

**MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY PROJECT**

**1996 GROUNDWATER MONITORING
WELL INSTALLATION PROGRAM
(REF. NO. 1628/4)**

FEBRUARY 7, 1997

*Suite 1400
750 West Pender Street
Vancouver, British Columbia
Canada V6C 2T8
Telephone (604) 685-0543
Telefax (604) 685-0147
CIS: 72360,477*

Knight Piésold Ltd.
CONSULTING ENGINEERS

IMPERIAL METALS CORPORATION
MT. POLLEY PROJECT

1996 GROUNDWATER MONITORING
WELL INVESTIGATION PROGRAM
(REF. NO. 1628/4)

This report was prepared by Knight Piésold Ltd. for the account of Imperial Metals Corporation. The material in it reflects Knight Piésold's best judgement in light of the information available to it at the time of preparation. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. Knight Piésold accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.



MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY PROJECT

1996 GROUNDWATER MONITORING
WELL INSTALLATION PROGRAM
(REF. NO. 1628/4)

TABLE OF CONTENTS

| | <u>PAGE</u> |
|--|--------------------|
| SECTION 1.0 INTRODUCTION | 1 |
| 1.1 PROJECT DESCRIPTION | 1 |
| 1.2 PREVIOUS WORK | 2 |
| 1.3 REFERENCE INFORMATION | 3 |
| 1.4 SCOPE OF WORK | 5 |
| SECTION 2.0 1996 MONITORING WELL INSTALLATIONS | 6 |
| 2.1 GENERAL | 6 |
| 2.2 DRILLING | 6 |
| 2.3 GROUNDWATER MONITORING WELL INSTALLATIONS | 8 |
| 2.4 IN-SITU TESTING | 9 |
| 2.5 LABORATORY TESTING | 9 |
| SECTION 3.0 SUMMARY AND CONCLUSIONS | 10 |

TABLES

| | |
|-----------|---|
| Table 2.1 | Summary of 1996 Monitoring Well Installations |
|-----------|---|



FIGURES

Figure 1 Groundwater Monitoring Wells Plan

APPENDICES

Appendix A Drillhole Logs

Appendix B Groundwater Monitoring Well Completion Details



MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY PROJECT

1996 GROUNDWATER MONITORING WELL
INSTALLATION PROGRAM
(REF. NO. 1628/4)

SECTION 1.0 INTRODUCTION

1.1 PROJECT DESCRIPTION

The Mount Polley Project is located in central British Columbia approximately 56 kilometres north-east of Williams Lake, as shown on Figure 1.1. The nearest settlement is the community of Likely, on the northern tip of Quesnel Lake.

The Mount Polley Mine has reserves of 82.3 million tonnes of copper and gold ore contained in three ore bodies. Ore will be hauled to the crusher and then it will be processed in the mill by selective flotation to produce a copper-gold concentrate at a production rate of approximately 17,800 tonnes per day (6.5 million tonnes per year). Approximately 92.6 million tonnes of waste rock will be stored in waste rock dumps adjacent to the open pit.

After processing the ore to produce the copper/gold concentrate, the tailings will be discharged as a slurry into the tailings storage facility which will provide environmentally secure storage of the tailings solids. As the solids settle out of the slurry, process fluids are collected and recycled back to the mill for re-use in the milling process. No surface discharge of any process solution from the tailings facility is required or anticipated.

In 1996, the British Columbia Ministry of Environment, Lands and Parks (MELP), Environmental Protection Branch requested that a Groundwater Monitoring Program be designed and implemented for the Mount Polley Project. One of the requirements of the program was to "... establish monitoring wells down-gradient from the pit, waste rock piles, and tailings pond dams, and to sample aquifers in



both surficial deposits and bedrock ...", including the establishment of background wells up-gradient of any potential impacts by mining activities. The 1996 Groundwater Monitoring Well Installation Program was undertaken to fulfil this requirement. This report presents the details of the 1996 Groundwater Monitoring Well Installation Program, procedures followed during the work and results of the program.

1.2 PREVIOUS WORK

In 1989 Knight Piésold Ltd. was retained by Imperial Metals Corporation to conduct a geotechnical evaluation of the open pits, waste dumps and tailings storage facility for the proposed development of the Mount Polley Project. Monitoring wells were installed as part of this program. The 1989 Monitoring Well Program is summarized as follows:

1989 MONITORING WELL PROGRAM

- A total of nine (9) groundwater monitoring wells were installed in selected NQ diamond drillholes during the 1989 investigations by Knight Piésold, as shown on Figure 1. The 1989 monitoring wells were not installed in complete accordance to current industry practices. They were constructed using 38 mm diameter PVC well pipe with screened sections extending from approximately 3 metres below ground surface to the end of the well string. The screened sections were made using a hacksaw to cut the slots in the PVC pipe.
- Three wells (MP-89-107, MP-89-146 and MP-89-151) were installed in the open pit area. These wells were extended the full length of the exploration drill holes, approximately 150 metres. Bentonite seals were not installed below the well string. The surface seals consisted of a 1 metre concrete plug covered by two metres of bentonite that was installed just below the bedrock surface.



- Six wells (MP-89-231, MP-89-232, MP-89-233, MP-89-234, MP-89-235 and MP-89-236) were installed at the tailings facility. These monitoring wells varied from 15 to 40 metres in depth. Bentonite seals were installed below the well string and at the ground surface. Natural sand backfill was placed around the screened interval.

Additional groundwater wells were completed in the vicinity of the open pits and mill site with an air rotary water well drill rig in 1995. The program was co-ordinated and supervised by Imperial Metals Corporation. The 1995 Monitoring Well Program is summarized as follows:

1995 MONITORING WELL PROGRAM

- In August, 1995 seven groundwater wells (R-95-1 to R-95-7) were installed in the vicinity of the open pits and mill site, as shown on Figure 1. The wells were primarily for groundwater supply and were constructed with 110 mm PVC well pipe in 150 mm holes advanced with air rotary drilling methods. Well casings were installed over the full length of the holes, which ranged from 80 to 170 metres. Screened zones were installed at various levels, where high recharge was encountered during drilling. The well casings were sealed in accordance with standard BC water well practices.

1.3 REFERENCE INFORMATION

Prior to starting the 1996 Groundwater Monitoring Well Installation Program, a report containing detailed specifications for the drill program was issued, "Imperial Metals Corporation, Specification for Drilling, Monitoring Well Installations and Related Services, (Ref. No. 1628/3), September 18, 1996".

A summary of previous work on groundwater monitoring wells is presented in the Knight Piésold report "Imperial Metals Corporation, Groundwater Monitoring Program, Ref. No. 1624/2, June 3, 1996". This report is a compilation of the



hydrogeological conditions at the site and the anticipated impacts that will result from the project development.

Knight Piésold Ltd. has prepared a number of reports which contain information relevant to the Groundwater Monitoring Program, as summarized below:

- i) Imperial Metals Corporation, Report on Geotechnical Investigations and Design of Open Pit, Waste Dumps and Tailings Storage Facility, February 19, 1990.
- ii) Imperial Metals Corporation, Mount Polley Project, Stage I Environmental and Socio-Economic Impact Assessment, January 1991.
- iii) Imperial Metals Corporation, Report on Project Water Management (Ref. No. 1624/1), February 6, 1995.
- iv) Imperial Metals Corporation, Tailings Storage Facility Design Report (Ref. No. 1625/1), May 26, 1995.
- v) Imperial Metals Corporation, Manual on Sampling and Handling Guidelines for Determination of Groundwater Quality, (Ref. No. 1625/5), May 19, 1995.

A number of geotechnical investigations were conducted during construction of the Stage Ia tailings embankment in 1996. Detailed geologic and hydrogeologic information obtained from these investigations and the 1996 Groundwater Monitoring Well Installation Program will be presented in the report, "Mount Polley Mining Corporation, Mount Polley Project, Updated Design Report, Ref. No. 1627/2".



1.4 SCOPE OF WORK

The 1996 Groundwater Monitoring Well Installation Program was conducted between October 30 and December 6, 1996. The drill Contractor (Drillwell Enterprises Ltd.) was responsible for the following:

- Mobilization of one drill rig (air rotary) and support equipment.
- Overburden drilling, using a dry drilling method.
- Standard penetration testing (SPT) and associated sampling in overburden.
- Bedrock drilling, using a dry drilling method.
- Monitoring changes in down hole water production and measuring water levels during drilling operations.
- Installation of groundwater monitoring wells in permeable zones and backfilling of drill holes. (Well pipe and supplies were provided by Mount Polley Mining Corporation.)
- Well development.
- Clean up of drill sites.

Access to the drill sites and drill site construction were the responsibility of Mount Polley Mining Corporation. The monitoring well locations were surveyed by the Mount Polley Mining Corporation survey crew.

The following services were provided by Knight Piésold for the 1996 Groundwater Monitoring Well Installation Program:

- Selection of location for drill sites.
- Supervision of drill activities and monitoring well installations.
- Logging of the drill holes, including SPT samples and drill cuttings. Detailed drill logs are included in this report.
- Laboratory testing of selected samples.
- Selection of completion zones for the groundwater monitoring wells. The monitoring well completion details are included in this report.
- Supervision of well development.
- Training and supervision of monitoring well sampling.



SECTION 2 - 1996 MONITORING WELL INSTALLATIONS

2.1 GENERAL

The 1996 groundwater monitoring well installation program was conducted between October 30 and December 6, 1996. The 1996 groundwater monitoring wells were designed to serve as permanent groundwater monitoring points for the project. They will be utilized prior to operations, during the life of the mine and after mine closure.

A total of nine sites were selected for well installations, as follows:

- Six sites around the perimeter of the tailings storage facility (GW96-1, GW96-2, GW96-3, GW96-4, GW96-5, GW96-9).
- Three sites around the perimeter of the mine (GW96-6, GW96-7, GW96-8).

The locations of the drill sites are shown on Figure 1.

A total of 15 monitoring wells were installed at the nine locations. Most sites were targeted for one deep and one shallow well. Only GW96-6, GW96-7 and GW96-9 had a single well completed. If two wells were targeted for a site, the geologic formations and hydrogeologic conditions observed during drilling of the first (deep) hole were used to select the well completion zone for the second (shallow) hole. The completion zones of the monitoring wells were selected to target preferential groundwater flow pathways near surface and at depth.

A summary of the monitoring wells, their locations and completion zone details is provided on Table 2.1.

2.2 DRILLING

The drilling was conducted with an air-rotary rig, provided by Drillwell Enterprises Ltd., of Duncan B.C. The holes were advanced with a 149.2 mm (5 7/8 inch) O.D.



Geologic descriptions and observations of moisture conditions, in-hole water levels and down-hole water production rates are provided on the drillhole logs in Appendix A.

2.3 GROUNDWATER MONITORING WELL INSTALLATIONS

After drilling and logging of the first (deep) drillhole was completed at each site, the zones of greatest groundwater yield within each of the overburden and bedrock units were selected for completion of the monitoring wells. If two wells were required, a second hole was then drilled for installation of the shallow well. At GW96-6 and GW96-7, bedrock was encountered at surface or beneath a very thin veneer of overburden and the bedrock permeability was relatively consistent. Therefore, only one well was installed at these locations. GW96-9 was a supplemental well specifically targeted for a near surface aquifer in the vicinity of GW96-3 and GW96-4 and only one well was considered necessary.

Each monitoring well consists of 50.8 mm (2 inch) diameter, decontaminated, flush-jointed, threaded Schedule 40 PVC tubing (screens and risers) installed within a hole approximately 150 mm (6 inch) in diameter. Screen lengths from 1.8 m (6 ft) to 6.1 m (20 ft) were selected in the field, as required to capture the extent of the target zone. The screens were provided with #20 (0.020 inch or 0.25mm) slots. The screens were surrounded by a filter pack of uniformly graded #16 silica sand. The well completion zone was hydraulically isolated by an upper and, where necessary, lower bentonite chip seal. In most cases, the upper seal was separated from the #16 filter sand pack by a layer of fine-grained (#20-#30) silica sand in order to prevent downward migration of gelled bentonite into the primary filter pack. Above the upper seal, the hole was backfilled with a combination of bentonite chips and/or cement-bentonite grout (installed using a tremmie pipe) and/or washed gravel (19 mm to 37 mm). Each well installation was completed with a bentonite chip surface seal and a steel protective casing with locking cap at surface.

Monitoring well completion details are provided in Appendix B.



2.4 IN-SITU TESTING

In-situ testing was limited to Standard Penetration Tests (SPT's) within the overburden in GW96-1A, GW96-2A and GW96-3A for the purpose of collecting further information on foundation conditions at the tailings embankments. Uncorrected SPT blow counts are included on the drillhole logs in Appendix A.

2.5 LABORATORY TESTING

Soil samples collected during Standard Penetration Testing in the 1996 groundwater monitoring well drillholes were sealed up and are in storage at the Mount Polley site. To date, no laboratory testing has been carried out on these samples.



SECTION 3 - SUMMARY AND CONCLUSIONS

During the 1996 Groundwater Monitoring Well Installation Program, a total of 15 monitoring wells were installed at 9 different sites, 6 of which were located around the perimeter of the tailings storage facility and 3 of which were located around the perimeter of the mine. Monitoring wells were completed in overburden and in bedrock.

Groundwater quality sampling from the monitoring wells is required on a quarterly basis. Monitoring will be conducted prior to commencement of mining operations, in order to establish baseline water quality, during mining operations and for a period of at least 2 years after mine closure. The groundwater monitoring program will be administered and conducted by Mount Polley Mining Corporation.



TABLE 2.1

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY PROJECT

SUMMARY OF 1996 MONITORING WELL INSTALLATIONS

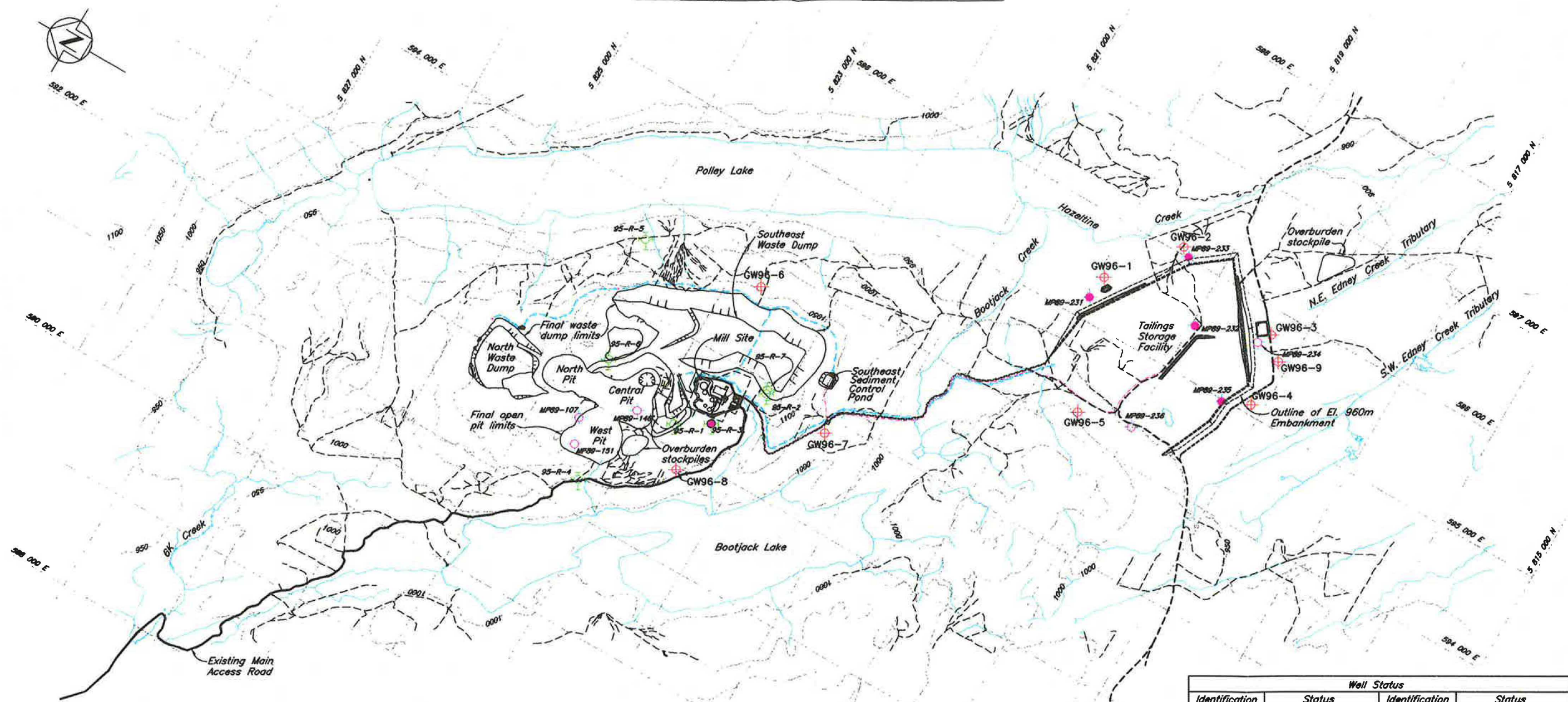
J:\JOB\REPORT\1628\14-ibf-21.xls\Sheet1

6-Feb-97

| Monitoring Well No. | General Location | Coordinates | | Ground El. (m) | Completion Zone (m below ground surface) | Geologic Unit |
|---------------------|-------------------|--------------|------------|----------------|--|--------------------|
| | | Northing | Easting | | | |
| GW96-1A | Tailings Facility | 5 819 939.06 | 595 415.82 | 927.89 | 52.4 - 60.1 | Bedrock |
| GW96-1B | Tailings Facility | 5 819 935.22 | 595 416.16 | 927.81 | 32.6 - 39.0 | Overburden |
| GW96-2A | Tailings Facility | 5 819 449.92 | 596 065.40 | 931.42 | 50.9 - 55.2 | Bedrock |
| GW96-2B | Tailings Facility | 5 819 447.08 | 596 074.73 | 931.42 | 29.7 - 35.7 | Overburden |
| GW96-3A | Tailings Facility | 5 818 308.97 | 595 768.75 | 912.06 | 47.0 - 53.0 | Bedrock |
| GW96-3B | Tailings Facility | 5 818 306.52 | 595 765.16 | 912.06 | 15.4 - 20.0 | Overburden |
| GW96-4A | Tailings Facility | 5 818 164.58 | 595 147.94 | 940.56 | 19.2 - 25.0 | Bedrock |
| GW96-4B | Tailings Facility | 5 818 162.87 | 595 151.26 | 940.46 | 2.7 - 7.3 | Overburden |
| GW96-5A | Tailings Facility | 5 819 626.68 | 594 330.34 | 973.55 | 13.8 - 19.7 | Bedrock |
| GW96-5B | Tailings Facility | 5 819 629.64 | 594 329.79 | 973.44 | 3.0 - 7.1 | Overburden |
| GW96-6 | Minesite Area | 5 822 851.66 | 593 659.21 | 1058.53 | 34.4 - 43.0 | Bedrock |
| GW96-7 | Minesite Area | 5 821 520.53 | 592 983.23 | 1021.32 | 9.9 - 14.3 | Bedrock |
| GW96-8A | Minesite Area | 5 822 468.46 | 591 861.59 | 1050.10 | 35.2 - 40.1 | Bedrock |
| GW96-8B | Minesite Area | 5 822 469.40 | 591 859.31 | 1050.09 | 11.0 - 15.7 | Overburden/Bedrock |
| GW96-9 | Tailings Facility | 5 818 277.14 | 595 503.89 | 916.18 | 3.4 - 6.1 | Overburden |

MOUNT POLLEY MINING CORPORATION
MOUNT POLLEY PROJECT
GROUNDWATER MONITORING WELLS PLAN

1628.B2COLOR



NOTES

1. Open Pits and Waste Dumps are shown in their final configurations.
2. 1989 Monitoring Wells consist of 38 mm PVC with slotted screens.
3. 1995 Monitoring Wells consist of 110mm PVC well pipe installed primarily as a water supply source. Wells are screened at multiple intervals.
4. Monitoring installation 95-R-3 has been blocked at a depth of approximately 70 metres below the collar. This installation is no longer operable as a screen interval is not accessible.
5. 1996 Monitoring Wells consist of 50 mm PVC with one slotted screen section.
6. Location of Southeast Sediment Control Pond to be finalized at the construction.

LEGEND

- MP89-107
GW96-1
95-R-4
- 1989 Groundwater Monitoring Well
1996 Groundwater Monitoring Well
Decommissioned / Lost Groundwater Well
1995 Groundwater Supply Well

| Well Status | | | |
|----------------|---------------------|----------------|--------|
| Identification | Status | Identification | Status |
| MP89-107 | Unknown | GW96-1A | Good |
| MP89-146 | Unknown | GW96-1B | Good |
| MP89-151 | Unknown | GW96-2A | Good |
| MP89-231 | Lost/Decommissioned | GW96-2B | Good |
| MP89-232 | Decommissioned | GW96-3A | Good |
| MP89-233 | Lost/Decommissioned | GW96-3B | Good |
| MP89-234 | Good | GW96-4A | Good |
| MP89-235 | Lost/Decommissioned | GW96-4B | Good |
| MP89-236 | Broken, Repairable | GW96-5A | Good |
| 95-R-1 | Good | GW96-5B | Good |
| 95-R-2 | Good | GW96-6 | Good |
| 95-R-3 | Blocked | GW96-7 | Good |
| 95-R-4 | Good | GW96-8A | Good |
| 95-R-5 | Good | GW96-8B | Good |
| 95-R-6 | Good | GW96-9 | Good |
| 95-R-7 | Good | | |



Feb. 6, 1997
KNIGHT PIESOLD LTD.
CONSULTING ENGINEERS

FIGURE 1

APPENDIX A

DRILLHOLE LOGS



Association
of Consulting
Engineers
of Canada

Association
des Ingénieurs-
Conseils
du Canada

KNIGHT PIESOLD LTD.
CONSULTING ENGINEERS

TEST HOLE LOG

TEST HOLE No.
GW96-1A/1B
SHEET 1 of 4

PROJECT Mt. Polley - Hydrological Investigation
LOCATION OF TEST HOLE TSF
DATE BEGUN Nov. 29/96 DATE FINISHED DEC 6/96

PROJECT NO. 1627.300
GROUND EL. 1A: 927.87
1B: 927.81
LOGGED BY RJP

| NOTES Water loss, type and size of hole, drilling method, groundwater level, etc. | CORE RECOVERY % | SPT BLOWS/FOOT | DEPTH (m) | GRAPHIC LOG | DESCRIPTION AND CLASSIFICATION OF MATERIAL |
|---|------------------|----------------|-----------|-------------|---|
| DRILLWELL - AIR ROTARY w/o WATER - 5 7/8" φ tricone bit - 6" steel casing | | | 0 | | |
| NOTE: * GW'S A+B installed in separate drill holes. (3m apart.) | | | 1.2 | | SILT (TILL) - sandy, some gravel (20%) and clay, rare cobbles, very stiff to stiff, well graded, low permeability, very moist to wet, brown, massive. |
| GEOLOGY inferred from cuttings and SPT samples. | 16" / 24" = 67% | 9 SPT n=16 35 | 3.3 | | - becoming very stiff to hard and very moist. |
| | | | 3.9 | | - becoming some gravel to gravelly and moist to very moist. |
| | | | 5.1 | | |
| | | | 6.0 | | CLAY and SILT (Glaciolacustrine) - poor recovery from cuttings as wet and softer - see SPT @ 6.0m. |
| | 24" / 24" = 100% | 2 SPT n=4 6 | | | CLAY and SILT (GLACIOLACUSTRINE) - lesser silt and fn silty sand laminations 1mm to 100mm thick, firm, well sorted, bedded, low permeability as no sand only laminations observed. Contains 20 to 100mm thick well graded fill-like texture layers, high to mod plasticity to non plastic coarse silt layers, wet to saturated, grey. |
| | | | 8.5 | | - hit 0.3m φ boulder, believed to be top of glacial till unit - see SPT @ 8.8m. |
| | | | 8.8 | | SILT and SAND (TILL) - some gravel to gravelly, trace clay and rare cobbles, med dense to dense, massive, low permeability moist to very moist, brown. |
| | | | 9.4 | | - possibly weathered top of till → softer |
| | | | 9.5 | | - becoming dense to very dense |

Likely pushed gravel in → split spoon!

DOW FILE: 1001/06/11 Plot scale 1"=1'

KNIGHT PIESOLD LTD.
CONSULTING ENGINEERS

TEST HOLE LOG

TEST HOLE No.
GW96-2A/B
SHEET 2 of 4

PROJECT Mt. Polley - Hydrological Investigation
LOCATION OF TEST HOLE _____
DATE BEGUN Nov. 29/96 DATE FINISHED DEC. 6/96

PROJECT NO. 1627.300
GROUND EL. _____
LOGGED BY RJP

| NOTES Water loss, type and size of hole, drilling method, groundwater level, etc. | CORE RECOVERY % | SPT BLOWS/FOOT | DEPTH (m) | GRAPHIC LOG | DESCRIPTION AND CLASSIFICATION OF MATERIAL |
|--|-----------------|-------------------|-----------|---------------------------------|---|
| DRILLWELL - AIR ROTARY w/o WATER - 5 7/8" ϕ tricone bit - 6" steel casing | | | | | |
| NOTE: * GW's A+B installed in separate drill holes. | | | | | |
| | | SPT | | | |
| | 15 1/2" | 22 | | | |
| | 24" | 40 n=39 | | | |
| | = 63% | | | | |
| | | | 10.7 | + . + . + . + . + . | - becoming very dense, moist and grey-brown \rightarrow BASAL Till-like, slightly coarser |
| | | | 12.1 | + . + . + . + . + . | SAND (TILL) - silty (25% to 30%), gravelly (30% to 35%), trace clay, very dense, well graded, massive, low permeability, moist, grey to grey-brown. |
| | | | 12.55 | + . + . + . + . + . | - last 1" of sample silt w some fn sand (thin layer of glacial straine?) |
| | | | 12.8 | + . + . + . + . + . | - cont'd gravelly silty sand till |
| | | | 13.7 | + . + . + . + . + . | - becoming fine grained to SILT (TILL) w some sand (20%) and some fine gravel "Fine Till", very stiff, low permeability, moist, grey-green. |
| | | | 15.2 | + . + . + . + . + . | SAND (TILL) - gravelly and silty, trace clay, very dense, well graded, massive, low perm, moist brown to orange-brown at times |
| | | | 17.3 | + . + . + . + . + . | - becoming gravelly and only some silt. |
| | 6 1/2" | 21 | 18.0 | + . + . + . + . + . | SILT and SAND (TILL) - gravelly, trace clay, very stiff to hard, well graded, massive, low permeability, moist, brown to red-brown. |
| | 60% | 50 (4") n=7100 | 18.25 | + . + . + . + . + . | |
| | | | 21.3 | + . + . + . + . + . | SAND (TILL) - gravelly, some silt, trace clay and cobbles, very dense, well graded, massive, low permeability, damp to moist, brown. |
| | | | 27.7 | + . + . + . + . + . | |

CAD FILE: \C001\20141 Plot scale 1=1

KNIGHT PIESOLD LTD.
CONSULTING ENGINEERS

TEST HOLE LOG

TEST HOLE No.
GW96-1A/1B
SHEET 3 of 4

PROJECT Mt. Polley - Hydrological Investigation
LOCATION OF TEST HOLE _____
DATE BEGUN Nov. 29/96 DATE FINISHED DEC 6/96

PROJECT NO. 1627.300
GROUND EL. _____
LOGGED BY PJP

| NOTES Water loss, type and size of hole, drilling method, groundwater level, etc. | CORE RECOVERY % | SPT BLOWS/FOOT | DEPTH (m) | GRAPHIC LOG | DESCRIPTION AND CLASSIFICATION OF MATERIAL |
|--|---------------------|------------------------------------|--------------|-------------|--|
| DRILLWELL - AIR ROTARY w/o WATER - 5 7/8" ϕ tricone bit - 6" steel casing | | | | | |
| NOTE: * GW's A+B installed in separate drill holes. | | | 27.7 | | SILT (GLACIOLACUSTRINE) - trace fine sand (10%) and clay (5-10%) mostly coarse silt, very stiff, likely low permeability unit, non plastic, massive?, moist, grey to grey-green. - may be periodic fine gravel and better graded layers. |
| | 24% 24% -100% | 45 43 n=62 S ₂₁₀₀ | 30.2 | | SAND (GLACIOFLUVIAL) - trace coarse silt, fine grained, silt laminations rare and thin, very dense, poorly graded, layered, saturated, grey. |
| NOTE: Upon start-up \rightarrow in AM, wtr at 60' below grade inside casing. | | | 30.65 | | |
| | | | 30.7 | | SILT (TILL) - sandy, some gravel, very stiff, well graded, trace clay (10%), massive, lower permeability, moist, grey |
| NOTE: Begins making water -31.9m - 2.9 gll/min -32.6m - 5.9 gll/min -36.6m - 15 gll/min -38.1m - 50 gll/min -41.1m - 2.9 gll/min -42.4m - 0 gll/min | | | 31.9 | | SAND (GLACIOFLUVIAL) - gravelly, trace silt (5-10%) resulting in dirty water, dense, periodic thin layers of silt/ sand (fine) < 50mm as brought up w sand & gravel. - unit grades back and forth between medium to coarse grained sand w some gravel to sandy gravel w 10% fines as dirty. - clean water and coarsest gravel |
| Steel Casing + Shoe cut-off and left in ground from 47.3 to 48.5m | | | 42.4 | | SILT and SAND (TILL) - some gravel (20%), trace clay, very stiff to hard, well graded massive, low permeability, moist, brown to red-brown. |

C&O REC: 1001/105141 Plot scale 1"=1'

[illegible]

KNIGHT PIESOLD LTD.
CONSULTING ENGINEERS

TEST HOLE LOG

TEST HOLE No.
GW96-2A/2B
SHEET 2 of 4

PROJECT Mt. Polley - Hydrological Investigation

PROJECT NO. 1627.300

LOCATION OF TEST HOLE _____

GROUND EL. _____

DATE BEGUN Nov. 10/96 DATE FINISHED Nov. 17/96

LOGGED BY PJP

| NOTES | CORE RECOVERY % | SPT BLOWS/FOOT | DEPTH (m) | GRAPHIC LOG | DESCRIPTION AND CLASSIFICATION OF MATERIAL |
|--|--------------------------|----------------|-----------|-------------|---|
| Water loss, type and size of hole, drilling method, groundwater level, etc. | | | | | |
| DRILLWELL - AIR ROTARY w/o WATER - 5 7/8" ϕ tricone bit - 6" steel casing | | | | | |
| NOTE: * GW's A+B installed in separate drill holes. | | | | | |
| | | | 11.8 | ++ | SPT - S.S. 2" O.D. @ 11.8m (38'9") |
| | | | | ++ | GLACIO-LACUSTRINE SILT |
| | | | | ++ | - VERY STIFF, OLIVE GREEN - LIGHT BROWN, THINLY TO IRREGULAR LAMINATED (2-10mm THICK), FINE SAND LAYERS, CONTAINS ONE 30mm THICK FINE-MED. GRAINED SAND LAYER - DAMP, VARIABLE SILT CONTENT (PRIMARYLY M-C-S GRAINED), LOW VERTICAL K, POTENTIALLY MODERATE HORIZONTAL K ALONG SEAMS (DISCONTINUOUS?). LOW TO SOME CLAY IN THIN LAYERS. |
| | | | | ++ | TO 14.9m - SAME UNIT, SEE SPT @ 14.9 |
| | | | | ++ | 14.9 - SPT - S.S. 2" O.D. (49') |
| | | | | ++ | GLACIO-LACUSTRINE |
| | | | | ++ | W. STIFF, OVERCONSOLIDATED, GENERALLY FINE-MED. GRAINED SILT WITH LAMINATIONS (VARVES?) OF MORE CLAY RICH LAYERS 1-2mm, OCCASIONAL 2-3cm LAYERS OF TILL-LIKE, POORLY SORTED. BETTER GRADED SAND/SILT LAYERS WITH FINE GRAVEL (up to 10mm ϕ). |
| | | | | ++ | LOW PLASTICITY IN GENERAL, LOW PERMEABILITY, HORIZONTAL STRATIFICATION. LT. BROWN FINE-MED GRAIN SAND SEAM (UP TO 2cm THICK), DENSE, UNSATURATED, MOIST |
| | | | 18.28 | ++ | - cuttings indicate coarsening to well graded till-like unit \rightarrow possibly SAND (TILL) w silty, gravelly (fng) matrix. |
| | | | | ++ | - driller indicates unit drills smooth and is very dense. Good returns. |
| SPT 2" O.D. S.S. @ 14.9m | 24" 18 30 36 45 | N=66 | | | |
| - WATER TABLE APPROX. @ 5.76m. (55') | | | | | |
| - WATER FILLING 2-4' @ EOM WHEN STOP DRILLING. | | | | | |

KNIGHT PIESOLD LTD.
CONSULTING ENGINEERS

TEST HOLE LOG

TEST HOLE No.
GW96-2A/2E
SHEET 3 of 4

PROJECT Mt. Polley - Hydrological Investigation

PROJECT NO. 1627.300

LOCATION OF TEST HOLE _____

GROUND EL. _____

DATE BEGUN Nov. 10/96 DATE FINISHED Nov. 17/96

LOGGED BY RJP

| NOTES Water loss, type and size of hole, drilling method, groundwater level, etc. | CORE RECOVERY % | BLOWS/FOOT | DEPTH (m) | GRAPHIC LOG | DESCRIPTION AND CLASSIFICATION OF MATERIAL |
|--|------------------------|--|----------------|-------------|--|
| DRILLWELL - AIR ROTARY w/o WATER - 5 7/8" ϕ tricone bit - 6" steel casing | | | 22.87 | | - becomes fine grained to Sandy Silt, some fine gravel, trace clay, no cobbles, moist to very moist, brown, likely low permeability |
| | 6 1/2" / 6 1/2" = 100% | SPT 45 \rightarrow 6" 10 \rightarrow 1 1/2" n = 75 to 100 | 24.24 | | SAND AND SILT (Glaciolacustrine) - fine grained sand and coarse grained silt with 1 to 2 mm thick laminations of saturated silt. Also contained 1 to 3 cm thick fine to medium grained, saturated sand layer. Very stiff, lower permeability. |
| | | | 24.24 to 26.83 | | - Last 3" SILT (till-like) - sandy, trace fine gravel, massive, very stiff, grey, moist. |
| | | | 26.83 | | - cuttings returned indicate continued fine grained till-like SILT - sandy with trace fine gravel |
| | | Does not make much water while drilling. once drilling stopped for 10 minutes \rightarrow 15' to 20' of water in bottom of hole. | 32.0 | | SAND and GRAVEL (Glaciofluvial) - believed to be saturated stratified sands and gravels with alternating "cleaner and dirtier" layers due to variable fines content. washed coarse fraction (i.e. medium to coarse gravel) is rounded to subrounded. |
| | | | 32.6 | | - sandy gravel, rounded to subrounded, medium to coarse grained. Produces \approx 80 l/minute |
| | | | 32.9 | | - thin silt (Glaciolacustrine) layer |
| | | | 35.2 | | - back to Glaciofluvial GRAVEL - some coarse sand, trace fines (10%), contains trace cobbles. Continues making water at 80 l/min. |
| | | | | | - water test 20-25 l/min |

KNIGHT PIESOLD LTD.
CONSULTING ENGINEERS

TEST HOLE LOG

TEST HOLE No.
GW96-3A/3B
SHEET 1 of 3

PROJECT Mt. Polley - Hydrological Investigation

LOCATION OF TEST HOLE (TSF) 3A: N5818308.97, E595768.75
3B: N5818306.52, E595765.16

DATE BEGUN Nov. 4/96 DATE FINISHED Nov. 9/96

PROJECT NO. 1627.300

GROUND EL. 3A: 912.06
3B: 912.06

LOGGED BY PJP

| NOTES Water loss, type and size of hole, drilling method, groundwater level, etc. | CORE RECOVERY % | BLOWS/FOOT | DEPTH (m) | GRAPHIC LOG | DESCRIPTION AND CLASSIFICATION OF MATERIAL |
|---|-----------------|----------------------------|--------------|-------------|---|
| DRILLWELL - AIR ROTARY w/o WATER - 5 7/8" φ tricone bit - 6" steel casing | | | 0 | | SILT (FILL) - fill composed of silt till - sandy, some gravel (10-15%), some clay (10%), low perm, very moist, brown |
| | | | 3.0 | | - fill is mixture of silt till and glaciolacustrine silt |
| | | SPT | 4.95 | | SILT (Glaciolacustrine) - some clay, trace fine sand, weakly interbedded, stiff to very stiff, low permeability, coarse silt - fine sand laminations, light grey to brown. |
| 5.2m Note: 20 min wait, 2 to 3' of standing water in bottom of hole. | 14"/18" = 78% | 2 8 } n=20 12 | 5.2 | | - primarily coarse silt and trace very fine sand, stiff, saturated, grey |
| 8.2m Note: water at pond elevation in bottom of hole overnight. | 24"/24" = 100% | 6 9 } n=22 13 18 | 6.7 | | - predominantly well graded silt with up to some clay, 2% fine sand, low permeability. |
| | | SPT | 8.2 | | SILT (Glaciolacustrine) - some clay to clayey, very stiff, irregular layers of slight composition change and color change, grey to grey-brown, moist, moderate plasticity, natural m/c >> PL. |
| | | | 9.8 | | - becoming SILT/CLAY (Glaciolacustrine) laminated with rare fn sand/coarse silt layers 1mm. |
| | | | 11.6 | | - continued laminated SILT and CLAY (1 to 3mm) as above for 1st 12" |
| | 24"/24" = 100% | 8 13 } n=32 19 22 | 11.6 to 14.7 | | - 2nd 12" → Coarse silt (sensitive) as quickens under vibration. Note: same unit as tested with CPT investigation earlier in year, saturated, grey, massive. |
| | | | | | - continued coarse silt unit as above. |

KNIGHT PIESOLD LTD.
CONSULTING ENGINEERS

TEST HOLE LOG

TEST HOLE No.
GW96-3A/3E
SHEET 2 of 3

PROJECT Mt. Polley - Hydrological Investigation

LOCATION OF TEST HOLE _____

DATE BEGUN Nov. 4/96 DATE FINISHED Nov. 9/96

PROJECT NO. 1627.300

GROUND EL. _____

LOGGED BY PJP

| NOTES Water loss, type and size of hole, drilling method, groundwater level, etc. | CORE RECOVERY % | BLOW/FOOT | DEPTH (m) | GRAPHIC LOG | DESCRIPTION AND CLASSIFICATION OF MATERIAL |
|--|------------------|----------------------|-----------|-------------|---|
| DRILLWELL - AIR ROTARY w/o WATER - 5 7/8" ϕ tricone bit - 6" steel casing | 24" / 24" = 100% | 0 0.7 1.5 4 | 14.7 | | SILT (Glaciolacustrine) - coarse silt primarily with trace fn sand, saturated. Note: Low blow counts due to loss of confinement and disturbance causing quickening of silt (non-plastic) unit. (CPT data showed unit was very stiff), grey, massive, saturated. |
| | | | 17.1 | | - becoming coarse grained with gravel returning with washings as now generating water, water test \rightarrow 50 to 60 l/min, likely glaciofluvial sandy gravel unit. |
| | 20" / 24" = 83% | 15 55 53 60 | 17.5 | | SAND (Glaciofluvial) - dense to very dense, medium to coarse grained, massive, saturated, grey, medium to high permeability. |
| | | | 17.65 | | SAND and SILT (TILL) - some gravel, trace to some clay, well graded, very dense, gravel up to 1/4", massive, low perm. - likely Basal Till, no water produced. - continued gray very dense Basal till from 17.5 to 19.8m. |
| | | | 19.8m | | - becoming red brown at times believed to be due to drilling through red-brown volcanic conglomerate clast caught up in till unit. |
| | 10" / 10" = 100% | 23 80/4" | 23.6 | | SILT and SAND (TILL) - continued, very dense, massive, low permeability. - occasional cobbles to 25m |
| 25m Note: Approx. 10m of water in bottom of hole overnight | | | 25 | | - becoming slightly more gravelly, silty sand, trace clay, likely continued cobbles, grey to red-brown, massive, low permeability likely, moist 25m to 35m: - cont'd glacio/till - red brown to grey, moist. |

KNIGHT PIESOLD LTD.
CONSULTING ENGINEERS

TEST HOLE LOG

TEST HOLE No.
GW96-3A/3B
SHEET 3 of 3

PROJECT Mt. Polley - Hydrological Investigation

PROJECT NO. 1627.300

LOCATION OF TEST HOLE _____

GROUND EL. _____

DATE BEGUN Nov. 4/96

DATE FINISHED Nov. 9/96

LOGGED BY PJP

| NOTES Water loss, type and size of hole, drilling method, groundwater level, etc. | CORE RECOVERY % | BLOWS/FOOT | DEPTH (m) | GRAPHIC LOG | DESCRIPTION AND CLASSIFICATION OF MATERIAL |
|--|-----------------|------------|-----------|-------------|---|
| <p>DRILLWELL - AIR ROTARY w/o WATER - 5 7/8" ϕ tricone bit - 6" steel casing</p> <p>Note: Contact between till and bedrock is dry. Wait 20 minutes but no water, drilled dry to dusty w occasional damp zones.</p> | | | 35 | | <p>Volcaniclastic Conglomerate-(Bedrock) - "fragments" of hematitically altered weathered sediment comprised of volcanic clasts, drilled with tricone bit \rightarrow soft - rock chips generally damp to dry with return dusty.</p> |
| | | | 52.1 | | <p>- possible fracture (wet) zone as material comes out as clumps and damp for 0.5 to 1.0 m.</p> |
| | | | 54.9 | | <p>EOH (180ft)</p> <p>- wait 20 minutes, no water in bottom of hole. - Pull rods and remeasure \rightarrow 1' of water in bottom of hole.</p> |

KNIGHT PIESOLD LTD.
CONSULTING ENGINEERS

TEST HOLE LOG

TEST HOLE No.
GW96-4A/48
SHEET 1 of 1

PROJECT Mt. Polley - Hydrological Investigation
LOCATION OF TEST HOLE (TSF) 4A: N5818164.58 E595147.98
4B: N5818162.87 E595151.26
DATE BEGUN Nov. 18/96 DATE FINISHED Nov. 20/96

PROJECT NO. 1627.300
GROUND EL. 4A: 240.56
4B: 240.46
LOGGED BY PJP

| NOTES Water loss, type and size of hole, drilling method, groundwater level, etc. | CORE RECOVERY % | BLOWS/FOOT | DEPTH (m) | GRAPHIC LOG | DESCRIPTION AND CLASSIFICATION OF MATERIAL |
|--|-----------------|------------|-----------|-------------|---|
| DRILLWELL - AIR ROTARY w/o WATER - 5 7/8" ϕ tricone bit - 6" steel casing 4.5 m Waited 20 minutes, water at 10' below grade. Note: 20' of water in bottom of hole overnight. | | | 0 | | SAND (TILL) - gravelly, some silt to silty, trace clay, very dense, well graded, low permeability, moist, medium brown. -(Ablation till) |
| | | | 4.0 | | SAND (Glaciofluvial) - some gravel to gravelly, trace silt (10%), dense, clasts rounded to subrounded, saturated, moderate permeability, cohesionless, grey-brown |
| | | | 4.5 | | - becoming slightly cleaner (less fines) and still saturated but not making any water. |
| | | | 7.0 | | SAND (TILL) - silty, some gravel, trace clay, rare cobbles, very dense, well graded, low permeability, moist, grey-brown. |
| | | | 9.8 | | Volcaniclastic Conglomerate (Bedrock) - fragments of hematitically altered volcanic in sediment matrix, red-brown, hard, dry. No observable fracture zones. |
| | | | 16.7 | | - making dribble of water |
| | | | 25.0 | | EOH |

| KNIGHT PIESOLD LTD. CONSULTING ENGINEERS | | TEST HOLE LOG | | | | TEST HOLE No. GW96-5A/56 SHEET 1 of 1 | |
|--|-----------------|---------------|--|-----------|---|---|--|
| PROJECT <u>Mt. Polley - Hydrological Investigation</u> | | | | | PROJECT NO. <u>1627.300</u> | | |
| LOCATION OF TEST HOLE <u>(TSF)</u> <small>5A: N5819626.68, E594330.54 5B: 9.64, E5943 29.79</small> | | | | | GROUND EL. <u>5A: 913.55 5B: 913.44</u> | | |
| DATE BEGUN <u>Nov. 21/96</u> | | | | | DATE FINISHED _____ | | |
| | | | | | LOGGED BY <u>RJP</u> | | |
| NOTES Water loss, type and size of hole, drilling method, groundwater level, etc. | CORE RECOVERY % | BLOWS/FOOT | | DEPTH (m) | GRAPHIC LOG | DESCRIPTION AND CLASSIFICATION OF MATERIAL | |
| DRILLWELL - AIR ROTARY w/o WATER - 5 7/8" ϕ tricone bit - 6" steel casing No water generated in overburden or bedrock during drilling. Note: 5.5m left for 1 week, water at surface upon re-startup. | | | | 0 | | SILT (Ablation Till) - sandy, some gravel and clay, stiff, moderately well graded, low permeability, wet to saturated, dark brown. | |
| | | | | 2.1 | | - becoming very stiff, moist to very moist, light to medium brown. | |
| | | | | 4.9 | | - hit 0.6m ϕ boulder | |
| | | | | 6.0 | | - becoming gravelly and dense | |
| | | | | 6.7 | | - becoming very dense, moist and grey, still low permeability and no water generated | |
| | | | | 10.4 | | | |
| | | | | 15.2 | | SYENITE INTRUSIVE (Bedrock) - coarse grained to pegmatitic, massive, - no observable fractures, dry to damp - narrow zone damp chips, no dust for 1m, water bearing? | |
| | | | | 25.5 | | EOH | |

| KNIGHT PIESOLD LTD. CONSULTING ENGINEERS | | TEST HOLE LOG | | | | TEST HOLE No. GW96-6 SHEET / of / | |
|--|--------------------|---------------|--|--------------|-----------------------------|--|--|
| PROJECT <u>Mt. Polley - Hydrological Investigation</u> | | | | | PROJECT NO. <u>1627.300</u> | | |
| LOCATION OF TEST HOLE <u>(Millsite) - N5822851.66, E593659.21</u> | | | | | GROUND EL. <u>1058.53</u> | | |
| DATE BEGUN <u>Oct. 30 / 96</u> DATE FINISHED <u>Oct. 31 / 96</u> | | | | | LOGGED BY <u>RJP</u> | | |
| NOTES Water loss, type and size of hole, drilling method, groundwater level, etc. | CORE RECOVERY % | BLOWS/FOOT | | DEPTH (m) | GRAPHIC LOG | DESCRIPTION AND CLASSIFICATION OF MATERIAL | |
| DRILLWELL - AIR ROTARY w/o WATER - 5 7/8" ϕ tricone bit - 6" steel casing | | | | 0 | | Intermediate Volcanic (bedrock) - fin grained, dark grey, andesite to basalt, minor epidote alteration, drills quickly, moderately competent, dry, dusty, no indication of water | |
| | | | | 9.1 | | - becoming slightly coarser grained to micro diorite composition, epidote + k-spr alteration, dry, relatively massive, no water produced | |
| | | | | 12.8 | | - let hole stand for 20 minutes, upon restart, 2 ft of water in bottom of hole, | |
| | | | | 15.2 | | - trace pyrite and minor chloropyrite for 1 m only, no water \rightarrow dusty continued. | |
| | | | | 24.4 | | - let hole stand for 20 minutes, upon start-up, rock chips moist initially only, then dusty again. - continued microdiorite intrusive, tight, no fractures observed. | |
| | | | | 36.6 | | - becoming harder to drill \rightarrow No water produced during drilling. | |
| | | | | 43.8 | | EOH | |

KNIGHT PIESOLD LTD.
CONSULTING ENGINEERS

TEST HOLE LOG

TEST HOLE No.
GW96-7
SHEET 1 of 1

PROJECT Mt. Polley - Hydrological Investigation

PROJECT NO. 1627.300

LOCATION OF TEST HOLE (Milestone) N5821520.53, E592983.23

GROUND EL. 1021.32

DATE BEGUN Nov. 7/96 DATE FINISHED Nov. 7/96

LOGGED BY PJP

| NOTES Water loss, type and size of hole, drilling method, groundwater level, etc. | CORE RECOVERY % | BLOWS/FOOT | DEPTH (m) | GRAPHIC LOG | DESCRIPTION AND CLASSIFICATION OF MATERIAL |
|--|-----------------|------------|-----------|-------------|--|
| DRILLWELL - AIR ROTARY w/o WATER - 5 7/8" tri-cone bit - 6" steel casing | | | 0 | | SILT (TILL) - sandy, some gravel and clay, dense to very dense, massive, low permeability, moist to very moist, brown. |
| | | | 2.4 | | |
| | | | 3.0 | | Diorite (Bedrock) - fine grained → microcline or plagioclase feldspar volcanic (intermediate) - epidote, magnetite and calcite altered, weak chlorite alteration?, fractured and weathered - begins making water at 5 to 10 L/min |
| | | | 6.0 | | - water test at 16 L/min |
| | | | 9.0 | | - becoming highly fractured with blue-grey fault gouge returns in water, water produced at 19 L/min. |
| | | | 10.7 | | - large fragments of rock breaking off forming pocket inside hole. Rock fragments contain numerous calcite stringers → fault zone. → still producing water → hole caving in. |
| | | | 15.5 | | EOH (51') |

KNIGHT PIESOLD LTD.
CONSULTING ENGINEERS

TEST HOLE LOG

TEST HOLE No.
GW26-84/88
SHEET 1 of 1

PROJECT Mt. Polley - Hydrological Investigation

PROJECT NO. 1627.300

LOCATION OF TEST HOLE (Millsite) 8A: N5822468.46, E591861.59
8B: N5822469.40, E591859.31

GROUND EL. 8A: 1050.10
8B: 1050.09

DATE BEGUN Nov. 1 / 96 DATE FINISHED _____

LOGGED BY PJP

| NOTES Water loss, type and size of hole, drilling method, groundwater level, etc. | CORE RECOVERY % | BLOWS/FOOT | DEPTH (m) | GRAPHIC LOG | DESCRIPTION AND CLASSIFICATION OF MATERIAL |
|--|--------------------|------------|--------------|-------------|--|
| DRILLWELL - AIR ROTARY w/o WATER - 5 7/8" ϕ tricone bit - 6" steel casing | | | 0 | | SILT (FILL) - fill composed of reworked sandy silt till with some gravel, stiff, wet to saturated, fill formerly pull-out for road construction, trace organics mixed in, grey, low permeability. |
| | | | 2.4 | | SILT and SAND (TILL) - gravelly, some clay, trace cobbles, very moist, low permeability, not producing water, brown. |
| | | | 4.5 | | - becoming dense to very dense, moist to very moist, |
| | | | 7.6 | | - becoming very dense and moist. |
| | | | 12.2 | | GRAVEL (Glaciofluvial) - sandy, dense, subrounded clasts, very moist to wet but not producing water, high permeability. → let stand for 20 minutes and 5 ft of water in bottom of hole. |
| | | | 12.8 | | Diorite (Bedrock) - medium grained, massive, somewhat weathered, weak chlorite alteration. → begins to make 15 L/min |
| | | | 27.4 | | - becomes much harder to drill and continues to produce 15 L/min. |
| | | | 36.9 | | - hit fractured zone (softer) and now produces 60 to 70 L/min. |
| | | | 40.1 | | - continuing in fracture zone with high flow rates to EOH. |
| | | | | | EOH |

KNIGHT PIESOLD LTD.
CONSULTING ENGINEERS

TEST HOLE LOG

TEST HOLE No.
GW96-9
SHEET 1 of 1

PROJECT Mt. Polley - Hydrological Investigation
LOCATION OF TEST HOLE TSF: N5818277.14, E595503.89
DATE BEGUN Nov. 21/96 DATE FINISHED Nov. 21/96

PROJECT NO. 1627.300
GROUND EL. 916.18
LOGGED BY PJP

| NOTES Water loss, type and size of hole, drilling method, groundwater level, etc. | CORE RECOVERY % | BLOWS/FOOT | DEPTH (m) | GRAPHIC LOG | DESCRIPTION AND CLASSIFICATION OF MATERIAL |
|---|-----------------|------------|-----------|-------------|--|
| DRILLWELL - AIR ROTARY w/o WATER - 5 7/8" φ tricone bit - 6" steel casing | | | 0 | | SILT (TILL) - sandy, some gravel and clay, trace cobbles, stiff to very stiff, low permeability, well graded, very moist to wet, grey to brown |
| | | | 2 | | - becoming very stiff and moist to very moist |
| | | | 3.9 | | SAND (Glaciofluvial) - fine grained with some fine gravel, trace to some silt, moderate permeability, saturated, grey-brown. - contains alternating more gravel rich layers 0.2 to 0.3m thick - producing only dribble of water with saturated cuttings. |
| | | | 5.1 | | SILT (Glaciolacustrine) - layered silt with lesser thin fn sand and silt laminations, as well as silt & clay layers, appears irregular, stiff to very stiff, low permeability, grey, moist to very moist. |
| | | | 6.0 | | EOH |

GWS 1122: (C40) 11/21/97 Plot scale 1"=1'

APPENDIX B

**GROUNDWATER MONITORING WELL
COMPLETION DETAILS**



Association
of Consulting
Engineers
of Canada

Association
des Ingénieurs-
Conseils
du Canada

GROUND ELEVATION 927.89m

FIGURE B.1

KNIGHT PIESOLD LTD.
CONSULTING ENGINEERS

GROUNDWATER MONITORING WELL COMPLETION DETAILS

1625.A43

PROJECT MT. POLLEY PROJECT

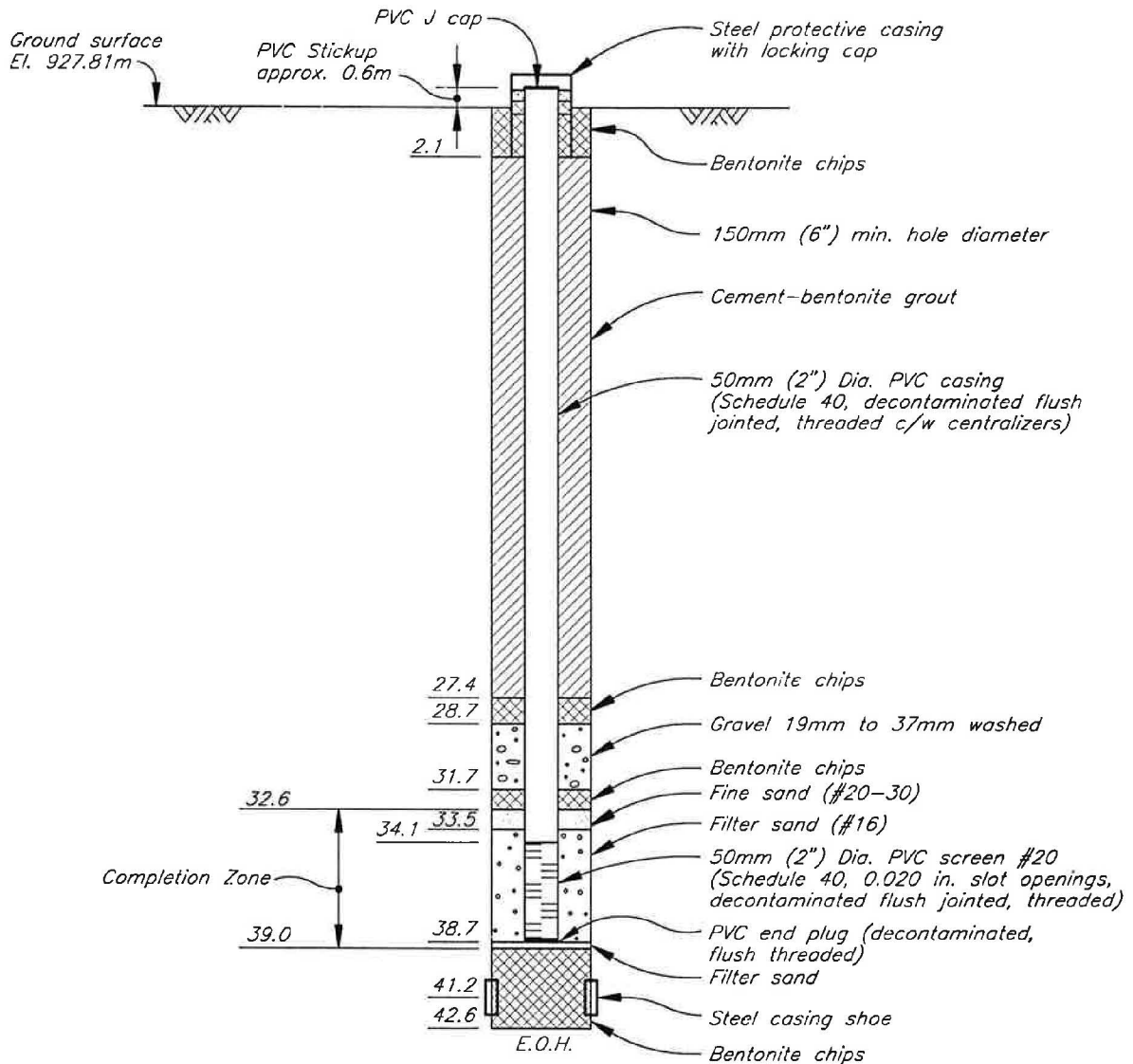
PROJECT No. 1628

LOCATION N: 5 819 935.220 E: 595 416.160

HOLE No. GW96-1B

COMPLETION DATE Dec. 5/96

GROUND ELEVATION 927.81



NOTES

1. Cement-grout mixture installed using tremmie pipe.
2. Depths shown from surface in metres.

FIGURE B.2

CAD FILE: 16251701.A43 Plot scale 1=1

PROJECT MT. POLLEY PROJECT

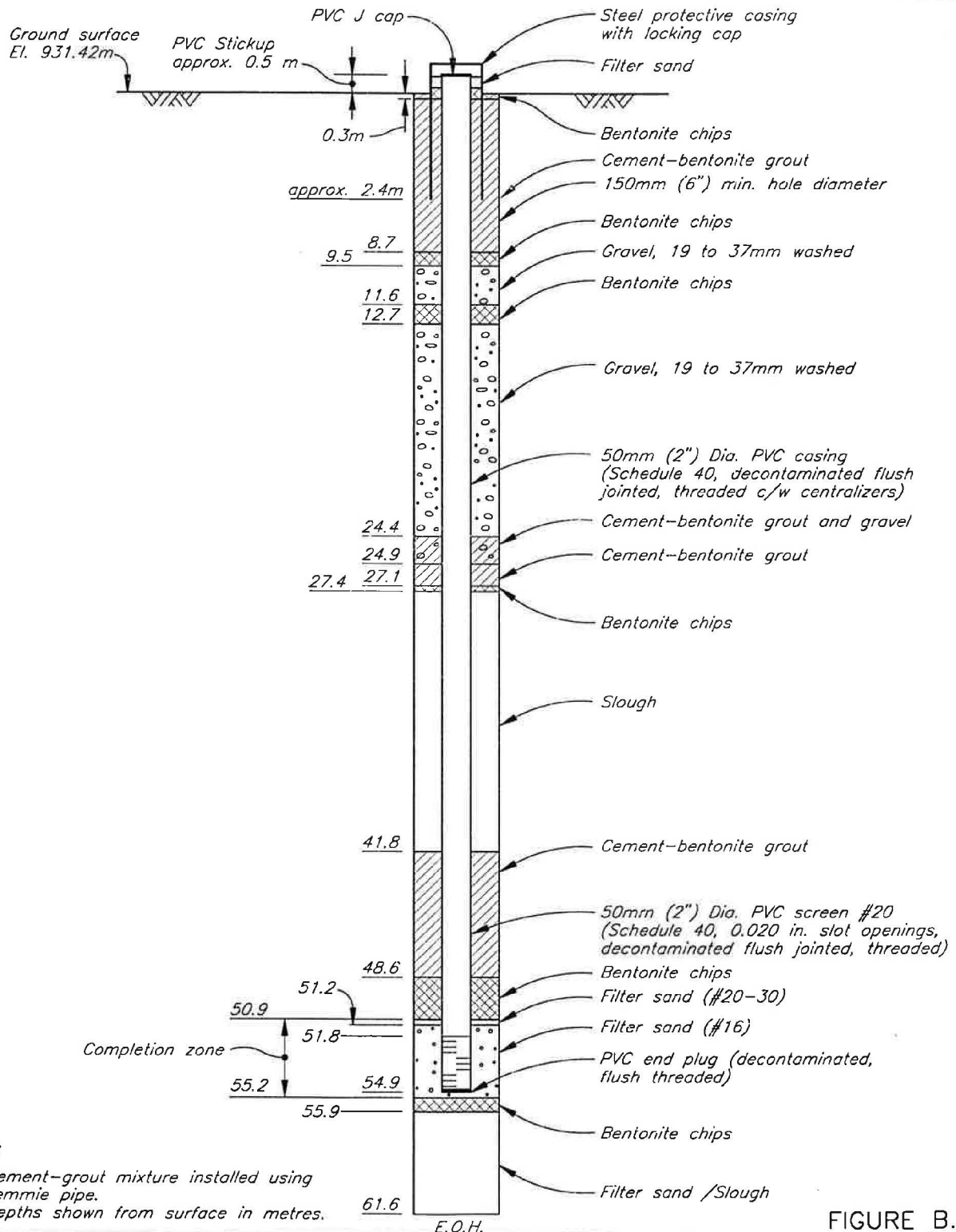
LOCATION N: 5 819 449.92 E: 596 065.40

COMPLETION DATE Nov. 17/96

PROJECT No. 1628

HOLE No. GW96-2A

GROUND ELEVATION 931.42



NOTES

1. Cement-grout mixture installed using tremmie pipe.
2. Depths shown from surface in metres.

FIGURE B.3

KNIGHT PIESOLD LTD.
CONSULTING ENGINEERS

GROUNDWATER MONITORING WELL COMPLETION DETAILS

1625.A50

PROJECT MT. POLLEY PROJECT

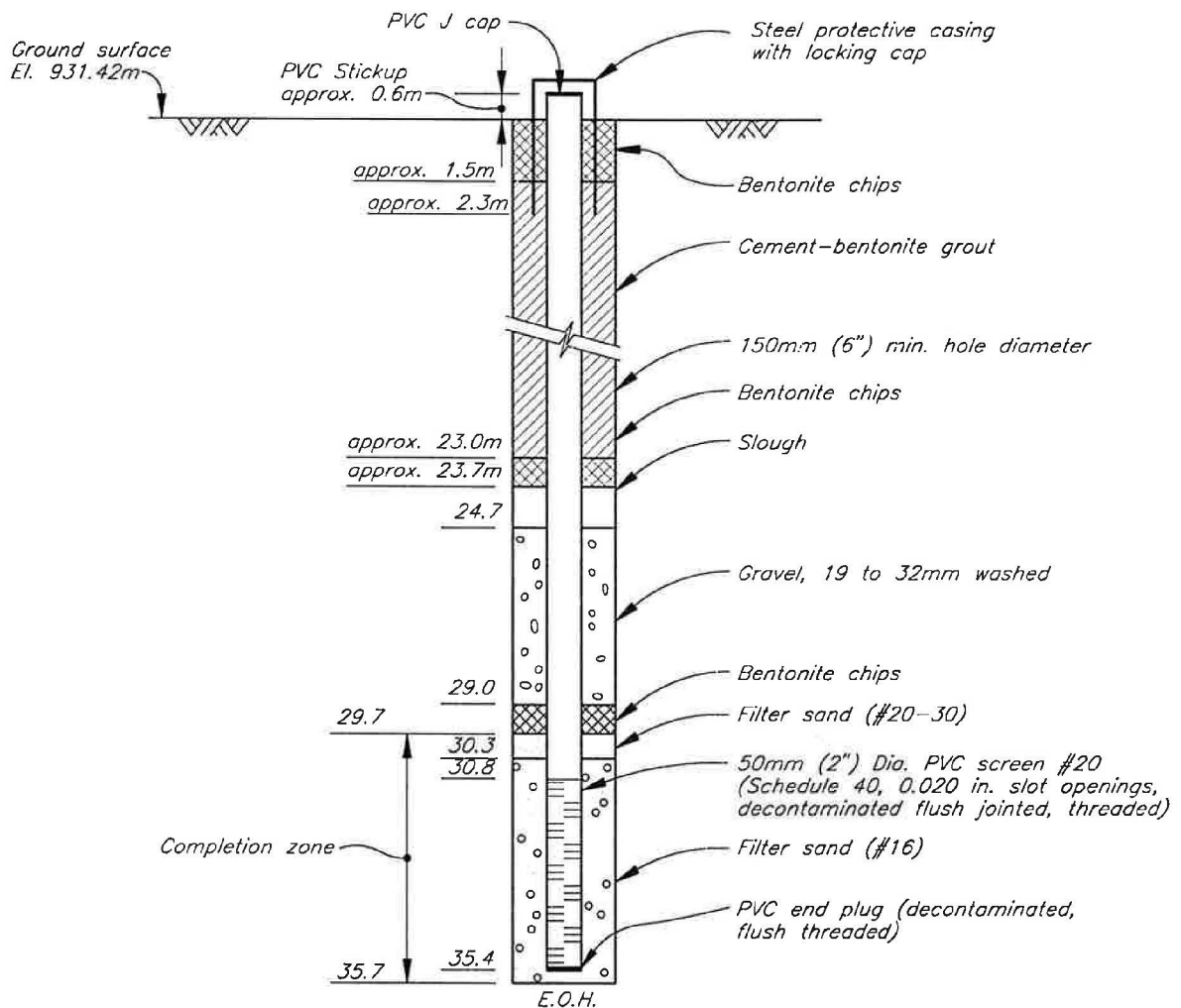
LOCATION N: 5 819 447.08 E: 596 074.73

COMPLETION DATE Nov. 16,17/96

PROJECT No. 1628

HOLE No. GW96-2B

GROUND ELEVATION 931.42



NOTES

1. Cement-grout mixture installed using tremmie pipe.
2. Depths shown from surface in metres.

FIGURE B.4

CAD FILE: \1525\FW\A50 Plot scale 1=1

KNIGHT PIESOLD LTD.
CONSULTING ENGINEERS

GROUNDWATER MONITORING WELL COMPLETION DETAILS

1625.A51

PROJECT MT. POLLEY PROJECT

PROJECT No. 1628

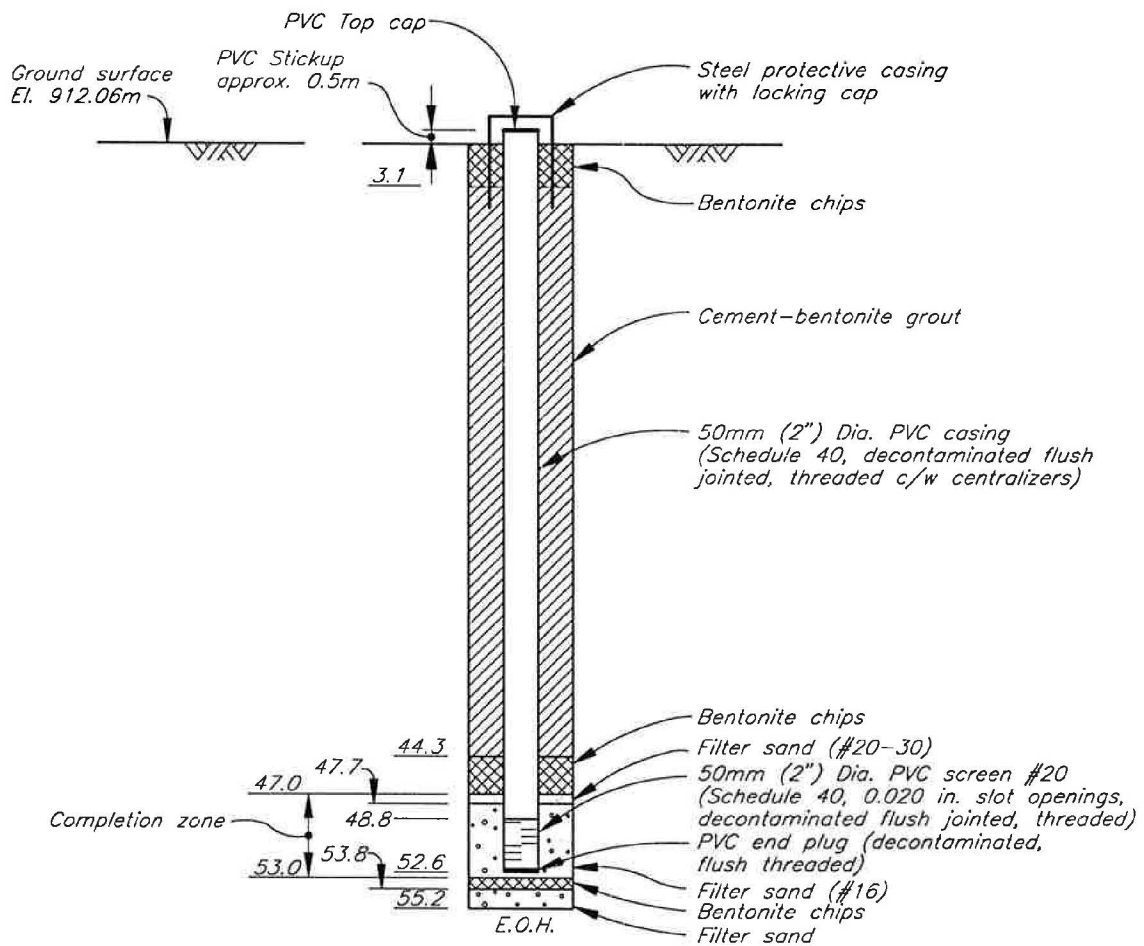
LOCATION N: 5 818 308.97 E: 595 768.75

HOLE No. GW96-3A

COMPLETION DATE Nov. 7,8/96

GROUND ELEVATION 912.06

PROPOSED 1996 GROUNDWATER MONITORING WELLS SCHEMATIC DIAGRAM



NOTES

1. Cement-grout mixture installed using tremmie pipe.
2. Depths shown from surface in metres.

FIGURE B.5

CAD FILE: \1625\FIG\A51 Plot scale 1=1

KNIGHT PIESOLD LTD.
CONSULTING ENGINEERS

GROUNDWATER MONITORING WELL COMPLETION DETAILS

1625.A52

PROJECT MT. POLLEY PROJECT

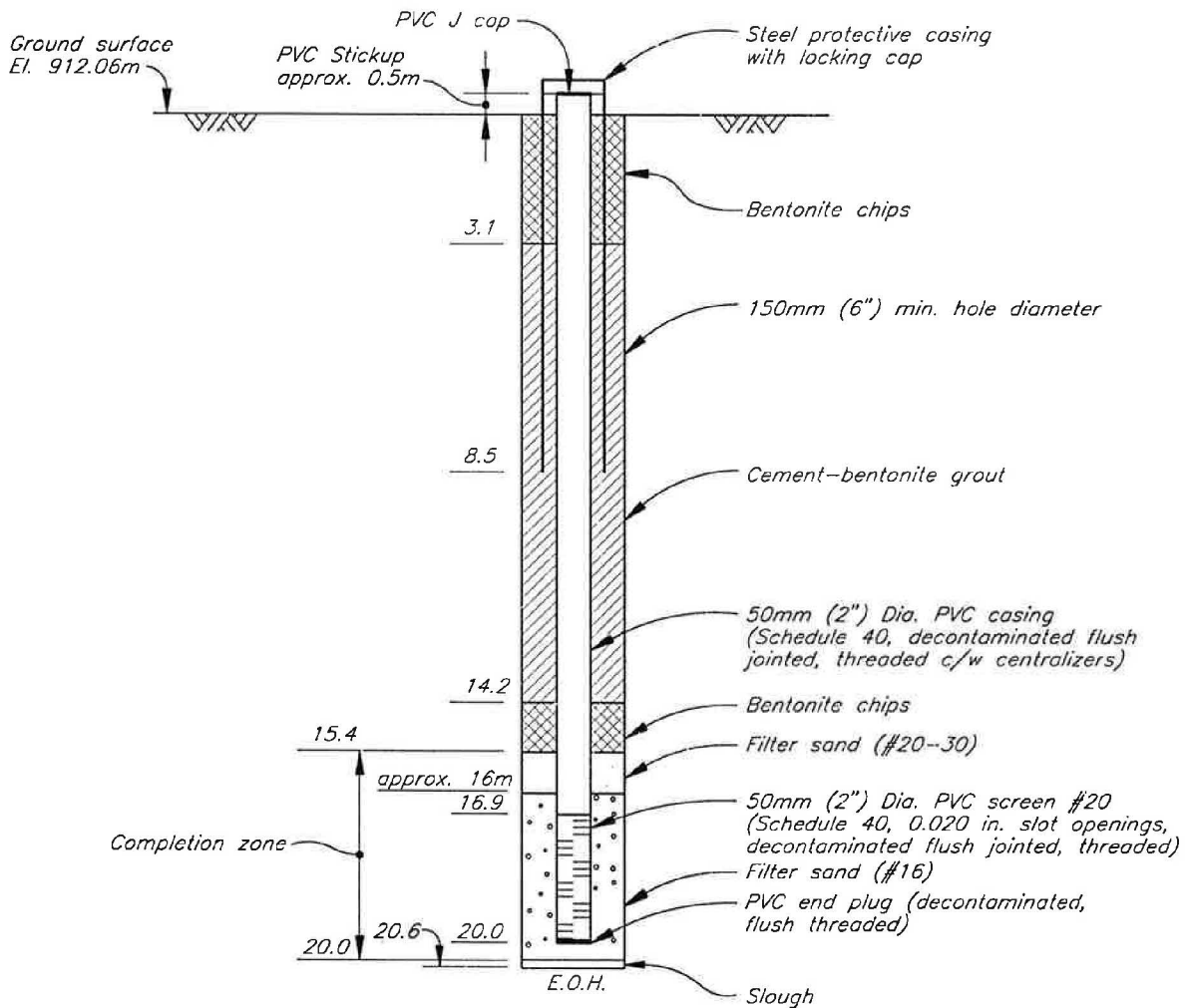
PROJECT No. 1628

LOCATION N: 5 818 306.52 E: 595 765.16

HOLE No. GW96-3B

COMPLETION DATE Nov. 9/96

GROUND ELEVATION 912.06



NOTES

1. Cement-grout mixture installed using tremmie pipe.
2. Depths shown from surface in metres.

FIGURE B.6

CAD FILE: \1625\FIG\A52 Plot scale 1"=1

KNIGHT PIESOLD LTD.
CONSULTING ENGINEERS

GROUNDWATER MONITORING WELL COMPLETION DETAILS

1625 A48

PROJECT MT. POLLEY PROJECT

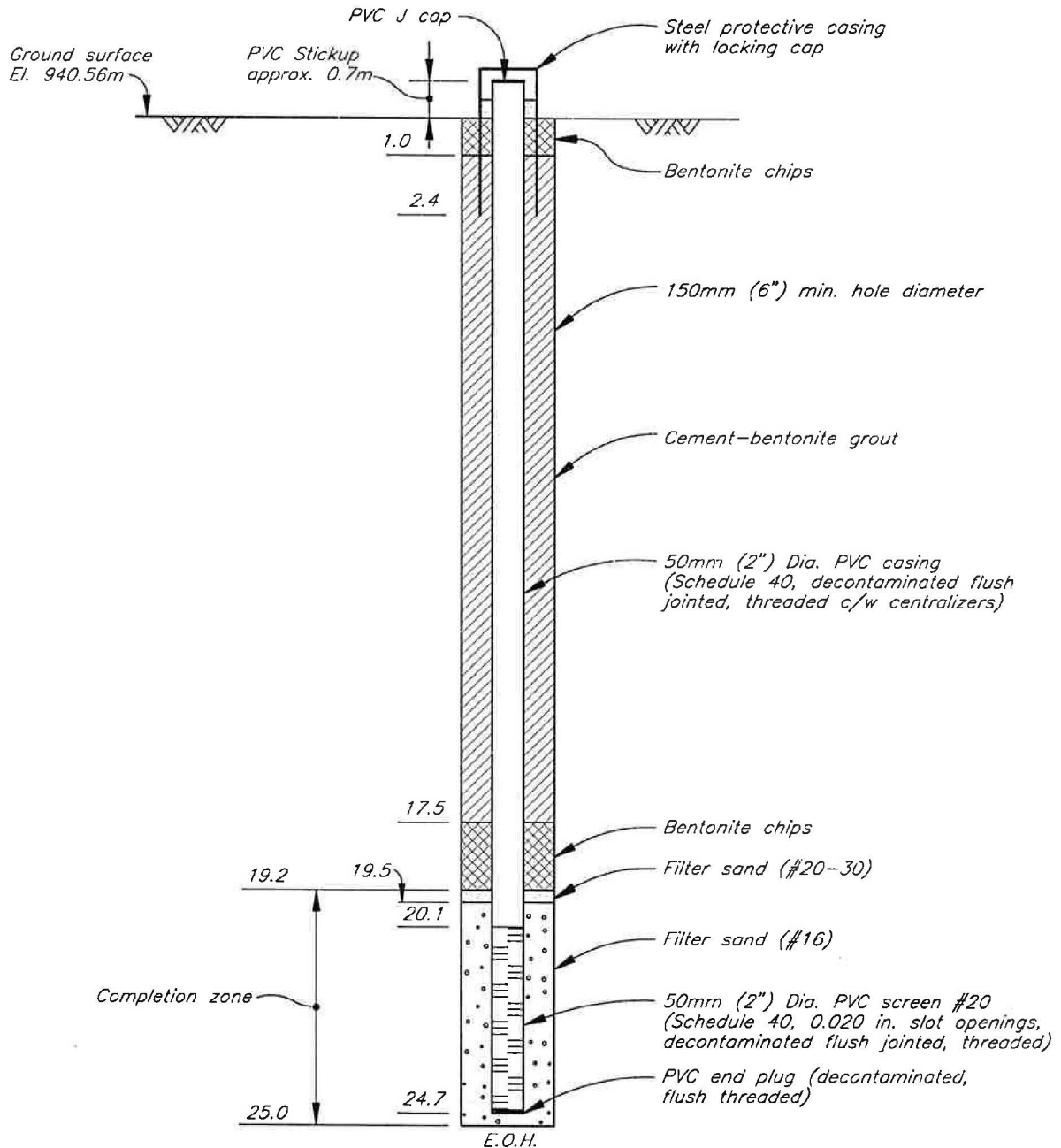
PROJECT No. 1628

LOCATION N: 5 818 164.58 E: 595 147.94

HOLE No. GW96-4A

COMPLETION DATE Nov. 19/96

GROUND ELEVATION 940.56



NOTES

1. Cement-grout mixture installed using tremmie pipe.
2. Depths shown from surface in metres.

FIGURE B.7

CAD FILE: \1625\FIG\A48 Plot scale 1=1

KNIGHT PIESOLD LTD.
CONSULTING ENGINEERS

GROUNDWATER MONITORING WELL COMPLETION DETAILS

1625.A47

PROJECT MT. POLLEY PROJECT

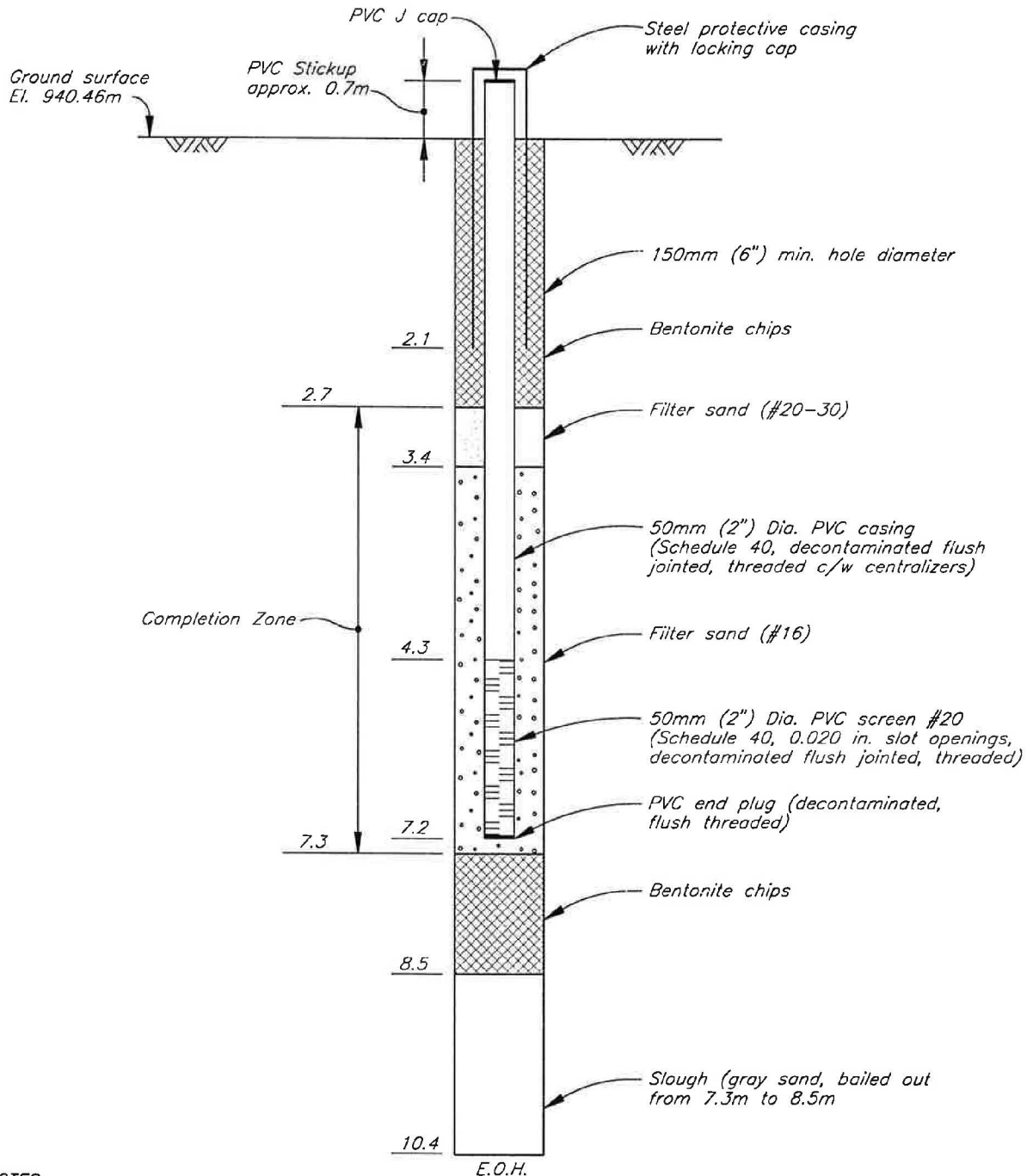
PROJECT No. 1628

LOCATION N: 5 818 162.87 E: 595 151.26

HOLE No. GW96-4B

COMPLETION DATE Nov. 20/96

GROUND ELEVATION 940.46



NOTES

1. Cement-grout mixture installed using tremmie pipe.
2. Depths shown from surface in metres.

FIGURE B.8

CAD FILE: \1625\1625\1625.A47 Plot scale 1=1

KNIGHT PIESOLD LTD.
CONSULTING ENGINEERS

GROUNDWATER MONITORING WELL COMPLETION DETAILS

1625.A45

PROJECT MT. POLLEY PROJECT

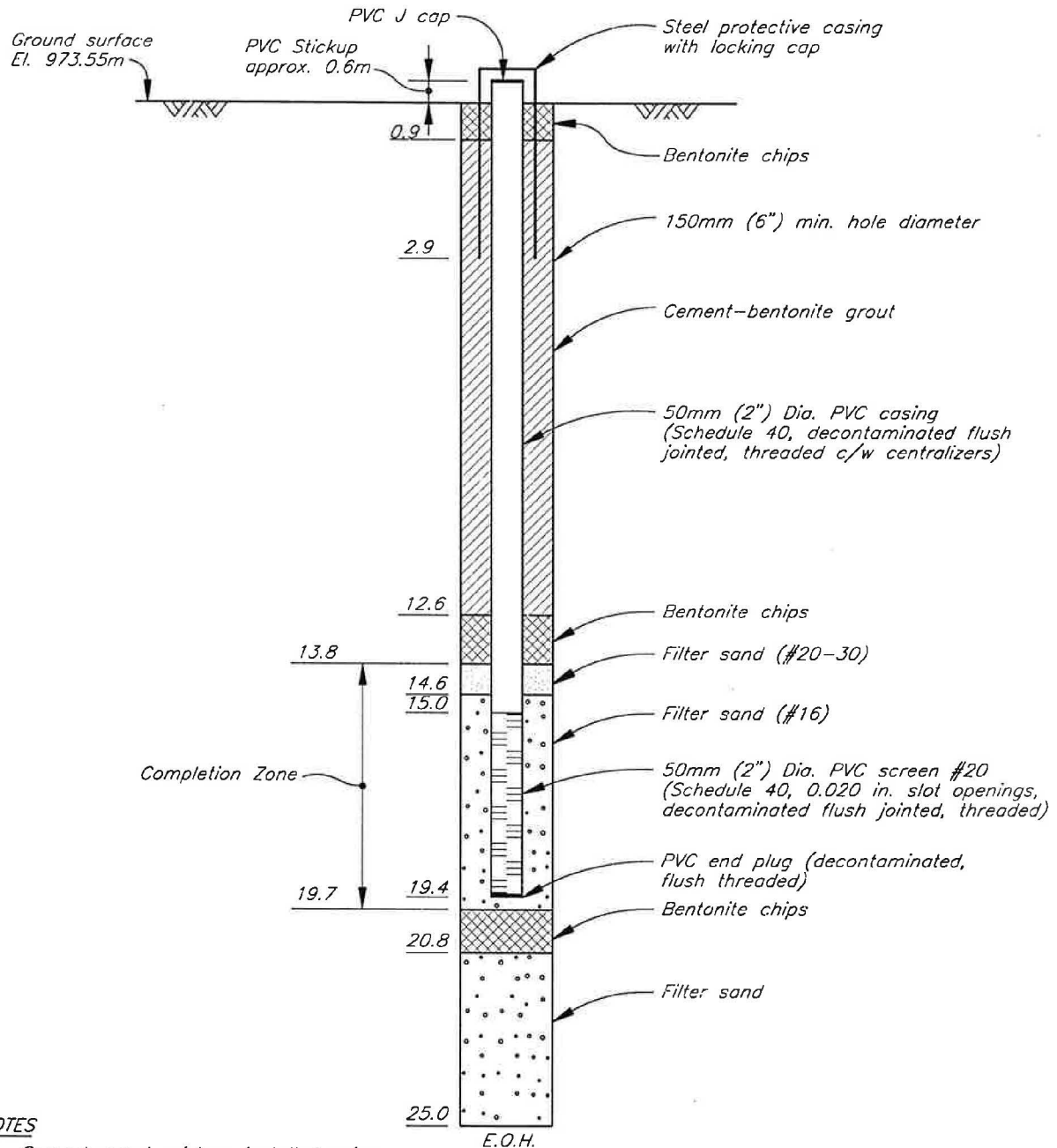
PROJECT No. 1628

LOCATION N: 5 819 626.68 E: 594 330.34

HOLE No. GW96-5A

COMPLETION DATE Nov. 28/96

GROUND ELEVATION 973.55



NOTES

1. Cement-grout mixture installed using tremmie pipe.
2. Depths shown from surface in metres.

FIGURE B.9

KNIGHT PIESOLD LTD.
CONSULTING ENGINEERS

GROUNDWATER MONITORING WELL COMPLETION DETAILS

1625.A44

PROJECT MT. POLLEY PROJECT

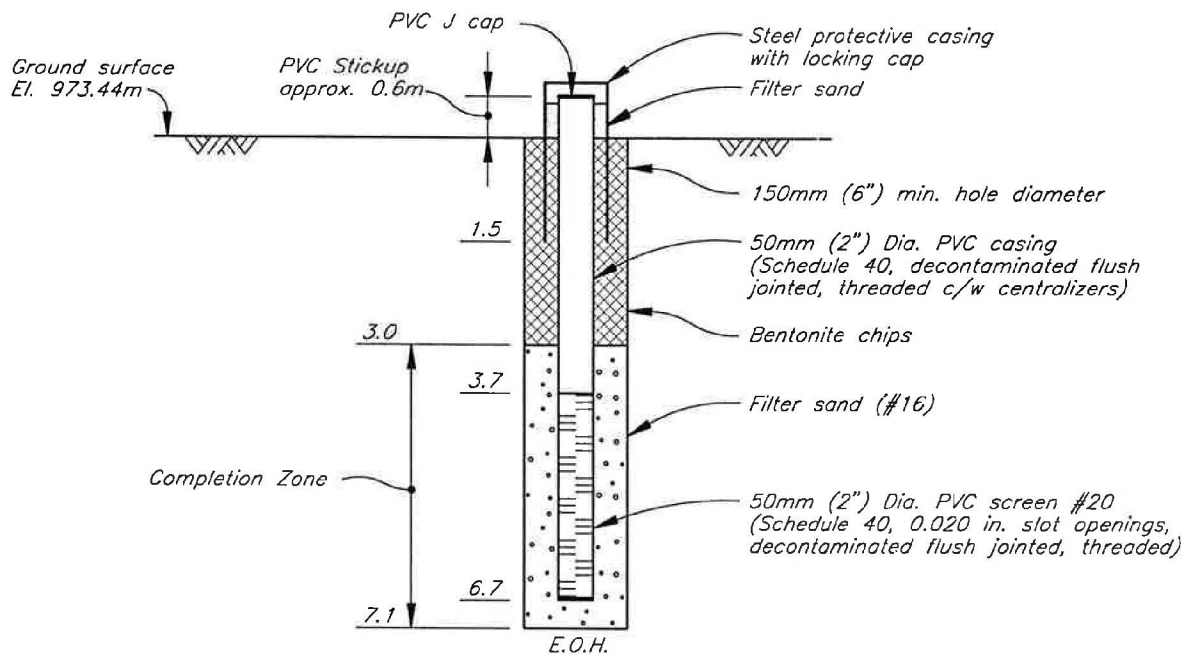
PROJECT No. 1628

LOCATION N: 5 819 629.64 E: 594 329.79

HOLE No. GW96-5B

COMPLETION DATE Nov. 29/96

GROUND ELEVATION 973.44



NOTES

1. Cement-grout mixture installed using tremmie pipe.
2. Depths shown from surface in metres.

FIGURE B.10

CAD FILE: \\1625\\1625\\A44 Plot scale 1=1

KNIGHT PIESOLD LTD.
CONSULTING ENGINEERS

GROUNDWATER MONITORING WELL COMPLETION DETAILS

1625.A54

PROJECT MT. POLLEY PROJECT

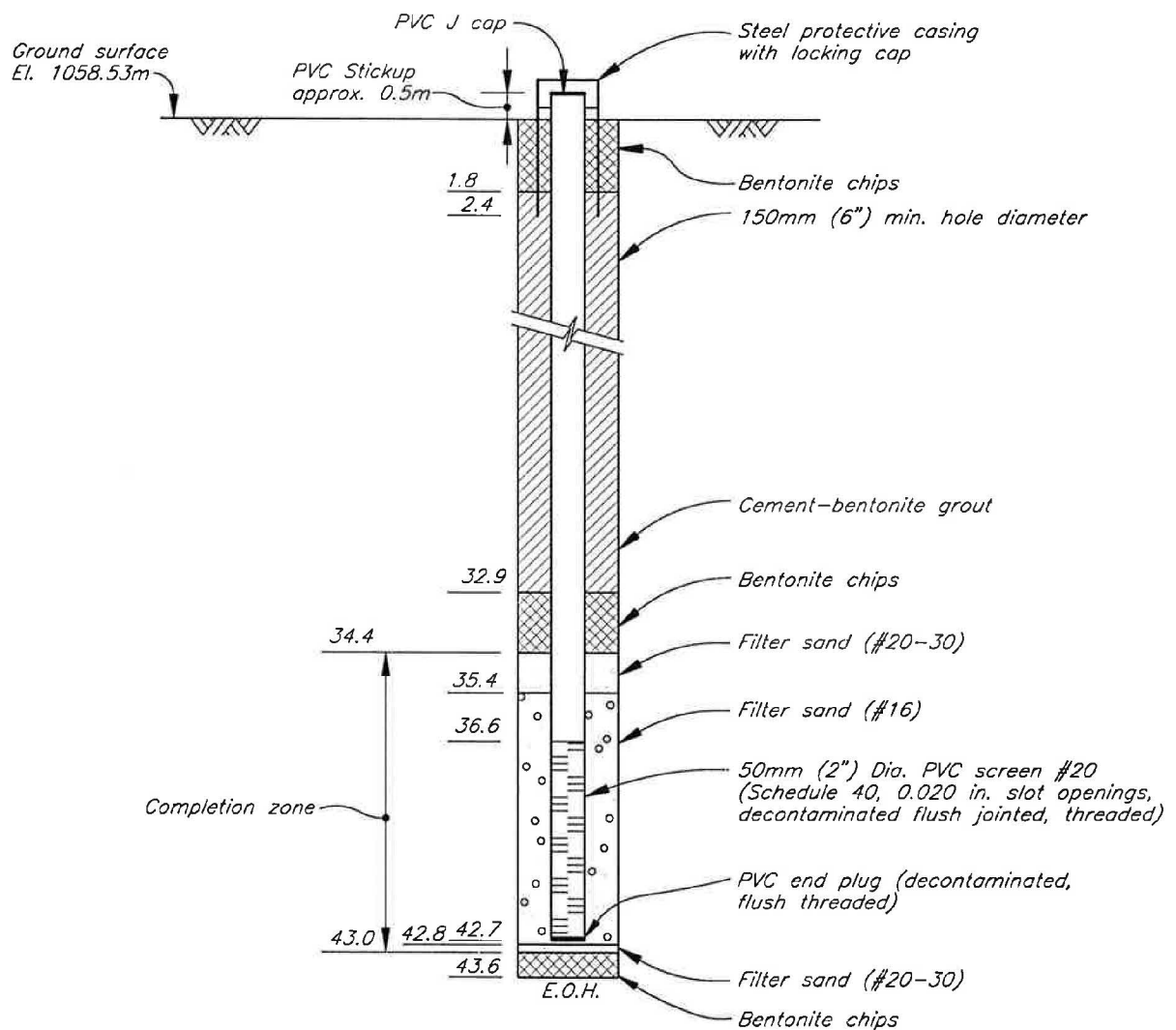
PROJECT No. 1628

LOCATION N: 5 822 851.66 E: 593 659.21

HOLE No. GW96-6

COMPLETION DATE Oct. 31/96

GROUND ELEVATION 1058.53



NOTES

1. Cement-grout mixture installed using tremmie pipe.
2. Depths shown from surface in metres.

FIGURE B.11

CAD FILE: \1625\F054 Plot scale 1=1

KNIGHT PIESOLD LTD.
CONSULTING ENGINEERS

GROUNDWATER MONITORING WELL COMPLETION DETAILS

1625.A53

PROJECT MT. POLLEY PROJECT

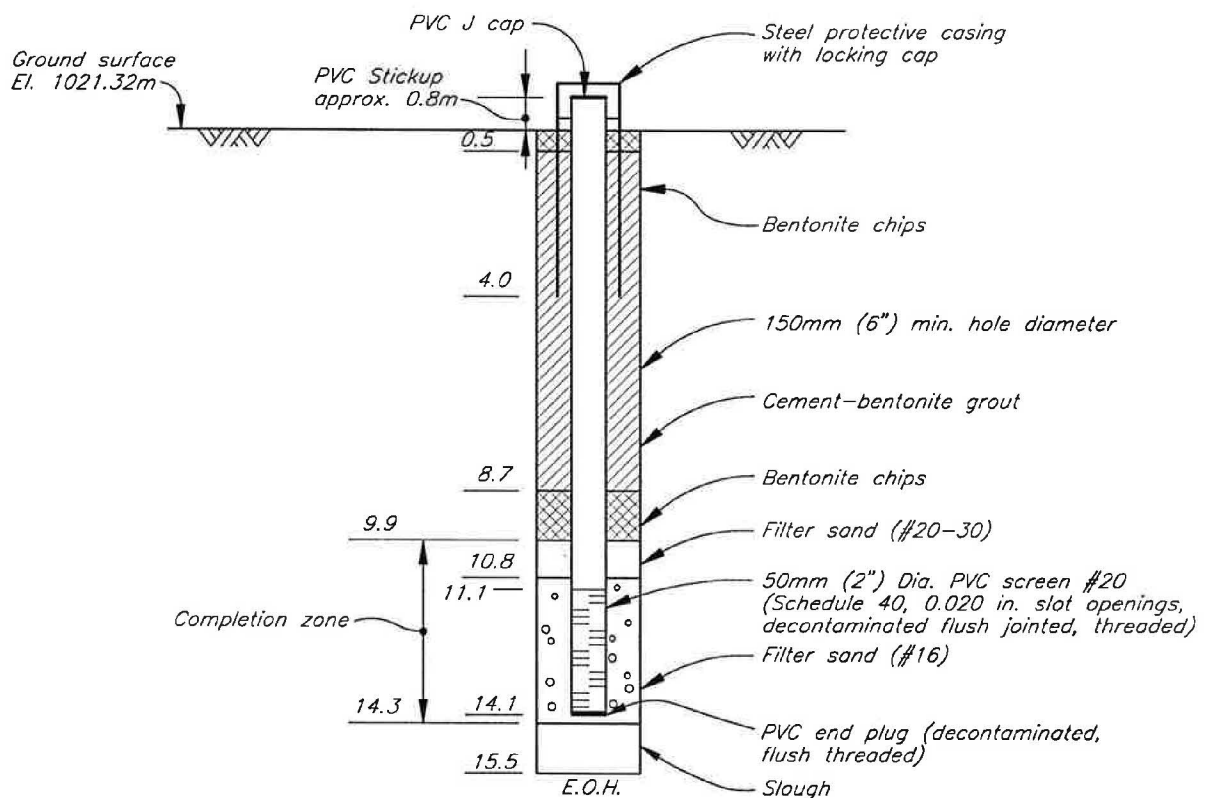
LOCATION N: 5 821 520.53 E: 592 983.23

COMPLETION DATE Nov. 4/96

PROJECT No. 1628

HOLE No. GW96-7

GROUND ELEVATION 1021.32



NOTES

1. Cement-grout mixture installed using tremmie pipe.
2. Depths shown from surface in metres.

FIGURE B.12

KNIGHT PIESOLD LTD.
CONSULTING ENGINEERS

GROUNDWATER MONITORING WELL COMPLETION DETAILS

1625.A55

PROJECT MT. POLLEY PROJECT

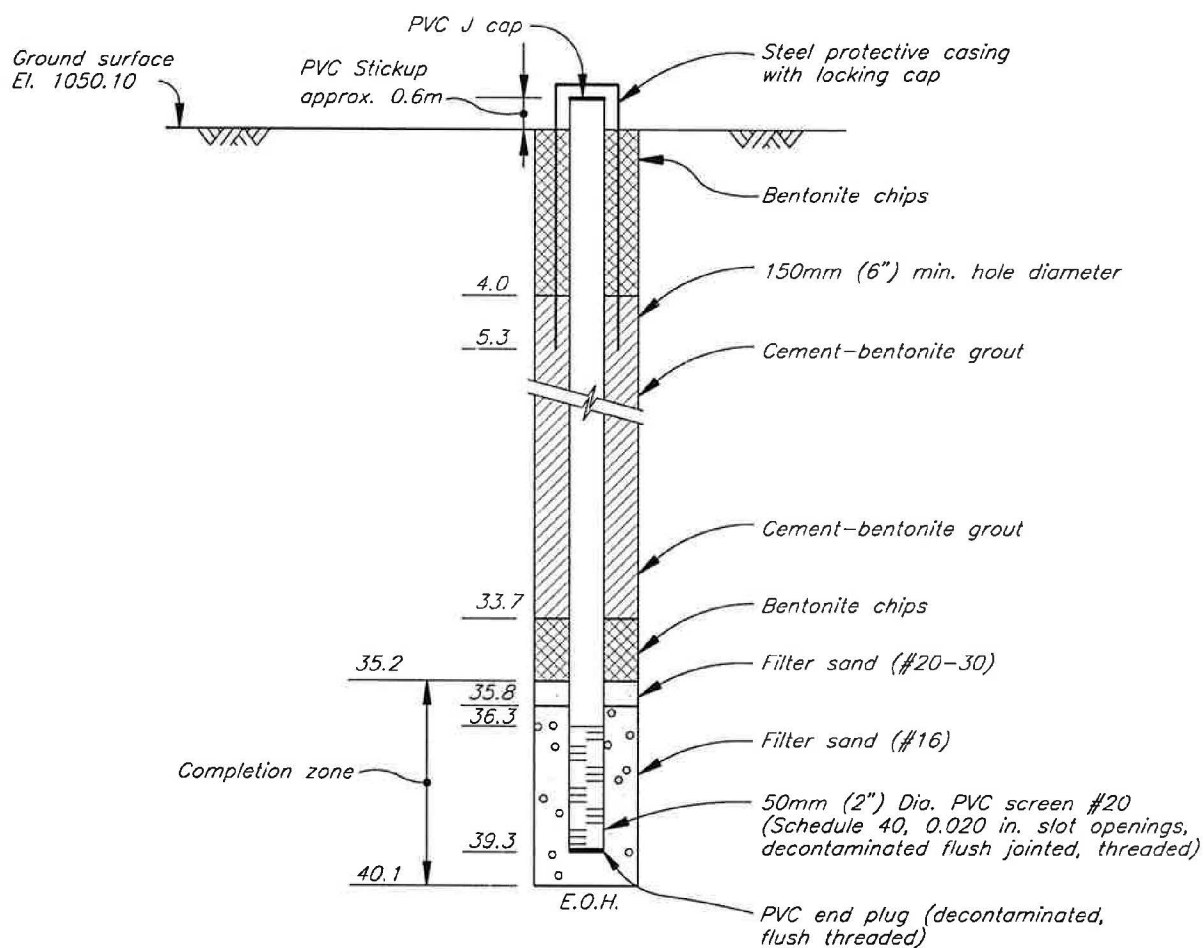
LOCATION N: 5 822 468.46 E: 591 861.59

COMPLETION DATE Nov. 2/96

PROJECT No. 1628

HOLE No. GW96-8A

GROUND ELEVATION 1050.10



NOTES

1. Cement-grout mixture installed using tremmie pipe.
2. Depths shown from surface in metres.

FIGURE B.13

CAD FILE: \1625\FIG\A55 Plot scale 1=1

KNIGHT PIESOLD LTD.
CONSULTING ENGINEERS

GROUNDWATER MONITORING WELL COMPLETION DETAILS

1625.A56

PROJECT MT. POLLEY PROJECT

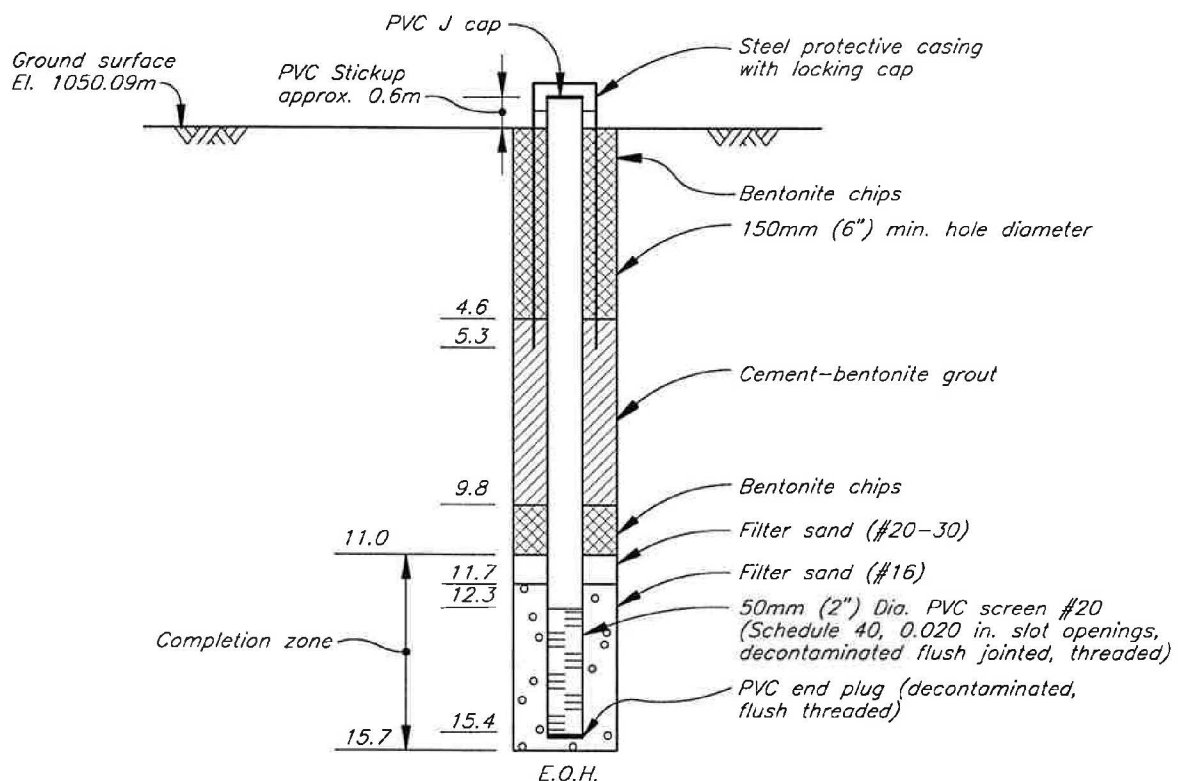
PROJECT No. 1628

LOCATION N: 5 822 469.40 E: 591 859.31

HOLE No. GW96-8B

COMPLETION DATE Nov. 3/96

GROUND ELEVATION 1050.09



NOTES

1. Cement-grout mixture installed using tremmie pipe.
2. Depths shown from surface in metres.

FIGURE B.14

CAD FILE: \1625\FIG\A56 Plot scale 1=1

KNIGHT PIESOLD LTD.
CONSULTING ENGINEERS

GROUNDWATER MONITORING WELL COMPLETION DETAILS

1625.A46

PROJECT MT. POLLEY PROJECT

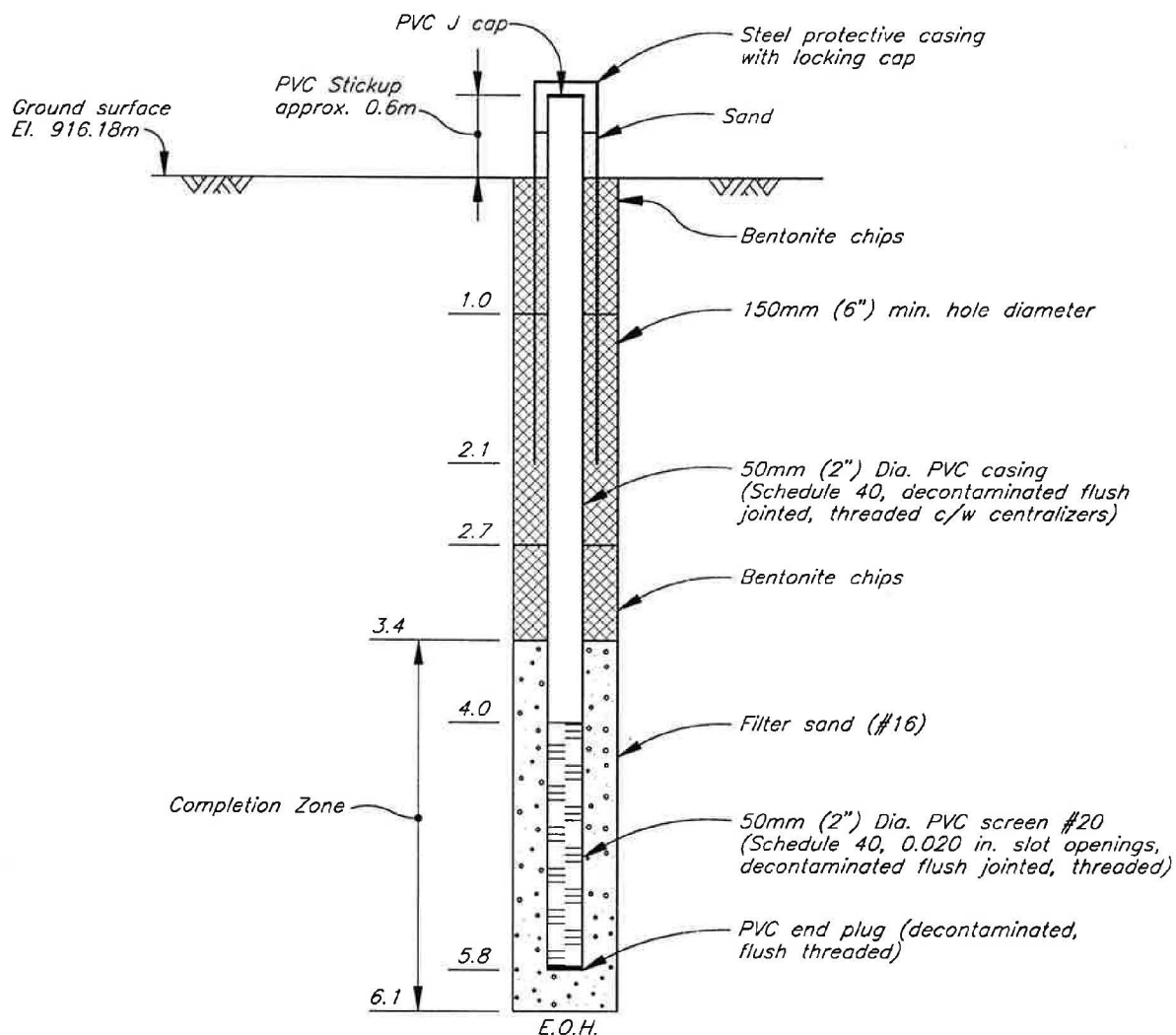
LOCATION N: 5 818 277.14 E: 595 503.89

COMPLETION DATE Nov. 21/96

PROJECT No. 1628

HOLE No. GW96-9

GROUND ELEVATION 916.18



NOTES

1. Cement-grout mixture installed using tremmie pipe.
2. Depths shown from surface in metres.

FIGURE B.15

CAD FILE: 16251701A46 Plot scale 1=1