| 4244         |             |         | DO 2 1.11  | DRALL C                            |                   |                                       | . NO. IX                              | · ·    | SHEEL    | 110. Z |
|--------------|-------------|---------|--|------------------------------------|-------------------|---------------------------------------|---------------------------------------|--------|----------|--------|
| Star         | ge NO.      | z       | Depth of p                                       | packer<br>ottom                    | 5.0 m /           | o.om Tes                              | ngth                                  | 5.0 m  | Reporter |        |
|              | Time        |         |  | Effective                          | Water             | pumped-in                             |                                       | Lugeon |          |        |
|              |             | Clapsed | pressure<br>Po(kg/cm²)                           | pressure<br>P(kg/cm <sup>2</sup> ) | Integrated<br>(1) | Sectional<br>floy<br>(1/min)          | Const. rate<br>of flow<br>Q (0)min)   |        | Remarks  |        |
| hr           | í           | mir     | 3  | 3.04                               | 41                | (x/aixay                              | d (E)mxii)                            |        |          | ,,     |
| <u>2</u> \$_ | i           | 1       | 1,   |                                    |                   |                                       |                                       |        |          |        |
|              | <i>}</i> /_ | 9       | <del>                                     </del> | · · · · · ·                        | <u>×6</u>         | <u> </u>                              | ~                                     |        |          |        |
|              | 32          | 10      | "  | "                                  | 5)                |                                       | 4.5                                   |        |          |        |
|              |             |         |  |                                    |                   |                                       |                                       |        |          |        |
| 25           | 44          | O       | 2  | Siok                               |                   |                                       |                                       |        |          |        |
| ;            | 3K          |         |  | "                                  | 61                |                                       |                                       |        |          |        |
|              | <u> 26</u>  | 2       | 11   | //                                 | 3/                |                                       |                                       |        |          |        |
|              | 36          | }       | ,  | . 17                               |                   |                                       |                                       |        |          |        |
|              | 37          | ų       | 4  | 4                                  | 92                |                                       |                                       |        |          |        |
|              | 38          | +       | 11   | 4                                  | 102               |                                       |                                       |        |          |        |
|              | 39          | 6       | "  | ,,                                 | 114               |                                       |                                       |        |          |        |
|              | 40          | 5       | ,  | //                                 | 126               |                                       |                                       |        |          |        |
|              | 41          | 3       | .,   | ,                                  | 137               |                                       |                                       |        | ,        |        |
|              | _ ¥2        | 9       | 3  |                                    | 148               |                                       |                                       |        |          |        |
|              | •           |         |  | <u> </u>                           |                   |                                       |                                       |        |          |        |
|              | 43          | 10      | 1,   |                                    | 160               |                                       | 10.9                                  |        |          |        |
| 15           | ¥6          | 0       | 3  | 3.04                               |                   |                                       |                                       |        | i        |        |
|              | 47          | 1.      | "  |                                    | 167               |                                       |                                       |        |          |        |
|              | ×8'         | 2       | 5,   | ,                                  | 174               |                                       |                                       |        |          |        |
|              | 49          | 3       | ,  |                                    | 181               |                                       |                                       |        |          |        |
|              | 50          | 4       |  | ,                                  | 189               |                                       |                                       | ·      | ·        |        |
|              | 51          | 占       | ,,   |                                    | 195               |                                       |                                       |        | ·        |        |
|              | 75          | 6       | ',   | , , , , , ,                        | 202               |                                       |                                       |        |          |        |
|              | 53          | 7       | ,  |                                    | 209               |                                       |                                       |        |          |        |
| i            | 2 ×         | 7       | 61   |                                    |                   |                                       |                                       |        |          |        |
| : !          |             |         |  |                                    | 2/6               |                                       |                                       |        |          |        |
|              | 22          | -9      | n .  | 1.                                 |                   |                                       | · · · · · · · · · · · · · · · · · · · | :      |          |        |
|              | 56          | 10      | 3,   |                                    | 230               |                                       | 2.0                                   |        |          |        |
|              |             |         |  |                                    |                   |                                       |                                       |        |          |        |
| <u> </u>     | 57          | Ö       |  | 1.04                               |                   |                                       |                                       |        |          |        |
|              | 58          |         | ,,   | <b>.</b>                           | 235               |                                       |                                       |        |          |        |
|              | 59          | 2       | ,,   | ,                                  | 239               | · · · · · · · · · · · · · · · · · · · | ļ <u>.</u>                            |        |          |        |
| 16           | 00          | 3       | ,  |                                    | 242               | ·                                     |                                       |        |          |        |
|              |             | ķ       | ,  | ,                                  | 246               |                                       |                                       |        |          |        |
| į            | 2           | 5       |  | 14                                 | 249               |                                       |                                       |        |          |        |

| Stage | ю.   |          | Depth of p                          | packer<br>ottom                    | 5.0 m-1        | 0.0 m 1.                     | ngth j                   | 5 m           | Reporter |
|-------|------|----------|-------------------------------------|------------------------------------|----------------|------------------------------|--------------------------|---------------|----------|
|       | Time |          | Gauge                               | Effective                          | Water          | pumped-in                    | :                        | Lugeon        |          |
| hr_   | _min | Elapsed  | pressure<br>Po(kg/cm <sup>2</sup> ) | pressure<br>P(kg/cm <sup>2</sup> ) | Integrated (1) | Sectional<br>floy<br>(1/min) | Const. rate<br>Q ((/min) | value<br>(Lu) | Remarks  |
| 16    | 3    | 6        |                                     | 1,04                               | 253            |                              |                          |               |          |
|       | Ų    | 7        | 11                                  | 4                                  | 257            |                              | ,                        |               |          |
|       | 5    | 8:       | /.                                  | ,,                                 | 260            |                              |                          |               |          |
|       | 6    | 9        | ,,                                  | ,                                  | 263            |                              |                          |               |          |
| ;     | 7.   | 10       | Ì                                   | 4                                  | 266            |                              | 3,6                      |               |          |
|       |      |          |                                     |                                    |                |                              |                          |               |          |
| ;     |      |          |                                     |                                    |                |                              |                          |               |          |
|       |      |          |                                     |                                    |                |                              |                          |               |          |
|       |      |          |                                     |                                    |                |                              |                          |               |          |
|       |      |          |                                     |                                    |                |                              |                          |               | •        |
| i     |      |          |                                     |                                    |                |                              |                          |               |          |
| -     |      |          |                                     |                                    |                |                              |                          |               |          |
|       |      |          |                                     |                                    |                |                              |                          |               |          |
|       |      |          | <u> </u>                            | ļ <u>-</u>                         |                |                              |                          |               |          |
|       |      |          |                                     |                                    |                |                              |                          |               |          |
| +     |      |          | <del> </del>                        |                                    |                |                              |                          | -             |          |
|       |      |          |                                     |                                    |                |                              |                          |               |          |
|       |      |          |                                     |                                    |                |                              |                          |               | ·        |
|       |      |          |                                     |                                    |                |                              |                          |               |          |
|       |      |          |                                     |                                    | <u> </u>       |                              |                          | <b></b>       |          |
|       |      |          |                                     |                                    |                |                              |                          |               |          |
|       |      |          |                                     | <u> </u>                           | ·              |                              |                          |               | ,        |
|       |      |          |                                     |                                    | <u> </u>       |                              |                          |               |          |
|       |      |          | ļ                                   | ļ                                  |                |                              |                          |               |          |
|       |      |          |                                     |                                    | ·              |                              |                          |               |          |
|       |      |          |                                     |                                    |                |                              | ļ                        |               |          |
|       |      |          |                                     |                                    |                | ļ                            | ļ                        |               |          |
| -     |      |          |                                     |                                    |                |                              |                          |               |          |
|       |      |          |                                     |                                    |                |                              |                          |               |          |
|       |      |          |                                     |                                    |                |                              |                          |               |          |
|       |      |          |                                     |                                    |                |                              |                          |               |          |
| •     |      | <br>     |                                     |                                    |                |                              |                          |               |          |
|       |      | <u> </u> |                                     |                                    |                |                              | .:                       |               |          |
|       |      |          |                                     |                                    |                |                              |                          |               |          |
|       |      |          |                                     |                                    |                |                              |                          |               |          |

|            |                   |  | Х         | E        | KA          | T         |             |              |          |              |           | HOL  | E N             | o. K I -         | - 1                                    | / OF / 1   |
|------------|-------------------|--|-----------|----------|-------------|-----------|-------------|--------------|----------|--------------|-----------|--|-----------------|------------------|--|--|
| LOCA       | ATION             |  | IN        | TAKI     | B DA        | 4         | g           | EPTH         | 1 OF     | HOL          | ε         | 15.0<br>6.6                                      |                 |                  | T DATE _                               | Mar. 13, '91<br>H. WATANABE                      |
|            | ATION             |  |           | 41       | 08. U       | w         |             |              |          | R OF<br>DEPT |           | 6. 6<br>15. 0                                    | w.              | TES              | TED BY "                               | THONGSAY   |
| OOF<br>NGI | RDINATE<br>E FROM | HOL                                    | 70NT      | Δι .     | 90          | •         |             | CUCI         | 0.1      | C DEAT       | . CO TADI | c  |                 | CHEC             | CKEO BY_                               | I. SHIMIZU                                       |
|            | NNG OF            |  |           |          |             |           | _           | 8EF0         | ORE      | т. В         | O m Af    | .c<br>TER.T                                      | , m             | 1 -              |  |  |
|            | T SECT            |  |           |          |             |           | m           | ro           |          | 15.0         | <u>m</u>  |  |                 |                  |  |  |
| m )        | H <sub>1</sub>    |  | H2<br>(m) |          | P(          |           | •           | P<br>g/cm²   | 2) (     | t<br>(min)   | Qt        | Qo<br>(2/mir                                     | 7) (4           | Q<br>{/min/m}    | LU<br>(Lugeon)                         | K (cm/sec)                                       |
| 7          | 1.1               |  | 8.5       |          | 1.          |           |             | 1.96         |          | 10           | 50        | 5.0  | 1               | 1.0              | 5.10                                   | 2.95 × 10-5                                      |
| <u>)</u>   | / /               | +-                                     | 4         | -        |             | 0         |             | . 96         |          | 10           | 277       | 22.2   |                 | ttx              | 9.30                                   | 5.38 4/0-5                                       |
| -          | 4                 | +                                      | 4         | +        | _3:<br>10   |           |             | 0.96         | _ ;_     | 10           | 401       | 40.  |                 | 8.02             | 7.54                                   | 4.20x/0-5  |
| -          |                   |  |           | +        |             | . 0       | F           | <u>v. 7.</u> |          | 10           | 301       | 30.1   |                 | 6.10             | 10.23                                  | 5.92 ×10-5                                       |
| _          | - /,              |  | <u> </u>  |          |             |           |             | 1.96         |          |              | 117       | 11.  |                 | الم ال           |  | 6.91 x10-5                                       |
|            | 11                |  |           | +        |             | 0         |             | 4            | -        | 10           | _//_/_    | <del>                                     </del> |                 |                  |  | 3.7.   |
| -          | <u> </u>          | -                                      |           | +        |             | <u> </u>  | -           |              | +        |              |           | <del> </del>                                     | -               |                  | <del></del>                            |  |
|            |                   | +                                      |           | +        |             | Parameter |             |              | 1        |              |           | <del> </del>                                     | _               |                  |  |  |
|            |                   | +                                      |           | +        |             |           | <del></del> |              | +        |              |           | 1  | +               |                  |  |  |
|            |                   |  |           | +        | ·           |           |             |              |          |              |           | 1  | +               | <del>-</del>     |  | 1  |
|            | <u></u>           | +                                      |           | $\dashv$ |             |           |             |              | $\dashv$ |              |           | 1  | $\top$          |                  |  |  |
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|            | L                 | - -                                    |           |          | <del></del> |           |             |              |          |              |           | <del> </del>                                     | - -             |                  |  | <del> </del>                                     |
|            |                   |  |           | -        |             |           |             |              | -        |              |           | ╁───   | +               |                  |  | <del> </del> -                                   |
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|            | <u> </u>          |  |           | +        |             |           |             |              | -        |              |           | }  |                 |                  |  | <del> </del>                                     |
|            |                   | ــــــــــــــــــــــــــــــــــــــ |           |          |             |           | L           |              |          |              |           |  |                 | cplanatio        | ne -                                   |  |
| [          |                   |  |           | =        |             |           |             |              |          |              | -         | ③(Po)  | @ <sup>[]</sup> | cpianatic        | , <sup>2</sup> Po                      | _3   |
| į          |                   |  |           |          |             |           |             |              |          |              |           | _ , , ,  | үገ              | _ <sub>0</sub> ~ |  | <del></del>                                      |
|            |                   |  |           |          |             |           |             |              |          |              | 1         | (m) [  | ξУ~ <u>_</u>    |                  |  | HI   |
|            |                   |  |           |          |             |           |             |              |          | ==           | H (m) H   | (m)  |                 | -0-              |  | 9  |
|            |                   |  |           |          |             |           |             |              |          |              |           |  |                 | (5)              |  | H (m) H2   |
|            |                   |  |           |          |             |           |             |              |          |              |           | T-199  | <u> </u>        |                  | PE                                     | <del>                                     </del> |
|            |                   |  |           |          |             |           |             |              |          |              | 69 r      | (m)  |                 |                  |  | L/2 (m) — (i                                     |
| F          |                   |  |           |          |             |           |             |              |          |              |           | 21   |                 |                  | ************************************** | <del></del> 0                                    |
|            |                   |  |           |          | 擅           |           |             |              |          |              | 1         | Baturated  | etro            | tal              |  | ated stratal                                     |
| 10         |                   |  |           | = //     |             |           |             |              |          |              | 1         |  | 3114            | •                |  | •  |
| 8          |                   |  |           | #        |             |           |             |              |          |              | (i): I    | 'ump<br>·low mete                                | ,               |                  | Gauge pres                             | ssure<br>Pressure gauge :                        |
|            |                   |  |           | #        |             |           |             |              |          |              | 4 . 7     | ressure ga                                       |                 | $H_2$ :          | Depth of C                             | Ground water                                     |
| 6          |                   |  |           |          |             |           |             |              |          |              | 1 =       | Ground su  |                 |                  | (Saturated                             |  |
|            |                   |  | #         |          |             |           |             |              |          |              | 1 -       | Orill hole                                       |                 | r:               | Effective p<br>P=P <sub>0</sub> + H(m  | )/10, H=H <sub>1</sub> +H <sub>2</sub>           |
| 4          |                   | //                                     |           |          |             |           |             |              |          |              |           | njection p                                       | ipe             | ţ :              | Injected tii                           | me   |
|            |                   |  |           |          |             |           |             |              |          |              | (7): F    | 'acker<br>Vater table                            |                 | Qt:              | Water volu<br>in "t"                   | me during time                                   |
| 4          |                   |  |           |          |             |           |             |              |          |              |           | lydrostatic                                      |                 | Qo:              | Water volu                             | me per one min.                                  |
|            |                   |  |           |          | J           |           |             |              |          |              | (i): I    | ength of   |                 | Lu:              | Lugeon val<br>I/min/m/10               | ue in<br>Okg/cm²                                 |
| 0          | 2                 | 4                                      | •         | )        | 8           |           | 0 "         | 01           | . 1 - \  |              |           | ecjion<br>Diameter o                             | Ehali           | 7/ .             | Coefficient                            | of permeability                                  |
|            |                   |  |           |          | :           |           | ψ ()        | ℓ/min        | 1/m)<br> | l            | (1.9), L  | , annotor O                                      |                 | к                | = Q <sub>0</sub> -                     | Log(L/r)<br>L(II,+H2+10P)                        |
|            |                   |  |           |          | ٠.          |           |             |              |          | 4P           | 2-31      |  |                 |                  | 14UU 7                                 | S LULTER TERMINE                                 |
|            |                   |  |           | -        |             |           |             |              |          |              | ., J.     |  |                 |                  |  |  |

kg/cm2

kg/cm<sup>2</sup>

0.1

15

Water table

Feature

Xe Katam project

Date of test 3 - 13 -199/

Max.

Location Intake Dani

Coordinates

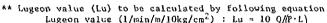
Country Lao P.D.R.

Reporter THONGSAT

Firm name ( HEC

| •••  |                               | Elevation of top                 | 468.   | O m      | Diametar           | (ø) mm             | ı; Size |               | Unsaturated strata  |
|------|-------------------------------|----------------------------------|--------|----------|--------------------|--------------------|---------|---------------|---------------------|
| BO   | re hole                       | Dip                              | 90     | 0        | Bearing            |                    |         |               | Po Pressure gauge   |
|      |                               | Stage NO.                        |        |          |                    | Geology            |         |               | Pump St.kor, van    |
| Te   | est                           | Depth of packer<br>& hole bottom | 70.5 a | <b>α</b> | , m                | Basalt             | Lava    |               | P3                  |
|      | section .                     | Elev. of packer<br>& hole bottom | i i    | n-       | m                  | Dasail.            | Tavas   |               | Packer 77 77 Packer |
|      |                               | Length (L)                       |        |          | m                  |                    |         |               | 4.7                 |
| 8    | ight of auge(h <sub>1</sub> ) | 1.1 m                            |        |          | <u> </u>           |                    |         |               | Water table         |
|      | ter<br>able(h2)               | 2,5 m                            |        |          | Temperat<br>of inf | ure<br>ected water |         | °C            | Saturated strata    |
|      | Mfr.<br>model                 | MG-5A                            |        | w<br>rer | Туре               |                    |         | <del></del> . | F                   |
| dun, | Max.<br>discharge             | 70                               | l/min  |          |                    |                    | /       | l             | Pump Pump           |
| ٦,   |                               |                                  |        | 2        | 1 C                | 1                  |         |               | 1 """" 1 3 1 1 1 1  |

\* Effective pressure(kg/cm<sup>2</sup>) :  $P = P_0 + 1/(10(h_3 - h_4))$  h4= head loss

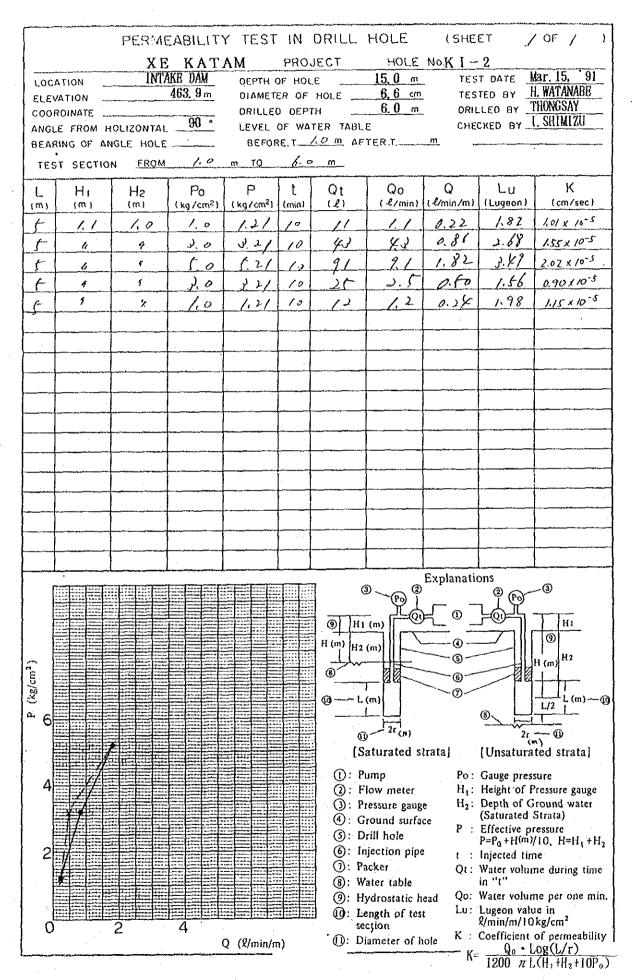


60

|            | Time        |                | Gauge | Effective              |                | er pumped-1                  |                                     | Lugeon        |         |
|------------|-------------|----------------|-------|------------------------|----------------|------------------------------|-------------------------------------|---------------|---------|
| _hr_       | <u>wi</u> n | Elapsed<br>min | i,    | pressure<br>P (kg/cm²) | Integrated (1) | Sectional<br>Flow<br>(k/min) | Const. rate<br>of flow<br>Q (l/min) | value<br>(Lu) | Remarks |
| 71         | 50          | C              | 1     | 1.96                   | C              |                              |                                     |               |         |
|            | 3/          |                | ,     |                        | Ç              |                              |                                     |               |         |
|            | <u>(:</u>   | ٠,             |       | t.                     | 10             | · ·                          |                                     |               |         |
|            | , t : 1     | ·              |       | 3,5                    | 15             |                              |                                     |               | •       |
|            | * • -       |                |       | 4                      | 27             |                              |                                     |               |         |
|            | * *         | Ç              |       | 4,                     | : (            |                              |                                     |               |         |
|            | 12          | 6              |       |                        |                |                              |                                     |               |         |
|            | 5 4         | <i>'</i>       |       | ,                      |                |                              |                                     |               |         |
|            | , j         | 7              |       | ,                      | 170            |                              |                                     |               |         |
|            | 63          | ٤              |       | ,                      | 46             |                              |                                     |               |         |
| رلار       | 00          | 16             |       | ч                      | \$0            |                              | 5,0                                 |               |         |
|            |             |                |       |                        |                |                              |                                     |               |         |
| <i>,</i> > | , s         | <u> </u>       | 5     | 5.96                   |                |                              | <u> </u>                            |               |         |
|            | Ų           |                |       |                        | 28             |                              |                                     |               |         |
|            | 1           | ~,             |       |                        | 105            |                              |                                     |               |         |
|            | ķ           |                |       |                        | /33            |                              |                                     |               |         |
|            | ,           |                |       | ,                      | 161            |                              |                                     |               |         |
|            |             | 5,             |       |                        | 188            |                              |                                     |               |         |
|            | _ ?         | <u>(</u> -     |       | "                      | 216            |                              |                                     |               |         |
|            | 15          | · .            |       |                        | 244            |                              |                                     |               |         |

| Stage NO. | 13      | Depth of p   |   | 10,0 m-    | K.Om T                                 | es:<br>length |                       | 5.0 m    | Reporter |
|-----------|---------|--------------|---|------------|--|---------------|-----------------------|----------|----------|
| Time      | 2       | Gauge        | Effective                                     | Water      | pumped-1                               |               |                       | Lugeon   |          |
| hr min    | Elapsed | pressure     |   | Integrated | Sectiona<br>floy<br>(l/mit             | Const.        | rate<br>flow<br>/min) |          | Remarks  |
| 12 11     | 8       | 5            | 5.96  | 272        | \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\ | 7 3 33        |                       |          |          |
|           | 9       | //           | 1.  | 300        |  |               |                       |          |          |
| 13        | 10      | ,,           | .,  | 327_       | ,                                      | 27            | 7                     |          |          |
|           |         |              |   | 7          |  |               |                       |          |          |
| 12 2/     | 0       | 10           | 10,76   |            |  |               |                       |          |          |
| 22        | 1       | 4            |   | 368        |  |               |                       | <u> </u> |          |
| 23        | 2       | ,            |   | 408        |  |               |                       |          |          |
| 24        | 3       | u            |   | 448        |  |               |                       |          |          |
| 25        | 4       | ,,           | ,,  | 488        |  |               |                       |          |          |
| 26        | 2       | ,            | ٨   | 528        |  |               |                       |          |          |
| 27        | 6       |              | ,   | 568        |  |               |                       |          |          |
| 78        | 7       | 4            |   | 608        | }                                      |               |                       |          |          |
| 29        | 8       | ,            | ,   | 648        |  | _             |                       |          |          |
| 30        | 9       | <u> </u>     | - 1,  | 688        |  |               |                       |          |          |
| 31        | 10      |              |   | 728        |  | 40            | 1                     |          |          |
|           |         | <b></b>      |   |            |  |               |                       |          |          |
| 32 در     | 6       | 2            | 5.96  |            |  | _             |                       |          |          |
| 33        | 1.      | - 1/         | ,   | 358        |  |               |                       |          |          |
|           | 2       | /,           | ,,  | 790        |  |               |                       |          |          |
| 35        | 3_      | 3            | ,   | 821        |  | <u> </u>      |                       |          |          |
| 36        | Ц       | ļ <u>'</u>   | .,,   | 893        |  |               |                       |          | •        |
| 37        | •       | ļ.,          | ٤   | 883        |  | _             |                       |          |          |
| 38        | 1       | <del> </del> | i.  | 913        | <br>                                   |               |                       |          |          |
| 39        | 2       | *            |   | 943        |  | _             |                       |          |          |
| 40        | 1       | <u> </u>     | •   | 973        |  |               |                       |          |          |
| 4/        |         |              |   | 1.003      | <br>                                   | -             |                       |          |          |
| 42        | 10      | 4            | ,   | 1.033      | <u></u>                                | 30            | 5                     |          |          |
|           |         | ļ            |   |            |  |               |                       |          |          |
| 17 K3     | 1       | 1            | 1.96  |            |  |               |                       |          |          |
| KK        | i       | 1            | 8   | 1045       |  |               |                       |          |          |
| 45        | 1       | ,            | <u>, , , , , , , , , , , , , , , , , , , </u> | 1.057      |  |               |                       |          |          |
|           | į.      |              | •   | 1.069      |  |               |                       |          |          |
| 47        | 1       | 4            | "   | 1.081      | <u> </u>                               | -             |                       |          |          |
| Form B    | 5       | 1,           | 5   | 1.092      | <u></u>                                |               |                       | <u> </u> |          |

| Reporter | 5 m             | t<br>ngth i                           | tiom Tes                                   | 100 m- 1                              | packer<br>prtom                       | Depth of p | 3           | Stage NO. |
|----------|-----------------|---------------------------------------|--|---------------------------------------|---------------------------------------|------------|-------------|-----------|
| Remarks  | Lugeon<br>value | <u></u>                               | pumped~in                                  |                                       | Effective<br>pressure                 | Gauge      |             | Time      |
|          | value<br>(Lu)   | Const. rate<br>of flow<br>Q ((/min)   | Sectional<br>flow<br>(L/min)               | Integrated                            | P(kg/cm <sup>2</sup> )                | Po(kg/cm²) | Elapsed min | br min    |
|          |                 |                                       |  | 1.104                                 | 1.96                                  | 1          |             | 2 49      |
|          |                 |                                       |  | 1.115                                 | , ,                                   | 4          | 2           | 50        |
|          |                 |                                       | •  | 1.127                                 | 4,                                    | J.         | 8           | 12        |
|          |                 |                                       |  | 1.139                                 | ,                                     | 17         | 9           | \$2       |
|          |                 | 11.7                                  |  | 1.150                                 | Į.                                    | ,          | 10          | 53        |
|          |                 |                                       |  |                                       |                                       |            |             |           |
|          |                 |                                       |  |                                       |                                       |            |             |           |
| •        |                 | !                                     |  |                                       |                                       |            |             |           |
|          | ·               |                                       |  |                                       |                                       |            |             |           |
| •        |                 |                                       |  |                                       |                                       |            |             |           |
| ÷        |                 |                                       |  |                                       |                                       |            |             |           |
|          |                 |                                       | ·<br>· · · · · · · · · · · · · · · · · · · |                                       |                                       |            |             |           |
|          |                 |                                       | <del></del>                                |                                       |                                       |            |             |           |
|          |                 |                                       |  |                                       |                                       |            |             |           |
|          |                 |                                       |  | <del></del>                           |                                       |            |             |           |
|          |                 | · · · · · · · · · · · · · · · · · · · | <u> </u>                                   |                                       |                                       | <b></b>    | <u> </u>    |           |
|          |                 |                                       | <del></del>                                |                                       |                                       |            |             |           |
|          | ·               |                                       | !<br>                                      | <u>.</u>                              |                                       |            | ·           | -         |
|          |                 | _                                     |  |                                       |                                       |            |             |           |
|          |                 |                                       |  |                                       |                                       |            |             |           |
|          |                 |                                       |  |                                       |                                       |            |             |           |
|          |                 |                                       |  |                                       |                                       |            |             |           |
|          |                 |                                       | 1  |                                       |                                       |            |             |           |
|          |                 |                                       |  |                                       |                                       |            |             |           |
|          |                 |                                       |  |                                       |                                       |            |             |           |
| ;        |                 |                                       |  |                                       |                                       |            |             |           |
|          |                 |                                       |  |                                       |                                       |            |             |           |
|          |                 | ;                                     |  |                                       |                                       |            |             |           |
|          |                 |                                       |  |                                       |                                       |            |             |           |
|          |                 |                                       |  |                                       |                                       |            |             |           |
|          |                 |                                       | <u>-</u>                                   | · · · · · · · · · · · · · · · · · · · |                                       |            |             |           |
|          |                 |                                       | <u></u>                                    |                                       |                                       |            |             |           |
|          |                 |                                       | ·  |                                       | · · · · · · · · · · · · · · · · · · · |            |             |           |
|          |                 |                                       |  |                                       |                                       |            |             |           |
|          |                 |                                       |  |                                       |                                       |            |             |           |
|          |                 |                                       | •  | İ                                     |                                       |            |             |           |



Feature Pone, Plan project Xe Katam

Location Intake Dam Coordinates

country Lao PDR.

Reporter THONGSAT

Date of test 5 -75 -197/

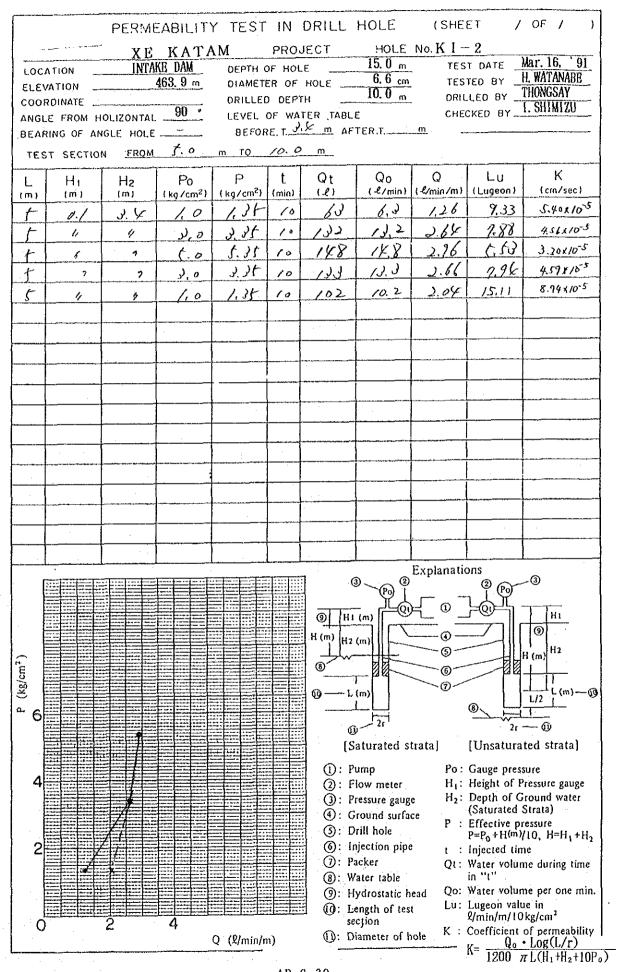
Firm name ( HEC )

| 0  | Elevation<br>of top   | .743.7                                    | l na                   | Diametar   | (d) LL mm; Size       | Unsaturated strata   |
|--|---|---|------------------------|--|-----------------------|--|
| Bore hole  | D1p   | 90  |                        | Bearing  |                       | Po Pressure gauge  |
|  | Stage NO. Depth of packer & hole bottom Elev. of packer & hole bottom | of packer 10 m- of packer 12 bottom 10 m- |                        | L, D so  | Basa/ lava            | RS4.SB.S   |
| Height of<br>gauge (h <sub>1</sub> )<br>Water<br>table (h <sub>2</sub> ) | Length (L)  |   |                        | Temperat   | ure °C<br>ccted water | Water table Saturated strata   |
| Mfr.<br>model<br>Max.<br>Discharge                                       | 716-5   | l/min                                     | surd Flow<br>uge meter | Type Min. graduation composition graduation graduation | / <u>1</u>            | Pump Pump State St |
| pressure<br>Type<br>of packer  | 80  | kg/cm <sup>2</sup>                        | Pressu                 | Max.   | /5 kg/cm <sup>2</sup> | 【  |
| ** Lugeon v  | re pressure(kg/cm<br>ralue (Lu) to be<br>eon value (l/mir             | calculate                                 | d by                   | y followin   |                       | -1   |

|    | Tinte     | <del></del>                           |     | Effective              | Wat        | er pumped-in                 | 1                                   | Lugeon        |                     |
|----|-----------|---------------------------------------|-----|------------------------|------------|------------------------------|-------------------------------------|---------------|---------------------|
| hr | mir       | Elapsed<br>min                        | ( ' | pressure<br>P (kg/cm²) | Integrated | Sectional<br>floy<br>(¿/min) | Const. rate<br>of flow<br>Q (V/min) | value<br>(Lu) | Remarks             |
| 9  | 34        | 0                                     |     | 1.21                   | 0          |                              |                                     |               |                     |
| 7  | 35        | 1                                     | ٠.  | ^                      | 1          |                              |                                     |               |                     |
|    | 36        | 2                                     | 4   | 4,                     | 3          |                              |                                     |               |                     |
|    | 37        | }                                     | ,   |                        | 4          |                              |                                     |               |                     |
|    | 36        | U                                     | ,.  | į.                     | \$         |                              |                                     |               |                     |
|    | 39        | 5                                     | ,.  |                        | ь.         |                              |                                     |               |                     |
|    | 40        | 6                                     |     |                        | 7          |                              |                                     |               |                     |
|    | 41        | 7                                     | ,   |                        | 7          | :                            |                                     |               |                     |
|    | 42        | 8                                     | ,   | ,                      | 9          |                              |                                     |               |                     |
|    | <u>43</u> | 7                                     |     | ,                      | 10         |                              |                                     |               |                     |
|    | 44        | 10                                    |     | ,                      | 11         |                              | 1.1                                 |               |                     |
|    |           | · · · · · · · · · · · · · · · · · · · |     |                        | -          |                              |                                     |               | It should be better |
| 10 | Ь         | b                                     | 3   | 3,2/                   |            |                              |                                     | 1             | interval.           |
| 70 | _ O       | 1                                     | ,   | 1                      | 16         |                              |                                     |               |                     |
|    | 7         |                                       | *   | 4                      | 19         |                              |                                     |               |                     |
|    | 9         | 3                                     | 4   | ,                      | 25         |                              |                                     |               |                     |
|    |           | Ĺ                                     | ,   |                        | 30         |                              |                                     | <b> </b>      |                     |
|    |           | \$                                    | 4   | •                      |            |                              |                                     | <del> </del>  |                     |
|    |           |                                       |     | - A :                  | 34         | <u> </u>                     |                                     |               |                     |
|    | 13        | _6                                    | 5   |                        | 38<br>42   |                              | -                                   |               |                     |

|           | · · · · · · · · · · · · · · · · · · · | Depth of p  |                                       |                | T_                          | <del></del>                 |               | Sileet no. Z o            |
|-----------|---------------------------------------|-------------|---------------------------------------|----------------|-----------------------------|-----------------------------|---------------|---------------------------|
| Stage NO. |                                       | & hole be   | ttom /                                | 0 m- 6         | 6.0 m Te                    | ength j                     | 5 . t m       | Reporter                  |
| Time      |                                       |             | Effective<br>pressure                 | <u> </u>       | pumped-in                   |                             | Lugeon        | Remarks                   |
| he min    | Elapsed min                           | Po(kg/cm²)  | P(kg/cm <sup>2</sup> )                | Integrated (1) | Sectional<br>floy<br>(1/min | Const. rate of flow (0/min) | value<br>(Lu) |                           |
| 10.14     | 1                                     | 3           | 3,21                                  | 46             |                             |                             |               |                           |
| 15        | 9                                     | "           |                                       | 50             | ·                           |                             |               |                           |
| 16        | 10                                    | 4           | . ,                                   | 5×             |                             | 4,3                         |               |                           |
|           |                                       |             |                                       |                |                             |                             |               |                           |
| 10 23     | 0                                     | 5           | 5.21                                  |                |                             |                             |               |                           |
| 24        | ,                                     | 4           | 4                                     | 61             |                             |                             |               |                           |
| 25        | 2                                     | /,          | 4                                     | 70             |                             |                             |               |                           |
| 26        | 3                                     | 1.          | 4                                     | 29             |                             |                             |               |                           |
| 27        | 4                                     |             | ,                                     | 88             |                             |                             |               |                           |
| 28        | 5                                     |             |                                       | 96             |                             |                             |               |                           |
| 29        | 6                                     | 1,          | ۲                                     | 105            |                             |                             |               |                           |
| 30        | 7                                     | 4,          |                                       | 115            |                             |                             |               |                           |
| 3/_       | 8                                     |             | ¥                                     | 125            |                             |                             |               |                           |
| 32_       | 9                                     |             | ,                                     | 135            |                             |                             |               |                           |
| 33        | 10                                    | \$1         | 1                                     | 145            | <br>                        | 9.1                         | !<br>         |                           |
|           |                                       |             |                                       |                |                             |                             |               | and retired has into only |
| 10.40     | 0                                     | 3           | 3.21                                  |                |                             |                             |               |                           |
| 41        | 1                                     | 1,          | ,                                     | 148            |                             |                             |               |                           |
| 42        | 2                                     | <i>j</i> ,, |                                       | 151            |                             |                             |               |                           |
| 43        | 3                                     | "           | ,.                                    | 154            |                             |                             |               |                           |
| 40        | 4                                     | ,           | ,,                                    | 156            |                             |                             | ,             |                           |
| 45        | 5                                     | ••          | ,                                     | 158            | <del>-</del>                |                             |               |                           |
| 46        | <u></u>                               |             | 6                                     | 160            |                             |                             | ,             |                           |
| 42        | 7                                     | ٠,          |                                       | 162            |                             |                             |               |                           |
| <u> </u>  | 8                                     | ,           |                                       | 165            |                             |                             |               |                           |
| 49        | 9                                     | ,           | ^                                     | 168            |                             |                             |               |                           |
| 50        | 10                                    |             | ٠,                                    | 170            |                             | 2,\$                        |               |                           |
|           |                                       |             |                                       |                |                             |                             |               |                           |
| 10:52     | 0                                     | 1           | 1,21                                  |                | .,                          |                             |               | ••                        |
|           |                                       |             |                                       | 171            |                             | _                           |               |                           |
| 54        | 2                                     |             | <i>A</i>                              | 173            |                             |                             |               |                           |
| 22        | 3                                     | r.          | , , , , , , , , , , , , , , , , , , , | 175            |                             |                             |               |                           |
| 56        | 4                                     |             |                                       | 177            |                             |                             |               | ·                         |
| 57        | 5                                     | 6           | F./                                   | 179            |                             |                             |               |                           |
| Form R    |                                       |             |                                       |                |                             |                             |               |                           |

| Sta | ge 80.     | 1                | Depth of                                      | packer<br>ottom        | /. 0 m- 6      | S.O m Tes       | ngth i                                | 50 m   | Reporter |
|-----|------------|------------------|---|------------------------|----------------|-----------------|---------------------------------------|--------|----------|
|     | Time       | 1                | Gauge   | Effective              | Water          | pumped-in       |                                       | Lugeon | Remarks  |
| _hr | <u>min</u> | Elapsed<br>min   | Po (kg/cm²)                                   | P(kg/cm <sup>2</sup> ) | Integrated (1) | flow<br>(l/min) | Const. rate<br>of flow<br>Q ((/min)   | (rn)   |          |
| 10  | 58         | Ь                |   | 1,21                   | 180            |                 |                                       |        | ·        |
|     | 59         | 7                | - 4   |                        | 180            |                 |                                       |        |          |
| //  | 00         | 3                | <u>,, , , , , , , , , , , , , , , , , , ,</u> | 4                      | 181            |                 |                                       |        |          |
|     |            | 9                | ,   |                        | 182            |                 |                                       |        |          |
|     | _2_        | 10               | "   |                        | 182            |                 | 7.5                                   |        |          |
|     |            | <u> </u>         |   |                        |                | <del></del>     |                                       |        |          |
|     |            |                  |   |                        |                |                 |                                       |        | ·        |
|     | !<br>!     |                  |   |                        | . <u></u>      |                 |                                       |        |          |
|     |            |                  |   |                        |                |                 |                                       |        |          |
|     |            | <u> </u>         |   |                        |                |                 |                                       |        |          |
|     | i          |                  |   |                        |                |                 |                                       |        |          |
|     |            | <del></del>      |   |                        |                |                 |                                       |        |          |
|     |            |                  |   |                        |                |                 |                                       |        |          |
|     |            |                  |   |                        |                |                 |                                       |        |          |
|     |            |                  |   |                        |                |                 |                                       |        |          |
|     |            |                  |   |                        |                |                 |                                       |        |          |
|     |            |                  |   |                        |                |                 |                                       |        |          |
|     |            |                  |   |                        |                |                 |                                       |        |          |
|     |            |                  |   |                        |                |                 |                                       |        |          |
|     |            |                  |   |                        |                |                 |                                       |        |          |
|     |            |                  |   |                        |                |                 |                                       |        |          |
|     |            |                  |   |                        |                |                 |                                       |        |          |
|     |            |                  |   |                        |                |                 |                                       |        |          |
|     |            | <u> </u>         |   |                        |                | }<br>}          |                                       |        |          |
|     |            |                  |   |                        |                |                 |                                       |        | ·        |
|     |            |                  |   |                        | <del></del>    |                 | <u> </u>                              |        |          |
|     |            | <u> </u>         |   |                        |                |                 |                                       |        | :        |
|     |            |                  |   |                        |                | <br>            |                                       |        |          |
|     |            | <br>             |   |                        | <br>           |                 | · · · · · · · · · · · · · · · · · · · |        |          |
|     |            | <br><del> </del> |   |                        | !<br>          |                 |                                       | : • '  |          |
|     |            | <br>             |   |                        | <del></del>    |                 |                                       |        |          |
|     |            | <br>             |   |                        |                |                 | <u> </u>                              |        |          |
|     |            |                  |   |                        |                |                 |                                       |        |          |



Feature

project Xe Katam

Location Intake Dam coordinates

Country Lao PDR.

Reporter THONGSAY

Firm name ( HEC

Date of test 3 - 16 -199 |

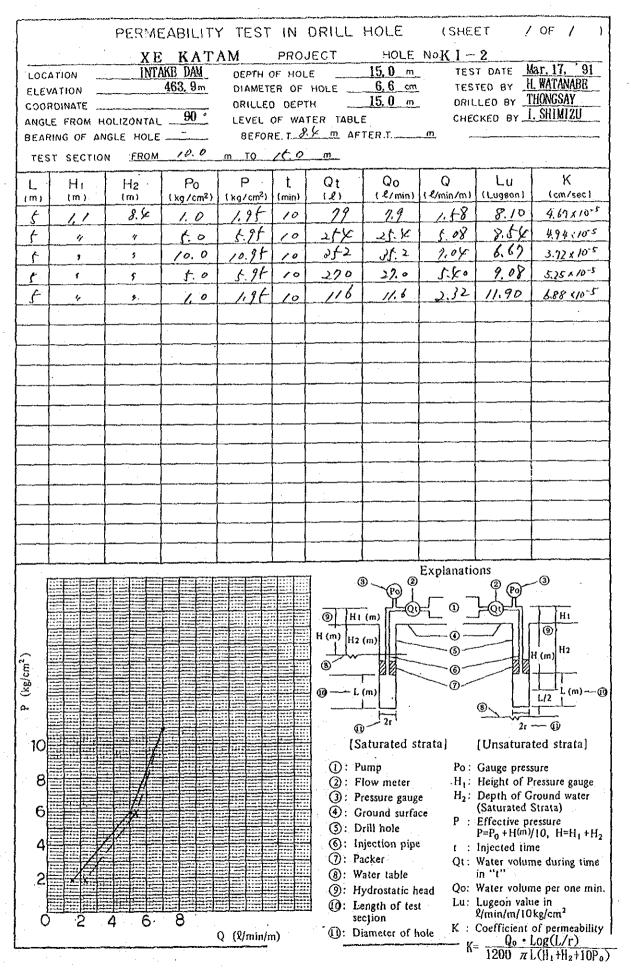
| n    | :                              | Elevation<br>of top                 | 463,9              | m          | Diametar           | (\$) 66 mm; Si     | ze .               | Unsaturated strata |  |
|------|--------------------------------|-------------------------------------|--------------------|------------|--------------------|--------------------|--------------------|--------------------|--|
|      | ore hole                       | Dip                                 | 90.                |            | Bearing            | -                  |                    | Po Pressure gauge  |  |
|      |                                | Stage NO.                           | 2                  |            |                    | Geology            |                    | Pump<br>SISSASAN   |  |
| Τe   | 25 L                           | Depth of packer<br>& hole bottom    | 5.0 0              | <u></u>    | 10,0 m             | Basald             | lara               | E. 2 3.3           |  |
|      | section                        | Elev. of packer<br>& hole bottom    | 13                 |            | m                  | 3,70               |                    | Packer Z           |  |
|      |                                | Length (L)                          | 4                  | 5          | m .                |                    |                    | 40                 |  |
| He   | ight of gauge(h <sub>1</sub> ) | $v_{i,l,m}$                         |                    |            |                    |                    |                    | Water cable        |  |
|      | ter<br>able(h2)                | 3.4 h                               |                    |            |                    | ure<br>ected water | °c                 | Saturated strata   |  |
| i    | Mfr.<br>model                  | MG-5A                               |                    | re.        | Type               |                    |                    |                    |  |
| dun. | Max.<br>discharge              |                                     | l/min              | žě,        | iin.<br>graduation |                    | 1 1                | Pump               |  |
|      | Max.<br>pressure               | 60                                  | kg/cm <sup>2</sup> | SSur       | a o Min.           | 0.1                | kg/cm2             | Vater table        |  |
|      | pe<br>f packer                 |                                     | kg/cm <sup>2</sup> | Pres<br>8a | Hax.               | 15                 | kg/cm <sup>2</sup> |                    |  |
| *    | Effectiv                       | e pressure(kg/cm                    | 2) : P = 1         | Po+        | 1/(10{h3 -         | h4)), h4= head lo  | 2\$0               |                    |  |
|      | Lugeon v                       | alue (Lu) to be<br>eon value (1/min | calculate          | d_by       | followin           | g equation         |                    | 9                  |  |

|     | Time     |                |            | Effective                           | Wati              | er pumped-i                  |                                     | Lugeon        |         |
|-----|----------|----------------|------------|-------------------------------------|-------------------|------------------------------|-------------------------------------|---------------|---------|
| hr_ | min      | Elapsed<br>min | ] -        | pressure<br>P (kg/cm <sup>2</sup> ) | Integrated<br>(1) | Sectional<br>(low<br>(//min) | Const. rate<br>of flow<br>Q (0/min) | value<br>(Lu) | Remarks |
| Z\$ | 50       | 0              |            | 135                                 | 0                 |                              |                                     |               |         |
|     | 51       | /              | ٠,         | "                                   | 2                 |                              |                                     |               |         |
|     | 52       | 2              | ,          | /                                   | /3                |                              |                                     |               |         |
|     | 53       | 3              | ,          | 4.                                  | 19                |                              |                                     |               |         |
|     | 54       | 4              | <i>/</i> . | ^                                   | 26                |                              |                                     |               |         |
| -   | کې       | 5              |            | ,,                                  | }2                |                              |                                     |               |         |
|     | <u> </u> | Ь              | ,,         |                                     | 39                |                              |                                     |               |         |
|     | 57       | 2              | ٠,         | 4                                   | 22                |                              |                                     |               |         |
|     | 58       | 8              | /-         | 1,                                  | _5/               | ļ<br>                        | ļ                                   |               |         |
|     | 59       | 9              |            |                                     | 57_               |                              |                                     |               |         |
| 16  | 00       | 10             | ,          | 3                                   | 63                |                              | 6.3                                 |               |         |
|     |          | <del></del>    | <u> </u>   |                                     |                   |                              | <u> </u>                            |               |         |
| 16  | 2        | · ·            | 3          | 3.35                                |                   |                              |                                     |               |         |
|     | }        |                | 4          |                                     | 26                |                              |                                     | <u></u>       |         |
|     | 4        | 2              | 1,         | e ·                                 | 89                |                              |                                     |               |         |
|     | 3        | . 3            | ,          | <u>+</u>                            | 102               | . :                          |                                     |               |         |
|     | Ь        | 4              | 1.         | h                                   | 116               |                              |                                     |               |         |
|     | 7        | \$             | A          | Þ                                   | /30               |                              |                                     |               |         |
|     | 8        | 6              | 6          | 4                                   | 140               |                              |                                     | ļ <u>.</u>    |         |
|     | 7        | L 7_           | 10         | ነ                                   | 156               | <u> </u>                     | <u>L,</u>                           | <u></u>       | :       |
| For | m A      | ,              |            |                                     | A                 | P-2-40                       |                                     |               |         |

| Stage  |             | 2  | Depth of the hole be | oacker<br>ottom                    | √0 m- 1        | -              |             | igth [                   | 5,0 m         | Reporter |
|--|-------------|--|----------------------|------------------------------------|----------------|----------------|-------------|--------------------------|---------------|----------|
|  | Time        |  | Cauge                | Effective                          | ļ              | pumped         |             |                          | Lugeon        | Remarks  |
| hr   | min         | Elapsed<br>min                                   | n. 0. 1. 2           | pressure<br>P(kg/cm <sup>2</sup> ) | Integrated (1) | Section flow   | nai<br>nin) | Const. rate<br>Q (()min) | value<br>(Lu) |          |
| 6  |             | 8  | 3                    | 9.35                               | 169            |                |             |                          |               |          |
| :  | 11          | 9  | 11                   | . 6                                | 182            |                |             |                          |               | :        |
| ī  | /2          | 10:  | h                    |                                    | 195            |                |             | 13,2                     |               | ,        |
|  | <u>/ =</u>  | , <u> </u>                                       |                      | 7                                  | 779            |                |             | <u> </u>                 |               |          |
| , ;  | . ^         | 0  | 4                    | 5.35                               |                |                |             |                          |               |          |
| - 1  | 25          | ,  | -0                   | 1                                  | > 0 9          |                | -           |                          |               |          |
|  | 16          |  |                      |                                    | 209            |                |             |                          | <b> </b>      |          |
| - 1.   | 12          | 2  |                      | <u>, ,</u>                         | 223            | ·              |             |                          |               |          |
| t t  | 78          | 3  |                      | . "                                | 239            |                | }           |                          |               |          |
| - 2  | 19          | 4  |                      |                                    | 253            |                |             |                          | <b> </b>      |          |
| •  | 20          | 5  | <u> </u>             | P P                                | 268            |                | -           |                          | <u>-</u>      |          |
|  | 2/          | 6  | **                   |                                    | 283            |                |             |                          |               |          |
| -  | 22          | 7_   |                      | <u> </u>                           | 298            |                |             | <u> </u>                 |               | ,        |
| <u>.</u>                                     | <u> ژ</u> ړ | 8  |                      |                                    | 313            |                |             |                          |               |          |
|  | 20          | 9_   | ٦                    | 4                                  | 3 58           |                |             |                          |               |          |
|  | 25          | _/0  | 5                    | 4                                  | 343            |                |             | 14.8                     |               |          |
|  |             |  |                      |                                    |                |                |             |                          |               |          |
| <u>,                                    </u> | 27          | ь  | 3                    | 3.35                               | <u>-</u>       | <br>           |             |                          |               |          |
| ì  | 28          | 1  | <i>n</i>             |                                    | 356            |                |             |                          |               |          |
|  | 29          | 2  |                      |                                    | 369            |                |             |                          |               |          |
| •  | 30          | 3_   |                      |                                    | 383            |                |             |                          |               |          |
| •  | 3/          | u  | 4,                   | '/                                 | 396            |                |             |                          |               | ·        |
|  | 32          | Ś  |                      |                                    | 409            |                |             |                          |               |          |
| 1  | 33          | 6  |                      | ,                                  | 422            |                |             |                          |               |          |
| •  | 34          | . 7  |                      | ,,                                 | 435            |                |             |                          |               |          |
|  | 35          | 8  | ,                    | . ,.                               | 448            |                |             |                          |               |          |
| F  | 36          | 9.   | ,,                   |                                    | 462            |                |             |                          |               |          |
|  | 3.6<br>3.7  | /0   |                      |                                    | × 62           | <del> </del> - |             |                          |               |          |
| +  | 2./         | <del>-                                    </del> | e,                   | •                                  | × /6           | <b></b>        |             | 13.3                     | <u> </u>      |          |
| <del>- -</del>                               | 30          | 0  |                      | 1.35                               |                |                |             |                          | <del> </del>  |          |
| <u>.</u>                                     |             |  | /                    | 1,53                               | ر دس ر ر       | -              |             |                          |               |          |
| •  | 40          |  | <u> </u>             |                                    | 484            | <del></del>    |             |                          | -             |          |
|  | 41          | <u> </u>   |                      |                                    | 494            |                |             | <u> </u>                 |               |          |
|  | 43          | 3  | /                    | 4                                  | 5011           |                | · ·         |                          |               |          |
|  | 43          | <u> </u>   | *                    |                                    | 510            |                |             | <del></del>              |               | m t = 1  |
|  | ベベ          | <u>s</u>   | 1                    | 1,                                 | 252            | <u> </u>       | ]           |                          |               |          |

| hr | min         | Elapsed                               | Po(kg/cm <sup>2</sup> ) | P(kg/cm <sup>2</sup> )                | Integrated (Å) | Sectional<br>flow<br>(//min) | Const. rate<br>of flow<br>U (l/min) | value<br>(Lu) |   |
|----|-------------|---------------------------------------|-------------------------|---------------------------------------|----------------|------------------------------|-------------------------------------|---------------|---|
| 16 | i           | d .                                   |                         | 1,35                                  | 536            |                              |                                     |               |   |
|    | 46          | r e                                   | <b>,</b>                | <i>y</i> .                            | 547            |                              |                                     |               | · |
|    | 47          |                                       | ,                       |                                       | \$22           |                              |                                     |               |   |
|    | !           |                                       |                         |                                       | 569            |                              |                                     | <u></u>       |   |
|    | <u>48</u>   | 1                                     |                         | •                                     | 1              | <br>                         |                                     |               |   |
|    | 49          | /0                                    |                         |                                       | 529            |                              | 10.2                                | <u></u>       | · |
|    |             |                                       |                         |                                       |                | <u> </u>                     |                                     |               |   |
|    | -           |                                       |                         |                                       |                |                              |                                     | <u></u>       |   |
|    | <u></u>     |                                       |                         |                                       |                |                              |                                     |               |   |
|    | i<br>!<br>! |                                       |                         |                                       |                |                              |                                     |               |   |
|    |             |                                       |                         |                                       |                | . :                          |                                     |               |   |
|    | <u>.</u>    |                                       |                         |                                       |                |                              |                                     |               |   |
|    | 1           |                                       |                         |                                       |                |                              |                                     |               | · |
|    |             |                                       |                         |                                       |                |                              |                                     |               |   |
|    |             |                                       |                         |                                       | ····           |                              |                                     |               |   |
|    |             |                                       |                         |                                       | ·····          |                              |                                     |               |   |
|    | <u> </u>    |                                       |                         |                                       |                | <u></u>                      | 1                                   |               |   |
|    | !           | ·                                     |                         |                                       | <u> </u>       |                              |                                     |               |   |
|    |             |                                       |                         |                                       |                |                              | <u> </u>                            |               |   |
|    |             |                                       |                         |                                       |                |                              |                                     |               |   |
|    |             | · · · · · · · · · · · · · · · · · · · |                         |                                       |                | <u> </u>                     |                                     |               |   |
|    |             |                                       |                         |                                       |                |                              |                                     |               |   |
|    |             |                                       |                         |                                       |                |                              |                                     |               |   |
|    |             |                                       |                         |                                       |                |                              |                                     |               |   |
|    |             |                                       |                         |                                       |                | -                            |                                     |               | · |
|    |             |                                       |                         |                                       |                |                              |                                     |               |   |
|    |             |                                       |                         |                                       | :              |                              |                                     |               | · |
|    |             | ·                                     |                         |                                       |                |                              |                                     |               |   |
|    |             |                                       |                         |                                       |                | <u> </u>                     | <u> </u>                            |               |   |
|    |             |                                       |                         |                                       |                |                              |                                     |               |   |
|    |             |                                       |                         |                                       | <u> </u>       | · ·                          |                                     |               |   |
|    |             | <br>                                  |                         |                                       | <del> </del>   |                              |                                     |               |   |
|    |             |                                       |                         |                                       | <del> </del>   |                              |                                     | <del></del>   |   |
| •  |             | <br>                                  |                         |                                       |                |                              |                                     |               |   |
|    |             |                                       |                         |                                       |                |                              |                                     |               |   |
|    |             | :                                     | ·                       |                                       |                |                              |                                     | !<br>         |   |
|    |             |                                       |                         |                                       |                |                              |                                     |               |   |
|    |             | ·                                     |                         | · · · · · · · · · · · · · · · · · · · |                |                              |                                     |               |   |

Form 8



Feature

Form A

project Xe Katam

Location Intake Dam, coordinates

Country Lao PDR

Reporter IHONGSAT

Firm name (HEC)

Date of test 3 - 17 -1971

|                                       | Elevation<br>of top                               | 463.9                   | m Diameta              | (¢) 66 mm; Size         | Unsaturated strata |
|---------------------------------------|---|-------------------------|------------------------|-------------------------|--------------------|
| Bore hole                             | Dip   | 900                     | Bearing                | _                       | Po Pressure gauge  |
|                                       | Stage NO.<br>Depth of packer                      | <u> </u>                |                        | Geology                 | Pump               |
| lest                                  | & hole bottom<br>Elev. of packer<br>& hole bottom | _                       |                        | Bosalt lan              | Packer             |
| · · · · · · · · · · · · · · · · · · · | Length (L)  | 5                       | m                      |                         | 40                 |
| Height of gauge(h <sub>l</sub> )      | 1.1 m   |                         | · .                    |                         | Water table        |
| Water<br>table(h2)                    | 8.4 m   |                         |                        | ure °C<br>ected water   | Saturated strata   |
| Mfr.<br>model                         | MG-SA   |                         | Type                   |                         | F                  |
| Max.                                  | 75  | l/min =                 | KA Min.<br>'graduation | , l                     | Pump Pump          |
| Max.<br>pressure                      | 60  | kg/cm <sup>2</sup>      | w do Min.              | r. / kg/cm <sup>2</sup> | Water table        |
| Type<br>of packer                     |   | kg/cm <sup>2</sup>      | Max.                   | /5 kg/cm <sup>2</sup>   |                    |
| * Effectiv                            | e pressure(kg/cm                                  | 1 <sup>2</sup> ): P = P | o+ 1/10(h3 -           | h4)), h4= head loss     |                    |
|                                       | ralue (Lu) to be<br>seon value (1/min             |                         |                        |                         | 9                  |

|             |            |                | Y           | <b></b>                 | r          |                              |                                     |  |         |
|-------------|------------|----------------|-------------|-------------------------|------------|------------------------------|-------------------------------------|--|---------|
|             | Time       | <u></u>        | nraceure    | Effective<br>pressure   | Wat        | er pumped-li                 | 1                                   | Lugeon   |         |
| hr          | min        | Elapsed<br>min |             | P (kg/cm <sup>2</sup> ) | Integrated | Sectional<br>flow<br>(½/min) | Const. race<br>of flow<br>d (l/min) | value<br>(Lu)                                    | Remarks |
| 9           | 14         | 0              | /           | 1.95                    |            |                              |                                     |  |         |
| 7           | <b>/\$</b> | 1              | 11          | Ł                       | 9          |                              |                                     |  |         |
| ***         | 16         | 2              | ,           | ,                       | 16         |                              |                                     |  |         |
|             | 17         | 3 _            | /,          | r.                      | 25         |                              |                                     |  |         |
|             | 18         | Ų.             | /.          | Ĺ                       | 35         |                              |                                     |  |         |
|             | 19         | 5              | *1          |                         | 39         |                              |                                     |  |         |
|             | -          | 6              | /1          | ,                       | 47         |                              |                                     |  |         |
|             | 2/         | 7_             | n           | ,                       | 35         |                              |                                     |  |         |
|             | 22         | 8              | t.          |                         | 63         |                              |                                     |  |         |
|             | 23         | q              | ı,          |                         | 2/         |                              |                                     |  |         |
|             | 24         | 10             | 1,          | ,                       | 79         |                              | 2.9                                 |  |         |
|             |            | <del></del>    |             |                         |            |                              |                                     |  |         |
| 9           | 30         | 0              | 5           | 5.95                    |            |                              |                                     | 3.5  |         |
| <del></del> | 3/         | /              | 1,          | ^                       | 104        |                              |                                     |  |         |
|             | 32         | 2              |             | ,                       | 129        |                              |                                     |  |         |
|             | 33         | 3              | .,          | 1,                      | 153        |                              |                                     |  |         |
|             | )!<br>}!!  | · · ·          | ,,          |                         | 178        |                              |                                     |  |         |
|             |            | 5              | ,           |                         | 203        |                              |                                     |  |         |
|             | 35         | . <i>l</i>     | <del></del> | 4,                      | 230        |                              |                                     | <del>                                     </del> |         |
|             | 36         | 47             | ,           | 1                       | 255        |                              |                                     |  |         |
|             | 37         |                | <u> </u>    | <u></u>                 |            |                              | L                                   | J  |         |

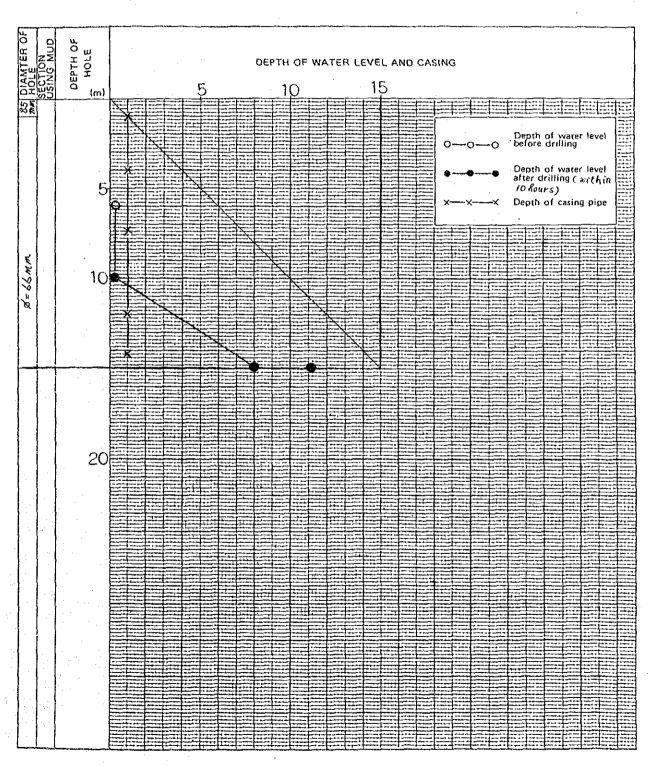
AP-2-44

| Sta       | ge NO. | 3              | Depth of p             |   | /C m-          | /5 m         | Tes         | t<br>ng th |          | 5 m    | Reporter |
|-----------|--------|----------------|------------------------|---|----------------|--------------|-------------|------------|----------|--------|----------|
|           | Time   |                |                        | Effective                                     | Water          | pumped       |             |            |          | Lugeon |          |
| hr        | min    | Elapsed<br>min | pressure<br>Po(kg/cm²) |   | Integrated (1) | Section flow | nal<br>min) | Const.     |          |        | Remarks  |
| 9         | 38     | 8              | 5                      | 5.95  | 28/            |              |             |            |          |        |          |
|           | 38     | 9              | 1.                     | ń   | 307            |              |             |            | ;<br>    | ļ      |          |
|           | 40     | 10:            | ,.                     | t,  | 333            |              |             | 25         | · u      |        |          |
|           |        |                |                        |   | l              |              |             |            |          |        |          |
| 9         | 以      | 0              | 20                     | 10.95   |                |              |             |            |          |        |          |
| 7         | 44     | 1              | 1,                     | 27  | 369            |              |             |            |          |        |          |
|           | 섨      | 2              | 11                     | <br>  | 405            |              |             | i          |          |        |          |
|           | 46     | 3              | 4                      | · · · · · · · · · · · · · · · · · · ·         | 440            | )<br>        |             |            |          |        |          |
|           | 42     | 4              | ħ                      |   | 475            |              |             | · ·        |          |        | _        |
|           | 48     | 5              | I,                     | •.  | 510            |              |             | !<br>      |          |        |          |
|           | 49     | Ь              | L                      | r.  | 545            |              |             | :<br>      |          |        |          |
|           | 50     | 7_             | <i>I</i> ,             | ŧ   | 580            |              |             |            |          |        |          |
|           | 5/     | 3              | ι,                     | 1,  | 615            |              |             |            |          |        |          |
|           | 52     | 9              | 3                      | 1   | 650            |              |             |            | ·        |        |          |
|           | 53     | 10             |                        | ,, <u>, , , , , , , , , , , , , , , , , ,</u> | 685            |              |             | 35         | .2       |        |          |
|           |        |                |                        |   |                |              |             |            |          |        |          |
| 9         | 5 K    | 0              | 5                      | 5.95  |                |              | .           |            |          |        |          |
|           | 55     | 1              | 1,                     |   | 210            | ļ            |             | <br>       |          |        | _        |
|           | 56     | 2              | /,                     |   | 238            |              |             |            |          |        |          |
|           | 57     | 3              |                        | 4   | 266            |              |             |            |          |        |          |
|           | 25     | <u> </u>       | l,                     | 6.  | 793            |              |             |            |          |        |          |
|           | 59     | 5              | /,                     |   | 820            |              |             |            | <u>.</u> |        | _        |
| <u>/a</u> | 00     | 6              | /                      | ·<br>   | 847            | ·            |             |            |          |        |          |
|           |        | 5              | ,                      | i.  | 874            |              |             |            |          |        |          |
|           | Z      | 8              | ,<br>,                 | •   | 901            |              |             |            |          |        | _        |
|           | 3      | 9              | <u> </u>               |   | 928            |              |             |            |          |        |          |
|           | 4      | 10             | ١,                     | <b>\$</b>                                     | 955            |              |             | 27         | .0       |        |          |
|           |        |                |                        |   | /              |              |             |            |          |        |          |
| 10        | ح      | 0              |                        | 1.95  |                |              |             |            |          |        |          |
|           | 6      | 1              | "                      | Z.  | 963            |              | ا           |            |          |        |          |
|           | 5      | 2              |                        | 3   | 973            |              |             |            |          |        |          |
|           | 8      | 3              | 1,                     | 4   | 985            |              |             |            |          |        |          |
|           | g      | 4              | 11                     | e .   | 997            |              | اً -<br>اب  |            |          |        |          |
|           | 10     | 2              | t)                     | 4   | 1.009          |              |             |            |          |        |          |
| For       | m B    |                |                        |   |                |              |             | -          |          |        |          |

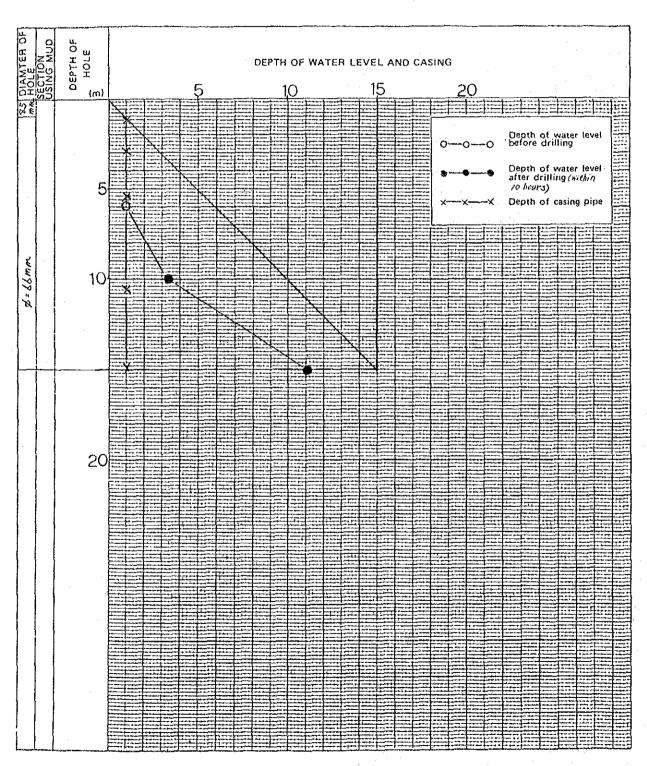
|    |    | Reporter | 5 m                            | ngth ;                   | L.Om 1                                   | 10.0 m- /                  | acker<br>ttom /                                 | & hole bo                       | 3                    | tage NO.       |
|----|----|----------|--------------------------------|--------------------------|--|----------------------------|---|---------------------------------|----------------------|----------------|
| -  |    | Remarks  | ugeon<br>value<br><u>(L</u> u) | Const. rate<br>Q ((/min) | pumped-in<br>Sectional<br>flow<br>(l/min | Water<br>Integrated<br>(1) | Effective<br>pressure<br>P(kg/cm <sup>2</sup> ) | Gauge<br>pressure<br>Po(kg/cm²) | Elapsed<br>min       | Time<br>ir min |
|    |    |          |                                |                          |  | 102/                       | 1.95  | 1                               | 6                    | 0 11           |
|    |    |          |                                |                          |  | 1.033<br>1.045             | , , , , , , , , , , , , , , , , , , ,           | 7)                              | - <del>2</del> - 8 : | 13             |
|    |    |          |                                |                          |  | 1.058                      |   | t.                              |                      | 10             |
|    |    |          |                                | 11.6                     |  | 1.07/                      | *   | <u>(</u>                        | 16                   | 15             |
|    |    |          |                                |                          |  |                            |   |                                 |                      |                |
|    |    | :        |                                |                          |  |                            |   |                                 |                      |                |
| •  |    |          |                                |                          |  |                            |   |                                 |                      |                |
|    |    |          |                                |                          |  |                            |   |                                 |                      |                |
|    | .1 | -        |                                |                          |  |                            |   |                                 |                      |                |
|    |    |          |                                |                          |  |                            |   |                                 |                      |                |
| ٠. |    |          |                                |                          |  |                            |   |                                 |                      |                |
|    |    |          |                                |                          |  |                            | i   |                                 |                      |                |
|    | •  |          |                                |                          |  |                            |   |                                 |                      |                |
|    |    |          |                                |                          |  |                            |   |                                 |                      |                |
|    |    |          |                                |                          |  |                            | <del></del>                                     |                                 |                      |                |
|    |    | •        |                                |                          |  |                            | L   |                                 |                      | -              |
|    |    |          |                                |                          |  |                            |   |                                 |                      |                |
|    |    |          |                                |                          |  |                            |   |                                 |                      |                |
|    |    |          |                                |                          |  |                            |   |                                 |                      | f<br>!         |
|    |    |          |                                |                          |  |                            |   |                                 |                      |                |
|    |    | •        |                                |                          |  |                            |   |                                 |                      |                |
|    |    |          |                                |                          |  |                            |   |                                 |                      |                |
|    |    |          |                                |                          |  |                            |   |                                 |                      |                |
|    |    |          |                                | ·                        |  |                            |   |                                 |                      |                |
| ,  |    |          |                                |                          |  | <del> </del>               |   |                                 |                      |                |

#### A2.4 Record of Water Level in Borehole During Drilling

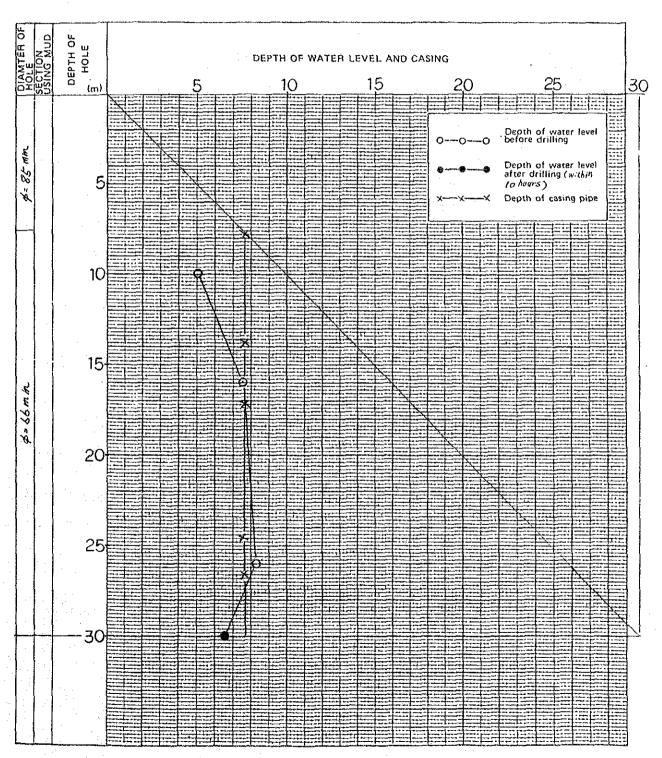
| XE KATAM PROJEC           | τ                | HOLE No. KI-1 | (SHEE       | T / OF7 )  |
|---------------------------|------------------|---------------|-------------|------------|
|                           | DEPTH OF HOLE    | 15m           | COMMENCED   | Mar. 10 91 |
| ELEVATION 468.0M          | DIAMETER OF HOLE | <u>66_</u> mm | COMPLETED   | Apr. 9 91  |
| COORDINATE                |                  | •             | -           | •          |
| ANGLE FROM HORIZONTAL 90° |                  |               | MEASURED BY | THOULSAY   |



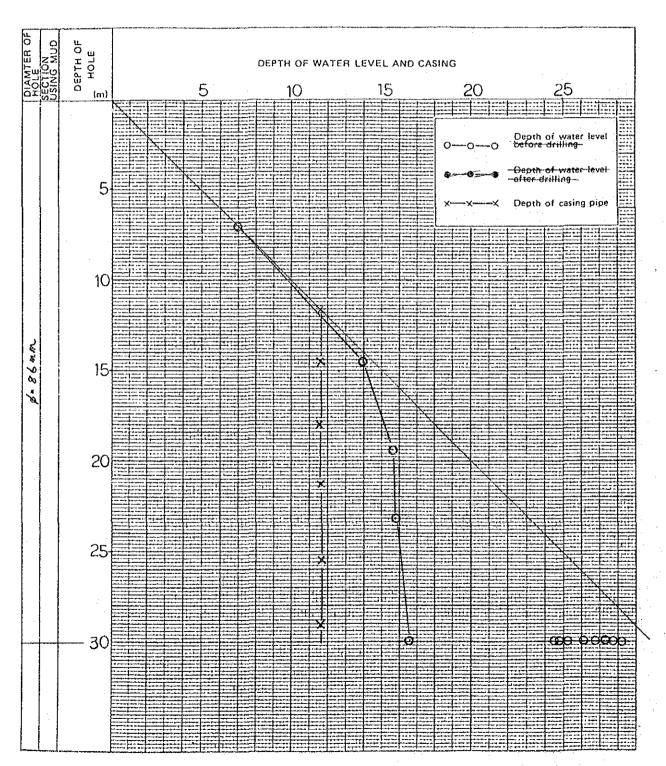
| XE KATAM PROJEC           | T                | HOLE No. K1-2 | ISHEET Z OF 7 )         |
|---------------------------|------------------|---------------|-------------------------|
| LOCATION INTAKE DAM       | DEPTH OF HOLE    |               | COMMENCED Mar. 15 . 191 |
| ELEVATION 463.9m          | DIAMETER OF HOLE |               | COMPLETED APR. 10 .491  |
| COORDINATE                |                  |               |                         |
| ANGLE FROM HORIZONTAL 90° |                  |               | MEASURED BY - THONG SAY |



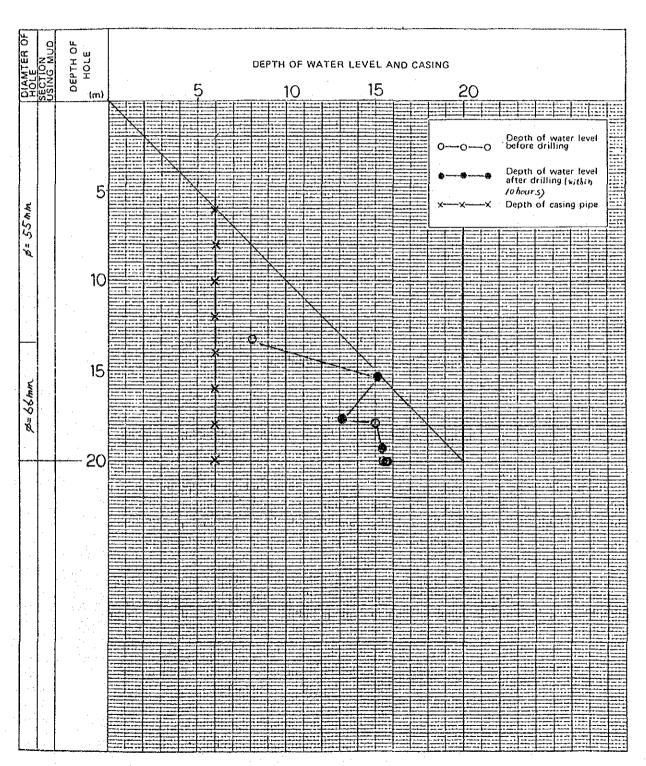
| XE KATAM PROJECT                   | HOLE No. <b>ΚΤ</b> – 1 | (SHEET      | 3 OF 7 1  |
|------------------------------------|------------------------|-------------|-----------|
| LOCATION TUNNEL DEPTH OF HOLE      | <u>30</u> m            | COMMENCED   |           |
| ELEVATION 473.3 m DIAMETER OF HOLE | <u>86</u> mm           | COMPLETED   | . '91     |
| COORDINATE                         |                        |             |           |
| ANGLE FROM HORIZONTAL              |                        | MEASURED BY | THONG SAY |



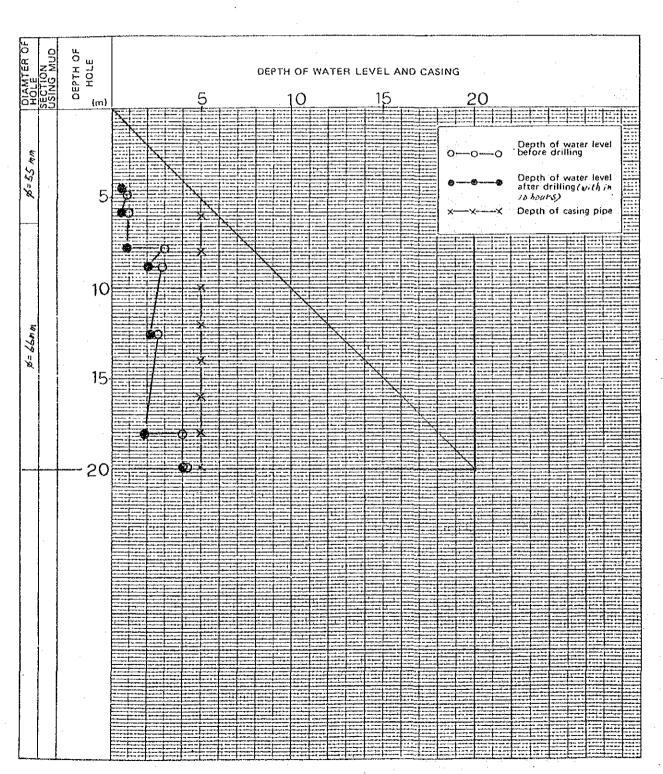
| XE KATAM PROJEC           | τ                | HOLE No. $KT-2$ | ISHEE"      | r 4 OF 7 ) |
|---------------------------|------------------|-----------------|-------------|------------|
| LOCATION TUNNEL           | DEPTH OF HOLE    | <u>30</u> m     | COMMENCED   |            |
| ELEVATION 479.8m          | DIAMETER OF HOLE | <u>86</u> mm    | COMPLETED   |            |
| COORDINATE                |                  |                 |             |            |
| ANGLE FROM HORIZONTAL 90° |                  |                 | MEASURED 8Y | THOUGSAY   |



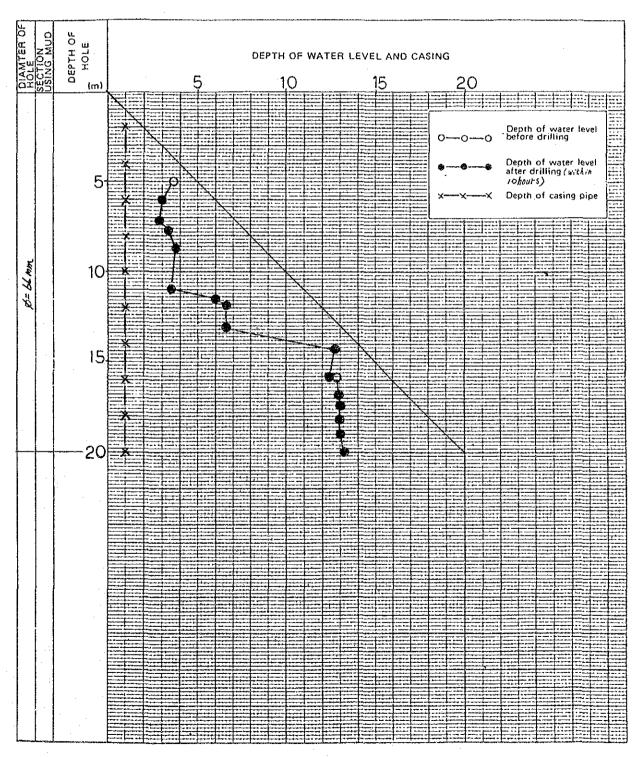
| XE KATAM PROJECT                   | HOLE No. KP-1 | (SHEET & O      | <u> 71</u> |
|------------------------------------|---------------|-----------------|------------|
| LOCATION PENSTOCK DEPTH OF HOLE    | 20m           | COMMENCED       | - 91       |
| ELEVATION 361.5 M DIAMETER OF HOLE | <u>66</u> _mm | COMPLETED       |            |
| COORDINATE                         |               |                 |            |
| ANGLE FROM HORIZONTAL 90°          |               | MEASURED BY THE | ONGSAY     |

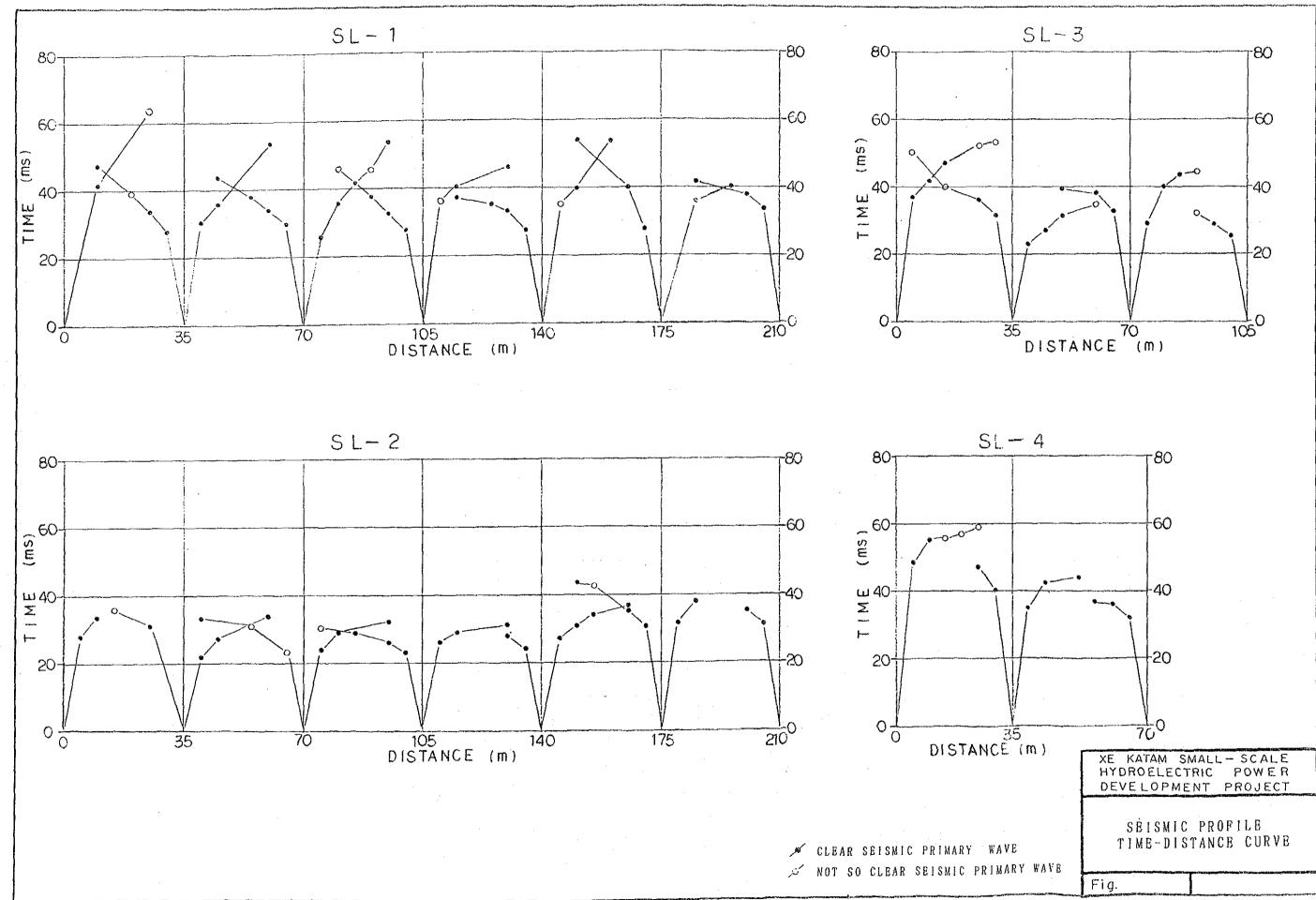


| >         | KE KATAM PROJECT | T :              | HOLE No. KP - 2 | ISHEET      | 6 OF 7 ) |
|-----------|------------------|------------------|-----------------|-------------|----------|
| LOCATION  | POWERHOUSE       | DEPTH OF HOLE    | <u></u>         | COMMENCED   | . '91    |
| ELEVATION | 307,3 m          | DIAMETER OF HOLE |                 | COMPLETED   | 91       |
|           | Ē                |                  |                 |             |          |
| ANGLE FRO | M HORIZONTAL 90° |                  |                 | MEASURED BY | THONGSAY |

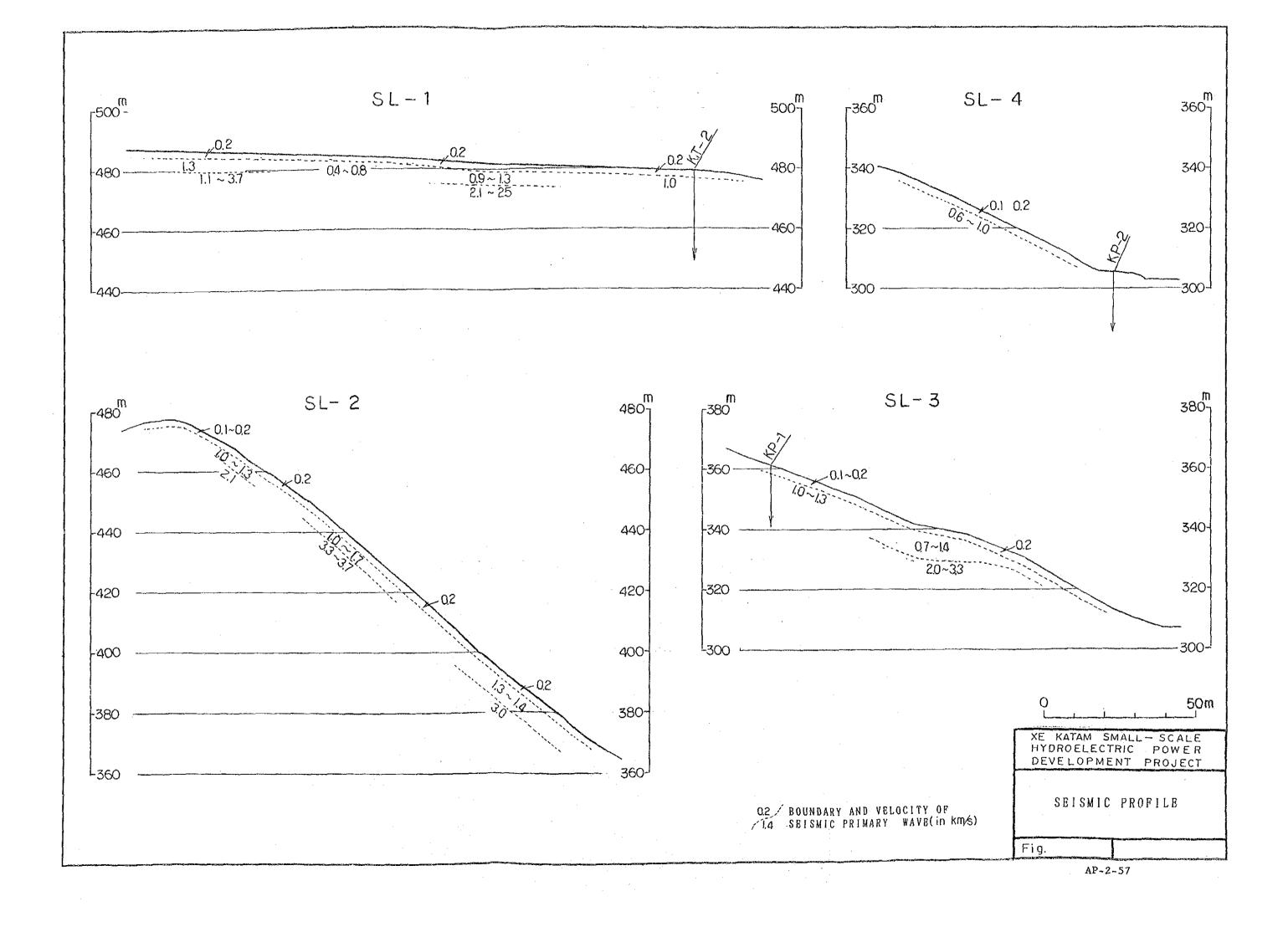


| XE KATAM PROJECT                    | HOLE NO. $KP-3$ (SHEET $70F7$ ) |
|-------------------------------------|---------------------------------|
| LOCATION POWERHOUSE DEPTH OF HOLE   | ZÓ m COMMENCED '91              |
| ELEVATION 308.5 PL DIAMETER OF HOLE | 66 mm COMPLETED                 |
| COORDINATE                          |                                 |
| ANGLE FROM HORIZONTAL 90°           | MEASURED BY - THONGSAY          |



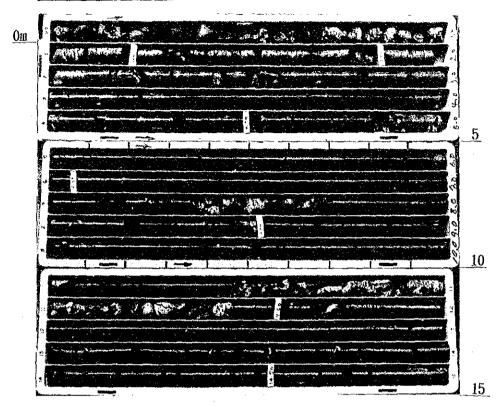


AP-2-55

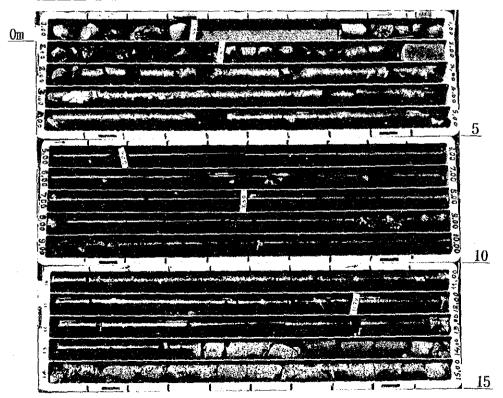


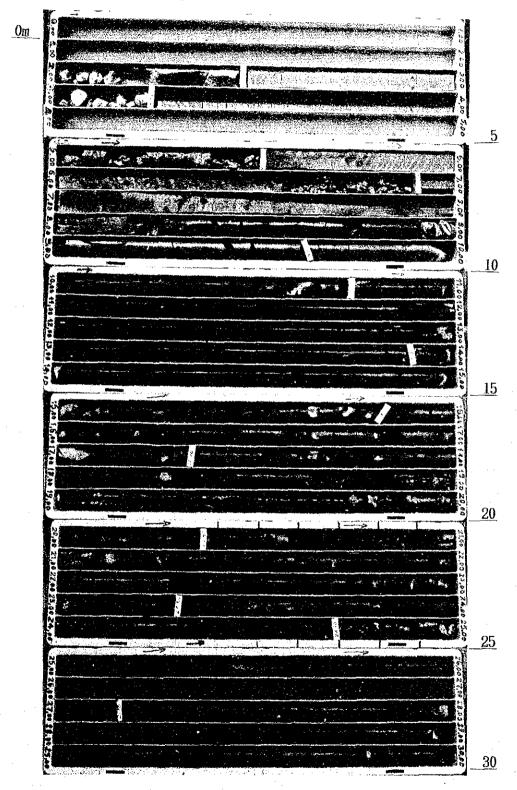
Core-Photograph

KI-1:Length=15m

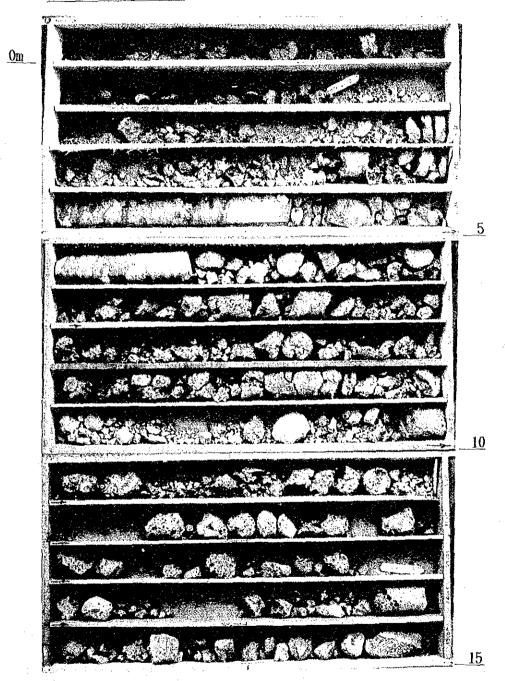


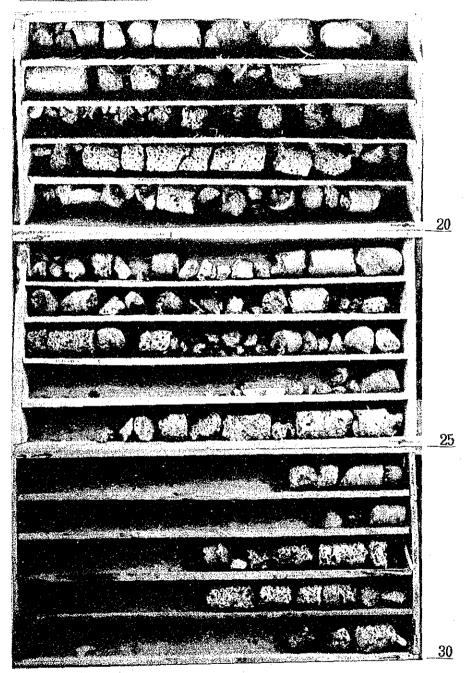
KI - 2: Length=15m



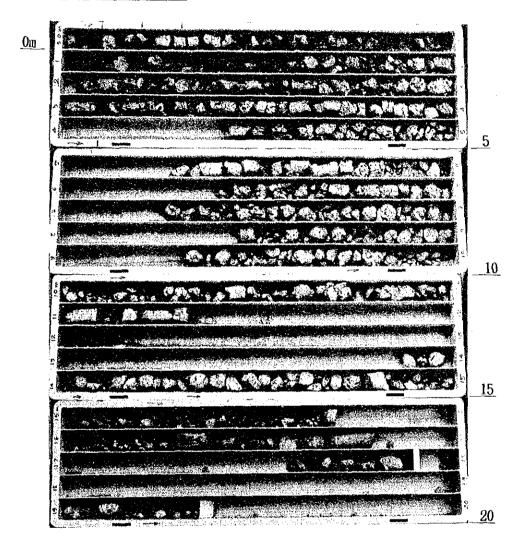


KT-2:Length=30m

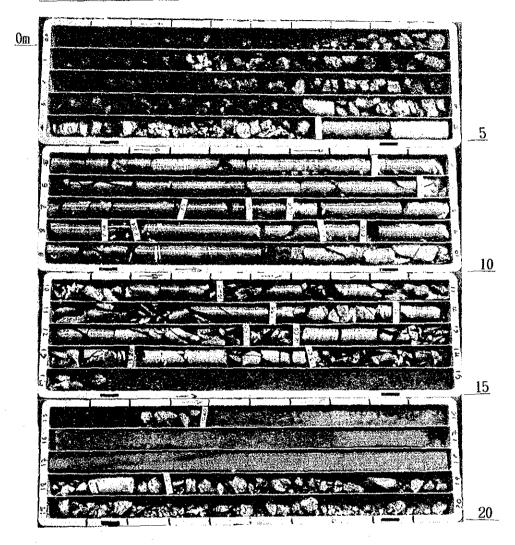


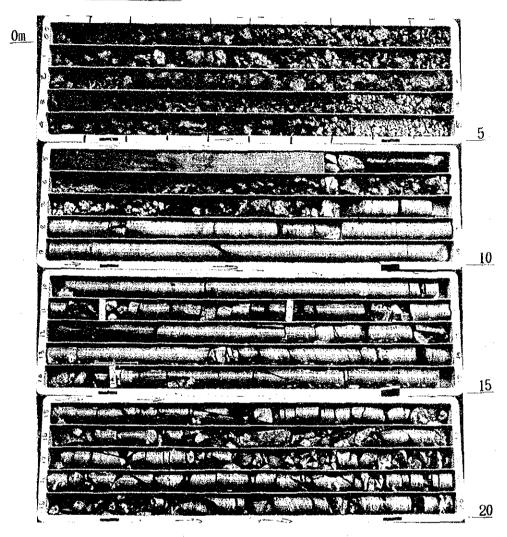


KP-1: Length=20m



# KP-2:Length=20m





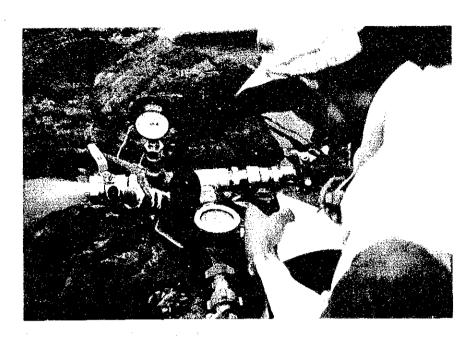
# Drilling Work Photograph



Brilling Kl-2



Drilling KT-1



Performing permeability test at KI-2



Removing the core drilling equipments along penstock route

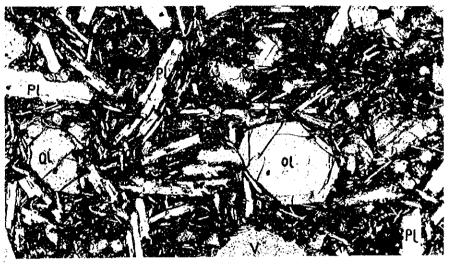
Micrograph and Petrographic Description of Rock

Sample No: R-1 Locality: Intake Dam

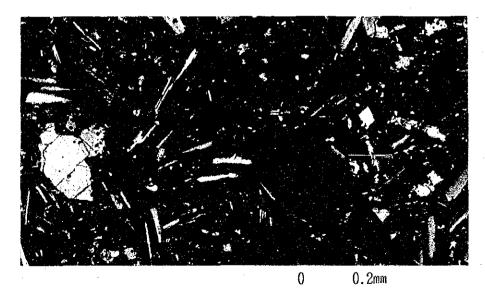
Rock Name: Olivine Basalt

Petrographic Description

Crystals are olivine, plagioclase. Olivines are idiomorphic crystals (0.1  $\sim$  1.0mm), plagioclases are idiomorphic laths (0.1  $\sim$ 0.8mm). The constituents of the groundmass are plagioclase, pyroxene, olivine, and minor amounts of glass. Rock is very flesh.

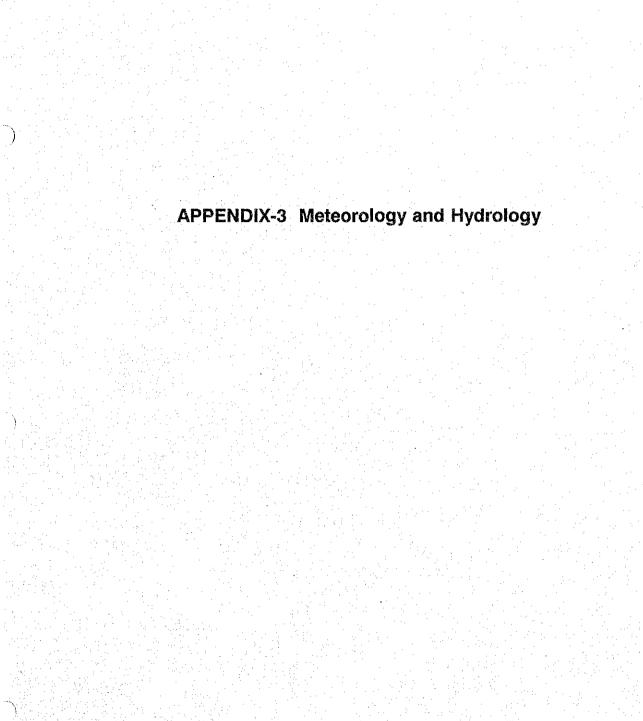


0.2mm (Open nicols)



(Crossed nicols)

Ol:olivine, Pl:Plagioclase, V:vacant



## APPENDIX-3 METEOROLOGY AND HYDROLOGY

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#### APPENDIX 3

### A3.1 Rainfall and Runoff Survey Performed by JICA Study Team

#### A3.1.1 Installation of Rainfall Gauges

During the first field reconnaissance in this Study, installation sites of rainfall gauge were selected at two sites in the Xe Katam River Basin and three sites in the Xe Namnoy River Basin. After installation work, observations were started from February 1991. The locations of installation site are as follows:

| No. | Basin     | Location      | Altitude* | <u>Longitude</u> * | <u>Latitude</u> * |
|-----|-----------|---------------|-----------|--------------------|-------------------|
| 1,  | Xe Katam  | Ban Xekata    | 1,060 m   | 106°26'15"         | 15°14'00"         |
| 2   | Xe Katam  | Ban Tongvay   | 950 m     | 106°31'15"         | 15°12'30"         |
| 3 . | Xe Namnoy | Ban Houaikong | 890 m     | 106°31'30"         | 15°07'45"         |
| : 4 | Xe Namnoy | Ban Latsasin  | 750 m     | 106°36'15"         | 15°03'15"         |
| 5   | Xe Namnoy | Ban Namkong   | 700 m     | 106°34'30"         | 14°59'00"         |

\* Altitudes, Longitudes and Latitudes are approximate values according to 1/100,000 topographical map.

The installation sites were selected with the principle of even arrangement of area division in the river basins. However, because of limited number of gauge units which could be installed, the locations were decided with following reasons.

- Because of the necessity to request maintenance of instruments and recording
  works to local residents, it was decided that installation should be inside
  of villages or at adjacent locations. Further, for convenience in
  installation of observation instruments and gathering of observed records,
  places where are accessible by vehicles were selected.
- In general, there is more rainfall in mountainous areas than in flat areas, and the run-off of a river will be strongly affected by rainfall in such intensive rainy areas. The basin of the Xe Katam River has mountains of

elevation approximately 1,500 m at its north side so that installation in this area was examined. However, accessibility in this area is very bad to install and maintain instrument. Accordingly, The Ban Xe Katam and Ban Tongvay sites were selected as being locations as close as possible to these mountains.

- Meanwhile, consideration was given to grasping the rainfall in flat areas as well, in order to observe contrasts with rainfall in mountainous areas. In this regard, installation at the Ban Nonghin site in the Xe Katam Basin was considered, but this site is located comparatively close to the Ban Tongvay site. Therefore, although out of the Xe Katam River Basin, the Ban Houaykong site which is connected topographically with Ban Nonghin was selected for installation.
- In the basin of Xe Nammoy mainstream, installation sites of water level gauge were selected at Ban Latsasin and Ban Namkong which are located in the left bank area of the Xe Nammoy midstream. It was given up to install gauges in the right bank area and upstream area of Xea Nammoy basin because of difficulty of access by vehicle.

#### A3.1.2 Installation of Water Level Gauges

During the first field reconnaissance of this Study, installation sites of water level gauge were selected at one site each on the Xe Katam River and the Xe Namnoy River mainstream, and after installation work, observations were started from February 1991. The locations of installation site are as follows:

| No. | River     | Location     | EL.   | Catchment Area      |
|-----|-----------|--------------|-------|---------------------|
| 1   | Xe Katam  | Ban Nonghin  | 840 m | 171 km <sup>2</sup> |
| 2   | Xe Namnoy | Ban Latsasin | 720 m | $537 \text{ km}^2$  |

Installation sites were selected with following reasons:

 Predicated on commissioning local residents to handle care of water gauges, periodical observations of staff gauges, and runoff observations for preparation of rating curves, locations were selected at sites adjacent to villages.

- Regarding the Xe Katam River, since there was no suitable village in the neighborhood of the Xe Katam project site located at the most downstream part of the river (catchment area 290  $\rm km^2$ ), it was decided to install a gauge at the Ban Nonghin site on the middle stretch of the Xe Katam River (catchment area 171  $\rm km^2$ ).
- Regarding the Xe Namnoy River, the Ban Latsasin site, which is located along the middle stretch of mainstream and is accessible by vehicle, was selected for installation.

#### A3.1.3 Discharge Measurements by JICA Team

Runoff measurements by current meters were performed by the study team during site survey at a number of sites in order to obtain runoff data on the various project sites on the Xe Katam and Xe Namnoy rivers to be examined in the Study. The results of measurements are given in Table A3-1.

Table A3-1 Discharge Measurement by JICA Team

|    | River   | Location                               | <u>Catchment</u><br><u>Area</u> | <u>Date</u>                | Discharge                   |
|----|---------|--|---------------------------------|----------------------------|-----------------------------|
| Хe | Katam   | Ban Nonghin                            | 171 km <sup>2</sup>             | Dec.28,1990<br>Mar.28,1991 | 1.8 $m^3/s$<br>0.64 $m^3/s$ |
|    |         |  |                                 | Mar.30,1991                | $0.58  m^3/s$               |
|    |         | Upstream of                            | 288 km²                         | Dec.28,1990                | 3.3 	 m <sup>3</sup> /s     |
|    |         | Planned Damsite                        |                                 | Mar.28,1991                | $0.80  \text{m}^3/\text{s}$ |
|    |         |  |                                 | Mar.28,1991                | $0.78 \text{ m}^3/\text{s}$ |
|    |         |  |                                 | Jul. 5,1991                | $13.3 \text{ m}^3/\text{s}$ |
|    |         | Planned Damsite                        | 290 km²                         | Mar.28,1991                | $0.78 \text{ m}^3/\text{s}$ |
|    |         | Downstream of<br>Planned Damsite       | 295 km <sup>2</sup>             | Mar.30,1991                | $0.75 \text{ m}^3/\text{s}$ |
| ۷o | Katam   | Ban Xekatam                            | 49 km <sup>2</sup>              | Mar.27,1991                | $0.33 \text{ m}^3/\text{s}$ |
| ΛC | Katam   | Dall Nekatali                          | 49 Km                           | 1101.27,1371               | 7 .                         |
| Хe | Namnoy  | Ban Latsasin                           | 537 km <sup>2</sup>             | Dec.29,1990                | $5.2 	ext{ m}^3/\text{s}$   |
|    |         |  |                                 | Mar.26,1991                | 0.55 m <sup>3</sup> /s      |
|    |         |  |                                 | Mar.31,1991                | $0.48 \text{ m}^3/\text{s}$ |
|    |         | Powerhouse site of<br>Xe Katam Project | 784 km²                         | Mar.30,1991                | 2.2 m <sup>3</sup> /s       |
| н. | Makchan | H.Makchan Nikhon34                     | 39 km <sup>2</sup>              | Mar.27,1991                | $0.28  \text{m}^3/\text{s}$ |
|    |         |  |                                 | Jun.23,1991                | $1.9  \text{m}^3/\text{s}$  |
|    |         |  |                                 | Jul. 8,1991                | $2.3 \text{ m}^3/\text{s}$  |
| н. | Champi  | H. Champi Ban Itou                     | 53 km <sup>2</sup>              | Apr. 1,1991                | $0.46 \text{ m}^3/\text{s}$ |

## A3.2 Hydrological Records observed in the Xe Namnoy River Basin

## A3.2.1 River Flow Survey on Xe Katam River in 1991

## Discharge Measurement Records at Ban Nonghin

## XEKATAM SMALL HYDRO-ELECTRIC POWER PROJECT

### LIST OF DISCHARGE MEASUREMENT

RIVER : XEKATAM

HYDROLOGIC YEAR 1991

STATION : BAN NONGHIN

SHEET .........

Made by : Mr. Sengchanh

Approved by : Mr. Somsack PHRASONTHI

|      |          |        |        | 122222   |           |        |         |
|------|----------|--------|--------|----------|-----------|--------|---------|
|      |          | GAUGE  |        | MEAN     | DISCHARGE | G.H    | REMARKS |
| No.  | DATE     | HEIGHT | ARE    | AEFOCITA |           | CHANGE |         |
|      |          | m      | sq.m   | m/s      | cu.m/s    |        |         |
| 1    | 3-5-91   | 0,34   | 4,030  | 281,0    | 11304     |        |         |
| 4_   | 8-5-91   | 0,34   | 6 (830 | 0(110    | 1,450     |        |         |
| 3    | 13-5-91  | 0,33   | 6,575  | 0.483    | 801.1     |        |         |
| 4_   | 16-5-91  | 0,45   | 9,345  | 0,255    | 2,383     |        |         |
| -2-  | 18-5-91  | 0,49   | 10,460 | NF410    | 7 833     |        |         |
| 6_   | 22-5-91  | 0,49   | 9,985  | 01772    | 2,654     |        |         |
| 7    | 27-5-91  | 0,43   | 7,450  | 0,240    | 1,792     |        |         |
| 8    | 30-5-91  | 0,42   | 8,100  | 0,112    | 1,805     |        |         |
| 9    | 1-6-91   | 0144   | 7, 588 | 6610     | 1,497     |        |         |
| 10   | 13-6-91  | 0.55   | 14,490 | 0,333    | 3,816     |        |         |
| 11   | 18-6-91  | 0,48   | 11,135 | 0,212    | 1,469     |        |         |
| 12   | 16-6-94  | 84,0   | 11,950 | 0,440    | 6,134     |        |         |
| 13   | 4-7-91   | 0.77   | 16,225 | 0,622    | 10,087    |        |         |
| 14   | 1-7-91   | 0,69   | 14,023 | 0,630    | 6,30      |        |         |
| 45   | 17-7-91  | 18,0   | 16,822 | 0,584    | 9,832     |        |         |
| 16   | 24-7-91  | 1,14   | 18,05  | 1,178    | 33,029    |        |         |
| 17   | 34-7-91  | 0,96   | 11,35  | 0,865    | 19,322    |        |         |
| 18   | 7-8-91   | 0,94   | 24,575 | 0,843    | 18,186    |        |         |
| 19.  | 16 -8-94 | 1,05   | 211755 | 0,985    | 23,677    |        |         |
| 20   | 17-8-91  | 1,24   | 31,45  | 1,275    | 40,080    |        |         |
| u    | 10-8-91  | 4,28   | 32,70  | 11465    | 47,894    |        |         |
| 22   | 27-8-94  | 1,15   | 17,875 | 1,189    | 33,458    |        |         |
| 23   | 29-8-91  | 1,1G   | 27,85  | 4,270    | 35,361    |        |         |
| 24   | 3-9-91   | 0,96   | 20,15  | 0,934    | 18,817    |        |         |
| 25   | 15-9-91  | 0,43   | 19,85  | 0,869    | 17,259    |        |         |
| 26   | 18-9-91  | 0,84   | 17,666 | 0,796    | 14,069    |        |         |
| 27   | 25-9-91  | 0,97   | 21,194 | 0,923    | 19,555    |        |         |
| 18   | 4-10-91  | 1,13   | 27,413 | 1,294    | 35,487    |        |         |
| لتتا |          |        |        | L        | l         |        |         |

#### XEKATAM SMALL HYDRO-ELECTRIC POWER PROJECT

## LIST OF DISCHARGE MEASUREMENT

RIVER : XEKATAM

HYDROLOGIC YEAR 1991

STATION : BAN NONGHIN

SHEET ....

Made by : Mr. Sengchanh

Approved by : Mr. Somsack PHRASONTHI

|     |          |        | I = 2 = 2 = 2 | 1        | T         |                |           |
|-----|----------|--------|---------------|----------|-----------|----------------|-----------|
|     |          | GAUGE  | ·             | MEAN     | DISCHARGE | G.H            | REMARKS · |
| No. | DATE     | HEIGHT | AREA          | AEFOCITA |           | CHANGE         |           |
|     | · _i     | m      | sq.m          | m/s      | cu.m/s    |                |           |
| 19  | 9-10-91  | NOL    | 12655         | 1,032    | 13,371    |                | y         |
| 30  | 16-40-91 | 0,90   | 181280        | 0 893    | 16,338    |                |           |
| 31  | 23-10-91 | 0.76   | 15,635        | 0 629    | 9,849     |                |           |
| 32  | 30-10-91 | 0,64   | 14,027        | 0,455    | 6,389     |                |           |
| 33  | 6-11-91  | 060    | 12,102        | 01421    | 2,096     |                |           |
| 34  | 27-11-91 | 0,50   | 9,899         | 0,304    | 3,007     |                |           |
| 35  | 4-42-94  | 0,46   | 9,366         | 0,230    | 1,237     |                |           |
| 36  | 11-12-94 | 0144   | 9,946         | 0,270    | 2,694     |                |           |
| 37  | 18-11-91 | 0,43   | 8,302         | 0,110    | 1,829     |                |           |
| 38  | 25-12-91 | 0,40   | 8,172         | 0,226    | 1,849     |                |           |
| 39  | 2-1-92   | 0,38   | 8,603         | 0,206    | 1,780     |                |           |
| 40  | 8-1-92   | 0,38   | 8,848         | 0,227    | 2,014     |                |           |
| 41  | 15-1-92  | 0,36   | 8,495         | 01192    | 1,630     |                |           |
| 42  |          |        |               |          |           |                |           |
| 43  |          |        |               |          |           | ,              |           |
| 44  |          |        |               |          |           |                |           |
| 45  |          | ·      |               |          |           | \ <del>-</del> |           |
| 46  |          |        | <del>-</del>  |          |           |                |           |
|     |          |        |               |          |           |                |           |
| 47  |          |        |               |          |           |                |           |
| 48  |          |        |               |          |           |                |           |
| 49  |          |        |               |          |           |                |           |
| 20  |          |        |               |          |           |                |           |
| 51  |          |        |               |          |           |                |           |
| 52  |          |        |               |          |           |                |           |
| 23  |          |        |               |          |           |                |           |
| 54  |          |        | ,             |          |           |                |           |
| 55  |          |        |               |          |           |                |           |
| 26  |          |        |               |          |           |                | L         |
| 76- | <u>-</u> |        |               |          |           |                | L         |

## **Current-Metering and Calculation of Flow** (Measurement No.1 to No.41)

(No.1) Station XEKA TAM.

| URRE         | NT - ME     | TERING         | AND CAL            | CULATIO         | N OF FL  | ∭ (1-2           | _3 POINT           | з/метно           | D)(D            | Page 2           |
|--------------|-------------|----------------|--------------------|-----------------|----------|------------------|--------------------|-------------------|-----------------|------------------|
|              |             |                | current - meter    |                 |          | Calculation      | of velocitie       | s and of flov     | γ               | Mater            |
| Verti-       | is          | Num-           | 202                | Rota-           | V        | clocity (m.      | g·1)               | Flow              | Flow            | Notes<br>(timee, |
| cai<br>(Max. | Depth<br>of | per            | . Time:<br>partial | tions           | io       | mean             | average            | area "F".         | 1.0%            | gaugo            |
| depth        | point       | of             | and total          | per             | the      | in the           | between.           | between           | (10) == (8)×(9) | reading          |
| in ni)       | (m·m)       | rota-<br>tions | (seconds)          | second<br>(rps) | point    | vertical<br>"VV" | verticals          | verticals<br>(m²) | (m3.4-1)        | etc.)            |
|              | 2           | 3              | 4                  | 5               | 6        | 7                | 8                  | 9=6 (P.1)         | 10              | 11               |
|              | <u></u>     | 3.             | 4                  |                 | 0        |                  |                    | 9c=0(F.1)         |                 | 11               |
|              | 20-         |                |                    |                 |          |                  | 0,03/              | 0,28              | 0.008           |                  |
| 70           | 60          | 4_             | 60                 | 9,066           | 0.068/_  | 0,062            | . <del>M. J </del> | <u></u>           |                 |                  |
|              | 80          | <u> </u>       |                    | <u> </u>        |          |                  | 1.                 |                   |                 | •                |
|              | 20          | 11             | 50                 | 0, 22           | 0 169    |                  | 0,105              | 0,515             | 0,054           |                  |
| 453          | 60          |                |                    | 1               |          | 0,145            | 177.100            | <u> </u>          |                 |                  |
| 407          | 80          | 8              | 22!                | 0,153           | 0,122    | <u> </u>         |                    |                   |                 | •                |
|              | 20-         | 21             | កនិរ               | 0,437           | 0.321    |                  | 0,225              | 0,55              | 0,123           |                  |
| 050          | 60          |                |                    |                 |          | 0,306            | 0,00               | 100               |                 |                  |
| 0129         | 80-         | 09             | 48                 | 0.395           | 0.291    | ļ                | ]                  |                   | Į (             |                  |
|              | 20          | 15             | 43"                | 0,319           | 0,238    | 1.               | 0,263              | 0,51              | 0,152           |                  |
| υ <b>έ</b> ν | 60-         |                |                    | <u> </u>        |          | 0,228            | UND                | 1 <u> 15a</u> -   |                 |                  |
| 0\23         | 80          | 14             | 481                | 0.291           | 0,219    | <u> </u>         | ] .                |                   |                 |                  |
|              | 20-         | 14             | 46                 | 0,304           | 0,228    |                  | 0,205              | 0,60              | 0,123           | Ì.               |
| 0,63         | 60          |                |                    |                 |          | 0,183            | 0,600              |                   |                 |                  |
| 400          | 80-         | 49             | 51"                | 0,126           | 0.138    | <u> </u>         | <u>.</u>           |                   |                 |                  |
|              | 20          | 13             | 46"_               | 0,282           | 0,212    | ]                | 0.00               | 4/05              | 0,102           |                  |
| CD A         | 60          |                |                    |                 |          | 0, 156           | 0,169              | 0,605             | 0,102           | ರಾವಧಾ            |
| 0,58         | 80-         | 7              | 29,                | 0,122           | -0,101   | 1 1/100          |                    |                   |                 | בו יכן           |
| <u>·</u>     | 20~         | _4             | 48                 | 0,291           | 0,219    |                  | l                  |                   | 0.110           | 1/35V            |
| 220          | 60-         | -35            | 90                 | nen_            | 4757.7   | 0,199            | 0,137              | 0.64              | 0,113           |                  |
|              | 80          | Ħ              | 47                 | 0,234           | 0,129    | ]                | 1                  |                   | }               | عرززي            |
|              | 20-         | .3/            | 46                 | <u> </u>        | 0,485    | 1                | 1                  |                   | 1               | 50 21            |
| 1.           | 60-         | -11            | 46                 | 0,673           | 0,403    | 0, 401           | 0,3                | 0,63:             | 0,189           | J. n. E          |
| 0,56         | 80-         | 20             | H6"                | 0,2134          | 0,318    | ייחייי           |                    |                   | <b> </b> '      | Poin             |
| ·            | 20-         |                | H <sub>2</sub> '   | 0,382           | 0,282    | <del> </del>     | 1 .                |                   |                 |                  |
| • .          | 60-         | _18            | <i>H.</i> †        | 10,200          | V1204    | 0,212            | 0,306              | 0,635             | 0,194           |                  |
| 16,0         | 80          |                | 53'                | 0,181           | 01/12    | 10,010           | ,                  | ∦ .               |                 |                  |
| ,,           | 20-         | 10             | H91                | Ţ               |          | <del> </del>     | 1                  |                   | 1.              |                  |
|              |             | 9              |                    | 0,183           | 0,143    | 0 100            | 0,158              | .0,635            | 0,100           | ]                |
| 0,56         | 60<br>80    | 32             | 53                 | 0.000           | 0 060    | 0,105            |                    | 1                 |                 | 1                |
| '            |             | <u>u</u>       | 82                 | 0,075           | 0,068    | <del> </del>     | 1 .                | \                 |                 | 1                |
| . !          | 20~         | . 12           | HS!                | 0,266           | 0,201    | 0, 123           | 0,11,4             | 0,535             | 0,060           |                  |
| 0,51         | 60          |                | 69"                | <b></b>         |          | 10,142           |                    | 4                 |                 | }                |
| ·            | 80-         | 3              | 67                 | 0,0H3           | 0,016    | -                | -{ · · ·           | 1                 |                 |                  |
|              | 20-         | _/1            |                    | 0,244           | 0,186    | 1,,,,,           | 0.127              | 0,1185            | 0,061           | 1                |
| 0,46         | 60<br>80-   |                |                    | -               | <u> </u> | 0,132            | ·                  |                   |                 | 1                |
|              | •           | _5             | 22,                | 0,090           | 0,038    | <del> </del>     | ┨.                 | 1                 |                 |                  |
| •            | 20-         |                |                    | -}              |          |                  | 0,066              | 0,38              | 0,025           |                  |
| 0,30         | 60-         |                |                    | 0               |          | -)               | - Land Alleron     |                   | <u> </u>        | ) '              |
| U 1 U U .    | 80-         |                |                    |                 |          |                  | 1                  | · ·               |                 |                  |
|              | 20          |                |                    |                 |          | 1                |                    | <b>[</b> .        |                 |                  |
| •            | 60          |                |                    |                 |          | 1                |                    | l                 | <del> </del>    | 1                |
|              | 80-         |                |                    |                 |          |                  | 1                  | 4                 |                 | (                |
| ji           | 20          |                |                    |                 |          |                  | 7                  | l                 | 1 .             | ł                |
|              | 60          |                |                    | 1               |          | ] : .            |                    | <b> </b>          | <del> </del>    | ├                |
|              | 80_         |                | <del></del>        | 1               |          | 7                | 1                  |                   | <u> </u>        |                  |
|              |             | <u></u>        |                    |                 | ·        |                  | 0,185              | 7,03              | 1,30#           | 1                |

| ,         | R        | sults of                                       | current - meteri                      | ng       | 1                                     | Calculation  | of velocitie                            | s and of flov |               |                     |
|-----------|----------|--|---------------------------------------|----------|---------------------------------------|--------------|---|---------------|---------------|---------------------|
| Verit-    | -        | Num-   | 1                                     | Rota-    | , Ve                                  | locity (m.   | g·1)                                    | Flow          | Yelani        | (time               |
| cal .     | Depth    | ber  | Time:                                 | tions    |                                       | mean         | 1                                       | area "F"      | Flow          | gang                |
| (Max.     | of       | of   | partial                               | per      | in                                    | in the .     | SACLUĞG                                 | between       |               | terqi:              |
| qebip     | point    | rota-  | and total                             | second   | the                                   | vertical     | between                                 | verticals     | (10)==(8)×(9) | etc.                |
| in ու)    | (%-in)   | tions  | (scconds)                             | (rps)    | point                                 | 4444         | verticals                               | (m²)          | (m3.s·1)      | 6102                |
| 1         | 2        | 3,   | 4                                     | 5        | 6                                     | 7            | 8 .                                     | 9=6(P.1)      | 10            | 11                  |
|           | 20_      | 3  | 531                                   | 0,054    | 0,053                                 |              | ļ                                       |               |               | T.end               |
|           | 60-      | 2  |                                       | 10011    | -440-/-                               | 0,058        | 0,029                                   | 0,3           | 0,008         | end                 |
| 0,60      |          |  | 114                                   | 0,068    | 0.003                                 | 0,000        |   |               | ì             | Ľ                   |
|           | 80       | 3  |                                       |          | 0,063                                 |              | <u></u>                                 |               |               | ••                  |
| -         | 20       | 12   | Hð                                    | 0,276    | 0,208                                 | 0,209        | 0,133                                   | 0,57          | 0,015         |                     |
|           | 60       |  | · · · · · · · · · · · · · · · · · · · | l        |                                       | Upag         |   |               |               | 7                   |
| · (10)    | 80       | 12   | 43                                    | 0,279    | 0,210                                 |              | <b>j</b>                                |               |               | 8                   |
|           | 20       | B  | 30                                    | 0,36     | 0,267                                 |              | 0111                                    | 0,56          | 0,134         | . 0                 |
|           | 60-      |  |                                       | ]        |                                       | 0,274        | 0,241                                   | 10/00         | 127           |                     |
| //L [X· ] | 80       |  | H2/                                   | 0,380    | 0,281                                 | 1,7,7,       |   | 1             |               | 4                   |
|           |          | _16  |                                       | 01700    |                                       | <del> </del> |   |               |               |                     |
|           | 20-      | 23   | HH.                                   | 0,522    | 0,380                                 | 0.000        | 0,291                                   | 0,54          | 0,157         | Ġ.                  |
| 0,50      | 60       |  |                                       |          |                                       | 0,309        |   |               |               | 茗                   |
| 100       | 80-      | 15   | 117"                                  | 0,319    | 0,238                                 | <u></u>      |   | <u> </u>      |               | 0, 74 m             |
|           | 20       | 16   | 113                                   | 0,312    | 0,215                                 |              | 0,249                                   | 0,60          | 0,149         |                     |
| 0,70      | 60-      |  |                                       |          |                                       | 0,190        | 01 000                                  | 0,00          | 0,300         |                     |
|           | 80-      | b  | 116                                   | 0,130    | 0,106                                 |              | [                                       |               |               | 1                   |
|           | 20 -     |  |                                       |          |                                       |              | 1                                       |               |               |                     |
| · :       | <b>{</b> | .18  | <u>H3</u>                             | 0,348    | 0,258                                 | ١٧٨          | 0,230                                   | 0,69          | 0,158         |                     |
| 0p68      | 60-      |  |                                       | 5 667    |                                       | 0,27!        | ]                                       |               |               |                     |
| ·         | 80       | 13   | HIF                                   | 0.386    | .0,280                                | ļ            | -                                       |               |               |                     |
|           | 20       | 26_  | 112                                   | 0,619    | 01 4148                               |              | 0,355                                   | 0,61          | 0,216         |                     |
| ne        | 60_      |  | •                                     |          | i '                                   | 0,439        | 01 000                                  | 0/0:          | 0/00.0        | et j                |
| //// 1.   | 80_      | 25   | H2.                                   | 0,595    | 0,1131                                |              | <b>i</b> .                              |               |               |                     |
|           | 20_      | . 19   | HII'                                  | 0,1131   | 0,316                                 |              |   | دار د         | 1 21          |                     |
| ,         |          | 17   | 7/4                                   | 12/1/2   | 01 712                                | 0,272        | 0,355                                   | 0,5#          | 0,191         | $\sum_{\mathbf{z}}$ |
| 0,53      | 60       |  | <del></del>                           | 0 0 0 1/ | 0,228                                 | DISTIL       |   | 1 .           | 1 .           | ۵                   |
|           | 80_      | _1#  | 116                                   | 0,304    |                                       | ļ            | 1                                       |               |               | \$                  |
|           | 20_      | _8   | H3                                    | 0,186    | 0,145                                 | ألفله        | 0,203                                   | 0,56          | 0.113         | 2                   |
| ~~~       | 60       |  |                                       |          |                                       | 0, 13/1      | `                                       |               |               | £                   |
| 793       | 80-      | 6  | 119                                   | 0,122    | 0,101                                 |              | ]                                       |               |               | Α                   |
|           | 20~      | <i>†</i>                                       | HS'                                   | 0,155    | 0,124                                 |              | 0,126                                   | .0,55         | 0,069         | ALB                 |
| A 5"2"    | 60       |  |                                       | [-7      | ]_,,,,,,                              | 0,118        | V1728                                   | .000          | 11001         |                     |
| 7KV I     | 80~-     | 6  | 1/3                                   | 0,139    | 0.113                                 | ' ' '        |   |               |               | 1                   |
|           | 20       |  | HH                                    | 0 210    | 0,231                                 | ,            | . م. د                                  | n -1.         | 2-0           | ١.                  |
| · [       | 60-      | dH   |                                       | 0,318    | U121_                                 | 0,227        | 0,172                                   | 0,54          | 0,092         | 1                   |
| 11.64     |          |  |                                       | 0 000    |                                       | property     |   |               | 1             | 1                   |
|           | 80       | _13_   | 115                                   | 0,288    | 0,217                                 | ļ            |   |               |               | l                   |
|           | 20-      |  |                                       |          |                                       |              | 0, 136                                  | 0,46          | 0,062         | ŀ                   |
|           | 60-      | <u>&amp;</u>                                   | H6                                    | 0,043    | 0,046                                 | 0,046        | \                                       | <i>/</i> -    | 1000          | [                   |
| ישוני     | 80       |  |                                       | L        | L'. "                                 | 1            | 1                                       |               |               |                     |
|           | 20-      |  | i .                                   |          |                                       |              | 0 407                                   | 60/           | 0.004         |                     |
| 1         | 60       | <del></del>                                    | H3.ª                                  | 0,162    | 0,129                                 | 0,129        | 1084                                    | 0,31          | 0,026         |                     |
|           | 80-      | - <i>I</i>                                     |                                       | NINK     | LU, 1.47                              | 1 7 12       |   |               |               |                     |
|           |          |  |                                       | <b> </b> |                                       | <b></b>      | {                                       |               |               |                     |
|           | 20-      |  | · · · · · · · · · · · · · · · · · · · | <b> </b> |                                       | 1            | -                                       | j -           | 1.            |                     |
|           | 60       |  |                                       |          |                                       | Į            | ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, |               | 4444          |                     |
| 0,1))     | 80       |  |                                       |          |                                       | <b>.</b>     |   |               | 1             | •                   |
|           | 20-      |  |                                       |          |                                       |              | }                                       | <b>\</b>      |               |                     |
|           | 60       |  | <del>,</del>                          | <b> </b> | · · · · · · · · · · · · · · · · · · · |              |   |               | <b>}</b>      |                     |
|           | 80-      | <del>;                                  </del> |                                       | <b> </b> |                                       |              |   | 6,83          |               | 1                   |
|           |          | - 1  |                                       | 1        |                                       |              | 0,212                                   | u ( 1) A      | 1,45          |                     |

| CU              | IRRE           | NT - ME     | TERING       | i and call       | CULATIO      | N OF FL     | ₩ (1-2.                               | -3 POINT    | s метно.  | D) .                     | Page 2           |
|-----------------|----------------|-------------|--------------|------------------|--------------|-------------|---------------------------------------|-------------|---|--------------------------|------------------|
| Ī.              |                | R           | esults of    | current - meteri | ln <b>g</b>  |             | Calculation of velocities and of flow |             |   |                          |                  |
| ı               | erti-  <br>cal | Depth       | Num          | Time:            | Rota-        | V           | locity (m.                            | :-1)        | Flow  | Flow                     | Notes<br>(times, |
| (8              | Max.           | of          | ber<br>of    | partial          | tions<br>per | io          | mean<br>in the                        | averaģe     | arca "F" between  | "Q"                      | gaugo            |
|                 | cpth           | point       | rota-        | and total        | second       | the         | vertical                              | between     | verticals   | (10)=(8)x(9)<br>(m5,s-1) | reading<br>etc.) |
| } ,,,           | im)            | (&-to)      | tions        | (seconds)        | (rýs)        | point       | "44"                                  | verticals   | (m²)  | (1113,811)               |                  |
|                 | 1              | 2           | 3            | 4                | 5            | 6           | ·7                                    | 8 .         | 9=6(P.1)  | 10                       | 11               |
|                 |                | 20          | 2            | //3"             | 0,046        | 0,049       |                                       | 0,019       | 0,21  | 0,004                    | T. share         |
| 1 0,            | 421            | 60          |              |                  | A,           |             | 0,039                                 | 01.0.7.     | V1~   | <i>V/V-11</i>            | Mark.            |
| 1/              |                | 80          | 1            | #8"              | 0,020        | 0,029       | ļ                                     |             |   | ,                        |                  |
|                 | 1              | 20          | _J           | Hb"              | 0,152        | 0, 122      |                                       | 0,065       | 0,485   | 0,031                    | 15 A             |
| 1 0,            | ANI I          | 60<br>80    |              | 115              | 0,066        | 0,062       | 0,092                                 |             |   |                          | 20               |
| <u> </u>        |                | 20-         | 3            | HS 110 H         | 0,222        | 0,170       | <b></b>                               |             |   |                          | 2,03             |
| ,   ,           |                | 60-         | 10           | //3              | المحدوا      | U, IJEV     | 0,133                                 | 0,112       | 0,505   | .0,056                   |                  |
| 10%             | $\mu_B$        | 80-         | XS           | 1/3'             | 0,116        | 0,096       | 1.112                                 |             |   |                          | # #              |
| -               |                | 20-         | 1//          | 1121             | 0,333        | 0,248       |                                       | A 141       | 0.51  | 0,091                    | 1                |
| 1 0.8           | r/             | 60          |              |                  |              |             | 0,225                                 | 0,179       | <u> </u>  | <u> </u>                 | 0,33             |
| 0,8             | <i>5,0</i>     | 80-         | 12           | 115              | 0,266        | 0,201       |                                       |             | '   |                          | 7 7              |
|                 |                | 20-         | 18           | H3 <sup>1</sup>  | 0,1118       | 0,808       |                                       | 0,244       | 0,52  | 0,126                    | , 2              |
| 1 0,            | JIX !          | 60-         |              |                  | 0.00         | - 09/       | 0,264                                 | V 12.37 /21 |   |                          |                  |
| · -             |                | 80          | 13           | 111              | 0,295        | 0,221       |                                       |             |   |                          |                  |
|                 | . !            | 20 ~<br>60  | 16           | 111              | 0,363        | 0,269       | 0,202                                 | 0,233       | 0,51  | 0,118                    |                  |
| ! 1 <i>0</i> ,5 | ( //           | 80          | 8            | 117              | 0,170        | 0,134       | 0,202                                 | '           |   |                          |                  |
| -               |                | 20-         | 22           | //3'             | 0,511        | 0,372       |                                       |             | ا مرا   | 161                      |                  |
|                 |                | 60          | _~~          |                  | <i>DISTI</i> | ביילעוט.    | 0,285                                 | 0,243       | 0,56  | 0,136                    |                  |
| 1 0,0           | ľV I           | 80~         | 12           | 116              | 0,260        | 0,197       | ,,,,,                                 |             | i<br>   |                          | C 0              |
| -               |                | 20_         | 20           | #3"              | 0, 1165      | 0,340       |                                       | 0,304       | 0,505   | 0.183                    | L'hamphet        |
| 1 0,            | 43             | 60-         |              |                  |              |             | 0,324                                 | 10,700      | <u>נשג</u> ן ע  | i , 101                  | 2 :              |
| 191             |                | 80          | 18           | 1/3              | 0,418        | 0,307       |                                       |             |   |                          | 2                |
| , .             |                | 20_         | 11           | H3 <sup>*</sup>  | 0,395        | 0,291       | 0 420                                 | 0.326       | 0,465   | 0,454                    | E                |
| 1 0,2           | X7) I          | 80 <u>-</u> |              | 1.8              | 0 0 000      | 0.186       | 0,238                                 | ``          |   |                          | 01               |
|                 |                | 20-         | 11           | 113'<br>H5"      | 0,274        |             |                                       |             |   | ,                        |                  |
| 1               |                | 60-         | ₽            | <i>H</i> 3       | 0,133        | 0,108       | 0,078                                 | 0,203       | 4525  | 0,106                    | , ,              |
| 1 0,0           | SS             | 80          | 2            | 43'              | 0,0/16       | 0,0118      | 0,000                                 |             |   |                          | ( ;              |
|                 |                | 20_         | 12           | HS.              |              | 0,279       |                                       | 0.110       | 0 - 4   |                          |                  |
| 10              | HG             | 60_         | . ]          | 7                |              | 777-7       | 0,220                                 | 0,149       | 0,52  | 0.037                    | <b>\</b> \       |
| ' ["            |                | 80-         | 9            | 113"             | 0,208        | 0,161       | . /                                   |             |   |                          |                  |
| ; [             |                | 20-         | 12           | 114              | 02181        | 0,205       |                                       | 0,189       | 0,515   | 0,097                    |                  |
| 0,8             |                | 60          |              | ·                |              |             | 0,158                                 | V(.70/      | 01310   | AL VII                   | 1                |
| 17              |                | 80 –        | 6            | HII'             | 0,136        | 0.110       |                                       |             |   |                          |                  |
| , 1             |                | 20-         | ··· <u>a</u> | 1.21             | 0.6111       | 4 4 1       | 0 440-                                | 0,103       | 0,445   | 0,0/15                   |                  |
| 0,              |                | 60<br>80    | D            | H3'              | 0,016        | 0,0418      | 0,048                                 |             | }   |                          | ] '              |
|                 |                | 20          |              |                  |              |             |                                       |             |   |                          | ` ;              |
| 1               | ا بر           | 20<br>60-   | 5            | H3'              | 0,116        | 0,069       | 0,069                                 | 0,058       | 0,3   | 0.017                    |                  |
| 1. j. 2         | <b>U</b>       | 80-         | _∪           | #9               | WILL -       | 1000        | 2000                                  | [           |   |                          | ] . ;            |
| -               |                | 20-         |              |                  |              |             | <b></b>                               | 1           | 1   |                          | ]                |
|                 | 1              | 60_         |              |                  | <b> </b>     |             |                                       | ļ           | ļ   | <u> </u>                 | <b> </b>         |
|                 |                | 80_         |              |                  |              |             | 1                                     |             |   | <u> </u>                 |                  |
| ,               |                |             |              |                  | <del></del>  | <del></del> |                                       | 0,183       | 6,575   | 1,208                    | ]                |
|                 |                |             | -            |                  |              |             |                                       |             | the state of the spinish state and a second |                          | 1 .              |
| -               |                |             |              | •                | ٠.           |             |                                       | VP=ZQ:ZF    | ZP (  | ΣQ                       |                  |

| JANUU            |             |            | AND CALL                |             | n vi II                                |              |          | and of flow |                       | Page 2     |  |
|------------------|-------------|------------|-------------------------|-------------|--|--------------|----------|-------------|-----------------------|------------|--|
| Verti-           |             | Num-       | ·                       | Rota-       | ν.                                     | elocity (m.  |          | Flow        | ,                     | Notes      |  |
| cal              | Depth.      | ber        | . Time:                 | tions       |  | mean         | 1        | area "F" .  | Flow                  | (time      |  |
| (Max.<br>depth   | of<br>point | of         | partial<br>and total    | per         | io                                     | ib the .     | averaĝe  | between     | (10)⇔(8)×(9)          | tead):     |  |
| in m)            | (% m)       | cota-      | (seconds)               | second      | the point                              | vertical     | between. | verticals   | (m <sup>3</sup> ,g-1) | eto.       |  |
|                  |             | tions      |                         | (rps)       |  | '''ΥΥ''      |          | (m²) .      |                       |            |  |
| 1                | 2           | 3          | 4                       | 5           | 6                                      | 7            | 8        | 9≈6(P.1)    | 10                    | 11         |  |
|                  | 20-         | 7          | lis"                    | 0,155       | 0.124                                  |              | 0,062    | 0,20        | 0,012                 | Trend      |  |
| 0,40             | 60-         |            | <u> </u>                | 1=0         | - 101                                  | 0,125        |          |             | •                     | È          |  |
|                  | 80-         | 7          | 11/10 1                 | 0,159       | 0,126                                  | ļ            |          | Ì           |                       | 11         |  |
|                  | 20_         | 7          | IIH!                    | 0,159       | 0,126                                  | ا            | 0,121    | 0,52        | 9062                  |            |  |
| 0,64             | 60-         |            |                         |             | ·                                      | 0,117        |          |             |                       | 12 1       |  |
| 1011             | 80-         | Ъ          | 115'                    | 2,133       | 0.108                                  | <u> </u>     | ].       |             |                       | 3          |  |
|                  | 20_         | 10         | //3                     | 0,2321      | 0.177                                  |              | 0,11/3   | 0,63        | 0,090 .               |            |  |
| 113.             | 60          |            |                         |             |  | 0, 169       | V1.00    | - 122       |                       | ±          |  |
| 4631             | 80          | 9          | H3 ¥                    | 0,209       | 0.161                                  |              | ]        |             | ]                     | ۱, ا       |  |
|                  | 20          | 24         | )12 <sup>1</sup>        | 0,521       | D, H 1H                                |              | 0,260    | 0,87        | 0,17/1                | W 911' a   |  |
| 0,72             | 60-         | ,          | •                       |             | <u></u>                                | 0,352        | 10,100   | VI-V        | 7                     | 16.        |  |
| 400              | 80-         | 14         | 113                     | 0,395       | 0,291                                  | <u> </u>     |          |             | ]                     | 7          |  |
|                  | 20-         | 31         | Н2                      | 0,720       | 0,518                                  |              | 0,402    | 0,72        | 0,289                 | <b>.</b>   |  |
| A V A            | 60-         |            |                         |             |  | 0,420        | UINU     |             | 01000                 |            |  |
| 972              | 80          | 19         | H3*                     | D. AHI      | 0,323                                  |              |          |             |                       |            |  |
|                  | 20 -        | 21         | Н3                      | 0,1188      | 0,356                                  |              | 0,366    | 0,785       | 0,287                 | i ·        |  |
|                  | 60-         |            |                         |             |  | 0,312        | VIJOU    | 1 1/1 00    | V/~~V/                |            |  |
| 0,85             | 80-         | 16         | 144                     | 0,363       | 0,269                                  |              | · ;      |             |                       |            |  |
|                  | 20-         | 27         | 113 <sup>1</sup>        | 0,627       | 0,453                                  |              | 6 411    | 0,83        | 0,288                 |            |  |
| 0,81             | 60-         | V          |                         | 1           |  | 0,383        | 0,3/11   | 10/07       | 10,200                | ' :        |  |
|                  | 80-         | 18         | 42                      | 0,428       | 63111                                  | ]            |          |             | l .                   | 2          |  |
|                  | 20_         | 22         | 113"                    | 0,511       | 0,37,2                                 |              | 0 952    | 0,36        | 0,268                 | 20         |  |
| ا<br>دون م       | 60          |            |                         | بعدد        | 12.72.4                                | 0,323        | 0,353    | N100        | UNCOP                 | Champhet   |  |
| 0,71             | 80-         | 16         | #3 <sup>11</sup>        | 0,312       | 0,275                                  | 1            | · :      |             | ;                     | 35         |  |
|                  | 20-         | 19         | 43'                     | 0,441       | 0,323                                  |              | 0 404    | 0,69        | 0,225                 |            |  |
| فيدم             | 60-         |            |                         | a turn      | ــــــــــــــــــــــــــــــــــــــ | 0,331        | 0,321    | V, b' J     | NIXXO                 | w.         |  |
| 0,67             | 80          | 20         | <i>н</i> з¹             | 0,465       | 0,340                                  |              |          |             | <b>]</b>              |            |  |
|                  | 20-         |            | 113'                    | 0,395       | 0,291                                  | 1            | . 001    | 010         | 1000                  | 1          |  |
| ا `رو            | 60-         | _1J        |                         | V1270       | تواتح الح                              | 0,258        | 0,291    | 0,69        | 0,202                 |            |  |
| 0,71             | 80_         | 13         | UA!                     | 0,3021      | 0,226                                  | 1            |          |             |                       |            |  |
|                  | 20_         | 22         | Н3 <mark>.</mark><br>Н3 | 0,511       | 0,312                                  | <b>1</b>     |          | 111         | 000                   | <b>]</b> . |  |
| 0.10             | 60_         | 1          |                         | WISH        | ~ <u>~ "~ "</u>                        | 0,351        | 0,304    | 0,665       | 0,202                 | 1          |  |
| 0,62             | 80-         | 19_        | 112                     | 0,452       | 0.331                                  | " "          |          |             |                       |            |  |
|                  | 20_         | 11         | 12                      | 0,261       | 0,198                                  | 1            | 0.000    | A DAY       | la me                 | ľ          |  |
|                  | 60-         |            |                         | ×120.1      | .V 1_J.U<br>                           | 0,236        | 0,293    | 0,1195      | 0, 1115               | 1          |  |
| 11 7             | 80 -        | 16         | H3'                     | 0.372       | 0,275                                  | 10000        |          | !           |                       |            |  |
|                  | 20-         | 16         | <u> </u>                | 0,023       | 0,039,                                 | <del> </del> | , ,,,,,, |             | 1                     | ·          |  |
| ا ن              | 60          | _4         | <u> </u>                | 0,027       | V V2//                                 | 0,032        | 0,13/1   | 0,41        | 0,05H                 | 1          |  |
| 0,45             | 80          |            | 43'                     | 0.023       | 0,032                                  | שפטוטן       |          |             | .                     |            |  |
|                  |             |            | <u> </u>                |             |  | <del> </del> | 1        |             | 1                     |            |  |
| !                | 20-         |            |                         | 0,022       | 0,031                                  | 0,0%         | 0,081:   | 0,39        | 0,012                 | 1          |  |
| 0,33             | 60-         |            |                         | 0 000       | 2 497                                  | 10/0%        |          |             |                       |            |  |
|                  | 80-         |            | HH                      | 0,022       | 1.03!                                  |              | -        |             |                       |            |  |
|                  | 20-         |            | 1.4                     | 1 0 0 0 0 0 |  | 0 100        | 0,112    | 0,3         | 0,033                 |            |  |
|                  | 60          | <u>://</u> | 113                     | 0,255       | 0,193                                  | 0,193        |          |             |                       |            |  |
| / . <sup>v</sup> | 80-         |            |                         | l           |  | L            | J        | <b>∥</b> .  | 1                     |            |  |

| CHRRENT          | - METERING           | AND    | CALCULATION | NF. | FLOW   | (1-2-3 | POINTS | METHOD) |
|------------------|----------------------|--------|-------------|-----|--------|--------|--------|---------|
| 1111111111111111 | 11/11/11/11/11/11/11 | 111111 | unicontini  | UI' | 1 4011 |        |        |         |

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| Verti- | R           | *************************************** | f current-metering |             |              |              |              | s and of flow |               | Notes      |
|--------|-------------|---|--------------------|-------------|--------------|--------------|--------------|---------------|---------------|------------|
| cal    | Depth       | Num.                                    | Time:              | Rota-       | }V           | locity (m.s  | :-1)         | Flow          | Flow          | (timee,    |
| (Max.  | of          | ber                                     | partial            | tions       | in .         | mean         | average      | area "F"      | "Q"           | gauge      |
| depth  | polat       | ot                                      | and total          | per         | the          | in the       | permeen.     | between       | (10)==(8)=(9) | reading    |
| in m)  | (%·m)       | rota-                                   | (seconds)          | second      | point        | vertical     | verticals    | verticals     | (m3,8-1)      | etc.)      |
|        |             | tions                                   | .,                 | (cģs)       | <u> </u>     | "үү"         |              | (m²) .        |               |            |
| 1      | 2           | 3                                       | 4                  | 5           | 6            | 7            | 8 .          | 9=6(P.1)      | 10            | 11         |
|        | 20          |   |                    |             |              |              | 0.1191       | 0,265         | 0,029         |            |
| -, ,   | 60          | 1                                       | H3"                | 0,023       | 0,032        | 0,032        | 0,112        | VI~03         |               |            |
| • ]    | 80-         |   |                    |             | <u> </u>     |              |              |               | •             |            |
|        | 20_         |   |                    |             |              | ]            | 0,04         | 0,295         | 0,011         |            |
| ا دو ۸ | 60-         | 2                                       | H3"                | 0,046       | 0,048        | 0,048        | - VI UH      | 10/~20        | 1011          | •          |
| 0,33   | 80          |   |                    | ¥           |              | .,,,,,       |              |               |               | •          |
|        | 20-         |   |                    |             |              |              | 0,255_       | 9.315         | 2,383         |            |
|        | 60          |   |                    |             |              |              | NYNO _       | 1100          | 21707         |            |
| • • •  | 80-         |   |                    |             |              | •            |              | }             | •             |            |
|        | 20_         |   |                    |             |              |              | }            |               | .             | ,          |
|        | 60-         | <del>, .</del>                          |                    |             |              |              |              |               |               |            |
|        | 80-         |   | <del></del>        | ,           |              | ĺ            |              |               |               |            |
|        | 20_         |   |                    |             | <del></del>  |              |              |               |               |            |
|        | 60 <u>-</u> |   |                    |             |              | •            |              |               |               | •          |
|        | 80-         |   |                    |             | ļ- <u></u>   | 1            |              |               |               | ľ          |
|        |             |   |                    |             | <b> </b>     | }            |              |               |               |            |
| . ,    | 20 -        | ļ                                       |                    |             |              | ,            |              |               | •             |            |
|        | 60-         |   |                    | <b> </b>    |              |              | '            |               |               | ſ          |
|        | 80          |   |                    |             | ļ            |              |              |               |               |            |
|        | 20-         |   |                    |             |              |              |              |               |               |            |
|        | 60          |   |                    |             | <br>         | •            | <del> </del> |               |               |            |
|        | 80          |   |                    |             |              |              |              |               |               | ١.         |
|        | 20          | <del>-</del>                            |                    |             |              | }            | 1            |               | 1 1 N         |            |
| ' [    | 60-         |   |                    |             | l            |              | <del> </del> |               | i .           | - "        |
| ì      | 80_         |   |                    |             |              | ]            |              |               |               |            |
|        | 20-         |   |                    |             |              |              | ]            | ŀ             |               |            |
| ,      | 60-         | j                                       |                    |             |              |              | ļ            | ļ             | <del></del>   |            |
|        | 80-         |   |                    |             | <del> </del> |              | `            |               | . 1           |            |
|        | 20_         | <del></del>                             |                    |             |              |              | 1 .          |               |               | •          |
|        | 60 <u>-</u> |   |                    |             | . ,          | ]            |              | <b> </b>      |               | ,          |
|        | 80_         |   |                    |             | <del> </del> | ł            |              |               |               |            |
|        | 20-         |   |                    |             |              | ,            | 1            |               |               | ] :        |
|        | 60-         |   |                    |             | <del> </del> | {            |              | <b></b>       |               | 1          |
|        | 80          |   |                    |             |              |              |              |               |               |            |
|        |             |   |                    | <b></b>     |              |              |              |               |               | }          |
|        | 20-         |   |                    | <del></del> | <b> </b>     | • •          |              | .             |               | ĺ          |
|        | 60_         |   |                    | <b></b>     | <b> </b>     | 1            |              | ]             | T             | 1          |
|        | 80 –        |   |                    |             | L            |              |              | U.            | <b>l</b> .    |            |
|        | 20          |   |                    | <b> </b>    |              | 1            | 1            | 1 .           |               | 1          |
|        | 60          |   |                    |             |              | <u> </u>     |              | <b>  </b>     | <del></del>   |            |
|        | 80          |   |                    |             | L            | <u></u>      | <u> </u> -   | ' '           | İ .           | ٠.         |
|        | 20-         |   |                    |             |              |              | <b>]</b> ·   | ₩.            |               | <b>)</b> . |
|        | 60-         | <del></del>                             | <del> </del>       |             |              | 1            | <del> </del> | <b> </b>      | <b></b>       | l          |
|        | 80-         |   |                    | <u> </u>    | ]            | ]            | 1            |               |               | ) ·        |
|        | 20→         |   |                    |             |              | <del> </del> | 1            |               |               | [          |
|        | 60          |   | •                  |             | ļ            | 1            |              |               |               |            |
| r      |             |   | ;<br>              |             | ļ            | <b>{</b> :   | [            |               | <b>[</b> ;    | '          |
| . !    | 80-         |   |                    | l :         | L            | l            | j            | II .          | 1             | ı          |

Station XEKATAH. 18/5/1991 (No. 5) X=0,69810 + 0,016.

CURRENT - METERING AND CALCULATION OF FLOW (1-2-3 POINTS METHOD)

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| Veril-          | R            | esults of       | current - meter | ring .   | ]              |  |                                       | a and of flov | <u> </u>         | Notes        |
|-----------------|--------------|-----------------|-----------------|----------|----------------|--|---------------------------------------|---------------|------------------|--------------|
| verit-          | D            | Num             | Times           | Rota-    | V              | elocity (m.                                      | (-1)                                  | Flow          | Flow             | (timee.      |
|                 | Depth        | ber             | Time:           | tions    |                | mean   |                                       | arca "F"      | . "0"            | gauge        |
| (Max.           | ot           | of              | partial         | per      | io             | in the   | average                               | between       | (10)==(8)×(9)    | reading      |
| depth           | point        | rota-           | and total       | second   | the            | vertical   | between                               | verticals.    | (m\$.s.1)        | eto.)        |
| (10 p)          | (%·m)        | tions           | (seconds)       | (rps)    | point          |  | verticals                             | (m²),         | (1113.8.1)       |              |
| 1               | 2            | 3               | 4               | 5        | 6              | 7  | 8                                     | 9⇔6 (P,1)     | 10               | 11           |
|                 | 20_          |                 |                 |          |                |  |                                       |               |                  | -1-          |
| 7,21            | 60           |                 | 0               |          |                |  |                                       |               | `                | end          |
|                 | 80-          |                 |                 |          |                | ļ  |                                       |               |                  | 77 %         |
|                 | 20-          |                 | 112"            | 0,023    | 0,032          |  | 0,024                                 | 0,325         | 0,001            | 124.00       |
| $HH$ . $\Gamma$ | 60           | ·               | 110             | ļ        | 0,065          | 0,048  |                                       |               |                  | 8 6          |
|                 | 80-          | 3               | HL              | 0,03/    |                | <del> </del>                                     |                                       |               |                  | , d          |
|                 | 20 –<br>60 – | _1              | Н3'             | 0,023    | 0,032          | 0,073  | 0,060                                 | 0,44          | 0,026            | _            |
| 7. UU           | 80-          | <u></u>         | 112'            | 0,1412   | 0,115          | 6000   |                                       |               | •                | 1 4 th       |
|                 | 20-          | <i>D</i>        |                 | 10,1000  | 7/10           |  |                                       | 000           | 0.000            | <i>p</i> 5   |
|                 | 60-          |                 | •               | -        |                | 0,137  | 0,105                                 | 0,555         | 0,058            | 0,           |
| in              | 80-          | 0.              |                 |          |                |  | ]                                     |               |                  | 5. K.        |
|                 | 20           | 21              | 112             | 0,5      | 0,8365         |  | 0,238                                 | 0,315         | 0,140            | Hend: O, Hgm |
| 7. 26           | 60-          |                 |                 | <u> </u> |                | 0,339  | 77:00                                 | 71111         | <u> </u>         | · · ·        |
| 700             | 80-          | 18              | 42'             | 0,428    | 0,314.         |  |                                       |               | ·. ·             |              |
| , .             | 20:-         | . 42            | 112'            | 1-1-     | 0,714          | 10   | 0, 8124                               | 0,16          | 0,339            |              |
| 2.37            | 60-          |                 | 1, 01           | 0 5/17   | 0 204          | 0,555  |                                       |               |                  |              |
| 70-             | 80-          | 23              | 112'            | 0,541    | 0,391          |  | <b>{</b>                              |               | . :              |              |
|                 | 20-<br>60-   | 29              | H2'             | 01690    | 0,491          | 0,355  | 0,455                                 | 0,82          | 0,373            |              |
| 188             | 80-          | 12              | JIZi'           | 0,188    | 0,214          | 10/980   | )                                     | ·             |                  | j            |
| ·               | 20-          | . 29            | 112             | 0,699    | 0,431          |  | 1 0 110                               |               | 0.00             | ·            |
| ۱ ۵ ـ           | 60~          | -: <u>-</u> 2:J |                 |          | - V J. C. V. Z | 0,341  | 0,348                                 | 0,865         | 0,301            |              |
| 0,85            | 80-          | 10              | )//             | 0.2113   | 0,185          | ]  | _                                     |               |                  |              |
|                 | 20-          | 23              | 112'            | 0,547    | 0,397          |  | 0,311                                 | 0,79          | 0,245            |              |
| , ,             | 60-          |                 |                 |          |                | 0,282  | \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ | 71.2          | <del></del>      | 1            |
| 770             | 80-          | g               | 112'            | 0,211    | 0,168          |  | -                                     |               |                  |              |
|                 | 20-          | .2f             | 112"            | 0,649    | _D, H6H        | 0, 444   | 0,363                                 | 0,685         | 0,248            | ] .          |
| 164             | 60<br>80     | ···             | 111             | 0,585    | 0,424          | ייוואון ניין                                     |                                       |               |                  |              |
|                 | 20_          | 2H<br>18        | 11.21           | 0, 428   | 0,314          | <del>                                     </del> | 1                                     |               |                  |              |
| 1.311           | 60-          |                 | Hote            | 14 1120  | U.1.21.71      | 0,28!  | 0,362                                 | 0,69          | 0,249            |              |
|                 | 80-          | 111             | 112!            | 0,333    | 0,248          |  |                                       |               |                  | 1            |
|                 | 20:          | 12              | 112'            | 0,285    | 0,214          |  | 0,248                                 | DYAT          | 0,114            | 1            |
|                 | 60-          |                 |                 |          |                | 0,216  | VIZH8                                 | 0,705         | V/17H            | }            |
| ]67 ]           | 80 -         | 12              | 41'             | 0,292    | 0,219          |  | 1                                     |               |                  | } .          |
| 1               | 20-          | Ib_             | JH"             | 0,634    | 0,458          |  | 0,311                                 | 0,795         | 0,244            |              |
|                 | 60-          |                 |                 |          |                | 0,406  | 1 VIV.1                               |               | 2/ 11/           | 1            |
|                 | 80~          | 20              | Н',             | ONET     | 0,355          | <b> </b>   | -                                     |               |                  | :            |
|                 | 20_          | _3              | H2'             | 2,071    | 0,065          |  | 0,235.                                | 0,775         | 0,182            |              |
| 7 / 4 1         | 60-          |                 | 1. 1            | 1        |                | 0,065  |                                       |               |                  |              |
|                 | 80-          | 2               | H2/             | 0,071    | 0,065          | <del> </del>                                     | -                                     |               |                  |              |
|                 | 20           | 15              | 112°            | 0,357    | 0,266          | 0 111  | 0,130                                 | 0,535         | 0,069            |              |
|                 | 60_<br>80_   | 7               | JIJI.V          | A IFA    | 0,126          | 0,196  | 1                                     |               | ]. · · · · · · · | }            |
| , [             | VV           | 1               | 4111            | 0,159    | 111.40         | <u></u>  | .]                                    | H · .         | 1 .              |              |

|          | m management of the A. C.    |        | A 4 C A HILL A TYCALL | 0   | PLA DILL |        | •      |          |
|----------|------------------------------|--------|-----------------------|-----|----------|--------|--------|----------|
| AHDDENT  | MALI DUDINIP                 | A RIII | CALCULATION           | m   | 1.111111 | /1 0 0 | DOINTS | METERNIN |
| PHRKLIAL | -: [A] L   L L [   J A [ J ] | HIM    | DAI GULATRIN          | 111 | 1 1 1/11 | (T~~~) | LOIMIO | MILLINON |
|          |                              |        |                       |     |          |        |        |          |

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|------|---|
|------|---|

| Verti- | R      | esults of   | current - meteri |                | <u></u>       |                |              | s and of flow     |  | Notes      |
|--------|--------|-------------|------------------|----------------|---------------|----------------|--------------|-------------------|--|------------|
| cal    | Depth  | Num-        | Time:            | Rota-          | , V           | elocity (m.s   | (1)          | Flow              | Flow   | (times     |
| (Max.  | of     | ber         | partial          | tìons          | in            | mean           | averaĝe      | arca "F"          | "Q"  | geuge      |
| depth  | point  | of          | and total        | per            | the           | in the         | permeen.     | between           | (10)=(8)×(9)                                     | readin     |
| (n m)  | (% pi) | roia-       | (seconds)        | second         | point         | vertical       | verticals    | verticals         | (m3,g-1)   | eto.)      |
|        |        | tions       |                  | (rps)          |               | ,,,,,,,        | l            | (m <sup>1</sup> ) |  |            |
| 1      | 2      | 3           | 4                | 5              | 6             | 7              | 8            | 9=6(P.1)          | 01   | 11         |
|        | 20     |             |                  |                |               | }              | 0,155        | 0,275             | 0,058  |            |
| ካ ካለ   | 60     | 6           | 42               | 0,1/12         | 0,115         | 0,115          |              | 71 K 1 K          |  |            |
| 131    | 80     | 7           |                  | [ '            | <i>'</i>      | l '            | [            |                   |  |            |
|        | 20     |             |                  | 1              |               | 1              | Ì            |                   | 0.020  |            |
|        | 60     | 8           | او بالح          | 0,190          | 0,148         | 91/18          | 0.131        | 0,305             | 0,039  |            |
|        | 80     | [ <i>P</i>  |                  | 14.78          | _ <u></u>     | 17.70          |              | į                 |  |            |
|        | 20     |             |                  |                |               |                |              | ļ <u>.</u>        | •  |            |
|        |        |             |                  | 2010           | A 440         | 0 100          | 0,158        | 0,325             | 0,051 .  |            |
|        | 60     | 9           | . 411            | 0,219          | 0,168         | 0,188          |              |                   |  |            |
|        | 80     |             |                  |                |               |                |              |                   | · a  |            |
|        | 20-    |             |                  | <u> </u>       |               | ļ. ·           | 10 471 11/2  | 10 1/2 11         | 2,836 113  |            |
| 0.00   | 60     |             | 0                | 0              |               | <u></u>        | 173          | 10, 10            | 21/11/11   | ĺ          |
| // ¶ ¥ | 80-    |             |                  |                |               | 1              | <u> </u>     |                   |  |            |
|        | 20-    |             |                  |                |               |                | ]            | •                 |  |            |
|        | 60~    |             |                  | ·              |               | 1              |              |                   |  | <u>'</u>   |
|        | L      |             |                  | <del> </del> - | ļ <del></del> |                |              |                   |  | [          |
|        | 80     |             | ļ                | <del> </del>   |               | <del> </del>   | <del>(</del> | ļ                 |  |            |
|        | 20 -   |             |                  |                |               |                | ]            |                   | ٠,   |            |
|        | 60     |             |                  |                |               | 1              | <del></del>  |                   |  | r          |
|        | 08     |             |                  | <u> </u>       |               | <u> </u>       | <u>.</u>     | l .               |  |            |
|        | 20     |             |                  |                |               |                |              |                   | •  |            |
| -      | 60_    | 1           | •                |                |               | ] · ·          | ļ            | ļ                 |  |            |
|        | 80     |             |                  |                |               | 1              | 1            | 1                 |  |            |
|        | 20-    |             |                  | <del> </del>   |               | <del> </del> - | 1            |                   | [ • 、  |            |
| 1      |        | <del></del> |                  | ļ              |               | -              | l            |                   | L  | -          |
|        | 60     |             |                  |                |               | -              |              |                   | , .  | ĺ          |
|        | 80-    |             |                  | <del> </del>   | L             | <b></b>        | 4            | -                 | ,  |            |
|        | 20_    |             |                  | <u></u>        |               | .[             |              | [                 | l ·  |            |
|        | 60     |             |                  | <u></u>        |               |                |              | <b> </b>          |  |            |
|        | 80-    | ,           |                  | ]              | i             |                |              |                   |  | 1          |
|        | 20-    |             |                  | 1              |               | <u> </u>       |              |                   | ļ . ·  |            |
| ,      | 60-    |             |                  |                |               | 1              |              | <u> </u>          | <u> </u>   |            |
|        | 80_    |             |                  | <u> </u>       | <b> </b>      |                |              |                   | 1  |            |
|        |        | <b> </b>    | ļ                | }              | <del> </del>  | <del> </del>   | 1            |                   | · ·  |            |
|        | 20     |             |                  |                | <b> </b> -    | -{             | [            |                   |  | ,          |
|        | 60-    |             | · ·              | <u> </u>       |               | .] .           | -            |                   | <del>                                     </del> | 1          |
|        | 80-    |             |                  |                |               | <u> </u>       | ] '          | )                 |  | 1          |
|        | 20-    |             |                  |                |               | 1              |              |                   |  | 1          |
|        | 60,    |             |                  |                | • ;           | 1              | <del></del>  | <u> </u>          |  | Į .        |
|        | 80     |             | <del></del>      |                | <u> </u>      | 1 .            | 1            | ∭ .               |  | <b>]</b> . |
|        | 20-    |             |                  | <b></b> -      | <b></b>       | <del> </del>   | 1.           | <b>i</b> i .      |  |            |
| • .    |        |             | <del></del>      | <u> </u>       |               | · [ ·          | ·            |                   | · ·  | 1          |
|        | 60-    | <u> </u>    |                  | <del> </del>   | ļ             | -[             |              |                   |  | <b>'</b>   |
|        | 80_    |             |                  | <b> </b>       |               |                |              | <b>l</b>          | ] .  | 1          |
|        | 20     |             |                  | <u> </u>       | <u></u>       |                | 1            | ╢.                | , ,  |            |
|        | 60-    |             |                  |                | [             | [              |              | <del> </del>      | <del> </del>                                     | 1          |
|        | 80_    |             | <del></del>      |                |               | 1              | '            |                   |  | ٠.         |
|        |        |             |                  | <del> </del> - |               | <del> </del>   | 1            | )                 |  |            |
| İ      | 20-    |             | <del></del>      | <b> </b>       | <b></b>       | .              | L            | <u></u>           |  |            |
|        | 60_    |             | <u> </u>         | <del> </del>   |               |                |              |                   | ,  |            |
|        | 80     | <u> </u>    |                  | <u>]</u>       | L             | L              | ]            | ]] .              | 1  | ]          |
|        |        |             |                  |                |               | <del> </del>   | 7            | H - C             | I  | 1          |

Studion XEKATAH. 22/5/91: (NO. 6.) V= 0,698N+0,016.

|         | - ,        |       | ん 人!<br>ipt rat   |                |                      | ,                | : ( <i>vid.</i> 6<br>N: nr ri |                             | = 9,6981                                   |  |              | 2   |
|---------|------------|-------|-------------------|----------------|----------------------|------------------|-------------------------------|-----------------------------|--|--|--------------|---|
|         | GUK        | KLI   |                   |                | AND CAL              | ستعصيمات ومحاسول | N OF TL                       |                             |  |  |              | Page 2                                      |
| i       | Ver        | ıi. İ | R                 |                | current - meter      |                  | 37                            | Calculation<br>clocity (m.: | وحكانات فللمحاسب الماري ويروع ويستوي ويروي | s and of flow                                    | ,            | Notes                                       |
|         | ca         |       | Depth             | Num-<br>ber    | Time:                | Rota-            |                               | nican                       |  | Flow<br>area "F"                                 | Flow         | (timeo,                                     |
|         | (Ma        |       | of<br>point       | of             | partial<br>and total | per              | io<br>the                     | is the                      | petmeen.<br>gretaĝo                        | between  | (10)=(8)×(9) | reading                                     |
| ( iii ) | in         | •     | (%·m)             | tota-<br>tions | (seconds)            | second<br>(rps)  | point                         | vestical<br>"YY"            | verticals                                  | verticals<br>(m²)                                | (m3,s-1)     | etc.)                                       |
|         |            |       | 2                 | 3              | 4                    | 5                | 6                             | 7                           | 8  | 9=6(P.1)   | 10           | 11  |
|         |            |       | 20-               |                | 48'                  | 0.25             | 0,191                         |                             |  |  |              | A DOWNSON AND ADDRESS OF THE PARTY NAMED IN |
|         | 1.         | - 1   | 60-               | 12             |                      | 1_42J            | <u> </u>                      | 0,168                       | 0,08/1                                     | 0,435  | 0,036        | Tistant =                                   |
| ,       | qs8        | i L   | 80                | 9              | H9 P                 | 0, 1811          | 0,144                         |                             |  |  |              | 100   |
| •       | 1          |       | 20                | 9              | H91                  | 0, 1811          | 0,1411                        |                             | 0/1/12                                     | 0,67   | 0,095        | 2.20  |
| 4       | 0.41       |       | 60-               |                |                      | <u> </u>         |                               | 0,117                       | 071112                                     | <u> </u>   | 070 05       | 7.3   |
| 7       | O, H.      |       | 80                |                | 50                   | 0.1              | 0,085                         |                             | ļ. <u> </u>                                |  | ,            |   |
|         | 1          |       | 20-               | 18             | <i>!</i> 6           | 0,391            | 0,288                         | D 218                       | 0,216                                      | 0,615  | 0,132        | 4 4   |
| .1      | 0,16       | " "   | 60 <u></u><br>80- |                | 112)                 | וצון מ           | 0,348                         | 0, 318                      |  |  | •            | H end                                       |
|         | }          |       | 20_               | 20<br>32       | 12)<br>AKI           | 0,136            | 0,523                         |                             |  |  |              | end   |
| Ą       |            | į.    | <u>60</u> →       | . J.L.         |                      | W. 1~1           | 4/200                         | 0,318                       | 0,3/18                                     | 0,585  | 0,203        |   |
| I       | O, J       | I) L  | 80_               | 1.1/           | H5'                  | 0,311            | 0,233                         | ]                           |  |  |              | 1. 10 X                                     |
| •       |            | ı ı   | 20-               | _33_           | HS 1                 | 0,433            | 0,5.27                        |                             | 0,43                                       | 0,715  | 0,307        | OH HOM                                      |
| . 1     | qj         |       | 60~               |                |                      | ļ                |                               | 0, 4821                     | <del>-/::-</del>                           | <i>P. F. F. F. F. F. F. F. F. F. F. F. F. F.</i> |              |   |
| _       | 10         |       | 80                | <u> </u>       | 1/3'                 | 0,60#            | 0,1131                        | <b></b>                     |  |  |              |   |
|         | 1          | 1.    | 20 –<br>60–       | . 28           | НН'                  | 9636             | 0,1159                        | 0,305                       | 8,393                                      | 0,7/1  | 0,290        |   |
| 1       | 0,78       |       | 80-               | 9              | #6 <sup>r</sup> -    | 0,195            | 0,152                         | 0) 300                      |  |  |              |   |
|         |            |       | 20 –              | 3.2            | H3'                  | 2,7111           | 0,535                         |                             | 0.243                                      | 0,135  | 0,274        |   |
|         |            | [     | 60                |                |                      |                  |                               | 0,442                       | 0,3/3                                      | 41120  | 01214        | ·   |
| . ]     | 0,7.       | 6     | 80_               | 22             |                      | 45_              | 0,349                         | ,                           |  |  |              |   |
|         |            | , j.  | 20-               |                |                      | ļ <u>.</u>       |                               |                             | 0,458                                      | 0,1145   | 0,203        | . *   |
| 1       | 0,17       | ı.    | 60-               | 29             | HH'                  | 0,659            | 0,475                         | 0,1125                      | 1.77                                       | 7  | <i>i</i> ,   |   |
| -       | 1777       |       | 80<br>20          | ar             | 113                  | 0.526            | 0,386                         |                             | {  |  |              |   |
| /       | 1 .        | - 1   | 60-               | 25             |                      | 0,531            | VI. 700                       | 0,272                       | 0,313                                      | 0,435  | 0,162        |   |
| 3       | 0,70       |       | 80                | 10             | 491                  | 0,204            | 0,158                         | 197.7.                      | ì  |  |              |   |
|         | -          |       | 20                | 24             | 48'                  | 95               | 0,365                         |                             | 0,318                                      | 1,82   | 0,262        |   |
|         | 100        | i, 1  | 60_               |                |                      | l                |                               | 0,365                       | 0,20                                       | 170~   | 010000       |   |
|         | 0,9        |       | 80-               | 22             | 111                  | 0,5              | 0,365                         |                             | ]  |  |              |   |
|         |            |       | 20<br>50          | _25            | 1131                 | 0,581            | Dy 1121                       | 0,289                       | 0,327                                      | 0,84   | 0,174        | 1 1   |
| . 1     | 0.7/       |       | 30-               | <u> </u>       | 119                  | 0,20/1           | 0,158                         | 0,007                       |  | [  |              | ·   |
| ٠,      | -          | t-    | 20-               | 10<br>15       |                      | 0,333            | 0,248                         |                             | 00%  | 24   | 2 // 2       | <b>1</b> ·                                  |
| ſ       |            | 1     | 30                |                |                      | 14.00.00         | 2/                            | 0,180                       | 0,234                                      | 0,7  | 0,163        | ٠.  |
|         | 0,66       | , [   | 30                | 6              | H3.                  | 0,139            | 0,113                         | ]                           |  |  |              | 29  |
|         |            | 1.    | -05               | _3             | 50'                  | 0,06             | 0,057                         |                             | 0,118                                      | 0,615  | 0,012        |   |
| 1       | la ri      |       | 50                |                |                      |                  |                               | 0,056                       | -/-10                                      |  | -727~        | 1   |
|         | 0,5,       |       | 30~               | _3             | <u>isk</u>           | 0,051            | 0,055                         |                             |  |  |              | ]   |
| ,_      |            | 1-    | 20 <u>-</u>       |                |                      | 0 000            | nait                          | 0,211                       | 0.136                                      | 0,75   | 0,102        |   |
| 2       | 0,18       |       | 30-<br>30-        | 13             | 115                  | 0,288            | 0,217                         | מיייןשן                     |  |  |              |   |
|         | 710        |       | 20-               |                | <del></del>          | <b>}</b>         |                               |                             |  |  |              |   |
| 1       | <u>l</u> . | 1     | 60-               | 5              | 11)1                 | 0,113            | 0,094                         | 0,094                       | 0,155                                      | 0,22   | 0,034        |   |
| .1      | 0,26       |       | 30-               | · ·            | (1/1                 | 21.21.2          | 2,200                         | 1-0"                        |  |  |              |   |
| -       |            |       | <u></u> .         | ·····          |                      |                  |                               |                             |  |  |              |   |
|         |            |       |                   |                |                      |                  |                               |                             | VP=EQ:EF                                   | ΣP (   | ∑Q.          |   |

| A1100011815                             | # # # * * * * * * * * * * * * * * * * * | 4 4 1 10 | A & I A   1   1 T   A   1 | AC 210   | 111        | •       | · ·     |
|---|---|----------|---------------------------|----------|------------|---------|---------|
| PHIDDENI                                | METERINE.                               | ANII     | CALCULATION               | 111 1111 | W 71 9 9   | PRIMING | METHODY |
| 101111111111111111111111111111111111111 | . 1111 1 1111111                        | 111111   | OMINUMATION               | VI 11.0  | 11 (1-2-4) | LOTHIO  | manage, |

Page 2

| Verti-                  | Re<br>Depth          | Results of current-meteri   |                             | Rota.                           | v                                       | Calculation tlocity (m.s                         |                                 | s and of flow<br>Flow            | Flow                       | Notes<br>(times          |
|-------------------------|----------------------|-----------------------------|-----------------------------|---------------------------------|---|--|---------------------------------|----------------------------------|----------------------------|--------------------------|
| (Max.<br>depth<br>in m) | of<br>point<br>(%-m) | ber<br>of<br>rots-<br>tions | partial and total (seconds) | tions<br>per<br>second<br>(rps) | ia<br>the<br>point                      | mean in the vertical "VV"                        | average<br>between<br>verticals | area "F" between yerticals (m²). | (10) = (8)x(9)<br>(m3,3-1) | gauge<br>readin<br>etc.) |
| 1                       | 2                    | 3                           | 4                           | 5                               | 6                                       | 7  | 8                               | 9=6(P.1)                         | 10                         | 11                       |
| กรร                     | 20<br>60             | _b                          | J14"                        | 0,127                           | 0,104                                   | 0,104  | 0,099                           | 0,2/15                           | 0,024                      |                          |
|                         | 80<br>20             |                             |                             |                                 |   |  | 0,052                           | 0 <sub>1</sub> )1,2;             | 0,021                      |                          |
| 0,19                    | 60—<br>80—           | <u>o</u> .                  | a                           |                                 |   |  | ` '                             |                                  |                            | . •                      |
|                         | 20<br>60-<br>80-     |                             |                             |                                 |   |  | 0,265                           | 9,985 2                          | 2,6511 1/3                 |                          |
|                         | 20<br>60             |                             |                             |                                 |   |  |                                 |                                  |                            | , .                      |
|                         | 80<br>20             |                             |                             |                                 |   |  |                                 |                                  |                            |                          |
|                         | 60~<br>80~           |                             |                             |                                 | - · · · · · · · · · · · · · · · · · · · | •  |                                 |                                  | · · ·                      |                          |
| [                       | 20 -<br>60-          |                             |                             |                                 |   |  |                                 |                                  |                            |                          |
|                         | 80<br>20             |                             |                             |                                 |   |  |                                 |                                  |                            |                          |
|                         | 20-<br>60-<br>80-    |                             |                             |                                 |   |  |                                 | <u> </u>                         |                            |                          |
|                         | 20-                  | ·                           |                             |                                 |   |  |                                 |                                  | ,                          | :                        |
|                         | 60<br>80<br>20       |                             |                             |                                 |   | <del> </del>                                     | -                               |                                  |                            |                          |
|                         | 60-<br>80-           |                             |                             |                                 |   |  | -                               |                                  |                            | ·                        |
|                         | 20_<br>60_           |                             |                             |                                 | •                                       | <del>                                     </del> |                                 |                                  |                            |                          |
|                         | 80 <u></u><br>20     |                             |                             |                                 |   | ļ  |                                 | _                                | -                          |                          |
|                         | 60-<br>80-           |                             |                             |                                 |   |  |                                 |                                  |                            | 1                        |
|                         | 20 <u>-</u><br>60-   |                             |                             |                                 |   |  |                                 |                                  |                            |                          |
|                         | 80-                  |                             |                             |                                 |   |  |                                 |                                  |                            |                          |
|                         | 20<br>60<br>80       |                             |                             |                                 |   |  |                                 |                                  |                            |                          |
|                         | 20                   |                             |                             |                                 |   |  |                                 |                                  |                            |                          |
|                         | 60_<br>80_           |                             |                             |                                 |   |  | , .                             |                                  |                            |                          |
| . (                     | 20 <u>-</u>          |                             |                             |                                 |   |  |                                 |                                  |                            |                          |
|                         | BO-                  |                             | 7                           |                                 |   |  | <b>,</b>                        |                                  |                            |                          |

Station, XEKATAH. 27 15 11991 (NO.7) V= 0,698 N + 0,016.
CURRENT - METERING AND CALCULATION OF FLOW (1-2-3 POINTS METHOD)

|                   | 10                | Canita OI | current - meteri | ng       | Calculation of velocities and of flow |              |                    |                   |              |                        |  |
|-------------------|-------------------|-----------|------------------|----------|---------------------------------------|--------------|--------------------|-------------------|--------------|------------------------|--|
| Verti-            | D!-               | Num-      | Times            | Rota-    | Y                                     | elocity (m.  | g·1)               | Flow              | Flow         | Notes<br>(times,       |  |
| cat<br>(Max.      | Depth<br>of       | ber       | Time:            | tions    |                                       | mean         |                    | area '"F"         | 1. 4.0 ii.   | gauge                  |  |
| depth             | point             | of        | and total        | per      | io<br>the                             | in the       | average<br>between | between           | (10)⇒(8)×(9) | guibasa                |  |
| in ni)            | (%·m)             | rota-     | (seconds)        | second   | point                                 | vertical     | verticals          | verticals         | (m3.s-1)     | etc.)                  |  |
|                   |                   | tions     |                  | (rps)    |                                       | '''ΥΥ''      |                    | (m <sup>2</sup> ) |              |                        |  |
| 1                 | 2                 | 3         | 4                | 5        | 6                                     | 7            | 8                  | 9=6(P.1)          | 10           | 11                     |  |
|                   | 20_               |           |                  |          |                                       |              |                    |                   |              | 13400                  |  |
| 0,5%              | 60-               | -         |                  |          | ļ                                     | .{           |                    |                   |              | 13h 31                 |  |
|                   | 80<br>20          |           |                  | 2 1/8    | 0,0911                                |              |                    |                   | 4.4          | H <sub>1</sub> = 0, H5 |  |
| •                 | 60-               | ی         |                  | 0,113    | 1031                                  | 0,096        | 0.048              | 0,615             | 0,029        | n; v,n)                |  |
| વર્તી!            | 80                | 3         | 112              | 0,119    | 0,099                                 | 1 ' '        |                    |                   |              | H = 0, 113             |  |
|                   | 20_               | Ь         | 113              | 0,139    | 0,113                                 |              | 0,095              | 0,58              | 0,055        |                        |  |
| n he              | 60-               |           |                  |          |                                       | 0,095        | 0,073              | 1010 N            | 01000        |                        |  |
| 0,45              | 80-               | H         | IIS'             | 0,088    | 0,017                                 | ļ: <u>`</u>  |                    |                   | •            |                        |  |
|                   | 20-               | 12_       | 112              | 0,285    | 0,214                                 |              | 0,137              | 0,545             | 0,074        | ,                      |  |
| 164               | 60-               |           |                  | 2101     | 0.11:-                                | 0,179        | <u> </u>           |                   |              |                        |  |
| Ton.              | 80-               | 8         | μ3               | 0,186    | 0,145                                 | <del> </del> | · !                |                   |              |                        |  |
|                   | 20_               | Lo        | 1/3              | 0,465    | 0,340                                 | 0,277        | 0,228              | 0,6               | 0,136        |                        |  |
| 156               | 60<br>80          | 12        | 112              | 0,285    | 0,21/1                                | Pridad       |                    |                   |              | i .                    |  |
|                   | 20 -              | 31        | 117              | 0,659    | 0,435                                 | <del> </del> |                    | 10                | - 440        | ~                      |  |
| •                 | 60                | _31       | K.c              | V1037    | ען מיזן ע                             | 0,367        | 0,322              | 0,69              | 0,222        | \gamma_{\infty}        |  |
| 782               | 80-               | 15        | 1/3              | 0,31/8   | 0,258                                 | 101700       |                    |                   |              | \$                     |  |
| <del>'</del>      | 20-               | £E        | HH               | 0,5      | 0,365                                 |              | 0,313              | 0,725             | 0,226        | 2                      |  |
| n <i>La</i>       | 60-               |           |                  | <u> </u> |                                       | 0,26         | 1010               | VIAXS             | 0/220        | 5                      |  |
| 163               | 80                | 9         | 115              | 0,2,     | 0,155                                 | ļ            | -                  |                   |              | <b>D</b>               |  |
| ,                 | 20-               | كنام.     | Hb'              | 0,5H3    | 0,395                                 |              | 0,295              | 0,628.            | 0,18/1       |                        |  |
| 4.62              | 60-               |           | 1.01             | 8057     | 0 0/5                                 | 0,33         |                    |                   | 7 .          | ľ                      |  |
|                   | 80-               | 15        | <u> </u>         | 0,357    | 0,263                                 | <del> </del> | 1                  |                   | ,            | •                      |  |
|                   | 20 <u>-</u><br>60 | LH.       | #3".             | 0,158    | OHOS                                  | 0.204        | 0,318              | 0,545             | 0,173        | }                      |  |
| P <sub>1</sub> HF | 80_               | 12        | H3.              | 0,279    | 0,210                                 | 0,307        | `                  |                   |              |                        |  |
| ·                 | 20-               | 22        | <u> </u>         | 0,5      | 0,365                                 | •            | 1 403              | 0,565             | 0,182        |                        |  |
| n di              | 60-               | ., .,     |                  | ļ        |                                       | 0,340        | 0,323              | 01000             | 0,1047       |                        |  |
| 0,66              | 80                | 19        | 1111             | 0,1131   | 0,316                                 |              |                    |                   |              |                        |  |
|                   | 20-               | _16       |                  | 0,312    | 2,275                                 | ' '          | 0,303              | 0,63              | 0,190        |                        |  |
| 0,60              | 60-               |           |                  |          | 0.00                                  | 0,266        |                    |                   | <u> </u>     |                        |  |
| 100               | 80-               | 15        | 43               | 0,3/18   | 0,258                                 | <del> </del> |                    |                   |              | · ·                    |  |
|                   | 20-<br>60-        | 2H        | 50               | 0,48     | 0,351                                 |              | 0,2811             | 0,595             | 0,168        |                        |  |
| 0,59              | 80                | 15        | H11              | 0,340    | 0,253                                 | 0,302        |                    |                   |              |                        |  |
| <u> </u>          | 20-               | 111       |                  | 0,318    | 0,237                                 | <del> </del> | 1.00               |                   |              | <b> </b> •             |  |
| ያ<br>የ            | 60-               |           | ///              | V/710    | سهنديه                                | 0,201        | 0,251              | 0,2168            | 0,116        |                        |  |
| 0,3)              | 80-               | 9         | 112              | 0,2111   | 0,165                                 | 1,,,,        |                    |                   |              |                        |  |
| ٠.                | 20-               | :         | •                |          |                                       | 1            | 0, 139             | 0,27              | 0,037        | ,                      |  |
| 100               | 60                | 11        | 115              | 0,088    | 0,037                                 | 0,031        | 01.177             | 1001 ·            | 101000       | 1                      |  |
| ),lo              | 80-               |           |                  |          |                                       | 1 00         |                    |                   |              |                        |  |
|                   | 20                |           |                  |          |                                       | ]            |                    |                   |              |                        |  |
| 1,12              | 60_               |           | 0                |          |                                       | <u> </u>     |                    | ^                 |              | <del> </del>           |  |
| 1' ~              | 80                |           |                  |          |                                       |              | 0,240              | J, 415 m          | 1,792 m3     | 1 -                    |  |
|                   | L                 |           |                  |          |                                       |              |                    |                   |              |                        |  |