Adanac Drilling Report on the Adera 9, Adera 11, Hobo 66, Hobo 75, Hobo 76, Clair 2 Fr and Jan Mineral Claims

59°43'N., 133°24'W.
N.T.S. 104 N/11

Atlin Mining Division

Owned By:
Adanac Mining and Exploration Ltd.

Operated By:
Placer Development Limited

By: E.S. Holt, P. Eng. (B.C.)

December 19

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Bound in Report

Extracts from Klohn Leonoff Consultants Ltd. report entitled, "Adanac Mine - Preliminary Site Investigation Report for Placer Development Limited", dated September 28, 1979.

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Drill Hole Assay Results for Hole PS-1 and W-1.

In Pocket

General Operating Plan (scale 1:5,000) showing the drill hole locations (coloured red) in relationship to the claim boundaries.

Layout and Borehole/Pit Location Plan prepared by Klohn Leonoff Consultants showing pit locations relative to drill holes and claim boundaries.

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INTRODUCTION

The Adanac property is located 24 kilometres N.E. of Atlin in the extreme north-western corner of British Columbia and is accessible from Atlin by 39 kilometres of road.

The deposit was explored extensively during the late 1960's and was the subject of a detailed feasibility study by Kerr Addison Mines Limited during 1970. At that time, due in part to depressed marketing conditions for molybdenite, economic projections were not sufficiently encouraging to warrant development. Late in 1978 an agreement was reached between Adanac Mining and Exploration Limited and Placer Development Limited for development of the Ruby Creek deposit. Under the agreement, Placer will be the operator and has the right to earn a 70% interest in the project.

The Ruby Creek molybdenum occurrence is a bulk type, low grade deposit amenable to extraction by open pit mining methods. The mineable open pit reserves at a .06% MoS_2 cut-off grade are estimated to be 68,084,000 metric tons with an average grade of 0.122 percent MoS_2.

Recent strong demand and significantly improved molybdenum prices have enhanced economic viability. An updated feasibility is currently being prepared. The drilling and test pitting described in this report is part of Placer's feasibility program, and was designed primarily to provide soils engineering data. The work included 38 test pits and 10 drill holes which explored the proposed plant site, tailing impoundment and water storage area.

The preliminary investigation indicates that the selected areas are suitable for the purposes intended.

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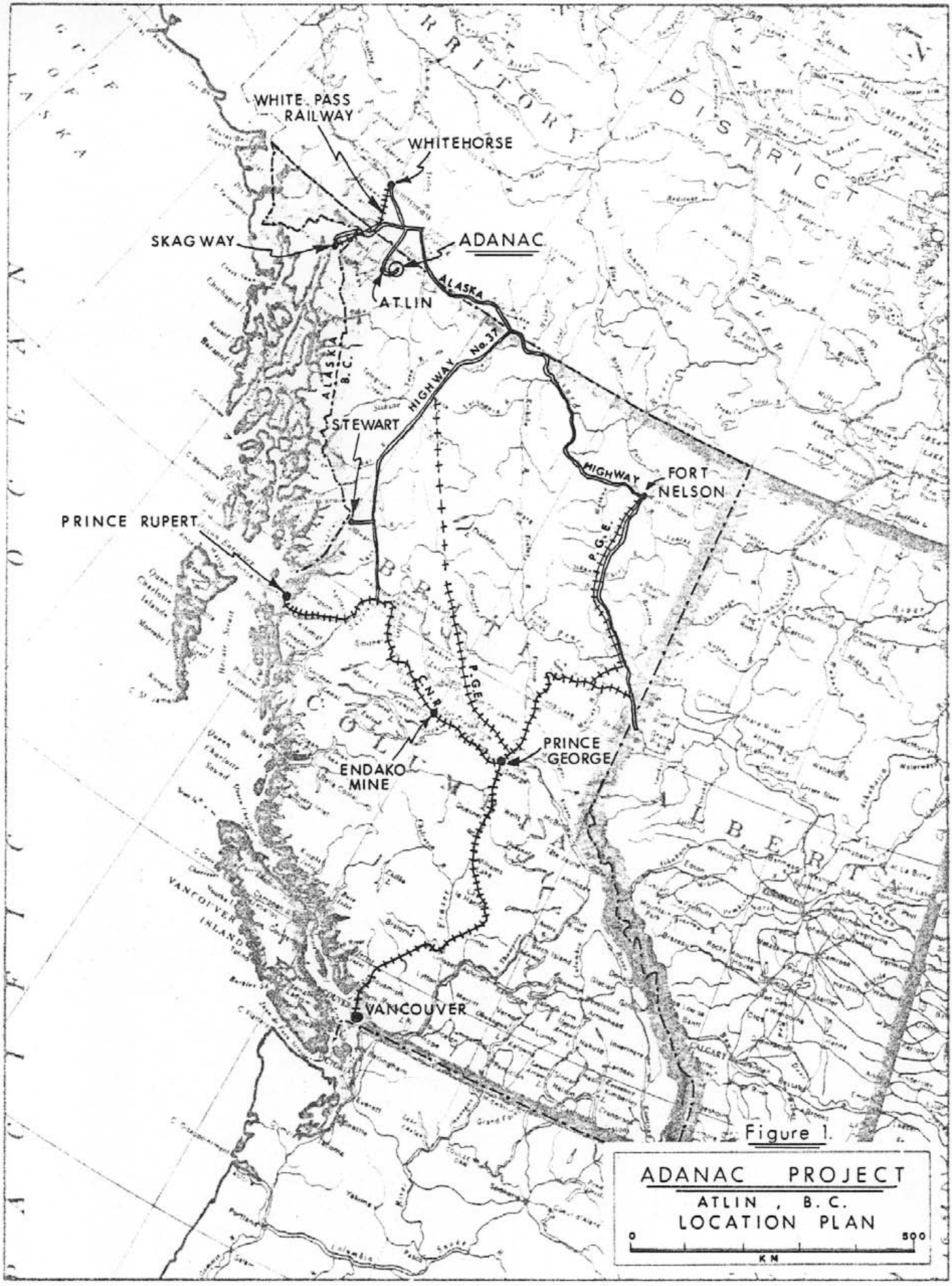
WHITE PASS RAILWAY
WHITEHORSE
SKAGWAY
ADANAC
ATLIN
ALASKA
HIGHWAY No. 37
ALASKA B.C.
STEWART
HIGHWAY
FORT NELSON
PRINCE RUPERT
P.G.E.
C.N.R.
PRINCE GEORGE
ENDAKO MINE
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ISLAND
ADANAC PROJECT
ATLIN, B.C.
LOCATION PLAN
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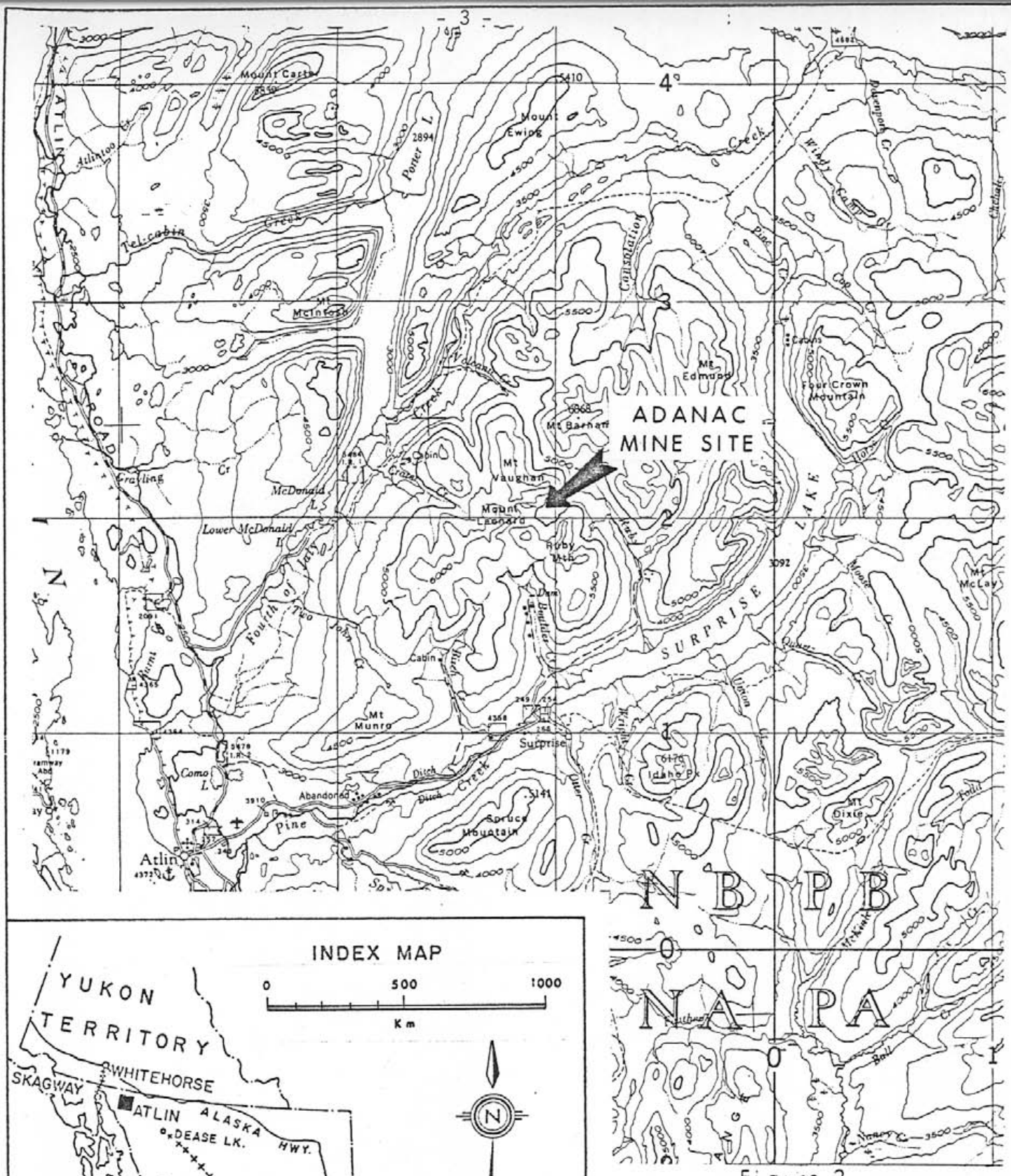
Figure 1.



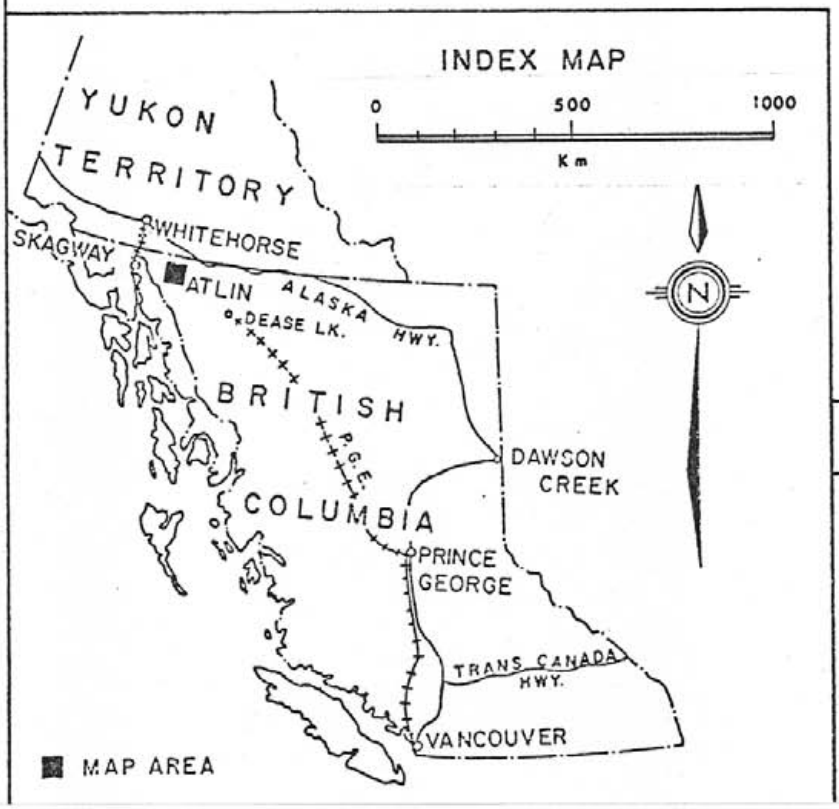


Figure 2.

PLACER DEVELOPMENT LIMITED

ATLIN MINING DIVISION
RUBY CREEK MOLYBDENUM DEPOSIT

LOCATION MAP

0 5 10 15
Km

DRILLING REPORT

During the period July 26 to September 21 a ten hole diamond drilling program was completed in the plant site, tailing impoundment basin and water storage area of the Adanac property. This ten hole site investigation program was carried out in conjunction with a much larger definition drilling program in the mine area.

The drill hole collar survey data for the site investigation program is as follows:

Hole	Northing	Easting	Elevation	Bearing	Dip	Length (m)
W-1	6,619,915.2	592,960.2	1,270.0	-	-90°	65.8
T-1	6,620,466.9	592,284.0	1,329.9	-	-90°	31.4
T-2	6,620,713.9	592,535.5	1,314.5	-	-90°	75.9
T-3	6,620,769.8	592,403.9	1,316.1	-	-90°	31.7
T-4	6,620,936.6	592,581.6	1,316.8	-	-90°	34.1
T-5	6,620,902.3	592,705.8	1,316.2	-	-90°	61.3
T-6	6,621,630.1	592,099.6	1,342.3	-	-90°	85.3
T-7	6,621,322.9	591,804.5	1,327.1	-	-90°	85.9
PS-1	6,620,821.6	590,213.1	1,426.1	320°	-50°	113.1
PS-2	6,620,951.9	590,565.6	1,388.8	-	-90°	92.1

As illustrated on drawing number 1, enclosed in the pocket, holes PS-1 and PS-2 were located in the planned plant site, holes T-1 to T-7 were within the tailing impoundment basin and hole W-1 was at a potential water storage site. The principal purpose of the drilling program was to determine the suitability of the areas for the purposes intended. In this regard most of the holes received critical scrutiny in the overburden portion of the drilling. The subsoil investigations were carried out under the direction of Klohn Leonoff Consultants Ltd. Pertinent portions of their report entitled, "Adanac Mine, Preliminary Site Investigation Report for Placer Development Limited" dated September 28, 1979, have been included as a supplement to this report.

The Klohn Leonoff report discusses in detail the foundation conditions at the plant site, tailing dam and water supply dam. Their work included test pits and ground mapping as well as subsurface drill holes.

All of the holes terminated in leucocratic granite of the Surprise Lake batholith, which hosts the molybdenite mineralization at Ruby Creek. Four of the most southerly holes, W-1, T-1, T-2 and T-3 penetrated a recent basalt lava flow which lies on old overburden above the granite and in turn is covered by more recent ash, cinders and overburden.

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Two of the holes PS-1 and T-2 encountered modest molybdenite values and were assayed for molybdenum content. Hole PS-1 averaged 0.028% Mo over the 341 foot interval within the Surprise Lake batholith while hole T-2 averaged 0.054% Mo over 59 feet. Detail of the individual assay results are bound into this report.

The other eight drill holes included in this report have not, as yet, been assayed for molybdenum content. Visually they were very low grade or barren. They will be assayed in due course to ensure that economic values were not encountered in the vicinity of the planned facilities.

Based on the results of the preliminary site investigation, all of the areas appear to be suitable for the purposes intended. Additional drilling is planned during the 1980 field season to confirm the initial results.

The core from the unassayed holes is in storage at the camp site on the property. The assayed holes have type specimens of the core retained for geologic record.

It will be noted that both the drilling costs and the supervision consulting fee is significantly higher than is normal in a standard drilling program. This resulted primarily from the efforts made to recover all of the overburden, and the delays necessitated in order to carry out geotechnical tests. In addition the cost of digging, describing and sampling the 38 test pits is included in the Klohn Leonoff invoice.

Respectfully submitted,

E.S. Holt, P. Eng.

ESH/mt
December 11, 1979

APPENDIX A

ADANAC DRILLING — PLANT SITE & TAILINGS AREA

DDH W-1 — 26/7/79 - 30/7/79

Caron Diamond Drilling	Invoice #596 & 615 (248 ft.)	$13,530.50
Camp Operations	6 men @ $30.00/man day x 5 days	900.00
Drilling Costs - Consumables		3,209.99
PDL & Consultant Fees		4,692.16
		$22,332.65

DDH T-1 — 8/8/79 - 11/8/79

Caron Diamond Drilling	Invoice #615 (119 ft.)	$4,649.50
Camp Operation	6 men @ $30.00/man day x 4 days	720.00
Drilling Costs - Consumables		2,496.67
PDL & Consultant Fees		2,251.48
		$10,117.65

DDH T-2 — 31/7/79 - 4/8/79

Caron Diamond Drilling	Invoice #596 (248 ft.)	$1,329.00
Camp Operations	6 men @ $30.00/man day x 5 days	900.00
Drilling Costs - Consumables		2,811.49
PDL & Consultants Fees		4,692.16
Assay Cost	6 samples @ $22.00	132.00
		$9,864.65

DDH T-3 — 12/8/79 - 15/8/79

Caron Diamond Drilling	Invoice #615 (104 ft.)	$4,822.00
Camp Operations	6 men @ $30.00/man day x 3 days	540.00
Drilling Costs - Consumables		5,227.86
PDL & Consultants Fees		1,967.68
		$12,557.54

DDH T-4 — 15/8/79

Caron Diamond Drilling	Invoice #615 & 633 (112 ft.)	$5,584.50
Camp Operations	6 men @ $30.00/man day x 2 days	360.00
Drilling Costs - Consumables		2,847.47
PDL & Consultant Fees		2,119.04
		$10,911.01

ADANAC DRILLING — Plant Site & Tailings Area Cont'd

DDH T-5	5/8/79 - 7/8/79	
Caron Diamond Drilling	Invoice #615 & 633 (201 ft.)	$7,688.50
Camp Operations	6 men @ $30.00/man day x 3 days	540.00
Drilling Costs - Consumables		2,701.61
PDL & Consultants Fees		3,802.92
		$14,733.03
DDH T-6	13/9/79	
Caron Diamond Drilling	Invoice #646 & 644 (280 ft.)	$6,642.75
Camp Operations	6 men @ $30.00/man day x 6 days	1,080.00
Drilling Costs - Consumables		3,558.65
PDL & Consultants Fees		5,297.60
		$16,579.00
DDH T-7	19/9/79 - 21/9/79	
Caron Diamond Drilling	Invoice #646 (282 ft.)	$4,070.25
Camp Operations	6 men @ $30.00/man day x 3 days	540.00
Drilling Costs - Consumables		1,433.40
Demobilization		994.00
PDL & Consultants Fees		5,335.44
		$12,373.09
PS - 1	17/8/79 - 20/8/79	
Caron Diamond Drilling	Invoice #634 (371 ft.)	$8,059.00
Camp Operations	6 men @ $30.00/man day x 4 days	720.00
Drilling Charges & Consumables		1,111.00
Assay Costs	34 samples @ $22.00/sample	748.00
PDL & Consultants Fees		7,019.32
		$17,657.32
PS - 2	10/9/79 - 12/9/79	
Caron Diamond Drilling	Invoice #643 (275 ft.)	$6,572.00
Camp Operations	5 men @ $30.00/man day x 3 days	450.00
Drilling Charges & Consumables		1,334.70
PDL & Consultants Fees		5,203.00
		$13,559.70

TOTAL $140,685.64

APPENDIX B

STATEMENT OF QUALIFICATIONS

I, Edward S. Holt of North Vancouver, British Columbia, do hereby certify:

1. That I am a geologist residing at 4091 St. Albans Avenue, North Vancouver, British Columbia.

2. That I am a Professional Engineer registered in the Province of British Columbia.

3. That I am employed by Placer Development Limited, 1030 West Georgia Street, Vancouver, British Columbia.

4. That I have practiced my profession for twenty years.

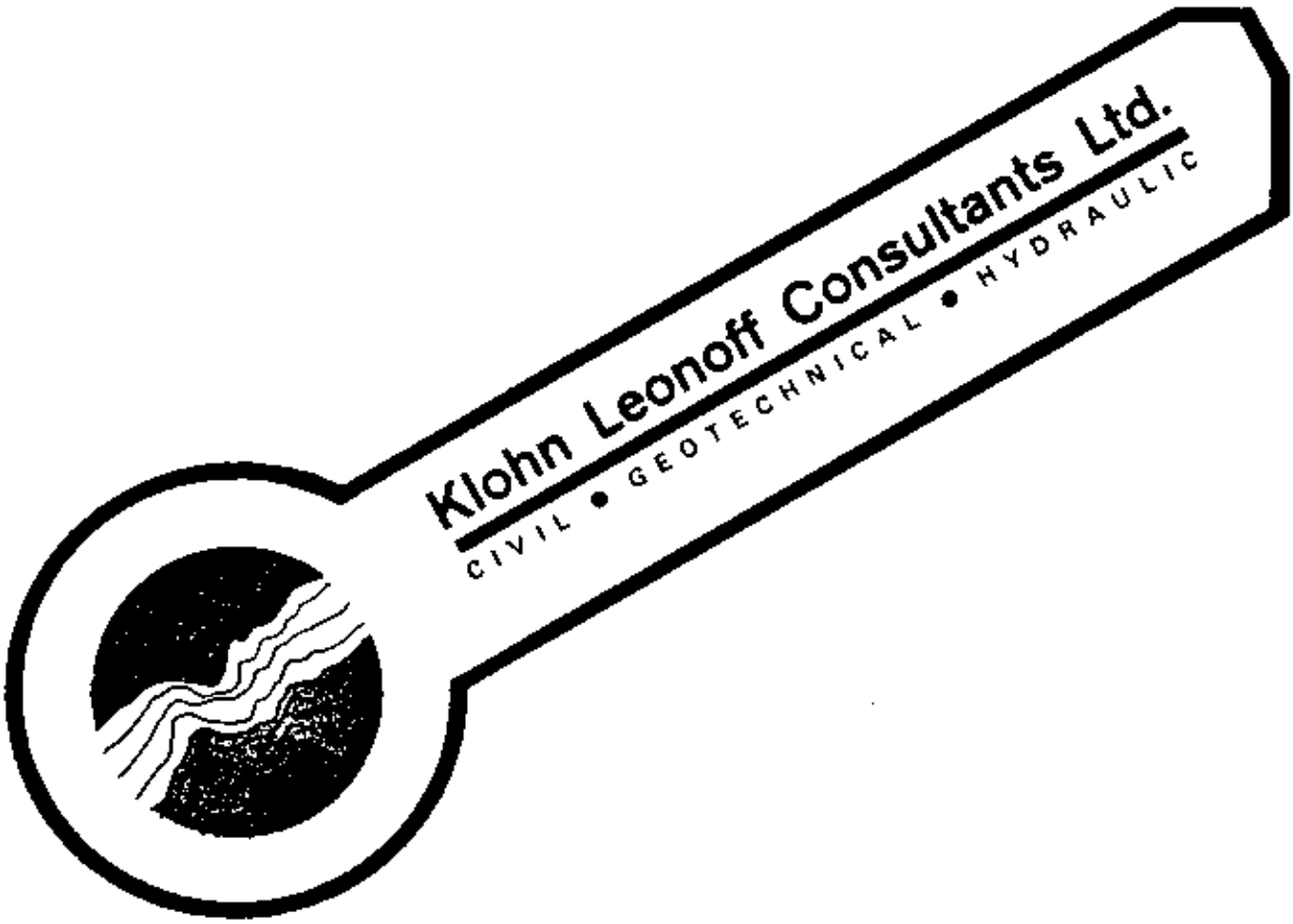
5. That I have personal knowledge of the Adanac Property being developed by Placer Development Limited in the Atlin Mining Division, British Columbia, having personally spent extensive time on the property during 1969, 1970 and 1979. I have examined the core and familiarized myself with the surface trenches, underground workings and local rock exposures.

Edward S. Holt, P. Eng.

December 11, 1979
Vancouver, B.C.

ESH/mt

REPORT



ADANAC MINE

Preliminary Site Investigation Report

For

PLACER DEVELOPMENT LIMITED

September 28, 1979

VA 2538

VANCOUVER
(604) 273-0311

CALGARY
(403) 259-4114

WINNIPEG
(204) 284-4045

1. INTRODUCTION

This report describes the preliminary site investigations carried out at the Adanac mine site during the summer of 1979. The purpose of these investigations was to obtain information regarding subsoil foundation conditions at the locations of the mill site, the tailings dam and the water supply dam. The investigations were also extended to borrow areas in the immediate vicinity of the proposed dam structures.

The field work consisted essentially of ground mapping, test pits and subsurface drill holes. Simple laboratory physical characteristic tests were also carried out on samples obtained from borrow pits. An estimate of the groundwater table profile in the mine pit area was obtained from water level measurements in the drill holes.

The details of the various investigations and their results are presented below, followed by a discussion of subsoil conditions and their influence on the design of the proposed engineering works.

2. GENERAL GEOLOGY

The Ruby Creek Valley has been modified by glaciation which began near the end of the Tertiary period. The upper part of the valley is flat-bottomed and u-shaped and the lower portion is covered with lava. Ice accumulated in the numerous cirques at the heads of tributary streams. These flowed together down Ruby Creek forming a major valley glacier, leaving glacial and glaciofluvial deposits.

Volcanism occurred during or after glaciation at two major centres. These centres are the large stratovolcano west of the Ruby Creek Valley and the smaller and younger cinder cone at the headwaters of Cracker Creek.

The stratovolcano consists of alternating sheets of lava and pyroclastic material of basaltic composition. The unconsolidated basaltic material found over a large portion of the Ruby Creek Valley is landslide rubble, related to the failure of the stratified materials.

The lava flows occurring in the middle and lower portions of Ruby Creek appear to be related to the cinder cone. These flows are usually underlain by permeable gravel and sand which is underlain by basement granitic rocks.

2.1 Plantsite

The plantsite is located mainly on alluvial fan materials with some alluvial floodplain material being present in the existing streams. Alluvial fan materials consist of sand and gravel with little to trace silt. This material is dense, compacted and stratified in some places. The topsoil covering intact materials is variable in thickness, although it is generally of 2 to 3 feet depth.

Alluvial fan materials are underlain by bedrock, a geophysical survey conducted on the site indicates the depth to bedrock ranges from 10 to 50 feet. The bedrock at the proposed plantsite consists of two rock types which are different phases of the Mount Leonard boss. These granitic rocks are separated from each other by the Adera Fault. A porphyritic granite occurs north of the fault, while a coarse grained granite occurs south of the fault. No major structures should be located on the fault, since there may be some movement on it related to stress release during mining of the open pit area.

The plantsite area is fringed by colluvial materials on the northern margin and by outcrop, colluvial materials and till on the south side.

2.2 Stockpile and Waste Dump Area

The stockpile and waste dump area is located on four different deposit types. The materials include: glaciofluvial floodplain material, ground moraine and organic fen material, talus, and bedrock masked by thin colluvial and undifferentiated glacial debris.

2.3 Tailings Dam

A variety of glacial, glaciofluvial, alluvial fan and lacustrine deposits are present at the tailings dam site. The abutments along the proposed dam axis consist mainly of ground moraine, essentially a silty-sandy gravel. Ridged "drumlin-like" moraine occurs at the dam centre and over a large portion of the right abutment. This material consists of silty to sandy gravel, and the vegetation occurring on these ridges indicates it may be more sandy than ground moraine. Some colluvial and alluvial materials occur on the left abutment, consisting of angular boulders, sand and gravel.

A lacustrine plain is present upstream of the proposed tailings dam axis, probably formed as a result of silt sedimentation behind an earlier small dam at that location. Examination of airphotos indicated ground ice may be present in this material; however, no ice was identified in the test pits, or by a thermistor string. Lacustrine plain materials consist mainly of silt and gravel and are overlain by a thin layer of peat and organic materials. A glaciofluvial deltaic deposit also exists upstream of the proposed tailings dam site. Several ponds with water levels at different elevations are found near the dam axis. These ponds indicate that the underlying material is probably impervious ground moraine.

Downstream of the proposed tailings dam axis is encountered mainly ground moraine and ridged ground moraine. Thin alluvial fan materials overlie ground moraine on the right abutment; these materials may consist of gravel size cinders or angular granitic boulders and gravel. Thick pervious alluvial sands and gravels occur at the Ruby Creek streambed near the dam centre.

2.4 Water Supply Dam, W-1 Site

The proposed W-1 site is located approximately 800 m downstream of the tailings dam centreline. The right abutment between the crest at elevation 1290 m to the 1265 m contour line shows the presence of ground moraine. The same deposit is also encountered on the left abutment between elevation 1275 m and crest elevation. However, a small portion of the lower part of the left abutment is overlain by thin alluvial and colluvial deposits. Alluvial floodplain material consisting of pervious sand and gravel occurs in Ruby Creek.

2.5 Water Supply Dam, W-2 Site

The surficial materials occurring at the W-1 site are similar to those occurring at the W-2 site. Glacial till occurs on the right abutment, while pervious alluvial gravel and sand is present at the dam centre. The lower portion of the left abutment consists of alluvial gravel and sand, while above the 1290 m contour line alluvial and colluvial deposits are found.

2.6 Borrow Areas

The impervious borrow materials may be obtained from deposits of ground moraine or ridged moraine. The deposits encountered above the right abutment of the tailings dam and above and along the left abutment of the water supply dam appear to be the most promising.

Plentiful supplies of cinder materials which may be suitable for dam filters exist in close proximity to the right abutment of the proposed dams.

3. FIELD INVESTIGATIONS

3.1 Drilling Program

The drilling program was carried out using a Longyear 34 diamond drill rig arranged by Placer Development Limited. Six holes were drilled during the field program; five in the tailings dam area and one adjacent to the W-1 water supply dam axis. The drillhole locations are shown on Drawing E-2538-1.

The drillholes were logged in the field and soil classification was supplemented by permeability data from packer tests and installed piezometers. The drillhole logs are presented on Plates 3 to 8. The coordinates of the various drillholes are given in Table 1.

The drilling procedures were modified in the field as necessary during the course of the program. Initially, the drilling sequence consisted of setting a HW collar casing to a depth of one to three meters, followed by wash boring of the NW casing to a depth just beyond the base of the collar casing. Further drilling consisted of coring ahead 3 to 6 metres with a diamond bit attached to NQ rods followed by reaming down with the NW casing. In order to obtain reliable field permeability data in the drillholes, it was desirable to avoid the use of drilling mud where possible. Thus hole W1-1, and a portion of T-2 were drilled with water as the drilling fluid. However, as a result of abundance of gravels in the soil, the casing shoe tended to wear out several times before the casing could be set in competent bedrock. On removal of the casing to replace the shoe, partial caving of the open hole resulted. Reaming down again resulted in added drilling time and additional wear on the casing shoes.

Hence, this method was later modified to drilling with a tricone bit attached to the end of the NW casing and the use of drilling mud to help stabilize the hole within the overburden. The tricone bit was advanced to bedrock, when the casing was pulled out to replace the tricone with a casing shoe. Although caving of the open hole was not eliminated, the drilling mud decreased the extent of caving. The hole was later flushed out with water prior to installation of piezometers.

Where soft silts or clays were encountered, as in the upper profile of drillhole T-3, standard penetration tests were performed and split spoon samples were recovered.

To ascertain if permafrost conditions exist near drillhole T-3, a separate shallow hole (T-3A) was drilled to a depth of 8 metres and a thermistor string placed in the hole. The hole was then back-filled with granular cinders and left overnight prior to obtaining a preliminary set of temperature readings. A second set of readings was later obtained (August 27, 1979) when temperature conditions had stabilized.

The depths and temperature readings of the nine thermocouples are presented in Plate 9 and Table 2.

3.2 Test Pit/Trenching Program

A total of 38 test pits and 4 trenches were excavated during the field investigation program. The eight test pits within the plant site area were excavated with a backhoe mounted on rubber tires (Model: 922B). The remaining 30 test pits were excavated with a track-mounted backhoe (Case 310); 17 of these test pits were located in the tailings dam site, 3 in the W-1 water supply dam site, 5 along the alternate W-2 water supply dam axis and 5 in borrow area II.

The four trenches were excavated with a D7 bulldozer within borrow area I where access was not readily available for the Case 310 machine.

In general, excavation of a 3.4 metre deep test pit required 1 1/2 hours as a result of the dense nature of the soils combined with the presence of large boulders. Trenching in borrow area I varied from two to six hours of excavation time per trench, to an average depth of 3 metres.

Test pit and trench locations are presented in Drawing E-2538-1. Pits and trenches were logged, and disturbed samples were recovered for laboratory testing. The test pit and trench logs are presented on Plates 10 to 32. The coordinates of all test pits and trenches are given in Table 3. Grain size laboratory data are summarized on Plates 36 to 46.

3.3 Field Permeability Program

In-situ permeability tests were performed in drillholes employing the following three methods:

3.3.1 Falling Head Tests in Drill Casing (Plate 33)

Where water was used as the drilling fluid, falling head tests were performed in the NW size drill casing (76.2 mm I.D.). The tests were carried out with the base of the casing seated flush against the soil. To obtain tight seals between the casing and the soil, minimal drilling fluid was used during casing advance. Also, during the falling head test, static hydraulic ram pressure was applied to the casing with the drill head. However, in spite of these precautions, poor seals are suspected in the tests performed in drillhole T-2.

The falling head test consisted of filling the casing with water and monitoring the drop in water level in the casing as a function of time, until the water level had stabilized. The permeability is then calculated using the equation,

$$k = (^{1}/_{C})\ (Q/rH) \qquad \text{(Zangar, 1953)}$$

where k = coefficient of permeability
Q = rate of flow
r = inside radius of the casing
H = head of water above ground water table
C = conductivity coefficient (dimensionless)

The above equation can be used with any consistent set of units. For the case with an open ended casing seated flush with the soil, C = 5.7 was used for calculations as suggested by Lacroix (1960). (Cedergren (1967) suggest the value of C = 5.5).

3.3.2 Packer Permeability Tests (Plate 34)

Three permeability tests were carried out using a double packer assembly with a three metre test section. Two of the tests were located in the basalt and the third test extended across a two feet gravel zone between the basalt and the alaskite. In all three tests, clean water was used for drilling prior to testing.

The tests were performed at three or four different pressure levels. Water pressure was applied to the test section between the seated packers with a three-piston water pump which produced pressure fluctuation of less than ±10 psi. Under a constant pressure, the rate of flow was monitored through a volume flowmeter for a minimum period of five minutes. Typically, the flow rates remained constant within the test period. The water pressure was then

raised to successive increments and flows were monitored at each pressure up to a maximum of 110 psi. The pressure was then incrementally decreased and flow volumes recorded. The pressure levels applied were set at approximately 0.25H, 0.5H, 1.0H and 1.25H (expressed in units of psi) where H denotes the depth to the test section in feet.

The test data was evaluated using:

$$k = (^{1}/_{C})\ (Q/rH) \qquad \text{(Zangar, 1953)}$$

where Q = rate of flow
r = radius of hole in the rock
H = pressure applied and static pressure of water above the groundwater level minus the head loss as a result of friction due to flow inside the casing.
C = conductivity coefficient (dimensionless).

The above equation can be applied with any consistent set of units.

3.3.3 Falling Heat Tests in Piezometers (Plate 35)

Sealed standpipe piezometers were installed in drillholes T-3, T-4 and T-5. The location of each piezometer is shown in the drillhole logs (Plates 6 to 8). The standpipe piezometers were constructed from 3/4 inch I.D. PVC tubing with the active piezometer tip consisting of a 1.0 to 1.5 metre section of staggered slots cut into the tubing. Prior to installation, the hole was flushed out with clean water to remove the drilling mud within the drillhole. Bentonite clay pellets were used to seal above and below the active section of each piezometer. Following the placement of the lower bentonite seal and 15 cm of coarse cinders, the active section was further purged with clean water through the

standpipe itself. The active section was then backfilled with coarse cinders. The upper bentonite seal was placed and allowed to swell for a minimum of one day prior to performing a falling head test.

The falling head test consists of recording the water level in the piezometer, filling the PVC tubing with water and monitoring the fall of the water level in the piezometer tubing as a function of time until the water level has stabilized or for a maximum period of 30 minutes.

The permeability was calculated following the method suggested by Cedergren (1967),

$$k = (r^2/2L)\ (\ln(L/R))\ ((\ln\ (h_1/h_2))/(t_2-t_1))$$

where h_1 = head of water above groundwater level at time t_1
h_2 = head of water above groundwater level at t_2
L = length of the active section of piezometer
R = radius of active section of piezometer (hole size)
r = radius of standpipe

The permeability results are shown on individual test hole logs and summarized in Table 4.

3.4 Groundwater Levels in the Ore Body Area

The 1969-1979 drillholes within the ore body area were located in the field and water levels were measured on July 19-20, 1979 following an unusually wet period. In general, casings were left in the ground and locations were marked with the old drillhole listing designation. The depth to the groundwater level within the drillhole casings were sounded with an electronic probe. The data was reduced to elevations and results are summarized in Table 5 and plotted on Drawing E-2538-1 as approximate water level contours.

4. LABORATORY TESTING

Wet sieve analyses were performed on 24 disturbed samples obtained from test pits and trenches. Of these, hydrometer analysis was carried out on 20 samples. The grain size data is presented on Plates 36 to 45.

Two samples each of red colluvial cinders and black alluvial cinders were analyzed for grain size distribution. To assess the structural breakdown of the cinder particles and their suitability as filter materials, standard Proctor compaction at wet of optimum was carried out followed by a falling head permeability test within the Proctor mold itself. The samples were then re-analyzed for grain size distribution for comparison with grain size data prior to compaction. The comparative grain size curves for the red and black cinders are presented on Plates 43 and 44 respectively.

The permeability after compaction of a sample under standard Proctor energy, from each of the borrow areas (I & II) has also been determined.

A grain size analysis was performed on the tailings obtained from the pilot tailings pond located in the plant site area. The data is plotted on Plate 46.

Atterberg limits have been obtained for split spoon sample 2 from drillhole T-3. The material was a grey-blue clay with organics. (Liquid limit: 36; Plastic limit: 28).

5. SEISMICITY

A seismic risk analysis was obtained from Pacific Geoscience Centre in Sidney, B.C. The seismic risk analysis is based on earthquake data between 1899 to 1976 inclusive for a site near Atlin (59° 38'N latitude, 133° 30'W longitude). During this 78 year period, 91 earthquakes of sufficient magnitude to be felt at the site were recorded. Predictions based on statistical analysis of these records are summarized below. While caution should be exercised in applying these probabilities and intensities since the predictions are based on a relatively short record period, the records do not indicate the area to be subjected to high seismic risk.

PREDICTED SEISMIC RISKS NEAR ATLIN, B.C.

Return Period (Years)	Intensity* (Modified Mercali Scale)	Acceleration in % Gravity
3	III	0
10	V	1
30	VII	3
50	VII	5
100	VII	9
200	VIII	17

* Accelerations and intensities are based on attenuation through firm soil.

6. DISCUSSION OF RESULTS

6.1 Plant Site

In general, the test pits show the presence of an upper medium dense sands and gravels, typically to 1 m depth, followed by very compact angular to sub angular sandy gravel. Often small boulders are also encountered, as talus material from the adjacent slopes. Occasionally, as in test pits 7 and 8, a thin layer of fine sandy silt with trace of gravel is encountered below the sandy gravel. The sandy gravel is expected to provide adequate foundation support for most structures. A drillhole carried out by Placer Development Limited in the area shows bedrock at a depth of approximately 8 m. Water table was invariably found to occur within 3 m depth from the ground surface. As mentioned earlier, the structures should not straddle the Adera fault since it may suffer some movements as a result of stress relief from excavation in the pit. Adequate drainage must be provided for in the design of excavation for foundations. The preliminary investigations carried out so far indicate that unforeseen foundation problems are unlikely to be encountered in the plant site area.

6.2 Tailings Dam

Drawing D-2538-2 shows typical subsoil profiles along and across the tailing dam alignment. The right abutment along the axis consists of an upper layer of relatively impervious till variable thickness, followed by gravel and scoria-vesicular basalt underlies the upper pervious materials, and is underlain by a pervious layer of sand and gravels. The bedrock is hard, sound alaskite. The drillholes on the left abutment do not show the presence of basalt or sands and gravels. Here the till is found to lie directly over alaskite.

Drillhole DDH T-3 was located in the low lying, swampy area upstream of the tailings dam axis, on the right abutment. Here, the till is overlain by an impervious deposit of lacustrine silt. Some silt layers are also encountered in the till. Measurements from thermistors installed to a depth of 8 m near drillhole T-3 did not show the presence of permafrost, (Plate 9).

The values of permeability in the till were found to lie in the range of 10^{-4} - 10^{-6} cm/sec, depending on the coarseness of the matrix material. The corresponding values for basalt lie in 10^{-4} - 10^{-5} cm/sec range. Of some concern is the layer of open gravel below till in the right abutment. In drillhole T-1, for example, water was pumped in at s rate of 10 gpm for 22 minutes producing a rise of water level in the casing of less than 2.4 m. Photographs 6 and 7 show an exposure of this deposit downstream of T-1, along Pond No. 1. Similar exposures are also visible on the bottom of Ponds No. 2 and 3. The observation that the water levels in the four ponds are at different elevations (Table 6) suggests that the gravel layer is not continuous. This must, however, be verified during the next stage of investigations. The continuity of till in the reservoir area should also be investigated. The till layer, if continuous, would act as an adequate impervious blanket and minimize seepage through the foundation. Some excavation would be required in the Ruby Creek channel to remove the pervious sands and gravels encountered there.

6.3 Water Supply Dam

Drawing D-2538-3 shows the subsoil profiles along the alignments W-1 and W-2 of the water supply dam. Only one drillhole (W1-1) was carried out at the W-1 alignment. The investigations show the presence of till on the abutments, while creek consists of approximately 15 m of pervious sands, gravels and scoria followed by approximately 20 m of vesicular basalt. The basalt is underlain by scoria and sand and gravel followed by alaskite.

Only test pits were excavated at the W-2 axis. The left abutment showed the presence of colluvium, while till was found on the right abutment.

In order to reduce seepage through the foundation of the water supply dam, it would be necessary to excavate the pervious sands and gravels in the Ruby Creek channel, and to ensure that a continuous cover of till exists upstream of the dam alignment. Alternatively the more expensive solution of constructing a positive cutoff to the top of basalt layer may have to be considered, if an adequate impervious till blanket cannot be guaranteed.

6.4 Borrow Areas

Only limited borrow area investigations were carried out during the current phase. A search for till was made in the borrow areas denominated I and II, and shown on Drawing E-2538-1. Till in borrow area I was visually more coarse than in area II, although the grain size curves obtained in the laboratory do not reflect this. A determination of the coefficient of permeability of a compacted sample from borrow area II gave the value of 6×10^{-6} cm/sec.

A partial estimate of the volume of till is given below. It should be noted that the borrow area II can easily be extended south within the area between the present road to Atlin and contour elevation 1300 m, for a distance of approximately 1 km. This extended area consists of cinder colluvium overlying till. The depth of colluvium is shallow (approximately 1 m) and requires verification.

BORROW AREAS I & II

	Areas		Approx. Depth Silt-Sand-Gravel Till (m)	Volumes	
	Above Res Level (m^2)	Below Res Level (m^2)		Above Res Level (m^3)	Below Res Level (m^3)
Borrow Area I	256,000	204,000	3	768,000	612,000
Borrow Area II	72,000		2	144,000	

Plentiful supplies of red and black cinders are available in close proximity to the dam alignments. The suitability of cinders as filter materials was investigated by comparing the grain sizes of the -3/4" fraction before and after the Proctor Standard Compaction test. Permeability of the compacted sample was measured in the compaction mould. The results are shown on Plates 43 and 44. Essentially some of the fine gravel fraction breaks down to sand under the Proctor compactive effort. The particle breakdown is minimal. The value of permeability for both samples was determined to be 1×10^{-2} cm/sec. Plate 47 shows the gradation envelopes of till from borrow areas I and II, on which the grain size of cinders after compaction is also drawn. It is evident that for the samples tested, the cinders could be utilized as satisfactory filters for the till.

6.5 Water Levels in the Ore Body Area

The groundwater level contours are shown on Drawing E-2538-1. Groundwater measurements indicate a water table which generally follows the ground contours. The water table is encountered at less than 15 m below ground level except with drillhole Nos. 25 and 44 where the water level was found to be 25 and 22 m respectively below ground surface. A number of drillholes in close proximity to the adits are blocked and could not be read. Of the remaining holes, the adit does not appear to drawdown the water significantly. A drawdown of water level in Molly Lake would signficantly reduce water levels in the pit area.

APPENDIX III

PLATES

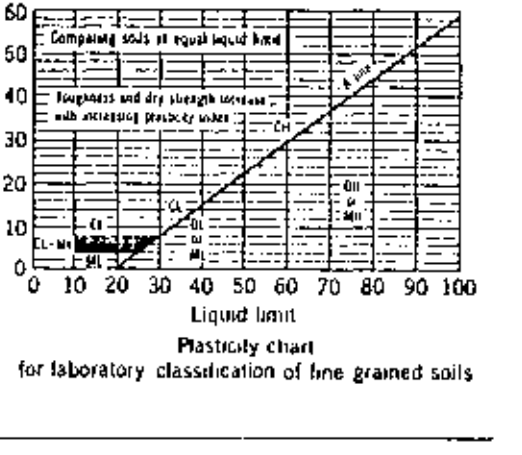
LEGEND ON DRILL HOLE AND TEST PIT LOGS

SYMBOL	DESCRIPTION
	3/4 IN. I.D. PVC OPEN STANDPIPE CINDER (OR SAND) BACKFILL
	BENTONITE CLAY SEAL COARSE CINDER SLOTTED 3/4 IN. I.D. PVC PIPE BENTONITE CLAY SEAL
	WATER LEVEL IN PIEZOMETER AT DATE SHOWN
	LOCATION OF FALLING HEAD PERMEABILITY TEST IN CASING
	LOCATION OF PACKER PERMEABILITY TEST
	GRAIN SIZE ANALYSIS PERFORMED
	SAND
	SILT
	CLAY
	SAND AND GRAVEL
	TILL
	SCORIA
	BASALT
	ALASKITE

PLATE No. 1

Table 3.5 Unified Soil Classification

Field Identification Procedures (Excluding particles larger than 3 in. and basing fractions on estimated weights)				Group Symbols[a]	Typical Names	Information Required for Describing Soils	Laboratory Classification Criteria
Coarse-grained soils: More than half of material is *larger* than No. 200 sieve size[b]	Gravels: More than half of coarse fraction is larger than No. 4 sieve size (For visual classification, the ¼ in. size may be used as equivalent to the No. 4 sieve size)	Clean gravels (little or no fines)	Wide range in grain size and substantial amounts of all intermediate particle sizes	*GW*	Well graded gravels, gravel-sand mixtures, little or no fines	Give typical name; indicate approximate percentages of sand and gravel, maximum size; angularity, surface condition, and hardness of the coarse grains; local or geologic name and other pertinent descriptive information; and symbols in parentheses For undisturbed soils add information on stratification, degree of compactness, cementation, moisture conditions and drainage characteristics Example: *Silty sand, gravelly*; about 20% hard, angular gravel particles ½-in. maximum size; rounded and subangular sand grains coarse to fine, about 15% nonplastic fines with low dry strength; well compacted and moist in place; alluvial sand; (*SM*)	Determine percentages of gravel and sand from grain size curve Depending on percentage of fines (fraction smaller than No. 200 sieve size) coarse grained soils are classified as follows: Less than 5%: *GW, GP, SW, SP* More than 12%: *GM, GC, SM, SC* 5% to 12%: *Borderline* cases requiring use of dual symbols Use grain size curve in identifying the fractions as given under field identification	$C_U = \frac{D_{60}}{D_{10}}$ Greater than 4 $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3 Not meeting all gradation requirements for *GW* Atterberg limits below "A" line, or *PI* less than 4 — Above "A" line with *PI* between 4 and 7 are *borderline* cases requiring use of dual symbols Atterberg limits above "A" line, with *PI* greater than 7
		Gravels with fines (appreciable amount of fines)	Predominantly one size or a range of sizes with some intermediate sizes missing	*GP*	Poorly graded gravels, gravel-sand mixtures, little or no fines		
			Nonplastic fines (for identification procedures see *ML* below)	*GM*	Silty gravels, poorly graded gravel-sand-silt mixtures		
			Plastic fines (for identification procedures, see *CL* below)	*GC*	Clayey gravels, poorly graded gravel-sand-clay mixtures		
	Sands: More than half of coarse fraction is smaller than No. 4 sieve size (For visual classification, the ¼ in. size may be used as equivalent to the No. 4 sieve size)	Clean sands (little or no fines)	Wide range in grain sizes and substantial amounts of all intermediate particle sizes	*SW*	Well graded sands, gravelly sands, little or no fines		$C_U = \frac{D_{60}}{D_{10}}$ Greater than 6 $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between 1 and 3 Not meeting all gradation requirements for *SW*
			Predominantly one size or a range of sizes with some intermediate sizes missing	*SP*	Poorly graded sands, gravelly sands, little or no fines		
		Sands with fines (appreciable amount of fines)	Nonplastic fines (for identification procedures, see *ML* below)	*SM*	Silty sands, poorly graded sand-silt mixtures		Atterberg limits below "A" line or *PI* less than 4 — Above "A" line with *PI* between 4 and 7 are *borderline* cases requiring use of dual symbols Atterberg limits below "A" line with *PI* greater than 7
			Plastic fines (for identification procedures, see *CL* below)	*SC*	Clayey sands, poorly graded sand-clay mixtures		
Fine-grained soils: More than half of material is *smaller* than No. 200 sieve size (The No. 200 sieve size is about the smallest particle visible to naked eye)	Identification Procedures on Fraction Smaller than No. 40 Sieve Size						
	Silts and clays: liquid limit less than 50	Dry Strength (crushing characteristics)	Dilatancy (reaction to shaking)	Toughness (consistency near plastic limit)			
		None to slight	Quick to slow	None	*ML*	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands with slight plasticity	Give typical name; indicate degree and character of plasticity, amount and maximum size of coarse grains; color in wet condition, odour if any, local or geologic name, and other pertinent descriptive information, and symbol in parentheses For undisturbed soils add information on structure, stratification, consistency in undisturbed and remolded states, moisture and drainage conditions Example: *Clayey silt*, brown; slightly plastic; small percentage of fine sand; numerous vertical root holes; firm and dry in place; loess; (*ML*)
		Medium to high	None to very slow	Medium	*CL*	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays	
		Slight to medium	Slow	Slight	*OL*	Organic silts and organic silty clays of low plasticity	
	Silts and clays: liquid limit greater than 50	Slight to medium	Slow to none	Slight to medium	*MH*	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts	
		High to very high	None	High	*CH*	Inorganic clays of high plasticity, fat clays	
		Medium to high	None to very slow	Slight to medium	*OH*	Organic clays of medium to high plasticity	
Highly Organic Soils		Readily identified by colour, odour, spongy feel and frequently by fibrous texture			*Pt*	Peat and other highly organic soils	



Plasticity chart
for laboratory classification of fine grained soils

From Wagner, 1957.

[a] *Boundary classifications.* Soils possessing characteristics of two groups are designated by combinations of group symbols. For example *GW-GC*, well graded gravel-sand mixture with clay binder.

[b] All sieve sizes on this chart are U.S. standard.

Field Identification Procedure for Fine Grained Soils or Fractions

These procedures are to be performed on the minus No. 40 sieve size particles, approximately ¼ in. For field classification purposes, screening is not intended, simply remove by hand the coarse particles that interfere with the tests.

Dilatancy (Reaction to shaking):

After removing particles larger than No. 40 sieve size, prepare a pat of moist soil with a volume of about one-half cubic inch. Add enough water if necessary to make the soil soft but not sticky.

Place the pat in the open palm of one hand and shake horizontally, striking vigorously against the other hand several times. A positive reaction consists of the appearance of water on the surface of the pat which changes to a livery consistency and becomes glossy. When the sample is squeezed between the fingers, the water and gloss disappear from the surface, the pat stiffens and finally it cracks or crumbles. The rapidity of appearance of water during shaking and of its disappearance during squeezing assist in identifying the character of the fines in a soil.

Very fine clean sands give the quickest and most distinct reaction whereas a plastic clay has no reaction. Inorganic silts, such as a typical rock flour, show a moderately quick reaction.

Dry Strength (Crushing characteristics):

After removing particles larger than No. 40 sieve size, mould a pat of soil to the consistency of putty, adding water if necessary. Allow the pat to dry completely by oven, sun or air drying, and then test its strength by breaking and crumbling between the fingers. This strength is a measure of the character and quantity of the colloidal fraction contained in the soil. The dry strength increases with increasing plasticity.

High dry strength is characteristic for clays of the CH group. A typical inorganic silt possesses only very slight dry strength. Silty fine sands and silts have about the same slight dry strength, but can be distinguished by the feel when powdering the dried specimen. Fine sand feels gritty whereas a typical silt has the smooth feel of flour.

Toughness (Consistency near plastic limit):

After removing particles larger than the No. 40 sieve size, a specimen of soil about one-half inch cube in size, is moulded to the consistency of putty. If too dry, water must be added and if sticky, the specimen should be spread out in a thin layer and allowed to lose some moisture by evaporation. Then the specimen is rolled out by hand on a smooth surface or between the palms into a thread about one-eight inch in diameter. The thread is then folded and re-rolled repeatedly. During this manipulation the moisture content is gradually reduced and the specimen stiffens, finally loses its plasticity, and crumbles when the plastic limit is reached.

After the thread crumbles, the pieces should be lumped together and a slight kneading action continued until the lump crumbles.

The toughness of the thread near the plastic limit and the stiffness of the lump when it finally crumbles, is measure of the colloidal clay fraction in the soil. Weakness of the thread at the plastic limit and quick loss of coherence of the lump below the plastic limit indicate either inorganic clay of low plasticity, or materials such as kaolin-type clays and organic clays which occur below the A-line.

Highly organic clays have a very weak and spongy feel at the plastic limit.

FROM : LAMBE AND WHITMAN

PLATE No. 2

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SH 1 OF 2.
Plate No. 3

GEOLOGIC LOG OF DRILL HOLE

DRILL HOLE NO. W1-1
PROJECT SITE INVESTIGATION - ADANAC
LOCATION WATER SUPPLY DAM
DATE AUGUST, 1979
STARTED JULY 26, 1979
FINISHED JULY 30, 1979

COLLAR COORD. N6619,915.2 E 592,960.2
GROUND ELEV. 1270.0
BEARING PLUNGE
DRILLING METHOD LONGYEAR 34
SOIL DIAMOND CORING
ROCK DIAMOND CORING

CONTRACTOR E. CARON DIAMOND DRILLING
DRILLING FLUID WATER

ELEVATION METRES	DEPTH METRES	SYMBOL	LITHOLOGIC DESCRIPTION
	0		SAND - fine to coarse - subrounded to angular clear (SW)
	2.7		SANDY GRAVEL - red cinder gravel - fine sand
	5.5		SCORIA - vesicular - amygdaloidal - scattered rock fragments - red
	10		
	13.4		BASALT - vesicular - amygdaloidal - aphanitic - dark grey-black
	20		
	30		

ROCK MASS HARDNESS: R 1 2 3 4 5

DISCONTINUITY DATA
- ○ Joint
- ⬌ Bedding
- = Foliation
- ▲ Shear zone

ANGLE WITH CORE AXIS: 30 60

DISCONTINUITY INDEX NO./METRE: 2 4 6

BROKEN CORE: ×

RECOVERY DATA
CORE Recovery %: 25 50 75
R.Q.D. %: 25 50 75

DRILLING DATA
CORE SIZE
CASING SIZE
DRILL FLUID
T = GAIN
⊥ = LOSS

7/30/79 ▽

Falling head test in casing
K < 3.5 x 10⁻²

NW K = ?

Leaking seal in Packer test

N()

FEB 11 79

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GEOLOGIC LOG OF DRILL HOLE

SH. 2 OF 2
Plate No. 3
(Cont'd)

DRILL HOLE NO. W1-1

LOCATION

ELEVATION METRES	DEPTH METRES	SYMBOL	LITHOLOGIC DESCRIPTION	ROCK MASS HARDNESS (R 1 2 3 4 5)	DISCONTINUITY DATA: C Joint, Bedding, Foliation, Shear zone; ANGLE WITH CORE AXIS (30 60); DISCONTINUITY INDEX (NO./METRE) (2 4 6); BROKEN CORE	RECOVERY DATA: CORE Recovery % (25 50 75); R.Q.D. % (25 50 75)	DRILLING DATA: CORE SIZE; CASING SIZE; DRILL FLUID (+ GAIN, - LOSS, k - emulsion)
	35.4						
			SCORIA - vesicular - scattered rock fragments - black				
	40						
	40.8						
			SAND AND GRAVEL - coarse sand - gravel up to 15 cm diameter				
	42.4						
			ALASKITE - coarse grained - equigranular				
	50						
	60						
	65.8						
			END OF DDH W1-1				
	70						

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SH 1 OF 2
Plate No. 4

GEOLOGIC LOG OF DRILL HOLE

DRILL HOLE NO. T-1
PROJECT SITE INVESTIGATION - ADANAC
LOCATION WATER SUPPLY DAM
DATE AUGUST, 1979
STARTED AUGUST 8, 1979
FINISHED ALGUST 11, 1979

COLLAR COORD. N 6620 466.9 E 592 284.0
GROUND ELEV. 1329.9
BEARING PLUNGE
DRILLING METHOD LONGYEAR 34
SOIL TRICONE
ROCK DIAMOND CORING

CONTRACTOR E. CARON DIAMOND DRILLING
DRILLING FLUID QUICK-GEL, POLY DRILL, WATER

ELEVATION METRES	DEPTH METRES	SYMBOL	LITHOLOGIC DESCRIPTION	ROCK MASS HARDNESS (R 1 2 3 4 5)	DISCONTINUITY DATA: C Joint, Bedding, Foliation, Shear zone; ANGLE WITH CORE AXIS (30 60); DISCONTINUITY INDEX (NO./METRE) (2 4 6); BROKEN CORE	RECOVERY DATA: CORE Recovery % (25 50 75); R.Q.D. % (25 50 75)	DRILLING DATA: CORE SIZE; CASING SIZE; DRILL FLUID (+ GAIN, - LOSS, ▲ UNKNOWN)
	5.8		SAND - SILT - GRAVEL (TILL) - fine to coarse sand - greyish light brown			No standing water level 8/19/79	
	10		GRAVEL - sandy - medium to coarse sand - intermittent water loss from 5.8 m to 11.3 m - full water loss from 11.3 m to 31.4 m			At 7.0 m, water pumped in @ 10 gal/min for 22 minutes produced a rise of less than 2.4 m in the casing	NW INTERMITTENT WATER LOSS FULL WATER LOSS
	20						
	20.3		BASALT - vesicular - amygdalcidal - aphanitic - dark grey				NQ K=2.8 x 10⁻³
	29.9						
	30						

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GEOLOGIC LOG OF DRILL HOLE

DRILL HOLE NO. T-1 LOCATION

ELEVATION METRES	DEPTH METRES	SYMBOL	LITHOLOGIC DESCRIPTION	ROCK MASS HARDNESS (R 1 2 3 4 5)	DISCONTINUITY DATA: ○ Joint, ⊕ Bedding, + Foliation, ▲ Shear zone; ANGLE WITH CORE AXIS (30 60); DISCONTINUITY INDEX (NO./METRE); BROKEN CORE (2 4 6)	RECOVERY DATA: CORE Recovery % (25 50 75); R.Q.D. % (25 50 75)	DRILLING DATA: CORE SIZE; CASING SIZE; DRILL FLUID (+ = GAIN, − = LOSS, ± = circ.)
	29.9						
	31.4		SAND AND GRAVEL				NQ
			END OF DDH T-1				K = 1.2x10
0							
0							
0							
0							

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GEOLOGIC LOG OF DRILL HOLE

DRILL HOLE NO. T-2
PROJECT SITE INVESTIGATION - ADANAC
LOCATION TAILINGS DAM
DATE AUGUST, 1979
STARTED JULY 31, 1979
FINISHED AUGUST 4, 1979

COLLAR COORD. N. 6620 768.9 E. 592 535.5
GROUND ELEV. 1314.5
BEARING PLUNGE
DRILLING METHOD LONGYEAR 34
SOIL TRICONE, DIAMOND CORING
ROCK DIAMOND CORING

CONTRACTOR E. CARON DIAMOND DRILLING
DRILLING FLUID QUICK-GEL, POLY DRILL, WATER

ELEVATION METRES	DEPTH METRES	SYMBOL	LITHOLOGIC DESCRIPTION	ROCK MASS HARDNESS R 1 2 3 4 5	DISCONTINUITY DATA: Joint, Bedding, Foliation, Shear zone; ANGLE WITH CORE AXIS 30 60; DISCONTINUITY INDEX NO./METRE; BROKEN CORE 2 4 6	RECOVERY DATA: CORE Recovery % 25 50 75; R.Q.D. % 25 50 75	DRILLING DATA: CORE SIZE; CASING SIZE; DRILL FLUID % GAIN, LOSS
	0		SILT - SAND - GRAVEL (TILL) - subangular to sub-rounded gravel - fine to coarse sand			Falling head test in casing $K < 2 \times 10^{-3}$ 8/8/79 Falling head test in casing $K < 4 \times 10^{-3}$	NW
	10						
	20						
	21.0		BASALT - vesicular - amygdaloidal - aphanitic - scattered rock fragments - dark grey to black				NQ
	29.5		SAND AND GRAVEL			Test in casing $K < 1.5 \times 10^{-3}$	
	30						

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GEOLOGIC LOG OF DRILL HOLE

SH. 2 OF 3
Plate No. 5
(Cont'd)

DRILL HOLE NO. T-2

LOCATION

ELEVATION METRES	DEPTH METRES	SYMBOL	LITHOLOGIC DESCRIPTION	ROCK MASS HARDNESS R 1 2 3 4 5	DISCONTINUITY DATA: ANGLE WITH CORE AXIS (30 50)	DISCONTINUITY DATA: DISCONTINUITY INDEX NO./METRE (2 4 6)	DISCONTINUITY DATA: BROKEN CORE	RECOVERY DATA: CORE Recovery % (25 50 75)	RECOVERY DATA: R.Q.D. % (25 50 75)	DRILLING DATA: CORE SIZE	DRILLING DATA: CASING SIZE	DRILLING DATA: DRILL FLUID
	40		SAND AND GRAVEL - gravel from 2 cm to 32 cm									
	42.4											
	50		ALASKITE - coarse grained - highly fractured							NQ		
	60		67.7 - 75.9 Shear Zone - highly fractured core, slickensided surfaces									
	70											

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GEOLOGIC LOG OF DRILL HOLE

DRILL HOLE NO. T-2

LOCATION

ELEVATION METRES	DEPTH METRES	SYMBOL	LITHOLOGIC DESCRIPTION	ROCK MASS HARDNESS (R 1 2 3 4 5)	DISCONTINUITY DATA: Joint / Bedding / Foliation / Shear zone; ANGLE WITH CORE AXIS (30 60); DISCONTINUITY INDEX (NO./METRE) (2 4 6); BROKEN CORE	RECOVERY DATA: CORE Recovery % (25 50 75); R.Q.D. % (25 50 75)	DRILLING DATA: CORE SIZE; CASING SIZE; DRILL FLUID (+ Gain, − Loss, k Artesian)
	75.9		END OF DDH T-2				NQ
	80						
	90						
	100						
	110						

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SH. 1 OF 2.
Plate No. 6

GEOLOGIC LOG OF DRILL HOLE

DRILL HOLE NO. T-3
PROJECT SITE INVESTIGATION - ADANAC TAILINGS DAM
LOCATION
DATE AUGUST, 1979
STARTED AUGUST 12, 1979
FINISHED AUGUST 15, 1979

COLLAR COORD. N 6620 7689 E 592 403.9
GROUND ELEV. 1316.1
BEARING PLUNGE
DRILLING METHOD LONGYEAR 34
SOIL TRICONE
ROCK DIAMOND CORING

CONTRACTOR E. CARON DIAMOND DRILLING
DRILLING FLUID QUICK-GEL, POLYDRILL, WATER

ELEVATION METRES	DEPTH METRES	SYMBOL	LITHOLOGIC DESCRIPTION	ROCK MASS HARDNESS R 1 2 3 4 5	DISCONTINUITY DATA: Joint, Bedding, Foliation, Shear zone; ANGLE WITH CORE AXIS 30 60	DISCONTINUITY INDEX (NO. METRE); BROKEN CORE 2 4 6	RECOVERY DATA: CORE Recovery % 25 50 75	R.Q.D. % 25 50 75	DRILLING DATA: CORE SIZE; CASING SIZE	DRILL FLUID + GAIN - LOSS
	1.2		FILL FOR DRILL PAD							
	3.1		SILTY CLAY - soft - plastic - dark grey							
	7.9		SILT - SAND - GRAVEL (TILL)							
	10.1		SILTY CLAY - firm, laminated, greenish grey							
	20		SILT - SAND - GRAVEL (TILL)							
	21.9		SCORIA - vesicular - reddish							
	30		BASALT - vesicular - aphanitic - greyish black							

- 2.29 to 2.74 SPLIT SPOON SAMPLE #1
- 2.74 to 3.14 SPLIT SPOON SAMPLE #2

8/19/79
K = 7.2 x 10

K = 9.0 x 10^{-6}

No standing water level 8/19/79

NW

NQ

Packer Test
K = 8.0 x 10^{-5}

Packer Test
K = 1.1 x 10^{-5}

F56 - 78

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GEOLOGIC LOG OF DRILL HOLE

SH. 2 OF 2
Plate No. 6
(Cont'd)

DRILL HOLE NO. T-3

LOCATION

ELEVATION METRES	DEPTH METRES	SYMBOL	LITHOLOGIC DESCRIPTION	ROCK MASS HARDNESS (R 1 2 3 4 5)	DISCONTINUITY DATA: ANGLE WITH CORE AXIS (30 60)	DISCONTINUITY DATA: DISCONTINUITY INDEX (NO. METRE) / BROKEN CORE (2 4 6)	RECOVERY DATA: CORE Recovery % (25 50 75)	RECOVERY DATA: R.Q.D. % (25 50 75)	DRILLING DATA: CORE SIZE	DRILLING DATA: CASING SIZE	DRILLING DATA: DRILL FLUID
	30.0										
	31.1		SAND & GRAVEL						NQ		
	31.1		ALASKITE								
			END OF DDH T-3								

FSS 11/78

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SH. 1. OF 2.
Plate No. 7

GEOLOGIC LOG OF DRILL HOLE

DRILL HOLE NO. T-4
PROJECT SITE INVESTIGATION - ADANAC
LOCATION TAILINGS DAM
DATE AUGUST 1979
STARTED AUGUST 15, 1979
FINISHED AUGUST 17, 1979

CONTRACTOR E. CARON DIAMOND DRILLING

COLLAR COORD. N 6620 936.6 E 592 581.6
GROUND ELEV. 1316.8
BEARING PLUNGE
DRILLING METHOD. LONGYEAR 34
SOIL TRICONE/DIAMOND CORING
ROCK DIAMOND CORING

DRILLING FLUID QUICK-GEL, POLYDRILL, WATER

ELEVATION METRES	DEPTH METRES	SYMBOL	LITHOLOGIC DESCRIPTION	ROCK MASS HARDNESS (R 1 2 3 4 5)	DISCONTINUITY DATA: ANGLE WITH CORE AXIS (30 50)	DISCONTINUITY DATA: DISCONTINUITY INDEX (NO. METRE) / BROKEN CORE (2 4 5)	RECOVERY DATA: CORE Recovery % (25 50 75)	RECOVERY DATA: R.Q.D. % (25 50 75)	DRILLING DATA: CORE SIZE / CASING SIZE	DRILLING DATA: DRILL FLUID
	0		SILT - SAND - GRAVEL - light brown silt - gravel content increases below 5.2 m, less boulders					8/19/79		
	10							K = 2.6 x 10	NW	
	20							K = 5.8 x 10	NQ	
	26.8		ALASKITE - coarse grained - brownish to greyish weathering							
	30									

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GEOLOGIC LOG OF DRILL HOLE

SH. 2 OF 2
PLATE No. 7
(Cont'd)

DRILL HOLE NO. T-4 LOCATION

ELEVATION METRES	DEPTH METRES	SYMBOL	LITHOLOGIC DESCRIPTION	ROCK MASS HARDNESS (R 1 2 3 4 5)	DISCONTINUITY DATA: Q Joint, Bedding, Foliation, Shear zone; ANGLE WITH CORE AXIS (30 60)	DISCONTINUITY INDEX (NO./METRE) / BROKEN CORE (2 4 6)	RECOVERY DATA: CORE Recovery % (25 50 75)	R.Q.D. % (25 50 75)	DRILLING DATA: CORE SIZE	CASING SIZE	DRILL FLUID: + GAIN, − LOSS, ▲ CASED
	34.1		END OF DDH T-4						NQ		

0

0

0

0

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SH. 1 OF 2
Plate No. 8

GEOLOGIC LOG OF DRILL HOLE

DRILL HOLE NO. T-5
PROJECT SITE INVESTIGATION - ADANAC
LOCATION TAILINGS DAM
DATE AUGUST, 1979
STARTED AUGUST 5, 1979
FINISHED AUGUST 7, 1979
CONTRACTOR

COLLAR COORD. N 6620 902.3 E 592 705.8
GROUND ELEV. 1316.2
BEARING PLUNGE
DRILLING METHOD LONGYEAR 34
SOIL TRICONE
ROCK DIAMOND CORING
DRILLING FLUID QUICK-GEL, POLYDRILL, WATER

ELEVATION METRES	DEPTH METRES	SYMBOL	LITHOLOGIC DESCRIPTION	ROCK MASS HARDNESS (R 1 2 3 4 5)	DISCONTINUITY DATA: ANGLE WITH CORE AXIS (O Joint, Bedding, + Foliation, ▲ Shear zone; 30 50)	DISCONTINUITY DATA: DISCONTINUITY INDEX NO. METRE / BROKEN CORE (2 4 6)	RECOVERY DATA: CORE Recovery % (25 50 75)	RECOVERY DATA: R.Q.D. % (25 50 75)	DRILLING DATA: CORE SIZE / CASING SIZE / DRILL FLUID (+ GAIN, - LOSS)
	0		SILT - SAND - GRAVEL (TILL)					8/8/79	NW
								K = 5.6 x 10⁻⁴	
	10								
	16.1		13.1 to 16.1 Very dense till(?) with hornfels and meta-volcanic gravel					K = 5.5 x 10⁻⁶	
	20		ALASKITE - altered between 16.1 to 18.6 - shear zone between 17.7 to 18.6						NQ
	30								

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SH. 2 OF 2

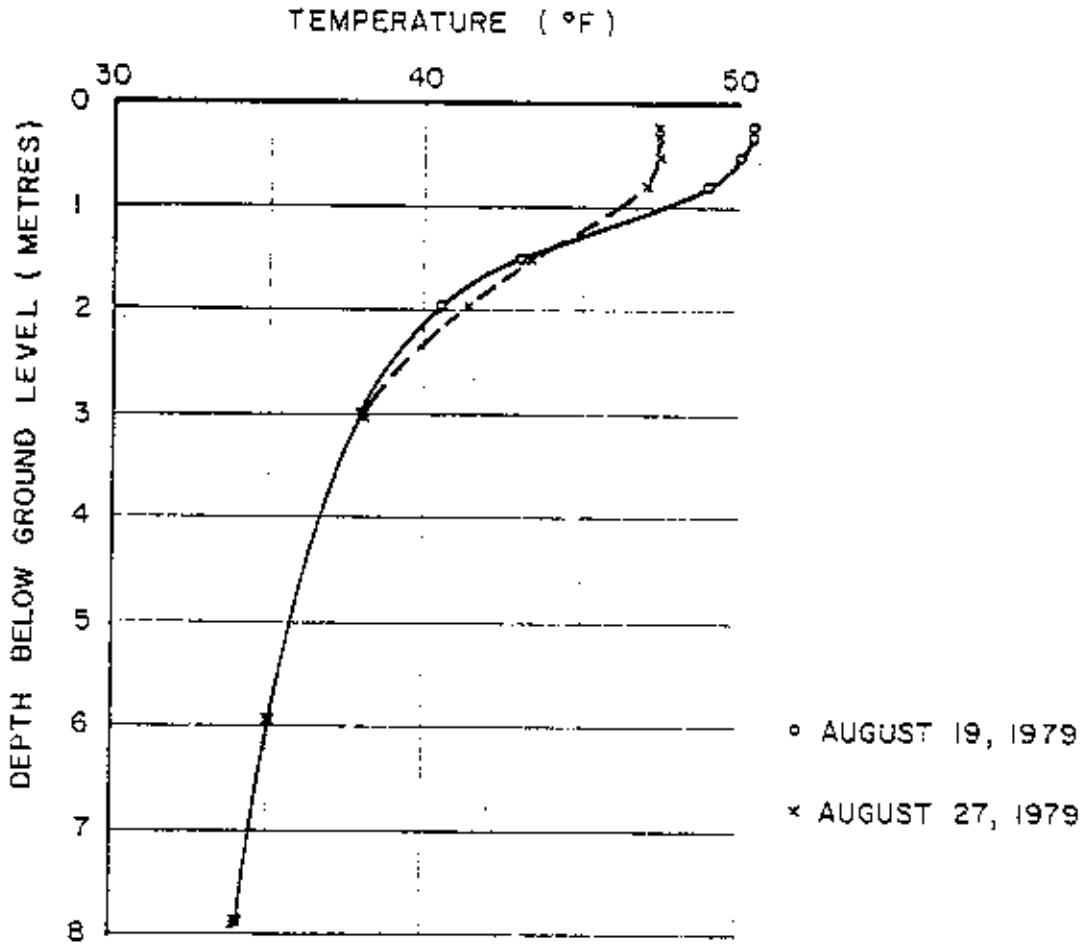
GEOLOGIC LOG OF DRILL HOLE

Plate No. B
(Cont'd)

DRILL HOLE NO. T-5 LOCATION

ELEVATION METRES	DEPTH METRES	SYMBOL	LITHOLOGIC DESCRIPTION	ROCK MASS HARDNESS R 1 2 3 4 5	DISCONTINUITY DATA: ○ Joint, ⬌ Bedding, – Foliation, ▲ Shear zone; ANGLE WITH CORE AXIS 30 60; DISCONTINUITY INDEX NO./METRE 2 4 6; BROKEN CORE	RECOVERY DATA: CORE Recovery % 25 50 75; R.Q.D. % 25 50 75	DRILLING DATA: CORE SIZE; CASING SIZE; DRILL FLUID T + GAIN ↓ LOSS ▲ caving
	40						NQ
	50		55.0 to 61.3 - Very competent rock				
	60						
	61.3		END OF DDH T-5				
	70						

F65 1178



NOTES

1) DDH T-3A IS LOCATED 3.7 METRES S.E. OF DDH T-3.
2) THERMISTOR STRING WAS INSTALLED ON AUG. 18, 1979.
3) READINGS TAKEN ON AUG. 27, 1979 WERE OBTAINED BY PLACER DEVELOPMENT LTD.

TO BE READ WITH KLOHN LEONOFF CONSULTANTS LTD. REPORT DATED . . . . . SCALE

KLOHN LEONOFF CONSULTANTS LTD. CIVIL • GEOTECHNICAL • HYDRAULIC VANCOUVER · CALGARY · WINNIPEG, CANADA	ADANAC – SITE INVESTIGATION GROUND TEMPERATURE VS. DEPTH CURVE AT DDH T-3A
CLIENT: PLACER DEVELOPMENT LTD.	APPR. | DWN. F.C. | DATE Sept., 79 | PLATE 9

TEST PIT LOGS

TP- 1

Lat. 6620 752.4
Dep. 590 330.2

Surface Elev. 1413.9

SOIL DESCRIPTION	Depth (M)	Sample Nº
TOPSOIL - SAND & GRAVEL - brown 0.30		
SAND - fine sand - little silt, some gravel - brown 0.91 - horizontally stratified (SP)	1	
SAND AND GRAVEL - subangular gravel - medium to coarse sand 1.83 - dense - brown (GP-GW)	2	
END OF TEST PIT	3	
WATER SEEPAGE AT 0.91	4	
	5	

TP- 2

Lat. 6620 870.6
Dep. 590 349.0

Surface Elev. 1411.1

SOIL DESCRIPTION	Depth (M)	Sample Nº
TOPSOIL - SAND AND GRAVEL - subangular gravel - coarse sand - medium dense - light brown (GP)	1	
	2	2-1
3.35 END OF TEST PIT	3	
WATER SEEPAGE AT 2.74	4	
	5	

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JOB Nº: VA 2538
PROJECT: SITE INVESTIGATION - ADANAC
LOCATION: PLANT SITE
TEST PIT Nº: 1 - 2
DATE: September, 1979 PLATE: 10

TEST PIT LOGS

TP- 3

Lat. 6620 922.3
Dep. 590 074.0

Surface Elev. 1444.5

SOIL DESCRIPTION	Depth (M)	Sample Nº
TOPSOIL - SAND-SILT-GRAVEL - angular gravel - fine sand - trace of clay - roots - rusty brown (GM)	1	
	2	
2.44 SAND AND GRAVEL - subrounded gravel - fine to medium sand (GP) - light brown 2.90	3	
BEDROCK (ALASKITE?) 3.20 - weathered - orange brown	4	
END OF TEST PIT	5	

TP- 4

Lat. 6620 910.0
Dep. 590 155.6

Surface Elev. 1430.:

SOIL DESCRIPTION	Depth (M)	Sample Nº
TOPSOIL - SAND & GRAVEL - dark rusty brown 0.76	1	
SAND AND GRAVEL - subrounded gravel - fine to coarse sand - little silt - few silty sand pockets - light brown (GW)	2	* 4-:
2.44 2.60 VOLCANIC CINDERS (WELDED) - black - friable fragments - hard (backhoe cannot penetrate)	3	
END OF TEST PIT WATER SEEPAGE at 0.76	4 5	

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JOB Nº : VA 2538
PROJECT : SITE INVESTIGATION - ADANAC
LOCATION : PLANT SITE
TEST PIT Nº : 3 - 4
DATE : September, 1979 PLATE : 11

TEST PIT LOGS

TP- 5

Lat. 6620 949.0
Dep. 590 246.7

Surface Elev. 1420.8

SOIL DESCRIPTION	Depth (M)	Sample Nº
TOPSOIL - subrounded gravel - med. to coarse sand - brown	1	
1.22		
SANDY GRAVEL - angular to sub-angular gravel - fine to coarse sand - trace of silt - dense - very dense below 2.75m - light brown (GW)	2 3	
3.35		
END OF TEST PIT		
WATER SEEPAGE at 1.37	4 5	

TP- 6

Lat. 6620 944.0
Dep. 590 339.8

Surface Elev. 1412.3

SOIL DESCRIPTION	Depth (M)	Sample Nº
TOPSOIL - SILT-SAND & GRAVEL - subangular gravel - less gravelly with depth - roots to 1.5m - brown (GM)	1 2 3	* S-1
3.35		
END OF TEST PIT		
WATER SEEPAGE at 2.10	4 5	

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JOB Nº : VA 2538
PROJECT : SITE INVESTIGATION - ADANAC
LOCATION : PLANT SITE
TEST PIT Nº : 5-6
DATE : September, 1979 | PLATE : 12

TEST PIT LOGS

TP- 7

Lat. 6621 052.0
Dep. 590 466.2

Surface Elev. 1401.8

SOIL DESCRIPTION	Depth (M)	Sample Nº
TOPSOIL - SAND & GRAVEL - light brown 0.61		
SANDY GRAVEL - angular to sub-angular gravel - fine to coarse sand - dense - light brown (GW) 1.83	1 2	7-1
2.29 SANDY SILT - fine sand - trace of gravel - firm - stratified - light brown	3	7-2
SAND & GRAVEL - subrounded gravel - fine to coarse sand 3.35 - trace of silt - light brown (GP-GW)	4	
END OF TEST PIT		
WATER SEEPAGE at 0.61	5	

TP- 8

Lat. 6621 095.0
Dep. 590 532.3

Surface Elev. 1395.7

SOIL DESCRIPTION	Depth (M)	Sample Nº
TOPSOIL - SAND & GRAVEL - light brown 0.61		
SAND & GRAVEL - fine to coarse sand 0.76 - light brown (GM)	1	
SANDY SILT 1.37 - fine sand - trace gravel - brown - interbedded with sand and gravel (ML)	2	* 8-1
SAND & GRAVEL - subangular gravel - fine to coarse sand - little silt - light brown (GM) 3.66	3	
END OF TEST PIT	4	
WATER SEEPAGE at 0.61	5	

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JOB Nº: VA 2538
PROJECT: SITE INVESTIGATION - ADANAC
LOCATION: PLANT SITE
TEST PIT Nº: 7 - 8
DATE: September , 1979 PLATE: 13

TEST PIT LOGS

TP- 9

Lat. 6620 078.9
Dep. 592 184.4

Surface Elev. 1357.0

SOIL DESCRIPTION	Depth (M)	Sample Nº
TOPSOIL - SAND & GRAVEL - fine sand, little silt 0.45 - reddish brown		
0.76 CINDERS - weathered - sandy texture - friable - hard digging - reddish black	1	* 9-1
SILT - SAND - GRAVEL (TILL) - subrounded gravel - fine to coarse sand - trace of clay - brown - dense - very dense below 2.13m (GM) 2.90	2	
	3	
END OF TEST PIT	4	
	5	

TP- 10

Lat. 6620 237.3
Dep. 592 189.8

Surface Elev. 1346.4

SOIL DESCRIPTION	Depth (M)	Sample Nº
TOPSOIL - GRAVELLY SILT - little fine to coarse sand - reddish brown 0.91		
1.22 SILT - SAND - GRAVEL (TILL) - subrounded gravel - fine to coarse sand - trace of clay - medium dense to dense - grey - brown - later glacial advance? (GM)	1 2	* 10-1
SILT - SAND - GRAVEL (TILL) - rounded to sub-angular gravel - fine to coarse sand - trace of clay - dense 2.65 - orange - brown (GM)	3	
END OF TEST PIT	4	
	5	

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JOB Nº: VA 2538
PROJECT: SITE INVESTIGATION - ADANAC
LOCATION: TAILINGS DAM SITE
TEST PIT Nº: 9-10
DATE: September, 1979 | PLATE: 14

TEST PIT LOGS

TP- 11 Lat. 6620 327.2 Dep. 592 149.1 — Surface Elev. 1344.0

SOIL DESCRIPTION	Depth (M)	Sample Nº
TOPSOIL - silt - organic - black — 0.30		
SILT - SAND - GRAVEL (TILL) - subrounded to subangular gravel - fine to coarse sand - trace clay - dense - light orange brown (GM)	1 2 3	11-1
3.05		
END OF TEST PIT		
WATER SEEPAGE at 0.30	4 5	

TP- 12 Lat. 6620 358.9 Dep. 592 271.9 — Surface Elev. 1343.0

SOIL DESCRIPTION	Depth (M)	Sample Nº
TOPSOIL - SAND & GRAVEL - reddish brown — 0.30		
SILT AND GRAVEL (TILL) - subrounded to angular gravel - some fine to coarse sand - little clay - very dense - greyish brown (GM)	1 2	* 12-1
1.98		
END OF TEST PIT	3 4 5	

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JOB Nº : VA 2538
PROJECT : SITE INVESTIGATION - ADANAC
LOCATION : TAILINGS DAM SITE
TEST PIT Nº : 11-12
DATE : September, 1979 | PLATE : 15

TEST PIT LOGS

TP- 13 Lat. 6620 263.4 Dep. 592 300.5 — Surface Elev. 1331.31

SOIL DESCRIPTION	Depth (M)	Sample Nº
TOPSOIL - SAND & GRAVEL - dark brown 0.61	1	
SAND & GRAVEL - subrounded to sub-angular gravel - well graded from 1/8" to 3" dia. - fine to coarse sand - little silt - brown - silt seams - trace of fine sand - loose (GW)	2	* 13-1
	3	13-2
3.66 END OF TEST PIT	4	
WATER SEEPAGE at 3.66	5	

TP- 14 Lat. 6620 184.6 Dep. 592 334.1 — Surface Elev. 1333.8

SOIL DESCRIPTION	Depth (M)	Sample Nº
TOPSOIL - SAND & GRAVEL - rounded to sub-angular gravel - fine to coarse sand - some silt - dark brown	1	
	2	
	3	
3.50 SAND & GRAVEL - subrounded to subangular gravel - fine to coarse sand - little silt - brown (GW)	4	* 14-1
4.11 END OF TEST PIT		
WATER SEEPAGE at 3.50	5	

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JOB Nº: VA 2538
PROJECT: SITE INVESTIGATION - ADANAC
LOCATION: TAILINGS DAM SITE
TEST PIT Nº: 13-14
DATE: September, 1979 | PLATE: 16

TEST PIT LOGS

TP- 15

Lat. 6620 408.8
Dep. 592 390.7

Surface Elev. 1339.2

SOIL DESCRIPTION	Depth (M)	Sample Nº
SILT - SAND- GRAVEL (TILL) - weathered - angular to sub-rounded gravel - fine to coarse sand - dense - orange - brown (GM)	1 2 3	15-1
3.55		
END OF TEST PIT	4 5	

TP- 16

Lat. 6620 461.0
Dep. 592 467.6

Surface Elev. 1316.3

SOIL DESCRIPTION	Depth (M)	Sample Nº
TOPSOIL - SILT & GRAVEL - reddish brown		
0.30		
SILTY SAND AND GRAVEL(TILL) - subrounded to subangular gravel - very dense - medium brown (GM)	1 2	* 16-1
2.59		
END OF TEST PIT	3 4 5	

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JOB Nº : VA 2538
PROJECT : SITE INVESTIGATION - ADANAC
LOCATION : TAILINGS DAM SITE
TEST PIT Nº : 15-16
DATE : September, 1979 | PLATE : 17

TEST PIT LOGS

TP- 17 Lat. 6620 597.5 Dep. 592 350.7 Surface Elev. 1319.7

SOIL DESCRIPTION	Depth (M)	Sample Nº
TOPSOIL 0.15		
SANDY SILT AND GRAVEL (TILL) - subrounded to sub-angular sand and gravels - fine to coarse sand - dense - very dense below 2.7m - light brown (GM)	1 2 3	17-1
3.20		
END OF TEST PIT	4	
WATER SEEPAGE at 0.15	5	

TP- 18 Lat. 6620 572.5 Dep. 592 179.5 Surface Elev. 1331.4

SOIL DESCRIPTION	Depth (M)	Sample Nº
SILT - SAND - GRAVEL - subrounded to angular gravel - fine to coarse sand - trace of clay - very dense below 0.5m (GM)	1 2 3	18-1
2.64		
END OF TEST PIT	4	
WATER SEEPAGE at 0.10	5	

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JOB Nº: VA 2538
PROJECT: SITE INVESTIGATION - ADANAC
LOCATION: TAILINGS DAM SITE
TEST PIT Nº: 17-18
DATE: September, 1979 | PLATE: 18

TEST PIT LOGS

TP- 19

Lat. 6620 635.2
Dep. 592 611.2

Surface Elev. 1305.9

SOIL DESCRIPTION	Depth (M)	Sample Nº
0.15 TOPSOIL - SILT & GRAVEL - reddish brown		
SILT - SAND-GRAVEL (TILL) - rounded to sub-rounded gravel - generally less than 3 inches diameter - fine to coarse sand - trace of clay - dense - light brown - later glacial advance? (GM)	1 2	* 19-1
2.75 SILTY - SAND & GRAVEL (TILL) - subrounded gravel - generally less than 6 " diameter - fine to coarse sand - very dense - light brown (GM) 3.50 END OF TEST PIT	3 4	* 19-2
LOCAL WATER SEEPAGE at 0.90	5	

TP- 20

Lat. 6620 565.1
Dep. 592 640.7

Surface Elev. 1301.2

SOIL DESCRIPTION	Depth (M)	Sample Nº
0.15 TOPSOIL - SILT - SAND - GRAVEL - reddish brown		
SILT - SAND-GRAVEL (TILL) - rounded to sub-angular gravel - medium to coarse sand - very dense - brown (GM) 1.98 END OF TEST PIT	1 2 3 4	
	5	

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JOB Nº : VA 2538
PROJECT : SITE INVESTIGATION - ADANAC
LOCATION : TAILINGS DAM SITE
TEST PIT Nº : 19-20
DATE : September, 1979 | PLATE : 19

TEST PIT LOGS

TP- 21

Lat. 6620 772.5
Dep. 592 553.9

Surface Elev. 1314.1

SOIL DESCRIPTION	Depth (M)	Sample Nº
0.15 TOPSOIL - blackish - brown		
SANDY SILT & GRAVEL - rounded to sub-rounded gravel - fine to coarse sand - trace of clay - dense - light brown (GM)	1 2	21-1
2.44	3	
END OF TEST PIT	4	
WATER SEEPAGE at 0.60	5	

TP- 22

Lat. 6620 855.9
Dep. 592 376.2

Surface Elev. 1315.9

SOIL DESCRIPTION	Depth (M)	Sample Nº
TOPSOIL - peaty silt - organic - very soft - black brown		
1.05 SILT - trace gravel - trace of sand - trace of clay (ML) - soft - grey	1 2	* 22-1
1.37 SILTY SAND & GRAVEL (TILL) - subrounded sands and gravels - trace of clay - medium dense to dense - blue - grey (GM)	3	
3.35	4	
END OF TEST PIT	5	
SEEPAGE at GROUND SURFACE		

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JOB Nº: VA 2538
PROJECT: SITE INVESTIGATION - ADANAC
LOCATION: TAILINGS DAM SITE
TEST PIT Nº: 21-22
DATE: September, 1979 | PLATE: 20

TEST PIT LOGS

TP- 23

Lat. 6620 911.8
Dep. 592 516.0

Surface Elev. 1321.0

SOIL DESCRIPTION	Depth (M)	Sample Nº
TOPSOIL - SILT & GRAVEL - reddish brown	0.30	
SILT - SAND - GRAVEL - subrounded to sub-angular gravel - trace of clay - very dense - greyish brown (GM)	1	23-1
	2	
	2.28	
	3	
	4	
END OF TEST PIT	5	

TP- 24

Lat. 6620 953.4
Dep. 592 634.0

Surface Elev. 1322.7

SOIL DESCRIPTION	Depth (M)	Sample Nº
TOPSOIL - SILT AND GRAVEL - reddish brown	0.30	
SANDY SILT & GRAVEL (TILL) - subrounded to sub-angular gravel - trace of clay - very dense - grey - brown (GM)	1	24-1
	2	
	2.28	
	3	
	4	
END OF TEST PIT	5	

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JOB Nº: VA 2538
PROJECT: SITE INVESTIGATION - ADANAC
LOCATION: TAILINGS DAM SITE
TEST PIT Nº. 23-24
DATE: September, 1979 | PLATE · 21

TEST PIT LOGS

TP- 25 | Lat. 6620 906.0 | Dep. 592 788.7 | Surface Elev. 1325.1

SOIL DESCRIPTION	Depth (M)	Sample Nº
0.15 TOPSOIL - SILT - organic - black		
SANDY SILT & GRAVEL (TILL) - subangular to sub-rounded gravel - trace of clay - very dense - medium brown (GM)	1 2	25-1
2.59	3	
END OF TEST PIT	4	
WATER SEEPAGE at 0.30	5	

TP- | Lat. | Dep. | Surface Elev.

SOIL DESCRIPTION	Depth (M)	Sample Nº
	1 2 3 4 5	

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JOB Nº: VA 2538
PROJECT: SITE INVESTIGATION - ADANAC
LOCATION: TAILINGS DAM SITE
TEST PIT Nº: 25
DATE: September, 1979 | PLATE: 22

TEST PIT LOGS

TP- 26 Lat. 6619 920 Dep. 592 780 (Approx.) Surface Elev. 1286.9

SOIL DESCRIPTION	Depth (M)	Sample Nº
TOPSOIL - SILT & GRAVEL - brown 0.30		
SILT & GRAVEL (TILL) - subrounded to subangular gravel - little fine to coarse sand - trace of clay - dense - brown (GM)	1 2	
2.90 END OF TEST PIT slow water seepage at 0.9	3 4 5	

TP- 27 Lat. 6619 828.4 Dep. 592 592.3 Surface Elev. 1277.8

SOIL DESCRIPTION	Depth (M)	Sample Nº
TOPSOIL - SILT & GRAVEL - dark brown 0.30		
SILT & GRAVEL (TILL) - subrounded to subangular gravel - little fine to coarse sand - trace of clay - brown 1.22 (GM) END OF TEST PIT slow water seepage at 0.3	1 2 3 4 5	

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JOB Nº: VA 2538
PROJECT: SITE INVESTIGATION - ADANAC
LOCATION: WATER SUPPLY DAM (W1 AXIS)
TEST PIT Nº: 26 & 27
DATE: SEPT 1979 PLATE: 23

TEST PIT LOGS

TP- 28	Lat. 6619 970.1 Dep. 593 080.8	Surface Elev. 1278.6

SOIL DESCRIPTION	Depth (M)	Sample Nº
TOPSOIL - SILT & GRAVEL - organic - black 0.15		
SILT & GRAVEL (TILL) - subrounded to subangular gravel - trace fine to coarse sand - trace of clay - dense - greyish brown	1 2	28-1
(GM)	3	
3.05		
END OF TEST PIT water seepage at 0.15	4 5	

TP-	Lat. Dep.	Surface Elev.

SOIL DESCRIPTION	Depth (M)	Sample Nº
	1 2 3 4 5	

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JOB Nº: VA 2538
PROJECT: SITE INVESTIGATION - ADANAC
LOCATION: WATER SUPPLY DAM (N1 AXIS)
TEST PIT Nº: 28
DATE: SEPT 1979 | PLATE: 24

TEST PIT LOGS

TP- 50

Lat. 6621 118.5
Dep. 592 837.5

Surface Elev. 1366.1

SOIL DESCRIPTION	Depth (M)	Sample Nº
TOPSOIL - SILT AND GRAVEL - brown		
0.45		
SAND AND GRAVEL (Colluvium) - angular to sub-angular gravel - fine to coarse sand - little silt - loose to medium dense - brown	1 2	* 50-1
GW		
- re-worked Colluvium below 2.1 metres - crudely stratified	3	* 50-2
4.57	4 5	
END OF TRENCH Water ponding at 4.4 m		

TP- 51

Lat. 6621 366.0
Dep. 592 766.0

Surface Elev. 1383.9

SOIL DESCRIPTION	Depth (M)	Sample Nº
TOPSOIL - GRAVELLY SILT - dark brown		
0.45		
SILT - SAND - GRAVEL (TILL) - subrounded gravel - fine to coarse sand - very heterogeneous with clayey and coarse sand pockets - very dense - greyish light brown	1 2	51-1
(GM)	3	
3.35	4 5	
END OF TRENCH Water seepage at 0.45' - water inflow (approx. 0.5 gpm) equals outflow by seepage at the base of the trench		

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JOB Nº: VA 2538
PROJECT: SITE INVESTIGATION - ADANAC
LOCATION: BORROW AREA 1
TEST PIT Nº: TRENCHES 50 & 51
DATE: SEPT, 1979
PLATE: 25

TEST PIT LOGS

TP- 52 Lat. 6621 558.9 Dep. 592 665.8 — Surface Elev. 1400.4

SOIL DESCRIPTION	Depth (M)	Sample Nº
TOPSOIL - SILT AND GRAVEL - medium brown		
0.61		
SILT - SAND - GRAVEL (TILL) - subrounded gravel - fine sand - little medium to coarse sand - medium dense to dense - greyish light brown (GP)	1 2 3	* 52-1
3.05		
END OF TEST TRENCH	4 5	

TP- 54 Lat. 6621 962.4 Dep. 592 694.1 — Surface Elev. 1423.1

SOIL DESCRIPTION	Depth (M)	Sample Nº
SILTY GRAVEL (COLLUVIUM) - rounded to angular gravel - little fine to coarse sand	1	
1.52		*
SILT - SAND - GRAVEL (TILL) - rounded to sub-rounded sand and gravel - fine to medium sand - medium dense to dense - greyish brown (GP)	2 3	54-1
3.05		
SAND AND GRAVEL (TILL?) - subangular sand and gravel - coarse sand - trace of fine to medium sand - loose - brown (GW)	4	
3.35		
END OF TEST TRENCH	5	
water seepage at 3.05		

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JOB Nº: VA 2538
PROJECT: SITE INVESTIGATION - ADANAC
LOCATION: BORROW AREA 1
TEST PIT Nº: TRENCHES 52 & 54
DATE: SEPT, 1979 | PLATE: 26

TEST PIT LOGS

TP- 55 Lat. 6620 029.4 Dep. 592 743.1 Surface Elev. 1294.7

SOIL DESCRIPTION	Depth (M)	Sample Nº
TOPSOIL - SANDY SILT - rusty brown		
0.76		
SILT AND GRAVEL (TILL) - subrounded to subangular gravel - little clay - brown	1	
(GM)	2	
2.28		
END OF TEST PIT	3	
water seepage at 0.76	4	
	5	

TP-56 Lat. 6620 068.4 Dep. 592 828.7 Surface Elev. 1285.7

SOIL DESCRIPTION	Depth (M)	Sample Nº
TOPSOIL - organic - dark brown		
SILT - SAND - GRAVEL - subrounded to subangular gravel - fine sand - light brown	1	
(GM)	2	
3.35	3	
END OF TEST PIT	4	
	5	

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JOB Nº: VA 2538
PROJECT: SITE INVESTIGATION - ADANAC
LOCATION: WATER SUPPLY DAM (W2 AXIS)
TEST PIT Nº: 55 & 56
DATE: SEPT, 1979 | PLATE: 27

TEST PIT LOGS

TP- 57 Lat. 6620 143.2 Dep. 592 943.9 Surface Elev. 1281.0

SOIL DESCRIPTION	Depth (M)	Sample Nº
TOPSOIL - SILT and GRAVEL - leached, brown	0.30	
SILT-SAND-GRAVEL (TILL) - subangular to subrounded gravel - fine to coarse sand - trace of clay - dense - greyish brown	1 2 3	* 57-1
END OF TEST PIT	3.35	
	4 5	

TP- 58 Lat. 6620 231.4 Dep. 593 101.4 Surface Elev. 1297.6

SOIL DESCRIPTION	Depth (M)	Sample Nº
TOPSOIL - SILT and GRAVEL (colluvium) - subrounded to angular gravel - little fine sand - medium brown	1	
SILTY GRAVEL - fine gravels - some sand - brown (GM)	1.52 1.83	
SILT - some fine sand - trace of gravel - laminated (ML)	2 2.13	
GRAVEL - subangular to angular - little sand and silt - brown (GW-GP)	2.74	* 58-1
END OF TEST PIT	3	
water seepage at 2.13	4 5	

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CLIENT: PLACER DEVELOPMENT LTD

JOB Nº: VA 2538
PROJECT: SITE INVESTIGATION - ADANAC
LOCATION: WATER SUPPLY DAM (N2 AXIS)
TEST PIT Nº: 57 & 58
DATE: Sept. 1979 PLATE: 28

TEST PIT LOGS

TP- 59	Lat. 6620 280.3 Dep. 593 188.3	Surface Elev. 1310.1

SOIL DESCRIPTION	Depth (M)	Sample Nº
SILTY GRAVEL (Colluvium) - subangular to angular gravel - loose - medium brown	1	
1.83	2	
SILTY SANDY GRAVEL (Colluvium?) - subrounded to subangular gravel - medium to coarse sand - little silt - loose to medium dense - medium brown	3	+ 59.1
3.35	4	
END OF TEST PIT	5	

TP-	Lat. Dep.	Surface Elev.

SOIL DESCRIPTION	Depth (M)	Sample Nº
	1	
	2	
	3	
	4	
	5	

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JOB Nº: VA 2538
PROJECT: SITE INVESTIGATION - ADANAC
LOCATION: WATER SUPPLY DAM (N2 Axis)
TEST PIT Nº: 59
DATE: Sept. 1979 PLATE: 29

TEST PIT LOGS

TP- 61

Lat. 6619 697.7
Dep. 592 607.7

Surface Elev. 1337.2

SOIL DESCRIPTION	Depth (M)	Sample Nº
SILT - SAND - GRAVEL (TILL) - subangular to angular gravel - fine to coarse sand - dense to medium dense - very heterogenous - greyish light brown (GM)	1 2	* 61-1
2.74	3	
END OF TEST PIT water seepage at 2.44	4 5	

TP- 62

Lat. 6619 844.4
Dep. 592 576.0

Surface Elev. 1326.4

SOIL DESCRIPTION	Depth (M)	Sample Nº
TOPSOIL - SAND AND GRAVEL - brown 0.30		
SILT - SAND - GRAVEL (COLLUVIUM?) - fine to coarse angular sand - trace of clay - loose - medium brown	1	
GRAVEL - subrounded to angular - trace of bedding - little silt - loose, brown 1.37 1.83	2	* 62.1
SILT - SAND - GRAVEL (TILL) - subrounded to subangular gravel - medium brown (GM) 2.74	3	
END OF TEST PIT	4 5	

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CLIENT: PLACER DEVELOPMENT LTD

JOB Nº: VA 2538
PROJECT: SITE INVESTIGATION - ADANAC
LOCATION: BORROW AREA II
TEST PIT Nº: 61 & 62
DATE: SEPT, 1979
PLATE: 30

TEST PIT LOGS

TP- 63

Lat. 6620 029.7
Dep. 592 527.6

Surface Elev. 1329.2

SOIL DESCRIPTION	Depth (M)	Sample Nº
INTERBEDDED GRAVEL AND GRAVELLY SILTS - black cinder gravels from 0 to 0.61 - subrounded to rounded gravels - little fine to coarse sand in silt layers - layers less than 0.3 m thickness.	1 2	
1.83		
SILTY SAND & GRAVEL (TILL) - angular to sub-rounded gravel - fine to coarse sand - dense (GM)	3	* 63-1
2.89		
END OF TEST PIT	4 5	

TP- 64

Lat. 6619 881.8
Dep. 592 502.4

Surface Elev. 1333.9

SOIL DESCRIPTION	Depth (M)	Sample Nº
SAND AND GRAVEL - rounded to subrounded gravel - fine to coarse sand - little silt - loose - medium brown - interbedded silty layers (GW)	1 2 3	64-*
3.96		
END OF TEST PIT	4 5	

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JOB Nº: VA 2538
PROJECT: SITE INVESTIGATION - ADANAC
LOCATION: BORROW AREA II
TEST PIT Nº: 63 & 64
DATE: SEPT, 1979 | PLATE: 31

TEST PIT LOGS

TP- 65	Lat. 6619 811.7 Dep. 592 532.7	Surface Elev. 1332.3

SOIL DESCRIPTION	Depth (M)	Sample Nº
TOPSOIL - SILT AND GRAVEL - light brown 0.30		
SILTY SAND AND GRAVEL (TILL) - subrounded to angular gravel - fine to coarse sand - trace of clay - very heterogeneous - greyish light brown (GM)	1 2	* 65-1
2.13 END OF TEST PIT	3 4 5	

TP-	Lat. Dep.	Surface Elev.

SOIL DESCRIPTION	Depth (M)	Sample Nº
	1 2 3 4 5	

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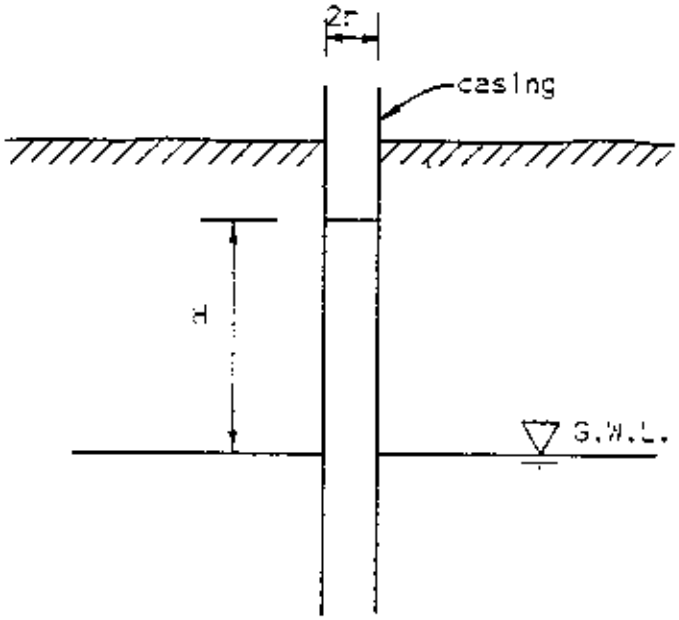
JOB Nº: VA 2538
PROJECT: SITE INVESTIGATION - ADANAC
LOCATION: BORROW AREA II
TEST PIT Nº: 65
DATE: SEPT, 1979 | PLATE: 32



$$k = \frac{1}{C}\,\frac{Q}{rH}$$

Q = rate of flow

r = inside radius of casing

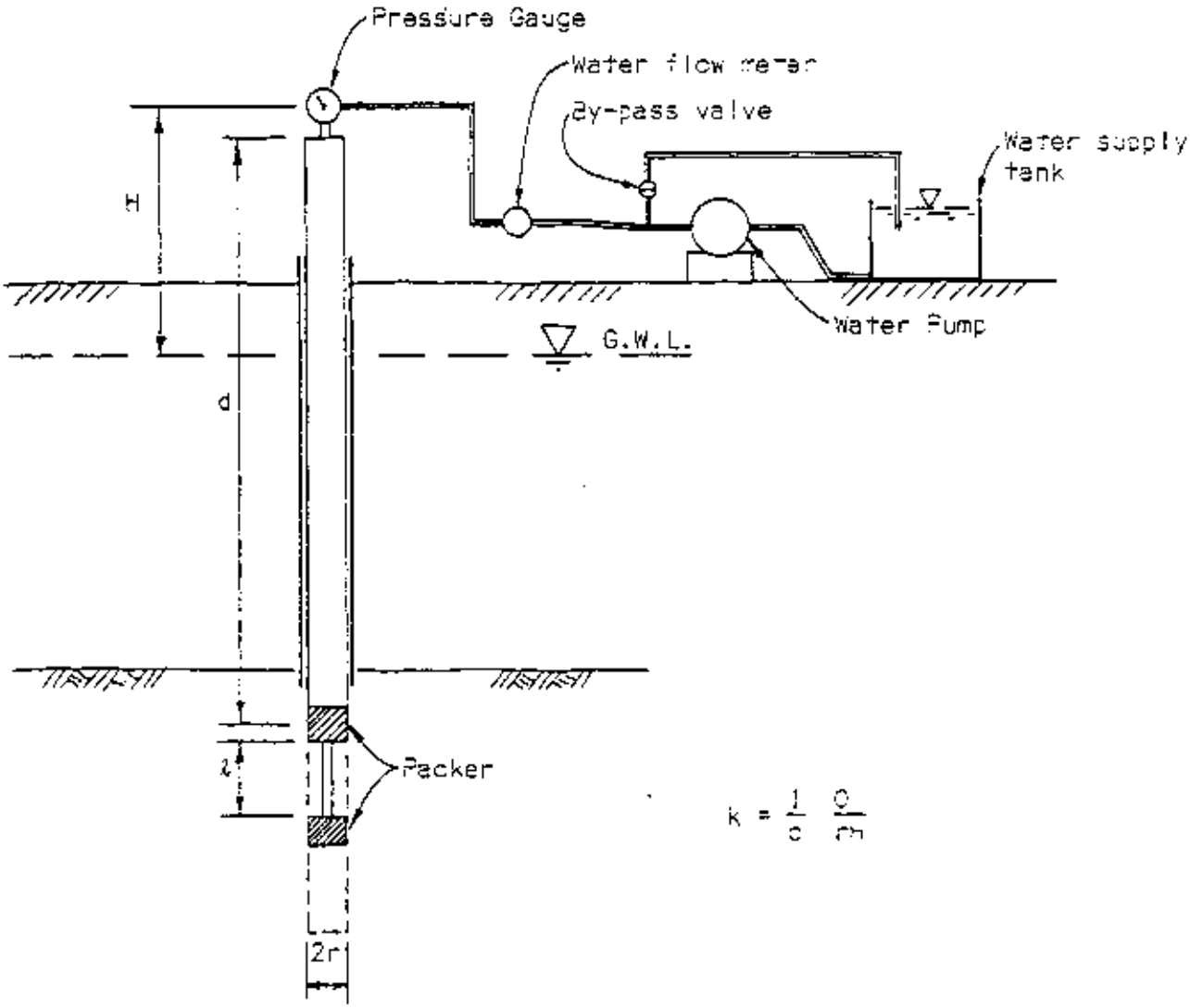
H = head of water above ground water table

C = conductivity coefficient (dimensionless)

= 5.7 (from Lacroix, 1960)

METHOD I : FALLING HEAD PERMEABILITY TEST

PLATE No. 33



$$k = \frac{1}{c}\,\frac{Q}{rh}$$

Q = rate of flow

r = radius of hole in the rock

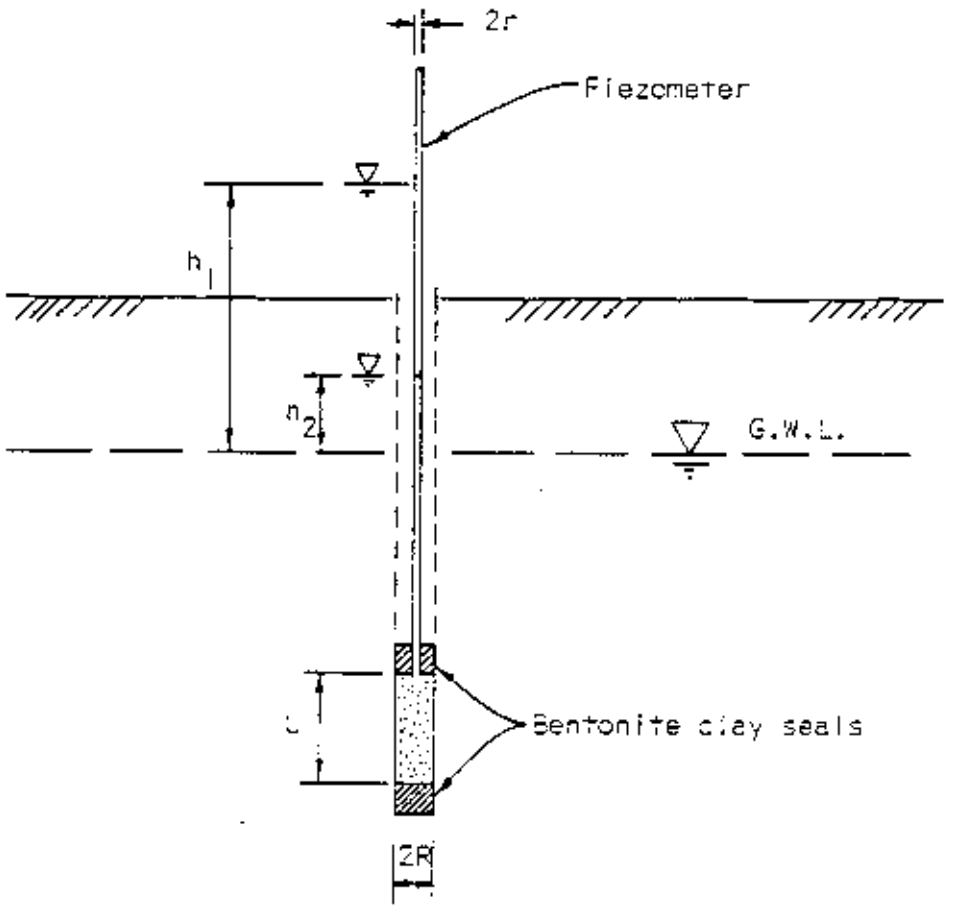
h = static water head

H = gauge reading + h - pressure loss in the pipe of length d

c = conductivity coefficient (dimensionless) (from Zangar, 1953, Fig. 41)

ℓ = test length, used to determine c

METHOD 11 : PACKER PERMEABILITY TEST



$$k = \frac{r^2}{2L} \ln\left(\frac{L}{R}\right)\left[\frac{\ln h_1/h_2}{t_2 - t_1}\right]$$

h_1 = head of water above ground water level at time t_1

h_2 = head of water above ground water level at time t_2

L = length of active section of piezometer

R = radius of hole

r = radius of standpipe

METHOD III : FALLING HEAD PERMEABILITY IN PIEZOMETER

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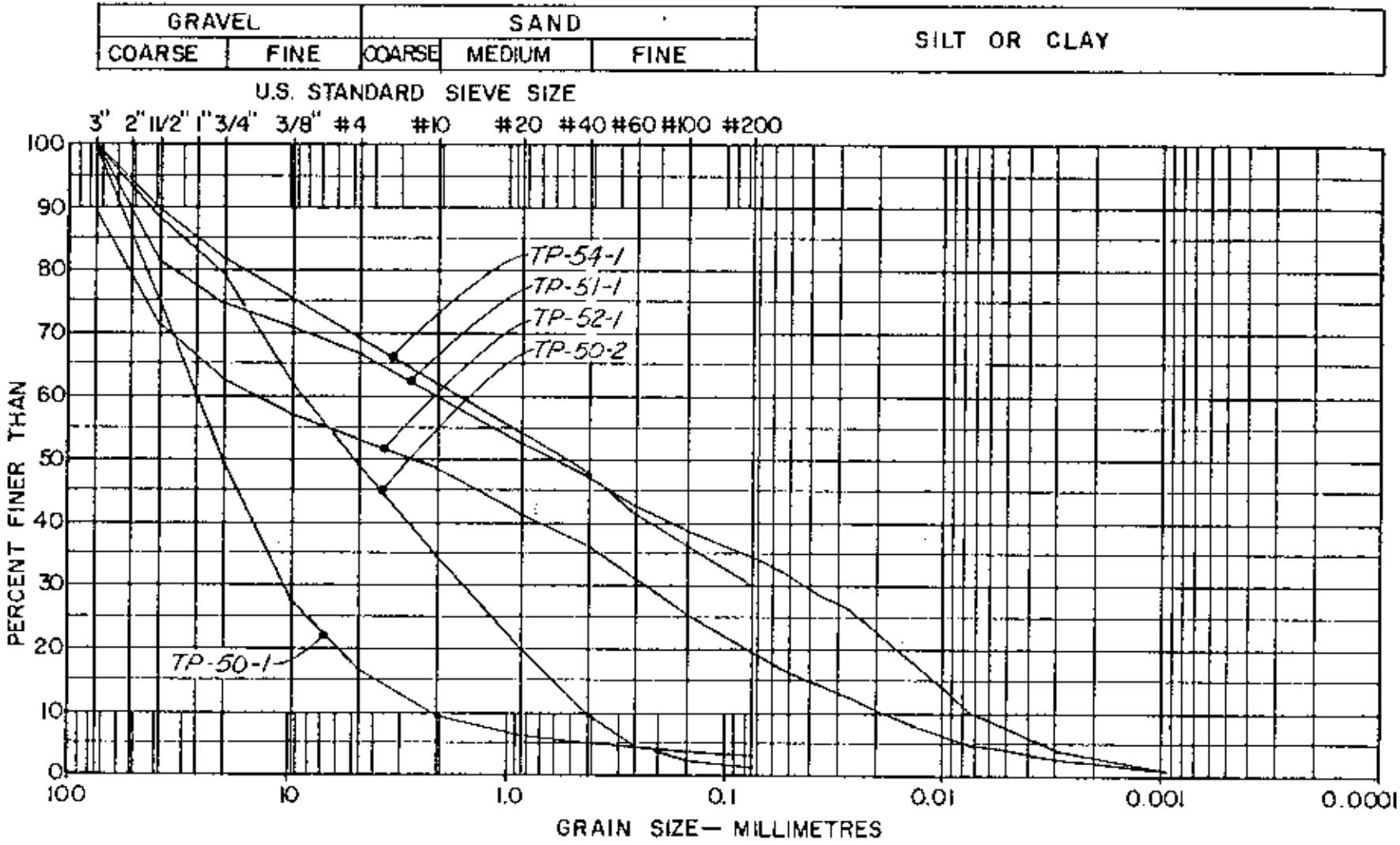
GRAIN SIZE CURVE

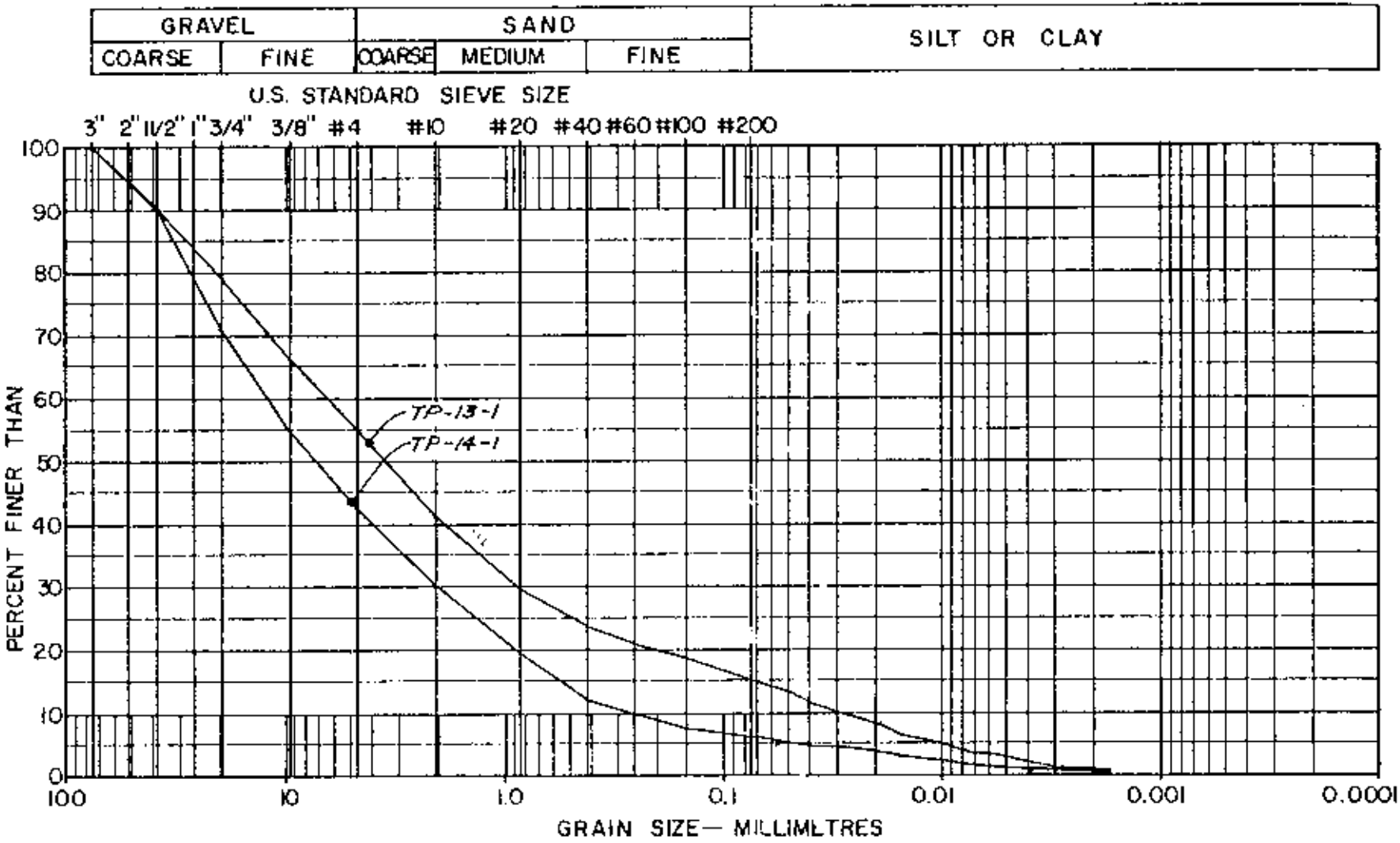


REMARKS:

TP-50-1	Depth 1.6 m	Sand and gravel (Colluvium)
TP-50-2	Depth 2.5 m	Reworked colluvium
TP-51-1	Depth 1.9 m	Till
TP-52-1	Depth 1.6 m	Till
TP-54-1	Depth 1.8 m	Till

JOB No. VA 2538
PROJECT Site Investigation - Adanac
LOCATION Borrow Area 1
HOLE No. As shown DEPTH As shown
DATE Aug. 1979 PLATE 36

GRAIN SIZE CURVE



REMARKS: TP - 13 - 1 Depth 2.9 m Sand and gravel

TP - 14 - 1 Depth 4.0 m Sand and gravel

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JOB No. VA 2538

PROJECT Site Investigation - Adanac

LOCATION Tailings Dam Site

HOLE No. As shown DEPTH As shown

DATE Aug. 1979 PLATE 37

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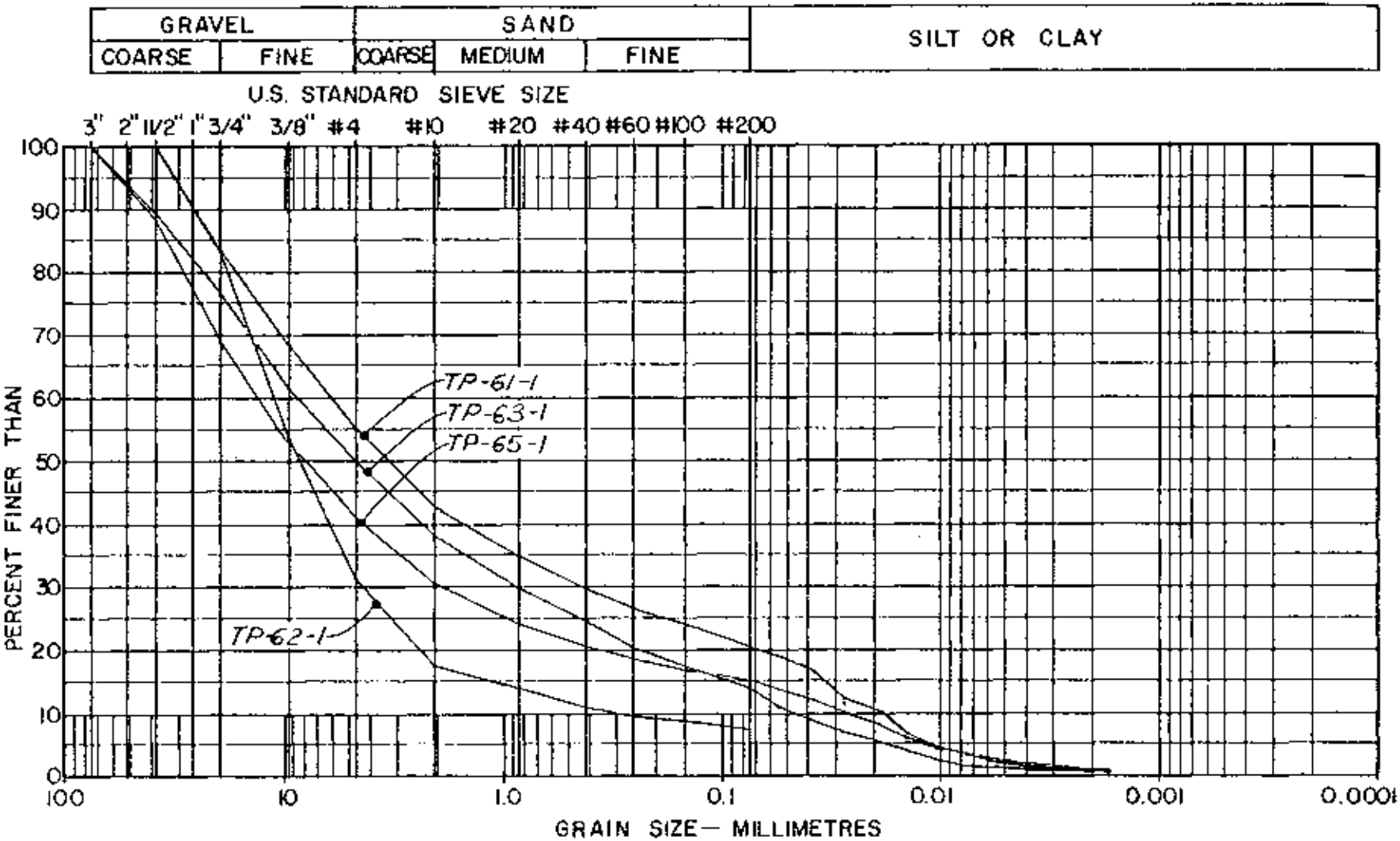
GRAIN SIZE CURVE



REMARKS: TP-61-1 Depth 2.4 m Till

TP-62-1 Depth 2.2m Till

TP-63-1 Depth 2.4 m Till

TP-65-1 Depth 1.8 m Till

JOB No.	VA 2538
PROJECT	Site Investigation - Adanac
LOCATION	Borrow Area II
HOLE No.	As shown DEPTH As shown
DATE	Aug. 1979 PLATE 38

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JOB No. VA 2538

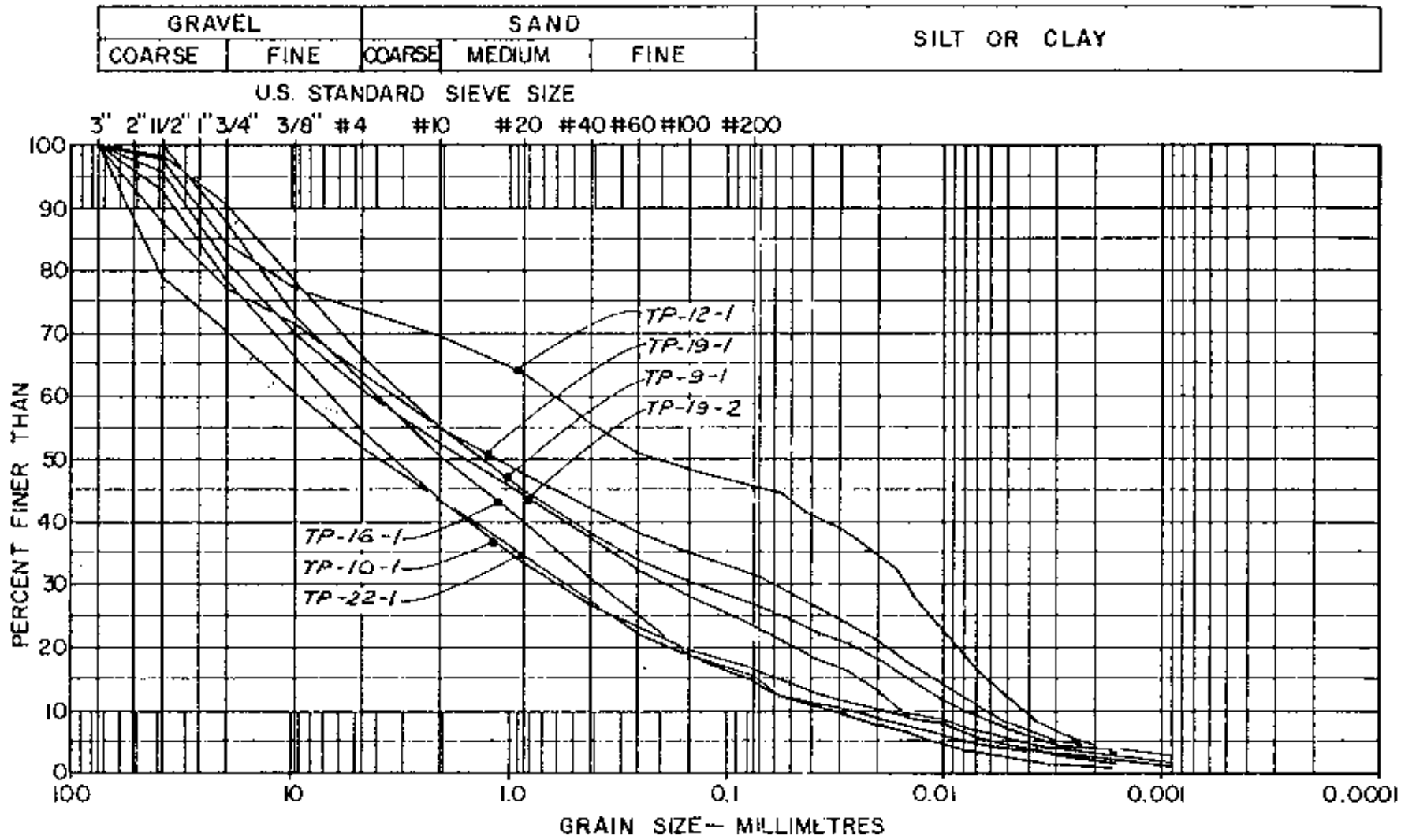
PROJECT Site Investigation - Adanac

LOCATION Tailings Dam Site

HOLE No. As shown DEPTH As shown

DATE Aug. 1979 PLATE 39

GRAIN SIZE CURVE



REMARKS:

TP-9-1	Depth	1.4m	Till
TP-10-1	Depth	2.1m	Till
TP-12-1	Depth	1.0m	Till
TP-16-1	Depth	1.5m	Till
TP-19-1	Depth	1.3m	Till
TP-19-2	Depth	3.0m	Till
TP-22-1	Depth	2.0m	Till

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JOB No. VA 2538

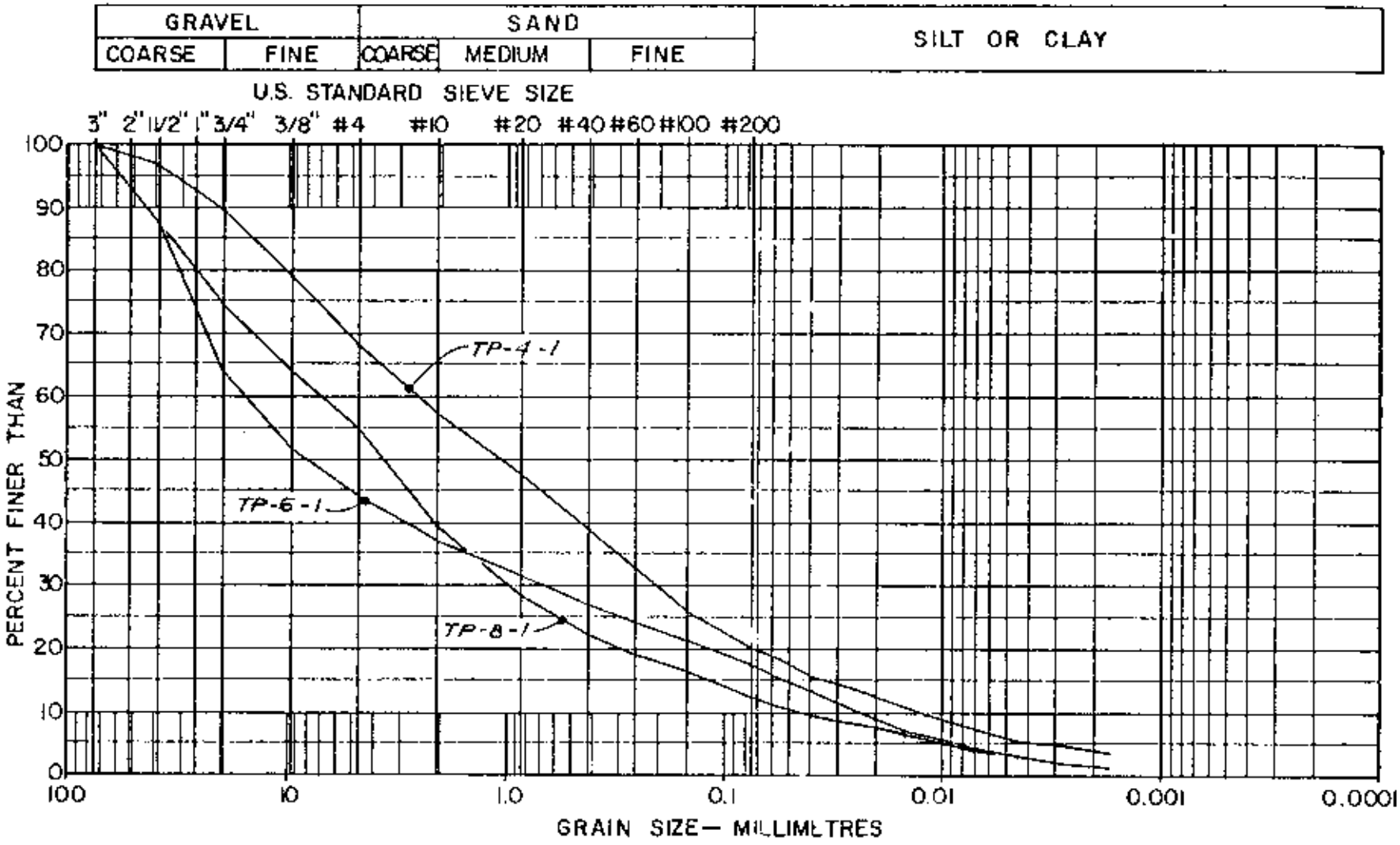
PROJECT Site Investigation - Adams

LOCATION Plant Site

HOLE No. As shown DEPTH As shown

DATE Aug. 1979 PLATE 40

GRAIN SIZE CURVE



REMARKS: TP-4-1 Depth 1.6 m Sand and gravel

TP-6-1 Depth 3.0 m Till

TP-8-1 Depth 2.5 m Sand and gravel

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JOB No. VA 2538

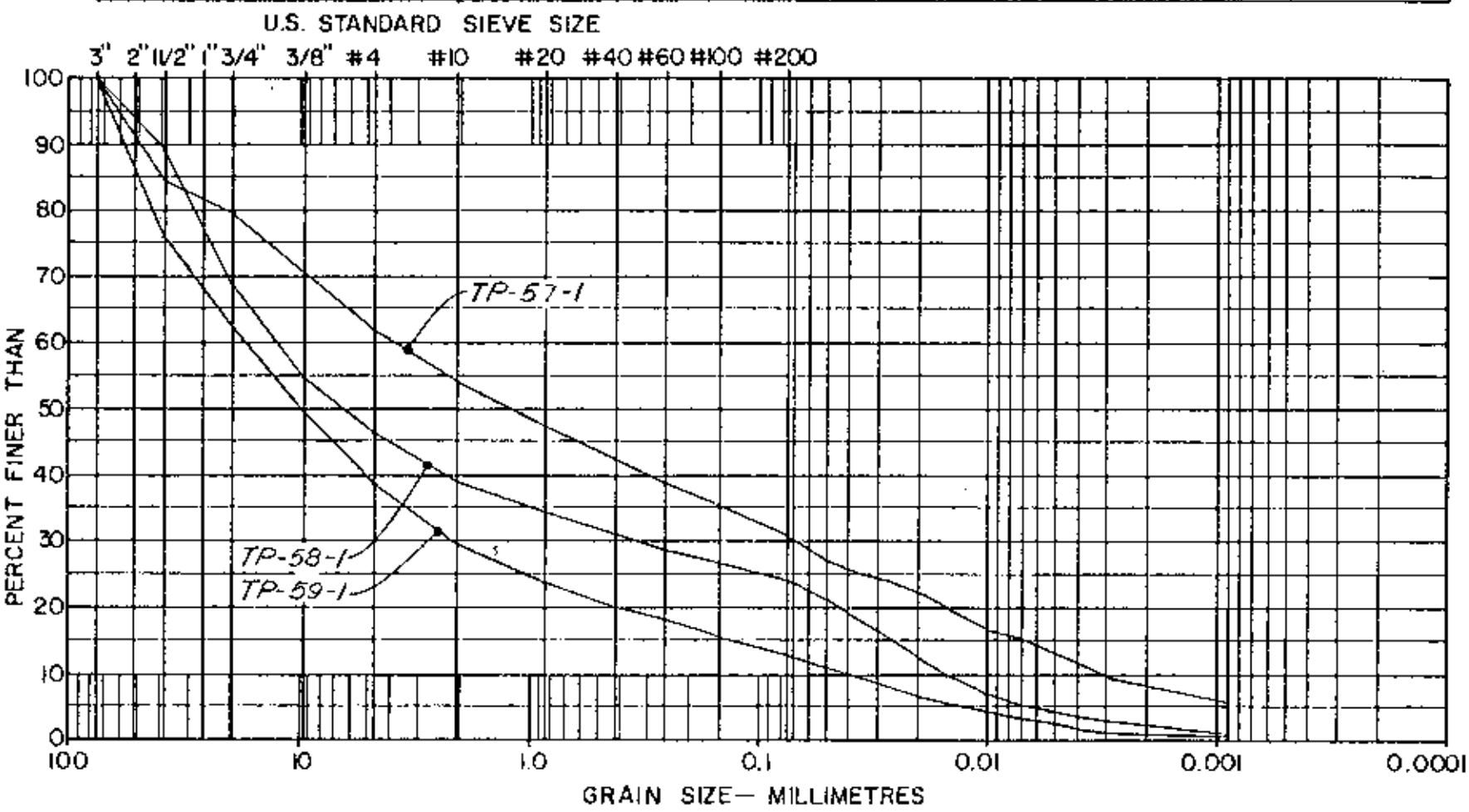
PROJECT Site Investigation - Adanac

LOCATION W2 Axis

HOLE No. As shown DEPTH As shown

DATE Aug. 1979 PLATE 41

GRAIN SIZE CURVE



REMARKS: TP-57-1 Depth 3.2 m Till

TP-58-1 Depth 2.6 m Gravel

TP-59-1 Depth 3.1 m Silt and gravel (Colluvium)

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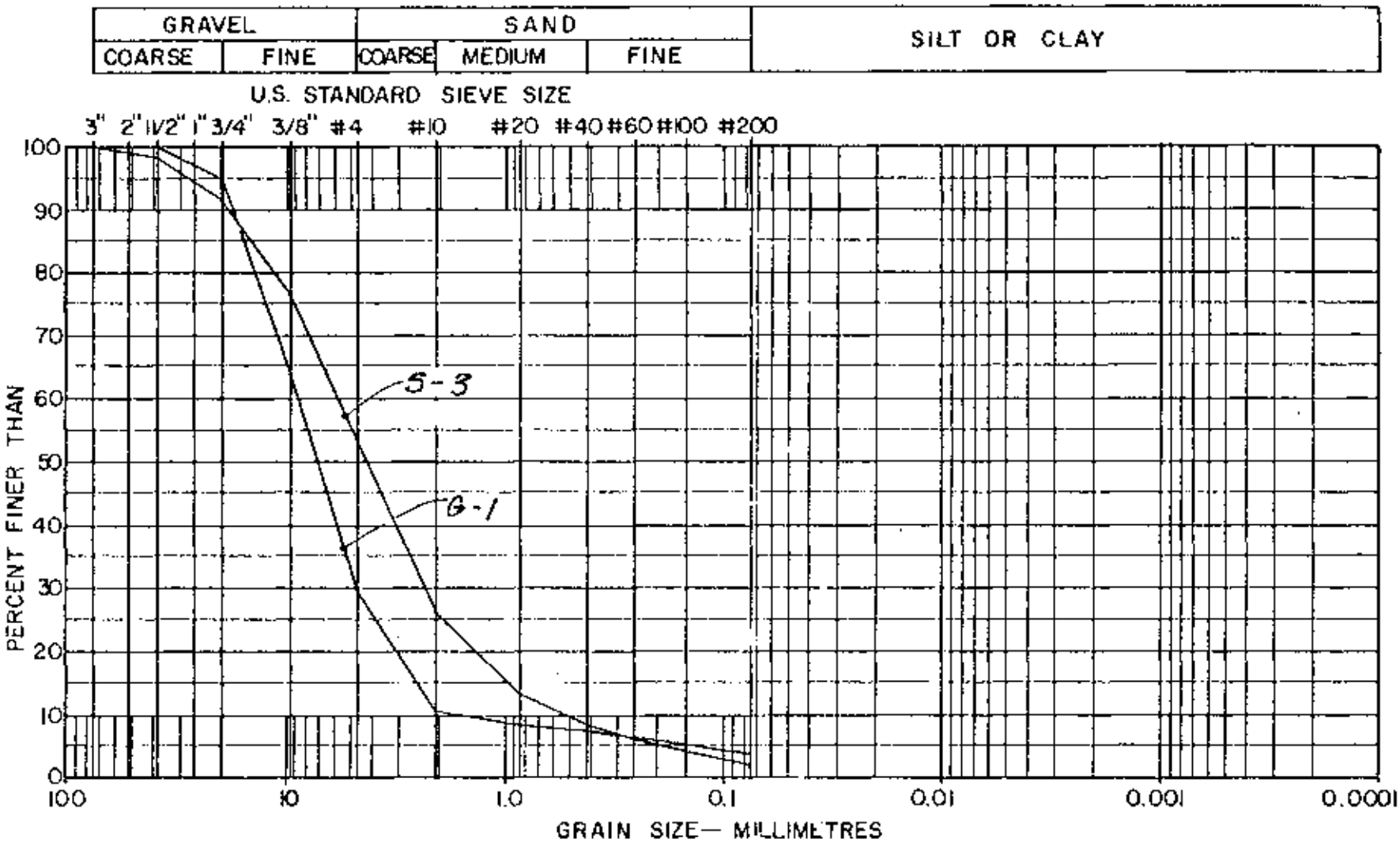
GRAIN SIZE CURVE



REMARKS: S-3 Black cinders.
G-1 Red cinders from south road cut just east of Tailings Dam.

JOB No. VA 2538
PROJECT Site Investigation - Adanac
LOCATION
HOLE No. DEPTH
DATE Aug. 1979 PLATE 42

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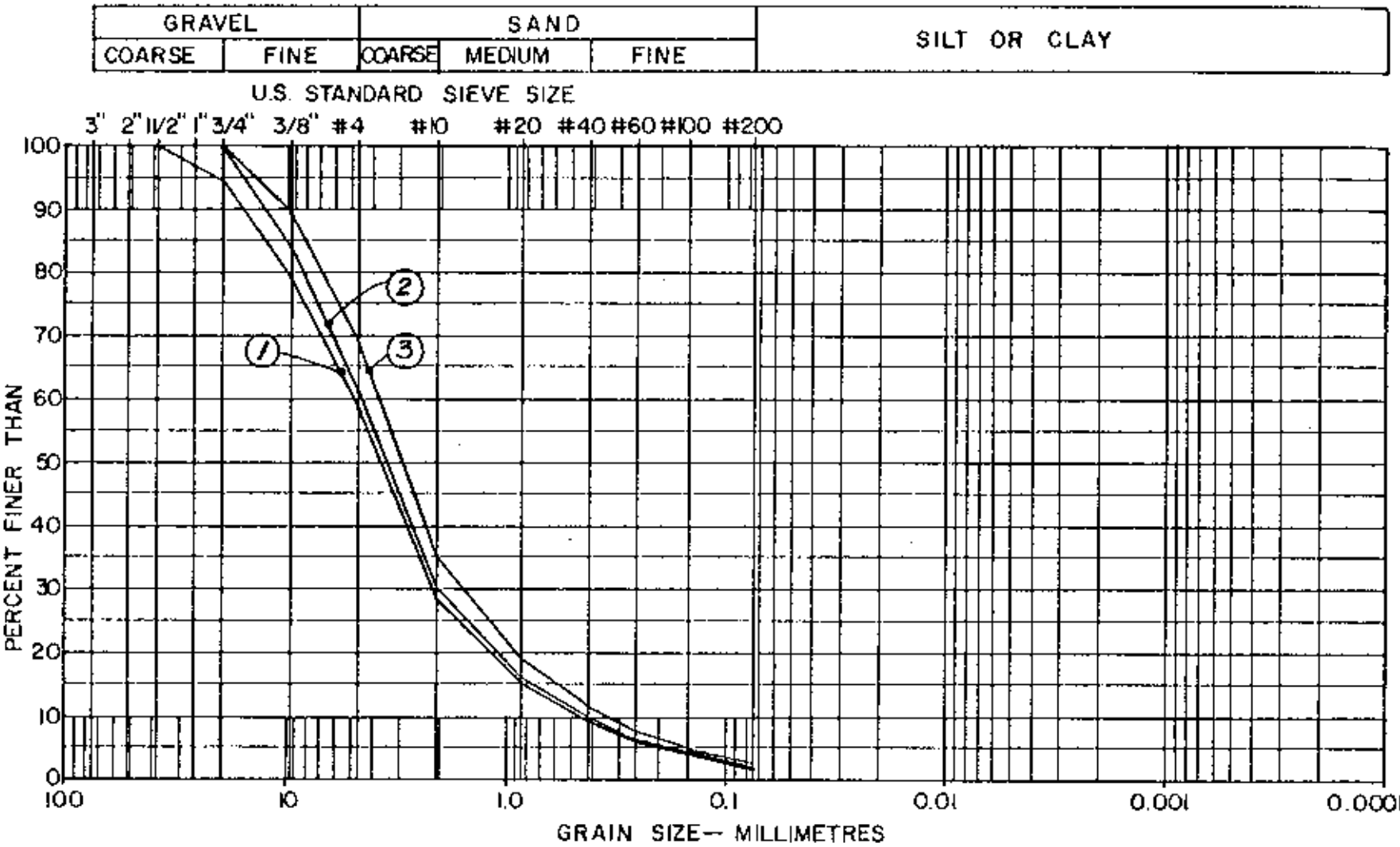
GRAIN SIZE CURVE



REMARKS: (1) Total Sample (Black Cinders)

(2) Sample - 3/4" Before Compaction

(3) Sample - 3/4" After Compaction

Permeability , $k = 1 \times 10^{-2}$ cm/sec.

JOB No. 1/A 2538
PROJECT Site Investigation - Adanac
LOCATION W-1 Axis
HOLE No.
DEPTH
DATE Aug., 1979
PLATE 43

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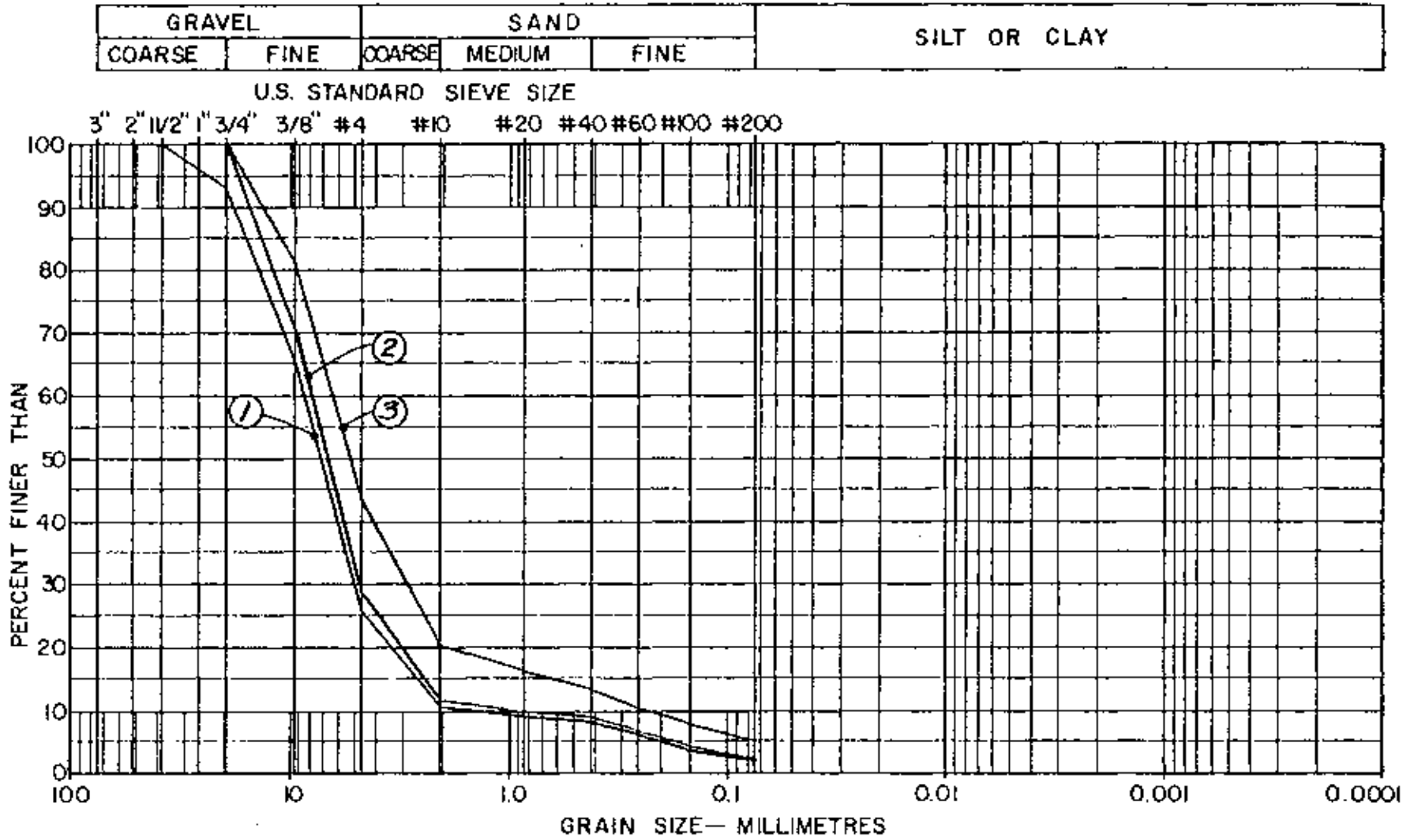
GRAIN SIZE CURVE



REMARKS: Red Cinders

(1) Total Sample

(2) Sample - 3/4" Before Compaction

(3) Sample - 3/4" After Compaction

Permeability, $k = 1 \times 10^{-2}$ cm/sec.

JOB No.	VA 2538
PROJECT	Site Investigation - Adanac
LOCATION	Black Cinders
HOLE No.	
DEPTH	
DATE	Aug., 1979
	PLATE 44

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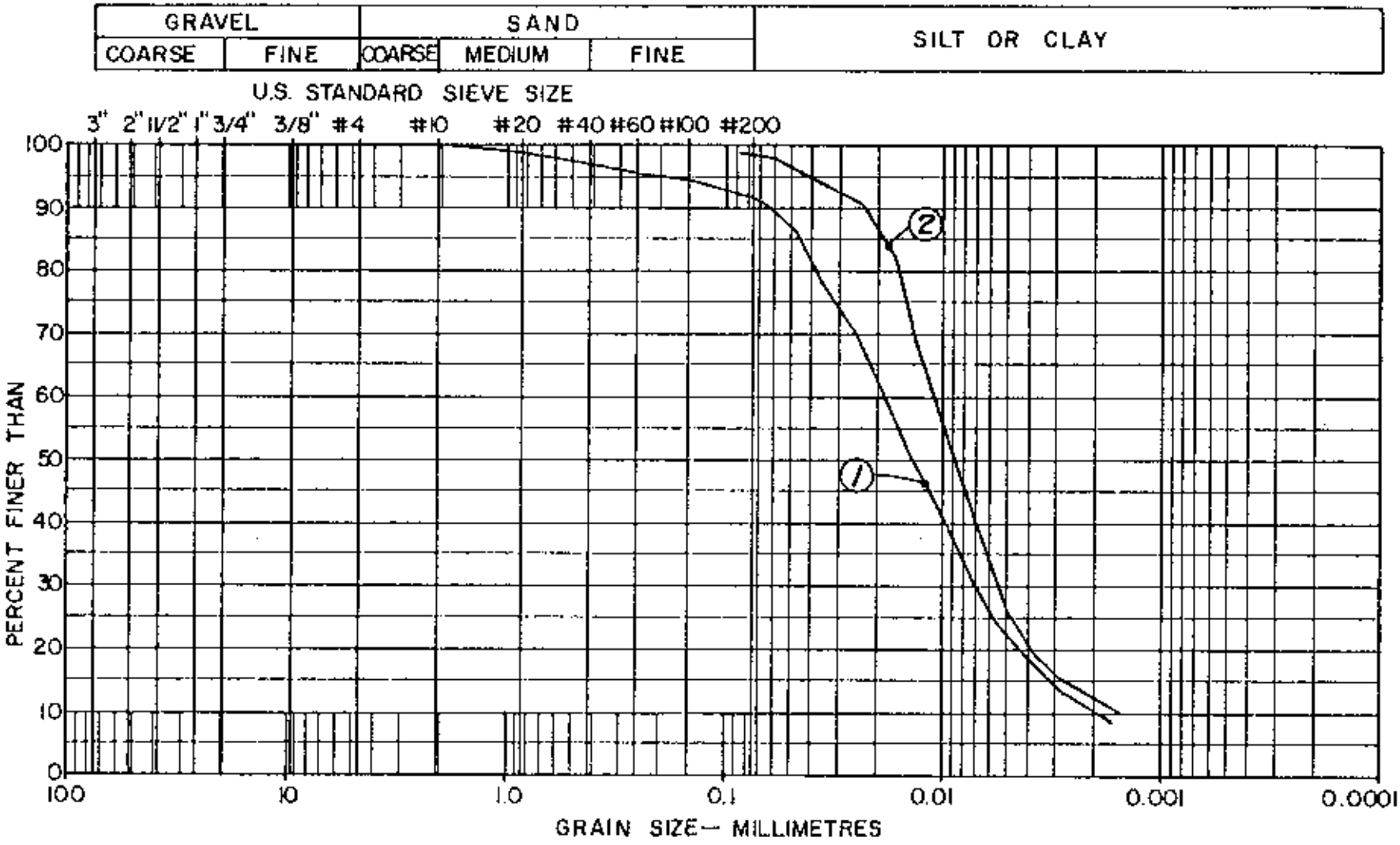
GRAIN SIZE CURVE



REMARKS:

(1) Depth = 17.5' to 19'

(2) Depth = 9.0' to 10.3'

JOB No. VA 2538

PROJECT Site Investigation - Adanac

LOCATION Tailings Dam Site

HOLE No. DDH-T3 DEPTH As shown

DATE Aug 1979 PLATE 45

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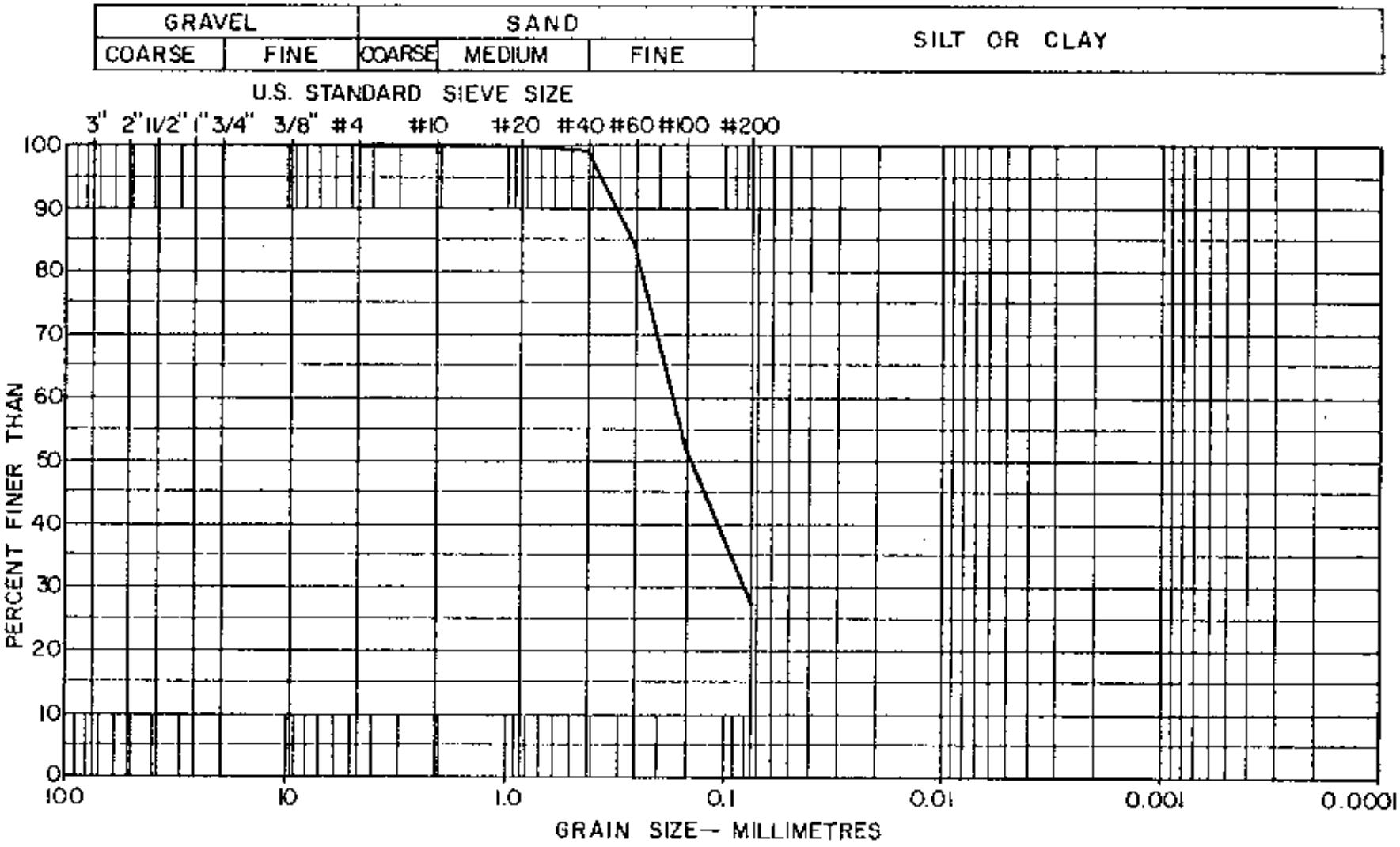
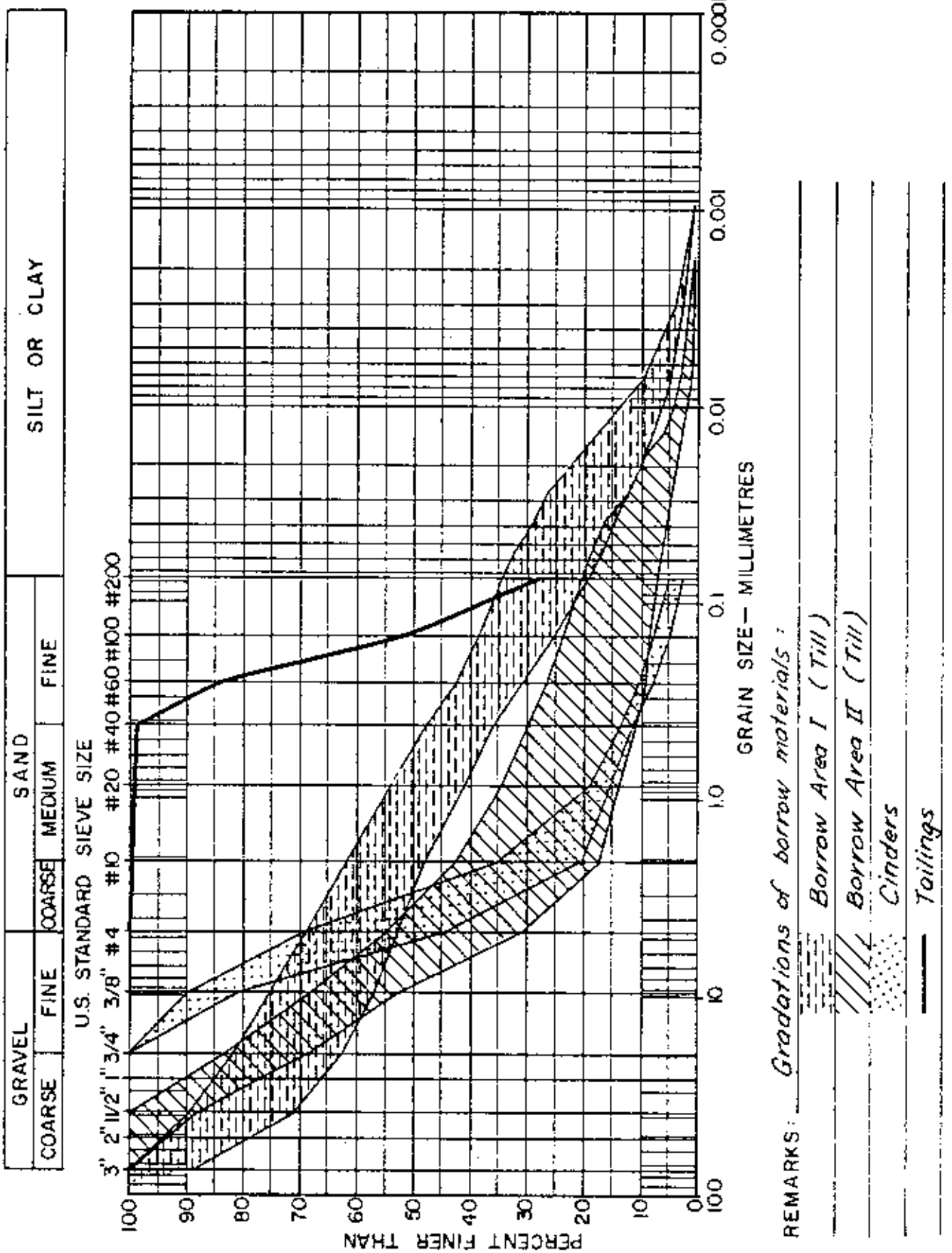
GRAIN SIZE CURVE



REMARKS: *Tailings from Pilot Pond.*

JOB No. VA 2485
PROJECT *Site Investigation - Adanac*
LOCATION *Pilot Pond*
HOLE No. DEPTH *0.2 m*
DATE *Aug. 1979* PLATE *46*

GRAIN SIZE CURVE



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JOB No.	VA 2485
PROJECT	Site Investigation - Adanac
LOCATION	
HOLE No.	DEPTH
DATE	Sept., 1979 PLATE 47

GEOLOGIC LOGS - SITE INVESTIGATION

"P.S. #2" (0-302') Vertical:

Biotite-rich quartz-monzonite mafic porphyry or granodiorite porphyry (25' - 302'); 80 - 90% recovery, with variable alteration related to fracture density. Mainly chloritic alteration of biotites and feldspars. Rare quartz veins and fractures contain traces of pyrite but no molybdenite.

"T-2" (0-249') Vertical:

Coarse-grained quartz monzonite (156' - 249'); 50% recovery, minor limonite alteration near surface but moderate to intense deformation and hydrothermal alteration at depth. The quartz-monzonite is sheared, fractured and quartz-veined, particularly below 190'. The principal quartz vein direction is 80^{o} to core axis. The quartz-monzonite shows secondary chloritization and silicification. Scattered specks of molybdenite and pyrite occur in quartz veins and on fractures below 190' level. Mineralized fractures occur at both steep and shallow angles to core axis.

"T-4" (0-112') Vertical:

Hybrid quartz-monzonite porphyry (88' - 112'); 80% recovery, with no sign of limonite alteration near surface. The porphyry consists of approximately 15% of orthoclase phenocrysts (1 cm) in a finer, aplitic matrix. The rock shows no sign of either pyrite or molybdenite alteration.

"T-5" (0-201') Vertical:

Mixed units of coarse-grained quartz monzonite and hybrid quartz monzonite porphyry (53'-201'); 90% recovery, near surface limonite stain to 96' and minor hydrothermal alteration throughout. Coarse-grained quartz monzonite is variably veined and soaked in a biotite rich aplitic, matrix. Crystals of orthoclase and plagioclase occur as xenocrysts within the hybrid quartz monzonite porphyry. The rock contains no molybdenite and only a trace of pyrite.

ESH/mt
December 17, 1979

"T-6" (0-282') Vertical:

Mixed units of coarse-grained quartz monzonite and hybrid quartz monzonite porphyry (74'-280'); 80% recovery, with no sign of limonite alteration near surface. The rock is generally fresh, although it is cut by two major zones of silicification and chlorite alteration from 152'-175'. Coarse-grained quartz monzonite is locally veined and soaked in aplitic magma which gives a hybrid sub porphyritic, texture to the rock. Sections of core are significantly enriched in primary biotite. There is no molybdenite and only a trace of pyrite.

"T-7" (0-282') Vertical:

Homogeneous, equigranular, coarse-grained quartz monzonite (80'-282'); 80 - 90% recovery, with limonite stain along fractures to depth of 100'. The rock is generally fairly fresh but silicification and chloritic alteration occur near fractures. Silicification occurs adjacent to quartz veins sub-parallel to the core axis. Minor pyrite is found on fractures below the oxidation zone.

"W-1" (0-211') Vertical:

Coarse-grained quartz monzonite (139' - 211'), 70% recovery, with moderate alteration and minor limonite near surface. Silicification and chloritization occurs in zones of deformation. Local quartz veins are molybdenite free but contain pyrite traces.

Geologic Descriptions by
R.H. Pinsent

ESH/mt
December 17, 1979

ADANAC DRILL CORE ASSAYS

Hole No. PS-1

Sample	Footage	G Split % Mo	H Split % Mo
64293	30-40	N.D.	N.D.
64294	40-50	0.007	0.007
64295	50-60	0.003	0.003
64296	60-70	0.037	0.035
64297	70-80	0.006	0.006
64298	80-90	0.009	0.009
64299	90-100	0.012	0.012
64300	100-110	0.001	0.001
64301	110-120	0.006	0.007
64302	120-130	0.300	0.297
64303	130-140	0.018	0.018
64304	140-150	0.003	0.003
64305	150-160	0.008	0.008
64306	160-170	0.010	0.010
64307	170-180	0.109	0.115
64308	180-190	0.012	0.014
64309	190-200	0.016	0.016
64310	200-210	0.022	0.022
64311	210-220	0.011	0.011
64312	220-230	0.007	0.007
64313	230-240	0.038	0.035
64314	240-250	0.041	0.042
64315	250-260	0.012	0.012
64316	260-270	0.035	0.035
64317	270-280	0.015	0.015
64318	280-290	0.013	0.014
64319	290-300	0.011	0.011
64320	300-310	0.009	0.009
64321	310-320	0.019	0.019
64322	320-330	0.015	0.014
64323	330-340	0.016	0.016
64324	340-350	0.030	0.030
64325	350-360	0.074	0.074
64326	360-371	0.010	0.010

ESH/mt
December 6, 1979

ADANAC DRILL CORE ASSAYS

Hole No. PDL T-2

Sample	Footage	G Split % Mo	H Split % Mo
64058	190-200	0.031	0.031
64059	200-210	0.021	0.021
64060	210-220	0.016	0.016
64061	220-230	0.164	0.164
64062	230-240	0.061	0.061
64063	240-249	0.029	0.027

ESH/mt
December 6, 1979

REFERENCE ORIGINAL BASE MAP BY PLACER DEVELOPMENT LTD, ADANAC MOLYBDENUM PROJECT DRAWING FILE Nº 79-08-V-164-13B-0025.

50 0 100 200 300 400 m

MINERAL RESOURCES BRANCH ASSESSMENT REPORT NO. 7727

PART 2 of 3

PROFESSIONAL ENGINEER, PROVINCE OF BRITISH COLUMBIA, E. S. HOLT

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Klohn Leonoff Consultants Ltd.
CIVIL & GEOTECHNICAL ENGINEERS
VANCOUVER - CALGARY - WINNIPEG, CANADA

CLIENT: PLACER DEVELOPMENT LTD.

REV.	DATE	REVISION DETAILS
DESIGN V.K.G./K.L.	DRAWN F.C.	DATE Sept., 1979 — SCALES As shown

PROJECT: ADANAC - SITE INVESTIGATION

TITLE: LAYOUT AND BOREHOLE / PIT LOCATION PLAN

DATE OF ISSUE: Sept. 28, 79 — PROJECT No. VA 2538 — DWG. No. E-2538-1 — REV.

KEY TO PLANT UNITS

1 PRIMARY CRUSHER
2 SECONDARY-TERTIARY CRUSHING PLANT
3 COARSE STOCKPILE
4 FINE ORE STORAGE
5 CONCENTRATOR
6 SHOPS-WAREHOUSE-OFFICE COMPLEX
7 DIESEL TANK FARM
8 POWER PLANT
9 SUB STATION

MAP AREA

0 5 10 KILOMETRES

ATLIN LAKE · SURPRISE LAKE · Pine Creek · Spruce Cr.

DIVERSION DITCH

ACCESS ROAD

WASTE DUMP

LOW GRADE STOCKPILE

TAILING IMPOUNDMENT

OPEN PIT

WASTE DUMP

DIVERSION DITCH

SEEPAGE DAM

FRESH WATER STORAGE

OPEN GROUND

OPEN GROUND

CM #1 CM #2 CM #3 CM #4 CM #5 CM #6 CM #7 CM #8 CM #9 CM #10

HOBO #1 HOBO #2 HOBO #3 HOBO #4 HOBO #5 HOBO #6 HOBO #7 HOBO #8 HOBO #9 HOBO #10 HOBO #11 HOBO #12 HOBO #13 HOBO #14 HOBO #17 HOBO #18 HOBO #19

HOBO #47 HOBO #48 HOBO #53 HOBO #54 HOBO #66(New) HOBO #67(New) HOBO #68(New) HOBO #69(New) HOBO #70(New) HOBO #71(New) HOBO #72(New) HOBO #73(New)

HOBO #74 HOBO #75 HOBO #76 HOBO #77 HOBO #78 HOBO #79 HOBO #80 HOBO #81 HOBO #82

HOBO 216A FR HOBO 216 FR HOBO 220 FR HOBO 133 FR HOBO 168 FR

CLAIRE 4 FR CLAIRE 3 FR CLAIRE 2 FR CLAIRE 1 FR

PETER 2 FR BLUE PETER 1 FR

RUTH 1 FR RUTH 3 FR

DAWN 1 FR

ZAP #6 ZAP #7 ZAP #8

ADERA #1 ADERA #2 ADERA #3 ADERA #4 ADERA #5 FR ADERA #6 ADERA #7 ADERA #8 ADERA #9 ADERA #10 ADERA #11 ADERA #12 ADERA No.8

PACIFIC #1 PACIFIC #2

THOR #2 THOR #4 THOR #6 THOR #8 THOR 10 THOR 12

PAT #12 PAT 13 FR LEO JAN

MOLLY LAKE #1 (591)

KEY 13 KEY 14 KEY 15 KEY 16 KEY 17 KEY 18 KEY 19 KEY 20 KEY 21 KEY 22 KEY 23 KEY 24 KEY 25 KEY 26 KEY 28

589,000 E 589,500 E 590,000 E 590,500 E 591,000 E 591,500 E 592,000 E 592,500 E 593,000 E 593,500 E 594,000 E

6,622,500 N 6,622,000 N 6,621,500 N 6,621,000 N 6,620,500 N 6,620,000 N

PROFESSIONAL ENGINEER PROVINCE OF BRITISH COLUMBIA E.B. HOLT

MINERAL RESOURCES BRANCH ASSESSMENT REPORT NO. 7727

PLACER DEVELOPMENT LIMITED
ATLIN MINING DIVISION PART 2 OF 3
ADANAC MOLYBDENUM PROJECT

GENERAL OPERATING PLAN

0 100 200 300 400 500 600 700 METRES

AUG., 1979. FILE NO. 79-08-V-164-13B-0025 E.S.H. (J.L.)