FORMATION WATER RESISTIVITIES OF CANADA

Canadian R_w Maps

for

Western Canadian Sedimentary Basin
Arctic Islands/Yukon Territory/MacKenzie District
East Coast Offshore

Published 1987
First Printing - 2500 Copies

Editor
C. J. Struyk, P.Eng.

Foreword

The Canadian Well Logging Society's Third Edition of the Formation Water Resistivities of Canada Catalogue has been a long time in preparation. The initial groundwork started back in late 1983 when the CWLS Executive determined that an update of the 1978 Edition of Rw Catalogue was necessary due to the tremendous amount of new drilling taking place in Canada. The initial committee struggled through some very unproductive meetings and almost perished due to lack of commitment and interest caused by economic turmoil in the oil industry.

Two individuals were co-erced into continuing the project, namely, Case Struyk and myself Through some productive lunch hour meetings, we decided that the data manipulation must be done by computer processing. We talked to Clark Smith of International Petrodata, who was interested in assisting the society by providing the water resistivity values in computer sensitive form after doing a preliminary data sort. Case Struyk then used the computer and drafting facilities of Gulf Canada Corporation to do final sorting, plotting and mapping. This new edition of the Rw catalogue is a great improvement over the last edition due to the vast amount of Rw data available.

The CWLS Executive greatly appreciates the contributions of International Petrodata for the Rw data; Gulf Canada Corporation firstly for the use of their computer and drafting services, and secondly, for the countless hours of work performed by Case Struyk on company hours, as Rw Catalogue Editor; and, to Canadian Occidental Petroleum Ltd. for my time spent on the project as Publications Chairman. Additional thanks go out to the many people who assisted in checking and verifying the data. My deepest appreciation goes out to Case Struyk who perservered over the last three years to ensure that this edition of the Rw Catalogue was completed. Case, a big thank-you from the CWLS Executive and the users of the Rw Catalogue.

This Rw Catalogue is published as a reference volume for all people engaged in log interpretation. Any comments should be directed to the current Publication Chairman in care of the CWLS office

September, 1987

Dave Ormon
CWLS Publication Chairman

PREFACE

The idea for a formation water resistivity catalogue began in 1964(?) when Schlumberger of Canada published the first Rw Catalogue for their field engineers. Prior to that, most major oil companies each had their own collections of Rw data. The 1964 edition was so popular that it was expanded and revised in 1966. In 1971, the C.W.L.S. published their first formation water resistivity catalogue based on Schlumberger's previous works. This was followed by an update in 1978.

This 1987 edition has taken almost three years to complete and contains significantly more information than the previous editions. This book was written to assist log analysts by providing reliably edited Rw values to improve the accuracy of water saturation calculations.

Since the 1978 edition, the total number of wells drilled in Canada has increased by 80% to 190,000 wells. A substantial increase in new water analyses is therefore available for the 1987 edition. Over 81,000 water analysis values were available for this catalogue and consequently, computers were used wherever possible in the sorting of this information.

International Petrodata Ltd. has made available to the Canadian Well Logging Society a computer data base of water analyses covering all of Canada. This data base consists of analysis of waters recovered from drill stem tests. Analyses of production waters were not available in computer sensitive form and therefore were not used in the catalogue.

The initial sorting process eliminated all water analyses with pH values lower than 6.0 and higher than 8.4 which should eliminate most waters contaminated by acid and by mud filtrate. The presence of CO_3 ions are normally associated with mud filtrate contamination and therefore all values containing CO_3 ions were eliminated. Values representing more than one major formation water were also eliminated. Measured resistivity values were used in preference to calculated values. This initial sorting decreased the data from over 81,000 to about 40,000 analyses.

At this point the data was transferred to the computers at Gulf Canada Resources for further filtering, computer contouring and mapping.

This catalogue was designed to be similar in size to the 1971 and 1978 editions. The maps of Western Canada are presented on a 1:5,000,000 scale which is the same scale as that used in the text "Geological History of Western Canada" published by the Canadian Society of Petroleum Geologists. The size of the final Rw map (8.5" x 11") limited the amount of data that could legibly be put on a map to one resistivity value per four townships. In each of these four township squares the minimum resistivity value was chosen because most mud systems tend to have a higher resistivity than formation water. This assumption worked well in most areas but could not be used in southeast Alberta and various shallow formations such as the Belly River and Cardium. In those areas sorting had to be done manually by checking the amount of water recovered and by comparing the results to logs.

The data at this point reached a more manageable level of about 9,000 values in total. The data was then computer plotted and contoured by formation on a 1:2,500,000 scale. The contoured maps assisted in pointing out anomalous data by creating "bull's eyes". These points were either verified by log calculation or eliminated outright. Overlapping values were also eliminated. The remaining values were then recontoured and rechecked numerous times until satisfactory results were obtained. The final checking was done by log analysts who were most familiar with the specific formation or particular area. As in previous editions the maps are presented such that the decimal point indicates the location of the Rw value.

For the first time, Rw maps have also been included for the East Coast, Arctic islands and the Yukon/Mackenzie area. Not many values are available in these areas even with contributions from various oil companies. Several of the maps contain no values at all but are included to provide the user with base maps for future entries.

Although every attempt was made to eliminate erroneous Rw values, some have probably been included on the maps. The user is therefore cautioned to use this catalogue as a guide only. No guarantee can be made as to the accuracy of the values presented, or to the correctness of the geological correlations suggested.

ACKNOWLEDGEMENTS

The Canadian Well Logging Society is most grateful for the generous contributions of the following organizations which made it possible to produce this edition of the formation water resistivity catalogue.

International Petrodata Ltd. –
who supplied all of the water resistivity values in computer sensitive form.

Gulf Canada Resources Ltd. –
who supplied the programming and computer time, all of the drafting and permitted me to spend innumerable work hours to construct this catalogue.

The following persons assisted in the production of this catalogue. These people checked water resistivity data, supplied knowledge in the field of geology and water analysis, did computer programming and drafting, and made many helpful suggestions.

Richard Bishop	BPB Intruments (Canada) Ltd.
Tim Blair	Gulf Canada Resources Ltd.
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Terry Buchanan	Esso Resources Canada Ltd.
Ed Cdding	GEOTECHnical Resources Ltd.
Ted Connolly	etcetera consulting ltd.
Doug Clenchy	Husky Oil Operations Ltd.
John Ellis	McDaniel Engineering Services
Jim Hamilton	Dome Petroleum Ltd.
Nancy Harland	PanCanadian Petroleum Ltd.
Bob Hausegger	Gulf Canada Resources Ltd.
. Bill Macijuk	Dome Petroleum Ltd.
Bill MacLeod	Petro-Canada Inc.
Richard Massing	Unocal Canada Ltd.
Sylvia Mathieson	Gulf Canada Resources Ltd.
Paul Murray	Computalog Gearhart Ltd.
Geraldine Nissen	Gulf Canada Resources Ltd.
-Dave Ormon	Canadian Occidental Petroleum Ltd.
Clayton Phair	Husky Oil Operations Ltd.
Joe Spalding	Dome Petroleum Ltd.
Jim Stewart	PanCanadian Petroleum Ltd.
Davis Swan	Gulf Canada Resources Ltd.
Chris Taggart	Unocal Canada Ltd.
Don Twaddle	Consultant
Vic Wiebe	Canterra Energy Ltd.
Keith Williams	Geological Survey of Canada

Special thanks are due to Ted Connolly and Dave Ormon for their continuous assistance and many helpful suggestions; also an extra special thanks to Sylvia Mathieson for her excellent drafting of the figures and maps.

September, 1987
Calgary, Alberta

C.J. Struyk
Editor

“THE Rw CATALOGUE" — HOW GOOD IS THE DATA?

by Connolly etcetera consulting Ltd.

An article in the December, 1984, CWLS Journal, Vol 13, No. 1, by Codding and Connolly, refers to the utilization of chemical analysis as an aid to exploration and production. The conclusion of this paper states: “it is only through the routine and consistent application of detailed chemical and physical analysis that trends can be established against which the composition of individual samples can be judged.”

Traditionally, the CWLS Rw catalogue has been used as a source of water resistivity (Rw) information for the analysis of wireline well logs. Rw, of course, is a critical parameter in the standard "Archie" equation. For clean sands:

F = Ro/Rw

and:

F = a/PHI**m where a = 1, and m = 2

The following brief discussion is included to remind users that there are more varied and accessable data in a chemical water analysis than a simple value of “Rw”. The “Rw” values in this catalogue are the end product of a thorough study by many individuals in the industry.

In the filtering process, the chemical analyses are passed through certain filters, which are traditional “industry standards”. These would include the following:

a) the exclusion of all samples containing carbonate (CO3)

b) all samples outside of the pH range 6 to 8.4, and

c) samples that have various elements missing in the analysis.

Figure 1 is from another Canadian Well Logging Society paper by Connolly and Fedenchuk presented in 1985 to the CWLS 10th Formation Evaluation Symposium. This diagram takes water analysis composition data from Collins* excellent text on the geochemistry of oilfield waters and plots one complete analysis for each of the geological ages. These are shown in the location column by the initials “T” for Triassic, “C” for Cretaceous, “J” for Jurassic, and so on. These are the results of hundreds of analyses judged by Collins to be the typical average analysis for each of these ages as found in his studies in the United States. The vertical columns represent the mg/l of sodium, potassium, calcium, magnesium, chloride, bicarbonate, sulfate, and carbonate. Each column is scaled logarithmically. In the bicarbonate column, for example, the scale is one, ten, one hundred.

Note that the potassium column, (K) indicates a low potassium content above the Mississippian, (M), and a high potassium content from there down to the Cambrian, (C). In the carbonate column, CO3 there are six zones that show values varying from 25 mg/l up to 150 mg/l On the side of this column, however, note that in the Tertiary, (T), out of 380 analysis only 8 show presence of carbonate, the average value being 75 mg/l. Cretaceous and Jurassic, (J), waters had no carbonate at all. In Pennsylvanian, (Pe), only 1 of 54 samples contained carbonate; the Permian, (Pn), 2 out of 950 samples in the Mississippian, (M), 1 out of 210 in the Devonian, (D), 2 out of 85; and in the Ordovician, (0), 26 out of 809. Sea Water, (S.W.), at the bottom of the diagram shows no carbonate. This study verified the fact that carbonate is not a normal composition of subsurface waters and, therefore, is used as one of the filtering criteria.

Figure 2 shows another water analysis composition plot for the Viking Formation in which 12 water analyses were taken. Mud samples were also taken during the drilling of the formations above the Viking zone. Samples 1 through 5 represent drilling and circulating samples prior to coring. Samples 6 through 17 represent the 12 samples taken from the 800 meters of water recovered on the drill stem test.

This water analysis composition plot dramatically illustrates the differences between the salinities and resistivities of drilling fluids and formation waters. Note also that nitrate, (NO3), used as a tracer, is present in the third column from the right. The mud filtrate resistivity, (Rm), sample, measured in the field is identical to the measured fluid sample measured by a chemical laboratory. Boron, (B), another formation fluid indicator, is presented on the column on the far right hand side. One can see that samples 8 through 17 on the diagram indicate a full recovery of formation water. Any one of those samples; for example, sample 13 marked with an "*", would represent an excellent value for the Viking water at this location. Note the filtrate contamination present in the upper samples 5 through 7. Note also the contamination of sample 17, which is from the bottom hole sampler. Contrary to popular belief, this is not uncommon in bottom-hole samples. Any Rw value to be used in log analysis must be an accurate representation of the formation water and not be contaminated by the presence of mud filtrates.

Figure 3 illustrates frequency distributions used to identify parameters for true formation waters. This example is from the Belly River and indicates a bimodal “Rw” response that is reflected in measurements of all cations shown in this example. This suggests that for the Belly River we probably should have two maps, one for the Upper Belly River and one for the Basal Belly River. This catalogue does not break the Belly River into two units. One must therefore remember to refer to the depth of the sample taken at any particular map location and identify whether it is from the Upper or the Basal Belly River.

The next two diagrams, Figures 4 and 5, show the use of element ratios as discriminators of water quality. Plots of chloride to sodium ratio (CLNA) versus sodium to potassium ratio, (NAK), are used to point out that a narrow range of CLNA may have, within it, a large numerical spread of Rw’s. CLNA by itself is not a good single discriminator for identifying formation waters.

Figure 5 shows a series of filtered plots of the ratio of CLNA versus NAK as a discriminator for the Belly River Formation. Figure 4 is an enlarged portion of Figure 5 (24E) on which are marked the pH values of samples and the origin of the sample by symbol in the legend. From this, one can see that the influence of KCL muds and acid waters can have a serious effect on the reliability of the chemical analysis. The data with NAK values less than 1.0 all represent either KCL muds, which would have reversed SP's or acid swab samples with low pH values in the 3.9 to 5.9 range.

Water samples having values of CLNA less than 1.0 all have high carbonates and represent contaminated water and mud recoveries. It is this method of filtering, using all available samples, that should be done, by formation, to give representative formation water samples. Such massive filtering of water samples, however, is beyond the resources and time available for assembling this water resistivity catalogue.

The next diagram, Figure 6, represents a “triple ratio” comparison for several formations in Alberta. In this diagram the element ratio’s of sodium-potassium, calcium-magnesium and chloride-sodium are plotted on a histogram of percent occurance. The first formation, the Beaverhill Lake, has values of 50.4 for NAK, 9.08 for CAMG, and 2.07 for CLNA. The pH of the Beaverhill Lake varies between 5.8 and 6.6. The Gilwood “triple ratio” on the other hand, reads 36.3, 7.08, and 2.15 respectively for the same three ratios. The Gilwood pH's are more acidic ranging from 5.4 to 6.2. A Belly River CLNA distribution is also shown on this diagram by the dashed outline with a CLNA ratio of 1.1 to 1.9 and a pH of 6.5 to 8.

Also shown are data from the Nisku Formation in Southern Alberta. Here, two distinct groupings are seen. CNL ratios are 1.4 to 2.0 for the upper unit and 0.25 to 1.12 for the lower unit. These two CNLA ratios represent a change in the Sulin classification from one to four. Both ratios are oilfiled common, yet one is a magnesium-chloride water and the other, a sodium-bicarbonate water.

All of the figures presented are examples of how chemical analysis may be utilized as an aid in the exploration process. Not enough Formation Evaluationists or Log Analysts today make thorough use of all information available from chemical water analyses. Perhaps this is because not enough companies are aware of the usefulness of chemical water analyses. Explorationists must become more familiar with information available from properly sampled formation waters and the use of expanded routine chemical analyses. As a result of these newer techniques, future data bases will contain a high volume of valid resistivity and salinity data. Future “Rw” catalogues would then benefit from these more sophisticated filtering techniques.

Fig. 7 shows two examples of STIFF STAR diagrams as used to fingerprint formation waters. Have you tried it? Go ahead – you’ll like it! It’s contagious!

*Collins, A.G. Geochemistry of Oilfield Waters, Elsevier Scientific Publishing Company, New York, 1975.

WATLOG PROGRAM 8

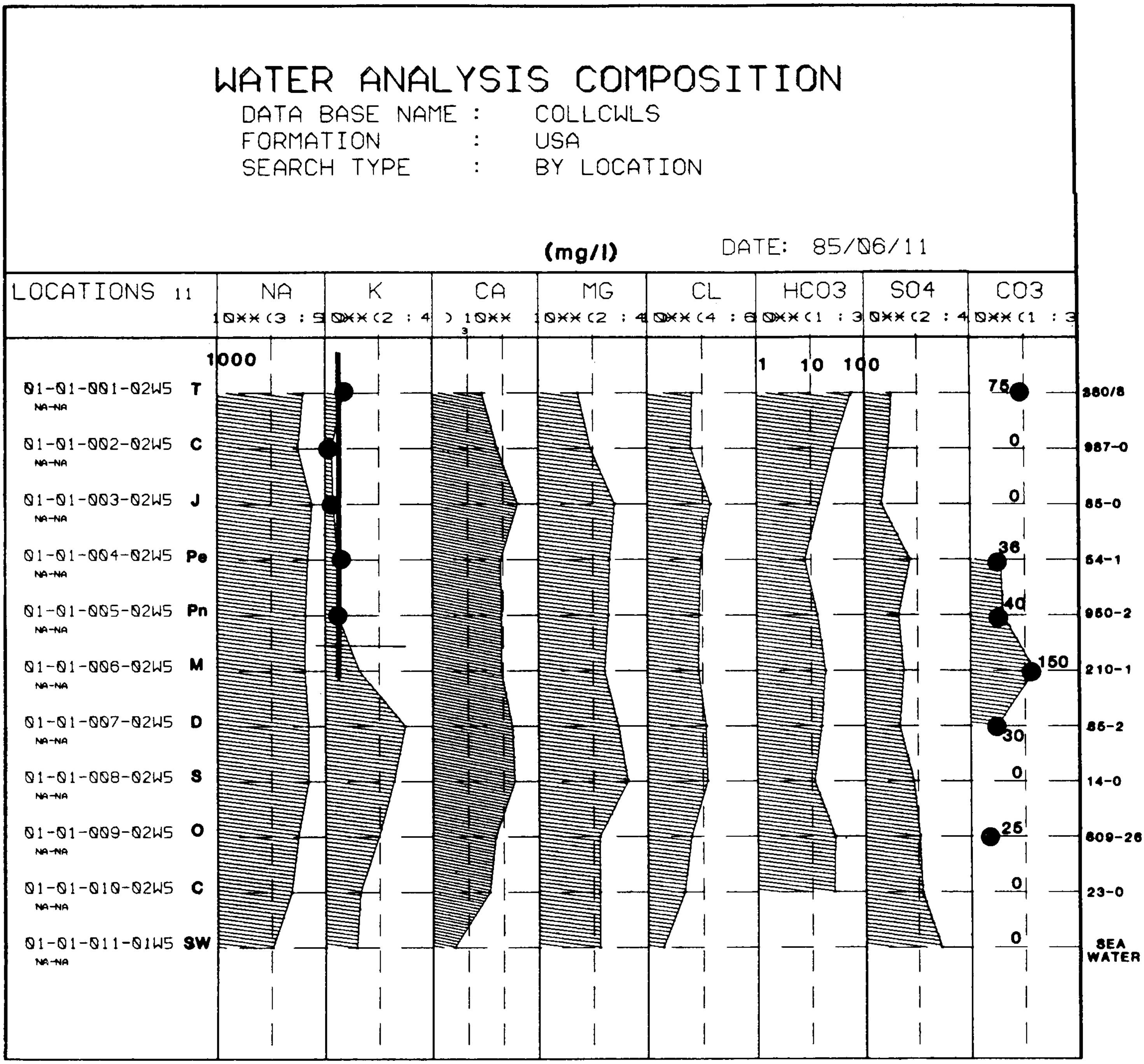


Figure 1

WATER ANALYSIS COMPOSITION

DATA BASE NAME :
FORMATION : VIKING
SEARCH TYPE : BY LOCATION

PROJECT : (100MW, 700CLW) DATE: 85/03/01

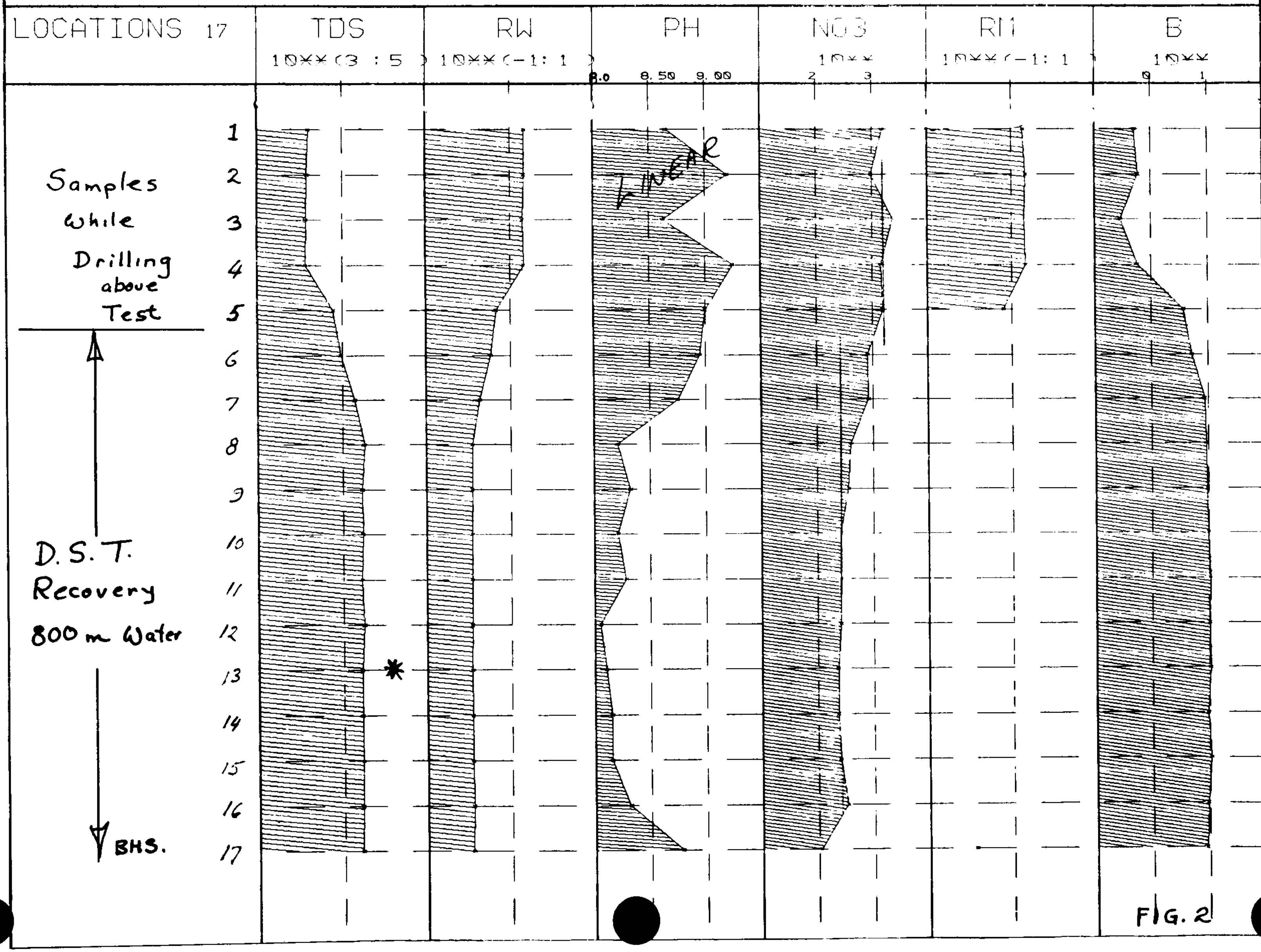


FIG. 2

FREQUENCY DISTRIBUTION OF Rw+CATIONS (FILTERED FILE)

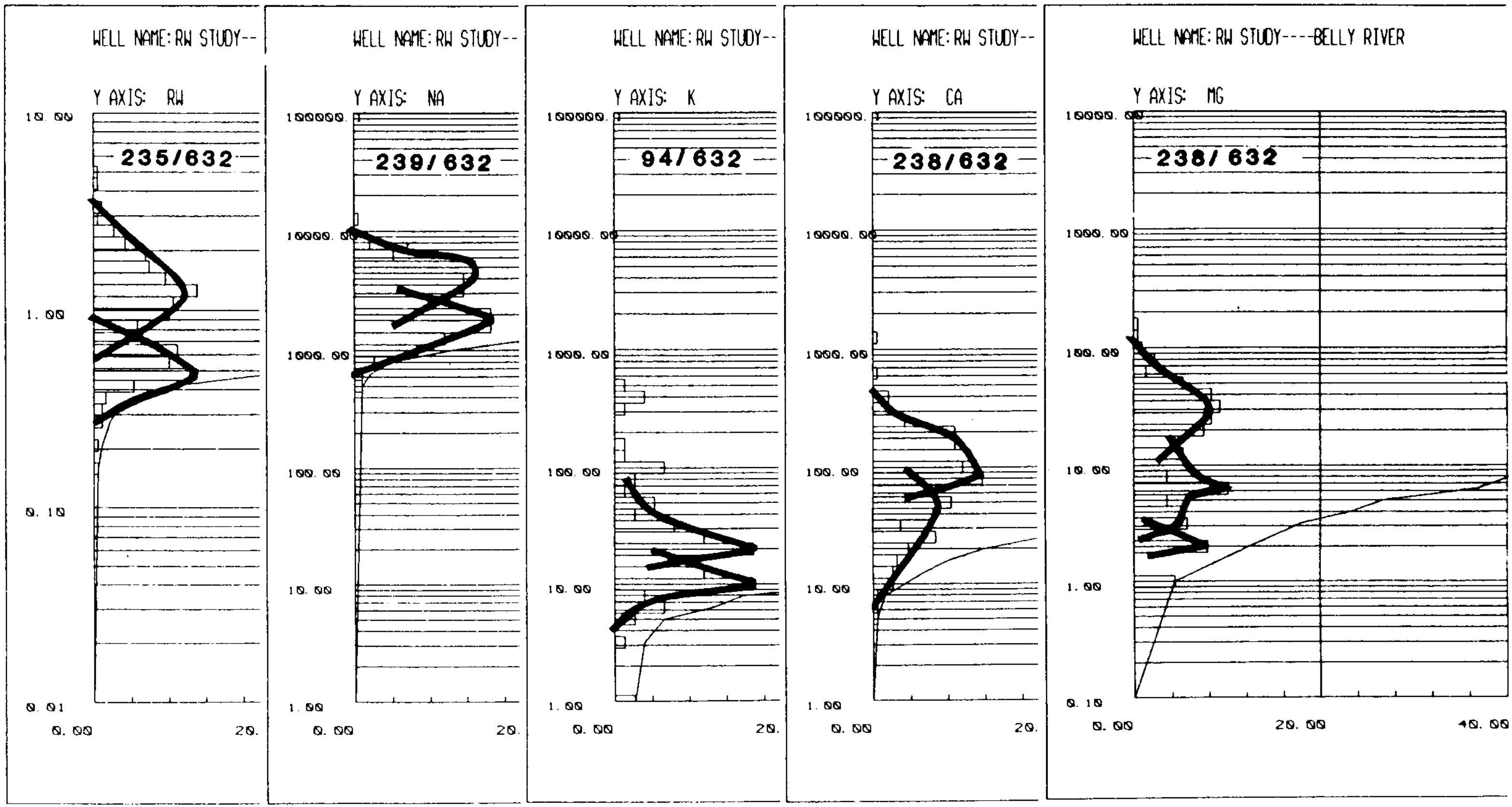


Figure 3

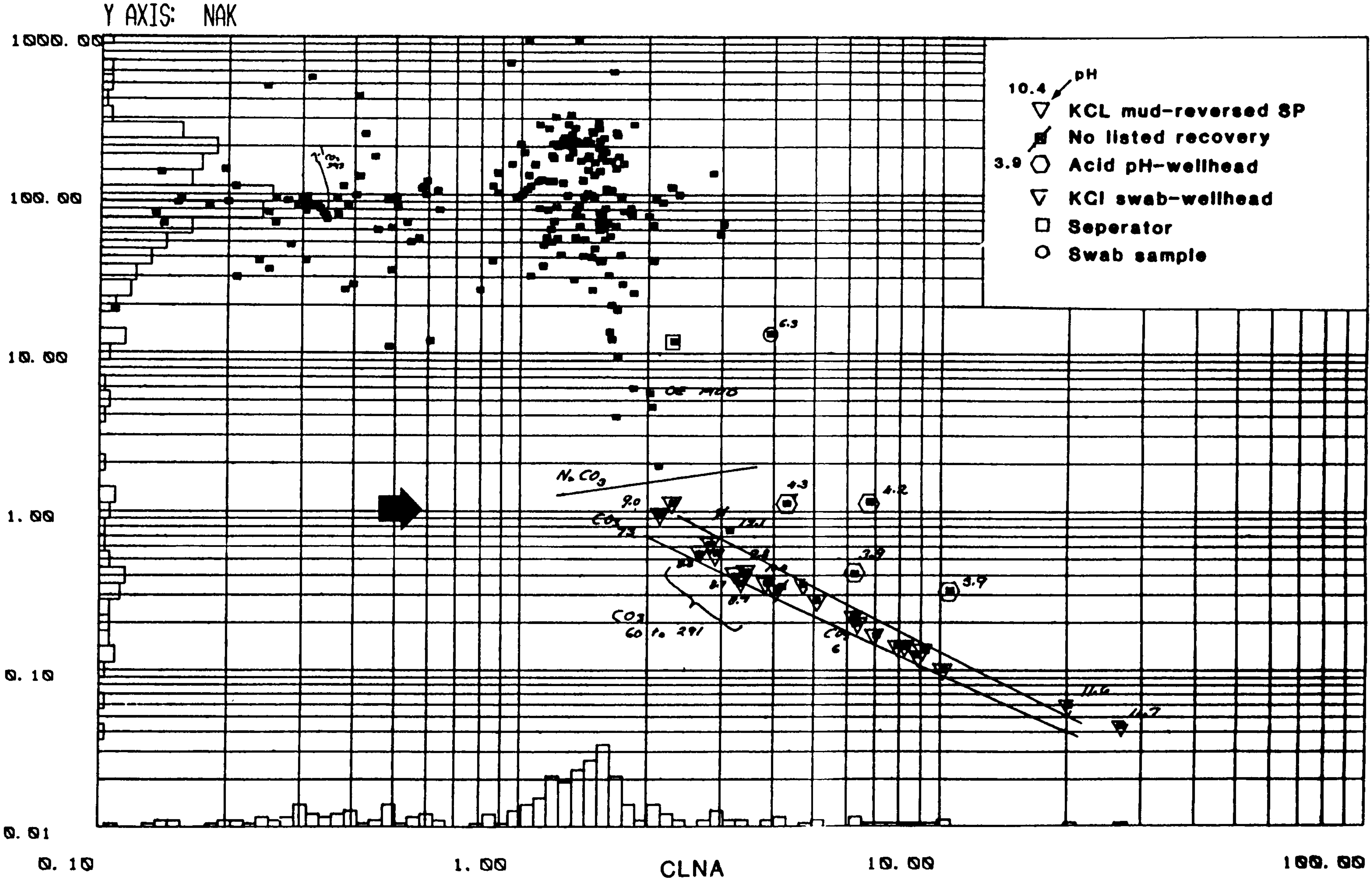

Y AXIS: NAK
1000. 00
100. 00
10. 00
1. 00
0. 10
0. 01
0. 10
1. 00
10. 00
100. 00
CLNA
10.4
pH
KCL mud-reversed SP
No listed recovery
3.9
Acid pH-wellhead
KCl swab-wellhead
Seperator
Swab sample

Figure 4

CHELOG - WATLOG PROGRAM 12

Rw Vs ClNa RATIO

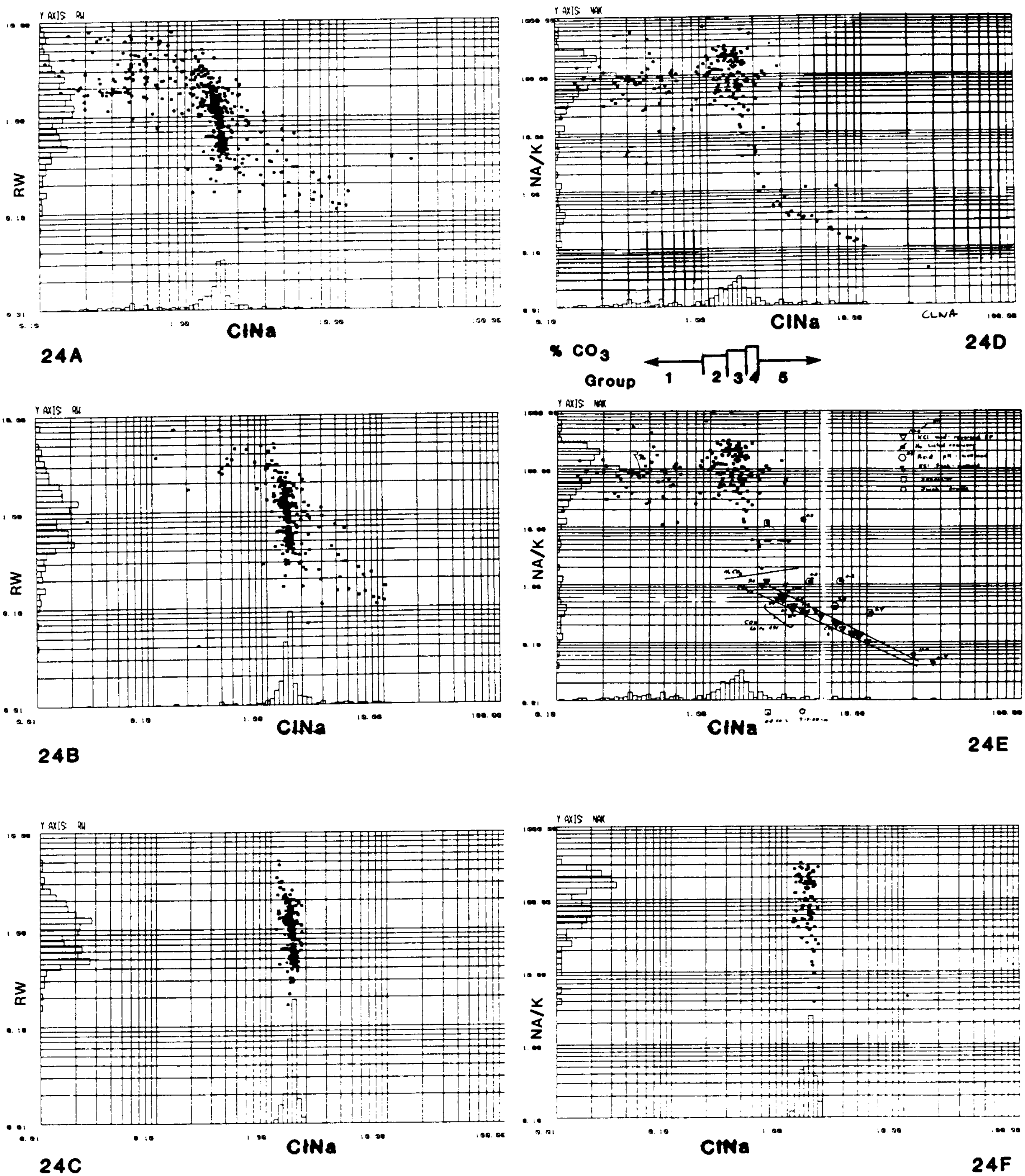
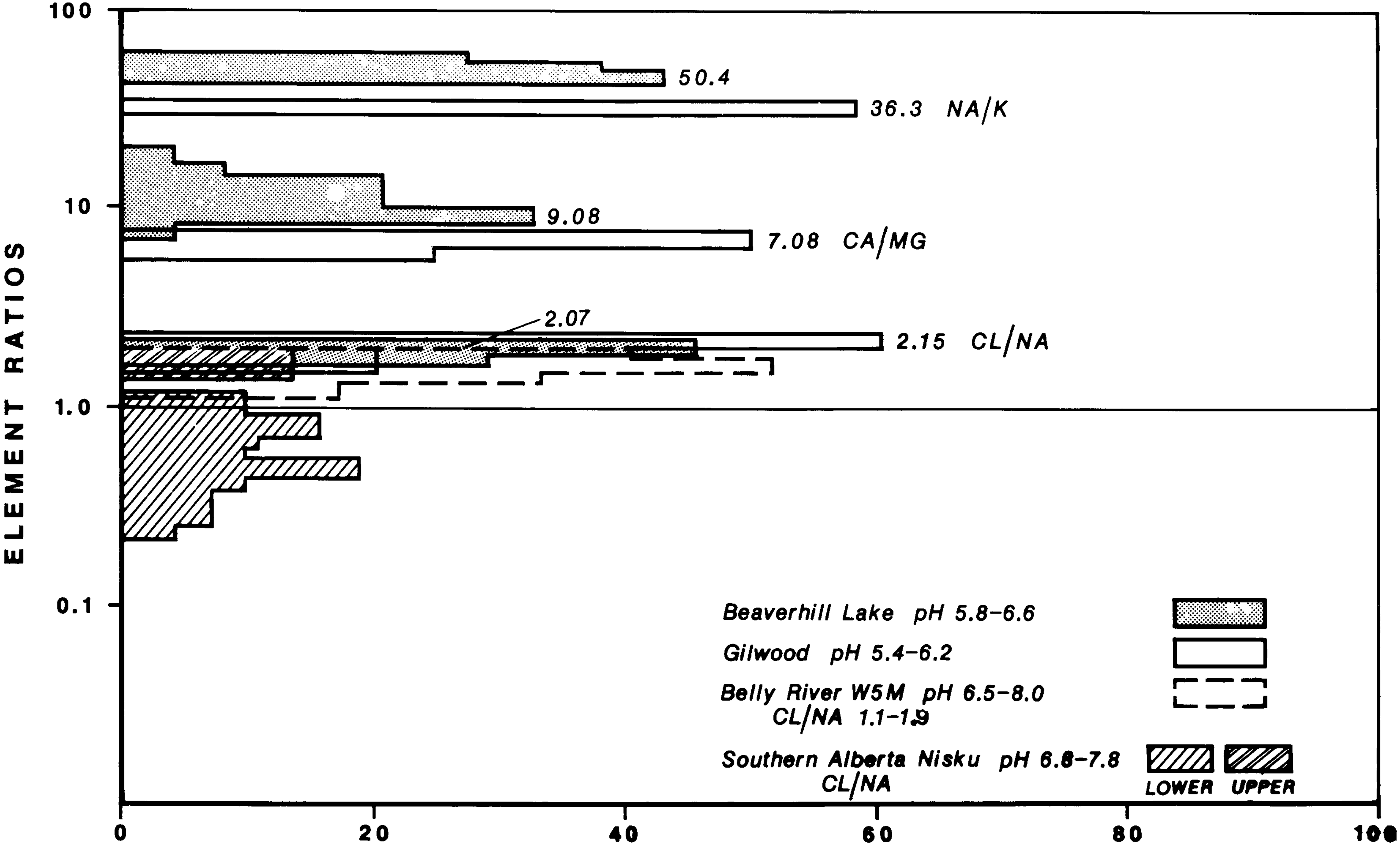


Figure 5

TRIPLE RATIO COMPARISONS
AND CL/NA SPREAD



E. T. CONNOLLY, 1987

Figure 6

WATLOG PROGRAM 7

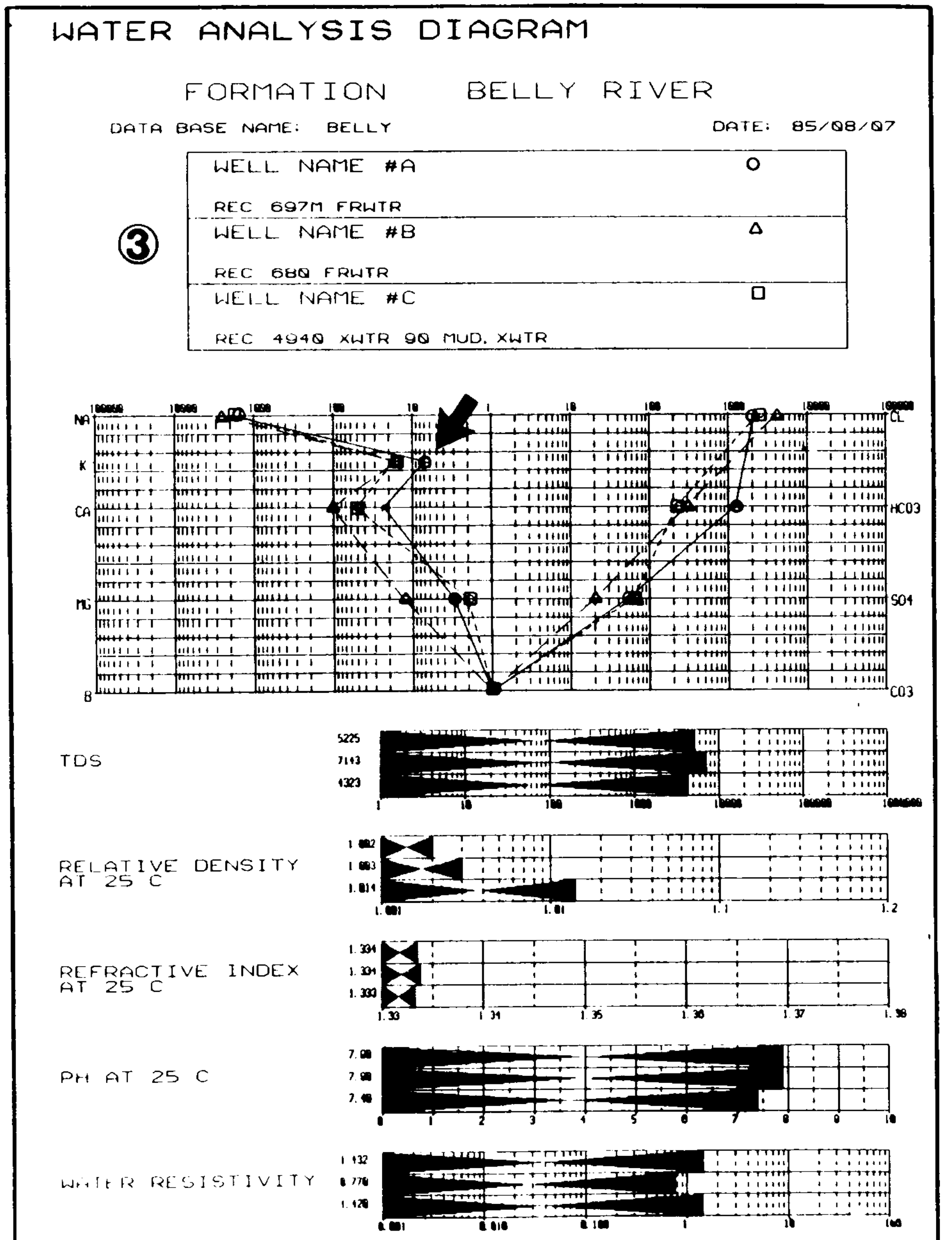


Figure 7a

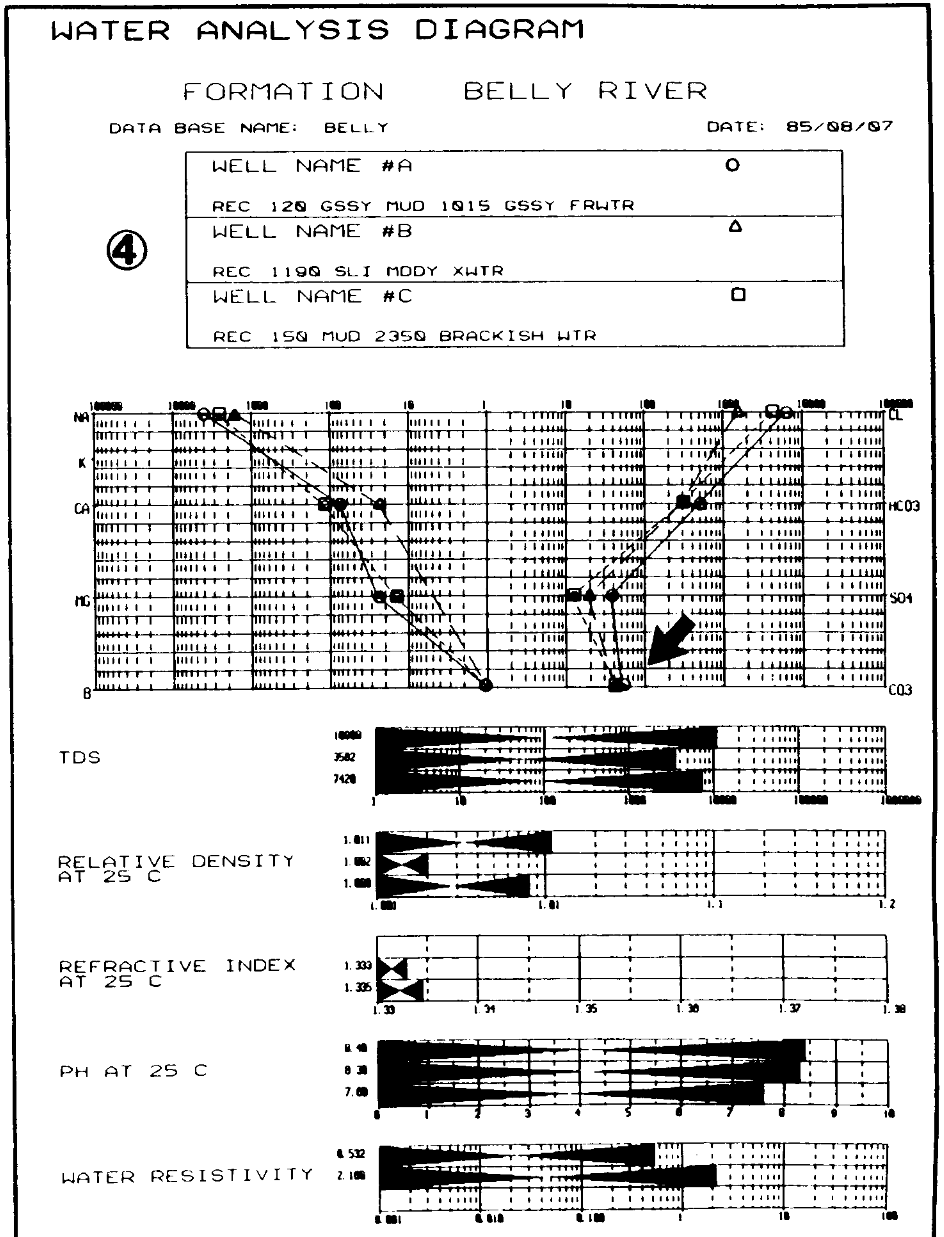
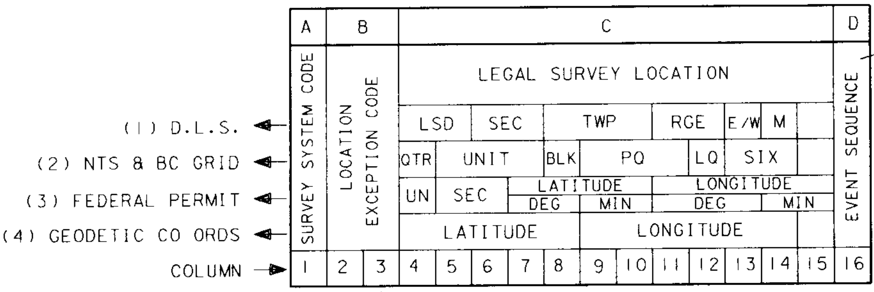


Figure 7b

THE CANADIAN UNIQUE WELL IDENTIFIER (UWI)

(THE UWI ALTHOUGH BASED ON THE LEGAL SURVEY POSITION OF A WELL IS PRIMARILY FOR IDENTIFICATION RATHER THAN LOCATION)



D: IDENTIFIES IN CHRONOLOGICAL SEQUENCE A SIGNIFICANT DRILLING &/OR COMPLETION OPERATION AT THE WELL WHICH YIELDS A SEPARATE & UNIQUE SET OF GEOLOGICAL OR PRODUCTION DATA.

EXAMPLE: DEEPENING, SIDE TRACKING, MULTIPLE COMPLETION, RECOMPLETION REEVALUATIONS (TESTS, LOGS ETC)

ALBERTA: 0 FOR FIRST, 2-9 FOR SUBSEQUENT RUNS

SASKATCHEWAN: 0 ORIGINAL OIL WELL
- 1 REENTRY
- 2 RECOMPLETION (OIL TO OIL)
- 3 SECOND COMPLETION (OIL TO OIL)
- 4 DUAL
- 5 GAS
- 6 WATER
- 7 WATER INJECTOR

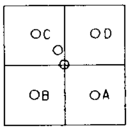
SEQUENCE

INDICATES THE CHRONOLOGICAL SEQUENCE IN WHICH THE WELL WAS DRILLED WHEN MORE THAN ONE WELL HAS BEEN DRILLED WITHIN THE SMALLEST AREA OF ANY PARTICULAR SURVEY SYSTEM. 0 — 1 WELL IN LOCATION
9 — 10 WELL IN LOCATION

POSITION

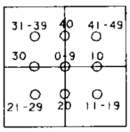
A NUMBER OR ALPHABETIC CHARACTER DESIGNATING THE POSITION OF THE WELL WITHIN OR IN RELATION TO THE SMALLEST AREA WITHIN THE SURVEY BY WHICH THE WELL IS LOCATED. (FIRST WELL-0) DEFINED AS:

ALBERTA MANITOBA



WELLS DRILLED IN THE CENTRE OF SECTIONS OR ON BOUNDARY LINES BETWEEN LSD'S ARE ARBITRARILY ASSIGNED TO AN LSD

SASKATCHEWAN DLS

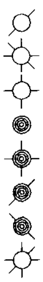


1 LSD

- 51-59 ROAD ALLOWANCE SOUTH BOUNDARY
- 61-69 ROAD ALLOWANCE WEST BOUNDARY
- 75-79 APPROXIMATE CENTRE OF SECTION (FOLLOWED BY 00 IN LSD FIELD)
- 81-89 APPROXIMATE CENTRE OF 80 ACRE TRACT
- 91-94 DIRECTIONALLY DRILLED HOLES (FOLLWED BY THE NUMBER IN WHICH THE HOLE BOTTOM IS THE LSD FIELD)
- 95-99 IF LOCATION IN LSD IS KNOWN

NOTE: NO SPECIAL EXCEPTION CODES HAVE BEEN DEFINED FOR THE USE WITH THE OTHER SURVEY SYSTEMS (NTS, BC GRID, FEDERAL & GEODETIC) ARBITRARILY ASSIGNED STARTING WITH A

STANDARD WELL SYMBOLS

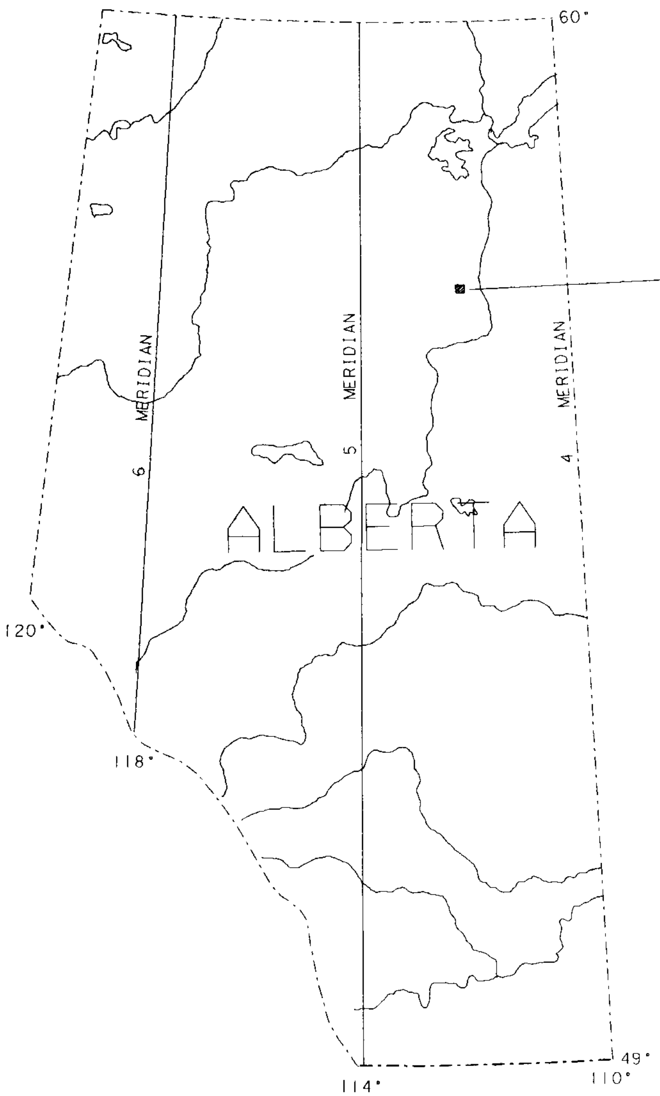


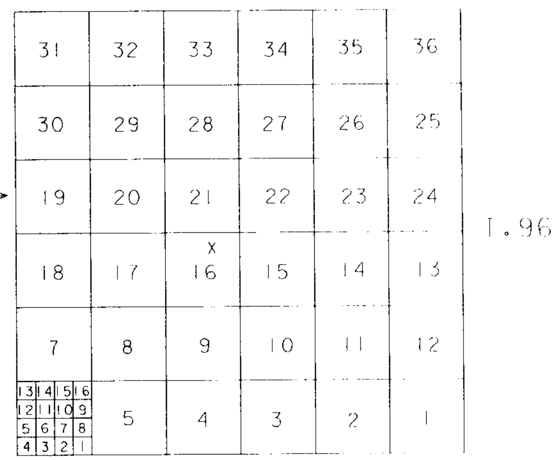
- ABANDONED
- SHUT-IN POTENTIAL GAS
- GAS
- OIL
- DUAL COMPLETION OIL & GAS
- OIL ABANDONED
- SHUT-IN POTENTIAL OIL
- GAS ABANDONED

D.L.S. (1)

EXAMPLE "X" DESIGNATED AS
100151609619W400

CODE 1 LSD 15 SEC 16 TWP 096
RGE 19 WEST OF MERIDIAN 4





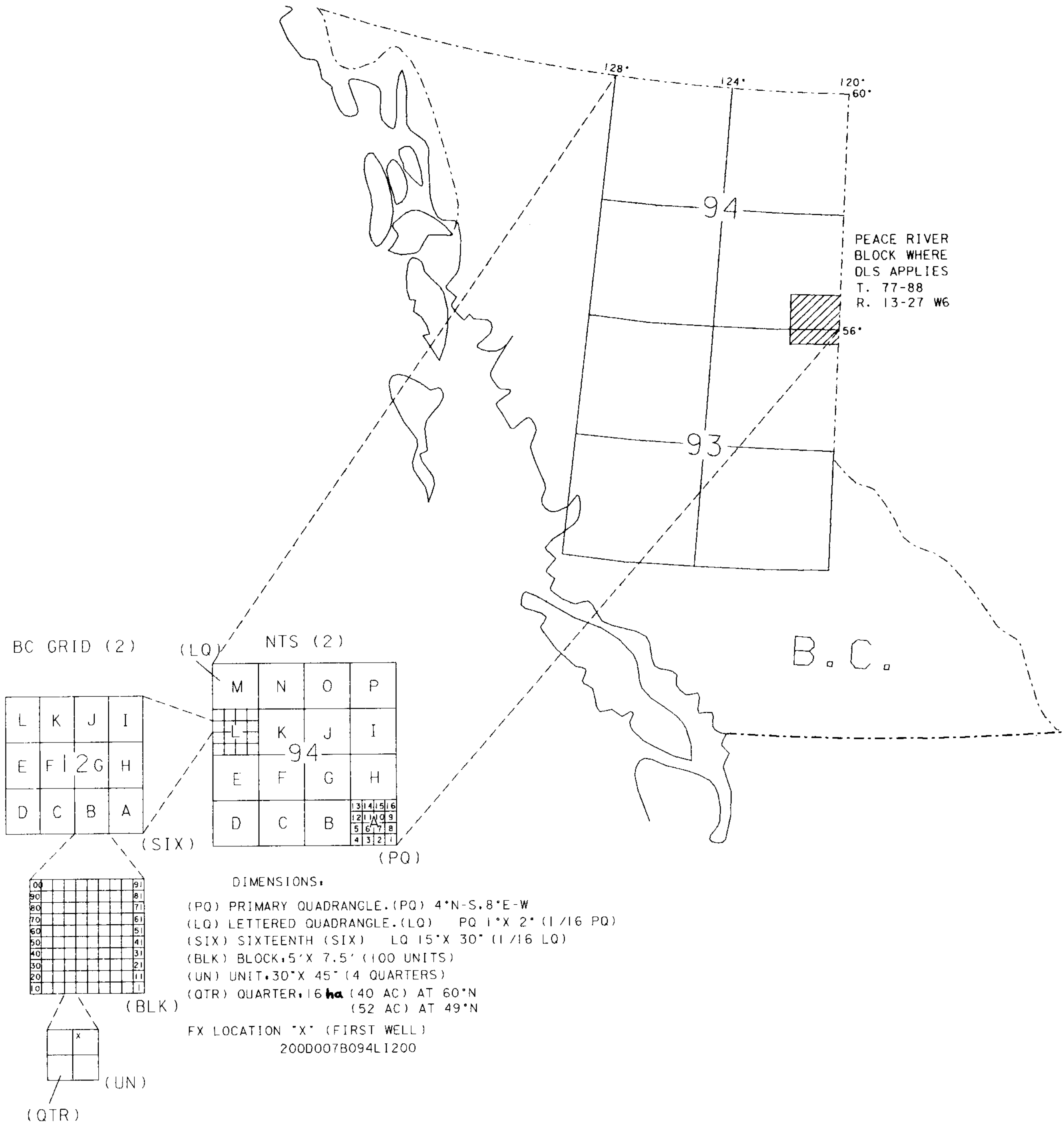
R.19 W4

DIMENSIONS: LSD= 16.2ha, 402m X 402m
(40 acres, 1320' X 1320')

SEC= 16 LSD'S, 256ha, 1.6km X 1.6km
(640 acres, 1 mile X 1 mile)

TWP= 36 SEC'S, 9.7km X 9.7km
(6 miles X 6 miles)

NTS & BC GRID (2)

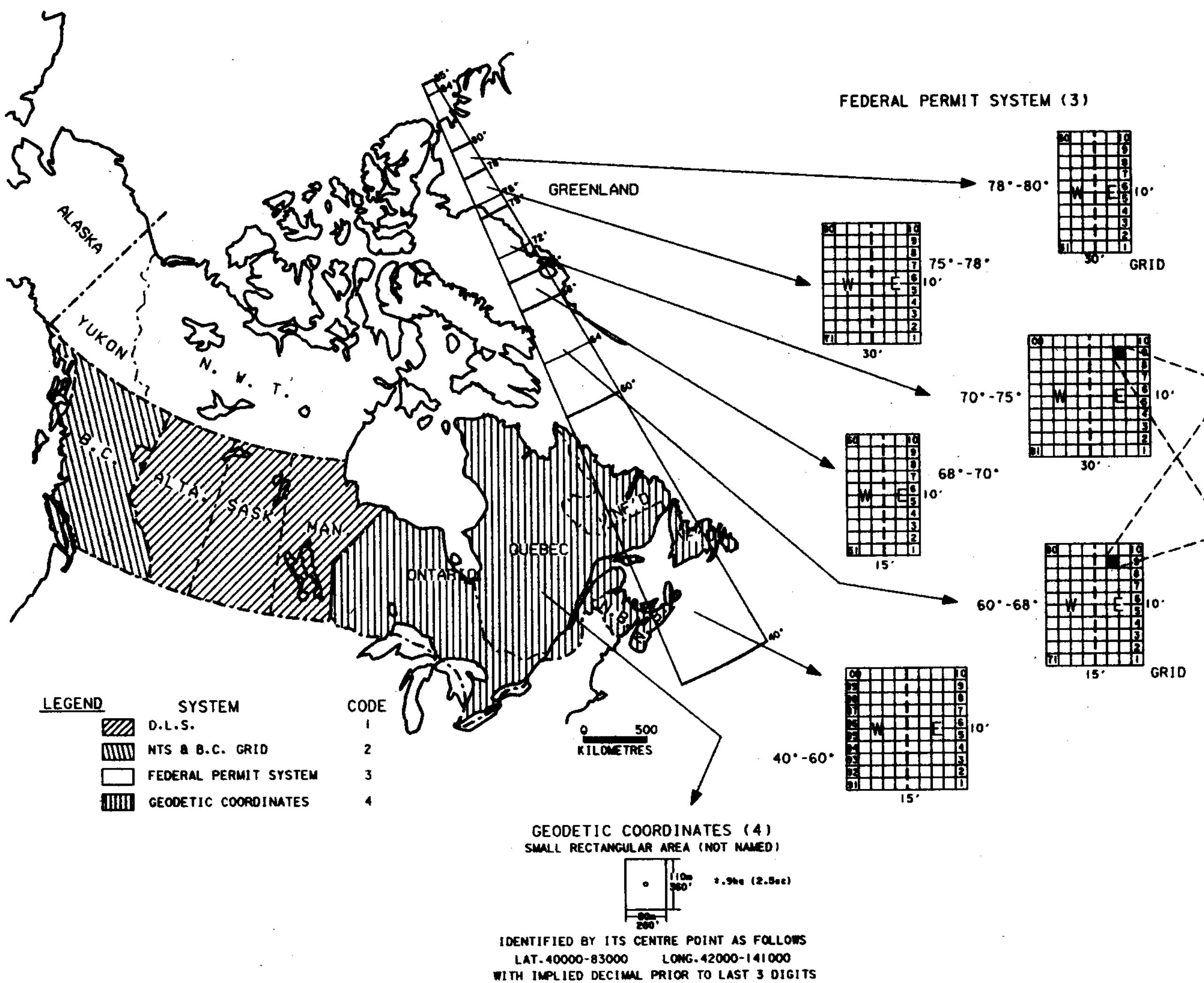


DIMENSIONS:

(PQ) PRIMARY QUADRANGLE.(PQ) 4°N-S.8°E-W
(LQ) LETTERED QUADRANGLE.(LQ) PQ 1°X 2° (1/16 PQ)
(SIX) SIXTEENTH (SIX) LQ 15'X 30' (1/16 LQ)
(BLK) BLOCK: 5'X 7.5' (100 UNITS)
(UN) UNIT. 30"X 45" (4 QUARTERS)
(QTR) QUARTER: 16 **ha** (40 AC) AT 60°N
(52 AC) AT 49°N

FX LOCATION "X" (FIRST WELL)
200D007B094L1200

FEDERAL PERMIT SYSTEM (3) and GEODETIC COORDINATES (4)



DIMENSIONS

GRID: 10' X 15' OR 10' X 30'
±18km N-S BY 8-18km E-W

SEC: 1/60, 1/80, 1/100th OF A GRID
240ha TO 325ha (600-800 ac)

UNIT: 1/16 SEC
14-20ha (35-50ac)

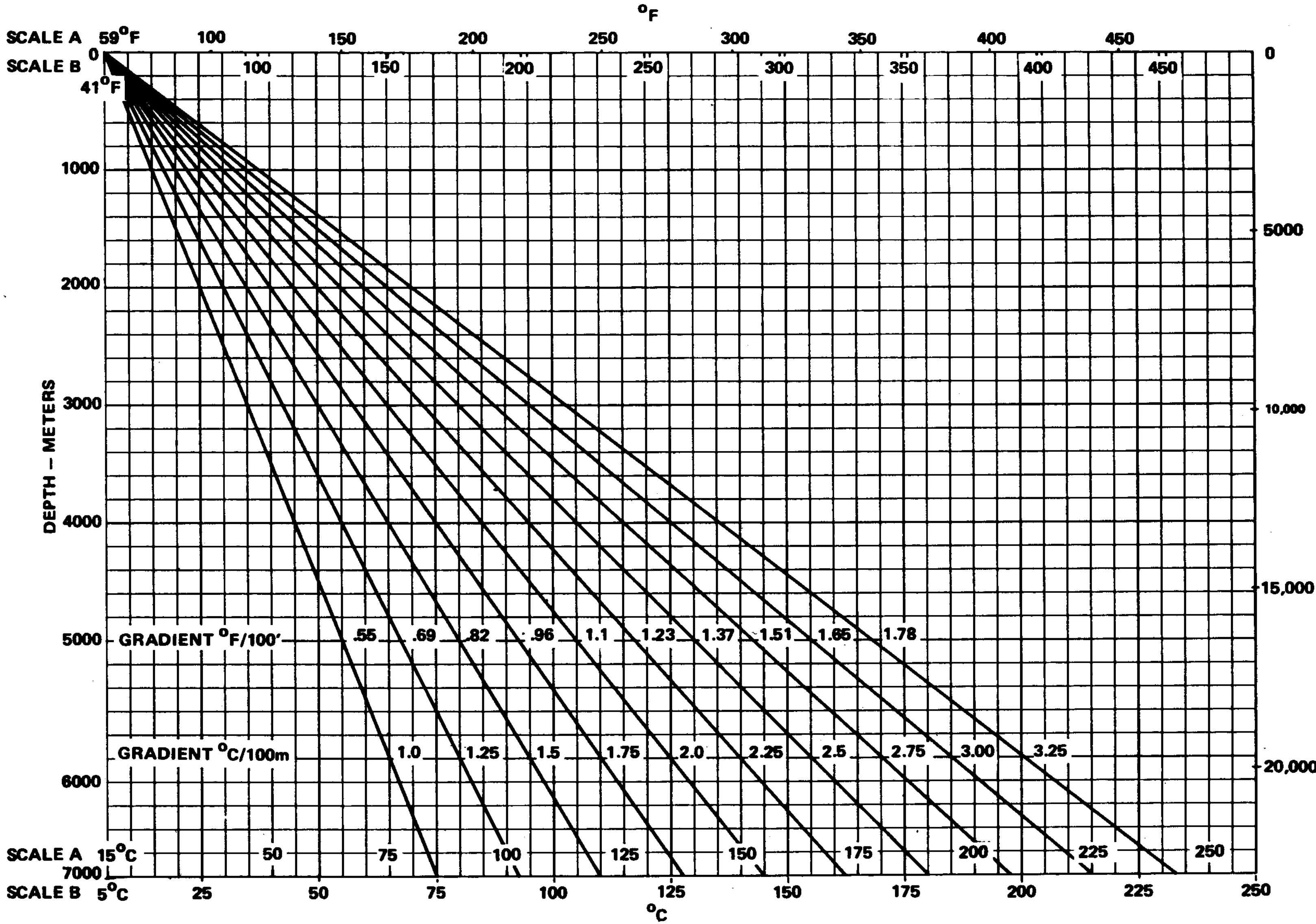
GRID IDENTIFICATION:

DEG LAT: LATITUDE AT NORTH BOUNDARY OF GRID (40-83)

MIN LAT: MINUTES OF LATITUDE AT NORTH BOUNDARY OF GRID (00',10',20' TO 50')

DEG LONG: DEGREES OF LONGITUDE AT THE EAST BOUNDARY OF GRID (42-141)

MIN LONG: MINUTES OF LONGITUDE AT EAST BOUNDARY OF GRID (00',15',30' TO 45')



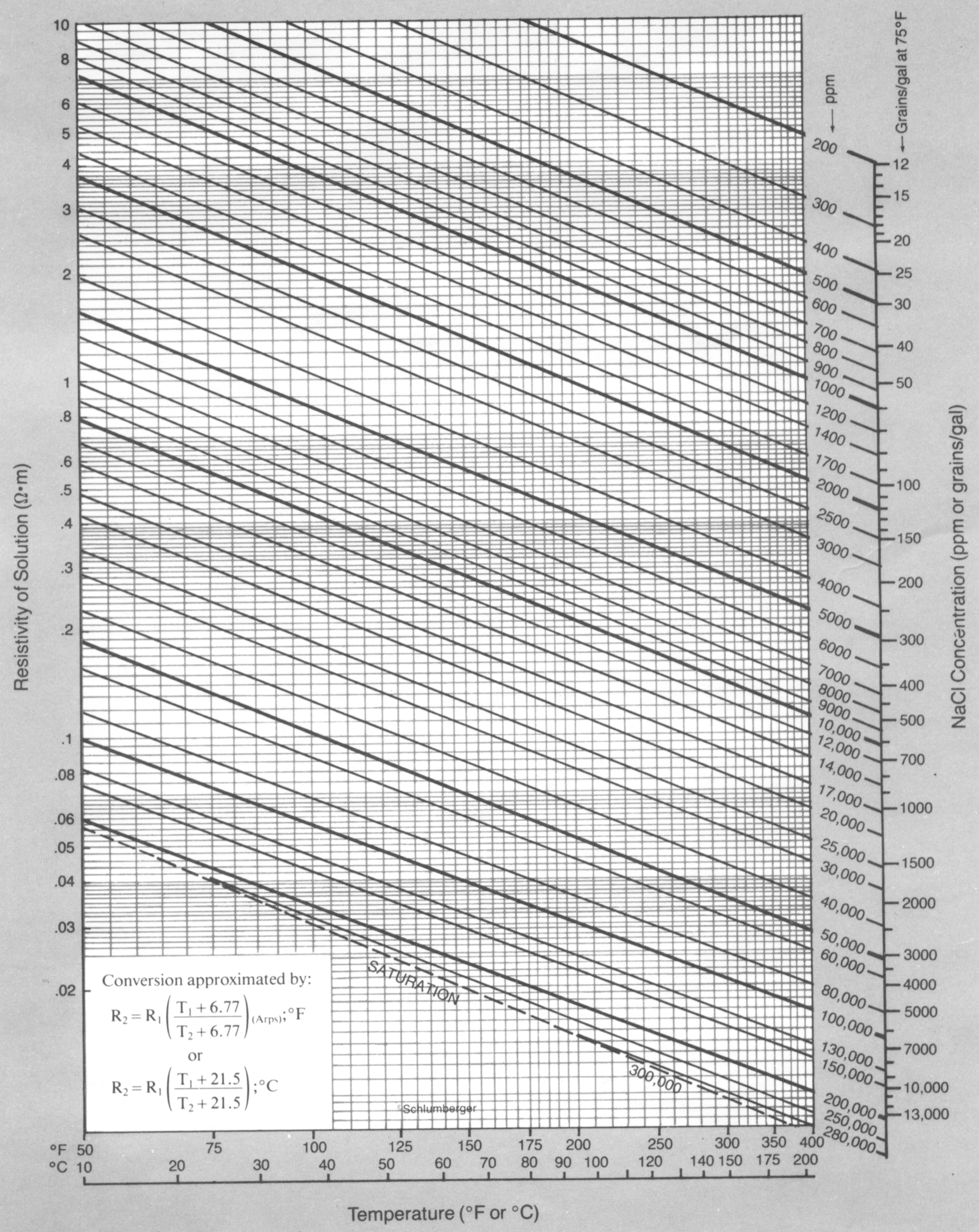
SCALE A ANNUAL MEAN SURFACE TEMPERATURE 15° C (59°F)

SCALE B ANNUAL MEAN SURFACE TEMPERATURE 5°C (41°F)

FORMATION TEMPERATURE – DEPTH RELATIONSHIPS

COMPUTALOG GEARHART LTD

Resistivity of NaCl Solutions



Gen-9

Alberta – British Columbia

Alphabetical List of Formations

A

ALBERTA	2
ARCS	15
ARCTOMYS	20

B

BADHEART	2
BAKKEN	12
BALDONNEL	8
BANFF	12
BARONS	2
BASAL BELLY RIVER	1
BASAL BLAIRMORE	6
BASAL COLARADO	3
BASAL PALEOZOIC	19
BASAL QUARTZ	6
BEARPAW	1
BEAVERHILL LAKE	16
BELLOY	9
BELLY RIVER	1
BIG VALLEY	13
BIRCH LAKE	1
BIRDBEAR	14
BLAIRMORE	4
BLAIRMORE	5
BLAIRMORE	6
BLUEBERRY	8
BLUE RIDGE	14
BLUESKY	5
BONANZA	3
BORRADAILE	4
BOUNDARY LAKE	8
BOW ISLAND	3
BRAZEAU	1
BROSSEAU	1
BROWN	7
BUICK CREEK	6
BULLHEAD	6

C

CADOMIN	6
CADOTTE	3
CAIRN	15
CALMAR	14
CAMBRIAN	20
CAMERON	6
CAMROSE	15
CANTUAR	4
CARDIUM	2
CECIL	8
CHARLIE LAKE	8
CHINCHAGA	18
CHINOOK	2
CLARKS	12
CLEARWATER	4
COLONY	4
COLORADO	2
COLORADO	3
COOKING LAKE	15
COPLIN	8
CRETACEOUS	1
CRETACEOUS	2
CRETACEOUS	3
CRETACEOUS	4
CRETACEOUS	5
CRETACEOUS	6
CROSSFIELD	13
CRUISER	2
CUMMINGS	5
CUTBANK	6

D

D-1	13
D-2	14
D-3	15
DAIBER	8
DALHOUSIE	6
DEBOLT	10
DETRITAL	6
DEVONIAN	13
DEVONIAN	14
DEVONIAN	15
DEVONIAN	16
DEVONIAN	17
DEVONIAN	18
DEVONIAN	19
DINA	6
DOE CREEK	2
DOIG	8
DUNVEGAN	2

E

ELLERSLIE 6
ELK POINT 17
ELK POINT 18
ELKTON 10
ELLIS 7

F

FAIRHOLME 15
FALHER 4
FARRELL 8
FERNIE 7
FISH SCALE 2
FORT SIMPSON 15
FORT ST. JOHN 3
FORT ST. JOHN 4
FORT ST. JOHN 5

G

G.P. 4
GP 4
GENERAL PETROLEUM 4
GETHING 6
GILWOOD 17
GLAUCONITIC 5
GLAUCONITE 5
GOLATA 10
GOODRICH 2
GRAMINA 14
GRAND RAPIDS 4
GRANITE WASH 19
GRAYLING 8
GROSMONT 15

H

HACKETT 4
HALFWAY 8
HASLER 3
HAY RIVER 15
HAY RIVER 16
HERALD 20
HIGHWOOD 2
HOME 5
HOWARD CREEK 2

I

INGA 8
IRETON 15

J

JEAN MARIE 14
JEFFERSON 14
JEFFERSON 15
JUDITH RIVER 1
JUMPING POUND 2
JURASSIC 7

K

KAKISA 14
KASKAPAU 2
KEG RIVER 18
KISKATINAW 10
KOBES 8
KOOTENAY 7
KOTCHO 13

L

LEA PARK 2
LEDUC 15
LIARD 8
LIVINGSTONE 11
LLOYD 4
LLOYDMINSTER 4
LOWER BLAIRMORE 5
LOWER BLAIRMORE 6
LOWER CRETACEOUS 3
LOWER CRETACEOUS 4
LOWER CRETACEOUS 5
LOWER CRETACEOUS 6
LOWER DEBOLT 10
LOWER MANNVILLE 5
LOWER MANNVILLE 6
LUSCAR 5

M

MAJEAU LAKE 15
MANNING 17
MANNVILLE 4
MANNVILLE 5
MANNVILLE 6
MATTSON 9
MCLAREN 4
MCMURRAY 6
MEDICINE HAT 2
MIDDLE DEVONIAN 18
MILK RIVER 2
MISSISSIPPIAN 10
MISSISSIPPIAN 11
MISSISSIPPIAN 12
MONTNEY 8

MOULTON 6
MOUNT HEAD 10
MUSKEG 18

N

NAHANNI 18
NANCY 8
NIKANASSIN 7
NISKU 14
NORDEGG 7
NORTH PINE 8
NOTIKEWIN 4

O

OLDMAN 1
ORDOVICIAN 20
OSTRACOD 5

P

PADDY 3
PAKOWKI 2
PALLISER 13
PARDONET 8
PEACE RIVER 3
PEECHEE 15
PEKISKO 11
PELICAN 3
PENNSYLVANIAN 9
PERDRIX 15
PERMIAN 9
PIKA 20
PINE POINT 18
PINGEL 8
POPLAR 6
POUCE COUPE 2
PRESQU'ILE 18
PRINCESS 6
PROPHET 10

R

RAINBOW 18
RED KNIFE 14
REX 4
RIBSTONE CREEK 1
RIERDON 7
ROCK CREEK 7
ROCKY MOUNTAIN 9
RUNDLE 10
RUNDLE 11

S

SAWTOOTH 7
SCATTER 3
SCHOOLER CREEK 8
SECOND WHITE SPECKS 2
SHAFTESBURY 2
SHUNDA 10
SILURIAN 20
SIPHON 8
SLAVE POINT 16
SMOKY 2
SOLOMON 1
SOUTHESK 14
SOUTHESK 15
SPARKY 4
SPIRIT RIVER 4
SPRAY RIVER 8
STETTLER 13
STODDART 10
SULPHUR POINT 18
SUNBURST 6
SWAN HILLS 16
SWIFT 7

T

TABER 6
TAYLOR FLAT 9
TETCHO 13
TOAD 8
TOAD-GRAYLING 8
TRIASSIC 8
TRIASSIC A,B,C,D 8
TROUT RIVER 14
TURNER VALLEY 10

U

UPPER BLAIRMORE 4
UPPER CRETACEOUS 1
UPPER CRETACEOUS 2
UPPER DEBOLT 10
UPPER DEVONIAN 13
UPPER DEVONIAN 14
UPPER DEVONIAN 15
UPPER DEVONIAN 16
UPPER MANNVILLE 4

V

VICTORIA 1
VIKING 3

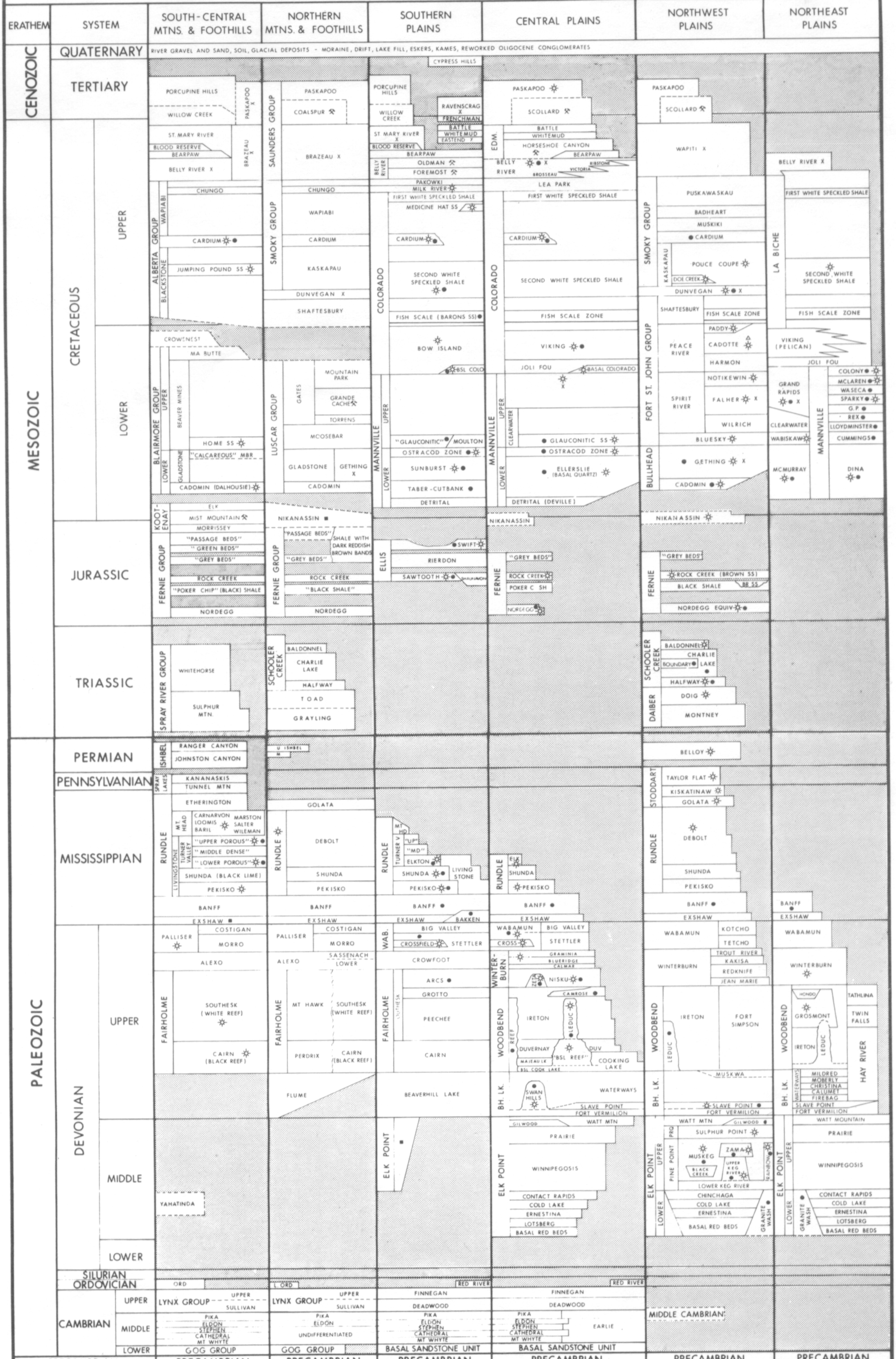
W

WABAMUN 13
WABISKAW 5
WAINWRIGHT 4
WAPITI 1
WASECA 4
WATERWAYS 16
WATT MOUNTAIN 17
WILRICH 4
WINTERBURN 14
WOODBEND 15

Z

ZAMA 18
ZETA LAKE 14

ERCB
TABLE OF FORMATIONS, ALBERTA



- LEGEND -
- ☼ GAS
- ● OIL
- x, ⚒ COAL OCCURRENCES (MINOR, MAJOR)
- --- CORRELATION UNCERTAIN
- ⌇ or ⋛ FACIES TRANSITION
- ■ AGE NOT CONCLUSIVELY ESTABLISHED
- △ THE FAUNAS SUGGEST THAT THE CADOTTE IS NOT THE EQUIVALENT OF THE PELICAN

- NOTES -

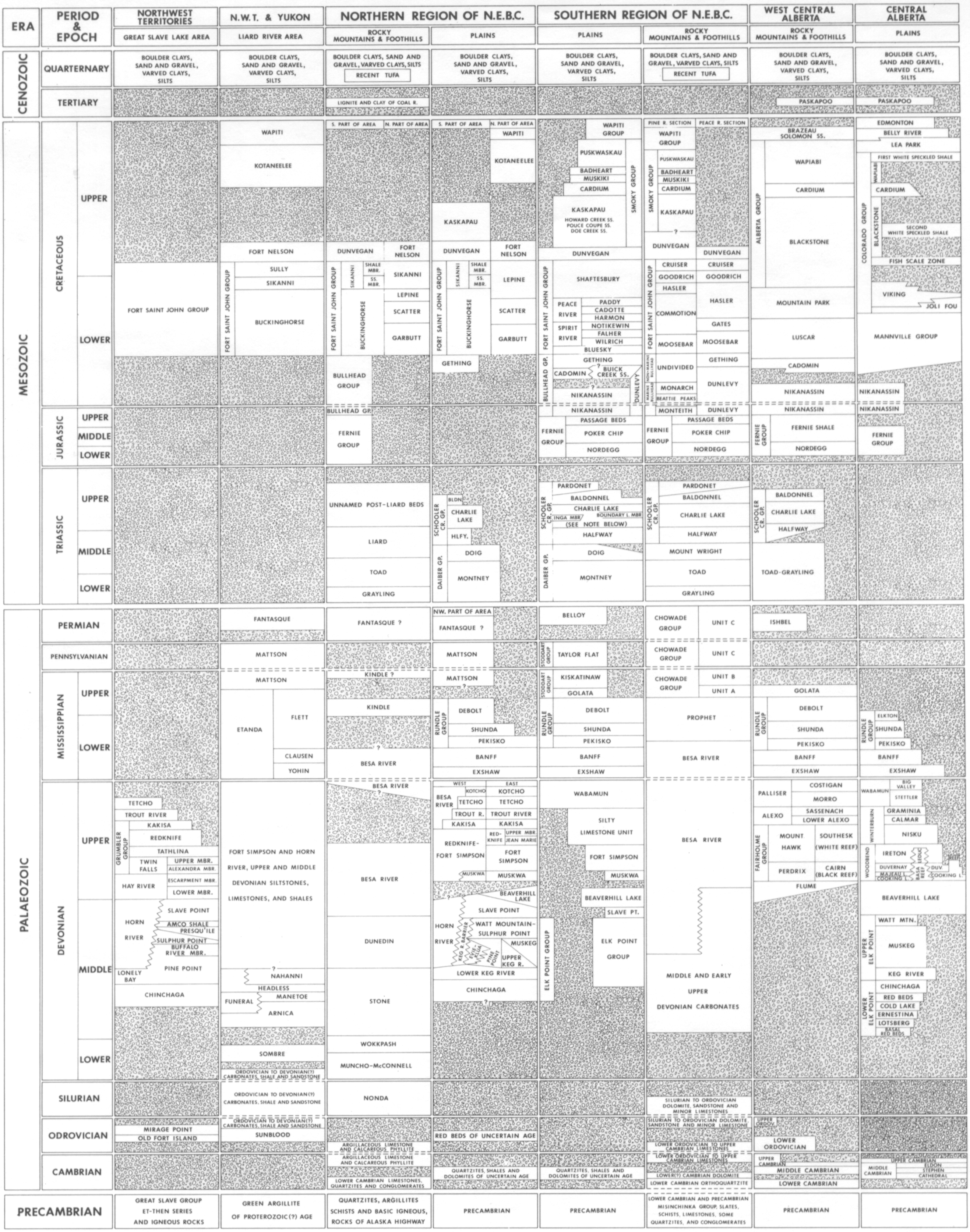
IN THE NORTHWEST PLAINS COLUMN, THE PEACE RIVER UPPER DEVONIAN STRATIGRAPHY IS SHOWN AT THE LEFT AND THE RAINBOW STRATIGRAPHY AT THE RIGHT

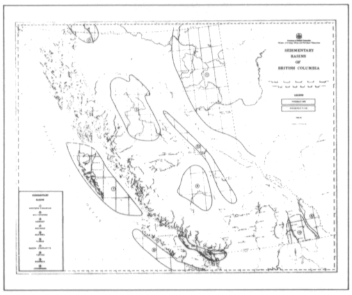
ALTERNATIVE LOCAL NAMES ARE SHOWN IN BRACKETS.

SELECTIVE MEMBERS AND ZONES ARE NOT KNOWN TO OCCUR THROUGHOUT THE ENTIRE AREAS.

PRICE: $2.00

DECEMBER 1985





Province of British Columbia
Ministry of Energy, Mines and Petroleum Resources

STRATIGRAPHIC CORRELATION CHART

NORTHEASTERN BRITISH COLUMBIA AND ADJACENT AREAS

TIME INTERVALS, UNIT THICKNESSES AND EROSIONAL OR DEPOSITIONAL EFFECTS ARE NOT SHOWN TO SCALE.

Droughted by: R.D. Satterfield 84 08

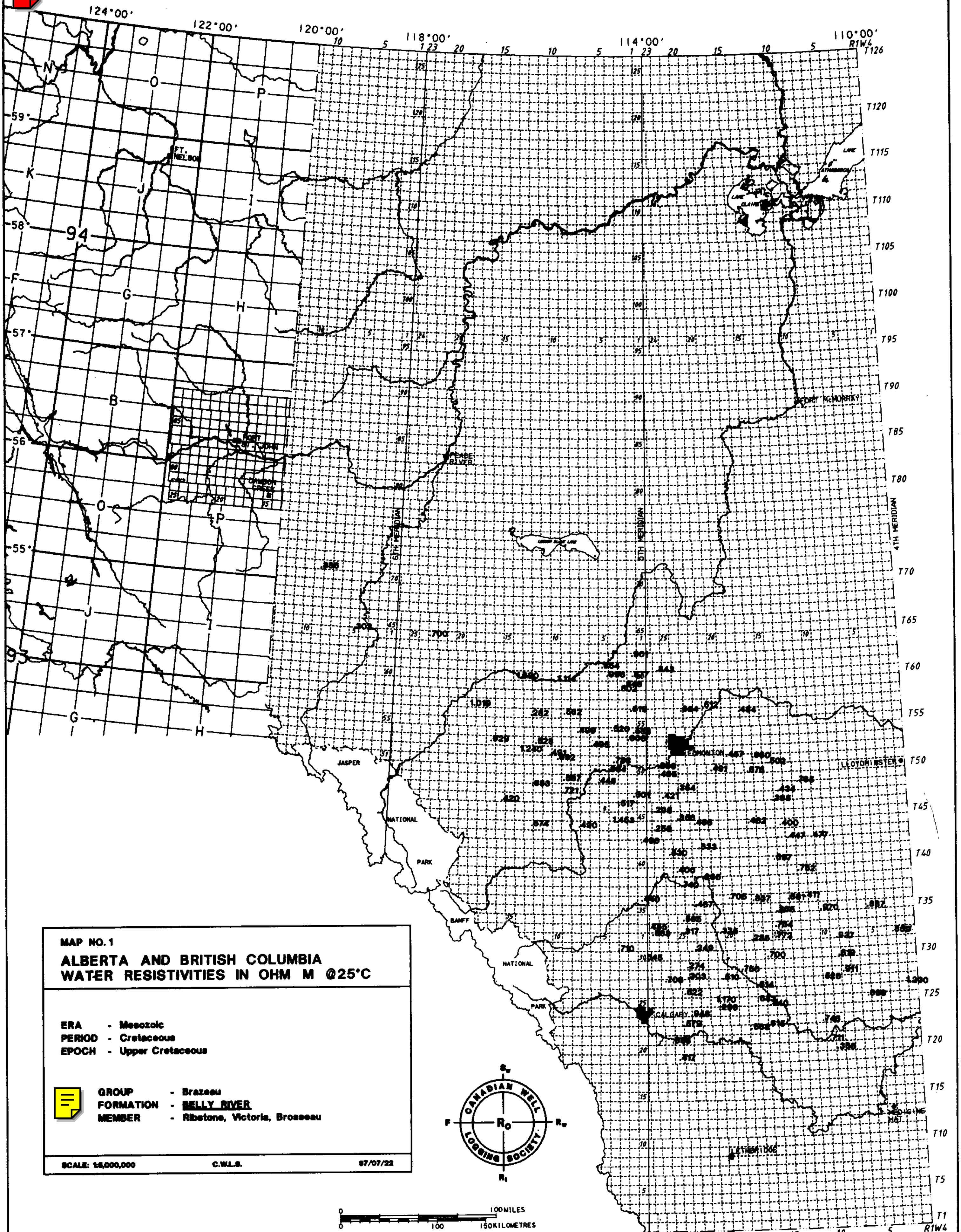
NOTE:

THE FOLLOWING MEMBERS (IN THEIR STRATIGRAPHIC ORDER) ARE RECOGNIZED IN THE CHARLIE LAKE FORMATION.

1. SIPHON
2. CECIL
3. NANCY
4. BOUNDARY LAKE
5. BASAL BOUNDARY LAKE
6. COPLIN
7. SEPTIMUS
8. MICA
9. KOBES
10. BLUEBERRY
11. FARRELL
12. INGA
13. NORTH PINE
14. BEAR FLAT
15. WILDER
16. PINGEL
17. 'A' SAND
18. ARTEX

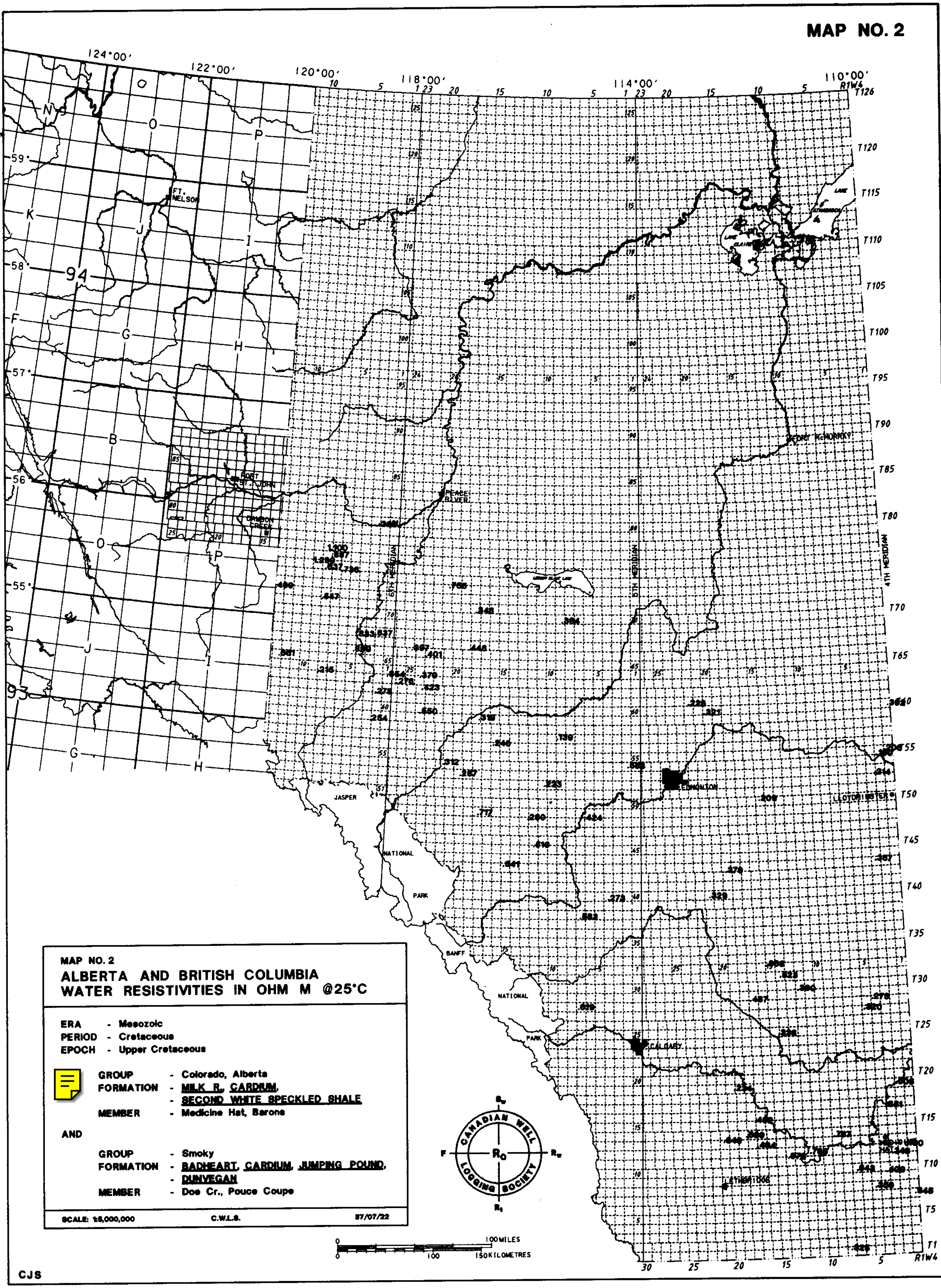
THE BREAKDOWN ABOVE OF THE CHARLIE LAKE FORMATION APPLIES ONLY TO THE PLAINS AREA OF THE SOUTHERN REGION OF NORTHEASTERN BRITISH COLUMBIA.

MAP NO. 1

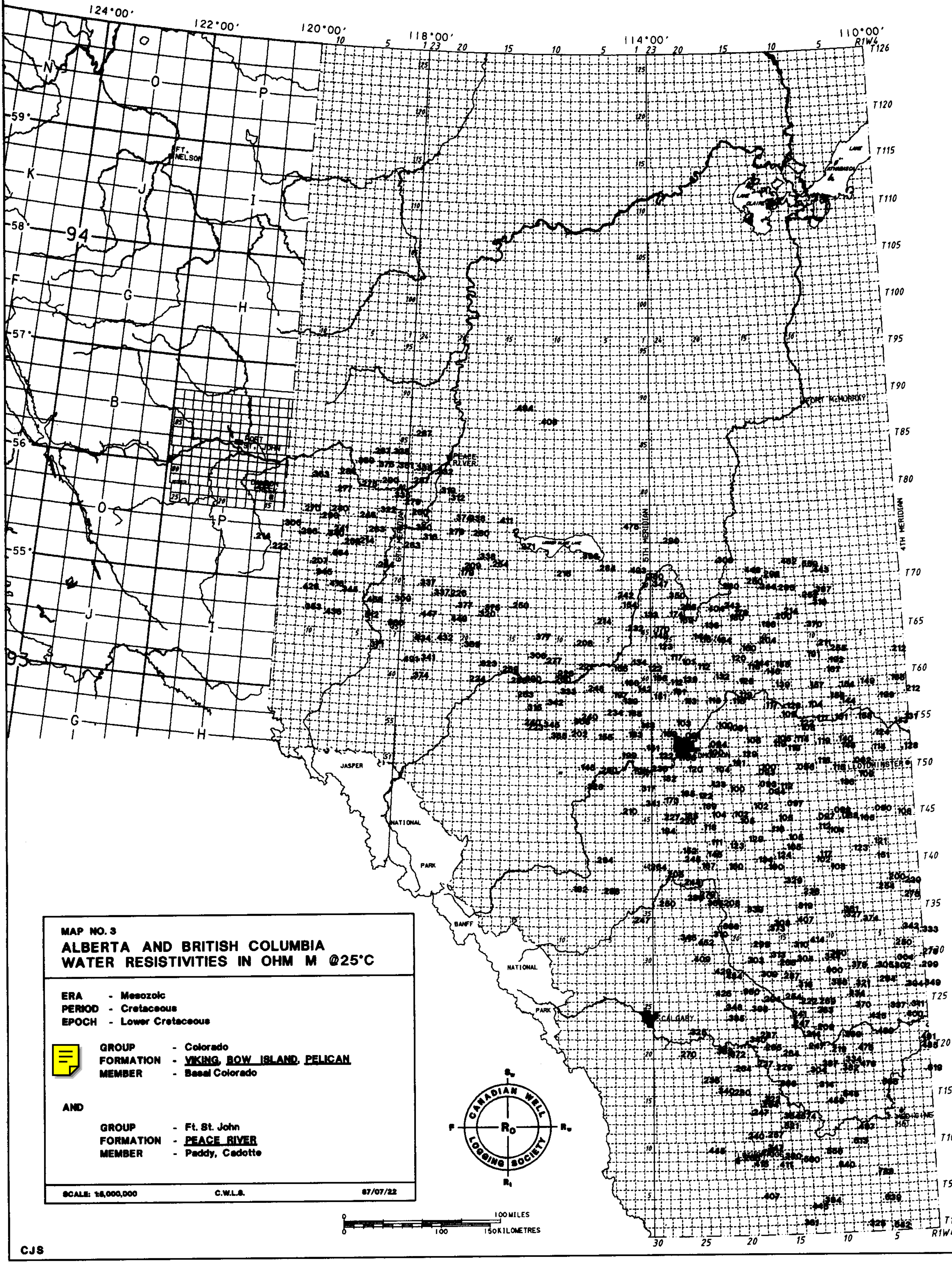


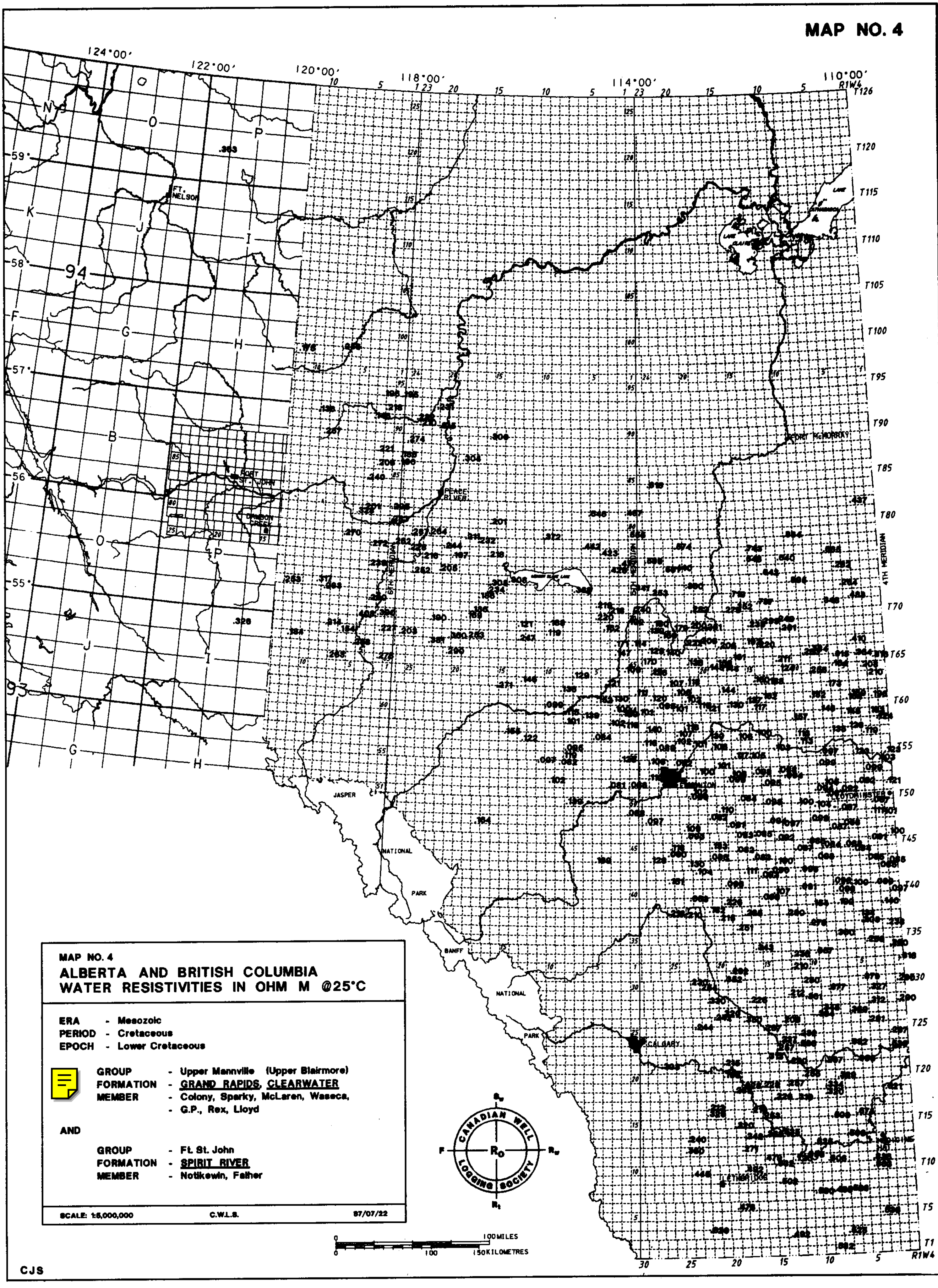
MAP NO. 1
ALBERTA AND BRITISH COLUMBIA
WATER RESISTIVITIES IN OHM M @25°C
ERA - Mesozoic
PERIOD - Cretaceous
EPOCH - Upper Cretaceous
GROUP - Brazeau
FORMATION - BELLY RIVER
MEMBER - Ribstone, Victoria, Brosseau
SCALE: 1:5,000,000
C.W.L.S.
87/07/22
CANADIAN WELL LOGGING SOCIETY
100 MILES
150 KILOMETRES
124°00′
122°00′
120°00′
118°00′
114°00′
110°00′
6TH MERIDIAN
5TH MERIDIAN
4TH MERIDIAN
FT. NELSON
FORT ST. JOHN
DAWSON CREEK
PEACE RIVER
FORT McMURRAY
EDMONTON
LLOYDMINSTER
JASPER NATIONAL PARK
BANFF NATIONAL PARK
CALGARY
LETHBRIDGE
MEDICINE HAT

CJS

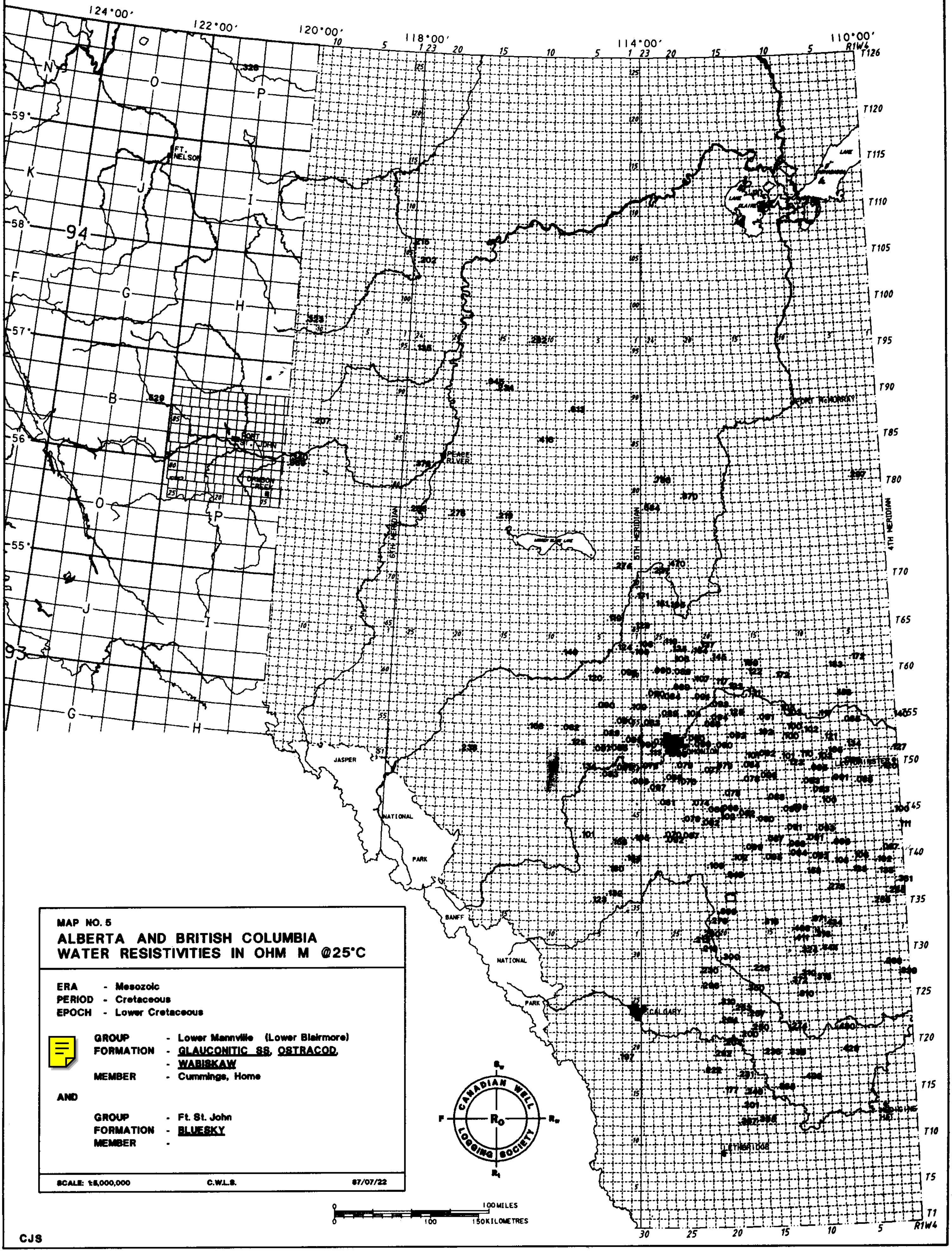

MAP NO. 2
MAP NO. 2
ALBERTA AND BRITISH COLUMBIA
WATER RESISTIVITIES IN OHM M @25°C
ERA - Mesozoic
PERIOD - Cretaceous
EPOCH - Upper Cretaceous
GROUP - Colorado, Alberta
FORMATION - MILK R., CARDIUM, - SECOND WHITE SPECKLED SHALE
MEMBER - Medicine Hat, Barons
AND
GROUP - Smoky
FORMATION - BADHEART, CARDIUM, JUMPING POUND, - DUNVEGAN
MEMBER - Doe Cr., Pouce Coupe
SCALE: 1:5,000,000
C.W.L.S.
87/07/22
CANADIAN WELL LOGGING SOCIETY
100 MILES
150 KILOMETRES
FT. NELSON
FORT ST. JOHN
DAWSON CREEK
PEACE RIVER
FORT McMURRAY
EDMONTON
LLOYDMINSTER
CALGARY
LETHBRIDGE
JASPER NATIONAL PARK
BANFF NATIONAL PARK
6TH MERIDIAN
5TH MERIDIAN
4TH MERIDIAN
CJS

MAP NO. 3


MAP NO. 3
ALBERTA AND BRITISH COLUMBIA
WATER RESISTIVITIES IN OHM M @25°C
ERA - Mesozoic
PERIOD - Cretaceous
EPOCH - Lower Cretaceous
GROUP - Colorado
FORMATION - VIKING, BOW ISLAND, PELICAN
MEMBER - Basal Colorado
AND
GROUP - Ft. St. John
FORMATION - PEACE RIVER
MEMBER - Paddy, Cadotte
SCALE: 1:5,000,000
C.W.L.S.
87/07/22
CANADIAN WELL LOGGING SOCIETY
100 MILES
150 KILOMETRES
CJS
124°00'
122°00'
120°00'
118°00'
114°00'
110°00'
R1W4
T126
T120
T115
T110
T105
T100
T95
T90
T85
T80
T75
T70
T65
T60
T55
T50
T45
T40
T35
T30
T25
T20
T15
T10
T5
T1
FT. NELSON
FORT ST. JOHN
PEACE RIVER
FORT McMURRAY
LLOYDMINSTER
CALGARY
JASPER
NATIONAL
PARK
BANFF
NATIONAL
PARK
5TH MERIDIAN
4TH MERIDIAN
94
93


MAP NO. 4
MAP NO. 4
ALBERTA AND BRITISH COLUMBIA
WATER RESISTIVITIES IN OHM M @25°C
ERA - Mesozoic
PERIOD - Cretaceous
EPOCH - Lower Cretaceous
GROUP - Upper Mannville (Upper Blairmore)
FORMATION - GRAND RAPIDS, CLEARWATER
MEMBER - Colony, Sparky, McLaren, Waseca,
- G.P., Rex, Lloyd
AND
GROUP - Ft. St. John
FORMATION - SPIRIT RIVER
MEMBER - Notikewin, Falher
SCALE: 1:5,000,000
C.W.L.S.
87/07/22
CANADIAN WELL LOGGING SOCIETY
100 MILES
150 KILOMETRES
FT. NELSON
FORT ST. JOHN
DAWSON CREEK
PEACE RIVER
FORT McMURRAY
EDMONTON
LLOYDMINSTER
CALGARY
JASPER
NATIONAL
PARK
BANFF
NATIONAL
PARK
4TH MERIDIAN
R1W4
CJS

MAP NO. 5


MAP NO. 5
ALBERTA AND BRITISH COLUMBIA
WATER RESISTIVITIES IN OHM M @25°C
ERA - Mesozoic
PERIOD - Cretaceous
EPOCH - Lower Cretaceous
GROUP - Lower Mannville (Lower Blairmore)
FORMATION - GLAUCONITIC SS, OSTRACOD,
- WABISKAW
MEMBER - Cummings, Home
AND
GROUP - Ft. St. John
FORMATION - BLUESKY
MEMBER -
SCALE: 1:5,000,000
C.W.L.S.
87/07/22
CANADIAN WELL LOGGING SOCIETY
100 MILES
150 KILOMETRES
FT. NELSON
FORT ST. JOHN
DAWSON CREEK
PEACE RIVER
FORT McMURRAY
JASPER
NATIONAL
PARK
BANFF
CALGARY
LETHBRIDGE
MEDICINE HAT
6TH MERIDIAN
5TH MERIDIAN
4TH MERIDIAN
124°00′
122°00′
120°00′
118°00′
114°00′
110°00′
R1W4
T126
T120
T115
T110
T105
T100
T95
T90
T85
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T65
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T45
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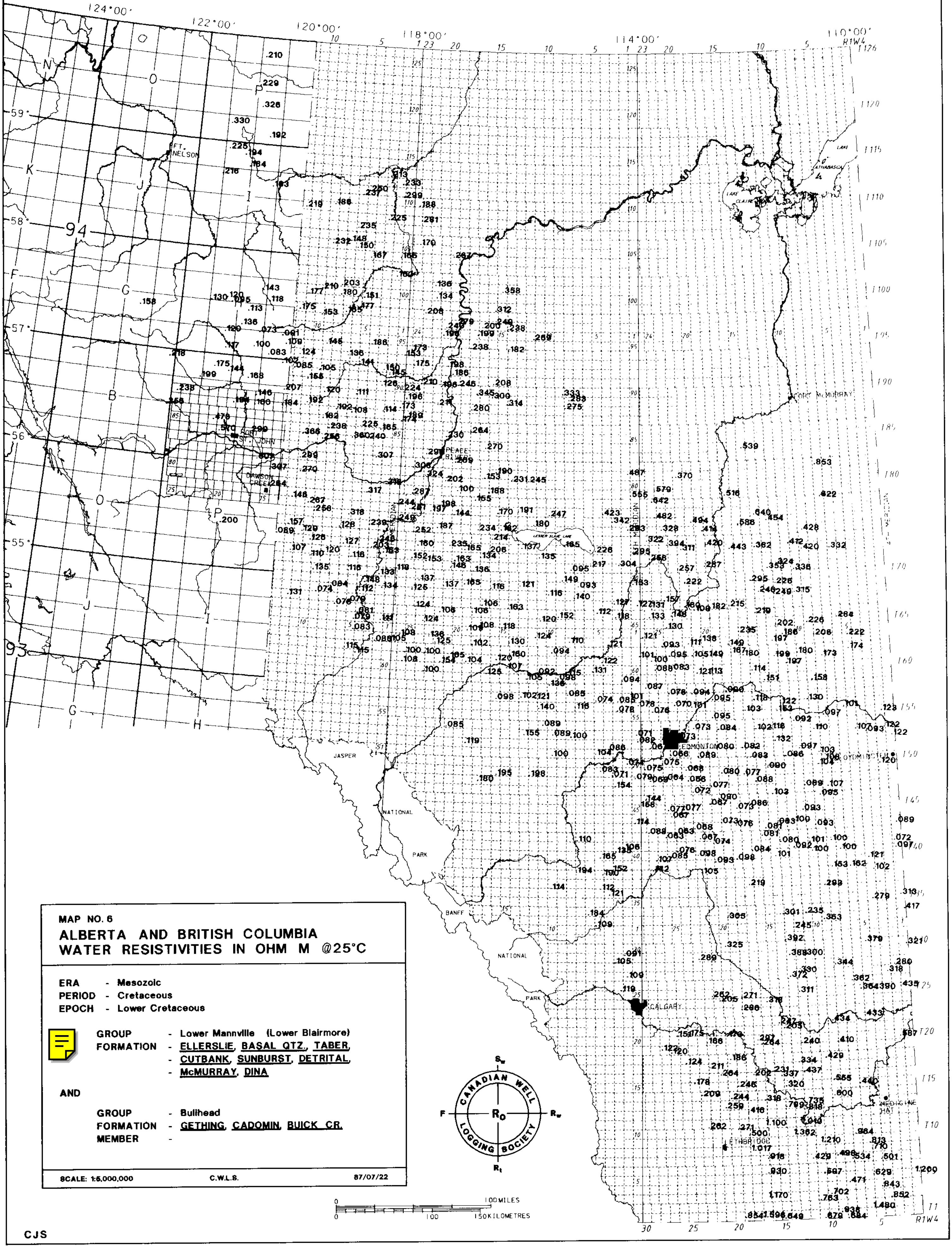
T20
T15
T10
T5
T1

CJS

MAP NO. 6



MAP NO. 6

ALBERTA AND BRITISH COLUMBIA
WATER RESISTIVITIES IN OHM M @25°C

ERA - Mesozoic
PERIOD - Cretaceous
EPOCH - Lower Cretaceous

GROUP - Lower Mannville (Lower Blairmore)
FORMATION - ELLERSLIE, BASAL QTZ., TABER,
- CUTBANK, SUNBURST, DETRITAL,
- McMURRAY, DINA

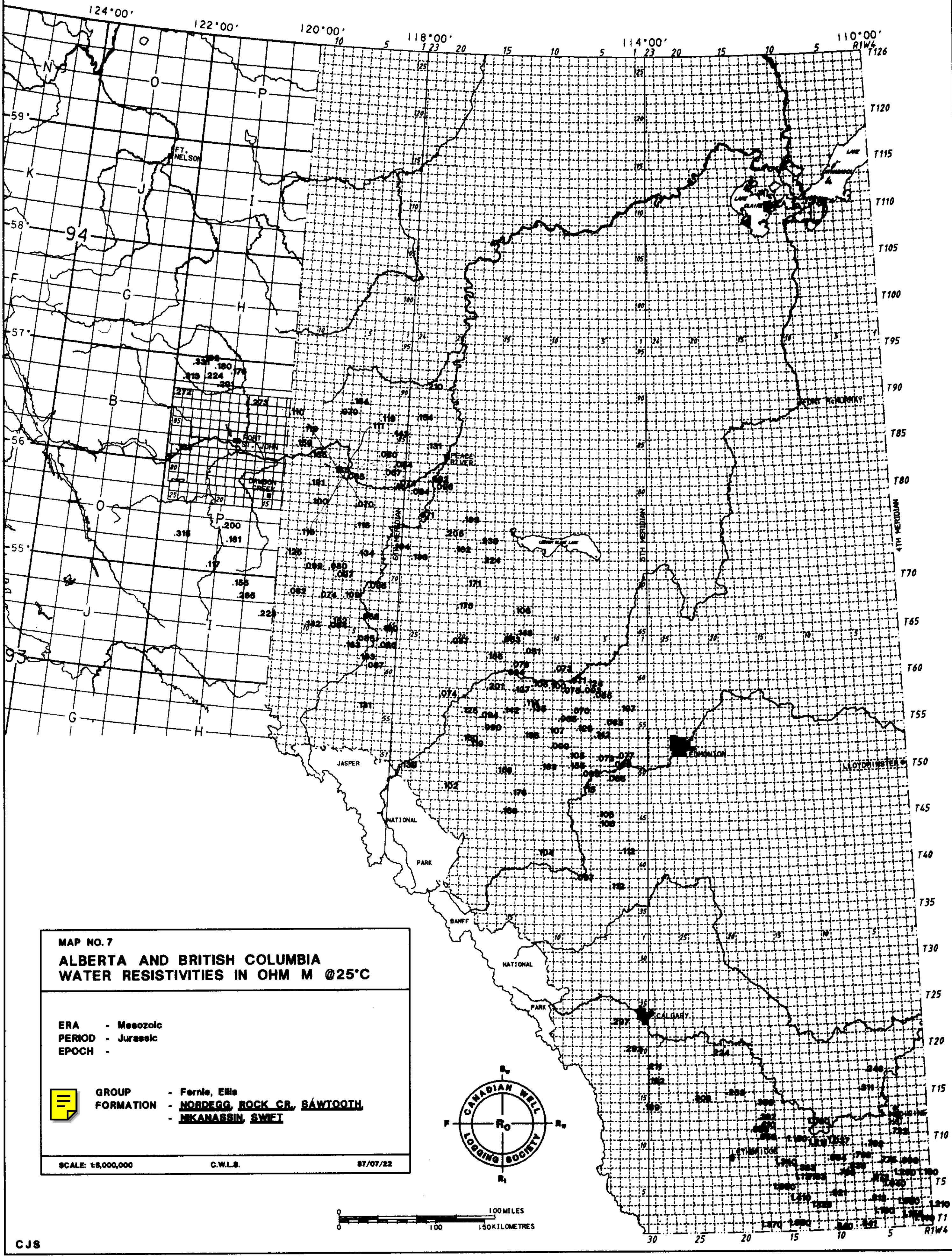
AND

GROUP - Bullhead
FORMATION - GETHING, CADOMIN, BUICK CR.
MEMBER -

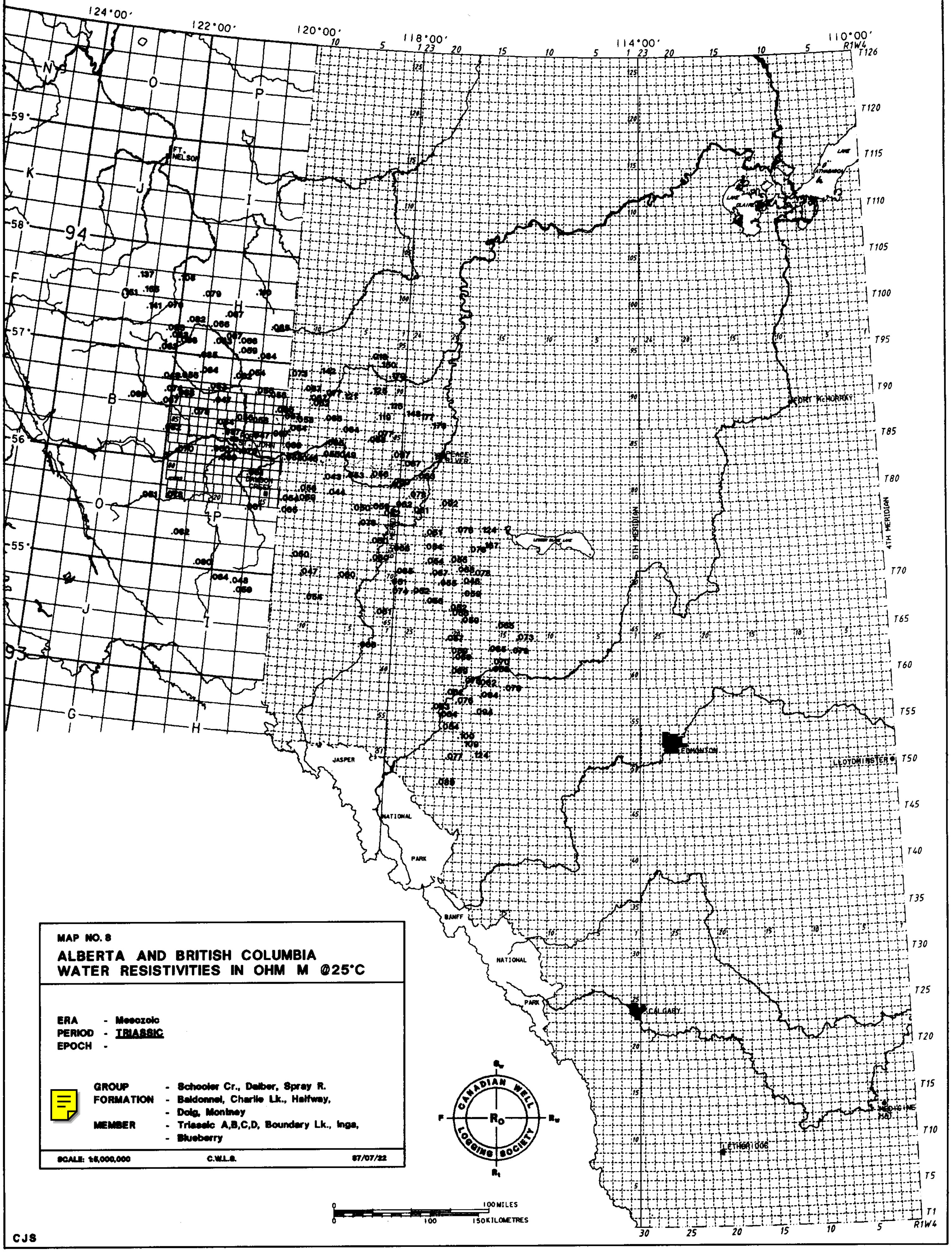
SCALE: 1:5,000,000 C.W.L.S. 87/07/22

CJS

MAP NO. 7


MAP NO. 7
ALBERTA AND BRITISH COLUMBIA
WATER RESISTIVITIES IN OHM M @25°C
ERA - Mesozoic
PERIOD - Jurassic
EPOCH -
GROUP - Fernie, Ellis
FORMATION - NORDEGG, ROCK CR., SAWTOOTH, NIKANASSIN, SWIFT
SCALE: 1:6,000,000
C.W.L.S.
87/07/22
CANADIAN WELL LOGGING SOCIETY
100 MILES
150 KILOMETRES
FT. NELSON
FORT ST. JOHN
DAWSON CREEK
PEACE RIVER
JASPER NATIONAL PARK
BANFF NATIONAL PARK
EDMONTON
CALGARY
LETHBRIDGE
LLOYDMINSTER
5TH MERIDIAN
4TH MERIDIAN
6TH MERIDIAN
124°00′
122°00′
120°00′
118°00′
114°00′
110°00′
R1W4
CJS

MAP NO. 8



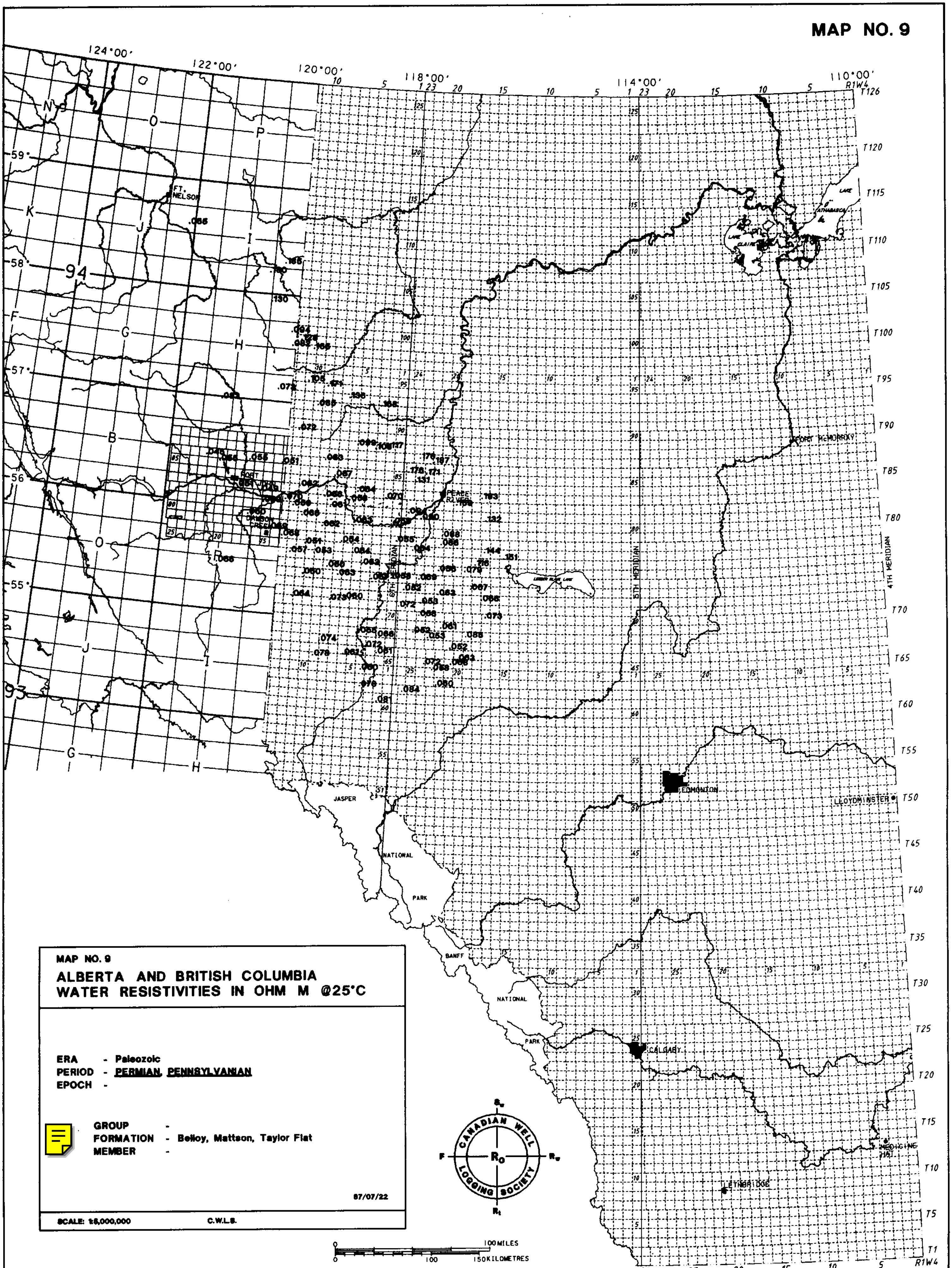
MAP NO. 8

ALBERTA AND BRITISH COLUMBIA WATER RESISTIVITIES IN OHM M @25°C

ERA - Mesozoic
PERIOD - TRIASSIC
EPOCH -

GROUP - Schooler Cr., Dalber, Spray R.
FORMATION - Baldonnel, Charlie Lk., Halfway, - Doig, Montney
MEMBER - Triassic A,B,C,D, Boundary Lk., Inga, - Blueberry

SCALE: 1:5,000,000 | C.W.L.S. | 87/07/22



MAP NO. 9

ALBERTA AND BRITISH COLUMBIA WATER RESISTIVITIES IN OHM M @25°C

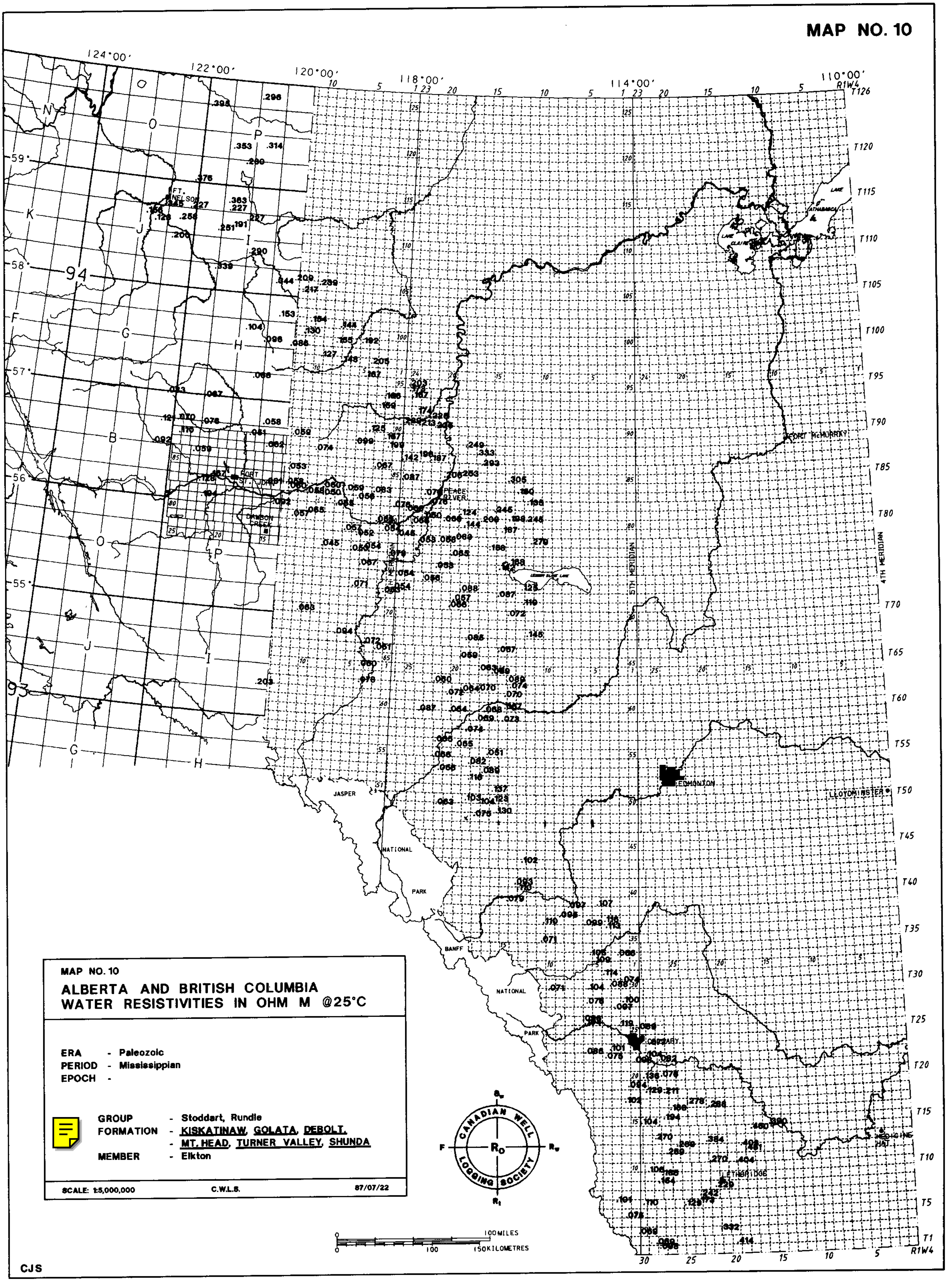
ERA - Paleozoic
PERIOD - PERMIAN, PENNSYLVANIAN
EPOCH -

GROUP -
FORMATION - Belloy, Mattson, Taylor Flat
MEMBER -

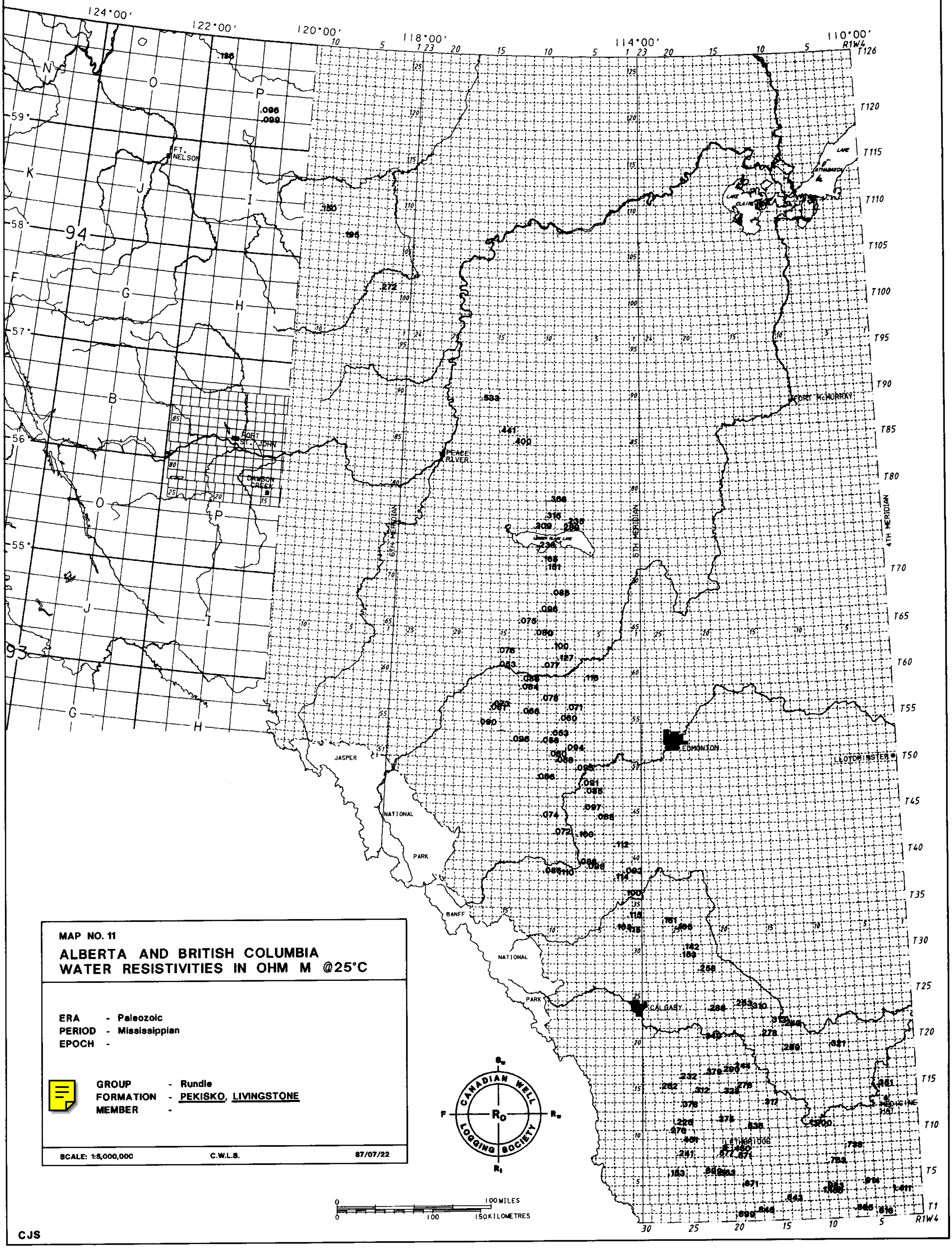
87/07/22

SCALE: 1:5,000,000 C.W.L.S.

CJS

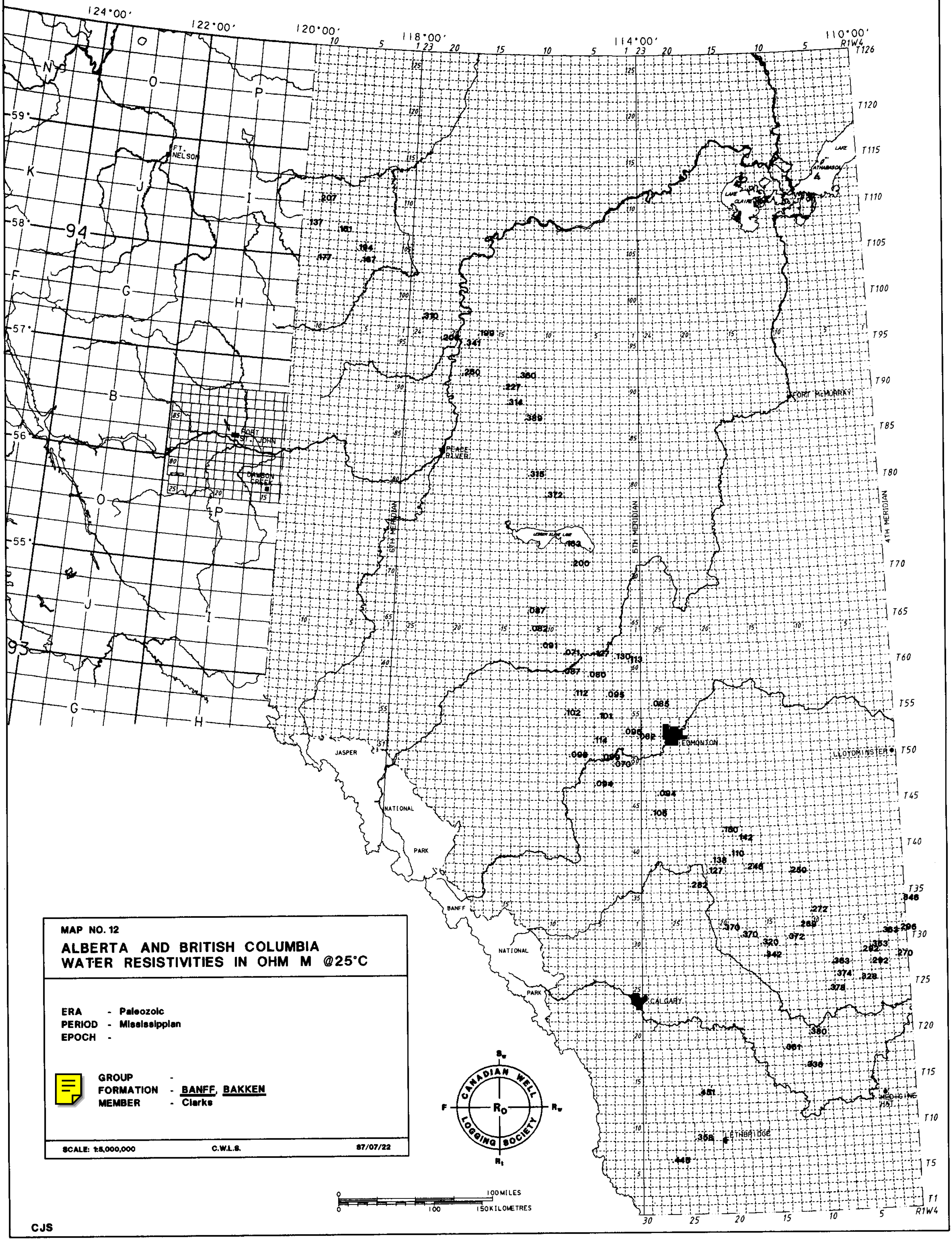

MAP NO. 10
MAP NO. 10
ALBERTA AND BRITISH COLUMBIA
WATER RESISTIVITIES IN OHM M @25°C
ERA - Paleozoic
PERIOD - Mississippian
EPOCH -
GROUP - Stoddart, Rundle
FORMATION - KISKATINAW, GOLATA, DEBOLT, - MT. HEAD, TURNER VALLEY, SHUNDA
MEMBER - Elkton
SCALE: 1:5,000,000
C.W.L.S.
87/07/22
CANADIAN WELL LOGGING SOCIETY
FT. NELSON
FORT ST. JOHN
DAWSON CREEK
PEACE RIVER
FORT McMURRAY
LESSER SLAVE LAKE
LAKE ATHABASCA
LAKE CLAIRE
EDMONTON
LLOYDMINSTER
CALGARY
LETHBRIDGE
MEDICINE HAT
JASPER NATIONAL PARK
BANFF NATIONAL PARK
5TH MERIDIAN
4TH MERIDIAN
6TH MERIDIAN
124°00′
122°00′
120°00′
118°00′
114°00′
110°00′
59°
58°
57°
56°
55°
94
93
100 MILES
150 KILOMETRES
CJS

MAP NO. 11



MAP NO. 11
ALBERTA AND BRITISH COLUMBIA
WATER RESISTIVITIES IN OHM M @25°C
ERA - Paleozoic
PERIOD - Mississippian
EPOCH -
GROUP - Rundle
FORMATION - PEKISKO, LIVINGSTONE
MEMBER -
SCALE: 1:5,000,000
C.W.L.S.
87/07/22
CANADIAN WELL LOGGING SOCIETY
FT. NELSON
FORT ST. JOHN
DAWSON CREEK
PEACE RIVER
FORT McMURRAY
LAKE CLAIRE
LAKE ATHABASCA
LESSER SLAVE LAKE
EDMONTON
LLOYDMINSTER
CALGARY
LETHBRIDGE
MEDICINE HAT
JASPER NATIONAL PARK
BANFF NATIONAL PARK
6TH MERIDIAN
5TH MERIDIAN
4TH MERIDIAN
100 MILES
150 KILOMETRES
CJS

MAP NO. 12



MAP NO. 12

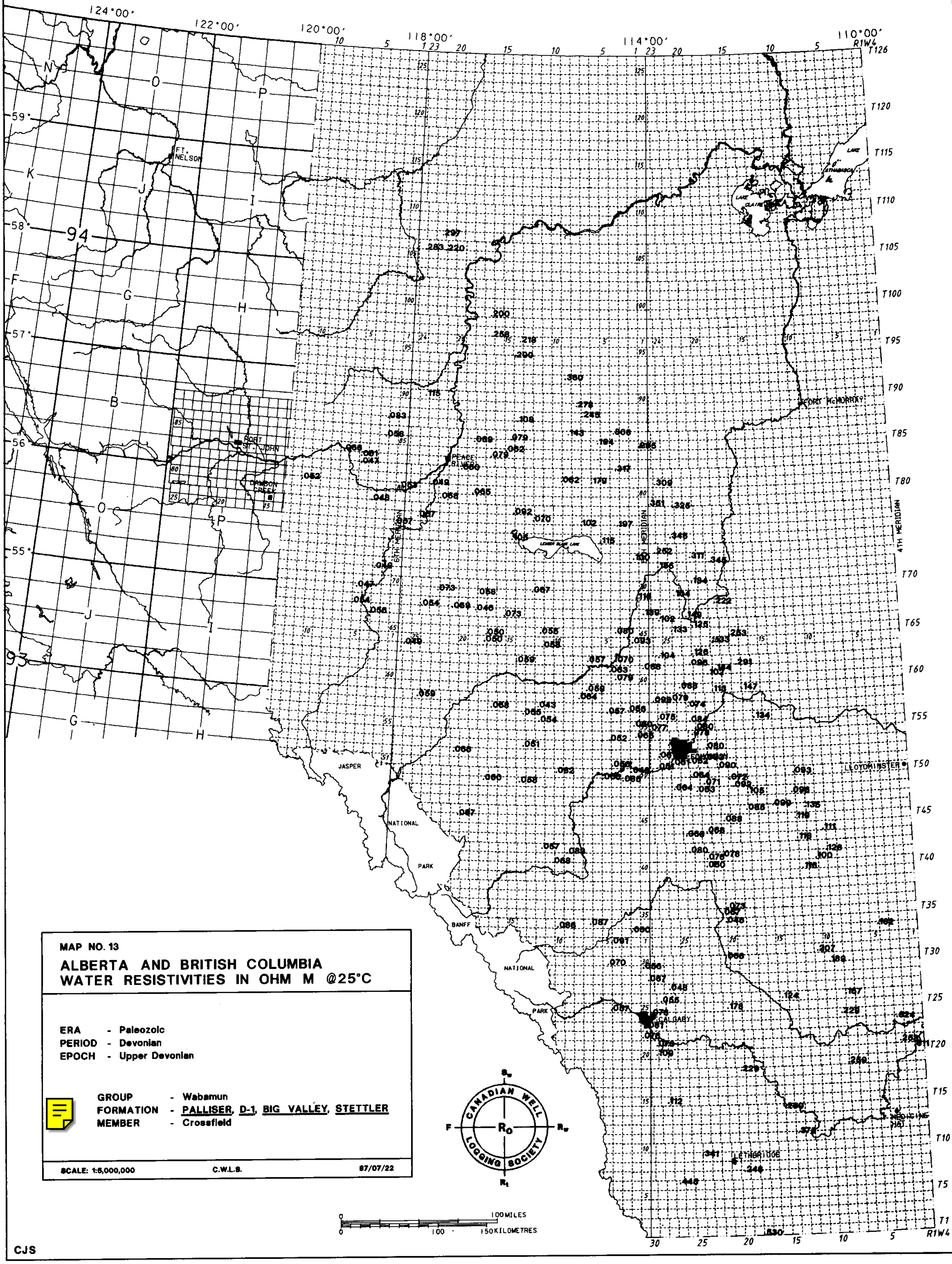
ALBERTA AND BRITISH COLUMBIA WATER RESISTIVITIES IN OHM M @25°C

ERA - Paleozoic
PERIOD - Mississippian
EPOCH -

GROUP -
FORMATION - BANFF, BAKKEN
MEMBER - Clarks

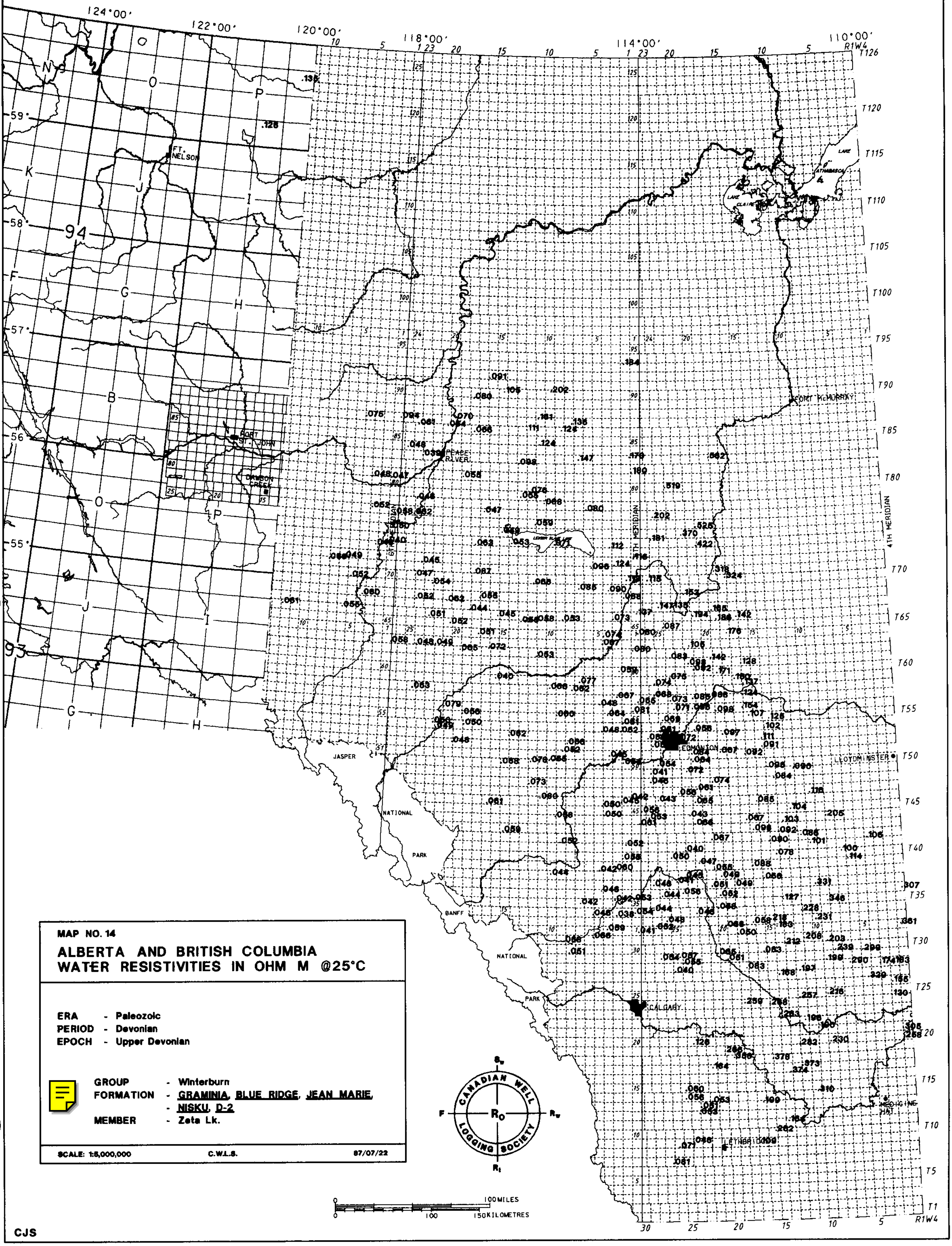
SCALE: 1:5,000,000 | C.W.L.S. | 87/07/22

CJS


MAP NO. 13
ALBERTA AND BRITISH COLUMBIA
WATER RESISTIVITIES IN OHM M @25°C
ERA - Paleozoic
PERIOD - Devonian
EPOCH - Upper Devonian
GROUP - Wabamun
FORMATION - PALLISER, D-1, BIG VALLEY, STETTLER
MEMBER - Crossfield
SCALE: 1:5,000,000
C.W.L.S.
87/07/22
CANADIAN WELL LOGGING SOCIETY
FT. NELSON
FORT ST. JOHN
DAWSON CREEK
PEACE RIVER
LESSER SLAVE LAKE
FORT McMURRAY
LAKE ATHABASCA
LAKE CLAIRE
EDMONTON
LLOYDMINSTER
JASPER NATIONAL PARK
BANFF NATIONAL PARK
CALGARY
LETHBRIDGE
MEDICINE HAT
5TH MERIDIAN
4TH MERIDIAN
100 MILES
150 KILOMETRES
124°00′
122°00′
120°00′
118°00′
114°00′
110°00′
R1W4
T126
T1

CJS

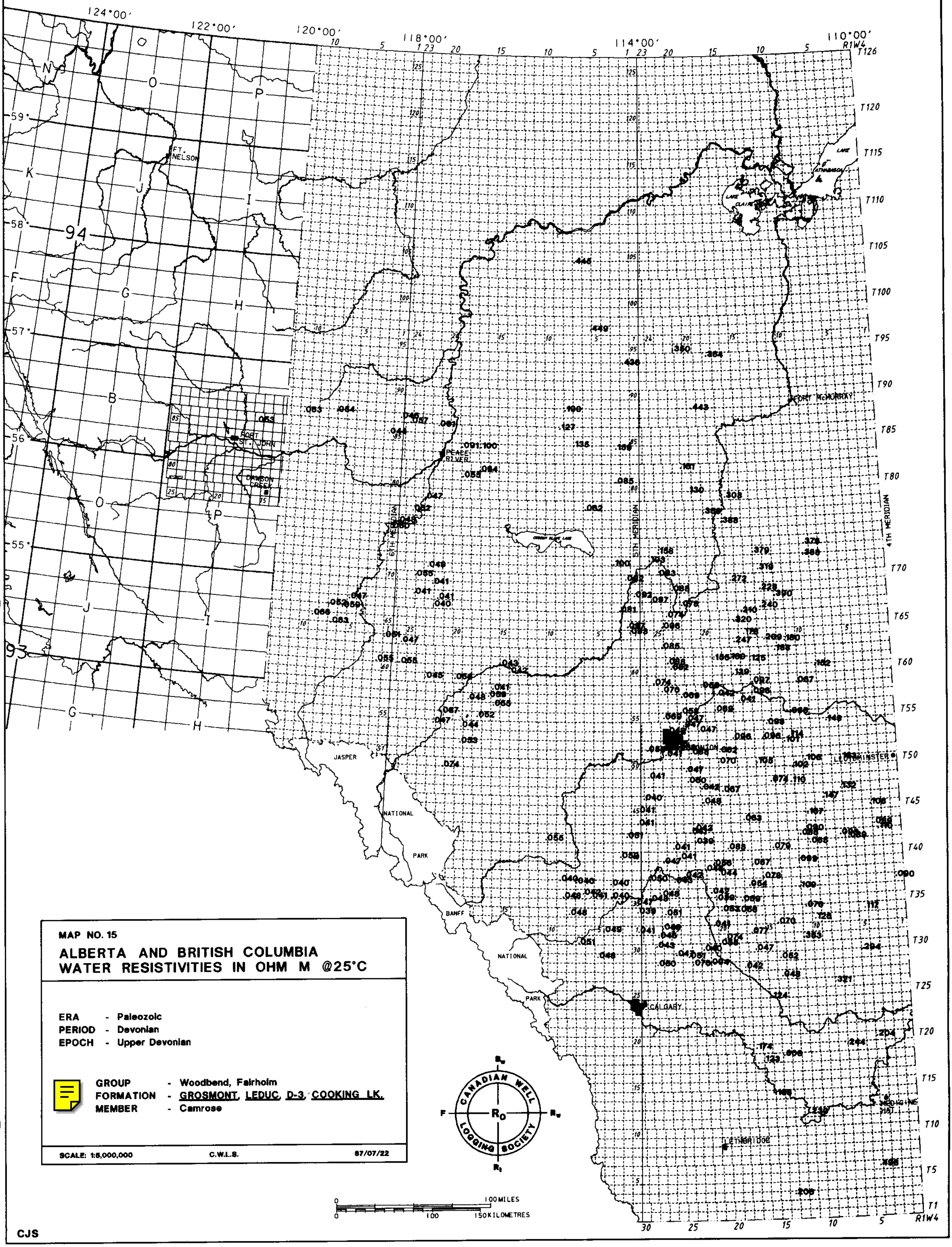
MAP NO. 14



MAP NO. 14
ALBERTA AND BRITISH COLUMBIA
WATER RESISTIVITIES IN OHM M @25°C
ERA - Paleozoic
PERIOD - Devonian
EPOCH - Upper Devonian
GROUP - Winterburn
FORMATION - GRAMINIA, BLUE RIDGE, JEAN MARIE, NISKU, D-2
MEMBER - Zeta Lk.
SCALE: 1:5,000,000
C.W.L.S.
87/07/22
CANADIAN WELL LOGGING SOCIETY
FT. NELSON
FORT ST. JOHN
DAWSON CREEK
PEACE RIVER
FORT McMURRAY
LAKE ATHABASCA
LAKE CLAIRE
LESSER SLAVE LAKE
EDMONTON
LLOYDMINSTER
CALGARY
LETHBRIDGE
MEDICINE HAT
JASPER NATIONAL PARK
BANFF NATIONAL PARK
5TH MERIDIAN
4TH MERIDIAN
6TH MERIDIAN
124°00'
122°00'
120°00'
118°00'
114°00'
110°00'
100 MILES
150 KILOMETRES

CJS

MAP NO. 15



MAP NO. 15

ALBERTA AND BRITISH COLUMBIA WATER RESISTIVITIES IN OHM M @25°C

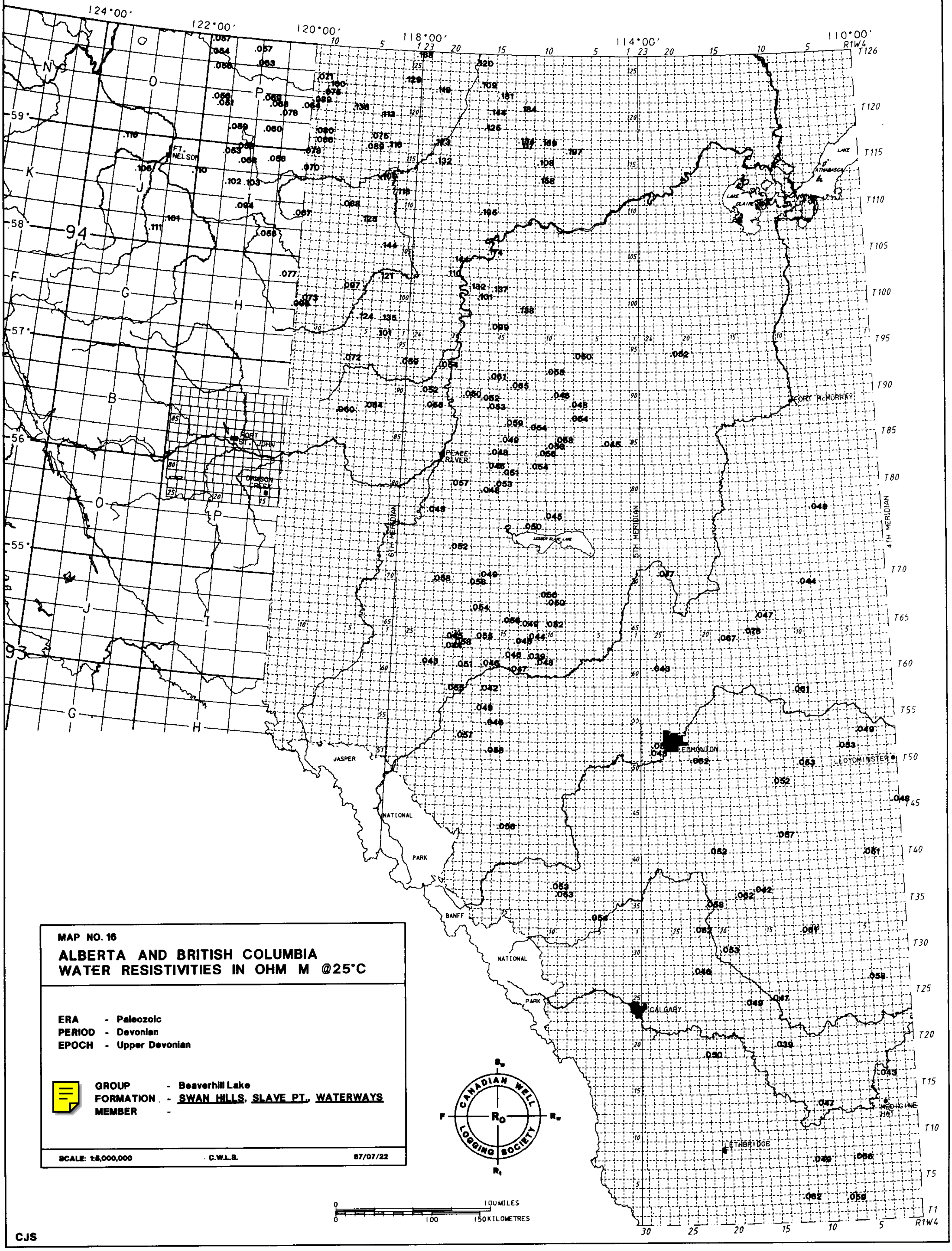
ERA - Paleozoic
PERIOD - Devonian
EPOCH - Upper Devonian

GROUP - Woodbend, Fairholm
FORMATION - GROSMONT, LEDUC, D-3, COOKING LK.
MEMBER - Camrose

SCALE: 1:5,000,000 C.W.L.S. 87/07/22

CJS

MAP NO. 16



MAP NO. 16

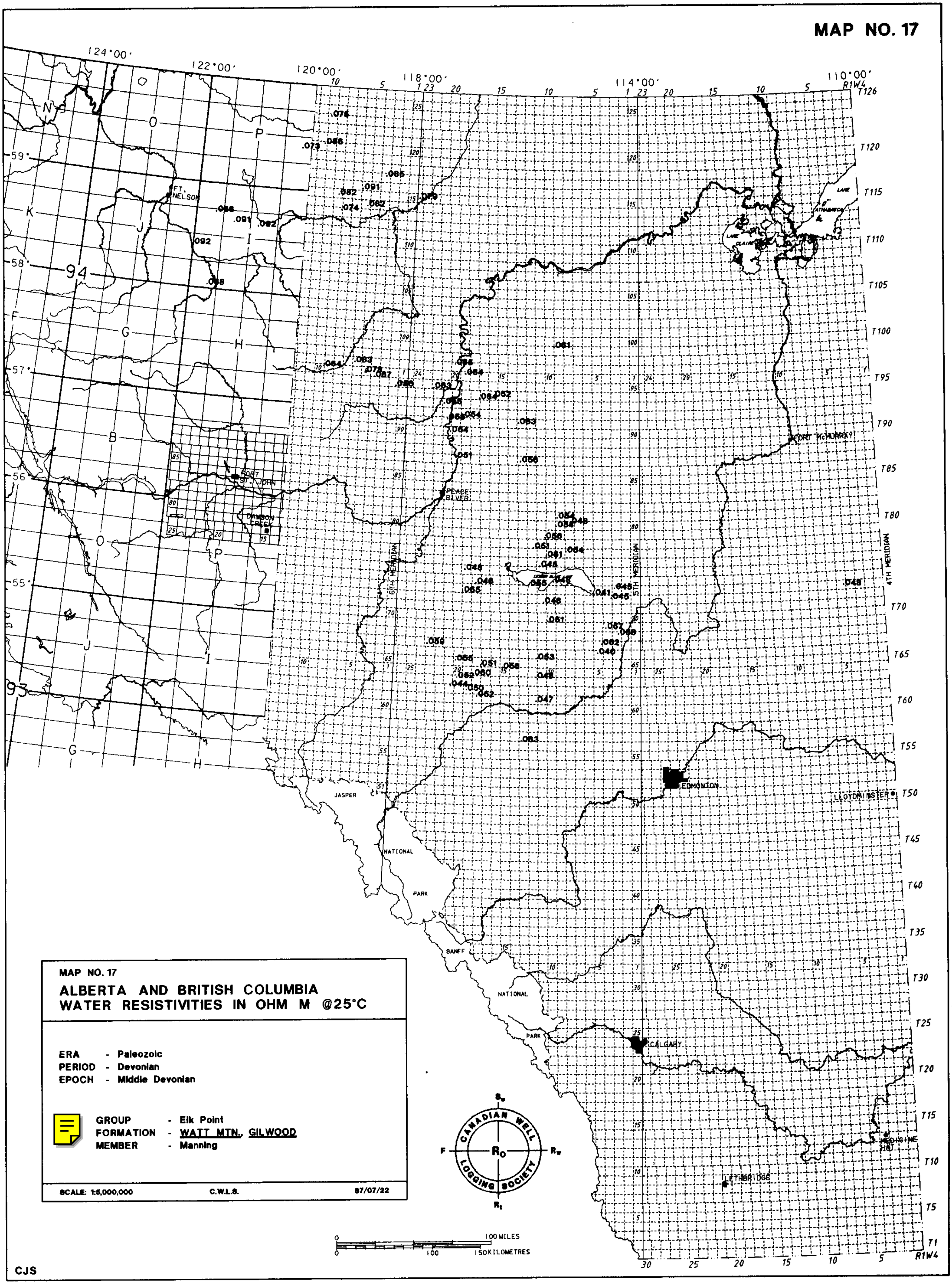
ALBERTA AND BRITISH COLUMBIA WATER RESISTIVITIES IN OHM M @25°C

ERA - Paleozoic
PERIOD - Devonian
EPOCH - Upper Devonian

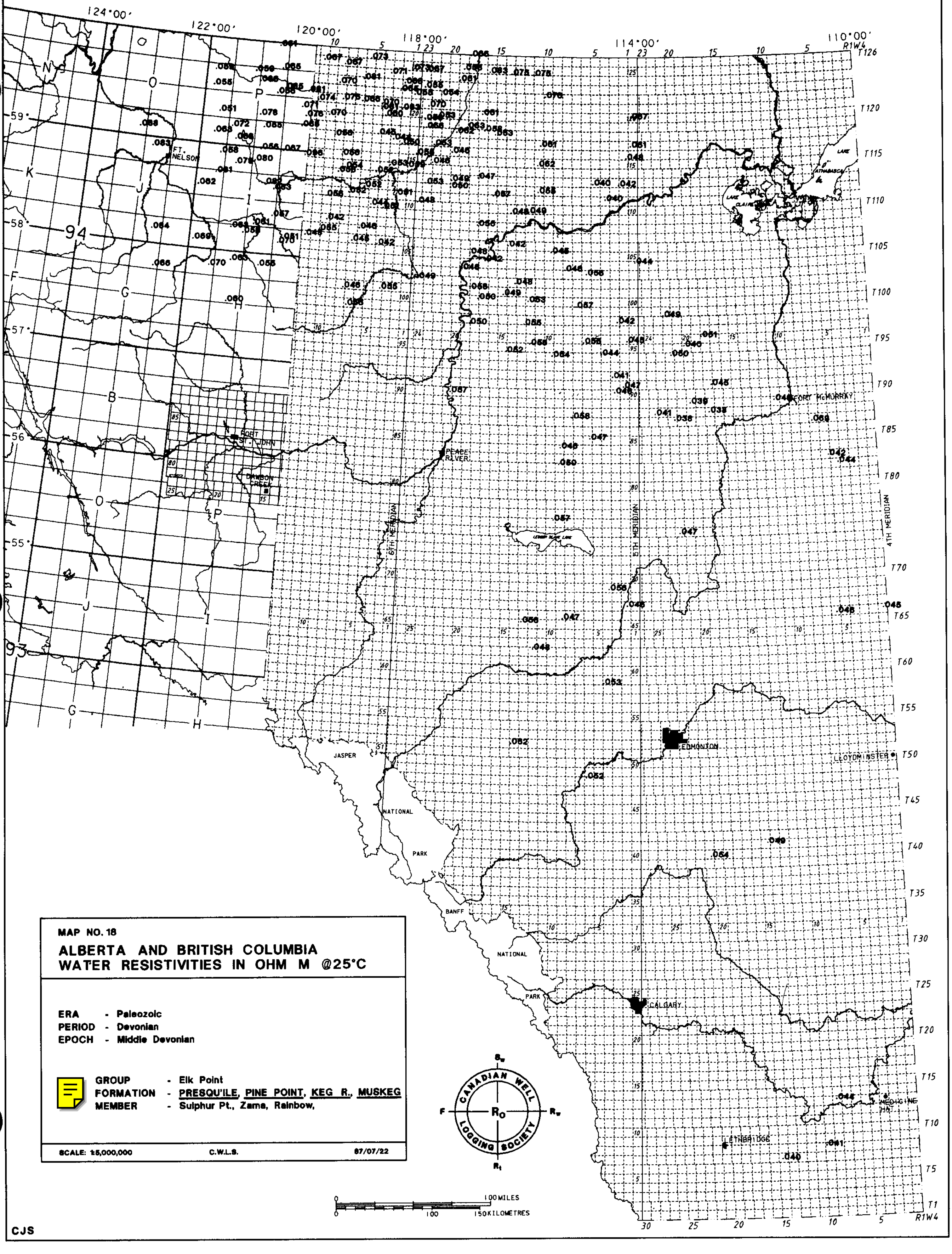
GROUP - Beaverhill Lake
FORMATION - SWAN HILLS, SLAVE PT., WATERWAYS
MEMBER -

SCALE: 1:5,000,000 C.W.L.S. 87/07/22

CJS


MAP NO. 17
MAP NO. 17
ALBERTA AND BRITISH COLUMBIA
WATER RESISTIVITIES IN OHM M @25°C
ERA - Paleozoic
PERIOD - Devonian
EPOCH - Middle Devonian
GROUP - Elk Point
FORMATION - WATT MTN., GILWOOD
MEMBER - Manning
SCALE: 1:5,000,000
C.W.L.S.
87/07/22
CANADIAN WELL LOGGING SOCIETY
100 MILES
150 KILOMETRES
FT. NELSON
FORT ST. JOHN
DAWSON CREEK
PEACE RIVER
FORT McMURRAY
EDMONTON
LLOYDMINSTER
CALGARY
LETHBRIDGE
MEDICINE HAT
JASPER
NATIONAL
PARK
BANFF
NATIONAL
PARK
6TH MERIDIAN
5TH MERIDIAN
4TH MERIDIAN
124°00′
122°00′
120°00′
118°00′
114°00′
110°00′
CJS

MAP NO. 18



MAP NO. 18

ALBERTA AND BRITISH COLUMBIA WATER RESISTIVITIES IN OHM M @25°C

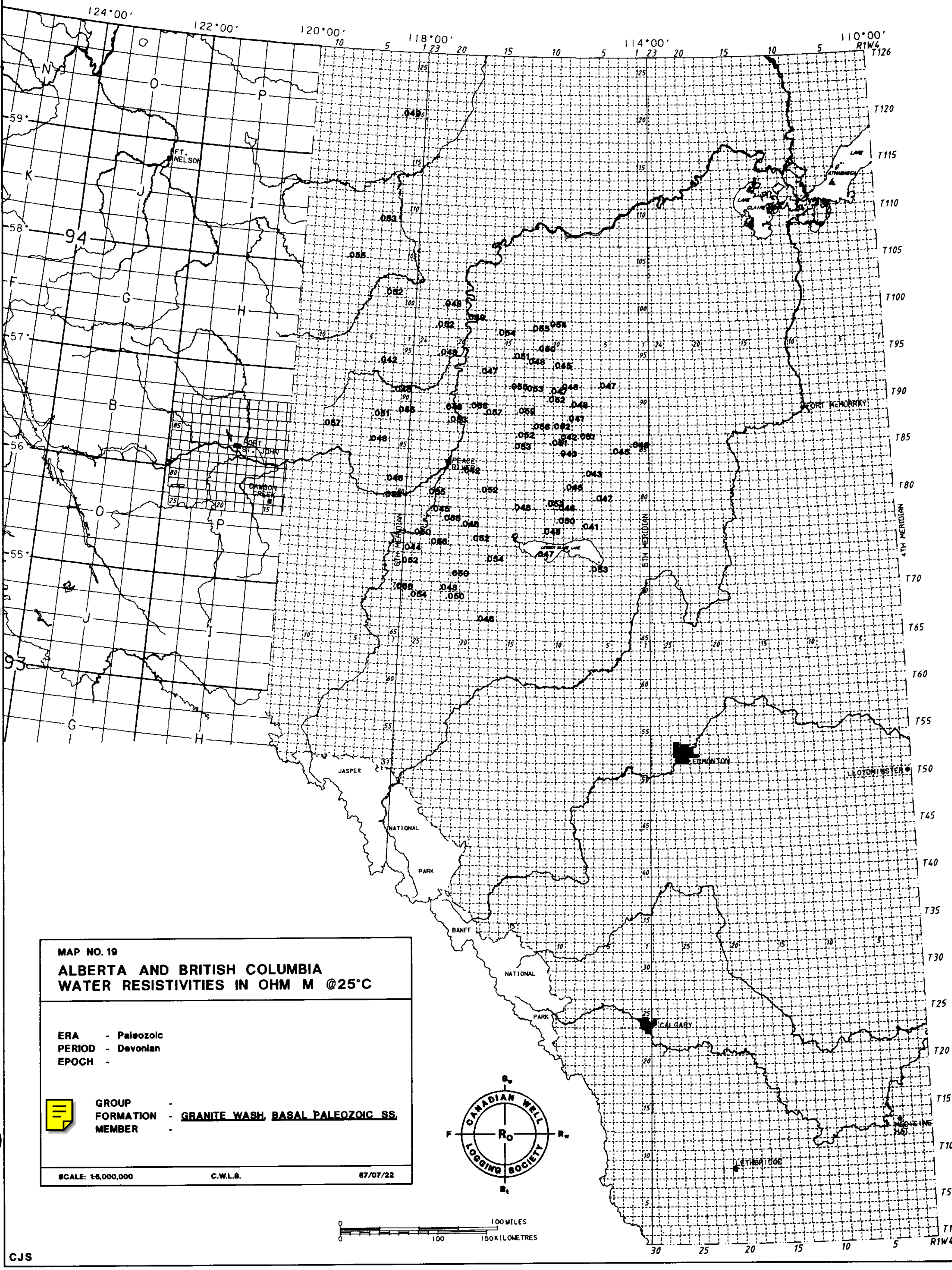
ERA - Paleozoic
PERIOD - Devonian
EPOCH - Middle Devonian

GROUP - Elk Point
FORMATION - PRESQU'ILE, PINE POINT, KEG R., MUSKEG
MEMBER - Sulphur Pt., Zama, Rainbow,

SCALE: 1:5,000,000 C.W.L.S. 87/07/22

CJS

MAP NO. 19



MAP NO. 19

ALBERTA AND BRITISH COLUMBIA WATER RESISTIVITIES IN OHM M @25°C

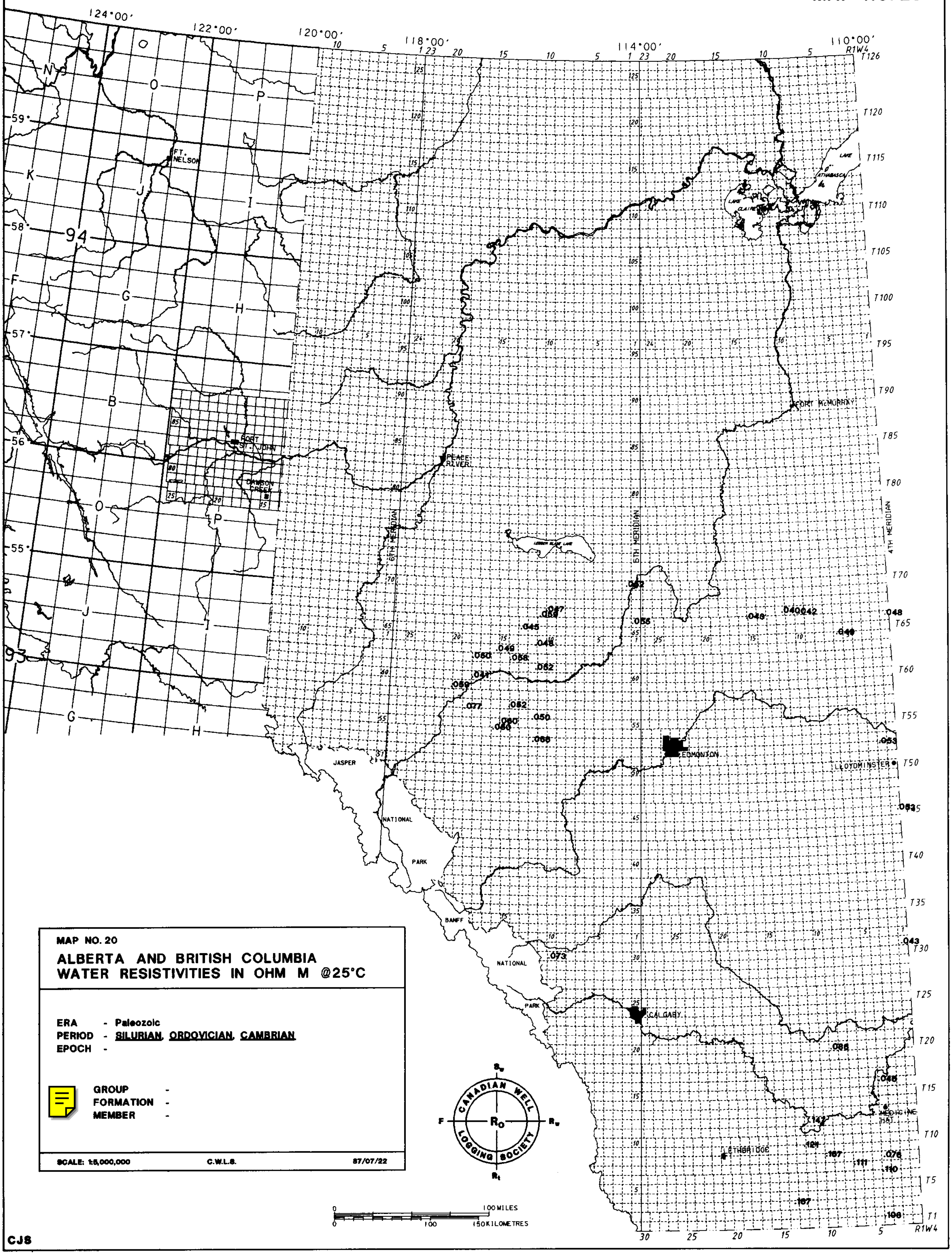
ERA - Paleozoic
PERIOD - Devonian
EPOCH -

GROUP -
FORMATION - GRANITE WASH, BASAL PALEOZOIC SS.
MEMBER -

SCALE: 1:5,000,000 C.W.L.S. 87/07/22

CJS

MAP NO. 20


MAP NO. 20
ALBERTA AND BRITISH COLUMBIA
WATER RESISTIVITIES IN OHM M @25°C
ERA - Paleozoic
PERIOD - SILURIAN, ORDOVICIAN, CAMBRIAN
EPOCH -
GROUP -
FORMATION -
MEMBER -
SCALE: 1:5,000,000
C.W.L.S.
87/07/22
CANADIAN WELL LOGGING SOCIETY
FT. NELSON
FORT ST. JOHN
DAWSON CREEK
PEACE RIVER
FORT McMURRAY
LESSER SLAVE LAKE
LAKE CLAIRE
LAKE ATHABASCA
EDMONTON
LLOYDMINSTER
CALGARY
LETHBRIDGE
MEDICINE HAT
JASPER NATIONAL PARK
BANFF NATIONAL PARK
6TH MERIDIAN
5TH MERIDIAN
4TH MERIDIAN
124°00′
122°00′
120°00′
118°00′
114°00′
110°00′
R1W4
T126
T1
100 MILES
150 KILOMETRES
CJS

Saskatchewan – Manitoba

Alphabetical List of Formations

A

ALIDA 30
AMARANTH 28
ASHERN 34
ASHVILLE 22

B

BAKKEN 32
BEAVERHILL LAKE 34
BIG VALLEY 33
BIRDBEAR 33
BLAIRMORE 23
BLAIRMORE 24
BOW ISLAND 22

C

CAMBRIAN 37
CANTUAR 23
CARDIUM 21
CHARLES 29
CLEARWATER 23
COLONY 23
COLORADO 21
COLORADO 22
CUMMINGS 24

D

DAWSON BAY 34
DEADWOOD 37
DETRITAL 24
DEVONIAN 33
DEVONIAN 34
DINA 24
DUPEROW 33

E

ELK POINT 34
ELM POINT 34

F

FROBISHER 30
FROBISHER - ALIDA 30

G

GRAND RAPIDS 23
GRAVELBOURG 28
GP 23
G.P. 23
GENERAL PETROLEUM 23

H

HALBRITE 30
HASTINGS 30
HUNTOON 30

I

INNES 30
INTERLAKE 35

J

JEFFERSON 33
JURASSIC 25
JURASSIC 26
JURASSIC 27
JURASSIC 28

K

KIBBEY 28
KISBEY 30

L

LEA PARK 21
LLOYDMINSTER 23
LODGEPOLE 31
LOWER BLAIRMORE 24
LOWER COLORADO 22
LOWER MANNVILLE 24

M

MADISON 29

MADISON 30
MADISON 31
MANITOBA 34
MCLAREN 23
MCMURRAY 24
MEADOW LAKE 34
MEDICINE HAT 21
MELITA 25
MIDALE 29
MILK RIVER 21
MISSION CANYON 30
MISSISSIPPIAN 29
MISSISSIPPIAN 30
MISSISSIPPIAN 31
MISSISSIPPIAN 32
MONTANA 21
MORRISON 26

N

NEW CASTLE 22
NISKU 33
NOTTINGHAM 30

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ORDOVICIAN 36

P

POPLAR 29
PRAIRIE EVAPORITE 34

R

RATCLIFFE 29
RED RIVER 36
REX 23
RIERDON 26
ROSERAY 26
ROUTLEDGE 31

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SCALLION 31
SHAUNAVON 27
SILURIAN 35
SOURIS RIVER 34
SOURIS VALLEY 31
SPARKY 23
SPINEY HILL 22
STONEWALL 36
STONEY MOUNTAIN 36
STOUGHTON 36
SUCCESS 24
SUNDANCE 25
SWAN RIVER 23
SWIFT 26

T

THREE FORKS 33
TILSTON 30
TORQUAY 33

U

UPPER BLAIRMORE 23
UPPER COLORADO 21
UPPER DEVONIAN 33
UPPER DEVONIAN 34
UPPER MANNVILLE 23

V

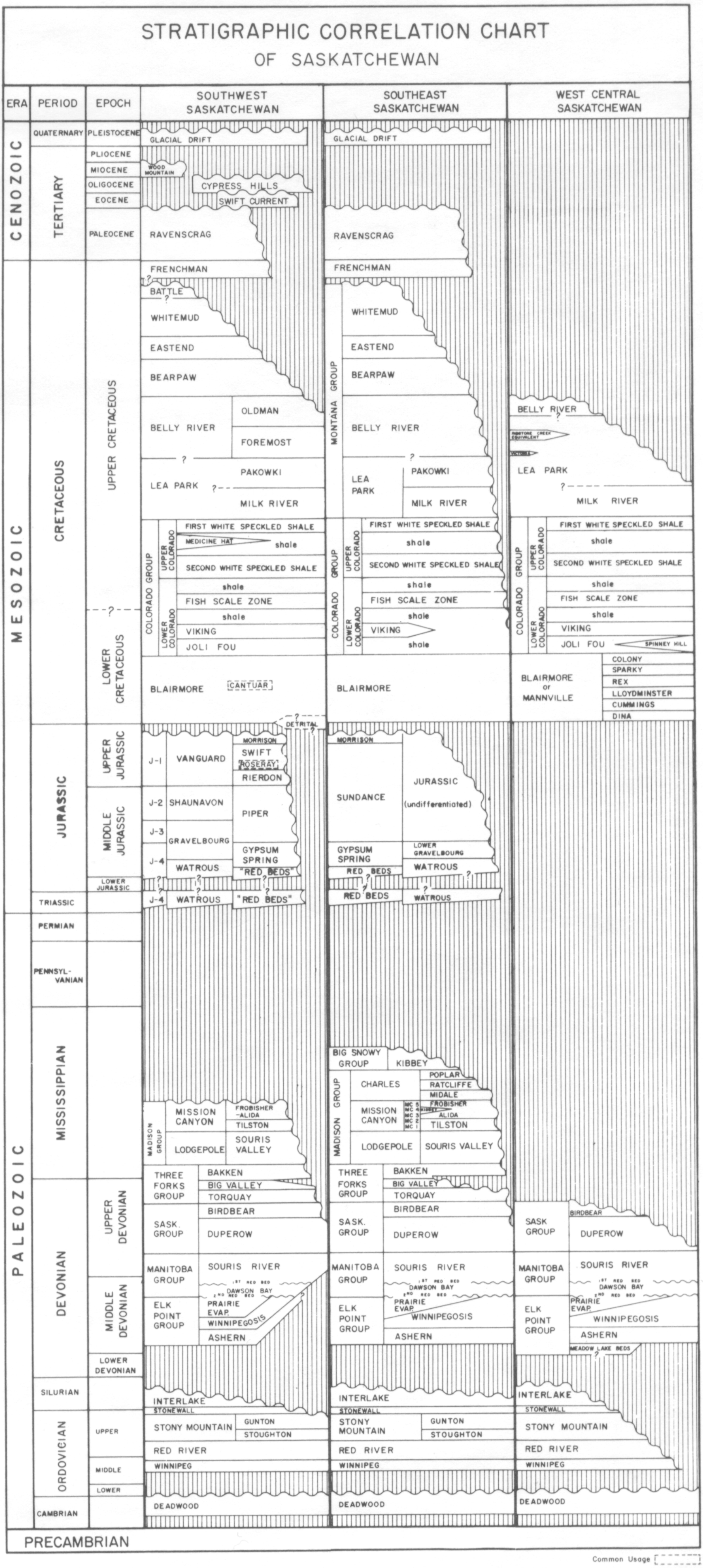
VANGUARD 26
VIKING 22
VIRDEN 31

W

WASECA 23
WASKADA 25
WATROUS 28
WILLMAR 30
WINNIPEG 36
WINNIPEGOSIS 34
WOODBEND 33

Y

YEOMAN 36



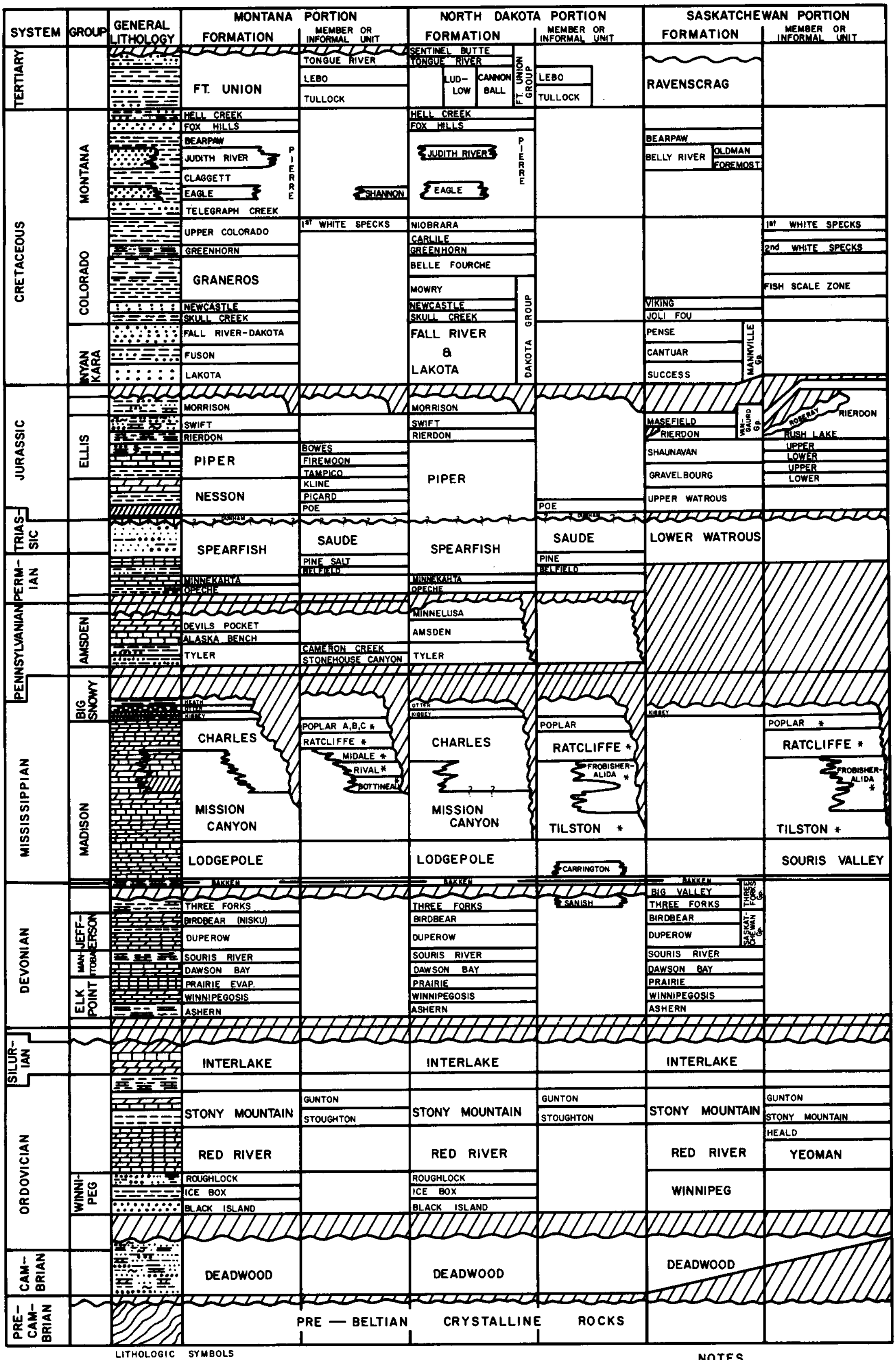
Saskatchewan Energy and Mines, 1983

GEOLOGICAL FORMATIONS IN MANITOBA

ERA	PERIOD	EPOCH	FORMATION	MEMBER	MAX. THICK (m)	BASIC LITHOLOGY
CENOZOIC	QUATERNARY	RECENT				TOP SOIL, DUNE SANDS
		PLEISTOCENE	GLACIAL DRIFT		140	CLAY, SAND, GRAVEL, BOULDERS, PEAT
	TERTIARY	PLIOCENE				
		MIOCENE				
		OLIGOCENE				
		EOCENE				
		PALEOCENE	TURTLE MTN.	PEACE GARDEN GOODLANDS	120	SHALE, CLAY AND SAND. LIGNITE BEDS LOCATED ONLY IN TURTLE MOUNTAIN
MESOZOIC	CRETACEOUS	UPPER CRETACEOUS	BOISSEVAIN		30	SAND AND SANDSTONE, GREENISH GREY, LOCATED ONLY IN TURTLE MOUNTAIN
			RIDING MTN.	COULTER ODANAH MILLWOOD	310	GREY SHALES—NON-CALC. LOCAL IRONSTONE BENTONITE NEAR BASE. GAS FOUND
			VERMILION RIVER	PEMBINA	155	SHALE DARK GREY CARBONACEOUS NON-CAL BENTONITE BANDS
				BOYNE		SHALE GREY SPECKLED CALC. BENTONITIC SLIGHTLY PETROLIFEROUS
				MORDEN		SHALE DARK GREY NON-CALC. CONCRETIONS.LOCAL SAND AND SILT
			FAVEL		40	GREY SHALE WITH HEAVY CALCAREOUS SPECKS BANDS LIMESTONE AND BENTONITE
			ASHVILLE ASHVILLE SAND		115	SHALE, DARK GREY, NON-CALC. SILTY "SAND ZONE" 27m F.G. QTZ. S. OR SS.
		LOWER CRETACEOUS	SWAN RIVER		75	SANDSTONE AND SAND, QTZ. PYRITIC SHALE—GREY, NON-CALC.
	JURASSIC	UPPER JURASSIC	WASKADA		200	BANDED-GREEN SHALE AND CALC.SANDSTONE
			MELITA			BANDS OF LIMESTONE, VARI-COLORED SHALE
		MIDDLE JURASSIC	RESTON		45	LIMESTONE, BUFF, AND SHALES, GREY
			AMARANTH	UPPER: EVAPORITE	45	WHITE ANHYDRITE AND/OR GYPSUM AND BANDED DOLOMITE AND SHALE
				LOWER: RED BEDS	40	RED SHALE TO SILTSTONE-DOLOMITIC OIL PRODUCTION
	TRIASSIC	(?)	ST. MARTIN COMPLEX		300	CARBONATE BRECCIA, TRACHYANDESITE (CRYPTO-EXPLOSION STRUCTURE)
PALEOZOIC	PERMIAN					
	PENNSYLVANIAN					
	MISSISSIPPIAN		MADISON GROUP: CHARLES		20	MASSIVE ANHYDRITE AND DOLOMITE
			MADISON GROUP: MISSION CANYON	MC-3 MC-2 MC-1	120	LIMESTONE—LIGHT BUFF, OOLITIC, FOSS. FRAG., CHERTY, BANDS SHALE AND ANHYDRITE. OIL PRODUCTION
			MADISON GROUP: LODGEPOLE	FLOSSIE LAKE WHITEWATER LAKE VIRDEN SCALLION / ROUTLEDGE	185	LIMESTONE & ARG. LIMESTONE LIGHT BROWN AND REDDISH MOTTLED. ZONES OF SHALEY, OOLITIC, CRINOIDAL & CHERTY. OIL PRODUCTION
			BAKKEN	UPPER MIDDLE LOWER	20	2 BLACK SHALE ZONES — SEPARATED BY SILTSTONE HIGH R.A. KICK. oil production
	DEVONIAN		QU'APPELLE GROUP: LYLETON		35	RED SILTSTONE AND SHALE DOLOMITIC.
			SASK GROUP: NISKU		40	LIMESTONE & DOLOMITE, YELLOW-GREY FOSS. POROUS. SOME ANHYD.
			SASK GROUP: DUPEROW		170	LIMESTONE & DOLOMITE. ARG.& ANHYDRITIC IN PLACES
			MAN. GROUP: SOURIS RIVER 1-ST RED		120	CYCLICAL SHALE, LIMESTONE & DOLOMITE. ANHYDRITE
			MAN. GROUP: DAWSON BAY 2-ND RED		65	LIMESTONE & DOLOMITE, POROUS, ANHYDRITE—LOCAL SHALE RED & GREEN
			ELK POINT G.: PRAIRIE EVAP		120	SALT POTASH & ANHYDRITE, DOLOMITE INTER-BEDDED.
			ELK POINT G.: WINNIPEGOSIS		75	DOLOMITE, LIGHT YELLOWISH BROWN REEFY.
			ELK POINT G.: ELM POINT			LIMESTONE—FOSS, HIGH CALCIUM
			ELK POINT G.: ASHERN		12	DOLOMITE AND SHALE—BRICK RED
	SILURIAN		INTERLAKE GROUP		135	DOLOMITE YELLOWISH—ORANGE TO GREYISH—YELLOW FOSS. SILTY ZONES
	ORDOVICIAN		STONEWALL		15	DOLOSTONE, GREYISH YELLOW, BEDDED
			STONY MOUNTAIN	WILLIAMS GUNTON	30	DOLOMITE—YELLOWISH—GREY SHALEY
				PENITENTIARY		DOLOMITE—DUSKY—YELLOW FOSS.
				GUNN	20	SHALE RED-GREEN FOSS. LIMESTONE BANDS
			RED RIVER	FORT GARRY SELKIRK CAT HEAD DOG HEAD	170	DOLOMITIC LIMESTONE, MOTTLED AND DOLOMITE
			WINNIPEG	UPPER UNIT	60	SHALE, GREEN, WAXY, SANDSTONE INTERBEDDED.
				SANDSTONE		SAND, SANDSTONE, QUARTZOSE.
	CAMBRIAN		DEADWOOD		60	SAND, BLACK TO GREEN-GREY WAXY, GLAUCONITIC SILTSTONE & SHALE, GREEN-GREY TO BLACK. VERY EDGE OF S.W. MANITOBA ONLY
PRECAMBRIAN						ACID & BASIC CRYSTALLINES & METAMORPHICS

Manitoba Energy and Mines, 1984

CORRELATION CHART WILLISTON BASIN



LITHOLOGIC SYMBOLS

- Shale & Claystone
- Siltstone
- Sandstone
- Limestone
- Dolomite
- Anhydrite
- Salt
- Black Organic Shale
- ~ Glauconite

NOTES

* Informal name

North Dakota portion provided by North Dakota Geological Survey

Saskatchewan portion provided by Donald M. Kent

Montana Geological Society
1978 Williston Basin Symposium

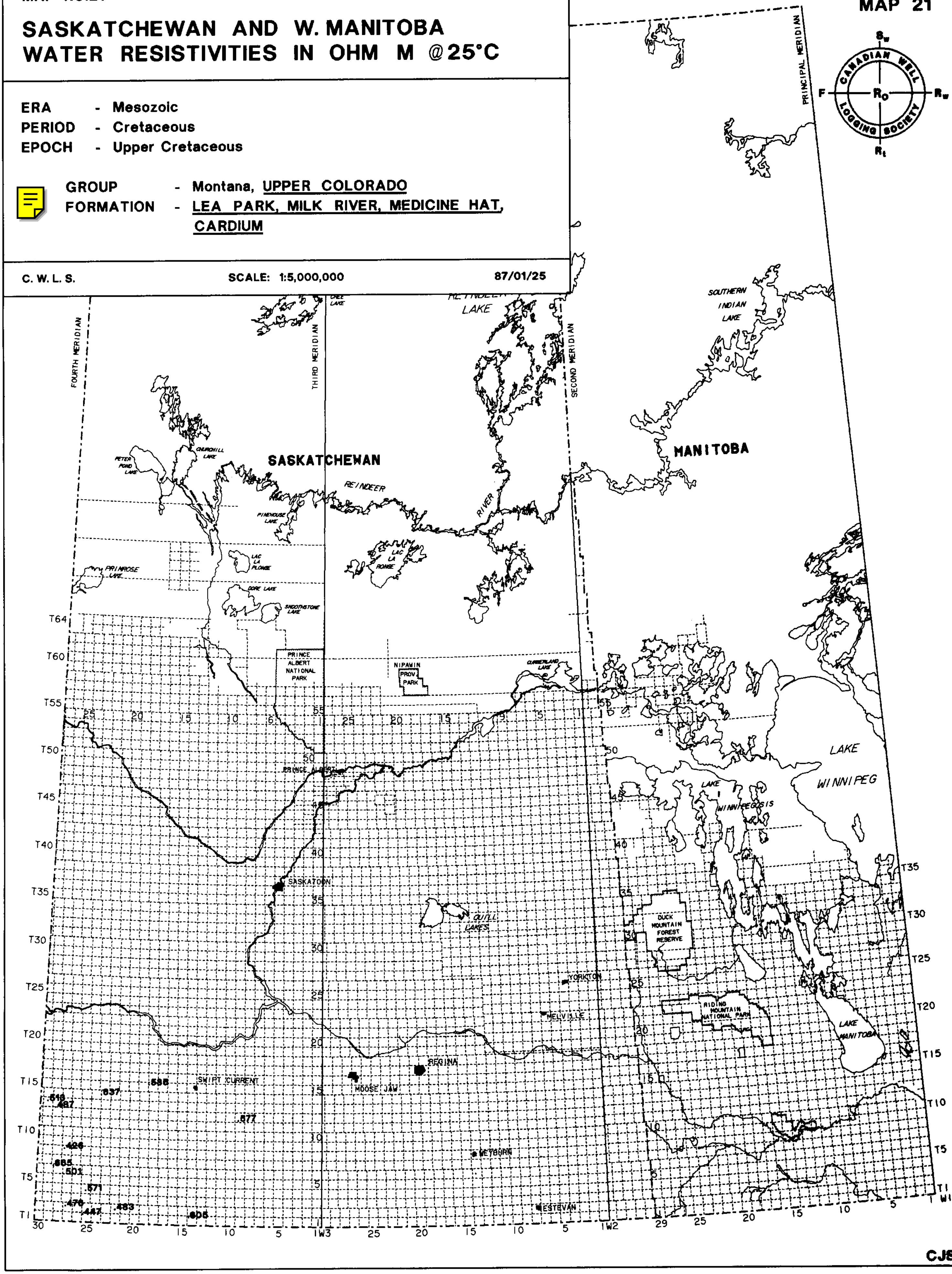
MAP NO.21

SASKATCHEWAN AND W. MANITOBA WATER RESISTIVITIES IN OHM M @25°C

ERA - Mesozoic
PERIOD - Cretaceous
EPOCH - Upper Cretaceous

GROUP - Montana, UPPER COLORADO
FORMATION - LEA PARK, MILK RIVER, MEDICINE HAT, CARDIUM

C. W. L. S. SCALE: 1:5,000,000 87/01/25



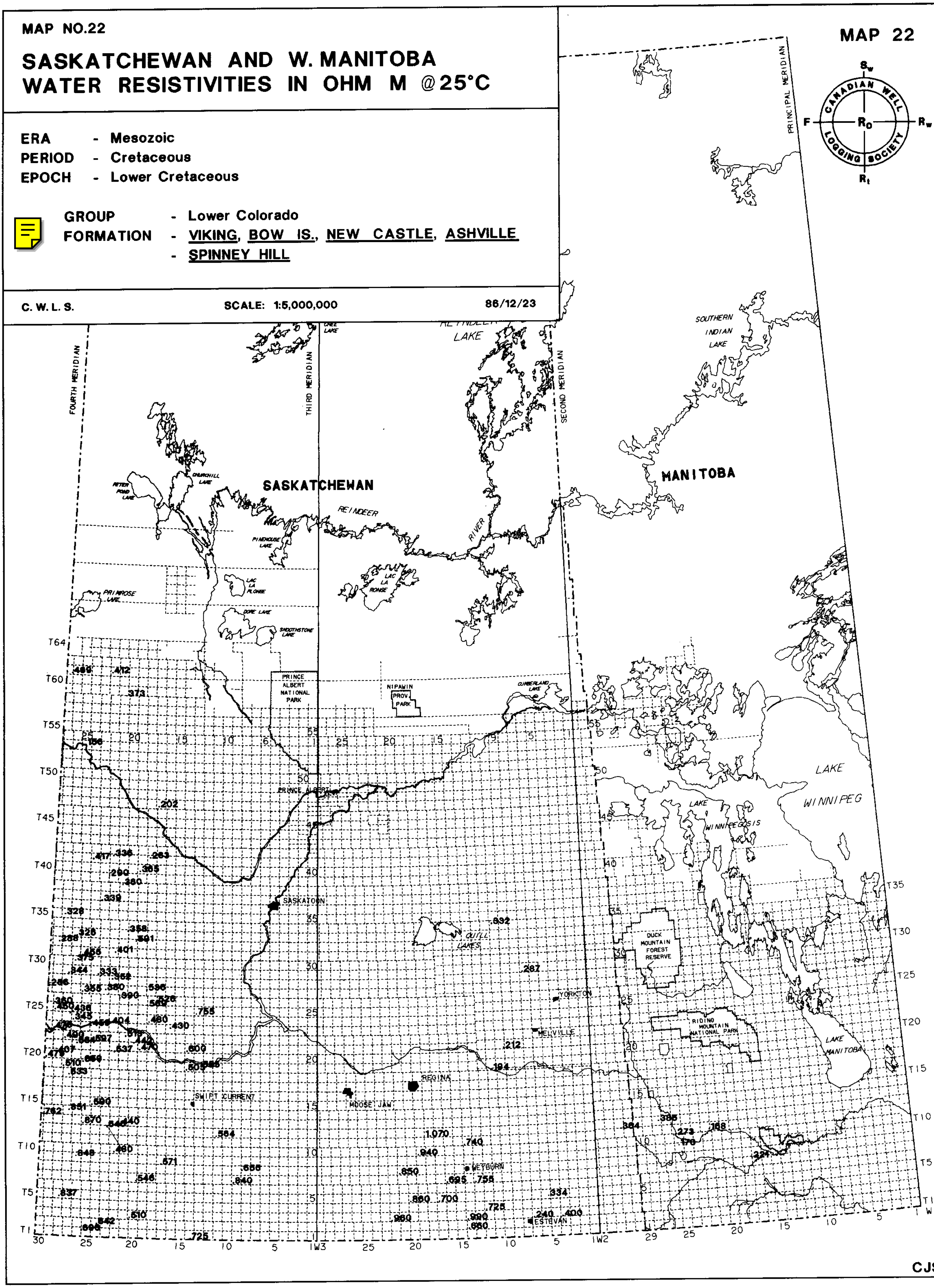
MAP NO.22

SASKATCHEWAN AND W. MANITOBA WATER RESISTIVITIES IN OHM M @25°C

ERA - Mesozoic
PERIOD - Cretaceous
EPOCH - Lower Cretaceous

GROUP - Lower Colorado
FORMATION - VIKING, BOW IS., NEW CASTLE, ASHVILLE - SPINNEY HILL

C. W. L. S. SCALE: 1:5,000,000 86/12/23



MAP NO.23

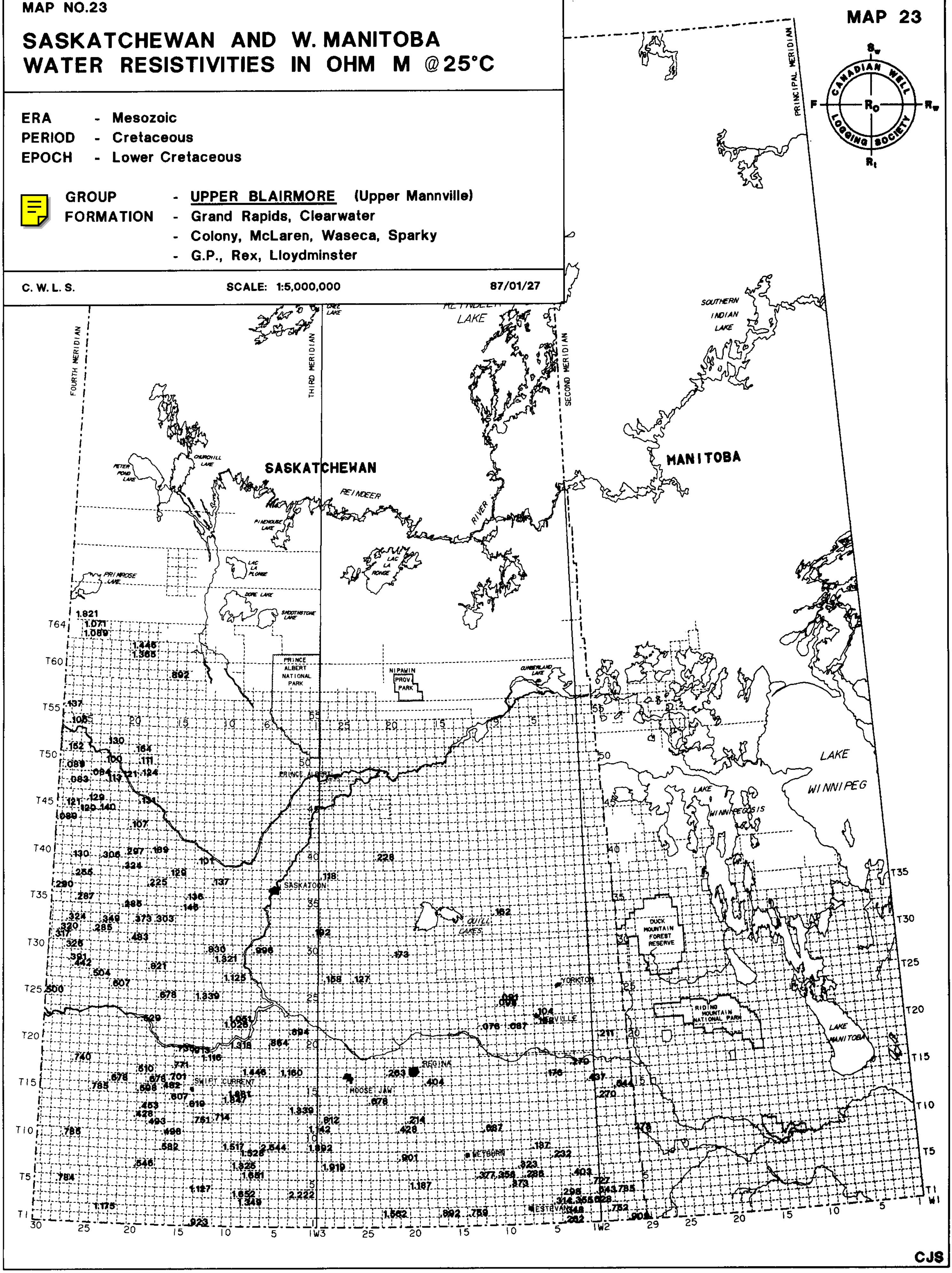
SASKATCHEWAN AND W. MANITOBA WATER RESISTIVITIES IN OHM M @25°C

MAP 23

ERA - Mesozoic
PERIOD - Cretaceous
EPOCH - Lower Cretaceous

GROUP - UPPER BLAIRMORE (Upper Mannville)
FORMATION - Grand Rapids, Clearwater
- Colony, McLaren, Waseca, Sparky
- G.P., Rex, Lloydminster

C. W. L. S. SCALE: 1:5,000,000 87/01/27



MAP NO.24

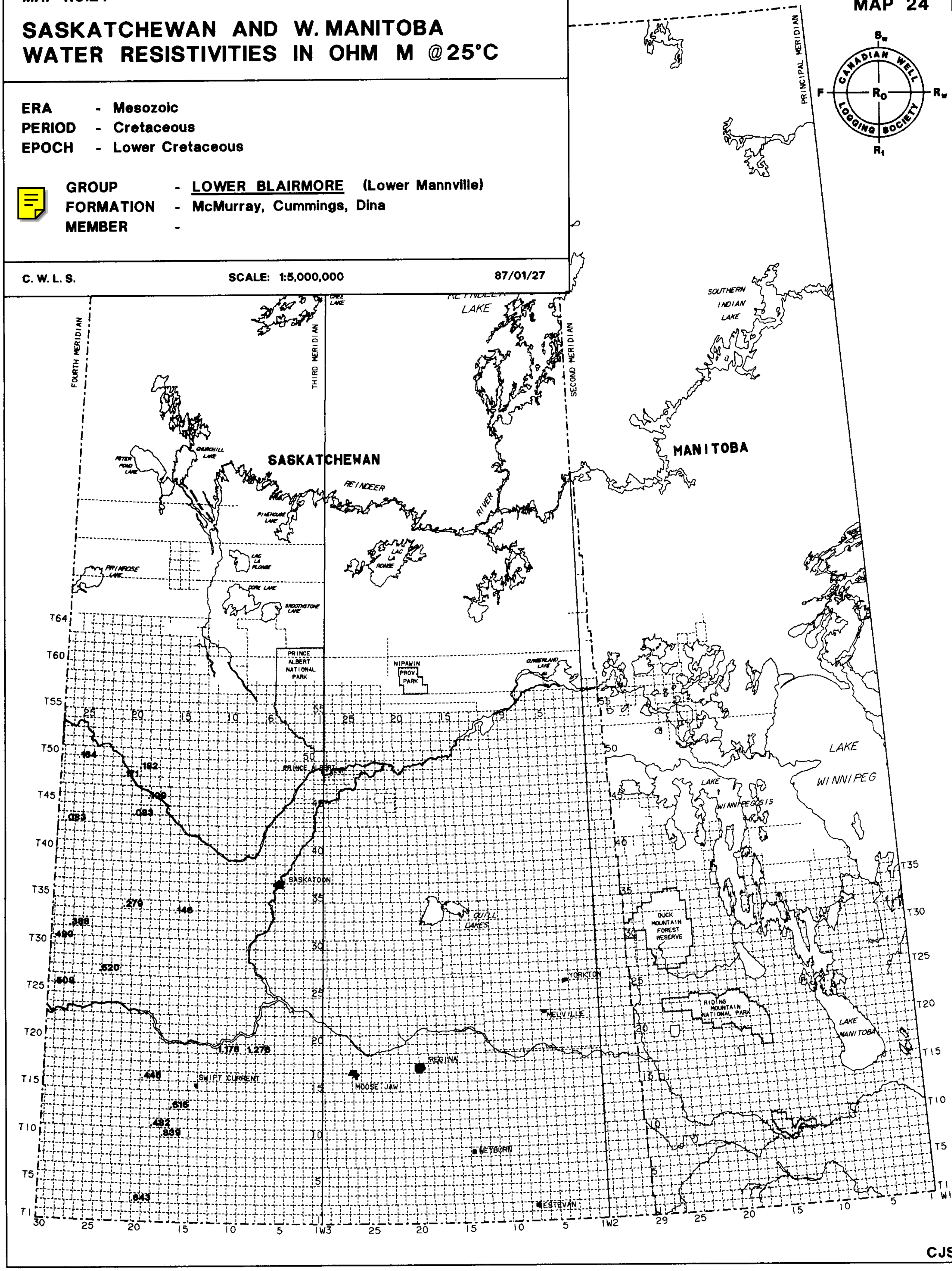
SASKATCHEWAN AND W. MANITOBA WATER RESISTIVITIES IN OHM M @25°C

ERA - Mesozoic
PERIOD - Cretaceous
EPOCH - Lower Cretaceous

GROUP - **LOWER BLAIRMORE** (Lower Mannville)
FORMATION - McMurray, Cummings, Dina
MEMBER -

C. W. L. S. SCALE: 1:5,000,000 87/01/27

MAP 24



CJS

MAP NO.25

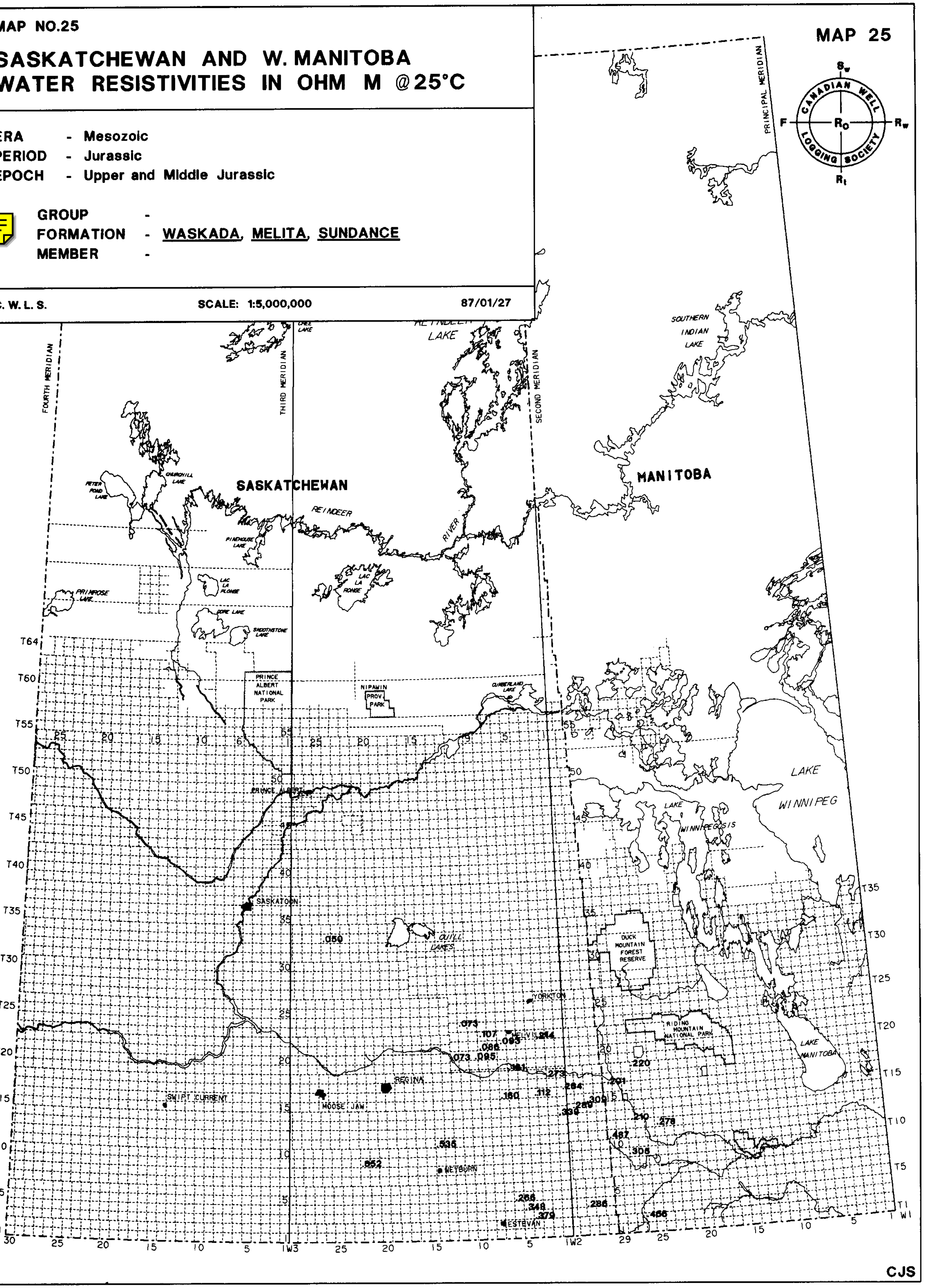
SASKATCHEWAN AND W. MANITOBA WATER RESISTIVITIES IN OHM M @25°C

ERA - Mesozoic
PERIOD - Jurassic
EPOCH - Upper and Middle Jurassic

GROUP -
FORMATION - WASKADA, MELITA, SUNDANCE
MEMBER -

C. W. L. S. SCALE: 1:5,000,000 87/01/27

MAP 25



CJS

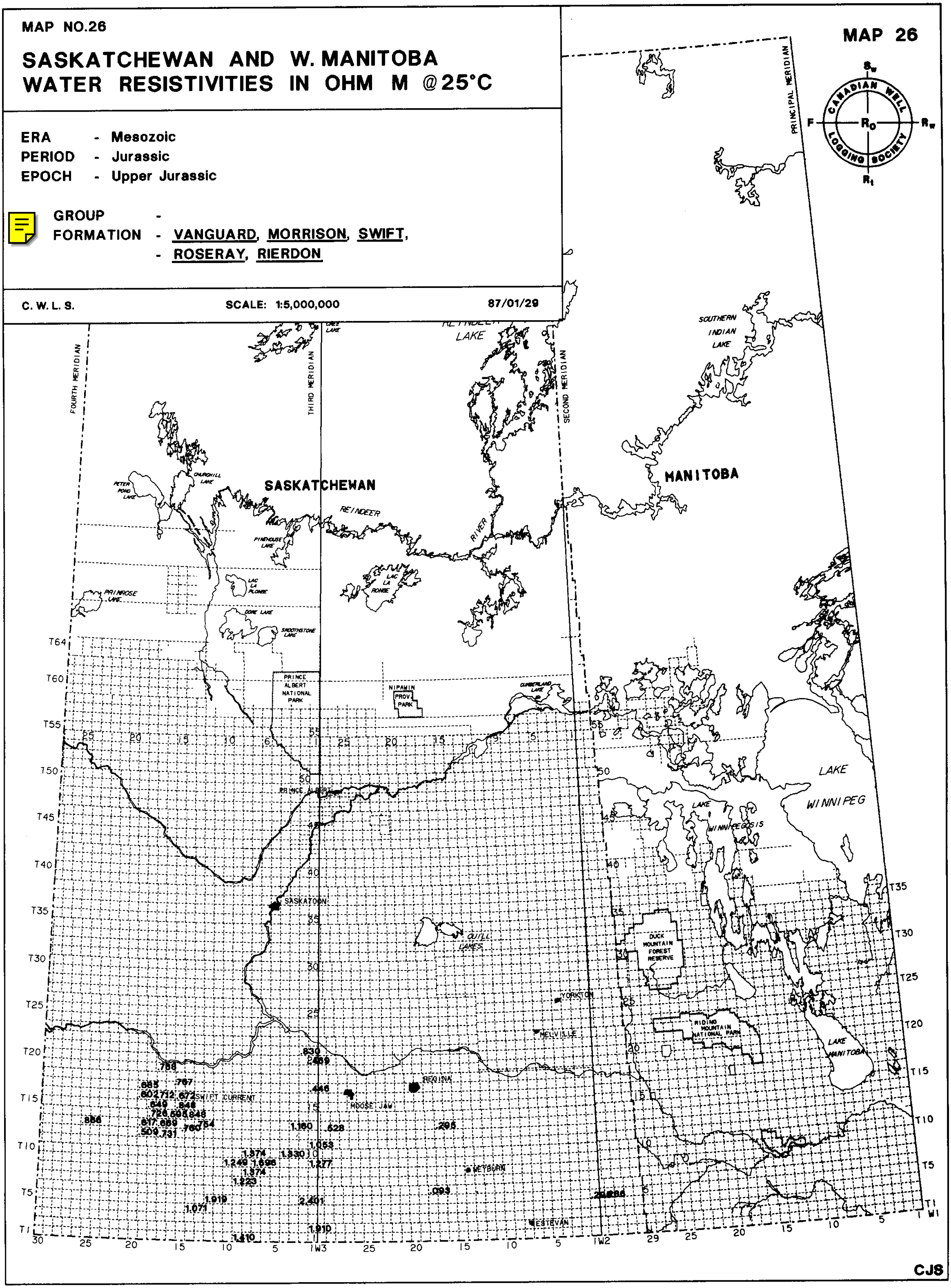
MAP NO.26

SASKATCHEWAN AND W. MANITOBA WATER RESISTIVITIES IN OHM M @25°C

ERA - Mesozoic
PERIOD - Jurassic
EPOCH - Upper Jurassic

GROUP -
FORMATION - VANGUARD, MORRISON, SWIFT,
- ROSERAY, RIERDON

C. W. L. S. SCALE: 1:5,000,000 87/01/29



MAP NO.27

SASKATCHEWAN AND W. MANITOBA WATER RESISTIVITIES IN OHM M @25°C

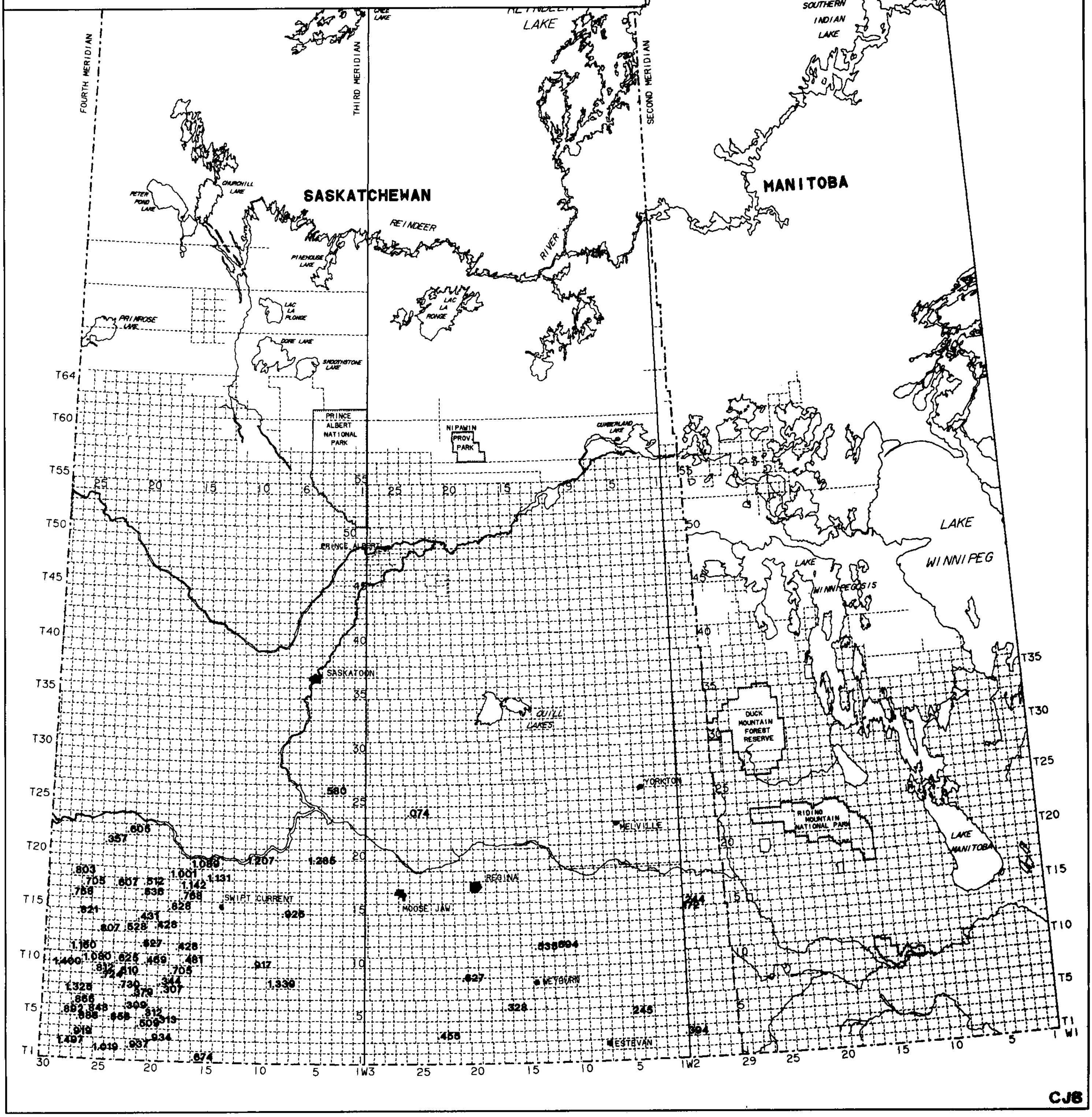
MAP 27

CANADIAN WELL LOGGING SOCIETY

ERA - Mesozoic
PERIOD - Jurassic
EPOCH - Middle Jurassic

GROUP -
FORMATION - SHAUNAVON
MEMBER -

C. W. L. S. SCALE: 1:5,000,000 87/01/29



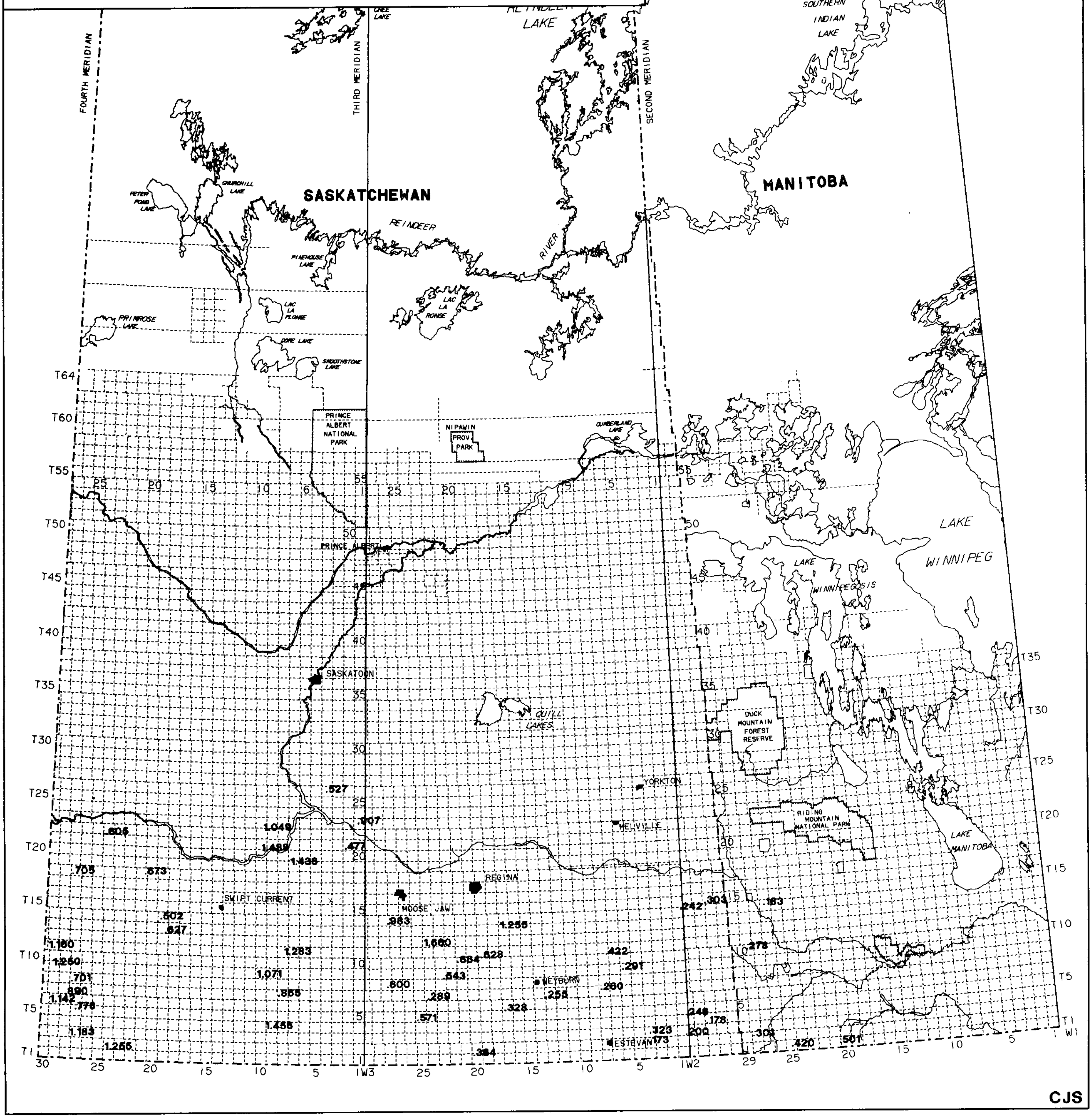
MAP NO.28

SASKATCHEWAN AND W. MANITOBA WATER RESISTIVITIES IN OHM M @25°C

ERA - Mesozoic
PERIOD - Jurassic
EPOCH - Middle Jurassic

GROUP -
FORMATION - <u>GRAVELBOURG</u>, <u>WATROUS</u>
MEMBER -

C. W. L. S. SCALE: 1:5,000,000 87/01/30



MAP NO.29

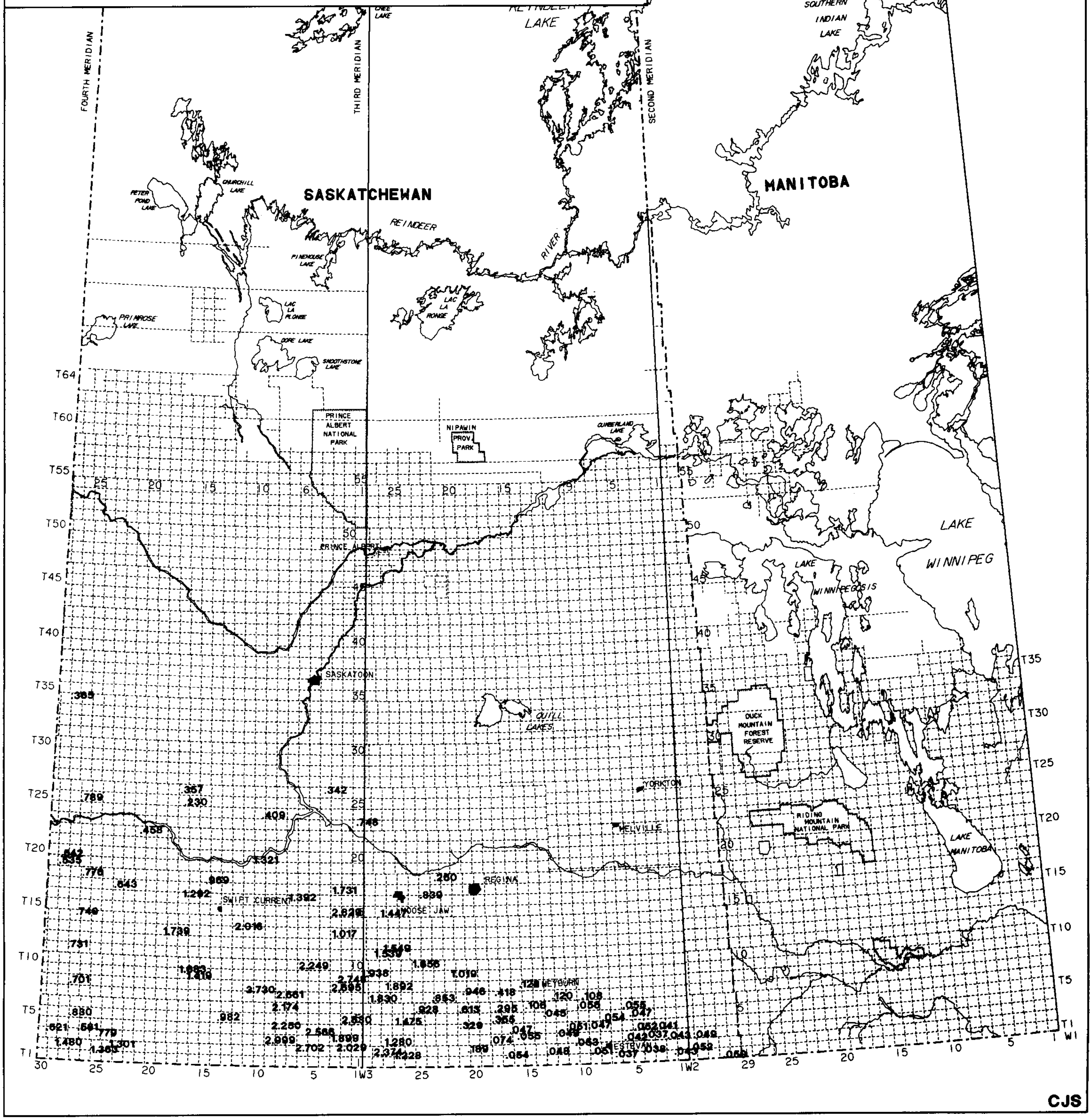
MAP 29

SASKATCHEWAN AND W. MANITOBA WATER RESISTIVITIES IN OHM M @25°C

ERA - Paleozoic
PERIOD - Mississippian
EPOCH -

GROUP - Madison
FORMATION - CHARLES
MEMBER - Poplar, Ratcliffe, Midale

C. W. L. S. SCALE: 1:5,000,000 87/01/30



CJS

MAP NO.30

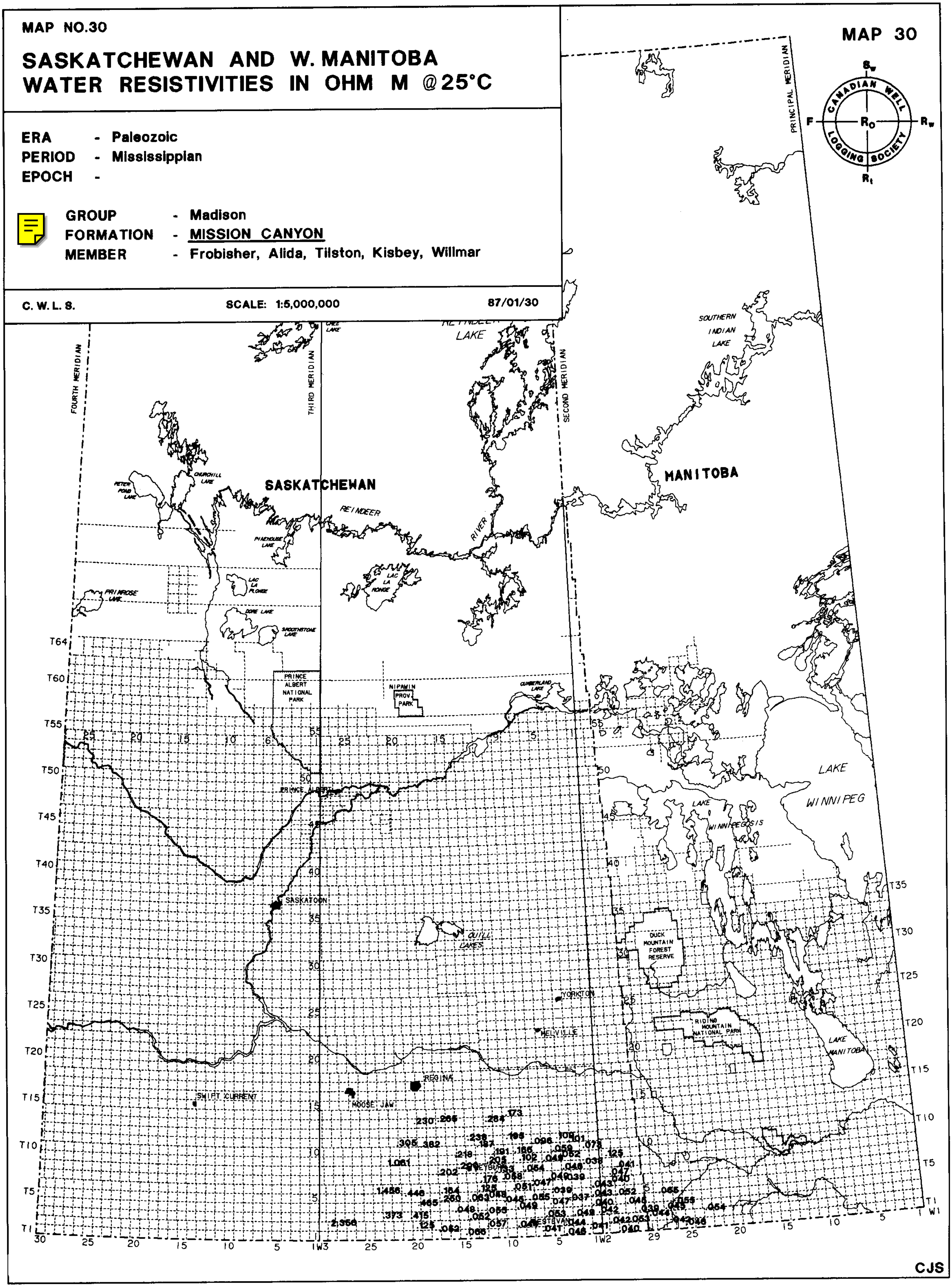
SASKATCHEWAN AND W. MANITOBA WATER RESISTIVITIES IN OHM M @25°C

MAP 30

ERA	-	Paleozoic
PERIOD	-	Mississippian
EPOCH	-	

GROUP	-	Madison
FORMATION	-	<u>MISSION CANYON</u>
MEMBER	-	Frobisher, Alida, Tilston, Kisbey, Willmar

C. W. L. S. SCALE: 1:5,000,000 87/01/30



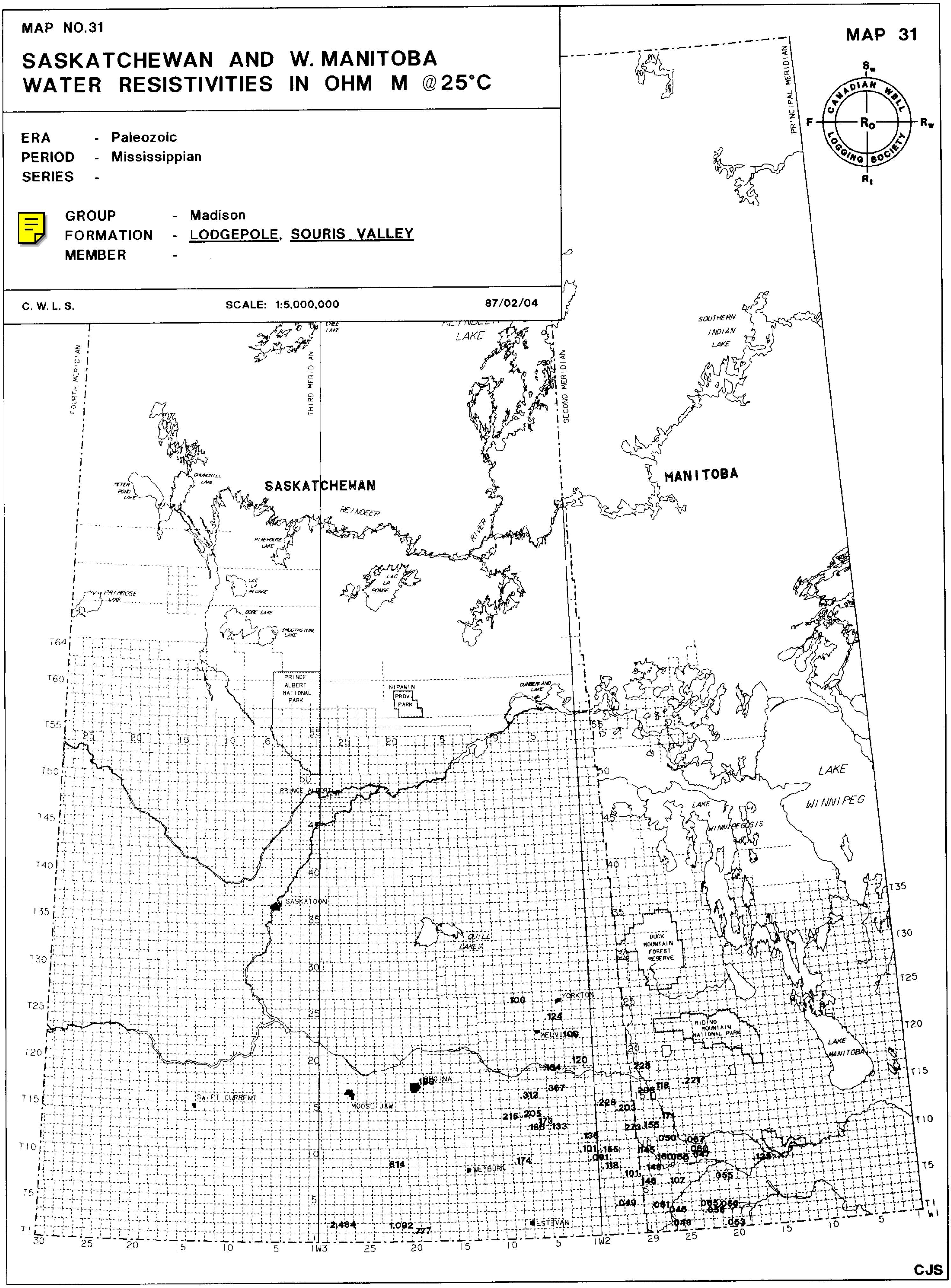
MAP NO.31

SASKATCHEWAN AND W. MANITOBA WATER RESISTIVITIES IN OHM M @25°C

ERA - Paleozoic
PERIOD - Mississippian
SERIES -

GROUP - Madison
FORMATION - LODGEPOLE, SOURIS VALLEY
MEMBER -

C. W. L. S. SCALE: 1:5,000,000 87/02/04



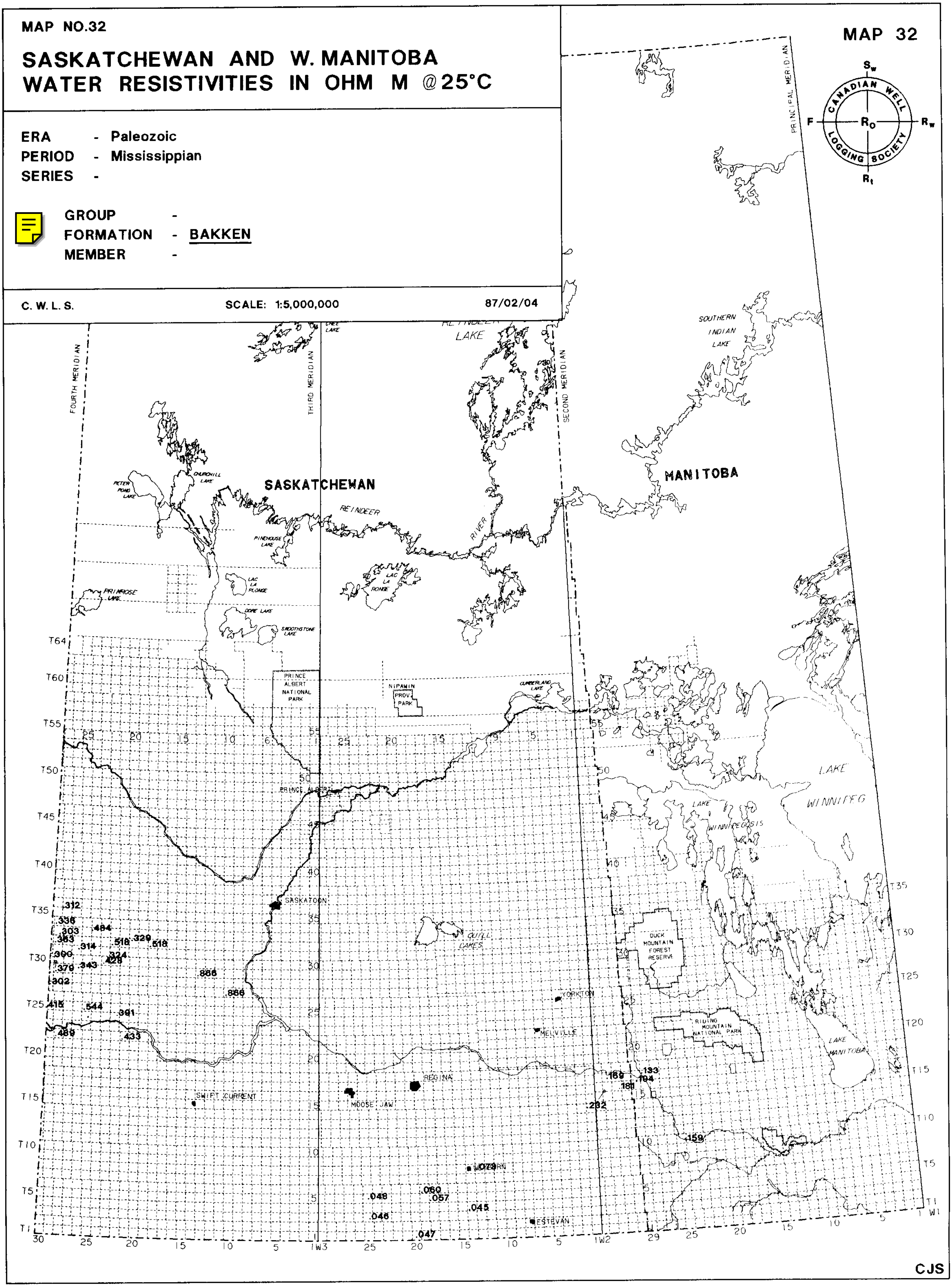
MAP NO.32

SASKATCHEWAN AND W. MANITOBA WATER RESISTIVITIES IN OHM M @25°C

ERA - Paleozoic
PERIOD - Mississippian
SERIES -

GROUP -
FORMATION - BAKKEN
MEMBER -

C. W. L. S. SCALE: 1:5,000,000 87/02/04



MAP NO.33

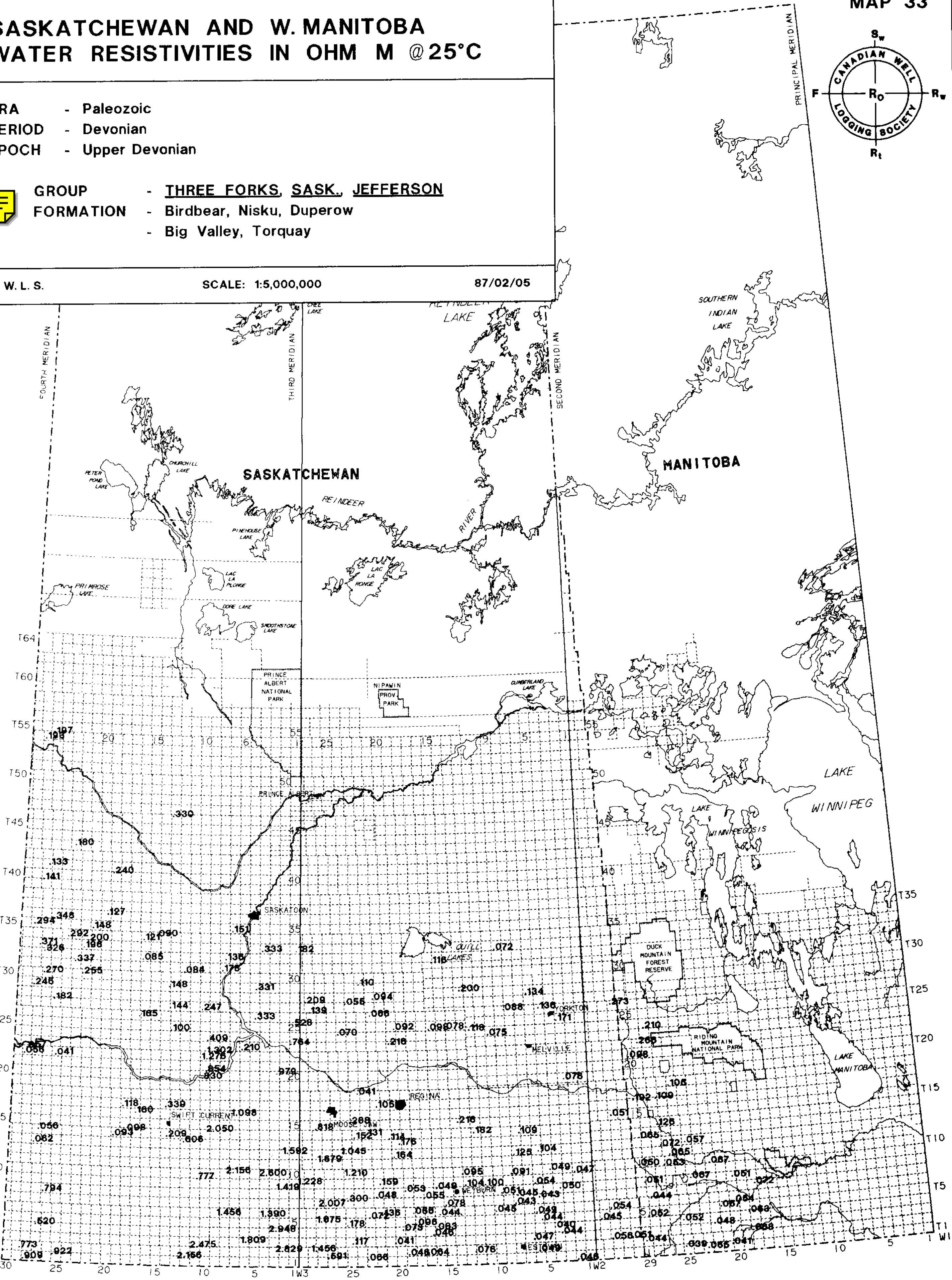
MAP 33

SASKATCHEWAN AND W. MANITOBA WATER RESISTIVITIES IN OHM M @25°C

ERA - Paleozoic
PERIOD - Devonian
EPOCH - Upper Devonian

GROUP - THREE FORKS, SASK., JEFFERSON
FORMATION - Birdbear, Nisku, Duperow
- Big Valley, Torquay

C. W. L. S. SCALE: 1:5,000,000 87/02/05



CJS

MAP NO.34

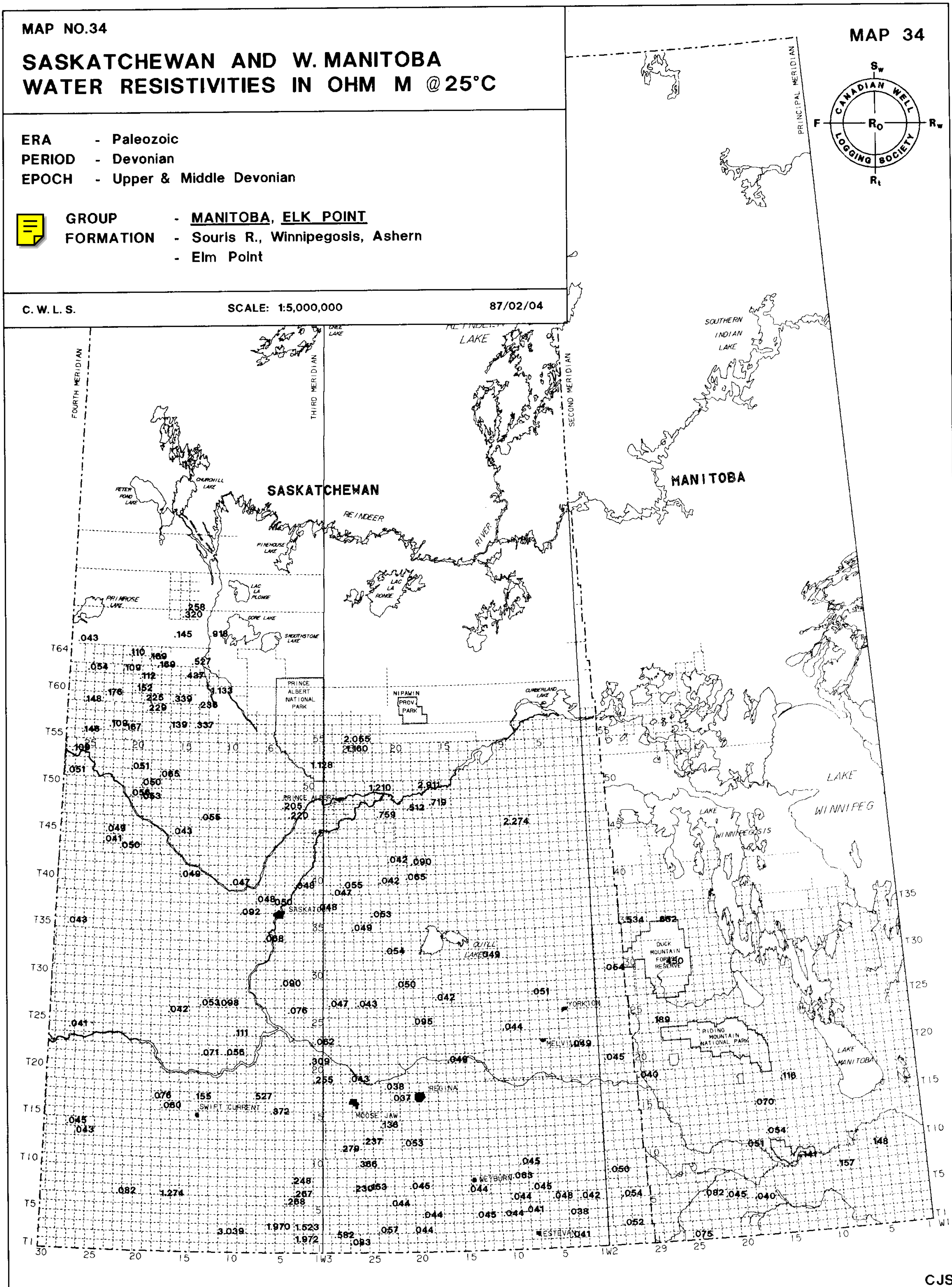
MAP 34

SASKATCHEWAN AND W. MANITOBA WATER RESISTIVITIES IN OHM M @25°C

ERA - Paleozoic
PERIOD - Devonian
EPOCH - Upper & Middle Devonian

GROUP - MANITOBA, ELK POINT
FORMATION - Souris R., Winnipegosis, Ashern
- Elm Point

C. W. L. S. SCALE: 1:5,000,000 87/02/04



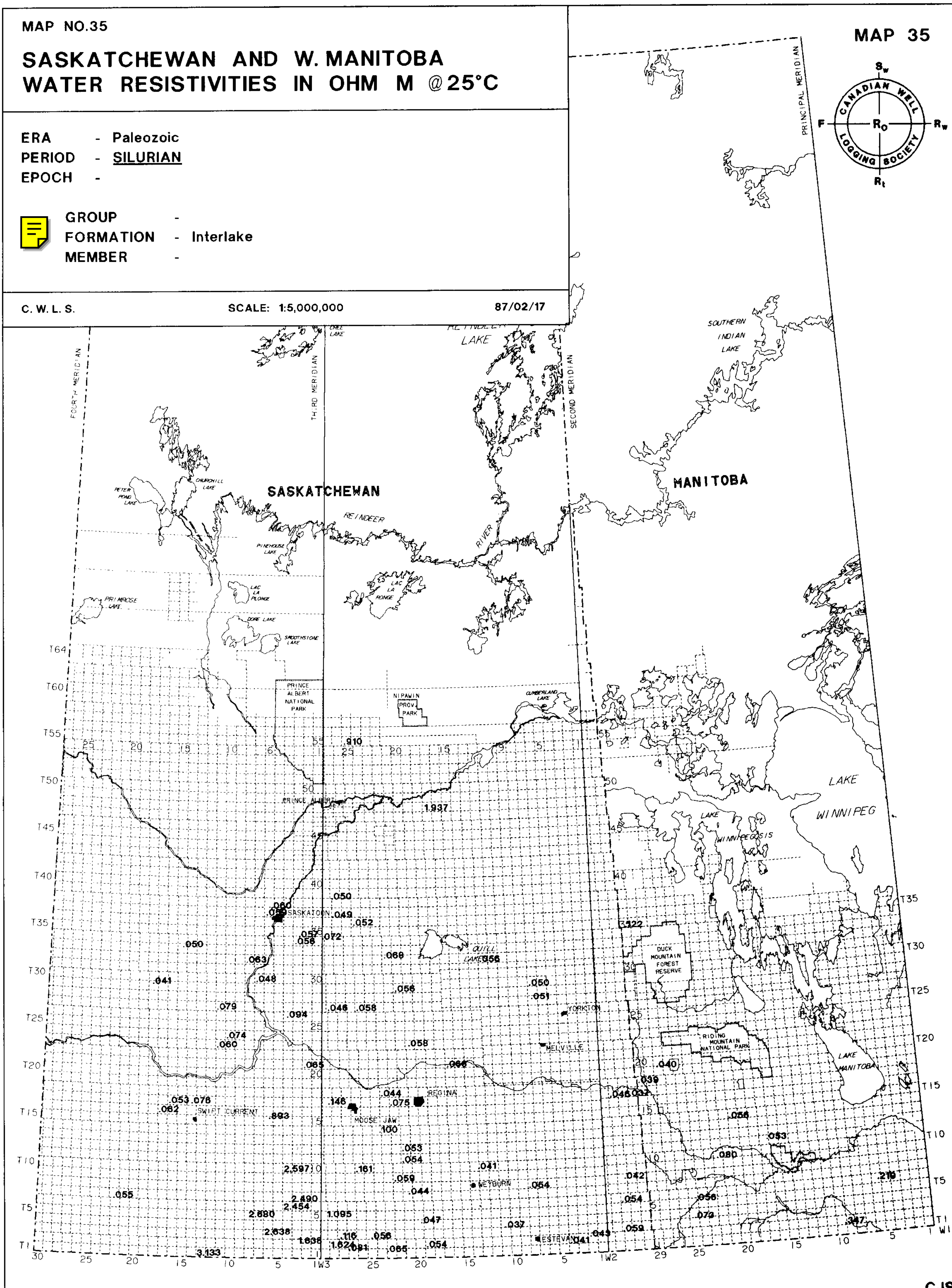
MAP NO.35

SASKATCHEWAN AND W. MANITOBA WATER RESISTIVITIES IN OHM M @25°C

ERA - Paleozoic
PERIOD - SILURIAN
EPOCH -

GROUP -
FORMATION - Interlake
MEMBER -

C. W. L. S. SCALE: 1:5,000,000 87/02/17



MAP NO.36

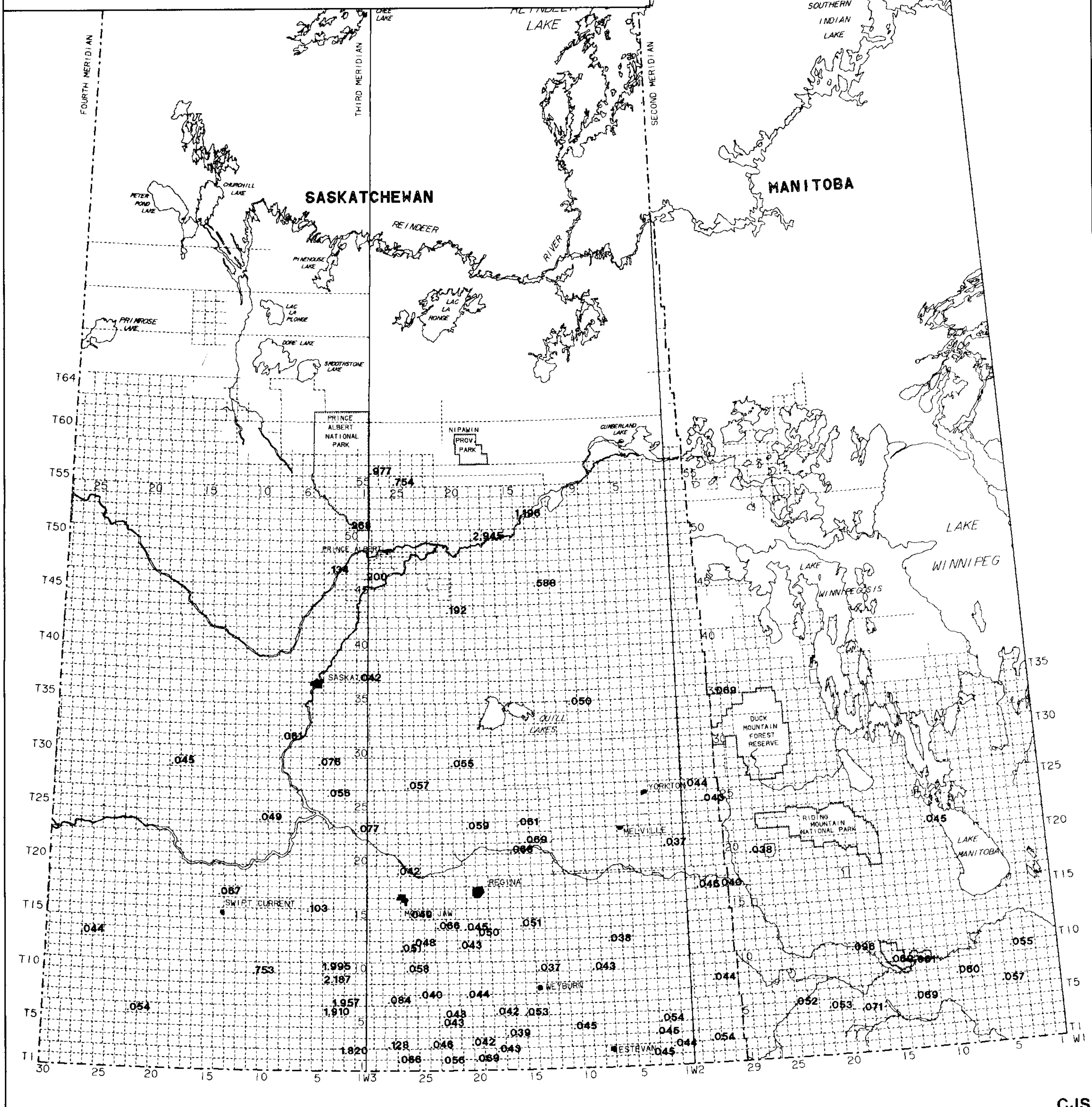
MAP 36

SASKATCHEWAN AND W. MANITOBA WATER RESISTIVITIES IN OHM M @25°C

ERA - Paleozoic
PERIOD - ORDOVICIAN
EPOCH -

GROUP -
FORMATION - Stonewall, Stony Mtn., Red R., Winnipeg
MEMBER - Herald, Yeoman

C. W. L. S. SCALE: 1:5,000,000 87/02/17



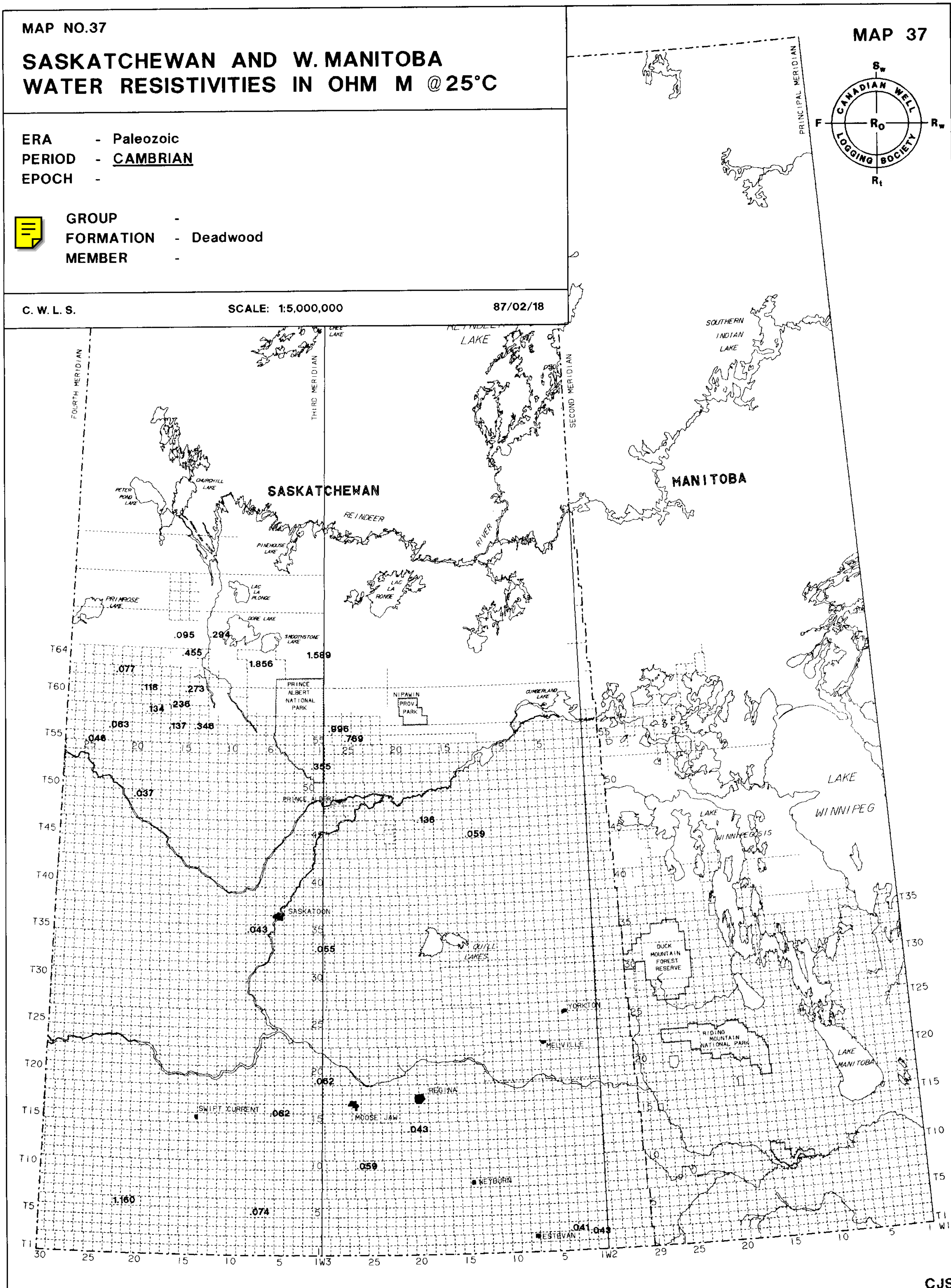
MAP NO.37

SASKATCHEWAN AND W. MANITOBA WATER RESISTIVITIES IN OHM M @25°C

ERA - Paleozoic
PERIOD - CAMBRIAN
EPOCH -

GROUP -
FORMATION - Deadwood
MEMBER -

C. W. L. S. SCALE: 1:5,000,000 87/02/18



YUKON/NWT

Alphabetical List of Formations

A

AKLAVIK 41
AKPAK 38
ALMSTROM 41
ARCTIC RED 40
ARNIKA 44
ATKINSON POINT 40

B

BEAR ROCK 44
BEAVERTAIL 44
BESA RIVER 42
BESA RIVER 43
BIRCH 42
BOUNDARY CREEK 39
BUG CREEK 41

C

CADILLAC 44
CAMSELL 44
CANOE 42
CANOL 43
CHANCE 42
CHINCHAGA 44
CRETACEOUS 39
CRETACEOUS 40
CROSSLEY LAKE 40

D

DEBOLT 42
DELORME 44
DEVONIAN 43
DEVONIAN 44
DUNVEGAN 39

E

EAGLE PLAIN 39
EAST FORK 39
ETTRAIN 42

F

FANTASQUE 42
FISH RIVER 38
FLETT 42
FORT SIMPSON 43
FORT ST. JOHN 39
FORT ST. JOHN 40

G

GARBUTT 40
GILMORE LAKE 40
GOSSAGE 44

H

HART RIVER 42
HARE INDIAN 44
HAY RIVER 43
HEADLESS 44
HORN RIVER 43
HORTON RIVER 40
HUME 44
HUSKY 40

I

IMPERIAL 43
IPERK 38

J

JEAN MARIE 43
JUNGLE CREEK 42
JURASSIC 41

K

KAKISA 43
KEE SCARP 44
KEG RIVER 44
KOPANOAR 38
KOTCHO 43
KUGMALLIT 38

L

LANDRY 44
LEPINE 40
LITTLE BEAR 39

LONELY BAY 44
LOWER CRETACEOUS 40
LOWER DEVONIAN 44

M

MACKENZIE 38
MANETOE 44
MASON RIVER 39
MATTSON 42
MICHELLE 44
MIDDLE DEVONIAN 44
MISSISSIPPIAN 42
MOOSE CHANNEL 38
MOUNT GOODENOUGH 40
MURRAY RIDGE 41
MUSKEG 44
MUSKWA 43

N

NAHANNI 44

O

OGILVIE 44

P

PARSONS 40
PEKISKO 42
PENNSYLVANNIAN 42
PERMIAN 42
PINE POINT 44
PRESQU'ILE 44

R

RAMPARTS 44
RAT RIVER 40
RED KNIFE 43
REINDEER 38
RICHARDS 38
RICHARDSON MOUNTAINS 41
ROAD RIVER 44

S

SANS SAULT 40
SCATTER 40
SHUNDA 42
SIKANNI 40
SIKU 40
SLATER RIVER 39
SLAVE POINT 44
SMOKING HILLS 39
SOMBRE 44
SULLEY 39
SULPHUR POINT 44
SUMMIT CREEK 38

T

TENT ISLAND 38
TERTIARY 38
TETCHO 43
TOAD 42
TOAD - GRAYLING 42
TREVOR 39
TROUT RIVER 43
TUTTLE 42

U

UPPER CRETACEOUS 39
UPPER DEVONIAN 43
UPPER JURASSIC 41

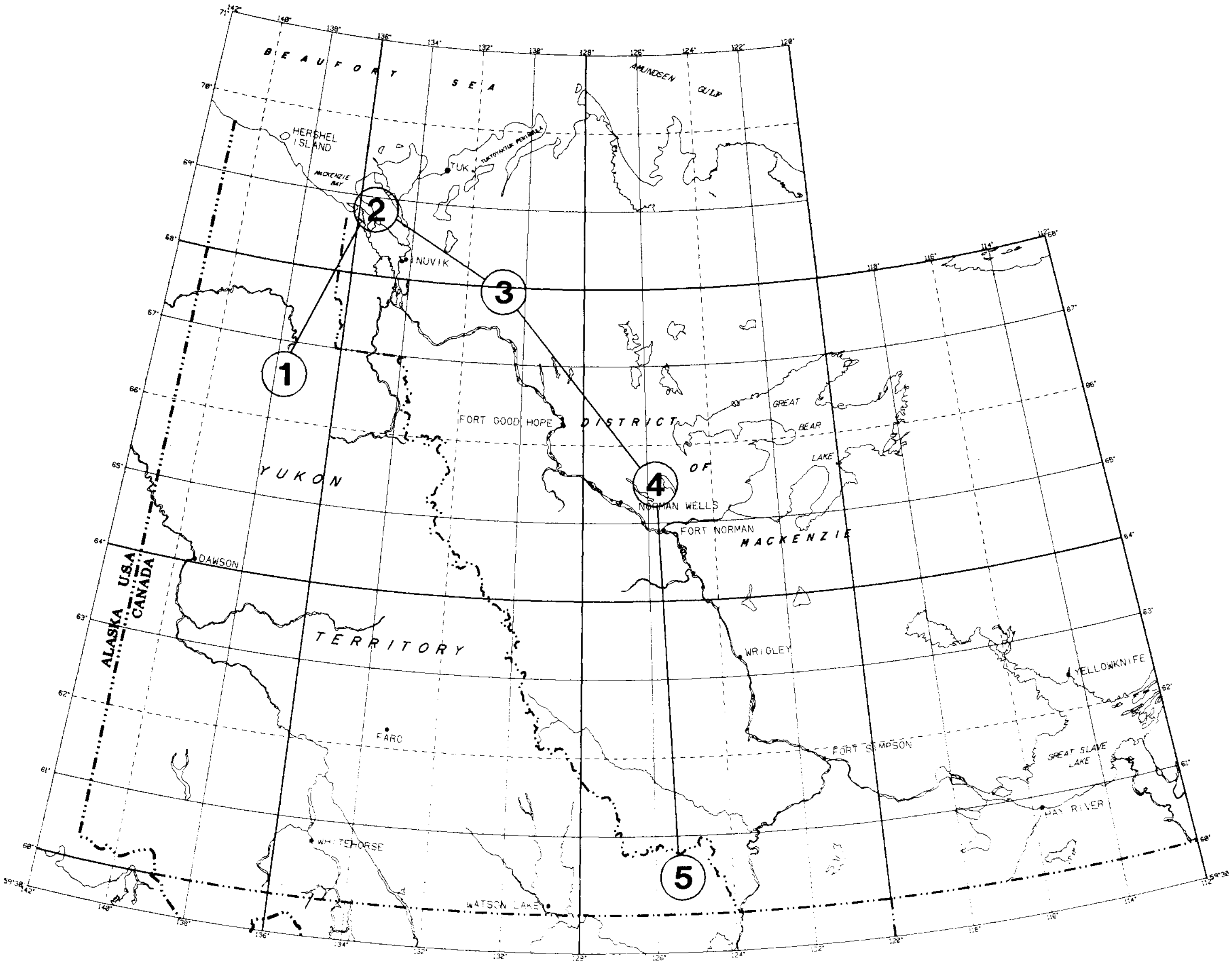
W

WAPITI 39
WILLOW LAKE 44

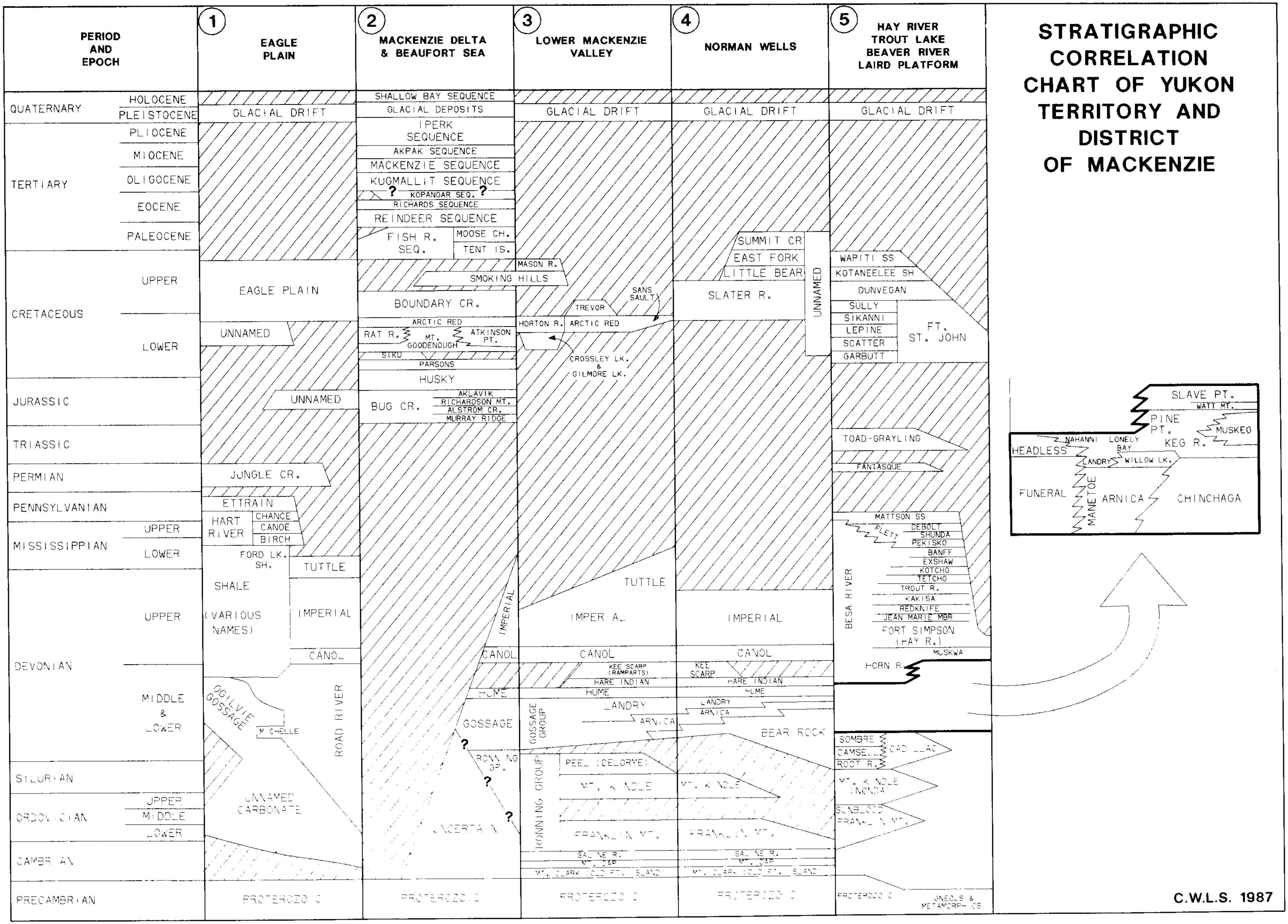
Y

YOHIN 42

MAP FOR STRATIGRAPHIC CORRELATION CHART OF YUKON TERRITORY AND DISTRICT OF MACKENZIE



1. EAGLE PLAIN
2. MACKENZIE DELTA & BEAUFORT SEA
3. LOWER MACKENZIE VALLEY
4. NORMAN WELLS
5. HAY RIVER
   TROUT LAKE
   BEAVER RIVER
   LIARD PLATEAU



STRATIGRAPHIC CORRELATION CHART OF YUKON TERRITORY AND DISTRICT OF MACKENZIE
PERIOD AND EPOCH
1 EAGLE PLAIN
2 MACKENZIE DELTA & BEAUFORT SEA
3 LOWER MACKENZIE VALLEY
4 NORMAN WELLS
5 HAY RIVER TROUT LAKE BEAVER RIVER LAIRD PLATFORM
QUATERNARY
HOLOCENE
PLEISTOCENE
TERTIARY
PLIOCENE
MIOCENE
OLIGOCENE
EOCENE
PALEOCENE
CRETACEOUS
UPPER
LOWER
JURASSIC
TRIASSIC
PERMIAN
PENNSYLVANIAN
MISSISSIPPIAN
UPPER
LOWER
DEVONIAN
UPPER
MIDDLE & LOWER
SILURIAN
ORDOVICIAN
UPPER
MIDDLE
LOWER
CAMBRIAN
PRECAMBRIAN
GLACIAL DRIFT
EAGLE PLAIN
UNNAMED
JUNGLE CR.
ETTRAIN
HART RIVER
CHANCE
CANOE
BIRCH
FORD LK. SH.
TUTTLE
SHALE (VARIOUS NAMES)
IMPERIAL
CANOL
OGILVIE GOSSAGE
MICHELLE
ROAD RIVER
UNNAMED CARBONATE
PROTEROZOIC
SHALLOW BAY SEQUENCE
GLACIAL DEPOSITS
IPERK SEQUENCE
AKPAK SEQUENCE
MACKENZIE SEQUENCE
KUGMALLIT SEQUENCE
KOPANOAR SEQ.
RICHARDS SEQUENCE
REINDEER SEQUENCE
FISH R. SEQ.
MOOSE CH.
TENT IS.
SMOKING HILLS
BOUNDARY CR.
ARCTIC RED
RAT R.
MT. GOODENOUGH
ATKINSON PT.
SIKU
PARSONS
HUSKY
BUG CR.
AKLAVIK
RICHARDSON MT.
ALSTROM CR.
MURRAY RIDGE
IMPERIAL
CANOL
HUME
GOSSAGE
RONNING GP.
UNCERTAIN
MASON R.
TREVOR
SANS SAULT
HORTON R.
ARCTIC RED
CROSSLEY LK. & GILMORE LK.
TUTTLE
IMPERIAL
CANOL
KEE SCARP (RAMPARTS)
HARE INDIAN
HUME
LANDRY
ARNICA
GOSSAGE GROUP
PEEL (DELORME)
MT. KINDLE
RONNING GROUP
FRANKLIN MT.
SALINE R.
MT. CAP
MT. CLARK (OLD FT. ISLAND)
SUMMIT CR
EAST FORK
LITTLE BEAR
SLATER R.
UNNAMED
BEAR ROCK
WAPITI SS
KOTANEELEE SH
DUNVEGAN
SULLY
SIKANNI
LEPINE
SCATTER
GARBUTT
FT. ST. JOHN
TOAD-GRAYLING
FANTASQUE
MATTSON SS
FLETT
DEBOLT
SHUNDA
PEKISKO
BANFF
EXSHAW
KOTCHO
TETCHO
TROUT R.
KAKISA
REDKNIFE
JEAN MARIE MBR
FORT SIMPSON (HAY R.)
BESA RIVER
MUSKWA
HORN R.
SOMBRE
CAMSELL
ROOT R.
CADILLAC
MT. KINDLE (NONDA)
SUNBLOOD
FRANKLIN MT.
GNEOLS & METAMORPHICS
SLAVE PT.
WATT MT.
PINE PT.
MUSKEG
NAHANNI
LONELY BAY
KEG R.
HEADLESS
LANDRY
WILLOW LK.
FUNERAL
MANETOE
ARNICA
CHINCHAGA
C.W.L.S. 1987

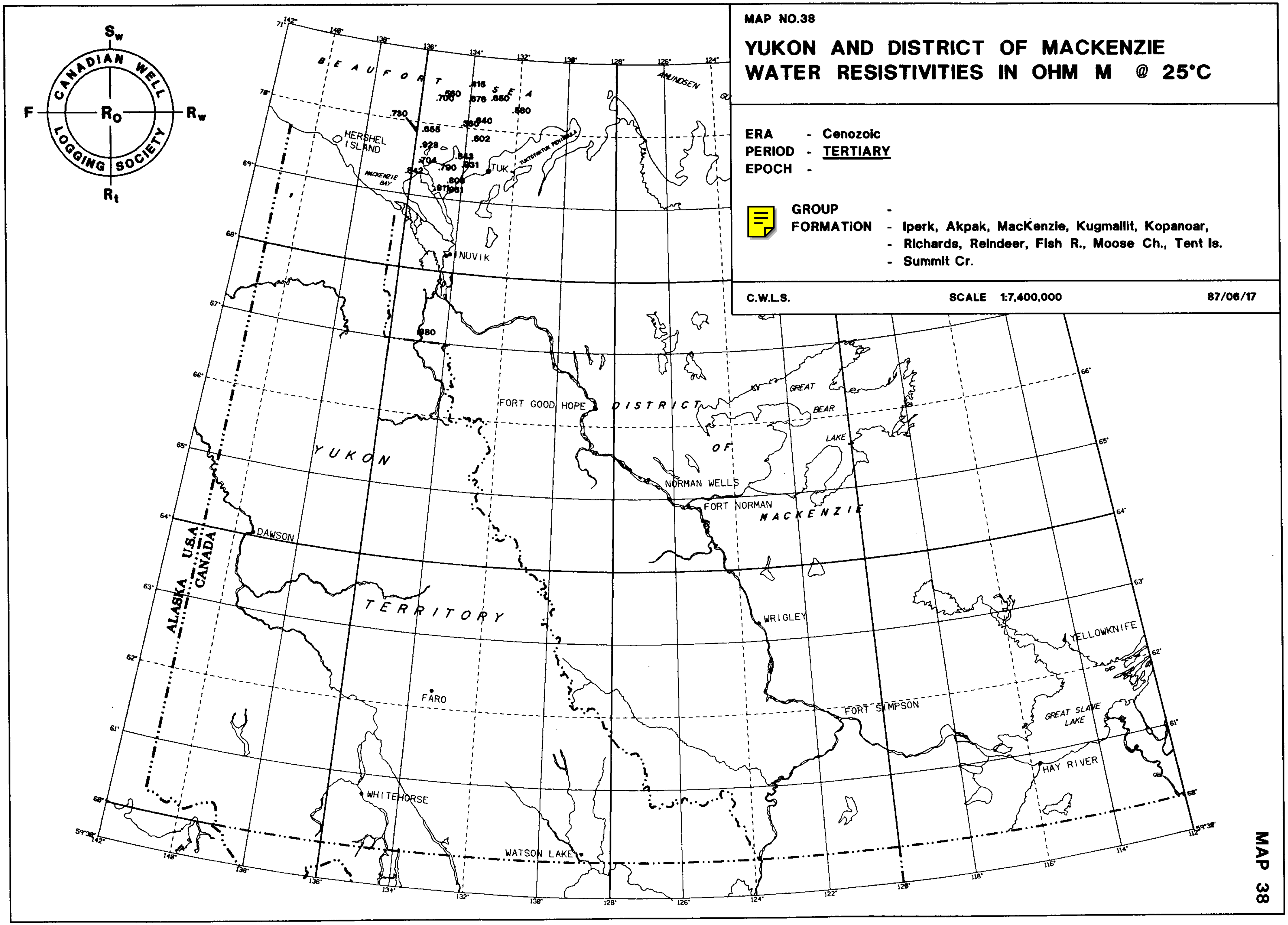
MAP NO.38

YUKON AND DISTRICT OF MACKENZIE WATER RESISTIVITIES IN OHM M @ 25°C

ERA - Cenozoic
PERIOD - TERTIARY
EPOCH -

GROUP -
FORMATION - Iperk, Akpak, MacKenzie, Kugmallit, Kopanoar,
- Richards, Reindeer, Fish R., Moose Ch., Tent Is.
- Summit Cr.

C.W.L.S. SCALE 1:7,400,000 87/06/17



MAP 38

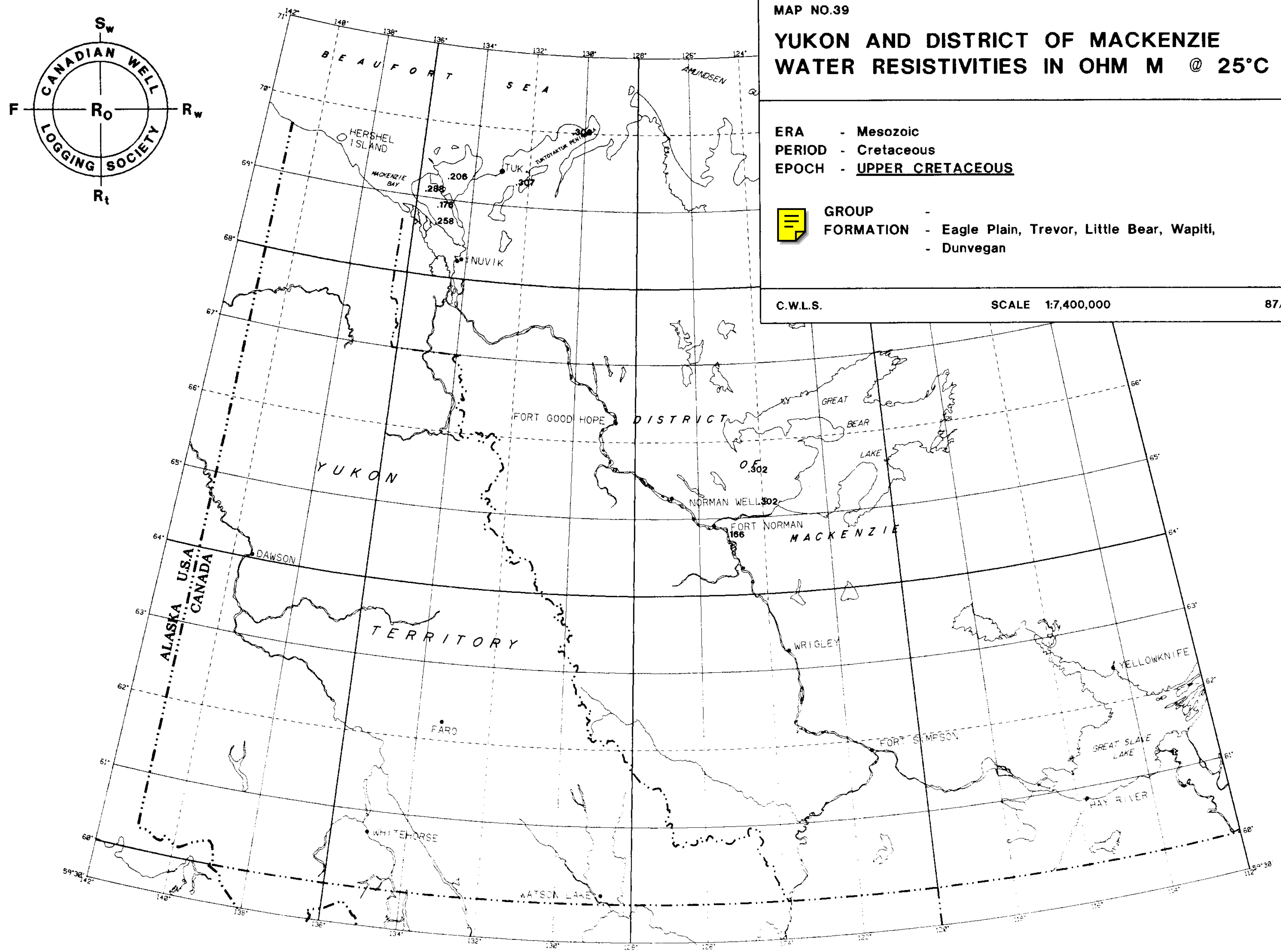
MAP NO.39

YUKON AND DISTRICT OF MACKENZIE WATER RESISTIVITIES IN OHM M @ 25°C

ERA - Mesozoic
PERIOD - Cretaceous
EPOCH - <u>UPPER CRETACEOUS</u>

GROUP -
FORMATION - Eagle Plain, Trevor, Little Bear, Wapiti,
- Dunvegan

C.W.L.S. SCALE 1:7,400,000 87/06/17



MAP 39

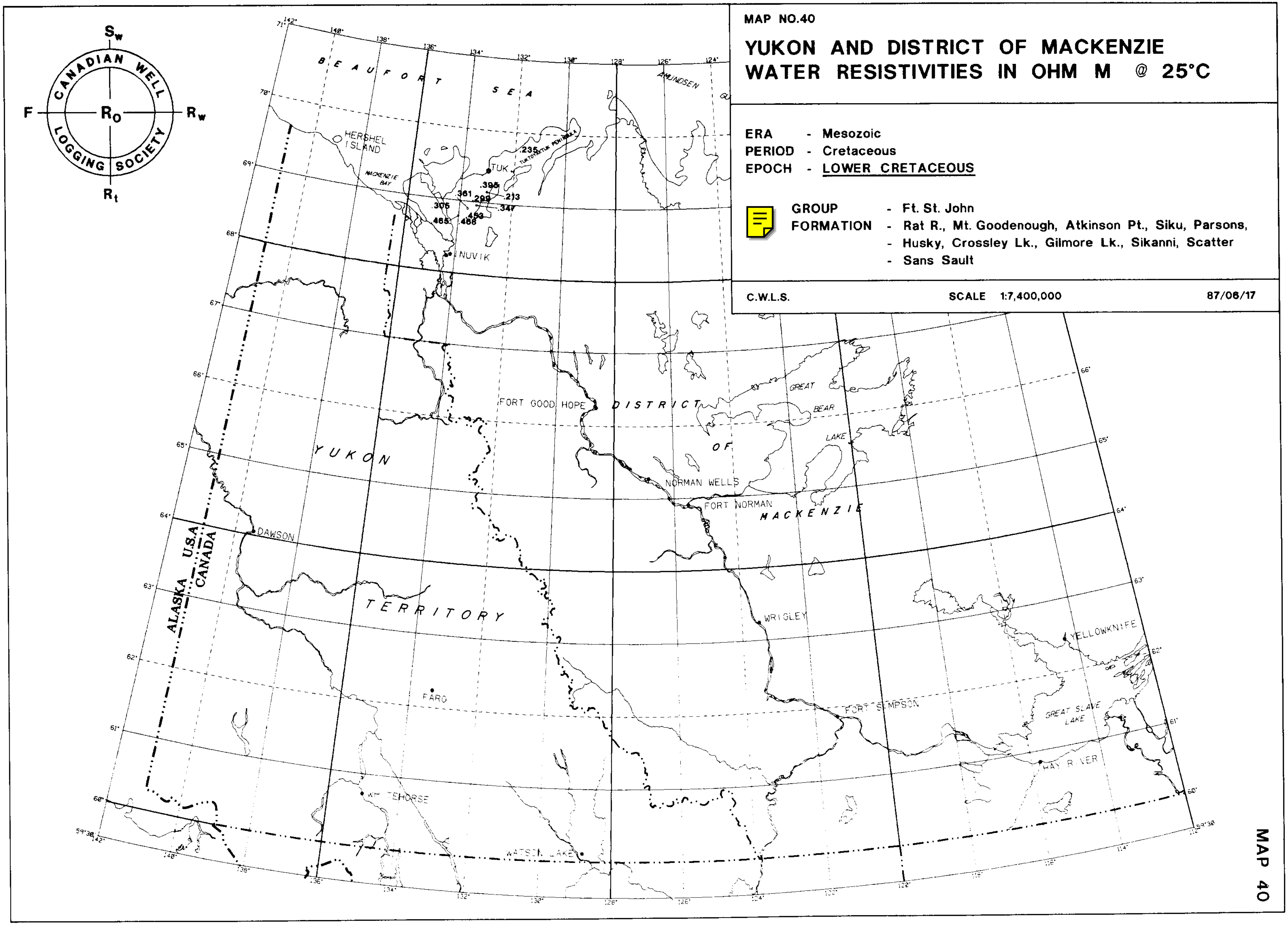
MAP NO.40

YUKON AND DISTRICT OF MACKENZIE WATER RESISTIVITIES IN OHM M @ 25°C

ERA - Mesozoic
PERIOD - Cretaceous
EPOCH - LOWER CRETACEOUS

GROUP - Ft. St. John
FORMATION - Rat R., Mt. Goodenough, Atkinson Pt., Siku, Parsons, - Husky, Crossley Lk., Gilmore Lk., Sikanni, Scatter - Sans Sault

C.W.L.S. SCALE 1:7,400,000 87/06/17



MAP 40

CANADIAN WELL LOGGING SOCIETY

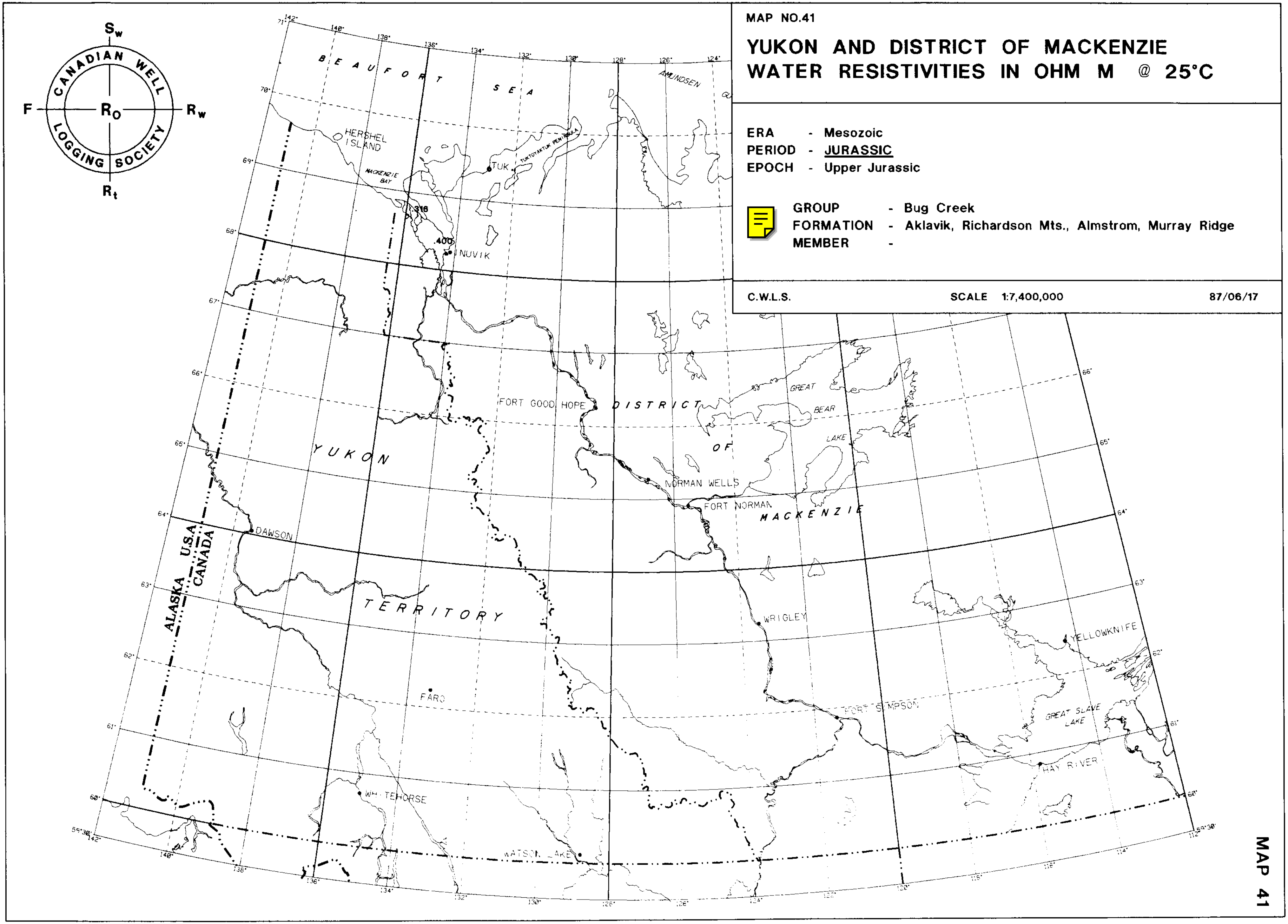
MAP NO.41

YUKON AND DISTRICT OF MACKENZIE WATER RESISTIVITIES IN OHM M @ 25°C

ERA - Mesozoic
PERIOD - JURASSIC
EPOCH - Upper Jurassic

GROUP - Bug Creek
FORMATION - Aklavik, Richardson Mts., Almstrom, Murray Ridge
MEMBER -

C.W.L.S. SCALE 1:7,400,000 87/06/17



MAP 41

MAP NO.42

YUKON AND DISTRICT OF MACKENZIE WATER RESISTIVITIES IN OHM M @ 25°C

ERA - Paleozoic

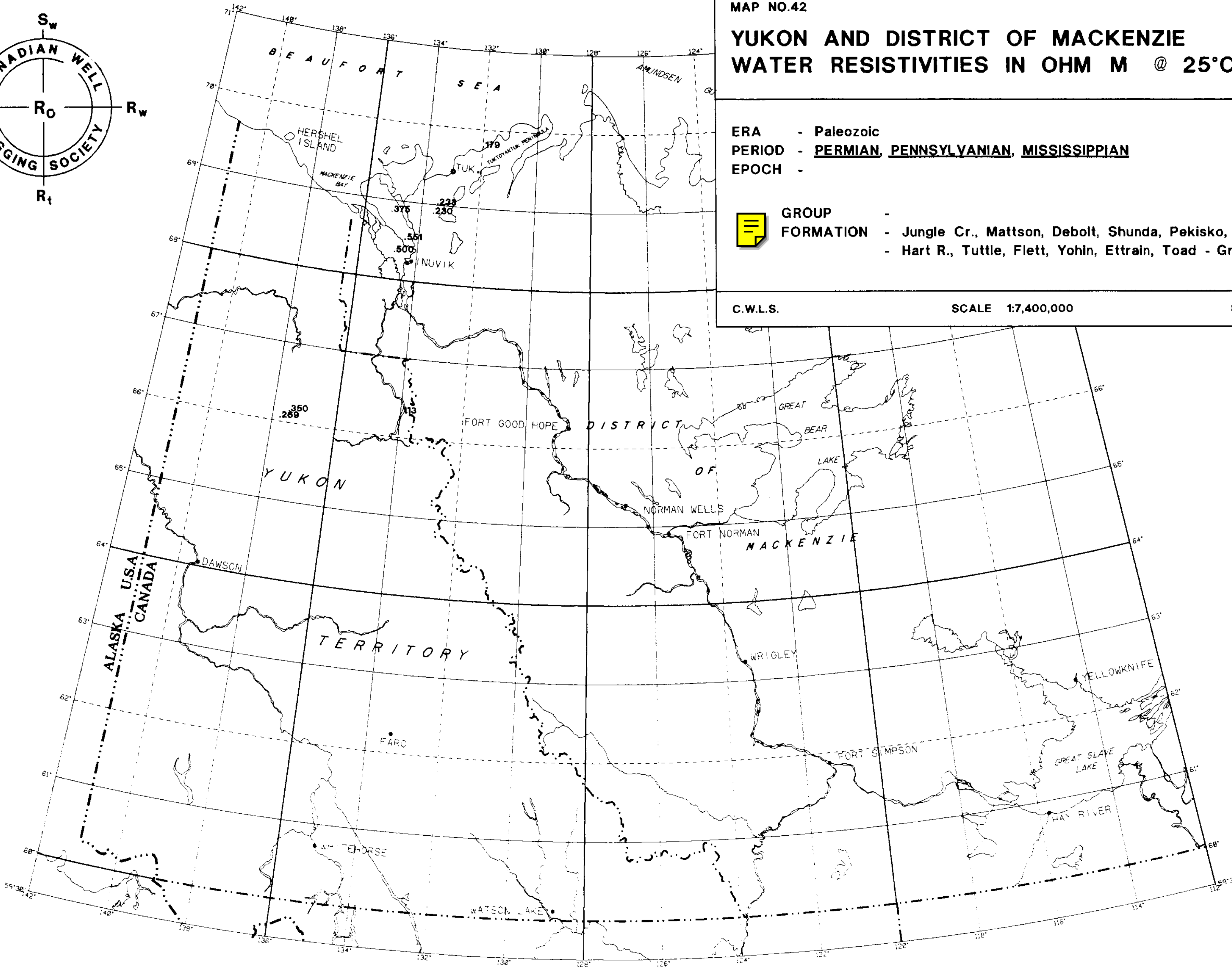
PERIOD - PERMIAN, PENNSYLVANIAN, MISSISSIPPIAN

EPOCH -

GROUP -

FORMATION - Jungle Cr., Mattson, Debolt, Shunda, Pekisko,
- Hart R., Tuttle, Flett, Yohin, Ettrain, Toad - Grayling

C.W.L.S. SCALE 1:7,400,000 87/06/17



MAP 42

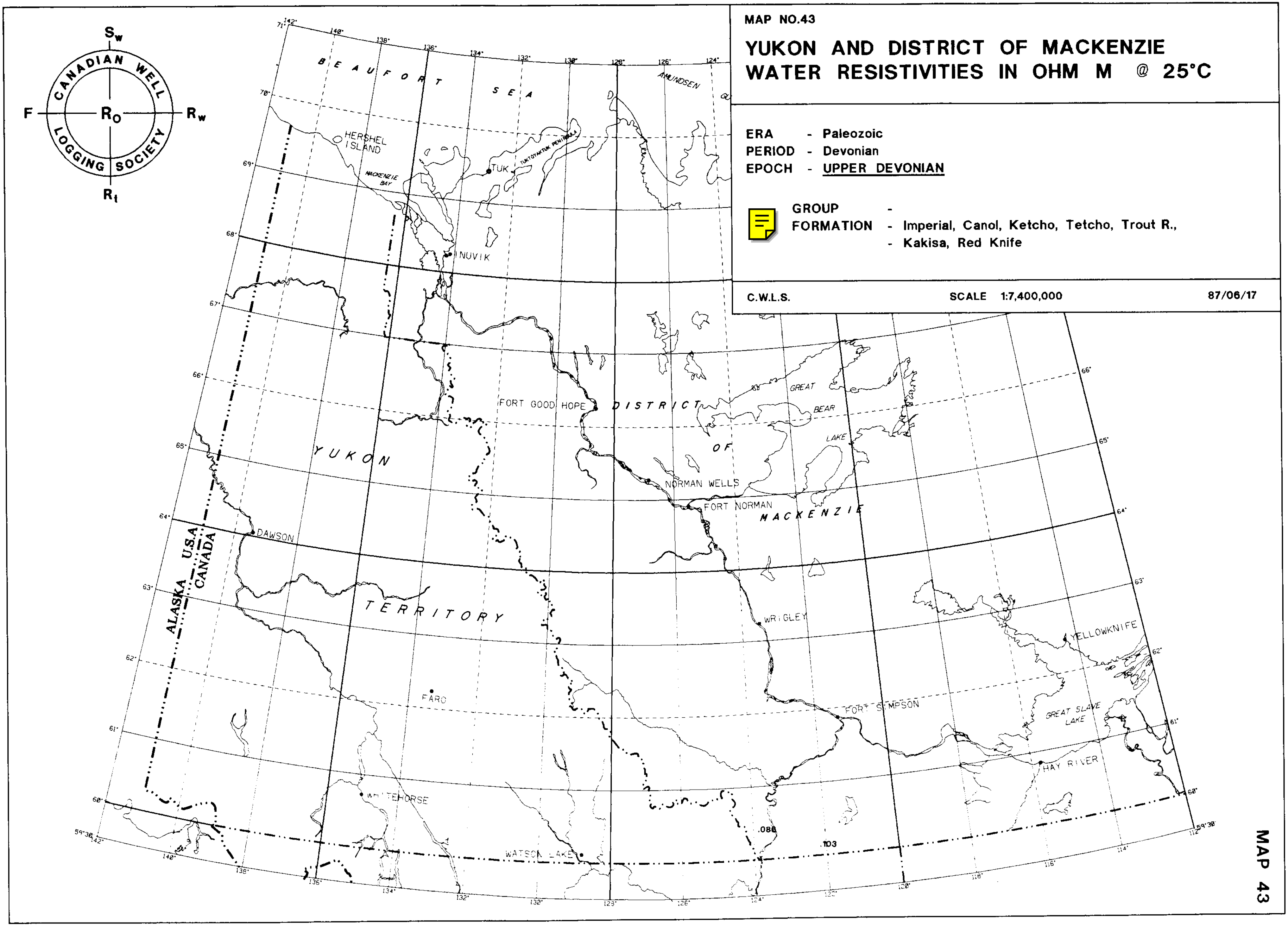
MAP NO.43

YUKON AND DISTRICT OF MACKENZIE
WATER RESISTIVITIES IN OHM M @ 25°C

ERA - Paleozoic
PERIOD - Devonian
EPOCH - UPPER DEVONIAN

GROUP -
FORMATION - Imperial, Canol, Ketcho, Tetcho, Trout R.,
- Kakisa, Red Knife

C.W.L.S. SCALE 1:7,400,000 87/06/17



MAP 43

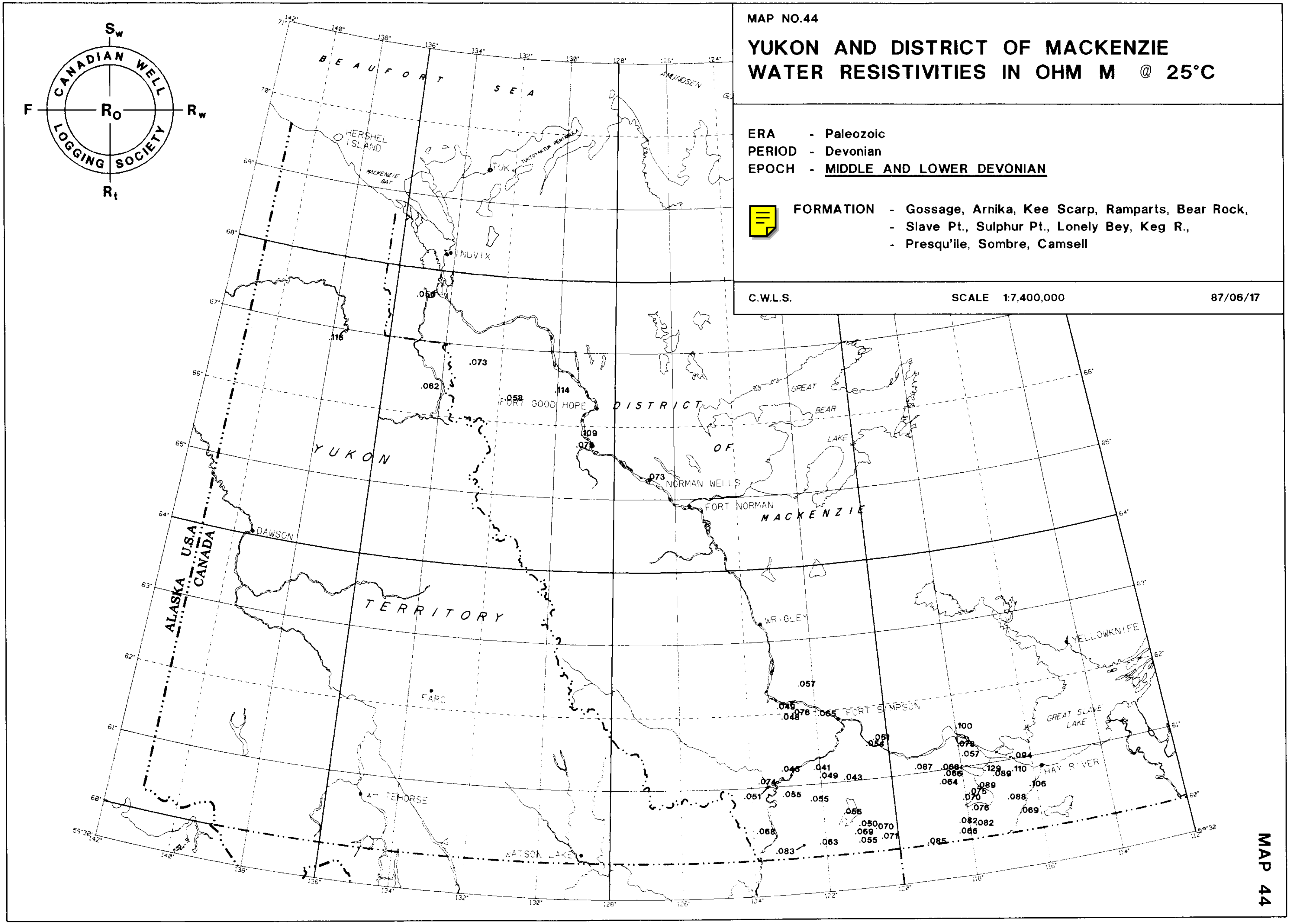
MAP NO.44

YUKON AND DISTRICT OF MACKENZIE WATER RESISTIVITIES IN OHM M @ 25°C

ERA - Paleozoic
PERIOD - Devonian
EPOCH - MIDDLE AND LOWER DEVONIAN

FORMATION - Gossage, Arnika, Kee Scarp, Ramparts, Bear Rock, - Slave Pt., Sulphur Pt., Lonely Bey, Keg R., - Presqu'ile, Sombre, Camsell

C.W.L.S. SCALE 1:7,400,000 87/06/17



ARCTIC

Alphabetical List of Formations

A

ANTOINNETTE 51
ASSISTANCE 51
AWINGAK 48

B

BATHURST ISLAND 53
BEAUFORT 45
BELCHER CHANNEL 51
BEVERLY INLET 52
BIRD FIORD 53
BJORNE 50
BLAA MOUNTAIN 50
BLIND FIORD 50
BLUE FIORD 53
BORDEN ISLAND 49
BORUP FIORD 51

C

CANYON FIORD 51
CAPE BUTLER 50
CAPE O'BRIEN 50
CAPE RICHARDS 50
CHADS POINT 50
CHANNEL 51
CRETACEOUS 46
CRETACEOUS 47

D

DEGERBOLS 51
DEVONIAN 52
DEVONIAN 53
DISAPPOINTMENT BAY 53
DRAKE POINT 49

E

EDEN BAY 50
ELDRIDGE BAY 50
EMMA FIORD 51
EUREKA SOUND 45

F

FOSHEIM 49
FRAM 52

G

GORE POINT 50
GRIPER BAY 52

H

HASSEL 46
HECLA BAY 53
HEIBERG 49
HELL GATE 52
HICCLES COVE 49

I

ISACHSEN 47

J

JURASSIC 48
JURASSIC 49

K

KANGUK 46
KING CHRISTIAN 49

L

LOWER CRETACEOUS 47
LOWER DEVONIAN 53
LOWER JURASSSIC 49

M

MACKENZIE KING 47
MACKENZIE KING 48
MACKENZIE KING 49
MACLEAN STRAIT 49
MELVILLE ISLAND 52
MIDDLE DEVONIAN 53
MIDDLE JURASSIC 49
MISSISSIPPIAN 51
MOULD BAY 48
MOUNT BAYLEY 51

N

NANSEN 51
NORDSTRAND POINT 52

O

OKSE BAY 52
OKSE BAY 53
OTTO FIORD 51

P

PALEOZOIC 51
PALEOZOIC 52
PALEOZOIC 53
PARRY ISLAND 52
PAT BAY 50
PATTERSON ISLAND 47
PEEL SOUND 53
PENNSYLVANIAN 51
PERMIAN 51
PRINCE ALFRED 53

R

REMUS 49
ROMULUS 50
ROUCHE POINT 50

S

SABINE BAY 51
SANDY POINT 49
SKY BATTLE 49
SNOWBLIND BAY 53
STRAND FIORD 46
STRATHCONA FIORD 53
STUART BAY 53

T

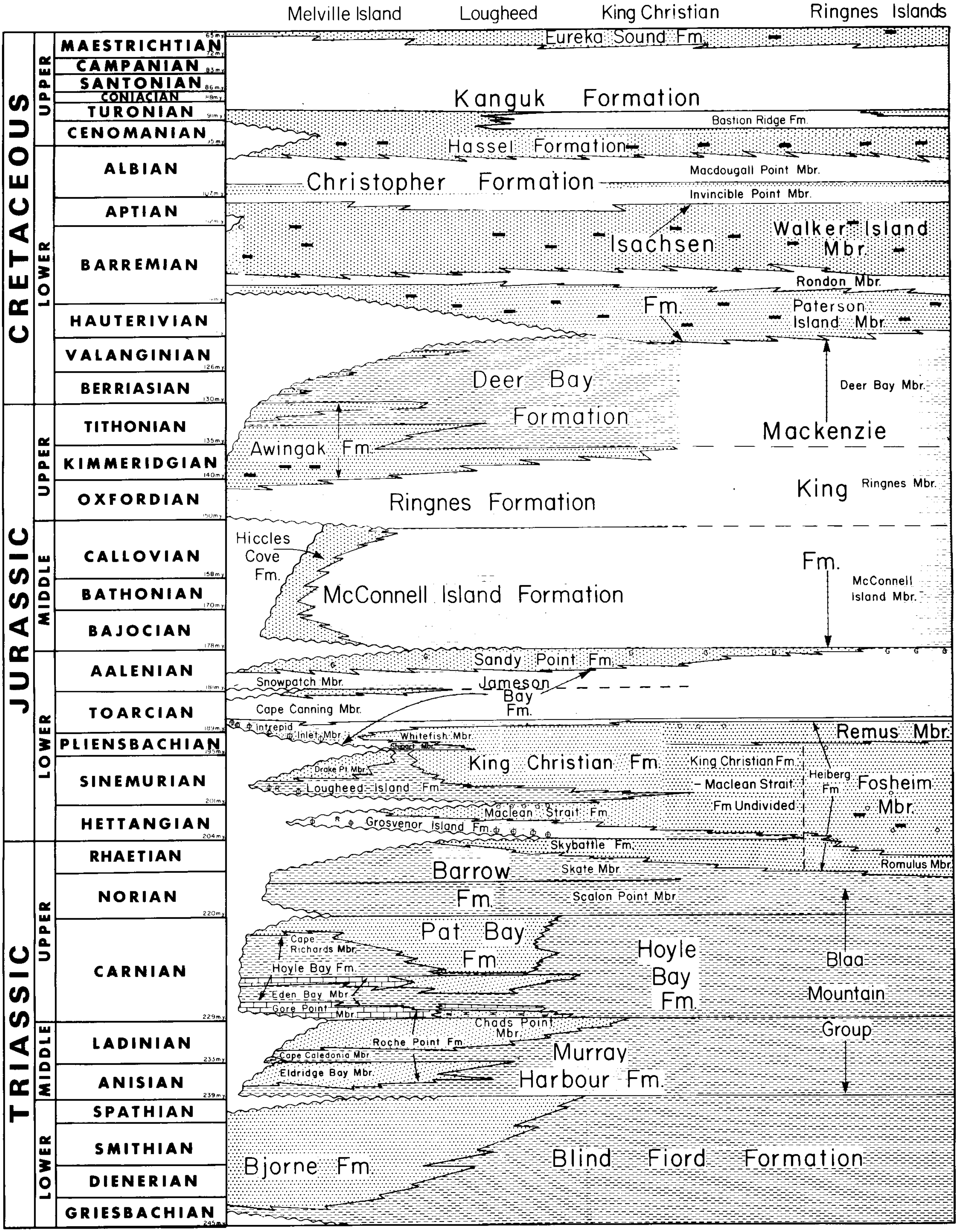
TANQUARY 52
TERTIARY 45
TRIASSIC 50
TROLD FIORD 51

U

UPPER CRETACEOUS 46
UPPER DEVONIAN 52
UPPER JURASSIC 48

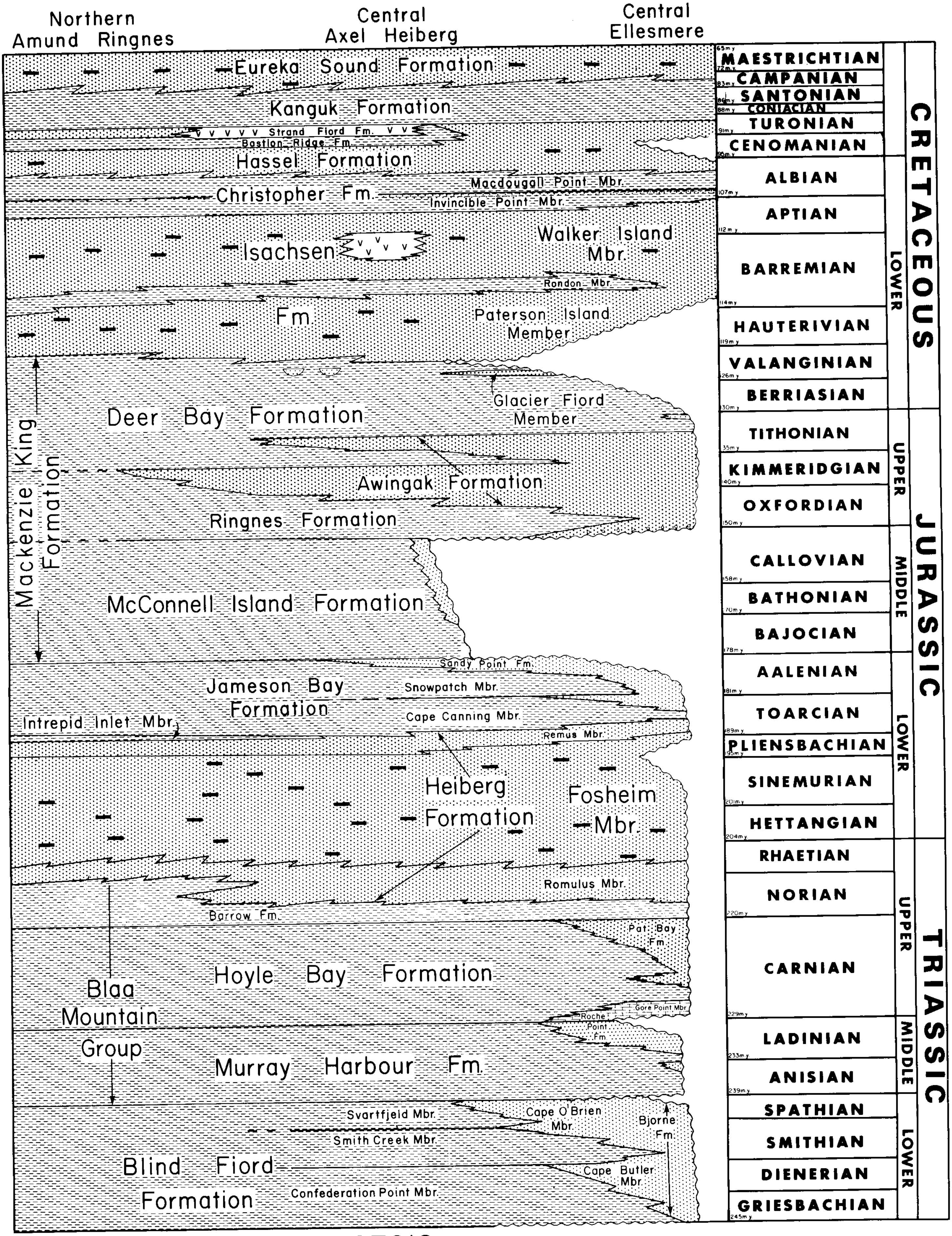
W

WALKER ISLAND 47
WEATHERALL 52
WHITE FISH 49



MESOZOIC STRATIGRAPHIC NOMENCLATURE
WESTERN and CENTRAL SVERDRUP BASIN

Geological Survey of Canada
A.F.E.
October, 1985

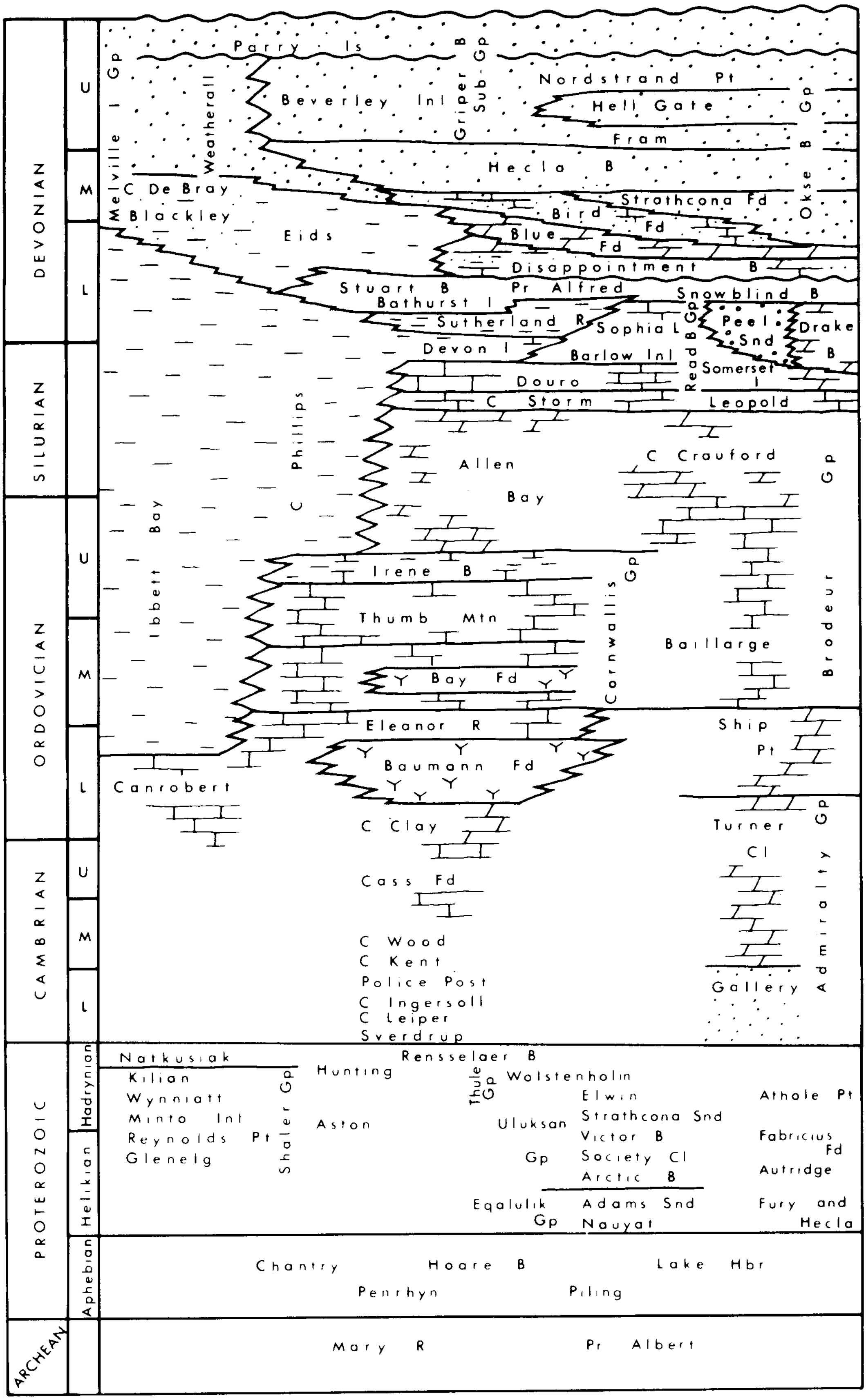


MESOZOIC STRATIGRAPHIC NOMENCLATURE EASTERN and CENTRAL SVERDRUP BASIN

Geological Survey of Canada

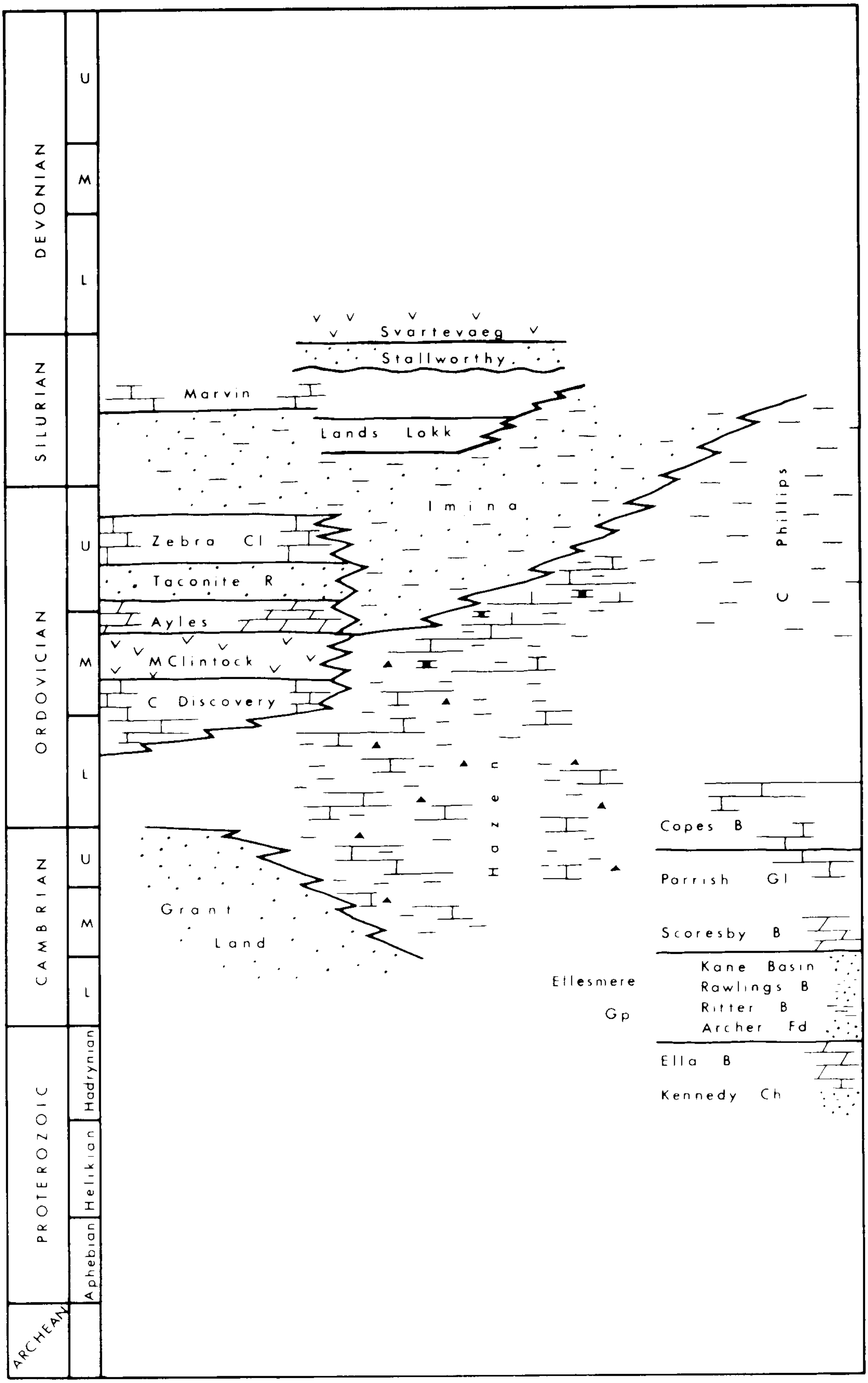
A.F.E.
October, 1985

Generalized Stratigraphy Franklinian Geosyncline



from Canadian Society of Petroleum Geologists Lexicon 1, 1981

Generalized Stratigraphy
Arctic Stable Platform



from Canadian Society of Petroleum Geologists
Lexicon 1, 1981

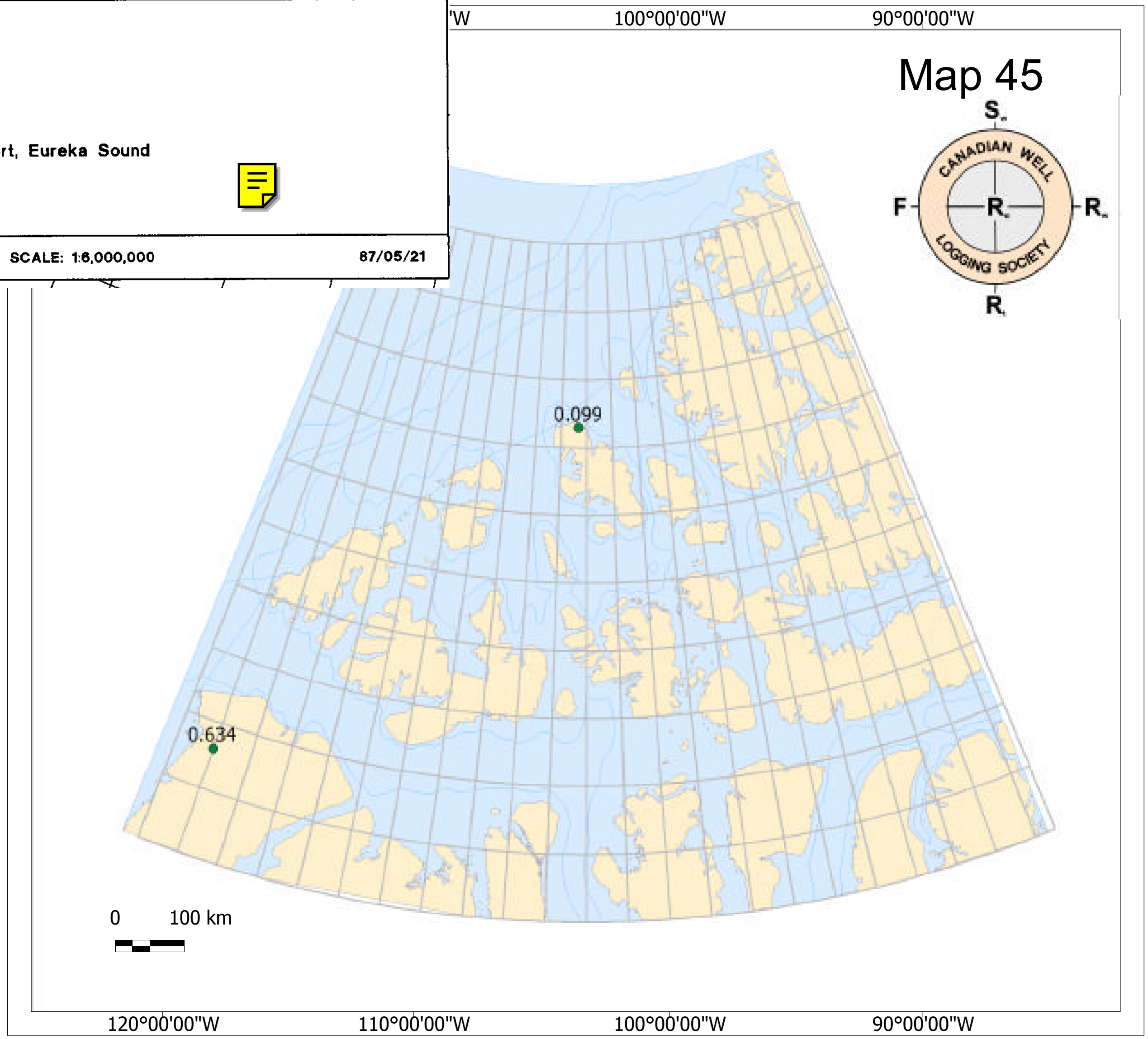
MAP NO.45

ARCTIC ISLANDS
WATER RESISTIVITIES IN OHM M @ 25°C

ERA - Cenozoic
PERIOD - TERTIARY
EPOCH -

GROUP -
FORMATION - Beaufort, Eureka Sound
MEMBER -

C.W.L.S. | SCALE: 1:6,000,000 | 87/05/21



MAP NO.46

ARCTIC ISLANDS
WATER RESISTIVITIES IN OHM M @ 25°C

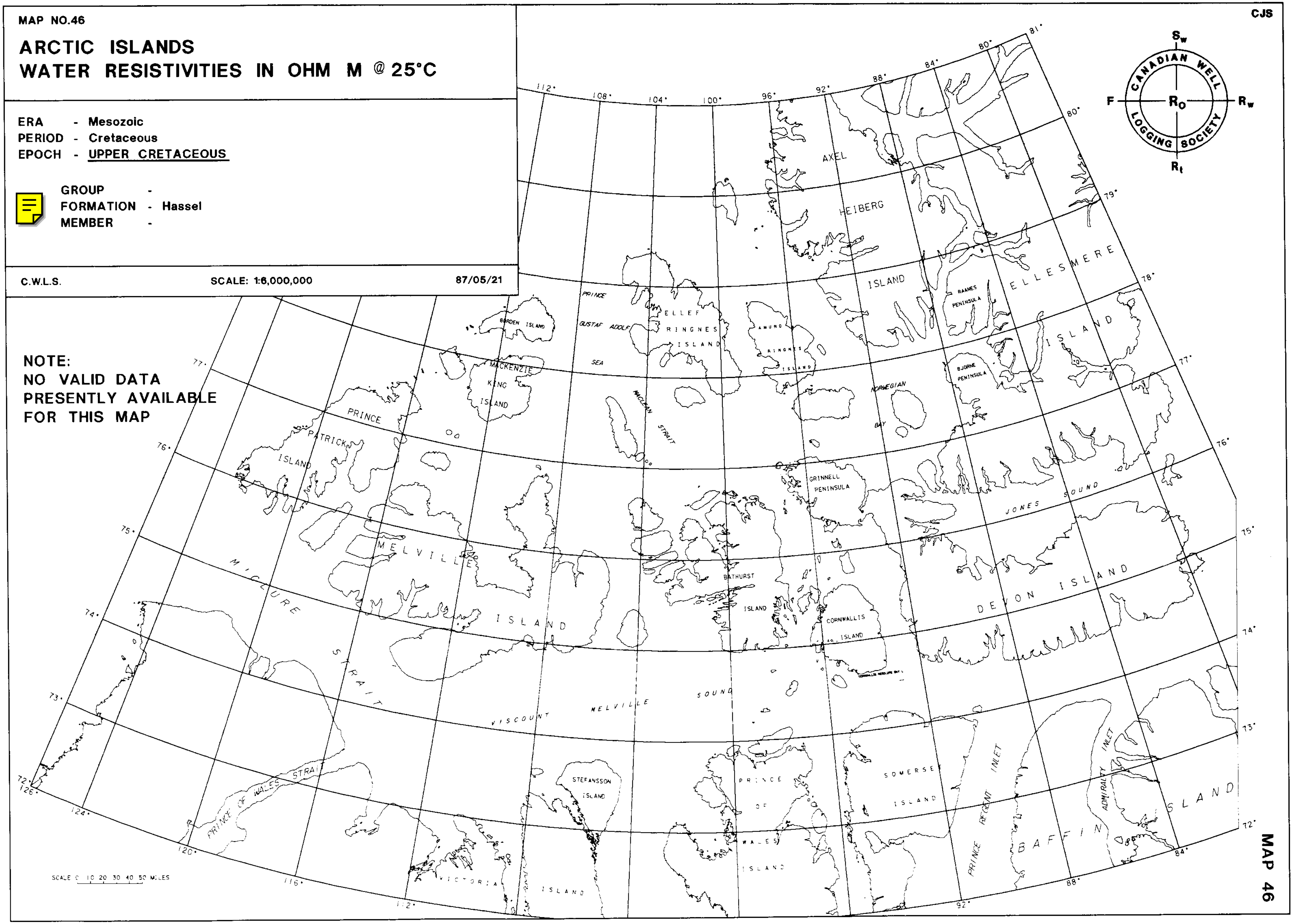
ERA - Mesozoic
PERIOD - Cretaceous
EPOCH - UPPER CRETACEOUS

GROUP -
FORMATION - Hassel
MEMBER -

C.W.L.S. SCALE: 1:6,000,000 87/05/21

NOTE:
NO VALID DATA PRESENTLY AVAILABLE FOR THIS MAP

CJS



MAP 46

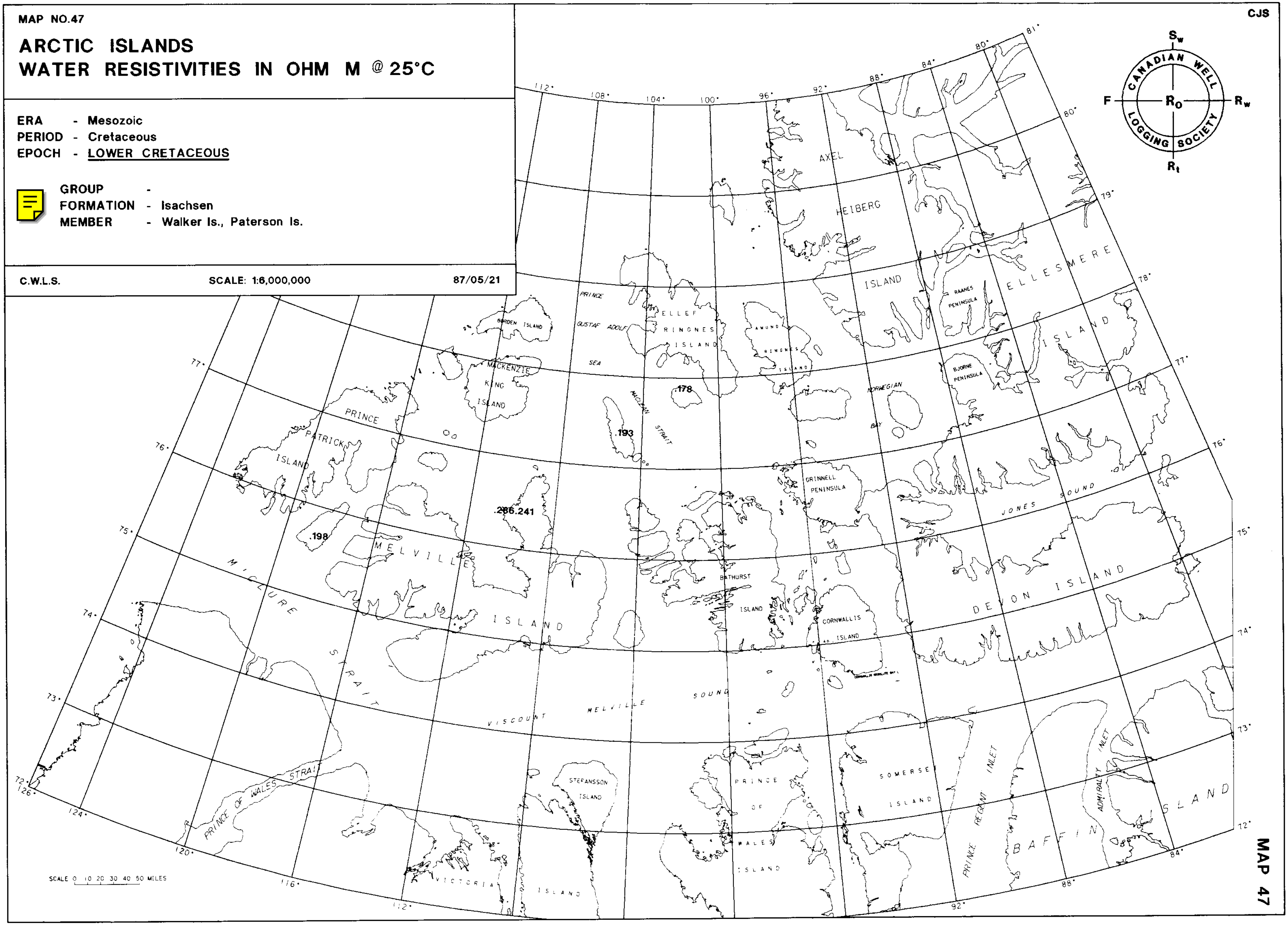
MAP NO.47

ARCTIC ISLANDS
WATER RESISTIVITIES IN OHM M @ 25°C

ERA - Mesozoic
PERIOD - Cretaceous
EPOCH - LOWER CRETACEOUS

GROUP -
FORMATION - Isachsen
MEMBER - Walker Is., Paterson Is.

C.W.L.S. SCALE: 1:6,000,000 87/05/21



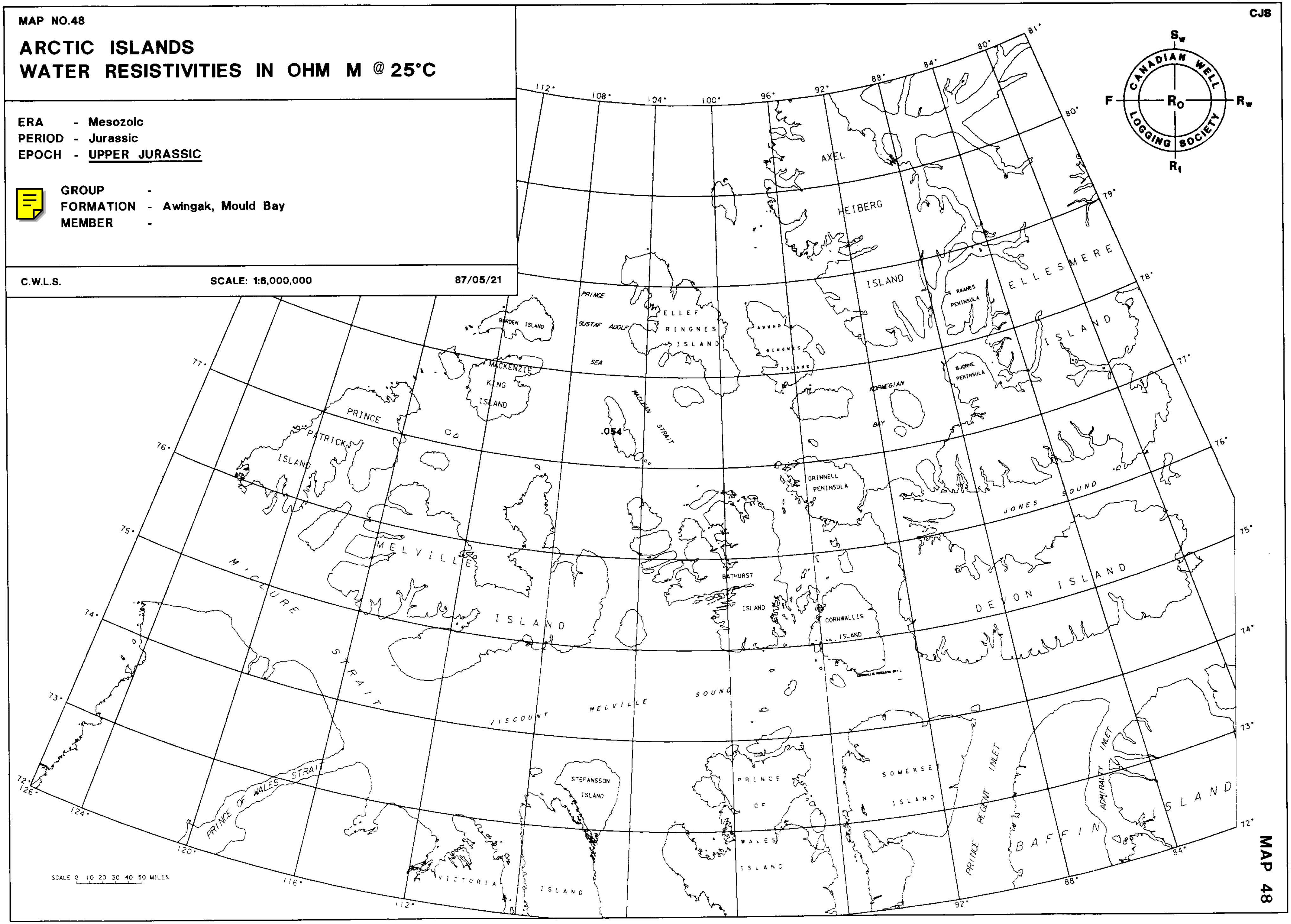
MAP NO.48

ARCTIC ISLANDS
WATER RESISTIVITIES IN OHM M @ 25°C

ERA - Mesozoic
PERIOD - Jurassic
EPOCH - UPPER JURASSIC

GROUP -
FORMATION - Awingak, Mould Bay
MEMBER -

C.W.L.S. SCALE: 1:6,000,000 87/05/21



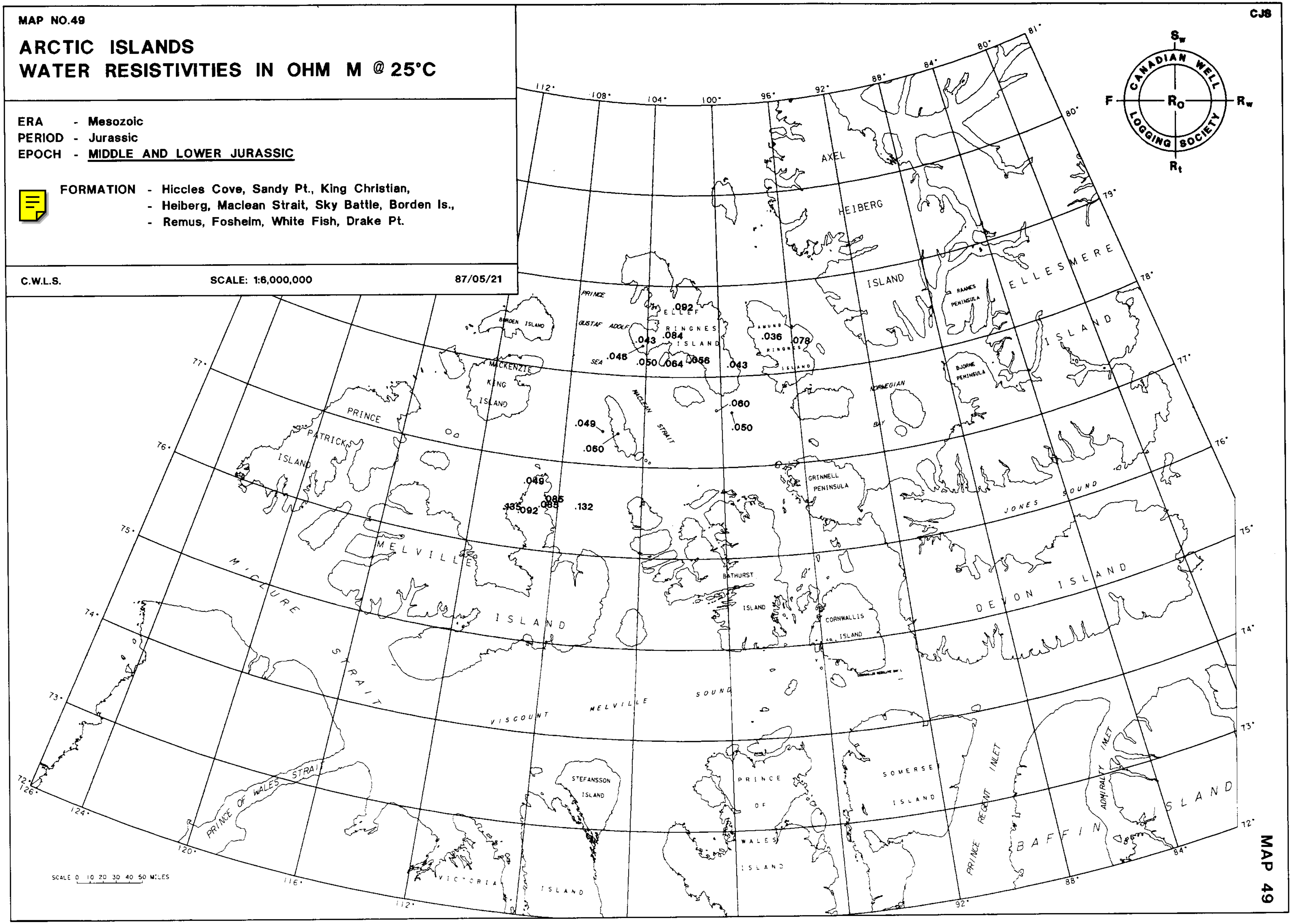
MAP NO.49

ARCTIC ISLANDS
WATER RESISTIVITIES IN OHM M @ 25°C

ERA - Mesozoic
PERIOD - Jurassic
EPOCH - MIDDLE AND LOWER JURASSIC

FORMATION - Hiccles Cove, Sandy Pt., King Christian,
- Heiberg, Maclean Strait, Sky Battle, Borden Is.,
- Remus, Fosheim, White Fish, Drake Pt.

C.W.L.S. SCALE: 1:6,000,000 87/05/21



MAP 49

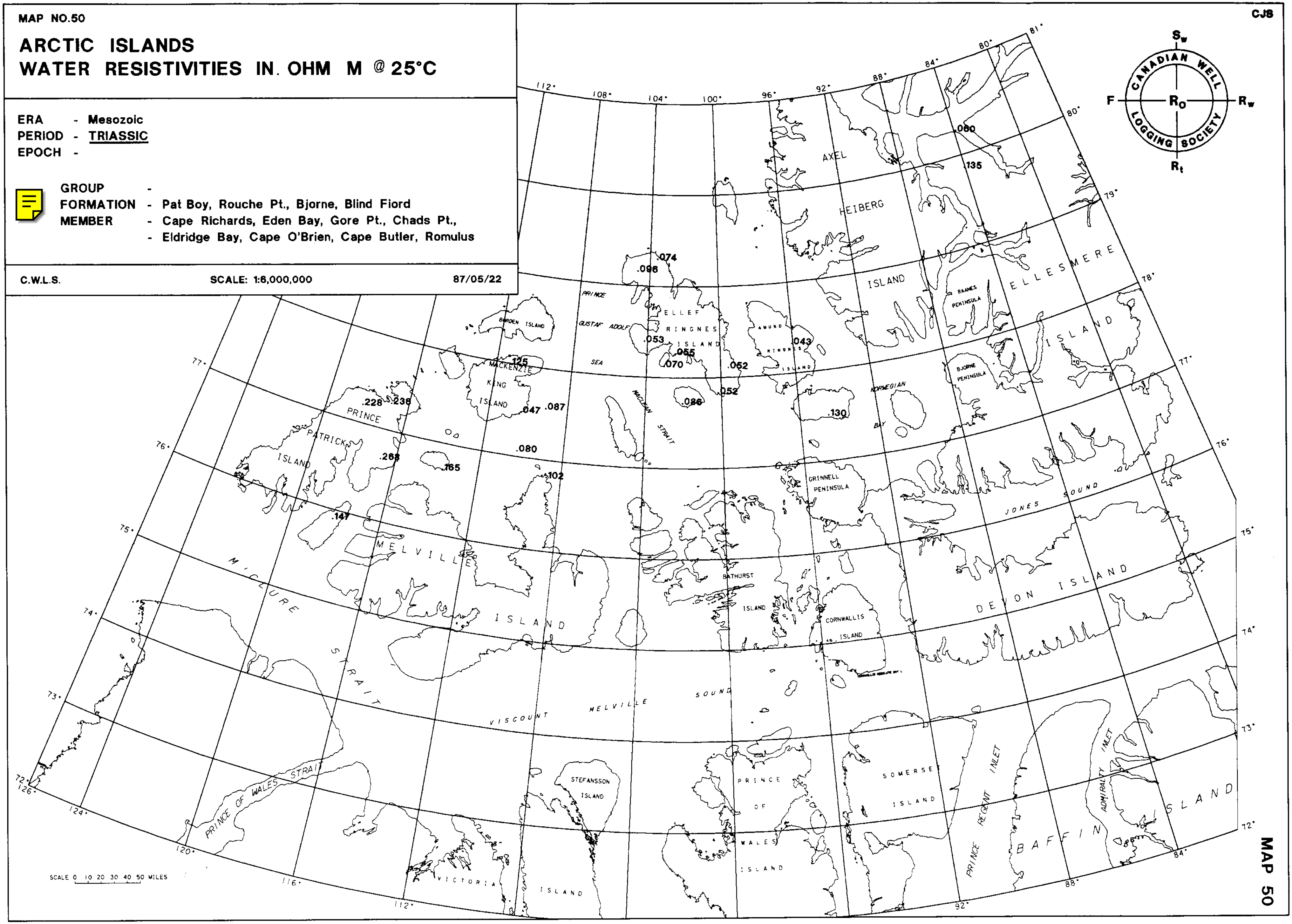
MAP NO.50

ARCTIC ISLANDS
WATER RESISTIVITIES IN. OHM M @ 25°C

ERA - Mesozoic
PERIOD - TRIASSIC
EPOCH -

GROUP -
FORMATION - Pat Boy, Rouche Pt., Bjorne, Blind Fiord
MEMBER - Cape Richards, Eden Bay, Gore Pt., Chads Pt.,
- Eldridge Bay, Cape O'Brien, Cape Butler, Romulus

C.W.L.S. SCALE: 1:6,000,000 87/05/22



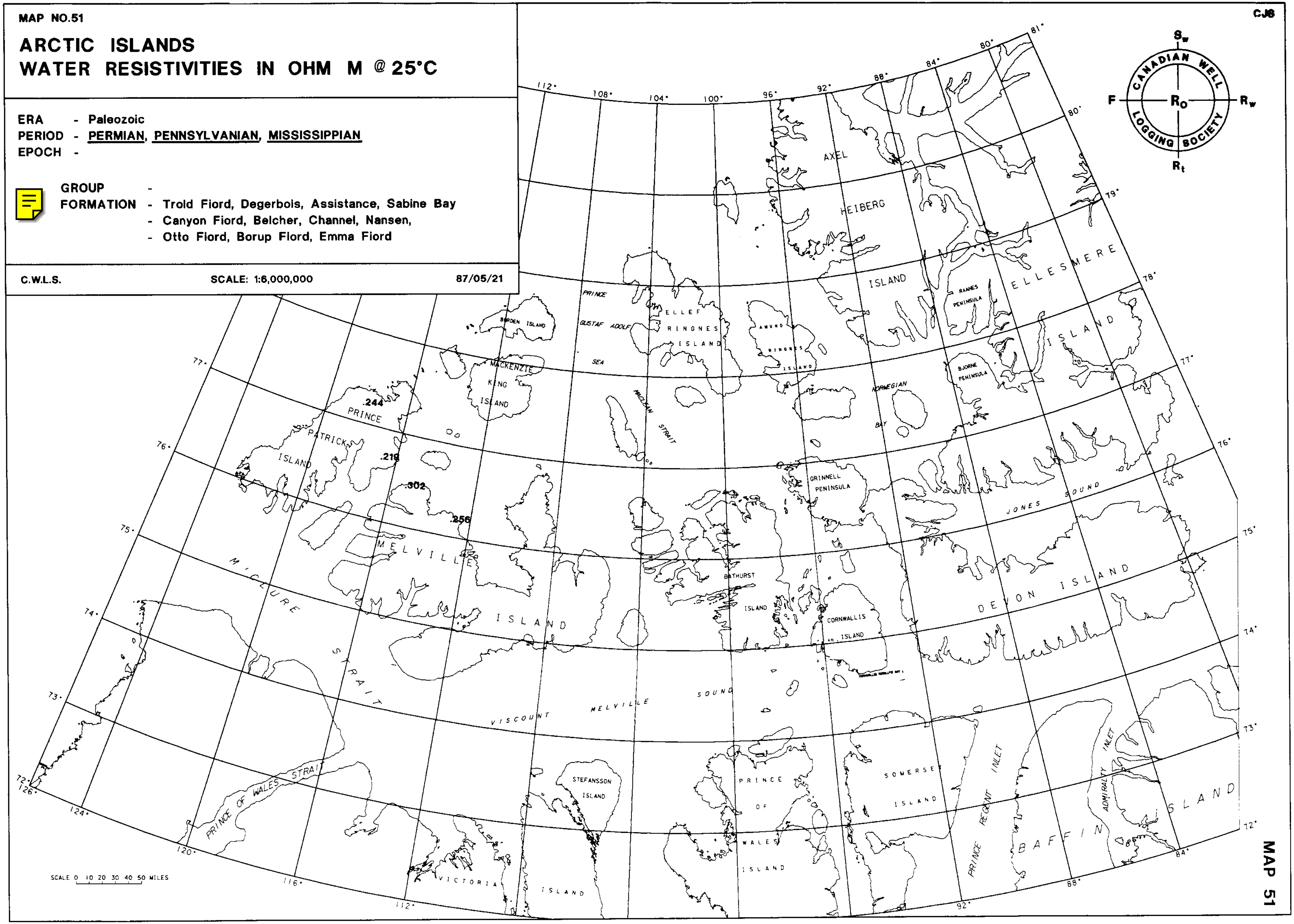
MAP NO.51

ARCTIC ISLANDS
WATER RESISTIVITIES IN OHM M @ 25°C

ERA - Paleozoic
PERIOD - PERMIAN, PENNSYLVANIAN, MISSISSIPPIAN
EPOCH -

GROUP -
FORMATION - Trold Fiord, Degerbols, Assistance, Sabine Bay
- Canyon Fiord, Belcher, Channel, Nansen,
- Otto Fiord, Borup Fiord, Emma Fiord

C.W.L.S. SCALE: 1:6,000,000 87/05/21



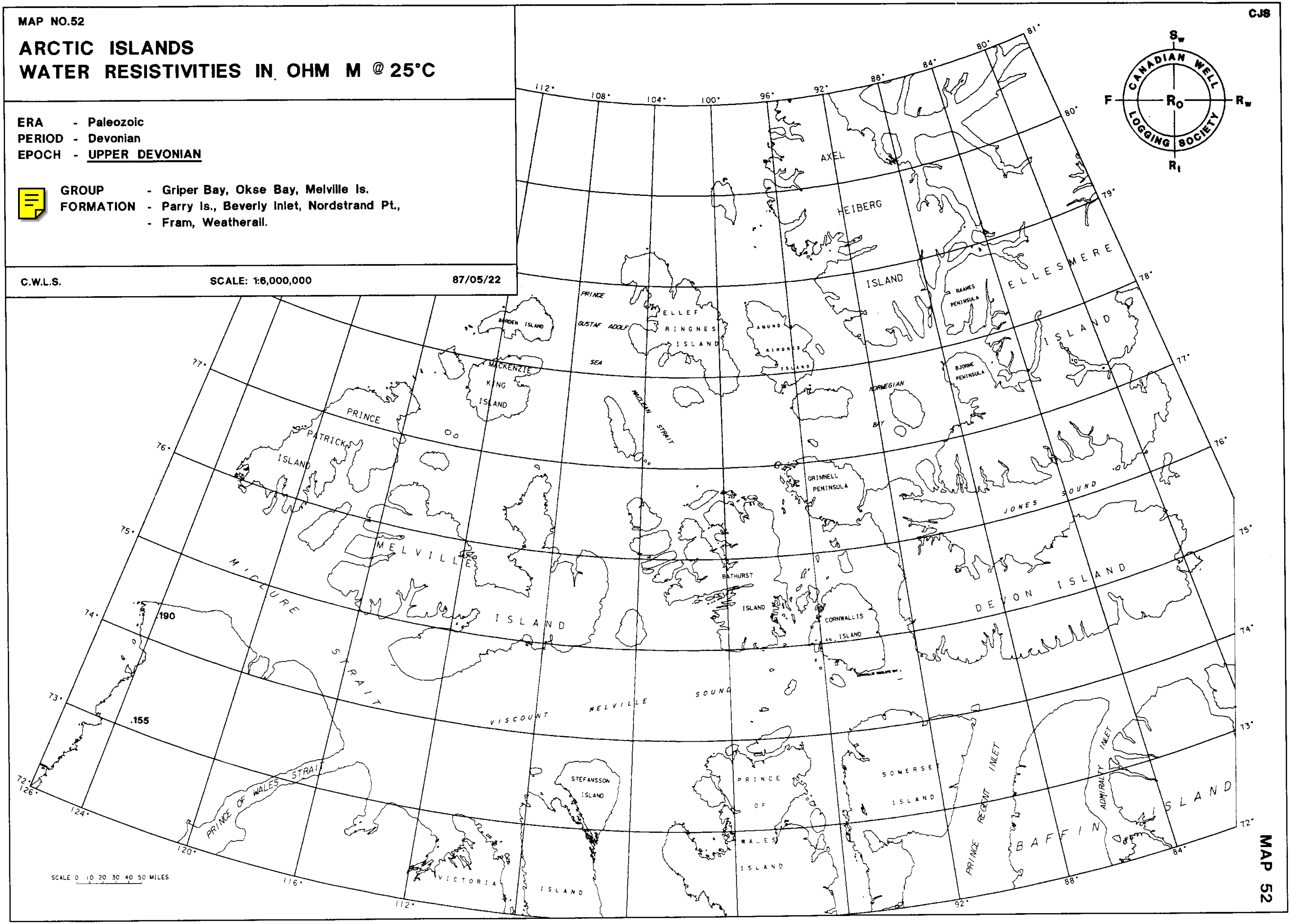
MAP NO.52

ARCTIC ISLANDS
WATER RESISTIVITIES IN OHM M @ 25°C

ERA - Paleozoic
PERIOD - Devonian
EPOCH - UPPER DEVONIAN

GROUP - Griper Bay, Okse Bay, Melville Is.
FORMATION - Parry Is., Beverly Inlet, Nordstrand Pt.,
- Fram, Weatherall.

C.W.L.S. SCALE: 1:6,000,000 87/05/22



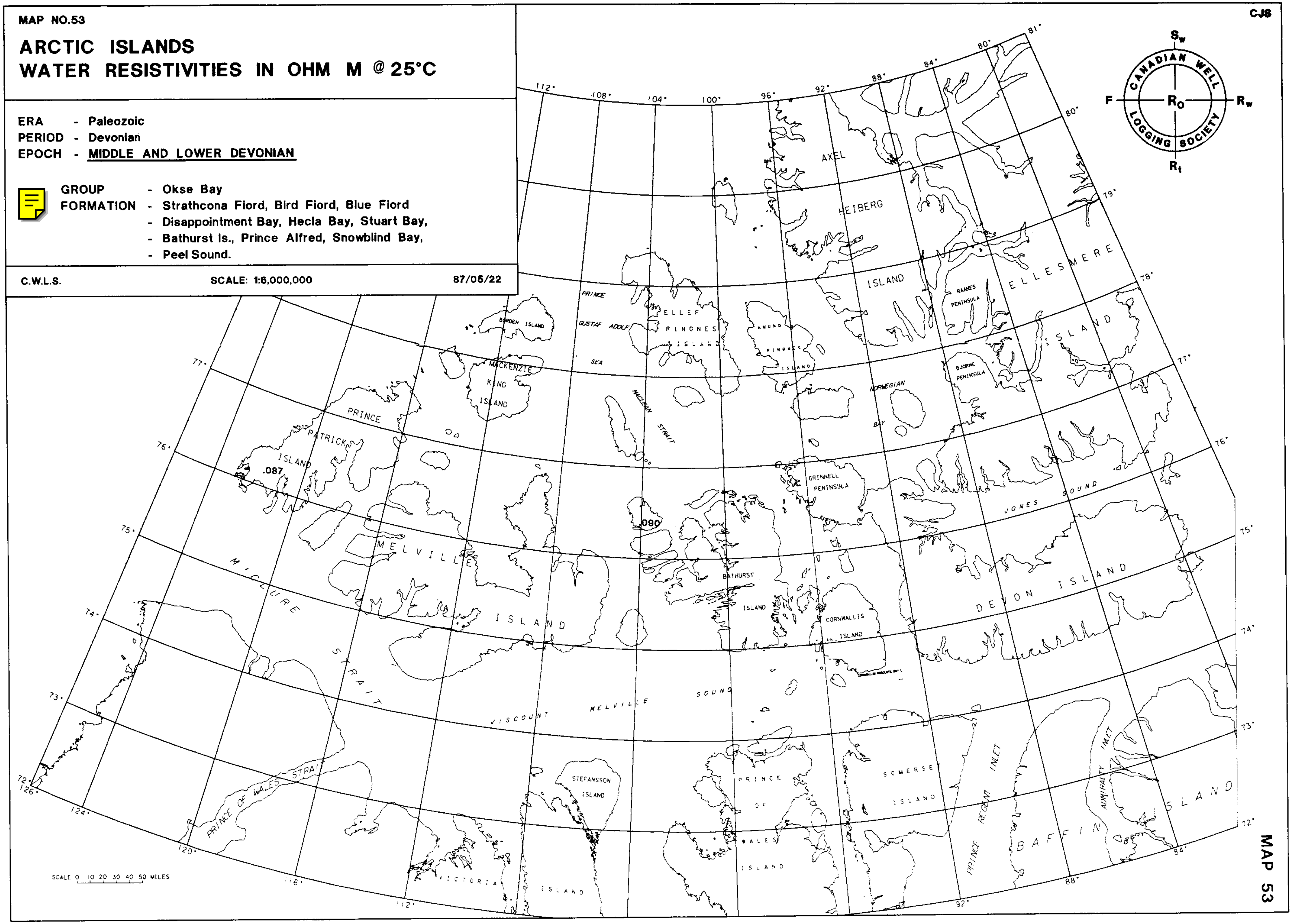
MAP NO.53

ARCTIC ISLANDS
WATER RESISTIVITIES IN OHM M @ 25°C

ERA - Paleozoic
PERIOD - Devonian
EPOCH - MIDDLE AND LOWER DEVONIAN

GROUP - Okse Bay
FORMATION - Strathcona Fiord, Bird Fiord, Blue Fiord
- Disappointment Bay, Hecla Bay, Stuart Bay,
- Bathurst Is., Prince Alfred, Snowblind Bay,
- Peel Sound.

C.W.L.S. SCALE: 1:6,000,000 87/05/22



EAST COAST

Alphabetical List of Formations

ABENAKI 57
ADOLPHUS 54
ADOLPHUS 55
AVALON 56

BANQUEREAU 54
BJARNI 56

CATALINA 56
CRETACEOUS 55
CRETACEOUS 56

DAWSON CANYON 55

EGRET 57
EIDER 55
FOX COVE 55

FREYDIS 55

GUDRID 54
HIBERNIA 56

IROQUOIS 57

JEANNE D'ARC 57

JURASSIC 57

LEIF 54
LOGAN CANYON 55
LOGAN CANYON 56
LOWER CRETACEOUS 56

MARA 54
MIC MAC 57
MISSISAUGA 56
MOHAWK 57
MURRE 57

OTTER BAY 55

PETREL 55

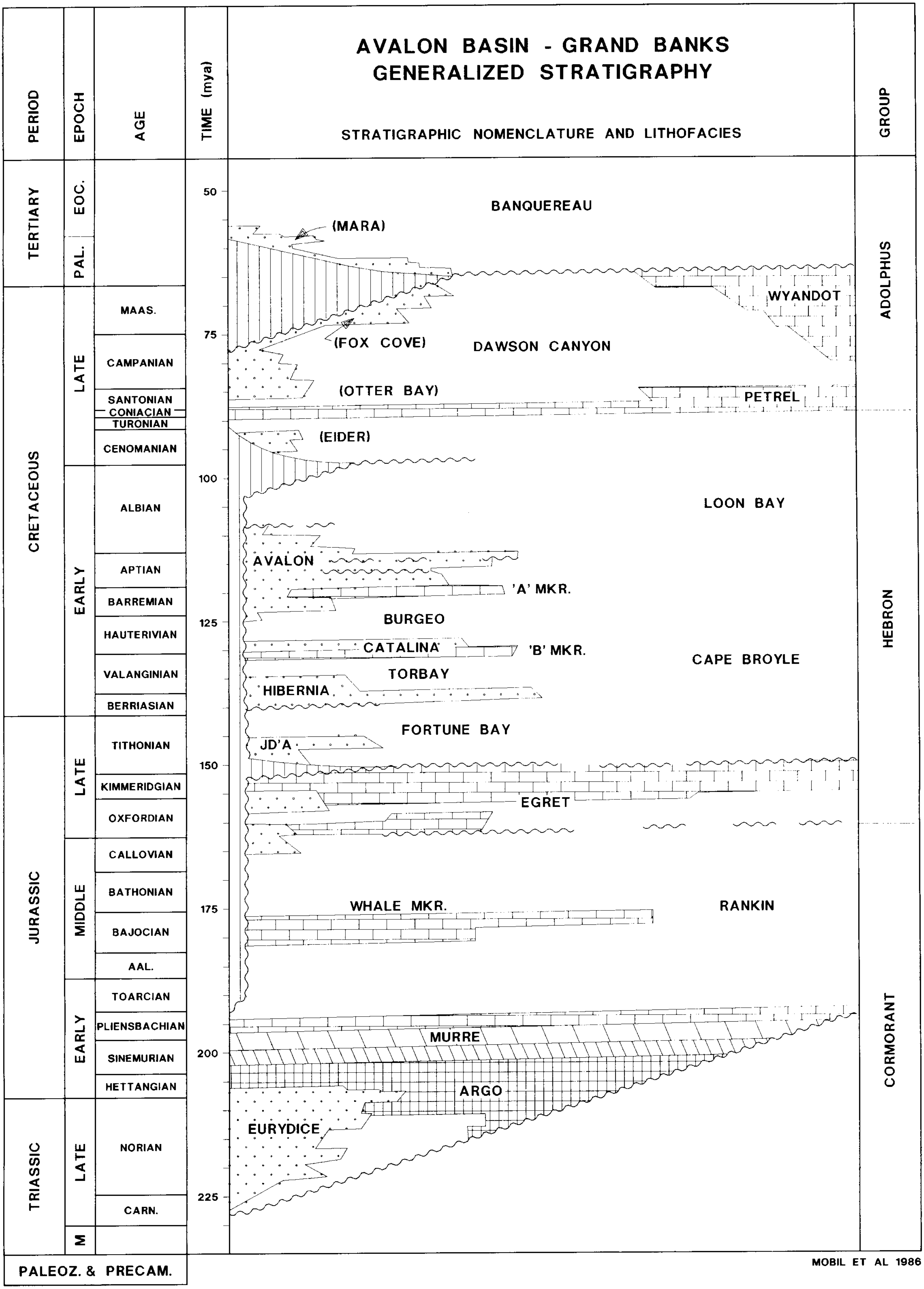
RANKIN 57

SNORRI 56

TERTIARY 54

UPPER CRETACEOUS 55

WYANDOT 55



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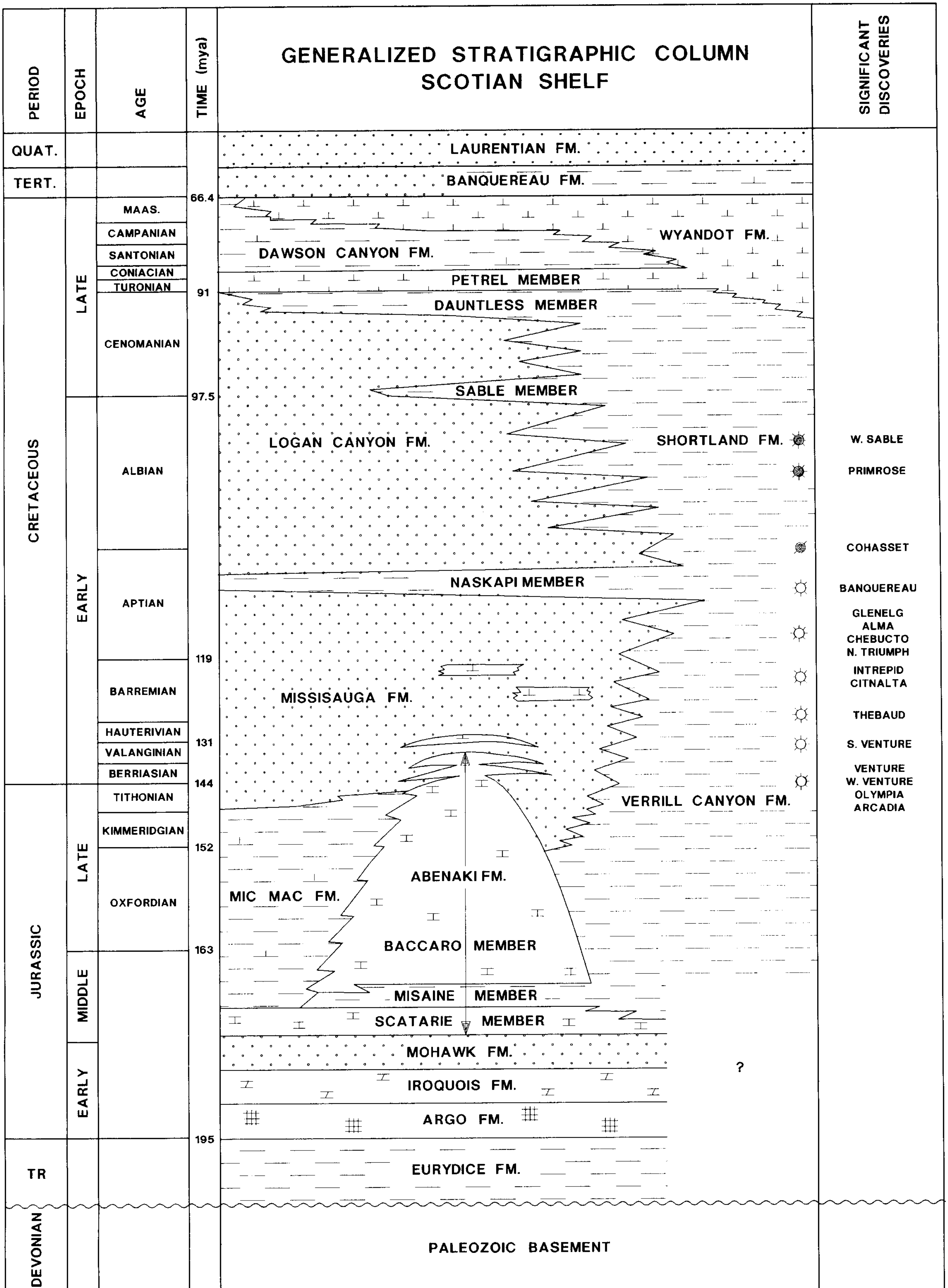
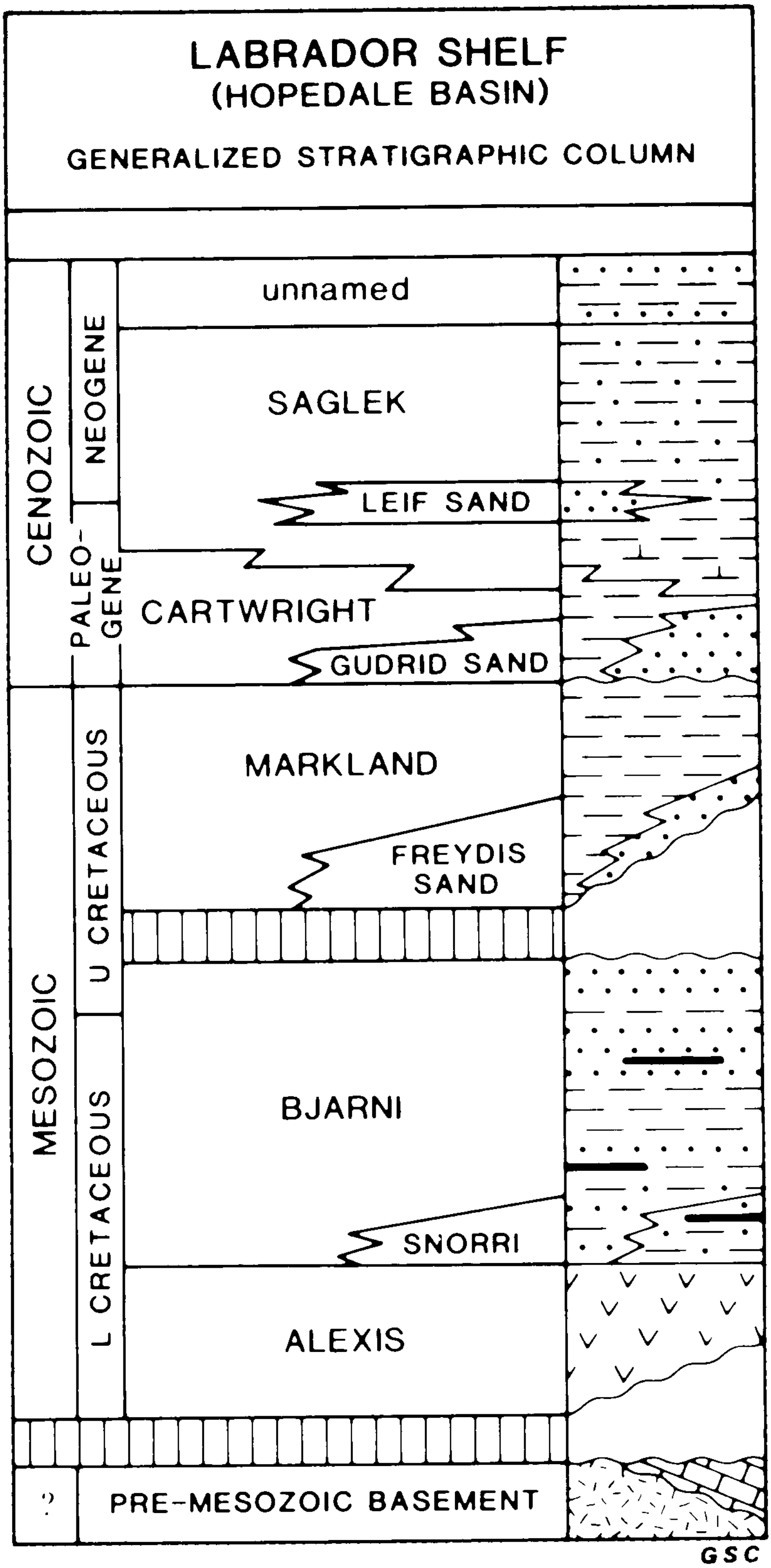


MOBIL ET AL 1987



Generalized stratigraphy of the Hopedale Basin (after Umpleby 1979)

MAP 54

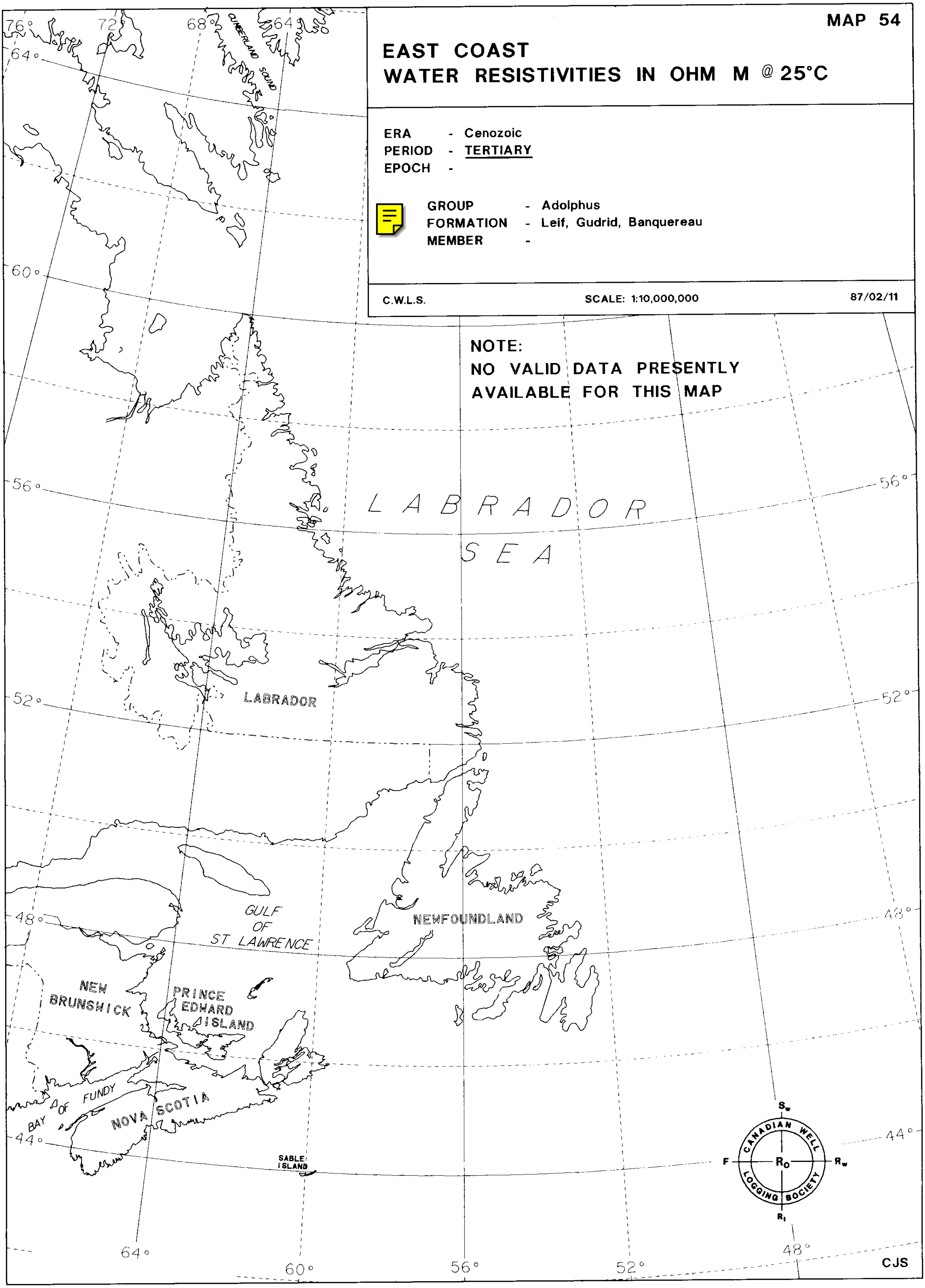
EAST COAST
WATER RESISTIVITIES IN OHM M @ 25°C

ERA - Cenozoic
PERIOD - TERTIARY
EPOCH -

GROUP - Adolphus
FORMATION - Leif, Gudrid, Banquereau
MEMBER -

C.W.L.S. SCALE: 1:10,000,000 87/02/11

NOTE:
NO VALID DATA PRESENTLY AVAILABLE FOR THIS MAP



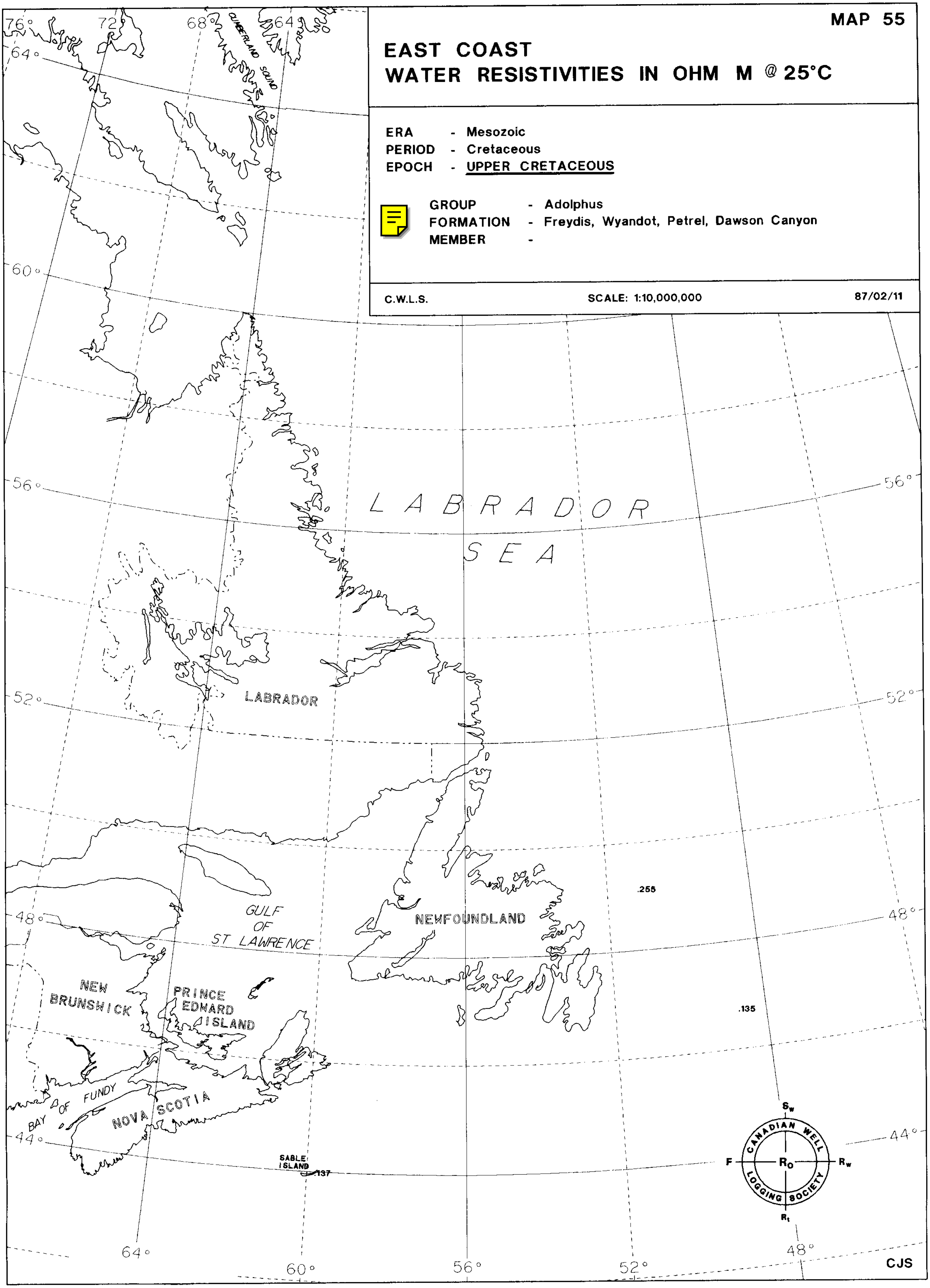
MAP 55

EAST COAST
WATER RESISTIVITIES IN OHM M @ 25°C

ERA - Mesozoic
PERIOD - Cretaceous
EPOCH - UPPER CRETACEOUS

GROUP - Adolphus
FORMATION - Freydis, Wyandot, Petrel, Dawson Canyon
MEMBER -

C.W.L.S. SCALE: 1:10,000,000 87/02/11



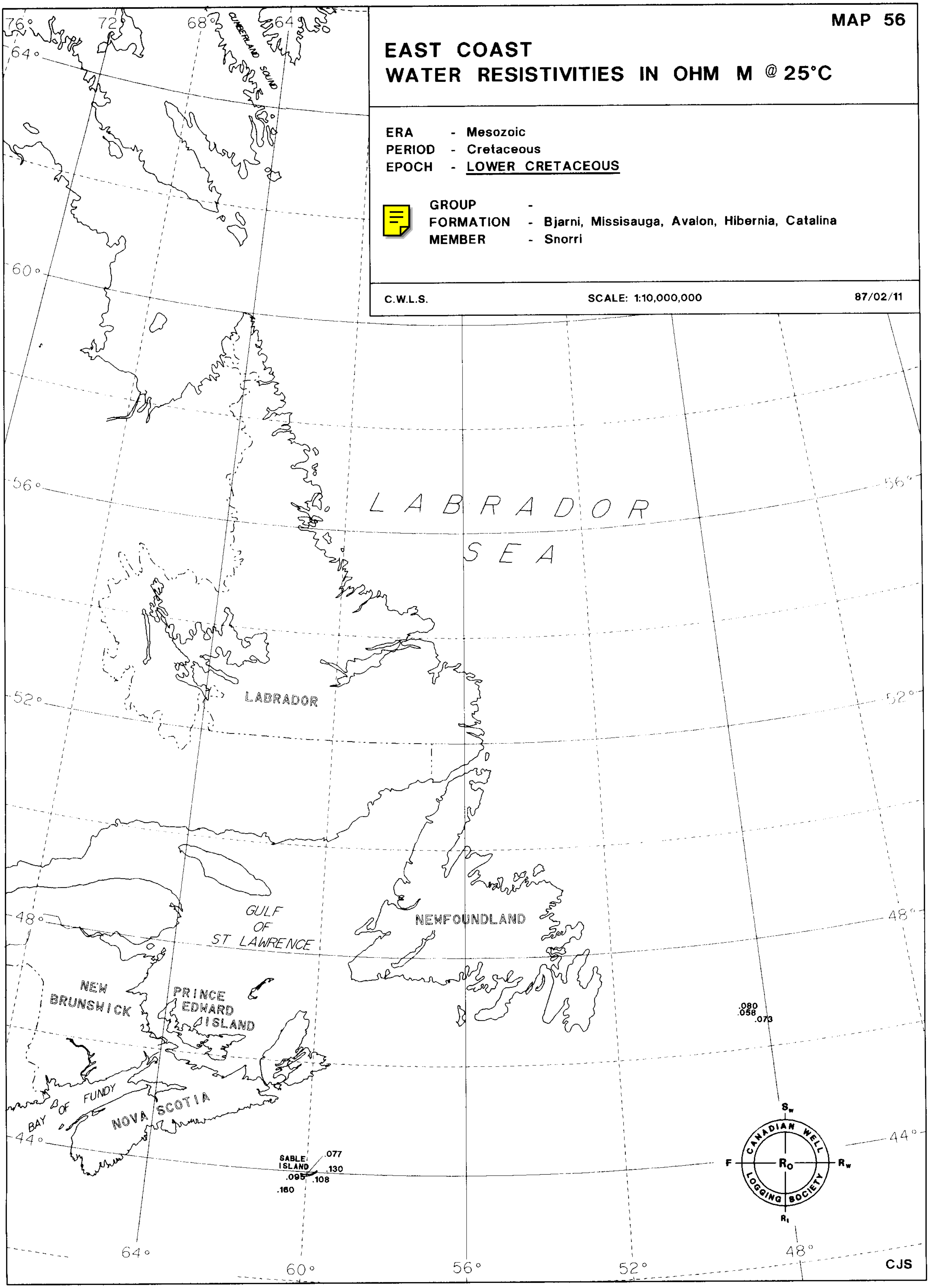
MAP 56

EAST COAST
WATER RESISTIVITIES IN OHM M @ 25°C

ERA - Mesozoic
PERIOD - Cretaceous
EPOCH - LOWER CRETACEOUS

GROUP -
FORMATION - Bjarni, Missisauga, Avalon, Hibernia, Catalina
MEMBER - Snorri

C.W.L.S. SCALE: 1:10,000,000 87/02/11



MAP 57

EAST COAST
WATER RESISTIVITIES IN OHM M @ 25°C

ERA - Mesozoic
PERIOD - JURASSIC
EPOCH -

GROUP -
FORMATION - Mic Mac, Abenaki, Jeanne D'arc
MEMBER -

C.W.L.S. SCALE: 1:10,000,000 87/02/11