Pebble Project

NORTHERN DYNASTY MINES INC.

DRAFT ENVIRONMENTAL BASELINE STUDIES
2004 PROGRESS REPORTS

CHAPTER 5. GROUND WATER HYDROGEOLOGY

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ACRONYMS

AASHTO	American Association of State and Highway Transportation Officials
ABA	acid-base accounting
ac-ft	acre-feet
ADEC	Alaska Department of Environmental Conservation
ADF&G	Alaska Department of Fish and Game
ADNR	Alaska Department of Natural Resources
agl	above ground level
AHRS	Alaska Heritage Resource Survey
ALS	ALS Environmental Laboratory
ANCSA	Alaska Native Claims Settlement Act
AP	acid potential
APE	area of potential effect
ASCI	Alaska Stream Condition Index
ASTM	American Society for Testing and Materials
ASTt	Arctic Small Tool tradition
BBNA	Bristol Bay Native Association
BEESC	Bristol Environmental & Engineering Services Corporation
bgs	below ground surface
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
BP	before present
BTEX	benzene, toluene, ethylbenzene, and xylenes
ºC	degrees Celsius
^{14}C	Carbon 14
CEMI	Canadian Environmental and Metallurgical Laboratory
cfs	cubic feet per second
CIRCAC	Cook Inlet Regional Citizens Advisory Council
cm	centimeter(s)
CPUE	catch per unit effort
CQ	continuous flow
CRM	cultural resources management
CUEQ%	copper equivalent grade
DEM	digital elevation model
DI	deionized
DOT&PF	Alaska Department of Transportation and Public Facilities

DRO	diesel-range organics
EBD	environmental baseline document
EIS	environmental impact statement
EPT	Ephemeroptera, Plecoptera, or Trichoptera
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
FL	fork length
fps	feet per second
FR	Federal Register
ft	foot (feet)
ft^2	square foot (feet)
g	gram(s)
GIS	geographic information system
GLM	general linear model
GMU	Game Management Unit
gpm	gallons per minute
GPS	global positioning system
GRO	gasoline-range organics
GS	gauging station
HC-3	high-gradient, contained channel
HDR	HDR Alaska, Inc.
HGM	hydrogeomorphic
HWM	high-water mark
ICP	inductively coupled plasma
IIE	Iniskin/Iliamna Estuary
IQ	instantaneous flow
KC	Kaskanak Creek
kg	kilogram(s)
km^2	square kilometers
KP	Knight Piesold
KR	Koktuli River Main Stem
L	liter(s)
LC-1	low-gradient, contained channel
LIDAR	light detection and ranging
m	meter(s)
m^2	square meter(s)
M.A.	Master of Arts

MC-1	moderate-gradient, narrow, shallow, contained channel
MCHTWG	Mulchatna Caribou Herd Technical Working Group
MDC	mine development concept
MDL	method detection limit
me-Hg	methyl-mercury
MEND	mine environment neutral drainage
mg	milligram(s)
mi^2	square mile(s)
ml	milliliter(s)
ML/ARD	metal leaching/acid rock drainage
MLLW	mean lower low water
mm	millimeter(s)
MM-1	moderate-gradient, mixed-control channel
MMS	Minerals Management Service
MODIS	moderate resolution imaging spectroradiometer
mph	miles per hour
MRL	method reporting limit
m/s	meters per second
µg	microgram(s)
µL	microliter(s)
µmhos	micromhos
NASA	National Aeronautics and Space Administration
ND	non-detect
NDM	Northern Dynasty Mines Inc.
NEPA	National Environmental Policy Act
ng	nanogram(s)
NK	North Fork Koktuli River
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NP	neutralization potential
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
Nv	calculated variance
NWR	National Wildlife Refuge
OCSEAP	Outer Continental Shelf Environmental Assessment Program
OHMP	Office of Habitat Management and Permitting
OHW	ordinary high water

PA-1	narrow, placid-flow habitat
PA-3	shallow-ground, water-fed slough
PA-5	palustrine beaver habitat
PAG	potentially acid-generating
PJD	preliminary jurisdictional determination
PSD	Prevention of Significant Deterioration
PVC	polyvinyl chloride
Q	discharge
QA	quality assurance
QAPP	quality assurance project plan
QC	quality control
RBP	Rapid Bioassessment Protocols
RRO	residual-range organics
SHPO	State Historic Preservation Officer
SK	South Fork Koktuli River
SLR	SLR Alaska
SRB&A	Stephen R. Braund & Associates
SRK	SRK Consulting (Canada) Inc.
SVOC	semivolatile organic compound
SWE	snow/water equivalent
3PP	Three Parameters Plus
TDS	total dissolved solids
TOC	total organic carbon
TSS	total suspended solids
UAF	University of Alaska Fairbanks
USACE	U.S. Army Corps of Engineers – Regulatory Branch
USC	United States Code
USDA	United States Department of Agriculture
USDI	United States Department of Interior
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
UT	Upper Talarik Creek
VHF	very high frequency
VOC	volatile organic compound
WMC	Water Management Consultants Inc.
WRIR	water-resources investigations report
WY	water year

5. GROUNDWATER HYDROGEOLOGY

5.1 Introduction

This chapter presents the findings of the hydrogeology study carried out in 2004 for the Pebble Project. The study included installation of background monitoring wells, collection of groundwater samples, and collection of additional information leading to characterization of the groundwater regime in the study area. The work was carried out by a number of firms and individuals. The firms included the following:

- CH2M Hill, Inc., led the hydrogeology characterization program until mid-October 2004. A number of individuals were involved in this program.
- Water Management Consultants Inc (WMC) provided hydrogeological advice to CH2M Hill until mid-October 2004, completed the field program at the end of the season, and analyzed the well-test data.
- Bristol Environmental & Engineering Services Corporation (BEESC) collected the groundwater samples in October 2004.
- SLR Alaska (SLR) assembled and prepared field data in January 2005 for this report.

Knight Piesold (KP), within their mandate to collect geotechnical information for design, installed and tested many additional piezometers in the study area. Knight Piesold's work is separate from the hydrogeology study described in this document, but is an important element of the site hydrogeology characterization.

This progress report presents the drill-hole logs for the wells installed as part of this study, presents the results of the analysis of well-test data, and provides a brief overview of the current understanding of the hydrogeological setting in the study area.

5.2 Study Objectives

The objectives of the groundwater hydrogeology study are as follows:

- To characterize the existing groundwater flow regime in the project area and to define how the local regime interacts with the regional groundwater system.
- To evaluate the interaction between groundwater and surface water, and the presence of cross-basin transfer of groundwater, both of which appear to occur in the study area.
- To assess both seasonal and long-term changes in the system.
- To characterize the baseline groundwater conditions so that the potential changes to the groundwater regime that may result from construction, operation, and closure of the mine can be identified.
- To use the above baseline data and analyses of these data to develop the baseline water-flow and water-chemistry models that will be used to evaluate alternatives, and to identify potential impacts and mitigative measures.

- To identify and assess alternative groundwater supply sources.
- To support aquatic, fish-resource, and wetlands-habitat assessments.

To achieve these objectives, the baseline study program comprised collection of groundwater data, including surface and subsurface geology, hydrogeologic parameters such as piezometric levels and hydraulic conductivities, delineation of groundwater recharge and discharge zones, and existing groundwater quality in areas of mineralized and barren rock as well as in the alluvial aquifers. Collection of background groundwater data is important and will help to document naturally occurring seasonal variations.

5.3 Study Area

The study area encompasses all local and regional groundwater within the general project area. The extent of the groundwater study area is presented on Figure 5-1.

The Pebble Mine site is located in the headwater areas of Koktuli River and Upper Talarik Creek. The main stems of the creek and river flow primarily within floodplain channels eroded into widespread glacial deposits. The valley glacial infill is bounded by bedrock mantled with glacial deposits.

The open pit is proposed along the margins of the valley infill deposits, so that certain sectors of the pit wall may be excavated into saturated overburden. Mining is expected to require dewatering of the sands and gravels and some additional dewatering of bedrock. During dewatering, local groundwater levels will likely be depressed within the overburden. The baseline groundwater study is intended to quantify the pre-mining conditions in the vicinity of the proposed pit and to provide empirical data to assess the potential project effects.

A range of alternatives are being considered for the location of the mill, tailings storage facilities, and other components. Therefore, groundwater characterization has been required over a broad area to help define groundwater characteristics over all the potential sites. The groundwater regime and the related environmental considerations with respect to downstream water supply and aquatic (fisheries and wetlands) resources will be important factors for optimizing the location and design of the mill and related mine-rock- and tailings-storage facilities.

5.4 Scope of Work

The research and field work for this study were conducted during 2004. CH2M Hill was the lead consultant for hydrogeological issues, reporting to Northern Dynasty Mines Inc. (NDM). WMC provided guidance to CH2M Hill on groundwater issues related to the Pebble Project as their subconsultant. Groundwater subsurface investigations were completed by WMC following the departure of CH2M Hill in early October 2004.

The study was conducted according to the approach described in the *Draft Environmental Baseline Studies, Proposed 2004 Study Plan* (NDM, 2004). This plan included selecting investigation locations and methodologies. Investigation modifications were implemented throughout the work to take advantage of the knowledge gained during the program.

The tasks completed for the groundwater study in 2004 were as follows:

- Evaluation of data provided or collected.
- Selection of monitoring locations, drilling equipment, and well-completion details.
- Selection of locations and methodology for pump tests.
- Preparation of groundwater-sampling protocols.
- Installation and development of monitoring wells and piezometers.
- Construction and development of pumping wells.
- Performance of pump testing at three locations.
- Performance of response testing.
- Collection of groundwater samples and measurement of groundwater levels.
- Analysis of monitoring-well response tests and pumping tests.
- Preliminary evaluation of hydrogeology in the area of the deposit.
- Preliminary evaluation of the hydrogeology in each potential tailings area.

5.5 Methods

5.5.1 Data Review

This activity included a review of previous baseline studies, and geologic reports and data. The review included an evaluation of basin and sub-basin drainage areas, channel lengths, annual precipitation, relief, typical flow regimes, and stream characteristics. This geologic, meteorologic, and hydrologic information was used to prepare a preliminary conceptual understanding of the study area hydrogeology.

5.5.2 Determination of Monitoring Requirements

The number and location of investigation and monitoring sites was defined on the basis of both the groundwater regime and the potential locations of mine facilities. Locations of wells were modified as new data became available and the overall understanding of the system developed.

5.5.3 Field Program

The field program consisted of multiple components, including monitoring well installation, groundwater sampling, seep and spring sampling, and piezometer installation and hydraulic testing. These field activities were primarily the responsibility of CH2M Hill until early October 2004. After that time, the field work was carried on as follows:

- WMC completed field direction of installation of one pumping well and two pumping tests.
- Bristol collected the fall groundwater samples.
- SLR prepared drill-hole logs for the 2004 hydrogeology field program.

5.5.3.1 Drilling Method

During the early part of the site investigation program, some piezometers were installed as part of the geotechnical drilling program. During that program, the ground conditions made installation of piezometers at other than shallow depths very difficult. The mud rotary drilling method used, although appropriate for defining geotechnical properties, was the main reason for the difficulty. As a result, alternate drilling methodologies were investigated to meet the needs of the hydrogeology program. Use of an ODEX heliportable rig eliminated the problems associated with hole caving and the addition of drilling mud and minimized potential site disturbance. A rig with 5-inch casing, capable of drilling over 200 feet in the sand and gravel materials at the study area, was supplied by Midnight Sun Drilling (MSD). The 5-inch-diameter casing was advanced with a down-hole hammer. At certain locations, the drillers switched the drilling bit with a tricone rotary bit to improve drilling through bedrock or plastic soil. Samples were retrieved from a cyclone where air and solid/liquid discharge were separated. Soil cuttings were discharged to the ground away from the soil boring. (Soil boring logs are provided in Appendix 5-A.)

5.5.3.2 Monitoring Well Installation

A primary goal of the hydrogeology investigation program was to install monitoring wells to collect background groundwater data. The standard practice for monitoring wells is to install 2-inch PVC (polyvinyl chloride) casing and screens. For this project, Schedule 80 PVC was used as much as was practical, because flush-threaded Schedule 40 PVC has limited wall strength for the ground conditions and depths in the study area. A slot size of 0.020 inch was generally used, but some screens had a slot size of 0.010 inch. The filter material was installed as a prepack, to ensure that filter material was in place around all of the screen. Above the monitored zone, the drill-hole annulus was backfilled by placing a high-density bentonite grout with a pump and tremie to a nominal depth of 10 feet below ground surface. A protective casing was installed at the surface with a whip-flag for winter locating. Piezometers were installed with the same protocols as the monitoring wells.

Monitoring wells were installed in the field with the helicopter-supported field program. These wells were labelled with a prefix "MW." Well drilling, installation, and construction followed requirements outlined in the *Draft Baseline Environmental Studies for Groundwater, Work Plan* (CH2M, 2004) and industry publications (ASTM, 1990; ADEC, 1992). Wells were constructed in completed soil borings concurrent with withdrawal of the drilling bit, hammer, and casing.

In well arrays (or clusters), each well was installed in a separate hole, with approximately 15 feet separation between holes. The first boring in the cluster was drilled into bedrock or to a reasonable capability of the rig. The drive-shoe was knocked off to create a rathole. Well-screen placement was determined after the rathole was sealed during construction. Depths for subsequent wells in the cluster were determined based on the lithology of the first hole. Each of these subsequent wells was over-drilled by about 10 feet before the drive-shoe was knocked off and the well constructed.

Screens were typically placed across two or three depth intervals (shallow, intermediate, and/or deep) in each well cluster as follows:

- In shallow wells (30 to 50 feet below ground surface [bgs]), 15-foot well screens were installed across the water table.

- In intermediate wells (70 to 100 feet bgs), well screens were installed beneath the water table across the most permeable horizon of deep overburden.
- In deep wells (150 to 200 feet bgs), well screens were placed beneath the water table in fractured bedrock surface or sealed into bedrock.

Monitoring-well installation was facilitated using prepack well screens at most well locations. Prepack screens consisted of 5 and 10-foot lengths of 2-inch-diameter Schedule 40 PVC with machine-cut 0.020-inch-wide slots and flush-threaded joints. The prepack screen contained 10- to 20-sieve silica sand as an internal sand filter. The well riser consisted of both 10-foot and 5-foot lengths of 2-inch-diameter Schedule 80 PVC flush-threaded joints.

Before installing the well-screen assembly, either borings were backfilled to the completion depth with 3/8-inch or 1/4-inch bentonite chips or the borehole was allowed to collapse to the base of the well-completion depth. Typically, a 1- to 3-foot-thick layer of 10- to 20-sieve silica sand was placed at the base of the well-completion depth to support the well assembly. The well assembly was placed at the top of the basal sand layer, then the drill casing was slowly removed and either the boring was backfilled with 10- to 20-sieve silica sand placed around the well screen (either prepack or non-prepack) concurrent with drill casing withdrawal, or the formation was allowed to collapse around prepack well screen.

A 2- to 3-foot-thick layer of 10- to 20-sieve silica sand was placed above the top of the well screen and a 2-foot-thick layer of 20- to 40-sieve silica sand was placed above the 10-20 sand. Several feet of 3/8-inch or 1/4-inch bentonite chips were placed above the 20- to 40-sieve silica sand. The bentonite-seal thickness ranged between 2 to 6 feet. A high-solids bentonite-grout seal was tremied into place above the bentonite-chip seal up to about 10 feet below ground surface. The annulus was then grouted to the surface with a cement-bentonite grout. A 5-foot-long, 6-inch-diameter steel monument was then placed over the top of the well assembly and set into the grout seal. A snow wand was placed adjacent to the well to improve visibility.

5.5.3.3 Piezometer Installation

Piezometers were installed in some drill-holes for determining regional gradients, for collecting response test information, and for measuring water levels during pump tests. These piezometers were installed with the same protocols as for the monitoring wells and were labeled with a prefix “P.” Some of the drill sites for the hydrogeology program in the pit area also met the requirements of the mine-design team and the water-quality program. These wells are labeled as “KP-P_”/”SRK__.”

5.5.3.4 Pumping Well Construction

Three pumping wells (PW-1, PW-3, and PW-4) were installed. The wells were drilled with the ODEX rig, but using welded casing rather than threaded casing. The design depth of the wells was established from logs of nearby monitoring wells and piezometers. After reaching the design depth, a telescoping, continuous-slot, stainless steel well screen and K-packer assembly was lowered into the well. The casing was then retracted to expose the screen to the formation.

5.5.3.5 Well Development

Following completion, the monitoring wells and piezometers were developed to remove fine sediment and as much drilling water as possible. Well development procedures followed those provided in the *Draft Baseline Environmental Studies for Groundwater, Work Plan* (CH2M, 2004). CH2M Hill typically developed wells using a Waterra inertial pump with 1-inch tubing, foot valve, and surge block to flush groundwater into and out of the well screen along 1- to 2-foot lengths of the well screen, and to remove groundwater from the well. As groundwater was pumped, CH2M Hill measured water-quality parameters—turbidity, temperature, pH, dissolved oxygen, and conductivity. Development proceeded until the development water was judged to have reached a maximum level of improvement, as demonstrated by stable water-sediment yield. Photographs were taken of filtrate and filter paper, both at the start and at completion of well development.

The pumping wells were developed by airlifting from the well until the sediment load had decreased significantly. Discharge was to land, with no visible discharge to surface water during development.

5.5.3.6 Response Testing

The monitoring wells and piezometers were response (slug) tested by CH2M Hill after well development was completed. A response test included the following:

1. A miniTROLL electric pressure transducer/datalogger was lowered into the well.
2. After the well water level stabilized, a 1-inch-diameter Waterra tube with a foot valve was quickly inserted into the well, thereby raising the water column in the well. The water level in the well was allowed to recover, comprising a falling head.
3. The Waterra tubing was then quickly extracted from the well, thereby lowering the water level in the well. The water level in the well was again allowed to recover, comprising a rising-head test.
4. This procedure was repeated at some wells.
5. The transducer was removed from the well.

5.5.3.7 Other Piezometers

Piezometers were installed in geotechnical drill-holes where possible and were constructed of 2-inch-diameter PVC casing. Slug testing and injection testing in the completed piezometers were attempted, to provide information from the completion zone. Drilling supervision was provided by Knight Piesold.

5.5.3.8 Pumping Tests

Pumping tests were conducted in alluvium and at the top of rock (PW-1) that will be exposed in the pit walls, and in areas of substantial alluvium thickness (PW-3 and PW-4) at the proposed tailings-storage facilities. Each test site included a pumping well and multiple piezometers for monitoring water levels. Two piezometer clusters (three holes each) were installed and monitored at the pit. The two tests in the tailings area each included one cluster of three piezometers.

The airlift technique was used to pump each of the wells. This method was selected primarily to maximize the potential pumping rate from the wells. The heliportable ODEX rig was equipped to drill

with 5-inch-diameter casing. This casing size provides clearance for a conventional submersible pump of 4-inch diameter, which will pump up to 100 gallons per minute. In contrast, airlifting from a 5-inch casing can yield over 300 gallons per minute. As high permeabilities were expected, the higher pumping rates were desirable. In addition, the necessary air compressors for airlifting were part of the ODEX drilling equipment.

The flow rate of the pumping well was recorded regularly with a weir, and tank and stopwatch. The water levels in the pumping well and observation wells were recorded frequently both with transducers and with manual sounding tapes. Barometric pressure was monitored during the tests so that the necessary corrections could be applied to the water-level measurements if required. The recovery of water levels was also recorded after the pump was turned off. Water-level monitoring of the pumped wells was not possible with the airlift pumping technique. Pump discharge was to land, with no runoff to surface water.

5.5.3.9 Monitoring Well Sampling

Groundwater sampling protocols were established in the *Draft Baseline Environmental Studies for Groundwater, Work Plan* (CH2M, 2004). Sampling events are timed to coincide with high groundwater levels in the spring and early fall, and low groundwater levels in summer and winter, and to be coincident with the surface-water-chemistry sampling. Before sampling, the depth to groundwater was measured using an electric well probe. The depth to groundwater was referenced to the top of the sample port after it was installed or to the top of the PVC before the sample port was installed. A dedicated Fultz electric, submersible pump was used for sampling. This pump was used to purge groundwater from the well at rates of less than 0.5 liters per minute. During well purging, water-quality parameters were measured using a Horiba Model U-22 multi-meter. Parameters measured were pH, conductivity, turbidity, dissolved oxygen, temperature, and oxidation reduction potential. The meter was calibrated daily before use, and the calibration was recorded in field reports. At the end of purging, the purge water was tested for ferrous and ferric iron using a Hach Model 890 field kit. Samples were collected from the tubing discharge and were placed directly into laboratory-prepared sample containers.

5.5.3.10 Spring and Seep Sampling

Spring and seep sampling carried out by CH2M Hill is discussed in Chapter 6, Water Chemistry.

5.5.3.11 Groundwater-level measurements

Groundwater levels were measured in monitoring wells during sampling. Water levels also were measured at several additional times during the year. As wells were not completed until late in the year, a regular program of water-level monitoring was not initiated in 2004.

5.5.4 Analysis of Response Tests and Pump Tests

Slug test data, including transducer data, manual water-level data, and field notes were assembled in spreadsheets for each of the 31 tested wells. The data were analyzed to determine apparent hydraulic conductivities of the formation materials surrounding the test well. The primary analytical methods used were methods described by Cooper et al. (1967) and Van der Kamp (1976).

The pumping test data, including transducer data, manual water levels, field notes, and pumping rates, were assembled in spreadsheets for each of the three pump tests. The data were analyzed to determine apparent transmissivities, as well as horizontal and vertical hydraulic conductivities. Methods used include the Hantush method (Hantush, 1960), the Hantush and Jacob method (Hantush and Jacob, 1955), and the ratio method (Neuman and Witherspoon, 1972).

5.5.5 Preliminary Hydrogeologic Characterization

Preliminary hydrogeologic characterization has been carried out to assist with planning of ongoing investigations and to provide input to site layout and design. This work included the following components:

- Preparation of preliminary geologic sections based on surface conditions, drill-hole logging, and drill action.
- Preparation of equipotential plots and comparison with measured dry-season surface flows.
- Comparison of measured flows and equipotentials with potential recharge rates in the subcatchments.

5.6 Results and Discussion

5.6.1 Well and Piezometer Installations

Appendix 5-A contains all available logs for soil borings and monitoring wells completed with the Midnight Sun Drilling rig in 2004. Table 5-1 (note that all tables are located after Section 5.8) summarizes well construction and sampling details. The well locations are depicted on Figure 5-2.

5.6.2 Response Tests

Groundwater monitoring wells and piezometers installed by Midnight Sun Drilling were response tested during 2004. Most of the testing was completed by CH2M Hill. A few of the response tests were completed by WMC. WMC analyzed the data to determine the apparent hydraulic conductivity near each installation. A summary of the response test results are presented in Tables 5-2, 5-3, and 5-4. The analytical plots are presented in Appendix 5-B.

The response test procedure was very effective at defining the response of the wells. A few conditions are worth noting:

- Many of the well-water levels responded very quickly, and many of the water levels in the wells oscillated after the water level was changed. This quick response would not have been observed without the transducers.
- On inserting or extracting the Waterra tubing, the transducer cable appears to have shifted enough to distort the response in some wells, because the change in water level during the test was very small and the response was very fast.

- Wells with a non-oscillating or over-damped response were analyzed with the Cooper method (Cooper et al, 1967; example shown in Figure 5-3). Wells with an oscillating response were analyzed using an under-damped analysis (Van der Kamp, 1976; example shown in Figure 5-4).
- Some of the responses were fast enough that even with the transducer, only a portion of the response was observed. In these cases, the available data were used to calculate the hydraulic conductivity.
- The high hydraulic-conductivity values determined may well be within the range of the effective value for the screen and filter pack. In these cases, the actual hydraulic conductivity of the formation might be higher than the calculated value.
- There was no record of a consistent method for preparing the foot valve on the end of the Waterra tubing for submergence below the water table. Therefore, when available, rising-head test data instead of falling-head test data were used, to ensure a known effective radius of the water column.

Table 5-2 presents the results of response tests in the pit area. Five tests were performed near the top of rock, two in sand and gravel, and seven in silty materials. The hydraulic conductivity from tests near the top of rock ranged from $3x10^{-5}$ meters per second (m/s) to $2.8x10^{-4}$ m/s with an average of $1.6x10^{-4}$ m/s. Based on these tests and the drill responses, this is considered a permeable unit, which was encountered at all of the drill sites, but with a limited thickness. Two response tests were carried out in sand and gravels. The hydraulic conductivities were $8x10^{-5}$ and $3x10^{-4}$ m/s. This is consistent with the expectation for sands and gravel. These permeable units represent horizons within a silty material.

Seven response tests were carried out in silty granular materials. Generally, the monitoring wells or piezometers were installed in more permeable horizons of the silty material. The calculated hydraulic conductivity of these materials ranged from $6x10^{-7}$ to $4x10^{-5}$ m/s, consistent with silty granular materials.

Table 5-3 presents the results of response tests carried out in the South Fork Koktuli River valley. Most of the tests indicate gravels or sand and gravels. It is probable that the higher hydraulic-conductivity values are impacted by the monitoring well slots and filter pack. In other words, the hydraulic conductivities of the ground could be higher.

Table 5-4 presents the results of response tests on monitoring wells installed in the G Area. The "G Area" is a valley tributary to North Fork Koktuli River. Generally, the valley bottom has a thin layer of overburden over bedrock. MW-10 was drilled into a thicker section of this thin cover, near the lower end of the stream. MW-6 was drilled further downstream on a bench adjacent to the stream. MW-7 and MW-9 are sited in the topographic saddle at the south end of the valley. At this site, the overburden was a little thicker. All of the tests indicate high-permeability material.

Table 5-5 presents the results of response test in the Frying Pan Lake Area (MW-5) and the North Fork Koktuli River Valley (MW-8). The results from MW-5 show that some lower permeabilities were measured in this area, consistent with the material descriptions on the drill log. The results from MW-8 indicate that this area includes some high-permeability gravels.

5.6.3 Pumping Tests

Pumping tests were completed at three locations: PW-1, PW-3, and PW-4. (PW-2 has not yet been drilled.) The pumping wells were drilled with five-inch welded-steel casing. A four-inch telescopic screen fitted with a K-packer was lowered into the well and the casing was pulled back to expose the screen. The well was then developed and tested with compressed air. Several piezometers were monitored during each pumping test. Table 5-6 summarizes the test results. Pumping test curves are included in Appendix 5-B.

The PW-1 pump test, located in the pit area and summarized in Table 5-6, indicates that the aquifer in shallow bedrock has a transmissivity of about $8x10^{-5}$ square meters (m^2)/s. The analysis was completed using the Hantush method (Hantush, 1960) for vertical recharge with contribution of aquitard storage and a barrier boundary at 100 meters (Figure 5-6). The transmissivity calculated using the Theis method (Theis, 1935) was very similar. With an aquifer thickness of 5 meters, the average horizontal hydraulic conductivity would be about $2x10^{-5}$ m/s. This result is about one order of magnitude lower than the average hydraulic conductivity in the response tests—about $2x10^{-4}$ m/s. The test results suggest that the local hydraulic conductivity is greater than the larger scale hydraulic conductivity. This difference may be due to the discontinuous and anisotropic nature of fractured bedrock and sand and gravel overlying the bedrock or the natural variation of properties over a substantial area.

Two estimates of vertical hydraulic conductivity were derived from the PW-1 pump test using the ratio method (Neuman and Witherspoon, 1972). Each represents the vertical hydraulic conductivity across clay materials immediately overlying the top of rock and a thin sand and gravel unit which represents the pumped aquifer. The calculated values are about 1 and $2x10^{-8}$ m/s. No response tests were carried out in this aquitard material.

The two shallow piezometers monitored did not respond to the pump test. At the low pumping rate of the test, no substantial response would be expected in these wells near the water table.

The PW-3 pump test, located on the east side of the J Area above Tributary 119 and summarized in Table 5-6, indicates a transmissivity of the gravel aquifer of $1x10^{-2}$ m^2/s. The Hantush and Jacob method (Hantush and Jacob, 1955) was used to analyze the drawdown data from the MW-11M nest. This method considers vertical leakage and assumes zero aquitard storage. It was used because the drawdown leveled off during the test. An alternate analysis would be to assume that delayed yield from the water table caused the flat response. Since the aquifer was underlain by a silty sand and gravel, the contribution from the underlying aquifer was expected to be small compared to drainage from above. Assuming an aquifer thickness of 20 meters, the horizontal hydraulic conductivity was estimated to be approximately $5x10^{-4}$ m/s. Since the well screen was open to only a portion of the aquifer and the monitoring well was only 8.4 meters away from the pump well, the partial penetration probably impacted the measured response. This aspect has not yet been accommodated in the analysis. Partial penetration will cause more drawdown near the well, which will result in a lower calculated transmissivity. In this case, the expected change is not large.

Response tests in the immediate area were completed in the three MW-11 wells. MW-11M is within the pumped horizon. The response test indicated a hydraulic conductivity of $9x10^{-4}$ m/s. The value higher than the pump test value may be due to the partial penetration of the pump test as noted above or may be the result of natural variation of materials.

The Hantush and Jacob method (Hantush and Jacob, 1955) resulted in an aquitard vertical hydraulic conductivity of $3x10^{-5}$ m/s with a thickness of 15 meters. This relatively high conductivity is probably the vertical hydraulic conductivity within the aquifer rather than in a significant confining layer.

The response of MW-11D to pumping indicated that the vertical hydraulic conductivity through the underlying silty granular materials was about $2x10^{-7}$ m/s, assuming the aquitard thickness was 5 meters.

The PW-4 pump test, located at the west end of the J Area and summarized in Table 5-6, indicates a transmissivity of the gravel aquifer of about $2x10^{-1}$ m^2/s. The Hantush and Jacob method (Hantush and Jacob, 1955) was used to analyze the drawdown data from the MW-1 nest (Figure 5-7). This method considers vertical leakage and assumes zero aquitard storage. It was used because the drawdown leveled off during the test. An alternate analysis would be to assume that delayed yield from the water table caused the flat response. Since the aquifer was underlain by a silty sand and gravel, the contribution from the underlying aquifer was expected to be small compared to drainage from above. Assuming an aquifer thickness of 30 meters, the horizontal hydraulic conductivity was estimated to be approximately $7x10^{-3}$ m/s. This conductivity is the highest documented value measured at the site.

Response tests in the immediate area were completed in the three MW-1 wells. MW-1M is completed within the pumped horizon. The response test indicated a hydraulic conductivity of about $1x10^{-5}$ m/s. The other two wells had response test results of about $6x10^{-4}$ m/s and $2x10^{-4}$ m/s. These values are all less than the pump test value, which may indicate the limitation of the slug test method (permeability of filter and screen) and/or the natural variation of material properties.

The Hantush and Jacob method resulted in an aquitard vertical hydraulic conductivity of $2x10^{-4}$ m/s, assuming a thickness of 15 meters. This conductivity probably represents the vertical hydraulic conductivity within the aquifer.

The response of MW-1D to pumping indicated that the vertical hydraulic conductivity through the underlying silty granular materials was about $2x10^{-7}$ m/s, assuming an aquifer thickness of 5 meters.

5.6.4 Testing by Knight Piesold

While drilling geotechnical holes in the pit area, Knight Piesold carried out packer tests (also known as Lugeon tests). The results of these tests are presented in Table 5-7. There is no clear separation of hydraulic conductivity values by rock type. However, there is a clear trend of decreasing hydraulic conductivity with depth. This trend is illustrated on Figure 5-5.

Knight Piesold also performed rising- or falling-head tests in piezometers installed in the pit area. These results are presented in Table 5-8. These shallow tests, as illustrated on Figure 5-5, are in the upper range of hydraulic conductivities, consistent with the conceptual model of relatively high conductivity in shallow bedrock.

Knight Piesold also performed rising- or falling-head tests in GH-series piezometers outside of the pit area. The results of these tests are presented in Table 5-9. Since a sounding tape was used to monitor water levels, many of the well responses could not be measured because they were too fast.

5.6.5 Water Level Data

Water levels were measured immediately following construction and during well development and testing from July through October. Most of the water levels were recorded again on October 16 and 17, 2004, and the results of the October 16 and 17 measurements are shown in Table 5-10.

During the field program, transducers were installed in monitoring wells, and levels were recorded over several days to provide background data away from the pump testing. A list of these data files is presented in Table 5-11. Figure 5-8 presents one of these files, illustrating the variation of MW-5 over several days, clearly a wet period.

5.6.6 Groundwater Sampling

The monitoring wells were sampled in September and October of 2004. Results of the sample analysis and evaluation of the data are discussed in Chapter 6, Water Chemistry.

5.6.7 Hydrogeologic Characterization of G Area

The G area, shown on Figure 5-9, is the catchment of a tributary to the North Fork Koktuli River (NK1.190). The catchment elevation ranges from 1,030 feet to 2,720 feet. The south end of the valley includes a saddle separating this catchment from the catchment to the south. The elevation of the saddle is approximately 1,525 feet. For a catchment of this size, the stream gradient in the upper reaches is relatively flat with gentle lower slopes. The upper slopes are steeper and are dominated by bedrock outcrops. Limited drilling and outcrop distributions indicate that overburden is thin over much of the valley; however, several holes intercepted up to about 100 feet of permeable overburden materials. Bedrock includes conglomerate, diorite, basalt, and gabbro. Response testing indicates that overburden materials have a high hydraulic conductivity (MW-6D and MW-7S, Table 5-4). Testing also indicates that the top of rock has high hydraulic conductivity (MW-7D, Table 5-4; GH04-23 and GH04-24, Table 5-9). One test in gabbro also has a high hydraulic conductivity (GH04-25 at 125-foot to 185-foot depth, Table 5-9).

Groundwater recharge is occurring on the valley slopes and moves primarily downslope towards the stream channel in the center of the valley. Groundwater then likely migrates downstream within the overburden and bedrock materials. As the overburden is expected to be thin along the valley floor, groundwater likely discharges to the streambed, contributing to the stream base flow. Piezometric pressures are therefore expected to be near ground surface over much of the catchment and at or above ground surface near the valley floor.

Although the available information indicates that bedrock has a high hydraulic conductivity, the high piezometric levels measured in piezometers near the saddle implies that the bedrock with high hydraulic conductivity is probably not widespread or that the high-conductivity zone is limited to shallow bedrock if it is widespread.

5.6.8 Hydrogeologic Characterization of Pit Area

One pump test with five monitored piezometers and 14 response tests (Table 5-2) was completed. In addition, Knight Piesold completed 51 packer tests in seven diamond drill-holes (Table 5-7) and rising-head tests in 10 piezometers (Table 5-8).

Most of the open pit will be located in the headwaters of the South Fork Koktuli River. A small area of the ultimate pit will be located in the headwaters of Upper Talarik Creek. The pit area will be located primarily on an east-facing, gentle slope between elevations of 950 and 1,435 feet. The bedrock includes mineralized sedimentary, volcanic, and intrusive rocks covered on the east side by barren tertiary sedimentary rocks. The bedrock is overlain primarily by variable thicknesses of glacial-related materials, including sands and gravels to clays. The surface nature of the overburden falls within the following broad categories:

- Bedrock outcrops are present over limited areas of the site.
- On the upper slopes, relatively smooth terrain, with some evidence of periglacial activity, is present. This is mapped as terraced and modified morainal deposits of the Mak Hill Glaciation.
- Above an elevation of about 1,100 feet and up to a maximum of about 1,400 feet, the topography is deranged, with many small ponds perched on the hillside. This topography is most likely the result of deposition of sediments with included ice blocks and subsequent melting of the ice blocks leaving the water-filled depressions. This is mapped as Brooks Lake Moraine by the Geological Survey (Dettterman and Reed, 1973).
- A smoother deposit is present below 1,100 feet, probably as moraine. This is mapped as moraine and terraced and modified morainal deposits of the Brooks Lake Glaciation.
- A gravelly surface, probably deposits at the ice margin, modified marginally by beaching along the margins of a larger Frying Pan Lake, is present in the valley bottom.
- Small terminal and lateral moraines are present at an elevation of about 1,100 feet forming arcs within the headwaters of Upper Talarik Creek.

The conceptual hydrogeologic setting includes permeability within the rock due to limited fractures. The main aquifer material is within shallow rock. This conceptual model is based on observed drilling returns when using air rotary, circulation losses when drilling with water, artesian conditions observed in diamond drill-holes, and measured hydraulic conductivities. This is also consistent with conditions in the area south of the exploration camp where the camp water supply is pumped from a flowing exploration hole. At this location, permeable horizons were identified in the middle of the overburden and at the top of rock where the flowing conditions were encountered.

No data have been collected that indicate a distinct difference in hydrogeologic properties among the various rock types in the study area. However, based on packer tests carried out in geotechnical holes, there is a distinct decrease in hydraulic conductivity with depth (Figure 5-5). The top of rock is the only location where drillers have noted any substantial loss or gain of drilling fluids on this site; therefore, no highly permeable structure of hydrogeologic significance has yet been identified.

Based on bedrock elevations from exploration and geotechnical drilling, as well as the drilling in the pit area during this program, overburden aquifers were defined in the pit area. These aquifers are illustrated on Figure 5-10 and are discussed below.

Overburden Aquifer 1 is located in a buried bedrock channel that cuts across a bedrock ridge at the north end of the South Fork Koktuli River watershed. The channel was identified based on depth of bedrock from drilling data and a refraction seismic line across the pit area (Frontier Geosciences Inc, 2004). At the east end of Aquifer 1, the overburden thickness is about 100 feet. Based on the available data, there is a shallow plunge of the floor of the bedrock valley towards the northwest. The overburden is therefore thickest under the ridge. Drilling and testing near the east end of the mapped aquifer indicates that a substantial thickness of the overburden includes silts and clays. However, there are cleaner sections in the sequence. Near the bedrock surface, sands and gravels were mapped and the top of rock is characterized by enhanced permeability, probably as a result of near-surface fractures. Limited groundwater-level data indicate that there is a groundwater mound in the channel with flow both to the southeast and to the northwest. The channel is probably recharged by meteoric water from above and by lateral flow from both sides. Some discharge from the bedrock up to the overburden infill materials is also expected.

Overburden Aquifer 2 is located in a drainage draw. The overburden thickness is about 100 feet. The aquifer was defined primarily by depth to bedrock during exploration drilling and the presence of several flowing exploration holes. The flowing conditions were encountered near bedrock after passing through silty overburden materials with one cleaner zone. The bedrock surface plunges to the southeast fairly parallel to the ground surface. The source of groundwater is expected to be from meteoric recharge, particularly under the upper slopes, with discharge to ground and on towards the Frying Pan Lake lowland.

Overburden Aquifer 3 is located west and above the ultimate pit boundaries. The location is based on only a few drill-holes. Recharge is expected to be limited to surface water, with discharge downslope towards the mine area.

Shallow bedrock is expected to be relatively permeable over most of the site. Therefore, where bedrock outcrops, recharge from surface infiltration will probably be relatively high. A component of overburden dewatering will therefore be derived from recharge to shallow bedrock, which is typically higher in the pit area.

The groundwater table likely forms a muted image of the ground surface. This is expected to be the case in the pit area. The many ponds in silty materials between elevations of 1,100 and 1,400 feet may indicate that the water table is near ground surface throughout that area. The flowing wells in the drainage (Overburden Aquifer 2), with water levels in shallow piezometers below ground surface and piezometers at the top of rock flowing, indicate that the vertical groundwater gradient is upwards in the lower part of the pit area. In this drainage, the majority of groundwater flow is expected in a downslope direction. Limited water-level data indicate that there is probably a groundwater divide in Overburden Aquifer 1, with flow both northwest towards the Upper Talarik and southeast towards the Frying Pan Lake lowlands.

5.6.9 Hydrogeologic Characterization of Frying Pan Lake Area

The Frying Pan Lake catchment, south of the open pit, has an elevation range of 950 feet to 1,950 feet. The upper slopes are dominated by bedrock outcrops. Mid-slope, the bedrock is covered by a veneer to a

layer of granular material. These materials represent Mak Hill moraine that has been subject to periglacial activity. Lower elevations have been subject to more recent glacial activity (Brooks Hill Glaciation). To the west of Frying Pan Lake, the upper range of these glacial materials form a terrace-like deposit with deranged topography and several small ponds, from an elevation of about 1,070 to 1,175 feet. This geomorphic feature continues south from the pit area and appears to pinch out at the outlet to Frying Pan Lake.

A similar terrace-like deposit on the west side of the valley continues south of a depression near the outlet to Frying Pan Lake. However, although there is substantial variation in topography, there are few depressions filled with water. MW-3, drilled in this area, indicates very permeable materials and a deep water table (piezometric level is about 870 feet and the nearby river level is about 930 feet). This terrace south of Frying Pan Lake therefore appears to be considerably more permeable than the valley side materials further north.

At lower elevations and on both sides of Frying Pan Lake the slopes are smoother, probably as a result of a glacier occupying this space when the terrace materials were deposited.

Within the Frying Pan Lake basin, groundwater recharge is expected on upper slopes with discharge into the lowlands. The groundwater discharge feeds into Frying Pan Lake base flow.

Immediately downstream of the outlet to Frying Pan Lake, the river is steep with significant rapids. Bedrock is exposed in this area. Drill-hole data and seismic-reflection data (SL-3 and SL-4; Frontier Geosciences Inc, 2004) indicate that most of the overburden is unsaturated downstream of Frying Pan Lake. There is a substantial gradient between Frying Pan Lake (950 feet) and MW-3 (870 feet). This is consistent with lower permeability materials in the vicinity of Frying Pan Lake and relatively high bedrock elevations near the outlet of the lake.

Within the Frying Pan Lake Basin, there is evidence of abandoned shorelines at several elevations, at least as high as 1,000 feet. This extended Frying Pan Lake was probably short lived and reliant on ice dams near the close of the last glacial period. Muskeg deposits prevail on the ancient lake floor. Alluvial fans are obvious over-riding valley bottom deposits from the two major tributaries on the east side of the valley. With limited groundwater discharge from the Frying Pan Lake area, most of the water must leave as surface water from the lake.

5.6.10 Hydrogeologic Characterization of South Fork Koktuli Recharge Basin

This study sub-area extends from Frying Pan Lake downstream along the South Fork Koktuli River about 7 miles (Figure 5-11). The catchment for the river ranges from an elevation of about 830 feet to above 2,700 feet. The upper slopes are dominated by bedrock outcrops. A substantial thickness of overburden is present along the river through this area. A simplified interpretation of the top of rock based on drill-hole and seismic reflection data is contoured on Figure 5-11. This plan indicates that a paleo-channel probably exists that drained across the present river alignment towards Upper Talarik Creek. Overburden thickness locally exceeds 300 feet.

The overburden material in the basin ranges from clay to clean gravel. Permeable material was encountered in every drill-hole, but quantities varied. Substantial thicknesses were encountered at MW-3,

GH04-30, GH03-03, and MW-11. Smaller but still substantial thicknesses were perforated in MW-2 and GH04-10. In GH04-34 and GH04-35, the permeable material was limited to the top 50 or 60 feet.

Groundwater originates on site as recharge of rainfall and snowmelt, both directly and as run-on and groundwater from the nearby slopes. The numerous enclosed depressions on the site may naturally enhance the recharge. Additional water originates from Frying Pan Lake. Although some travels downstream as groundwater, this quantity is limited by the relatively low-permeability material surrounding the lake and the relatively high bedrock elevation downstream of the lake. Most of the water from the Frying Pan Lake area is therefore expected to flow as surface water downstream in the river channel. The lake water includes rainfall and snowmelt as well as water from storage in other ponds, and the groundwater and muskeg.

The river probably recharges the groundwater system almost immediately downstream of the lake. This interpretation is based on piezometric levels in MW-3, which are considerably lower than the adjacent river level. Streamflow loss probably continues for several miles downstream. The loss is visually obvious in the vicinity of GH04-35, where the channel often dries during low-flow periods. Again, piezometer measurements indicate the groundwater levels are significantly below the channel bottom in this area.

Other tributary catchments contribute to the groundwater system. Of these, SK1.240 is the largest and provides a substantial inflow. Much of this flow is lost from the channel to the groundwater system.

Groundwater leaves this area by two routes, which is unusual for a river valley. Some of the groundwater continues down the South Fork Koktuli River valley. The remainder crosses the surface-water divide and discharges to the Upper Talarik Creek watershed. A substantial portion of the groundwater entering the Upper Talarik Creek watershed appears to discharge into tributary UT1.190. The measured low flow is approximately 25 cubic feet per second. Figure 5-12 illustrates an interpretation of groundwater equipotentials and groundwater flow directions consistent with this groundwater system concept.

5.6.11 Hydrogeologic Characterization of South Fork Koktuli Discharge Area

This study sub-area extends from about one mile upstream of the confluence of South Fork Koktuli River and SK1.190 to a point that is about 2.4 miles downstream (Figure 5-11). The catchment for this portion of the river ranges from an elevation of about 800 feet to more than 2,315 feet. The upper slopes are dominated by bedrock outcrops. Mid-slope is mapped as terraced and modified morainal deposit of the Mak Hill Glaciation. The lower slopes are mapped as moraine of the Brooks Lake Glaciation. A substantial outwash gravel deposit is present on the south side of the stream. The stream is undersized in a depression within the outwash deposit. Much of the outwash gravel might have been deposited while ice occupied the valley in which the river flows. The borehole testing and material descriptions indicate that the gravels are very permeable in this area.

The overburden material in the basin ranges from clay to clean gravel, although gravel predominates. Permeable materials were encountered in every drill-hole, with thicknesses of about 100 feet (MW-1, PW-4, GH04-05, GH04-17).

Groundwater travels downstream from the South Fork Koktuli recharge area. At times when the groundwater level is high, groundwater might discharge to the streambed at the upstream end of this area.

However, during dry periods, the South Fork Koktuli streambed upstream of the confluence with tributary SK1.190 is dry. Additional water recharges the groundwater system in this area, both as direct recharge of rainfall and snowmelt and as run-on from adjoining slopes. A substantial addition to the system is derived from tributaries SK1.190 and SK1.210.

Immediately downstream of the confluence with SK1.190, groundwater discharges extensively to the valley floor. This discharge area is the result of increased recharge to the aquifer and a reduction of the aquifer cross-section in this area. In the dry season, with little to no visible surface-water flow upstream of the confluence with tributary SK1.190, the surface-water flow is about 50 cubic feet per second about 2.4 miles downstream of the confluence with SK1.190. At that location, simple calculation methods indicate a groundwater flow rate of about 10 cubic feet per second.

5.6.12 Groundwater Recharge and Discharge for South Fork Koktuli Catchment

A preliminary estimate of groundwater recharge was developed to be consistent with the conditions reported in the South Fork Koktuli River area. The calculations assumed that average precipitation is 1.3 times the Iliamna Airport precipitation. The calculations also accounted for snowpack accumulation, sublimation, snowmelt, evapotranspiration, groundwater recharge, and runoff. The preliminary calculations were completed without the benefit of calibrating to stream-gauging data. As such, the results of this analysis are very preliminary and will be revised in future.

Model-generated hydrographs were prepared for seven locations and included surface water, groundwater, and total flows at each location. The analysis assumed that the piezometric distribution and the groundwater flow directions illustrated on Figure 5-12 are representative of site conditions. Figure 5-13 provides a visual summary of the results, presenting annual average surface-water and groundwater flows and the dry-season surface-water and groundwater flows at the seven locations. Noteworthy is the substantial percentage of flow in this area within the groundwater system.

5.7 Summary

In order to support groundwater studies at the mine site, 47 monitoring wells and piezometers, and three pumping wells were installed. Selected monitoring wells were sampled twice in the fall 2004 by CH2M Hill and BEESC. The analysis results are being reviewed by the quality control team. Water-response data and pumping-test data were collected by CH2M Hill and WMC field crews. The initial results of analyzing these data are presented in this report.

The study area includes permeable sand and gravel overburden deposited during glacial periods. The most permeable and most extensive of these deposits occur in the J Area. The groundwater recharge analysis and hydraulic testing indicate that a substantial proportion of precipitation migrates through these sands and gravels in the J Area. The analysis and field observations also suggest that groundwater recharge within the study area discharges to local streams relatively close to the proposed tailings areas and that a substantial amount of flow can be attributed to groundwater discharge. Some of the groundwater that originates in the South Fork Koktuli River valley crosses the surface-water divide and reports to Upper Talarik Creek. Groundwater recharge is expected to be lower in the area of Frying Pan Lake, and therefore, less groundwater flow is expected in that area. Similarly, the sands and gravels are thinner and less prevalent near the proposed location of the open pit. In the pit area, the top of bedrock is the most

permeable horizon. The permeability of the bedrock decreases significantly with depth. Although thinner than in the J Area, permeable deposits of sand and gravel have also been identified in the G Area. In addition, the top of bedrock is also a permeable horizon in the G Area.

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TABLES

TABLE 5-1
Locations of Investigations

Drill-hole	NAD 1927 Coordinates Northing (m)	NAD 1927 Coordinates Easting (m)	Ground Elevation (m)	PVC Elevation (m)	Well Completion Date	Well Development Date	Total Well Depth (ft, FTOC)[1]	Screened Interval (ft, bgs)	Response Test	September Sample Date	October Sample Date
MW-1 D	6632496.2	364145.6	249.484	250.025	7/24/04	08/17/04	135.12	124.5-134.5	X	9/23/2004	10/22/2004
MW-1 M	6632494.1	364149.2	249.595	250.317	7/22/04	07/25/04	70.65	62-72	X	9/24/2004	10/24/2004
MW-1 S	6632498.6	364139.9	249.410	249.938	7/21/04	07/24/04	16.69	15-25	X	9/25/2004	10/24/2004
MW-2 D	6631411.0	370599.6	253.771	254.493	7/28/04	10/29/04	140.31	120-135	X	9/7/2004	10/24/2004, 10/30/2004
MW-2 S	6631405.9	370601.1	253.645	254.339	7/26/04	08/18/04	75 BGS	65-75		NS	NS
MW-3	6635793.3	370886.0	312.756	313.691	8/4/04	08/19/04	195.57	179-194	X	NS	NS
MW-4	6642499.4	373229.4	308.300	308.636	7/21/04	--	25 BGS	15-25		NS	NS
MW-5 D	6639808.5	371890.5	298.691	299.394	7/31/04	08/13/04	105.73	90-105	X	9/24/2004	10/19/2004
MW-5 M	6639807.6	371895.8	300.377	299.693	8/1/04	08/13/04	67.38	55-65	X	9/7/2004	10/19/2004
MW-5 S	6639813.3	371894.3	300.219	299.598	8/2/04	08/13/04	43.49	31-41	X	9/7/2004	10/19/2004
MW-6	6645685.0	365569.4	341.565	342.370	8/10/04	08/15/04	95.80	81-91	X	9/7/2004	10/21/2004
MW-7 D	6640225.7	362766.2	471.016	471.867	8/11/04	08/15/04	75.15	61-71	X	9/6/2004	10/20/2004
MW-7 S	6640227.4	362760.5	471.613	472.653	8/12/04	08/16/04	34.35	20-30	X	9/24/2004	10/20/2004
MW-8 D	6646958.2	371002.6	340.579	341.498	8/7/04	08/14/04	100.37	87-97	X	9/6/2004	10/19/2004
MW-8 M	6646954.0	370998.3	340.622	341.437	8/8/04	08/14/04	48.82	32-47	X	9/6/2004	10/19/2004
MW-8 S	6646959.4	370997.5	340.583	341.582	8/8/04	08/14/04	21.84	8-18	X	9/6/2004	10/19/2004
MW-9	6640169.4	362821.7	465.708	466.672	8/11/04	08/16/04	81.45	58-73	X	9/6/2004	10/20/2004
MW-10	6644819.8	365783.3	338.278	339.229	9/25/04	09/27/04	44.12	30-40		NS	10/21/2004
MW-11D	6632823.5	370282.4	269.360	270.252	10/1/04	--	136 BGS	126-136	X	NS	10/21/2004
MW-11Db	NO WELL										
MW-11M	6632827.6	370280.6	269.336	270.319	10/3/04	--	112 BGS	102-112	X	NS	10/21/2004
MW-11S	6632832.4	370279.6	269.317	270.179	10/4/04	--	71 BGS	51-71	X	NS	10/19/2004, 10/21/2004
MW-11Sb	NO WELL										
P-1	6641349.6	371318.2	325.800	NO WELL							
P-2 D	6641256.3	371666.0	312.093	312.915	8/19/04	No Log[2]	86 BGS	76-86	X	NS	NS
P-2 M	6641262.9	371665.5	312.328	313.098	8/20/04	08/31/04	70.31	58-68	X	NS	NS
P-3	6641476.7	371915.7	311.551	312.334	8/22/04	--	24.50	12.5-22.5	X	NS	NS
P-4 M	6641565.2	372451.5	302.745	303.672	8/28/04	08/31/04	58.24	45-55	X	NS	NS
P-4A D	6641739.7	372508.1	304.918	305.878	9/9/04	09/13/04	93.85	80-90	X	9/15/2004[3]	NS
P-4A S	6641734.9	372513.0	304.894	305.994	9/11/04	09/13/04	52.79	40-50	X	NS	NS
P-6 D	6641798.0	372590.8	304.183	305.049	9/12/04	09/15/04	116.40	102-112	X	NS	NS
P-6 M	6641793.5	372590.8	304.246	305.144	9/13/04	09/15/04	90.3	81-86	X	NS	NS
P-6 S	6641794.8	372595.8	304.289	305.198	9/15/04	09/16/04	38.21	25-35	X	NS	NS
KP-P1/SRK-2	6642931.8	372826.1	304.016	304.956	8/24/04	09/02/04	139.50	124-134	X	NS	NS
KP-P1/SRK-2A	6642933.7	372821.9	--	--	8/26/04	--	84 BGS	70-80		NS	NS
KP-P2/SRK-4	6641888.6	372879.8	319.459	--	--	--	--	--		NS	NS
KP-P3 D /SRK-5D	6641305.8	371507.4	318.667	319.521	8/17/04	09/02/04	80.45	68-78	X	9/24/2004	NS

TABLE 5-1
Locations of Investigations

Drill-hole	NAD 1927 Coordinates Northing (m)	NAD 1927 Coordinates Easting (m)	Ground Elevation (m)	PVC Elevation (m)	Well Completion Date	Well Development Date	Total Well Depth (ft, FTOC)[1]	Screened Interval (ft, bgs)	Response Test	September Sample Date	October Sample Date
KP-P3 M /SRK-5M	6641309.4	371510.2	318.665	319.616	8/17/04	09/01/04	54.17	41-51	X	9/25/2004	10/20/2004
KP-P3 S /SRK-5S	6641302.3	371516.5	316.445	317.442	8/18/04	09/02/04	21.68	8-18	X	9/25/2004	10/20/2004
KP-P4	6641716.1	372818.4	305.482	306.406	8/15/04	--	45.76	--	X	NS	NS
PW-1	6641746.0	372532.0	304.658	305.585	9/18/04	09/20/04	113.50	106-113	Pump[4]	NS	NS
PW-1b	NO WELL										
PW-3	6632832.0	370288.0	268.891	--	10/7/04	10/07/04	117.00	97 - 105	Pump[4]	NS	NS
PW-4	6632497.7	364151.7	249.187		10/13/04	10/14/04	71.30	61.6 - 70	Pump[4]	NS	NS

NOTES:

1) Measured in feet from top of casing (FTOC) or below ground surface (bgs)

2) Well developed, but no log.

3) There is no preliminary data for this sample.

4) Short-term pumping test performed.

NS - Not Sampled

-- Data not available

TABLE 5-2
Summary of Response Tests in Pit Area

Well	K (m/s)	Method	Depth (ft)	Materials
P-2M	3.0E-05	Cooper-Papadopulos	55 - 68	top of rock
P-2D	3.0E-05	Cooper-Papadopulos	73 - 88	within rock
P-3	2.5E-04	Cooper-Papadopulos	9 - 24	top of rock
KP-P3/SRK-5D	2.8E-04	Van der Kamp	65 - 78	top of rock
P-6D	2.0E-04	Cooper-Papadopulos	98 - 112	sand and gravel and top of rock
Average	**1.6E-04**			
KP-P3/SRK-5S	3.0E-04	Cooper-Papadopulos	6 - 22	sand and gravel
KP-P3/SRK-5M	8.0E-05	Cooper-Papadopulos	37 - 52	sand and gravel
Average	**1.9E-04**			
P-6S	4.0E-05	Cooper-Papadopulos	22 - 41	silty sand
P-4AS	4.0E-05	Cooper-Papadopulos	37 - 51	sand with silt
P-4mid	2.0E-05	Cooper-Papadopulos	41 - 58	sand, some silt
KP-P4	2.0E-05	Cooper-Papadopulos	29 - 44	silty sand with gravel
KP-P1/SRK2	1.2E-05	Cooper-Papadopulos	121 - 136	silty sand and gravel (15% fines)
P-6M	5.0E-06	Cooper-Papadopulos	79 - 92	interbedded silt sand gravel clay
P-4AD	6.0E-07	Cooper-Papadopulos	77 - 92	sand with gravel and silt
Average	**2.0E-05**			

TABLE 5-3
Summary of Response Tests in South Fork Koktuli Area

Well	K (m/s)	Method	Depth (ft)	Materials
MW-1S	6.0E-04	Cooper-Pap.	14 - 32	Gravel with sand
MW-1M	1.3E-05	Cooper-Pap.	70 - 102	Gravel with sand
MW-1D	2.6E-04	Van der Kamp	120 - 135	Sand and gravel and silt, top of rock
MW-2D	1.1E-03	Van der Kamp	130, uncertain	Gravel with sand
MW-3	6.4E-04	Van der Kamp	175 - 205	Gravel, sand and interbedded silt and sand
MW-11S	7.0E-04	Van der Kamp	47 - 84	Sand and sand and gravel
MW-11M	9.0E-04	Van der Kamp	99 - 113	Sandy gravel
MW-11D	8.0E-04	Van der Kamp	125 - 137	Clayey gravel, sand and gravel, top of rock

TABLE 5-4
Summary of Response Tests in G Area

Well	K (m/s)	Method	Depth (ft)	Materials
MW-6	5.5E-04	Van der Kamp	76 - 95	Gravel with sand and boulders
MW-7S	3.0E-04	Cooper-Pap.	15 - 33	Gravel with sand
MW-7D	3.0E-04	Van der Kamp	55 - 73	Conglomerate
MW-9	8.0E-04	Van der Kamp	55 - 75	Sand to top of rock
MW-10	—	No test results	25 - 42	Gravel with silt and cobbles to top rock

TABLE 5-5
Summary of Other Response Tests

Well	K (m/s)	Method	Depth (ft)	Materials
MW-5S	5.0E-05	Cooper-Pap.	25 - 41	Silt and silty sand with gravel, gravel at 35'
MW-5M	3.4E-04	Van der Kamp	52 - 71	Silt and sand and gravel
MW-5D	5.0E-06	Cooper-Pap.	85 - 109	Sand and gravel to top of rock
MW-8S	—	No test results	5 - 19	Silty sand and sand and gravel
MW-8M	7.5E-04	Van der Kamp	24 - 55	Gravelly sand
MW-8D	3.2E-04	Van der Kamp	80 - 103	Gravelly sand

TABLE 5-6
Preliminary Results of Pump Tests

Pump Test	Area	Piezo Location	Pumping Rate (usgpm)	Distance (m)	K_h (m/s)	K_v (m/s)	Thickness (m)	Method	Comments
PW-1	Pit	P4-AS	10.4	29					No response
		P4-AD		30		2.2E-08	5	Ratio	Calculated drawdown in aquifer
		P-6S		75					No response
		P-6M		71		1.1E-08	5	Ratio	Clays
		P-6D		73	1.6E-05		5	Hantush	Bedrock aquifer, anisotropic?
PW-3	Upper J	MW-11S	49.5	10.3					No response
		MW-11M		8.4	5.0E-04		20	Hantush and Jacob	Partial penetration impacts?
						3.0E-05	15	Hantush and Jacob	Sand and gravel to water table?
		MW-11D		7.9		2.1E-07	5	Ratio	Clay is only about 1 m.
PW-4	Lower J	MW-1S	356	11.7					No response, 1.5' daily fluctuations
		MW-1M		8.4	7.3E-03		30	Hantush and Jacob	Partial penetration impacts?
						2.0E-04	15	Hantush and Jacob	Sand and gravel to water table?
		MW-1D		7.9		1.9E-07	5	Ratio	Silty sand and gravel

usgpm = U.S. gallons per minute

TABLE 5-7
2004 Open Pit Packer Permeability Tests by Knight Piesold

Drill Hole No.	Test No.	Test Type	Depth		Collar Elevation (m)	Hole Inclination (degrees)	Elevation		Hydraulic Conductivity (cm/s)	Geology Unit
			From (m)	To (m)			From (m)	To (m)		
KP-01	1	Lugeon	58.80	80.20	383.57	60	332.65	314.12	**2.09E-05**	Y
	2	Lugeon	86.30	113.70	383.57	60	308.84	285.11	**3.73E-06**	Y
	3	Lugeon	113.10	150.30	383.57	60	285.63	253.41	**4.84E-06**	Y
	4	Lugeon	147.30	196.00	383.57	60	256.01	213.83	**1.47E-05**	Y
	5	Lugeon	196.00	235.60	383.57	60	213.83	179.54	**2.47E-06**	Y
	6	Lugeon	235.70	275.30	383.57	60	179.45	145.16	**4.51E-06**	P
	7	Lugeon	279.90	319.50	383.57	60	141.17	106.88	**5.31E-08**	Y
	8	Lugeon	365.20	411.00	383.57	60	67.30	27.64	**6.62E-07**	P
KP-02	1	Lugeon	46.70	67.20	315.74	60	275.30	257.54	**1.47E-06**	T
	2	Lugeon	119.80	144.20	315.74	60	211.99	190.86	**4.13E-05**	D
	3	Lugeon	165.60	196.00	315.74	60	172.33	146.00	**4.59E-06**	D
KP-02A	1	Lugeon	27.00	55.50	312.67	60	289.29	264.61	**1.42E-04**	Gs
	2	Lugeon	55.50	98.17	312.67	60	264.61	227.66	**8.66E-05**	Gs
	3	Lugeon	98.20	143.60	312.67	60	227.63	188.31	**7.42E-06**	D
	4	Lugeon	160.67	206.40	312.67	60	173.53	133.93	**1.42E-07**	D
	5	Lugeon	206.40	252.13	312.67	60	133.93	94.32	**3.35E-06**	D
	6	Lugeon	252.13	297.86	312.67	60	94.32	54.72	**3.50E-06**	D
	7	Lugeon	297.87	343.60	312.67	60	54.71	15.11	**9.40E-09**	D
	8	Lugeon	343.60	404.57	312.67	60	15.11	-37.69	**2.77E-07**	D
KP-04	1	Lugeon	48.50	63.70	306.72	65	262.76	248.98	**6.43E-05**	T
	2	Lugeon	86.26	96.90	306.72	60	232.01	222.80	**1.04E-05**	T
	3	Lugeon	95.70	103.00	306.72	60	223.84	217.51	**2.49E-06**	T
	4	Lugeon	100.00	106.00	306.72	60	220.11	214.92	**1.32E-06**	T
	5	Lugeon	105.50	110.70	306.72	60	215.35	210.85	**2.60E-06**	T
	6	Lugeon	110.70	119.80	306.72	60	210.85	202.97	**6.70E-07**	T
	7	Lugeon	175.60	180.70	306.72	60	154.64	150.22	**5.00E-06**	Y
	8	Lugeon	181.40	186.80	306.72	60	149.62	144.94	**4.59E-06**	Y
	9	Lugeon	200.00	214.30	306.72	60	133.51	121.13	**1.66E-07**	Y
	10	Lugeon	211.80	232.60	306.72	60	123.29	105.28	**1.95E-06**	Gs
	11	Lugeon	233.50	281.30	306.72	60	104.50	63.10	**3.23E-07**	Y
	12	Lugeon	350.00	411.00	306.72	60	3.61	-49.22	**1.03E-06**	Gs
	13	Lugeon	342.40	473.50	306.72	60	10.19	-103.35	**2.49E-06**	Y

Drill Hole No.	Test No.	Test Type	Depth		Collar Elevation (m)	Hole Inclination (degrees)	Elevation		Hydraulic Conductivity (cm/s)	Geology Unit
			From (m)	To (m)			From (m)	To (m)		
KP-05A	1	Lugeon	190.80	242.70	307.19	60	141.95	97.00	**3.91E-06**	D
	2	Lugeon	236.20	266.30	307.19	60	102.63	76.56	**4.51E-06**	D
	3	Lugeon	282.30	343.30	307.19	60	62.71	9.88	**1.31E-06**	Gs
	4	Lugeon	337.20	396.80	307.19	60	15.16	-36.45	**5.03E-07**	Gs
KP-06	1	Lugeon	54.90	100.60	320.37	60	272.83	233.25	**8.21E-05**	N
	2	Lugeon	102.70	138.70	320.37	60	231.43	200.25	**2.09E-05**	Y
	3	Lugeon	138.70	181.40	320.37	60	200.25	163.27	**2.07E-05**	N
	4	Lugeon	181.40	211.90	320.37	60	163.27	136.86	**3.24E-06**	N
	5	Lugeon	213.40	250.00	320.37	60	135.56	103.86	**4.69E-06**	N
	6	Lugeon	315.50	352.10	320.37	60	47.14	15.44	**6.00E-06**	N
	7	Lugeon	352.10	391.80	320.37	60	15.44	-18.94	**3.93E-05**	N
KP-08	1	Lugeon	89.30	113.70	353.49	60	276.15	255.02	**8.21E-05**	N
	2	Lugeon	104.60	138.70	353.49	60	262.90	233.37	**8.44E-05**	N
	3	Lugeon	148.80	188.40	353.49	60	224.63	190.33	**2.75E-04**	Y
	4	Lugeon	183.80	223.50	353.49	60	194.32	159.93	**1.83E-05**	Y
	5	Lugeon	200.60	231.10	353.49	60	179.77	153.35	**3.71E-07**	Y
	6	Lugeon	232.60	277.70	353.49	60	152.05	113.00	**8.27E-08**	N
	7	Lugeon	279.90	319.50	353.49	60	111.09	76.80	**1.72E-06**	N
	8	Lugeon	353.00	426.20	353.49	60	47.78	-15.61	**2.53E-06**	N

Notes:

cm/s = centimeters per second

D = Diorite

Gs = Granodiorite

N = Monzonite

P = Porphyritic Monzodiorite

Y = Andesitic Siltstone

TABLE 5-8
2004 Open Pit Rising-head Test Results by Knight Piesold

Drill-hole No.	Test No.	Test Type	Depth		Collar Elevation (m)	Hole Inclination (deg)	Elevation		Hydraulic Conductivity (cm/s)	Geology Unit
			From (m)	To (m)			From (m)	To (m)		
I-125	1	Rising Head	20.00	24.40	307.3	90	287.30	282.90	**1.31E-04**	T
	2	Rising Head	20.00	24.40	307.3	90	287.30	282.90	**1.34E-04**	T
I-172	1	Rising Head	34.80	39.10	312.9	90	278.10	273.80	**9.45E-05**	T
	2	Rising Head	34.80	39.10	312.9	90	278.10	273.80	**8.95E-05**	T
M-21	1	Rising Head	23.00	28.00	371.6	90	348.60	343.60	**1.67E-04**	Gs
	2	Rising Head	23.00	28.00	371.6	90	348.60	343.60	**2.54E-04**	Gs
M-110	1	Rising Head	25.50	31.10	360.3	90	334.80	329.20	**4.14E-05**	Y
	2	Rising Head	25.50	31.10	360.3	90	334.80	329.20	**6.90E-05**	Y
PQ-4	1	Rising Head	36.10	40.78	392.8	90	356.70	352.02	**2.37E-05**	N
	2	Rising Head	36.10	40.78	392.8	90	356.70	352.02	**2.30E-05**	N
PQ-8	1	Rising Head	25.50	31.10	318.8	90	293.30	287.70	**8.19E-05**	Gs
	2	Rising Head	25.50	31.10	318.8	90	293.30	287.70	**8.32E-05**	Gs
SRK-2	1	Rising Head	58.00	70.00	303.5	90	245.50	233.50	**1.50E-06**	T
	2	Rising Head	58.00	70.00	303.5	90	245.50	233.50	**1.50E-06**	T
SRK-3	1	Rising Head	18.80	23.10	313.7	90	294.90	290.60	**3.58E-04**	T
	2	Rising Head	18.80	23.10	313.7	90	294.90	290.60	**3.41E-04**	T
SRK-5	1	Rising Head	33.00	37.80	323.7	90	290.70	285.90	**4.10E-05**	Gs
	2	Rising Head	33.00	37.80	323.7	90	290.70	285.90	**6.30E-05**	Gs
I-201	1	Rising Head	43.10	47.60	321.7	90	278.60	274.10	**5.05E-04**	O
	2	Rising Head	43.10	47.60	321.7	90	278.60	274.10	**1.82E-04**	O

TABLE 5-9
Falling- or Rising-head Tests in GH-series Piezometers by Knight Piesold

Drill-hole No.	Permeability Tests (k)		Depth (feet)	Piezometer Completion Zone
	Rising/Falling-head Test Results (cm/s)	Packer (Lugeon) Test Results (cm/s)		
South Fork Koktuli River				
GH04-12A	Recovery too fast for test.		43 - 65	Andesite
GH04-17	Recovery too fast for test.		36 - 40	Gravelly sand
GH04-18	Recovery too fast for test.		44 - 57	S&G, silt
GH04-38		6.2E-04	95 - 190	Mudstone/siltstone
GH04-40A		1.2E-04	187.5 - 255	Tertiary andesite
Area W				
GH04-20	1.4E-04		1 - 24	Granodiorite
Area G				
GH04-23	Recovery too fast for test.		9 - 22	Diorite
GH04-24	5.0E-04			Basalt
GH04-25	Recovery too fast for test.		62 - 77	Silt/gabbro
GH04-25		1.2E-04	125 - 185	Gabbro
Mill Site				
GH04-26		3.8E-04	35 - 135	Siltstone
GH04-27		2.40E-03	25 - 55	Siltstone
GH04-27		1.20E-04	55 - 125	Siltstone
Frying Pan Lake				
GH04-28	5.4E-05		45 - 60	Latite
GH04-28		3.5E-04	45 - 145	Latite
GH04-31		1.2E-05	95 - 195	Latite
GH04-41		3.0E-04	25 - 120	Qtz latite/wacke
GH04-43	Recovery too fast for test.		85 - 110	Igneous
GH04-45A		1.8E-04	125 - 225	Diorite
GH04-46	3.6E-05		64 - 87.5	Dacite/andesite
GH04-46		1.2E-04	35 - 135	Andesite
GH04-47		2.7E-04	185 - 270	Latite

TABLE 5-10
Water Levels Measured on October 16 and October 17, 2004

Well	Date	TD	DTW	PVC elev.	Water Elev
MW-1S	13-Dec-04	17.1	12.4	820.0	807.61
MW-1M	13-Dec-04		7.32	821.3	813.93
MW-1D	13-Dec-04	135	7.7	820.3	812.59
MW-2S	17-Oct-04	101.0	63.0	834.5	damaged well
MW-2D	17-Oct-04	146.0	87.6	835.0	747.33
MW-3D	17-Oct-04	195	158.4	1029.2	870.77
MW-4	18-Oct-04	55.0	17.1	1012.6	995.48
MW-5S	16-Oct-04	50.0	13.5	982.7	969.25
MW-5M	16-Oct-04	75.0	14.5	982.8	968.33
MW-5D	16-Oct-04	109.0	13.4	982.3	968.84
MW-6D	16-Oct-04	100.0	69.3	1123.3	1054.01
MW-7S	16-Oct-04	35.0	19.4	1549.8	1530.44
MW-7D	16-Oct-04	75.0	18.5	1548.1	1529.62
MW-8S	16-Oct-04	20.0	14.6	1120.5	1105.96
MW-8M	16-Oct-04	55.0	14.3	1120.3	1105.99
MW-8D	16-Oct-04	103.0	9.2	1120.4	1111.19
MW-9D	16-Oct-04	80.0	6.7	1531.1	1524.41
MW-10	16-Oct-04	44.2	26.9	1113.0	1086.06
MW-11D	16-Oct-04	137.7	52.3	886.7	834.44
MW-11M	16-Oct-04	115.2	51.7	887.2	835.45
MW-11S	16-Oct-04	84.0	54.2	886.9	832.69
KP-P1/SRK2	16-Oct-04	174.0	52.3	1000.5	948.22
SRK-2A	16-Oct-04	84.0	55.0	1001.1	946.12
KP_P2A/ Stand 3	17-Oct-04	4.6	dry	1057.6	
KP-P3 3/ SRK 5S	17-Oct-04	24.0	6.3	1047.9	1041.66
SRK-2/ 4251	17-Oct-04	198.4	43.6	995.7	952.15
KP-P3M/ SRK 5M	17-Oct-04	57.0	10.7	1047.9	1037.26
KP-P3D/ SRK 5D	17-Oct-04	79.0	0.0	1047.9	1047.91
KP-P2/ SRK-4	16-Oct-04	54.0	22.3	1005.3	983.02
SRK-3-4250	17-Oct-04	73.7	25.6	1027.4	1001.81
KP-P4	4-Sep-04	54.0	25.7		
PW-1	17-Oct-04	119.0	16.6	1003.3	986.72
P-2 M	16-Oct-04	70.3	4.2	1027.1	1022.90
P-2 D	17-Oct-04	89.2	4.4	1026.6	1022.22
P-3	17-Oct-04	25.4	5.2	1024.7	1019.56
P-4 mid	17-Oct-04	104.0	13.8	996.3	982.47

Well	Date	TD	DTW	PVC elev.	Water Elev
P-4A S	16-Oct-04	52.8	19.2	1003.9	984.71
P-4A D	16-Oct-04	123.0	18.0	1003.5	985.51
P-6S	16-Oct-04	43.0	16.6	1001.1	984.55
P-6M	16-Oct-04	93.0	15.7	1001.2	985.54
P-6D	16-Oct-04	116.4	14.3	1000.8	986.50
GHO4-01	16-Oct-04		13.1	1066.5	1053.38
GHO4-02	17-Oct-04		4.9	1151.1	1146.17
GHO4-03	17-Oct-04	59.9	57.4	935.7	878.32
GH04-04		74.6	74.6	924.0	<850
GHO4-05	17-Oct-04		3.6	772.3	768.69
GHO4-08	17-Oct-04		0.0	1526.5	1526.46
GH04-10			56.8	908.0	851.15
GHO4-11	16-Oct-04		24.7	977.2	952.59
GHO4-12A	17-Oct-04		29.1	884.3	855.24
GHO4-13	17-Oct-04		42.2	1055.5	1013.26
GHO4-14	16-Oct-04		69.9	929.1	859.20
GHO4-16	16-Oct-04		67.6	890.6	823.02
GHO4-17	17-Oct-04		20.5	842.6	822.16
GHO4-18	17-Oct-04		10.3	833.2	822.89
GHO4-19	17-Oct-04		2.6	882.4	879.74
GHO4-20	17-Oct-04		0.0	1225.5	1225.54
GHO4-22	17-Oct-04		3.7	1133.7	1129.99
GHO4-23	17-Oct-04		2.1	1366.9	1364.81
GHO4-24	17-Oct-04			1121.7	1121.74
GHO4-26	17-Oct-04		27.0	1558.6	1531.68
GHO4-27	17-Oct-04			1553.2	1553.21
GHO4-28	17-Oct-04		38.5	1157.8	1119.32
GHO4-29A	17-Oct-04	60.5	57.6	1030.1	<973
GHO4-30	17-Oct-04	77	74.8	939.3	864.53
GHO4-31	17-Oct-04		15.0	1011.5	996.42
GHO4-32	17-Oct-04		30.3	1214.0	1183.73
GHO4-33	17-Oct-04		30.0	905.5	875.47
GHO4-35	17-Oct-04	66.3	64.4	890.4	<826
GHO4-37	17-Oct-04		135.2	977.7	842.44
GHO4-38	17-Oct-04		38.5	943.9	905.40
GHO4-41	16-Oct-04		30.9	943.7	912.83
GHO4-42	17-Oct-04		55.3	1066.5	1011.22
GHO4-43	17-Oct-04		74.6	1122.9	1048.32

Well	Date	TD	DTW	PVC elev.	Water Elev
GHO4-44	17-Oct-04	97.6	dry	1100.1	<1002.5
GHO4-46	17-Oct-04		25.0	1143.8	1118.82
GHO4-47	17-Oct-04		5.6	974.2	968.67
GHO4-48	17-Oct-04		36.6	1184.8	1148.20

TABLE 5-11
List of Files Containing Background Water-level Data for Monitoring Wells

In Situ Data Filename	Time Start	Time End	Hole ID	Comment
SN05461 2004-09-14 174527 P-4A S 9-14.bin	9/14/2004 17:45	9/16/2004 9:59	P-4AS	Pressure Ft H_2O
SN05461 2004-09-16 110214 P-4A S 9-16-04.bin	9/16/2004 11:02	9/17/2004 13:37	P--4AS	Pressure Ft H_2O
SN05461 2004-09-17 124922 P4A-S 2.bin	9/17/2004 12:49	9/18/2004 18:51	P4AS	Pressure Ft H_2O
SN05461 2004-09-17 133827 P4AS-2.bin	9/17/2004 13:38	9/17/2004 13:47	P-4AS	Pressure Ft H_2O
SN05461 2004-09-18 185415 P4A-S 9-18-04.bin	9/18/2004 18:54	9/20/2004 9:39	P-4AS	Pressure Ft H_2O
SN05461 2004-09-20 094115 P4A Shallow 9-20.bin	9/20/2004 9:41	9/22/2004 7:55	P-4AS	Pressure Ft H_2O
SN05461 2004-09-23 134100 P4AS_092304(2).bin	9/23/2004 13:41	9/23/2004 15:02	P-4AS	Pressure Ft H_2O
SN14201 2004-09-18 125332 P6S - PW1.bin	9/18/2004 12:53	9/18/2004 17:22	P-6S	Pressure Ft H_2O
SN14201 2004-09-18 132459 P6S-PW1 #2.bin	9/18/2004 13:24	9/18/2004 19:02	P-6S	Pressure Ft H_2O
SN14201 2004-09-18 190512 P6S 9-18-04.bin	9/18/2004 19:05	9/20/2004 9:26	P-6S	Pressure Ft H_2O
SN14201 2004-09-20 092637 P6S 9-20-04.bin	9/20/2004 9:26	9/22/2004 7:58	P-6S	Pressure Ft H_2O
SN14201 2004-09-23 105455 P6S 9-23-04.bin	9/23/2004 10:54	9/23/2004 13:32	P-6S	Pressure Ft H_2O
SN14201 2004-09-23 133404 P6S_092304_(2).bin	9/23/2004 13:34	9/23/2004 15:05	P-6S	Pressure Ft H_2O
SN14559 2004-09-18 115757 P6D - PW1.bin	9/18/2004 11:57	9/18/2004 16:15	P-6D	Pressure Ft H_2O
SN14559 2004-09-18 131836 P6D-PW1 #2.bin	9/18/2004 13:18	9/18/2004 18:55	P-6D	Pressure Ft H_2O
SN14559 2004-09-18 185721 P6D 9-18-04.bin	9/18/2004 18:57	9/20/2004 9:12	P-6D	Pressure Ft H_2O
SN14559 2004-09-20 092008 P6D 9-20-04.bin	9/20/2004 9:20	9/22/2004 11:21	P-6D	Pressure Ft H_2O

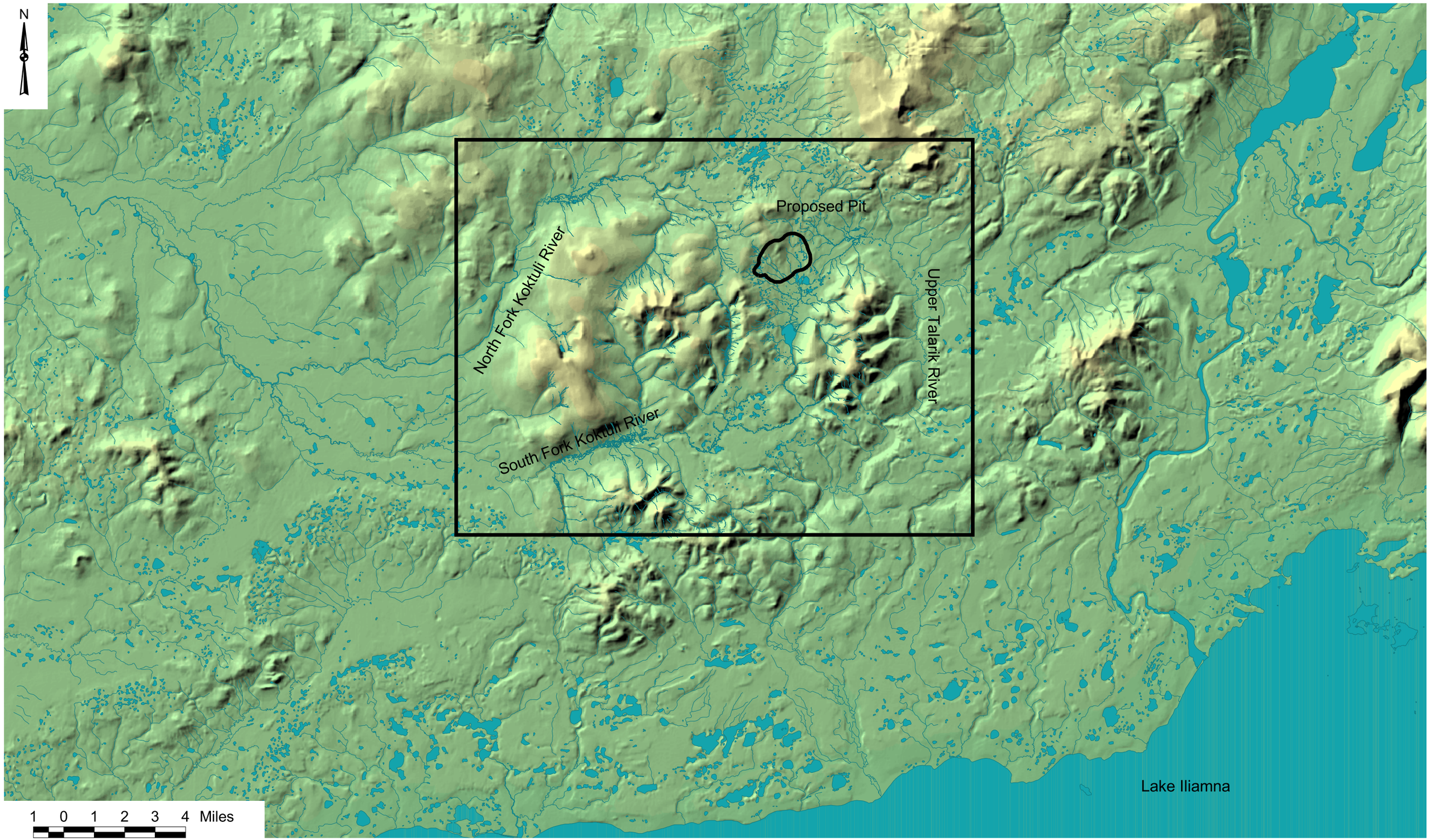
In Situ Data Filename	Time Start	Time End	Hole ID	Comment
SN14559 2004-09-23 110221 P6D 9-23-04.bin	9/23/2004 11:02	9/23/2004 13:36	P-6D	Pressure Ft H_2O
SN14559 2004-09-23 133841 P6D_092304_(2).bin	9/23/2004 13:38	9/23/2004 15:07	P-6D	Pressure Ft H_2O
SN14673 2004-09-17 124750 P6M-1.bin	9/17/2004 12:47	9/17/2004 13:19	P-6M	Pressure Ft H_2O
SN14673 2004-09-17 132520 P6M-2.bin	9/17/2004 13:25	9/17/2004 15:01	P-6M	Pressure Ft H_2O
SN14673 2004-09-18 070029 P6M - PW1.bin	9/18/2004 7:00	9/18/2004 11:23	P-6M	Pressure Ft H_2O
SN14673 2004-09-18 132158 P6M-PW1 #2.bin	9/18/2004 13:21	9/18/2004 18:58	P-6M	Pressure Ft H_2O
SN14673 2004-09-18 190125 P6M 9-18-04.bin	9/18/2004 19:01	9/20/2004 9:21	P-6M	Pressure Ft H_2O
SN14673 2004-09-20 092220 P6M 9-20-04.bin	9/20/2004 9:22	9/22/2004 9:27	P-6M	Pressure Ft H_2O
SN14715 2004-09-14 143713 P-4A DEEP 9-14.bin	9/14/2004 14:37	9/16/2004 10:23	P-4AD	Pressure Ft H_2O
SN14715 2004-09-16 110345 P-4A D 9-16-04.bin	9/16/2004 11:03	9/17/2004 12:18	P-4AD	Pressure Ft H_2O
SN14715 2004-09-17 123546 P4AD-2.bin	9/17/2004 12:35	9/17/2004 12:51	P-4AD	Pressure Ft H_2O
SN14715 2004-09-17 125310 P4A-D 2.bin	9/17/2004 12:53	9/18/2004 18:47	P-4AD	Pressure Ft H_2O
SN14715 2004-09-18 185007 P4A-D 9-18-04.bin	9/18/2004 18:50	9/20/2004 9:32	P-4AD	Pressure Ft H_2O
SN14715 2004-09-20 093421 P4A Deep 9-20-04.bin	9/20/2004 9:34	9/22/2004 11:06	P-4AD	Pressure Ft H_2O
SN14715 2004-09-23 110740 P4AD 9-23-04.bin	9/23/2004 11:07	9/23/2004 13:37	P-4AD	Pressure Ft H_2O
SN14715 2004-09-23 134242 P4AD_092304_(2).bin	9/23/2004 13:42	9/23/2004 14:57	P-4AD	Pressure Ft H_2O
SN16575 2004-09-16 161539 PTest #1 Pond.bin				
SN05461 2004-10-07 094147 MW11D PW3 Develp.bin	10/7/2004 9:41	10/7/2004	MW-11D	Pressure Ft H_2O
SN05461 2004-10-08 163000 MW11D PW3 PTest.bin	10/8/2004 16:30	10/10/2004 9:46	MW-11D	Pressure Ft H_2O
SN14559 2004-10-07 160012 MW11S PW3 Develp.bin	10/7/2004 16:00	10/8/2004 16:01	MW-11S	Pressure Ft H_2O
SN14559 2004-10-08 163000 MW11S PTest.bin	10/8/2004 16:30	10/10/2004 9:49	MW-11S	Pressure Ft H_2O
SN05461 2004-10-16 181756 MW11M Background.bin	10/16/2004 18:17	10/18/2004 11:25	MW-11M	

In Situ Data Filename	Time Start	Time End	Hole ID	Comment
SN14715 2004-10-07 095139 MW11M PW3 Develp.bin	10/7/2004 9:51	10/8/2004 16:08	MW-11M	Pressure Ft H_2O
SN14715 2004-10-08 163000 MW11M PW3 PTest.bin	10/8/2004 16:30	10/10/2004 9:44	MW-11M	Pressure Ft H_2O
SN08274 2004-09-30 123924 MW1S_BG(2).bin	9/30/2004 12:39	10/17/2004 11:47	MW-1S	Pressure Ft H_2O
SN08274 2004-10-17 114837 MW1S Pump Test.bin	10/17/2004 11:48	10/20/2004 13:20	MW-1S	Pressure Ft H_2O
SN14673 2004-09-23 170000 MW1D_Background.bin	9/23/2004 17:00	10/11/2004 8:45	MW-1D	Pressure Ft H_2O
SN14715 2004-10-13 103000 MW1 D Background.bin	10/13/2004 10:30	10/17/2004 11:48	MW-1D	Pressure Ft H_2O
SN14715 2004-10-17 114904 MW1D Pump Test.bin	10/17/2004 11:49	10/20/2004 13:34	MW-1D	Pressure Ft H_2O
SN14886 2004-09-23 170000 MW1M_Background.bin	9/23/2004 17:00	10/14/2004 9:15	MW-1M	Pressure Ft H_2O
SN14886 2004-10-14 110655 MW1 M bckgrnd.bin	10/14/2004 11:06	10/17/2004 11:42	MW-1M	Pressure Ft H_2O
SN14886 2004-10-17 114509 MW1M Pump Test.bin	10/17/2004 11:45	10/20/2004 12:27	MW-1M	Pressure Ft H_2O
SN16930 2004-10-16 145221 Barotroll MW1M.bin	10/16/2004 14:52	10/20/2004 12:07	MW-1M	Inches of Hg
SN16930 2004-09-16 111356 P-4A S 9-16-04.bin	9/16/2004 11:13	9/17/2004 13:56	@ P-4AS	Inches of Hg
SN16930 2004-09-17 130025 P-4A S 9-17-04.bin	9/17/2004 13:00	9/21/2004 11:15	@P-4AS	Inches of Hg

FIGURES

WATER MANAGEMENT CONSULTANTS

Figure 5-1 Hydrogeology Study Area



study area.apr

Figure 5-2 Location of Hydrogeology Investigations

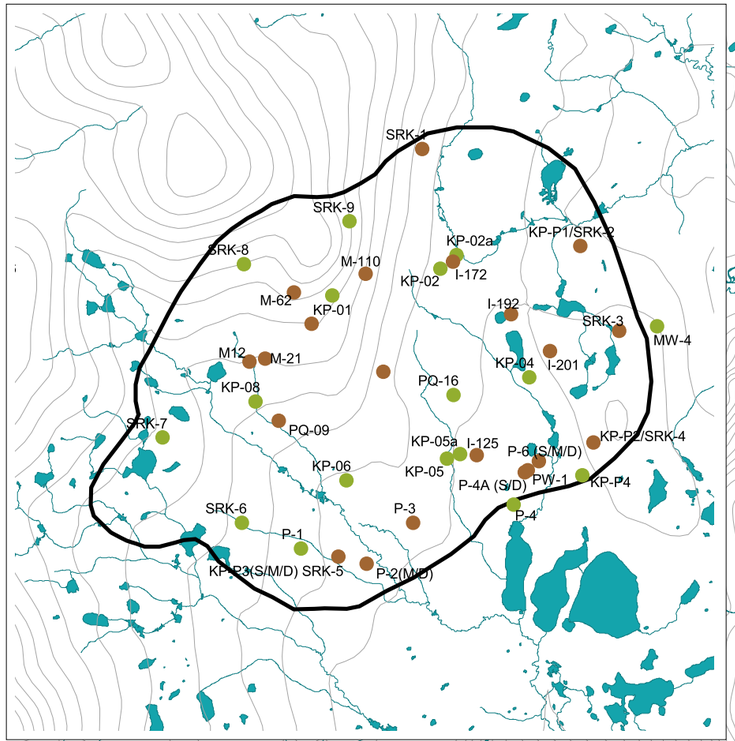
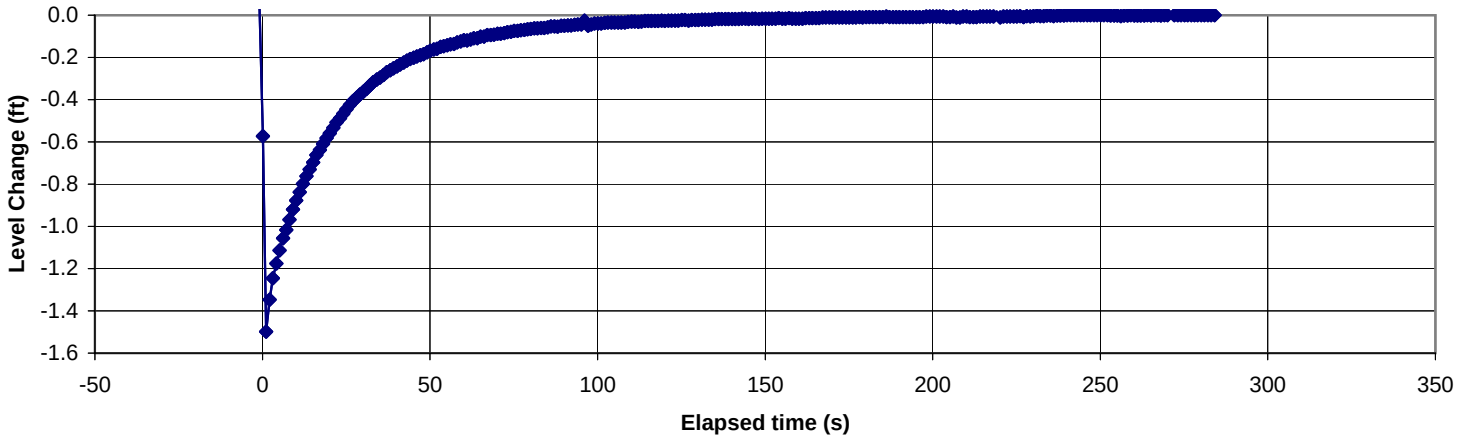


Figure 5-3: Water Level Response in KP-P4



Head Ratio Plot

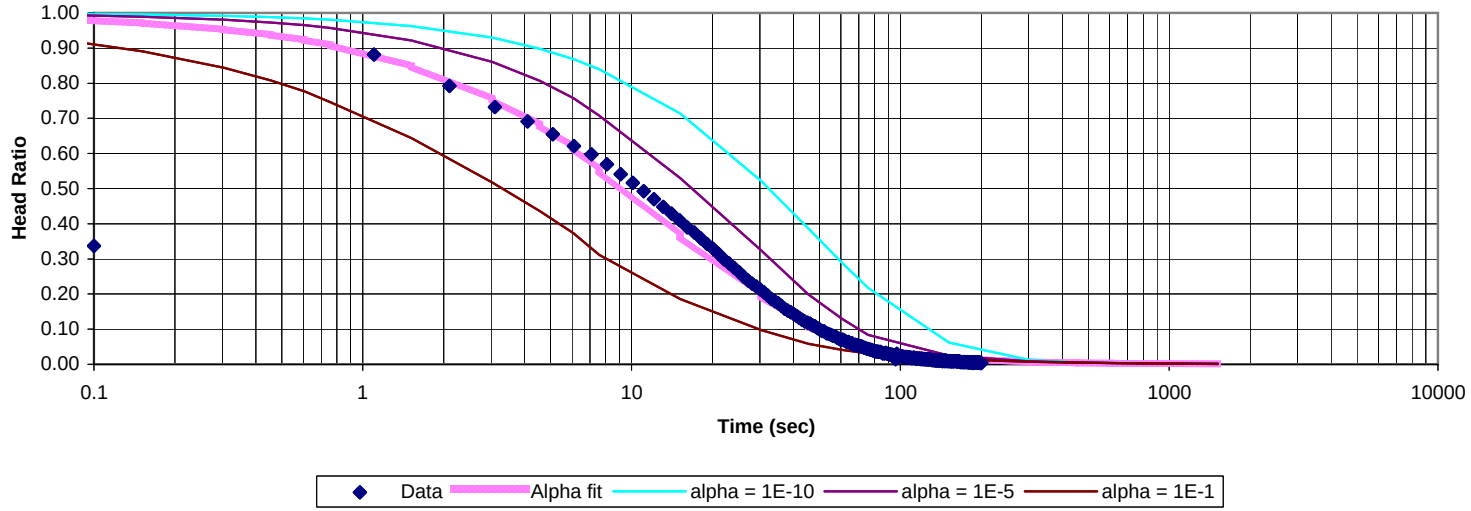


Figure 5-4: Water Level Response in MW-11M

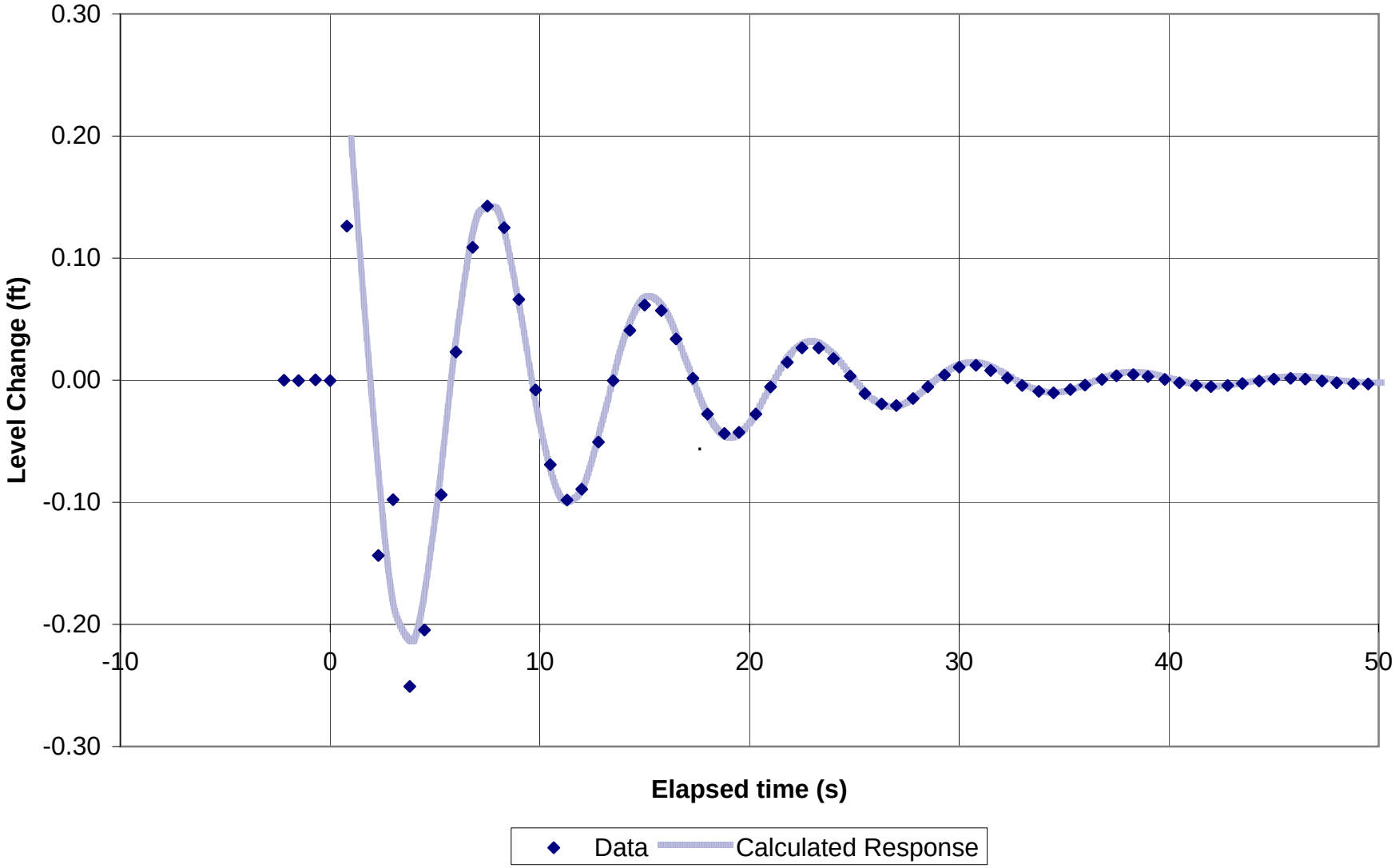


Figure 5-5: Pit Area Lugeon and Rising Head Test Hydraulic Conductivity (m/s) by Knight Piesold

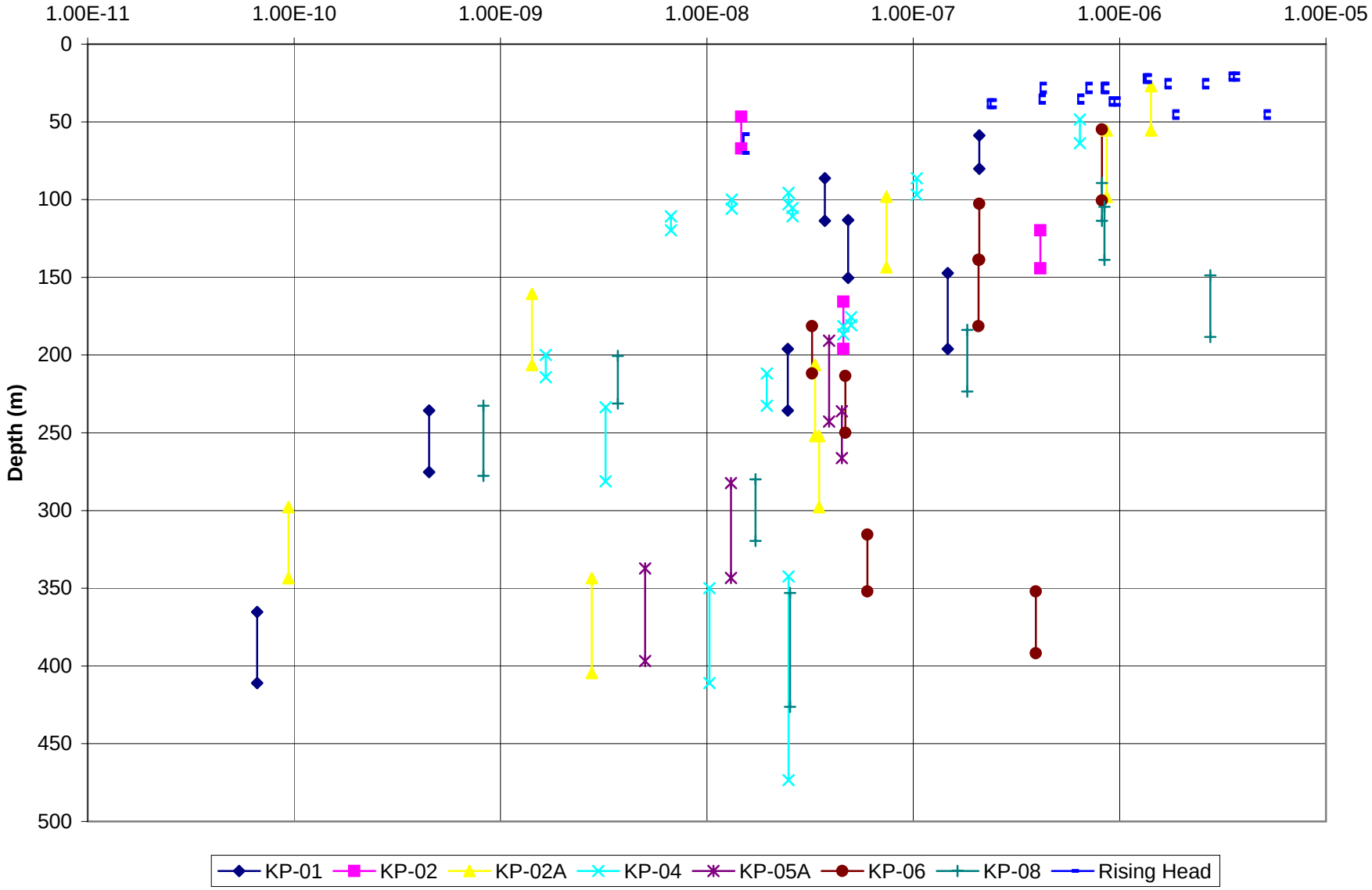


Figure 5-6: Response of P6D to pumping from PW1

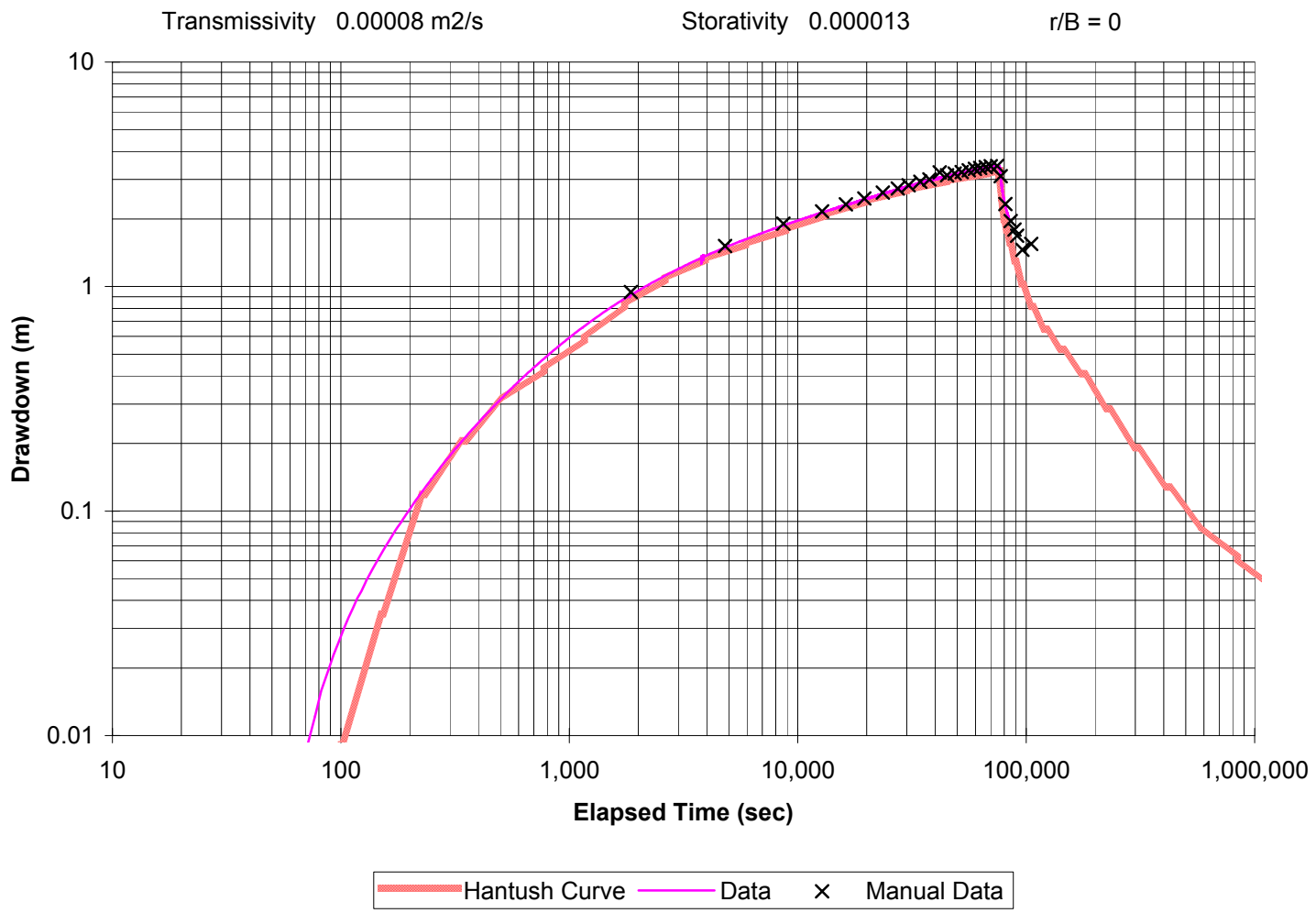


Figure 5-7: MW1M response to pumping PW4

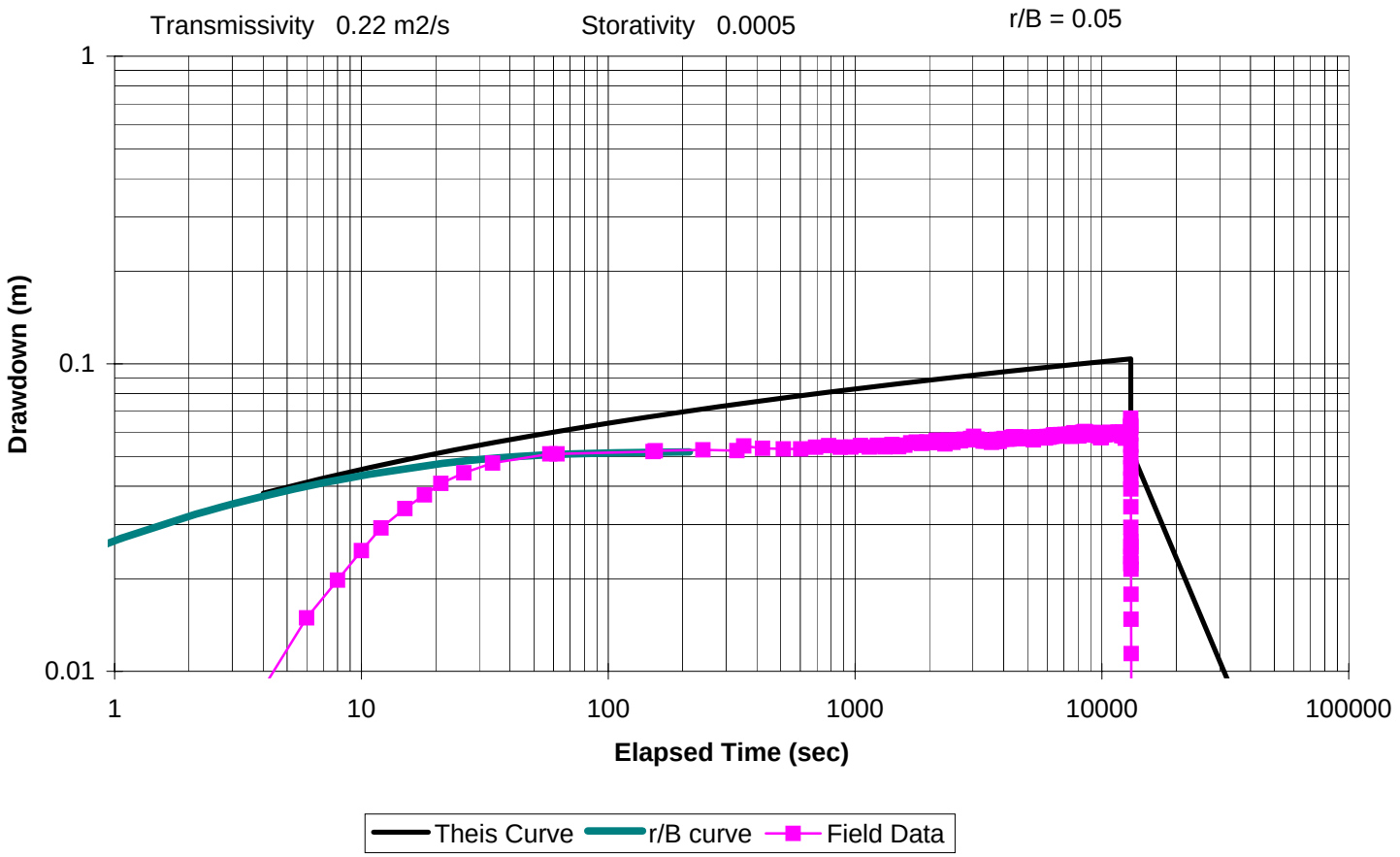
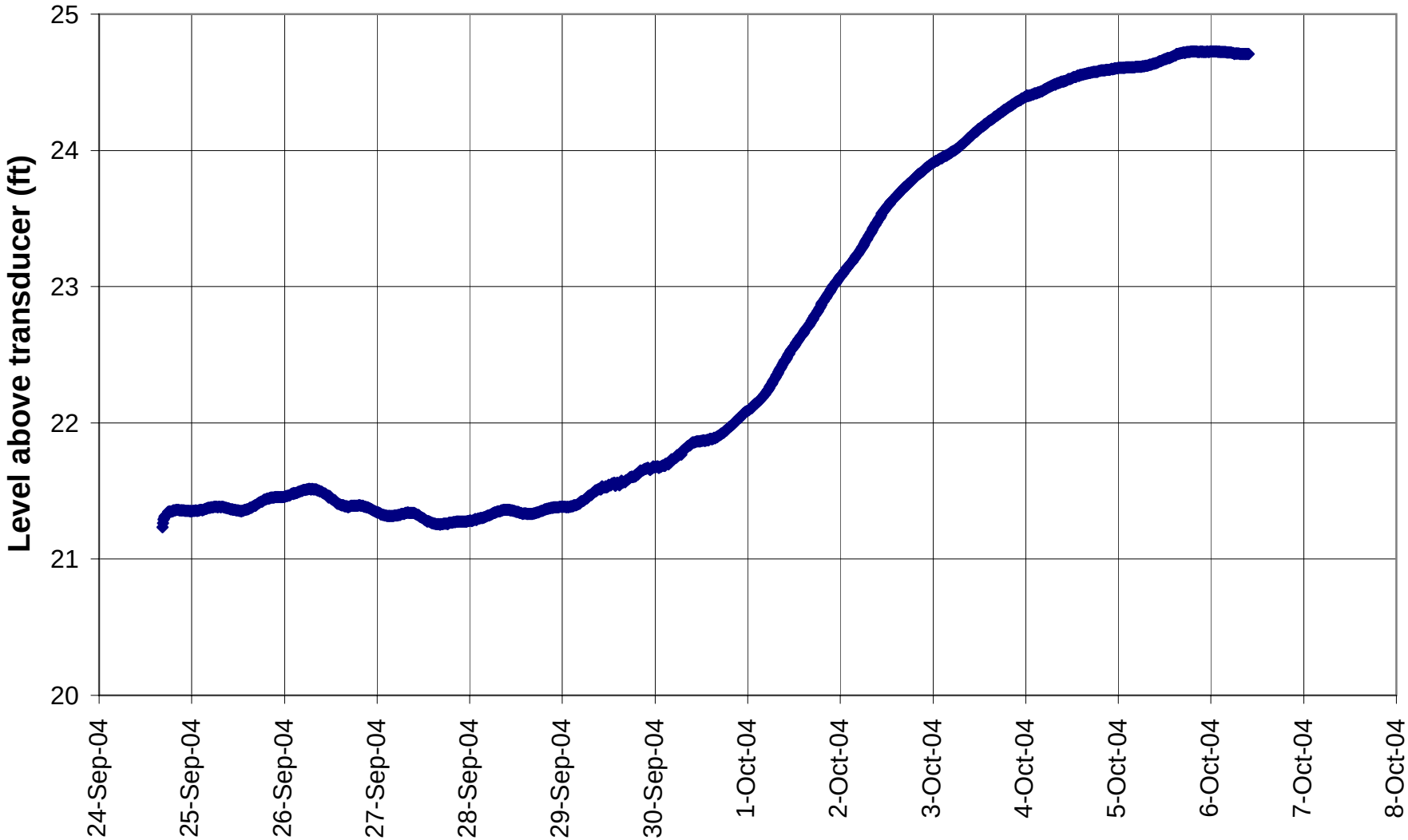
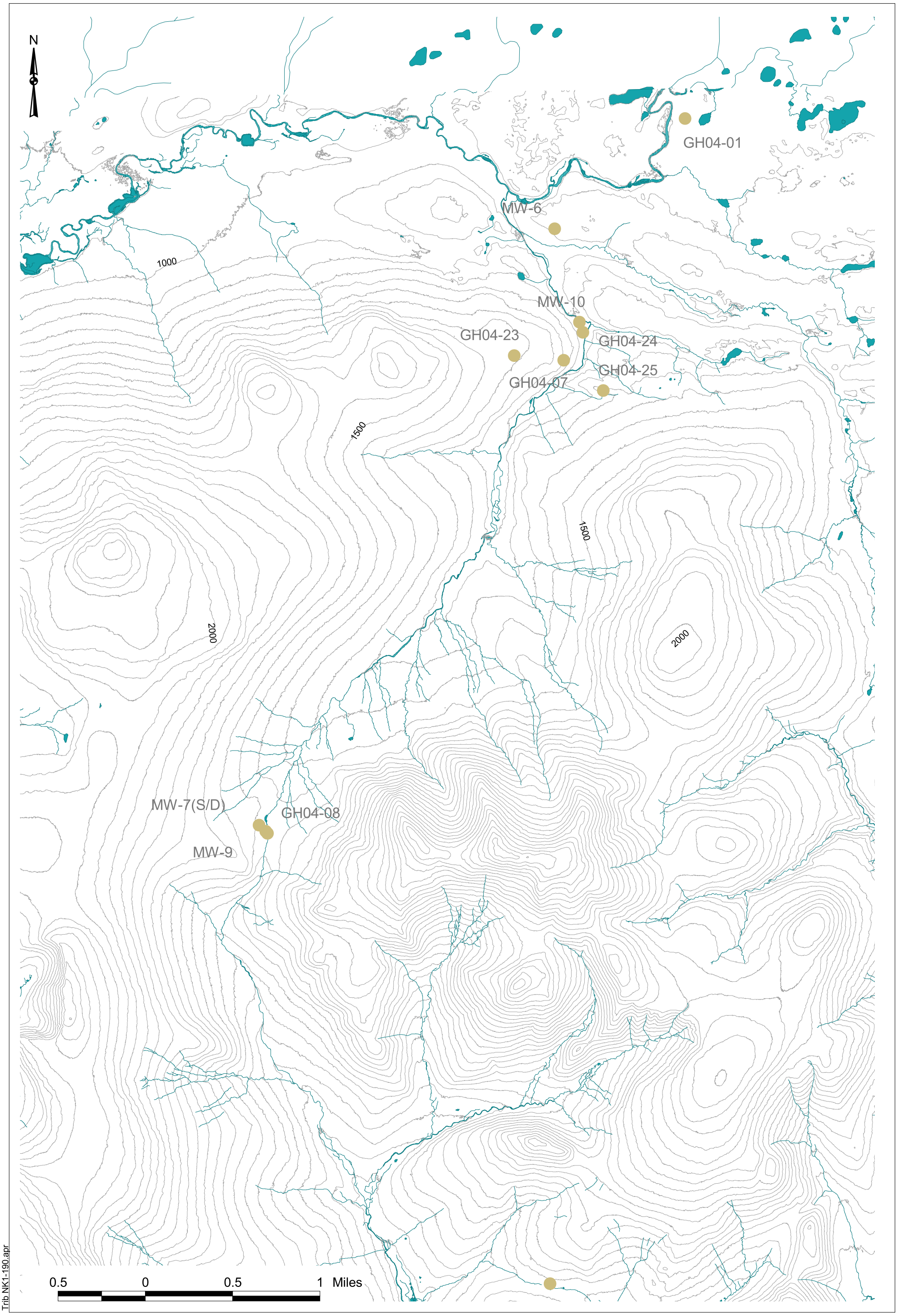


Figure 5-8: Record of MW5D water level



WATER MANAGEMENT CONSULTANTS

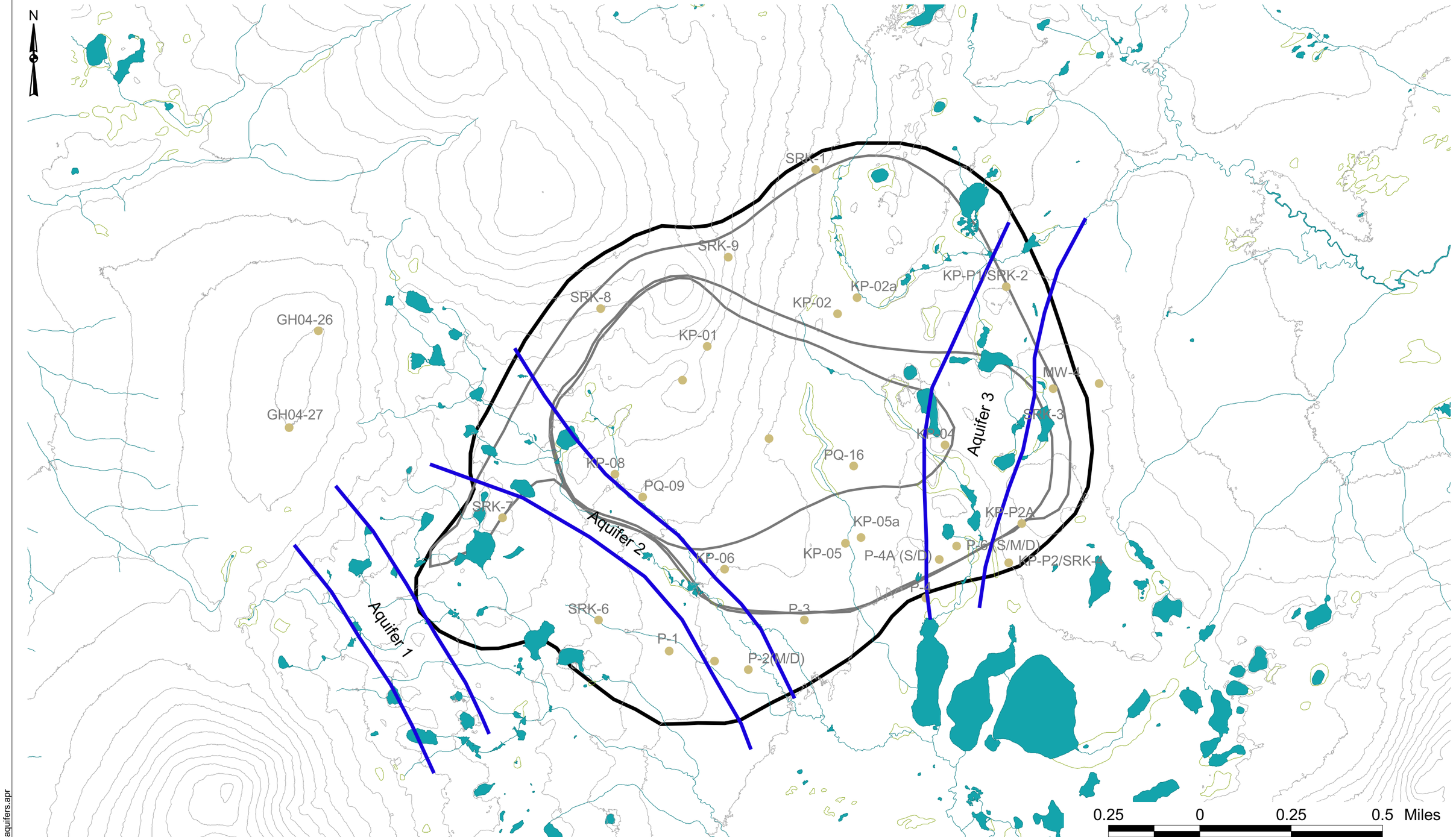
Figure 5-9 Tributary NK1.190 Catchment



Trib NK1-190.apr

WATER MANAGEMENT CONSULTANTS

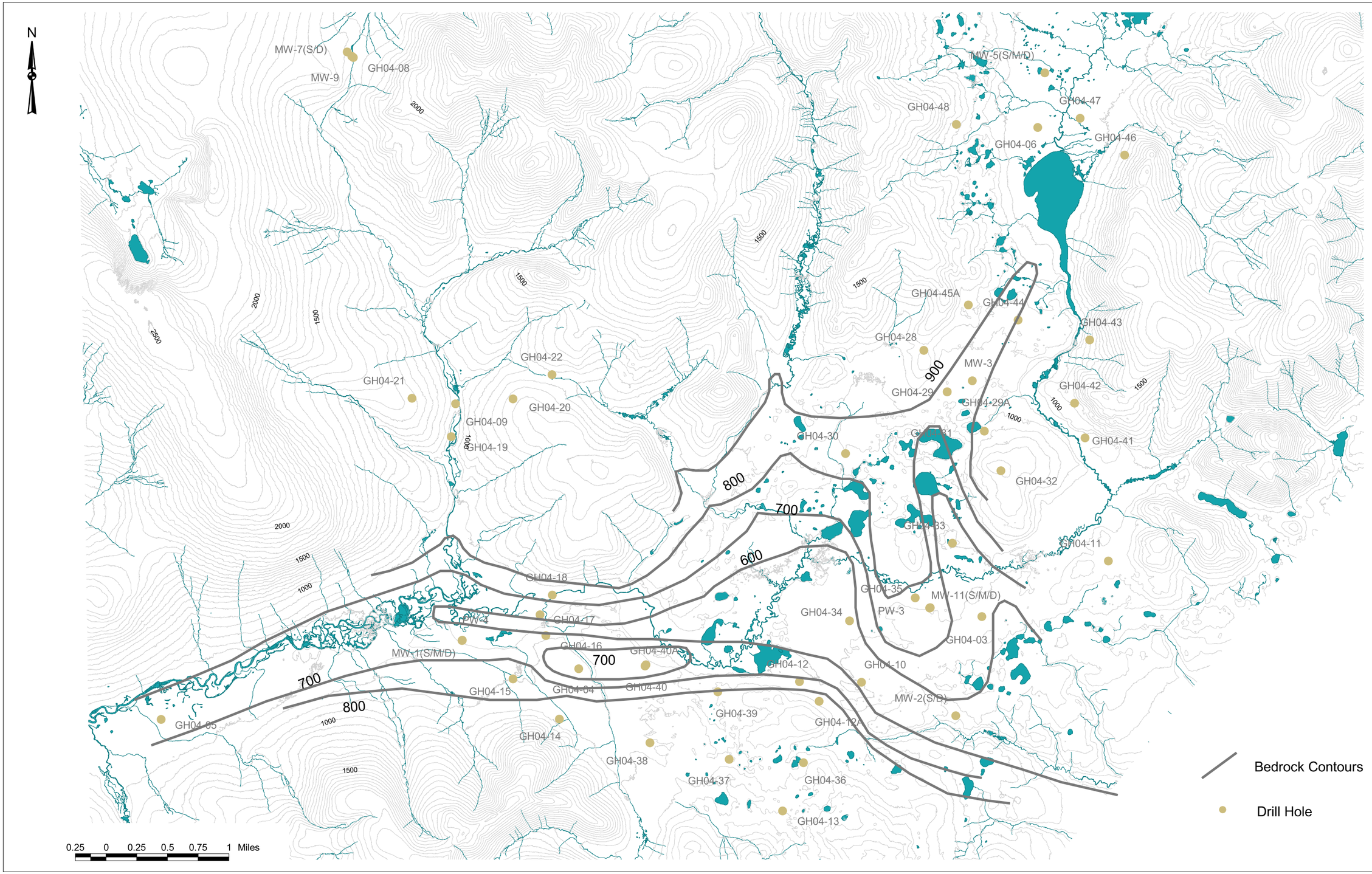
Figure 5-10 Conceptual Overburden Aquifers in Pit



pit aquifers.apr

WATER MANAGEMENT CONSULTANTS

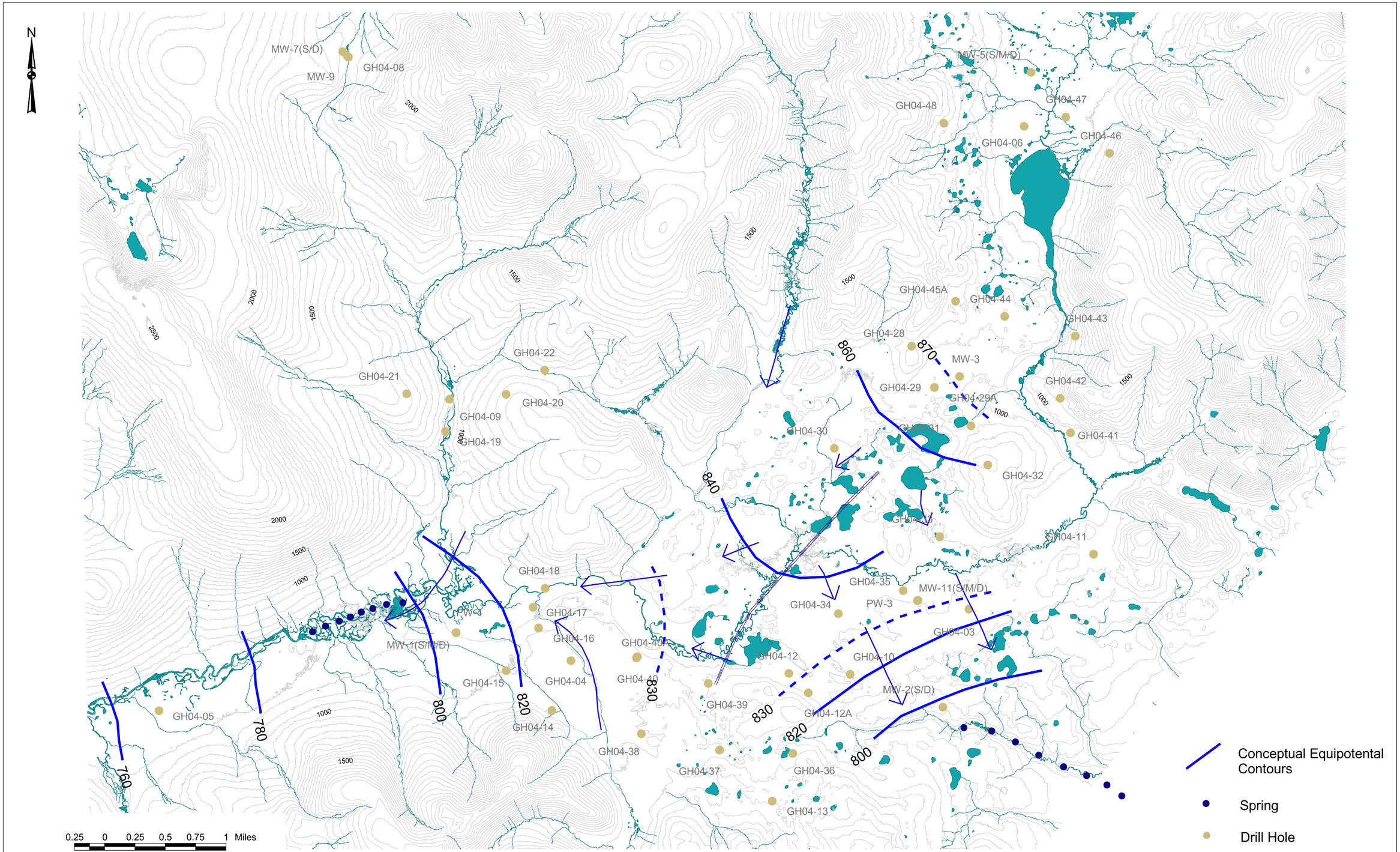
Figure 5-11 Site Plan of South Fork Koktuli Area



South Koktuli.apr

WATER MANAGEMENT CONSULTANTS

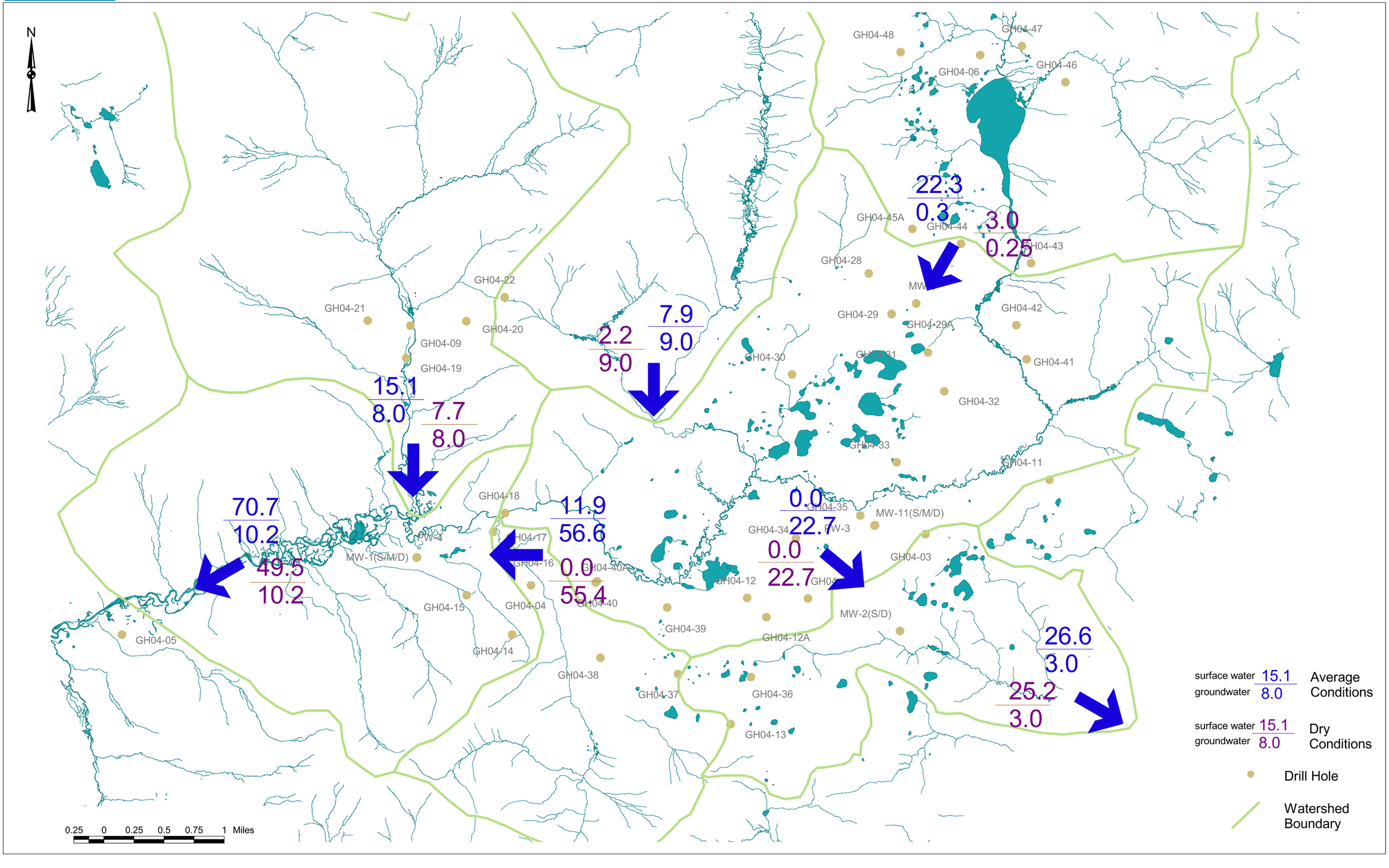
Figure 5-12 South Fork Koktuli Equipotential Distribution



South Koktuli GW.apr

WATER MANAGEMENT CONSULTANTS

Figure 5-13 Results of South Fork Koktuli Conceptual Recharge-Discharge Analysis



water balance.apr

APPENDICES

APPENDIX 5-A
Drill-hole and Installation Logs

BORING NUMBER MW-1D

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 7/24/04 **COMPLETED** 7/24/04 **GROUND ELEVATION** _____ **WATER LEVELS** feet

DRILLING DRILLING CONTRACTOR Midnight Sun **NORTHING** 6632496 **EASTING** 364146

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Matt Flynn

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
0					**Peat (PT)** Brown, moist, soft.	
					3.0 **Well-graded sand w/ trace gravel to 3/8" (SW)** Brown, moist, fine to medium sand.	
					6.0 **Poorly-graded sand (SP)** Brown, moist, medium to fine sand, trace gravel to 3/8".	
10					Wet at 11-12'	
					13.0 **Well-graded gravel with sand (GW)** Brown, moist, sub-angular to rounded gravel to 1/2"	Lost shoe. Pull string and move 3'.
20					Gravel is sub-angular to rounded up to 1". Medium to fine sand approximately 25%.	
30					Sand content approximately 40%. Gravel same as above.	

WELL COMPLETION INFORMATION

CASING

Top elevation (feet): _____

Vent hole?: _____

WELLHEAD PROTECTION COVER

Type: 6" steel casing

Weep hole?: No

Concrete pad dimensions: _____

WELL CASING

Dia.: 2 inches

Type: Schedule 80 PVC

SURFACE CASING

Dia.: 5 inches

Type: _____

SCREEN

Type: 2-inch/Schedule 40 PVC Insta-pack

Slot size: 0.020"

SCREEN FILTER

Type: 10/20 Silica sand

Quantity used: _____

SEAL

Type: Bentonite

Quantity used: 0.5 5-gallon bucket

GROUT

Mix used: 30% Solids Volclay

Method of placement: Tremmie Pipe

Vol. in surface casing: _____

Vol. in well casing: _____

DEVELOPMENT

Method Surge and block, with 1" Waterra pump

Time: _____

Estimated purge volume: _____

Comments: _____

(Continued Next Page)

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 7/24/04 **COMPLETED** 7/24/04 **GROUND ELEVATION** _____ **WATER LEVELS** feet

DRILLING DRILLING CONTRACTOR Midnight Sun **NORTHING** 6632496 **EASTING** 364146

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Matt Flynn

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
40					**Sandy well-graded gravel (GW)** Brown, wet, sub-angular to rounded gravel to 1", medium sand.	Flow YES/OUT
					Sandy well-graded gravel (GW) Brown, wet, sub-angular to rounded gravel to 1", medium sand.	Cond=0-1, pH=6.1 Flow YES/OUT
					70% gravel, 30% sand	
50					Sand content increasing. 60% gravel, 40% sand.	
					54.5	
					Well-graded sand with gravel (SW) Brown, moist to wet, medium to coarse sub-angular sand, sub-angular to rounded gravel up to 3/4". 60% sand, 40% gravel.	
60						Collect water at 65'. Specific Condition=5.7, pH=6.55
					Same as above.	
70					Same as above.	
					Same as above.	
80					**Gravelly well-graded sand (SW)** Brown, wet, sand is fine to coarse, gravel up to 3/4". Approximately 65% sand, 35% gravel.	
						Flow YES/OUT
					Decreasing sand.	
90					90.0	
					Well-graded gravel with sand (GW) Brown, wet, find sand to 3/4" gravel. Sub-angular gravel and sub-angular sand. 35% sand and 65% gravel	Flow YES/OUT, Specific Condition=5.3,

NORTHERN DYNASTY PEBBLE.GPJ GINT US.GDT 1/24/05

(Continued Next Page)

BORING NUMBER MW-1D

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 7/24/04 **COMPLETED** 7/24/04 **GROUND ELEVATION** _____ **WATER LEVELS** feet

DRILLING DRILLING CONTRACTOR Midnight Sun **NORTHING** 6632496 **EASTING** 364146

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Matt Flynn

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
100					45% sand and 55% gravel	pH=6.04 Collect water at 95'. Flow YES/OUT
					105.0 Same	
					Silty gravel with sand (GM) Tan/brown, saturated. 20% silt, 30% sand, 50% gravel	
110						Flow YES/OUT
120					**Poorly-graded sand with gravel and silt (SP-SM)** Brown, wet, fine sand, sub-rounded gravel to 1/2".	Flow YES/OUT, Specific Condition=5.2, pH=6.52
					128.0	
130					**Bedrock** White/green, wet, calcified rock with pyrite. HCl test confirmed.	Flow YES/OUT, Specific Condition=5.9, pH=6.14 Water sample at 132'.
					134.5	
					Bottom of boring at 134.5' at 16:00 on 7/24/04 Bottom of hole at 134.5 feet.	

NORTHERN DYNASTY PEBBLE.GPJ GINT US.GDT 1/24/05

BORING NUMBER MW-1M

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 7/22/04 **COMPLETED** 7/22/04 **GROUND ELEVATION** App. 1,000 ft. AMSL **WATER LEVELS** 8.9 feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 5954.44 **EASTING** -15518.37

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Rob Crotty

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
0					0.5 **Peat (PT)** Dark brown, moist, blocky, fibrous mat with fine sand and subangular gravel to 0.5 inches.	Drill cuttings, drilling action and rate indicate organics, silts and fine sands. Drilling rate is 2.5 ft/min.
					Silty Gravel (GM) Light brown, wet, subangular gravel to 0.5 inches with fine to medium subangular sand and trace silt.	Drill cuttings, drilling action and rate indicate gravels and sands.
					7.0	Drill cuttings, drilling action and rate indicate gravels and sands. Increasing sand fraction. Drilling rate is 1 ft/min.
					9.0 ▽ **Poorly Graded Sand (SW)** Brown, moist to wet, uniform subangular, medium sand with trace round gravel to 0.5 inches and trace silt.	Drill cuttings, drilling action and rate indicate sands. Drilling rate is 1 ft/min. Increasing gravel fraction.
10					**Well Graded Gravel with Sand (GW)** Brown, wet, platy, subround gravel to >1 inch with fine to coarse subangular sand and trace silt.	Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is 1 ft/min. Flow rate is < 0.1gpm. Flow IN
					17.0	Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is 1 ft/min. Increasing gravel fraction.
20					**Poorly Graded Gravel with Sand (GP)** Brown, wet, platy, subround gravel to >1 inch with medium to coarse subangular sand.	Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is 2 ft/min. Flow rate is < 0.1 gpm. Flow IN
					Increasing gravel fraction and coarse sands.	Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is 1 ft/min.
30						Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is 2 ft/min.

WELL COMPLETION INFORMATION

CASING

Top elevation (feet): _____

Vent hole?: _____

WELLHEAD PROTECTION COVER

Type: 6" dia. by 5 ft stainless steel

Weep hole?: _____

Concrete pad dimensions: _____

WELL CASING

Dia.: 2 inches

Type: Schedule 40

SURFACE CASING

Dia.: 5 inch

Type: Steel

SCREEN

Type: 2-inch/Schedule 40 PVC Insta-pack

Slot size: 0.020"

SCREEN FILTER

Type: CSSI 10-20 silica sand

Quantity used: 2.5 cubic feet

SEAL

Type: PureGold medium bentonite chips

Quantity used: 1 5-gallon bucket

GROUT

Mix used: 10 lbs VOLCLAY grout, 100 lbs Portland cem

Method of placement: Tremie pipe from bottom up

Vol. in surface casing: _____

Vol. in well casing: _____

DEVELOPMENT

Method Surge and block with 1" Waterra pump

Time: _____

Estimated purge volume: _____

Comments: 3 foot rathole filled with PureGold medium bentonite chips/ 1 5-gallon pail CSSI 10-20 silica sand/ 1 cubic foot.

(Continued Next Page)

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 7/22/04 **COMPLETED** 7/22/04 **GROUND ELEVATION** App. 1,000 ft. AMSL **WATER LEVELS** 8.9 feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 5954.44 **EASTING** -15518.37

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Rob Crotty

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
					Increasing sand fractions.	Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is 1.5 ft/min. Flow rate is < 0.3 gpm. Flow IN
40					40.0	
					Gravelly Sand (SP) Brown, wet, medium to coarse, subangular sand with subround gravel to >1 inch.	Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is 1 ft/min.
					46.0	Drill cuttings, drilling action and rate indicate gravels and sands.
					Poorly Graded Gravel with Sand (GP) Brown, wet, platy, subround gravel to >1 inch with medium to coarse subangular sand.	Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is 2 ft/min. Increasing gravel fraction. Flow is 2 gpm - IN. 6.3 mS/m, pH = 6.3
50						Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is 1 ft/min.
						Flow rate = 10 gpm. Specific Conductivity = 5.6 mS/m, pH = 6.3
					55.0	
					Gravelly Sand (SP) Brown, wet, medium to coarse subangular sand with subround gravel to >1 inch.	Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is 1 ft/min. Same flow rate.
60						
					62.0	Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is 1 ft/min.
					Poorly Graded Gravel with Sand (GP) Brown, wet, platy, subround gravel to >1 inch with medium to coarse subangular sand.	Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is 1 ft/min.
						Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is 1 ft/min. Same flow rate.
70						Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is 0.5 ft/min.
						Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is 0.5 ft/min. Flow rate = 10 gpm. Specific conductivity = 6.1 mS/m. pH = 6.3. Flow IN
80					80.0	Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is 1 ft/min.
					Poorly Graded Gravel with Sand (GP) Brown, wet, subround gravel to >1 inch with medium to coarse subangular sand.	Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is 1 ft/min.
						Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is 1.5 ft/min. Flow rate = 10 gpm, Specific conductivity = 1 mS/m, pH = 6.3.
					Increasing sand fraction.	Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is 1 ft/min.
90						
					93.0	Flow Rate = 7gpm. IN. Specific
					Silty Gravel (GM) Light brown, wet, subangular	

(Continued Next Page)

BORING NUMBER MW-1M

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 7/22/04 **COMPLETED** 7/22/04 **GROUND ELEVATION** App. 1,000 ft. AMSL **WATER LEVELS** 8.9 feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 5954.44 **EASTING** -15518.37

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Rob Crotty

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
100					gravel to 0.5 inches with fine to medium subangular sand. 100.0 Bottom of hole at 100.0 feet.	Conductivity = 6.1 mS/m. pH=6.2. Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is 1 ft/min.

BORING NUMBER MW-1S

Northern Dynasty Minerals Ltd.

CLIENT | **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 | **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 7/21/04 **COMPLETED** 7/21/04 | **GROUND ELEVATION** App. 1,000 ft AMSL **WATER LEVELS** 6.9 feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC | **NORTHING** 5954.1076801 **EASTING** -15516.1340719

DRILLING DRILLING METHOD | **EQUIPMENT** | **LOGGER** Rob Crotty

NOTES

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
0					0.5 **Peat (PT)** Dark brown, moist, blocky, fibrous organic mat	Drill cuttings, drilling action and rate indicate organics, silts, and fine sands. Drilling rate is 2.5 ft/min.
					3.5 **Organics with Silt (OL)** Dark brown, moist, includes mat and roots, trace fine sand and subangular gravel to 0.2 inches.	Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is 1 ft/min.
					7.0 ▽ **Poorly Graded Gravel with Sand (GP)** Brown, moist, platy, subround gravel to 1 inch with fine to medium subangular sand and trace silt.	Drill cuttings, drilling action and rate indicate sands. Drilling rate is 1.5 ft/min.
10					**Poorly Graded Sand (SP)** Brown, moist, uniform subround medium sand with trace round gravel to 0.5 inches and trace silt.	
					13.0 **Gravelly Sand (SP)** Brown, moist, subround medium to coarse sand with trace round gravel to <1 inch along with trace silt.	Increasing gravel fraction.
					Poorly Graded Gravel with Sand (GP) Brown, moist to wet, elongated, subround gravel to >1 inch with fine to coarse subangular sand and trace silt.	Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is 0.8 ft/min. Increasing gravel fraction.
20					**Poorly Graded Gravel with Sand (GP)** Brown, wet, elongated, subround gravel to >1 inch with medium to coarse subangular sand.	Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is 1 ft/min.
						Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is 1 ft/min.
					Increasing gravel fraction and coarse sands.	Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is 1 ft/min.
30						Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is 1 ft/min. 65% gravel, 35% sand, and <5% fines.
					32.0	Drill cuttings, drilling action and rate
					35.0 **Gravelly Sand (SP)** Brown, moist, subangular fine to coarse sand with trace round gravel to 0.5 inches along	

WELL COMPLETION INFORMATION

CASING

Top elevation (feet):

Vent hole?:

WELLHEAD PROTECTION COVER

Type: 5" dia. by 6 ft Steel

Weep hole?: Yes

Concrete pad dimensions:

WELL CASING

Dia.: 2 inches

Type: Schedule 40

SURFACE CASING

Dia.: 5 inch

Type: Steel

SCREEN

Type: 2-inch/Schedule 40 PVC Insta-pack

Slot size: 0.020"

SCREEN FILTER

Type: CSSI 10-20 silica sand

Quantity used: 4 50-lb bags

SEAL

Type: PureGold medium bentonite chips

Quantity used: 1 5-gallon bucket

GROUT

Mix used: None due to shallow groundwater

Method of placement: Tremie pipe

Vol. in surface casing:

Vol. in well casing:

DEVELOPMENT

Method Surge and block with 1" Waterra pump

Time: 96 hour lag after installation

Estimated purge volume:

Comments: 3 foot rathole filled with PureGold medium bentonite chips, 1 5-gallon pail. Note; Northing and Easting in WGS 84.

NORTHERN DYNASTY PEBBLE.GPJ GINT US.GDT 1/24/05

(Continued Next Page)

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 7/21/04 **COMPLETED** 7/21/04 **GROUND ELEVATION** App. 1,000 ft AMSL **WATER LEVELS** 6.9 feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 5954.1076801 **EASTING** -15516.1340719

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Rob Crotty

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
					with trace silt. Bottom of hole at 35.0 feet.	indicate gravels and sands. Drilling rate is 1 ft/min. 45% gravel, 55% sand, and <5% fines.

NORTHERN DYNASTY PEBBLE.GPJ GINT US.GDT 1/24/05

BORING NUMBER MW-2D

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 7/27/04 **COMPLETED** 7/28/04 **GROUND ELEVATION** _____ **WATER LEVELS** feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 6631411 **EASTING** 370600

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Matt Flynn

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
0					0.5 **Peat (PT)** Brown, moist.	
					Silty Sand with Gravel (SM) Brown, moist, fine to medium sand, ravel subangular to subround to 0.7 inches. Gravel 10%, sand 60%, fines 30%.	
10					Same as above.	
					Same as above.	
					17.0	
20					**Silt with Sand and Gravel (ML)** Brown, moist.	
					Becoming clay-like. Less coarse.	
					Silt. Brown, moist. Trace subangular to subrounded gravel to 0.5 inches.	
30						
					34.0	

WELL COMPLETION INFORMATION

CASING

Top elevation (feet): _____

Vent hole?: _____

WELLHEAD PROTECTION COVER

Type: _____

Weep hole?: _____

Concrete pad dimensions: _____

WELL CASING

Dia.: 2 inches

Type: Schedule 40 and Schedule 80

SURFACE CASING

Dia.: _____

Type: _____

SCREEN

Type: 2-inch/Schedule 40 PVC Insta-pack

Slot size: 0.020"

SCREEN FILTER

Type: Native collapse

Quantity used: _____

SEAL

Type: Natural Cave-in

Quantity used: _____

GROUT

Mix used: 30% solids

Method of placement: Tremie pipe

Vol. in surface casing: _____

Vol. in well casing: Thursday: 4 bags Friday: 8 bags

DEVELOPMENT

Method _____

Time: _____

Estimated purge volume: _____

Comments: 5' rathole filled with 1 5-gal bucket Bentonite chips.

(Continued Next Page)

BORING NUMBER MW-2D

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 7/27/04 **COMPLETED** 7/28/04 **GROUND ELEVATION** _____ **WATER LEVELS** feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 6631411 **EASTING** 370600

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Matt Flynn

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
40					**Poorly-Graded Sand (SP)** Light brown to off-white. Dry to moist. Very fine sand, more silt with depth. Color changing to brown, moist.	
					40.0	
50					**Poorly-Graded Sand with Silt (SP-SM)** Moist, brown, fine-grained sand. Trace silt. Silt 5 to 10%.	
					Increasing silt. SM?	
					57.0	
60					**Silt/Clay with Sand (ML/CL)** Brown, moist to wet. Very fine-grained sand - 15%.	
					Same as above. Low plasticity.	
70						
					Silt/clay. Moist, trace sand. Low plasticity.	Broken shoe at 75'. Able to pull out and re-drill same hole.
80						Driller using water to keep return hose clean and lubricate clay in well.
					Silt/clay (ML/CL) Brown, moist. Trace sand and gravel.	
90					Increased gravel content.	

NORTHERN DYNASTY PEBBLE.GPJ GINT US.GDT 1/24/05

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BORING NUMBER MW-2D

Northern Dynasty Minerals Ltd.

CLIENT | **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 | **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 7/27/04 **COMPLETED** 7/28/04 | **GROUND ELEVATION** | **WATER LEVELS** feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC | **NORTHING** 6631411 | **EASTING** 370600

DRILLING DRILLING METHOD | **EQUIPMENT** | **LOGGER** Matt Flynn

NOTES

DEPTH BELOW SURFACE (ft)	SOIL DESCRIPTION	WELL DIAGRAM
	97.0	
	98.5 **Silty Sand (SM)** Brown, moist to wet. Very fine sand.	
100	**Poorly Graded Sand with Gravel (SP)** Brown, moist to wet. Fine sand, trace silt. Subangular gravel to 0.5 inches.	
	102.0	Very soft drilling.
	Well-Graded Sand with Gravel (SW) Brown, wet, medium to course subangular sand. Gravel is subangular to 0.75 inches. Trace silt.	
110	Same as above.	
	112.0	
	Well-Graded Gravel with Sand (GW) Brown, wet, medium to coarse sand. Subangular gravel to 0.75 inches. Very soft/loose.	
	117.0	
	119.0 **Poorly Graded Sand (SP)** Brown, moist, loose. Fine-grained.	
120	**Well-Graded Gravel with Sand (GW)** Moist to wet. Subangular to round medium grained sand. Gravel to 0.75 inches.	
	Same as above.	
130	133.0	Driller using water and unable to tell if moist or wet.
	133.5 **Silt (ML)** Lense of silt or clay. Wet, gray.	
	Well-Graded Gravel with Sand (GW) Brown/gray, moist to wet, subangular to round gravel to 0.75". Medium-grained sand.	
140	Same as above. Very wet.	
	143.0	
	Clay/Silt (CL-ML) Gray, moist to wet, trace gravel to 0.25 inches.	Driller using water to clean casing.
	147.0	Broken shoe.
	Bottom of hole at 147.0 feet.	

NORTHERN DYNASTY PEBBLE.GPJ GINT US.GDT 1/24/05

BORING NUMBER MW-2S

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 7/25/04 **COMPLETED** 7/26/04 **GROUND ELEVATION** _____ **WATER LEVELS** feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 6631406 **EASTING** 370601

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Matt Flynn

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
0					1.0 **Peat (PT)** Dark brown, moist, with organics.	
					Silty Sand with Gravel (SM) Tan, moist. Gravel subangular to subround to 0.75 inches. Gravel = 10 to 15%, sand = 65-70%, fines = 20%.	
10					Same as above.	
					Same as above. 17.0	
20					**Silt with Sand and Gravel (ML)** Tan/brown, moist.	
					Silt, tan/brown, moist. Possibly with clay (not enough moisture to tell). Trace subangular gravel to 0.5 inches.	
30					34.0	

WELL COMPLETION INFORMATION

CASING

Top elevation (feet): _____

Vent hole?: _____

WELLHEAD PROTECTION COVER

Type: 6" Steel casing with lid

Weep hole?: _____

Concrete pad dimensions: _____

WELL CASING

Dia.: 2 inches

Type: Schedule 80

SURFACE CASING

Dia.: _____

Type: _____

SCREEN

Type: 2-inch/Schedule 40 PVC Insta-pack

Slot size: 0.020"

SCREEN FILTER

Type: Native collapse

Quantity used: _____

SEAL

Type: .25" bentonite coated pellets

Quantity used: 1 5-gallon bucket

GROUT

Mix used: Volclay approx. 30% solids

Method of placement: Tremie pipe

Vol. in surface casing: _____

Vol. in well casing: _____

DEVELOPMENT

Method Waterra

Time: _____

Estimated purge volume: _____

Comments: 3 foot rathole filled with Bentonite pellets.

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Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 7/25/04 **COMPLETED** 7/26/04 **GROUND ELEVATION** _____ **WATER LEVELS** feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 6631406 **EASTING** 370601

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Matt Flynn

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
40					**Poorly Graded Sand (SP)** Light brown/white, dry to moist. Very fine sand. Color changing to brown at 36 feet.	
					Brown, moist sand, poorly graded. Fine grained.	Drill string plugged at 45 feet.
50						
					57.0	
60					**Silt with Sand (ML)** Brown, wet, with 10-15% very fine sand; occasional clayey silt layers.	
					Clayey silt layer	
70						Very few cuttings making it to surface. Pushing aside with drill head.
						Very wet, lots of water in drill string. Unable to determine water carrying layer.
80					Silt/clay, brown, moist to wet.	
90					Trace gravel.	
					Increasing gravel with depth.	

NORTHERN DYNASTY PEBBLE.GPJ GINT US.GDT 1/24/05

(Continued Next Page)

BORING NUMBER MW-2S

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 7/25/04 **COMPLETED** 7/26/04 **GROUND ELEVATION** _____ **WATER LEVELS** feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 6631406 **EASTING** 370601

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Matt Flynn

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
100					98.0 99.0 **Well-graded Sand with Gravel (SW)** Brown, moist , fine to coarse subangular sand. Subangular to subround gravel to 0.5 inches. 101.0 **Well-graded Gravel with Sand (GW)** Brown/gray, moist, gravel to 0.75 inches subangular to round. Sand medium, coarse, subangular. Bottom of hole and drill string at 101 feet. Bottom of hole at 101.0 feet.	Broken shoe, pulled out and moved.

BORING NUMBER MW-3D

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 8/4/04 **COMPLETED** 8/4/04 **GROUND ELEVATION** _____ **WATER LEVELS** 171 feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 5950.44 **EASTING** -15518.37

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Rob Crotty

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
0					0.5 **Peat (PT)** Dark brown, moist, blocky, fibrous mat. **Silty Gravel (GM)** Reddish brown, moist, subround gravel to 0.8 inches with some fine sand. 5.0	Drill cuttings, drilling action and rate indicate organics, silts and fine sands. Drilling rate is 2.5 ft/min. Drill cuttings, drilling action and rate indicate silts, gravels and sands. Drilling rate is 1 ft/min.
10					**Well-Graded Gravel with Sand (GW)** Brown, moist, platy, subround gravel to >1 inch with fine to coarse subangular sand and trace silt and occasional boulder and cobble. Increasing sand fraction.	Drill cuttings, drilling action and rate indicate gravels and sands. Increasing sand fraction. Drilling rate is 1 ft/min. Drill cuttings, drilling action and rate indicate sands. Drilling rate is 1 ft/min. Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is 1 ft/min. Broken shoe at 14 feet.
20					Increasing gravel fraction.	Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is 1 ft/min.
30						Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is 0.5 ft/min. Decrease in drill rate. Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is <0.5 ft/min.

WELL COMPLETION INFORMATION

CASING

Top elevation (feet): _____

Vent hole?: _____

WELLHEAD PROTECTION COVER

Type: 6" dia. by 5 ft stainless steel

Weep hole?: _____

Concrete pad dimensions: _____

WELL CASING

Dia.: 2 inches

Type: Schedule 80

SURFACE CASING

Dia.: 5 inch

Type: Steel

SCREEN

Type: 2-inch/Schedule 40 PVC Insta-pack

Slot size: 0.020"

SCREEN FILTER

Type: CSSI 10-20 silica sand

Quantity used: 8 cubic feet

SEAL

Type: PureGold medium bentonite chips

Quantity used: 1 5-gallon bucket

GROUT

Mix used: 20 lbs VOLCLAY grout, 200 lbs Portland cem

Method of placement: Tremie pipe from bottom up

Vol. in surface casing: _____

Vol. in well casing: _____

DEVELOPMENT

Method Surge and block with 1" Waterra pump

Time: _____

Estimated purge volume: _____

Comments: No Rathole. Heaving sands from 205 to 195 ft.

NORTHERN DYNASTY PEBBLE.GPJ GINT US.GDT 1/24/05

(Continued Next Page)

BORING NUMBER MW-3D

Northern Dynasty Minerals Ltd.

CLIENT | **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 | **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 8/4/04 **COMPLETED** 8/4/04 | **GROUND ELEVATION** | **WATER LEVELS** 171 feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC | **NORTHING** 5950.44 | **EASTING** -15518.37

DRILLING DRILLING METHOD | **EQUIPMENT** | **LOGGER** Rob Crotty

NOTES

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
40					37.0 **Poorly Graded Gravel w/ Boulders (GP)** **GP and Boulders** 40.0	Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is <0.5 ft/min. Drillers notes boulders at 37 ft.
					Gravelly Sand (SP) Brown, moist, medium to coarse subangular sand with subround gravel to >1 inch and some silt 44.0 Increasing gravel fraction.	Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is 1 ft/min. Note. Driller using water to supplement air rotary beginning at 42 ft.
50					**Poorly Graded Gravel with Sand (GP)** Brown, moist, platy, subround gravel to >1 inch with medium to coarse subangular sand. Occasional cobble and boulder.	Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is 2 ft/min. Drill cuttings, drilling action and rate indicate gravels and sands.
					55.0 **Gravelly Sand (SP)** Brown, moist, fine to coarse subround sand with subround gravel to >1 inch.	Drill cuttings, drilling action and rate indicate gravels and sands.
60					62.0 **Poorly Graded Gravel with Sand (GP)** Brown, moist, subround gravel to >1 inch.	Drill cuttings, drilling action and rate indicate gravels and sands. Drill cuttings, drilling action and rate indicate gravels and sands.
70					70.0 **Silty Gravel (GM)** Brown, moist, subround gravel to >1 inch with some fine sand. 73.0	Drill cuttings, drilling action and rate indicate gravels, silts and sands. Drilling rate is <1 ft/min.
					Well-Graded Gravel with Sand (GW) Brown, moist, subround gravel to >1 inch with fine to coarse subangular sand; trace silt and occasional boulder.	Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is <1 ft/min. Driller notes casing is tight, sticking. Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is <1 ft/min. Driller continued drilling with water. No freestanding water encountered.
80					**Well-Graded Gravel with Sand (GW)** Brown, moist, subround gravel to >1 inch with fine to coarse subangular sand; trace silt and occasional boulder or cobble.	Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is <1 ft/min. Driller continued drilling with water. No (or very limited) freestanding water encountered. Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is <1 ft/min. Drill cuttings, drilling action and rate indicate gravels and sands.
90						

NORTHERN DYNASTY PEBBLE.GPJ GINT US.GDT 1/24/05

(Continued Next Page)

BORING NUMBER MW-3D

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 8/4/04 **COMPLETED** 8/4/04 **GROUND ELEVATION** _____ **WATER LEVELS** 171 feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 5950.44 **EASTING** -15518.37

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Rob Crotty

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
100						Drill cuttings, drilling action and rate indicate gravels and sands.
						Drill cuttings, drilling action and rate indicate gravels and sands.
110					110.0	Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is <1 ft/min. Driller continued drilling with water. No (or very limited) freestanding water encountered.
					Gravelly Sand (SP) Brown, moist, fine to coarse subangular sand with subround gravel to >1 inch, trace silt and occasional cobble or boulder.	Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is <1 ft/min. Driller continued drilling with water. No (or very limited) freestanding water encountered.
120					116.0 **Poorly Graded Gravel with Sand (GP)** Brown, moist, subround gravel to >1 inch with coarse subangular sand. 120.0	Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is <1 ft/min. Driller continued drilling with water. No (or very limited) freestanding water encountered.
					Well Graded Gravel with Sand (GW) Brown, moist, subround gravel to >1 inch with fine to coarse subangular sand, trace silt and occasional cobble.	Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is <1 ft/min. Driller continued drilling with water. No (or very limited) freestanding water encountered.
130						Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is <1 ft/min.
						Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is <1 ft/min.
140					135.0 **Gravelly Sand (SP)** Brown, moist, fine to coarse subangular sand with subround gravel to >1 inch, trace silt and occasional cobble or boulder.	Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is <1 ft/min. Driller continued drilling with water. No (or very limited) freestanding water encountered.
						Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is <1 ft/min.
150					150.0	Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is <1 ft/min. Driller continued drilling with water. No (or very limited) freestanding water encountered.
					Well-Graded Gravel with Sand (GW) Brown, moist, subround gravel >1 inch with fine to coarse subangular sand and trace silt.	Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is <1 ft/min. Driller continued drilling with water. No (or very limited) freestanding water encountered.

NORTHERN DYNASTY PEBBLE.GPJ GINT US.GDT 1/24/05

(Continued Next Page)

BORING NUMBER MW-3D

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 8/4/04 **COMPLETED** 8/4/04 **GROUND ELEVATION** _____ **WATER LEVELS** 171 feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 5950.44 **EASTING** -15518.37

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Rob Crotty

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
160					160.0	Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is <1 ft/min. Driller continued drilling with water. No (or very limited) freestanding water encountered.
					Poorly Graded Gravel with Sand (GP) Brown, moist, subround gravel to 1 inch uniform medium subangular sand, trace silt and occasional cobble and boulder. Increasing sand fraction at 164 feet.	
					166.0	Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is <1 ft/min. Driller continued drilling with water. No (or very limited) freestanding water encountered.
170					**Gravelly Sand (SP)** Brown, moist, fine to coarse subangular sand with subround gravel to >1 inch, trace silt and occasional cobble or boulder.	Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is <1 ft/min.
					171.0▽	
					Poorly Graded Gravel with Sand (GP) Brown, moist, subround gravel to 1 inch uniform medium subangular sand, trace silt and occasional cobble and boulder.	Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is <1 ft/min.
					175.0	
					176.0 **Silty Clay (CL)** Light brown, wet, with some fine sand and trace subround gravel to 0.5 inches.	Drill cuttings, drilling action and rate indicate clays, silts and sands. Flow line plugged at 176 ft.
					Interbedded Sands and Silt (SM and ML) Brown, wet, fine sand with trace subangular gravel to 0.4 inches.	Drill cuttings, drilling action and rate indicate gravels and sands.
180					179.0	Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is 1 ft/min.
					Poorly Graded Gravel with Sand (GP) Brown, moist, subround gravel to 1 inch uniform medium to coarse subangular sand, trace silt and occasional cobble and boulder.	Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is 1 ft/min.
					184.0	Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is <1 ft/min.
190					**Interbedded Gravelly Sand and Well-Graded Gravel with Sand (SP and GW)** Brown, moist, subround gravel to >1 inch with fine to coarse subangular sand, trace silt and occasional cobble and boulder.	Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is <1 ft/min.
						Note: 10 ft of heaving sands and gravels after drilling rod pulled despite casing filled with water. Well was set with bottom of screen at 194 ft.
200					205.0	
					Bottom of hole at 205.0 feet.	

NORTHERN DYNASTY PEBBLE.GPJ GINT US.GDT 1/24/05

BORING NUMBER MW-4

Northern Dynasty Minerals Ltd.

CLIENT | **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 | **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 7/20/04 **COMPLETED** 7/21/04 | **GROUND ELEVATION** | **WATER LEVELS** feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC | **NORTHING** 5954.92446286 **EASTING** -15516.1340719

DRILLING DRILLING METHOD | **EQUIPMENT** | **LOGGER** Rob Crotty

NOTES

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
0					1.5 **Organics with Silt (OL)** Dark brown, moist, includes mat and roots, trace fine sand and subangular gravel to 0.2 inches. **Sandy Silt (ML)** Brown, moist, fine to subangular medium sand with trace subangular gravel to 0.5 inches and trace organics.	Drill cuttings, drilling action, and rate indicate organics, silts, and fine sands. Drilling rate is 2.5 ft/min. Drill cuttings, drilling action, and rate indicate silts and fine sands. Drilling rate is 1 ft/min. Drill cuttings, drilling action, and rate indicate silts and fine sands.
10						Drill cuttings, drilling action, and rate indicate silts and fine sands. Drilling rate is 1 ft/min. Drill cuttings, drilling action, and rate indicate silts and fine sands. Drilling rate is 1 ft/min. Drill cuttings, drilling action, and rate indicate silts and fine sands. Drilling rate is 1 ft/min.
20					17.0 **Bedrock (Tertiary Sediments)** Light brownish buff with siltstone fragments.	Drill cuttings, drilling action, and rate indicate organics, silts and fine sands. Driller noted cuttings and rate indicate rock. Cuttings include rock dust, pulverized material with consistency of clay. Drilling rate 0.5 ft/min. Driller noted cuttings and rate indicate rock. Cuttings include rock dust, pulverized material with consistency of clay. Drilling rate 0.5 ft/min.
30						Driller note cuttings and rate indicate rock. Cuttings include rock dust, pulverized material. Driller noted cuttings and rate indicate

WELL COMPLETION INFORMATION

CASING

Top elevation (feet):

Vent hole?:

WELLHEAD PROTECTION COVER

Type: 5" dia. by 6 ft steel

Weep hole?: Yes

Concrete pad dimensions:

WELL CASING

Dia.: 2 inches

Type: Schedule 40

SURFACE CASING

Dia.: 5 inch

Type: Steel

SCREEN

Type: 2-inch/Schedule 40 PVC Insta-pack

Slot size: 0.020"

SCREEN FILTER

Type: CSSI 10-20 silica sand

Quantity used: 2 50-lb bags

SEAL

Type: PureGold medium bentonite chips

Quantity used: 1 5-gallon bucket

GROUT

Mix used: 10 lbs PureGold bentonite grout to 100 lbs P

Method of placement:

Vol. in surface casing:

Vol. in well casing:

DEVELOPMENT

Method Surge and block, with 1" Waterra pump

Time: 96 hour lag after installation

Estimated purge volume:

Comments: Rathole backfill included one 5-gallon pail PureGold medium bentonite chips. Transition sand included two 50lb bags of CSSI 10-20 silica sand. Nor

NORTHERN DYNASTY PEBBLE.GPJ GINT US.GDT 1/24/05

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Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 7/20/04 **COMPLETED** 7/21/04 **GROUND ELEVATION** _____ **WATER LEVELS** feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 5954.92446286 **EASTING** -15516.1340719

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Rob Crotty

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
40					**Bedrock (Tertiary Sediments)** Light brownish buff with siltstone fragments.	rock. Cuttings include rock dust, pulverized material with consistency of clay. Drilling rate 0.5 ft/min.
					Color change to brown.	Driller noted cuttings and rate indicate rock. Cuttings include rock dust, pulverized material with consistency of clay. Drilling rate 0.5 ft/min.
50					Color change to light brownish buff.	Driller noted cuttings and rate indicate rock. Cuttings include rock dust, pulverized material with consistency of clay. Drilling rate 0.5 ft/min.
					Light brownish buff with siltstone fragments.	Driller noted cuttings and rate indicate rock. Cuttings include rock dust, pulverized material with consistency of clay. Drilling rate 0.5 ft/min.
					55.0 Bottom of hole at 55.0 feet.	

BORING NUMBER MW5-D

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 7/30/04 **COMPLETED** 7/31/04 **GROUND ELEVATION** _____ **WATER LEVELS** feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 6639808 **EASTING** 371890

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Andy Larson

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
0					1.0 **Peat (PT)**	
					Silty Gravel with Sand (GM) Brown, moist, gravels to greater than 1".	
					As above. Becoming ML.	
10					10.0	
					Silt with Gravel (ML) Brown, moist, trace sand, some gravel to approximately 0.5"	
					Slightly more gravel.	
					15.0	Driller will set next piece of casing to 25'. Will need water in the morning to fight silt. Added water to hole.
					Well-Graded Gravel (GW) Brown, moist, subangular gravel to 1".	
20						Driller reports Well-graded Gravel (GW) here.
					As above, Gray-brown, trace sand, ~95% gravel, trace silt.	
					Becoming sandier with depth	Some water with cuttings.
30					30.0	
					Well-Graded Sand with Gravel (SW) Gray, wet, medium-grained sand, some gravel to 0.5". Trace fines.	
					35.0	

WELL COMPLETION INFORMATION

CASING

Top elevation (feet): _____

Vent hole?: _____

WELLHEAD PROTECTION COVER

Type: _____

Weep hole?: _____

Concrete pad dimensions: _____

WELL CASING

Dia.: 2 inches

Type: Schedule 80

SURFACE CASING

Dia.: _____

Type: _____

SCREEN

Type: 2-inch/Schedule 40 PVC Insta-pack

Slot size: 0.020"

SCREEN FILTER

Type: 10-20 Sand

Quantity used: 2 bags

SEAL

Type: 0.25" bentonite pellets

Quantity used: 1 5-gallon bucket

GROUT

Mix used: 50% solids

Method of placement: Tremie pipe

Vol. in surface casing: _____

Vol. in well casing: 3-batches - 6 bags before casing is

DEVELOPMENT

Method _____

Time: _____

Estimated purge volume: _____

Comments: Grout level fell 20 feet bgs. Will add more in conjunction with monitoring well. One more batch

(Continued Next Page)

BORING NUMBER MW5-D

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 7/30/04 **COMPLETED** 7/31/04 **GROUND ELEVATION** _____ **WATER LEVELS** feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 6639808 **EASTING** 371890

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Andy Larson

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
40					**Sandy Silt (ML)** Brown, moist, less sand with depth.	Driller reports that he is drilling with water. Doesn't believe it's too wet yet.
					40.0	
					Poorly Graded Sand (SP) Grey, wet, very fine sand, trace silt .	Turned water off. Wet - not super-saturated.
						Hammer was silted in - now free.
					47.0	Still drilling with water. Specific conductivity (SC) = 0.257 mS/cm.
50					**Well-Graded Gravel with Sand (GW)** Gray, moist, coarse sand, gravels to 0.75".	
					As above. Gravel is coarser - to greater than 1".	
60						
					Gravels smaller and more round, trace silt.	Slower drilling 65' to 75'.
70						
					More coarse gravels observed near 75'.	Still drilling with water.
					Continued GW. Trace silt only. Coarse sand also.	
80						SC = 0.206 mS/cm.
					Well-Graded Gravel with sand (GW) Wet, coarse sand, tan fines, more than above. Gravel to 0.75".	Continued slower drilling rate.
					Same as above. Fines still in substrate, but gravel is cleaner.	
90						
					As above. Coarse sand, gravels to 0.75". Wet.	Return water turns rusty. Driller thinks he is on a rock. SC = 0.236 mS/cm.

NORTHERN DYNASTY PEBBLE.GPJ GINT US.GDT 1/24/05

(Continued Next Page)

BORING NUMBER MW5-D

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 7/30/04 **COMPLETED** 7/31/04 **GROUND ELEVATION** _____ **WATER LEVELS** feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 6639808 **EASTING** 371890

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Andy Larson

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
100					Lighter material - more angular. Still GW. 99.0 **Bedrock** Angular, whitish-grey material. No reaction to HCl test. Small, pulverized bedrock on re-drill. Bedrock - return water is light gray, pulverized pieces. 109.0 Bottom of hole at 109.0 feet.	Driller suspects bedrock. No positive reaction to HCL test. SC = 0.128 mS/cm. "Got tight". SC = 0.069 mS/cm.

BORING NUMBER MW5-M

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 8/1/04 **COMPLETED** 8/1/04 **GROUND ELEVATION** _____ **WATER LEVELS** feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 6639808 **EASTING** 371896

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Andy Larson

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
0					**Organic Silt (OL)** Brown, dry, loose for about first 5 feet.	Drilling with water.
5.0						
					Silt with Sand and Gravel (ML)	
10					More gravel than sand - was initially a GM, then ML zone.	
15.0						
					Well-Graded Sand with Gravel (SW) Light brown, moist. Less gravel, less silt.	
20					20' to 25': More gravel and more silt than above. All else the same.	
25.0						Driller drilled without water.
					Poorly-graded Sand (SP) Brown, moist, fine-grained.	
30					At approximately 30', bands of silt.	At approximately 30', not very wet, but silt layer is present.

WELL COMPLETION INFORMATION

CASING

Top elevation (feet): _____

Vent hole?: _____

WELLHEAD PROTECTION COVER

Type: _____

Weep hole?: _____

Concrete pad dimensions: _____

WELL CASING

Dia.: 2 inches

Type: Schedule 80

SURFACE CASING

Dia.: _____

Type: _____

SCREEN

Type: 2-inch/Schedule 40 PVC Insta-pack

Slot size: 0.020"

SCREEN FILTER

Type: 10-20 Sand

Quantity used: 3.25 bags

SEAL

Type: 0.25" bentonite pellets

Quantity used: 1.5 5-gallon buckets

GROUT

Mix used: 30% solids

Method of placement: Tremie pipe

Vol. in surface casing: _____

Vol. in well casing: 3-batches - 6 bags

DEVELOPMENT

Method _____

Time: _____

Estimated purge volume: _____

Comments: Hole stayed open when casing removed.

NORTHERN DYNASTY PEBBLE.GPJ GINT US.GDT 1/24/05

(Continued Next Page)

BORING NUMBER MW5-M

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 8/1/04 **COMPLETED** 8/1/04 **GROUND ELEVATION** _____ **WATER LEVELS** feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 6639808 **EASTING** 371896

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Andy Larson

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
40					40.0	Air only at 40' to obtain samples.
					Poorly-Graded Sand (SP) Moist, medium-grained. More silt with depth, bedded until 45'.	
					48.0	
50					**Silt (ML)** Gray with brown, moist, stiff. Some sand and gravel overlies GW.	Specific Conductivity = 0.062 mS/cm.
					55.0	Slower drilling. Still using water.
60					**Well-graded Gravel with Sand (GW)** Grey, moist, coarse sand, subangular gravel to 0.75".	
					Less sand than above.	Continued slower drilling. Driller reports silt unit, bouncing bit.
70					75.0 Wet, gray, trace silt.	Turned water off, blew air for five minutes. Wet hole.
					Bottom of hole at 75.0 feet.	

BORING NUMBER MW5-S

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 8/1/04 **COMPLETED** 8/2/04 **GROUND ELEVATION** _____ **WATER LEVELS** feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 6639813 **EASTING** 371894

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Andy Larson

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
0						
					Organic Silt (OL)	
					3.0	
					Silt (ML) Red-brown, moist, medium-stiff, occasional gravels and sands. Gravels subangular to 0.25"	Driller is drlling with air only.
10						
20					More sand and gravel by 20'.	
					More moist, more sand.	
					One wet zone observed.	Driller observes connection to other wells. PMW5-D bubbling, pushed grout from PMW5-D and PMW5-M. Hole had produced some water overnight.
30						Hammer silted in (continue on with water).
					As above, with slightly more sand and gravel.	
					35.0	

WELL COMPLETION INFORMATION

CASING

Top elevation (feet): _____

Vent hole?: _____

WELLHEAD PROTECTION COVER

Type: _____

Weep hole?: _____

Concrete pad dimensions: _____

WELL CASING

Dia.: 2 inches

Type: Schedule 80

SURFACE CASING

Dia.: _____

Type: _____

SCREEN

Type: 2-inch/Schedule 40 PVC Insta-pack

Slot size: 0.020"

SCREEN FILTER

Type: Native collapse

Quantity used: 1/8 bag of sand

SEAL

Type: 0.25" bentonite pellets

Quantity used: 2.5 5-gallon buckets

GROUT

Mix used: 30% solids

Method of placement: Tremie pipe

Vol. in surface casing: _____

Vol. in well casing: 1-batch - 2 bags

DEVELOPMENT

Method _____

Time: _____

Estimated purge volume: _____

Comments: Hole heaved closed - well at 41' rather than desired 45'.

(Continued Next Page)

BORING NUMBER MW5-S

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 8/1/04 **COMPLETED** 8/2/04 **GROUND ELEVATION** _____ **WATER LEVELS** feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 6639813 **EASTING** 371894

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Andy Larson

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
40					**Silty Sand with Gravel (SM)** Red-brown, moist, subround gravel to 0.5". 40.0	Driller reports gravel at 35'.
					Poorly-Graded Sand (SP) Gray, moist to wet. Very fine-grained. 47.0	Drilled soft.
50					**Silt (ML)** Gray, moist, some gravel. 50.0	
					Bottom of boring. Bottom of hole at 50.0 feet.	

BORING NUMBER MW-6D

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 8/9/04 **COMPLETED** 8/10/04 **GROUND ELEVATION** _____ **WATER LEVELS** 74.9 feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 6645685 **EASTING** 365569

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Rob Crotty

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
0					2.0 **Sandy Silt (ML)** Brown, moist, fine sand with trace gravel to 0.4 inches.	Drill cuttings, drilling action and rate indicate organics, silts and fine sands. Drilling rate is 2.5 ft/min.
					Silty Gravel with Sand (GM) Reddish brown, moist subround gravel to >1 inch with some fine to medium subangular sand. Occasional cobble.	Drill cuttings, drilling action and rate indicate silts, gravels and sands. Drilling rate is 2 ft/min.
						Note driller using water to supplement air starting at 5 feet.
						Drilling rate is 1 ft/min.
10					10.0 Increasing gravel and sand fraction/decreasing fines	Drill cuttings, drilling action and rate indicate silts and sands. Drilling rate is 2 ft/min.
					Poorly Graded Gravel with Sand and Cobbles (GP) Brown, wet, subround gravel to 0.5 inches with medium coarse angular sand and trace silt.	Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is 2 ft/min.
						Drill cuttings, drilling action and rate indicate gravels and sands. Increasing gravel fraction
20						Drill cuttings, drilling action and rate indicate gravels and sands.
						Drill cuttings, drilling action and rate indicate gravels and sands.
					25.0	
					Well-Graded Gravel with Sand (GW) Brown, moist, subround gravel to >1 inch fine to coarse subangular sand.	Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is 1 ft/min.
30						Drill cuttings, drilling action and rate indicate gravels and sands.

WELL COMPLETION INFORMATION

CASING

Top elevation (feet): _____

Vent hole?: _____

WELLHEAD PROTECTION COVER

Type: 6" dia. by 5 ft stainless steel

Weep hole?: _____

Concrete pad dimensions: _____

WELL CASING

Dia.: 2 inches

Type: Schedule 80

SURFACE CASING

Dia.: 5 inch

Type: Steel

SCREEN

Type: 2-inch/Schedule 40 PVC Insta-pack

Slot size: 0.020"

SCREEN FILTER

Type: CSSI 10-20 silica sand

Quantity used: 1 50-lb bag

SEAL

Type: PureGold medium bentonite chips

Quantity used: 2.5 5-gallon buckets

GROUT

Mix used: VOLCAY grout, >30% solids 12 50-gal. buck

Method of placement: Tremie pipe from bottom up

Vol. in surface casing: _____

Vol. in well casing: _____

DEVELOPMENT

Method Surge and block with 1" Waterra pump

Time: _____

Estimated purge volume: _____

Comments: 5 foot rathole filled with PureGold medium bentonite chips/1.5 buckets CSSI 10-20 silica sand/Three 50-pound bags.

NORTHERN DYNASTY PEBBLE.GPJ GINT US.GDT 1/24/05

(Continued Next Page)

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 8/9/04 **COMPLETED** 8/10/04 **GROUND ELEVATION** _____ **WATER LEVELS** 74.9 feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 6645685 **EASTING** 365569

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Rob Crotty

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
40					40.0	Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is 1 ft/min.
					Gravelly Sand (SP) Brown, moist, fine to coarse subangular sand with subround gravel to >1 inch and some silt. Increasing gravel fraction.	Drill cuttings, drilling action and rate indicate gravels and sands.
					46.0	
50					**Poorly Graded Gravel with Sand (GP)** Brown, moist, subround gravel to >1 inch with uniform medium subangular sand. Occasional cobble.	Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is 1 ft/min.
						Drill cuttings, drilling action and rate indicate gravels and sands.
					56.0	
60					**Well-Graded Gravel with Sand (GW)** Brown, moist, subround gravel to 0.5 inches with fine to coarse subangular sand.	Drill cuttings, drilling action and rate indicate gravels and sands.
					Note: Boulders at 65 to 66 ft.	
70					Decreasing gravel size at 70 ft to <0.5 inches. Increasing sand fraction.	
					75.0 ▽	
					Gravelly Sand (SP) Brown, wet, medium to coarse subangular sand with subround fine gravel to 0.5 inches. Trace silt with occasional cobble.	
80					80.0	
					82.0 **Poorly Graded Gravel with Sand and Boulders (GP and Boulders)** Brown, wet, subangular gravel with medium to coarse angular sand.	Drill cuttings, drilling action and rate indicate gravels and sands.
					Poorly Graded Gravel with Sand (GP) Brown, wet, subround gravel to >1 inch with medium to coarse subangular sand. Occasional cobble and boulders.	
					89.0	
90					**Bedrock (Bedrock)** Dark gray, massive, fresh, fine to medium-grained and hard. No reaction to 12% HCL solution.	

NORTHERN DYNASTY PEBBLE.GPJ GINT US.GDT 1/24/05

(Continued Next Page)

BORING NUMBER MW-6D

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 8/9/04 **COMPLETED** 8/10/04 **GROUND ELEVATION** _____ **WATER LEVELS** 74.9 feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 6645685 **EASTING** 365569

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Rob Crotty

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
100					100.0 Bottom of hole at 100.0 feet.	

BORING NUMBER MW-7D

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 8/11/04 **COMPLETED** 8/11/04 **GROUND ELEVATION** _____ **WATER LEVELS** 24.5 feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 6640222 **EASTING** 362763

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Rob Crotty

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
0					1.0 **Peat with Cobbles and Boulders (PT)** Black, moist, round cobbles and boulders to 0.9 feet with some fine sand.	Drilling rate is >5 ft/min.
					5.0 **Silty Gravel (GM)** Light brown, wet, gravel to >1 inch with uniform fine sand, and an occasional cobble and boulder.	Drill cuttings, drilling action and rate indicate silts and sands. Drilling rate is >3 ft/min. Note: driller using water to supplement air rotary.
					8.0 **Sandy Silt (ML)** Light brown, wet, fine to medium subround sand with some gravel to 0.3 inches.	
10					10.0 **Silty Gravel (GM)** Light brown, wet, gravel to >1 inch with some fine to medium sand, and an occasional cobble and boulder	Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is >3 ft/min. Driller notes increasing cobbles.
					12.0 **Well-Graded Gravel with Sand (GW)** Brown, moist, subround gravel to >1 inch with fine to coarse subangular sand, trace silt, occasional cobble and boulder.	
					Poorly Graded Gravel with Sand and Cobbles (GP) Brown, moist, subround gravel to >1 inch with uniform fine to medium angular sand. Some silt and occasional boulder.	Drill cuttings, drilling action and rate indicate gravels, sands, cobbles. Drilling rate is >2 ft/min. Driller notes water flowing at 2gpm.
20					21.0 **Well-Graded Gravel with Sand (GW)** Brown, wet, subround gravel to >1 inch with fine to coarse subangular sand. Trace silt along with occasional cobble and boulder.	Drill cuttings, drilling action and rate indicate gravels, sands, cobbles. Drilling rate is >2 ft/min. Driller notes water flowing at 2gpm.
					Well-Graded Gravel with Sand (GW) Brown, wet, subround gravel to >1 inch with fine to coarse subangular sand. Trace silt.	Drill cuttings, drilling action and rate indicate gravels, sands, cobbles. Drilling rate is >2 ft/min.
30					32.0 **Boulders (Boulder)** Erratics.	Drill cuttings, drilling action and rate indicate boulders. Drilling rate is 1 ft/min.
						Drill cuttings, drilling action and rate indicate boulders. Drilling rate is 1 ft/min.

WELL COMPLETION INFORMATION

CASING

Top elevation (feet): _____

Vent hole?: _____

WELLHEAD PROTECTION COVER

Type: 6" dia. by 5 ft stainless steel

Weep hole?: _____

Concrete pad dimensions: _____

WELL CASING

Dia.: 2 inches

Type: Schedule 80

SURFACE CASING

Dia.: 5 inch

Type: Steel

SCREEN

Type: 2-inch/Schedule 40 PVC Insta-pack

Slot size: 0.020"

SCREEN FILTER

Type: CSSI 10-20 silica sand

Quantity used: 6 50-lb bags

SEAL

Type: PureGold medium bentonite chips

Quantity used: 2 5-gallon buckets

GROUT

Mix used: VOLCAY grout, >30% solids 6 50-gallon buc

Method of placement: Tremie pipe from bottom up

Vol. in surface casing: _____

Vol. in well casing: _____

DEVELOPMENT

Method Surge and block with 1" Waterra pump

Time: _____

Estimated purge volume: _____

Comments: 2 foot rathole filled with PureGold medium bentonite chips/1 bucket CSSI 10-20 silica sand/1 50-pound bag.

NORTHERN DYNASTY PEBBLE.GPJ GINT US.GDT 1/24/05

(Continued Next Page)

BORING NUMBER MW-7D

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 8/11/04 **COMPLETED** 8/11/04 **GROUND ELEVATION** _____ **WATER LEVELS** 24.5 feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 6640222 **EASTING** 362763

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Rob Crotty

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
40					39.0 **Bedrock (Bedrock)** Dark gray, red-stained, fractured, soft, fine-grained siltstone and mudstone. No HCL reaction.	Drill cuttings, drilling action and rate indicate boulders. Drilling rate is 1 ft/min. Drilling cuttings indicate fractured bedrock is uniform 0.5 inches. Drilling cuttings indicate fractured bedrock is uniform 0.5 inches.
50					**Bedrock (Bedrock)** Brown to gray, angular fractured, hard, fine to coarse-grained conglomerate. No HCL reaction	Drilling cuttings are uniform, angular, about 0.2 inches in size.
60						
70					**Bedrock (Bedrock)** Dark gray, red-stained, rounded 0.6 inch diameter, soft, fine-grained siltstone and mudstone. 75.0 Bottom of hole at 75.0 feet.	Note: dramatic increase in flow rate (10 gpm).

BORING NUMBER MW-7S

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 8/12/04 **COMPLETED** 8/12/04 **GROUND ELEVATION** _____ **WATER LEVELS** 20 feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 6640231 **EASTING** 362683

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Rob Crotty

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
0					**Silty Gravel with Sand (GM)** Brown, moist, subround gravel to >1 inch with fine to medium subangular sand. Occasional cobble and boulders throughout.	Drill cuttings, drilling action and rate indicate silts, gravels and sands. Drilling rate is >5 ft/min.
						Note: driller using water to supplement air starting at 5 feet. Drill cuttings, drilling action and rate indicate silts, gravels and sands. Drilling rate is >2 ft/min.
10						
					Well-Graded Gravel with Sand (GW) Brown, moist, subround gravel to >1 inch with fine to coarse subangular sand, trace silt and occasional cobble and boulder.	Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is >3 ft/min.
						Driller notes increasing cobbles.
					Poorly-Graded Gravel with Sand and Cobbles (GP) Brown, moist, subround gravel to >1 inch with uniform fine to medium angular sand. Some silt.	Drill cuttings, drilling action and rate indicate silts, gravels and sands. Drilling rate is >2 ft/min.
20						Drill cuttings, drilling action and rate indicate silts, gravels and sands. Drilling rate is >2 ft/min.
						Drill cuttings, drilling action and rate indicate silts, gravels and sands. Drilling rate is >2 ft/min.
					Well-Graded Gravel with Sand(GW) Brown, wet, subround gravel to >1 inch with fine to coarse subangular sand and cobbles/boulders throughout along with some silt.	Drill cuttings, drilling action and rate indicate silts, gravels and sands. Drilling rate is >2 ft/min.
30						
						Drill cuttings, drilling action and rate indicate silts, gravels and sands. Drilling rate is >2 ft/min.

9.0 — 15.0 — 25.0 — 35.0

Bottom of hole at 35.0 feet

WELL COMPLETION INFORMATION

CASING

Top elevation (feet): _____

Vent hole?: _____

WELLHEAD PROTECTION COVER

Type: 6" dia. by 5 ft stainless steel

Weep hole?: _____

Concrete pad dimensions: _____

WELL CASING

Dia.: 2 inches

Type: Schedule 80

SURFACE CASING

Dia.: 5 inch

Type: Steel

SCREEN

Type: 2-inch/Schedule 40 PVC Insta-pack

Slot size: 0.020"

SCREEN FILTER

Type: CSSI 10-20 silica sand

Quantity used: 2 50-lb bags

SEAL

Type: PureGold medium bentonite chips

Quantity used: 2 5-gallon buckets

GROUT

Mix used: none

Method of placement: _____

Vol. in surface casing: _____

Vol. in well casing: _____

DEVELOPMENT

Method Surge and block with 1" Waterra pump

Time: _____

Estimated purge volume: _____

Comments: 2 foot rathole filled with PureGold medium bentonite chips/1 buckets CSSI 10-20 silica sand/1 50-pound bags.

NORTHERN DYNASTY PEBBLE.GPJ GINT US.GDT 1/24/05

BORING NUMBER MW-8D

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 8/6/04 **COMPLETED** 8/7/04 **GROUND ELEVATION** _____ **WATER LEVELS** 15 feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 6646958 **EASTING** 371003

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Rob Crotty

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
0					0.5 **Peat (PT)** Dark brown, moist, blocky, fibrous mat with fine sand.	Drill cuttings, drilling action and rate indicate organics, silts and fine sands. Drilling rate is 2.5 ft/min.
					Sandy Silt (ML) Brown, moist, fine sand with trace gravel to 0.4 inches. 4.0	
					Silty Gravel with Sand (GM) Brown, moist, subround gravel to 1 inch with some fine to medium subangular sand. Occasional boulder and cobble. 7.0	Drill cuttings, drilling action and rate indicate silts, gravels and sands. Drilling rate is 1 ft/min.
					Silty Sand (SM) Brown, moist, fine to medium sand with some subround gravel to 0.5 inches. Increasing gravel and sand fractions/decreasing fines. 9.0	Drill cuttings, drilling action and rate indicate silts and sands. Drilling rate is 1 ft/min.
10					**Well-Graded Gravel with Sand (GW)** Brown, moist, fine to coarse subangular sand and trace silt and occasional cobble and boulder.	Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is 1 ft/min.
					15.0 ▽	Broken shoe at 14 ft.
					Poorly Graded gravel (GP) Brown, wet, subround gravel to 0.5 inches with uniform medium subangular sand. Occasional cobble and boulder.	Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is 1 ft/min.
20						Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is 1 ft/min.
					Increasing coarse sands. 24.0	Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is 1 ft/min.
					Gravelly Sand (SP) Brown, moist, medium to coarse subangular with subround gravel to >1 inch with some silt and occasional boulder.	
30						Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is 1 ft/min.

WELL COMPLETION INFORMATION

CASING

Top elevation (feet): _____

Vent hole?: _____

WELLHEAD PROTECTION COVER

Type: 6" dia. by 5 ft stainless steel

Weep hole?: _____

Concrete pad dimensions: _____

WELL CASING

Dia.: 2 inches

Type: Schedule 80

SURFACE CASING

Dia.: 5 inch

Type: Steel

SCREEN

Type: 2-inch/Schedule 40 PVC Insta-pack

Slot size: 0.020"

SCREEN FILTER

Type: CSSI 10-20 silica sand

Quantity used: 1 50-lb bag

SEAL

Type: PureGold medium bentonite chips

Quantity used: 1.5 5-gallon bucket

GROUT

Mix used: VOLCAY grout, >30% solids by weight

Method of placement: Tremie pipe from bottom up

Vol. in surface casing: _____

Vol. in well casing: _____

DEVELOPMENT

Method Surge and block with 1" Waterra pump

Time: _____

Estimated purge volume: _____

Comments: Rathole backfill included 4 50-lb bags of CSSI 10-20 silica sand.

NORTHERN DYNASTY PEBBLE.GPJ GINT US.GDT 1/24/05

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Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 8/6/04 **COMPLETED** 8/7/04 **GROUND ELEVATION** _____ **WATER LEVELS** 15 feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 6646958 **EASTING** 371003

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Rob Crotty

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
40					40.0	Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is 1 ft/min. Heaving sands.
					Poorly Graded Gravel with Sand(GP) Brown, wet, subround gravel to 0.5 inches with uniform medium subangular sand.	Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is 1 ft/min.
					44.0 Increasing sand fraction	Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is 1 ft/min.
					Gravelly Sand (SP) Brown, moist, medium to coarse subangular sand with subround gravel to >1 inch with trace silt and occasional boulder.	Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is 1 ft/min.
50						Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is 1 ft/min.
					53.0	Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is 1 ft/min.
					Poorly Graded Gravel with Sand (GP) Brown, wet, subround gravel to 0.5 inches with uniform medium subangular sand. Occasional cobble and boulder.	Drill cuttings, drilling action and rate indicate silts, clays and sands. Drilling rate is <1 ft/min.
					57.0	Drill cuttings, drilling action and rate indicate silts, clays and sands. Drilling rate is <1 ft/min. No reaction with 12% HCL solution. Driller using water to supplement air rotary beginning at 57 ft
60					**Sandy Silty Clay (CL)** Gray, wet, with fine to medium sand and trace subangular gravel to 0.4 inches.	Drill cuttings, drilling action and rate indicate silts and clays. Drilling rate is <1 ft/min. No reaction with 12% HCL solution. Driller using water to supplement air rotary.
					60.0 Decreasing sand fraction/increasing silts and clays.	Drill cuttings, drilling action and rate indicate silts and clays. Drilling rate is <1 ft/min. No reaction with 12% HCL solution. Driller using water to supplement air rotary.
					Silty Clay (CL) Gray, wet, with trace fine sands.	Drill cuttings, drilling action and rate indicate silts and clays. Drilling rate is <1 ft/min. No reaction with 12% HCL solution. Driller using water to supplement air rotary.
70						Drill cuttings, drilling action and rate indicate silts and clays. Drilling rate is <1 ft/min. No reaction with 12% HCL solution. Driller using water to supplement air rotary.
						Drill cuttings, drilling action and rate indicate silts and clays. Drilling rate is <1 ft/min. No reaction with 12% HCL solution. Driller using water to supplement air rotary.
80					80.0	Drill cuttings, drilling action and rate indicate silts and clays. Drilling rate is <1 ft/min. No reaction with 12% HCL solution. Driller using water to supplement air rotary.
					82.0	Drill cuttings, drilling action and rate indicate silts and clays. Drilling rate is <1 ft/min. No reaction with 12% HCL solution. Driller using water to supplement air rotary.
					Gravelly Sand (SP) Brown, wet, medium to coarse subangular sand with subround fine gravel to 0.5 inches. Occasional cobble.	Drill cuttings, drilling action and rate indicate silts and clays. Drilling rate is <1 ft/min. No reaction with 12% HCL solution. Driller using water to supplement air rotary.
90						Drill cuttings, drilling action and rate indicate silts and clays. Drilling rate is <1 ft/min. No reaction with 12% HCL solution.
						Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate

NORTHERN DYNASTY PEBBLE.GPJ GINT US.GDT 1/24/05

(Continued Next Page)

BORING NUMBER MW-8D

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 8/6/04 **COMPLETED** 8/7/04 **GROUND ELEVATION** _____ **WATER LEVELS** 15 feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 6646958 **EASTING** 371003

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Rob Crotty

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
100					95.5 **Siltstone (Bedrock)** Dark gray, massive. with quartz lenses. 103.0 Bottom of hole at 103.0 feet.	is 1 ft/min. Driller turns off water to help evaluate if gravels and sands below aquitard is wet. Heaving sands at 85 feet. Shoe lost while trying to trip in/out of hole. Trip out of hole. End of 6-August-04 shift. Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is 1 ft/min. Driller notes bedrock. Drilled 8 feet to confirm. No reaction with 12% HCL solution.

BORING NUMBER MW-8M

Northern Dynasty Minerals Ltd.

CLIENT | **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 | **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 8/8/04 **COMPLETED** 8/8/04 | **GROUND ELEVATION** | **WATER LEVELS** 13.3 feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC | **NORTHING** 6646954 | **EASTING** 370998

DRILLING DRILLING METHOD | **EQUIPMENT** | **LOGGER** Rob Crotty

NOTES

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
0					0.5 **Peat (PT)** Dark brown, moist, blocky, fibrous mat with fine sand **Sandy Silt (ML)** Brown, moist, with fine sand and trace gravel to 0.4 inches. 5.0 **Silty Gravel with Sand (GM)** Brown, moist, subround gravel to 1 inch with some fine to medium subangular sand. Occasional boulder and cobble. 7.0 **Silty Sand (SM)** Brown, moist, fine to medium sand, with some subround gravel to 0.5 inches. 10.0 Increasing gravel and sand fractions/decreasing fines. **Well-Graded Gravel with Sand (GW)** Brown, moist, platy, subround gravel to >1 inch with fine to coarse subangular sand and trace silt and occasional cobble and boulder. 15.0 **Poorly Graded Gravel with Sand (GP)** Brown, wet, subround gravel to 0.5 inches with uniform medium subangular sand. Occasional cobble and boulder. Increasing coarse sands. 26.0 **Gravelly Sand (SP)** Brown, moist, medium to coarse subangular sand with subround gravel to >1 inch and some silt.	Drill cuttings, drilling action and rate indicate organics, silts and fine sands. Drilling rate is 2.5 ft/min. Drill cuttings, drilling action and rate indicate silts and sands. Drilling rate is 3 ft/min. Drill cuttings, drilling action and rate indicate silts, gravels and sands. Drilling rate is 1 ft/min. Drill cuttings, drilling action and rate indicate silts and sands. Drilling rate is 1 ft/min. Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is 1 ft/min. Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is 1 ft/min. Increasing gravel fraction. Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is 1 ft/min. Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is 1 ft/min. Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is 1 ft/min. Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is 1 ft/min. Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is 1 ft/min.
10						
20						
30						

WELL COMPLETION INFORMATION

CASING

Top elevation (feet):

Vent hole?:

WELLHEAD PROTECTION COVER

Type: 6" dia. by 5 ft stainless steel

Weep hole?:

Concrete pad dimensions:

WELL CASING

Dia.: 2 inches

Type: Schedule 80

SURFACE CASING

Dia.: 5 inch

Type: Steel

SCREEN

Type: 2-inch/Schedule 40 PVC Insta-pack

Slot size: 0.020"

SCREEN FILTER

Type: CSSI 10-20 silica sand

Quantity used: 4 50-lb bags

SEAL

Type: PureGold medium bentonite chips

Quantity used: 3 5-gallon buckets

GROUT

Mix used: none

Method of placement:

Vol. in surface casing:

Vol. in well casing:

DEVELOPMENT

Method Surge and block with 1" Waterra pump

Time:

Estimated purge volume:

Comments: No rathole. Heaving sands.

(Continued Next Page)

BORING NUMBER MW-8M

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 8/8/04 **COMPLETED** 8/8/04 **GROUND ELEVATION** _____ **WATER LEVELS** 13.3 feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 6646954 **EASTING** 370998

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Rob Crotty

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
40					40.0	Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is 1 ft/min. Heaving sands.
					Poorly Graded Gravel with Sand (GP) Brown, wet, subround gravel to 0.5 inches with uniform medium subangular sand. Occasional cobble and boulder.	Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is 1 ft/min.
					43.0 Increasing sand fraction.	Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is 1 ft/min.
					Gravelly Sand (SP) Brown, moist, medium to coarse subangular sand with subround gravel to >1 inch and trace silt.	Drill cuttings, drilling action and rate indicate gravels and sands.
50						Drill cuttings, drilling action and rate indicate gravels and sands.
					53.0	Drill cuttings, drilling action and rate indicate gravels and sands.
					55.0 **Poorly Graded Gravel with Sand (GP)** Brown, wet, subround gravel to 0.5 inches with uniform medium subangular sand. Occasional cobble and boulder.	
					Bottom of hole at 55.0 feet.	

BORING NUMBER MW-8S

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 8/8/04 **COMPLETED** 8/8/04 **GROUND ELEVATION** _____ **WATER LEVELS** 13.8 feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 6646959 **EASTING** 370997

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Rob Crotty

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
0					0.5 **Peat (PT)** Dark brown, moist, blocky, fibrous mat with fine sand **Sandy Silt (ML)** Brown, moist, with fine sand and trace gravel to 0.4 inches.	Drill cuttings, drilling action and rate indicate organics, silts and fine sands. Drilling rate is 2.5 ft/min.
					6.0 **Silty Sand (SM)** Brown, moist, fine to medium sand with trace subround gravel to 0.5 inches. Increasing gravel and sand fractions/decreasing fines.	Drill cuttings, drilling action and rate indicate silts and sands. Drilling rate is 3 ft/min.
10					11.0	Drill cuttings, drilling action and rate indicate silts and sands. Drilling rate is 1 ft/min.
					▽ **Well-Graded Gravel with Sand (GW)** Brown, moist, platy, subround gravel to >1 inch with fine to coarse subangular sand, trace silt and occasional boulder and cobble.	Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is 1 ft/min.
					15.0 **Poorly-Graded Gravel with Sand (GP)** Brown, wet, subround gravel to 0.5 inches with uniform medium subangular sand.	Broken shoe at 14 ft. Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is 1 ft/min. Increasing gravel fraction.
20					20.0 Bottom of hole at 20.0 feet.	Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is 1 ft/min.

WELL COMPLETION INFORMATION

CASING

Top elevation (feet): _____

Vent hole?: _____

WELLHEAD PROTECTION COVER

Type: 6" dia. by 5 ft stainless steel

Weep hole?: _____

Concrete pad dimensions: _____

WELL CASING

Dia.: 2 inches

Type: Schedule 80

SURFACE CASING

Dia.: 5 inch

Type: Steel

SCREEN

Type: 2-inch/Schedule 40 PVC Insta-pack

Slot size: 0.020"

SCREEN FILTER

Type: CSSI 10-20 silica sand

Quantity used: 1.5 50-lb bags

SEAL

Type: PureGold medium bentonite chips

Quantity used: 1 5-gallon bucket

GROUT

Mix used: none

Method of placement: _____

Vol. in surface casing: _____

Vol. in well casing: _____

DEVELOPMENT

Method Surge and block, with 1" Waterra pump

Time: _____

Estimated purge volume: _____

Comments: Rathole backfill included .5 5-gallon pail PureGold medium bentonite chips/1 50-lb bags of CSSI 10-20 silica sand.

NORTHERN DYNASTY PEBBLE.GPJ GINT US.GDT 1/24/05

BORING NUMBER MW-9D

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 8/11/04 **COMPLETED** 8/11/04 **GROUND ELEVATION** _____ **WATER LEVELS** 24.5 feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 6640166 **EASTING** 362830

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Rob Crotty

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
0					1.0 **Peat with Cobbles and Boulders (PT)** Black, moist, round cobbles and boulders to 0.9 feet with some fine sand	Drilling rate is >5 ft/min.
					5.0 **Silty Gravel (GM)** Light brown, wet, gravel to >1 inch with uniform fine sand, and an occasional cobble and boulder.	Drill cuttings, drilling action and rate indicate silts and sands. Drilling rate is >3 ft/min. Note driller using water to supplement air rotary.
					8.0 **Sandy Silt (ML)** Light brown, wet, with fine to medium subround sand and some gravel to 0.3 inches.	
10					10.0 **Silty Gravel (GM)** Light brown, wet gravel to >1 inch with uniform fine to medium sand, and an occasional cobble and boulder.	Drill cuttings, drilling action and rate indicate gravels and sands. Drilling rate is >3 ft/min. Driller notes increasing cobbles.
					12.0 **Well-Graded Gravel with Sand (GW)** Brown, moist, subround gravel to >1 inch with fine to coarse subangular sand, trace silt, occasional cobble and boulder.	
					Poorly Graded Gravel with Sand and Cobbles (GP) Brown, moist, subround gravel to >1 inch with uniform fine to medium angular sand. Some silt and occasional boulder.	Drill cuttings, drilling action and rate indicate gravels, sands, cobbles. Drilling rate is >2 ft/min. Driller notes water flowing in at 2 gpm.
20					21.0 **Well-Graded Gravel with Sand (GW)** Brown, wet, subround gravel to >1 inch with fine to coarse subangular sand. Trace silt with occasional cobble.	Drill cuttings, drilling action and rate indicate gravels, sands, cobbles. Drilling is >2 ft/min. Driller notes water flowing in at 2 gpm.
					23.0 **Silty Gravel with Sand(GM)** Light brown, wet, gravel to >1 inch with fine to medium sand, and occasional cobble and boulder.	
					28.0 **Well-Graded Sand (SW)** Brown, wet, fine to coarse subangular sand with some gravel to >1 inch, some silt and occasional boulders and cobbles.	Driller notes water flowing in at 2 gpm. Drill cuttings, drilling action and rate indicate gravels, sands, cobbles. Drilling is >2 ft/min.
30						

WELL COMPLETION INFORMATION

CASING

Top elevation (feet): _____

Vent hole?: _____

WELLHEAD PROTECTION COVER

Type: 6" dia. by 5 ft stainless steel

Weep hole?: _____

Concrete pad dimensions: _____

WELL CASING

Dia.: 2 inches

Type: Schedule 80

SURFACE CASING

Dia.: 5 inch

Type: Steel

SCREEN

Type: 2-inch/Schedule 40 PVC Insta-pack

Slot size: 0.020"

SCREEN FILTER

Type: CSSI 10-20 silica sand

Quantity used: 6 50-lb bags

SEAL

Type: PureGold medium bentonite chips

Quantity used: 2 5-gallon buckets

GROUT

Mix used: VOLCAY grout, >30% solids 6 50-gall bags

Method of placement: Tremie pipe from bottom up

Vol. in surface casing: _____

Vol. in well casing: _____

DEVELOPMENT

Method Surge and block with 1" Waterra pump

Time: _____

Estimated purge volume: _____

Comments: 3 foot rathole filled with PureGold medium bentonite chips/ 1 bucket CSSI 10-20 silica sand/ one 50-lb bag.

(Continued Next Page)

BORING NUMBER MW-9D

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 8/11/04 **COMPLETED** 8/11/04 **GROUND ELEVATION** _____ **WATER LEVELS** 24.5 feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 6640166 **EASTING** 362830

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Rob Crotty

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
40						Driller notes water flowing in at 2 gpm. Drill cuttings, drilling action and rate indicate gravels, sands, cobbles. Drilling is >2 ft/min.
					45.0	
					Silty Gravelly Sand (SM) Brown, wet, fine to coarse subround sand with fine gravel to 0.4 inches, trace silt and occasional cobble and boulder.	Driller notes water flowing in at 2 gpm.
50					50.0	
					Well-Graded Sand (SW) Brown, wet, fine to coarse subround sand with some gravel to >1 inch, some silt and occasional boulders and cobbles.	Driller notes water flowing in at 2 gpm. Drill cuttings, drilling action and rate indicate gravels, sands, cobbles. Drilling is >2 ft/min.
						Driller notes water flowing in at 2 gpm. Drill cuttings, drilling action and rate indicate gravels, sands, cobbles. Drilling is >2 ft/min.
60						Driller notes boulder to 1.5 feet in diameter.
						Driller notes water flowing in at 2 gpm. Drill cuttings, drilling action and rate indicate gravels, sands, cobbles. Drilling is >2 ft/min.
						Note dramatic increase in flow rate; 5 gpm.
70						Drill cuttings, drilling action and rate indicate gravels, sands, cobbles. Drilling rate is >2 ft/min. Flow rate increased to 8 gpm.
					73.0	
					Bedrock (Bedrock) Dark gray, red-stained, fracture (angular) soft, fine grained siltstone and mudstone, no HCL reaction.	Drilling cuttings indicate fractured bedrock is uniform 0.5 inches. Flow rate 8 gpm.
					Bedrock (Bedrock) Brown to gray, fracture (angular) hard, fine- to coarse-grained conglomerate. No HCL reaction.	Drilling cuttings are uniform, angular, about 0.2 inches in size. Easily mistaken for gravelly sand.
					80.0	
					Bottom of hole at 75.0 feet.	

NORTHERN DYNASTY PEBBLE.GPJ GINT US.GDT 1/24/05

BORING NUMBER MW-10

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 9/25/04 **COMPLETED** 9/25/04 **GROUND ELEVATION** _____ **WATER LEVELS** 28.3 feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 6644802 **EASTING** 365803

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Dave Lacey

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
0				1.0	**Orangic Silt (OL)** Moist, dark brown.	Drilling with air
					Poorly-graded Gravel with Silt and Cobbles (GP) Gray, moist, 1/4-inch and greater, sub-angular to rounded.	12:08 at 3-feet. Varying amounts of silt 10 to 20%.
10					Color change - Light brown. More silt than above. Color change - Light gray. Color change - Light brown.	Hammer clogged. Start drilling with water 2 gpm. 13:27 at 13-feet. Return line clogged.
20					Color change - Brown. Color change - Light brown.	Water line broken 14:30 to 15:00. 15:30 at 23-feet. Stop drilling with water. Start drilling with water 2 gpm.
30						14:00 at 33-feet.

WELL COMPLETION INFORMATION

CASING

Top elevation (feet): _____

Vent hole?: _____

WELLHEAD PROTECTION COVER

Type: 6" dia. steel casing with lid.

Weep hole?: No

Concrete pad dimensions: _____

WELL CASING

Dia.: 2 inches

Type: Schedule 80 PVC

SURFACE CASING

Dia.: _____

Type: _____

SCREEN

Type: 2-inch/Schedule 40 PVC Insta-pack

Slot size: 0.020"

SCREEN FILTER

Type: 10/20 silica sand.

Quantity used: 4 50-lb bags

SEAL

Type: 0.25" bentonite pellets CETCO

Quantity used: 2 5-gallon buckets

GROUT

Mix used: Volclay

Method of placement: Tremie pipe

Vol. in surface casing: 50 gallons

Vol. in well casing: 1-batch - 2 bags

DEVELOPMENT

Method Surge and block with 1" Waterra pump

Time: 2.5 hours

Estimated purge volume: 400 gallons

Comments: Boring TD-44'. Sealed shoe with 2-feet 1/4-inch bentonite pellets. Heave from 25' to 13' during grouting. Seal from 25' to 20' with 1/4-inch bentonite

(Continued Next Page)

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 9/25/04 **COMPLETED** 9/25/04 **GROUND ELEVATION** _____ **WATER LEVELS** 28.3 feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 6644802 **EASTING** 365803

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Dave Lacey

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
40					36.0 Color change = Light gray. **Bedrock** Black, fractured cuttings - Well-graded Sand, angular, light greenish gray. **Bedrock** Black, fractured cuttings - Well-graded Sand, angular, light greenish gray. 44.0 Bottom of hole at 44.0 feet.	Slow drilling. TD - 44-feet.

NORTHERN DYNASTY PEBBLE.GPJ GINT US.GDT 1/24/05

BORING NUMBER MW-11D

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 9/29/04 **COMPLETED** 10/1/04 **GROUND ELEVATION** _____ **WATER LEVELS** feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 6632824 **EASTING** 370302

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Dave Lacey

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
0					**Organic Silt with Gravel (OL)** Brown, moist.	
					3.0	17:15 at 3-feet Start drilling with water 2 gpm Add 10 gallons of diluted (1:20) polymer to out side of casing.
					Poorly Graded Gravel with Sand (GP) Brown, subrounded to subangular gravel to >1 inch, medium to coarse sand, with some cobbles.	
					7.0	
					8.0 **Boulder**	
10					**Poorly-graded Gravel with Sand (GP)** Gray, subrounded to subangular gravel to >1 inch; medium to coarse sand.	Varying amounts of sand
						18:30 at 13-feet Casing getting binded up in formation. Lots of action need to keep it free.
20						
						Added 10 gallons of diluted polymer. 19:10 at 23-feet. Stop for day. Start 10-1-2004 9:50.
					27.0 Cobbles	Casing binding. Add 15 gallons diluted polymer.
					29.0 **Poorly Graded Sand (SP)** Gray, medium grain, 5% gravel, 5% clay.	
30					**Clay with Gravel (CL)** Gray.	

WELL COMPLETION INFORMATION

CASING

Top elevation (feet): _____

Vent hole?: _____

WELLHEAD PROTECTION COVER

Type: 6" steel casing with lid

Weep hole?: No

Concrete pad dimensions: _____

WELL CASING

Dia.: 2 inches

Type: Schedule 40 PVC

SURFACE CASING

Dia.: _____

Type: _____

SCREEN

Type: 2-inch/Schedule 40 PVC Insta-pack

Slot size: 0.020"

SCREEN FILTER

Type: 10/20 Sand

Quantity used: NA

SEAL

Type: 0.25" bentonite pellets

Quantity used: 1 5-gallon bucket

GROUT

Mix used: Volclay

Method of placement: Tremie pipe

Vol. in surface casing: 120 gallons

Vol. in well casing: 3-batches - 8 bags

DEVELOPMENT

Method Surge and block, with 1" Waterra pump

Time: NA

Estimated purge volume: NA

Comments: Used portland grout from 11' bgs to surface, 4 100 lb bags. 1/4-inch bentonite pellet seal from 125' to 120'.

NORTHERN DYNASTY PEBBLE.GPJ GINT US.GDT 1/24/05

(Continued Next Page)

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 9/29/04 **COMPLETED** 10/1/04 **GROUND ELEVATION** _____ **WATER LEVELS** feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 6632824 **EASTING** 370302

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Dave Lacey

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
					36.0	
					Well-graded Sand (SW) Brown, very fine grain.	
40					42.0	
					Poorly-graded Sand with Gravel (SP) Brown, coarse and medium grain.	11:00 at 43-feet.
					45.0	Varying amounts of sand 5 to 50%.
					Sandy Gravel with Cobbles (GP) Brown, subrounded to subangular gravel, coarse sand.	Casing binding. Added 15 gallons of diluted polymer.
50						11:40 at 53-feet. Varying amounts of sand 0 to 90%.
						Casing moving freely.
60						Casing binding up. 12:42 at 63-feet. Add 1 gallon of diluted polymer through hammer, 10 gallons to outside of casing.
					65.0	
					Poorly-graded Sand (SP) Dark brown, fine to medium grain.	
70					Finer than above.	
					74.0	13:30 at 73-feet. Flow = 5 gpm.
					76.0 **Poorly-graded Gravel with Sand (GP)** Dark brown, up to 1-inch, sub-rounded and sub-angular gravel, 10% sand.	
					78.0 **Poorly-graded Sand with Gravel (SP)** Brown, medium and coarse sand, 10% gravel.	
80					**Sandy Gravel (GP)** Brown, subrounded to subangular gravel to >1 inch.	Varying amounts of sand 10 to 90%.
						14:10 at 83-feet. Flow = 5 gpm. Varying amounts of sand 10 to 40%.
90						
					95.0	14:50 at 93-feet. Flow = 8 gpm.

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BORING NUMBER MW-11D

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 9/29/04 **COMPLETED** 10/1/04 **GROUND ELEVATION** _____ **WATER LEVELS** feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 6632824 **EASTING** 370302

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Dave Lacey

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
					96.0 **Poorly-graded Gravely Sand (SP)** Brown, medium sand, gravel up to >1-inch, sub-rounded and sub-angular.	Varying amounts of sand 10 to 50%.
100					**Sandy Gravel (GP)** Brown, up to >1-inch, sub-rounded and sub-angular gravel, medium to coarse sand.	Return line clogged. Flow = 10 gpm.
					105.0	15:35 at 103-feet. Flow = 10 gpm.
					Gravely Sand (SP) Brown, coarse and medium sand, gravel up to >1-inch.	Varying amounts of Gravel 10 o 50%.
110					0.5-foot layer of fine sand. Color change dark brown.	
120					121.0	Casing binding up, can not move upward.
					123.0 **Sandy Gravel (GP)** Brown, subrounded to subangular gravel to >1-inch, 40% sand.	17:17 at 123-feet. Flow = 10 gpm.
					Gravely Sand (SP) Brown, medium and coarse sand, 30% gravel. 126.0	Return water very cloudy with balls of clay. Flow = 15 gpm. Varying amounts of sand 30 to 40%.
130					128.0 **Clayey Gravel (GC)** 20% clay. **Sandy Gravel with Cobbles (GP)** Rounded, sub-rounded and sub-angular, up to >1-inch, sand-coarse, 40% sand.	18:23 at 133-feet. Flow = 15 gpm.
					136.0 137.0 **Bedrock** Cuttings-Black, angular. Bottom of hole at 136.0 feet.	TD - 137.

NORTHERN DYNASTY PEBBLE.GPJ GINT US.GDT 1/24/05

BORING NUMBER MW-11Db

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 9/27/04 **COMPLETED** 9/28/04 **GROUND ELEVATION** _____ **WATER LEVELS** 53 feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** _____ **EASTING** _____

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Dave Lacey

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
0					1.0 **Organic Silt with Gravel (OL)** Brown, moist.	Start drilling with water 2 gpm.
					Poorly-graded Gravel with Sand (GP) Brown, sub-rounded to sub-angular gravel to >1-inch, Some cobbles, coarse sand, trace silt.	Drilling slowly in order to make a larger bore hole.
10						16:00 at 13-feet. Return line leaking, stop to fix resume drilling at 16:40.
						Varying amounts of sand 10 to 50%.
					Color change - Light gray.	
20						Casing vary tight, difficult to pull up. Added 5 gallons of dilute polymer from the top outside the casing.
					Color change - Light brown.	17:50 at 23-feet.
					27.0	
					29.0 **Lean Clay with Gravel (CL)** Light gray, 20% gravel.	
30					30.0 **Well-graded Sand (SW)** Brown, fine.	
					31.0 **Poorly Graded Sand (SP)** Gray, fine to medium sand.	
					Poorly Graded Sand with Gravel (SP) Brown, medium to coarse sand, subangular to subrounded fine	19:00 at 33-feet. Stop for the day. Start drilling 9-28-2004 9:10.

WELL COMPLETION INFORMATION

CASING

Top elevation (feet): Boring abandoned.

Vent hole?: _____

WELLHEAD PROTECTION COVER

Type: _____

Weep hole?: _____

Concrete pad dimensions: _____

WELL CASING

Dia.: _____

Type: _____

SURFACE CASING

Dia.: _____

Type: _____

SCREEN

Type: _____

Slot size: _____

SCREEN FILTER

Type: _____

Quantity used: _____

SEAL

Type: _____

Quantity used: _____

GROUT

Mix used: _____

Method of placement: _____

Vol. in surface casing: _____

Vol. in well casing: _____

DEVELOPMENT

Method _____

Time: _____

Estimated purge volume: _____

Comments: Casing locked in boring. Casing broke apart 5-feet below ground surface. Boring abandoned. 140-feet of casing abandon in hole. Bottom and top o

NORTHERN DYNASTY PEBBLE.GPJ GINT US.GDT 1/24/05

(Continued Next Page)

BORING NUMBER MW-11Db

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 9/27/04 **COMPLETED** 9/28/04 **GROUND ELEVATION** _____ **WATER LEVELS** 53 feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** _____ **EASTING** _____

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Dave Lacey

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
					gravel to >1 inch.	Varying amounts of gravel 20 to 80%.
40					Coarser than above, gravel up to >1-inch.	9:30 at 43-feet.
					Cobbles	
50					50.0	Varying amounts of sand 5 to 30%.
					53.0 ▽ **Well-graded Sand (SW)** Brown, fine.	10:15 at 53-feet. Production = <0.5 gpm (Difficult to tell if this is groundwater or drilling water) Return rate (cutting, drilling water, formation water) = 1 gpm. Specific Cond. = 0.031 mS pH = 7.42
					Poorly Graded Gravel with Sand (GP) Sub-rounded and sub-angular, up to >1-inch, light brown coarse to fine grain sand.	
60					62.0	Return water Specific Cond. = 0.033mS pH = 7.62.
					63.0 **Clay with Sand and Gravel (CL)** Gray, fine sand, 40% sand, 10% gravel.	12:00 at 63-feet. Production = 1 gpm
					Well-graded Sand (SW)	
					66.0 **Poorly-graded Sand with Gravel (SP)** Coarse and medium grain sand, gravel up to 1-inch. 40% gravel, with cobbles	Slow drilling through cobbles.
70					71.0 **Poorly-graded Gravel with Sand (GP)** Light brown, sub-rounded, up to >1-inch	13:03 at 73-feet. Production = 2 gpm. Specific Cond. = 0.050 mS, pH = 7.35 Varying amounts of sand 0 to 20%.
80					80.0	
					81.0 **Well-graded Sand (SW)** Brown, fine grain.	13:42 at 83-feet. Produciton = <0.5 gpm.
					Poorly Graded Gravel with Sand (GP) Fine to coarse gravel, sand coarse to medium grain.	Varying amounts of sand 10 40%.
					87.0	
					89.0 **Gravely Sand (SP)** Coarse and medium grain, 40% gravel	
90					90.0 **Sandy Gravel (GP)** Sub-angular and sub-rounded, up to 1-inch, 40% sand.	
					Poorly Graded Sand with Gravel (SP) Medium and coarse grain, gravel up to 1-inch. 30% gravel.	14:40 at 93-feet. Production = 1 gpm. Specific Cond. = 0.044 mS pH = 7.60

NORTHERN DYNASTY PEBBLE.GPJ GINT US.GDT 1/24/05

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BORING NUMBER MW-11Db

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 9/27/04 **COMPLETED** 9/28/04 **GROUND ELEVATION** _____ **WATER LEVELS** 53 feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** _____ **EASTING** _____

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Dave Lacey

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
100					Finer than above, Medium to fine grain.	
					Coarser than above, Medium and coarse grain.	
					Finer than above, Medium and fine grain.	Production = 2 gpm. Specific Cond. = 0.036 mS pH = 7.80
110					Coarser than above, Coarse and medium grain.	
					112.0	Increased flow rate, stoped adding water. Flow = 8 gpm.
					Sandy Gravel (GP) Sub-rounded gravel to 1-inch; coarse grain sand, 40% sand.	
					115.0	
					117.0 **Gravely Sand (SP)** Medium to coarse grain, 30% gravel.	
					Poorly-graded Sand (SP) Dark brown, fine sand.	
120					120.0	Flow rate = 15 gpm.
					121.0	
					122.0 **Poorly-graded Sand with Gravel (SP)** Medium sand, gravel to >1-inch, 20% gravel.	
					Clayey Gravel (GP)	
					124.0 **Clay (CL)** Light gray.	18:30 at 123-feet. Stop for the day. Specific Cond. = 0.040 mS pH = 7.80 Difficult to estimate clay content. Water very cloudy. Cuttings 1% clay balls. Flow rate = 1 gpm. Flow rate = 10 gpm.
					Clayey Gravel with Sand (GC) 20% clay.	
					129.0	
130					**Sandy Gravel with Cobbles (GP)** Light gray, some sub-rounded, mostly cobble fragments.	Flow rate = 15 gpm.
					132.0	
					Sandy Gravel (GP) Light brown, sub-rounded, up to >1-inch. Up to 5% clay.	Flow rate = 15 gpm. Less than 1% clay balls. Slow drilling 1-foot/20mins.
						Flow rate 15 gpm
140					140.0	Return up to 70% sand but mostly angular. Flow = 15 gpm.
					Sandy Gravel (GP) Sub-rounded, up to >1-inch, fine to coarse grain sand.	
					143.0	Flow rate = 1 gpm. Start adding water 2 gpm.
					145.0 **Fractured Bedrock** Traces of clay.	
					147.0 **Bedrock** Cuttings - fine to medium sand, angular.	TD - 147. Casing locked in boring. Casing broke apart 5-feet below ground surface. Abandoned boring.
					Bottom of hole at 147.0 feet.	

BORING NUMBER MW-11M

Northern Dynasty Minerals Ltd.

CLIENT | **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 | **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 10/2/04 **COMPLETED** 10/3/04 | **GROUND ELEVATION** | **WATER LEVELS** 52.51 feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC | **NORTHING** 6632820 **EASTING** 370303

DRILLING DRILLING METHOD | **EQUIPMENT** | **LOGGER** Matt Flynn

NOTES

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
0					**Organic Silt (OL)**	
					4.0	Adding water with polymer.
					Poorly Graded Gravel with Silt and Sand (GP-GM) Brown, moist, gravel-sub-rounded to angular, up to >3/4-inch, medium to coarse grain sand.	
10					Occasional cobble -12-inches.	Difficult drilling, using polymer. Pull casing up many times because of sticking with rocks or casing.
					Occasional large cobble, difficult drilling.	
					18.0	
20					**Poorly Graded Gravel with Sand (GP)** Trace silt, brown, moist, gravel is sub-rounded to angular, up to >3/4-inches, medium to coarse sand, sub-angular to sub-rouned sand.	Adding water down rods and polymer/water outside casing.
					Cobble ~12 inch.	
30						

WELL COMPLETION INFORMATION

CASING

Top elevation (feet):

Vent hole?:

WELLHEAD PROTECTION COVER

Type: 6" steel casing with lid

Weep hole?: No

Concrete pad dimensions:

WELL CASING

Dia.: 2 inches

Type: Schedule 40 PVC

SURFACE CASING

Dia.:

Type:

SCREEN

Type: 2-inch/Schedule 40 PVC Insta-pack

Slot size: 0.020"

SCREEN FILTER

Type: Native collapse

Quantity used: NA

SEAL

Type: 0.25" bentonite pellets CETCO

Quantity used: 1 5-gallon bucket

GROUT

Mix used: Volclay

Method of placement: Tremie pipe

Vol. in surface casing: NA

Vol. in well casing: NA

DEVELOPMENT

Method Surge and block, with 1" Waterra pump

Time: NA

Estimated purge volume: NA

Comments: Boring TD-113.5-feet. Top 6-feet sealed with portland grout. 1/4-inch bentonite pellet seal from 99' to 94'.

(Continued Next Page)

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 10/2/04 **COMPLETED** 10/3/04 **GROUND ELEVATION** _____ **WATER LEVELS** 52.51 feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 6632820 **EASTING** 370303

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Matt Flynn

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
					35.5 **Well-graded Sand (SW)** Brown, moist, fine to medium grain, sub-rounded.	Reached 35-feet at 19:02 on 10/02/2004.
40					40.0 **Well-graded Sand (SW)** Brown, moist, fine to coarse sand, sub-rounded to sub-angular.	Occasional cobbles. 5 gallons mixed polymer to outer casing.
					45.0 **Well-graded Sand (SW)** Moist, Grayish brown, fine to coarse, subrounded sand.	Drilling with water
50					49.0 51.0 **Well-graded Sand with Gravel (SW)** Grayish brown, fine to coarse subrounded sand; gravel rounded to sub-rounded to 3/4-inch, 30% gravel	
					53.0 **Well-graded Gravel with Sand (GW)** Medium to coarse subangular to subrounded sand; rounded to sub-angular gravel to >3/4-inch.	Drilling with water.
					56.0 **Well-graded Sand (SW)** Moist, grayish brown, fine to coarse grain, sub-angular to sub-rounded. **Well-graded Sandy Gravel (GW)** Moist, medium to coarse subrounded to subangular sand, rounded to angular gravel to 3/4-inch. 30% sand.	
60						Drilling with water.
					66.0 **Poorly Graded Sand (SP)** Brown, moist, medium, sub-angular sand.	100% sand Water at 68-feet.
70					74.0 **Poorly Graded Sand (SP)** Brown, wet, very fine grain.	100% sand.
					77.0 **Well-graded Sandy Gravel (GW)** Angular to rounded gravel >3/4-inch, medium to coarse grain sand, 40% sand.	60% gravel 40% sand.
80						Flow at 83-feet = 5 to 7 gpm. 30% sand
90					93.0 **Well-graded Sandy Gravel (GW)** Wet, small up to	Flow at 93-feet = 8 gpm.

NORTHERN DYNASTY PEBBLE.GPJ GINT US.GDT 1/24/05

(Continued Next Page)

BORING NUMBER MW-11M

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 10/2/04 **COMPLETED** 10/3/04 **GROUND ELEVATION** _____ **WATER LEVELS** 52.51 feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 6632820 **EASTING** 370303

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Matt Flynn

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
100					>3/4-inch, rounded to angular gravel; medium to coarse subangular to subrounded sand.	
					103.0	Flow at 103-feet = 10 gpm.
					Well-graded Sandy Gravel (GW) Small to >3/4-inch, rounded to angular gravel, medium to coarse sand.	
110						
					113.5	Flow at 113 = 10 gpm. TD - 113.5-feet on 10/03/2004
					Bottom of hole at 113.5 feet.	

BORING NUMBER MW-11S

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 10/4/04 **COMPLETED** 10/4/04 **GROUND ELEVATION** _____ **WATER LEVELS** NA feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 6632813 **EASTING** 370304

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Matt Flynn

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
0					1.0 **Organic Silt (OL)**	Using water and polymer to drill.
					4.0 **Silty Gravel with Sand (GM)** Brown, Moist, sub-rounded to angular gravel to >3/4-inch; medium to coarse subrounded to subangular sand; 15% silt, 60% gravel, 25% sand. **Poorly-graded Sandy Gravel (GP)** Moist, 1/2 to >3/4-inch, angular to sub-angular gravel, medium to coarse, angular to sub-rounded sand.	
10						
					18.0 **Well-graded Sandy Gravel (GW)** Moist, rounded to angular, fine to >3/4-inch gravel, medium to coarse, angular to subrounded sand, 20% sand.	
20						
30						
					34.0	

WELL COMPLETION INFORMATION

CASING

Top elevation (feet): _____

Vent hole?: _____

WELLHEAD PROTECTION COVER

Type: 6" steel casing with lid

Weep hole?: No

Concrete pad dimensions: _____

WELL CASING

Dia.: 2 inches

Type: Schedule 40 PVC

SURFACE CASING

Dia.: _____

Type: _____

SCREEN

Type: 2-inch/Schedule 40 PVC Insta-pack

Slot size: 0.020"

SCREEN FILTER

Type: 10/20 Sand

Quantity used: 6 50-lb bags

SEAL

Type: 0.25" bentonite pellets

Quantity used: 1 5-gallon bucket

GROUT

Mix used: 30% solids Volclay

Method of placement: Tremie pipe

Vol. in surface casing: NA

Vol. in well casing: NA

DEVELOPMENT

Method Surge and block, with 1" Waterra pump

Time: _____

Estimated purge volume: _____

Comments: Boring TD-84'. Portland grountt (2 100 lb bags) in to 6-feet of well.

(Continued Next Page)

BORING NUMBER MW-11S

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 10/4/04 **COMPLETED** 10/4/04 **GROUND ELEVATION** _____ **WATER LEVELS** NA feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 6632813 **EASTING** 370304

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Matt Flynn

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
40					**Well-graded Sand (SW)** Brown, moist, fine to medium grain, sub-rounded sand; trace gravel to 1/2-inch.	
					40.0	
					Well-graded Sand (SW) Brown, moist, fine to coarse grain, sub-rounded, trace rounded gravel to 1/2-inch.	
					47.0	
50					**Well-graded Sand with Gravel (SW)** Fine to coarse grain, sub-rounded sand; rounded to sub-rounded gravel to 1/2-inch, 20% gravel.	
					Increasing gravel with depth 65% sand, 35% gravel.	
60						Bottom of boring at 84-feet. 18:30 10/04/2004
					60.0	
					Well-graded Sandy Gravel (GW) Brownish gray, moist, fine to 3/4-inch, rounded to sub-rounded, sand-medium to coarse. 35% sand.	
					66.5	
70					**Poorly Graded Sand (SP)** Brown, moist, wet at 69-feet, medium, sub-angular.	100% sand
					Finer than above- very fine grain.	
					77.0	100% sand
80					**Well-graded Sandy Gravel (GW)** Brown, wet, rounded, gravel to >3/4-inch; medium to coarse sand; 35% sand.	
					84.0	flow at 84-feet = 6 to 7 gpm.
					Bottom of hole at 84.0 feet.	

BORING NUMBER MW-11Sb

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 9/26/04 **COMPLETED** 9/26/04 **GROUND ELEVATION** _____ **WATER LEVELS** 53 feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** _____ **EASTING** _____

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Dave Lacey

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
0					1.0 **Organic Silt with Gravel (OL)** Brown, moist.	Drilling with air.
					Poorly Graded Gravel with Silt (GP-SM) Brown, moist, sub-rounded tosub-angular, up to >1-inch, some cobbles.	13:20 at 3-feet.
						Start drilling with water 2 gpm.
					8.0	
10					**Poorly Graded Sandy Gravel (GP)** Brown, moist, sub-rounded and sub-angular gravel to >1-inch, some cobbles, coarse sand, 5% silt.	13:50 at 13-feet.
						Varying amounts of sand 10 to 50%.
20						14:12 at 23-feet.
					26.0	
					Clay (CL) Light gray, 5% sand, 5% gravel.	
30					31.0	
					Silty Sand (SM) Brown, moist, very fine grain. Change in grain size - Fine grain, coarser than above.	14:56 at 33-feet.

WELL COMPLETION INFORMATION

CASING

Top elevation (feet): Boring abandoned.

Vent hole?: _____

WELLHEAD PROTECTION COVER

Type: _____

Weep hole?: _____

Concrete pad dimensions: _____

WELL CASING

Dia.: _____

Type: _____

SURFACE CASING

Dia.: _____

Type: _____

SCREEN

Type: _____

Slot size: _____

SCREEN FILTER

Type: _____

Quantity used: _____

SEAL

Type: _____

Quantity used: _____

GROUT

Mix used: _____

Method of placement: _____

Vol. in surface casing: _____

Vol. in well casing: _____

DEVELOPMENT

Method _____

Time: _____

Estimated purge volume: _____

Comments: Drill casing broke at 80'. Boring abandoned. 15' of casing lost in hole.

(Continued Next Page)

BORING NUMBER MW-11Sb

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 9/26/04 **COMPLETED** 9/26/04 **GROUND ELEVATION** _____ **WATER LEVELS** 53 feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** _____ **EASTING** _____

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Dave Lacey

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
					37.0	
40					**Poorly Graded Gravel with Sand (GP)** Sub-rounded and sub-angular gravel o 1-inch, coarse sand.	
					Coarser than above with cobbles.	15:15 at 43-feet.
50					Cobbles	Slow drilling Faster drilling
					53.0 ▽	
					54.0 **Well-graded Sand (SW)** Brown, Fine grain.	15:40 at 53-feet. Production = No water.
					Poorly Graded Gravel with Sand (GP) Brown, sub-rounded to sub-angular gravel to >1-inch.	Drilling rate 0.5-feet/min.
60						
						16:20 at 63-feet. Production = 1 gpm. Water between 53' and 63'
70						
						17:00 at 73-feet.
					75.0	
					Poorly Graded Sand with Gravel (SP) Brown, coarse sand, fine gravel.	Varying amounts of gravel 5 to 30%
80					80.0	
					Bottom of hole at 80.0 feet.	Casing broke. Abandon boring. Move 5-feet east and start MW-11(A).

NORTHERN DYNASTY PEBBLE.GPJ GINT US.GDT 1/24/05

BORING NUMBER P-1

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 8/21/04 **COMPLETED** 8/21/04 **GROUND ELEVATION** _____ **WATER LEVELS** feet

DRILLING DRILLING CONTRACTOR Midnight Sun **NORTHING** 6641340 **EASTING** 5371341

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Matt Flynn

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
0					0.5 **Silty gravel w/ sand (GM)** Brown, moist, medium to coarse sub-angular to sub-rounded sand, angular to sub-rounded gravel up to >3/4".	10-15% fines, 60% gravel, 25-30% sands
						Flow IN
					8.0 **Well-graded sand w/ gravel and silt (SW-SM)** Brown, moist, medium to coarse sub-angular to sub-rounded sand, angular to sub-rounded gravel up to 3/4".	Adding water at 8'. 10% fines, 50% sands, 40% gravel Flow IN
10						
					16.0 **Clayey gravel w/ sand (GC)** Brown, moist, sub-rounded fine to coarse sand, sub-angular to rounded gravel to 1/2".	30% fine, 40% gravel, 20% sand Flow IN
20						
						Flow IN
					26.0 **Well-graded sand w/ silt (SW-SM)** Yellowish orange, moist, sub-angular to rounded fine to coarse sand, layers where silt increases to 20- 30%.	90% sand, 10% silt
30					31.0 **Bedrock** Yellowish orange and off-white, moist.	

WELL COMPLETION INFORMATION

CASING

Top elevation (feet): Boring abandoned

Vent hole?: _____

WELLHEAD PROTECTION COVER

Type: _____

Weep hole?: _____

Concrete pad dimensions: _____

WELL CASING

Dia.: _____

Type: _____

SURFACE CASING

Dia.: _____

Type: _____

SCREEN

Type: _____

Slot size: _____

SCREEN FILTER

Type: _____

Quantity used: _____

SEAL

Type: _____

Quantity used: _____

GROUT

Mix used: _____

Method of placement: _____

Vol. in surface casing: _____

Vol. in well casing: _____

DEVELOPMENT

Method _____

Time: _____

Estimated purge volume: _____

Comments: _____

NORTHERN DYNASTY PEBBLE.GPJ GINT US.GDT 1/24/05

(Continued Next Page)

BORING NUMBER P-1

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 8/21/04 **COMPLETED** 8/21/04 **GROUND ELEVATION** _____ **WATER LEVELS** feet

DRILLING DRILLING CONTRACTOR Midnight Sun **NORTHING** 6641340 **EASTING** 5371341

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Matt Flynn

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
40					44.0 TD. No water encountered. No well installed. Bore hole abandoned. 1710 8/21/2004. Bottom of hole at 44.0 feet.	

BORING NUMBER P-2D

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 8/18/04 **COMPLETED** 8/19/04 **GROUND ELEVATION** _____ **WATER LEVELS** 8.59 feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 6641241 **EASTING** 5371688

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Matt Flynn

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
0					0.5 **Peat**	
					Silty Gravel (GM) Yellowish orange and light brown, moist, angular to subangular gravel to greater than .75 inches.	Water in.
					8.0 ▽	
10					**Silty Sand with Gravel (SM)** Yellowish brown, moist (wet at 9 feet). Medium, subangular to subround sand, subangular to subround gravel to .5 inches. 20% fines.	
					As above, fines 10-15%.	
					18.0	
20					**Well-Graded Sand with Gravel (SW)** Yellowish brown, wet, medium to coarse subangular to subround sand, subangular gravel to .75 inches.	
					22.5	
					23.0 **Silty Sand with Gravel (SM)** Small lense of silty sand or sandy silt, yellow brown, wet, fine to medium sand	
					25.0 **Well-Graded Sand with Gravel (SW)**	Water in.
					26.0 **Silty Sand with Gravel (SM)** Small lense of silty sand/sandy silt, yellow-brown, wet	
30					**Clay (CL)** Gray, moist, trace gravel.	
					33.0	
					Clayey Gravel with Sand (GC) Gray, moist, angular	

WELL COMPLETION INFORMATION

CASING

Top elevation (feet): _____

Vent hole?: _____

WELLHEAD PROTECTION COVER

Type: 6" steel casing with lid

Weep hole?: N/A

Concrete pad dimensions: _____

WELL CASING

Dia.: 2 inches

Type: Schedule 40 PVC

SURFACE CASING

Dia.: _____

Type: _____

SCREEN

Type: 2-inch/Schedule 40 PVC

Slot size: 0.020"

SCREEN FILTER

Type: 10/20 silica sand.

Quantity used: _____

SEAL

Type: bentonite coated pellets

Quantity used: _____

GROUT

Mix used: 30% volclay grout

Method of placement: _____

Vol. in surface casing: _____

Vol. in well casing: _____

DEVELOPMENT

Method _____

Time: _____

Estimated purge volume: _____

Comments: _____

NORTHERN DYNASTY PEBBLE.GPJ GINT US.GDT 1/24/05

(Continued Next Page)

BORING NUMBER P-2D

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 8/18/04 **COMPLETED** 8/19/04 **GROUND ELEVATION** _____ **WATER LEVELS** 8.59 feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 6641241 **EASTING** 5371688

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Matt Flynn

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
					36.0 to subround gravel to .75 inches, subangular to subround medium sand.	
					37.0 **Well-Graded Sand with Gravel (SW)** Yellow, brown, moist, subangular to subround medium to coarse sand, angular to subround gravel up to .75 inches.	
40					38.0 **Clay with Gravel (CL)** Gray, moist, lense 6-12 inches.	
					Well-Graded Sand with Gravel (SW) Gray, moist to wet, subangular to subround medium to coarse sand, gravel subround to .5 inches. Small lense of gray clay. Large cobble. Small lense of clay.	
					49.0	
50					**Large Cobble** Calcified off-white/rust colored, wet, angular sands and gravels.	
					51.0 **Well-Graded Sand with Gravel (SW)** Gray, wet Increased Fines.	
					56.0	
					58.0 **Boulder**	
60					**Well-Graded Sand with Gravel and Clay (SW)** Brown, moist, subangular sand , medium to coarse. Subround gravel to .5 inches. Clay approx. 10%.	
					63.0 **BEDROCK** Calcified off white/rust colored, wet, angular sands and gravels. w	
					68.0	
70					**Weathered Bedrock** Possibly Siltstone. Brown, most likely wet, soft.	
					75.0	
					BEDROCK Calcified, off white/rust colored. Angular sands and gravels, wet.	
80					**BEDROCK** Highly fractured, off white/reddish brown, wet.	
					88.5	
					Bottom of hole at 88.5 feet.	

NORTHERN DYNASTY PEBBLE.GPJ GINT US.GDT 1/24/05

BORING NUMBER P-2M

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 8/20/04 **COMPLETED** 8/20/04 **GROUND ELEVATION** _____ **WATER LEVELS** 8.61 feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 6641256 **EASTING** 5371690

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Matt Flynn

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
0					0.5 **Peat (PT)**	
					Silty Gravel (GM) Yellow-orange, moist. Gravel is angular to subround to greater than .75 inches.	
					7.0	Adding water to drill.
10					▽ **Well-Graded Sand with Gravel and Silt (SW-SM)** Medium to coarse subangular-subround sand. Subangular to subround gravel to .5 inches. 10-15% fines.	Best guess at water level.
					Less fines-about 5%.	Adding water to drill. Confirmed water is also coming from aquifer.
20					24.0 Small lense of silt.	
					25.5 **Sandy Silt (SM)** Brownish gray, moist, possibly wet.	
					Clay (CL) Gray, moist, trace gravel.	
30						
					33.5 Increased Gravel to about 30%.	

WELL COMPLETION INFORMATION

CASING

Top elevation (feet): _____

Vent hole?: N/A

WELLHEAD PROTECTION COVER

Type: 6" steel casing with lid

Weep hole?: _____

Concrete pad dimensions: _____

WELL CASING

Dia.: 2 inches

Type: Schedule 40 PVC

SURFACE CASING

Dia.: _____

Type: _____

SCREEN

Type: 2-inch/Schedule 40 PVC

Slot size: 0.020"

SCREEN FILTER

Type: 20/20 Silica Sand

Quantity used: 4 50-lb bags

SEAL

Type: 0.25" bentonite pellets

Quantity used: 1 5-gallon bucket

GROUT

Mix used: Volclay

Method of placement: _____

Vol. in surface casing: _____

Vol. in well casing: _____

DEVELOPMENT

Method _____

Time: _____

Estimated purge volume: _____

Comments: 8" Bentonite plug with 4" silica sand on top.

NORTHERN DYNASTY PEBBLE.GPJ GINT US.GDT 1/24/05

(Continued Next Page)

BORING NUMBER P-2M

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 8/20/04 **COMPLETED** 8/20/04 **GROUND ELEVATION** _____ **WATER LEVELS** 8.61 feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 6641256 **EASTING** 5371690

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Matt Flynn

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
40					**Clayey Gravel (GC)** Gray, moist, gravel to .5 inches, subround to round. Gray, moist, subangular to subround gravel to .5 inches.	
					46.0	
					Boulder (BLDRCBBL)	
					49.0	
50					50.0 **Well-Graded Sand with Gravel (SW) Interbedded with layers of Gravel and Clay (GC)** wet, gray, layers 6-12 inches. GC/SW layers to 55 feet.	Some water in gravel layers. However, layers are too small to install screen. Water is sporadic.
					51.0 52.0	
					53.0 **Gravel and Clay (GC)**	
					54.0 **Well-Graded Sand with Gravel (SW)**	
					55.0 **Gravel and Clay (GC)**	
					56.0 **Well-Graded Sand with Gravel (SW)**	
					Gravel and Clay (GC)	
					58.0 **Boulder (BLDRCBBL)** 12 inch boulder.	
60					**Well-Graded Sand with Gravel and Silt (SW-SM)** brown/tan, moist to wet. Subangular to subround sand, medium to coarse. Gravel is subangular to subround to .75 inches.	Lots of water in the fractured bedrock.
					Bedrock (BEDROCK) Degraded/highly fractured bedrock, off-white/reddish brown, wet.	
					68.0	
					69.0 **Siltstone (SILTSTONE)**	
					Bottom of hole at 69.0 feet.	

BORING NUMBER P3

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 8/22/04 **COMPLETED** 8/22/04 **GROUND ELEVATION** _____ **WATER LEVELS** 10.82 feet

DRILLING DRILLING CONTRACTOR Midnight Sun **NORTHING** 6641467 **EASTING** 5371948

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Stacey Cooper

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
0					1.0 **Peat (PT)** Brown, moist, trace sand and gravel, gravel to 1/4". **Well-graded gravel with silt and sand (GW)** Dark brown, moist, sub-angular to sub-round gravel to 3/4", angular to subangular fine to coarse sand, 70% gravel, 20% sand, 10% fines. Becomes less gravelly, more sandy- lighter brown.	5% gravel, 5% sands, 90% fines
10					11.0 ▽ **Silt w/ sand (ML)** Yellowish orange, dry, sand is sub-angular, 5% gravel, 15% coarse to medium sand, 80% silt. 14.0 **Well-graded gravel w/ sand (GW) Bedrock** Yellowish orange, wet, 70% well-graded angular to sub-angular gravel, metamorphics (?) and white limestone, 20% subangular to sub-round sand, 10% silt. Becomes dry at 16'. Same material.	Water level at 14' Flow OUT Dry again.
20					More sandy at 20'. Still a mix with white limestone. Dry. 23.0 Color change- whitish gray at 23' **Gravelly sand w/ silt (SW/SM)** Driller reports this is unweathered bedrock, 35% gravel to 1/2", 50% well-graded angular to sub-angular sand, 15% silt, dry. 25.0 Bottom of hole at 25.0 feet.	TD = 24.5'

WELL COMPLETION INFORMATION

CASING

Top elevation (feet): 311m

Vent hole?: N/A

WELLHEAD PROTECTION COVER

Type: _____

Weep hole?: _____

Concrete pad dimensions: _____

WELL CASING

Dia.: 2 inches

Type: Schedule 40 PVC

SURFACE CASING

Dia.: 5 inches

Type: _____

SCREEN

Type: 2-inch/Schedule 40 PVC Insta-pack

Slot size: 0.020"

SCREEN FILTER

Type: 10/20 Silica sand. Filter sand

Quantity used: 4.5 50-lb bags

SEAL

Type: Bentonite pellets

Quantity used: 1.5 5-gallon buckets

GROUT

Mix used: Portland Cement

Method of placement: Poured in directly (only 4' from g

Vol. in surface casing: _____

Vol. in well casing: _____

DEVELOPMENT

Method _____

Time: _____

Estimated purge volume: _____

Comments: 6" Bentonite @ bottom of hole. 1.5' filter sand above that.

NORTHERN DYNASTY PEBBLE.GPJ GINT US.GDT 1/24/05

BORING NUMBER P-4 M

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 8/27/04 **COMPLETED** 8/28/04 **GROUND ELEVATION** _____ **WATER LEVELS** 12 feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 6641549 **EASTING** 372473

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Andy Larson

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
0					2.0 **Low Plasticity Organic Silt or Clay (OL)** Light brown.	
					Well-Graded Gravel with Sand (GW) Moist, gravel to 1 inch. As above, trace silt.	
10					▽	
					19.0 More moist, more silt.	Began drilling with water.
20					**Silt with Sand (ML)** Reddish-brown, moist, fine sand. (Wet.)	On re-drill more gray silt noted than in original drilling. Swivel messed up. (8/28)
30					31.0 **Silty Gravel (GM)** Reddish-brown, moist, more gravel than above. 35.0	Still drilling with water.

WELL COMPLETION INFORMATION

CASING

Top elevation (feet): about 300m

Vent hole?: _____

WELLHEAD PROTECTION COVER

Type: _____

Weep hole?: _____

Concrete pad dimensions: _____

WELL CASING

Dia.: 2 inches

Type: Schedule 40

SURFACE CASING

Dia.: _____

Type: _____

SCREEN

Type: 2-inch/Schedule 40 PVC

Slot size: 0.020"

SCREEN FILTER

Type: 10-20 Sand

Quantity used: 7 bags

SEAL

Type: .25" bentonite tablets

Quantity used: 1 5-gallon bucket

GROUT

Mix used: usual

Method of placement: Tremie pipe

Vol. in surface casing: _____

Vol. in well casing: 2 batches, 4 bags inside casing

DEVELOPMENT

Method _____

Time: _____

Estimated purge volume: _____

Comments: 3' same-2 bags-55-lb bags. 2' bentonite chips -1/2 bucket-58-lb bags. Native cuttings/rocks-approximate 8 buckets rocks to 60-lb bags. Boring logs

NORTHERN DYNASTY PEBBLE.GPJ GINT US.GDT 1/24/05

(Continued Next Page)

BORING NUMBER P-4 M

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 8/27/04 **COMPLETED** 8/28/04 **GROUND ELEVATION** _____ **WATER LEVELS** 12 feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 6641549 **EASTING** 372473

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Andy Larson

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
40					**Poorly-Graded Sand (SP)** Red-brown, moist.	Driller notes substrate is "soft." On re-drill, there is a zone of sand around 40 feet. Driller says coarser.
					40.0 **Well-Graded Gravel with Sand (GW)** Reddish brown, wet, subround gravel to 1 inch, trace silt reddish tinge.	
					45.0 **Poorly-Graded Sand (SP)** Reddish-brown, wet, some silt, gravel to <1 inch.	Driller says water there, just not making water, like some of other wells. Casing broken. (8/27)
50					More gray in color, more gravel observed.	
					57.0 **Well-Graded Sand with Gravel (SW)** Varied colors, light gray matrix, wet, coarser than above, some gravels to 1 inch, coarse sand.	Expelled around 20 gallons at rod change. Wet, not flowing. Looks like return hose is plugged. Driller reports clay? Looks bedrocky.
60					67.0 **Well-Graded Gravel with Sand (GW)** Gravel -varied colors, wet, subround to 1 inch. Sand-orange, subangular.	Driller notes that they often see silt before bedrock.
70					78.0 **BEDROCK** (Suspected.) Erratic.	Driller indicates ther is more clay around 69 feet, becoming gravel by 72 feet. Slow drilling rate. Negligible flow rate at 75 foot rod sweep.
80					80.0 **Well-Graded Gravel with Sand (GW)**	
					85.0 **BEDROCK** (Suspected.) Erratic.	Not much water in casing at rod change.
					87.0 **Basal Till (TILL)**	
90					89.0 **BEDROCK**	
					91.0 **Basal Till (TILL)**	

NORTHERN DYNASTY PEBBLE.GPJ GINT US.GDT 1/24/05

(Continued Next Page)

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 8/27/04 **COMPLETED** 8/28/04 **GROUND ELEVATION** _____ **WATER LEVELS** 12 feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 6641549 **EASTING** 372473

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Andy Larson

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
					98.0	Pretty good water, 40 gallons at 95 foot rod change.
100					**BEDROCK** Black, angular.	Not making water yet.
					103.0	
					Bottom of hole at 105.0 feet.	

BORING NUMBER P-4A D

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 9/8/04 **COMPLETED** 9/9/04 **GROUND ELEVATION** _____ **WATER LEVELS** 20.4 feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 6641728 **EASTING** 372532

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Dave Lacey

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
0					**Silty Gravel with Sand (GM)** Brown, dry, gravel .25 inch to 1 inch, subrounded.	
					5.0	14:44 at 5-feet
					Poorly-Graded Gravel with Silt and Sand (GP-GM) Brown, dry.	6 inch cobble.
10						14:49 at 10-feet
					Poorly-Graded Gravel with Sand and Silt (GP-GM) Light brown, dry.	15:01 at 15-feet. Start drilling with water.
20					▽ Color change to brown.	15:16 at 20-feet (Water level 090904=20.4 ft bgs.)
					Color change to gray.	Water stands between 15 and 24 feet. Production < 1gpm.
					27.0	
30					**Poorly-Graded Sand with Silt (SP-SM)** Gray, wet, coarse grain. **Poorly-Graded Sand with Silt (SP-SM)** Light gray, wet, fine grain.	15:46 at 34-feet Wet but not producing.

WELL COMPLETION INFORMATION

CASING

Top elevation (feet): _____

Vent hole?: None

WELLHEAD PROTECTION COVER

Type: 6" steel casing with lid

Weep hole?: No

Concrete pad dimensions: _____

WELL CASING

Dia.: 2 inches

Type: Schedule 80

SURFACE CASING

Dia.: _____

Type: _____

SCREEN

Type: 2-inch/Schedule 40 PVC

Slot size: 0.020"

SCREEN FILTER

Type: 10/20 silica sand.

Quantity used: 5 50-lb bags

SEAL

Type: 0.25" bentonite pellets CETCO

Quantity used: 2 5-gallon buckets

GROUT

Mix used: Volclay

Method of placement: Tremie pipe

Vol. in surface casing: 150 gallons

Vol. in well casing: 3-batches - 6 bags before casing is

DEVELOPMENT

Method Surge and block, with 1" Waterra pump

Time: 4.5 hours

Estimated purge volume: 130 gallons

Comments: TD - 123-feet. Filled rat hole with cuttings and site gravel from 123' to 97'. Bentonite pellets from 97' to 92' and 10/20 sand from 92' to 90'.

NORTHERN DYNASTY PEBBLE.GPJ GINT US.GDT 1/24/05

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Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 9/8/04 **COMPLETED** 9/9/04 **GROUND ELEVATION** _____ **WATER LEVELS** 20.4 feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 6641728 **EASTING** 372532

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Dave Lacey

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
					Same as above, with 5% gravel.	
					37.0	
					39.0 **Silt (MH)** Gray, wet.	
40					**Poorly Graded Sand with Silt (SP-SM)** Gray, wet, medium to coarse grain.	
					41.0 Color change - Dark brown.	
					Well-Graded Sand (SW) Brown-orange, medium grain, 10% silt.	16:00 at 44-feet Production = 3 gpm.
					Color change - Brown.	
					49.0	
50					50.0 **Poorly Graded Sand with Silt and Gravel (SP-SM)** Gray, wet, medium grain, 5% gravel.	
					Clay with Sand and Gravel (CL) Gray, wet.	16:35 at 54-feet Production = 1 gpm.
					57.5	
60					**Poorly Graded Gravel with Silt (GP-GM)** Gray, wet, subangular.	
					60.0 **Poorly Graded Gravel (GP)** Gray, wet, subangular.	
					63.0	
					Poorly Graded Sand with Gravel (SP) Gray, wet, coarse grain.	17:10 at 64-feet Production = 2 gpm. Hammer not working, may be frozen or blocked line. Trip out of hole. Repaired hammer. Startup 090904 09:45. Adding water at about 2gpm.
					68.0	
70					**Poorly Graded Gravel with Sand (GP)** Gray, wet, fine to coarse.	
					71.0	
					Clay (CL) Gray, wet, minor gravel and sand up to 20%.	Small return volume. Clay mostly in suspension. 3 cups/foot. 10:30 at 73-feet Production appoximately 2 gpm.
					79.0	
80					**Poorly Graded Sand with Silt and Gravel (SP-SM)** Gray, wet, 40% subangular gravel, coarse sand.	11:25 at 83-feet Production = 3 gpm.
					91.0	
90					**Poorly Graded Sand with Silt (SP-SM)** Gray, wet, fine sand, 5% gravel.	12:20 at 93-feet Production = 1 gpm.
					94.0	
					Silty Sand with Gravel (SM)	

NORTHERN DYNASTY PEBBLE.GPJ GINT US.GDT 1/24/05

(Continued Next Page)

BORING NUMBER P-4A D

Northern Dynasty Minerals Ltd.

CLIENT | **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 | **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 9/8/04 **COMPLETED** 9/9/04 | **GROUND ELEVATION** | **WATER LEVELS** 20.4 feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC | **NORTHING** 6641728 | **EASTING** 372532

DRILLING DRILLING METHOD | **EQUIPMENT** | **LOGGER** Dave Lacey

NOTES

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
					96.0	
					Silt (ML) Gray, wet.	
					99.0	
100					**Clay with Silt and Sand (CL)** Gray, wet.	
					101.0	
					Poorly Graded Sand (SP) Gray, wet, fine to coarse sand.	13:36 at 103-feet
					106.0 Color change, light orange/brown.	Cutting water very thick with fines. Slow drilling @106 feet.
					Bedrock Cuttings - Well-Graded Sand with Silt (SM) Light orange/brown. Suspended fines-light orange/brown. Sand-dark gray.	
110						Slow drilling; may be bedrock.
						14:45 at 113-feet. Production = 2gpm. Slow drilling, may be bedrock.
120					Same as above	
					122.0	
					123.0	1604 Drilling very slow. Driller thinks bedrock. Backfilled with rock to 97 bgs. Grout to 91 feet.
					Bottom of hole at 123.0 feet.	

BORING NUMBER P-4A S

Northern Dynasty Minerals Ltd.

CLIENT | **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 | **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 9/10/04 **COMPLETED** 9/11/04 | **GROUND ELEVATION** | **WATER LEVELS** 20 feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC | **NORTHING** 6641728 **EASTING** 372532

DRILLING DRILLING METHOD | **EQUIPMENT** | **LOGGER** Dave Lacey

NOTES

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
0					**Organic Silt with Sand and Gravel (OL)** Moist, light brown.	14:28 at 3-feet
					7.0	Start drilling with water 2 gpm
10					**Poorly Graded Gravel with Sand and Silt (GP-GM)** Light Brown, moist, subangular gravel up to 1-inch.	
					More fines than above.	14:31 at 13-feet
					Less fines than above.	
20					▽ 21.0 Color change - Dark brown.	
					22.0 **Silt (ML)** Dark brown.	
					Poorly-graded Gravel (GP) Dark brown, Coarse.	15:23 at 23-feet Production = 0.75 gpm Very fast drilling through sand = 6-mins/10-feet
					25.0 Color change - Light orange brown.	
					Well-graded Sand with Silt (SW-SM) Light gray, very fine grain.	
30						15:52 at 33-feet Production = 1 gpm (Lots of sand in water) Specific

WELL COMPLETION INFORMATION

CASING

Top elevation (feet):

Vent hole?: None

WELLHEAD PROTECTION COVER

Type: 6" steel casing with lid

Weep hole?: No

Concrete pad dimensions:

WELL CASING

Dia.: 2 inches

Type: Schedule 80

SURFACE CASING

Dia.:

Type:

SCREEN

Type: 2-inch/Schedule 40 PVC Insta-pack

Slot size: 0.020"

SCREEN FILTER

Type: 10/20 silica sand.

Quantity used: 4.5 50-lb bags

SEAL

Type: 0.25" bentonite pellets CETCO

Quantity used: 1 5-gallon bucket

GROUT

Mix used: Volclay

Method of placement: Tremie pipe

Vol. in surface casing: NA

Vol. in well casing: NA

DEVELOPMENT

Method Surge and block, with 1" Waterra pump

Time: 3 hours

Estimated purge volume: 405 gallons

Comments: TD of boring 59-feet. Bentonite bottom seal 59' to 57'. Sand and formation 57' to 50'.

(Continued Next Page)

BORING NUMBER P-4A S

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 9/10/04 **COMPLETED** 9/11/04 **GROUND ELEVATION** _____ **WATER LEVELS** 20 feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 6641728 **EASTING** 372532

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Dave Lacey

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
40					40.0	Cond=0.213 mS, pH=6.83
					Well-graded Sand with Silt (SW-SM) Orange brown, Medium grain.	Very fast drilling through sand.
						16:45 at 43-feet. Production = 1.5 gpm (Lots of sand in water) Specific Cond = 0.240 mS, pH=6.82 Heaving sands.
50					Color change - gray.	
					51.0	
					53.0 **Clay with Gravel (CL)** Gray, plastic, firm.	Attempted to install well on 9-11-04. Heaving sands locked well casing in the drill casing. Drove to 59-feet.
					Clay (CL) Gray, plastic, firm.	
					59.0	TD - 59-feet bgs. Installed well screen 40' to 50'.
					Bottom of hole at 59.0 feet.	

BORING NUMBER P-6 D

Northern Dynasty Minerals Ltd.

CLIENT | **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 | **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 9/12/04 **COMPLETED** 9/12/04 | **GROUND ELEVATION** | **WATER LEVELS** 15 feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC | **NORTHING** 6641786 | **EASTING** 372616

DRILLING DRILLING METHOD | **EQUIPMENT** | **LOGGER** Dave Lacey

NOTES

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
0					2.0 **Silt with Gravel (ML)** Brown, moist.	
					Gravel with Silt (GP-GM) Gravel up to one inch, subrounded, 10% silt, 5% sand.	9:45 at 3-feet
					8.0	
10					10.0 **Poorly-Graded Sand (SP)** Brown, moist, coarse grain, 5% silt.	Start drilling with water 2 gpm.
					Gravel with Sand (GP) Brown, gravel up to one inch, subrounded.	
					▽	Varying amounts of sand 5-25%.
					Color change-light brown/orange	
20					**Poorly Graded Gravel with Sand and Silt (GP-GM)** Dark brown gravel up to one inch, subrounded, 10% silt.	
					Color change-light orange/brown	Varying amounts of sand 5-40%.
					25.0	Clogged air line.
					Silty Sand with Gravel (SM) Brown, coarse grain.	Varying amounts of gravel 5 to 40%. 11:05 at 28. Production at about 5 gpm. Specific cond. = 0.243 mS. pH = 6.55.
30						
						Varying amounts of silt 15-30%.

WELL COMPLETION INFORMATION

CASING

Top elevation (feet):

Vent hole?: None

WELLHEAD PROTECTION COVER

Type: 6" steel casing with lid

Weep hole?: No

Concrete pad dimensions:

WELL CASING

Dia.: 2 inches

Type: Schedule 80

SURFACE CASING

Dia.:

Type:

SCREEN

Type: 2-inch/Schedule 40 PVC Insta-pack

Slot size: 0.020"

SCREEN FILTER

Type: 10/20 silica sand.

Quantity used: 5 50-lb bags

SEAL

Type: 0.25" bentonite pellets CETCO

Quantity used: 1 5-gallon bucket, plus 1/2 bucket of 3/4

GROUT

Mix used: Volclay

Method of placement: Tremie pipe

Vol. in surface casing: NA

Vol. in well casing: NA

DEVELOPMENT

Method Surge and block, with 1" Waterra pump

Time: 3 hours

Estimated purge volume: 780 gallons

Comments: Boring TD - 113'. Sealed shoe with 1-foot 1/4-inch bentonite pellets. 10/20 sand from 112' to 112.4'. 1/4-inch bentonite pellet seal from 98' to 92'.

(Continued Next Page)

BORING NUMBER P-6 D

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 9/12/04 **COMPLETED** 9/12/04 **GROUND ELEVATION** _____ **WATER LEVELS** 15 feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 6641786 **EASTING** 372616

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Dave Lacey

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
40					37.0 **Well-Graded Sand with Silt (SM)** Light orange/brown, fine grain. **Silt (ML)** Gray, very soft. 45.0	11:30 at 43-feet. Very fast drilling through silt. Drill shoe fell off, got it re-attached. Production 0 gpm -1/2 bucket of silt.
50					**Clay with Gravel (CL)** Gray, stiff, plastic, 20% gravel. Boulder. **Clay with Sand and Gravel (CL)** Gray, firm, plastic, 10% gravel, 10% sand.	12:12 at 53-feet Production = 0 gpm.
60					**Clay (CL)** Gray, firm, plastic	12:42 at 63-feet
70					70.0 **Silt (ML)** Gray, soft, 5% sand.	
80					**Silt with Sand and Gravel (MH)** Gray, soft, 20% sand, 5% gravel. 88.0	13:13 at 83-feet. No significant water.
90					91.0 **Poorly-Graded Sand with Gravel (SP)** Sand-gray, coarse grain, gravel-fine, subrounded, 20% gravel, 5% sand. **Clay (CL)** Gray, firm, plastic.	14:02 at 93-feet. No significant water.

NORTHERN DYNASTY PEBBLE.GPJ GINT US.GDT 1/24/05

(Continued Next Page)

BORING NUMBER P-6 D

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 9/12/04 **COMPLETED** 9/12/04 **GROUND ELEVATION** _____ **WATER LEVELS** 15 feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 6641786 **EASTING** 372616

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Dave Lacey

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
					97.0	
					98.0 **Silt (ML)** Gray.	
100					**Clay (CL)** Gray, firm, plastic.	
					102.0	
					Poorly Graded Gravel with Sand (GP) Fine, some sub-rounded mostly angular to subangular. Boulder.	14:42 at 103-feet. Production = 0..75 gpm. Specific cond. = 0.506 mS. pH = 8.55. May be bedrock.
					109.0	
110					**Bedrock** Black, angular, water light brown.	Appears to be bedrock, very slow drilling. 15:49 at 110-feet. Production = 5 gpm. Specific cond. = 0.668 mS. pH=8.51.
					113.0	
					Bottom of hole at 113.0 feet.	TD - 113-feet.

BORING NUMBER P-6 M

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 9/13/04 **COMPLETED** 9/13/04 **GROUND ELEVATION** _____ **WATER LEVELS** 33 feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 6641786 **EASTING** 372616

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Dave Lacey

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
0						
					Gravely Silt (ML) Brown, moist.	
					3.0	13:30 at 3-feet
					Poorly-graded Gravel with Silt and Sand (GP-GM) Up to 1-inch, sub-rounded.	Start drilling with water 2 gpm.
						Varying amounts of sand 5 to 15%. Varying amounts of Silt 5 to 15%.
10						
					Color change - Dark brown.	13:52 at 13-feet
					Color change - Brown.	Varying amounts of sand 5 to 20%. Varying amounts of silt 5 to 30%.
					Color change - Dark brown.	
20						
					22.0 Color change - Light brownish orange.	
					Silty Sand (SM) Wet, light brownish orange, medium grain, 20% silt.	
					27.0	
					Silty Sand with Gravel (SM) Wet, light brownish orange, medium grain, 20% silt, 10% gravel.	
30					▽	14:30 at 33-feet. Production = 1 gpm.
					35.0	

WELL COMPLETION INFORMATION

CASING

Top elevation (feet): _____

Vent hole?: _____

WELLHEAD PROTECTION COVER

Type: 6" steel casing with lid

Weep hole?: No

Concrete pad dimensions: None

WELL CASING

Dia.: 2 inches

Type: Schedule 80

SURFACE CASING

Dia.: _____

Type: _____

SCREEN

Type: 2-inch/Schedule 40 PVC Insta-pack

Slot size: 0.020"

SCREEN FILTER

Type: 10/20 Sand

Quantity used: 5 50-lb bags

SEAL

Type: 0.25" bentonite pellets

Quantity used: 2 5-gallon buckets

GROUT

Mix used: Volclay

Method of placement: Tremie pipe

Vol. in surface casing: NA

Vol. in well casing: NA

DEVELOPMENT

Method Surge and block, with 1" Waterra pump

Time: 2.5 hours

Estimated purge volume: 105 gallons

Comments: Boring TD - 93'. Sealed shoe with 1-foot 1/4-inch bentonite pellets. 10/20 sand from 90' to 86'. 1/4-inch bentonite seal from 81' to 79'.

(Continued Next Page)

BORING NUMBER P-6 M

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 9/13/04 **COMPLETED** 9/13/04 **GROUND ELEVATION** _____ **WATER LEVELS** 33 feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 6641786 **EASTING** 372616

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Dave Lacey

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
					36.0 **Well-graded Sand with Silt (SW-SM)** Light grayish brown, fine grain. **Silt (ML)** Gray, 5% gravel.	Vary fast drilling through silt.
40						
					44.0 **Silt with Gravel (ML)** Gray, 20% gravel.	15:04 at 43-feet. Production = 0.5 gpm.
					48.0	
50					50.0 **Clay with Sand and Gravel (CL)** Gray, plastic, firm, 10% sand, 10% gravel.	
					52.0 **Clay (CL)** Gray, plastic, firm.	
					Clay wuth Gravel (CL) Gray, firm, plastic, angular gravel to 1/2-inch.	15:40 at 53-feet. No significate water. Varying amounts of gravel 5 to 40%. Varying amounts of sand 0 to 10%.
60						
						16:20 at 63-feet. No significant water.
70						
					74.0 **Silt (ML)** Gray.	16:40 at 73-feet. Production = 3 gpm.
					79.0	
80					**Silt with Sand (ML)** Gray, 10% sand. 82.0	Varying amounts of gravel 0 to 20%. 17:45 at 83. (Hammer clogged during production test)
					Poorly-graded Sand with Silt and Gravel (SP-SM) Gray, coarse grain sand, sub-rounded gravel, 10% sand, 10% gravel. 86.0	
					87.0 **Silt (ML)** Gray.	
90					**Clay with Gravel (CL)** Gray, plastic, firm, 20% gravel. 91.0	
					93.0 **Clay (CL)** Gray, plastic, firm. Bottom of hole at 93.0 feet.	TD - 93-feet

NORTHERN DYNASTY PEBBLE.GPJ GINT US.GDT 1/24/05

BORING NUMBER P-6 S

Northern Dynasty Minerals Ltd.

CLIENT | **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 | **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 9/15/04 **COMPLETED** 9/15/04 | **GROUND ELEVATION** | **WATER LEVELS** 23 feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC | **NORTHING** 6641786 **EASTING** 372616

DRILLING DRILLING METHOD | **EQUIPMENT** | **LOGGER** Dave Lacey

NOTES

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
0					1.0 **SILT with GRAVEL (ML)** Brown, Moist.	
					Gravel with Sand and Silt (GP-GM) Sub-rounded to rounded, gravel up to >1-inch.	9:10 at 3-feet Varying amounts of sand 10 to 40%. Varying amounts of silt 5 to 40%. Start drilling with water 2 gpm.
10					Color change - Light orangish brown. Color change - Dark brown. Color change - Brown.	9:50 at 13-feet Varying amounts of sand 10 to 30%. Varying amounts of silt 10 to 15%.
20					22.0 ▽ **Silty Sand (SM)** Brown, wet, medium to fine grain, 30% silt.	10:16 at 23-feet. Production = 0.5 gpm (Lots of sand and silt in water)
					26.0 **Silty Sand with Gravel (SM)** Coarse to medium grain sand, fine grain gravel, 20% Silt.	Varying amounts of gravel 5 to 10%.
30						10:36 at 33-feet. Production = 1.0 gpm. (Lots of sand and silt in water)

WELL COMPLETION INFORMATION

CASING

Top elevation (feet):

Vent hole?: None

WELLHEAD PROTECTION COVER

Type: 6" steel casing with lid

Weep hole?:

Concrete pad dimensions:

WELL CASING

Dia.: 2 inches

Type: Schedule 80

SURFACE CASING

Dia.:

Type:

SCREEN

Type: 2-inch/Schedule 40 PVC Insta-pack

Slot size: 0.020"

SCREEN FILTER

Type: 10/20 silica sand.

Quantity used: 4 50-lb bags

SEAL

Type: 0.25" bentonite pellets CETCO

Quantity used: 3 5-gallon bucket

GROUT

Mix used: Volclay

Method of placement: Tremie pipe

Vol. in surface casing: 150 gallons

Vol. in well casing: 6 bags before casing pulled

DEVELOPMENT

Method Surge and block, with 1" Waterra pump

Time: 2 hours

Estimated purge volume:

Comments: Boring TD-43-feet. Sealed shoe with 2' bentonite pellets. Filled rat hole 41' to 35' with 10/20 sand. 1/4-inch bentonite seal from 21.5' to 16'.

(Continued Next Page)

BORING NUMBER P-6 S

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 9/15/04 **COMPLETED** 9/15/04 **GROUND ELEVATION** _____ **WATER LEVELS** 23 feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 6641786 **EASTING** 372616

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Dave Lacey

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
40					38.0 **Silt (ML), Gray.** 43.0 Bottom of hole at 43.0 feet.	11:00 at 43-feet. TD - 43-feet

BORING NUMBER KP-P1/SRK-2

Northern Dynasty Minerals Ltd.

CLIENT | **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 | **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 8/23/04 **COMPLETED** 8/24/04 | **GROUND ELEVATION** | **WATER LEVELS** 50.7 feet

DRILLING DRILLING CONTRACTOR Midnight Sun | **NORTHING** 6642931 | **EASTING** 50372826

DRILLING DRILLING METHOD | **EQUIPMENT** | **LOGGER** Stacey Cooper

NOTES

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
0					1.0 **Peat (PT)** Dark brown, moist, organic tundra, roots. **Clay (CL)** Light brown, dry to moist, 10% sub-angular gravel to 1/2", 5% fine sand, 85% clay fines.	SRK-2 sample.
10					Becoming more gravelly.	SRK2 sample. Driller adding water Flow IN
					14.0	SRK2 sample.
					Well-graded gravel w/ sand and clay (GW-GC) Brown, moist, 60% angular to sub-angular gravel to 3/4", 20% sub-angular to sub-rounded well-graded snad, 20% clay fines. 19.0	
20					**Well-graded gravel w/ snad (GW)** Gray/brown, moist, 70% well-graded sub-angluar to sub-rounded gravel, 25" well-graded angular to sub-angular fine to coarse sand, 5% fines.	Flow IN
					Slightly more fines, light brown.	Water- 8/24/04 Probably just a pool of water here- not water level (SC 8/26/04) Flow OUT
					28.0	
30					**Well-graded sand w/ gravel and clay (SC)** Gray to light brown, wet, 30% well-graded sub-angular to sub-rounded gravel to 1/2", 50% sub-angular sand fine to coarse, 20% fines.	Driller says soil is saturated, but not flowing anymore.
					35.0	

WELL COMPLETION INFORMATION

CASING

Top elevation (feet): 309m

Vent hole?:

WELLHEAD PROTECTION COVER

Type: steel monument

Weep hole?:

Concrete pad dimensions:

WELL CASING

Dia.: 2 inches

Type: Schedule 80 PVC

SURFACE CASING

Dia.: 5 inch

Type:

SCREEN

Type: 2-inch/Schedule 40 PVC Insta-pack

Slot size: 0.020"

SCREEN FILTER

Type: 10/20 Colorado Silica Sand

Quantity used: 3 bags

SEAL

Type: Coated Bentonite Pellets

Quantity used: 3 5-gallon buckets

GROUT

Mix used: Volcay, granular grout

Method of placement: Tremie pipe

Vol. in surface casing:

Vol. in well casing:

DEVELOPMENT

Method

Time:

Estimated purge volume:

Comments: TD was 174'. Filled rat hole with cuttings and transition sand- no natural cave-in. Grout was seeping into formation (gravels) so mixed some

NORTHERN DYNASTY PEBBLE.GPJ GINT US.GDT 3/7/05

(Continued Next Page)

BORING NUMBER KP-P1/SRK-2

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 8/23/04 **COMPLETED** 8/24/04 **GROUND ELEVATION** _____ **WATER LEVELS** 50.7 feet

DRILLING DRILLING CONTRACTOR Midnight Sun **NORTHING** 6642931 **EASTING** 50372826

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Stacey Cooper

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
40					**Well-graded gravel w/ sand (GW)** Gray/brown, moist, 60% well-graded sub-anglar to round gravel, 25% well-graded medium to coarse sand, 15% fines.	Gravel to 1/2". Driller adding water. Flow IN
						Flow IN
					As above.	SRK sample
50					A little more sand here.	Flow IN
					▽	SRK sample
60					50% gravel, 40% sand, 10% fines. Otherwise as above.	Flow IN SRK sample
						SRK sample
70					More gravel here again- like at 35'.	Flow IN SRK sample
					Color beginning to change here- slightly rusted color with a few white limestone gravels and sands- 1st sign of bedrock?	SRK sample
					74.0	Water. SRK sample 1650. Flow OUT Driller added water to get silt out of drill rig. Flow IN
80					**Silty sand (SM)** Gray, wet, 10% well-graded sub-angular gravel to 1/2", 60% well-graded medium to coarse sand, 30% fines.	
					80.0	Water here. SRK sample 1715. Flow OUT
					Sandy clay (CL) Gray, moist to wet, 5% sub-angular gravel to 1/4", 30% sub-angular well-graded sand, 65% fines.	
					85.0	SRK sample 1750. Flow OUT
90					**Sandy gravel w/ clay (GC)** Gray, wet 45% well-graded angular to sub-angular gravel to 1/2", 40% well-graded medium to coarse sand, 15% fines.	Flow IN SRK sample.
					As above.	Flow OUT

NORTHERN DYNASTY PEBBLE.GPJ GINT US.GDT 3/7/05

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BORING NUMBER KP-P1/SRK-2

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 8/23/04 **COMPLETED** 8/24/04 **GROUND ELEVATION** _____ **WATER LEVELS** 50.7 feet

DRILLING DRILLING CONTRACTOR Midnight Sun **NORTHING** 6642931 **EASTING** 50372826

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Stacey Cooper

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
					As above.	Driller reports water and that we're on top of some heaving sands, will shut down here for the night. 8/24/04
100					As above. Slightly more fines.	Flow OUT Driller still adding water too.
					As above.	SRK sample Flow OUT
110					As above.	SRK sample Flow OUT
					As above.	Flow OUT SRK sample
120					Still a Sandy Gravel with Clay (GC), but more clay here to at least 125'.	Flow IN & OUT SRK sample at 1023.
						Flow IN & OUT SRK sample 1040.
130					Back to 45% gravel, 50% sand, 15% Fines. (GC)	SRK sample 1050.
					As above.	SRK sample Flow IN/OUT
140					140.0 **Clay (CL)** Gray, wet, 10% well-graded sub-angular sand, 90% fines.	Nothing to sample at 140'. Just water and a tiny bit of clay and sand. Flow IN/OUT
						Flow IN/OUT Nothing to sample here. As above. Goes through strainer.
150					As above.	SRK sample 1230. Water sample practically. This is what 140' and 145' were like.

NORTHERN DYNASTY PEBBLE.GPJ GINT US.GDT 3/7/05

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BORING NUMBER KP-P1/SRK-2

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 8/23/04 **COMPLETED** 8/24/04 **GROUND ELEVATION** _____ **WATER LEVELS** 50.7 feet

DRILLING DRILLING CONTRACTOR Midnight Sun **NORTHING** 6642931 **EASTING** 50372826

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Stacey Cooper

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
160					Some more cohesive clay here. Clay is high plasticity.	SRK sample 1255.
					As above- (CL)	SRK sample. Flow IN/OUT
					165.0	
					167.0 **Silt (ML)** Light gray, wet, 10% sub-angular well-graded sand, 90% fines.	SRK sample 1330 Flow IN/OUT
170					**Well-graded gravel w/ sand (GW)** Gray (dark), wet, 70% well-graded angular gravel to 3/4", 20% angular to sub-angular sand, 10% fines.	SRK sample 1345 Flow IN/OUT
					Less sand here, more angular gravel. This is bedrock. Hit bedrock at 167'.	Drilling is slow due to tight gravels. Flow IN/OUT
					174.0	We're 7' into bedrock- Driller does not want to proceed further because he's afraid he will not be able to get the casing out. TD = 174' 15:45
					Bottom of hole at 174.0 feet.	

NORTHERN DYNASTY PEBBLE.GPJ GINT US.GDT 3/7/05

BORING NUMBER KP-P1/SRK-2A

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 8/25/04 **COMPLETED** 8/26/04 **GROUND ELEVATION** _____ **WATER LEVELS** feet

DRILLING DRILLING CONTRACTOR Midnight Sun **NORTHING** 6642933.685 **EASTING** 372821.856

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Stacey Cooper

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
0					1.0 **Peat (PT)** Brown, moist, roots, trace gravel and sand. **Clay (CL)** Light brown, moist, 10% sub-angular gravel to 1/2", 5% fine sand, 85% clay fines.	IN-driller adding water OUT- Water out of hole Flow IN
10					10.0 **Well-graded gravel w/ sand and clay (GW/GC)** 60% angular to sub-angular gravel to 3/4", 20% angular to sub-angular sand, 20% clay fines. Fewer fines here.	Flow IN 1640
20					Back to 20% fines. 24.0	1655 Flow IN
30					**Well-graded gravel w/ sand (GW)** Gray, moist, 65% well-graded sub-angular gravel to 1/2", 25% angular to sub-angular medium to coarse sand, 10% fines.	Flow IN

WELL COMPLETION INFORMATION

CASING

Top elevation (feet): 290m

Vent hole?: _____

WELLHEAD PROTECTION COVER

Type: steel monument

Weep hole?: _____

Concrete pad dimensions: _____

WELL CASING

Dia.: 2 inches

Type: Schedule 40 PVC

SURFACE CASING

Dia.: 5 inch

Type: _____

SCREEN

Type: 2-inch/Schedule 40 PVC Insta-pack

Slot size: 0.020"

SCREEN FILTER

Type: 10/20 Silica sand

Quantity used: 5 bags

SEAL

Type: Bentonite Pellets

Quantity used: 4 5-gallon buckets

GROUT

Mix used: Volcay granular grout

Method of placement: Poured in dry hole @ 48'

Vol. in surface casing: _____

Vol. in well casing: _____

DEVELOPMENT

Method _____

Time: _____

Estimated purge volume: _____

Comments: TD=84'. Rat hole filled w/ 1' bentonite pellets, 3' filter sand. Bentonite bridged @ 53'. Screen separated from riser around 60' by about 6".

NORTHERN DYNASTY PEBBLE.GPJ GINT US.GDT 3/7/05

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BORING NUMBER KP-P1/SRK-2A

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 8/25/04 **COMPLETED** 8/26/04 **GROUND ELEVATION** _____ **WATER LEVELS** feet

DRILLING DRILLING CONTRACTOR Midnight Sun **NORTHING** 6642933.685 **EASTING** 372821.856

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Stacey Cooper

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
40					**Well-graded gravel w/ sand (GW)** Gray, moist, 65% well-graded sub-angular gravel to 1/2", 25% angular to sub-angular medium to coarse sand, 10% fines. Slightly more sand here.	Flow IN 1800 1155 8/26/2004 Flow IN
50					**Well-graded gravel w/ sand (GW)** Gray, moist, 65% well-graded sub-angular gravel to 1/2", 25% angular to sub-angular medium to coarse sand, 10% fines. **Well-graded gravel w/ sand (GW)** Gray, moist, 65% well-graded sub-angular gravel to 1/2", 25% angular to sub-angular medium to coarse sand, 10% fines.	A little water here. Dripping from cuttings bin. Flow OUT Flow IN A little water here.
60					**Well-graded gravel w/ sand (GW)** Gray, moist, 65% well-graded sub-angular gravel to 1/2", 25% angular to sub-angular medium to coarse sand, 10% fines.	A little water. Flow OUT
70					69.0 **Well-graded silty gravel w/ sand (GM)** Gray, moist, 50% well-graded sub-angular gravel to 1/2", 25% sub-angular to angular sand, 25% fines.	A little water here. Driller also adding water. Flow IN/OUT Water here. More shooting out of casing. Flow OUT Change casing- more water then settles down. Greg adding water again. Flow IN
80					84.0 **Well-graded silty gravel w/ sand (GM)** Gray, moist, 50% well-graded sub-angular gravel to 1/2", 25% sub-angular to angular sand, 25% fines. TD= 84' Bottom of hole at 84.0 feet.	Flow rate=5 gallons/minute. In well construction, well was lost. Bentonite bridged and screen was pulled apart from riser. Driller thinks 1" well could be installed within this. See well installation diagram.

NORTHERN DYNASTY PEBBLE.GPJ GINT US.GDT 3/7/05

BORING NUMBER KP-P2/SRK-4

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 8/14/04 **COMPLETED** 8/15/04 **GROUND ELEVATION** _____ **WATER LEVELS** NA feet

DRILLING DRILLING CONTRACTOR Midnight Sun **NORTHING** 6641876 **EASTING** 5372904

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Matt Flynn

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
0					0.5	
					Sandy silt with gravel (ML) Brown, moist, fine sand, sub-angular gravel.	
					4.5	Collect sample at 4-5'. 1705.
					Well-graded sand w/ gravel (SW) Brown, moist, fine to coarse angular to sub-angular sand, gravel angular to sub-rounded up to 1/2".	Begin using water at 7'.
					8.5	Collect sample at 9-10'. 1720.
10					**Silty sand w/ gravel (SM)** Brown, moist, gravel is >3/4" possibly cobble.	
					12.0	(Well graded/poorly graded?)
					Gravel/cobbles w/ sand Brown, sands moist, gravels 1/2 to 3/4" fractured/angular.	Collect sample at 14-15'. 1740.
					17.0	
					Silt/clay w/ gravel (ML/CL) Brown, moist, gravel is angular to sub-rounded 1/2-3/4", possibly larger rocks exist. Gravel = 10%.	Collect sample at 19-20'. 1810.
20					24.0	
					Gravel/cobbles Brown, moist to dry, highly fractured material from medium samd to 3/4" gravel size, all appears to be broken rock.	Collect sample at 24-25'. 1830.
					27.5	
					Silty gravel/cobbles (GM) Brown, moist, angular sand to angular/sub-angular gravels. Medium sand to 1/2" gravels.	Collect sample at 29-30'. 1845.
30					31.5	
					Bedrock Bedrock or large boulder at 31.5', color changing to green/gray.	Collect sample at 34-35'. 0805.

WELL COMPLETION INFORMATION

CASING

Top elevation (feet): Boring abandoned

Vent hole?: _____

WELLHEAD PROTECTION COVER

Type: _____

Weep hole?: _____

Concrete pad dimensions: _____

WELL CASING

Dia.: _____

Type: _____

SURFACE CASING

Dia.: _____

Type: _____

SCREEN

Type: _____

Slot size: _____

SCREEN FILTER

Type: _____

Quantity used: _____

SEAL

Type: _____

Quantity used: _____

GROUT

Mix used: _____

Method of placement: _____

Vol. in surface casing: _____

Vol. in well casing: _____

DEVELOPMENT

Method _____

Time: _____

Estimated purge volume: _____

Comments: _____

NORTHERN DYNASTY PEBBLE.GPJ GINT US.GDT 3/4/05

(Continued Next Page)

BORING NUMBER KP-P2/SRK-4

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 8/14/04 **COMPLETED** 8/15/04 **GROUND ELEVATION** _____ **WATER LEVELS** NA feet

DRILLING DRILLING CONTRACTOR Midnight Sun **NORTHING** 6641876 **EASTING** 5372904

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Matt Flynn

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
					39.0 Bottom of hole at 39.0 feet.	Bedrock to 39'. End of boring. No well/ Abandon hole.

BORING NUMBER KP-P3D/SRK-5D

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 8/16/04 **COMPLETED** 8/17/04 **GROUND ELEVATION** _____ **WATER LEVELS** 1.71 feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 6641294 **EASTING** 5371532

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Matt Flynn

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
0					1.0 **Peat (OL)** Brown, moist, organics.	
					Silty Gravel (GM) Brown, dry to moist, gravel is angular to subrounded to greater than .75 inches. Less silty with depth.	
					3.0 **Well-Graded Gravel with Sand and Silt (GW)** Brown, dry, fine sands, round to angular gravel greater than .75 inches.	
10					As above, trace silts. Moist, subangular fine to coarse sand. Gravel subround to round to .5 inches.	Using water.
					As above, less silt, brown/gray, wet. Medium to coarse subangular to subround sand. Gravel angular to round up to .75 inches.	Water off.
20					21.0 **Silty Gravel (GM)** Brown, wet, gravel sub-angular to subround up to .75 inches, trace sands.	
					23.5 **Clay with Trace Gravel (CL)** Gray, moist.	Water on.
30					31.0 Increased gravel.	
					Well-Graded Gravel with Sand (GW) Brown, moist, angular to subround gravel to >.75 inches; fine to coarse subangular to round sand.	

WELL COMPLETION INFORMATION

CASING

Top elevation (feet): _____

Vent hole?: _____

WELLHEAD PROTECTION COVER

Type: _____

Weep hole?: _____

Concrete pad dimensions: _____

WELL CASING

Dia.: 2 inches

Type: Schedule 40 PVC

SURFACE CASING

Dia.: _____

Type: _____

SCREEN

Type: 2-inch/Schedule 40 PVC Insta-pack

Slot size: 0.020"

SCREEN FILTER

Type: 10/20 Sand

Quantity used: 4 50-lb bags

SEAL

Type: bentonite

Quantity used: _____

GROUT

Mix used: 30% solids Volclay

Method of placement: Tremie pipe

Vol. in surface casing: 50 gallons

Vol. in well casing: _____

DEVELOPMENT

Method N/A

Time: _____

Estimated purge volume: _____

Comments: Sealed off bottom bit with 6-12" bentonite plug topped with silica sand. Completed top with bentonite/cement mix, about 10 feet bgs to surfa

NORTHERN DYNASTY PEBBLE.GPJ GINT US.GDT 3/4/05

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BORING NUMBER KP-P3D/SRK-5D

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 8/16/04 **COMPLETED** 8/17/04 **GROUND ELEVATION** _____ **WATER LEVELS** 1.71 feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 6641294 **EASTING** 5371532

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Matt Flynn

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
40					40.0	
					Well-Graded Sand with Gravel (SW) Brown, wet, medium to coarse, subangular to subrounded sand, subangular to subround gravel to .75 inches.	Sampled 44-45.
50					As above, more silt and clay (SW-SC) Brown to gray, wet, subangular to subround gravel to .5 inches.	
					Small lenses of clay, brown, moist, starting at 51 feet.	
					54.0	Drilled to 54 feet by COB 8/16/04.
					Clay (CL) Brown, moist, trace gravel.	
60					59.0	
					Well-Graded Sand with Gravel (SW) Gray, wet, medium to coarse, subangular to subround sand, subangular to subround gravel to .75 inches.	
					65.0	
70					**BEDROCK** White/reddish brown, wet, highly fractured.	
					79.0	
					Bottom of hole at 79.0 feet.	

BORING NUMBER KP-P3M/SRK-5M

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 8/17/04 **COMPLETED** 8/17/04 **GROUND ELEVATION** _____ **WATER LEVELS** 16.1 feet

DRILLING DRILLING CONTRACTOR Midnight Sun **NORTHING** 6641298 **EASTING** 5371535

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Matt Flynn

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
0					1.0 **Peet (PT)**	
					2.0 **Organic Soil (OL)** Brown, moist, organics.	
					3.0 **Silty Gravel (GM)** Brown, dry to moist, gravel is angular to sub-rounded up to >3/4", less silt with depth.	Flow IN. Adding water to drill.
					Well-graded gravel w/ sand (GW) Brown, dry to moist, medium to coarse sub-angular to sub-rounded sand, angular to rounded gravels up to >3/4".	Flow IN
10					**Well-graded gravel w/ sand (GW)** Brown, dry to moist, medium to coarse sub-angular to sub-rounded sand, angular to rounded gravels up to >3/4".	Flow IN
					Medium to coarse sub-angular to sub-rounded sand and gravels to >3/4". ▽	Wet at 13.5'
20						Flow OUT at 2-4 gpm.
					23.5	
					Clay w/ gravel (CL) Gray, moist.	
30					Some medium sand and gravel in clay. Approximately 10-15%.	
					32.0	
					Well-graded gravel w/sand (GW) Light brown to yellowish gray, moist, sands are sub-angular to	

WELL COMPLETION INFORMATION

CASING

Top elevation (feet): _____

Vent hole?: N/A

WELLHEAD PROTECTION COVER

Type: 6" steel casing

Weep hole?: N/A

Concrete pad dimensions: _____

WELL CASING

Dia.: 2 inches

Type: Schedule 40 PVC

SURFACE CASING

Dia.: 5 inches

Type: _____

SCREEN

Type: 2-inch/Schedule 40 PVC Insta-pack

Slot size: 0.020"

SCREEN FILTER

Type: 10/20 Silica sand

Quantity used: 6 50-lb bags

SEAL

Type: Bentonite

Quantity used: 2 50-lb buckets

GROUT

Mix used: 30% Solids Volclay

Method of placement: Tremmie Pipe

Vol. in surface casing: 40 gallons

Vol. in well casing: _____

DEVELOPMENT

Method _____

Time: _____

Estimated purge volume: _____

Comments: Bottom of hole 2' bentonite w/ 1' of silica. Volclay grout to about 8' bgs. Cement grout to surface.

(Continued Next Page)

BORING NUMBER KP-P3M/SRK-5M

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 8/17/04 **COMPLETED** 8/17/04 **GROUND ELEVATION** _____ **WATER LEVELS** 16.1 feet

DRILLING DRILLING CONTRACTOR Midnight Sun **NORTHING** 6641298 **EASTING** 5371535

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Matt Flynn

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
40					sub-rounded, medium to coarse, gravel is angular to sub-rounded up to >3/4". Trace silts.	Wet at 40'
					41.0 **Well-graded sand w/gravel (SW)** Brown to yellow orange, wet, med to coarse sand sub-angular to sub-rounded, gravel is sub-rounded to 1/2".	Flow OUT at 5 gpm.
50					Color change to gray at about 49'.	Flow OUT at 3-6 gpm.
					52.0 Small pellets of Clay (CL), grey mixed in with well graded sand w/ gravels (SW) begining at 51'.	
					53.0 **Clay (CL)** Gray, moist.	
					Bottom of boring 53' on 8/17/04	
					Bottom of hole at 53.0 feet.	

BORING NUMBER KP-P3S/SRK-5S

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 8/18/04 **COMPLETED** 8/18/04 **GROUND ELEVATION** _____ **WATER LEVELS** 11.36 feet

DRILLING DRILLING CONTRACTOR Midnight Sun **NORTHING** 6641294 **EASTING** 5371541

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Matt Flynn

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
0					0.5 **Peat (PT)**	
					1.5 **Organic Soil (OL)**	
					3.5 **Silty gravel (GM)** Brown, dry to moist, gravel is angular to sub-angular >3/4".	
					Well-graded gravel w/ sand (GW) Brown, dry to moist, med-course sand sub-angular to sub-rounded, angular to rounded gravels up to >3/4".	60% gravel and 40% sands
					7.0 **Well-graded sand w/ gravel (SW)** Brown, moist, med-course sand sub-angular to sub-rounded, angular to rounded gravels up to >3/4".	Driller notes water at 8'. Cuttings are shiny wet but no flowing water out of hole.
10					**Well-graded sand w/ gravel (SW)** Brown, moist, med-course sand sub-angular to sub-rounded, angular to rounded gravels up to >3/4".	70% sands and 30% gravel
					Well-graded sand w/ gravel (SW) Brown, moist, med-course sand sub-angular to sub-rounded, angular to rounded gravels up to >3/4".	60% sands and 40 %gravel
					16.5 **Well-graded sand w/ gravel (SW)** Brown, moist, med-course sand sub-angular to sub-rounded, angular to rounded gravels up to >3/4".	75% sands and 25% gravel
					18.0 **Poorly-graded sand (SP)** Brown, moist to wet, medium sub-angular sand.	30% sands and 70% fines
20					**Clay w/ sand (CL)** Brown, moist, sand is medium and sub-angular.	5% gravels, 25% sands, and 70% fines
					24.0 Mottled color of brown/gray starting at 23'	
					Bottom of boring at 25' on 8/18/2004 Bottom of hole at 24.0 feet.	

WELL COMPLETION INFORMATION

CASING

Top elevation (feet): _____

Vent hole?: _____

WELLHEAD PROTECTION COVER

Type: 6" steel casing

Weep hole?: N/A

Concrete pad dimensions: _____

WELL CASING

Dia.: 2 inches

Type: Schedule 40 PVC

SURFACE CASING

Dia.: 5 inch

Type: _____

SCREEN

Type: 2-inch/Schedule 40 PVC Insta-pack

Slot size: 0.020"

SCREEN FILTER

Type: 10/20 Silica sand

Quantity used: 6 bags

SEAL

Type: Bentonite

Quantity used: 1 5-gallon buckets

GROUT

Mix used: N/A

Method of placement: _____

Vol. in surface casing: _____

Vol. in well casing: _____

DEVELOPMENT

Method _____

Time: _____

Estimated purge volume: _____

Comments: Cement 3' to surface.

NORTHERN DYNASTY PEBBLE.GPJ GINT US.GDT 3/4/05

BORING NUMBER KP-P4

Northern Dynasty Minerals Ltd.

CLIENT | **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 | **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 8/15/04 **COMPLETED** 8/15/04 | **GROUND ELEVATION** | **WATER LEVELS** 23 feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC | **NORTHING** 6641705 **EASTING** 5372842

DRILLING DRILLING METHOD | **EQUIPMENT** | **LOGGER** Matt Flynn

NOTES

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
0					0.5 **Peat (PT)** 2.0 **Silt with Sand and Gravel (SM)** Dark brown, moist.	
					Silty Sand with Gravel (SM) Brown, moist, fine to medium sand. Angular to subround gravel .25 to >.75 inches.	Collected sample 4-5 feet.
					7.0 More gravel with depth.	
10					**Gravel/Cobble with Silt (GP)** Brown, moist (almost dry). Gravel is .125 to .75 inches angular to subangular.	Collected sample 9-10 feet.
					12.0 Increasing sand.	
					Silty Gravel (GM) Brown, moist.	Collected sample 14-15 feet.
					16.0 Increasing silt with depth.	
20					**Silt/Clay with Sand and Gravel (ML)** Brown, moist, with subangular to subround medium to coarse sand.	Collected sample 19-20 feet.
					20.0 Angular to subround gravel .125 to .5 inches.	
					Cobbly Gravel with Silt (GM) Brown, moist. Angular gravel from small to .75 inches.	Collected sample 24-25 feet.
					Olive green rock with brown silts.	
30						Only small amout sampled 29-30 feet at 1600.
					34.0	Sampled 34-35 feet at 1630.

WELL COMPLETION INFORMATION

CASING

Top elevation (feet):

Vent hole?:

WELLHEAD PROTECTION COVER

Type: 6" dia. steel casing with lid.

Weep hole?: no

Concrete pad dimensions: 8 inches

WELL CASING

Dia.: 2 inches

Type: Schedule 80 PVC

SURFACE CASING

Dia.:

Type:

SCREEN

Type: 2-inch/Schedule 40 PVC Insta-pack

Slot size: 0.020"

SCREEN FILTER

Type: 10-20 Silica sand.

Quantity used: 1/2 bag on filter/screen

SEAL

Type: Bentonite pellets

Quantity used: 1 5-gallon bucket.

GROUT

Mix used: 30% solids Volclay

Method of placement: Tremie pipe

Vol. in surface casing: 60 gallons

Vol. in well casing:

DEVELOPMENT

Method

Time:

Estimated purge volume:

Comments: Backfilled bottom of hole 1042 feet with cuttings/bentonite mix. Top of this was 2' layer of bentonite with 1 foot layer of sand.

(Continued Next Page)

BORING NUMBER KP-P4

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 8/15/04 **COMPLETED** 8/15/04 **GROUND ELEVATION** _____ **WATER LEVELS** 23 feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 6641705 **EASTING** 5372842

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Matt Flynn

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
40					35.5 **Gravelly Sand with Silt (SP)** Brown/grey, wet, medium poorly graded, subangular to subround sand, angular to subround gravels to 0.5 inches. Becoming siltier with depth. *(continued)*	Sampled.
					Silty Sand with Gravel (SM) Brown, moist. Fine, subround to coarse subround sand. Gravels subround to round up to .5 inch. Approximately 10-15% silt. 42.0	
					Poorly Graded Gravelly Sand (GP) Brown/green, moist. Subangular to subround, medium to coarse sand; subangular to subround gravel to .5 inch, trace silts.	Collected sample 44-45 feet.
50					**Sandy Gravel/Cobble (GP)** Brown/gray, moist (almost dry) trace green. Subangular to subround, medium to coarse sand. Subangular to subround gravel to .5 inch. 53.0	14-50 feet at 1750.
					54.0 **BEDROCK** Gray/green, dry. Fractured and angular. Bottom of hole at 54.0 feet.	1820.

BORING NUMBER PW-1

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 9/17/04 **COMPLETED** 9/18/04 **GROUND ELEVATION** _____ **WATER LEVELS** NA feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 6641734 **EASTING** 372557

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Dave Lacey

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
0					2.0 **Organic Silt with Gravel and Sand (OL)** Brown, rounded and subrounded gravel to >1 inch. **Silty Gravel with Sand (GP)** Brown, moist, rounded and subrounded gravel to >1 inch.	Varing amounts of sand 10 to 20% Varing amounts of silt 5 to 20%
						Start drilling with water, 2 gpm
10						19:50 at 13-feet, Stop for the day 10:05 09/17/2004 Start drilling
					19.0	
20					20.5 **Clay with Gravel (CL)** Gray.	
					Poorly-graded Sandy Gravel with Silt (GP) Fine sand, subrounded to sub-angular gravel. 23.5	11:46 at 23-feet, Production = No significat water (Hammer holes may be silted up) Varing amounts of silt 10 to 15%
					Well-graded Sand with Silt (SW-SM) Gray, fine sand.	
30						11:54 at 33-feet, Production = 1 gpm (lots of sand and silt in water)

WELL COMPLETION INFORMATION

CASING

Top elevation (feet): _____

Vent hole?: _____

WELLHEAD PROTECTION COVER

Type: 6" steel casing with lid

Weep hole?: No

Concrete pad dimensions: None

WELL CASING

Dia.: 5 inches

Type: Steel

SURFACE CASING

Dia.: _____

Type: _____

SCREEN

Type: Steel

Slot size: 0.060"

SCREEN FILTER

Type: None

Quantity used: None

SEAL

Type: None

Quantity used: None

GROUT

Mix used: None

Method of placement: None

Vol. in surface casing: None

Vol. in well casing: None

DEVELOPMENT

Method Air surging

Time: 6 hours

Estimated purge volume: >2040 gallons

Comments: Water cloudy with clay and fine sand at the end of development. See field book for well construction comments.

(Continued Next Page)

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 9/17/04 **COMPLETED** 9/18/04 **GROUND ELEVATION** _____ **WATER LEVELS** NA feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 6641734 **EASTING** 372557

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Dave Lacey

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
40					40.0	
					Well-graded Sand with Silt (SW-SM) Light orange brown, medium grain.	13:16 at 43-feet, Production = 1 gpm
					45.0 **Well-graded Sand with Silt (SW-SM)** Gray, fine grain.	
50					Coarser than above with <5% gravel.	
					54.0	14:32 at 53-feet, Production = 1 gpm
					Clay (CL) Gray, plastic, firm.	
60						
						15:50 at 63-feet, Production = 1 gpm
70					70.0	
					Silty Sand (SM) Gray, medium sand.	17:20 at 73-feet, Hammer frozen, working again at 19:21, Production = NA
					75.0	
					77.0 **Clay with Sand (CL)** Gray, plastic.	
80					**Sandy Gravel (GP)** Gray, coarse, subangular sand ~30%.	
					Sub-rounded and rounded, 50% sand.	
					83.0	19:50 at 83-feet, Stop for the day, 10:05 09/18/2004, Production = <0.5 gpm
					85.0 **Clay with Sand and Gravel (CL)** Gray, plastic, firm.	
					Clay (CL) Gray, plastic, firm.	
90					90.0	
					91.5 **Poorly Graded Gravelly Sand (SP)** Coarse grain,	
					92.5 gravel up to 1/2-inch, sub-rounded, 30% gravel.	
					Clay with Gravel and Sand (CL) 20% sand.	11:53 at 93-feet, Production = <0.5 gpm
					95.0 **Silty Sand with Gravel (SM)** Angular and sub-angular,	

NORTHERN DYNASTY PEBBLE.GPJ GINT US.GDT 1/24/05

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BORING NUMBER PW-1

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 9/17/04 **COMPLETED** 9/18/04 **GROUND ELEVATION** _____ **WATER LEVELS** NA feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** 6641734 **EASTING** 372557

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Dave Lacey

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
100					some sub-rounded, 20% gravel. **Clay (CL)** Gray, plastic.	13:36 at 103-feet, Production = <0.5 gpm
					105.0 106.0 **Silty Sand with Gravel (SM)** Mostly angular few sub-rounded.	Black staining and floating sheen down to 112-feet
110					No sub-rounded, Fractured Bedrock. Color change - Light brownish gray.	Bedrock? 14:30 at 113'
					Bedrock Cuttings = Well-graded sand (SW), Medium, angular. Color change - Light brown. 119.0 Color change - Light reddish brown Bottom of hole at 119.0 feet.	TD = 119

NORTHERN DYNASTY PEBBLE.GPJ GINT US.GDT 1/24/05

BORING NUMBER PW-1b

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 9/15/04 **COMPLETED** 9/16/04 **GROUND ELEVATION** _____ **WATER LEVELS** NA feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** _____ **EASTING** _____

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Dave Lacey

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
0					2.0 **Organic Silt with Gravel and Sand (OL)** Brown, rounded to subrounded gravel to >1". **Poorly-graded Gravel with Silt and Sand (GP-GM)** Brown, moist, rounded to subrounded gravel to >1-inch.	9:10 on 9-16-2004 start drilling Varying amounts of silt 15 to 20% Varying amounts of sand 0 to 40% Start drilling with water 1gpm
10						9:20 at 13-feet (Completed casing weld at 10:34)
					19.0 21.0 **Silt (ML)** Gray.	
20					**Silty Sand with Gravel (SM)** Brown, coarse grain, 10% gravel. Change in grain size - Medium to fine grain.	10:40 at 23-feet (Continued drilling at 11:50) Production = 0 gpm (Hammer may be silted up) Varying amounts of silt 20 to 40%
30					30.0 **Silty Sand (SM) Gray, fine grain.**	12:07 at 33-feet Production = No significant water

WELL COMPLETION INFORMATION

CASING

Top elevation (feet): Boring abandoned

Vent hole?: _____

WELLHEAD PROTECTION COVER

Type: Boring abandoned.

Weep hole?: _____

Concrete pad dimensions: _____

WELL CASING

Dia.: _____

Type: _____

SURFACE CASING

Dia.: _____

Type: _____

SCREEN

Type: _____

Slot size: _____

SCREEN FILTER

Type: _____

Quantity used: _____

SEAL

Type: _____

Quantity used: _____

GROUT

Mix used: _____

Method of placement: _____

Vol. in surface casing: _____

Vol. in well casing: _____

DEVELOPMENT

Method _____

Time: _____

Estimated purge volume: _____

Comments: _____

NORTHERN DYNASTY PEBBLE.GPJ GINT US.GDT 1/24/05

(Continued Next Page)

BORING NUMBER PW-1b

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 9/15/04 **COMPLETED** 9/16/04 **GROUND ELEVATION** _____ **WATER LEVELS** NA feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** _____ **EASTING** _____

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Dave Lacey

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
40					**Silty Sand (SM) Gray, fine grain.** ***(continued)***	(Hammer may be silted up)
					40.0	
					Silty Sand (SM) Light orangish brown, Fine sand, 5% gravel.	13:19 at 43-feet (completed weld at 14:20)
					Change in grain size - Medium grain.	
50					50.0 Color Change - Gray.	Return line clogged.
					Bottom of hole at 55.0 feet.	TD = 50 Casing broke. Boring abandon with 14 bgs of 3/4 chips. 15-feet of casing lost in boring. Moved 5-feet to the east to start PW-1(A).

BORING NUMBER PW-3

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 10/5/04 **COMPLETED** 10/7/04 **GROUND ELEVATION** _____ **WATER LEVELS** feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** _____ **EASTING** _____

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Matt Flynn

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
0					1.0 **Organic Silt (OL)**	
					3.0 **Silty Gravel with Sand (GM)** Brown, moist, gravel is sub-rounded and rounded, fine to >3/4-inch, sand is sub-rounded-sub-rounded, medium to coarse.	
					Poorly-graded Gravel with Sand (GP) Moist, 1/2 to >3/4-inch, angular and sub-rounded gravel; medium to coarse, angular to subrounded sand.	75% gravel 25% sand
10					Occasional cobble.	
						Start drilling with water
					17.0 **Well-graded Gravel with Sand (GW)** Brownish gray, moist, angular and rounded, grading fine to >3/4-inch gravel, medium to coarse subrounded to angular sand..	80% gravel, 20% sand
20					Increasing sand 30%.	Adding polymer.
						Stopped for day at 24-feet on 10/05/2004
30					34.0	

WELL COMPLETION INFORMATION

CASING

Top elevation (feet): _____

Vent hole?: _____

WELLHEAD PROTECTION COVER

Type: _____

Weep hole?: _____

Concrete pad dimensions: _____

WELL CASING

Dia.: 5 inches

Type: Steel

SURFACE CASING

Dia.: _____

Type: _____

SCREEN

Type: Steel

Slot size: 0.060"

SCREEN FILTER

Type: None

Quantity used: None

SEAL

Type: None

Quantity used: None

GROUT

Mix used: None

Method of placement: None

Vol. in surface casing: None

Vol. in well casing: None

DEVELOPMENT

Method Air surging

Time: _____

Estimated purge volume: _____

Comments: See field book for well construction and developlment comments.

NORTHERN DYNASTY PEBBLE.GPJ GINT US.GDT 1/24/05

(Continued Next Page)

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 10/5/04 **COMPLETED** 10/7/04 **GROUND ELEVATION** _____ **WATER LEVELS** feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** _____ **EASTING** _____

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Matt Flynn

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
40					**Well-graded Sand (SW)** Brown, Moist, fine to medium grain, occasional gravel.	95% sand 5% gravel
					Increasing gravel with depth.	80% sand 20% gravel 70% sand 30% gravel
					47.0	
50					**Well-graded Gravely Sand (SW)**	
					51.0	
					Well-graded Gravel with Sand (GW) Moist, grayish brown, fine to >3/4-inch, sub-rounded and angular gravel.	
60					Less sand.	
					Larger gravels (based on angular cuttings).	
					69.0	
70					**Poorly-graded Sand with Gravel (SP)** Brown, wet, medium sub-angular sand; gravel up to 1/2-inch, 10% gravel.	
					Less gravel with depth. Finer than above - Medium to fine sand.	
80					81.0	
					Well-graded Sandy Gravel (GW) Grayish brown, wet, fine to >3/4-inch, R-A.	75% gravel 25% sand
					Small lense of silt (1 to 2-inches) at 85-feet.	
					87.0	
					89.0 **Poorly-graded Sand with Gravel (SP)** Brown, wet, medium grain, gravel 1/2-inch.	
90					**Well-graded Gravel with Sand (GW)** Brown to gray, fine to >3/4-inch, rounded and angular gravel; sand-medium to coarse grain.	70% gravel 30% sand 80% gravel 20% sand
					95.0	

NORTHERN DYNASTY PEBBLE.GPJ GINT US.GDT 1/24/05

(Continued Next Page)

BORING NUMBER PW-3

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 10/5/04 **COMPLETED** 10/7/04 **GROUND ELEVATION** _____ **WATER LEVELS** feet

DRILLING DRILLING CONTRACTOR Midnight Sun Drilling LLC **NORTHING** _____ **EASTING** _____

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Matt Flynn

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
100					**Well-graded Gravel with Sand (GW)** Brown to gray, fine to >3/4-inch, rounded and angular gravel; sand-medium to coarse grain.	90% gravel 10% sand 80% gravel 20% sand 90% gravel 10% sand
					106.0	95% gravel 5% sand
					107.0 **Poorly-graded Sand (SP)** Brown, wet, medium/fine, rounded and angular.	100% sand 70% gravel 30% sand
110					**Well-graded Sandy Gravel (GW)** Brown, wet, fine to >1-inch, rounded to angular gravel; medium to coarse sand.	
					110.5 **Well-graded Sand with Gravel (SW)** Brown, wet, medium to coarse sand; subrounded to angular fine gravel to >3/4-inch.	
					115.0 Sand is fine to medium from 114 to 115-feet.	
					Bottom of hole at 115.0 feet.	TD - 115-feet at 11:00 on 10/7/2004

BORING NUMBER PW-4

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 10/11/04 **COMPLETED** 10/13/04 **GROUND ELEVATION** _____ **WATER LEVELS** feet

DRILLING DRILLING CONTRACTOR Midnight Sun **NORTHING** _____ **EASTING** _____

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Alex Rosenberg

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
0					1.0 **Organic w/silt (OL)**	
					Poorly-graded gravel w/sand (GP) - cobbles	
10					Boulder chips, grey, angular, dry.	
					Gravel w/coarse sand (GP), multicolored	
					17.0 **Sand w/gravel (SP)**	
20					21.0 **Boulders (GP)**	
					Increasing fines, dark grey/brown. No fines.	
30					30.0 **Gravelly sand (SW)** subangular, dark brown	
					32.5 **Coarse sand (SP)** few gravel pieces, angular, immature.	

WELL COMPLETION INFORMATION

CASING

Top elevation (feet): _____

Vent hole?: _____

WELLHEAD PROTECTION COVER

Type: _____

Weep hole?: _____

Concrete pad dimensions: None

WELL CASING

Dia.: 2 inches

Type: Steel

SURFACE CASING

Dia.: _____

Type: _____

SCREEN

Type: Steel continuous wire

Slot size: 0.050" to 0.060"

SCREEN FILTER

Type: None

Quantity used: None

SEAL

Type: None

Quantity used: None

GROUT

Mix used: None

Method of placement: None

Vol. in surface casing: None

Vol. in well casing: None

DEVELOPMENT

Method _____

Time: _____

Estimated purge volume: _____

Comments: _____

NORTHERN DYNASTY PEBBLE.GPJ GINT US.GDT 3/4/05

(Continued Next Page)

BORING NUMBER PW-4

Northern Dynasty Minerals Ltd.

CLIENT _____ **PROJECT NAME** Pebble Gold Copper Project

PROJECT NUMBER 316349.PP.GW.02.04 **PROJECT LOCATION** Iliamna, Alaska

DATE STARTED 10/11/04 **COMPLETED** 10/13/04 **GROUND ELEVATION** _____ **WATER LEVELS** feet

DRILLING DRILLING CONTRACTOR Midnight Sun **NORTHING** _____ **EASTING** _____

DRILLING DRILLING METHOD _____ **EQUIPMENT** _____ **LOGGER** Alex Rosenberg

NOTES _____

DEPTH BELOW SURFACE (ft)	SAMPLE TYPE NUMBER	RECOVERY (IN)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	GRAPHIC LOG	SOIL DESCRIPTION	WELL DIAGRAM
40					**Coarse sand (SP)** few gravel pieces, angular, immature. *(continued)*	
					42.5	
					44.0 **Gravelly sand (SW)** 60% gravel, 40% sand, small amount of silt. Very brown water.	
50					**Medium coarse sand w/gravel (SP)** grey, (many different rock types). **Gravelly sand (SP)** 70% sand and 30% angular gravel up to 1-inch, small amount of silt, brown water.	
60					60.0	
					61.0 **Coarse sand w/gravel (SP)** 80% sand and 20% gravel up to 1-inch, increasing fines.	
					62.5 **Sandy gravel (GP)** medium grain sands, angular. **Poorly-sorted gravelly sand (SP)** angular.	
70					65% sand, 35% gravel	
					72.0 **Coarse sand w/some gravel (SP)**	
					73.0 **Sand w/silt and gravel (SW)** 60% sand, 20% silt, 20% gravel. **Poorly graded, coarse gravelly sand (SP)**	
					Medium to coarse sand w/gravel (SP) 65% sand, 35% gravel.	
					82.5	

Bottom of hole at 71.0 feet.

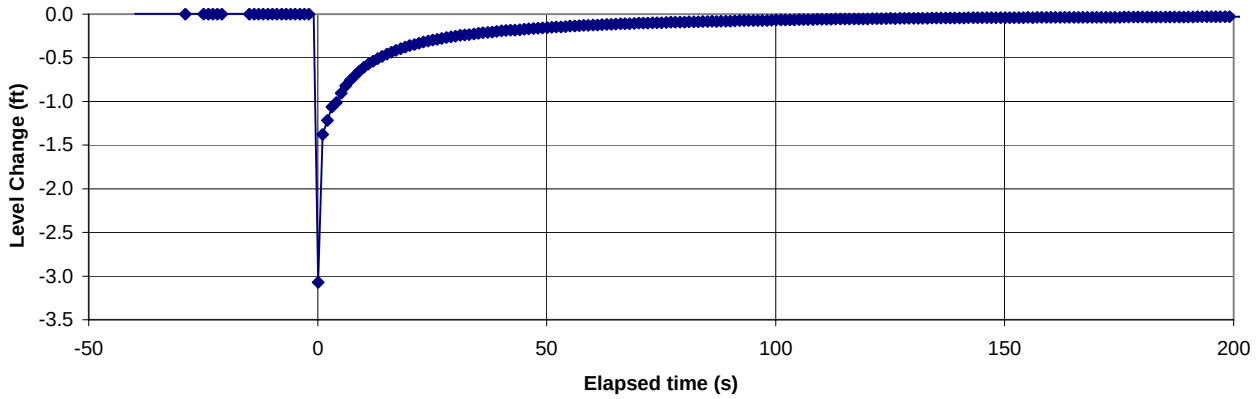
APPENDIX 5-B
Hydrogeologic Testing Results

Borehole Response Test - Cooper Papadopulos Method

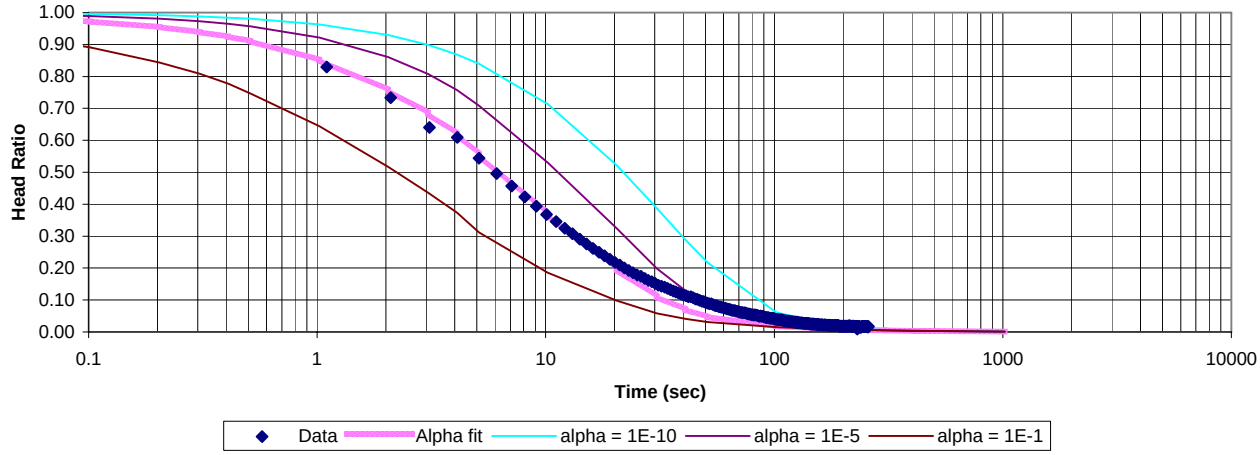
PEBBLE GOLD COPPER PROJECT
Northern Dynasty Minerals

Borehole No:	P2M	Test type:	Rising head
Instrument type:	In-situ transducer	Test date:	4-Sep-04
Zone depth (m):	16.8-21.3	Test time:	4:39 PM
Test zone length (m):	4.5	Screen type:	2 " PVC - 20 slot
Hole diameter (m):	0.127	Field technician:	
Riser inside diameter (m):	0.053	Analyst:	Alex Rosenberg
K (m/s):	3.0E-05	Transmissivity (m^2/s):	1.35E-04
Storage:	4.00E-04	Alpha:	2.34E-03

Water Level Change



Head Ratio Plot

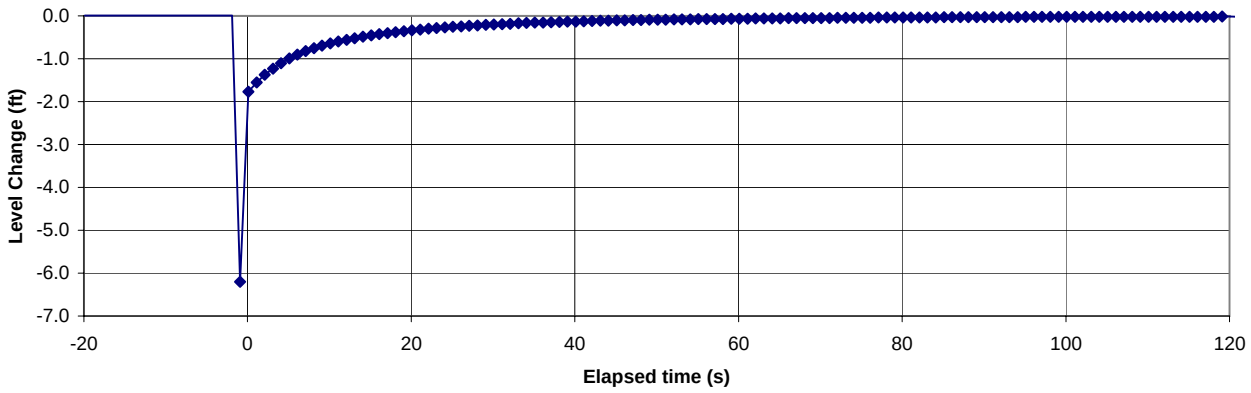


Borehole Response Test - Cooper Papadopulos Method

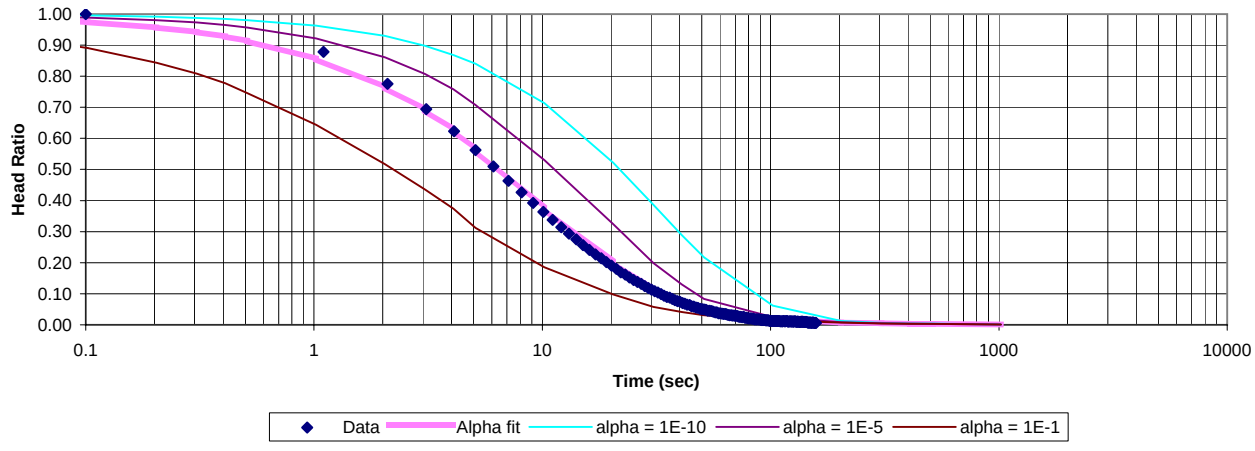
PEBBLE GOLD COPPER PROJECT
Northern Dynasty Minerals

Borehole No:	P2D	Test type:	Rising head
Instrument type:	In-situ transducer	Test date:	4-Sep-04
Zone depth (m):	22.3-26.8	Test time:	3:30 PM
Test length (m):	4.5	Screen type:	2 " PVC - 20 slot
Hole diameter (m):	0.127	Field technician:	
Riser inside diameter (m):	0.053	Analyst:	Alex Rosenberg
K (m/s):	3.0E-05	Transmissivity (m^2/s):	1.35E-04
Storage:	3.00E-04	Alpha:	1.76E-03

Water Level Change



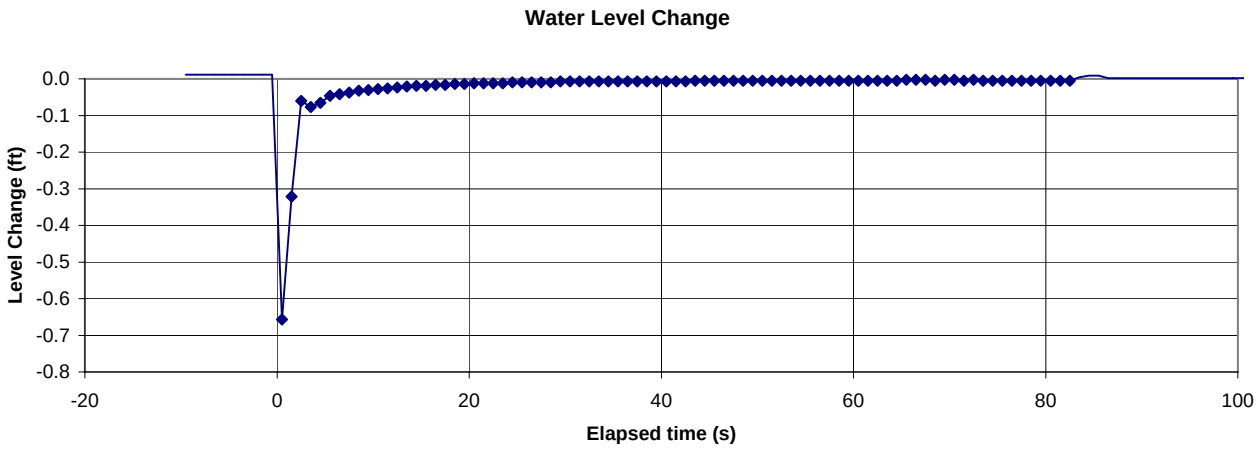
Head Ratio Plot

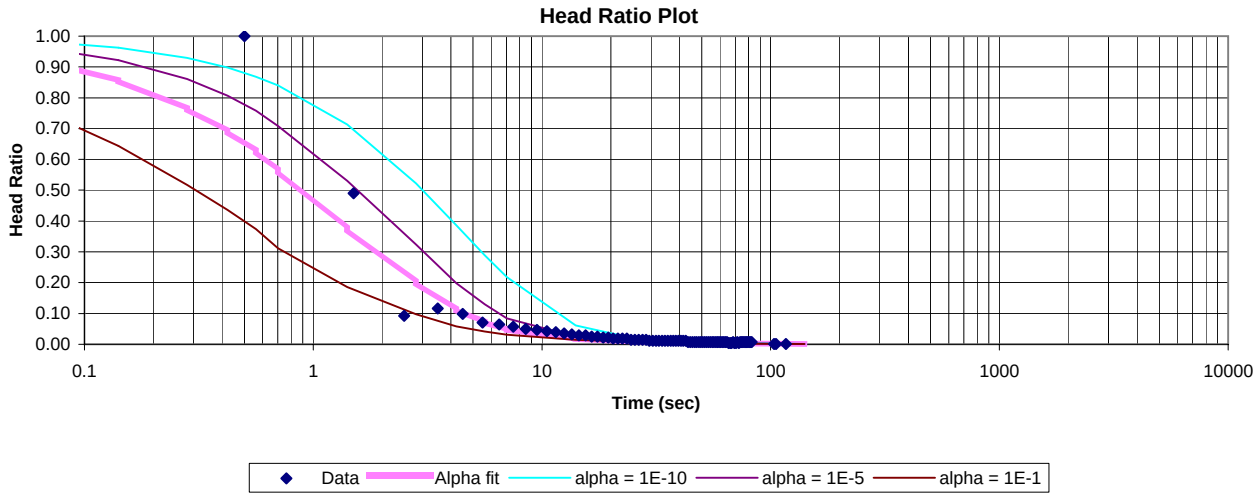


Borehole Response Test - Cooper Papadopulos Method

PEBBLE GOLD COPPER PROJECT
Northern Dynasty Minerals

Borehole No:	P3	Test type:	Falling head
Instrument type:	In-situ transducer	Test date:	4-Sep-04
Zone depth (m):	2.7-7.6	Test time:	8:40 PM
Test length (m):	4.9	Screen type:	2 " PVC - 20 slot
Hole diameter (m):	0.127	Field technician:	
Riser inside diameter (m):	0.053	Analyst:	Alex Rosenberg
K (m/s):	2.0E-04	Transmissivity (m^2/s):	9.80E-04
Storage:	3.00E-04	Alpha:	1.76E-03



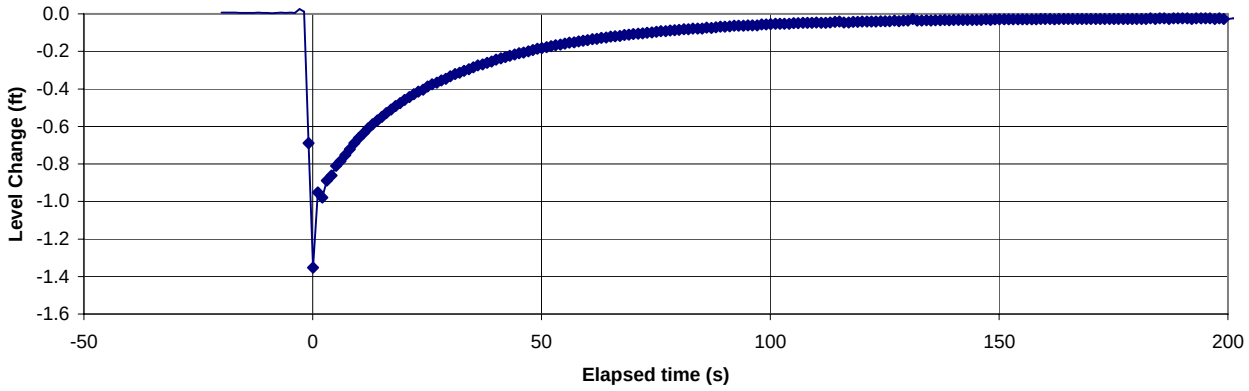


Borehole Response Test - Cooper Papadopulos Method

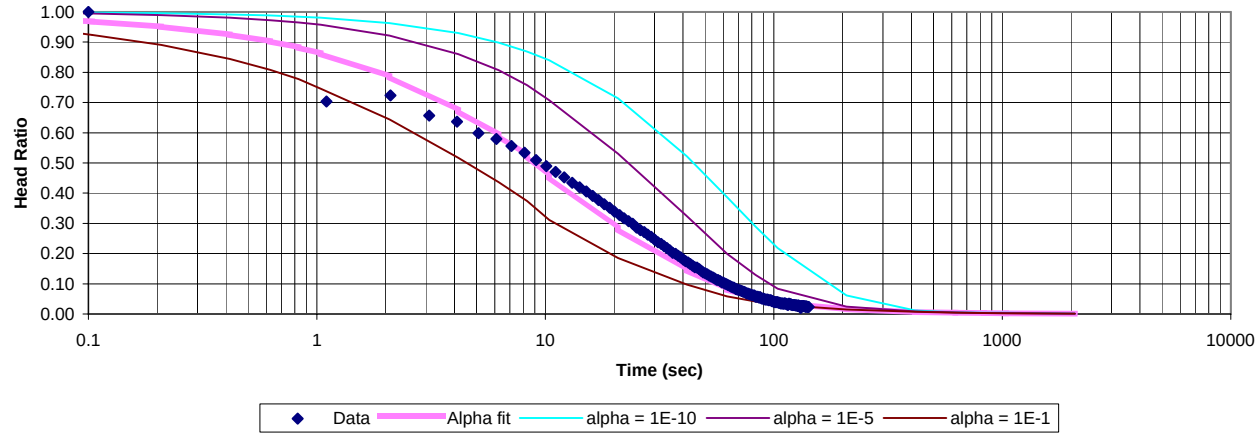
PEBBLE GOLD COPPER PROJECT
Northern Dynasty Minerals

Borehole No:	P4 (mid)	Test type:	Rising head
Instrument type:	In-situ transducer	Test date:	4-Sep-04
Zone depth (m):	13.7-16.8	Test time:	2:00 PM
Test length (m):	3.1	Screen type:	2 " PVC - 20 slot
Hole diameter (m):	0.127	Field technician:	
Riser inside diameter (m):	0.0508	Analyst:	Alex Rosenberg
K (m/s):	2.0E-05	Transmissivity (m^2/s):	6.20E-05
Storage:	2.00E-03	Alpha:	1.25E-02

Water Level Change



Head Ratio Plot

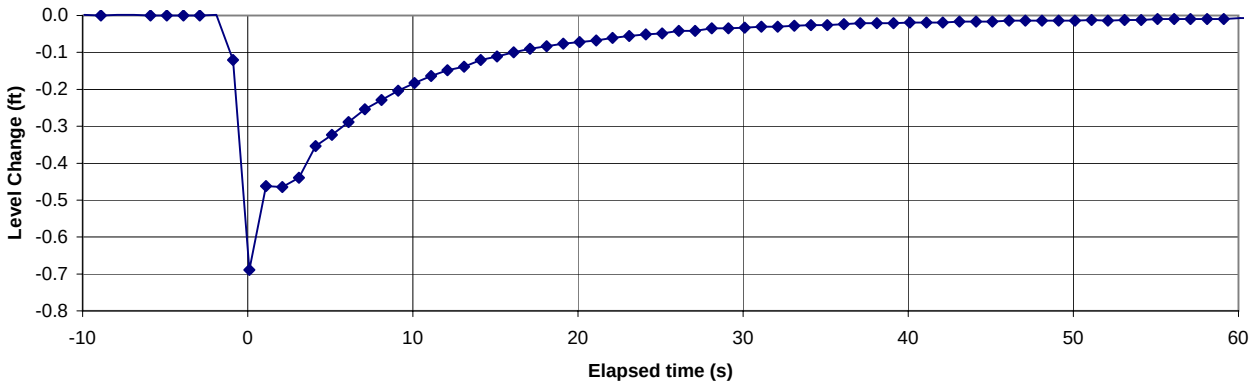


Borehole Response Test - Cooper Papadopulos Method

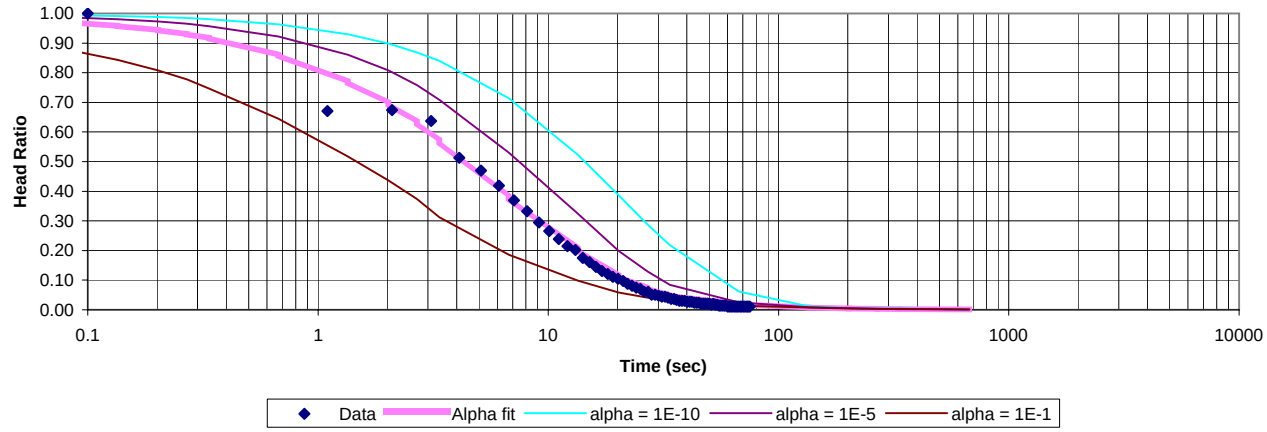
PEBBLE GOLD COPPER PROJECT
Northern Dynasty Minerals

Borehole No:	P4AS	Test type:	Rising head
Instrument type:	In-situ transducer	Test date:	14-Sep-04
Zone depth (m):	11.1-15.5	Test time:	4:50 PM
Test length (m):	4.5	Screen type:	2 " PVC - 20 slot
Hole diameter (m):	0.127	Field technician:	
Riser inside diameter (m):	0.049	Analyst:	Alex Rosenberg
K (m/s):	4.0E-05	Transmissivity (m^2/s):	1.80E-04
Storage:	2.00E-04	Alpha:	1.33E-03

Water Level Change



Head Ratio Plot

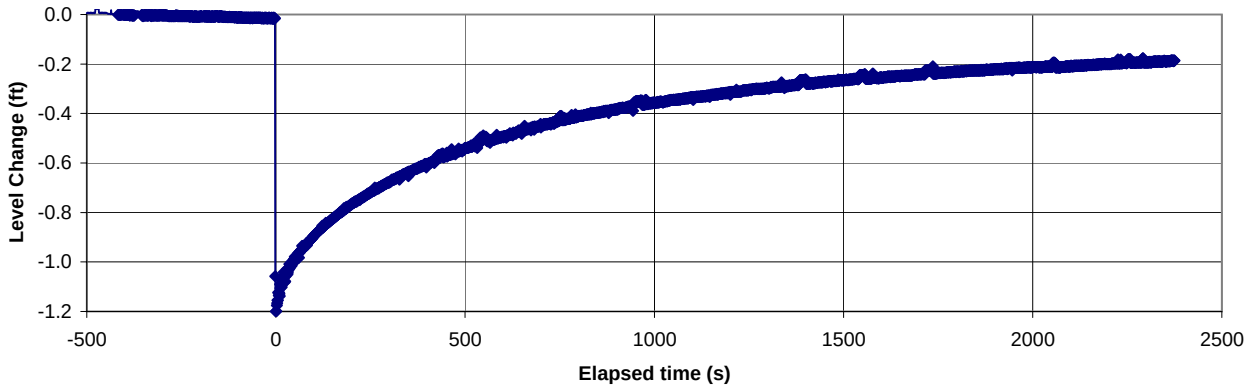


Borehole Response Test - Cooper Papadopulos Method

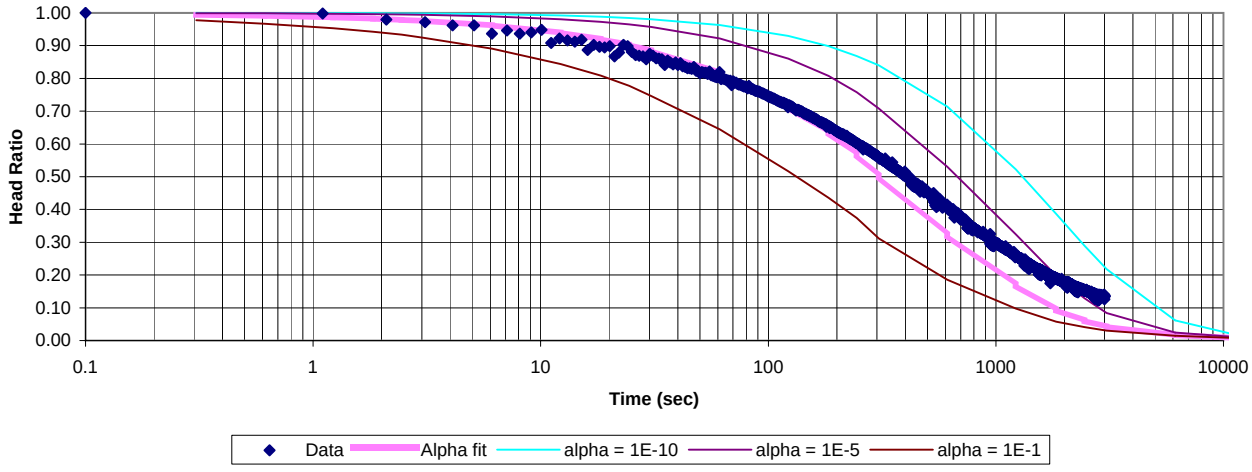
PEBBLE GOLD COPPER PROJECT
Northern Dynasty Minerals

Borehole No:	P4AD	Test type:	Rising head
Instrument type:	In-situ transducer	Test date:	14-Sep-04
Zone depth (m):	24.7-28.0	Test time:	11:18 AM
Test length (m):	3.3	Screen type:	2 " PVC - 20 slot
Hole diameter (m):	0.127	Field technician:	
Riser inside diameter (m):	0.049	Analyst:	Alex Rosenberg
K (m/s):	6.0E-07	Transmissivity (m^2/s):	1.98E-06
Storage:	1.00E-03	Alpha:	6.65E-03

Water Level Change



Head Ratio Plot

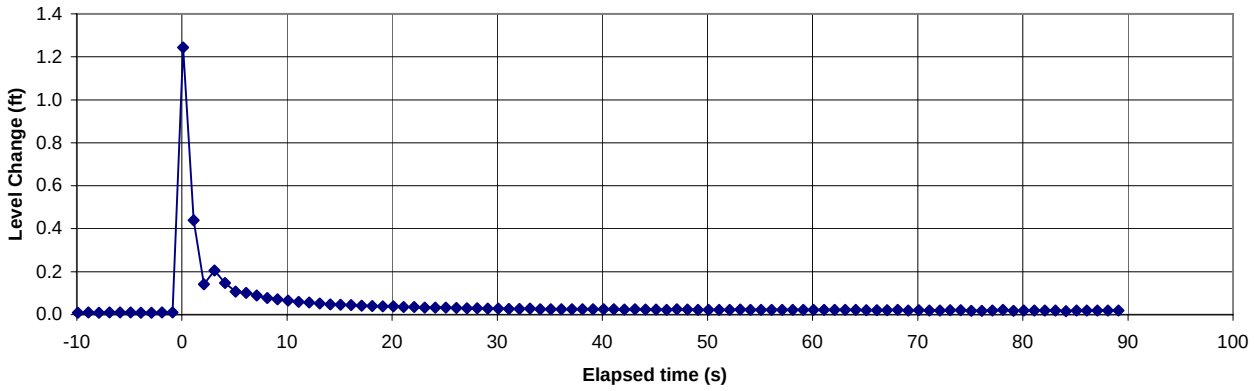


Borehole Response Test - Cooper Papadopulos Method

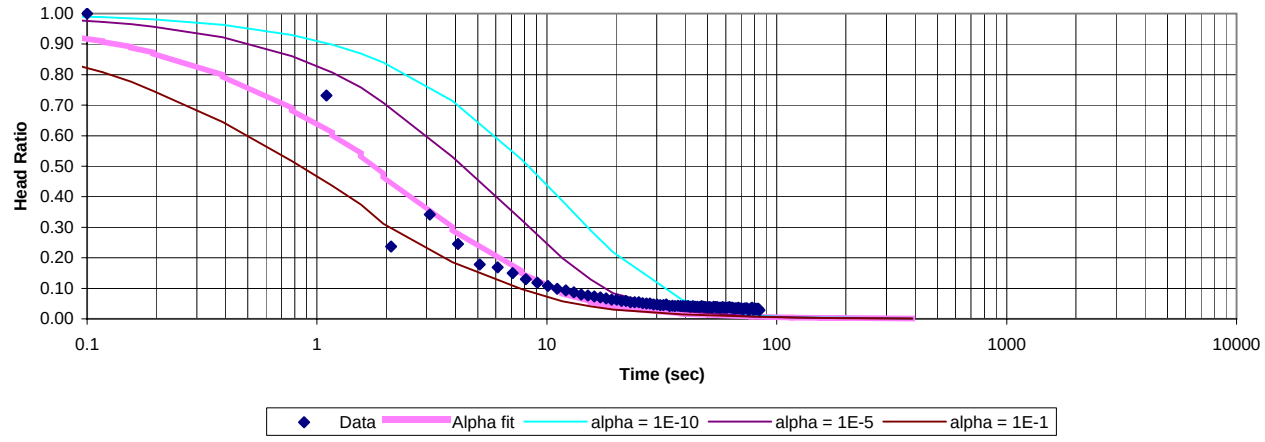
PEBBLE GOLD COPPER PROJECT
Northern Dynasty Minerals

Borehole No:	P6S	Test type:	Falling head
Instrument type:	In-situ transducer	Test date:	9/17/2004
Zone depth (m):	6.5-12.2	Test time:	3:54 PM
Test length (m):	5.7	Screen type:	2 " PVC - 20 slot
Hole diameter (m):	0.127	Field technician:	
Riser inside diameter (m):	0.042	Analyst:	Alex Rosenberg
K (m/s):	4.0E-05	Transmissivity (m^2/s)	2.28E-04
Storage:	1.00E-03	Alpha	9.10E-03

Water Level Change



Head Ratio Plot



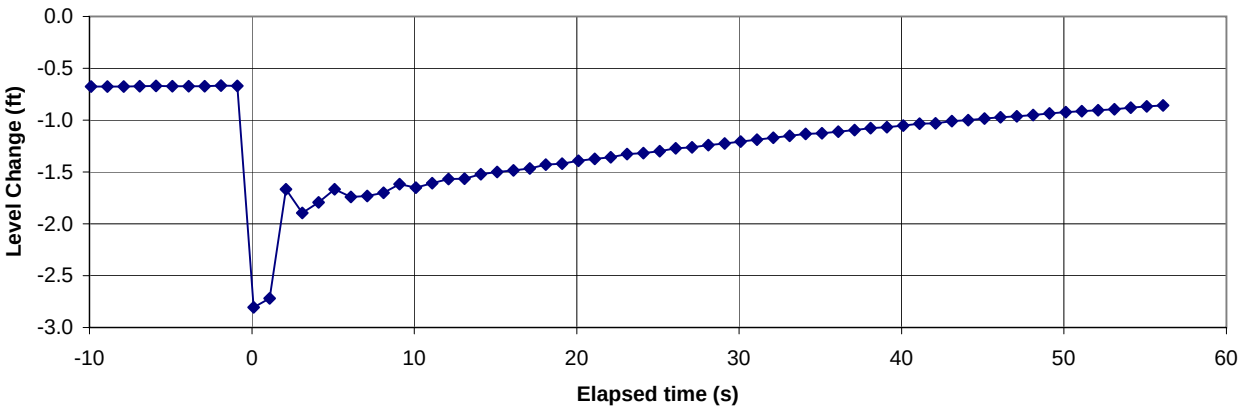
Borehole Response Test - Cooper Papadopulos Method

PEBBLE GOLD COPPER PROJECT
Northern Dynasty Minerals

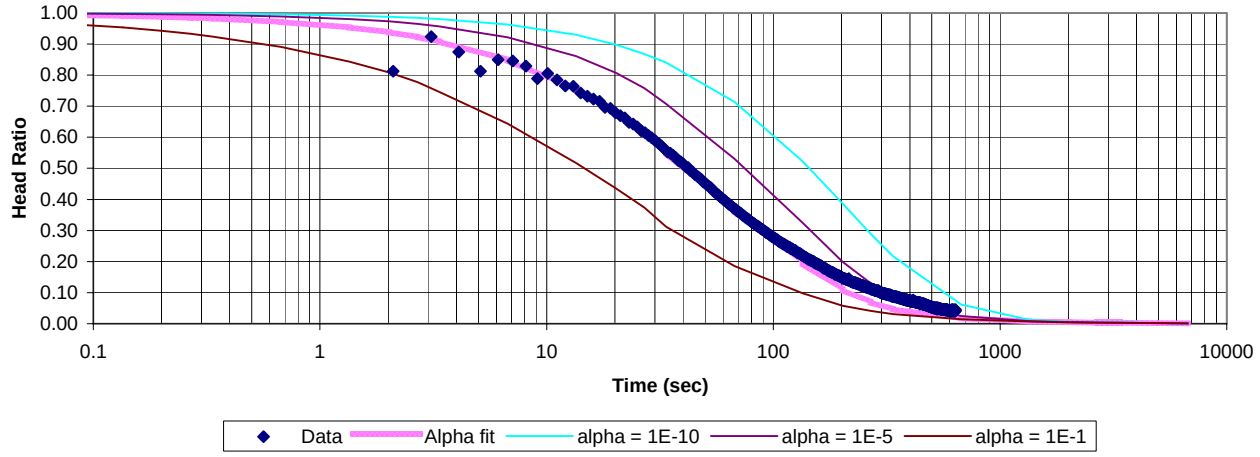
Borehole No:	P6M	Test type:	Rising head
Instrument type:	In-situ transducer	Test date:	17-Sep-04
Zone depth (m):	23.8-27.4	Test time:	12:47 PM
Test length (m):	3.6	Screen type:	2 " PVC - 20 slot
Hole diameter (m):	0.127	Field technician:	
Riser diameter (m):	0.049	Analyst:	Alex Rosenberg

K (m/s):	5.0E-06	Transmissivity (m^2/s):	1.80E-05
Storage:	4.00E-04	Alpha:	2.66E-03

Water Level Change



Head Ratio Plot

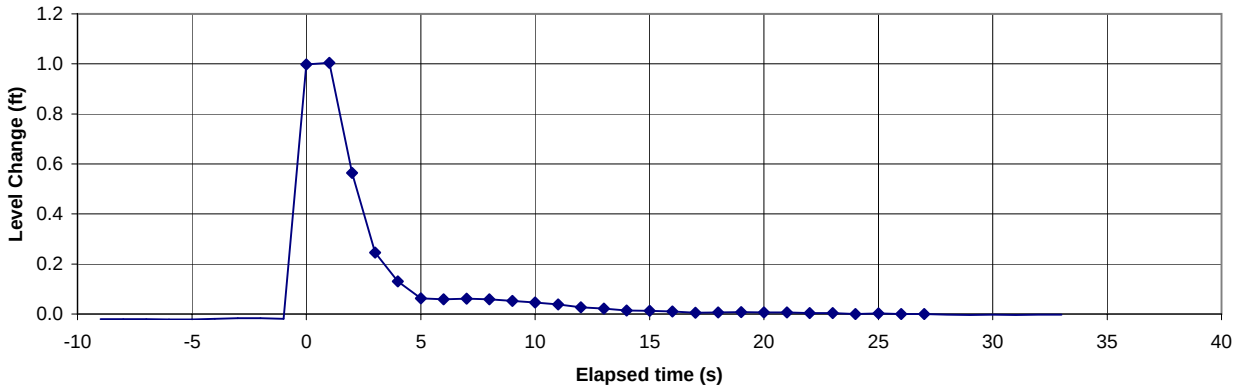


Borehole Response Test - Cooper Papadopulos Method

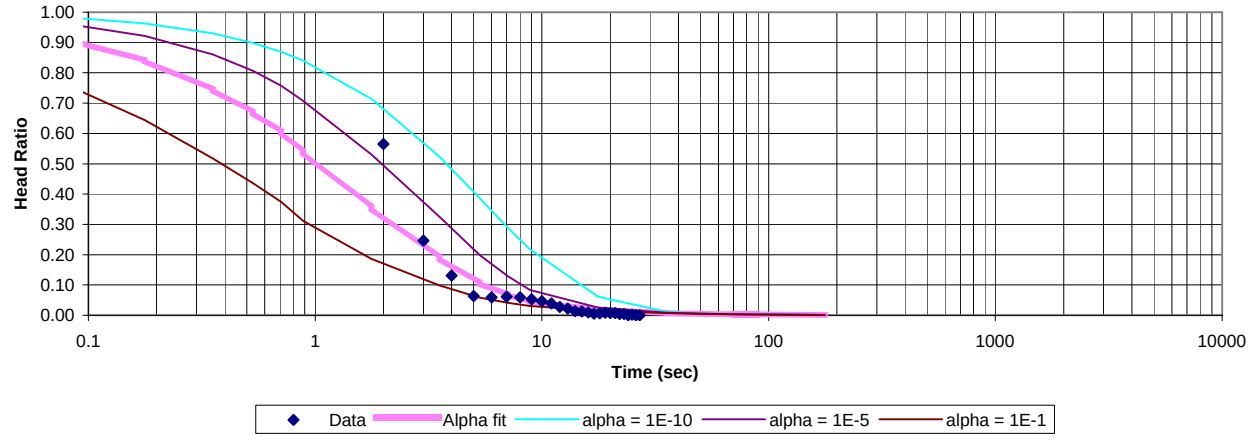
PEBBLE GOLD COPPER PROJECT
Northern Dynasty Minerals

Borehole No:	P6D	Test type:	Falling head
Instrument type:	In-situ transducer	Test date:	9/17/04
Zone depth (m):	31-33.5	Test time:	16:32:10
Test length (m):	2.5	Screen type:	2 " PVC - 20 slot
Hole diameter (m):	0.127	Field technician:	Alex Rosenberg
Riser inside diameter (m):	0.042	Analyst:	Alex Rosenberg
K (m/s):	2.0E-04	Transmissivity (m^2/s)	5.00E-04
Storage:	4.00E-04	Alpha	3.64E-03

Water Level Change



Head Ratio Plot

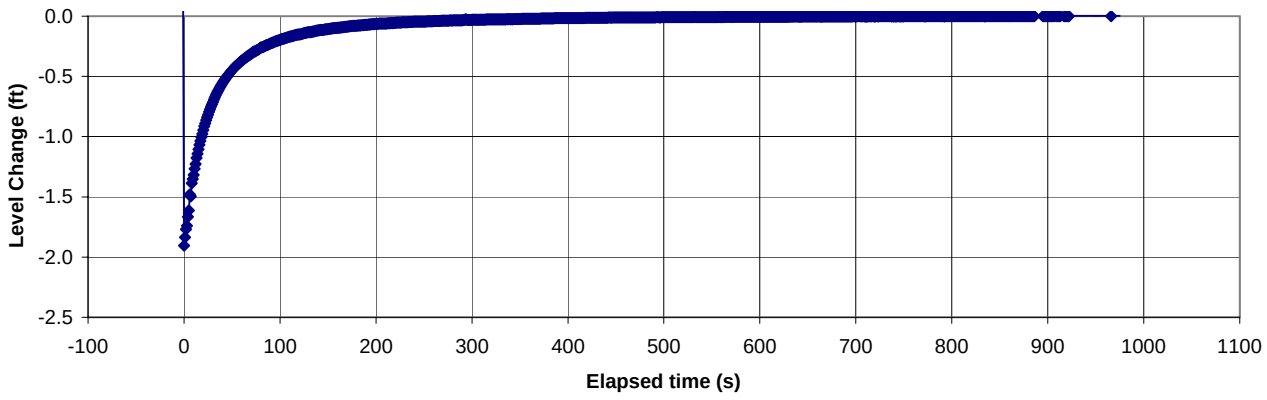


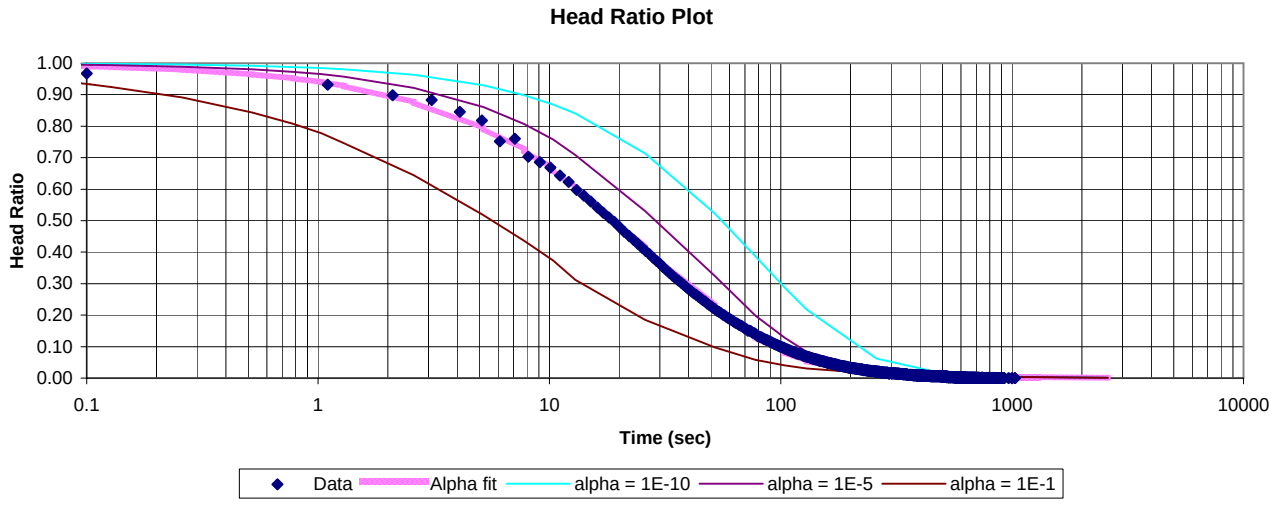
Borehole Response Test - Cooper Papadopulos Method

PEBBLE GOLD COPPER PROJECT
Northern Dynasty Minerals

Borehole No:	KP-P1	Test type:	Rising head
Instrument type:	In-situ transducer	Test date:	5-Sep-04
Zone depth (m):	36.9-40.8	Test time:	12:08 PM
Test length (m):	3.9	Screen type:	2 " PVC - 20 slot
Hole diameter (m):	0.127	Field technician:	
Riser inside diameter (m):	0.049	Analyst:	Alex Rosenberg
K (m/s):	1.2E-05	Transmissivity (m^2/s):	4.68E-05
Storage:	1.00E-04	Alpha:	6.65E-04

Comment: changed initial displacement to match cooper plot



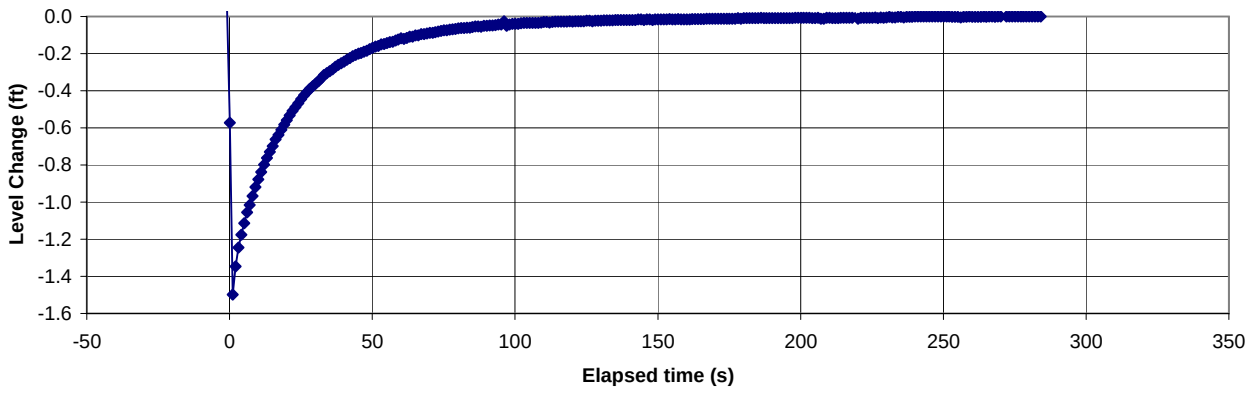


Borehole Response Test - Cooper Papadopulos Method

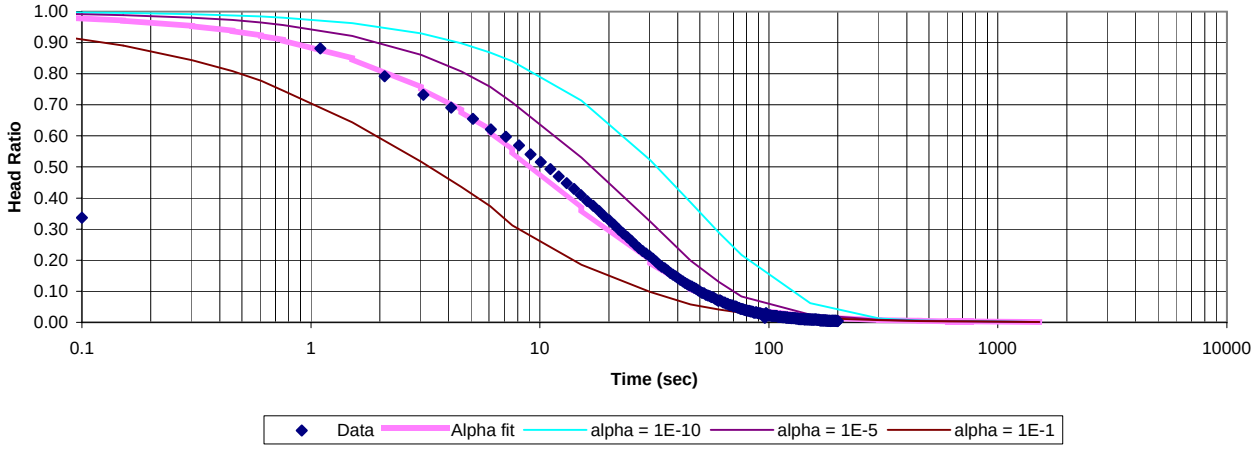
PEBBLE GOLD COPPER PROJECT
Northern Dynasty Minerals

Borehole No:	KP-P2	Test type:	Rising head
Instrument type:	In-situ transducer	Test date:	4-Sep-04
Zone depth (m):	8.8-12.8	Test time:	12:17 PM
Test length (m):	4	Screen type:	2 " PVC - 20 slot
Hole diameter (m):	0.127	Field technician:	
Riser inside diameter (m):	0.049	Analyst:	Alex Rosenberg
K (m/s):	2.0E-05	Transmissivity (m^2/s):	8.00E-05
Storage:	4.00E-04	Alpha:	2.66E-03

Water Level Change



Head Ratio Plot

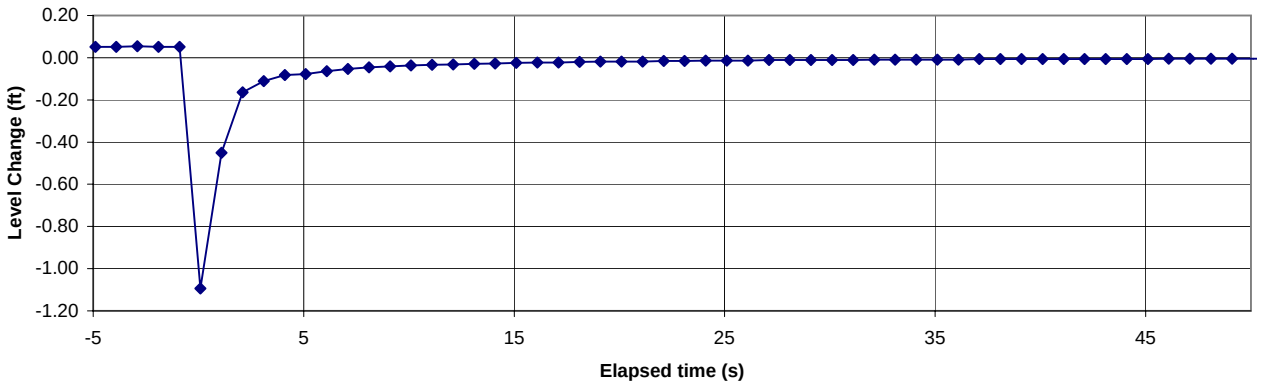


Borehole Response Test - Cooper Papadopulos Method

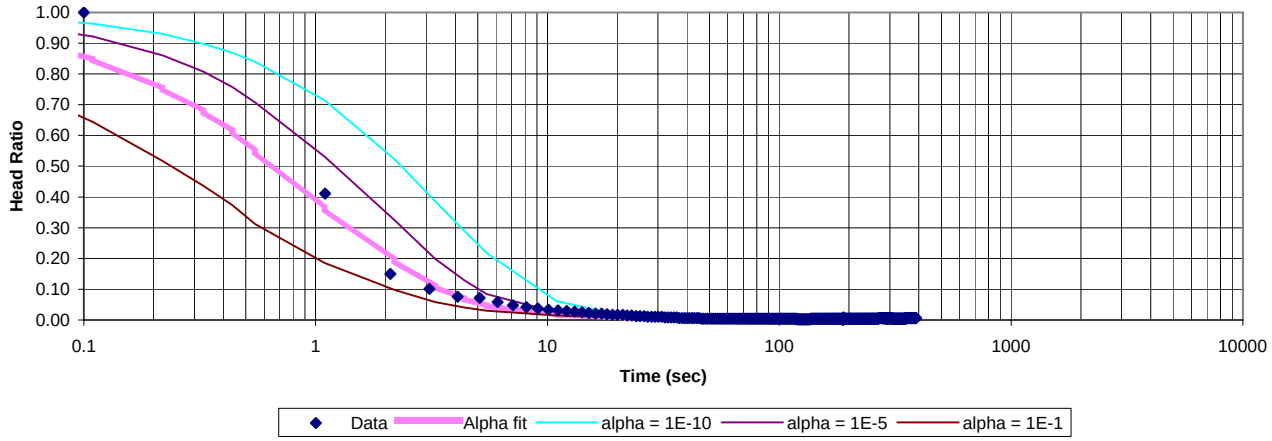
PEBBLE GOLD COPPER PROJECT
Northern Dynasty Minerals

Borehole No:	KP-P3S	Test type:	Rising head
Instrument type:	In-situ transducer	Test date:	4-Sep-04
Zone depth (m):	1.8-6	Test time:	7:34 PM
Test length (m):	4.2	Screen type:	2 " PVC - 20 slot
Hole diameter (m):	0.127	Field technician:	
Riser inside diameter (m):	0.052502	Analyst:	Alex Rosenberg
K (m/s):	3.0E-04	Transmissivity (m^2/s):	1.26E-03
Storage:	5.00E-04	Alpha:	2.93E-03

Water Level Change



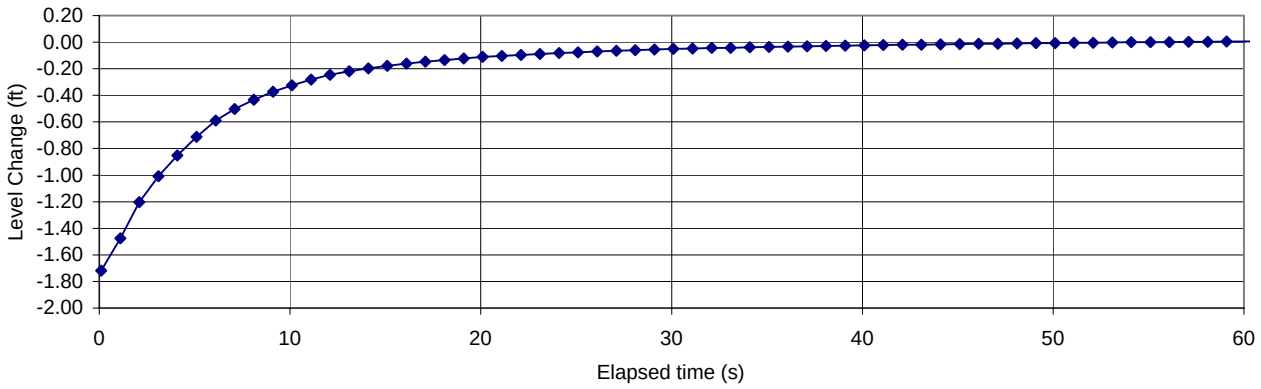
Head Ratio Plot

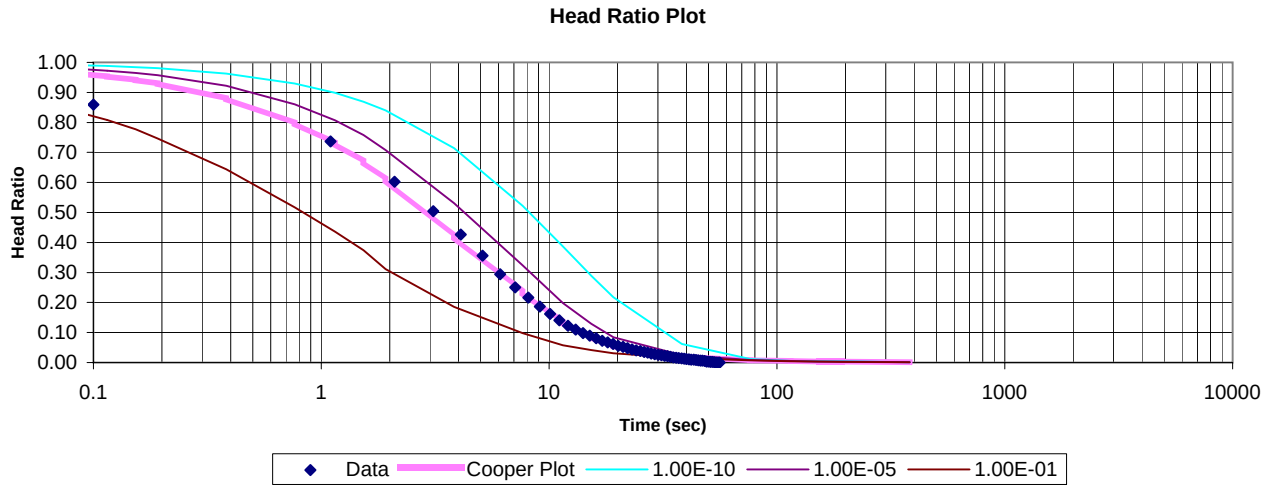


Borehole Response Test - Cooper Papadopulos Method

PEBBLE GOLD COPPER PROJECT
Northern Dynasty Minerals

Borehole No:	KP-P3M	Test type:	Rising head
Instrument type:	In-situ transducer	Test date:	4-Sep-04
Zone depth (m):	11.3-15.8	Test time:	5:50 PM
Test length (m):	4.5	Screen type:	2 " PVC - 20 slot
Hole diameter (m):	0.127	Field technician:	
Riser inside diameter (m):	0.052502	Analyst:	Alex Rosenberg
K (m/s):	8.0E-05	Transmissivity (m^2/s):	3.60E-04
Storage:	1.00E-04	Alpha:	5.85E-04

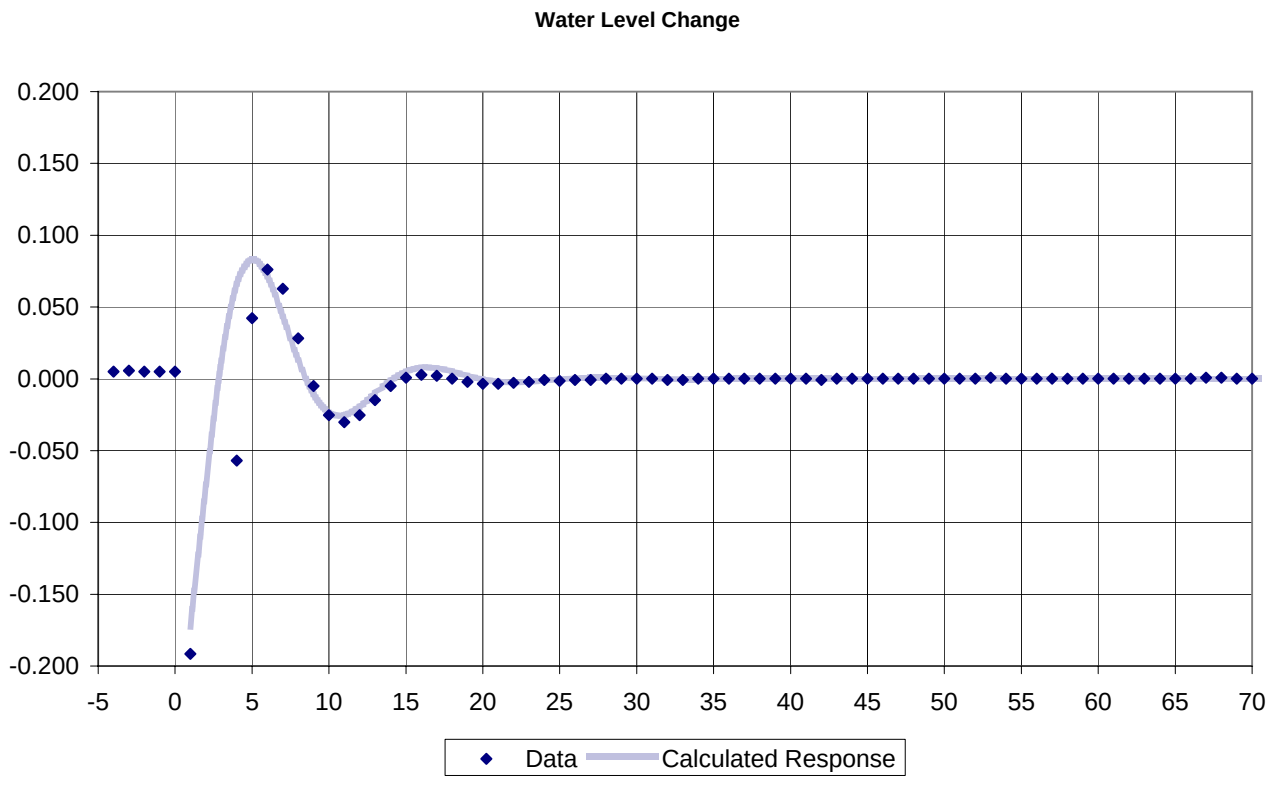




Borehole Response Test - Van der Kamp Method

PEBBLE GOLD COPPER PROJECT
Northern Dynasty Minerals

Borehole No:	KP-P3D	Test type:	Rising head
Instrument type:	In-situ transducer	Test date:	9/4/2004
Zone depth (m):	19.8-24	Test time:	6:49 PM
Test length (m):	4.2	Screen type:	2 " PVC - 20 slot
Hole diameter (m):	0.127	Field technician:	
Riser inside diameter (m):	0.053	Analyst:	Alex Rosenberg
Depth of screen (m):	22.00	d:	0.35
Depth to water (m):	0.10	angular frequency (per second):	0.55
Height of water predicted(m):	28.00	damping constant:	0.21
Height of water (m):	21.90	Initial amplitude:	-0.25
K (m/s):	2.8E-04	Transmissivity (m^2/s)	1.18E-03
Storage:	2.00E-04		

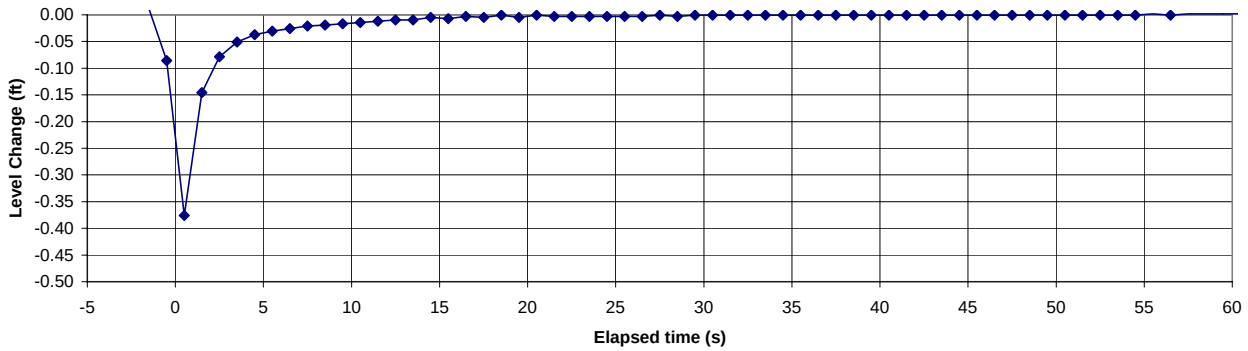


Borehole Response Test - Cooper Papadopulos Method

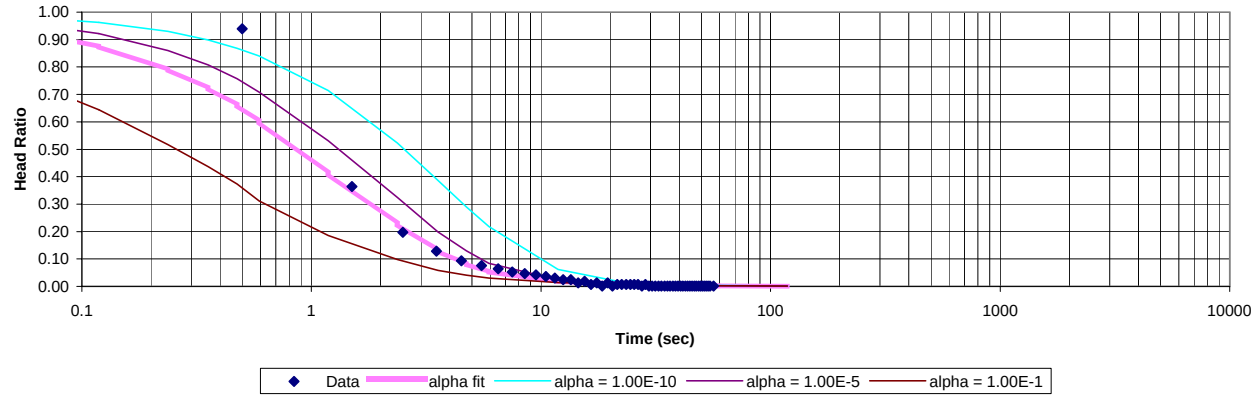
PEBBLE GOLD COPPER PROJECT
Northern Dynasty Minerals

Borehole No:	MW-1S	Test Type	Rising head
Instrument type:	In-situ transducer	Test date:	8/17/2004
Test zone depth (m):	2-7	Test time:	3:52 PM
Test zone length (m):	5	Screen type:	2 " Sch 80 PVC - 20 slot
Hole diameter (m):	0.127	Field technician:	
Riser inner diameter (m):	0.084	Analyst:	Alex Rosenberg
K (m/s):	6.0E-04	Transmissivity (m^2/s)	3.00E-03
Storage:	3.00E-04	Alpha	6.80E-04

Water Level Change



Head Ratio Plot

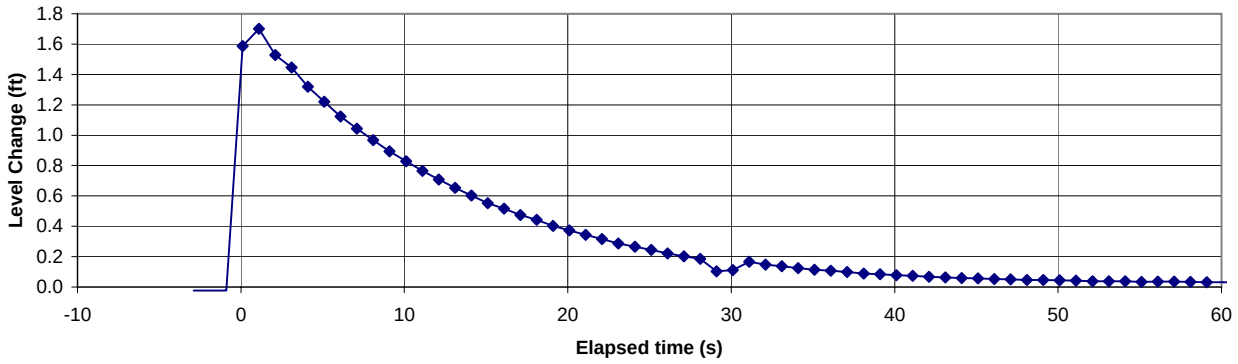


Borehole Response Test - Cooper Papadopulos Method

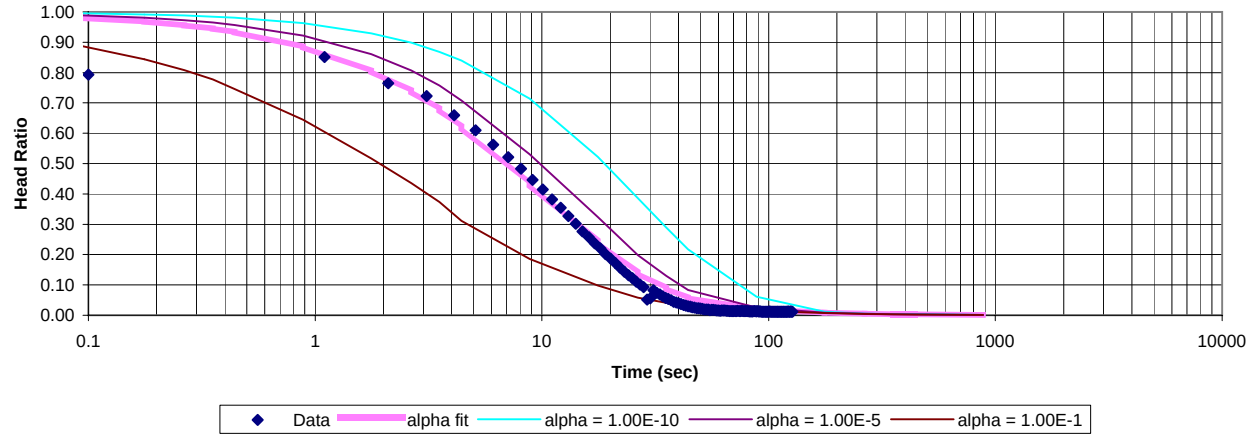
PEBBLE GOLD COPPER PROJECT
Northern Dynasty Minerals

Borehole No:	MW1M	Test Type:	Falling head
Instrument type:	In-situ transducer	Test date:	8/17/2004
Test zone depth (m):	20.4-29.6	Test time:	5:11 PM
Test zone length (m):	9.2	Screen type:	2 " PVC - 20 slot
Hole diameter (m):	0.127	Field technician:	Alex Rosenberg
Riser inner diameter (m):	0.046	Analyst:	Alex Rosenberg
K (m/s):	1.3E-05	Transmissivity (m^2/s)	1.20E-04
Storage:	6.00E-05	Alpha	4.58E-04

MW-1M
Water Level Change



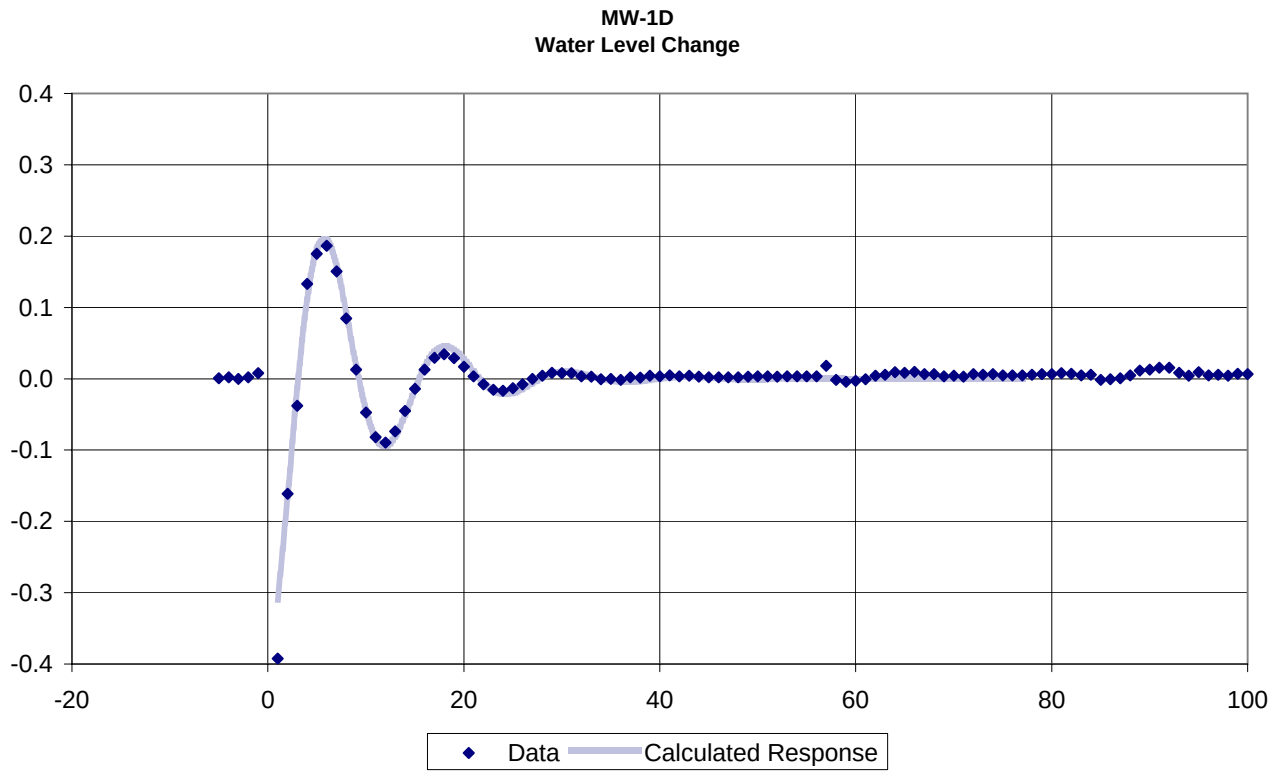
Head Ratio Plot



Borehole Response Test - Van der Kamp Method

PEBBLE GOLD COPPER PROJECT
Northern Dynasty Minerals

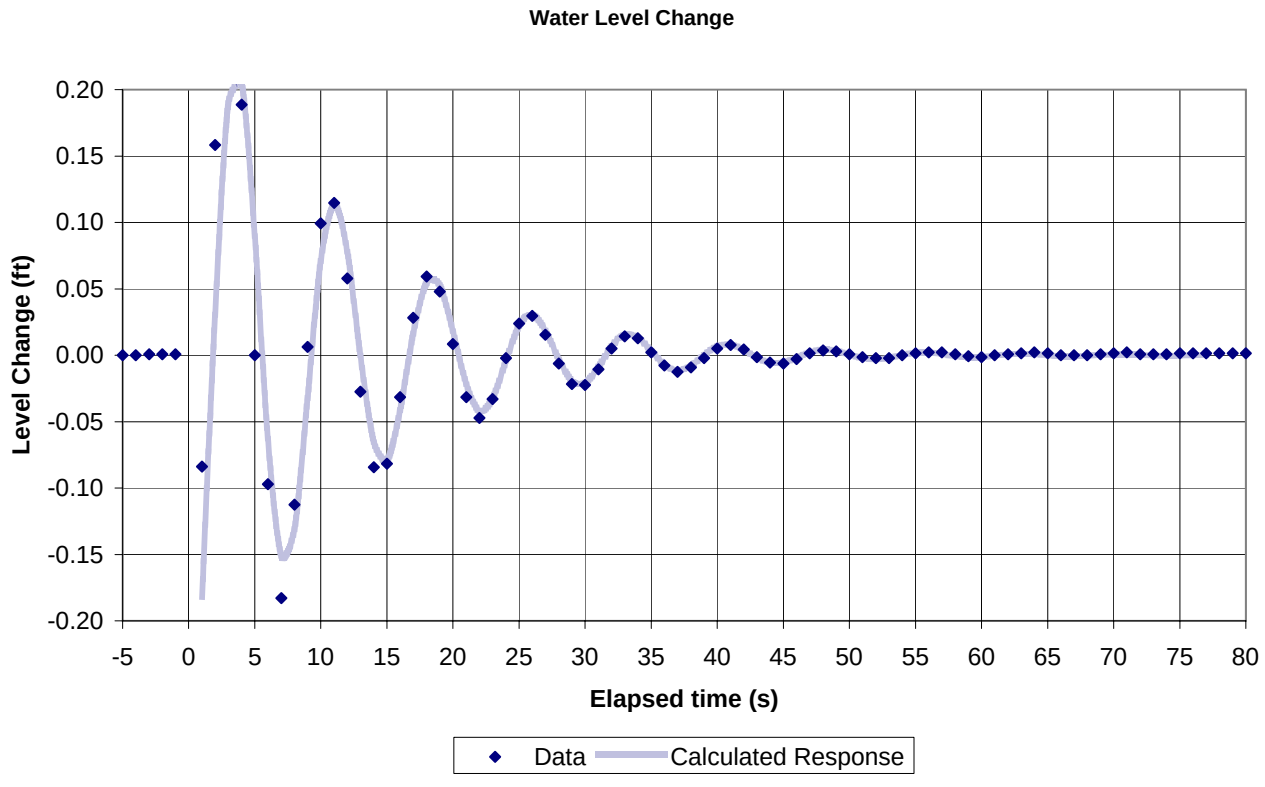
Borehole No:	MW1D	Test type:	Rising head
Instrument type:	In-situ transducer	Test date:	8/17/2004
Test zone depth (m):	36.6-41.5	Test time:	4:37 PM
Test zone length (m):	4.9	Screen type:	2 " PVC - 20 slot
Hole diameter (m):	0.127	Field technician:	
Riser inner diameter (m):	0.049	Analyst:	Alex Rosenberg
Depth of screen (m):	40.00	d:	0.23
Depth to water (m):	1.70	angular frequency (per second):	0.51
Height of water predicted(m):	36.00	damping constant:	0.12
Height of water (m):	38.30	Initial amplitude:	-0.4
K (m/s):	2.6E-04	Transmissivity (m^2/s)	1.27E-03
Storage:	5.00E-04		



Borehole Response Test - Van der Kamp Method

PEBBLE GOLD COPPER PROJECT
Northern Dynasty Minerals

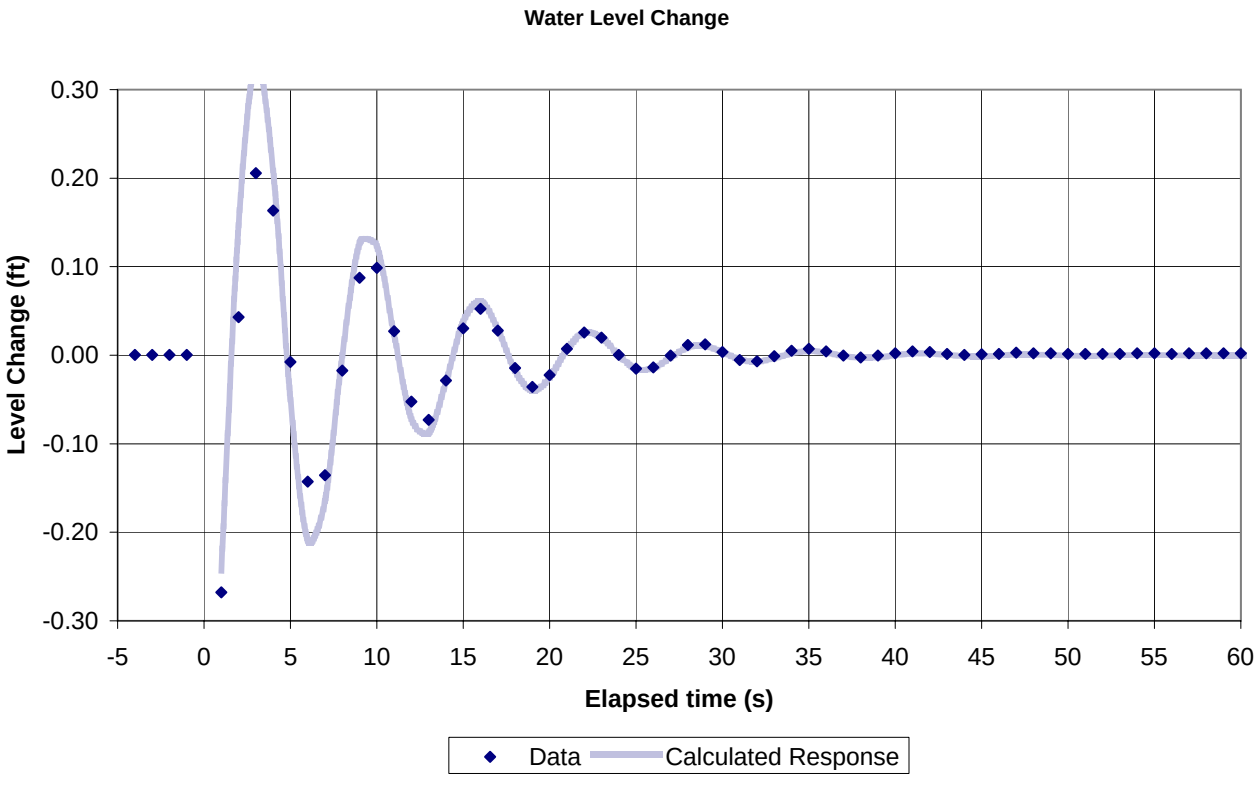
Borehole No:	MW2D	Test type:	Rising head
Instrument type:	In-situ transducer	Test date:	8/18/2004
Test zone depth (m):	36 - 41	Test time:	5:47 PM
Test zone length (m):	5	Screen type:	2 " PVC - 20 slot
Hole diameter (m):	0.127	Field technician:	
Riser inner diameter (m):	0.0508	Analyst:	Alex Rosenberg
Depth of screen (m):	38.50	d:	0.104
Depth to water (m):	26.70	angular frequency (per second):	0.85
Height of water predicted(m):	13.56	damping constant:	0.09
Height of water (m):	11.80	Initial amplitude:	-0.3
K (m/s):	1.1E-03	Transmissivity (m^2/s)	5.50E-03
Storage:	5.00E-04		



Borehole Response Test - Van der Kamp Method

PEBBLE GOLD COPPER PROJECT
Northern Dynasty Minerals

Borehole No:	MW3D	Test Type:	Rising head
Instrument type:	In-situ transducer	Test date:	8/19/2004
Test zone depth (m):	54-60	Test time:	6:00 PM
Test zone length (m):	7.5	Screen type:	2 " PVC - 20 slot
Hole diameter (m):	0.127	Field technician:	
Riser inner diameter (m):	0.0492506	Analyst:	Alex Rosenberg
Depth of screen (m):	57.00	d:	1.33E-01
Depth to water (m):	46.60	angular frequency (per second):	0.98
Height of water predicted(m):	10.00	damping constant:	0.13
Height of water (m):	10.40	Initial amplitude:	-0.5
K (m/s):	6.4E-04	Transmissivity (m^2/s)	4.80E-03
Storage:	3.00E-04		

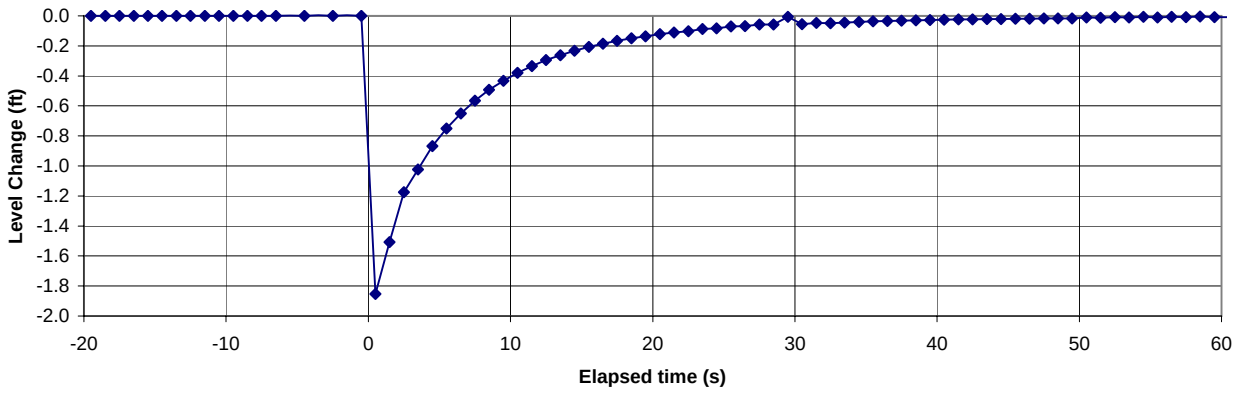


Borehole Response Test - Cooper Papadopulos Method

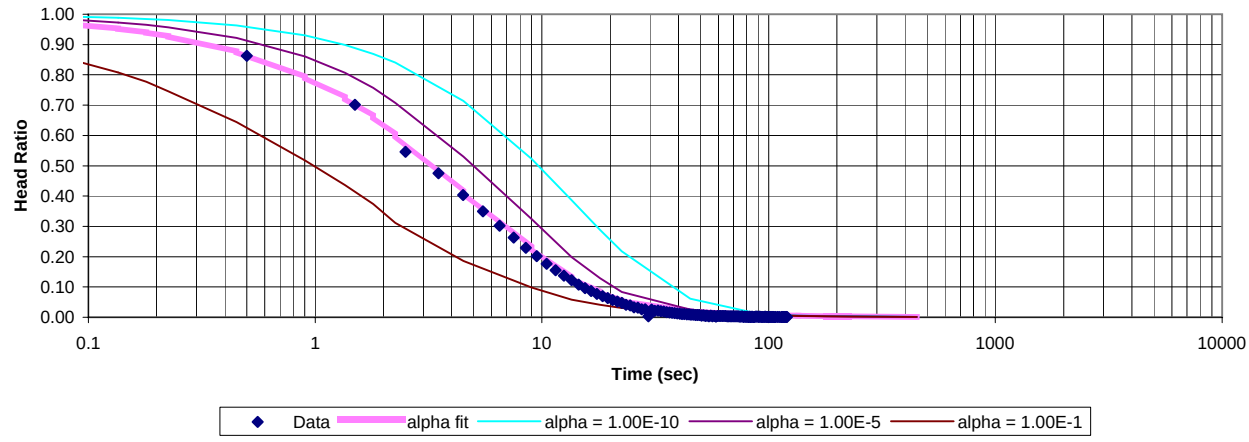
PEBBLE GOLD COPPER PROJECT
Northern Dynasty Minerals

Borehole No:	MW5S	Test type:	Rising head
Instrument type:	In-situ transducer	Test date:	8/20/2004
Test zone depth (m):	7.62-13	Test time:	1:50 PM
Test zone length (m):	5.38	Screen type:	2 " PVC - 20 slot
Hole diameter (m):	0.127	Field technician:	
Riser inner diameter (m):	0.049	Analyst:	Alex Rosenberg
K (m/s):	5.0E-05	Transmissivity (m^2/s)	2.69E-04
Storage:	1.00E-04	Alpha	6.65E-04

Water Level Change



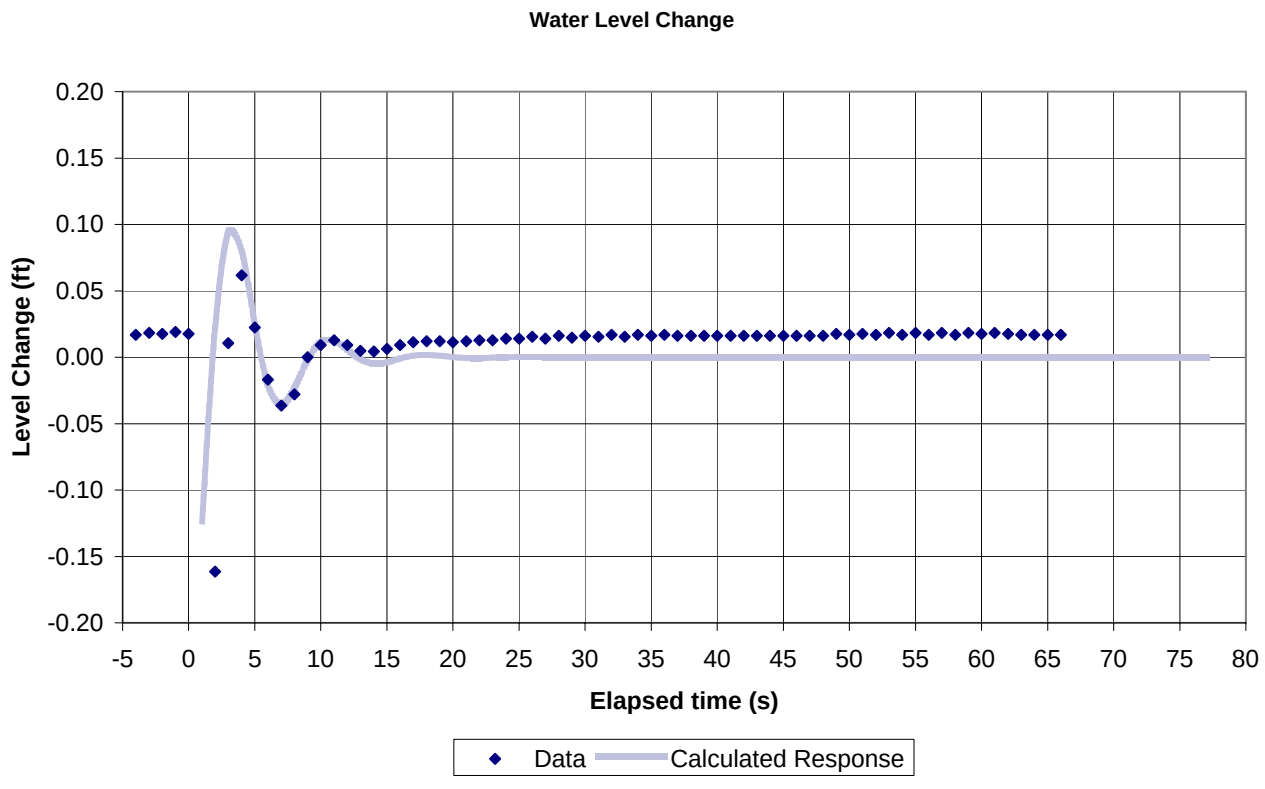
Head Ratio Plot



Borehole Response Test - Van der Kamp Method

PEBBLE GOLD COPPER PROJECT
Northern Dynasty Minerals

Borehole No:	MW5M	Test type:	Rising head
Instrument type:	In-situ transducer	Test date:	8/20/2004
Test zone depth (m):	15.8-21.3	Test time:	1:36 PM
Test zone length (m):	5.5	Screen type:	2 " PVC - 20 slot
Hole diameter (m):	0.127	Field technician:	
Riser inner diameter (m):	0.049	Analyst:	Alex Rosenberg
Depth of screen (m):	19.00	d:	0.302
Depth to water (m):	0.60	angular frequency (per second):	0.86
Height of water predicted(m):	12.00	damping constant:	0.27
Height of water (m):	18.40	Initial amplitude:	-0.25
K (m/s):	3.0E-04	Transmissivity (m^2/s)	1.65E-03
Storage:	4.00E-04		

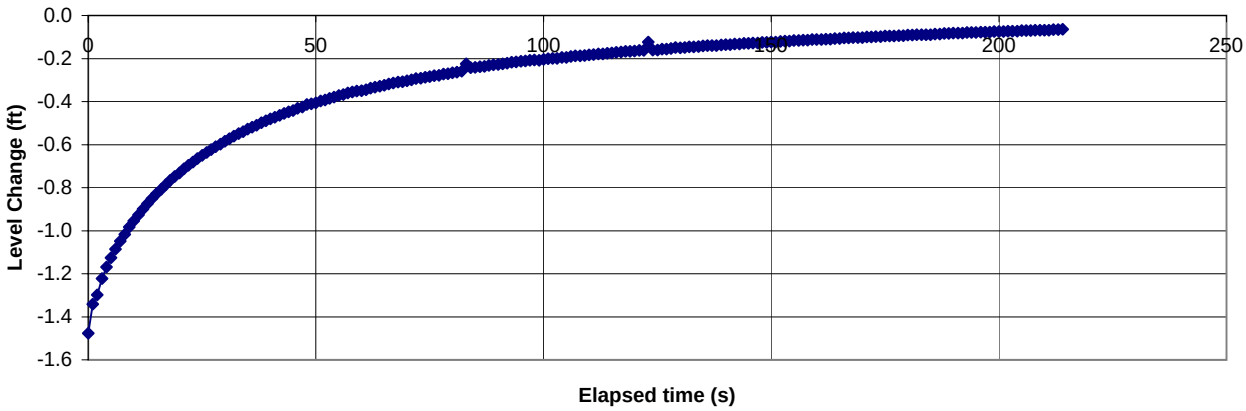


Borehole Response Test - Cooper Papadopulos Method

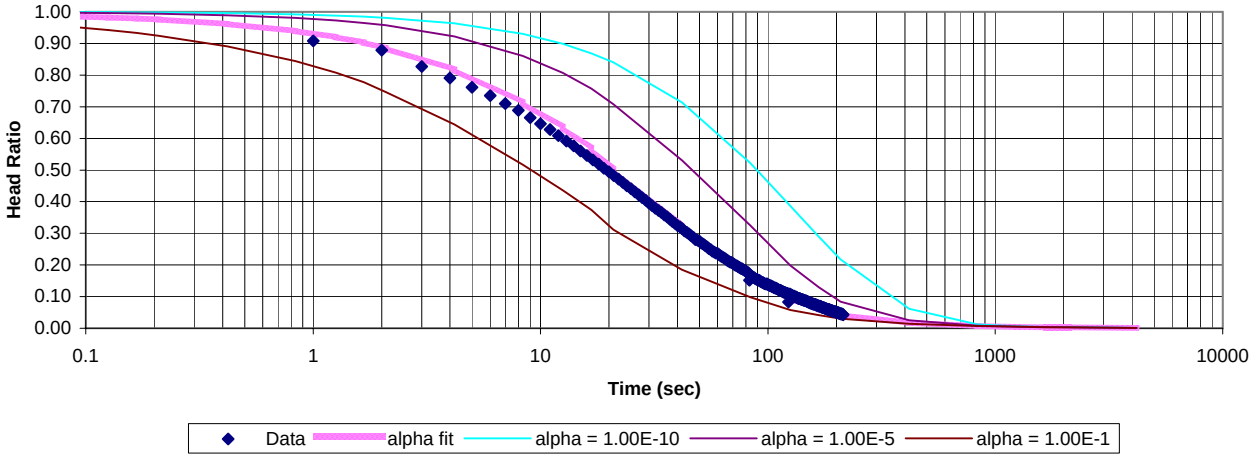
PEBBLE GOLD COPPER PROJECT
Northern Dynasty Minerals

Borehole No:	MW-5D	Test type:	Rising head
Instrument type:	In-situ transducer	Test date:	20-Aug-04
Test zone depth (m):	25.9-31.7	Test time:	12:17 PM
Test zone length (m):	5.8	Screen type:	2 " PVC - 20 slot
Hole diameter (m):	0.127	Field technician:	
Riser inner diameter (m):	0.049	Analyst:	Alex Rosenberg
	1		
K (m/s):	5.0E-06	Transmissivity (m^2/s)	2.90E-05
Storage:	1.00E-03	Alpha	6.65E-03

Water Level Change



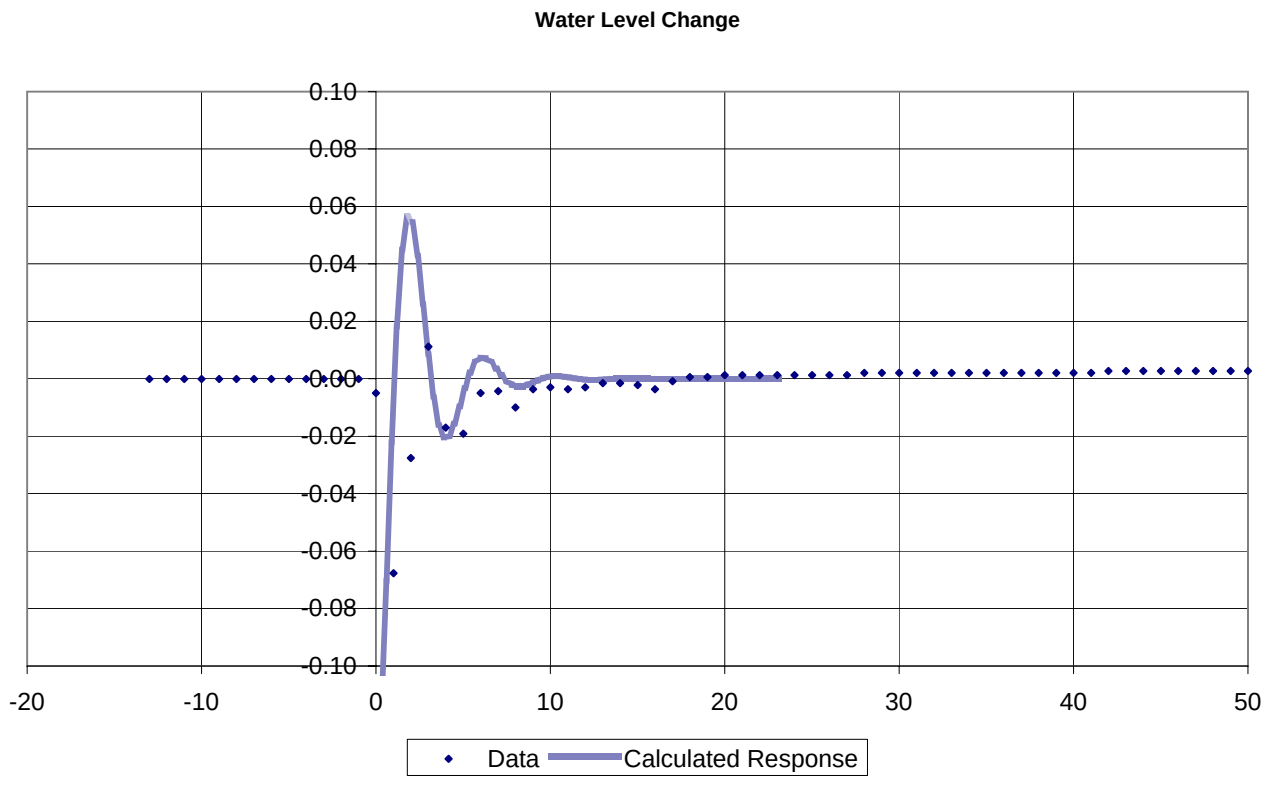
Head Ratio Plot



Borehole Response Test - Van der Kamp Method

PEBBLE GOLD COPPER PROJECT
Northern Dynasty Minerals

Borehole No:	MW6D	Test type:	Rising head
Instrument type:	In-situ transducer	Test date:	9/5/2004
Test zone depth (m):	23.8-30	Test time:	2:12 PM
Test zone length (m):	6.2	Screen type:	2 " PVC - 20 slot
Hole diameter (m):	0.127	Field technician:	
Riser inner diameter (m):	0.049	Analyst:	Alex Rosenberg
Depth of screen (m):	30.00	d:	0.307
Depth to water (m):	20.30	angular frequency (per second):	1.49
Height of water predicted(m):	4.00	damping constant:	0.48
Height of water (m):	9.70	Initial amplitude:	-0.15
K (m/s):	5.5E-04	Transmissivity (m^2/s)	3.41E-03
Storage:	1.00E-04		

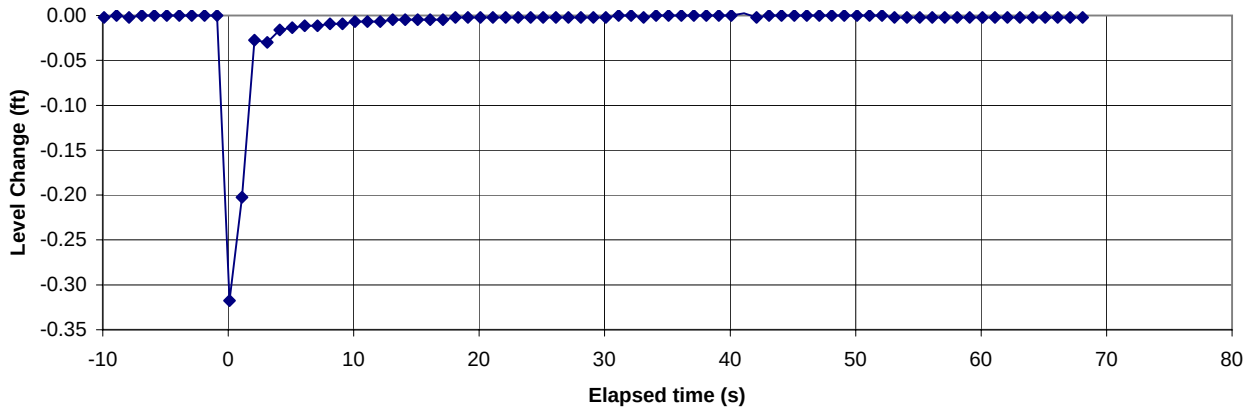


Borehole Response Test - Cooper Papadopulos Method

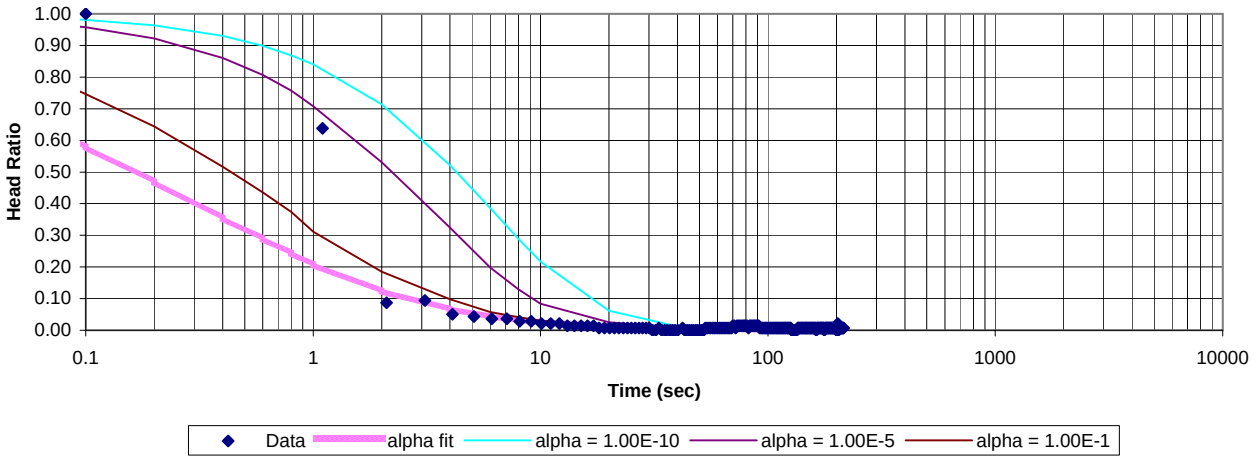
PEBBLE GOLD COPPER PROJECT
Northern Dynasty Minerals

Borehole No:	MW-7S	Test type:	Rising head
Instrument type:	In-situ transducer	Test date:	16-Aug-04
Test zone depth (m):	4.6-10	Test time:	7:08 PM
Test zone length (m):	5.4	Screen type:	2 " PVC - 20 slot
Hole diameter (m):	0.127	Field technician:	
Riser inner diameter (m):	0.081	Analyst:	Alex Rosenberg
K (m/s):	3.0E-04	Transmissivity (m^2/s)	1.62E-03
Storage:	3.00E-01	Alpha	7.47E-01

Water Level Change



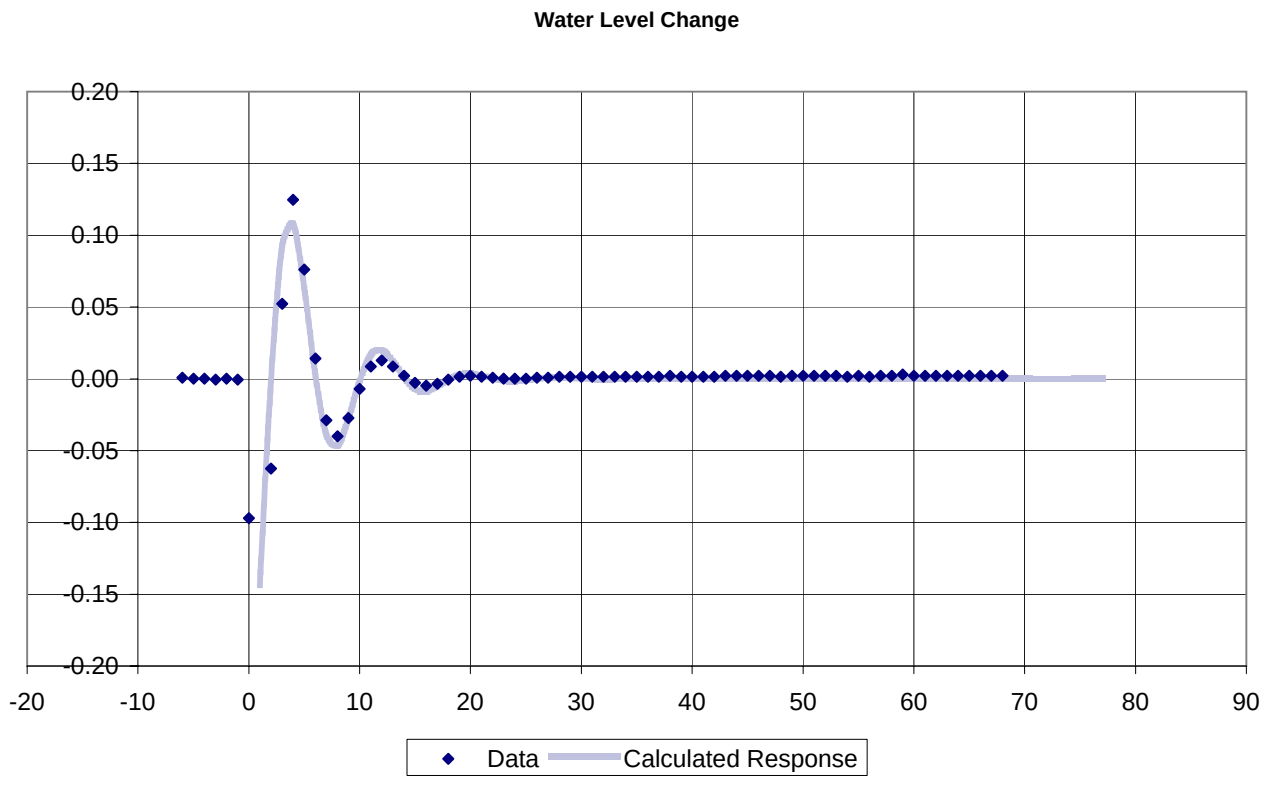
Head Ratio Plot



Borehole Response Test - Van der Kamp Method

PEBBLE GOLD COPPER PROJECT
Northern Dynasty Minerals

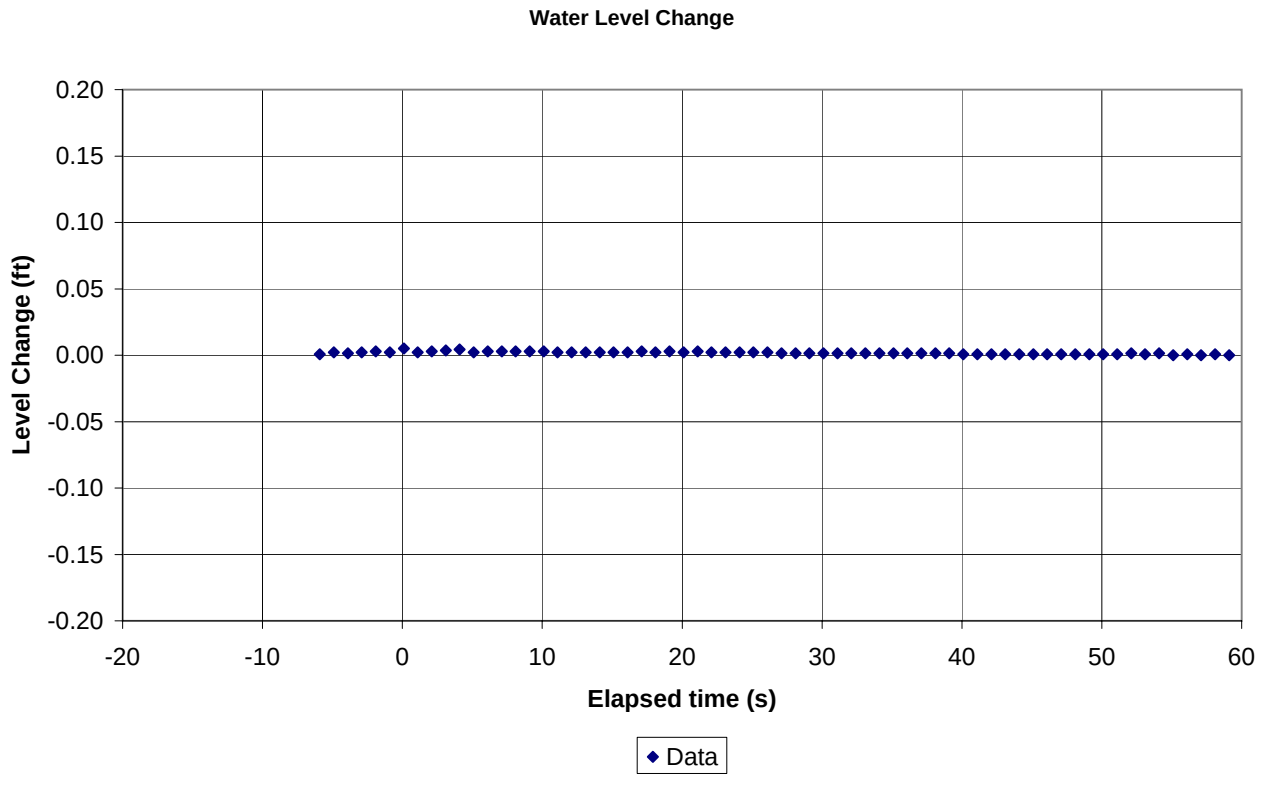
Borehole No:	MW7D	Test type:	Rising head
Instrument type:	In-situ transducer	Test date:	8/16/2004
Test zone depth (m):	16.46-22.3	Test time:	6:26 PM
Test zone length (m):	5.84	Screen type:	2 " PVC - 20 slot
Hole diameter (m):	0.127	Field technician:	Alex Rosenberg
Riser inner diameter (m):	0.049	Analyst:	Alex Rosenberg
Depth of screen (m):	21.00	d:	0.260
Depth to water (m):	4.70	angular frequency (per second):	0.78
Height of water predicted(m):	15.00	damping constant:	0.21
Height of water (m):	16.30	Initial amplitude:	-0.25
K (m/s):	3.0E-04	Transmissivity (m^2/s)	1.75E-03
Storage:	4.00E-04		



Borehole Response Test - Van der Kamp Method

PEBBLE GOLD COPPER PROJECT
Northern Dynasty Minerals

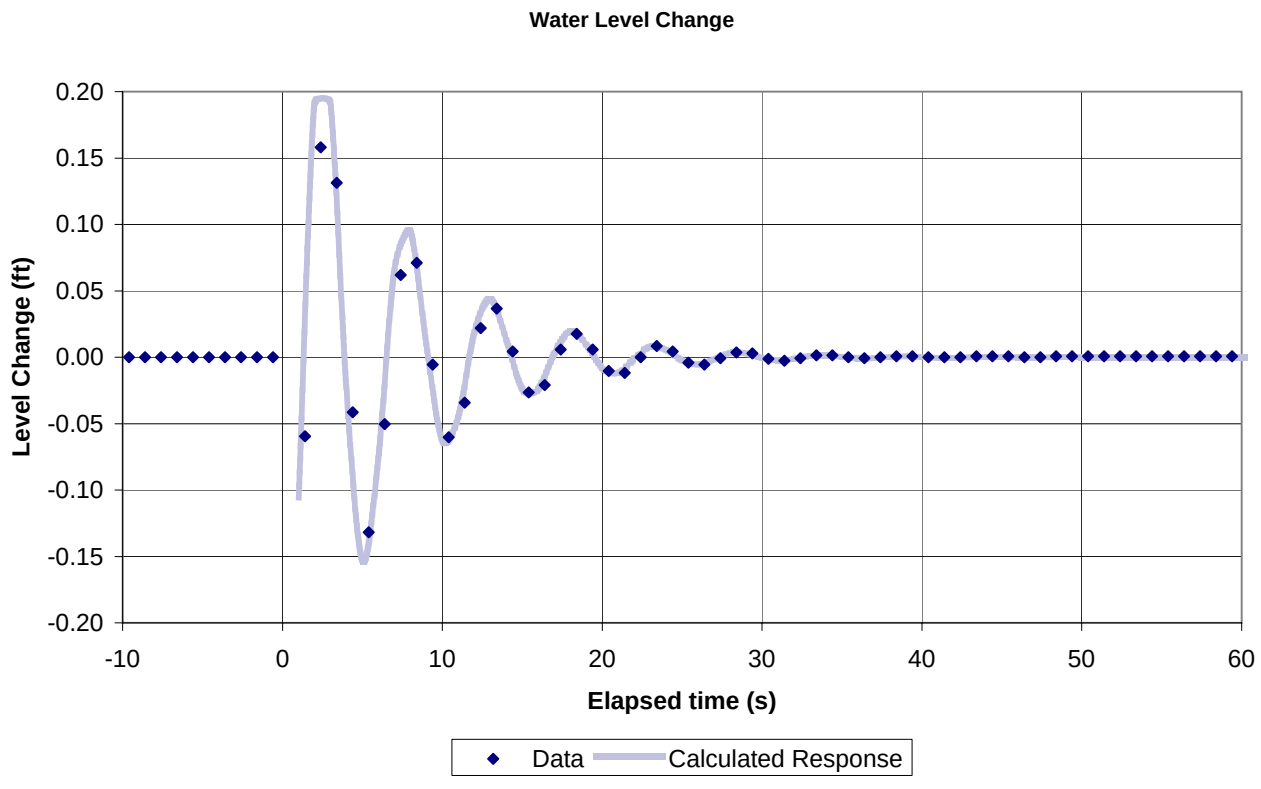
Borehole No:	MW8S	Test type:	Falling head
Instrument type:	In-situ transducer	Test date:	8/14/2004
Test zone depth (m):	1.8-5.5	Test time:	5:48 PM
Test zone length (m):	3.7	Screen type:	2 " PVC - 20 slot
Hole diameter (m):	0.127	Field technician:	
Riser inner diameter (m):	0.081	Analyst:	Alex Rosenberg
Depth of screen (m):	57.00	d:	
Depth to water (m):	57.00	angular frequency (per second):	
Height of water predicted(m):	10.40	damping constant:	
Height of water (m):	10.40	Initial amplitude:	
K (m/s):		Transmissivity (m^2/s)	
Storage:			



Borehole Response Test - Van der Kamp Method

PEBBLE GOLD COPPER PROJECT
Northern Dynasty Minerals

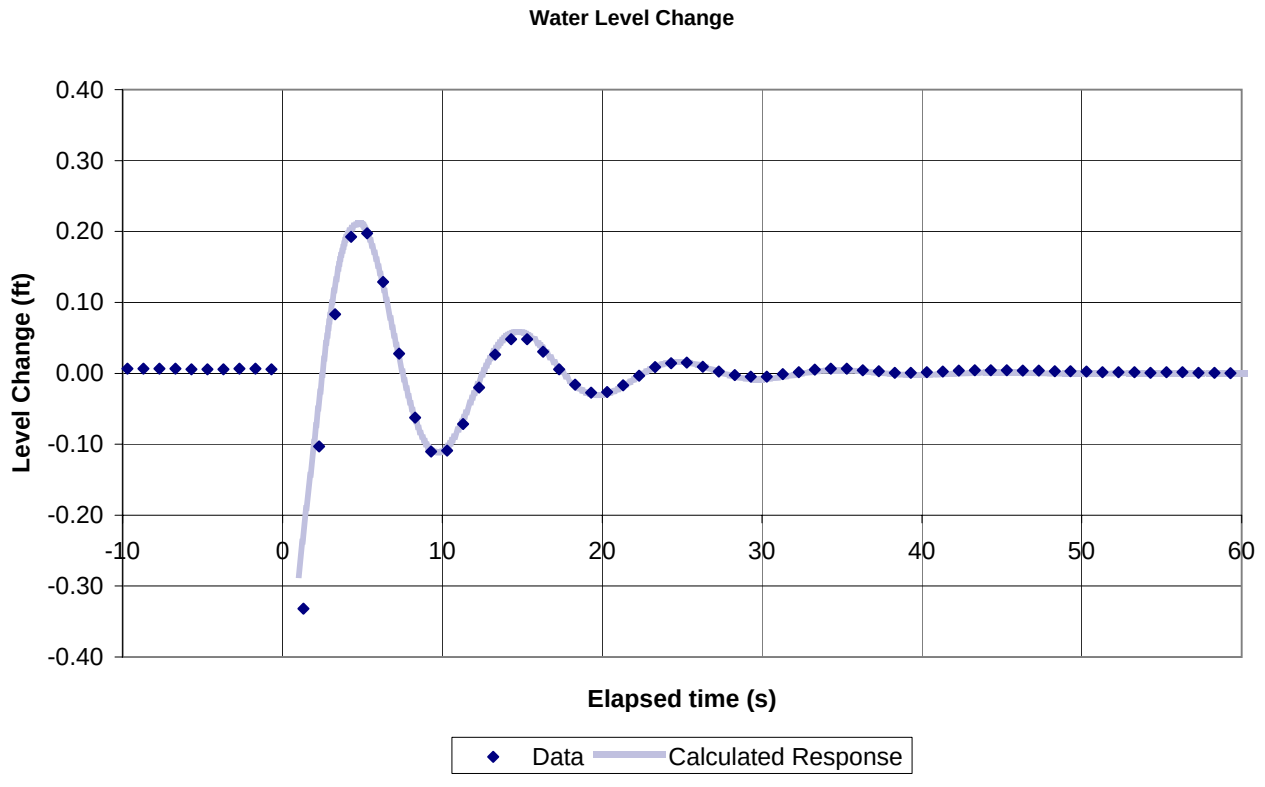
Borehole No:	MW8M	Test type:	Rising head
Instrument type:	In-situ transducer	Test date:	8/14/2004
Test zone depth (m):	8-15.5	Test time:	5:15 PM
Test zone length (m):	7.5	Screen type:	2 " PVC - 20 slot
Hole diameter (m):	0.127	Field technician:	Alex Rosenberg
Riser inner diameter (m):	0.049	Analyst:	Alex Rosenberg
Depth of screen (m):	12.00	d:	0.131
Depth to water (m):	3.60	angular frequency (per second):	1.21
Height of water predicted(m):	6.60	damping constant:	0.16
Height of water (m):	8.40	Initial amplitude:	-0.35
K (m/s):	7.5E-04	Transmissivity (m^2/s)	5.63E-03
Storage:	5.00E-04		



Borehole Response Test - Van der Kamp Method

PEBBLE GOLD COPPER PROJECT
Northern Dynasty Minerals

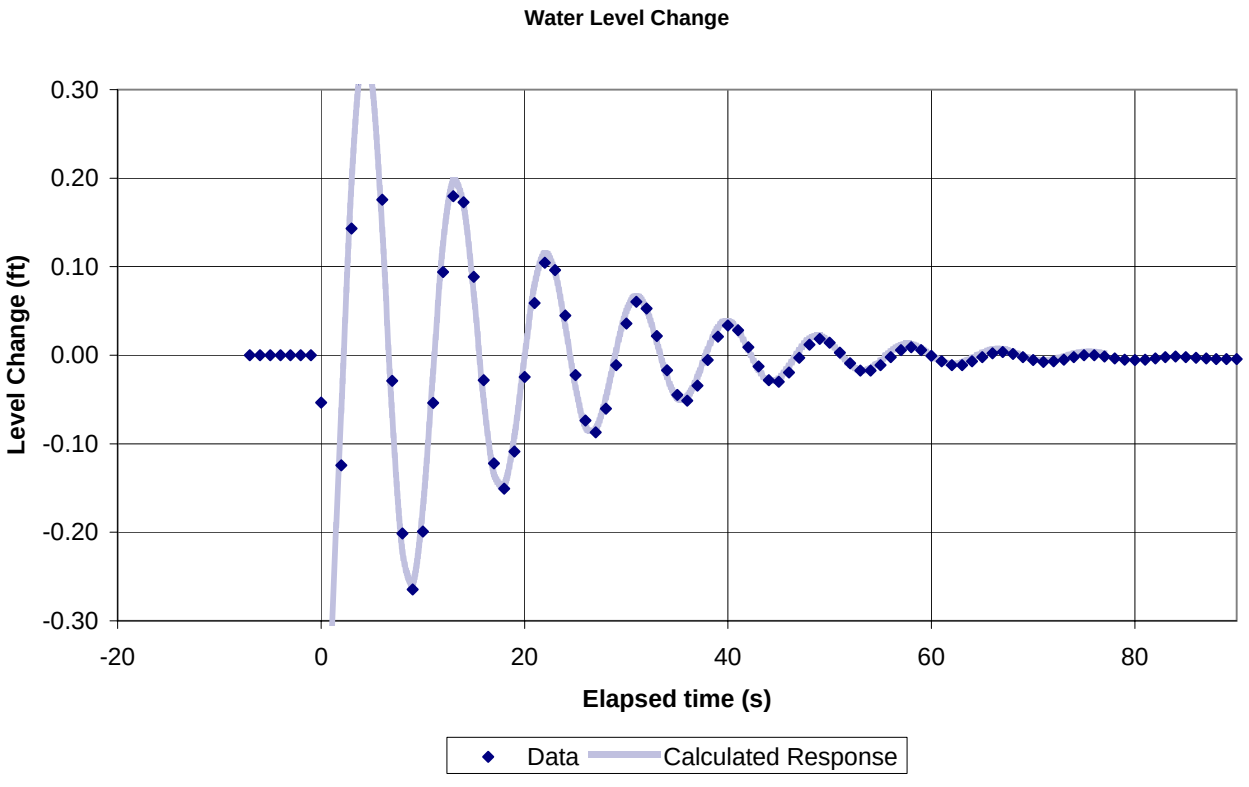
Borehole No:	MW8D	Test type:	Rising head
Instrument type:	In-situ transducer	Test date:	8/14/2004
Test zone depth (m):	24.4-31.4	Test time:	1:11 PM
Test zone length (m):	7	Screen type:	2 " PVC - 20 slot
Hole diameter (m):	0.127	Field technician:	
Riser inner diameter (m):	0.049	Analyst:	Alex Rosenberg
Depth of screen (m):	28.00	d:	0.201
Depth to water (m):	2.80	angular frequency (per second):	0.63
Height of water predicted(m):	24.00	damping constant:	0.13
Height of water (m):	25.20	Initial amplitude:	-0.4
K (m/s):	3.2E-04	Transmissivity (m^2/s)	2.24E-03
Storage:	1.00E-04		



Borehole Response Test - Van der Kamp Method

PEBBLE GOLD COPPER PROJECT
Northern Dynasty Minerals

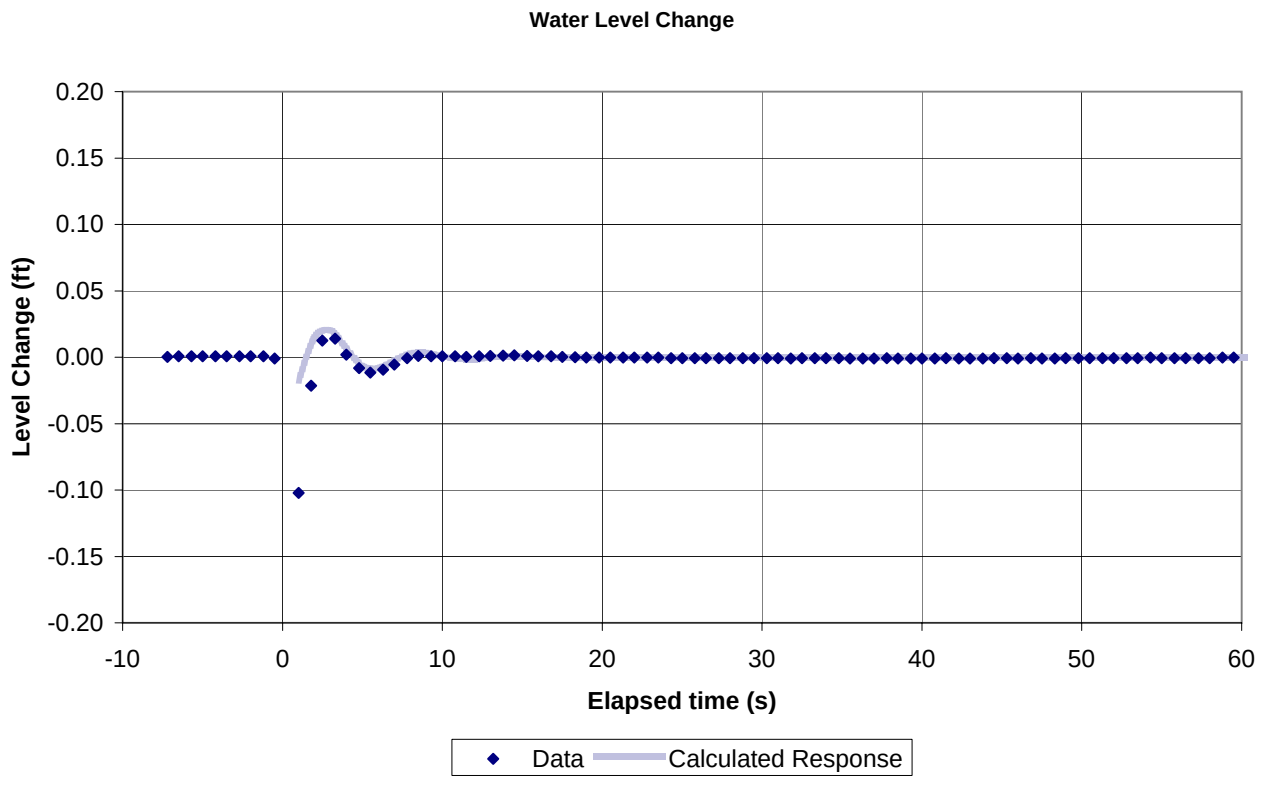
Borehole No:	MW9	Test type:	Rising head
Instrument type:	In-situ transducer	Test date:	8/16/2004
Test zone depth (m):	15.5-22.6	Test time:	5:15 PM
Test zone length (m):	7	Screen type:	2 " PVC - 20 slot
Hole diameter (m):	0.127	Field technician:	
Riser inner diameter (m):	0.049	Analyst:	Alex Rosenberg
Depth of screen (m):	21.00	d:	0.087
Depth to water (m):	1.20	angular frequency (per second):	0.71
Height of water predicted(m):	19.50	damping constant:	0.06
Height of water (m):	19.80	Initial amplitude:	-0.45
K (m/s):	8.0E-04	Transmissivity (m^2/s)	5.60E-03
Storage:	3.00E-04		



Borehole Response Test - Van der Kamp Method

PEBBLE GOLD COPPER PROJECT
Northern Dynasty Minerals

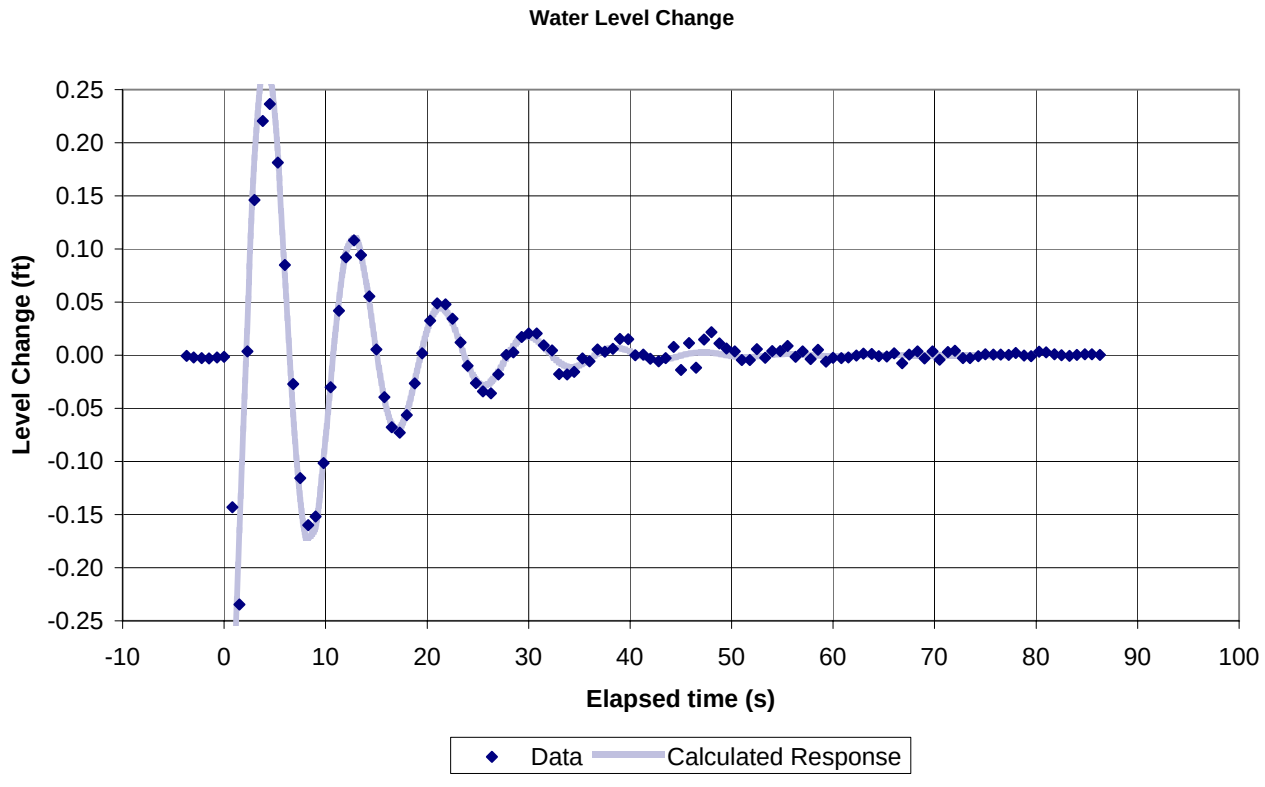
Borehole No:	MW11S	Test type:	Rising head
Instrument type:	In-situ transducer	Test date:	10/18/2004
Test zone depth (m):	14.3-25.6	Test time:	11:45 AM
Test zone length (m):	11	Screen type:	2 " PVC - 20 slot
Hole diameter (m):	0.127	Field technician:	Alex Rosenberg
Riser inner diameter (m):	0.082	Analyst:	Alex Rosenberg
Depth of screen (m):	18.30	d:	0.270
Depth to water (m):	16.45	angular frequency (per second):	1.07
Height of water predicted(m):	8.00	damping constant:	0.30
Height of water (m):	9.14	Initial amplitude:	-0.05
K (m/s):	7.0E-04	Transmissivity (m^2/s)	7.70E-03
Storage:	3.00E-04		



Borehole Response Test - Van der Kamp Method

PEBBLE GOLD COPPER PROJECT
Northern Dynasty Minerals

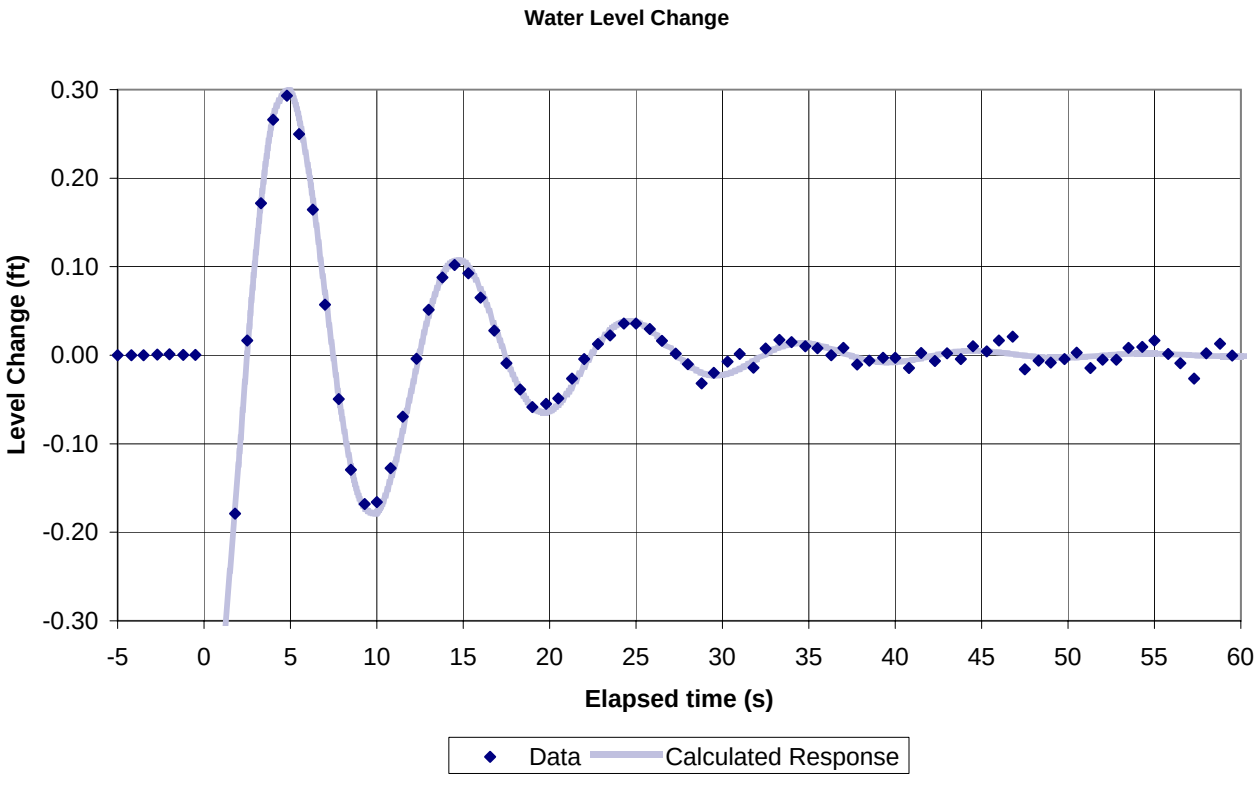
Borehole No:	MW11M	Test type:	Rising head
Instrument type:	In-situ transducer	Test date:	10/18/2004
Test zone depth (m):	30.2-34.4	Test time:	11:27 AM
Test zone length (m):	4.2	Screen type:	2 " PVC - 20 slot
Hole diameter (m):	0.127	Field technician:	Alex Rosenberg
Riser inner diameter (m):	0.053	Analyst:	Alex Rosenberg
Depth of screen (m):	33.00	d:	0.144
Depth to water (m):	15.70	angular frequency (per second):	0.73
Height of water predicted(m):	18.00	damping constant:	0.11
Height of water (m):	17.30	Initial amplitude:	-0.44
K (m/s):	9.0E-04	Transmissivity (m^2/s)	3.78E-03
Storage:	3.00E-04		



Borehole Response Test - Van der Kamp Method

PEBBLE GOLD COPPER PROJECT
Northern Dynasty Minerals

Borehole No:	MW11D	Test type:	Rising head
Instrument type:	In-situ transducer	Test date:	10/18/2004
Test zone depth (m):	38.4-42	Test time:	11:56 AM
Test zone length (m):	3.6	Screen type:	2 " PVC - 20 slot
Hole diameter (m):	0.127	Field technician:	Alex Rosenberg
Riser inner diameter (m):	0.053	Analyst:	Alex Rosenberg
Depth of screen (m):	40.00	d:	0.162
Depth to water (m):	15.90	angular frequency (per second):	0.63
Height of water predicted(m):	24.00	damping constant:	0.10
Height of water (m):	24.10	Initial amplitude:	-0.5
K (m/s):	8.0E-04	Transmissivity (m^2/s)	2.88E-03
Storage:	3.00E-04		

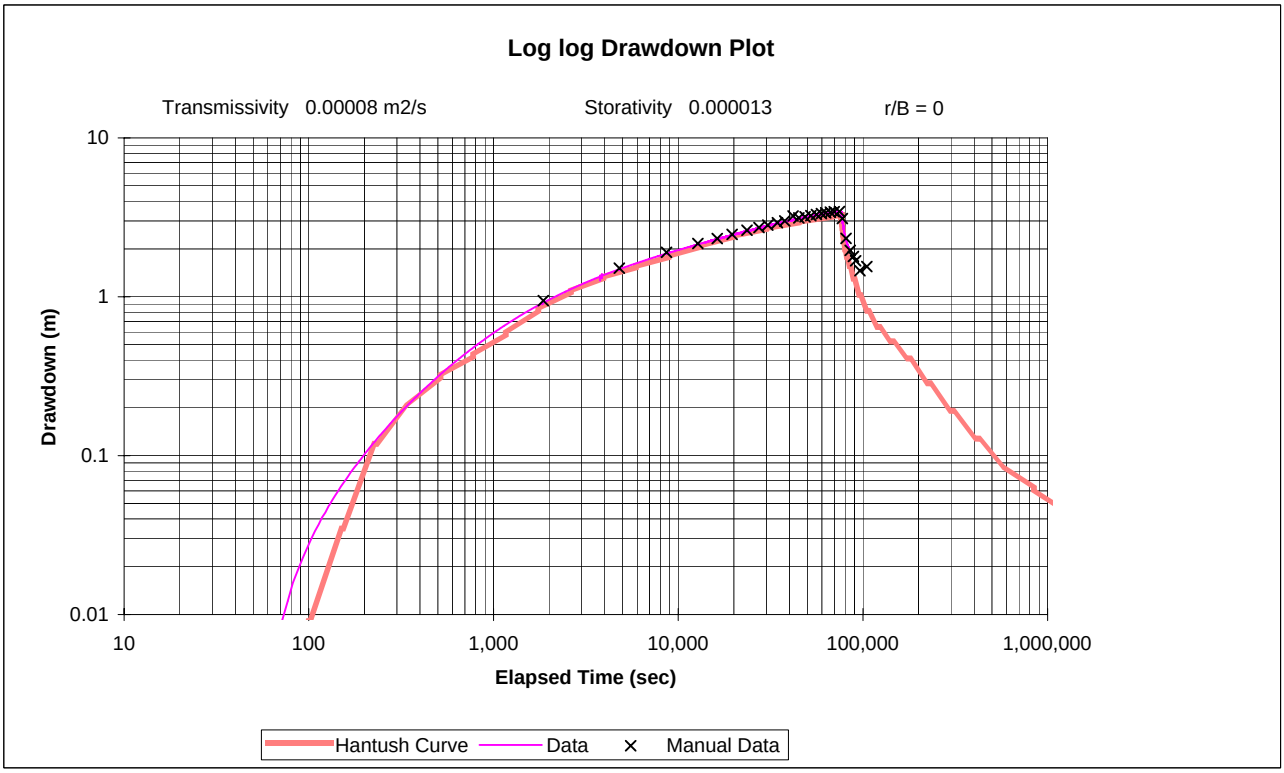


Pumping Test - Hantush Slightly Leaky Method

PEBBLE GOLD COPPER PROJECT
Northern Dynasty Minerals

Pumping Well:	PW-1	Test start:	9/21/04 12:02 PM
Measurement Well:	P-6D	Test stop:	9/22/04 9:13 AM
Distance (m):	73.00	Field technician:	
		Analyst:	R Smith
Transmissivity (m^2/s):	8.00E-05	Aquitard K (m/s):	1.10E-08
Storativity:	1.30E-05	Aquitard Specific Storage:	2.00E-05
		Aquitard Thickness (m):	5.00

Well No.	Description		Distance	start (s)	pumping rate (m3/s)
1	PW-1 start		73.00	0	6.56E-04
2	PW-1 stop		73.00	76,295	-6.56E-04
3	first image		200	0	6.56E-04
4			200	76295	-6.56E-04
5			1	0	0
6			1	0	0
7			1	0	0
8			1	0	0
9			1	0	0
10			1	0	0

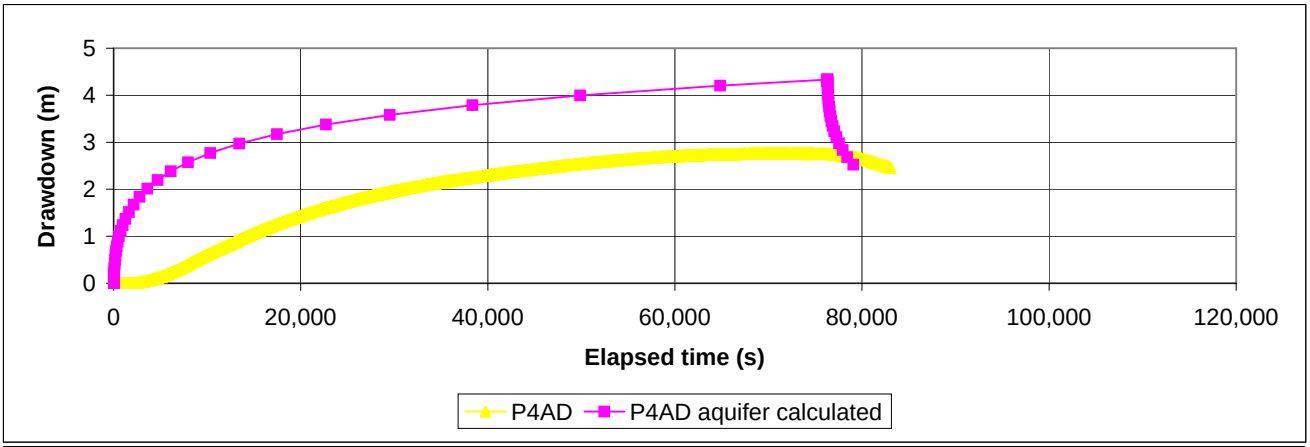


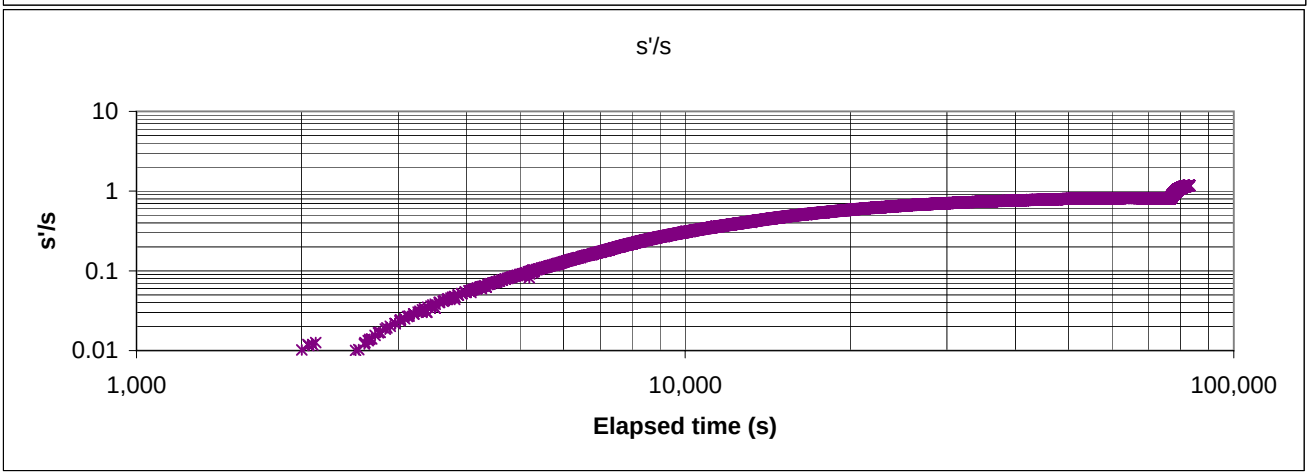
Pumping Test - Neuman Ratio Method

PEBBLE GOLD COPPER PROJECT
Northern Dynasty Minerals

Pumping Well:	PW-1	Test start:	9/21/04 12:02 PM
Measurement Wells:	P4AD	Test stop:	9/22/04 9:13 AM
Distance (m):	30.00	Field technician:	
		Analyst:	R Smith
Transmissivity (m^2/s):	8.00E-05	Aquitard K (m/s):	2.2E-08
Storativity:	1.30E-05	Aquitard Thickness (m):	5.00
		Aquitard Specific Storage (/m):	2.0E-05

Item	
time (s)	4075
s'/s	0.057
t_D	27.86
t_D'	0.18
alpha'	1.10E-03
K'	2.2E-08



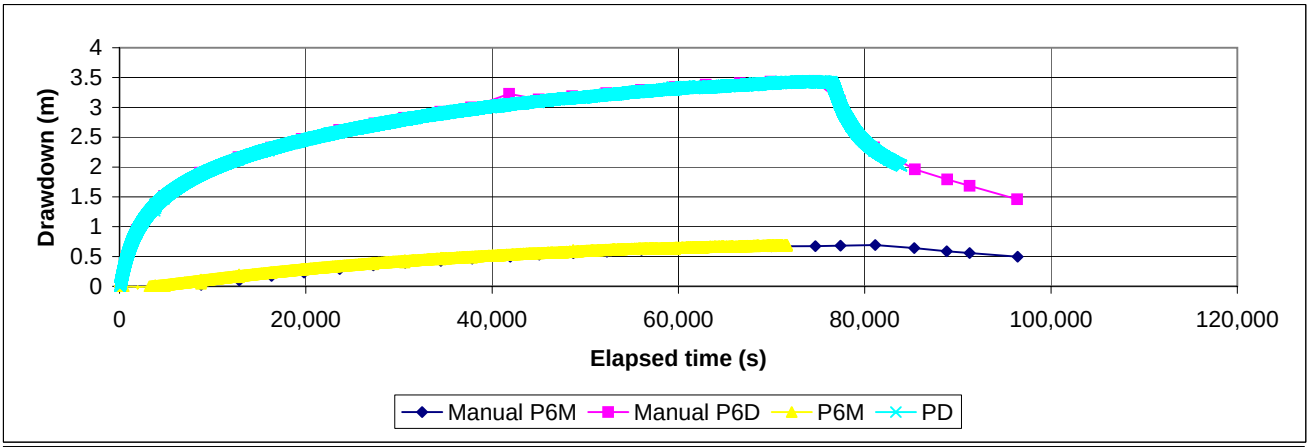


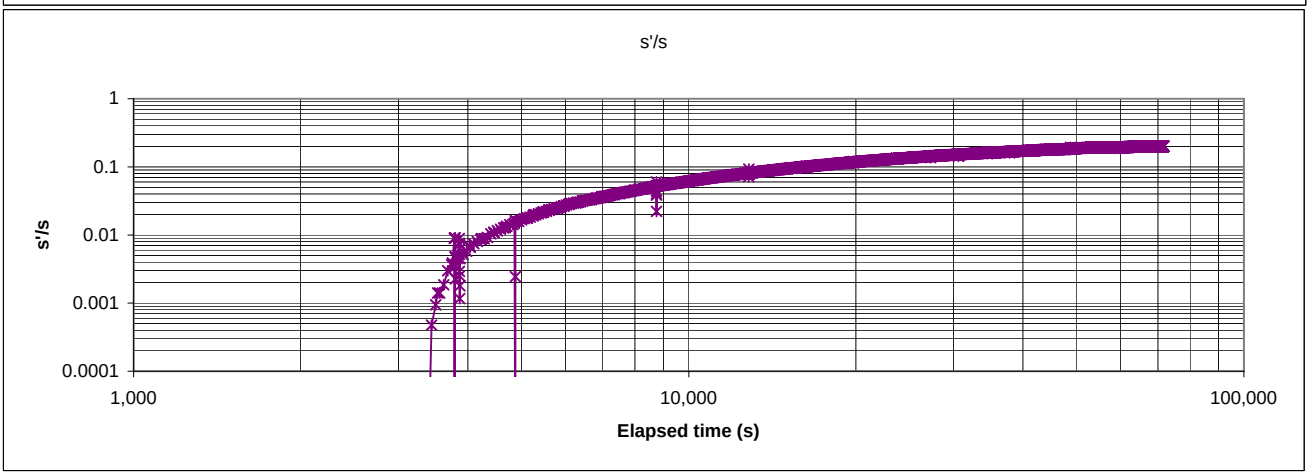
Pumping Test - Neuman Ratio Method

PEBBLE GOLD COPPER PROJECT
Northern Dynasty Minerals

Pumping Well:	PW-1	Test start:	9/21/04 12:02 PM
Measurement Wells:	P-6D, P-6M	Test stop:	9/22/04 9:13 AM
Distance (m):	73.00	Field technician:	
		Analyst:	R Smith
Transmissivity (m^2/s):	8.00E-05	Aquitard K (m/s):	1.1E-08
Storativity:	1.30E-05	Aquitard Thickness (m):	5.00
		Aquitard Specific Storage (/m):	2.0E-05

Item	
time (s)	4.40E+03
s'/s	0.01
t_D	5.08
t_D'	0.1
alpha'	5.68E-04
K'	1.1E-08





Pumping Test - Hantush and Jacob Method

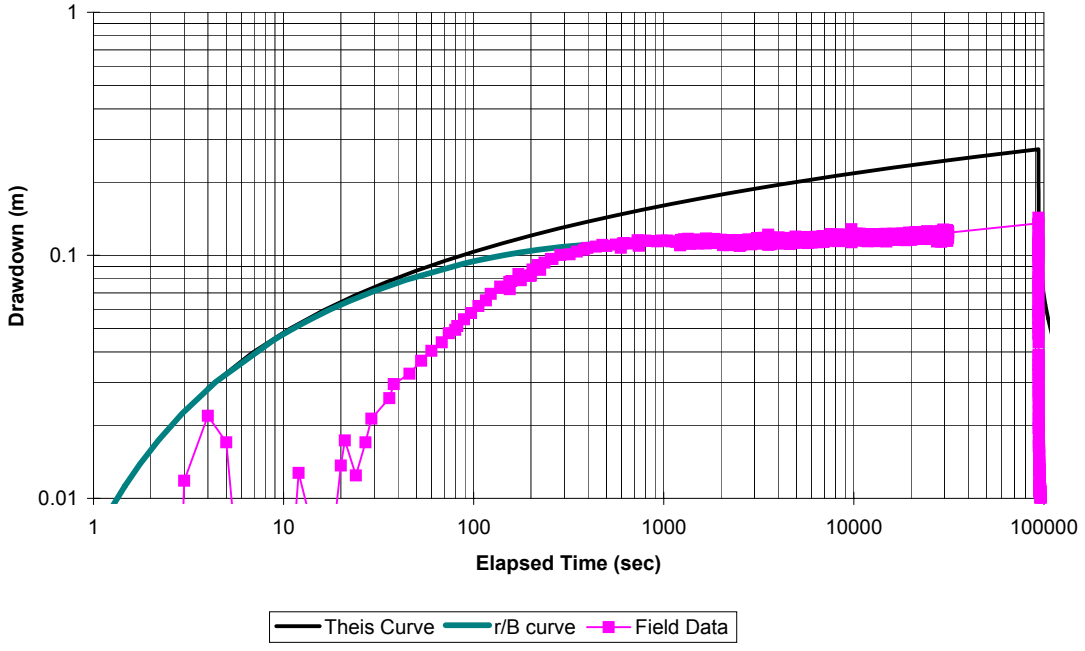
PEBBLE GOLD COPPER PROJECT
Northern Dynasty Minerals

Pumping Well:	PW3	Test start:	10/8/04 4:30 PM
Measurement Well:	MW11-M	Test stop:	10/9/04 6:31 PM
Distance (m):	8.38	Field technician:	A. Rosenberg
Transmissivity (m^2/s):	1.00E-02	Analyst:	R Smith
Storativity:	5.00E-04	Aquitard Thickness (m):	15.00
Aquitard K (m/s):	3.00E-05	r/B =	0.12

Well No.	Description	Distance	start (s)	pumping rate (m3/s)
1	PW-3 start	8.38	0	3.12E-03
2	PW-3 stop	8.38	93,660	-3.12E-03
3		1	0	0.00E+00
4		1	0	0.00E+00
5		1	0	0.00E+00
6		1	0	0.00E+00
7		1	0	0.00E+00
8		1	0	0.00E+00
9		1	0	0.00E+00
10		1	0	0.00E+00

MW11M - PW3 Log-Log Plot

Transmissivity 0.01 m2/s Storativity 0.0005 r/B = 0.12

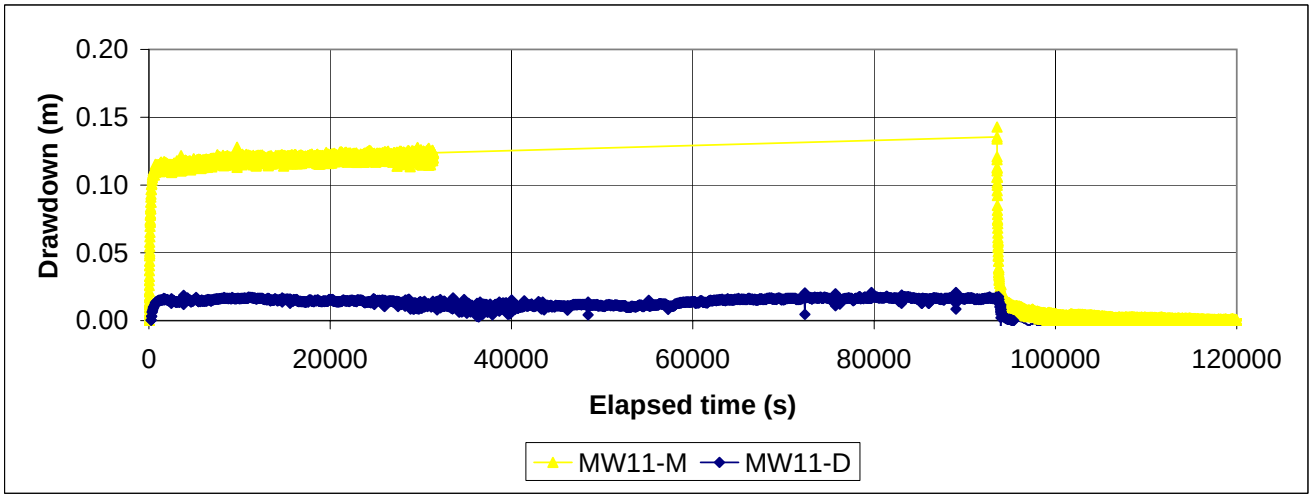


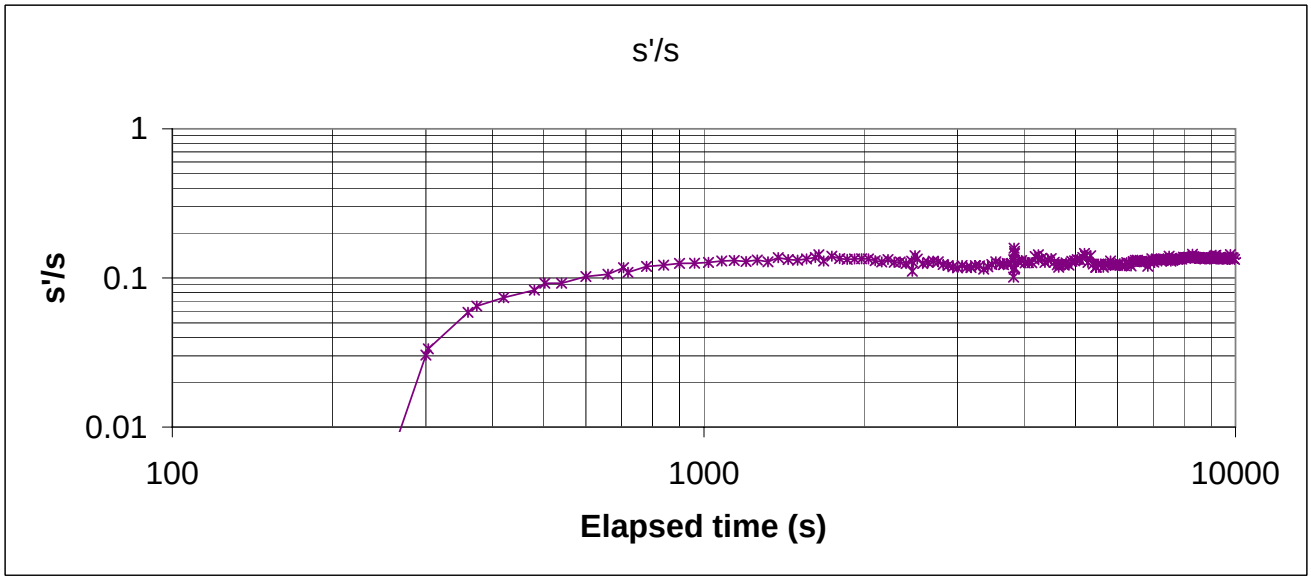
Pumping Test - Neuman Ratio Method

PEBBLE GOLD COPPER PROJECT
Northern Dynasty Minerals

Pumping Well:	PW-3		Test start:	10/19/04 11:18 AM
Measurement Wells:	MW11-D, MW11-M		Test stop:	10/19/04 2:56 PM
Distance (m):	7.9	8.4	Field technician:	
			Analyst:	R Smith
Transmissivity (m^2/s):	1.00E-02		Aquitard K (m/s):	2.1E-07
Storativity:	5.00E-04		Aquitard Thickness (m):	5.00
			Aquitard Specific Storage (/m):	2.0E-05

Item	
time (s)	3.03E+02
s'/s	0.033
t_D	86.25
t_D'	0.13
alpha'	1.07E-02
K'	2.1E-07



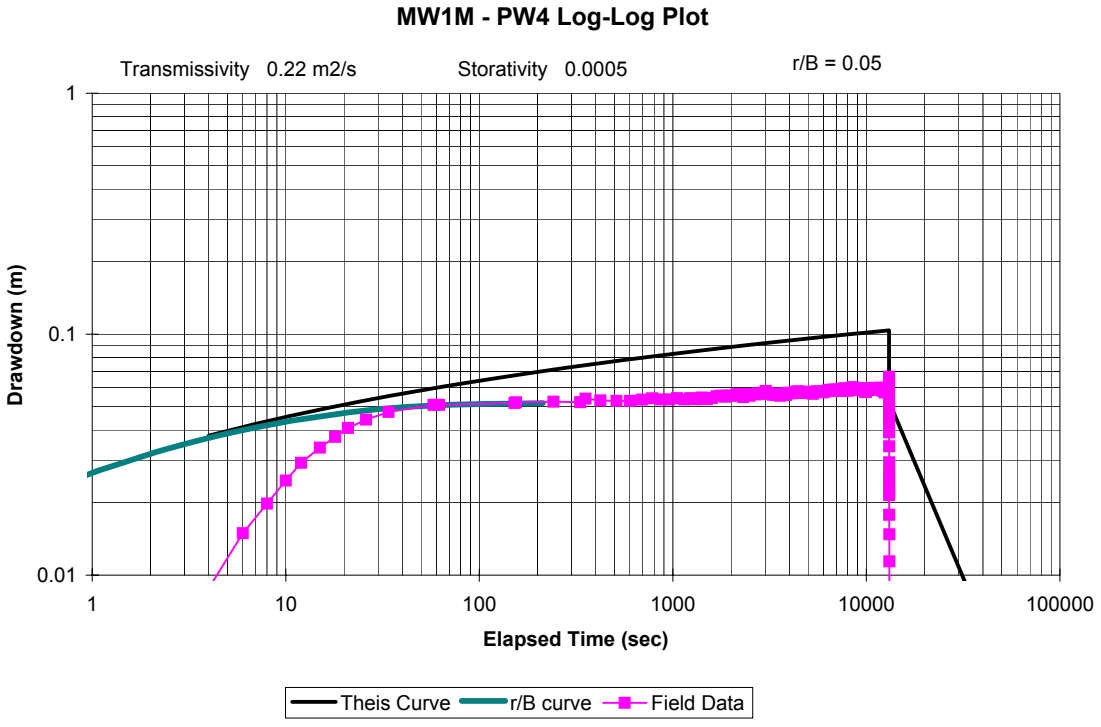


Pumping Test - Hantush and Jacob Method

PEBBLE GOLD COPPER PROJECT
Northern Dynasty Minerals

Pumping Well:	PW4	Test start:	10/19/04 11:18 AM
Measurement Well:	MW1-M	Test stop:	10/19/04 2:56 PM
Distance (m):	6.13	Field technician:	A. Rosenberg
Transmissivity (m^2/s):	2.20E-01	Analyst:	R Smith
Storativity:	5.00E-04	Aquitard Thickness (m):	15.00
Aquitard K (m/s):	2.00E-04	r/B =	0.05

Well No.	Description	Distance	start (s)	pumping rate (m3/s)
1	PW-4 start	6.13	0	2.25E-02
2	PW-4 stop	6.13	13,096	-2.25E-02
3		1	0	0.00E+00
4		1	0	0.00E+00
5		1	0	0.00E+00
6		1	0	0.00E+00
7		1	0	0.00E+00
8		1	0	0.00E+00
9		1	0	0.00E+00
10		1	0	0.00E+00



Pumping Test - Neuman Ratio Method

PEBBLE GOLD COPPER PROJECT
Northern Dynasty Minerals

Pumping Well:	PW-4		Test start:	10/19/04 11:18 AM
Measurement Wells:	MW1-D, MW1-M		Test stop:	10/19/04 2:56 PM
Distance (m):	4.8	6.1	Field technician:	
			Analyst:	R Smith
Transmissivity (m^2/s):	2.20E-01		Aquitard K (m/s):	1.9E-07
Storativity:	5.00E-04		Aquitard Thickness (m):	5.00
			Aquitard Specific Storage (/m):	2.0E-05

Item	
time (s)	1.04E+03
s'/s	0.267
t_D	12215.14
$t_{D'}$	0.4
alpha'	9.60E-03
K'	1.9E-07