Report No. 033001/3

ANVIL RANGE MINING COMPLEX -

INTEGRATED COMPREHENSIVE ABANDONMENT PLAN

Volume 4

Appendices A to C

Prepared for:

Anvil Range Mining Corporation

Prepared by:
ROBERTSON GEOCONSULTANTS INC.

Suite 902 - 580 Hornby Street
Vancouver, BC Canada V6C 3B6
Tel.: (604) 684-8072
Fax: (604) 681-4166
E-mail: rgc@info-mine.com

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APPENDIX A

Seismic Study.

SEISMIC GROUND MOTION ESTIMATES
ANVIL RANGE MINING COMPLEX
FARO, YUKON

Introduction

Closure plans for the Anvil Range Mining Complex, Faro, Yukon require consideration of the ability of water storage dams and tailings embankments to withstand seismic ground motions. Probabilistic estimates of seismic ground motions corresponding to selected return periods (or probabilities of exceedance) were made at the site. The following describes the criteria for estimation of ground motions, the estimation procedure, and presents the results.

Criteria for Ground Motion Estimation

The Canadian Dam Safety Association Dam Safety Guidelines (CDSA, 1995, Section 5.0) specify the following criterion for estimation of the ground motions:

- Dams shall be designed and evaluated to withstand ground motions associated with a Maximum Design Earthquake (MDE), without release of the reservoir.

- Selection of the MDE for a dam shall be based on the consequences of dam failure.

The above criterion was developed for application to water storage dams. However, Section 11.0 of the Guidelines specify that tailings dams shall meet the same requirements. The last sentence above implies that the MDE ground motions should increase with increasing severity of the consequences (or risks) associated with failure of dams or embankments. Table 5-1 of the Guidelines provides specific criteria for derivation of MDE ground motions. A copy of this table is given below.

The description of consequence categories is given in Section 1.4 of the Guidelines. In the case of the Anvil Range Mining Complex, failure of the dams or embankments could result in release of acid water and tailings and considerable damage to the river environment and fisheries. Such consequences are considered "Very High" and therefore the average return period of ground motions derived by a probabilistic method should be 10,000 years.

USUAL MINIMUM CRITERIA FOR DESIGN EARTHQUAKES
(from Table 5-1 of CDSA, 1995)

Consequence Category	MAXIMUM DESIGN EARTHQUAKE (MDE)	
	Deterministically Derived	Probabilistically Derived Average Return Period (years)
Very High	MCE[1]	10,000
High	50% to 100% MCE	1,000 to 10,000
Low	-	100 to 1,000

[1] Maximum Credible Earthquake

Although probabilistic estimates of ground motion are made herein, a comment concerning the term "Maximum Credible Earthquake" and deterministic estimates is in order. The MCE is basically an earthquake magnitude. In the Guidelines, the MCE is defined as the largest reasonably conceivable earthquake that could occur under the presently known or interpreted tectonic framework. Once the magnitude of the MCE is determined, ground motion attenuation relationships or previously recorded strong motion accelerograms due to earthquakes having magnitudes similar to the MCE may be used to estimate MCE ground motions. However, the estimation of MCE magnitude requires a high degree of physical and seismological understanding of the tectonic framework and the identification of specific earthquake sources (faults). Such an understanding is not available in most parts of Canada and the identification of sources is usually not possible. Thus, in the above table, the apparent relationship between MCE ground motions and ground motions corresponding to a 10,000 year return period is vague. Much of the vagueness results from attempting to define the word "credible". Experience in the United States shows that the definition can depend heavily on different seismological interpretations and even involve societal issues. For this reason the term "maximum magnitude" is preferable, i.e., the issue of credibility is avoided. In Canada, the maximum magnitude is typically based on a combination of historical seismicity and what is known of the tectonic framework. In most areas, including the Yukon, the maximum magnitude cannot be associated with any particular source.

Ground Motion Estimation Methodology

A probabilistic method was used in which the annual rates of exceeding particular values of ground motion are estimated. A brief description of the methodology is given in the following paragraphs. The method used is similar to that used by the Geological Survey of Canada (GSC) to compute values of seismic ground motion for the National Building Code of Canada.

A basic component of a quantitative seismic hazard analysis is a model of ground motion attenuation. Ground motion attenuation equations describe the amplitude of ground motion as a function of earthquake magnitude, M, and distance, R. Such equations show that to obtain a ground motion value, y, at a site, an earthquake of magnitude m at a distance r has to occur. The ground motion y would be exceeded if the magnitude exceeds m (M>m) or the distance is less than r (R<r) and would not be exceeded if the magnitude is too small (M<m) or the earthquake is too far away (R>r). The task of probabilistic seismic hazard analysis is to determine the annual rate at which exceedances of the ground motion y occur (i.e., the annual rate of scenarios M>m and R<r). For example, in most regions of Canada where seismic activity is low, the annual rate of exceeding ground motion amplitudes of engineering interest (peak ground accelerations of 0.05g or greater) may be 0.002/year. The average return period of ground motion exceeding 0.05g is approximately the reciprocal of the exceedance rate, i.e., 500 years.

Probabilistic seismic hazard analysis also requires a seismic zonation which defines areas or zones having uniform tectonics and/or seismological characteristics in which earthquakes are assumed to occur at a uniform rate. The rate at which a particular magnitude is exceeded is given by a magnitude recurrence relationship for the zone. Such relationships are derived from historical observations of earthquakes in the zone. The magnitudes of the earthquakes are limited to values below a maximum magnitude estimated by an assessment of the historical seismicity and tectonic framework of the zone. The geometry of a zone may range from an individual fault to a polygonal area. Since seismic activity in most parts of Canada is diffuse and not related to particular faults, seismic zonations in Canada are typically polygonal in nature. Thus, a seismic zonation allows the rates of earthquake occurrences to be estimated and allows definition of the location of earthquakes with respect to the site in question.

To compute the rates of exceeding a particular value of ground motion, the analysis considers possible combinations of magnitude and distance which lead to exceedance of that value. This can be done by random sampling of the magnitude recurrence relationship in each zone and by random location of earthquakes within the zones. (This random sampling is referred to as Monte Carlo analysis.) The attenuation relationship is then used to compute the ground motion corresponding to each magnitude-distance combination. The rates of exceedance of particular

ground motion values are computed by simple counting. A computer program, called *McHazard*, was written to perform these calculations.

Ground Motion Estimates at Faro

A recent GSC Open File report describes the development of new seismic hazard maps of Canada (Adams et al, 1996). Two seismic zonations are proposed for Canada: the H (for Historical) and the R (for Regional). Each of these zones is assumed to be an equally valid interpretation of the seismological observations and data. The H and R zonations for western Canada as well as the location of Faro are shown on Figures 1 and 2, respectively.

The following zones were used to estimate ground motion at Faro:

H Zonation	R Zonation
MCK - Mackenzie Mountains	MMB - Mackenzie Mountains
SYT - Southern Yukon	SOY - Southern Yukon

Other zones are considered to be too distant to have much effect on the ground motion at Faro. Zone geometries, parameters of the magnitude recurrence equation, and maximum magnitudes for each zone were obtained from the Open File report. Probabilistic estimates of peak ground acceleration were then made for each zonation.

The attenuation relationship used by GSC for western Canada is that derived by Boore et al (1993). This relationship computes peak ground acceleration on a rock site given earthquake magnitude and distance from the site. The relationship was derived using strong motion data recorded in California and it is assumed that the relationship describes ground motion attenuation in western Canada (where no data are available). From the point of view of seismic wave propagation, the structure of the two regions is similar, (i.e., mountainous terrane composed of geologically young rocks) and it is reasonable to assume that ground motion attenuation is similar in both regions.

The resulting seismic hazard curves, which relate values of peak ground acceleration to exceedance probability or return period, are shown in Figure 3. The approach recommended by GSC is to adopt the larger estimate. Thus, if the selected return period is 10,000 years, the curve for the R zonation should be used. From this curve the peak ground acceleration corresponding to a 475 year return period is approximately 0.05g and that corresponding to a 10,000 year return period is approximately 0.13g. Note that these values apply to rock sites.

The Tintina Fault

Figure 4 shows the locations of earthquake epicenters recorded in southwestern Yukon during 1980-1991. This figure is taken from a paper by Lowe et al (1994) who discuss geological and geophysical data used to interpret the tectonics and geology of the region. Seismic activity in the region is concentrated in southwestern Yukon and there is a general decrease in activity to the northeast. Of particular interest is seismic activity along the Tintina fault which is close to Faro. Numerous small (M<4) events occur west of the fault, while immediately east of the fault there is little seismic activity. There is little seismic activity along the trace of the fault. This is consistent with the geophysical data presented by Lowe et al (1994) which show that the fault separates two regions with distinct physical properties: a relatively homogeneous region to the northeast and a more heterogeneous region to the southwest in which considerable strain is built up and sometimes released as earthquakes.

The offsets of major geological features along the fault indicate that about 450 km of displacement has occurred on the fault since Late Cretaceous time (70 million years ago). However, there is no evidence of more recent displacement along the Tintina fault and the fault is not included as an earthquake source zone in either the H or R zonations given in the GSC report, i.e., the fault is not considered active and no maximum magnitude has been defined for the fault. Thus, it is unrealistic to consider a deterministic estimate of seismic ground motion at Faro in which an earthquake is assumed to occur on the Tintina.

References

Adams, J., Weichert, D. H., Halchuk, S., and Basham, P. W., 1996. *Trial Seismic Hazard Maps of Canada - 1995: Final Values for Selected Canadian Cities.* Geological Survey of Canada Open-File Report 3283.

Boore, D. M., Joyner, W. B. and Fumal, T. E., 1993. *Estimation of Response Spectra and Peak Ground Accelerations from Western North American Earthquakes: An Interim Report, Part 2.* US Geological Survey Open File Report 94-127, USGS, Menlo Park, California.

CDSA, 1995. *Dam Safety Guidelines.* Canadian Dam Safety Association.

Lowe, C., Horner, R. B., Mortenson, J. K., Johnston, S. T., and Roots, C. F., 1994. New geophysical data from the northern Cordillera: preliminary interpretations and implications for the tectonics and deep geology. *Canadian Journal of Earth Sciences,* 31, 891-904.

Figure 1

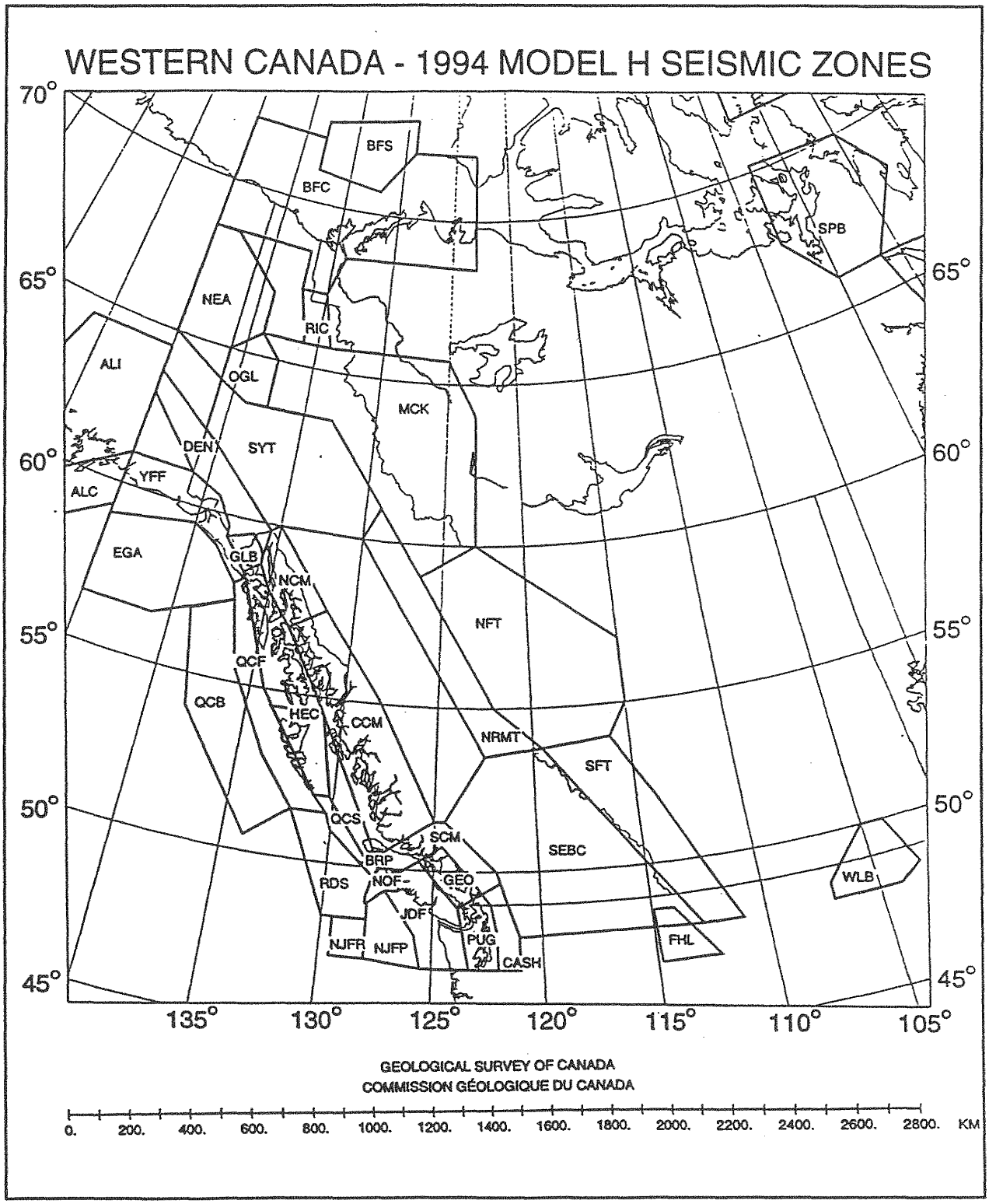

WESTERN CANADA - 1994 MODEL H SEISMIC ZONES
70°
65°
60°
55°
50°
45°
135°
130°
125°
120°
115°
110°
105°
BFS
BFC
SPB
NEA
RIC
ALI
OGL
MCK
DEN
SYT
YFF
ALC
EGA
GLB
NCM
NFT
QCF
QCB
HEC
CCM
NRMT
SFT
QCS
SCM
SEBC
BRP
NOF
GEO
WLB
RDS
JDF
PUG
FHL
NJFR
NJFP
CASH
GEOLOGICAL SURVEY OF CANADA
COMMISSION GÉOLOGIQUE DU CANADA
0. 200. 400. 600. 800. 1000. 1200. 1400. 1600. 1800. 2000. 2200. 2400. 2600. 2800. KM

Figure 2

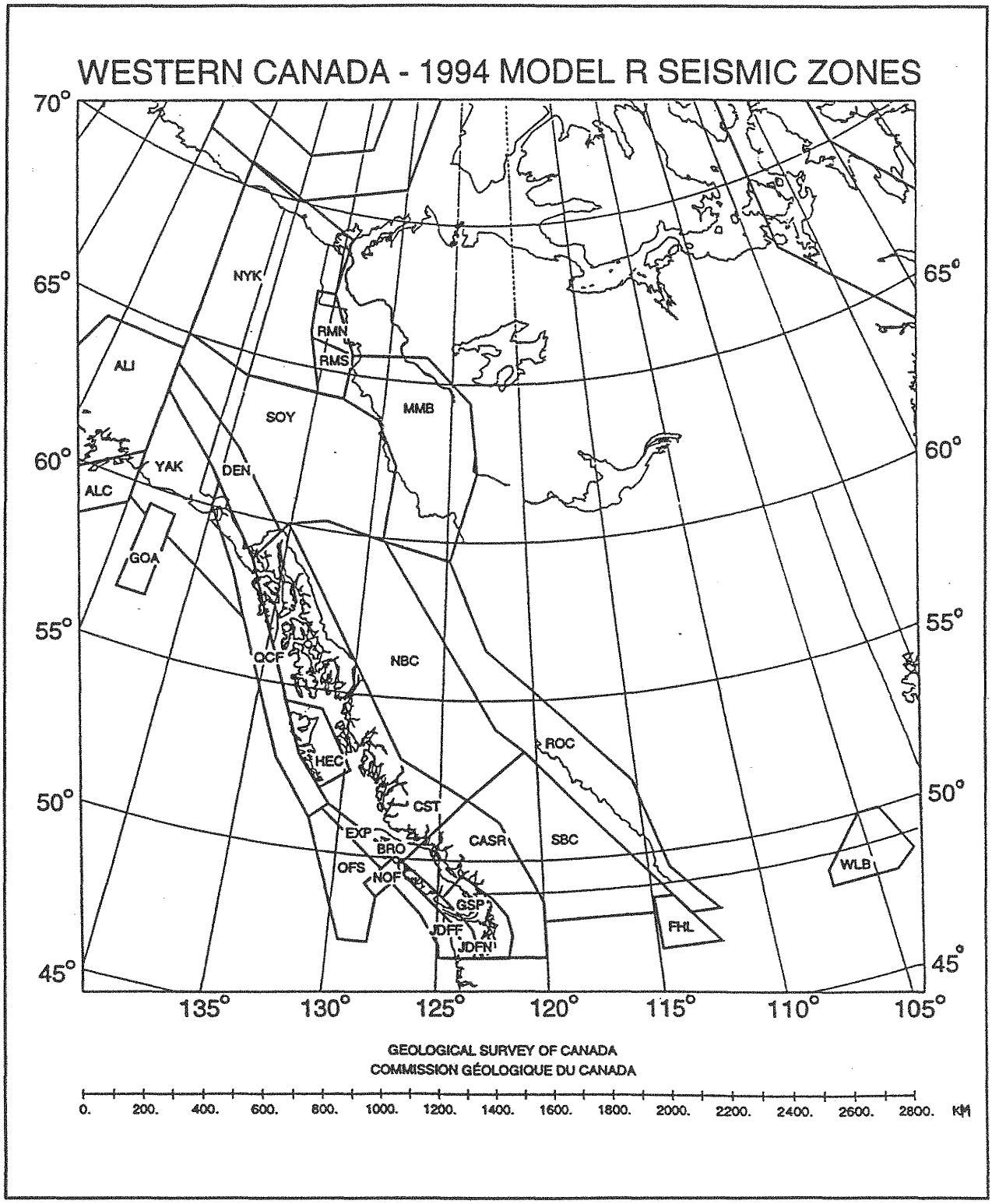

WESTERN CANADA - 1994 MODEL R SEISMIC ZONES
70°
65°
60°
55°
50°
45°
135°
130°
125°
120°
115°
110°
105°
NYK
RMN
RMS
ALI
SOY
MMB
YAK
DEN
ALC
GOA
QCF
NBC
ROC
HEC
CST
EXP
BRO
CASR
SBC
OFS
NOF
GSP
JDFF
JDFN
FHL
WLB
GEOLOGICAL SURVEY OF CANADA
COMMISSION GÉOLOGIQUE DU CANADA
0. 200. 400. 600. 800. 1000. 1200. 1400. 1600. 1800. 2000. 2200. 2400. 2600. 2800. KM

Figure 3
Seismic Hazard Curves
Faro, Yukon

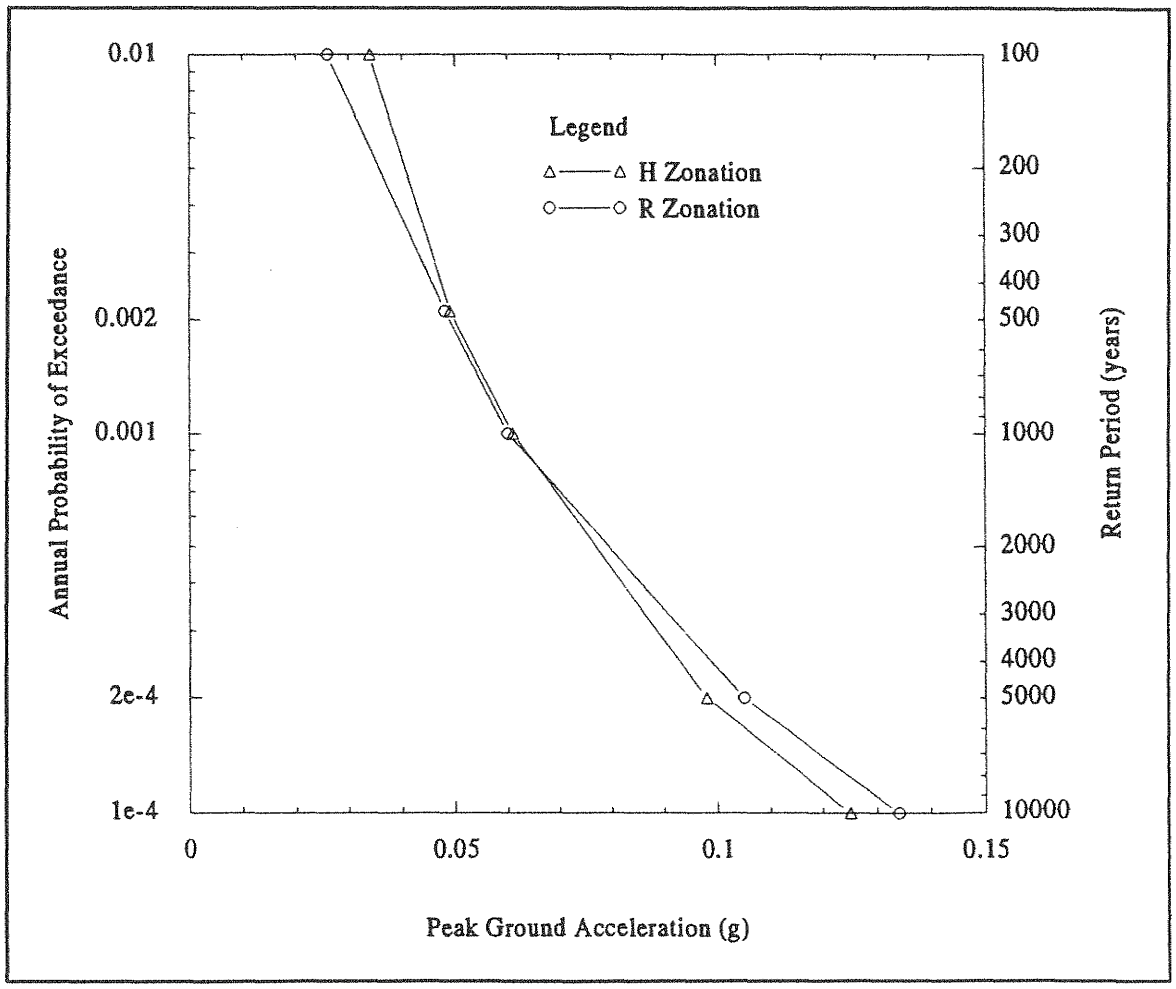
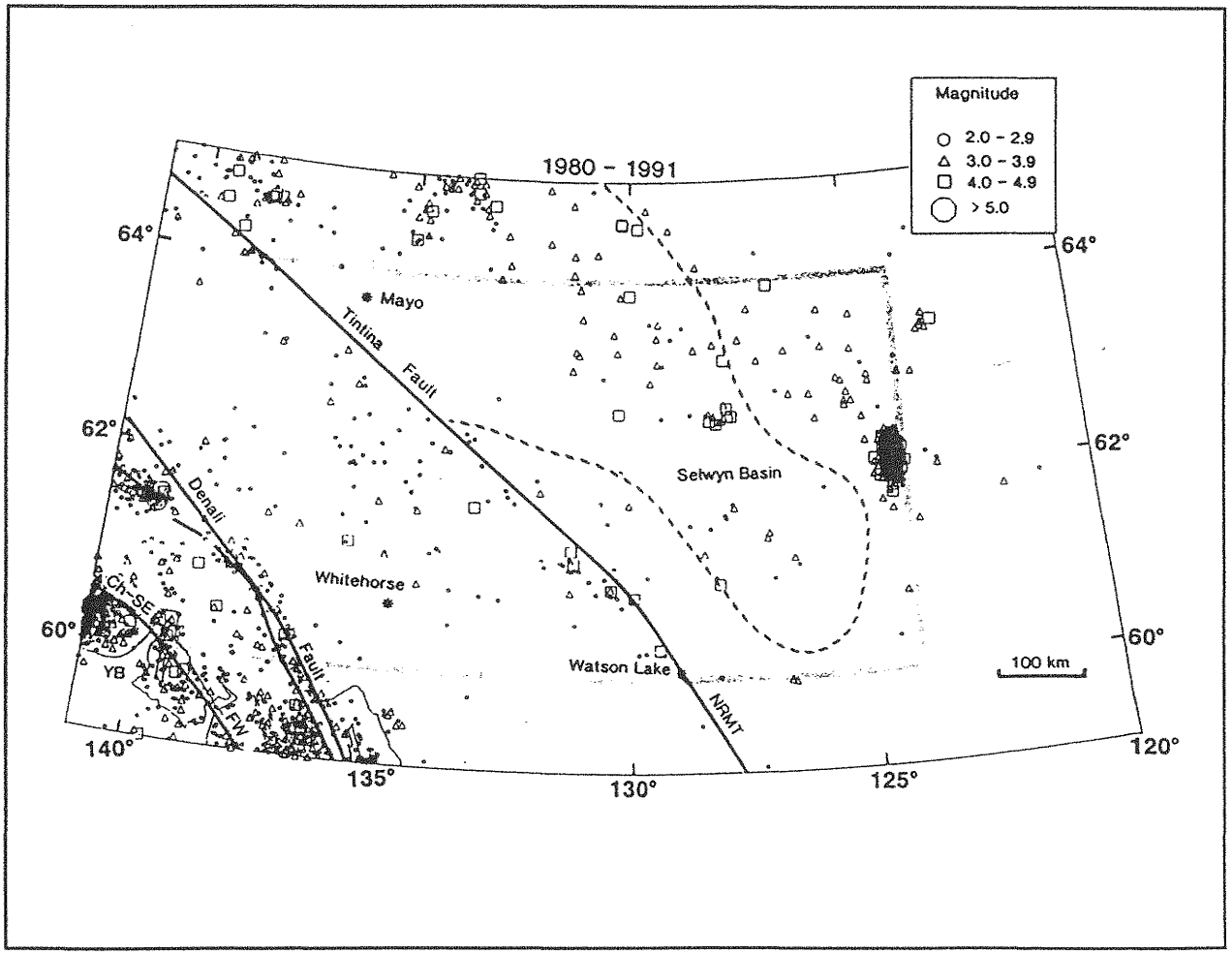


Figure 4
Earthquake Epicenters Recorded in
Southwestern Yukon During 1980 - 1991.



APPENDIX B

Surface Hydrology.

Appendix B

Processing of Surface Hydrology Data

A study was undertaken to characterize the hydrology of the streams in the vicinity of the Anvil Range Mining Complex. The focus of this study was to estimate the monthly flows which actually occurred in the minesite streams during the six-year period from January 1990 to December 1995. These estimated flows were required as the primary input to the historical water balance analysis, as described in Section 6.1 of the main report.

In preparing the hydrology study, the single largest task was the processing of flow data. This primarily involved: converting water level data to equivalent discharge rates; patching data gaps within streamflow records; and, extending the length of short streamflow records. This appendix documents much of the work carried out under this task. Section B.1 describes the processing of the regional data collected at the government streamflow gauging stations while Section B.2 serves a similar function for the site-specific data collected at the minesite. The reader is referred to Sections 3.7 and 6.1 of the main report for the results and conclusions of the hydrology study.

1.0 Processing of Government Data

The Water Survey of Canada (WSC) and the Department of Indian Affairs and Northern Development (DIAND) each operate a network of streamflow gauging stations in the Yukon. These two networks were reviewed to identify stations which could provide important data for the minesite hydrology study. From this review, a total of nineteen stations were selected, sixteen from the WSC network and three from the DIAND network. Table B1 provides details of these stations while Figure B-1 shows the outlines of their catchment boundaries.

Most of the government stations listed in Table B1 were operated on a year-round basis and possessed long periods of record. Processing of the data for these particular stations was a straightforward task, involving nothing more than importing the monthly flow record of each station into a spreadsheet and then computing averages.

Some stations, however, were operated for only a short period or had records which contained gaps of missing data. The value of these stations to the current hydrology study was significantly improved by "patching" their streamflow records (i.e., infilling the gaps or extending the length of record with estimated flows). The method adopted to patch the records involved correlation with a nearby streamflow station. The implementation of the method was broken down into four broad steps. Firstly, a preliminary selection process was undertaken. For each station to be patched, i.e. each "target" station, a search was made of all possible candidate stations that could be used as a "control" (i.e., a station which provided the required independent data for the correlation). Candidates were selected on the basis that their flows were monitored all year-round and their period of record overlapped that of the target station.

The second step in the process involved screening the candidates to identify the most suitable control station. To accomplish this, the daily streamflow records of the target station and all the candidate stations were imported into a spreadsheet program (EXCEL 5.0). For each candidate station, the statistical module of the spreadsheet was used to fit a regression curve between the

overlapping sets of data from the target station record (dependent variable) and from the candidate station record (independent variable). The candidate station yielding the highest correlation coefficient was then adopted as the control.

The third step entailed using the control station's streamflow record and its associated regression curve to make estimates for the missing pieces of data in the target streamflow record. These estimates were then inserted into the appropriate position within the daily record of the target station. The estimates were flagged with a plus sign (+) so that patched flows could be distinguished from the actual observed flows.

The final step was to convert the patched daily record into a monthly record. Plus signs were retained for the monthly records to identify those computed monthly flows that were based on one or more patched daily values.

The process described above was applied to the following government streamflow stations:

- Drury Creek at km 469 Robert Campbell Highway;
- Rose Creek below Faro Creek;
- Tay River near the mouth;
    - Blind Creek near Faro;
    - Mile Creek at km 295.8 North Canol Highway; and,
- Vangorda Creek at Faro Townsite Road.

A total of fourteen figures and six tables are presented in this appendix to illustrate the patching of the streamflow records for the six stations listed above. Table B2 presents an index to these figures and tables. The first two columns of this table provide the station's ID No. and name. The third column indicates the period over which the station operated while the fourth column specifies the length of the patched streamflow record. (For a given station, the periods of record shown in the third and fourth columns are not necessarily the same. When the length of the patched record is greater than that of the observed record, this indicates the patching process was used to extend the length of the station's streamflow record, as well as infilling any missing data. The reverse situation reveals that the patching process was applied to only a portion of the complete streamflow record.)

The fifth column of Table B2 directs the reader to the figure which displays the correlation used for patching purposes. The sixth column references the figure which shows a comparison between observed flows and "transposed" flows (i.e., flows which were estimated using the correlation). The seventh column indicates to the reader where to find a plot of the complete daily streamflow record. Finally, the last column directs the reader to a table which contains a listing of the patched monthly streamflow record.

Table B3 provides details of the correlations used to patch the streamflow records of the six government stations. Two of the patched streamflow records are discussed below to reveal some interesting aspects of the patching process.

1.1 Blind Creek near Faro

This station is operated only during the period of open water and, accordingly, its winter flows are missing. The daily flows measured at this station were correlated with the flow records of several nearby gauging stations. Of all the correlations examined, the one between the flows of Blind Creek and Tay River turned out to have the highest correlation coefficient (r^2=0.90). Figure B-8 shows a scatter plot of the coincidental data measured at these two stations. Also shown on this figure is the regression curve fitted to these data. This curve is a power function and not a straight line (i.e., the least-squares regression was performed on log-transformed data rather than on the raw data). Two reasons exist for selecting a power function over a straight line. Firstly, this recognizes that small streams exhibit greater variability in their flows than do large streams (i.e., the ratio between the annual maximum and annual minimum flows is greater for a small stream than for a large stream). As a consequence of this trend of increasing streamflow variability with decreasing stream size (or catchment size), one would expect scatter plots for differently-sized streams to have a curved appearance. In particular, if the vertical axis is used to represent the flows generated by a small catchment and the horizontal axis is used for the flows from a large catchment, then the resulting relationship should exhibit a concave-upwards form. A power function can better fit this form than can a straight line.

The second reason for adopting a power function is to force the correlation through the origin. This avoids the generation of negative flow estimates during the low-flow months which could occur with the use of a straight line (i.e., a linear regression fitted to data with a concave-upward shape would normally have a negative value for its intercept constant).

Figure B-9 presents the observed daily streamflow record for Blind Creek at Station 29BC004. Superimposed on this figure is the "transposed" flow record obtained by correlation between the Blind Creek and Tay River flows. As can be seen, the observed and transposed flows match remarkably well.

1.2 Rose Creek below Faro Creek

This station was installed by the Water Survey of Canada in 1966, just prior to the development of the Faro minesite. Up to about September 1968, this station measured natural flows, or flows which had been minimally influenced by human activity. From October 1968 to the final discontinuation of the gauge in November 1969, the flows measured at Station 09BC003 were affected to some degree by the Fresh Water Reservoir on the South Fork of Rose Creek. Station 09BC003 was located approximately 300 m below the Faro Creek confluence and about 2 km upstream of where the Intermediate Dam has subsequently been located.

During this gauge's period of operation, the network of streamflow gauging stations in the Yukon was sparse. Accordingly, few streamflow records were available upon which to patch the Rose Creek data. Furthermore, all of the stations which operated in the region were sited on large rivers. Examination of the WSC database uncovered three candidate stations which could be used in the patching process, namely: Big Salmon River at 09AG001, Ross River at 09BA001, and Pelly River at 09BC001. Of these three, the data from the Pelly River was determined to have the highest correlation coefficient with the Rose Creek streamflow record. Figure B-4 is a scatter plot showing the daily flows of Rose Creek versus the coincidental daily flows of the Pelly River. Also shown on this figure is the best-fit power function. The correlation is good for low

flows but less satisfactory for high flows. The large scatter in data at high flows is a direct consequence of the large discrepancy in the catchment areas of the two gauges (i.e., the flows draining from the much smaller Rose Creek catchment are more erratic than the flows experienced in the Pelly River).

In examining Figure B-4, it should be noted that the correlation was conducted only on the Rose Creek data collected prior to any influence which may have resulted from operation of the Fresh Water Reservoir. In other words, this correlation may be used to estimate the natural flow regime of Rose Creek.

Figure B-5 is a plot of the observed streamflow record for Station 09BC003. Two gaps exist in this record, i.e. winter 1966 to spring 1967 and fall 1969. One or more spot flow measurements were made during these two gaps. Superimposed on Figure B-5 is the transposed flow record derived by correlation with the Pelly River record. The observed and transposed flows match reasonably well, especially during the low-flow months.

Two interesting observations can be extracted from Figure B-5:

- The streamflow record for Station 09BC003 highlights the advantage of correlating flows on a daily , rather than monthly, basis. A daily correlation makes use of all the information available while a monthly correlation does not. A monthly correlation only uses the data for months with a complete set of daily discharges. Months with data gaps are eliminated. Thus, in the case of Rose Creek, a monthly correlation would have led to the discarding of valuable spot flow measurements made during the winter months.
- The operation of the Fresh Water Reservoir appears to have had only minimal influence on the flows collected at Station 09BC003. This judgement was based on the close correspondence which exists between the observed and transposed flows for the period after October 1968, or the period after commissioning of the Fresh Water Reservoir. The transposed flows represent the natural flow regime of Rose Creek. If the Fresh Water Reservoir had had a significant effect on the flows in the period October 1968 to July 1969, then one would expect a greater discrepancy between the observed and transposed hydrographs for this period.

2.0 Processing of Mine Data

A large database of flow measurements has been assembled for the mine complex by both mine and government personnel. The processing of these data has largely been documented within the spreadsheets which were used to reconstruct the historical water balance of the mine complex. This section of the appendix has been reserved for discussing two flow records which were not covered in great detail within these spreadsheets, namely:

- Station X14 - Rose Creek below the Down Valley Tailings Impoundment; and,
- Station X13 - Combined seepage from the Cross Valley Dam.

As revealed in Section 3.7 of the main report, these two stations represent only a fraction of the number of sites which are monitored for flow at the mine complex. The reader is referred to Appendices P and Q for details on the processing of the other minesite data.

2.1 Station X14 - Rose Creek below the Down Valley Tailings Impoundment

A pressure transducer and datalogger were installed at this location in September 1990. This equipment has remained functional ever since. Accordingly, the potential existed for this equipment to monitor an uninterrupted record of water level from September 1990 to present. However, for various reasons discussed below, it was not possible to assemble the complete water level record for this station. The first gap in the record spanned the period May 1992 to March 1993. The water level record for this period had undoubtedly been measured by the X14 gauging station and subsequently downloaded from the datalogger. However, an exhaustive search of the mine's environmental records failed to locate these data. Two other shorter gaps occurred in the record, covering periods of from two to three months during the winters of 1994 and 1995. These gaps were caused when the memory of the datalogger filled between maintenance visits to the X14 gauging station.

A total of 53 current meterings have been conducted at X14 since the installation of the datalogger (see Table B10). Figure B-16 shows a stage-discharge relationship for X14 based on the measured discharges and the coincident water levels recorded by the pressure transducer. A power regression was fitted to these data to enable extension of the rating curve to higher flows. This rating curve was used to convert the water level measurements at X14 to corresponding flow rates on a daily basis. Figures B-18 to B-23 show the computed daily flows at X14 for the periods in which water level data were available between September 1990 and December 1995.

As indicated above, a complete daily streamflow record for Station X14 could not be derived from the datalogger readings because of missing water level data. This problem of missing data was compounded because some of the available datalogger readings were discovered to be erroneous and, therefore, had to be discarded. The erroneous readings were believed to be caused by glaciation of the streambed near the pressure transducer. To maximize the value of the X14 streamflow record to the hydrological analysis, the decision was made to patch the segments of the record where data were missing or affected by glaciation. The process of patching this station's record was done in much the same manner as described in Section B.1 for the government flow records. Correlations were performed between the daily flows of Station X14 and those of several neighbouring WSC gauging stations. Based on the resulting correlation coefficients, the best correlation was identified to be the one with the flows of Tay River (see Figure B-17). The data used for the correlations were limited to the period subsequent to August 1992. For the period prior to this, the winter flows at Station X14 were significantly influenced by the discharge of tailings into the Down Valley Tailings Impoundment (i.e., the discharge from the tailings impoundment was the dominant component of flow at X14 during the winter months). Figures B-18 to B-23 show the patchings which were derived by the correlation to infill missing data within the daily record for Station X14. Table B11 shows the patched monthly flow record for this station for the period 1990 to 1995, as derived from the patched daily record. Plus signs denote those months in which one or more of the daily values within the month had to be patched.

2.2 Station X13 - Combined Seepage below the Cross Valley Dam

This station measures much of the groundwater which discharges just below the downstream toe of the Cross Valley Dam. The flow rate is gauged using a weir. The typical monitoring

frequency for this station was weekly while the mine was operational. However, the monitoring frequency was severely curtailed during the temporary shutdown from May 1993 to November 1994.

Processing of this station's record involved:

- assembling all of the known flow measurements made for this station; and,
- patching the flow record during the temporary shutdown when only a few measurements were available.

Figure B-24 presents a plot of the flow data assembled for Station X13. Superimposed on this plot is an estimate of the monthly average discharge record for the period October 1986 to December 1995. Different procedures were used to derive the monthly discharge values. For a given month with one or more flow measurements, the monthly average discharge was set equal to the average of the flow measurements taken during that month. For a month with no measurements, the trend in the data set was used to provide an estimate of the monthly average discharge rate. Two trends were identified in the data set for the period 1986 to 1995. Firstly, the discharge rate varied seasonally with a high in the summer months and a low in the winter. Secondly, the discharge rate significantly declined between 1992 and 1994. This decline appears to correspond with the cessation of tailings deposition to the Down Valley Tailings Impoundment.

Table B12 provides a tabulation of the patched monthly flow record for Station X13.

Table B1
Details of Regional Streamflow Gauging Stations

Streamflow Gauging Station		Period of Record	Catchment Area	Catchment Median Elevation	Mean Annual Runoff For Period 1990 - 1995		Mean Annual Runoff For Period 1986 - 1995	
ID No.	Name		(km^2)	(m)	(m^3/s)	(mm)	(m^3/s)	(mm)
WATER SURVEY OF CANADA								
(Total Catchments, Year-round Operation)								
09AH003	Big Creek near the mouth	1974 - 1994	1750	1070	9.3	168	8.3	150
09AG001	Big Salmon River near Carmacks	1953 - 1995	6760	1300	72.3	338	67.7	316
09AH005	Drury Creek at km 469 Robert Campbell Highway	1994 - 1995	559 [1]	1250	5.73	323	5.37	303
09BB002	MacMillan River near the mouth	1984 - 1995	13800	1130	147	336	135	309
09AD001	Nisutlin River above Wolf River	1979 - 1995	8030	1260	96.4	379	88.5	348
09AH004	Nordenskiold River below Rowlinson Creek	1982 - 1995	6370	1090	16.7	83	14.9	74
09BA002	Pelly River below Fortin Creek	1986 - 1994	5020	1290	77.1	485	70.8	445
09BC002	Pelly River at Ross River	1954 - 1974	18400	1160	197	338	177	304
09BC004	Pelly River below Vangorda Creek	1972 - 1995	22100	1210	223	318	201	287
09BC001	Pelly River at Pelly Crossing	1952 - 1995	49000	1110	435	280	390	251
09BC003	Rose Creek below Faro Creek	1966 - 1969	208	1430	2.27	344	2.08	316
09BA001	Ross River at Ross River	1960 - 1995	7250	1130	73.2	319	67.2	293
09AD002	Sidney Creek at km 46 South Canol Road	1982 - 1994	372	1250	4.50	382	4.13	350
09AG003	South Big Salmon River below Livingstone Creek	1982 - 1995	515	1340	4.38	268	4.02	246
09BB001	South MacMillan River at km 407 Canol Road	1974 - 1995	997	1440	21.5	681	19.7	624
09BC005	Tay River near the mouth	1990 - 1995	3810 [1]	1160	27.5	228	24.7	205
DEPARTMENT OF INDIAN AFFAIRS AND NORTHERN DEVELOPMENT								
(Total Catchments, Seasonal Operation)								
29BC004	Blind Creek near Faro	1992 - 1995	618	1180	4.52	231	4.15	212
29BA002	180 Mile Creek at km 295.8 North Canol Highway	1975 - 1993	97.9	1310	0.90	290	0.83	268
29BC003	Vangorda Creek at Faro Townsite Road	1977 - 1985, 1989 - 1995	91.2	1210	0.74	256	0.68	235
WATER SURVEY OF CANADA								
(Incremental Catchments, Year-round Operation)								
09BC001 - 09BB002 - 09BC004 (Lower Pelly River catchment)		1984 - 1995 [2]	13100	1010	65	157	54	130
Lower Pelly R. catchment - 09BC005 (as above but excluding Tay R.)		1990 - 1995 [2]	9290	880	37.5	127	29.3	100
09BC004 - 09BA001 - 09BA002 (Middle Pelly River catchment)		1986 - 1994 [2]	9830	1200	72.7	233	63	202
09BB002 - 09BB001 (MacMillan R. catchment excluding headwaters)		1984 - 1995 [2]	12803	1100	125.5	309	115.3	284

Notes: 1. The Water Survey of Canada has not yet published official values for the catchment areas of these two new stations. The values presented in this table were measured from 1:250,000 scale topographic maps.

2. This is the period of overlap of the station records used to estimate the runoff from the incremental catchment.

Table B2
Index to Patched Streamflow Records for Government Stations

Streamflow Gauging Station		Period of Record		Correlation used to patch record is plotted on Figure No.	Comparison between observed and transposed flows is shown on Figure No.:	Complete raw daily streamflow record is shown on Figure No.:	Patched monthly streamflow record is presented on Table No.:
ID No.	Name	Observed Record	Patched Record				
WATER SURVEY OF CANADA							
09AH005	Drury Creek at km 469 Robert Campbell Highway	1994 - 1995	1990 - 1995	B-2	B-3	B-3	B4
09BC003	Rose Creek below Faro Creek	1966 - 1969	1966 - 1969	B-4	B-5	B-5	B5
09BC005	Tay River near the mouth	1990 - 1995	1990 - 1995	B-6	B-7	B-7	B6
DEPARTMENT OF INDIAN AFFAIRS AND NORTHERN DEVELOPMENT							
29BC004	Blind Creek near Faro	1992 - 1995	1990 - 1995	B-8	B-9	B-9	B7
29BA002	180 Mile Creek at km 295.8 North Canol Highway	1975 - 1993	1990 - 1995	B-10	B-11	B-12	B8
29BC003	Vangorda Creek at Faro Townsite Road	1977 - 1995*	1990 - 1995	B-13	B-14	B-15	B9

Note: * Gap exists in record from 1986 to 1988.

Table B3
Correlations Used to Patch Missing Streamflow Data

Item	Target Station (i.e., station which was patched)					
	29BC004 Blind Creek near Faro	09AH005 Drury Creek at km 469 Robert Campbell Highway	29BA002 180 Mile Creek at km 295.8 North Canol Highway	09BC003 Rose Creek below Faro Creek	09BC005 Tay River near the mouth	29BC003 Vangorda Creek at Faro Townsite Road
Control Station (i.e., station which provided the independent data for the correlation)	09BC005 Tay River near the mouth	09AG001 Big Salmon River near Carmacks	09BA001 Ross River at Ross River	09BC001 Pelly River at Pelly Crossing	09BA001 Ross River at Ross River	09BC005 Tay River near the mouth
Regression Intercept (log units)	-0.852	-1.074	-2.26	-2.57	-0.143	-1.62
Regression Slope	1.033	0.983	1.146	1.093	0.860	1.016
Coefficient of Correlation (r^2)	0.86	0.91	0.77	0.92	0.92	0.85
Standard Error of Estimate (log units)	0.111	0.092	0.156	0.157	0.132	0.119
Number of Observations	584	621	471	546	2072	675
Uncorrected Regression Equation [1]	$Q_y = 0.141\ Q_x^{1.033}$	$Q_y = 0.0843\ Q_x^{0.983}$	$Q_y = 0.00555\ Q_x^{1.146}$	$Q_y = 0.00268\ Q_x^{1.093}$	$Q_y = 0.719\ Q_x^{0.860}$	$Q_y = 0.0239\ Q_x^{1.016}$
Correction Factor [2]	1.033	1.023	1.067	1.067	1.047	1.038
Corrected Regression Equation [1,3]	**$Q_y = 0.145\ Q_x^{1.033}$**	**$Q_y = 0.0862\ Q_x^{0.983}$**	**$Q_y = 0.00592\ Q_x^{1.146}$**	**$Q_y = 0.00285\ Q_x^{1.093}$**	**$Q_y = 0.753\ Q_x^{0.860}$**	**$Q_y = 0.0248\ Q_x^{1.016}$**

Notes: 1. Q_y = Estimated daily average discharge of target station in cubic metres per second
Q_x = Observed daily average discharge of control station in cubic metres per second

2. The purpose of the correction factor is to remove bias which is introduced when a regression line is fitted to log-transformed data. The correction factor is a function of the standard error of estimate (SEE) and is computed using the equation: $\exp(2.65\ SEE^2)$.

3. To obtain the "corrected" version of the regression equation, the "uncorrected" equation was scaled by the correction factor. The corrected equation was used to patch missing data within the streamflow record of the target station.

Table B4
Patched Monthly Discharge Record of Station 09AH005 for Period 1990 to 1995
(Drury Creek at km 469 Robert Campbell Highway)

Year	Monthly and Annual Average Discharges (m^3/s)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Mean
1990	1.56 +	1.31 +	1.30 +	1.90 +	8.38 +	16.6 +	8.56 +	5.31 +	8.37 +	5.09 +	2.89 +	2.26 +	**5.30**
1991	1.85 +	1.76 +	1.60 +	1.49 +	8.15 +	15.1 +	14.1 +	10.3 +	10.9 +	8.07 +	5.03 +	4.08 +	**6.89**
1992	3.00 +	2.15 +	1.87 +	1.85 +	4.99 +	28.0 +	19.1 +	8.48 +	6.48 +	3.89 +	3.12 +	2.32 +	**7.10**
1993	1.79 +	1.42 +	1.38 +	1.52 +	9.96 +	14.2 +	9.66 +	7.76 +	7.81 +	6.76 +	3.65 +	2.54 +	**5.73**
1994	2.15 +	2.00 +	1.85 +	1.98 +	5.82	14.9	11.8	5.26	4.04	6.22	3.23	2.38	**5.16**
1995	1.98	1.54	1.24	1.29	5.23	6.65	5.51	6.11	9.12	5.92	3.45	2.55	**4.23**
Mean	**2.05**	**1.69**	**1.54**	**1.67**	**7.09**	**15.9**	**11.5**	**7.20**	**7.78**	**5.99**	**3.56**	**2.69**	**5.73**

Note: Patched monthly values are flagged with a plus sign (+).

Table B5
Patched Monthly Discharge Record of Station 09BC003 for Period 1966 to 1969
(Rose Creek below Faro Creek)

Year	Monthly and Annual Average Discharges (m^3/s)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Mean
1966	0.18 +	0.18 +	0.18 +	0.21 +	3.24 +	7.54 +	3.38 +	1.28 +	1.05	1.03 +	0.41 +	0.28 +	**1.58**
1967	0.23 +	0.21 +	0.19 +	0.19 +	5.93 +	11.56	2.99	1.78	1.91	1.05	0.60	0.43	**2.26**
1968	0.27	0.21	0.20	0.23	4.01	6.14	4.58	4.24	5.43	1.39	0.92	0.64	**2.36**
1969	0.30	0.22	0.21	0.25	2.57	3.80	2.55	3.17 +	3.58 +	1.49 +	0.55 +	0.37 +	**1.59**
Mean	**0.24**	**0.20**	**0.19**	**0.22**	**3.94**	**7.26**	**3.37**	**2.62**	**2.99**	**1.24**	**0.62**	**0.43**	**1.95**

Note: Patched monthly values are flagged with a plus sign (+).

Table B6
Patched Monthly Discharge Record of Station 09BC005 for Period 1990 to 1995
(Tay River near the mouth)

Year	Monthly and Annual Average Discharges (m^3/s)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Mean
1990	4.87 +	3.69 +	3.43 +	5.20 +	73.5	58.7	35.2	25.7	74.3	29.2	11.4	7.00	**27.8**
1991	4.93	4.03	3.80	6.56	89.3	58.0	81.4	61.1	68.3	35.5	17.4	10.0	**36.9**
1992	6.92	5.84	5.20	7.04	55.7	128	67.6	33.9	33.2	15.8	11.4	7.25	**31.5**
1993	4.79	4.00	3.81	8.19	86.4	91.9	45.9	35.1	38.6	23.1	10.7	10.8	**30.4**
1994	6.22	4.53	4.28	11.3	56.3	64.8	28.8	13.5	13.8	16.6	7.96	5.53	**19.5**
1995	3.97	3.22	2.79	8.05	39.8	24.4	28.6	31.7	51.7	20.6	7.16	6.46	**19.1**
Mean	**5.28**	**4.22**	**3.88**	**7.73**	**66.8**	**71.0**	**47.9**	**33.5**	**46.6**	**23.5**	**11.0**	**7.84**	**27.5**

Note: Patched monthly values are flagged with a plus sign (+).

Table B7
Patched Monthly Discharge Record of Station 29BC004 for Period 1990 to 1995
(Blind Creek near Faro)

Year	Monthly and Annual Average Discharges (m^3/s)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Mean
1990	0.75 +	0.56 +	0.52 +	0.81 +	12.3 +	9.76 +	5.75 +	4.16 +	12.4 +	4.76 +	1.79 +	1.08 +	**4.57**
1991	0.75 +	0.61 +	0.58 +	1.02 +	15.0 +	9.61 +	13.7 +	10.2 +	11.4 +	5.80 +	2.78 +	1.57 +	**6.13**
1992	1.07 +	0.90 +	0.80 +	1.09 +	8.49 +	21.8	9.87	4.47	3.87	2.51 +	1.79 +	1.12 +	**4.81**
1993	0.73 +	0.61 +	0.58 +	1.28 +	16.5 +	13.9	8.93	7.51	6.88 +	3.73 +	1.68 +	1.69 +	**5.36**
1994	0.96 +	0.69 +	0.65 +	1.79 +	9.81 +	10.7	3.92	1.48	2.83 +	2.64 +	1.24 +	0.85 +	**3.14**
1995	0.60 +	0.49 +	0.42 +	1.28 +	8.15 +	5.20	4.71	4.91	5.87	3.07 +	1.11 +	1.00 +	**3.08**
Mean	**0.81**	**0.64**	**0.59**	**1.21**	**11.7**	**11.8**	**7.81**	**5.45**	**7.21**	**3.75**	**1.73**	**1.22**	**4.52**

Note: Patched monthly values are flagged with a plus sign (+).

Table B8
Patched Monthly Discharge Record of Station 29BA002 for Period 1990 to 1995
(180 Mile Creek at km 295.8 North Canol Highway)

Year	Monthly and Annual Average Discharges (m^3/s)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Mean
1990	0.07 +	0.05 +	0.04 +	0.06 +	2.63 +	2.74 +	0.92	0.75	1.38	0.79 +	0.23 +	0.14 +	**0.82**
1991	0.08 +	0.07 +	0.06 +	0.08 +	2.85 +	2.26 +	2.71 +	1.62	2.15	0.81 +	0.23 +	0.18 +	**1.10**
1992	0.13 +	0.10 +	0.09 +	0.17 +	2.88	6.23	2.54	0.64	0.57 +	0.34 +	0.15 +	0.11 +	**1.16**
1993	0.08 +	0.07 +	0.06 +	0.11 +	4.25 +	3.46 +	1.40	0.84 +	0.62 +	0.31 +	0.14 +	0.17 +	**0.97**
1994	0.10 +	0.06 +	0.05 +	0.13 +	2.26 +	2.41 +	0.89 +	0.37 +	0.36 +	0.94 +	0.27 +	0.16 +	**0.67**
1995	0.09 +	0.07 +	0.06 +	0.48 +	2.31 +	1.38 +	0.90 +	0.80 +	1.00 +	0.54 +	0.15 +	0.08 +	**0.66**
Mean	**0.09**	**0.07**	**0.06**	**0.17**	**2.86**	**3.08**	**1.56**	**0.84**	**1.02**	**0.62**	**0.19**	**0.14**	**0.90**

Note: Patched monthly values are flagged with a plus sign (+).

Table B9
Patched Monthly Discharge Record of Station 29BC003 for Period 1990 to 1995
(Vangorda Creek at Faro Townsite Road)

Year	Monthly and Annual Average Discharges (m^3/s)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Mean
1990	0.12 +	0.09 +	0.09 +	0.13 +	1.86	1.44	0.85	0.66	1.74	0.71 +	0.29 +	0.18 +	**0.68**
1991	0.13 +	0.10 +	0.10 +	0.17 +	2.59 +	1.84	1.96	1.50 +	1.72	0.93 +	0.45 +	0.26 +	**0.98**
1992	0.18 +	0.15 +	0.13 +	0.18 +	1.69 +	4.04	1.79	0.71	0.62	0.41 +	0.29 +	0.19 +	**0.86**
1993	0.12 +	0.10 +	0.10 +	0.21 +	3.12 +	2.50	1.17	0.78	0.86 +	0.60 +	0.28 +	0.28 +	**0.85**
1994	0.16 +	0.12 +	0.11 +	0.29 +	1.53 +	1.82 +	0.74 +	0.35	0.51 +	0.43 +	0.20 +	0.14 +	**0.53**
1995	0.10 +	0.08 +	0.07 +	0.21 +	1.19 +	1.02	0.83	0.82	1.26	0.53 +	0.18 +	0.17 +	**0.54**
Mean	**0.13**	**0.11**	**0.10**	**0.20**	**2.00**	**2.11**	**1.22**	**0.80**	**1.12**	**0.60**	**0.28**	**0.20**	**0.74**

Note: Patched monthly values are flagged with a plus sign (+).

Table B10
Spot Streamflow Measurements at Station X14

Date	Time	Staff Gauge Reading (m)	Pressure Transducer Reading (m)	Discharge (m^3/s)	Comments
17-Feb-88				0.3953	DIAND
7-Feb-89				0.465	DIAND
12-Mar-90				0.576	
17-Apr-90				0.620	
1-May-90				1.836	DIAND
14-May-90				5.54	
11-Jun-90				3.85	
11-Jul-90				3.17	DIAND
13-Aug-90				1.66	
21-Sep-90	9:55	0.968	1.411	4.77	Automatic recorder installed on Sept 16
4-Oct-90		0.852	1.290	3.59	
15-Nov-90			0.960	0.755	
14-Dec-90	15:30	0.450	0.900	0.492	
3-Jan-91	14:50	0.525	0.981	0.503	Ice cover
16-Jan-91	15:44	0.442	0.892	0.502	
4-Feb-91		0.460	0.908	0.484	
27-Feb-91			0.92	0.655	DIAND
4-Mar-91			0.912	0.492	
1-Apr-91	11:30	0.461	0.908	0.559	2 deg C
29-Apr-91	11:10	0.660	1.111	1.81	3 deg C
3-Jun-91	12:00	0.90	1.355	4.46	6.5 deg C
2-Jul-91	13:20	0.875	1.327	3.85	12 deg C
10-Jul-91	10:59	0.827	1.345	3.55	
24-Jul-91	13:50	1.00	1.447	6.36	DIAND
5-Aug-91	13:45	0.90	1.425	5.22	
16-Aug-91	13:20	0.77	1.232	3.07	
3-Sep-91		0.756	1.224	2.65	
7-Oct-91	12:20	0.824	1.285	3.55	
6-Nov-91	14:32	0.602	1.065	1.32	
3-Dec-91	12:31	0.613	0.970	0.778	
17-Jan-92	12:30	0.455	0.903	0.55	
21-Jan-92			0.94	0.65	DIAND
20-Feb-92			0.92	0.55	
12-Mar-92	14:30	0.459	0.903	0.598	
29-Apr-92			1.01	1.039	DIAND
12-May-92			N/A	1.44	
9-Jun-92			N/A	6.70	
14-Jul-92			N/A	2.50	
10-Aug-92			N/A	2.80	
9-Sep-92			N/A	2.135	DIAND
6-Oct-92			N/A	1.20	
24-Nov-92			N/A	0.266	DIAND
17-Dec-92			N/A	0.205	
Feb-93			N/A	0.11	
27-Apr-93			1.05	1.392	DIAND
24-Jun-93			1.33	4.087	DIAND
2-Aug-93			1.19	2.40	DIAND
20-Sep-93			1.25	3.47	DIAND
4-Oct-93			1.22	2.812	DIAND
18-Oct-93			1.16	2.26	DIAND
1-Nov-93			1.06	1.117	DIAND
15-Nov-93			1.06	1.141	DIAND
12-Oct-94			1.15	1.90	DIAND
25-Nov-94			1.01	1.03	
25-Jan-95			0.95	0.211	DIAND
6-Mar-95			N/A	0.489	DIAND
8-May-95			1.26	3.069	DIAND
26-Oct-95		0.645	1.145	1.455	No ice cover at gauge
12-Dec-95			0.94	0.244	DIAND
9-Apr-96			0.90	0.22	Estimate
15-May-96			1.14	1.29	
29-May-96			1.45	4.99	

Table B11
Patched Monthly Discharge Record of Station X14 for Period 1990 to 1995
(Rose Creek below tailings impoundment and diversion channel)

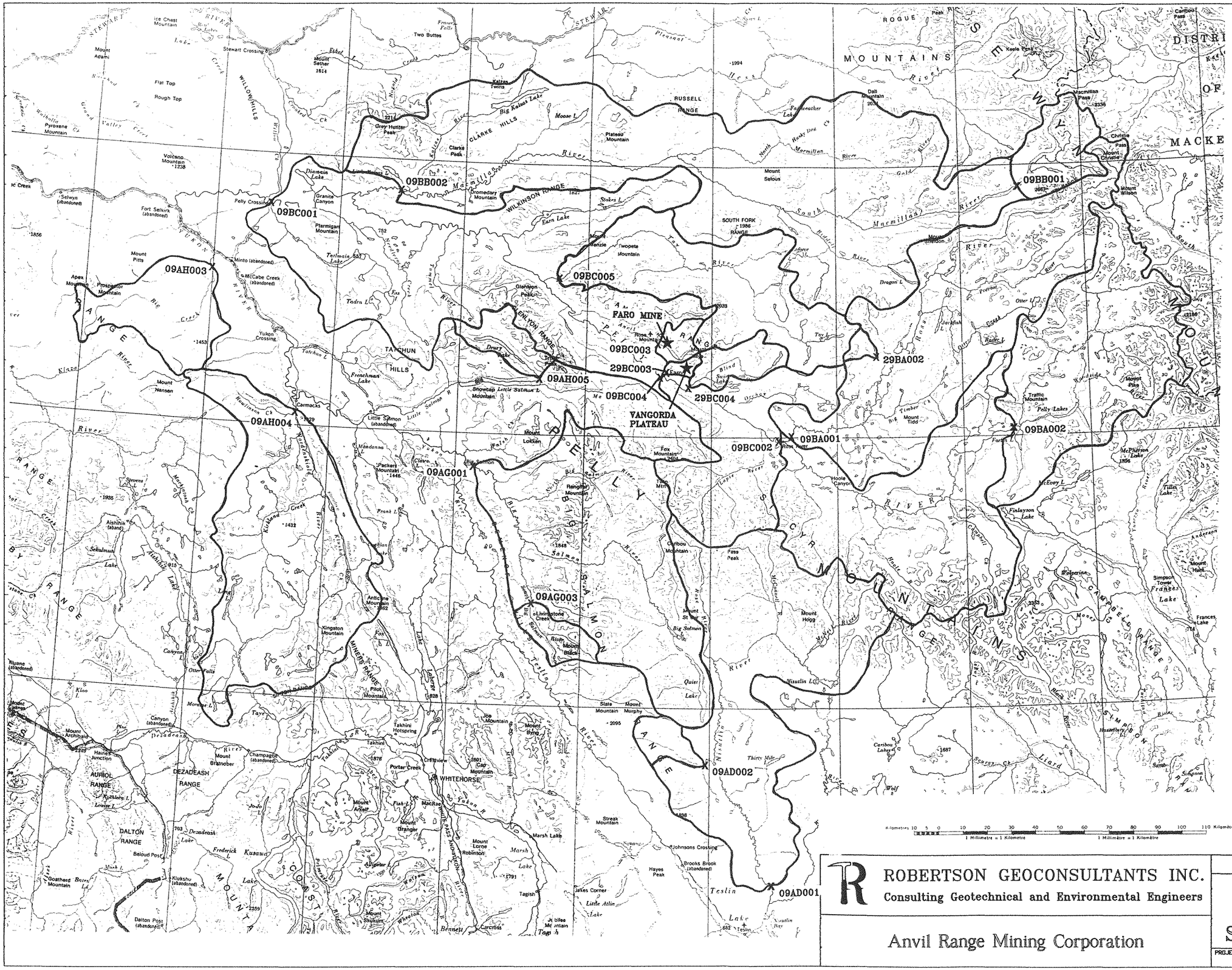
Year	Monthly and Annual Average Discharges (m^3/s)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Mean
1990	0.78 +	0.61 +	0.57 +	0.72 +	5.56 +	4.52 +	2.83 +	2.32 +	5.30 +	2.34	0.83	0.50	2.25
1991	0.54	0.58	0.56	0.93	5.38	4.91	5.16	3.67	4.24	2.23	1.13	0.67	2.51
1992	0.55	0.61	0.53	0.80	4.36 +	10.5 +	5.03 +	2.62 +	2.44 +	0.78 +	0.39 +	0.20 +	2.40
1993	0.14 +	0.11 +	0.14 +	0.64	7.71	6.01	3.58	2.39	2.77	2.22	1.10 +	0.93 +	2.33
1994	0.41 +	0.20 +	0.13 +	0.78 +	4.22	5.31	2.92	1.80	1.81	2.12	1.41 +	0.60 +	1.82
1995	0.36 +	0.35 +	0.49 +	0.75 +	2.92	2.71	2.92	2.38	4.19	2.19	1.03 +	0.32 +	1.72
Mean	**0.46**	**0.41**	**0.40**	**0.77**	**5.02**	**5.67**	**3.74**	**2.53**	**3.46**	**1.98**	**0.98**	**0.54**	**2.17**

Note: Patched monthly values are flagged with a plus sign (+).

Table B12
Patched Monthly Discharge Record of Station X13 for Period 1987 to 1995
(Combined Seepage from Cross Valley Dam)

Year	Monthly and Annual Average Discharges (m^3/s)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Mean
1987	0.097	0.099	0.097	0.098	0.093	0.106	0.121	0.128	0.128	0.119	0.108	0.107	0.108
1988	0.101	0.103	0.094	0.097	0.103	0.085	0.133	0.124	0.128	0.112	0.106	0.111	0.108
1989	0.115	0.092	0.087	0.091	0.109	0.106	0.117	0.118	0.110	0.101	0.104	0.090	0.103
1990	0.086	0.082	0.078	0.079	0.108	0.114	0.116	0.117	0.124	0.109	0.092	0.087	0.099
1991	0.095	0.093	0.092	0.091	0.104	0.109	0.108	0.108	0.106	0.092	0.102	0.089	0.099
1992	0.076	0.071	0.084	0.090	0.108	0.108	0.116	0.100 +	0.069	0.070	0.066	0.064	0.085
1993	0.067	0.067	0.074 +	0.080	0.083 +	0.086 +	0.088 +	0.087 +	0.086 +	0.075 +	0.061	0.060 +	0.076
1994	0.059 +	0.054 +	0.049 +	0.051 +	0.057 +	0.063 +	0.070 +	0.047	0.036 +	0.024	0.070	0.054 +	0.053
1995	0.039	0.044	0.051	0.057 +	0.063	0.063	0.053	0.056	0.055	0.050	0.038	0.034	0.050
Mean	**0.082**	**0.078**	**0.078**	**0.082**	**0.092**	**0.093**	**0.102**	**0.098**	**0.093**	**0.084**	**0.083**	**0.077**	**0.087**

Note: Patched monthly values are flagged with a plus sign (+).



LEGEND

09BC001 Regional Streamflow Gauging Station

Catchment Boundary

SCALE 1:1,500,000

Figure B-2
Correlation Between Daily Flows at 09AH005 (Drury Creek) and 09AG001 (Big Salmon River)

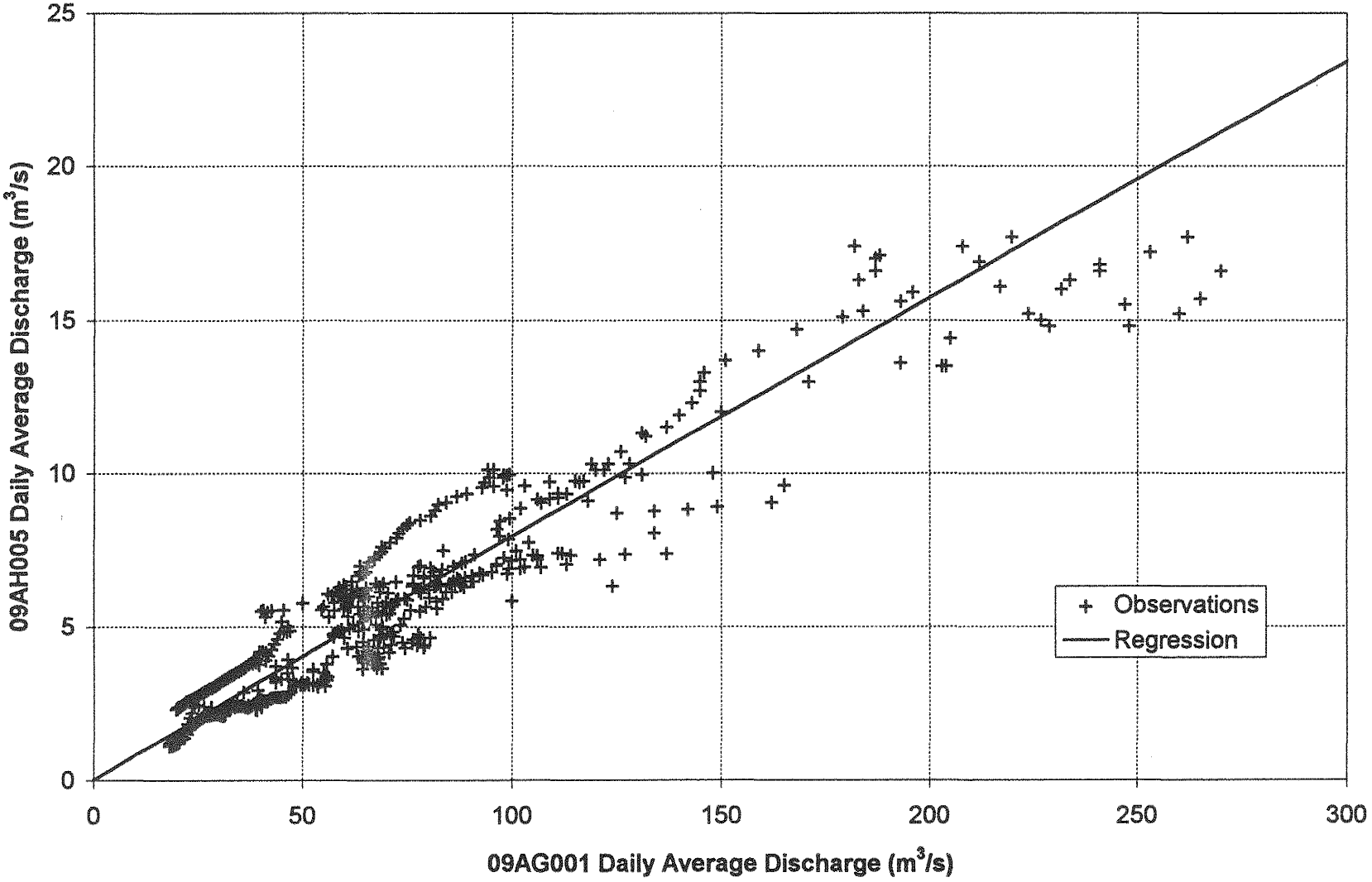


Figure B-3
Daily Streamflow Record for Drury Creek at Station 09AH005

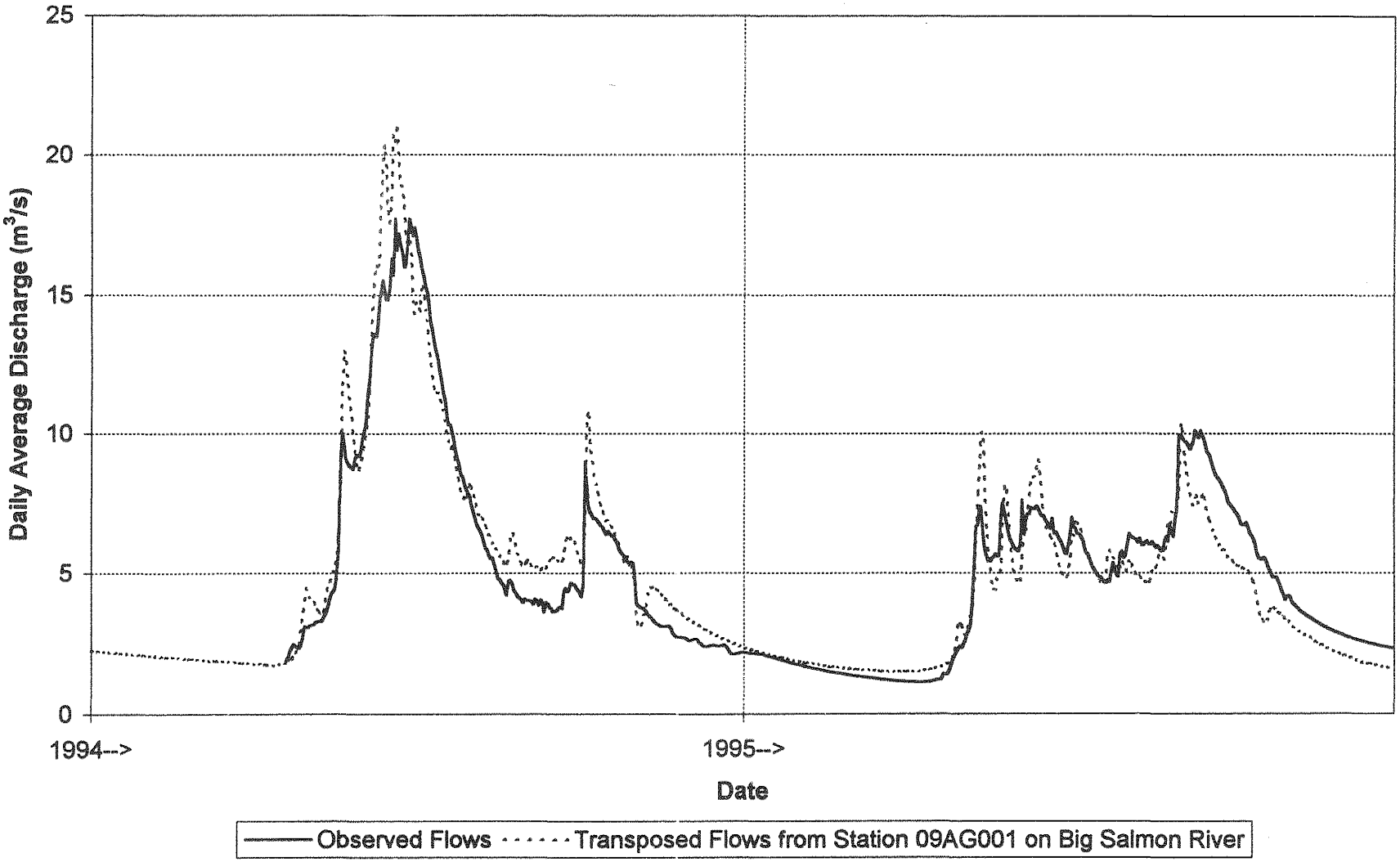


Figure B-4
Correlation Between Daily Flows at 09BC003 (Rose Creek) and 09BC001 (Pelly River)

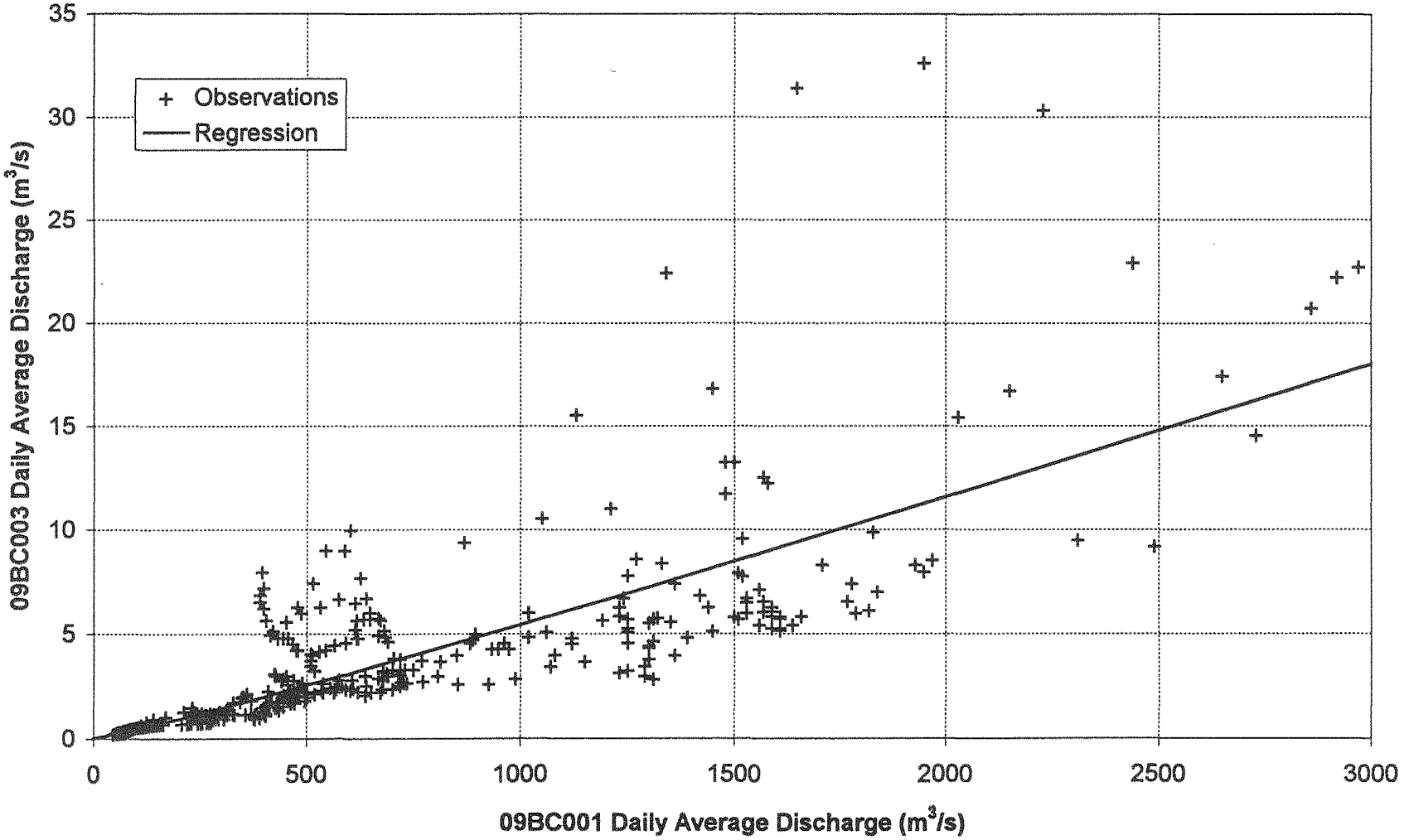


Figure B-5
Daily Streamflow Record for Rose Creek at Station 09BC003

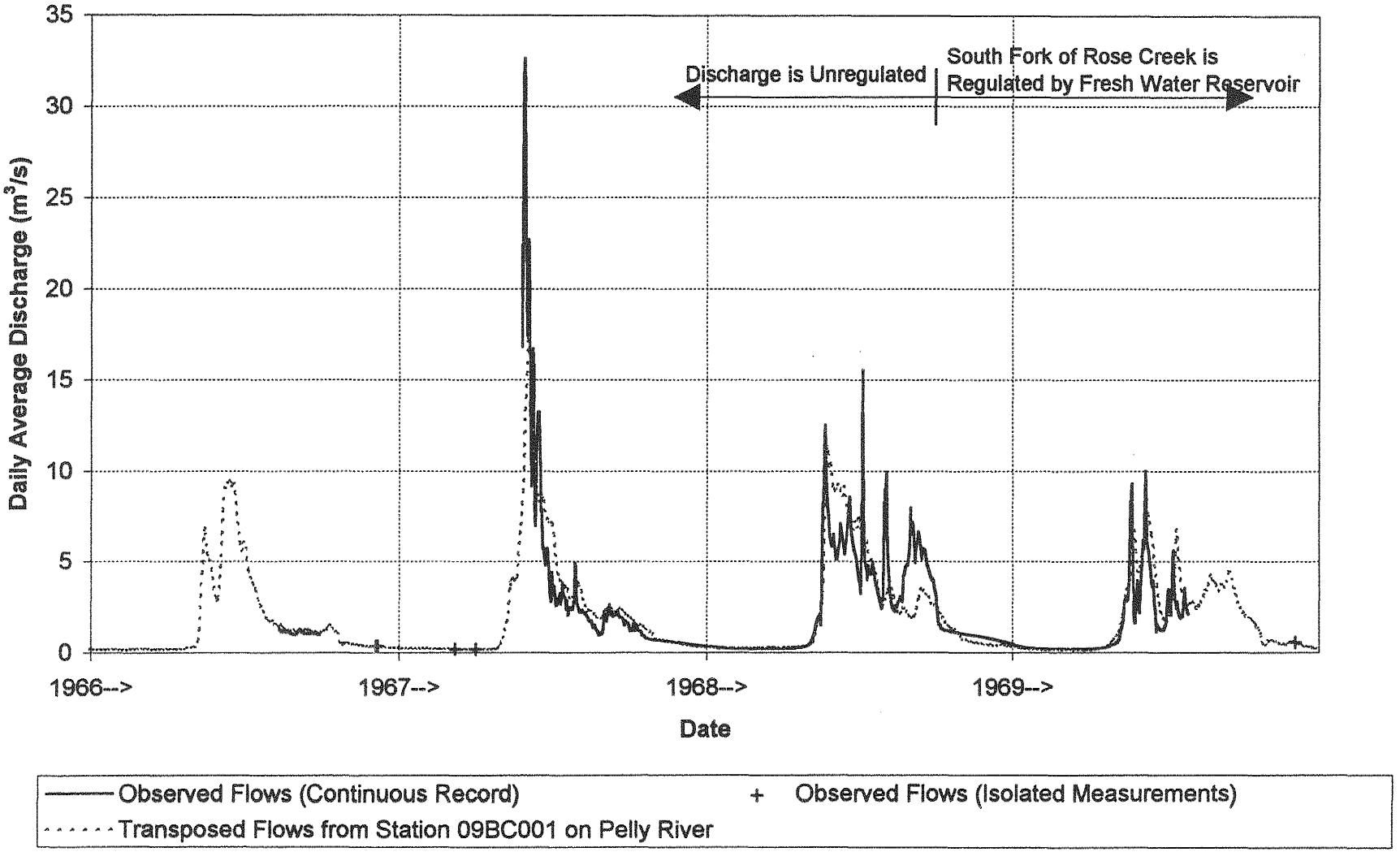


Figure B-6
Correlation Between Daily Flows at 09BC005 (Tay River) and 09BA001 (Ross River)

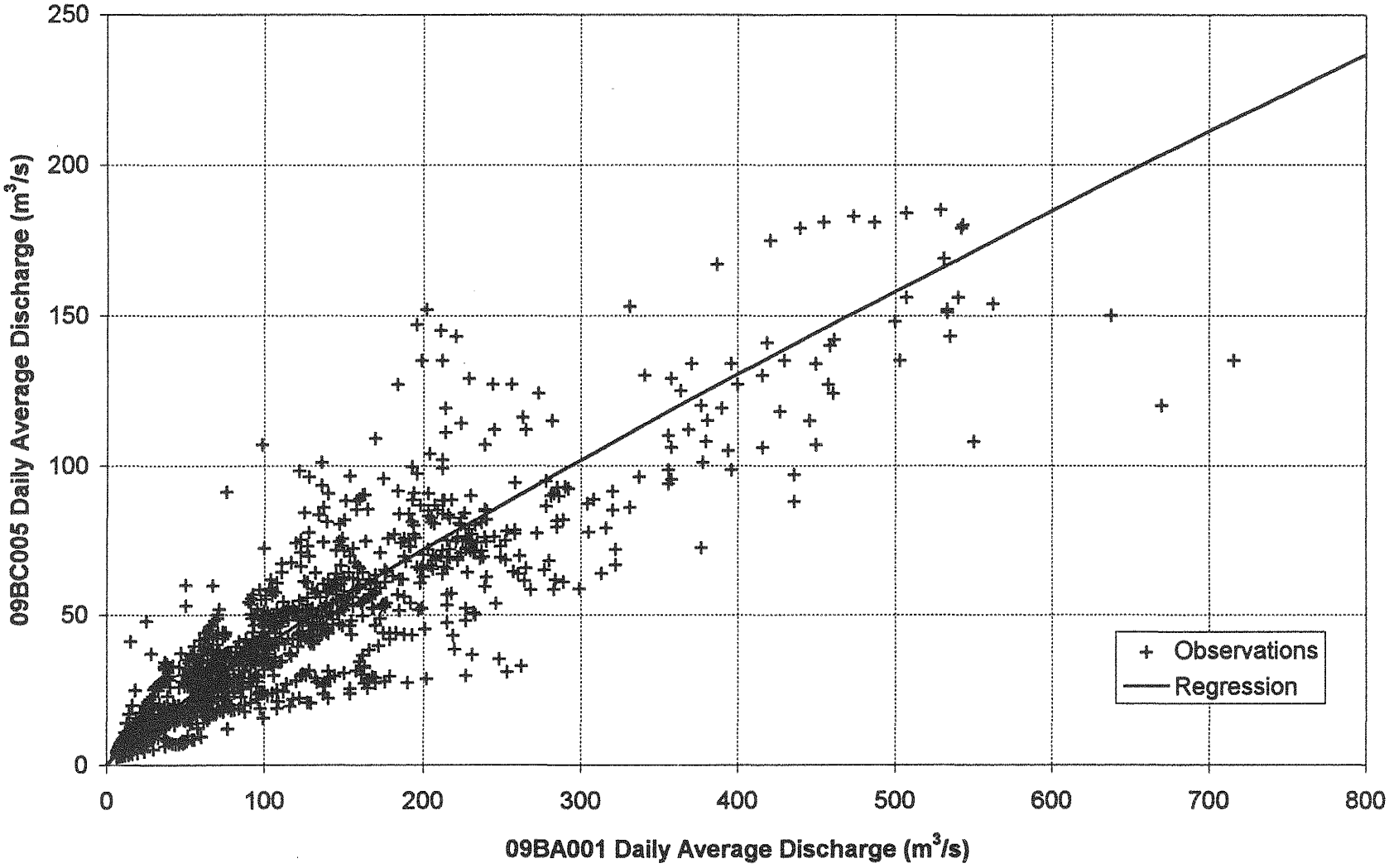


Figure B-7
Daily Streamflow Record for Tay River at Station 09BC005

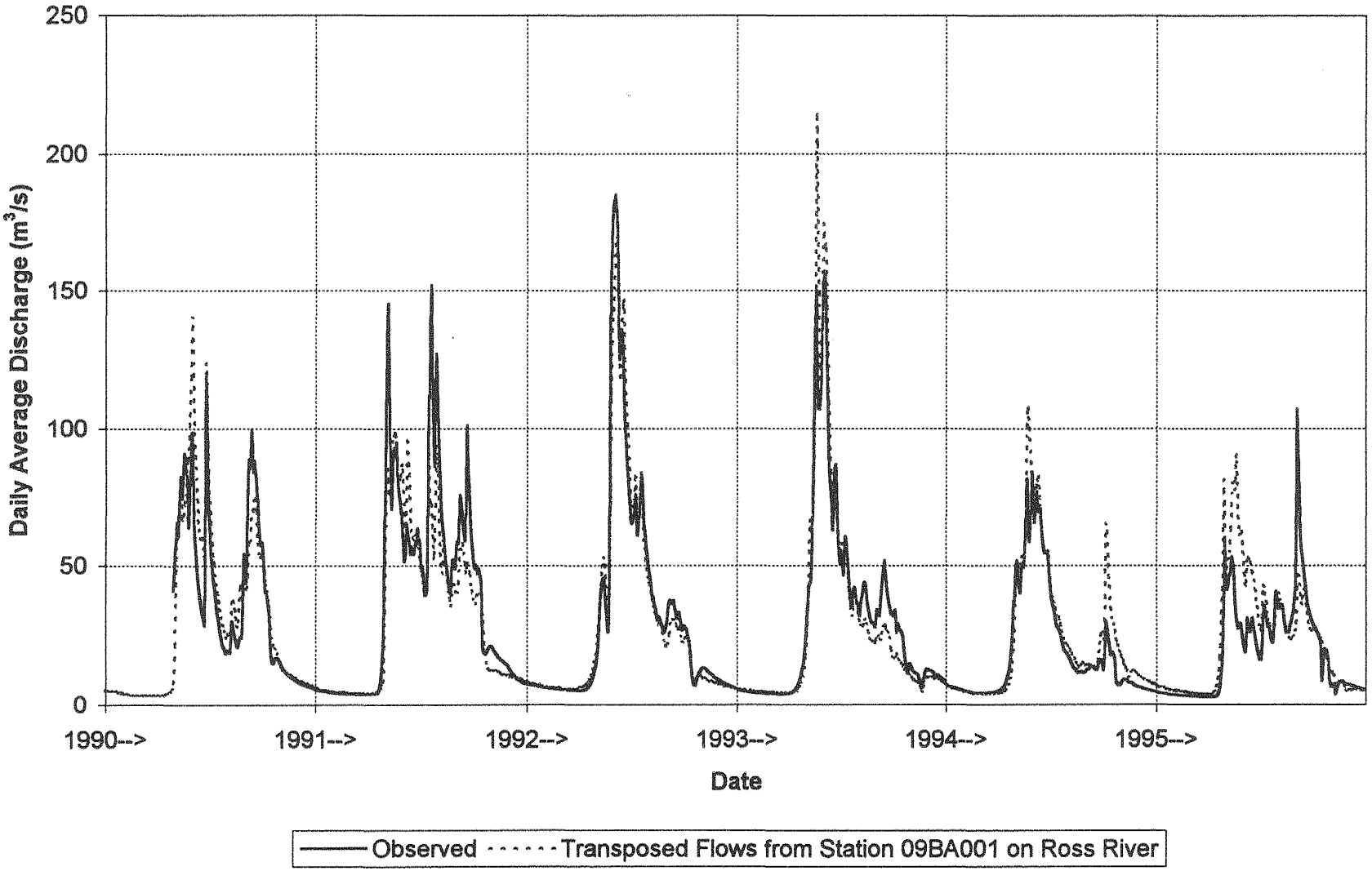


Figure B-8
Correlation Between Daily Flows at 29BC004 (Blind Creek) and 09BC005 (Tay River)

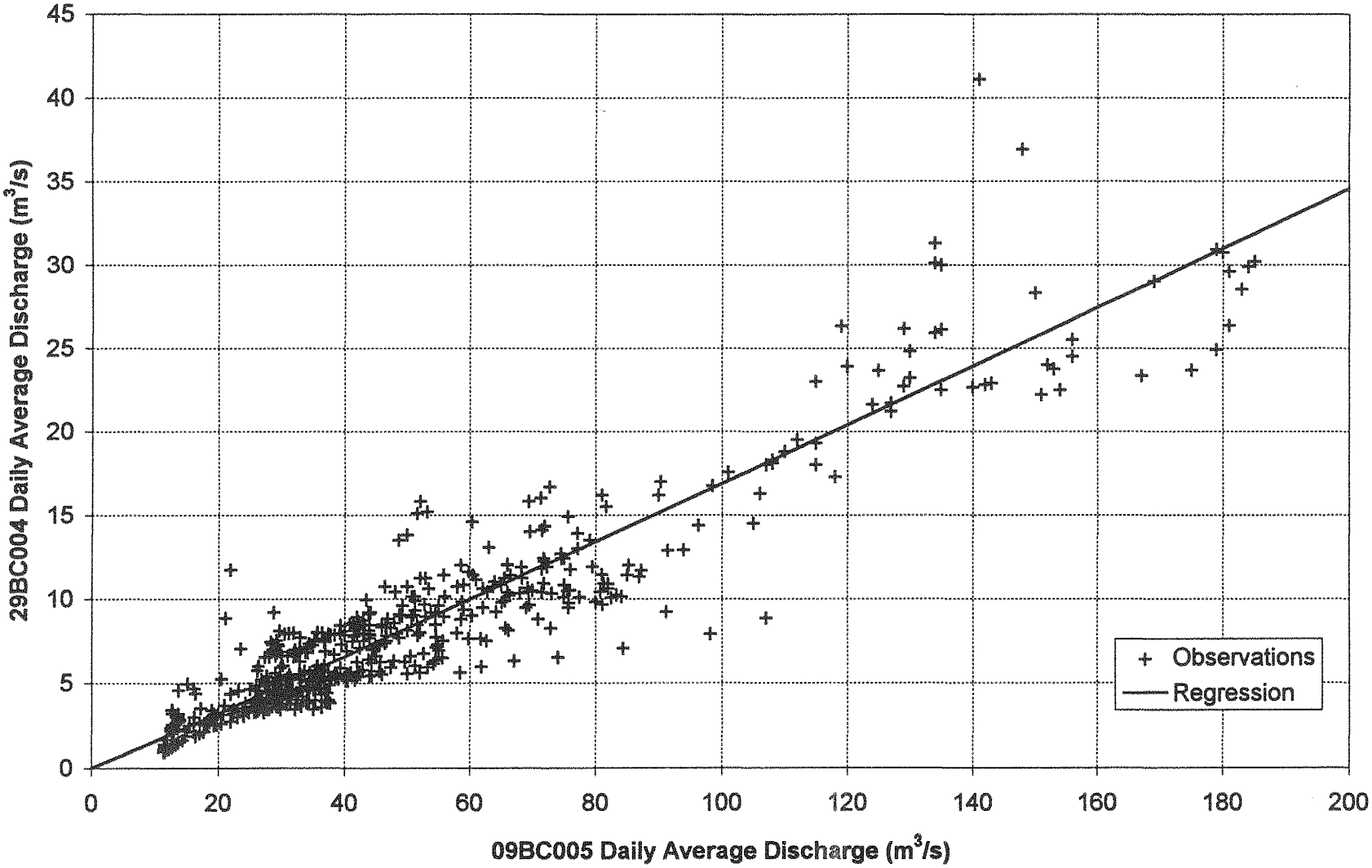


Figure B-9
Daily Streamflow Record for Blind Creek at Station 29BC004

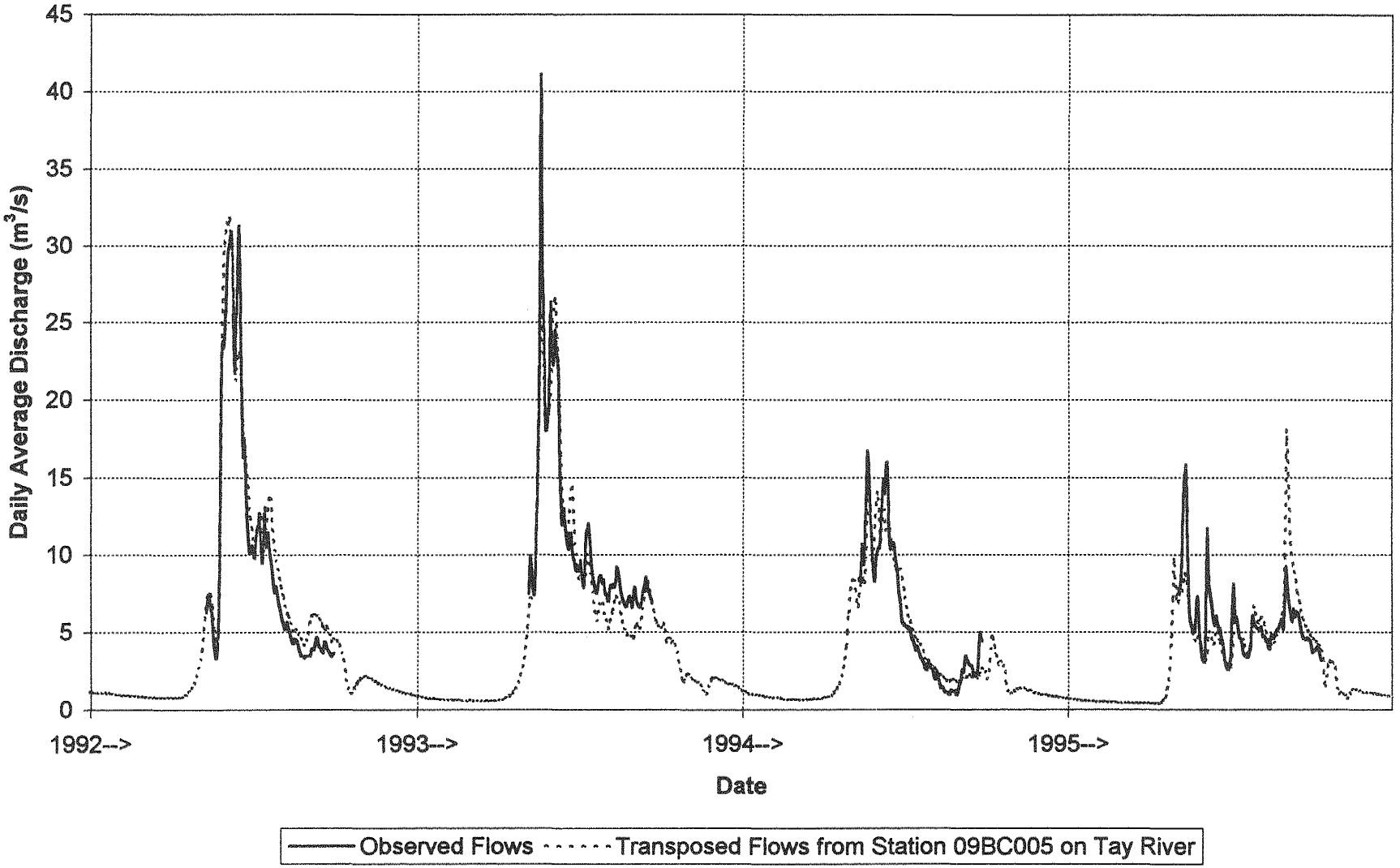


Figure B-10
Correlation Between Daily Flows at 29BA002 (180 Mile Creek) and 09BA001 (Ross River)

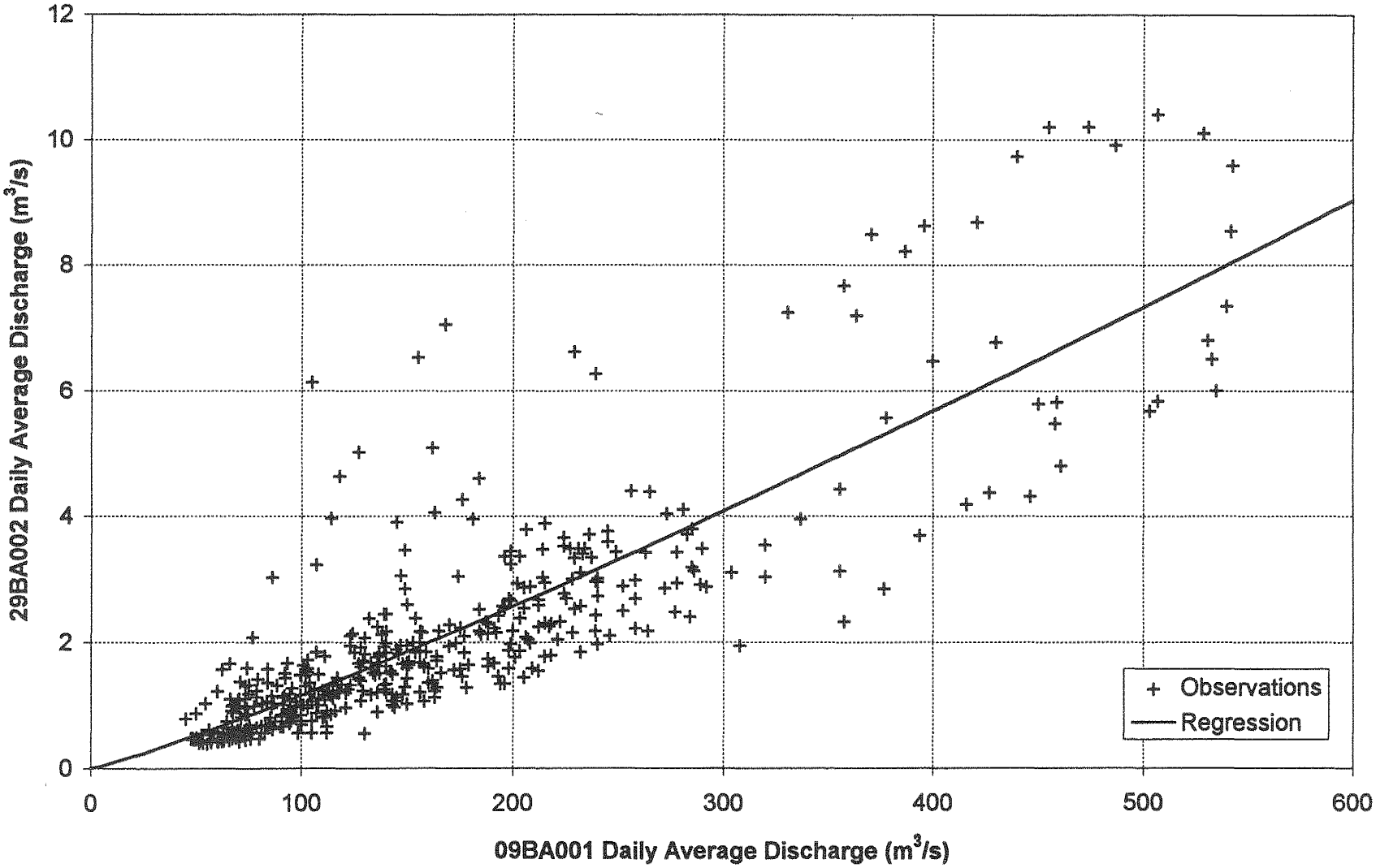


Figure B-11
Daily Streamflow Record for 180 Mile Creek at Station 29BA002 for Period 1990 to 1993

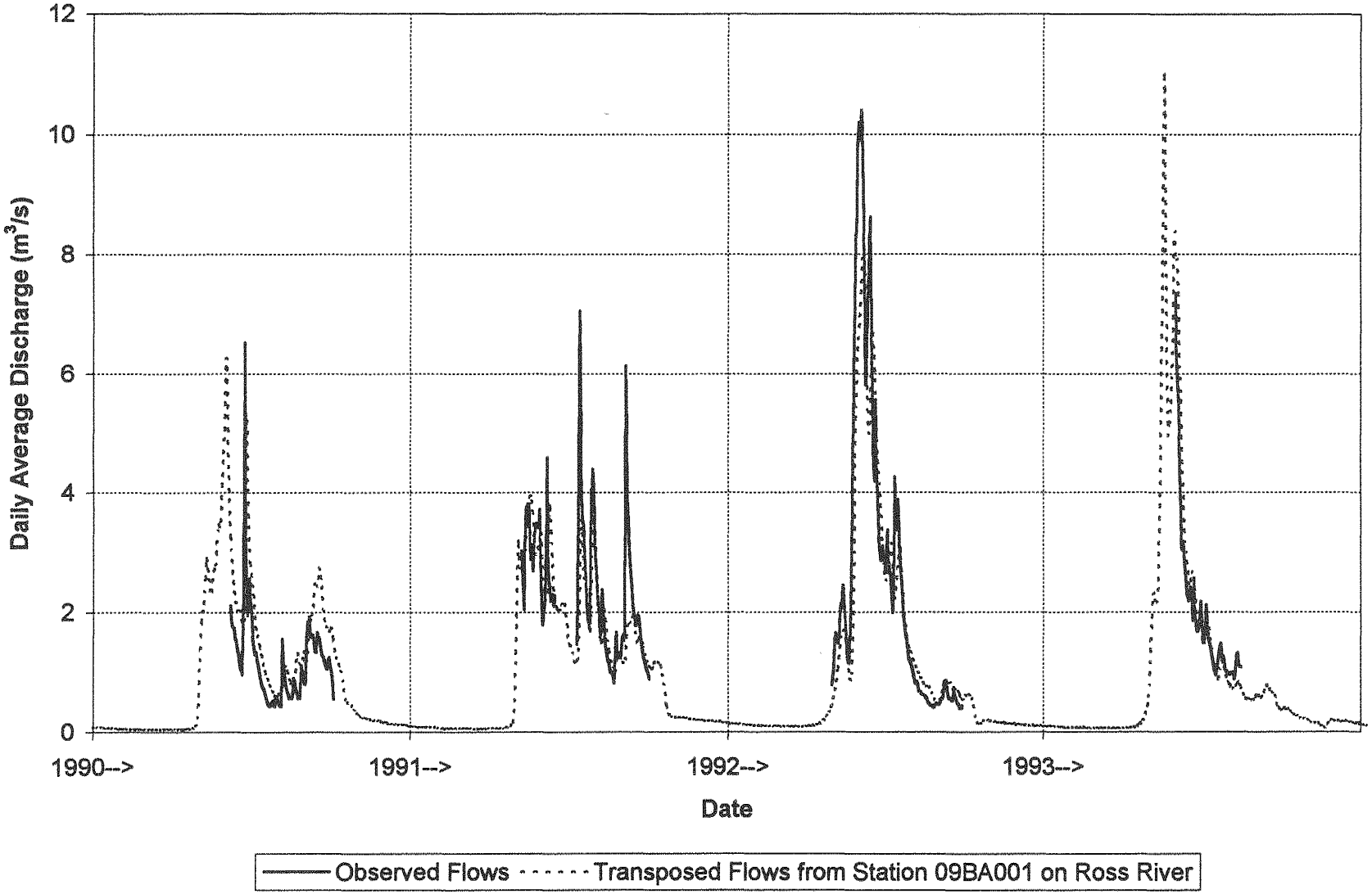


Figure B-12
Complete Daily Streamflow Record for 180 Mile Creek at Station 29BA002

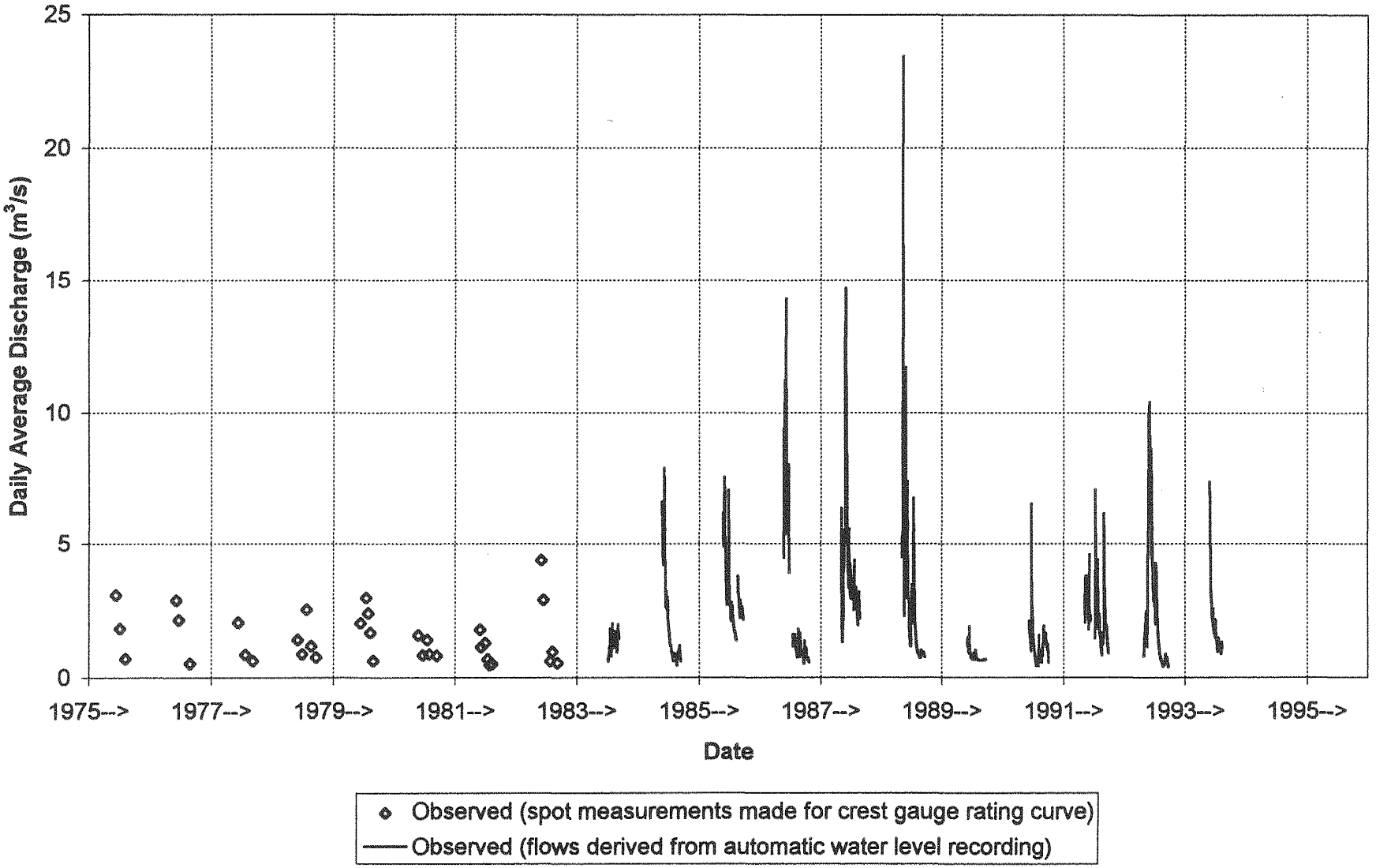


Figure B-13
Correlation Between Daily Flows at 29BC003 (Vangorda Creek) and 09BC005 (Tay River)

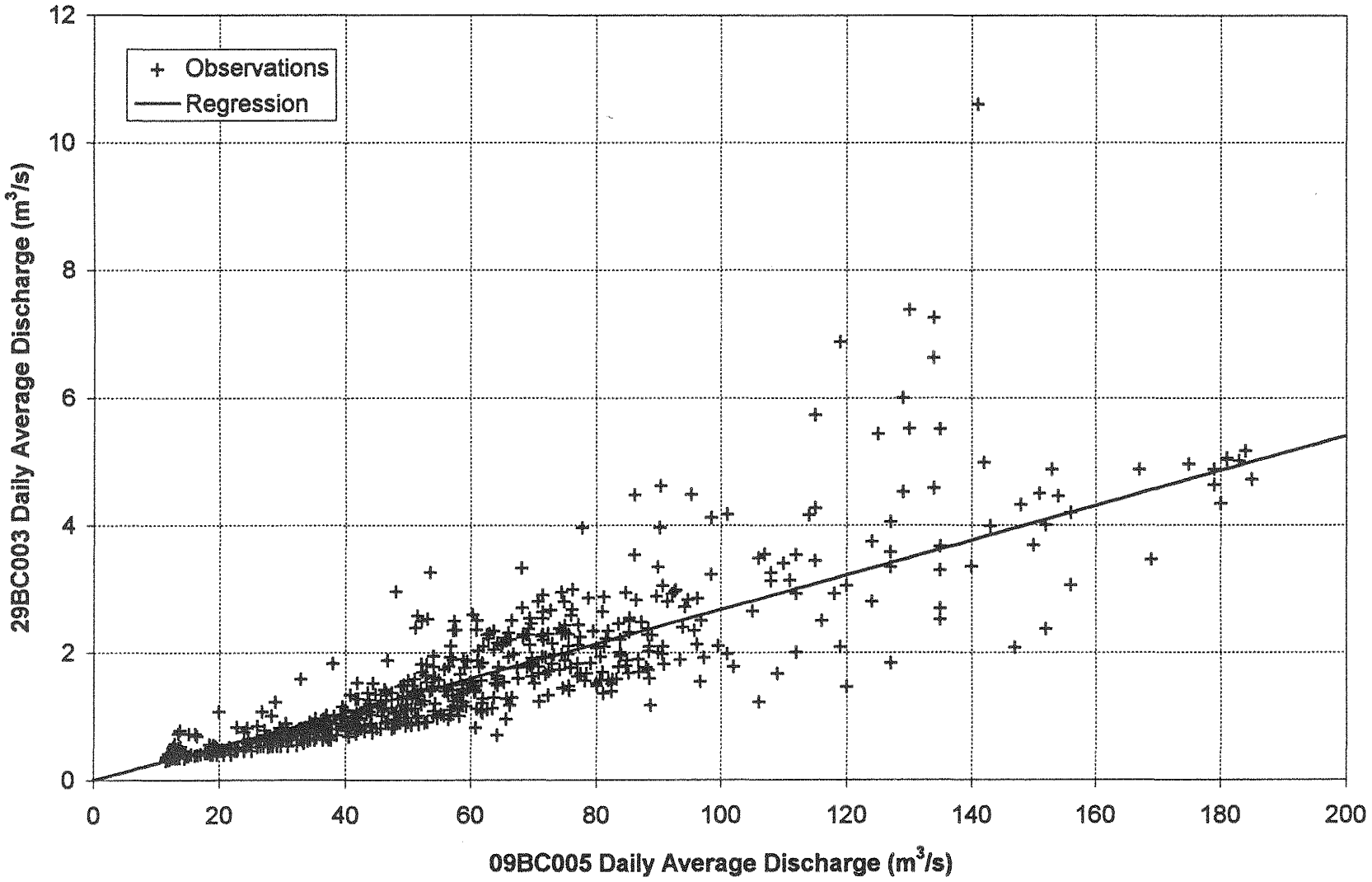


Figure B-14
Daily Streamflow Record for Vangorda Creek at Station 29BC003 for Period 1990 to 1995

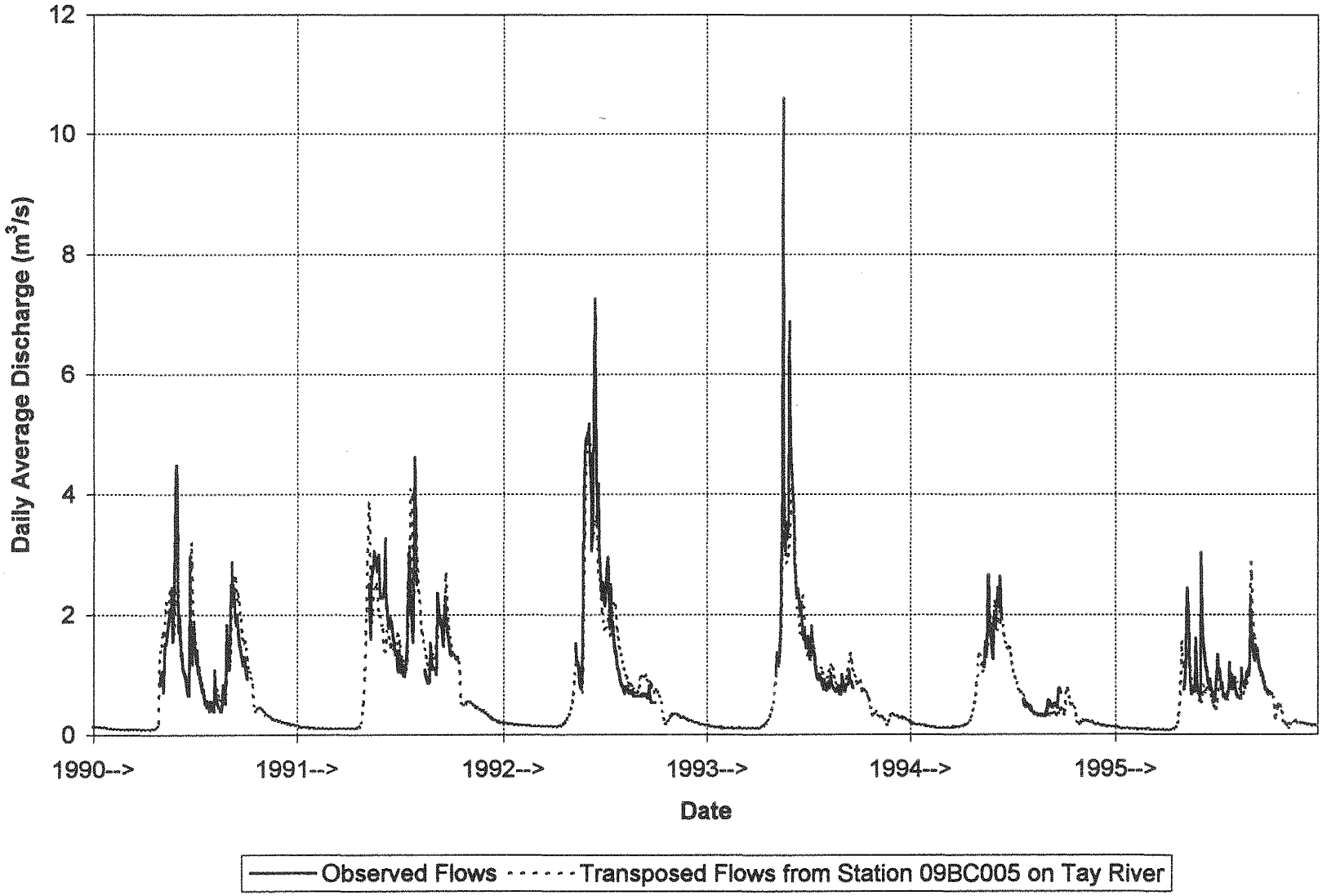


Figure B-15
Complete Daily Streamflow Record for Vangorda Creek at Station 29BC003

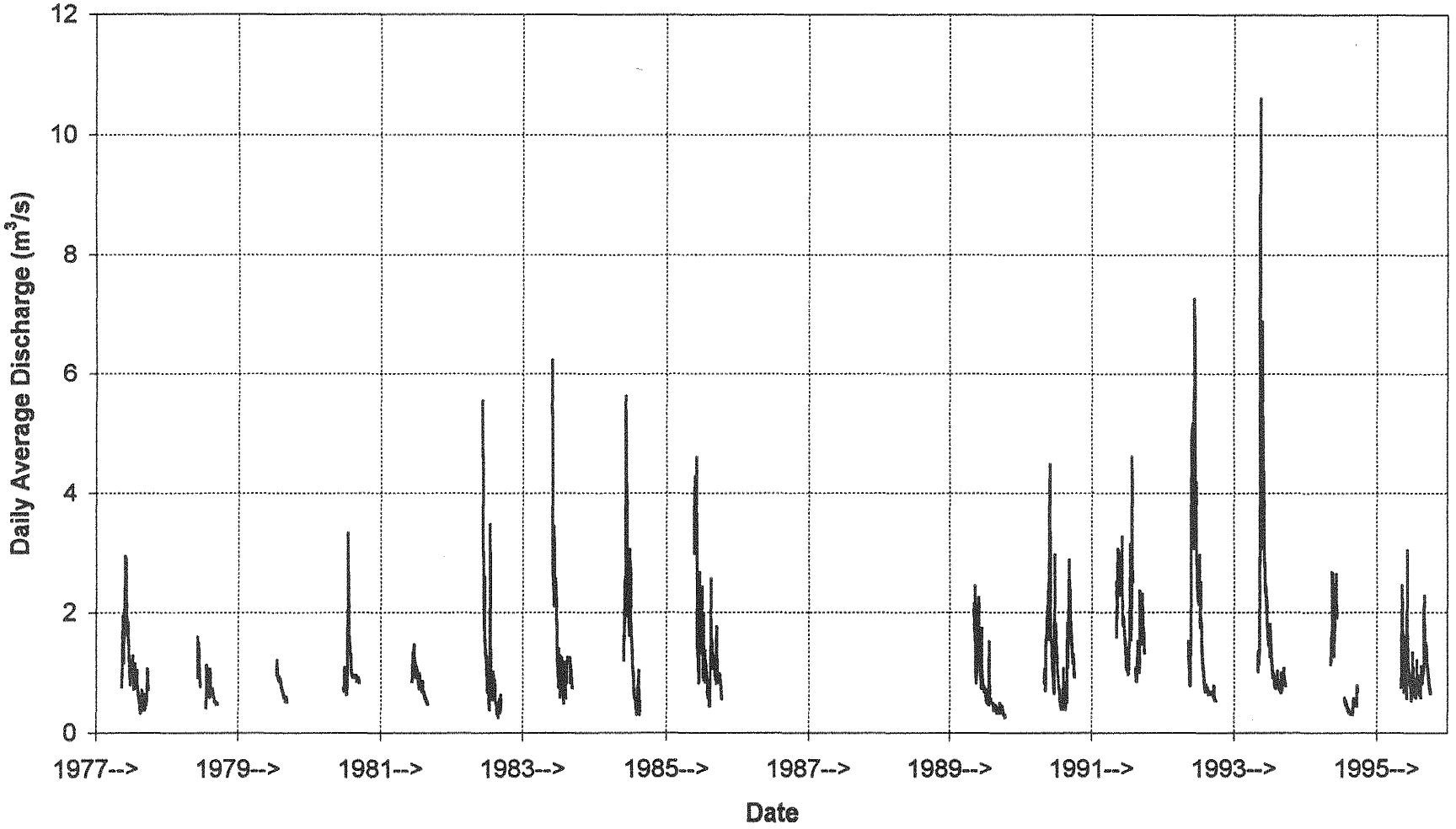


Figure B-16
Stage-Discharge Relationship for Station X14

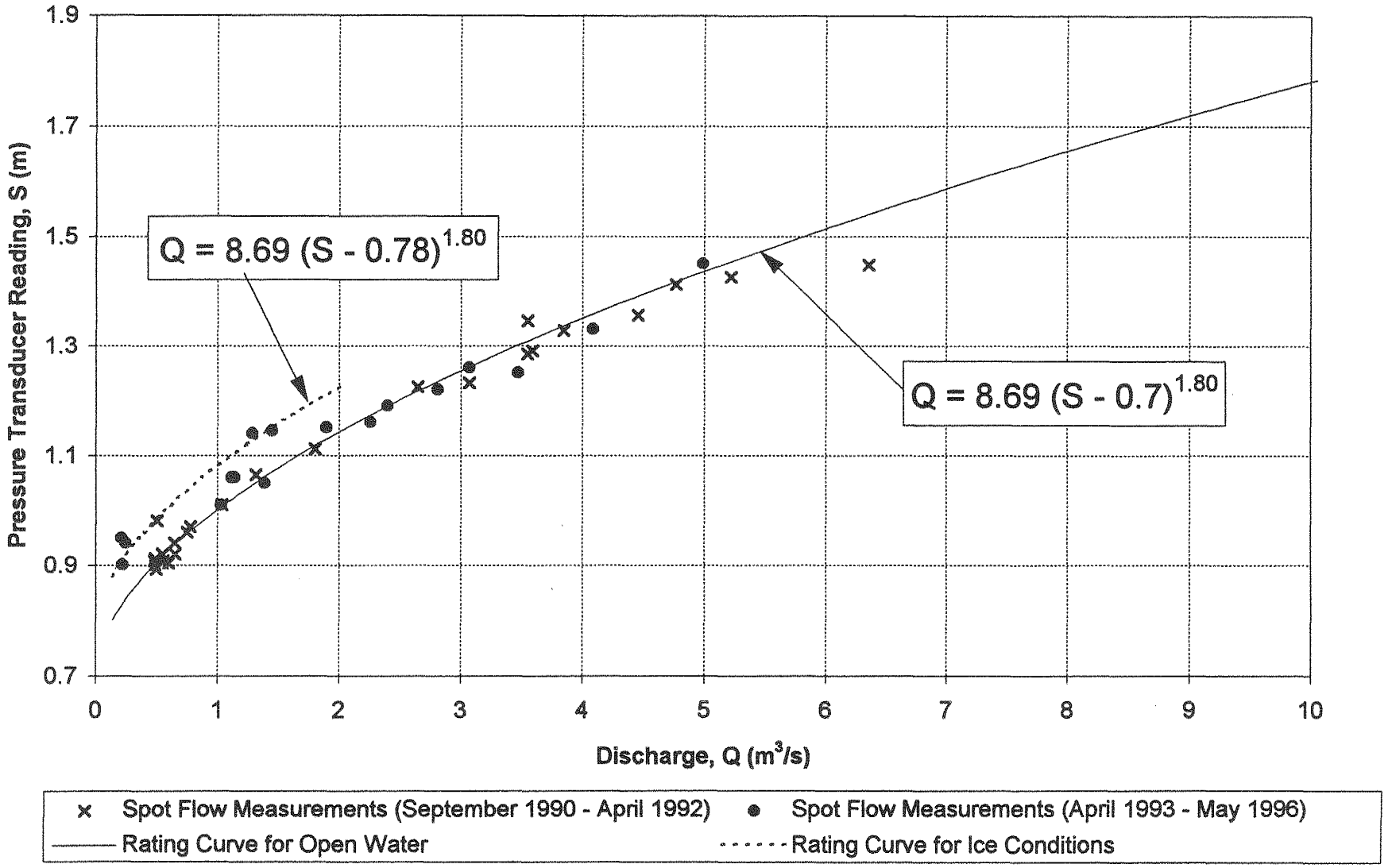


Figure B-17
Correlation Between Daily Flows at X14 (Rose Creek) and 09BC005 (Tay River)

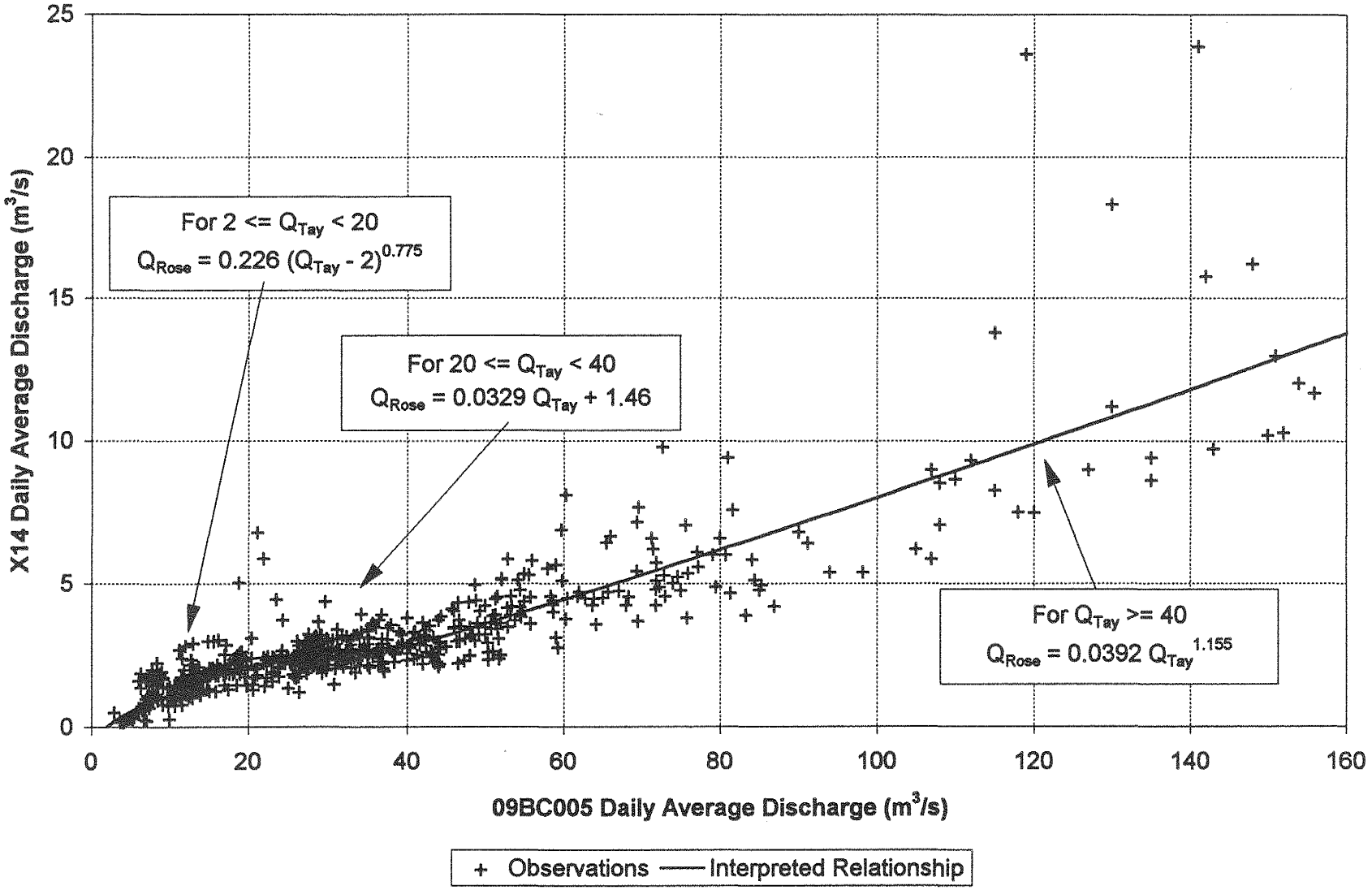


Figure B-18
Patched 1990 Daily Streamflow Record for Station X14

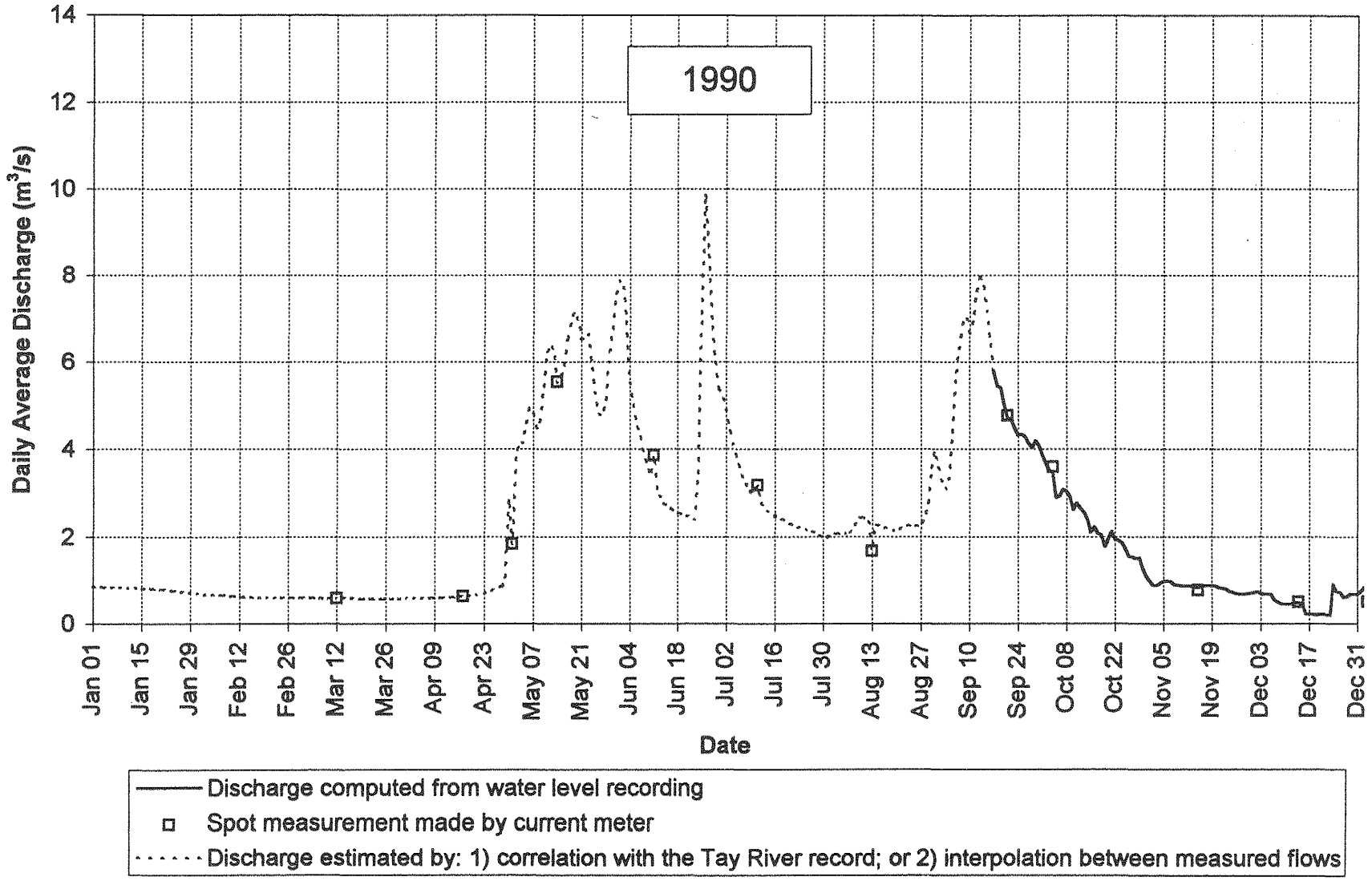


Figure B-19
1991 Daily Streamflow Record for Station X14

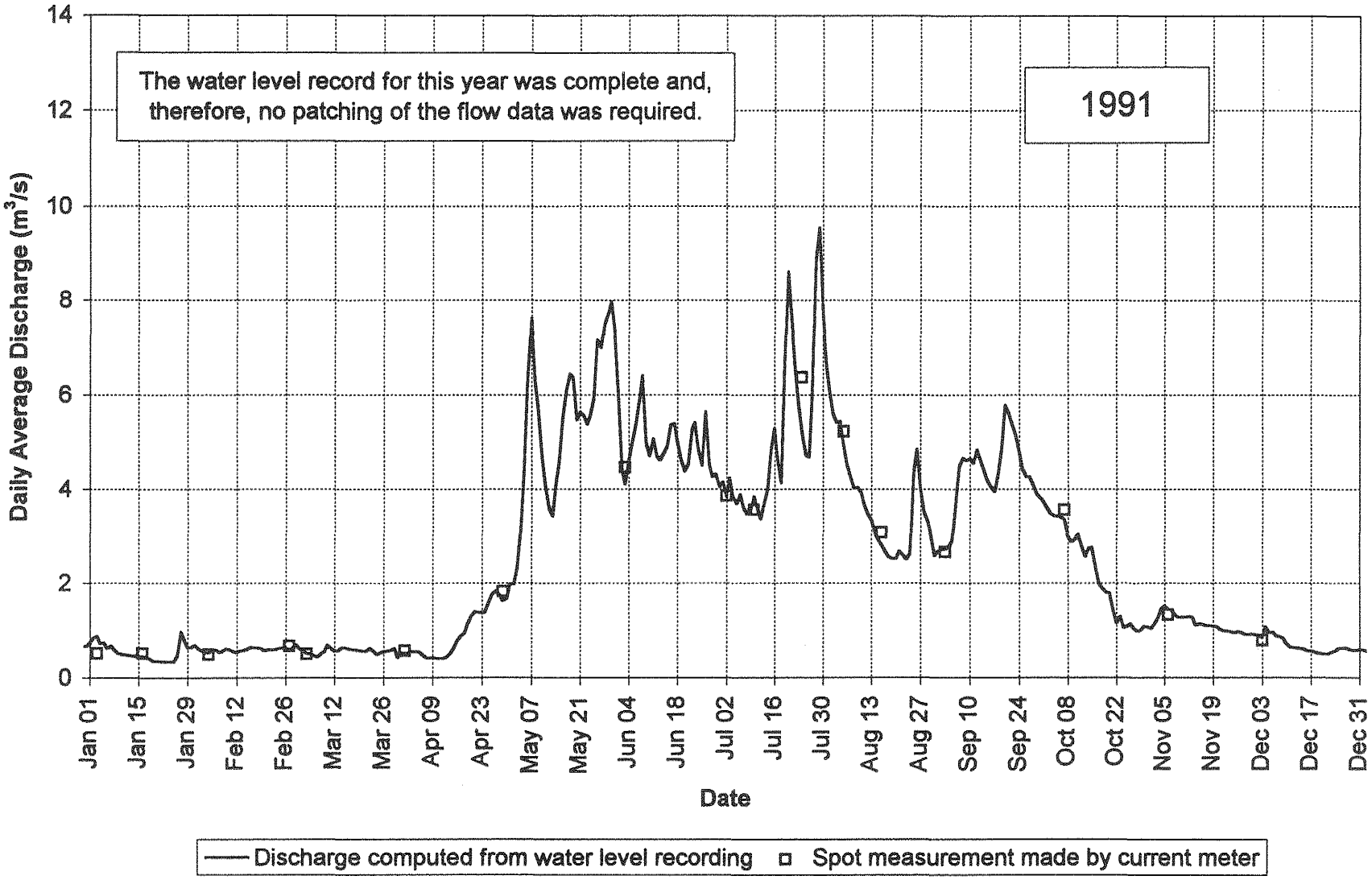


Figure B-20
Patched 1992 Daily Streamflow Record for Station X14

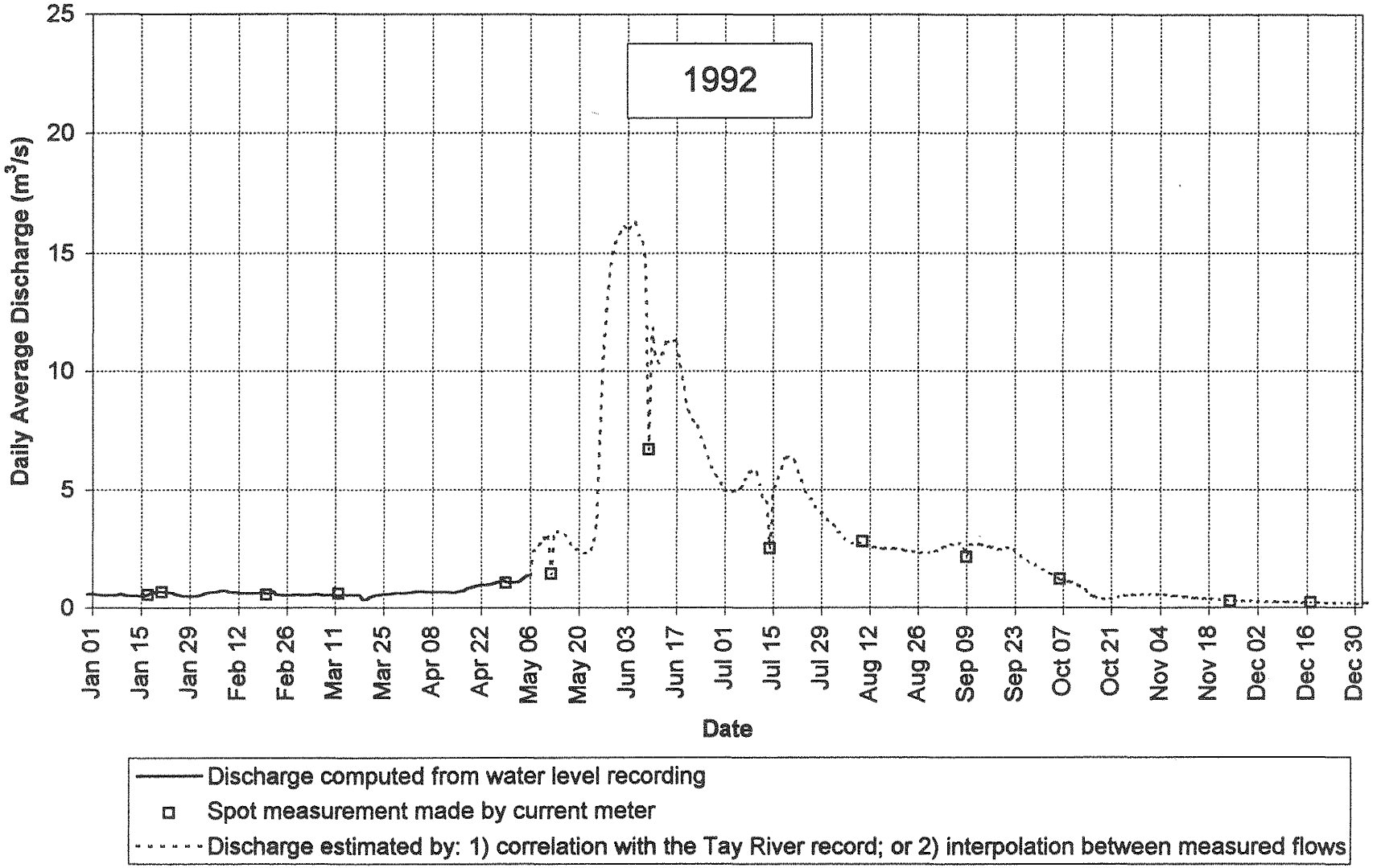


Figure B-21
Patched 1993 Daily Streamflow Record for Station X14

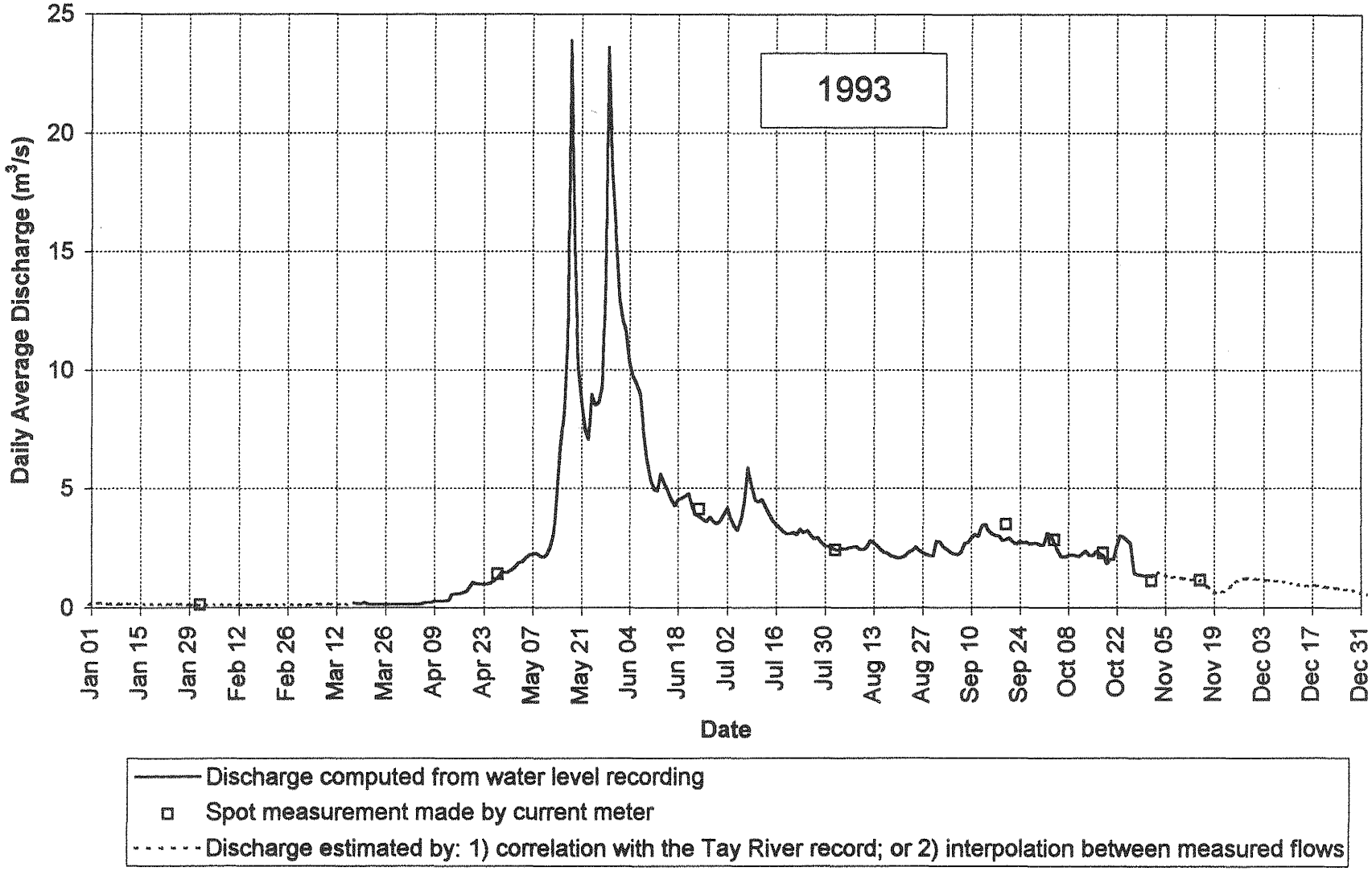


Figure B-22
Patched 1994 Daily Streamflow Record for Station X14

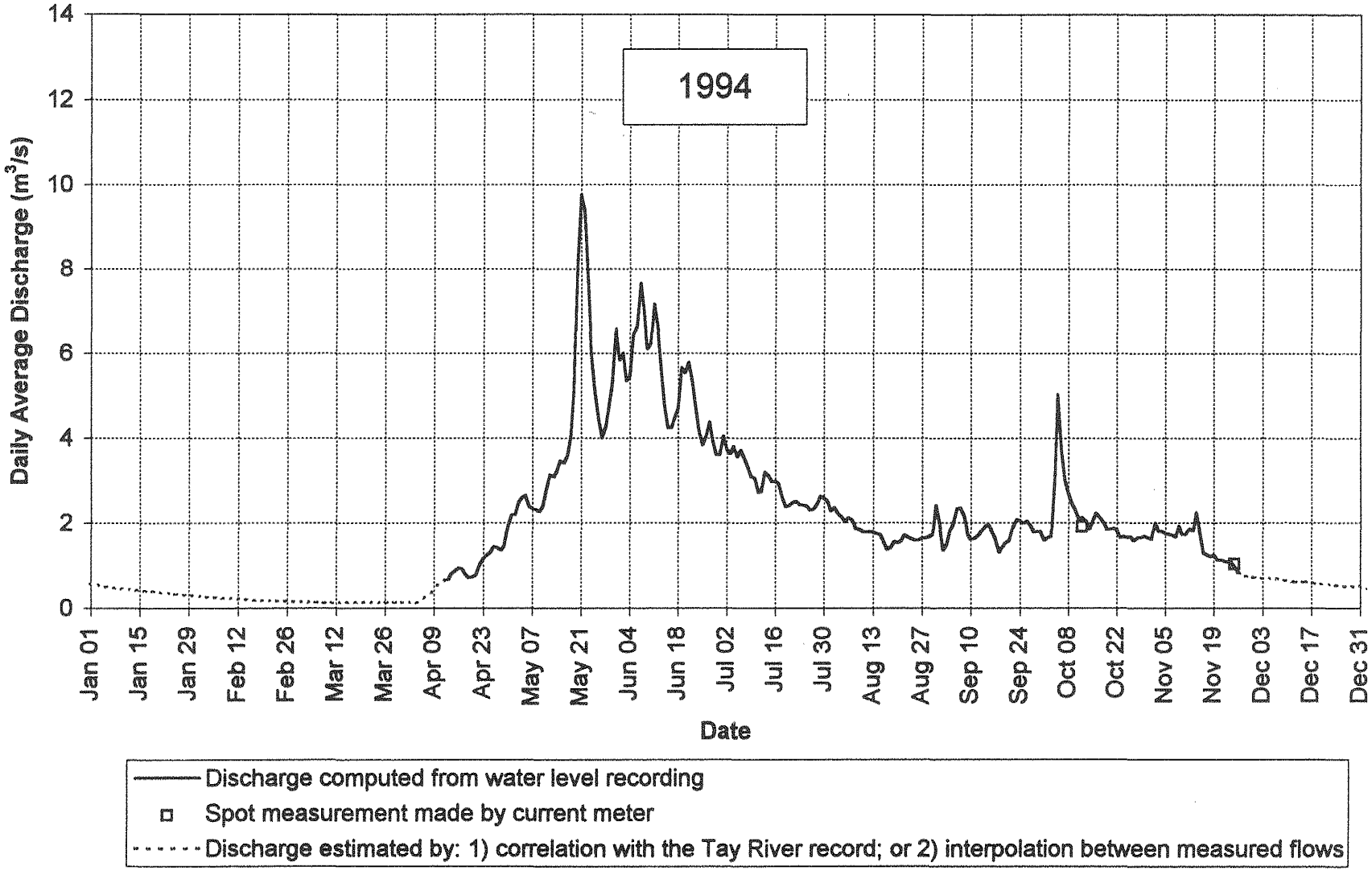


Figure B-23
Patched 1995 Daily Streamflow Record for Station X14

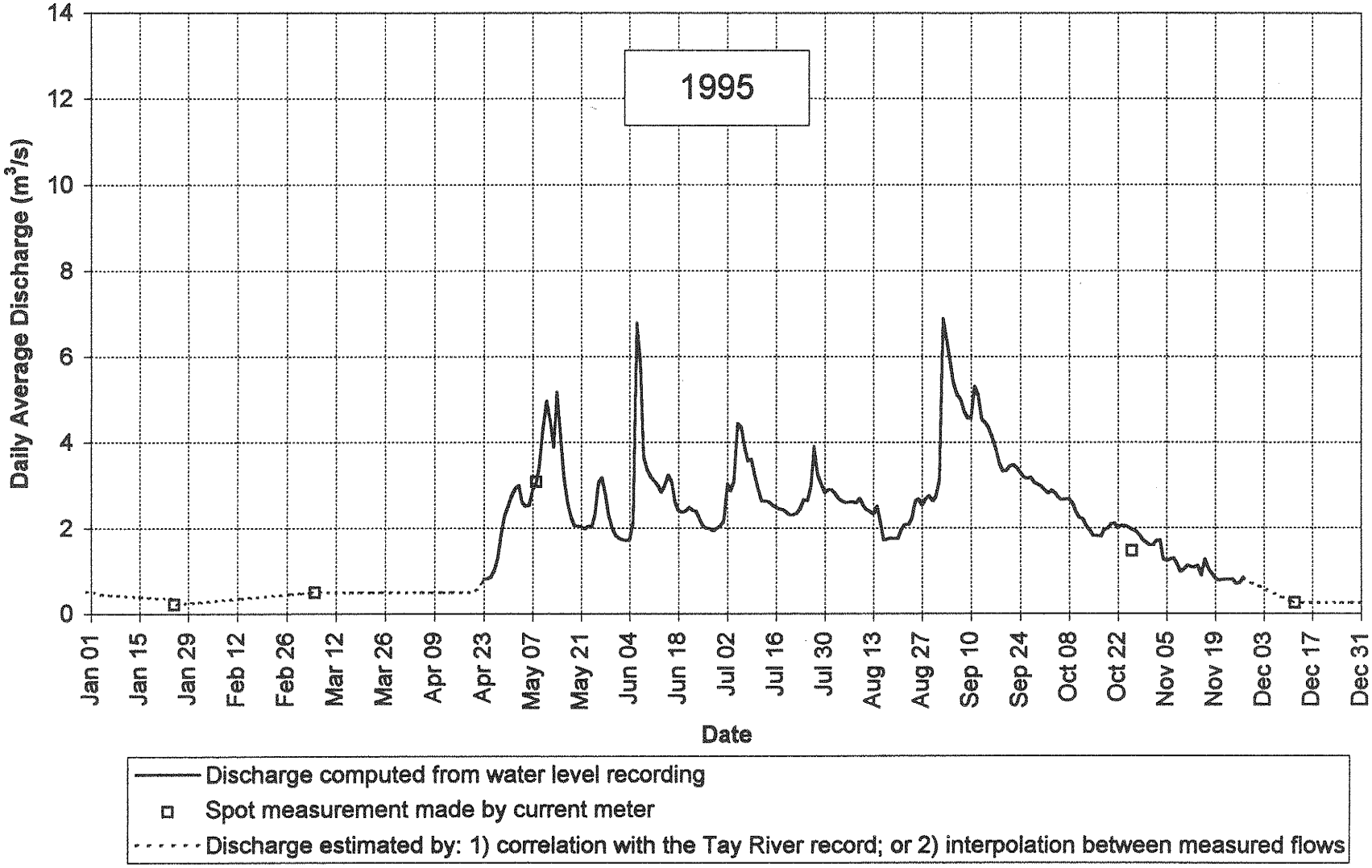
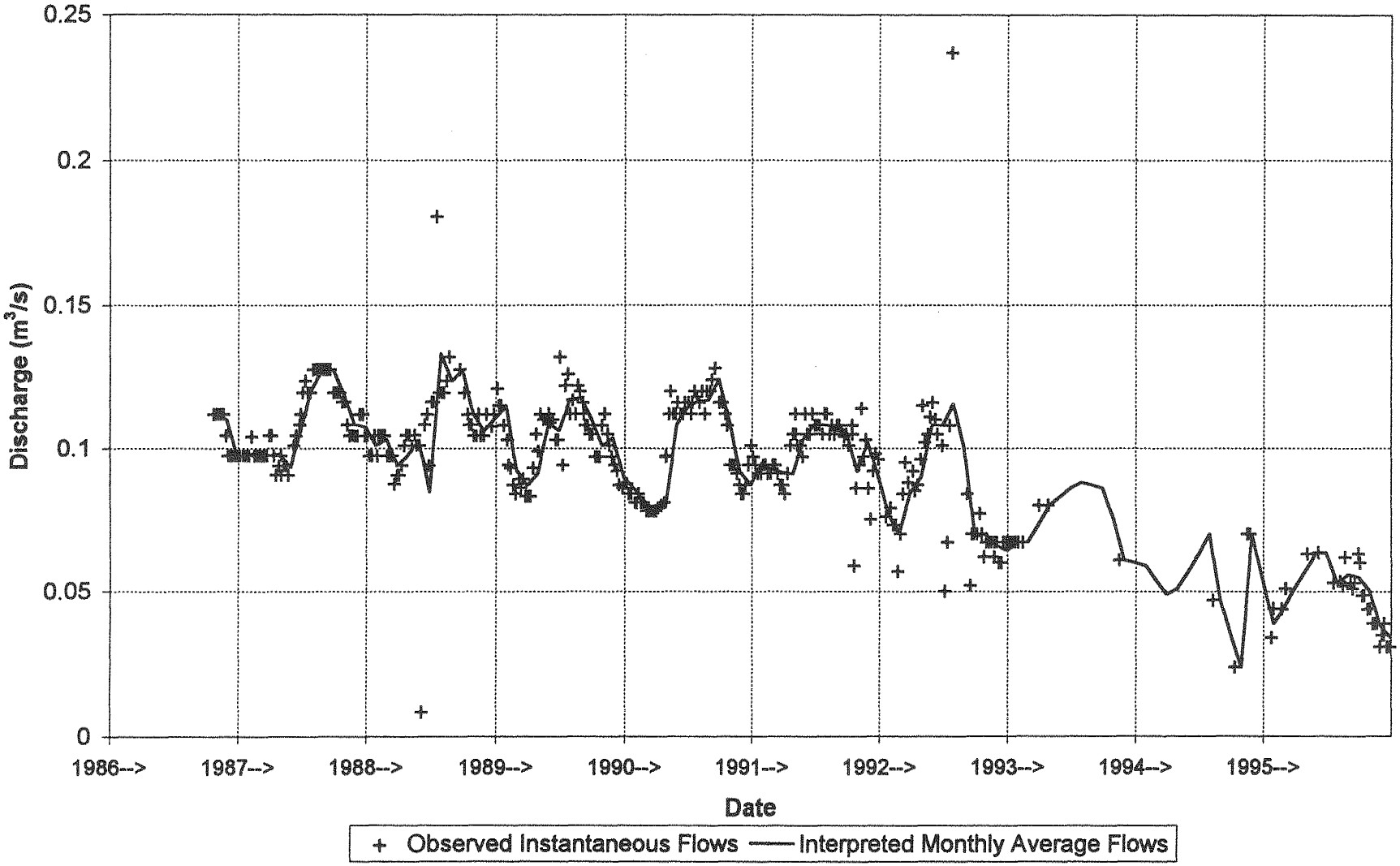


Figure B-24
Flow Record of Station X13 for Period 1986 to 1995
(Combined Seepage from Cross Valley Dam)



APPENDIX C

Hydrogeology Data Compilation.

Appendix C
Compilation of Borehole and Piezometer Installation Data for the Anvil Range Mining Complex

Numerous hydrogeological studies have been conducted at the Anvil Range mining complex (Faro and Vangorda Plateau mine sites) over the last 30 years of mining activity. Table C1 lists those hydrogeological studies that have been reviewed for preparation of the Integrated Conceptual Abandonment Plan. A summary of pertinent hydrogeological data, including borehole logs and piezometer installation details of existing monitoring wells, has been extracted from these reports and is compiled in this appendix for ease of reference.

Table C1

List of Hydrogeological Studies at Anvil Range Mining Complex

Date	Author	Title
Dec., 1967	International Water Supply	Anvil Mine Yukon Territories - Groundwater Investigation
Feb., 1976	Piteau Gadsby MacLeod Limited	Results of Test Holes Drilled for Stratigraphy and Groundwater Observations
Jan., 1978	Piteau and Associates	Drainhole Installation and Related Monitoring for Groundwater Drainage of Faro Valley
Sept., 1981	Klohn Leonoff	Faro Mine Tailings Abandonment Plan
Oct., 1986	Piteau and Associates	Assessment of Groundwater Conditions in Faro Pit, East Wall
July, 1986	International Water Supply	An Outline of the 1986 Groundwater Investigation and Water Supply Development
July,1989	Hydrogeological Consultants Ltd.	Grum Pit - 1988 Dewatering Assessment
July,1989	EBA Engineering Consultants Ltd.	Piezometer and Dewatering Well Installation Report - Grum, Vangorda and Faro Mine Sites, Faro, Yukon
Dec., 1990	Piteau Associates	Hydrogeological Assessment and Development of Groundwater Control Strategy
Jan., 1991	Piteau Associates	Grum Pit Review and Analysis of Hydrogeological Data and Design of Phase I Dewatering System
April, 1991	Piteau Associates	Grum Pit Dewatering Well GDW 91-2 - Pump Test Analysis and Pump Selection
Nov., 1994	SRK - Robinson Inc.	Construction Report Vangorda Rehabilitation PWGSC Project 760831, Vangorda Plateau, Faro Mine Yukon Territory
Dec., 1994	Steffen, Robertson and Kirsten	Groundwater Investigation North Fork of Rose Creek, Faro Mine, Yukon Territory
June, 1995	Piteau Associates	Current Groundwater Conditions in the Southeast Walls of the Grum Pit
Dec., 1996	Robertson GeoConsultants Inc.	Anvil Range Mining Complex - 1996 Piezometer Installation Program

In the following, a brief description of the various hydrogeological studies and a listing of the data extracted from a given report is given. The hydrogeological data reproduced are listed in the back of this appendix in chronological order, i.e. by year of report completion.

International Water Supply Ltd., December 1987. ***Anvil Mine Yukon Territories - Groundwater Investigation.***

A total of eleven test wells were drilled in the Rose Creek valley near the confluence of Faro Creek and Rose Creek in 1967 to study the potential of the Rose Creek valley aquifer to augment the freshwater supply of the mill during the low flow winter months. Several pumptests were conducted to estimate the water supply potential of the aquifer. The following information was extracted from this report:

- summary of test well installation data

Piteau, Gadsby and MacLeod, 1976. ***Results of Test Holes Drilled for Stratigraphy and Groundwater Observations in Faro Valley Overburden,*** **Report No. 75-055.**

In the winter of 1975/76 six boreholes were drilled through the Faro Valley rock dump into the underlying overburden soils immediately upstream of the crest of the Faro pit slope to examine the phreatic surface in the overburden soils and to assess the potential for further slumping of overburden material into the Faro pit. The following information was extracted from this report:

- site plan showing location of piezometers
- cross-section through Faro Valley Overburden
- summary of piezometer installation data

Piteau and Associates, 1978. ***Drainhole Installation and Related Monitoring for Groundwater Drainage of Faro Valley.***

A total of eight inclined drain holes were drilled in 1977 into the Faro Valley overburden material from the "4030 bench" of the Faro main pit in order to enhance drainage of the overburden soils and reduce excess pore pressures which were believed to have caused slumping of the overburden material in this area. The following information was extracted from this report:

- site plan showing location of inclined drainholes
- summary of drainhole installation data

Golder Associates, July 1979. ***Project Number 792-2025***

Golder Associates drilled a series of boreholes in the vicinity of the Intermediate Dam and Cross Valley Dam **prior to construction** in July 1979 to study the foundation conditions and groundwater flows in the valley aquifer. Permeability tests were conducted in selected piezometers. Downhole geophysical logging included gamma and resistivity surveys. Geological cross-sections inferred from these boreholes are shown in Figures 4-82 and 4-84a of the main report. The following information was extracted from this report:

- summary of borehole log and piezometer installation data

Golder Associates, November 1981. ***Project Number 812-2041***

Golder Associates drilled a series of boreholes in the vicinity of the Intermediate Dam and Cross Valley Dam **after construction** in November 1981 to monitor seepage through the dam and the underlying foundation soils. The following information was extracted from this report:

- summary of borehole log and piezometer installation data

Klohn Leonoff, 1981. *Faro Mine Tailings Abandonment Plan.* Report No. VA-2758.

The first abandonment plan for the tailings impoundments located in the Rose Creek Valley were prepared in 1981 for Cyprus Anvil Mining Corporation by Klohn Leonoff. A detailed hydrogeological investigation of the Rose Creek Valley aquifer were performed as part of this study including the installation of fifteen piezometers within the aquifer and hydraulic testing. Several of these piezometers are still used for water quality monitoring today. The following information was extracted from this report:

- site plan showing approximate locations of piezometers
- borehole logs
- summary of piezometer installation data
- summary of hydraulic testing results

Piteau and Associates, 1986. *Assessment of Groundwater Conditions in Faro Pit, East Wall.* Report No. 86-804

A total of eight boreholes were drilled and 17 piezometers installed at various locations in the east wall of the Faro main pit in August 1986 as part of a slope stability investigation. Hydraulic testing included falling head tests in individual piezometers and a pump test to evaluate the transmissivity of a fault zone encountered during drilling. The following information was extracted from this report:

- summary of piezometer installation data as well as hydraulic testing results
- hydrogeologic cross-section through east wall

International Water Supply Ltd., May 1987. *Water Well Development Report.* Report #1

Numerous boreholes were drilled upstream of the Rose Creek tailings impoundment in May 1986 to study the potential of the Rose Creek valley aquifer to augment the freshwater supply of the mill during the low flow winter months. Several pumptests were performed to estimate the transmissivity of the aquifer and three pumping wells were eventually put into production. The following information was extracted from this report:

- site plan showing locations of drill holes
- two hydrogeologic cross-sections through the valley aquifer
- selected borehole logs

EBA Engineering Consultants, July 1989. *Piezometer and Dewatering Well Installation Report. Grum, Vangorda and Faro Mine Sites.* Report Nos. 0201-100018, 0201-10027, and 0201-10028

Piezometers and dewatering wells were completed at four different sites at the Anvil Range mining complex from March to April 1989. Three piezometers and two dewatering wells were completed in the "Thalweg Aquifer" just east of the (then proposed) Grum Pit. Four piezometers were installed to the east

of the Vangorda Pit. Five piezometers were installed in three boreholes below the Sulphide waste dump (so called "sulphide series") and a single large diameter piezometer was installed in the Zone II waste dump. The following information was extracted from this report:

- site plan showing locations of piezometers/dewatering wells at Grum site
- borehole logs at Grum site
- site plan showing locations of piezometers at Vangorda site
- borehole logs at Vangorda site
- site plans showing approximate locations of piezometers at Faro site
- borehole logs at Faro site

SRK-Robinson Inc., November 1994. ***Construction Report - Vangorda Rehabilitation PWGSC Project 760831, Vangorda Plateau, Faro Mine, Yukon Territory.*** **Project No. P225101.**

Several groundwater wells and shallow piezometers were installed downstream of the Vangorda rock pile as part of the rehabilitation project of the Vangorda mine rock facility in order to allow monitoring of water quality of seepage reporting from the pile. Five monitoring wells were completed at greater depths in the overburden soils downstream of the new seepage collection channel. Nine monitoring wells were drilled through the mine rock and shallow piezometers installed in overburden soils near the base of the mine rock pile. The following information was extracted from this report:

- summary of piezometer installation data and hydraulic testing
- selected borehole logs

Steffen, Robertson and Kirsten, December 1994. ***Groundwater Investigation - North Fork of Rose Creek, Faro Mine, Yukon Territory.*** **Project No. A114101.**

Steffen, Robertson and Kirsten (Canada) Inc. drilled several boreholes and installed mulitlevel piezometers to evaluate the potential sources of contamination in the North Fork of Rose Creek, located to the south of the Faro main pit and the backfilled Zone 2 pit. Five deep boreholes were drilled into intact bedrock in the vicinity of the Zone 2 pit and seven shallow boreholes were drilled into the overburden soils at the toe of the Zone 2 and the Northeast Rock piles. Hydraulic testing, including packer tests and slug tests, was performed in most piezometers. The following information was extracted from this report:

- hydrogeologic cross-section from the Faro main pit via Zone 2 pit into the valley of the North Fork of Rose Creek
- summary of piezometer installation data and hydraulic testing
- selected borehole logs

Piteau Associates, 1995. ***Current Groundwater Conditions in the Southeast Walls of the Grum Pit.*** **Letter Report dated June 23, 1995.**

This short report gives a brief review of the current monitoring data for wells in the Grum pit area and gives recommendations on how to control groundwater inflows into the Grum pit originating from the thalweg aquifer to the southeast of the Grum Pit. The following information was extracted from this report:

- site plan showing locations of piezometers/dewatering wells at Grum site (status Dec. 1994)
- hydrographs for pumping and observation wells
- summary of water levels in dewatering/piezometer wells at Grum site
- hydrogeological cross-sections through thalweg aquifer

Robertson GeoConsultants Inc., 1996. *Anvil Range Mining Complex - 1996 Drilling and Piezometer Installation Program*. Report No. 033002/1

A series of monitoring wells were completed at the Faro and Vangorda Plateau minesites in August-September 1996 as part of this closure plan study. A total of nine piezometers were installed in three drill holes in the valley aquifer underlying the Intermediate Tailings Impoundment, replacing older licenced monitoring wells now destroyed. Two piezometers were installed into the toe drain of the Intermediate Dam to monitor the pore pressures in the toe drain of the dam. Four piezometers were installed in three drill holes downstream of the Faro rock dumps for future monitoring of seepage quality. Two piezometers were installed in a borehole drilled downstream of the Grum Main dump for seepage quality monitoring. Hydraulic testing was performed at selected piezometers. The following information was extracted from this report:

- summary of piezometer installation data
- summary of hydraulic testing results
- borehole logs

International Groundwater Supply Ltd.

December 1967

Groundwater Investigation

Summary of test wells drilled during 1967 groundwater investigation (after International Water Supply, 1967)

Test Well	Coordinates (UTM)*		Ground Elevation (MASL)	Static Water level, Oct. '7 (MASL)	Depth to Bedrock (m)
	North	East			
1/67	6912783	583049	1045.6	1030.1	43.6
2/67	6913061	582576	1039.2	1026.1	35.7
3/67	6913354	582613	1041.3	1039.2	>21.6
4/67	6913008	582497	1038.3		>4.9
5/67	6913491	582791	1044.7		>19.5
6/67	6913228	582602	1041.3	1038.6	24.4
7/67	6913790	582970	1050.5		16.2
8/67	6912735	583406	1051.7	1048.7	>29.9
9/67	6912347	583900	1067.8	1061.4	20.1
10/67	6912221	584373	1066.3	1064.2	11.9
11/67	6911933	584971	1070.6		14.6
Anvil Camp Well	6913349	582426	1047.7	1036.4	23.2

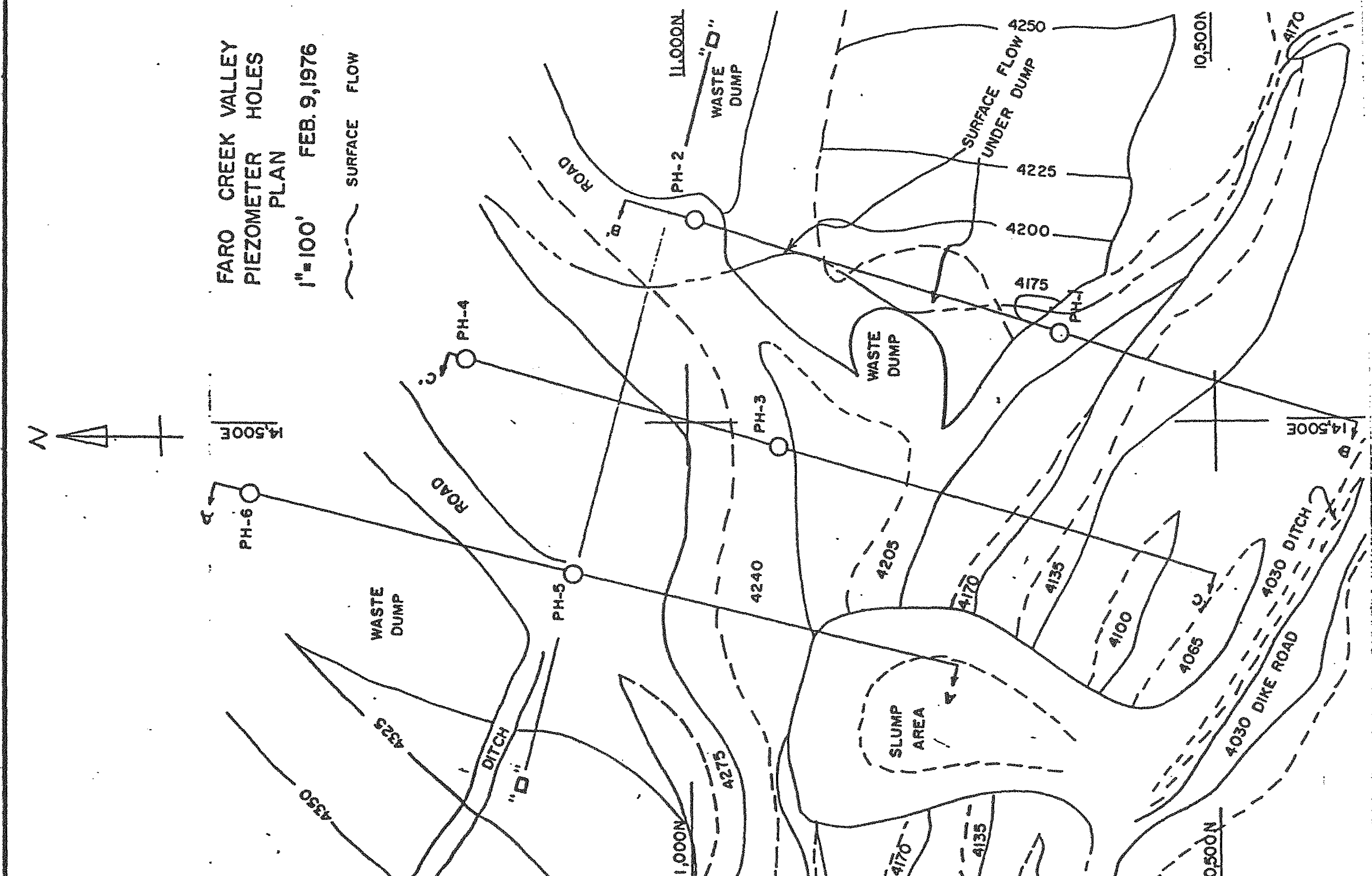
* approximate coordinates based on location map shown in IWS, 1967

Piteau Gadsby MacLeod Ltd.

February 27, 1976

Drilled for Stratigraphy and Groundwater Observations
in Faro Valley Overburden

Report No. 75 - 055



Notes

1) Topography supplied by Cyprus Anvil

2) Topographic details within the slump area are not available

3) Line D-D is to assist matching the sections A-A, B-B and C-C.

Cyprus Anvil Mining Corp.	PITEAU GADSBY MACLEOD LIMITED GEOTECHNICAL CONSULTANTS NORTH VANCOUVER, B.C.		
Faro Valley Overburden Faro, Yukon	Site Plan	BY RCD APPROVED 75-055	DATE 23Feb7 DWG. 055-1

Surface mapping of pit slope July 1975

"D"

4300

4200

4100

4000

Dumped waste

Fill for roads

Clayey SILT

SILT with cobbles

Gravelly SAND

CLAYS, SILTS and fine SANDS

July 75

PH-1

ST

P151

P178

Nov. 19/77

Rock seen @ seam #5

1711.5°

"Alluvium

GRAVEL and sand, possibly some silt, boulders.

Bedded:
SAND
clayey SILT
GRAVEL

PH-2

SP

Nov. 19/77

P231

P180

"Dumped waste"

"Alluvium"

CLAY and silt, some gravel and sand, brown

Bedded:
SAND, trace of silt,
laminated SILT
silty CLAY
varying amounts of gravel

Bedrock

Scale: 1 in = 50 ft.

Cyprus Anvil Mining Corp.	PITEAU GADSBY MACLEOD LIMITED GEOTECHNICAL CONSULTANTS NORTH VANCOUVER, B.C.		
Faro Valley Overburden Faro, Yukon	Section B-B	BY RCD	DATE 23Feb76
		APPROVED 75-055	DWG. 055-4

Summary of piezometer installation, Faro Valley Rock Dump, November, 1975 to January, 1976 (after Piteau et al., 1976).

Borehole/ Piezometer	Ground elevation (feet a.s.l.)	UTM coordinates (feet)		Depth to bedrock (feet b.g.s.)	Screened interval (feet b.g.s.)	Lithology	Type of piezometer
		East	North				
PH 1	4077.47	1,918,073	22,688,091	123	0 - 29	"waste rock" over "alluvium"	standpipe
P 151					57 - 76	bedded sand, clayey rock	pneumatic
P 178					107 - 123	bedrock	pneumatic
PH 2	4143.71	1,918,188	22,688,419	167	0 - 84	"waste rock" over "alluvium"	standpipe
P 231					110 - 123	Sand, some gravel,	pneumatic
P 180					159 - 176	bedrock	pneumatic
PH 3	4136.96	1,917,953	22,688,332	135	0 - 46	"waste rock" over "alluvium"	standpipe
P 230					108 - 129	Sand, some gravel	pneumatic
P 229					145 - 154	bedrock	pneumatic
PH 4	~4212	1,918,043	22,688,657	not completed to bedrock	0 - 93	"waste rock" over "alluvium"	no piezos installed

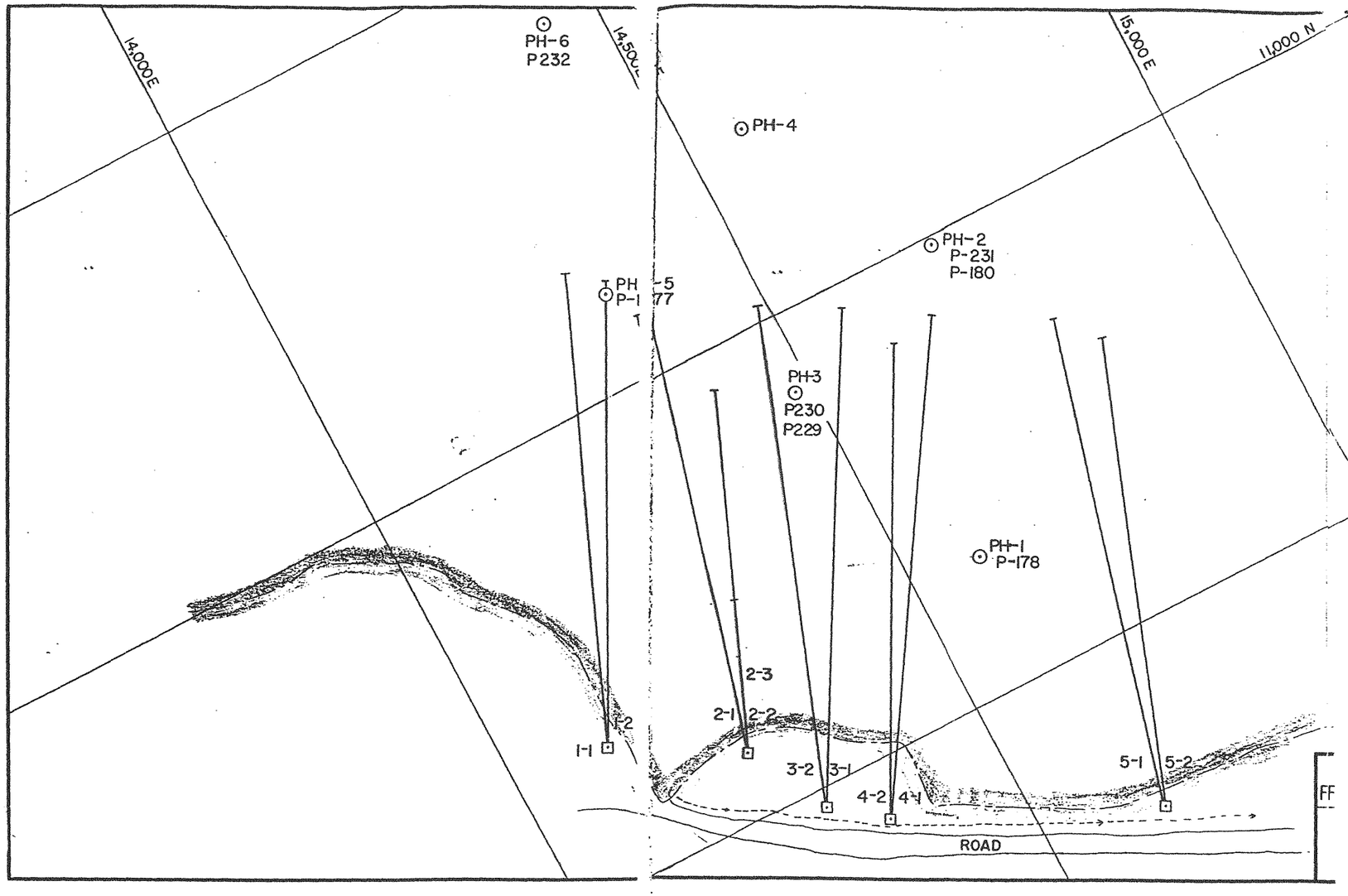
cont'd: Summary of piezometer installation, Faro Valley Rock Dump, November, 1975 to January, 1976 (after Piteau et al., 1976).

Borehole/ Piezometer	Ground elevation (feet a.s.l.)	UTM coordinates (feet)	Depth to bedrock (feet b.g.s.)	Screened Interval (feet b.g.s.)	Lithology	Type of piezometer	
		East	North				
PH 5	4136.96	1,917,820	22,688,546	173	0 - 43	"waste rock" over "alluvium"	standpipe
P 137					43 - 52	as above	pneumatic
P 179					120 - 140	silty sand and gravel	pneumatic
P 177					165 - 187	bedrock	
PH 6	4217.02	1,917,902	22,688,881	183	0 - 45	"waste rock" over "alluvium"	standpipe
P 147					46 - 63	bedded sandy gravel & silty clay	pneumatic
P 153					82 - 95	sand, clayey, some gravel	pneumatic
P 228					111 - 140	gravel and sand	pneumatic
P 232					194 - 204	schist bedrock	pneumatic

Piteau & Associates

January 1978

Drainhole Installation and Related Monitoring for Groundwater Drainage of Faro Valley



LEGEND

Overburden

Bedrock

SYMBOLS

Ditch on 4030 bench

Piezometer hole number and location, and piezometer number — PH-2 P-231

Location of collar of inclined drain

Number and location of inclined drain — 2-2

Contact between bedrock and overburden

SCALE

100 0 100 200

CYPRUS ANVIL
RO VALLEY DEWATERING

D.R. PITEAU AND ASSOCIATES LIMITED
GEOTECHNICAL CONSULTANTS
KAPILANO 100 - SUITE 708
WEST VANCOUVER, BRITISH COLUMBIA

LOCATION PLAN FOR INCLINED DRAINS

BY	DATE
DMM	7/12/77
APPROVED	DWG.
A. Sproat	FIG. 1

TABLE 1

LOCATION AND ORIENTATION OF INCLINED DRAINS

INCLINED DRAIN NUMBER	COLLAR COORDINATES		COLLAR ELEVATION	TREND OF INCLINED DRAIN	PLUNGE OF INCLINED DRAIN	LENGTH OF INCLINED DRAIN
	NORTH	EAST				
1 - 1	10652	14115	4087.2	N 23 E	-7°	550'
1 - 2			4087.7	N 28 E	-8°	540'
2 - 1	10577	14245	4087.8	N 15 E	-8°	520'
2 - 2			4088.2	N 22 E	-11.5°	180'
2 - 3			4088.2	N 22 E	-9.5°	420'
3 - 1	10480	14295	4055.6	N 29 E	-10°	590'
3 - 2			4056.5	N 20 E	-12°	590'
4 - 1	10435	14350	4053.6	N 32 E	-10°	590'
4 - 2			4053.1	N 28 E	-12°	560'
5 - 1	10306	14637	4048.8	N 15 E	-11°	580'
5 - 2			4048.8	N 20 E	-12°	550'

Klohn Leonoff Ltd.

September 1, 1981

Faro Mine Tailings Abandonment Plan
Final Report

File No. VA 2758

LEGEND

- 1981 Drill hole and groundwater sampling point
- 1981 Surface water sampling point
- 1981 Sediment sampling point
- 1981 Stream gauging site
- 1981 Drill hole
- Golder drill hole and groundwater sampling point (1981)

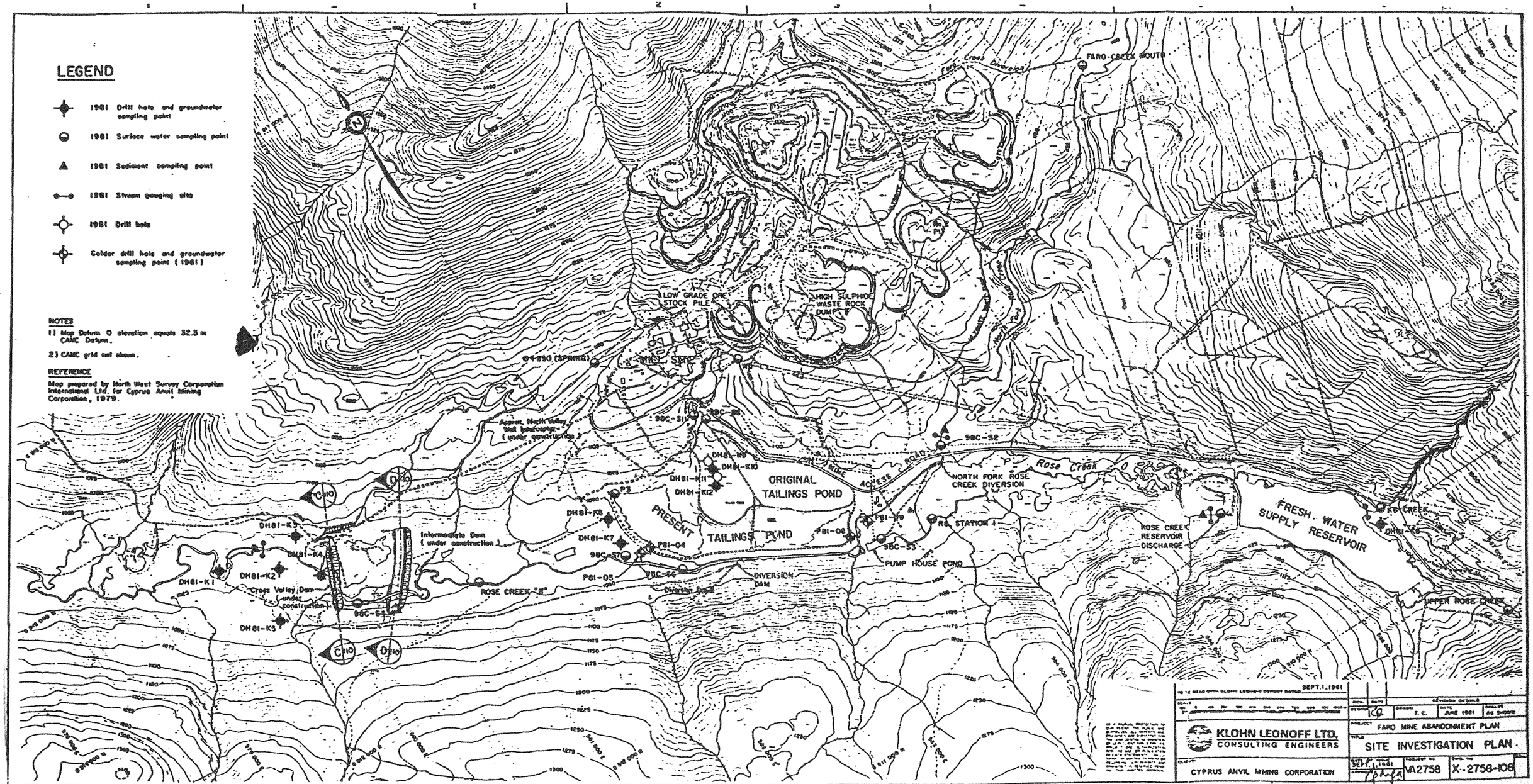
NOTES

1) Map Datum 0 elevation equals 32.5 m CANC Datum.

2) CANC grid not shown.

REFERENCE

Map prepared by North West Survey Corporation International Ltd. for Cyprus Anvil Mining Corporation, 1979.



KLOHN LEONOFF LTD. CONSULTING ENGINEERS

CYPRUS ANVIL MINING CORPORATION

FARO MINE ABANDONMENT PLAN

SITE INVESTIGATION PLAN

SEPT. 1, 1981 | VA2758 | X-2758-108

SEPT. 1, 1981 | F.C. | JUNE 1981 | AS SHOWN

ROBERTSON GEOCONSULTANTS INC.
Consulting Geotechnical and Environmental Engineers

Anvil Range Mining Corporation

Anvil Complex Closure Plan

DH81 series KL Drilling Program

PROJECT NO. 033001 | DATE Jan. 1997 | APPROVED | FIGURE

GEOLOGIC LOG OF DRILL HOLE

JOB NO VA2758
CLIENT CYPRUS ANVIL MINING CORP
PROJECT ABANDONMENT PLAN
HOLE NO DH 81-K1
LOCATION 2626.75 N (Surveyed by Underhill)
630.52 W
AZIMUTH
DIP
ELEV GROUND 1048.21m.
ELEV. TOP OF ROCK 33.40

DRILLING CONTRACTOR MIDNIGHT SUN
DATE HOLE STARTED MAR. 16, 1981
DATE HOLE FINISHED MAR. 18, 1981
TYPE OF DRILLING OVERBURDEN tricone, air rotary (15cm)
ROCK tricone, air rotary (15cm)
THICKNESS OF OVERBURDEN 173 ft (52.7 m)
DEPTH INTO ROCK 5 ft
TOTAL DEPTH OF HOLE 178 ft (54.3m)
NO OF PIEZOMETERS INSTALLED 2
LOGGED BY CL/DL

1014.81

DEPTH (m)	ELEV (m)	SYMBOL	DESCRIPTION
			Excavation Spoil
			Organic Layer
5			Clean Sand and Gravel
			Silty Sand and Gravel (brown)
10			
			Silty Sand (dark grey)
15			
			Silt (dark grey)
			Clay or Silt (dark grey, plastic)
20			
			Uniform Pebbly Sand
25			
			Sandy Gravel
30			
35			
			Stratified medium to fine grained material. Some undecomposed organics. Very little clay
40			
45			
			Clean Sandy Gravels and Gravelly Sands END OF HOLE AT 54m.
50			

PACKER TEST SECTION

PERMEABILITY (cm/sec)
3×10^{-2}

RETURN FLOW RATE (l/sec)
2 4 6 8

PIEZOMETER INSTALLATION

REMARKS ON INSTALLATION
1½" ID PVC
3" ID PVC
3" 60 slot Johnson screen
end of ¾" ID PVC
bentonite plug mud ¾" PVC

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JOB NO VA2758
PROJECT CYPRUS ANVIL ABANDONMENT
LOCATION FARO, Y.T.
HOLE NO DH 81-K1
DATE MAR 24/81 PLATE 1

GEOLOGIC LOG OF DRILL HOLE

JOB NO. VA275B
CLIENT CYPRUS ANVIL MINING CORP.
PROJECT ABANDONMENT PLAN
HOLE NO. DH # 81-K2
LOCATION 2429.06 N
330.18 W
AZIMUTH
DIP
ELEV. GROUND 1046.60 m.
ELEV. TOP OF ROCK 33.4

DRILLING CONTRACTOR MIDNIGHT SUN
DATE HOLE STARTED MAR. 16, 1981
DATE HOLE FINISHED MAR. 19, 1981
TYPE OF DRILLING OVERBURDEN tricone, air rotary (15cm)
ROCK tricone, air rotary (15cm)
THICKNESS OF OVERBURDEN 75 ft (22.9m)
DEPTH INTO ROCK 7 ft (2.1m)
TOTAL DEPTH OF HOLE 82 ft (25 m)
NO OF PIEZOMETERS INSTALLED 2
LOGGED BY CL/DL

1013.2

DEPTH (m)	ELEV. (m)	SYMBOL	DESCRIPTION
0			Organic layer
			Silty Sand and Gravel
5			
10			Sand and Gravel, braun trace of silt
15			
			Silty Sand and Gravel, grey
20			Sandy Gravel with minor sand lenses
			Bedrock
25			
30			

Note: P_2 installed in a separate drill hole.

PACKER TEST SECTION

PERMEABILITY (cm/sec)
3×10^{-2}
6×10^{-2}

RETURN FLOW RATE (l/sec)
2 4 6 8

PIEZOMETER INSTALLATION
1" ID PVC PIPE
3" ID PVC PIPE
3" x 60 slot Johnson Screen

REMARKS ON INSTALLATION

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CONSULTING ENGINEERS

JOB NO VA275B
PROJECT CYPRUS ANVIL ABANDONMENT
LOCATION FARO, Y.T.
HOLE NO DH # 81-K2
DATE MAR 24/81 PLATE 2

GEOLOGIC LOG OF DRILL HOLE

JOB NO VA 2758
CLIENT CYPRUS ANVIL MINING CORP
PROJECT ABANDONMENT PLAN
HOLE NO. DH# 81-K3
LOCATION 2493.63 N
98.96 W
AZIMUTH
DIP
ELEV. GROUND 1051.27 m.
ELEV. TOP OF ROCK

DRILLING CONTRACTOR MIDNIGHT SUN
DATE HOLE STARTED MAR. 12, 1981
DATE HOLE FINISHED MAR. 12, 1981
TYPE OF DRILLING OVERBURDEN: tricone, air rotary (15cm)
ROCK: tricone, air rotary (15cm)
THICKNESS OF OVERBURDEN 53ft (16.1m)
DEPTH INTO ROCK 22 ft (6.7m)
TOTAL DEPTH OF HOLE 75 ft (22.9m)
NO OF PIEZOMETERS INSTALLED 2
LOGGED BY DL/CL

ELEV. (m)	SYMBOL	DESCRIPTION
		Sand and Gravel
		Organic Zone
		Sand
		Organics
		Coarse Sand and Gravel trace silt
		Coarse Pebbly Sand
		Fine Pebbly Sand
		Bedrock with broken seams

PACKER TEST SECTION | PERMEABILITY (cm/sec) | RETURN FLOW RATE (l/sec) 0.1 0.2 0.3 0.4 | PIEZOMETER INSTALLATION | REMARKS ON INSTALLATION

PERMEABILITY: 2×10^{-2}; 3×10^{-4}

PIEZOMETER INSTALLATION: 1" I.D. PVC PIPE

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CONSULTING ENGINEERS

JOB NO VA2758
PROJECT CYPRUS ANVIL ABANDONMENT
LOCATION FARO, Y.T.
HOLE NO DH# 81-K3
DATE MAR 24/81 PLATE 3

GEOLOGIC LOG OF DRILL HOLE

JOB NO VA 2758
CLIENT CYPRUS ANVIL MINING CORP.
PROJECT ABANDONMENT PLAN
HOLE NO DH # 81-K4
LOCATION 2229.12 N
154.15 W
AZIMUTH
DIP
ELEV. GROUND 1052.74 m.
ELEV. TOP OF ROCK 33.40

DRILLING CONTRACTOR MIDNIGHT SUN
DATE HOLE STARTED MAR. 13 1981
DATE HOLE FINISHED MAR. 14 1981
TYPE OF DRILLING OVERBURDEN tricone, air rotary (15cm)
ROCK tricone, air rotary (15cm)
THICKNESS OF OVERBURDEN 125 ft. (38 m.)
DEPTH INTO ROCK 5 ft. (1.5 m.)
TOTAL DEPTH OF HOLE 130 ft. (39.5 m.)
NO OF PIEZOMETERS INSTALLED 2
LOGGED BY CL / DL

1019.34

DEPTH (m)	ELEV (m)	SYMBOL	DESCRIPTION
5			Moist soil, some organic Spoils from excavation
			Saturated silty soil
			Sandy silt
			Boulder
10			Till
			Moist Sand & Gravel
15			
			Saturated silt (dark grey)
20			
25			
			Sand & Gravel (gravelly)
30			
			Sand & Gravel (some silt)
35			Sand & Gravel (gravelly)
			Bedrock
40			END OF HOLE

PACKER TEST SECTION

PERMEABILITY (cm/sec): $>1 \times 10^{-2}$

RETURN FLOW RATE (l/sec): 2, 4, 6, 8

PIEZOMETER INSTALLATION

REMARKS ON INSTALLATION: 1" ø PVC PIPE

SPECIFIC CONDUCTIVITY (μA): 250, 260

KLOHN LEONOFF LTD.
CONSULTING ENGINEERS

JOB NO VA 2758
PROJECT CYPRUS ANVIL ABANDONMENT
LOCATION FARO, Y. T.
HOLE NO DH # 81-K4
DATE APRIL 1981 PLATE 4

GEOLOGIC LOG OF DRILL HOLE

JOB NO VA 275B
CLIENT CYPRUS ANVIL MINING CORP.
PROJECT ABANDONMENT PLAN
HOLE NO DH # 81-K5
LOCATION 2220.68 N
613.27 W
AZIMUTH
DIP
ELEV. GROUND 1060.68 m.
ELEV. TOP OF ROCK

DRILLING CONTRACTOR MIDNIGHT SUN
DATE HOLE STARTED MAR. 14 1981
DATE HOLE FINISHED MAR. 15 1981
TYPE OF DRILLING OVERBURDEN tricone, air rotary (15cm)
ROCK tricone, air rotary (15cm)
THICKNESS OF OVERBURDEN 115 ft (35 m)
DEPTH INTO ROCK 25 ft (7.6m)
TOTAL DEPTH OF HOLE 140 ft (42.7m)
NO OF PIEZOMETERS INSTALLED 1
LOGGED BY CL / DL

DEPTH (m)	ELEV. (m)	SYMBOL	DESCRIPTION
			Frozen Peat
5			Frozen Organic Silty Sand
10			Silty Sand and Gravel
15			Clean Sand and Gravel
20			Silty Sand and Gravel
25			Sand and Silt
			Boulder
30			Gravelly Sand
			Till?
35			Lean Till
40			Bedrock with seams of broken rock
			END OF HOLE

PACKER TEST SECTION

PERMEABILITY (cm/sec): 6×10^{-3}

RETURN FLOW RATE (l/sec): 2, 4, 6, 8

PIEZOMETER INSTALLATION

REMARKS ON INSTALLATION: 1½" ID PVC PIPE; 43m lost casing

SPECIFIC CONDUCTIVITY (μ Amp.): 280

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CONSULTING ENGINEERS

JOB NO VA 275B
PROJECT CYPRUS ANVIL ABANDONMENT
LOCATION FARO, Y.T.
HOLE NO DH # 81-K5
DATE MAR 24/81 . PLATE 5

GEOLOGIC LOG OF DRILL HOLE

JOB NO VA 2758
CLIENT CYPRUS ANVIL MINING CORP.
PROJECT ABANDONMENT PLAN
HOLE NO DH # 81 - K6
LOCATION 1418.64 N
1790.20 E
AZIMUTH
DIP
ELEV GROUND 1076.92 m.
ELEV. TOP OF ROCK

DRILLING CONTRACTOR MIDNIGHT SUN
DATE HOLE STARTED MAR. 19, 1981
DATE HOLE FINISHED MAR. 20, 1981
TYPE OF DRILLING OVERBURDEN tricone, air rotary (15cm)
ROCK tricone, air rotary (15cm)
THICKNESS OF OVERBURDEN 125 ft. (38.1 m.)
DEPTH INTO ROCK 5 ft. (1.5 m.)
TOTAL DEPTH OF HOLE 130 ft. (39.6 m.)
NO OF PIEZOMETERS INSTALLED 3
LOGGED BY C.L./ D.L.

DEPTH (m)	ELEV (m)	SYMBOL	DESCRIPTION	PACKER TEST SECTION	PERMEABILITY (cm/sec)	RETURN FLOW RATE (l/sec) 2 4 6 8	PIEZOMETER INSTALLATION	REMARKS ON INSTALLATION	SPECIFIC CONDUCTIVITY (μ mho)
5			Silty Sand & Gravel (stony)					1½" ID PVC PIPE	
10			Moist Sand & Gravel		5×10^{-3}	not measurable			
15			Silt (non-plastic)						
20									
25									480
30			Gravelly sand with several fine sand layers		1×10^{-2}				550 435
35						6			380
40			Bedrock		1×10^{-2}				
			END OF HOLE						285

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JOB NO VA 2758
PROJECT CYPRUS ANVIL ABANDONMENT
LOCATION FARO, Y.T.
HOLE NO DH # 81-K6
DATE APRIL 5 1981 PLATE 6

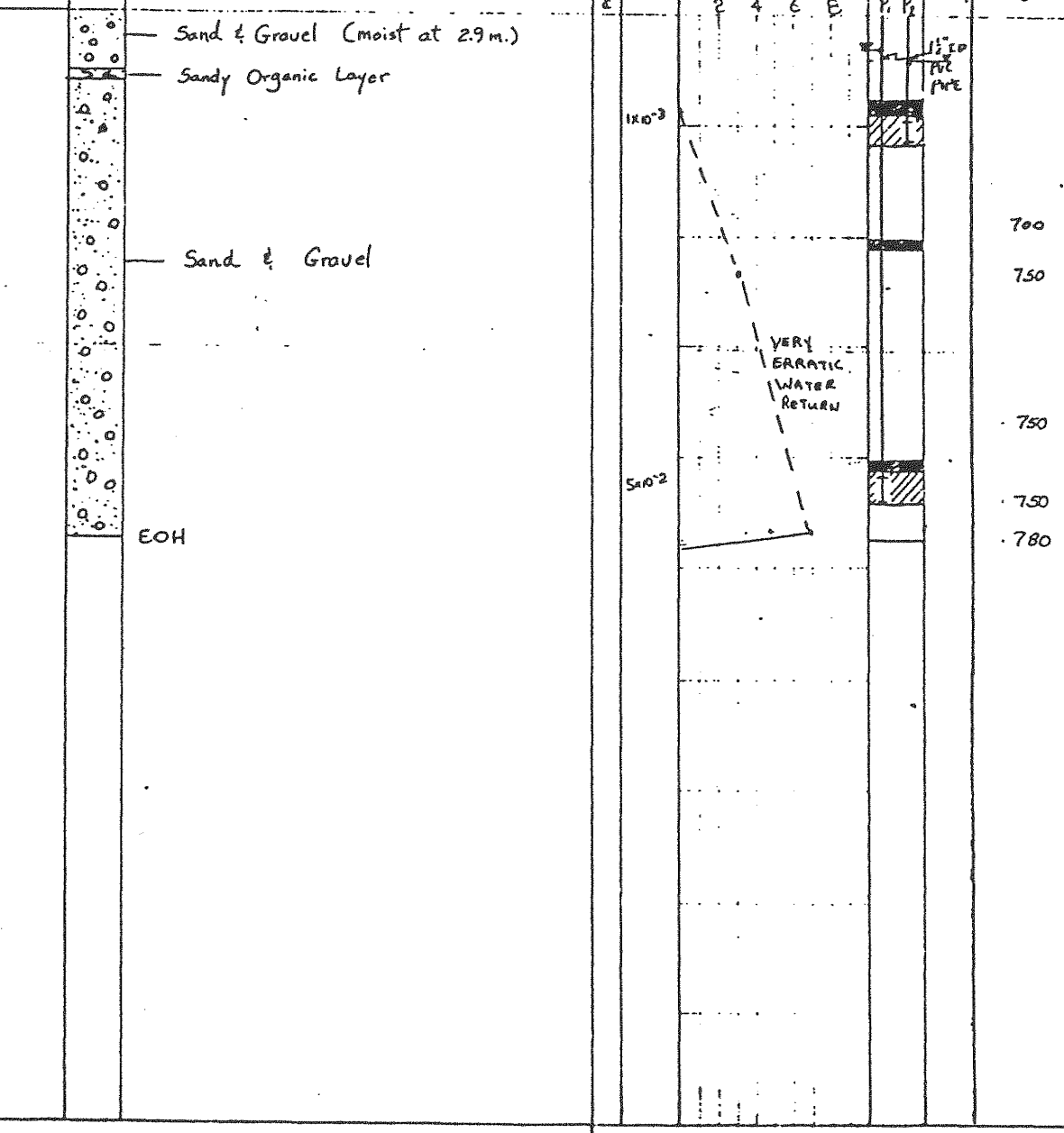
GEOLOGIC LOG OF DRILL HOLE

JOB NO VA 2758
CLIENT CYPRUS ANVIL MINING CORP.
PROJECT ABANDONMENT PLAN
HOLE NO DH # 81-K7
LOCATION 1252.56 N
1752.18 E
AZIMUTH
DIP
ELEV. GROUND 1068.22 m.
ELEV TOP OF ROCK 33.4

DRILLING CONTRACTOR MIDNIGHT SUN
DATE HOLE STARTED MAR. 20 1981
DATE HOLE FINISHED MAR. 21 1981
TYPE OF DRILLING OVERBURDEN tricone, air rotary (15cm)
ROCK
THICKNESS OF OVERBURDEN 78 ft. (23.8m.)
DEPTH INTO ROCK
TOTAL DEPTH OF HOLE 78 ft. (23.8m)
NO OF PIEZOMETERS INSTALLED 2
LOGGED BY C.L. / D.L.

DEPTH (m)	ELEV (m)	SYMBOL	1034.82 DESCRIPTION
5			Sand & Gravel (moist at 2.9 m.)
			Sandy Organic Layer
10			Sand & Gravel
15			
20			
25			EOH
30			

PACKER TEST SECTION | PERMEABILITY (cm/sec) | RETURN FLOW RATE (l/sec) | PIEZOMETER INSTALLATION | REMARKS ON INSTALLATION | SPECIFIC CONDUCTIVITY (μ mho)



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CONSULTING ENGINEERS

JOB NO VA 2758
PROJECT CYPRUS ANVIL ABANDONMENT
LOCATION FARO, Y.T.
HOLE NO DH # 81-K7
DATE APRIL 6 1981 PLATE 7

GEOLOGIC LOG OF DRILL HOLE

JOB NO VA 2758
CLIENT CYPRUS ANVIL MINING CORP.
PROJECT ABANDONMENT PLAN
HOLE NO DH # 81-K8
LOCATION 2284.58 S
229.64 E
AZIMUTH
DIP
ELEV GROUND 1130.13
ELEV TOP OF ROCK

DRILLING CONTRACTOR MIDNIGHT SUN
DATE HOLE STARTED MAR. 21 1981
DATE HOLE FINISHED MAR. 21 1981
TYPE OF DRILLING OVERBURDEN tricone, air rotary (15cm)
ROCK
THICKNESS OF OVERBURDEN 58 ft. (17.8 m)
DEPTH INTO ROCK
TOTAL DEPTH OF HOLE 58 ft. (17.8m)
NO OF PIEZOMETERS INSTALLED 1
LOGGED BY C.L. / D.L.

DEPTH (m)	ELEV (m)	SYMBOL	DESCRIPTION
			Forzen silty Sand & Gravel (sand lenses)
5			Boulder.
			Moist silty Sand & Gravel
			Sand & Gravel (some water return)
10			
			Sand & Gravel (occasional boulder)
15			
		a b	Silty Sand & Gravel (Till)
			END OF HOLE
20			
25			
30			

PACKER TEST SECTION

PERMEABILITY (cm/sec)

5×10^{-3}

RETURN FLOW RATE (l/sec)

2 4 6 8

not measured

PIEZOMETER INSTALLATION

1½" ID PVC PIPE

REMARKS ON INSTALLATION

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JOB NO VA 2758
PROJECT CYPRUS ANVIL - ABANDONMENT
LOCATION FALO, Y.T.
HOLE NO DH # 81-K8
DATE APRIL 6 1981 PLATE 8

GEOLOGIC LOG OF DRILL HOLE

JOB NO VA2758
CLIENT CYPRUS ANVIL MINING CORP
PROJECT ABANDONMENT PLAN
HOLE NO DH 81-K9
LOCATION ON OLD TAILINGS POND

AZIMUTH
DIP
ELEV. GROUND APPROX 1095
ELEV TOP OF ROCK

DRILLING CONTRACTOR CAMC
DATE HOLE STARTED
DATE HOLE FINISHED
TYPE OF DRILLING OVERBURDEN PERCUSSION
ROCK
THICKNESS OF OVERBURDEN
DEPTH INTO ROCK
TOTAL DEPTH OF HOLE 6m
NO OF PIEZOMETERS INSTALLED 1
LOGGED BY DL

DEPTH (m)	ELEV (m)	SYMBOL	DESCRIPTION	PACKER TEST SECTION	PERMEABILITY (cm/sec)	RETURN FLOW RATE (l./sec) 1 2 3 4	PIEZOMETER INSTALLATION
5			Tailings - no water return. - hole caved during piezometer installation.				1" ID PVC PIPE (DRY)
10							

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JOB NO VA2758
PROJECT CYPRUS ANVIL ABANDONMENT
LOCATION FARO, Y.T
HOLE NO DH 81-K9
DATE PLATE 9

GEOLOGIC LOG OF DRILL HOLE

JOB NO VA2758
CLIENT Cyprus Anvil Mining Corp
PROJECT Abandonment Plan
HOLE NO DHB1-K10
LOCATION on old tailings pond

AZIMUTH
DIP
ELEV GROUND approx 1099
ELEV TOP OF ROCK

DRILLING CONTRACTOR CAMC
DATE HOLE STARTED
DATE HOLE FINISHED
TYPE OF DRILLING OVERBURDEN Percussion
ROCK
THICKNESS OF OVERBURDEN
DEPTH INTO ROCK
TOTAL DEPTH OF HOLE 6.2 m
NO OF PIEZOMETERS INSTALLED 1
LOGGED BY DL

DEPTH (m)	ELEV (m)	SYMBOL	DESCRIPTION	PACKER TEST SECTION	PERMEABILITY (cm/sec)	RETURN FLOW RATE (l/sec) 1 2 3 4	PIEZOMETER INSTALLATION
5			Tailings - water slurry return near bottom of hole.		2.5×10^{-5}		¾" PVC pipe; grout tip.
10							

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JOB NO VA2758
PROJECT Cyprus Anvil Abandonment
LOCATION Faro, Y.T.
HOLE NO DHB1-K10
DATE
PLATE 10

GEOLOGIC LOG OF DRILL HOLE

JOB NO VA 2758
CLIENT Cyprus Anvil Mining Corp
PROJECT Abandonment Plan
HOLE NO DH81-K11
LOCATION on old tailings pond

AZIMUTH
DIP
ELEV GROUND approx 1099
ELEV TOP OF ROCK

DRILLING CONTRACTOR CAMC
DATE HOLE STARTED
DATE HOLE FINISHED
TYPE OF DRILLING OVERBURDEN Percussion
ROCK
THICKNESS OF OVERBURDEN
DEPTH INTO ROCK
TOTAL DEPTH OF HOLE 4.3
NO OF PIEZOMETERS INSTALLED 1
LOGGED BY DL

DEPTH (m)	ELEV (m)	SYMBOL	DESCRIPTION	PACKER TEST SECTION	PERMEABILITY (cm/sec)	RETURN FLOW RATE (l/sec) 1 2 3 4	PIEZOMETER INSTALLATION
			Tailings - water slurry return near bottom of hole.				¾" PVC pipe; Perforated tip (Dry)
5							
10							

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CONSULTING ENGINEERS

JOB NO VA 2758
PROJECT Cyprus Anvil Abandonment
LOCATION Faro, Y.T.
HOLE NO DH81-K11
DATE
PLATE 11

GEOLOGIC LOG OF DRILL HOLE

JOB NO VA2758
CLIENT Cyprus Anvil Mining Corp.
PROJECT Abandonment Plan
HOLE NO DH81-K12
LOCATION on old tailings pond.

AZIMUTH
DIP
ELEV GROUND approx 1099 m
ELEV TOP OF ROCK

DRILLING CONTRACTOR CAMC
DATE HOLE STARTED
DATE HOLE FINISHED
TYPE OF DRILLING OVERBURDEN Percussion
ROCK
THICKNESS OF OVERBURDEN
DEPTH INTO ROCK
TOTAL DEPTH OF HOLE 4.3 m
NO OF PIEZOMETERS INSTALLED 1
LOGGED BY DL

DEPTH (m)	ELEV (m)	SYMBOL	DESCRIPTION	PACKER TEST SECTION	PERMEABILITY (cm/sec)	RETURN FLOW RATE (l/sec) 1 2 3 4	PIEZOMETER INSTALLATION
			Tailings - water slurry return near bottom of hole.		7×10^{-5}		¾" PVC Pipe; Perforated Tip
5							
10							

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CONSULTING ENGINEERS

JOB NO VA2758
PROJECT Cyprus Anvil Abandonment
LOCATION Faro, Y.T.
HOLE NO DH81-K12
DATE
PLATE 12

TABLE IV-2

PIEZOMETER INSTALLATION DATA

Piezometer No.	Ground Elevation (m)	Test Zone, (m below G.L.)	Height above G.L. (m)	Depthto Water (mbelow G.L.)	Water Elevation, (m)
DH81-K1-P1	1048.21	20 - 34	0.10	4.45	1043.86
-P2	1048.21	3 - 6	0.5	5.20	1043.51
DH81-K2-P1	1046.60	17 - 25	1.0	3.12	1044.48
-P2	1046.60	4.5 - 6.2	0.5	2.76	1044.34
DH81-K3-P1	1051.27	16.6 - 22.8	0.4	6.62	1045.05
-P2	1051.27	8.8 - 10.6	0.4	6.51	1045.16
DH81-K4-P1	1052.74	25.0 - 28.7	0.4	7.92	1045.22
-P2	1052.74	10 - 24	0.5	7.88	1045.36
DH81-K5-P1	1060.68	15 - 28	0.4	16.31	1044.77
DH81-K6-P1	1076.92	37.1 - 40.1	0.5	9.64	1067.78
-P2	1076.92	27 - 29.5	0.6	9.75	1067.77
-P3	1076.92	6 - 13	0.5	9.40	1068.02
DH81-K7-P1	1068.22	20.1 - 23.8	0.4	1.50	1067.12
P2	1068.22	4.3 - 10.1	0.7	1.98	1066.94
DH81-K8-P1	1130.13	9.2 - 17.0	0.6	6.65	1124.04
DH81-K9-P1	1095 (approx.)	3.0	0.5	Dry	-----
DH81-K10-P1	1099 (approx.)	4.80- 6.2	0.5	4.80	1095 (approx.)
DH81-K11-P1	1099 (approx.)	4.3	0.5	Dry	-----
DH81-K12-P1	1099 (approx.)	3.8 - 4.3	0.5	3.75	1096 (approx.)

TABLE IV-2

PIEZOMETER INSTALLATION DATA

Piezometer No.	Ground Elevation (m)	Test Zone, (m below G.L.)	Height above G.L. (m)	Depthto Water (mbelow G.L.)	Water Elevation, (m)
DH81-K1-P1	1048.21	20 - 34	0.10	4.45	1043.86
-P2	1048.21	3 - 6	0.5	5.20	1043.51
DH81-K2-P1	1046.60	17 - 25	1.0	3.12	1044.48
-P2	1046.60	4.5 - 6.2	0.5	2.76	1044.34
DH81-K3-P1	1051.27	16.6 - 22.8	0.4	6.62	1045.05
-P2	1051.27	8.8 - 10.6	0.4	6.51	1045.16
DH81-K4-P1	1052.74	25.0 - 28.7	0.4	7.92	1045.22
-P2	1052.74	10 - 24	0.5	7.88	1045.36
DH81-K5-P1	1060.68	15 - 28	0.4	16.31	1044.77
DH81-K6-P1	1076.92	37.1 - 40.1	0.5	9.64	1067.78
-P2	1076.92	27 - 29.5	0.6	9.75	1067.77
-P3	1076.92	6 - 13	0.5	9.40	1068.02
DH81-K7-P1	1068.22	20.1 - 23.8	0.4	1.50	1067.12
P2	1068.22	4.3 - 10.1	0.7	1.98	1066.94
DH81-K8-P1	1130.13	9.2 - 17.0	0.6	6.65	1124.04
DH81-K9-P1	1095 (approx.)	3.0	0.5	Dry	-----
DH81-K10-P1	1099 (approx.)	4.80- 6.2	0.5	4.80	1095 (approx.)
DH81-K11-P1	1099 (approx.)	4.3	0.5	Dry	-----
DH81-K12-P1	1099 (approx.)	3.8 - 4.3	0.5	3.75	1096 (approx.)

TABLE IV-1

PERMEABILITY TEST RESULTS

ɜzometer No.	Depth (m)	Material	Permeability (kin cm/sec) Falling Head	Rising Head	Pump Test Steady State/Transient State
81-K1-P1	20-34	SG	------	------	$2x10^{-2}/4x10^{-2}$
81-K1-P2	3-6	SG	------	------	---------
81-K2-P1	17-25	SG	------	------	$5x10^{-2}/8x10^{-2}$
81-K2-P2	4.5-6.2	SG	$>1.5x10^{-2}$	$>1.8x10^{-2}$	$2x10^{-2}/5x10^{-2}$
81-K3-P1	16.6-22.8	B	$3.8x10^{-4}$	$1.3x10^{-4}$	---------
81-K3-P2	8.8-10.6	SSG	$2.2x10^{-2}$	$2.2x10^{-2}$	---------
81-K4-P1	25-28.7	SG	$>1.0x10^{-2}$	$>1.0x10^{-2}$	---------
81-K4-P2	10-24	SG	------	------	---------
81-K5-P1	19-21	SSG	$>5.7x10^{-3}$	$>5.7x10^{-3}$	---------
81-K6-P1	37-40	SG	$>1.4x10^{-2}$	$>1.4x10^{-2}$	---------
81-K6-P2	27-29	SG	$>1.1x10^{-2}$	$>1.1x10^{-2}$	---------
81-K6-P3	6-13	SG	$>5.1x10^{-3}$	$>5.1x10^{-3}$	---------
81-K7-P1	20.1-23.8	SG	$6.7x10^{-3}$	$1.3x10^{-2}$	$3x10^{-2}/5x10^{-2}$
81-K7-P2	4.3-10.1	SG	$1.4x10^{-3}$	$5.7x10^{-4}$	---------
81-K8-P1	9.2-17.0	SSG	$>5.0x10^{-3}$	$>5.0x10^{-3}$	---------
81-K9	3	T	Piezometer Dry		---------
81-K10	4.8-6.2	T	------	$2.5x10^{-5}$	---------
81-K11	4.3	T	Piezometer Dry		---------
81-K12	3.8-4.3	T	$6.9x10^{-5}$	------	---------
PK-1	0.3	T	$1.0x10^{-3}$*	------	---------
PK-2	0.3	T	$3.0x10^{-4}$*	------	---------
PK-3	0.3	T	------	$5.0x10^{-5}$*	---------

: SG = Sand and Gravel
SSG = Silty Sand and Gravel
B = Bedrock
T = Tailings
ady State = Hvorslev Analysis
nsient State = Papadopoulos Analysis
PK = Denotes percolation test performed in tailings.

Note: *Analysis method inaccurate for fine-grained material. Permeability values possibly too high.

Golder Associates

November 1981

Project No. 812 - 2041

POST CONSTRUCTION INSTRUMENTATION SCHEDULE

BOREHOLE	LOCATION NORTH(m)	LOCATION EAST(m)	GROUND ELEVATION (m)	DEPTH OF BOREHOLE (m)	INSTRUMENTATION ABBREV. *	INSTRUMENTATION DETAILS	REMARKS
INTERMEDIATE DAM (ID)							
ID1-0+240	2061.2	511.5	1064.13	1.5	V,H		
ID2-0+250	2066.5	514.4	1064.1	10.67	2HP	Tip Elev.1059.60 m Tip Elev.1054.10 m	Location approximate
ID3-0+450	1894.2	391.9	1064.06	1.5	V,H		
ID4-0+460	1895.7	392.5	1065.3	20.12	2HP	Tip Elev.1060.80 m Tip Elev.1045.50 m	
ID5-0+627	1769.5	286.1	1064.90	1.5	V,H		
ID6-0+627	1767.8	284.7	1064.9	30.48	2HP	Tip Elev.1060.40 m Tip Elev.1034.70 m	
ID7-0+740	1668.8	234.4	1068.9	15.20	T,PP	Thermistor#11 10 x 1.0 m Tip#3821,Elev.1054.00 m	Thermal Liner, South Abutment
ID8-0+745	1679.3	212.9	1069.1	15.50	PP	Tip#333, Elev.1054.20 m	Thermal liner, South Abutment
ID9-0+750	1704.5	171.9	1066.3	9.80	PP	Tip#390, Elev.1057.30 m	Thermal liner, South Abutment
CROSS VALLEY DAM (CVD)							
81-126-PP	1953.09	-163.82	1058.86	9.3	PP	Tip#3527, Elev. 1050.1 m	Downstream South Abutment
CVDB-0+370	2139.4	36.2	1052.1	9.10	T,PP	Thermistors, 10 x 1.0 m Tip#3475, Elev. 1043.0 m	Upstream Toe Blanket
CVDB-0+370	2138.3	34.8	1052.1	5.20	PP	Tip#3576, Elev. 1047.2 m	Upstream Toe Blanket
CVDC1-0+050	2394.8	126.6	1064.8	15.54	T,PP	Thermistors 8 x 2.0 m Tip#3822, Elev. 1049.6 m	NVWID Dyke Location and ground elevation approx.
CVDC2-0+150	2390.8	78.1	1062.3	14.93	PP	Tip#344, Elev. 1048.0 m	Spillway Location and elevations approximate
CVDC3-0+204	2304.0	68.6	1065.72	1.5	V,H		
CVDC4-0+215	2295.1	63.1	1065.5	34.14	2HP	Tip Elev. 1040.2 m Tip Elev. 1032.0 m	
CVDC5-0+338	2183.0	6.8	1066.82	1.5	V,H		
CVDC6-0+340	2182.1	4.7	1065.8	34.14	T,PP	Thermistors 8 x 2.0 m Tip #3526, Elev. 1032.3 m	Thermistors from 15.0-31. depth
CVDC7-0+450	2086.5	-44.9	1065.7	31.09	2HP	Tip Elev. 1040.1 m Tip Elev. 1035.2 m	

*SI: Slope Indicator S: Incremental Settlement V: Vertical Settlement H: Horizontal Settlement
T: Thermistor String PP: Pneumatic Piezometer HP: Hydraulic Piezometer (Standpipe)

(Cont'd)

TABLE VIII-1 (CONT'D)

POST CONSTRUCTION INSTRUMENTATION SCHEDULE

BOREHOLE	LOCATION NORTH(m)	LOCATION EAST(m)	GROUND ELEVATION (m)	DEPTH OF BOREHOLE (m)	INSTRUMENTATION ABBREV. *	INSTRUMENTATION DETAILS	REMARKS
CROSS VALLEY DAM (CVD) (CONT'D)							
CVDC8-0+460	2076.6	-48.2	1065.69	1.5	V,H		
CVDC9-0+565	1984.1	-97.4	1065.6	33.83	2HP	Tip Elev. 1040.0 m Tip Elev. 1033.0 m	
CVDC10-0+568	1981.1	-97.4	1065.74	1.5	V,H		
CVDC11-0+645	1913.4	-133.5	1065.7	15.24	T,PP	Thermistors 8 x 2.0 m Tip#3820, Elev. 1050.8 m	South Abutment
CVDT1-0+210	2317.4	17.6	1050.0	10.06	HP	Tip Elev. 1040.2 m	Downstream Toe
CVDT2-0+450	2111.6	-102.3	1051.8	13.71	HP	Tip Elev. 1038.5 m	Downstream Toe
CVDT3-0+570	2009.1	-154.5	1053.10	13.71	HP	Tip Elev. 1040.1 m	
CVDT4-0+630	1953.4	-164.0	1058.90	15.50	T	Thermistors 8 x 2.0 m	Downstream South Abutment Location and elev. approx.
CANAL DYKE (CD)							
CD1-0+020	701.5	2,377.4	1090.7	12.2	2PP	Piez. #368 (Elev. 1085.5?) Piez. #384 Elev. 1080.0 m	Diversion Dam, see bore-hole log for more detail.
CD2-0+150	693.5	2,294.9	1090.37	1.5	V		
CD3-0+300	732.7	2,143.6	1089.64	1.5	V		
CD4-0+400	748.6	2,053.2	1089.7	10.4	S	Settlement rings 10 X 1.0 m	
	747.2	2,057.0	1089.7	11.6	T,PP	Thermistor #12, 10 X 1.0 m Piez. #365 Elev. 1078.4	
	757.2	2,050.7	1089.7	9.8	PP	Piez. #341 Elev. 1082.7 m	
	748.3	2,054.5	1089.73	1.5	V,H		

* SI: Slope Indicator S: Incremental Settlement V: Vertical Settlement H: Horizontal Settlement
T: Thermistor String PP: Pneumatic Piezometer HP: Hydraulic Piezometer (Standpipe)

(Cont'd)

Summary of Borehole and Piezometer Installation

Borehole #	Mine Grid Coordinates		Project Datum Elevations	
	N	E		
79 - 6	1924.93	26.74	G.S. at 1050m Till at 1017m	S + G EOH = 1010m
79 - 7	2081.44	43.55	G.S. at 1048m Till at 1027m	S + G EOH = 1022m
79 - 15	2374.12	57.74	G.S. at 1056m B.R. at 1025m	S + G EOH = 1018m
79 - 16	2256.12	5.12	G.S. at 1048m Till at 1029m B.R. at 1022m	S + G EOH = 1018m
79 - 19	2216.56	73.73	G.S. at 1048 Till at 1047m B.R. at 1026m	S + G EOH = 1024m
79 - 20	2447.49	114.36	G.S. at 1077 B.R. at 1047	Till EOH = 1039m
79 - 21	1974.58	-119.73	G.S. at 1050m B.R. at 1016m	Till EOH = 36.58m
79 - 1	2320.85	122.32	G.S. at 1049m Till at 1038m B.R. at 1032m	S + G EOH = 1031.5
79 - 6	1924.93	-26.74	G.S. at 1050m Till at 1017	S + G EOH = 1010m
79 - 7	2081.44	-43.55	G.S. at 1048m Till at 1028m	S + G EOH = 1022m
79 - 8	1806.18	-92.71	G.S. at 1079m S + G at 1068 m	Till B.R. at 1066m EOH = 1062m
79 - 15	2374.12	57.74	G.S. at 1056m B.R. at 1025m	S + G EOH = 1018m
79 -16	2256	5.12	G.S. at 1048m B.R. at 1020m	S + G EOH = 1018m
79 - 18	2138.4	44.98	G.S. at 1049m B.R. at 1015	EOH 1008
79 - 19	2216.56	73.73	G.S. at 1048m B.R. at 1026m	Till EOH = 1024m
79 - 20	2447.49	114.36	G.S. at 1077m B.R. at 1016m	Till EOH = 1039m
79 - 21	1974.6	-119.73	G.S. at 1050m B.R. at 1016m	Till EOH = 1013m

Summary of Borehole and Piezometer Installation continued

Borehole #	Mine Grid Coordinates N	E	Project Datum Elevations	
79 - 22A	1840.84	-185.9	G.S. at 1082m	Till EOH = 1064
79 - 17	2448.63	109.94	G.S. at 1077m Till at 1071m	Till EOH = 1065m
79 - 23	1910.41	-387.72	G.S. at 1083.17m	Till EOH = 1065m
79 - 24	1161.4	1222.5	G.S. at 1084m	Till EOH = 1062m
79 - 25	1050.6	1432.6	G.S. at 1087m B.R. at 1080m	Till EOH = 1075m
79 - 27	1946.5	427.7	G.S. at 1066.7 B.R. at 1024m	S + G EOH = 1015m
79 - 28	2056.32	490.5	G.S. at 1065m B.R. at	S + G EOH =
79 - 29	2250.6	559.2	B.R. at 1073.4m	
79 - 30	2138	521	B.R. at 1041.2m	
79 - 31	1797	334	B.R. at 1009.7m	
79 - 33	1748	301.7	B.R. at 1044m	
79 -34	2177.44	-2300		1022m

Notes:
B.R. = Bed Rock
EOH = End of Hole
G.S. = Ground Surface
S + G = Sand and Gravel

MINE GRID → DOWN VALLEY PROJECT DATUM ↓

REPORT	BOREHOLE #	COORDINATES N	COORDINATES E	ELEVATIONS	
Golder Assoc. - Black Binder July 30/79 PROJ. # 792-2025	79-6	1924.93	26.74	G.S. = 1050m Till at 1017 m	S+G EOH = 1010r
" " July 31/79	79-7	2081.44	43.55	G.S. = 1048 Till at 1027m	S+G EOH = 1022
" " Aug 7/79	79-15	2374.12 (6,912,769)	57.74 (580,222)	G.S. = 1056m B.R. @ 1025	S+G EOH = 1018m
" " Aug 9/79	79-16	2256.12 (6,912,733)	5.12 (580,206)	G.S. = 1048m Till at 1029m B.R. at 1022m	S+G EOH = 1018 m
" " Aug 15/79	79-19	2216.56 (6,912,721	73.73 580,227	G.S, = 1048 Till at 1047 B.R. at 1026	S+G EOH = 1024
" " Aug 16/79	79-20	2447.49 6,912,792	114.36 580,239	G.S. = 1077 B.R. at 1047	Till EOH at 103
" " Aug 16/79	79-21	1974.58 6,912,647	-119.73 580,169	G.S. = 1050 B.R. at 1016	Till EOH = 36.5
" " JULY 27/79	79-1	2320.85 6,912,753	122.32 580,241	G.S. = 1049 Till at 1038 B.R. at 1032	S+G EOH = 1031.5
" " July 29/79	79-6	1924.93	-26.74	G.S. at 1050 Till at 1017	S+G EOH at 101

REPORT	BOREHOLE #	COORDINATE N	COORDINATE E	ELEVATIONS	
Golder Assoc. July 31/79	79-7	2081.44	-43.55	G.S. at 1048m Till at 1028m	S+G EOH at 1022
" Aug. 2/79 "	79-8	1806.18 6,912,596	-92.71 580,177	G.S. at 1079 S+G at 1068	Till B.R. at 1066 EOH at 106
" Aug 7/79 "	79-15	2374.12 6,912,769	57.74 580,222	G.S. at 1056 B.R. at 1025	S+G EOH at 1018
" Aug 9/79 "	79-16	2256 6,912,733	5.12 580,206	G.S. at 1048 B.R. at 1020	S+G EOH at 1018
" Aug 18/79 "	79-18	2138.4 6,912,697	44.98 580,218	G.S. at 1049 B.R. at 1015	EOH at 100
" Aug. 15/79 "	79-19	2216.56 6,912,721	73.73 580,227	G.S. at 1048 B.R. at 1026	Till EOH at 102
Aug 16/79 "	79-20	2447.49 6,912,792	114.36 580,239	G.S. at 1077 B.R. at 1047	EOH at 104
" Aug 16/79 "	79-21	1974.6 6,912,647	-119.73 580,169	G.S. at 1050 B.R. at 1016	EOH at 101
" Aug 21/79 "	79-22A	1840.84	-185.9	G.S. at 1082	Till EOH at 106
" Aug 11/79 "	77-17	2448.63	109.94	G.S. at 1077 S+G at 1071	TILL EOH at 1065
" Aug 22/79 "	79-23	1910.41	-387.72	G.S. at 1083.17	Till EOH at 1065

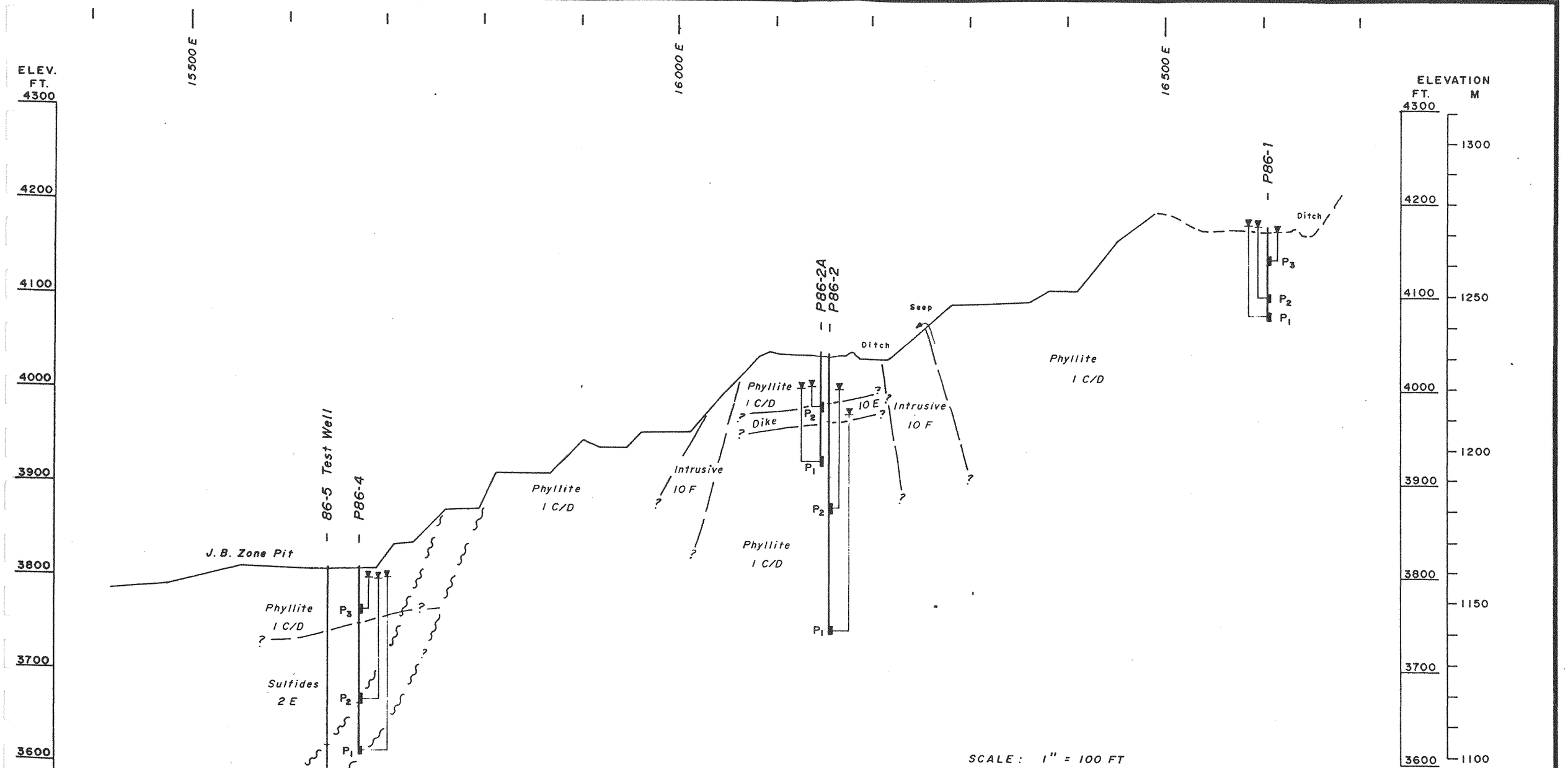
REPORT	BOREHOLE #	COORDINATE N	COORDINATE E	ELEVATIONS	EOH
Golder Assoc. Aug. 22/79	79-24	1161.4	1222.5	G.S. at 1084	Till EOH at 1062
" " Aug 27/79	79-25 369	1050.6	1432.6	644 G.S. at 1087 B.R. at 1080	Till EOH at 1075
" " Nov. 30/79	79-27 640	1946.5	427.7	335 G.S. at 1066.7 B.R. at 1024	S+G EOH at 1015
" " DEC 1/79	79-28 673	2056.32	490.5	354 G.S. at 1065 B.R. at	S+G EOH at
DEC. 2/79	79-29 733	2250.6	559.2	375 B.R. at 1073.4	
Dec. 2-3/79	79-30 698	2138	521	363 B.R at 1041.2	
Dec. 3-4/79	79-31 594	1797	334	307 B.R. at 1009.7	
Dec. 5/79	79-33 ~~27~~ 579	1748	301.7	298 B.R at 1044	
Dec. 6/79	79-34	2177.44	-2300		1022
Feb. 20/80	80-35	1709.7	258.5		1048
GOLDER	80-37	1711.7	300.9		1045.3
	80-38	2215.3	41.2		1044.2
	80-38A	2199	41.9		1044
	80-39	2153.4	21.9		1042
	80-40	2113.5	7.5		1046
	80-41	2069.5	-8.6		1046.9
	80-46	1807.6	303.9		1039.9

Piteau Associates

October 10, 1986

Assessment of Groundwater Conditions in Faro Pit, East Wall

File 86 - 804



NOTE: See Fig. 1 for location section.

SCALE: 1" = 100 FT

CURRAGH RESOURCES - ANVIL MINE

PITEAU & ASSOCIATES
GEOTECHNICAL CONSULTANTS
VANCOUVER CALGARY

SECTION THROUGH EAST WALL ABOVE J.B. PIT

BY	DATE
HWR	8-10-86
APPROVED	DWG:
JK	2

Summary of Piezometer Installations

Site	Piezometer No.	Ref. Point Elevation	Mine Co-ordinates E	N	Depth (m) From	To	Lithology of Filter Zone		Water Level Elevation (m)	Hydraulic Conductivity (m/s)	
P86-1	1	1272.77	16608.40	8266.03	30.5	27.9	Phyllite	1C/D	1273.48	2.4×10^{-8}	(R)
	2				24.2	21.9	Phyllite	1C	1273.36	9.4×10^{-8}	(R)
	3				12.1	9.6	Phyllite	1C/D	1271.56	$>10^{-6}$	(R)
P86-2	1	1231.23	16152.05	8161.73	91.4	88.8	Phyllite	1C	1211.71	$<10^{-8}$	(F)
	2				52.4	48.8	Phyllite	1C/D	1219.98	6.5×10^{-9}	(F)
	3				36.6	33.5	Phyllite	1C/D	1221.23	-	-
P86 - 2A	1	1231.12	16148.44	8172.44	36.6	33.2	Phyllite	1C	1221.08	5.1×10^{-8}	(F)
	2				19.1	15.7		10E	1221.69	2.0×10^{-8}	(F)
P86 - 3	1	1298.48	16256.01	9148.02	55.9	53.9	Schist	1C	1289.54	$>10^{-6}$	(F)
	2				18.3	16.2	Schist	1C	1291.62	6.4×10^{-7}	(F)
P86 - 3A	1	1298.32	16236.25	9163.91	30.5	27.4	Schist	1C	1289.94	2.3×10^{-9}	(F)
	2				22.9	20.6	Dike	10E	1290.82	5.6×10^{-9}	(F)
P86 - 4	1	1161.16	15675.71	8007.97	61.3	58.5	Massive Sulphide	2E	1157.82	7.8×10^{-5}	(T)
	2				44.0	41.6	Massive Sulphide	2E	1157.78	7.1×10^{-5}	(T)
	3				14.5	12.2	Massive Sulphide	1C	1157.86	-	-
86 - 5	Test Well	1161.00	15640.53	8012.65	74.7	21.0	Massive Sulphide	2E	1157.8	Pumped at	
					21.0	9.1	Phyllite	1C		9.5 Lps	
86 - 6	Test Bore	1180	15430	7220	88.1	5.2	Phyllite	1C/D	-	Dry hole	
					5.2	Sfc.	Massive Sulphide	2E			

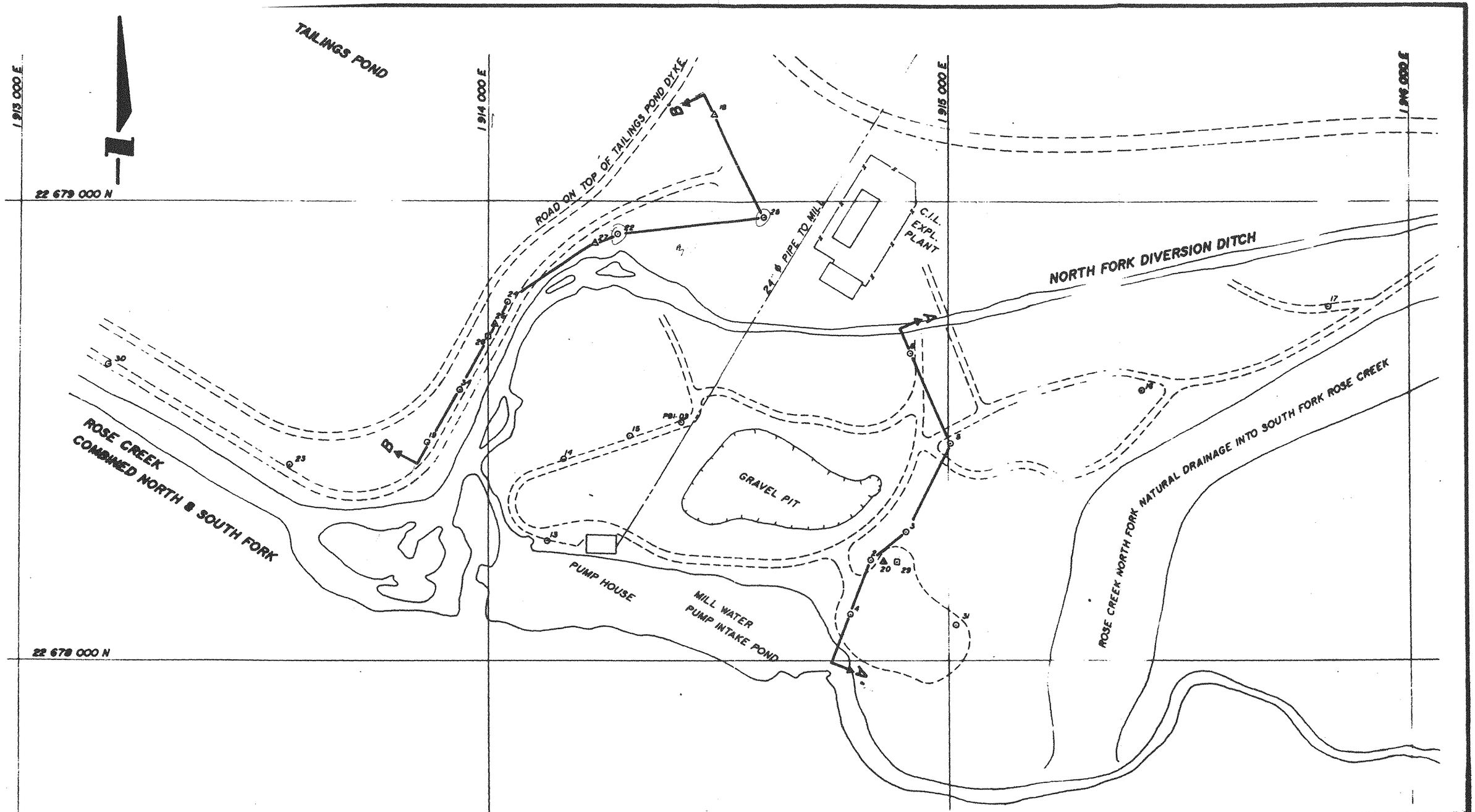
(R) = Rising head test
(F) = Falling head test
(T) = Transmissivity (m^2/s) from pumping test well

International Water Supply Ltd.

May 28, 1987

Water Well Development Report

Report No. 1



NO.	WAS	BY	DATE
		A.M.T.	MAY 8/87

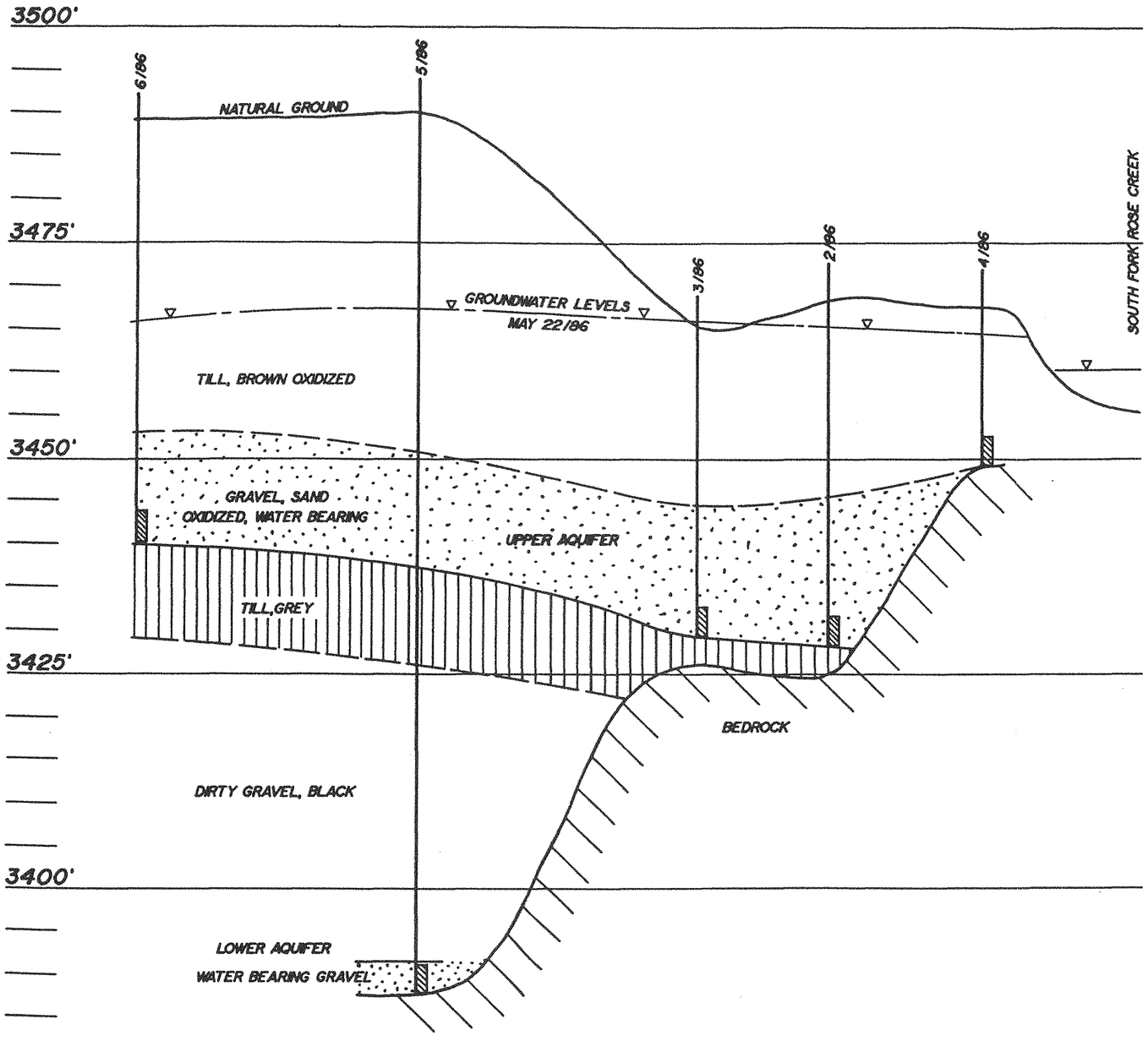
International Water Supply Limited
SASKATOON – BARRIE – MONTREAL

CURRAGH RESOURCES
FARO, YUKON

LOCATIONS OF CROSS SECTIONS A-A' & B-B'
REFER TO DRAWINGS 586-784 AND 586-784A

DRN: S.R.K.
CKD: A.M. TOTH P. ENG.

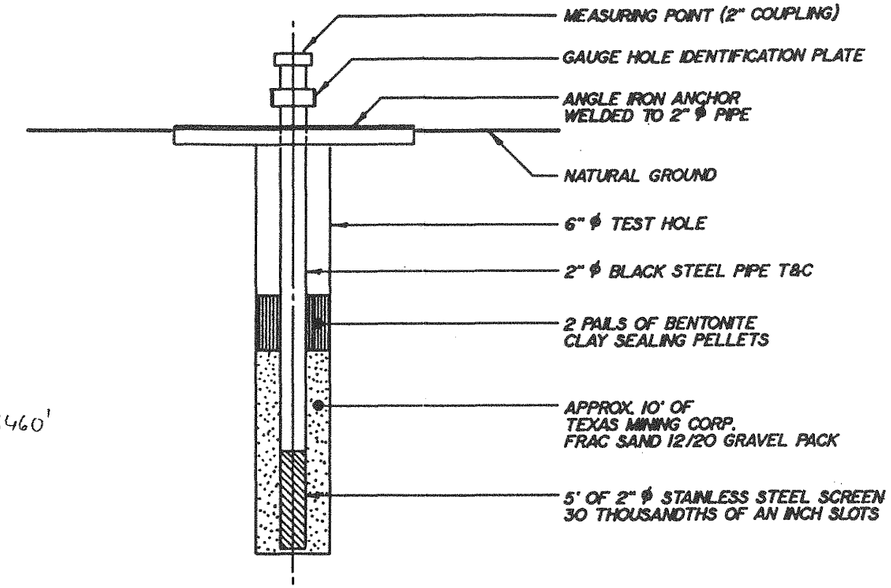
DRAWING NO.
887-804



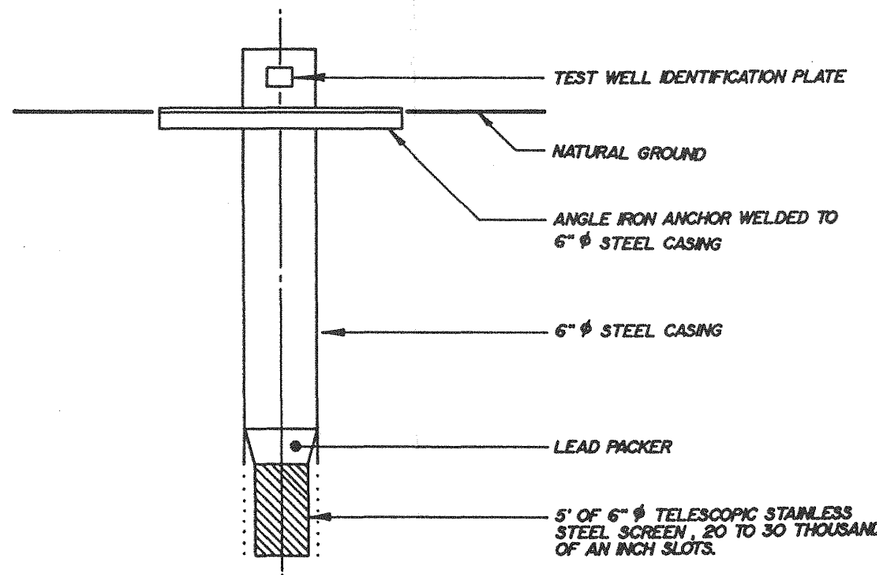
HYDRO GEOLOGICAL CROSS SECTION A - A'

SCALE: 1" = 100' HORZ. 1" = 15' VERT.

1" = 1200' 24"/=21,000



TYPICAL 2" ϕ GAUGE HOLE



TYPICAL 6" ϕ TEST WELL

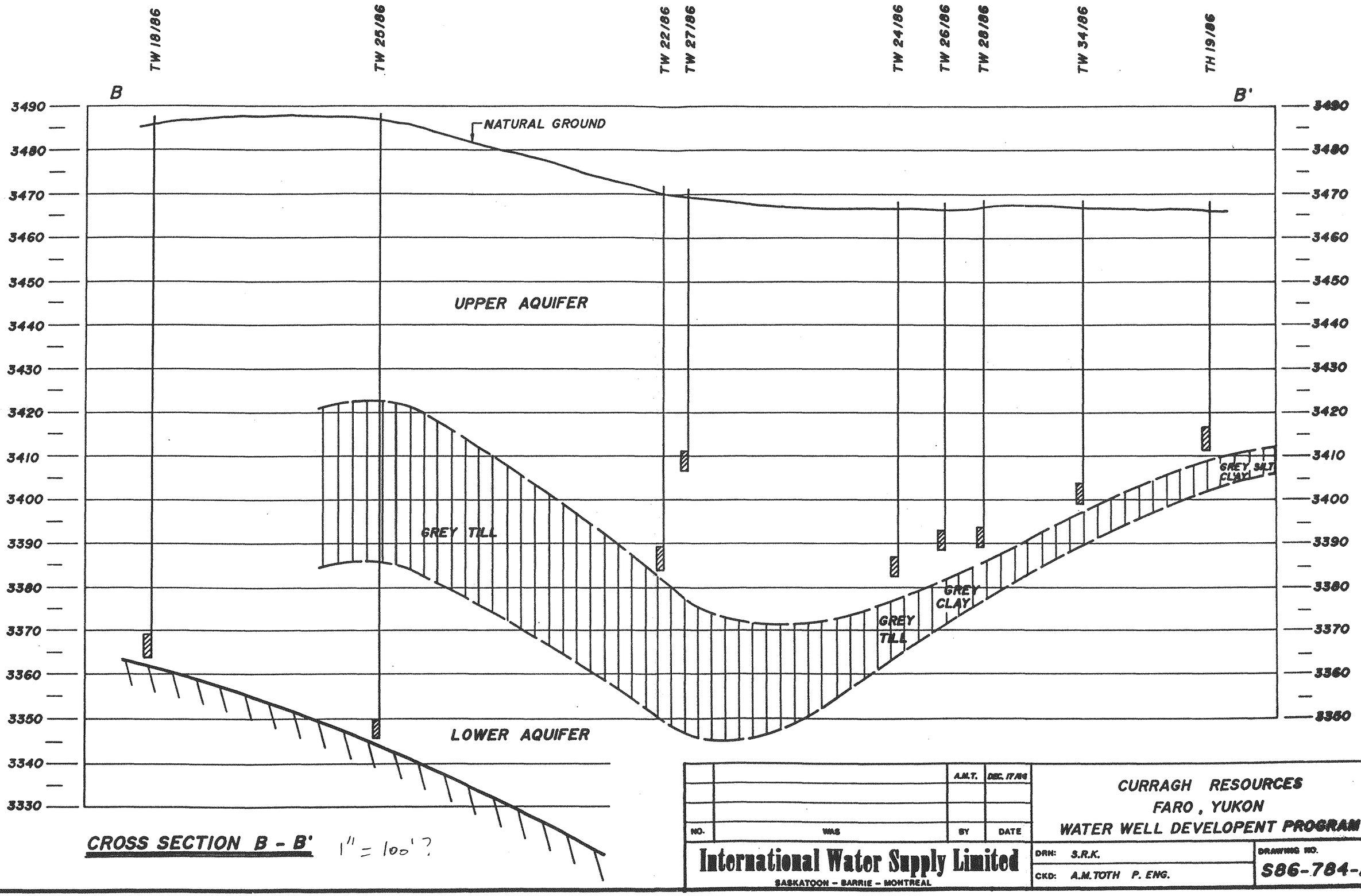
NO.	WAS	BY	DATE
		A.M.T.	DEC. 3/86

International Water Supply Limited
SASKATOON – BARRIE – MONTREAL

CURRAGH RESOURCES
FARO, YUKON
WATER WELL DEVELOPMENT PROGRAM

DRN: S.R.K.
CKD: A.M.TOTH P. ENG.

DRAWING NO. S86-779



CROSS SECTION B - B' 1" = 100'?

NO.	WAS	BY	DATE
		A.M.T.	DEC. 17/86

International Water Supply Limited
SASKATOON – BARRIE – MONTREAL

CURRAGH RESOURCES
FARO, YUKON
WATER WELL DEVELOPENT PROGRAM

DRN: S.R.K.
CKD: A.M. TOTH P. ENG.

DRAWING NO. S86-784-A

Field Report

MIDNIGHT SUN DRILLING CO. LTD.
WHITEHORSE Y.T.
PH. 633-3070
P.O. BOX 4391
WHITEHORSE, YUKON

Started May 23 1986

Completed ..... 19...

NAME AND ADDRESS OF CLIENT	DESCRIPTION OF WORK	LOCATION OF WORK
Curragh Resources	Test wells	Faro Mine
	TH 1/86	

FORMATION LOG FROM	TO	FORMATION
H.	1	86.
2	6	Gr. sand silt cobbles Fill
	10	Gr. silt cobbles Black
0	15	Sand silt Brown
-	26	Gr. sand cobbles.
6	28	BR

DESCRIPTION OF WORK	TIME DATE	FROM	TO	HOURS
MOVE				
Loading	May 23	8:00	10:30	2.5
Travel to Faro	"	10:30	5:30	7
Travel to mine	"	6:30	7:30	1
Unload Flat Deck	"	7:30	8:30	1
Crew Travel	"	8:30	9:00	0.5
Crew Travel	May 24	8:00	8:30	0.5
move set up	"	8:30	10:30	2
Dry Hole	"	10:30	12:00	1.5
Pull casing	"	12:00	1:00	1
set 11' of 6" casing				

No. of Casing & Pipe e	Type	Size	Type
t	Inch	Feet	Inch

Remarks:

1 - Drive shoe.

1 - Tricone

Field Report

MIDNIGHT SUN DRILLING CO. LTD
WHITEHORSE Y.T
PH. 633-3070
P.O. BOX 4391
WHITEHORSE, YUKON

Started May 23 1984

Completed ..... 19..

(2)

AME AND ADDRESS OF CLIENT	DESCRIPTION OF WORK	LOCATION OF WORK
urragh Resources	Test Wells	Faro Mine

FORMATION LOG			DESCRIPTION OF WORK	TIME			
ROM	TO	FORMATION		DATE	FROM	TO	HOURS
			MOVE				
TH	2	86	move set up.	May 24	1:00	1:30	0.5
0	11	silt sand Gr. Cobbles		"	1:30	4:00	2.5
11	15	sand Gr. cobbles					
5	38	Coarse sand Gr. cobbles					
8	43	silt Gr. sand Cobbles					
3	46	BR					
			set 2" pipe and screen	"	4:00	7:30	3.5
			Pull casing				
			set up Develop.				
			Crew Travel	"	7:30	8:00	0.5
			33'6" - 2" pipe				
			5' - 30 slot 2" screen				
			4 bags sand.				

d. of Casing & Pipe				Remarks:
ze	Type	Size	Type	
et	Inch	Feet	Inch	

Field Report

MIDNIGHT SUN DRILLING CO. LTD. WHITEHORSE Y.T.

PH. 633-3070
P.O. BOX 4391
WHITEHORSE, YUKON

Started May 23 1986

Completed ..... 19...

(3)

ME AND ADDRESS OF CLIENT	DESCRIPTION OF WORK	LOCATION OF WORK
Cyprus Resources	test wells	Faro Mine

FORMATION LOG			DESCRIPTION OF WORK	TIME			
OM	TO	FORMATION		DATE	FROM	TO	HOURS
			MOVE				
			Crews travel	May 25	8:30	9:00	0.5
4	3	86	move set up	"	9:00	10:00	1
3'	12	Gr. cobbles	sand silt	"	10:00	1:00	3
.	28	coarse	sand Gr. cobbles				
8	36	sand	Gr. Cobbles				
6	37	clay	Gr.				
7	40	BR.					
			set 2" pipe and screen	"	1:00	4:00	3
			pull casing				
			set up Develop				
			31' 6" - 2" pipe				
			5' - 30 slot 2" screen				
			5 bags sand				

l. of Casing & Pipe			
e	Type	Size	Type
t	Inch	Feet	Inch

Remarks:

Field Report

MIDNIGHT SUN DRILLING CO. LTD
WHITEHORSE Y.T.
PH. 633-3070
P.O. BOX 4391
WHITEHORSE, YUKON

Started May 23 ..... 19 86

Completed ..... 19 ....

(4)

NAME AND ADDRESS OF CLIENT	DESCRIPTION OF WORK	LOCATION OF WORK
wragh Resources	Test Wells	Faro mine

FORMATION LOG FROM	TO	FORMATION	DESCRIPTION OF WORK	TIME DATE	FROM	TO	HOURS
			MOVE				
TY	4	86	move set up	May 25	4:00	4:30	0.5
'	2	sand Gr. Fill		"	4:30	5:30	1
n.	6	Gr. sand Cobbles silt					
i	9	clay	silt				
9	14	Gr. sand cobbles silt					
4	17	Gr. sand cobbles					
17	18	Bolder					
8	24	B.R.					
			Set 2" pipe and screen	"	5:30	7:00	1.5
			pull casing				
			set up Develop				
			13' 8" - 2" pipe				
			5' - 30 slot 2" screen				
			3 bags sand.				

Record of Casing & Pipe Size	Type	Size	Type
Feet	Inch	Feet	Inch

Remarks:

1 - Drive shoe.

FARO YUKON

1986 GROUNDWATER EVALUATION PROGRAM
DRILLER'S LOGS
MIDNIGHT SON DRILLING
WHITEHORSE, Y.T.

May 26/86 TH-5/86

May 25	move set up		7:00 - 7:30
0'-10'	Gr. sand cobbles. Boul		7:30 - 8:00
10'-26	Gr sand cob. Boulders	May 26	8:00 - 2:00
26-52	Gr sand cob. silt		
52-68	clay Gr silt cob.		
68-97	Black Gr. silt clay cobbles		
97-102	Gr. sand cob.		
102-109	BR.		
	Set 2" pipe + screen	"	2:00 - 5:00
	Pull casing		
	set up Develop.		
	99' - 2" casing		
	5' screen		
	3 bags sand		
	2 pails balls.		

LEGEND: Gr. - Gravel
Cob. - Cobbles
B.R. - Bedrock
Balls - Bentonite clay sealing pellets

FARO YUKON

1986 GROUNDWATER EVALUATION PROGRAM
DRILLER'S LOGS
MIDNIGHT SON DRILLING
WHITEHORSE, Y.T.

May 26/86 TH-6/86

		Move set up	May 26	5:00	-	5:30
0	12	Sand Gr. Cobbles Boulders silt	"	5:30	-	7:00
12	16	same	May 27	10:00	-	1:00
16	22	Gr sand cob.				
22	48	Gr sand cob. silt				
48	50	Grey Gr. silt clay cobbles.				
		set 2" pipe + screen	"	1:00	-	3:00
		pull casing				
		set up Develop				
		43' 10" - 2" pipe				
		5' screen				
		3 bags sand				
		1 pail balls.				

LEGEND: Gr. - Gravel
Cob. - Cobbles
B.R. - Bedrock
Balls - Bentonite clay sealing pellets

FARO YUKON

1986 GROUNDWATER EVALUATION PROGRAM
DRILLER'S LOGS
MIDNIGHT SON DRILLING
WHITEHORSE, Y.T.

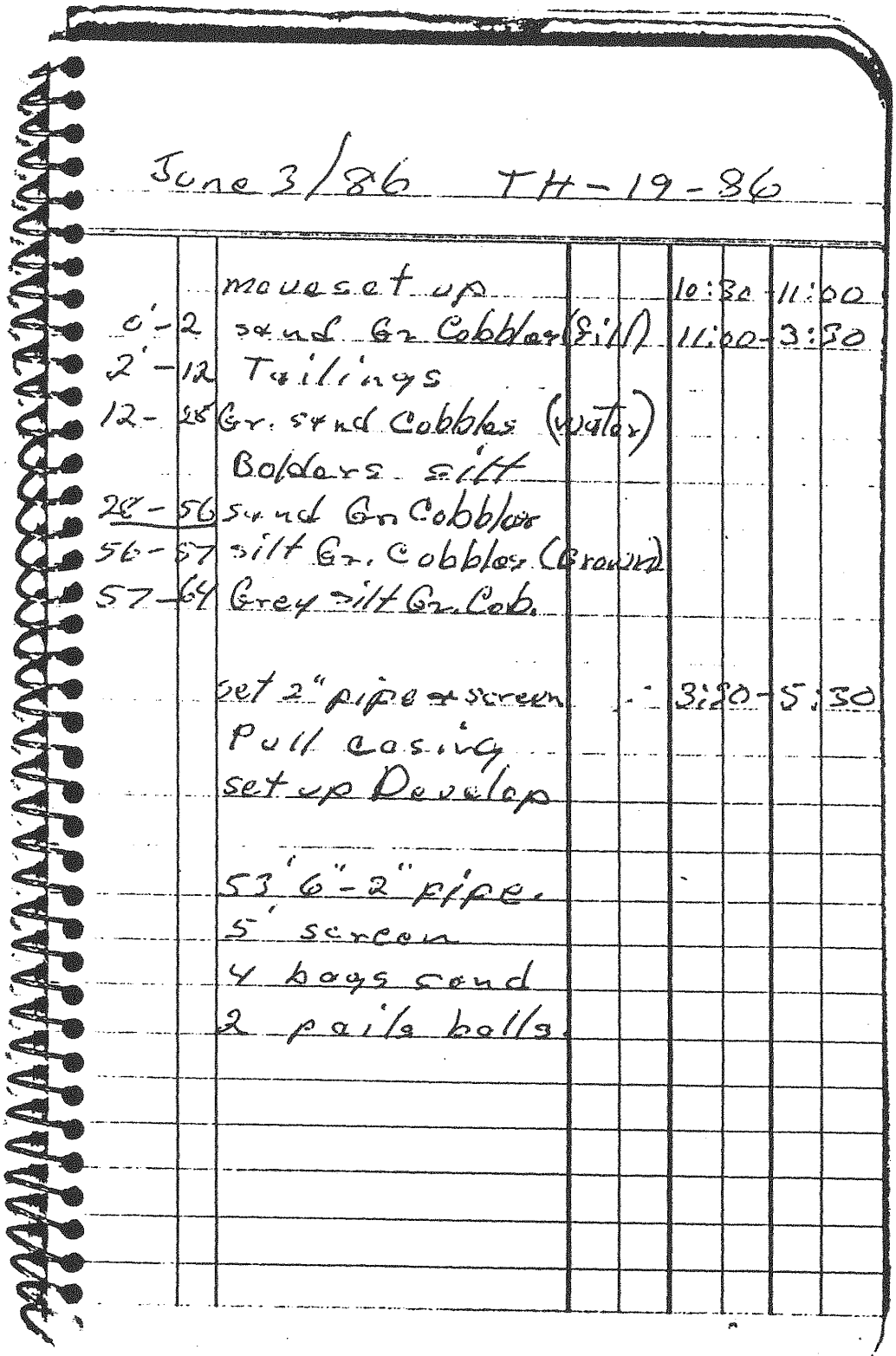
June 2/86 TW-18-86

	Move set up		8:00 - 9:00
0 - 9	Gr. sand Cob. Boul		9:00 - 6:00
9 - 49	B. sand Cob. silt		
49 - 123	Gr. sand Cobs		
123 - 130	B.R.		
	set screen		6:00 - 7:30
	Develop		7:30 - 8:00
5' -	25 slot screen		
	112'6" casing 6"		
	Set 2" pipe 110' 2"	June 3	8:00 - 1:30
	set up Develop		

LEGEND: Gr. - Gravel B.R. - Bedrock
Cob.- Cobbles Balls - Bentonite clay sealing pellets

FARO YUKON

1986 GROUNDWATER EVALUATION PROGRAM
DRILLER'S LOGS
MIDNIGHT SON DRILLING
WHITEHORSE, Y.T.



June 3/86 TH-19-86

		move set up			10:30	11:00
0'	2	sand Gr Cobbles (silt)			11:00	3:30
2'	12	Tailings				
12	28	Gr. sand Cobbles (water)				
		Boulders silt				
28	56	sand Gr Cobbles				
56	57	silt Gr. Cobbles (Brown)				
57	64	Grey silt Gr. Cob.				
		set 2" pipe + screen			3:20	5:30
		Pull casing				
		set up Develop				
		53' 6" - 2" pipe.				
		5' screen				
		4 bags sand				
		2 pails balls				

LEGEND: Gr. - Gravel
Cob.- Cobbles
B.R. - Bedrock
Balls - Bentonite clay sealing pellets

FARO YUKON

1986 GROUNDWATER EVALUATION PROGRAM
DRILLER'S LOGS
MIDNIGHT SON DRILLING
WHITEHORSE, Y.T.

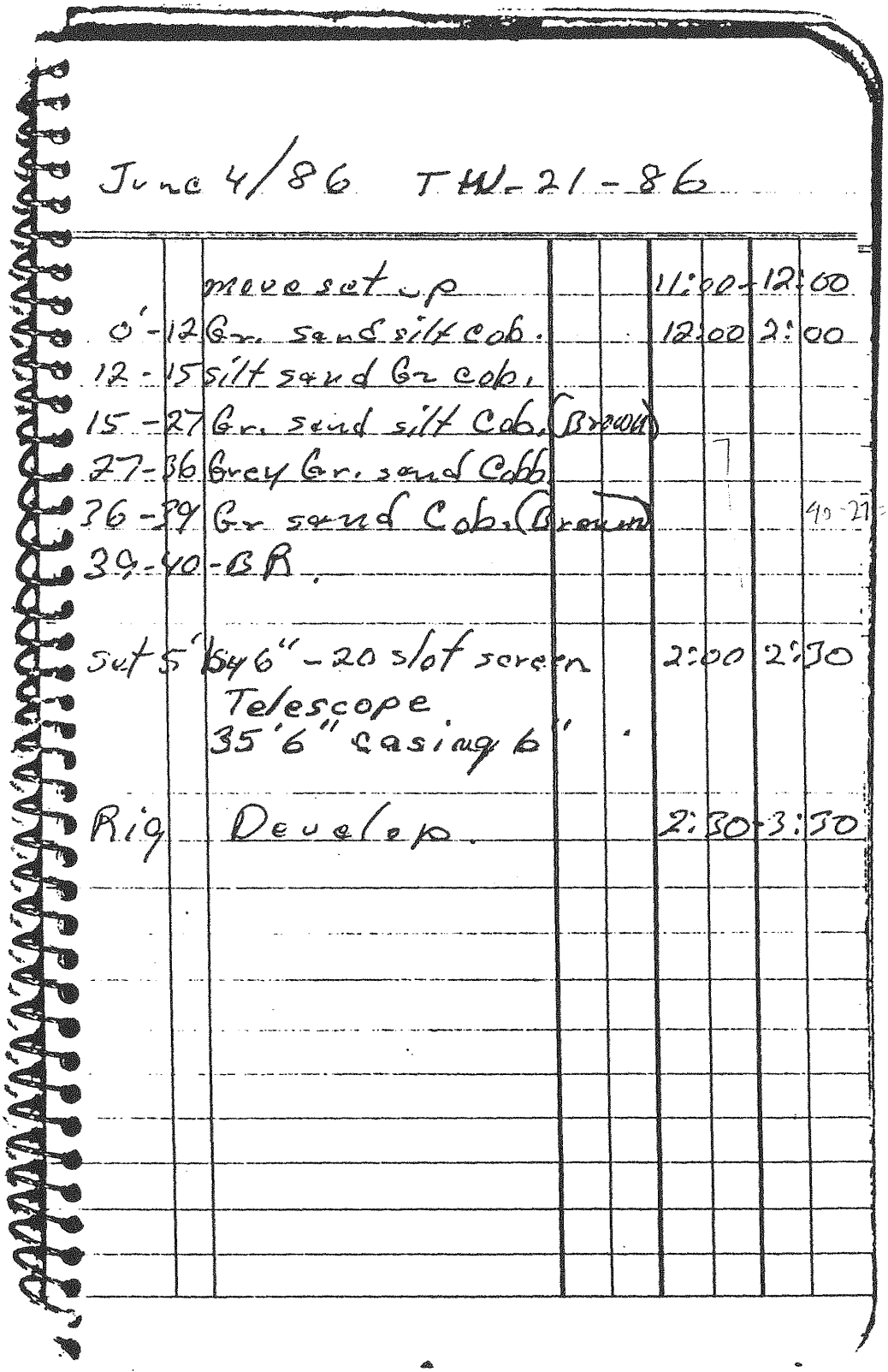
June 3/86 TH-20-86

		move set up			5:30	6:00
0'	10	silt sand Gr. Cob.			6:00	7:00
10	15	sand Gr. Cob.				
15	20	Gr. Cobbles.				
20	26	Gr. Cob. silt	June 4		8:00	9:00
26	37	Gr. sand Cob.				
37	38	clay Gr. Cob.				
20 slot		set 5' by 6" screen			9:00	9:30
		telescope				
		32' casing 6"				
Rig		Develop			9:30	11:00

LEGEND: Gr. - Gravel B.R. - Bedrock
Cob.- Cobbles Balls - Bentonite clay sealing pellets

FARO YUKON

1986 GROUNDWATER EVALUATION PROGRAM
DRILLER'S LOGS
MIDNIGHT SON DRILLING
WHITEHORSE, Y.T.



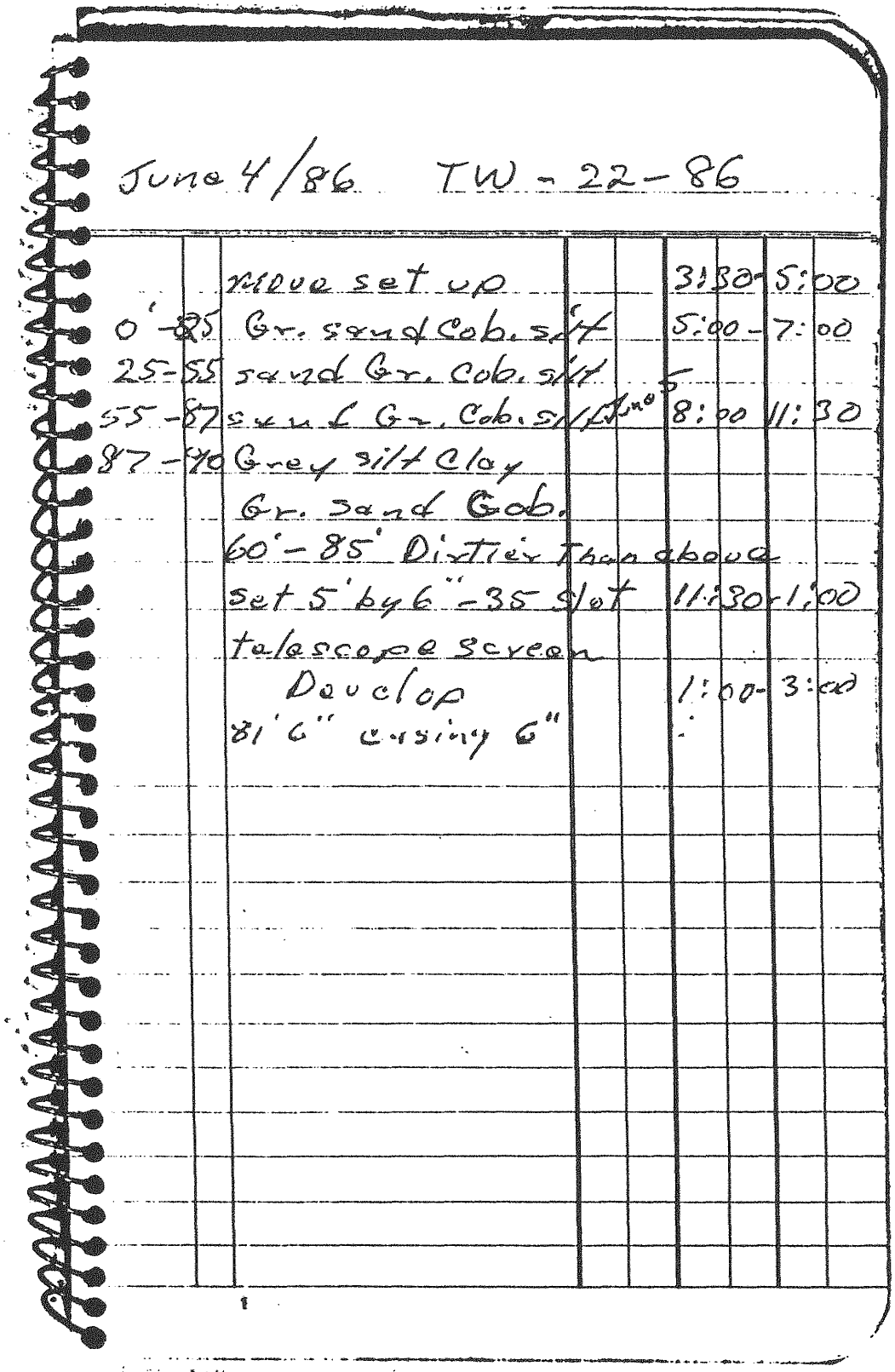
June 4/86 TW-21-86

	move set up	11:00	12:00
0'-12	Gr. sand silt cob.	12:00	2:00
12-15	silt sand Gr cob.		
15-27	Gr. sand silt Cob. (Brown)		
27-36	Grey Gr. sand Cobb.		
36-39	Gr sand Cob. (Brown)		40-27 = 13'
39-40	B.R.		
Set 5' 6" 6" - 20 slot screen Telescope 35' 6" casing 6"		2:00	2:30
Rig	Develop.	2:30	3:30

LEGEND: Gr. - Gravel B.R. - Bedrock
Cob.- Cobbles Balls - Bentonite clay sealing pellets

FARO YUKON

1986 GROUNDWATER EVALUATION PROGRAM
DRILLER'S LOGS
MIDNIGHT SON DRILLING
WHITEHORSE, Y.T.



June 4/86 TW-22-86

	move set up	3:30	5:00
0'-25	Gr. sand Cob. silt	5:00	7:00
25-55	sand Gr. Cob. silt		
55-87	sand Gr. Cob. silt Lots of	8:00	11:30
87-90	Grey silt Clay Gr. sand Cob.		
	60'-85' Dirtier than above		
	set 5' by 6"-35 Slot telescope screen	11:30	1:00
	Develop	1:00	3:00
	81' 6" casing 6"		

LEGEND: Gr. - Gravel B.R. - Bedrock
Cob.- Cobbles Balls - Bentonite clay sealing pellets

FARO YUKON

1986 GROUNDWATER EVALUATION PROGRAM
DRILLER'S LOGS
MIDNIGHT SON DRILLING
WHITEHORSE, Y.T.

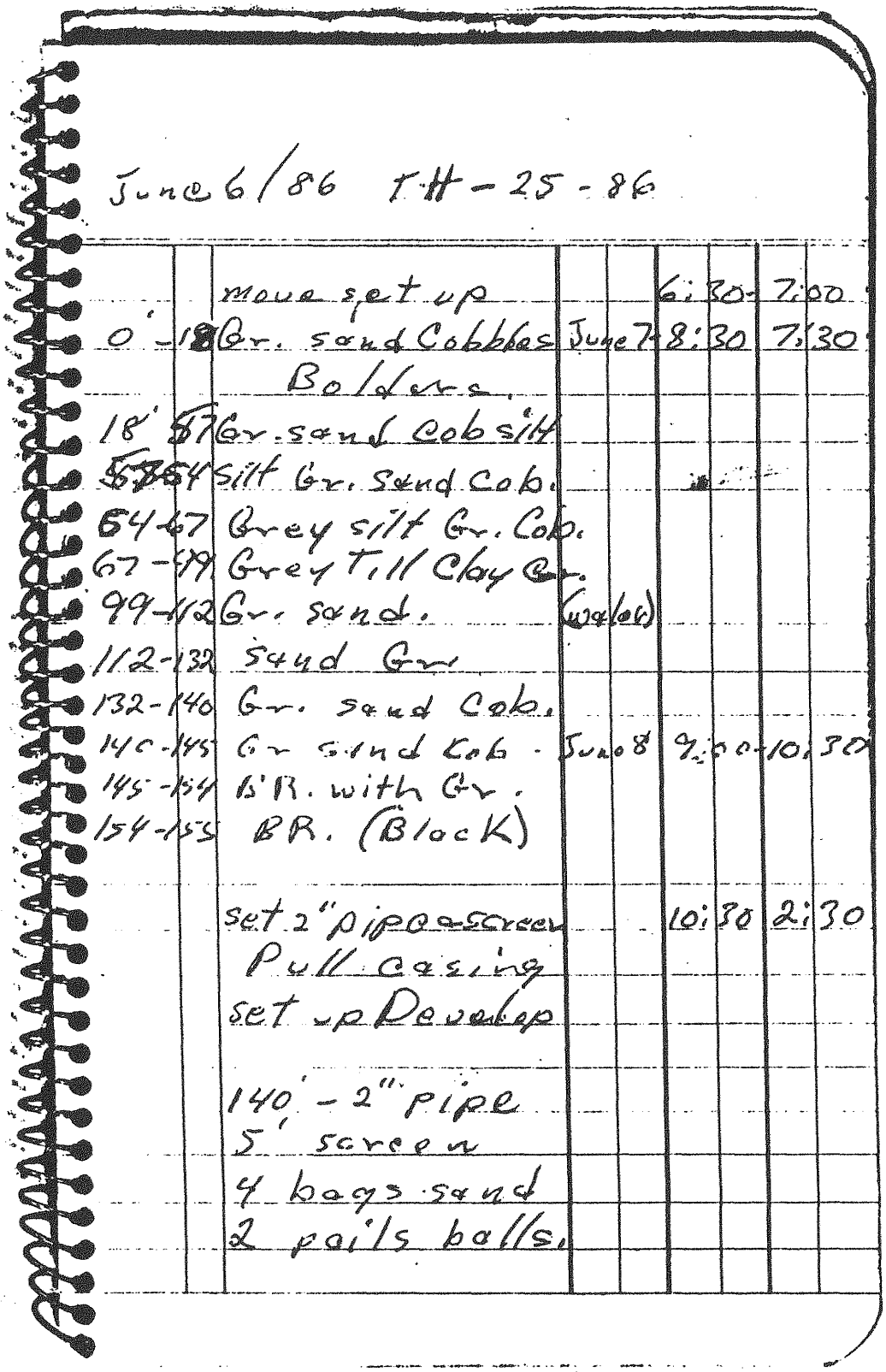
June 6/86 TH-24-86

	Move set up		10:30	11:00
0 - 4	Gr. sand Cobs		11:00	3:30
4 - 19	silt sand Gr. Cobs			
19 - 62	Gr. Sand Cob.			
62 - 82	Gr. sand cob. silt			
82 - 85	silt Gr. sand Cob.			
85 - 87	Grey Till			
	Set 2" pipe ream reach		3:30	6:30
	Pull casing			
	set up Develop			
	79' - 2" pipe			
	5' screen			
	4 bags sand			
	2 pails balls			

LEGEND: Gr. - Gravel B.R. - Bedrock
Cob.- Cobbles Balls - Bentonite clay sealing pellets

FARO YUKON

1986 GROUNDWATER EVALUATION PROGRAM
DRILLER'S LOGS
MIDNIGHT SON DRILLING
WHITEHORSE, Y.T.



June 6/86 T-H-25-86

	move set up		6:30	7:00
0'-18'	Gr. sand Cobbles Boulders.	June 7	8:30	7:30
18'-57'	Gr. sand cob silt			
57-64	silt Gr. sand Cob.			
64-67	Grey silt Gr. Cob.			
67-99	Grey Till Clay Gr.			
99-112	Gr. sand. (water)			
112-132	Sand Gr.			
132-140	Gr. sand Cob.			
140-145	Gr sand Cob.	June 8	9:00	10:30
145-154	B.R. with Gr.			
154-155	BR. (Block)			
	set 2" pipe-screen		10:30	2:30
	Pull casing			
	set up Develop			
	140' - 2" pipe			
	5' screen			
	4 bags sand			
	2 pails balls.			

LEGEND: Gr. - Gravel
Cob.- Cobbles
B.R. - Bedrook
Balls - Bentonite clay sealing pellets

FARO YUKON

1986 GROUNDWATER EVALUATION PROGRAM
DRILLER'S LOGS
MIDNIGHT SON DRILLING
WHITEHORSE, Y.T.

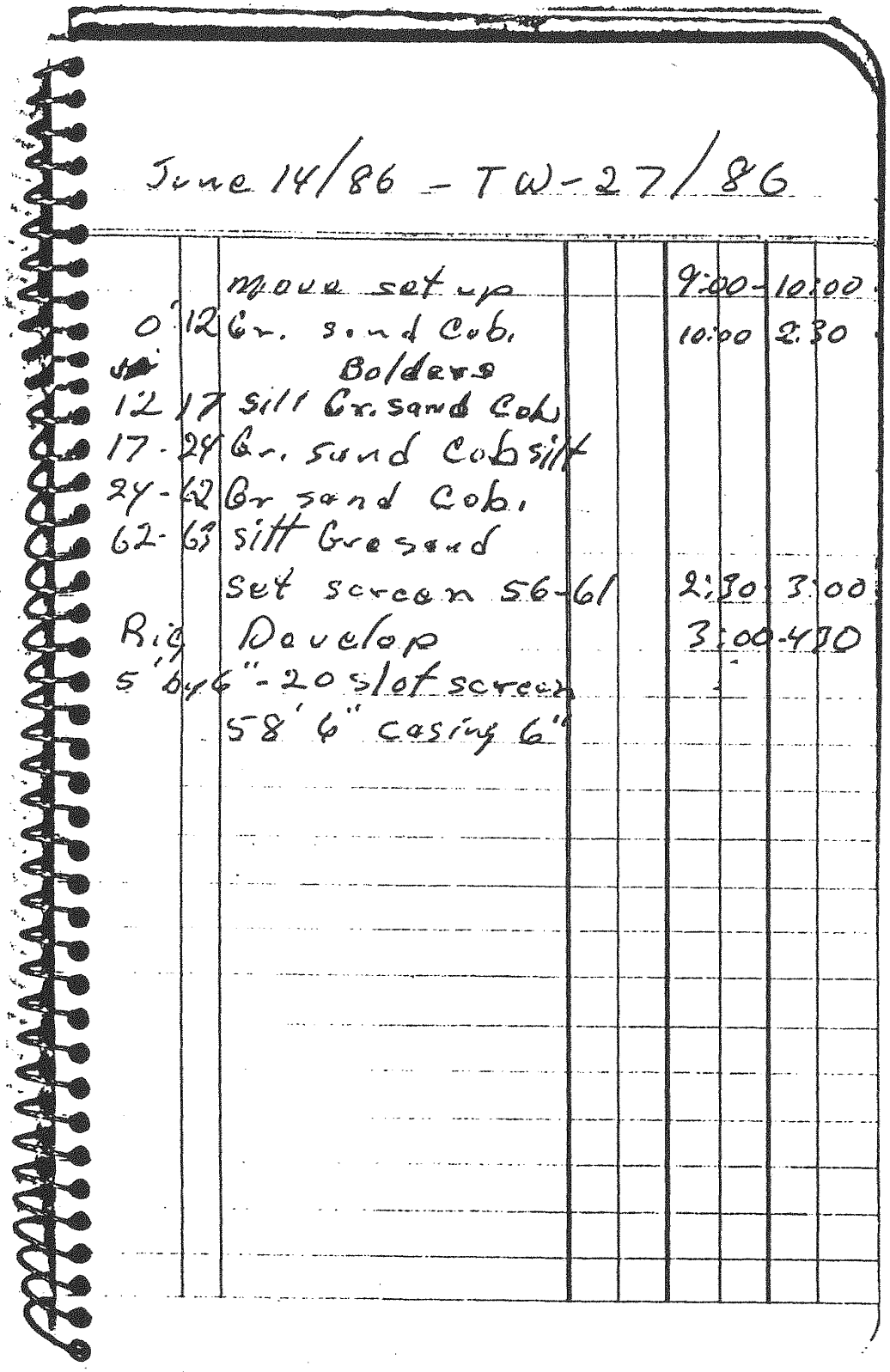
June 13/86 TW-26-86

		move setup	8:00	9:00
0'	24	sand Gr. silt cobbles	9:00	3:00
24	42	Gr. sand Cob.		
42	64	Sand Gr. Cob.		
64	79	Gr. sand Cob. silt		
79.	80	Grey Gr. Clay		
		Set screen 71'-76'	3:00	4:00
Rig		Develop	4:00	6:00
5'-	20	slot screen		
		74' casing 6"		
		standby	6:00	7:00

LEGEND: Gr. - Gravel B.R. - Bedrock
Cob.- Cobbles Balls - Bentonite clay sealing pellets

FARO YUKON

1986 GROUNDWATER EVALUATION PROGRAM
DRILLER'S LOGS
MIDNIGHT SON DRILLING
WHITEHORSE, Y.T.



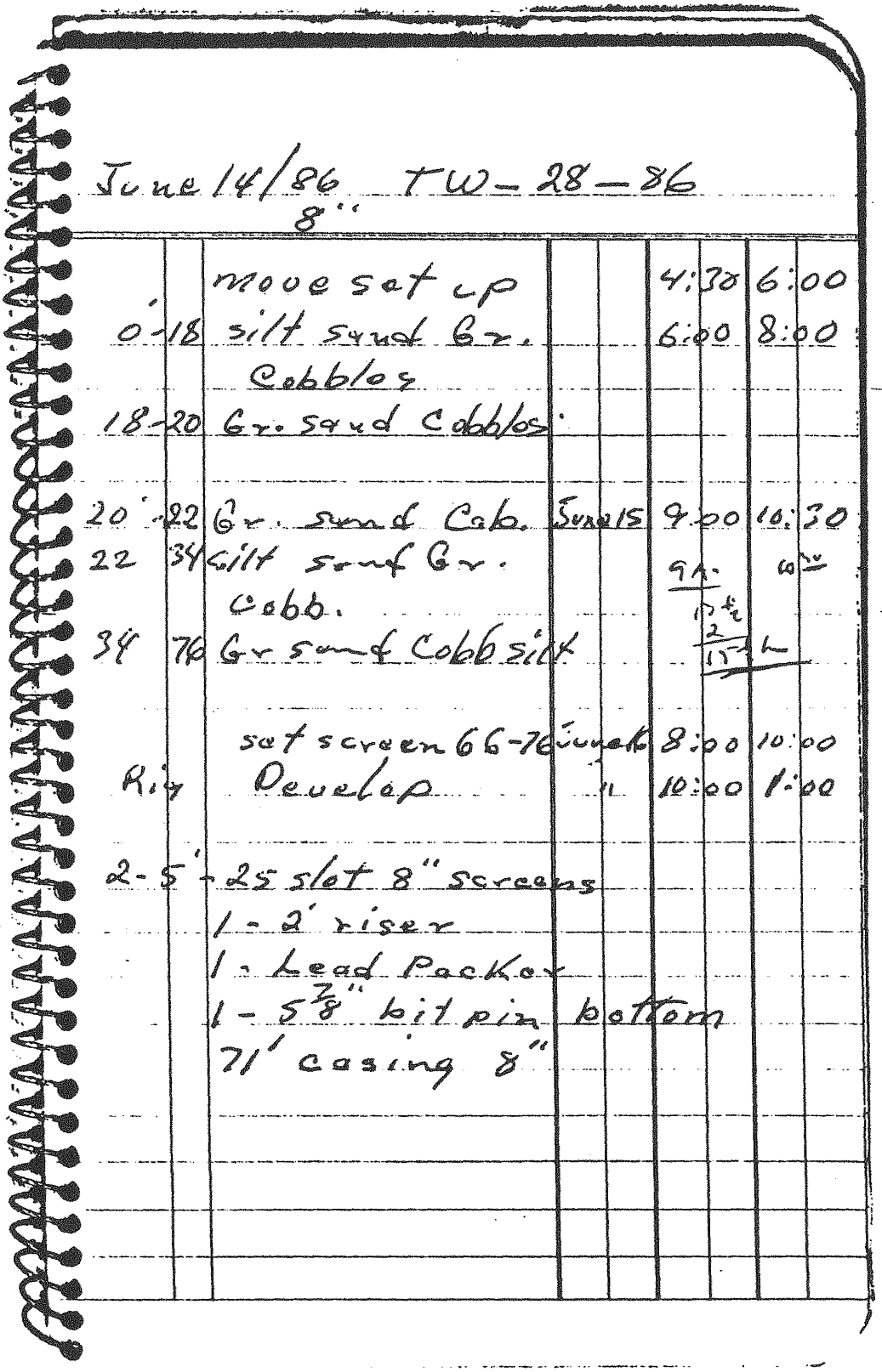
June 14/86 - TW-27/86

		move set up	9:00	10:00
0	12	Gr. sand Cob.	10:00	2:30
		Bolders		
12	17	sill Gr. sand Cob		
17	24	Gr. sand Cob silt		
24	62	Gr sand Cob.		
62	63	sitt Gre sand		
		set screen 56-61	2:30	3:00
Rig		Develop	3:00	4:30
5' 6"		6" - 20 slot screen		
		58' 6" casing 6"		

LEGEND: Gr. - Gravel
Cob.- Cobbles
B.R. - Bedrock
Balls - Bentonite clay sealing pellets

FARO YUKON

1986 GROUNDWATER EVALUATION PROGRAM
DRILLER'S LOGS
MIDNIGHT SON DRILLING
WHITEHORSE, Y.T.



June 14/86 TW-28-86
8"

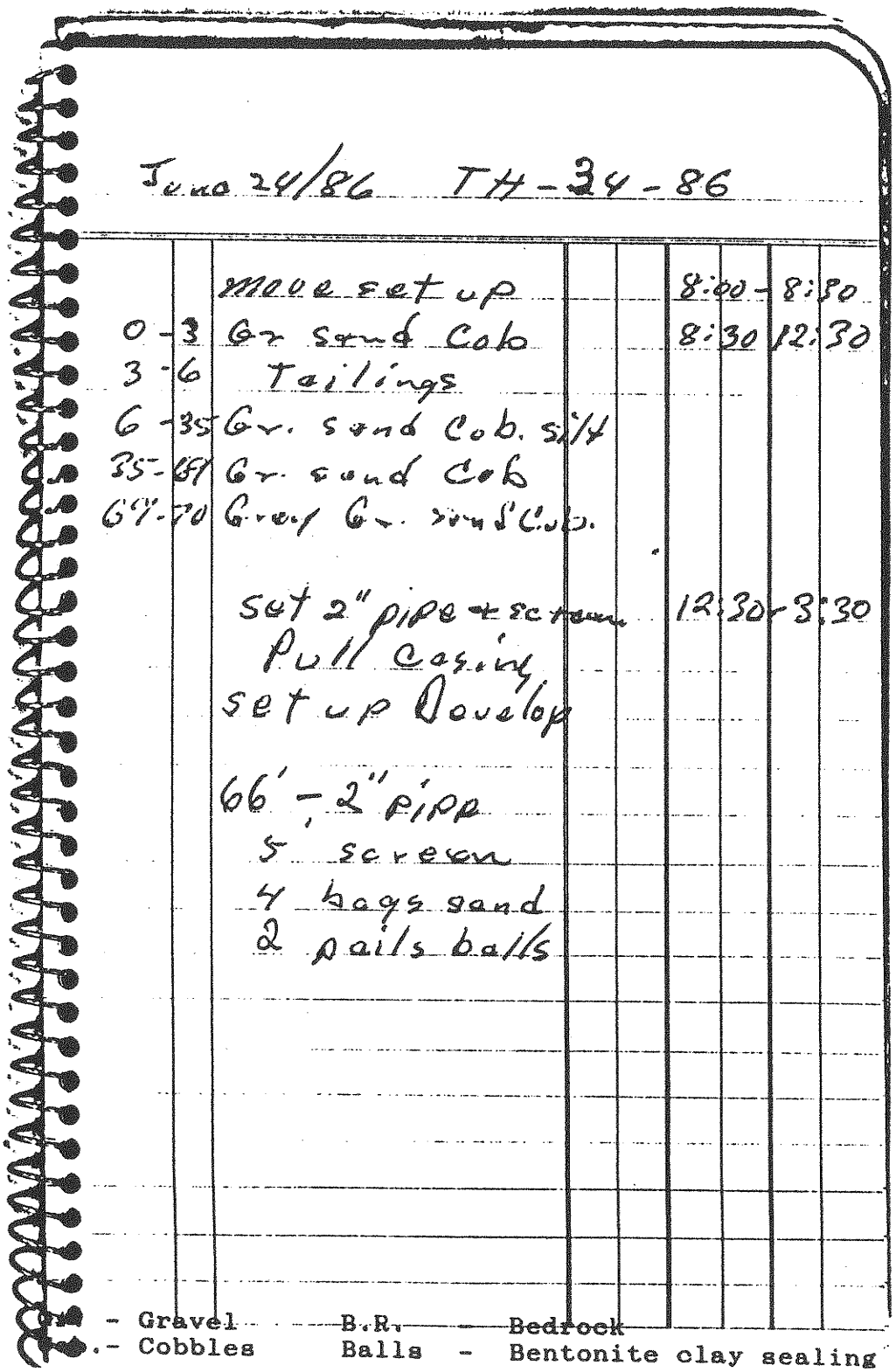
		move set up		4:30	6:00
0'	18'	silt sand Gr. Cobbles		6:00	8:00
18'	20'	Gr. sand Cobbles			
20'	22'	Gr. sand Cob.	Sand 15	9:00	10:30
22'	34'	silt sand Gr. Cobb.		9A.	10 ½
34'	76'	Gr sand Cobb silt		1½ 2 15 ½	
		set screen 66-76	Sand	8:00	10:00
Rig		Develop	"	10:00	1:00

2 - 5' - 25 slot 8" screens
1 - 2' riser
1 - Lead Packer
1 - 5 7/8" bit pin bottom
71' casing 8"

LEGEND: Gr. - Gravel B.R. - Bedrock
Cob.- Cobbles Balls - Bentonite clay sealing pellets

FARO YUKON

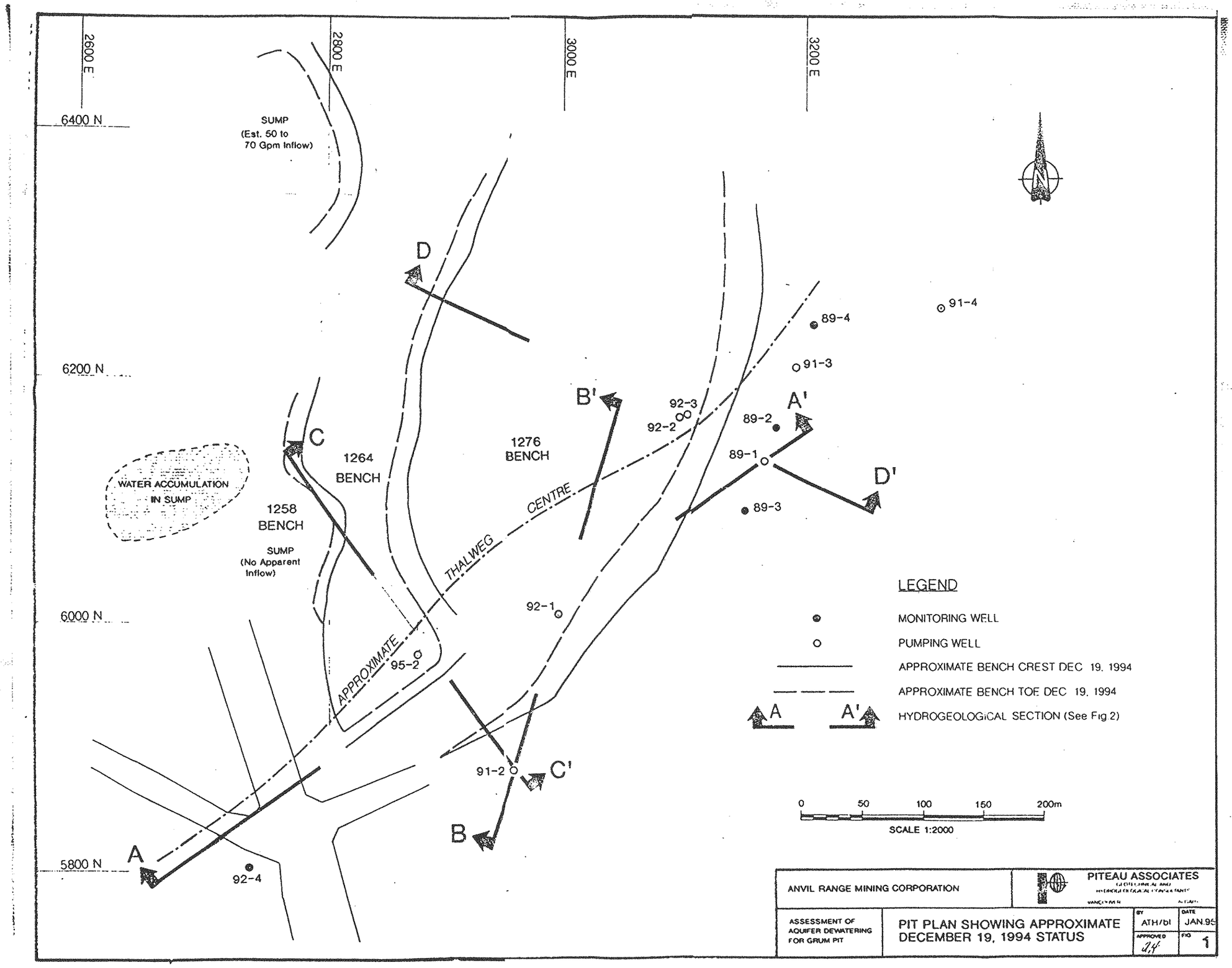
1986 GROUNDWATER EVALUATION PROGRAM
DRILLER'S LOGS
MIDNIGHT SON DRILLING
WHITEHORSE, Y.T.

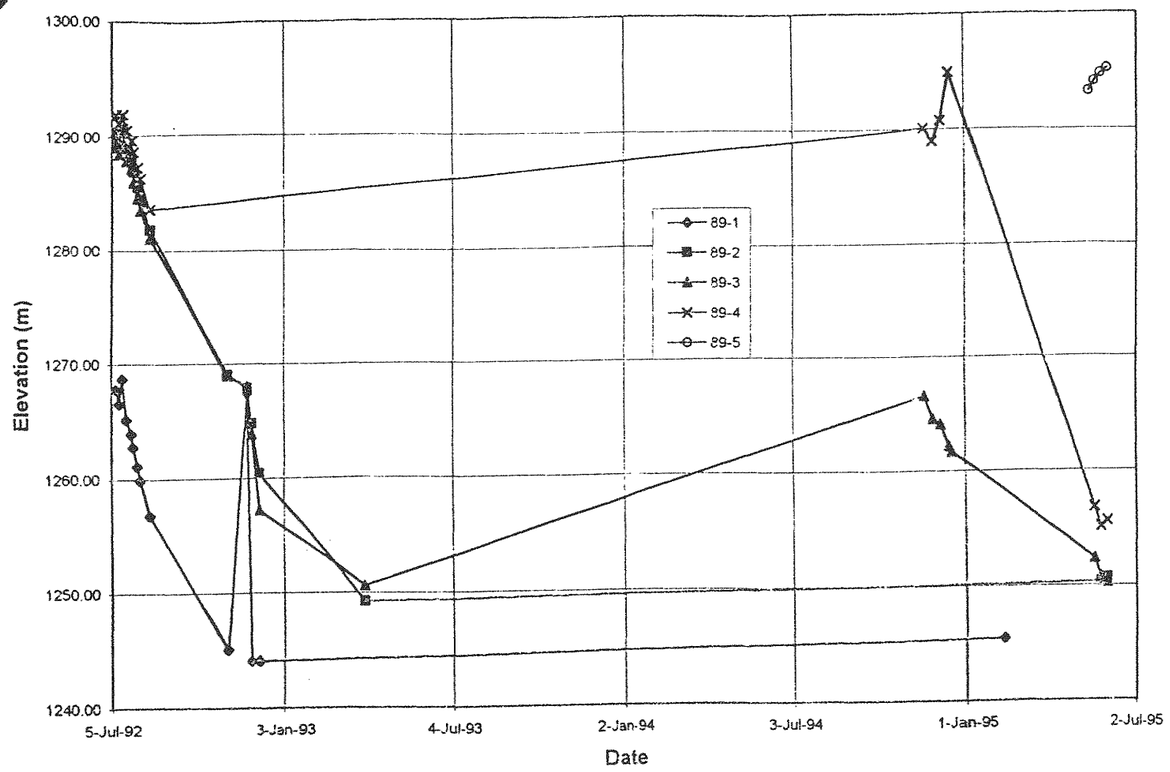


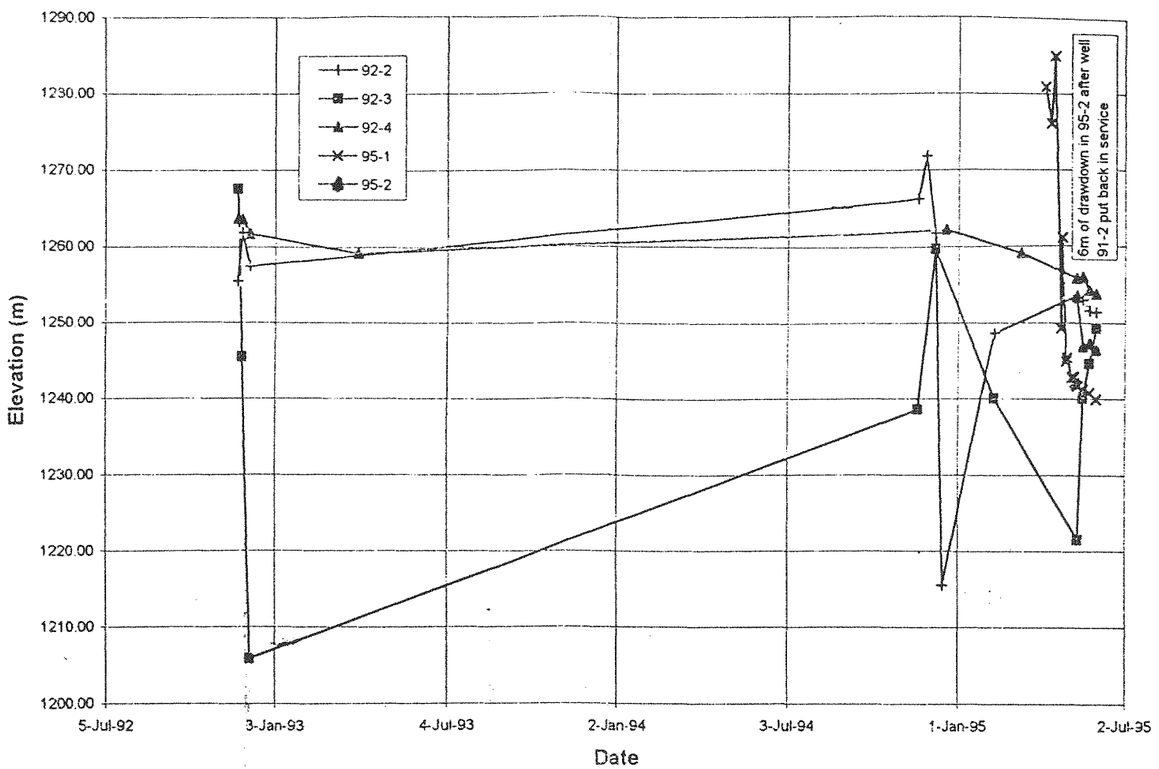
June 24/86 TH-34-86

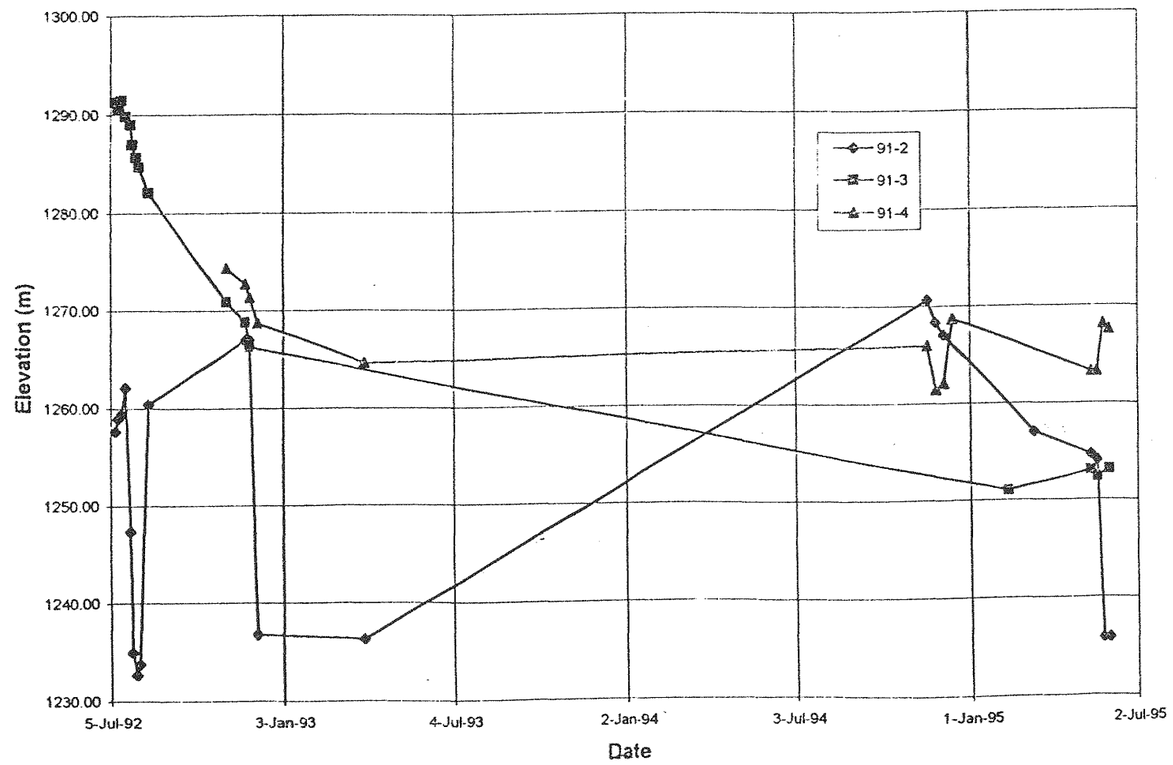
	move set up	8:00 - 8:30	
0 - 3	Gr sand Cob	8:30	12:30
3 - 6	Tailings		
6 - 35	Gr. sand Cob. s/t		
35 - 64	Gr. sand Cob		
64 - 70	Grey Gr. sand Cob.		
	set 2" pipe + screen	12:30	3:30
	Pull casing		
	set up Develop		
	66' - 2" pipe		
	5 screen		
	4 bags sand		
	2 pails balls		

LEGEND: Gr. - Gravel B.R. - Bedrock
Cob. - Cobbles Balls - Bentonite clay sealing pellets


2600 E
2800 E
3000 E
3200 E
6400 N
6200 N
6000 N
5800 N
SUMP
(Est. 50 to
70 Gpm Inflow)
SUMP
(No Apparent
Inflow)
WATER ACCUMULATION
IN SUMP
1258
BENCH
1264
BENCH
1276
BENCH
THALWEG
CENTRE
APPROXIMATE
A
A'
B
B'
C
C'
D
D'
89-1
89-2
89-3
89-4
91-1
91-2
91-3
91-4
92-1
92-2
92-3
92-4
95-2
N
LEGEND
MONITORING WELL
PUMPING WELL
APPROXIMATE BENCH CREST DEC 19, 1994
APPROXIMATE BENCH TOE DEC 19, 1994
HYDROGEOLOGICAL SECTION (See Fig 2)
0
50
100
150
200m
SCALE 1:2000
ANVIL RANGE MINING CORPORATION
PITEAU ASSOCIATES
ASSESSMENT OF
AQUIFER DEWATERING
FOR GRUM PIT
PIT PLAN SHOWING APPROXIMATE
DECEMBER 19, 1994 STATUS
BY
ATH/bl
DATE
JAN.95
APPROVED
FIG
1







ANVIL RANGE MINING CORPORATION

PITEAU ASSOCIATES
GEOTECHNICAL CONSULTANTS
VANCOUVER CALGARY

ASSESSMENT OF AQUIFER DEWATERING GRUM PIT

HYDROGRAPHS FOR PUMPING AND OBSERVATION WELLS

BY: ATH

DATE: JUN 95

APPROVED

DWG: 3

EXISTING GROUND SURFACE

ZONE II PIT

PROPOSED PLUG DAMS (SLIMES)

COMPACTED TILL COVER

MAX. PIT WATER EL. 3850

SLIMES

MAIN PIT

WATER LEVEL (DEC. 1, 1994)

PUMP START LEVEL EL. 3653 ft.

PUMP STOP LEVEL EL. 3633 ft.

ZONE II PUMPING WELL

NORTH FORK ROSE CREEK

BH94-6

BH94-7

BH94-10

BH94-8

BH94-11

BH94-9

65-50

76-DS-4

BH94-15

76-14

BH94-16

ELEVATION (FEET)

4000

3900

3800

3700

3600

3500

3400

3300

LEGEND

- HORNBLENDE BIOTITE DIORITE
- QUARTZITE BIOTITE SCHIST
- CHLORITIC BIOTITE SCHIST
- SANDY GRAVEL
- QUARZITIC FELDSPATHIC BIOTITE SCHIST
- QUARTZ DIORITE
- GRAVELLY SAND

SECTION A 2.1

0 150 300 450 600 750 FEET

HORIZ. SCALE: 1"=300'

0 50 100 150 200 250 FEET

VERT. SCALE: 1"=100'

NOTE: UTM DATUM USED

NO	DESCRIPTION / REVISIONS	DATE	APP'D

STEFFEN ROBERTSON & KIRSTEN Consulting Engineers

ANVIL RANGE MINING CORPORATION

FARO GROUNDWATER

SECTION A

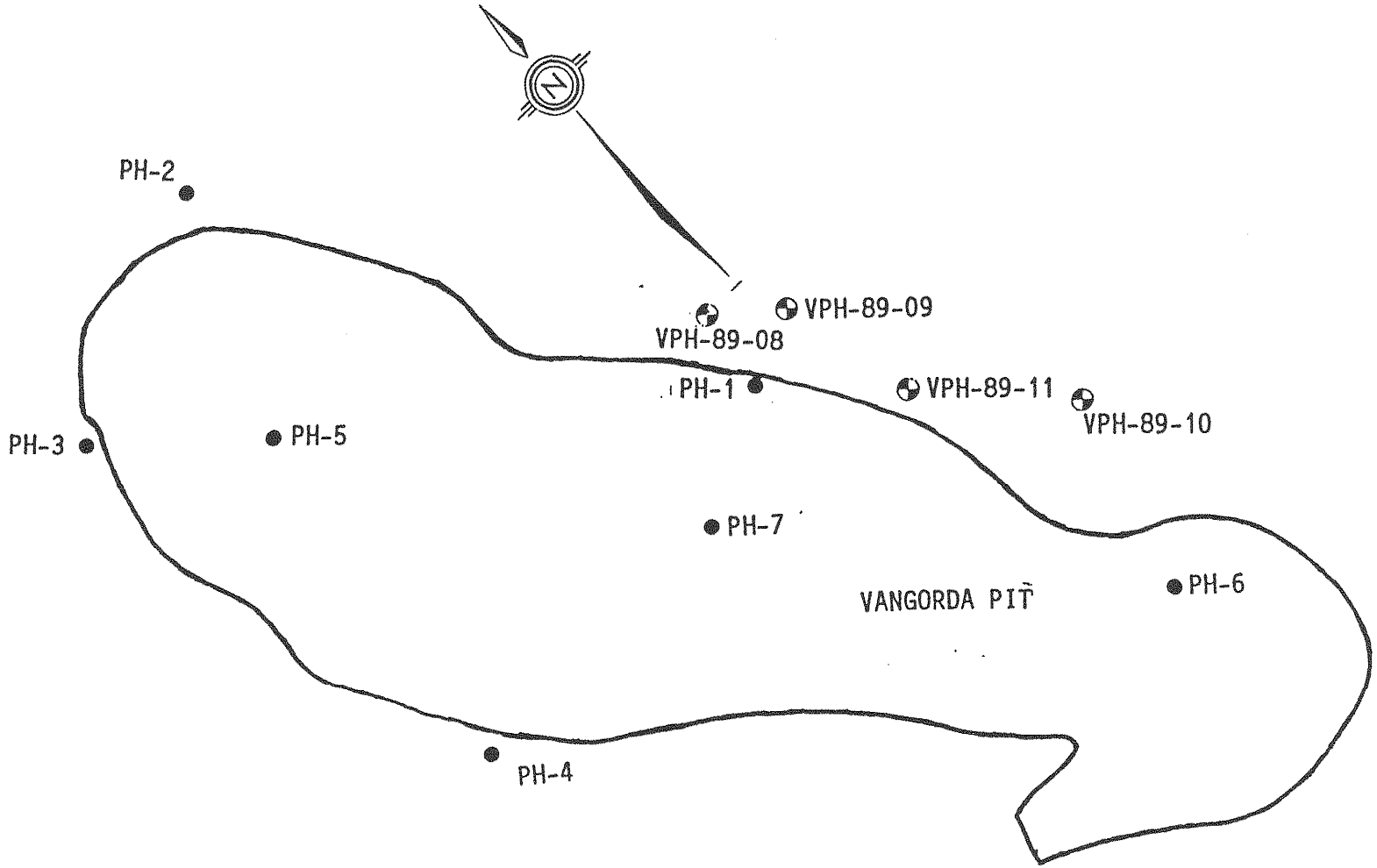
FILE REFERENCE	PROJECT NO.	DRAWING NO.	REV.
SECT.DWG	A114101	3.1	0

EBA Engineering Consultants Ltd.

July 1989

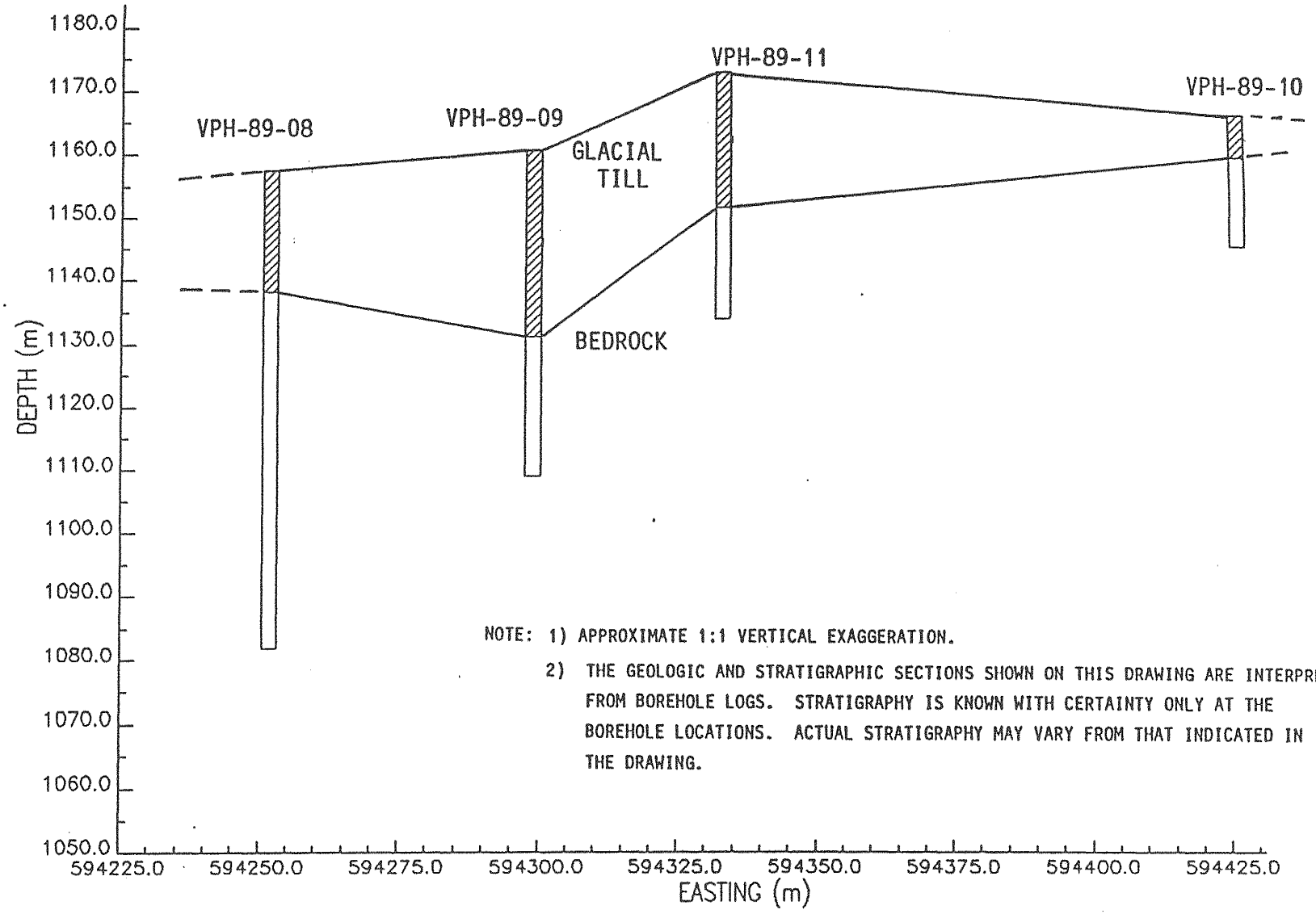
Piezometer and Dewatering Well Installation Report
Grum Vangorda and Faro Mine Sites

Report No. 0201-10018
0201-10027
0201-10028



LEGEND:
- ● PIEZOMETER PREVIOUSLY INSTALLED BY CURRAGH RESOURCES INC.
- ◓ PIEZOMETER INSTALLED BY EBA ENGINEERING

EBA Engineering Consultants Ltd.	PROJECT: PIEZOMETER INSTALATIONS VANGORDA MINE SITE
CLIENT: CURRAGH RESOURCES INC.	TITLE: SITE PLAN AND APPROXIMATE PIEZOMETER LOCATIONS
DATE: 1989-07-07 DWN: JSB CHKD: MAV	DWG NO.: 10027-B-01 0201-10027



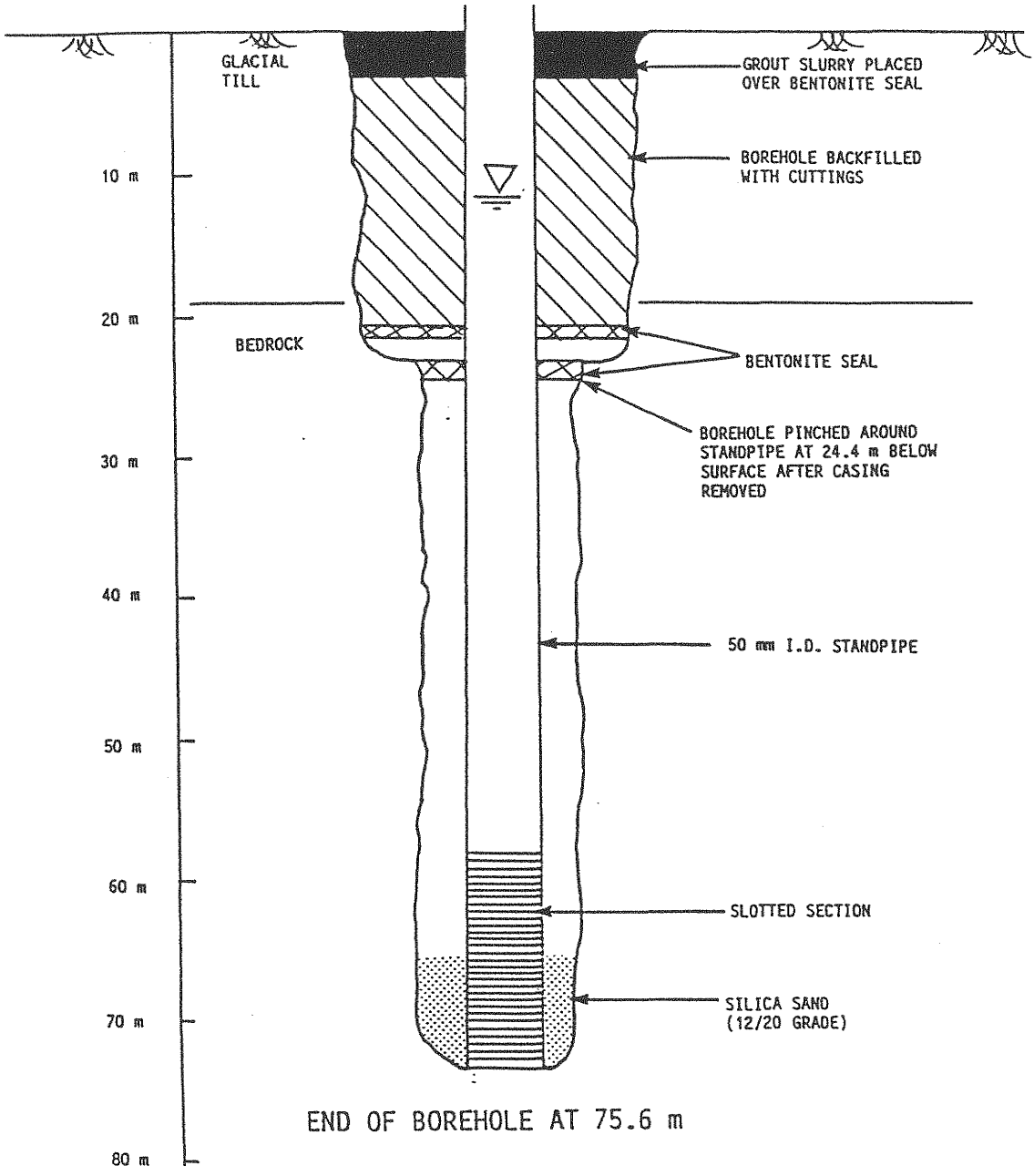
EBA Engineering Consultants Ltd.			PROJECT: PIEZOMETER INSTALLATION VANGORDA MINE SITE	
CLIENT: CURRAGH RESOURCES INC.			TITLE: GENERAL STRATIGRAPHIC CROSS-SECTION	
DATE 1989-06-23	DWN JSB	CHKD MAV	DWG NO. 10027-B-02	0201-10027

PIEZOMETER AND WATER WELL INSTALLATION	CLIENT: CURRAGH RESOURCES INC.	BOREHOLE No. 10027-01
PIEZOMETER VPH-89-08	DRILL RIG: SCHRAMM T66H (ODEX SYSTEM)	Project No: 0201-10027
VANGORDA MINE SITE FARO, YUKON	UTM ZONE: 8 N6903316.00 E594252.00	ELEVATION 1157.47 (m)

SAMPLE TYPE ■ CYCLONE ⊘ NO RECOVERY ⊠ STANDARD PEN.

DEPTH (m)	SAMPLE TYPE	SAMPLE NO	USC	SOIL/ROCK DESCRIPTION	DRILLING COMMENTS	STANDARD PENETRATION 20 40 60 80 / PLASTIC M.C. LIQUID / 20 40 60 80	DEPTH (m)
0.0				SAND TILL(SM)–silty, some gravel, some clay; with occasional cobbles, boulders, and fragmented phyllite particles disseminated through–out;coarse to fine–grained sand; coarse to fine–grained, subrounded to angular gravel; damp; dense(est.); low plastic; olive	–Borehole drilled using Odex system with downhole casing hammer to drill and set casing to 25.8 m. –NOTE: Times indicated below are actual drilling time only. This does not include the time required to add and weld additional sections of casing. –20 minutes to drill and set casing between surface and 5.6 m. –30 minutes to drill and set casing between 5.6 m and 11.6 m. –20 minutes to drill and set casing between 14.3 m and 19.5 m. –35 minutes to drill and set casing between 19.5 m and 25.8 m. –170 mm O.D. casing set to 25.8 m.		0.0
5.0							5.0
10.0							10.0
15.0							15.0
20.0				–small amount of water encountered at 18.6 m; flow rate estimated to be less than 25 litres/minute			20.0
25.0				BEDROCK– weathered, fractured iron oxide stained –quartz–sericite phyllite –graphitic phyllite			25.0
30.0							30.0
35.0				–small amount of water encountered at 35 m; flow rate estimated to be less than 25 litres/minute			35.0
40.0							40.0
45.0					–Approx. 45 minutes drilling time per 6 m drill rod while drilling bedrock.		45.0
50.0							50.0
55.0					–Water level readings taken: 1989–04–24 at 09:30 hours 12 m below surface. 1989–04–28 at 07:30 hours 11.9 m below surface. 1989–04–30 at 08:00 hours 11.5 m below surface.		55.0
60.0							60.0
65.0							65.0
70.0							70.0
75.0				END OF BOREHOLE AT 75.6 m			75.0
80.0							80.0
85.0							85.0
90.0							90.0

EBA Engineering Consultants Ltd. Whitehorse, Yukon	COMPLETION DEPTH 75.6 m	COMPLETE 89/04/13
	LOGGED BY MAV	DWG NO.
		Page 1 of 1



END OF BOREHOLE AT 75.6 m

NOTE: 1) Refer to Borehole log (10027-01) for detailed stratigraphic description

2) Water level indicated at 11.5 m as measured 1989-04-30 at 08:00 hrs

3) Horizontal dimensions not to scale

EBA Engineering Consultants Ltd.	PROJECT: VANGORDA MINE SITE - FARO, YUKON
CLIENT: CURRAGH RESOURCES INC.	TITLE: PIEZOMETER VPH-89-08 INSTALLATION DETAILS
DATE 89/05/16 | DWN WAS | CHKD	DWG NO. 0201-10027

PIEZOMETER AND WATER WELL INSTALLATION	CLIENT: CURRAGH RESOURCES INC.	BOREHOLE No. 10027-02
PIEZOMETER VPH-89-09	DRILL RIG: SCHRAMM T66H (ODEX SYSTEM)	Project No: 0201-10027
VANGORDA MINE SITE FARO, YUKON	UTM ZONE: 8 N6903286.00 E594299.00	ELEVATION 1160.75 (m)

SAMPLE TYPE ■ CYCLONE ⊘ NO RECOVERY ⊠ STANDARD PEN.

DEPTH (m)	SAMPLE TYPE	SAMPLE NO	USC	SOIL/ROCK DESCRIPTION	DRILLING COMMENTS	STANDARD PENETRATION 20 40 60 80 / PLASTIC M.C. LIQUID 20 40 60 80	DEPTH (m)
0.0				SAND TILL(SM)–silty, some gravel, some clay; with cobbles, boulders and fragmented phyllite particles disseminated throughout; coarse to fine-grained sand; coarse to fine-grained, subrounded to angular gravel; damp; dense(est.) low plastic; olive grey, with iron oxide staining and nodules throughout –trace water encountered at 19 m, very thin water bearing sand lens	–Borehole drilled using Odex system with downhole casing hammer to set 170 mm O.D. casing. –Water level readings taken: 1989-04-30 at 08:00 hours 15.2 m below surface. 1989-04-30 at 18:00 hours 15.2 m below surface.		0.0
30.0				BEDROCK– weathered –small amount of water encountered at 29.6 m; estimated flow rate 25 litres/minute max. –bedrock becomes competent with depth	–170 mm O.D. casing set to 31.4 m.		30.0
51.8				END OF BOREHOLE AT 51.8 m			51.8
90.0							90.0

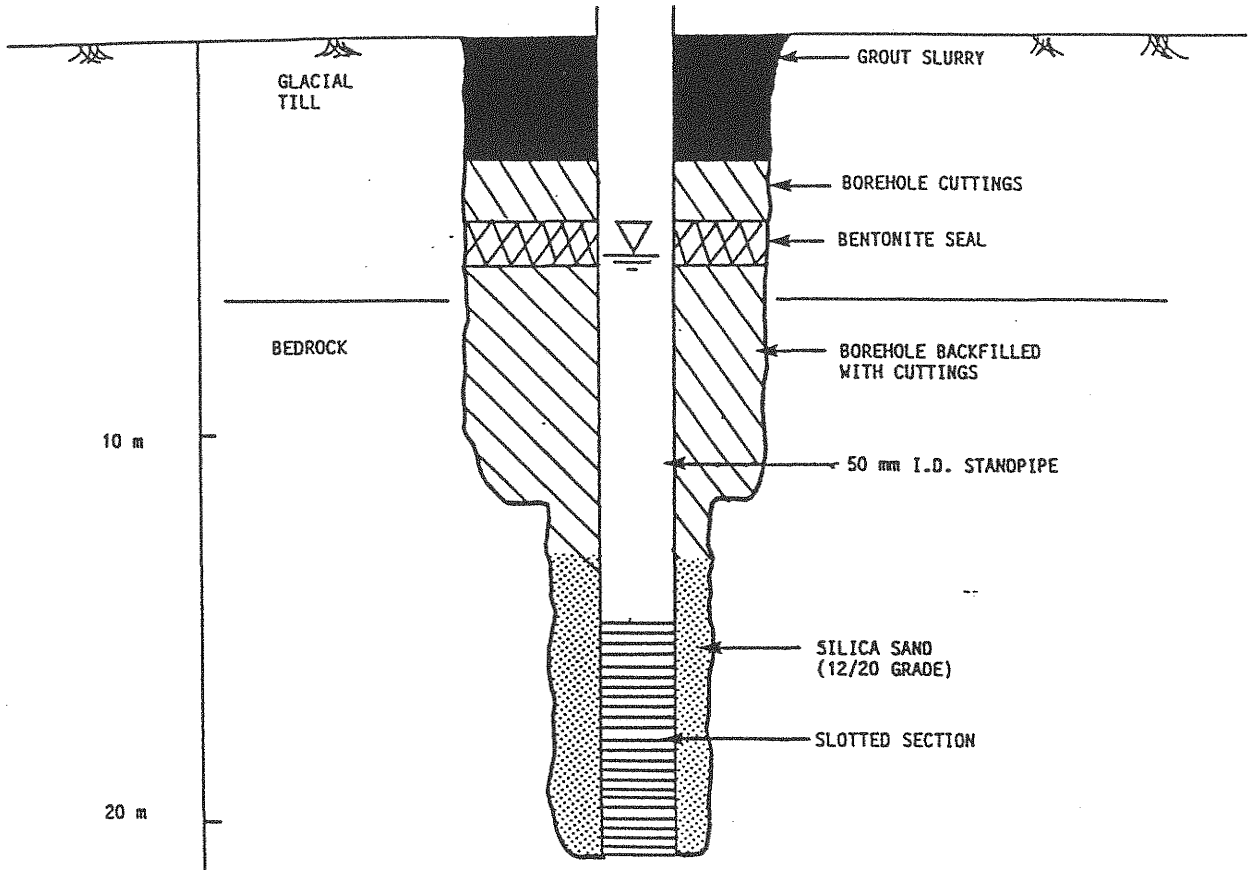
EBA Engineering Consultants Ltd. Whitehorse, Yukon	COMPLETION DEPTH 51.8 m	COMPLETE 89/04/29
	LOGGED BY MAV	DWG NO.
		Page 1 of 1

PIEZOMETER AND WATER WELL INSTALLATION	CLIENT: CURRAGH RESOURCES INC.	BOREHOLE No. 10027-03
PIEZOMETER VPH-89-10	DRILL RIG: SCHRAMM T66H (ODEX SYSTEM)	Project No: 0201-10027
VANGORDA MINE SITE FARO, YUKON	UTM ZONE: 8 N6903103.00 E594425.00	ELEVATION 1166.26 (m)

SAMPLE TYPE ■ CYCLONE ⊘ NO RECOVERY ⊠ STANDARD PEN.

DEPTH (m)	SAMPLE TYPE	SAMPLE NO	USC	SOIL/ROCK DESCRIPTION	DRILLING COMMENTS	STANDARD PENETRATION 20 40 60 80 / PLASTIC M.C. LIQUID / 20 40 60 80	DEPTH (m)
0.0				SAND TILL(SM)-silty, some gravel, some clay; with occasional cobbles and boulders throughout; fragmented phyllite particles; coarse to fine-grained sand; coarse to fine-grained, subrounded to angular gravel; moist at surface, moisture content decreases with depth becoming damp; dense(est.); low plastic; olive	Borehole drilled using Odex system with downhole casing hammer to drill and set casing to 11.9 m. Very little water observed while drilling; estimated less than 25 litres/minute. Water level reading taken: 1989-04-30 at 08:15 hours 5.3 m below surface.		0.0
5.0							5.0
10.0							10.0
15.0							15.0
20.0				BEDROCK- weathered -becomes competent with depth -graphitic phyllite			20.0
25.0				END OF BOREHOLE AT 21.0 m			25.0
30.0							30.0
35.0							35.0
40.0							40.0
45.0							45.0
50.0							50.0
55.0							55.0
60.0							60.0
65.0							65.0
70.0							70.0
75.0							75.0
80.0							80.0
85.0							85.0
90.0							90.0

EBA Engineering Consultants Ltd. Whitehorse, Yukon	COMPLETION DEPTH 21.0 m	COMPLETE 89/04/29	
	LOGGED BY MAV	DWG NO.	Page 1 of 1



END OF BOREHOLE AT 21.0 m

NOTE: 1) Refer to Borehole log (10027-03) for detailed stratigraphic description

2) Water level indicated at 5.3 m as measured 1989-04-30 at 08:15 hrs

3) Horizontal dimensions not to scale

EBA Engineering Consultants Ltd.	PROJECT: VANGORDA MINE SITE - FARO, YUKON
CLIENT: CURRAGH RESOURCES INC.	TITLE: PIEZOMETER VPH-89-10 INSTALLATION DETAILS
DATE 89/05/16 | DWN WAS | CHKD	DWG NO. 0201-10027

PIEZOMETER AND WATER WELL INSTALLATION	CLIENT: CURRAGH RESOURCES INC.	BOREHOLE No. 10027-04
PIEZOMETER VPH-89-11	DRILL RIG: SCHRAMM T66H (ODEX SYSTEM)	Project No: 0201-10027
VANGORDA MINE SITE FARO, YUKON	UTM ZONE: 8 N6903181.00 E594333.00	ELEVATION 1173.00 (m)

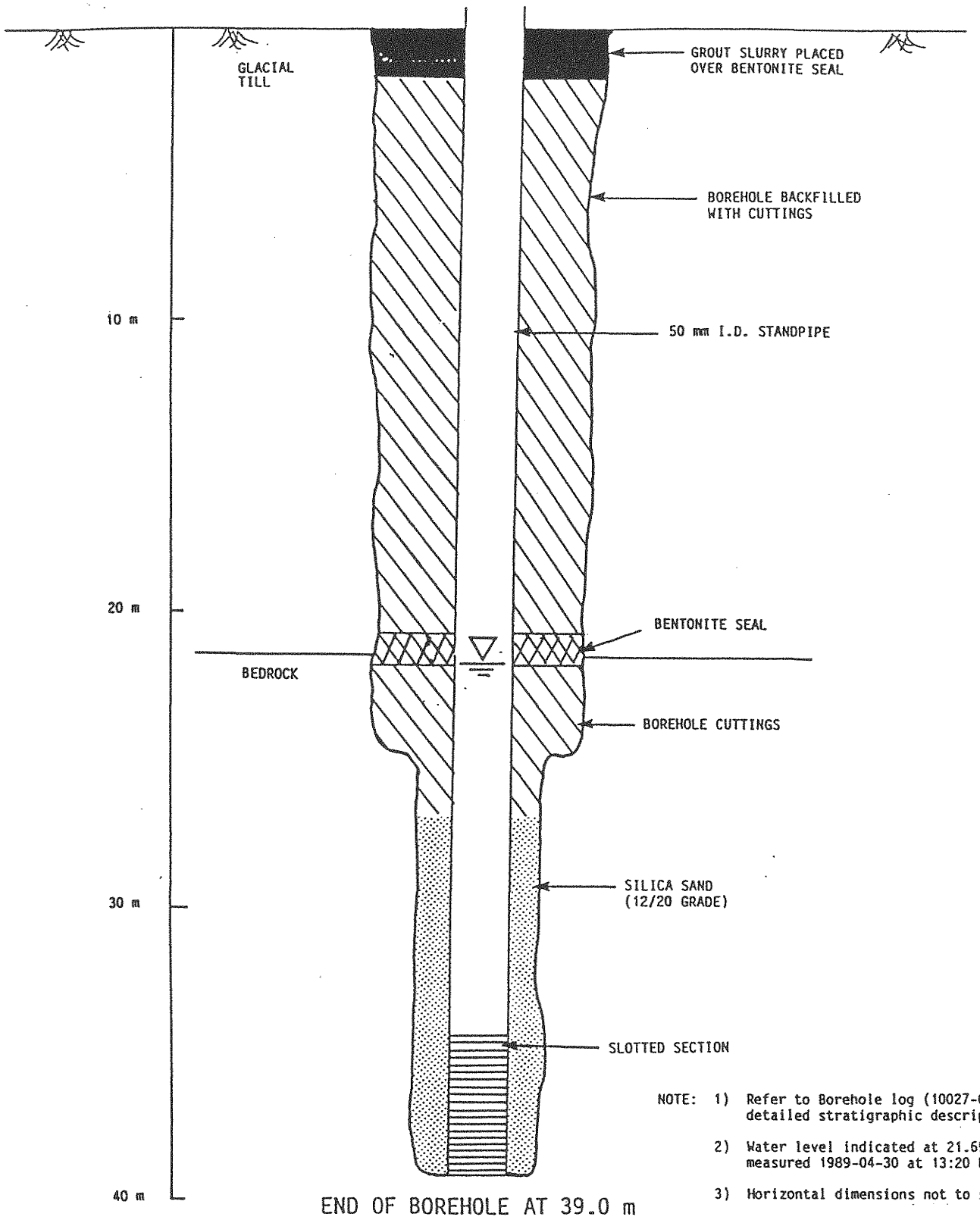
SAMPLE TYPE ■ CYCLONE ⊘ NO RECOVERY ⊠ STANDARD PEN.

DEPTH (m)	SAMPLE TYPE	SAMPLE NO	USC	SOIL/ROCK DESCRIPTION	DRILLING COMMENTS	STANDARD PENETRATION 20 40 60 80 / PLASTIC M.C. LIQUID 20 40 60 80
0.0				SAND TILL(SM)–silty, some gravel, some clay; with occasional cobbles, boulders and fragmented phyllite particles disseminated throughout; coarse to fine–grained sand; coarse to fine–grained, subrounded to angular gravel; moist to wet at surface, moisture content decreases with depth becoming damp; dense(est.); low plastic; olive at surface changing to grey at depth	Borehole drilled using Odex system with downhole hammer to drill and set casing to 24.7 m. NOTE: Drilling time given is actual drilling time only. This does not account for the time required to add and weld casing. –25 minutes to drill and set casing between 18.3 m and 24.7 m.	
20.0				BEDROCK– quartz–sericite phyllite –graphitic phyllite –water encountered, estimated less than 40 litres/minute	Water encountered, estimated less than 40 litres/minute.	
39.0				END OF BOREHOLE AT 39.0 m		
90.0						

EBA Engineering Consultants Ltd.
Whitehorse, Yukon

COMPLETION DEPTH 39.0 m | COMPLETE 89/04/30

LOGGED BY MAV | DWG NO. | Page 1 of

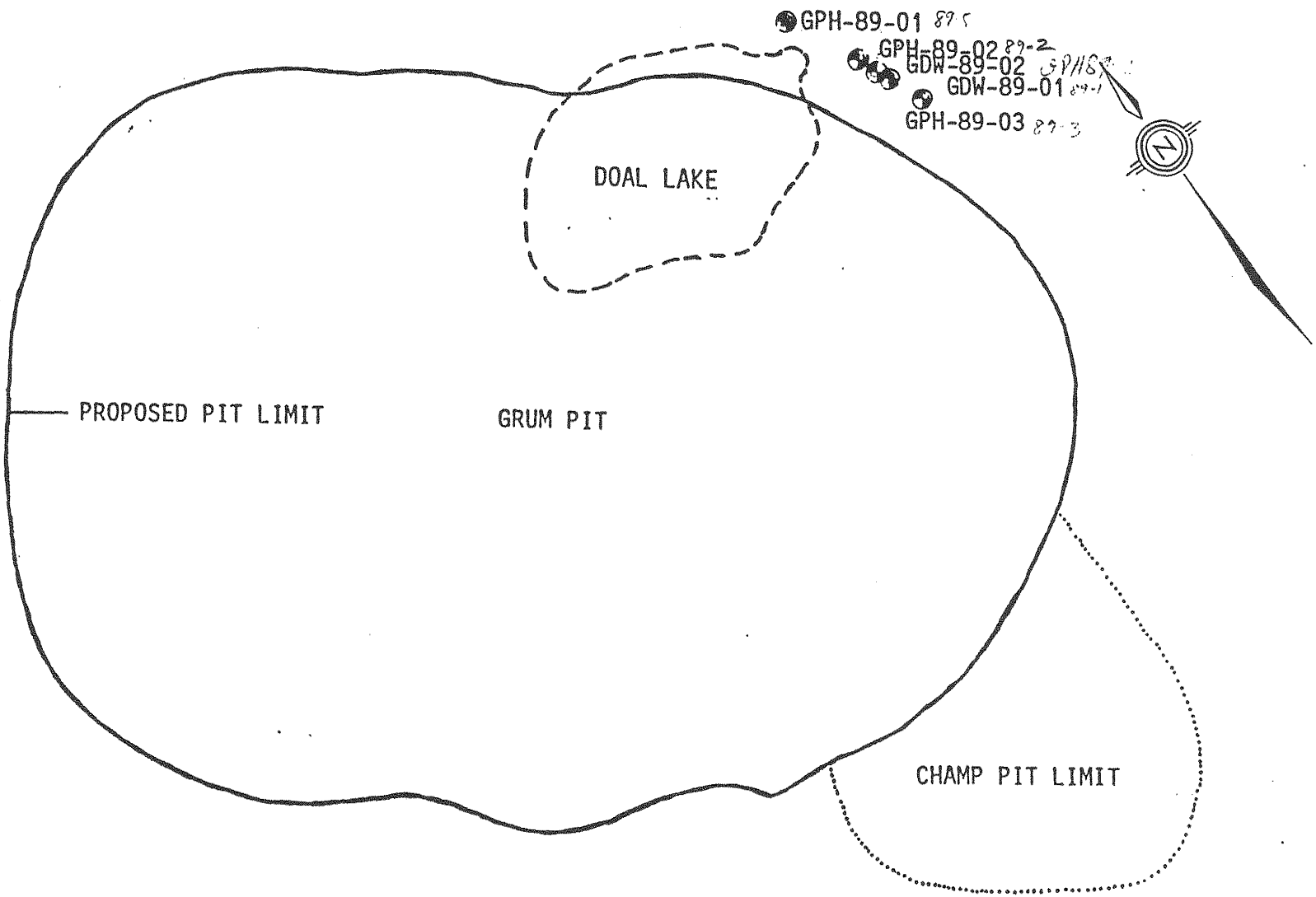


NOTE: 1) Refer to Borehole log (10027-04) for detailed stratigraphic description

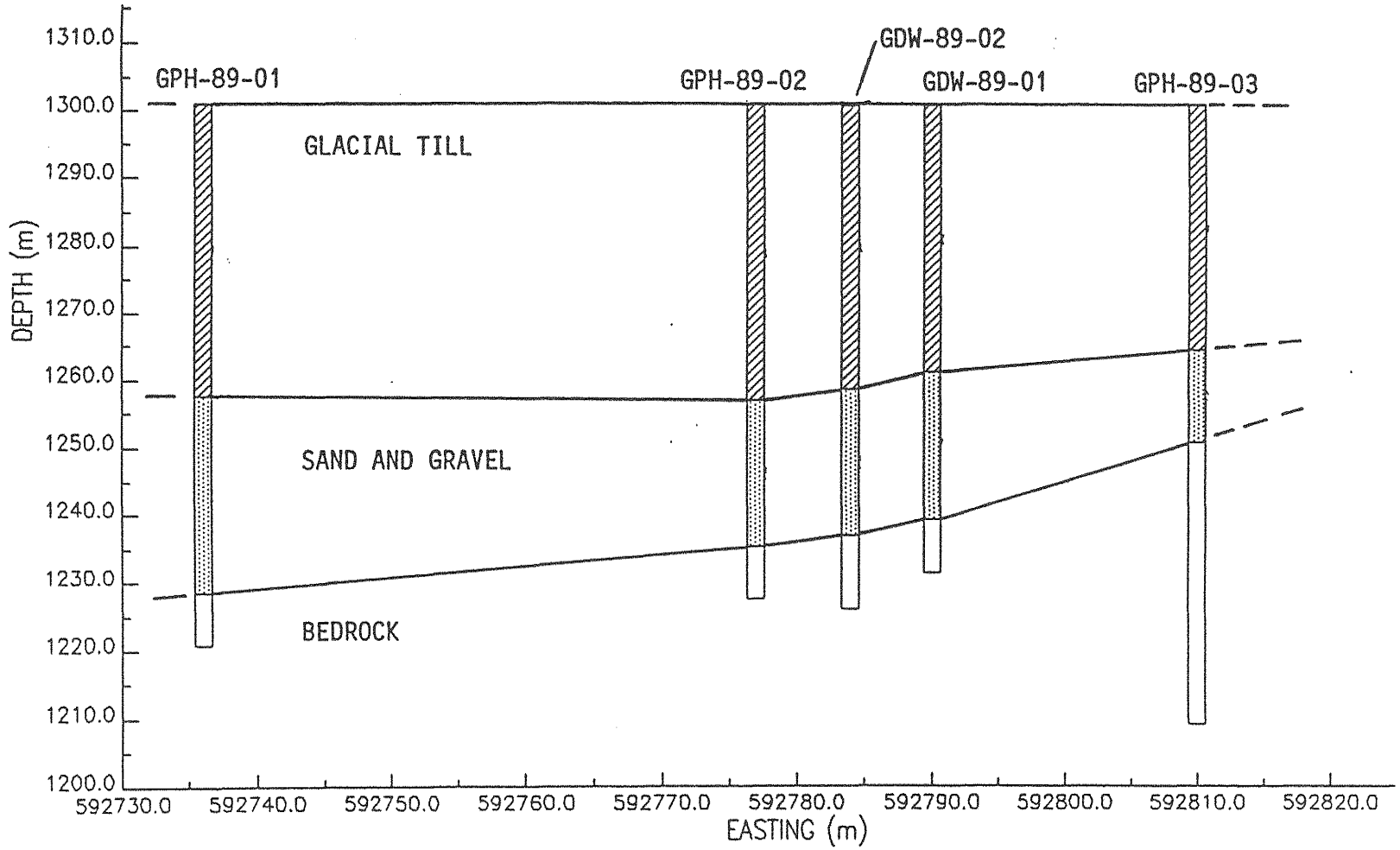
2) Water level indicated at 21.65 m as measured 1989-04-30 at 13:20 hrs

3) Horizontal dimensions not to scale

EBA Engineering Consultants Ltd.			PROJECT: VANGORDA MINE SITE - FARO, YUKON
CLIENT: CURRAGH RESOURCES INC.			TITLE: PIEZOMETER VPH-89-11 INSTALLATION DETAILS
DATE 89/05/16	DWN WAS	CHKD	DWG NO. 0201-10027



EBA Engineering Consultants Ltd.			PROJECT: PIEZOMETER & DEWATERING WELL INSTALLATIONS	
CLIENT: CURRAGH RESOURCES INC.			TITLE: SITE PLAN AND APPROXIMATE INSTALLATION LOCATIONS GRUM MINE SITE	
DATE 1989-07-07	DWN JSB	CHKD MAV	DWG NO. 10018-A-01	0201-10018



NOTE: 1) APPROXIMATE 1:2 VERTICAL EXAGGERATION.

2) THE GEOLOGIC AND STRATIGRAPHIC SECTIONS SHOWN ON THIS DRAWING ARE INTERPRETED FROM BOREHOLE LOGS. STRATIGRAPHY IS KNOWN WITH CERTAINTY ONLY AT THE BOREHOLE LOCATIONS. ACTUAL STRATIGRAPHY MAY VARY FROM THAT INDICATED IN THE DRAWING.

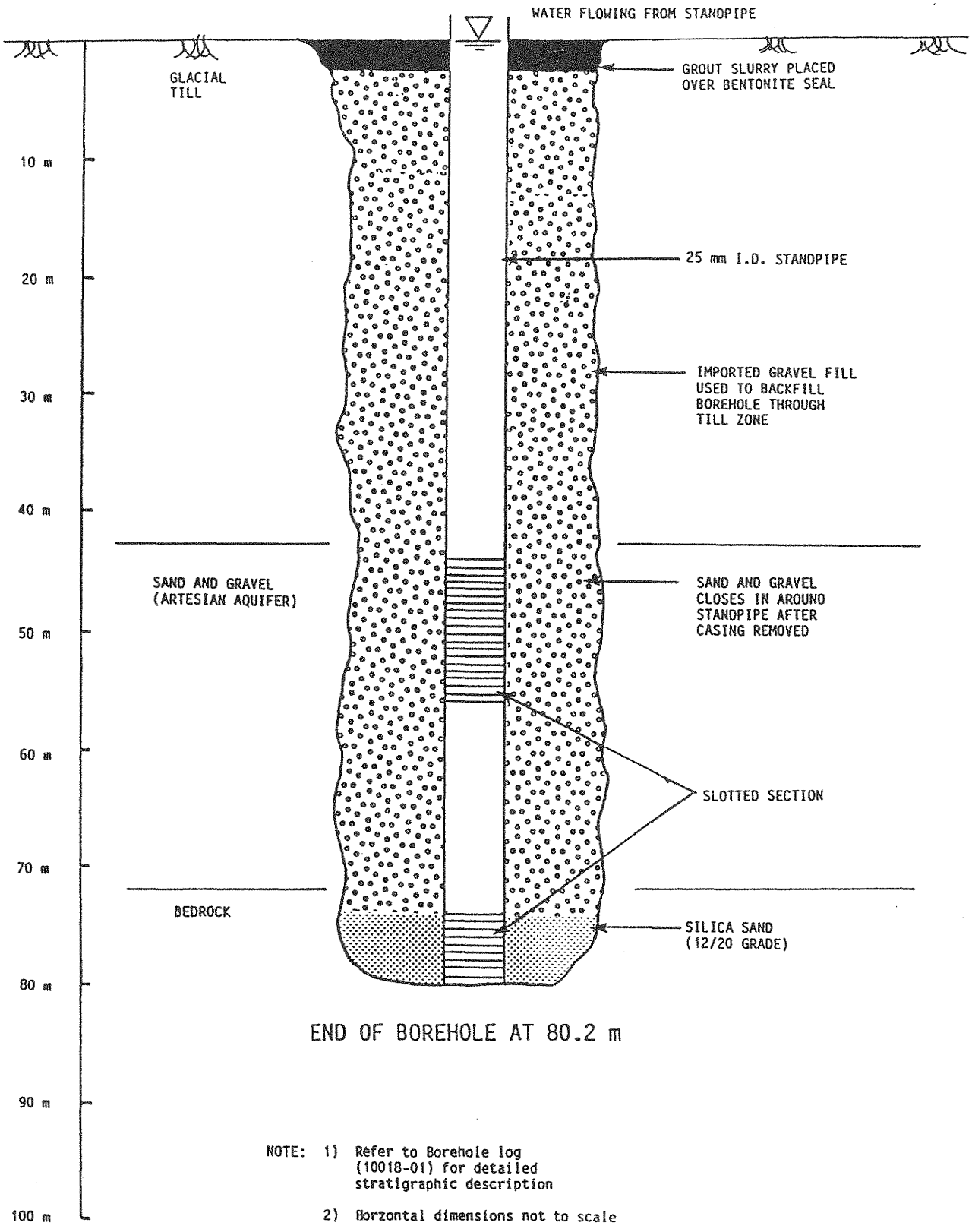
EBA Engineering Consultants Ltd.	PROJECT PIEZOMETER AND WATER WELL INSTALLATION GRUM MINE SITE
CLIENT CURRAGH RESOURCES INC.	TITLE GENERAL STRATIGRAPHIC CROSS - SECTION
DATE 1989-06-23 | DWN | CHKD	DWG NO. 10018-A-02 | 0201-10018

PIEZOMETER AND WATER WELL INSTALLATION	CLIENT: CURRAGH RESOURCES INC.	BOREHOLE No. 10018-01
PIEZOMETER GPH-89-01	DRILL RIG: SCHRAMM T66H (ODEX SYSTEM)	Project No: 0201-10018
GRUM MINE SITE FARO, YUKON	UTM ZONE: 8 N6905239.00 E592736.00	ELEVATION 1300.99 (m)

SAMPLE TYPE ■ CYCLONE ⊘ NO RECOVERY ⊠ STANDARD PEN.

DEPTH (m)	SAMPLE TYPE	SAMPLE NO	USC	SOIL/ROCK DESCRIPTION	DRILLING COMMENTS	STANDARD PENETRATION 20 40 60 80 / PLASTIC M.C. LIQUID 20 40 60 80	DEPTH (m)
0.0				SAND TILL(SM)–silty, some gravel, some clay; with cobbles and boulders disseminated throughout; coarse to fine–grained, subrounded to angular gravel; coarse to fine–grained sand; damp; compact; low plastic; dark grey	Standard Penetration Test (SPT) samples taken at the request of Mr. J. Huntley. These samples were used for classification testing.		0.0
5.0				–with cobbles throughout at 9 m			5.0
10.0				–quartz gravel; very dense at 12 m	Compressed air used as circulating medium to return cuttings while drilling from surface to 18 m. Water was then used to return cuttings for the complement of the borehole. Borehole drilled using Odex system with downhole hammer to set 170 mm O.D. casing.		10.0
15.0							15.0
20.0				–phyllite fragments disseminated throughout at 19 m			20.0
25.0				–boulder			25.0
30.0					NOTE: Times indicated below are actual drilling time only. This does not include the amount of time required to add and weld the length of casing.		30.0
35.0				–occasional lens of sand and gravel encountered between 33 m and 37 m			35.0
40.0							40.0
45.0				SAND(SP) AND GRAVEL– trace silt; with occasional cobble and fragmented phyllite particles; coarse to fine–grained sand; coarse to fine–grained, subrounded to angular gravel; saturated, artesian aquifer encountered at 43.3 m; dense; nonplastic	Artesian aquifer encountered at 43.3 m. Water flowing from installed standpipe.		45.0
50.0					–15 minutes to drill and set casing between 49 m and 55 m.		50.0
55.0					–25 minutes to drill and set casing between 55 m and 61 m.		55.0
60.0				SAND(SM)–silty; medium to fine–grained sand; uniform, homogeneous; saturated; compact(est.); non–plastic; dark olive grey	–Hydrostatic pressure causes sand to heave inside casing when the drill rods were removed to sample.		60.0
65.0				–gravelly lens encountered at 58 m	–60 minutes to drill and set casing between 61 m and 67 m.		65.0
70.0				–gravelly lens encountered at 69 m	–Hydrostatic pressure causes sand to heave and plug the Odex bit while section of casing was being added. This necessitated removing the drill rods and clearing the bit.		70.0
75.0				BEDROCK– phyllite	–45 minutes to drill and set casing between 67 m and 73 m.		75.0
80.0				END OF BOREHOLE AT 80.2 m	–30 minutes to drill and set casing between 73 m and 79 m		80.0
85.0							85.0
90.0							90.0

EBA Engineering Consultants Ltd. Whitehorse, Yukon	COMPLETION DEPTH 80.2 m	COMPLETE 89/04/03	
	LOGGED BY MAV	DWG NO.	Page 1 of 1



NOTE: 1) Refer to Borehole log (10018-01) for detailed stratigraphic description

2) Horizontal dimensions not to scale

EBA Engineering Consultants Ltd.	PROJECT: GRUM MINE SITE- FARO, YUKON
CLIENT: CURRAGH RESOURCES INC.	TITLE: PIEZOMETER GPH-89-01 INSTALLATION DETAILS
DATE 89/05/16 | DWN WAS | CHKD	DWG NO. 0201-10018

PIEZOMETER AND WATER WELL INSTALLATION	CLIENT: CURRAGH RESOURCES INC.	BOREHOLE No. 10018-02
PIEZOMETER GPH-89-02	DRILL RIG: SCHRAMM T66H (ODEX SYSTEM)	Project No: 0201-10018
GRUM MINE SITE FARO, YUKON	UTM ZONE: 8 N6905164.00 E592777.00	ELEVATION 1301.07 (m)

SAMPLE TYPE ■ CYCLONE ⊘ NO RECOVERY ⊠ STANDARD PEN.

DEPTH (m)	SAMPLE TYPE	SAMPLE NO	USC	SOIL/ROCK DESCRIPTION	DRILLING COMMENTS	STANDARD PENETRATION 20 40 60 80 / PLASTIC M.C. LIQUID 20 40 60 80	DEPTH (m)
0.0				PEAT(PT)-and organic root mat; fibrous; dark brown to black	Borehole was drilled using Odex system with downhole hammer to set 170 mm O.D. casing.		0.0
5.0				SAND TILL(SM)-silty, some gravel; some clay; with cobbles, boulders and fragmented phyllite particles disseminated throughout; coarse to fine-grained sand; coarse to fine-grained, subrounded to angular gravel; damp; dense(est.) low plastic; grey	NOTE: Times indicated below are actual drilling time only. This does not account for the time required to add and weld sections of casing.		5.0
10.0							10.0
15.0					Slow penetration while drilling and setting casing between 46 m and 55 m. The hydrostatic pressure encountered through this zone inhibit the effective air pressure required to the downhole casing hammer.		15.0
20.0							20.0
25.0							25.0
30.0							30.0
35.0				-boulder			35.0
40.0					-10 minutes to drill and set casing between 39.6 m and 41.8 m.		40.0
45.0				SAND(SP) AND GRAVEL- trace silt; with occasional cobbles throughout; coarse to fine-grained sand; coarse to fine-grained, subrounded to angular gravel; saturated, artesian aquifer dense(est.); nonplastic; iron oxide staining encountered at 45 m;	-5 minutes to drill and set casing between 42.3 m and 43.8 m. -Artesian aquifer encountered at 45 m. -60 minutes to drill and set casing between 45.7 m and 48.8 m. -95 minutes to drill and set casing between 48.8 m and 53.3 m. -40 minutes to drill and set casing between 54.3 m and 60.4 m. -60 minutes to drill and set casing between 60.4 m and 66.5 m. -35 minutes to drill and set casing between 67.4 m and 73.5 m.		45.0
50.0							50.0
55.0							55.0
60.0				SAND(SM)-silty, trace to some gravel; medium to fine-grained sand; saturated			60.0
65.0				BEDROCK- phyllite			65.0
70.0							70.0
75.0				END OF BOREHOLE AT 73.5 m			75.0
80.0							80.0
85.0							85.0
90.0							90.0

EBA Engineering Consultants Ltd. Whitehorse, Yukon	COMPLETION DEPTH 73.5 m	COMPLETE 89/03/29
	LOGGED BY MAV	DWG NO.
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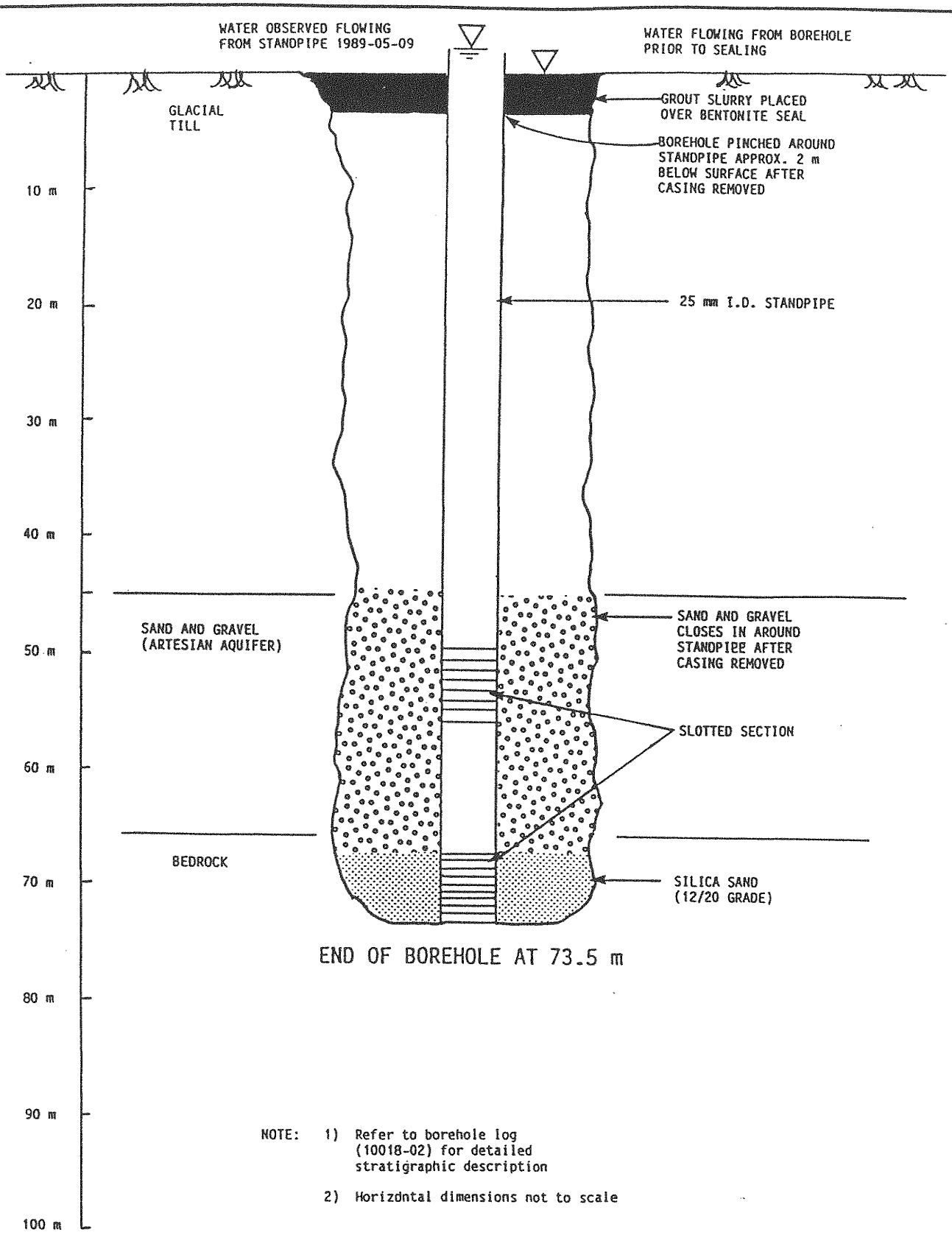

NOTE: 1) Refer to borehole log (10018-02) for detailed stratigraphic description

2) Horizontal dimensions not to scale

EBA Engineering Consultants Ltd.	PROJECT: GRUM MINE SITE - FARO, YUKON
CLIENT: CURRAGH RESOURCES INC.	TITLE: PIEZOMETER GPH-89-02 INSTALLATION DETAILS
DATE 89/05/16 | DWN WAS | CHKD	DWG NO. 0201-10018

PIEZOMETER AND WATER WELL INSTALLATION	CLIENT: CURRAGH RESOURCES INC.	BOREHOLE No. 10018-03
PIEZOMETER GPH-89-03	DRILL RIG: SCHRAMM T66H (ODEX SYSTEM)	Project No: 0201-10018
GRUM MINE SITE FARO, YUKON	UTM ZONE: 8 N6905101.00 E592810.00	ELEVATION 1301.14 (m)

SAMPLE TYPE ■ CYCLONE ⊘ NO RECOVERY ⊠ STANDARD PEN.

DEPTH (m)	SAMPLE TYPE	SAMPLE NO	USC	SOIL/ROCK DESCRIPTION	DRILLING COMMENTS	STANDARD PENETRATION 20 40 60 80 / PLASTIC M.C. LIQUID / 20 40 60 80	DEPTH (m)
0.0				PEAT(PT)-and organic root mat; fibrous; dark brown to black	Borehole initially drilled with a 130 mm tricone bit, using reverse circulation. Borehole did not remain open after drill rods were removed. This necessitated using the Odex system to set casing (170 mm O.D.) to facilitate the installation of the piezometer. Gravel lens at surface sealed off the borehole at appox. 1.5 m below grade after the casing was pulled. Bentonite plug was set and borehole was sealed with a grout slurry.		0.0
5.0				SAND(SP) AND GRAVEL-trace silt; with occasional cobbles			5.0
10.0				SAND TILL(SM)-silty, some gravel, some clay; with cobbles, boulders and fragmented phyllite particles disseminated throughout; coarse to fine-grained sand; coarse to fine-grained, subrounded to angular gravel; damp; dense(est.) low plastic; olive grey -boulder at 2.1 m -fragmented particles of quartz-sericite phyllite -trace amount of water encountered at 6.4 m; thin water bearing sand and gravel lens -dark grey			10.0
15.0							15.0
20.0							20.0
25.0							25.0
30.0							30.0
35.0					Artesian aquifer encountered at 36.6 m. Water flowed from the open standpipe for several days after installation.		35.0
40.0				SAND(SP) AND GRAVEL- trace silt; with occasional cobbles throughout; coarse to fine-grained sand; coarse to fine-grained, subrounded to angular gravel; saturated, artesian aquifer encountered at 36.6 m; dense(est.); nonplastic			40.0
45.0							45.0
50.0				BEDROCK- phyllite			50.0
55.0							55.0
60.0							60.0
65.0							65.0
70.0							70.0
75.0							75.0
80.0							80.0
85.0							85.0
90.0				END OF BOREHOLE AT 92.0			90.0

EBA Engineering Consultants Ltd. Whitehorse, Yukon	COMPLETION DEPTH 92.0 m	COMPLETE 89/03/25
	LOGGED BY MAV	DWG NO.
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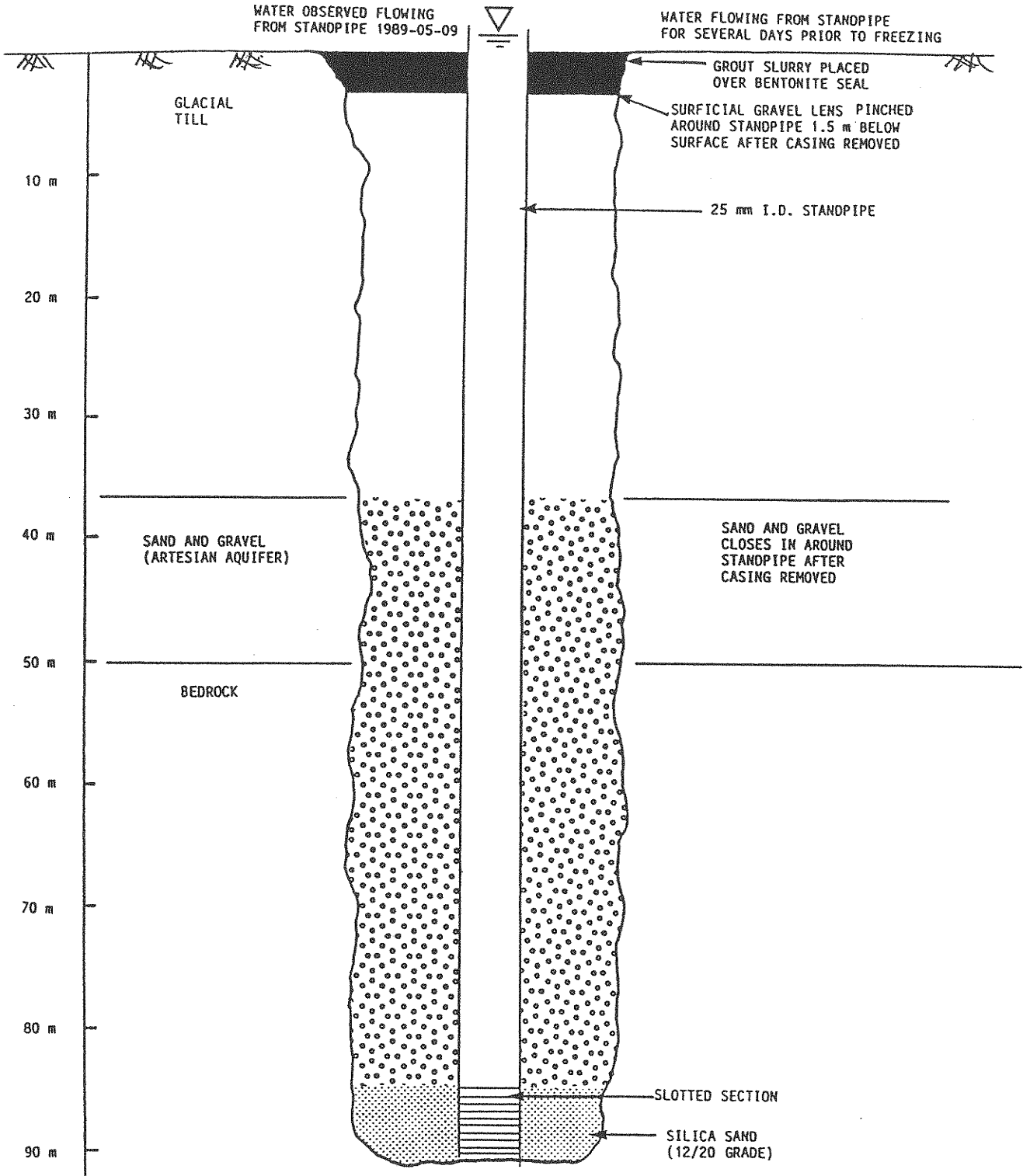


END OF BOREHOLE AT 92.0 m

NOTE: 1) Refer to Borehole log (10018-03) for detailed stratigraphic description

2) Horizontal dimensions not to scale

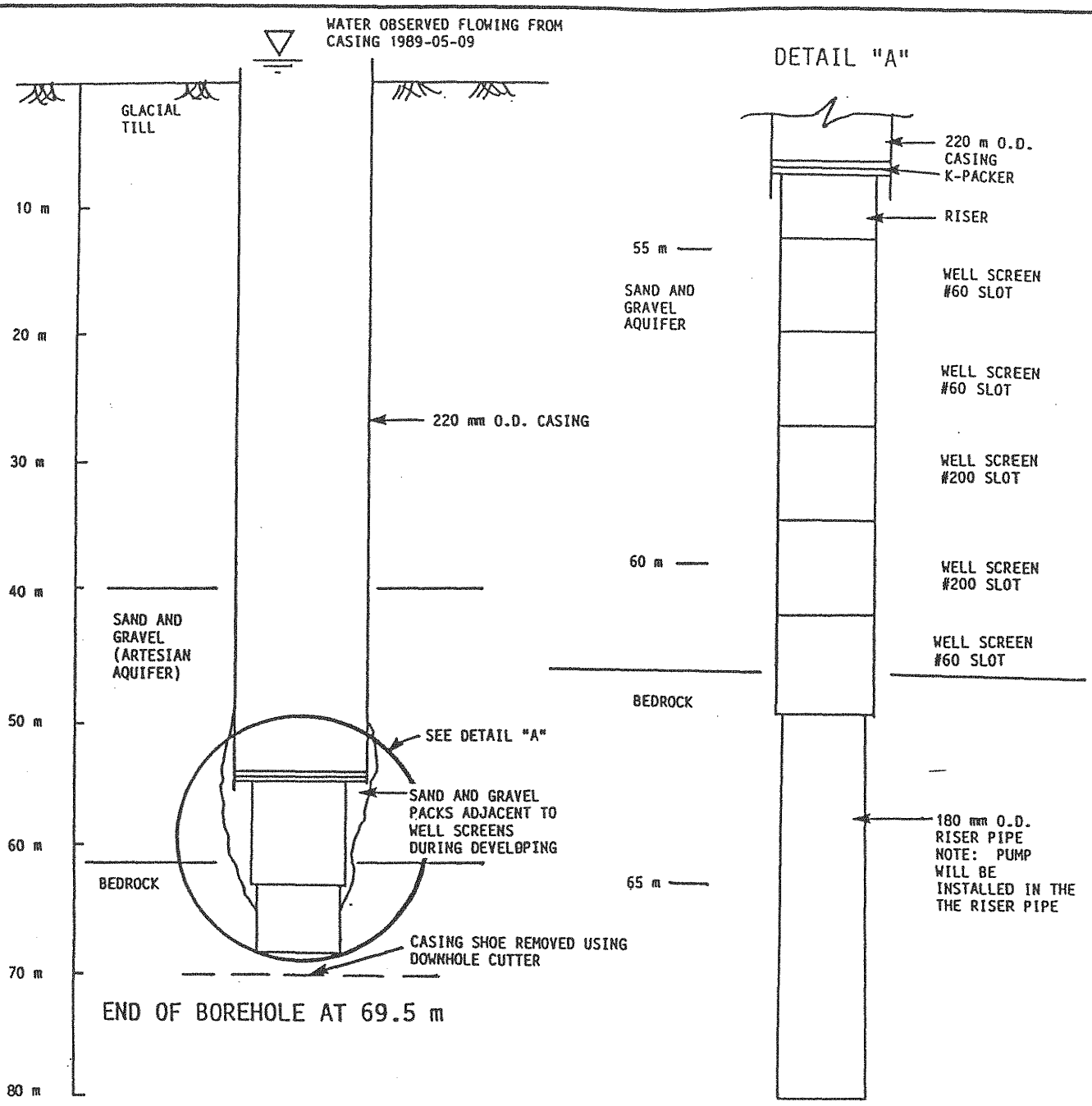
EBA Engineering Consultants Ltd.	PROJECT: GRUM MINE SITE - FARO, YUKON
CLIENT: CURRAGH RESOURCES INC.	TITLE: PIEZOMETER GPH-89-03 INSTALLATION DETAILS
DATE 89/05/16 | DWN WAS | CHKD	DWG NO. 0201-10018

PIEZOMETER AND WATER WELL INSTALLATION	CLIENT: CURRAGH RESOURCES INC.	BOREHOLE No. 10018-04
WATER WELL GDW-89-01	DRILL RIG: SCHRAMM T66H (ODEX SYSTEM)	Project No: 0201-10018
GRUM MINE SITE FARO, YUKON	UTM ZONE: 8 N6905140.00 E592790.00	ELEVATION 1301.00 (m)

SAMPLE TYPE ■ CYCLONE ⊘ NO RECOVERY ⊠ STANDARD PEN.

DEPTH (m)	SAMPLE TYPE	SAMPLE NO	USC	SOIL/ROCK DESCRIPTION	DRILLING COMMENTS	STANDARD PENETRATION 20 40 60 80 / PLASTIC M.C. LIQUID 20 40 60 80	DEPTH (m)
0.0				PEAT(PT)-and organic root mat; fibrous; dark brown to black	-Borehole drilled using Odex system with downhole hammer to set 220 mm O.D. casing. Auxillary compressor NOTE: Times given below are actual drilling time only. Approx. 40 minutes to add and weld each section of casing. used in addition with the rig compressor. -25 minutes to drill and set casing between 5.5 m and 11.2 m. -25 minutes to drill and set casing between 11.2 m and 18.3 m. -30 minutes to drill and set casing between 18.3 m and 24.7 m. -25 minutes to drill and set casing between 24.7 m and 30.8 m -50 minutes to drill and set casing between 30.8 m and 37.2 m. -25 minutes to drill and set casing between 37.2 m and 43.3 m. -artesian aquifer encountered at 39.9 m -Slow progress made while drilling and setting casing between 43.3 m and 50.3 m. Hydrostatic pressure inhibits the effective air pressure to the downhole casing hammer. -90 minutes to drill and set casing between 48.5 m and 50.3 m. -20 minutes to drill and set casing between 64.9 m and 68.0 m. -Downhole cutting tool used to remove casing shoe prior to installing and exposing the well screens.		0.0
5.0				SAND TILL(SM)-silty, some gravel, some clay; with cobbles, boulders and fragmented phyllite particles disseminated throughout;coarse to fine-grained sand; coarse to fine-grained, subrounded to angular gravel; damp; dense(est.) low plastic; grey, with iron oxide nodules and staining			5.0
10.0							10.0
15.0							15.0
20.0							20.0
25.0				-moist to wet; thin water bearing lens of sand and gravel			25.0
30.0							30.0
35.0				-boulder			35.0
40.0				SAND(SP) AND GRAVEL-trace silt; with occasional cobbles throughout; coarse to fine-grained sand; coarse to fine-grained, subrounded to angular gravel; saturated, artesian aquifer encountered at 39.9 m; dense(est.); nonplastic			40.0
45.0							45.0
50.0							50.0
55.0							55.0
60.0							60.0
65.0				BEDROCK- phyllite			65.0
70.0				END OF BOREHOLE AT 69.5 m			70.0
75.0							75.0
80.0							80.0
85.0							85.0
90.0							90.0

EBA Engineering Consultants Ltd. Whitehorse, Yukon	COMPLETION DEPTH 69.5 m	COMPLETE 89/04/24
	LOGGED BY MAV	DWG NO.
		Page 1 of 1



NOTE: 1) Refer to borehole log (10018-04) for detailed stratigraphic description

2) Horizontal dimensions not to scale

EBA Engineering Consultants Ltd.	PROJECT: GRUM MINE SITE - FARO, YUKON
CLIENT: CURRAGH RESOURCES INC.	TITLE: DEWATERING WELL GDW-89-01 INSTALLATION DETAILS
DATE 89/05/16 | DWN WAS | CHKD	DWG NO. 0201-10018

PIEZOMETER AND WATER WELL INSTALLATION	CLIENT: CURRAGH RESOURCES INC.	BOREHOLE No. 10018-05
WATER WELL GDW-89-01 (ABANDONED WELL)	DRILL RIG: SCHRAMM T66H (ODEX SYSTEM)	Project No: 0201-10018
GRUM MINE SITE FARO, YUKON	UTM ZONE: 8 N6905148.00 E592784.00	ELEVATION 1300.93 (m)

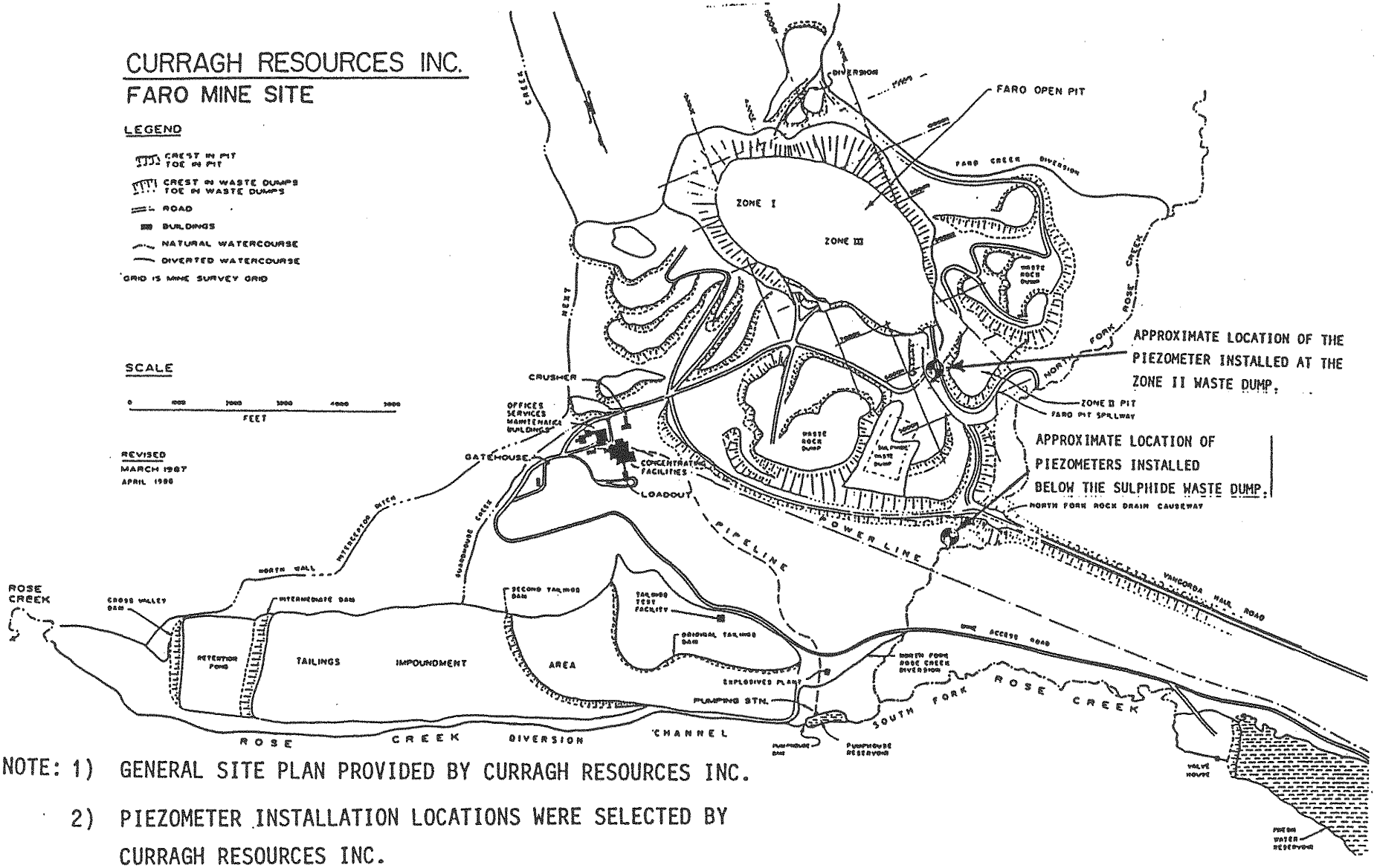
SAMPLE TYPE ■ CYCLONE ☒ NO RECOVERY ☒ STANDARD PEN.

DEPTH (m)	SAMPLE TYPE	SAMPLE NO	USC	SOIL/ROCK DESCRIPTION	DRILLING COMMENTS	STANDARD PENETRATION 20 40 60 80 / PLASTIC M.C. LIQUID 20 40 60 80	DEPTH (m)
0.0				PEAT(PT)–and organic root mat; fibrous; dark brown to black	–Borehole drilled using Odex system with downhole hammer to set 220 mm O.D. casing. Auxillary air compressor used in conjunction with the compressor on the drill rig. –NOTE: Times indicated below are actual drilling time only. This does not include the time required to add and weld additional sections of casing. –15 minutes to drill and set casing from surface to 5.5 m. –Borehole abandoned leaving 9.5 m length of 180 mm O.D. casing at the bottom of the borehole. Unable to set 190 mm O.D. well screens and pull back casing to expose screens due to casing shoe. –25 minutes to drill and set casing between 5.5 m and 11.9 m. –25 minutes to drill and set casing between 11.9 m and 18.3 m. –30 minutes to drill and set casing between 11.9 m and 24.5 m. –25 minutes to drill and set casing between 24.5 m and 31.1 m. –40 minutes to drill and set casing between 31.1 m and 37.8 m. –35 minutes to drill and set casing between 37.8 m and 44 m. –artesian aquifer encountered at 42.7 m. –40 minutes to drill and set casing between 62.5 m and 68.9 m. –30 minutes to drill and set casing between 68.9 m and 75 m.		0.0
5.0				SAND TILL(SM)–silty, some gravel, some clay; with cobbles, occasional boulder and phyllite fragments disseminated throughout; coarse to fine–grained sand; coarse to fine–grained, subrounded to angular gravel; damp; dense(est.) low plastic; dark grey, with iron oxide staining and iron oxide nodules throughout			5.0
10.0							10.0
15.0							15.0
20.0							20.0
25.0				–moist to wet; thin water bearing lens of sand and gravel			25.0
30.0				–gravel content increasing, becomes gravelly			30.0
35.0							35.0
40.0							40.0
45.0				SAND(SP) AND GRAVEL–trace silt; with occasional cobbles throughout; coarse to fine–grained sand; coarse to fine–grained, sub–rounded to angular gravel; saturated, aquifer encountered at 42.3 m; dense(est.); nonplastic; iron oxide staining throughout			45.0
50.0							50.0
55.0							55.0
60.0				–occasional thin sand lens encountered between 59 m and 62 m			60.0
65.0				BEDROCK– phyllite			65.0
70.0							70.0
75.0				END OF BOREHOLE AT 75.0 m			75.0
80.0							80.0
85.0							85.0
90.0							90.0

EBA Engineering Consultants Ltd. Whitehorse, Yukon	COMPLETION DEPTH 75.0 m	COMPLETE 89/04/11
	LOGGED BY MAV	DWG NO.
		Page 1 of 1

CURRAGH RESOURCES INC.

FARO MINE SITE



NOTE: 1) GENERAL SITE PLAN PROVIDED BY CURRAGH RESOURCES INC.

2) PIEZOMETER INSTALLATION LOCATIONS WERE SELECTED BY CURRAGH RESOURCES INC.

EBA Engineering Consultants Ltd.			PROJECT PIEZOMETER INSTALLATIONS FARO MINE SITE	
CLIENT CURRAGH RESOURCES INC.			TITLE SITE PLAN AND APPROXIMATE PIEZOMETER LOCATIONS	
DATE 1989-06-26	DWN JSB	CHKD MAV	DWG NO. 10028-C-01	0201-10028

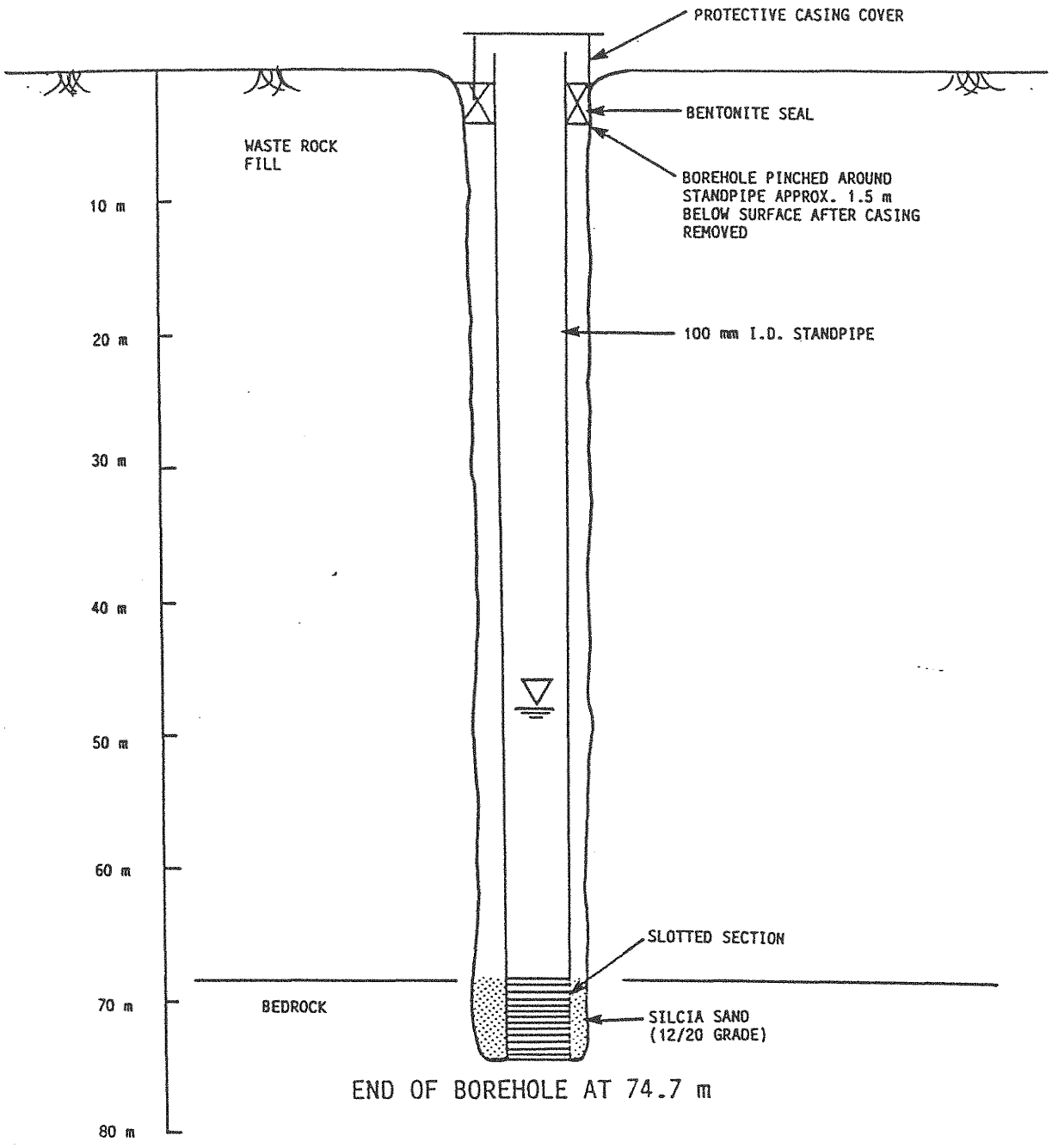
PIEZOMETER INSTALLATION	CLIENT: CURRAGH RESOURCES INC.	BOREHOLE No. 10028-04
PIEZOMETER: ZONE II WASTE DUMP-89-01	DRILL RIG: SCHRAMM T66H (ODEX SYSTEM)	Project No: 0201-10028
FARO MINE SITE FARO, YUKON	UTM ZONE: 8 N - E -	ELEVATION 0.00 (m)

SAMPLE TYPE ■ CYCLONE ☒ NO RECOVERY ☒ STANDARD PEN.

DEPTH (m)	SAMPLE TYPE	SAMPLE NO	USC	SOIL/ROCK DESCRIPTION	DRILLING COMMENTS	STANDARD PENETRATION 20 40 60 80 / PLASTIC M.C. LIQUID / 20 40 60 80	DEPTH (m)
0.0				WASTE ROCK (Fill)	Borehole drilled to facilitate the installation of a 114 mm O.D. PVC stand-pipe to obtain groundwater samples.		0.0
5.0							5.0
10.0							10.0
15.0							15.0
20.0					Borehole drilled using the Odex system with downhole casing hammer.		20.0
25.0							25.0
30.0							30.0
35.0							35.0
40.0							40.0
45.0							45.0
50.0							50.0
55.0							55.0
60.0				-water encountered while drilling			60.0
65.0							65.0
70.0				BEDROCK			70.0
75.0				END OF BOREHOLE AT 74.7 m			75.0
80.0							80.0
85.0							85.0
90.0							90.0

EBA Engineering Consultants Ltd.
Whitehorse, Yukon

COMPLETION DEPTH 74.7 m		COMPLETE 89/04/26
LOGGED BY MAV	DWG NO.	Page 1 of 1

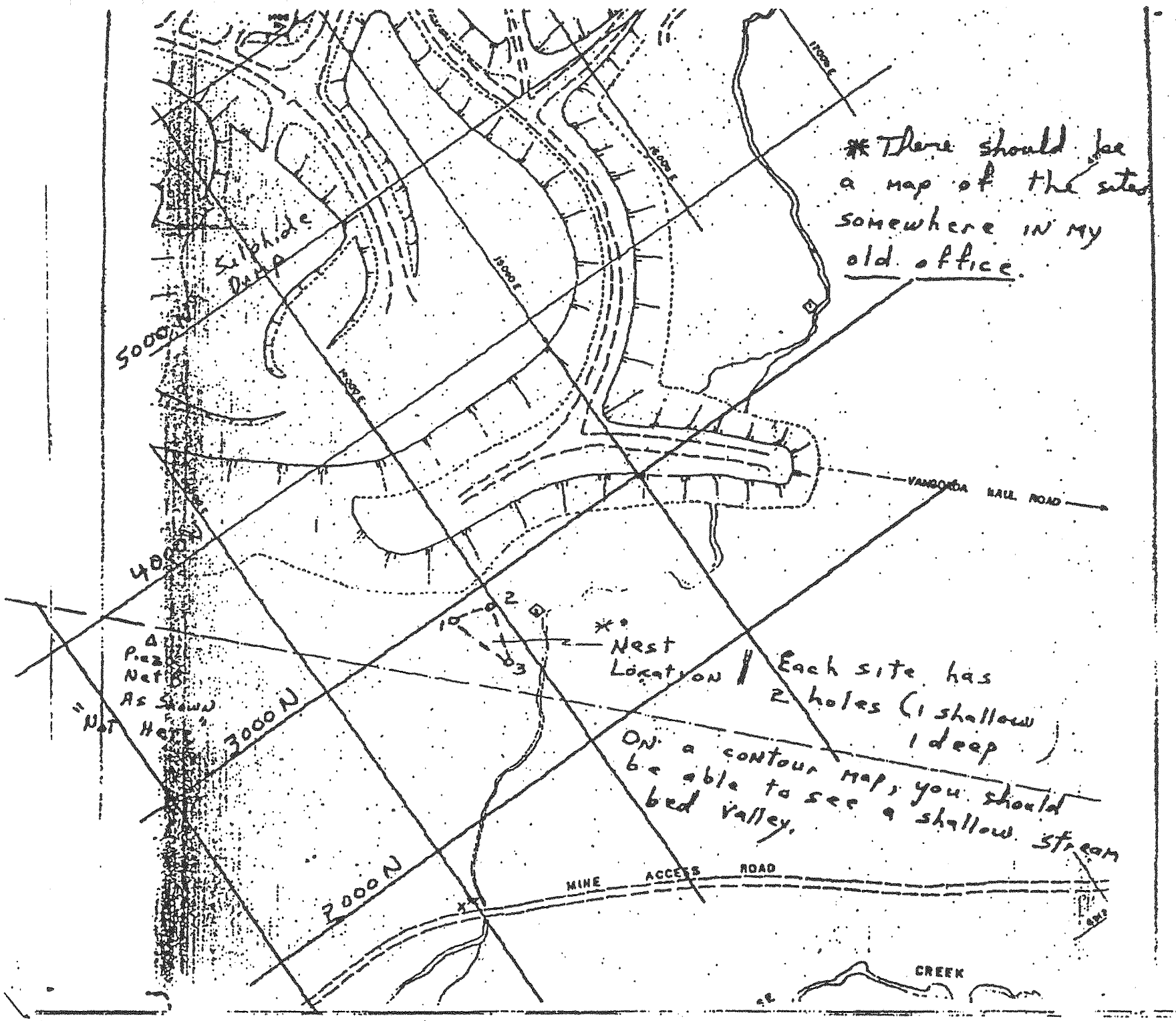


END OF BOREHOLE AT 74.7 m

NOTE: 1) Horizontal dimensions not to scale

2) Water level indicated at 47.6 m as measured 1989-05-09 at 11:00 hrs.

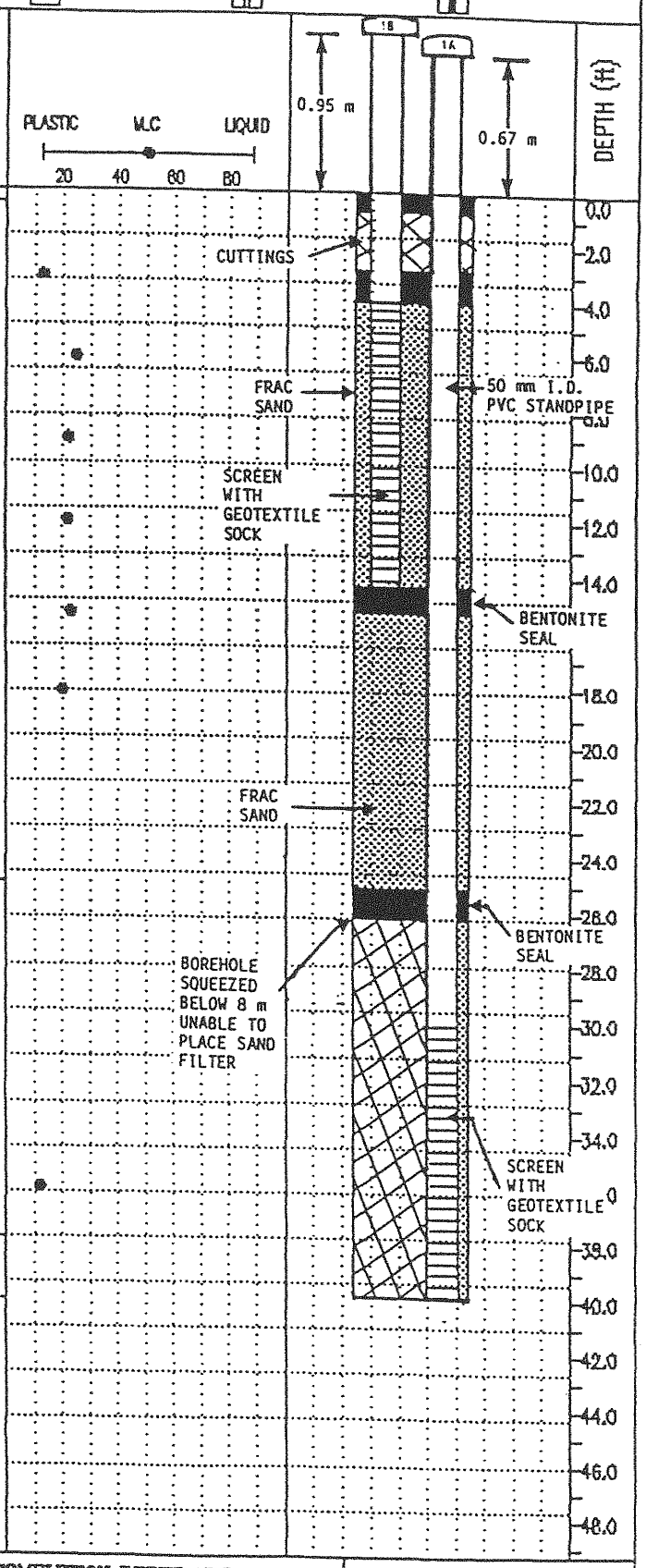
EBA Engineering Consultants Ltd.	PROJECT: FARO MINE SITE- ZONE II WASTE DUMP-FARO, YUKON
CLIENT: CURRAGH RESOURCES INC.	TITLE: PIEZOMETER INSTALLATION DETAILS
DATE 89/05/16 | DWN WAS | CHKD	DWG NO. 0201-10028


* There should be a map of the sites somewhere in my old office.
Sulphide Dump
5000 N
4000 N
3000 N
2000 N
1000 E
VANCOUVA RAIL ROAD
Nest Location
Each site has 2 holes (1 shallow 1 deep)
On a contour map, you should be able to see a shallow stream bed valley.
MINE ACCESS ROAD
CREEK

PIEZOMETER INSTALLATION – FARO PIT	Drill Rig: CME 750, Solid Shaft Augers	BOREHOLE No. 10028-01
Faro, Yukon		Project No: 0201-10028
CURRAGH RESOURCES INC.	TM ZONE: – N – E –	ELEVATION 0.00 (m)

SAMPLE TYPE ■ GRAB SAMPLE ◪ NO RECOVERY ☒ STANDARD PEN.

DEPTH (m)	SAMPLE TYPE	SAMPLE NO	USC	SOIL/ROCK DESCRIPTION
0.0				ORGANIC COVER
				TILL (SM) – sand and silt, gravelly, occasional cobble, subangular to subrounded, moist, dense, grayish brown.
1.0		1	PT	
2.0		2	SM	– becoming wet
3.0		3	SM	
4.0		4	SM	
5.0		5	SM	
6.0		6	SM	
7.0				WEATHERED ROCK – some sand and gravel, occasional cobble, yellowish brown
11.0		7		BEDROCK – phyllite
12.0				END OF BOREHOLE AT 12.2 m
13.0				
14.0				

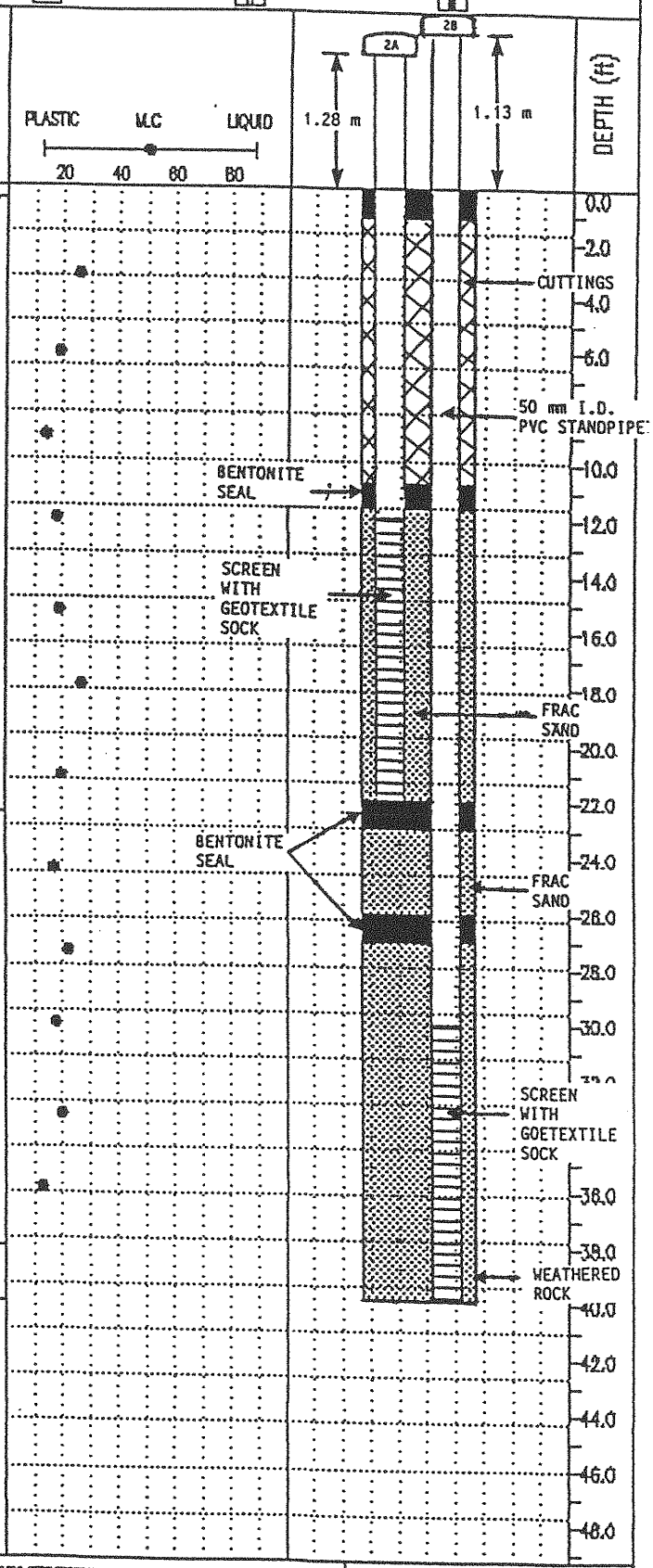


EBA Engineering Consultants Ltd. Whitehorse, Yukon	COMPLETION DEPTH 12.2 m	COMPLETE 89/04/22
	LOGGED BY TRM	DWG NO.10028-02 Page 1 of 1

PIEZOMETER INSTALLATION – FARO PIT	Drill Rig: CME 750, Solid Shaft Augers	BOREHOLE No. 10028-02
Faro, Yukon		Project No: 0201-10028
CURRAGH RESOURCES INC.	TM ZONE: – N – E –	ELEVATION 0.00 (m)

SAMPLE TYPE ■ GRAB SAMPLE ⊘ NO RECOVERY ⊠ STANDARD PEN.

DEPTH (m)	SAMPLE TYPE	SAMPLE NO	USC	SOIL/ROCK DESCRIPTION
0.0				ORGANIC COVER
				TILL (SM) – sand and silt, gravelly, occasional cobble, moist, greyish brown.
1.0		1	PT	
		2	SM	– becoming brownish grey
2.0				
		3	SM	
3.0				
		4	SM	– becoming moist to wet
4.0				
		5	SM	
5.0				
		6	SM	– saturated
6.0				
		7	SM	
7.0				WEATHERED ROCK – sand and gravel, some silt, saturated, brownish orange.
		8		
8.0				
		9		– occasional cobble
9.0				
		10		– becoming light greyish brown.
10.0				
		11		
11.0		12		
				BEDROCK – phyllite
12.0		13		
				END OF BOREHOLE AT 12.2 m.
13.0				
14.0				

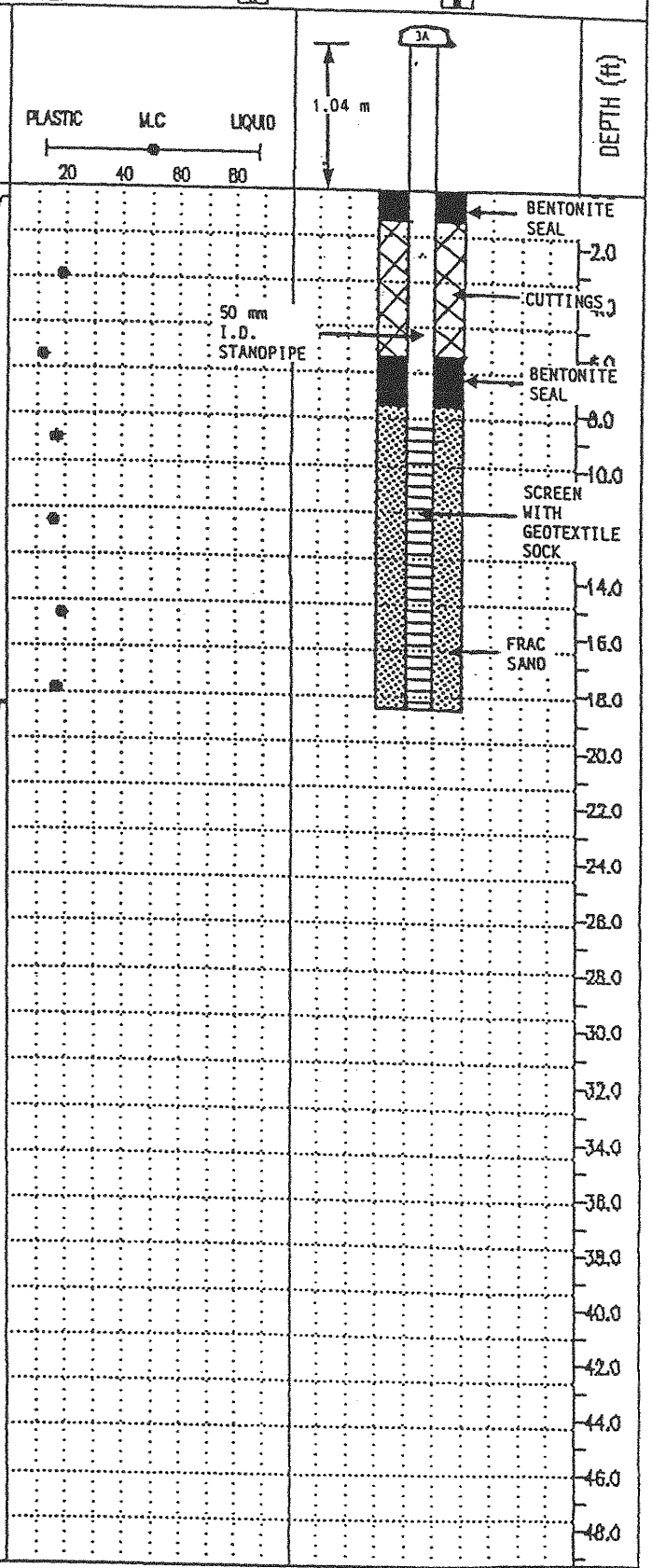


EBA Engineering Consultants Ltd. Whitehorse, Yukon	COMPLETION DEPTH 12.2 m	COMPLETE 89/04/21
	LOGGED BY TRM	DWG NO.10028-03 Page 1 of 1

PIEZOMETER INSTALLATION – FARO PIT	Drill Rig: CME 750, Solid Shaft Augers	BOREHOLE No. 10028-03
Faro, Yukon		Project No: 0201-10028
CURRAGH RESOURCES INC.	TM ZONE: – N – E –	ELEVATION 0.00 (m)

SAMPLE TYPE ■ GRAB SAMPLE ☒ NO RECOVERY ☒ STANDARD PEN.

DEPTH (m)	SAMPLE TYPE	SAMPLE NO	USC	SOIL/ROCK DESCRIPTION
0.0				ORGANIC COVER
				TILL (SM) – sand and silt, gravelly, occasional cobble, angular to sub-rounded, moist, dense, dark greyish brown.
1.0		1	PT	
2.0		2	SM	
3.0		3	SM	
		4	SM	
4.0				
		5	SM	
5.0				– becoming saturated
		6	SM	
6.0				BEDROCK/BOULDER – white quartzite, auger refusal at 5.64 m.
				END OF BOREHOLE AT 5.64 m
7.0				Note: Bedrock or boulders precluded drilling past 1.5 m in two attempts approximately 3 m north and west of of this borehole location.
8.0				
9.0				
10.0				
11.0				
12.0				
13.0				
14.0				



EBA Engineering Consultants Ltd. Whitehorse, Yukon	COMPLETION DEPTH 5.6 m	COMPLETE 89/04/21
	LOGGED BY TRM	DWG NO.10028-04 Page 1 of 1

SRK - Robinson Inc.

November 1994

Construction Report Vangorda Rehabilitation
PWGSC Project 760831

Report No. P 225101

TABLE 1

Vangorda Waste Rock Containment Facility - Faro, Y.T.

Groundwater Wells and Piezometer Installation Summary

Well No.	Stickup above Ground Elevation (m)	Depth from Top of Pipe (m)	Depth to Static Water Level may3, 1994 (m)	Depth to Static Water Level June 21, 1994 (m)	Top of Pipe (m)	Coordinates (Mine Grid)	
						North	East
P94-01A	0.61	12.37	no water	N/R	1136.555	10014.802	8893.956
P94-01B	0.61	6.05	no water	N/R	1136.493	10013.012	8894.394
P94-02A	0.53	10.72	10.57 (bailed empty)	N/R	1138.410	10157.070	8935.215
P94-02B	0.56	6.12	no water	N/R	1138.332	10155.070	8933.309
P94-02C	0.61	13.34	13.08 (bailed empty)	N/R	1129.840	10137.120	8888.761
P94-03A	0.61	14.10	no water	N/R	1134.373	10188.741	9245.064
P94-03B	0.61	9.80	no water	N/R	1134.459	10187.816	9248.427
P94-04A	0.61	12.70	12.17 (bailed empty)	N/R	1134.609	10142.198	9448.836
P94-04B	0.61	8.99	no water	N/R	1134.326	10145.418	9442.209
GW94-01	0.58	12.80	8.28	7.45	1117.445	9782.317	8945.534
GW94-02	0.53	15.70	14.33	8.65	1117.405	10008.160	8810.969
GW94-03	0.64	11.94	11.28	9.15	1118.431	10306.670	9020.492
GW94-04	0.54	14.48	14.33	9.65	1116.165	10310.048	9261.925
GW94-05	0.76	16.13	11.56	See Note 5	1101.673	10396.139	9083.394

Notes:
1. All depths measured from top of pipe
2. Water levels were measured on May 3. 1994
3. Piezometers containing water were bailed dry
4. N/R = Not Recorded
5. Artesian conditions cause water to spill over the pipe.

Table 1

Vangorda Waste Rock Containment Facility - Faro, Y.T.

Groundwater Wells and Piezometer Installation Summary

Well No.	Stickup above Ground Elevation (m)	Depth from Top of Pipe (m)	Depth to Static Water Level May 3, 1994 (m)	Depth to Static Water Level June 21, 1994 (m)	Top of Pipe (m)	Coordinate (Mine Grid)	
						North	East
P64-01A	0.61	12.37	no water	N/R	1136.555	10014.802	8893.956
P94-01B	0.61	6.05	no water	N/R	1136.493	10013.012	8894.394
P94-02A	0.53	10.72	10.57 (bailed empty)	N/R	11.38.410	10157.070	8932.215
P94-02B	0.56	6.12	no water	N/R	1138.332	10155.070	8933.309
P94-02C	0.61	13.34	13.08 (bailed empty)	N/R	1129.840	10137.120	8888.761
P94-03B	0.61	9.80	no water	N/R	1134.459	10187.816	9248.427
P94-04A	0.61	12.70	12.17 (bailed empty)	N/R	1134.609	10142.198	9448.836
P94-04B	0.61	8.99	no water	N/R	1134.326	10145.418	9442.209
GW94-01	0.58	12.80	8.28	7.45	1117.445	9782.317	8945.534
GW94-02	0.53	15.70	14.33	8.65	1117.405	10008.160	8810.969
GW94-03	0.64	11.94	11.28	9.15	1118.431	10306.670	9020.492
GW94-04	0.54	14.48	14.33	9.65	1116.165	10310.048	9264.925
GW94-05	0.76	16.13	11.56	See Note 5	1101.673	10396.139	9083.394

Notes:

1. All depths measured from top of pipe
2. Water levels were measured on May 3, 1994
3. Piezometers containing water were bailed dry
4. N/R = Not Recorded
5. Artesian conditions cause water to spill over the pipe.

VANGORDA WASTE ROCK CONTAINMENT FACILITY	CLIENT: PELLY CONSTRUCTION LTD.	BOREHOLE NO: GW94-01
MONITORING WELL INSTALLATION	DRILL: CME 750 - SOLID SHAFT AUGERS	PROJECT NO: 0201-11365
VANGORDA MINE SITE, FARO, YUKON	UTM ZONE: 8 N6909782.32 E568945.53	ELEVATION: 1116.745 (m)

SAMPLE TYPE: GRAB SAMPLE | NO RECOVERY | STANDARD PEN. | 75 mm SPLIT SP. | CRREL BARREL | NW CORE

DEPTH (m)	SAMPLE TYPE	SAMPLE NO	SPT(N)	WELL INSTALLATION	SOIL DESCRIPTION
0.0					ORGANICS AND SILT, some moss and roots, some white ash
1.0					SILT (TILL) - sandy, some gravel, trace to some clay, stiff, low plastic, fine grained sands, subangular particles brown
					- seasonally frozen (Nbn) to 1.2 m
					- damp below 1.2 m
2.0					
3.0					- becomes softer, higher clay content
					- colour changes to brownish grey
			20		- some phyllite pieces in sample (10%)
4.0					
5.0					- stiffer, harder drilling, drier
6.0					
			27		- more phyllite rock (20%), with some pieces of quartzite
7.0					- grinding rock
	▼				- water at 7.6 m depth measured on 94/05/03
8.0					

STANDARD PENETRATION 10 20 30 40 | PLASTIC M.C. LIQUID 10 20 30 40

PERCENT GRAVEL 20 40 60 80 | PERCENT SAND 20 40 60 80 | PERCENT SILT OR FINES 20 40 60 80 | GROUND ICE DESCRIPTION 20 40 60 80

DEPTH (ft): 0.0, 2.0, 4.0, 6.0, 8.0, 10.0, 12.0, 14.0, 16.0, 18.0, 20.0, 22.0, 24.0, 26.0

EBA Engineering Consultants Ltd.
Whitehorse, Yukon

LOGGED BY: BCF	COMPLETION DEPTH: 12.5 m
REVIEWED BY:	COMPLETE: 94/04/30
Fig. No:	Page 1 of 2

94/05/27 12:41PM

1116.868

VANGORDA WASTE ROCK CONTAINMENT FACILITY	CLIENT: PELLY CONSTRUCTION LTD.	BOREHOLE NO: GW94-01
MONITORING WELL INSTALLATION	DRILL: CME 750 – SOLID SHAFT AUGERS	PROJECT NO: 0201-11365
VANGORDA MINE SITE, FARO, YUKON	UTM ZONE: 8 N6909782.32 E588945.53	ELEVATION: 1116.745 (m)

SAMPLE TYPE ■ GRAB SAMPLE ⊘ NO RECOVERY ⊠ STANDARD PEN. ▤ 75 mm SPLIT SP. ▥ CRREL BARREL ▥ NW CORE

DEPTH (m)	SAMPLE TYPE	SAMPLE NO	SPT(N)	WELL INSTALLATION	SOIL DESCRIPTION
8.0					
					– drier, hard drilling
9.0					
			64		– grinding rock
10.0					
					BEDROCK – phyllite – very hard drilling, – fine, muddy cuttings with pieces of phyllite
11.0					
					12.80 – .58 = 12.22 m (12.4)
12.0					
			95		END OF BOREHOLE
					NOTE: – Hole sloughed to 11 m, and had to be redrilled to 12.4 m. Auger bit had broken off due to excessive pressure and heat from drilling bedrock
13.0					MONITORING WELL INSTALLATION – 0.15 m sand layer on bottom – 1.5 m screen+12.2 m 50 mm PVC pipe – 8 bags sand to 5 m below grade – 0.5 bags bentonite to 4.3 m – some water in hole pushing pipe up – mixed 3 bags grout + 30 gal. water for wells 94-01 and 94-02 – top of PVC 0.58 m above ground
14.0					
15.0					
16.0					

STANDARD PENETRATION 10 20 30 40 | PLASTIC M.C. LIQUID 10 20 30 40 | PERCENT GRAVEL 20 40 60 80 | PERCENT SAND 20 40 60 80 | PERCENT SILT OR FINES 20 40 60 80 | GROUND ICE DESCRIPTION 20 40 60 80

DEPTH (ft): 28.0, 30.0, 32.0, 34.0, 36.0, 38.0, 40.0, 42.0, 44.0, 46.0, 48.0, 50.0, 52.0

EBA Engineering Consultants Ltd.
Whitehorse, Yukon

LOGGED BY: BCF	COMPLETION DEPTH: 12.5 m
REVIEWED BY:	COMPLETE: 94/04/30
Fig. No:	Page 2 of 2

94/05/27 12:42PM

VANGORDA WASTE ROCK CONTAINMENT FACILITY	CLIENT: PELLY CONSTRUCTION LTD.	BOREHOLE NO: GW94-02
MONITORING WELL INSTALLATION	DRILL: CME 750 - SOLID SHAFT AUGERS	PROJECT NO: 0201-11365
VANGORDA MINE SITE, FARO, YUKON	UTM ZONE: 8 N6910008.16 E588810.97	ELEVATION: 1116.705 (m)

SAMPLE TYPE: GRAB SAMPLE | NO RECOVERY | STANDARD PEN. | 75 mm SPLIT SP. | CRREL BARREL | NW CORE

DEPTH (m)	SAMPLE TYPE	SAMPLE NO	SPT(N)	WELL INSTALLATION	SOIL DESCRIPTION
0.0					ORGANICS AND SILT, some moss and roots, some white ash
1.0					SILT (TILL) - sandy, some gravel, trace to some clay, stiff, low plastic, fine grained sands, subangular particles brown
					- seasonally frozen (Nbn) to 1.2 m
					- damp below 1.2 m
2.0					- grinding rock
3.0			25		
4.0					- more phyllite rock (20%), with some - higher moisture content, almost wet - colour changes to darker brown
5.0					
6.0			24		
7.0					
8.0					- softer, higher clay content, low to medium plastic - colour changes to darker brown, almost black
9.0					
10.0			20		SILT AND CLAY - some sand, trace of gravel firm, low to med plastic, fine grained sands, subangular particles some quartzite and phyllite pieces,

STANDARD PENETRATION 10 20 30 40

PLASTIC M.C. LIQUID 10 20 30 40

PERCENT GRAVEL 20 40 60 80

PERCENT SAND 20 40 60 80

PERCENT SILT OR FINES 20 40 60 80

GROUND ICE DESCRIPTION 20 40 60 80

DEPTH (ft): 0.0, 2.0, 4.0, 6.0, 8.0, 10.0, 12.0, 14.0, 16.0, 18.0, 20.0, 22.0, 24.0, 26.0, 28.0, 30.0, 32.0

EBA Engineering Consultants Ltd.
Whitehorse, Yukon

LOGGED BY: BCF	COMPLETION DEPTH: 15.5 m
REVIEWED BY:	COMPLETE: 94/04/30
Fig. No:	Page 1 of 2

94/04/01 10:57AM

VANGORDA WASTE ROCK CONTAINMENT FACILITY	CLIENT: PELLY CONSTRUCTION LTD.	BOREHOLE NO: GW94-02
MONITORING WELL INSTALLATION	DRILL: CME 750 - SOLID SHAFT AUGERS	PROJECT NO: 0201-11365
VANGORDA MINE SITE, FARO, YUKON	UTM ZONE: 8 N6910008.16 E588810.97	ELEVATION: ~~1116.705~~ (m) 1116.875

SAMPLE TYPE: GRAB SAMPLE | NO RECOVERY | STANDARD PEN. | 75 mm SPLIT SP. | CRREL BARREL | NW CORE

DEPTH (m)	SAMPLE TYPE	SAMPLE NO	SPT(N)	WELL INSTALLATION	SOIL DESCRIPTION
10.0					damp to moist, dark grey
11.0					
12.0					
			33		
13.0					– higher clay content, wet on sampler at 12.5 m, less gravel and very fine silts
14.0					– water at 13.8 m depth measured on 94/05/03
15.0					15.47 = 15.20 − .53 ± (15.6)
			47		– damp to moist, some phyllite – no water at this depth
16.0					END OF BOREHOLE
					NOTE: – some yellowish brown sandy silt was found on augers between 9.1–12.2 m – water was noticed on A-rods from about 10.7 m below grade
17.0					MONITORING WELL INSTALLATION – 0.15 m sand layer on bottom – 1.5 m screen+15.2 m 50 mm PVC pipe – 10 bags sand to 5 m below grade – 0.5 bags bentonite to 4.4 m – used grout mixed from GW94-01 – top of PVC 0.53 m above ground
18.0					
19.0					
20.0					

STANDARD PENETRATION 10 20 30 40 | PLASTIC M.C. LIQUID 10 20 30 40 | PERCENT GRAVEL 20 40 60 80 | PERCENT SAND 20 40 60 80 | PERCENT SILT OR FINES 20 40 60 80 | GROUND ICE DESCRIPTION 20 40 60 80

DEPTH (ft): 34.0, 36.0, 38.0, 40.0, 42.0, 44.0, 46.0, 48.0, 50.0, 52.0, 54.0, 56.0, 58.0, 60.0, 62.0, 64.0

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LOGGED BY: BCF	COMPLETION DEPTH: 15.5 m
REVIEWED BY:	COMPLETE: 94/04/30
Fig. No:	Page 2 of 2

94/06/01 10:57AM

VANGORDA WASTE ROCK CONTAINMENT FACILITY	CLIENT: PELLY CONSTRUCTION LTD.	BOREHOLE NO: GW94-03
MONITORING WELL INSTALLATION	DRILL: CME 750 – HOLLOW STEM AUGERS	PROJECT NO: 0201-11365
VANGORDA MINE SITE, FARO, YUKON	UTM ZONE: 8 N6910306.67 E589020.49	ELEVATION: 1117.731 (m)

SAMPLE TYPE: GRAB SAMPLE | NO RECOVERY | STANDARD PEN. | 75 mm SPLIT SP. | CRREL BARREL | NW CORE

DEPTH (m)	SAMPLE TYPE	SAMPLE NO	SPT(N)	WELL INSTALLATION	SOIL DESCRIPTION
0.0					SILT (TILL) – sandy, some clay, some gravel, very stiff, low to medium plastic, fine grained sands, subangular particles, dark brown
					– frozen to approx. 7.0 m, Nbn – Vx
1.0					
2.0					– grinding rock, very hard drilling
3.0					– higher gravel content, some quartzite rock
			45		– some medium grained, uniformly graded sand deposits in sample
					– temperature measured at –0.2 deg. C
4.0					– more rock
					– becomes softer, higher moisture content when thawed
					– colour changes to brownish grey
					– very stiff till, less rock
5.0					
6.0					– temperature measured at –0.2 deg. C
			70		
7.0					
8.0					

STANDARD PENETRATION 10 20 30 40 | PLASTIC M.C. LIQUID 10 20 30 40

PERCENT GRAVEL 20 40 60 80 | PERCENT SAND 20 40 60 80 | PERCENT SILT OR FINES 20 40 60 80 | GROUND ICE DESCRIPTION 20 40 60 80

DEPTH (ft): 0.0, 2.0, 4.0, 6.0, 8.0, 10.0, 12.0, 14.0, 16.0, 18.0, 20.0, 22.0, 24.0, 26.0

EBA Engineering Consultants Ltd. Whitehorse, Yukon	LOGGED BY: BCF	COMPLETION DEPTH: 11.9 m
	REVIEWED BY:	COMPLETE: 94/04/23
	Fig. No:	Page 1 of 2

94/06/01 10:56AM

VANGORDA WASTE ROCK CONTAINMENT FACILITY	CLIENT: PELLY CONSTRUCTION LTD.	BOREHOLE NO: GW94-03
MONITORING WELL INSTALLATION	DRILL: CME 750 – HOLLOW STEM AUGERS	PROJECT NO: 0201-11365
VANGORDA MINE SITE, FARO, YUKON	UTM ZONE: 8 N6910306.67 E589020.49	ELEVATION: 1117.73T (m) 1117.80

SAMPLE TYPE: GRAB SAMPLE | NO RECOVERY | STANDARD PEN. | 75 mm SPLIT SP. | CRREL BARREL | NW CORE

DEPTH (m)	SAMPLE TYPE	SAMPLE NO	SPT(N)	WELL INSTALLATION	SOIL DESCRIPTION	DEPTH (ft)
8.0						28.0
9.0			41			30.0
						32.0
10.0					11.94 – .63 = 11.31	34.0
					– water at 10.6 m depth measured on 94/05/03	
11.0						36.0
					– possible 150 mm thick sand seam (sand materials noted on augers)	38.0
					– grinding rock, not drillable with CME 750	
12.0					END OF BOREHOLE	40.0
					NOTE:	
					– no water level at 1200 hrs	
					– 2.1 m water in hole at 1240 hrs	
					MONITORING WELL INSTALLATION – 1830 hrs	
13.0					– 0.15 sand layer on bottom	42.0
					– 1.5 m screen+12.2 m 50 mm PVC pipe	
					– 15.5 bags sand to 5.3 m below grade	
					– 1 bag bentonite to 4.8 m	
					– mixed 2 bags grout + 25 gal. water	
					– install protective casing + endcap	
14.0					– Top of PVC 0.63 m above ground	44.0
						46.0
						48.0
15.0						50.0
16.0						52.0

STANDARD PENETRATION 10 20 30 40 | PLASTIC M.C. LIQUID 10 20 30 40 | PERCENT GRAVEL 20 40 60 80 | PERCENT SAND 20 40 60 80 | PERCENT SILT OR FINES 20 40 60 80 | GROUND ICE DESCRIPTION 20 40 60 80

EBA Engineering Consultants Ltd. Whitehorse, Yukon	LOGGED BY: BCF	COMPLETION DEPTH: 11.9 m
	REVIEWED BY:	COMPLETE: 94/04/23
	Fig. No:	Page 2 of 2

94/06/01 10:59AM

VANGORDA WASTE ROCK CONTAINMENT FACILITY	CLIENT: PELLY CONSTRUCTION LTD.	BOREHOLE NO: GW94-04
MONITORING WELL INSTALLATION	DRILL: CME 750 - HOLLOW STEM AUGERS	PROJECT NO: 0201-11365
VANGORDA MINE SITE, FARO, YUKON	UTM ZONE: 8 N6910310.05 E599261.93	ELEVATION: 1145.465 (m)

SAMPLE TYPE: GRAB SAMPLE | NO RECOVERY | STANDARD PEN. | 75 mm SPLIT SP. | CRREL BARREL | NW CORE

DEPTH (m) | SAMPLE TYPE | SAMPLE NO | SPT(N) | WELL INSTALLATION

SOIL DESCRIPTION

STANDARD PENETRATION 10 20 30 40 | PLASTIC M.C. LIQUID 10 20 30 40

PERCENT GRAVEL 20 40 60 80 | PERCENT SAND 20 40 60 80 | PERCENT SILT OR FINES 20 40 60 80 | GROUND ICE DESCRIPTION 20 40 60 80

DEPTH (ft)

0.0 SILT (TILL) - gravelly, sandy, trace of clay, roadway fill material

SILT (TILL) - sandy, gravelly, some clay, frozen (Nbn), low plastic, fine grained sands, subangular particles, brown

- temperature measured at -0.2 deg. C

- hole sloughed to 4.5 m - switched to hollow stem augers
- less gravel content, higher moisture content

- harder drilling

- higher silt and clay content

10.0 - grinding rock

0.0 2.0 4.0 6.0 8.0 10.0 12.0 14.0 16.0 18.0 20.0 22.0 24.0 26.0 28.0 30.0 32.0

EBA Engineering Consultants Ltd. Whitehorse, Yukon	LOGGED BY: BCF	COMPLETION DEPTH: 14.1 m
	REVIEWED BY:	COMPLETE: 94/04/25
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94/06/01 11:20AM

VANGORDA WASTE ROCK CONTAINMENT FACILITY	CLIENT: PELLY CONSTRUCTION LTD.	BOREHOLE NO: GW94-04
MONITORING WELL INSTALLATION	DRILL: CME 750 - HOLLOW STEM AUGERS	PROJECT NO: 0201-11365
VANGORDA MINE SITE, FARO, YUKON	UTM ZONE: 8 N6910310.05 E599261.93	ELEVATION: ~~1115.465~~ (m) 1115.478

SAMPLE TYPE: GRAB SAMPLE | NO RECOVERY | STANDARD PEN. | 75 mm SPLIT SP. | CRREL BARREL | NW CORE

DEPTH (m)	SAMPLE TYPE	SAMPLE NO	SPT(N)	WELL INSTALLATION	SOIL DESCRIPTION
10.0					- soft spot (0.15 m)
11.0					- grinding rock
12.0					- finish drilling today at 1900 hrs - continue on 94/04/24 at 0800 hrs - very dusty dry till, very hard - very hard drilling - broke down from 1030 - 1630 hrs
13.0					
14.0			70		- water at 13.9 m depth measured on 94/05/03 - very hard till with some phyllite
					END OF BOREHOLE
15.0					MONITORING WELL INSTALLATION - 0.15 m sand layer on bottom - 1.5 m screen+14 m, 50 mm PVC pipe - 9.5 bags sand to 9.0 m below grade - 1 bag bentonite to 8.3 m - mixed 4 bags grout + 45 gal. water - installed protective casing + endcap - top of PVC 0.69 m above ground
16.0					
17.0					
18.0					
19.0					
20.0					

STANDARD PENETRATION 10 20 30 40

PLASTIC M.C. LIQUID 10 20 30 40

PERCENT GRAVEL 20 40 60 80

PERCENT SAND 20 40 60 80

PERCENT SILT OR FINES 20 40 60 80

GROUND ICE DESCRIPTION 20 40 60 80

DEPTH (ft): 34.0, 36.0, 38.0, 40.0, 42.0, 44.0, 46.0, 48.0, 50.0, 52.0, 54.0, 56.0, 58.0, 60.0, 62.0, 64.0

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LOGGED BY: BCF	COMPLETION DEPTH: 14.1 m
REVIEWED BY:	COMPLETE: 94/04/25
Fig. No:	Page 2 of 2

94/06/01 11:00AM

VANGORDA WASTE ROCK CONTAINMENT FACILITY	CLIENT: PELLY CONSTRUCTION LTD.	BOREHOLE NO: GW94-05
MONITORING WELL INSTALLATION	DRILL: CME 750 - HOLLOW STEM AUGERS	PROJECT NO: 0201-11365
VANGORDA MINE SITE, FARO, YUKON	UTM ZONE: 8 N6910396.14 E589083.39	ELEVATION: 1100.973 (m) 1100.91

SAMPLE TYPE: GRAB SAMPLE | NO RECOVERY | STANDARD PEN. | 75 mm SPLIT SP. | CRREL BARREL | NW CORE

STANDARD PENETRATION 10 20 30 40 | PLASTIC M.C. LIQUID 10 20 30 40

PERCENT GRAVEL 20 40 60 80 | PERCENT SAND 20 40 60 80 | PERCENT SILT OR FINES 20 40 60 80 | GROUND ICE DESCRIPTION 20 40 60 80

DEPTH (m)	SAMPLE TYPE	SAMPLE NO	SPT(N)	WELL INSTALLATION	SOIL DESCRIPTION	DEPTH (ft)
0.0					ORGANICS AND SILT - some moss, some roots, some snow cover	0.0
					SILT (TILL) - some gravel, some sand, trace of clay, stiff, low plastic, fine grained sands, moist to wet, greyish brown	2.0
1.0						4.0
2.0 ▼					- water at 2.0 m depth measured after 5 hrs	6.0 ▼
					SAND AND GRAVEL - trace of silt, loose, fine grained, subrounded to sub-angular, damp, brown	8.0
3.0					SILT (TILL) - gravelly, some sand, trace to some clay, low plastic, frozen (Vs) 15%, grey	10.0
					- stiffer drilling	
4.0					- increasing clay content	12.0
					- grinding rock	14.0
5.0					- grinding rock	16.0
					- softer drilling	18.0
6.0					- stiffer drilling	20.0
					- sample still frozen (Nbn-Vr)	
					- ice coatings surround smaller sub-rounded gravels, silt sample does not melt when heated	22.0
7.0					- finish drilling today at 1730 hrs	24.0
					- continue on 94/04/21 at 0840 hrs	
					- stiffer drilling, some grinding	26.0
8.0					- more grinding rock	28.0
					- large rock	
					- soft spot	30.0
9.0					WATER LEVEL	
					- more silt-till, some excessive moisture, very cold, possibly frozen	32.0
10.0					- softer drilling	

EBA Engineering Consultants Ltd. Whitehorse, Yukon	LOGGED BY: BCF	COMPLETION DEPTH: 15.4 m
	REVIEWED BY:	COMPLETE: 94/04/21
	Fig. No:	Page 1 of 2

94/05/17 12:46PM

VANGORDA WASTE ROCK CONTAINMENT FACILITY	CLIENT: PELLY CONSTRUCTION LTD.	BOREHOLE NO: GW94-05
MONITORING WELL INSTALLATION	DRILL: CME 750 - HOLLOW STEM AUGERS	PROJECT NO: 0201-11365
VANGORDA MINE SITE, FARO, YUKON	UTM ZONE: 8 N6910396.14 E589083.39	ELEVATION: 1100.973 (m)

SAMPLE TYPE ■ GRAB SAMPLE ⊘ NO RECOVERY ⊠ STANDARD PEN. ▤ 75 mm SPLIT SP. ▥ CRREL BARREL ▮ NW CORE

DEPTH (m)	SAMPLE TYPE	SAMPLE NO	SPT(N)	WELL INSTALLATION	SOIL DESCRIPTION
10.0					- stiffer, some grinding rock - hard drilling - grinding rock
11.0					- some hard and soft layers
12.0					- more very stiff till in sample - sample is quite warm
13.0					- softer drilling
14.0					
15.0					
16.0					END OF BOREHOLE NOTE: - 5 m of water in hole at 1100 hrs - 10.4 m water in hole at 1140 hrs MONITORING WELL INSTALLATION - 0.15 m sand layer on bottom of hole - 1.5 m screen+15.2 m, 50 mm PVC pipe - 26 bags sand to 5.2 m below grade - some slough over sand (2 m) - 1 bag bentonite from 3.2 - 2.5 m - mixed 2 bags grout + 25 gal. water - install protective casing + endcap - top of PVC 0.76 m above ground
17.0					
18.0					
19.0					
20.0					

■ STANDARD PENETRATION ■ 10 20 30 40

PLASTIC M.C. LIQUID 10 20 30 40

■ PERCENT GRAVEL ■ 20 40 60 80

● PERCENT SAND ● 20 40 60 80

▲ PERCENT SILT OR FINES ▲ 20 40 60 80

◆ GROUND ICE DESCRIPTION ◆ 20 40 60 80

DEPTH (ft): 34.0, 36.0, 38.0, 40.0, 42.0, 44.0, 46.0, 48.0, 50.0, 52.0, 54.0, 56.0, 58.0, 60.0, 62.0, 64.0

EBA Engineering Consultants Ltd.
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LOGGED BY: BCF	COMPLETION DEPTH: 15.4 m
REVIEWED BY:	COMPLETE: 94/04/21
Fig. No:	Page 2 of 2

94/05/27 12:47PM

Steffen Robertson and Kirsten

December 1994

Groundwater Investigation North Fork of Rose Creek

Report No. A114101

TABLE 3.1

Summary of Lithology and Hydraulic Conductivities of the Piezometric Screened Intervals

DIAMOND DRILLHOLE	PIEZO	UTM GROUND ELEV (ft)	UTM CO-ORDINATES Northing	UTM CO-ORDINATES Easting	STICKUP ABOVE GROUND ELEVATION (ft)	DEPTH FROM TOP OF PIPE (ft)	WATER LEVEL DEPTH TO STATIC (ft)	WATER LEVEL UTM ELEV (ft)	WATER LEVEL DATE (yr/mon/day)	FILTER ZONE INTERVAL (ft) From	FILTER ZONE INTERVAL (ft) To	PACKER TEST INTERVAL (ft) From	PACKER TEST INTERVAL (ft) To	LITHOLOGY IN SPECIFIED INTERVAL		HYDRAULIC CONDUCTIVITY (cm/s)	
BH94-09		3744	22 682 540	1 919 985	0.42	180.42	111.68	3632.74	94/11/20	125	180			CHL BIOT SCHIST	1C		
												150	180	CHL BIOT SCHIST	1C	4.5E-05	
BH94-10	A	3621	22 682 240	1 919 950	2.82	122.82	24.07	3599.75	94/11/21	140	180			CHL BIOT SCHIST	1C		
	B				2.82	182.82	24.07	3599.75	94/11/21	80	120			CHL BIOT SCHIST	1C		
												61	93	METABASITE	1F	1.5E-04	
												95	120	CHL BIOT SCHIST	1C	1.9E-04	
												132	152	CHL BIOT SCHIST	1C	2.0E-04	
BH94-11		3715	22 682 580	1 920 305	0.67	180.67	119.08	3596.59	94/11/21	160	180			CHL BIOT SCHIST	1C		
												75	105	DIORITE	10E	5.6E-06	
												103	133	CHL BIOT SCHIST	1C	1.6E-05	
BH94-15	A	3869	22 683 915	1 919 980	0.69	45.69	10.69	3859.00	94/11/22	10	45			QUARTZ DIORITE	10D		
	B				0.00	200.00	10.20	3858.80	94/11/22	100	182			QUARTZ DIORITE	10D		
	C				0.69	345.69	10.96	3858.73	94/11/22	235	345			QUARTZ DIORITE	10D		
												72	98	QUARTZ DIORITE	10D	1.5E-06	
												302	327	QUARTZ DIORITE	10D	1.0E-06	
BH94-16	A	3809	22 683 710	1 919 145	0.66	75.66	24.11	3785.55	94/11/27	NC*	75			CHL BIOT SCHIST	1C		
	B				0.49	200.49	23.98	3785.51	94/11/27	100	200			CHL BIOT SCHIST	1C		
	C				0.33	280.33	24.01	3785.32	94/11/27	235	280			CHL BIOT SCHIST	1C		
												14	49	GRAPHITIC PHYLLITE	1D	2.1E-06	
												50	80	CHL BIOT SCHIST	1C	8.9E-07	
												192	222	CHL BIOT SCHIST	1C	6.1E-06	
AUGER BOREHOLE	PIEZO.																
BH94-05		3597	22 681 705	1 919 940	3.28	28.28	8.82	3591.46	94/10/25	18	25			COBBLES		4.4E-04	(F)
BH94-06		3602	22 681 965	1 919 960	2.62	23.12	11.78	3592.84	94/10/25	14	20.5			SANDY GRAVEL		1.0E-04	(F)
BH94-07	A	3623	22 682 260	1 920 080	2.56	31.56	17.42	3608.14	94/10/25	22	29			COBBLES		1.2E-04	(F)
	B				3.28	24.28	18.50	3607.78	94/10/25	14	21			SAND		1.8E-03	(R & F)
BH94-08		3683	22 682 410	1 920 120	2.59	70.09	54.45	3631.14	94/11/22	56	67.5			SCHIST	1C	1.6E-06	(R)
BH94-12	A	3795	22 683 950	1 922 150	2.19	12.19	6.79	3790.40	94/11/19	3	10			weathered SCHIST	1C	5.3E-04	(R & F)
	B				2.56	29.56	6.79	3790.77	94/11/19	18	25			SCHIST	1C	2.4E-06	(R)
BH94-13	A	3896	22 684 839	1 922 060	1.34	13.84	10.43	3886.91	94/11/21	4.5	12.5			SANDY GRAVEL		no test taken	
	B				2.23	29.23	11.41	3886.82	94/10/23	18.5	27			SCHIST	1C	no test taken	
BH94-14	A	3797	22 683 155	1 921 510	0.62	21.12	11.02	3786.60	94/11/19	13.5	20.5			weathered QRTZ DIORITE	10D	2.2E-05	(R)
	B				2.72	33.22	14.63	3785.09	94/11/19	23.5	30.5			QUARTZ DIORITE	10D	1.1E-05	(R)

Notes:

1. NC* Filter Zone not completed because water in open borehole froze 2.5 feet below ground elevation.
2. R = Rising Head Test or Bail Down Test
   F = Falling Head Test or Injection Slug Test

FARO SEEPAGE INVESTIGATION	ANVIL RANGE MINING CORPORATION	BOREHOLE NO: BH-05
MONITORING WELL INSTALLATION	DRILL: CME 750 – HOLLOW STEM AUGERS	PROJECT NO: A114101
FARO MINE SITE, FARO, YUKON	UTM ZONE: 8 N 22 681 705 E 1 919 940	ELEVATION: 3597.00 (ft)

SAMPLE TYPE: GRAB SAMPLE | TRICONE CUTTINGS | SPT | NO RECOVERY | NW CASING | NQ CORE

DEPTH (ft)	SAMPLE TYPE	SAMPLE NO	SPT(N)	SPT (blows / 12") 20 40 60 80	SOLIDS - % ZINC	USC	SOIL SYMBOL	GEOLOGIC DESCRIPTION	SLOTTED PIEZOMETER	ADDITIONAL COMMENTS	ELEVATION (ft)
0.0											3597.0
1.0		1						GRAVELLY SAND – some cobble sized stones, loose, (damp)			3596.0
2.0											3595.0
3.0		2	4	■		SM		SILTY SAND – brown, some organics and some rust brown water staining.			3594.0
4.0											3593.0
5.0								– (wet)			3592.0
▼										STATIC WATER LEVEL IN PIEZOMETER BH-05 @ 3591.46 ft ELEVATION ON OCTOBER 25, 1994.	▼
6.0		3	5	■	0.08						3591.0
7.0											3590.0
8.0											3589.0
9.0											3588.0
10.0										DRILL CUTTINGS BACKFILL	3587.0
11.0		4	32	■				SANDY GRAVEL – dark brown, subrounded gravel, medium grained sand.			3586.0
12.0						GM					3585.0
13.0											3584.0
14.0		5	45	■							3583.0
15.0								– color changes to rust brown			3582.0
16.0		6	38	■	0.05					BENTONITE CHIP SEAL	3581.0
17.0								DRILLING: encountered sand lense grading to a sandy gravel with depth.			3580.0
18.0											3579.0
19.0						SM-GM				COLORADO 10-20 SILICA SAND	3578.0
20.0											3577.0

STEFFEN, ROBERTSON AND KIRSTEN
Consulting Engineers

LOGGED BY: GRB
REVIEWED BY: PMH
Fig. No: A-1

COMPLETION DEPTH: 25.5 ft
COMPLETE: 94/09/04

94/12/21 11:00AM

FARO SEEPAGE INVESTIGATION	ANVIL RANGE MINING CORPORATION	BOREHOLE NO: BH-05
MONITORING WELL INSTALLATION	DRILL: CME 750 – HOLLOW STEM AUGERS	PROJECT NO: A114101
FARO MINE SITE, FARO, YUKON	UTM ZONE: 8 N 22 681 705 E 1 919 940	ELEVATION: 3597.00 (ft)

SAMPLE TYPE: GRAB SAMPLE | TRICONE CUTTINGS | SPT | NO RECOVERY | NW CASING | NO CORE

DEPTH (ft)	SAMPLE TYPE	SAMPLE NO	SPT(N)	SPT (blows / 12") 20 40 60 80	SOLIDS – % ZINC	USC	SOIL SYMBOL	GEOLOGIC DESCRIPTION	SLOTTED PIEZOMETER	ADDITIONAL COMMENTS	ELEVATION (ft)
20.0											3577.0
21.0		7	28		0.05	SM-GM		– medium grained sandy gravel		COLORADO 10–20 SILICA SAND	3576.0
22.0											3575.0
23.0								DRILLING: encountered cobbles			3574.0
24.0						CB				FALLING HEAD TEST RESULT k = 4.4E-04 cm/sec	3573.0
25.0											3572.0
26.0								END OF BOREHOLE: cobbles blocked the progress of drilling and SPT sampling			3571.0
27.0								MONITORING WELL INSTALLATION			3570.0
28.0								– 0.5 ft sand layer on bottom			3569.0
29.0								– 5 ft screen + 23.3 ft of 2" PVC pipe			3568.0
30.0								– 3 bags sand to 18 ft below grade			3567.0
31.0								– 1 bag bentonite chips to 15 ft			3566.0
32.0								– backfill borehole with drill cuttings			3565.0
33.0								– install friction (slip off) endcap			3564.0
34.0								– Top of PVC 3.3 ft above ground			3563.0
35.0											3562.0
36.0											3561.0
37.0											3560.0
38.0											3559.0
39.0											3558.0
40.0											3557.0

STEFFEN, ROBERTSON AND KIRSTEN
Consulting Engineers

LOGGED BY: GRB	COMPLETION DEPTH: 25.5 ft
REVIEWED BY: PMH	COMPLETE: 94/09/04
Fig. No: A-1	Page 2 of 2

94/12/21 11:01AM

FARO SEEPAGE INVESTIGATION	ANVIL RANGE MINING CORPORATION	BOREHOLE NO: BH-06
MONITORING WELL INSTALLATION	DRILL: CME 750 - HOLLOW STEM AUGERS	PROJECT NO: A114101
FARO MINE SITE, FARO, YUKON	UTM ZONE: 8 N 22 681 965 E 1 919 960	ELEVATION: 3602.00 (ft)

SAMPLE TYPE: GRAB SAMPLE; TRICONE CUTTINGS; SPT; NO RECOVERY; NW CASING; NQ CORE

DEPTH (ft)	SAMPLE TYPE	SAMPLE NO	SPT(N)	SPT (blows / 12") 20 40 60 80	SOLIDS - % ZINC	USC	SOIL SYMBOL	GEOLOGIC DESCRIPTION	SLOTTED PIEZOMETER	ADDITIONAL COMMENTS	ELEVATION (ft)
0.0											3602.0
1.0		1						GRAVELLY SAND - Brown, alluvial outwash - material, medium to coarse grained sand, medium grained gravel, loose, (damp).			3601.0
2.0											3600.0
3.0											3599.0
4.0						SM				DRILL CUTTINGS BACKFILL	3598.0
5.0											3597.0
6.0		2	8		0.09			- some rust brown water staining.			3596.0
7.0											3595.0
8.0											3594.0
9.0											3593.0
10.0						SW				STATIC WATER LEVEL IN PIEZOMETER BH-06 @ 3592.84 FT ELEVATION ON OCTOBER 25, 1994.	3592.0
11.0		3	13		0.03			SAND - clean, grey, medium grained, some organics, native material.			3591.0
12.0											3590.0
13.0						CB		DRILLING: encountered cobble seam.		BENTONITE CHIP SEAL	3589.0
14.0								DRILLING: encountered interbedded gravelly sand and coarse grained sand.			3588.0
15.0						SM-SW					3587.0
16.0						SW		DRILLING: encountered sand lense.		COLORADO 10-20 SILICA SAND	3586.0
17.0								DRILLING: encountered dense sandy gravel.			3585.0
18.0						CB-GM				FALLING HEAD TEST RESULT k = 1.0E-04 cm/sec	3584.0
19.0											3583.0
20.0											3582.0

STEFFEN, ROBERTSON AND KIRSTEN
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LOGGED BY: GRB	COMPLETION DEPTH: 21.0 ft
REVIEWED BY: PMH	COMPLETE: 94/10/06
Fig. No: A-2	Page 1 of 2

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FARO SEEPAGE INVESTIGATION	ANVIL RANGE MINING CORPORATION	BOREHOLE NO: BH-06
MONITORING WELL INSTALLATION	DRILL: CME 750 – HOLLOW STEM AUGERS	PROJECT NO: A114101
FARO MINE SITE, FARO, YUKON	UTM ZONE: 8 N 22 681 965 E 1 919 960	ELEVATION: 3602.00 (ft)

SAMPLE TYPE ■ GRAB SAMPLE ▨ TRICONE CUTTINGS ☒ SPT ▤ NO RECOVERY ▥ NW CASING ▥ NQ CORE

DEPTH (ft)	SAMPLE TYPE	SAMPLE NO	SPT(N)	SPT (blows / 12") 20 40 60 80	SOLIDS – % ZINC	USC	SOIL SYMBOL	GEOLOGIC DESCRIPTION	SLOTTED PIEZOMETER	ADDITIONAL COMMENTS	ELEVATION (ft)
20.0						CB–GM				COLORADO 10–20 SILICA SAND	3582.0
21.0								END OF BOREHOLE: cobbles blocked the progress of drilling.			3581.0
22.0								MONITORING WELL INSTALLATION – 0.5 ft sand layer on bottom – 5 ft screen + 18.12 ft of 2" PVC pipe – 4 bags sand to 14 ft below grade – 1 bag bentonite chips to 11.5 ft – backfill borehole with drill cuttings – install friction (slip off) endcap – Top PVC 2.62 ft above ground			3580.0
23.0											3579.0
24.0											3578.0
25.0											3577.0
26.0											3576.0
27.0											3575.0
28.0											3574.0
29.0											3573.0
30.0											3572.0
31.0											3571.0
32.0											3570.0
33.0											3569.0
34.0											3568.0
35.0											3567.0
36.0											3566.0
37.0											3565.0
38.0											3564.0
39.0											3563.0
40.0											3562.0

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LOGGED BY: GRB	COMPLETION DEPTH: 21.0 ft
REVIEWED BY: PMH	COMPLETE: 94/10/06
Fig. No: A-2	Page 2 of 2

94/12/21 01:21PM

FARO SEEPAGE INVESTIGATION	ANVIL RANGE MINING CORPORATION	BOREHOLE NO: BH-07
MONITORING WELL INSTALLATION	DRILL: CME 750 - HOLLOW STEM AUGERS	PROJECT NO: A114101
FARO MINE SITE, FARO, YUKON	UTM ZONE: 8 N 22 682 260 E 1 920 080	ELEVATION: 3623.00 (ft)

SAMPLE TYPE: GRAB SAMPLE | TRICONE CUTTINGS | SPT | NO RECOVERY | NW CASING | NQ CORE

DEPTH (ft)	SAMPLE TYPE	SAMPLE NO	SPT(N)	SPT (blows / 12") 20 40 60 80	SOLIDS - % ZINC	USC	SOIL SYMBOL	GEOLOGIC DESCRIPTION	SLOTTED PIEZOMETER A	SLOTTED PIEZOMETER B	ADDITIONAL COMMENTS	ELEVATION (ft)
0.0												3623.0
1.0		1						GRAVELLY SAND - brown gravel-sand-silt mixture, loose, occasional cobble sized stones, (dry).				3622.0
2.0												3621.0
3.0		2	15		0.12							3620.0
4.0						GM		- some organics, change in color to rust brown, (damp).				3619.0
5.0											DRILL CUTTINGS BACKFILL	3618.0
6.0		3	9		0.10			- angular to subrounded gravel, (moist).				3617.0
7.0												3616.0
8.0								- (wet)				3615.0
9.0		4	14					WEATHERED BEDROCK - looks like highly bedrock, phyllitic flakey gravel, rust brown, medium dense.				3614.0
10.0												3613.0
11.0		5,6	18		0.12							3612.0
12.0						BR						3611.0
13.0											DRILL CUTTINGS (BH-07A) BENTONITE CHIP SEAL (BH-07B)	3610.0
14.0		7	28									3609.0
15.0											STATIC WATER LEVEL IN PIEZOMETER BH-07A @ 3608.14 ft ELEVATION ON OCTOBER 25, 1994. STATIC WATER LEVEL IN PIEZOMETER BH-07B @ 3607.78 ft ELEVATION ON OCTOBER 25, 1994.	3608.0
16.0		8,9	21									3607.0
17.0								SAND - reddish brown, medium grained, medium dense.				3606.0
18.0						SW					DRILL CUTTINGS (BH-07A) COLORADO 10-20 SAND (BH-07B)	3605.0
19.0											FALLING HEAD TEST RESULT k = 1.2E-04 cm/sec	3604.0
20.0												3603.0

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LOGGED BY: GRB
REVIEWED BY: PMH
Fig. No: A-3

COMPLETION DEPTH: 30.0 ft
COMPLETE: 94/10/05

94/12/21 11:03AM

FARO SEEPAGE INVESTIGATION	ANVIL RANGE MINING CORPORATION	BOREHOLE NO: BH-07
MONITORING WELL INSTALLATION	DRILL: CME 750 – HOLLOW STEM AUGERS	PROJECT NO: A114101
FARO MINE SITE, FARO, YUKON	UTM ZONE: 8 N 22 682 260 E 1 920 080	ELEVATION: 3623.00 (ft)

SAMPLE TYPE: GRAB SAMPLE; TRICONE CUTTINGS; SPT; NO RECOVERY; NW CASING; NQ CORE

DEPTH (ft)	SAMPLE TYPE	SAMPLE NO	SPT(N)	SPT (blows / 12") 20 40 60 80	SOLIDS - % ZINC	USC	SOIL SYMBOL	GEOLOGIC DESCRIPTION	SLOTTED PIEZOMETER A	SLOTTED PIEZOMETER B	ADDITIONAL COMMENTS	ELEVATION (ft)
20.0						SW						3603.0
21.0		10,11	65					DRILLING: encountered cobble seam, or dense but highly weathered bedrock; air rotary triconed through seam, and cleaned out borehole with hollow stem auger.			BENTONITE CHIP SEAL (BH-07A) COLORADO 10-20 SAND (BH-07B)	3602.0
22.0												3601.0
23.0												3600.0
24.0												3599.0
25.0		12				BR-CB		TRICONE CUTTINGS: reddish brown, extremely weathered phyllitic bedrock.			COLORADO 10-20 SAND (BH-07A)	3598.0
26.0												3597.0
27.0											RISING/FALLING HEAD TEST k = 1.8E-03 cm/sec	3596.0
28.0												3595.0
29.0												3594.0
30.0								END OF BOREHOLE: Could not progess any further with the air-rotary tricone or				3593.0
31.0								MONITORING WELL INSTALLATION BH-07A – 1.0 ft sand and slough on bottom – 5 ft screen + 26.56 ft of 2" PVC pipe – 3 bags sand to 22 ft below grade – 1 bag bentonite chips to 20 ft – backfill borehole with drill cuttings – install friction (slip off) endcap – Top of PVC 2.56 ft above ground				3592.0
32.0												3591.0
33.0												3590.0
34.0												3589.0
35.0								MONITORING WELL INSTALLATION BH-07B – 0.5 ft sand layer on bottom – 5 ft screen + 19.28 ft of 2" PVC pip – 4 bags sand to 14 ft below grade – 1 bag bentonite chips to 11 ft – backfill borehole with drill cuttings – install friction (slip off) endcap – Top of PVC 3.28 ft above ground				3588.0
36.0												3587.0
37.0												3586.0
38.0												3585.0
39.0												3584.0
40.0												3583.0

STEFFEN, ROBERTSON AND KIRSTEN Consulting Engineers	LOGGED BY: GRB REVIEWED BY: PMH Fig. No: A-3	COMPLETION DEPTH: 30.0 ft COMPLETE: 94/10/05 Page 2 of 2

94/12/21 11:24AM

FARO SEEPAGE INVESTIGATION	ANVIL RANGE MINING CORPORATION	BOREHOLE NO: BH-09
MONITORING WELL INSTALLATION	DRILL: BOYLE OIL 3500 – NQ DIAMOND CORE	PROJECT NO: A114101
FARO MINE SITE, FARO, YUKON	UTM ZONE: 8 N 22 682 540 E 1 919 985	ELEVATION: 3744.00 (ft)

SAMPLE TYPE: GRAB SAMPLE | TRICONE CUTTINGS | SPT | NO RECOVERY | NW CASING | NQ CORE

DEPTH (ft)	SAMPLE TYPE	▲ RECOVERY (%) ▲ 20 40 60 80 / ● RQD (%) ● 20 40 60 80	SOIL SYMBOL	GEOLOGIC DESCRIPTION	DEGREE OF BREAKAGE	PACKER TEST	SLOTTED PIEZOMETER	ADDITIONAL COMMENTS	ELEVATION (ft)
0.0									3744.0
5.0									3739.0
10.0									3734.0
15.0									3729.0
20.0									3724.0
25.0									3719.0
30.0				TRICONED AND CASED TO 48 FT					3714.0
35.0								BENTONITIC GROUT SEAL	3709.0
40.0									3704.0
45.0									3699.0
50.0				HORNBLENDE BIOTITE DIORITE – Highly weathered, orange rust colored (oxidized) (originally grey color) VERY BROKEN UP CORE, surface water would have no trouble percolating through this rock type. A LOT OF MISSING CORE indicative of lots of sand and clay. CHUNKS OF BEDROCK themselves are fairly hard but so weathered that they can be pried apart by hand.					3694.0
55.0									3689.0
60.0					B+				3684.0
65.0									3679.0
70.0									3674.0
75.0					B–				3669.0

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LOGGED BY: GRB	COMPLETION DEPTH: 180.0 ft
REVIEWED BY: PMH	COMPLETE: 94/11/17
Fig. No: A-8	Page 1 of 3

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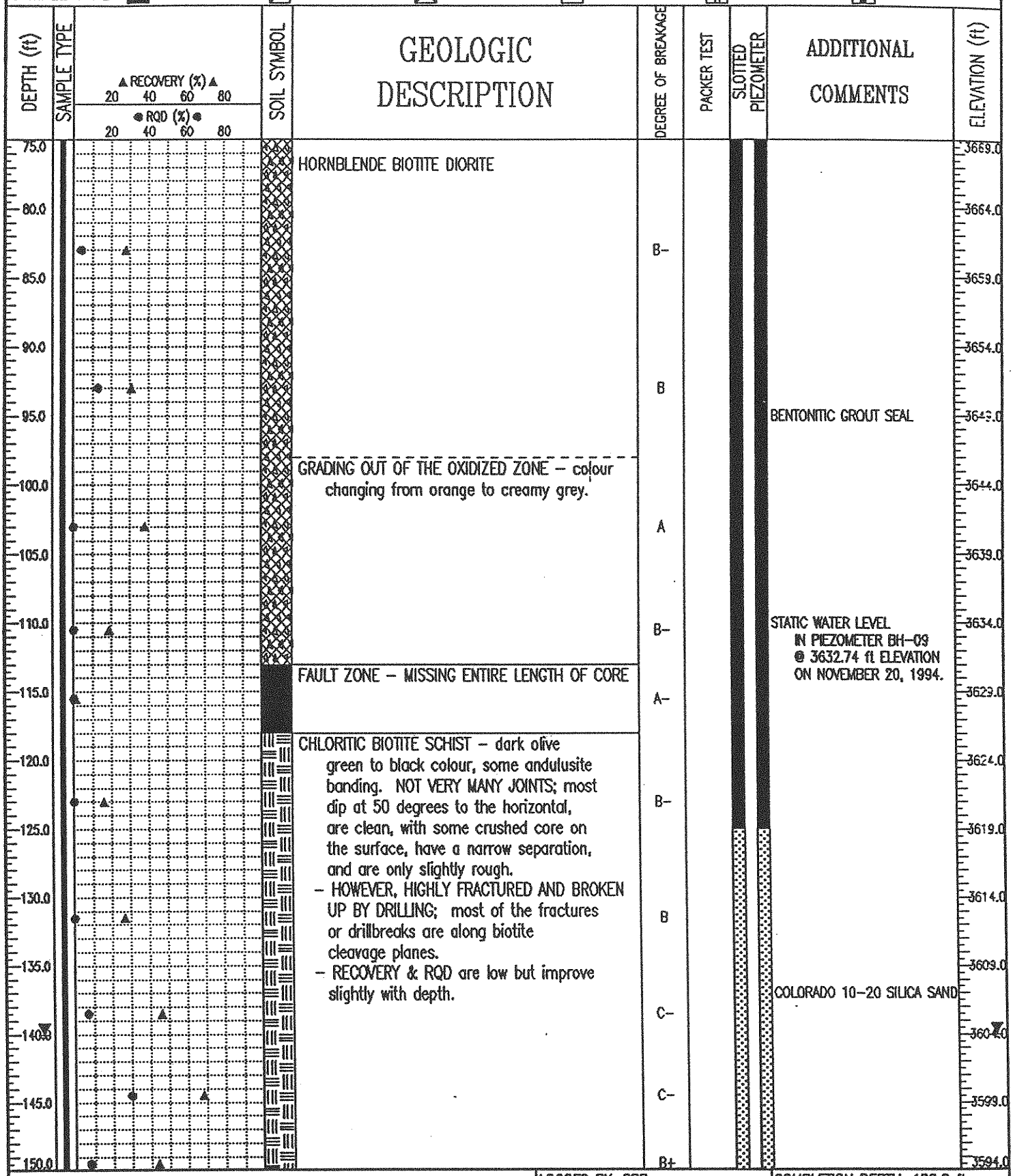
FARO SEEPAGE INVESTIGATION	ANVIL RANGE MINING CORPORATION	BOREHOLE NO: BH-09
MONITORING WELL INSTALLATION	DRILL: BOYLE OIL 3500 – NQ DIAMOND CORE	PROJECT NO: A114101
FARO MINE SITE, FARO, YUKON	UTM ZONE: 8 N 22 682 540 E 1 919 985	ELEVATION: 3744.00 (ft)

SAMPLE TYPE: GRAB SAMPLE | TRICONE CUTTINGS | SPT | NO RECOVERY | NW CASING | NQ CORE



STEFFEN, ROBERTSON AND KIRSTEN Consulting Engineers	LOGGED BY: GRB REVIEWED BY: PMH Fig. No: A-8	COMPLETION DEPTH: 180.0 ft COMPLETE: 94/11/17 Page 2 of 3

FARO SEEPAGE INVESTIGATION	ANVIL RANGE MINING CORPORATION	BOREHOLE NO: BH-09
MONITORING WELL INSTALLATION	DRILL: BOYLE OIL 3500 – NQ DIAMOND CORE	PROJECT NO: A114101
FARO MINE SITE, FARO, YUKON	UTM ZONE: 8 N 22 682 540 E 1 919 985	ELEVATION: 3744.00 (ft)

SAMPLE TYPE: GRAB SAMPLE | TRICONE CUTTINGS | SPT | NO RECOVERY | NW CASING | NQ CORE

DEPTH (ft)	SAMPLE TYPE	▲RECOVERY (%)▲ 20 40 60 80 / ●RQD (%)● 20 40 60 80	SOIL SYMBOL	GEOLOGIC DESCRIPTION	DEGREE OF BREAKAGE	PACKER TEST	SLOTTED PIEZOMETER	ADDITIONAL COMMENTS	ELEVATION (ft)
150.0				CHLORITIC BIOTITE SCHIST					3594.0
155.0					A–			COLORADO 10–20 SILICA SAND	3589.0
160.0				– BELOW THE WATER TABLE: core is slightly weathered and there is some evidence of water movement (staining), BUT NO DEPOSITS ON FRACTURES OR JOINTS SO SEEPAGE CANNOT BE DRAMATIC.	C–				3584.0
165.0					B+			PACKER TEST RESULT k = 4.5E–05 cm/sec	3579.0
170.0					C				3574.0
175.0					C–				3569.0
180.0				END OF BOREHOLE: design depth attained. MONITORING WELL INSTALLATION – clean, firm bedrock at bottom – 5 ft screen + 175.42 ft 3/4" PVC pipe – 6 bags sand to 125 ft below grade – mixed 10 bags grout + 100 gal. water – grouted to surface – install copper slip off endcap and tape on with electrician's tape – Top of PVC 0.42 ft above ground					3564.0
185.0									3559.0
190.0									3554.0
195.0									3549.0
200.0									3544.0
205.0									3539.0
210.0									3534.0
215.0									3529.0
220.0									3524.0
225.0									3519.0

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LOGGED BY: GRB	COMPLETION DEPTH: 180.0 ft
REVIEWED BY: PMH	COMPLETE: 94/11/17
Fig. No: A-8	Page 3 of 3

94/12/21 01:03PM

FARO SEEPAGE INVESTIGATION	ANVIL RANGE MINING CORPORATION	BOREHOLE NO: BH-12
MONITORING WELL INSTALLATION	DRILL: CME 750 – HOLLOW STEM AUGERS	PROJECT NO: A114101
FARO MINE SITE, FARO, YUKON	UTM ZONE: 8 N 22 683 950 E 1 922 150	ELEVATION: 3795.00 (ft)

SAMPLE TYPE: GRAB SAMPLE; TRICONE CUTTINGS; SPT; NO RECOVERY; NW CASING; NQ CORE

DEPTH (ft)	SAMPLE TYPE	SAMPLE NO	SPT(N)	SPT (blows / 12") 20 40 60 80	SOLIDS – % ZINC	USC	SOIL SYMBOL	GEOLOGIC DESCRIPTION	SLOTTED PIEZOMETER B	SLOTTED PIEZOMETER A	ADDITIONAL COMMENTS	ELEVATION (ft)
0.0												3795.0
1.0												3794.0
2.0		1				SM		GRAVELLY SAND – light brown, medium grained, loose, (dry).			BENTONITE CHIP SEAL	3793.0
3.0												3792.0
4.0	▼										STATIC WATER LEVEL IN PIEZOMETER BH-12B @ 3790.77 ft ELEVATION ON NOVEMBER 19, 1994.	3791.0
5.0		2	100					WEATHERED BEDROCK – very dense, light grey weathered bedrock, (wet).			STATIC WATER LEVEL IN PIEZOMETER BH-12A @ 3790.40 ft ELEVATION ON NOVEMBER 19, 1994.	3790.0
6.0												3789.0
7.0						BR						3788.0
8.0		3	100					– not consolidated enough to tricone.			COLORADO 10-20 SILICA SAND	3787.0
9.0											RISING/FALLING HEAD TEST k = 5.3E-04 cm/sec	3786.0
10.0								BEDROCK – consolidated. – begin air-rotary triconing.				3785.0
11.0												3784.0
12.0												3783.0
13.0												3782.0
14.0												3781.0
15.0						BR					BENTONITE CHIP SEAL	3780.0
16.0												3779.0
17.0												3778.0
18.0		4						– soft, phyllitic schist.				3777.0
19.0											COLORADO 10-20 SILICA SAND	3776.0
20.0												3775.0

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LOGGED BY: GRB	COMPLETION DEPTH: 27.0 ft
REVIEWED BY: PMH	COMPLETE: 94/10/08
Fig. No: A-5	Page 1 of 2

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FARO SEEPAGE INVESTIGATION	ANVIL RANGE MINING CORPORATION	BOREHOLE NO: BH-12
MONITORING WELL INSTALLATION	DRILL: CME 750 – HOLLOW STEM AUGERS	PROJECT NO: A114101
FARO MINE SITE, FARO, YUKON	UTM ZONE: 8 N 22 683 950 E 1 922 150	ELEVATION: 3795.00 (ft)

SAMPLE TYPE: GRAB SAMPLE; TRICONE CUTTINGS; SPT; NO RECOVERY; NW CASING; NQ CORE

DEPTH (ft)	SAMPLE TYPE	SAMPLE NO	SPT(N)	SPT (blows / 12") 20 40 60 80	SOLIDS - % ZINC	USC	SOIL SYMBOL	GEOLOGIC DESCRIPTION	SLOTTED PIEZOMETER B	SLOTTED PIEZOMETER A	ADDITIONAL COMMENTS	ELEVATION (ft)
20.0												3775.0
21.0											COLORADO 10-20 SILICA SAND	3774.0
22.0												3773.0
23.0		5				BR		– soft, phyllitic schist.			RISING HEAD TEST RESULT k = 2.4E-06 cm/sec	3772.0
24.0												3771.0
25.0								END OF BOREHOLE: design depth of 15 ft into bedrock attained.				3770.0
26.0								MONITORING WELL INSTALLATION BH-12B – firm bedrock at bottom – 5 ft screen + 24.56 ft 2" PVC pipe – 2.5 bags sand to 18 ft below grade – 1.5 bags bentonite chips to 10.5 ft – install friction (slip off) endcap – Top of PVC 2.56 ft above ground				3769.0
27.0												3768.0
28.0												3767.0
29.0								MONITORING WELL INSTALLATION BH-12A – 0.5 ft silica sand on bentonite seal – 5 ft screen + 7.19 ft 2" PVC pipe – 2.5 bags sand to 3 ft below grade – 0.5 bags bentonite chips to surface – install friction (slip off) endcap – Top of PVC 2.19 ft above ground				3766.0
30.0												3765.0
31.0												3764.0
32.0												3763.0
33.0												3762.0
34.0												3761.0
35.0												3760.0
36.0												3759.0
37.0												3758.0
38.0												3757.0
39.0												3756.0
40.0												3755.0

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LOGGED BY: GRB
REVIEWED BY: PMH
Fig. No: A-5

COMPLETION DEPTH: 27.0 ft
COMPLETE: 94/10/08

94/12/21 01:26PM

FARO SEEPAGE INVESTIGATION	ANVIL RANGE MINING CORPORATION	BOREHOLE NO: BH-13
MONITORING WELL INSTALLATION	DRILL: CME 750 – HOLLOW STEM AUGERS	PROJECT NO: A114101
FARO MINE SITE, FARO, YUKON	UTM ZONE: 8 N 22 684 830 E 1 922 060	ELEVATION: 3896.00 (ft)

SAMPLE TYPE: GRAB SAMPLE | TRICONE CUTTINGS | SPT | NO RECOVERY | NW CASING | NQ CORE

DEPTH (ft)	SAMPLE TYPE	SAMPLE NO	SPT(N)	SPT (blows / 12") 20 40 60 80	SOLIDS – % ZINC	USC	SOIL SYMBOL	GEOLOGIC DESCRIPTION	SLOTTED PIEZOMETER B	SLOTTED PIEZOMETER A	ADDITIONAL COMMENTS	ELEVATION (ft)
0.0		1				OR		VOLCANIC ASH – at 2", white. ORGANIC SAND – at 6", medium grained, black.			BENTONITE CHIP SEAL (BH-13A) DRILL CUTTINGS (BH-13B)	3896.0
1.0								GRAVELLY SAND – medium to rust brown, medium grained sand, angular to sub-angular gravel, loose, (dry).				3895.0
2.0												3894.0
3.0		2									DRILL CUTTINGS (BH-13A) DRILL CUTTINGS (BH-13B)	3893.0
4.0						GM						3892.0
5.0		3						– density increasing with depth.			COLORADO 10-20 SAND (BH-13A) DRILL CUTTINGS (BH-13B)	3891.0
6.0												3890.0
7.0												3889.0
8.0		4						SANDY GRAVEL – brownish grey, dense, (dry)				3888.0
9.0											STATIC WATER LEVEL IN PIEZOMETER BH-13A @ 3886.91 ft ELEVATION ON NOVEMBER 21, 1994. STATIC WATER LEVEL IN PIEZOMETER BH-13B @ 3886.82 ft ELEVATION ON OCTOBER 23, 1994.	3887.0
10.0						GP						3886.0
11.0		5						– some phyllitic gravel slices.				3885.0
12.0												3884.0
13.0								BEDROCK – consolidated. – begin air-rotary triconing.				3883.0
14.0												3882.0
15.0		6						– soft, phyllitic schist.				3881.0
16.0						BR						3880.0
17.0											BENTONITE CHIP SEAL (BH-13B)	3879.0
18.0												3878.0
19.0												3877.0
20.0											COLORADO 10-20 SAND (BH-13B)	3876.0

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LOGGED BY: GRB
REVIEWED BY: PMH
Fig. No: A-6

COMPLETION DEPTH: 27.0 ft
COMPLETE: 94/09/30

FARO SEEPAGE INVESTIGATION	ANVIL RANGE MINING CORPORATION	BOREHOLE NO: BH-13
MONITORING WELL INSTALLATION	DRILL: CME 750 – HOLLOW STEM AUGERS	PROJECT NO: A114101
FARO MINE SITE, FARO, YUKON	UTM ZONE: 8 N 22 684 830 E 1 922 060	ELEVATION: 3896.00 (ft)

SAMPLE TYPE: GRAB SAMPLE | TRICONE CUTTINGS | SPT | NO RECOVERY | NW CASING | NQ CORE

DEPTH (ft)	SAMPLE TYPE	SAMPLE NO	SPT(N)	SPT (blows / 12") 20 40 60 80	SOLIDS – % ZINC	USC	SOIL SYMBOL	GEOLOGIC DESCRIPTION	SLOTTED PIEZOMETER B	SLOTTED PIEZOMETER A	ADDITIONAL COMMENTS	ELEVATION (ft)
20.0												3876.0
21.0												3875.0
22.0												3874.0
23.0		7				BR		– soft, phyllitic schist.			COLORADO 10-20 SAND (BH-13B)	3873.0
24.0												3872.0
25.0												3871.0
26.0												3870.0
27.0								END OF BOREHOLE: design depth of 15 ft into bedrock attained.				3869.0
28.0								MONITORING WELL INSTALLATION BH-13B – firm bedrock at bottom – 5 ft screen + 24.23 ft 2" PVC pipe – 3.5 bags sand to 18.5 ft below grade – mixed 0.75 bags grout + 10 gal. water – grouted to 16.0 ft below grade – backfill borehole with drill cuttings – install friction (slip off) endcap – Top of PVC 2.23 ft above ground				3868.0
29.0												3867.0
30.0												3866.0
31.0												3865.0
32.0								MONITORING WELL INSTALLATION BH-13A – 0.5 ft sand layer on bottom – 5 ft screen + 8.84 ft 2" PVC pipe – 2.5 bags sand to 4.5 ft below grade – backfill with drill cuttings to 1.5 ft – mixed 0.5 bags grout + 7 gal. water – grouted to surface – install friction (slip off) endcap – Top of PVC 1.34 ft above ground				3864.0
33.0												3863.0
34.0												3862.0
35.0												3861.0
36.0												3860.0
37.0												3859.0
38.0												3858.0
39.0												3857.0
40.0												3856.0

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LOGGED BY: GRB | COMPLETION DEPTH: 27.0 ft
REVIEWED BY: PMH | COMPLETE: 94/09/30
Fig. No: A-6

FARO SEEPAGE INVESTIGATION	ANVIL RANGE MINING CORPORATION	BOREHOLE NO: BH-14
MONITORING WELL INSTALLATION	DRILL: CME 750 – HOLLOW STEM AUGERS	PROJECT NO: A114101
FARO MINE SITE, FARO, YUKON	UTM ZONE: 8 N 22 683 155 E 1 921 510	ELEVATION: 3797.00 (ft)

SAMPLE TYPE: GRAB SAMPLE | TRICONE CUTTINGS | SPT | NO RECOVERY | NW CASING | NQ CORE

DEPTH (ft)	SAMPLE TYPE	SAMPLE NO	SPT(N)	SPT (blows / 12") 20 40 60 80	SOLIDS – % ZINC	USC	SOIL SYMBOL	GEOLOGIC DESCRIPTION	SLOTTED PIEZOMETER B	SLOTTED PIEZOMETER A	ADDITIONAL COMMENTS	ELEVATION (ft)
0.0						OR		ORGANIC MATTER – to 2"				3797.0
								VOLCANIC ASH – to 6"				
1.0		1						GRAVELLY SAND – dark brown, medium grained loose to medium density, (moist).				3796.0
2.0												3795.0
3.0		2				GM						3794.0
4.0								– changing colour to light brown.				3793.0
5.0		3						– (dry)			DRILL CUTTINGS BACKFILL	3792.0
6.0								WEATHERED BEDROCK				3791.0
7.0												3790.0
8.0		4	100									3789.0
9.0											STATIC WATER LEVEL IN PIEZOMETER BH-14A @ 3786.60 ft ELEVATION ON NOVEMBER 19, 1994.	3788.0
10.0											STATIC WATER LEVEL IN PIEZOMETER BH-14B @ 3785.09 ft ELEVATION ON NOVEMBER 19, 1994.	3787.0
11.0												3786.0
12.0												3785.0
13.0						BR					BENTONITE CHIP SEAL	3784.0
14.0												3783.0
15.0		5	100					– weathered bedrock, not consolidated enough to air-rotary tricone.				3782.0
16.0											COLORADO 10-20 SILICA SAND	3781.0
17.0												3780.0
18.0											RISING HEAD TEST RESULT k = 2.2E-05 cm/sec	3779.0
19.0												3778.0
20.0												3777.0

STEFFEN, ROBERTSON AND KIRSTEN
Consulting Engineers

LOGGED BY: GRB | REVIEWED BY: PMH | Fig. No: A-7

COMPLETION DEPTH: 30.5 ft | COMPLETE: 94/10/07

FARO SEEPAGE INVESTIGATION	ANVIL RANGE MINING CORPORATION	BOREHOLE NO: BH-14
MONITORING WELL INSTALLATION	DRILL: CME 750 – HOLLOW STEM AUGERS	PROJECT NO: A114101
FARO MINE SITE, FARO, YUKON	UTM ZONE: 8 N 22 683 155 E 1 921 510	ELEVATION: 3797.00 (ft)

SAMPLE TYPE: GRAB SAMPLE; TRICONE CUTTINGS; SPT; NO RECOVERY; NW CASING; NQ CORE

DEPTH (ft)	SAMPLE TYPE	SAMPLE NO	SPT(N)	SPT (blows / 12") 20 40 60 80	SOLIDS – % ZINC	USC	SOIL SYMBOL	GEOLOGIC DESCRIPTION	SLOTTED PIEZOMETER B	SLOTTED PIEZOMETER A	ADDITIONAL COMMENTS	ELEVATION (ft)
20.0								BEDROCK – consolidated – begin air–rotary triconing.			COLORADO 10–20 SILICA SAND	3777.0
21.0												3776.0
22.0											BENTONITIC CHIP SEAL	3775.0
23.0												3774.0
24.0												3773.0
25.0											COLORADO 10–20 SILICA SAND	3772.0
26.0		6				BR		– hard quartz diorite				3771.0
27.0												3770.0
28.0											RISING HEAD TEST RESULT k = 1.1E–05 cm/sec	3769.0
29.0												3768.0
30.0												3767.0
31.0								END OF BOREHOLE: design depth of 30 ft attained. MONITORING WELL INSTALLATION BH–14B – firm bedrock at bottom – 5 ft screen + 28.22 ft 2" PVC pipe – 3 bags sand to 23.5 ft below grade – 1 bag bentonite chips to 21 ft – install friction (slip off) endcap – Top of PVC 2.72 ft above ground MONITORING WELL INSTALLATION BH–14A – 0.5 ft silica sand on bentonite seal – 5 ft screen + 16.12 ft 2" PVC pipe – 4 bags sand to 13.5 ft below grade – 1 bag bentonite chips to 10.5 ft – backfill borehole with drill cuttings – install flush threaded endcap – Top of PVC 0.62 ft above ground			3766.0
32.0												3765.0
33.0												3764.0
34.0												3763.0
35.0												3762.0
36.0												3761.0
37.0												3760.0
38.0												3759.0
39.0												3758.0
40.0												3757.0

STEFFEN, ROBERTSON AND KIRSTEN
Consulting Engineers

LOGGED BY: GRB
REVIEWED BY: PMH
Fig. No: A–7

COMPLETION DEPTH: 30.5 ft
COMPLETE: 94/10/07

94/12/21 01:30PM

Piteau Resources Inc.

June 23, 1995

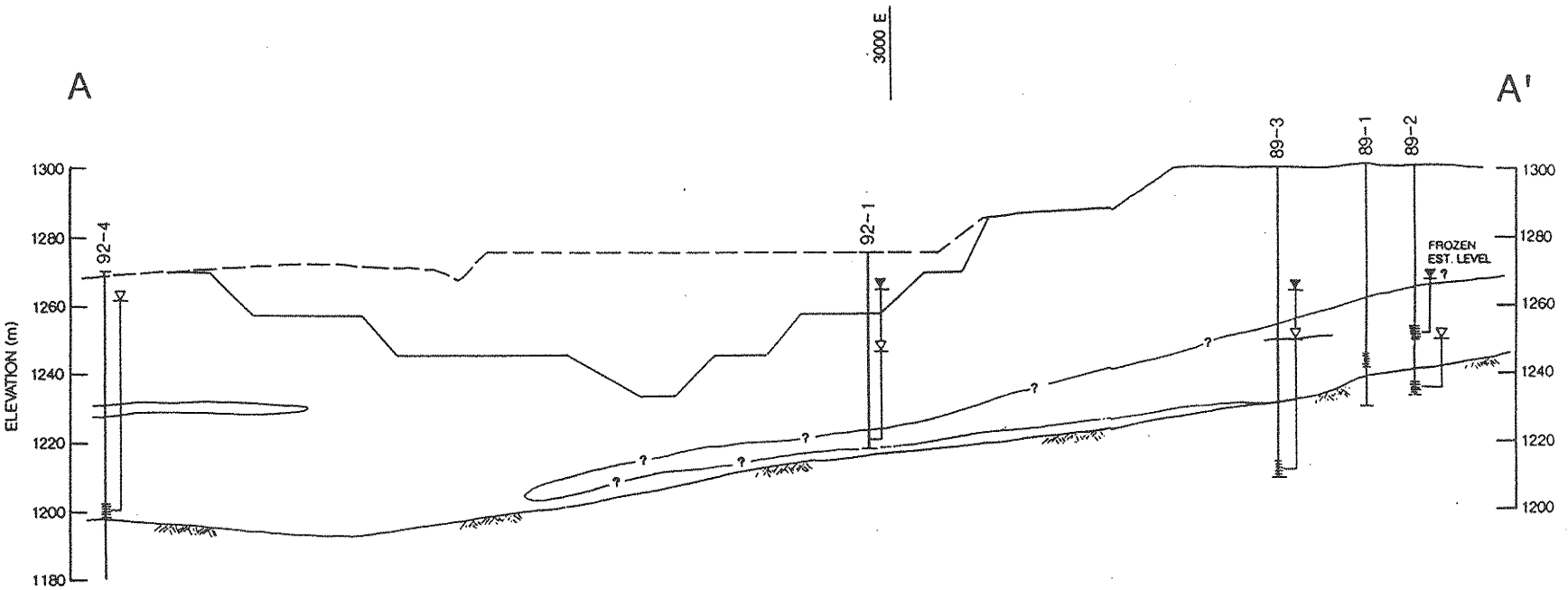
Current Groundwater in the Southeast Walls of Grum Pit

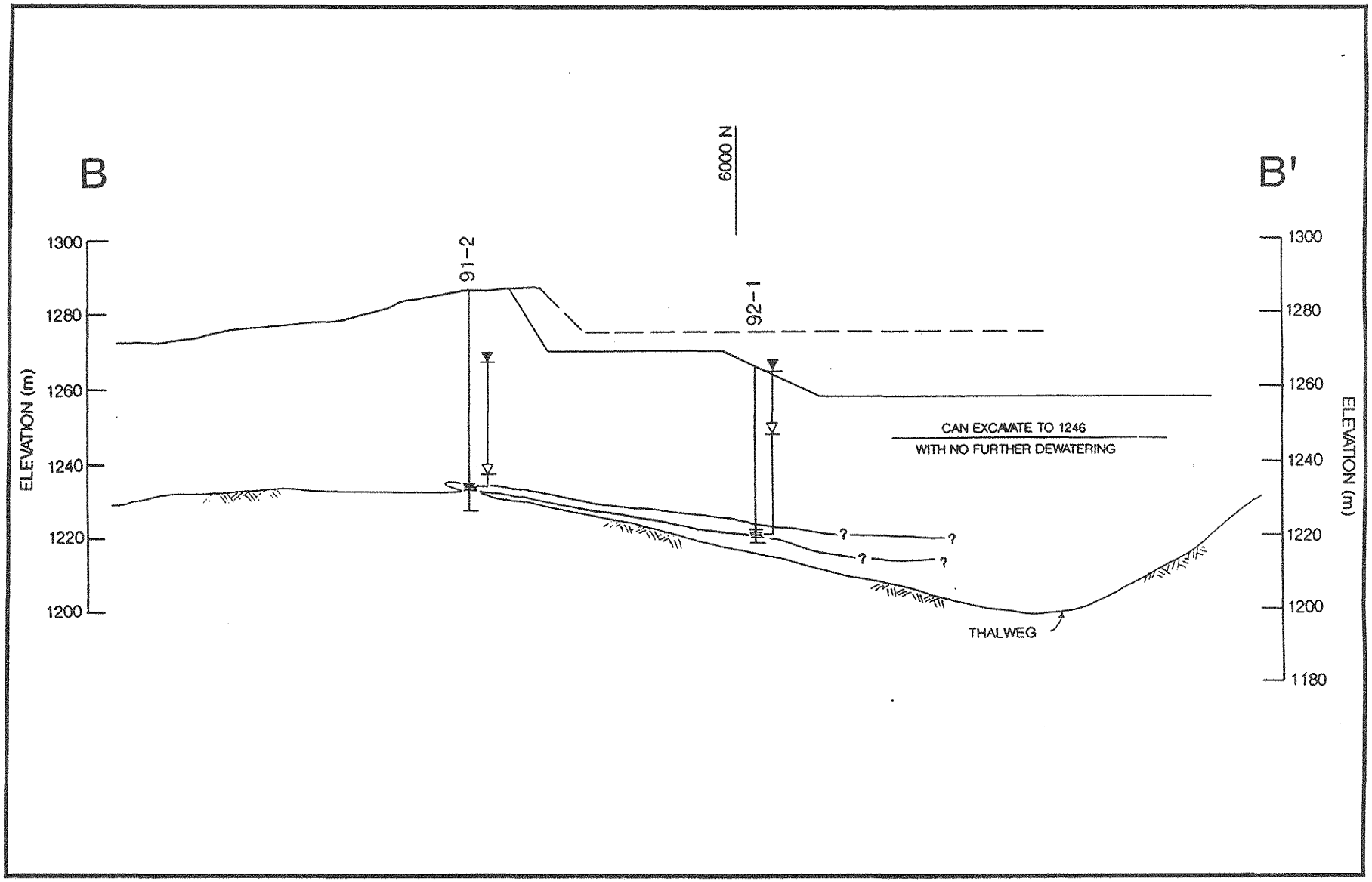
File No. 1327

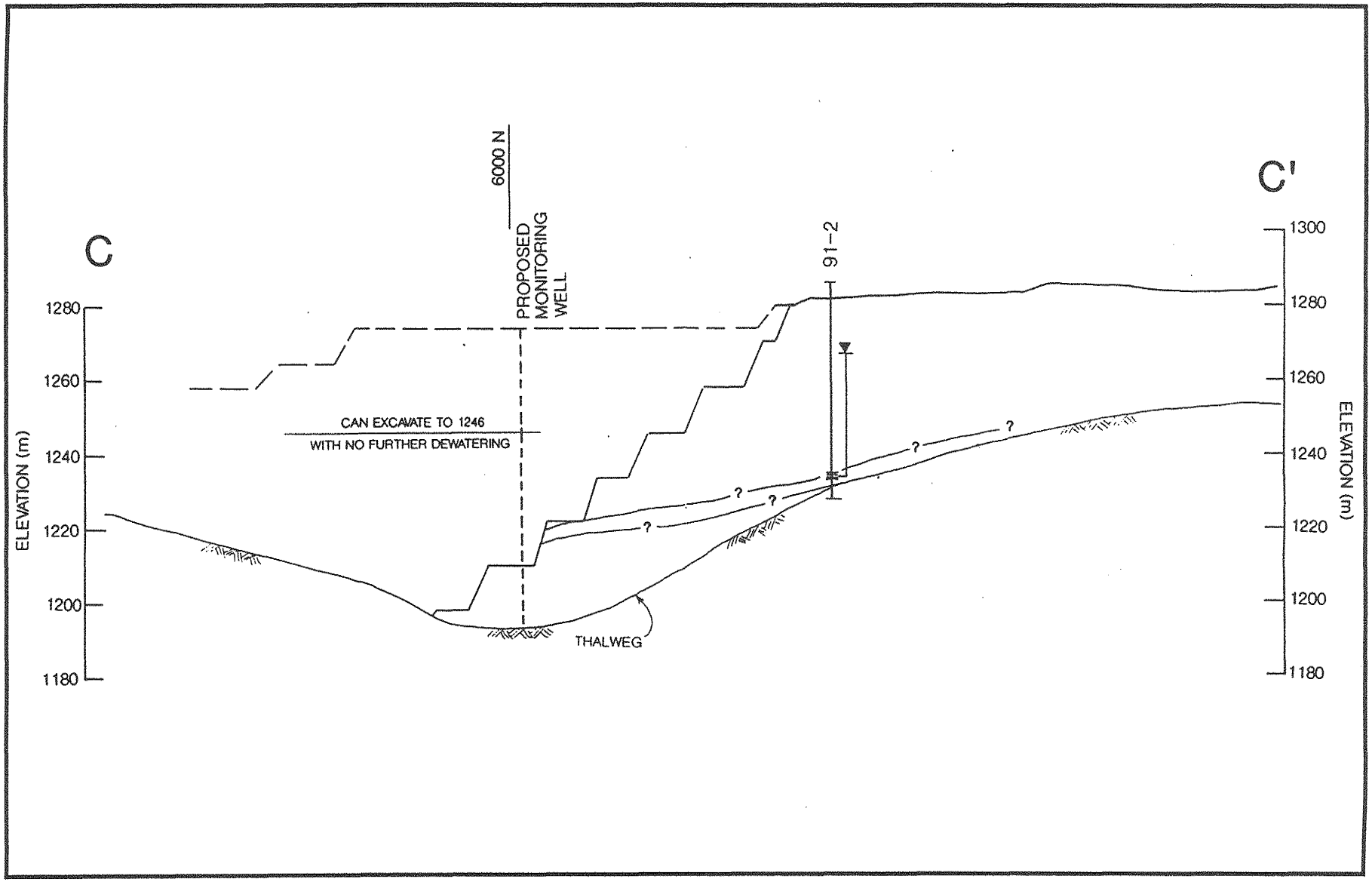
TABLE I
SUMMARY OF GRUM PIT WATER LEVELS, 1992 TO 1995

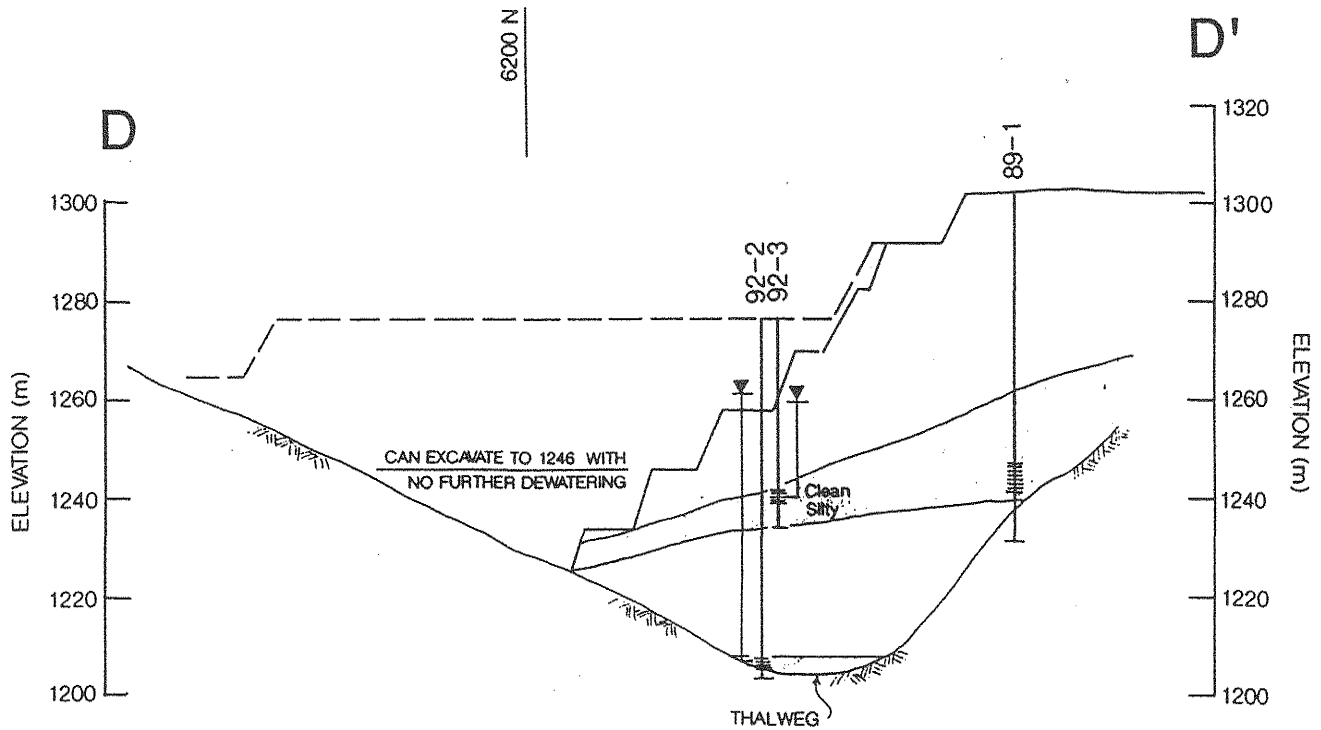
	89-1	89-2	89-3	89-4	89-5	91-2	91-3	91-4	92-1	92-2	92-3	92-4	95-1	95-2
DATUM (m)	1301.67	1301.14	1301.17	1300.74	1302.05	1285.93	1300.37	1305.22	1278.39	1289.71	1289.66	1271.31	1293.08	1253.38
10-Jul-92	1267.78	1290.26	1288.98	1291.90	#N/A	1257.64	1291.26	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
13-Jul-92	1266.56	1289.47	1288.34	1291.14	#N/A	1258.92	1290.49	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
16-Jul-92	1268.69	1290.69	1290.29	1291.90	#N/A	1259.41	1291.44	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
20-Jul-92	1265.19	1288.86	1287.76	1290.47	#N/A	1262.09	1289.82	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
25-Jul-92	1263.97	1288.00	1287.06	1289.58	#N/A	1247.37	1288.97	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
27-Jul-92	1262.78	1286.84	1285.93	1288.58	#N/A	1234.88	1286.93	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
31-Jul-92	1261.10	1285.53	1284.53	1287.21	#N/A	1232.59	1285.65	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
3-Aug-92	1259.89	1284.50	1283.46	1286.23	#N/A	1233.69	1284.67	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
12-Aug-92	1256.75	1281.78	1281.05	1283.58	#N/A	1260.42	1282.02	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
2-Nov-92	1245.04	1269.04	1268.92	#N/A	#N/A	#N/A	1270.86	1274.31	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
23-Nov-92	1267.38	1267.85	1268.00	#N/A	#N/A	1266.96	1268.79	1272.70	1266.38	1255.51	1267.53	1263.69	#N/A	#N/A
28-Nov-92	1244.06	1264.80	1263.85	#N/A	#N/A	1266.93	1266.25	1271.32	1265.22	1261.82	1245.43	1263.59	#N/A	#N/A
7-Dec-92	1244.06	1260.38	1257.15	#N/A	#N/A	1236.73	#N/A	1268.71	1258.06	1257.46	1205.84	1261.68	#N/A	#N/A
1-Apr-93	#N/A	1249.23	1250.60	#N/A	#N/A	1236.27	#N/A	1264.62	1247.27	#N/A	#N/A	1259.15	#N/A	#N/A
19-Nov-94	#N/A	#N/A	1266.54	1290.03	#N/A	1270.60	#N/A	1265.92	1267.19	1266.24	1238.56	#N/A	#N/A	#N/A
28-Nov-94	#N/A	#N/A	1264.54	1288.90	#N/A	1268.30	#N/A	1261.42	1264.79	1271.81	#N/A	#N/A	#N/A	#N/A
7-Dec-94	#N/A	#N/A	1264.04	1290.70	#N/A	1267.00	#N/A	1262.02	1264.19	1261.80	1259.70	#N/A	#N/A	#N/A
16-Dec-94	#N/A	#N/A	1262.14	1294.90	#N/A	#N/A	#N/A	1268.62	1264.09	1215.50	#N/A	#N/A	#N/A	#N/A
19-Dec-94	#N/A	#N/A	1261.64	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	1262.21	#N/A	#N/A
10-Feb-95	1245.40	#N/A	#N/A	#N/A	#N/A	#N/A	1251.00	#N/A	#N/A	1248.60	1240.00	#N/A	#N/A	#N/A
11-Mar-95	#N/A	#N/A	#N/A	#N/A	#N/A	1257.00	#N/A	#N/A	#N/A	#N/A	#N/A	1259.00	#N/A	#N/A
7-Apr-95	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	1280.88	#N/A
13-Apr-95	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	1276.08	#N/A
17-Apr-95	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	1284.88	#N/A
24-Apr-95	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	1249.28	#N/A
25-Apr-95	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	1261.08	#N/A
30-Apr-95	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	1244.88	#N/A
1-May-95	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	1245.38	#N/A
6-May-95	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	1242.81	#N/A
8-May-95	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	1242.84	#N/A
9-May-95	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	1242.15	#N/A
11-May-95	#N/A	#N/A	#N/A	#N/A	#N/A	1254.67	1253.07	#N/A	#N/A	#N/A	#N/A	1255.76	1241.79	1253.38
12-May-95	#N/A	#N/A	#N/A	#N/A	1293.25	#N/A	#N/A	1263.22	#N/A	1253.52	1221.49	#N/A	1241.67	#N/A
18-May-95	#N/A	#N/A	1252.30	1256.74	1294.09	1254.07	1252.37	1263.22	#N/A	1252.99	1240.11	1255.98	1241.31	1246.83
25-May-95	#N/A	1250.32	1250.76	1255.09	1294.78	1235.85	#N/A	1268.08	#N/A	1251.55	1244.59	1254.20	1240.80	1247.20
1-Jun-95	#N/A	1250.63	1250.26	1255.57	1295.18	1235.84	1253.15	1267.52	#N/A	1251.34	1249.28	1253.73	1239.96	1246.38

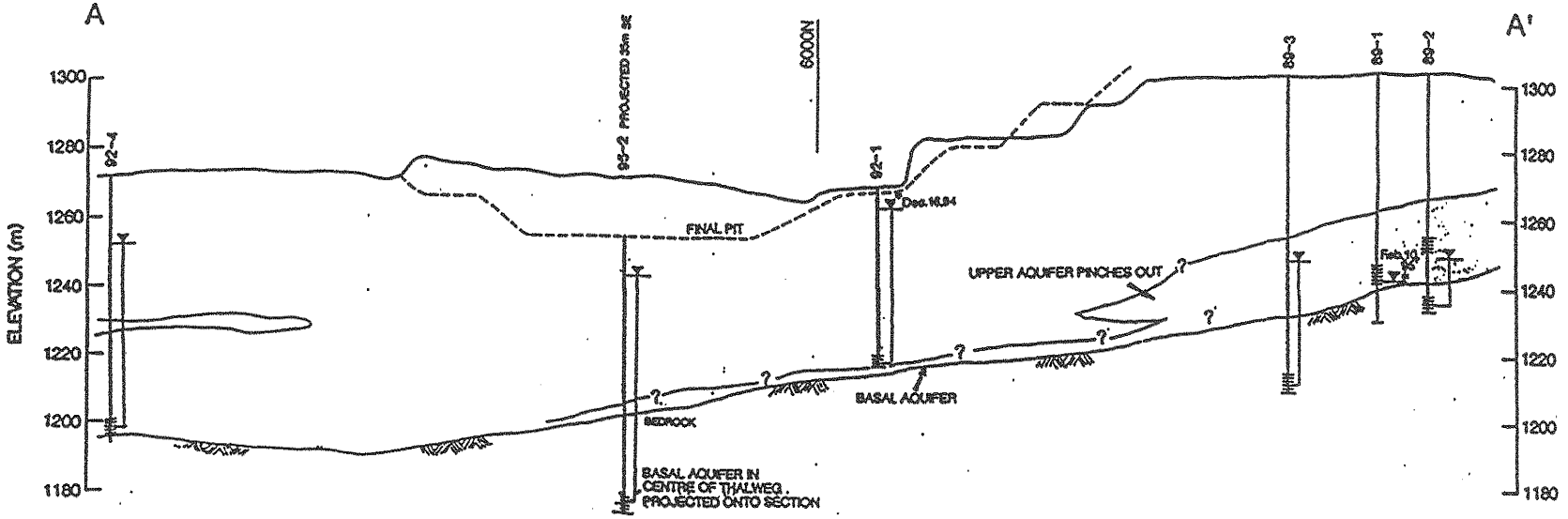
Hydrogeological Sections Through
Southeast Pit Walls - Figure 2
Piteau Resources Inc.
File # 1327
June 23, 1995

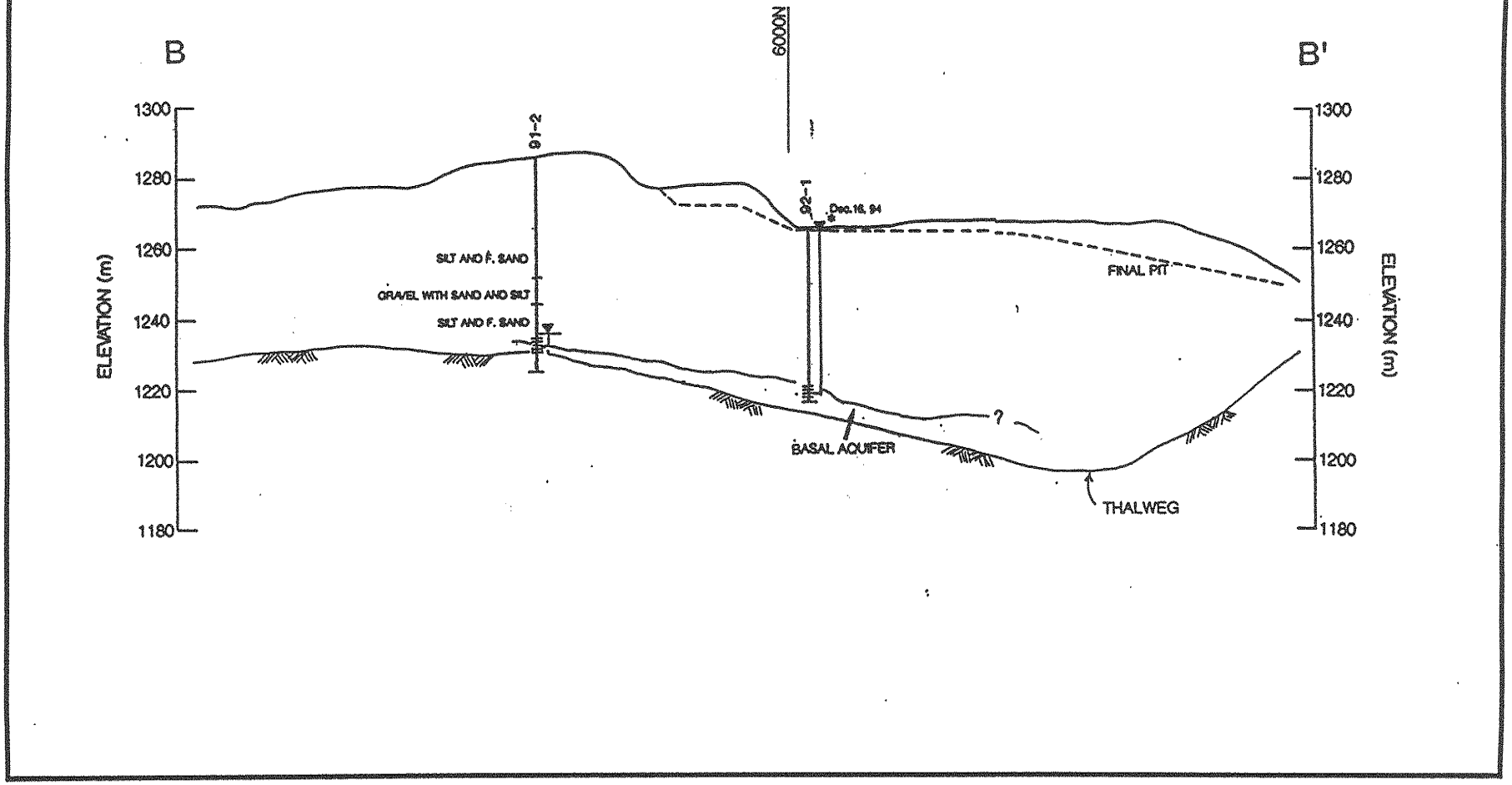

A
A'
3000 E
92-4
92-1
89-3
89-1
89-2
FROZEN
EST. LEVEL
ELEVATION (m)
1300
1280
1260
1240
1220
1200
1180

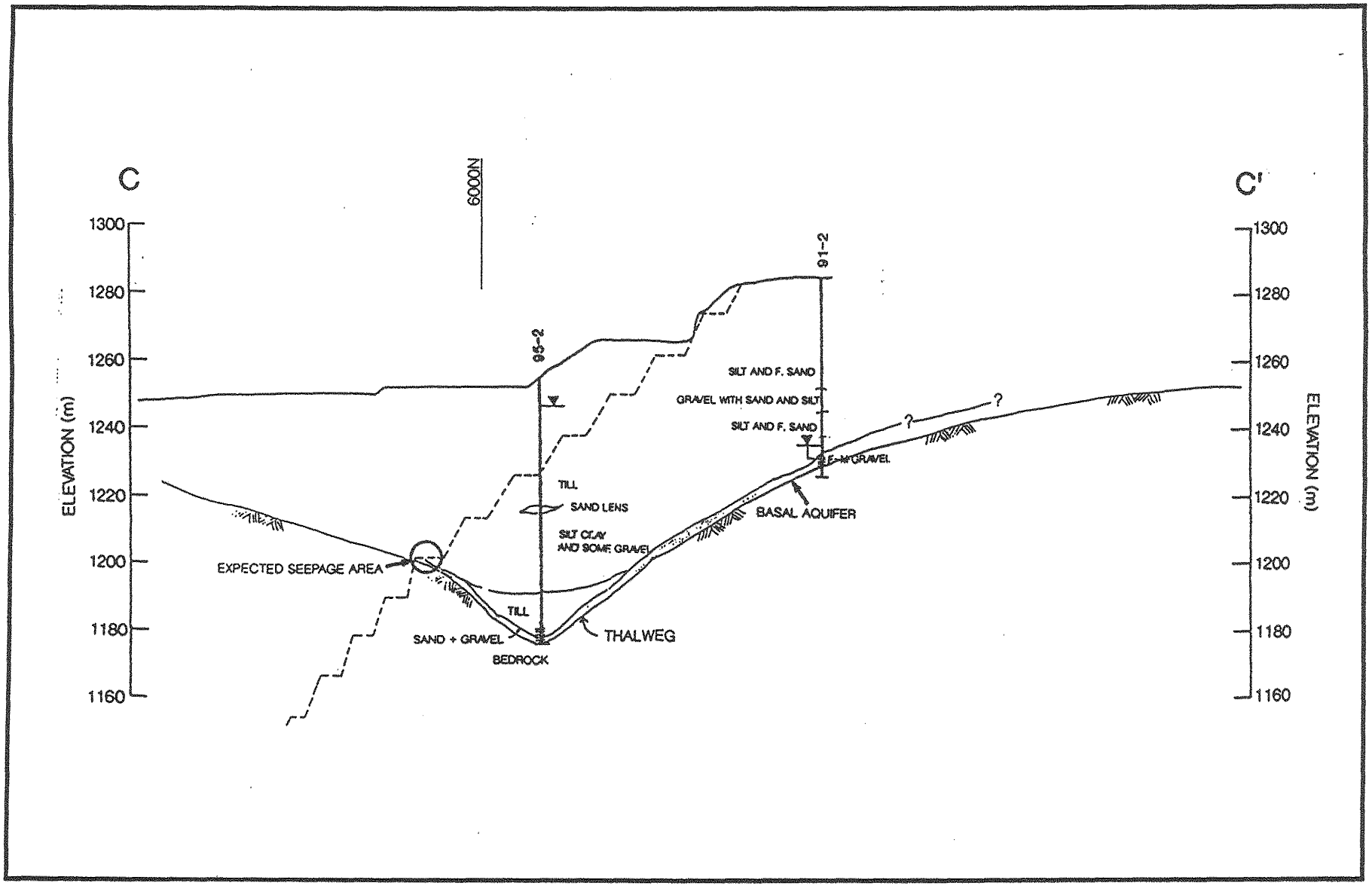

B
B'
6000 N
91-2
92-1
1300
1280
1260
1240
1220
1200
1180
ELEVATION (m)
CAN EXCAVATE TO 1246
WITH NO FURTHER DEWATERING
?
THALWEG

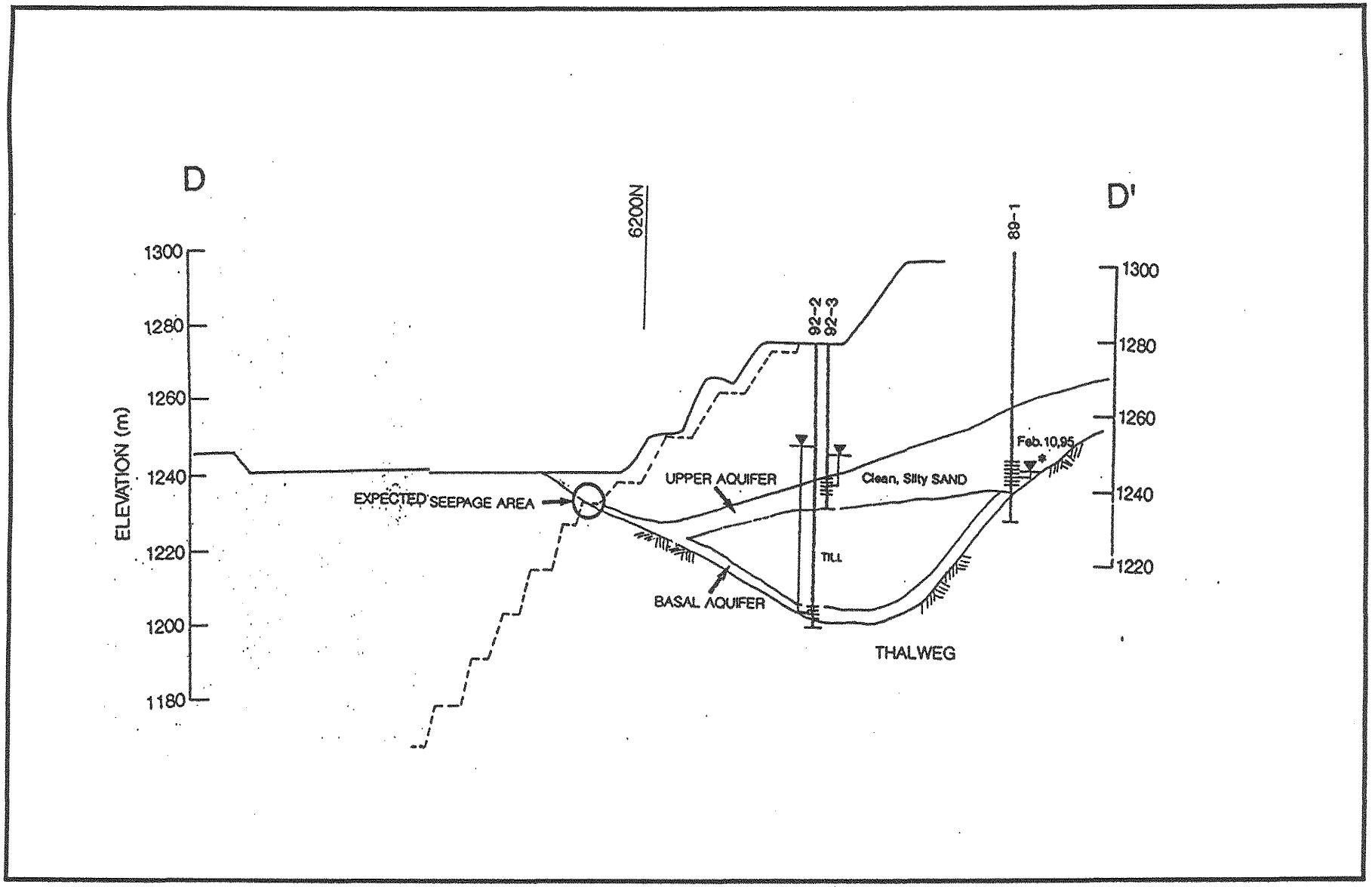

C
C'
6000 N
PROPOSED MONITORING WELL
91-2
CAN EXCAVATE TO 1246
WITH NO FURTHER DEWATERING
THALWEG
ELEVATION (m)
1280
1260
1240
1220
1200
1180
1300


D
D'
6200 N
89-1
92-2
92-3
1320
1300
1280
1260
1240
1220
1200
ELEVATION (m)
CAN EXCAVATE TO 1246 WITH
NO FURTHER DEWATERING
Clean
Silty
THALWEG


A
A'
ELEVATION (m)
1300
1280
1260
1240
1220
1200
1180
92-4
93-2 PROJECTED 35m SE
6000N
92-1
Dec.16,84
FINAL PIT
UPPER AQUIFER PINCHES OUT
BASAL AQUIFER
BEDROCK
BASAL AQUIFER IN CENTRE OF THALWEG, PROJECTED ONTO SECTION
89-3
89-1
89-2
Feb.10


B
B'
6000N
91-2
92-1
Dec.16, 94
SILT AND F. SAND
GRAVEL WITH SAND AND SILT
SILT AND F. SAND
FINAL PIT
BASAL AQUIFER
?
THALWEG
ELEVATION (m)
1300
1280
1260
1240
1220
1200
1180


C
C'
6000N
95-2
91-2
ELEVATION (m)
1300
1280
1260
1240
1220
1200
1180
1160
SILT AND F. SAND
GRAVEL WITH SAND AND SILT
SILT AND F. SAND
F-M GRAVEL
TILL
SAND LENS
SILT CLAY
AND SOME GRAVEL
BASAL AQUIFER
EXPECTED SEEPAGE AREA
TILL
SAND + GRAVEL
BEDROCK
THALWEG
?
?


D
D'
6200N
92-2
92-3
89-1
1300
1280
1260
1240
1220
1200
1180
ELEVATION (m)
EXPECTED SEEPAGE AREA
UPPER AQUIFER
Clean, Silty SAND
Feb.10,95
TILL
BASAL AQUIFER
THALWEG

Robertson GeoConsultants Inc.

December 1996

Anvil Range Mining Complex - 1996 Drilling and Piezometer Installation Program

Report No. 033002/1

Table 1.

Groundwater Monitoring Well Construction Details

Monitoring Well	Stickup (m)	T.O.P. Elevation (m a.s.l.)	Ground Elevation (m a.s.l.)	Screened Interval (m a.s.l.)	Filter Pack (mbgs)	Seal (mbgs)	Backfill/ Cave (mbgs)
MW 96-1	0.75	1050.1	1049.3	18.77-21.80	18.37-21.30	0.0-0.50	0.50-17.36
						17.36-18.37	21.80-22.25
MW 96-2	0.75	1050.1	1049.3	17.13-20.12	0.20-1.25	1.25-1.55	1.55-16.40
					17.00-20.12	16.40-17.00	
MW 96-3A	0.68	1032.1	1031.4	7.44-8.97	6.50-8.30	1.35-1.85	0.50-1.35
							1.85-6.50
MW 96-3B	0.63	1032.0	1031.4	17.70-19.17	16.80-18.60	16.40-16.80	8.30-16.40
							18.17-19.80
MW 96-4A	0.80	1033.1	1032.3	6.46-6.48	N/A	0.0-1.00	1.00-6.48
MW 96-4B	0.75	1033.0	1032.3	9.80-11.30	N/A	N/A	6.48-11.30
MW 96-4C	0.70	1033.0	1032.3	14.97-16.47	18.37-21.80	N/A	11.30-17.36
below 96-4					28.50-30.63	17.36-18.37	21.80-28.50
MW 96-4D	0.70	1032.9	1032.2	26.84-28.34	0.20-1.00	2.00-2.30	1.00-2.00
					26.00-28.34		2.18-26.00
MW 96-5A	0.69	1052.1	1051.4	2.43-8.53	2.29-9.14	0.0-2.29	N/A
MW 96-5B	0.74	1052.14	1051.4	11.64-14.69	10.67-14.69	9.14-10.67	N/A
MW 96-5C	0.81	1052.2	1051.4	27.86-29.37	27.50-29.37	25.20-25.96	14.69-25.20
							25.96-27.50
							29.37-29.87
MW 96-6	0.73	no survey	no survey	18.07-20.12	15.90-20.12	0.0-3.00	3.00-7.01
						7.01-15.90	
MW 96-7	0.66	no survey	no survey	6.26-9.24	4.20-9.24	0.0-1.20	1.20-3.20
						3.20-4.20	
MW 96-8A	0.70	no survey	no survey	1.15-4.17	1.20-4.30	0.0-1.20	N/A
MW 96-8B	0.78	no survey	no survey	5.50-8.52	5.80-9.20	4.30-5.80	9.20-9.45
MW 96-9A	0.70	no survey	no survey	4.96-9.45	4.04-10.36	0.0-0.80	0.80-3.25
						3.25-4.04	
MW 96-9B	0.60	no survey	no survey	16.53-17.99	15.98-17.99	10.36-15.98	

Table 3: Hydraulic Conductivity Testing Results

Monitoring Well	Test Number	Solution Method: van der Kamp* S Min	S Max	S BEJ	K (m/s) Min	K (m/s) Max	K (m/s) BEJ	B & R** K (m/s) BEJ	Hvorslev*** K (m/s) Min	Max	BEJ	Hazen**** K (m/s)	Overall K (m/s) Min	Max	BEJ
3A	FH1	0.001	0.1	.01	6E-04	2E-03	1E-03	1E-03					6E-04	2E-03	1E-03
	FH2	0.001	0.1	.01	6E-04	2E-03	1E-03	9E-04					6E-04	2E-03	1E-03
	mean												6E-04	2E-03	1E-03
3B	FH1	0.001	0.1	.01	8E-04	2E-03	2E-03						8E-04	2E-03	2E-03
	FH2	0.001	0.1	.01	8E-04	3E-03	2E-03	1E-03					8E-04	3E-03	2E-03
	RH2	0.001	0.1	.01	5E-04	2E-03	1E-03	2E-03					5E-04	2E-03	1E-03
	mean												7E-04	2E-03	2E-03
4C	FH1	0.001	0.1	.01	2E-04	7E-04	4E-04						2E-04	7E-04	4E-04
	RH3	0.001	0.1	.01	9E-04	2E-03	2E-03	4E-04					4E-04	2E-03	2E-03
	mean												3E-04	1E-03	9E-04
4D	RH1	0.001	0.1	.01	7E-04	2E-03	1E-03	4E-04				8E-03	4E-04	8E-03	1E-03
5B	FH1	0.001	0.1	.01	3E-04	9E-04	6E-04	6E-04					3E-04	9E-04	6E-04
	FH2	0.001	0.1	.01	3E-04	8E-04	5E-04	5E-04					3E-04	8E-04	5E-04
	RH1	0.001	0.1	.01	6E-04	2E-03	1E-03						6E-04	2E-03	1E-03
	mean												4E-04	1E-03	7E-04
5C	RH1								4E-06	4E-06	4E-06		4E-06	4E-06	4E-06
	FH1								3E-06	5E-06	4E-06		3E-06	5E-06	4E-06
	mean												3E-06	4E-06	4E-06
6												1E-02	1E-02	1E-02	2E-03
8B												2E-03	2E-03	2E-03	4E-04
9A	RH1								2E-05	2E-05	2E-05		2E-05	2E-05	2E-05
	RH3								8E-06	2E-05	2E-05		8E-06	2E-05	2E-05
	mean												1E-05	2E-05	2E-05
9B	RH1								2E-05	2E-05	2E-05		2E-05	2E-05	2E-05
	RH2								2E-05	2E-05	2E-05		2E-05	2E-05	2E-05
	mean												2E-05	2E-05	2E-05

N.B. FH = Falling Head Test RH = Rising Head Test BEJ = Best Engineering Judgement

* van der kamp method, van der Kamp, 1976

** Bouwer & Rice method, Bouwer and Rice, 1976

*** Hvorslev method, Hvorslev, 1951

**** Hazen grain-size method, ref. Freeze and Cherry, 1979

Client Name: Anvil Range Mining Corp.	Driller: Midnight Sun Drilling	BOREHOLE NO: BH96-1
Location: Faro, Yukon	Track-mounted Air-rotary (ODEX) - 175 mm	PROJECT NO: 033001
BH Loc: Crest of Int. Dam (South Side)	UTM ZONE: - N6913921.3 E580550.5	ELEVATION: 1049.3 (m)

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | CEMENT | DRILL CUTTINGS | SAND

DEPTH(m)	SOIL SYMBOL	SOILS/ROCK DESCRIPTION	Additional Comments	SAMPLE TYPE	SPT(N)	DEPTH(ft)
0.0		SAND (FILL) - very fine to fine grained, silty, trace angular to subangular gravel, damp, dense, greenish brown.	- well stickup = 0.75 m ags - well completed with 6" diameter steel protective casing			0.0
2.0						5.0
4.0					40	10.0
6.0		SAND (FILL) - gravelly, some silt, trace cobbles, damp, dense to very dense, greenish-brown.			50/10	20.0
8.0						25.0
10.0		GRAVEL (FILL) - subangular to subrounded, sandy, trace silt, dry to damp, green-brown.			56/15	30.0
		SAND AND GRAVEL (FILL) - subangular to subrounded, trace silt, damp, green-brown.				35.0
12.0		GRAVEL (FILL) - subangular to subrounded, sandy, trace silt, dry to damp, light brown.			50/14	40.0
14.0		SAND (FILL) - gravelly, trace silt, damp, light brown.				45.0
		GRAVEL AND SAND (FILL) - subangular to subrounded, trace silt, dry to damp, light brown.			90	50.0
16.0						55.0
18.0		- increasing moisture content below about 18.3 m.				60.0
20.0			- water level on September 8, 1996			65.0

SPT (#blows/30 cm) 20 40 60 80

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LOGGED BY: TH/CW	COMPLETION DEPTH: 22.3 m
REVIEWED BY: AR	COMPLETE: 30/08/96
Fig. No: 1	Page 1 of 2

96/12/10 02:23PM (BOREHOLE1)

Client Name: Anvil Range Mining Corp.	Driller: Midnight Sun Drilling	BOREHOLE NO: BH96-1
Location: Faro, Yukon	Track-mounted Air-rotary (ODEX) - 175 mm	PROJECT NO: 033001
BH Loc: Crest of Int. Dam (South Side)	UTM ZONE: - N6913921.3 E580550.5	ELEVATION: 1049.3 (m)

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | CEMENT | DRILL CUTTINGS | SAND

DEPTH(m)	SOIL SYMBOL	SOILS/ROCK DESCRIPTION	WELL INSTALLATION	Additional Comments	SAMPLE TYPE	SPT(N)	SPT (#blows/30 cm) 20 40 60 80	DEPTH(ft)
20.0		SAND (FILL) - trace gravel, moist to wet, light brown.						70.0
22.0		GRAVEL (FILL) - coarse grained, subrounded, some sand, trace silt, wet, light brown.						75.0
		GRAVEL (FILL) - fine grained, subrounded to subangular, sandy, trace silt, wet, light brown.						
24.0		BOREHOLE TERMINATED AT 22.3 m IN SANDY GRAVEL FILL. MONITORING WELL INSTALLED.						80.0
26.0								85.0
28.0								90.0
30.0								95.0 100.0
32.0								105.0
34.0								110.0
36.0								115.0 120.0
38.0								125.0
40.0								130.0

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LOGGED BY: TH/CW	COMPLETION DEPTH: 22.3 m
REVIEWED BY: AR	COMPLETE: 30/08/96
Fig. No: 1	Page 2 of 2

96/12/10 02:23PM (BOREWELL1)

Client Name: Anvil Range Mining Corp.	Driller: Midnight Sun Drilling	BOREHOLE NO: BH96-2
Location: Faro, Yukon	Track-mounted Air-rotary (ODEX) - 175 mm	PROJECT NO: 033001
BH Loc: Crest of Int. Dam (North Side)	UTM ZONE: - N6914103.8 E580685.6	ELEVATION: 1049.3 (m)

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | CEMENT | DRILL CUTTINGS | SAND

DEPTH(m)	SOIL SYMBOL	SOILS/ROCK DESCRIPTION	Additional Comments	SAMPLE TYPE	DEPTH(ft)
0.0		SAND (FILL) - fine grained, silty, trace gravel, dry to damp, green-brown.	- well stickup = 0.75 m ags - well completed with 6" diameter steel protective casing		0.0
2.0					5.0
4.0					10.0
6.0					15.0
8.0		SAND (FILL)- fine grained, some silt, trace gravel, dry to damp, green-brown.			20.0
10.0					25.0
12.0		GRAVEL (FILL) - some sand to sandy, trace silt, damp to moist, light green-brown.			30.0
14.0		SAND (FILL) - gravelly, some silt, dry to damp, green-brown.			35.0
16.0					40.0
18.0					45.0
▼			- water level on September 8, 1996		50.0
20.0		GRAVEL (FILL) - predominantly coarse			55.0
					60.0
					▼
					65.0

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LOGGED BY: TH/CW	COMPLETION DEPTH: 19.0 m
REVIEWED BY: AR	COMPLETE: 30/08/96
Fig. No: 2	Page 1 of 1

96/12/10 02:23PM (MONWELL2)

Client Name: Anvil Range Mining Corp.	Driller: Midnight Sun Drilling	BOREHOLE NO: BH96-3
Location: Faro, Yukon	Track-mounted Air-rotary (ODEX) - 175 mm	PROJECT NO: 033001
BH Loc: Toe of Int. Dam (South Side)	UTM ZONE: - N6913945.4 E580519.3	ELEVATION: 1031.4 (m)

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | CEMENT | DRILL CUTTINGS | SAND

DEPTH(m)	SOIL SYMBOL	SOILS/ROCK DESCRIPTION	Additional Comments
0.0		GRAVEL (FILL) - well graded, subrounded, sandy, some silt, damp to moist, light brown.	- well stickups: 3A (shallow) - 0.68 m ags; 3B (deep) - 0.63 m ags - wells completed with 6" diameter steel protective casing - water levels: 3A - 1.69 m bgs; 3B - 1.62 m bgs (September 8, 1996)
2.0		- becomes wet at about 2 m. - some sand, trace silt below about 2.3 m.	
4.0		- sandy below about 3.8 m (native?).	
6.0		SAND (NATIVE?) - well graded, some gravel, silt, wet, loose to compact (heaving into casing), brown.	- water EC = 800 uS/cm
8.0		GRAVEL - subrounded, sandy, trace silt, wet, loose to compact, medium brown.	- water EC = 920 uS/cm
10.0		SAND - well graded, gravelly (fine), trace silt, wet, loose to compact, medium brown.	
12.0			- water EC = 810 uS/cm
14.0		SAND - fine grained, silty, trace gravel, wet, loose to compact, light brown.	
16.0			
18.0		SAND - well graded to coarse grained, gravelly, trace silt, wet, loose to compact, medium orange brown.	- water EC = 1300 uS/cm
20.0		- some silt, some gravel below 18.9 m. SILT - sandy to silty sand, wet, grey.	

SAMPLE TYPE

EC (uS/cm): 400, 800, 1200, 1600

DEPTH(ft): 0.0, 5.0, 10.0, 15.0, 20.0, 25.0, 30.0, 35.0, 40.0, 45.0, 50.0, 55.0, 60.0, 65.0

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LOGGED BY: TH/CW	COMPLETION DEPTH: 19.8 m
REVIEWED BY: AR	COMPLETE: 31/08/96
Fig. No: 3	Page 1 of 1

96/12/10 02:23PM (BOREWELLS)

Client Name: Anvil Range Mining Corp.	Driller: Midnight Sun Drilling	BOREHOLE NO: BH96-4-1
Location: Faro, Yukon	Track-mounted Air-rotary (ODEX) - 175 mm	PROJECT NO: 033001
BH Loc: Toe of Int. Dam (North Side)	UTM ZONE: - N6914123.8 E580654.8	ELEVATION: 1032.3 (m)

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | CEMENT | DRILL CUTTINGS | SAND

DEPTH(m)	SOIL SYMBOL	SOILS/ROCK DESCRIPTION	Additional Comments	SAMPLE TYPE
0.0		SAND (FILL + NATIVE) - well graded, some gravel, some silt, moist, compact, light brown.	- well stickups: 4A (shallow) - 0.80 m ags 4B (upp. mid)- 0.75 m ags 4C (low. mid)- 0.70 m ags - well completed with 6" diameter steel protective casing - water levels: 4A - 2.31 m bgs 4B - 2.29 m bgs 4C - 2.28 m bgs (September 8, 1996)	
2.0		- becomes wet at about 1.8 m.		
4.0		- trace gravel below 3.7 m (native?).		
6.0			- pipe broken on MW96-4A at 5.7 m bgs; open hole below	
8.0		- some gravel, silt below 7.6 m.		
10.0		GRAVEL (NATIVE) - subrounded, some sand, trace silt, wet, permeable, compact, light brown.	- MW96-4B completed as 1" diameter well	
12.0				
14.0		SAND - silty, trace gravel, wet, medium brown.	- water EC = 1600 uS/cm pH = 6.9	
		GRAVEL - subrounded, sandy, wet, permeable, medium brown.		
16.0		SAND - silty, trace gravel, wet, medium brown.		
		SAND - gravelly, trace to some silt, wet, medium brown.	- water EC = 1970 uS/cm pH = 6.4	
18.0				
20.0			- water EC = 1630 uS/cm	

pH: 6.6 7.2 7.8 8.4

EC (uS/cm): 400 800 1200 1600

DEPTH(ft): 0.0 5.0 10.0 15.0 20.0 25.0 30.0 35.0 40.0 45.0 50.0 55.0 60.0 65.0

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LOGGED BY: TH/CW	COMPLETION DEPTH: 30.6 m
REVIEWED BY: AR	COMPLETE: 02/09/96
Fig. No: 4	Page 1 of 2

Client Name: Anvil Range Mining Corp.	Driller: Midnight Sun Drilling	BOREHOLE NO: BH96-4-1
Location: Faro, Yukon	Track-mounted Air-rotary (ODEX) - 175 mm	PROJECT NO: 033001
BH Loc: Toe of Int. Dam (North Side)	UTM ZONE: - N6914123.8 E580654.8	ELEVATION: 1032.3 (m)

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | CEMENT | DRILL CUTTINGS | SAND

DEPTH(m)	SOIL SYMBOL	SOILS/ROCK DESCRIPTION	WELL INSTALLATION	WELL INSTALLATION	WELL INSTALLATION	Additional Comments	SAMPLE TYPE	pH / EC (uS/cm)	DEPTH(ft)
20.0		SAND - silty, trace gravel, wet, loose to compact (fast drilling), light brown.				pH = 6.8		pH: 6.6 7.2 7.8 8.4; EC (uS/cm): 400 800 1200 1600	70.0
22.0		GRAVEL - sandy, some silt, wet, brown.							75.0
		SAND - silty, trace gravel, wet, loose to compact, light brown.							
24.0		GRAVEL - sandy, some silt, wet, permeable, light brown.				- water EC = 1660 uS/cm pH = 7.1			80.0
26.0		SAND - silty, some gravel to sandy silt, wet, relatively soft, orange-brown (Fe oxides).							85.0
28.0		GRAVEL - fine to coarse, occasional cobbles, boulders, subangular to subrounded, sandy, trace silt, wet, dense?, light orange-brown (Fe oxides). - boulder from 29.6 to 29.9.				- water EC = 1900 uS/cm pH = 7.2			90.0
30.0		BOREHOLE TERMINATED AT 30.6 m IN GRAVEL. 3 MONITORING WELLS INSTALLED.				- deep well broken during installation; left down-hole - grain size analysis: 62 % gravel 33 % sand 5 % silt			95.0
32.0									100.0
34.0									105.0
36.0									110.0
38.0									115.0
40.0									120.0
									125.0
									130.0

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LOGGED BY: TH/CW | COMPLETION DEPTH: 30.6 m
REVIEWED BY: AR | COMPLETE: 02/09/96
Fig. No: 4 | Page 2 of 2

96/12/10 02:24PM (WORWELL4)

Client Name: Anvil Range Mining Corp.	Driller: Midnight Sun Drilling	BOREHOLE NO: BH96-4-II
Location: Faro, Yukon	Track-mounted Air-rotary (ODEX) - 175 mm	PROJECT NO: 033001
BH Loc: 2 m southwest of 96-4-I	UTM ZONE: - N6914123.5 E580653.2	ELEVATION: 1032.2 (m)

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | CEMENT | DRILL CUTTINGS | SAND

DEPTH(m)	SOIL SYMBOL	SOILS/ROCK DESCRIPTION	Additional Comments	SAMPLE TYPE	EC (uS/cm) 400 800 1200 1600	DEPTH(ft)
0.0		GRAVEL (FILL + NATIVE) - subangular to subrounded, sandy, trace silt, moist, light brown.	- well stickup: 0.70 m ags - well completed with 6" diameter steel protective casing - water level on September 8, 1996.			0.0
2.0		- becomes wet at 1.8 m.				5.0
4.0						10.0
		SAND - well graded, trace gravel, silt, wet, dark brown.				15.0
6.0						20.0
8.0		GRAVEL - well graded, sandy, trace silt, wet, grey-brown.				25.0
10.0						30.0
		SAND - fine to medium grained, silty, trace gravel, wet, brown.				35.0
12.0						40.0
14.0		GRAVEL - well graded, sandy, trace silt, wet, grey-brown.				45.0
						50.0
16.0			- water EC = 1640 uS/cm			55.0
18.0		- coarser grained below 18.3 m.				60.0
20.0						65.0

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LOGGED BY: TH/CW | COMPLETION DEPTH: 28.0 m
REVIEWED BY: AR | COMPLETE: 03/09/96
Fig. No: 4B | Page 1 of 2

96/12/16 02:24PM (BOREHOLES)

Client Name: Anvil Range Mining Corp.	Driller: Midnight Sun Drilling	BOREHOLE NO: BH96-4-II
Location: Faro, Yukon	Track-mounted Air-rotary (ODEX) - 175 mm	PROJECT NO: 033001
BH Loc: 2 m southwest of 96-4-I	UTM ZONE: - N6914123.5 E580653.2	ELEVATION: 1032.2 (m)

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | CEMENT | DRILL CUTTINGS | SAND

DEPTH(m)	SOIL SYMBOL	SOILS/ROCK DESCRIPTION	WELL INSTALLATION	Additional Comments	SAMPLE TYPE	EC (uS/cm) 400 800 1200 1600	DEPTH(ft)
20.0							70.0
22.0		- some sand, orange-brown below 21.3 m.		- water EC = 1490 uS/cm			75.0
24.0				- water EC = 1640 uS/cm			80.0
26.0		- permeable, water-bearing zone from 26.2 to 27.7 m.		- water EC = 1880 uS/cm			85.0
28.0		- becomes dark brown at 27.7 m.		- water EC = 1920 uS/cm			90.0
		BOREHOLE TERMINATED AT 28.0 m IN GRAVEL. 1 BOREHOLE INSTALLED.					95.0
30.0							100.0
32.0							105.0
34.0							110.0
36.0							115.0
38.0							120.0
40.0							125.0
							130.0

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LOGGED BY: TH/CW	COMPLETION DEPTH: 28.0 m
REVIEWED BY: AR	COMPLETE: 03/09/96
Fig. No: 4B	Page 2 of 2

96/12/10 02:24PM (MONWELLS)

Client Name: Anvil Range Mining Corp.	Driller: Midnight Sun Drilling	BOREHOLE NO: BH96-5
Location: Faro, Yukon	Track-mounted Air-rotary (ODEX) - 175 mm	PROJECT NO: 033001
BH Loc: North of 2nd Impoundment	UTM ZONE: - N6913416.7 E581989.3	ELEVATION: 1051.4 (m)

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | CEMENT | DRILL CUTTINGS | SAND

DEPTH(m)	SOIL SYMBOL	SOILS/ROCK DESCRIPTION	Additional Comments
0.0		TAILINGS - silty fine sand to fine sand, some silt, approx. 30 - 40% sulphides, dominantly pyrite, trace clay, upper 0.3 - 0.6 m oxidized, orange-brown, moist, compact. - dark grey below about 0.6 m.	- well stickups: 5A - 0.69 m ags; 5B - 0.74 m ags; 5C - 0.81 m ags - wells completed with 6" diameter steel protective casing - MW96-5A completed as a 1" diameter well - water levels: 5A (shallow) - 3.79 m bgs; 5B (mid) - 3.77 m bgs; 5C (deep) - 3.80 m bgs
8.0		SAND AND GRAVEL (FILL) - subrounded gravel, well graded sand, mixed with 20 - 30% tailings, moist, compact, dark grey.	
10.0		SAND (NATIVE?) - well graded, trace to some silt, trace gravel, with estimated 5 % pyrite, wet, medium grey-brown.	
12.0		GRAVEL (NATIVE) - subrounded to subangular, some sand, trace silt, wet, medium grey-brown.	- water EC = 1540 uS/cm pH = 6.9
14.0		SAND - well graded, some gravel, trace to some silt, wet, grey-brown.	
		GRAVEL - subangular to subrounded, some sand, trace silt, wet, brown.	
16.0		SAND - well graded, trace to some gravel, trace to some silt, wet, brown.	
		GRAVEL - subangular to subrounded, some sand, trace silt, wet, brown.	- water EC = 1470 uS/cm pH = 7.1
18.0		SAND - fine to medium grained, some silt to silty, trace gravel, wet, brown.	- water EC = 1560 uS/cm
20.0		SILT - sandy, trace to some clay, trace gravel, estimated 2% pyrite, wet	

SAMPLE TYPE

pH: 6.6 7.2 7.8 8.4

EC (uS/cm): 400 800 1200 1600

DEPTH(ft): 0.0 5.0 10.0 15.0 20.0 25.0 30.0 35.0 40.0 45.0 50.0 55.0 60.0 65.0

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LOGGED BY: TH/CW | COMPLETION DEPTH: 29.9 m
REVIEWED BY: AR | COMPLETE: 04/09/96
Fig. No: 5

96/12/10 02:24PM (MONWELL4)

Client Name: Anvil Range Mining Corp.	Driller: Midnight Sun Drilling	BOREHOLE NO: BH96-5
Location: Faro, Yukon	Track-mounted Air-rotary (ODEX) - 175 mm	PROJECT NO: 033001
BH Loc: North of 2nd Impoundment	UTM ZONE: - N6913416.7 E581989.3	ELEVATION: 1051.4 (m)

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | CEMENT | DRILL CUTTINGS | SAND

DEPTH(m)	SOIL SYMBOL	SOILS/ROCK DESCRIPTION	WELL INSTALLATION	Additional Comments	SAMPLE TYPE	pH (6.6 7.2 7.8 8.4) / EC (uS/cm) (400 800 1200 1600)	DEPTH(ft)
20.0		(spongy), grey-brown.					70.0
22.0		- brown-grey below 21.5 m.		- water pH = 8.3			75.0
24.0		SAND AND GRAVEL - well graded, subangular gravel, some silt to silty, trace clay, trace py, wet, grey.		- water EC = 890 uS/cm pH = 8.6			80.0
26.0							85.0
28.0		- hard drilling (cobbles?) between 27.4 and 28.0 m.					90.0
30.0		BOREHOLE TERMINATED AT 29.9 m IN SAND AND GRAVEL. 3 MONITORING WELLS INSTALLED.					95.0
32.0							100.0
34.0							105.0
36.0							110.0
38.0							115.0
40.0							120.0
							125.0
							130.0

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LOGGED BY: TH/CW
REVIEWED BY: AR
Fig. No: 5

COMPLETION DEPTH: 29.9 m
COMPLETE: 04/09/96

06/12/10 02:24PM (MONWELL4)

Client Name: Anvil Range Mining Corp.	Driller: Midnight Sun Drilling	BOREHOLE NO: BH96-6
Location: Faro, Yukon	Track-mounted Air-rotary (ODEX) - 175 mm	PROJECT NO: 033001
BH Loc: Faro Rock Dump, N. of Rose Ck.	UTM ZONE: - N - E -	ELEVATION:

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | CEMENT | DRILL CUTTINGS | SAND

DEPTH(m)	SOIL SYMBOL	SOILS/ROCK DESCRIPTION	Additional Comments	SAMPLE TYPE	pH (6.6 7.2 7.8 8.4) / EC (uS/cm) (400 800 1200 1600)	DEPTH(ft)
0.0		SAND - fine to medium grained, trace silt, dry to damp, brown.	- well stickup: 0.73 m ags - well completed with 6" diameter steel protective casing			0.0
2.0		SILT (TILL?) - sandy, some gravel, moist, green-brown.				5.0
4.0						10.0
6.0		GRAVEL - subangular to subrounded, silty, some sand, damp to moist, green-brown.				15.0
8.0		SAND - fine to medium grained, silty, trace gravel, moist, green-brown.				20.0
10.0		- becomes brown at 10.4 m.				25.0
12.0			- water level 12.21 m bgs on September 8, 1996			30.0
14.0		- increasing coarse gravel below 13.7 m.				35.0
16.0		SAND - some gravel, silt, damp, dense, orange-brown; mica flakes.	- water EC = 550 uS/cm pH = 7.8			40.0
18.0		GRAVEL AND SAND - subangular to subrounded gravel, trace silt, wet, dark brown.	- grain size analysis: 48 % gravel 48 % sand 4 % silt			45.0
20.0		GRAVEL - coarse, subangular to subrounded, some cobbles, boulders, trace sand,	- water EC = 620 uS/cm			50.0
						55.0
						60.0
						65.0

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LOGGED BY: TH/CW	COMPLETION DEPTH: 20.1 m
REVIEWED BY: AR	COMPLETE: 05/09/96
Fig. No: 6	Page 1 of 2

96/12/10 02:25PM (BORWELL4)

Client Name: Anvil Range Mining Corp.	Driller: Midnight Sun Drilling	BOREHOLE NO: BH96-6
Location: Faro, Yukon	Track-mounted Air-rotary (ODEX) - 175 mm	PROJECT NO: 033001
BH Loc: Faro Rock Dump, N. of Rose Ck.	UTM ZONE: - N - E -	ELEVATION:

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | CEMENT | DRILL CUTTINGS | SAND

DEPTH(m)	SOIL SYMBOL	SOILS/ROCK DESCRIPTION	WELL INSTALLATION	Additional Comments	SAMPLE TYPE	◆pH◆ 6.6 7.2 7.8 8.4 / ● EC (uS/cm) ● 400 800 1200 1600	DEPTH(ft)
20.0		silt, wet, permeable, brown.		pH = 7.8			70.0
		BOREHOLE TERMINATED AT 20.1 m IN GRAVEL.					
		MONITORING WELL INSTALLED.					
22.0							75.0
24.0							80.0
26.0							85.0
28.0							90.0
							95.0
30.0							100.0
32.0							105.0
							110.0
34.0							115.0
36.0							120.0
38.0							125.0
40.0							130.0

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LOGGED BY: TH/CW | COMPLETION DEPTH: 20.1 m
REVIEWED BY: AR | COMPLETE: 05/09/96
Fig. No: 6 | Page 2 of 2

96/12/10 02:25PM (ROWELL4)

Client Name: Anvil Range Mining Corp.	Driller: Midnight Sun Drilling	BOREHOLE NO: BH96-7
Location: Faro, Yukon	Track-mounted Air-rotary (ODEX) - 175 mm	PROJECT NO: 033001
BH Loc: Faro Rock Dump,	UTM ZONE: - N - E -	ELEVATION:

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | CEMENT | DRILL CUTTINGS | SAND

DEPTH(m)	SOIL SYMBOL	SOILS/ROCK DESCRIPTION	Additional Comments	SAMPLE TYPE	DEPTH(ft)
0.0		SAND - fine grained, silty, some gravel, moist, medium brown.	- well stickup: 0.66 m ags - well completed with 6" diameter steel protective casing		0.0
2.0					5.0
					10.0
4.0		SAND - very fine to fine grained, some silt to silty, slight trace gravel, micaceous, dry to damp, light brown. - increasing gravel content below 5.5 m.			
			- water level 5.17 m bgs on September 8, 1996		15.0
6.0					20.0
					25.0
8.0		- becomes moist to wet at about 7.6 m. PHYLLITE BEDROCK - aphanitic, well foliated, fractured, light green, some water.			
					30.0
10.0		BOREHOLE TERMINATED AT 9.2 m IN PHYLLITE BEDROCK. MONITORING WELL INSTALLED.			35.0
12.0					40.0
14.0					45.0
					50.0
16.0					55.0
18.0					60.0
20.0					65.0

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96/12/10 02:25PM (MONWELL2)

Client Name: Anvil Range Mining Corp.	Driller: Midnight Sun Drilling	BOREHOLE NO: BH96-8
Location: Faro, Yukon	Track-mounted Air-rotary (ODEX) - 175 mm	PROJECT NO: 033001
BH Loc: Faro Rock Dump - Lower Faro Ck.	UTM ZONE: - N - E -	ELEVATION:

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | CEMENT | DRILL CUTTINGS | SAND

DEPTH(m)	SOIL SYMBOL	SOILS/ROCK DESCRIPTION	Additional Comments	SAMPLE TYPE	pH / EC (uS/cm)	DEPTH(ft)
0.0		GRAVEL (COBBLES, BOULDERS) - subrounded, some sand, trace silt, dry to damp, light brown.	- well stickups: 8A (shallow) - 0.70 m ags 8B (deep) - 0.78 m ags - well completed with 6" diameter steel protective casing		pH: 6.6 7.2 7.8 8.4 EC (uS/cm): 400 800 1200 1600	0.0
2.0						5.0
		SAND - fine grained, silty, trace to some gravel, damp to moist, light grey-brown.	- water levels: 8A - 2.84 m bgs 8B - 2.78 m bgs (September 8, 1996)			10.0
4.0		- becomes moist to wet at 3.7 m.				15.0
		- becomes brown, some gravel at 4.6 m.				
		- becomes light grey-brown at 5.5 m.				
6.0		SAND - medium to coarse grained, some gravel, trace to some silt, moist to wet, water-bearing, grey orange-brown.	- water EC = 1680 uS/cm pH = 6.5			20.0
8.0		GRAVEL AND SAND - subangular to subrounded, coarse grained sand, trace silt, wet, brown.	- grain size analysis: 60 % gravel 35 % sand 5 % silt			25.0
		PHYLLITE BEDROCK - aphanitic, well foliated, moderately weathered, wet.				30.0
10.0		- open, weathered seam at 8.6 to 8.8 m.				35.0
		BOREHOLE TERMINATED AT 9.5 m IN PHYLLITE BEDROCK.				
		TWO MONITORING WELLS INSTALLED.				40.0
12.0						45.0
14.0						50.0
16.0						55.0
18.0						60.0
20.0						65.0

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LOGGED BY: TH/CW | COMPLETION DEPTH: 9.4 m
REVIEWED BY: AR | COMPLETE: 06/09/96
Fig. No: 8 | Page 1 of 1

06/12/10 02:25PM (BOREWELL4)

Client Name: Anvil Range Mining Corp.	Driller: Midnight Sun Drilling	BOREHOLE NO: BH96-9
Location: Faro, Yukon	Track-mounted Air-rotary (ODEX) - 175 mm	PROJECT NO: 033001
BH Loc: South of Grumm Rock Dump	UTM ZONE: - N - E -	ELEVATION:

SAMPLE TYPE: DISTURBED | NO RECOVERY | SPT | A-CASING | SHELBY TUBE | CORE

BACKFILL TYPE: BENTONITE | PEA GRAVEL | SLOUGH | CEMENT | DRILL CUTTINGS | SAND

DEPTH(m)	SOIL SYMBOL	SOILS/ROCK DESCRIPTION	Additional Comments	SAMPLE TYPE	DEPTH(ft)
0.0		SILT (FILL) - some sand, gravel, high organic content, moist to wet, swampy smell, soft, dark brown.	- well stickups: 9A (shallow) - 0.70 m ags 9B (deep) - 0.60 m ags - well completed with 6" diameter steel protective casing		0.0
2.0					5.0
					10.
4.0		GRAVEL (COBBLES, BOULDERS - FILL) - silty, some sand, high organic content, moist, dark brown.	- water levels: (September 8, 1996) 9A - 4.82 m bgs 9B - flowing		15.
6.0		GRAVEL - subangular, some sand to sandy, some silt, damp to moist, dark brown. - water encountered at about 6 m.			20.
8.0		SAND - well graded, trace gravel, silt, wet, brown.			25.
10.0		SILT - sandy, trace clay, slight trace gravel, wet (PROBABLY FROZEN - PERMAFROST), light green-brown.	- PROBABLE PERMAFROST		30.
		SILT (TILL?) - sandy, gravelly, gravel subrounded, fine, moist, dense, dark grey.			35.
12.0		SAND (TILL?) - silty, some fine subrounded gravel, damp, dense, dark grey.	- grain size analysis: 3 % gravel 48 % sand 49 % silt		40.
14.0		SILT AND SAND - very fine to fine grained sand, trace fine gravel, damp, dark grey.			45.
					50.
16.0		SAND - well graded, some gravel, trace silt, wet, permeable, dark grey.			55.
18.0		PHYLLITE BEDROCK - aphanitic, well foliated, grey, relatively little water.			60.
		BOREHOLE TERMINATED AT 18.0 m IN PHYLLITE BEDROCK. TWO MONITORING WELLS INSTALLED.			
20.0					65.

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95/12/18 02:25PM (BOREWELL2)