

B-07



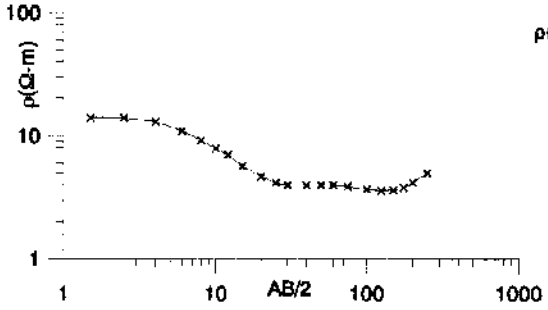
ρ(Ω-m)	d(m)
6.5	2.1
4.3	17.9
5.1	25.4
8.7	INF.

B-08



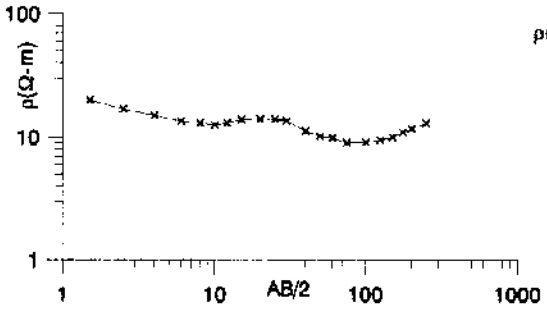
ρ(Ω-m)	d(m)
60.1	1.0
115.8	1.7
29.8	3.2
6.4	14.9
32.0	59.7
5.6	INF.

B-09



ρ(Ω-m)	d(m)
14.4	4.0
4.1	50.3
2.3	70.5
19.1	INF.

B-10



ρ(Ω-m)	d(m)
21.0	1.3
12.2	6.8
18.3	10.8
6.7	73.1
29.0	INF.

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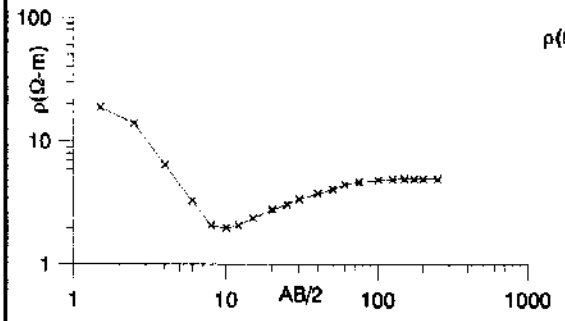
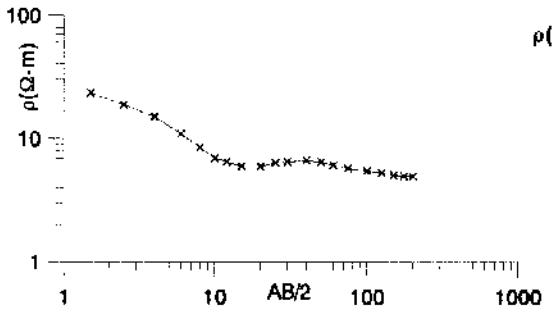
Appendix 4. 62 VES Curves (B-1 to B-10)
Desa Poto (NTB#15)

B-11



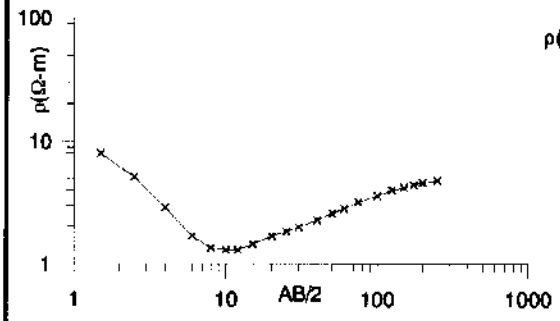
ρ(Ω-m)	d(m)
23.7	1.1
10.4	0.9
1.3	5.5
5.4	INF.

B-16



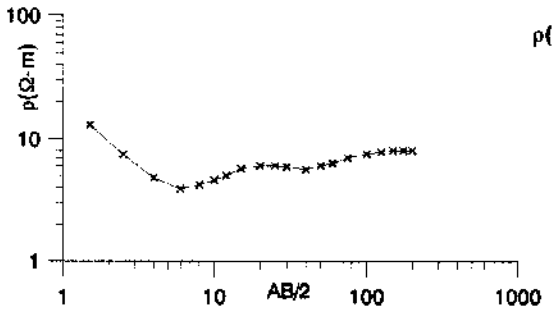
ρ(Ω-m)	d(m)
25.8	1.2
12.9	2.2
5.0	9.5
8.6	15.2
4.8	INF.

B-12



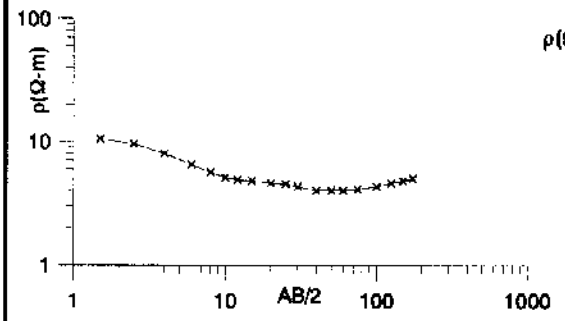
ρ(Ω-m)	d(m)
10.0	1.0
3.7	1.0
1.1	10.6
4.9	INF.

B-17



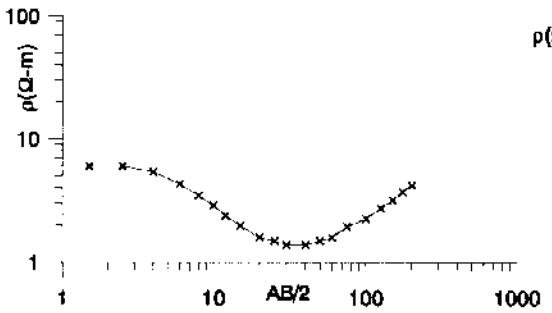
ρ(Ω-m)	d(m)
18.4	1.0
3.0	3.8
9.2	8.6
3.3	11.8
9.8	INF.

B-13



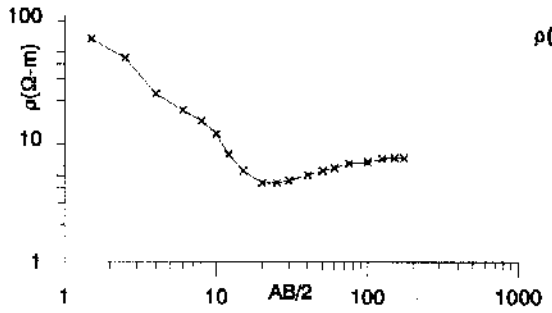
ρ(Ω-m)	d(m)
11.5	1.7
4.8	14.9
3.4	35.0
6.0	INF.

B-18



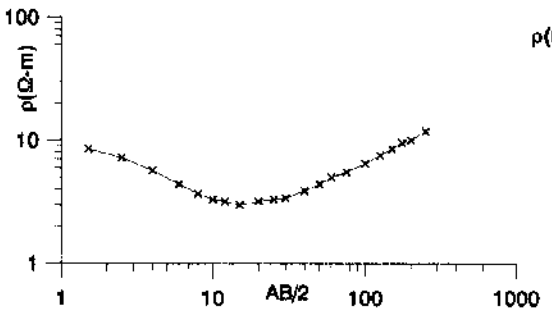
ρ(Ω-m)	d(m)
6.0	4.0
1.3	39.4
2.8	30.2
20.2	INF.

B-14



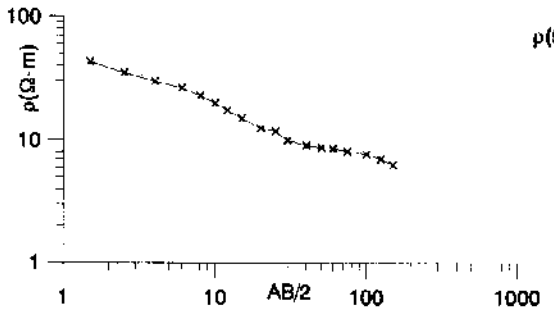
ρ(Ω-m)	d(m)
80.7	1.1
16.8	4.5
2.6	9.8
7.9	INF.

B-19



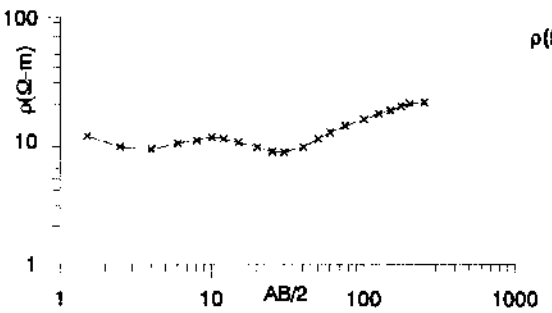
ρ(Ω-m)	d(m)
8.8	1.9
2.8	15.7
5.7	40.7
21.7	INF.

B-15



ρ(Ω-m)	d(m)
44.1	1.2
25.7	5.0
8.9	58.9
4.3	INF.

B-20



ρ(Ω-m)	d(m)
13.9	0.7
6.7	1.8
15.8	4.2
5.5	16.4
24.7	61.1
34.4	INF.

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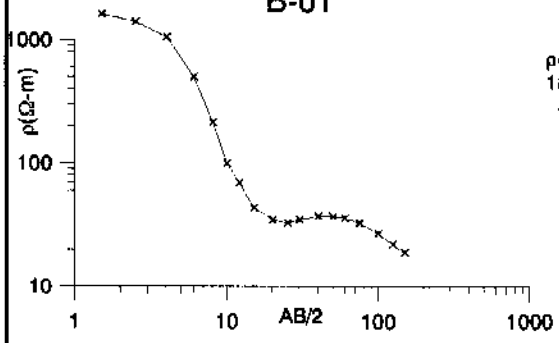
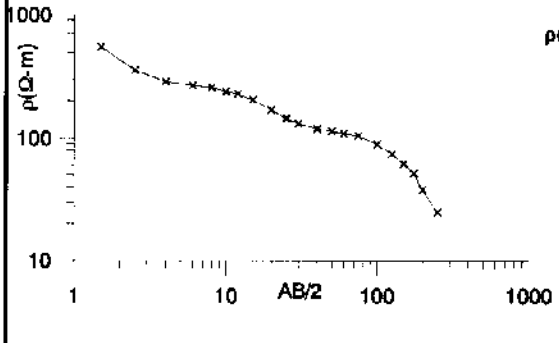
Appendix 4. 63 VES Curves (B-11 to B-20)
Desa Poto (NTB#15)

B-01



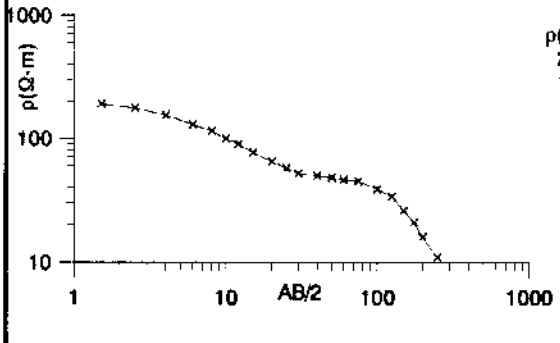
ρ(Ω-m)	d(m)
1845.8	1.8
497.2	1.7
32.0	15.9
58.3	19.1
24.1	39.3
7.9	INF.

B-02



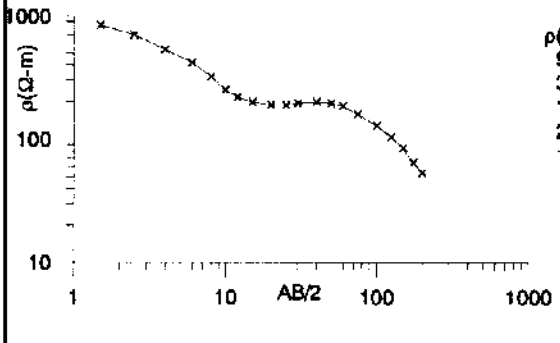
ρ(Ω-m)	d(m)
669.1	0.8
265.6	6.3
121.2	76.7
5.0	INF.

B-03



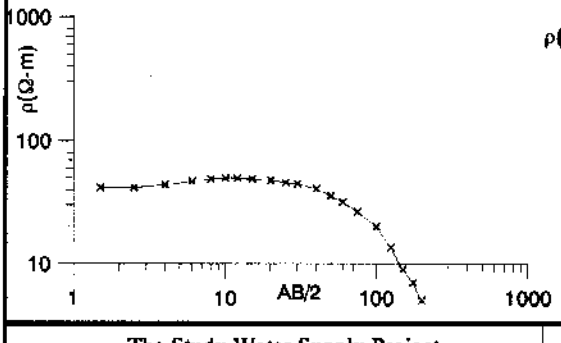
ρ(Ω-m)	d(m)
209.0	1.6
113.5	4.3
49.7	75.7
5.0	INF.

B-04



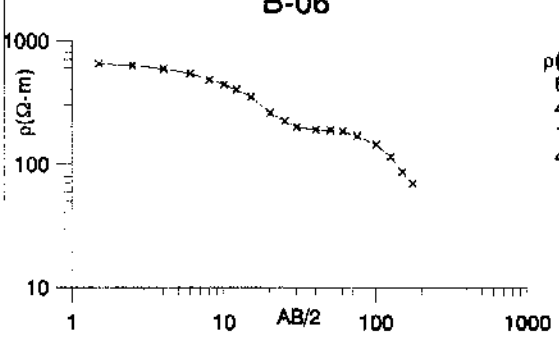
ρ(Ω-m)	d(m)
976.2	1.3
384.0	3.4
156.3	10.0
260.1	16.0
119.7	68.3
10.0	INF.

B-05



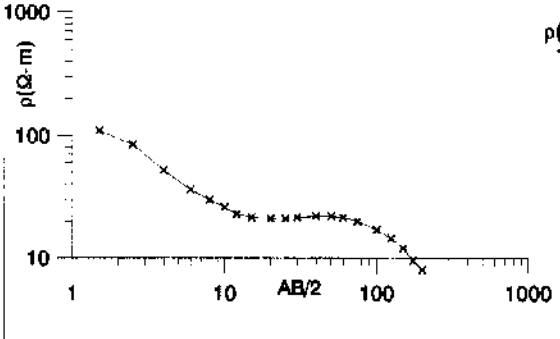
ρ(Ω-m)	d(m)
42.0	3.0
55.0	9.9
44.9	14.9
19.4	43.1
3.0	INF.

B-06



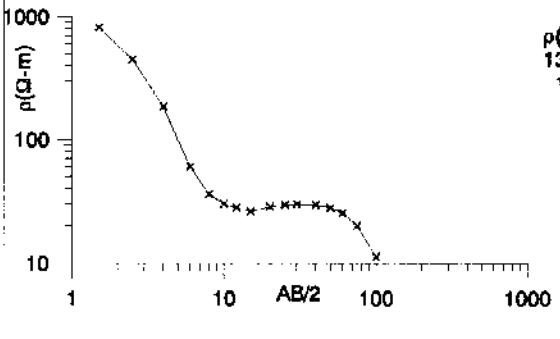
ρ(Ω-m)	d(m)
659.9	2.4
442.1	6.3
121.9	14.4
420.0	16.7
50.0	INF.

B-07



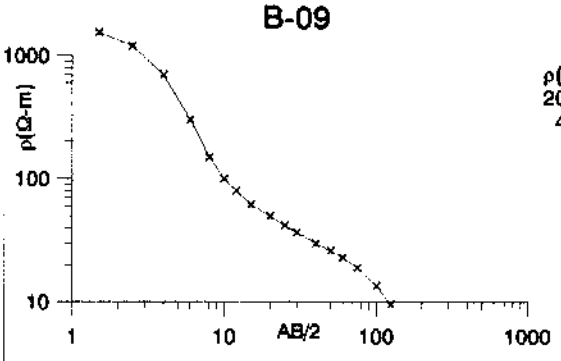
ρ(Ω-m)	d(m)
120.9	1.7
21.4	16.3
26.1	32.9
16.0	31.7
2.0	INF.

B-08



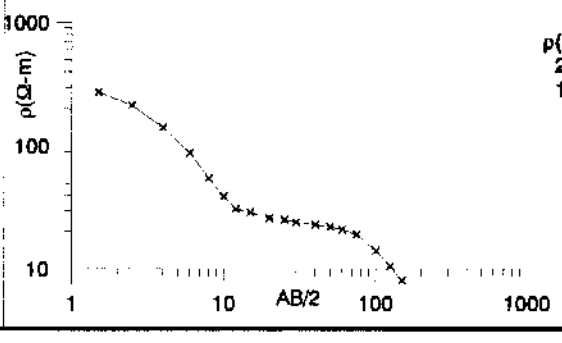
ρ(Ω-m)	d(m)
1317.4	1.0
144.4	1.8
21.2	6.5
43.2	19.5
19.6	24.1
3.0	INF.

B-09



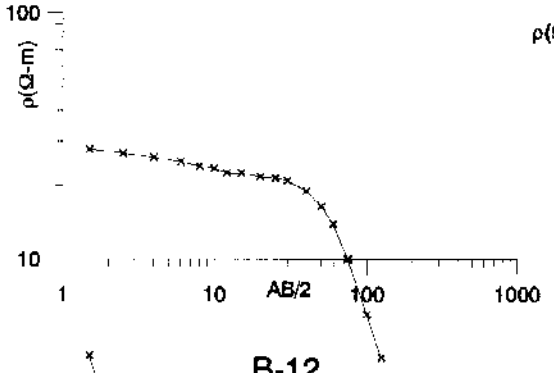
ρ(Ω-m)	d(m)
2001.8	1.3
427.4	2.1
55.0	14.5
21.9	52.7
3.0	INF.

B-10



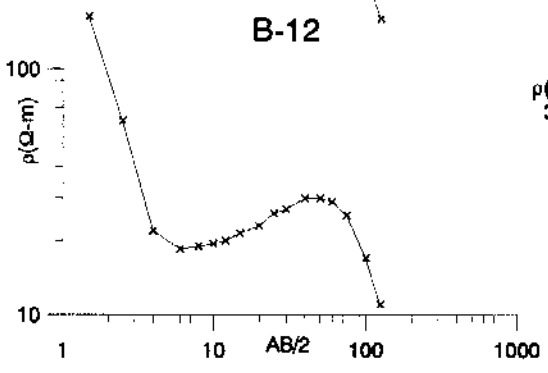
ρ(Ω-m)	d(m)
293.2	1.5
100.8	2.0
24.1	57.6
2.0	INF.

B-11



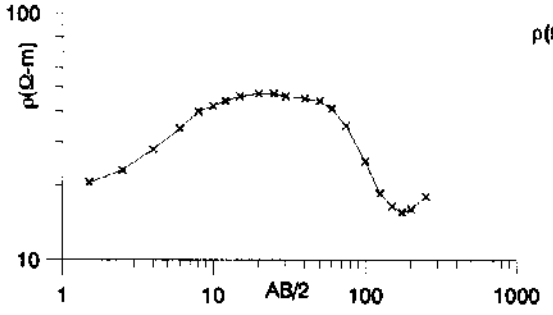
ρ(Ω-m)	d(m)
29.7	1.5
22.0	22.6
14.2	18.9
2.0	INF.

B-12



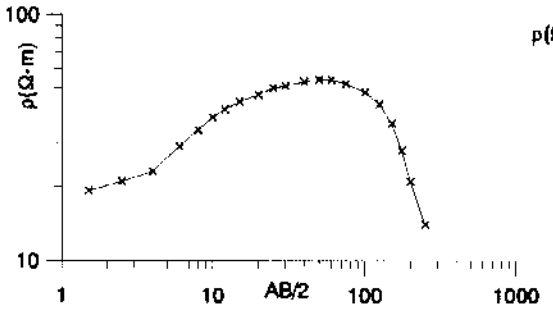
ρ(Ω-m)	d(m)
300.9	0.8
13.0	3.4
26.1	7.5
40.0	34.0
1.9	INF.

B-13



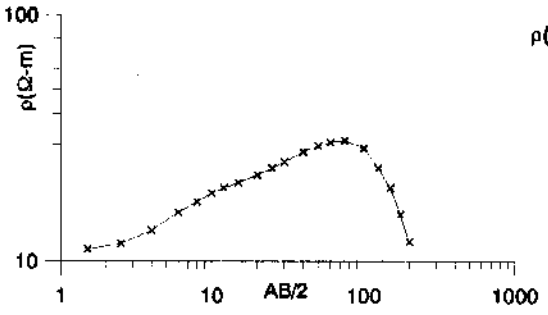
ρ(Ω-m)	d(m)
19.3	2.2
83.0	4.8
43.2	26.4
26.8	31.5
4.8	61.3
60.2	INF.

B-14



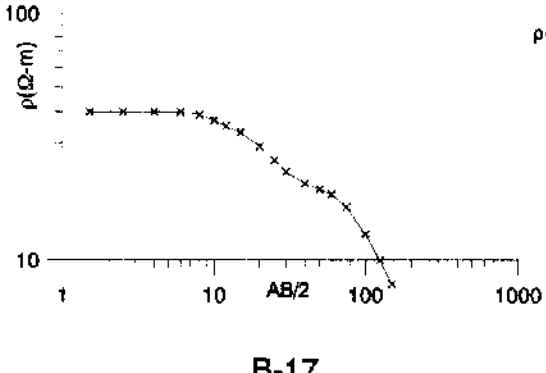
ρ(Ω-m)	d(m)
19.3	3.1
72.0	7.6
58.2	68.5
4.9	INF.

B-15



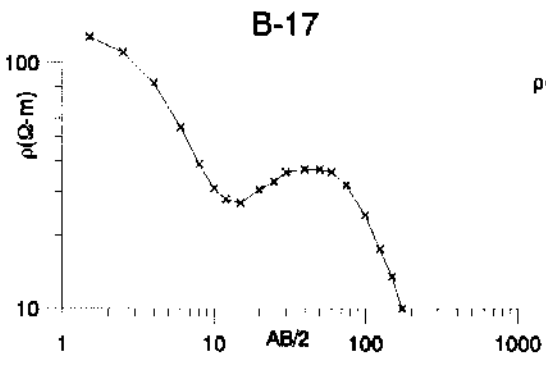
ρ(Ω-m)	d(m)
11.0	2.0
20.0	8.0
40.0	55.0
5.0	INF.

B-16



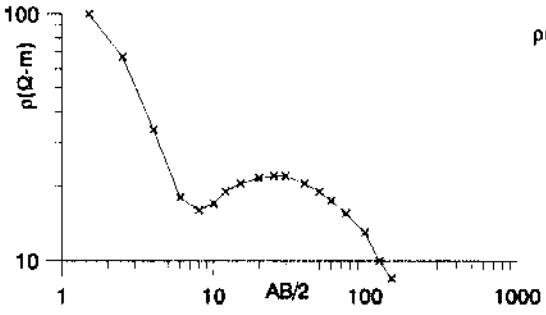
ρ(Ω-m)	d(m)
41.0	8.2
19.3	51.3
4.0	INF.

B-17



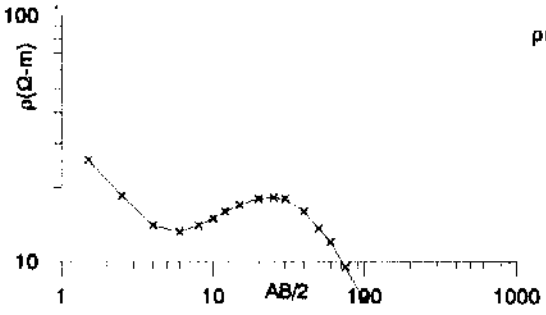
ρ(Ω-m)	d(m)
135.0	2.1
24.3	9.8
56.2	13.9
30.8	35.3
4.1	INF.

B-18



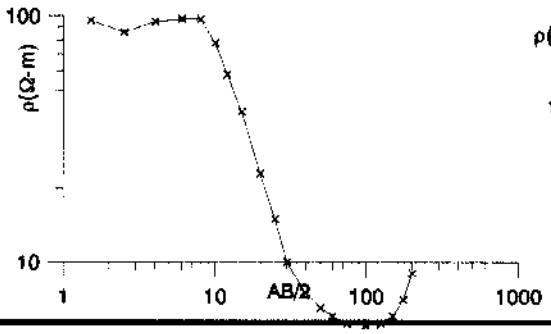
ρ(Ω-m)	d(m)
126.5	1.3
13.2	5.7
32.2	10.3
15.8	50.8
3.0	INF.

B-19



ρ(Ω-m)	d(m)
31.5	1.0
11.0	4.2
23.6	14.4
14.3	17.2
2.7	INF.

B-20



ρ(Ω-m)	d(m)
94.3	0.9
77.6	0.9
154.6	2.9
15.4	7.0
5.2	82.0
10.5	INF.

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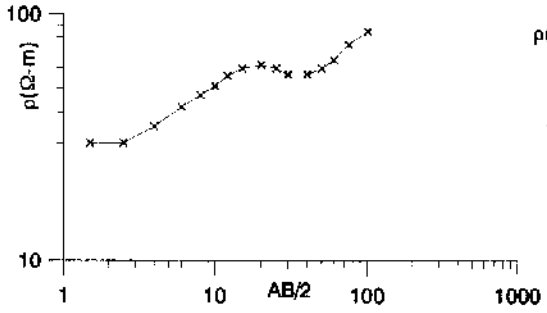
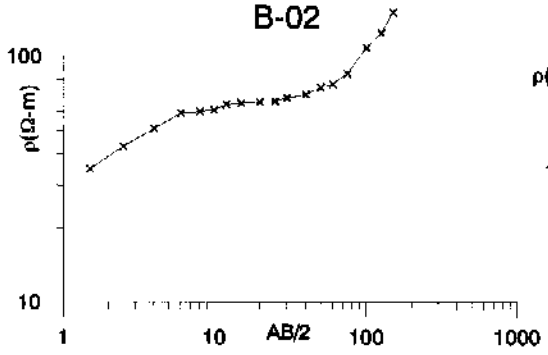
Appendix 4. 65 VES Curves (B-11 to B-20)
Desa Piong (NTB#16)

B-01



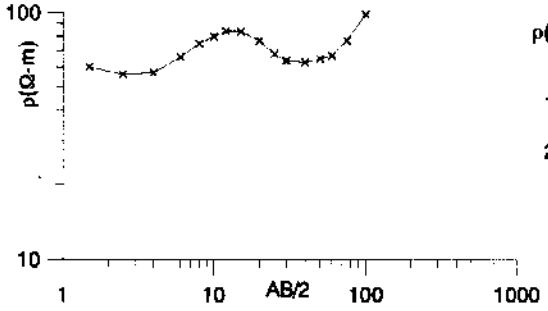
ρ(Ω-m)	d(m)
29.8	2.8
75.7	11.8
31.1	11.8
124.0	INF.

B-02



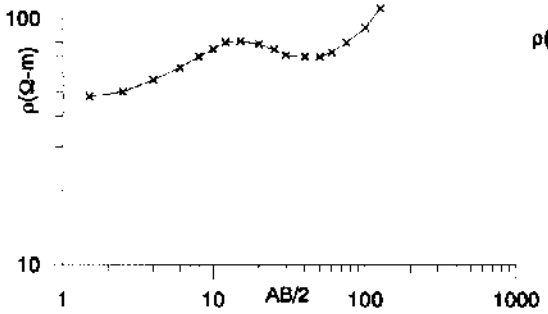
ρ(Ω-m)	d(m)
28.8	1.0
73.7	6.2
53.7	21.3
187.7	INF.

B-03



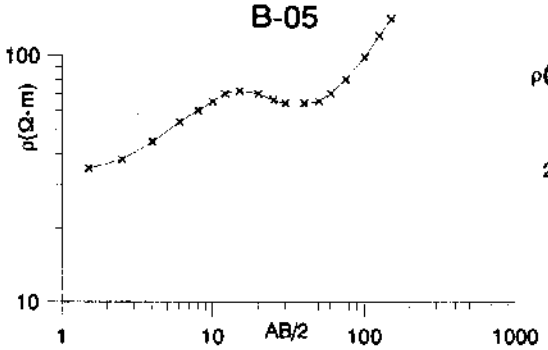
ρ(Ω-m)	d(m)
56.7	1.4
52.5	1.8
119.7	7.0
37.4	25.9
298.3	INF.

B-04



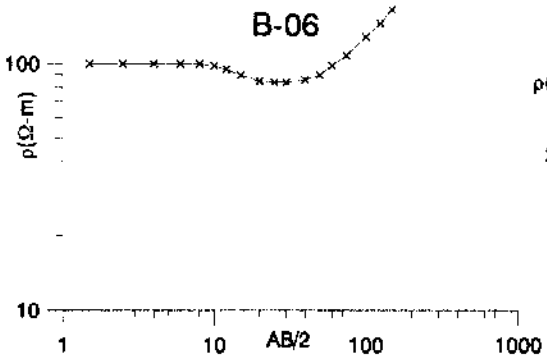
ρ(Ω-m)	d(m)
43.1	1.6
86.9	12.1
42.8	22.3
232.9	INF.

B-05



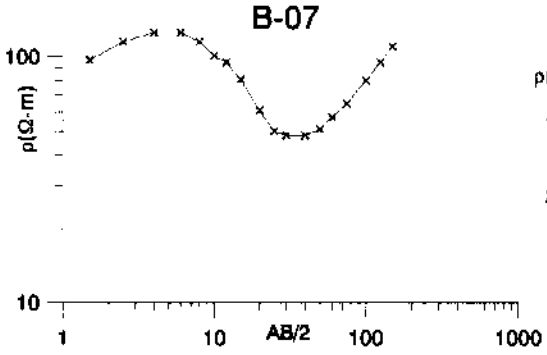
ρ(Ω-m)	d(m)
33.0	2.1
88.1	11.5
36.9	21.0
294.7	INF.

B-06



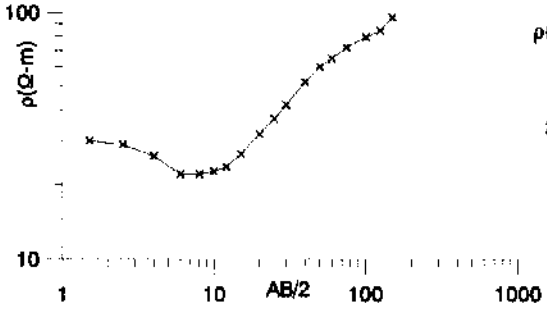
ρ(Ω-m)	d(m)
97.9	10.8
61.1	21.9
275.4	INF.

B-07



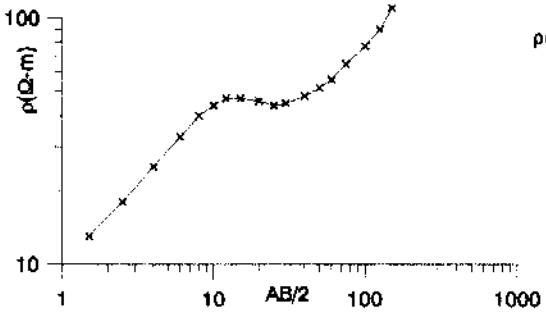
ρ(Ω-m)	d(m)
93.9	1.2
183.7	2.2
73.9	7.1
29.5	23.3
236.4	INF.

B-08



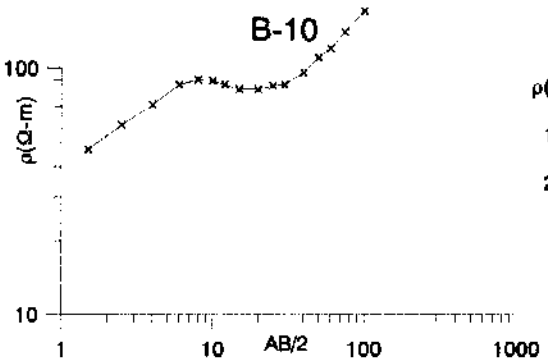
ρ(Ω-m)	d(m)
30.9	2.1
16.8	6.2
77.2	41.1
258.8	INF.

B-09



ρ(Ω-m)	d(m)
11.1	1.3
72.7	7.8
26.0	16.6
189.5	INF.

B-10



ρ(Ω-m)	d(m)
42.8	1.1
103.1	5.6
62.4	13.7
227.0	INF.

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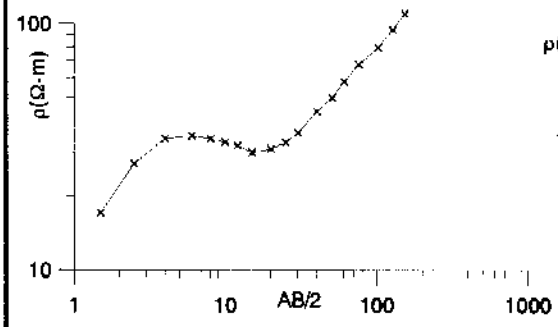
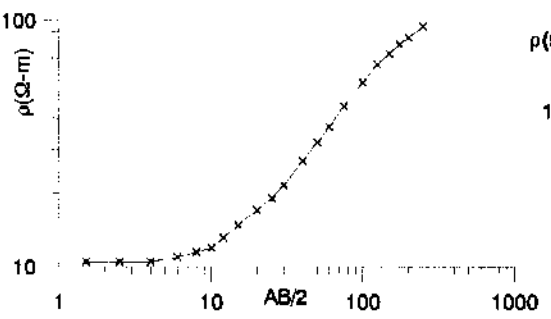
Appendix 4. 66 VES Curves (B-1 to B-10)
Desa Kawuwu (NTB#18)

B-11



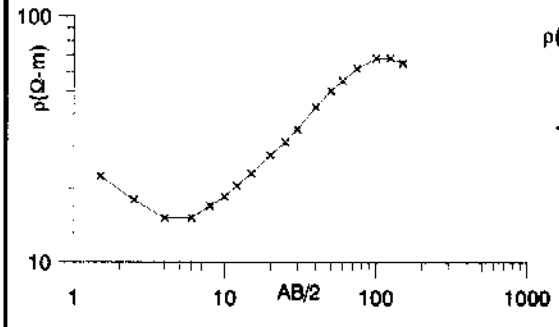
ρ(Ω-m)	d(m)
13.1	0.9
79.1	1.9
18.5	10.9
143.4	INF.

B-16



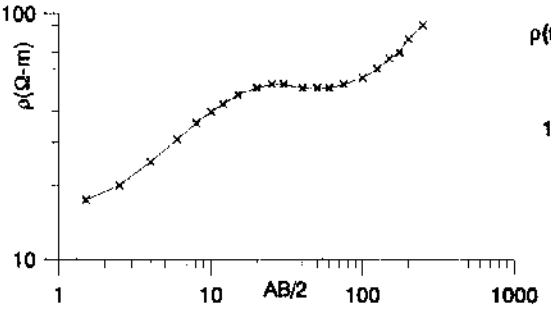
ρ(Ω-m)	d(m)
10.2	6.4
23.1	15.6
149.4	INF.

B-12



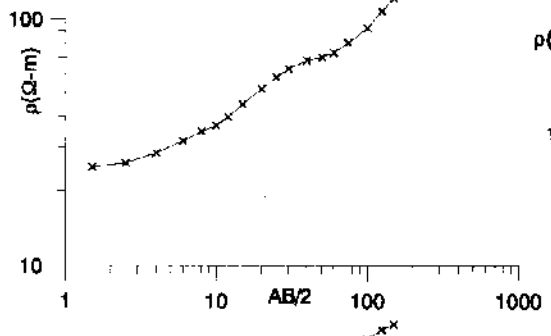
ρ(Ω-m)	d(m)
22.5	1.2
12.5	4.1
29.6	7.0
123.4	50.7
31.7	INF.

B-17



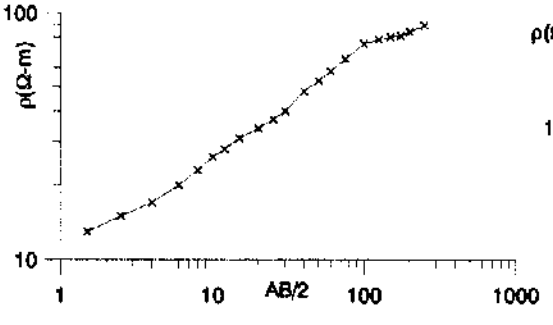
ρ(Ω-m)	d(m)
15.5	1.6
58.2	18.2
35.3	27.2
108.4	INF.

B-13



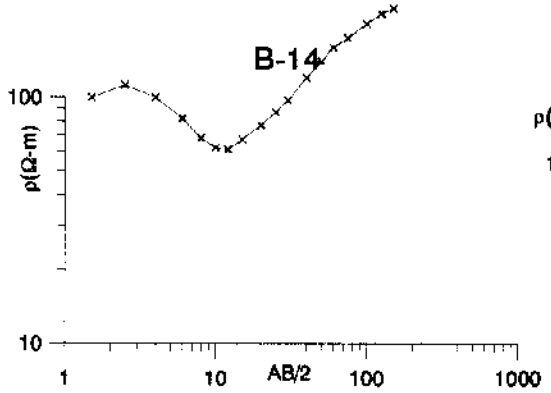
ρ(Ω-m)	d(m)
24.6	2.8
49.5	6.5
76.3	35.6
172.3	INF.

B-18



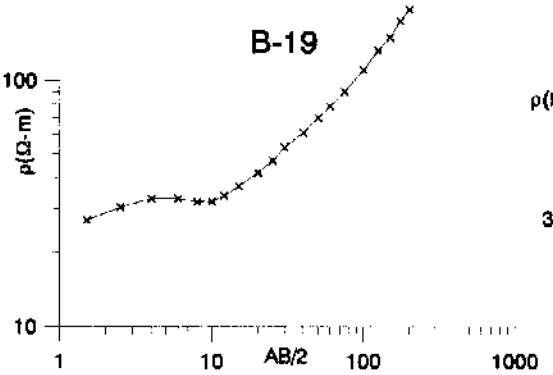
ρ(Ω-m)	d(m)
12.2	1.7
29.8	9.8
80.7	58.6
119.1	INF.

B-14



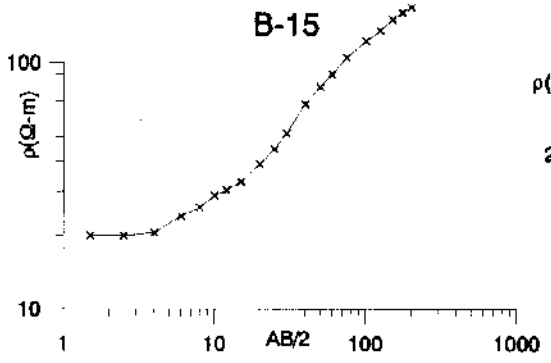
ρ(Ω-m)	d(m)
98.8	1.0
161.2	1.1
44.1	8.6
298.7	INF.

B-19



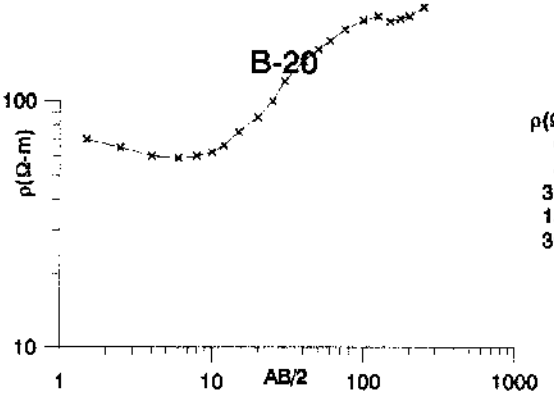
ρ(Ω-m)	d(m)
27.0	1.3
39.3	2.1
24.5	5.2
73.7	26.8
380.6	INF.

B-15



ρ(Ω-m)	d(m)
20.3	4.3
32.0	7.5
223.4	INF.

B-20



ρ(Ω-m)	d(m)
66.4	2.0
49.8	7.1
305.2	71.5
153.7	49.6
303.3	INF.

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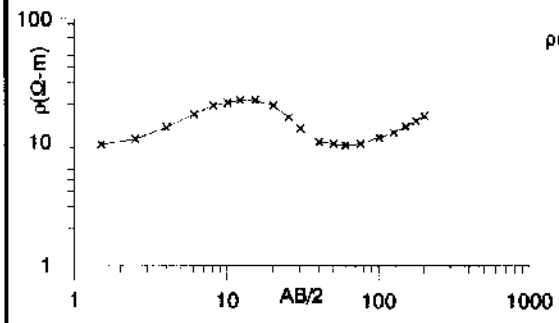
Appendix 4. 67 VES Curves (B-11 to B-20)

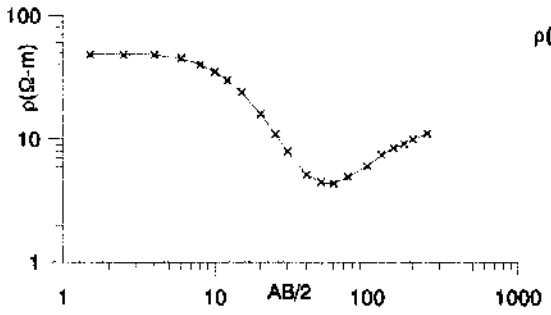
Desa Kawuwu (NTB#18)

B-01



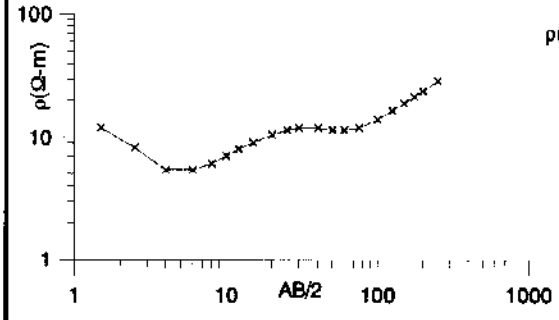
ρ(Ω-m)	d(m)
8.1	1.6
33.8	7.4
6.0	43.8
38.0	INF.

B-06



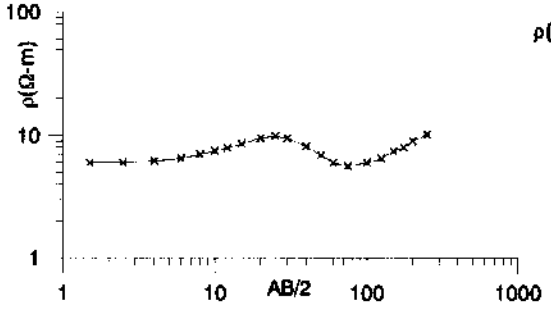
ρ(Ω-m)	d(m)
49.7	4.9
21.5	7.7
2.1	27.9
36.4	INF.

B-02



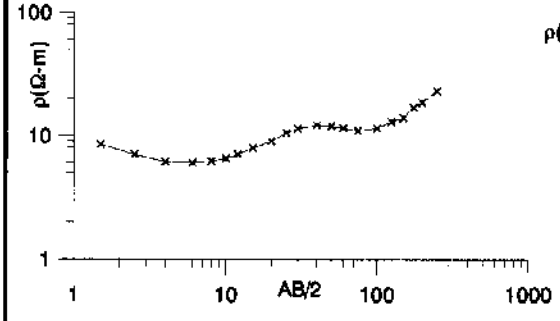
ρ(Ω-m)	d(m)
16.4	1.0
3.5	3.0
16.6	17.3
6.5	27.3
59.7	INF.

B-07



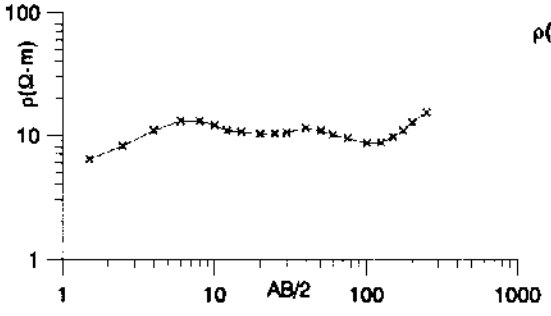
ρ(Ω-m)	d(m)
5.9	6.1
33.8	5.0
3.1	49.2
40.1	INF.

B-03



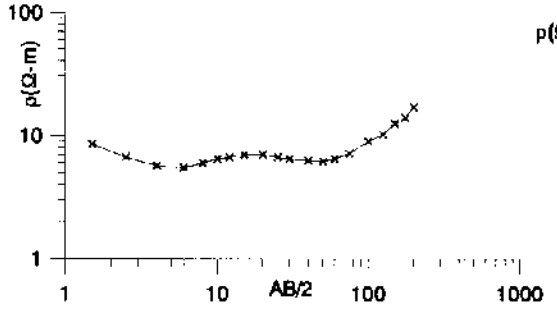
ρ(Ω-m)	d(m)
9.5	1.0
5.3	6.1
17.6	22.2
4.7	29.2
50.6	INF.

B-08



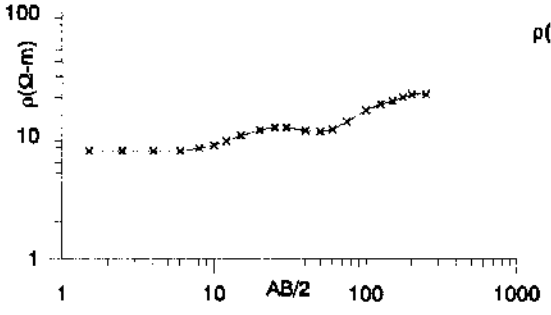
ρ(Ω-m)	d(m)
4.7	0.9
23.5	2.7
6.2	6.6
17.7	16.3
4.7	54.3
52.1	INF.

B-04



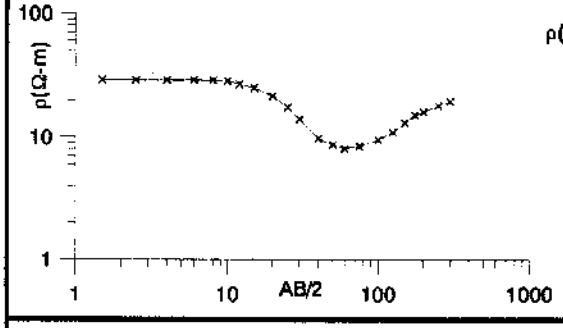
ρ(Ω-m)	d(m)
9.0	1.1
4.5	3.5
10.5	7.0
4.7	38.4
40.9	INF.

B-09



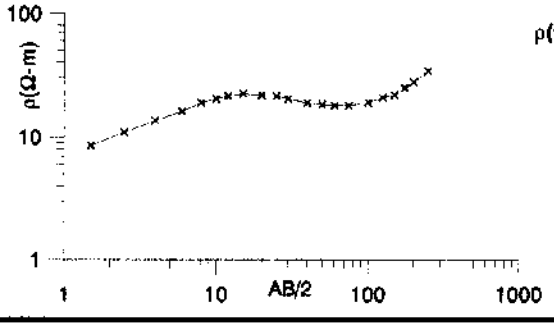
ρ(Ω-m)	d(m)
7.3	7.0
18.7	11.1
5.3	17.5
47.4	84.9
21.4	INF.

B-05



ρ(Ω-m)	d(m)
29.7	8.6
19.5	6.8
4.9	39.5
40.3	INF.

B-10



ρ(Ω-m)	d(m)
7.1	1.2
27.2	10.5
14.8	65.6
61.8	INF.

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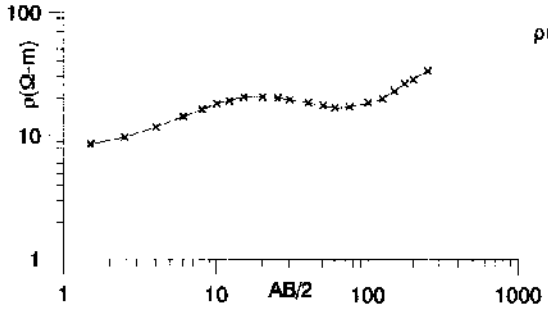
Appendix 4. 68 VES Curves (B-1 to B-10)

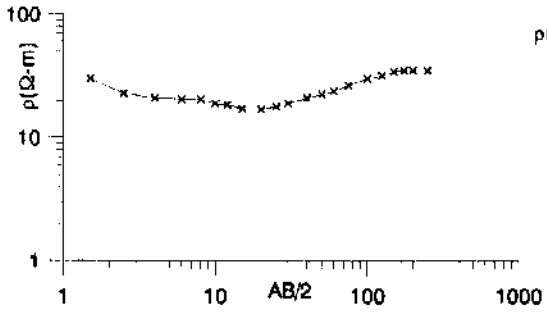
Desa Ranggo (NTB#19)

B-11



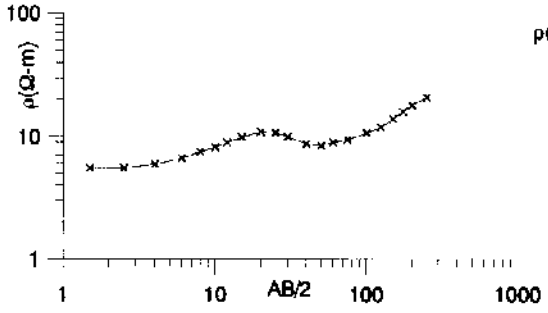
ρ(Ω-m)	d(m)
8.3	2.0
27.2	10.4
13.9	56.0
64.1	INF.

B-16



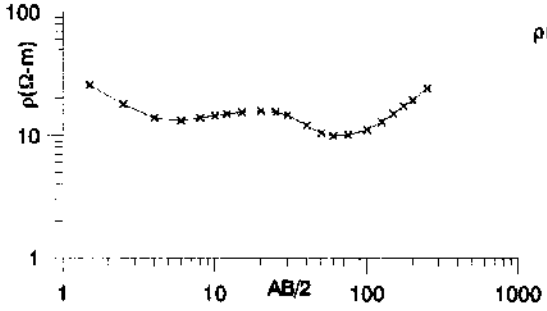
ρ(Ω-m)	d(m)
33.5	0.9
18.8	8.1
10.4	7.2
30.0	55.1
48.2	INF.

B-12



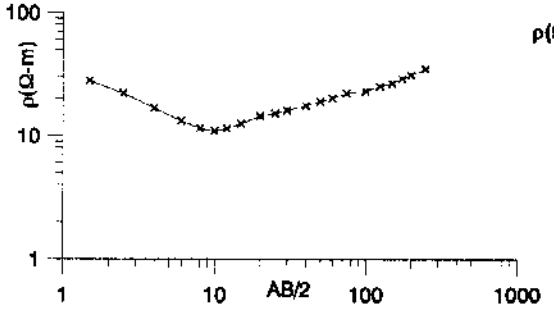
ρ(Ω-m)	d(m)
5.2	2.7
9.3	3.6
22.1	7.1
3.9	19.5
15.9	38.4
45.4	INF.

B-17



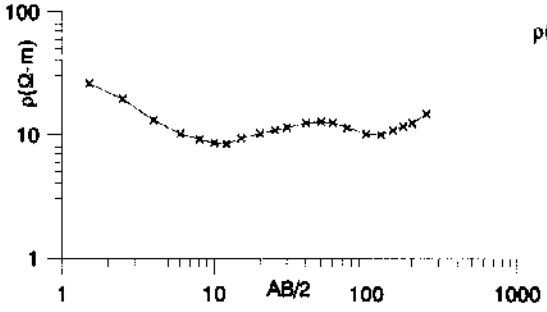
ρ(Ω-m)	d(m)
33.0	0.9
10.0	2.8
20.4	13.0
6.2	37.5
20.2	29.8
60.6	INF.

B-13



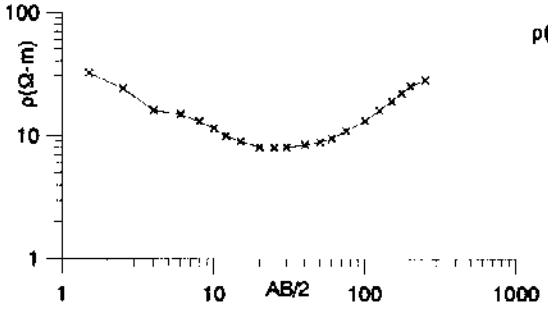
ρ(Ω-m)	d(m)
29.4	1.5
10.0	7.0
17.8	15.7
25.3	55.7
58.9	INF.

B-18



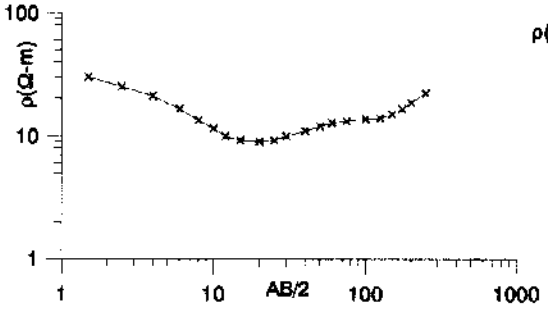
ρ(Ω-m)	d(m)
30.6	1.3
8.2	8.7
15.3	29.7
6.4	68.8
38.1	INF.

B-14



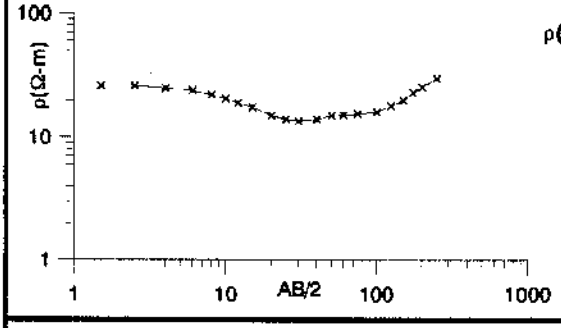
ρ(Ω-m)	d(m)
36.4	1.1
13.5	4.7
6.6	25.0
15.4	35.2
71.6	INF.

B-19



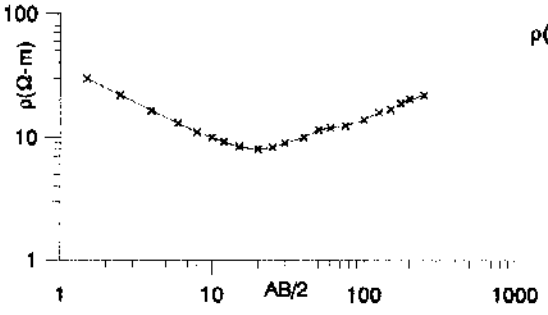
ρ(Ω-m)	d(m)

B-15



ρ(Ω-m)	d(m)
26.9	1.6
23.3	5.5
11.6	18.2
18.6	24.0
11.1	20.0
49.0	INF.

B-20



ρ(Ω-m)	d(m)
29.0	1.8
8.2	21.3
15.3	21.2
9.4	17.7
46.7	79.0
24.6	INF.

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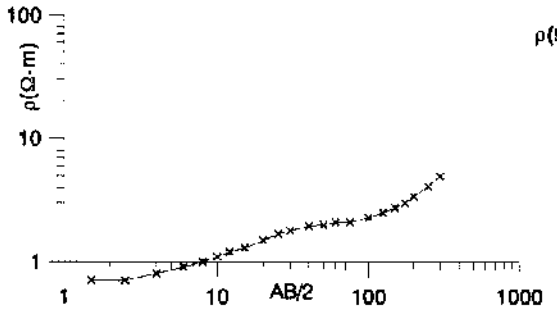
Appendix 4. 69 VES Curves (B-11 to B-20)

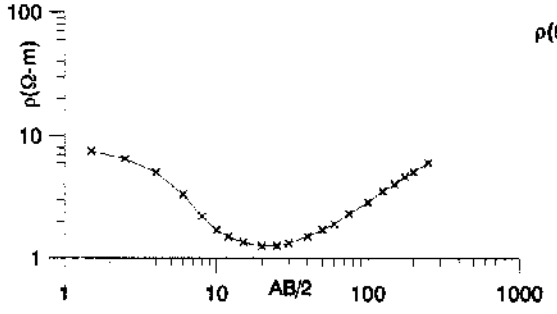
Desa Ranggo (NTB#19)

B-01



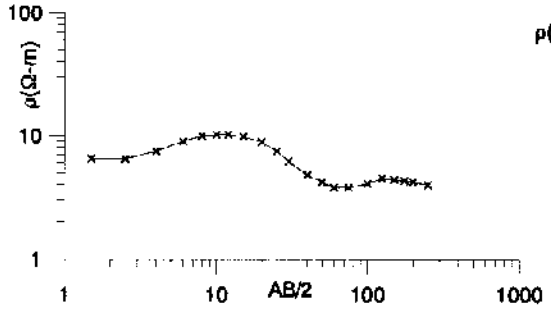
ρ(Ω-m)	d(m)
0.7	3.1
2.1	14.9
1.7	59.3
16.0	INF.

B-02



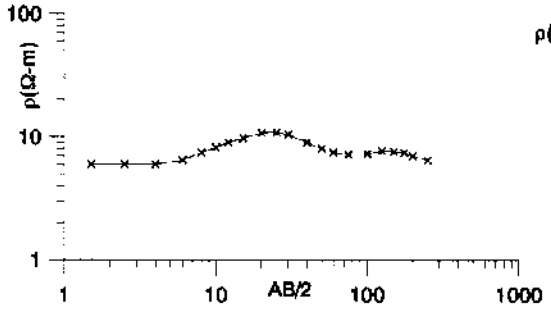
ρ(Ω-m)	d(m)
7.9	2.2
1.2	24.0
2.6	32.2
19.4	INF.

B-03



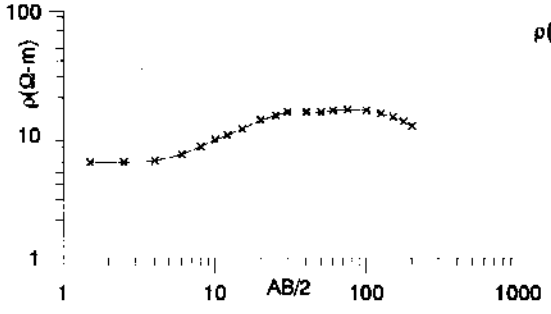
ρ(Ω-m)	d(m)
6.3	2.5
15.4	7.7
2.9	55.8
13.3	36.8
3.3	INF.

B-04



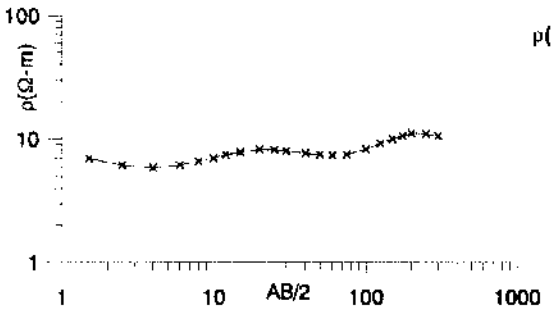
ρ(Ω-m)	d(m)
5.8	3.8
13.7	13.6
5.5	46.0
14.3	34.1
4.9	INF.

B-05



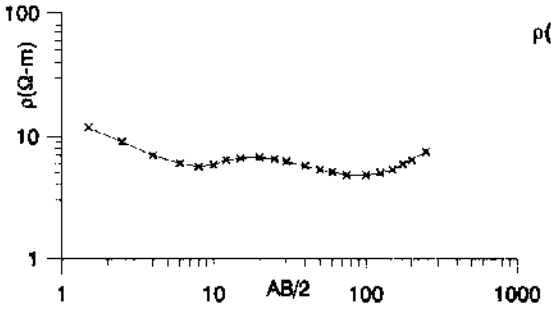
ρ(Ω-m)	d(m)
5.9	4.1
19.0	30.0
8.7	35.0
24.6	52.0
9.4	INF.

B-06



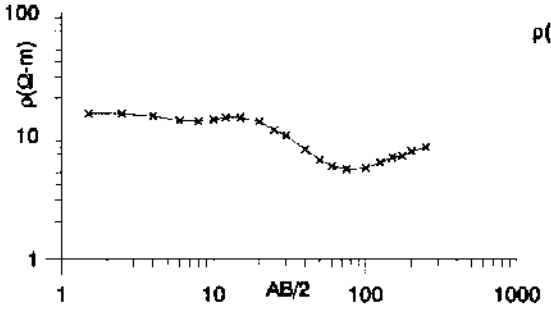
ρ(Ω-m)	d(m)
7.0	1.1
5.5	3.6
10.3	10.8
6.1	46.2
24.2	72.8
6.8	INF.

B-07



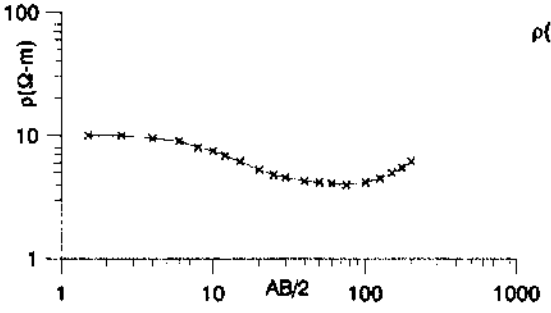
ρ(Ω-m)	d(m)
13.0	1.2
5.0	6.0
12.0	7.0
4.0	85.0
20.0	INF.

B-08



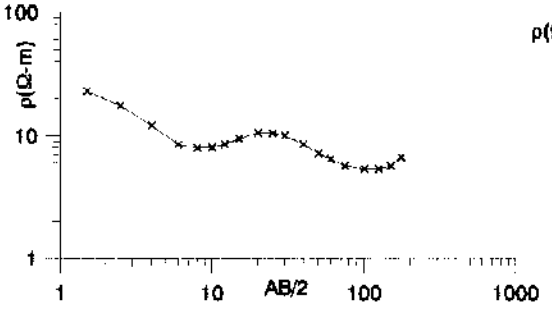
ρ(Ω-m)	d(m)
14.5	6.6
17.8	6.6
4.1	63.9
13.6	INF.

B-09



ρ(Ω-m)	d(m)
9.9	4.9
4.1	116.4
13.7	INF.

B-10



ρ(Ω-m)	d(m)
26.3	1.4
6.7	5.5
15.6	11.8
3.7	71.7
14.9	INF.

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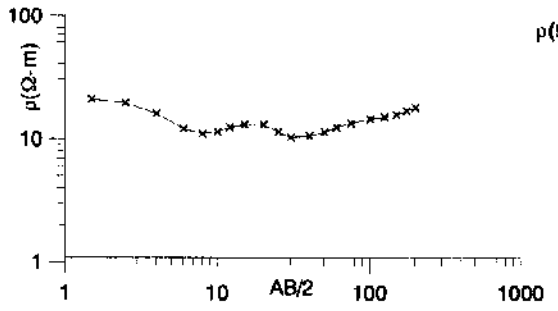
Appendix 4. 70 VES Curves (B-1 to B-10)

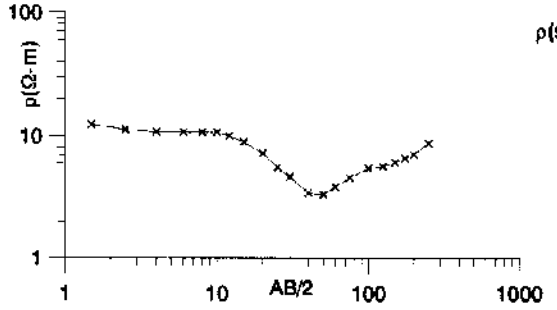
Desa Jambu (NTB#20)

B-11



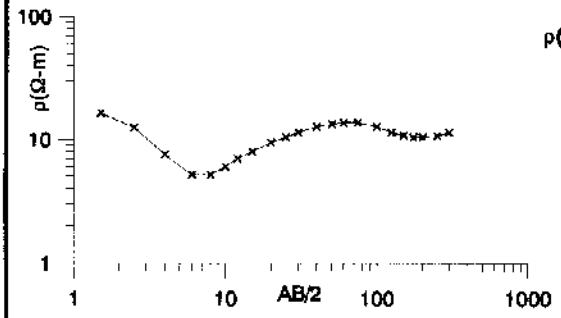
ρ(Ω-m)	d(m)
23.0	1.7
8.9	3.5
17.4	6.6
6.0	12.3
20.1	37.5
9.5	34.3
41.9	INF.

B-12



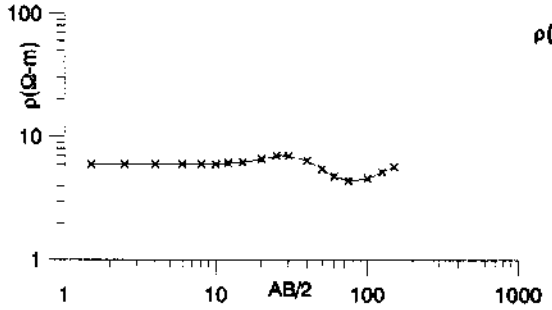
ρ(Ω-m)	d(m)
12.1	1.4
9.7	2.5
16.5	4.4
2.3	31.4
14.7	24.9
4.8	35.9
29.4	INF.

B-13



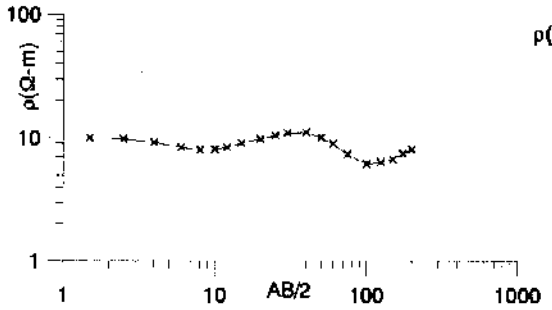
ρ(Ω-m)	d(m)
18.6	1.5
2.8	3.7
26.4	24.1
6.7	49.3
13.0	INF.

B-14



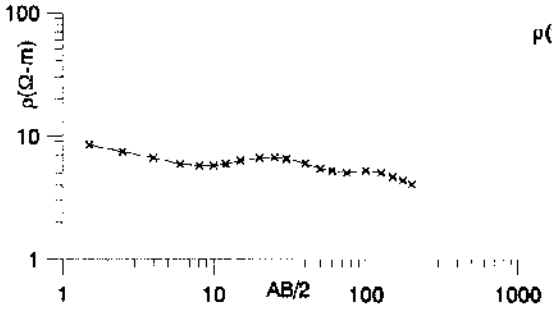
ρ(Ω-m)	d(m)
6.0	10.8
10.0	11.3
2.3	39.7
14.2	INF.

B-15



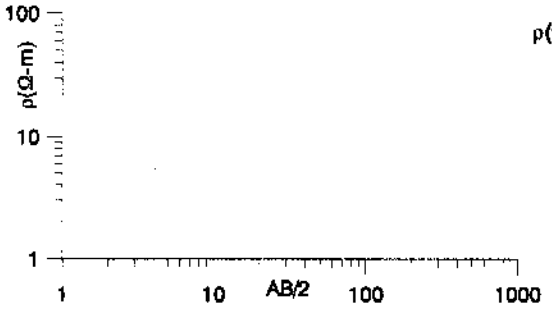
ρ(Ω-m)	d(m)
9.9	2.5
6.9	5.6
15.5	20.2
3.0	54.2
20.1	INF.

B-16



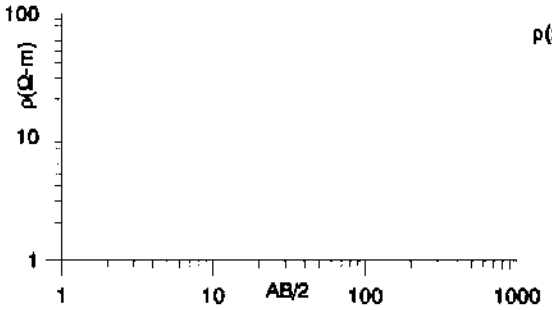
ρ(Ω-m)	d(m)
9.7	1.3
5.3	7.8
10.3	9.6
3.7	40.5
10.8	29.6
3.0	INF.

B-17



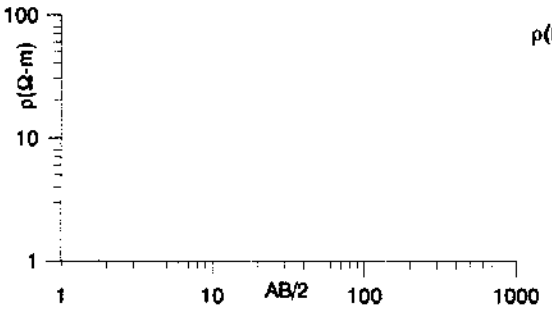
ρ(Ω-m)	d(m)

B-18



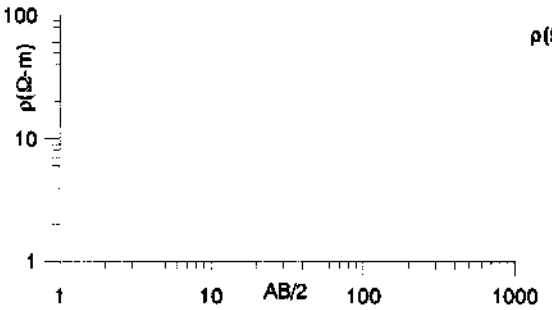
ρ(Ω-m)	d(m)

B-19



ρ(Ω-m)	d(m)

B-20



ρ(Ω-m)	d(m)

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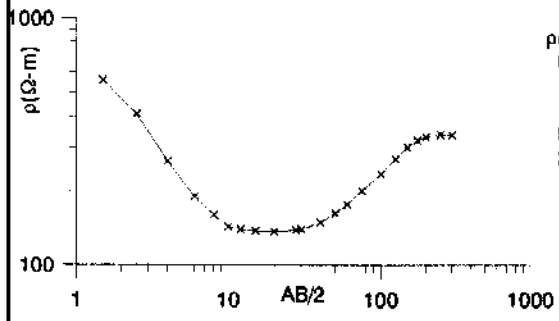
Appendix 4. 71 VES Curves (B-11 to B-20)

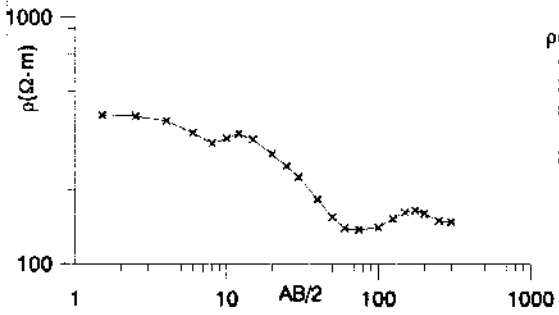
Desa Jambu (NTB#20)

B-01



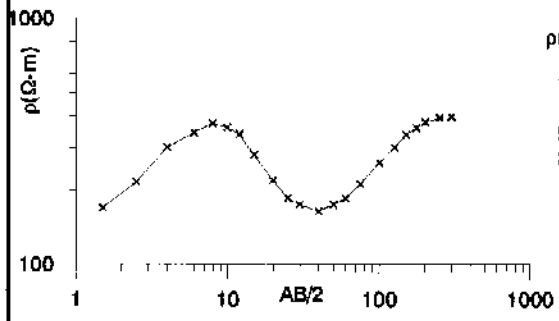
ρ(Ω-m)	d(m)
608.7	1.5
131.9	19.7
175.7	33.4
972.7	67.5
212.3	INF.

B-06



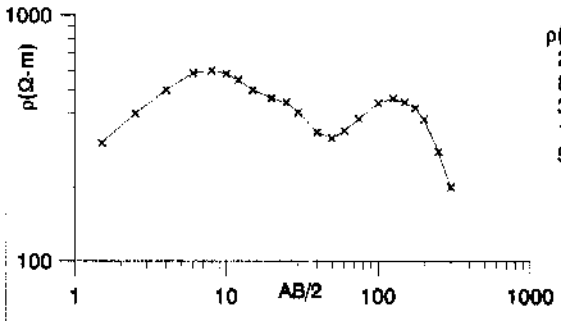
ρ(Ω-m)	d(m)
412.9	2.1
285.1	4.3
505.1	5.4
106.1	47.7
316.8	60.2
87.4	INF.

B-02



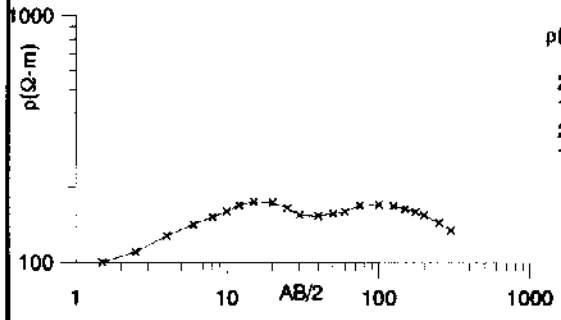
ρ(Ω-m)	d(m)
132.9	1.1
728.2	3.4
120.4	33.5
938.9	102.0
235.0	INF.

B-07



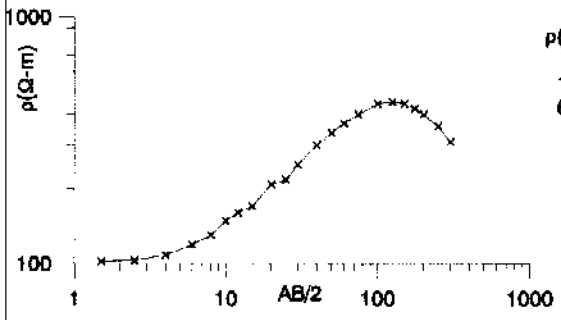
ρ(Ω-m)	d(m)
248.8	1.0
869.6	4.2
376.3	9.6
162.7	13.2
947.6	59.5
33.0	INF.

B-03



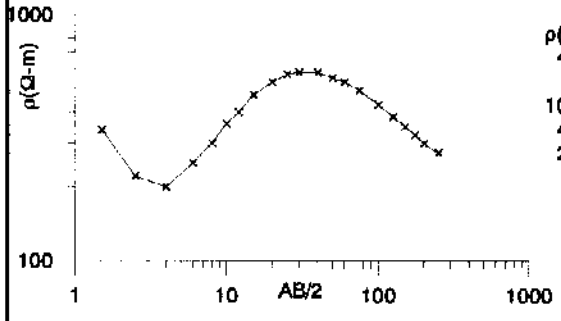
ρ(Ω-m)	d(m)
97.9	2.0
206.5	10.0
100.0	15.1
268.3	41.4
111.7	INF.

B-08



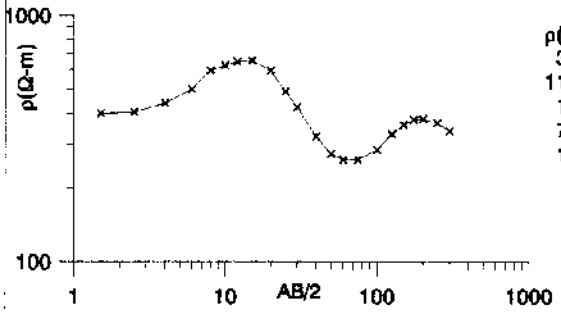
ρ(Ω-m)	d(m)
98.8	3.1
185.9	10.3
673.6	92.0
94.7	INF.

B-04



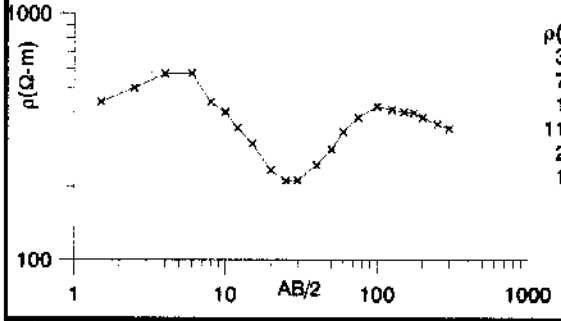
ρ(Ω-m)	d(m)
423.8	1.0
96.5	1.7
1051.5	11.7
424.7	48.9
224.3	INF.

B-09



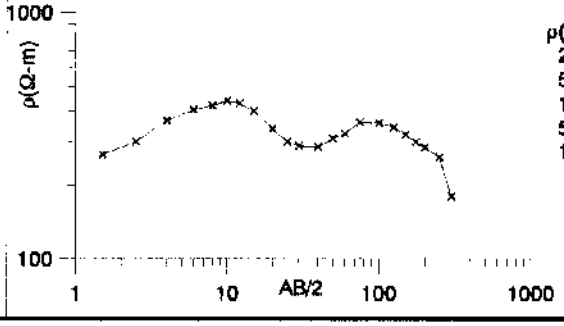
ρ(Ω-m)	d(m)
381.8	2.9
1149.3	6.8
159.9	34.5
700.7	116.7
102.7	INF.

B-05



ρ(Ω-m)	d(m)
393.4	1.1
798.7	3.2
135.7	17.0
1158.9	41.2
214.7	52.3
123.8	INF.

B-10



ρ(Ω-m)	d(m)
238.7	1.4
571.4	5.9
184.0	16.1
587.2	50.1
152.8	INF.

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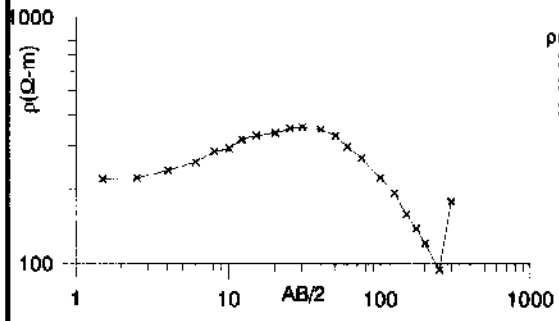
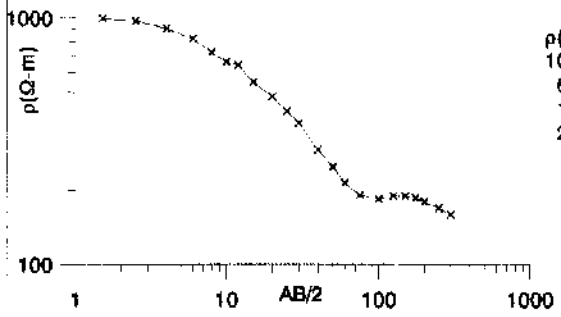
B-11



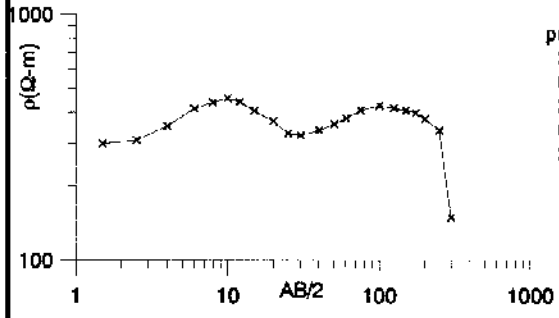
ρ(Ω-m)	d(m)
219.0	3.0
378.1	26.4
293.5	32.2
69.7	INF.

B-16



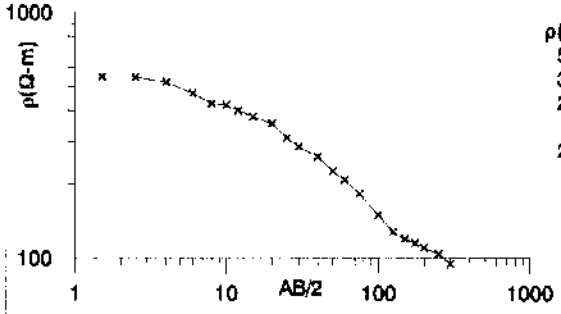
ρ(Ω-m)	d(m)
1016.0	2.7
601.9	11.8
162.2	41.5
267.2	67.6
92.3	INF.

B-12



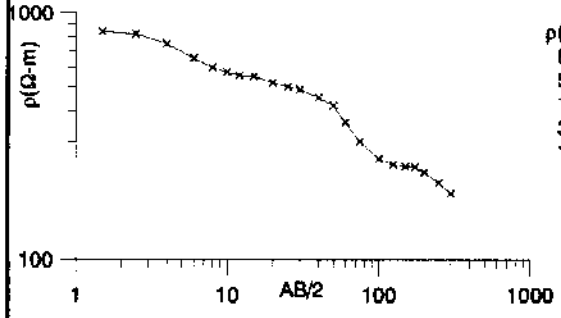
ρ(Ω-m)	d(m)
296.3	2.3
640.7	5.0
208.1	14.5
636.4	56.9
230.4	INF.

B-17



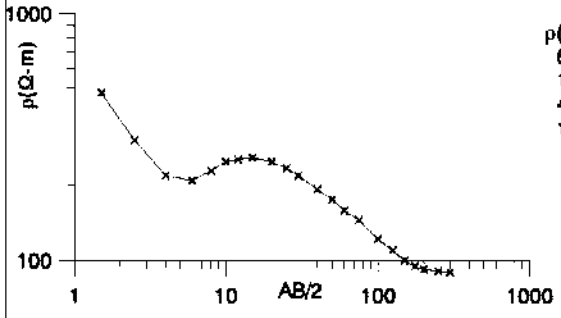
ρ(Ω-m)	d(m)
561.3	3.0
365.0	12.5
215.4	26.0
84.3	49.3
201.8	50.2
60.2	INF.

B-13



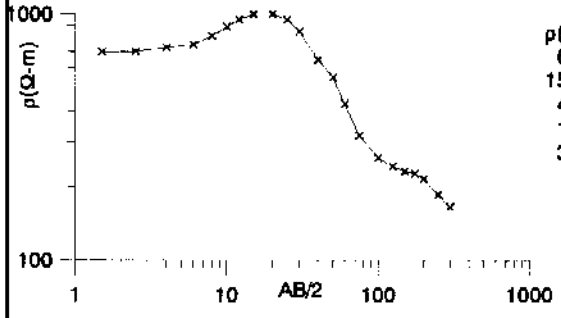
ρ(Ω-m)	d(m)
872.2	2.0
544.7	26.4
184.5	53.3
378.3	52.0
116.6	INF.

B-18



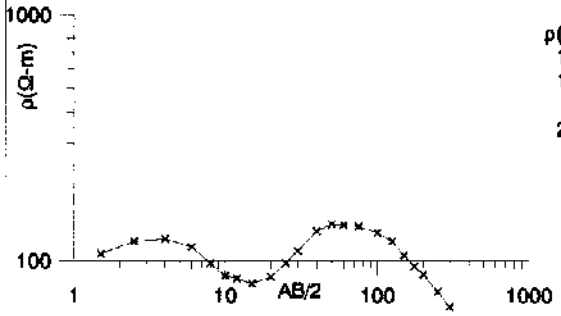
ρ(Ω-m)	d(m)
614.6	0.9
161.0	3.2
424.3	5.0
185.3	23.6
88.4	INF.

B-14



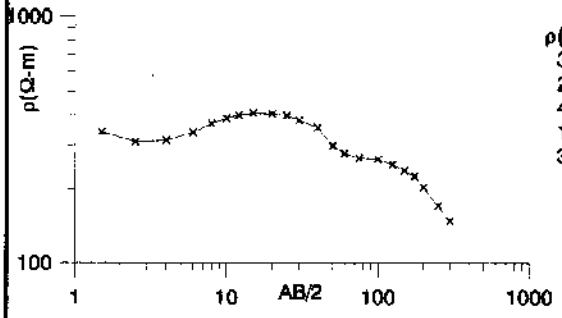
ρ(Ω-m)	d(m)
681.2	4.1
1504.2	9.3
444.4	14.3
163.9	40.9
392.4	50.3
96.8	INF.

B-19



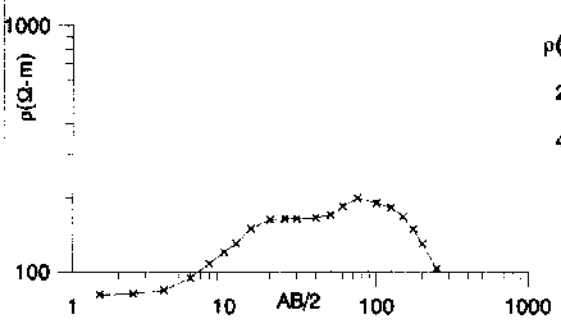
ρ(Ω-m)	d(m)
100.0	1.0
171.6	1.9
56.8	9.3
278.6	30.4
53.5	INF.

B-15



ρ(Ω-m)	d(m)
338.7	1.1
265.8	1.6
467.5	16.7
187.3	27.3
339.6	63.0
82.1	INF.

B-20



ρ(Ω-m)	d(m)
78.4	3.8
208.8	15.7
97.9	10.0
486.8	29.2
48.6	INF.

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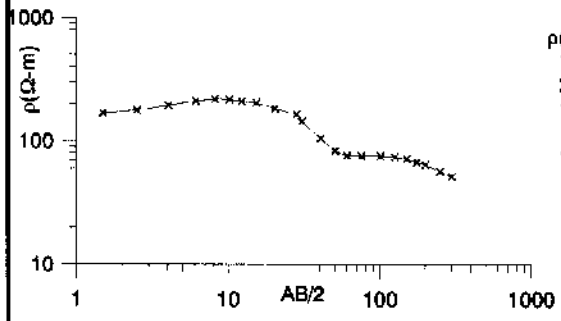
Appendix 4. 73 VES Curves (B-11 to B-20)

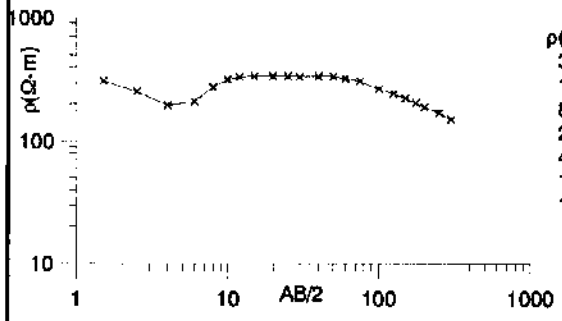
Desa Mekendatung (NTT#4)

B-01



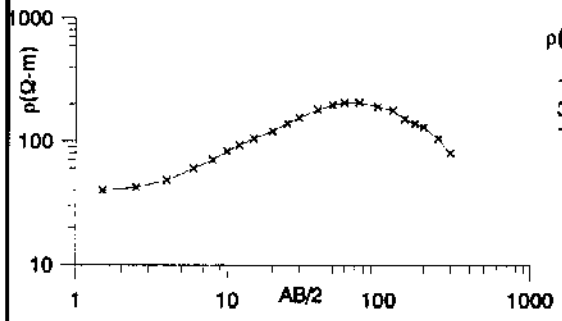
ρ(Ω-m)	d(m)
164.4	2.1
295.4	5.2
147.7	10.8
44.5	21.3
118.8	46.6
38.3	INF.

B-02



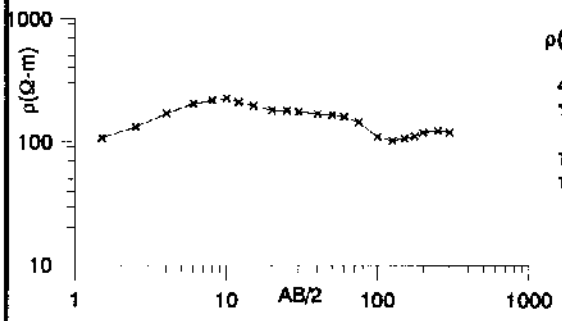
ρ(Ω-m)	d(m)
385.0	1.2
100.0	2.0
811.0	4.0
250.0	9.0
420.0	20.0
188.0	80.0
132.4	INF.

B-03



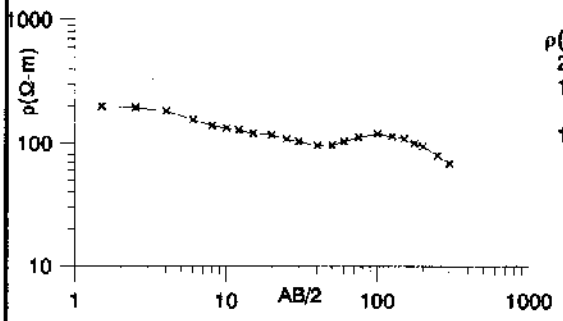
ρ(Ω-m)	d(m)
39.6	3.3
183.6	7.3
319.7	32.5
110.2	124.8
19.0	INF.

B-04



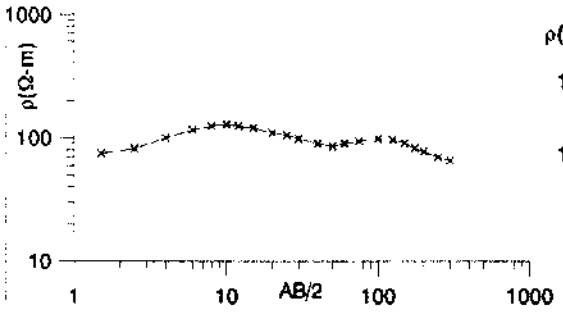
ρ(Ω-m)	d(m)
88.0	1.2
468.0	2.0
169.6	43.5
46.1	40.4
195.0	122.6
108.8	INF.

B-05



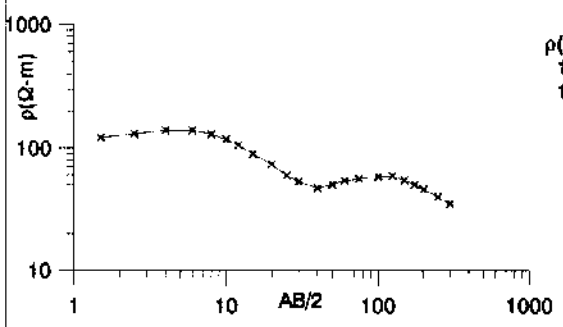
ρ(Ω-m)	d(m)
205.5	2.5
117.2	13.3
67.5	17.7
195.0	43.4
48.0	INF.

B-06



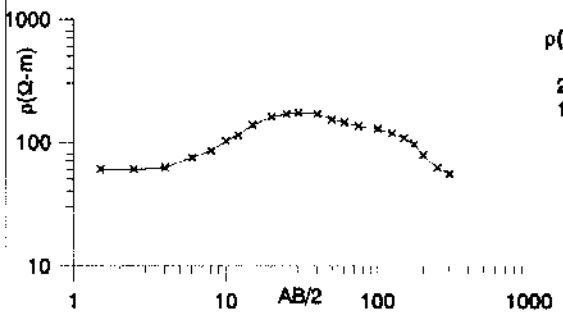
ρ(Ω-m)	d(m)
74.5	1.9
178.9	4.4
93.9	9.0
61.5	19.1
172.0	43.3
42.3	INF.

B-07



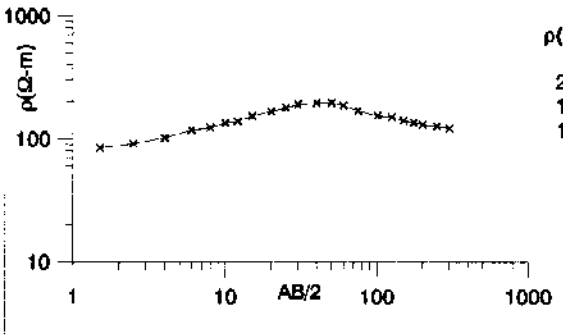
ρ(Ω-m)	d(m)
125.2	1.9
172.8	4.3
39.3	25.3
93.3	51.7
21.7	INF.

B-08



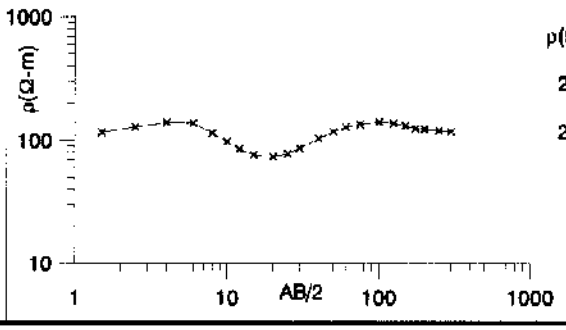
ρ(Ω-m)	d(m)
57.0	3.8
263.0	15.9
121.0	50.7
48.0	INF.

B-09



ρ(Ω-m)	d(m)
86.8	3.1
209.8	28.3
145.0	45.9
109.6	INF.

B-10



ρ(Ω-m)	d(m)
94.0	1.0
236.0	2.3
39.5	8.8
241.0	41.9
89.3	INF.

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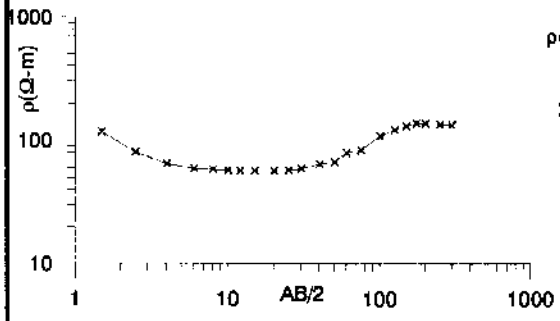
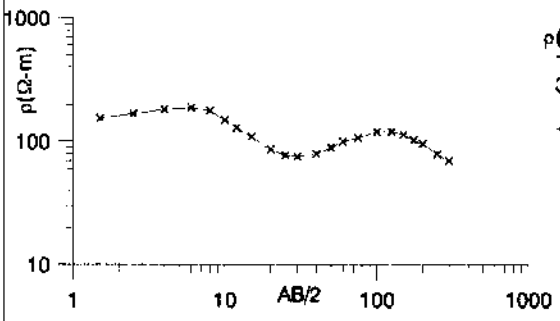
Japan International Cooperation Agency	Desa Sinar Hading (NTT#6)

B-11



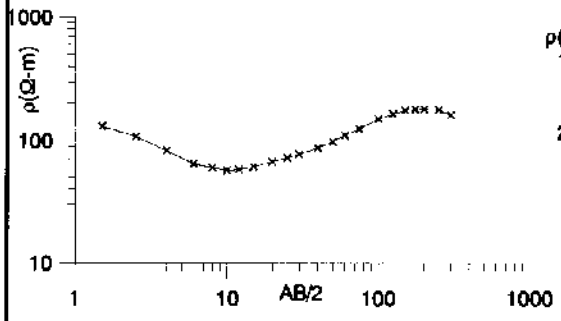
ρ(Ω-m)	d(m)
174.7	0.7
56.4	34.9
256.2	118.4
53.2	INF.

B-16



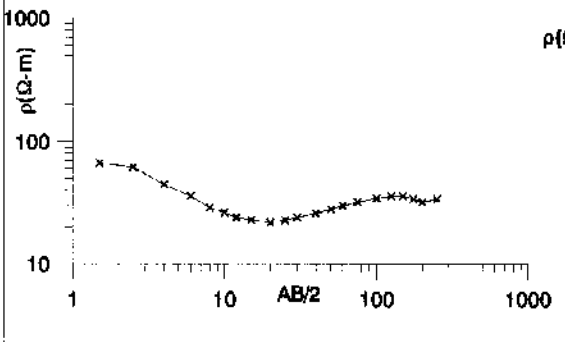
ρ(Ω-m)	d(m)
150.3	1.8
307.3	3.0
48.0	16.8
198.0	53.8
47.0	INF.

B-12



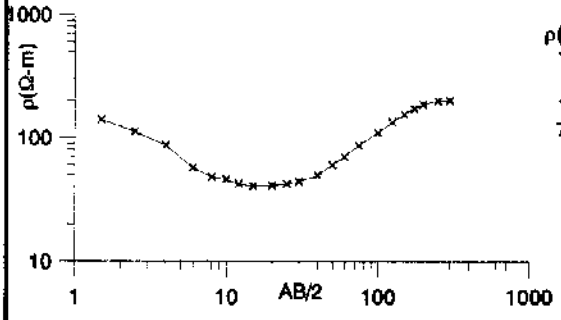
ρ(Ω-m)	d(m)
136.4	1.7
45.6	7.0
92.9	20.4
278.5	109.7
92.2	INF.

B-17



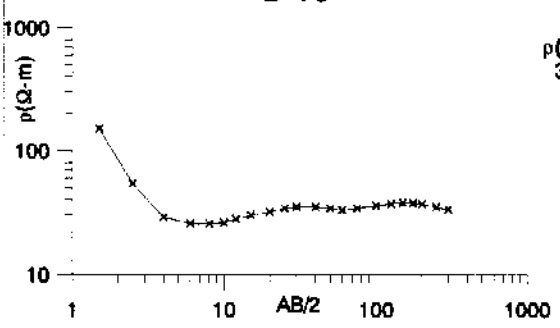
ρ(Ω-m)	d(m)
69.4	1.9
21.4	20.9
45.4	81.0
20.0	INF.

B-13



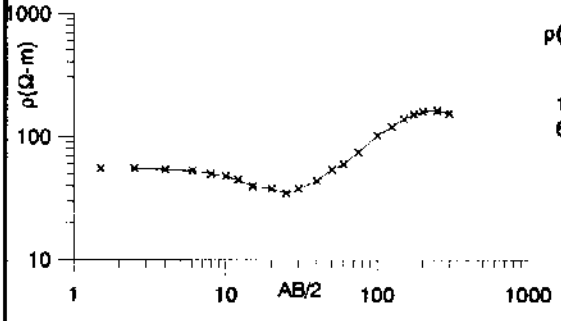
ρ(Ω-m)	d(m)
143.6	1.8
36.9	22. 2
100.1	19.0
750.4	131.0
96.8	INF.

B-18



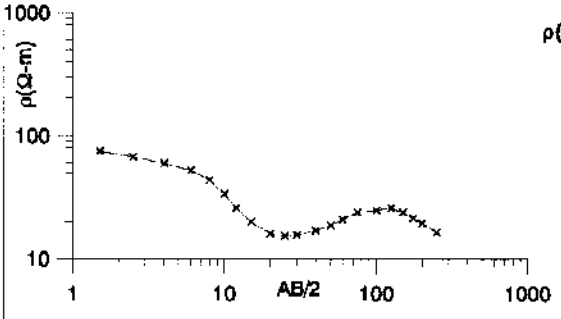
ρ(Ω-m)	d(m)
311.5	0.7
21.7	5.3
41.2	21.9
22.8	15.5
46.9	75.6
27.7	INF.

B-14



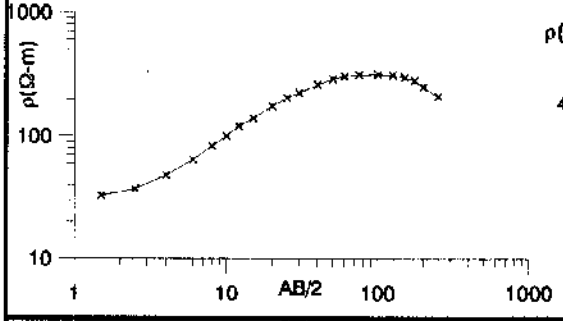
ρ(Ω-m)	d(m)
55.9	6.0
26.2	17.6
137.5	14.0
650.1	92.0
74.6	INF.

B-19



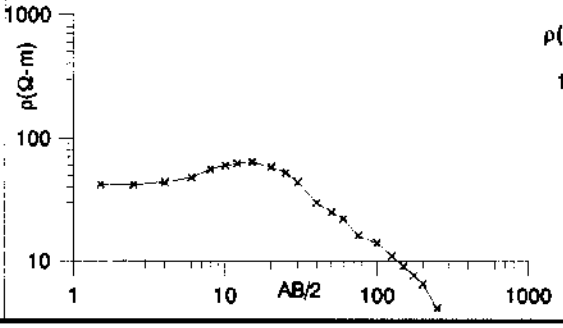
ρ(Ω-m)	d(m)
74.2	1.4
61.3	3.3
10.5	16.4
46.5	53.4
7.6	INF.

B-15



ρ(Ω-m)	d(m)
30.1	1.8
90.6	2.1
491.8	66.4
88.7	INF.

B-20



ρ(Ω-m)	d(m)
40.5	3.5
109.1	7.4
14.9	84.3
1.3	INF.

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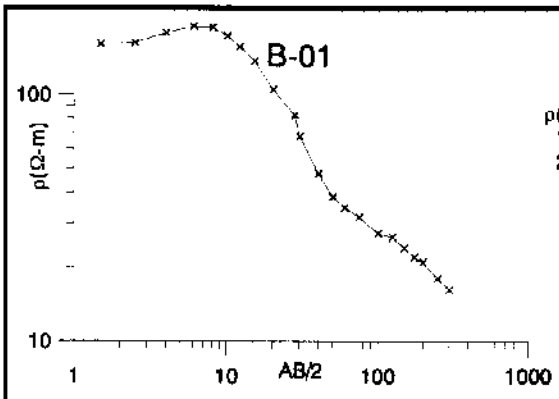
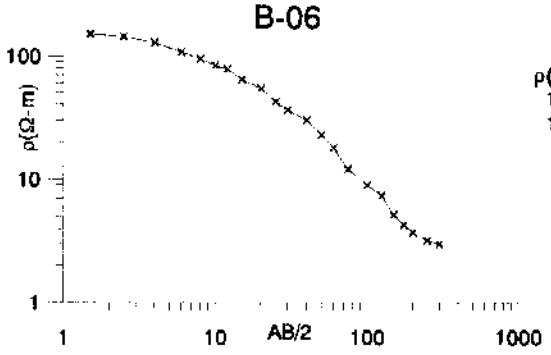
Appendix 4. 75 VES Curves (B-11 to B-20)

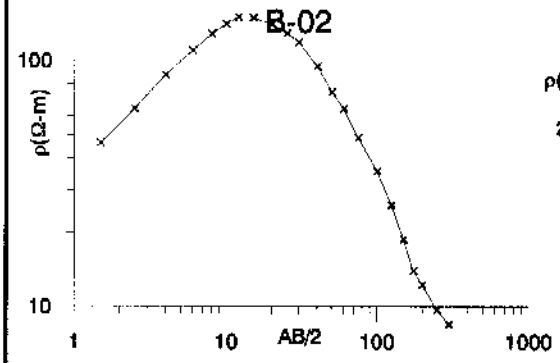
Desa Sinar Hading (NTT#6)



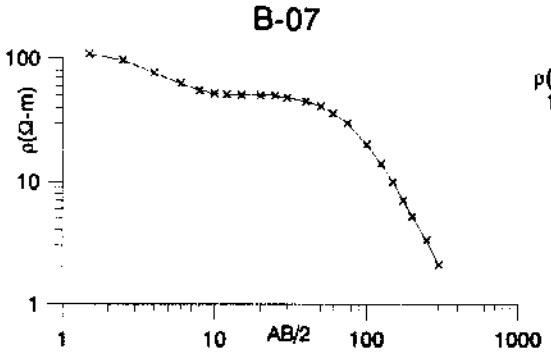
ρ(Ω-m)	d(m)
162.4	2.2
230.3	4.3
89.9	7.3
30.7	72.5
13.7	INF.



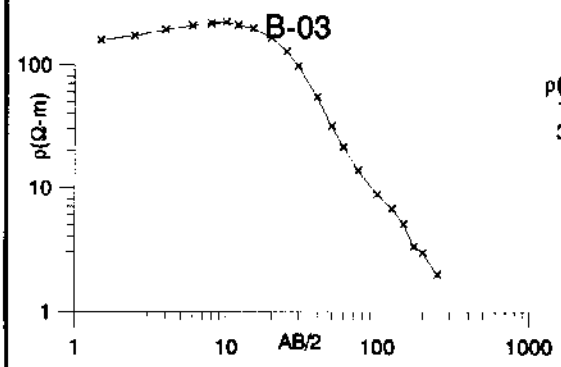
ρ(Ω-m)	d(m)
148.8	2.1
106.1	4.2
34.0	29.2
3.5	INF.



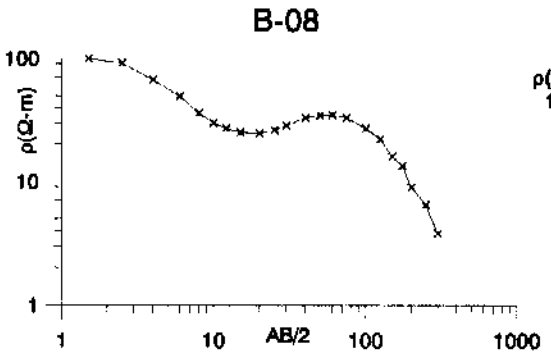
ρ(Ω-m)	d(m)
34.5	1.1
242.2	6.3
98.0	16.9
30.2	62.3
5.2	INF.



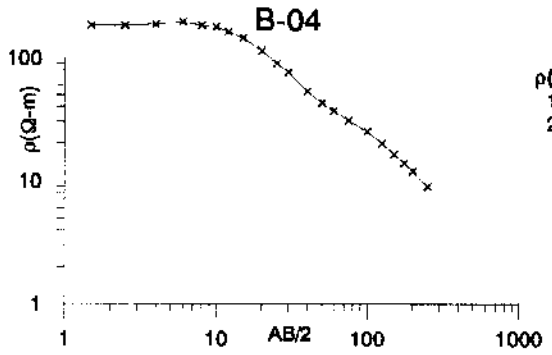
ρ(Ω-m)	d(m)
111.7	1.8
48.2	9.9
57.9	9.3
37.4	36.0
2.1	INF.



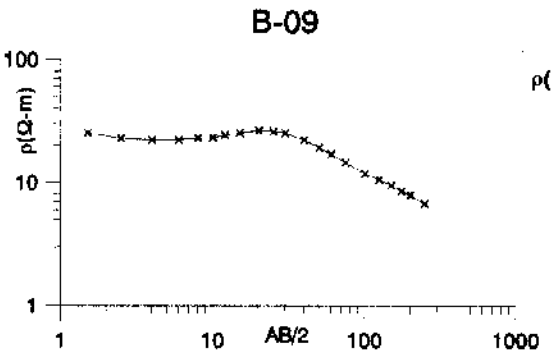
ρ(Ω-m)	d(m)
160.7	2.6
365.2	5.5
73.0	8.6
16.1	39.6
2.5	INF.



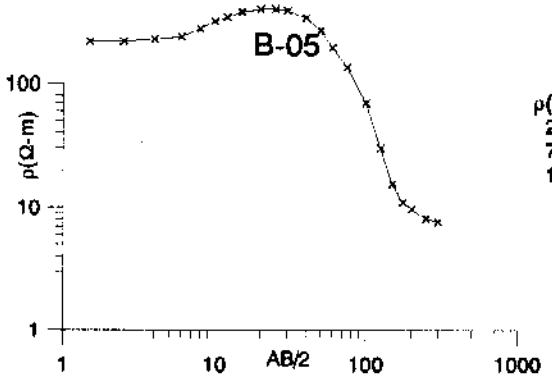
ρ(Ω-m)	d(m)
102.6	2.4
20.7	13.3
69.5	19.0
28.9	23.6
3.0	INF.



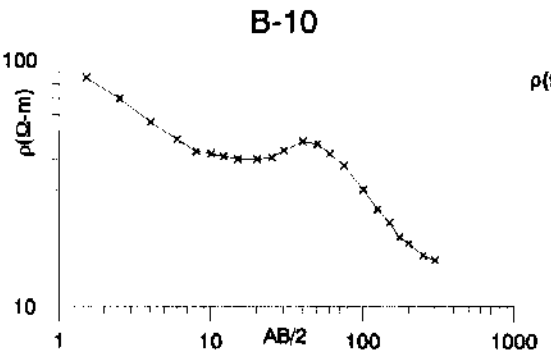
ρ(Ω-m)	d(m)
183.5	2.9
251.8	3.8
90.9	7.9
31.2	80.8
1.1	INF.



ρ(Ω-m)	d(m)
24.6	1.5
19.3	3.7
31.1	16.6
10.5	104.2
2.2	INF.



ρ(Ω-m)	d(m)
214.6	4.6
724.9	12.8
112.0	17.9
29.7	9.9
7.6	INF.



ρ(Ω-m)	d(m)
89.0	1.5
38.0	13.4
65.9	23.0
14.6	INF.

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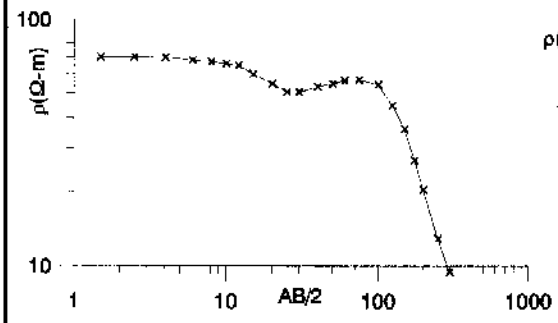
Appendix 4. 76 VES Curves (B-1 to B-10)

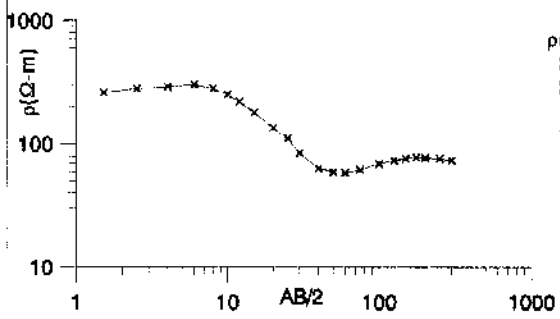
Desa Ile Padung (NTT#7)

B-11



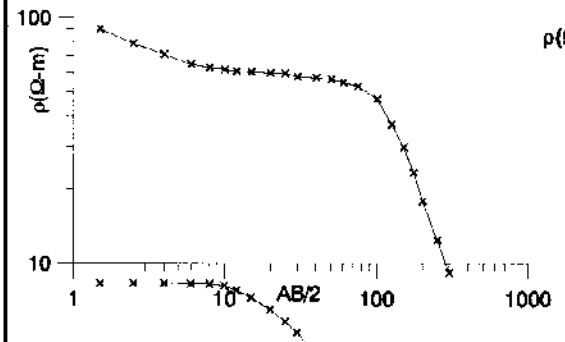
ρ(Ω-m)	d(m)
70.3	9.2
31.3	12.4
127.7	32.9
2.6	INF.

B-16



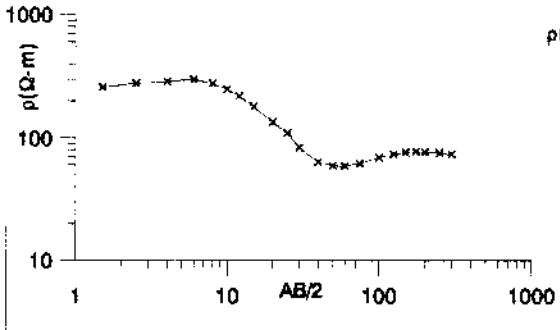
ρ(Ω-m)	d(m)
269.9	2.5
389.6	4.3
52.1	48.2
133.4	74.9
45.4	INF.

B-12



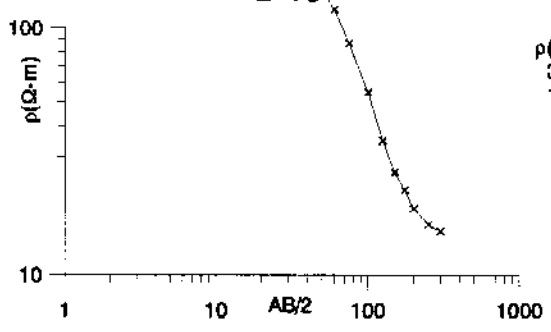
ρ(Ω-m)	d(m)
95.8	1.2
60.7	27.7
51.7	60.6
2.7	INF.

B-17



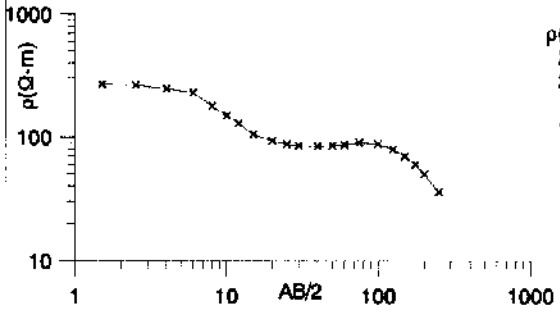
ρ(Ω-m)	d(m)
99.1	2.2
43.9	14.0
66.8	33.3
12.6	INF.

B-13



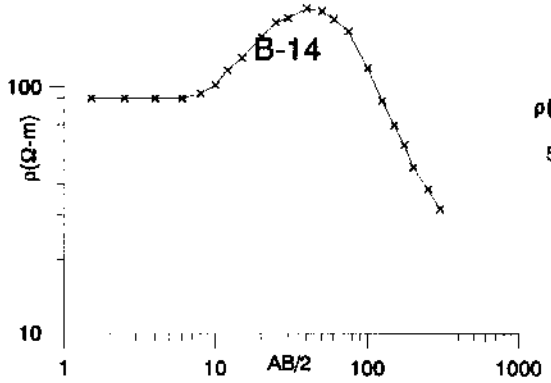
ρ(Ω-m)	d(m)
340.2	12.2
125.0	37.1
13.1	INF.

B-18



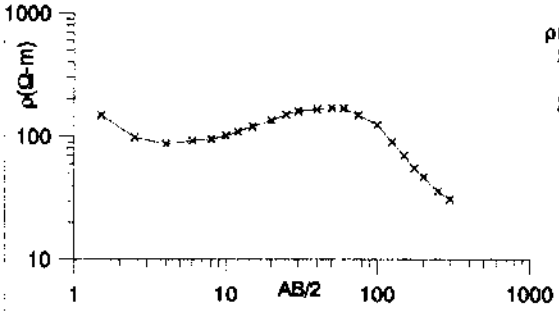
ρ(Ω-m)	d(m)
278.8	1.6
254.9	2.6
78.4	31.0
136.2	48.9
10.4	INF.

B-14



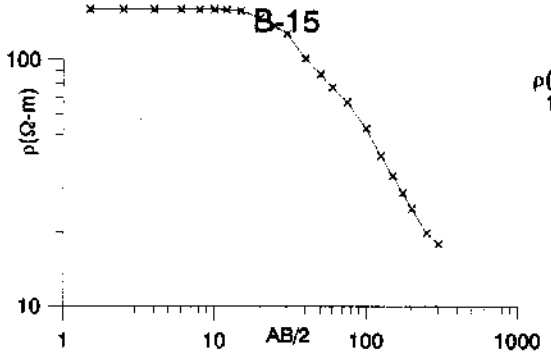
ρ(Ω-m)	d(m)
87.1	7.7
522.5	16.3
37.1	213.4
6.2	INF.

B-19



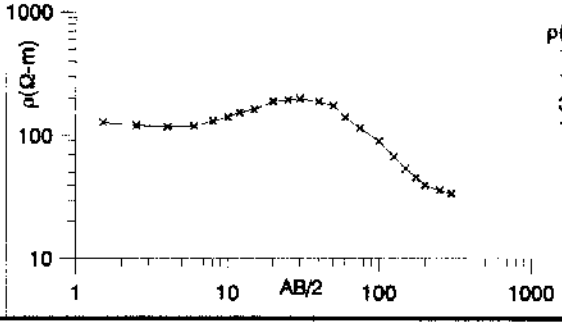
ρ(Ω-m)	d(m)
248.6	0.6
75.1	5.4
236.4	31.8
67.7	33.0
24.2	INF.

B-15



ρ(Ω-m)	d(m)
163.6	16.0
66.0	57.0
13.5	INF.

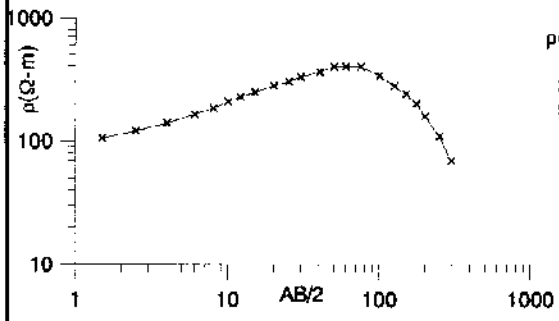
B-20



ρ(Ω-m)	d(m)
132.1	1.2
101.9	4.1
307.4	13.3
137.6	21.4
33.4	INF.

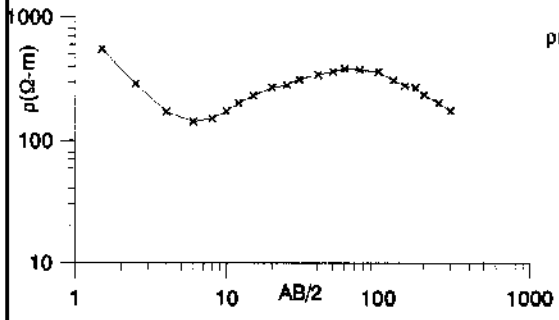
The Study Water Supply Project in Nusa Tenggara Barat and Nusa Tenggara Timur Japan International Cooperation Agency	Appendix 4. 77 VES Curves (B-11 to B-20) Desa Ile Padung (NTT#7)

B-01



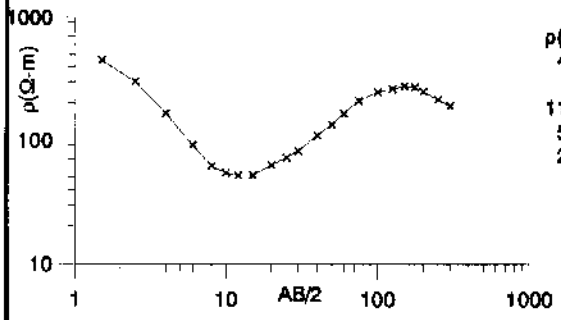
ρ(Ω-m)	d(m)
100.8	1.8
236.9	6.9
544.6	43.4
150.0	71.8
10.7	INF.

B-02



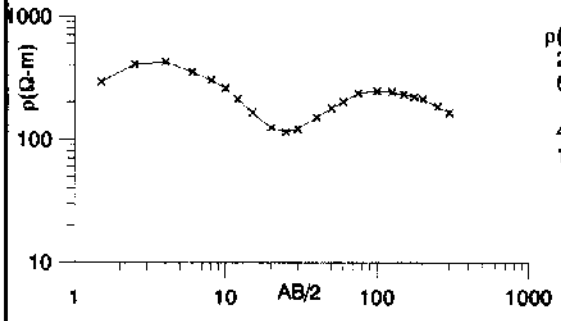
ρ(Ω-m)	d(m)
767.0	0.9
110.5	5.1
631.0	8.5
462.2	46.7
134.3	INF.

B-03



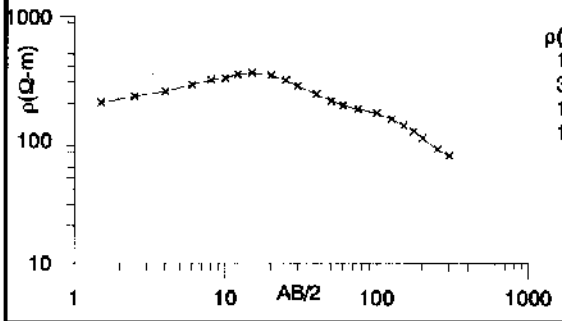
ρ(Ω-m)	d(m)
461.6	1.6
43.9	13.3
1177.3	24.2
584.1	24.2
230.5	26.0
31.1	INF.

B-04



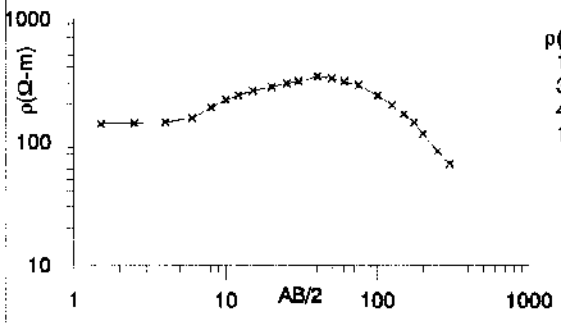
ρ(Ω-m)	d(m)
232.6	0.7
613.4	2.9
75.9	13.8
455.9	55.9
142.6	43.2
62.9	INF.

B-05



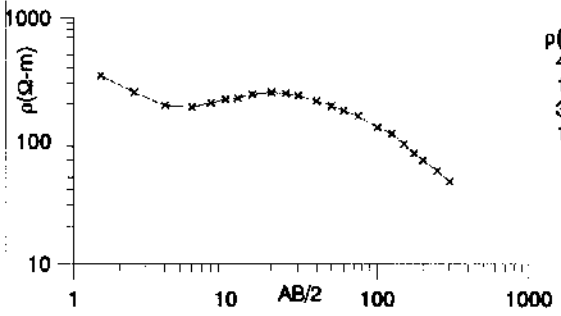
ρ(Ω-m)	d(m)
193.4	1.7
394.4	12.1
165.3	27.4
180.3	46.8
71.7	77.9
34.0	INF.

B-06



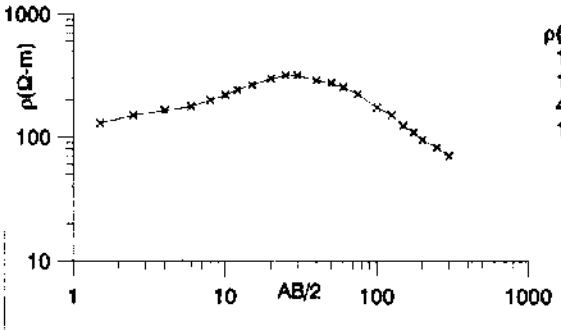
ρ(Ω-m)	d(m)
135.0	3.8
376.3	7.0
406.0	32.7
121.6	79.4
32.3	INF.

B-07



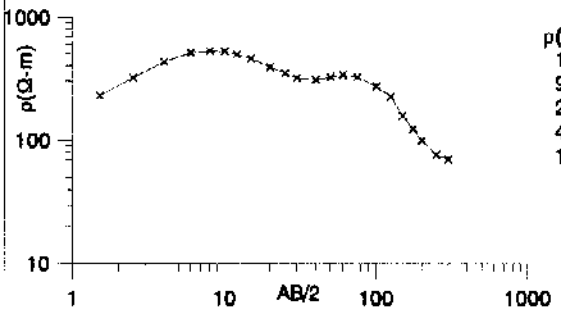
ρ(Ω-m)	d(m)
434.5	0.9
162.8	3.7
300.1	18.1
115.6	76.8
31.1	INF.

B-08



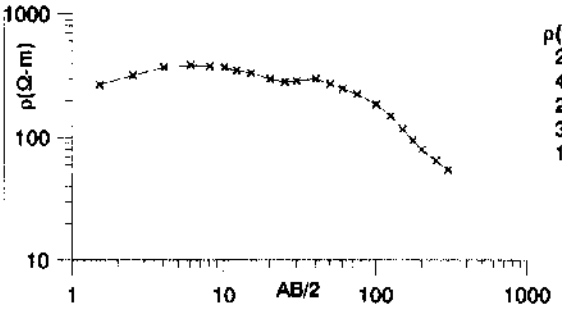
ρ(Ω-m)	d(m)
124.3	1.2
188.2	4.1
432.9	20.4
129.1	63.7
56.8	INF.

B-09



ρ(Ω-m)	d(m)
176.6	1.0
977.3	3.3
260.8	17.2
494.3	26.3
155.1	29.6
40.1	INF.

B-10



ρ(Ω-m)	d(m)
244.8	1.1
478.3	3.5
270.2	17.8
397.2	16.4
112.4	56.4
38.1	INF.

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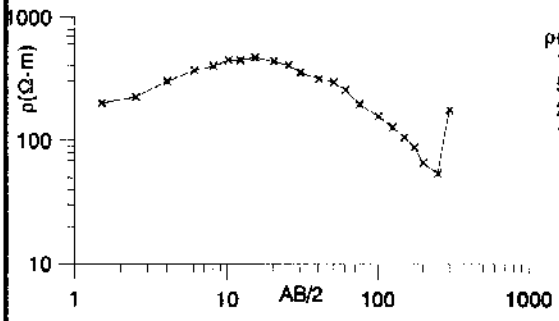
Appendix 4. 78 VES Curves (B-1 to B-10)

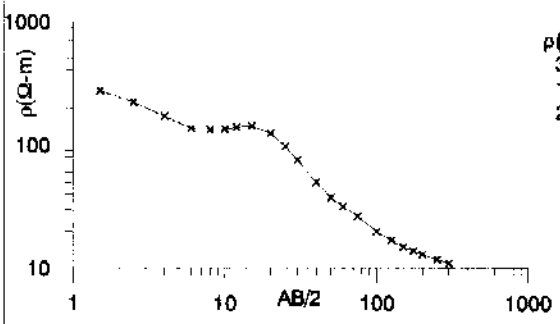
Desa Hepang (NTT#13)

B-11



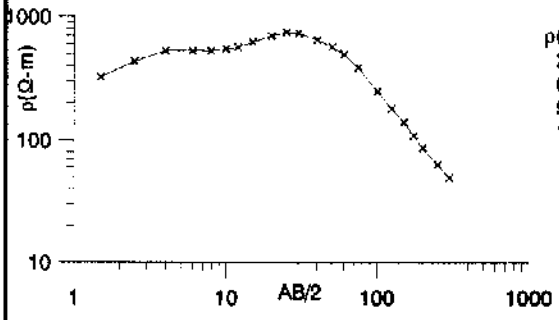
ρ(Ω-m)	d(m)
177.7	1.3
522.4	12.0
292.9	18.2
125.9	59.0
36.9	INF.

B-16



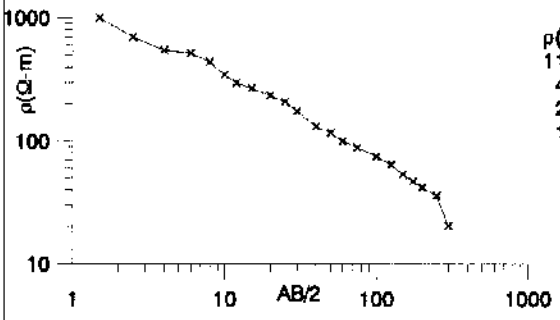
ρ(Ω-m)	d(m)
321.8	1.2
112.0	3.7
287.4	4.6
31.8	33.6
11.9	INF.

B-12



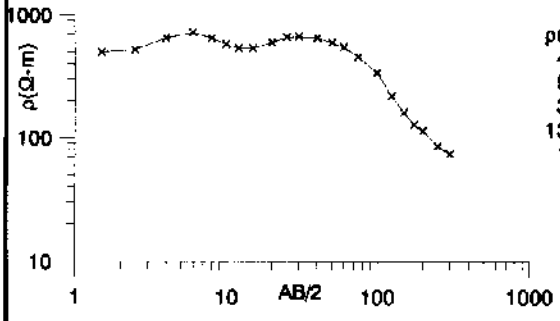
ρ(Ω-m)	d(m)
279.7	0.8
600.8	7.7
963.7	20.1
127.9	66.9
38.7	INF.

B-17



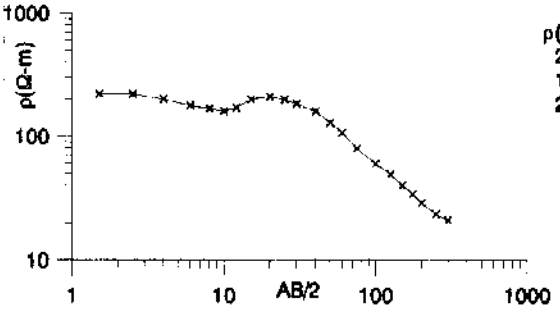
ρ(Ω-m)	d(m)
1196.8	0.9
493.1	4.2
235.0	8.4
128.5	14.2
75.4	67.4
21.1	INF.

B-13



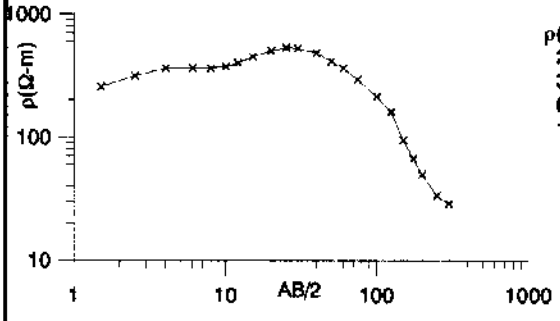
ρ(Ω-m)	d(m)
433.0	1.2
954.6	2.7
320.8	5.5
1334.2	17.1
127.6	58.9
62.5	INF.

B-18



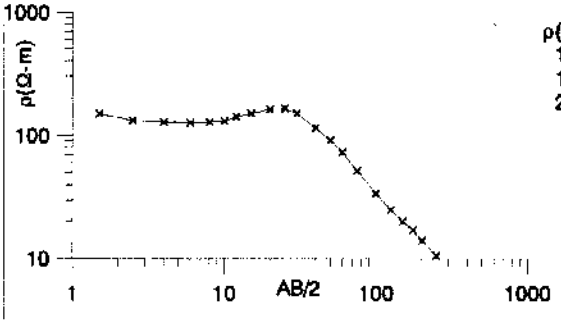
ρ(Ω-m)	d(m)
234.7	1.9
138.6	4.2
284.5	13.7
53.7	57.9
18.2	INF.

B-14



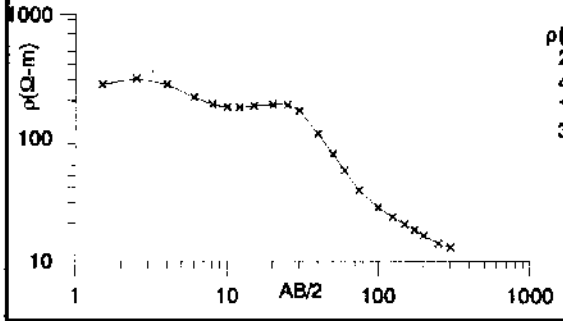
ρ(Ω-m)	d(m)
247.4	1.0
375.2	5.5
674.5	20.1
181.5	40.9
22.6	INF.

B-19



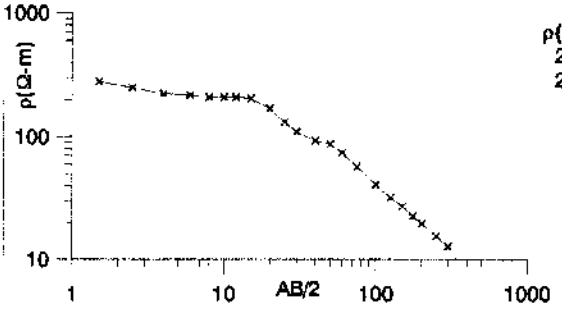
ρ(Ω-m)	d(m)
152.2	1.2
108.6	3.9
225.3	13.0
42.8	32.6
11.9	INF.

B-15



ρ(Ω-m)	d(m)
243.7	0.7
450.8	1.1
127.1	4.1
388.9	7.1
37.9	16.0
28.2	27.4
13.7	INF.

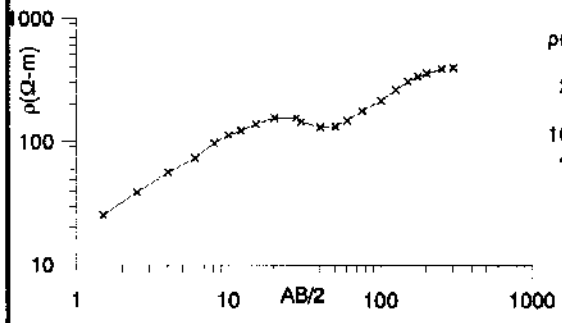
B-20



ρ(Ω-m)	d(m)
277.5	1.3
212.7	11.6
63.8	49.0
12.3	INF.

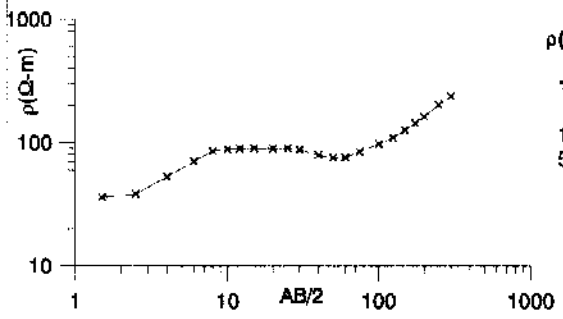
The Study Water Supply Project in Nusa Tenggara Barat and Nusa Tenggara Timur	Appendix 4. 79 VES Curves (B-11 to B-20)
Japan International Cooperation Agency	Desa Hepang (NTT#13)

B-01



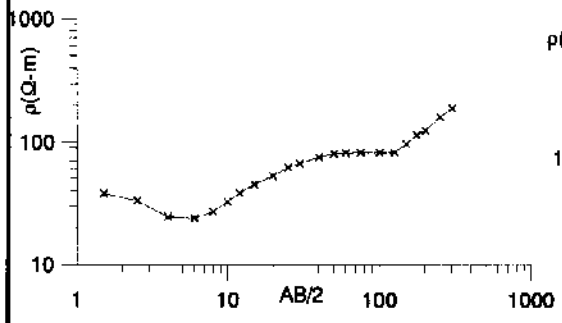
ρ(Ω-m)	d(m)
17.6	1.0
270.3	9.2
64.3	19.2
1095.7	123.2
493.1	INF.

B-06



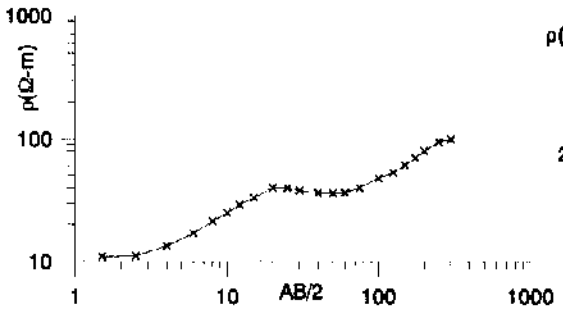
ρ(Ω-m)	d(m)
31.4	1.6
139.7	9.0
52.1	27.7
101.6	29.6
547.7	INF.

B-02



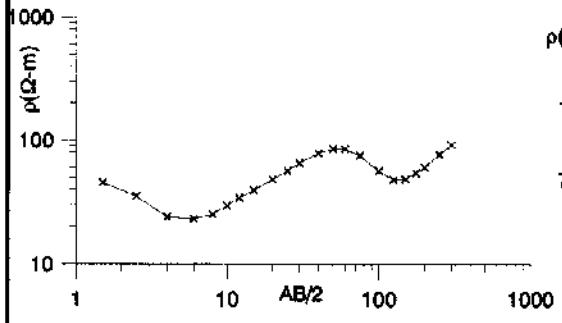
ρ(Ω-m)	d(m)
43.2	1.4
14.4	3.3
215.4	9.5
60.5	74.1
1360.3	INF.

B-07



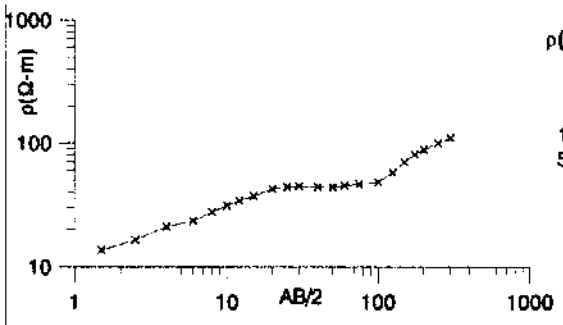
ρ(Ω-m)	d(m)
10.0	2.7
77.3	9.4
19.2	24.4
76.4	26.9
273.9	INF.

B-03



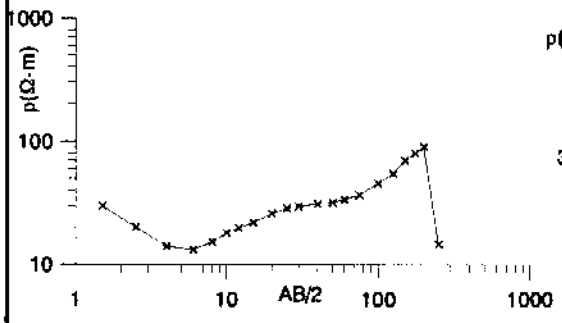
ρ(Ω-m)	d(m)
52.7	1.3
12.8	3.2
181.2	14.1
88.9	9.0
22.1	66.4
737.9	INF.

B-08



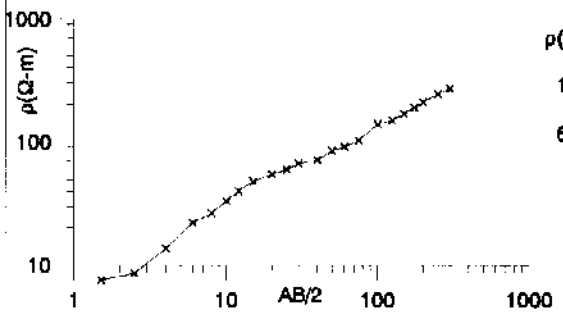
ρ(Ω-m)	d(m)
13.5	2.2
56.1	15.9
26.5	33.5
100.0	25.9
580.4	INF.

B-04



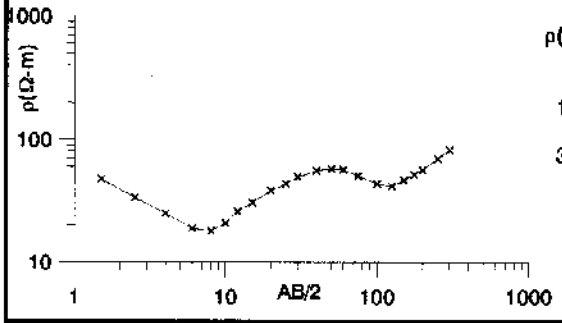
ρ(Ω-m)	d(m)
37.6	1.1
7.7	2.6
35.7	33.8
44.1	30.3
322.1	INF.

B-09



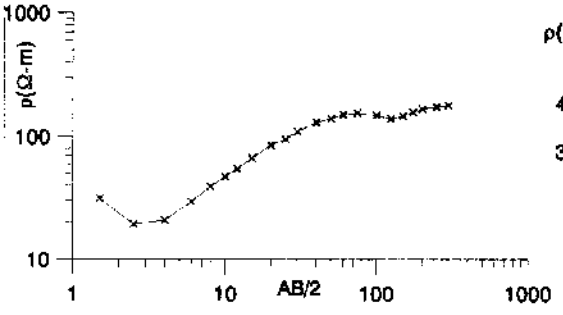
ρ(Ω-m)	d(m)
6.0	1.5
157.2	11.3
87.5	33.3
652.3	INF.

B-05



ρ(Ω-m)	d(m)
52.7	1.4
11.3	3.9
132.8	16.8
16.8	45.6
334.6	INF.

B-10



ρ(Ω-m)	d(m)
51.5	0.8
5.1	0.9
447.2	18.9
33.0	22.5
333.5	INF.

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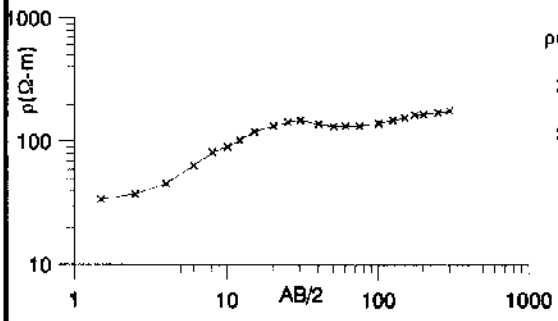
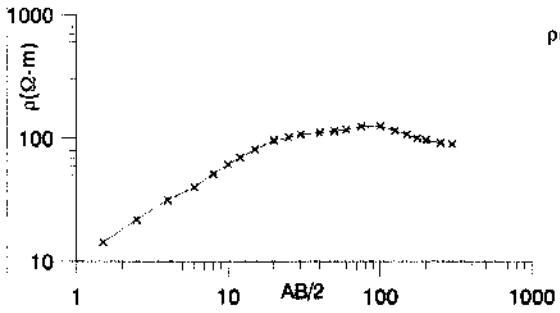
Appendix 4. 80 VES Curves (B-1 to B-10)
Desa Bloro (NTT#14)

B-11



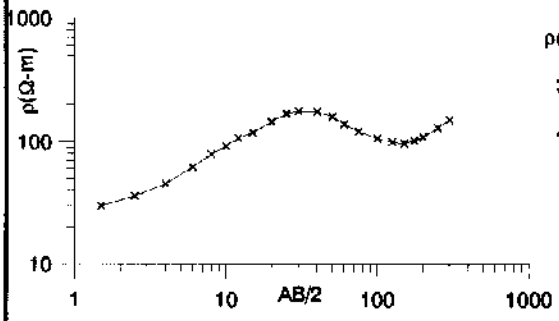
ρ(Ω-m)	d(m)
32.1	2.5
291.4	10.4
78.8	25.4
207.4	INF.

B-16



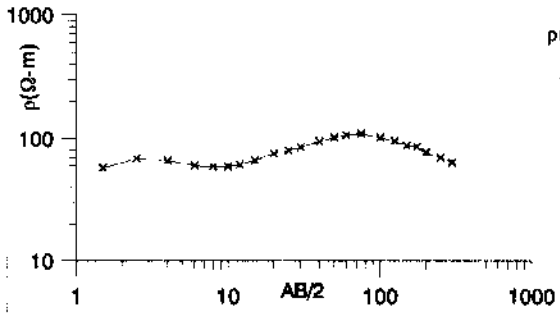
ρ(Ω-m)	d(m)
12.0	1.3
150.0	45.0
100.0	50.0
80.0	INF.

B-12



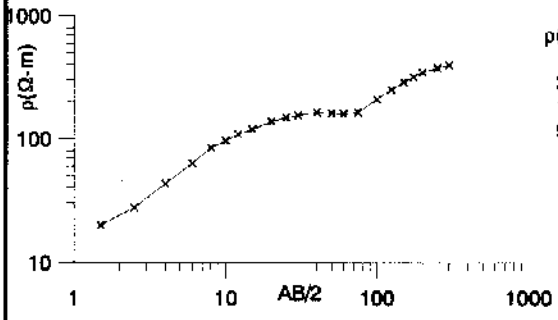
ρ(Ω-m)	d(m)
28.7	2.3
392.9	14.6
42.8	56.5
403.2	INF.

B-17



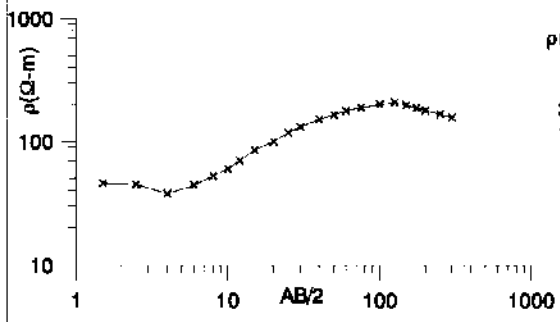
ρ(Ω-m)	d(m)
49.7	0.9
137.2	0.9
38.5	5.1
135.6	43.3
98.3	24.8
49.0	INF.

B-13



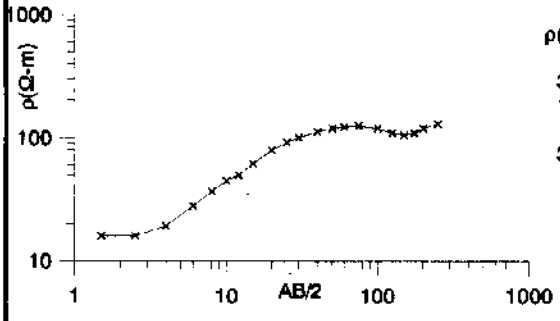
ρ(Ω-m)	d(m)
14.9	1.2
321.5	7.7
131.8	44.0
963.2	INF.

B-18



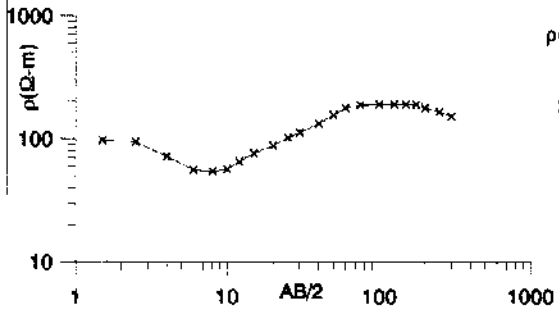
ρ(Ω-m)	d(m)
47.2	1.8
21.9	2.2
300.0	55.0
114.0	INF.

B-14



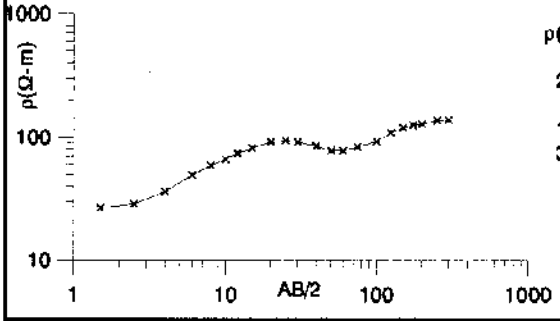
ρ(Ω-m)	d(m)
15.1	2.9
399.5	11.7
104.0	29.2
54.0	58.4
312.2	INF.

B-19



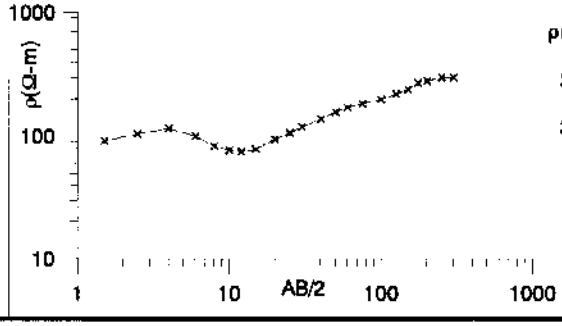
ρ(Ω-m)	d(m)
105.0	2.3
21.0	2.9
298.0	60.0
100.4	INF.

B-15



ρ(Ω-m)	d(m)
25.0	2.5
218.5	6.7
48.0	30.0
130.0	50.0
300.0	INF.

B-20



ρ(Ω-m)	d(m)
77.9	1.1
298.6	1.0
37.9	6.0
301.3	INF.

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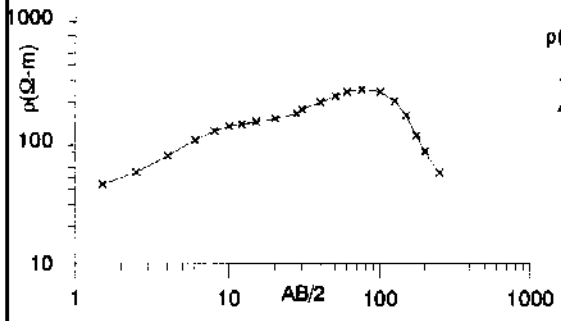
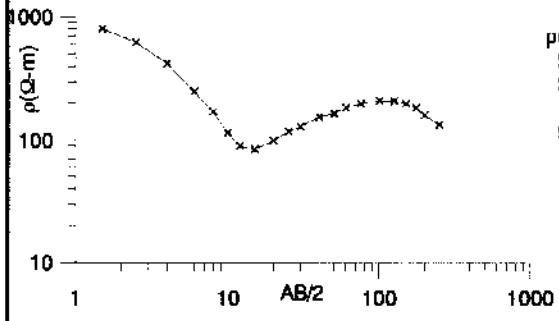
Appendix 4. 81 VES Curves (B-11 to B-20)
Desa Bloro (NTT#14)

B-01



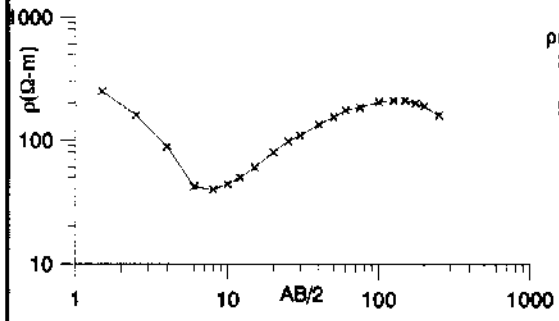
ρ(Ω-m)	d(m)
36.0	1.2
160.8	12.2
464.2	34.3
85.3	34.8
4.8	INF.

B-02



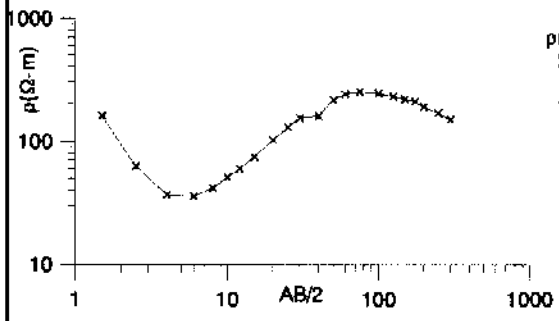
ρ(Ω-m)	d(m)
956.8	1.3
309.3	2.6
44.1	7.3
543.9	37.4
54.8	INF.

B-03



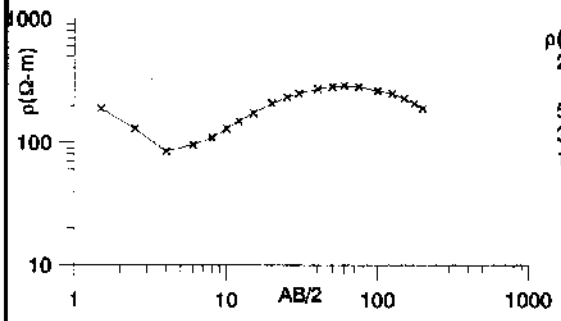
ρ(Ω-m)	d(m)
297.5	1.4
19.6	4.1
514.3	40.9
85.0	INF.

B-04



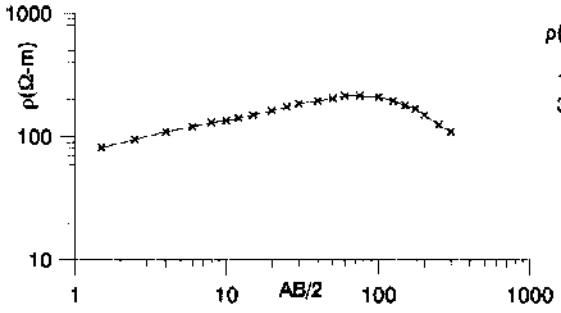
ρ(Ω-m)	d(m)
216.0	0.8
18.3	3.0
700.0	32.0
88.6	INF.

B-05



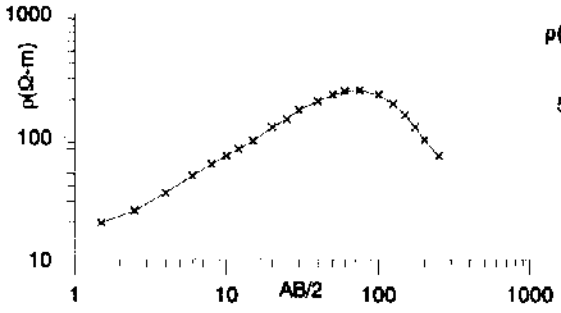
ρ(Ω-m)	d(m)
231.2	1.1
46.0	2.6
572.6	11.3
315.0	25.8
164.4	INF.

B-06



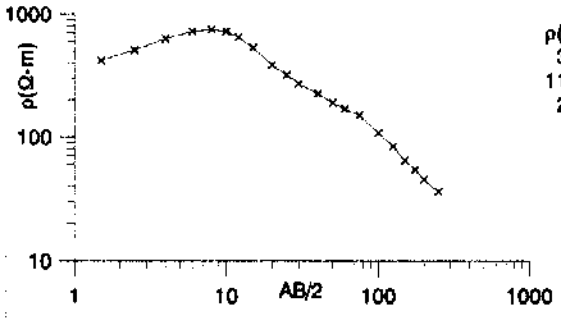
ρ(Ω-m)	d(m)
80.0	1.5
150.0	12.0
300.0	50.0
85.0	INF.

B-07



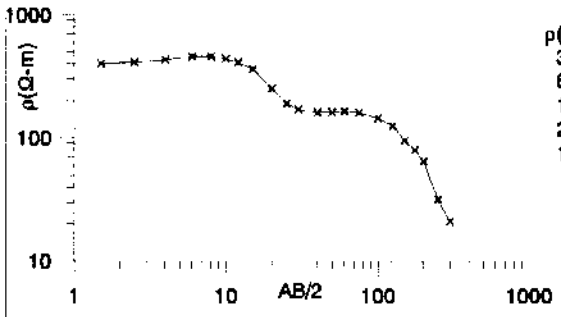
ρ(Ω-m)	d(m)
19.3	1.8
80.4	3.0
555.6	32.9
19.9	INF.

B-08



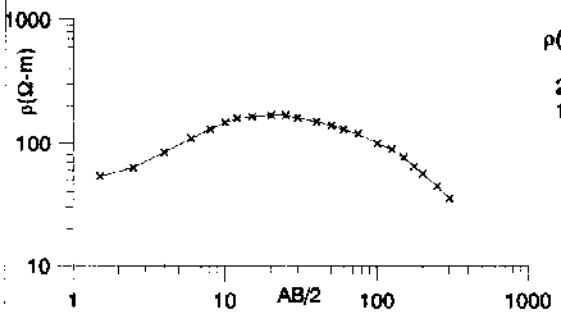
ρ(Ω-m)	d(m)
366.4	1.2
1132.2	4.1
223.0	36.6
40.0	INF.

B-09



ρ(Ω-m)	d(m)
395.4	2.3
689.0	3.9
120.0	17.7
294.1	21.5
105.0	45.1
8.9	INF.

B-10



ρ(Ω-m)	d(m)
53.7	2.0
228.4	12.8
132.7	20.8
87.2	74.3
17.0	INF.

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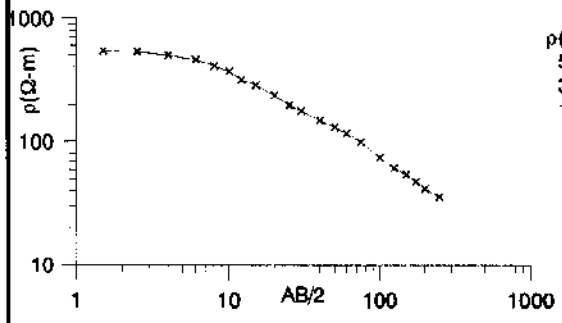
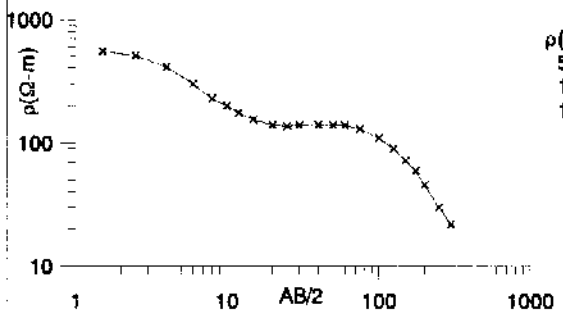
Appendix 4. 82 VES Curves (B-1 to B-10)
Desa Watuliwung (NTT#15)

B-11



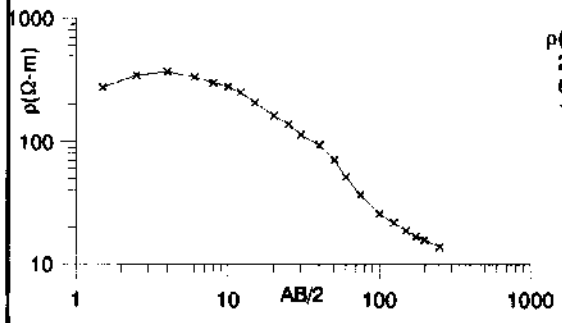
ρ(Ω-m)	d(m)
555.3	2.9
324.3	6.5
147.0	31.2
40.0	INF.

B-16



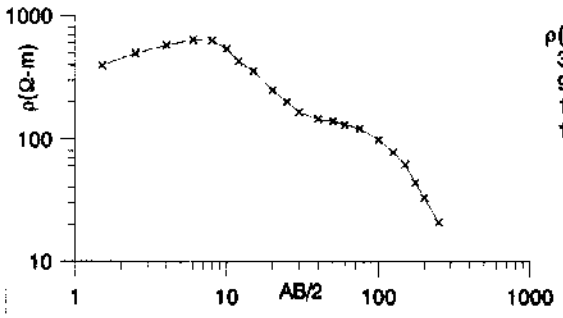
ρ(Ω-m)	d(m)
575.0	2.4
141.5	21.5
195.0	16.3
90.0	56.2
10.5	INF.

B-12



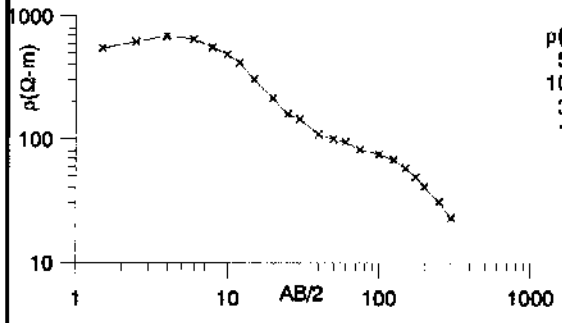
ρ(Ω-m)	d(m)
231.9	1.0
615.1	2.4
140.9	19.5
25.1	41.3
13.4	INF.

B-17



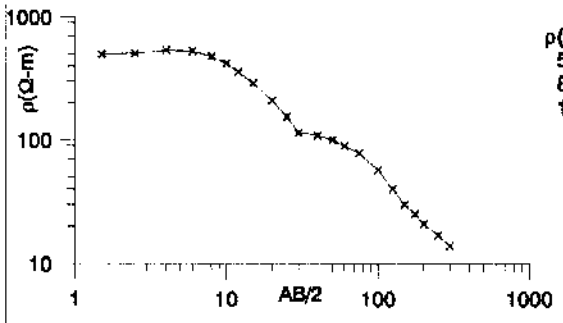
ρ(Ω-m)	d(m)
330.1	1.0
982.7	3.5
156.6	21.2
111.3	56.9
9.5	INF.

B-13



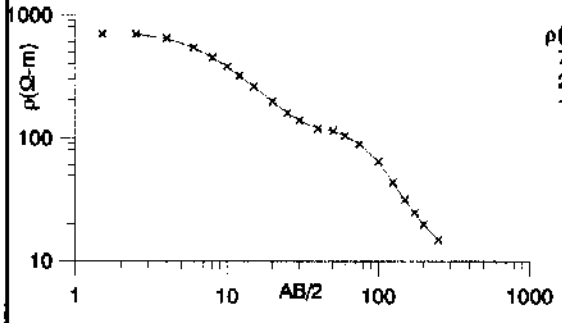
ρ(Ω-m)	d(m)
510.0	1.1
1041.4	2.2
310.1	5.2
121.0	22.0
85.0	60.0
17.0	INF.

B-18



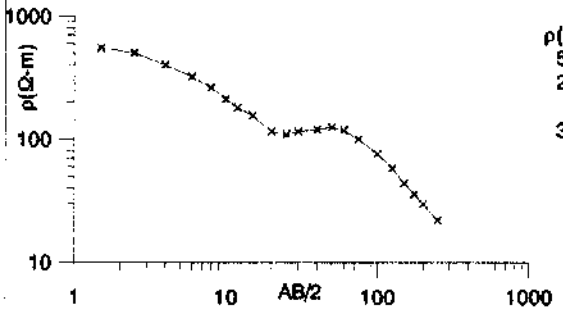
ρ(Ω-m)	d(m)
503.2	2.4
804.2	2.7
121.5	21.9
67.6	42.3
12.2	INF.

B-14



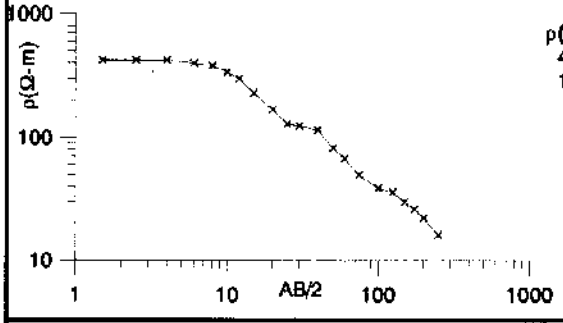
ρ(Ω-m)	d(m)
734.9	3.5
233.5	6.8
133.1	20.5
69.6	46.7
8.5	INF.

B-19



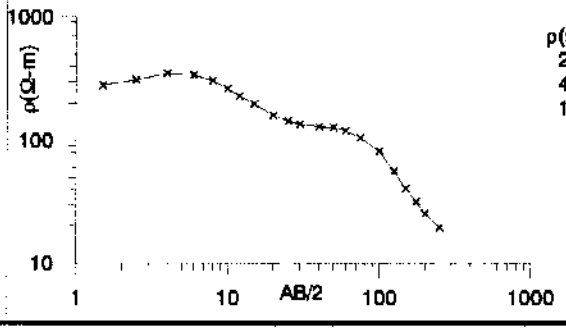
ρ(Ω-m)	d(m)
561.1	1.9
296.0	3.5
75.0	11.5
358.9	12.3
33.4	58.0
13.3	INF.

B-15



ρ(Ω-m)	d(m)
434.3	6.1
120.5	22.2
34.6	56.5
16.5	INF.

B-20



ρ(Ω-m)	d(m)
271.3	1.2
446.2	3.0
139.2	23.5
97.9	42.6
10.0	INF.

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Appendix 4. 83 VES Curves (B-11 to B-20)
Desa Watuliwung (NTT#15)

Appendix 5

WATER QUALITY SURVEY / RESULTS OF WATER QUALITY ANALYSIS

Appendix 5

WATER QUALITY SURVEY / RESULTS OF WATER QUALITY ANALYSIS

TABLE OF CONTENTS

List of Results of Water Quality Analysis, TRI-LINER Diagram, DUROV Diagram, and HEXA Diagram

List of Dendrogram and Concentration Correlation Matrix

Appendix 5 WATER QUALITY SURVEY

5.1 General

Water Quality Surveys were initially carried out for existing water sources, such as springs, dug wells, rainwater collectors, public hydrants etc in order to learn the condition of the water sources that are presently used and/or possibly could be used for new water supply schemes. Water from potential water sources such as PDAM distribution lines, newly drilled wells and existing wells were additionally water-quality tested. Hydrogeological conditions were compared with the results of water quality laboratory tests.

5.2 Items of Water Quality Analysis

5.2.1 Human Health-Related Items – Suitability for Drinking Water

The following items were tested and analyzed to assess suitability for drinking purposes.

Type of Test	Items Tested/analyzed
Field Test	General Bacteria, Coliform Bacteria, Nitrate (NO3), Nitrite (NO2), Ammonium (NH4)
Laboratory Test	Chromium VI (Cr6＋), Fluoride (F) Arsenic (As), Lead (Pb), Selenium (Se), Mercury (Hg), Cyanide(CN), Iron (Fe), Cadmium (Cd), Magnesium(Mg), Calcium (Ca),

5.2.2 Hydrogeology-Related Items

As the water sources for potential new water supply systems, in accordance with the Scope of Works, can only be taken from springs or other groundwater sources; it is essential that hydro-geological conditions must be analyzed. Water quality tests were carried out for the following items, to facilitate the hydro-geological analyses.

Type of Test	Items Tested/Analyzed
Field Test	Electric Conductivity, pH
Laboratory Test	Sodium (Na), Potassium (K), Chloride (Cl), Bicarbonate (HCO_3), Sulfate (SO_4), Silica (SiO_4)

5.3 Water Sampling and Analysis

5.3.1 Water Sampling and Transportation for Laboratory Analysis

Sampling was carried out at five water sources in every village, in principle. The five samples consisted of, (a) two 2-liter water samples for analysis for suitability for drinking water and hydrogeology related items; and (b) three 1-liter water samples for hydrogeology related items only. In addition, five samples were taken from PDAM transmission pipelines in Lombok Barat to assess the water quality of the PDAM system. Water samples were also taken from newly drilled 6 wells and two existing wells where pumping tests were carried out under the Study.

Water samples were bottled in plastic bottles and sealed immediately on site, packed in wooden boxes and sent to the selected laboratory in Jakarta by carrier service. A total of 228 samples were analyzed.

5.3.2 Tests and Measurements in the Field

A number of items were field tested or measured manually in the field.

Field tested items	Measurement method
Electric conductivity,	Handy digital EC Meter
pH,	Handy digital pH Meter
Temperature	Digital thermometer
Common bacteria, coliform bacteria	Detection paper
Nitrate (NO3), Nitrite (NO2), Ammonium (NH4)	Pack test

5.3.3 Test and Measurement in the Laboratory

Water samples sent to the laboratory were analyzed by the methods shown in the Appendix 6.

5.4 Results of Water Quality Analysis

5.4.1 Suitability for Drinking Water

The water quality assessments for drinking purpose were carried out based on the Indonesian Drinking Water Quality Standard. Suitability for drinking water in each Kabupaten is as follows.

(1) Nusa Tenggara Barat

1) Kabupaten Lombok Barat

Most of the water sampled satisfied all the Indonesian criteria for drinking water for except for bacteria and coliform. General bacteria and coliform were detected in all samples. The number of general bacteria in volcanic springs with large discharges was less than that in dug wells. High concentrations of iron (0.88 and 0.70mg/l) were observed in the waters from springs in Kuranji and Duman, which exceed the drinking water standard (0.3 mg/l). High concentrations of manganese (0.43 and 1.06 mg/l) occur in the spring in Kuranji and a tube well in Bajur, which exceed the standard (0.1 mg/l). Reducing/removing iron and manganese is difficult and costly.

The five water samples from PDAM pipelines in Lombok Barat, which originate from large scale springs at higher elevations and is chlorinated, satisfied the Indonesian drinking water standards for all analysis criteria.

2) Kabupaten Lombok Tengah

Coliform and bacteria were detected in all samples. The concentrations of sodium (230 mg/l) and chloride (275-298 mg/l) in several dug wells exceeded the standard values (200 mg/l and 250 mg/l respectively). The water sampled and tested from springs and tube wells satisfied the Indonesia criteria for drinking water, except for coliform and bacteria. High concentrations of total hardness (500 - 714 mg/l) were also observed at some dug wells.

Infiltration of wastewater from the ground surface is considered to be the reason for the sodium and chloride readings. Saline water intrusion is judged not to have taken place. Villagers using dug wells rely on these contaminated waters.

3) Kabupaten Lombok Timur

All water samples collected in Desa Bagik Papan and Selaparang satisfied the Indonesia criteria for drinking water, except for coliform and bacteria.

The water collected from dug wells in Desa Batu Nampar did not satisfy the criteria regarding coliform and bacteria, sodium (256 – 478 mg/l), chloride (863 – 918 mg/l) and total hardness. The causes are considered to be (1)

saline water intrusion, (2) wastewater infiltration or (3) mineral solution from the aquifers.

Although bacteria and coliform can be treated with chlorination, water with excessive sodium and chloride tastes bitter.

4) Kabupaten Sumbawa

The water sampled from some dug wells satisfied the Indonesian criteria for drinking water, except for coliform and bacteria; sodium (226 – 329 mg/l), chloride (393 – 972 mg/l) and total hardness (516 –767 mg/l). The water samples from the dug wells indicated the possibility of saline water intrusion and wastewater infiltration. However, the chloride content of water samples from deep wells and springs is small (4 - 61 mg/l).

Two new test wells, TW-01 and TW-02, were drilled. TW-01 in Desa Labuhan Lalar produce groundwater of satisfactory quality, while TW-02in Desa Poto yield saline water.

5) Kabupaten Bima

The water collected from a deep well in a transmigration village next to Desa Piong shows high-concentrations of sodium (322 mg/l) and chloride (472 mg/l). This is caused by saline water intrusion due to group over pumping in a limited area.

The water collected in Desa Labuhan Kenanga and Kawuwu satisfied the Indonesian criteria for drinking water, except for coliform and bacteria.

6) Kabupaten Dompu

Water samples collected from dug wells in the coastal area of Desa Jambu and Desa Ranggo did not satisfy the Indonesia drinking water criteria regarding sodium (207 – 465 mg/l) and chloride (318 – 379 mg/l). Saline water intrusion has taken place. Also high salinity (chloride concentrations of 658 mg/l) was identified in Hodo spring because of the mixing of seawater and fresh spring water. However, the deep tube well in Kwangko satisfies the Indonesian drinking water standards except for bacteria and coliform.

Two new test wells, TW-03 and TW-04 were drilled. TW-03 in Desa Ranggo yield water of satisfactory quality though the volume (2.8 L/sec) was not sufficient for the expected water demand (7.37 L/sec). TW-04 in Desa Jambu produced saline water.

(2) Nusa Tengara Timur

1) Kabupaten Sikka

The water from a deep well and several springs all satisfied the Indonesian criteria for drinking water, except for bacteria and coliform. These waters are drinkable with chlorination. Water from dug wells in coastal areas contains high sodium (206 – 475 mg/l) and chloride (378 – 448 mg/l) due to saline water intrusion and the infiltration of polluted wastewater. Some of these exceed the criteria.

Stored rainwater was also tested as one of the essential water sources in the region. Most of them were highly contaminated with bacteria and coliform. High pH values (8.8 –9.62) were found in some of the stored rainwater, due to dissolution of ions from the concrete tanks.

Springs and groundwater from deep wells can be used as water sources for drinking water supply schemes, although chlorination is required.

Two new test wells, TW-05 and TW-06 were provided in Desa Hepang and Desa Watuliwung. Both produce insufficient volume of water. Water quality of the groundwater did not meet the Indonesia Standards.

2) Kabupaten Flores Timur

All water, except for the hot spring in Desa Sinar Hading, satisfy the Indonesian criteria for drinking water, except for coliform and bacteria that necessitates chlorination if the water is to be used for drinking purpose.

The hot spring in Desa Sinar Hading contains a large amount of sodium (209 mg/l) and chloride (308 mg/l).

3) Kabupaten Ende

Most water collected satisfied the Indonesian criteria for drinking water except for bacteria and coliform. If the water is used for drinking water, chlorination is required.

The hot spring in Desa Watuneso contains more fluoride (1.66 mg/l) than the standard (1.50 mg/l). Water from dug wells in coastal areas, such as Desa Nggorea, is rich in sodium (256 mg/l) and chloride (226 mg/l), possibly due to saline water intrusion or contamination by polluted wastewater.

From the water quality point of view springs are the only possible sources for drinking purposes.

4) Kabupaten Sumba Barat

Desa Patialadete and Desa Welebo are located on sedimentary rocks of Cretaceous age. The geology forms poor aquifers. The other Desa Weerame, is located on limestone of Pliocene Tertiary age. The limestone contains many cavities and fissures that can form good aquifers.

All water sampled from springs satisfied the Indonesian criteria for drinking water except for bacteria and coliform. The spring water is drinkable with chlorination.

5) Kabupaten Sumba Timur

All the water sampled satisfied the Indonesian criteria for drinking water except for bacteria and coliform. From the view of water quality, the water is drinkable with chlorination.

The springs in Desa Pulupanjang were nothing more than seepage. The discharge volume was totally insufficient.

6) Kabupaten Kupang

(i) Timor Island

All the water collected from the villages, except for water from a cave, satisfied the Indonesia criteria for drinking water, except for bacteria and coliform. These waters are drinkable with chlorination. The water from the cave can be classified as brackish water (chloride concentration at 749 mg/l) that can not be used for drinking purposes.

(ii) Rote Island

All water sampled and tested, except water from a dug well near the coast in Desa Nusakdale, satisfied the Indonesian criteria for drinking water, except for bacteria and coliform. From the water quality points of view, the water is drinkable with chlorination. Water from the dug well contained a high amount of chloride (106 – 268 mg/l) possibly due to saline water intrusion.

5.4.2 Geo-chemical Characteristics of Water Sources

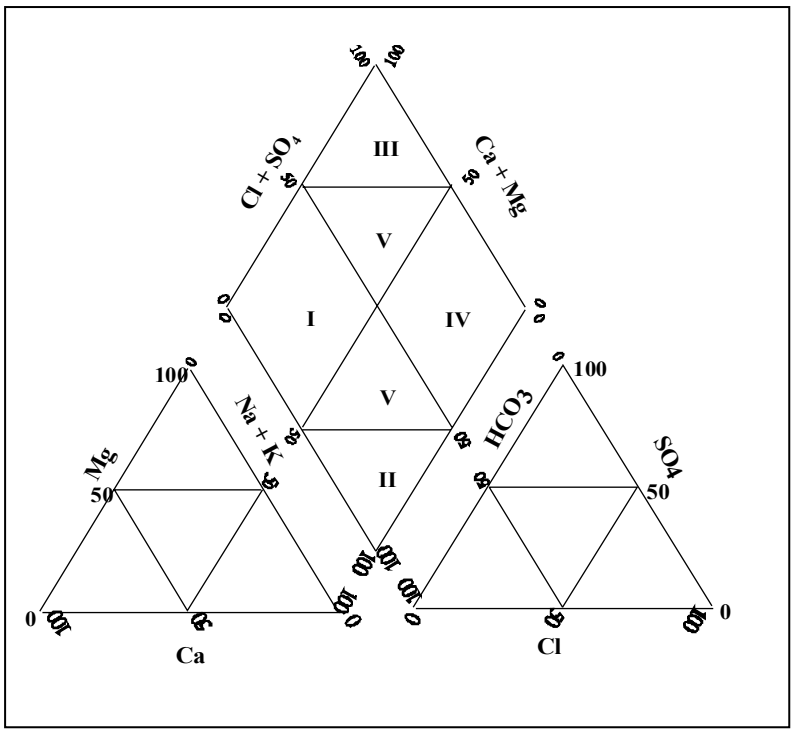
Geo-chemical water quality analyses were carried out to facilitate fundamental interpretation of all potential aquifers. The analyzed results were plotted in (1) Trilinear diagrams, (2) Durov diagrams and (3) Hexa-diagrams. The following seven predominant ions were plotted in accordance with international practice.

Cations: Sodium (Na), Potassium (K), Calcium (Ca), Magnesium (Mg)
Anions: Chloride (Cl), Bicarbonate (HCO3), Sulfate (SO4)

(1) Data Presentation in Diagrams

1) Trilinear Diagram

A Trilinear Diagram, as shown in the figure below, has one diamond and two triangles. Concentrations of ions in mg/L are converted to milli-equivalents



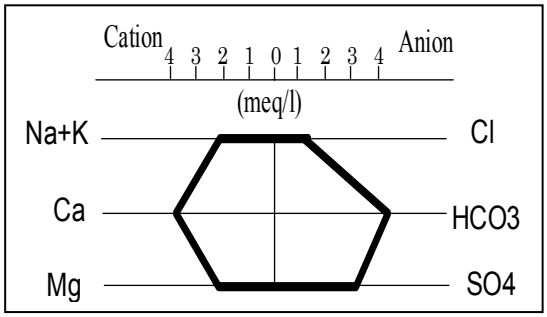
(meq/L). Thereafter the percentage of each cation and anion is calculated against the total cation and anion concentration. Plots are made on the triangles first and on the diamond thereafter.

Depending on the plotting position in the diagram, the water quality is classified into five types as follows.

Type-I:	Alkaline Earth Bicarbonate	[$Ca(HCO_3)_2$]-Type
Type-II:	Alkaline Bicarbonate	[$NaHCO_3$] -Type
Type-III:	Alkaline Earth Non-bicarbonate	[$CaSO_4$ or $CaCl_2$] -Type
Type-IV:	Alkaline Non-bicarbonate	[Na_2SO_4 or NaCl] -Type
Type-V:	Transitional	Often a mixture of Types-II and III

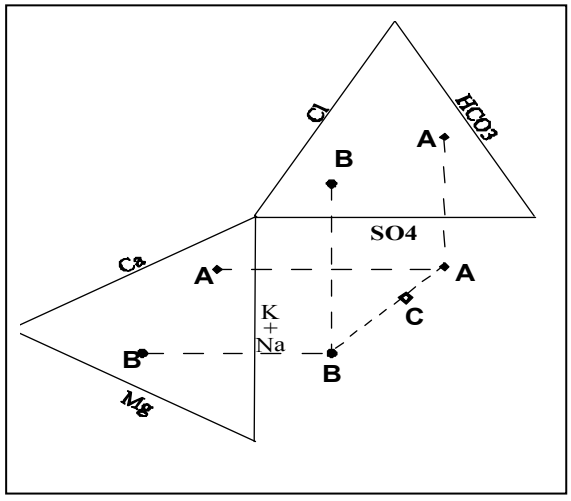
2) Hexa-diagram

A Hexa-Diagram has three parallel, equally spaced coordinate axes, on which the concentration of ions are plotted as shown below. Connecting the six points produces a hexagonal shape. The shape and size varies in accordance with the variation of ion concentrations in the water. Based on such variation of shape and size, water can be classified visually from the quality point of view.



3) Durov Diagram

A Durov Diagram consists of two triangles and one square as shown below. Similar to the Trilinear Diagram, ion concentrations are plotted in triangles first, these plotted points are then projected parallel to both axes as shown in the figure below. If



water A in the diagram is mixed with water B, the mixture C is plotted on a linear line connecting A and B. The diagram is useful to identify mixtures of water such as is caused by saline water intrusion.

4) Multivariate Analysis

(i) Cluster Analysis

Cluster Analysis is a multivariate analysis technique that seeks to organize information about variables so that relatively homogenenous groups, or "clusters," can be formed. The clusters formed with this family of methods should be highly internally homogenous (members are similar to one another) and highly externally heterogenous (members are not like members of other clusters.

Cluster analysis can accept a wide variety of input data. While these are generally called "similarity" measures, they can also be termed "proximity," "resemblance," or "association."

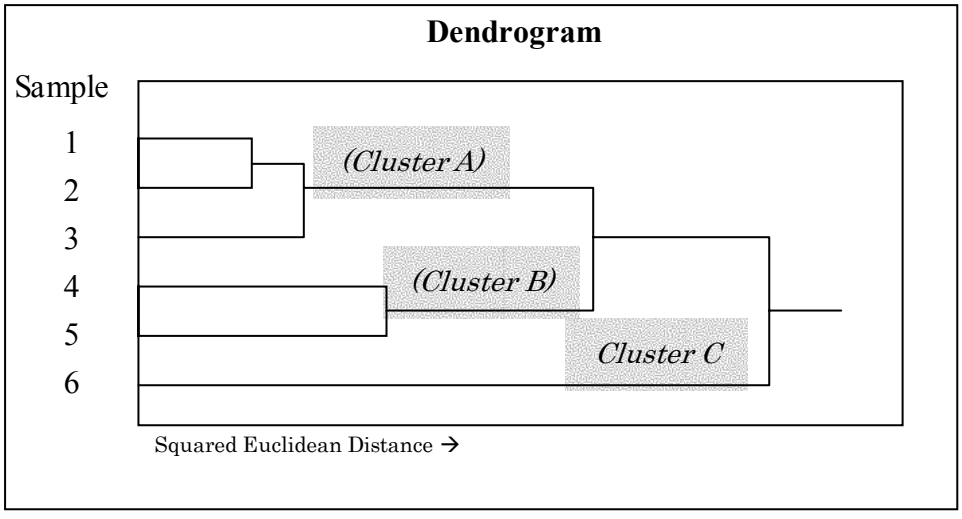
There are four basic cluster analysis steps:

- data collection and selection of the variables for analysis
- generation of a similarity matrix
- decision about number of clusters and interpretation
- validation of cluster solution

The main outcome of a cluster analysis is a **Dendrogram**, which is

also called a tree diagram.

As shown in the figure below, the 6 samples are grouped into Cluster A (Sample 1, 2 and 3), Cluster B (Sample 4 and 5), and Cluster C (Sample 6).



(ii) Concentration Correlation Matrix (CCM) Analysis

Concentration Correlation Matrix Analysis examines the similarity of the water quality composition of samples by calculating the 'Correlation Matrix'. Results are shown in the form as shown below.

Sample No.	1	2	3	4	5	6
1	*					
2	A	*				
3	B	B	*			
4	.	.	A.	*		
5	.	.	.	B	*	
6	.	.	.	.	.	*
Note: 'A': excellent correlation, 'B': good correlation, '.': poor correlation						

(2) Nusa Tengara Barat

1) Kabupaten Lombok Barat

All the samples plotted in the same domain of a trilinear diagram and a Durov diagram, which indicates that all originated in the same aquifer, or aquifers having similar hydrogeological characteristics. All the waters fall in the domain of Alkaline Bicarbonate [$NaHCO_3$] type in the Trilinear Diagram, which normally indicates that they originated relatively deep under ground.

The Hexa-diagrams show that (1) most of water contains relatively small amounts of dissolved ions, which indicates that the groundwater flows relatively fast, (2) the waters are characterized by high concentration of Na^+ and HCO_3^- as supported by the trilinear diagram, suggesting the type of aquifer geology.

Dendrogram and CCM indicate that all the springs in Kab. Lombok Barat have similar characteristics, though BS1-1 may be a different origine.

Combined with the general hydrogeological conditions in the area, the geo-chemical analysis suggests that this area consists of a large regional aquifer system and the aquifer has a relatively high permeability and contains fresh water.

All these analyses show positive indications that the aquifer has potential for development.

2) Kabupaten Lombok Tengah

The waters analyzed fall in several domains in the trilinear diagram, although many are in $NaHO_3$-type. The Durov diagram also shows no appreciable pattern amongst the plots. Patterns of the Hexa-diagrams differ greatly from each other. Similarly, the Dendrogram and CCM show no appreciable 'clusters'. No appreciable similarities were identified.

Combined with the hydrogeological conditions, the geo-chemical analysis suggests that

- there is no regional groundwater aquifer system in the area,
- accordingly, aquifers are local and small, having limited capacities,
- groundwater flows slowly or stagnates in each aquifer,
- each aquifer is susceptible to pollution from the ground surface.

All the above indicate that the aquifers in the area are likely to be 'poor' in yielding capacity and quality.

3) Kabupaten Lombok Timur

Two patterns are noticeable; one is for Desa Bagik Papan and Selaparang located in the north of the Kabupaten; and the other for Desa Batu Nampar in the south.

The waters in the north of the Kabupaten are classified as $NaHCO_3$ (normally deep groundwater) in the trilinear diagram. They do not show any indications of mixture with other types of water in Durov diagram. The Hexa-diagrams show that the waters are HCO_3 rich and contain relatively small ion contents, which indicate that the groundwater flows with appreciable speeds. This, combined with the geological information, indicates that the water in the northern area is borne in one regional groundwater aquifer system of high permeability.

On the other hand the Trilinear diagram and Durov diagram show no appreciable plot patterns for water in the south. Some fall in the domain of Alkaline Non-bicarbonate [NaCl]-type. The Hexa-diagram shows that the patterns vary from location to location and that ion concentrations are high. This, combined with the geological information, suggests that the aquifers in

the area are local and the groundwater is stagnant. Saline intrusion has occurred in some dug wells.

The Dendrogram and CCM suggest that all the springs in Desa Bagik Papan and Desa Selaparang are very similar origin.

4) Kabupaten Sumbawa

Although the hydrogeological settings of all areas where water was sampled are coastal plains or river terraces, water quality patterns differ from place to place according to the diagrams.

The water from Desa Labuhan Mapin is $NaHCO_3$ Type II in the Trilinear diagram, suggesting that it is a deep groundwater. The Durov diagram indicates that a cation exchange from Ca^{2+} to Na^{+} has taken place in the groundwater, due to the high solubility of Na^{+}, and that the groundwater is stagnant. The waters from dug wells are considered to be contaminated or saline water intruded.

Water from Desa Labuhan Lalar falls in the Alkaline Earth Bicarbonate [$Ca(HCO_3)_2$] Type I in the Trilinear diagram, indicating that it is of shallow origin. Ion concentrations are lower that those of the other village, although it increases at high tide. The permeability is considered to be high.

Water from dug wells in Desa Poto are classified as NaCl Type IV or $Ca(HCO_3)_2$-Type I, indicating that existing shallow water $Ca(HCO_3)_2$-Type-I is being contaminated with saline water [NaCl-type]. Water from the deep tube wells was also classified as $Ca(HCO_3)_2$-Type-I, supporting the existence of subsurface limestone reported in the geological information.

In general water samples from this Kabupaten do not resemble in quality according to the Dendrogram and CCM. No wide-scale aquifers therefore are anticipated.

5) Kabupaten Bima

Waters from Desa Piong, Labuhan Kenanga and Kawuwu all fall in the $Ca(HCO_3)_2$ Type-I area of the Trilinear diagram. Hexa-diagrams show low ion concentrations and similar water quality patterns. These analyses, combined with the hydrogeological information, indicate that the groundwater flows in regional aquifer systems which have high development potential.

The diagrams suggest that (1) water from a dug well in Desa Labuhan Kenangga is contaminated with saline water, and (2) saline water intrusion has taken place in the water of a deep tube well in the transmigration camp near Desa Piong, due to excessive pumping in a limited area.

Similarly, Dendrogram and CCM indicate that Springs in the area may be similar origin, but that the pumped groundwater in Desa Piong is completely different origin.

6) Kabupaten Dompu

The diagrams show various types of water quality in accordance with the variation of geology. No regional aquifer systems are anticipated.

Water from Desa Ranggo is normally classified as $Ca(HCO_3)_2$-Type I, indicating that it is a shallow groundwater. Dug well BD19-2 shows NaCl-Type-IV, indicating contamination by human activities, while spring BS19-1 is $Mg(HCO_3)_2$ due to the geological conditions.

Samples from Desa Jambu are classified as $Ca(HCO_3)_2$ or $Mg(HCO_3)_2$, indicating that they are shallow groundwater. Some show NaCl-Type IV, indicating saline water intrusion.

In M.A. Hodo, water is classified in NaCl-Type IV, indicting the influence of sea water.

Waters from Desa Kawangko is plotted both the in $Ca(HCO_3)_2$ and the $NaHCO_3$-Types, indicating that they are shallow groundwater, while the tube well samples are classified as $CaCl_2$, suggesting the influence of volcanic activities. The water of TW-3 is similar to the water of deep well of Desa Ranggo. A new well TW-4 yielded saline water that is not suitable for drinking.

(3) Nusa Tengara Timur

1) Kabupaten Sikka

Water from dug wells and a borehole fall in the NaCl-Type IV or $Ca(HCO_3)_2$ –NaCl-Type I categories, indicating that shallow groundwater is slightly mixed with saline water. Water from rain collectors shows small ion concentrations, though pH is sometimes very high due to ion solution from concrete tanks.

The water of TW-5 is $NaHCO_3$ – Type in the trilinear diagram, suggesting that it is a deep groundwater. The water of TW-6 and PT-1 are $Ca(HCO_3)_2$ –Type. These water samples are slightly similar to other water of this Kabupaten.

2) Kabupaten Flores Timur

The predominant groundwater can be classified as NaCl – Type IV, although variations are seen. In the Durov diagram, plots of the spring water lie on a line, indicating that two types water have mixed in varying ratios.

Dug well waters are classified as $Ca(HCO_3)_2$ or $Mg(HCO_3)_2$. They show low ion concentrations, indicating that a relatively rapid cycle of water circulation is taking place in the hydro geological system. The dug well is influenced by seawater, as indicated by high EC values of more than 100 mS/m.

3) Kabupaten Ende

Most of the waters from dug wells and springs are classified as $Ca(HCO_3)_2$, indicating that the water originates from shallower aquifers. Combined with the hydrogeological conditions, no regional aquifers are considered to exist in the area.

The Durov diagram shows that water rich in Ca^{2+} , with little Cl^- , has mixed with water rich in Na^+ and Cl^-. The implication of this is that the original shallow groundwater has mixed with seawater in various ratios.

The spring plotted in the Alkaline Earth Non-bicarbonate domain is the hot spring sampled in Desa Watuneso.

4) Kabupaten Sumba Barat

All the waters are classified in the Alkaline Earth Bicarbonate [$Ca(HCO_3)_2$]-Type-I, implying that the they originate from shallower aquifers.

The waters can further be grouped into two types: (1) Water predominantly rich in Ca^{2+} and HCO_3^-, (2) Water containing Na^+ and Mg^{2+}. Type I originates from limestone in Desa Weerame, and type II originates from

sedimentary rocks in Desa Patialadete and Welebo. The aquifer of type I can be a good whereas type II may be poor.

5) Kabupaten Sumba Timur

The waters in the area are all classified as Alkaline Earth Bicarbonate [$Ca(HCO_3)_2$]-Type I, and largely contain Ca^{2+} and HCO_3^- ions. This information indicates that the water from the dug wells and springs originates from carbonate rocks (limestone, calcareous sedimentary rocks etc.) Carbonate rocks can be good aquifers if they are fissured or cavitated*.

*Note:Site investigation revealed that such carbonate rocks are cavitated in Desa Kondamara but are not cavitated or fissured in Desa Pulupanjang.

6) Kabupaten Kupang

(i) Timor Island

Waters from springs and dug wells are classified as [$Ca(HCO_3)_2$]-Type I and [NaCl]-Type IV as seen in the trilinear diagram. A typical pattern of limestone origin groundwater can also seen in the Hexa-diagram. All the geo-chemical information is in accordance with the geological information. The Durov diagram indicates that groundwater from limestone has mixed with saline waters in various ratios

(ii) Rote Island

All the diagrams show similar geo-chemical conditions to those of Timor Island, although it is a different island.

Waters from springs and dug wells are classified as [$Ca(HCO_3)_2$]-Type as shown in the Trilinear diagram. A typical pattern of limestone origin groundwater can also seen in the Hex-diagrams. All the geo-chemical information is in accordance with the geological information that the area consists of coral limestone. The Durov diagram indicates that the groundwater in limestone has mixed with saline water in various ratios. Serious saline water intrusion is seen in TD 23-5 in Desa Nusakdale.

5.1 RESULTS OF WATER QUALITY ANALYSIS - NTB (1)

Sample No.	Name of Village	Measurement on Site								Analysis in Laboratory																				
										Suitability for Drinking Water (mg/L)												Hydrogeological Parameters (mg/L)								
		WT (°C)	pH	EC (mS/m)	NH_4 (mg/l)	NO_3 (mg/l)	NO_2 (mg/l)	Bacteria (col/ml)	T. Coli	Cr^{6+}	F	As	Pb	Se	Hg	CN	Fe	Cd	Mn	Cu	Na	K	Ca	Mg	Cl	HCO_3	SO_4	S_iO_2	Hard-ness
BD 1-1	KURANJI	29.9	6.61	76.7	0.8	< 1	< 0.02	> 100	D												42.7	54.2	38.6	18.4	41.9	255.1	<0.94	45.7	172.1
BD 1-2		29.2	6.79	49.4	< 0.1	< 1	< 0.02	> 100	D	<0.006	0.45	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	40.1	27.8	22.7	10.3	19.1	179.1	5.6	40.9	99.0
BD 1-3		30.3	6.66	44.7	< 0.1	2	< 0.02	> 100	D												40.8	24.5	19.4	14.5	19.8	141.0	16.8	38.9	108.1
BS 1-1		28.8	6.69	20.9	0.3	< 1	< 0.02	> 100	D												42.5	14.3	22.6	10.5	12.1	188.3	<0.94	38.4	99.4
BS 1-2		29.6	6.65	34.7	0.2	< 1	< 0.02	19	D	<0.006	0.30	<0.001	<0.01	<0.007	<0.001	<0.01	0.88	<0.005	0.43	<0.03	22.6	14.7	14.8	8.8	8.9	123.3	4.6	46.9	73.1
BD 2-1	BAJUR	28.1	7.03	45.8	0.15	2	< 0.02	> 100	D	<0.006	0.42	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	40.7	16.2	24.9	7.7	19.7	193.2	13.4	27.4	93.6
BD 2-2		29.6	7.13	71.5	0.5	40	0.02	> 100	D												63.3	45.9	45.3	21.6	52.7	327.8	23.4	25.0	202.1
BB 2-3		29.2	7.29	38.6	0.4	< 1	< 0.02	> 100	ND	<0.006	0.55	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	1.06	<0.03	33.5	8.9	29.2	10.6	8.2	228.9	<0.94	23.9	116.8
BD 2-4		30.5	6.87	34.9	0.1	2	< 0.02	> 100	D												31.5	12.8	21.8	9.3	14.9	149.1	11.7	21.9	92.5
BD 2-5		30.5	7.00	83.2	0.1	4	0.03	> 100	D												64.2	60.0	33.5	29.2	70.8	321.7	19.5	25.0	203.8
BD 3-1	SEMBUNG	29.6	6.64	15.5	< 0.1	4	< 0.02	> 100	D												22.0	16.1	12.5	10.2	9.5	107.6	4.6	47.2	73.3
BD 3-2		28.6	6.75	13.8	0.2	3	0.03	> 100	D												20.5	10.6	11.1	8.7	9.4	93.6	3.1	47.5	63.4
BD 3-3		28.9	6.56	25.3	< 0.1	4	< 0.02	78	D												18.7	9.7	10.2	8.4	7.8	90.5	2.8	43.2	60.0
BS 3-1		29.8	6.66	28.7	< 0.1	3	< 0.02	34	D	<0.006	0.39	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	20.5	11.7	10.6	9.2	7.7	96.0	3.9	49.3	64.3
BS 3-2		28.0	6.60	12.5	< 0.1	4	< 0.02	85	D	<0.006	0.26	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	18.3	9.6	9.2	7.8	5.9	80.9	3.1	37.5	55.2
BD 4-1	DUMAN	29.2	6.57	49.9	0.1	30	0.03	> 100	D												30.6	11.7	24.3	22.8	29.0	125.5	20.2	40.1	154.4
BD 4-2		29.2	6.96	24.3	0.1	1	0.02	> 100	D												18.5	7.9	13.0	6.6	6.6	84.6	3.1	30.8	59.6
BS 4-1		29.2	7.63	5.5	< 0.1	< 1	< 0.02	> 100	D	<0.006	<0.02	<0.001	<0.01	<0.007	<0.001	<0.01	0.70	<0.005	<0.02	<0.03	5.7	3.5	3.0	1.5	<0.1	30.7	4.0	26.2	13.8
BS 4-2		29.2	6.42	18.1	< 0.1	2	< 0.02	2	D												13.9	6.6	10.2	5.1	3.2	69.2	<0.94	43.2	46.4
BS 4-3		28.1	6.68	12.4	< 0.1	2	< 0.02	63	D	<0.006	0.21	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	15.4	16.1	13.8	6.2	5.2	98.8	2.6	37.7	60.0
Water Quality Standard			**6.5-8.5**			*** 10** **** 44**	*** 1** **** 3**		**ND**	**0.05**	**1.5**	**0.05**	**0.05**	**0.01**	**0.001**	**0.1**	**0.3**	**0.005**	**0.1**	**1**	**200**				**250**		**400**		**500**

Note:

: Value exceeds standard

* : Value means concentration of NO_3-N and NO_2-N

** : Value means concentration of NO_3 and NO_2

D : Detected

ND : Not Detected

- BD: NTB - Dug Well
- BS: NTB - Spring
- BB: NTB - Tube Well

5.2 RESULTS OF WATER QUALITY ANALYSIS - NTB (2)

Sample No.	Name of Village	Measurement on Site								Analysis in Laboratory																				
										Suitability for Drinking Water (mg/L)												Hydrogeological Parameters (mg/L)								
		WT (°C)	pH	EC (mS/m)	NH_4 (mg/l)	NO_3 (mg/l)	NO_2 (mg/l)	Bacteria (col/ml)	T. Coli	Cr^{6+}	F	As	Pb	Se	Hg	CN	Fe	Cd	Mn	Cu	Na	K	Ca	Mg	Cl	HCO_3	SO_4	S_iO_2	Hard-ness
BD 5-1	PERESAK	27.4	6.64	26.2	< 0.1	4	< 0.02	> 100	D												18.7	10.0	9.7	8.5	9.7	82.0	7.7	42.9	59.1
BD 5-2		27.7	6.55	38.2	< 0.1	8	< 0.02	> 100	D												22.1	7.2	19.6	11.6	13.6	109.5	13.1	50.2	96.7
BS 5-1.1		21.7	7.45	14.3	< 0.1	1	< 0.02	2	D																				
BS 5-1.2		22.5	7.52	15.4	< 0.1	1	0.02	> 100	D	<0.006	0.36	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	12.5	4.3	5.4	4.6	6.4	47.2	5.6	28.1	32.6
BS 5-2		23.6	6.88	15.4	< 0.1	3	< 0.02	> 100	D	<0.006	0.31	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	13.0	4.3	6.2	5.0	6.6	49.7	4.2	45.9	36.1
BS 5-3		28.3	6.64	23.1	< 0.1	4	< 0.02	12	D												21.4	10.6	10.1	7.0	5.6	80.0	8.9	41.2	53.9
BD 6-1	JELANTIK	28.0	6.86	59.2	<0.1	3	< 0.02	> 100	D	<0.006	0.69	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	48.4	37.6	38.3	12.1	18.0	195.6	11.5	37.2	145.5
BD 6-2		28.7	7.31	82.6	0.1	5	0.02	> 100	D												81.8	49.3	27.0	6.9	46.2	242.5	51.5	38.4	95.7
BD 6-3		28.7	6.58	53.8	0.1	1	0.02	> 100	D												40.1	49.6	20.4	11.4	23.6	170.2	16.1	34.6	97.8
BB 6-4		28.7	6.81	36.4	< 0.1	< 1	< 0.02	> 100	D	<0.006	0.52	<0.001	<0.01	<0.007	<0.001	<0.01	0.10	<0.005	<0.02	<0.03	33.0	11.3	17.9	1.7	5.0	143.6	2.7	40.5	51.4
BD 6-5		28.1	6.95	183.5	< 0.1	40	0.02	> 100	D												130.3	42.1	116.5	50.8	243.0	317.7	74.7	41.5	500.2
BD 7-1	LABULIA	28.9	6.96	102.7	0.7	5	0.07	> 100	D												87.6	32.0	70.8	25.8	52.4	324.2	20.1	33.4	283.0
BD 7-2		29.3	6.96	99.5	0.1	2	< 0.02	> 100	D	<0.006	0.68	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	61.3	20.4	81.8	24.9	76.3	266.6	43.0	41.0	306.9
BD 7-3		28.4	7.27	112.1	1.5	< 1	0.02	> 100	D												141.9	26.4	67.0	25.4	96.9	319.2	26.3	27.7	271.9
BD 7-4		29.3	6.74	38.0	< 0.1	3	< 0.02	> 100	D												27.4	25.4	19.8	24.6	12.8	125.7	8.0	33.3	150.8
BS 7-1		28.4	6.68	35.6	< 0.1	2	< 0.02	> 100	D	<0.006	0.43	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	33.2	17.9	14.9	0.1	6.1	130.4	4.2	42.8	37.6
BD 8-1	SETANGGOR	27.2	7.05	50.6	< 0.1	4	0.02	> 100	D	<0.006	0.47	<0.001	<0.01	<0.007	<0.001	<0.01	0.06	<0.005	<0.02	<0.03	104.4	6.5	60.0	49.4	66.3	321.7	43.0	39.6	353.1
BD 8-2		26.9	7.52	48.7	0.1	2	< 0.02	> 100	D												123.8	5.8	50.8	42.5	41.4	346.9	28.3	53.7	301.9
BD 8-3		26.6	7.25	116.9	0.3	< 1	< 0.02	> 100	D												146.6	6.1	43.0	49.7	54.9	401.2	35.7	45.1	312.0
BD 8-4		26.7	7.49	115.3	0.1	4	< 0.02	> 100	D	<0.006	1.03	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	91.7	4.7	38.0	20.2	41.8	400.2	39.1	44.9	178.3
BD 8-5		27.5	7.04	94.4	< 0.1	15	0.02	> 100	D												111.6	4.9	179.6	50.2	275.4	305.1	64.9	56.3	655.4
Water Quality Standard			**6.5-8.5**			*** 10** **** 44**	*** 1** **** 3**		**ND**	**0.05**	**1.5**	**0.05**	**0.05**	**0.01**	**0.001**	**0.1**	**0.3**	**0.005**	**0.1**	**1**	**200**				**250**		**400**		**500**

Note:

: Value exceeds standard

* : Value means concentration of NO_3-N and NO_2-N

** : Value means concentration of NO_3 and NO_2

D : Detected

ND : Not Detected

- BD: NTB - Dug Well
- BS: NTB - Spring
- BB: NTB - Tube Well

5.3 RESULTS OF WATER QUALITY ANALYSIS - NTB (3)

Sample No.	Name of Village	Measurement on Site								Analysis in Laboratory																				
										Suitability for Drinking Water (mg/L)												Hydrogeological Parameters (mg/L)								
		WT (°C)	pH	EC (mS/m)	NH_4 (mg/l)	NO_3 (mg/l)	NO_2 (mg/l)	Bacteria (col/ml)	T. Coli	Cr^{6+}	F	As	Pb	Se	Hg	CN	Fe	Cd	Mn	Cu	Na	K	Ca	Mg	Cl	HCO_3	SO_4	S_iO_2	Hard-ness
BD 9-1	REMBITAN	27.9	7.10	155.6	< 0.1	4	0.02	> 100	D	<0.006	0.49	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	157.9	2.2	108.6	34.3	184.1	342.1	6.5	40.8	412.2
BD 9-2		27.3	6.97	113.8	0.1	10	0.05	> 100	D												179.0	33.9	188.7	59.2	298.3	389.5	85.8	42.3	714.8
BD 9-3		30.2	7.04	185.7	0.1	10	0.02	> 100	D												138.8	1.4	151.9	52.3	46.1	314.8	41.3	46.1	594.4
BD 9-4		29.1	7.08	195.0	< 0.1	20	0.08	> 100	D												210.0	7.5	155.7	50.2	118.9	335.2	96.9	43.5	595.3
BS 9-1		27.9	7.94	43.5	0.2	1	< 0.02	> 100	D	<0.006	0.28	<0.001	<0.01	<0.007	<0.001	<0.01	0.29	<0.005	0.06	<0.03	60.9	4.2	96.7	14.8	47.0	288.2	21.9	36.3	302.5
BD 10-1	BAGIK PAPAN	26.6	7.13	36.2	< 0.1	3	< 0.02	> 100	D												25.1	13.1	20.1	12.5	6.5	137.6	7.9	39.8	101.4
BD 10-2		26.3	6.95	30.3	< 0.1	4	< 0.02	60	D												20.0	9.5	15.0	10.5	7.4	103.0	9.8	47.0	80.8
BD 10-3		27.4	6.82	38.4	< 0.1	10	< 0.02	95	D												23.6	9.4	18.4	13.8	15.5	112.7	14.0	49.8	102.8
BS 10-1		25.4	7.12	15.5	< 0.1	5	0.02	60	D	<0.006	0.37	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	19.0	4.9	15.0	11.8	6.9	111.8	5.0	42.4	86.1
BS 10-2		25.6	7.19	19.5	< 0.1	1	0.02	> 100	D	<0.006	0.51	<0.001	<0.01	<0.007	<0.001	<0.01	0.06	<0.005	0.09	<0.03	23.4	12.1	21.3	12.1	9.3	143.2	11.8	35.7	103.1
BS 11-1	SELAPARANG	22.1	6.62	16.0	< 0.1	2	< 0.02	25	ND	<0.006	0.15	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	8.7	3.4	9.7	4.9	4.8	56.4	2.8	29.0	44.6
BD 12-1	BATU NAMPAR	28.3	7.50	138.9	0.1	1	< 0.02	> 100	D	<0.006	0.60	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	136.1	26.6	70.6	45.0	215.1	409.0	54.7	30.2	361.7
BD 12-2		29.7	7.10	108.0	< 0.1	1	< 0.02	> 100	D												185.9	3.7	36.1	134.7	202.1	836.6	70.4	17.0	644.8
BD 12-3		28.9	7.32	371.0	0.1	7	0.02	> 100	D	<0.006	0.99	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	440.9	45.8	121.0	165.8	863.4	557.4	366.0	29.7	984.8
BD 12-4		29.7	7.56	185.0	0.15	2	0.02	> 100	D												256.4	11.3	35.9	48.8	221.9	554.8	82.7	26.7	290.4
BD 12-5		29.5	7.37	431.0	0.1	40	0.03	> 100	D												478.9	35.0	228.2	82.8	917.7	482.6	179.1	26.2	910.8
BB 13-1	LB. MAPIN	32.3	7.65	46.3	0.2	< 1	< 0.02	31	D	<0.006	0.59	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	213.9	4.7	14.4	5.3	36.3	317.3	42.2	27.8	57.6
BD 13-2		30.2	7.24	75.4	0.1	18	0.1	> 100	D												153.0	36.9	86.9	37.4	87.4	406.0	61.6	35.8	371.0
BD 13-3		32.4	8.17	249.0	0.2	< 1	< 0.02	> 100	D												108.5	108.4	21.1	17.0	422.8	739.2	57.2	26.1	122.7
BD 13-4		29.5	7.33	128.0	0.1	1	< 0.02	> 100	D												329.3	12.8	119.0	83.9	393.0	423.8	343.8	24.1	642.9
BS 13-1		30.2	7.50	39.1	0.15	1	0.02	23	D	<0.006	0.23	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	11.6	3.0	47.5	12.8	4.1	134.8	4.2	36.4	171.5
Water Quality Standard			**6.5-8.5**			*** 10** **** 44**	*** 1** **** 3**		**ND**	**0.05**	**1.5**	**0.05**	**0.05**	**0.01**	**0.001**	**0.1**	**0.3**	**0.005**	**0.1**	**1**	**200**				**250**		**400**		**500**

Note:

: Value exceeds standard

* : Value means concentration of NO_3-N and NO_2-N

** : Value means concentration of NO_3 and NO_2

D : Detected

ND : Not Detected

- BD: NTB - Dug Well
- BS: NTB - Spring
- BB: NTB - Tube Well

5.4 RESULTS OF WATER QUALITY ANALYSIS - NTB (4)

Sample No.	Name of Village	Measurement on Site								Analysis in Laboratory																				
										Suitability for Drinking Water (mg/L)												Hydrogeological Parameters (mg/L)								
		WT (°C)	pH	EC (mS/m)	NH_4 (mg/l)	NO_3 (mg/l)	NO_2 (mg/l)	Bacteria (col/ml)	T. Coli	Cr^{6+}	F	As	Pb	Se	Hg	CN	Fe	Cd	Mn	Cu	Na	K	Ca	Mg	Cl	HCO_3	SO_4	S_iO_2	Hard-ness
BD 14-1	LB. LALAR	29.2	7.31	39.9	0.1	< 1	< 0.02	> 100	D	<0.006	0.70	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	45.7	18.4	86.9	18.8	21.2	305.0	17.6	36.1	294.2
BD 14-2		29.2	7.56	68.2	0.1	< 1	< 0.02	> 100	D												90.8	6.4	112.3	64.2	48.3	324.0	162.5	34.7	544.6
BD 14-3		29.2	7.94	38.5	0.1	1	< 0.02	> 100	D												81.0	74.9	37.3	24.0	53.4	232.5	22.0	11.3	191.9
BD 14-4		30.2	7.23	43.5	< 0.1	3	< 0.02	> 100	D												59.1	19.3	97.3	20.8	25.1	337.2	24.4	36.3	328.6
BD14-5		28.1	7.13	47.7	0.1	40	< 0.02	> 100	D	<0.006	0.53	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	80.0	13.2	88.0	19.3	75.5	303.6	37.2	51.0	299.0
BD 15-1	POTO	28.0	6.81	61.4	0.15	5	0.03	> 100	D												65.4	27.7	140.8	46.7	61.0	340.2	45.7	34.5	543.7
BD 15-2		30.4	7.50	107.1	0.1	< 1	< 0.01	> 100	D	<0.006	0.78	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	226.1	9.1	131.4	45.7	336.5	271.2	66.9	44.0	516.1
BD 15-3		28.9	7.12	139.3	0.1	45	0.15	> 100	D												284.1	9.2	127.8	108.8	971.9	398.1	74.9	28.1	767.1
BB 15-4		30.2	6.62	108.0	0.1	5	< 0.02	36	D	<0.006	0.45	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	59.5	7.3	100.3	33.8	61.1	338.3	32.2	28.3	389.8
BS15-1		27.8	7.71	46.2	0.2	3	0.03	> 100	D												54.0	9.3	72.2	39.3	34.0	293.5	42.1	50.1	341.9
BB 16-1	PIONG	32.4	7.22	229.0	< 0.1	1	< 0.02	> 100	D	<0.006	0.57	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	321.8	19.9	65.0	46.7	471.7	199.2	47.2	46.8	354.4
BD 16-2		29.2	7.18	54.2	< 0.1	2	< 0.02	> 100	D												26.9	11.3	42.6	22.9	17.5	235.6	5.1	47.6	200.7
BD 16-3		30.2	7.23	25.4	0.1	4	< 0.02	> 100	D												35.7	10.2	43.4	16.5	14.4	214.9	5.9	51.3	176.3
BD 16-4		30.2	7.17	26.9	< 0.1	7	< 0.02	> 100	D												26.8	13.0	46.9	21.2	10.5	232.3	11.4	44.6	204.3
BS16-1		29.2	7.65	40.8	< 0.1	1	< 0.02	> 100	D	<0.006	0.42	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	21.5	9.2	43.4	18.5	16.1	156.1	2.8	56.9	184.3
BD 17-1	LB. KENANGA	29.2	6.91	32.3	< 0.1	2	< 0.02	> 100	D												20.6	36.0	28.3	10.9	6.8	131.9	7.4	35.6	115.6
BD 17-2		29.2	6.69	19.3	< 0.1	-	< 0.02	> 100	D	<0.006	0.68	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	18.3	26.7	25.9	14.0	11.0	105.7	6.4	42.2	122.3
BD 17-3		27.0	7.58	77.1	0.1	3	< 0.02	> 100	D												42.6	31.0	37.8	12.3	96.4	172.4	13.5	37.9	144.7
BD 17-4		30.2	7.05	23.7	0.1	5	< 0.02	> 100	D												22.6	27.3	39.7	16.9	15.7	145.5	7.4	32.8	168.7
BS 17-1		23.8	6.88	22.1	0.1	1	< 0.02	> 100	D	<0.006	0.27	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	11.0	13.6	21.8	7.8	2.8	85.7	13.2	33.8	86.3
Water Quality Standard			**6.5-8.5**			*** 10** **** 44**	*** 1** **** 3**		**ND**	**0.05**	**1.5**	**0.05**	**0.05**	**0.01**	**0.001**	**0.1**	**0.3**	**0.005**	**0.1**	**1**	**200**				**250**		**400**		**500**

Note:

: Value exceeds standard

* : Value means concentration of NO_3-N and NO_2-N

** : Value means concentration of NO_3 and NO_2

D : Detected

ND : Not Detected

- BD: NTB - Dug Well
- BS: NTB - Spring
- BB: NTB - Tube Well

5.5 RESULTS OF WATER QUALITY ANALYSIS - NTB (5)

Sample No.	Name of Village	Measurement on Site								Analysis in Laboratory																				
										Suitability for Drinking Water (mg/L)												Hydrogeological Parameters (mg/L)								
		WT (°C)	pH	EC (mS/m)	NH_4 (mg/l)	NO_3 (mg/l)	NO_2 (mg/l)	Bacteria (col/ml)	T. Coli	Cr^{6+}	F	As	Pb	Se	Hg	CN	Fe	Cd	Mn	Cu	Na	K	Ca	Mg	Cl	HCO_3	SO_4	S_iO_2	Hard-ness
BD 18-1	KAWUWU	29.2	6.94	33.6	< 0.1	2	< 0.02	> 100	D	<0.006	0.34	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	27.3	4.8	65.9	24.1	18.8	340.0	18.2	10.7	264.0
BS 18-1		30.2	6.98	34.3	0.1	1	< 0.02	> 100	D												17.3	1.6	36.5	8.8	7.7	173.4	15.1	5.9	127.4
BS 18-2		28.1	7.51	22.5	0.2	< 1	< 0.02	> 100	D	<0.006	0.23	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	17.9	0.2	44.2	10.1	4.4	219.8	2.4	11.0	152.2
BS 18-3		28.1	7.02	42.3	0.1	1	< 0.02	> 100	D												21.0	0.3	44.2	10.2	<0.1	235.1	3.7	5.7	152.2
BS 18-4		28.1	7.08	63.6	0.1	3	< 0.02	> 100	D												26.3	0.3	56.8	28.4	15.5	325.3	24.8	7.0	258.8
BB 19-1	RANGGO	29.2	6.83	27.7	0.5	< 1	< 0.02	> 100	D	<0.006	0.25	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	41.3	3.1	56.0	14.2	10.6	175.3	33.4	31.6	198.3
BD 19-2		28.1	6.77	118.8	0.2	7	0.05	> 100	D												207.3	11.6	175.5	74.8	379.1	275.7	206.6	29.0	746.5
BD 19-3		28.1	6.66	38.1	0.1	20	< 0.02	> 100	D												47.0	12.2	62.2	18.7	48.0	140.6	59.1	35.4	232.3
BD 19-4		30.2	6.56	115.3	0.1	20	< 0.02	> 100	D												56.5	14.2	90.6	33.1	114.7	203.5	62.7	28.7	362.2
BS 19-1		27.0	7.51	70.1	< 0.1	< 1	0.02	> 100	D	<0.006	0.31	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	36.3	3.8	56.3	40.1	21.3	289.6	78.1	24.2	305.9
BD 20-1	JAMBU	30.2	7.20	136.6	0.1	1	0.02	95	D												465.3	14.5	65.8	56.9	317.8	467.7	175.5	20.7	398.4
BD 20-2		30.2	7.23	112.2	0.2	< 1	< 0.02	> 100	D	<0.006	0.52	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	64.3	7.6	48.6	37.8	44.4	385.1	54.3	25.7	277.2
BD 20-3		29.2	6.93	27.9	0.1	1	< 0.02	> 100	D												30.8	36.8	46.2	16.7	23.7	206.1	15.7	28.2	184.3
BD 20-4		30.2	7.00	74.5	0.1	1	< 0.02	> 100	D												64.3	21.7	61.0	16.5	17.1	296.7	22.0	30.0	220.2
BB 20-5		30.2	6.94	68.8	0.1	< 1	< 0.02	50	D	<0.006	0.38	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	32.6	6.8	94.2	43.5	2.9	301.3	41.5	45.4	414.2
BS 21-1	HODO	28.1	7.68	138.8	0.15	1	< 0.02	> 100	D	<0.006	1.78	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	476.4	89.6	23.8	51.1	658.0	162.3	73.4	31.8	270.1
BD 22-1	KWANGKO	29.2	7.06	77.4	0.1	< 1	< 0.02	> 100	D												54.5	13.0	72.3	21.2	21.6	286.4	15.2	41.0	267.8
BB 22-2		31.3	6.69	62.5	0.1	1	< 0.02	> 100	D	<0.006	0.35	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	48.9	6.2	37.4	25.4	50.6	172.7	22.7	56.1	198.0
BB 22-3		31.3	6.74	134.2	< 0.1	40	0.02	0	ND												88.4	29.6	81.0	47.6	132.0	212.0	56.9	40.8	398.3
BD 22-4		30.2	6.98	102.8	0.1	4	0.02	> 100	D												115.8	25.8	51.7	22.0	97.4	238.3	40.7	47.4	219.5
BS 22-1		28.1	8.09	78.6	< 0.1	< 1	< 0.02	> 100	D	<0.006	0.33	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	70.5	8.3	48.0	25.1	93.5	177.9	24.5	43.5	223.1
Water Quality Standard			**6.5-8.5**			*** 10** **** 44**	*** 1** **** 3**	**0**	**ND**	**0.05**	**1.5**	**0.05**	**0.05**	**0.01**	**0.001**	**0.1**	**0.3**	**0.005**	**0.1**	**1**	**200**				**250**		**400**		**500**

Note:

: Value exceeds standard

* : Value means concentration of NO_3-N and NO_2-N

** : Value means concentration of NO_3 and NO_2

D : Detected

ND : Not Detected

- BD: NTB - Dug Well
- BS: NTB - Spring
- BB: NTB - Tube Well

5.6 RESULTS OF WATER QUALITY ANALYSIS - NTB (6)

Sample No.	Name of Village	Measurement on Site								Analysis in Laboratory																				
										Suitability for Drinking Water (mg/L)												Hydrogeological Parameters (mg/L)								
		WT (°C)	pH	EC (mS/m)	NH_4 (mg/l)	NO_3 (mg/l)	NO_2 (mg/l)	Bacteria (col/ml)	T. Coli	Cr^{6+}	F	As	Pb	Se	Hg	CN	Fe	Cd	Mn	Cu	Na	K	Ca	Mg	Cl	HCO_3	SO_4	S_iO_2	Hard-ness
BP 1-1	PDAM (Kuranji & Bajur)	28.8	7.07	11.6	2.5	2.5	0.05	0	ND	<0.006	0.14	< 0.001	< 0.01	< 0.007	< 0.001	< 0.01	< 0.04	< 0.005	< 0.02	< 0.03	8.9	4.3	5.5	3.4	0.0	84.6	< 0.94	54.8	27.9
BP 3-1	PDAM (Sembung)	28.3	6.96	11.8	0	2.5	0	0	ND	<0.006	0.14	< 0.001	< 0.01	< 0.007	< 0.001	< 0.01	< 0.04	< 0.005	< 0.02	< 0.03	8.4	4.0	5.6	3.5	0.0	74.6	2.3	55.5	28.6
BP 4-1	PDAM (Spring Sarasuta)	25.3	6.67	14.1	0	2.5	0	0	ND	<0.006	0.23	< 0.001	< 0.01	< 0.007	< 0.001	< 0.01	< 0.04	< 0.005	< 0.02	< 0.03	9.8	5.6	7.1	4.7	0.0	97.1	2.3	58.7	37.2
BP 4-2	PDAM (Res. Bug-Bug)	25.2	6.74	14.8	0	4	0	0	ND	<0.006	0.43	< 0.001	< 0.01	< 0.007	< 0.001	< 0.01	< 0.04	< 0.005	< 0.02	< 0.03	10.2	6.1	6.9	4.7	2.3	96.1	< 0.94	58.0	36.8
BP 5-1	PDAM (Peresak)	28.4	7.30	14.9	0	1	0	0	ND	<0.006	0.16	< 0.001	< 0.01	< 0.007	< 0.001	< 0.01	< 0.04	< 0.005	< 0.02	< 0.03	11.3	5.1	6.6	5.3	6.2	87.7	4.8	49.9	38.2
Water Quality Standard			**6.5-8.5**			*** 10** **** 44**	*** 1** **** 3**		**ND**	**0.05**	**1.5**	**0.05**	**0.05**	**0.01**	**0.001**	**0.1**	**0.3**	**0.005**	**0.1**	**1**	**200**				**250**		**400**		**500**

Note:

: Value exceeds standard

* : Value means concentration of NO_3-N and NO_2-N

** : Value means concentration of NO_3 and NO_2

D : Detected

ND : Not Detected

- BP: NTB - PDAM Water Source

5.7 RESULTS OF WATER QUALITY ANALYSIS - NTT (1)

Sample No.	Name of Village	Measurement on Site								Analysis in Laboratory																				
										Suitability for Drinking Water (mg/L)											Hydrogeological Parameters (mg/L)								
		WT (°C)	pH	EC (mS/m)	NH_4 (mg/l)	NO_3 (mg/l)	NO_2 (mg/l)	Bacteria (col/ml)	T. Coli	Cr^{6+}	F	As	Pb	Se	Hg	CN	Fe	Cd	Mn	Cu	Na	K	Ca	Mg	Cl	HCO_3	SO_4	SiO_2	Hard-ness
TT 4-1	MEKENDATUNG	24.9	7.68	11.7	<0.1	<1	<0.02	>100	D	<0.006	0.15	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	1.3	2.8	15.8	0.3	<0.1	56.2	<0.94	62.8	40.6
TT 4-2		27.1	7.56	21.6	0.5	<1	<0.02	>100	D												7.9	12.0	23.8	1.0	7.0	106.4	<0.94	9.8	63.4
TT 4-3		26.8	8.19	8.0	<0.1	1.5	<0.02	>100	D	<0.006	0.09	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	1.2	1.0	11.5	1.0	0.4	42.9	<0.94	3.2	32.6
TT 4-4		25.7	9.59	11.1	<0.1	<1	<0.02	>100	D												3.3	2.3	17.1	0.1	<0.1	64.0	<0.94	0.6	43.1
TT 4-5		27.6	8.55	5.1	<0.1	<1	<0.02	>100	D												3.9	1.9	20.6	0.1	<0.1	72.9	<0.94	0.7	51.8
TT 5-1	KOKOWAHOR	27.8	9.62	15.2	<0.1	<1	<0.02	>100	D	<0.006	0.05	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	11.8	12.0	11.4	0.6	6.2	73.8	2.0	5.9	31.1
TT 5-2		27.6	7.86	12.6	<0.1	2.5	<0.02	>100	D												3.1	2.5	12.8	0.7	<0.1	52.1	1.1	4.9	34.6
TT 5-3		26.5	8.43	9.5	<0.1	<1	<0.02	>100	D												2.8	2.3	14.1	0.3	0.1	50.5	4.8	2.7	36.7
TT 5-4		28.5	8.88	7.6	<0.1	<1	<0.02	>100	D												2.9	1.0	11.2	0.1	1.7	44.0	<0.94	1.5	28.4
TT 5-5		28.2	7.90	2.4	<0.1	<1	<0.02	>100	D	<0.006	0.09	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	0.6	0.3	2.5	0.1	<0.1	11.1	<0.94	0.5	6.7
TD 6-1	SINAR HADING	31.3	6.54	42.2	0.2	5	<0.02	>100	D	<0.006	0.36	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	16.1	8.2	38.1	18.4	14.2	222.5	12.0	28.9	170.8
TD 6-2		33.4	6.39	102.2	0.1	1	<0.02	>100	D												65.1	20.3	37.5	43.5	149.7	168.2	83.4	29.6	272.6
TD 6-3		30.2	6.42	47.7	0.15	4	<0.02	>100	D	<0.006	0.36	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	20.8	9.1	37.5	20.2	19.8	223.2	18.3	28.4	176.9
TD 6-4		29.2	6.40	41.9	0.15	2	<0.02	>100	D												16.7	7.4	30.7	19.6	9.2	219.8	15.4	27.2	157.2
TS 6-1		48.5	5.93	180.3	<0.1	<1	<0.02	0	ND												208.8	44.7	24.9	34.9	307.5	182.1	75.0	34.3	205.9
TD 7-1	ILE PADUNG	30.2	6.61	57.8	0.2	<1	<0.02	>100	D	<0.006	0.36	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	38.1	9.7	38.8	11.6	61.5	159.9	29.7	20.8	144.4
TD 7-2		31.2	6.53	66.7	<0.1	<1	<0.02	>100	D												54.8	11.5	31.8	23.2	91.2	192.4	23.2	25.9	174.9
TS 7-1		31.3	6.60	74.2	<0.1	1	<0.02	50	ND	<0.006	0.37	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	118.1	14.1	13.5	7.3	138.2	128.1	23.0	24.9	63.6
TS 7-2		23.2	7.20	17.3	<0.1	<1	<0.02	18	D	<0.006	0.24	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	110.5	12.2	9.6	7.7	135.6	78.7	25.6	30.3	55.7
TS 7-3		30.4	6.75	70.8	<0.1	<1	<0.02	>100	D												8.4	3.6	10.2	5.4	5.2	52.7	5.6	40.9	47.8
Water Quality Standard			**6.5-8.5**			*** 10** **** 44**	*** 1** **** 3**		**ND**	**0.05**	**1.5**	**0.05**	**0.05**	**0.01**	**0.001**	**0.1**	**0.3**	**0.005**	**0.1**	**1**	**200**				**250**		**400**		**500**

Note:

: Value exceeds standard

* : Value means concentration of NO_3-N and NO_2-N

** : Value means concentration of NO_3 and NO_2

D : Detected

ND : Not Detected

- TT: NTT - Tank Water (Rain Water)
- TD: NTT - Dug Well
- TS: NTT - Spring

5.8 RESULTS OF WATER QUALITY ANALYSIS - NTT (2)

Sample No.	Name of Village	Measurement on Site								Analysis in Laboratory																				
										Suitability for Drinking Water (mg/L)											Hydrogeological Parameters (mg/L)								
		WT (°C)	pH	EC (mS/m)	NH_4 (mg/l)	NO_3 (mg/l)	NO_2 (mg/l)	Bacteria (col/ml)	T. Coli	Cr^{6+}	F	As	Pb	Se	Hg	CN	Fe	Cd	Mn	Cu	Na	K	Ca	Mg	Cl	HCO_3	SO_4	S_2O_2	Hard-ness
TS 8-1	WATUNESO	22.0	6.99	15.0	<0.1	<1	<0.02	>100	D	<0.006	0.26	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	7.7	0.8	13.1	3.5	2.9	69.2	5.6	23.3	47.2
TS 8-2		41.8	7.78	134.7	<0.1	<1	<0.02	>100	D	<0.006	1.66	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	28.6	2.5	80.9	0.3	94.8	37.0	97.9	43.2	203.2
TP 8-3		32.9	8.13	23.8	<0.1	<1	<0.02	>100	D												14.4	0.8	15.1	7.5	4.3	91.1	16.6	29.4	68.4
TP 8-4		28.3	8.25	22.6	<0.1	<1	<0.02	>100	D												14.0	0.7	15.2	7.6	3.6	98.0	18.8	28.0	69.2
TR 8-5		25.1	8.15	18.3	<0.1	<1	<0.02	>100	D												10.9	1.3	11.2	5.7	<0.1	77.3	16.0	20.7	51.4
TP 9-1	BOROKANDA	28.4	7.01	33.8	0.1	5	<0.02	>100	D	<0.006	0.35	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	14.4	2.2	30.4	11.0	5.3	175.5	6.7	38.9	121.0
TD 9-2		28.6	7.62	158.3	<0.1	25	0.03	>100	D												68.2	133.4	76.7	39.6	173.2	478.2	45.8	42.5	354.5
TD 9-3		28.5	7.39	89.0	<0.1	8	<0.02	>100	D												70.7	6.4	48.4	31.9	26.7	418.8	22.4	38.7	252.1
TS 9-4		28.0	7.43	41.6	<0.1	5	<0.02	>100	D	<0.006	0.45	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	17.1	4.1	36.2	11.7	9.7	241.3	9.0	38.2	138.3
TS 9-5		27.9	7.13	46.4	<0.1	5	<0.02	>100	D												23.3	4.2	45.4	16.3	10.1	263.0	9.2	39.1	180.4
TD 10-1	BHERAMARI	27.0	7.11	47.7	0.5	3	<0.02	>100	D	<0.006	0.45	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	24.9	1.7	46.1	20.2	9.5	282.5	12.1	36.6	198.4
TD 10-2		27.9	7.36	76.7	<0.1	2.2	<0.02	>100													48.7	1.6	58.7	33.8	22.2	421.7	24.4	35.6	285.8
TD 10-3		27.1	7.26	47.2	<0.1	4	<0.02	>100													25.4	1.9	47.0	19.4	2.5	278.3	12.3	29.5	197.0
TS 10-4		25.0	7.21	44.9	<0.1	2	<0.02	>100	D	<0.006	0.33	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	18.4	1.2	46.7	16.0	6.3	260.1	6.7	29.9	182.6
TR 10-5		25.0	8.13	41.6	0.1	4	<0.02	>100	D												17.1	1.4	40.4	15.4	6.0	241.7	7.1	34.1	164.4
TP 11-1	NGGOREA	26.2	7.35	57.6	<0.1	2	<0.02	>100	D												37.7	3.4	43.3	27.2	11.3	335.5	12.8	27.7	219.9
TS 11-2		25.8	7.41	56.0	<0.1	1.5	<0.02	>100	D	<0.006	0.70	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	37.7	4.3	52.2	16.6	11.5	323.3	13.4	32.2	198.7
TD 11-3		27.1	7.09	68.8	<0.1	2	<0.02	64	D												57.3	5.2	50.3	25.5	18.0	382.7	26.4	27.6	230.7
TD 11-4		28.6	7.31	124.6	<0.1	8	<0.02	>100	D	<0.006	1.01	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	136.4	5.8	64.3	5.5	58.5	482.5	59.7	42.5	183.1
TD 11-5		29.3	7.55	232.0	<0.1	40	0.06	>100	D												256.4	19.0	39.1	62.0	223.4	757.2	84.0	40.8	352.7
Water Quality Standard			**6.5-8.5**			*** 10** **** 44**	*** 1** **** 3**		**ND**	**0.05**	**1.5**	**0.05**	**0.05**	**0.01**	**0.001**	**0.1**	**0.3**	**0.005**	**0.1**	**1**	**200**				**250**		**400**		**500**

Note:

: Value exceeds standard

* : Value means concentration of NO_3-N and NO_2-N

** : Value means concentration of NO_3 and NO_2

D : Detected

ND : Not Detected

- TP: NTT - Public Hydrant
- TD: NTT - Dug Well
- TS: NTT - Spring
- TR: NTT - River

5.9 RESULTS OF WATER QUALITY ANALYSIS - NTT (3)

Sample No.	Name of Village	Measurement on Site								Analysis in Laboratory																				
										Suitability for Drinking Water (mg/L)											Hydrogeological Parameters (mg/L)								
		WT (°C)	pH	EC (mS/m)	NH_4 (mg/l)	NO_3 (mg/l)	NO_2 (mg/l)	Bacteria (col/ml)	T. Coli	Cr^{6+}	F	As	Pb	Se	Hg	CN	Fe	Cd	Mn	Cu	Na	K	Ca	Mg	Cl	HCO_3	SO_4	S_2O_2	Hard-ness
TS 12-1	NDETUNDORA	24.7	6.98	34.6	<0.1	4	<0.02	>100	D												11.1	2.2	43.2	11.8	3.9	209.4	6.8	36.4	156.5
TS 12-2		24.8	6.63	34.7	<0.1	10	<0.02	>100	D	<0.006	0.18	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	10.3	2.0	34.6	10.9	5.6	180.1	2.4	50.4	131.1
TS 12-3		24.5	6.82	18.2	0.1	5	<0.02	>100	D												7.0	1.4	22.2	10.0	2.6	122.4	2.3	21.1	96.4
TS 12-4		24.3	6.83	18.8	<0.1	3	<0.02	>100	D	<0.006	0.19	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	7.2	1.6	16.6	5.5	0.5	110.1	2.2	36.2	64.1
TS 12-5		24.7	6.68	26.9	<0.1	6	<0.02	>100	D												9.3	2.2	31.1	7.0	2.9	152.2	2.2	40.6	106.7
TT 13-1	HEPANG	26.9	7.95	9.0	<0.1	<1	<0.02	>100	D												3.1	1.1	6.9	0.1	<0.1	28.9	<0.94	2.2	17.7
TS 13-2		26.3	7.24	54.6	<0.1	2	<0.02	32	D	<0.006	0.54	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	41.8	3.3	52.1	18.2	11.6	221.2	11.3	46.6	204.8
TD 13-3		32.8	7.52	252.0	<0.1	<1	<0.02	34	D	<0.006	1.82	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	413.0	10.9	79.8	12.2	447.8	168.5	89.7	32.6	249.3
TP 13-4		29.0	7.47	54.8	<0.1	2	<0.02	>100	D												39.8	5.8	43.9	19.6	10.3	200.4	<0.94	53.0	190.5
TT 13-5		29.6	8.43	7.6	0.1	1	<0.02	>100	D												2.9	2.1	6.8	0.1	<0.1	32.1	<0.94	0.9	17.3
TT 14-1	BLORO	26.2	9.41	12.9	<0.1	<1	<0.02	>100	D												8.4	2.3	12.5	1.3	5.7	61.3	<0.94	8.2	36.3
TP 14-2		26.6	7.62	24.4	<0.1	2	<0.02	>100	D												16.8	1.4	10.8	6.9	6.5	98.8	<0.94	49.7	55.5
TT 14-3		28.4	7.62	8.1	<0.1	<1	<0.02	>100	D												2.5	1.8	6.8	0.1	0.8	29.4	<0.94	4.0	17.2
TS 14-4		24.1	7.78	23.5	<0.1	2	<0.02	>100	D	<0.006	0.68	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	14.4	0.8	14.3	9.0	4.3	114.9	<0.94	51.6	72.7
TS 14-5		25.0	7.43	25.8	<0.1	1	<0.02	>100	D	<0.006	0.05	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	18.6	1.3	10.8	6.8	10.4	98.3	<0.94	57.2	54.8
TT 15-1	WATULIWUNG	28.5	8.12	8.8	0.8	2	<0.02	>100	D												4.9	2.4	11.1	0.1	2.5	46.1	77.7	3.3	28.2
TB 15-2		33.2	7.16	166.1	<0.1	5	<0.02	>100	D	<0.006	0.72	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	205.7	13.2	68.0	61.0	155.4	335.1	77.7	62.6	420.9
TD 15-3		29.2	7.30	396.0	<0.1	>45	0.02	>100	D												474.7	56.8	197.3	165.5	377.9	336.5	815.0	53.0	1174.1
TD 15-4		28.9	7.49	186.4	0.4	<1	<0.02	>100	D	<0.006	0.71	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	237.8	14.8	45.7	95.5	168.9	343.2	97.5	53.2	507.5
TT 15-5		26.9	8.06	146.2	<0.1	5	<0.02	>100	D											<0.03	226.5	12.8	41.7	42.8	175.4	286.6	121.2	34.8	280.2
Water Quality Standard			**6.5-8.5**			*** 10** **** 44**	*** 1** **** 3**		**ND**	**0.05**	**1.5**	**0.05**	**0.05**	**0.01**	**0.001**	**0.1**	**0.3**	**0.005**	**0.1**	**1**	**200**				**250**		**400**		**500**

Note:

: Value exceeds standard

* : Value means concentration of NO_3-N and NO_2-N

** : Value means concentration of NO_3 and NO_2

D : Detected

ND : Not Detected

- TP: NTT - Public Hydrant
- TT: NTT - Tank Water (Rain Water)
- TD: NTT - Dug Well
- TS: NTT - Spring
- TB: NTT - Tube Well

5.10 RESULTS OF WATER QUALITY ANALYSIS - NTT (4)

Sample No.	Name of Village	Measurement on Site								Analysis in Laboratory																				
										Suitability for Drinking Water (mg/L)											Hydrogeological Parameters (mg/L)								
		WT (°C)	pH	EC (mS/m)	NH_4 (mg/l)	NO_3 (mg/l)	NO_2 (mg/l)	Bacteria (col/ml)	T. Coli	Cr^{6+}	F	As	Pb	Se	Hg	CN	Fe	Cd	Mn	Cu	Na	K	Ca	Mg	Cl	HCO_3	SO_4	S_2O_2	Hard-ness
TT 16-1	PATIALADETE	27.5	9.13	4.0	0.15	<1	<0.02	0	D												0.9	0.6	5.7	0.1	<0.1	23.0	<0.94	1.0	14.6
TS 16-2		28.7	7.08	38.4	<0.1	<1	<0.02	48	D	<0.006	0.16	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	28.2	1.4	40.4	8.2	8.6	224.7	1.7	8.6	134.7
TS 16-3		26.7	6.56	27.5	<0.1	<1	<0.02	6	D												14.7	1.3	29.2	8.2	3.6	138.6	9.8	15.6	106.7
TS 16-4		27.3	7.13	46.8	<0.1	1	<0.02	4	D	<0.006	0.14	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	9.0	1.1	86.4	2.9	6.2	266.9	15.1	7.3	227.7
TR 16-5		29.5	8.48	26.0	0.1	0	<0.02	25	D												15.6	1.4	29.6	8.3	5.7	156.9	6.2	11.0	108.2
TD 17-1	WELIBO	28.4	6.85	61.5	0.3	8	<0.02	15	D												39.2	0.9	45.8	26.1	25.4	303.3	18.4	18.3	222.0
TS 17-2		27.3	7.08	40.4	<0.1	<1	<0.02	0	D	<0.006	0.26	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	27.4	0.3	38.2	17.6	7.4	251.6	4.5	10.1	167.6
TS 17-3		26.8	7.84	39.4	<0.1	<1	<0.02	2	D												24.1	0.2	33.3	22.1	8.2	252.6	2.2	12.8	174.1
TS 17-4		26.5	6.83	62.8	0.1	3	<0.02	>100	D												32.2	0.5	46.5	33.6	36.6	286.3	27.9	15.2	254.5
TS 17-5		27.3	6.81	56.8	0.15	1.5	<0.02	>100	D	<0.006	0.12	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	6.7	0.7	84.8	2.5	8.1	283.8	1.5	5.8	222.0
TS 18-1	WEE RAME	23.7	7.48	39.3	<0.1	2.5	<0.02	>100	D												2.0	0.8	66.8	1.0	<0.1	225.0	<0.94	3.0	171.0
TS 18-2		24.7	7.42	37.7	<0.1	2.3	<0.02	>100	D	<0.006	<0.02	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	2.1	1.1	67.9	2.9	2.6	230.8	<0.94	2.5	181.6
TS 18-3		23.7	7.38	36.4	<0.1	3	<0.02	>100	D												2.0	1.2	59.6	0.9	0.5	245.1	<0.94	2.6	152.7
TS 18-4		23.5	7.44	37.9	<0.1	3.5	<0.02	>100	D	<0.006	0.12	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	2.5	1.2	72.6	1.1	0.6	230.1	<0.94	3.6	185.7
TS 18-5		24.3	7.17	39.9	<0.1	4	<0.02	11	D	<0.006	0.03	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	2.6	1.3	88.1	1.1	<0.1	263.8	<0.94	3.3	224.4
TS 19-1	KONDAMARA	25.2	7.35	29.4	0.2	<1	<0.02	37	D	<0.006	0.16	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	1.8	0.4	54.2	0.9	0.5	186.5	<0.94	3.5	139.0
TD 19-2		25.8	7.32	52.8	<0.1	10	0.03	23	D												10.7	3.4	75.4	1.4	18.6	249.9	7.9	1.9	194.0
TS 19-3		28.8	7.18	40.5	0.1	2	<0.02	2	D	<0.006	0.12	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	2.7	0.5	76.8	2.2	1.0	231.5	2.0	6.8	200.7
TD 19-4		25.0	6.93	46.8	<0.1	17	<0.02	17	D												2.8	0.3	69.3	0.8	3.4	260.9	<0.94	5.3	176.4
TD 19-5		25.9	7.35	42.3	<0.1	12	<0.02	12	D												1.7	0.1	59.7	1.0	3.1	250.4	<0.94	4.6	153.0
Water Quality Standard			**6.5-8.5**			*** 10** **** 44**	*** 1** **** 3**		**ND**	**0.05**	**1.5**	**0.05**	**0.05**	**0.01**	**0.001**	**0.1**	**0.3**	**0.005**	**0.1**	**1**	**200**				**250**		**400**		**500**

Note:

: Value exceeds standard

* : Value means concentration of NO_3-N and NO_2-N

** : Value means concentration of NO_3 and NO_2

D : Detected

ND : Not Detected

- TT: NTT - Tank Water (Rain Water)
- TD: NTT - Dug Well
- TS: NTT - Spring
- TR: NTT - River

5.11 RESULTS OF WATER QUALITY ANALYSIS - NTT (5)

Sample No.	Name of Village	Measurement on Site								Analysis in Laboratory																				
										Suitability for Drinking Water (mg/L)											Hydrogeological Parameters (mg/L)								
		WT (°C)	pH	EC (mS/m)	NH_4 (mg/l)	NO_3 (mg/l)	NO_2 (mg/l)	Bacteria (col/ml)	T. Coli	Cr^{6+}	F	As	Pb	Se	Hg	CN	Fe	Cd	Mn	Cu	Na	K	Ca	Mg	Cl	HCO_3	SO_4	S_2O_2	Hard-ness
TD 20-1	PULU PANJANG	26.9	7.01	59.0	<0.1	1	<0.02	23	D	<0.006	0.38	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	4.6	0.8	77.0	6.1	0.5	279.0	3.0	15.8	217.5
TD 20-2		25.1	7.44	48.7	<0.1	4	<0.02	>100	D												2.9	0.9	69.0	8.0	5.0	246.8	4.5	13.1	205.1
TS 20-3		25.6	7.25	47.3	<0.1	<1	<0.02	7	D	<0.006	0.60	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	5.0	5.2	82.1	6.5	3.0	286.5	5.7	12.4	231.7
TR 20-4		29.6	8.05	39.9	<0.1	<1	<0.02	>100	D												3.4	0.8	37.6	0.7	<0.1	196.5	1.7	11.0	96.6
TR 20-5		26.5	8.00	41.0	<0.1	<1	<0.02	>100	D												2.3	0.5	49.8	1.2	2.8	168.9	6.3	8.6	129.4
TD 21-1	OEBAU	28.6	6.61	81.1	<0.1	<1	<0.02	>100	D	<0.006	0.17	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	30.7	2.2	109.0	4.8	55.1	339.7	7.9	10.4	291.7
TD 21-2		28.7	6.67	84.0	<0.1	<1	<0.02	>100	D												30.3	2.3	123.9	3.6	56.4	365.8	8.4	8.3	324.4
TD 21-3		27.5	6.65	87.5	<0.1	1.5	<0.02	>100	D												26.6	4.4	110.6	4.8	35.0	362.1	5.1	12.3	295.8
TS 21-4		28.4	6.65	34.7	<0.1	<1	<0.02	>100	D	<0.006	0.06	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	14.6	2.8	100.0	2.8	20.1	345.8	5.0	14.0	261.4
TS 21-5		27.3	6.73	68.3	0.1	<1	<0.02	>100	D												14.1	2.0	58.1	31.7	19.4	328.1	3.3	15.5	275.9
TS 22-1	SONIMANU	29.3	6.63	88.3	0.1	<1	<0.02	>100	D	<0.006	0.19	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	36.2	2.7	119.5	10.8	58.6	403.4	9.9	11.1	342.8
TS 22-2		27.2	6.90	79.0	<0.1	1	<0.02	>100	D	<0.006	0.30	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	46.8	4.0	106.1	6.6	68.3	341.9	19.5	15.5	292.0
TD 22-3		28.0	7.04	107.3	<0.1	20	<0.02	>100	D												61.4	5.1	94.4	34.3	123.8	371.5	23.7	20.2	376.6
TS 22-4		29.5	6.88	83.3	<0.1	3	<0.02	>100	D	<0.006	0.15	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	42.9	6.1	95.7	10.0	62.7	327.8	17.8	11.8	280.1
TD 22-5		27.4	7.08	78.9	0.2	0	0.1	>100	D												46.2	4.7	78.8	9.2	60.3	287.4	20.3	12.5	234.3
TS 23-1	NASAK DALE	28.5	6.92	101.0	0.1	<1	<0.02	>100	D	<0.006	1.23	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	71.2	9.4	77.5	19.0	106.6	335.5	20.1	24.5	271.8
TS 23-2		27.3	6.88	57.2	<0.1	1	<0.02	13	D	<0.006	<0.02	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	18.8	3.8	75.8	13.1	23.5	289.0	8.6	13.4	243.2
TS 23-3		27.5	6.88	58.2	<0.1	3	<0.02	>100	D												19.3	1.8	81.3	9.0	23.4	282.1	6.4	12.3	240.0
TD 23-4		28.5	7.72	57.4	0.1	1	<0.02	>100	D												44.1	15.9	56.2	4.8	74.1	182.7	12.8	17.3	160.0
TD 23-5		30.2	6.95	175.8	<0.1	<1	<0.02	>100	D												129.0	9.0	78.1	82.0	268.8	71.6	58.5	28.1	532.8
Water Quality Standard			**6.5-8.5**			*** 10** **** 44**	*** 1** **** 3**	**0**	**ND**	**0.05**	**1.5**	**0.05**	**0.05**	**0.01**	**0.001**	**0.1**	**0.3**	**0.005**	**0.1**	**1**	**200**				**250**		**400**		**500**

Note:

: Value exceeds standard

* : Value means concentration of NO_3-N and NO_2-N

** : Value means concentration of NO_3 and NO_2

D : Detected

ND : Not Detected

- TD: NTT - Dug Well
- TS: NTT - Spring
- TR: NTT - River

5.12 RESULTS OF WATER QUALITY ANALYSIS - NTT (6)

Sample No.	Name of Village	Measurement on Site								Analysis in Laboratory																				
										Suitability for Drinking Water (mg/L)											Hydrogeological Parameters (mg/L)								
		WT (°C)	pH	EC (mS/m)	NH_4 (mg/l)	NO_3 (mg/l)	NO_2 (mg/l)	Bacteria (col/ml)	T. Coli	Cr^{6+}	F	As	Pb	Se	Hg	CN	Fe	Cd	Mn	Cu	Na	K	Ca	Mg	Cl	HCO_3	SO_4	S_iO_2	Hard-ness
TD 24-1	TARUS	28.2	7.01	62.0	<0.1	6	<0.02	>100	D	<0.006	0.19	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	10.3	2.1	74.2	5.6	9.5	269.0	7.7	12.1	208.2
TD 24-2		28.2	7.16	104.8	<0.1	<1	<0.02	>100	D												128.6	13.9	28.4	53.0	43.5	619.3	<0.94	11.5	289.2
TD 24-3		28.7	7.15	53.4	<0.1	10	<0.02	>100	D												8.2	3.4	76.0	2.0	98.7	285.0	3.3	5.6	198.1
TD 24-4		28.7	7.21	56.7	<0.1	10	<0.02	>100	D												7.8	0.9	71.5	8.2	10.2	265.6	3.0	9.0	212.2
TS 24-5		27.9	6.86	53.1	<0.1	5	<0.02	>100	D	<0.006	0.09	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	20.5	1.3	79.9	2.8	7.2	335.4	4.3	9.0	210.9
TD 25-1	BOLOK	28.8	6.78	91.8	0.1	15	<0.02	>100	D	<0.006	0.10	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	50.3	3.7	99.9	16.5	97.3	341.9	16.5	4.7	317.5
TD 25-2		28.9	6.87	67.2	<0.1	30	<0.02	>100	D												14.5	2.6	107.8	6.7	24.2	363.1	3.0	5.4	296.9
TD 25-3		28.7	7.12	61.2	<0.1	4	<0.02	>100	D												28.1	1.1	68.2	6.3	48.8	228.8	2.2	3.8	196.4
TD 25-4		28.5	7.31	130.0	<0.1	6	<0.02	>100	D												136.9	5.9	56.2	26.5	297.5	197.4	34.0	1.3	249.2
TD 25-5		28.6	6.86	295.0	<0.1	2.5	<0.02	>100	D	<0.006	0.25	<0.001	<0.01	<0.007	<0.001	<0.01	<0.04	<0.005	<0.02	<0.03	386.2	16.6	96.3	54.5	748.7	337.0	68.3	2.9	464.8
Water Quality Standard			**6.5-8.5**			*** 10** **** 44**	*** 1** **** 3**	**0**	**ND**	**0.05**	**1.5**	**0.05**	**0.05**	**0.01**	**0.001**	**0.1**	**0.3**	**0.005**	**0.1**	**1**	**200**				**250**		**400**		**500**

Note:

: Value exceeds standard

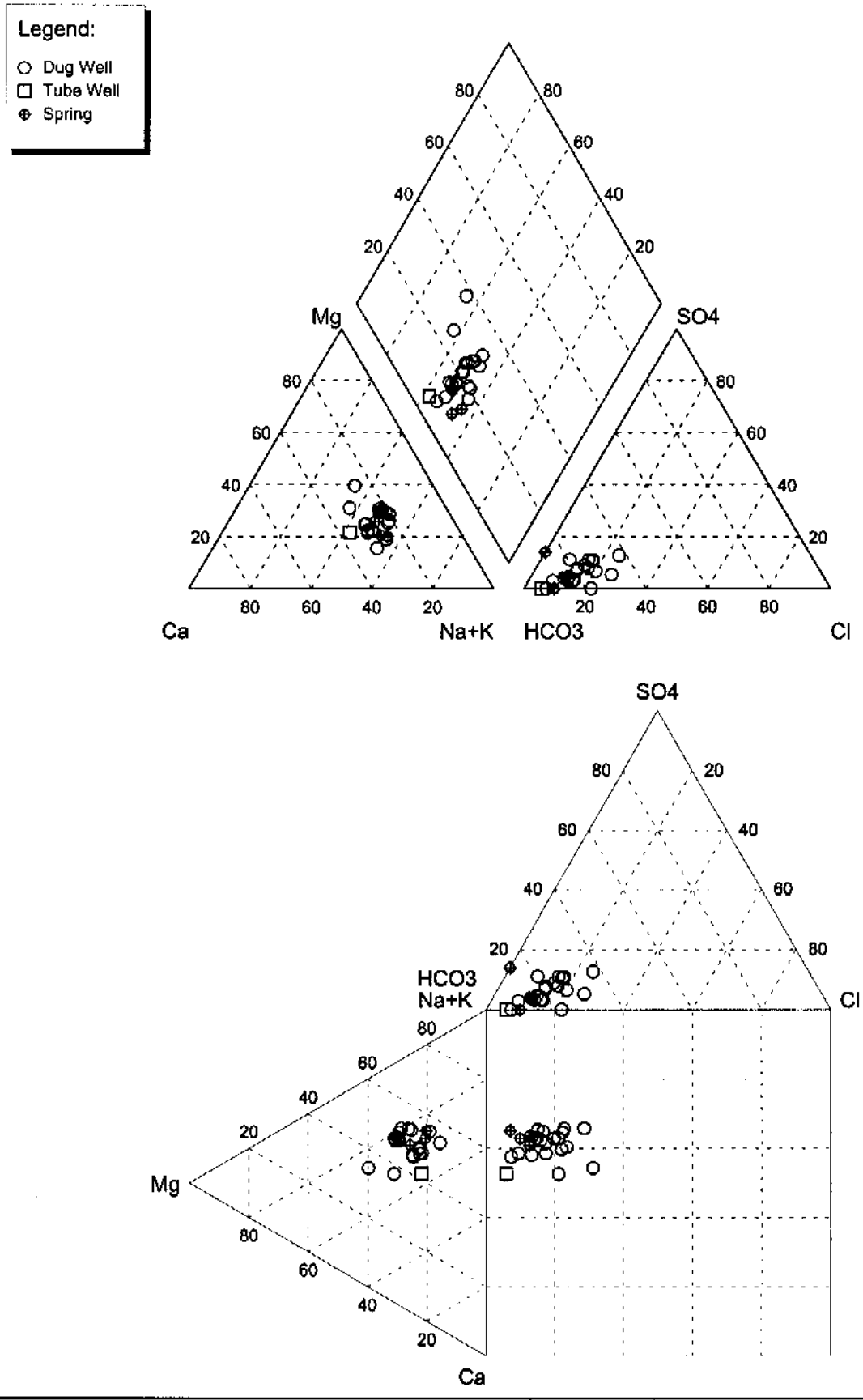
* : Value means concentration of NO_3-N and NO_2-N

** : Value means concentration of NO_3 and NO_2

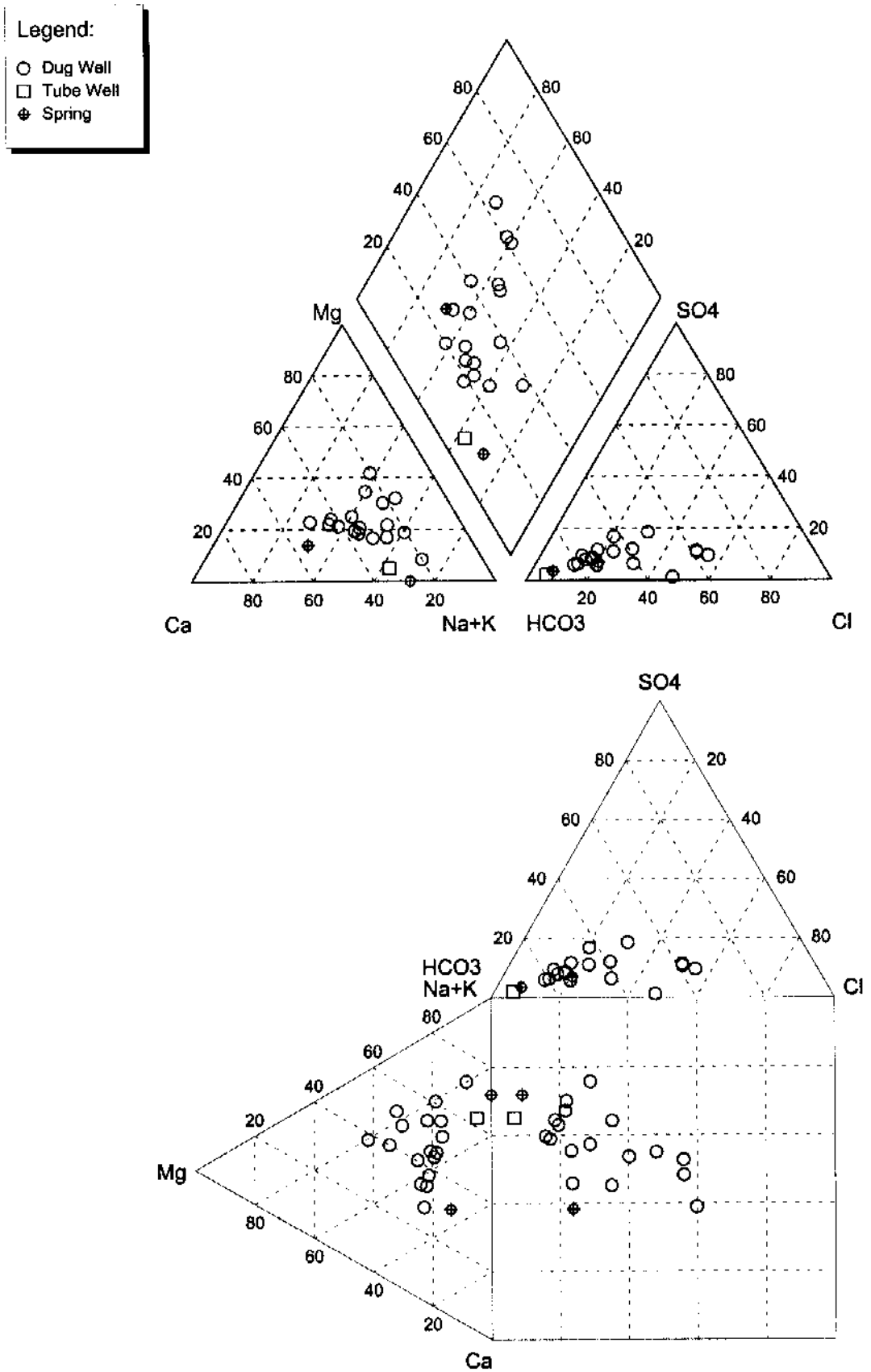
D : Detected

ND : Not Detected

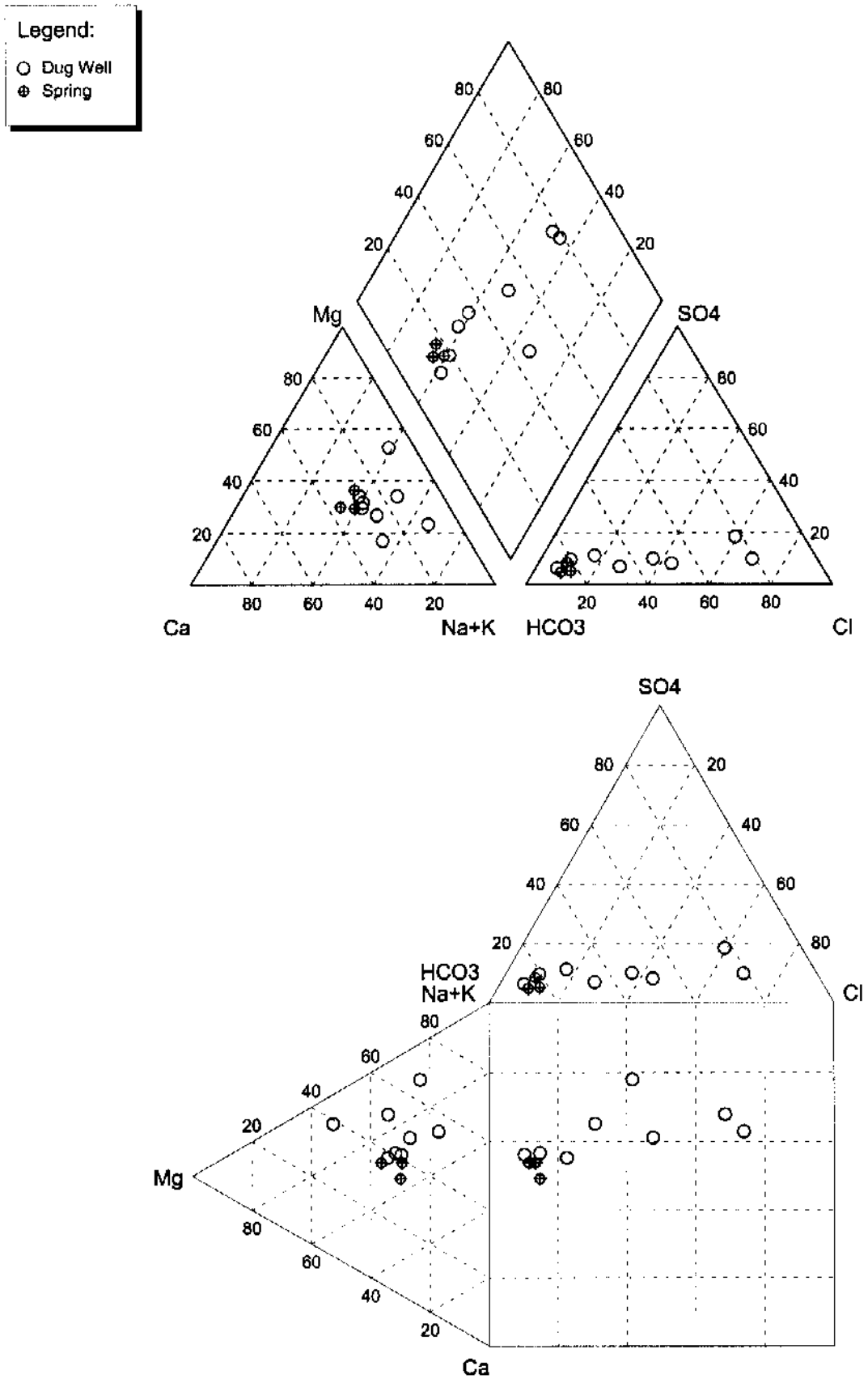
- TD: NTT - Dug Well
- TS: NTT - Spring



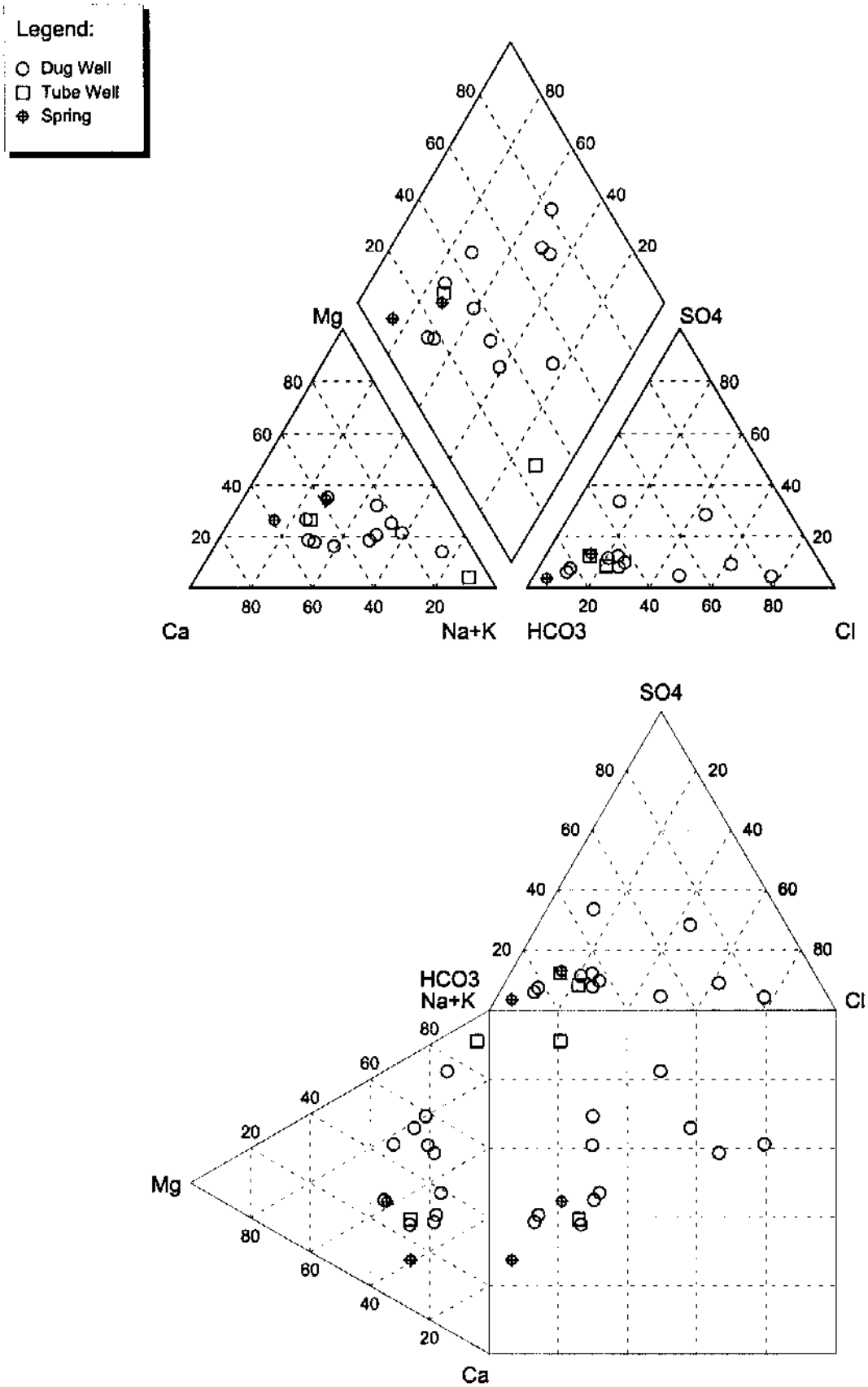
THE STUDY ON RURAL WATER SUPPLY PROJECT IN NUSA TENGGARA BARAT AND NUSATENGGARA TIMUR	Appendix 5. 13 TRI-LINEAR DIAGRAM AND DUROV DIAGRAM (KABUPATEN LOMBOK BARAT)
JAPAN INTERNATIONAL COOPERATION AGENCY	



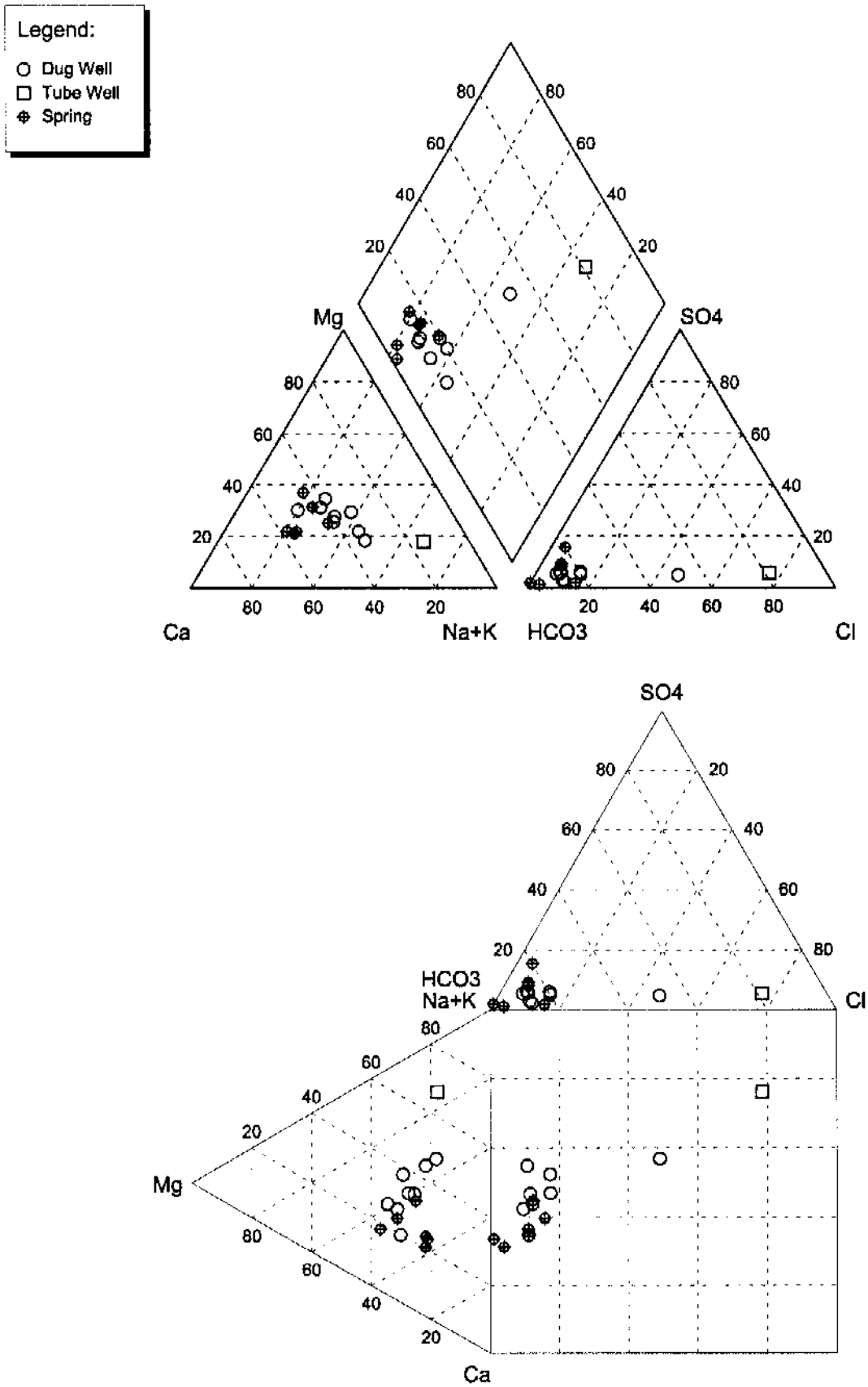
THE STUDY ON RURAL WATER SUPPLY PROJECT IN NUSA TENGGARA BARAT AND NUSATENGGARA TIMUR	Appendix 5. 14 TRI-LINEAR DIAGRAM AND DUROV DIAGRAM (KABUPATEN LOMBOK TENGAH)
JAPAN INTERNATIONAL COOPERATION AGENCY	



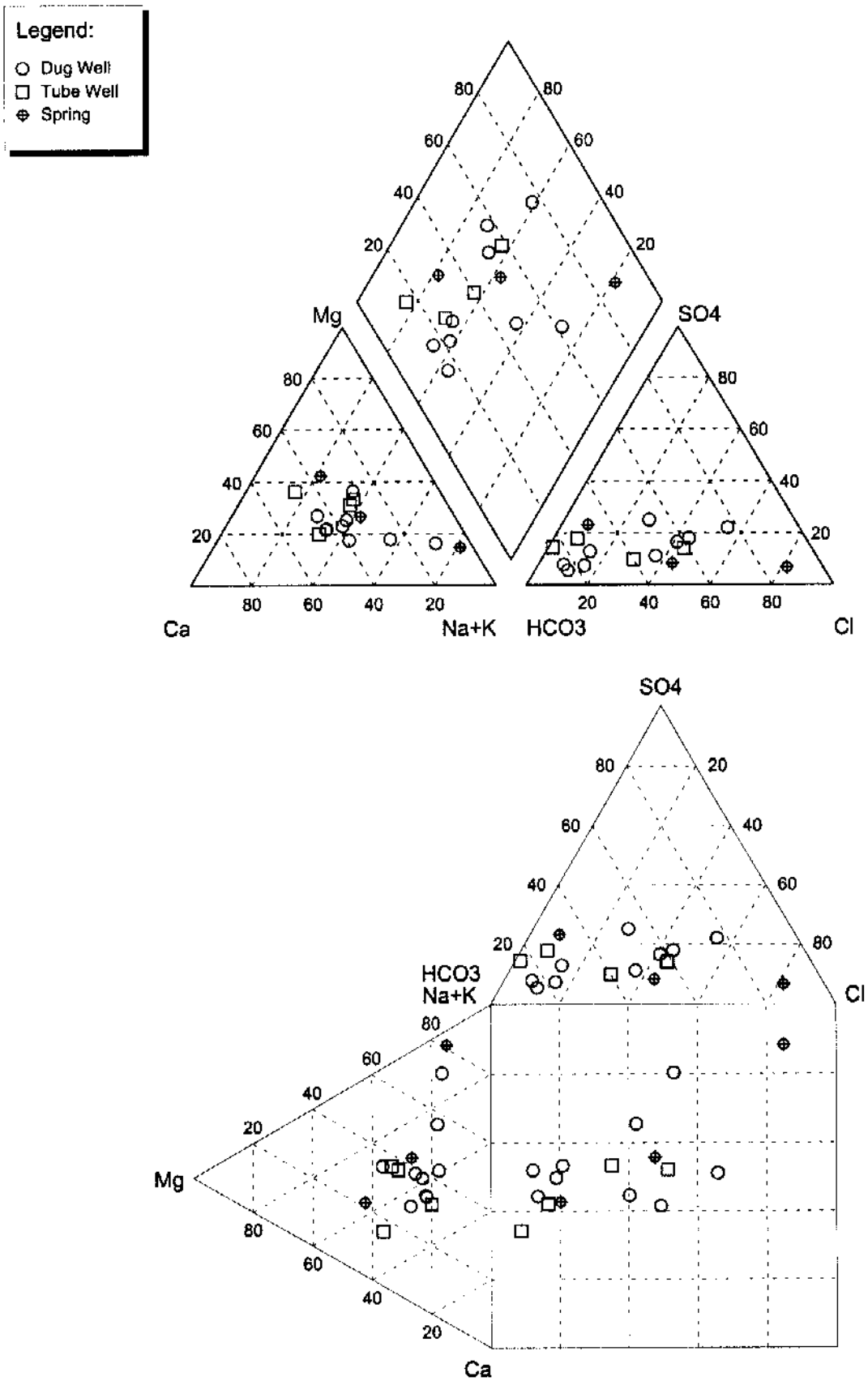
THE STUDY ON RURAL WATER SUPPLY PROJECT IN NUSA TENGGARA BARAT AND NUSATENGGARA TIMUR	Appendix 5. 15 TRI-LINEAR DIAGRAM AND DUROV DIAGRAM (KABUPATEN LOMBOK TIMUR)
JAPAN INTERNATIONAL COOPERATION AGENCY	



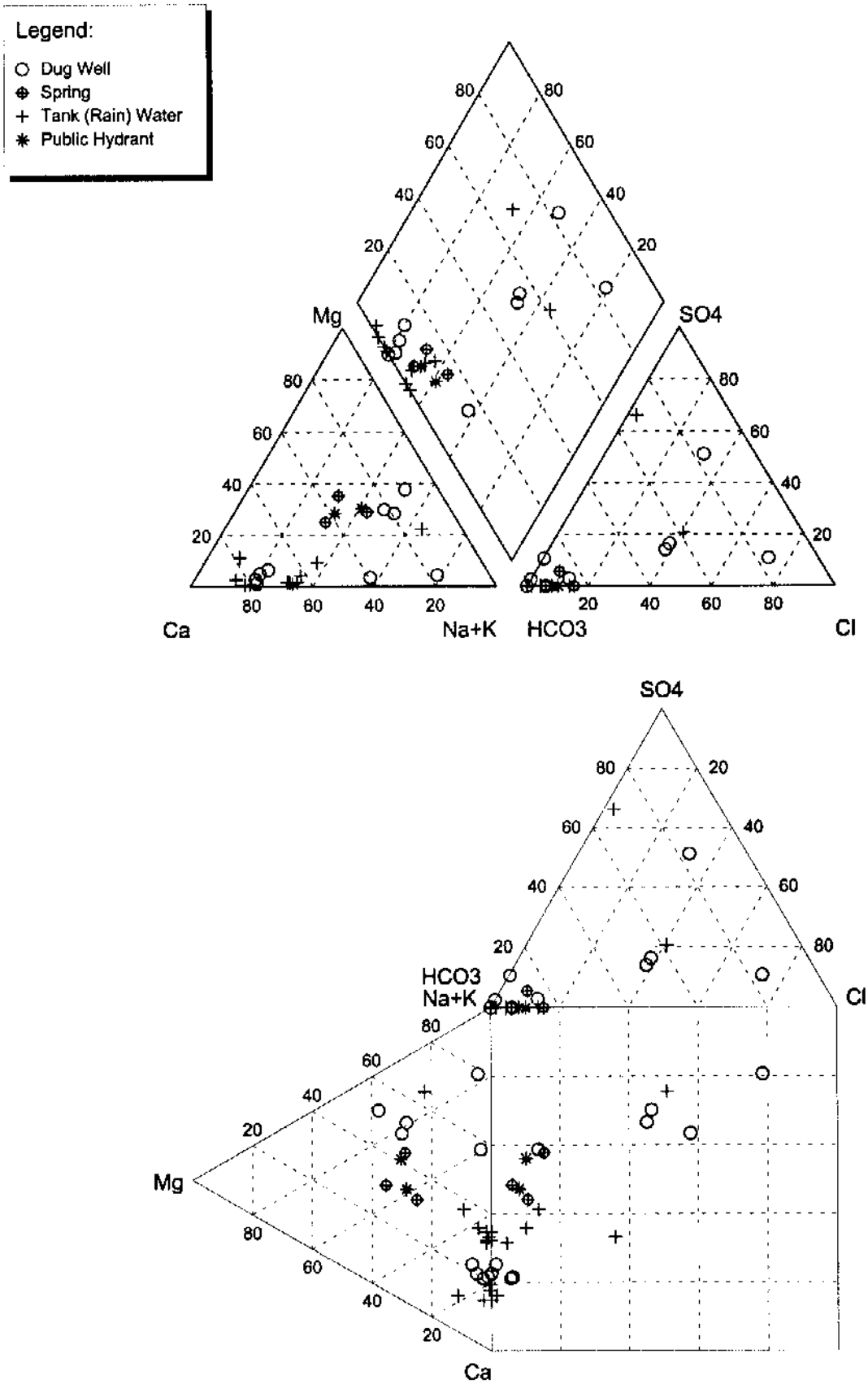
THE STUDY ON RURAL WATER SUPPLY PROJECT IN NUSA TENGGARA BARAT AND NUSATENGGARA TIMUR	Appendix 5. 16 TRI-LINEAR DIAGRAM AND DUROV DIAGRAM (KABUPATEN SUMBAWA)
JAPAN INTERNATIONAL COOPERATION AGENCY	



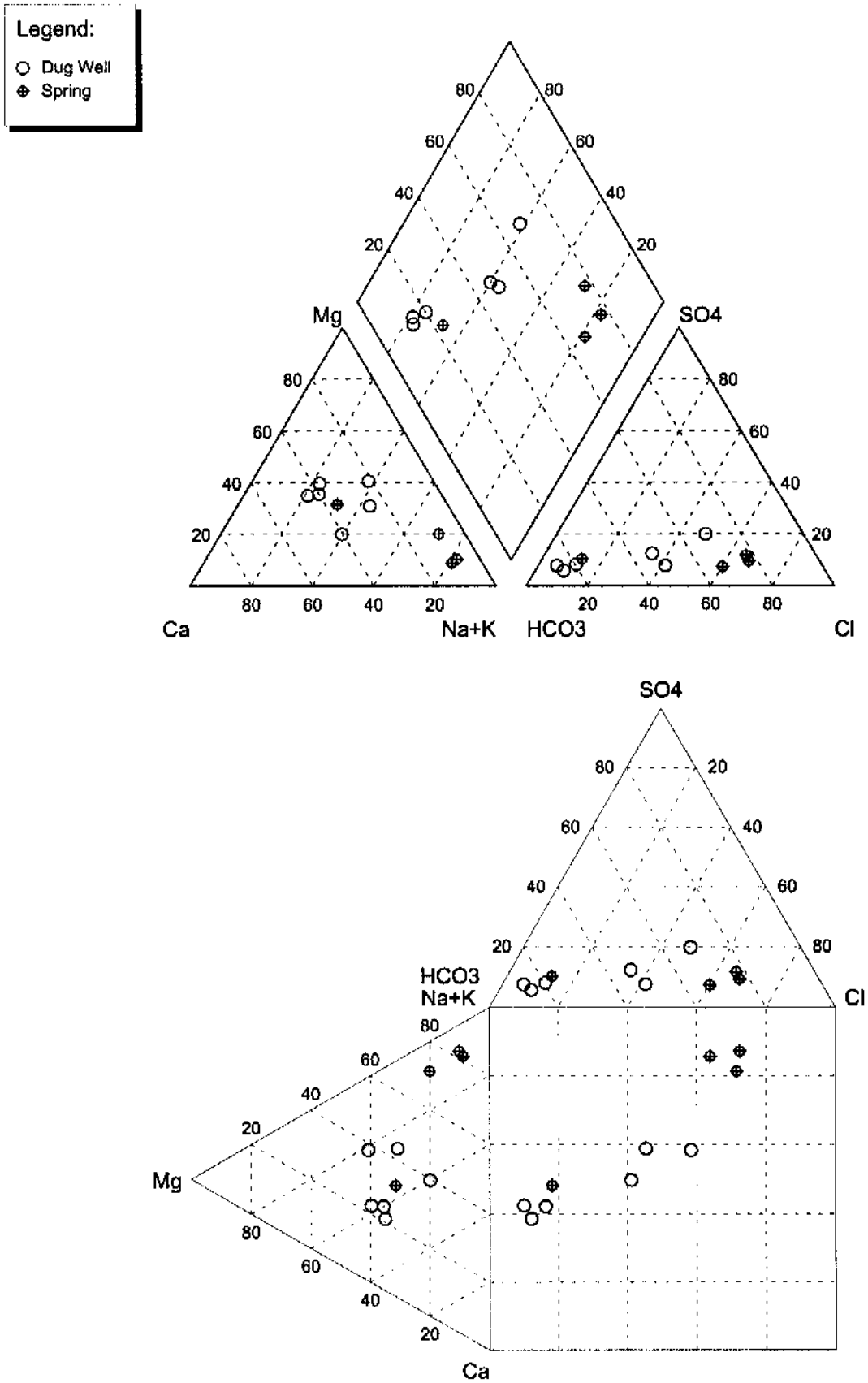
THE STUDY ON RURAL WATER SUPPLY PROJECT IN NUSA TENGGARA BARAT AND NUSATENGGARA TIMUR	Appendix 5. 17 TRI-LINEAR DIAGRAM AND DUROV DIAGRAM (KABUPATEN BIMA)
JAPAN INTERNATIONAL COOPERATION AGENCY	



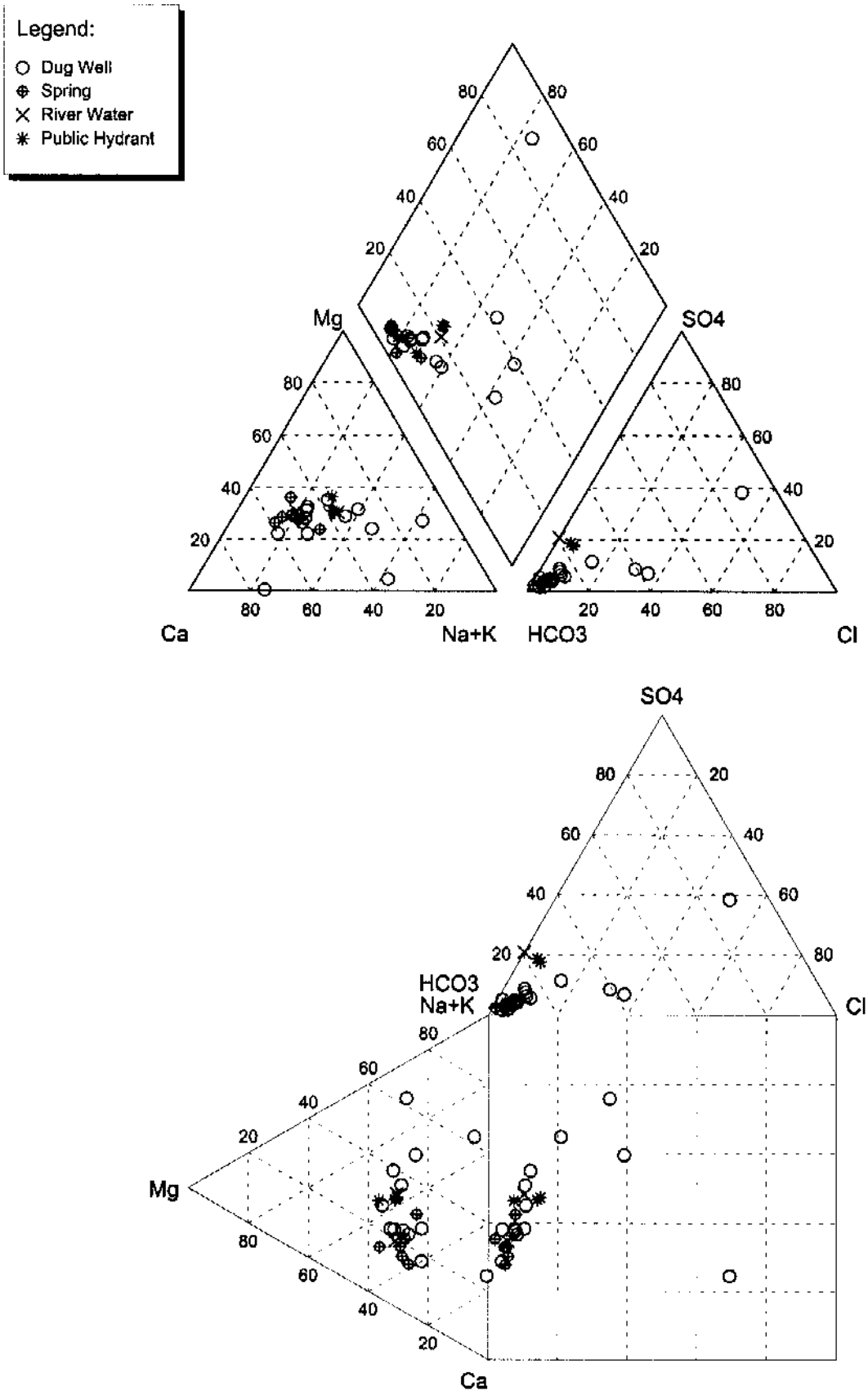
THE STUDY ON RURAL WATER SUPPLY PROJECT IN NUSA TENGGARA BARAT AND NUSATENGGARA TIMUR	Appendix 5. 18 TRI-LINEAR DIAGRAM AND DUROV DIAGRAM (KABUPATEN DOMPU)
JAPAN INTERNATIONAL COOPERATION AGENCY	



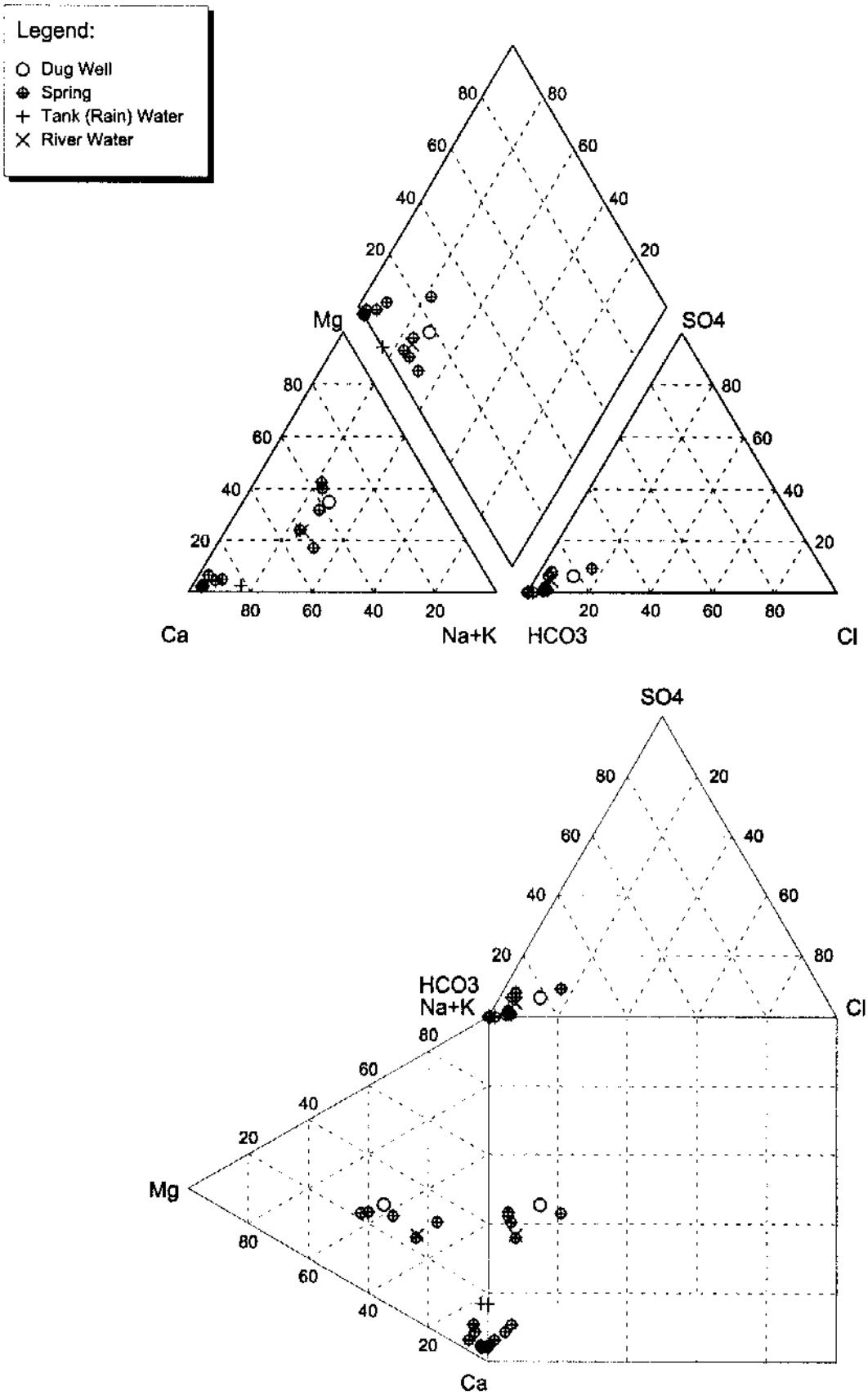
THE STUDY ON RURAL WATER SUPPLY PROJECT IN NUSA TENGGARA BARAT AND NUSATENGGARA TIMUR	Appendix 5. 19 TRI-LINEAR DIAGRAM AND DUROV DIAGRAM (KABUPATEN SIKKA)
JAPAN INTERNATIONAL COOPERATION AGENCY	



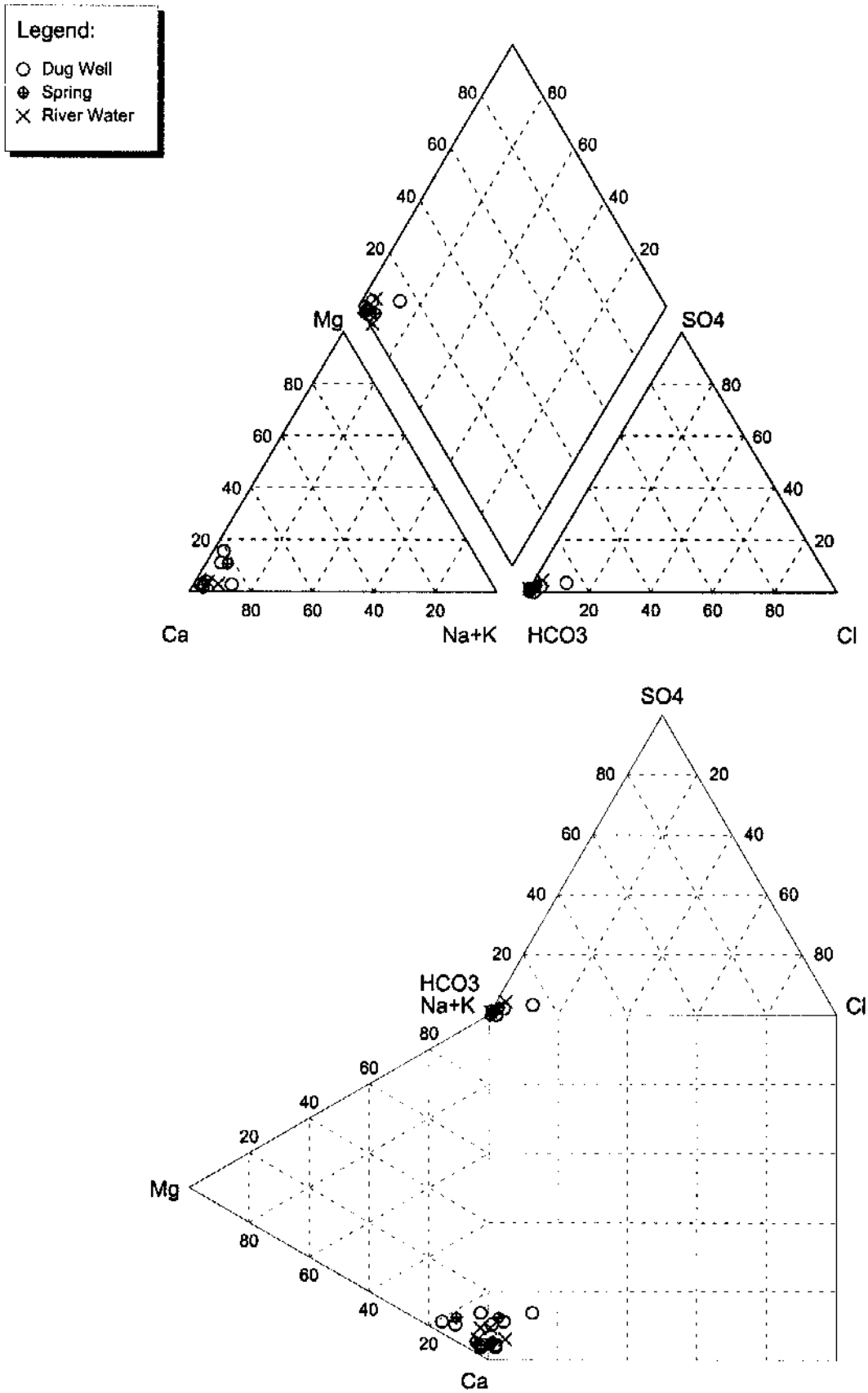
THE STUDY ON RURAL WATER SUPPLY PROJECT IN NUSA TENGGARA BARAT AND NUSATENGGARA TIMUR	Appendix 5. 20 TRI-LINEAR DIAGRAM AND DUROV DIAGRAM (KABUPATEN FLORES TIMUR)
JAPAN INTERNATIONAL COOPERATION AGENCY	



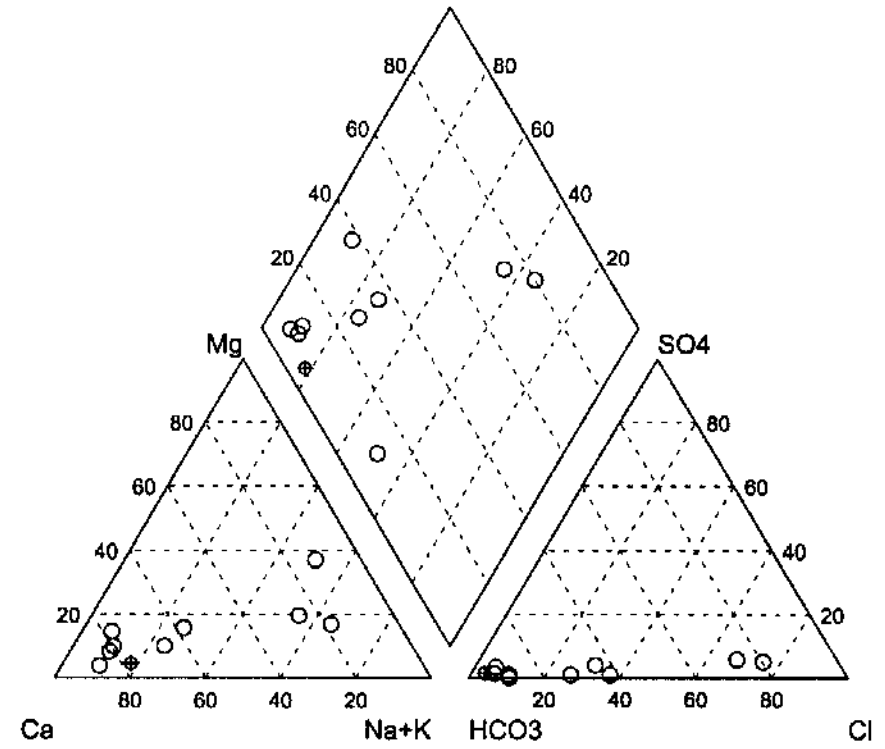
THE STUDY ON RURAL WATER SUPPLY PROJECT IN NUSA TENGGARA BARAT AND NUSATENGGARA TIMUR	Appendix 5. 21 TRI-LINEAR DIAGRAM AND DUROV DIAGRAM (KABUPATEN ENDE)
JAPAN INTERNATIONAL COOPERATION AGENCY	

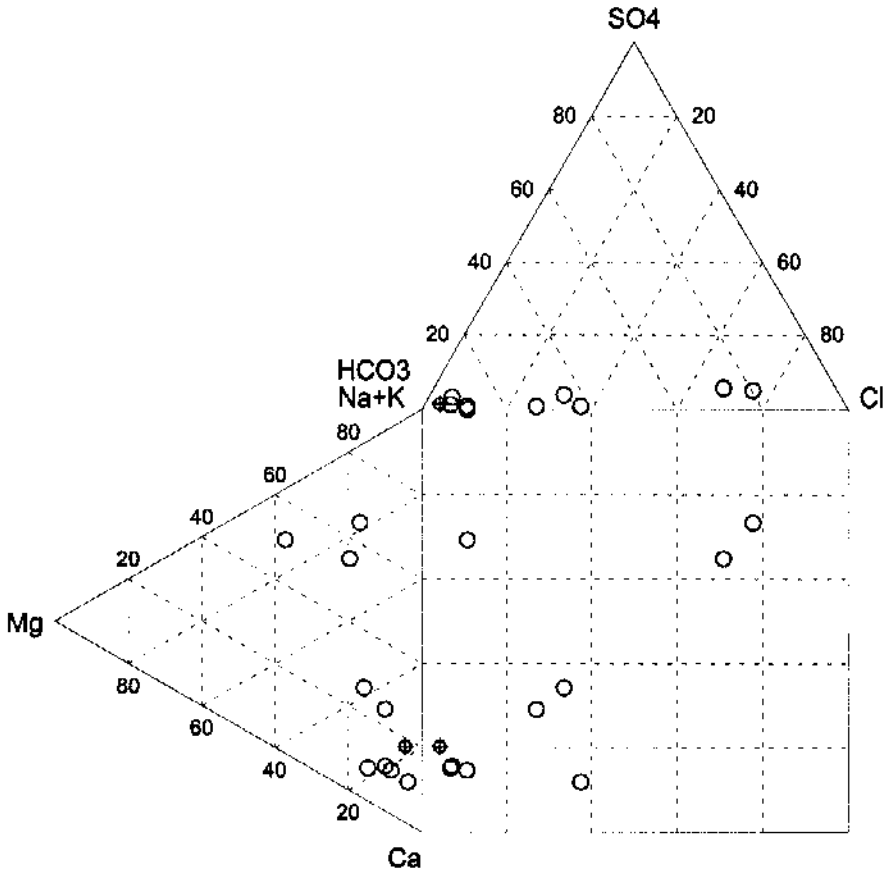


THE STUDY ON RURAL WATER SUPPLY PROJECT IN NUSA TENGGARA BARAT AND NUSATENGGARA TIMUR	Appendix 5. 22 TRI-LINEAR DIAGRAM AND DUROV DIAGRAM (KABUPATEN SUMBA BARAT)
JAPAN INTERNATIONAL COOPERATION AGENCY	

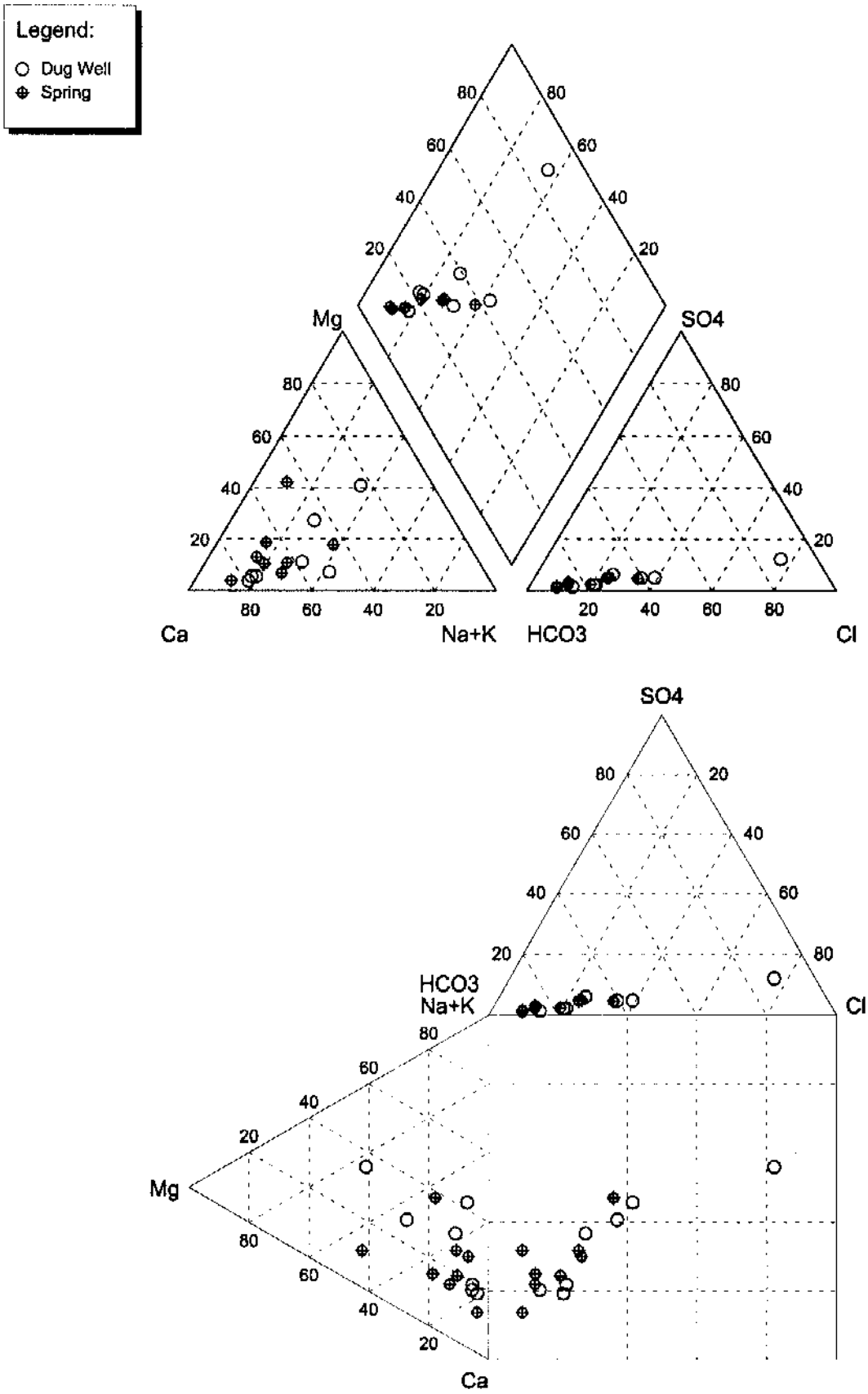


THE STUDY ON RURAL WATER SUPPLY PROJECT IN NUSA TENGGARA BARAT AND NUSATENGGARA TIMUR	Appendix 5. 23 TRI-LINEAR DIAGRAM AND DUROV DIAGRAM (KABUPATEN SUMBA TIMUR)
JAPAN INTERNATIONAL COOPERATION AGENCY	



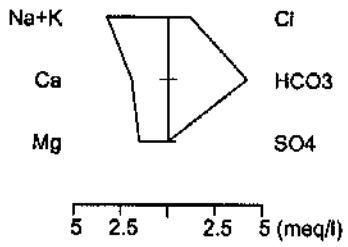


THE STUDY ON RURAL WATER SUPPLY PROJECT IN NUSA TENGGARA BARAT AND NUSATENGGARA TIMUR	Appendix 5. 24 TRI-LINEAR DIAGRAM AND DUROV DIAGRAM (KECAMATAN KUPANG)
JAPAN INTERNATIONAL COOPERATION AGENCY	

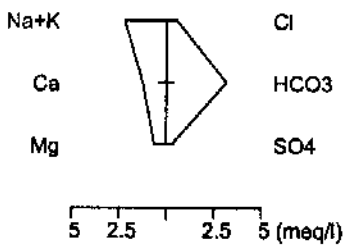


THE STUDY ON RURAL WATER SUPPLY PROJECT IN NUSA TENGGARA BARAT AND NUSATENGGARA TIMUR	Appendix 5. 25 TRI-LINEAR DIAGRAM AND DUROV DIAGRAM (KABUPATEN ROTE)
JAPAN INTERNATIONAL COOPERATION AGENCY	

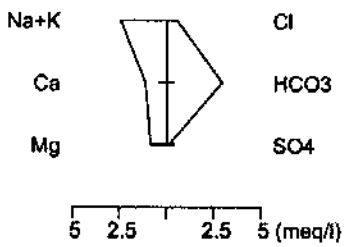
BD 1-1



BD 2-1



BD 1-2



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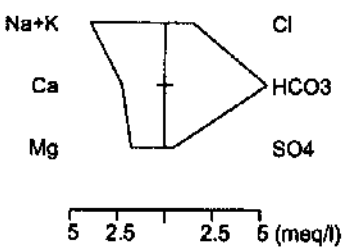
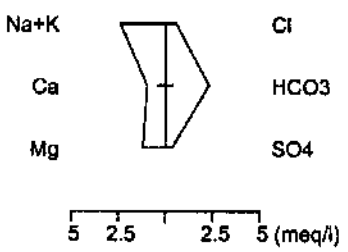


BD 1-3



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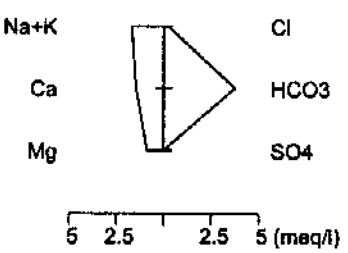

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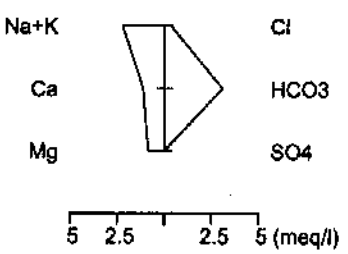

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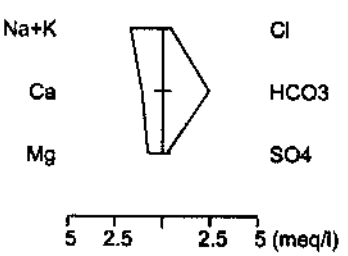

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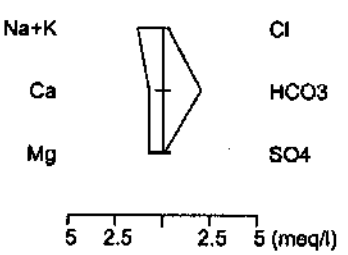

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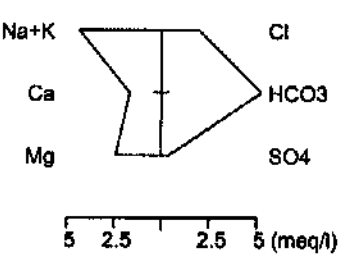

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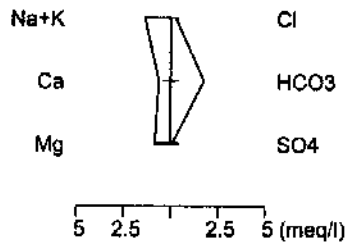
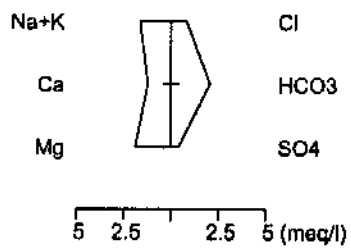


BD 4-1



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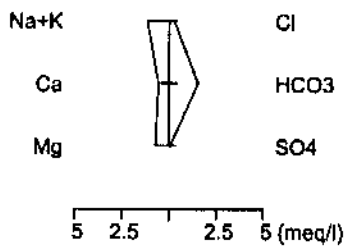

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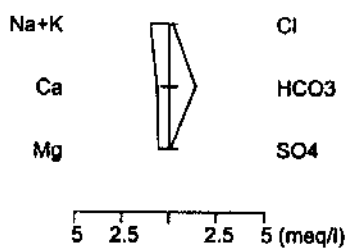

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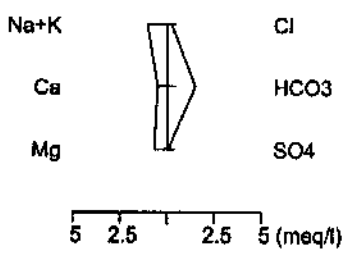

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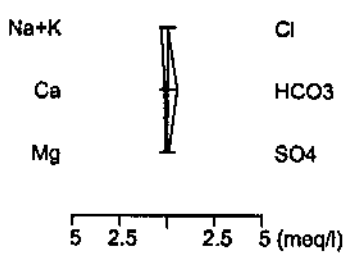

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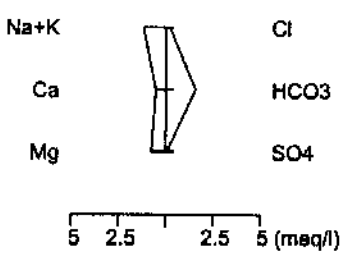

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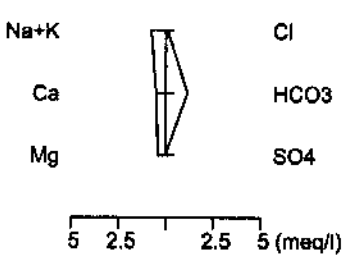

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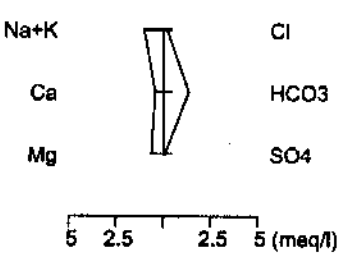

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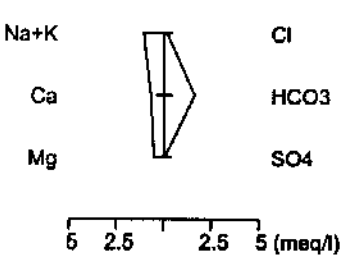
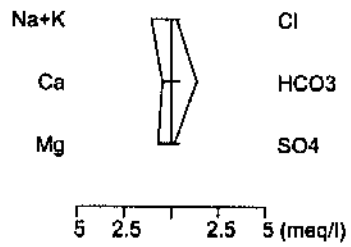
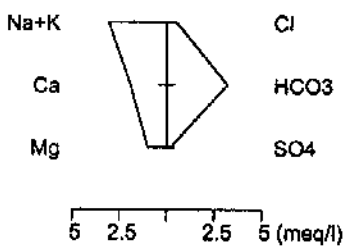


BD 5-1



BD 6-1



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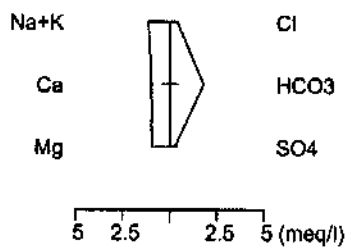

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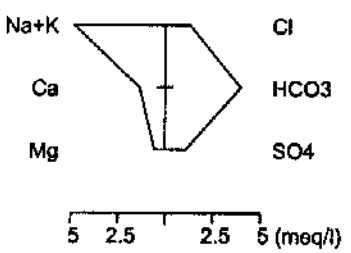

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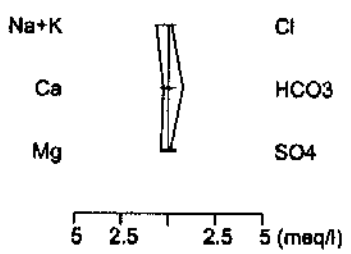

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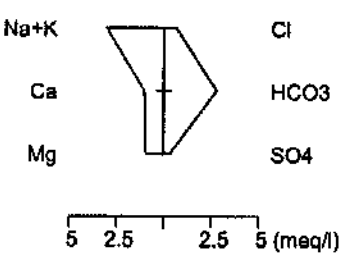

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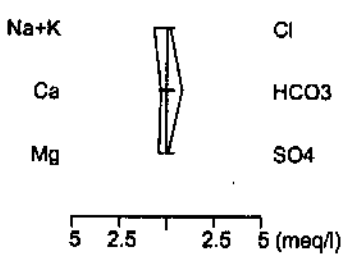

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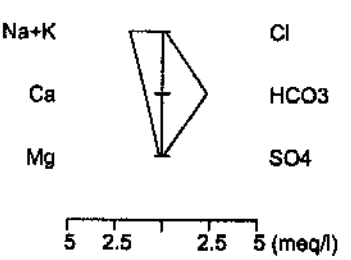

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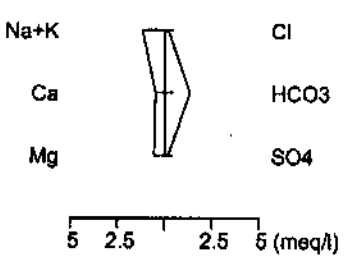

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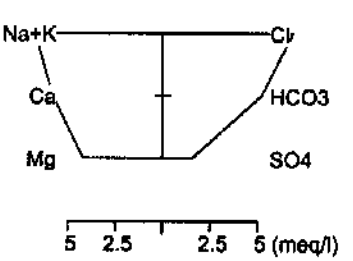
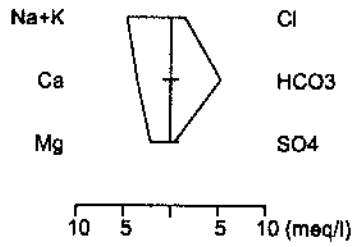
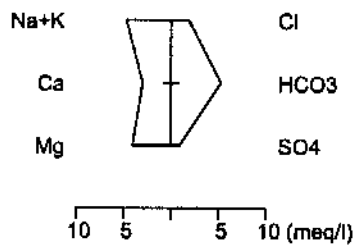


BD 7-1



BD 8-1



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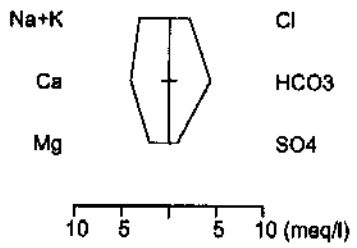

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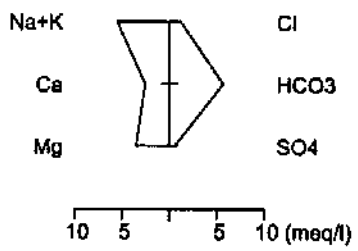

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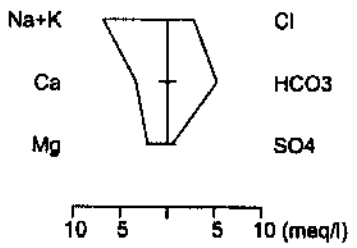

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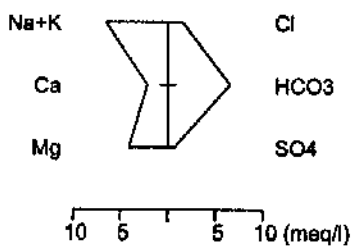

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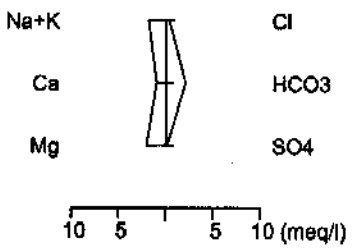

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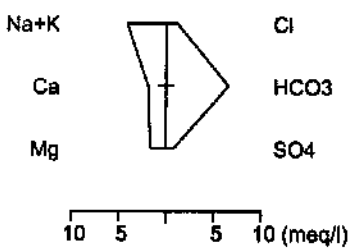
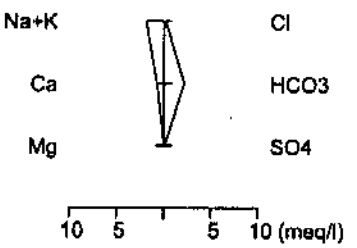


BS 7-1



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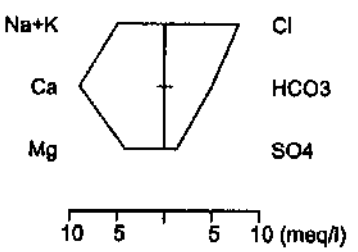
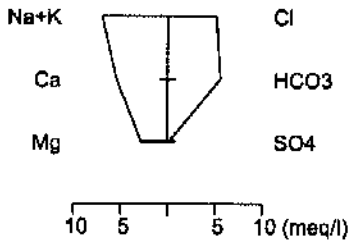
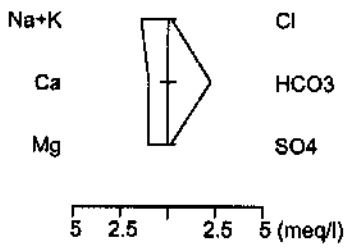


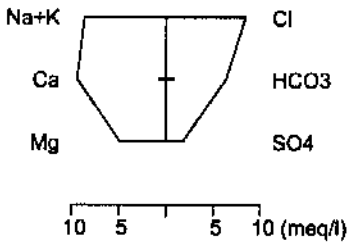
BD 9-1



BD 10-1



BD 9-2



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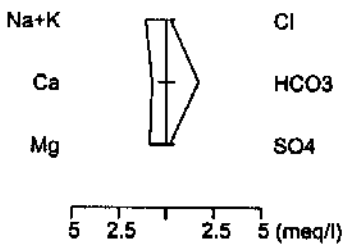

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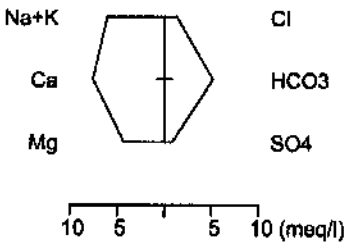

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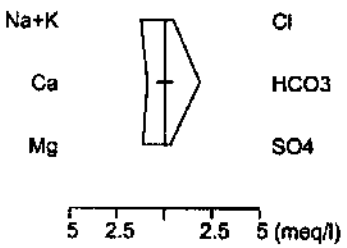

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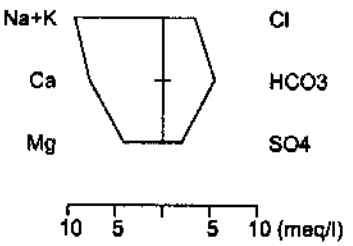
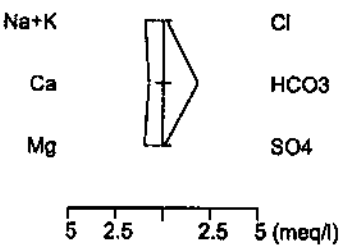
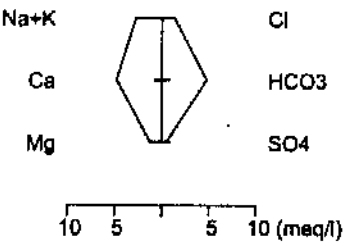


BS 10-1



BS 9-1



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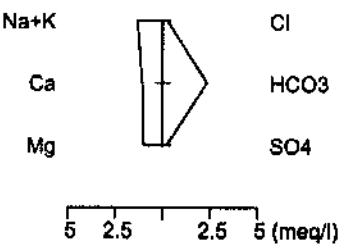
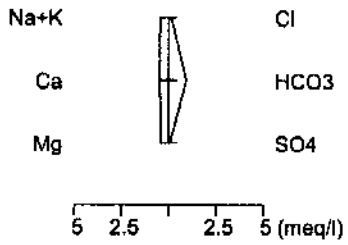
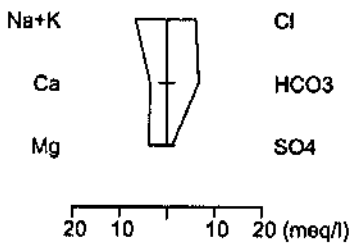


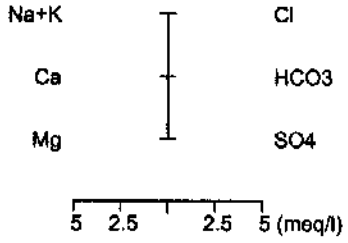
BS 11-1

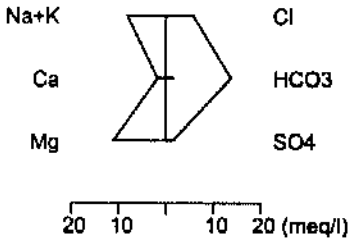


BD 12-1

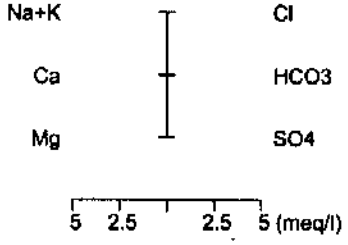


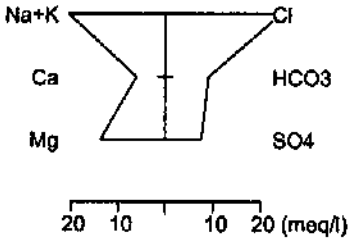
BD 12-2



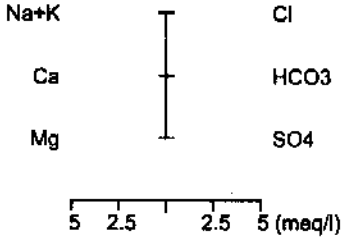


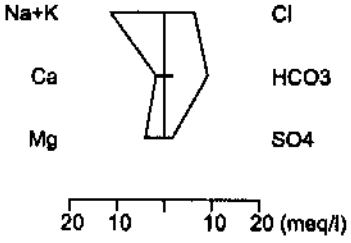
BD 12-3



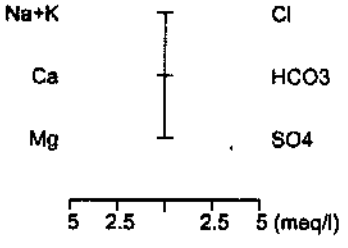


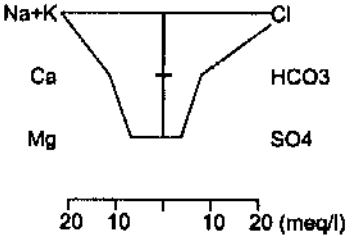
BD 12-4



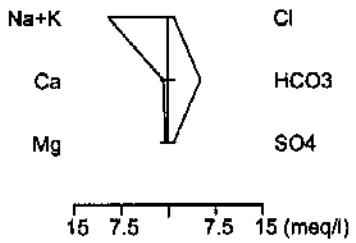


BD 12-5

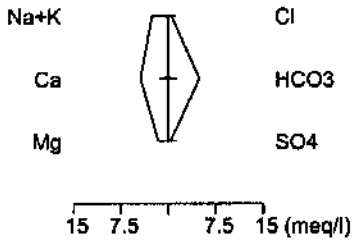




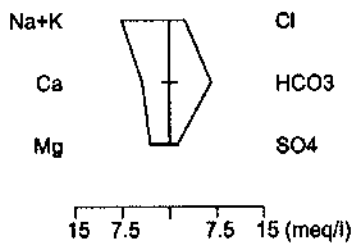
BB 13-1



BD 14-1



BD 13-2



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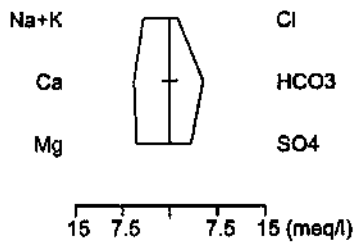
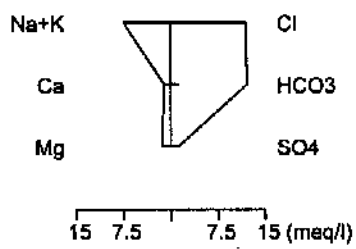


BD 13-3



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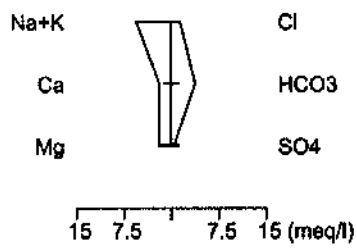

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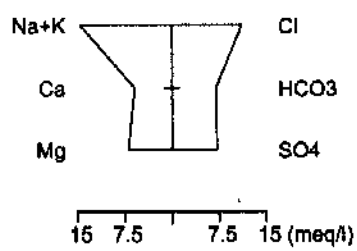

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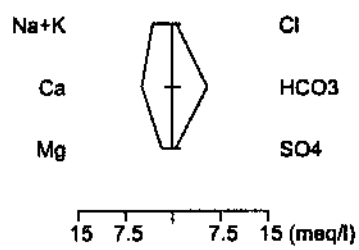
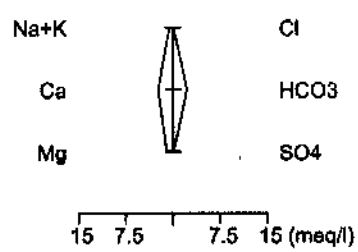
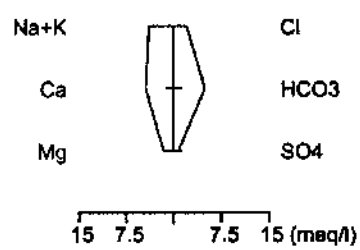


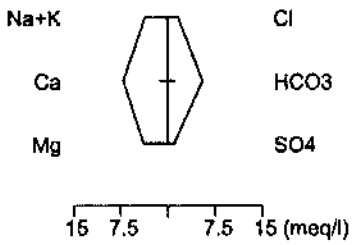
BS 13-1



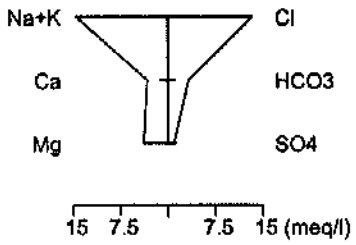
BD 14-5



BD 15-1



BB 16-1



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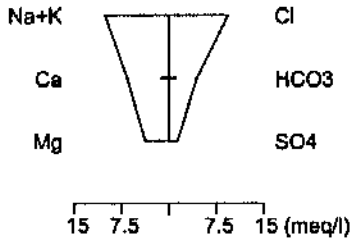

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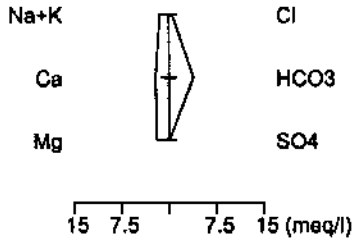

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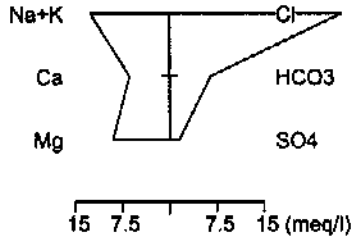

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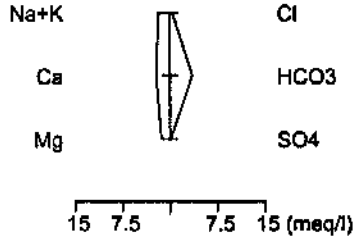

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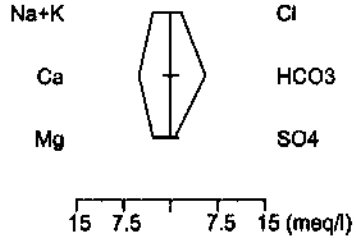

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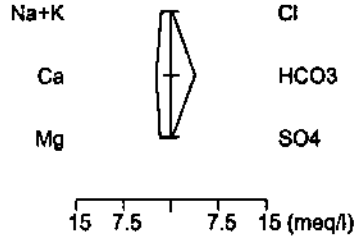
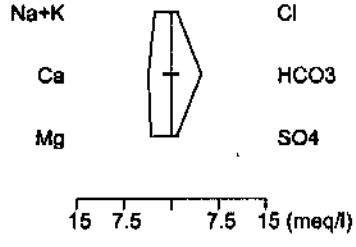
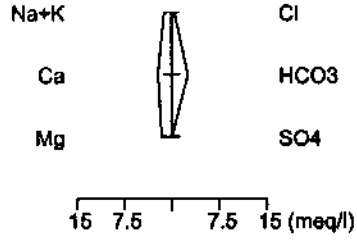


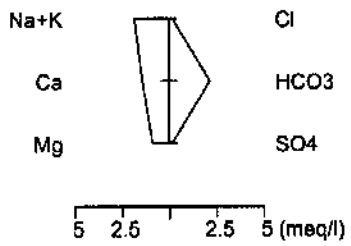
BS 15-1



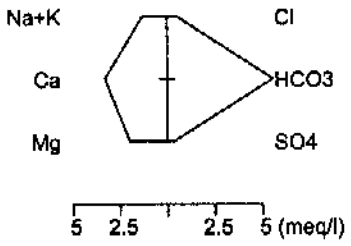
BS 16-1



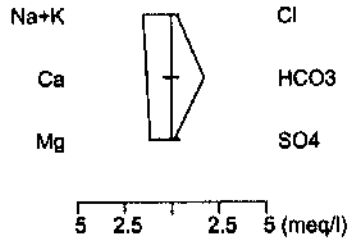
BD 17-1



BD 18-1



BD 17-2



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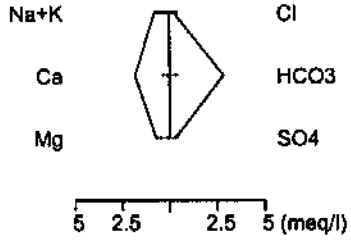

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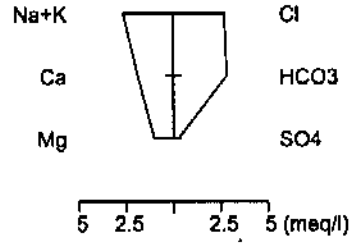

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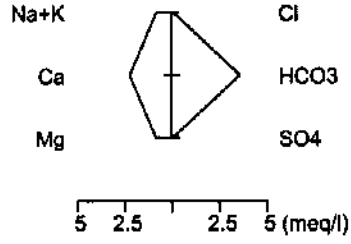

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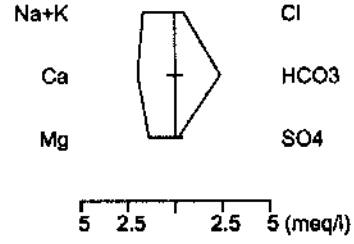

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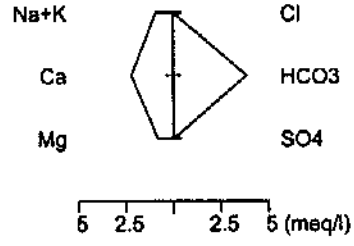

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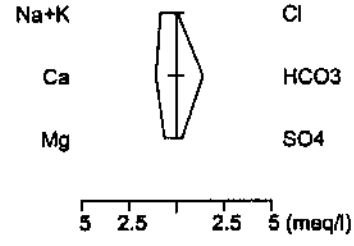

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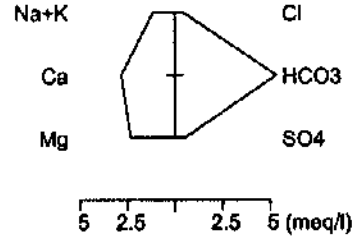
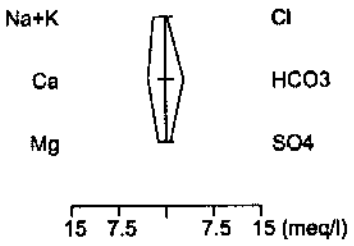
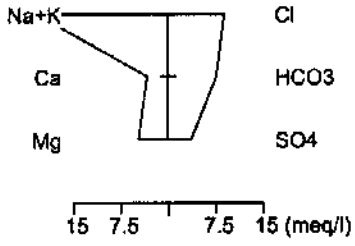


BB 19-1



BD 20-1



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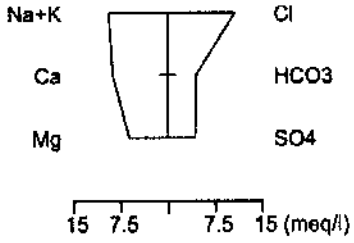

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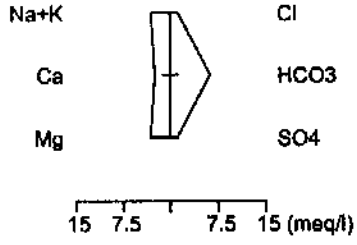

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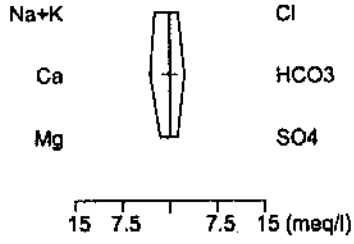

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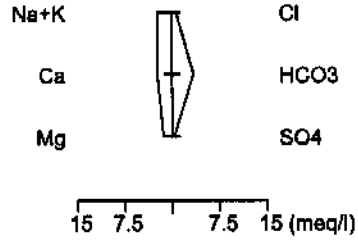
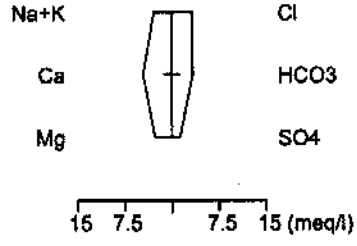


BD 19-4



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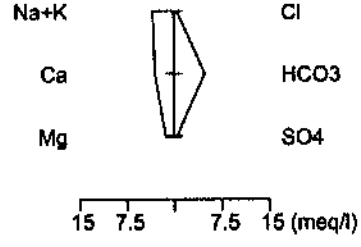
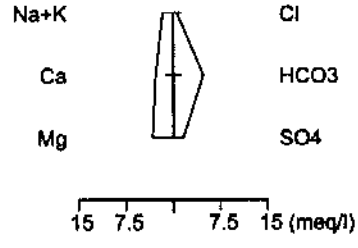
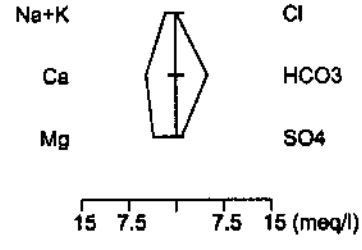


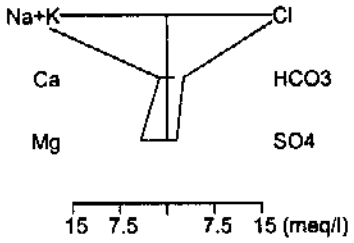
BS 19-1



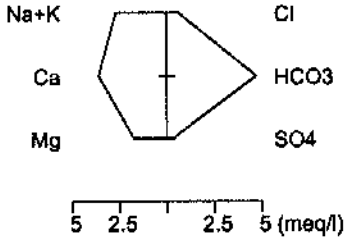
BB 20-5

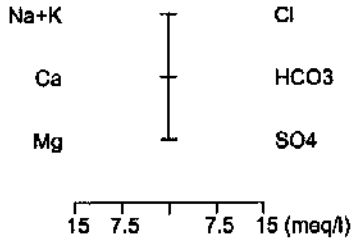


BS 21-1

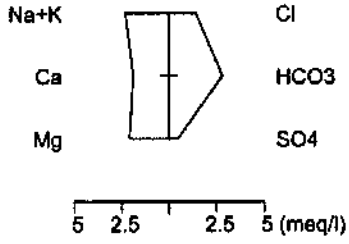


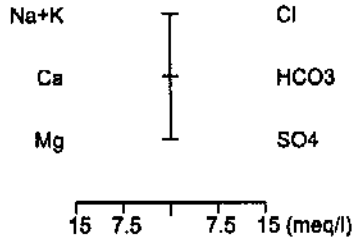
BD 22-1



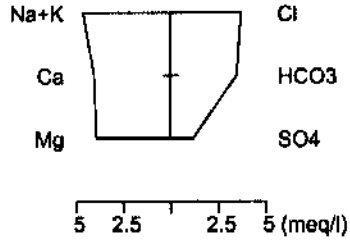


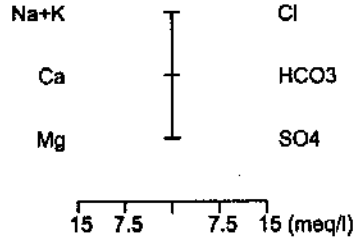
BB 22-2



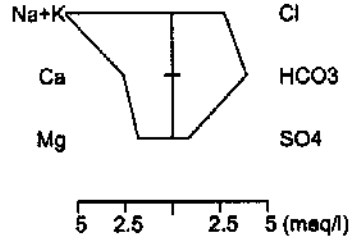


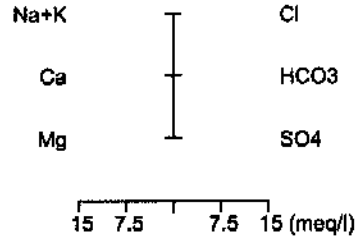
BB 22-3



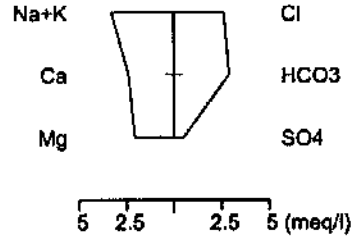


BD 22-4

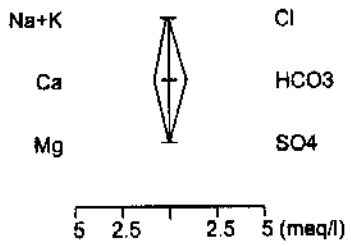




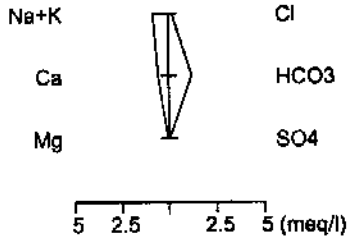
BS 22-1



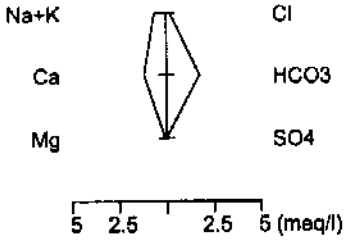
TT 4-1



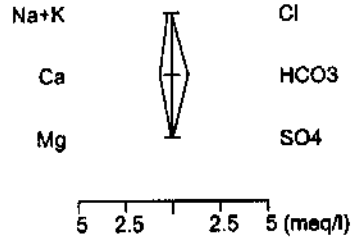
TT 5-1



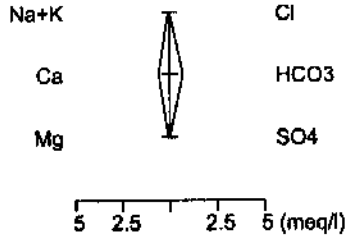
TT 4-2



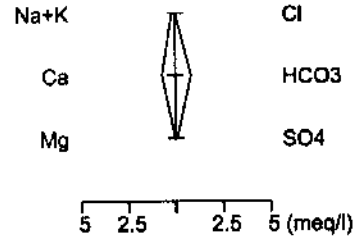
TT 5-2



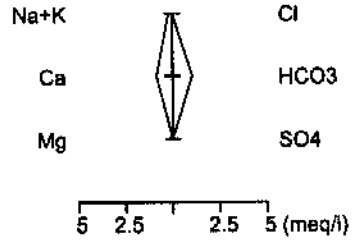
TT 4-3



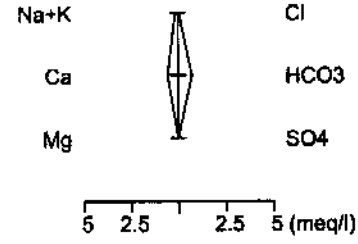
TT 5-3



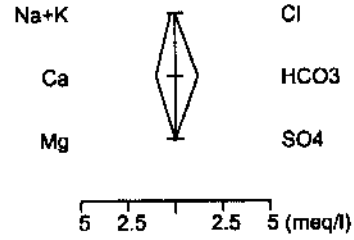
TT 4-4



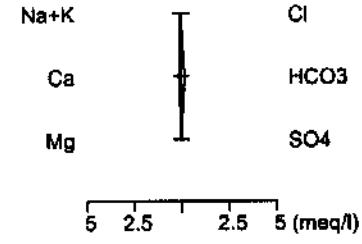
TT 5-4



TT 4-5



TT 5-5



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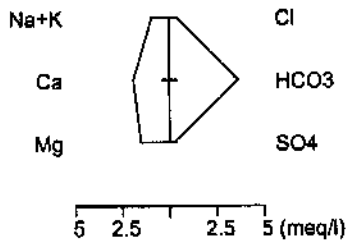

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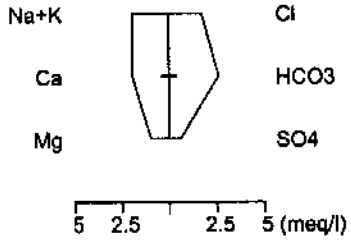

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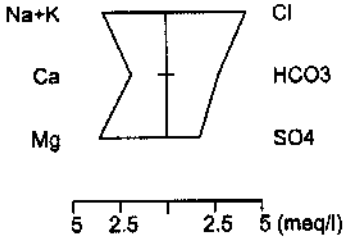

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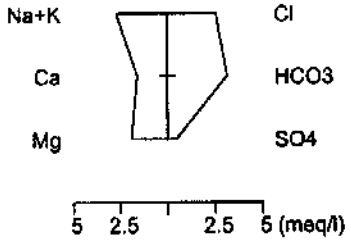

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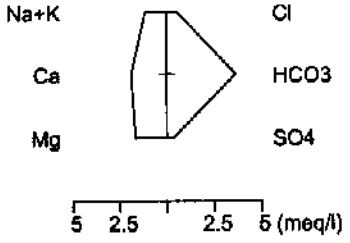

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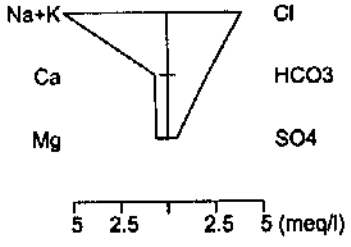

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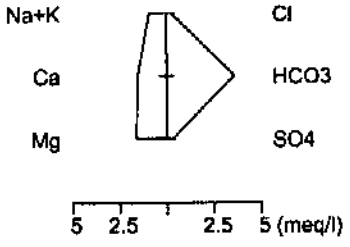

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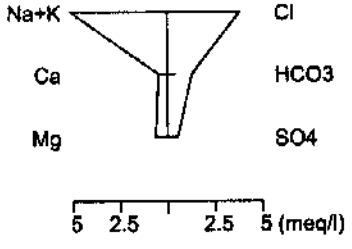

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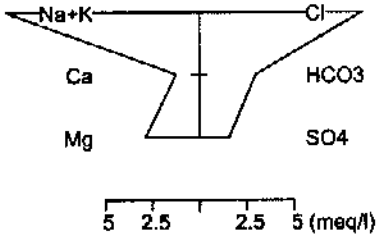

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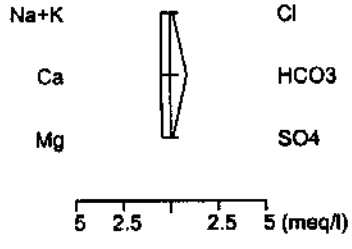
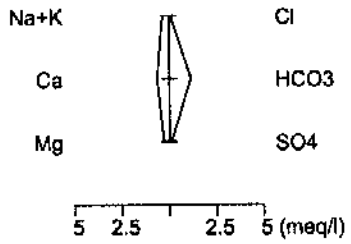
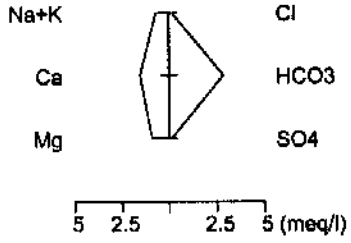


TS 8-1



TP 9-1



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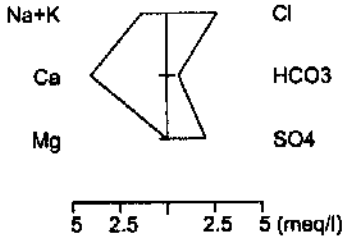

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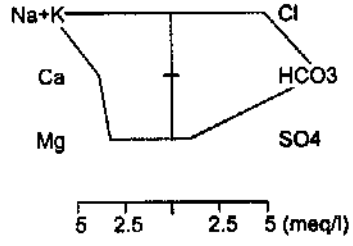

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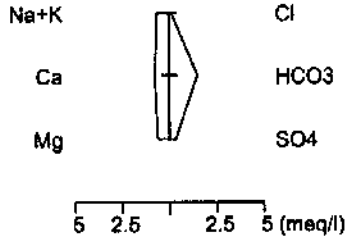

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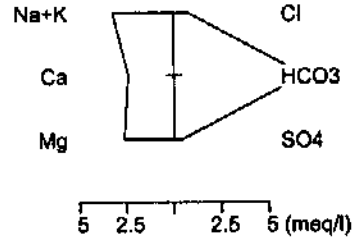

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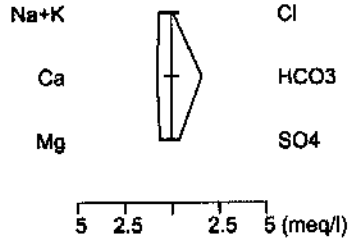

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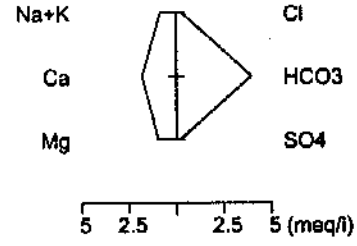

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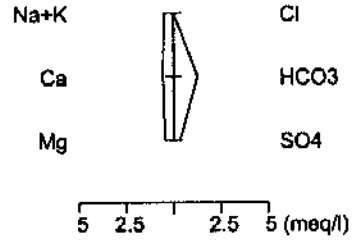

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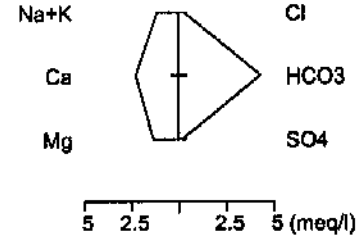
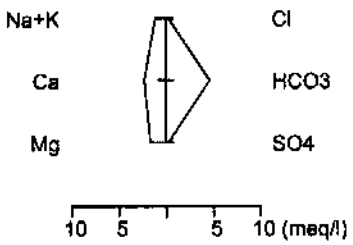
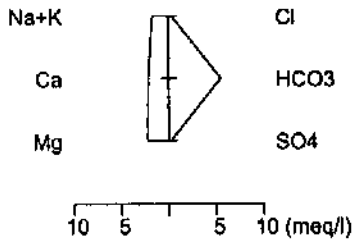


TD 10-1



TP 11-1



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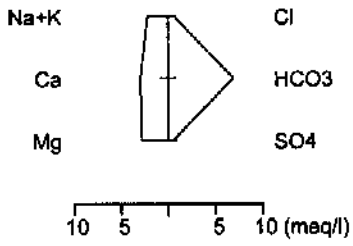

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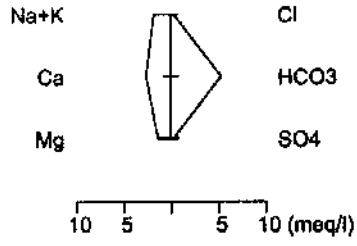

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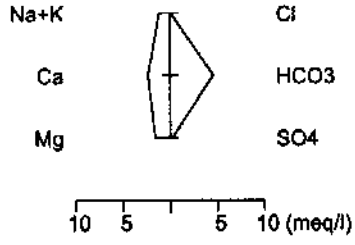

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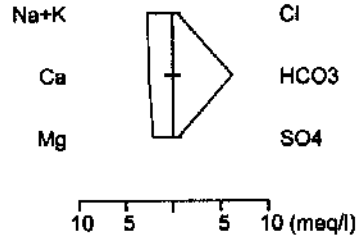

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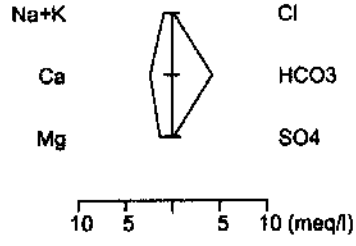

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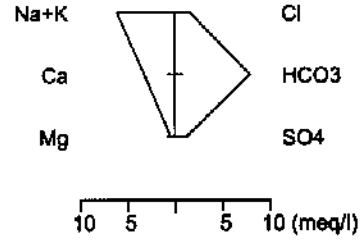

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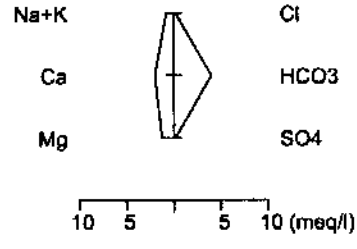

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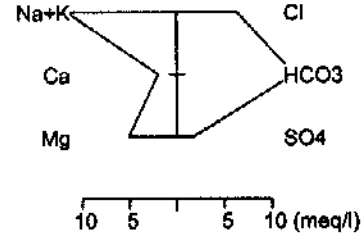

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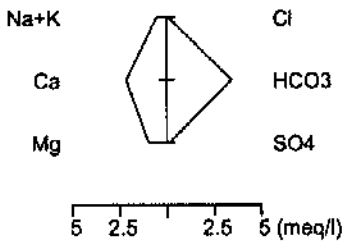

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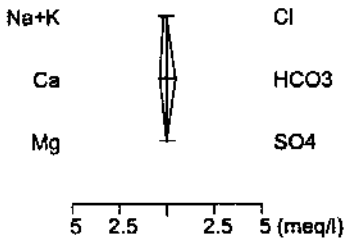

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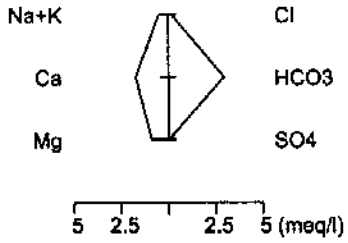

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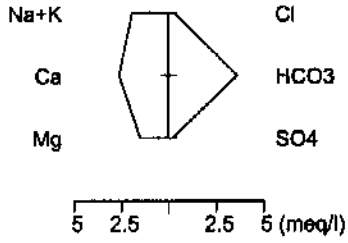

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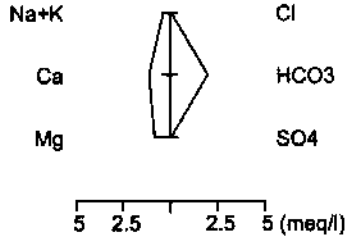

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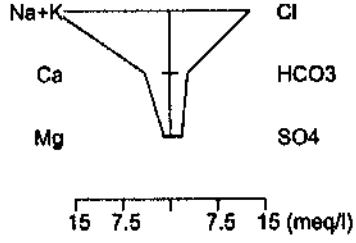

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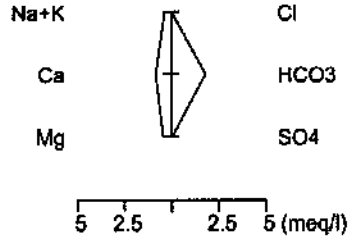

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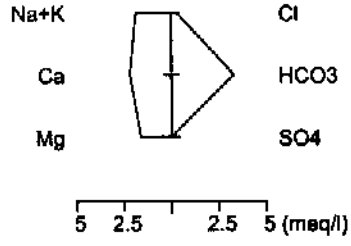

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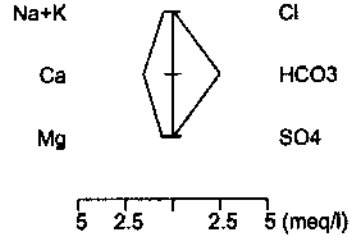

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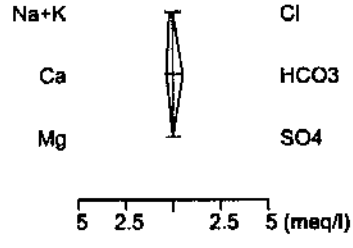
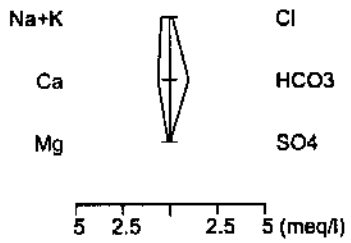
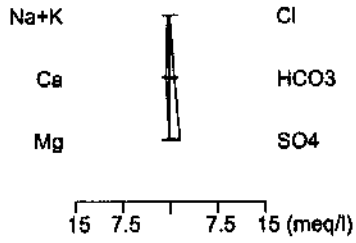


TT 14-1



TT 15-1



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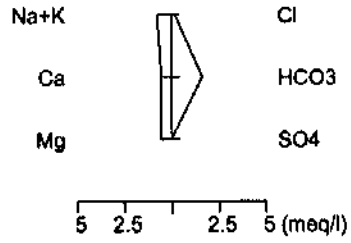

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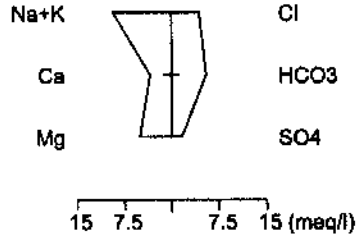

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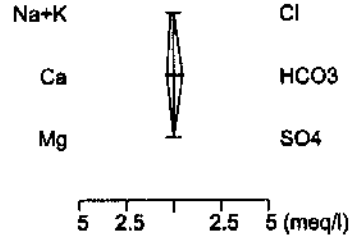

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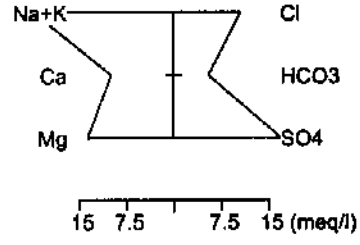

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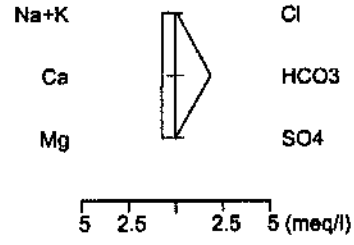

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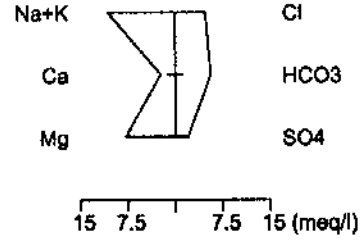

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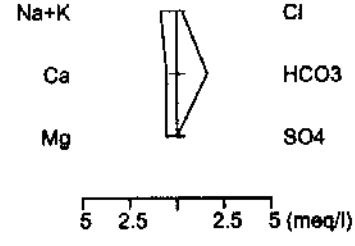

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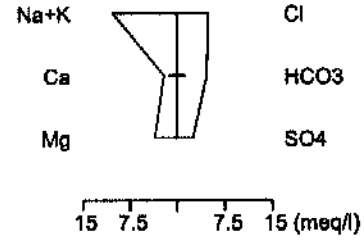
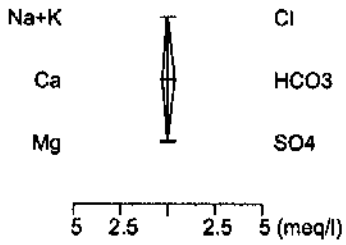
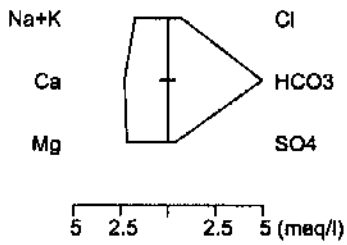


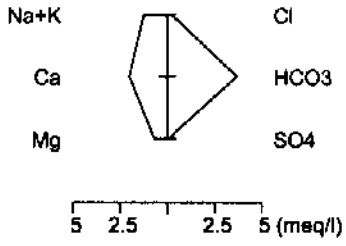
TT 16-1



TD 17-1



TS 16-2



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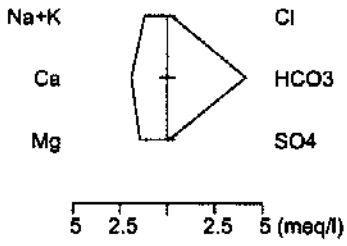

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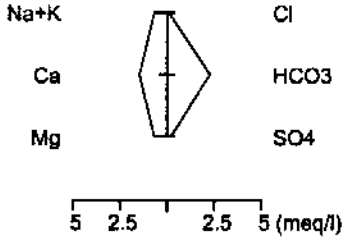

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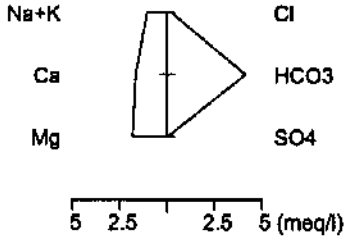

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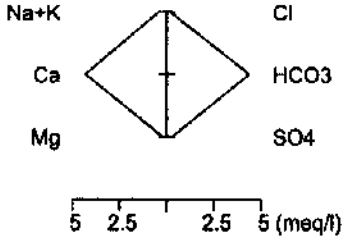

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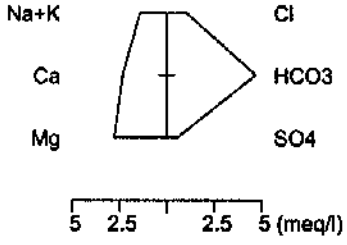
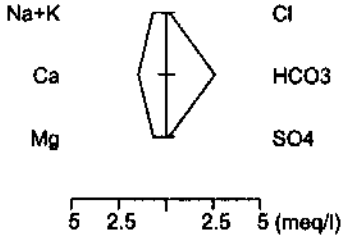
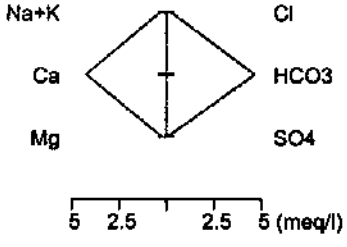


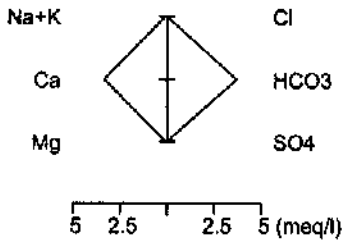
TR 16-5



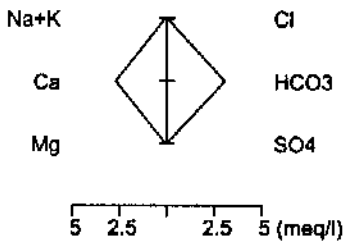
TS 17-5



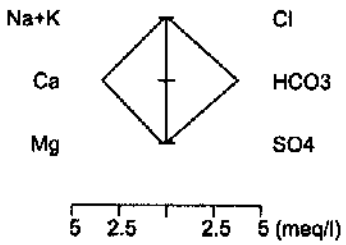
TS 18-1



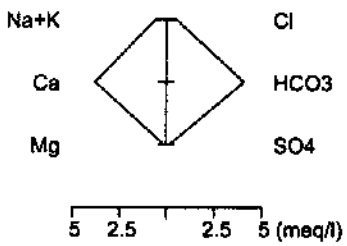
TS 19-1



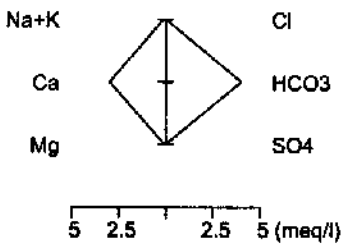
TS 18-2



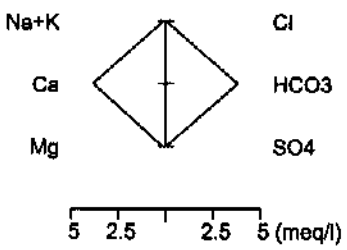
TD 19-2



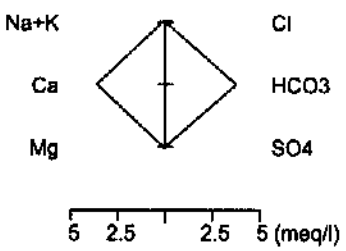
TS 18-3



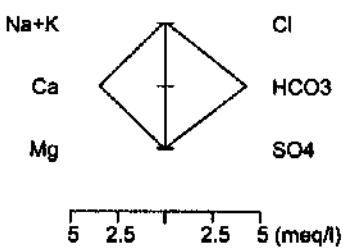
TS 19-3



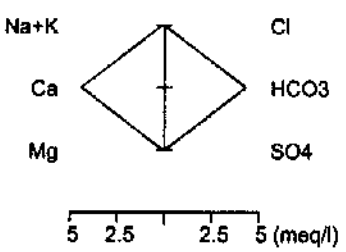
TS 18-4



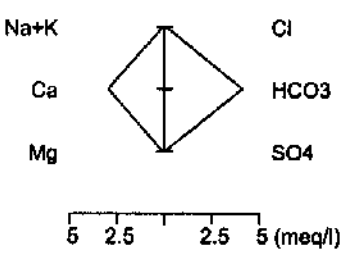
TD 19-4



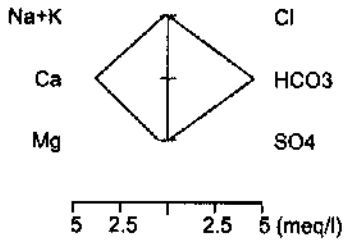
TS 18-5



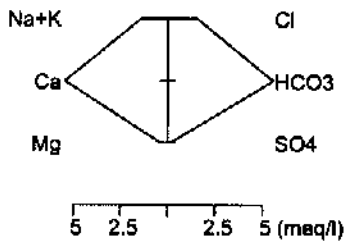
TD 19-5



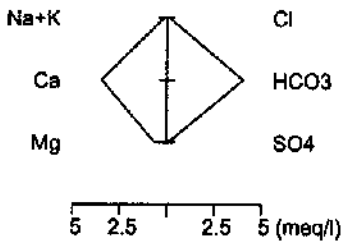
TD 20-1



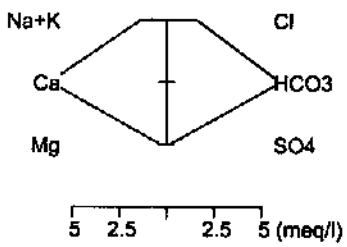
TD 21-1



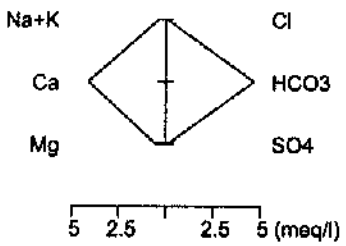
TD 20-2



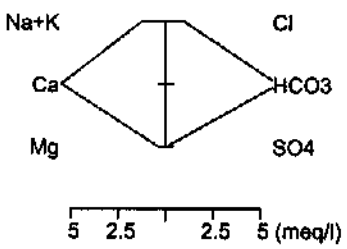
TD 21-2



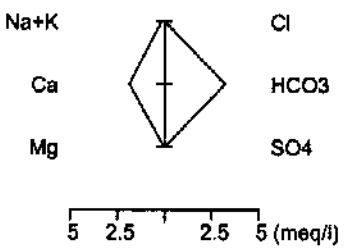
TS 20-3



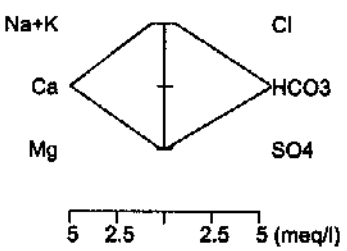
TD 21-3



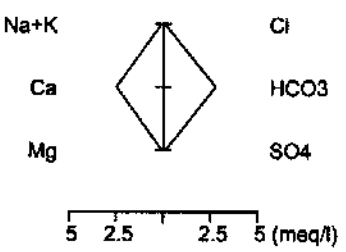
TR 20-4



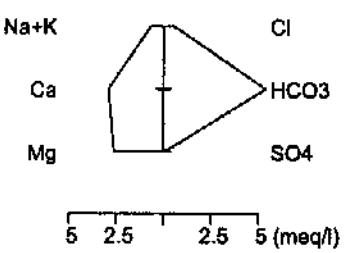
TS 21-4



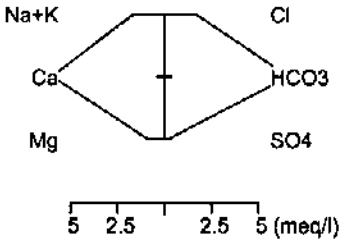
TR 20-5



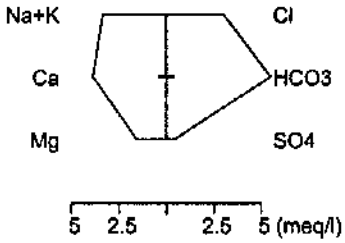
TS 21-5



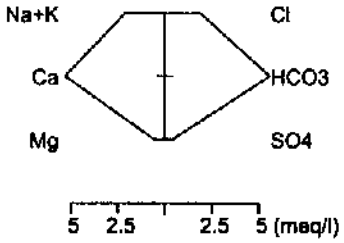
TS 22-1



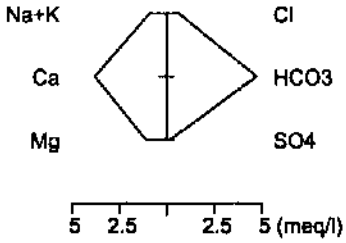
TS 23-1



TS 22-2



TS 23-2



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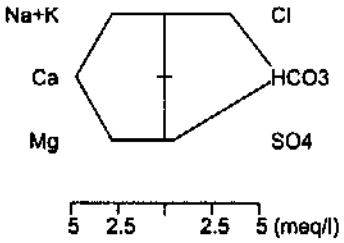
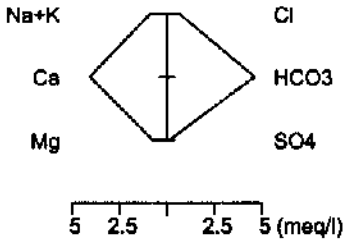
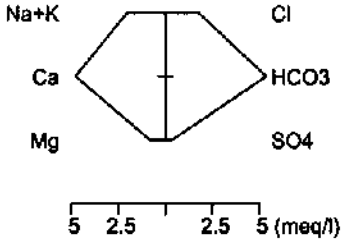


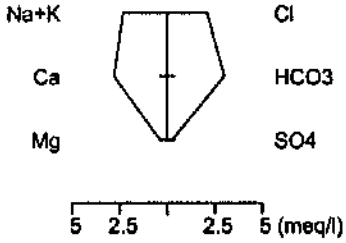
TS 23-3



TS 22-4



TD 23-4



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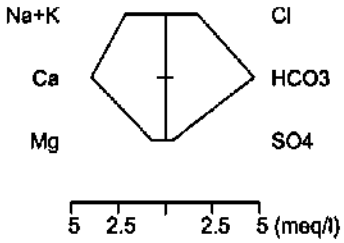

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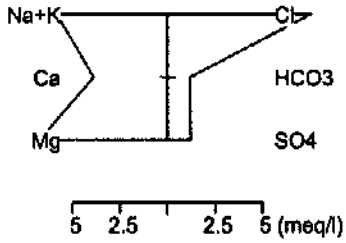
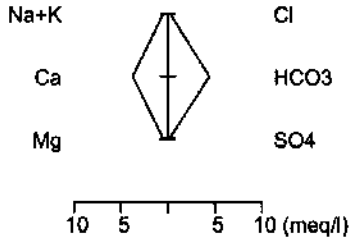
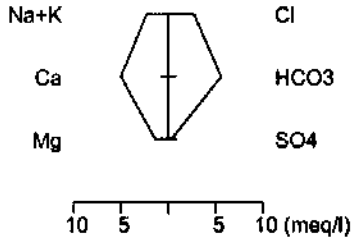


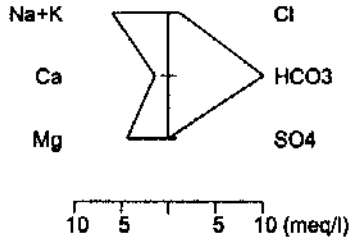
TD 24-1



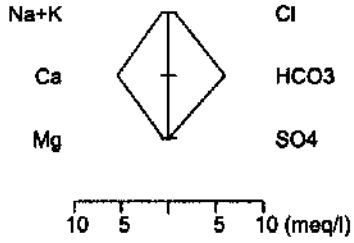
TD 25-1



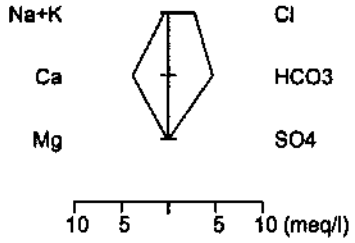
TD 24-2



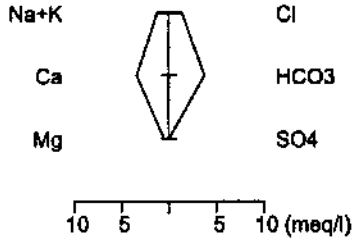
TD 25-2



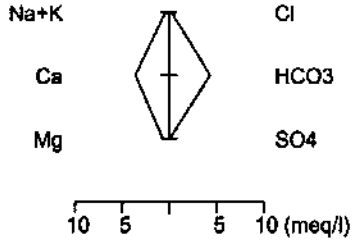
TD 24-3



TD 25-3



TD 24-4



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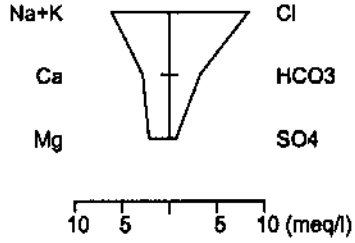
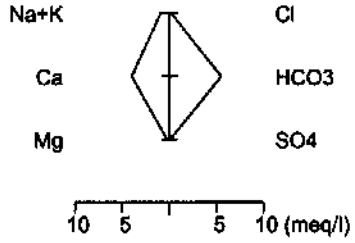
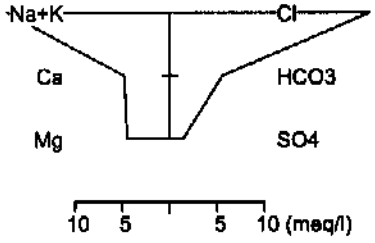
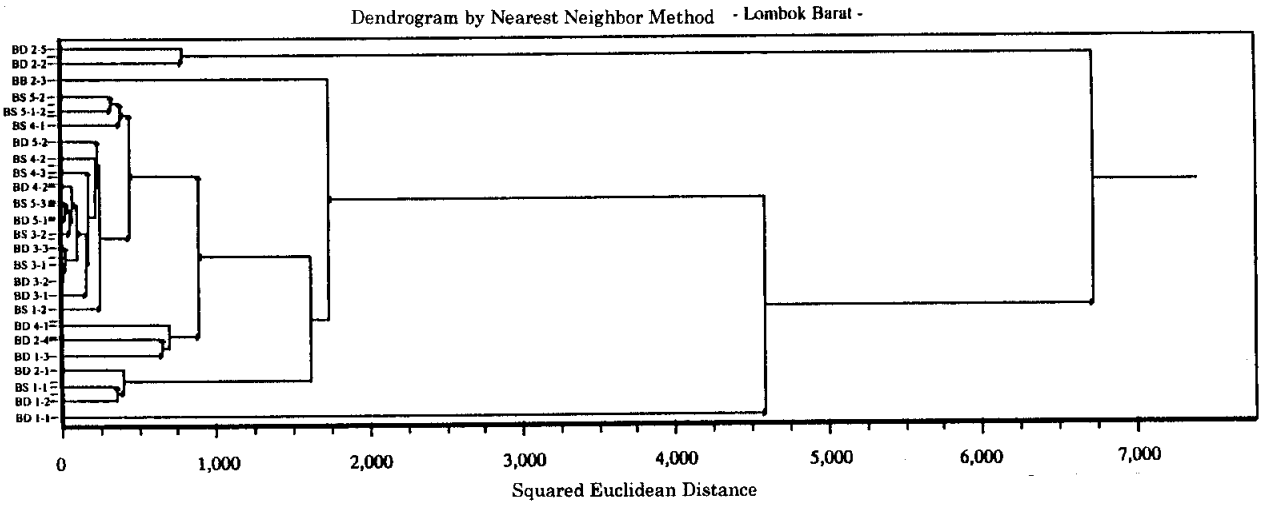


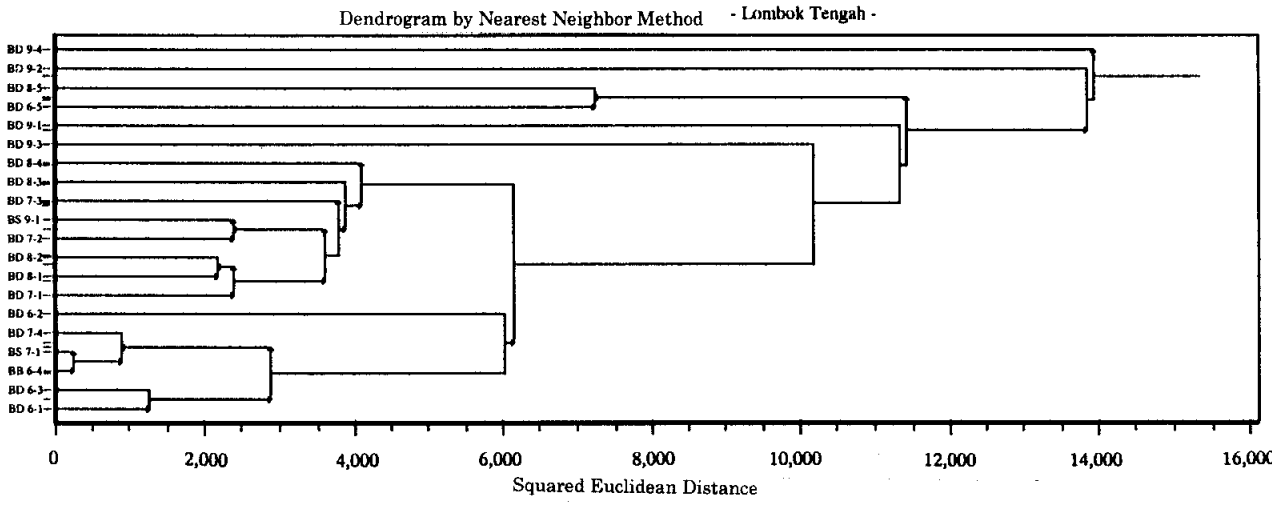
TS 24-5

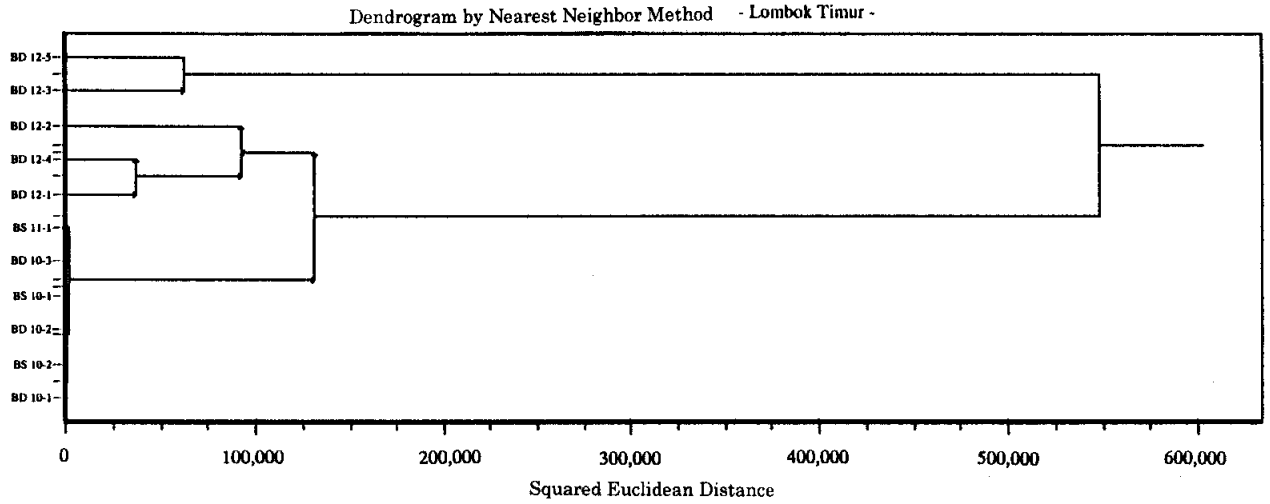


TD 25-5



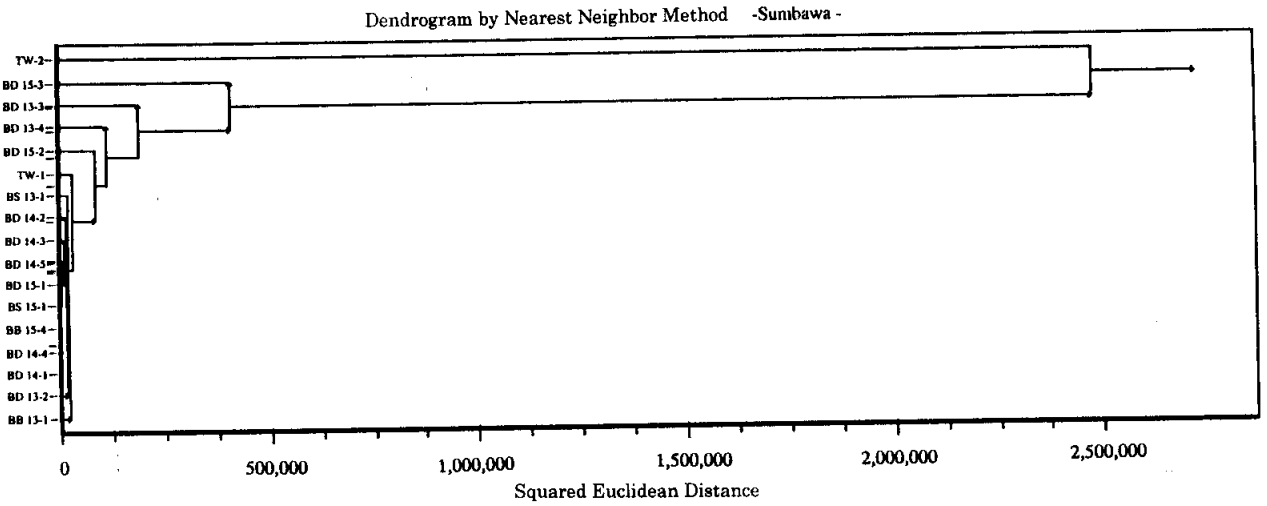


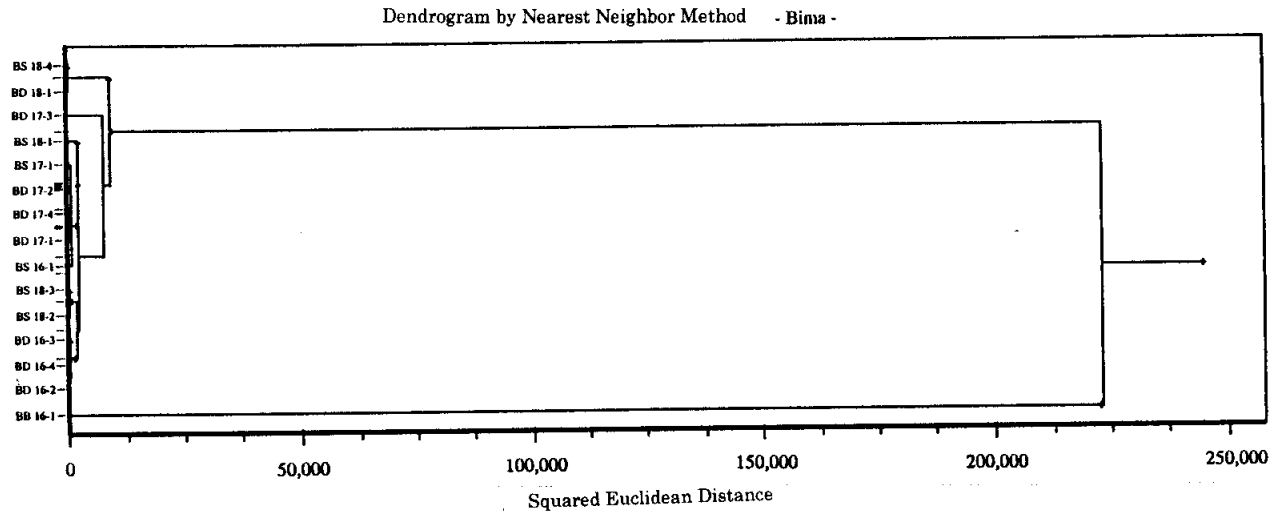


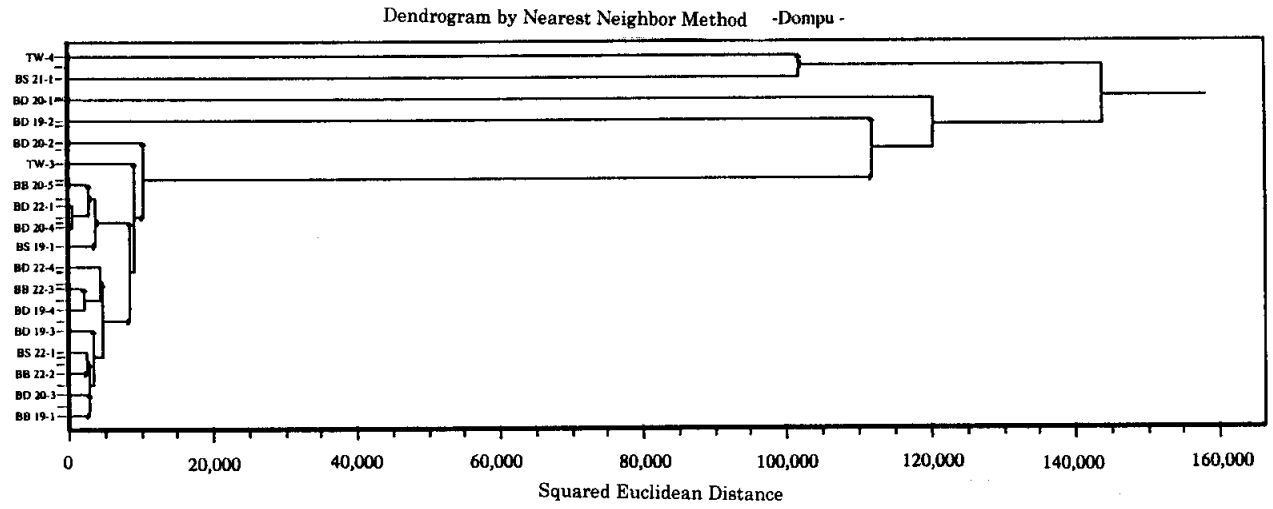


Appendix 5. 48 DENDROGRAM BY NEAREST NEIGHBOR METHOD

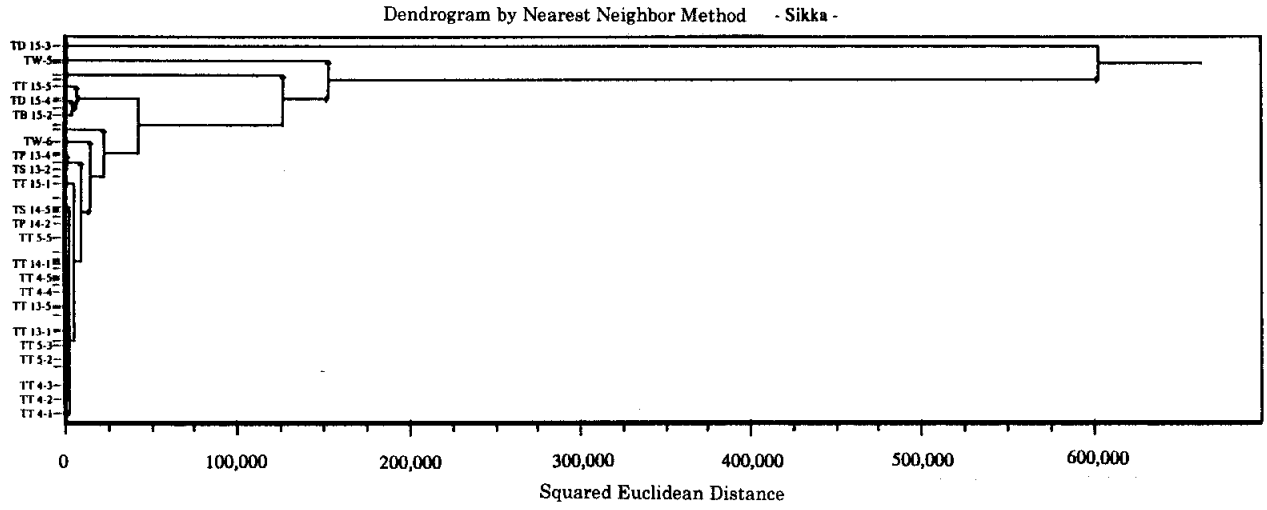
Lombok Barat, Lombok Tengah, Lombok Timur

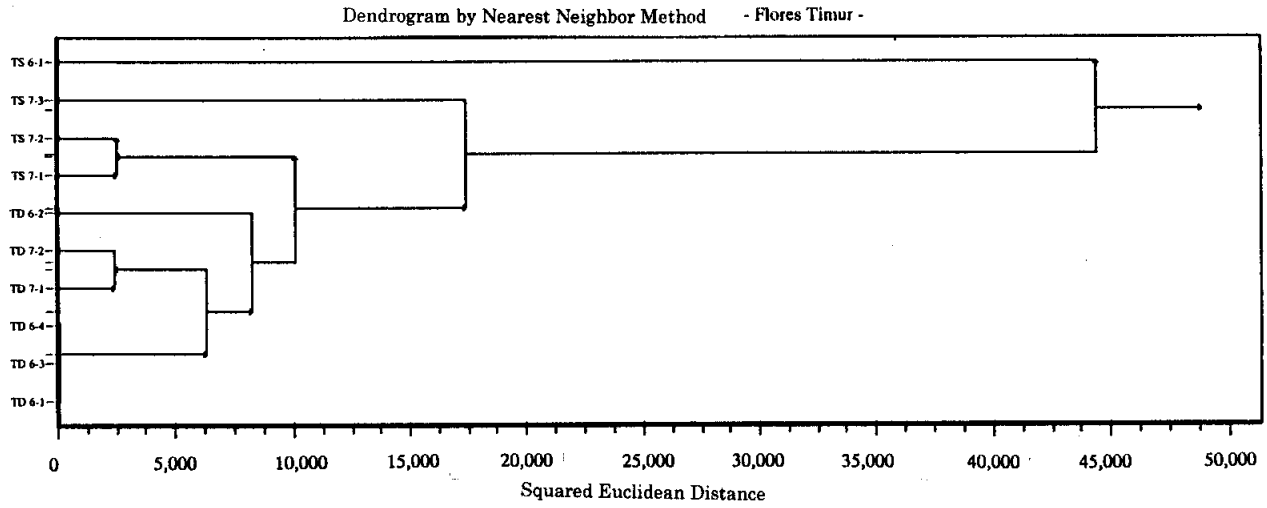


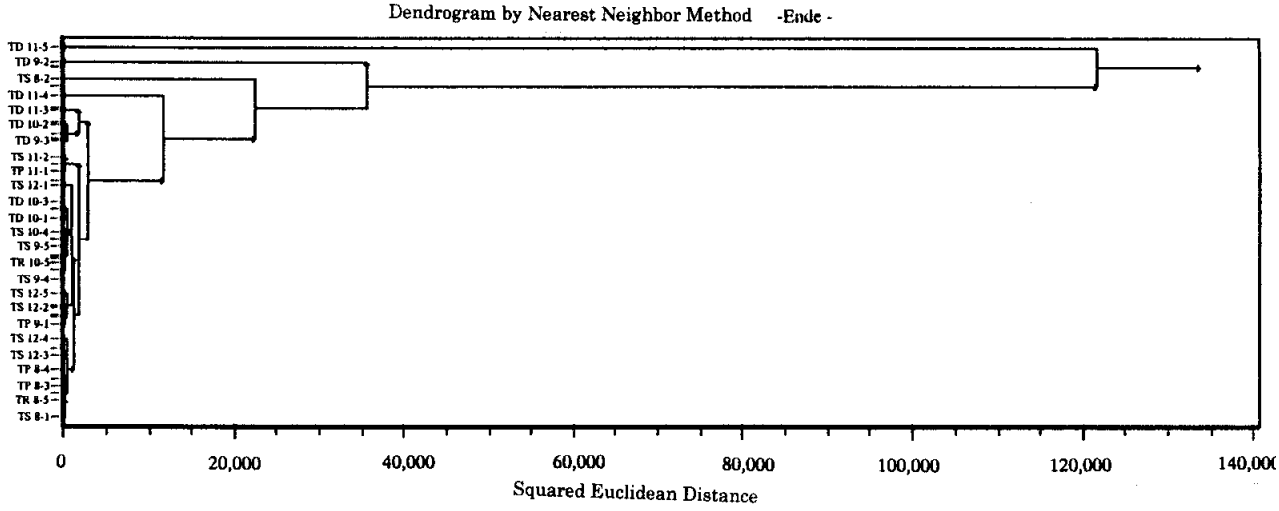




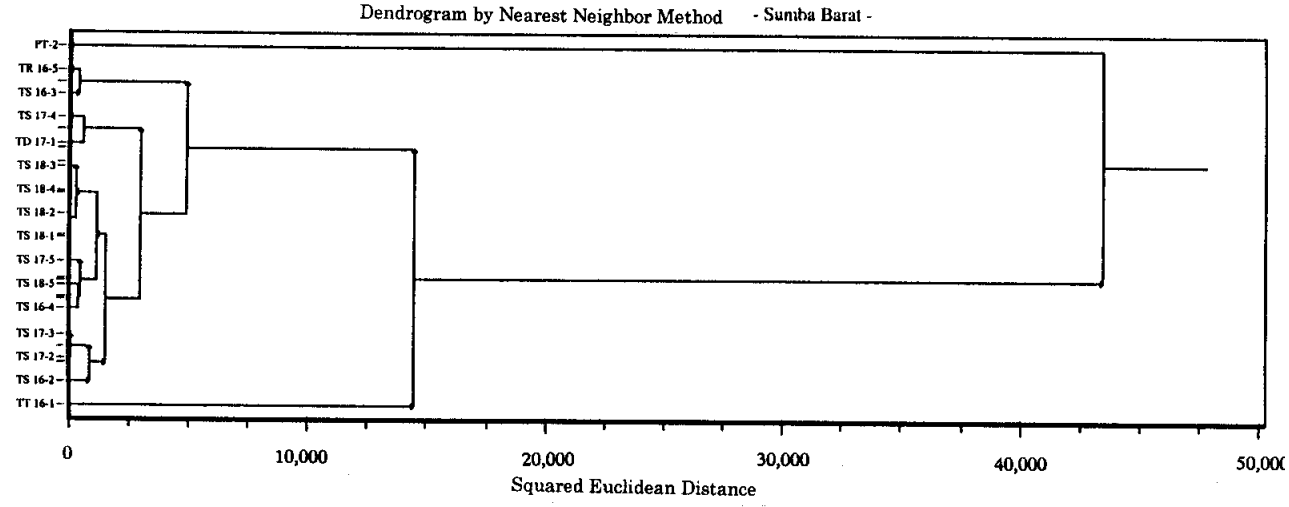
Appendix 5. 49 DENDROGRAM BY NEAREST NEIGHBOR METHOD
Sumbawa, Bima, Dompu

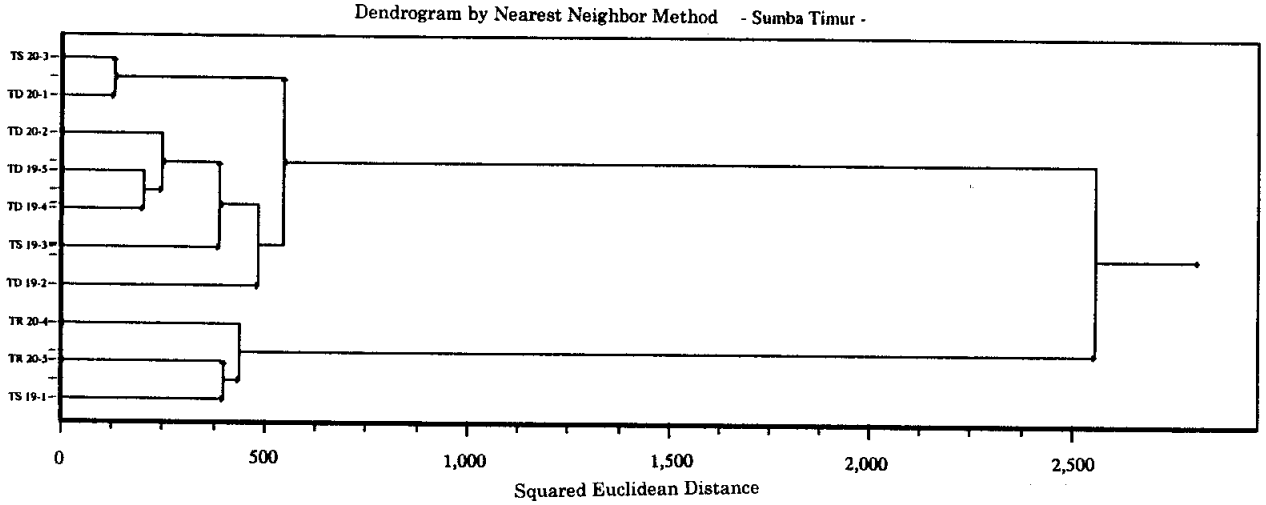




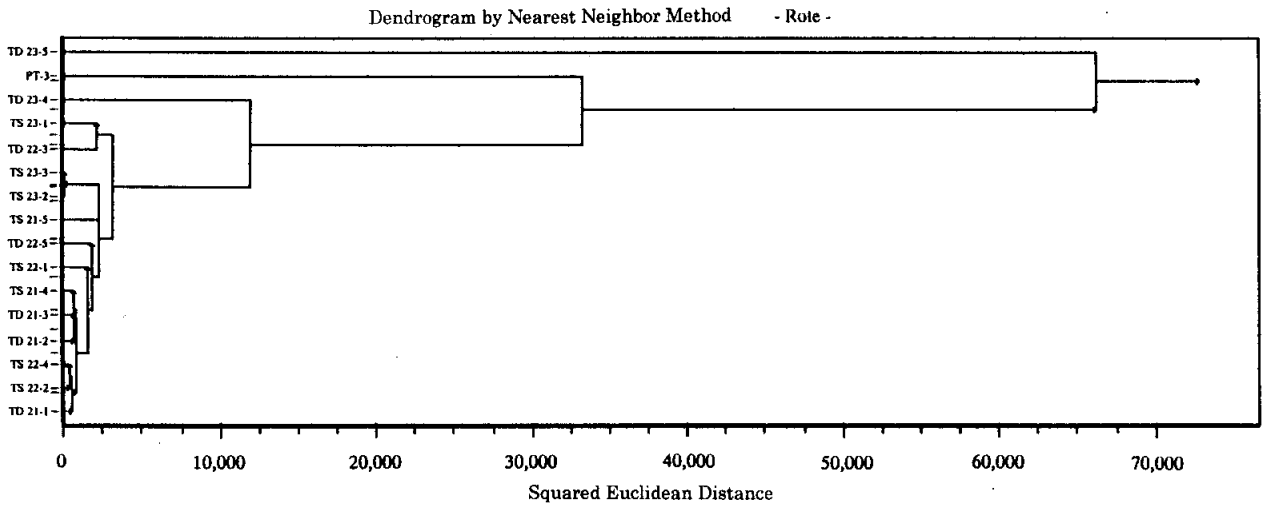


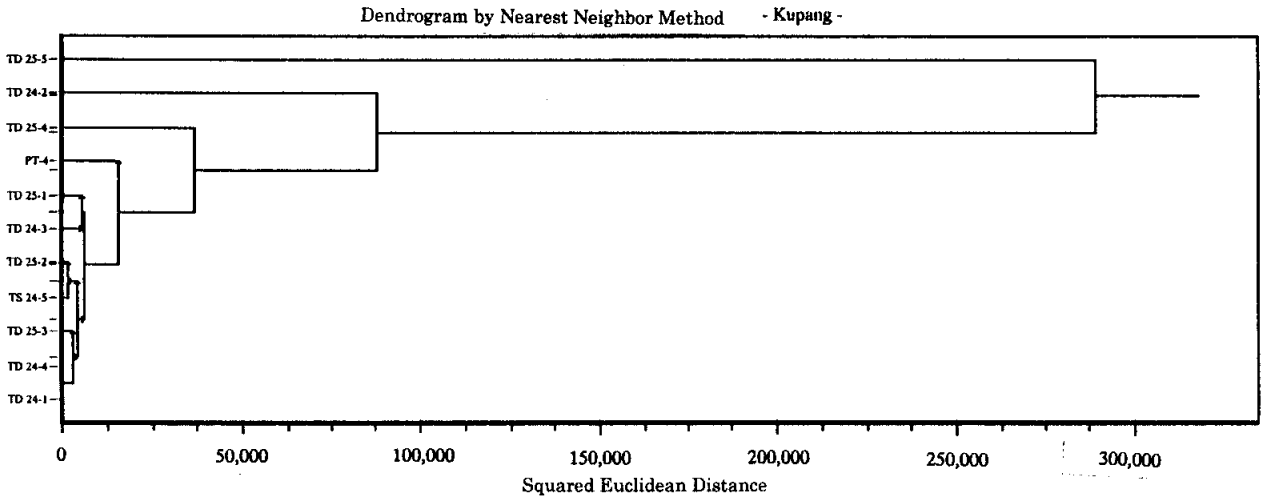
Appendix 5. 50 DENDROGRAM BY NEAREST NEIGHBOR METHOD
Sikka, Flores Timur, Ende





Appendix 5. 51 DENDROGRAM BY NEAREST NEIGHBOR METHOD
Sumba Barat, Sumba Timur





Appendix 5. 52 DENDROGRAM BY NEAREST NEIGHBOR METHOD
Rote, Kupang

Concentration Correlation Matrix (1)

District: Lombok Barat

Sample Name		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	
1	BD1-1	*																									1
2	BD1-2	.	*																								2
3	BD1-3	.	A	*																							3
4	BS1-1	.	.	.	*																						4
5	BS1-2	.	B	.	.	*																					5
6	BD2-1	.	.	B	.	.	*																				6
7	BD2-2	.	.	.	.	.	.	*																			7
8	BB2-3	.	.	.	.	.	.	.	*																		8
9	BD2-4	.	.	B	B	.	A	.	.	*																	9
10	BD2-5	.	.	.	.	.	.	B	.	.	*																10
11	BD3-1	.	B	B	.	A	.	.	.	.	B	*															11
12	BD3-2	.	B	B	.	A	.	.	.	.	.	A	*														12
13	BD3-3	.	B	.	.	A	.	.	.	.	.	A	A	*													13
14	BS3-1	.	B	.	.	A	.	.	.	.	.	A	A	A	*												14
15	BS3-2	.	B	.	.	A	.	.	.	.	.	A	A	A	A	*											15
16	BD4-1	.	.	B	.	.	.	.	.	.	.	.	.	.	.	.	*										16
17	BD4-2	.	B	.	B	A	.	.	.	B	.	A	A	A	A	A	.	*									17
18	BS4-1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	*								18
19	BS4-2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	*							19
20	BS4-3	.	.	.	.	A	.	.	.	.	.	B	B	B	B	B	.	B	.	.	*						20
21	BD5-1	.	.	A	.	B	B	.	.	B	.	A	A	A	A	A	.	B	.	.	.	*					21
22	BD5-2	.	.	B	.	.	.	.	.	.	.	.	.	.	.	.	B	B	.	.	.	A	*				22
23	BS5-1-2	.	.	A	.	.	.	.	.	B	.	.	A	A	B	B	.	.	.	.	.	A	B	*			23
24	BS5-2	.	.	B	.	.	A	.	.	B	.	.	B	B	.	.	.	.	.	.	.	A	B	A	*		24
25	BS5-3	.	.	A	.	A	.	.	.	.	.	A	A	A	A	A	.	B	.	B	.	A	B	A	.	*	25
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	

Note: "A" means both samples have a very excellent correlation.
"B" means both samples have an excellent correlation.
"." means both samples have a little correlation.

Concentration Correlation Matrix (2)

District : Lombok Tengah

Sample Name		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
1	BD6-1	*																				1
2	BD6-2	.	*																			2
3	BD6-3	B	.	*																		3
4	BB6-4	.	.	.	*																	4
5	BD6-5	.	.	.	.	*																5
6	BD7-1	.	.	.	.	.	*															6
7	BD7-2	.	.	.	.	B	.	*														7
8	BD7-3	.	.	.	.	.	B	.	*													8
9	BD7-4	A	.	B	.	.	.	.	.	*												9
10	BS7-1	.	.	.	B	.	.	.	.	.	*											10
11	BD8-1	.	.	.	.	.	.	.	.	.	.	*										11
12	BD8-2	.	.	.	.	.	.	.	.	.	.	B	*									12
13	BD8-3	.	.	.	.	.	.	.	.	.	.	A	A	*								13
14	BD8-4	.	.	B	.	.	.	.	.	.	.	B	B	B	*							14
15	BD8-5	.	.	.	.	B	.	.	.	.	.	.	.	.	.	*						15
16	BD9-1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	*					16
17	BD9-2	.	.	.	.	A	.	.	.	.	.	.	.	.	.	B	.	*				17
18	BD9-3	.	.	.	.	.	.	.	.	.	.	.	.	B	.	.	.	.	*			18
19	BD9-4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	B	.	*		19
20	BS9-1	.	.	.	.	.	.	.	.	.	.	.	.	.	B	.	.	.	.	.	*	20
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	

District : Lombok Timur

Sample Name		1	2	3	4	5	6	7	8	9	10	11	
1	BD10-1	*											1
2	BD10-2	B	*										2
3	BD10-3	B	A	*									3
4	BS10-1	B	A	.	*								4
5	BS10-2	A	A	B	.	*							5
6	BS11-1	.	B	B	A	B	*						6
7	BD12-1	.	.	.	.	.	.	*					7
8	BD12-2	.	.	.	.	.	.	.	*				8
9	BD12-3	.	.	.	.	.	.	.	.	*			9
10	BD12-4	.	.	.	.	.	.	.	.	.	*		10
11	BD12-5	.	.	.	.	.	.	.	.	.	.	*	11
		1	2	3	4	5	6	7	8	9	10	11	

Note: "A" means both samples have a very excellent correlation.
"B" means both samples have an excellent correlation.
"." means both samples have a little correlation.

Concentration Correlation Matrix (3)

District : Sumbawa

Sample Name		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
1	BB13-1	*																	1
2	BD13-2	.	*																2
3	BD13-3	.	.	*															3
4	BD13-4	.	.	.	*														4
5	BS13-1	.	.	.	.	*													5
6	BD14-1	.	.	.	.	.	*												6
7	BD14-2	.	.	.	.	.	.	*											7
8	BD14-3	.	.	.	.	.	.	.	*										8
9	BD14-4	.	.	.	.	.	A	.	.	*									9
10	BD14-5	.	.	.	.	.	.	.	.	.	*								10
11	BD15-1	.	.	.	.	.	.	.	.	.	.	*							11
12	BD15-2	.	.	.	.	.	.	.	.	.	.	.	*						12
13	BD15-3	.	.	.	.	.	.	.	.	.	.	.	.	*					13
14	BB15-4	.	.	.	.	.	.	.	.	.	.	A	.	.	*				14
15	BS15-1	.	.	.	.	.	.	.	.	.	B	.	.	.	B	*			15
16	TW-1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	*		16
17	TW-2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	*	17
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	

District : Bima

Sample Name		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
1	BB16-1	*															1
2	BD16-2	.	*														2
3	BD16-3	.	A	*													3
4	BD16-4	.	A	B	*												4
5	BS16-1	.	A	B	.	*											5
6	BD17-1	.	.	B	A	.	*										6
7	BD17-2	.	B	.	.	A	B	*									7
8	BD17-3	.	.	.	.	.	.	.	*								8
9	BD17-4	.	B	.	B	.	B	A	.	*							9
10	BS17-1	.	.	.	.	.	.	.	.	.	*						10
11	BD18-1	.	.	.	.	.	.	.	.	.	.	*					11
12	BS18-1	.	.	.	.	.	.	.	.	.	.	B	*				12
13	BS18-2	.	.	.	.	.	.	.	.	.	.	.	.	*			13
14	BS18-3	.	.	.	.	.	.	.	.	.	.	.	.	.	*		14
15	BS18-4	.	.	.	.	.	.	.	.	.	.	B	.	.	.	*	15
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	

Note:

"A" means both samples have a very excellent correlation.
"B" means both samples have an excellent correlation.
"." means both samples have a little correlation.

Concentration Correlation Matrix 4)

District : Dompu

Sample Name		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
1	BB19-1	*																		1
2	BD19-2	.	*																	2
3	BD19-3	.	.	*																3
4	BD19-4	.	.	B	*															4
5	BS19-1	.	.	.	.	*														5
6	BD20-1	.	.	.	.	.	*													6
7	BD20-2	.	.	B	.	.	.	*												7
8	BD20-3	.	.	.	.	.	.	.	*											8
9	BD20-4	.	.	.	.	.	.	.	B	*										9
10	BB20-5	.	.	.	.	.	.	.	.	.	*									10
11	BS21-1	.	.	.	.	.	.	.	.	.	.	*								11
12	BD22-1	.	.	.	.	.	.	.	B	B	.	.	*							12
13	BB22-2	.	.	.	.	.	.	.	.	.	.	.	.	*						13
14	BB22-3	.	.	.	B	.	.	.	.	.	.	.	.	.	*					14
15	BD22-4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	*				15
16	BS22-1	.	.	.	.	.	.	.	.	.	.	.	.	B	.	.	*			16
17	TW-3	B	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	*		17
18	TW-4	.	.	.	.	.	B	.	.	.	.	.	.	.	.	.	.	.	*	18
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	

Note: "A" means both samples have a very excellent correlation.
"B" means both samples have an excellent correlation.
"." means both samples have a little correlation.

Concentration Correlation Matrix (5)

District : Sikka

Sample Name		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	
1	TT4-1	*																												1
2	TT4-2	.	*																											2
3	TT4-3	.	.	*																										3
4	TT4-4	.	.	.	*																									4
5	TT4-5	.	.	.	B	*																								5
6	TT5-1	.	.	.	.	.	*																							6
7	TT5-2	.	.	.	.	.	.	*																						7
8	TT5-3	.	.	.	.	.	.	.	*																					8
9	TT5-4	.	.	.	.	.	.	.	.	*																				9
10	TT5-5	.	.	.	.	.	.	.	.	.	*																			10
11	TT13-1	.	.	.	.	.	.	.	.	.	.	*																		11
12	TS13-2	.	.	.	.	.	.	.	.	.	.	.	*																	12
13	TD13-3	.	.	.	.	.	.	.	.	.	.	.	.	*																13
14	TP13-4	.	.	.	.	.	.	.	.	.	.	.	A	.	*															14
15	TT13-5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	*														15
16	TT14-1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	*													16
17	TP14-2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	*												17
18	TT14-3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	*											18
19	TS14-4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	*										19
20	TS14-5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	A	.	.	*									20
21	TT15-1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	*								21
22	TB15-2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	*							22
23	TD15-3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	*						23
24	TD15-4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	A	.	*					24
25	TT15-5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	B	.	B	*				25
26	PT-1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	*			26
27	TW-5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	*		27
28	TW-6	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	*	28
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	

Note: "A" means both samples have a very excellent correlation.
"B" means both samples have an excellent correlation.
"." means both samples have a little correlation.

Concentration Correlation Matrix (6)

District : Flores Timur

Sample Name		1	2	3	4	5	6	7	8	9	10	
1	TD6-1	*										1
2	TD6-2	.	*									2
3	TD6-3	A	.	*								3
4	TD6-4	A	.	A	*							4
5	TS6-1	.	.	.	.	*						5
6	TD7-1	.	.	.	.	.	*					6
7	TD7-2	.	.	B	.	.	B	*				7
8	TS7-1	.	.	.	.	.	.	.	*			8
9	TS7-2	.	.	.	.	.	.	.	A	*		9
10	TS7-3	.	.	B	.	.	.	.	.	.	*	10
		1	2	3	4	5	6	7	8	9	10	

Note: "A" means both samples have a very excellent correlation.
"B" means both samples have an excellent correlation.
"." means both samples have a little correlation.

Concentration Correlation Matrix (7)

District : Ende

Sample Name		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	
1	TS8-1	*																									1
2	TS8-2	.	*																								2
3	TP8-3	B	.	*																							3
4	TP8-4	.	.	A	*																						4
5	TR8-5	.	.	B	A	*																					5
6	TP9-1	B	.	.	.	.	*																				6
7	TD9-2	.	.	.	.	.	.	*																			7
8	TD9-3	.	.	.	.	.	.	.	*																		8
9	TS9-4	.	.	.	.	.	A	.	.	*																	9
10	TS9-5	.	.	.	.	.	A	.	.	A	*																10
11	TD10-1	.	.	.	.	.	A	.	.	B	A	*															11
12	TD10-2	.	.	.	.	.	.	.	B	.	.	B	*														12
13	TD10-3	.	.	.	.	.	.	.	.	.	.	A	.	*													13
14	TS10-4	.	.	.	.	.	B	.	.	.	B	A	.	B	*												14
15	TR10-5	.	.	.	.	.	A	.	.	B	A	A	.	B	A	*											15
16	TP11-1	.	.	B	.	.	B	.	B	.	B	B	B	B	B	B	*										16
17	TS11-2	B	.	.	.	.	A	.	B	B	A	B	.	B	.	B	A	*									17
18	TD11-3	B	.	.	.	.	.	B	A	.	.	.	A	.	.	.	B	A	*								18
19	TD11-4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	*							19
20	TD11-5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	*						20
21	TS12-1	.	.	.	.	.	A	.	.	B	B	.	.	.	B	B	.	.	.	.	.	*					21
22	TS12-2	B	.	.	.	.	A	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	*				22
23	TS12-3	.	.	.	.	.	B	.	.	.	B	.	.	.	B	B	.	.	.	.	.	A	B	*			23
24	TS12-4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	B	.	*		24
25	TS12-5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	B	A	B	B	*	25
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	

Note: "A" means both samples have a very excellent correlation.
"B" means both samples have an excellent correlation.
"." means both samples have a little correlation.

Concentration Correlation Matrix (8)

District : Sumba Barat

Sample Name		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
1	TT16-1	*																1
2	TS16-2	.	*															2
3	TS16-3	.	.	*														3
4	TS16-4	.	.	.	*													4
5	TR16-5	.	.	B	.	*												5
6	TD17-1	.	.	.	.	.	*											6
7	TS17-2	.	.	.	.	.	.	*										7
8	TS17-3	.	.	.	.	.	.	B	*									8
9	TS17-4	.	.	.	.	.	.	.	.	*								9
10	TS17-5	.	.	.	B	.	.	.	.	.	*							10
11	TS18-1	.	.	.	.	.	.	.	.	.	.	*						11
12	TS18-2	.	.	.	.	.	.	.	.	.	.	.	*					12
13	TS18-3	.	.	.	.	.	.	.	.	.	.	.	.	*				13
14	TS18-4	.	.	.	.	.	.	.	.	.	.	B	.	A	*			14
15	TS18-5	.	.	.	.	.	.	.	.	.	.	B	.	B	A	*		15
16	PT-2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	*	16
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	

District : Sumba Timur

Sample Name		1	2	3	4	5	6	7	8	9	10	
1	TS19-1	*										1
2	TD19-2	.	*									2
3	TS19-3	.	.	*								3
4	TD19-4	.	.	.	*							4
5	TD19-5	.	.	.	.	*						5
6	TD20-1	.	.	.	.	.	*					6
7	TD20-2	.	.	.	.	.	B	*				7
8	TS20-3	.	.	.	.	.	.	.	*			8
9	TR20-4	.	.	.	.	.	.	.	.	*		9
10	TR20-5	.	.	.	.	.	.	B	.	.	*	10
		1	2	3	4	5	6	7	8	9	10	

Note: "A" means both samples have a very excellent correlation.
"B" means both samples have an excellent correlation.
"." means both samples have a little correlation.

Concentration Correlation Matrix (9)

District : Kupang (Rote Island)

Sample Name		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
1	TD21-1	*																1
2	TD21-2	A	*															2
3	TD21-3	.	.	*														3
4	TS21-4	.	.	.	*													4
5	TS21-5	.	.	.	B	*												5
6	TS22-1	A	A	.	.	.	*											6
7	TS22-2	B	B	.	.	.	B	*										7
8	TD22-3	.	.	.	.	.	.	B	*									8
9	TS22-4	.	.	.	.	.	B	A	.	*								9
10	TD22-5	.	.	.	.	.	.	A	B	A	*							10
11	TS23-1	.	.	.	.	.	.	.	B	B	B	*						11
12	TS23-2	.	.	.	.	.	.	.	.	.	.	.	*					12
13	TS23-3	B	.	.	.	.	B	.	.	.	.	.	B	*				13
14	TD23-4	.	.	.	.	.	.	.	.	.	.	A	.	.	*			14
15	TD23-5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	*		15
16	PT-3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	*	16
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	

District : Kupang (Timor Island)

Sample Name		1	2	3	4	5	6	7	8	9	10	11	
1	TD24-1	*											1
2	TD24-2	.	*										2
3	TD24-3	.	.	*									3
4	TD24-4	.	.	.	*								4
5	TS24-5	.	.	.	.	*							5
6	TD25-1	.	.	.	.	.	*						6
7	TD25-2	.	.	.	.	.	.	*					7
8	TD25-3	.	.	.	.	.	.	.	*				8
9	TD25-4	.	.	.	.	.	.	.	.	*			9
10	TD25-5	.	.	.	.	.	.	.	.	A	*		10
11	PT-4	.	.	.	.	.	.	.	.	.	.	*	11
		1	2	3	4	5	6	7	8	9	10	11	

Note: "A" means both samples have a very excellent correlation.
"B" means both samples have an excellent correlation.
"." means both samples have a little correlation.

Appendix 6

WATER QUALITY STANDARDS AND ANALYSIS METHODS

Appendix 6
WATER QUALITY STANDARDS AND ANALYSIS METHODS

TABLE OF CONTENTS

Water Quality Standard and Analysis Methods

A. Analysis in Laboratory

Parameter		Water Quality Standard	Lower Limit of Detection	Method of Water Quality Analysis
Suitability for Drinking Water				
Chromium Hexavalent	(Cr^{6+})	0.05 mg/L	0.006 mg/L	Atomic Absorption Method for Total Chromium (3500-Cr B)
Fluoride	(F)	1.4 mg/L	0.02 mg/L	SPADNS Method (4500-F D)
Arsenic	(As)	0.05 mg/L	0.001 mg/L	Continuous Hydride Generation/ Atomic Absorption Spectrometric Method (3114 C)
Lead	(Pb)	0.05 mg/L	0.01 mg/L	Direct Air-Acetylene Flame Method (3111 B)
Selenium	(Se)	0.01 mg/L	0.007 mg/L	Continuous Hydride Generation/ Atomic Absorption Spectrometric Method (3114 C)
Mercury	(Hg)	0.001 mg/L	0.001 mg/L	Cold-Vapor Atomic Absorption Spectrometric Method (3112 B)
Cyanide	(CN)	0.1 mg/L	0.01 mg/L	Colorimetric Method (4500-CN E)
Iron Total	(Fe)	0.3 mg/L	0.04 mg/L	Direct Air-Acetylene Flame Method (3111 B)
Cadmium	(Cd)	0.005 mg/L	0.005 mg/L	Direct Air-Acetylene Flame Method (3111 B)
Manganese	(Mn)	0.1 mg/L	0.02 mg/L	Direct Air-Acetylene Flame Method (3111 B)
Cupper	(Cu)	1 mg/L	0.03 mg/L	Direct Air-Acetylene Flame Method (3111 B)
Hydrogeological Parameters				
Sodium	(Na)	200 mg/L	0.01 mg/L	Direct Air-Acetylene Flame Method (3111 B)
Potassium	(K)		0.05 mg/L	Direct Air-Acetylene Flame Method (3111 B)
Calcium	(Ca)		0.05 mg/L	Direct Air-Acetylene Flame Method (3111 B)
Magnesium	(Mg)		0.1 mg/L	Direct Air-Acetylene Flame Method (3111 B)
Chloride	(Cl)	250 mg/L	0.1 mg/L	Potentiometric Method (4500-Cl D)
Bicarbonate	(HCO_3)		0.01 mmol/L	Titration Method (2320 B)
Sulfate	(SO_4)	400 mg/L	0.94 mg/L	Turbidimetric Method (4500-SO_4^{2-} E)
Silicate	(SiO_2)		0.2 mg/L	Atomic Absorption Spectrometric Method (4500-Si B)

B. Measurement on Site

Parameter		Water Quality Standard	Lower Limit of Detection	Method of Water Quality Analysis
Suitability for Drinking Water				
Total Coliform		0 col./100mL		Detection Paper Method
Bacteria				Detection Paper Method
Nitrate	(NO3-N)	10 mg/L		Pack Test Method
Nitrite	(NO2-N)	1.0 mg/L		Pack Test Method
Hydrogeological Parameters				
pH		6.5 - 8.5		pH Meter Method
Electric Conductivity	(EC)			EC Meter Method

Source: Peraturan Menteri Kesehatan Reoublik Indonesia (Nomor:416/Menkes /Per/IX/1990) Tetang Syarat-Syarat dan Pengawasan Kualitas Air

Appendix 7

TEST WELL DRILLING AND PUMPING TESTS

Appendix 7
TEST WELL DRILLING AND PUMPING TESTS

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List of Test Well Data, Pumping Test Data and Water Quality Data

Appendix 7 TEST WELL DRILLING, PUMPING TEST

7.1 Introduction

Seventeen out of the 25 villages recommended for preliminary basic design in the Progress Report required further technical investigation to confirm the availability of stable water sources. The six new test wells and four pumping tests proposed were carried out under this study. Additional site visits were made to springs to confirm the dry season yield. Flows and pressures in PDAM and village gravity supply lines were measured where necessary.

This chapter describes and evaluates the results of these tests and field observations.

7.2 Field Investigations and Laboratory Tests

7.2.1 Test Well Drilling

(1) Objectives

Test well drilling was carried out to investigate the hydrogeological conditions, followed by pumping tests, to evaluate the potential well yields and confirm hydrogeological conditions.

(2) Location and Quantity

The locations of the test wells are shown below and in the location map **(Figure A3-1 in Appendix 3).** The target depth of each test well was determined in accordance with the available information such as existing wells, vertical resistivity survey results, and geological and hydrogeological conditions in the Study Area.

Location of Test Wells

JICA Well No.	Province	District	Village		Proposed well depth (m)
			No.	Name	
TW01	NTB	Sumbawa	# 14	Labuhan Lalar	70
TW02		Sumbawa	#15	Poto	80
TW03		Dompu	#19	Ranggo	70
TW04		Dompu	#20	Jambu	100
TW05	NTT	Sikka	#13	Hepang	80
TW06		Sikka	#15	Watuliwung	80

(3) Methodology

The wells were drilled under subcontract by a local contractor selected by the Team through JICA's procurement regulations.

The contractor mobilized three drill rigs for Sumbawa Island and one for Flores Island. The drilling equipment consisted of direct rotary machines equipped with tri-con type bits.

1) Drilling pilot hole

Drilling was performed in the following sequence.

- Drilling of a 425 mm dia. bore to a depth of some 3.0 m.bgl.
- Installation of a temporary conductor pipe of 400 mm dia.
- Drilling a 150 mm dia. pilot hole to a designated depth.

2) Electrical logging

The pilot hole was geo-electrically logged. Locations for screens and blank casing were then determined by the Team.

3) Reaming

The hole was then reamed to a 300 mm dia. and the bottom part of each hole was backfilled with motor cement, when required.

4) Screen and casing installation, gravel packing and grouting

Screens and casing were installed in the reamed hole, as designated by the Team. The screens are stainless steel wire wrapped type. The blank casing is made of black mild steel 6.3 mm thick. The periphery of the screen was gravel-packed and the annulus above was sand-mortar grouted.

5) Development

The well was air-flushed, surged and water-jetted until the water became clean. A preliminary pumping test followed the development.

(4) Progress

Equipment was mobilized for Desa Poto on 26 July 2001, for Jambu on 28 July 2001, for Ranggo on 4 August 2001 and for Watuliwung on 28 July 2001. One rig was moved from Desa Poto to Desa Labuhan Lalar on 7 September 2001 and then from Desa Watuliwung to Desa Hepang on 26 August 2001. A detailed progress record is shown in **Table 8.2.1,** with a summary below.

Summary of Well Construction Progress

Well No.	Village	Depth drilled (m)	Days required	Rate (m/day)
JICA TW-1	Labuhan Lalar	71	24	3.0
JICA TW-2	Poto	82	41	2.0
JICA TW-3	Ranggo	70	35	2.0
JICA TW-4	Jambu	99	27	3.6
JICA TW-5	Hepang	85	38	2.2
JICA TW-6	Watuliwung	85	38	2.2

(5) Results

The geological and geo-physical logs, and the casing and screen positions are shown in **Figure A3-1 to Figure A3-6 in Appendix 3.**

7.2.2 Pumping Tests for Test Wells and Existing Water Sources

(1) Objectives

Pumping tests were carried out (a) to investigate the yield of the test wells, (b) to confirm the availability of sufficient water from existing wells and (c) to examine the yield of 'cave water'.

(2) Location

Locations and quantities are listed in the table below.

List of Pumping Tests

	Province	Village	Water source	Test type	Note
PT-1	NTB	Labuhan Lalar	JICA TW-01	a	New well
PT-2		Poto	JICA TW-02	b	New well
PT-3		Ranggo	JICA TW-3	a	New well
PT-4		Jambu	JICA TW-4	a	New well
PT-5	NTT	Hepang	JICA TW-5	c	New well
PT-6		Watuliwung	JICA TW-6	c	New well
PT-7		Kokowahor	P2AT IKI 05	a	Existing well
PT-8		Weerame	M.A. Paneru	a	Cave water
PT-9		Oebao	Cave	a	Cave water
PT-10		Bolok	P2AT PBM22	a	Existing well
a: Full test, b: Preliminary and constant discharge tests, c: Air lifting					

(3) Methodology

1) Field Test and Observation.

The pumping tests comprised the following four type of tests. As is normal practice, pumping tests were carried out using the single well method where no observation wells were provided.

- Two hour preliminary test.
- Four step drawdown test.
- 48 hours continuous time-drawdown test.
- Recovery observation.

The information obtained through the pumping tests was analyzed using the following methodology.

2) Analysis

The following Coefficients were calculated / obtained from the results of the pumping tests.

- Well Loss Coefficient (C): $Sw/Q = B + CQ^{n-1}$
- Well Efficiency (Ew): $Ew = BQ /Sw \times 100\ \%$
- Specific Capacity (Sc): $Sc = Q/Sw$
- Transmissivity (T) : $T = (2.30 \times Qd) / (4 \times \pi \times ds)$

(For $(r2S)/(4Tt)<0.01$, (r is large and t is small enough))

Where:

Sw	:	Total drawdown in pumped well (m)
Q	:	Discharge (L/sec)
B	:	Aquifer loss coefficient
C	:	Well loss coefficient
n	:	n=2 for many cases
T	:	Transmissivity (m^2/day)
Qd	:	Discharge (m^2/day)
ds	:	Drawdown difference per log cycle on semi-log graph
S	:	Storage potential
t_0	:	t (time) value at the intersecting point of the projection of t-s line on semi-log graph
r	:	Distance from the discharging well to the observation point
	:	The ratio of the circumference of a circle to its diameter

(4) Progress

Pumping tests were carried out immediately after well development during the period 30 August 2001 to 5 October 2001. For the existing water sources, the tests were performed during the period 18 August 2001 to 28 September 2001, as shown in **Table 8.2.1.**

(5) Results

The results of the pumping tests are plotted and analyzed **in Figure A3-8 to Figure A3-15 in Appendix 3.** A summary of the pumping test results is shown in **Table 8.2.2**. Essential points from the Table are shown below.

Summary of Pumping Tests

	Village	Water Source	SWL (m.bgl)	Q (L/sec)	Sw (m)	Sc (L/sec/m)	C	Ew (%)	T (m^2/day)
PT-1	Lb. Lalar	TW-01	0.46	4.02	13.6	0.30	0.19	67	27.9
PT-2	Poto	TW-02	5.32	0.78	26.1	0.03	-	-	1.1
PT-3	Ranggo	TW-03	-1.54	2.81	18.0	0.16	1.63	21	124.5
PT-4	Jambu	TW-04	1.66	1.50	12.7	0.12	1.80	21	10.4
PT-5	Hepang	TW-05	70	-	-	-	-	-	-
PT-6	Watuliwung	TW-06	52	-	-	-	-	-	-
PT-7	Kokowahor	IKI05	49.53	4.62	2	2.28	0.021	68	1636
PT-8	Weerame	Cave	6.3	7.68	0.19	40	-	-	2997
PT-9	Oebau	Cave	2.79	5.0	0.57	8.8	-	-	1033
PT-10	Bolok	PBM 22	34.34	9.0	0.19	47.4	0.002	16	51508

SWL:Static Water Level, Q: Discharge for constant discharge test

The specific capacities (Sc) are generally small values, less than 0.2 L/sec/m. A greater drawdown is required to obtain larger amounts of groundwater. Hydrogeological conditions in Poto and Jambu are poor, as indicated by the smaller transmissivities (T). Ranggo has a better aquifer than the other locations.

In both Desa Hepang and Watuliwung in NTT, pumping tests were not carried out due to the very deep groundwater levels and small discharge which was confirmed by air lifting during well development.

The two existing wells, IKI05 in Desa Kokowahor and PBM 22 in Desa Bolok, showed relatively good performance as production wells and indicated good hydrogeological conditions.

The two caves in Desa Weerame, Sumba Barat and Desa Oebau, Rote Island have high production capacities.

7.2.3 Investigation on Existing Distribution Pipes (PDAM and Village Supplies)

(1) Objectives

Water Sources from PDAM or village pipelines are proposed for several villages. Flow rates and water pressures in these existing pipelines were investigated.

(2) Location and Quantity

Nineteen field measurements were performed in seven villages in NTB (Desa Bajur, Kuranji, Duman, Sembung, Bagik Papan, Selaparang and Labuhan Mapin). Detail information is presented in **Table 8.2.3.**

(3) Methodology

An ultrasonic flow meter and a mechanical pressure gauge were used.

(4) Progress

The field investigations were performed during the period from 21 August 2001 to 21 September 2001.

(5) Results

The detailed results of the field measurement are presented in Table 8.2.3. A Summary of results is presented below.

Summary of Field Measurement

Target Village	Nominal pipe Dia. (mm)	Flow (L/sec)	Pressure (kg/cm^2)
Bajur	150	21.7	4.2
	200	20.3	4.2
	300	66.7	-
Kuranji	200	24.7	3.4
Duman	150	1.0	5.5
Sembung	400	174.2	-
Bagik Papan	50	53.8 - 56.1	-
	75	68.3 - 75.9	-
Selaparang	50	2.1	*
	100	105.5	*
	150	150.1	*
Labuhan Mapin	40	-	0.2
	75	-	1.1
	150	1.3-11.2	*
*: Location is a break pressure tank.			

7.2.4 Flow Observation of Springs in Dry Season

(1) Objectives

It was reported, during the first field investigation which was carried out at the very end of a wet season, that the hydro-geological conditions in the dry season might be significantly different. The Team undertook additional field measurements of the existing springs nominated for possible development.

(2) Locations and Quantity

Six springs in NTB and four springs in NTT were visited as shown in the table below.

(3) Methodology

Water flow was measured either by a flow meter, bucket or poly-bags, as suited to the site conditions.

(4) Progress

The measurements were carried out mainly in September 2001, at the end of a dry season when hydrogeological conditions were considered to be driest during the field investigation of the Study.

(5) Results

The measurement results are summarized as follows.

Seasonal Yield Variation of Springs

Province	Village	Spring	Yield (L/sec)	
			Wet season (April-May 2001)	Dry season (September 2001)
NTB	Duman	M.A.Trawasan	30.1	20
	Peresak	M.A. Pura Petong	23.9	Not to be used
	Bagik Papan	M.A. Bala I	8.0	8.0
	Selaparang	M.A. Lemor	355.0	250
	Labuhan Mapin	M.A. Remas	6.9[*1]	12.0[*2]
	Kawuwu	M.A. Mpubeda	1.5	0.5
NTT	Ile Pading	M.A. Wai Langu	59.0	some 20.0
	Kondamara	M.A. Lailama	28.8	some 25.0
	Tarus	M.A. Tarus	65.6[*3]	65.6[*3]
	Nasakdale	M.A. Meakoen	more than 2	more than 2

[*1]: All the spring was not captured at intake. [*2]: Intake was repaired, all spring was captured.
[*3]: Official record

7.2.5 Water Quality Tests for the New Wells

(1) Objectives

Water quality tests were carried out on the water sources where pumping tests were performed in order to confirm the suitability for drinking.

(2) Location, Tested Items and Quantity

Water was sampled from (a) six new test wells (b) two existing wells and (c) two caves. The items tested are shown below.

Item of Water Quality Testing

Type of Test	Items Tested/analyzed
Tested on site	General bacteria, coliform bacteria, nitrate (NO3), nitrite (NO2), ammonium (NH4), electric conductivity (EC), pH
Tested in Laboratory	Chromium VI (Cr6＋), fluoride (F) arsenic (As), lead (Pb), selenium (Se), mercury (Hg), cyanide(CN), iron (Fe), cadmium (Cd), magnesium(Mg), calcium (Ca), sodium (Na), potassium (K), chloride (Cl), bicarbonate (HCO_3), sulfate (SO_4), silica (SiO_4)

(3) Methodology

The water samples were tested in a laboratory selected by the Team through JICA's subcontracting procedures. The methods adopted for the testing are listed **in Appendix 2.**

(4) Progress

Water samples were collected and sent to the laboratory as the test well drilling and pumping tests proceeded. The results were made available to the Team at the beginning of October 2001, as was scheduled.

(5) Results

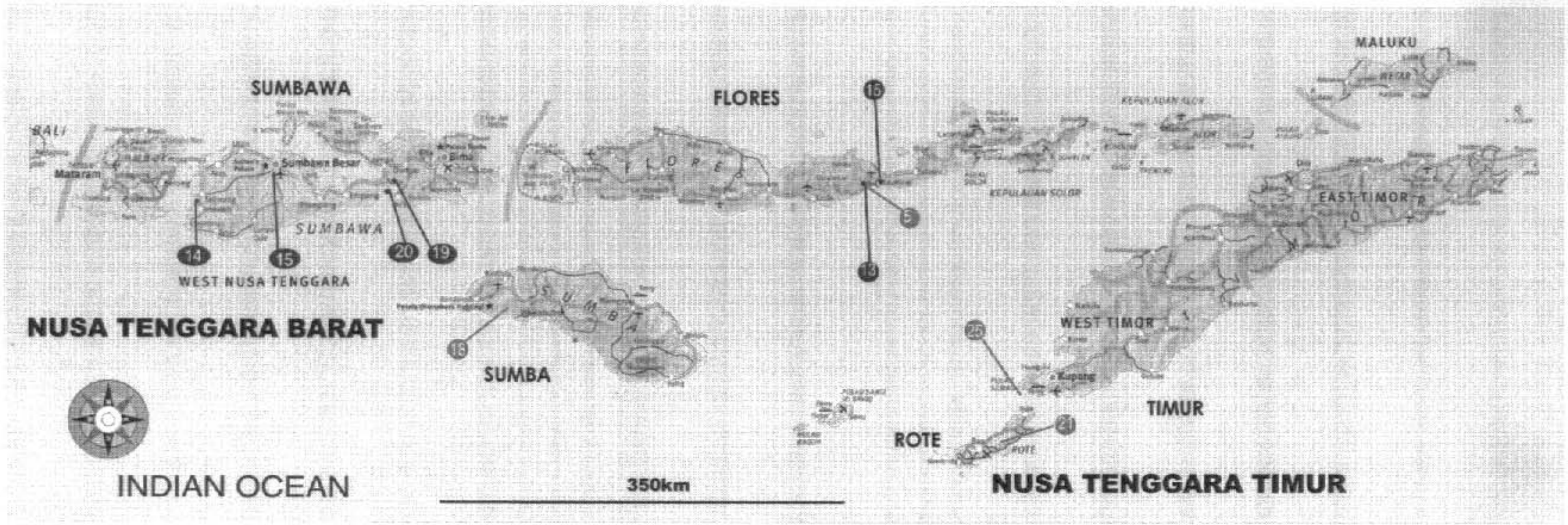
The test results are listed in **Table 8.2.4.**

The results were compared with the Indonesian guidelines and items that exceeded the guidelines were highlighted. The following results should be noted.

- Test Well JICA TW1 at Lb. Lalar: All items are within the Indonesian Standards. The water from the well is drinkable.
- Test Well JICA TW2 at Desa Poto: Na, Cl and SO_4 exceed the Indonesian Standard. The water is saline and undrinkable.
- Test Well JICA TW3 at Desa Rango: All items are within the standards. The water is drinkable.
- Test Well JICA TW 4 at Desa Jambu: Mn, Na and Cl exceed the standards. The water is saline and undrinkable.
- Test Well JICA TW 5 at Desa Hepang: The pH and EC are unreasonably high. Due to an unproductive and undevelopable well, the tested water sample was a mixture with drilling fluid.
- Test Well JICA TW 6 at Desa Hepang: The pH and Fe are unreasonably high. Due to an unproductive and undevelopable well, the tested water sample was a mixture with drilling fluid.

Appendix 7. 1

Location Map of Test Wells and Pumping Tests

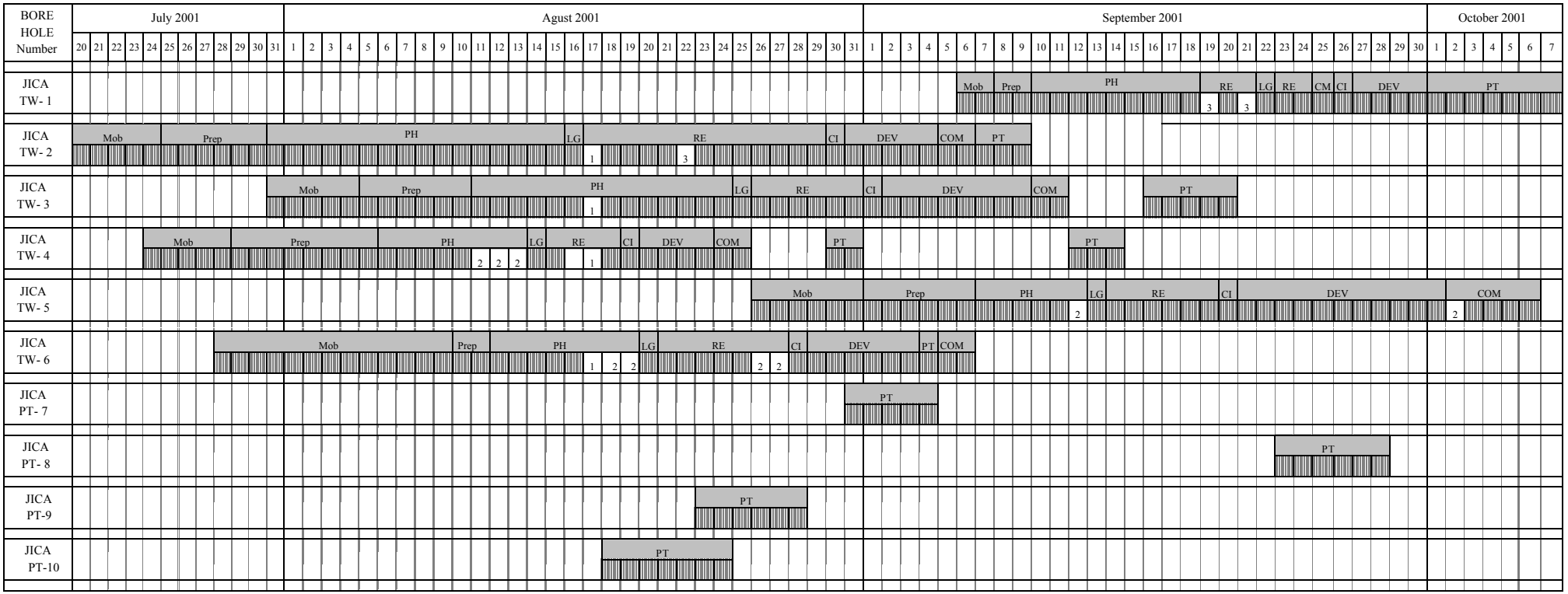


TEST WELLS	< Village >	< District >
14	Labuhan Lalar	Sumbawa
15	Poto	Sumbawa
19	Ranggo	Dompu
20	Jambu	Dompu
13	Hepang	Sikka
15	Watuliwung	Sikka

PUMPING TEST FOR EXISTING WATER SOURCES	< Village >	< District >
5	Kokowahor	Sikka
18	Weerame	Sumba Barat
21	Oebao	Kupang
25	Bolok	Kupang

Test Wells and Pumping Test Sites

Progress of Well Constructions



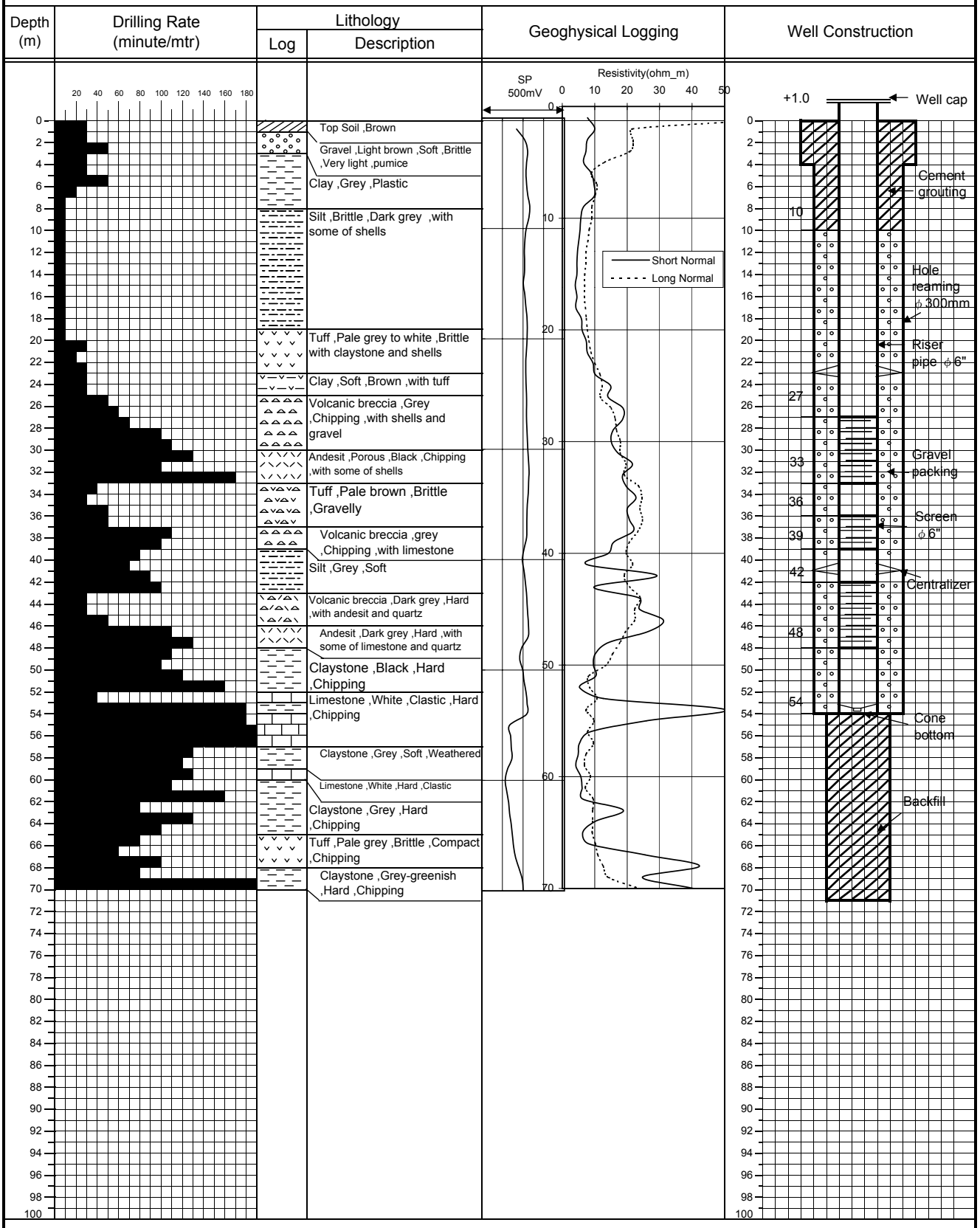
Note : full activity | 1 Not activity (Holiday) | 2 Not activity (waiting for) | 3 Not activity (problem with equipment)

Mob : Mobilization
Prep : Preparation include riogging down
PH : Pilot hole
LG : Geophysical logging
RE : Hole Reaming
CM : Cementing
CI : Casing & Screen Installation
DEV : Well Development
PT : Pumping test

JAPAN INTERNATIONAL COORPORATION AGENCY (JICA)
The Study of Rural Water Supply Project in NTB & NTT
Test Well Drilling and Pumping Test

WELL DESIGN

Well Number	: JICA-TW1	Drilling Rig	: TOHO DH3C
Location	: LABUHAN LALAR ,TALIWANG ,SUMBAWA	Logging Instrument	: OYO 3030
Coordinate	: Lat. S08°49.4′Longt. E116°50.0′	Bor Master	: MUSRIYONO
Elevation	: 10 m above sea level		

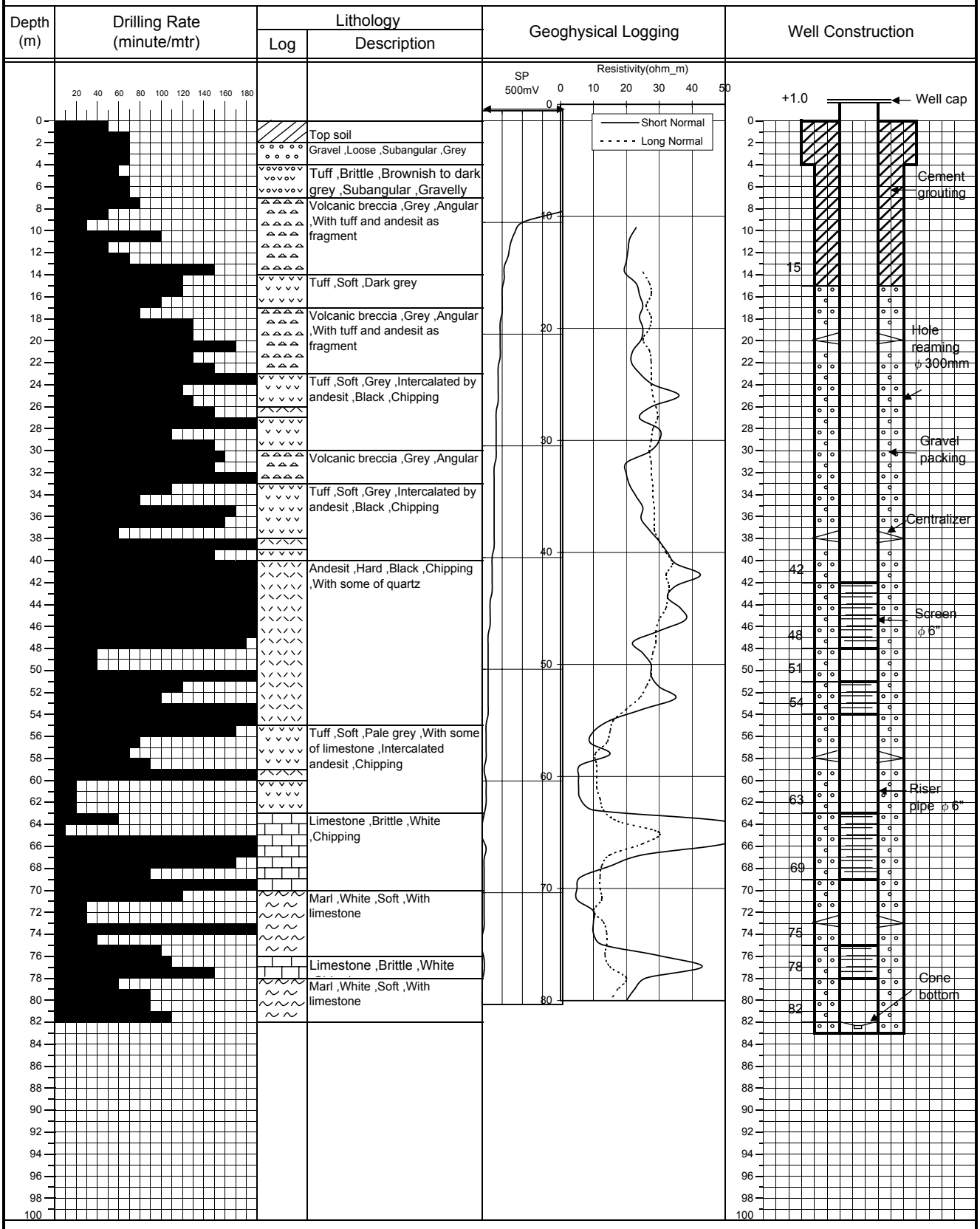


The Study on Rural Water Supply Project in Nusa Tenggara Barat and Nusa Tenggara Timur Japan International Cooperation Agency	Appendix A7-3 Well Design of Test Well (JICA TW-1)

JAPAN INTERNATIONAL COORPORATION AGENCY (JICA)
The Study of Rural Water Supply Project in NTB & NTT
Test Well Drilling and Pumping Test

WELL DESIGN

Well Number	: JICA-TW2	Drilling Rig	: TOHO DH3C
Location	: POTO ,MOYOHILIR ,SUMBAWA	Logging Instrument	: OYO 3030
Coordinate	: Lat. S08°29.9′Longt. E117°28.6′	Bor Master	: MUSRIYONO
Elevation	: 12 m above sea level		

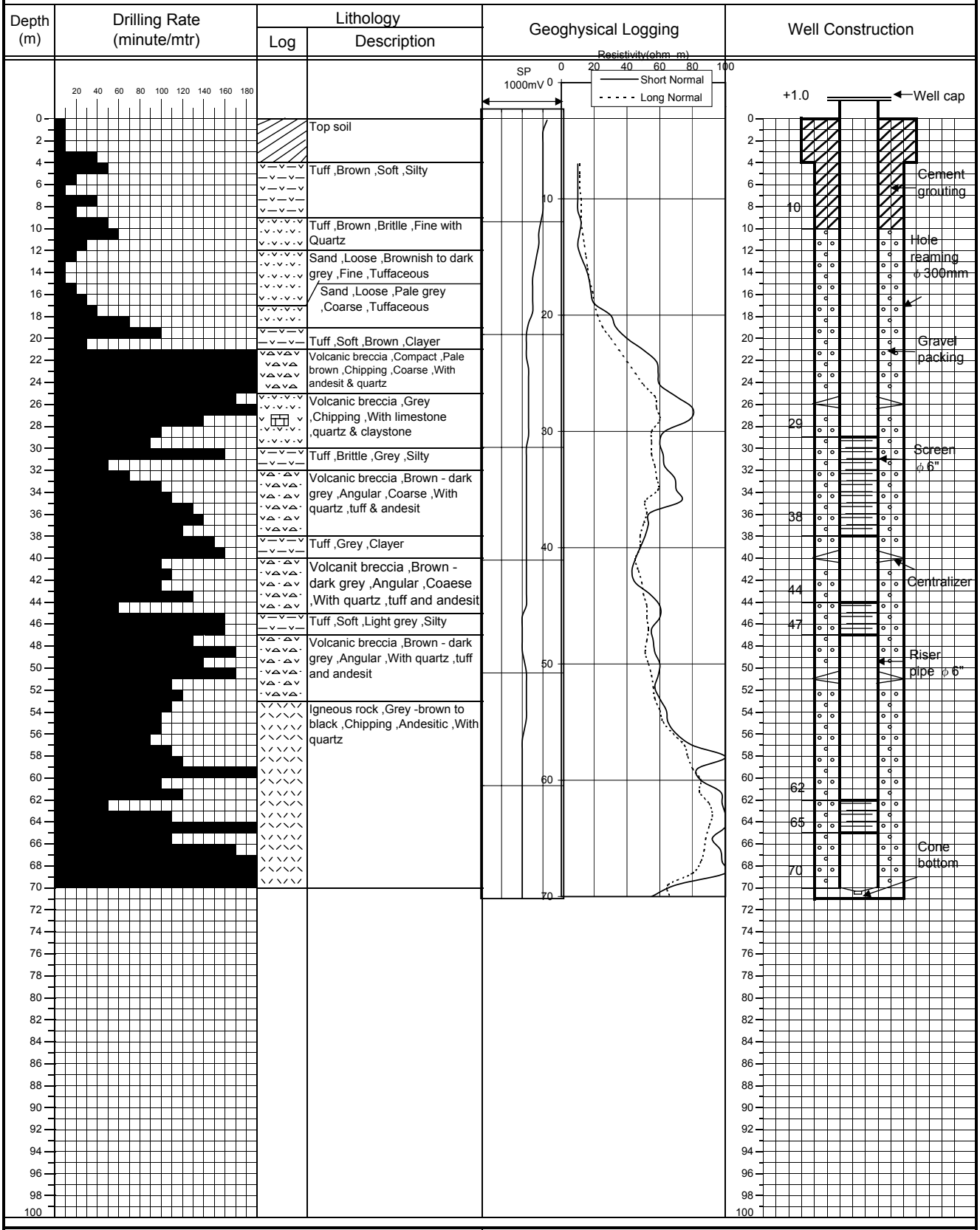


The Study on Rural Water Supply Project in Nusa Tenggara Barat and Nusa Tenggara Timur Japan International Cooperation Agency	Appendix A7-4 Well Design of Test Well (JICA TW-2)

JAPAN INTERNATIONAL COORPORATION AGENCY (JICA)
The Study of Rural Water Supply Project in NTB & NTT
Test Well Drilling and Pumping Test

WELL DESIGN

Well Number	: JICA-TW3	Drilling Rig	: XY-42
Location	: RANGGO ,PAJO ,DOMPU	Logging Instrument	: OYO 3030
Coordinate	: Lat. S08°37.1′Longt. E118°29.4′	Bor Master	: SYAIFUDIN
Elevation	: 63 m above sea level		



The Study on Rural Water Supply Project in Nusa Tenggara Barat and Nusa Tenggara Timur Japan International Cooperation Agency	Appendix A7-5 Well Design of Test Well (JICA TW-3)

JAPAN INTERNATIONAL COORPORATION AGENCY (JICA)
The Study of Rural Water Supply Project in NTB & NTT
Test Well Drilling and Pumping Test

WELL DESIGN

Well Number	: JICA-TW4	Drilling Rig	: KOKEN KM 15B
Location	: JAMBU ,PAJO ,DOMPU	Logging Instrument	: OYO 3030
Coordinate	: Lat. S08°39.0′ Longt. E118°26.2′	Bor Master	: SUMARNO
Elevation	: 10 m above sea level		

Depth (m)	Drilling Rate (minute/mtr)	Lithology Log	Lithology Description	Geoghysical Logging	Well Construction
0–2	10 20 30 40 50 60 70 80 90			SP 500mV; Resistivity(ohm_m) 0 4 8 12 16 20; Short Normal; Long Normal	+1.0 Well cap
2–10			Top Soil is Silt ,Soft ,Brown		
10–20			Sand ,Loose ,Dark grey ,Subangular ,Very coarse ,With some of molusca and gastropoda		Cement grouting
15					
20–22			Silty clay ,Soft ,Brown		
22–30			Sand ,Loose ,Dark grey ,Subangular ,Medium		Hole reaming ϕ300mm
30–40			Gravel ,Loose ,Dark grey ,With tuff ,Molusca and gastropoda		
40–42			Silty clay ,Soft ,Light brown ,With some of limestone		Gravel packing
42					Centralizer
42–45			Gravel ,Loose ,Greynish to black ,Subrounded ,Fine ,Consists of andesit ,Tuff ,Molusca and gastropoda		
45–54			Clayer silt ,Soft ,Brownish grey		
54–57			Gravel ,Loose ,Dark grey ,Subrounded ,Coarse ,With andesit ,Tuff ,Molusca and gastropoda		Screen ϕ6"
57–66			Tuffaceous silt ,Sand ,Grey		
66–72			Tuff ,Soft ,Pale grey ,With gravel ,Molusca and limestone		
72–81			Tuff ,Compact ,Brittle ,Greenish grey ,Chipping ,Intercolated with gravel ,Subangular ,Grey		Riser pipe ϕ6"
81–87					
87–90					
90–100					Cone bottom

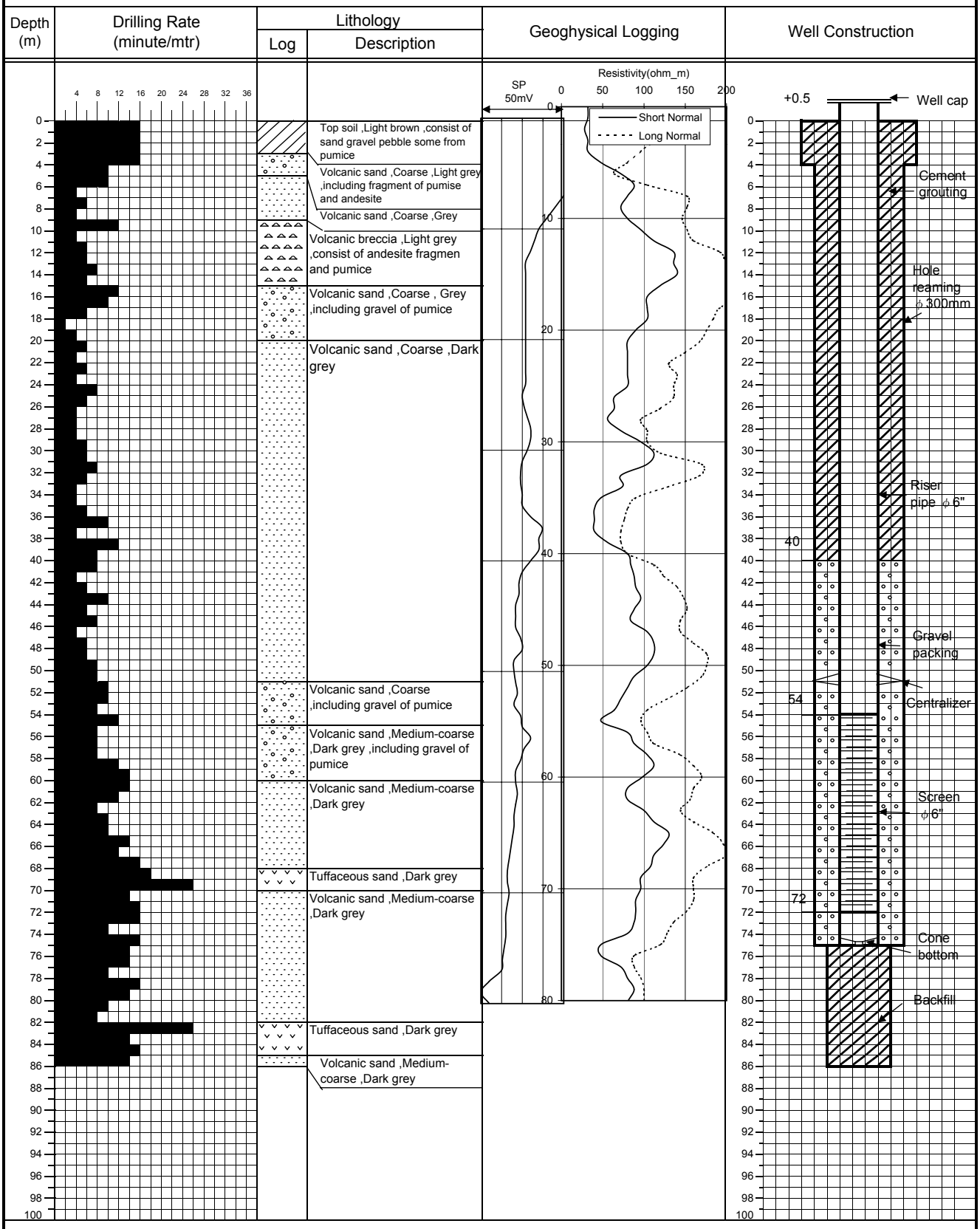
The Study on Rural Water Supply Project in Nusa Tenggara Barat and Nusa Tenggara Timur
Japan International Cooperation Agency

Appendix A7-6
Well Design of Test Well (JICA TW-4)

JAPAN INTERNATIONAL COORPORATION AGENCY (JICA)
The Study of Rural Water Supply Project in NTB & NTT
Test Well Drilling and Pumping Test

WELL DESIGN

Well Number	: JICA-TW5	Drilling Rig	: KOKEN KM 15B
Location	: HEPANG ,LELA ,SIKKA	Logging Instrument	: OYO 3030
Coordinate	: Lat. S08°42.6′ Longt. E112°09.0′	Bor Master	: SUMARNO/KREBO
Elevation	: 110 m above sea level		

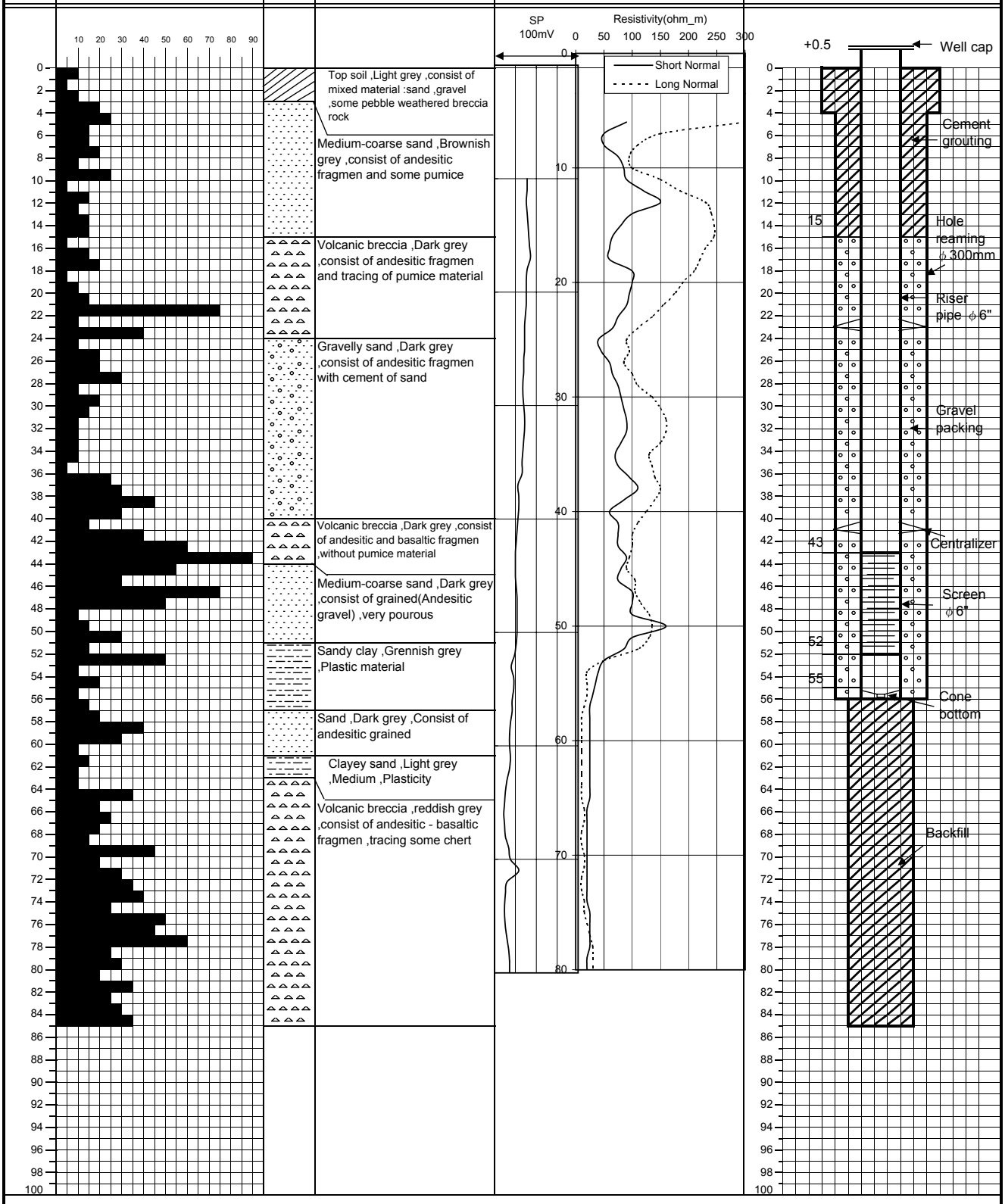


The Study on Rural Water Supply Project in Nusa Tenggara Barat and Nusa Tenggara Timur Japan International Cooperation Agency	Appendix A7-7 Well Design of Test Well (JICA TW-5)

JAPAN INTERNATIONAL COORPORATION AGENCY (JICA)
The Study of Rural Water Supply Project in NTB & NTT
Test Well Drilling and Pumping Test

WELL DESIGN

Well Number	: JICA-TW6	Drilling Rig	: XW-1000
Location	: WATULIWUNG ,KEWAPANTE ,SIKKA	Logging Instrument	: OYO 3030
Coordinate	: Lat. S08°39.6′Longt. E112°15.3′	Bor Master	: KUSWARA
Elevation	: 95 m above sea level		

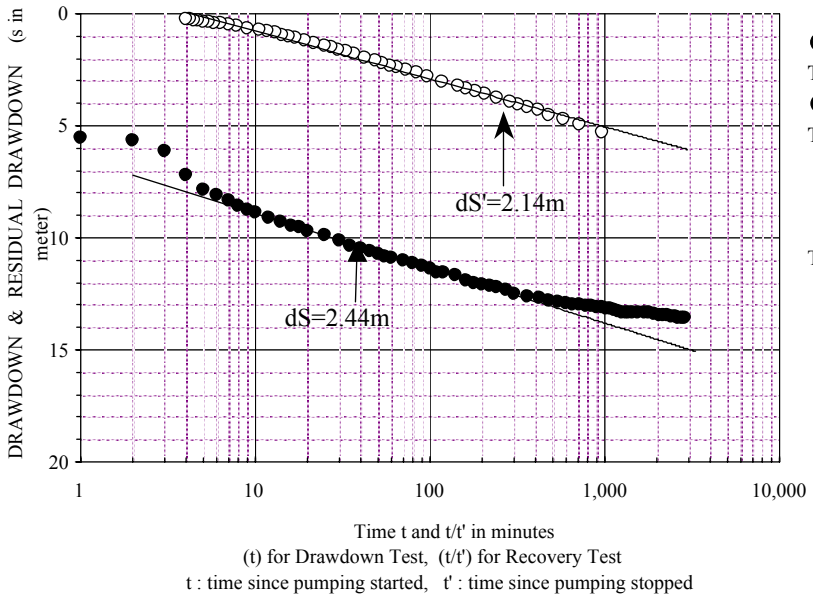


The Study on Rural Water Supply Project in Nusa Tenggara Barat and Nusa Tenggara Timur Japan International Cooperation Agency	Appendix A7-8 Well Design of Test Well (JICA TW-6)

Pumping Test Summary

No.: **PT-1**
Location : **Labuhan Lalar**

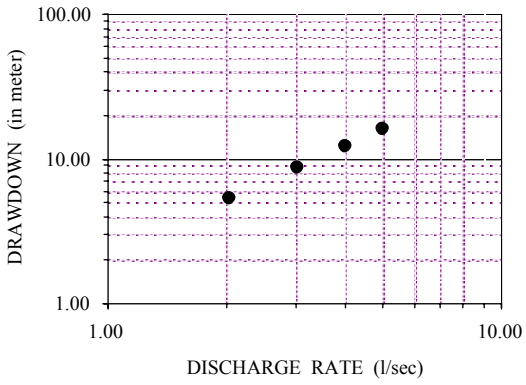
TIME DRAWDOWN GRAPH & RESIDUAL DRAWDOWN GRAPH



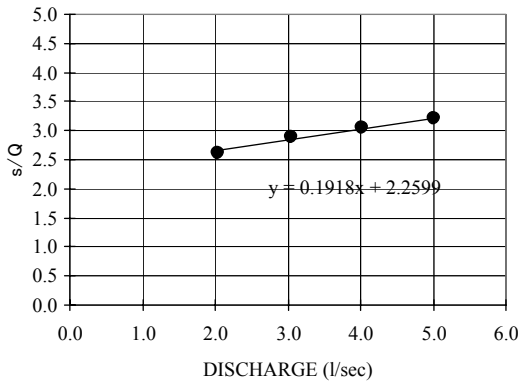
Data of Residual Drawown
T=15.81Q/ds'= 29.7(m2/d)
Data of Time Drawdown
T=15.81Q/ds= 26.1(m2/d)
SWL= 1.46(m)
Q= 4.02(l/sec)

T=(2.3/4pi)x(q/ds') [m2/d]
=15.81x(Q/ds'),
q=60x60x24xQ,
q[m3/d], Q[l/sec]

STEP DRAWDOWN TEST



WELL LOSS EVALUATION



Q (l/sec)	s (m)	Q/s(l/sec/m)	s/Q
2.03	5.32	0.38	2.62
3.04	8.76	0.35	2.88
4.02	12.22	0.33	3.04
5.01	16.04	0.31	3.20

Q: Discharge, s: Drawdown, Q/s: Specific capacity, s/Q=B+CQ

B:	2.26
C:	0.19

B:Aquifer Loss Coefficient
C:Well Loss Coefficient

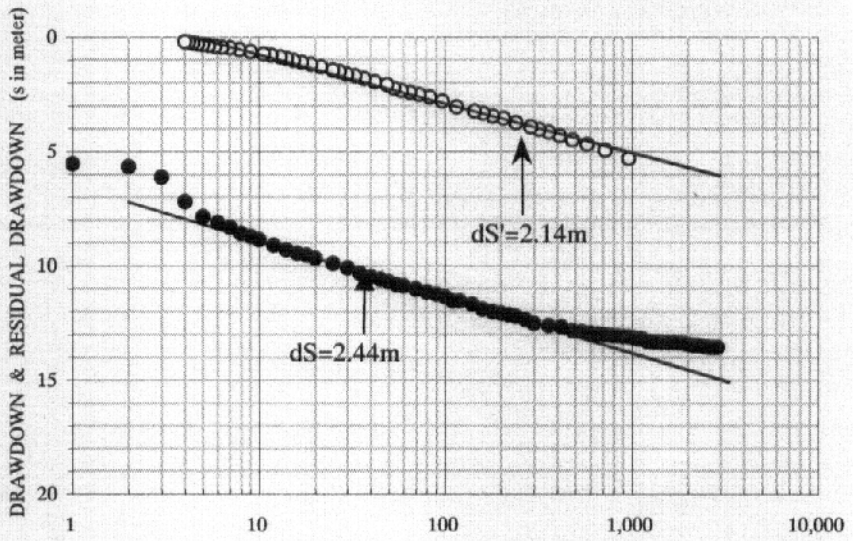
T=(2.3/4pi)x(q/ds') [m2/d]=15.81x(Q/ds'), q=60x60x24xQ, q[m3/d], Q[l/sec]

The Study on Rural Water Supply Project in Nusa Tenggara Barat and Nusa Tenggara Timur	Appendix A7-9 Pumping Test Summary (PT-1for JICA TW-1)
Japan International Cooperation Agency	

Pumping Test Summary

No.: **PT-1**
Location : **Labuhan Lalar**

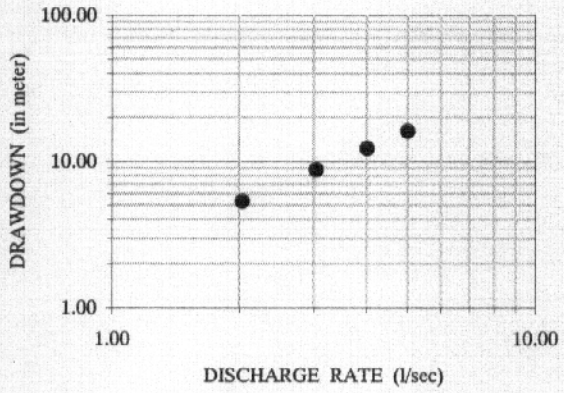
TIME DRAWDOWN GRAPH & RESIDUAL DRAWDOWN GRAPH



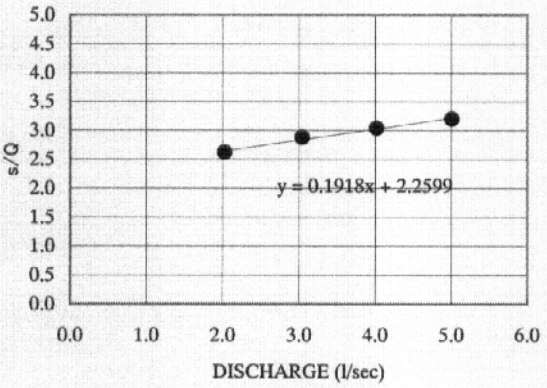
○ Data of Residual Drawown
T=15.81Q/ds'= 29.7(m2/d)
● Data of Time Drawdown
T=15.81Q/ds= 26.1(m2/d)
SWL= 1.46(m)
Q= 4.02(l/sec)

T=(2.3/4pi)x(q/ds') [m2/d]
=15.81x(Q/ds'),
q=60x60x24xQ,
q[m3/d], Q[l/sec]

STEP DRAWDOWN TEST



WELL LOSS EVALUATION



Q (l/sec)	s (m)	Q/s(l/sec/m)	s/Q
2.03	5.32	0.38	2.62
3.04	8.76	0.35	2.88
4.02	12.22	0.33	3.04
5.01	16.04	0.31	3.20

Q: Discharge, s: Drawdown, Q/s: Specific capacity, s/Q=B+CQ

B:	2.26
C:	0.19

B:Aquifer Loss Coefficient
C:Well Loss Coefficient

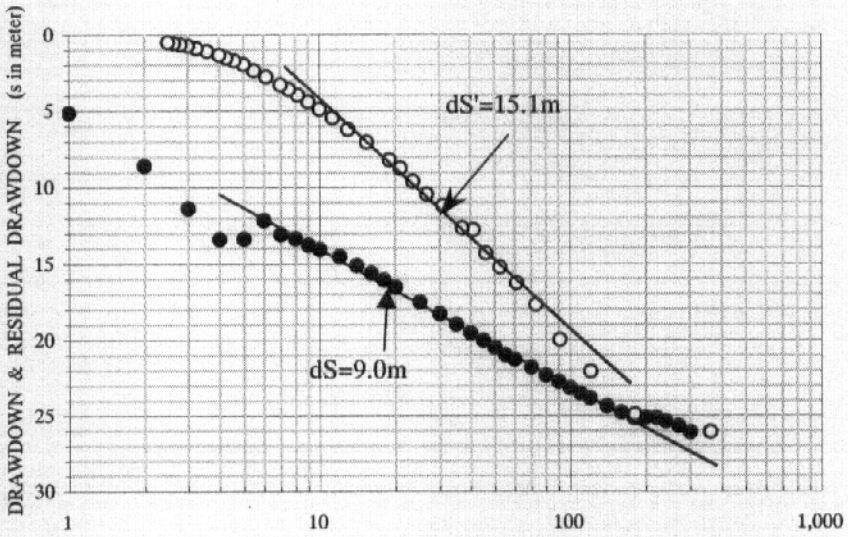
T=(2.3/4pi)x(q/ds') [m2/d]=15.81x(Q/ds'), q=60x60x24xQ, q[m3/d], Q[l/sec]

The Study on Rural Water Supply Project in Nusa Tenggara Barat and Nusa Tenggara Timur	Figure A7-9 Pumping Test Summary (PT-1for JICA TW-1)
Japan International Cooperation Agency	

Pumping Test Summary

No.: **PT-2**
Location : **Poto**

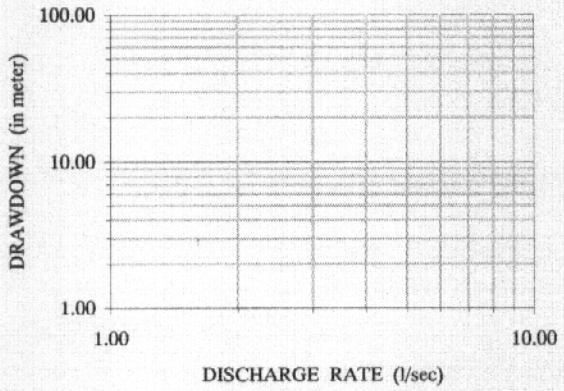
TIME DRAWDOWN GRAPH & RESIDUAL DRAWDOWN GRAPH



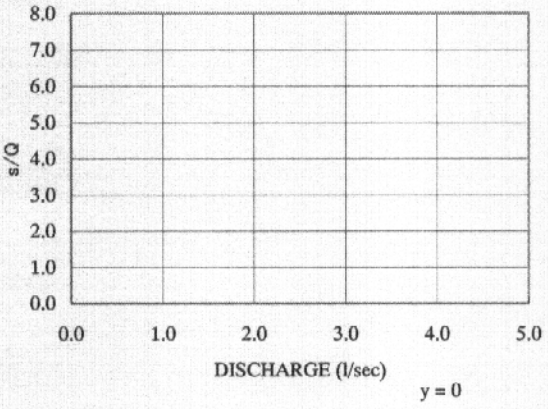
○ Data of Residual Drawown
T=15.81Q/ds'= 0.82(m2/d)
● Data of Time Drawdown
T=15.81Q/ds= 1.36(m2/d)
SWL= 6.32(m)
Q= 0.78(l/sec)

T=(2.3/4pi)x(q/ds') [m2/d]
=15.81x(Q/ds'),
q=60x60x24xQ,
q[m3/d], Q[l/sec]

STEP DRAWDOWN TEST



WELL LOSS EVALUATION



Q (l/sec)	s (m)	Q/s(l/sec/m)	s/Q
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-

Q: Discharge, s: Drawdown, Q/s: Specific capacity, s/Q=B+CQ

B:	-
C:	-

B:Aquifer Loss Coefficient
C:Well Loss Coefficient

T=(2.3/4pi)x(q/ds') [m2/d]=15.81x(Q/ds'), q=60x60x24xQ, q[m3/d], Q[l/sec]

The Study on Rural Water Supply Project in Nusa Tenggara Barat and Nusa Tenggara Timur Japan International Cooperation Agency	Figure A7-10 Pumping Test Summary (PT-2 for JICA TW-2)