

**Azghar {Water Resources Development in Rural Area (DGH)}** **Sheet No. 1 of 3**

|                       |               |                          |                            |
|-----------------------|---------------|--------------------------|----------------------------|
| <b>Borehole No.:</b>  | <b>SO2</b>    | <b>Location:</b>         | <b>Dam Axis, River Bed</b> |
| <b>Ground EL. :</b>   | <b>833 m</b>  | <b>Drilling period:</b>  |                            |
| <b>Total Length :</b> | <b>67.8 m</b> | <b>Hole inclination:</b> | <b>Vertical</b>            |

| Date | Depth(m) | EL.(m) | Log.   | Rock type   | Core (%) |         | RQD (%) | Depth(m) | Hardness | Joint interval | Joint condition | Rock class (large scale) | Rock class (small scale) | G.W.L. S.P.T.          | Lugeon value      | Sample            | Casing | Cementation | Depth (m) |    |
|------|----------|--------|--------|---|----------|---------|---------|----------|----------|----------------|-----------------|--------------------------|--------------------------|------------------------|-------------------|-------------------|--------|-------------|-----------|----|
|      |          |        |        |   | Core (%) | RQD (%) |         |          |          |                |                 |                          |                          |                        |                   |                   |        |             |           |    |
|      | 1        |        |        | Coluvial dep.                                       |          | 40      | 0       |          |          |                |                 |                          |                          |                        |                   |                   |        |             | 1         |    |
|      | 2        | 1.50   | 831.50 |   |          | 81      | 0       |          |          |                |                 |                          |                          |                        |                   |                   |        |             |           |    |
|      | 3        |        |        | Terrace dep.  |          | 90      | 0       |          |          |                |                 |                          |                          |                        |                   |                   |        |             |           | 3  |
|      | 4        |        |        |   |          | 100     | 0       |          |          |                |                 |                          |                          |                        |                   |                   |        |             |           |    |
|      | 5        | 4.50   | 828.50 | Weathered layer                                     |          | 100     | 52      |          |          |                |                 |                          |                          | 1<br>5.0m<br>2<br>6.6m |                   |                   |        |             | 5         |    |
|      | 6        | 5.40   | 827.60 |   |          | 100     | 60      | 5.40     | D•E      | 3•5            | b•c             | CL                       | M(L)<br>M(L)             |                        |                   |                   |        |             |           |    |
|      | 7        |        |        | Formation of Shaly Marl with black Limestone layers |          | 100     | 88      |          |          |                |                 |                          |                          |                        |                   |                   |        |             |           | 7  |
|      | 8        |        |        |   |          | 100     | 100     |          |          |                |                 |                          |                          |                        |                   | Lu'=1.1<br>Pc=6.6 |        |             |           | 8  |
|      | 9        |        |        |   |          | 100     | 100     |          |          |                |                 |                          |                          |                        |                   |                   |        |             |           | 9  |
|      | 10       |        |        |   |          | 100     | 100     |          |          |                |                 |                          |                          |                        |                   |                   |        |             |           | 10 |
|      | 11       |        |        |   |          | 100     | 100     |          |          |                |                 |                          |                          |                        |                   | Lu'=1.1<br>Pc=6.6 |        |             |           | 11 |
|      | 12       |        |        |   |          | 100     | 100     |          |          |                |                 |                          |                          |                        |                   |                   |        |             |           | 12 |
|      | 13       |        |        |   |          | 100     | 100     |          |          |                |                 |                          |                          |                        |                   |                   |        |             |           | 13 |
|      | 14       |        |        |   |          | 100     | 100     |          |          |                |                 |                          |                          |                        |                   | Lu'=1.3<br>Pc=6.6 |        |             |           | 14 |
|      | 15       |        |        |   |          | 100     | 100     |          |          |                |                 |                          |                          |                        |                   |                   |        |             |           | 15 |
|      | 16       |        |        |   |          | 100     | 100     |          |          |                |                 |                          |                          |                        |                   |                   |        |             |           | 16 |
|      | 17       |        |        |   | 100      | 100     |         |          |          |                |                 |                          |                          |                        | Lu'=1.0<br>Pc=6.6 |                   |        |             | 17        |    |
|      | 18       |        |        |   | 100      | 100     |         |          | C        | 1•3            | a               | CH                       |                          |                        |                   |                   |        |             | 18        |    |
|      | 19       |        |        |   | 100      | 100     |         |          |          |                |                 |                          |                          |                        |                   |                   |        |             | 19        |    |
|      | 20       |        |        |   | 100      | 100     |         |          |          |                |                 |                          |                          |                        | Lu=0.4<br>Pc= -   |                   |        |             | 20        |    |
|      | 21       |        |        |   | 100      | 100     |         |          |          |                |                 |                          |                          |                        |                   |                   |        |             | 21        |    |
|      | 22       |        |        |   | 100      | 100     |         |          |          |                |                 |                          |                          |                        |                   |                   |        |             | 22        |    |
|      | 23       |        |        |   | 100      | 100     |         |          |          |                |                 |                          |                          |                        | Lu=0.4<br>Pc= -   |                   |        |             | 23        |    |
|      | 24       |        |        |   | 100      | 100     |         |          |          |                |                 |                          |                          |                        |                   |                   |        |             | 24        |    |
|      | 25       |        |        |   | 100      | 100     |         |          |          |                |                 |                          |                          |                        |                   |                   |        |             | 25        |    |
|      | 26       |        |        |   | 100      | 100     |         |          |          |                |                 |                          |                          |                        | Lu=0.3<br>Pc= -   |                   |        |             | 26        |    |
|      | 27       |        |        |   | 100      | 100     |         |          |          |                |                 |                          |                          |                        |                   |                   |        |             | 27        |    |
|      | 28       |        |        |   | 100      | 100     |         |          |          |                |                 |                          |                          |                        |                   |                   |        |             | 28        |    |
|      | 29       |        |        |   | 100      | 100     |         |          |          |                |                 |                          |                          |                        | Lu=0.4<br>Pc= -   |                   |        |             | 29        |    |
|      | 30       |        |        |   | 100      | 100     |         | 30.00    |          |                |                 |                          |                          |                        |                   |                   |        |             | 30        |    |

**Lu' : Converted Lugeon Value**  
**Pc : Critical Pressure (kgf/cm<sup>2</sup>)**  
**Lu : Lugeon Value**

| Borehole No.: |          | SO2    |      |           |          |         |          |          |                |                 |                  |                  |               |                 |  |        |             |           |    |
|---------------|----------|--------|------|-----------|----------|---------|----------|----------|----------------|-----------------|------------------|------------------|---------------|-----------------|--|--------|-------------|-----------|----|
| Date          | Depth(m) | EL.(m) | Log. | Rock type | Core (%) | RQD (%) | Depth(m) | Hardness | Joint interval | Joint condition | Lu (large scale) | Pc (small scale) | G.W.L. S.P.T. | Lu value        | Sample                                   | Casing | Cementation | Depth (m) |    |
|               | 31       |        |      |           | 100      | 100     |          |          |                |                 |                  |                  |               |                 |  |        |             |           | 31 |
|               | 32       |        |      |           | 100      | 100     |          |          |                |                 |                  |                  |               | Lu=0.3<br>Pc= - |  |        |             |           | 32 |
|               | 33       |        |      |           | 100      | 100     |          |          |                |                 |                  |                  |               |                 |  |        |             |           | 33 |
|               | 34       |        |      |           | 100      | 100     |          |          |                |                 |                  |                  |               |                 |  |        |             |           | 34 |
|               | 35       |        |      |           | 100      | 100     |          |          |                |                 |                  |                  |               | Lu=0.3          |  |        |             |           | 35 |
|               | 36       |        |      |           | 100      | 100     |          |          |                |                 |                  |                  |               |                 |  |        |             |           | 36 |
|               | 37       |        |      |           | 100      | 100     |          |          |                |                 |                  |                  |               |                 |  |        |             |           | 37 |
|               | 38       |        |      |           | 100      | 100     |          |          |                |                 |                  |                  |               | Lu=0.3          |  |        |             |           | 38 |
|               | 39       |        |      |           | 100      | 100     |          |          |                |                 |                  |                  |               |                 |  |        |             |           | 39 |
|               | 40       |        |      |           | 100      | 100     |          |          |                |                 |                  |                  |               |                 |  |        |             |           | 40 |
|               | 41       |        |      |           | 100      | 100     |          |          |                |                 |                  |                  |               | Lu=0.3          |  |        |             |           | 41 |
|               | 42       |        |      |           | 100      | 100     |          |          |                |                 |                  |                  |               |                 |  |        |             |           | 42 |
|               | 43       |        |      |           | 100      | 100     |          |          |                |                 |                  |                  |               |                 |  |        |             |           | 43 |
|               | 44       |        |      |           | 100      | 100     |          |          |                |                 |                  |                  |               | Lu=0.3          |  |        |             |           | 44 |
|               | 45       |        |      |           | 100      | 100     |          |          |                |                 |                  |                  |               | C               | I  | a      | CH          |           | 45 |
|               | 46       |        |      |           | 100      | 100     |          |          |                |                 |                  |                  |               |                 |  |        |             |           | 46 |
|               | 47       |        |      |           | 100      | 100     |          |          |                |                 |                  |                  |               | Lu=0.3          |  |        |             |           | 47 |
|               | 48       |        |      |           | 100      | 100     |          |          |                |                 |                  |                  |               |                 |  |        |             |           | 48 |
|               | 49       |        |      |           | 100      | 100     |          |          |                |                 |                  |                  |               |                 |  |        |             |           | 49 |
|               | 50       |        |      |           | 100      | 100     |          |          |                |                 |                  |                  |               | Lu=0.2          |  |        |             |           | 50 |
|               | 51       |        |      |           | 100      | 100     |          |          |                |                 |                  |                  |               |                 |  |        |             |           | 51 |
|               | 52       |        |      |           | 100      | 100     |          |          |                |                 |                  |                  |               |                 |  |        |             |           | 52 |
|               | 53       |        |      |           | 100      | 100     |          |          |                |                 |                  |                  |               | Lu=0.3          |  |        |             |           | 53 |
|               | 54       |        |      |           | 100      | 100     |          |          |                |                 |                  |                  |               |                 |  |        |             |           | 54 |
|               | 55       |        |      |           | 100      | 100     |          |          |                |                 |                  |                  |               |                 |  |        |             |           | 55 |
|               | 56       |        |      |           | 100      | 100     |          |          |                |                 |                  |                  |               | Lu=2.4          |  |        |             |           | 56 |
|               | 57       |        |      |           | 100      | 100     |          |          |                |                 |                  |                  |               |                 |  |        |             |           | 57 |
|               | 58       |        |      |           | 100      | 100     |          |          |                |                 |                  |                  |               |                 |  |        |             |           | 58 |
|               | 59       |        |      |           | 100      | 100     |          |          |                |                 |                  |                  |               | Lu=0.4          |  |        |             |           | 59 |
|               | 60       |        |      |           | 100      | 100     | 60.00    |          |                |                 |                  |                  |               |                 |  |        |             |           | 60 |
|               |          |        |      |           |          |         |          |          |                |                 |                  |                  |               | Lu' :           | Converted Lugeon Value                   |        |             |           |    |
|               |          |        |      |           |          |         |          |          |                |                 |                  |                  |               | Pc :            | Critical Pressure (kgf/cm <sup>2</sup> ) |        |             |           |    |
|               |          |        |      |           |          |         |          |          |                |                 |                  |                  |               | Lu :            | Lugeon Value                             |        |             |           |    |

| Borehole No.:          |          | SO2    |      |   |          |         |          |          |                |                 |               |            |               |   |        |              |        |        |             |           |    |    |
|------------------------|----------|--------|------|---|----------|---------|----------|----------|----------------|-----------------|---------------|------------|---------------|---|--------|--------------|--------|--------|-------------|-----------|----|----|
| Date                   | Depth(m) | EL.(m) | Log. | Rock type   | Core (%) | RQD (%) | Depth(m) | Hardness | Joint interval | Joint condition | (large scale) | Rock class | (small scale) | G.W.L.  | S.P.T. | Lugeon value | Sample | Casing | Cementation | Depth (m) |    |    |
|                        | 61       |        |      | Formation of Shaly Marl with black Limestone layers | 100      | 100     |          |          |                |                 |               |            |               |   |        |              |        |        |             |           | 61 |    |
|                        | 62       |        |      |   | 100      | 100     |          |          |                |                 |               |            |               |   |        |              | Lu=0.3 |        |             |           |    | 62 |
|                        | 63       |        |      |   | 100      | 100     |          |          |                |                 |               |            |               |   |        |              |        |        |             |           |    | 63 |
|                        | 64       |        |      |   | 100      | 100     |          |          |                |                 |               |            |               |   |        |              |        |        |             |           |    | 64 |
|                        | 65       |        |      |   | 100      | 100     |          | C        | 1-2            | a               | CH            | H          |               |   |        |              | Lu=0.3 |        |             |           |    | 65 |
|                        | 66       |        |      |   | 100      | 100     |          |          |                |                 |               |            |               |   |        |              |        |        |             |           |    | 66 |
|                        | 67       |        |      |   | 100      | 100     |          |          |                |                 |               |            |               |   |        |              |        |        |             |           |    | 67 |
|                        | 68       |        |      |   | 100      | 100     |          |          |                |                 |               |            |               |   |        |              | Lu=0.6 |        |             |           |    | 68 |
|                        | 69       |        |      |   | 100      | 100     |          | 69.00    |                |                 |               |            |               |   |        |              |        |        |             |           |    | 69 |
| <b>End of Borehole</b> |          |        |      |   |          |         |          |          |                |                 |               |            |               | Lu' : Converted Lugeon Value                  |        |              |        |        |             |           |    |    |
|                        |          |        |      |   |          |         |          |          |                |                 |               |            |               | Pc : Critical Pressure (kgf/cm <sup>2</sup> ) |        |              |        |        |             |           |    |    |
|                        |          |        |      |   |          |         |          |          |                |                 |               |            |               | Lu : Lugeon Value                             |        |              |        |        |             |           |    |    |
|                        |          |        |      |   |          |         |          |          |                |                 |               |            |               | k : Coefficient of Permeability               |        |              |        |        |             |           |    |    |
|                        |          |        |      |   |          |         |          |          |                |                 |               |            |               |   |        | (cm/sec)     |        |        |             |           |    |    |

| Azghar {Water Resources Development in Rural Area (DGH)} |          |        |        |   |                   |     |                                     |          |                        |                |                 |                          |                          | Sheet No. 1 of 1 |  |         |        |             |           |              |    |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |   |
|--|----------|--------|--------|---|-------------------|-----|-------------------------------------|----------|------------------------|----------------|-----------------|--------------------------|--------------------------|------------------|--|---------|--------|-------------|-----------|--------------|----|--|--|--|--|--|--|--|--|--|--|---|--|--|--|--|--|--|--|--|--|--|--|---|
| Borehole No.:  |          | SO3    |        |   | Location:         |     | 30m downstream from Axis, River Bed |          |                        |                |                 |                          |                          |                  |  |         |        |             |           |              |    |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |   |
| Ground EL. :   |          | 828 m  |        |   | Drilling period:  |     |                                     |          |                        |                |                 |                          |                          |                  |  |         |        |             |           |              |    |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |   |
| Total Length :   |          | 27.0 m |        |   | Hole inclination: |     | Vertical                            |          |                        |                |                 |                          |                          |                  |  |         |        |             |           |              |    |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |   |
| Date   | Depth(m) | EL.(m) | Log.   | Rock type   | Core (%)          |     | RQD (%)                             | Depth(m) | Hardness               | Joint interval | Joint condition | Rock class (large scale) | Rock class (small scale) | G.W.L. S.P.T.    | Lugeon value                             | Sample  | Casing | Cementation | Depth (m) |              |    |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |   |
|  | 1        |        |        | Coluvial dep.                                       |                   | 5   | 0                                   | X        |                        |                |                 |                          |                          |                  | X  |         |        |             | 1         |              |    |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |   |
|  | 2        | 2.00   | 826.00 |   |                   | 5   | 0                                   |          |                        |                |                 |                          |                          |                  |  |         |        |             |           | Terrace dep. |    |  |  |  |  |  |  |  |  |  |  | 2 |  |  |  |  |  |  |  |  |  |  |  |   |
|  | 3        |        |        |   | 9                 | 0   |                                     |          |                        |                |                 |                          |                          |                  |  |         |        |             |           |              |    |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  | 3 |
|  | 4        |        |        |   | 11                | 0   |                                     |          |                        |                |                 |                          |                          |                  |  |         |        |             |           |              |    |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |   |
|  | 5        | 5.00   | 823.00 |   | 30                | 0   |                                     |          |                        |                |                 |                          |                          |                  |  |         |        |             |           |              |    |  |  |  |  |  |  |  |  |  |  | 5 |  |  |  |  |  |  |  |  |  |  |  |   |
|  | 6        | 6.00   | 822.00 |   | 100               |     | 30                                  | 6.00     | C•D                    | 3              | b•c             | CL•CM                    | LM                       | 1<br>6.1m        |  |         |        |             |           | 6            |    |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |   |
|  | 7        |        |        | Formation of Shaly Marl with black Limestone layers |                   | 100 | 95                                  |          |                        |                |                 |                          | M                        |                  |  |         |        |             |           | 7            |    |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |   |
|  | 8        |        |        |   |                   | 100 | 90                                  |          |                        |                |                 |                          |                          | M                |  | Lu=97.8 | Pc= -  |             |           |              | 8  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |   |
|  | 9        |        |        |   |                   | 100 | 89                                  |          |                        |                |                 |                          |                          | M(L)             |  |         |        |             |           |              | 9  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |   |
|  | 10       |        |        |   |                   | 100 | 100                                 |          |                        |                |                 |                          |                          | M(L)             |  |         |        |             |           |              | 10 |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |   |
|  | 11       |        |        |   |                   | 100 | 100                                 |          |                        | C              | 2•4             | a•b                      | CM                       | L                |  | Lu=218  | Pc= -  |             |           |              | 11 |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |   |
|  | 12       |        |        |   |                   | 100 | 100                                 |          |                        |                |                 |                          |                          | M                |  |         |        |             |           |              | 12 |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |   |
|  | 13       |        |        |   |                   | 100 | 100                                 |          |                        |                |                 |                          |                          | M                |  |         |        |             |           |              | 13 |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |   |
|  | 14       |        |        |   |                   | 100 | 100                                 |          |                        |                |                 |                          |                          | M                |  | Lu=18.1 | Pc=6.5 |             |           |              | 14 |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |   |
|  | 15       |        |        |   |                   | 100 | 100                                 |          | 15.00                  |                |                 |                          |                          | M                |  |         |        |             |           |              | 15 |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |   |
|  | 16       |        |        |   |                   | 100 | 100                                 |          |                        | C              | 1               | a                        | CH                       | M                |  | Lu=0.8  | Pc= -  |             |           |              | 16 |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |   |
|  | 17       |        |        |   | 100               | 100 |                                     | 17.20    |                        |                |                 |                          | M                        |                  |  |         |        |             |           | 17           |    |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |   |
|  | 18       |        |        |   | 100               | 100 |                                     |          |                        |                |                 |                          | M                        |                  |  |         |        |             |           | 18           |    |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |   |
|  | 19       |        |        |   | 100               | 100 |                                     |          | C                      | 2•4            | a               | CM                       | M(L)                     |                  | Lu=0.6                                   | Pc= -   |        |             |           | 19           |    |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |   |
|  | 20       |        |        |   | 100               | 100 |                                     |          |                        |                |                 |                          | M(L)                     |                  |  |         |        |             |           | 20           |    |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |   |
|  | 21       |        |        |   | 100               | 100 |                                     | 21.00    |                        |                |                 |                          | M                        |                  |  |         |        |             |           | 21           |    |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |   |
|  | 22       |        |        |   | 100               | 100 |                                     |          | C                      | 1              | a               | CH                       | M                        |                  | Lu=6.7                                   | Pc= -   |        |             |           | 22           |    |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |   |
|  | 23       |        |        |   | 100               | 100 |                                     | 23.00    |                        |                |                 |                          | M                        |                  |  |         |        |             |           | 23           |    |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |   |
|  | 24       |        |        |   | 100               | 100 |                                     | 24.10    | C                      | 4              | a               | CL•CM                    | L<br>M(L)<br>LM          |                  |  |         |        |             |           | 24           |    |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |   |
|  | 25       |        |        |   | 100               | 100 |                                     |          |                        |                |                 |                          | M                        |                  |  |         |        |             |           | 25           |    |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |   |
|  | 26       |        |        |   | 100               | 100 |                                     |          | C                      | 3•4            | a               | CM                       | M(L)                     |                  | Lu=4.9                                   | Pc= -   |        |             |           | 26           |    |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |   |
|  | 27       |        |        |   | 100               | 100 |                                     | 27.00    | <b>End of Borehole</b> |                |                 |                          |                          |                  |  |         |        |             |           | 27           |    |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |   |
|  |          |        |        |   |                   |     |                                     |          |                        |                |                 |                          |                          | Lu' :            | Converted Lugeon Value                   |         |        |             |           |              |    |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |   |
|  |          |        |        |   |                   |     |                                     |          |                        |                |                 |                          |                          | Pc :             | Critical Pressure (kgf/cm <sup>2</sup> ) |         |        |             |           |              |    |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |   |
|  |          |        |        |   |                   |     |                                     |          |                        |                |                 |                          |                          | Lu :             | Lugeon Value                             |         |        |             |           |              |    |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |   |

**Azghar {Water Resources Development in Rural Area (DGH)}** **Sheet No. 1 of 1**

**Borehole No.:** SO4 **Location:** 35m downstream from Axis, River Bed  
**Ground EL. :** 832.5 m **Drilling period:**  
**Total Length :** 27.0 m **Hole inclination:** Vertical

| Date | Depth(m) | EL.(m) | Log.  | Rock type | Core (%) | RQD (%) | Depth(m) | Hardness | Joint interval | Joint condition | Rock class (large scale) | Rock class (small scale) | G.W.L. S.P.T. | Lugeon value | Sample | Casing | Cementation | Depth (m) |
|------|----------|--------|---|-----------|----------|---------|----------|----------|----------------|-----------------|--------------------------|--------------------------|---------------|--------------|--------|--------|-------------|-----------|
|      | 1        |        | Coluvial dep.                                       |           | 59       | 0       | X        |          |                |                 |                          |                          |               |              |        |        |             | 1         |
|      | 2        | 1.60   |   |           | 830.90   | 71      |          |          |                |                 |                          |                          |               |              |        |        |             | 0         |
|      | 3        |        | Terrace dep.  |           | 83       | 0       |          |          |                |                 |                          |                          |               |              |        |        |             | 3         |
|      | 4        | 4.00   |   |           | 828.50   | 83      |          |          |                |                 |                          |                          |               |              |        |        |             | 0         |
|      | 5        |        | Weathered layer                                     |           | 83       | 17      | 5.70     | D        | 4              | b•c             | CL                       |                          |               |              |        |        |             | 5         |
|      | 6        | 5.70   |   |           | 826.80   | 96      |          |          |                |                 |                          |                          |               |              |        |        |             | 69        |
|      | 7        |        | Formation of Shaly Marl with black Limestone layers |           | 100      | 80      | 8.20     | C        | 2•4            | b               | CM                       |                          |               |              |        |        |             | 7         |
|      | 8        |        |   |           | 100      | 80      |          |          |                |                 |                          |                          |               |              |        |        |             | 8         |
|      | 9        |        |   |           | 100      | 80      |          |          |                |                 |                          |                          |               |              |        |        |             | 9         |
|      | 10       |        |   |           | 100      | 80      |          |          |                |                 |                          |                          |               |              |        |        |             | 10        |
|      | 11       |        |   |           | 100      | 80      |          |          |                |                 |                          |                          |               |              |        |        |             | 11        |
|      | 12       |        |   |           | 100      | 80      |          |          |                |                 |                          |                          |               |              |        |        |             | 12        |
|      | 13       |        |   |           | 100      | 100     |          |          |                |                 |                          |                          |               |              |        |        |             | 13        |
|      | 14       |        |   |           | 100      | 100     |          |          |                |                 |                          |                          |               |              |        |        |             | 14        |
|      | 15       |        | Formation of Shaly Marl with black Limestone layers |           | 100      | 100     | 18.00    | C        | 1•3            | a               | CM•CH                    |                          |               |              |        |        |             | 15        |
|      | 16       |        |   |           | 100      | 100     |          |          |                |                 |                          |                          |               |              |        |        |             | 16        |
|      | 17       |        |   |           | 100      | 100     |          |          |                |                 |                          |                          |               |              |        |        |             | 17        |
|      | 18       |        |   |           | 100      | 100     |          |          |                |                 |                          |                          |               |              |        |        |             | 18        |
|      | 19       |        |   |           | 100      | 100     |          |          |                |                 |                          |                          |               |              |        |        |             | 19        |
|      | 20       |        |   |           | 100      | 100     |          |          |                |                 |                          |                          |               |              |        |        |             | 20        |
|      | 21       |        |   |           | 100      | 100     |          |          |                |                 |                          |                          |               |              |        |        |             | 21        |
|      | 22       |        |   |           | 100      | 100     |          |          |                |                 |                          |                          |               |              |        |        |             | 22        |
|      | 23       |        |   |           | 100      | 100     |          |          |                |                 |                          |                          |               |              |        |        |             | 23        |
|      | 24       |        |   |           | 100      | 100     |          |          |                |                 |                          |                          |               |              |        |        |             | 24        |
|      | 25       |        |   |           | 100      | 100     |          |          |                |                 |                          |                          |               |              |        |        |             | 25        |
|      | 26       |        |   |           | 100      | 100     |          |          |                |                 |                          |                          |               |              |        |        |             | 26        |
|      | 27       |        | 100   | 100       | 27       |         |          |          |                |                 |                          |                          |               |              |        |        |             |           |

**End of Borehole**  
 Lu' : Converted Lugeon Value  
 Pc : Critical Pressure (kg/cm<sup>2</sup>)  
 Lu : Lugeon Value

| Azghar {Water Resources Development in Rural Area (DGH)} |          |        |      |   |          |                         |          |          |                |                 |                          |                          | Sheet No. 1 of 3                              |                   |        |        |             |           |    |                    |
|--|----------|--------|------|---|----------|-------------------------|----------|----------|----------------|-----------------|--------------------------|--------------------------|---|-------------------|--------|--------|-------------|-----------|----|--------------------|
| Borehole No.:  |          | SG1    |      | Location:   |          | Dam Axis, Left Abutment |          |          |                |                 |                          |                          |   |                   |        |        |             |           |    |                    |
| Ground EL. :   |          | 890 m  |      | Drilling period:                                    |          |                         |          |          |                |                 |                          |                          |   |                   |        |        |             |           |    |                    |
| Total Length :   |          | 80.2 m |      | Hole inclination:                                   |          | Vertical                |          |          |                |                 |                          |                          |   |                   |        |        |             |           |    |                    |
| Date   | Depth(m) | EL.(m) | Log. | Rock type   | Core (%) | RQD (%)                 | Depth(m) | Hardness | Joint interval | Joint condition | Rock class (large scale) | Rock class (small scale) | G.W.L. S.P.T.                                 | Lugeon value      | Sample | Casing | Cementation | Depth (m) |    |                    |
|  | 1        |        |      | Weathered layer                                     | 95       | 10                      |          |          |                |                 |                          | L                        |   |                   |        |        |             | 1         |    |                    |
|  | 2        |        |      |   | 100      | 40                      |          | D•E      | 4              | c               | CL                       | LM                       | 1   |                   |        |        |             | 2.2m      | 2  |                    |
|  | 3        | 2.40   |      |   | 887.60   | 100                     | 72       |          |                |                 |                          |                          |   |                   |        |        |             |           | 3  |                    |
|  | 4        |        |      | Formation of Shaly Marl with black Limestone layers | 100      | 91                      |          |          |                |                 |                          | M(L)                     |   |                   |        |        |             | 4         |    |                    |
|  | 5        |        |      |   | 100      | 95                      |          | C        | 2•3            | b               | CM                       | M                        | 2   |                   |        |        |             | 4.8m      | 5  | Lu'=14.3<br>Pc= -  |
|  | 6        |        |      |   | 100      | 95                      |          |          |                |                 |                          | M(L)                     |   |                   |        |        |             |           | 6  |                    |
|  | 7        |        |      |   | 100      | 82                      | 6.55     |          |                |                 |                          |                          |   |                   |        |        |             |           | 7  |                    |
|  | 8        |        |      |   | 100      | 91                      | 8.00     | D        | 4•5            | b               | CL•CM                    | LM                       |   |                   |        |        |             |           | 8  | Lu'=5.6<br>Pc=6.6  |
|  | 9        |        |      |   | 100      | 100                     |          |          |                |                 |                          | M                        | 3   |                   |        |        |             | 9.5m      | 9  |                    |
|  | 10       |        |      |   | 100      | 100                     |          |          |                |                 |                          |                          |   |                   |        |        |             |           | 10 |                    |
|  | 11       |        |      |   | 100      | 100                     |          |          |                |                 |                          |                          |   |                   |        |        |             |           | 11 | Lu'=12.2<br>Pc=6.5 |
|  | 12       |        |      |   | 100      | 100                     |          | C        | 1•3            | a•b             | CM                       | M                        |   |                   |        |        |             |           | 12 |                    |
|  | 13       |        |      |   | 100      | 100                     |          |          |                |                 |                          |                          |   |                   |        |        |             |           | 13 |                    |
|  | 14       |        | 100  | 100   |          |                         |          |          |                |                 |                          |                          | 14  | Lu'=41.8<br>Pc= - |        |        |             |           |    |                    |
|  | 15       |        | 100  | 100   | 15.00    |                         |          |          |                |                 |                          |                          | 15  |                   |        |        |             |           |    |                    |
|  | 16       |        | 100  | 93  | 15.80    | C                       | 4        | b        | CL•C<br>M      | LM              |                          |                          | 16  |                   |        |        |             |           |    |                    |
|  | 17       |        | 100  | 100   |          |                         |          |          |                |                 |                          |                          | 17  | Lu'=114<br>Pc=4.9 |        |        |             |           |    |                    |
|  | 18       |        | 100  | 93  |          | C                       | 1•3      | a•b      | CM             | M(L)            | 4                        | 18.0m                    | 18  |                   |        |        |             |           |    |                    |
|  | 19       |        | 100  | 100   |          |                         |          |          |                |                 |                          |                          | 19  |                   |        |        |             |           |    |                    |
|  | 20       |        | 100  | 100   |          |                         |          |          |                |                 |                          |                          | 20  | Lu'=97<br>Pc=3.7  |        |        |             |           |    |                    |
|  | 21       |        | 100  | 100   | 20.50    |                         |          |          |                |                 |                          |                          | 21  |                   |        |        |             |           |    |                    |
|  | 22       |        | 100  | 100   |          |                         |          |          |                |                 |                          |                          | 22  |                   |        |        |             |           |    |                    |
|  | 23       |        | 100  | 100   |          |                         |          |          |                |                 |                          |                          | 23  | Lu'=1.1<br>Pc= -  |        |        |             |           |    |                    |
|  | 24       |        | 100  | 100   |          |                         |          |          |                |                 |                          |                          | 24  |                   |        |        |             |           |    |                    |
|  | 25       |        | 100  | 100   |          |                         |          |          |                |                 |                          |                          | 25  |                   |        |        |             |           |    |                    |
|  | 26       |        | 100  | 91  |          | C                       | 1•2      | a        | CH             | H(M)            |                          |                          | 26  | Lu'=8.1<br>Pc= -  |        |        |             |           |    |                    |
|  | 27       |        | 100  | 100   |          |                         |          |          |                |                 |                          |                          | 27  |                   |        |        |             |           |    |                    |
|  | 28       |        | 100  | 100   |          |                         |          |          |                |                 |                          |                          | 28  | Lu'=3.7<br>Pc=8.1 |        |        |             |           |    |                    |
|  | 29       |        | 100  | 100   |          |                         |          |          |                |                 |                          |                          | 29  |                   |        |        |             |           |    |                    |
|  | 30       |        | 100  | 100   | 30.00    |                         |          |          |                |                 |                          |                          | 30  |                   |        |        |             |           |    |                    |
|  |          |        |      |   |          |                         |          |          |                |                 |                          |                          | Lu' : Converted Lugeon Value                  |                   |        |        |             |           |    |                    |
|  |          |        |      |   |          |                         |          |          |                |                 |                          |                          | Pc : Critical Pressure (kgf/cm <sup>2</sup> ) |                   |        |        |             |           |    |                    |
|  |          |        |      |   |          |                         |          |          |                |                 |                          |                          | Lu : Lugeon Value                             |                   |        |        |             |           |    |                    |

| Borehole No.: |          | SG1    |      |           |          |         |          |          |                |                 |               |                          |               |              |        |        |             |           |    |  |  |
|---------------|----------|--------|------|-----------|----------|---------|----------|----------|----------------|-----------------|---------------|--------------------------|---------------|--------------|--------|--------|-------------|-----------|----|--|--|
| Date          | Depth(m) | EL.(m) | Log. | Rock type | Core (%) | RQD (%) | Depth(m) | Hardness | Joint interval | Joint condition | (large scale) | Rock class (small scale) | G.W.L. S.P.T. | Lugeon value | Sample | Casing | Cementation | Depth (m) |    |  |  |
|               | 31       |        |      |           | 100      | 100     |          |          |                |                 |               | H                        |               |              |        |        |             |           | 31 |  |  |
|               | 32       |        |      |           | 100      | 100     |          |          |                |                 |               | LM                       |               | Lu=3.0       |        |        |             |           | 32 |  |  |
|               | 33       |        |      |           | 100      | 100     |          |          |                |                 |               |                          |               |              |        |        |             |           | 33 |  |  |
|               | 34       |        |      |           | 100      | 100     |          |          |                |                 |               |                          |               |              |        |        |             |           | 34 |  |  |
|               | 35       |        |      |           | 100      | 100     |          |          |                |                 |               |                          |               | Lu=0.8       |        |        |             |           | 35 |  |  |
|               | 36       |        |      |           | 100      | 100     |          |          |                |                 |               |                          |               |              |        |        |             |           | 36 |  |  |
|               | 37       |        |      |           | 100      | 100     |          |          |                |                 |               |                          |               |              |        |        |             |           | 37 |  |  |
|               | 38       |        |      |           | 100      | 100     |          |          |                |                 |               |                          |               | Lu=0.5       |        |        |             |           | 38 |  |  |
|               | 39       |        |      |           | 100      | 100     |          |          |                |                 |               |                          |               |              |        |        |             |           | 39 |  |  |
|               | 40       |        |      |           | 100      | 100     |          |          |                |                 |               |                          |               |              |        |        |             |           | 40 |  |  |
|               | 41       |        |      |           | 100      | 100     |          |          |                |                 |               | H                        |               | Lu=0.5       |        |        |             |           | 41 |  |  |
|               | 42       |        |      |           | 100      | 100     |          |          |                |                 |               |                          |               |              |        |        |             |           | 42 |  |  |
|               | 43       |        |      |           | 100      | 100     |          |          |                |                 |               |                          |               |              |        |        |             |           | 43 |  |  |
|               | 44       |        |      |           | 100      | 100     |          |          |                |                 |               |                          |               | Lu=0.2       |        |        |             |           | 44 |  |  |
|               | 45       |        |      |           | 100      | 100     |          |          |                |                 |               |                          |               |              |        |        |             |           | 45 |  |  |
|               | 46       |        |      |           | 100      | 100     |          |          |                |                 |               |                          |               |              |        |        |             |           | 46 |  |  |
|               | 47       |        |      |           | 100      | 100     |          |          |                |                 |               |                          |               | Lu=0.3       |        |        |             |           | 47 |  |  |
|               | 48       |        |      |           | 100      | 100     |          |          |                |                 |               |                          |               |              |        |        |             |           | 48 |  |  |
|               | 49       |        |      |           | 100      | 100     |          |          |                |                 |               |                          |               |              |        |        |             |           | 49 |  |  |
|               | 50       |        |      |           | 100      | 100     |          |          |                |                 |               |                          |               | Lu=3.0       |        |        |             |           | 50 |  |  |
|               | 51       |        |      |           | 100      | 100     |          |          |                |                 |               |                          |               |              |        |        |             |           | 51 |  |  |
|               | 52       |        |      |           | 100      | 100     |          |          |                |                 |               |                          |               |              |        |        |             |           | 52 |  |  |
|               | 53       |        |      |           | 100      | 100     |          |          |                |                 |               |                          |               | Lu=0.5       |        |        |             |           | 53 |  |  |
|               | 54       |        |      |           | 100      | 100     |          |          |                |                 |               |                          |               |              |        |        |             |           | 54 |  |  |
|               | 55       |        |      |           | 100      | 100     |          |          |                |                 |               |                          |               |              |        |        |             |           | 55 |  |  |
|               | 56       |        |      |           | 100      | 100     |          |          |                |                 |               |                          |               | Lu=0.3       |        |        |             |           | 56 |  |  |
|               | 57       |        |      |           | 100      | 100     |          |          |                |                 |               |                          |               |              |        |        |             |           | 57 |  |  |
|               | 58       |        |      |           | 100      | 100     |          |          |                |                 |               |                          |               |              |        |        |             |           | 58 |  |  |
|               | 59       |        |      |           | 100      | 100     |          |          |                |                 |               |                          |               | Lu=0.4       |        |        |             |           | 59 |  |  |
|               | 60       |        |      |           | 100      | 100     | 60.00    |          |                |                 |               |                          |               |              |        |        |             |           | 60 |  |  |

Formation of Shaly Marl with black Limestone layers

Lu' : Converted Lugeon Value  
 Pc : Critical Pressure (kg/cm<sup>2</sup>)  
 Lu : Lugeon Value

| Borehole No.: |          | SG1    |      |   |          |         |          |          |                        |                 |               |            |               |               |  |        |          |             |           |    |
|---------------|----------|--------|------|---|----------|---------|----------|----------|------------------------|-----------------|---------------|------------|---------------|---------------|--|--------|----------|-------------|-----------|----|
| Date          | Depth(m) | EL.(m) | Log. | Rock type   | Core (%) | RQD (%) | Depth(m) | Hardness | Joint interval         | Joint condition | (large scale) | Rock class | (small scale) | G.W.L. S.P.T. | Lugeon value                                 | Sample | Casing   | Cementation | Depth (m) |    |
|               | 61       |        |      | Formation of Shaly Marl with black Limestone layers | 100      | 100     |          |          |                        |                 |               |            |               |               |  |        |          |             | 61        |    |
|               | 62       |        |      |   | 100      | 100     |          |          |                        |                 |               |            |               |               |  | Lu=2.1 |          |             |           | 62 |
|               | 63       |        |      |   | 100      | 100     |          |          |                        |                 |               |            |               |               |  |        |          |             |           | 63 |
|               | 64       |        |      |   | 100      | 100     |          |          |                        |                 |               |            |               |               |  |        |          |             |           | 64 |
|               | 65       |        |      |   | 100      | 100     |          |          |                        |                 |               |            |               |               |  | Lu=2.0 |          |             |           | 65 |
|               | 66       |        |      |   | 100      | 100     |          |          |                        |                 |               |            |               |               |  |        |          |             |           | 66 |
|               | 67       |        |      |   | 100      | 100     |          |          |                        |                 |               |            |               |               |  |        |          |             |           | 67 |
|               | 68       |        |      |   | 100      | 100     |          |          |                        |                 |               |            |               |               |  | Lu=0.0 |          |             |           | 68 |
|               | 69       |        |      |   | 100      | 100     |          |          |                        |                 |               |            |               |               |  |        |          |             |           | 69 |
|               | 70       |        |      |   | 100      | 100     |          |          | C                      | l               | a             | CH         | H(M)          |               |  | Lu=0.0 |          |             |           | 70 |
|               | 71       |        |      |   | 100      | 100     |          |          |                        |                 |               |            |               |               |  |        |          |             |           | 71 |
|               | 72       |        |      |   | 100      | 100     |          |          |                        |                 |               |            |               |               |  |        |          |             |           | 72 |
|               | 73       |        |      |   | 100      | 100     |          |          |                        |                 |               |            |               |               |  |        |          |             |           | 73 |
|               | 74       |        |      |   | 100      | 100     |          |          |                        |                 |               |            |               |               |  | Lu=0.1 |          |             |           | 74 |
|               | 75       |        |      |   | 100      | 100     |          |          |                        |                 |               |            |               |               |  |        |          |             |           | 75 |
|               | 76       |        |      |   | 100      | 100     |          |          |                        |                 |               |            |               |               |  |        |          |             |           | 76 |
|               | 77       |        |      |   | 100      | 100     |          |          |                        |                 |               |            |               |               |  | Lu=0.4 |          |             |           | 77 |
|               | 78       |        |      |   | 100      | 100     |          |          |                        |                 |               |            |               |               |  |        |          |             |           | 78 |
|               | 79       |        |      |   | 100      | 100     |          |          |                        |                 |               |            |               |               |  | Lu=1.4 |          |             |           | 79 |
|               | 80       |        |      |   | 100      | 100     |          | 80.00    | <b>End of Borehole</b> |                 |               |            |               |               |  |        |          |             |           | 80 |
|               |          |        |      |   |          |         |          |          |                        |                 |               |            |               |               | Lu' : Converted Lugeon Value                 |        |          |             |           |    |
|               |          |        |      |   |          |         |          |          |                        |                 |               |            |               |               | Pc : Critical Pressure (kg/cm <sup>2</sup> ) |        |          |             |           |    |
|               |          |        |      |   |          |         |          |          |                        |                 |               |            |               |               | Lu : Lugeon Value                            |        |          |             |           |    |
|               |          |        |      |   |          |         |          |          |                        |                 |               |            |               |               | k : Coefficient of Permeability              |        | (cm/sec) |             |           |    |



|                |        |                   |                         |  |  |
|----------------|--------|-------------------|-------------------------|--|--|
| Borehole No.:  | SG2    | Location:         | Dam Axis, Left Abutment |  |  |
| Ground EL. :   | 850 m  | Drilling period:  |                         |  |  |
| Total Length : | 80.3 m | Hole inclination: | 15° to Left along Axis  |  |  |

| Date | Depth(m) | EL.(m) | Log. | Rock type   | Core (%) | RQD (%) | Depth(m) | Hardness | Joint interval | Joint condition | Rock class<br>(large scale) | Rock class<br>(small scale) | G.W.L.<br>S.P.T. | Lugeon<br>value | Sample  | Casing  | Cementation | Depth (m) |    |    |
|------|----------|--------|------|---|----------|---------|----------|----------|----------------|-----------------|-----------------------------|-----------------------------|------------------|-----------------|---------|---------|-------------|-----------|----|----|
|      |          |        |      |   |          |         |          |          |                |                 |                             |                             |                  |                 |         |         |             |           |    |    |
|      | 1        |        |      | Weathered layer                                     | 86       | 26      | 0.50     | H        | 7              | d               | D                           | D                           |                  |                 |         |         |             | 1         |    |    |
|      | 2        |        |      |   | 100      | 0       |          | E        | 4              | c               | CL                          | CL                          |                  |                 |         | 2       |             |           |    |    |
|      | 3        |        |      |   | 100      | 34      | 2.20     |          |                |                 |                             |                             |                  |                 |         | 3       |             |           |    |    |
|      | 4        |        |      |   | 61       | 18      |          | C•D      | 3•5            | b               | CL•C                        | CL•C                        |                  |                 |         | 4       |             |           |    |    |
|      | 5        | 4.80   |      |   | 845.20   | 100     | 80       | 4.80     |                |                 |                             |                             |                  |                 |         | 5       |             |           |    |    |
|      | 6        |        |      | Formation of Shaly Marl with black Limestone layers | 100      | 100     |          |          |                |                 |                             |                             | 1                | Lu'=783         |         |         |             | 6         |    |    |
|      | 7        |        |      |   | 100      | 100     |          |          |                |                 |                             |                             |                  | 2               | Lu'=0.5 |         |             |           | 7  |    |
|      | 8        |        |      |   | 100      | 100     |          |          |                |                 |                             |                             |                  | 3               | Lu'=0.1 |         |             |           | 8  |    |
|      | 9        |        |      |   | 100      | 100     |          |          |                |                 |                             |                             |                  |                 |         |         |             |           | 9  |    |
|      | 10       |        |      |   | 100      | 100     |          |          |                |                 |                             |                             |                  |                 |         |         |             |           | 10 |    |
|      | 11       |        |      |   | 100      | 100     |          |          |                |                 |                             |                             |                  |                 |         | Lu'=1.0 |             |           |    | 11 |
|      | 12       |        |      |   | 100      | 100     |          |          |                |                 |                             |                             |                  |                 |         |         |             |           | 12 |    |
|      | 13       |        |      |   | 100      | 100     |          |          |                |                 |                             |                             |                  |                 |         |         |             |           | 13 |    |
|      | 14       |        |      |   | 100      | 100     |          |          |                |                 |                             |                             |                  |                 |         | Lu'=0.1 |             |           |    | 14 |
|      | 15       |        |      |   | 100      | 100     |          |          |                |                 |                             |                             |                  |                 |         |         |             |           |    | 15 |
|      | 16       |        |      |   | 100      | 100     |          |          |                | C               | 1•2                         | a•b                         | CM•CH            |                 |         |         |             |           |    | 16 |
|      | 17       |        |      |   | 100      | 100     |          |          |                |                 |                             |                             |                  |                 | 4       | Lu'=274 |             |           |    | 17 |
|      | 18       |        |      |   | 100      | 100     |          |          |                |                 |                             |                             |                  |                 |         |         |             |           |    | 18 |
|      | 19       |        |      |   | 100      | 100     |          |          |                |                 |                             |                             |                  |                 |         |         |             |           |    | 19 |
|      | 20       |        |      |   | 100      | 100     |          |          |                |                 |                             |                             |                  |                 |         | Lu'=24  |             |           |    | 20 |
|      | 21       |        | 100  | 100   |          |         |          |          |                |                 |                             |                             |                  |                 |         |         |             | 21        |    |    |
|      | 22       |        | 100  | 100   |          |         |          |          |                |                 |                             |                             | 5                | Lu'=51.5        |         |         |             | 22        |    |    |
|      | 23       |        | 100  | 100   |          |         |          |          |                |                 |                             |                             |                  |                 |         |         |             | 23        |    |    |
|      | 24       |        | 100  | 100   |          |         |          |          |                |                 |                             |                             | 6                |                 |         |         |             | 24        |    |    |
|      | 25       |        | 100  | 100   |          |         |          |          |                |                 |                             |                             |                  |                 |         |         |             | 25        |    |    |
|      | 26       |        | 100  | 100   |          |         | 26.10    |          |                |                 |                             |                             |                  | Lu'=105         |         |         |             | 26        |    |    |
|      | 27       |        | 100  | 100   |          |         |          |          |                |                 |                             |                             |                  |                 |         |         |             | 27        |    |    |
|      | 28       |        | 100  | 100   |          |         |          | C        | 1              | a               | CH                          |                             |                  |                 |         |         |             | 28        |    |    |
|      | 29       |        | 100  | 100   |          |         |          |          |                |                 |                             |                             |                  | Lu'=0.1         |         |         |             | 29        |    |    |
|      | 30       |        | 100  | 100   |          |         | 30.00    |          |                |                 |                             |                             |                  |                 |         |         |             | 30        |    |    |

Lu' : Converted Lugeon Value  
 Pc : Critical Pressure (kgf/cm<sup>3</sup>)  
 Lu : Lugeon Value

|                      |  |            |  |
|----------------------|--|------------|--|
| <b>Borehole No.:</b> |  | <b>SG2</b> |  |
|----------------------|--|------------|--|

| Date | Depth(m) | EL.(m) | Log. | Rock type | Core (%) | RQD (%) | Depth(m) | Hardness | Joint interval | Joint condition | (large scale)<br>Rock class<br>(small scale) | G.W.L.<br>S.P.T. | Lugeon<br>value | Sample | Casing | Cementation | Depth (m) |
|------|----------|--------|------|-----------|----------|---------|----------|----------|----------------|-----------------|--|------------------|-----------------|--------|--------|-------------|-----------|
|      | 31       |        |      |           | 100      | 100     |          |          |                |                 |  |                  |                 |        |        |             | 31        |
|      | 32       |        |      |           | 100      | 100     |          |          |                |                 |  |                  | Lu=0.2          |        |        |             | 32        |
|      | 33       |        |      |           | 100      | 100     |          |          |                |                 |  |                  |                 |        |        |             | 33        |
|      | 34       |        |      |           | 100      | 96      |          |          |                |                 |  |                  |                 |        |        |             | 34        |
|      | 35       |        |      |           | 100      | 96      |          |          |                |                 |  |                  | Lu=0.2          |        |        |             | 35        |
|      | 36       |        |      |           | 100      | 96      |          |          |                |                 |  |                  |                 |        |        |             | 36        |
|      | 37       |        |      |           | 100      | 100     |          |          |                |                 |  |                  |                 |        |        |             | 37        |
|      | 38       |        |      |           | 100      | 100     |          |          |                |                 |  |                  | Lu=0.2          |        |        |             | 38        |
|      | 39       |        |      |           | 100      | 100     |          |          |                |                 |  |                  |                 |        |        |             | 39        |
|      | 40       |        |      |           | 100      | 100     |          |          |                |                 |  |                  |                 |        |        |             | 40        |
|      | 41       |        |      |           | 100      | 100     |          |          |                |                 |  |                  | Lu=0.3          |        |        |             | 41        |
|      | 42       |        |      |           | 100      | 100     |          |          |                |                 |  |                  |                 |        |        |             | 42        |
|      | 43       |        |      |           | 100      | 100     |          |          |                |                 |  |                  |                 |        |        |             | 43        |
|      | 44       |        |      |           | 100      | 100     |          |          |                |                 |  |                  | Lu=0.2          |        |        |             | 44        |
|      | 45       |        |      |           | 100      | 100     |          | C        | 1              | a               | CH   |                  |                 |        |        |             | 45        |
|      | 46       |        |      |           | 100      | 100     |          |          |                |                 |  |                  |                 |        |        |             | 46        |
|      | 47       |        |      |           | 100      | 100     |          |          |                |                 |  |                  | Lu=0.2          |        |        |             | 47        |
|      | 48       |        |      |           | 100      | 100     |          |          |                |                 |  |                  |                 |        |        |             | 48        |
|      | 49       |        |      |           | 100      | 100     |          |          |                |                 |  |                  |                 |        |        |             | 49        |
|      | 50       |        |      |           | 100      | 100     |          |          |                |                 |  |                  |                 |        |        |             | 50        |
|      | 51       |        |      |           | 100      | 100     |          |          |                |                 |  |                  |                 |        |        |             | 51        |
|      | 52       |        |      |           | 100      | 100     |          |          |                |                 |  |                  |                 |        |        |             | 52        |
|      | 53       |        |      |           | 100      | 100     |          |          |                |                 |  |                  |                 |        |        |             | 53        |
|      | 54       |        |      |           | 100      | 100     |          |          |                |                 |  |                  |                 |        |        |             | 54        |
|      | 55       |        |      |           | 100      | 100     |          |          |                |                 |  |                  |                 |        |        |             | 55        |
|      | 56       |        |      |           | 100      | 100     |          |          |                |                 |  |                  |                 |        |        |             | 56        |
|      | 57       |        |      |           | 100      | 100     |          |          |                |                 |  |                  |                 |        |        |             | 57        |
|      | 58       |        |      |           | 100      | 100     |          |          |                |                 |  |                  |                 |        |        |             | 58        |
|      | 59       |        |      |           | 100      | 100     |          |          |                |                 |  |                  |                 |        |        |             | 59        |
|      | 60       |        |      |           | 100      | 100     | 60.00    |          |                |                 |  |                  |                 |        |        |             | 60        |

Formation of Shaly Marl with black Limestone layers

Lu' : Converted Lugeon Value  
 Pc : Critical Pressure (kgf/cm<sup>2</sup>)  
 Lu : Lugeon Value

| Borehole No.:          |          | SG2    |      |   |          |         |          |          |                |                 |               |            |               |                  |   |          |        |             |           |    |  |    |
|------------------------|----------|--------|------|---|----------|---------|----------|----------|----------------|-----------------|---------------|------------|---------------|------------------|---|----------|--------|-------------|-----------|----|--|----|
| Date                   | Depth(m) | EL.(m) | Log. | Rock type   | Core (%) | RQD (%) | Depth(m) | Hardness | Joint interval | Joint condition | (large scale) | Rock class | (small scale) | G.W.L.<br>S.P.T. | Lugeon value                            | Sample   | Casing | Cementation | Depth (m) |    |  |    |
|                        | 61       |        |      | Formation of Shaly Marl with black Limestone layers | 100      | 100     |          |          |                |                 |               |            |               |                  |   |          |        |             |           | 61 |  |    |
|                        | 62       |        |      |   | 100      | 100     |          |          |                |                 |               |            |               |                  |   |          |        |             |           |    |  | 62 |
|                        | 63       |        |      |   | 100      | 100     |          |          |                |                 |               |            |               |                  |   |          |        |             |           |    |  | 63 |
|                        | 64       |        |      |   | 100      | 100     |          |          |                |                 |               |            |               |                  |   |          |        |             |           |    |  | 64 |
|                        | 65       |        |      |   | 100      | 100     |          |          |                |                 |               |            |               |                  |   |          |        |             |           |    |  | 65 |
|                        | 66       |        |      |   | 100      | 100     |          |          |                |                 |               |            |               |                  |   |          |        |             |           |    |  | 66 |
|                        | 67       |        |      |   | 100      | 100     |          |          |                |                 |               |            |               |                  |   |          |        |             |           |    |  | 67 |
|                        | 68       |        |      |   | 100      | 100     |          |          |                |                 |               |            |               |                  |   |          |        |             |           |    |  | 68 |
|                        | 69       |        |      |   | 100      | 100     |          |          |                |                 |               |            |               |                  |   |          |        |             |           |    |  | 69 |
|                        | 70       |        |      |   | 100      | 100     |          |          |                |                 |               |            |               |                  |   |          |        |             |           |    |  | 70 |
|                        | 71       |        |      |   | 100      | 100     |          |          |                | C               | l             | a          | CH            | R(0)             |   |          |        |             |           |    |  | 71 |
|                        | 72       |        |      |   | 100      | 100     |          |          |                |                 |               |            |               |                  |   |          |        |             |           |    |  | 72 |
|                        | 73       |        |      |   | 100      | 100     |          |          |                |                 |               |            |               |                  |   |          |        |             |           |    |  | 73 |
|                        | 74       |        |      |   | 100      | 100     |          |          |                |                 |               |            |               |                  |   |          |        |             |           |    |  | 74 |
|                        | 75       |        |      |   | 100      | 100     |          |          |                |                 |               |            |               |                  |   |          |        |             |           |    |  | 75 |
|                        | 76       |        |      |   | 100      | 100     |          |          |                |                 |               |            |               |                  |   |          |        |             |           |    |  | 76 |
|                        | 77       |        |      |   | 100      | 100     |          |          |                |                 |               |            |               |                  |   |          |        |             |           |    |  | 77 |
|                        | 78       |        |      |   | 100      | 100     |          |          |                |                 |               |            |               |                  |   |          |        |             |           |    |  | 78 |
|                        | 79       |        |      |   | 100      | 100     |          |          |                |                 |               |            |               |                  |   |          |        |             |           |    |  | 79 |
|                        | 80       |        |      |   | 100      | 100     |          |          | 80.00          |                 |               |            |               |                  |   |          |        |             |           |    |  | 80 |
| <b>End of Borehole</b> |          |        |      |   |          |         |          |          |                |                 |               |            |               | Lu' :            | Converted Lugeon Value                  |          |        |             |           |    |  |    |
|                        |          |        |      |   |          |         |          |          |                |                 |               |            |               | Pc :             | Critical Pressure (kg/cm <sup>2</sup> ) |          |        |             |           |    |  |    |
|                        |          |        |      |   |          |         |          |          |                |                 |               |            |               | Lu :             | Lugeon Value                            |          |        |             |           |    |  |    |
|                        |          |        |      |   |          |         |          |          |                |                 |               |            |               | k :              | Coefficient of Permeability             | (cm/sec) |        |             |           |    |  |    |

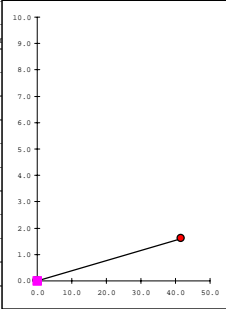
| Azghar {Water Resources Development in Rural Area (DGH)} |          |        |      |   |          |                                      |          |          |                |                    |                             |                             | Sheet No. 1 of 3                             |                    |                    |        |             |           |    |
|--|----------|--------|------|---|----------|--------------------------------------|----------|----------|----------------|--------------------|-----------------------------|-----------------------------|--|--------------------|--------------------|--------|-------------|-----------|----|
| Borehole No.:  |          | SG3    |      | Location:   |          | 20m down stream from Axis, Left Bank |          |          |                |                    |                             |                             |  |                    |                    |        |             |           |    |
| Ground EL. :   |          | 855 m  |      | Drilling period:                                    |          |                                      |          |          |                |                    |                             |                             |  |                    |                    |        |             |           |    |
| Total Length :   |          | 80.3 m |      | Hole inclination:                                   |          | 15° to Left along Axis               |          |          |                |                    |                             |                             |  |                    |                    |        |             |           |    |
| Date   | Depth(m) | EL.(m) | Log. | Rock type   | Core (%) | RQD (%)                              | Depth(m) | Hardness | Joint interval | Joint condition    | Rock class<br>(large scale) | Rock class<br>(small scale) | G. W.L.<br>S.P.T.                            | Lugeon<br>value    | Sample             | Casing | Cementation | Depth (m) |    |
|  | 0.75     | 854.25 |      | Weathered layer                                     | 100      | 40                                   | 0.75     | C•D      | 3•4            | b                  | CL•CM                       | LM                          |  |                    |                    |        |             | 1         |    |
|  |          |        |      | Formation of Shaly Marl with black Limestone layers | 100      | 81                                   |          | C        | 1•3            | a•b                | CM                          | HL                          |  |                    |                    |        |             | 2         |    |
|  |          |        |      |   | 100      | 90                                   | 2.30     |          |                |                    |                             |                             |  |                    |                    |        |             |           | 3  |
|  |          |        |      |   | 100      | 100                                  |          | C        | 1              | a                  | CH                          | H(M)                        |  |                    |                    |        |             |           | 4  |
|  |          |        |      |   | 100      | 100                                  | 5.40     |          |                |                    |                             |                             |  |                    |                    |        |             |           | 5  |
|  |          |        |      |   | 100      | 100                                  | 6.60     | C        | 2•4            | b                  | CM                          | LM                          | 1<br>6.3m                                    |                    |                    |        |             |           | 6  |
|  |          |        |      |   | 100      | 100                                  |          |          |                |                    |                             |                             |  |                    |                    |        |             |           | 7  |
|  |          |        |      |   | 100      | 100                                  |          |          |                |                    |                             |                             |  | 2<br>8.0m          | Lu'=27.6<br>Pc=6.5 |        |             |           | 8  |
|  |          |        |      |   | 100      | 100                                  |          |          |                |                    |                             |                             |  |                    |                    |        |             |           | 9  |
|  |          |        |      |   | 100      | 100                                  |          | C        | 1              | a                  | CH                          | H                           |  |                    |                    |        |             |           | 10 |
|  |          |        |      |   | 100      | 100                                  |          |          |                |                    |                             |                             |  |                    | Lu=0.4<br>Pc= -    |        |             |           | 11 |
|  |          |        |      |   | 100      | 100                                  | 12.60    |          |                |                    |                             |                             |  |                    |                    |        |             |           | 12 |
|  |          |        |      |   | 100      | 100                                  | 14.00    | C•D      | 2•5            | b                  | CL•CM                       | HL                          | 3<br>13.9m                                   | Lu'=522<br>Pc= -   |                    |        |             |           | 13 |
|  |          |        |      |   | 100      | 100                                  |          |          |                |                    |                             |                             |  |                    |                    |        |             |           | 14 |
|  |          |        |      | 100   | 100      |                                      |          |          |                |                    |                             |                             |  |                    |                    |        |             | 15        |    |
|  |          |        |      | 100   | 100      |                                      |          |          |                |                    |                             |                             |  |                    |                    |        |             | 16        |    |
|  |          |        |      | 100   | 100      |                                      |          |          |                |                    |                             |                             |  | Lu'=12.9<br>Pc=7.2 |                    |        |             | 17        |    |
|  |          |        |      | 100   | 100      |                                      |          |          |                |                    |                             |                             |  |                    |                    |        |             | 18        |    |
|  |          |        |      | 100   | 100      |                                      |          |          |                |                    |                             |                             |  |                    |                    |        |             | 19        |    |
|  |          |        |      | 100   | 100      |                                      | C        | 1•4      | a•b            | CM<br>partly<br>CL | HL                          | 4<br>20.1m                  | Lu'=13.6<br>Pc=7.5                           |                    |                    |        |             | 20        |    |
|  |          |        |      | 100   | 100      |                                      |          |          |                |                    |                             |                             |  |                    |                    |        |             | 21        |    |
|  |          |        |      | 100   | 100      |                                      |          |          |                |                    |                             |                             |  |                    |                    |        |             | 22        |    |
|  |          |        |      | 100   | 100      |                                      |          |          |                |                    |                             |                             |  |                    |                    |        |             | 23        |    |
|  |          |        |      | 100   | 100      |                                      |          |          |                |                    |                             |                             |  |                    |                    |        |             | 24        |    |
|  |          |        |      | 100   | 100      |                                      |          |          |                |                    |                             |                             |  |                    |                    |        |             | 25        |    |
|  |          |        |      | 100   | 100      |                                      |          |          |                |                    |                             |                             | 5<br>26.8m                                   | Lu'=584<br>Pc= -   |                    |        |             | 26        |    |
|  |          |        |      | 100   | 100      |                                      |          |          |                |                    |                             |                             |  |                    |                    |        |             | 27        |    |
|  |          |        |      | 100   | 100      |                                      | 27.50    |          |                |                    |                             |                             |  |                    |                    |        |             | 28        |    |
|  |          |        |      | 100   | 100      |                                      |          | C        | 1•2            | a                  | CH                          | H(M)                        |  | Leak               |                    |        |             | 29        |    |
|  |          |        |      | 100   | 100      |                                      | 30.00    |          |                |                    |                             |                             |  |                    |                    |        |             | 30        |    |
|  |          |        |      |   |          |                                      |          |          |                |                    |                             |                             | Lu' : Converted Lugeon Value                 |                    |                    |        |             |           |    |
|  |          |        |      |   |          |                                      |          |          |                |                    |                             |                             | Pc : Critical Pressure (kg/cm <sup>2</sup> ) |                    |                    |        |             |           |    |
|  |          |        |      |   |          |                                      |          |          |                |                    |                             |                             | Lu : Lugeon Value                            |                    |                    |        |             |           |    |

| Borehole No.: |          | SG3    |      |           |          |         |          |          |                |                 |                          |                          |               |  |        |        |             |           |    |  |  |
|---------------|----------|--------|------|-----------|----------|---------|----------|----------|----------------|-----------------|--------------------------|--------------------------|---------------|--|--------|--------|-------------|-----------|----|--|--|
| Date          | Depth(m) | EL.(m) | Log. | Rock type | Core (%) | RQD (%) | Depth(m) | Hardness | Joint interval | Joint condition | Rock class (large scale) | Rock class (small scale) | G.W.L. S.P.T. | Lugeon value                                 | Sample | Casing | Cementation | Depth (m) |    |  |  |
|               | 31       |        |      |           | 100      | 100     |          |          |                |                 |                          |                          |               |  |        |        |             |           | 31 |  |  |
|               | 32       |        |      |           | 100      | 100     |          |          |                |                 |                          |                          |               | Lu'=5.5<br>Pc=8.7                            |        |        |             |           | 32 |  |  |
|               | 33       |        |      |           | 100      | 100     |          | C        | 1              | a               | CH                       |                          |               |  |        |        |             |           | 33 |  |  |
|               | 34       |        |      |           | 100      | 100     |          |          |                |                 |                          |                          |               |  |        |        |             |           | 34 |  |  |
|               | 35       |        |      |           | 100      | 100     | 35.30    |          |                |                 |                          |                          |               | Lu=1.7                                       |        |        |             |           | 35 |  |  |
|               | 36       |        |      |           | 100      | 100     |          |          |                |                 |                          |                          |               |  |        |        |             |           | 36 |  |  |
|               | 37       |        |      |           | 100      | 100     |          | C        | 3-4            | a               | CM                       |                          |               |  |        |        |             |           | 37 |  |  |
|               | 38       |        |      |           | 100      | 100     | 38.00    |          |                |                 |                          |                          |               | Lu=0.8                                       |        |        |             |           | 38 |  |  |
|               | 39       |        |      |           | 100      | 100     |          |          |                |                 |                          |                          |               |  |        |        |             |           | 39 |  |  |
|               | 40       |        |      |           | 100      | 100     |          |          |                |                 |                          |                          |               |  |        |        |             |           | 40 |  |  |
|               | 41       |        |      |           | 100      | 100     |          |          |                |                 |                          |                          |               | Lu=0.6                                       |        |        |             |           | 41 |  |  |
|               | 42       |        |      |           | 100      | 100     |          |          |                |                 |                          |                          |               |  |        |        |             |           | 42 |  |  |
|               | 43       |        |      |           | 100      | 100     |          |          |                |                 |                          |                          |               |  |        |        |             |           | 43 |  |  |
|               | 44       |        |      |           | 100      | 100     |          |          |                |                 |                          |                          |               | Lu=0.5                                       |        |        |             |           | 44 |  |  |
|               | 45       |        |      |           | 100      | 100     |          |          |                |                 |                          |                          |               |  |        |        |             |           | 45 |  |  |
|               | 46       |        |      |           | 100      | 100     |          |          |                |                 |                          |                          |               |  |        |        |             |           | 46 |  |  |
|               | 47       |        |      |           | 100      | 100     |          |          |                |                 |                          |                          |               | Lu=0.4                                       |        |        |             |           | 47 |  |  |
|               | 48       |        |      |           | 100      | 100     |          |          |                |                 |                          |                          |               |  |        |        |             |           | 48 |  |  |
|               | 49       |        |      |           | 100      | 100     |          | C        | 1              | a               | CH                       |                          |               |  |        |        |             |           | 49 |  |  |
|               | 50       |        |      |           | 100      | 100     |          |          |                |                 |                          |                          |               | Lu=0.3                                       |        |        |             |           | 50 |  |  |
|               | 51       |        |      |           | 100      | 100     |          |          |                |                 |                          |                          |               |  |        |        |             |           | 51 |  |  |
|               | 52       |        |      |           | 100      | 100     |          |          |                |                 |                          |                          |               |  |        |        |             |           | 52 |  |  |
|               | 53       |        |      |           | 100      | 100     |          |          |                |                 |                          |                          |               | Lu=0.3                                       |        |        |             |           | 53 |  |  |
|               | 54       |        |      |           | 100      | 100     |          |          |                |                 |                          |                          |               |  |        |        |             |           | 54 |  |  |
|               | 55       |        |      |           | 100      | 100     |          |          |                |                 |                          |                          |               |  |        |        |             |           | 55 |  |  |
|               | 56       |        |      |           | 100      | 100     |          |          |                |                 |                          |                          |               | Lu=0.3                                       |        |        |             |           | 56 |  |  |
|               | 57       |        |      |           | 100      | 100     |          |          |                |                 |                          |                          |               |  |        |        |             |           | 57 |  |  |
|               | 58       |        |      |           | 100      | 100     |          |          |                |                 |                          |                          |               |  |        |        |             |           | 58 |  |  |
|               | 59       |        |      |           | 100      | 100     |          |          |                |                 |                          |                          |               | Lu=0.3                                       |        |        |             |           | 59 |  |  |
|               | 60       |        |      |           | 100      | 100     | 60.00    |          |                |                 |                          |                          |               |  |        |        |             |           | 60 |  |  |
|               |          |        |      |           |          |         |          |          |                |                 |                          |                          |               | Lu' : Converted Lugeon Value                 |        |        |             |           |    |  |  |
|               |          |        |      |           |          |         |          |          |                |                 |                          |                          |               | Pc : Critical Pressure (kg/cm <sup>2</sup> ) |        |        |             |           |    |  |  |
|               |          |        |      |           |          |         |          |          |                |                 |                          |                          |               | Lu : Lugeon Value                            |        |        |             |           |    |  |  |

Formation of Shaly Marl with black Limestone layers

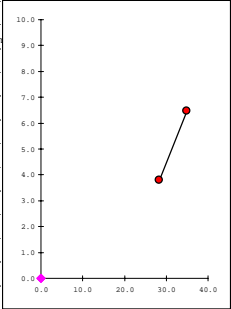
| Borehole No.:          |          | SG3    |      |   |          |         |          |          |                |                 |               |                   |               |        |  |              |        |        |             |           |    |    |    |
|------------------------|----------|--------|------|---|----------|---------|----------|----------|----------------|-----------------|---------------|-------------------|---------------|--------|--|--------------|--------|--------|-------------|-----------|----|----|----|
| Date                   | Depth(m) | EL.(m) | Log. | Rock type   | Core (%) | RQD (%) | Depth(m) | Hardness | Joint interval | Joint condition | (large scale) | Rock class        | (small scale) | G.W.L. | S.P.T.                                   | Lugeon value | Sample | Casing | Cementation | Depth (m) |    |    |    |
|                        | 61       |        |      | Formation of Shaly Marl with black Limestone layers | 100      | 100     |          |          |                |                 |               |                   |               |        |  |              |        |        |             |           | 61 |    |    |
|                        | 62       |        |      |   | 100      | 100     |          |          |                |                 |               |                   |               |        |  |              | Lu=0.4 |        |             |           |    | 62 |    |
|                        | 63       |        |      |   | 100      | 100     |          |          |                |                 |               |                   |               |        |  |              |        |        |             |           |    |    | 63 |
|                        | 64       |        |      |   | 100      | 100     |          |          |                |                 |               |                   |               |        |  |              |        |        |             |           |    |    | 64 |
|                        | 65       |        |      |   | 100      | 100     |          |          |                |                 |               |                   |               |        |  |              | Lu=0.3 |        |             |           |    |    | 65 |
|                        | 66       |        |      |   | 100      | 100     |          |          |                |                 |               |                   |               |        |  |              |        |        |             |           |    |    | 66 |
|                        | 67       |        |      |   | 100      | 100     |          |          |                |                 |               |                   |               |        |  |              |        |        |             |           |    |    | 67 |
|                        | 68       |        |      |   | 100      | 100     |          |          |                |                 |               |                   |               |        |  |              | Lu=0.3 |        |             |           |    |    | 68 |
|                        | 69       |        |      |   | 100      | 100     |          |          |                |                 |               |                   |               |        |  |              |        |        |             |           |    |    | 69 |
|                        | 70       |        |      |   | 100      | 100     |          |          | C              | l               | a             | CH <sup>(M)</sup> |               |        |  |              |        |        |             |           |    |    | 70 |
|                        | 71       |        |      |   | 100      | 100     |          |          |                |                 |               |                   |               |        |  |              | Lu=0.3 |        |             |           |    |    | 71 |
|                        | 72       |        |      |   | 100      | 100     |          |          |                |                 |               |                   |               |        |  |              |        |        |             |           |    |    | 72 |
|                        | 73       |        |      |   | 100      | 100     |          |          |                |                 |               |                   |               |        |  |              |        |        |             |           |    |    | 73 |
|                        | 74       |        |      |   | 100      | 100     |          |          |                |                 |               |                   |               |        |  |              | Lu=0.3 |        |             |           |    |    | 74 |
|                        | 75       |        |      |   | 100      | 100     |          |          |                |                 |               |                   |               |        |  |              |        |        |             |           |    |    | 75 |
|                        | 76       |        |      |   | 100      | 100     |          |          |                |                 |               |                   |               |        |  |              |        |        |             |           |    |    | 76 |
|                        | 77       |        |      |   | 100      | 100     |          |          |                |                 |               |                   |               |        |  |              | Lu=0.3 |        |             |           |    |    | 77 |
|                        | 78       |        |      |   | 100      | 100     |          |          |                |                 |               |                   |               |        |  |              |        |        |             |           |    |    | 78 |
|                        | 79       |        |      |   | 100      | 100     |          |          |                |                 |               |                   |               |        |  |              | Lu=0.4 |        |             |           |    |    | 79 |
|                        | 80       |        |      |   | 100      | 100     |          | 80.00    |                |                 |               |                   |               |        |  |              |        |        |             |           |    |    | 80 |
| <b>End of Borehole</b> |          |        |      |   |          |         |          |          |                |                 |               |                   |               | Lu'    | Converted Lugeon Value                   |              |        |        |             |           |    |    |    |
|                        |          |        |      |   |          |         |          |          |                |                 |               |                   |               | Pc     | Critical Pressure (kgf/cm <sup>2</sup> ) |              |        |        |             |           |    |    |    |
|                        |          |        |      |   |          |         |          |          |                |                 |               |                   |               | Lu     | Lugeon Value                             |              |        |        |             |           |    |    |    |
|                        |          |        |      |   |          |         |          |          |                |                 |               |                   |               | k      | Coefficient of Permeability (cm/sec)     |              |        |        |             |           |    |    |    |

|                              |   |                            |               |
|------------------------------|---|----------------------------|---------------|
| Location                     |   | SD1                        |               |
| Injecting Section            | 3 ~ 6 m                                 |                            |               |
| Ground Water Level           | Nilll m                                 |                            |               |
| Height of Pressure Gauge     | 100.0 cm                                |                            |               |
| Length of Test Section       | 3.0 m                                   |                            |               |
| Friction Loss per meter      | $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm |                            |               |
| Pipe Length of Injecting Pa  | 4.00 m                                  |                            |               |
| $P_0$ (kgf/cm <sup>2</sup> ) | $Q_{av}$ (l/min)                        | $P$ (kgf/cm <sup>2</sup> ) | $q$ (l/min/m) |
| 1.5                          | 125.0                                   | 1.6                        | 41.7          |
| 0.0                          | 0.0                                     | 0.0                        | 0.0           |
| 0.0                          | 0.0                                     | 0.0                        | 0.0           |
| 0.0                          | 0.0                                     | 0.0                        | 0.0           |
| 0.0                          | 0.0                                     | 0.0                        | 0.0           |



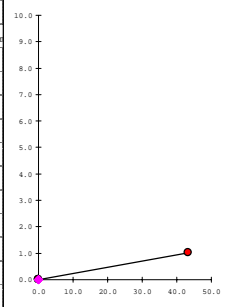
|       |                       |
|-------|-----------------------|
| Lu' = | 258                   |
| Pc =  | - kgf/cm <sup>2</sup> |

|                              |   |                            |               |
|------------------------------|---|----------------------------|---------------|
| Location                     |   | SD1                        |               |
| Injecting Section            | 12 ~ 15 m                               |                            |               |
| Ground Water Level           | Nilll m                                 |                            |               |
| Height of Pressure Gauge     | 100.0 cm                                |                            |               |
| Length of Test Section       | 3.0 m                                   |                            |               |
| Friction Loss per meter      | $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm |                            |               |
| Pipe Length of Injecting Pa  | 13.00 m                                 |                            |               |
| $P_0$ (kgf/cm <sup>2</sup> ) | $Q_{av}$ (l/min)                        | $P$ (kgf/cm <sup>2</sup> ) | $q$ (l/min/m) |
| 3.0                          | 85.0                                    | 3.8                        | 28.3          |
| 6.0                          | 104.9                                   | 6.4                        | 35.0          |
| 0.0                          | 0.0                                     | 0.0                        | 0.0           |
| 0.0                          | 0.0                                     | 0.0                        | 0.0           |
| 0.0                          | 0.0                                     | 0.0                        | 0.0           |



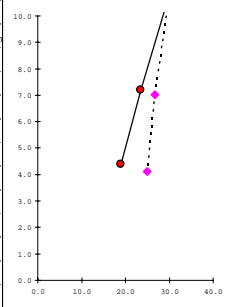
|       |                       |
|-------|-----------------------|
| Lu' = | 43.8                  |
| Pc =  | - kgf/cm <sup>2</sup> |

|                              |   |                            |               |
|------------------------------|---|----------------------------|---------------|
| Location                     |   | SD1                        |               |
| Injecting Section            | 6 ~ 9 m                                 |                            |               |
| Ground Water Level           | Nilll m                                 |                            |               |
| Height of Pressure Gauge     | 100.0 cm                                |                            |               |
| Length of Test Section       | 3.0 m                                   |                            |               |
| Friction Loss per meter      | $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm |                            |               |
| Pipe Length of Injecting Pa  | 7.00 m                                  |                            |               |
| $P_0$ (kgf/cm <sup>2</sup> ) | $Q_{av}$ (l/min)                        | $P$ (kgf/cm <sup>2</sup> ) | $q$ (l/min/m) |
| 1.0                          | 130.0                                   | 1.0                        | 43.3          |
| 0.0                          | 0.0                                     | 0.0                        | 0.0           |
| 0.0                          | 0.0                                     | 0.0                        | 0.0           |
| 0.0                          | 0.0                                     | 0.0                        | 0.0           |
| 0.0                          | 0.0                                     | 0.0                        | 0.0           |



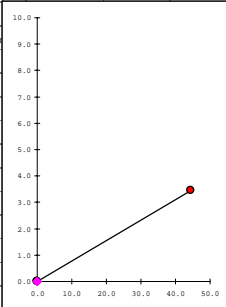
|       |                       |
|-------|-----------------------|
| Lu' = | 424                   |
| Pc =  | - kgf/cm <sup>2</sup> |

|                              |   |                            |               |
|------------------------------|---|----------------------------|---------------|
| Location                     |   | SD1                        |               |
| Injecting Section            | 15 ~ 18 m                               |                            |               |
| Ground Water Level           | Nilll m                                 |                            |               |
| Height of Pressure Gauge     | 100.0 cm                                |                            |               |
| Length of Test Section       | 3.0 m                                   |                            |               |
| Friction Loss per meter      | $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm |                            |               |
| Pipe Length of Injecting Pa  | 16.00 m                                 |                            |               |
| $P_0$ (kgf/cm <sup>2</sup> ) | $Q_{av}$ (l/min)                        | $P$ (kgf/cm <sup>2</sup> ) | $q$ (l/min/m) |
| 3.0                          | 57.0                                    | 4.4                        | 19.0          |
| 6.0                          | 70.6                                    | 7.2                        | 23.5          |
| 10.0                         | 90.0                                    | 10.8                       | 30.0          |
| 6.0                          | 80.0                                    | 7.0                        | 26.7          |
| 3.0                          | 75.0                                    | 4.1                        | 25.0          |



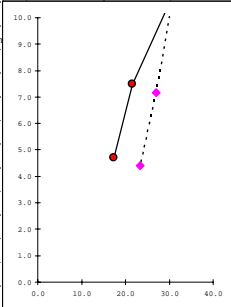
|      |                          |
|------|--------------------------|
| Lu = | 28.5                     |
| Pc = | 10.0 kgf/cm <sup>2</sup> |

|                              |   |                            |               |
|------------------------------|---|----------------------------|---------------|
| Location                     |   | SD1                        |               |
| Injecting Section            | 9 ~ 12 m                                |                            |               |
| Ground Water Level           | Nilll m                                 |                            |               |
| Height of Pressure Gauge     | 100.0 cm                                |                            |               |
| Length of Test Section       | 3.0 m                                   |                            |               |
| Friction Loss per meter      | $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm |                            |               |
| Pipe Length of Injecting Pa  | 10.00 m                                 |                            |               |
| $P_0$ (kgf/cm <sup>2</sup> ) | $Q_{av}$ (l/min)                        | $P$ (kgf/cm <sup>2</sup> ) | $q$ (l/min/m) |
| 2.5                          | 133.4                                   | 3.5                        | 44.5          |
| 0.0                          | 0.0                                     | 0.0                        | 0.0           |
| 0.0                          | 0.0                                     | 0.0                        | 0.0           |
| 0.0                          | 0.0                                     | 0.0                        | 0.0           |
| 0.0                          | 0.0                                     | 0.0                        | 0.0           |



|       |                       |
|-------|-----------------------|
| Lu' = | 129                   |
| Pc =  | - kgf/cm <sup>2</sup> |

|                              |   |                            |               |
|------------------------------|---|----------------------------|---------------|
| Location                     |   | SD1                        |               |
| Injecting Section            | 18 ~ 21 m                               |                            |               |
| Ground Water Level           | Nilll m                                 |                            |               |
| Height of Pressure Gauge     | 100.0 cm                                |                            |               |
| Length of Test Section       | 3.0 m                                   |                            |               |
| Friction Loss per meter      | $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm |                            |               |
| Pipe Length of Injecting Pa  | 19.00 m                                 |                            |               |
| $P_0$ (kgf/cm <sup>2</sup> ) | $Q_{av}$ (l/min)                        | $P$ (kgf/cm <sup>2</sup> ) | $q$ (l/min/m) |
| 3.0                          | 52.0                                    | 4.7                        | 17.3          |
| 6.0                          | 65.0                                    | 7.5                        | 21.7          |
| 10.0                         | 93.0                                    | 10.9                       | 31.0          |
| 6.0                          | 81.0                                    | 7.2                        | 27.0          |
| 3.0                          | 70.0                                    | 4.4                        | 23.3          |



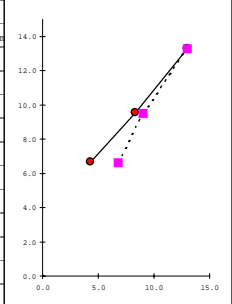
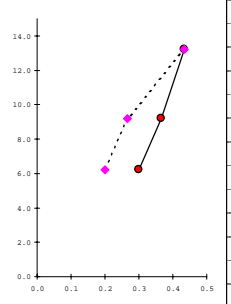
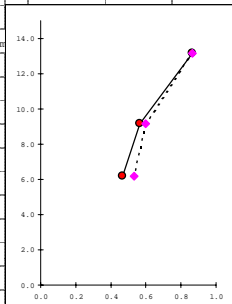
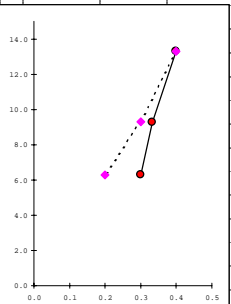
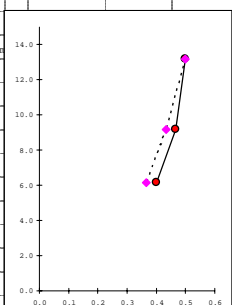
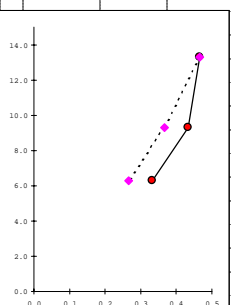
|       |                         |
|-------|-------------------------|
| Lu' = | 25.6                    |
| Pc =  | 9.0 kgf/cm <sup>2</sup> |

Résultat de l'essai lugeon du sondage SD1 (1)

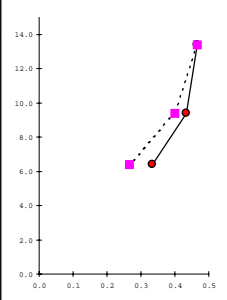
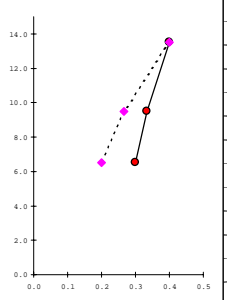
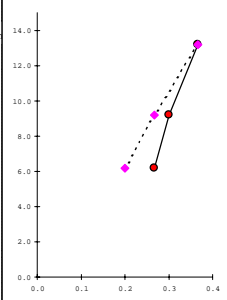
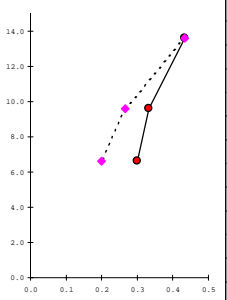
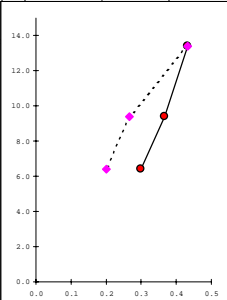
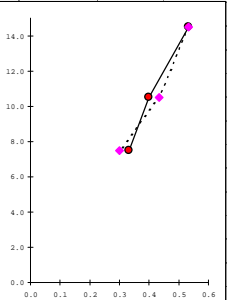
|                               |                  |   |               |                              |                  |   |               |
|-------------------------------|------------------|---|---------------|------------------------------|------------------|---|---------------|
| <b>Location SD1</b>           |                  |   |               | <b>Location SD1</b>          |                  |   |               |
| <b>Injecting Section</b>      |                  | 21 ~ 24 m                               |               | <b>Injecting Section</b>     |                  | 30 ~ 33 m                               |               |
| Ground Water Level            |                  | 21.3 m                                  |               | Ground Water Level           |                  | Null                                    |               |
| Height of Pressure Gauge      |                  | 100.0 cm                                |               | Height of Pressure Gauge     |                  | 100.0 cm                                |               |
| Length of Test Section        |                  | 3.0 m                                   |               | Length of Test Section       |                  | 3.0 m                                   |               |
| Friction Loss per meter       |                  | $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm |               | Friction Loss per meter      |                  | $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm |               |
| Pipe Length of Injecting Pa   |                  | 22.00 m                                 |               | Pipe Length of Injecting Pa  |                  | 31.00 m                                 |               |
| $P_0$ (kgf/cm <sup>2</sup> )  | $Q_{av}$ (l/min) | $P$ (kgf/cm <sup>2</sup> )              | $q$ (l/min/m) | $P_0$ (kgf/cm <sup>2</sup> ) | $Q_{av}$ (l/min) | $P$ (kgf/cm <sup>2</sup> )              | $q$ (l/min/m) |
| 3.0                           | 42.0             | 5.0                                     | 14.0          | 3.0                          | 31.0             | 6.0                                     | 10.3          |
| 6.0                           | 60.9             | 7.7                                     | 20.3          | 6.0                          | 40.5             | 8.9                                     | 13.5          |
| 10.0                          | 85.0             | 11.1                                    | 28.3          | 10.0                         | 56.0             | 12.6                                    | 18.7          |
| 6.0                           | 70.0             | 7.5                                     | 23.3          | 6.0                          | 43.0             | 8.8                                     | 14.3          |
| 3.0                           | 51.0             | 4.8                                     | 17.0          | 3.0                          | 37.0             | 6.0                                     | 12.3          |
| Lu' = 25.7                    |                  |   |               | Lu = 15.1                    |                  |   |               |
| Pc = 11.1 kgf/cm <sup>2</sup> |                  |   |               | Pc = - kgf/cm <sup>2</sup>   |                  |   |               |
| <b>Location SD1</b>           |                  |   |               | <b>Location SD1</b>          |                  |   |               |
| <b>Injecting Section</b>      |                  | 24 ~ 27 m                               |               | <b>Injecting Section</b>     |                  | 33 ~ 36 m                               |               |
| Ground Water Level            |                  | Null m                                  |               | Ground Water Level           |                  | 29.5                                    |               |
| Height of Pressure Gauge      |                  | 100.0 cm                                |               | Height of Pressure Gauge     |                  | 100.0 cm                                |               |
| Length of Test Section        |                  | 3.0 m                                   |               | Length of Test Section       |                  | 3.0 m                                   |               |
| Friction Loss per meter       |                  | $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm |               | Friction Loss per meter      |                  | $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm |               |
| Pipe Length of Injecting Pa   |                  | 25.00 m                                 |               | Pipe Length of Injecting Pa  |                  | 34.00 m                                 |               |
| $P_0$ (kgf/cm <sup>2</sup> )  | $Q_{av}$ (l/min) | $P$ (kgf/cm <sup>2</sup> )              | $q$ (l/min/m) | $P_0$ (kgf/cm <sup>2</sup> ) | $Q_{av}$ (l/min) | $P$ (kgf/cm <sup>2</sup> )              | $q$ (l/min/m) |
| 3.0                           | 41.0             | 5.4                                     | 13.7          | 3.0                          | 8.5              | 6.0                                     | 2.8           |
| 6.0                           | 56.5             | 8.1                                     | 18.8          | 6.0                          | 12.0             | 9.0                                     | 4.0           |
| 10.0                          | 80.6             | 11.5                                    | 26.9          | 10.0                         | 27.0             | 12.9                                    | 9.0           |
| 6.0                           | 60.0             | 8.0                                     | 20.0          | 6.0                          | 19.0             | 9.0                                     | 6.3           |
| 3.0                           | 41.0             | 5.4                                     | 13.7          | 3.0                          | 10.4             | 6.0                                     | 3.5           |
| Lu = 23.3                     |                  |   |               | Lu' = 4.4                    |                  |   |               |
| Pc = - kgf/cm <sup>2</sup>    |                  |   |               | Pc = 9.0 kgf/cm <sup>2</sup> |                  |   |               |
| <b>Location SD1</b>           |                  |   |               | <b>Location SD1</b>          |                  |   |               |
| <b>Injecting Section</b>      |                  | 27 ~ 30 m                               |               | <b>Injecting Section</b>     |                  | 36 ~ 39 m                               |               |
| Ground Water Level            |                  | Null m                                  |               | Ground Water Level           |                  | 31.0                                    |               |
| Height of Pressure Gauge      |                  | 100.0 cm                                |               | Height of Pressure Gauge     |                  | 100.0 cm                                |               |
| Length of Test Section        |                  | 3.0 m                                   |               | Length of Test Section       |                  | 3.0 m                                   |               |
| Friction Loss per meter       |                  | $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm |               | Friction Loss per meter      |                  | $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm |               |
| Pipe Length of Injecting Pa   |                  | 28.00 m                                 |               | Pipe Length of Injecting Pa  |                  | 37.00 m                                 |               |
| $P_0$ (kgf/cm <sup>2</sup> )  | $Q_{av}$ (l/min) | $P$ (kgf/cm <sup>2</sup> )              | $q$ (l/min/m) | $P_0$ (kgf/cm <sup>2</sup> ) | $Q_{av}$ (l/min) | $P$ (kgf/cm <sup>2</sup> )              | $q$ (l/min/m) |
| 3.0                           | 35.0             | 5.7                                     | 11.7          | 3.0                          | 7.5              | 6.2                                     | 2.5           |
| 6.0                           | 47.6             | 8.5                                     | 15.9          | 6.0                          | 10.1             | 9.2                                     | 3.4           |
| 10.0                          | 60.9             | 12.2                                    | 20.3          | 10.0                         | 20.0             | 13.1                                    | 6.7           |
| 6.0                           | 50.0             | 8.5                                     | 16.7          | 6.0                          | 12.0             | 9.2                                     | 4.0           |
| 3.0                           | 38.0             | 5.7                                     | 12.7          | 3.0                          | 9.1              | 6.2                                     | 3.0           |
| Lu = 17.6                     |                  |   |               | Lu' = 3.6                    |                  |   |               |
| Pc = - kgf/cm <sup>2</sup>    |                  |   |               | Pc = 9.2 kgf/cm <sup>2</sup> |                  |   |               |

Résultat de l'essai leugon du sondage SD1 (2)



|   |                  |                            |               |   |                  |                            |               |
|---|------------------|----------------------------|---------------|---|------------------|----------------------------|---------------|
| <b>Location SD1</b>   |                  |                            |               | <b>Location SD1</b>   |                  |                            |               |
| <b>Injecting Section 39 ~ 42 m</b>  |                  |                            |               | <b>Injecting Section 48 ~ 51 m</b>  |                  |                            |               |
| Ground Water Level 36.2 m   |                  |                            |               | Ground Water Level 31.0 m   |                  |                            |               |
| Height of Pressure Gauge 100.0 cm   |                  |                            |               | Height of Pressure Gauge 100.0 cm   |                  |                            |               |
| Length of Test Section 3.0 m  |                  |                            |               | Length of Test Section 3.0 m  |                  |                            |               |
| Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm                     |                  |                            |               | Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm                       |                  |                            |               |
| Pipe Length of Injecting Pa 40.00 m   |                  |                            |               | Pipe Length of Injecting Pa 49.00 m   |                  |                            |               |
| $P_0$ (kgf/cm <sup>2</sup> )  | $Q_{av}$ (l/min) | $P$ (kgf/cm <sup>2</sup> ) | $q$ (l/min/m) | $P_0$ (kgf/cm <sup>2</sup> )  | $Q_{av}$ (l/min) | $P$ (kgf/cm <sup>2</sup> ) | $q$ (l/min/m) |
| 3.0   | 13.0             | 6.7                        | 4.3           | 3.0   | 0.9              | 6.2                        | 0.3           |
| 6.0   | 25.0             | 9.5                        | 8.3           | 6.0   | 1.1              | 9.2                        | 0.4           |
| 10.0  | 39.0             | 13.3                       | 13.0          | 10.0  | 1.3              | 13.2                       | 0.4           |
| 6.0   | 27.0             | 9.5                        | 9.0           | 6.0   | 0.8              | 9.2                        | 0.3           |
| 3.0   | 20.4             | 6.6                        | 6.8           | 3.0   | 0.6              | 6.2                        | 0.2           |
| Lu= 8.9   |                  |                            |               | Lu= 0.4   |                  |                            |               |
| Pc= 13.3 kgf/cm <sup>2</sup>  |                  |                            |               | Pc= - kgf/cm <sup>2</sup>   |                  |                            |               |
|    |                  |                            |               |    |                  |                            |               |
| <b>Location SD1</b>   |                  |                            |               | <b>Location SD1</b>   |                  |                            |               |
| <b>Injecting Section 42 ~ 45 m</b>  |                  |                            |               | <b>Injecting Section 51 ~ 54 m</b>  |                  |                            |               |
| Ground Water Level 30.6 m   |                  |                            |               | Ground Water Level 31.8 m   |                  |                            |               |
| Height of Pressure Gauge 100.0 cm   |                  |                            |               | Height of Pressure Gauge 100.0 cm   |                  |                            |               |
| Length of Test Section 3.0 m  |                  |                            |               | Length of Test Section 3.0 m  |                  |                            |               |
| Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm                     |                  |                            |               | Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm                       |                  |                            |               |
| Pipe Length of Injecting Pa 43.00 m   |                  |                            |               | Pipe Length of Injecting Pa 52.00 m   |                  |                            |               |
| $P_0$ (kgf/cm <sup>2</sup> )  | $Q_{av}$ (l/min) | $P$ (kgf/cm <sup>2</sup> ) | $q$ (l/min/m) | $P_0$ (kgf/cm <sup>2</sup> )  | $Q_{av}$ (l/min) | $P$ (kgf/cm <sup>2</sup> ) | $q$ (l/min/m) |
| 3.0   | 1.4              | 6.2                        | 0.5           | 3.0   | 0.9              | 6.3                        | 0.3           |
| 6.0   | 1.7              | 9.2                        | 0.6           | 6.0   | 1.0              | 9.3                        | 0.3           |
| 10.0  | 2.6              | 13.2                       | 0.9           | 10.0  | 1.2              | 13.3                       | 0.4           |
| 6.0   | 1.8              | 9.2                        | 0.6           | 6.0   | 0.9              | 9.3                        | 0.3           |
| 3.0   | 1.6              | 6.2                        | 0.5           | 3.0   | 0.6              | 6.3                        | 0.2           |
| Lu'= 0.6  |                  |                            |               | Lu= 0.3   |                  |                            |               |
| Pc= 9.2 kgf/cm <sup>2</sup>   |                  |                            |               | Pc= - kgf/cm <sup>2</sup>   |                  |                            |               |
|   |                  |                            |               |   |                  |                            |               |
| <b>Location SD1</b>   |                  |                            |               | <b>Location SD1</b>   |                  |                            |               |
| <b>Injecting Section 45 ~ 48 m</b>  |                  |                            |               | <b>Injecting Section 54 ~ 57 m</b>  |                  |                            |               |
| Ground Water Level 30.7 m   |                  |                            |               | Ground Water Level 31.9 m   |                  |                            |               |
| Height of Pressure Gauge 100.0 cm   |                  |                            |               | Height of Pressure Gauge 100.0 cm   |                  |                            |               |
| Length of Test Section 3.0 m  |                  |                            |               | Length of Test Section 3.0 m  |                  |                            |               |
| Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm                     |                  |                            |               | Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm                       |                  |                            |               |
| Pipe Length of Injecting Pa 46.00 m   |                  |                            |               | Pipe Length of Injecting Pa 55.00 m   |                  |                            |               |
| $P_0$ (kgf/cm <sup>2</sup> )  | $Q_{av}$ (l/min) | $P$ (kgf/cm <sup>2</sup> ) | $q$ (l/min/m) | $P_0$ (kgf/cm <sup>2</sup> )  | $Q_{av}$ (l/min) | $P$ (kgf/cm <sup>2</sup> ) | $q$ (l/min/m) |
| 3.0   | 1.2              | 6.2                        | 0.4           | 3.0   | 1.0              | 6.3                        | 0.3           |
| 6.0   | 1.4              | 9.2                        | 0.5           | 6.0   | 1.3              | 9.3                        | 0.4           |
| 10.0  | 1.5              | 13.2                       | 0.5           | 10.0  | 1.4              | 13.3                       | 0.5           |
| 6.0   | 1.3              | 9.2                        | 0.4           | 6.0   | 1.1              | 9.3                        | 0.4           |
| 3.0   | 1.1              | 6.2                        | 0.4           | 3.0   | 0.8              | 6.3                        | 0.3           |
| Lu= 0.5   |                  |                            |               | Lu= 0.4   |                  |                            |               |
| Pc= - kgf/cm <sup>2</sup>   |                  |                            |               | Pc= - kgf/cm <sup>2</sup>   |                  |                            |               |
|  |                  |                            |               |  |                  |                            |               |

**Résultat de l'essai lugeon du sondage SD1 (3)**

|   |                  |                            |               |   |                  |                            |               |
|---|------------------|----------------------------|---------------|---|------------------|----------------------------|---------------|
| <b>Location SD1</b>   |                  |                            |               | <b>Location SD1</b>   |                  |                            |               |
| <b>Injecting Section</b> 57 ~ 60 m  |                  |                            |               | <b>Injecting Section</b> 66 ~ 69 m  |                  |                            |               |
| Ground Water Level 32.9 m   |                  |                            |               | Ground Water Level 34.0 m   |                  |                            |               |
| Height of Pressure Gauge 100.0 cm   |                  |                            |               | Height of Pressure Gauge 100.0 cm   |                  |                            |               |
| Length of Test Section 3.0 m  |                  |                            |               | Length of Test Section 3.0 m  |                  |                            |               |
| Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm                     |                  |                            |               | Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm                       |                  |                            |               |
| Pipe Length of Injecting Pa 58.00 m   |                  |                            |               | Pipe Length of Injecting Pa 67.00 m   |                  |                            |               |
| $P_0$ (kgf/cm <sup>2</sup> )  | $Q_{av}$ (l/min) | $P$ (kgf/cm <sup>2</sup> ) | $q$ (l/min/m) | $P_0$ (kgf/cm <sup>2</sup> )  | $Q_{av}$ (l/min) | $P$ (kgf/cm <sup>2</sup> ) | $q$ (l/min/m) |
| 3.0   | 1.0              | 6.4                        | 0.3           | 3.0   | 0.9              | 6.5                        | 0.3           |
| 6.0   | 1.3              | 9.4                        | 0.4           | 6.0   | 1.0              | 9.5                        | 0.3           |
| 10.0  | 1.4              | 13.4                       | 0.5           | 10.0  | 1.2              | 13.5                       | 0.4           |
| 6.0   | 1.2              | 9.4                        | 0.4           | 6.0   | 0.8              | 9.5                        | 0.3           |
| 3.0   | 0.8              | 6.4                        | 0.3           | 3.0   | 0.6              | 6.5                        | 0.2           |
| Lu= 0.4   |                  |                            |               | Lu= 0.3   |                  |                            |               |
| Pc= - kgf/cm <sup>2</sup>   |                  |                            |               | Pc= - kgf/cm <sup>2</sup>   |                  |                            |               |
|    |                  |                            |               |    |                  |                            |               |
| <b>Location SD1</b>   |                  |                            |               | <b>Location SD1</b>   |                  |                            |               |
| <b>Injecting Section</b> 60 ~ 63 m  |                  |                            |               | <b>Injecting Section</b> 69 ~ 72 m  |                  |                            |               |
| Ground Water Level 30.8 m   |                  |                            |               | Ground Water Level 35.0 m   |                  |                            |               |
| Height of Pressure Gauge 100.0 cm   |                  |                            |               | Height of Pressure Gauge 100.0 cm   |                  |                            |               |
| Length of Test Section 3.0 m  |                  |                            |               | Length of Test Section 3.0 m  |                  |                            |               |
| Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm                     |                  |                            |               | Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm                       |                  |                            |               |
| Pipe Length of Injecting Pa 61.00 m   |                  |                            |               | Pipe Length of Injecting Pa 70.00 m   |                  |                            |               |
| $P_0$ (kgf/cm <sup>2</sup> )  | $Q_{av}$ (l/min) | $P$ (kgf/cm <sup>2</sup> ) | $q$ (l/min/m) | $P_0$ (kgf/cm <sup>2</sup> )  | $Q_{av}$ (l/min) | $P$ (kgf/cm <sup>2</sup> ) | $q$ (l/min/m) |
| 3.0   | 0.8              | 6.2                        | 0.3           | 3.0   | 0.9              | 6.6                        | 0.3           |
| 6.0   | 0.9              | 9.2                        | 0.3           | 6.0   | 1.0              | 9.6                        | 0.3           |
| 10.0  | 1.1              | 13.2                       | 0.4           | 10.0  | 1.3              | 13.6                       | 0.4           |
| 6.0   | 0.8              | 9.2                        | 0.3           | 6.0   | 0.8              | 9.6                        | 0.3           |
| 3.0   | 0.6              | 6.2                        | 0.2           | 3.0   | 0.6              | 6.6                        | 0.2           |
| Lu= 0.3   |                  |                            |               | Lu= 0.3   |                  |                            |               |
| Pc= - kgf/cm <sup>2</sup>   |                  |                            |               | Pc= - kgf/cm <sup>2</sup>   |                  |                            |               |
|   |                  |                            |               |   |                  |                            |               |
| <b>Location SD1</b>   |                  |                            |               | <b>Location SD1</b>   |                  |                            |               |
| <b>Injecting Section</b> 63 ~ 66 m  |                  |                            |               | <b>Injecting Section</b> 72 ~ 75 m  |                  |                            |               |
| Ground Water Level 33.0 m   |                  |                            |               | Ground Water Level 44.0 m   |                  |                            |               |
| Height of Pressure Gauge 100.0 cm   |                  |                            |               | Height of Pressure Gauge 100.0 cm   |                  |                            |               |
| Length of Test Section 3.0 m  |                  |                            |               | Length of Test Section 3.0 m  |                  |                            |               |
| Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm                     |                  |                            |               | Friction Loss per meter $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm                       |                  |                            |               |
| Pipe Length of Injecting Pa 64.00 m   |                  |                            |               | Pipe Length of Injecting Pa 73.00 m   |                  |                            |               |
| $P_0$ (kgf/cm <sup>2</sup> )  | $Q_{av}$ (l/min) | $P$ (kgf/cm <sup>2</sup> ) | $q$ (l/min/m) | $P_0$ (kgf/cm <sup>2</sup> )  | $Q_{av}$ (l/min) | $P$ (kgf/cm <sup>2</sup> ) | $q$ (l/min/m) |
| 3.0   | 0.9              | 6.4                        | 0.3           | 3.0   | 1.0              | 7.5                        | 0.3           |
| 6.0   | 1.1              | 9.4                        | 0.4           | 6.0   | 1.2              | 10.5                       | 0.4           |
| 10.0  | 1.3              | 13.4                       | 0.4           | 10.0  | 1.6              | 14.5                       | 0.5           |
| 6.0   | 0.8              | 9.4                        | 0.3           | 6.0   | 1.3              | 10.5                       | 0.4           |
| 3.0   | 0.6              | 6.4                        | 0.2           | 3.0   | 0.9              | 7.5                        | 0.3           |
| Lu= 0.4   |                  |                            |               | Lu= 0.4   |                  |                            |               |
| Pc= - kgf/cm <sup>2</sup>   |                  |                            |               | Pc= - kgf/cm <sup>2</sup>   |                  |                            |               |
|  |                  |                            |               |  |                  |                            |               |

Résultat de l'essai lugeon du sondage SD1 (4)

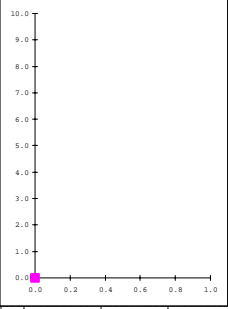
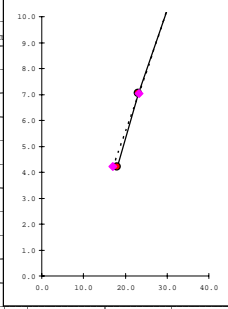
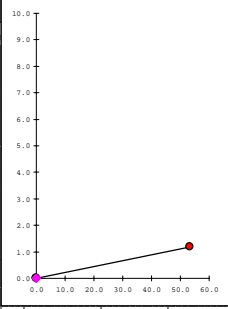
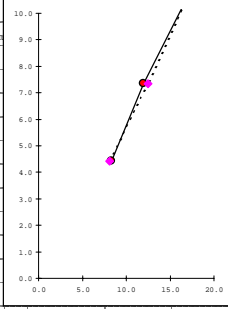
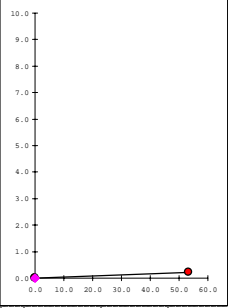
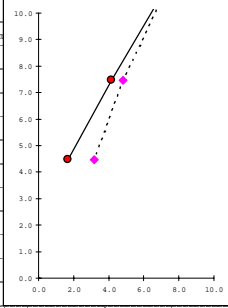
|                              |                  |   |               |
|------------------------------|------------------|---|---------------|
| Location                     |                  | SD1                                     |               |
| Injecting Section            |                  | 75 ~ 78 m                               |               |
| Ground Water Level           |                  | 45.0 m                                  |               |
| Height of Pressure Gauge     |                  | 100.0 cm                                |               |
| Length of Test Section       |                  | 3.0 m                                   |               |
| Friction Loss per meter      |                  | $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm |               |
| Pipe Length of Injecting Pa  |                  | 76.00 m                                 |               |
| $P_0$ (kgf/cm <sup>2</sup> ) | $Q_{av}$ (l/min) | $P$ (kgf/cm <sup>2</sup> )              | $q$ (l/min/m) |
| 3.0                          | 1.0              | 7.6                                     | 0.3           |
| 6.0                          | 1.2              | 10.6                                    | 0.4           |
| 10.0                         | 1.5              | 14.6                                    | 0.5           |
| 6.0                          | 1.2              | 10.6                                    | 0.4           |
| 3.0                          | 0.9              | 7.6                                     | 0.3           |
| Lu= 0.4                      |                  |   |               |
| Pc= - kgf/cm <sup>2</sup>    |                  |   |               |

|                              |                  |   |               |
|------------------------------|------------------|---|---------------|
| Location                     |                  | SD1                                     |               |
| Injecting Section            |                  | 78 ~ 80 m                               |               |
| Ground Water Level           |                  | 48.0 m                                  |               |
| Height of Pressure Gauge     |                  | 100.0 cm                                |               |
| Length of Test Section       |                  | 2.0 m                                   |               |
| Friction Loss per meter      |                  | $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm |               |
| Pipe Length of Injecting Pa  |                  | 79.00 m                                 |               |
| $P_0$ (kgf/cm <sup>2</sup> ) | $Q_{av}$ (l/min) | $P$ (kgf/cm <sup>2</sup> )              | $q$ (l/min/m) |
| 3.0                          | 1.1              | 7.9                                     | 0.6           |
| 6.0                          | 1.6              | 10.9                                    | 0.8           |
| 10.0                         | 1.8              | 14.9                                    | 0.9           |
| 6.0                          | 1.4              | 10.9                                    | 0.7           |
| 3.0                          | 1.1              | 7.9                                     | 0.6           |
| Lu= 0.8                      |                  |   |               |
| Pc= - kgf/cm <sup>2</sup>    |                  |   |               |

Résultat de l'essai lugeon du sondage SD1 (5)

|   |                  |   |               |   |                  |   |               |
|---|------------------|---|---------------|---|------------------|---|---------------|
| <b>Location SD2</b>   |                  |   |               | <b>Location SD2</b>   |                  |   |               |
| <b>Injecting Section</b>  |                  | 3 ~ 6 m                                 |               | <b>Injecting Section</b>  |                  | 12 ~ 15 m                               |               |
| Ground Water Level  |                  | Null m                                  |               | Ground Water Level  |                  | 13.7 m                                  |               |
| Height of Pressure Gauge  |                  | 100.0 cm                                |               | Height of Pressure Gauge  |                  | 100.0 cm                                |               |
| Length of Test Section  |                  | 3.0 m                                   |               | Length of Test Section  |                  | 3.0 m                                   |               |
| Friction Loss per meter   |                  | $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm |               | Friction Loss per meter   |                  | $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm |               |
| Pipe Length of Injecting Pa   |                  | 4.00 m                                  |               | Pipe Length of Injecting Pa   |                  | 13.00 m                                 |               |
| $P_0$ (kgf/cm <sup>2</sup> )  | $Q_{av}$ (l/min) | $P$ (kgf/cm <sup>2</sup> )              | $q$ (l/min/m) | $P_0$ (kgf/cm <sup>2</sup> )  | $Q_{av}$ (l/min) | $P$ (kgf/cm <sup>2</sup> )              | $q$ (l/min/m) |
| 0.0   | 0.0              | 0.0                                     | 0.0           | 3.0   | 54.3             | 4.2                                     | 18.1          |
| 0.0   | 0.0              | 0.0                                     | 0.0           | 6.0   | 69.6             | 7.0                                     | 23.2          |
| 0.0   | 0.0              | 0.0                                     | 0.0           | 10.0  | 93.1             | 10.7                                    | 31.0          |
| 0.0   | 0.0              | 0.0                                     | 0.0           | 6.0   | 69.7             | 7.0                                     | 23.2          |
| 0.0   | 0.0              | 0.0                                     | 0.0           | 3.0   | 51.0             | 4.2                                     | 17.0          |
| Lu' = -   |                  |   |               | Lu = 29.6   |                  |   |               |
| Pc = - kgf/cm <sup>2</sup>  |                  |   |               | Pc = - kgf/cm <sup>2</sup>  |                  |   |               |
|    |                  |   |               |    |                  |   |               |
| <b>Location SD2</b>   |                  |   |               | <b>Location SD2</b>   |                  |   |               |
| <b>Injecting Section</b>  |                  | 6 ~ 9 m                                 |               | <b>Injecting Section</b>  |                  | 15 ~ 18 m                               |               |
| Ground Water Level  |                  | 8.5 m                                   |               | Ground Water Level  |                  | 13.9 m                                  |               |
| Height of Pressure Gauge  |                  | 100.0 cm                                |               | Height of Pressure Gauge  |                  | 100.0 cm                                |               |
| Length of Test Section  |                  | 3.0 m                                   |               | Length of Test Section  |                  | 3.0 m                                   |               |
| Friction Loss per meter   |                  | $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm |               | Friction Loss per meter   |                  | $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm |               |
| Pipe Length of Injecting Pa   |                  | 7.00 m                                  |               | Pipe Length of Injecting Pa   |                  | 16.00 m                                 |               |
| $P_0$ (kgf/cm <sup>2</sup> )  | $Q_{av}$ (l/min) | $P$ (kgf/cm <sup>2</sup> )              | $q$ (l/min/m) | $P_0$ (kgf/cm <sup>2</sup> )  | $Q_{av}$ (l/min) | $P$ (kgf/cm <sup>2</sup> )              | $q$ (l/min/m) |
| 1.5   | 160.0            | 1.2                                     | 53.3          | 3.0   | 25.0             | 4.4                                     | 8.3           |
| 0.0   | 0.0              | 0.0                                     | 0.0           | 6.0   | 36.0             | 7.3                                     | 12.0          |
| 0.0   | 0.0              | 0.0                                     | 0.0           | 10.0  | 53.4             | 11.2                                    | 17.8          |
| 0.0   | 0.0              | 0.0                                     | 0.0           | 6.0   | 37.5             | 7.3                                     | 12.5          |
| 0.0   | 0.0              | 0.0                                     | 0.0           | 3.0   | 24.3             | 4.4                                     | 8.1           |
| Lu' = 446   |                  |   |               | Lu = 16.0   |                  |   |               |
| Pc = - kgf/cm <sup>2</sup>  |                  |   |               | Pc = - kgf/cm <sup>2</sup>  |                  |   |               |
|   |                  |   |               |   |                  |   |               |
| <b>Location SD2</b>   |                  |   |               | <b>Location SD2</b>   |                  |   |               |
| <b>Injecting Section</b>  |                  | 9 ~ 12 m                                |               | <b>Injecting Section</b>  |                  | 18 ~ 21 m                               |               |
| Ground Water Level  |                  | 9.0 m                                   |               | Ground Water Level  |                  | 13.8 m                                  |               |
| Height of Pressure Gauge  |                  | 100.0 cm                                |               | Height of Pressure Gauge  |                  | 100.0 cm                                |               |
| Length of Test Section  |                  | 3.0 m                                   |               | Length of Test Section  |                  | 3.0 m                                   |               |
| Friction Loss per meter   |                  | $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm |               | Friction Loss per meter   |                  | $7 \cdot 10^{-6} \cdot Q_{av}^2$ kgf/cm |               |
| Pipe Length of Injecting Pa   |                  | 10.00 m                                 |               | Pipe Length of Injecting Pa   |                  | 19.00 m                                 |               |
| $P_0$ (kgf/cm <sup>2</sup> )  | $Q_{av}$ (l/min) | $P$ (kgf/cm <sup>2</sup> )              | $q$ (l/min/m) | $P_0$ (kgf/cm <sup>2</sup> )  | $Q_{av}$ (l/min) | $P$ (kgf/cm <sup>2</sup> )              | $q$ (l/min/m) |
| 1.0   | 160.0            | 0.2                                     | 53.3          | 3.0   | 5.0              | 4.5                                     | 1.7           |
| 0.0   | 0.0              | 0.0                                     | 0.0           | 6.0   | 12.5             | 7.5                                     | 4.2           |
| 0.0   | 0.0              | 0.0                                     | 0.0           | 10.0  | 23.0             | 11.4                                    | 7.7           |
| 0.0   | 0.0              | 0.0                                     | 0.0           | 6.0   | 14.5             | 7.5                                     | 4.8           |
| 0.0   | 0.0              | 0.0                                     | 0.0           | 3.0   | 9.5              | 4.5                                     | 3.2           |
| Lu' = 2,564   |                  |   |               | Lu = 6.4  |                  |   |               |
| Pc = - kgf/cm <sup>2</sup>  |                  |   |               | Pc = 11.4 kgf/cm <sup>2</sup>   |                  |   |               |
|  |                  |   |               |  |                  |   |               |

Résultat de l'essai lugéon du sondage SD2 (1)