**CONTINENTAL LIME LTD.**

# CONSTRUCTION OF ACCESS TRAIL, ROAD IMPROVEMENTS, AND GEOLOGIC MAPPING ON THE KELLY LAKE LIMESTONE DEPOSITS, MARBLE RANGE

**WEST OF CLINTON, BRITISH COLUMBIA**

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## WEST OF CLINTON, BRITISH COLUMBIA

CLAIMS STAG 1 - 5, MARY 1, WILLIAM 1, MAR 42, 66-69, 101-102, 104-113

Annual Work Approval Number: KAM 96-0300423-294
Mineral Exploration Reclamation Permit: MX-3-173

Geographic Coordinates
51° 07' N
121° 51' W
NTS Sheet 92 P/4 W

Owner of Claims Stag 1 - 5, Mary 1, William 1, Mar 104, 110-112:
BMC Lime Ltd.
215, 10451 Shellbridge Way, Richmond, B.C.

Owner of Claims Mar 42, 66-69, 101-102, 105-109, 113:
Continental Lime Ltd.
215, 10451 Shellbridge Way
Richmond, B.C. V6X 2W8



Operator: Continental Lime Ltd. / Ecowaste Industries Ltd.
215, 10451 Shellbridge Way
Richmond, B.C. V6X 2W8

Consultant: Halferdahl & Associates Ltd.
18, 10509 - 81 Avenue
Edmonton, Alberta T6E 1X7

Authors: J. Dahrouge, B.Sc., P.Geol., and L.B. Halferdahl, Ph.D., P.Eng., P.Geol.
Date Submitted: 1996 12 20

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# 1. INTRODUCTION

As used in this report, the term "Kelly Lake limestone deposits" refers to those deposits in a band of limestone about 19 km long by up to 4 km wide on the southwest side of the Marble Range in southwestern British Columbia. Most are within the first two mountain ridges on the southwest side of the Marble Range. Some of these limestone deposits had been held by the predecessors of BMC Lime Ltd. since the early 1970s. These and others were acquired by Continental Lime Ltd. in 1992, 1993, and 1996. Some 1003 samples were collected from them and analyzed in 1992, 1993, and 1994. In preparation for drilling two limestone deposits near the southwestern end of the Kelly Lake limestone deposits, one on South Porcupine Ridge and the other on Columbia Lime Ridge, access was flagged to the proposed drillsites on both ridges in 1994. The 1996 work included collecting 36 samples on Columbia Lime and South Porcupine Ridges, observations on the geology, construction of the previously flagged access trail on Columbia Lime Ridge, and improvements to the road up Porcupine Creek to make it suitable for trucks to haul out logs cut during construction of the access trail. The work was authorized by Continental Lime Ltd.

As previous assessment reports (Halferdahl, 1992; Faragher and Halferdahl, 1993) include descriptions of the geographic setting and the geology, most of these subjects are not repeated here. New information bearing on these subjects is, however, included.

Throughout this report attitudes of bedding and other planar features are given as A°/B° SW, where A° is the azimuth of the strike and B° is the amount of dip in the direction indicated.

## 1.1 GEOGRAPHIC SETTING

The Kelly Lake limestone deposits are in the Intermontane Belt of southwestern British Columbia about 230 km northeasterly from Vancouver and about 16 km west of the Town of Clinton (Fig. 1.1). From Clinton they are easily reached via the Kelly Lake and Jesmond roads, and other mostly unimproved roads. Two of these roads were originally constructed in the early 1970s for limestone exploration: one was improved in 1996. Others have been built for access to power lines of the British Columbia Hydro and Power Authority.

## 1.2 PROPERTY

The claims listed in Table 1.1 are held as follows:

| BMC Lime Ltd. | Continental Lime Ltd. |
|---|---|
| Stag 1-5 | Mar 42 |
| William 1 | Mar 66-69 |
| Mary 1 | Mar 101-102 |
| Mar 104 | Mar 105-109 |
| Mar 110-112 | Mar 113. |

**TABLE 1.1: LIST OF MINERAL CLAIMS COVERING THE KELLY LAKE LIMESTONE DEPOSITS**

| Claim Name | Tenure Number | Units/Claim | Record Date | Actual or Expected Expiry Date |
|---|---|---|---|---|
| Stag 1 | 208 888 | 20 | 1989 09 30 | 2005 09 30 |
| Stag 2 | 208 889 | 20 | 1989 09 29 | 2005 09 29 |
| William 1 | 208 932 | 12 | 1989 11 24 | 2004 11 24 |
| Mary 1 | 208 933 | 12 | 1989 11 24 | 2004 11 24 |
| Mar 42 | 309 898 | 1 | 1992 05 21 | 2000 05 21 |
| Mar 66-69 | 310 968-71 | 1 each | 1992 06 22 | 2007 06 22 |
| Mar 101 | 321 061 | 4 | 1993 09 22 | 2007 09 22 |
| Mar 102 | 321 062 | 20 | 1993 09 22 | 2007 09 22 |
| Mar 104 | 320 198 | 12 | 1993 08 07 | 2004 08 07 |
| Mar 105 | 321 063 | 20 | 1993 09 22 | 1999 09 22 |
| Mar 106 | 321 064 | 18 | 1993 09 22 | 1999 09 22 |
| Mar 107 | 321 065 | 12 | 1993 09 21 | 2000 09 21 |
| Mar 108 | 321 066 | 15 | 1993 09 22 | 1997 09 22 |
| Mar 109 | 321 067 | 20 | 1993 09 22 | 1998 09 22 |
| Mar 110 | 320 199 | 18 | 1993 08 10 | 1997 08 10 |
| Mar 111 | 320 200 | 15 | 1993 08 10 | 1997 08 10 |
| Mar 112 | 320 201 | 20 | 1993 08 10 | 1997 08 10 |
| Mar 113 | 321 068 | 6 | 1993 09 22 | 2000 09 22 |
| Stag 3 | 346 292 | 4 | 1996 05 23 | 2006 05 23 |
| Stag 4-5 | 346 299-300 | 1 each | 1996 05 23 | 2007 05 23 |
| | | 255 | | |

## 1.3 SUMMARY OF WORK DONE

About 1800 m of access trails to proposed drill sites were constructed on Columbia Lime Ridge. This involved the cutting of 16 truckloads of logs or 560 $m^3$ as estimated by B.C. Forest Service. About 3150 m of the previously constructed road up Porcupine Creek to the start of the new access trail were improved. Some 36 samples were chipped across 142½ m of stratigraphic sections. Three magnetometer traverses totalling 420 m were run. Geological observations accompanied the sampling and magnetometry.

## 1.4 FIELD OPERATIONS

A contractor based in 100 Mile House constructed the new access trail and improved the existing road up Porcupine Creek. This work started on June 18, 1996 and except for removal of the logs was mostly completed by July 25, 1996. The geological work was conducted by a four-man crew based in a motel in Clinton. Transportation was by four-wheel-drive vehicles supplemented by a compact car as required.

To assist in geologic mapping and the locating of geophysical traverses, two baselines totalling 460 m and 620 m were established on the southwest side of Columbia Lime Ridge. Stations were chained by topofil and marked at 10-m intervals with their locations shown in Fig. 2.2, 2.4.

### 1.4.1 Magnetometer Traverses

Three magnetometer traverses totalling 420 m (Fig. 1.4) were run with a Scintrex MP-2 proton magnetometer with their locations shown in Fig. 2.2, 2.4. Stations were chained by topofil and marked at 10-m intervals along each traverse. At each station at least three readings within 5 nT were recorded with the median or mean selected as appropriate for the reading at that station. Station readings were not corrected for diurnal variations, but two of the traverses were rerun within 1½ h. Interpretations of the magnetometer traverses are in Section 2 of this report.

### 1.4.2 Global Positioning Systems

The geographic locations of selected points were aided by global-positioning-system (GPS) instruments. Those employed consisted of Garmin GPS Survey II and Garmin GPS 45. For the former, a benchmark along the BCR near the Kelly Lake Station served as a base station reference point for differential corrections. The GPS instruments did not give satisfactory readings over much of the area where they were employed due to mountainous terrain and thick tree-cover impeding the satellite signals. Hence, at many locations an insufficient number of common satellites were observed by the instruments.

# 2. GEOLOGY

## 2.1 STRATIGRAPHY

Of the stratigraphic units previously described (Faragher and Halferdahl, 1993) only units N3, C4, N5, and C6 form parts of Columbia Lime and South Porcupine Ridges. Unit C4 has been subdivided into an Upper Crumbly Member, a Middle Massive Member, and a Lower Dolomitic Member. Towards the base of the limestone bulge on Columbia Lime Ridge another limestone unit, C8, which may be a fault repeat of unit C6, has been tentatively identified. It appears to be separated from unit C6 by another band of schist or perhaps a fault. The stratigraphic units for the Kelly Lake limestone deposits with these revisions are listed in Table 2.1.

**TABLE 2.1 STRATIGRAPHIC UNITS IN THE KELLY LAKE LIMESTONE DEPOSITS**

| Unit | | Estimated Thickness (m) |
|---|---|---|
| D | | thin |
| N9 | | not known |
| C8 | | <86(?) |
| N7 | | ~17 |
| C6 | | ~15 |
| N5 | | not known |
| C4 | Upper Member | >45 |
| | Middle Member | ~120 |
| | Lower Member | ~115 |
| N3 | | 311 + |
| C2 | | 303 (?) |
| N1 | | not known |

The thicknesses of some of the units in Table 2.1 are lower than those in Dahrouge and Halferdahl (1994) because dips measured in 1996 on Columbia Lime and South Porcupine Ridges are lower than those in previous reports (Halferdahl, 1992; Faragher and Halferdahl, 1993). No new data were obtained in 1996 on units N1, C2, N3, N9 and D, so they are not discussed further.

### 2.1.1 Lower and Middle Massive Members of Unit C4

The Lower Member of unit C4 is a massive, dark-grey, partly dolomitic limestone and is about 115 m thick.

The Middle Member of unit C4 is a massive, cryptocrystalline to finely crystalline, light-grey, limestone. Based on the 1996 work, it is estimated to be 120 m thick.

### 2.1.2 Upper Crumbly Member of Unit C4

The Upper Member of unit C4 is light- to dark-brownish-grey limestone, which weathers light- to medium-rusty-grey. Based on the stratigraphic thicknesses represented by samples from the upper part of Columbia Lime Ridge (Fig. 2.2), this unit is more than 45 m thick.

### 2.1.3 Unit N5

Schists of unit N5 separate limestone units C4 and C6 (Fig. 2.2, 2.4). These schists were uncovered during construction of the access trail below the cliffs near sample section B-2 and about 120 m northwest of the depression contour on the lower part of Columbia Lime Ridge (Fig. 2.2, 2.3, 2.4), and were also observed as float at several locations in between. A lack of outcrops and unit contacts prevent an accurate estimate of its thickness.

### 2.1.4 Unit C6

On the southwest side of Columbia Lime Ridge, southwest of the depression contour near the base of the bulge at an elevation of about 1600 m, limestones of unit C6 form a partly covered northwesterly trending ridge, here termed Sefton Ridge, that extends intermittently for at least 1000 m to the northwest (sample section B-37, Fig. 2.2, 2.4) and for more than 100 m to the southeast. Limestones of unit C6 are competent, thick-bedded to massive, cryptocrystalline, mostly light- to medium-grey, and similar to those in the Middle Member of unit C4.

### 2.1.5 Unit N7

Immediately southwest of northwesterly trending Sefton Ridge (sample section B-37, Fig. 2.2, 2.4), a second less prominent easterly trending ridge, here termed Flathead Ridge, is separated from unit C6 by a linear depression. No outcrops were observed within the depression. However interpretation of magnetometer profile Line 2 (Fig. 1.4) suggests that a band of schist (unit N7) underlies the recessive area.

### 2.1.6 Unit C8

On Flathead Ridge, limestone exposures are tentatively named unit C8 (Fig. 2.2, 2.4). However, if the linear depression immediately north of Flathead Ridge represents a fault then it is probable that the limestone exposed on the ridge is a repeat of unit C6. Here unit C8 may be up to 86 m thick. It consists of light-grey, cryptocrystalline, high-quality limestone.

## 2.2 STRUCTURE

The massive nature of Lower and Middle Members of unit C4 precludes the identification of bedding surfaces in many outcrops. Where observed, they are not easily distinguished from joint surfaces with similar attitudes. A distinct contact between the Middle and Upper Members of unit C4 was observed in a small gully on the southwest side of Columbia Lime Ridge at an elevation of approximately 1895 m. Most bedding attitudes observed in 1996 from the Lower and Middle Massive Members agree with the attitude of this contact.

### 2.2.1 Homocline on South Porcupine and Columbia Lime Ridges

On the upper part of Columbia Lime Ridge, on Sefton Ridge, and southeasterly at Porcupine Creek attitudes of bedding vary little. On the upper part of Columbia Lime Ridge dips observed in 1996 vary from 35° to 45° SW. At and near Sefton Ridge dips are less, 25° to 35° SW, and southeasterly towards Porcupine Creek they increase to about 45° to 55° SW. Such variations of as much as 10° over short distances may be related to the depositional environment. These observations and others, indicate that the units exposed on Columbia Lime Ridge form part of a homoclinal succession with mostly shallow to moderate southwest dips. Previous observations (Wahl, 1973; Halferdahl, 1992) indicate locally steeper southwesterly dips, and perhaps a slight overturning at one place at the top of Columbia Lime Ridge. If confirmed, these earlier observations are consistent with a homocline dipping southwesterly. This disagrees with Trettin's (1980) interpretation that this part of Columbia Lime Ridge forms the core of a tightly folded anticline.

### 2.2.2 Bulge on Southwest Side of Columbia Lime Ridge

From the top of Columbia Lime Ridge, the extent of limestone outcrops in a southwesterly direction is considerably wider than on South Porcupine Ridge on strike to the southeast, and on strike to the northwest in the First Ridge of Marble Range. Both South Porcupine and Columbia Lime Ridge comprise the southeast part of First Ridge of Marble Range. This widening of the limestone is here called the bulge. It is expressed topographically by gentler slopes than those which occupy the upper parts of Columbia Lime Ridge. Faragher and Halferdahl (1993) thought that this bulge might be the result of a fault. A feature readily identified on aerial photographs was interpreted as the trace of such a fault.

In 1996, where the contact between the Upper Crumbly Member of unit C4 and the Middle Massive Member of unit C4 was observed, it coincides with the fault mentioned in the preceding paragraph. At a small gully on the southwest side of Columbia Lime Ridge at an elevation of approximately 1895 m, this contact shows a pronounced separation, probably indicating some movement on it.

The bulge may be caused by:

- a fault,
- slumping within the Upper Crumbly Member of unit C4. This mass movement may have produced the bulge and obscured the contact between units C4 and N5;
- the presence of limestone in units C6 and C8, or
- some combination of the foregoing.

### 2.2.3 Faults in the Lower Part of Columbia Lime Ridge

On the southwest side of Columbia Lime Ridge at an elevation of about 1600 m, Sefton Ridge is separated from limestones of unit C4 by a northwesterly trending topographic depression with a depression contour at one place (Fig. 2.2, 2.4). This recessive area is interpreted as a northwest-trending fault, which appears to cut unit N5 schists obliquely. This feature may continue to the east or southeast where it brings unit N5 in contact with the Middle Massive Member of unit C4. A magnetometer traverse across the central part of the recessive area was inconclusive (Line 1, Fig. 1.4), and a second across its eastern part suggests the presence of N5 schists (Line 3, Fig. 1.4).

A less prominent depression separates Sefton Ridge from Flathead Ridge (Fig. 2.2, 2.4). As previously indicated, if this recessive area represents a second fault, then it is probable that limestones on Flathead Ridge are a repeat of unit C6. This linear depression intersects the main topographic depression at a point approximately 250 m southeast of the depression contour. A magnetometer traverse across the central part of this depression indicates the presence of unit N7 schists (Line 2, Fig. 1.4).

# 3. COMPOSITION OF LIMESTONE SAMPLES

## 3.1 SAMPLING AND ANALYTICAL PROCEDURES

Some 36 samples were collected by chipping outcrops mostly perpendicular to the bedding at 11 sample sections (Appendix 1). Samples consisted of chips at intervals of 33 cm measured stratigraphically. One sample (11503) was misplaced and not sent for analyses.

The samples for analyses were sent to the Central Analytical Laboratory of Continental Lime Inc. in Salt Lake City, Utah for preparation and analyses for 12 constituents by standard ICP techniques, and LOI. ICP analytical procedures in the Central Laboratory are described in Appendix 3. The analytical report as received by modem from the Central Laboratory constitutes Appendix 2.

Ten samples for check analyses for 19 constituents were sent to Acme Analytical Laboratories Ltd. The results are in Appendix 4. Acme uses standard ICP techniques; LOI was determined at 1100° C for 2 h.

## 3.2 ADJUSTMENTS TO REPORTED ANALYSES

As explained in Appendix 5, some of the check analyses by Acme require adjustments because the CaO determinations exceed 56 per cent CaO, the maximum possible content for pure $CaCO_3$.

When LOI has been determined, chemical analyses of limestone can be checked by subtracting carbon dioxide equivalent to CaO plus that equivalent to MgO from the determined LOI as explained in Appendix 5. This criterion shows that only 6 of the 35 Continental analyses required adjustments to determined CaO percentages, compared to 9 of the 11 Acme analyses. The preferred CaO percentages for these 6 Continental analyses (Appendix 5) have been lowered by amounts ranging from 0.01 to 0.22 per cent. Such amounts are probably well within the accuracy of the determinations.

The percentage of CaO determined by Continental for sample 10795 has been raised to 55.27 per cent as the preferred value. This change is based on the adjusted Acme percentage for this sample and the low total of 99.00 per cent for Continental's determinations on this sample.

The percentages of CaO for the samples in Appendix 1 are the preferred values of the Continental analyses in Appendix 5. The percentages for the other constituents of the samples in Appendix 1 are those determined by Continental.

### 3.3 COMPARISONS OF ANALYSES BY THE TWO LABORATORIES

Appropriate tests for comparing analyses of individual samples (Appendix 6) reported by the Central Analytical Laboratory of Continental Lime Inc. and Acme Analytical Laboratories Ltd. are the test of differences (Snedecor, 1957), the sign test (Mendenhall et al., 1990), and the test of confidence intervals (Koch and Link, 1970). For the test of differences and the test of confidence intervals, determinations for each constituent in each sample by the two laboratories are paired; their differences comprise the sample data. For the sign test determinations for each constituent in each sample by the two laboratories are paired with the sign of the difference comprising the sample data.

Results of statistical tests are in Appendix 6 and summarized in Table 3.1. They show that for CaO, MgO, $SrCO_3$, BaO, and adjusted LOI, differences, signs, and confidence intervals are significant for all levels of significance examined. For $SiO_2$, $P_2O_5$, and LOI, differences, confidence intervals, and signs are generally not significant. For adjusted CaO, differences and confidence intervals are significant at the 10 per cent probability level, and at probability level of about 5½ per cent for signs. Statistical comparisons between laboratories for $Al_2O_3$, $Fe_2O_3$, $Na_2O$, $K_2O$, $TiO_2$, and MnO are not attempted because most determinations of these constituents from one or the other of the laboratories are below the limits of detection. Adjusting the Acme determinations for CaO as explained in Appendix 5, reduces the means of the differences between the two laboratories from 0.66 to 0.25 per cent. If the low CaO determination for sample 10795 by Continental is raised as explained in Section 3.2, the mean of the differences for adjusted CaO will be lower. In general, Continental's determinations of CaO are slightly more conservative than the adjusted Acme determinations. Although the differences for MgO, $SrCO_3$, and BaO are statistically significant, the maximum absolute difference for MgO is only 0.04 per cent, for $SrCO_3$ is 72 ppm, and for BaO is

**TABLE 3.1: SUMMARY OF STATISTICAL TESTS FOR SAMPLES ANALYSED BY THE CENTRAL ANALYTICAL LABORATORY OF CONTINENTAL LIME LTD. AND ACME ANALYTICAL LABORATORIES LTD.**

For the sign test $\alpha$ is the level of significance associated with the rejection region (Appendix 6).

Ho: Constituent $\text{Determination}_{CONT}$ - Constituent $\text{Determination}_{ACME}$

| Constituent | Statistic | Test of Differences | | | | Test of Confidence Intervals | | | | | | Sign Test | | | | | | | Difference | | n |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | $t$ | $t_{\alpha=0.100}$ | $t_{\alpha=0.050}$ | $t_{\alpha=0.025}$ | $t_{\alpha=0.100}$ | | $t_{\alpha=0.050}$ | | $t_{\alpha=0.025}$ | | M | RRα1 | | RRα2 | | RRα3 | | Range | μ | |
| | | | 1.812 | 2.228 | 2.634 | μL | μU | μL | μU | μL | μU | | L | U | L | U | L | U | | | |
| CaO | $t$ | -3.795 | - | - | - | -0.99 | -0.35 | -1.06 | -0.28 | -1.13 | -0.20 | 1 | 3 | 8 | 2 | 9 | 1 | 10 | -1.79 to 0.44 | -0.67 | 11 |
| | Ho | - | Reject | Reject | Reject | Reject | | Reject | | Reject | | | Reject | | Reject | | Reject | | | | |
| Adjusted Acme CaO | $t$ | -2.214 | - | - | - | -0.46 | -0.00 | -0.51 | 0.00 | -0.56 | 0.05 | 2 | 3 | 8 | 2 | 9 | 1 | 10 | -0.86 to 0.44 | -0.25 | 11 |
| | Ho | - | Reject | Accept | Accept | Reject | | Accept | | Accept | | | Reject | | Reject | | Accept | | | | |
| MgO | $t$ | -12.845 | - | - | - | -0.03 | -0.03 | -0.04 | -0.03 | -0.04 | -0.02 | 0 | 3 | 8 | 2 | 9 | 1 | 10 | -0.04 to -0.02 | -0.03 | 11 |
| | Ho | - | Reject | Reject | Reject | Reject | | Reject | | Reject | | | Reject | | Reject | | Reject | | | | |
| $SiO_2$ | $t$ | -0.077 | - | - | - | -0.02 | 0.02 | -0.03 | 0.03 | -0.03 | 0.03 | 5 | 3 | 8 | 2 | 9 | 1 | 10 | -0.06 to 0.05 | 0.00 | 11 |
| | Ho | - | Accept | Accept | Accept | Accept | | Accept | | Accept | | | Accept | | Accept | | Accept | | | | |
| $SrCO_3$ | $t$ | 10.483 | - | - | - | 40 | 56 | 38 | 58 | 36 | 60 | 11 | 3 | 8 | 2 | 9 | 1 | 10 | 32 to 72 | 48 | 11 |
| | Ho | - | Reject | Reject | Reject | Reject | | Reject | | Reject | | | Reject | | Reject | | Reject | | | | |
| BaO | $t$ | -9.740 | - | - | - | -16 | -11 | -16 | -10 | -17 | -10 | 0 | 3 | 8 | 2 | 9 | 1 | 10 | -21 to -6 | -13 | 11 |
| | Ho | - | Reject | Reject | Reject | Reject | | Reject | | Reject | | | Reject | | Reject | | Reject | | | | |
| $P_2O_5$ | $t$ | -0.958 | - | - | - | -0.02 | 0.01 | -0.02 | 0.01 | -0.03 | 0.01 | 3 | 3 | 8 | 2 | 9 | 1 | 10 | -0.04 to 0.05 | -0.01 | 11 |
| | Ho | - | Accept | Accept | Accept | Accept | | Accept | | Accept | | | Reject | | Accept | | Accept | | | | |
| LOI | $t$ | -0.632 | - | - | - | -0.07 | 0.04 | -0.09 | 0.05 | -0.10 | 0.06 | 4 | 3 | 8 | 2 | 9 | 1 | 10 | -0.12 to 0.22 | -0.02 | 11 |
| | Ho | - | Accept | Accept | Accept | Accept | | Accept | | Accept | | | Accept | | Accept | | Accept | | | | |
| Adjusted Acme LOI | $t$ | -6.478 | - | - | - | -0.32 | -0.18 | -0.33 | -0.16 | -0.35 | -0.15 | 1 | 3 | 8 | 2 | 9 | 1 | 10 | -0.37 to 0.02 | -0.25 | 11 |
| | Ho | - | Reject | Reject | Reject | Reject | | Reject | | Reject | | | Reject | | Reject | | Reject | | | | |

21 *ppm. Continental is lower for* MgO and BaO, and higher for $SrCO_3$. The Continental analyses agree well with those from samples collected in previous years from South Porcupine and Columbia Lime Ridges, and are acceptable for the 1996 samples, except that the determination of CaO in sample 10795 is questionable. *All the 1996 samples are of high-quality limestone.*

# 4. ACCESS TRAIL TO DRILLSITES ON COLOMBIA LIME RIDGE

## 4.1 NEGOTIATIONS WITH B.C. MINES

A Notice of Work and Reclamation Program on a Mineral Property was dated 1994 01 20 to construct *access trails to proposed drill sites on South Porcupine and Columbia* Lime Ridges and the diamond drilling and was submitted to B.C. Mines in Kamloops shortly thereafter. After an inspection in late May 1994, a plan dated 1994 06 03 with revised access trails to proposed drillholes on South Porcupine Ridge was resubmitted to B.C. Mines. After the *required referrals and* the posting of a bond, Reclamation Permit MX-3-173 was issued on August 23, 1994. In the referrals several concerns were raised: one required the work to be done between June 1 and September 10, later revised to June 16 and September 10. Another required that a Licence to Cut be obtained from B.C. Forest Service. A third required that the proposed access trails be flagged prior to construction. The trails were flagged in August 1994 (Dahrouge and Halferdahl, 1994).

Another round of referrals took place in spring 1995, with authorization to continue dated July 12, 1995.

A letter dated May 10, 1996 was obtained from B.C. Mines regarding the reclamation of access trails constructed under Reclamation Permit MX-3-173. B.C. Mines was advised that work on the access trail on Columbia Lime Ridge was to commence on or about June 17, 1996. This work was completed on or about July 25, 1996 except for another barrier ditch and some erosion bars constructed after removal of the timber. Slash was burned later in the fall and all disturbed areas were seeded with certified seed as specified by B.C. Forest Service. The work was inspected by an officer of B.C. Mines on July 17, 1996, and his inspection report answered on August 13, 1996. Another inspection by officers of B.C. Mines and B.C. Forest Service took place on September 17, 1996, and the B.C. Mines inspection report answered on September 26, 1996.

## 4.2 NEGOTIATIONS WITH B.C. FOREST SERVICE

An application dated October 21, 1994 for a Licence to Cut was submitted to B.C. Forest Service. Duly executed copies of Licence to Cut L41886 were obtained in late August 1995, too late to have the work completed by September 10, 1995 as required by B.C. Environment. Licence to

Cut L41886 covered the period July 1, 1995 to June 30, 1996. When requested it was extended to July 31, 1996. The site of the access trail on Columbia Lime Ridge was inspected by officers of B.C. Forest Service, the contractor, and one of the writers of this report on May 24, 1996. By this time, the holders of the claims had decided to construct access only on Columbia Lime Ridge in 1996. The inspection on May 24, 1996 was to estimate the number of logs, confirm the selection of decking areas, and to assess the amount of the improvements required to the existing road up Porcupine Creek to make it suitable for logging trucks.

Officers of B.C. Forest Service inspected the work on June 20, July 11, July 24, 1996, and subsequently when bids for the logs were being obtained. Another inspection took place on September 17, 1996, after the logs had been removed.

## 4.3 CONSTRUCTION OF ACCESS TRAIL AND IMPROVEMENTS TO PORCUPINE CREEK ROAD

After soliciting and evaluating quotations and bids for the construction of access trails, the work was awarded to Kingsgate Auto (1974) Ltd. of 100 Mile House, B.C. During the period from June 17 to July 25, 1996, the following equipment was used:

790 John Deere Excavator equipped with Bush Guarding and Hydraulic Thumb,
518 Cat Skidder operated by one man who also felled and bucked trees as appropriate,
D-6 Bulldozer, and
Tandem Dump Truck of 10 $yd^3$ capacity.

The excavator and skidder were used throughout the above noted period to build the access trail, to move the logs to decking areas ready for loading onto logging trucks, and for some ditching along the previously existing road. Logs were decked in four places: two along the previously existing road up Porcupine Creek, one at the start of the new trail, and the fourth about 350 m along the trail constructed in 1996. The dump truck was used as required to haul granular material excavated by the excavator to places that required it along the pre-existing road. This granular material was spread by the skidder. The dump truck was also used to haul wet clayey material from a short stretch along the pre-existing Porcupine Creek road. The bulldozer was used to provide better access to one of the decking areas for a logging truck, and where needed, to smooth and slightly widen the pre-existing Porcupine Creek road.

Mr. N. J. Duncan, P.Eng., provided an opinion that limestone blocks along a short stretch of the pre-existing Porcupine Creek road were sufficiently stable that their removal was not required.

During early November 1996, a single axle truck hauled 1½ loads of additional logs from the main docking area to the Jesmond road.

#### 4.3.1 Description of Access Trail

The access trail constructed in 1996 is about 1745 m long (Fig. 4.1 and 4.2). In this report its starting point near the intersection of two trails constructed in 1973 is referred to as 0 m (0.0 km, A, Fig. 4.1), with distances along it measured from this point. One of these trails now forms part of the Porcupine Creek road; the other is mostly overgrown, locally slumped, and washed out where it formerly crossed Porcupine Creek. From 0 m to about 360 m, the 1996 trail has an average gradient of about 3 per cent to a fairly level spur on the mountainside, which proved suitable as the main decking area for the logs. This stretch of about 360 m is 5 to 6 m wide without a ditch, because of the granular material in which it is constructed. For the remaining approximately 1325 m, the 1996 trail is 4 to 5 m wide, also without a ditch. In this stretch of 1325 m are more than 42 erosion bars. One barrier ditch to hinder access was dug at 375 m. After the timber was removed another barrier ditch was dug at 0 m with erosion bars between.

In order to avoid limestone cliffs just past the main decking area, from about 380 m to 406 m the trail descends a gradient of up to 14°. This gradient can be reduced at an appropriate time after the logs are removed. From about 406 m to 573 m the trail continues at gentle gradients, thence rises steeply to 595 m at a gradient of 16° to 17°. This steep gradient is caused by the presence of limestone blocks up to 4 m in size between 533 m and 548 m. These blocks were too large to be moved by the John Deere Excavator. When this trail is next used, these blocks can be drilled with a hand-operated gas-powered plugger and blasted into smaller pieces. Following this, the 22-m very steep gradient can be reduced to a more suitable 10° to 12°. From 595 m to 683 m the gradient is about 10°, and increases to about 11° from 683 m to 719 m. From 719 m to about 1400 m the gradient averages about 8 per cent including stretches from 743 m to 762 m with a 10° gradient and at about 1023 m with an 11° gradient. From about 1400 m to 1745 m at the end of the trail the gradient averages 8° to 9°. At about 1013 m is a 30-m branch to a proposed drillsite. During the fall of 1996 all disturbed areas including the surface of the trail, side-cast material below the trail, cut banks, decking areas, and the spoil pile were seeded.

#### 4.3.2 Descriptions of Improvements to Pre-Existing Road

The pre-existing road up Porcupine Creek as far as a Y (point F, Fig. 4.1), where a branch ascends southeasterly towards South Porcupine Ridge (Fig. 4.1) had been previously used by logging trucks. Hence, snags (trees on the high side of the road with their roots disturbed) were removed for about 450 m as far as the Y (point G to F, Fig. 4.1). Some logs were decked at the Y. Beyond the Y, snags were also removed for about 1.3 km as far as the beginning of the old trail, now no longer used (point F to E, Fig. 4.1). These 1.3 km were also locally widened and smoothed.

The pre-existing road crosses Porcupine Creek with two 24"-corrugated culverts installed side-by-side in 1973 (point D, Fig. 4.1). Measuring downroad from this crossing of Porcupine Creek, one 6-inch culvert was installed at each of 35 m, 54 m, 68 m, 144 m, and 241 m. A ditch was excavated for about 12 m easterly from the culvert at 35 m to allow drainage into it. From 53 m to 144 m up to 1 m of wet clayey material was excavated from the pre-existing road, and replaced by granular material. From 53 m to 156 m, the high side of the road was well ditched. Granular material about 10 cm to 15 cm thick on the surface of the pre-existing road was extended from 144 m to 200 m.

Uproad of the crossing of Porcupine Creek up to 15 cm or 20 cm of granular material was spread on the surface of the pre-existing road for 261 m (point D to C, Fig. 4.1), and again for 20 m from 337 m to 357 m, measured from Porcupine Creek. Snags were removed for about 200 m between Steady and Porcupine Creeks measured from Steady Creek; they were decked about 260 m from Porcupine Creek. In June 1996, a new spring commenced flowing above the pre-existing road about 185 m before its crossing of Steady Creek (Fig. 4.1). Two 6-inch culverts about 3 m apart were installed to handle this water.

Snags were removed from the remaining 550 m of the pre-existing road from Steady Creek to the start of the new trail (point B to A, Fig. 4.1). This stretch was also widened and smoothed, where required. The curvature of a sharp bend about 90 m downroad from the start of the new trail was reduced.

J.R. Dahrouge, B.Sc., P.Geol.

L. B. HALFERDAHL

L.B. Halferdahl, Ph.D., P.Eng.

Edmonton, Alberta

1996 12 20

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F1

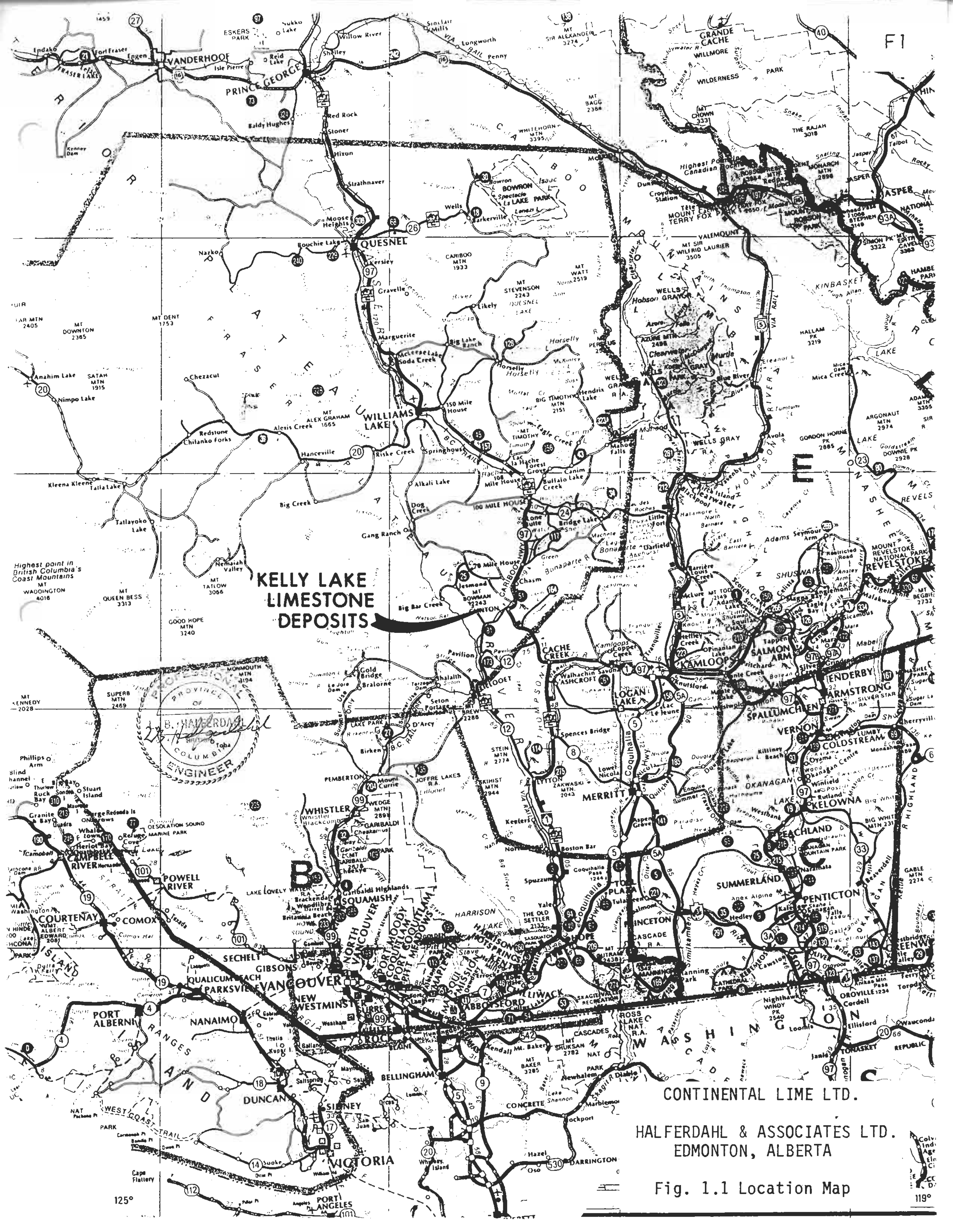


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Fig. 1.1 Location Map

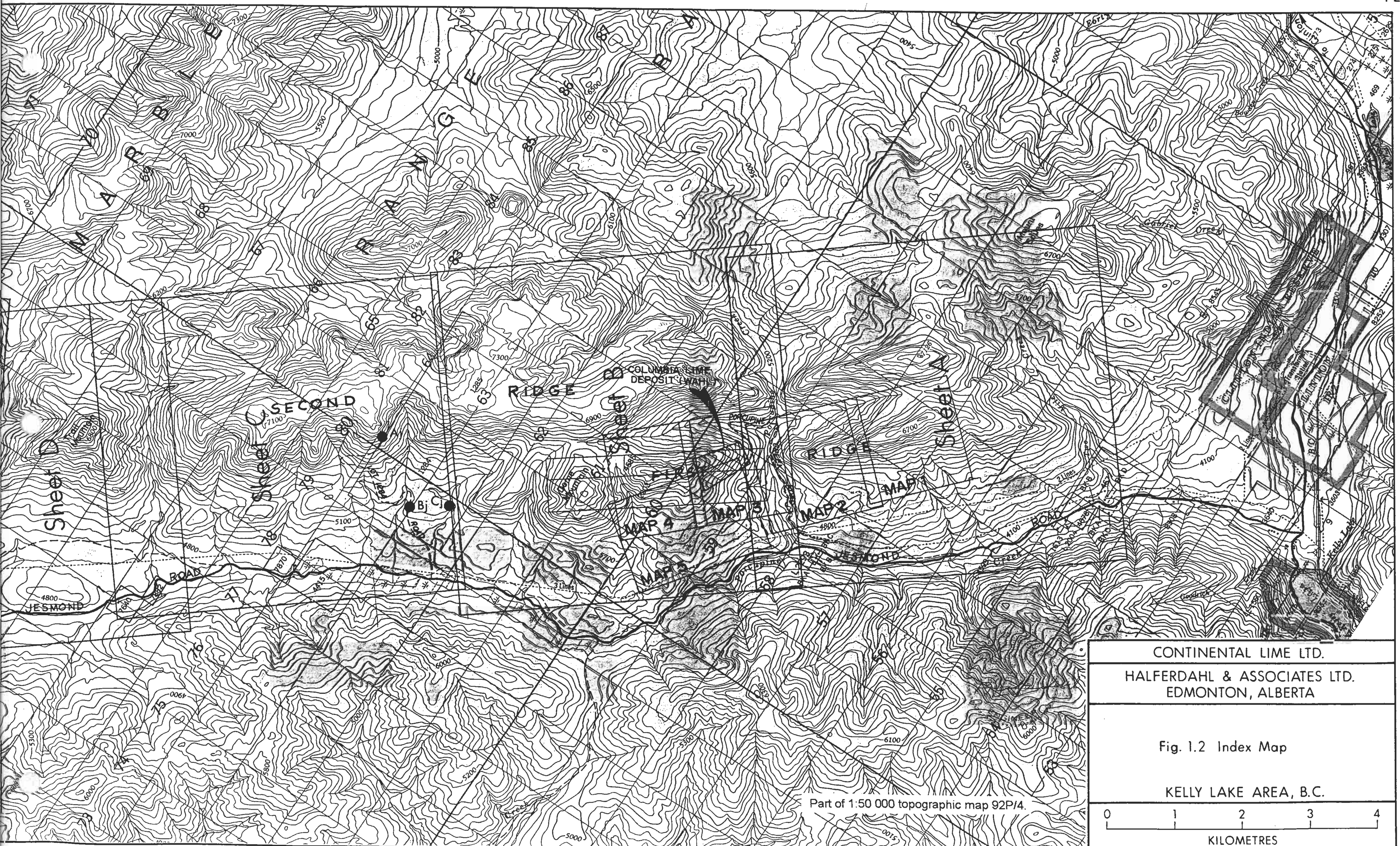
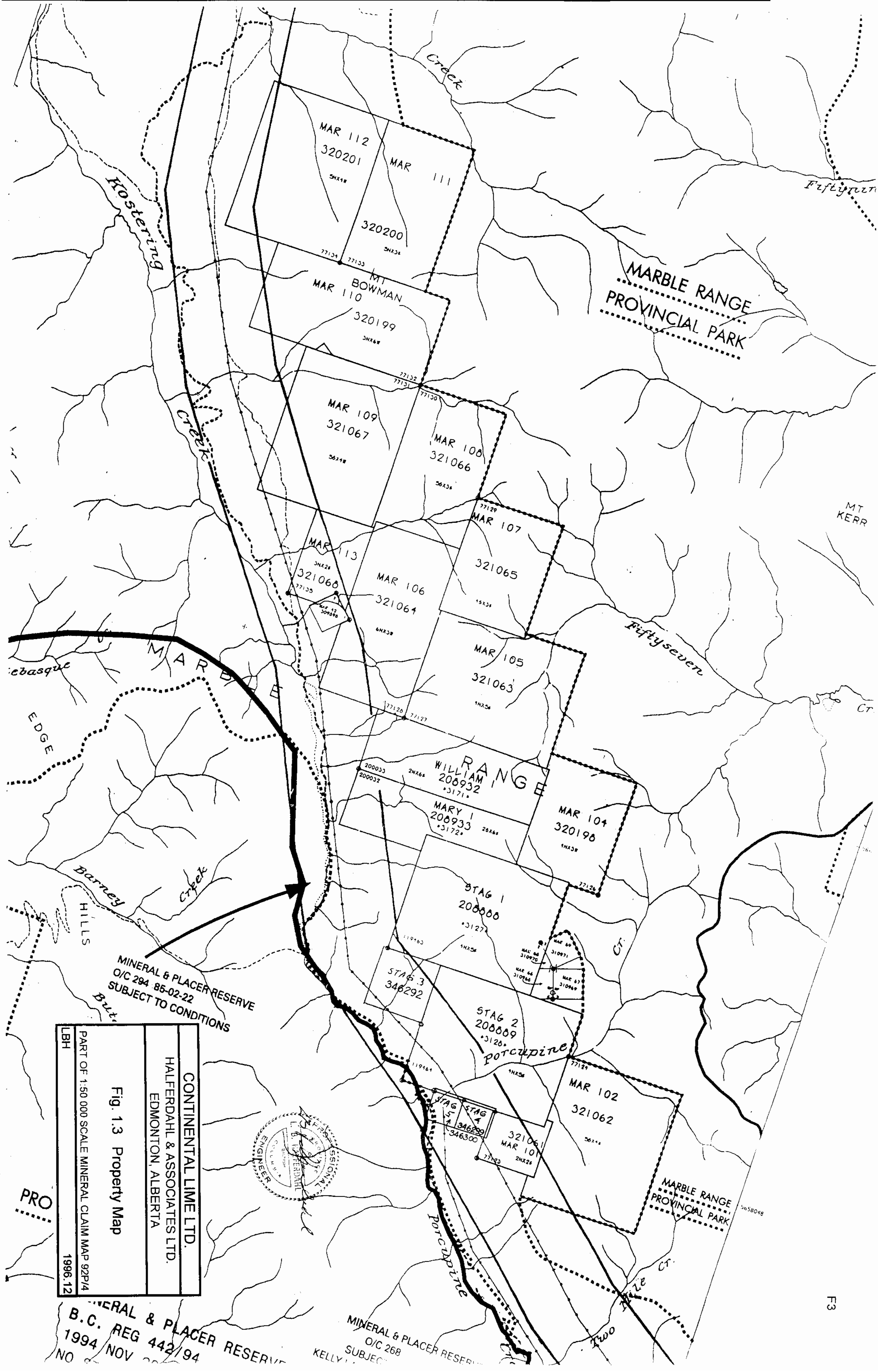



Fig. 1.2 Index Map



CONTINENTAL LIME LTD.
HALFERDAHL & ASSOCIATES LTD.
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Fig. 1.3 Property Map
PART OF 1:50 000 SCALE MINERAL CLAIM MAP 92P/4
LBH
1996.12
MARBLE RANGE PROVINCIAL PARK
MINERAL & PLACER RESERVE
O/C 294 85-02-22
SUBJECT TO CONDITIONS
B.C. REG 442/94
1994 NOV
MINERAL & PLACER RESERVE
O/C 268
Kostering Creek
Barney Creek
Porcupine
Fiftyseven
Two Mile Cr.
MT KERR
MT BOWMAN
MARBLE RANGE
EDGE
HILLS
MAR 112
320201
MAR 111
320200
MAR 110
320199
MAR 109
321067
MAR 108
321066
MAR 107
321065
MAR 113
321068
MAR 106
321064
MAR 105
321063
WILLIAM 1
208932
MARY 1
208933
MAR 104
320198
STAG 1
208888
STAG 3
346292
STAG 2
208889
MAR 102
321062
MAR 101
321061
STAG 5
346300
STAG 4
346299


F3

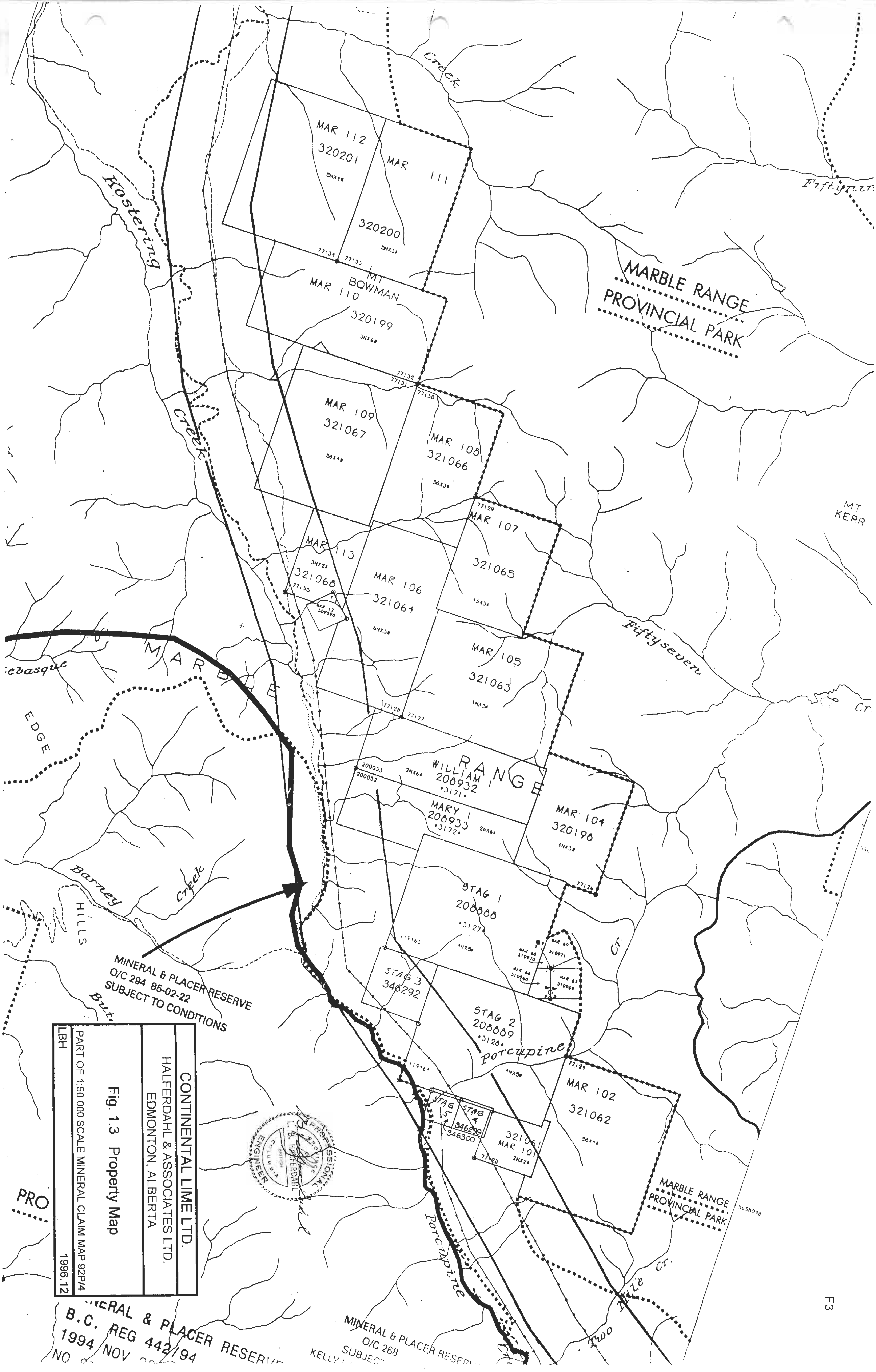
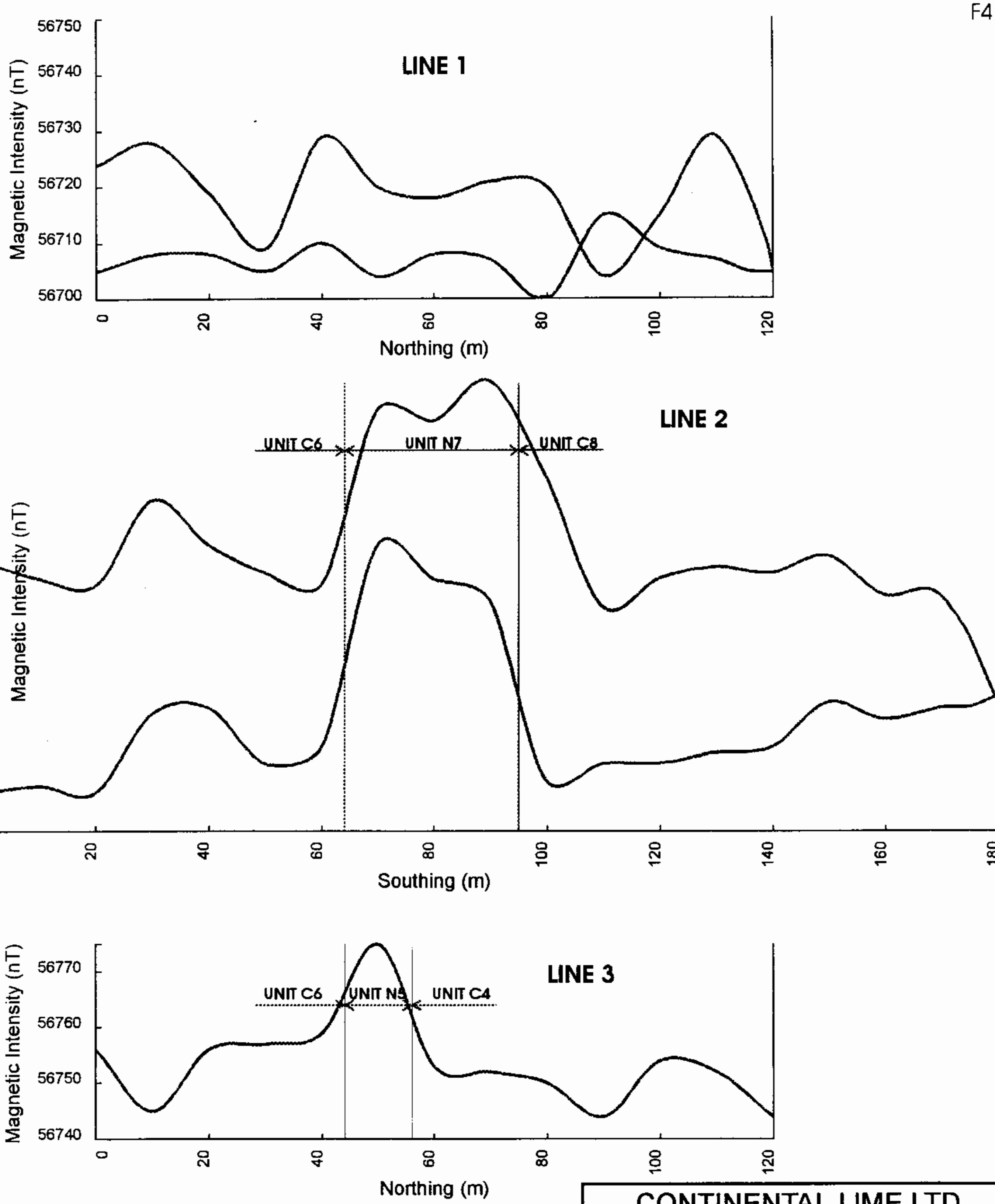


Fig. 1.3 Property Map





See Fig. 2.2 and 2.4 for locations of profiles.

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Fig. 1.4 Magnetometer Profiles for Lines 1, 2, and 3.

KELLY LAKE, BRITISH COLUMBIA

JD 1996.09

## APPENDIX 1: DESCRIPTIONS AND COMPOSITIONS OF CHIP SAMPLES

Stratigraphic thicknesses are based on measured attitudes of bedding as listed below with appropriate interpolations. Overlapping stratigraphic thicknesses are prefixed minus (-).

Samples are listed in order from stratigraphic top to bottom. They consist of chips at intervals of 33 cm. Percentages of constituents are from Appendix 2 and for CaO from Appendix 5.

| Sample | Strat. Thick.(m) | Unit | Description | CaO (%) | MgO (%) | $SiO_2$ (%) | $Al_2O_3$ (%) | $Fe_2O_3$ (%) | $SrCO_3$ (ppm) | MnO (ppm) | $P_2O_5$ (ppm) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Section A-15 Near Centre of South Porcupine Ridge (Fig. 2.1)** | | | | | | | | | | | |
| 11516 | 11 | C4U | Limestone, light-grey weathered, light- to medium-tan-grey fresh, cryptocrystalline, very fractured, rusty stains on joint surfaces | 55.55 | 0.20 | 0.04 | 0.034 | 0.022 | 263 | 39 | 190 |
| 11515 | 6¼ | C4U | Limestone, light-grey weathered, light- to medium-tan-grey fresh, cryptocrystalline, very fractured | 55.36 | 0.22 | 0.07 | 0.034 | 0.015 | 248 | 37 | 201 |
| 11514 | 5½ | C4U | Limestone, light-grey weathered, medium- to light-tan-grey fresh, cryptocrystalline, rust on joint surfaces | 55.54 | 0.22 | 0.10 | 0.046 | 0.019 | 336 | 37 | 157 |
| 11513 | 5½ | C4U | Limestone, rusty-yellow weathered, variable color from light-grey to rusty-brown on fresh surfaces, cryptocrystalline | 55.36 | 0.20 | 0.14 | 0.056 | 0.029 | 219 | 63 | 328 |
| 11512 | 5¾ | C4U | Limestone, light-grey to rust colored weathered, light-tan to medium-light-grey fresh, cryptocrystalline, very fractured, attitude of bedding 124°/45° SW, attitude of joints 30°/87°NW, 75°/65°NW, 10°/76°NW, elevation 6040' | 55.55 | 0.22 | 0.09 | 0.040 | 0.021 | 264 | 37 | 157 |
| **Section B-36 Northwest Side of Porcupine Creek (Fig. 2.2)** | | | | | | | | | | | |
| 10793 | 5 | C4M | Limestone, light- to medium-grey weathered, very light grey fresh, cryptocrystalline, rusty-brown stains on fractures and joints, attitude of bedding (?) 121°/63°SW offset 18.5 m from sample 10792 at 347° slope +43 ° | 55.23 | 0.26 | 0.03 | 0.029 | 0.016 | 284 | 21 | 328 |
| - | 6 | C4M | covered | - | - | - | - | - | - | - | - |
| 10792 | 1 | C4M | Limestone, light-greyish-brown weathered, light-grey fresh, cryptocrystalline, with a few rusty fractures, attitude of bedding (?) 130°/64°SW | 55.13 | 0.26 | 0.02 | 0.027 | 0.011 | 266 | 18 | 139 |
| - | 3¼ | C4M | covered | - | - | - | - | - | - | - | - |
| 10791 | 2¾ | C4M | Limestone, light-brownish-grey weathered, very light brownish-grey fresh, cryptocrystalline, | 55.24 | 0.22 | 0.06 | 0.031 | 0.018 | 286 | 23 | 339 |
| 10790 | 2½ | C4M | Limestone, light-greyish-brown with some rusty-brown stain on weathered surfaces, very light grey fresh, cryptocrystalline, rusty-brown stains along joints and fractures, attitude of joint 140°/68° SW | 55.51 | 0.22 | 0.14 | 0.050 | 0.021 | 263 | 32 | 142 |

## APPENDIX 1: CONTINUED

| Sample | Strat. Thick.(m) | Unit | Description | CaO (%) | MgO (%) | $SiO_2$ (%) | $Al_2O_3$ (%) | $Fe_2O_3$ (%) | $SrCO_3$ (ppm) | MnO (ppm) | $P_2O_5$ (ppm) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Section B-36 (Cont.)** | | | | | | | | | | | |
| 10789 | -½ | C4M | Limestone, light- to medium-grey weathered, very light grey fresh, cryptocrystalline, minor rusty-buff stains on a few joint surfaces, attitude of bedding(?) 142°/40°SW, attitude of joints 71°/52°SE, 152°/65°SW, 30°/48°NW | 55.47 | 0.23 | 0.19 | 0.044 | 0.019 | 319 | 18 | 185 |
| 10788 | 1 | C4M | Limestone, buff-weathered, light-grey fresh, cryptocrystalline, abundant coarse white calcite as blebs and masses to 10 cm, joints horizontal | 55.35 | 0.24 | 0.12 | 0.048 | 0.016 | 371 | 16 | 109 |
| **Section B-37° Sefton Ridge (Fig. 2.2, 2.4)** | | | | | | | | | | | |
| **Section B-38 Flathead Ridge (Fig. 2.2, 2.4)** | | | | | | | | | | | |
| 11502 | 1¾ | C8 | Limestone, medium- to dark-grey cryptocrystalline | 55.34 | 0.35 | 0.14 | 0.054 | 0.026 | 174 | 44 | 470 |
| 11501 | 5¾ | C8 | Limestone, medium- to dark-grey fresh, cryptocrystalline, few white calcite stringers and blebs | 54.68 | 0.35 | 0.15 | 0.052 | 0.036 | 217 | 39 | 591 |
| - | -1 | C8 | Offset | - | - | - | - | - | - | - | - |
| 9202* | 1½ | C8 | Revised thickness (Faragher and Halferdahl, 1993) | 55.49 | 0.25 | <0.05 | <0.05 | <0.05 | 152 | 100 | 400 |
| 9201* | 4 | C8 | Revised thickness (Faragher and Halferdahl, 1993) | 55.45 | 0.25 | <0.05 | <0.05 | <0.05 | 138 | 100 | 200 |
| 9175* | 4½ | C8 | Revised thickness (Faragher and Halferdahl, 1993) | 55.42 | 0.24 | <0.05 | <0.05 | <0.05 | 116 | 100 | 200 |
| - | 35 | C8 | Covered | - | - | - | - | - | - | - | - |
| 9174* | 4½ | C8 | Revised thickness (Faragher and Halferdahl, 1993) | 55.47 | 0.22 | <0.05 | <0.05 | <0.05 | 138 | 100 | 400 |
| 9173* | 7½ | C8 | Revised thickness (Faragher and Halferdahl, 1993) | 55.43 | 0.21 | <0.05 | <0.05 | <0.05 | 125 | 100 | 100 |
| 9172* | 10 | C8 | Revised thickness (Faragher and Halferdahl, 1993) | 55.47 | 0.20 | <0.05 | <0.05 | <0.05 | 136 | 100 | 100 |
| - | 8 | C8 | Covered | - | - | - | - | - | - | - | - |
| 10778 | 2¾ | C8 | Limestone, light-grey with buff patches weathered, light- to medium-grey fresh, cryptocrystalline, rusty-brown material on a few broken surfaces, attitude of planar feature (bedding?) 94°/32°S | 55.37 | 0.26 | 0.06 | 0.033 | 0.010 | 171 | 57 | 274 |
| 10777 | 3¼ | C8 | Limestone, medium-grey weathered, light-grey fresh, cryptocrystalline, few white calcite blebs to ¾ cm, attitude of planar feature (bedding?) 96°/38°S | 55.48 | 0.28 | 0.09 | 0.038 | 0.019 | 193 | 52 | 295 |

° Section B-37 was sampled in 1994 as part of Section B-24.

* Samples 9201- 2, and 9172 - 5 collected in 1993 were originally included in sample Section B-24, but they are now known to be in Unit C8. Analyses are from Faragher and Halferdahl (1993).

## APPENDIX 1: CONTINUED

| Sample | Strat. Thick.(m) | Unit | Description | CaO (%) | MgO (%) | $SiO_2$ (%) | $Al_2O_3$ (%) | $Fe_2O_3$ (%) | $SrCO_3$ (ppm) | MnO (ppm) | $P_2O_5$ (ppm) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Section B-39 Contact between Upper and Middle Members of Unit C4 on SW Side of Columbia Lime Ridge (Fig. 2.2, 2.4)** | | | | | | | | | | | |
| 10780 | 6¾ | C4U | Limestone, medium-grey with abundant rust-buff staining weathered, medium- to dark-grey fresh, cryptocrystalline, trace rusty-orange material on fractures, some black to dark-grey stain, attitude of bedding 120°/41°S | 55.39 | 0.32 | 0.06 | 0.033 | 0.024 | 333 | 39 | 2464 |
| 10779 | 1 | C4M | Limestone, medium-grey weathered, light-buff-grey fresh, cryptocrystalline, attitude of bedding 119°/40°SW, attitude of joints 20°/80°NW, 140°/62°SW, elevation 6220' at top of sample | 54.91 | 0.28 | 0.06 | 0.036 | 0.025 | 249 | 90 | 353 |
| **Section B-40 Crown on South Summit of Columbia Lime Ridge (Fig. 2.2)** | | | | | | | | | | | |
| 11503 | 11 | C4U | Limestone, light yellowish-brown weathered, light greyish-brown fresh, cryptocrystalline, very fractured, attitude of bedding 134°/ 30° SW, elevation 6520' (sample lost) | - | - | - | - | - | - | - | - |
| 11504 | 6 | C4U | Limestone, medium-brownish-grey fresh, cryptocrystalline | 55.29 | 0.27 | 0.08 | 0.037 | 0.022 | 287 | 48 | 433 |
| 11505 | 6¼ | C4U | Limestone, light- to medium-tan-grey fresh, cryptocrystalline | 55.26 | 0.28 | 0.07 | 0.037 | 0.020 | 273 | 46 | 921 |
| 11506 | 6½ | C4U | Limestone, light-tan-grey weathered, medium-tan-grey fresh, cryptocrystalline | 55.32 | 0.28 | 0.04 | 0.030 | 0.037 | 287 | 42 | 645 |
| 11507 | 4¼ | C4U | Limestone, light-brownish-grey weathered, medium-greyish-brown fresh, cryptocrystalline | 55.15 | 0.26 | 0.05 | 0.030 | 0.034 | 290 | 43 | 501 |
| 11508 | 2¾ | C4U | Limestone, medium- to dark-greyish-brown fresh, cryptocrystalline, attitude of bedding 130°/40° SW, attitude of joints 55°/60°NW, 55°/61°NW, 130°/38°SW 197°/74°NW | 54.92 | 0.28 | 0.05 | 0.032 | 0.035 | 293 | 57 | 395 |
| - | 9¼ | C4U | Covered | - | - | - | - | - | - | - | - |
| **Section B-41 Northwest Extension of Flathead Ridge (Fig. 2.2, 2.4)** | | | | | | | | | | | |
| 10795 | 1 | C8 | Limestone, light- to medium-grey weathered, light-grey fresh, cryptocrystalline, abundant fractures with rust stain, attitude of joints 85°/83°S, 90°/70°S | 55.27 | 0.30 | 0.05 | 0.037 | 0.016 | 246 | 42 | 249 |
| 10794 | 4 | C8 | Limestone, light-to medium-grey weathered, light-grey fresh, cryptocrystalline, abundant fractures, attitude of bedding 121°/38°SW, attitude of joints 81°/85S, 37°/60°NW | 55.02 | 0.31 | 0.02 | 0.027 | 0.010 | 226 | 33 | 360 |

## APPENDIX 1: CONTINUED

| Sample | Strat. Thick.(m) | Unit | Description | CaO (%) | MgO (%) | $SiO_2$ (%) | $Al_2O_3$ (%) | $Fe_2O_3$ (%) | $SrCO_3$ (ppm) | MnO (ppm) | $P_2O_5$ (ppm) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Section B-42 Upper Part of Bulge on Columbia Lime Ridge (Fig. 2.3, 2.4)** | | | | | | | | | | | |
| 11510 | 1¼ | C4U | Limestone, light- to very light greyish brown, cryptocrystalline, rusty fracture surfaces, attitude of bedding 116°/38°SW, attitude of joints 48°/75°NW, 138°/70°NE, *elevation 6150'* | 55.38 | 0.24 | 0.12 | 0.054 | 0.033 | 251 | 43 | 2826 |
| - | 1½ | C4U | covered | - | - | - | - | - | - | - | - |
| 11511 | 1½ | C4U | Limestone, light-grey to white weathered, greyish-brown fresh, cryptocrystalline, white calcite blebs throughout, attitude of bedding 113°/37°SW | 55.45 | 0.29 | 0.07 | 0.034 | 0.058 | 322 | 69 | 985 |
| **Section B-43 Northwest of Sefton and Flathead Ridges (Fig. 2.3, 2.4)** | | | | | | | | | | | |
| 10796 | 1¼ | C6 or C8 | Limestone, medium- to dark-grey weathered, very dark grey to black fresh, cryptocrystalline, up to 15% white calcite veinlets and stringers, few rust-lined fractures, attitude of bedding (?) 117°/58°SW, attitude of joint 180°/85°W, elevation 5070' | 55.13 | 0.47 | 0.29 | 0.057 | 0.072 | 488 | 53 | 401 |
| | 9 | C6 or C8 | covered | | | | | | | | |
| - | 1½ | C6 or C8 | inaccessible cliff | | | | | | | | |
| 10787 | 5 | C6 or C8 | Limestone, tan weathered, medium- to medium-dark-grey fresh, cryptocrystalline, abundant calcite blebs, stringers and veinlets of calcite | 54.75 | 0.37 | 0.19 | 0.065 | 0.024 | 376 | 15 | 562 |
| 10786 | 4½ | C6 or C8 | Limestone, dark-grey weathered, light- to medium-grey fresh, cryptocrystalline, abundant white calcite blebs to 3 cm, abundant calcite stringers and veinlets, attitude of joints 90°/42°S, 7°/82°E | 55.26 | 0.38 | 0.09 | 0.046 | 0.014 | 363 | 11 | 452 |
| 10785 | 4½ | C6 or C8 | Limestone, dark-grey weathered, medium-grey fresh, cryptocrystalline, few pockets of white calcite to 5 cm | 55.08 | 0.37 | 0.13 | 0.062 | 0.027 | 394 | 19 | 418 |
| 10784 | 3¾ | C6 or C8 | Limestone, dark-grey weathered, medium-grey fresh, cryptocrystalline, a few blebs of white calcite to 1 cm, rusty-brown fracture, attitude of bedding(?) 121°/58°SW to 124°/61°SW, elevation 5240' at bottom of sample | 55.16 | 0.36 | 0.12 | 0.055 | 0.022 | 390 | 22 | 348 |

## APPENDIX 1: CONTINUED

| Sample | Strat. Thick.(m) | Unit | Description | CaO (%) | MgO (%) | $SiO_2$ (%) | $Al_2O_3$ (%) | $Fe_2O_3$ (%) | $SrCO_3$ (ppm) | MnO (ppm) | $P_2O_5$ (ppm) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Section B-44** | | **Northwest of Sefton Ridge (Fig. 2.3, 2.4)** | | | | | | | | | |
| 10783 | 3½ | C6 | Limestone, medium- to light-grey fresh, cryptocrystalline, a few blebs and stringers of white calcite, few rusty fractures, attitude of bedding 108°/44°SW | 55.12 | 0.35 | 0.14 | 0.054 | 0.019 | 612 | 13 | 422 |
| 10782 | 4¾ | C6 | Limestone, medium- to dark-grey weathered, light-grey fresh, cryptocrystalline, blebs of white calcite to 1 cm, calcite veins and stringers perpendicular to bedding, attitude of bedding 113°/40°S, attitude of joints 139°/55°SW, 88°/85°S, 155°/61°SW | 54.85 | 0.37 | 0.10 | 0.050 | 0.019 | 465 | 11 | 669 |
| 10781 | 3 | C6 | Limestone, medium- to dark-grey weathered, light- to medium-grey fresh, cryptocrystalline, few white calcite blebs to ½ cm, few rust-stained fractures | 55.00 | 0.37 | 0.14 | 0.053 | 0.025 | 383 | 19 | 486 |
| **Isolated** | **Southwest of Knob on Top of Columbia Lime Ridge (Fig. 2.3)** | | | | | | | | | | |
| 11509 | 1 | C4U | Limestone, rusty-brownish-grey weathered, light-brownish-grey fresh, cryptocrystalline, abundant fractures, knobby texture, with knobs not reacting to HCl, elevation 6210' at bottom of sample | 54.97 | 0.26 | 0.41 | 0.103 | 0.054 | 216 | 48 | 254 |

# APPENDIX 2: ANALYTICAL REPORTS OF LIMESTONE SAMPLES FROM THE CENTRAL ANALYTICAL LABORATORY OF CONTINENTAL LIME INC.

**L.B. Halferdahl**

**Samples From Kelly Lake Limestone Property, British Columbia**

| | % | % | % | % | % | % | ppm | ppm | % | ppm | ppm | ppm | ppm | ppm | % | % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample | $CaCO_3$ | CaO | $MgCO_3$ | MgO | $Fe_2O_3$ | $Al_2O_3$ | $SrCO_3$ | MnO | $SiO_2$ | BaO | $K_2O$ | $Na_2O$ | $P_2O_5$ | $TiO_2$ | Total | LOI |
| 10777 | 99.12 | 55.54 | 0.58 | 0.28 | 0.019 | 0.038 | 193 | 52 | 0.09 | 36 | <30 | 28 | 295 | 13 | 99.92 | 43.55 |
| 10778 | 99.12 | 55.37 | 0.55 | 0.26 | 0.010 | 0.033 | 171 | 57 | 0.06 | 27 | <30 | <20 | 274 | 9 | 99.83 | 43.61 |
| 10779 | 98.66 | 54.91 | 0.59 | 0.28 | 0.025 | 0.036 | 249 | 90 | 0.06 | 35 | <30 | <20 | 353 | 13 | 99.45 | 43.78 |
| 10780 | 98.87 | 55.39 | 0.67 | 0.32 | 0.024 | 0.033 | 333 | 39 | 0.06 | 43 | <30 | <20 | 2464 | 8 | 99.94 | 43.48 |
| 10781 | 98.77 | 55.00 | 0.77 | 0.37 | 0.025 | 0.053 | 383 | 19 | 0.14 | 119 | 91 | <20 | 486 | 25 | 99.86 | 43.53 |
| 10782 | 98.50 | 54.85 | 0.77 | 0.37 | 0.019 | 0.050 | 465 | 11 | 0.10 | 110 | 62 | <20 | 669 | 17 | 99.57 | 43.58 |
| 10783 | 98.68 | 55.12 | 0.73 | 0.35 | 0.019 | 0.054 | 612 | 13 | 0.14 | 77 | 87 | <20 | 422 | 21 | 99.74 | 43.49 |
| 10784 | 98.60 | 55.16 | 0.76 | 0.36 | 0.022 | 0.055 | 390 | 22 | 0.12 | 84 | 79 | <20 | 348 | 23 | 99.65 | 43.68 |
| 10785 | 98.61 | 55.08 | 0.78 | 0.37 | 0.027 | 0.062 | 394 | 19 | 0.13 | 116 | 92 | <20 | 418 | 30 | 99.71 | 43.54 |
| 10786 | 98.82 | 55.26 | 0.80 | 0.38 | 0.014 | 0.046 | 363 | 11 | 0.09 | 83 | <30 | <20 | 452 | 14 | 99.86 | 43.52 |
| 10787 | 98.16 | 54.75 | 0.78 | 0.37 | 0.024 | 0.065 | 376 | 15 | 0.19 | 112 | 88 | <20 | 562 | 29 | 99.34 | 43.54 |
| 10788 | 99.09 | 55.35 | 0.49 | 0.24 | 0.016 | 0.048 | 371 | 16 | 0.12 | 48 | 60 | <20 | 109 | 15 | 99.83 | 43.90 |
| 10789 | 99.08 | 55.60 | 0.47 | 0.23 | 0.019 | 0.044 | 319 | 18 | 0.19 | 31 | 41 | <20 | 185 | 14 | 99.87 | 43.53 |
| 10790 | 99.24 | 55.60 | 0.45 | 0.22 | 0.021 | 0.050 | 263 | 32 | 0.14 | 27 | 47 | <20 | 142 | 14 | 99.95 | 43.51 |
| 10791 | 99.09 | 55.24 | 0.45 | 0.22 | 0.018 | 0.031 | 286 | 23 | 0.06 | 37 | <30 | <20 | 339 | 7 | 99.72 | 43.54 |
| 10792 | 99.16 | 55.13 | 0.55 | 0.26 | 0.011 | 0.027 | 266 | 18 | 0.02 | 23 | <30 | <20 | 139 | 7 | 99.82 | 43.56 |
| 10793 | 98.70 | 55.23 | 0.54 | 0.26 | 0.016 | 0.029 | 284 | 21 | 0.03 | 30 | <30 | <20 | 328 | 8 | 99.38 | 43.57 |
| 10794 | 98.87 | 55.02 | 0.65 | 0.31 | 0.010 | 0.027 | 226 | 33 | 0.02 | 22 | <30 | <20 | 360 | 7 | 99.65 | 43.44 |
| 10795 | 98.20 | 54.41 | 0.64 | 0.30 | 0.016 | 0.037 | 246 | 42 | 0.05 | 23 | 30 | <20 | 249 | 13 | 99.00 | 43.63 |
| 10796 | 97.61 | 55.13 | 0.98 | 0.47 | 0.072 | 0.057 | 488 | 53 | 0.29 | 110 | 42 | <20 | 401 | 11 | 99.11 | 43.75 |
| 11501 | 98.39 | 54.68 | 0.73 | 0.35 | 0.036 | 0.052 | 217 | 39 | 0.15 | 75 | 87 | <20 | 591 | 70 | 99.46 | 43.72 |
| 11502 | 98.20 | 55.56 | 0.74 | 0.35 | 0.026 | 0.054 | 174 | 44 | 0.14 | 26 | 73 | <20 | 470 | 37 | 99.24 | 43.65 |
| 11504 | 99.16 | 55.29 | 0.56 | 0.27 | 0.022 | 0.037 | 287 | 48 | 0.08 | 39 | 31 | <20 | 433 | 10 | 99.95 | 43.79 |
| 11505 | 98.68 | 55.26 | 0.58 | 0.28 | 0.020 | 0.037 | 273 | 46 | 0.07 | 32 | <30 | <20 | 921 | 14 | 99.51 | 43.60 |
| 11506 | 98.92 | 55.32 | 0.58 | 0.28 | 0.037 | 0.030 | 287 | 42 | 0.04 | 33 | <30 | <20 | 645 | 10 | 99.70 | 43.63 |
| 11507 | 98.74 | 55.15 | 0.55 | 0.26 | 0.034 | 0.030 | 290 | 43 | 0.05 | 30 | <30 | <20 | 501 | 8 | 99.49 | 43.73 |
| 11508 | 98.74 | 54.92 | 0.58 | 0.28 | 0.035 | 0.032 | 293 | 57 | 0.05 | 36 | <30 | <20 | 395 | 8 | 99.51 | 43.77 |
| 11509 | 98.52 | 54.97 | 0.55 | 0.26 | 0.054 | 0.103 | 216 | 48 | 0.41 | 43 | 133 | 59 | 254 | 47 | 99.72 | 44.00 |
| 11510 | 98.51 | 55.38 | 0.50 | 0.24 | 0.033 | 0.054 | 251 | 43 | 0.12 | 50 | 34 | <20 | 2826 | 18 | 99.54 | 43.50 |

## APPENDIX 2: CONTINUED

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 11511 | 98.58 | 55.52 | 0.60 | 0.29 | 0.058 | 0.034 | 322 | 69 | 0.07 | 44 | 34 | <20 | 985 | 9 | 99.49 | 43.70 |
| 11512 | 99.15 | 55.55 | 0.45 | 0.22 | 0.021 | 0.040 | 264 | 37 | 0.09 | 20 | <30 | <20 | 157 | 13 | 99.80 | 43.85 |
| 11513 | 99.10 | 55.36 | 0.43 | 0.20 | 0.029 | 0.056 | 219 | 63 | 0.14 | 24 | 60 | <20 | 328 | 21 | 99.83 | 43.54 |
| 11514 | 99.14 | 55.55 | 0.45 | 0.22 | 0.019 | 0.046 | 336 | 37 | 0.10 | 27 | 36 | <20 | 157 | 18 | 99.82 | 43.51 |
| 11515 | 98.81 | 55.36 | 0.45 | 0.22 | 0.015 | 0.034 | 248 | 37 | 0.07 | 21 | <30 | <20 | 201 | 9 | 99.44 | 43.59 |
| 11516 | 99.15 | 55.55 | 0.42 | 0.20 | 0.022 | 0.034 | 263 | 39 | 0.04 | 29 | <30 | <20 | 190 | 9 | 99.72 | 43.55 |
| | | | | | | | | | | | | | | | | |
| Averag | 98.76 | 55.22 | 0.60 | 0.29 | 0.025 | 0.044 | 303 | 37 | 0.11 | 49 | 64 | 44 | 516 | 17 | 99.64 | 43.62 |
| Stdev. | 0.36 | 0.29 | 0.14 | 0.06 | 0.013 | 0.015 | 92 | 18 | 0.08 | 32 | 28 | 22 | 571 | 13 | 0.24 | 0.13 |
| Min | 97.61 | 54.41 | 0.42 | 0.20 | 0.010 | 0.027 | 171 | 11 | 0.02 | 20 | <30 | <20 | 109 | 7 | 99.00 | 43.44 |
| Max | 99.24 | 55.60 | 0.98 | 0.47 | 0.072 | 0.103 | 612 | 90 | 0.41 | 119 | 133 | 59 | 2826 | 70 | 99.95 | 44.00 |

As received by modem.

# APPENDIX 3: ANALYTICAL PROCEDURES IN THE CENTRAL ANALYTICAL LABORATORY OF CONTINENTAL LIME INC.

## Fusions Method For ICP Analysis

Lithium metaborate, which melts at 845° C, is used for sample dissolution. Lithium metaborate is well suited for attacking and dissolving acidic oxides. The procedure for fusion with lithium metaborate is as follows:

1. Weigh a 0.5 g sample of powdered rock, pulverized to minus 100 mesh, into a graphite crucible of approximately 30 ml capacity. Graphite crucibles must be manufactured from high-purity graphite, and they have a limited lifetime.

2. Add anhydrous lithium metaborate to the crucible and mix the contents well. The ratio of flux to sample should be 4:1. If resistant minerals such as zircon are present, a larger ratio must be used for a successful attack

3. Fuse the mixture in a muffle furnace at 900° C for 15 minutes. Remove the crucible and swirl the contents. Replace the crucible in the muffle furnace for an additional 15 minutes at 900° C.

4. Remove the crucible from the muffle furnace and allow the fusion to cool to room temperature. Leave any graphite dust in the crucible. Immerse the crucible in a solution of 165 ml of water and 10 ml of concentrated nitric acid. An internal standard, cobalt, is added at this point. The solids will dissolve in 1-2 hrs.

The following analytical lines are used for ICP analysis:

| | | | |
|---|---|---|---|
| P | 213.618 | Ti | 334.941 |
| Si | 251.611 | Al | 396.152 |
| Mn | 257.610 | Sr | 407.771 |
| Fe | 259.940 | Ba | 455.403 |
| Mg | 280.270 | Na | 589.592 |
| Ca | 317.933 | K | 766.491 |

# APPENDIX 4: ANALYTICAL REPORT OF CHECK SAMPLES FROM ACME ANALYTICAL LABORATORIES LTD.

ACME ANALYTICAL LABORATORIES LTD. 852 E. HASTINGS ST. VANCOUVER BC V6A 1R6 PHONE(604)253-3158 FAX(604)253-1716

## WHOLE ROCK ICP ANALYSIS

**Halferdahl & Associates Ltd.** File # 96-4318
18 - 10509 - 81st Ave, Edmonton AB T6E 1X7 Submitted by: L.B. Halferdahl

| SAMPLE# | SiO2 % | Al2O3 % | Fe2O3 % | MgO % | CaO % | Na2O % | K2O % | TiO2 % | P2O5 % | MnO % | Cr2O3 % | Ba ppm | Ni ppm | Sr ppm | Zr ppm | Y ppm | Nb ppm | Sc ppm | LOI % | SUM % |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10778 | .12 | <.03 | <.04 | .30 | 55.69 | .03 | <.04 | .01 | .05 | .01 | .002 | 35 | 28 | 81 | <10 | <10 | <10 | <10 | 43.7 | 99.97 |
| 10780 | .08 | <.03 | <.04 | .35 | 56.15 | .02 | <.04 | .01 | .23 | <.01 | .001 | 48 | <20 | 166 | 20 | <10 | <10 | <10 | 43.6 | 100.52 |
| 10781 | .14 | <.03 | <.04 | .39 | 55.70 | .03 | <.04 | <.01 | .07 | <.01 | <.001 | 117 | 29 | 190 | <10 | <10 | <10 | <10 | 43.6 | 100.04 |
| 10782 | .07 | <.03 | <.04 | .40 | 56.22 | .01 | <.04 | <.01 | .02 | <.01 | <.001 | 111 | <20 | 236 | 18 | <10 | <10 | <10 | 43.5 | 100.29 |
| 10787 | .19 | <.03 | .06 | .40 | 55.29 | .01 | <.04 | <.01 | .08 | <.01 | .007 | 116 | 50 | 189 | 10 | <10 | <10 | <10 | 43.6 | 99.71 |
| 10795 | .11 | <.03 | <.04 | .34 | 56.20 | <.01 | <.04 | <.01 | .05 | <.01 | .004 | 26 | <20 | 124 | <10 | <10 | <10 | <10 | 43.6 | 100.36 |
| 10796 | .33 | <.03 | .08 | .50 | 54.69 | .01 | <.04 | <.01 | .04 | .01 | .002 | 112 | <20 | 247 | <10 | <10 | <10 | <10 | 43.8 | 99.53 |
| 11501 | .12 | <.03 | <.04 | .37 | 55.33 | .01 | <.04 | .02 | .06 | <.01 | .002 | 86 | <20 | 110 | 13 | <10 | <10 | <10 | 43.7 | 99.70 |
| RE 11501 | .11 | <.03 | <.04 | .38 | 55.63 | .01 | <.04 | <.01 | .06 | <.01 | .005 | 83 | <20 | 110 | 12 | <10 | <10 | <10 | 43.5 | 99.79 |
| 11506 | .02 | <.03 | .07 | .32 | 55.74 | <.01 | <.04 | <.01 | .10 | <.01 | .003 | 39 | <20 | 146 | 11 | <10 | <10 | <10 | 43.7 | 100.01 |
| 11510 | .07 | <.03 | .04 | .26 | 55.67 | <.01 | <.04 | <.01 | .29 | .01 | <.001 | 52 | <20 | 127 | 17 | <10 | <10 | <10 | 43.6 | 99.99 |
| STANDARD SO-15 | 49.53 | 12.31 | 7.23 | 7.09 | 6.08 | 2.52 | 1.89 | 1.54 | 2.72 | 1.26 | .983 | 2131 | 68 | 376 | 781 | 18 | 17 | <10 | 5.9 | 99.58 |

.200 GRAM SAMPLES ARE FUSED WITH 1.2 GRAM OF LIBO2 AND ARE DISSOLVED IN 100 MLS 5% HNO3. Ba IS SUM AS BaSO4 AND OTHER METALS ARE SUM AS OXIDES.
- SAMPLE TYPE: PULP   Samples beginning 'RE' are Reruns and 'RRE' are Reject Reruns.   *LOI ignited @ 1100°c for 2hrs*

DATE RECEIVED: SEP 9 1996   DATE REPORT MAILED: *Sept 18/96*   SIGNED BY. *C. L.* .D.TOYE, C.LEONG, J.WANG; CERTIFIED B.C. ASSAYERS

## APPENDIX 5: ADJUSTMENTS TO REPORTED ANALYSES OF SAMPLES AND SELECTION OF PREFERRED VALUES FOR CaO AND LOI

Examination of the analytical report by Acme Analytical Laboratories Ltd. (Appendix 4) indicates that some of the analytical determinations for CaO are not accurate. Of the 11 check analyses, 3 exceed 56 per cent CaO, the maximum possible CaO content for pure $CaCO_3$.

Chemical analyses of limestone can be checked by subtracting the carbon dioxide equivalent to CaO plus that equivalent to MgO (total carbon dioxide equivalents are indicated $CO_2$ EQ) from the determined LOI (see next two pages). If $P_2O_5$ has been determined, the percentage of CaO to use in this calculation is the determined CaO minus 1.31693 $P_2O_5$. LOI should exceed $CO_2$ EQ by a small amount to allow for moisture, oxidation of any pyrite, and other factors. Of the 35 samples analyzed in the Central Analytical Laboratory of Continental Lime Inc., LOI minus $CO_2$ EQ is positive in 17. Of the 11 check analyses, LOI minus $CO_2$ EQ is positive in 1.

For the 46 analyses (35 by Continental and 11 by Acme), adjustments to determined values of CaO and LOI have been calculated by two methods: LOI-based and impurity-based (see next two pages). The LOI-based method involves lowering the determined CaO in analyses with high CaO determinations and concomitantly raising the determined LOI so that with the adjusted values of CaO and LOI, LOI minus $CO_2$ EQ equals 0.2. The equations for LOI-based adjustments follow:

$$CaO_F = \frac{99.80 - 0.21522\,CaO - 2.09175\,MgO - SiO_2 - R_2O_3 - \textit{others} + 0.983\,P_2O_5}{1.56956}$$

$$LOI_F = \tfrac{1}{2}\,(\,100.20 - 0.21522\,CaO + 0.09175\,MgO - SiO_2 - R_2O_5 - \textit{others} - 0.983\,P_2O_5\,)$$

where the subscript $_F$ refers to the adjusted or calculated percentage (final) of CaO or LOI;
$R_2O_3$ is the sum of $Al_2O_3 + Fe_2O_3 + TiO_2 + P_2O_5 + MnO + Cr_2O_3$ as determined;
with any determination less than the detection limit set at half the detection limit; and
*others* is the sum of the rest of the constituents as determined in the analytical reports (Appendices 2 and 4) not already appearing in the equations, with any determination less than the detection limit set at half the detection limit.

The impurity-based method involves subtracting the sum of all the determined impurities from 100.00 per cent, assigning the remainder to $CaCO_3$, and calculating adjusted values for CaO and LOI based on this remainder. The equations for impurity-based adjustments follow:

$$CaO_F = \frac{99.80 - 2.09175\,MgO - SiO_2 - R_2O_3 - \textit{others} + 0.983\,P_2O_5}{1.78478}$$

$$LOI_F = \frac{100.2548 + 0.39115\,MgO - 1.2526\,P_2O_5 - SiO_2 - R_2O_3 - \textit{others}}{2.2742}$$

where the subscript $_F$, $R_2O_3$, and *others* have the same meanings as for the previous two equations.

Review of the six Continental and nine Acme analyses adjusted to obtain preferred values for CaO (Codes 4 and 5, next two pages) indicates that the CaO and LOI values adjusted by either method are very close, the CaO values adjusted by the LOI method being slightly less than those adjusted by the impurity-based method.

## APPENDIX 5: CONTINUED

Det'd - determined; adjustments: LOI - LOI based, Imp - impurity based; Pref - preferred

Code

1 LOI - $CO_2$ EQ $\geq$ 0.00 — CaO(Pref) = CaO(Det'd) — LOI(Pref) = LOI(Det'd)

2 LOI - $CO_2$EQ < 0.00 and CaO(Det'd) < 52.50 — CaO(Pref) = CaO(Det'd) — LOI(Pref) = LOI(Det'd)

3 LOI - $CO_2$EQ < 0.00 and CaO(Det'd) < CaO(LOI) — CaO(Pref) = CaO(Det'd) — LOI(Pref) = LOI(Det'd)

4 For repeat analyses (RE) the preferred values for that sample are the means of the CaO(Pref) and the LOI(Pref) values.

5 LOI - $CO_2$EQ < 0.00 and CaO(LOI) $\leq$ CaO(Imp) — CaO(Pref) = CaO(LOI) — LOI(Pref) = LOI(Det'd)*

Criteria for codes are applied to each sample in the order listed.

### CONTINENTAL ANALYSES

| Sample | LOI - $CO_2$ EQ | Code | CaO% Det'd | CaO% LOI | CaO% Imp | CaO% Pref | LOI% Det'd | LOI% LOI | LOI% Imp | LOI% Pref | SUM % Det'd | SUM % Adjusted |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10777 | -0.31 | 5 | 55.54 | 55.48 | 55.49 | 55.48 | 43.55 | 44.02 | 44.03 | 43.55 | 99.92 | 99.86 |
| 10778 | -0.10 | 3 | 55.37 | 55.57 | 55.54 | 55.37 | 43.61 | 44.06 | 44.05 | 43.61 | 99.83 | 99.83 |
| 10779 | 0.42 | 1 | 54.91 | 55.59 | 55.50 | 54.91 | 43.78 | 44.09 | 44.03 | 43.78 | 99.45 | 99.45 |
| 10780 | -0.08 | 3 | 55.39 | 55.46 | 55.45 | 55.39 | 43.48 | 43.83 | 43.83 | 43.48 | 99.94 | 99.94 |
| 10781 | 0.01 | 1 | 55.00 | 55.37 | 55.33 | 55.00 | 43.53 | 44.01 | 43.98 | 43.53 | 99.86 | 99.86 |
| 10782 | 0.20 | 1 | 54.85 | 55.42 | 55.35 | 54.85 | 43.58 | 44.03 | 43.98 | 43.58 | 99.57 | 99.57 |
| 10783 | -0.11 | 3 | 55.12 | 55.37 | 55.34 | 55.12 | 43.49 | 44.00 | 43.97 | 43.49 | 99.74 | 99.74 |
| 10784 | 0.03 | 1 | 55.16 | 55.38 | 55.35 | 55.16 | 43.68 | 44.02 | 44.00 | 43.68 | 99.65 | 99.65 |
| 10785 | -0.05 | 3 | 55.08 | 55.36 | 55.33 | 55.08 | 43.54 | 44.01 | 43.98 | 43.54 | 99.71 | 99.71 |
| 10786 | -0.22 | 3 | 55.26 | 55.38 | 55.36 | 55.26 | 43.52 | 44.03 | 44.02 | 43.52 | 99.86 | 99.86 |
| 10787 | 0.23 | 1 | 54.75 | 55.37 | 55.29 | 54.75 | 43.54 | 44.00 | 43.94 | 43.54 | 99.34 | 99.34 |
| 10788 | 0.21 | 1 | 55.35 | 55.53 | 55.51 | 55.35 | 43.90 | 44.03 | 44.01 | 43.90 | 99.83 | 99.83 |
| 10789 | -0.34 | 5 | 55.60 | 55.47 | 55.48 | 55.47 | 43.53 | 43.96 | 43.98 | 43.53 | 99.87 | 99.74 |
| 10790 | -0.35 | 5 | 55.60 | 55.51 | 55.52 | 55.51 | 43.51 | 43.99 | 44.00 | 43.51 | 99.95 | 99.86 |
| 10791 | -0.02 | 3 | 55.24 | 55.63 | 55.58 | 55.24 | 43.54 | 44.06 | 44.03 | 43.54 | 99.72 | 99.72 |
| 10792 | 0.03 | 1 | 55.13 | 55.62 | 55.56 | 55.13 | 43.56 | 44.12 | 44.08 | 43.56 | 99.82 | 99.82 |
| 10793 | -0.02 | 3 | 55.23 | 55.60 | 55.55 | 55.23 | 43.57 | 44.08 | 44.05 | 43.57 | 99.38 | 99.38 |
| 10794 | -0.04 | 3 | 55.02 | 55.57 | 55.51 | 55.02 | 43.44 | 44.12 | 44.06 | 43.44 | 99.65 | 99.65 |
| 10795 | 0.63 | 1 | 54.41 | 55.64 | 55.49 | 55.27° | 43.63 | 44.17 | 44.05 | 43.63 | 99.00 | 99.86 |
| 10796 | 0.01 | 1 | 55.13 | 55.09 | 55.09 | 55.13 | 43.75 | 43.91 | 43.91 | 43.75 | 99.11 | 99.11 |
| 11501 | 0.49 | 1 | 54.68 | 55.44 | 55.35 | 54.68 | 43.72 | 44.03 | 43.96 | 43.72 | 99.46 | 99.46 |
| 11502 | -0.29 | 5 | 55.56 | 55.34 | 55.37 | 55.34 | 43.65 | 43.97 | 43.99 | 43.65 | 99.24 | 99.02 |
| 11504 | 0.15 | 1 | 55.29 | 55.53 | 55.50 | 55.29 | 43.79 | 44.03 | 44.01 | 43.79 | 99.95 | 99.95 |
| 11505 | 0.02 | 1 | 55.26 | 55.53 | 55.50 | 55.26 | 43.60 | 44.00 | 43.97 | 43.60 | 99.51 | 99.51 |
| 11506 | -0.02 | 3 | 55.32 | 55.54 | 55.51 | 55.32 | 43.63 | 44.03 | 44.01 | 43.63 | 99.70 | 99.70 |
| 11507 | 0.22 | 1 | 55.15 | 55.58 | 55.53 | 55.15 | 43.73 | 44.05 | 44.01 | 43.73 | 99.49 | 99.49 |
| 11508 | 0.41 | 1 | 54.92 | 55.58 | 55.50 | 54.92 | 43.77 | 44.09 | 44.03 | 43.77 | 99.51 | 99.51 |
| 11509 | 0.60 | 1 | 54.97 | 55.31 | 55.27 | 54.97 | 44.00 | 43.86 | 43.83 | 44.00 | 99.72 | 99.72 |
| 11510 | 0.07 | 1 | 55.38 | 55.51 | 55.50 | 55.38 | 43.50 | 43.75 | 43.74 | 43.50 | 99.54 | 99.54 |
| 11511 | -0.09 | 5 | 55.52 | 55.45 | 55.46 | 55.45 | 43.70 | 43.94 | 43.95 | 43.70 | 99.49 | 99.42 |
| 11512 | 0.03 | 1 | 55.55 | 55.56 | 55.56 | 55.55 | 43.85 | 44.03 | 44.03 | 43.85 | 99.80 | 99.80 |
| 11513 | -0.09 | 3 | 55.36 | 55.56 | 55.54 | 55.36 | 43.54 | 43.99 | 43.97 | 43.54 | 99.83 | 99.83 |
| 11514 | -0.31 | 5 | 55.55 | 55.54 | 55.54 | 55.54 | 43.51 | 44.01 | 44.01 | 43.51 | 99.82 | 99.81 |
| 11515 | -0.07 | 3 | 55.36 | 55.61 | 55.58 | 55.36 | 43.59 | 44.06 | 44.04 | 43.59 | 99.44 | 99.44 |
| 11516 | -0.24 | 3 | 55.55 | 55.62 | 55.61 | 55.55 | 43.55 | 44.05 | 44.04 | 43.55 | 99.72 | 99.72 |

* LOI(Pref) = LOI(Det'd) has been chosen for these analyses because differences in the LOI determinations from both labs are not statistically significant.

° Adjusted Acme analysis substituted because of Continental's low total.

# APPENDIX 5: CONTINUED

Det'd - determined; adjustments: LOI - LOI based, Imp - impurity based; Pref - preferred

| Code | | | |
|---|---|---|---|
| 1 | LOI - $CO_2$EQ ≥ 0.00 | CaO(Pref) = CaO(Det'd) | LOI(Pref) = LOI(Det'd) |
| 2 | LOI - $CO_2$EQ < 0.00 and CaO(Det'd) < 52.50 | CaO(Pref) = CaO(Det'd) | LOI(Pref) = LOI(Det'd) |
| 3 | LOI - $CO_2$EQ < 0.00 and CaO(Det'd) < CaO(LOI) | CaO(Pref) = CaO(Det'd) | LOI(Pref) = LOI(Det'd) |
| 4 | For repeat analyses (RE) the preferred values for that sample are the means of the CaO(Pref) and the LOI(Pref) values. | | |
| 5 | LOI - $CO_2$EQ < 0.00 and CaO(LOI) ≤ CaO(Imp) | CaO(Pref) = CaO(LOI) | LOI(Pref) = LOI(Det'd)* |

Criteria for codes are applied to each sample in the order listed.

## ACME ANALYSES

| Sample | LOI - | Code | CaO% | | | | LOI% | | | | SUM % | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $CO_2$ EQ | | Det'd | LOI | Imp | Pref | Det'd | LOI | Imp | Pref | Det'd | Adjusted |
| 10778 | -0.28 | 5 | 55.69 | 55.39 | 55.42 | 55.39 | 43.70 | 43.95 | 43.98 | 43.70 | 99.97 | 99.67 |
| 10780 | -0.61 | 5 | 56.15 | 55.28 | 55.38 | 55.28 | 43.60 | 43.74 | 43.82 | 43.60 | 100.52 | 99.65 |
| 10781 | -0.47 | 5 | 55.70 | 55.23 | 55.28 | 55.23 | 43.60 | 43.90 | 43.94 | 43.60 | 100.04 | 99.57 |
| 10782 | -1.04 | 5 | 56.22 | 55.20 | 55.32 | 55.20 | 43.50 | 43.94 | 44.03 | 43.50 | 100.29 | 99.27 |
| 10787 | -0.14 | 5 | 55.29 | 55.22 | 55.23 | 55.22 | 43.60 | 43.90 | 43.90 | 43.60 | 99.71 | 99.64 |
| 10795 | -0.82 | 5 | 56.20 | 55.27 | 55.38 | 55.27 | 43.60 | 43.90 | 43.99 | 43.60 | 100.36 | 99.43 |
| 10796 | 0.38 | 1 | 54.69 | 55.08 | 55.03 | 54.69 | 43.80 | 43.93 | 43.89 | 43.80 | 99.53 | 99.53 |
| 11501 | -0.06 | 3,4 | 55.33 | 55.34 | 55.34 | 55.31 | 43.70 | 43.98 | 43.98 | 43.60 | 99.70 | 99.58 |
| RE 11501 | -0.51 | 4,5 | 55.63 | 55.29 | 55.33 | - | 43.50 | 43.95 | 43.98 | - | 99.79 | 99.67 |
| 11506 | -0.29 | 5 | 55.74 | 55.39 | 55.43 | 55.39 | 43.70 | 43.92 | 43.95 | 43.70 | 100.01 | 99.66 |
| 11510 | -0.07 | 5 | 55.67 | 55.47 | 55.49 | 55.47 | 43.60 | 43.73 | 43.75 | 43.60 | 99.99 | 99.79 |

* LOI(Pref) = LOI(Det'd) has been chosen for these analyses because Acme determined LOI at 1100° C for 2h, and because differences in the LOI determinations from both labs are not statistically significant.

# APPENDIX 6: TWO-TAILED STUDENTS *t*-TEST FOR DIFFERENCES, SIGN TEST, AND TEST OF CONFIDENCE INTERVALS FOR CONSTITUENT DETERMINATIONS IN THE 1996 SAMPLES FROM THE KELLY LAKE LIMESTONE DEPOSITS

Notes: **CONT:** Analysis by the Central Analytical Laboratory of Continental Lime Inc.
**ACME:** Analysis by Acme Analytical Laboratories Ltd.
**Adjusted CaO:** Adjusted CaO analyses by Acme Analytical Laboratories (Appendix 5).

**DEV:** deviation (**d** = **D-dx**)
**DIFF:** difference (**D** = Constituent Determination$_{Lab1}$ - Constituent Determination$_{Lab2}$)
**SD:** squared deviation ($\mathbf{d^2}$)

**n:** number of samples
**d.o.f:** degrees of freedom [**n**-1]
$\mathbf{d_x}$: mean of differences in constituent
$\mathbf{t_\alpha}$: two-tailed

## TWO-TAILED STUDENTS *t*-TEST OF DIFFERENCES (Snedecor, 1957)

For the test of differences determinations of the same sample from two laboratories are paired and their differences comprise the sample data for which the following hypothesis may be tested:

**Ho**: Constituent Determination$_{LAB1}$ - Constituent Determination$_{LAB2}$ = 0
**Ha**: Constituent Determination$_{LAB1}$ - Constituent Determination$_{LAB2}$ $\neq$ 0

The measured variation in the population of sample differences is given by

$\mathbf{S_D2}$: variance of differences in constituent $[\Sigma \mathbf{d^2} / \mathbf{d.o.f.}]$
$\mathbf{S_D}$: standard deviation of differences in constituent $[(\mathbf{S_D2})^{1/2}]$

and measured variation in sample differences is given by

$\mathbf{S_d2}$: sample variance of differences in constituent $[\mathbf{S_D2} / \mathbf{n}]$
$\mathbf{S_d}$: sample standard deviation of differences in constituent $[(\mathbf{S_d2})^{1/2}]$

The students *t*-Test is used to test the hypothesis regarding sample differences.

**t**: test statistic $[(\mathbf{d_x} - \mu / \mathbf{s_d})]$

## TWO-TAILED SIGN TEST (Mendenhall et al., 1990)

For the sign test the determinations of the same sample from two laboratories are paired and the sign of the differences comprise the sample data, with **M** equal to the number of positive differences. The hypothesis that both samples are derived from the same probability distribution with the same position is tested against the alternative that the distributions differ in position. Under the null hypothesis the probability that the sign of the differences is + or - is ½, and

**M**: number of positive differences

**Ho**: P(Constituent Determination$_{LAB1}$ > Constituent Determination$_{LAB2}$) = ½
**Ha**: P(Constituent Determination$_{LAB1}$ > Constituent Determination$_{LAB2}$) $\neq$ ½

## APPENDIX 6: CONTINUED

If both samples are derived from the same probability distribution then **M** will be binomially distributed with **p** = ½ and the level of significance $\alpha$ associated with the rejection region is determined by

> **y**: number of samples required to raise $\alpha$ to the required level of significance
> **p(x)**: binomial probability $[(n! / ((n-x)!(x)!))\ 0.5^{x}0.5^{n-x}]$
> $\alpha$: two-tailed level of significance $[p(0) + \ldots + p(0+y) + p(n-y) + \ldots + p(n)]$
> **RR**: rejection region $[(0 \leq M \leq y,\ n-y \leq M \leq n)]$

**TWO-TAILED STUDENTS *t*-TEST OF CONFIDENCE INTERVALS (Koch and Link, 1970)**

For the test of confidence intervals the determinations of the same sample from two laboratories are paired and their differences comprise the sample data for which the following *hypothesis may be tested:*

> **Ho**: Constituent Determination$_{LAB1}$ - Constituent Determination$_{LAB2}$ = 0
> **Ha**: Constituent Determination$_{LAB1}$ - Constituent Determination$_{LAB2}$ ≠ 0

If confidence intervals constructed about the mean difference exclude 0 then the null hypothesis is rejected.

> $\Sigma$ **w**: sum of observations
> $\Sigma\ w_{DIFFERENCE}$: difference of the sum of observations $[\Sigma\ w_{LAB1} - \Sigma\ w_{LAB2}]$
> $(\Sigma\ w_{DIFFERENCE})^2$: squared difference of the sum of observations $[(\Sigma\ w_{LAB1} - \Sigma\ w_{LAB1})^2]$
> $(\Sigma\ w_{DIFFERENCE})^2 / n$: mean squared difference
> **SS**: sum of squared deviations from the sample mean
> $s^2$: sample variance **[SS / d.o.f]**
> **s**: sample standard deviation $[(s^2)^{1/2}$ **or** $SS^{1/2}]$
> $s / n^{1/2}$: standard deviation of sample means
> $t(s / n^{1/2})$: test statistic at $\alpha$ level of significance $[(s / n½) \bullet (t_{\alpha})]$
> $\mu_L$: lower confidence limit $[d_x - t(s / n^{1/2})]$
> $\mu_U$: upper confidence limit $[d_x + t(s / n^{1/2})]$

# APPENDIX 6: CONTINUED

## CaO [CONTINENTAL - ACME]

| Sample | | CaO (%) CONT | ACME | | Test of Differences and Confidence Intervals DIFF (D) | DEV (d) | | SD ($d^2$) | | Sign Test Sign of DIFF |
|---|---|---|---|---|---|---|---|---|---|---|
| 10778 | | 55.37 | 55.69 | | -0.32 | 0.35 | | 0.12 | | - |
| 10780 | | 55.39 | 56.15 | | -0.76 | -0.09 | | 0.01 | | - |
| 10781 | | 55.00 | 55.70 | | -0.70 | -0.03 | | 0.00 | | - |
| 10782 | | 54.85 | 56.22 | | -1.37 | -0.70 | | 0.49 | | - |
| 10787 | | 54.75 | 55.29 | | -0.54 | 0.13 | | 0.02 | | - |
| 10795 | | 54.41 | 56.20 | | -1.79 | -1.12 | | 1.26 | | - |
| 10796 | | 55.13 | 54.69 | | 0.44 | 1.11 | | 1.23 | | + |
| 11501 | | 54.68 | 55.33 | | -0.65 | 0.02 | | 0.00 | | - |
| RE11501 | | 54.68 | 55.63 | | -0.95 | -0.28 | | 0.08 | | - |
| 11506 | | 55.32 | 55.74 | | -0.42 | 0.25 | | 0.06 | | - |
| 11510 | | 55.38 | 55.67 | | -0.29 | 0.38 | | 0.14 | | - |
| | Total ($\Sigma$ w) | 604.96 | 612.31 | $\Sigma W_{DIFF}$ = | -7.35 | 0.00 | SS = | 3.41 | M = | 1 |
| | Mean ($\mu$) | 55.00 | 55.66 | $d_x$ = | -0.67 | | $S_D^2$ = | 0.34 | | |
| | n = | 11 | | d.o.f = | 10 | | | | | |

## TEST OF DIFFERENCES

| | | | | | | |
|---|---|---|---|---|---|---|
| $S_D$ = | 0.58 | t = | -3.795 | tα = 0.100 = | 1.812 | **Reject** Ho: |
| $S_{d2}$ = | 0.03 | | | tα = 0.050 = | 2.228 | **Reject** Ho: |
| $S_d$ = | 0.18 | | | tα = 0.025 = | 2.634 | **Reject** Ho: |

## SIGN TEST

| | | | | |
|---|---|---|---|---|
| α = p(0)+...+p(2)+p(4)+...+p(6) | **RR** = (0 ... 3, 8 ... 11) | α = | 0.161 | **Reject** Ho: |
| α = p(0)+...+p(1)+p(5)+...+p(6) | **RR** = (0 ... 2, 9 ... 11) | α = | 0.054 | **Reject** Ho: |
| α = p(0)+p(6) | **RR** = (0 ... 1, 10 ... 11) | α = | 0.011 | **Reject** Ho: |

## TEST OF CONFIDENCE INTERVALS

| | | | | | | |
|---|---|---|---|---|---|---|
| $(\Sigma W_{DIFF})^2$ = | 54.02 | $(\Sigma W_{DIFF})^2 / n$ = | 4.91 | SS = | 3.41 | |
| $s^2$ = SS/d.o.f = | 0.34 | $s = (s^2)^{1/2}$ = | 0.58 | $s / n^{1/2}$ = | 0.18 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| $t(s/n^{1/2})\alpha$ = 0.100 = | 0.319 | μL = | -0.987 | μU = | -0.349 | **Reject** Ho: |
| $t(s/n^{1/2})\alpha$ = 0.050 = | 0.392 | μL = | -1.061 | μU = | -0.276 | **Reject** Ho: |
| $t(s/n^{1/2})\alpha$ = 0.025 = | 0.464 | μL = | -1.132 | μU = | -0.204 | **Reject** Ho: |

## APPENDIX 6: CONTINUED

### Adjusted Acme CaO [CONTINENTAL - ACME]

| Sample | | Adjusted Acme CaO (%) | | | Test of Differences and Confidence Intervals | | | | | Sign Test |
|---|---|---|---|---|---|---|---|---|---|---|
| | | CONT | ACME | | DIFF (D) | DEV (d) | | SD ($d^2$) | | Sign of DIFF |
| 10778 | | 55.37 | 55.39 | | -0.02 | 0.24 | | 0.06 | | - |
| 10780 | | 55.39 | 55.28 | | 0.11 | 0.37 | | 0.13 | | + |
| 10781 | | 55.00 | 55.23 | | -0.23 | 0.03 | | 0.00 | | - |
| 10782 | | 54.85 | 55.20 | | -0.35 | -0.09 | | 0.01 | | - |
| 10787 | | 54.75 | 55.22 | | -0.47 | -0.22 | | 0.05 | | - |
| 10795 | | 54.41 | 55.27 | | -0.86 | -0.61 | | 0.37 | | - |
| 10796 | | 55.13 | 54.69 | | 0.44 | 0.69 | | 0.48 | | + |
| 11501 | | 54.68 | 55.33 | | -0.65 | -0.40 | | 0.16 | | - |
| RE11501 | | 54.68 | 55.29 | | -0.61 | -0.36 | | 0.13 | | - |
| 11506 | | 55.32 | 55.39 | | -0.07 | 0.19 | | 0.03 | | - |
| 11510 | | 55.38 | 55.47 | | -0.09 | 0.17 | | 0.03 | | - |
| | Total (Σ w) | 604.96 | 607.75 | $\Sigma W_{DIFF}$ = | -2.79 | 0.00 | SS = | 1.44 | M = | 2 |
| | Mean (μ) | 55.00 | 55.25 | $d_x$ = | -0.25 | | $S_D^2$ = | 0.14 | | |
| | n = | 11 | | d.o.f = | 10 | | | | | |

#### TEST OF DIFFERENCES

| | | | | | | |
|---|---|---|---|---|---|---|
| $S_D$ = | 0.38 | t = | -2.214 | tα = 0.100 = | 1.812 | **Reject** Ho: |
| $S_{d2}$ = | 0.01 | | | tα = 0.050 = | 2.228 | **Accept** Ho: |
| $S_d$ = | 0.11 | | | tα = 0.025 = | 2.634 | **Accept** Ho: |

#### SIGN TEST

| | | | | |
|---|---|---|---|---|
| α = p(0)+...+p(2)+p(4)+...+p(6) | **RR** = (0 ... 3, 8 ... 11) | α = | 0.161 | **Reject** Ho: |
| α = p(0)+...+p(1)+p(5)+...+p(6) | **RR** = (0 ... 2, 9 ... 11) | α = | 0.054 | **Reject** Ho: |
| α = p(0)+p(6) | **RR** = (0 ... 1, 10 ... 11) | α = | 0.011 | **Accept** Ho: |

#### TEST OF CONFIDENCE INTERVALS

| | | | | | | |
|---|---|---|---|---|---|---|
| $(\Sigma W_{DIFF})^2$ = | 7.78 | $(\Sigma W_{DIFF})^2 / n$ = | 0.71 | SS = | 1.44 | |
| $s^2$ = SS/d.o.f = | 0.14 | $s = (s^2)^{½}$ = | 0.38 | $s / n^{½}$ = | 0.11 | |
| t(s/n½)α = 0.100 = | 0.208 | μL = -0.461 | | μU = -0.046 | | **Reject** Ho: |
| t(s/n½)α = 0.050 = | 0.255 | μL = -0.509 | | μU = 0.002 | | **Accept** Ho: |
| t(s/n½)α = 0.025 = | 0.302 | μL = -0.555 | | μU = 0.048 | | **Accept** Ho: |

# APPENDIX 6: CONTINUED

## MgO [CONTINENTAL - ACME]

| Sample | | MgO (%) CONT | ACME | | DIFF (D) | DEV (d) | | SD ($d^2$) | | Sign Test Sign of DIFF |
|---|---|---|---|---|---|---|---|---|---|---|
| 10778 | | 0.26 | 0.30 | | -0.04 | -0.01 | | 0.00 | | - |
| 10780 | | 0.32 | 0.35 | | -0.03 | 0.00 | | 0.00 | | - |
| 10781 | | 0.37 | 0.39 | | -0.02 | 0.01 | | 0.00 | | - |
| 10782 | | 0.37 | 0.40 | | -0.03 | 0.00 | | 0.00 | | - |
| 10787 | | 0.37 | 0.40 | | -0.03 | 0.00 | | 0.00 | | - |
| 10795 | | 0.30 | 0.34 | | -0.04 | -0.01 | | 0.00 | | - |
| 10796 | | 0.47 | 0.50 | | -0.03 | 0.00 | | 0.00 | | - |
| 11501 | | 0.35 | 0.37 | | -0.02 | 0.01 | | 0.00 | | - |
| RE11501 | | 0.35 | 0.38 | | -0.03 | 0.00 | | 0.00 | | - |
| 11506 | | 0.28 | 0.32 | | -0.04 | -0.01 | | 0.00 | | - |
| 11510 | | 0.24 | 0.26 | | -0.02 | 0.01 | | 0.00 | | - |
| | **Total (Σ w)** | 3.68 | 4.01 | **$\Sigma W_{DIFF}$ =** | -0.33 | 0.00 | **SS =** | 0.00 | **M =** | 0 |
| | **Mean (μ)** | 0.33 | 0.36 | **$d_x$ =** | -0.03 | | **$S_D^2$ =** | 0.00 | | |
| | **n =** | 11 | | **d.o.f =** | 10 | | | | | |

### TEST OF DIFFERENCES

| | | | | | | |
|---|---|---|---|---|---|---|
| **$S_D$ =** | 0.01 | **t =** | -12.845 | **tα = 0.100 =** | 1.812 | **Reject** Ho: |
| **$S_{d}2$ =** | 0.00 | | | **tα = 0.050 =** | 2.228 | **Reject** Ho: |
| **$S_d$ =** | 0.00 | | | **tα = 0.025 =** | 2.634 | **Reject** Ho: |

### SIGN TEST

| | | | | |
|---|---|---|---|---|
| α = p(0)+...+p(2)+p(4)+...+p(6) | **RR** = (0 ... 3, 8 ... 11) | **α =** | 0.161 | **Reject** Ho: |
| α = p(0)+...+p(1)+p(5)+...+p(6) | **RR** = (0 ... 2, 9 ... 11) | **α =** | 0.054 | **Reject** Ho: |
| α = p(0)+p(6) | **RR** = (0 ... 1, 10 ... 11) | **α =** | 0.011 | **Reject** Ho: |

### TEST OF CONFIDENCE INTERVALS

| | | | | | | |
|---|---|---|---|---|---|---|
| **$(\Sigma W_{DIFF})^2$ =** | 0.11 | **$(\Sigma W_{DIFF})^2 / n$ =** | 0.01 | **SS =** | 0.00 | |
| **$s^2$ = SS/d.o.f =** | 0.00 | **s = $(s^2)^{½}$ =** | 0.01 | **s / $n^{½}$ =** | 0.00 | |
| **t(s/n½)α** = 0.100 = | 0.004 | **μL =** -0.034 | | **μU =** -0.026 | | **Reject** Ho: |
| **t(s/n½)α** = 0.050 = | 0.005 | **μL =** -0.035 | | **μU =** -0.025 | | **Reject** Ho: |
| **t(s/n½)α** = 0.025 = | 0.006 | **μL =** -0.036 | | **μU =** -0.024 | | **Reject** Ho: |

# APPENDIX 6: CONTINUED

## $SiO_2$ [CONTINENTAL - ACME]

| Sample | | $SiO_2$ (%) CONT | ACME | | Test of Differences and Confidence Intervals DIFF (D) | DEV (d) | | SD ($d^2$) | | Sign Test Sign of DIFF |
|---|---|---|---|---|---|---|---|---|---|---|
| 10778 | | 0.06 | 0.12 | | -0.06 | -0.06 | | 0.00 | | - |
| 10780 | | 0.06 | 0.08 | | -0.02 | -0.02 | | 0.00 | | - |
| 10781 | | 0.14 | 0.14 | | 0.00 | 0.00 | | 0.00 | | - |
| 10782 | | 0.10 | 0.07 | | 0.03 | 0.03 | | 0.00 | | + |
| 10787 | | 0.19 | 0.19 | | 0.00 | 0.00 | | 0.00 | | - |
| 10795 | | 0.05 | 0.11 | | -0.06 | -0.06 | | 0.00 | | - |
| 10796 | | 0.29 | 0.33 | | -0.04 | -0.04 | | 0.00 | | - |
| 11501 | | 0.15 | 0.12 | | 0.03 | 0.03 | | 0.00 | | + |
| RE11501 | | 0.15 | 0.11 | | 0.04 | 0.04 | | 0.00 | | + |
| 11506 | | 0.04 | 0.02 | | 0.02 | 0.02 | | 0.00 | | + |
| 11510 | | 0.12 | 0.07 | | 0.05 | 0.05 | | 0.00 | | ± |
| | Total (Σ w) | 1.35 | 1.36 | $\Sigma W_{DIFF}$ = | -0.01 | 0.00 | SS = | 0.02 | M = | 5 |
| | Mean (μ) | 0.12 | 0.12 | $d_x$ = | 0.00 | | $S_D^2$ = | 0.00 | | |
| | n = | 11 | | d.o.f = | 10 | | | | | |

### TEST OF DIFFERENCES

| | | | | | | |
|---|---|---|---|---|---|---|
| $S_D$ = | 0.04 | t = | -0.077 | tα = 0.100 = | 1.812 | Accept Ho: |
| $S_{d2}$ = | 0.00 | | | tα = 0.050 = | 2.228 | Accept Ho: |
| $S_d$ = | 0.01 | | | tα = 0.025 = | 2.634 | Accept Ho: |

### SIGN TEST

| | | | | |
|---|---|---|---|---|
| α = p(0)+...+p(2)+p(4)+...+p(6) | RR = (0 ... 3, 8 ... 11) | α = | 0.161 | Accept Ho: |
| α = p(0)+...+p(1)+p(5)+...+p(6) | RR = (0 ... 2, 9 ... 11) | α = | 0.054 | Accept Ho: |
| α = p(0)+p(6) | RR = (0 ... 1, 10 ... 11) | α = | 0.011 | Accept Ho: |

### TEST OF CONFIDENCE INTERVALS

| | | | | | | |
|---|---|---|---|---|---|---|
| $(\Sigma W_{DIFF})^2$ = | 0.00 | $(\Sigma W_{DIFF})^2 / n$ = | 0.00 | SS = | 0.02 | |
| $s^2$ = SS/d.o.f = | 0.00 | $s = (s^2)^{1/2}$ = | 0.04 | $s / n^{1/2}$ = | 0.01 | |
| $t(s/n^{1/2})\alpha$ = 0.100 = | 0.022 | μL = | -0.022 | μU = | 0.021 | Accept Ho: |
| $t(s/n^{1/2})\alpha$ = 0.050 = | 0.026 | μL = | -0.027 | μU = | 0.026 | Accept Ho: |
| $t(s/n^{1/2})\alpha$ = 0.025 = | 0.031 | μL = | -0.032 | μU = | 0.030 | Accept Ho: |

# APPENDIX 6: CONTINUED

## $P_2O_5$ [CONTINENTAL - ACME]

| Sample | | $P_2O_5$ (%) CONT | ACME | | Test of Differences and Confidence Intervals DIFF (D) | DEV (d) | | SD ($d^2$) | | Sign Test Sign of DIFF |
|---|---|---|---|---|---|---|---|---|---|---|
| 10778 | | 0.03 | 0.05 | | -0.02 | -0.02 | | 0.00 | | - |
| 10780 | | 0.25 | 0.23 | | 0.02 | 0.02 | | 0.00 | | + |
| 10781 | | 0.05 | 0.07 | | -0.02 | -0.01 | | 0.00 | | - |
| 10782 | | 0.07 | 0.02 | | 0.05 | 0.05 | | 0.00 | | + |
| 10787 | | 0.06 | 0.08 | | -0.02 | -0.02 | | 0.00 | | - |
| 10795 | | 0.02 | 0.05 | | -0.03 | -0.02 | | 0.00 | | - |
| 10796 | | 0.04 | 0.04 | | 0.00 | 0.01 | | 0.00 | | + |
| 11501 | | 0.06 | 0.06 | | 0.00 | 0.01 | | 0.00 | | - |
| RE11501 | | 0.06 | 0.06 | | 0.00 | 0.01 | | 0.00 | | - |
| 11506 | | 0.06 | 0.10 | | -0.04 | -0.03 | | 0.00 | | - |
| 11510 | | 0.28 | 0.29 | | -0.01 | 0.00 | | 0.00 | | - |
| | Total (Σ w) | 0.98 | 1.05 | $\Sigma W_{DIFF}$ = | -0.07 | 0.00 | SS = | 0.01 | M = | 3 |
| | Mean (μ) | 0.09 | 0.10 | $d_x$ = | -0.01 | | $S_D^2$ = | 0.00 | | |
| | n = | 11 | | d.o.f = | 10 | | | | | |

## TEST OF DIFFERENCES

| | | | | | | |
|---|---|---|---|---|---|---|
| $S_D$ = | 0.02 | t = | -0.958 | tα = 0.100 = | 1.812 | Accept Ho: |
| $S_d2$ = | 0.00 | | | tα = 0.050 = | 2.228 | Accept Ho: |
| $S_d$ = | 0.01 | | | tα = 0.025 = | 2.634 | Accept Ho: |

## SIGN TEST

| | | | | |
|---|---|---|---|---|
| α = p(0)+...+p(2)+p(4)+...+p(6) | RR = (0 ... 3, 8 ... 11) | α = | 0.161 | Reject Ho: |
| α = p(0)+...+p(1)+p(5)+...+p(6) | RR = (0 ... 2, 9 ... 11) | α = | 0.054 | Accept Ho: |
| α = p(0)+p(6) | RR = (0 ... 1, 10 ... 11) | α = | 0.011 | Accept Ho: |

## TEST OF CONFIDENCE INTERVALS

| | | | | | | |
|---|---|---|---|---|---|---|
| $(\Sigma W_{DIFF})^2$ = | 0.01 | $(\Sigma W_{DIFF})^2 / n$ = | 0.00 | SS = | 0.01 | |
| $s^2$ = SS/d.o.f = | 0.00 | $s = (s^2)^{½}$ = | 0.02 | $s / n^{½}$ = | 0.01 | |
| t(s/n½)α = 0.100 = | 0.013 | μL = -0.020 | μU = | 0.006 | | Accept Ho: |
| t(s/n½)α = 0.050 = | 0.016 | μL = -0.022 | μU = | 0.009 | | Accept Ho: |
| t(s/n½)α = 0.025 = | 0.019 | μL = -0.025 | μU = | 0.012 | | Accept Ho: |

# APPENDIX 6: CONTINUED

## $SrCO_3$ [CONTINENTAL - ACME]

| Sample | | $SrCO_3$ (ppm) CONT | ACME | | Test of Differences and Confidence Intervals DIFF (D) | DEV (d) | | SD ($d^2$) | | Sign Test Sign of DIFF |
|---|---|---|---|---|---|---|---|---|---|---|
| 10778 | | 171 | 136 | | 35 | -13 | | 176 | | + |
| 10780 | | 333 | 280 | | 53 | 6 | | 30 | | + |
| 10781 | | 383 | 320 | | 63 | 15 | | 227 | | + |
| 10782 | | 465 | 398 | | 67 | 20 | | 383 | | + |
| 10787 | | 376 | 318 | | 58 | 10 | | 95 | | + |
| 10795 | | 246 | 209 | | 37 | -11 | | 115 | | + |
| 10796 | | 488 | 416 | | 72 | 24 | | 577 | | + |
| 11501 | | 217 | 185 | | 32 | -16 | | 261 | | + |
| RE11501 | | 217 | 185 | | 32 | -16 | | 261 | | + |
| 11506 | | 287 | 246 | | 41 | -7 | | 46 | | + |
| 11510 | | 251 | 214 | | 37 | -11 | | 116 | | ± |
| | Total ($\Sigma$ w) | 3434.00 | 2908.14 | $\Sigma W_{DIFF}$ = | 526 | 0.00 | SS = | 2287.42 | M = | 11 |
| | Mean ($\mu$) | 312.18 | 264.38 | $d_x$ = | 47.81 | | $S_D^2$ = | 228.74 | | |
| | n = | 11 | | d.o.f = | 10 | | | | | |

### TEST OF DIFFERENCES

| | | | | | | |
|---|---|---|---|---|---|---|
| $S_D$ = | 15.12 | t = | 10.483 | $t\alpha$ = 0.100 = | 1.812 | Reject Ho: |
| $S_d2$ = | 20.79 | | | $t\alpha$ = 0.050 = | 2.228 | Reject Ho: |
| $S_d$ = | 4.56 | | | $t\alpha$ = 0.025 = | 2.634 | Reject Ho: |

### SIGN TEST

| | | | | |
|---|---|---|---|---|
| $\alpha$ = p(0)+...+p(2)+p(4)+...+p(6) | RR = (0 ... 3, 8 ... 11) | $\alpha$ = | 0.161 | Reject Ho: |
| $\alpha$ = p(0)+...+p(1)+p(5)+...+p(6) | RR = (0 ... 2, 9 ... 11) | $\alpha$ = | 0.054 | Reject Ho: |
| $\alpha$ = p(0)+p(6) | RR = (0 ... 1, 10 ... 11) | $\alpha$ = | 0.011 | Reject Ho: |

### TEST OF CONFIDENCE INTERVALS

| | | | | | | |
|---|---|---|---|---|---|---|
| $(\Sigma W_{DIFF})^2$ = | 276531 | $(\Sigma W_{DIFF})^2 / n$ = | 25139.22 | SS = | 2287.42 | |
| $s^2$ = SS/d.o.f = | 228.74 | $s = (s^2)^{½}$ = | 15.12 | $s / n^{½}$ = | 4.56 | |
| $t(s/n^{½})\alpha$ = 0.100 = | 8.265 | $\mu L$ = | 39.541 | $\mu U$ = | 56.071 | Reject Ho: |
| $t(s/n^{½})\alpha$ = 0.050 = | 10.161 | $\mu L$ = | 37.645 | $\mu U$ = | 57.966 | Reject Ho: |
| $t(s/n^{½})\alpha$ = 0.025 = | 12.010 | $\mu L$ = | 35.795 | $\mu U$ = | 59.816 | Reject Ho: |

## APPENDIX 6: CONTINUED

### BaO [CONTINENTAL - ACME]

| Sample | | BaO (ppm) CONT | ACME | | Test of Differences and Confidence Intervals DIFF (D) | DEV (d) | | SD ($d^2$) | | Sign Test Sign of DIFF |
|---|---|---|---|---|---|---|---|---|---|---|
| 10778 | | 27 | 39 | | -12 | 1 | | 1 | | - |
| 10780 | | 43 | 54 | | -11 | 3 | | 6 | | - |
| 10781 | | 119 | 131 | | -12 | 1 | | 2 | | - |
| 10782 | | 110 | 124 | | -14 | -1 | | 1 | | - |
| 10787 | | 112 | 130 | | -18 | -4 | | 19 | | - |
| 10795 | | 23 | 29 | | -6 | 7 | | 50 | | - |
| 10796 | | 110 | 125 | | -15 | -2 | | 4 | | - |
| 11501 | | 75 | 96 | | -21 | -8 | | 63 | | - |
| RE11501 | | 75 | 93 | | -18 | -5 | | 21 | | - |
| 11506 | | 33 | 44 | | -11 | 3 | | 7 | | - |
| 11510 | | 50 | 58 | | -8 | 5 | | 25 | | - |
| | Total ($\Sigma$ w) | 777.00 | 921.10 | $\Sigma W_{DIFF}$ = | -144 | 0.00 | SS = | 198.99 | M = | 0 |
| | Mean ($\mu$) | 70.64 | 83.74 | $d_x$ = | -13.10 | | $S_D^2$ = | 19.90 | | |
| | n = | 11 | | d.o.f = | 10 | | | | | |

**TEST OF DIFFERENCES**

| | | | | | | |
|---|---|---|---|---|---|---|
| $S_D$ = | 4.46 | t = | -9.740 | $t\alpha$ = 0.100 = | 1.812 | Reject Ho: |
| $S_{d2}$ = | 1.81 | | | $t\alpha$ = 0.050 = | 2.228 | Reject Ho: |
| $S_d$ = | 1.34 | | | $t\alpha$ = 0.025 = | 2.634 | Reject Ho: |

**SIGN TEST**

| | | | | |
|---|---|---|---|---|
| $\alpha$ = p(0)+...+p(2)+p(4)+...+p(6) | RR = (0 ... 3, 8 ... 11) | $\alpha$ = | 0.161 | Reject Ho: |
| $\alpha$ = p(0)+...+p(1)+p(5)+...+p(6) | RR = (0 ... 2, 9 ... 11) | $\alpha$ = | 0.054 | Reject Ho: |
| $\alpha$ = p(0)+p(6) | RR = (0 ... 1, 10 ... 11) | $\alpha$ = | 0.011 | Reject Ho: |

**TEST OF CONFIDENCE INTERVALS**

| | | | | | | |
|---|---|---|---|---|---|---|
| $(\Sigma W_{DIFF})^2$ = | 20766.03 | $(\Sigma W_{DIFF})^2 / n$ = | 1887.82 | SS = | 198.99 | |
| $s^2$ = SS/d.o.f = | 19.90 | $s = (s^2)^{1/2}$ = | 4.46 | $s / n^{1/2}$ = | 1.34 | |
| $t(s/n^{1/2})\alpha$ = 0.100 = | 2.438 | $\mu L$ = | -15.538 | $\mu U$ = | -10.663 | Reject Ho: |
| $t(s/n^{1/2})\alpha$ = 0.050 = | 2.997 | $\mu L$ = | -16.097 | $\mu U$ = | -10.104 | Reject Ho: |
| $t(s/n^{1/2})\alpha$ = 0.025 = | 3.542 | $\mu L$ = | -16.643 | $\mu U$ = | -9.558 | Reject Ho: |

# APPENDIX 6: CONTINUED

## LOI [CONTINENTAL - ACME]

| Sample | | LOI (%) CONT | ACME | | Test of Differences and Confidence Intervals DIFF (D) | DEV (d) | | SD ($d^2$) | | Sign Test Sign of DIFF |
|---|---|---|---|---|---|---|---|---|---|---|
| 10778 | | 43.61 | 43.70 | | -0.09 | -0.07 | | 0.01 | | - |
| 10780 | | 43.48 | 43.60 | | -0.12 | -0.10 | | 0.01 | | - |
| 10781 | | 43.53 | 43.60 | | -0.07 | -0.05 | | 0.00 | | - |
| 10782 | | 43.58 | 43.50 | | 0.08 | 0.10 | | 0.01 | | + |
| 10787 | | 43.54 | 43.60 | | -0.06 | -0.04 | | 0.00 | | - |
| 10795 | | 43.63 | 43.60 | | 0.03 | 0.05 | | 0.00 | | + |
| 10796 | | 43.75 | 43.80 | | -0.05 | -0.03 | | 0.00 | | - |
| 11501 | | 43.72 | 43.70 | | 0.02 | 0.04 | | 0.00 | | + |
| RE11501 | | 43.72 | 43.50 | | 0.22 | 0.24 | | 0.06 | | + |
| 11506 | | 43.63 | 43.70 | | -0.07 | -0.05 | | 0.00 | | - |
| 11510 | | 43.50 | 43.60 | | -0.10 | -0.08 | | 0.01 | | - |
| | Total (Σ w) | 479.69 | 479.90 | $\Sigma W_{DIFF}$ = | -0.21 | 0.00 | SS = | 0.10 | M = | 4 |
| | Mean (μ) | 43.61 | 43.63 | $d_x$ = | -0.02 | | $S_D^2$ = | 0.01 | | |
| | n = | 11 | | d.o.f = | 10 | | | | | |

### TEST OF DIFFERENCES

| | | | | | | |
|---|---|---|---|---|---|---|
| $S_D$ = | 0.10 | t = | -0.632 | tα = 0.100 = | 1.812 | Accept Ho: |
| $S_{d}2$ = | 0.00 | | | tα = 0.050 = | 2.228 | Accept Ho: |
| $S_d$ = | 0.03 | | | tα = 0.025 = | 2.634 | Accept Ho: |

### SIGN TEST

| | | | | |
|---|---|---|---|---|
| α = p(0)+...+p(2)+p(4)+...+p(6) | RR = (0 ... 3, 8 ... 11) | α = | 0.161 | Accept Ho: |
| α = p(0)+...+p(1)+p(5)+...+p(6) | RR = (0 ... 2, 9 ... 11) | α = | 0.054 | Accept Ho: |
| α = p(0)+p(6) | RR = (0 ... 1, 10 ... 11) | α = | 0.011 | Accept Ho: |

### TEST OF CONFIDENCE INTERVALS

| | | | | | |
|---|---|---|---|---|---|
| $(\Sigma W_{DIFF})^2$ = | 0.04 | $(\Sigma W_{DIFF})^2 / n$ = | 0.00 | SS = | 0.10 |
| $s^2$ = SS/d.o.f = | 0.01 | $s = (s^2)^{1/2}$ = | 0.10 | $s / n^{1/2}$ = | 0.03 |

| | | | | | | |
|---|---|---|---|---|---|---|
| $t(s/n^{1/2})\alpha$ = 0.100 = | 0.055 | μL = | -0.074 | μU = | 0.036 | Accept Ho: |
| $t(s/n^{1/2})\alpha$ = 0.050 = | 0.067 | μL = | -0.086 | μU = | 0.048 | Accept Ho: |
| $t(s/n^{1/2})\alpha$ = 0.025 = | 0.080 | μL = | -0.099 | μU = | 0.061 | Accept Ho: |

# APPENDIX 6: CONTINUED

## Adjusted Acme LOI [CONTINENTAL - ACME]

| Sample | | Adjusted Acme LOI (%) | | | Test of Differences and Confidence Intervals | | | | | Sign Test |
|---|---|---|---|---|---|---|---|---|---|---|
| | | CONT | ACME | | DIFF (D) | DEV (d) | | SD ($d^2$) | | Sign of DIFF |
| 10778 | | 43.61 | 43.95 | | -0.34 | -0.09 | | 0.01 | | - |
| 10780 | | 43.48 | 43.74 | | -0.26 | -0.01 | | 0.00 | | - |
| 10781 | | 43.53 | 43.90 | | -0.37 | -0.12 | | 0.01 | | - |
| 10782 | | 43.58 | 43.94 | | -0.36 | -0.11 | | 0.01 | | - |
| 10787 | | 43.54 | 43.90 | | -0.36 | -0.11 | | 0.01 | | - |
| 10795 | | 43.63 | 43.90 | | -0.27 | -0.02 | | 0.00 | | - |
| 10796 | | 43.75 | 43.80 | | -0.05 | 0.20 | | 0.04 | | - |
| 11501 | | 43.72 | 43.70 | | 0.02 | 0.27 | | 0.07 | | + |
| RE11501 | | 43.72 | 43.95 | | -0.23 | 0.02 | | 0.00 | | - |
| 11506 | | 43.63 | 43.92 | | -0.29 | -0.04 | | 0.00 | | - |
| 11510 | | 43.50 | 43.73 | | -0.23 | 0.02 | | 0.00 | | - |
| | Total (Σ w) | 479.69 | 482.40 | $\Sigma W_{DIFF}$ = | -2.71 | 0.00 | SS = | 0.16 | M = | 1 |
| | Mean (μ) | 43.61 | 43.85 | $d_x$ = | -0.25 | | $S_D^2$ = | 0.02 | | |
| | n = | 11 | | d.o.f = | 10 | | | | | |

## TEST OF DIFFERENCES

| | | | | | | |
|---|---|---|---|---|---|---|
| $S_D$ = | 0.13 | t = | -6.478 | tα = 0.100 = | 1.812 | Reject Ho: |
| $S_{d2}$ = | 0.00 | | | tα = 0.050 = | 2.228 | Reject Ho: |
| $S_d$ = | 0.04 | | | tα = 0.025 = | 2.634 | Reject Ho: |

## SIGN TEST

| | | | | |
|---|---|---|---|---|
| α = p(0)+...+p(2)+p(4)+...+p(6) | RR = (0 ... 3, 8 ... 11) | α = | 0.161 | Reject Ho: |
| α = p(0)+...+p(1)+p(5)+...+p(6) | RR = (0 ... 2, 9 ... 11) | α = | 0.054 | Reject Ho: |
| α = p(0)+p(6) | RR = (0 ... 1, 10 ... 11) | α = | 0.011 | Reject Ho: |

## TEST OF CONFIDENCE INTERVALS

| | | | | | | |
|---|---|---|---|---|---|---|
| $(\Sigma W_{DIFF})^2$ = | 7.36 | $(\Sigma W_{DIFF})^2 / n$ = | 0.67 | SS = | 0.16 | |
| $s^2$ = SS/d.o.f = | 0.02 | $s = (s^2)^{½}$ = | 0.13 | $s / n^{½}$ = | 0.04 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| t(s/n½)α = 0.100 = | 0.069 | μL = | -0.316 | μU = | -0.178 | Reject Ho: |
| t(s/n½)α = 0.050 = | 0.085 | μL = | -0.331 | μU = | -0.162 | Reject Ho: |
| t(s/n½)α = 0.025 = | 0.100 | μL = | -0.347 | μU = | -0.146 | Reject Ho: |

# APPENDIX 7: ITEMIZED COST STATEMENT

| | | | | | | |
|---|---|---|---|---|---|---|
| a) | **Personnel** | | | | | |
| | Troy Bilon, geological assistant | | | | | |
| | 15 days | field work from June 17 to July 1, 1996 | | | | |
| | 29 days | compiling field data | | | | |
| | 44 days | @ | $220.00 | $9,680.00 | | |
| | J.R. Dahrouge, geologist | | | | | |
| | 9 days | field work between June 17 to 25, 1996 | | | | |
| | 11 days | preparing report | | | | |
| | 20 days | @ | $405.00 | $8,100.00 | | |
| | L. B. Halferdahl, geological engineer | | | | | |
| | 14 days | field work between May 24 and August 9, 1996 | | | | |
| | 16½ days | preparing for field work and arranging for physical work | | | | |
| | 10 days | supervising and preparing report | | | | |
| | 40.5 days | @ | $590.00 | $23,895.00 | | |
| | W. McGuire, field assistant, draftsman | | | | | |
| | 120 hours | field work from June 17 to July 1, 1996 | | | | |
| | 158 hours | drafting and graphics | | | | |
| | 278 hours | @ | $34.25 | $9,521.50 | | |
| | | | | | | $51,196.50 |
| b) | **Food and Accommodation** | | | | | |
| | 53 man-days | in motel and restaurants @ $56.16 | | $2,976.48 | | |
| | | | | | | $2,976.48 |
| c) | **Transportation** | | | | | |
| | Airfares: | 4½ trips Edmonton-Kamloops return | | | $1,599.47 | |
| | Vehicles: | rental of 4x4 and gas for 5 days | | $510.41 | | |
| | | rental of car and gas for 8 days | | $381.65 | | |
| | | 4x4 pickup truck 2352 km @ 35¢ | | $880.82 | | |
| | | | | | $1,772.88 | |
| | Express on field supplies | | | | $30.10 | |
| | Freight on samples | | | | $38.00 | |
| | | | | | | $3,440.45 |
| d) | **Instrument Rental** | | | | | |
| | 2 Garmin Survey II instruments for 2 weeks @ $177.62 | | | | $710.48 | |
| | Magnetometer | | | | $100.00 | |
| | | | | | | $810.48 |
| e) | **Not Applicable** | | | | | |
| f) | **Analyses** | | | | | |
| | 35 | samples crushed, pulverized, and analyzed for 13 constituents by ICP | | | | |
| | | 35 samples @ | $12.50 | $437.50 | | |
| | 10 | samples (checks) analyzed for 18 constituents by ICP | | | | |
| | | 10 samples @ | $14.23 | $142.31 | | |
| | | | | | | $579.81 |
| g) | **Report Preparation** | | | | | |
| | | typing, reproduction, assembly | | | | $468.00 |

# APPENDIX 7: CONTINUED

h) **Other**

| | | | |
|---|---|---|---|
| | Field Supplies | $250.48 | |
| | Maps | $56.36 | |
| | Long Distance Telephone | $305.06 | |
| | Courier | $87.63 | |
| | Physical Work: cutting logs, trail construction, improvements to Porcupine Creek road, reclamation | $53,048.63 | |
| | | | $53,748.16 |
| **Total:** | | | $113,219.88 |

## APPENDIX 8: QUALIFICATIONS

J.R. Dahrouge obtained degrees in geology and computing science from the University of Alberta, Edmonton in 1988 and 1994, respectively. He has six years of experience in mining exploration. He is registered as P. Geol. in the Association of Professional Engineers, Geologists, and Geophysicists of Alberta.

The work described in the report was under the supervision of L.B. Halferdahl, who obtained degrees in geological engineering and geology from Queen's University, Kingston, Ontario, and The Johns Hopkins University, Baltimore, Maryland. He has more than 35 years experience as a practising engineer and geologist in research and mining exploration, including consulting since 1969. He is a member of the Canadian Institute of Mining and Metallurgy, and is registered as P. Eng. and P. Geol. in the Association of Professional Engineers, Geologists, and Geophysicists of Alberta, and registered as P. Eng. in the Association of Professional Engineers and Geoscientists of British Columbia.


GEOLOGICAL SURVEY BRANCH
ASSESSMENT REPORT

24,715

| WM | 1996.09 | | | | |
|---|---|---|---|---|---|
| BY | DATE | BY | DATE | BY | DATE |

REVISIONS

## SYMBOLS

- Geological boundary (approximate, assumed)
- Fault (approximate, assumed)
- Bedding (horizontal, inclined, vertical)
- Schistosity, cleavage, foliation (inclined, vertical)
- Planar feature / joint (inclined, vertical)
- Synclinal axis (arrow indicates plunge)
- Anticlinal axis (arrow indicates plunge)
- Rock-chip sample with sample/section number
- Claim post (2 post, 4 post)
- Claim line
- Main road
- Access road, trail
- Diamond drillhole
- Power line
- Boundary of treed area

## LEGEND

Upper Permian
Cache Creek Group
Marble Canyon Formation

| | |
|---|---|
| C6 | Middle Carbonate |
| N5 | Argillite, siltstone, conglomerate, schist |
| C4 | Lower Carbonate |
| N3 | Schist (sch), tuff and agglomerate (v), limestone and argillite (s), greenstone (g) |

NOTES:
1. Base map prepared photogrammetrically from 1:20 000 aerial photos taken in 1980.
2. Geology modified after Trettin (1980).
3. Contour interval is 2m / 5m.

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## Fig. 2.1 Geology and Samples, South Porcupine Ridge SE.

KELLY LAKE AREA, B. C.

0 100 200 m
Scale: 1: 2000

LBH 1993.12

MAP 1


## LEGEND

Upper Permian
Cache Creek Group
Marble Canyon Formation

| | |
|---|---|
| C8 | Upper Carbonate |
| N7 | Argillite, siltstone, conglomerate, schist (sch) |
| C6 | Middle Carbonate |
| N5 | Argillite, siltstone, conglomerate, schist (sch) |
| C4 | Lower Carbonate |
| N3 | Schist (sch), tuff and agglomerate (v), limestone and argillite (s), greenstone (g) |

## SYMBOLS

- Geological boundary (approximate, assumed)
- Fault (approximate, assumed)
- Bedding (horizontal, inclined, vertical)
- Schistosity, cleavage, foliation (inclined, vertical)
- Planar feature / joint (inclined, vertical)
- Synclinal axis (arrow indicates plunge)
- Anticlinal axis (arrow indicates plunge)
- Rock-chip sample with sample/section number
- Claim post (2 post, 4 post)
- Claim line
- Main road
- Access road, trail
- Diamond drillhole
- Power line
- Boundary of treed area

NOTES:

1. Base map prepared photogrammetrically from 1:20 000 aerial photos taken in 1980.
2. Geology modified after Trettin (1980).
3. Contour interval is 2m / 5m.

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| WM | 1996.12 | | | | |
|---|---|---|---|---|---|
| BY | DATE | BY | DATE | BY | DATE |

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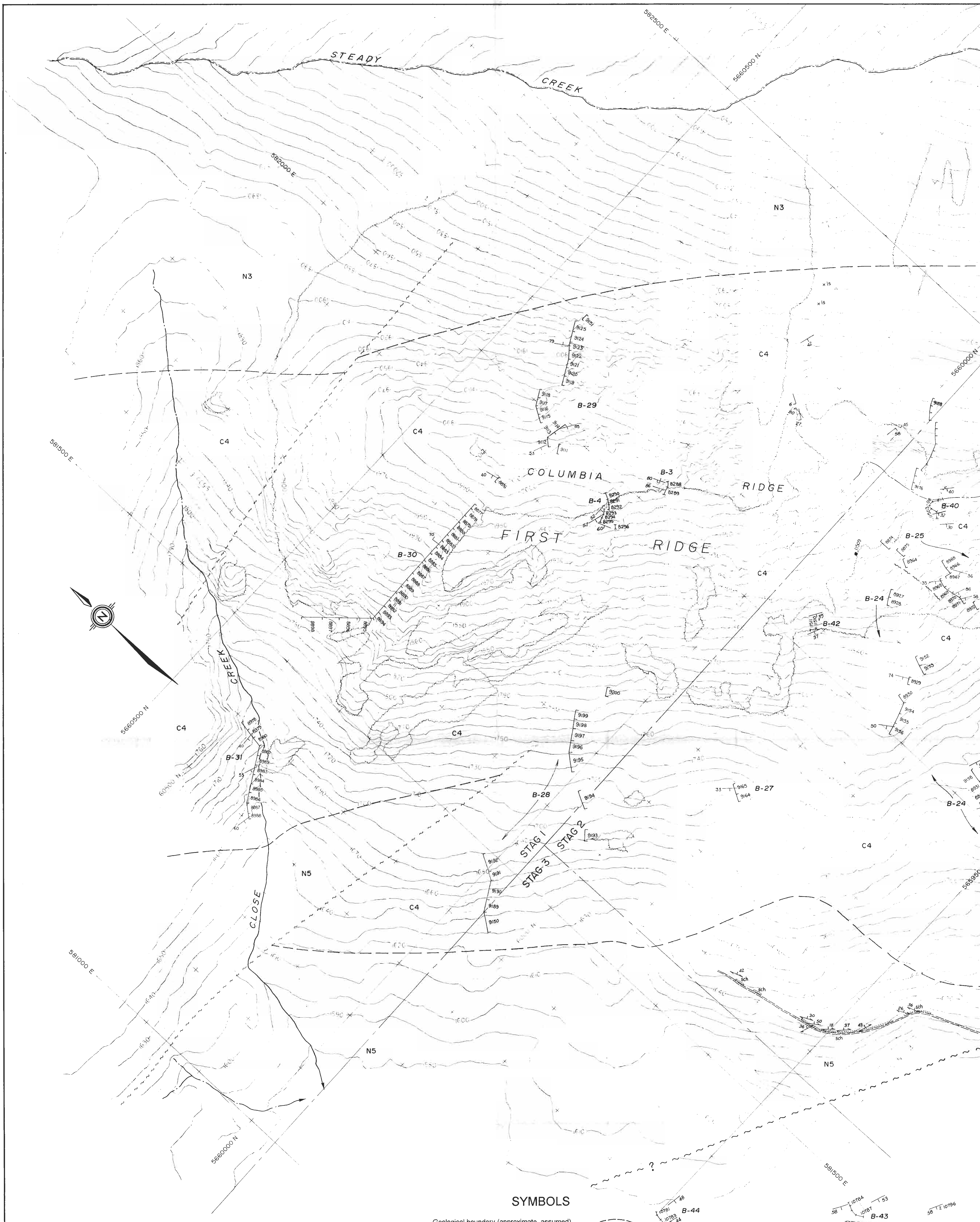
Fig. 2.2 Geology and Samples,
Columbia Lime Ridge SE.

KELLY LAKE AREA, B. C.

0 100 200 m
Scale: 1:2000

LBH 1993.12

MAP 3




## LEGEND

Upper Permian
Cache Creek Group
Marble Canyon Formation

| | |
|---|---|
| C6 | Middle Carbonate |
| N5 | Argillite, siltstone, conglomerate, schist |
| C4 | Lower Carbonate |
| N3 | Schist (sch), tuff and agglomerate (v), limestone and argillite (s), greenstone (g) |

## SYMBOLS

Geological boundary (approximate, assumed) .........
Fault (approximate, assumed) ........
Bedding (horizontal, inclined, vertical) ........
Schistosity, cleavage, foliation (inclined, vertical) .....
Planar feature / joint (inclined, vertical) ........
Synclinal axis (arrow indicates plunge) ........
Anticlinal axis (arrow indicates plunge) ........
Rock-chip sample with sample/section number ....... 8925 - 8928 B-25 • 8517
Claim post (2 post, 4 post) ........
Claim line ........
Main road ........
Access road, trail ........
Diamond drillhole ........
Power line ........
Boundary of treed area ........

NOTES:

1. Base map prepared photogrammetrically from 1:20 000 aerial photos taken in 1980.
2. Geology modified after Trettin (1980).
3. Contour interval is 2m / 5m.

MAP 4

GEOLOGICAL SURVEY BRANCH
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| | | | | | |
|---|---|---|---|---|---|
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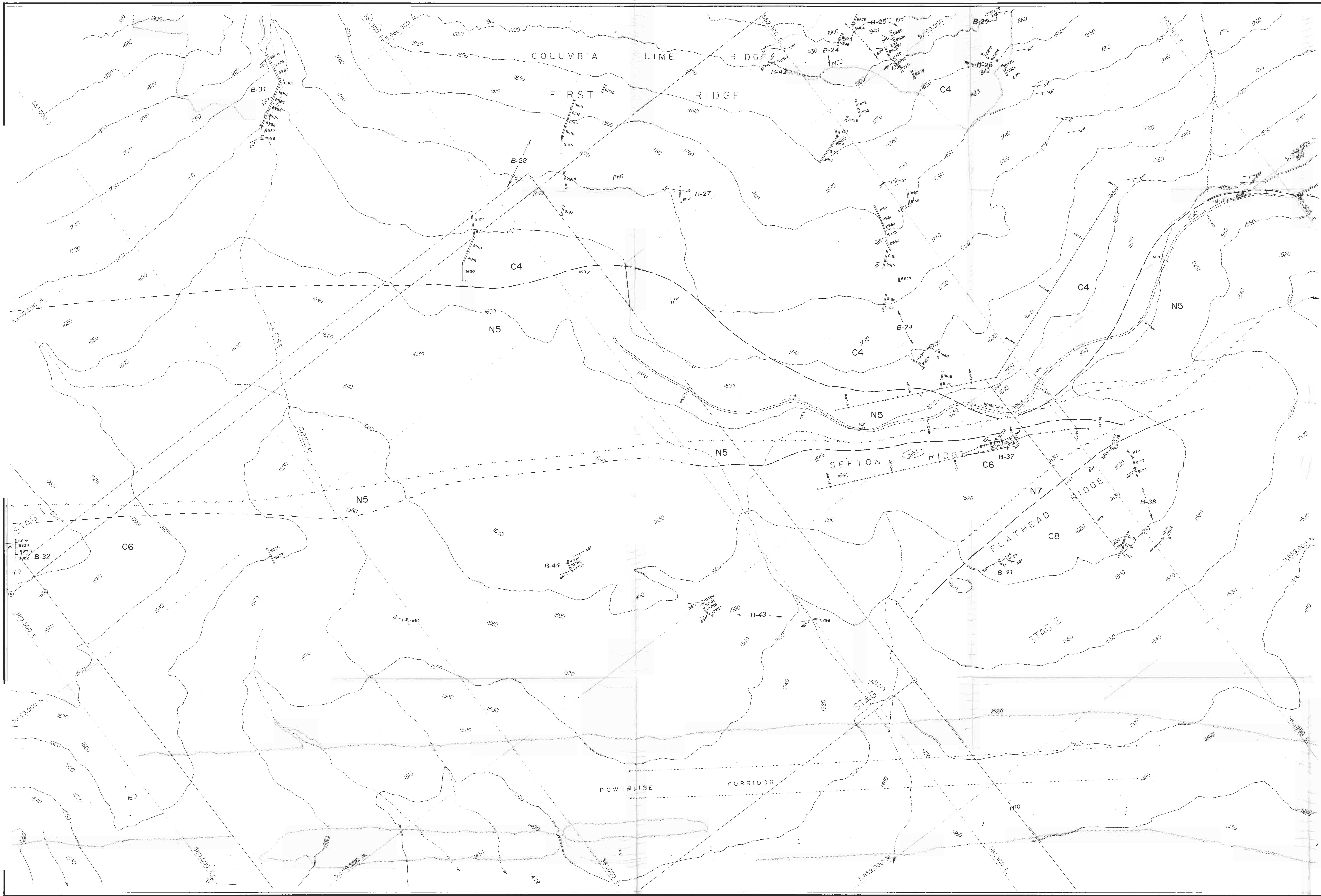
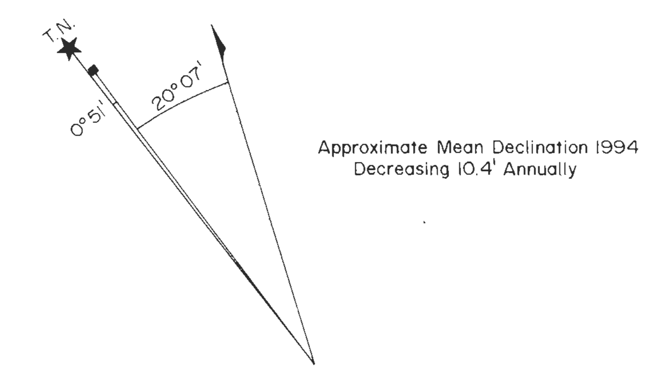
Fig. 2.3 Geology and Samples, Columbia Lime Ridge NW.

KELLY LAKE AREA, B. C.

0 100 200 m
Scale: 1:2000

LBH 1993.12




## LEGEND

Upper Permian
Cache Creek Group
Marble Canyon Formation

| | |
|---|---|
| C8 | Upper Carbonate |
| N7 | Argillite, siltstone, conglomerate, schist (sch) |
| C6 | Middle Carbonate |
| N5 | Argillite, siltstone, conglomerate, schist (sch) |
| C4 | Lower Carbonate |
| N3 | Schist (sch), tuff and agglomerate (v), limestone and argillite (s), greenstone (g) |

## SYMBOLS

- Geological boundary (defined, approximate)
- Fault (defined, approximate, assumed)
- Bedding
- Schistosity
- Joint or planar feature
- Area of outcrop, isolated outcrop
- Rock chip sample location with number
- Legal corner post
- Claim location line
- Access road
- Diamond drillhole with number (dip)
- Power line
- Boundary of treed area
- Surveyed picket line

NOTES:

1. Base map prepared photogrammetrically from 1:20 000 aerial photos taken in 1980.
2. UTM grid is NAD 83.
3. Contour interval is 5 m.
4. Geology modified after Trettin (1980).
5. Contours are based on Digital Elevation Model data from Terrain Resource Information Management Map 92P.001 and do not match those of Fig. 2.2 and 2.3.



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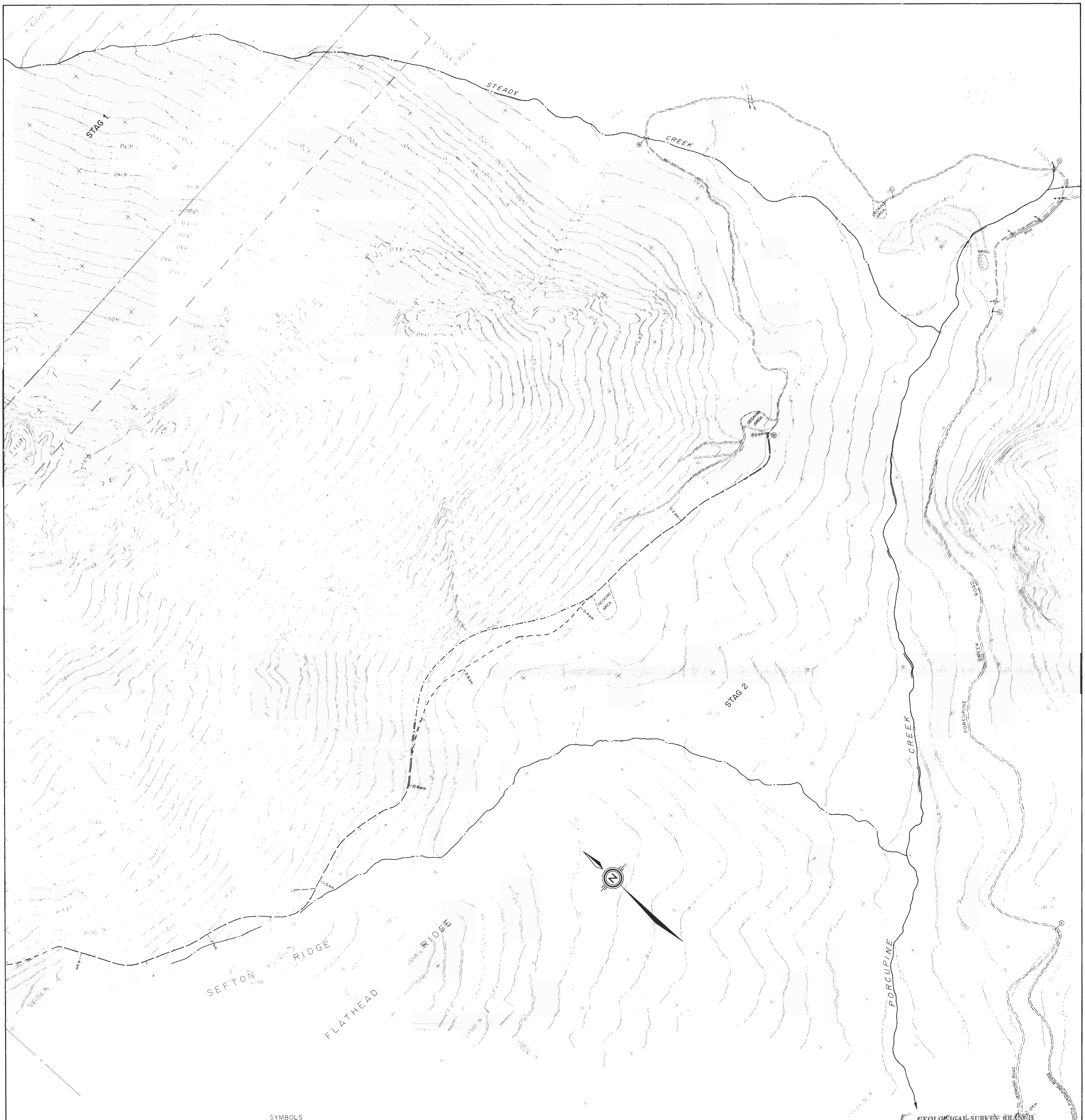
| BY | DATE |

Fig. 2.4 Geology and Samples, Map 5

KELLY LAKE AREA, BRITISH COLUMBIA

0 100 200 m
Scale: 1 : 2000

WM 1996.11




SYMBOLS

| | |
|---|---|
| Existing road | |
| Drill access and proposed haul road (8%) | |
| Proposed haul road (8%) | |
| Drill access road (up to 18%) | |
| Diamond drillhole | |
| Claim boundary | |
| Culvert drainage | |
| Reference point | |



| BY | DATE | BY | DATE | BY | DATE |
|---|---|---|---|---|---|
| WM | 1996.09 | | | | |

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Fig. 4.1 Access Trails to Proposed Drillsites, Columbia Lime Ridge SE.

KELLY LAKE AREA, B.C.

0 100 200 m
Scale: 1:2000

LBH 1994.09

MAP 3


SYMBOLS

Drill access and proposed haul road (8%)
Drill access road (up to 18%)
Diamond drillhole
Claim boundary

GEOLOGICAL SURVEY BRANCH
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24,715

| WM | 1996.09 | | | | |
|---|---|---|---|---|---|
| BY | DATE | BY | DATE | BY | DATE |

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Fig. 4.2 Access Trail to Proposed Drillsites, Columbia Lime Ridge NW.

KELLY LAKE AREA, B.C.

0 100 200 m
Scale: 1:2000

LBH 1994.09

MAP 4