

**KEMESS PROJECT  
1994 GEOTECHNICAL TEST PITTING PROGRAM  
ASSESSMENT REPORT**

**RECEIVED**

**JUL 27 1995**

**Gold Commissioner's Office  
VANCOUVER, B.C.**

OMINECA MINING DIVISION  
BRITISH COLUMBIA  
CANADA

N.T.S. 94 E/2  
LATITUDE 57°04' N  
LONGITUDE 126°44' W

GEOLOGICAL SURVEY BRANCH  
ASSESSMENT REPORTS

DATE RECEIVED  
AUG 14 1995

**MINERAL CLAIMS**

WASTE 1 FRACTION  
TSIZI 1  
TSIZI 2  
DUN 1  
DUN 2  
DUN 3

**TENURE NUMBERS**

325176  
243442  
243443  
310076  
310077  
310078

**OWNER AND OPERATOR**

**El Condor Resources Ltd.  
1020-800 W. Pender St.  
Vancouver, B.C.  
V6C 2V6**

**July 27, 1995**

by

**L. K. Brommeland, B.Sc.  
C.M. Rebagliati, P. Eng.**

**FILMED**

**24,005**

**GEOLOGICAL BRANCH  
ASSESSMENT REPORT**

# 1994 GEOTECHNICAL TEST PITTING PROGRAM

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## 1.0 SUMMARY

The Kemess Property is located 440 kilometres northwest of Mackenzie, B.C. in the Omineca Mining Division. The 150 square kilometre property is comprised of 134 mineral claims: 23 claims in the Kemess South Block which is subject to a joint venture agreement between El Condor Resources Ltd. (60% interest) and St. Philips Resources Inc. (40% interest); and 111 claims in the Kemess North Block which is owned 100% by El Condor Resources Ltd.

Road access to the Property is north from Mackenzie or Fort St. James via the Omineca Resource Access Road (ORAR). This all-weather mainline road passes approximately 5 kilometres west of the property and El Condor has constructed a tote road between the ORAR and the Property. Access is also possible by scheduled fixed wing aircraft flights from Smithers, B.C. to the Sturdee Airstrip which is located 46 road kilometres north of the Property.

Exploration by numerous operators, including Pacific Ridge Resources Ltd., Anaconda Canada Inc., St. Philips Resources Inc. and El Condor Resources Ltd., culminated in the discovery and definition of a gold-copper porphyry deposit. The Kemess South Deposit contains a mineable reserve of 200,440,000 tonnes of ore at an average grade of 0.22% Cu and 0.63 grams/tonne Au.

A surficial geotechnical investigation program, consisting of thirty-six (36) test pits, was carried out to the east of the main deposit area during the period of August 06 to 19, 1994. The work program, performed by Sturdee Management Inc. with the aid of a Caterpillar 225 excavator operating under the direct supervision of Knight Piesold Ltd., was designed to evaluate the surficial materials and foundation conditions in and around the proposed Tailings Storage Facility.

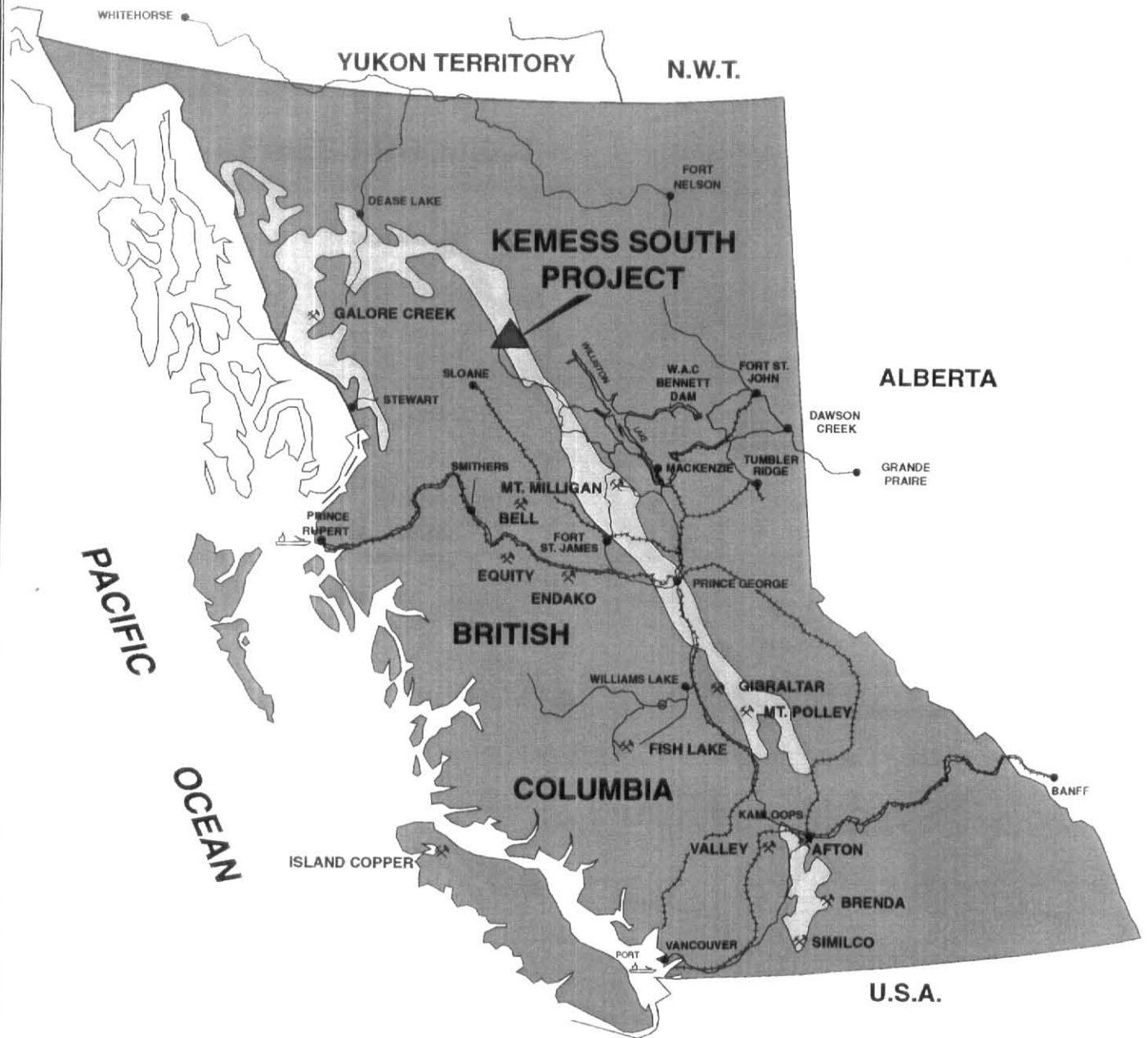
The test pits confirmed that the South Kemess Creek valley, a classic U-shaped glacial valley, contains significant deposits of glacial till overlying bedrock and that glaciofluvial (outwash) sands and gravels overlie the glacial till along terrace areas adjacent to the South Kemess and tributary creek valleys. The test pits also identified the presence of very dense, fine grained, basal till overlying bedrock in most of the proposed tailings area. These results are consistent with and support the results of previous geotechnical investigations carried out at the Tailings Facility.

## 2.0 INTRODUCTION

The Kemess South gold-copper porphyry deposit is located approximately 440 kilometres northwest of Mackenzie, B.C. (Figure 1.0). The Kemess Property, which covers the deposit area, incorporates a total of 134 mineral claims.

El Condor Resources Ltd., in conjunction with Knight Piesold Ltd., conducted a surficial geotechnical investigation program on the property in 1994. This program consisted of thirty-six (36) test pits that were excavated in the area of the proposed Tailings Storage Facility.

This report documents the results and data collected from the thirty-six (36) test pits during the period of August 06 to 19, 1994. The geotechnical program specifically investigated the surficial materials and foundation conditions at the proposed diversion structures of the proposed Tailings Storage Facility and updated information on the availability and quantity of borrow materials for embankment construction. A technical summary of the test pits is contained in Appendix I and test pit logs are located in Appendix III.



WHITEHORSE

YUKON TERRITORY N.W.T.

**KEMESS SOUTH PROJECT**

ALBERTA

PACIFIC OCEAN

BRITISH COLUMBIA

COLUMBIA

U.S.A.

**LEGEND**

- Road
- +—+ Railway
- |—| Quesnel Trough
- ⊗ Open Pit Porphyry Mines & Projects



**EL CONDOR RESOURCES LTD.  
KEMESS SOUTH PROJECT  
LOCATION MAP**

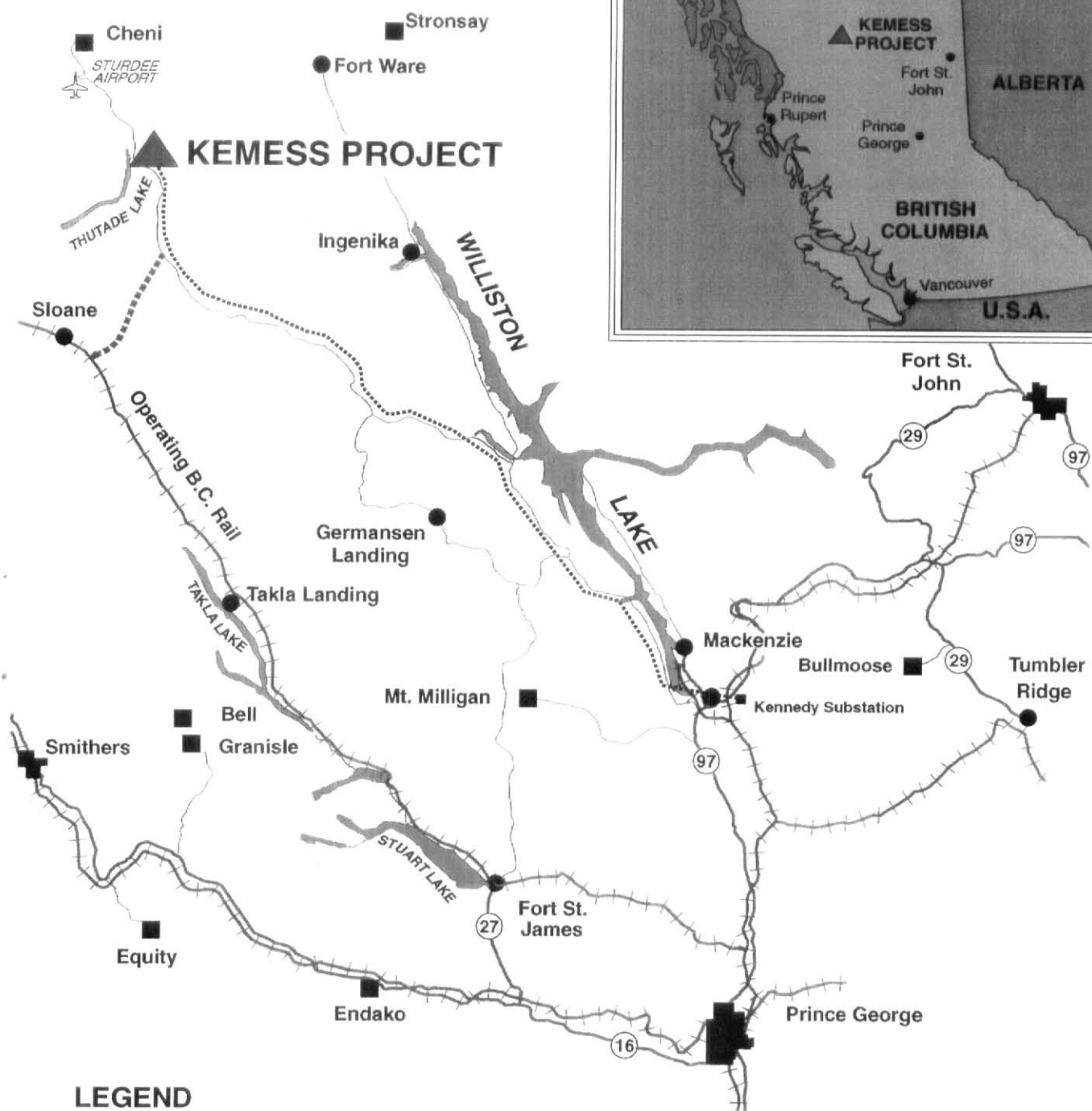
Figure 1.0

### 3.0 LOCATION AND ACCESS

The Kemess Property is situated 7 kilometres east of Thutade Lake, or 265 kilometres north of Smithers, in northcentral British Columbia (Figure 2). The Property is located in the Omineca Mining Division at Latitude 57°04' North, Longitude 126°44' West (NTS 94D/2).

Access to the Property is possible from Prince George (554 road kilometres southeast) via Mackenzie (368 road kilometres southeast). Alternate road access is possible along the Omineca Resource Access Road (ORAR) from Fort St. James. The ORAR, an all-weather mainline industrial road, passes approximately 5 kilometres west of the property and El Condor Resources Ltd. has constructed a tote road between the ORAR and the Property (Figure 3).

Access to the Property is also possible via scheduled fixed wing aircraft flights from Smithers, B.C. to the Sturdee Airstrip. It is approximately 265 air kilometres from Smithers to the Sturdee Airstrip and a further 26 air kilometres by helicopter, or 46 road kilometres by truck, to the Property.



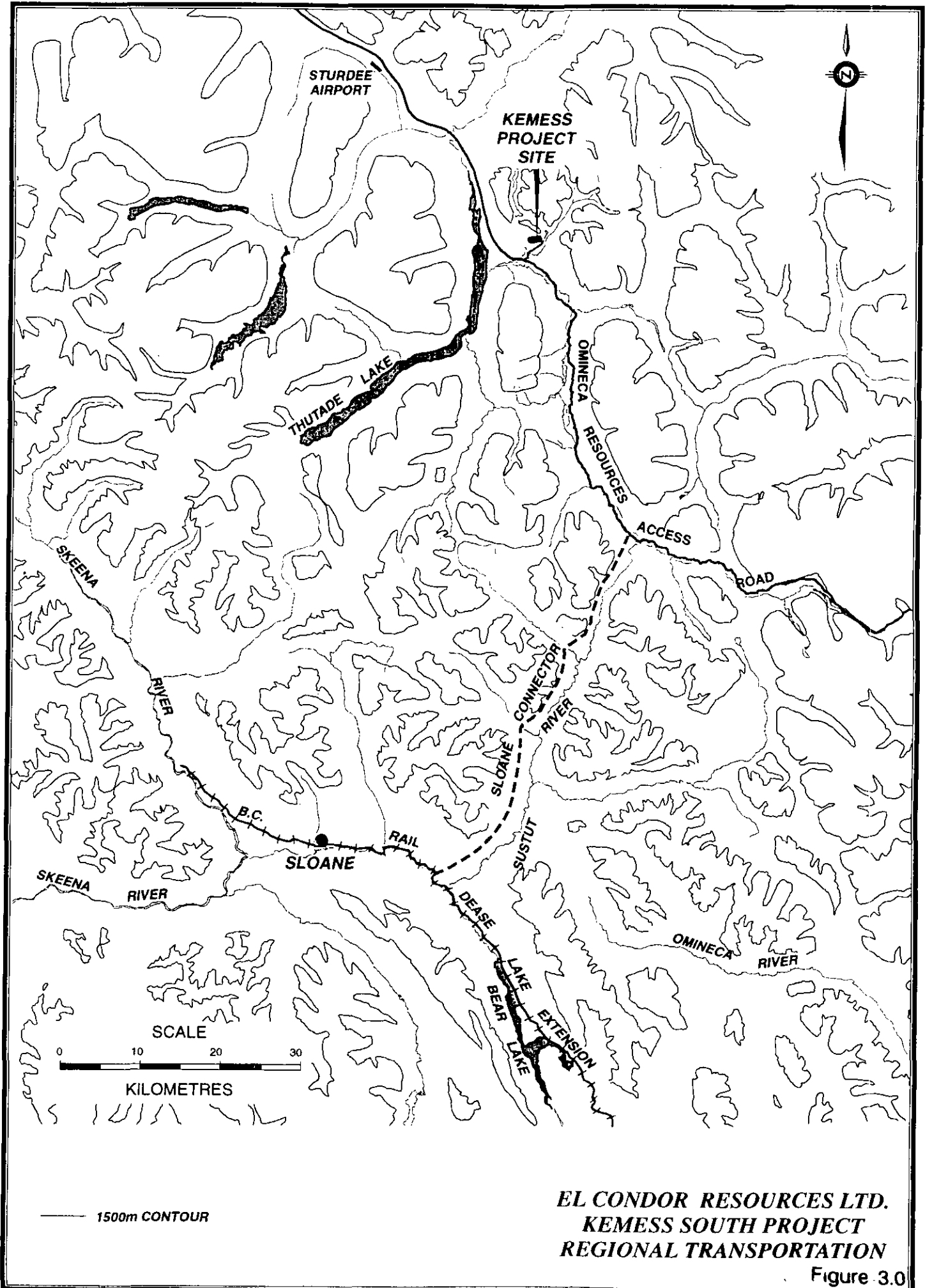
**LEGEND**

- Highway
- Year Round Industrial Road
- ..... Designed Connector Road
- + + + Railway
- ..... B.C. Hydro-Proposed 230 kV Line
- Mines And Mine Development Projects



**EL CONDOR RESOURCES LTD.  
KEMESS SOUTH PROJECT  
INFRASTRUCTURE**

Figure 2.0



**EL CONDOR RESOURCES LTD.  
 KEMESS SOUTH PROJECT  
 REGIONAL TRANSPORTATION**

Figure 3.0



#### 4.0 CLAIM DATA

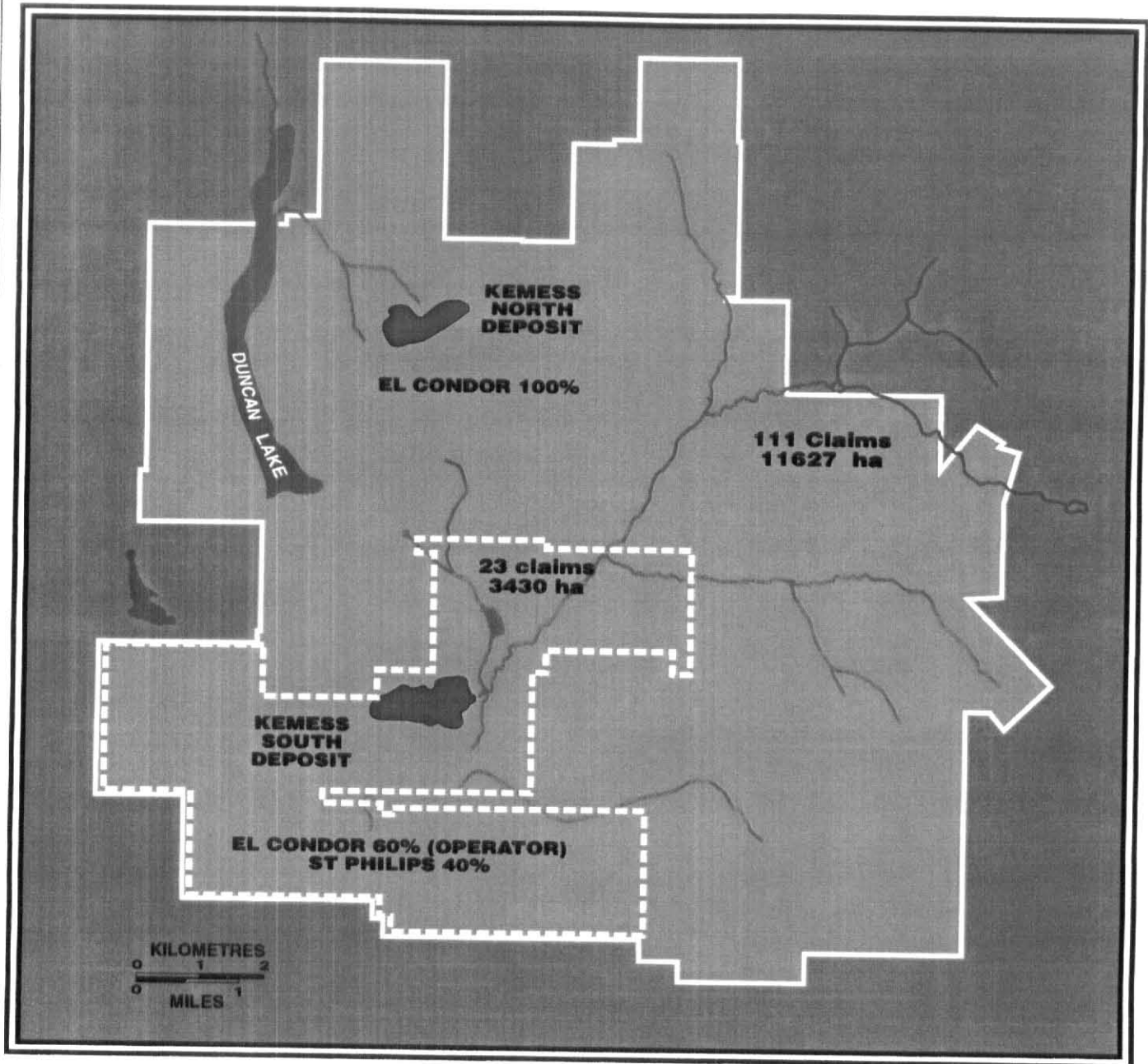
The Kemess Property, which is approximately 150 square kilometres (15,057 hectares) in size, is situated in the Omineca Mining Division on N.T.S. map sheet 94E/2 (Figure 4). The Property is divided into two blocks: Kemess North and Kemess South.

The Kemess North Block, which includes the Kemess North Deposit, is comprised of 111 mineral claims which are owned 100% by El Condor Resources Ltd. The Kemess South Block, which includes the Kemess South Deposit, is comprised of 23 mineral claims which are subject to the Kemess South Joint Venture agreement between El Condor Resources Ltd. (60% ownership) and St. Philips Resources Inc. (40% ownership). El Condor Resources Ltd. acts as operator in the Joint Venture agreement.

A list of claim data pertinent to this report appears below. The expiry dates shown in the table are subject to acceptance of assessment work and credits supported by this report. A complete list of claims for the Property is provided in Appendix II.

**TABLE 1.0 - MINERAL CLAIMS REFERENCED**

| <b>CLAIM NAME</b> | <b>TENURE NO.</b> | <b>UNITS</b> | <b>RECORD DATE</b> | <b>EXPIRY DATE</b> |
|-------------------|-------------------|--------------|--------------------|--------------------|
| Waste 1 Fraction  | 325176            | 1            | 28-April-94        | 28-April-2000      |
| Tiszi 1           | 243442            | 20           | 16-May-91          | 16-May-96          |
| Tiszi 2           | 243443            | 20           | 16-May-91          | 16-May-96          |
| Dun 1             | 310076            | 9            | 31-May-92          | 31-May-97          |
| Dun 2             | 310077            | 9            | 31-May-92          | 31-May-97          |
| Dun 3             | 310077            | 9            | 31-May-92          | 31-May-97          |



*EL CONDOR RESOURCES LTD.  
KEMESS SOUTH PROJECT  
PROPERTY MAP*

Figure 4.0

## 5.0 PHYSIOGRAPHY

The Property, which is located in the Omineca Mountains of the Swannel Range, exhibits moderate topographic relief with increasing relief and elevation to the north. Elevations range from 1,400 metres to 1,932 metres above mean sea level.

Climate is characterized by warm summers and cold winters typical of the moderate interior continental climate with annual temperatures ranging from +25°C to -40°C. Precipitation is generally moderate.

## 6.0 EXPLORATION HISTORY

In 1966, Kennco Explorations (Western) Limited carried out a regional silt geochemical survey in the vicinity of the property and the following year they staked an intense gossan zone with high base and precious metal silt geochemistry.

Pacific Ridge Resources Ltd. conducted soil geochemical surveys in 1983. In 1984, Pacific Ridge Resources Ltd. and Anaconda Canada Inc. undertook additional soil geochemical surveys and completed 600 m of diamond drilling. In 1988, the Property was acquired by St. Philips Resources Inc., who conducted soil geochemical, magnetic and Induced Polarization surveys and completed 700 m of reverse circulation drilling.

El Condor optioned the Property from St. Philips in 1990 and over the next two years they undertook geological, geochemical, resistivity, IP, and magnetic surveys and completed over 23,000 m of diamond drilling. By the end of 1991, a mineral resource of 245 million tonnes had been outlined on the project claims.

In 1992, the Joint Venture undertook an extensive metallurgical test program and conducted environmental and other baseline studies. An audited mineable reserve of 200,440,000 tonnes of ore with an average grade of 0.22% Cu and 0.63 grams/tonne Au was established. A "Project Prospectus" covering the proposed development of the Project was first submitted, for review and approval, to the B.C. Mine Development Assessment Committee in March of 1992 in advance of the "Application for a Mine Development Certificate". The "Application for a Mine Development Certificate" was submitted in December of 1993 and the Joint Venture is still waiting for approval.

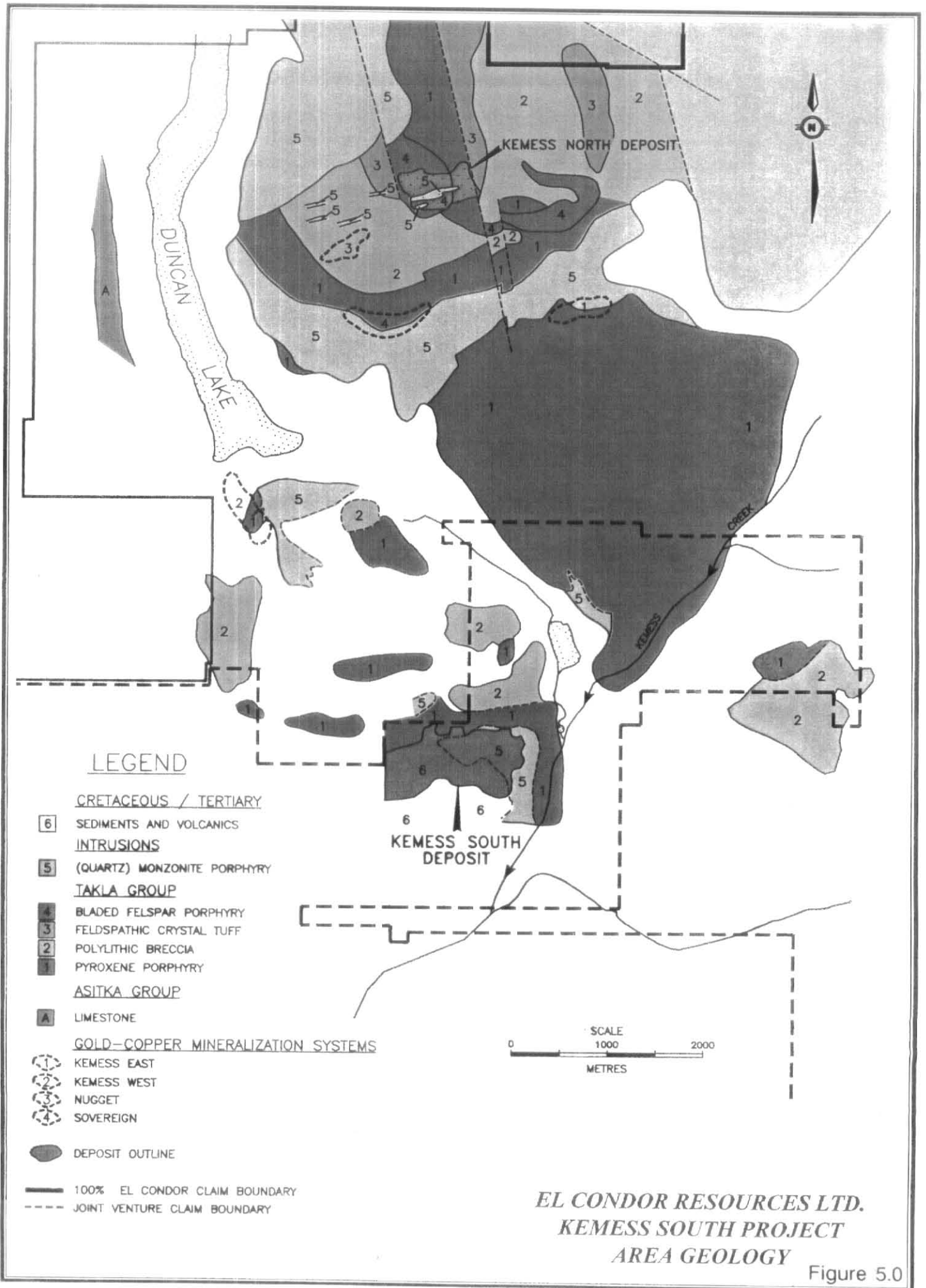
## 7.0 REGIONAL GEOLOGY

The Kemess Property lies within early Mesozoic Quesnel Belt rocks. This 1,200 km long northwest-trending belt contains a number of important porphyry copper mines and deposits as illustrated in Figure 1.

The Kemess Property is centred on rocks of the Upper Triassic to Lower Jurassic Takla Group (Figure 5.0). These rocks are dominated by subaqueous volcanic strata comprised of flows and fragmentals of pyroxene porphyry and heterolithic breccias. Limestones and shales of the Permian Asitka Group are in fault contact with the Takla Group rocks. Unconformably overlying the Takla Group are Lower Jurassic Hazelton Group Toodoggone Formation volcanic rocks dominated by flows and tuffs of plagioclase porphyry breccia and bladed feldspar porphyry.

Toodoggone and Takla strata in the Kemess Property area are intruded by numerous stocks and dykes of Lower to Mid Jurassic age. Gold-rich porphyry copper deposits are spatially associated with these stocks and dykes and are probably genetically related to epithermal gold-silver deposits that have recently been mined in the nearby Toodoggone District.

In the Kemess Property area, overlying Toodoggone volcanics have been eroded, exposing several large monzonite intrusions with disseminated sulphide mineralization and associated hydrothermal alteration. The resulting disseminated sulphide system measures at least 9 km north-south and 6 km east-west and is known to contain two gold-copper porphyry deposits: Kemess South and Kemess North.



**EL CONDOR RESOURCES LTD.**  
**KEMESS SOUTH PROJECT**  
**AREA GEOLOGY**

Figure 5.0

## 8.0 PROPERTY GEOLOGY

The Kemess South deposit occurs in the flat-lying, near surface, Maple Leaf quartz monzodiorite intrusion that contains classic porphyry-style mineralization consisting of gold, copper and lesser silver.

The deposit area is covered by a veneer of glacial till which is overlain in part by glaciofluvial outwash sands and gravels and recent fluvial material. The thickness of the surficial deposits range from 2 m to 20 m and generally increases to the east toward Kemess Creek.

The overburden overlies Tertiary sedimentary rocks that in turn overlie the mineralized Maple Leaf quartz monzodiorite intrusion. The mineralized intrusion is terminated to the north by a high-angle normal fault which separates the intrusion from Takla Group sedimentary rocks to the north.

The base of the intrusion is marked by a low angle fault that commonly separates the intrusion-hosted deposit from the underlying Takla Group volcanic rocks. Little if any displacement is evident along this fault.

Immediately beneath the Maple Leaf intrusion, the Takla Group volcanic rocks display weak potassic alteration in the form of secondary biotite. Within a few metres, the potassic alteration gives way to propylitic alteration. The Takla sediments north of the high angle fault are weakly biotite hornfelsed.

The deposit measures 1,600 m east-west, 800 m north-south and up to 300 m in depth. Two stages of gold-copper mineralization and associated hydrothermal alteration have been recognized within the deposit.

Early stage mineralization is characterized by disseminated, fracture-filling and vein-hosted pyrite, auriferous chalcopyrite, magnetite, minor bornite and molybdenite within quartz-

potassium feldspar stockworks. Late stage mineralization consists of more intense development of quartz-copper sulphide stockwork that can comprise up to 40% of the rock volume. Associated sericite alteration overprints, and in places obliterates, the early stage potassic alteration.

Gold and copper grades are roughly correlated with the intensity of late stage sericite alteration and the frequency of stockwork veins. Post-mineralization carbonate veinlets occur throughout the deposit and have also been noted in propylitic altered wallrocks along the east and south sides of the deposit.

During the late Cretaceous or early Tertiary, the deposit was unroofed and subjected to arid weathering. This resulted in the development of a 10 m to 70 m thick blanket of supergene mineralization in the upper portion of the deposit. Within this zone, sulphide minerals were converted to iron oxide, native copper and chalcocite; however, overall gold and copper grades remain unchanged. Following this period of weathering, carbonate-rich Sustut Group clastic sediments and interbedded volcanics, the latter comprise less than 5% of the total rock sequence, covered the deposit.

Supergene mineralization was eroded by glaciation from atop the eastern margin of the deposit; however, it has been preserved over the western portion by the cover of Sustut Group rocks. The thickness of the Sustut cover rocks ranges from zero to over 190 m.



## 9.0 GEOTECHNICAL TEST PITTING PROGRAM

A geotechnical test pitting program, comprising a total of 36 test pits, was completed on the Rik, Rated, Pond 3, Hena 35, Pond 2, Fred, Freddy 5, Freddy 6, Du 2 and KC1 mineral claims during the period August 06 to 19, 1994. The test pitting work was performed by Sturdee Management Inc. with the aid of a Cat 225 excavator operating under the direct supervision of Knight Piesold Ltd.

The 36 test pits (Figure 6.0) were excavated for the following reasons:

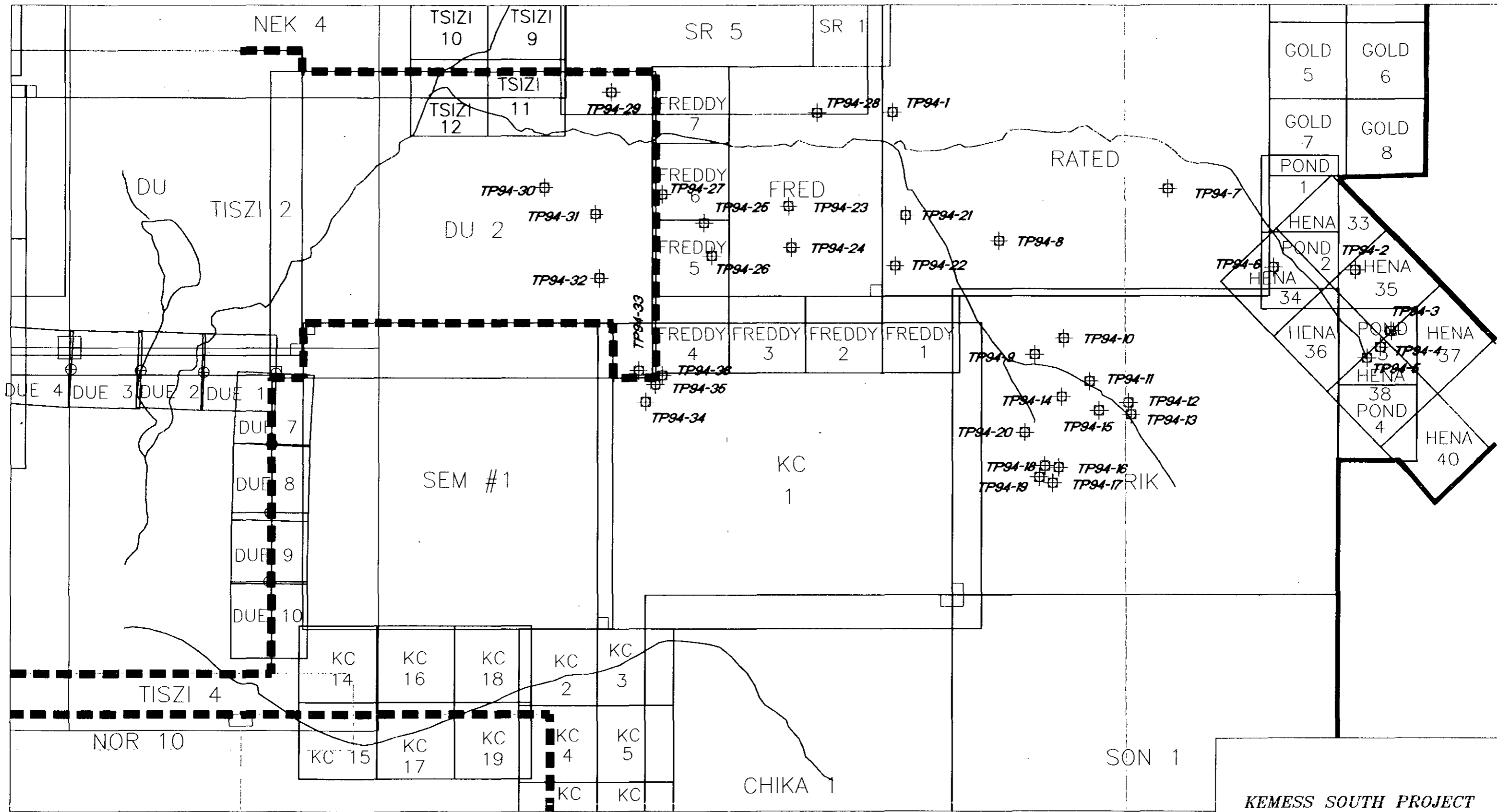
- To investigate surficial materials and foundation conditions for the proposed diversion works at the Tailings Storage Facility, including the diversion dam sites, the diversion conduit, diversion ditch, the access road and the fresh water storage dam for mill water makeup.
- To provide an update on borrow material types and quantities for initial and ongoing embankment construction.

Specifics of the work included:

- Excavation of test pits with a Cat 225 excavator.
- Detailed logging of test pit excavations, including photographs.
- Representative sampling of surficial materials for visual description and laboratory testwork.
- Backfilling and reclamation of all test pit excavations

Knight Piesold Ltd. produced a summary of the test pits, laboratory index test results, laboratory compaction and permeability test results in table format. This information is provided in Appendix I. Appendix I also outlines in table form the availability, as determined by Knight Piesold Ltd., of borrow materials for construction of the main tailings embankment and provides a map showing the location of these materials.

Copies of the test pit logs are provided in Appendix III.



■■■■■■ OUTLINE OF JOINT VENTURE PROPERTY  
 \_\_\_\_\_ OUTLINE OF EL CONDOR CLAIM HOLDINGS

KEMESS SOUTH PROJECT  
TEST PIT LOCATION

JULY 22, 1995

Figure 6.0

## 10.0 CONCLUSIONS AND RECOMMENDATIONS

The significant results of the geotechnical test pitting program are as follows:

- South Kemess Creek valley is a classic U-shaped glacial valley with significant deposits of glacial till overlying bedrock. Glaciofluvial (outwash) sands and gravels overlie glacial till along terraces adjacent to the valley. Post-glacial alluvial processes have resulted in the erosion, down-cutting and re-working of the glacial materials.
- Very dense, fine grained, grey coloured basal till overlies bedrock in most of the tailings area. This material was likely deposited at the base of the ice sheet during glaciation. Well graded, brown coloured, fine grained, silty (ablation type) glacial till overlies the basal till. This material was likely deposited from ice melt during deglaciation.
- Sands and gravels of glaciofluvial and alluvial origins overlie till along terrace areas adjacent to South Kemess and tributary creek valleys. These deposits are generally coarse grained and vary in thickness from 1 to 3 metres.
- Colluvial sands and gravels lie at surface in talus fans along the base of steep slopes.
- A thin veneer of colluvium and/or glacial till overlies broken, blocky, fresh, hard bedrock at high elevations along steep slopes south of South Kemess Creek near the main embankment.

The dense, fine grained, grey basal till and the well graded, brown, fine grained, silty glacial till found in the tailings area will provide good borrow material for embankment construction as well as for the relatively low permeability foundation conditions required for water storage and diversion dam structures.

The sands and gravels of glaciofluvial and alluvial origins that occur along terrace areas adjacent to South Kemess and tributary creek valleys are considered excellent structural fill material for the embankment construction.

Surface occurrences of colluvial sands and gravels at the base of steep slopes are recognized as suitable materials for free-draining, coarse grained structural fills for earthworks construction purposes.

Additional site investigations and design studies will be required for the final design and permitting of the Tailings Storage Facility. The results of this additional work will be used to verify and confirm the relevant criteria for final Tailings Storage Facility design.

## 11.0 STATEMENT OF COSTS

### 1994 GEOTECHNICAL TEST PITTING PROGRAM

#### Cat 225 Excavator (Sturdee Management Inc.)

|   |    |                    |
|---|----|--------------------|
| Mob and Demob                               | \$ | 740.00             |
| Operating Costs: 64.5 hours @ \$110.00/hour | \$ | 7,095.00           |
| Fuel Costs: 2,250 litres @ \$ 0.61/litre    | \$ | 1,372.50           |
| Subtotal:                                   |    | <u>\$ 9,207.50</u> |

#### On Site Engineering Testwork (Knight Piesold Ltd.)

|  |    |                    |
|--|----|--------------------|
| Geotechnician: 13 days @ \$ 200.00/day | \$ | 2,600.00           |
| Engineer: 9 days @ \$ 350.00/day       | \$ | 3,150.00           |
| Subtotal:                              |    | <u>\$ 5,750.00</u> |

#### Fixed Wing Support

|   |    |                  |
|---|----|------------------|
| Central Mountain Air: Smithers to Sturdee Strip | \$ | 350.00           |
| Canadian Airlines: Vancouver to Smithers        | \$ | 550.00           |
| Subtotal:                                       |    | <u>\$ 900.00</u> |

#### Camp Costs (Kemess Camp)

|  |    |                    |
|--|----|--------------------|
| Room & Board: 35 man days @ \$100.00/man day | \$ | 3,500.00           |
| Subtotal:                                    |    | <u>\$ 3,500.00</u> |

#### Report Preparation

|  |    |                  |
|--|----|------------------|
| El Condor Personnel: 2 man days @ \$250.00/day | \$ | 500.00           |
|  |    | <u>\$ 500.00</u> |

#### TOTAL EXPENDITURES 1994 TEST PITTING PROGRAM

\$19,857.50

## **12.0 REFERENCES**

### **COPELAND, D.J., 1991**

Assessment Report for 1990 Diamond Drilling on the Kemess South Property, Omineca Mining Division, British Columbia.

### **COPELAND REBAGLIATI & ASSOCIATES, 1991**

Geological and Geochemical Assessment Report, 1990 Exploration Program, Kemess Property.

### **HALLAM KNIGHT PIESOLD LTD., 1993**

Kemess South Gold-Copper Project, Application for a Mine Development Certificate. Volume I of VI - Executive Summary.

### **KNIGHT PIESOLD LTD., 1995**

Report on Tailings Storage Facility Supplementary Geotechnical Investigations and Updated Design Basis, Kemess South Project. Private report prepared for El Condor Resources Ltd. and St. Philips Resources Inc.

### **REBAGLIATI, C.M., 1993**

Phase VI, 1993 Exploration Diamond Drilling on the Kemess South Property. Private Report prepared for El Condor Resources Ltd. and St. Philips Resources Inc.

### 13.0 STATEMENT OF QUALIFICATIONS

I, Clarence Mark Rebagliati, of the City of Vancouver, Province of British Columbia, DO HEREBY CERTIFY THAT:

1. I am a consulting Geological Engineer with a business office at Suite 1020 - 800 West Pender Street, Vancouver, British Columbia.
2. I am a graduate of the Provincial Institute of Mining, Haileybury, Ontario (Mining Technology, 1966).
3. I am a graduate of the Michigan Technological University, Houghton, Michigan, U.S.A. (B.Sc., Geological Engineering, 1969).
4. I am a registered member, in good standing, of the Association of Professional Engineers and Geoscientists of British Columbia.
5. I have practiced my profession continuously since graduation.
6. I directed the 1994 program on the Kemess Property



C.M. Rebagliati, P.Eng.

Dated at Vancouver, British Columbia, this 27 day of July, 1995.

### 13.0 STATEMENT OF QUALIFICATIONS

I, Lena Kathryn Brommeland, of the City of Vancouver, Province of British Columbia, DO HEREBY CERTIFY THAT:

1. I am a Geologist employed by El Condor Resources Ltd. at Suite 1020 - 800 West Pender Street, Vancouver, British Columbia.
2. I am a graduate of the University of British Columbia, with a Bachelor of Science in Geology, 1989.
3. I have practiced my profession continuously since graduation.
4. I reviewed the data from the 1994 exploration program on the subject property.

  
Lena K. Brommeland, B.Sc.

Dated at Vancouver, British Columbia, this 27 th day of July, 1995.



**APPENDIX I**

**GEOTECHNICAL SUMMARY INFORMATION**

**EL CONDOR RESOURCES LTD. / ST. PHILIPS RESOURCES INC.**  
**KEMESS SOUTH PROJECT**

**SUMMARY OF TEST PITS**

| TEST PIT | DEPTH INTERVAL (m)                     | MATERIAL DESCRIPTION  |
|----------|--|---|
| TP94-1   | 0-0.3<br>0.3-4.6                       | TOPSOIL, sand with organics (roots).<br>GLACIAL TILL, silty sand, some gravel (ablation till).  |
| TP94-2   | 0-0.15<br>0.15-4.5                     | TOPSOIL, silt with organics (roots).<br>COLLUVIUM(TALUS), sandy gravel, some cobbles.   |
| TP94-3   | 0-0.4<br>0.4-2.4<br>2.4-3.4<br>3.4-4.2 | TOPSOIL, wet sand, some gravel and organics.<br>GLACIAL TILL, clayey silt, some gravel and sand.<br>GLACIAL TILL, grey gravelly sand, some silt.<br>COLLUVIUM, sandy gravel, some cobbles.                  |
| TP94-4   | 0-0.3<br>0.3-3.0<br>3.0-3.5            | TOPSOIL, sandy silt with peat and organics.<br>ALLUVIUM, stratified sands, gravels and silts.<br>COLLUVIUM/ALLUVIUM(?), sandy gravel with cobbles.  |
| TP94-5   | 0-0.2<br>0.2-2.9<br>2.9-3.2<br>3.2-4.2 | TOPSOIL, sandy silt with peat and organics.<br>COLLUVIUM(TALUS), gravelly sand, some cobbles.<br>GLACIAL TILL, brown sandy silt, some gravel (seam).<br>COLLUVIUM (TALUS), grey sandy gravel, trace silt.   |
| TP94-6   | 0-0.1<br>0.1-2.6<br>2.6-4.3            | TOPSOIL, silty sand with gravel and roots.<br>COLLUVIUM(TALUS), sandy gravel, some cobbles.<br>GLACIAL TILL, dense silty fine sand, some gravel.  |
| TP94-7   | 0-0.3<br>0.3-3.5                       | TOPSOIL, silty sand with roots.<br>COLLUVIUM, fine gravelly sand to sandy gravel.   |
| TP94-8   | 0-0.3<br>0.3-3.0<br>3.0-5.2<br>5.2     | TOPSOIL, soft silt, some fine roots.<br>GLACIAL TILL, sandy silt, some gravel and clay.<br>RESIDUAL SOIL, heavily weathered silty sand, some gravel.<br>BEDROCK, fresh, hard, blocky intrusives (diorite?). |
| TP94-9   | 0-0.2<br>0.2-2<br>2-3.5                | TOPSOIL, silty sand, some gravel and roots.<br>ALLUVIUM, loose gravelly sand.<br>LACUSTRINE, soft, wet sandy/silty clays.   |
| TP94-10  | 0-0.3<br>0.3-2.8<br>2.8-4.8            | TOPSOIL, gravelly sand, some roots.<br>ALLUVIUM, loose sand with some gravel.<br>GLACIAL TILL, brown sandy silt, some gravel and clay.  |
| TP94-11  | 0-0.2<br>0.2-1.9<br>1.9-4.5            | TOPSOIL, gravelly sand, some roots.<br>ALLUVIUM, sands and gravels.<br>GLACIAL TILL, sandy silt, some gravel, trace clay.   |
| TP94-12  | 0-0.2<br>0.2-2.3<br>2.3-3.5<br>3.5-4.0 | TOPSOIL, silty sand and peat with roots.<br>GLACIAL TILL, brown silty/gravelly sand (ablation till).<br>ALLUVIUM, stratified cobbly sands and gravels.<br>GLACIAL TILL, sandy silt, some gravel and clay.   |

**EL CONDOR RESOURCES LTD. / ST. PHILIPS RESOURCES INC.**  
**KEMESS SOUTH PROJECT**

**SUMMARY OF TEST PITS**

| TEST PIT | DEPTH INTERVAL (m)                     | MATERIAL DESCRIPTION  |
|----------|--|---|
| TP94-13  | 0-0.2<br>0.2-2.2<br>2.2-3.5            | TOPSOIL, silty sand with roots.<br>COLLUVIUM, cobbly sands and gravels.<br>GLACIAL TILL, dense silty sand, some gravel (basal till).  |
| TP94-14  | 0-0.3<br>0.3-1.4<br>1.4-4.1            | TOPSOIL, cobbly/silty sand with peat.<br>GLACIAL TILL, silty sand with gravel.<br>GLACIAL TILL, grey gravelly sand with silt.   |
| TP94-15  | 0-0.2<br>0.2-5.4                       | TOPSOIL, soft silt, some organics and gravel.<br>GLACIAL TILL, fine sandy silt with some gravel (ablation till).  |
| TP94-16  | 0-0.3<br>0.3-1.5<br>1.5-4.0            | TOPSOIL, gravelly sand with roots.<br>ALLUVIUM, sands and gravels.<br>GLACIAL TILL, brown, silty sand, some gravel (ablation till).   |
| TP94-17  | 0-0.3<br>0.3-3.5                       | TOPSOIL, silty sand with gravel and roots.<br>ALLUVIAL (GLACIOFLUVIAL), cobbly sands and gravels.   |
| TP94-18  | 0-1.1<br>1.1-5.2                       | ALLUVIUM, cobbly sands and gravels.<br>GLACIAL TILL, grey, fine sandy silt, some gravel (basal till).   |
| TP94-19  | 0-0.3<br>0.3-2.6<br>2.6-5.2            | TOPSOIL, sand with some gravel, silt and roots.<br>GLACIAL TILL, brown clayey silt, some gravel and sand (ablation).<br>GLACIAL TILL, stiff, grey clayey silt, trace sand (basal).                          |
| TP94-20  | 0-0.4<br>0.4-5.0<br>5.0-5.2            | TOPSOIL, sandy silt with roots.<br>GLACIAL TILL, brown sandy silt with gravel and clay (ablation).<br>GLACIAL TILL, stiff, grey clayey silt with sand and gravel (basal).                                   |
| TP94-21  | 0-0.3<br>0.3-1.6<br>1.6-3.8<br>3.8-4.8 | TOPSOIL, soft, wet silt and peat.<br>ALLUVIUM, fine sand, some silt.<br>GLACIAL TILL, brown clayey silt, some gravel and sand (ablation).<br>GLACIAL TILL, hard, grey sandy silt, some gravel (basal till). |
| TP94-22  | 0-0.3<br>0.3-2.5<br>2.5-5.2            | TOPSOIL, silty sand, some gravel and roots.<br>ALLUVIUM, fine sand, some gravel.<br>GLACIAL TILL, hard brown silty sand some gravel.  |
| TP94-23  | 0-0.4<br>0.4-5.2                       | TOPSOIL, silty sand, some gravel (re-worked till).<br>GLACIAL TILL, stiff, brown sandy silt, tr. gravel and clay (basal?).  |
| TP94-24  | 0-0.3<br>0.3-1.2<br>1.2                | TOPSOIL, gravelly sand, some silt and roots.<br>BROKEN ROCK, fresh, hard, angular blocky rock fragments.<br>BEDROCK, competent volcanics (?) (refusal).   |
| TP94-25  | 0-0.3<br>0.3-4.8                       | TOPSOIL, silty sand, some gravel and roots.<br>GLACIAL TILL, stiff, brown v. fine sandy silt, trace gravel.   |

**EL CONDOR RESOURCES LTD. / ST. PHILIPS RESOURCES INC.**  
**KEMESS SOUTH PROJECT**

**SUMMARY OF TEST PITS**

| TEST PIT | DEPTH INTERVAL (m)                     | MATERIAL DESCRIPTION   |
|----------|--|--|
| TP94-26  | 0-0.3<br>0.3-0.7<br>0.7-1.4<br>1.4     | TOPSOIL, sandy silt, trace roots.<br>COLLUVIUM, sandy, angular gravel-size rock fragments.<br>BROKEN ROCK, fresh, hard, blocky rock.<br>BEDROCK, slightly broken, v. hard fine grained volcanics (?).  |
| TP94-27  | 0-0.2<br>0.2-3.5<br>3.5-4.2            | TOPSOIL, gravelly sand, trace roots.<br>ALLUVIAL (GLACIOFLUVIAL), stratified gravelly sands.<br>ALLUVIAL (GLACIOFLUVIAL), sands and gravels, trace cobbles.  |
| TP94-28  | 0-0.3<br>0.3-5.5                       | TOPSOIL, soft silt with some gravel, trace fine roots.<br>GLACIAL TILL, soft, wet, brown silty sand, some gravel (ablation).   |
| RC94-1   | 0-1                                    | GLACIAL TILL, brown silty fine sand, some gravel (ablation till).  |
| TP94-29  | 0-0.2<br>0.2-5.0                       | TOPSOIL, fine gravelly sand, trace roots.<br>ALLUVIAL (GLACIOFLUVIAL), outwash sands and gravels.  |
| TP94-30  | 0-0.3<br>0.3-3.5<br>3.5-5.5            | TOPSOIL, firm, dry silt, some fine roots.<br>GLACIAL TILL, brown fine sandy silt, some gravel (ablation till).<br>GLACIAL TILL, grey, stiff sandy silt, some gravel (basal till).  |
| TP94-31  | 0-0.2<br>0.2-1.2<br>1.2-4.2<br>4.2-5.3 | TOPSOIL, silty sand, some peat and roots.<br>ALLUVIUM, gravelly sand, some cobbles.<br>GLACIAL TILL, stiff, brown v.f. sandy silt, some gravel (ablation?).<br>GLACIAL TILL, grey, hard sandy silt, some gravel (basal till).                  |
| TP94-32  | 0-0.3<br>0.3-2.0<br>2.0-4.8<br>4.8     | TOPSOIL, silty sand and gravel, some roots.<br>GLACIAL TILL, brown gravelly sand, some silt, tr. cobbles and clay.<br>BROKEN ROCK, weak, heavily wthrd, blocky to pulverized rock.<br>BEDROCK, broken, blocky v.f. grained grey volcanics (?). |
| TP94-33  | 0-0.3<br>0.3-5.0                       | TOPSOIL, firm silt, some peat, trace fine roots.<br>GLACIAL TILL, brown sandy silt, some fine gravel (ablation till).  |
| TP94-34  | 0-0.3<br>0.3-2.9<br>2.9-5.7            | TOPSOIL, clayey silt, trace fine roots.<br>GLACIAL TILL, fine sandy/gravelly silt, trace clay (ablation till).<br>GLACIAL TILL, hard, brown sandy silt, some gravel (basal till).  |
| TP94-35  | 0-0.3<br>0.3-3.1<br>3.1-5.0            | TOPSOIL, soft silt, trace gravel and roots.<br>GLACIAL TILL, fine sandy silt, some gravel, tr. clay (ablation till).<br>GLACIAL TILL, hard, grey v.fine sandy silt, some gravel (basal till).  |
| TP94-36  | 0-0.2<br>0.2-6.2                       | TOPSOIL, soft silt, trace f. gravel, sand and roots.<br>GLACIAL TILL, brown, soft, f. sandy silt, some gravel (ablation till).   |



**TABLE 3.1**

**EL CONDOR RESOURCES LTD. / ST. PHILIPS RESOURCES INC.  
KEMESS SOUTH PROJECT**

**SUMMARY OF LABORATORY INDEX TEST RESULTS**

U:\USER\MDG\1765\TABLE31.WK3

05 - Oct - 94

| TEST PIT/<br>SAMPLE NO. | NATURAL<br>MOISTURE<br>CONTENT (%) | SPECIFIC<br>GRAVITY,<br>G <sub>s</sub> | ATTERBERG LIMITS (%) |      |      | GRAIN SIZE DISTRIBUTION * |                       |                      |                       | SOIL DESCRIPTION                 |
|-------------------------|------------------------------------|--|----------------------|------|------|---------------------------|-----------------------|----------------------|-----------------------|----------------------------------|
|                         |                                    |  | LL                   | PL   | PI   | +2mm<br>(% Gravel)        | 2-0.06 mm<br>(% Sand) | -0.06 mm<br>(% Silt) | -0.002 mm<br>(% Clay) |                                  |
| TP94-1-A                | 8.7                                | 2.76                                   | 21.9                 | 11.8 | 10.1 | 36                        | 42                    | 13                   | 9                     | Brown sandy (ablation) till      |
| TP94-3-A                | 14.0                               | 2.78                                   | 29.4                 | 16.1 | 13.3 | 28                        | 19                    | 36                   | 17                    | Brown silty/clayey till          |
| TP94-4-A                | 16.0                               |  |                      |      |      | 41                        | 43                    | 16                   |                       | Alluvial sands and gravels       |
| TP94-5-A                | 6.1                                | 2.80                                   |                      |      |      | 63                        | 29                    | 6                    | 2                     | Colluvial sandy gravel           |
| TP94-7-A                | 5.4                                |  |                      |      |      | 71                        | 27                    | 2                    |                       | Colluvial sandy gravel           |
| TP94-11-A *             | 10.0                               |  |                      |      |      | 27                        | 40                    | 21                   | 12                    | Brown silty/sandy till           |
| TP94-12-A               | 10.4                               |  |                      |      |      | 50                        | 37                    | 13                   |                       | Brown sandy/gravelly till        |
| TP94-15-A               | 11.9                               | 2.71                                   | 22.8                 | 13.5 | 9.3  | 21                        | 42                    | 25                   | 12                    | Brown silty/sandy till           |
| TP94-16-B               | 10.7                               | 2.73                                   | 20.5                 | 13.7 | 6.8  | 35                        | 39                    | 18                   | 8                     | Brown sandy/silty till           |
| TP94-18-A               | 10.3                               | 2.72                                   | 21.9                 | 12.7 | 9.2  | 30                        | 37                    | 24                   | 9                     | Grey silty/sandy (basal) till    |
| TP94-19-A *             | 22.9                               |  |                      |      |      | 4                         | 42                    | 36                   | 18                    | Grey silty/sandy till            |
| TP94-22-B               | 6.2                                | 2.73                                   | 16.8                 | 12.7 | 4.1  | 40                        | 38                    | 18                   | 4                     | Brown sandy/silty till           |
| TP94-23-A               | 12.1                               | 2.72                                   | 24.1                 | 13.2 | 10.9 | 27                        | 35                    | 26                   | 12                    | Brown silty/sandy till           |
| TP94-25-A               | 12.3                               | 2.69                                   | 18.8                 | 14.9 | 3.9  | 21                        | 40                    | 27                   | 12                    | Brown silty/sandy till           |
| TP94-29-A               | 7.3                                |  |                      |      |      | 54                        | 41                    | 5                    |                       | Alluvial sands and gravels       |
| TP94-30-A *             | 11.9                               |  | 23.5                 | 14.8 | 8.7  | 17                        | 40                    | 28                   | 15                    | Brown silty/sandy till           |
| TP94-31-A               | 8.5                                | 2.72                                   | 24.2                 | 12.9 | 11.3 | 28                        | 36                    | 26                   | 10                    | Brown silty/sandy till           |
| TP94-33-A               | 12.0                               | 2.71                                   | 23.9                 | 14.3 | 9.6  | 22                        | 40                    | 27                   | 11                    | Brown silty/sandy till           |
| TP94-34-A *             | 10.7                               |  |                      |      |      | 22                        | 40                    | 26                   | 12                    | Brown-grey silty (basal) till    |
| TP94-35-A *             | 8.7                                |  | 21.8                 | 13.5 | 8.3  | 25                        | 40                    | 24                   | 11                    | Grey silty/f. sandy (basal) till |
| RC94-1                  | 11.7                               | 2.70                                   | 17.6                 | 14.5 | 3.1  | 39                        | 39                    | 15                   | 7                     | Brown sandy/silty till           |

**NOTE:**

\* Designates grain size analysis carried out on -3/4 inch dia. particles only from Modified Proctor mold.

**TABLE 3.2**

**EL CONDOR RESOURCES LTD. / ST. PHILIPS RESOURCES INC.  
KEMESS SOUTH PROJECT**

**SUMMARY OF LABORATORY COMPACTION AND  
PERMEABILITY TEST RESULTS**

**1. COMPACTION TEST RESULTS:**

| TEST PIT/<br>SAMPLE NO. | NATURAL<br>MOISTURE<br>CONTENT (%) | OPTIMUM<br>MOISTURE<br>CONTENT (%) | MAXIMUM DRY<br>DENSITY [1]<br>(kg/m <sup>3</sup> ) | SOIL DESCRIPTION              |
|-------------------------|------------------------------------|------------------------------------|--|-------------------------------|
| TP94-1-A                | 8.7                                | 6.2                                | 2315   | Brown sandy (ablation) till   |
| TP94-3-A                | 14.0                               | 9.2                                | 2185   | Brown silty/clayey till       |
| TP94-15-A               | 11.9                               | 7.8                                | 2215   | Brown silty/sandy till        |
| TP94-18-A               | 10.3                               | 7.0                                | 2248   | Grey silty/sandy (basal) till |
| TP94-23-A               | 12.1                               | 7.0                                | 2230   | Brown silty/sandy till        |
| TP94-31-A               | 8.5                                | 7.7                                | 2220   | Brown silty/sandy till        |
| TP94-33-A               | 12.0                               | 6.8                                | 2230   | Brown silty/sandy till        |

**2. PERMEABILITY TEST RESULTS:**

| TEST PIT/<br>SAMPLE NO. | HYDRAULIC<br>CONDUCTIVITY<br>(cm/s) | TEST TYPE [2]        | COMMENTS                         | SOIL DESCRIPTION                 |
|-------------------------|-------------------------------------|----------------------|----------------------------------|----------------------------------|
| TP94-1-A                | 4E-05                               | Triaxial permeameter | Sandy material (random fill)     | Brown sandy (ablation) till      |
| TP94-11-A               | 4E-09                               | Lab AEP              | Silty material (core zone)       | Brown silty/sandy till           |
| TP94-19-A               | 5E-10                               | Lab AEP              | Stiff, v. fine grained (core)    | Grey silty/clayey (basal) till   |
| TP94-23-A               | 2E-08                               | Triaxial permeameter | V. stiff, f. grained (core fill) | Brown silty/sandy till           |
| TP94-30-A               | 8E-10                               | Lab AEP              | F. gr. silty mat'l (core zone)   | Brown silty/sandy till           |
| TP94-34-A               | 1E-09                               | Lab AEP              | Hard, over-consolidated          | Brown-grey silty (basal) till    |
| TP94-35-A               | 3E-10                               | Lab AEP              | Hard, dry, over-consol.          | Grey silty/f. sandy (basal) till |

**NOTES:**

1. Compaction (Modified Proctor) test method as per ASTM D1557.
2. Triaxial permeability test carried out at high confining pressure and approx. 95% (Mod. Proctor) max. dry density. Laboratory Air Entry Permeameter (AEP) test carried out on sample compacted to 100% Mod. Proctor compactive effort (approx. 90 to 95 percent max. dry density) and at natural moisture content.

**TABLE 5.1**

**EL CONDOR RESOURCES LTD. / ST. PHILIPS RESOURCES INC.  
KEMESS SOUTH PROJECT**

**SUMMARY OF BORROW MATERIALS AND ESTIMATED QUANTITIES  
FOR THE FRESH WATER STORAGE AND DIVERSION DAMS**

U:\USER\IBM\1765\TABLE52.WK4

| Dam Site /<br>Borrow Area [1] | Estimated Borrow Quantity<br>Available (m <sup>3</sup> ) |              |                              | Dam Site   | Estimated Embankment Quantity Required<br>for Construction (m <sup>3</sup> ) |                     |            |                 |
|-------------------------------|--|--------------|------------------------------|------------|--|---------------------|------------|-----------------|
|                               | Alluvial Sand<br>and Gravel                              | Glacial Till | Colluvial Sand<br>and Gravel |            | Random Fill<br>(S and G / till)  | Core Zone<br>(till) | Riprap [4] | Total Earthfill |
| F.W.D.D. [2]:                 |  |              |                              | F.W.D.D.:  | 18,850   | 11,310              | 1,600      | 31,760          |
| F.W.S.D. [3]:                 |  |              |                              | F.W.S.D.:  | 35,980   | 15,420              | 2,100      | 53,500          |
| F1                            |  | 285,000      |                              |            |  |                     |            |                 |
| East Dam:                     |  |              |                              | East Dam:  | 53,720   | 27,680              | 7,390      | 88,790          |
| E1                            |  |              | 90,000                       |            |  |                     |            |                 |
| E2                            |  |              | 164,000                      |            |  |                     |            |                 |
| E3                            |  | 72,500       |                              |            |  |                     |            |                 |
| North Dam:                    |  |              |                              | North Dam: | 68,730   | 24,150              | 5,360      | 98,240          |
| N1                            | 112,000  |              |                              |            |  |                     |            |                 |
| N2                            |  | 60,000       |                              |            |  |                     |            |                 |
| N3                            |  | 175,000      |                              |            |  |                     |            |                 |
| South Dam:                    |  |              |                              | South Dam: | 55,195   | 20,415              | 4,500      | 80,110          |
| S1                            |  | 235,000      |                              |            |  |                     |            |                 |
| S2                            | 60,000   |              |                              |            |  |                     |            |                 |

**NOTES:**

- [1] Dam sites and borrow areas shown on Drawing No. 1765.504.
- [2] F.W.D.D. = Fresh Water Diversion Dam.
- [3] F.W.S.D. = Fresh Water Storage Dam.
- [4] Riprap obtained from local drill and blast rock quarries.

**SUMMARY OF BORROW MATERIALS AND ESTIMATED QUANTITIES FOR THE MAIN EMBANKMENT**

U:\USER\B\M\1765\TABL.E51.WK4

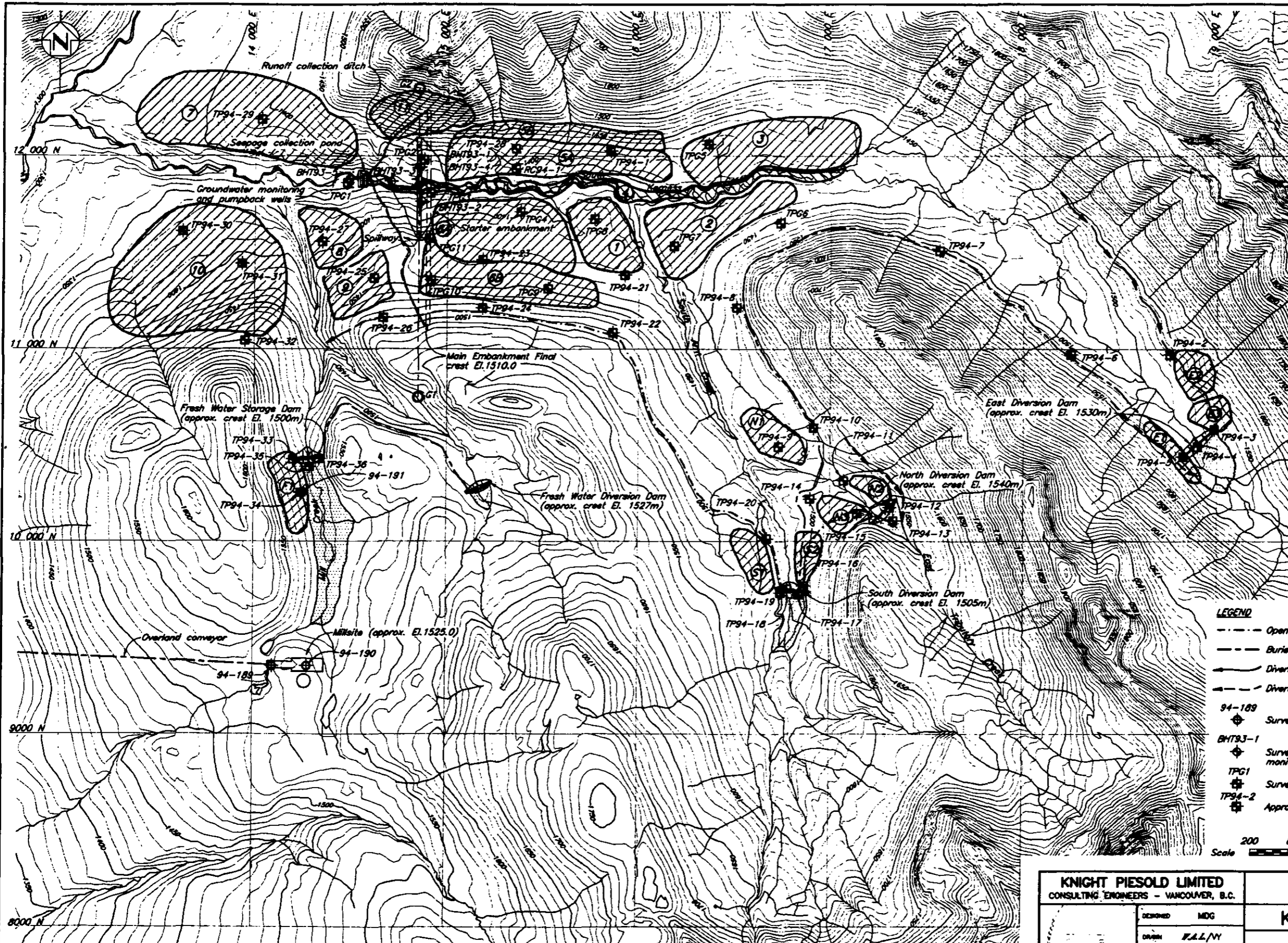
20-Dec-94

| Borrow Area [1] | Estimated Borrow Quantity Available (m³)   |              |                   | Construction Stage | Production (Year) [2] | Estimated Embankment Quantity Required for Construction (m³) [3]   |                  |         |                     |                        |
|-----------------|--|--------------|-------------------|--------------------|-----------------------|--|------------------|---------|---------------------|------------------------|
|                 | Sand and Gravel  | Glacial Till | Colluvium (talus) |                    |                       | Random Fill (S and G / till)   | Core Zone (till) | Riprap  | Core Drain (Gravel) | Select Sand and Gravel |
| 1               | 525,000  |              |                   | Starter            | 0                     | 1,728,000  | 756,000          | 78,600  | 8,600               | 116,600                |
| 2               | 354,000  |              |                   | Starter            | 1                     | 754,900  | 134,100          |         | 840                 | 32,400                 |
| 3               | 460,000  |              |                   | On-going           | 2                     | 3,369,000  | 158,700          | 172,800 | 450                 | 24,400                 |
| 4               | 100,000  |              |                   | Starter            | 3                     | 866,200  | 133,500          | 42,000  | 700                 | 26,700                 |
| 5A              |  | 909,000      |                   | Starter            | 4                     | 412,600  | 110,000          | 22,000  | 350                 | 13,800                 |
| 5B              |  | 465,000      |                   | On-going           | 5                     | 132,100  | 66,100           | 15,100  | 275                 | 600                    |
| 6A              |  | 985,500      |                   | Starter            | 6                     | 132,100  | 66,100           | 15,100  | 275                 | 600                    |
| 6B              |  | 805,500      |                   | On-going           | 7                     | 132,100  | 66,100           | 15,100  | 275                 | 600                    |
| 7               | 2,758,000  |              |                   | On-going           | 8                     | 132,100  | 66,100           | 15,100  | 275                 | 600                    |
| 8               | 375,000  |              |                   | On-going           | 9                     | 132,100  | 66,100           | 15,100  | 275                 | 600                    |
| 9               |  | 410,000      |                   | On-going           | 10                    | 132,100  | 66,100           | 15,100  | 275                 | 600                    |
| 10              |  | 2,772,000    |                   | On-going           | 11                    | 132,100  | 66,100           | 15,100  | 275                 | 600                    |
| 11              |  |              | 380,000           | Starter/ o-g       | 12-16                 | 660,400  | 330,500          | 75,500  | 1,375               | 3,000                  |
| Totals          | 4,572,000  | 6,347,000    | 380,000           |                    | Totals                | 8,715,800  | 2,085,500        | 496,600 | 14,240              | 221,100                |
| Summary:        | Starter sand and gravel = 979,000<br>Starter glacial till = 1,894,500<br>Total = 2,873,500<br><br>On-going sand and gravel = 3,593,000<br>On-going glacial till = 4,452,500<br>Total = 8,045,500 |              |                   |                    | Summary:              | Starter random fill (S and G / till)= 1,728,000<br>Starter core zone (till)= 756,000<br>Total = 2,484,000<br><br>On-going random fill (S and G / till)= 6,987,800<br>On-going core zone (till)= 1,329,500<br>Total = 8,317,300 |                  |         |                     |                        |

NOTES:

- [1] Borrow areas shown on Drawing No. 1765.503.
- [2] Year 0 designates pre-production (starter); year 1 designates first year of operations and etc.
- [3] Estimated embankment quantities required for construction based on 2H:1V downstream slope.





| BORROW AREA                     | MATERIAL DESCRIPTION                                 |
|---------------------------------|--|
| <b>Main Embankment:</b>         |  |
| ①                               | Glaciofluvial sands and gravels                      |
| ②                               | Glaciofluvial sands and gravels                      |
| ③                               | Glaciofluvial sands and silts                        |
| ④                               | Alluvial gravels and sands with cobbles and boulders |
| ⑤A                              | Glacial till   |
| ⑥A                              | Glacial till   |
| ⑦A                              | Glacial till   |
| ⑧                               | Colluvial sands and gravels                          |
| ⑨                               | Glaciofluvial sands and gravels                      |
| ⑩                               | Glacial till   |
| ⑪                               | Colluvium (talus)                                    |
| <b>Fresh Water Storage Dam:</b> |  |
| ⑦1                              | Glacial till   |
| <b>East Diversion Dam:</b>      |  |
| ⑤1                              | Colluvial sands and gravels                          |
| ⑤2                              | Colluvial sands and gravels                          |
| ⑤3                              | Glacial till   |
| <b>North Diversion Dam:</b>     |  |
| ④1                              | Alluvial sands and gravels                           |
| ④2                              | Glacial till   |
| ④3                              | Glacial till   |
| <b>South Diversion Dam:</b>     |  |
| ⑤1                              | Glacial till   |
| ⑤2                              | Alluvial sands and gravels                           |

**LEGEND**

- Open diversion conduit, diversion ditch and road
- Buried diversion conduit and access road
- Diversion ditch and road
- Diversion ditch only
- 94-189 Surveyed borehole location
- BHT93-1 Surveyed borehole location with groundwater monitoring well
- TPG1 Surveyed test pit location (1992)
- TP94-2 Approximate test pit location (1994)

Scale 0 200 400 600 800 1000 Metres

| REV. | DATE         | DESCRIPTION              | APPROVED |
|------|--------------|--------------------------|----------|
| 0    | MAR. 1, 1995 | ISSUED FOR DESIGN REPORT |          |

|  |                |  |
|--|----------------|--|
| <b>KNIGHT PIESOLD LIMITED</b><br>CONSULTING ENGINEERS - VANCOUVER, B.C.        | DESIGNED MDG   | <b>EL CONDOR RESOURCES LTD. /</b><br><b>ST. PHILIPS RESOURCES INC.</b> |
|  | DRAWN F.A.L./N |  |
| <b>KEMESS SOUTH PROJECT</b>  |                | <b>TAILINGS STORAGE FACILITY</b><br><b>UPDATED BORROW AREAS</b>        |
| DATE <b>MAR. 3, 1995</b> SCALE AS SHOWN ORG. NO. <b>1765.504</b> REV. <b>0</b> |                |  |

**APPENDIX II**

**KEMESS PROPERTY CLAIM LISTING**

**EL CONDOR RESOURCES LTD.  
KEMESS SOUTH PROPERTY  
MINERAL CLAIMS LISTING**

NTS 94E/2, 94D/15  
Omineca Mining Division

| Claim Name | Record Number | Tenure Number | Units | Record Date | New Expiry Date | Ownership    |
|------------|---------------|---------------|-------|-------------|-----------------|--------------|
| DU         | 6396          | 238819        | 20    | 16-Jul-84   | 16-Jul-2002     | El Condor JV |
| DU 2       | 12423         | 242573        | 20    | 02-Aug-90   | 02-Aug-2002     | El Condor JV |
| DUE 1      | 12425         | 242575        | 1     | 02-Aug-90   | 02-Aug-2002     | El Condor JV |
| DUE 2      | 12426         | 242576        | 1     | 02-Aug-90   | 02-Aug-2002     | El Condor JV |
| DUE 3      | 12427         | 242577        | 1     | 02-Aug-90   | 02-Aug-2002     | El Condor JV |
| DUE 4      | 12428         | 242578        | 1     | 03-Aug-90   | 03-Aug-2002     | El Condor JV |
| DUE 5      | 12429         | 242579        | 1     | 03-Aug-90   | 03-Aug-97       | El Condor JV |
| DUE 6      | 12430         | 242580        | 1     | 03-Aug-90   | 03-Aug-97       | El Condor JV |
| NOR 2      | 7486          | 239096        | 10    | 24-Feb-86   | 24-Feb-2003     | El Condor JV |
| NOR 3      | 7487          | 239097        | 9     | 24-Feb-86   | 24-Feb-2003     | El Condor JV |
| NOR 4      | 7488          | 239098        | 18    | 24-Feb-86   | 24-Feb-2003     | El Condor JV |
| NOR 5      | 12841         | 242991        | 16    | 11-Dec-90   | 11-Dec-2001     | El Condor JV |
| NOR 6      | 12842         | 242992        | 16    | 11-Dec-90   | 11-Dec-2001     | El Condor JV |
| NOR 7      | 7536          | 239106        | 18    | 04-Apr-86   | 04-Apr-2003     | El Condor JV |
| NOR 8      | 301219        | 301219        | 18    | 29-Jun-91   | 29-Jun-2003     | El Condor JV |
| NOR 10     | 303614        | 303614        | 6     | 28-Aug-91   | 28-Aug-2001     | El Condor JV |
| NOR 11     | 303615        | 303615        | 4     | 28-Aug-91   | 28-Aug-2001     | El Condor JV |
| NOR 12     | 303616        | 303616        | 3     | 29-Aug-91   | 29-Aug-2001     | El Condor JV |
| RON 4      | 3630          | 238404        | 20    | 03-Mar-81   | 03-Mar-2000     | El Condor JV |
| TISZI 1    | 13292         | 243442        | 20    | 16-May-91   | 16-May-96       | El Condor JV |
| TISZI 2    | 13293         | 243443        | 20    | 16-May-91   | 16-May-96       | El Condor JV |
| TISZI 3    | 13294         | 243444        | 20    | 16-May-91   | 16-May-2000     | El Condor JV |
| TISZI 4    | 13295         | 243445        | 20    | 16-May-91   | 16-May-2000     | El Condor JV |

|          |        |        |    |           |             |                  |
|----------|--------|--------|----|-----------|-------------|------------------|
| ALISON 1 | 13290  | 243440 | 20 | 14-May-91 | 14-May-2002 | El Condor (100%) |
| ALISON 2 | 13291  | 243441 | 20 | 14-May-91 | 14-May-2002 | El Condor (100%) |
| CAN 1    | 12913  | 243063 | 20 | 02-Feb-91 | 02-Feb-99   | El Condor (100%) |
| CHIKA 1  | 12924  | 243074 | 20 | 02-Feb-91 | 02-Feb-2000 | El Condor (100%) |
| CHIKA 2  | 12925  | 243075 | 8  | 03-Feb-91 | 03-Feb-2000 | El Condor (100%) |
| CREEK    | 12917  | 243067 | 12 | 02-Feb-91 | 02-Feb-2000 | El Condor (100%) |
| DC 1     | 304015 | 304015 | 1  | 04-Sep-91 | 04-Sep-2002 | El Condor (100%) |
| DC 2     | 304016 | 304016 | 1  | 04-Sep-91 | 04-Sep-2002 | El Condor (100%) |
| DC 3     | 304017 | 304017 | 1  | 04-Sep-91 | 04-Sep-2002 | El Condor (100%) |
| DC 4     | 304018 | 304018 | 1  | 04-Sep-91 | 04-Sep-2002 | El Condor (100%) |
| DC 5     | 304019 | 304019 | 1  | 04-Sep-91 | 04-Sep-2002 | El Condor (100%) |
| DUE 7    | 12431  | 242581 | 1  | 03-Aug-90 | 03-Aug-2002 | El Condor (100%) |
| DUE 8    | 12432  | 242582 | 1  | 03-Aug-90 | 03-Aug-2002 | El Condor (100%) |
| DUE 9    | 12433  | 242583 | 1  | 03-Aug-90 | 03-Aug-2002 | El Condor (100%) |
| DUE 10   | 12434  | 242584 | 1  | 03-Aug-90 | 03-Aug-2002 | El Condor (100%) |
| DUN 1    | 310076 | 310076 | 9  | 31-May-92 | 31-May-97   | El Condor (100%) |
| DUN 2    | 310077 | 310077 | 9  | 31-May-92 | 31-May-97   | El Condor (100%) |
| DUN 3    | 310078 | 310078 | 9  | 31-May-92 | 31-May-97   | El Condor (100%) |
| DUNC 1   | 12914  | 243064 | 4  | 01-Feb-91 | 01-Feb-2000 | El Condor (100%) |
| DUNC 2   | 12915  | 243065 | 4  | 01-Feb-91 | 01-Feb-2000 | El Condor (100%) |
| DUNC 3   | 12916  | 243066 | 6  | 01-Feb-91 | 01-Feb-2000 | El Condor (100%) |
| FRED     | 12920  | 243070 | 6  | 31-Jan-91 | 31-Jan-2000 | El Condor (100%) |
| FREDDY 1 | 304008 | 304008 | 1  | 04-Sep-91 | 04-Sep-2002 | El Condor (100%) |
| FREDDY 2 | 304009 | 304009 | 1  | 04-Sep-91 | 04-Sep-2002 | El Condor (100%) |
| FREDDY 3 | 304010 | 304010 | 1  | 04-Sep-91 | 04-Sep-2002 | El Condor (100%) |
| FREDDY 4 | 304011 | 304011 | 1  | 04-Sep-91 | 04-Sep-2002 | El Condor (100%) |
| FREDDY 5 | 304012 | 304012 | 1  | 04-Sep-91 | 04-Sep-2002 | El Condor (100%) |
| FREDDY 6 | 304013 | 304013 | 1  | 04-Sep-91 | 04-Sep-2002 | El Condor (100%) |
| FREDDY 7 | 304014 | 304014 | 1  | 04-Sep-91 | 04-Sep-2002 | El Condor (100%) |

**EL CONDOR RESOURCES LTD.  
KEMESS SOUTH PROPERTY  
MINERAL CLAIMS LISTING**

NTS 94E/2, 94D/15

Omineca Mining Division

| Claim Name | Record Number | Tenure Number | Units | Record Date | New Expiry Date | Ownership        |
|------------|---------------|---------------|-------|-------------|-----------------|------------------|
| GOLD 1     | 305548        | 305548        | 1     | 10-Oct-91   | 10-Oct-2000     | El Condor (100%) |
| GOLD 2     | 305549        | 305549        | 1     | 10-Oct-91   | 10-Oct-2000     | El Condor (100%) |
| GOLD 3     | 305550        | 305550        | 1     | 10-Oct-91   | 10-Oct-2000     | El Condor (100%) |
| GOLD 4     | 305551        | 305551        | 1     | 10-Oct-91   | 10-Oct-2000     | El Condor (100%) |
| GOLD 5     | 305552        | 305552        | 1     | 10-Oct-91   | 10-Oct-2000     | El Condor (100%) |
| GOLD 6     | 305553        | 305553        | 1     | 10-Oct-91   | 10-Oct-2000     | El Condor (100%) |
| GOLD 7     | 305554        | 305554        | 1     | 10-Oct-91   | 10-Oct-2000     | El Condor (100%) |
| GOLD 8     | 305555        | 305555        | 1     | 10-Oct-91   | 10-Oct-2000     | El Condor (100%) |
| GOZ 1      | 304706        | 304706        | 1     | 21-Sep-91   | 21-Sep-2002     | El Condor (100%) |
| GOZ 2      | 304707        | 304707        | 1     | 21-Sep-91   | 21-Sep-2002     | El Condor (100%) |
| HENA 7     | 311291        | 311291        | 1     | 11-Jul-92   | 11-Jul-98       | El Condor (100%) |
| HENA 8     | 311292        | 311292        | 1     | 11-Jul-92   | 11-Jul-98       | El Condor (100%) |
| HENA 9     | 311293        | 311293        | 1     | 11-Jul-92   | 11-Jul-98       | El Condor (100%) |
| HENA 10    | 311294        | 311294        | 1     | 11-Jul-92   | 11-Jul-98       | El Condor (100%) |
| HENA 33    | 311261        | 311261        | 1     | 12-Jul-92   | 12-Jul-2000     | El Condor (100%) |
| HENA 34    | 311262        | 311262        | 1     | 12-Jul-92   | 12-Jul-2000     | El Condor (100%) |
| HENA 35    | 311263        | 311263        | 1     | 12-Jul-92   | 12-Jul-2000     | El Condor (100%) |
| HENA 36    | 311264        | 311264        | 1     | 12-Jul-92   | 12-Jul-2000     | El Condor (100%) |
| HENA 37    | 311265        | 311265        | 1     | 12-Jul-92   | 12-Jul-2000     | El Condor (100%) |
| HENA 38    | 311266        | 311266        | 1     | 12-Jul-92   | 12-Jul-2000     | El Condor (100%) |
| HENA 39    | 311267        | 311267        | 1     | 12-Jul-92   | 12-Jul-2000     | El Condor (100%) |
| HENA 40    | 311268        | 311268        | 1     | 12-Jul-92   | 12-Jul-2000     | El Condor (100%) |
| KC 1       | 309045        | 309045        | 20    | 26-Apr-92   | 26-Apr-2000     | El Condor (100%) |
| KC 2       | 309046        | 309046        | 1     | 26-Apr-92   | 26-Apr-2000     | El Condor (100%) |
| KC 3       | 309047        | 309047        | 1     | 26-Apr-92   | 26-Apr-2000     | El Condor (100%) |
| KC 4       | 309048        | 309048        | 1     | 26-Apr-92   | 26-Apr-2000     | El Condor (100%) |
| KC 5       | 309049        | 309049        | 1     | 26-Apr-92   | 26-Apr-2000     | El Condor (100%) |
| KC 6       | 309050        | 309050        | 1     | 26-Apr-92   | 26-Apr-2000     | El Condor (100%) |
| KC 7       | 309051        | 309051        | 1     | 26-Apr-92   | 26-Apr-2000     | El Condor (100%) |
| KC 8       | 309052        | 309052        | 1     | 26-Apr-92   | 26-Apr-2000     | El Condor (100%) |
| KC 9       | 309053        | 309053        | 1     | 26-Apr-92   | 26-Apr-2000     | El Condor (100%) |
| KC 10      | 309054        | 309054        | 1     | 26-Apr-92   | 26-Apr-2000     | El Condor (100%) |
| KC 11      | 309055        | 309055        | 1     | 26-Apr-92   | 26-Apr-2000     | El Condor (100%) |
| KC 12      | 309056        | 309056        | 1     | 26-Apr-92   | 26-Apr-2000     | El Condor (100%) |
| KC 13      | 309057        | 309057        | 1     | 26-Apr-92   | 26-Apr-2000     | El Condor (100%) |
| KC 14      | 310032        | 310032        | 1     | 28-May-92   | 28-May-2000     | El Condor (100%) |
| KC 15      | 310033        | 310033        | 1     | 28-May-92   | 28-May-2000     | El Condor (100%) |
| KC 16      | 310034        | 310034        | 1     | 28-May-92   | 28-May-2000     | El Condor (100%) |
| KC 17      | 310035        | 310035        | 1     | 28-May-92   | 28-May-2000     | El Condor (100%) |
| KC 18      | 310036        | 310036        | 1     | 28-May-92   | 28-May-2000     | El Condor (100%) |
| KC 19      | 310037        | 310037        | 1     | 28-May-92   | 28-May-2000     | El Condor (100%) |
| LA 1       | 13204         | 243354        | 1     | 09-Apr-91   | 09-Apr-99       | El Condor (100%) |
| LA 2       | 13205         | 243355        | 1     | 09-Apr-91   | 09-Apr-99       | El Condor (100%) |
| LA 3       | 13206         | 243356        | 1     | 09-Apr-91   | 09-Apr-99       | El Condor (100%) |
| LA 4       | 13207         | 243357        | 1     | 09-Apr-91   | 09-Apr-99       | El Condor (100%) |
| LA 5       | 13208         | 243358        | 1     | 09-Apr-91   | 09-Apr-99       | El Condor (100%) |
| LA 6       | 13209         | 243359        | 1     | 09-Apr-91   | 09-Apr-99       | El Condor (100%) |
| LA 7       | 13210         | 243360        | 1     | 09-Apr-91   | 09-Apr-99       | El Condor (100%) |
| LA 8       | 13211         | 243361        | 1     | 09-Apr-91   | 09-Apr-99       | El Condor (100%) |
| LAKE 1     | 13212         | 243362        | 20    | 09-Apr-91   | 09-Apr-99       | El Condor (100%) |
| LAKE 2     | 13213         | 243363        | 20    | 09-Apr-91   | 09-Apr-99       | El Condor (100%) |
| NEK 1      | 11804         | 241957        | 12    | 03-May-90   | 03-May-2002     | El Condor (100%) |
| NEK 2      | 11805         | 241958        | 10    | 03-May-90   | 03-May-2002     | El Condor (100%) |

**EL CONDOR RESOURCES LTD.  
KEMESS SOUTH PROPERTY  
MINERAL CLAIMS LISTING**

NTS 94E/2, 94D/15

Omineca Mining Division

| Claim Name      | Record Number | Tenure Number | Units | Record Date | New Expiry Date | Ownership        |
|-----------------|---------------|---------------|-------|-------------|-----------------|------------------|
| NEK 3           | 11806         | 241959        | 20    | 03-May-90   | 03-May-2002     | El Condor (100%) |
| NEK 4           | 12424         | 242574        | 14    | 01-Aug-90   | 01-Aug-2002     | El Condor (100%) |
| NEW KEMESS NO.1 | 43            | 237800        | 18    | 11-Jul-75   | 11-Jul-2002     | El Condor (100%) |
| NEW KEMESS NO.2 | 44            | 237801        | 20    | 11-Jul-75   | 11-Jul-2002     | El Condor (100%) |
| NEW KEMESS 3    | 11807         | 241960        | 15    | 03-May-90   | 03-May-2002     | El Condor (100%) |
| POND 1          | 12926         | 243076        | 1     | 03-Feb-91   | 03-Feb-2000     | El Condor (100%) |
| POND 2          | 12927         | 243077        | 1     | 03-Feb-91   | 03-Feb-2000     | El Condor (100%) |
| POND 3          | 12928         | 243078        | 1     | 03-Feb-91   | 03-Feb-2000     | El Condor (100%) |
| POND 4          | 12929         | 243079        | 1     | 03-Feb-91   | 03-Feb-2000     | El Condor (100%) |
| RAT 1           | 9463          | 239994        | 9     | 15-Jun-88   | 15-Jun-2002     | El Condor (100%) |
| RAT 2           | 13015         | 243165        | 10    | 04-Mar-91   | 04-Mar-99       | El Condor (100%) |
| RAT 3           | 13016         | 243166        | 20    | 04-Mar-91   | 04-Mar-99       | El Condor (100%) |
| RATED           | 12919         | 243069        | 20    | 02-Feb-91   | 02-Feb-2000     | El Condor (100%) |
| RIK             | 12921         | 243071        | 20    | 02-Feb-91   | 02-Feb-2000     | El Condor (100%) |
| RON 10          | 5850          | 238705        | 20    | 05-Oct-83   | 05-Oct-2002     | El Condor (100%) |
| RON 11          | 5851          | 238706        | 10    | 05-Oct-83   | 05-Oct-2002     | El Condor (100%) |
| SEM 1           | 10851         | 241014        | 16    | 18-Jul-89   | 18-Jul-2002     | El Condor (100%) |
| SER             | 12918         | 243068        | 20    | 02-Feb-91   | 02-Feb-2000     | El Condor (100%) |
| SON 1           | 12922         | 243072        | 20    | 02-Feb-91   | 02-Feb-2000     | El Condor (100%) |
| SON 2           | 12923         | 243073        | 10    | 03-Feb-91   | 03-Feb-2000     | El Condor (100%) |
| SR 1            | 304020        | 304020        | 1     | 04-Sep-91   | 04-Sep-2002     | El Condor (100%) |
| SR 2            | 304021        | 304021        | 1     | 04-Sep-91   | 04-Sep-2002     | El Condor (100%) |
| SR 3            | 304022        | 304022        | 1     | 04-Sep-91   | 04-Sep-2002     | El Condor (100%) |
| SR 4            | 304023        | 304023        | 1     | 04-Sep-91   | 04-Sep-2002     | El Condor (100%) |
| SR 5            | 310075        | 310075        | 8     | 28-May-92   | 28-May-2000     | El Condor (100%) |
| SR 6            | 310054        | 310054        | 1     | 28-May-92   | 28-May-2000     | El Condor (100%) |
| SR 7            | 310055        | 310055        | 1     | 28-May-92   | 28-May-2000     | El Condor (100%) |
| SR 8            | 310056        | 310056        | 1     | 28-May-92   | 28-May-2000     | El Condor (100%) |
| WASTE 1 F.R.    | 325176        | 325176        | 1     | 28-Apr-94   | 28-Apr-2000     | El Condor (100%) |

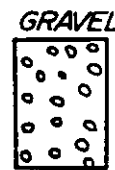
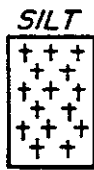
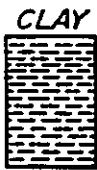
TOTAL # CLAIMS (Principal Claim Group) 134

TOTAL # UNITS (Principal Claim Group) 839

NOTE:  Expiry Date Pending Acceptance of this Assessment Report

**APPENDIX III**

**1994 TEST PIT LOGS**



The symbols may be combined to denote various soil combinations, the predominant soil being heavier.

| <u>RELATIVE PROPORTIONS</u>            |              | <u>CLASSIFICATION BY PARTICLE SIZE</u> |                     |
|--|--------------|--|---------------------|
| <u>TERM</u>                            | <u>RANGE</u> |  |                     |
| Trace                                  | 0 - 10%      | Boulder                                | Over 8"             |
| Some                                   | 10 - 20%     | Cobble                                 | 3" - 8"             |
| "y" or "ey"                            | 20 - 35%     | Gravel -                               |                     |
| and                                    | 35 - 50%     | Coarse                                 | 3/4" - 3"           |
|  |              | Fine                                   | # 4 - 3/4"          |
|  |              | Sand -                                 |                     |
|  |              | Coarse                                 | # 4 - #10           |
|  |              | Medium                                 | #10 - #40           |
|  |              | Fine                                   | #40 - #200          |
|  |              | Silt                                   | #200 - #0.002 mm    |
|  |              | Clay                                   | Finer than 0.002 mm |
| ie. CLAY - silty, trace sand           |              | <u>NOTE</u>                            |                     |
| means : Clay soil with 20% to 35% silt |              | Sieve sizes shown are U.S. standard    |                     |
| and 0% to 10% sand                     |              |  |                     |

DENSITY OF SANDS AND GRAVELS

| <u>DESCRIPTIVE TERM</u> | <u>RELATIVE DENSITY</u> | <u>STANDARD PENETRATION TEST</u> |
|-------------------------|-------------------------|----------------------------------|
| Very loose              | 0 - 15%                 | 0 - 4 Blows per foot             |
| Loose                   | 15 - 35%                | 4 - 10 Blows per foot            |
| Medium dense            | 35 - 65%                | 10 - 30 Blows per foot           |
| Dense                   | 65 - 85%                | 30 - 50 Blows per foot           |
| Very dense              | 85 - 100%               | Over 50 Blows per foot           |

CONSISTENCY OF CLAYS AND SILTS

| <u>DESCRIPTIVE TERM</u> | <u>UNCONFINED COMPRESSIVE STRENGTH</u> |            | <u>N VALUE STANDARD PENETRATION TEST</u> | <u>REMARKS</u>                  |
|-------------------------|--|------------|--|---------------------------------|
|                         | <u>kPa</u>                             | <u>TSF</u> |  |                                 |
| Very soft               | < 25                                   | < 0.25     | Less than 2                              | - Can penetrate with fist       |
| Soft                    | 25 - 50                                | 0.25 - 0.5 | 2 - 4                                    | - Can indent with fist          |
| Firm                    | 50 - 100                               | 0.5 - 1.0  | 4 - 8                                    | - Can penetrate with thumb      |
| Stiff                   | 100 - 200                              | 1.0 - 2.0  | 8 - 15                                   | - Can indent with thumb         |
| Very stiff              | 200 - 400                              | 2.0 - 4.0  | 15 - 30                                  | - Can indent with thumb-nail    |
| Hard                    | > 400                                  | > 4.0      | Greater than 30                          | - Cannot indent with thumb-nail |

NOTES

1. Relative density determined by standard laboratory tests
2. N Value - blows/ft. of a 140lb. hammer falling 30in. on a 2 in. O.D. split spoon
3. Unconfined compressive strength = 2 x Undrained shear strength,  $C_u$

KNIGHT AND PIESOLD LTD.  
CONSULTING ENGINEERS

# TEST PIT LOG

TEST PIT No.  
TP94-1  
SHEET 1 of 1

PROJECT KEMESS SOUTH

PROJECT No. 1765

LOCATION OF TEST PIT EAST OF MAIN EMBANKMENT

GROUND ELEVATION \_\_\_\_\_

DATE Aug. 10/94

LOGGED BY MDG

| NOTES<br>Groundwater level,<br>difficulty in dig-<br>ging, equipment<br>used, etc.   | DEPTH<br>(m)   | GRAPHIC<br>LOG | DESCRIPTION AND CLASSIFICATION<br>OF MATERIAL   |
|--|--|----------------|---|
| <p>Ca- 225<br/>with 2.5 ft.<br/>wide tooth<br/>bucket.</p> <p>Materials<br/>dry (well-<br/>drained),<br/>loose.</p> <p>Test pit walls<br/>stable.</p> <p>No groundwater</p> <p>Easy<br/>digging all<br/>materials.</p> | <p>0</p> <p>0.3</p> <p>1</p> <p>2</p> <p>3</p> <p>Sample<br/>TP94-1-A</p> <p>A</p> |                | <p><u>Vegetation</u>: Short grass with wildflowers<br/>(meadow) on 8% slope north of<br/>S. Kemess Creek</p> <p><u>0-0.3m</u>: <u>SANDY ORGANIC TOPSOIL</u><br/>silty coarse SAND with some gravel and<br/>fresh roots. Well drained on slope.</p> <p><u>0.3-4.6 m</u>: <u>SANDY/SILTY (ABLATION) TILL</u><br/>Brown silty SAND with some gravel,<br/>trace cobbles. Well graded, very poorly<br/>sorted. Gravel sub-rounded, well graded.<br/>Cobbles up to 5 cm. No boulders. Trace<br/>clay in part. Matrix supported clasts.</p> <ul style="list-style-type: none"> <li>• Material slightly wet of optimum</li> <li>• Est. moderately low in-situ permeability<br/>(approx. <math>10^{-6}</math> cm/s)</li> <li>* • Strong, mod. low perm. compacted fill<br/>burrow source. (potential).</li> <li>• Sandy Ablation-type glacial till.</li> </ul> |



KNIGHT AND PIESOLD LTD.  
CONSULTING ENGINEERS

# TEST PIT LOG

TEST PIT No.  
TP94-2  
SHEET / of 1

PROJECT KEMESS SOUTH

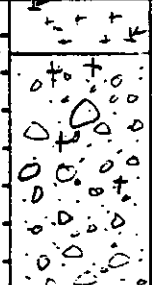
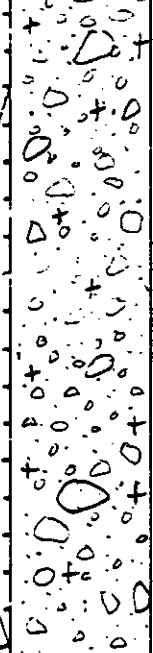

PROJECT No. 1765

LOCATION OF TEST PIT DIVERSION DITCH - EAST DAM

GROUND ELEVATION \_\_\_\_\_

DATE AUG. 11 / 94 350 m Downstream of E. Dam.

LOGGED BY MDG

| NOTES<br>Groundwater level,<br>difficulty in digg-<br>ing, equipment<br>used, etc. | DEPTH<br>(m)                                 | GRAPHIC<br>LOG  | DESCRIPTION AND CLASSIFICATION<br>OF MATERIAL   |
|--|--|---|---|
| Cat 225<br>backhoe<br>with 2.5 ft.<br>wide tooth<br>bucket                         | 0<br>0.15                                    |    | <p>Vegetation: Scrub spruce 3-5 ft. tall on ~10% slope.</p> <p>- Test pit located on small talus fan.</p> <p>0-0.15m: <u>SILTY ORGANIC TOPSOIL</u><br/>Brown, soft silty topsoil with organics</p>  |
| Easy<br>digging in<br>coarse<br>granular,<br>free-draining<br>colluvium<br>(talus) | <p>Sample<br/>TP94-2-A</p> <p>1</p> <p>2</p> |   | <p>0.15-4.5m: <u>WELL GRADED GRAVELLY/SANDY COLLUVIUM (TALUS)</u></p> <p>Brown, moist sandy gravel with some cobbles and trace (~10%) silt. Rare large boulder to 1m dia. Clasts very angular from 0.5-3cm dia. Material is moderately well graded, poorly sorted (massive) colluvium - transported down-slope as talus fan.</p> <ul style="list-style-type: none"> <li>Occasional seam of gravelly sand but generally massive.</li> <li>Est. mod. high permeability (~10<sup>-4</sup> cm/s)</li> <li>Material is granular, till-like in part but only trace fines.</li> <li>Good source of strong compacted, structural fill.</li> <li>Mat'l will likely direct flow during peak runoff periods with some seepage loss.</li> </ul> |
|  | 3<br>4                                       |  |   |

PROJECT KEMESS SOUTH

PROJECT No. 1765

LOCATION OF TEST PIT RIGHT ABUT. E. DAM ON E

GROUND ELEVATION \_\_\_\_\_

DATE Aug. 11/94

LOGGED BY MDG

| NOTES<br>Groundwater level,<br>difficulty in dig-<br>ging, equipment<br>used, etc.  | DEPTH<br>(m)  | GRAPHIC<br>LOG | DESCRIPTION AND CLASSIFICATION<br>OF MATERIAL   |
|---|---|----------------|---|
| <p>Cat 225 backhoe with 2.5 ft. wide tooth bucket.</p> <p>Easy digging at surface.</p> <p>Top 1.5 m wet → groundwater table perched on top of till.</p> <p>Top 0.7 m of till wet (saturated).</p> | <p>▽ 0<br/>(Perched)</p> <p>0.4</p> <p>Wet till</p> <p>1</p> <p>Sample TP94-3-A</p> <p>2</p> <p>2.4</p> <p>Sample TP94-3-B</p> <p>3</p> <p>3.4</p> <p>4</p> |                | <p>Vegetation: Scrub spruce, thick moss.</p> <p>Abundant ponded surface water → slope poorly drained.</p> <p>0-0.4m: <u>WET, SANDY ORGANIC TOPSOIL</u></p> <p>Brown, wet SAND with some fine angular gravel, silt and organics (roots).</p> <p>0.4-2.4m: <u>BROWN SILTY / CLAYEY (ABLATION?) GLACIAL TILL</u></p> <p>Light brown, slightly moist clayey SILT with some fine, sub-angular gravel and sand. Well graded, very poorly sorted, massive, firm to slightly stiff. Clasts are matrix supported.</p> <ul style="list-style-type: none"> <li>• Est. low to medium plasticity (cohesive, slightly sticky).</li> <li>• Mat'l at approx. optimum moisture content for compaction. (hard, chunky consistency).</li> <li>• Est. v. low permeability (<math>\sim 10^{-7}</math> cm/s)</li> <li>* • Excellent potential core zone material and foundation seepage cut-off for diversion dam structure.</li> </ul> <p>2.4-3.4m: <u>GREY SANDY/GRAVELLY TILL (?)</u></p> <p>Grey, med. dense, moist gravelly fine-med. SAND with trace to some (<math>\sim 15\%</math>) silt. Moderately well graded, poorly sorted. Clasts angular, 1-3 cm dia.</p> <ul style="list-style-type: none"> <li>• Est. mod. high permeability</li> <li>• Good potential embankment fill.</li> </ul> |

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# TEST PIT LOG

TEST PIT No.  
TP94-3  
SHEET 2 of 2

PROJECT KEMESS SOUTH

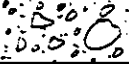
PROJECT No. 1765

LOCATION OF TEST PIT RIGHT ABUT. EAST DAM ON E

GROUND ELEVATION \_\_\_\_\_

DATE AUG. 11/99.

LOGGED BY MDG

| NOTES<br>Groundwater level,<br>difficulty in dig-<br>ging, equipment<br>used, etc. | DEPTH<br>(m)        | GRAPHIC<br>LOG   | DESCRIPTION AND CLASSIFICATION<br>OF MATERIAL  |
|--|---------------------|--|--|
| <p>(cont'd)</p> <p>Difficult digging in boney colluvium (talus) 3.4-4.2m</p>       | <p>4</p> <p>4.2</p> |  <p>Refusal</p> | <p>... (cont'd) ...</p> <p><u>3.4 - 4.2m: GRAVELLY/SANDY COLLUVIUM</u></p> <p>Brown, wet sandy GRAVEL with cobbles.<br/>Clasts very angular.</p> <ul style="list-style-type: none"> <li>• Groundwater seeping into pit in colluvium.</li> <li>• Est. high permeability</li> <li>• Possibly old talus fan deposited from side slope during glaciation or between two different glacial advances.</li> </ul> <p>4.2m Refusal - Very large boulder (&gt;1.5m) likely. Could not move with bucket.</p> |

# TEST PIT LOG

PROJECT KEMESS SOUTH  
LOCATION OF TEST PIT CENTRE EAST DAM ON E  
(VALLEY BOTTOM)  
DATE AUG. 11/94

PROJECT No. 1765  
GROUND ELEVATION \_\_\_\_\_  
LOGGED BY MDG

| NOTES<br>Groundwater level,<br>difficulty in dig-<br>ging, equipment<br>used, etc.   | DEPTH<br>(m)  | GRAPHIC<br>LOG | DESCRIPTION AND CLASSIFICATION<br>OF MATERIAL   |
|--|---|----------------|---|
| <p>Cat 225 backhoe with 2.5 ft. wide tooth bucket.</p> <p>Groundwater table at approx. 1m (creek elev.)</p> <p>Very easy digging in loose, cohesionless, free-draining alluvials.</p> <p>Test pit walls caving in continually as groundwater seeps into pit.</p> <p>Easy digging in colluvium at bottom</p> <p>Could not excavate beyond ~3.5m as pit walls continually caving in.</p> | <p>0</p> <p>0.3</p> <p>Composite sample TP94-4-A</p> <p>1</p> <p>2</p> <p>3</p> <p>3.5</p> <p>4</p> |                | <p>0-0.3m: <u>SANDY-FINE SILTY ORGANIC TOPSOIL</u><br/>Dark brown silty fine sand with organics (fine roots). Material is loose, sl. moist, fairly well drained.</p> <p>0.3-3.0 m (approx):<br/><u>STRATIFIED ALLUVIAL SANDS, GRAVELS AND SILTS.</u><br/>Loose, wet (saturated below water table) stratified sequence of:</p> <ul style="list-style-type: none"> <li>• Alluvial sands;</li> <li>• Alluvial sandy gravel with cobbles;</li> <li>• Occasional seam of silty fine sand</li> </ul> <p>• Most alluvial materials free-draining.</p> <p>• Groundwater seeping into pit through coarser beds of alluvium (estimate 5-10 gal/min.)</p> <p>• Materials horizontally stratified, well sorted → likely glacial meltwater outwash.</p> <p>• Clasts sub-angular - likely since alluvial materials not transported very far.</p> <p>3.0-3.5m: <u>COLLUVIAL/ALLUVIAL(?) SANDY GRAVEL</u><br/>Loose sandy gravel with broken (cobble size) rock fragments (colluvium).</p> <ul style="list-style-type: none"> <li>• Materials saturated</li> <li>• Est. very high permeability</li> <li>• Material could be alluvium but higher percentage of angular rock frags.<br/>∴ likely colluvial (talus fan)</li> </ul> |

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# TEST PIT LOG

TEST PIT No.  
TP94-5  
SHEET 1 of 2

PROJECT KENESS SOUTH  
LOCATION OF TEST PIT LEFT ABUT. SLOPE E. DAM. ON E  
DATE AUG. 11 / 94 ~ 65m west of Creek.

PROJECT No. 1765  
GROUND ELEVATION \_\_\_\_\_  
LOGGED BY MDG

| NOTES<br>Groundwater level, difficulty in digging, equipment used, etc.  | DEPTH<br>(m)   | GRAPHIC LOG | DESCRIPTION AND CLASSIFICATION OF MATERIAL   |
|--|--|-------------|--|
| <p>Cat 225 backhoe with 2.5 ft. wide bucket.</p> <p>Moderately difficult digging ("boney") at surface in colluvium.</p> <p>Test pit walls stable in granular colluvium and dense till.</p> <p>Groundwater table at 1.5m in free-draining, mod. high perm. colluv. (perched on top of till)</p> <p>Fairly easy digging in grey till.</p> <p>Sample TP94-5-A</p> | <p>0</p> <p>0.2</p> <p>1</p> <p>1.5</p> <p>2</p> <p>2.9</p> <p>3</p> <p>3.2</p> <p>4</p> |             | <p>Vegetation: Grasses, v. thin moss with occasional short spruce + pine tree</p> <p><u>0-0.2m: SILTY ORGANIC TOPSOIL</u><br/>Fine sandy SILT with peat and fine organics (roots). Material is soft and moist.</p> <p><u>0.2-2.9m: SANDY/GRAVELLY COLLUVIUM (TALUS)</u><br/>Brown, massive, well graded, poorly sorted gravelly SAND with some some cobbles, trace (~5%) silt. Clasts v. angular, blocky 1-5 cm dia. w/ occasional rubble to 10 cm.<br/>• Mat'l is free-draining. Saturated below water table at ~1.5m. Est. high permeability. (~10<sup>-3</sup> cm/s)<br/>• Excellent structural fill for dam construction.</p> <p><u>2.9-3.2m: BROWN SILTY TILL (SEAM)</u><br/>Brown, well graded seam of v. fine sandy SILT w/ some v. fine angular gravel, trace clay. Dense, clumpy, dry.<br/>- Same mat'l as found in TP94-3 on right abutment.</p> <p><u>3.2-4.2m: GREY SANDY/GRAVELLY COLLUV. (?)</u><br/>Grey, med. dense, moist gravelly SAND with trace (est 10%) silt and cobbles. clasts well graded, sub-angular to sub-rounded with silt coating from 0.5-3 cm dia.<br/>• Material is non-plastic, non-cohesive</p> <p>(cont'd)...</p> |

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# TEST PIT LOG

TEST PIT No.  
TP94-5  
SHEET 2 of 2

PROJECT KEMESS SOUTH

PROJECT No. 1765

LOCATION OF TEST PIT LEFT ABUT. SLOPE E. DAM ON  $\phi$

GROUND ELEVATION \_\_\_\_\_

DATE AUG. 11/94

LOGGED BY MDG

| NOTES<br>Groundwater level,<br>difficulty in digg-<br>ing, equipment<br>used, etc. | DEPTH<br>(m) | GRAPHIC<br>LOG | DESCRIPTION AND CLASSIFICATION<br>OF MATERIAL   |
|--|--------------|----------------|---|
| As above   | 4.2          |                | <p>... (cont'd)</p> <p><u>GREY SANDY / GRAVELLY COLLUV. (?)</u> (cont'd)</p> <ul style="list-style-type: none"> <li>• Est. mod. low permeability (<math>10^{-5}</math> cm/s).</li> <li>• Good potential strong compacted fill for dam construction.</li> <li>• Grey fill same as found in <u>TP94-3</u> on right abutment.</li> </ul> |

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# TEST PIT LOG

TEST PIT No.  
TP94-6  
SHEET 1 of 1

PROJECT KEMESS SOUTH

PROJECT No. 1765

LOCATION OF TEST PIT BURIED CONDUIT ALIGNMENT  
~900m North of East Dam.

GROUND ELEVATION \_\_\_\_\_

DATE AUG. 11/94

LOGGED BY MDG

| NOTES<br>Groundwater level,<br>difficulty in dig-<br>ging, equipment<br>used, etc.   | DEPTH<br>(m)   | GRAPHIC<br>LOG | DESCRIPTION AND CLASSIFICATION<br>OF MATERIAL  |
|--|--|----------------|--|
| <p>Cat 225 backhoe with 2.5 ft. wide tooth bucket.</p> <p>Easy digging in surficial colluvium.</p> <p>No groundwater</p> <p>All materials dry and very well drained</p> <p>Groundwater seeping into pit at 2.6m.</p> <p>Materials very wet, saturated below ~3m</p> <p>Pit walls stable in fill below 2.6m</p> | <p>0</p> <p>0.1</p> <p>Sample TP94-6-A</p> <p>1</p> <p>2</p> <p>2.6</p> <p>3</p> <p>Sample TP94-6-B</p> <p>4</p> |                | <p><u>0-0.1m SANDY/SILTY ORGANIC TOPSOIL</u><br/>Dark brown silty SAND with gravel and fine roots.</p> <p><u>0.1-2.6m: GRAVELLY/SANDY COLLUVIUM (TALUS)</u><br/>Brown, dry (well drained) sandy fine-med gravel with some cobbles. No fines (silt or clay). Clasts angular, well graded, poorly sorted (massive).<br/>• Est. v. high permeability in coarse granular, cohesionless material.<br/>• Est. 15% cobbles up to 10cm dia.<br/>• Excellent potential coarse grained, free-draining structural fill or backfill<br/>• Coarse grained colluvium (talus) deposited along slope</p> <p><u>2.6-4.3m: BROWN, DENSE SANDY/SILTY TILL</u><br/>Light brown, very dense silty v. fine SAND with some v. fine angular gravel and trace (~2% est.) clay. Well graded, very poorly sorted. Gravel is angular from 3mm to 2cm, matrix supported<br/>• Est low plasticity, very low in-situ permeability (~10<sup>-7</sup> cm/s est.)<br/>• Good dense foundation for conduit and good road building material.</p> |
|  |  |                |  |

# TEST PIT LOG

PROJECT KEMESS SOUTH  
LOCATION OF TEST PIT NEAR BURIED CONDUIT ALIGNMENT  
DATE AUG. 11/94

PROJECT No. 1765  
GROUND ELEVATION \_\_\_\_\_  
LOGGED BY MDG

| NOTES<br>Groundwater level,<br>difficulty in dig-<br>ging, equipment<br>used, etc.   | DEPTH<br>(m)  | GRAPHIC<br>LOG | DESCRIPTION AND CLASSIFICATION<br>OF MATERIAL  |
|--|---|----------------|--|
| <p>Cat 225 backhoe with 2.5 ft wide tooth bucket.</p> <p>very easy digging in well-drained cohesionless alluvial gravelly sand</p> <p>No groundwater apparent</p> <p>Pit walls caving in colluvium</p> | <p>0</p> <p>0.3</p> <p>Sample TP94-7-A</p> <p>1</p> <p>2</p> <p>3</p> <p>3.5</p> <p>4</p> |                | <p><u>-0.3m: SANDY ORGANIC TOPSOIL</u><br/>Orange-brown silty SAND with organics. Very thin topsoil - easy stripping.</p> <p><u>0.3-3.5m: SANDY/GRAVELLY COLLUVIUM</u><br/>Brown fine gravelly SAND to sandy GRAVEL with trace cobbles (-6" dia. mat'l). Most clasts angular. No fines (washed away).</p> <ul style="list-style-type: none"> <li>• Very clean, coarse granular, free-draining material. Sand is med.-cgs. grained comprising ~40%; gravel is fine-med (few mat - 3cm dia.) comprising ~55%.</li> <li>• Excellent potential conduit bedding; non-frost-susceptible backfill; and road surfacing material</li> <li>• Mat'l is well-drained, est. high permeability</li> </ul> <p>Test pit walls caving therefore terminated at 3.5m depth.</p> |



# TEST PIT LOG

PROJECT KEMESS SOUTH

PROJECT No. 1765

LOCATION OF TEST PIT BURIED CONDUIT ALIGNMENT

GROUND ELEVATION \_\_\_\_\_

DATE AUG. 13/94

LOGGED BY MDG

| NOTES<br>Groundwater level,<br>difficulty in dig-<br>ging, equipment<br>used, etc.   | DEPTH<br>(m)   | GRAPHIC<br>LOG | DESCRIPTION AND CLASSIFICATION<br>OF MATERIAL   |
|--|--|----------------|---|
| <p>Cut 225 excavator with 2.5 ft. wide tooth bucket.</p> <p>Easy digging in loose surficial silty till</p> <p>Test pit is dry (no groundwater) mat's moist.</p> <p>Walls stable during excavation.</p> | <p>0</p> <p>0.3</p> <p>1</p> <p>Sample TP94-8-A</p> <p>2</p> <p>3</p> <p>4</p> |                | <p><u>vegetation</u>: Balsam and fir trees with moss cover. Trees 20 ft. tall; heavily forested.</p> <p><u>0-0.3m</u>: <u>SILTY ORGANIC TOPSOIL</u><br/>Reddish brown, soft, slightly moist (fairly well-drained) SILT w/ some fine organics (roots), trace fine sand and clay. Slightly plastic. Very easy stripping</p> <p><u>0.3-3m</u>: <u>BROWN, WELL GRADED SILTY/SANDY TILL</u><br/>Dark brown, firm (med. dense), fine sandy SILT w/ some fine-med. angular gravel and clay. Material is very well graded, very poorly sorted (massive), matrix supported</p> <ul style="list-style-type: none"> <li>• Est. v. low permeability (<math>&lt;10^{-8}</math> cm/s), medium plasticity. Cohesive, slightly sticky consistency.</li> <li>• Natural m/c &gt; optimum (slightly).</li> <li>• Gravel clasts range 0.2-2cm dia, angular. Few cobbles to 10cm. No boulders</li> <li>• Silty, well graded (ablation-type?) glacial till</li> </ul> |
|  |  |                | <p><u>3-5.2m</u>: <u>RESIDUAL SILTY SAND</u><br/>Light yellowish orange, dense, dry residual extremely weathered granodiorite comprising silty coarse SAND w/ some fine, angular gravel (rock fragments).</p> <ul style="list-style-type: none"> <li>• Texture of crs. grained granodiorite</li> <li>• Heavily weathered in place prior to glaciation.</li> </ul>   |

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# TEST PIT LOG

TEST PIT No.  
TP94-8  
SHEET 2 of 2

PROJECT KEMESS SOUTH  
LOCATION OF TEST PIT BURIED CONDUIT ALIGNMENT  
DATE AUG. 13/94

PROJECT No. 1765  
GROUND ELEVATION \_\_\_\_\_  
LOGGED BY MDG

| NOTES<br>Groundwater level,<br>difficulty in digging,<br>equipment used, etc. | DEPTH<br>(m)            | GRAPHIC<br>LOG | DESCRIPTION AND CLASSIFICATION<br>OF MATERIAL  |
|---|-------------------------|----------------|--|
| Refusal in<br>bedrock<br>at 5.2m.   | 4                       |                | <u>RESIDUAL SILTY SAND (cont'd)</u>  |
|   | Sample<br>TP94-8-B<br>5 |                |  |
|   | 5.2                     |                | <u>5.2m: FRESH, HARD, BLOCKY GRANODIORITE<br/>BEDROCK</u><br>Broken, blocky, fresh, v. hard, med.<br>grained intrusives (Granodiorite)<br>bedrock. Pinkish grey (k-spar),<br>equigranular. <ul style="list-style-type: none"><li>• Rock blocks range from 3-15 cm dia.</li><li>• Est. hard (R4-R5) rock.</li><li>• Slightly weathered (stained) in part.<br/>chlorite alteration (minor) w/ trace<br/>pyrite and iron oxide (hematite)<br/>staining.</li></ul> |
|   | 6                       |                |  |

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# TEST PIT LOG

TEST PIT No.  
TP94-9  
SHEET 1 of 1

PROJECT KEMESS SOUTH

PROJECT No. 1765

LOCATION OF TEST PIT TERRACE FLATS D/S OF NORTH

GROUND ELEVATION \_\_\_\_\_

DATE AUG. 13/94 DIVERSION DAM

LOGGED BY MDG

| NOTES<br>Groundwater level, difficulty in digging, equipment used, etc.   | DEPTH<br>(m)   | GRAPHIC LOG | DESCRIPTION AND CLASSIFICATION OF MATERIAL   |
|---|--|-------------|--|
| <p>Cat 225 excavator with 2.5 ft wide tooth bucket.</p> <p>Test pit walls wet. Walls caving in continuously during and after excavation.</p> <p>Groundwater table at 2m pushed on top of lacustrine clays.</p> <p>Very easy digging in soft clays. 2-3.5m.</p> <p>Could not dig beyond ~3.5m since pit walls caving in.</p> | <p>0</p> <p>0.2</p> <p>Sample TP94-9-A 1</p> <p>2</p> <p>Sample TP94-9-B 3</p> <p>3.5</p> <p>4</p> |             | <p><u>Vegetation</u>: Sparse balsam and fir trees w/ moss/lichen cover.</p> <p><u>0-0.2m SANDY ORGANIC TOPSOIL</u></p> <p>Alluvial silty SAND w/ some gravel and fine roots. Free-draining material. (washed)</p> <p><u>0.2-2m: ALLUVIAL GRAVELLY SAND</u></p> <p>Brown, loose, wet alluvial gravelly med.-coarse grained SAND w/ trace (~5-10%) silt.</p> <ul style="list-style-type: none"> <li>• Mat'l is cohesionless, granular, non-plastic.</li> <li>• Moderately sorted. Gravel clasts sub-rounded from 0.5-3cm w/ rare small cobble to 10cm dia. (No boulders or clay).</li> <li>• Groundwater seeping into pit through alluvials. (Est. 2 gal/min.).</li> <li>• Good source of granular, strong fill for dam construction.</li> </ul> <p><u>2-3.5m: GREY, SOFT LACUSTRINE CLAYS</u></p> <p>Grey, uniform, wet, soft fine sandy/silty lacustrine clay.</p> <ul style="list-style-type: none"> <li>• Est. med.-high plasticity, very sticky (fat), soft clays.</li> </ul> |

# TEST PIT LOG

PROJECT KEMESS SOUTH

PROJECT No. 1765

LOCATION OF TEST PIT CONDUIT ALIGNMENT

GROUND ELEVATION \_\_\_\_\_

DATE AUG. 13/94

LOGGED BY MDG

| NOTES<br>Groundwater level, difficulty in digging, equipment used, etc.   | DEPTH<br>(m)   | GRAPHIC LOG | DESCRIPTION AND CLASSIFICATION OF MATERIAL  |
|---|--|-------------|---|
| <p>Cat 225 excavator with 2.5 ft wide tooth bucket.</p> <p>Test pit is dry - no groundwater</p> <p>Fairly easy digging down to bedrock at 4.8m.</p> | <p>0</p> <p>0.3</p> <p>Sample TP94-10-A<sub>1</sub></p> <p>1</p> <p>2</p> <p>2.8</p> <p>3</p> <p>4</p> |             | <p><u>Vegetation</u>: Assorted trees, thick moss, heavily forested.</p> <p><u>0-0.3m SANDY ORGANIC TOPSOIL</u><br/>Dark brown gravelly SAND w/ roots.<br/>Dry topsoil along well-drained, steep slope.</p> <p><u>0.3-2.8m: LOOSE ALLUVIAL SANDS</u><br/>Brown, dry (well-drained), loose med.-crs. SAND w/ some fine-med. gravel, trace (~2%) silt. Gravel sub-angular to sub-rounded from few mm to 2cm dia.</p> <ul style="list-style-type: none"> <li>• well drained, cohesionless, granular, non-plastic material.</li> <li>• Excellent potential conduit bedding and backfill.</li> <li>• Moderately well sorted. Clasts supported by sand matrix.</li> <li>• Est. moderately high permeability (<math>10^{-4}</math> cm/s)</li> </ul> <p><u>2.8-4.8m: BROWN SILTY (ABLATION) GLACIAL TILL</u><br/>Brown, firm, moist v. fine sandy SILT w/ some fine, angular gravel and clay. Very well graded, v. poorly sorted (massive) Gravel is very angular from 2mm-1cm, matrix supported. Occasional cobble to 10cm dia.</p> <ul style="list-style-type: none"> <li>• Est. med. plasticity fines, est. very low permeability (<math>\sim 10^{-7}</math> cm/s)</li> </ul> |

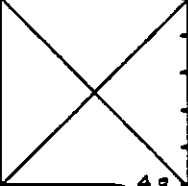
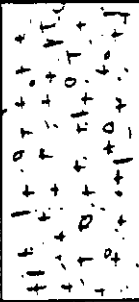
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# TEST PIT LOG

TEST PIT No.  
TP94-10  
SHEET 2 of 2

PROJECT KEMESS SOUTH  
LOCATION OF TEST PIT CONDUIT ALIGNMENT  
DATE AUG. 13/94

PROJECT No. 1765  
GROUND ELEVATION \_\_\_\_\_  
LOGGED BY MDG

| NOTES<br>Groundwater level,<br>difficulty in digg-<br>ing, equipment<br>used, etc. | DEPTH<br>(m)   | GRAPHIC<br>LOG  | DESCRIPTION AND CLASSIFICATION<br>OF MATERIAL  |
|--|--|---|--|
|  | <p style="text-align: center;">4</p> <p>Sample<br/>TP94-10-B</p>  <p style="text-align: right;">4.8</p> |  | <p><u>BROWN SILTY TILL</u> (cont'd)</p> <ul style="list-style-type: none"> <li>• Good potential core zone fill or road base.</li> <li>• Silty glacial till (ablation type) likely deposited along margin of glacier at base of slope.</li> </ul> |
|  | <p style="text-align: center;">5</p>   |   |  |

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# TEST PIT LOG

TEST PIT No.  
TP94-11  
SHEET 1 of 2

PROJECT KEMESS SOUTH

PROJECT No. 1765

LOCATION OF TEST PIT D/S OF RIGHT ABUT.-NORTH  
DIVERSION DAM.

GROUND ELEVATION \_\_\_\_\_

DATE AUG. 13/94

LOGGED BY MDG

| NOTES<br>Groundwater level,<br>difficulty in dig-<br>ging, equipment<br>used, etc.  | DEPTH<br>(m)   | GRAPHIC<br>LOG | DESCRIPTION AND CLASSIFICATION<br>OF MATERIAL   |
|---|--|----------------|---|
| <p>Cat 225 excavator with 2.5 ft wide tooth bucket.</p> <p>Easy digging in surficial alluvium</p> <p>Test pit is dry. Walls stable in alluvium and till. (minor caving in alluvium).</p> <p>Moderately difficult digging in glacial till.</p> | <p>0</p> <p>0.2</p> <p>1</p> <p>1.9</p> <p>2</p> <p>3</p> <p>4</p> <p>Sample TP94-11-A</p> |                | <p>Vegetation: Tall, thin balsam and fir trees w/ thin moss cover. Heavily forested.</p> <p><u>0-0.2m: SANDY/GRAVELLY ORGANIC TOPSOIL</u><br/>Dark brown gravelly SAND w/ organics (roots). Material is well drained, granular, mod. high permeability.</p> <p><u>0.2-1.9m: ALLUVIAL SANDS and GRAVELS</u><br/>Orangeish brown, loose, slightly moist alluvial SANDS and GRAVELS. Poorly sorted alluvial/glaciofluvial outwash. Trace rounded cobbles up to 15cm dia.<br/> <ul style="list-style-type: none"> <li>• Free draining, non-plastic coarse granular material.</li> <li>• Good source of granular fill for random/structural zone of dam.</li> </ul> </p> <p><u>1.9-4.5m: BROWN SILTY (ABLATION) TILL</u><br/>Brown, well graded, firm, very moist, poorly consolidated, slightly cohesive, plastic fine sandy SILT w/ some fine-med. gravel, trace (5-10%) clay.<br/> <ul style="list-style-type: none"> <li>• Material is very well graded, very poorly sorted, massive.</li> <li>• Mat'l in plastic state. <math>w/c &gt; \text{optimum}</math>.</li> <li>• Est. very low permeability (<math>\sim 10^{-8}</math> cm/s).</li> <li>• Good potential core zone fill for diversion dam construction but slightly wet.</li> <li>• Gravel fine-med. grained, sub-angular supported in silty matrix.</li> </ul> </p> |

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# TEST PIT LOG

TEST PIT No.  
TP44-11  
SHEET 2 of 2

PROJECT KEMESS SOUTH

PROJECT No. 1765

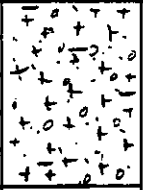
LOCATION OF TEST PIT D/S OF RIGHT ABUTMENT -

GROUND ELEVATION \_\_\_\_\_


DATE AUG. 13/94 NORTH DIVERSION DAM

LOGGED BY MDG

| NOTES<br>Groundwater level,<br>difficulty in digg-<br>ing, equipment<br>used, etc. | DEPTH<br>(m) | GRAPHIC<br>LOG | DESCRIPTION AND CLASSIFICATION<br>OF MATERIAL |
|--|--------------|----------------|---|
|--|--------------|----------------|---|

|  |   |   |   |
|--|---|---|---|
|  | 4 |  | <u>BROWN SILTY (ABLATION) TILL (cont'd)</u> |
|--|---|---|---|

|  |     |   |  |
|--|-----|---|--|
|  | 4.5 |  |  |
|--|-----|---|--|

|  |   |  |  |
|--|---|--|--|
|  | 5 |  |  |
|--|---|--|--|

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# TEST PIT LOG

TEST PIT No.  
TP94-12  
SHEET 1 of 2

PROJECT KEMESS SOUTH

PROJECT No. 1765

LOCATION OF TEST PIT RIGHT ABUT. - NORTH DIVERSION

GROUND ELEVATION \_\_\_\_\_

DATE AUG. 13/94

DAM SITE

LOGGED BY MDG

| NOTES<br>Groundwater level, difficulty in digging, equipment used, etc.  | DEPTH<br>(m)  | GRAPHIC LOG | DESCRIPTION AND CLASSIFICATION OF MATERIAL   |
|--|---|-------------|--|
| <p>Cat 225 excavator with 2.5 ft wide tooth bucket.</p> <p>Easy digging in surficial till</p> <p>More difficult digging in alluvium and basal till at bottom.</p> <p>Groundwater table at 2.3m<br/>Seepage into pit through coarse grained alluvium.</p> | <p>0</p> <p>0.2</p> <p>1</p> <p>2</p> <p>2.3</p> <p>3</p> <p>3.5</p> <p>4</p> <p>Sample TP94-12-A</p> <p>Sample TP94-12-B</p> |             | <p><u>0-0.2m: SANDY ORGANIC TOPSOIL</u></p> <p>Dark brown to black silty SAND and peat with roots.</p> <p><u>0.2-2.3m: BROWN SANDY/GRVLY (ABLATION) TILL</u></p> <p>Brown, well graded, very moist silty / gravelly fine-med. SAND. Very poorly sorted - massive. Clasts are angular, matrix supported from few mm to 3cm. Rare rounded cobble.</p> <ul style="list-style-type: none"> <li>• Est. mod. low permeability (<math>10^{-5}</math> cm/s)</li> <li>• Est. very low plasticity (no clay).</li> <li>• Mod. consolidated. Natural w/c optimum</li> <li>• Likely ablation till deposited during de-glaciation (ablation from melting ice). (could also be massive, poorly sorted, well graded Colluvium - talus).</li> </ul> |
|  |   |             | <p><u>2.3-3.5m (approx.): STRATIFIED ALLUVIAL COBBLY SANDS &amp; GRAVELS</u></p> <p>stratified alluvial cobbly SANDS and GRAVELS w/ interbeds of alluvial silty SANDS. Material is generally loose, coarse granular, free draining.</p> <ul style="list-style-type: none"> <li>• Est. high permeability (<math>\sim 10^{-2} - 10^{-3}</math> cm/s). Seepage through alluvial into pit (est. 2-5 gal/min.).</li> </ul> <p><u>3.5-4.0m: BROWN SILTY (BASAL) TILL</u></p> <p>Brown, very firm, very well graded fine sandy SILT w/ some angular gravel and clay.</p> <p>(cont'd) -</p>  |



|  |                         |
|--|-------------------------|
| PROJECT <u>KEMESS SOUTH</u>  | PROJECT No. <u>1765</u> |
| LOCATION OF TEST PIT <u>RIGHT ABUT. - NORTH DIVERSION</u><br><span style="float: right;">DAM SITE</span> | GROUND ELEVATION _____  |
| DATE <u>AUG. 13/94</u>   | LOGGED BY <u>MDG</u>    |

| NOTES<br>Groundwater level,<br>difficulty in digg-<br>ing, equipment<br>used, etc. | DEPTH<br>(m) | GRAPHIC<br>LOG | DESCRIPTION AND CLASSIFICATION<br>OF MATERIAL  |
|--|--------------|----------------|--|
|  | 4            |                | <p><u>BROWN SILTY TILL</u> (cont'd) ...</p> <ul style="list-style-type: none"> <li>• Till is v. well graded, very poorly sorted, massive.</li> <li>• Est. very low permeability (<math>\approx 10^{-8}</math> cm/s), med. plasticity, moderately consolidated.</li> <li>• Gravel is very angular from 2mm - 2cm dia. w/ rare ccs gravel and small cobble</li> <li>• Material is cohesive and sticky but firm (est. 10% clay).</li> <li>• Excellent core zone fill for dam and foundation seepage cutoff.</li> <li>• Hard, chunky consistency.</li> </ul> |

| KNIGHT AND PIESOLD LTD.<br>CONSULTING ENGINEERS   |              | TEST PIT LOG   |   | TEST PIT No.<br>TP94-13<br>SHEET 1 of 1 |
|---|--------------|--|---|---|
| PROJECT <u>KEMESS SOUTH</u>   |              |  | PROJECT No. <u>1765</u>   |   |
| LOCATION OF TEST PIT <u>TERRACE ~15m East of Creek on</u>   |              |  | GROUND ELEVATION _____  |   |
| DATE <u>AUG. 13/94</u> <u>&amp; N. DIVERSION DAM SITE</u>   |              |  | LOGGED BY <u>MDG</u>  |   |
| NOTES<br>Groundwater level,<br>difficulty in dig-<br>ging, equipment<br>used, etc.  | DEPTH<br>(m) | GRAPHIC<br>LOG   | DESCRIPTION AND CLASSIFICATION<br>OF MATERIAL   |   |
| <p>Cat 225 excavator with 2.5 ft wide tooth bucket.</p> <p>"Boney" digging at surface in coarse colluvium.</p> <p>Test pit is dry (above water table)</p> <p>Water table likely near creek elev.</p> <p>Test pit walls caving in colluvium as groundwater seeps into pit at ~2.2m (GWT perched on top of relatively impervious till.)</p> | 0            |  | Vegetation: <u>Stunted (short) 2-3 ft tall spruce trees only.</u>   |   |
|   | 0.2          |  | <u>0-0.2m SANDY ORGANIC TOPSOIL</u><br>Brown, loose, dry silty SAND w/ organics.  |   |
|   | 1            |  | <u>0.2-2.2m: COBBLY SAND &amp; GRAVEL COLLUVIUM</u><br>Brown, loose, cobbly / bouldery SAND and GRAVEL. Clasts all very angular, blocky, hard.  |   |
|   | 2            |  | <ul style="list-style-type: none"> <li>• Cobbles &amp; boulders (~30%) supported by matrix of coarse sand and gravel</li> <li>• Est. very high permeability, cns. free draining material.</li> <li>• Colluvium (talus) deposited in fan along slope</li> <li>• Excellent potential cns. granular structural fill for dam construction.</li> </ul> |   |
|   | 2.2          |  | <u>2.2-3.5m (approx.): BROWN SANDY/SILTY TILL</u><br>Brown, dense silty fine SAND w/ some gravel, trace clay. Clasts sub-angular from 2mm - 2cm dia., matrix supported, well graded. Very well graded, very poorly sorted (massive).  |   |
| 3   |              | <ul style="list-style-type: none"> <li>• Est. low permeability (~10<sup>-7</sup> cm/s); low plasticity (only trace clay)</li> <li>• Good potential, strong, low perm., compacted fill for core zone of dam.</li> <li>• Moderately consolidated n/c = optimum.</li> </ul> |   |   |
| 3.5   |              | * (some material as found in TP94-12, specifically sample TP94-12-B)   |   |   |
| 4   |              |  |   |   |

|   |                         |
|---|-------------------------|
| PROJECT <u>KEMESS SOUTH</u>                                 | PROJECT No. <u>1765</u> |
| LOCATION OF TEST PIT <u>TERRACE AREA D/S OF N. DAM SITE</u> | GROUND ELEVATION _____  |
| DATE <u>AUG. 14/94</u> ON LEFT ABUTMENT.                    | LOGGED BY <u>MDG</u>    |

| NOTES<br>Groundwater level, difficulty in digging, equipment used, etc.  | DEPTH<br>(m)  | GRAPHIC LOG | DESCRIPTION AND CLASSIFICATION OF MATERIAL   |
|--|---|-------------|--|
| <p>Cat 225 excavator with 2.5 ft wide tooth bucket.</p> <p>Easy digging all materials</p> <p>No seepage but mat's wet ∴ getting some caving of pit walls</p> | <p>0</p> <p>0.3</p> <p>Sample TP94-14-A</p> <p style="text-align: center; border: 1px solid black; width: 40px; margin: 0 auto;">X</p> <p>1</p> <p>1.4</p> <p>2</p> <p>3</p> <p>4</p> |             | <p><u>Vegetation</u>: Open-meadow/swampy area. No trees. Buck brush and thick moss.</p> <p><u>0-0.3m</u>: <u>SANDY/COBBLY ORGANIC TOPSOIL</u></p> <p>Brown cobbly/silty SAND w/ soft silty peat (black) and roots. Soft and wet (poorly drained - swampy).</p> <p><u>0.3-1.4m</u>: <u>SANDY/SILTY (ABLATION) GLACIAL TILL</u></p> <p>Brown, loose-med dense silty SAND w/ some gravel, trace (~2%) clay. Gravel is angular 2mm-2cm dia. Occasional small rounded cobble to 10cm dia.</p> <ul style="list-style-type: none"> <li>• Material is well graded, massive, very poorly sorted. Also poorly consolidated, very moist, slightly sticky and cohesive.</li> <li>• Estimate low permeability (<math>10^{-6}</math> cm/s), low plasticity.</li> <li>• Sandy/silty (ablation-type) till overlain locally by eskers up to 3m high in surrounding area.</li> <li>• Good potential strong, low perm. compacted fill but likely too wet.</li> </ul> <p><u>1.4-4.1m</u>: <u>GREY SANDY/GRAVELLY TILL</u></p> <p>Grey gravelly SAND w/ some silt, trace cobbles and boulders (~15%); and clay (&lt;2%). (Coarser than till above) Clasts range from 0.5-3cm (gravel); cobbles 5-15 cm dia.; boulders up to 30cm dia.</p> <ul style="list-style-type: none"> <li>• Clasts matrix supported, slightly cohesive.</li> <li>• Loose to med. dense, poorly consolidated, very moist to wet.</li> </ul> <p style="text-align: right;">(cont'd)...</p> |

|                             |                         |
|-----------------------------|-------------------------|
| PROJECT <u>KEMESS SOUTH</u> | PROJECT No. <u>1765</u> |
| LOCATION OF TEST PIT _____  | GROUND ELEVATION _____  |
| DATE <u>AUG. 14/94</u>      | LOGGED BY <u>MDG</u>    |

| NOTES<br>Groundwater level,<br>difficulty in digg-<br>ing, equipment<br>used, etc. | DEPTH<br><br><i>(m)</i> | GRAPHIC<br>LOG | DESCRIPTION AND CLASSIFICATION<br>OF MATERIAL |
|--|-------------------------|----------------|---|
|--|-------------------------|----------------|---|

|  |  |  |  |
|--|--|--|--|
|  |  |  | <p><u>GREY SANDY GRAVELLY TILL</u> (cont'd)</p> <ul style="list-style-type: none"> <li>• Est. mod. low permeability (<math>10^{-5}</math> - <math>10^{-6}</math> cm/s)</li> <li>• Moderately well graded, poorly sorted, massive. Low fines content (est. 15-20%).</li> <li>• Potential fill for dam but likely too wet (require drainage).</li> </ul> |
|--|--|--|--|

# TEST PIT LOG

PROJECT KEMESS SOUTH  
LOCATION OF TEST PIT LEFT ABUTMENT - NORTH  
DATE AUG. 14/94 DIVERSION DAM SITE

PROJECT No. 1765  
GROUND ELEVATION \_\_\_\_\_  
LOGGED BY MDG

| NOTES<br>Groundwater level, difficulty in digging, equipment used, etc.   | DEPTH<br>(m)   | GRAPHIC LOG | DESCRIPTION AND CLASSIFICATION OF MATERIAL   |
|---|--|-------------|--|
| <p>Cat 225 excavator with 2.5 ft. wide tooth bucket.</p> <p>Easy digging in silty till from surface.</p> <p>Test pit walls dry and stable.</p> <p>Till is moist 0-2m; very moist below 2m</p> <p>Groundwater seeping into pit at 2.6m (&lt;1gal/min.)</p> <p>Groundwater table = 2.6m</p> <p>Till spalling (caving) off walls below 2m depth. (occasional).</p> | <p>0</p> <p>0.2</p> <p>1</p> <p>2</p> <p>2.6</p> <p>3</p> <p>4</p> <p>Sample TP94-15-A</p> |             | <p>Vegetation = Sparse balsam and fir trees. w/ thin moss/lichen cover. Area is well drained, hard ground.</p> <p>0-0.2m: <u>SILTY ORGANIC TOPSOIL</u><br/>Orangish brown, soft, slightly moist SILT w/ some organics, gravel and trace fine sand. Well drained topsoil w/ moss roots.</p> <p>0.2-5.4m: <u>BROWN, WELL GRADED SILTY TILL</u><br/>Brown, very well graded, slightly moist fine silty f. SAND w/ some fine gravel, small cobbles and trace clay.</p> <ul style="list-style-type: none"> <li>• Moderately consolidated and "chunky" (natural <math>nfc \approx</math> optimum <math>nfc</math>). above GWT. Very moist below GWT.</li> <li>• Mat is very well graded, very poorly sorted, massive (basal type) glacial till</li> <li>• Est. low permeability (<math>\approx 10^{-7} - 10^{-8}</math> cm/s); low to medium plasticity</li> <li>• Gravel clasts 2mm - 2cm sub-angular, matrix supported.</li> <li>• Occasional cobble to 10cm, small boulder to 30 cm dia. (rounded).</li> <li>• Firm consistency (chunky)</li> <li>• Increase clay and gravel (broken rock fragments, content w/ depth</li> </ul> <p>* Excellent potential low permeability compacted core zone fill for diversion dam structure.</p> <p>(Silty Till<br/>Cont'd to 5.4m)</p> |

KNIGHT AND PIESOLD LTD.  
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# TEST PIT LOG

TEST PIT No.  
TP94-16  
SHEET 1 of 1

PROJECT KEILLESS SOUTH  
LOCATION OF TEST PIT RT. ABUT. - S. DIVERSION DAM  
DATE AUG 14/94 SITE (UPPER SLOPE)

PROJECT No. 1765  
GROUND ELEVATION \_\_\_\_\_  
LOGGED BY MDG

| NOTES<br>Groundwater level,<br>difficulty in dig-<br>ging, equipment<br>used, etc.  | DEPTH<br>(m)  | GRAPHIC<br>LOG | DESCRIPTION AND CLASSIFICATION<br>OF MATERIAL  |
|---|---|----------------|--|
| <p>Cat 225 excavator with 2.5 ft. wide tooth bucket.</p> <p>Test pit walls casing in continuously during excavation in alluvials sands and gravels.</p> <p>Groundwater seeping into pit at ~2.6m (water table) at alluv./till contact. (perched GWT on top of relatively impervious till).</p> <p>Stopped digging at ~4m due to casing.</p> | <p>0</p> <p>0.3</p> <p>sample TP94-16-A</p> <p>1</p> <p>1.5</p> <p>2</p> <p>2.6</p> <p>3</p> <p>Sample TP94-16-B</p> <p>4</p> |                | <p>Vegetation: Sumb balsam/spruce (?), thin moss.</p> <p>0-0.3m: <u>SANDY ORGANIC TOPSOIL</u><br/>orangeish brown (iron oxidized) gravelly SAND w/ roots.</p> <p>0.3-1.5m: <u>ALLUVIAL SANDS AND GRAVELS</u><br/>Brown, loose, well drained alluvial (outwash) SANDS and GRAVELS w/ trace cobbles. Clean coarse granular material (no fines)<br/> <ul style="list-style-type: none"> <li>• Cohesiveless, free draining, unstable.</li> <li>• Occasional interbed of alluvial sand, otherwise fairly massive (poorly sorted) w/ gravel clasts 0.5-2 cm dia. supported in sand matrix.</li> <li>• Est. high permeability (<math>10^{-3}</math> cm/s)</li> <li>* Excellent potential, strong crs. granular shell zone / structural fill for construction.</li> </ul> </p> <p>1.5-4.0m (approx.): <u>BROWN SANDY/SILTY (ABLATION) TILL</u><br/>Brown, firm, well graded silty SAND and gravel, trace cobbles and clay.<br/> <ul style="list-style-type: none"> <li>• Material is very moist, slightly sticky, cohesive (Est. low-med. plasticity).</li> <li>• Gravel is angular from 2mm to 2cm dia. supported in silty sand matrix.</li> <li>• Natural m/c &gt; optimum m/c</li> <li>• Est. low permeability (<math>\sim 10^{-7}</math> cm/s.)</li> <li>* Excellent core zone fill and foundation seepage cut-off key trench.</li> </ul> </p> |

# TEST PIT LOG

PROJECT KEMESS SOUTH

PROJECT No. 1765

LOCATION OF TEST PIT RT. ABUT. - S. DIVERSION DAM SITE

GROUND ELEVATION \_\_\_\_\_

DATE AUG. 14/94. TOP OF LOWER TERRACE \*

LOGGED BY MDG

| NOTES<br>Groundwater level,<br>difficulty in dig-<br>ging, equipment<br>used, etc.   | DEPTH<br>(m)   | GRAPHIC<br>LOG | DESCRIPTION AND CLASSIFICATION<br>OF MATERIAL  |
|--|--|----------------|--|
| <p>Cat 225 excavator with 2.5 ft. wide tooth bucket.</p> <p>Fairly easy digging in coarse grained alluvium at surface.</p> <p>Test pit walls caving in cohesionless alluvials.</p> <p>No groundwater table (dry test pit).</p> <p>Stop digging at ~3.5 m since pit caving in continuously.</p> | <p>0</p> <p>0.3</p> <p>1</p> <p>2</p> <p>3</p> <p>3.5</p> <p>4</p> |                | <p>* Located on grassy area on top of lower terrace immediately east of creek.</p> <p>0-0.3m: <u>SANDY ORGANIC TOPSOIL</u><br/>Medium brown, loose, well drained silty SAND w/ gravel and roots.</p> <p>0.3-3.5m: <u>ALLUVIAL / GLACIOFLUVIAL COBBLY SANDS AND GRAVELS</u></p> <p>Orange-brown (iron oxidized) cobbly SANDS and GRAVELS w/ thin (10-20cm) interbeds of silty fine sand. Cobbles comprise ~30%, rounded 3-7cm dia. Rare small boulder up to 30cm dia.</p> <ul style="list-style-type: none"> <li>• Cobbles supported in matrix of sand and gravel (moderately well sorted).</li> <li>• Black organic layer 30cm thick at 1.3m. (likely old mud flat organics - swamp - overlain by glaciofluvial sands and gravels).</li> <li>• Alluvials are cohesionless, free draining. Est. high permeability.</li> <li>• Excellent potential structural fill for dam construction (shell zone).</li> </ul> <p>Bottom of test pit</p> |

# TEST PIT LOG

PROJECT KEMESS SOUTH

PROJECT No. 1765

LOCATION OF TEST PIT VALLEY BOTTOM - E.S. DIVERSION

GROUND ELEVATION \_\_\_\_\_

DATE AUG 14/94 DAM SITE

LOGGED BY MDG

| NOTES<br>Groundwater level,<br>difficulty in dig-<br>ging, equipment<br>used, etc.   | DEPTH<br>(m)  | GRAPHIC<br>LOG | DESCRIPTION AND CLASSIFICATION<br>OF MATERIAL  |
|--|---|----------------|--|
| <p>Cat 225 excavator with 2.5 ft. wide tooth bucket.</p> <p>"Boney" digging at surface in cobbly sands and gravels (alluvium) w/ some small boulders</p> <p>Moderately diff. cult digging in till at 1.1m.</p> <p>Groundwater seeping into pit at colluv./till contact at 1m. (perched on top of till)</p> | <p>0</p> <p>1</p> <p>1.1</p> <p>Sample TP94-18-A</p> <p>2</p> <p>3</p> <p>4</p> |                | <p><u>0-1.1m: ALLUVIAL COBBLY SANDS AND GRAVELS</u></p> <p>Brown alluvial cobbly SANDS and GRAVELS w/ occasional small boulder. Gravel is sub-rounded from 0.2 - 3cm dia; Cobbles rounded 5-15cm dia; Boulders up to 0.5m. Sand is clean, medium-coarse grained</p> <ul style="list-style-type: none"> <li>• Mat'l is very coarse granular, free-draining.</li> <li>• Est. high permeability.</li> <li>• Material is cohesionless, loose and caving slowly into pit as groundwater seeps into pit.</li> <li>* Good potential, strong granular shell zone / structural fill for dam construction.</li> </ul> <p><u>1.1-5.2m: GREY SILTY (BASAL) TILL</u></p> <p>Brownish grey, firm to slightly stiff fine sandy SILT w/ some fine-medium gravel, trace cobbles and clay</p> <ul style="list-style-type: none"> <li>• Gravel is sub-angular to sub-rounded from 0.2 - 3cm. Cobbles (~10%) rounded approx. 10cm dia.</li> <li>• Mat'l is very well graded, very poorly sorted, massive. Clasts are matrix supported.</li> <li>• Est. med. plasticity, v. low permeability (~10<sup>-8</sup> cm/s). Good for foundation seepage cut-off.</li> </ul> |



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# TEST PIT LOG

TEST PIT No.  
**TP94-18**  
SHEET 2 of 2

PROJECT KEMESS SOUTH

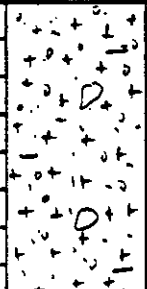
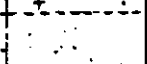
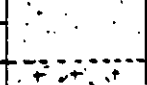

PROJECT No. 1765

LOCATION OF TEST PIT VALLEY BOTTOM - S. DIVERSION

GROUND ELEVATION \_\_\_\_\_

DATE AUG. 14 / 94 . DAM SITE

LOGGED BY MDG

| NOTES<br>Groundwater level,<br>difficulty in digging,<br>equipment used, etc. | DEPTH<br>(m) | GRAPHIC<br>LOG  | DESCRIPTION AND CLASSIFICATION<br>OF MATERIAL  |
|---|--------------|---|--|
|   | 4            |    | <u>GREY SILTY (BASAL) TILL</u> (cont'd)  |
|   | 5            |    | Thin black sand seam (approx 30cm thick)<br>within till at ~ 5 m. → Uniform,<br>med. grained sand. |
|   | 5.2          |   | Max. reach w/ excavator  |
|   | 6            |  |  |

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# TEST PIT LOG

TEST PIT No.  
7994-19  
SHEET 1 of 2

PROJECT KEMESS SOUTH

PROJECT No. 1765

LOCATION OF TEST PIT L. ABUT. SLOPE - S. DIVERSION

GROUND ELEVATION \_\_\_\_\_

DATE AUG. 14/94. DAM ~ 50m west of Creek

LOGGED BY MDG

| NOTES<br>Groundwater level,<br>difficulty in dig-<br>ging, equipment<br>used, etc.  | DEPTH<br>(m)   | GRAPHIC<br>LOG | DESCRIPTION AND CLASSIFICATION<br>OF MATERIAL   |
|---|--|----------------|---|
| <p>Cat 225 excavator with 2.5 ft wide tooth bucket</p> <p>Fairly easy digging in till at surface</p> <p>No groundwater or seepage.</p> <p>Test pit walls stable.</p> <p>Slope well drained.</p> | <p>0</p> <p>0.3</p> <p>1</p> <p>2</p> <p>2.6</p> <p>3</p> <p>4</p> |                | <p><u>Vegetation:</u> sparse balsam &amp; fir trees</p> <p><u>0-0.3m: SANDY ORGANIC TOPSOIL</u><br/>Orange-brown (iron oxid.) SAND w/ some gravel, silt and fine roots.</p> <p><u>0.3-2.6m: BROWN, F.G.R. SILTY/CLAYEY TILL</u><br/>Brown, sticky, firm clayey SILT w/ some fine-med. gravel (~20%) and fine sand. Gravel is fine (2mm-1cm), sub-angular. Mat'l is mod. well graded, very fine grained till.</p> <ul style="list-style-type: none"> <li>• Est. med.-high plasticity - very sticky &amp; cohesive. (lumpy, firm consistency - very moist)</li> <li>• Est. v. low permeability (<math>10^{-8}</math> - <math>10^{-9}</math> cm/s)</li> <li>• Natural m/c &gt; optimum &gt; Plastic limit. - (Mat'l too wet to utilize as dam fill but o.k. for foundation seepage cut-off).</li> </ul> <p><u>2.6-5.2m: GREY SILTY/CLAYEY (BASAL) TILL</u><br/>Grey, sl. moist, slightly stiff clayey SILT w/ trace fine sand and fine (2mm-0.5cm) angular gravel. * (less gravel &amp; sand than above)</p> <ul style="list-style-type: none"> <li>• Uniform, hard "clumpy" mat'l. Est. medium plasticity. Sl. moist at approx. optimum moisture content.</li> <li>• Mat'l is poorly graded, poorly sorted (Trace gravel supported in very fine grained clayey silt matrix).</li> </ul> |

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# TEST PIT LOG

TEST PIT No.  
**TP94-19**  
SHEET 2 of 2

PROJECT KEMESS SOUTH

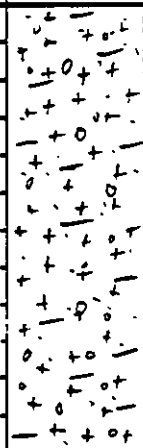
PROJECT No. 1765

LOCATION OF TEST PIT L. ABUT. SLOPE - S. DIVERSION

GROUND ELEVATION \_\_\_\_\_

DATE AUG. 14/94 DAM SITE

LOGGED BY MDG

| NOTES<br>Groundwater level,<br>difficulty in digg-<br>ing, equipment<br>used, etc. | DEPTH<br>(m) | GRAPHIC<br>LOG   | DESCRIPTION AND CLASSIFICATION<br>OF MATERIAL   |
|--|--------------|--|---|
|  | 4            |  | <p><u>GREY SILTY/CLAYEY (BASAL) TILL (cont'd)</u></p> <ul style="list-style-type: none"> <li>• Good potential low permeability core zone fill.</li> <li>• Recommend excavating down to grey till for core trench foundation seepage cut-off.</li> </ul> |
|  | 5            |  |   |
|  | 5.2          |  | Max. reach with excavator.  |
|  | 6            |  |   |

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# TEST PIT LOG

TEST PIT No.  
TP94-20  
SHEET 1 of 2

PROJECT KEMESS SOUTH

PROJECT No. 1765

LOCATION OF TEST PIT ON CONDUIT/ED. ALIGNMENT

GROUND ELEVATION \_\_\_\_\_

DATE AUG. 14/94 ~300m D/S OF SOUTH DAM.

LOGGED BY MDG

| NOTES<br>Groundwater level,<br>difficulty in dig-<br>ging, equipment<br>used, etc.   | DEPTH<br>(m)  | GRAPHIC<br>LOG | DESCRIPTION AND CLASSIFICATION<br>OF MATERIAL   |
|--|---|----------------|---|
| <p>Cat 225 excavator with 2.5 ft wide tooth bucket.</p> <p>Easy digging in loose to med. dense, fine grained till. 0.4-5.0m</p> <p>Test pit dry. No groundwater seepage. Pit walls stable.</p> | <p>0</p> <p>0.4</p> <p>1</p> <p>Sample TP94-20-A</p> <p>2</p> <p>3</p> <p>4</p> |                | <p>0-0.4m: <u>SILTY ORGANIC TOPSOIL</u><br/>Orange brown sandy SILT w/ some roots.</p> <p>0.4-5.0m: <u>BROWN SILTY/SANDY (ABEATION) TILL</u><br/>Brown, well graded, moist fine sandy SILT w/ some gravel and clay. Rare small cobble. Gravel clasts sub-angular 0.2-2cm (well graded), supported in fine grained matrix.</p> <ul style="list-style-type: none"> <li>• Est. very low permeability, low-med. plasticity, well graded till</li> </ul> |

(cont'd)...

PROJECT KEMESS SOUTH

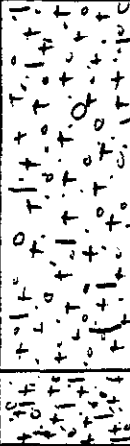
PROJECT No. 1765

LOCATION OF TEST PIT CONDUIT/ED. ALIGNMENT ~ 300m

GROUND ELEVATION \_\_\_\_\_

DATE AUG. 14/99 D/S OF SOUTH DAM SITE

LOGGED BY MDG

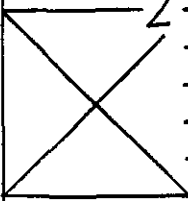
| NOTES<br>Groundwater level,<br>difficulty in dig-<br>ging, equipment<br>used, etc. | DEPTH<br>(m)   | GRAPHIC<br>LOG   | DESCRIPTION AND CLASSIFICATION<br>OF MATERIAL   |
|--|--|--|---|
| <p>Difficult digging in stiff silty grey (basal) till at 5m.</p>                   | <p>4</p> <p>Sample TP94-20-B</p> <p><del>5</del></p> <p>5.2</p> <p>6</p> |  | <p><u>BROWN SILTY (ABLATION) TILL</u> (cont'd).</p> <p>5.0-5.2m: <u>GREY FINE GRAINED SILTY (BASAL) TILL</u></p> <p>Brownish grey stiff, dry clayey silt w/ fine sand and gravel (approx. 20%). Gravel is sub-angular 2mm - 1cm dia supported in silty/clayey matrix.</p> <ul style="list-style-type: none"> <li>• Mat'l is highly (over) consolidated. <math>w/c \approx</math> optimum <math>w/c</math>.</li> <li>• Est. medium plasticity, very low permeability (est. <math>10^{-8}</math> cm/s).</li> <li>• V. well graded, poorly sorted, massive.</li> <li>• Excellent potential borrow for core zone dam fill.</li> <li>• Similar composition to (ablation) till above but dry, highly consolidated and stiff.</li> </ul> |

PROJECT KEMESS SOUTH  
LOCATION OF TEST PIT TERRACE WEST OF S. ARM TRIB.  
DATE AUG. 16/94 TO S. KEMESS CR.

PROJECT No. 1765  
GROUND ELEVATION \_\_\_\_\_  
LOGGED BY MDG

| NOTES<br>Groundwater level, difficulty in digging, equipment used, etc.  | DEPTH<br>(m)                            | GRAPHIC LOG | DESCRIPTION AND CLASSIFICATION OF MATERIAL  |
|--|---|-------------|---|
| <p>Cat 225 excavator with 2.5 ft wide tooth bucket.</p> <p>Easy digging in silty sand (alluvium) at surface.</p> | <p>0</p> <p>0.3</p> <p>1</p> <p>1.6</p> |             | <p><u>Vegetation:</u> Abundant fir (sparse) w/ few balsam. Scrawny trees. Swamp grass and moss. Area is poorly drained, swampy in places.</p> <p><u>0-0.3m:</u> <u>SILTY ORGANIC TOPSOIL &amp; PEAT.</u><br/>Dark brown-black, very soft &amp; wet swamp muck comprising silt and soft peat w/ fresh roots.</p> <p><u>0.3-1.6m:</u> <u>ALLUVIAL FINE SAND</u><br/>Light brown, med. dense, slightly moist (fairly well drained) alluvial FINE SAND w/ some silt and trace sub-rounded fine-med. gravel.<br/>Mat'l is non-plastic, fairly uniform, moderately well sorted.</p> |
| <p>Difficult digging in basal till at 3.8m.</p>  | <p>2</p> <p>3</p> <p>3.8</p> <p>4</p>   |             | <p><u>1.6-3.8m:</u> <u>BROWN SILTY (ABLATION) TILL</u><br/>Brown, firm, moist, well graded clayey SILT w/ some gravel and fine sand.<br/>• Est. medium plasticity, sticky and cohesive.<br/>• Est. low permeability (~10<sup>-8</sup> cm/s).<br/>• Gravel is sub-angular 0.3-3cm. Occasional cobble to 10cm.<br/>• Ablation glacial till or oxidised and softened basal till</p> <p><u>3.8-4.8m:</u> <u>GREY, HARD SILTY (BASAL) TILL</u><br/>Grey, hard, dry, "chunky", over-consolidated fine sandy SILT w/ some gravel, trace clay.</p>                                    |

Sample TP94-21-A




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# TEST PIT LOG

TEST PIT No.  
TP94-21  
SHEET 2 of 2

PROJECT KEMESS SOUTH  
LOCATION OF TEST PIT TERRACE WEST OF S. ARM TRIB.  
DATE AUG. 16/94 TO S. KEMESS CR.

PROJECT No. 1765  
GROUND ELEVATION \_\_\_\_\_  
LOGGED BY MDG

| NOTES<br>Groundwater level,<br>difficulty in dig-<br>ging, equipment<br>used, etc. | DEPTH<br>(m)  | GRAPHIC<br>LOG  | DESCRIPTION AND CLASSIFICATION<br>OF MATERIAL   |
|--|---------------|---|---|
|  | 4<br>4.8<br>5 |  | <p><u>GREY, HARD SILTY (BASAL) TILL (cont'd)</u></p> <ul style="list-style-type: none"> <li>• Very well graded, poorly sorted, massive, matrix supported. Gravel is sub-angular from 2mm - 2cm.</li> <li>• Est. low plasticity, v. low permeability.</li> <li>• Natural m/c ≈ optimum.</li> <li>• Excellent potential core zone fill for Main embankment construction.</li> </ul> |

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# TEST PIT LOG

TEST PIT No.  
TP94-22  
SHEET 1 of 2

PROJECT KEMESS SOUTH  
LOCATION OF TEST PIT BASE OF STEEP SLOPE NEAR CONDUIT/RO. ALIGNMENT.  
DATE AUG. 16/94

PROJECT No. 1765  
GROUND ELEVATION \_\_\_\_\_  
LOGGED BY MDG

| NOTES<br>Groundwater level, difficulty in digging, equipment used, etc.   | DEPTH<br>(m)   | GRAPHIC LOG | DESCRIPTION AND CLASSIFICATION OF MATERIAL  |
|---|--|-------------|---|
| <p>Cat 225 excavator with 2.5ft wide tooth bucket.</p> <p>Very easy digging in loose alluvial sands at sfc.</p> <p>Test pit is dry, walls stable.</p> | <p>0</p> <p>0.3</p> <p>1</p> <p>Sample TP94-22-A</p> |             | <p><u>Vegetation</u>: Sparse balsam w/ occasional fir tree. Moss/lichen cover.</p> <ul style="list-style-type: none"> <li>Well drained slope - mat's dry</li> </ul> <p><u>0-0.3m: SANDY ORGANIC TOPSOIL</u></p> <p>Dark reddish brown silty SAND w/ some v. fine gravel and fresh fine roots.</p> <p><u>0.3-2.5m: ALLUVIAL SANDS, SOME GRAVEL</u></p> <p>Loose, dry, light brown, well-drained alluvial FINE SAND w/ some gravel and occasional cobble.</p> <ul style="list-style-type: none"> <li>Moderately well sorted, fairly uniform, poorly graded</li> <li>Alluvial materials or re-worked (washed) glacial till.</li> </ul> |
| <p>Difficult digging in hard till at ~4.5m.</p> <p>Groundwater seepage into pit at 3.8m.</p>  | <p>2</p> <p>2.5</p> <p>3</p> <p>3.8</p> <p>4</p>     |             | <p><u>2.5-5.2m: BROWN, DENSE SANDY/SILTY TILL</u></p> <p>Brown, hard (dense), dry silty fine SAND w/ some gravel. Gravel is fine, angular 2mm to 1cm dia., matrix supported (est. 20%). Also trace coarse gravel and small cobbles.</p> <ul style="list-style-type: none"> <li>Est. v. low plasticity - Mod. low permeability (~ 10<sup>-6</sup> cm/s est.).</li> <li>Mat'l is highly consolidated &amp; dry. Natural n/c ≈ optimum n/c.</li> <li>Excellent potential low perm., strong compacted till for core zone of main embankment.</li> </ul> <p>(cont'd)...</p>  |



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# TEST PIT LOG

TEST PIT No.  
TP94-22  
SHEET 2 of 2

PROJECT KEMESS SOUTH  
LOCATION OF TEST PIT (see p. 1/2)  
DATE AUG. 16/94

PROJECT No. 1765  
GROUND ELEVATION \_\_\_\_\_  
LOGGED BY MDG

| NOTES<br>Groundwater level,<br>difficulty in dig-<br>ging, equipment<br>used, etc. | DEPTH<br>(m) | GRAPHIC<br>LOG | DESCRIPTION AND CLASSIFICATION<br>OF MATERIAL |
|--|--------------|----------------|---|
|--|--------------|----------------|---|

|                     |  |
|---------------------|--|
| 4                   |  |
| sample<br>TP94-22-B |  |
| 5                   |  |

BROWN, DENSE-SANDY TILL (CONT'D)

- Excellent dense foundation for diversion conduit and good mat'l for road building

\* Note: Brown, dense silty, well graded till also exposed at surface along excavator trail approx. 50m north of TP94-22.

|     |  |
|-----|--|
| 5.2 |  |
| 6   |  |

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# TEST PIT LOG

TEST PIT No.  
TP94-23  
SHEET 1 of 1

PROJECT KEMESS SOUTH

PROJECT No. 1765

LOCATION OF TEST PIT L. ABUT. MAIN EMBANKMENT ~300m

GROUND ELEVATION \_\_\_\_\_

DATE AUG. 16/94 U/S.

LOGGED BY MDE

| NOTES<br>Groundwater level, difficulty in digging, equipment used, etc.   | DEPTH<br>(m)  | GRAPHIC LOG | DESCRIPTION AND CLASSIFICATION OF MATERIAL  |
|---|---|-------------|---|
| <p>Cat 225 excavator with 2.5 ft wide tooth bucket.</p> <p>Moderately difficult digging in dense till from surface to bottom.</p> <p>Pit walls dry and stable above SWT</p> <p>Groundwater table at 2.7m</p> <p>Groundwater seepage into pit (0.7-0.25 gal/min. along 3x2m seepage face).</p> <p>Some caving of till into test pit below GW</p> | <p>0</p> <p>0.4</p> <p>1</p> <p>2</p> <p>Sample TP94-23-A</p> <p>▽ GW 2.7</p> |             | <p>0-0.4m: <u>SANDY ORGANIC TOPSOIL (RE-WORKED TILL)</u></p> <p>Orange-brown silty SAND w/some gravel, trace fine roots → Re-worked (slightly washed) glacial till. topsoil.</p> <p>0.4-5.2m: <u>BROWN, HARD SILTY F.G. TILL</u></p> <p>Brown, stiff to hard (dense), slightly moist fine sandy SILT w/ trace to some (~20%) fine angular gravel, trace clay and cobbles (No boulders) Gravel ranges from 2mm - 1.5cm dia., supported in silty, stiff, dry matrix. (approx. 80% matrix).</p> <ul style="list-style-type: none"> <li>• Est. low permeability (est. <math>10^{-7}</math> cm/s); low plasticity.</li> <li>• Natural <math>w/c \approx</math> optimum - mat'l is highly consolidated, hard, "blocky" consistency. <math>w/c &lt;</math> Plastic limit.</li> <li>• Slight increase in clay content and density w/ depth.</li> <li>• Very poorly sorted, road well graded, massive mat'l.</li> <li>• Excellent potential strong, low perm. compacted fill for glacial till core zone at Main Embankment (Above ** Starter Dam crest elev. ∴ good for on-going raises of embankment).</li> </ul> <p>(cont'd to 5.2m)</p> |

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# TEST PIT LOG

TEST PIT No.  
TP94-29  
SHEET 1 of 1

PROJECT KEMESS SOUTH  
LOCATION OF TEST PIT CONDUIT/RD. ALIGNMENT 300m  
DATE AUG. 16/94 U/S OF MAIN EMBANKMENT

PROJECT No. 1765  
GROUND ELEVATION \_\_\_\_\_  
LOGGED BY MDG

| NOTES<br>Groundwater level,<br>difficulty in dig-<br>ging, equipment<br>used, etc.   | DEPTH<br>(m)   | GRAPHIC<br>LOG                              | DESCRIPTION AND CLASSIFICATION<br>OF MATERIAL  |
|--|--|---|--|
| <p>Cat 225 excavator with 2.5 ft wide tooth bucket.</p> <p>Difficult (very boney) digging at surface in broken crs. blocky bedrock.</p> <p>(Refusal)</p> <p>Test pit is very dry (no groundwater.)</p> | <p>0</p> <p>0.3</p> <p>1</p> <p>1.2</p> <p>2</p> <p>3</p> <p>4</p> | <p>FR,<br/>blocky,<br/>hard<br/>bedrock</p> | <p>Vegetation: Sparse fir &amp; balsam. Steep, well-drained slope. Thin moss cover. Abundant blocky rock frag. float; hard ground.</p> <p>0-0.3m: <u>SANDY / GRAVELLY TOPSOIL</u><br/>Orange-brown, loose gravelly SAND w/ some silt and organics (roots).</p> <p>0.3-1.2m: <u>BROKEN, BLOCKY, HARD, FRESH ROCK</u><br/>Broken, hard (est. RA), fresh, fine-grained intrusive blocky bedrock. Greenish grey colour; Diorite (?). Blocks are very angular from 0.3-1m dia. Competent rock.</p> <p>1.2m: Refusal in broken bedrock.<br/>(likely rippable w/ heavy equipment)</p> |

|   |                         |
|---|-------------------------|
| PROJECT <u>KOMNESS SOUTH</u>  | PROJECT No. <u>1765</u> |
| LOCATION OF TEST PIT <u>D/S OF MAIN EMB. (L. ABUT.)</u>                                       | GROUND ELEVATION _____  |
| DATE <u>Aug. 16/94</u> <span style="margin-left: 50px;"><u>ABOVE STARTER CREST EL.</u></span> | LOGGED BY <u>MDG</u>    |

| NOTES<br>Groundwater level, difficulty in digging, equipment used, etc.  | DEPTH<br>(m)  | GRAPHIC LOG | DESCRIPTION AND CLASSIFICATION OF MATERIAL  |
|--|---|-------------|---|
| <p>Cat 225 excavator with 2.5 ft wide tooth bucket</p> <p>Easy digging in till from 0-3m. then more difficult digging.</p> <p>Test pit is dry to bottom. Walls are stable.</p> | <p>0</p> <p>0.3</p> <p>Composite Sample TP94-25-A</p> <p>1</p> <p>2</p> <p>3</p> <p>4</p> |             | <p><u>Vegetation:</u> Sparse fir, balsam and pine w/ thin moss/lichen cover.</p> <p><u>0-0.3m:</u> <u>SANDY, WELL-DRAINED ORGANIC TOPSOIL</u></p> <p>Orange silty SAND w/ some gravel and organics. Dry to slightly moist, granular, well drained topsoil. Moss cover 10cm thick.</p> <p><u>0.3-4.8m:</u> <u>BROWN, STIFF SILTY TILL TO SANDY, WELL GRADED TILL</u></p> <p>Brown, dry, v. fine sandy SILT w/ trace to some (~15%) gravel. (No cobbles or clay). Gravel clasts sub-angular from 2mm - 1.5cm supported in fine grained matrix.</p> <ul style="list-style-type: none"> <li>• Est. v. low plasticity; low permeability (<math>10^{-7}</math> cm/s)</li> <li>• Poorly graded, poorly sorted.</li> <li>• Mat'l is hard, dry - sl. moist, highly consolidated, "chunky" - "blocky" consistency. <math>M_L \approx</math> optimum.</li> <li>* Good potential borrow for core zone fill for on-going raises of Main Emb.</li> <li>• Fine-grained (ablation-type) glacial till. Mat'l is fairly uniform, massive.</li> </ul> <p>Till grades down to silty SAND w/ gravel at depth (est. 3.5-4.8m). Coarser grained till than above.</p> <p>** <u>Note:</u> Sample TP94-25-A composite well graded sandy till.</p> |

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# TEST PIT LOG

TEST PIT No.  
TP94-25  
SHEET 2 of 2

PROJECT KEMESS SOUTH

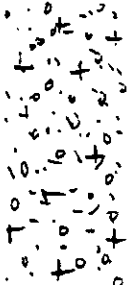
PROJECT No. 1765

LOCATION OF TEST PIT (see p. 1/2)

GROUND ELEVATION \_\_\_\_\_

DATE AUG. 16/94

LOGGED BY MDG

| NOTES<br>Groundwater level,<br>difficulty in digg-<br>ing, equipment<br>used, etc. | DEPTH<br>(M) | GRAPHIC<br>LOG  | DESCRIPTION AND CLASSIFICATION<br>OF MATERIAL |
|--|--------------|---|---|
|  | 4            |  | <u>BROWN, WELL GRADED SANDY TILL (CONT'D)</u> |
|  | 4.8          |   | (Bottom)                                      |
|  | 5            |   |   |

# TEST PIT LOG

PROJECT KEMESS SOUTH  
LOCATION OF TEST PIT FINAL SPILLWAY - MAIN EMB.  
DATE AUG. 16/94

PROJECT No. 1765  
GROUND ELEVATION \_\_\_\_\_  
LOGGED BY MDG

| NOTES<br>Groundwater level,<br>difficulty in dig-<br>ging, equipment<br>used, etc.  | DEPTH<br>(m)  | GRAPHIC<br>LOG  | DESCRIPTION AND CLASSIFICATION<br>OF MATERIAL  |
|---|---|---|--|
| <p>Cat 225 excavator with 2.5ft wide tooth bucket.</p> <p>Test pit is dry. Free draining slope.</p> <p>* Excellent foundation conditions for final spillway - (drill &amp; blast cut in rock for spillway).</p> | <p>0</p> <p>0.3</p> <p>0.7</p> <p>1</p> <p>Refusal 1.4</p> <p>2</p> <p>3</p> <p>4</p> | <p>FR<br/>Blocky<br/>v. hard<br/>Bedrock<br/>(volc.?)</p> | <p>Vegetation: Thin, sparse balsam and fir trees<br/>Thin moss cover.<br/>- Slope is very well drained and steep.</p> <p><u>0-0.3m: SILTY ORGANIC TOPSOIL</u><br/>Orange (rust) fine sandy SILT w/ trace roots and gravel. Slightly moist. Moss/lichen cover 5-10cm thick.</p> <p><u>0.3-0.7m: GRAVELLY COLLUVIUM</u><br/>Sandy angular gravel size rock fragments w/ trace silt. Gravel clasts in sand matrix aligned downslope, range from 0.3-2cm dia.<br/>• Est. high perm., free-draining, ccs. granular mat'l.</p> <p><u>0.7-1.4m: BROKEN, BLOCKY, FRESH, HARD ROCK</u><br/>Broken, blocky, hard, fresh, fine grained grey volcanic (?) rock frags. w/ trace hematite (iron oxide) staining on very rough, sub-planar fracture surfaces<br/>• Blocks range from 5-20cm dia., very hard (R5)<br/>• Est. v. high permeability (fracture controlled).<br/>• Trace sandy gravel rock frags. between blocks<br/>• Joint surfaces are fresh (no infilling), hard, sub-planar, rough, competent.</p> <p><u>1.4m COMPETENT BEDROCK (REFUSAL)*</u><br/>Slightly broken, v. hard, fresh blocky bedrock blocks 30-50cm dia.</p> |

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# TEST PIT LOG

TEST PIT No.  
**TP94-27**  
SHEET 1 of 1

PROJECT KEMESS SOUTH

PROJECT No. 1765

LOCATION OF TEST PIT TERRACE D/S OF MAIN EMB.

GROUND ELEVATION \_\_\_\_\_

DATE AUG. 16/94 FT APPROX. STARTER CREST EL.

LOGGED BY MDG

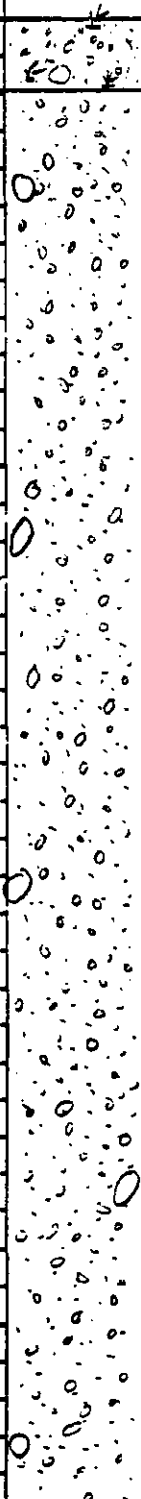
| NOTES<br>Groundwater level, difficulty in digging, equipment used, etc.   | DEPTH<br>(m)   | GRAPHIC LOG | DESCRIPTION AND CLASSIFICATION OF MATERIAL  |
|---|--|-------------|---|
| <p>Cat 225 excavator with 2.5 ft wide tooth bucket.</p> <p>Very easy digging in clean, cohesionless gravelly sands.</p> <p>Alluvial mat's well drained; some caving below GWT, otherwise stable.</p> <p>Groundwater seeping slowly into pit at ~3.5m (est. 1-2 gal/min.).</p> | <p>0</p> <p>0.2</p> <p>Sample TP94-27-A</p> <p>1</p> <p>2</p> <p>3</p> <p>Δ GWT 3.5</p> <p>4</p> |             | <p><u>Vegetation</u>: Pine, fir trees; fern moss. Very well drained area on alluvial / glacio-fluvial terrace.</p> <p><u>0-0.2m</u>: <u>SANDY / GRAVELLY ORGANIC TOPSOIL</u>.</p> <p>Loose, orange, dry (well drained) gravelly SAND w/ trace fine roots.</p> <p><u>0.2-3.5m</u>: <u>GLACIOFLUVIAL (ALLUVIAL) GRAVELLY SANDS</u>.</p> <p>Clean, stratified alluvial gravelly SANDS w/ occasional interbed of uniform coarse sand.</p> <ul style="list-style-type: none"> <li>• Mat is dry (above GWT), clean, coarse granular.</li> <li>• Sand is med. grained. Trace small cobbles throughout.</li> <li>• Gravel clasts range from 1-4cm, rounded, generally supported in sandy matrix.</li> <li>• Excellent coarse granular fill for shell zone of Main Embankment.</li> </ul> <p><u>3.5-4.2m</u>: <u>GLACIOFLUVIAL SANDS &amp; GRAVELS w/ COBBLES</u>.</p> <p>Alluvial / glaciofluvial sands and gravels, trace cobbles (no fines - silt or clay).</p> <ul style="list-style-type: none"> <li>• Mats are wet (saturated) since below GWT but are free-draining.</li> <li>• Groundwater seeping into pit in alluvials.</li> </ul> |

|   |                         |
|---|-------------------------|
| PROJECT <u>KEMESS SOUTH</u>                             | PROJECT No. <u>1765</u> |
| LOCATION OF TEST PIT <u>RT. ABUT. ~500m U/S OF MAIN</u> | GROUND ELEVATION _____  |
| DATE <u>AUG. 17/94</u> <u>EMB. N. OF S. KEMESS CK.</u>  | LOGGED BY <u>MDG</u>    |

| NOTES<br>Groundwater level, difficulty in digging, equipment used, etc.   | DEPTH<br>(m)   | GRAPHIC LOG | DESCRIPTION AND CLASSIFICATION OF MATERIAL   |
|---|--|-------------|--|
| <p>Cat 225 excavator with 2.5 ft wide tooth bucket.</p> <p>Easy digging in soft, very moist silty till at surface.</p> <p>Materials loose - pit walls caving occasionally as groundwater seeps into pit at ~3.5m.</p> <p style="margin-top: 20px;">Groundwater table at 3.5m.</p> | <p>0</p> <p>0.3</p> <p>1</p> <p style="text-align: center;">Sample<br/>TP94-28-A</p> <p style="text-align: center; border: 1px solid black; width: 40px; margin: 0 auto;">2</p> <p>3</p> <p style="text-align: center;">▽ GWT 3.5</p> <p>4</p> |             | <p><u>0-0.3m: SILTY-ORGANIC TOPSOIL</u></p> <p>Dark brown, soft SILT w/ some gravel, trace fine roots and v. fine sand. Moist.</p> <p><u>0.3-5.5m: BROWN, WET LOOSE SANDY/SILTY (ABLATION) TILL</u></p> <p>Dark brown, loose and soft, wet silty fine-med. SAND w/ some gravel and trace clay. Gravel is sub-rounded from 0.5-2cm dia., supported in wet sandy matrix. Material is slightly sticky and cohesive.</p> <ul style="list-style-type: none"> <li>• Est. low plasticity, mod. low permeability (est <math>10^{-6}</math> cm/s)</li> <li>• Well graded sandy (ablation type) glacial till - likely deposited along valley margin of ice during glaciation.</li> <li>• Good potential strong low perm. fill but <u>too wet</u> to utilize as embankment fill. (Mat'l becomes tough and strong if allowed to dry, however, as is evident along nearby road cut).</li> </ul> <p style="margin-top: 20px;">Same mat'l to 5.5m (Max. reach w/ excavator)</p> |



|   |                             |
|---|-----------------------------|
| PROJECT <u>KEMESS SOUTH</u>                           | PROJECT No. <u>1765</u>     |
| LOCATION OF TEST PIT <u>UPPER TERRACE D/S OF MAIN</u> | GROUND ELEVATION _____      |
| DATE <u>AUG. 17/94</u>                                | EMB. NORTH OF S. KEMESS CK. |
| LOGGED BY <u>MDG</u>                                  |                             |

| NOTES<br>Groundwater level, difficulty in digging, equipment used, etc.   | DEPTH<br>(m)  | GRAPHIC LOG  | DESCRIPTION AND CLASSIFICATION OF MATERIAL  |
|---|---|--|---|
| <p>Cat 225 excavator with 2.5 ft. wide tooth bucket.</p> <p>Test pit is dry; No groundwater. Walls stable.</p> <p>Very easy digging in loose alluvials to bottom at 5m.</p> | <p>0</p> <p>0.2</p> <p>1</p> <p>2</p> <p>3</p> <p>4</p> |  | <p><u>0-0.2m: SANDY/GRAVELLY ORGANIC TOPSOIL</u></p> <p>Orange (iron oxid.) fine gravelly coarse SAND w/ trace organics (roots). Thin moss cover. Very well drained topsoil. Pine trees abundant.</p> <p><u>0.2-5m: GLACIOFLUVIAL (OUTWASH) SANDS AND GRAVELS.</u></p> <p>Brown, dry, v. well drained, clean SAND AND GRAVEL w/ trace small cobbles. Gravel clasts well rounded, supported in sand matrix (med.-coarse grained), range from 0.5-3cm dia.</p> <ul style="list-style-type: none"> <li>• Mat'l is very clean (no fines) and no boulders.</li> <li>* Excellent potential borrow source for clean granular shell zone / structural fill for on-going construction of the Main Embankment.</li> <li>• Similar mat'l's exposed along old road cuts 6 to 7m high to the east and west. Est. total thickness &gt; 7m.</li> </ul> <p>(Same mat'l to bottom of Test Pit at 5m).</p> <p style="text-align: center;">↓</p> |

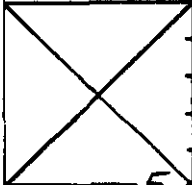

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# TEST PIT LOG

TEST PIT No.  
TP94-29  
SHEET 2 of 2

PROJECT KEMESS SOUTH  
LOCATION OF TEST PIT (see p. 1/2)  
DATE AUG. 17/94

PROJECT No. 1765  
GROUND ELEVATION \_\_\_\_\_  
LOGGED BY MDG

| NOTES<br>Groundwater level,<br>difficulty in dig-<br>ging, equipment<br>used, etc. | DEPTH<br>(M)  | GRAPHIC<br>LOG  | DESCRIPTION AND CLASSIFICATION<br>OF MATERIAL                           |
|--|---|---|---|
|  | <p>4</p> <p>Sample<br/>TP94-29-A</p>  <p>5</p> |  | <p><u>GLACIOFLUVIAL (OUTWASH) SANDS<br/>AND GRAVELS (CONT'D)...</u></p> |

# TEST PIT LOG

PROJECT KCMSS SOUTH

PROJECT No. 1765

LOCATION OF TEST PIT SLOPE WEST OF MILL CR (D/S  
OF MAIN EMB.)

GROUND ELEVATION \_\_\_\_\_

DATE AUG. 18/94

LOGGED BY MDG

| NOTES<br>Groundwater level,<br>difficulty in dig-<br>ging, equipment<br>used, etc.   | DEPTH<br>(m)   | GRAPHIC<br>LOG | DESCRIPTION AND CLASSIFICATION<br>OF MATERIAL   |
|--|--|----------------|---|
| <p>Cat 225 excavator with 2.5 ft. wide tooth bucket.</p> <p>Test pit dry (no seepage); walls fairly stable in most fine grained till.</p> <p>Very easy digging in loose to med. dense fine grained till.</p> | <p>0</p> <p>0.3</p> <p>1</p> <p>2</p> <p>3</p> <p>3.5</p> <p>4</p> |                | <p>Vegetation: Fir, spruce, some pine trees. Thick moss. occasional swampy area (poorly drained in part).</p> <p>0-0.3m: <u>FINE GRAINED (SILTY) ORGANIC TOPSOIL</u><br/>Brown, stiff, dry SILT w/ some fine roots, trace fine sand. Moss ≈ 5cm thick.</p> <p>0.3-3.5m: <u>BROWN, FINE GRAINED SILTY (ABLATION) GLACIAL TILL</u><br/>Brown, sl. moist fine sandy SILT w/ some (est. 20%) fine gravel, trace clay. Mat'l is mod. well graded, poorly sorted, massive. Gravel is sub-angular 0.2-2cm.</p> <ul style="list-style-type: none"> <li>• Est. low-med. plasticity (slightly sticky and cohesive); Est. v. low permeability (<math>\approx 10^{-7}</math> cm/s).</li> <li>• Natural <math>w/c \approx</math> optimum → good for compaction.</li> <li>* • Good potential source of borrow for low perm., dense compacted fill for core zone of on-going raises of the Main Embankment.</li> </ul> |
| <p>More difficult digging in hard till from 3.5-5.5m</p>   |  |                | <p>3.5-5.5m: <u>GREY, HARD, DRY SILTY (BASAL) TILL</u><br/>Grey, stiff to hard, dry fine sandy SILT w/ some gravel, trace cobbles and clay.</p> <p>(cont'd)..</p>   |

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# TEST PIT LOG

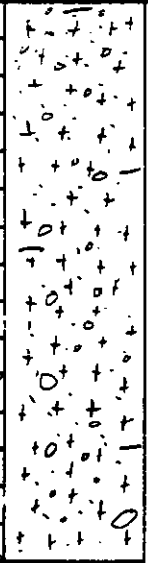
TEST PIT No.  
TP94-30  
SHEET 2 of 2

PROJECT KENESS SOUTH  
LOCATION OF TEST PIT (see p. 1/2)  
DATE AUG. 18/94

PROJECT No. 1765  
GROUND ELEVATION \_\_\_\_\_  
LOGGED BY MDG

| NOTES<br>Groundwater level,<br>difficulty in digg-<br>ing, equipment<br>used, etc. | DEPTH<br>(m) | GRAPHIC<br>LOG | DESCRIPTION AND CLASSIFICATION<br>OF MATERIAL |
|--|--------------|----------------|---|
|--|--------------|----------------|---|

|   |                          |     |
|---|--------------------------|-----|
| 4 | Sample<br>TP94-30-B<br>5 | 5.5 |
|---|--------------------------|-----|



GREY, HARD, DRY SILTY (BASAL)  
TILL (CONT'D) ...

- Till is well graded, highly consolidated, hard "chunky", dry consistency.
- Drier and denser than brown ablation till above. (similar composition).
- \* • Excellent source of low perm, low PI core zone fill for Main Embankment construction.

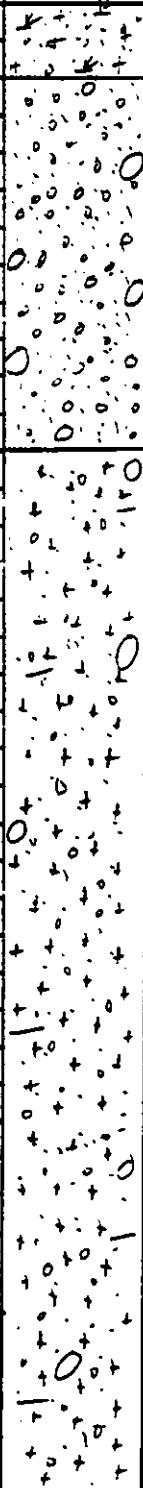
Bottom of Test pit - max. reach w/ excavator.

|   |  |  |
|---|--|--|
| 6 |  |  |
|---|--|--|


# TEST PIT LOG

PROJECT KOMESS SOUTH  
LOCATION OF TEST PIT FLAT AREA WEST OF MILL CK.  
DATE AUG. 18/94 D/S OF MAIN EMB.

PROJECT No. 1765  
GROUND ELEVATION \_\_\_\_\_  
LOGGED BY MDE

| NOTES<br>Groundwater level,<br>difficulty in dig-<br>ging, equipment<br>used, etc.   | DEPTH<br>(m)  | GRAPHIC<br>LOG   | DESCRIPTION AND CLASSIFICATION<br>OF MATERIAL |
|--|---|--|---|
| <p>Cat 225 excavator with 2.5 ft. wide tooth bucket.</p> <p>Easy digging in alluvial sands.</p> <p>Test pit is dry, walls stable.</p> <p>Difficult digging in glacial till materials.</p> <p>Trace gdw. seepage at 4.2m.</p> | <p>0</p> <p>0.2</p> <p>1</p> <p>1.2</p> <p>2</p> <p>3</p> <p>4</p> <p>Sample TP94-31-A</p>  | <p><u>Vegetation:</u> Sparse, abundant balsam, occasional f.r. Thin moss/lichen cover.</p> <p><u>0-0.2m: SANDY ORGANIC TOPSOIL</u><br/>Dark brown, loose, dry silty SAND w/ some peat, roots and trace gravel.</p> <p><u>0.2-1.2m: ALLUVIAL GRAVELLY SANDS.</u><br/>Brown, loose, dry, (well drained) alluvial (glaciofluvial?) gravelly COARSE SAND w/ some small cobbles. Gravel is rounded 1-3 cm dia., supported in sand matrix.<br/>• Mat'l is fairly massive (poorly sorted), very clean (no fines - silt or clay).<br/>* • Good potential granular fill borrow.</p> <p><u>1.2-4.2m: BROWN, FINE GRAINED, SILTY (ABLATION) TILL</u><br/>Brown, dry, very stiff to hard, v.f. sandy SILT w/ some fine-med. sub-angular gravel, trace cobbles and clay (~5% est.).<br/>• Very well graded, poorly sorted. Highly (over) consolidated. Natural m/c = optimum m/c.<br/>• Gravel ranges from 0.2-2 cm., matrix supported, comprises ~20%.<br/>• Est. low plasticity, v. low permeability (approx. <math>10^{-8}</math> cm/s est.).<br/>* • Excellent potential source of low perm, strong, dry core zone borrow for on-going embankment raises.</p> |   |

|  |                         |
|--|-------------------------|
| PROJECT <u>KEMESS SOUTH</u>              | PROJECT No. <u>1765</u> |
| LOCATION OF TEST PIT <u>(see p. 1/2)</u> | GROUND ELEVATION _____  |
| DATE <u>AUG. 18/94</u>                   | LOGGED BY <u>MDG</u>    |

| NOTES<br>Groundwater level,<br>difficulty in dig-<br>ging, equipment<br>used, etc. | DEPTH<br>(m)              | GRAPHIC<br>LOG   | DESCRIPTION AND CLASSIFICATION<br>OF MATERIAL  |
|--|---------------------------|--|--|
| Very difficult digging in grey till at 4.2m.                                       | 4<br>4.2<br>5<br>5.3<br>6 |  | <p><u>4.2-5.3m: GREY, HARD SILTY (BASAL) TILL</u></p> <p>Grey, dry, hard fine sandy SILT w/ some gravel, trace cobbles and clay.</p> <ul style="list-style-type: none"> <li>- Similar composition to brown till above <u>but</u> harder and drier.</li> <li>• Est. low plasticity, v. low permeability (<math>10^{-8}</math> - <math>10^{-9}</math> cm/s).</li> <li>• Very hard, blocky consistency.</li> <li>• Gravel is angular 2mm - 2cm dia., supported in hard, fine grained matrix.</li> <li>• Similar to grey (basal) till found in TP94-30.</li> </ul> <p>* • Excellent potential low perm., strong fill for core zone of Main Emb. Since low m/c, low perm., over-consolidated m/c = optimum m/c.</p> |

|   |                         |
|---|-------------------------|
| PROJECT <u>KEMESS SOUTH</u>   | PROJECT No. <u>1765</u> |
| LOCATION OF TEST PIT <u>LOCATED ALONG MILLSITE RD. WEST OF MILL CK.</u> | GROUND ELEVATION _____  |
| DATE <u>AUG. 10/94</u>  | LOGGED BY <u>MDG</u>    |

| NOTES<br>Groundwater level, difficulty in digging, equipment used, etc.   | DEPTH<br>(m)  | GRAPHIC LOG | DESCRIPTION AND CLASSIFICATION OF MATERIAL   |
|---|---|-------------|--|
| <p>Cat 225 excavator with 2.5 ft. wide tooth bucket.</p> <p>Easy digging in fill at surface.</p> <p>Test pit walls dry, stable.</p> | <p>0</p> <p>0.3</p> <p>1</p> <p>2</p> <p>3</p> <p>4</p> <p style="text-align: center;">Sample TP94-32-A</p> |             | <p><u>0-0.3m: SANDY-GRAVELLY ORGANIC TOPSOIL</u></p> <p>Brown, sl. moist, silty SAND and GRAVEL w/ cobbles and fine roots. Very thin moss/lichen cover. Well drained c/s. grained.</p> <p><u>0.3-2m: BROWN, WELL GRADED SANDY TILL</u></p> <p>Chocolate brown, very moist, med. dense, (well graded) gravelly SAND w/ some silt, and trace cobbles and clay.</p> <ul style="list-style-type: none"> <li>• Mat'l is well graded, v. poorly sorted (typical sandy ablation till found along millsite access road).</li> <li>• Gravel is sub-angular to sub-odd from 0.5 - 2cm dia., comprising ~35% of mat'l, supported in sandy/silty matrix.</li> <li>• Natural m/c sl. &gt; optimum m/c. Est. low plasticity (mat'l slightly sticky and cohesive).</li> </ul> <p><u>2-4.8m: HEAVILY WEATHERED, WEAK, BLOCKY TO PULVERIZED BEDROCK.</u></p> <p>HW, weak, friable, heavily iron oxidized (limonite/hematite pervasive throughout), badly broken, blocky bedrock.</p> <p>Mat'l comprises:</p> <ul style="list-style-type: none"> <li>• ~30% weak, broken, blocky, angular rock frags. 3-7cm dia.</li> <li>• ~70% HW, pulv. gravelly SAND. loose, well drained. → residual, HW-EW rock</li> </ul> |


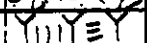
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CONSULTING ENGINEERS

# TEST PIT LOG

TEST PIT No.  
TP94-32  
SHEET 2 of 2

PROJECT KEMESS SOUTH  
LOCATION OF TEST PIT (see p. 1/2)  
DATE AUG. 18/94

PROJECT No. 1765  
GROUND ELEVATION \_\_\_\_\_  
LOGGED BY MDG

| NOTES<br>Groundwater level,<br>difficulty in dig-<br>ging, equipment<br>used, etc. | DEPTH<br>(m) | GRAPHIC<br>LOG  | DESCRIPTION AND CLASSIFICATION<br>OF MATERIAL  |
|--|--------------|---|--|
|  | 4            |  | <u>HW, WEAK, BLOCKY - PULV. BEDROCK (CONT'D)</u>   |
|  | 4.8          |  | (Refusal)  |
|  | 5            | SW,<br>hard,<br>blocky<br>Bedrock   | <u>4.8m: SW, HARD, BLOCKY BEDROCK.</u><br><br>Mod. hard, broken, blocky, SW,<br>v. fine grained dk. grey Volcanics (?).<br>Coarse blocks - could not move w/<br>excavator bucket. (likely rippable w/<br>heavy equipment). |



|  |                         |
|--|-------------------------|
| PROJECT <u>KEMESS SOUTH</u>  | PROJECT No. <u>1765</u> |
| LOCATION OF TEST PIT <u>L. ABENT. &amp; CREST EL. OF</u>             | GROUND ELEVATION _____  |
| DATE <u>AUG. 18/99</u> <u>FRESH WATER STORAGE DAM SITE</u><br>(FWSD) | LOGGED BY <u>MDG</u>    |

| NOTES<br>Groundwater level, difficulty in digging, equipment used, etc.   | DEPTH<br>(m)                 | GRAPHIC LOG | DESCRIPTION AND CLASSIFICATION OF MATERIAL  |
|---|------------------------------|-------------|---|
| <p>Cat 225 excavator with 2.5 ft. wide tooth bucket.</p> <p>Easy digging in brown till to bottom of pit at 5.0m.</p> <p>Test pit is dry. (no seepage). Mat'l moist.</p> <p>Minor caving of walls during excavation.</p> | 0<br>0.3<br>1<br>2<br>3<br>4 |             | <p><u>0-0.3m: SILTY ORGANIC TOPSOIL</u></p> <p>Dark brown, firm, sl. moist SILT w/ some decomposed organics (peat top 10 cm), trace sand and gravel, fresh fine roots. Moss/lichen cover ~10cm thick.</p> <p><u>0.3-5.0m: BROWN, WELL GRADED SILTY (ABLATION) GLACIAL TILL</u></p> <p>Brown, firm, moist, v. fine sandy SILT w/ some fine, sub-angular gravel, trace clay. Rare small cobble. Gravel 2mm-3cm, matrix supported.</p> <ul style="list-style-type: none"> <li>• Mat'l is v. well graded, v. poorly sorted, massive.</li> <li>• Est. med. plasticity; low permeability (<math>10^{-8}</math> cm/s).</li> <li>• Natural <math>w/c \approx</math> optimum. Mat'l at plastic limit</li> <li>• Excellent strong, low perm. well graded compacted fill for core zone of FWSD.</li> </ul> <p><u>Also:</u> Good mat'l for foundation seepage cut-off.</p> <ul style="list-style-type: none"> <li>• Same mat'l to bottom of pit at 5m.</li> </ul> |

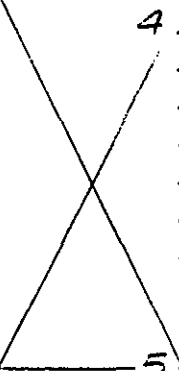
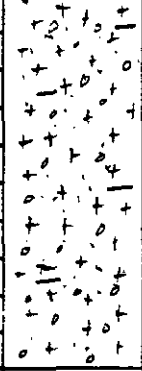
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# TEST PIT LOG

TEST PIT No.  
TP94-33  
SHEET 2 of 2

PROJECT KEMESS SOUTH  
LOCATION OF TEST PIT (see p. 1/2)  
DATE AUG. 18/94

PROJECT No. 1765  
GROUND ELEVATION \_\_\_\_\_  
LOGGED BY MDG

| NOTES<br>Groundwater level,<br>difficulty in dig-<br>ging, equipment<br>used, etc. | DEPTH<br>(m)<br>TP94-33-A   | GRAPHIC<br>LOG  | DESCRIPTION AND CLASSIFICATION<br>OF MATERIAL                              |
|--|---|---|--|
|  | <p>4</p>  <p>5</p> |  | <p><u>BROWN, WELL-GRADED SILTY (ABLATION)</u><br/><u>TILL (CONT'D)</u></p> |

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# TEST PIT LOG

TEST PIT No.  
7P94-34  
SHEET 1 of 2

PROJECT KENESS SOUTH  
LOCATION OF TEST PIT 200m W/S of F WSD SITE  
DATE AUG. 18/94 AT DRILLHOLE 94-191.

PROJECT No. 1765  
GROUND ELEVATION \_\_\_\_\_  
LOGGED BY MDG

| NOTES<br>Groundwater level, difficulty in digging, equipment used, etc.  | DEPTH<br>(m)                                     | GRAPHIC LOG | DESCRIPTION AND CLASSIFICATION OF MATERIAL  |
|--|--|-------------|---|
| <p>Cat 225 excavator with 2.5 Ft. wide tooth bucket.</p> <p>Fairly easy digging in surficial brown till. 0-2.9m.</p> <p>Test pit dry (no seepage) Hat's moist. Pit walls fairly stable</p> | <p>0</p> <p>0.3</p> <p>1</p> <p>2</p> <p>2.9</p> |             | <p>0-0.3m: <u>SILTY ORGANIC TOPSOIL.</u><br/>Dark brown, firm, sl. moist clayey SILT (very uniform) w/ trace fine roots.</p> <p>0.3-2.9m: <u>BROWN, WELL GRADED COBBLY/SILTY (ABLATION) TILL.</u><br/>Brown, v. moist, v. well graded fine sandy/gravelly SILT w/ some cobbles and trace clay. Gravel is sub-rounded from 0.5-2cm dia. Cobbles comprise angular, hard rock frags., are matrix supported and range from 5-10cm dia.</p> <ul style="list-style-type: none"> <li>• Natural m/c &gt; optimum (possibly too wet to utilize as dam fill).</li> <li>• Est. med. plasticity fines. (cohesive and sticky but very moist).</li> <li>• Clasts are all matrix supported, massive.</li> <li>• Likely ablation till deposited along valley walls during deglaciation (ice melt).</li> <li>• Est. low permeability.</li> </ul> |
| <p>Moderately difficult digging in hard silty till at 2.9m.</p>  | <p>3</p> <p>4</p>                                |             | <p>2.9-5.7m: <u>BROWN, HARD SILTY (BASAL) TILL</u><br/>Light brown, hard, dry to sl. moist, very fine sandy SILT to silty v. FINE SAND, w/ some fine sub-angular gravel and trace cobbles and clay. Very dense, hard till. Gravel is matrix supported ranges from few mm to 2cm dia.</p> <ul style="list-style-type: none"> <li>• Well graded, v. poorly sorted and massive.</li> </ul>   |

(cont'd)...

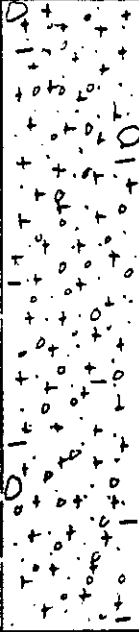
KNIGHT AND PIESOLD LTD.  
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# TEST PIT LOG

TEST PIT No.  
TP94-34  
SHEET 2 of 2

PROJECT KEINNESS SOUTH  
LOCATION OF TEST PIT (see p. 3/2)  
DATE AUG. 13/94

PROJECT No. 1765  
GROUND ELEVATION \_\_\_\_\_  
LOGGED BY MIDG

| NOTES<br>Groundwater level,<br>difficulty in digg-<br>ing, equipment<br>used, etc. | DEPTH<br>(m)  | GRAPHIC<br>LOG   | DESCRIPTION AND CLASSIFICATION<br>OF MATERIAL   |
|--|---|--|---|
|  | <p>4</p> <p>Sample<br/>TP94-34-A</p> <p>5</p> <p>5.7</p> <p>6</p> |  | <p><u>BROWN, HARD SILTY (BASAL) TILL (CONT'D)...</u></p> <ul style="list-style-type: none"> <li>• Till is highly to over (?) consolidated</li> <li>• Natural <math>w_p</math> <math>\approx</math> optimum <math>w_p</math> for compaction.</li> <li>• Est. v. low permeability (<math>&lt; 10^{-8}</math> cm/s).</li> <li>* • Excellent potential strong, low perm. fill for core zone of FWSD.</li> </ul> |

|  |                         |
|--|-------------------------|
| PROJECT <u>KEMESS SOUTH</u>                            | PROJECT No. <u>1765</u> |
| LOCATION OF TEST PIT <u>VALLEY BOTTOM ~ 45m U/S OF</u> | GROUND ELEVATION _____  |
| DATE <u>AUG. 19/94</u> @ FWSO SITE ADJACENT TO CK.     | LOGGED BY <u>MDG</u>    |

| NOTES<br>Groundwater level, difficulty in digging, equipment used, etc.   | DEPTH<br>(m)                        | GRAPHIC LOG | DESCRIPTION AND CLASSIFICATION OF MATERIAL  |
|---|-------------------------------------|-------------|---|
| <p>Cat 225 excavator with 2.5ft wide tooth bucket.</p> <p>Fairly easy digging in brown surficial till. 0-3.1m.</p> <p>Test pit walls very stable in till materials.</p> <p>Groundwater table at approx. creek elev. (~1m)</p> <p>No seepage into pit - Trace developing in to 0.5m in brown till.</p> <p>Made quite by difficult digging in hard grey till at 3.1m.</p> | 0<br>0.3<br>1<br>2<br>3<br>3.1<br>4 |             | <p><u>0-0.3m: SILTY/PEATY SOFT ORGANIC TOPSOIL</u><br/>                     Orangish brown, soft, sl. moist SILT w/ trace fine gravel and v. fine roots. Top 10cm comprises decomposed organics (peat) and fine roots.</p> <p><u>0.3-3.1m: BROWN, WELL GRADED, SOFT SILTY (ABLATION) GLACIAL TILL</u><br/>                     Brown, v. moist to wet, firm (indent with finger), well graded fine sandy SILT w/ some gravel and trace clay. Gravel is sub-rounded ranging from 2mm to 2cm dia. (well graded) supported in silty matrix.</p> <ul style="list-style-type: none"> <li>• Similar to till found along left abutment at FWSO.</li> <li>• Est. med plasticity, low perm. (<math>10^{-7}</math> cm/s).</li> <li>• Very well graded, very poorly sorted, massive.</li> <li>• Natural mfc &gt; optimum. (est. +3-4% over). Likely too wet to utilize as fill for dam.</li> </ul> <p>* Recommend excavating out and keying into underlying hard grey (basal) till at ~3m. for foundation seepage cut-off.</p> <p><u>3.1-5.0m: GREY, HARD, DRY, SILTY (BASAL) TILL *</u><br/>                     Grey, hard, dry, well graded, very fine sandy SILT w/ some fine-med. gravel, trace (~5%) clay. Gravel is sub-angular, well graded, supported in dry silty matrix.</p> <p>* (similar composition to brown fill above but harder and drier). (cont'd)...</p> |

# TEST PIT LOG

PROJECT KEMESS SMITH

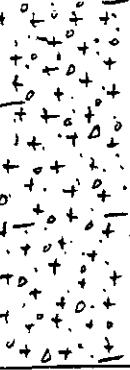
PROJECT No. 1765

LOCATION OF TEST PIT (see p. 1/2)

GROUND ELEVATION \_\_\_\_\_

DATE Aug 19/94

LOGGED BY MDG

| NOTES<br>Groundwater level,<br>difficulty in dig-<br>ging, equipment<br>used, etc. | DEPTH<br>(m)                                  | GRAPHIC<br>LOG  | DESCRIPTION AND CLASSIFICATION<br>OF MATERIAL   |
|--|---|---|---|
|  | <p>4</p> <p>Sample<br/>TP94-35-A</p> <p>5</p> |  | <p><u>GREY, HARD, DRY SILTY (BASAL) TILL (CONT'D)...</u></p> <ul style="list-style-type: none"> <li>• Till is highly - over (?) consolidated, at approx. optimum moisture content. (sl. dry of optimum).</li> <li>• Well graded, v. poorly sorted, massive.</li> <li>• Rare rounded cobble to 10cm (No boulders).</li> <li>• Est. low plasticity; Natural w/c &lt; plastic limit.</li> </ul> <p>* • Excellent core zone fill for dam construction and good, low perm., hard mat'l for core key trench excavation for Foundation seepage cut-off.</p> <p>**<br/><u>Note:</u></p> <p>Mill creek has apparently down-cut into dense glacial till materials. There is no evidence of glacial outwash (sands and gravels). The till materials will provide strong, low permeability compacted fill for the Fresh Water Storage Dam site and excellent conditions for foundation seepage cut-off.</p> |

# TEST PIT LOG

PROJECT Kemess South  
LOCATION OF TEST PIT SMALL TERRACE ON RIGHT ABUT.  
DATE AUG. 19/94. OF FWSD SITE (APPROX. E)

PROJECT No. 1765  
GROUND ELEVATION \_\_\_\_\_  
LOGGED BY MDG

| NOTES<br>Groundwater level, difficulty in digging, equipment used, etc.   | DEPTH<br>(m)  | GRAPHIC LOG | DESCRIPTION AND CLASSIFICATION OF MATERIAL   |
|---|---|-------------|--|
| <p>Lat 725 excavator with 2.5 ft. wide tooth bucket.</p> <p>Easy digging in brown glacial till.</p> <p>Test pit is dry, walls stable. (no groundwater seepage).</p> <p>Sample TP94-36-A</p> <p>Seepage face developing at 3.1 m in 30cm thick x 1m long section (est. &lt; 1 gal/min)</p> | <p>0</p> <p>0.2</p> <p>1</p> <p>2</p> <p>3</p> <p>4</p> |             | <p>0-0.2m: <u>SOFT SILTY ORGANIC TOPSOIL</u></p> <p>Dark (chocolate) brown, soft, sl. moist SILT w/ trace fine gravel and sand, fine roots. Moss/lichen cover ~ 10cm thick.</p> <p>0.2-6.2m: <u>BROWN, MOIST SILTY (ABLATION) TILL*</u></p> <p>Brown, soft, very moist, well graded fine sandy SILT w/ trace to some fine gravel and trace (~ 5%) clay. Gravel is sub-rounded from 0.2-1.5 cm dia. (est. 15%), supported in silty matrix.</p> <ul style="list-style-type: none"> <li>• Mod well graded, i. poorly sorted, massive silty (ablation type) till.</li> <li>• Poorly consolidated; Est. mod. plasticity; low permeability (<math>&lt; 10^{-7}</math> cm/s).</li> <li>• Till is v. moist, wet of optimum m/c. (consistency of firm "silly puddy").</li> <li>• Till is likely too wet to utilize as fill in dam construction but likely OK for foundation seepage cut-off</li> </ul> <p>* Note: Suspect hard grey (basal) till at depth under brown (ablation) till - possibly at creek elev.</p> <p>Groundwater seepage (spring) within till. at 3.1m. Est. 2 gal/min seepage into test pit. → Isolated gdw. spring in pervious, 20-30cm thick layer within till. (Not the Groundwater Table).</p> |

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# TEST PIT LOG

TEST PIT No.  
7P94-36  
SHEET 2 of 2

PROJECT KENIESS SOUTH  
LOCATION OF TEST PIT (see p. 1/2)  
DATE AUG. 19/94

PROJECT No. 1765  
GROUND ELEVATION \_\_\_\_\_  
LOGGED BY MDG.

| NOTES<br>Groundwater level,<br>difficulty in digg-<br>ing, equipment<br>used, etc. | DEPTH<br>(M) | GRAPHIC<br>LOG | DESCRIPTION AND CLASSIFICATION<br>OF MATERIAL |
|--|--------------|----------------|---|
|--|--------------|----------------|---|

4  
5  
6  
6.2

BROWN, MOIST SILTY (ABLATION) TILL (CONT'D)

Bottom (max. reach w/ excavator).

7



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# TEST PIT LOG

TEST PIT No.  
RC94-1  
SHEET 1 of 1

PROJECT KEMESS SOUTH

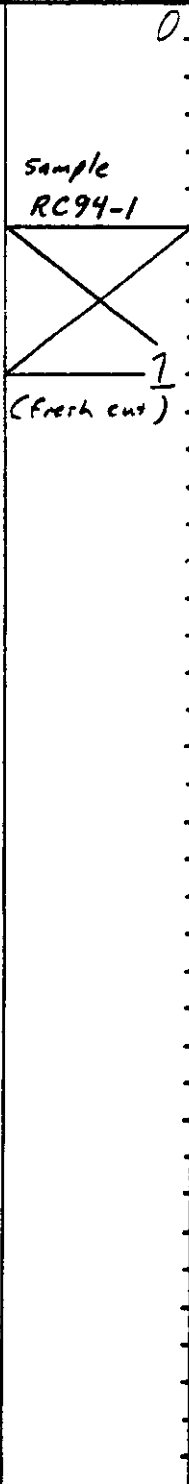

PROJECT No. 1765

LOCATION OF TEST PIT ROAD CUT TO STAFF GAUGES

GROUND ELEVATION \_\_\_\_\_

DATE AUG. 17/94 -500m U/S OF MAIN EMB.  
-(DOWNSLOPE OF TP94-2B)

LOGGED BY MDG

| NOTES<br>Groundwater level,<br>difficulty in dig-<br>ging, equipment<br>used, etc. | DEPTH<br>(m)   | GRAPHIC<br>LOG   | DESCRIPTION AND CLASSIFICATION<br>OF MATERIAL   |
|--|--|--|---|
| <p>Fresh road cut made by Cat 225 excavator for fresh sample.</p>                  | <p>0</p> <p>Sample RC94-1</p>  |  | <p>- Grab sample along new road cut (rd. to Staff Gauges #18 &amp; #19).</p> <p>Sample RC94-1 description:</p> <p>0-1m: <u>BROWN, V. MOIST SANDY/SILTY (ABLATION) TILL.</u></p> <p>Dark brown, very moist silty fine SAND w/ some gravel, trace cobbles and clay.</p> <ul style="list-style-type: none"> <li>- Est. v. low plasticity, mod. low permeability (<math>\sim 10^{-6}</math> cm/s).</li> <li>- Gravel is sub-rounded from 0.5-3cm dia. Cobbles rounded up to 15cm dia.</li> <li>- Mat'l is well graded, v. poorly sorted, massive.</li> </ul> <p>(Typical of sandy/silty ablation type glacial till found along entire slope north of S. Kemess (k., upstream of the Main Embankment).</p> |