

GEOLOGICAL SURVEY OF CANADA



COMMISSION GÉOLOGIQUE DU CANADA

**AIRBORNE GEOPHYSICAL SURVEY
1988**

**MOUNT PLEASANT CALDERA
NEW BRUNSWICK**

**McDougall Lake 21G/7 (part)
Fredericton Junction 21G/10 (part)**

**GAMMA RAY SPECTROMETER, VLF AND MAGNETOMETER
COLOUR MAPS**

**with accompanying
Profile Maps, Stacked Profiles and Geology Map**

Scale 1:100 000



Project funded by the Geological Survey of Canada as a contribution to
Canada-New Brunswick Mineral Development Agreement 1984-89,
a subsidiary agreement to the Economic and Regional Development Agreement.

Ce projet a été subventionné par la CGC comme contribution à
l'entente Canada - Nouveau-Brunswick: Entente d'exploitation minérale 1984-89,
faisant partie de l'Entente sur le développement économique et régional.



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GEOLOGICAL SURVEY OF CANADA
COMMISSION GÉOLOGIQUE DU CANADA
OTTAWA

1988

AIRBORNE GAMMA RAY SPECTROMETER SURVEY

In November 1987 and July 1988 a multiparameter geophysical survey was flown by the Geological Survey of Canada over the Mount Pleasant Caldera region of New Brunswick. The survey location is shown on the index map. The main purpose of the survey was to acquire quantitative gamma ray spectrometric information. VLF electromagnetic and total field magnetic data were also recorded and compiled.

Data are presented at 1:100,000 scale, including: colour radioelement contour maps (ternary radioelement, exposure rate, potassium, equivalent uranium, equivalent thorium and eU/eTh, eU/K, eTh/K ratios); colour and profile maps of VLF total field, VLF quadrature and magnetic total field; flight line, topography and geology maps; stacked profiles for each of 114 flight lines.

All instrumentation was carried on board a Shorts Skyvan fixed wing aircraft, flown at a mean terrain clearance of 125 m at 190 km/h. Data were sampled at 1 second intervals, along northwest-southeast oriented flight lines, 250 m apart.

Spectrometric Data

The airborne radiometric measurements were made using a 256 channel spectrometer, with twelve 102x102x406 mm NaI (TI) detectors. Potassium is measured directly from the 1.46 MeV gamma ray photons emitted by ⁴⁰K, whereas uranium and thorium are measured indirectly from gamma ray photons emitted by daughter products in their decay chains. Uranium is monitored by means of gamma ray photons at approximately 1.76 MeV from ²¹⁴Bi, and thorium, from 2.62 MeV photons emitted by ²⁰⁸Tl. The energy windows used are :

Potassium	⁴⁰ K	1.36-1.56 MeV
Uranium	²¹⁴ Bi	1.66-1.86 MeV
Thorium	²⁰⁸ Tl	2.41-2.81 MeV

Uranium, thorium and potassium counts have been corrected for dead time, ambient temperature changes, background radiation, spectral scattering and deviations of terrain clearance from the planned survey altitude. The data as presented represent an average surface concentration which is influenced by varying amounts of outcrop, overburden, vegetation, soil moisture and surface waters. As a result, the concentrations as shown are usually lower than the concentrations in the bedrock.

Factors for converting the airborne measurements to concentrations were determined by relating the airborne count rates to the known ground concentrations of a test strip in the Ottawa area. The factors used to convert the airborne measurements to ground concentrations are:

1% K	91.0 cps
1 ppm eU	9.1 cps
1 ppm eTh	7.0 cps

The exposure rate, in micro Roentgens per hour has been computed from the measured concentrations of potassium, uranium and thorium (Grasty, R.L., Carson, J.M., Charbonneau, B.W. and Holman, P.B., 1984, Natural Background Radiation in Canada, Geol. Sur. Can., Bull. 360). To compare these data with earlier total count maps expressed in Units of Radioelement concentrations (Ur), the conversion factor is 1µR/h=1.67 Ur.

VLF Data

The primary electromagnetic field is generated by VLF navigation stations. For portions of this survey (lines 42 to 101 inclusively) the receiving coils of a Hertz Totem 1A VLF unit were tuned to station NSS at Annapolis, Maryland, which transmits at a frequency of 21.4 kHz. When station NSS was not operating, station NAA at Cutler, Maine, which transmits at 24.0 kHz was used (lines 1 to 41 and 102-114). Where erratic responses were obtained using station NAA in 1987, the VLF data has been removed, as indicated on the VLF profile maps.

Anomalies reflect distortions on the primary field caused by a secondary electromagnetic field generated by eddy currents flowing in geological and man-made conductors. Anomalies produce positive peaks on the total field track and are of the cross-over type (negative to positive) on the quadrature trace. Both parameters are plotted with positive deflections towards northeast. The profiles presented are the total field value (vector sum of the horizontal and vertical components) and the quadrature value (out-of-phase component). The mean values of the total field and quadrature component were removed along each flight line. The resultant values are plotted with a two second lag. The quadrature, which depends on the flight line direction, was inverted for lines flown from southeast to northwest. A 5 point filter was applied to both total field and quadrature data for final presentation as profiles.

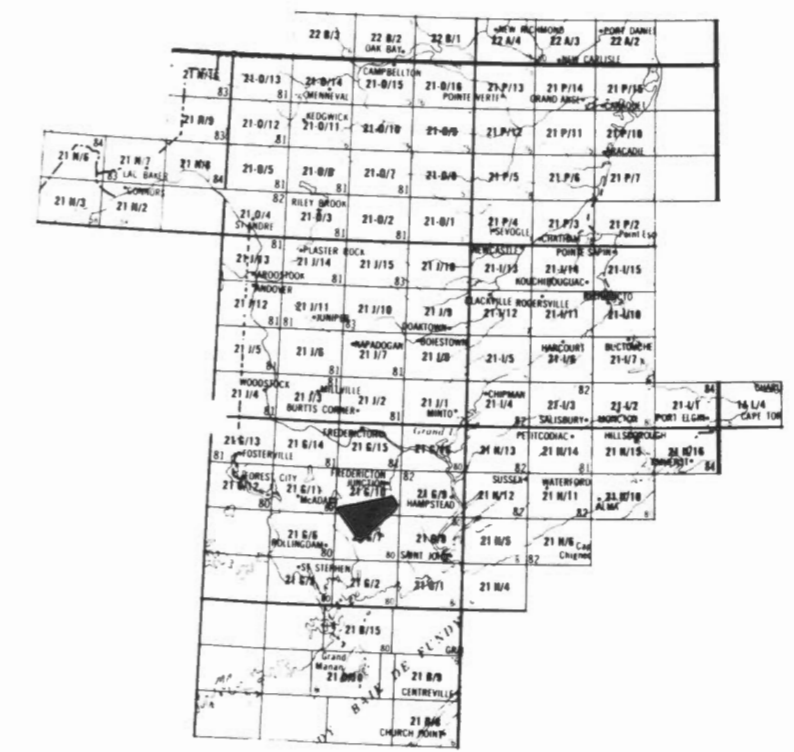
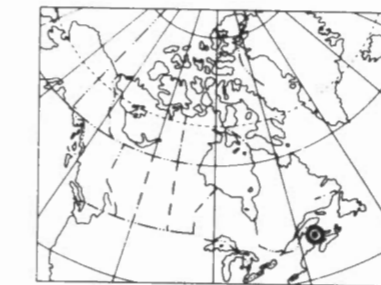
Magnetic Data

Low resolution aeromagnetic data were acquired with an uncompensated aircraft and were compiled with no correction for regional or diurnal variation. Apparent heading effects were removed during processing.

Copies of this booklet may be viewed at offices of New Brunswick Department of Natural Resources and Energy in Sussex and Fredericton and at all Geological Survey of Canada libraries. Colour photocopies may be purchased from Ashley Reproductions Inc., 386 Bank Street, Ottawa K2P 1Y4, (613) 235-2115. For additional information relating to this survey, contact R. Shives, Mineral Resources Division, Geological Survey of Canada (613) 996-2323.

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21 G/7 (part), 21 G/10 (part)



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GEOLOGICAL LEGEND

Geology after: McCutcheon, S.R. *The Mount Pleasant Caldera Complex: Stratigraphy, Geochemistry and Mineral Deposits*
(unpublished maps, Ph.D. Thesis, Dalhousie University, to be published 1989)

LEGEND

POST-CALDERA ROCKS

PENNSYLVANIAN

PETITODIAC GROUP

Pp Grey quartzose sandstone and granule to pebble conglomerate, with quartz clasts; dark grey mudstone, minor greyish red mudstone and fine-grained sandstone.

MISSISSIPPIAN TO PENNSYLVANIAN

MPs SHIN FORMATION: greyish red, pebble to granule conglomerate and pebbly arkosic sandstone, locally, with calcareous matrix; reddish brown to greyish red mudstone and fine- to medium-grained sandstone with scattered calcareous nodules; a few thin tuff beds toward the top and, thin, discontinuous, siliciclastic limestone ("GELDER LIMESTONE") near the base.

CALDERA-FILL ROCKS

MISSISSIPPIAN AND/OR LATE DEVONIAN

DMk KLEEF FORMATION:
DMk3 Reddish brown, rhyolitic, lithic-tuff and lithic-lapilli-tuff that contains flattened tubular pumice and, in places, algal (?) limestone clasts.

DMk2 Porphyritic to glomeroporphyritic basalt.

DMk1 Greyish red, pebble to cobble conglomerate; interbedded reddish brown sandy mudstone with calcareous nodules.

DMbs BIG SCOTT MOUNTAIN TUFF:
DMbs3 Greyish red purple, rhyolitic crystal-tuff (crystals mostly less than 1 mm).

DMbs2 Greyish purple, rhyolitic lithic-tuff and lithic-lapilli-tuff that contains some block-sized clasts.

DMbs1 Dark greyish red to light brownish grey, rhyolitic crystal-tuff (crystals commonly 2-4 mm); 1a, reddish brown rhyolitic crystal-tuff or porphyritic lava (crystals mostly less than 1 mm); 1b, greyish red, aphyric, rhyolitic tuff.

DMbs? Greyish red, nearly aphyric, flow-banded, rhyolite.

LATE DEVONIAN

Dmp MOUNT PLEASANT PORPHYRY AND ASSOCIATED BRECCIAS: greyish olive to greenish black, in places, flow-banded, sparsely quartz-feldspar phytic (mostly 1-2 mm) porphyry that occurs as dykes and plugs cutting older silicic and younger chloritic hydrothermal breccias. Locally, it is cut by pebble dykes and exhibits greyish orange alteration along fractures.

INTRACALDERA FACIES

Dmb MCDUGALL BROOK PORPHYRITIC MICROGRANITE:
Dmb3 Brownish grey to dusky green, equigranular to subporphyritic, fine-grained granite.

Dmb2 Reddish brown, brownish grey, yellowish brown and rarely dusky green, feldspar-porphyritic (2-10 mm) microgranite; 2a, silicified hydrothermal breccia within unit Dmb2.

Dmb1 Greyish red to reddish brown, feldspar to quartz-feldspar phytic (mostly 2-10 mm) porphyry; 1a, hydrothermally altered equivalent; 1b, extrusive equivalent.

Ds SEELYS TUFF:
Ds3 Greyish red to reddish brown, rhyolitic crystal-tuff (crystals mostly 1-3 mm).

Ds2 Greyish red to greyish brown, rhyolitic, crystal-tuff (crystals mostly 1-2 mm) that contains abundant reddish brown flattened pumice.

Ds1 Dark grey to greenish grey, rhyolitic lithic-tuff and rhyolitic lithic-lapilli-tuff with minor reddish brown flattened pumice.

Dimp LITTLE MOUNT PLEASANT TUFF:
Dimp3 Greyish red and minor greenish grey, rhyolitic crystal-tuff (crystals mostly 1-3 mm); 3a, quartz-feldspar porphyry at Mount Pleasant.

Dimp2 Greyish red or greenish grey to olive grey, rhyolitic crystal-tuff (crystals mostly 1-2 mm) that contains minor reddish brown or greenish black flattened pumice.

Dimp1 Greyish red, rhyolitic crystal-tuff (crystals mostly less than 1 mm).

Dsm SCOLLAR MOUNTAIN FORMATION:
Dsm6 Grey, fine- to coarse-grained sandstone, pebbly sandstone, minor conglomerate.

Dsm5 Dark reddish brown to dusky green, porphyritic microdiorite and porphyritic andesite.

Dsm4 Olive grey to pale brown, porphyritic andesite, weakly magnetic.

Dsm3 Undivided felsic pyroclastic rocks, dominantly crystal-tuffs.

Dsm2 Dusky green, porphyritic to amygdaloidal, andesite, minor felsic pyroclastic rocks.

Dsm1 Greenish grey cobble to boulder sedimentary breccia (sharpstone conglomerate).

PRE-CALDERA ROCKS

EARLY DEVONIAN

Dg Heterogeneous granitoid rocks.

Dfr FLUME RIDGE FORMATION: greenish grey, micaceous, commonly calcareous, sandstone, siltstone and slate.

SILURIAN

Ss Dark grey to greenish grey, quartzo-feldspathic sandstone, siltstone and slate.

LATE DEVONIAN

Dmd MOUNT DOUGLAS GRANITE: Pink, medium- to coarse-grained, seriate to equigranular, biotite-granite with aplite and porphyritic microgranite dykes.

Dth TRUE HILL GRANITE AND BRECCIA:
Dth2 Brecciated, silicified metasedimentary and granitic rocks including "crackle breccia", "pebble breccia", and brecciated "brain-rock".

CALDERA OUTFLOW FACIES

Dbr BAILEY ROCK RHYOLITE: Greyish red, dark reddish brown and pale brown, quartz-feldspar porphyritic (mostly 2-8 mm lava and associated intrusive rocks (feeder dykes).

Dc CARROW FORMATION:
Dc4 Greyish green amygdaloidal basalt; basalt-clast sedimentary breccia; ("mudflow"); fine-grained redbeds.

Dc3 Greyish green to reddish brown sandstone, pebbly sandstone and granule conglomerate; greyish red to reddish brown mudstone commonly containing calcareous nodules.

Dc2 Greyish red, or where altered yellowish green and pyritic, felsic lithic-lapilli-tuff containing some dusky green flattened pumice fragments; tuffaceous sandstone, tuffite.

Dc1 Greyish red, or where altered yellowish green and granule to cobble conglomerate, pebbly sandstone, sandy mudstone.

Dso SOUTH OROMOCTO ANDESITE: dark greenish grey, brownish grey, and olive black, massive to amygdaloidal andesite.

Dr ROTHEA TUFF:
Dr3 IMAGE BROOK MEMBER: greyish red, rhyolitic lithic-tuff overlying reddish brown mudstone containing calcrete.

Dr2 JUVENILE MEMBER: greyish red purple, spherulitic, aphyric, rhyolitic tuff that grades upward into greyish red rhyolitic crystal-tuff (crystals mostly 1-3 mm).

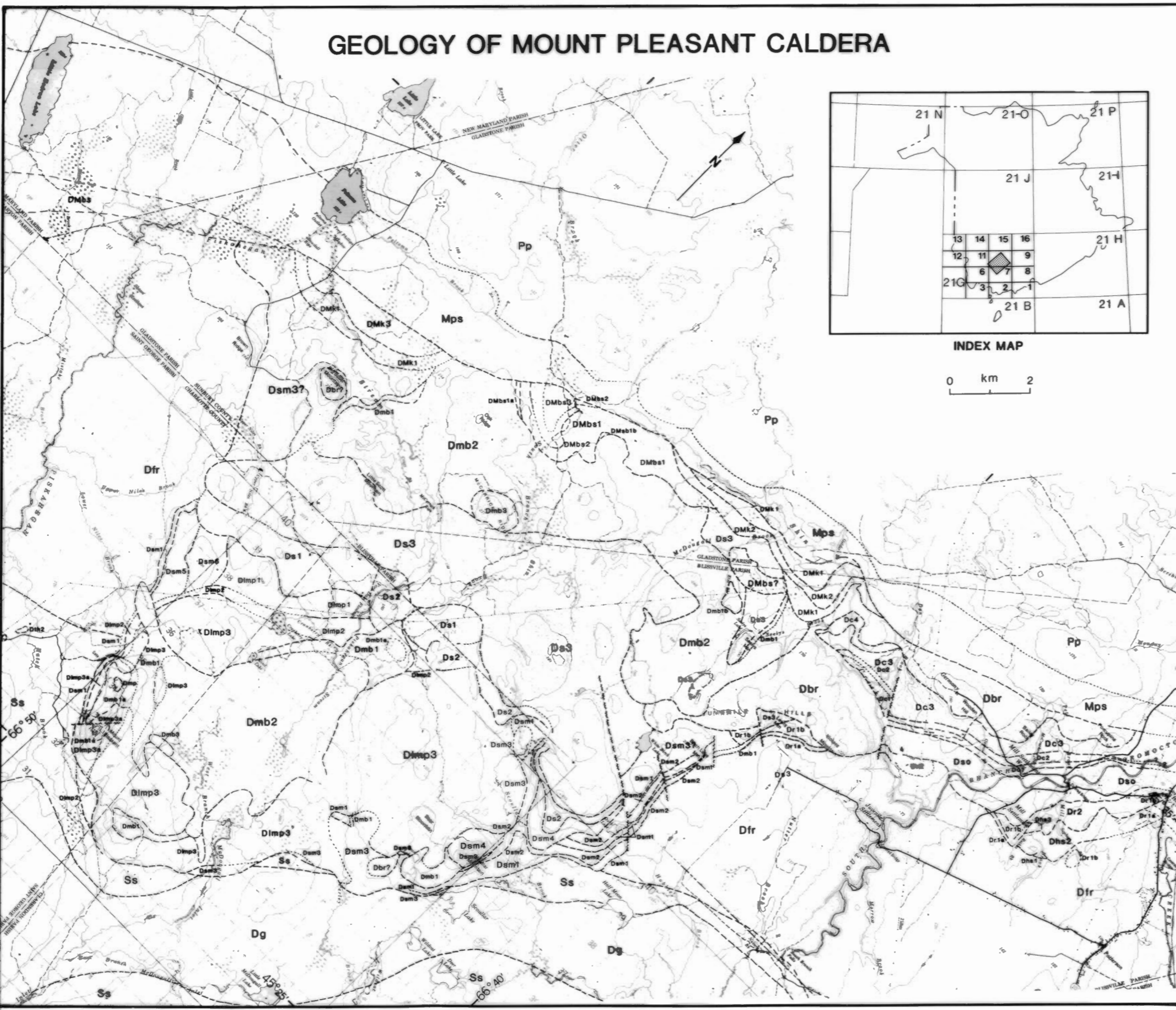
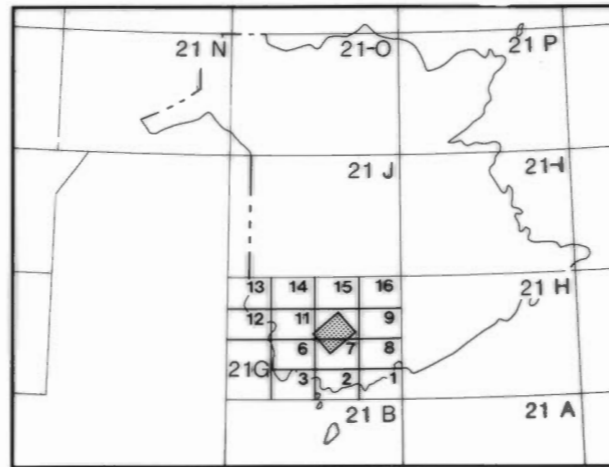
Dr1 SOPHIA MEMBER: 1a, greyish red, or where altered greyish yellow-green, pumiceous, rhyolitic lapilli-tuff; 1b, greyish purple, rhyolitic crystal-tuff (crystals mostly less than 1 mm); 1c, pale to moderate red, rhyolitic crystal-tuff (crystals mainly 1-3 mm).

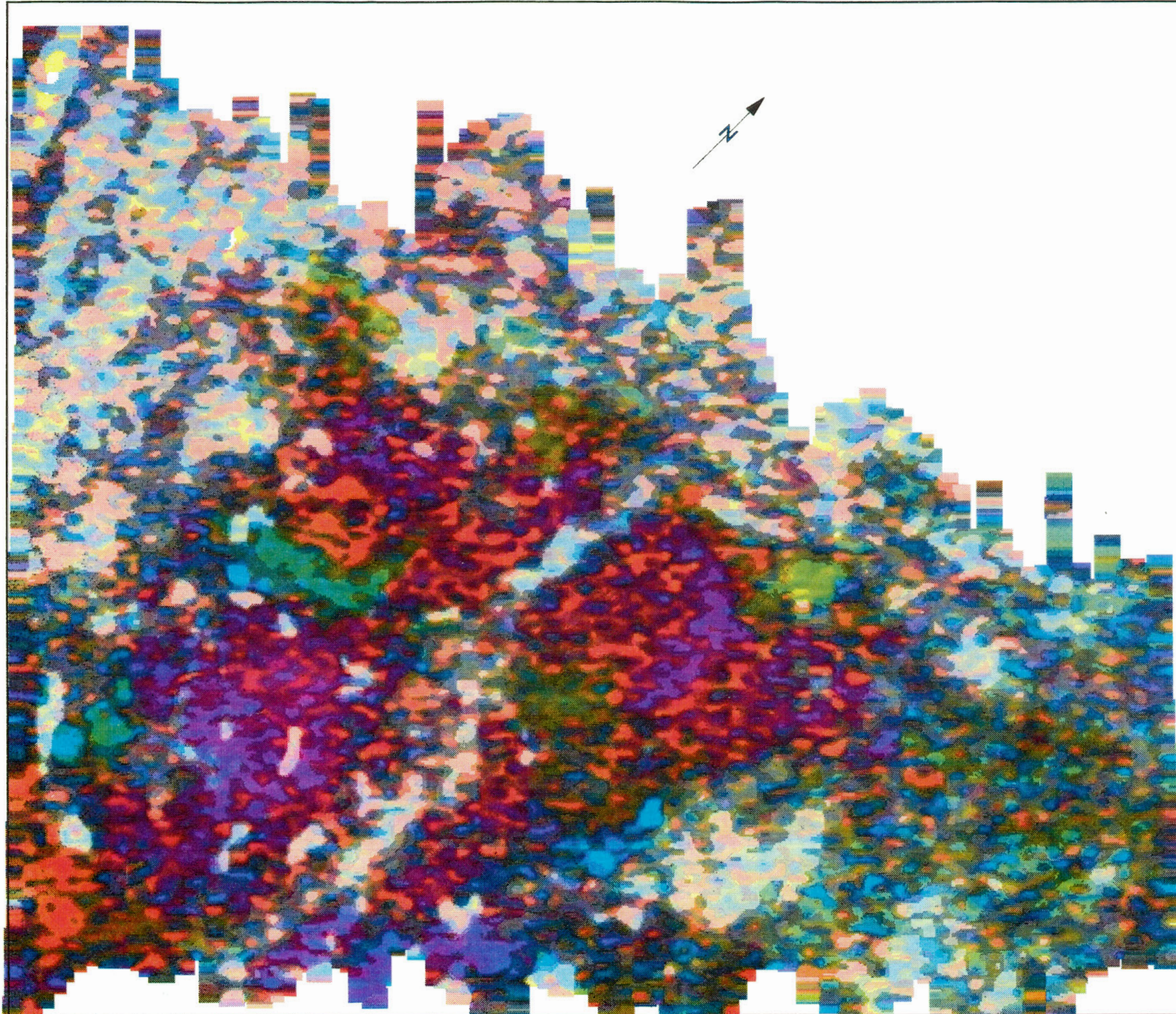
Dhs HOYT STATION VOLCANICS:
Dhs3 Cobble to boulder conglomerate.

Dhs2 Basalt; minor intraformational conglomerate.

Dhs1 Rhyolitic crystal-tuff; lithic-tuff.

GEOLOGY OF MOUNT PLEASANT CALDERA





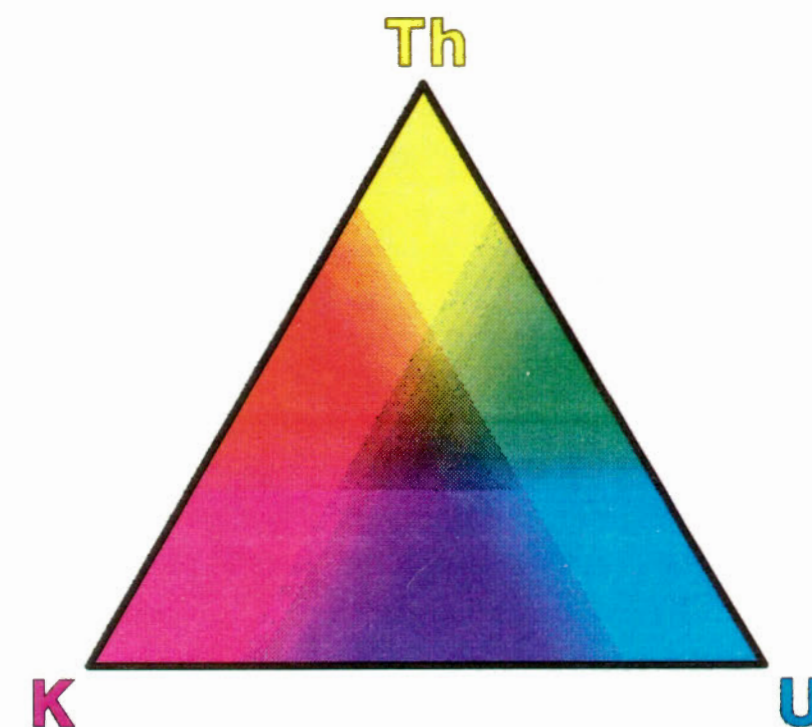
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21 G/7 (part), 21 G/10 (part)



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 Data compilation: R.B.K. Shives
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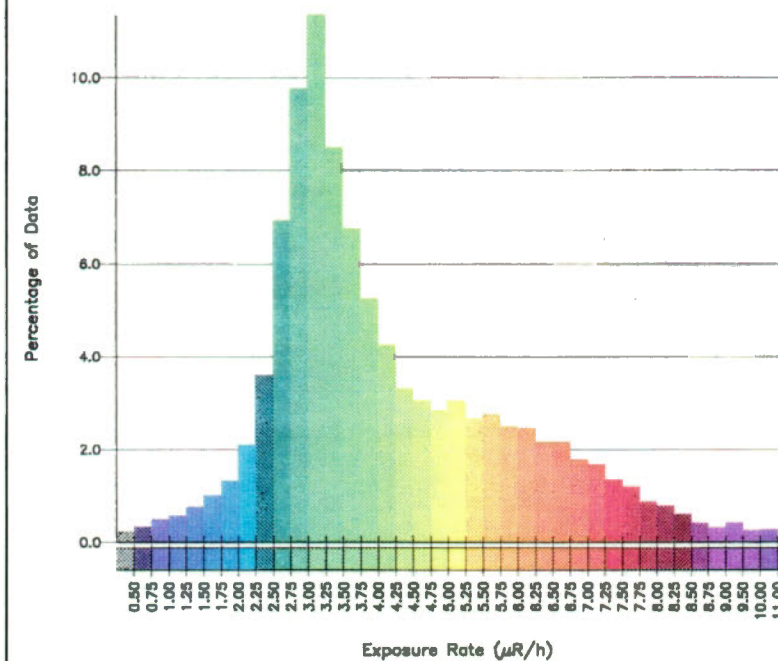


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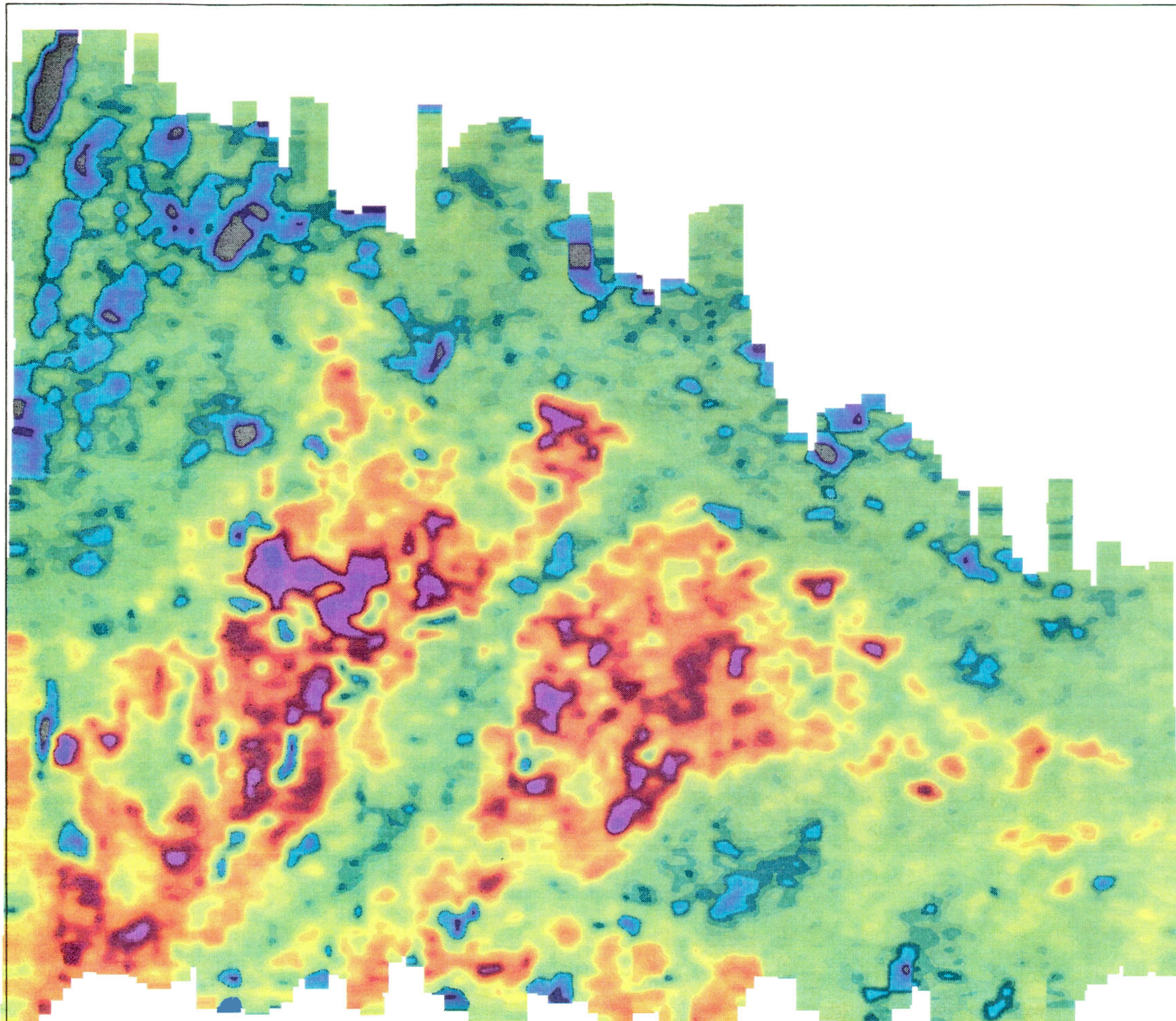
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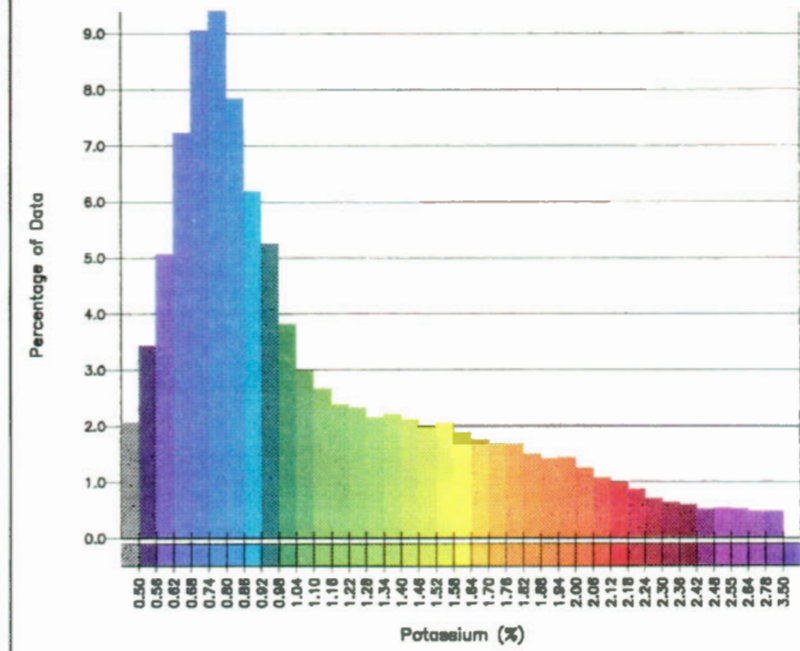
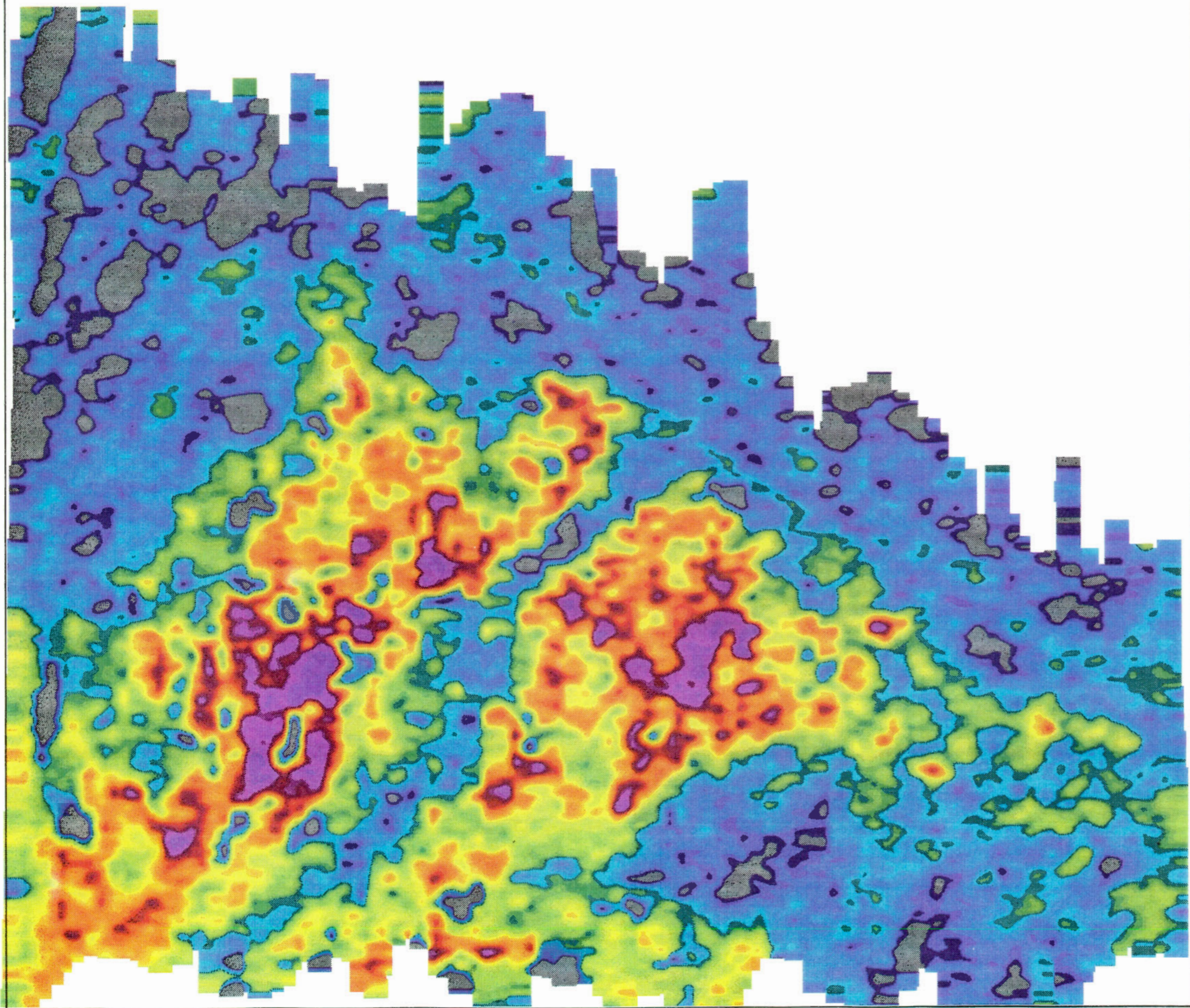


Exposure Rate ($\mu\text{R}/\text{h}$)

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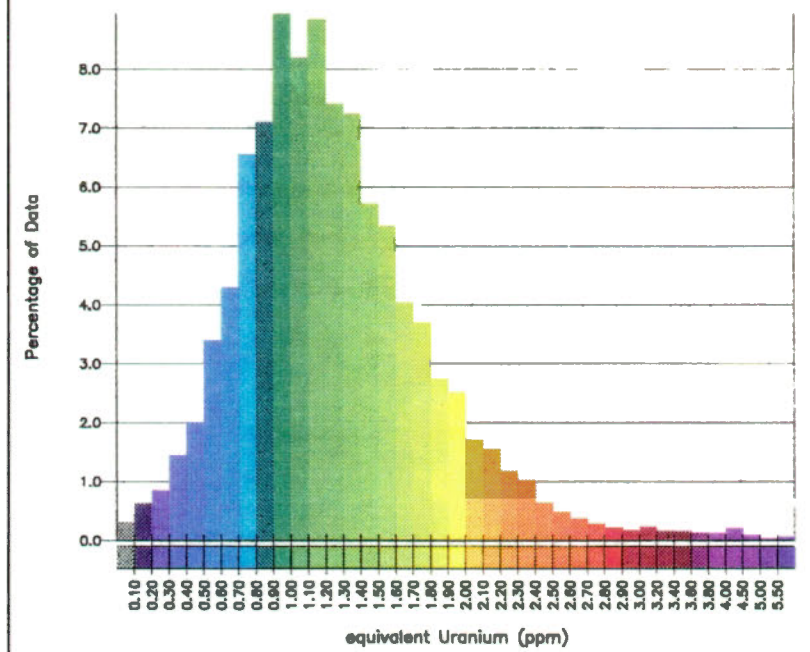
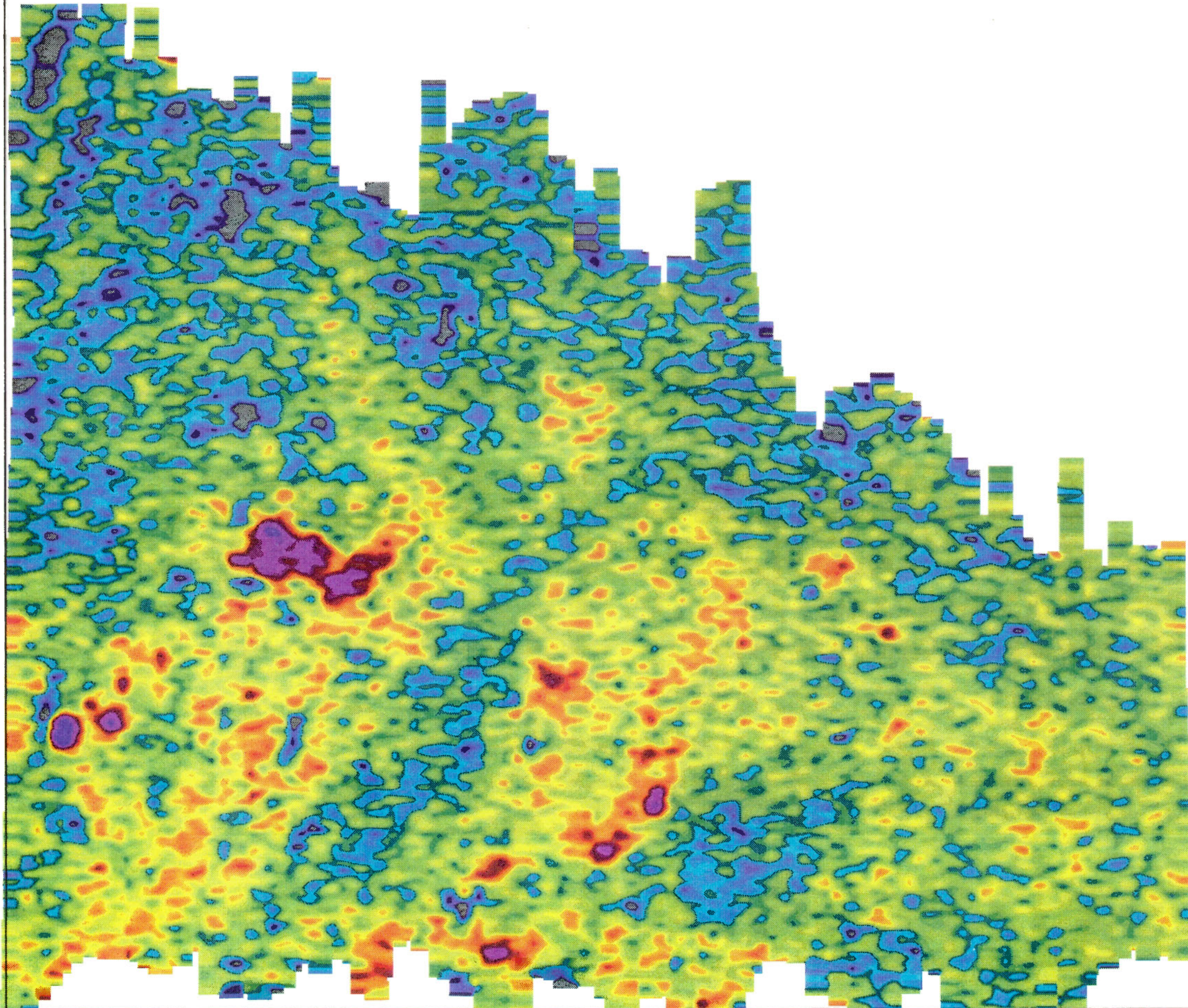
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Potassium (%)

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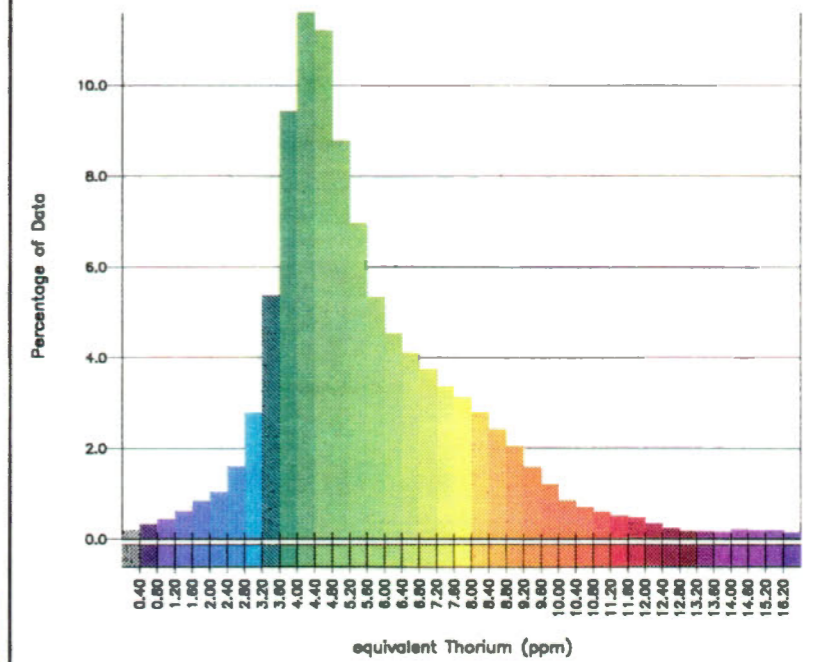
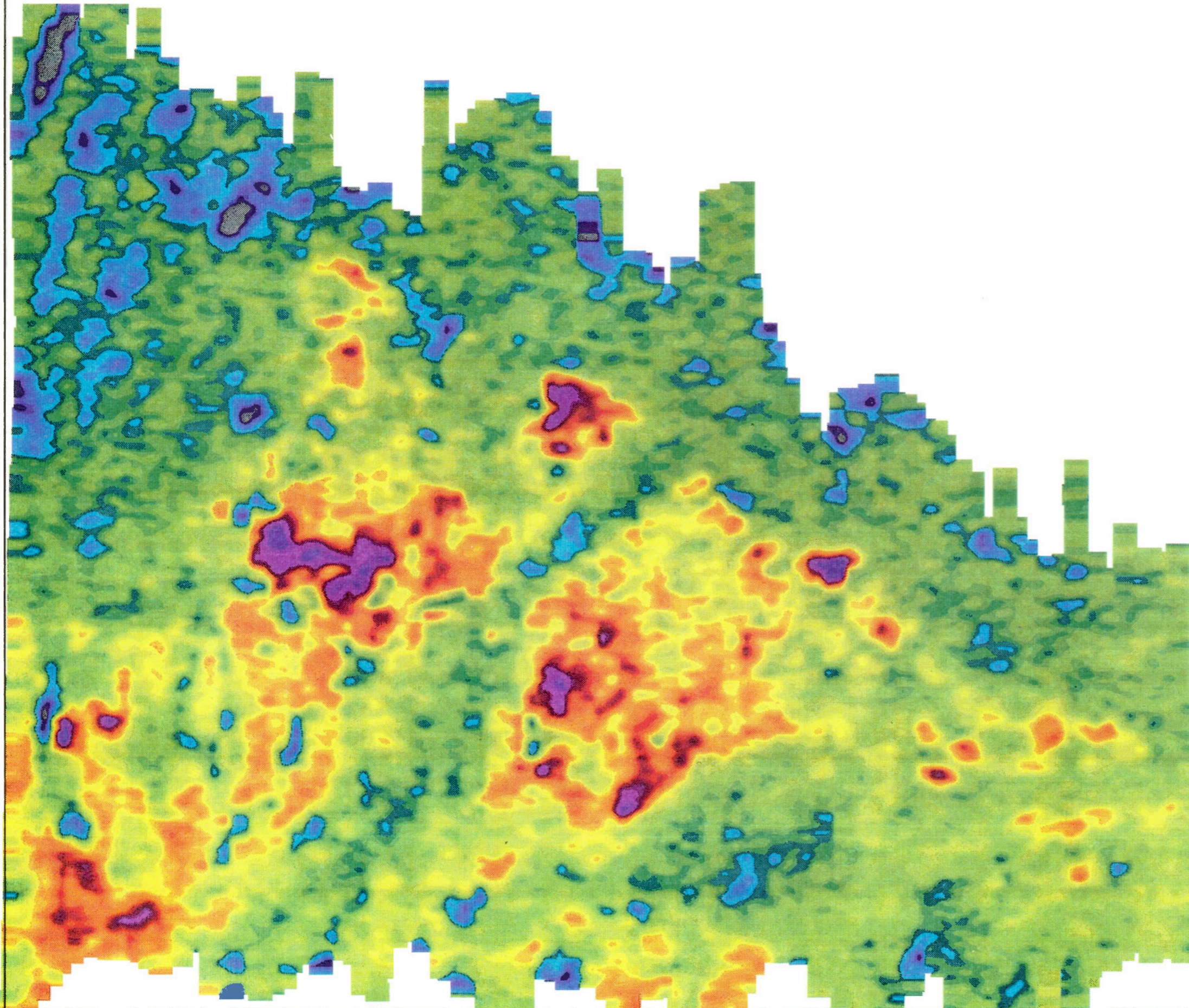
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equivalent Uranium (ppm)

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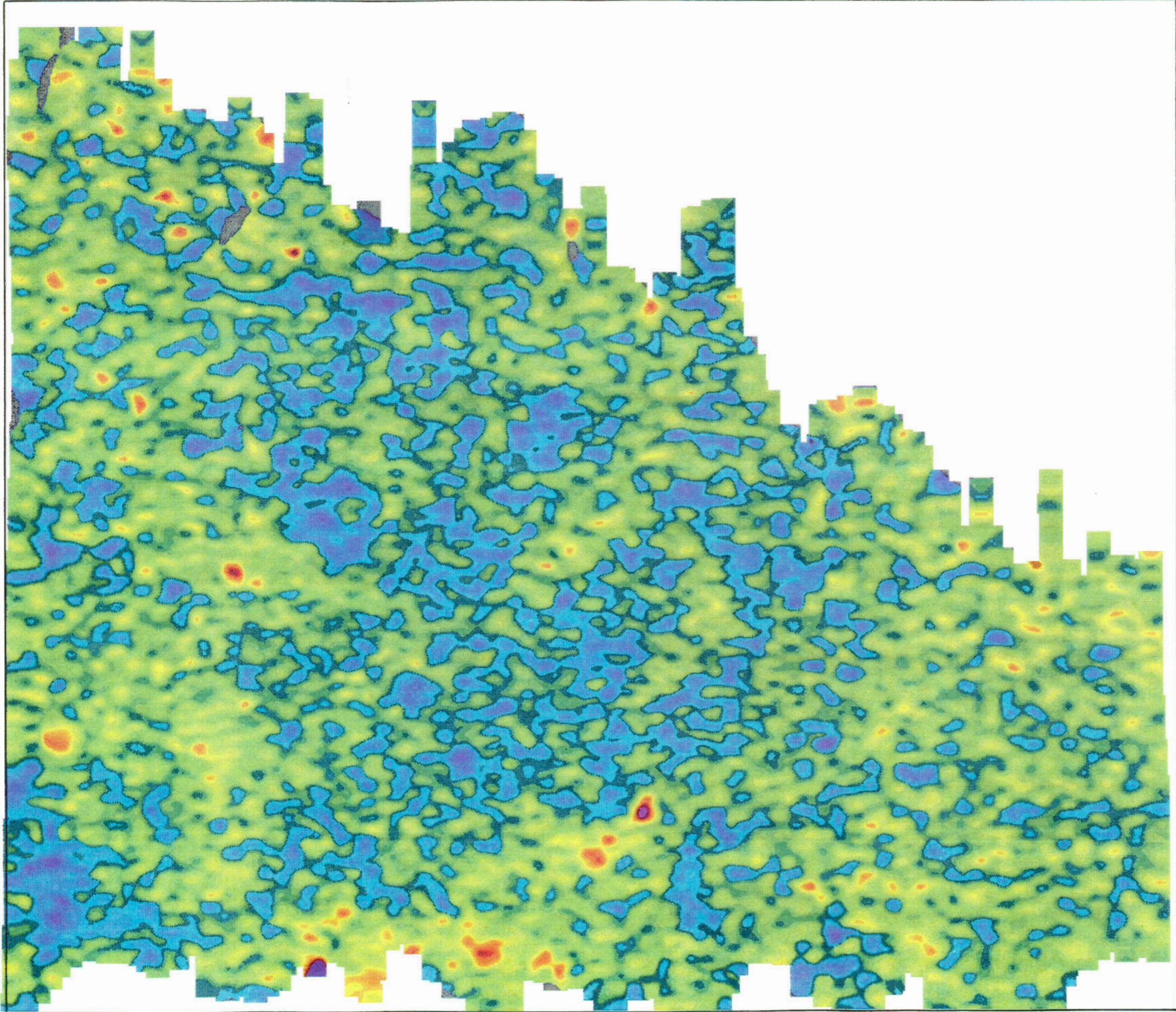
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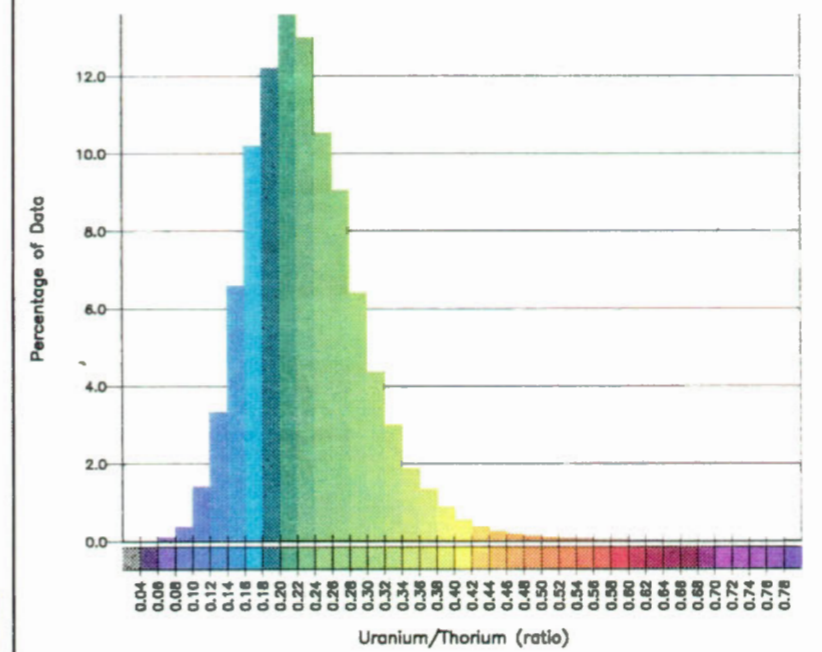
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equivalent Thorium (ppm)



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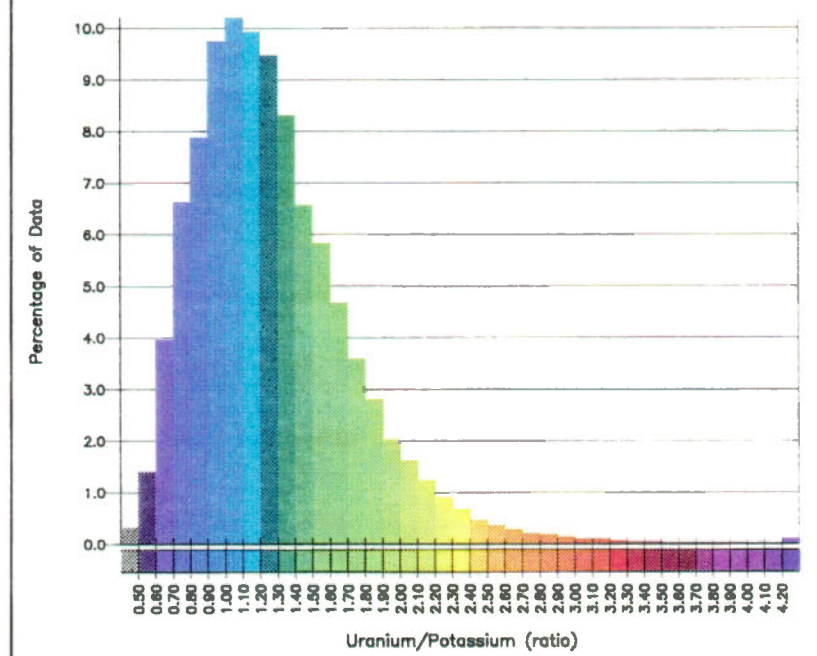
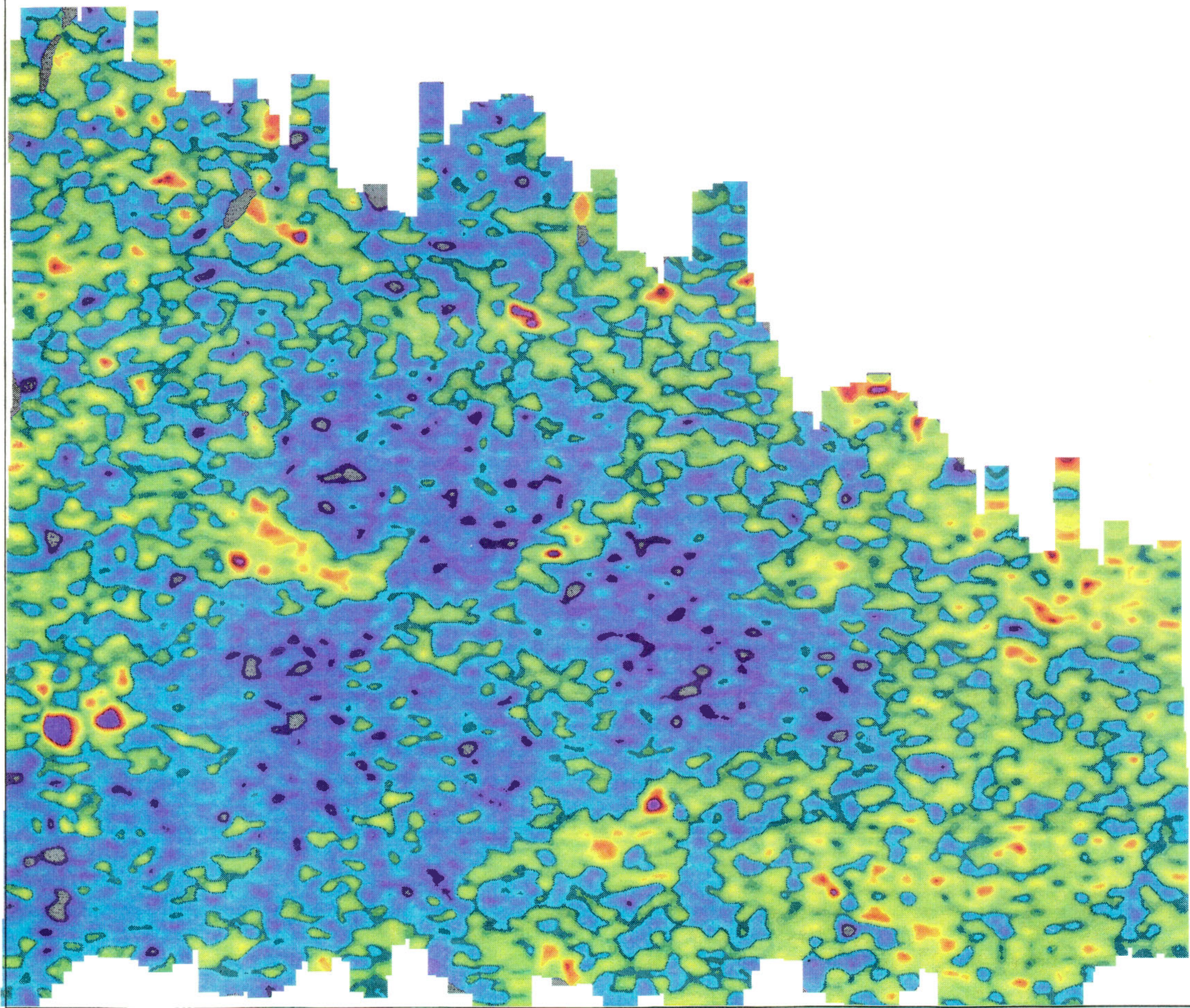
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equivalent Uranium / equivalent Thorium

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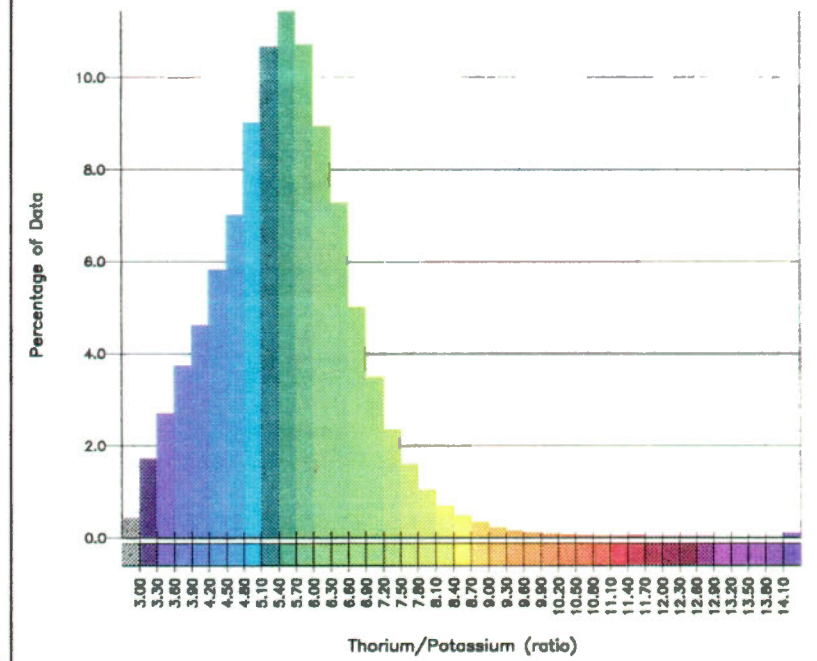
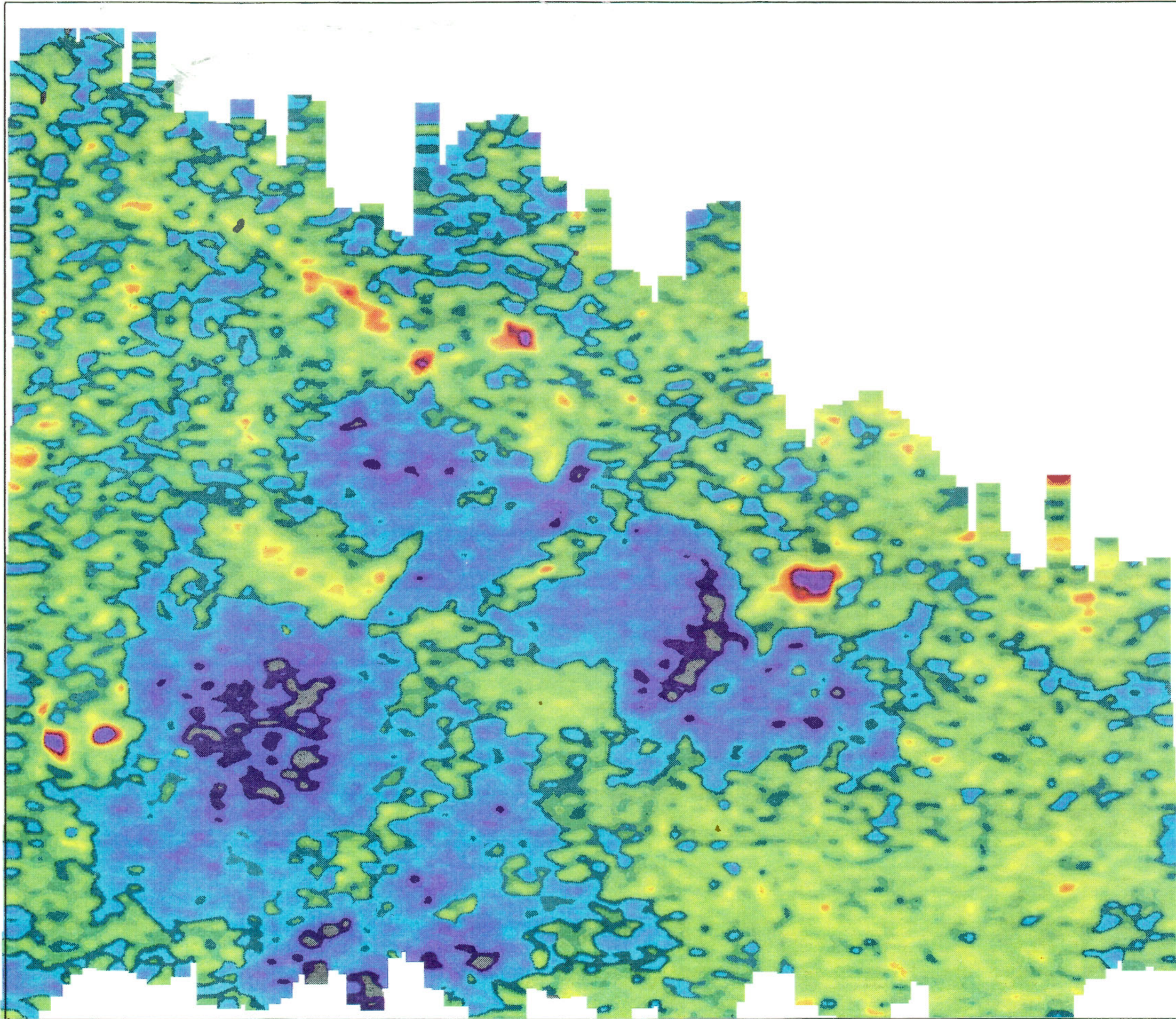
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equivalent Uranium / Potassium ($\times 10^4$)

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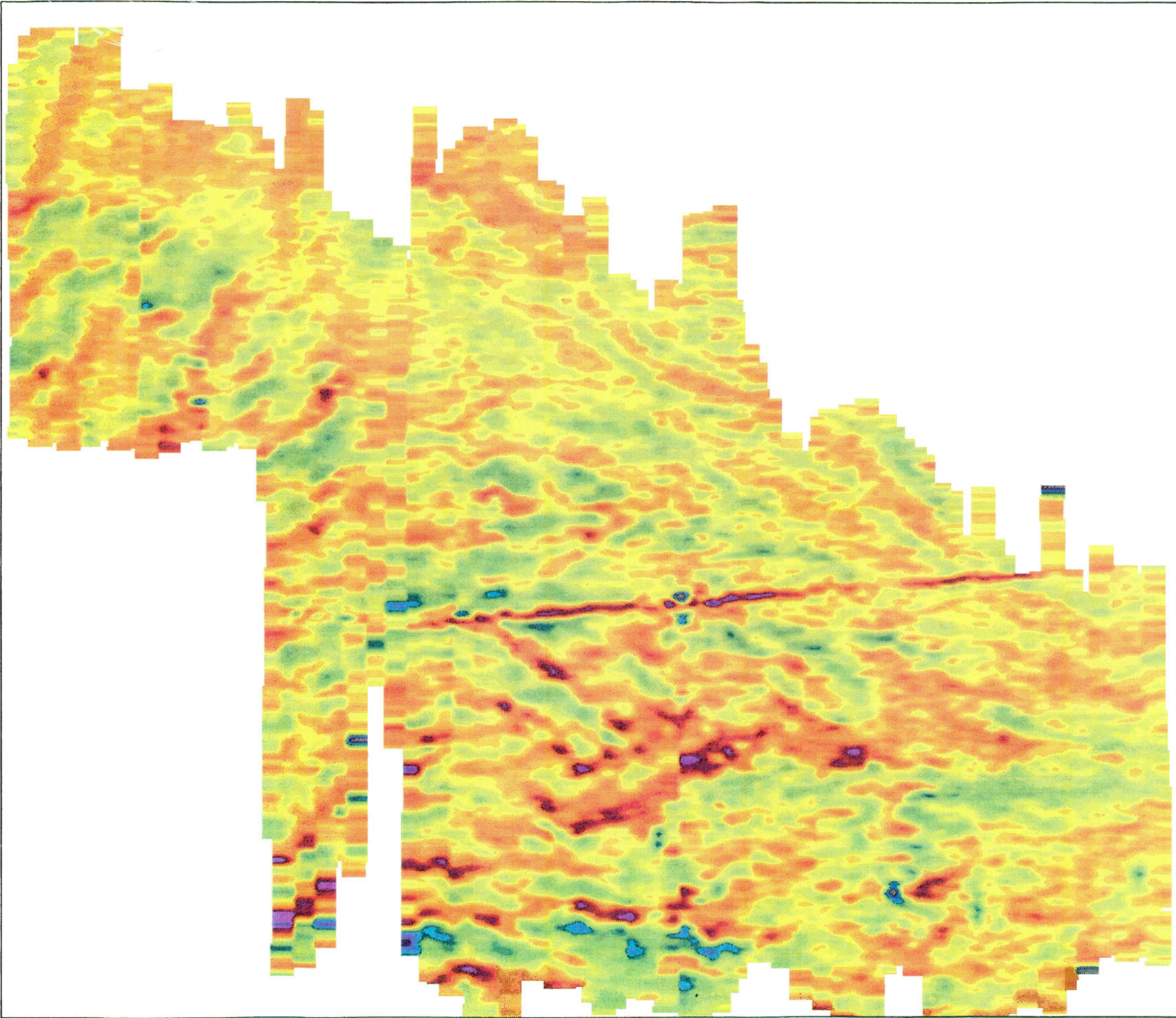
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equivalent Thorium / Potassium ($\times 10^4$)

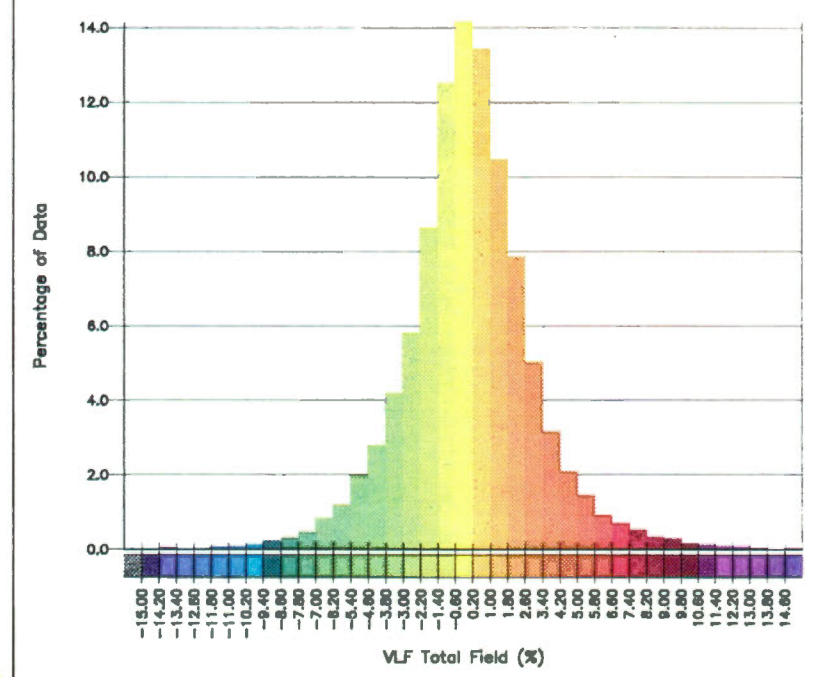
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VLF Total Field (%)

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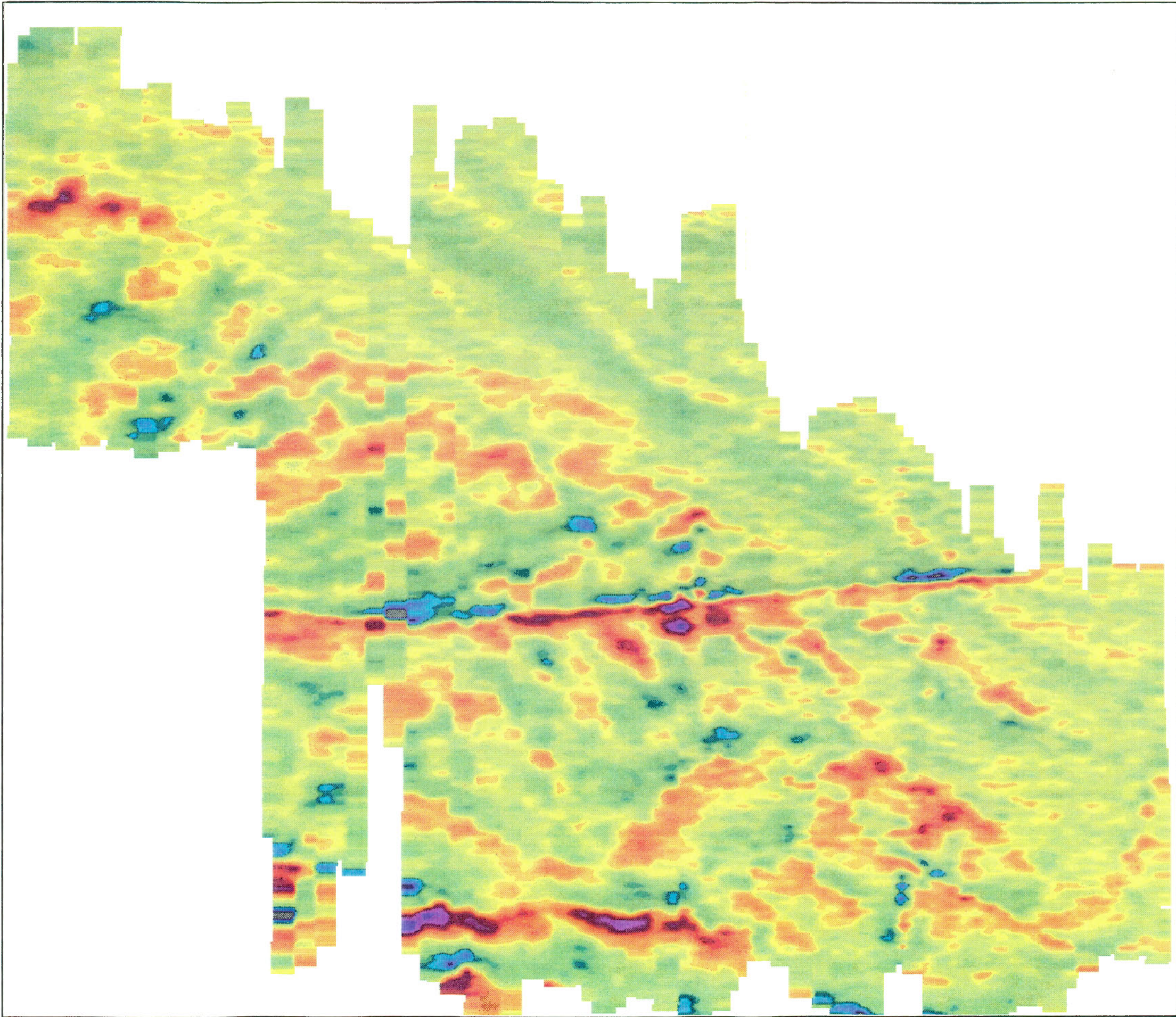
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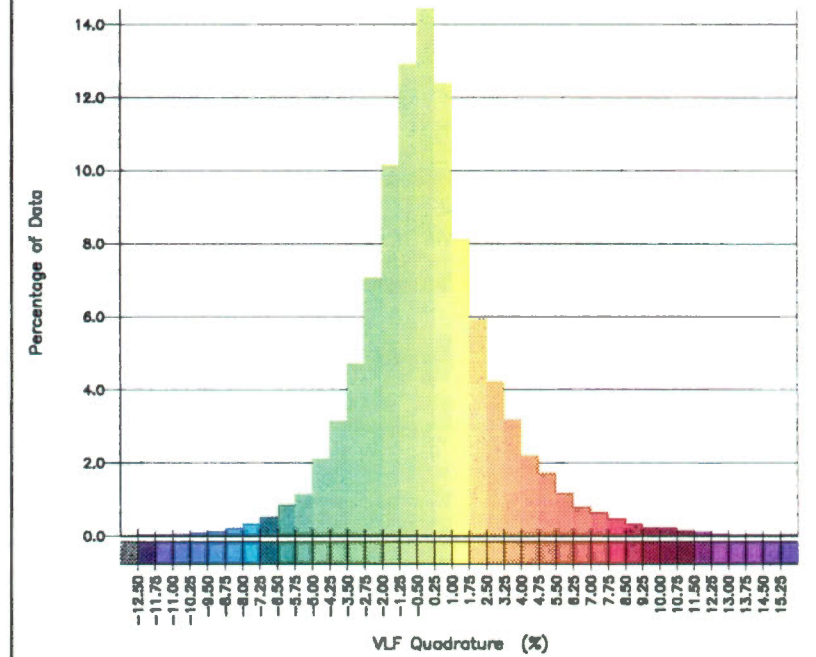
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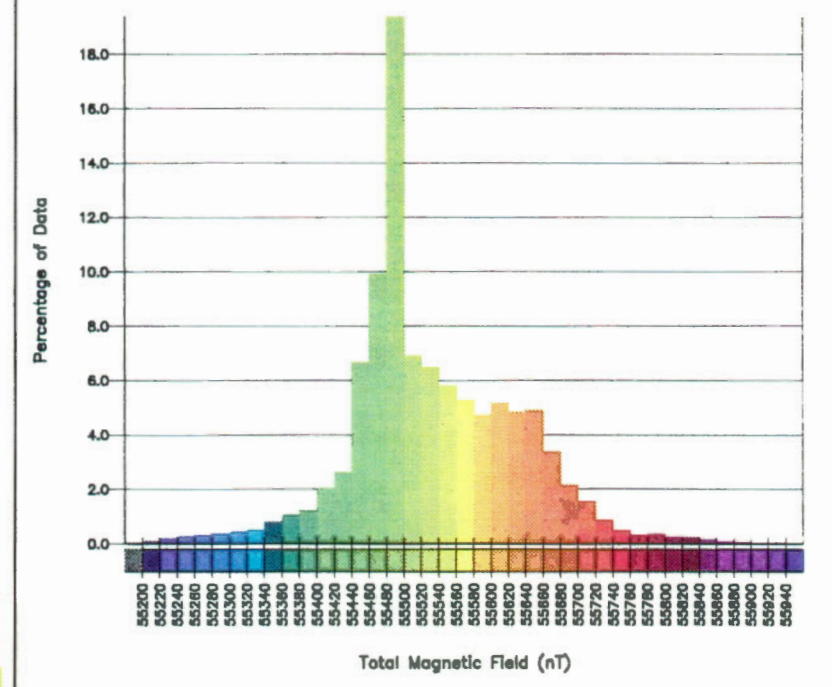
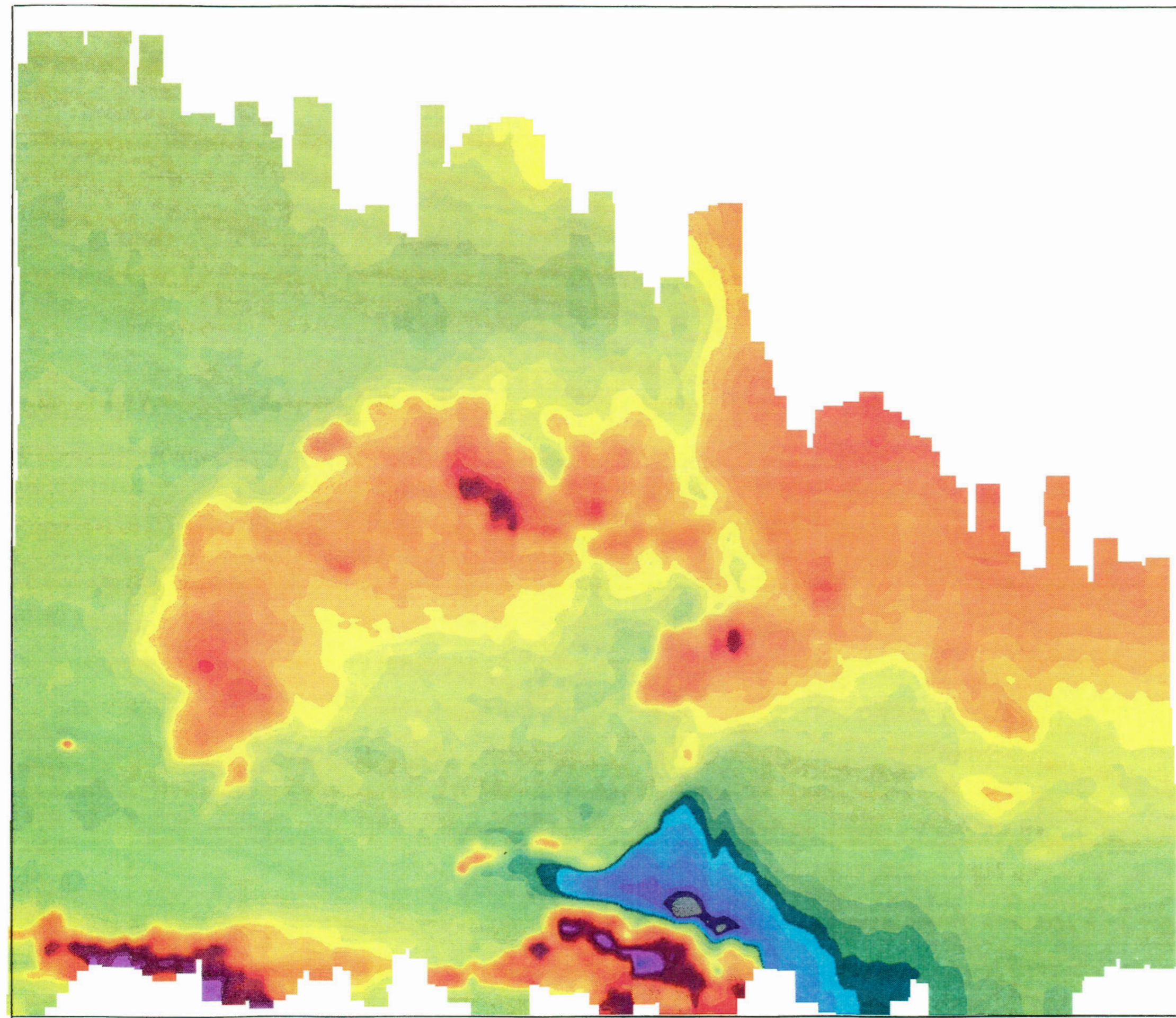
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VLF Quadrature (%) X

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Magnetic Total Field (nT)

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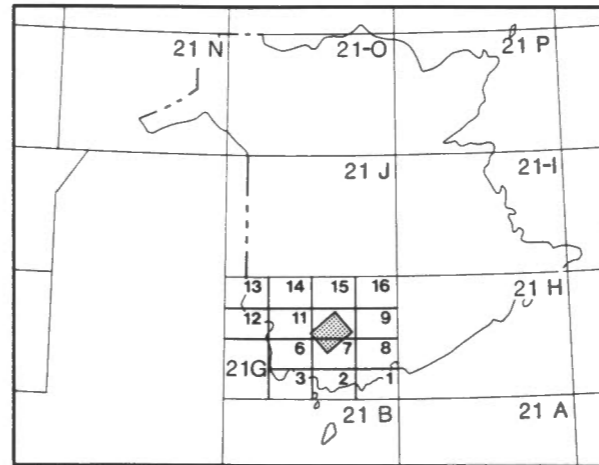
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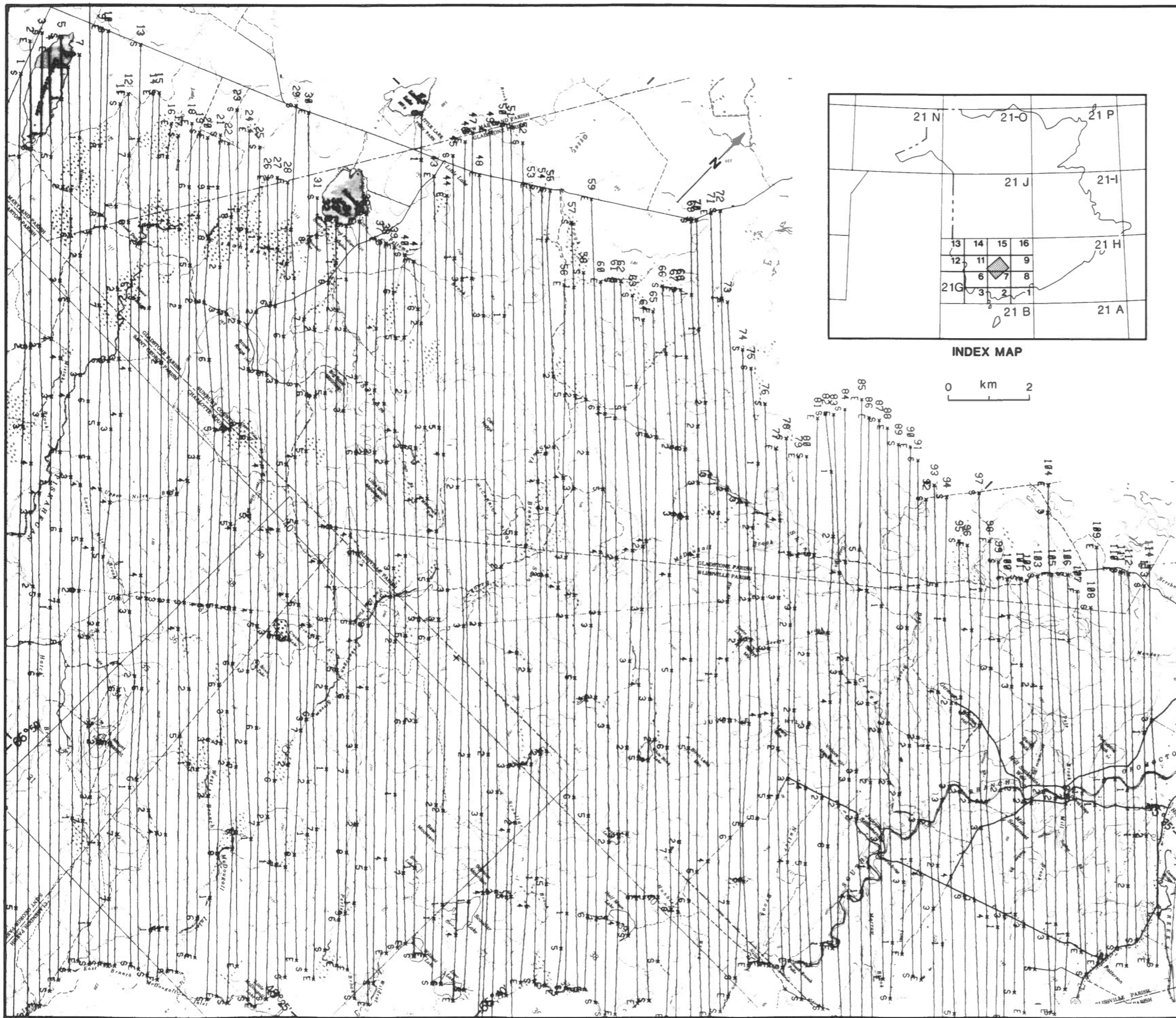
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 of the
MOUNT PLEASANT CALDERA
 New Brunswick
 1988

21 G/7 (part), 21 G/10 (part)



INDEX MAP

0 km 2



Data collection: P.B. Holman
 Data compilation: R.B.K. Shives
 Mineral Resources Division

Survey flown, compiled and funded by
 Geological Survey of Canada
 as a

Contribution to the Canada - New Brunswick
 Mineral Development Agreement 1984-1989

ENERGY, MINES AND
 RESOURCES CANADA

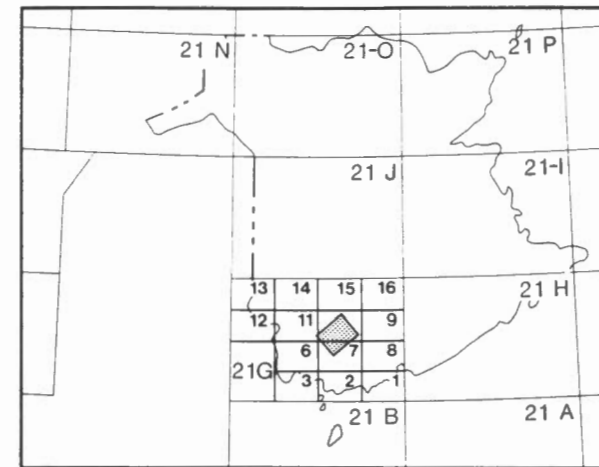
ENERGIE, MINES ET
 RESSOURCES CANADA

FLIGHT LINES

Canada

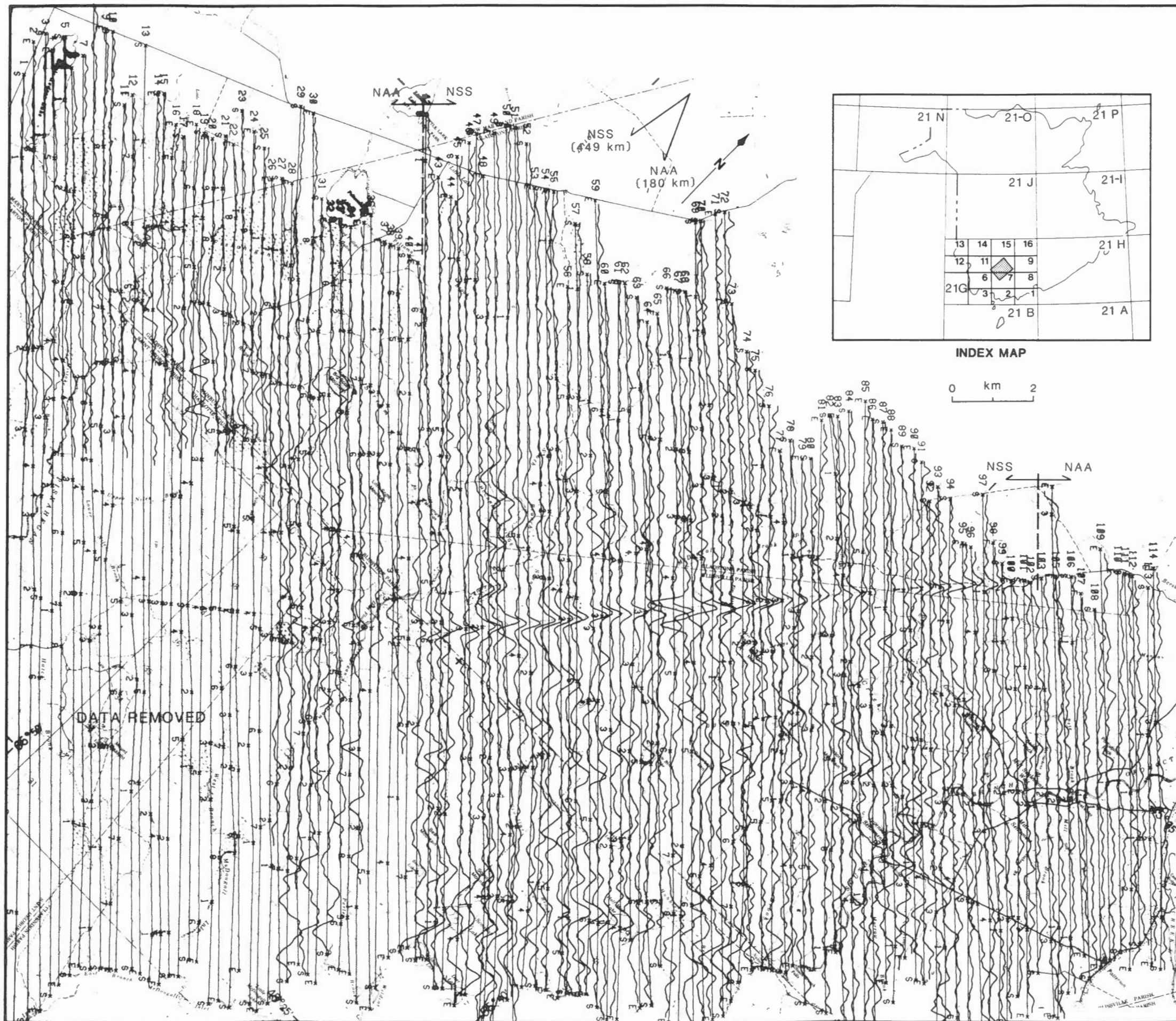
OPEN FILE 1946
 Airborne Gamma Ray Spectrometer Survey
 of the
MOUNT PLEASANT CALDERA
 New Brunswick
 1988

21 G/7 (part), 21 G/10 (part)



INDEX MAP

0 km 2



NW



-80 -40 0 40 80
 (40%/cm)

% Relative signal change
 VLF TOTAL FIELD RESPONSE

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ENERGY, MINES AND
 RESOURCES CANADA

ENERGIE, MINES ET
 RESSOURCES CANADA

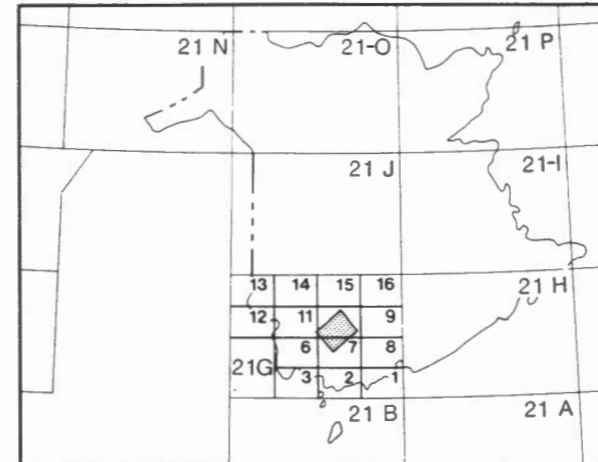
scale 1:100 000

VLF TOTAL FIELD (%)

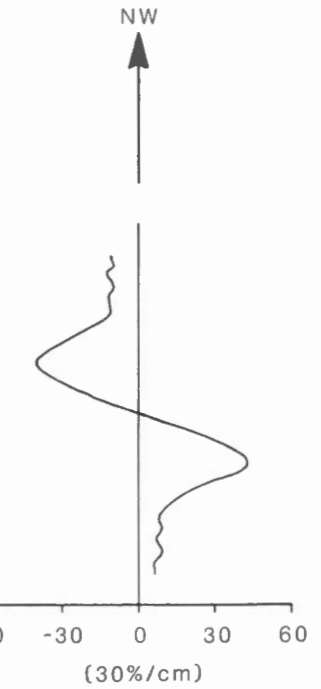
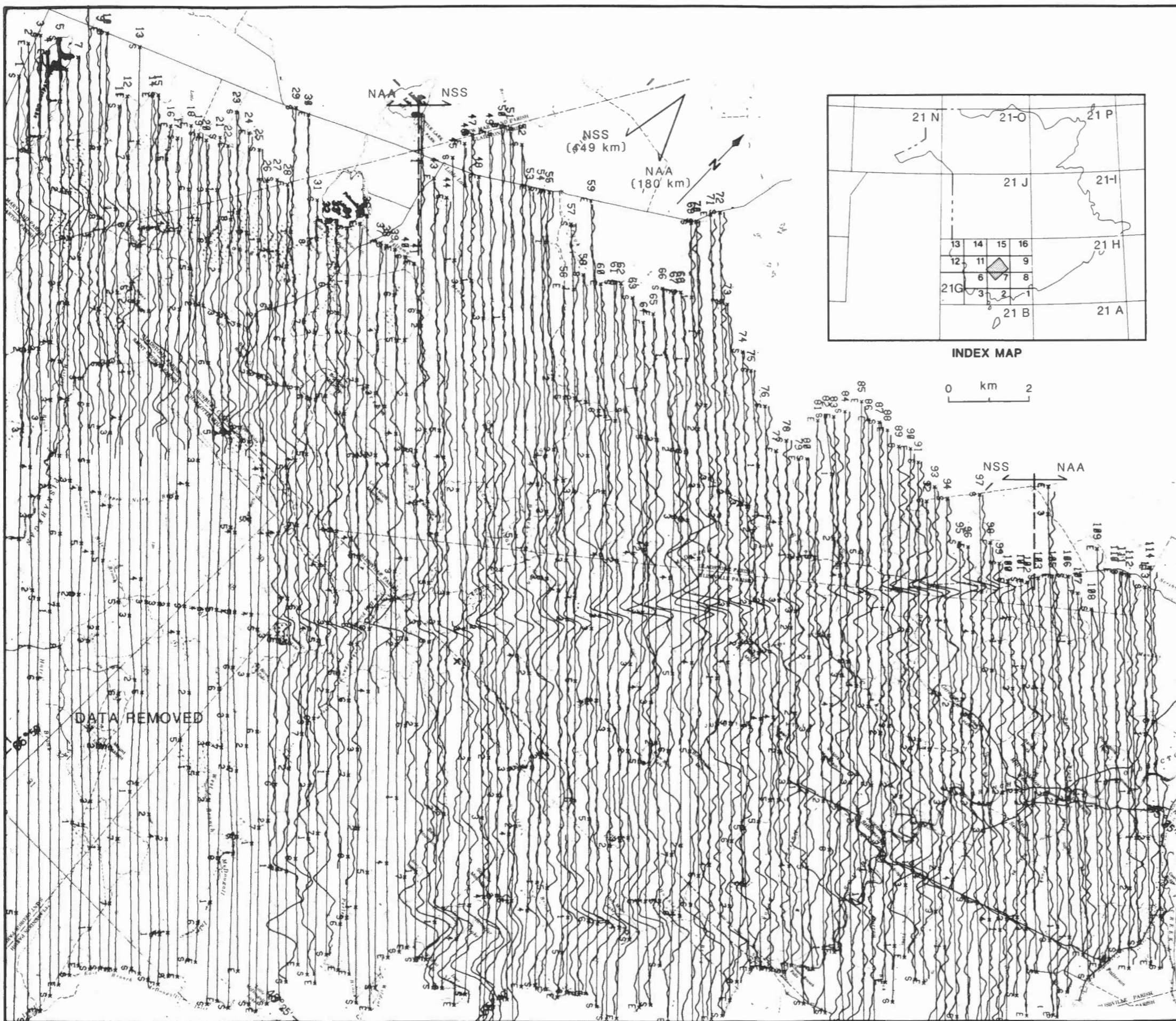
Canada

OPEN FILE 1946
 Airborne Gamma Ray Spectrometer Survey
 of the
MOUNT PLEASANT CALDERA
 New Brunswick
 1988

21 G/7 (part), 21 G/10 (part)



INDEX MAP



(30%/cm)
 % Relative signal change
 VLF QUADRATURE RESPONSE

Data collection: P.B. Holman
 Data compilation: R.B.K. Shives
 Mineral Resources Division

Survey flown, compiled and funded by
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 as a

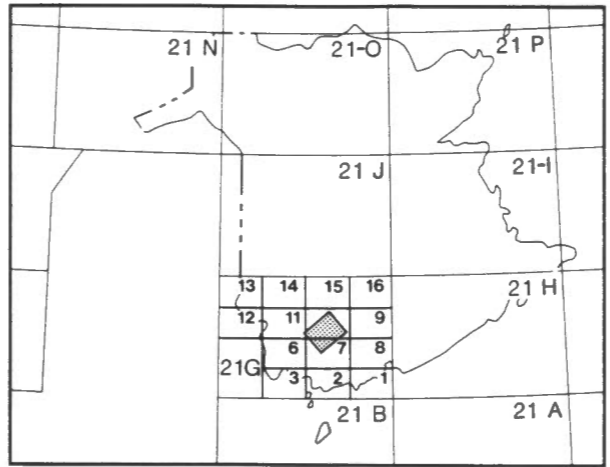
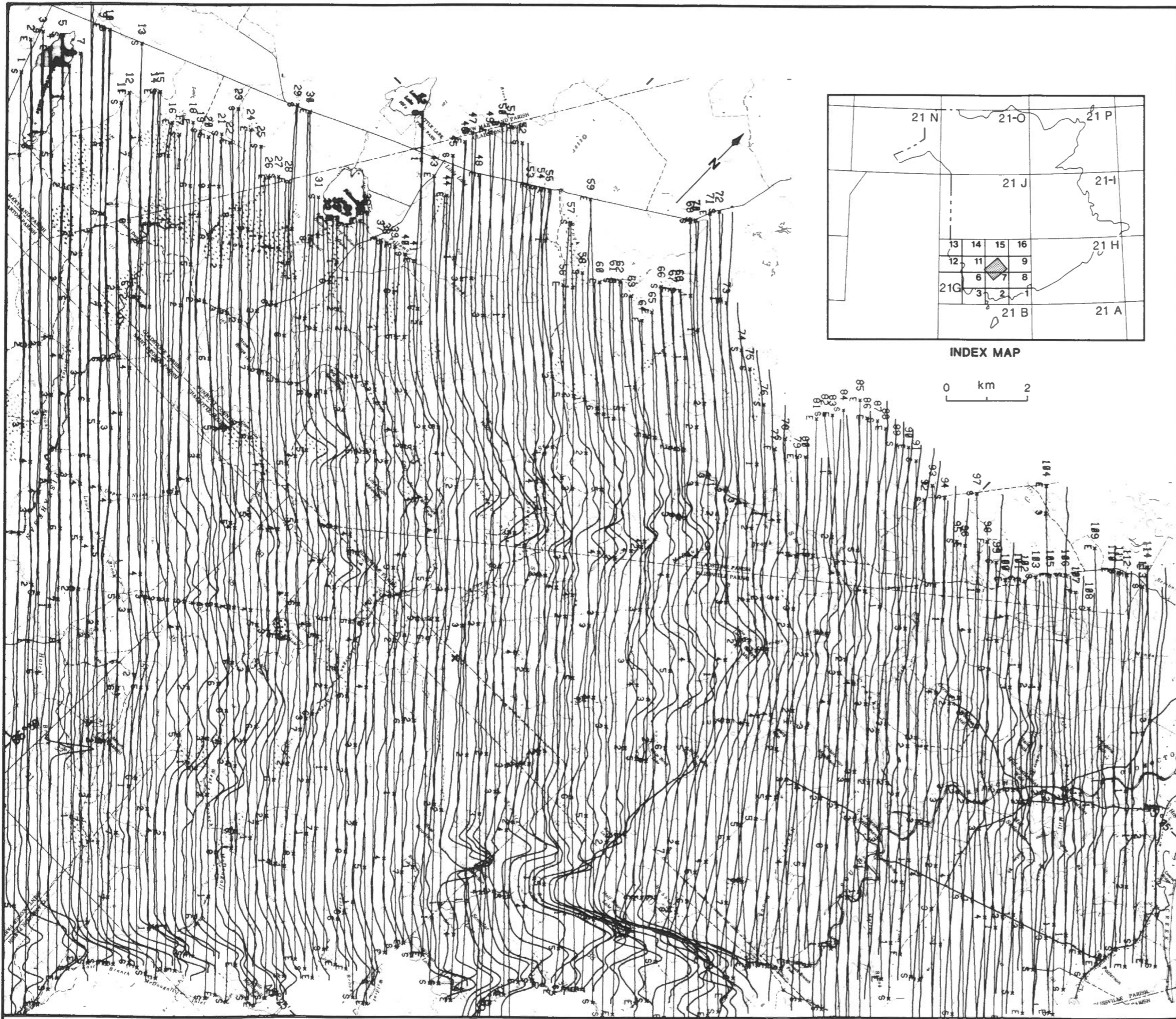
Contribution to the Canada - New Brunswick
 Mineral Development Agreement 1984-1989

ENERGY, MINES AND RESOURCES CANADA ENERGIE, MINES ET RESSOURCES CANADA

scale 1:100 000

VLF QUADRATURE (%)

Canada



INDEX MAP



NW



-600 -300 0 300 600
(300nT/cm)

Relative signal change
MAGNETIC TOTAL FIELD RESPONSE

Data collection: P.B. Holman
Data compilation: R.B.K. Shives
Mineral Resources Division

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Mineral Development Agreement 1984-1989

ENERGY, MINES AND
RESOURCES CANADA

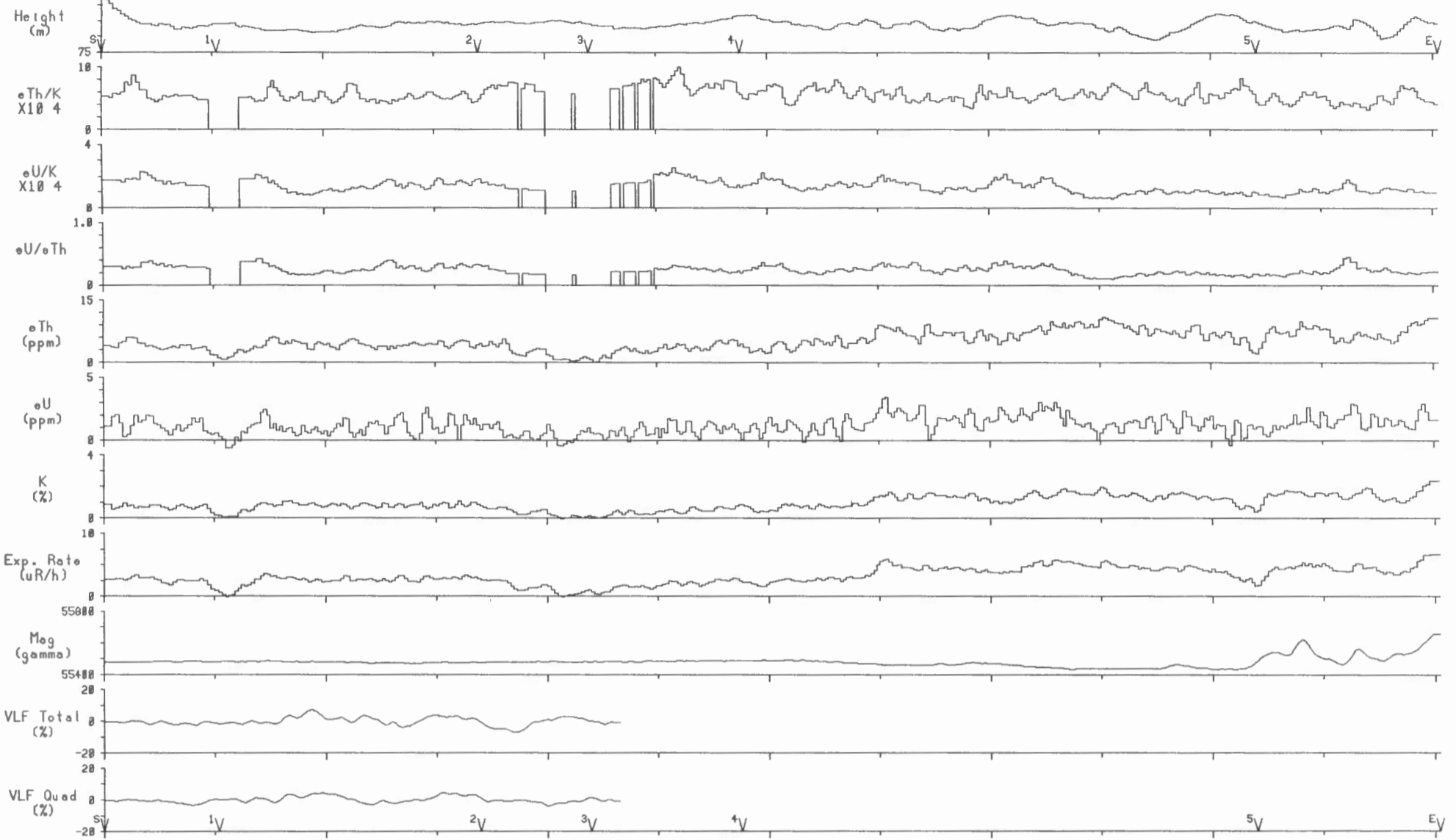
ENERGIE, MINES ET
RESSOURCES CANADA

scale 1:100 000

MAGNETIC TOTAL FIELD (nT)

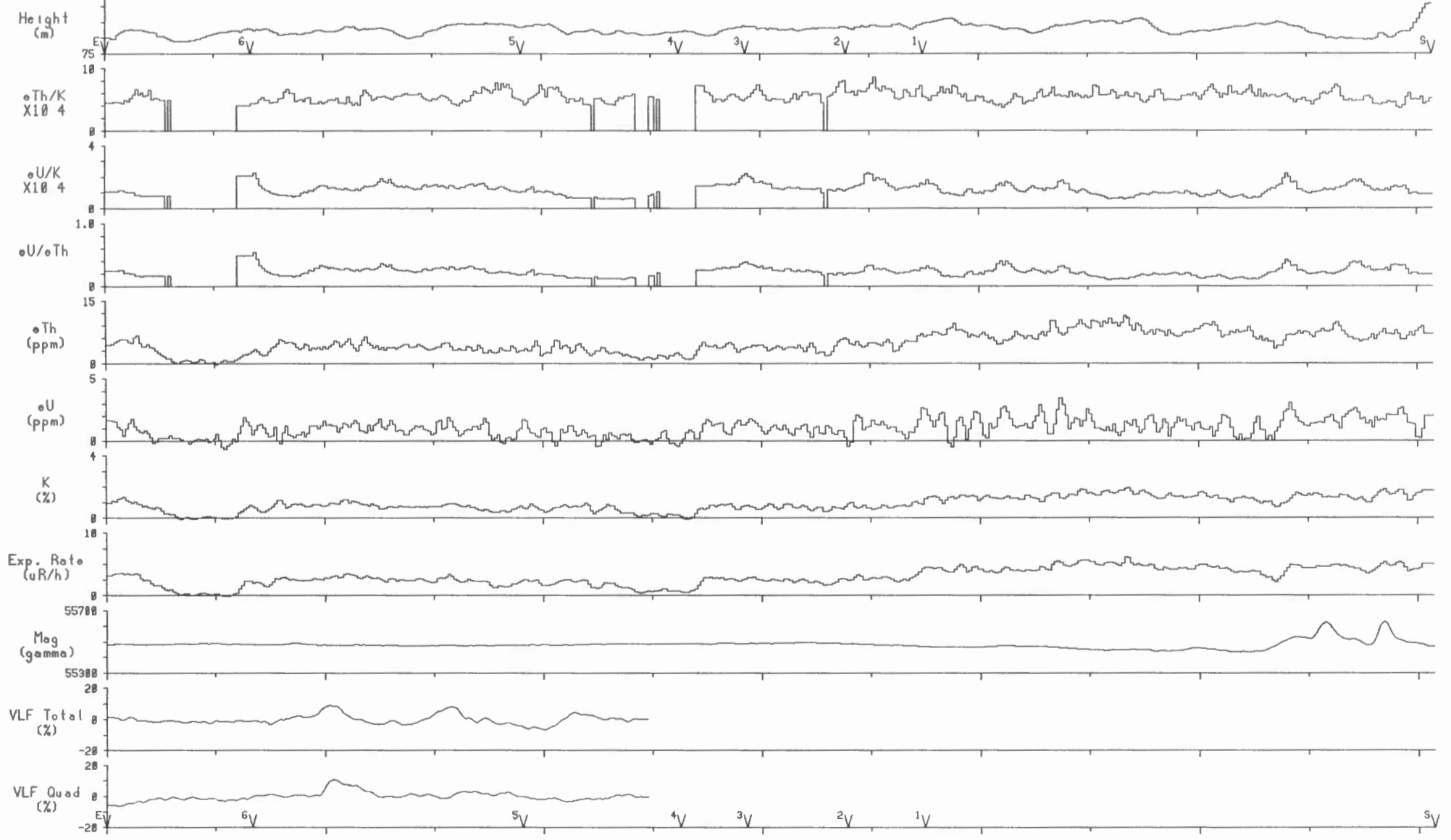
Canada

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



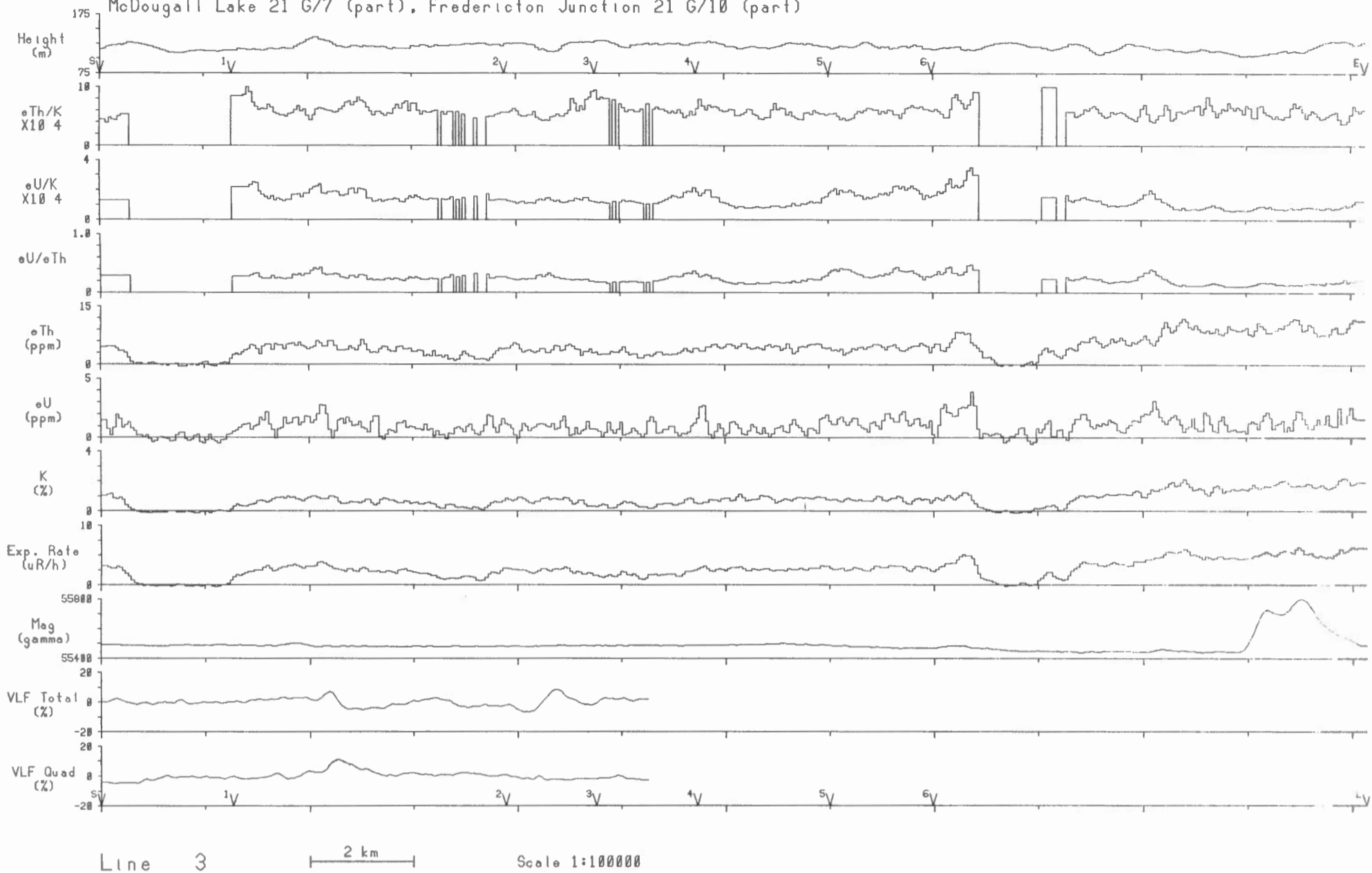
Line 1 2 km Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)

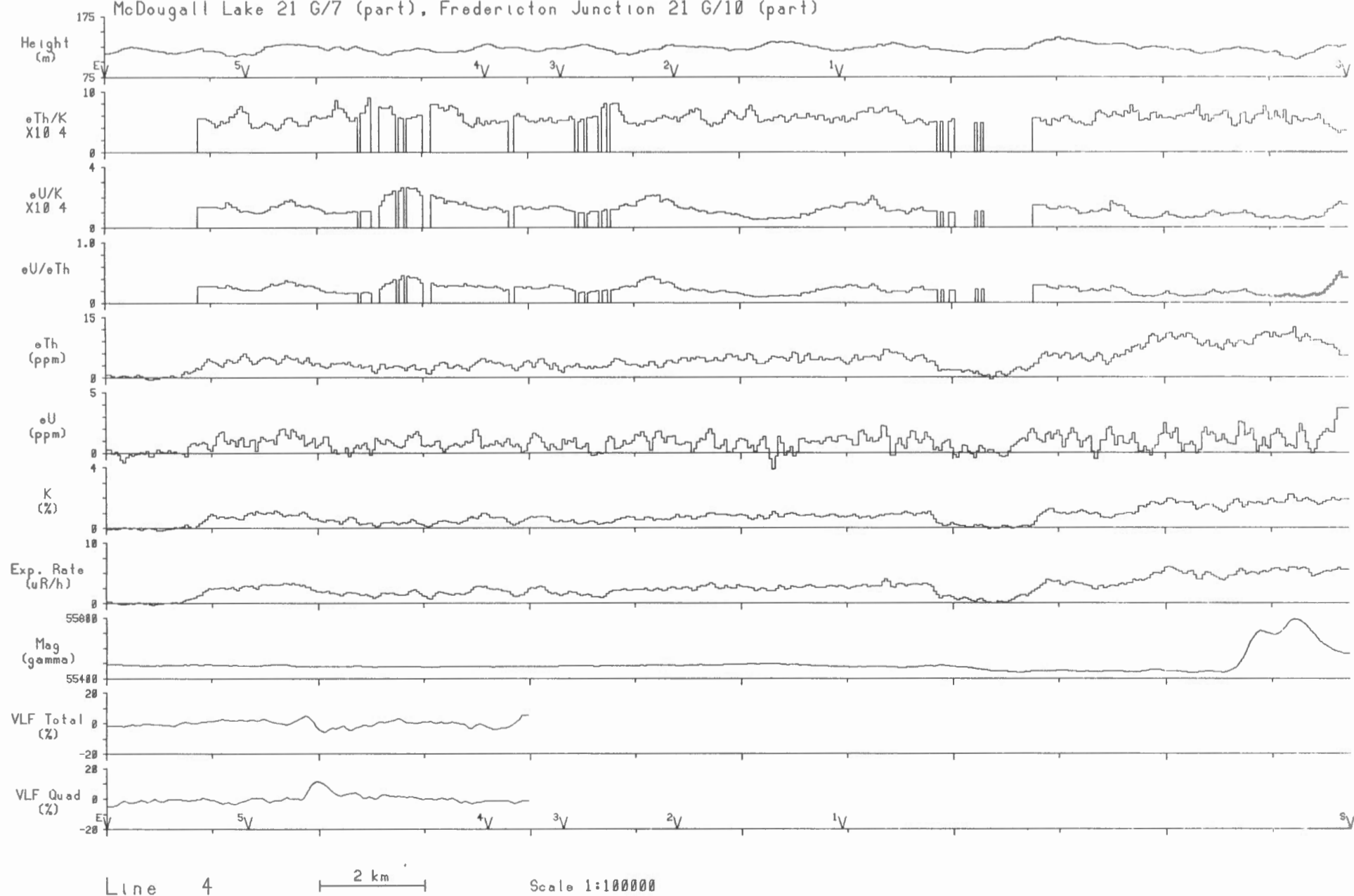


Line 2 2 km Scale 1:100000

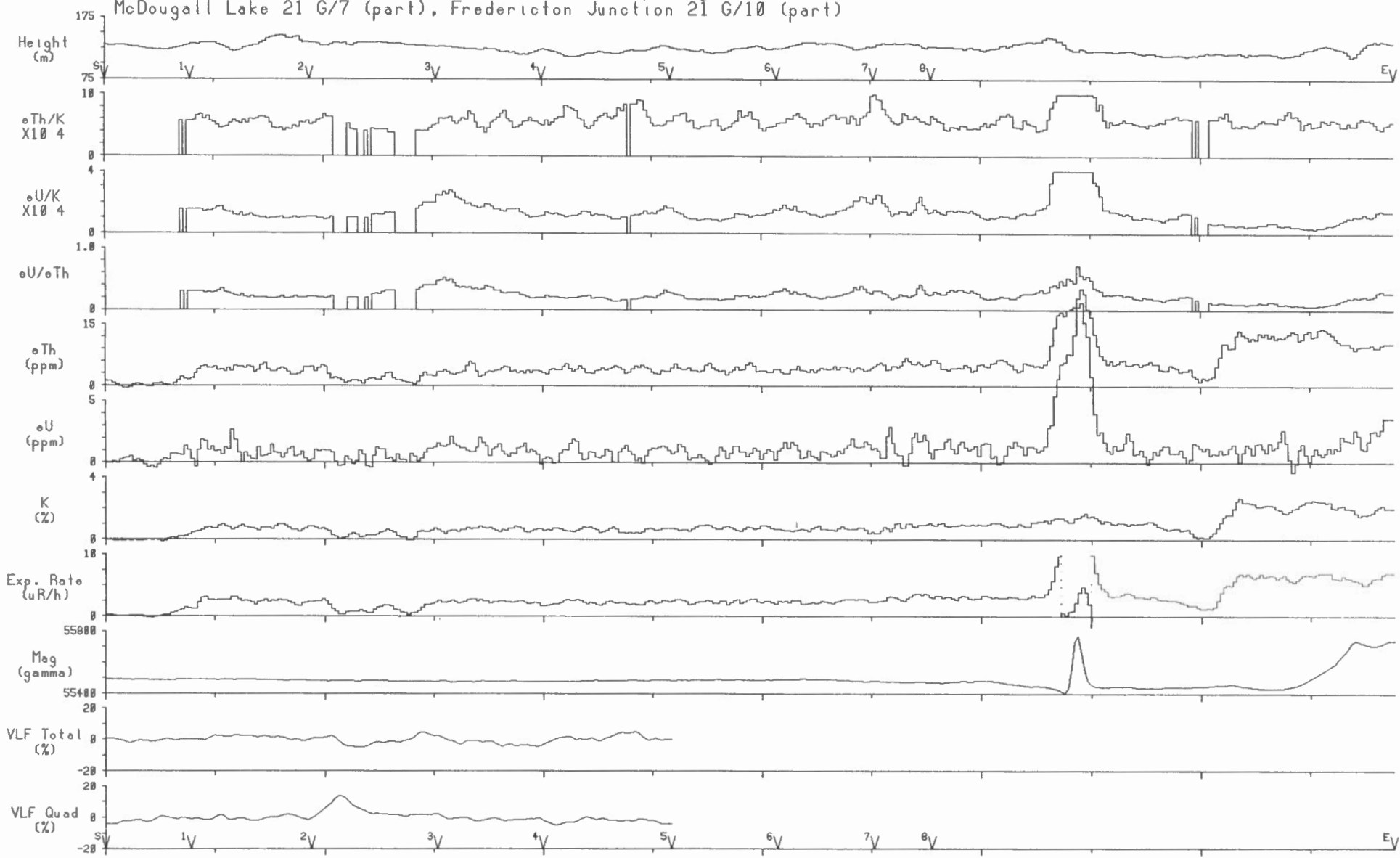
Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)

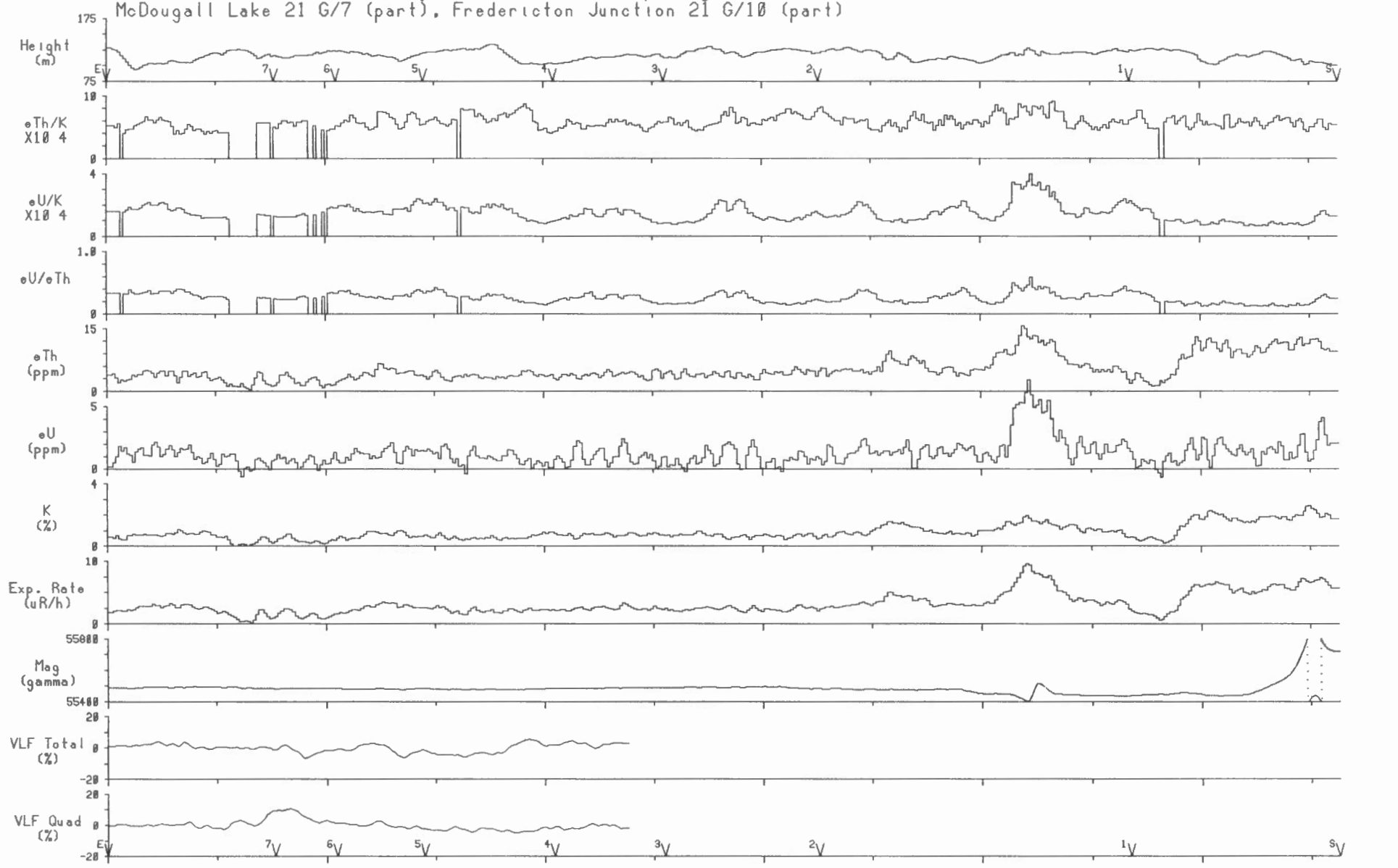


Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



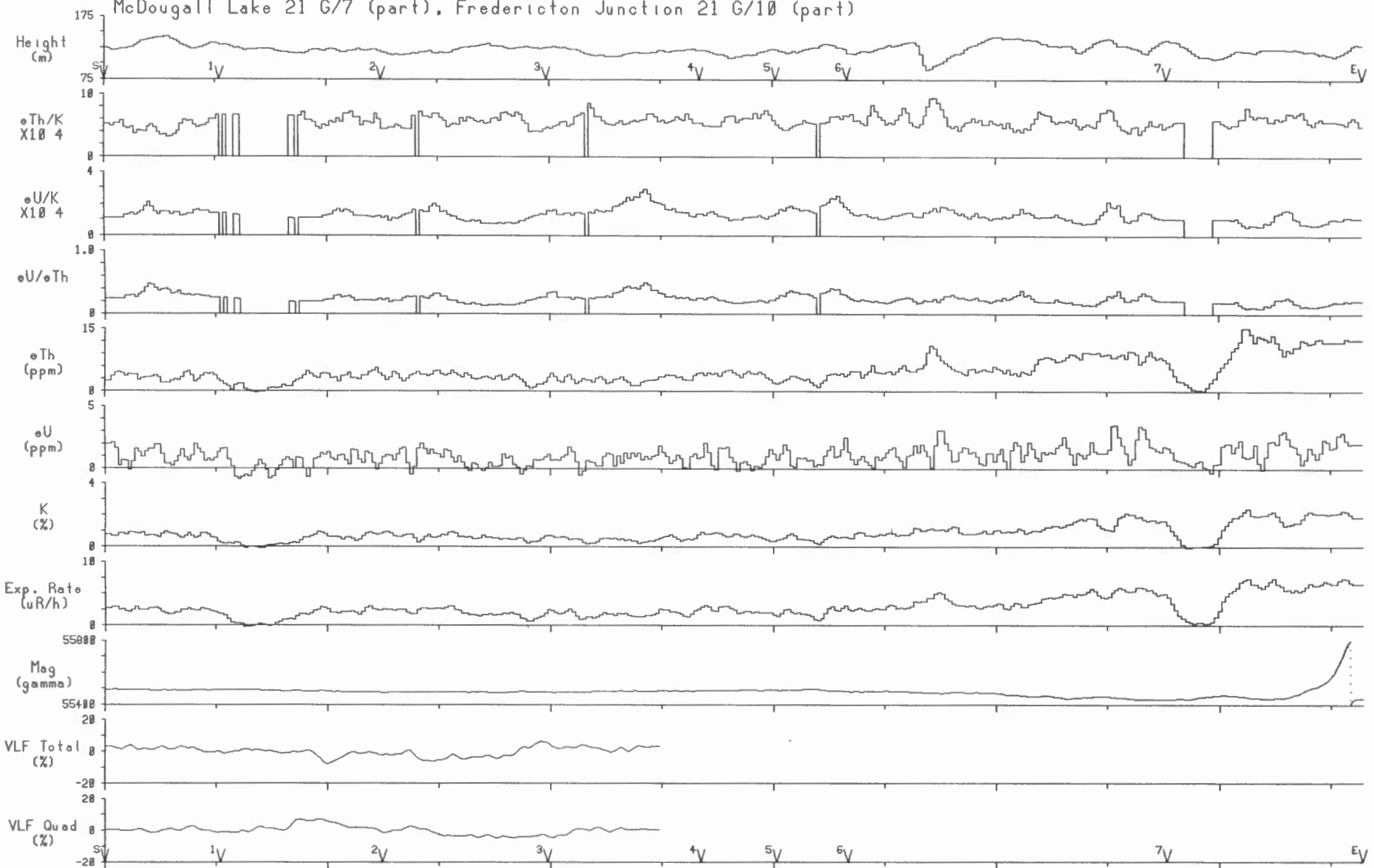
Line 5 2 km Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



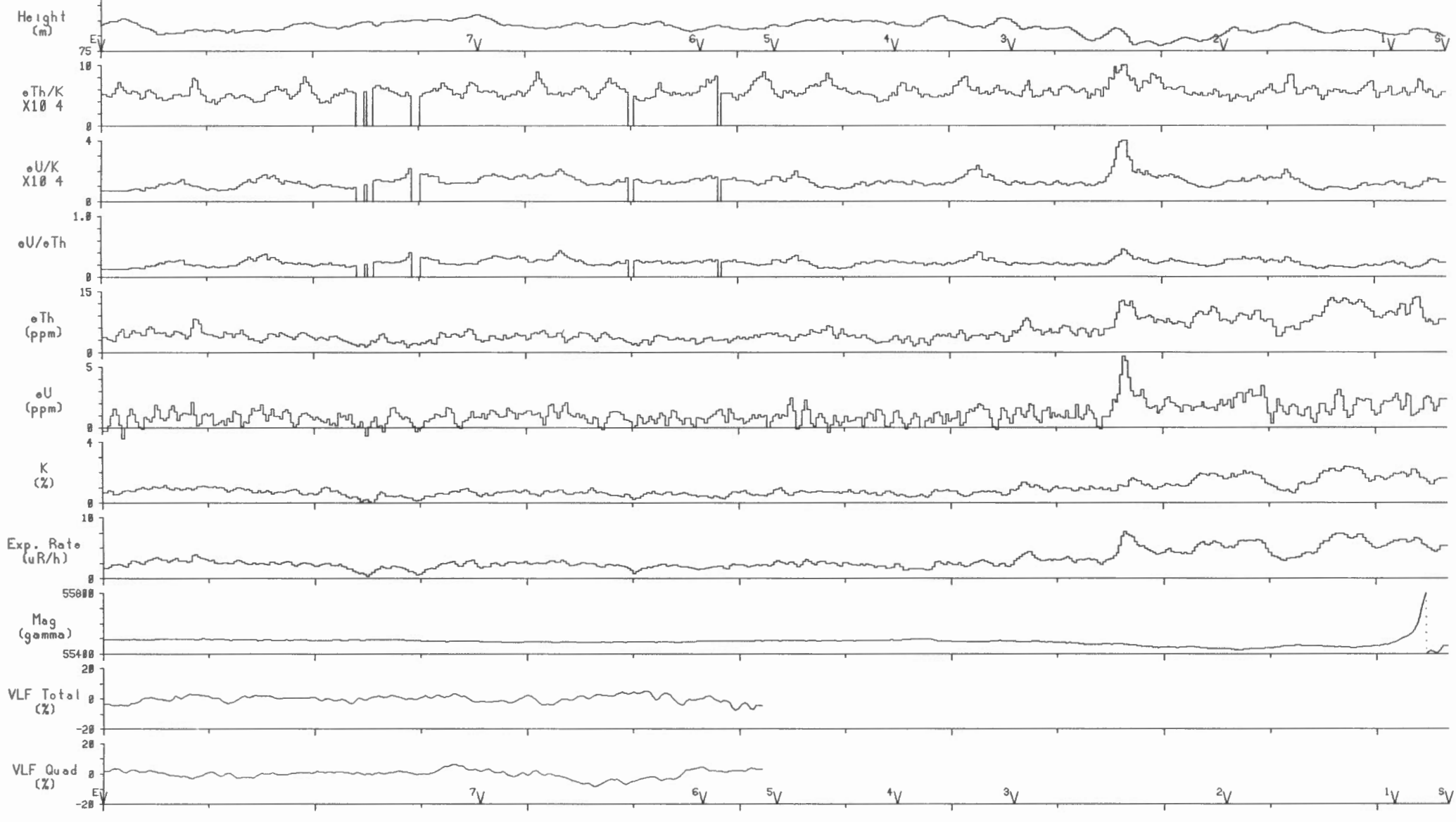
Line 6 2 km Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



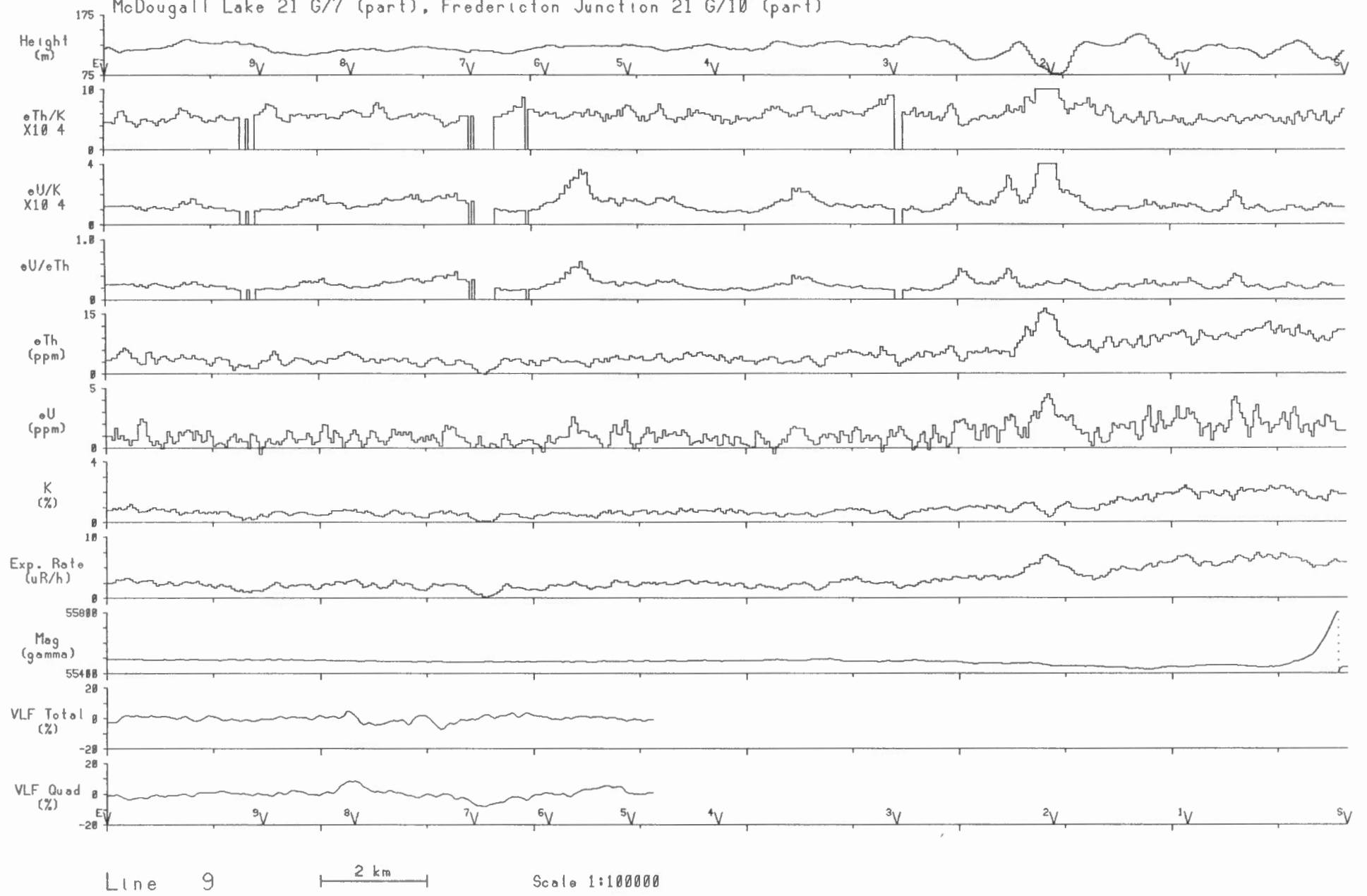
Line 7 2 km Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)

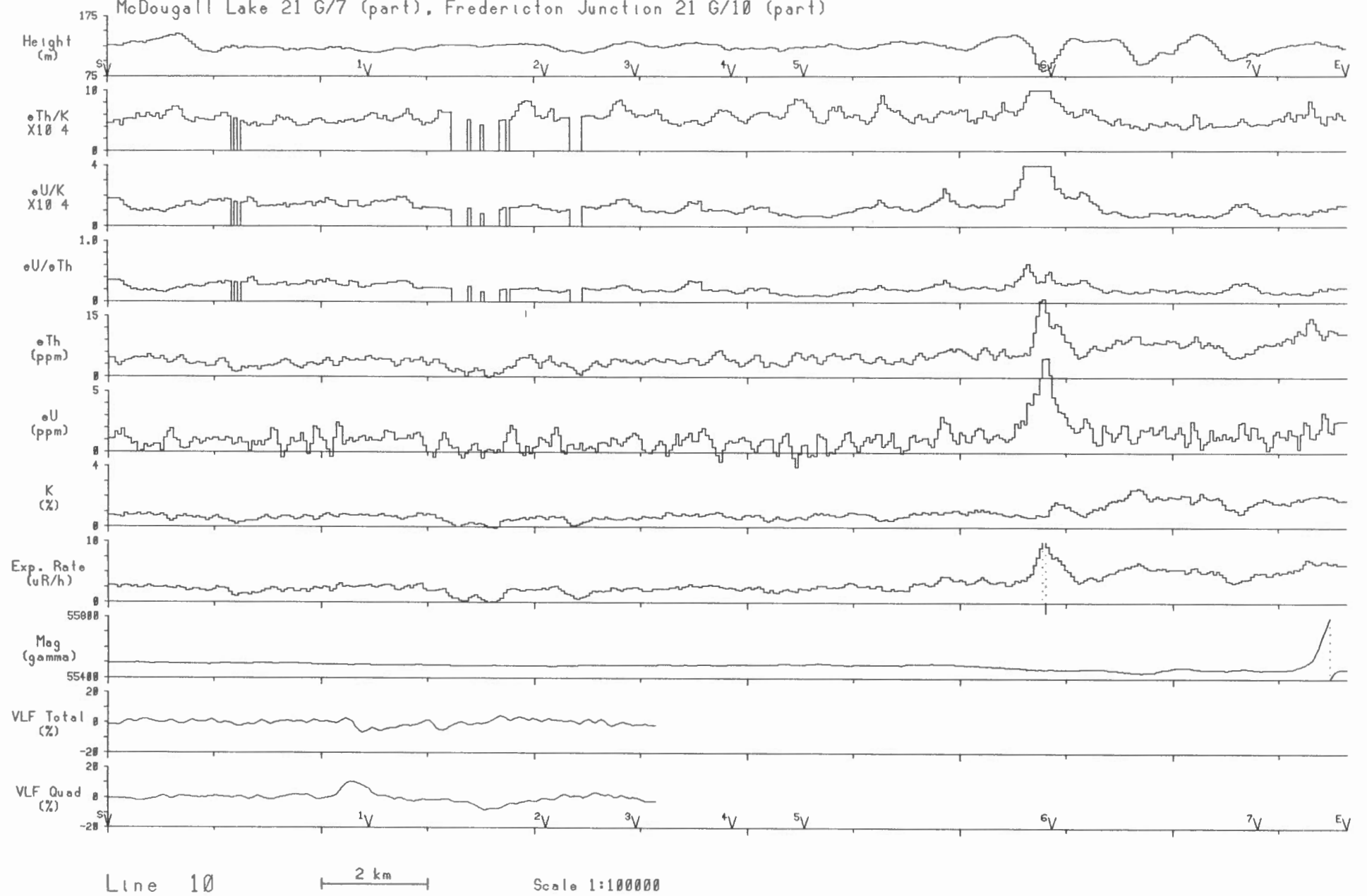


Line 8 2 km Scale 1:100000

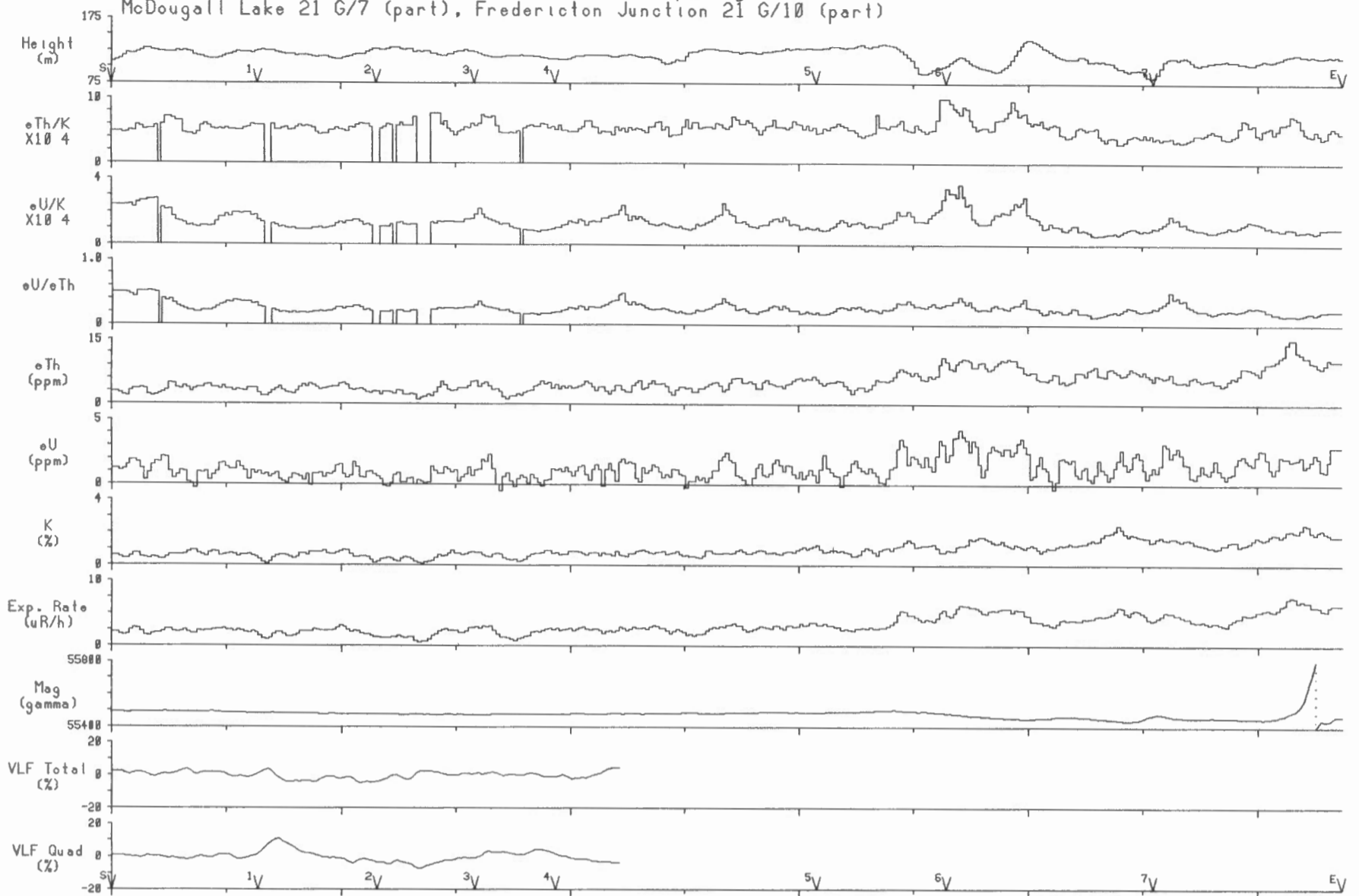
Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)

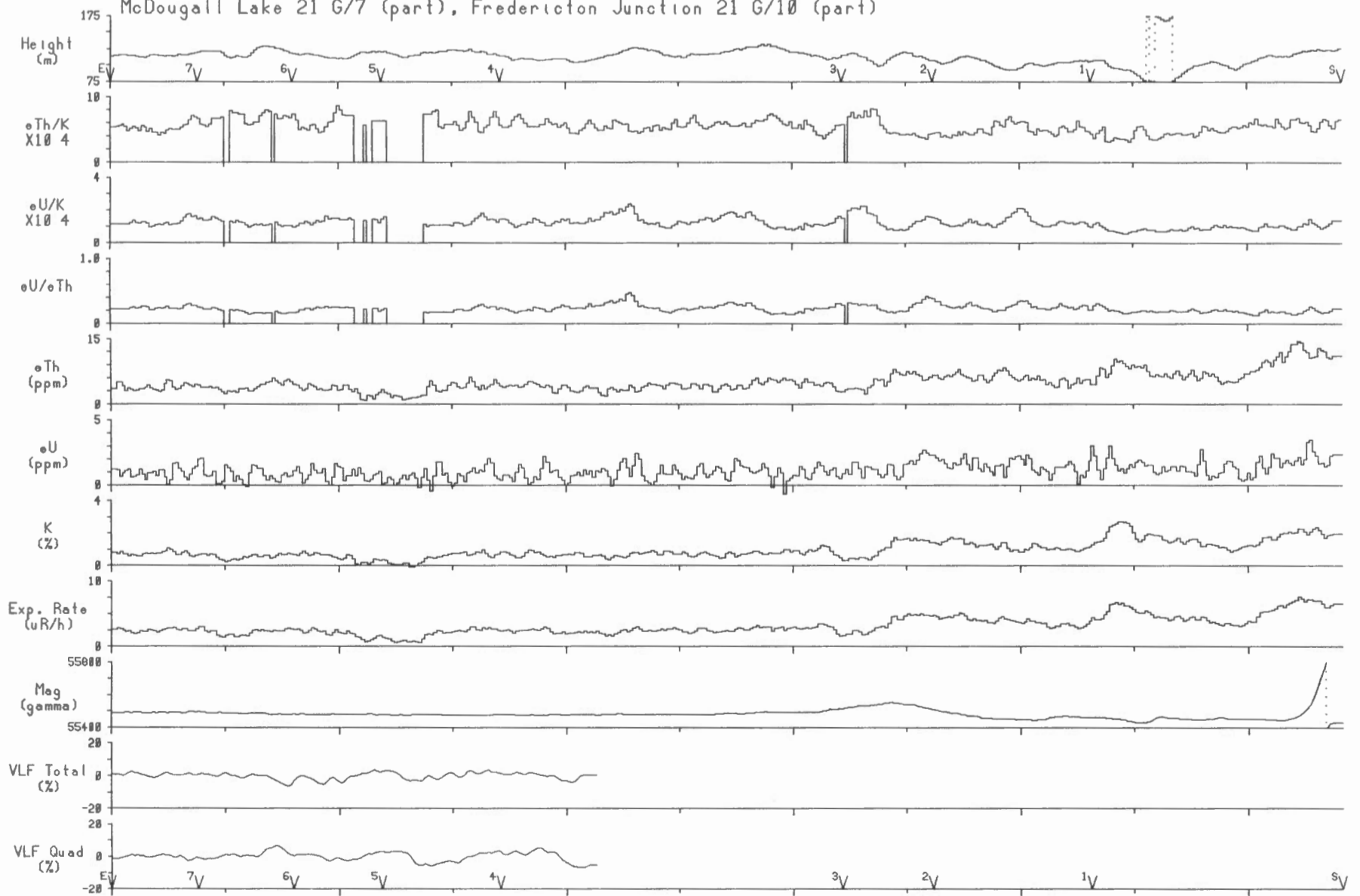


Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



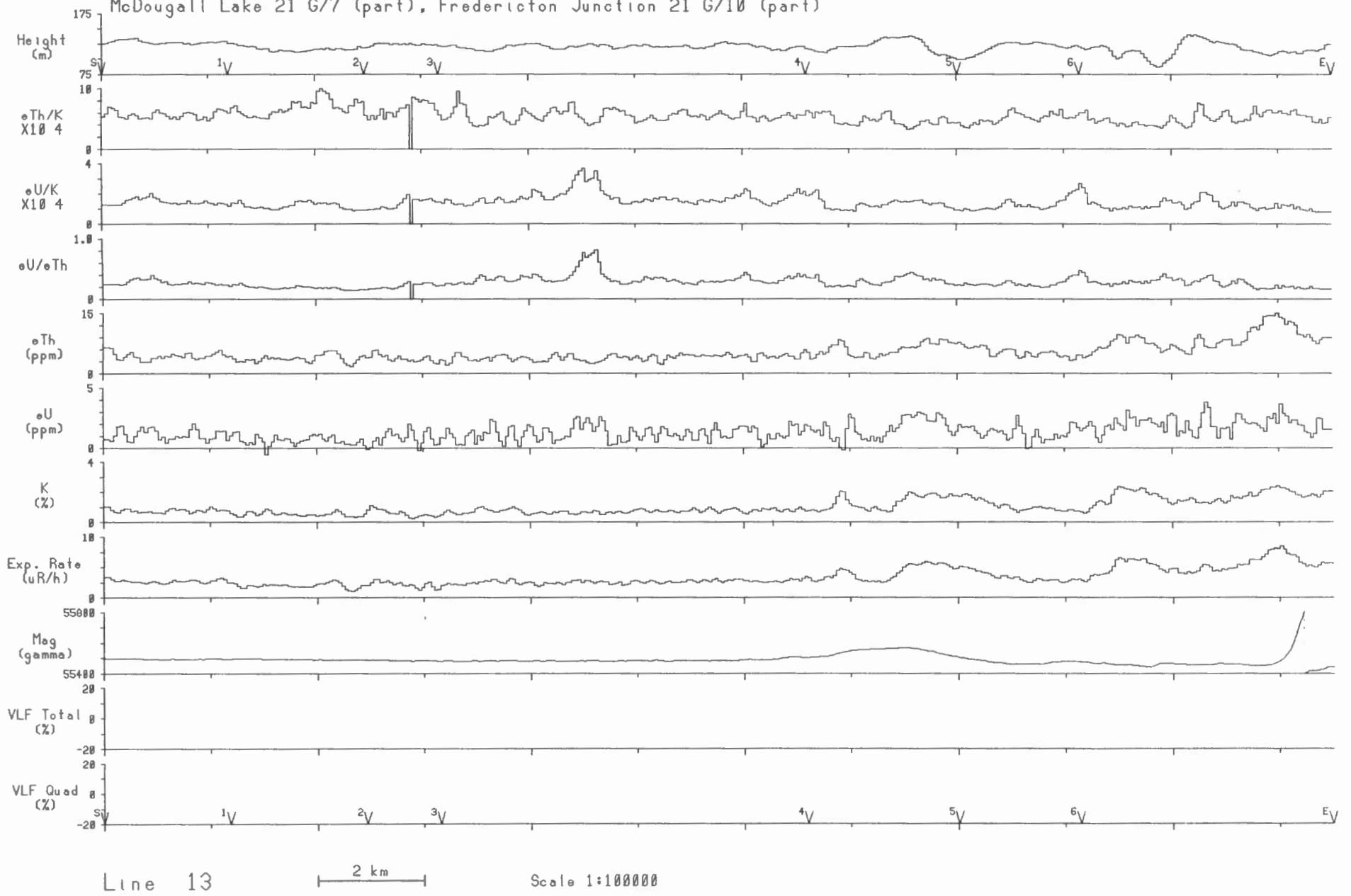
Line 11 2 km Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)

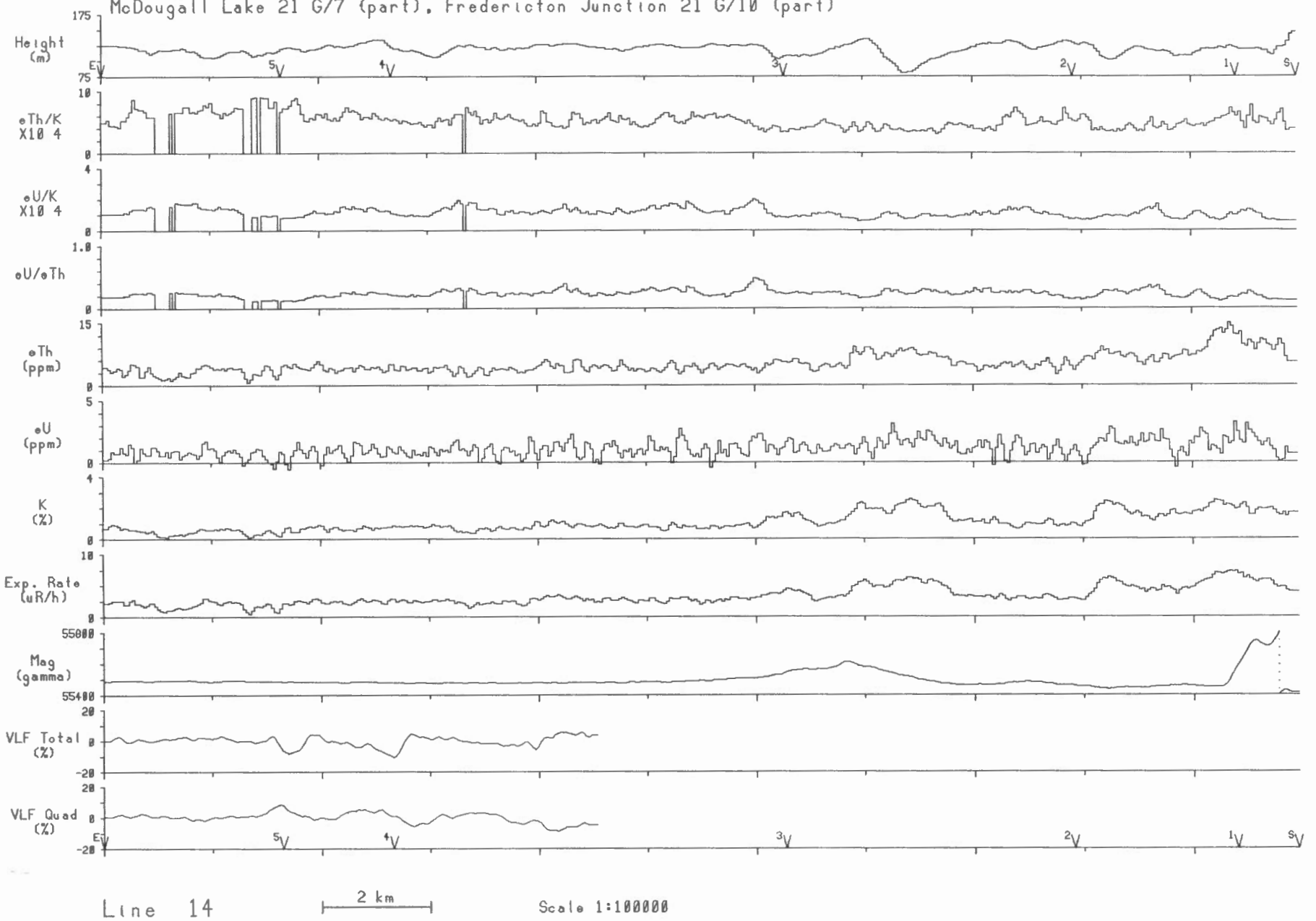


Line 12 2 km Scale 1:100000

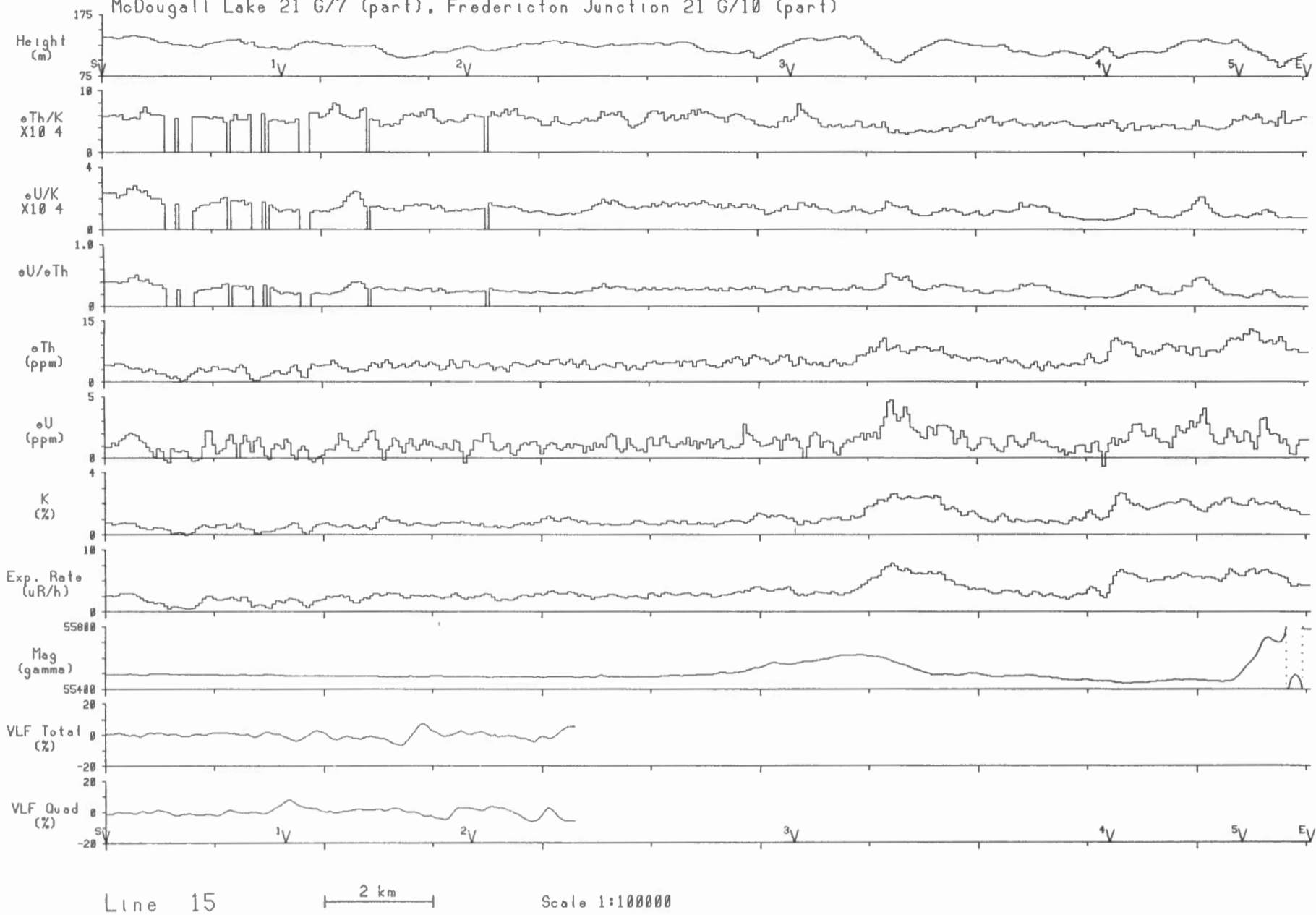
Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



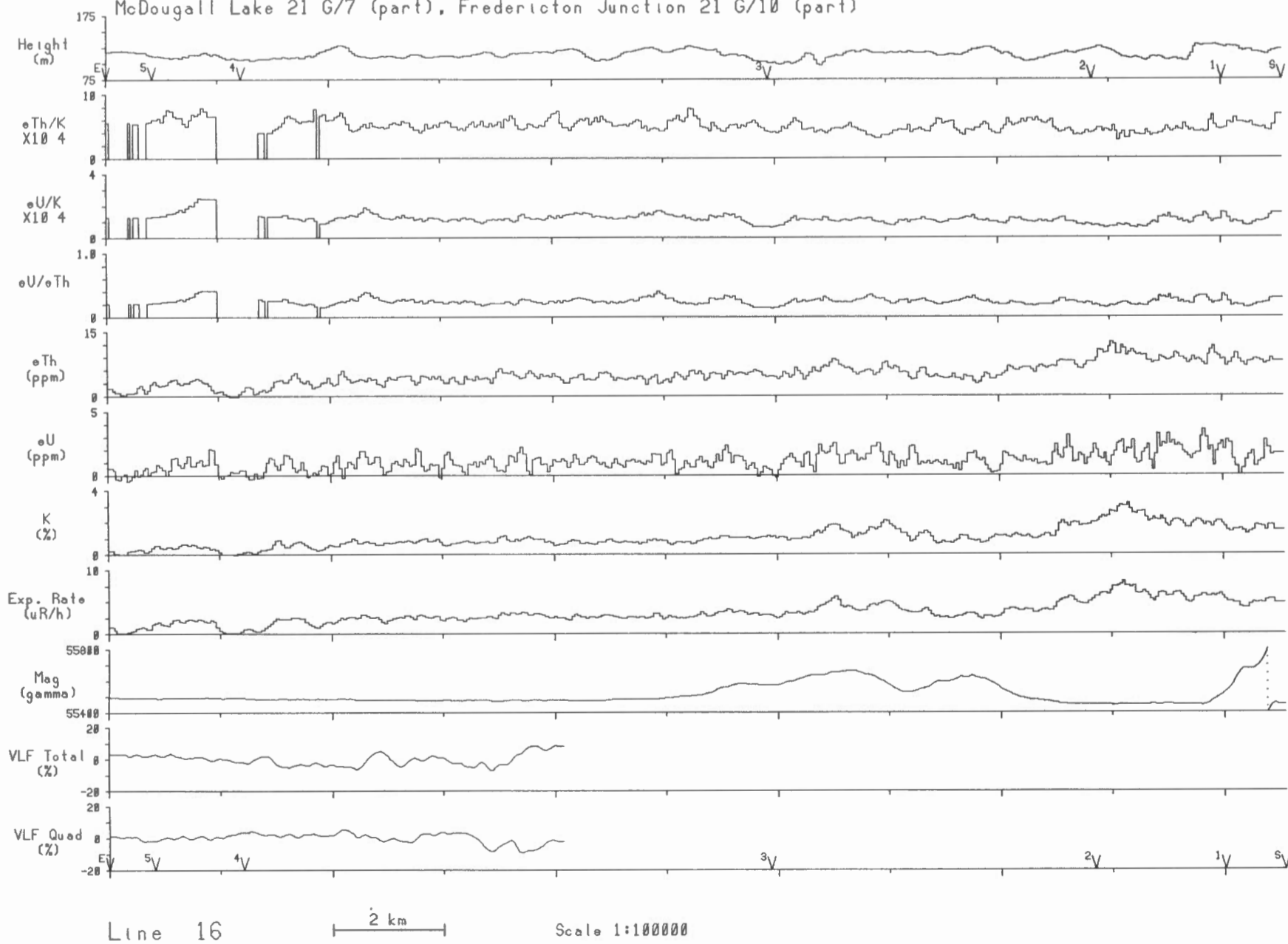
Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



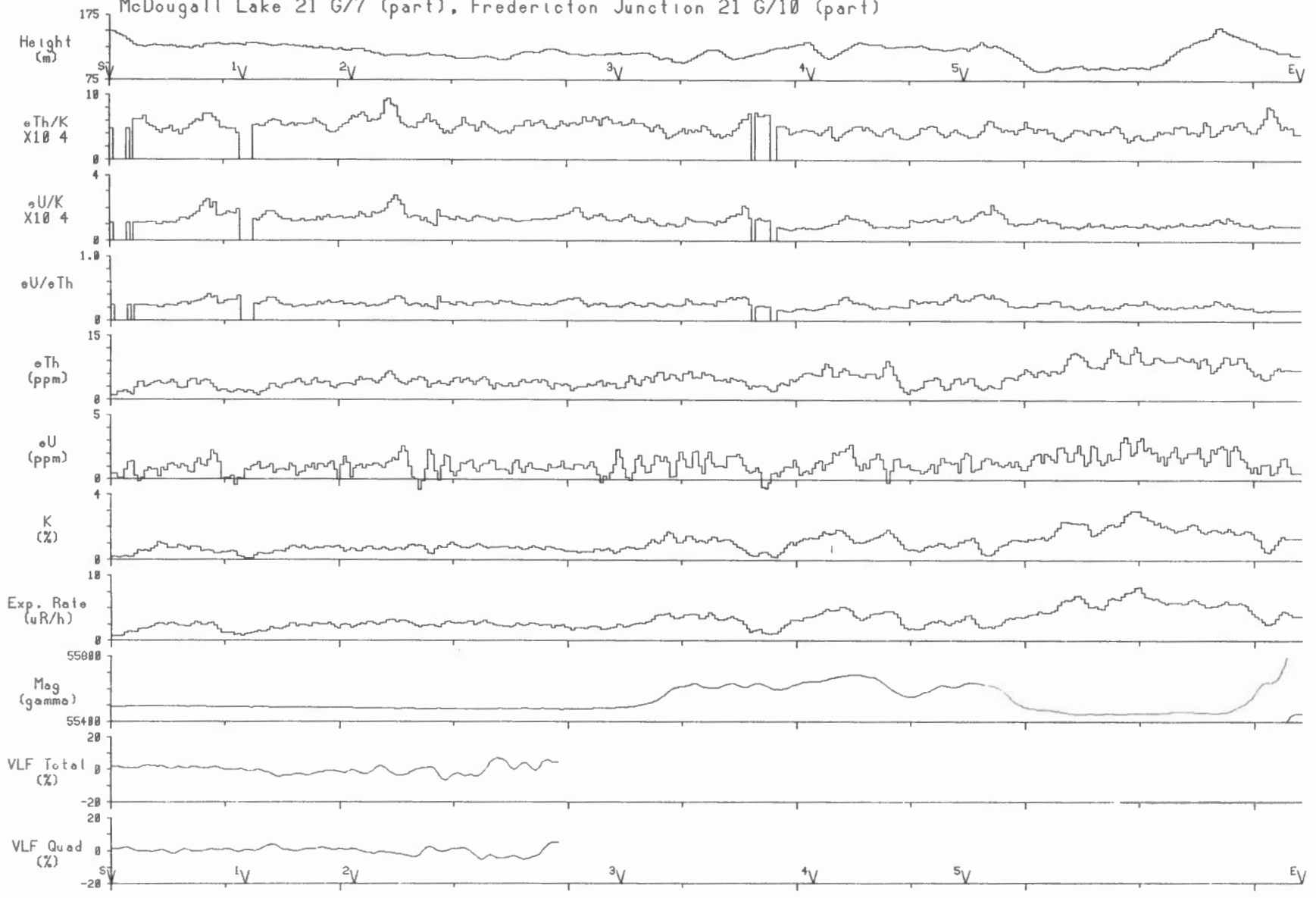
Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)

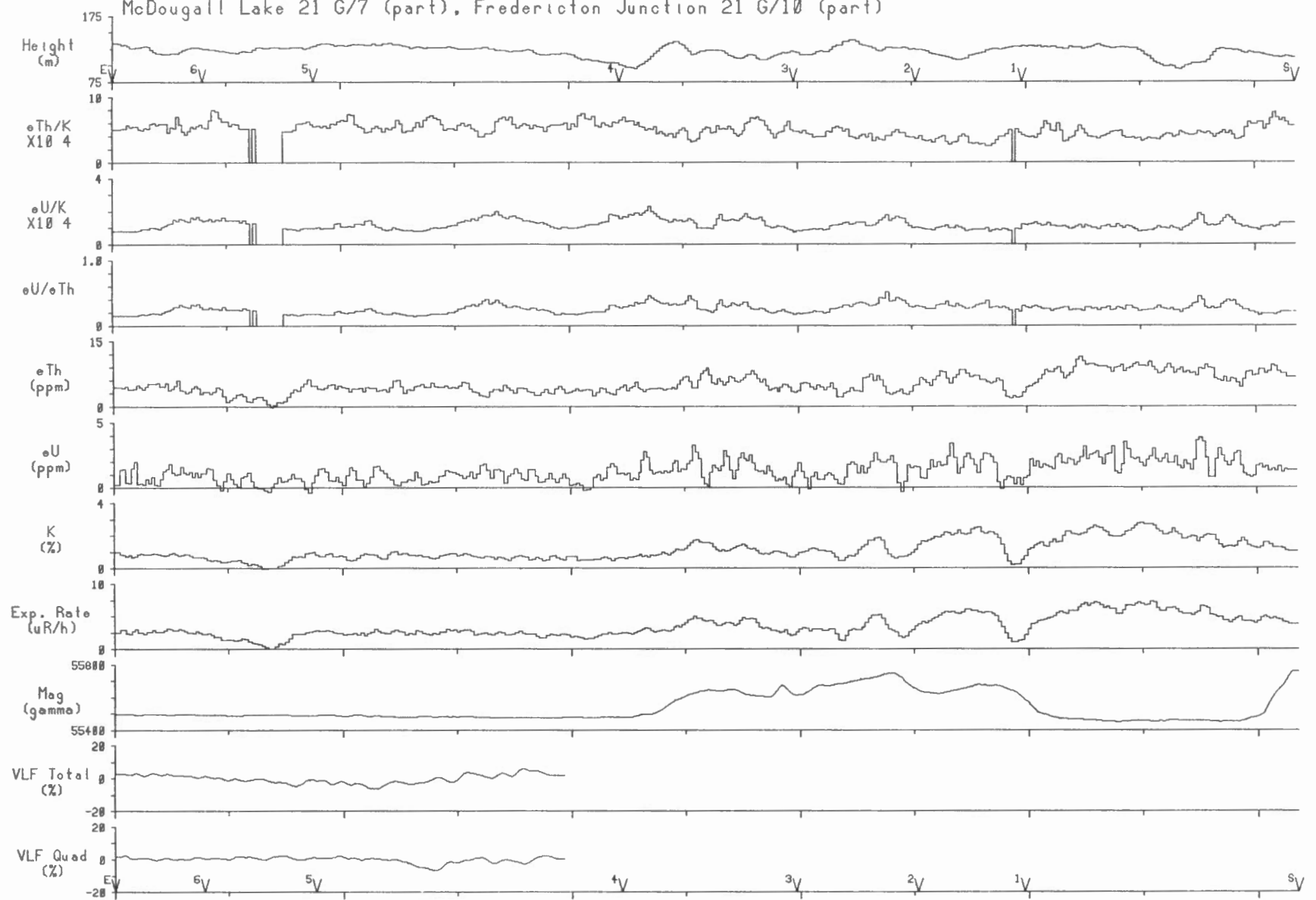


Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



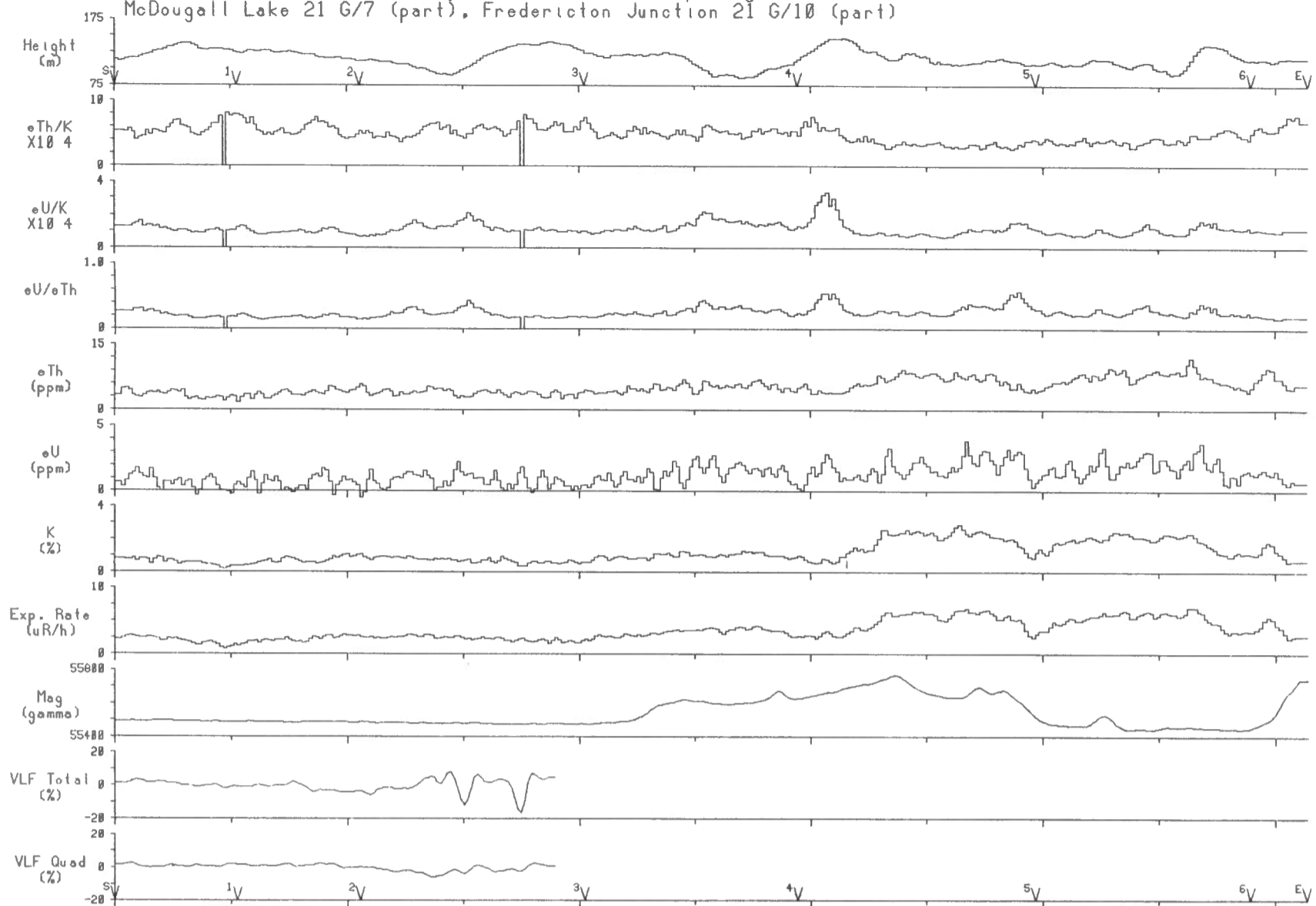
Line 17 2 km Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



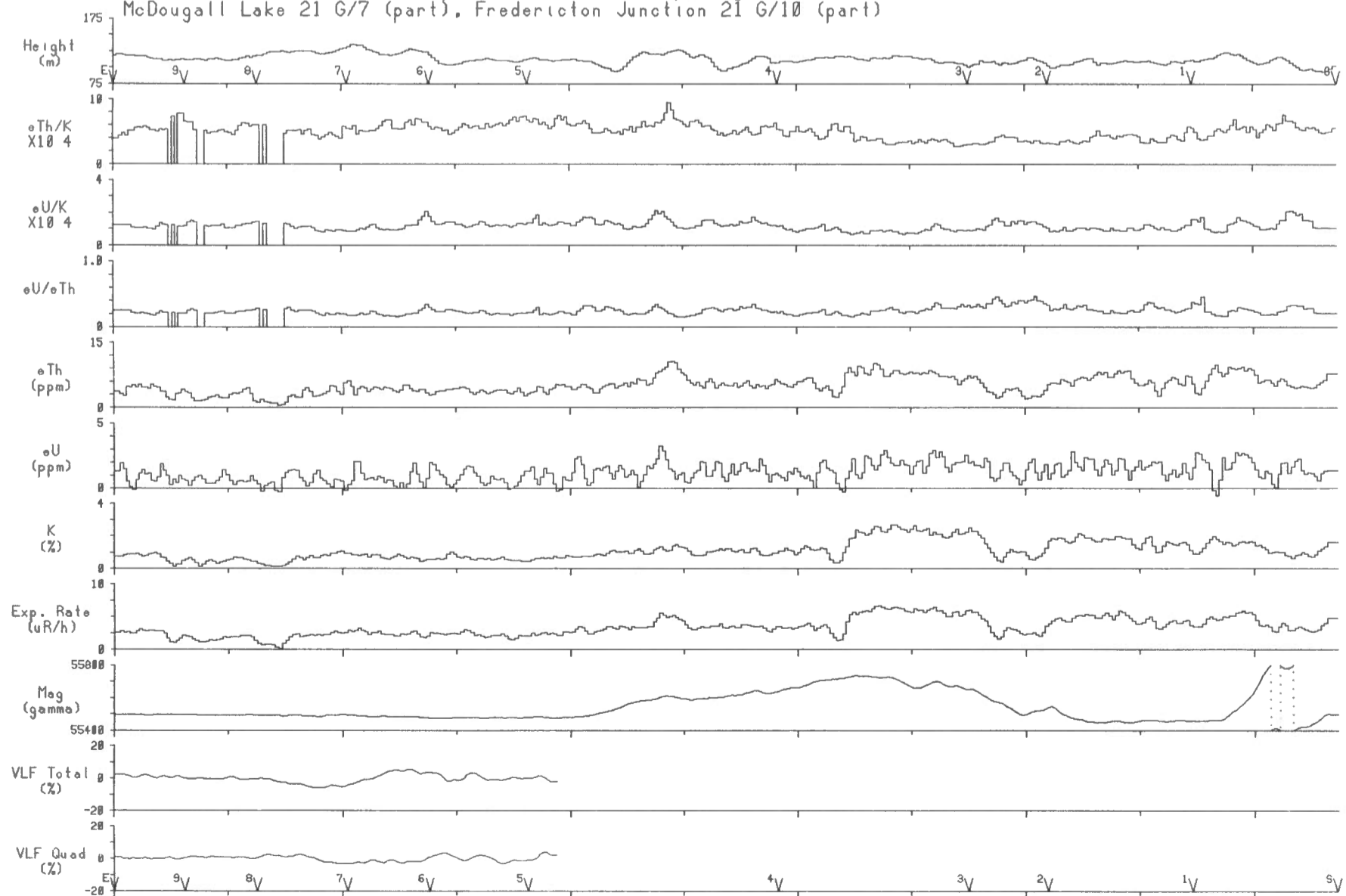
Line 18 2 km Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



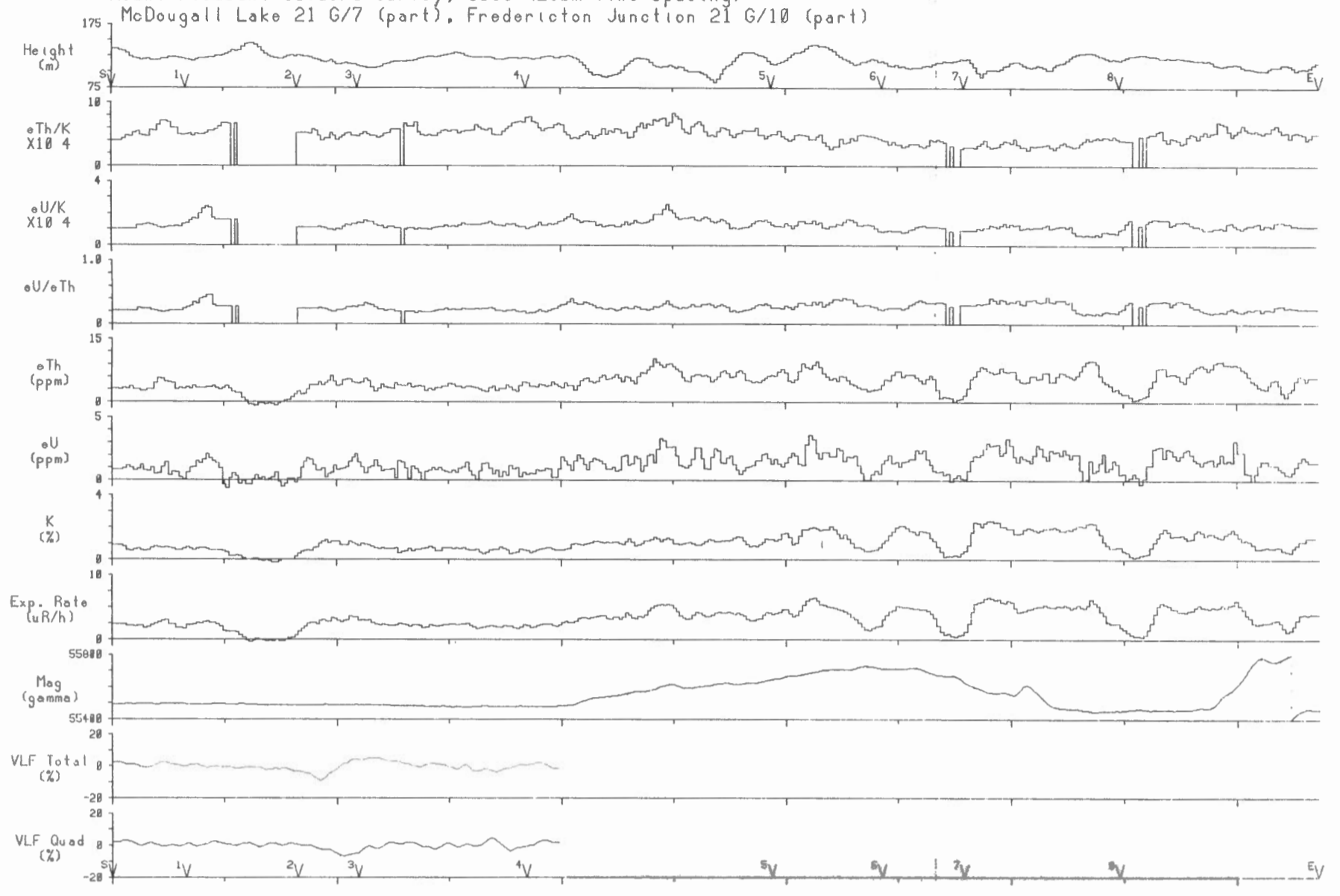
Line 19 2 km Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



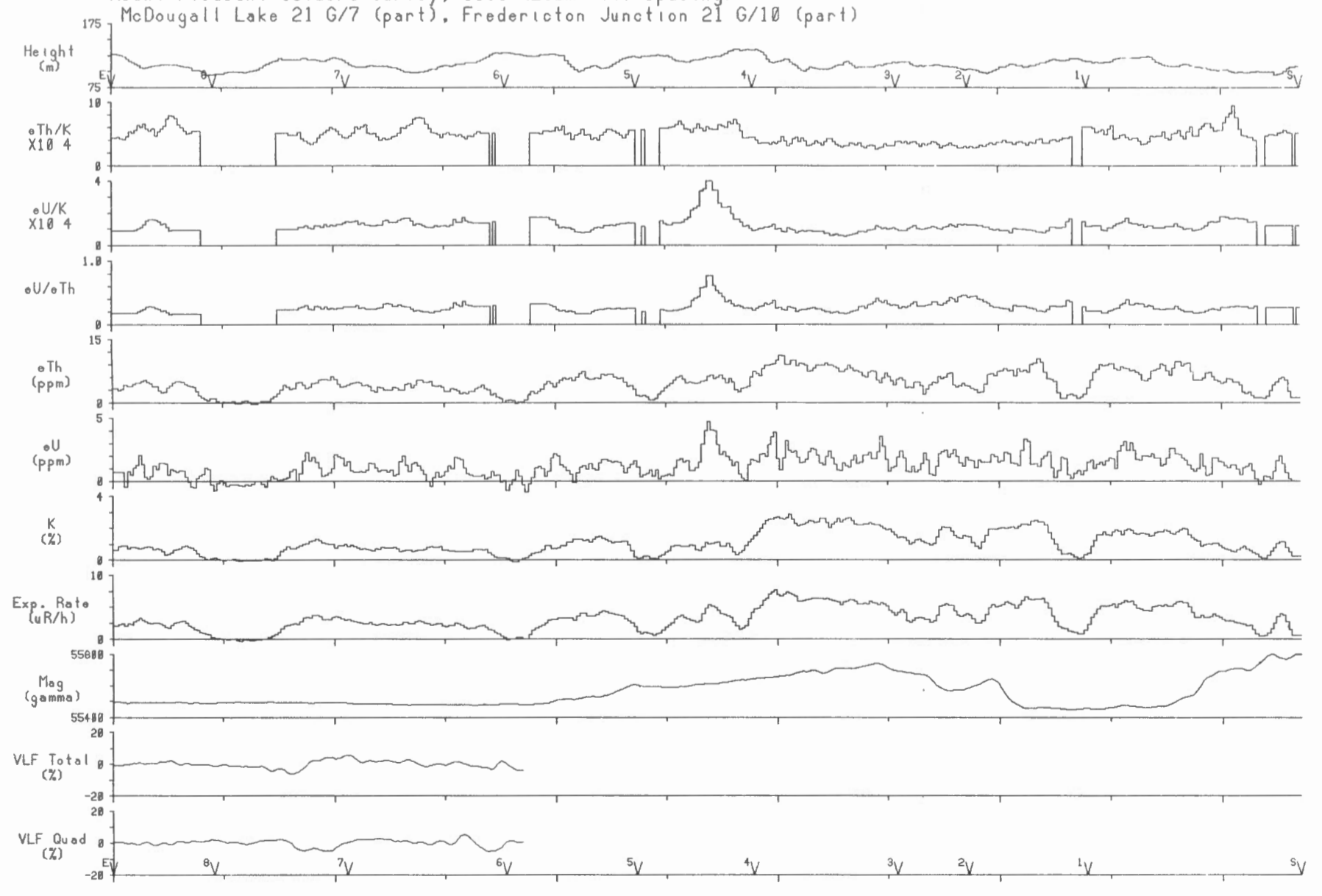
Line 20 2 km Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



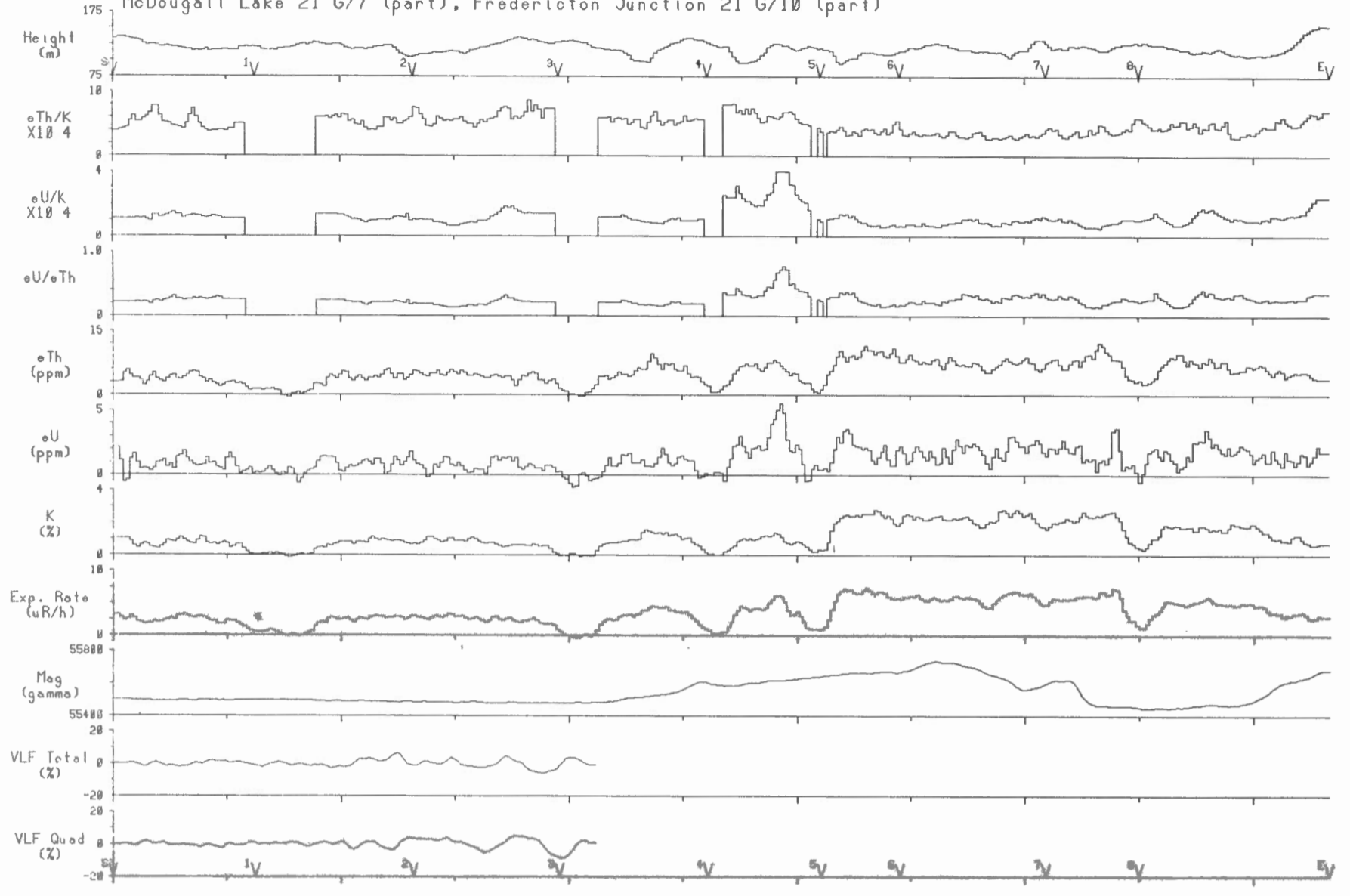
Line 21 2 km Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



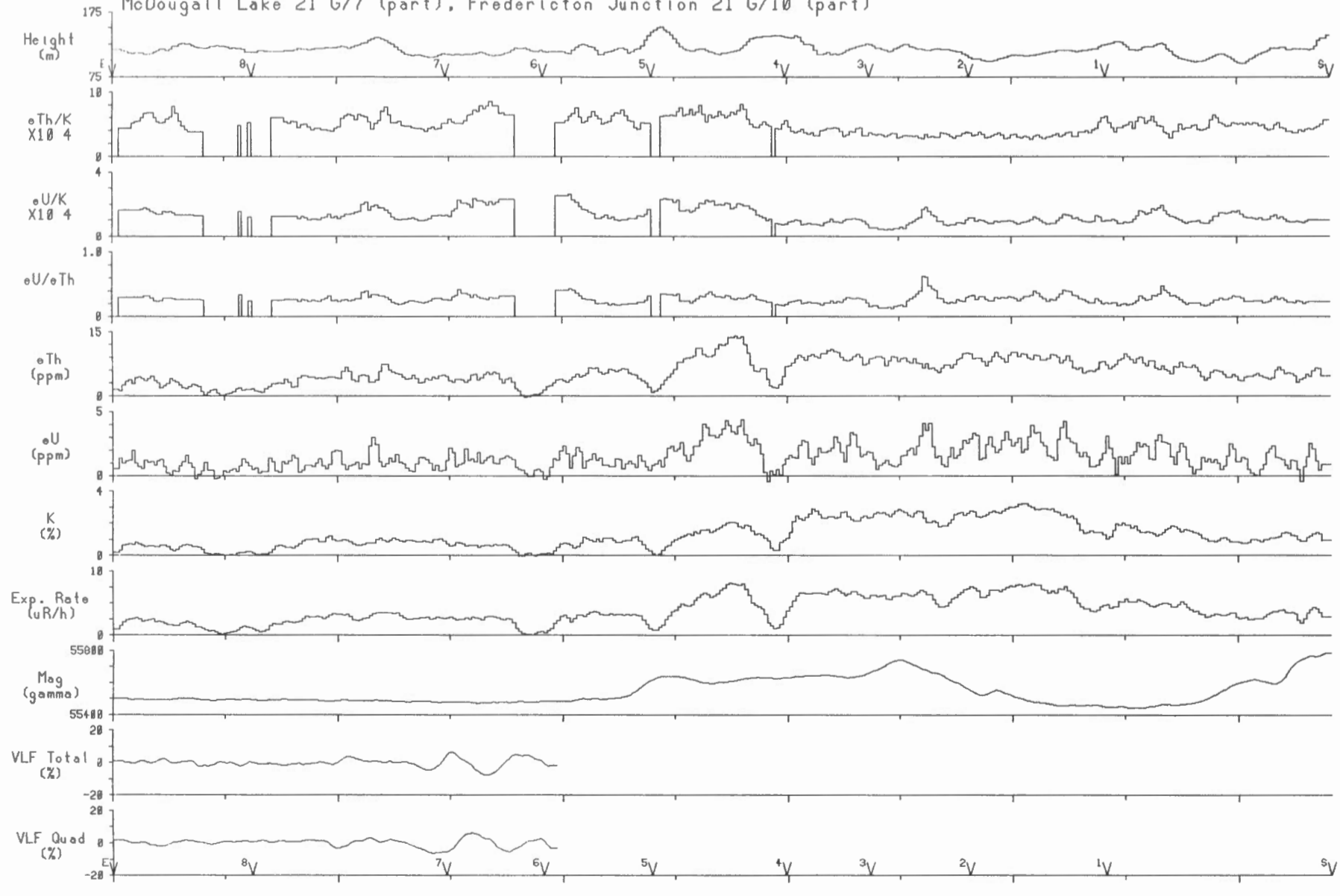
Line 22 2 km Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



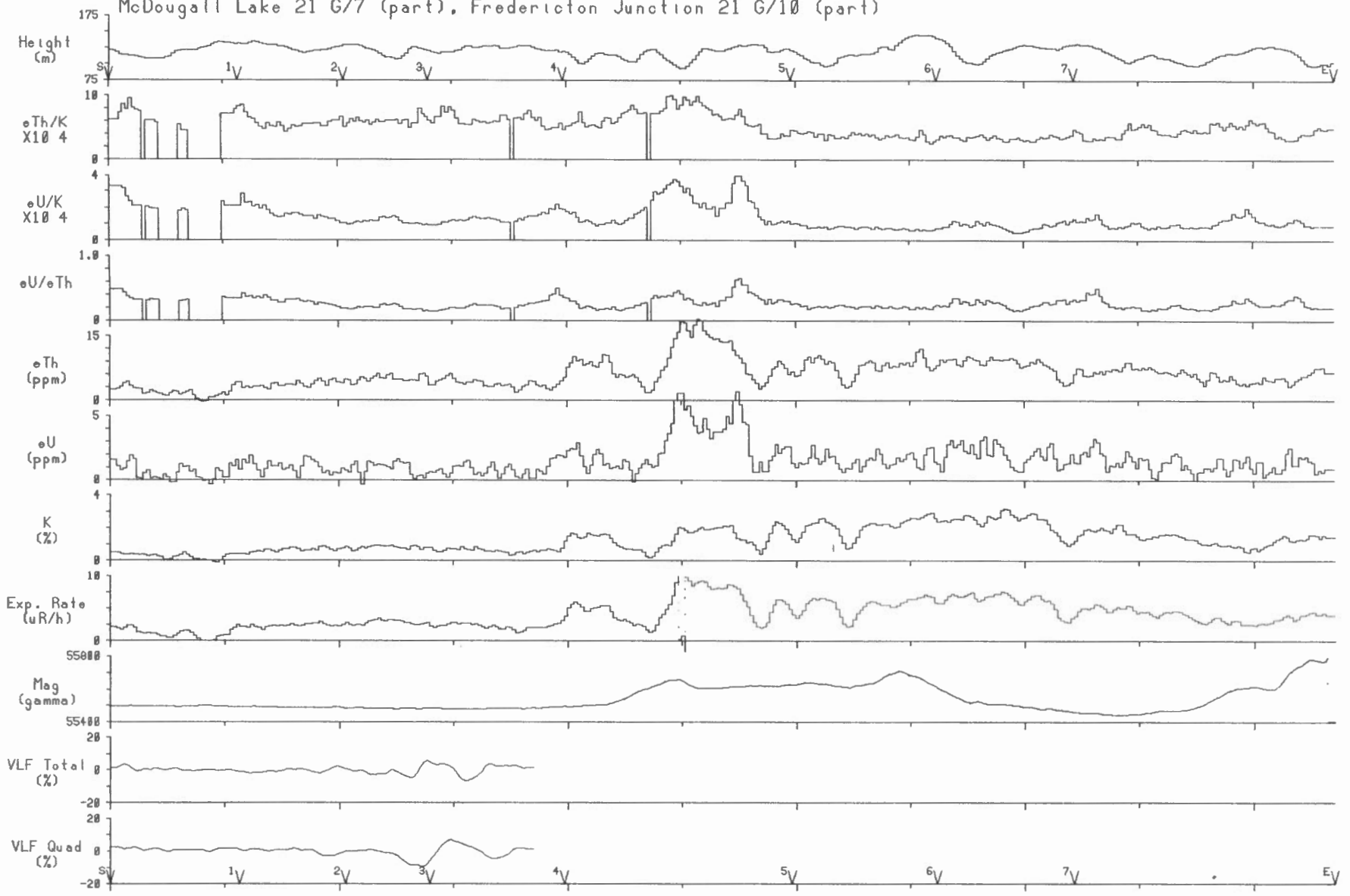
Line 23 2 km Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



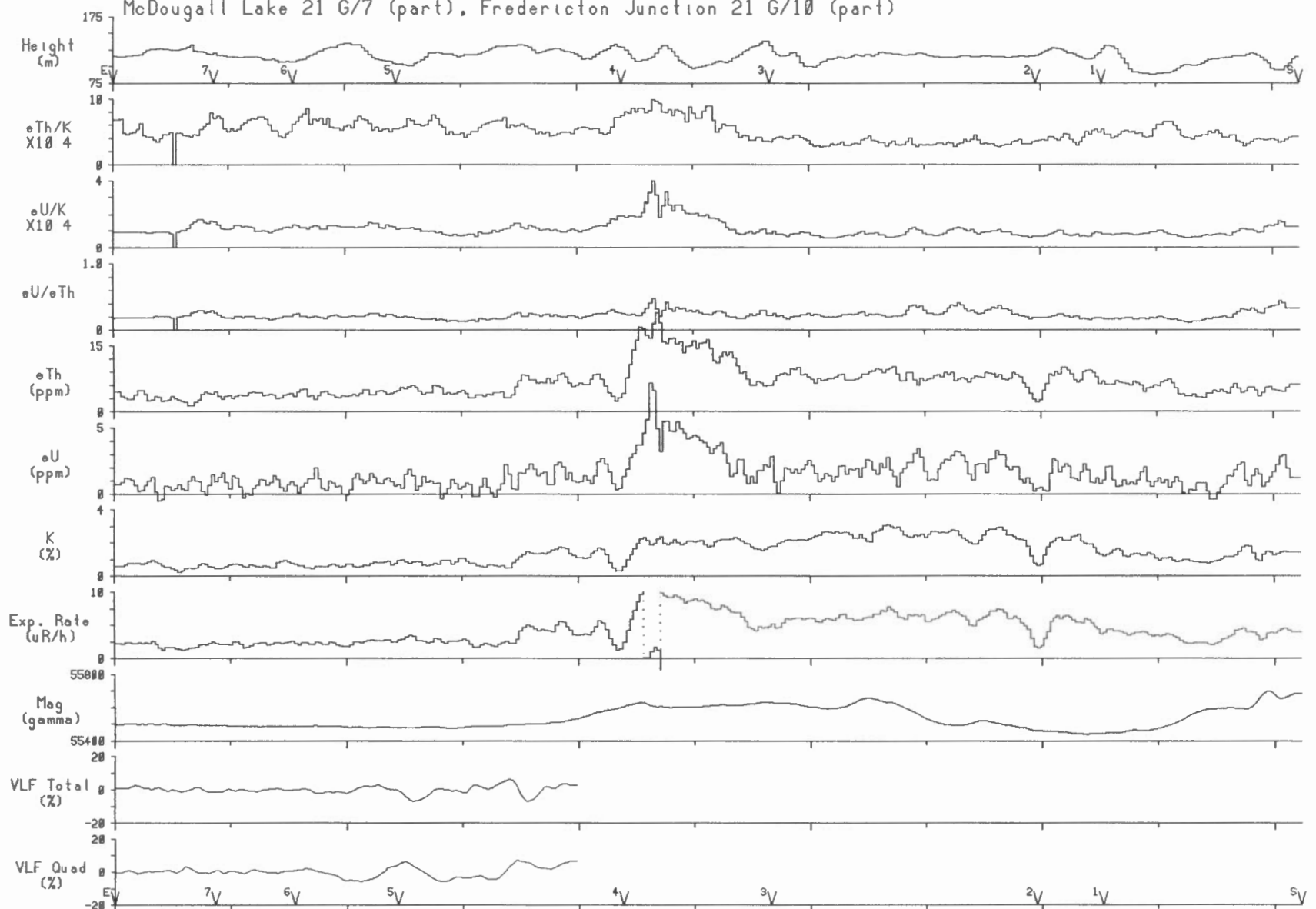
Line 24 2 km Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



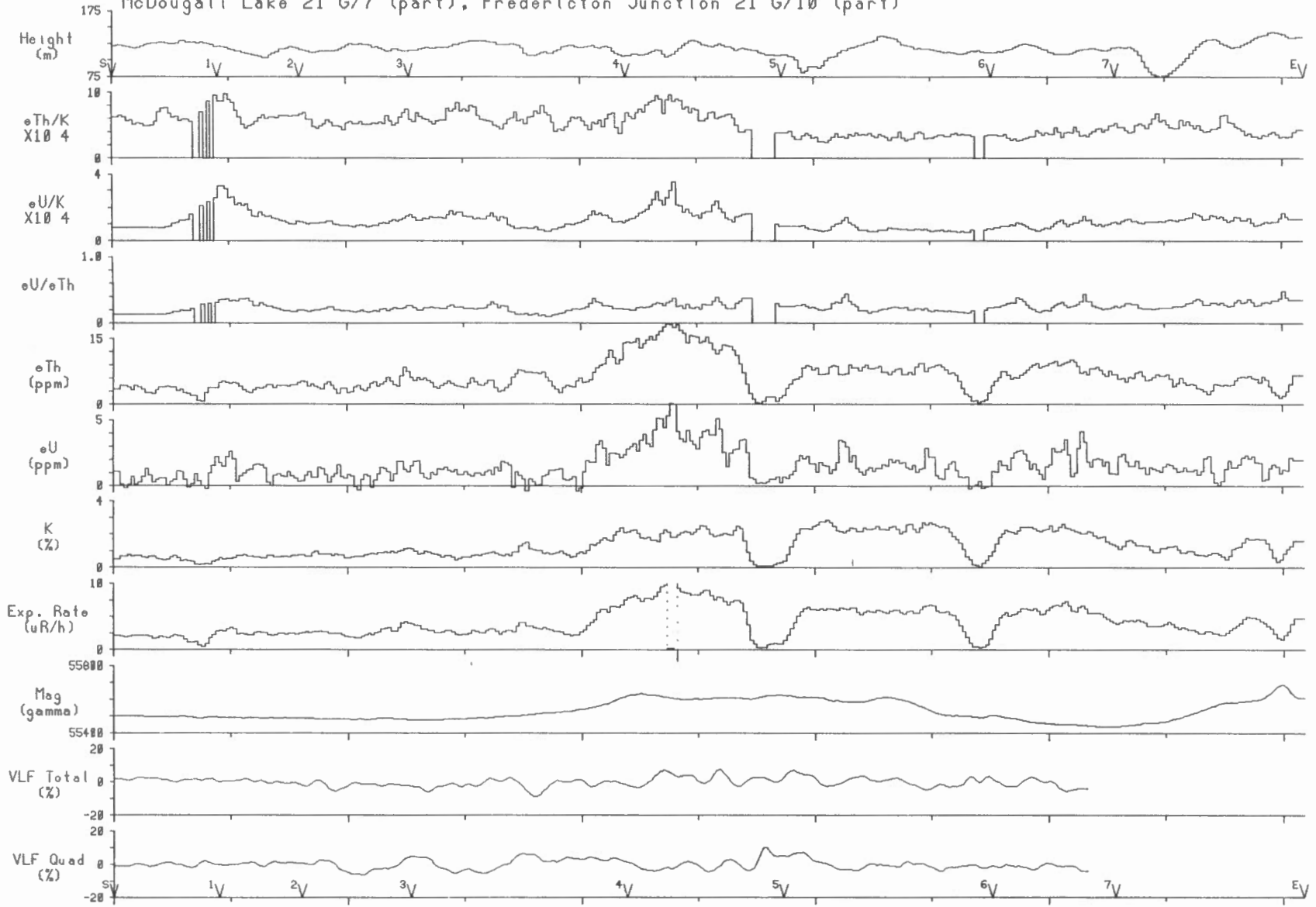
Line 25 2 km Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



Line 26 2 km Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)

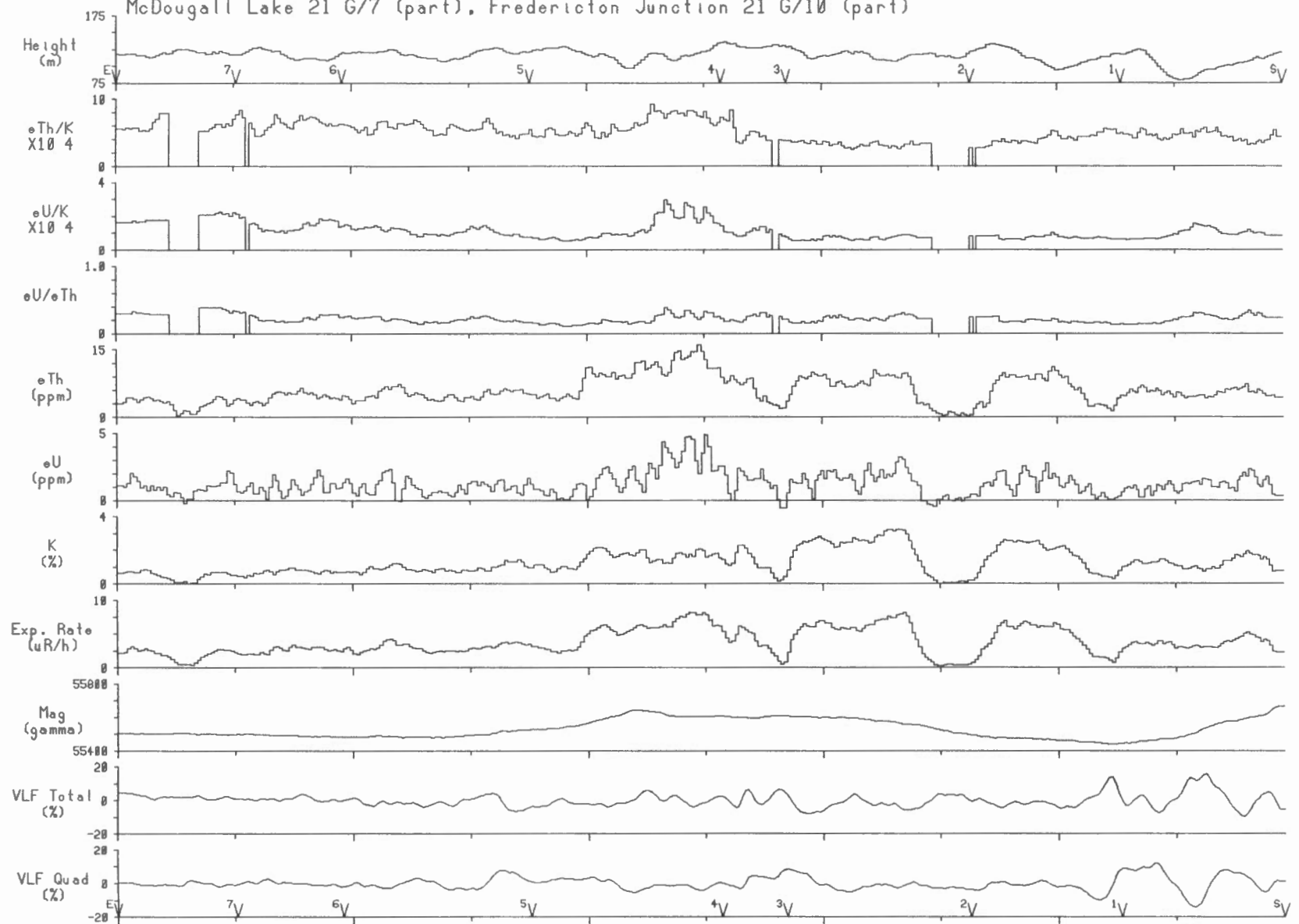


Line 27

2 km

Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)

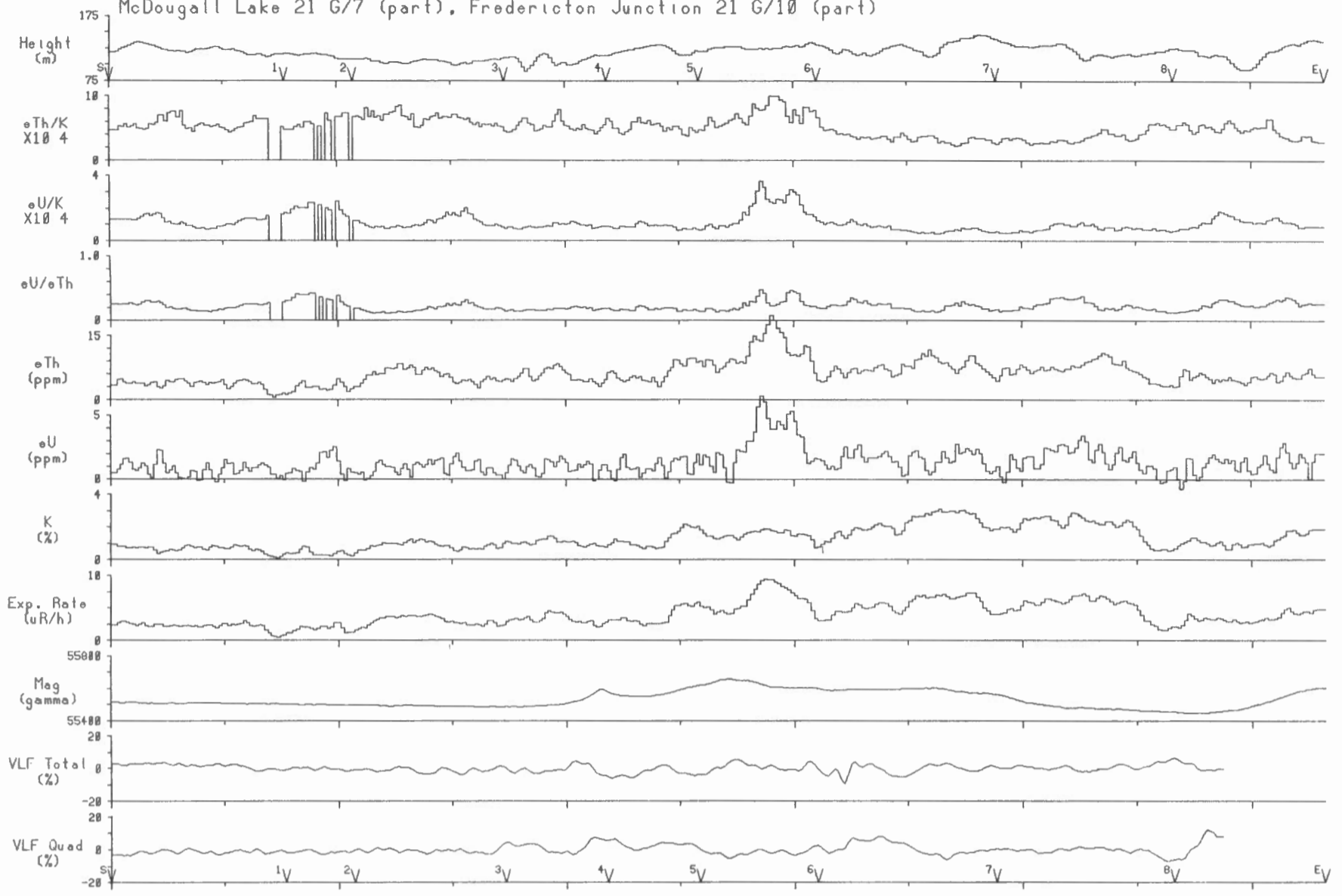


Line 28

2 km

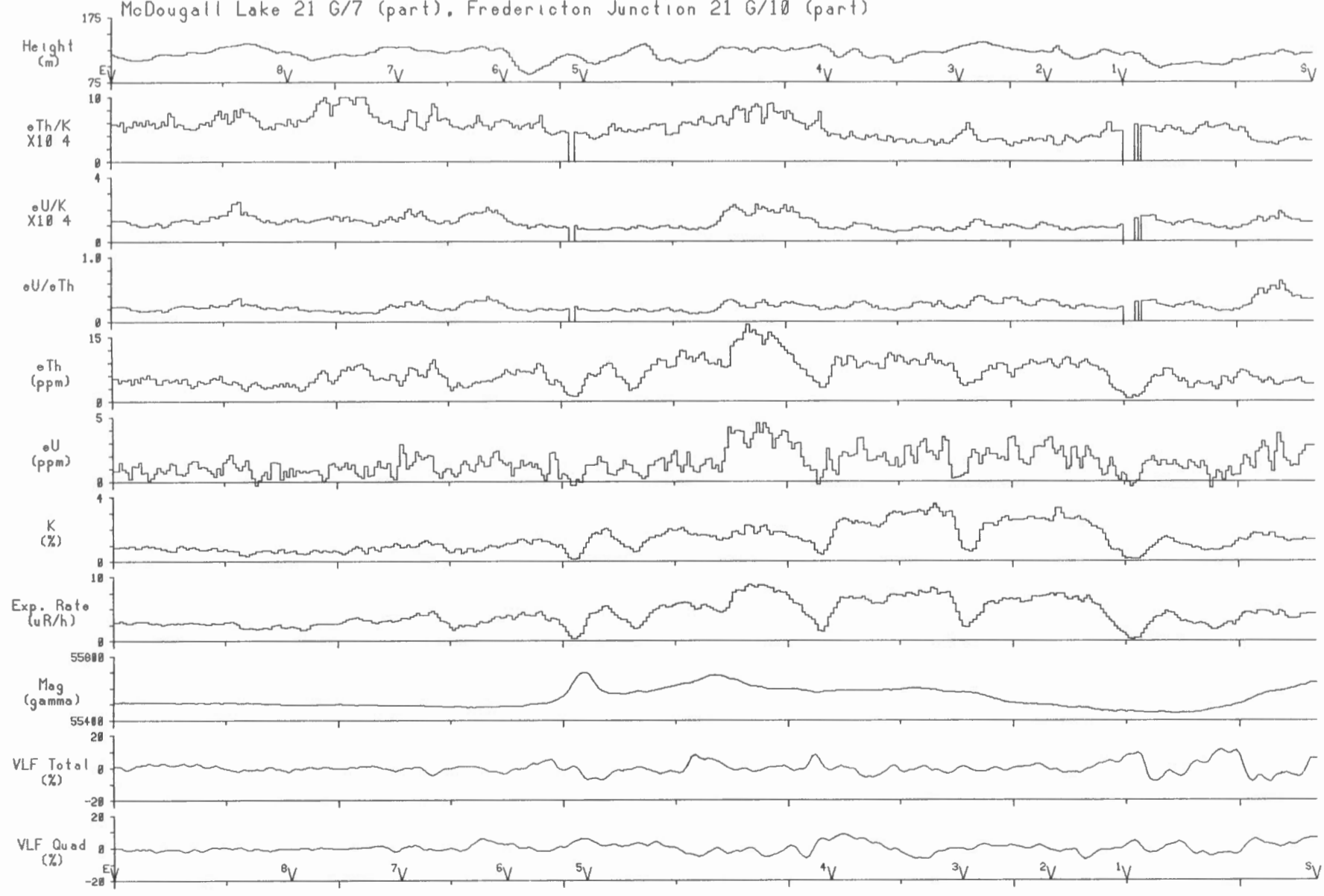
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Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



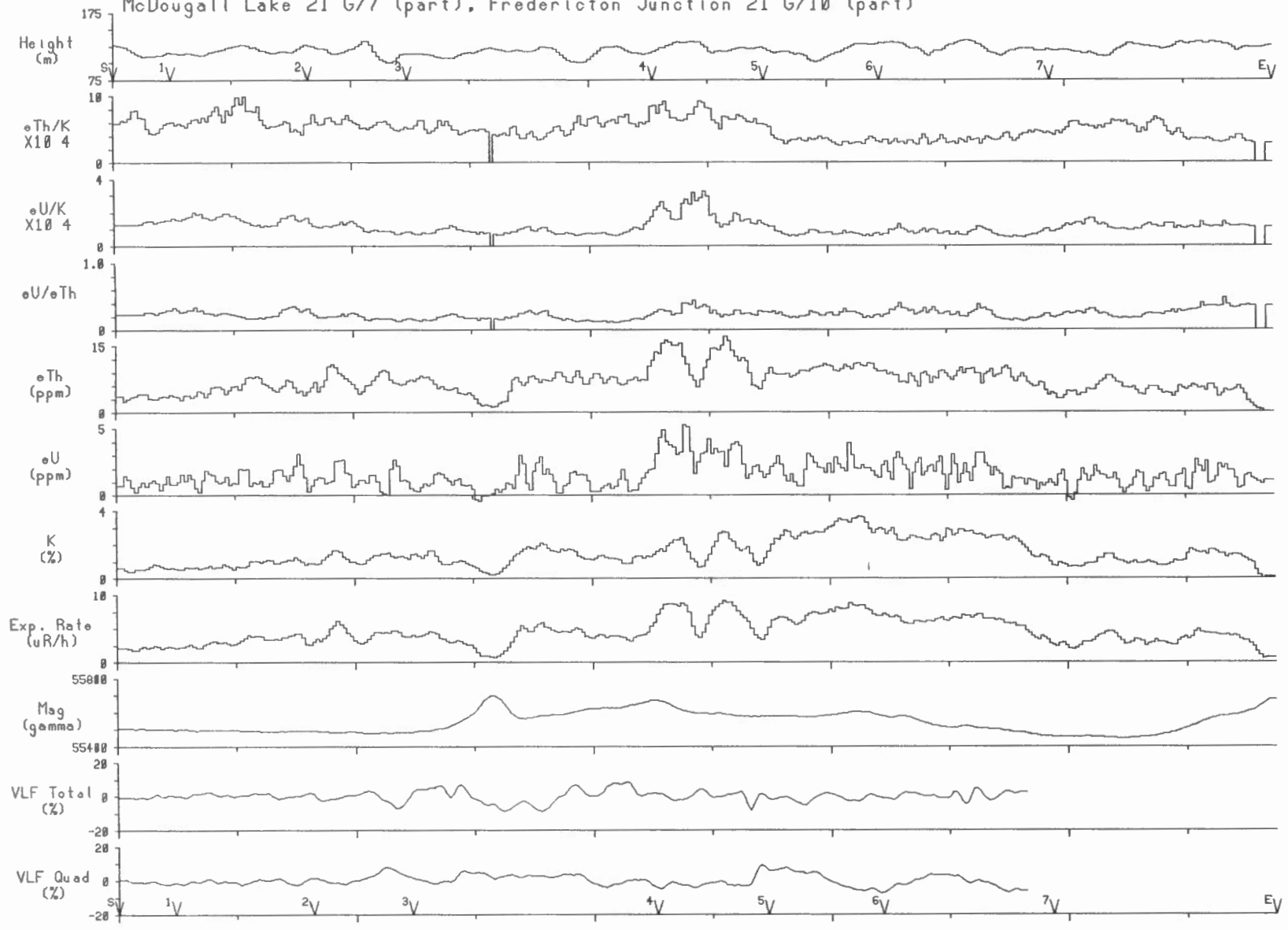
Line 29 2 km Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



Line 30 2 km Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)

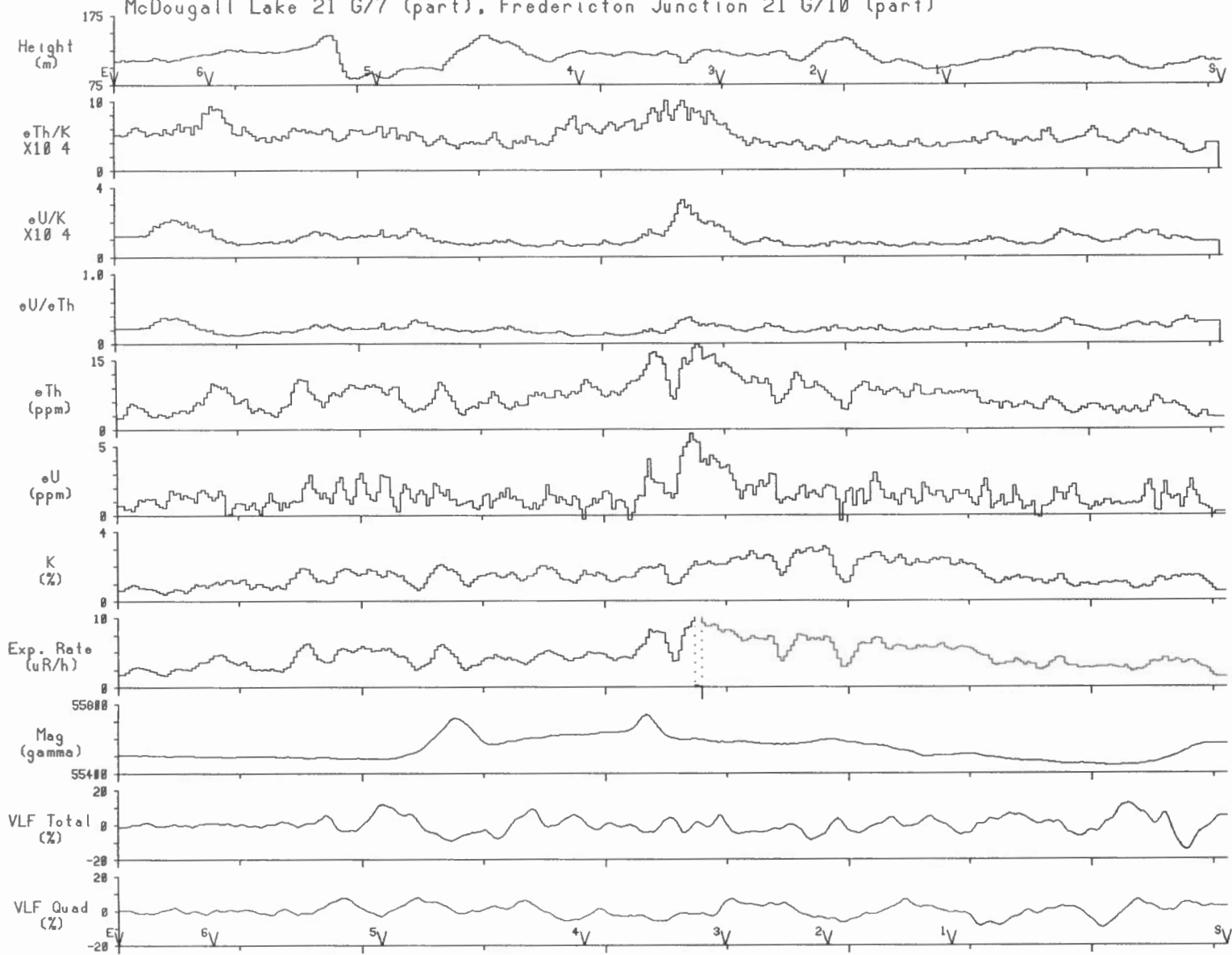


Line 31

2 km

Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)

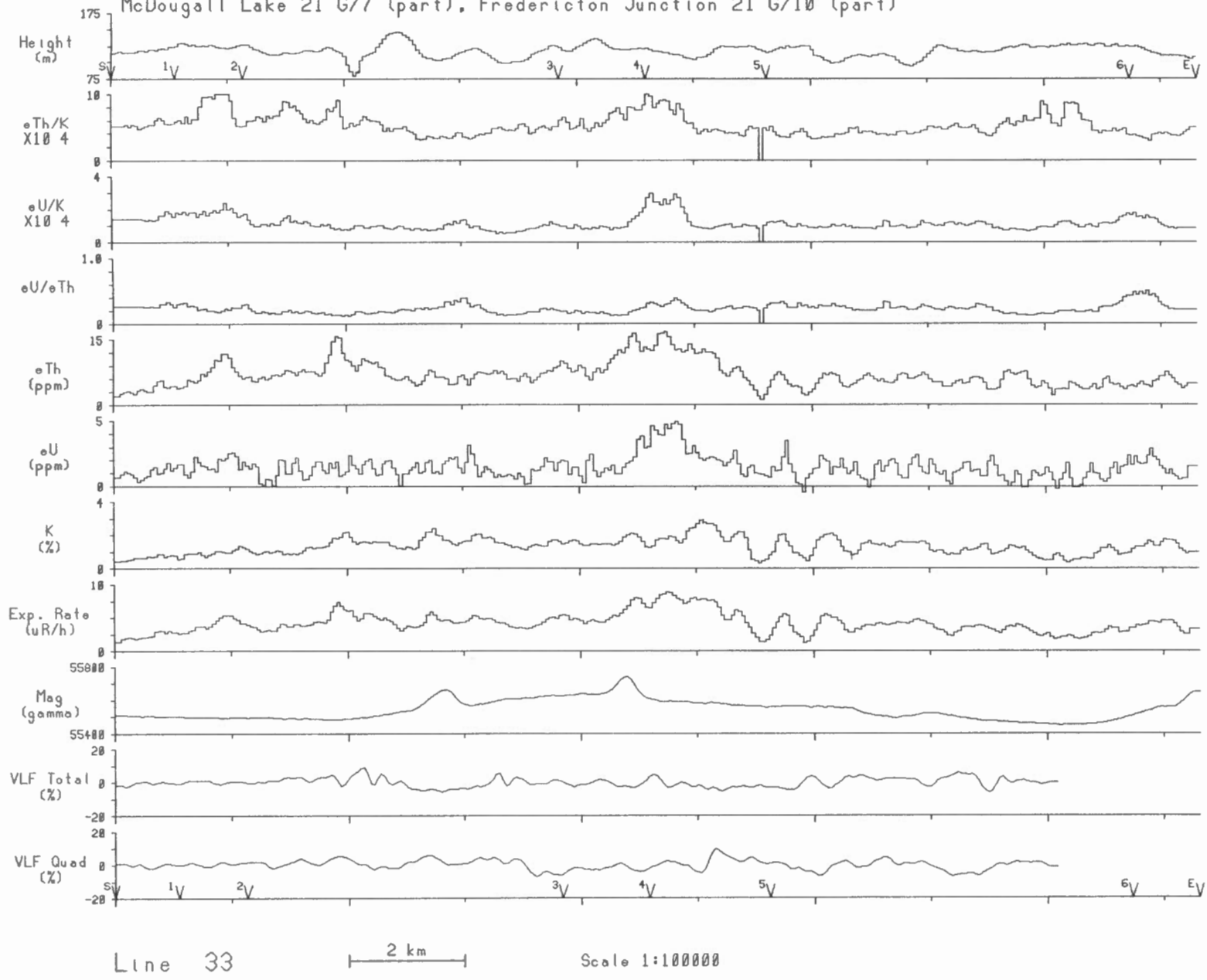


Line 32

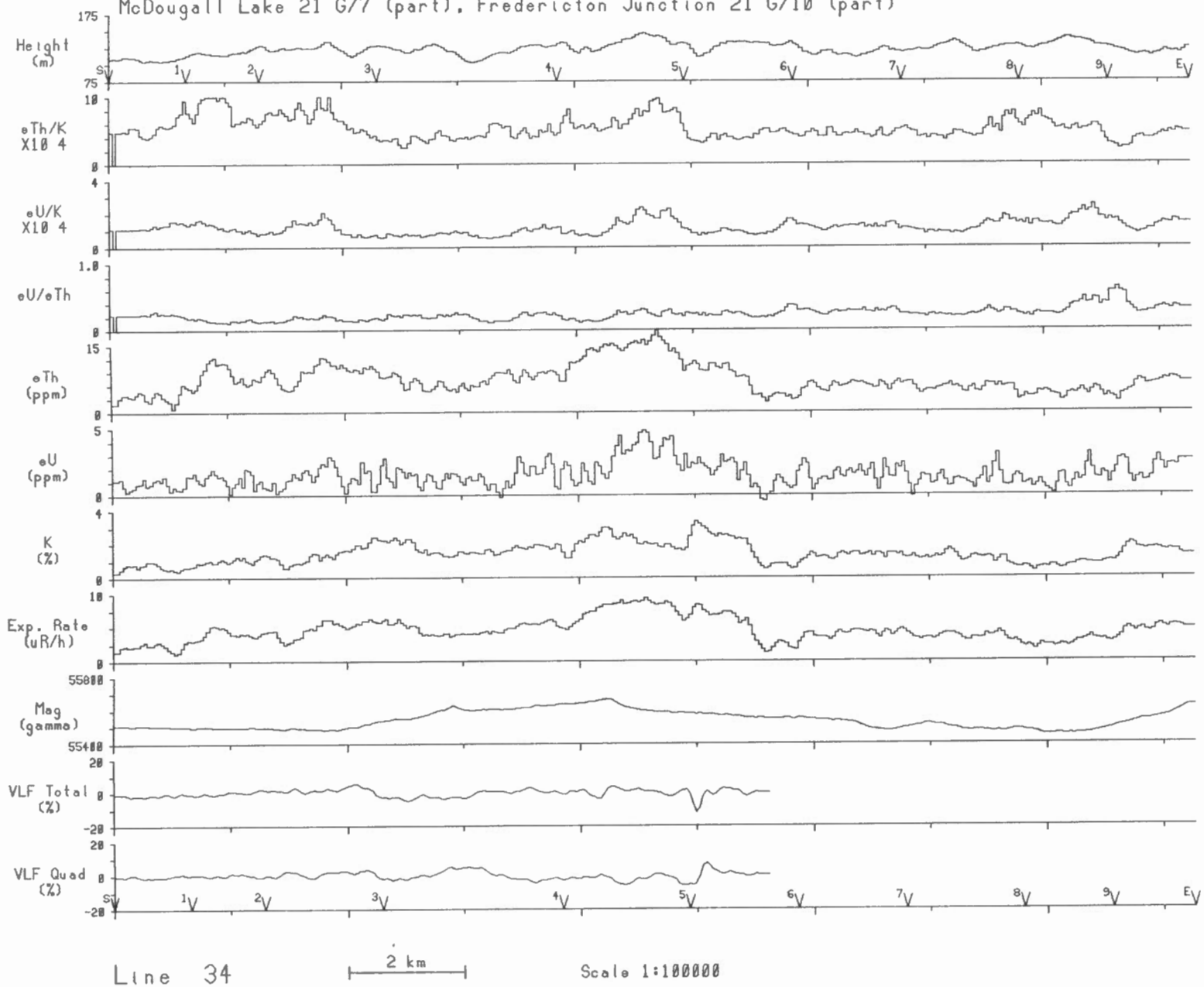
2 km

Scale 1:100000

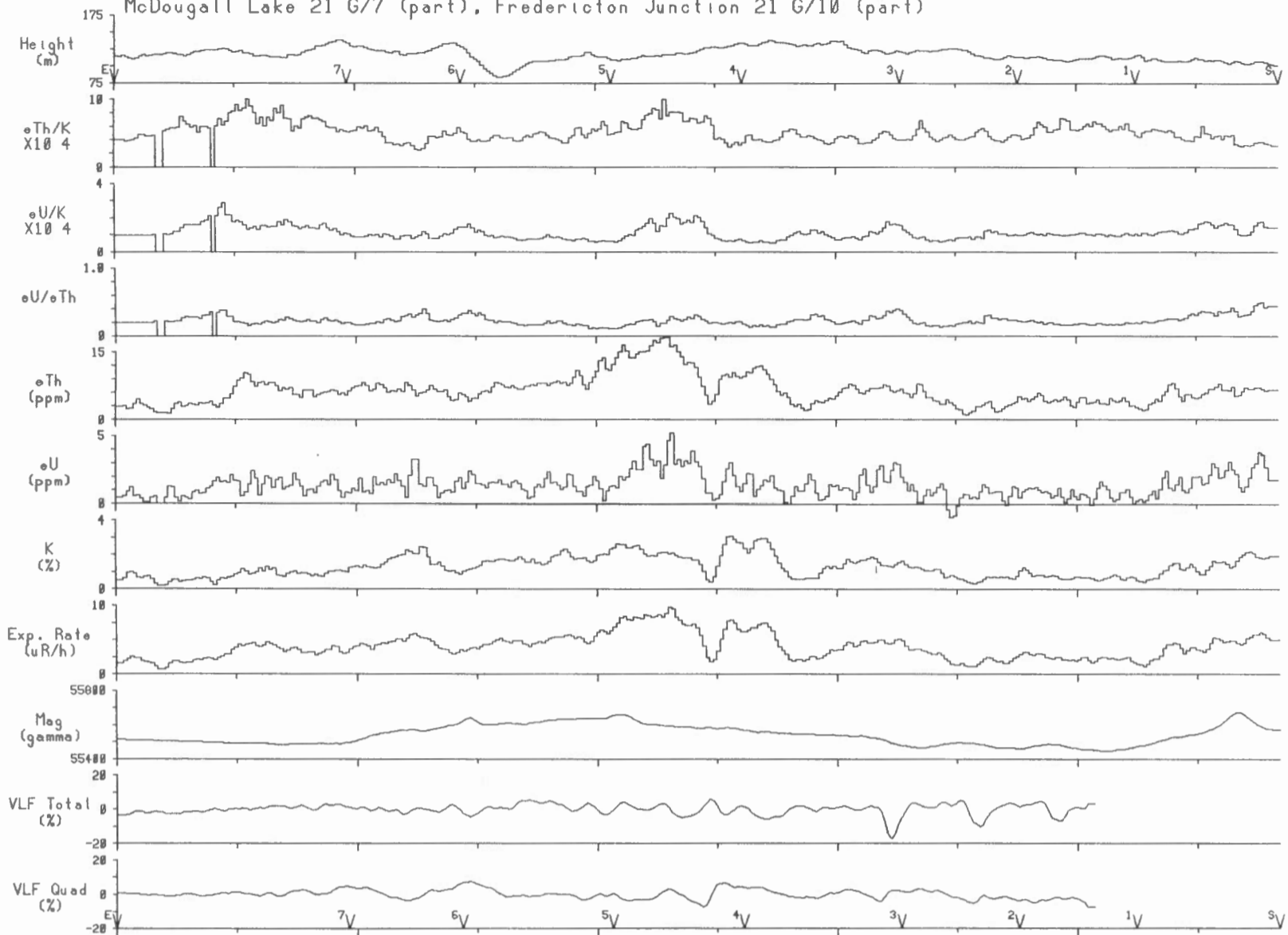
Mount Pleasant Caldera Survey, 1988 (250m line spacing)
McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



Mount Pleasant Caldera Survey, 1988 (250m line spacing)
McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)

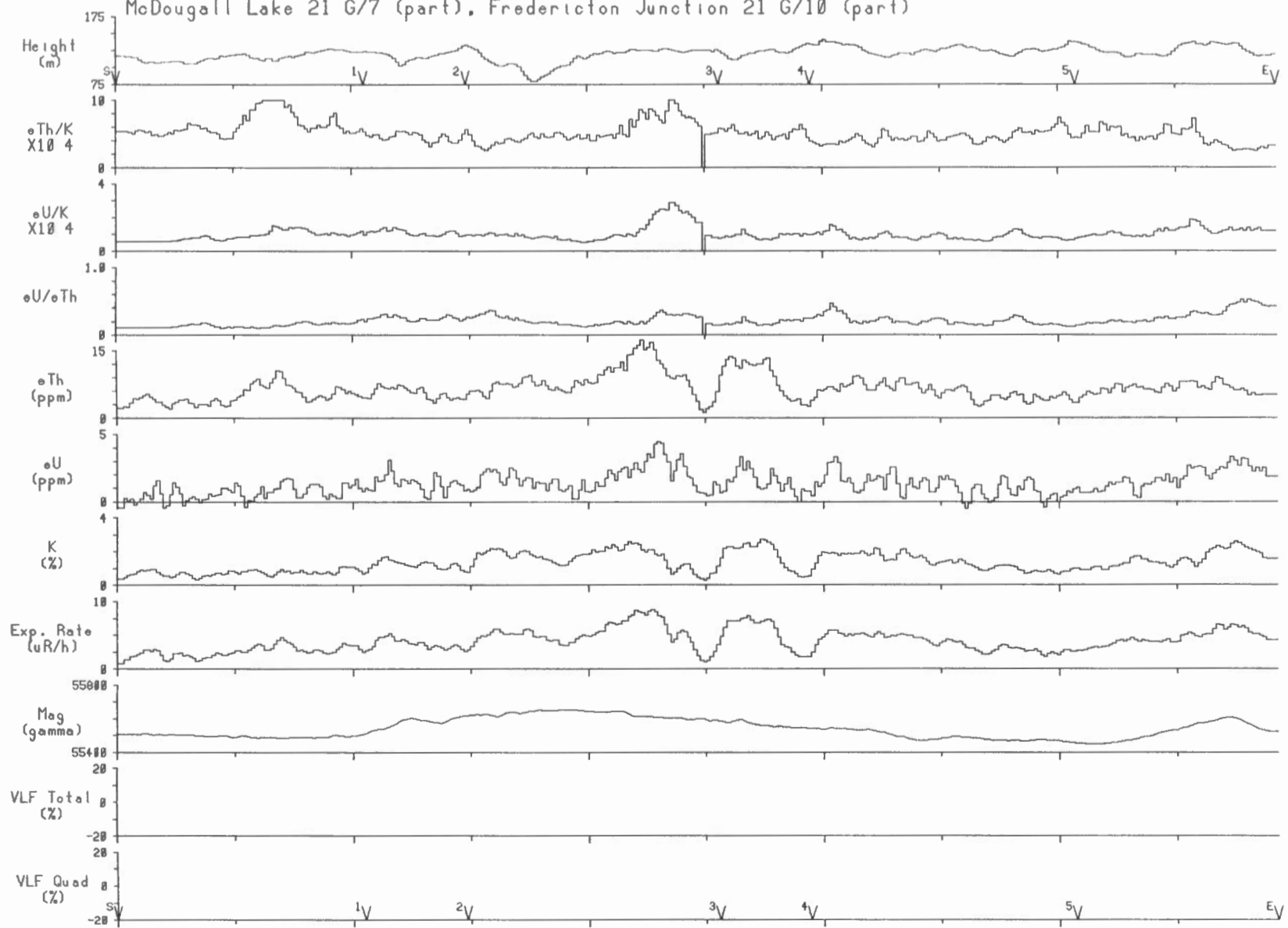


Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



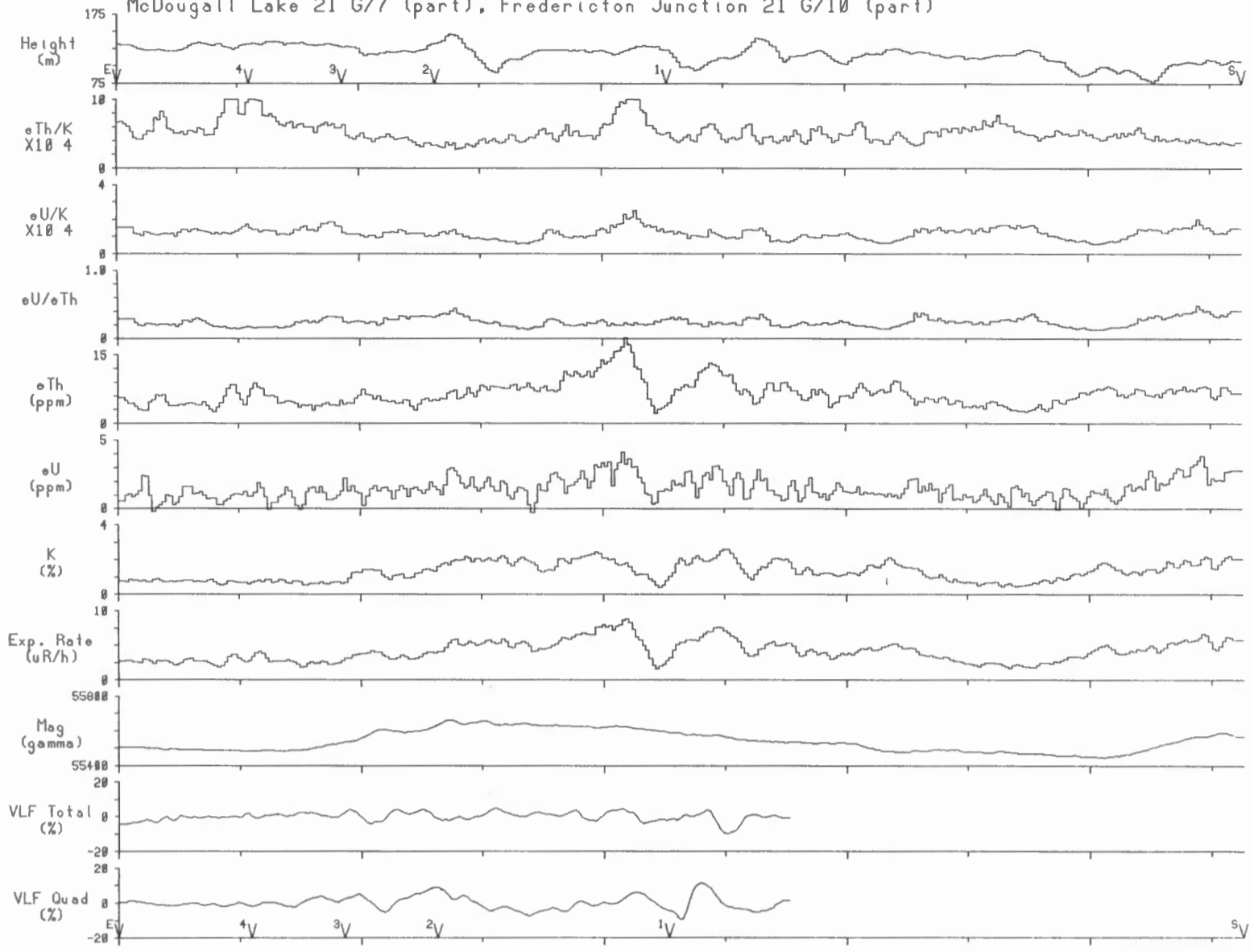
Line 35 2 km Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



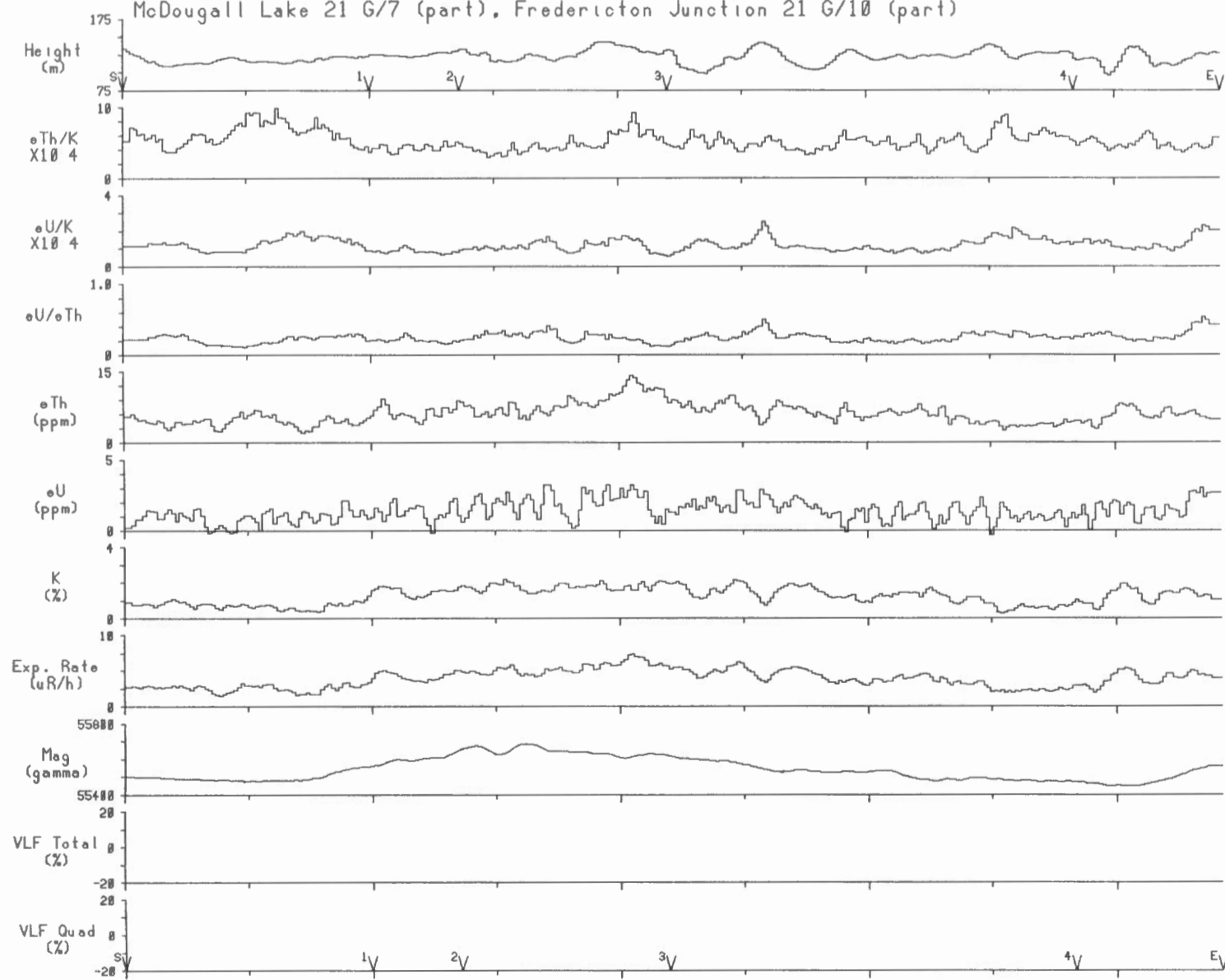
Line 36 2 km Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



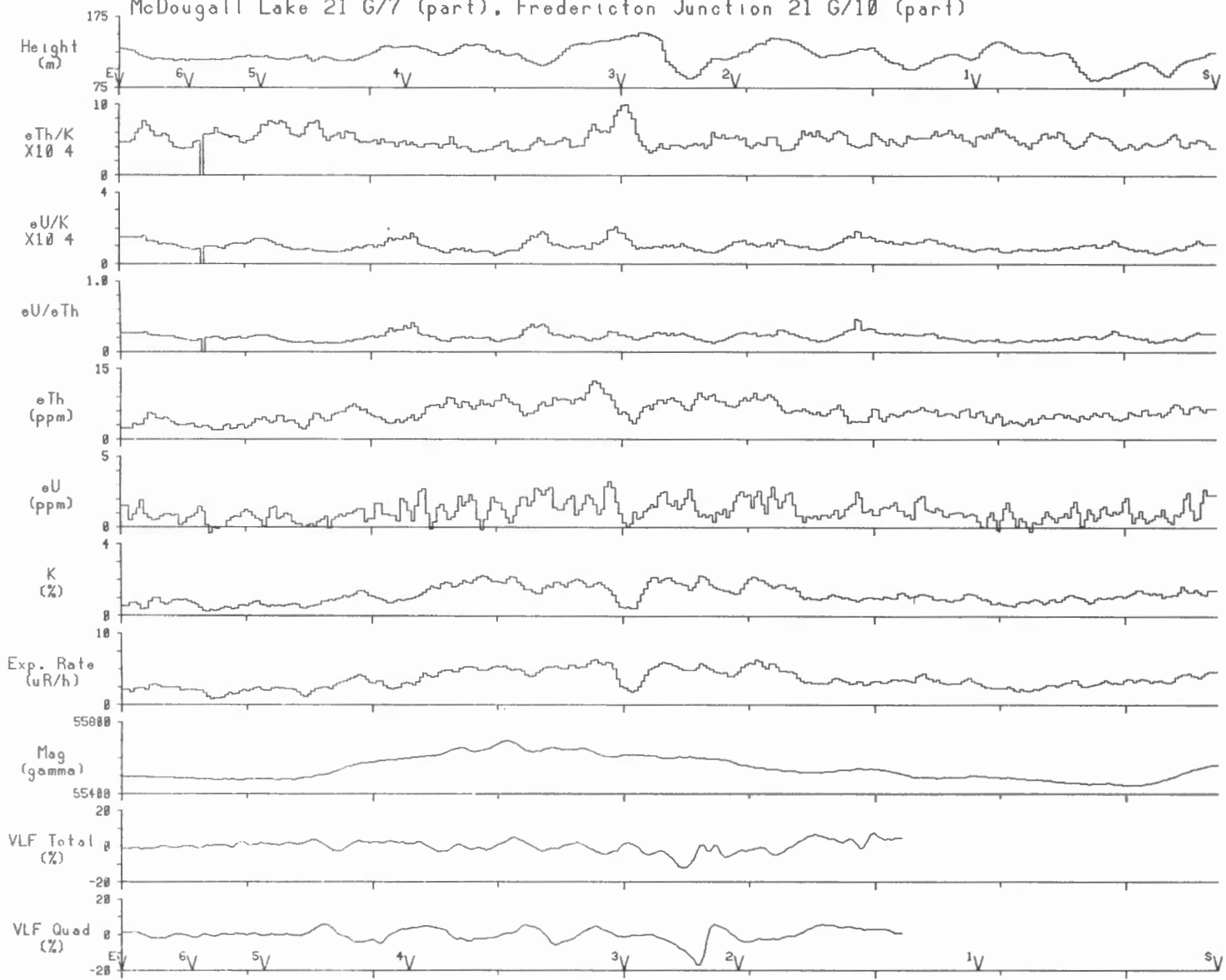
Line 37 2 km Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



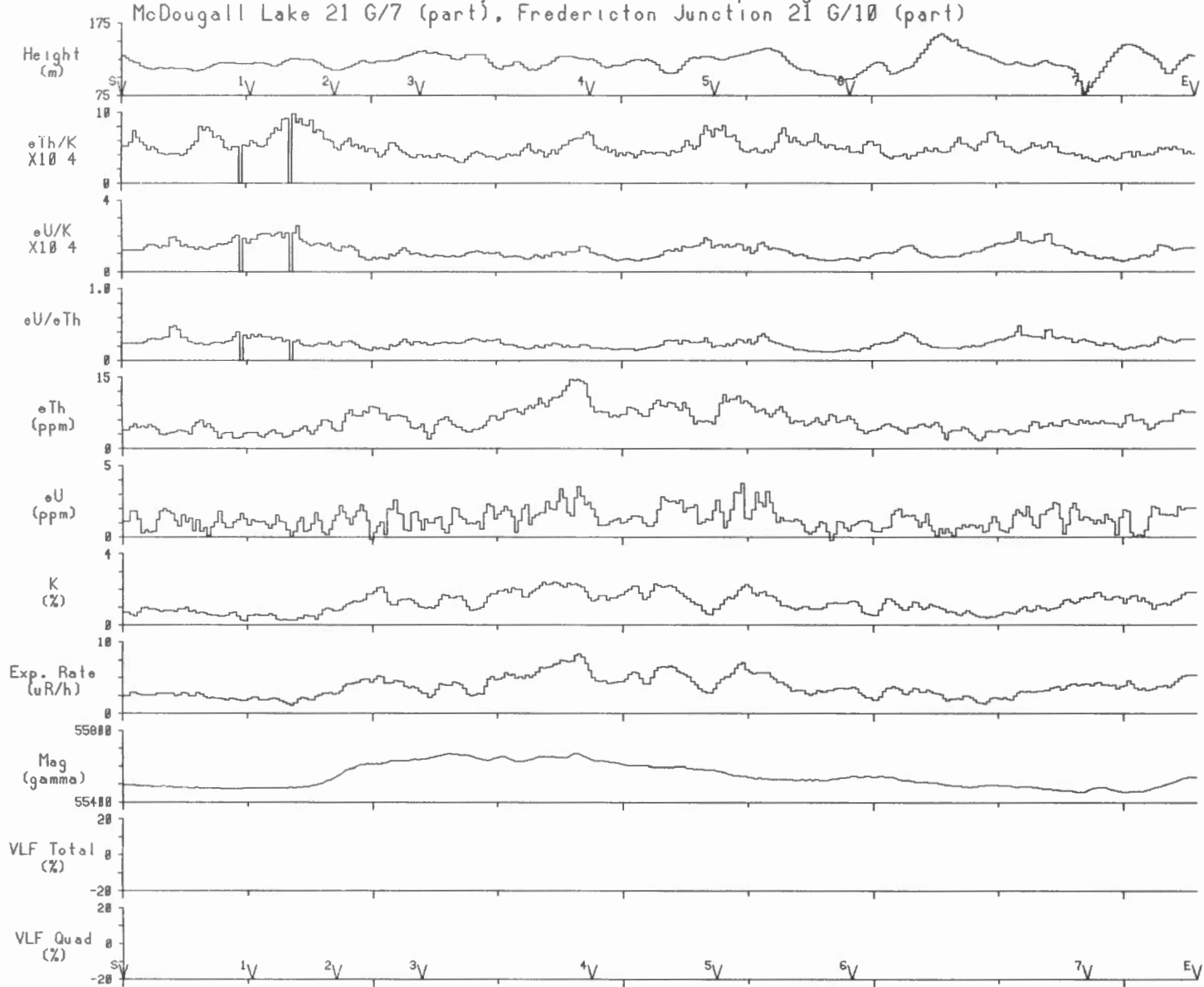
Line 38 2 km Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



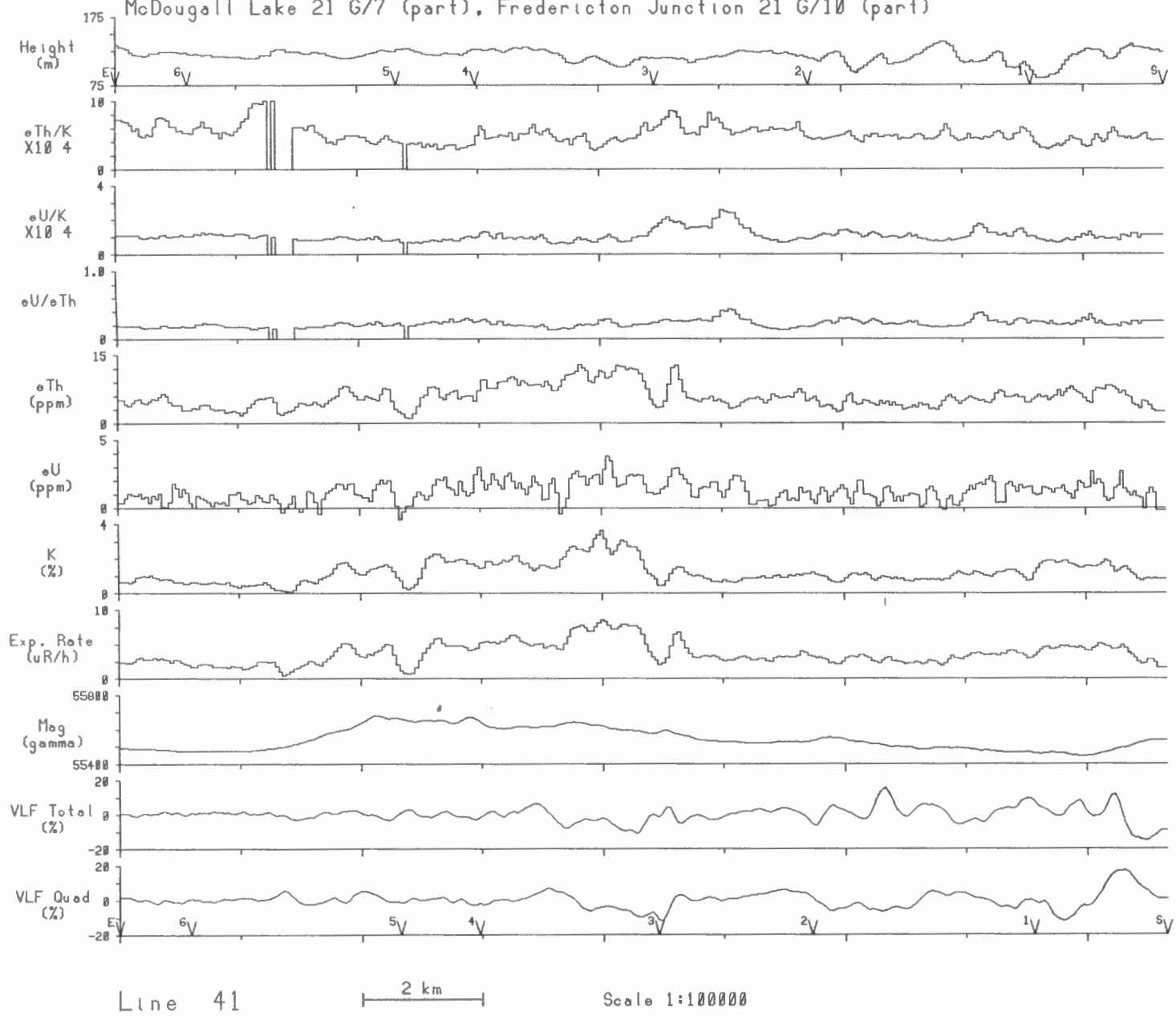
Line 39 2 km Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)

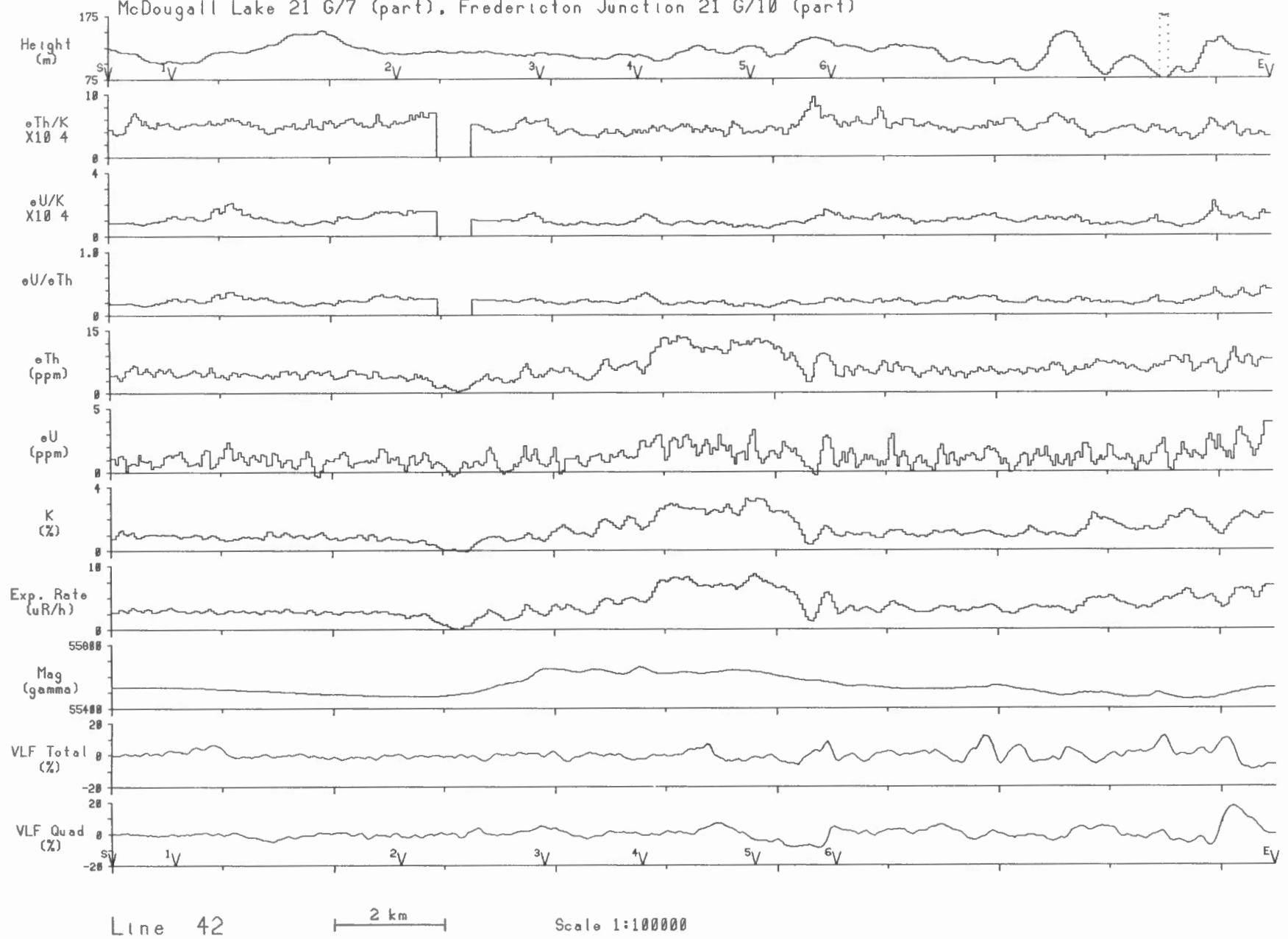


Line 40 2 km Scale 1:100000

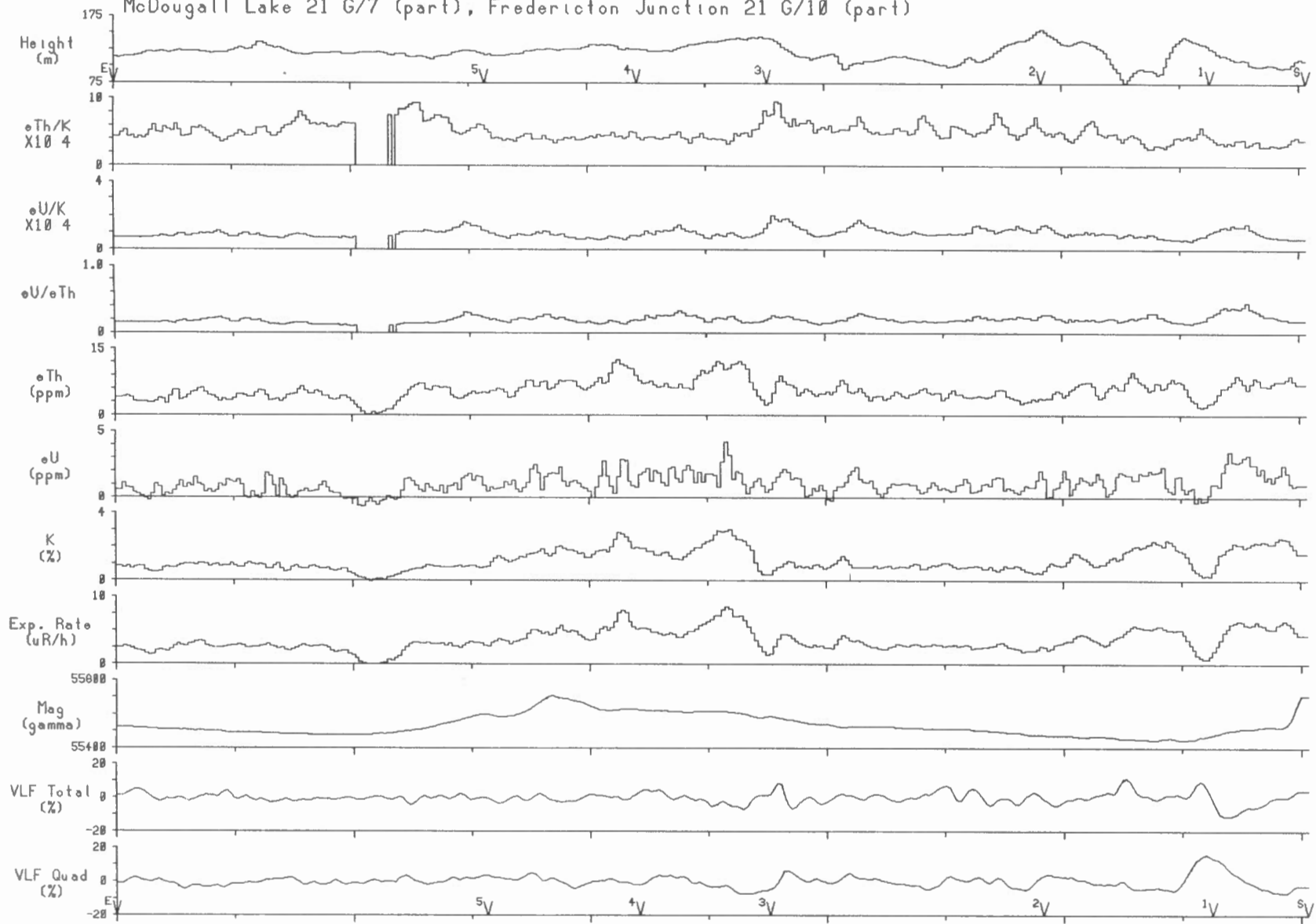
Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)

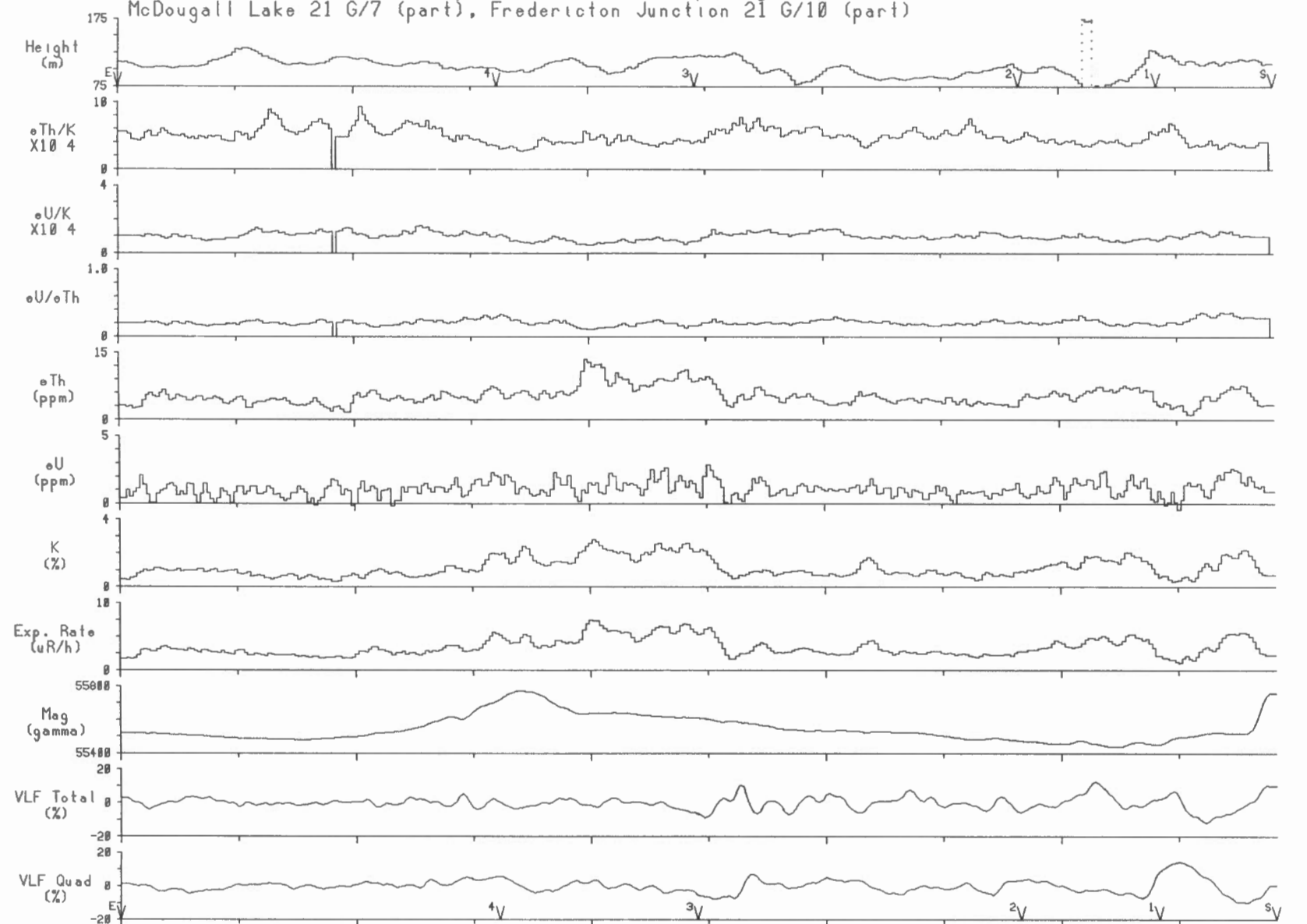


Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



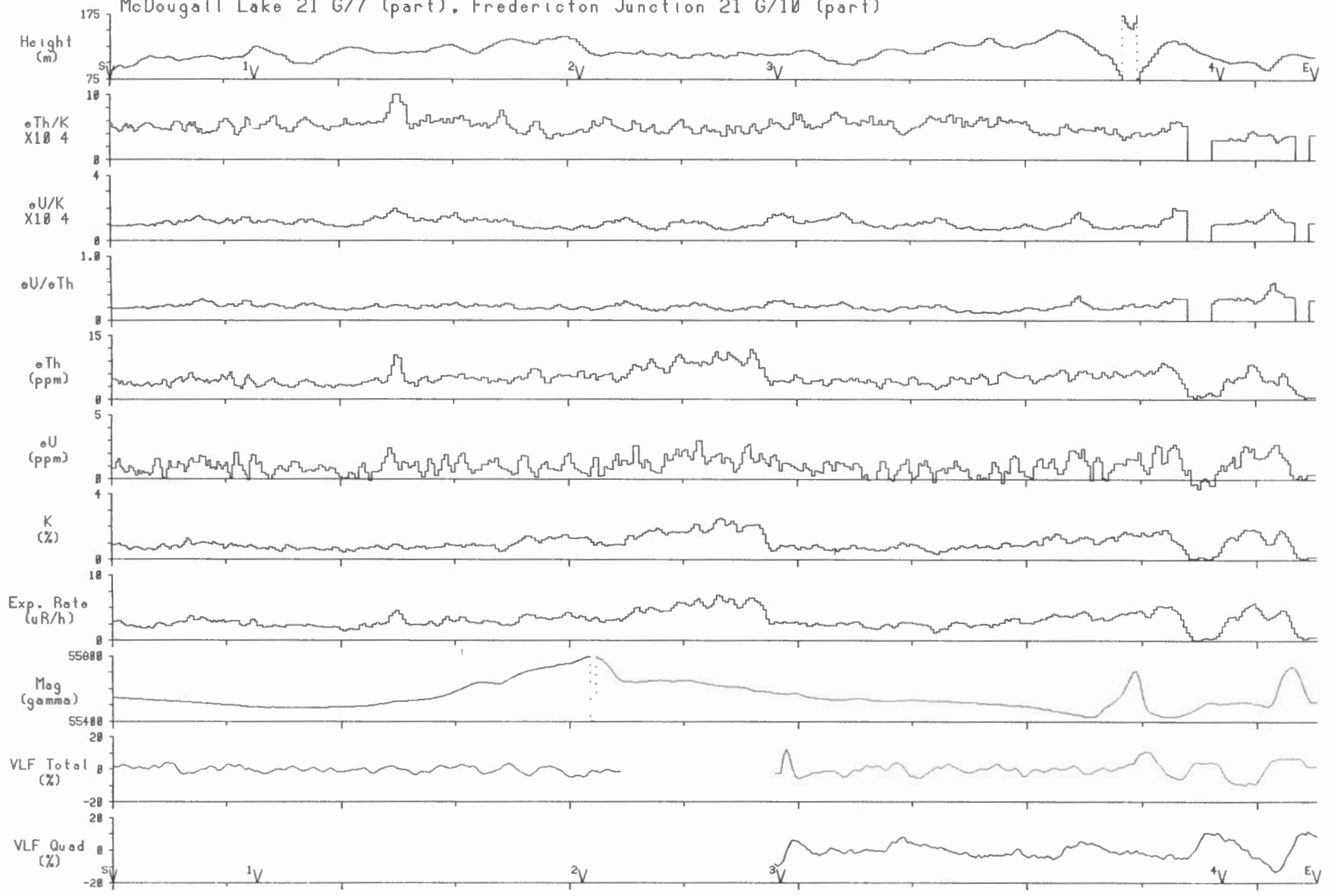
Line 43 2 km Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



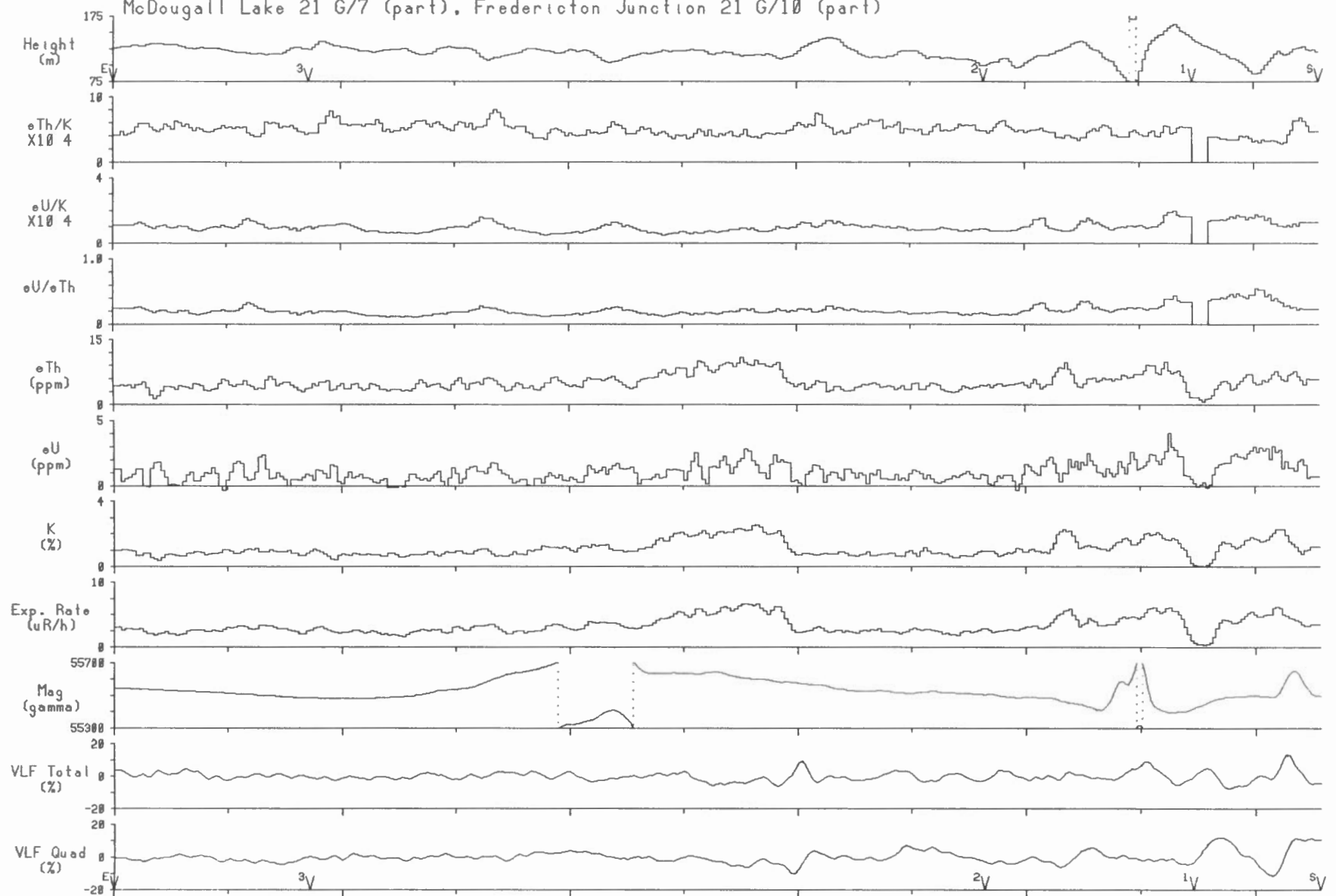
Line 44 2 km Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



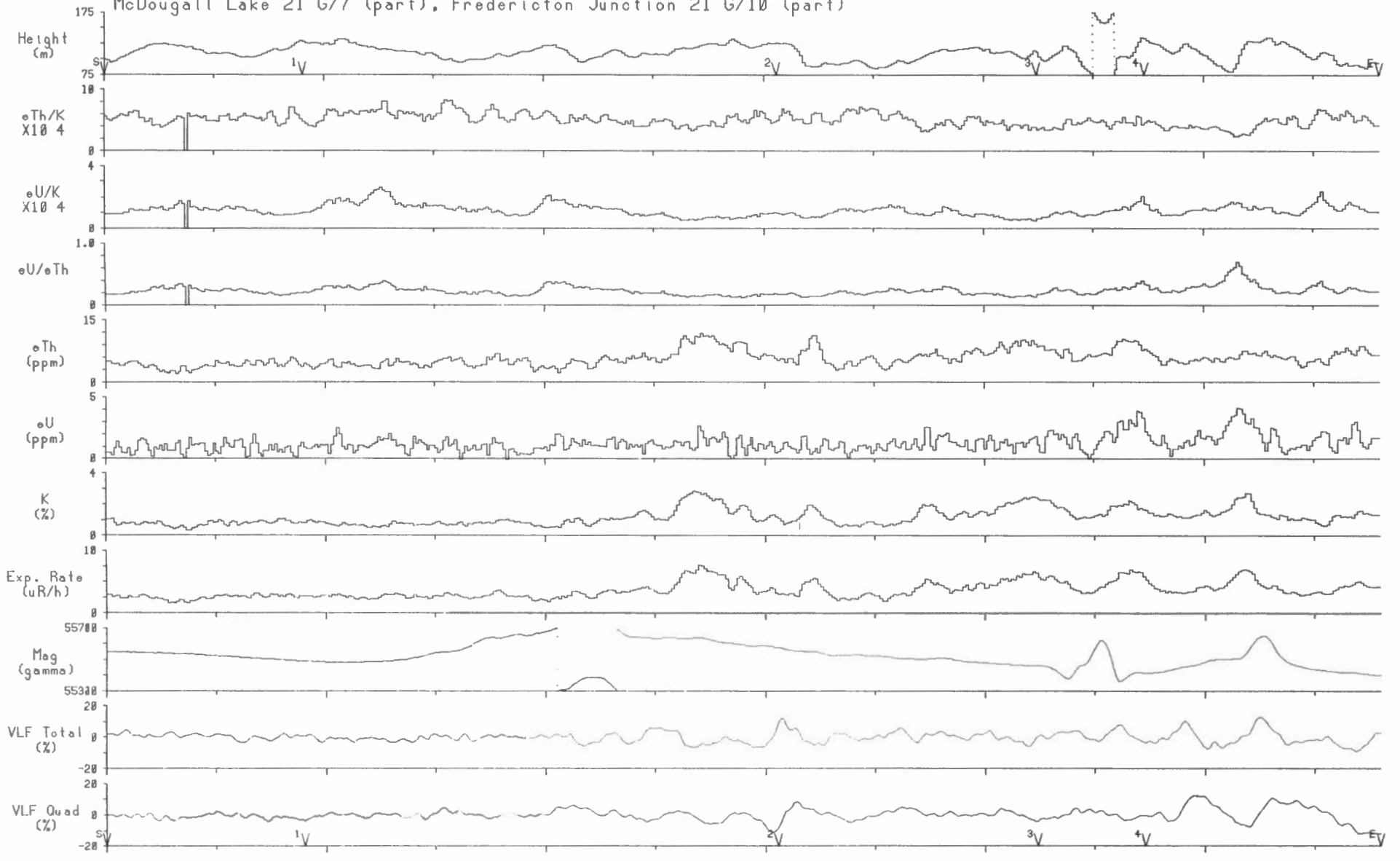
Line 45 2 km Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



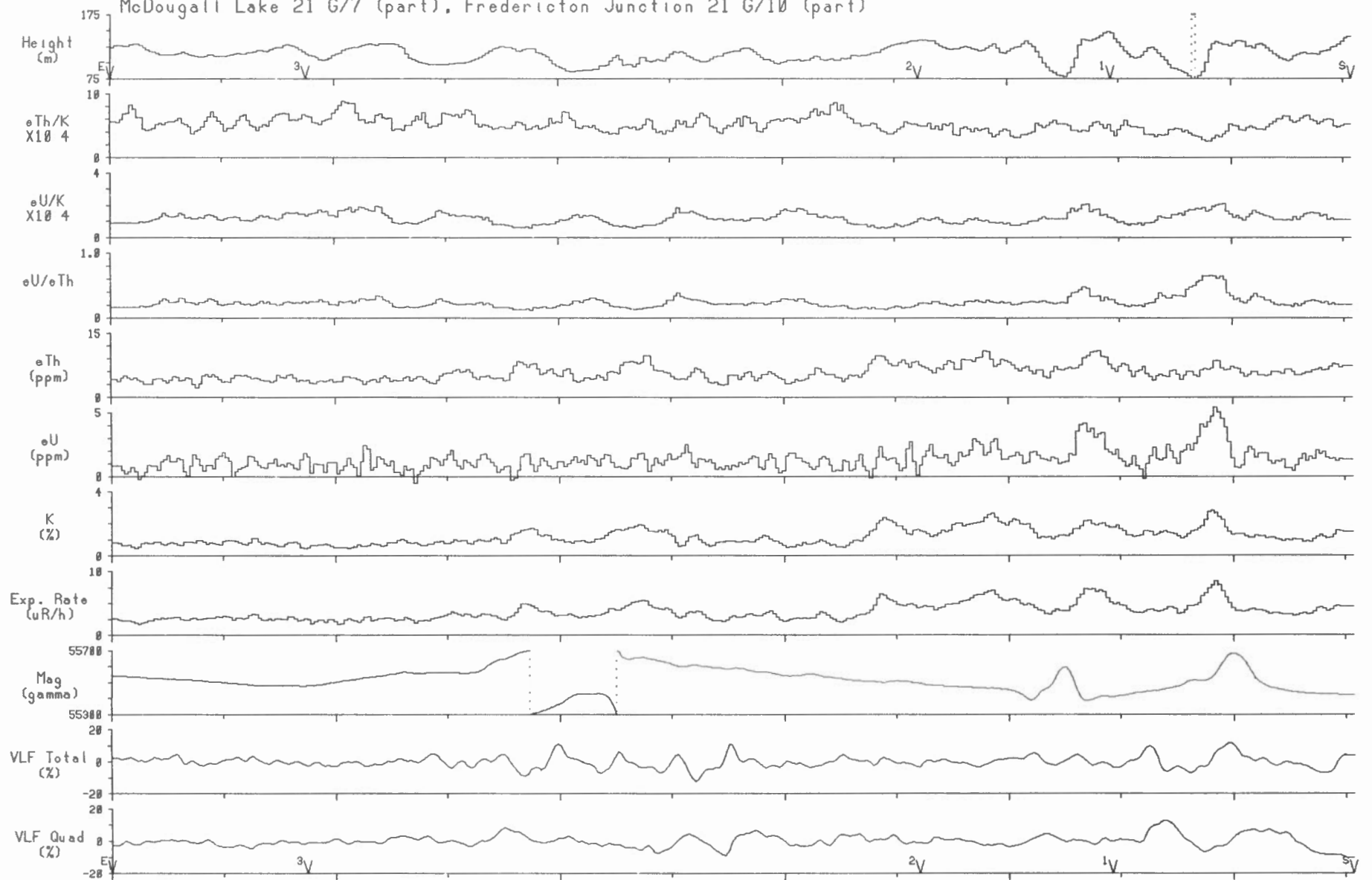
Line 46 2 km Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



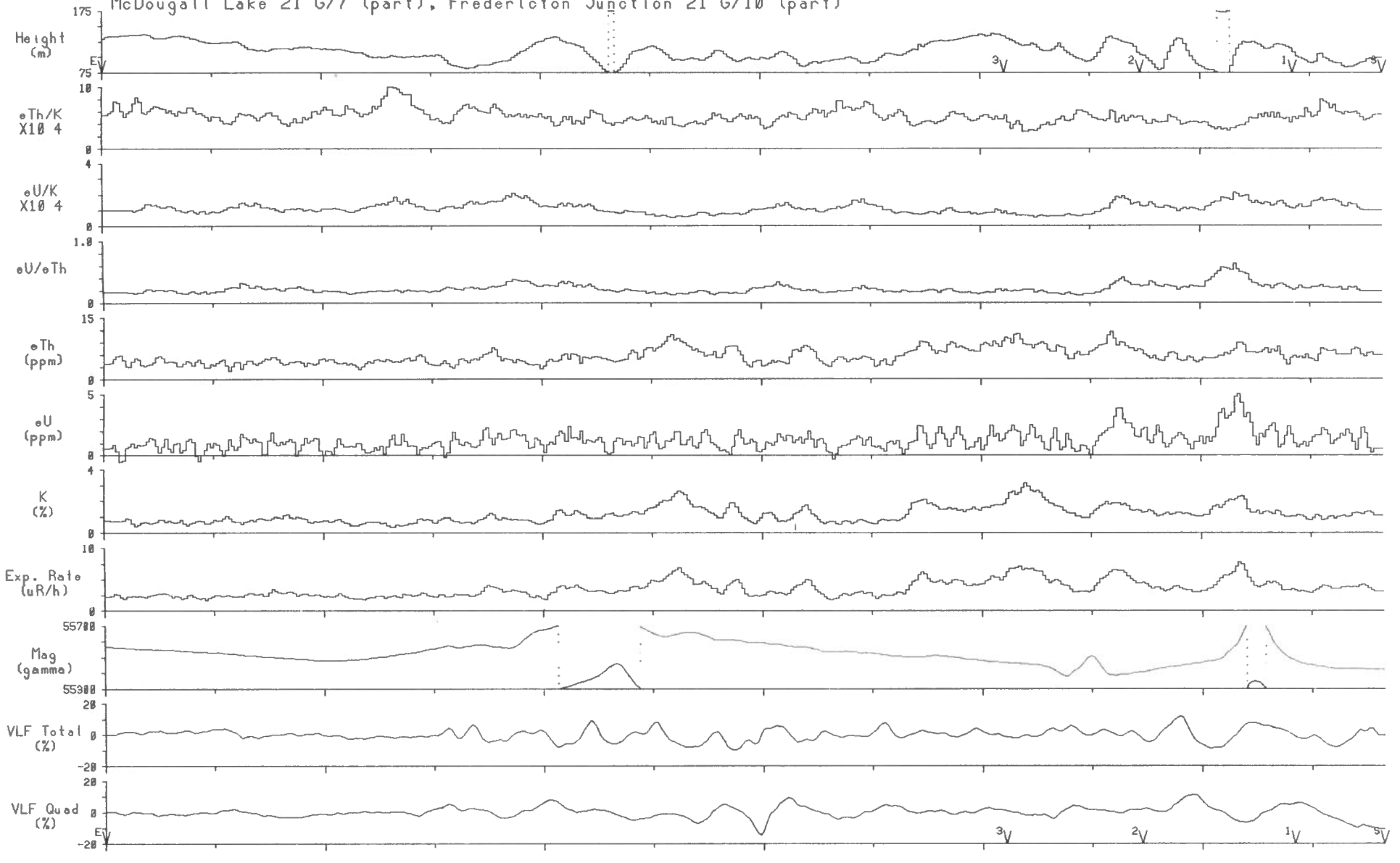
Line 47 2 km Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



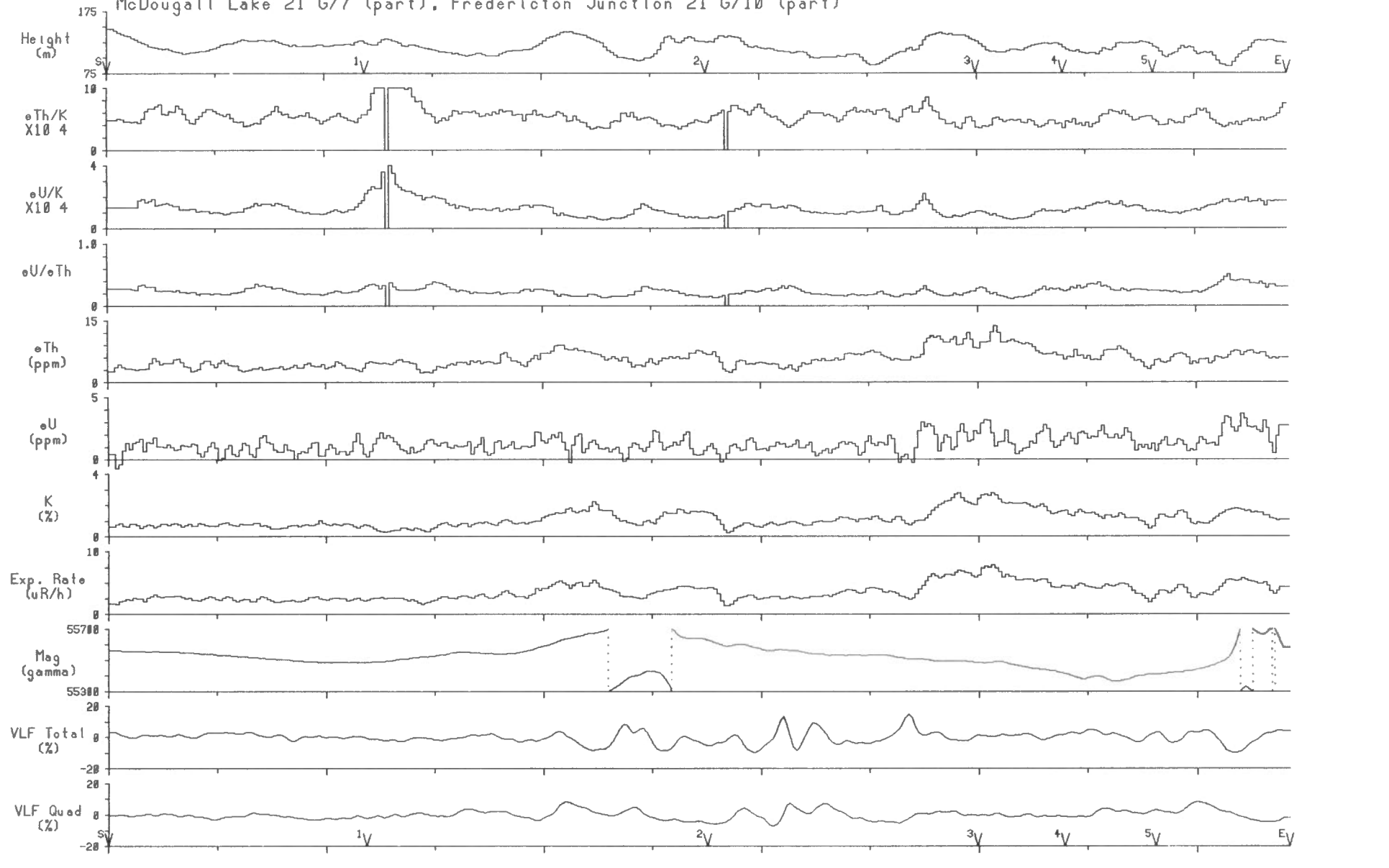
Line 48 2 km Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



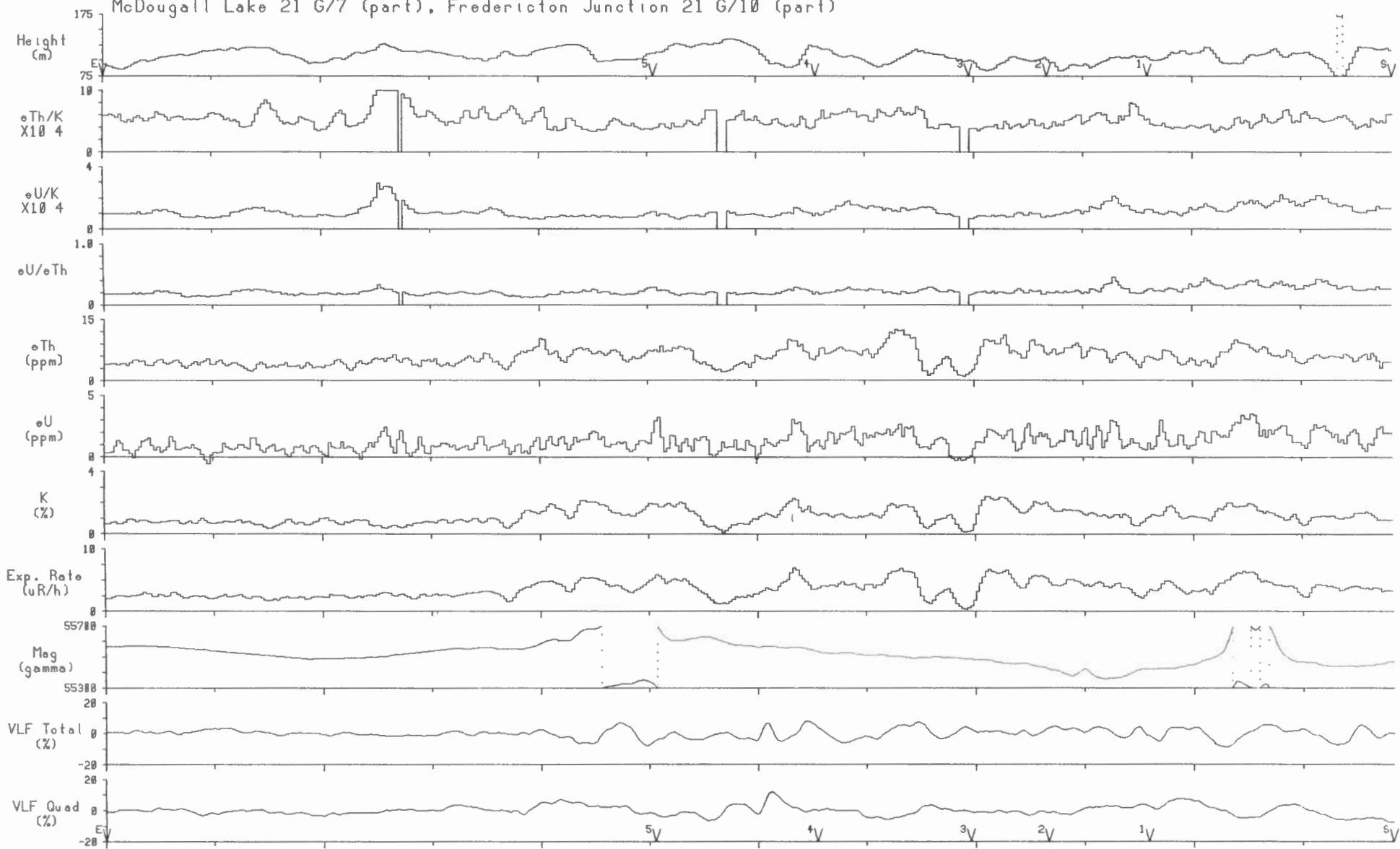
Line 49 2 km Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



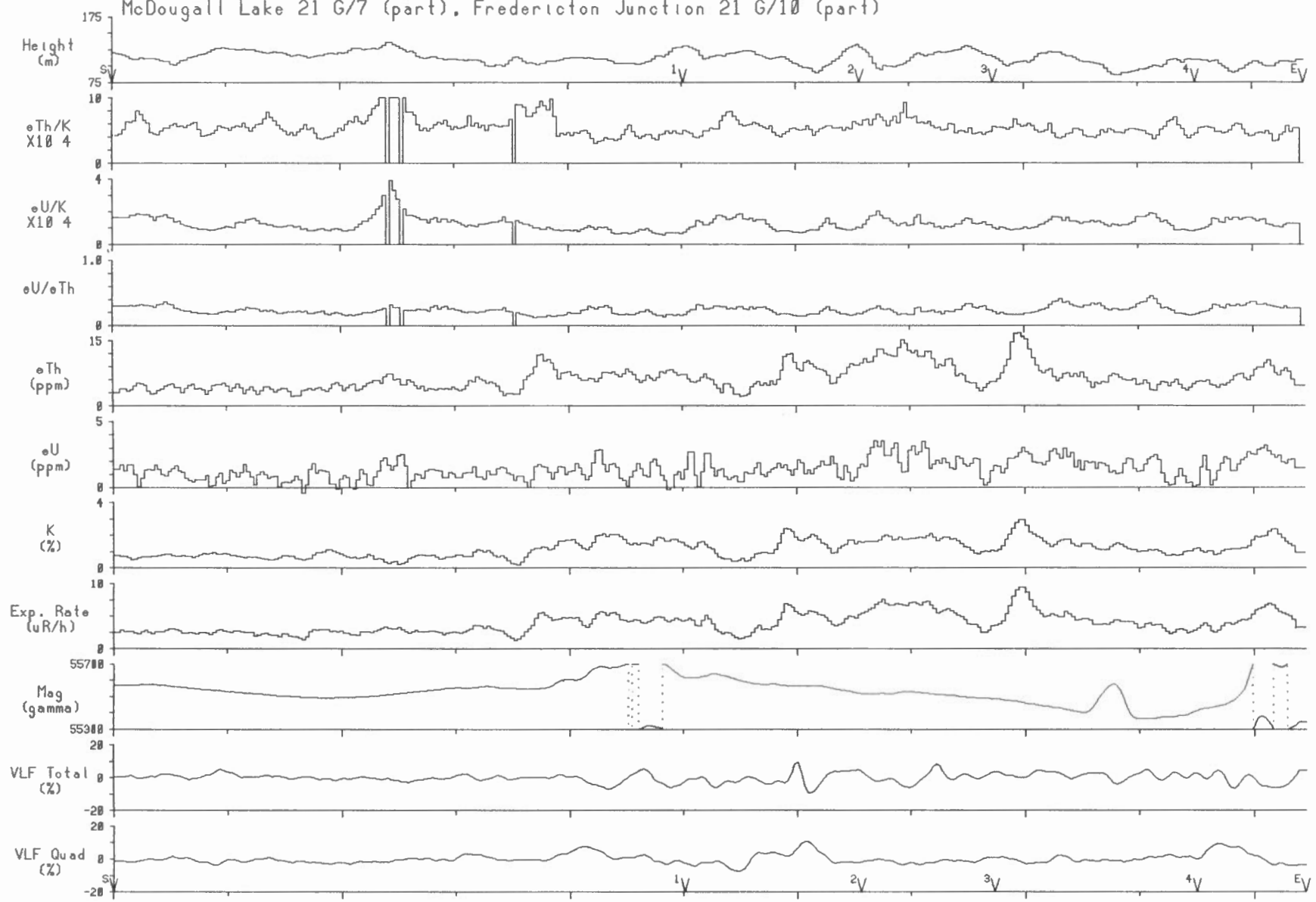
Line 50 2 km Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



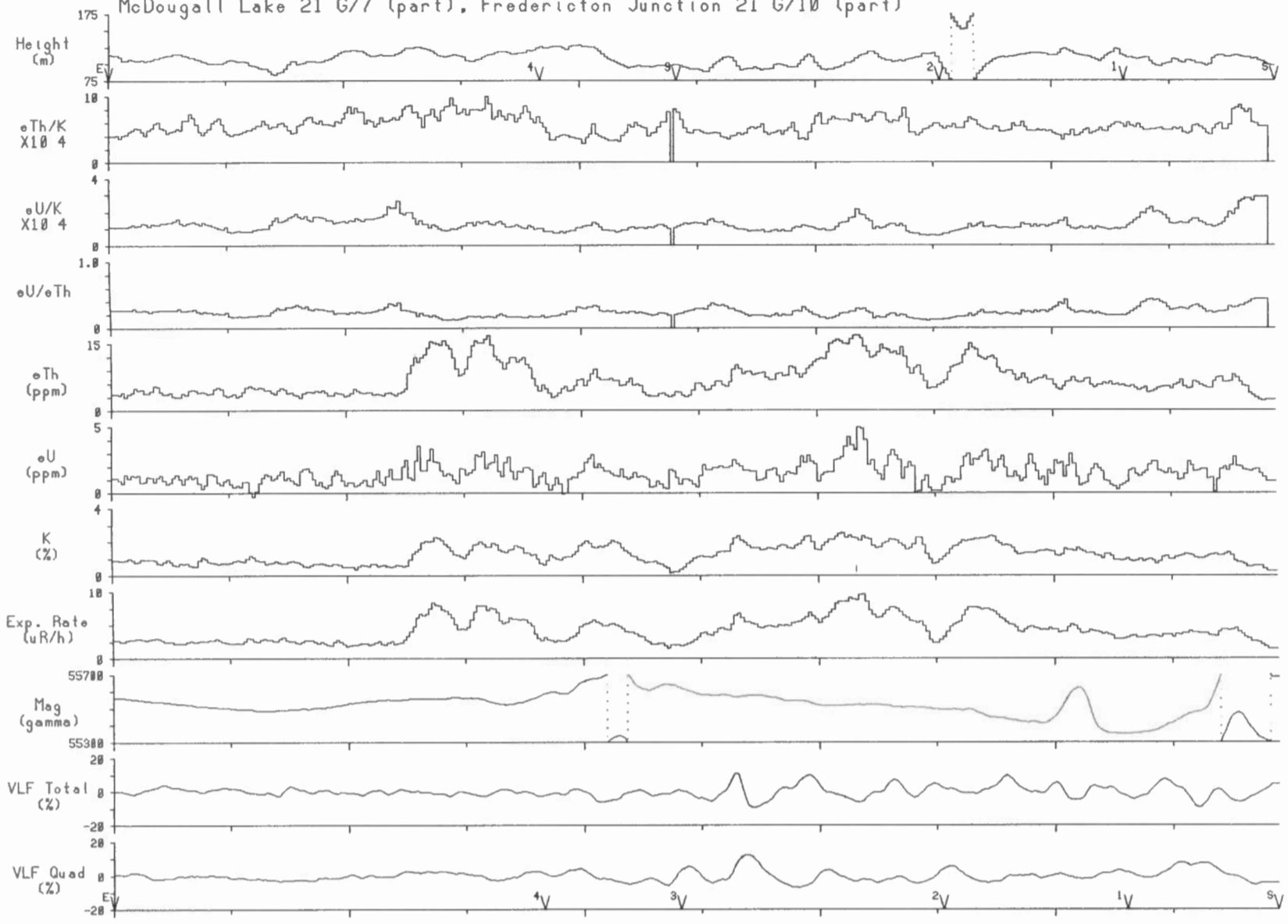
Line 51 2 km Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



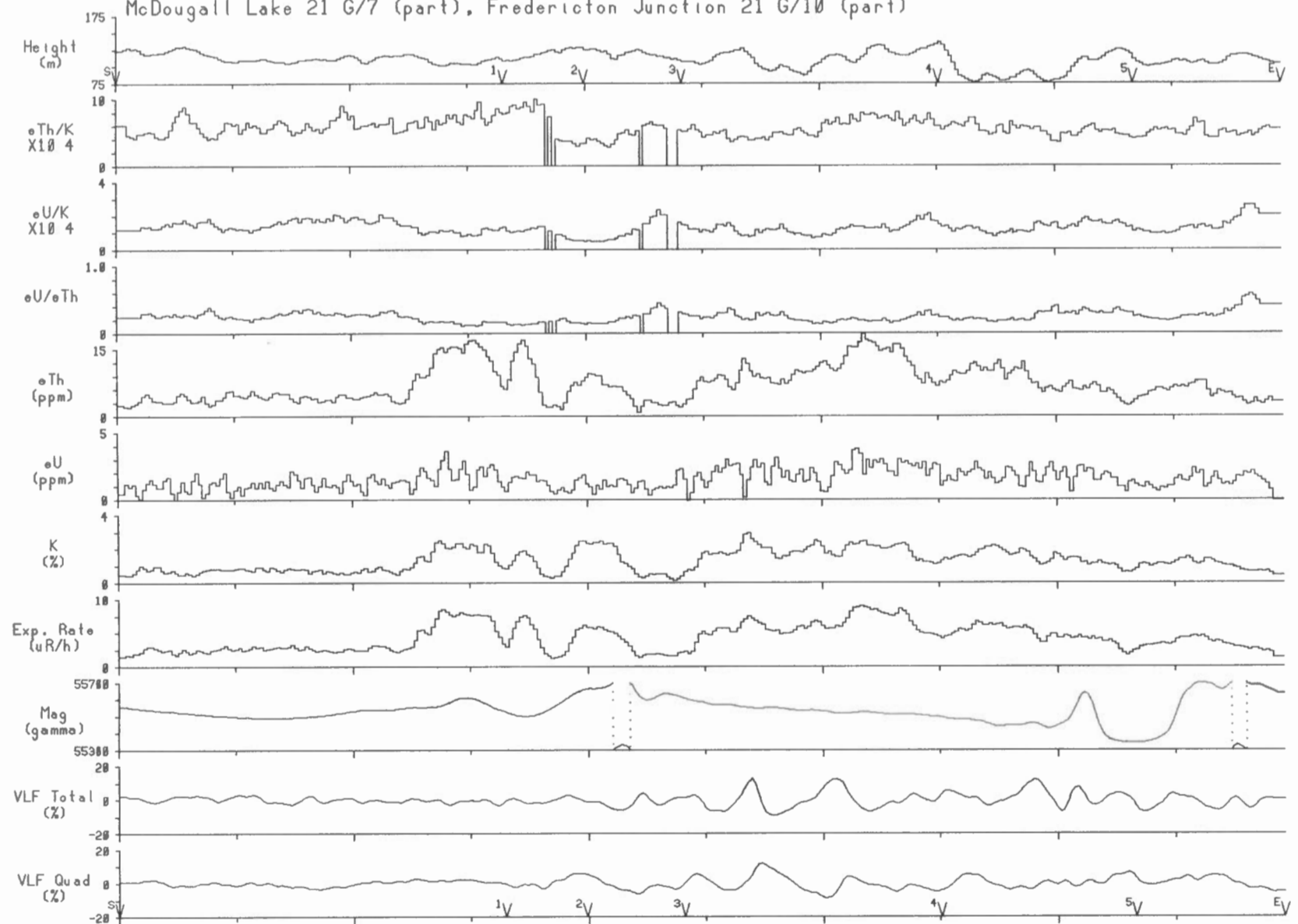
Line 52 2 km Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



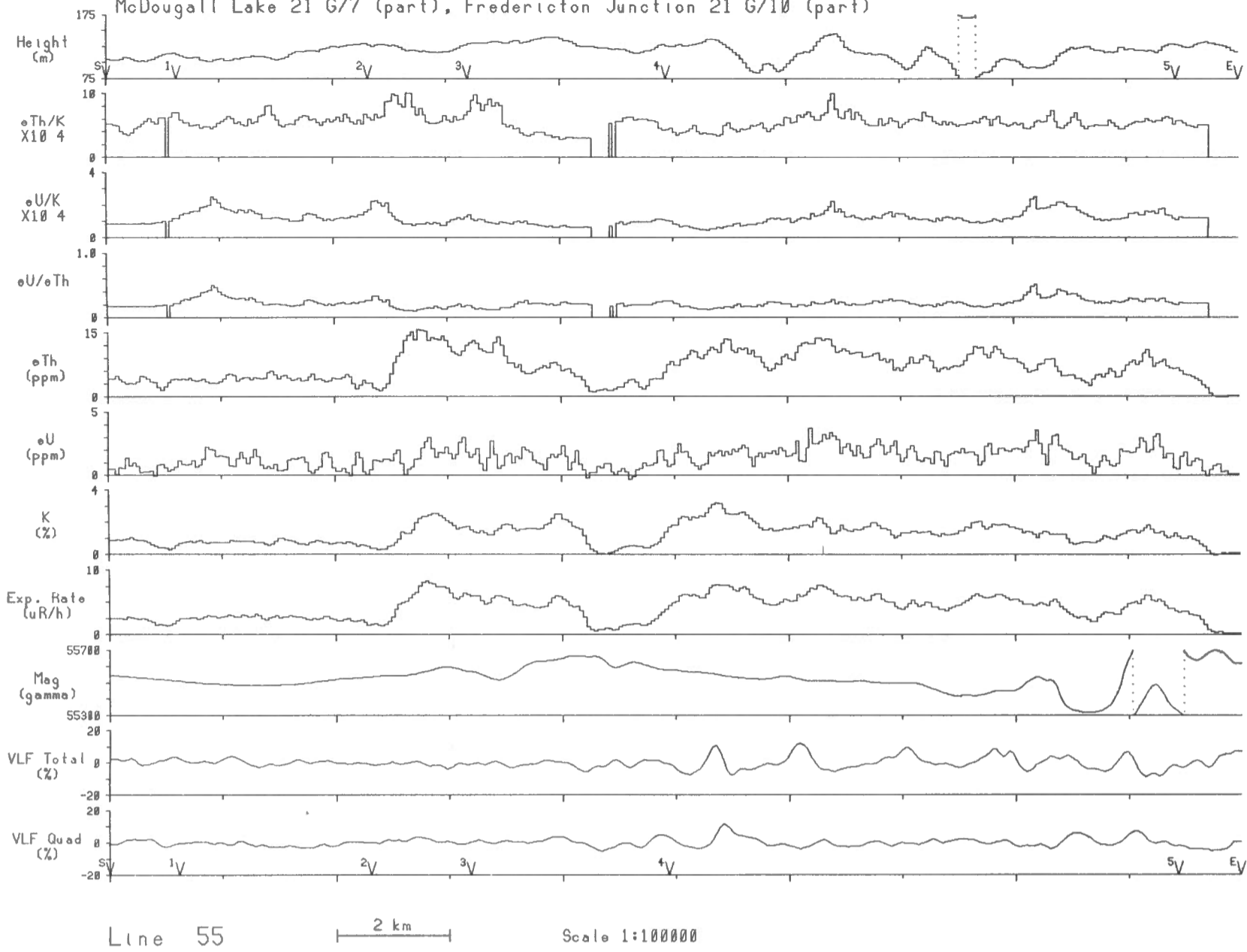
Line 53 2 km Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)

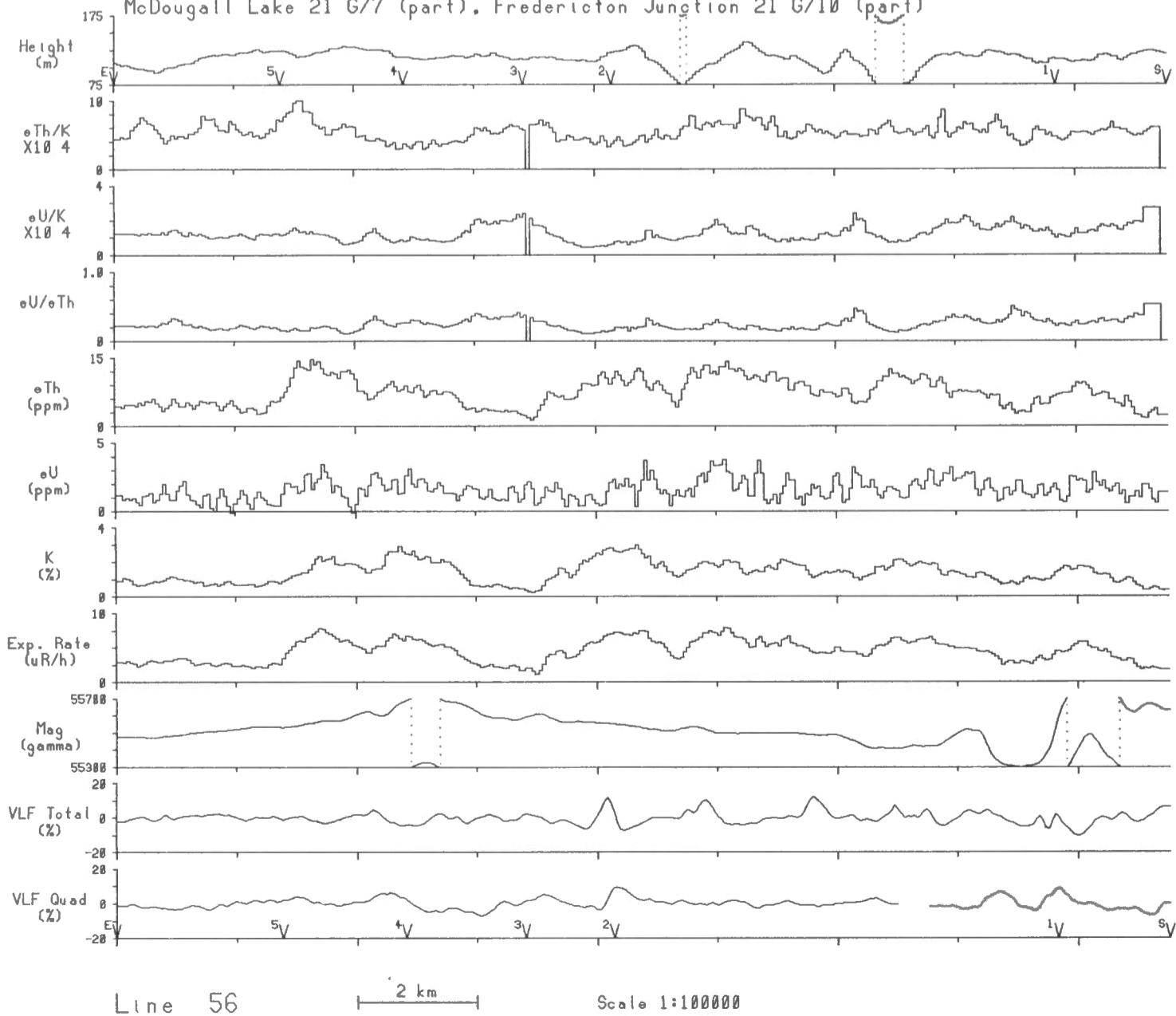


Line 54 2 km Scale 1:100000

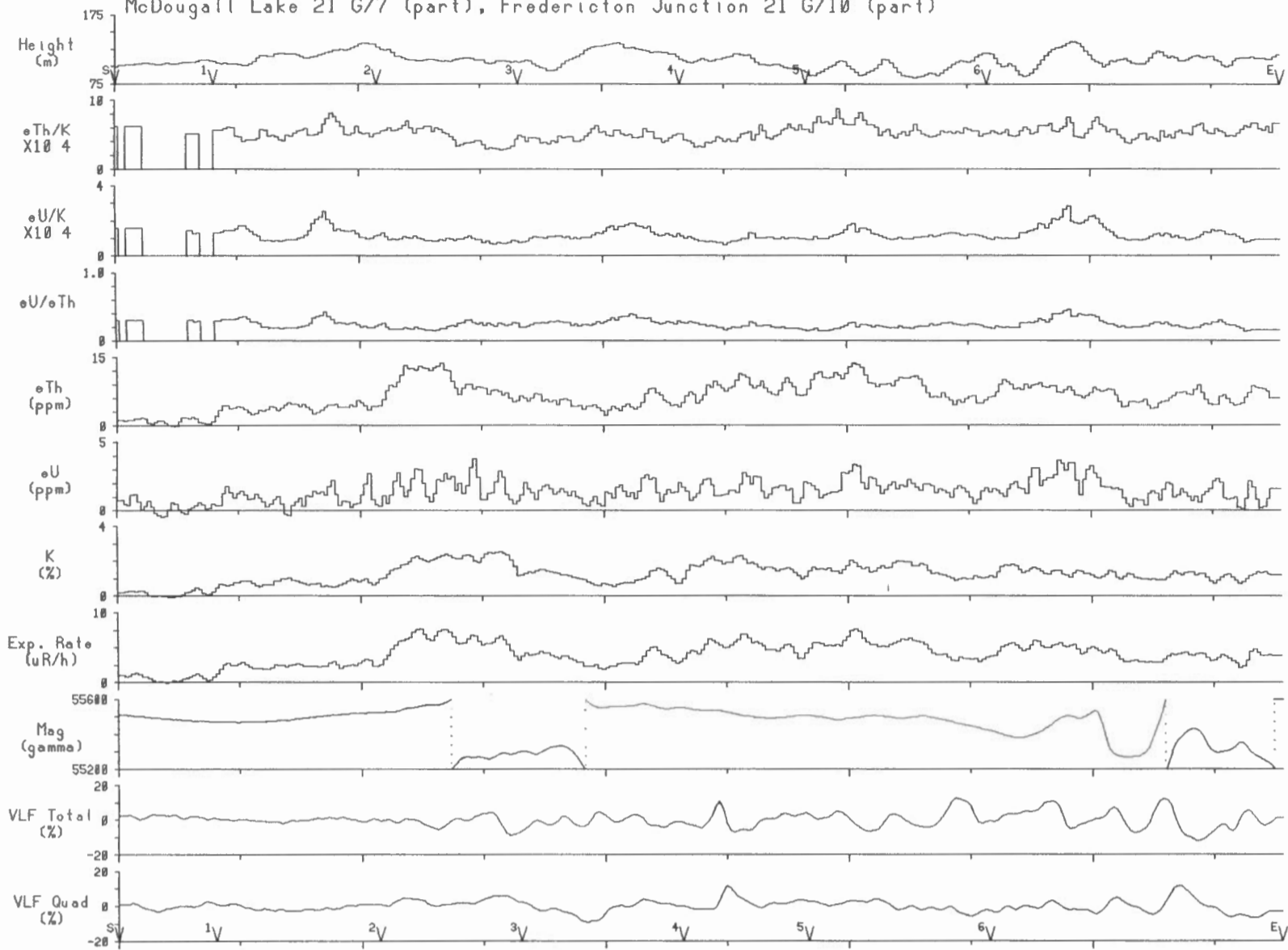
Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)

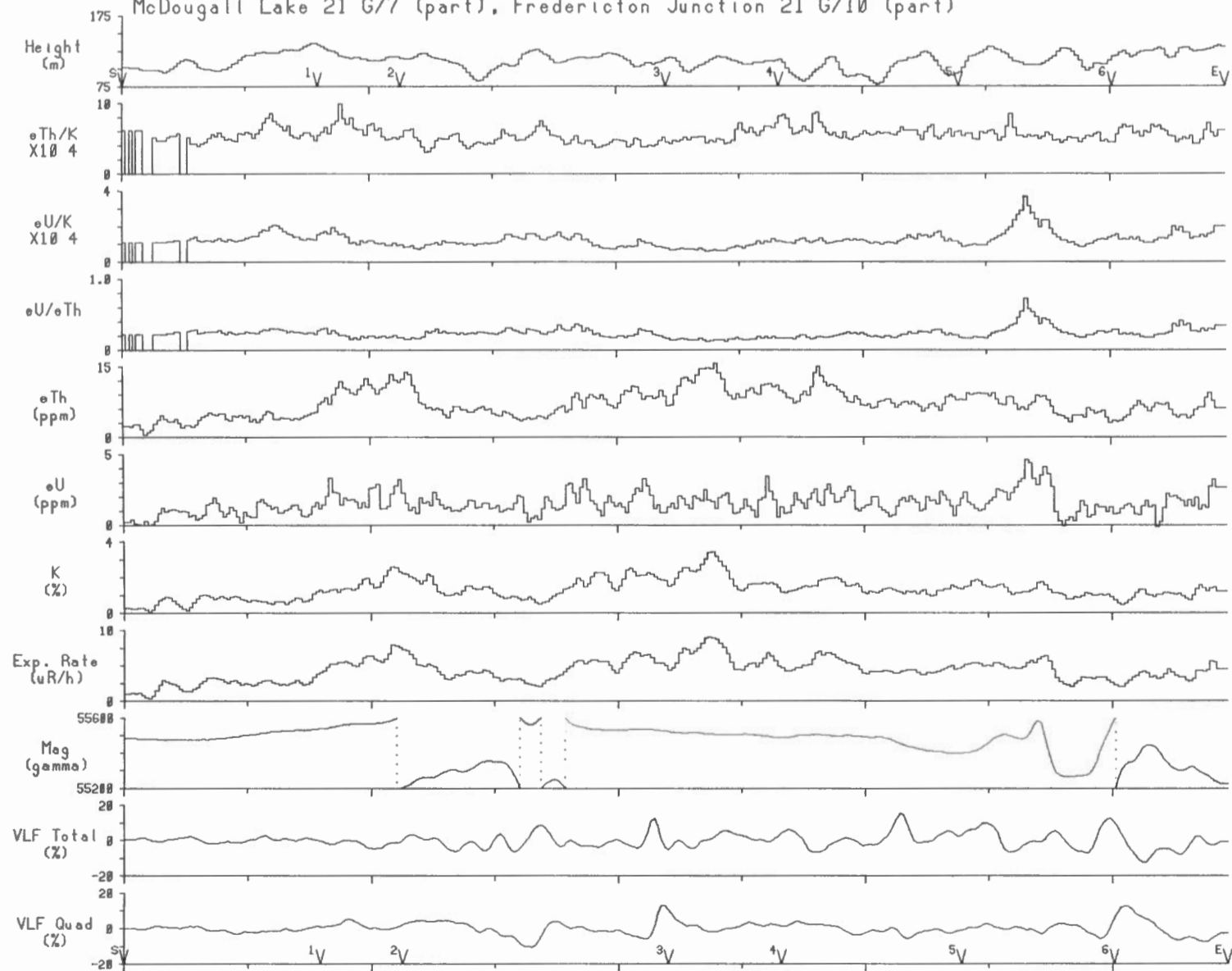


Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



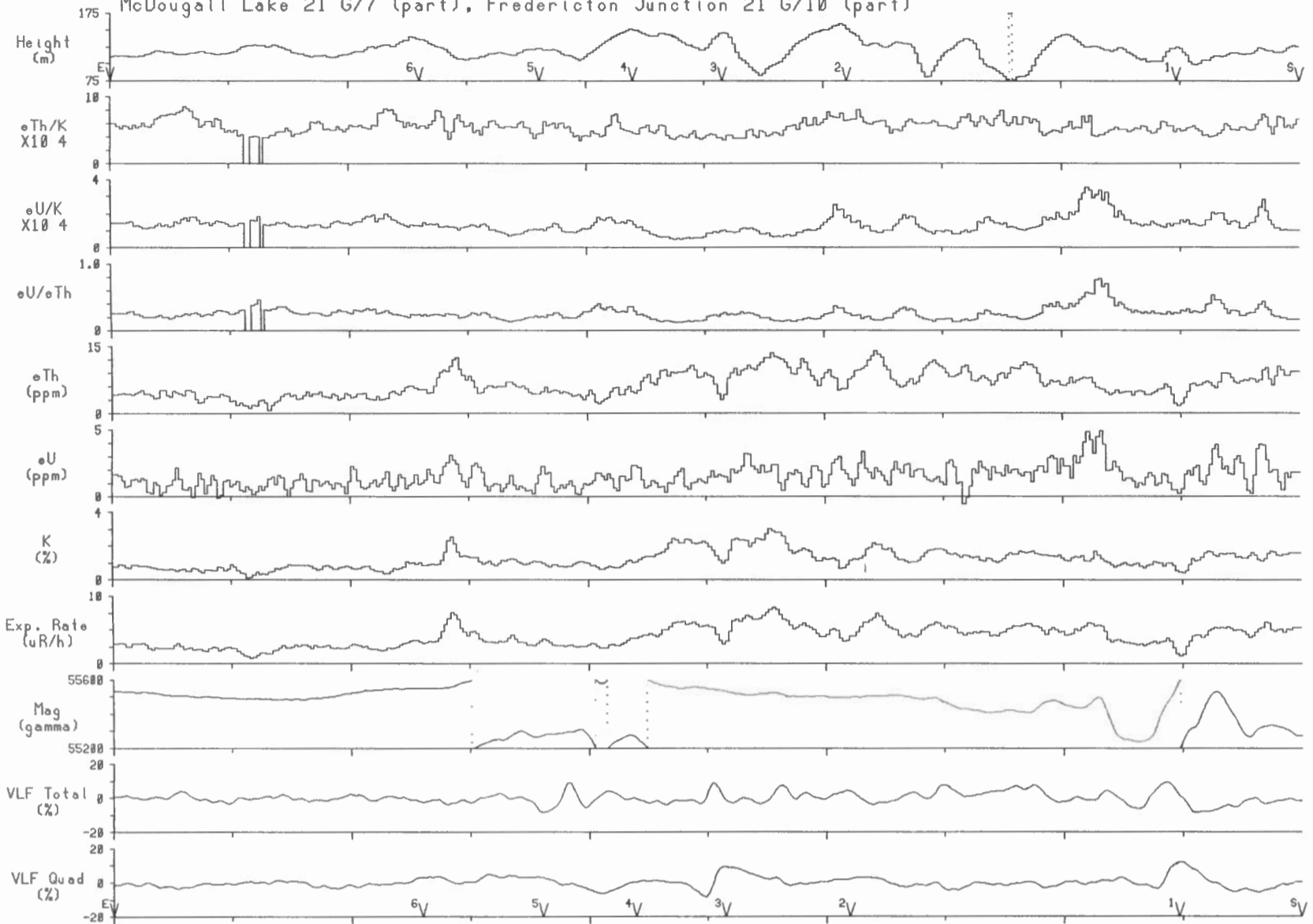
Line 57 2 km Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



Line 58 2 km Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)

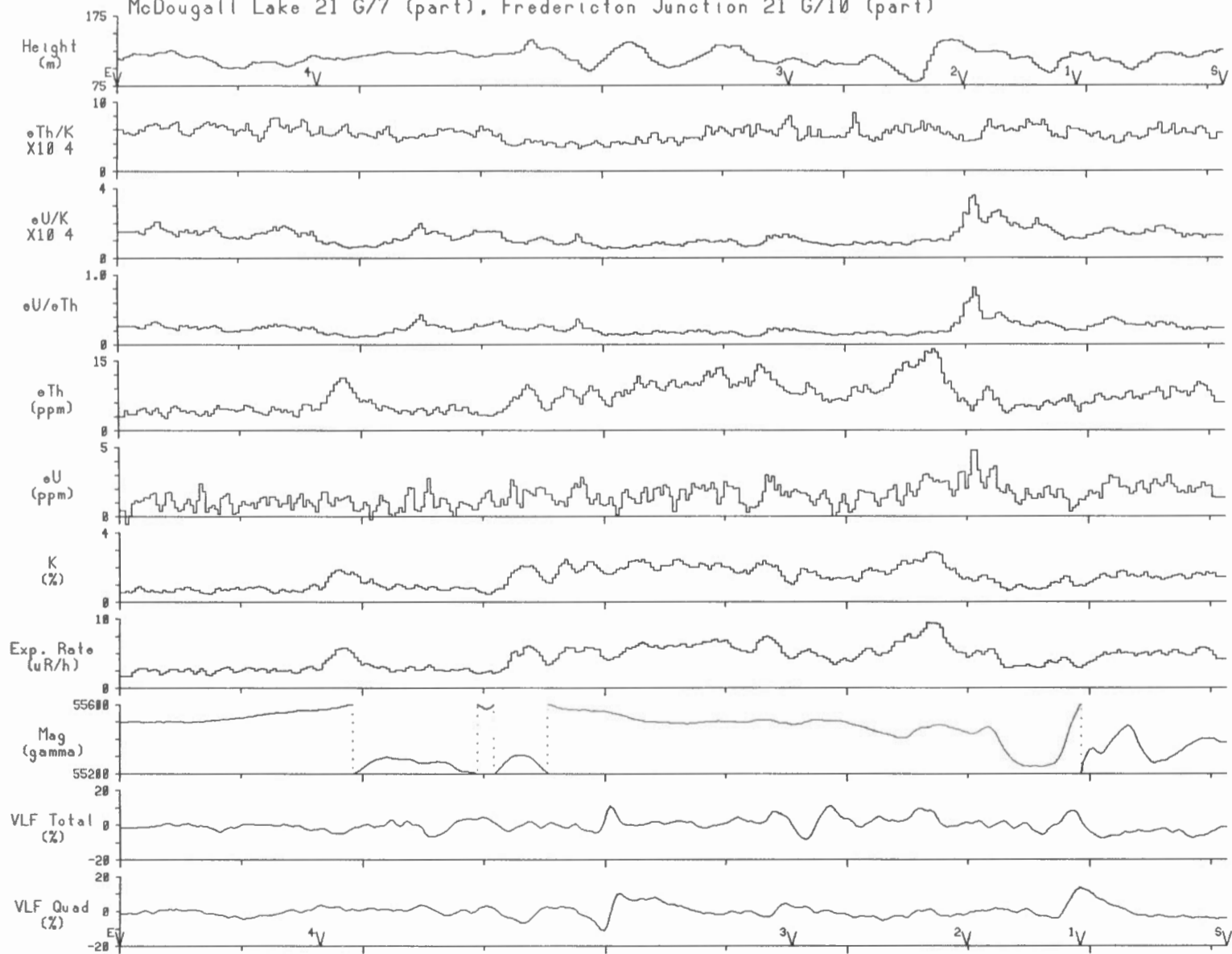


Line 59

2 km

Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)

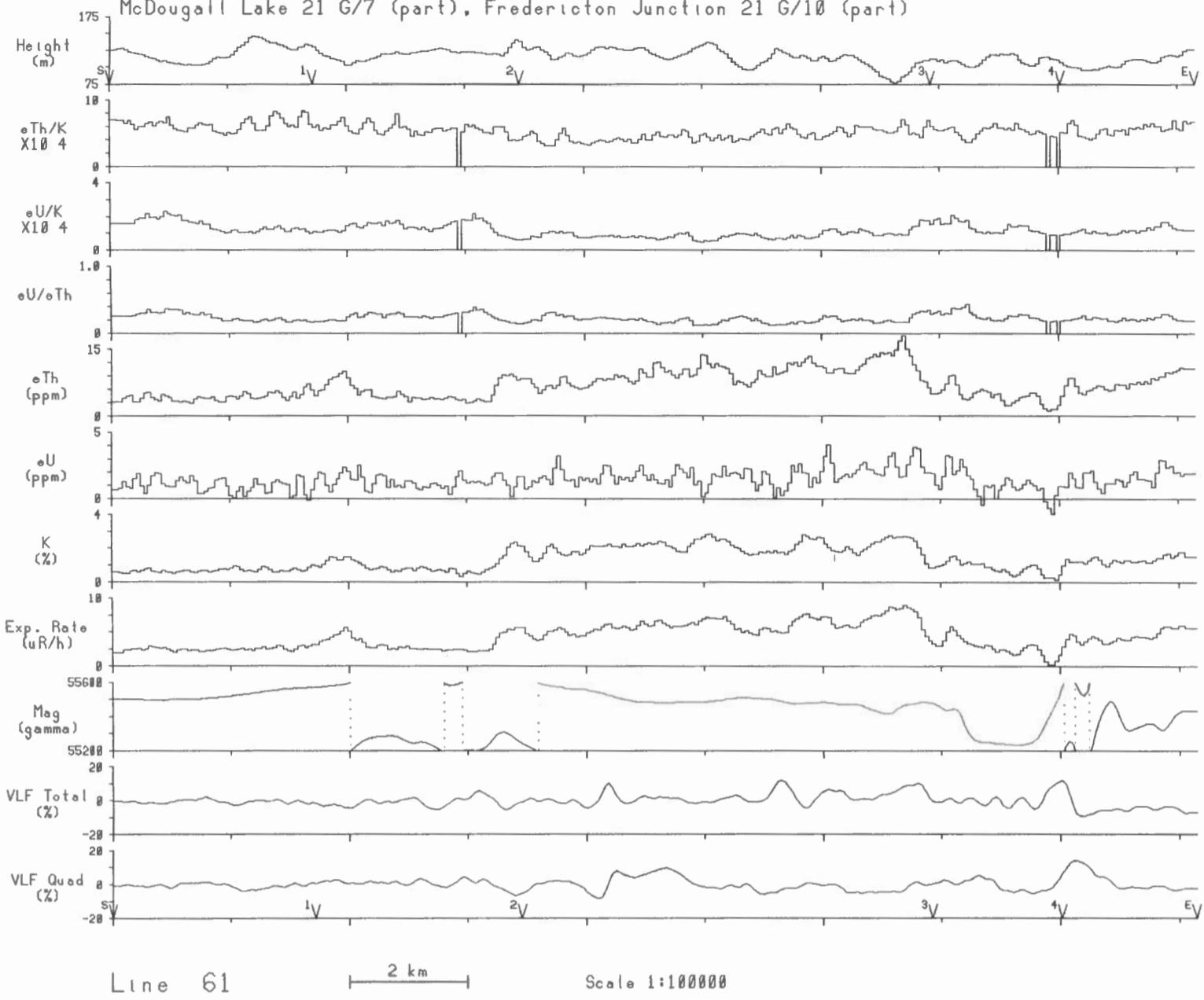


Line 60

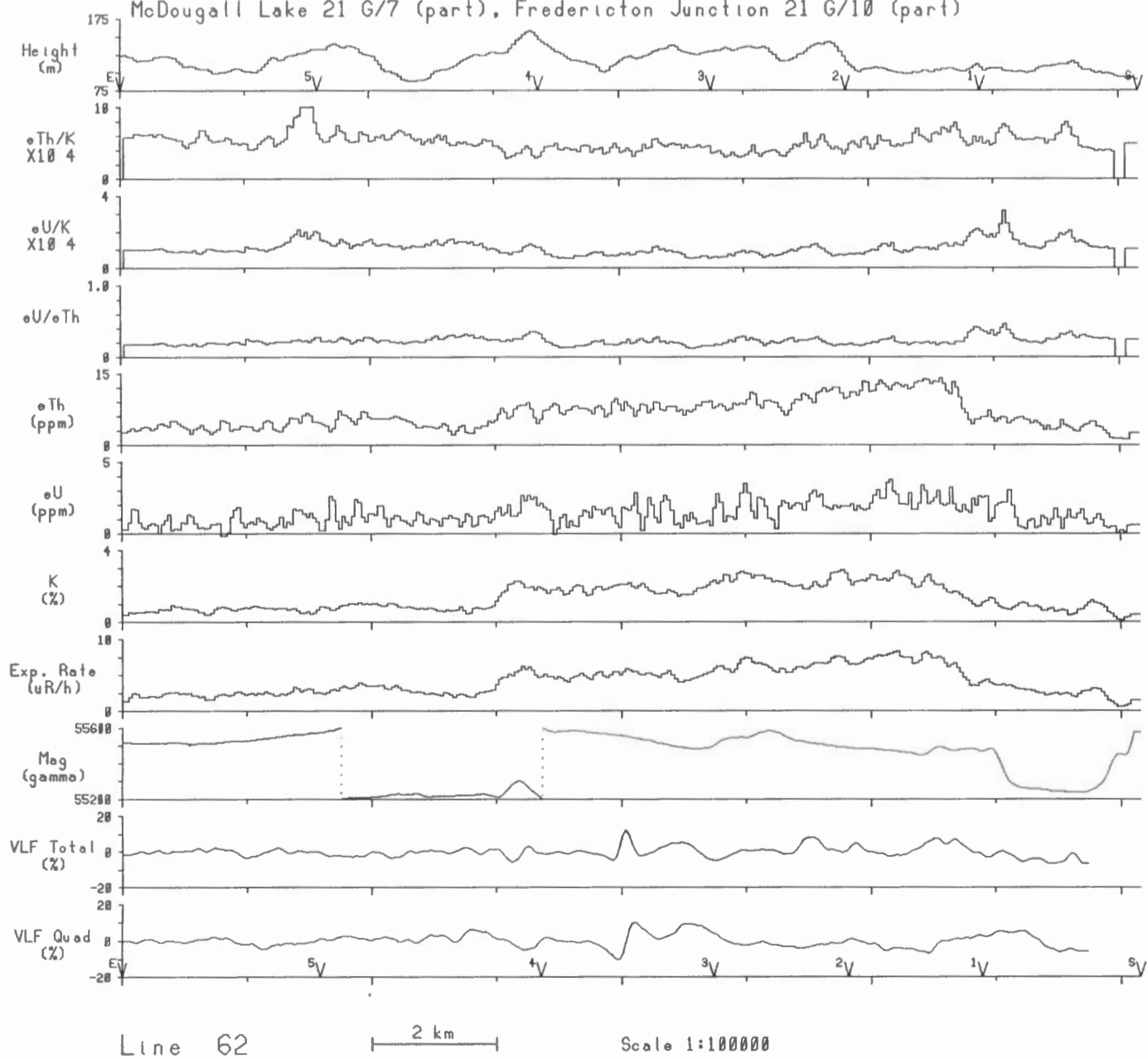
2 km

Scale 1:100000

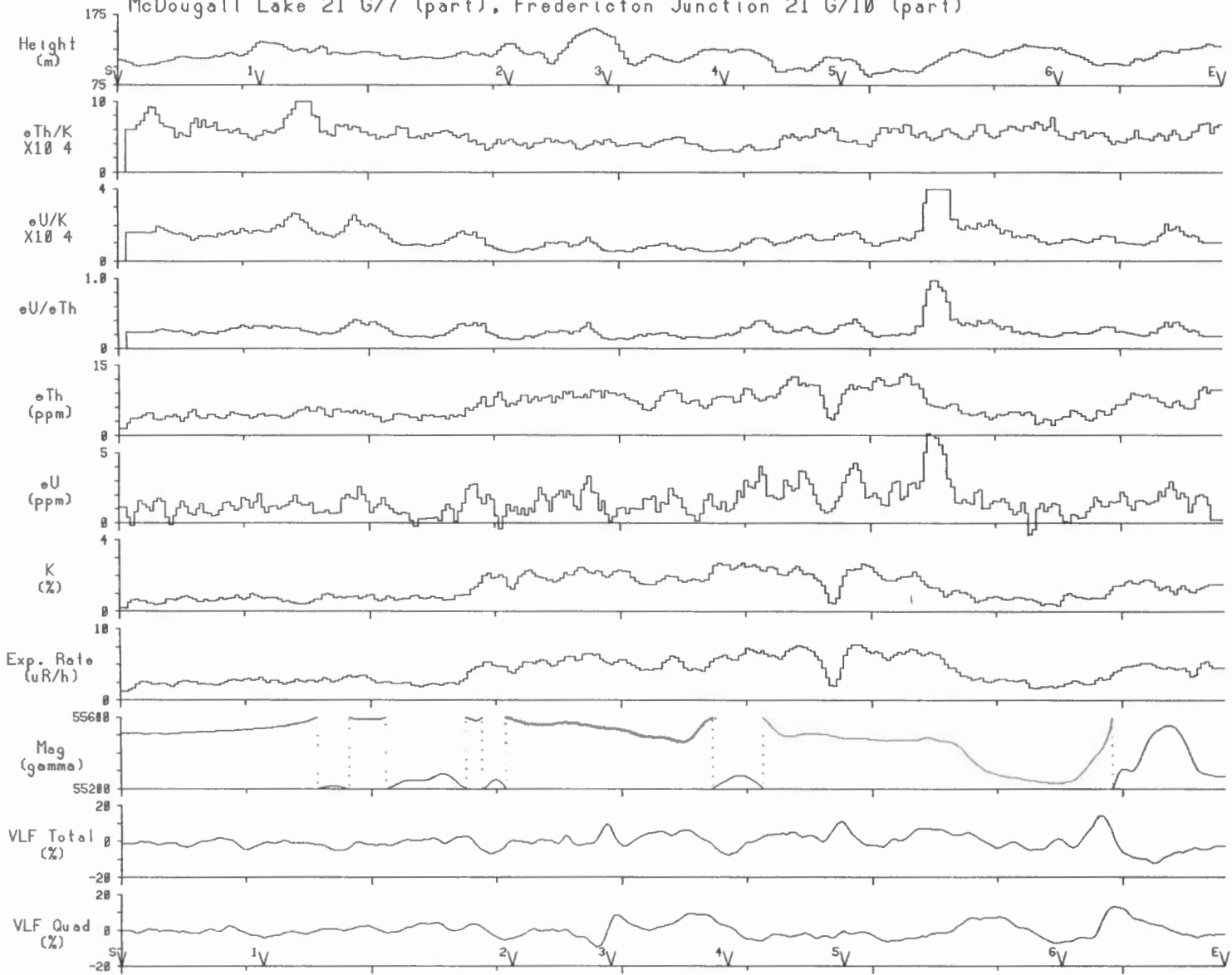
Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



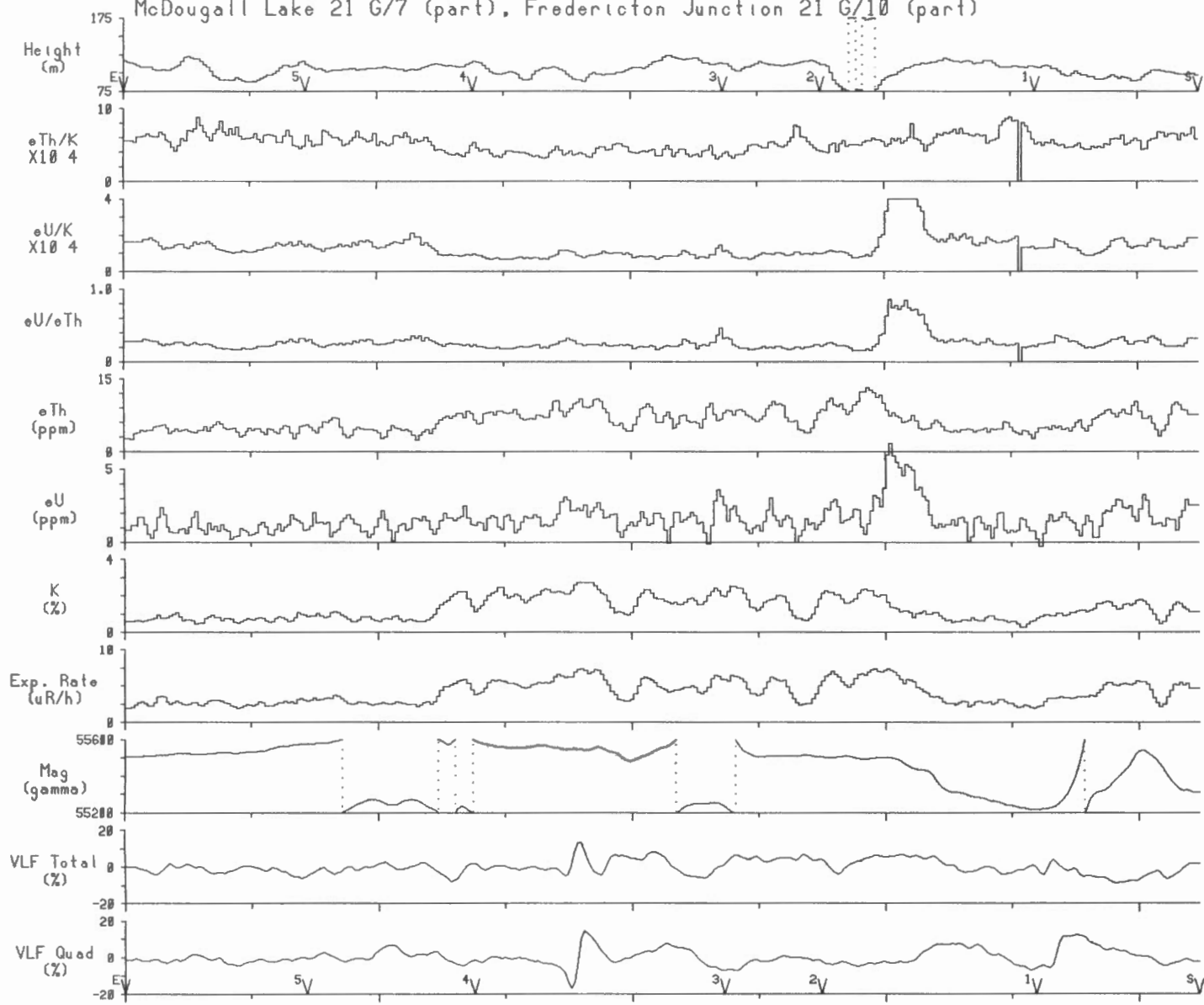
Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



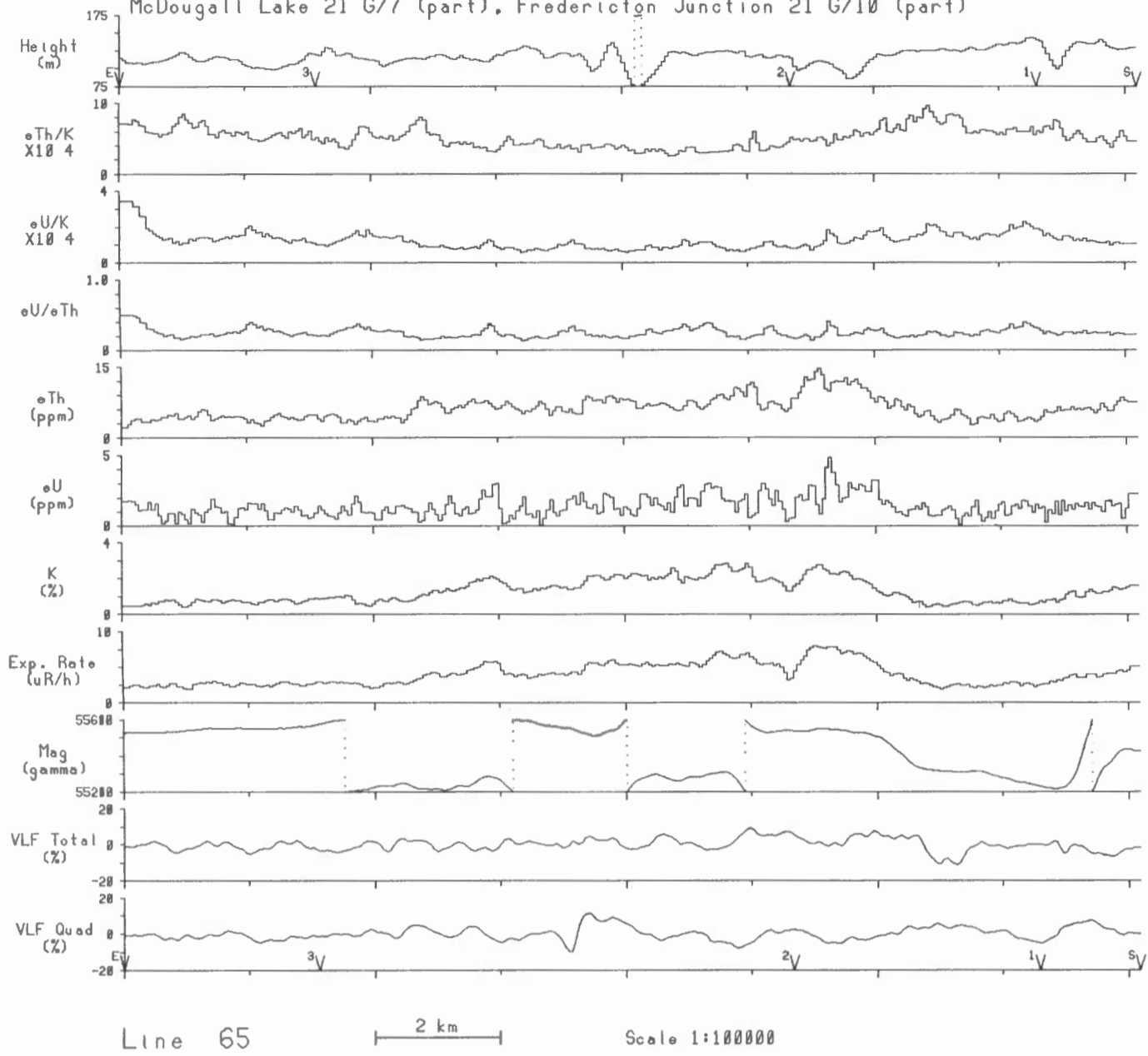
Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



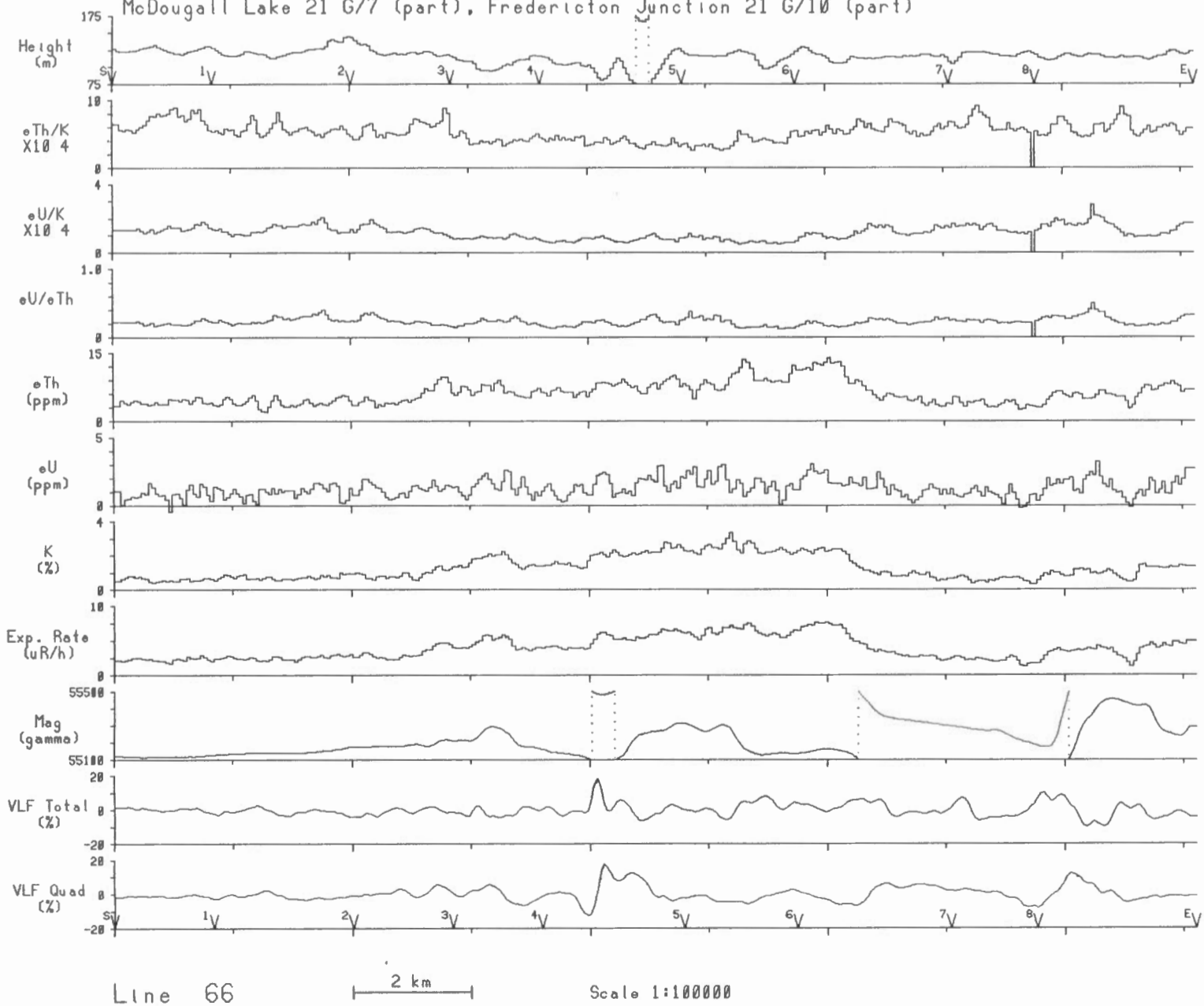
Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



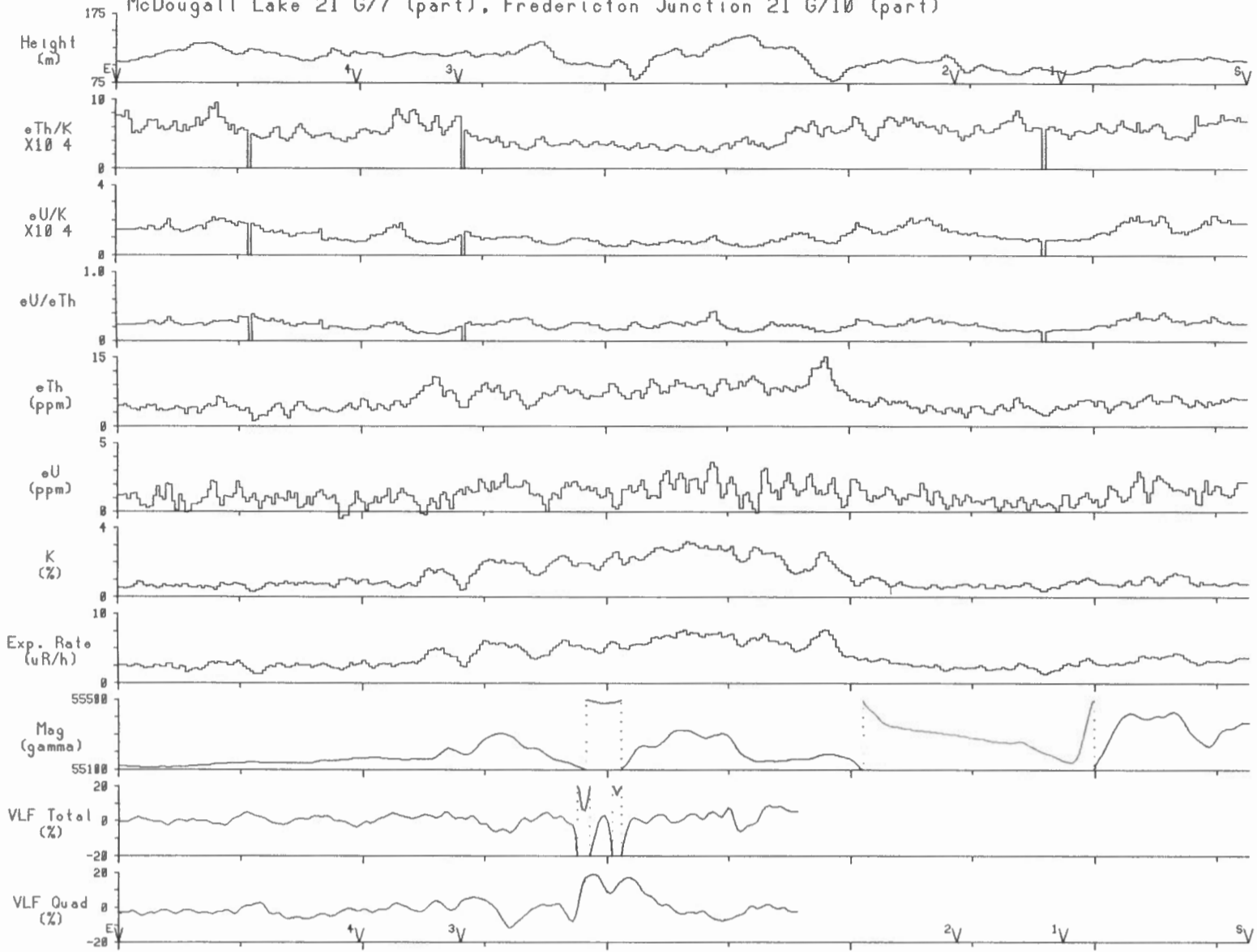
Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)

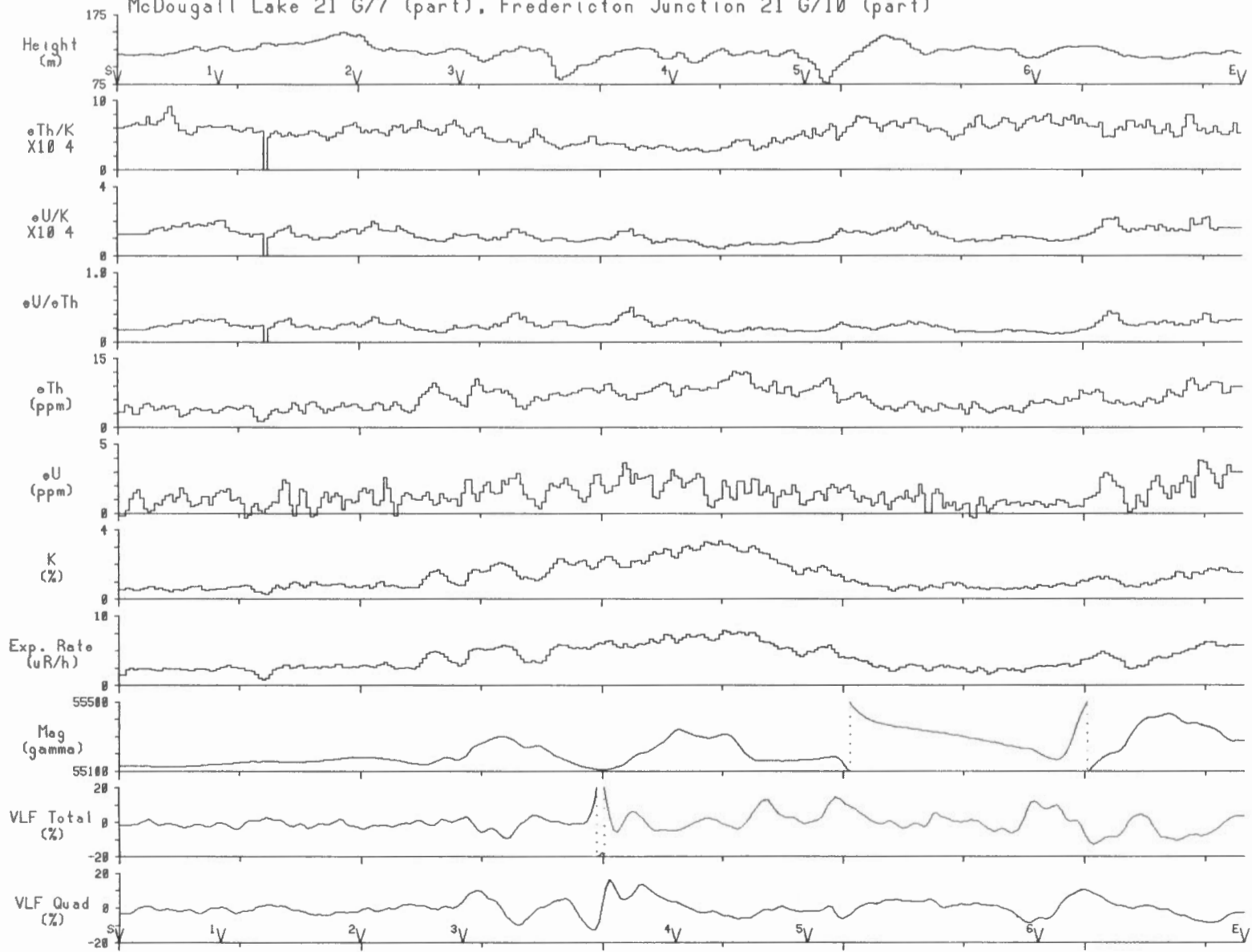


Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



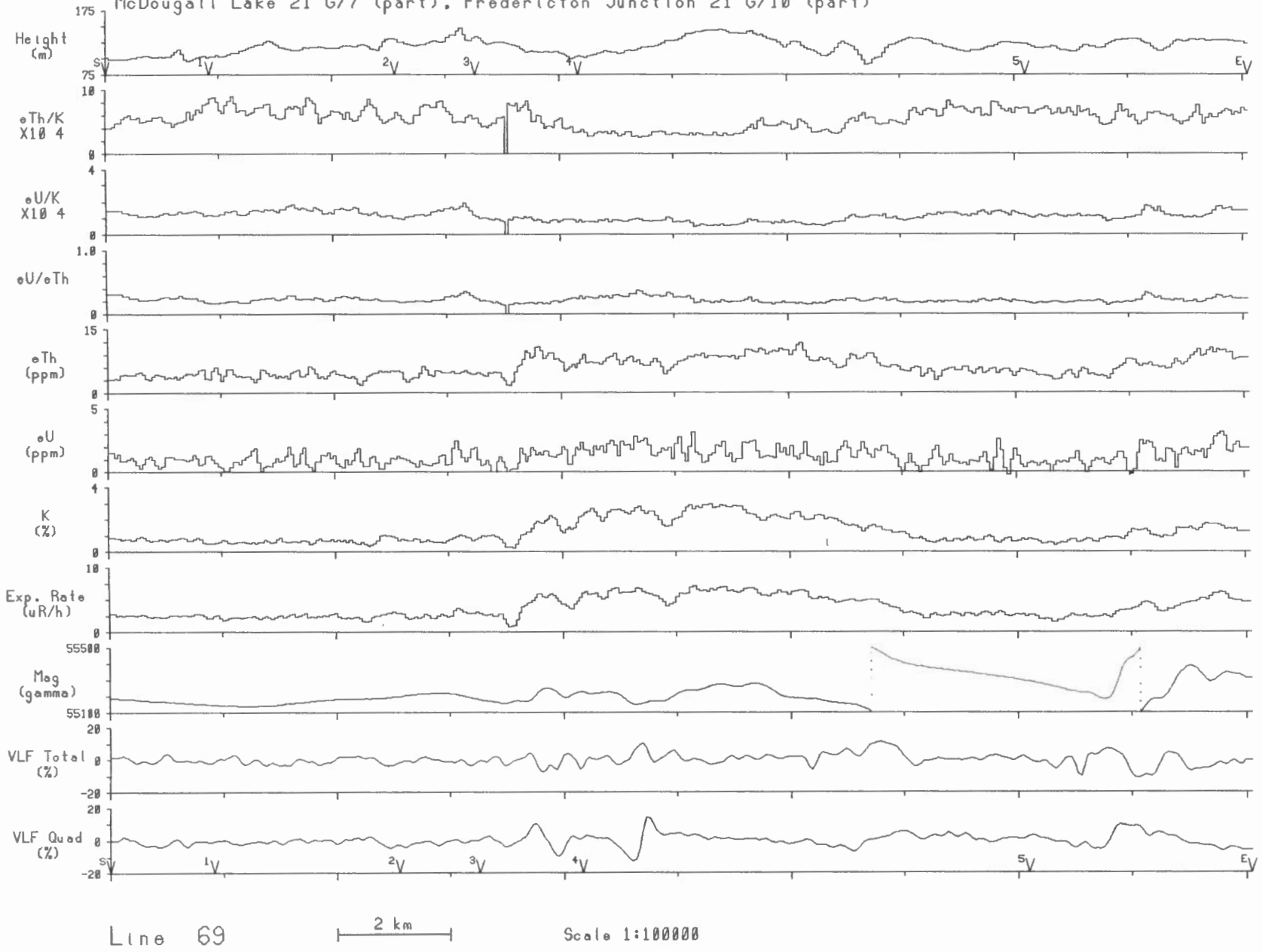
Line 67 2 km Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



Line 68 2 km Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)

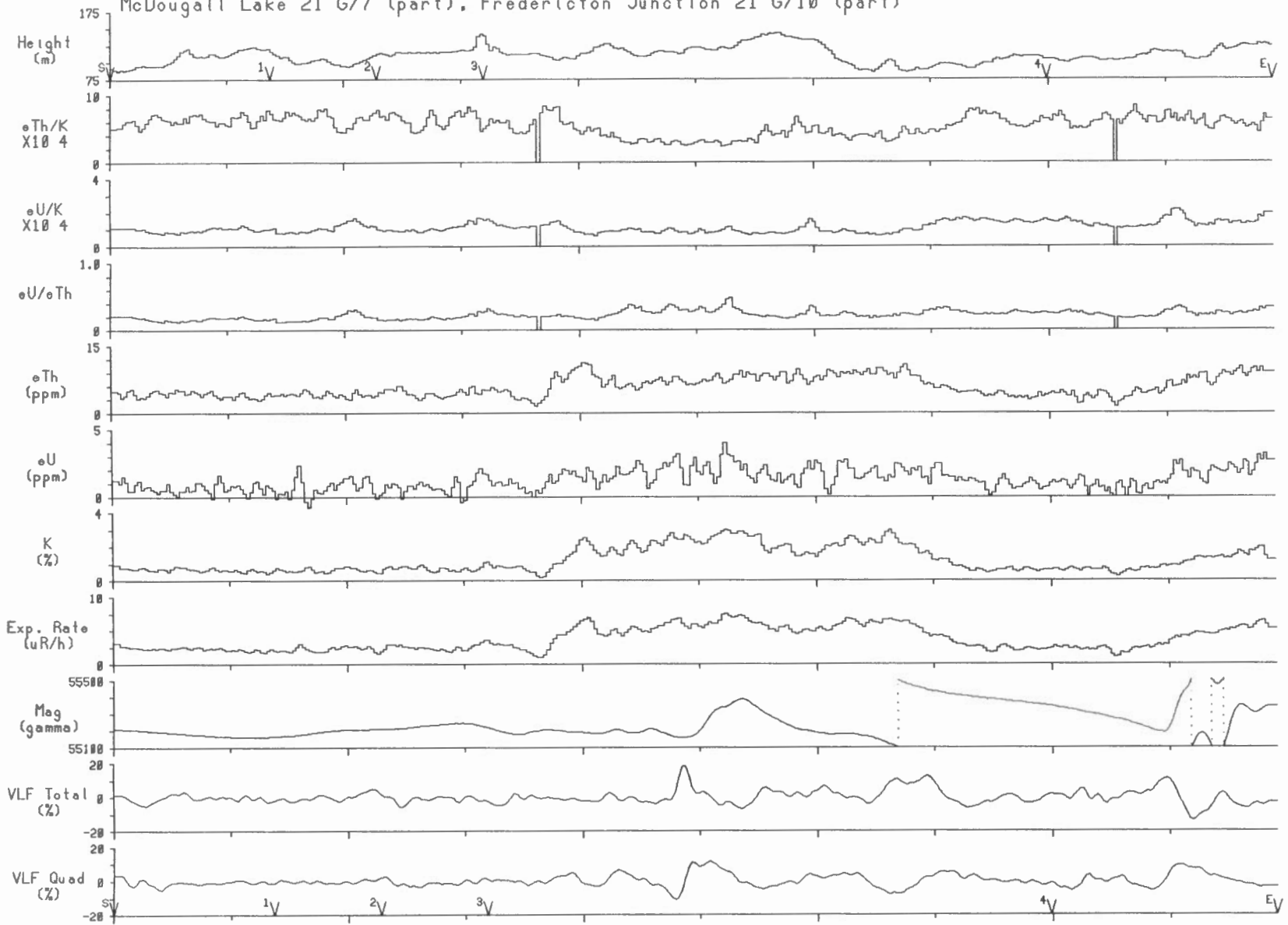


Line 69

2 km

Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)

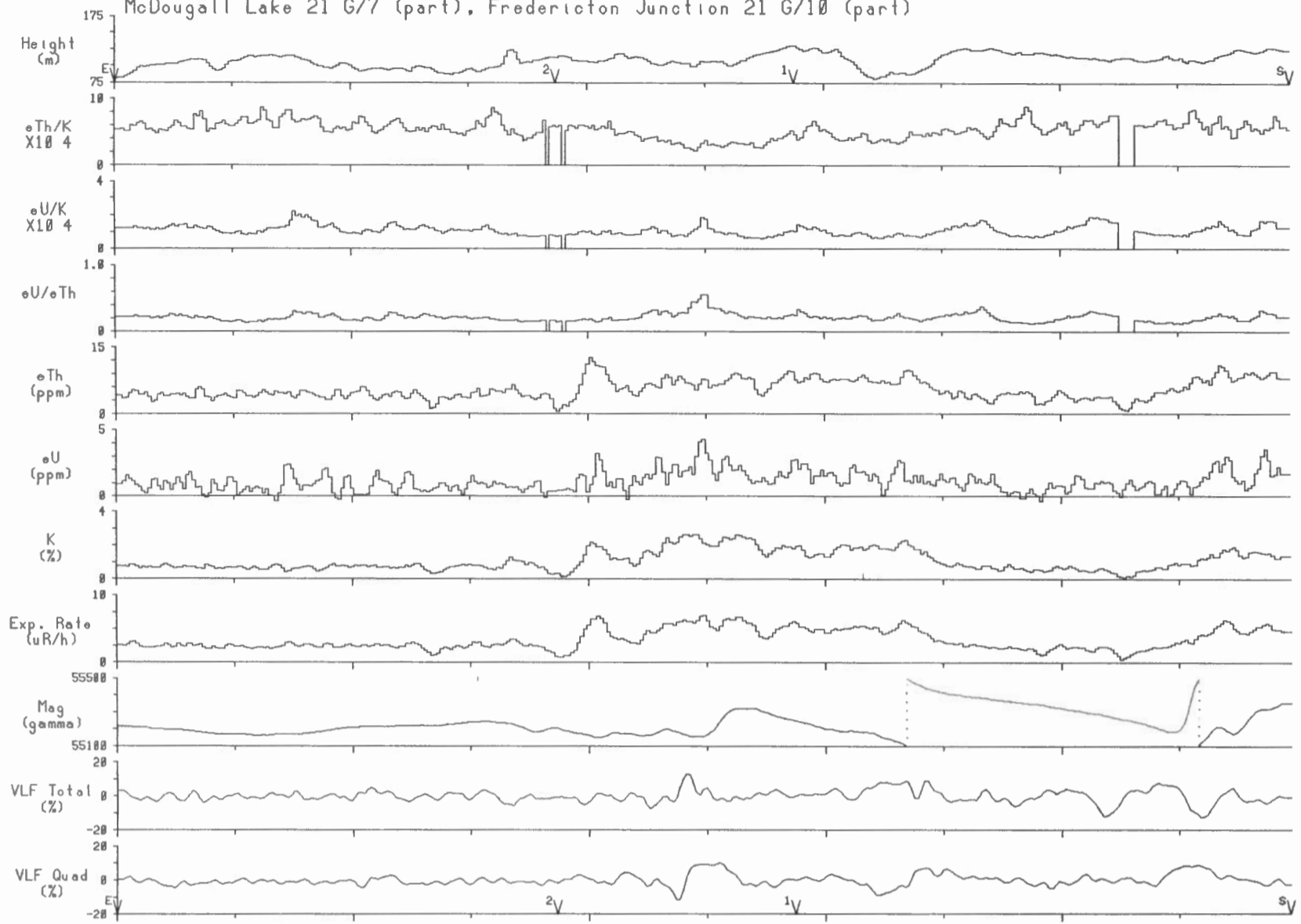


Line 70

2 km

Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)

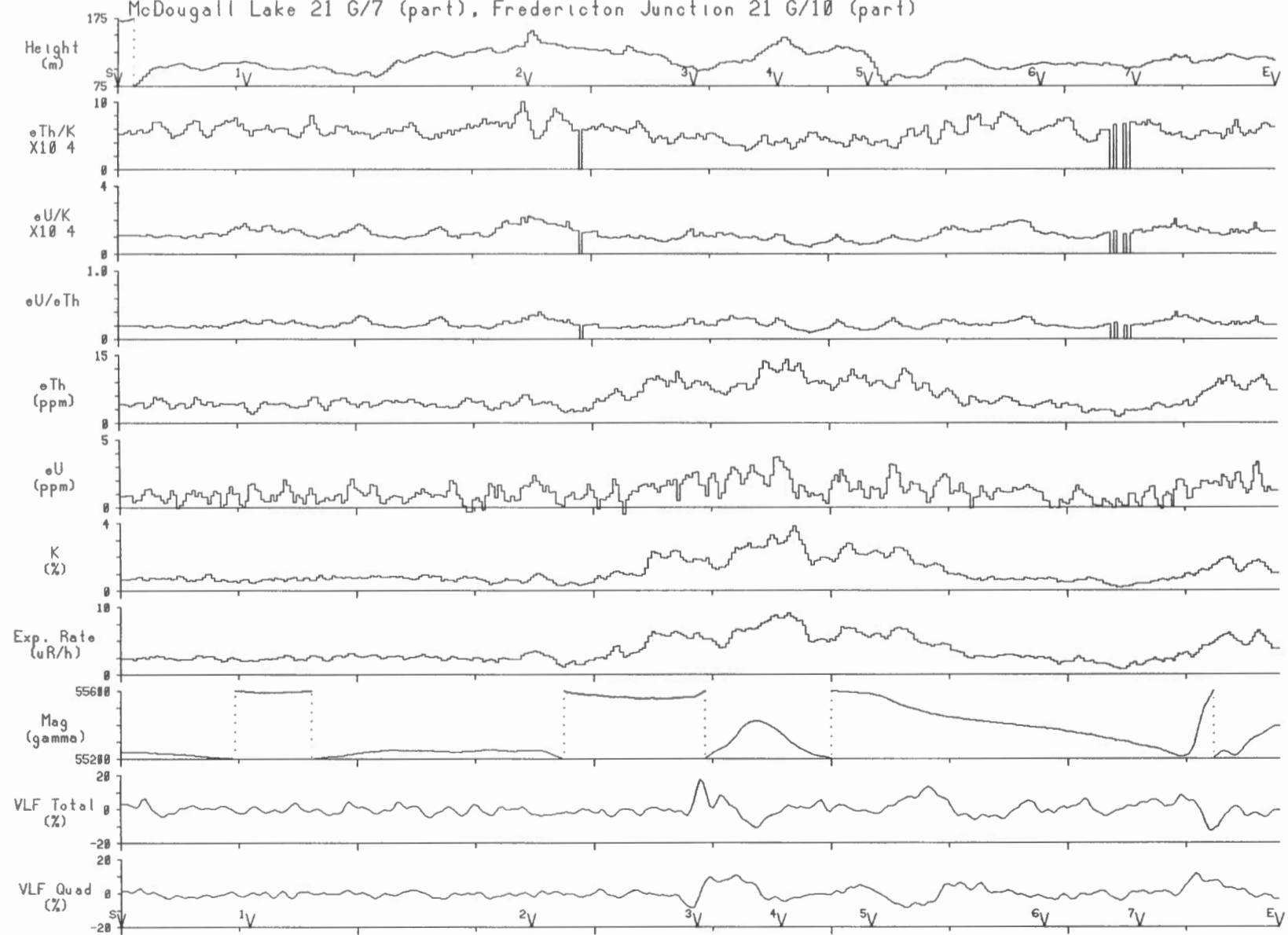


Line 71

2 km

Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)

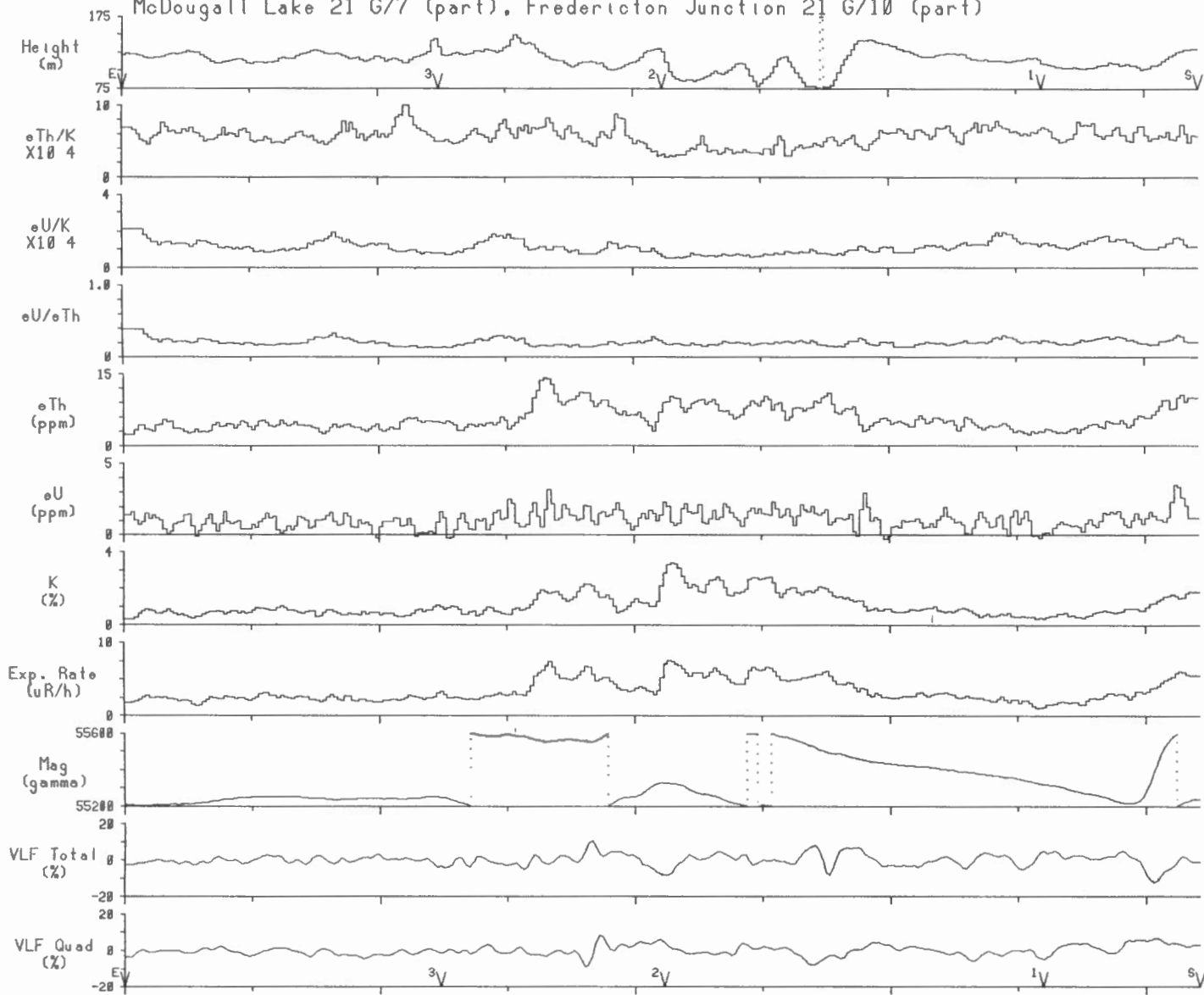


Line 72

2 km

Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)

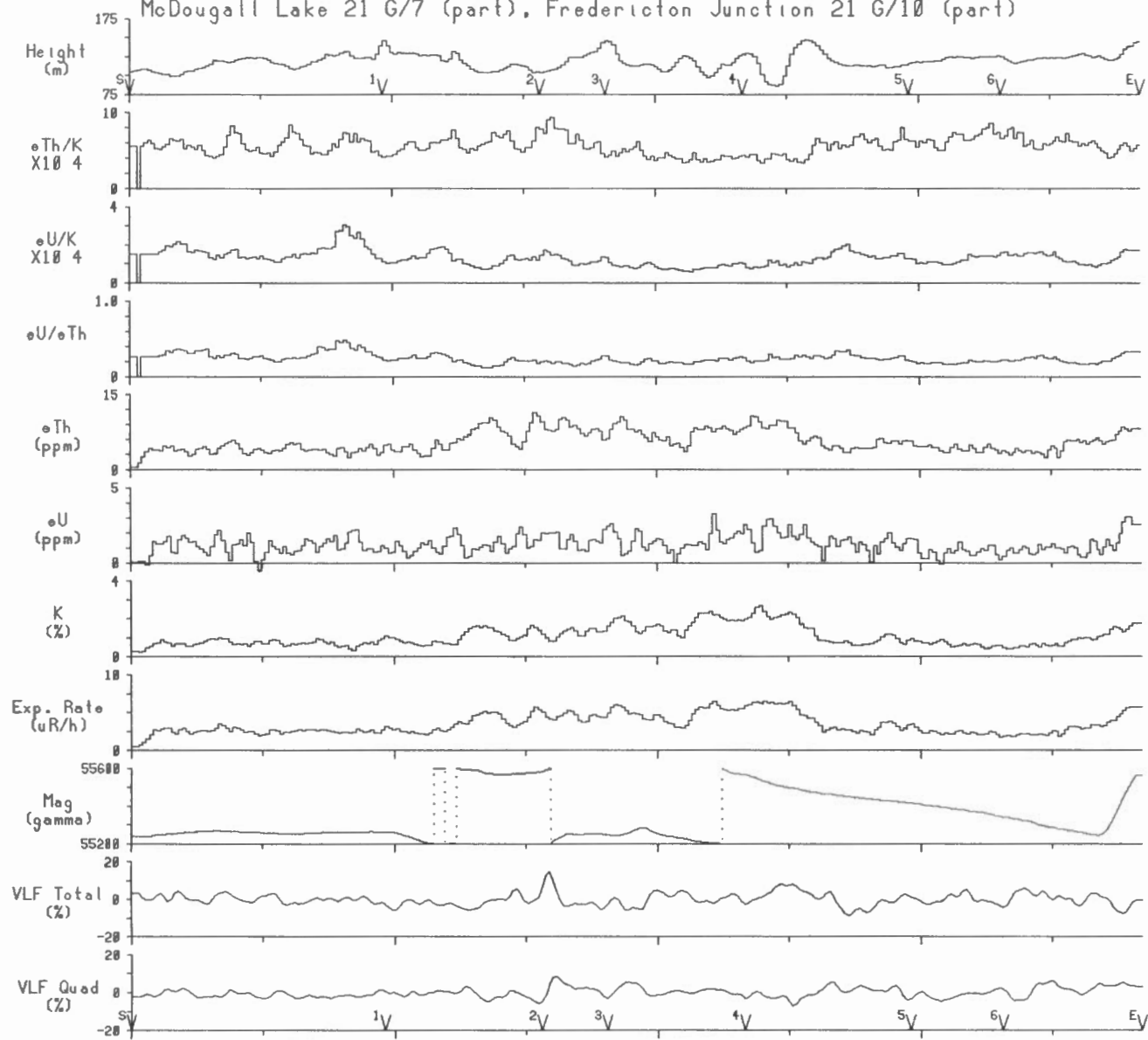


Line 73

2 km

Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)

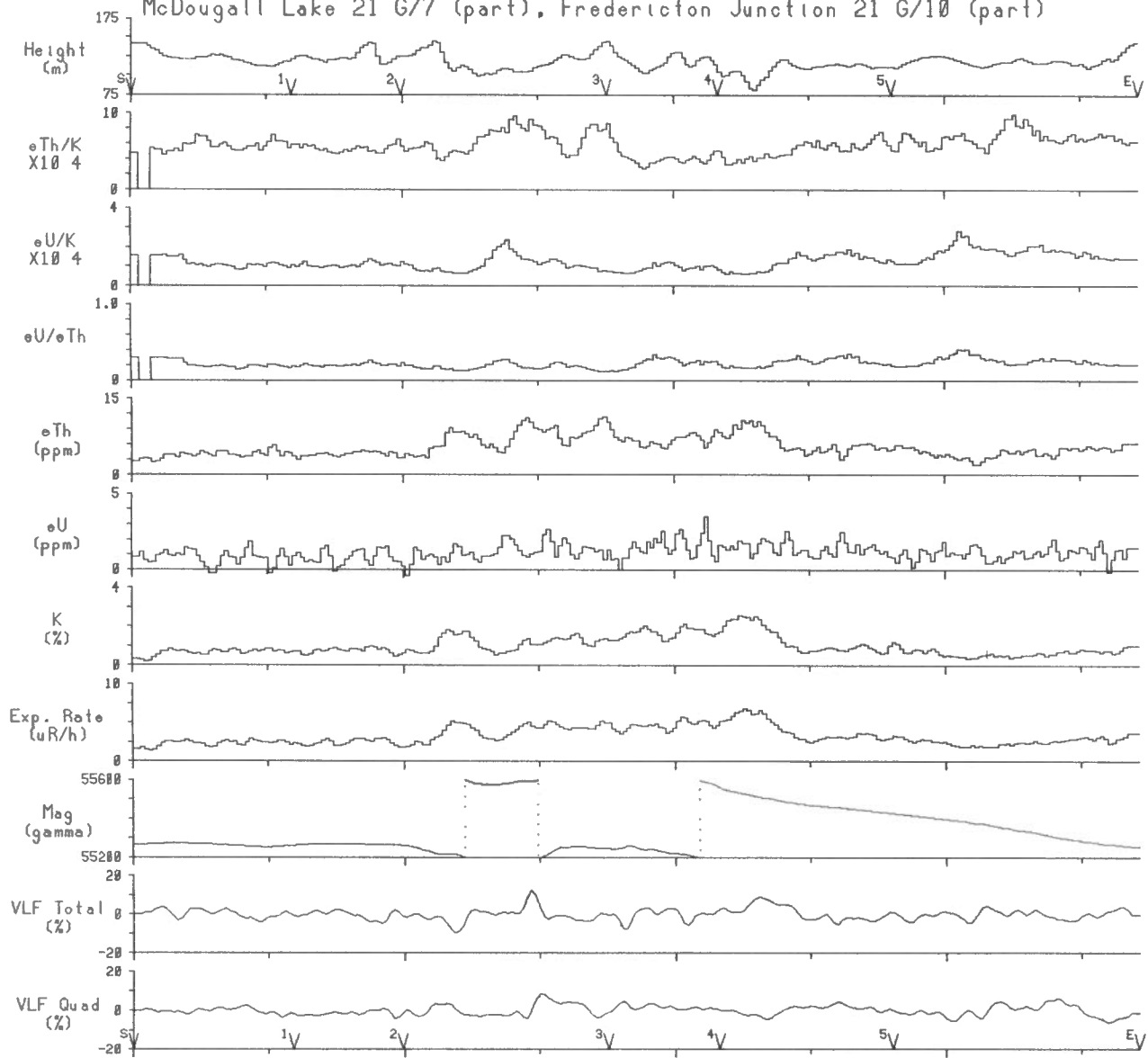


Line 74

2 km

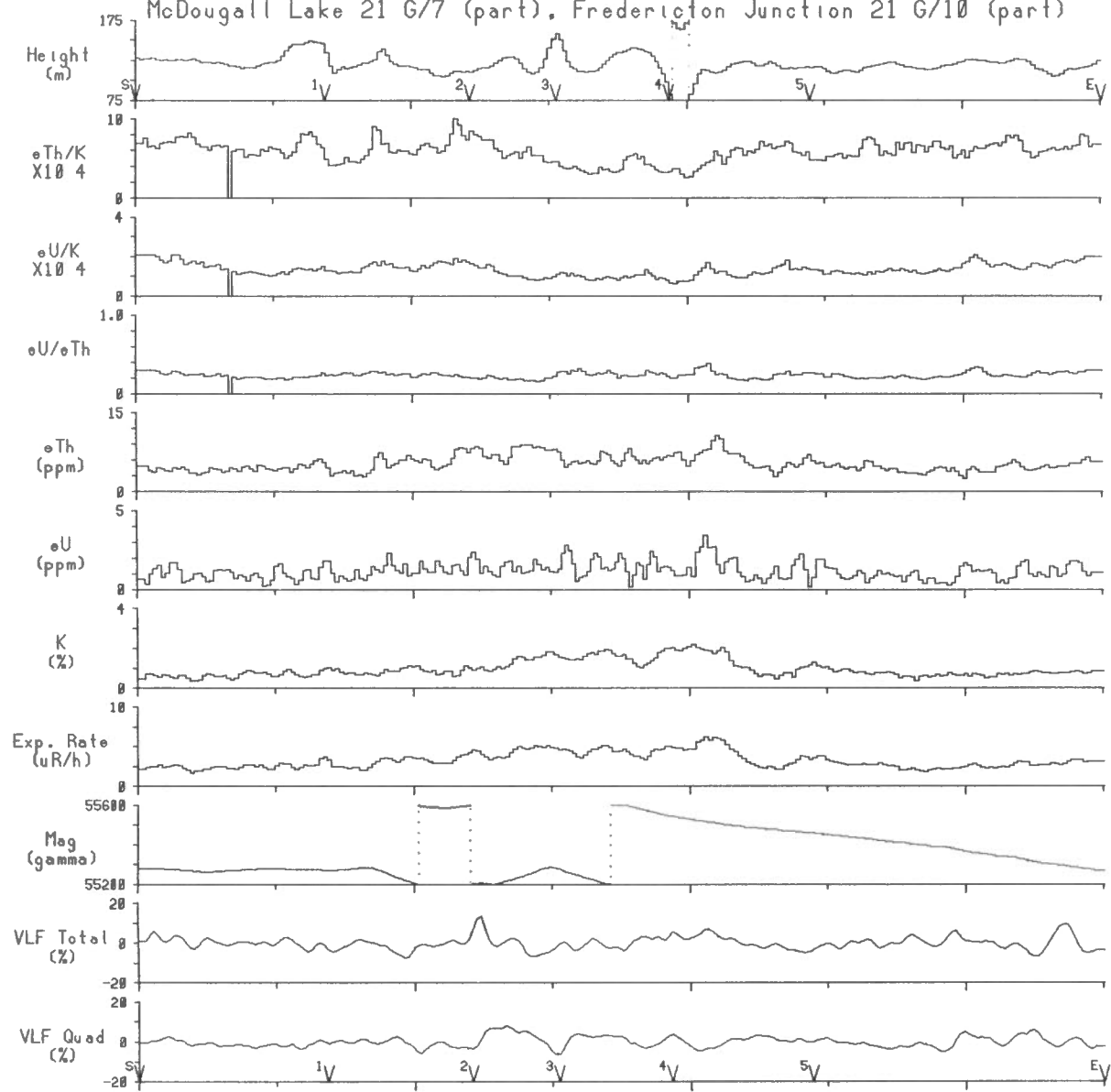
Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



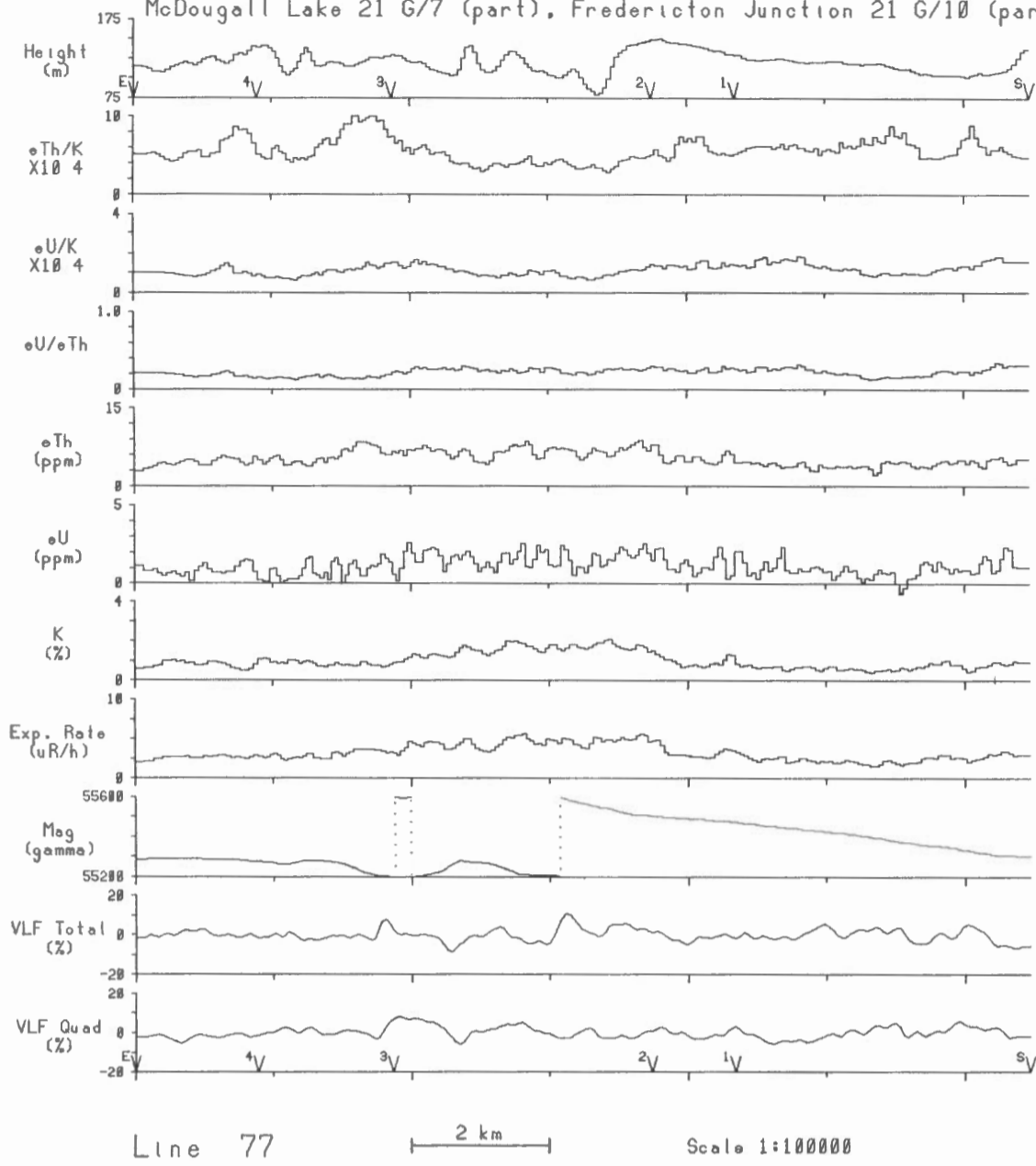
Line 75 2 km Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)

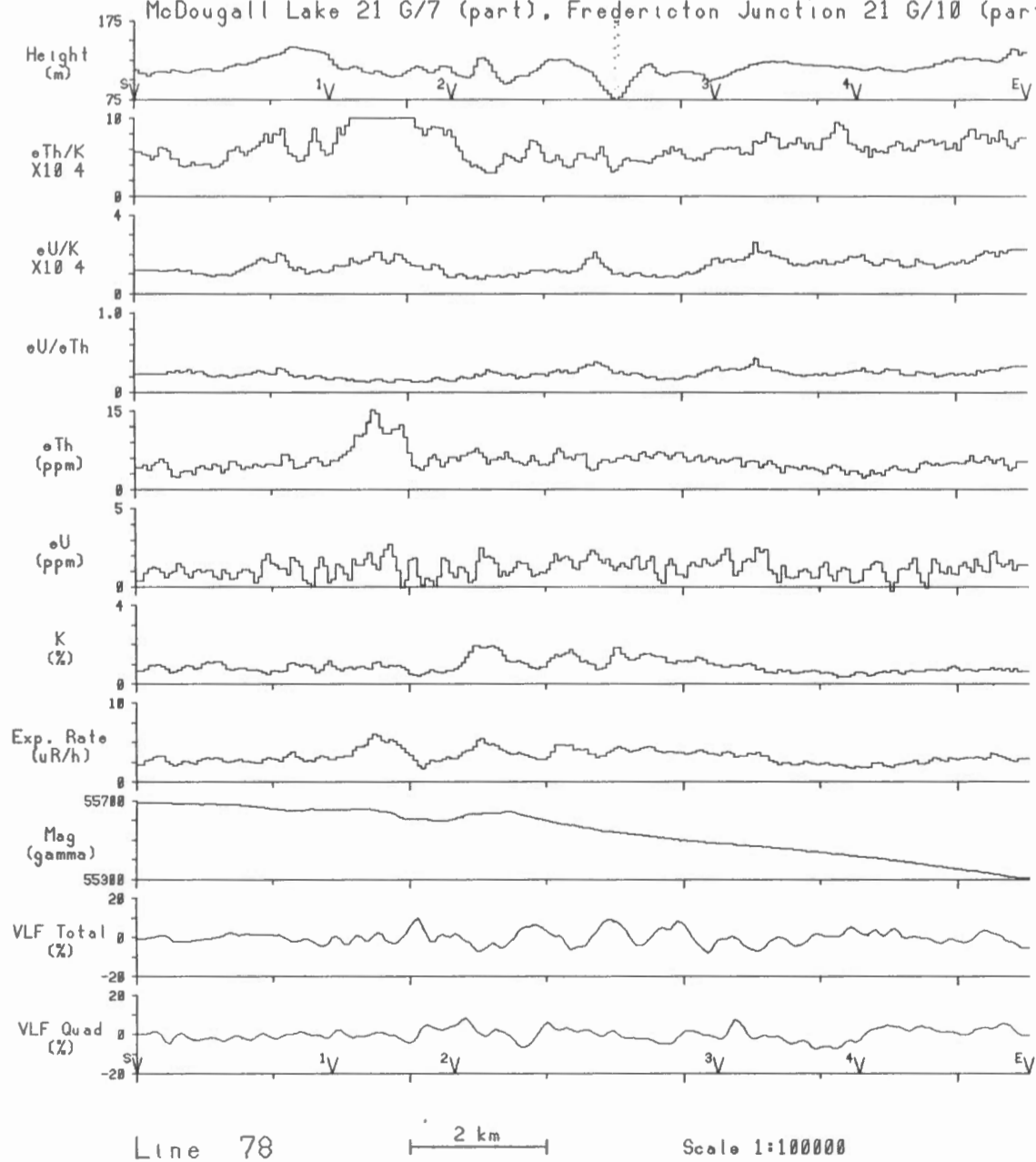


Line 76 2 km Scale 1:100000

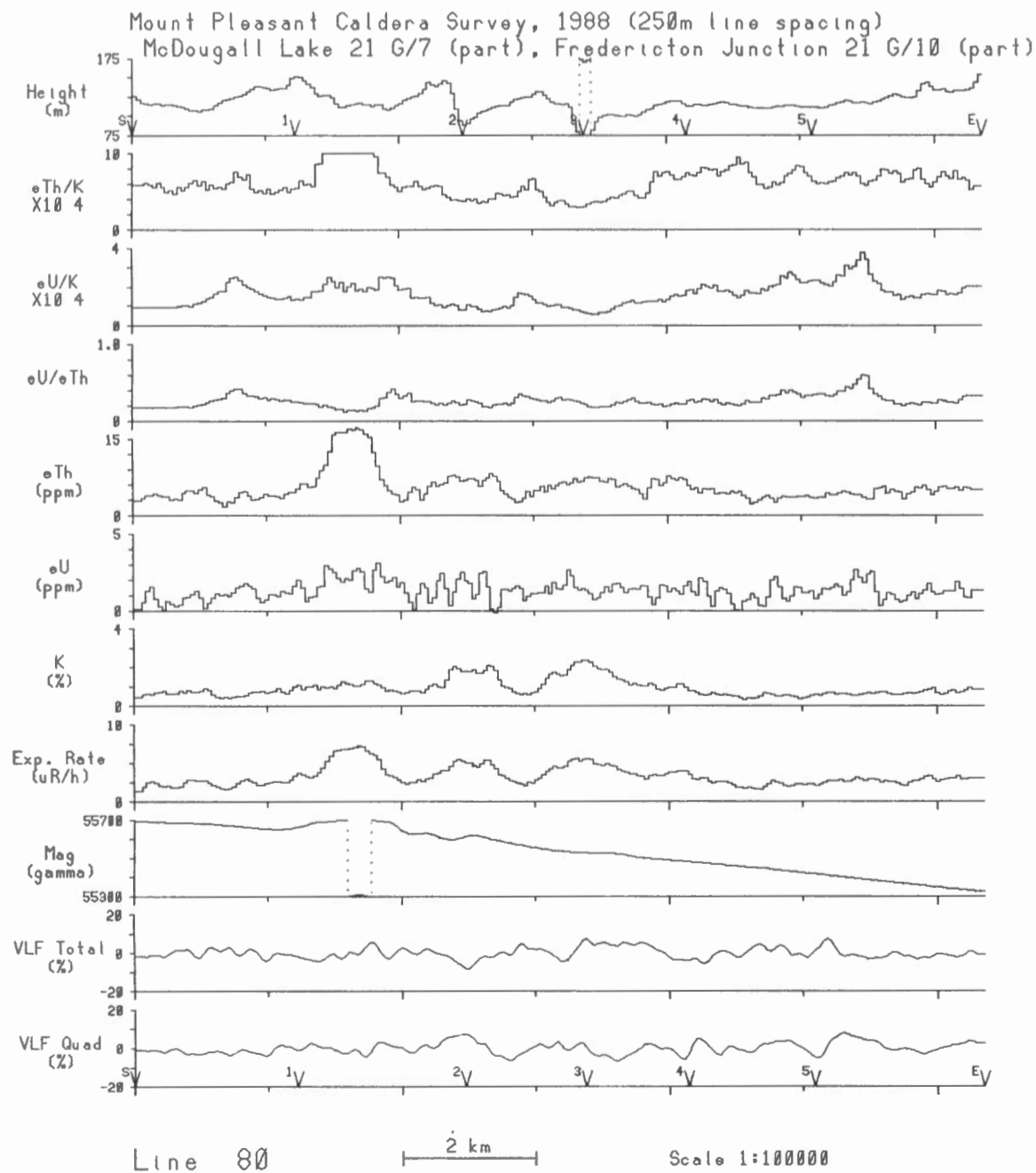
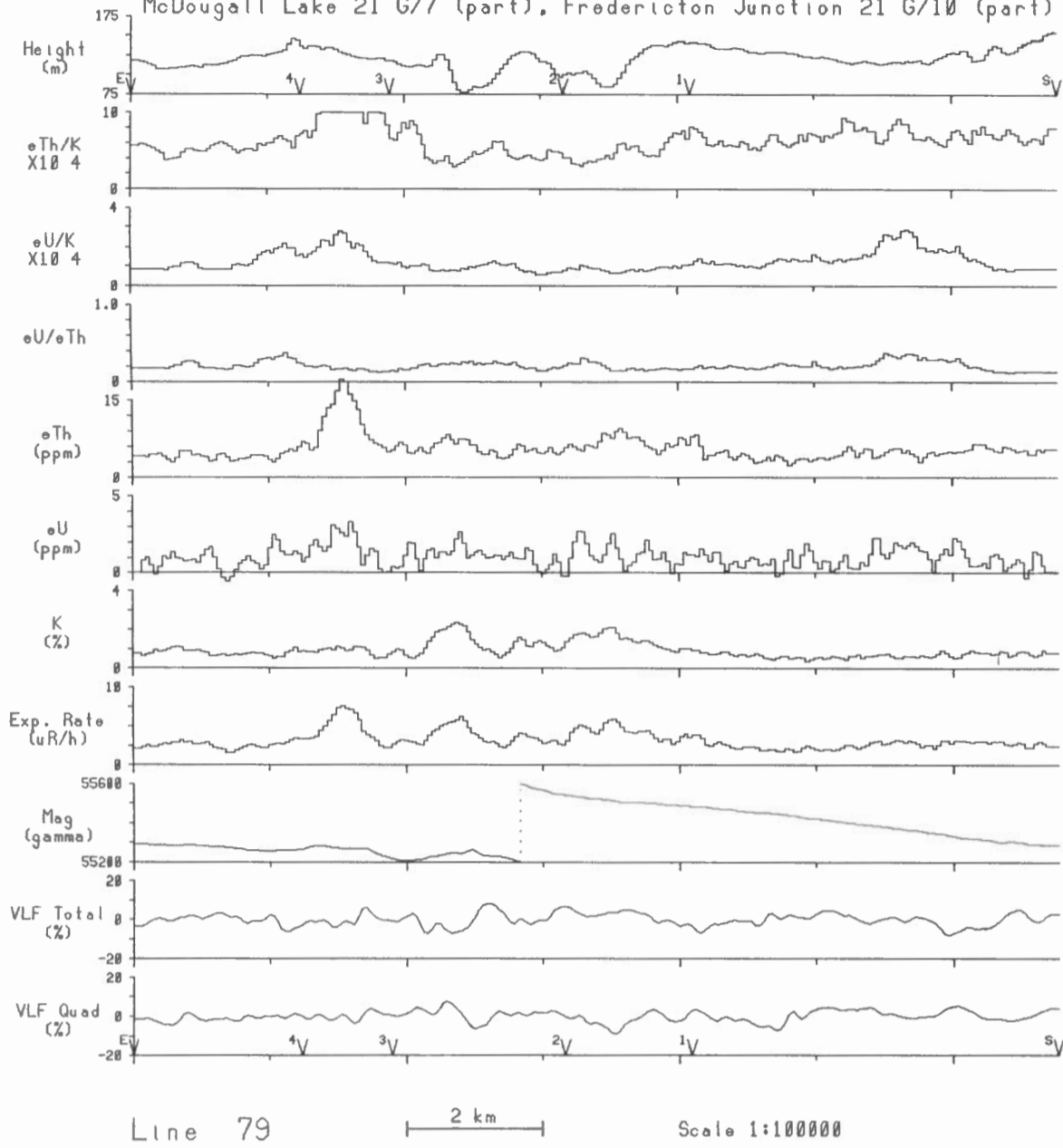
Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



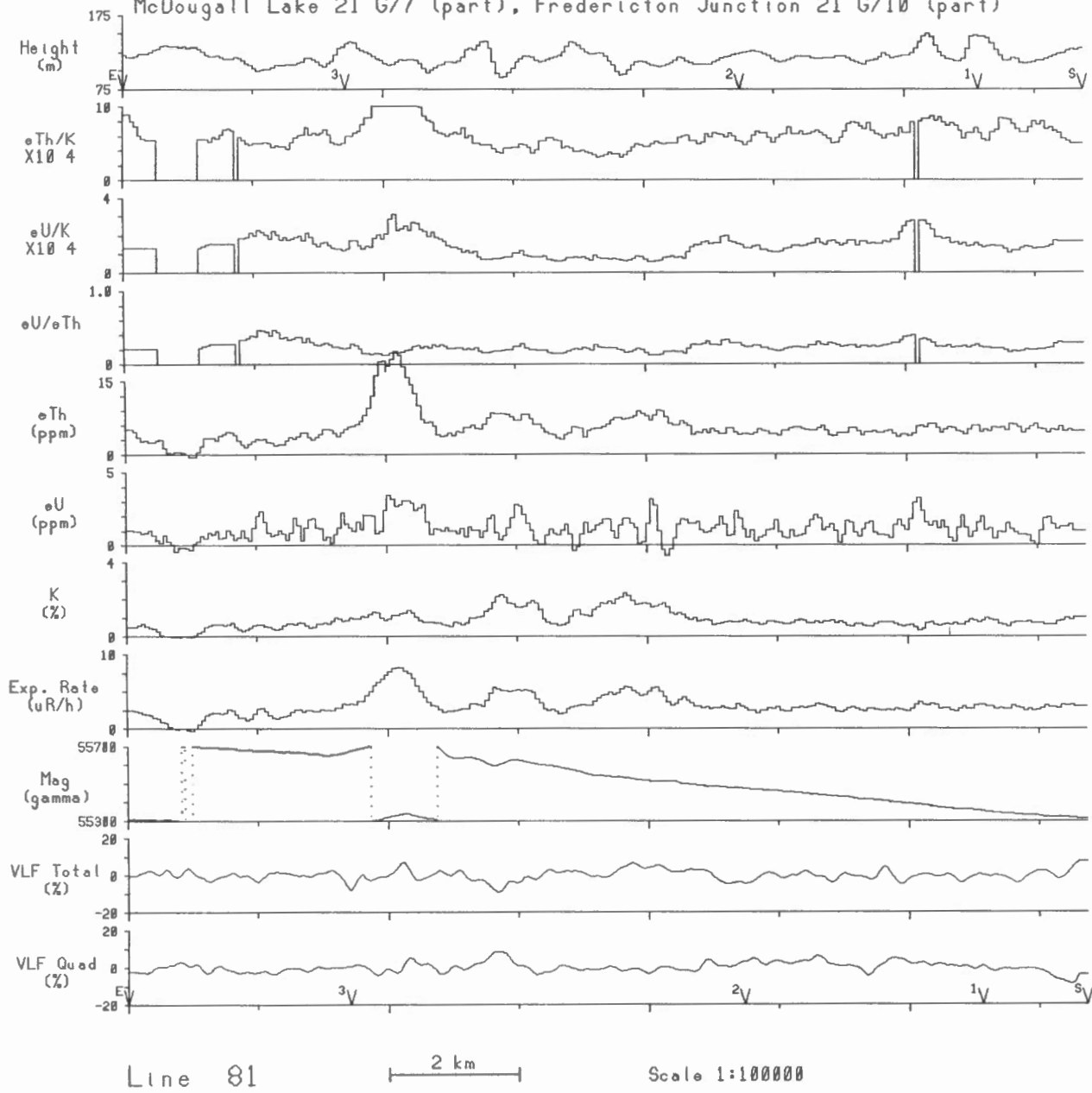
Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



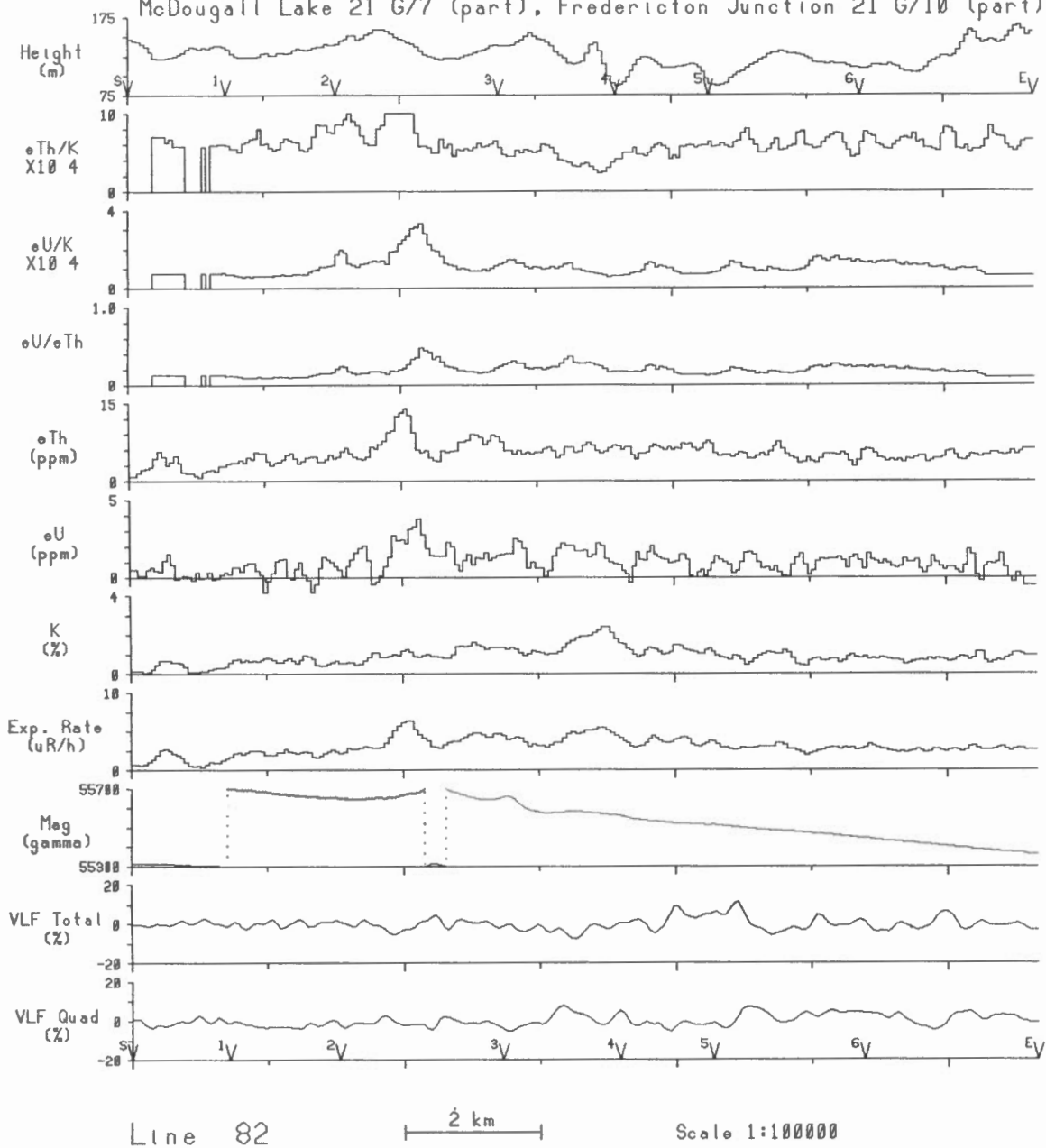
Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



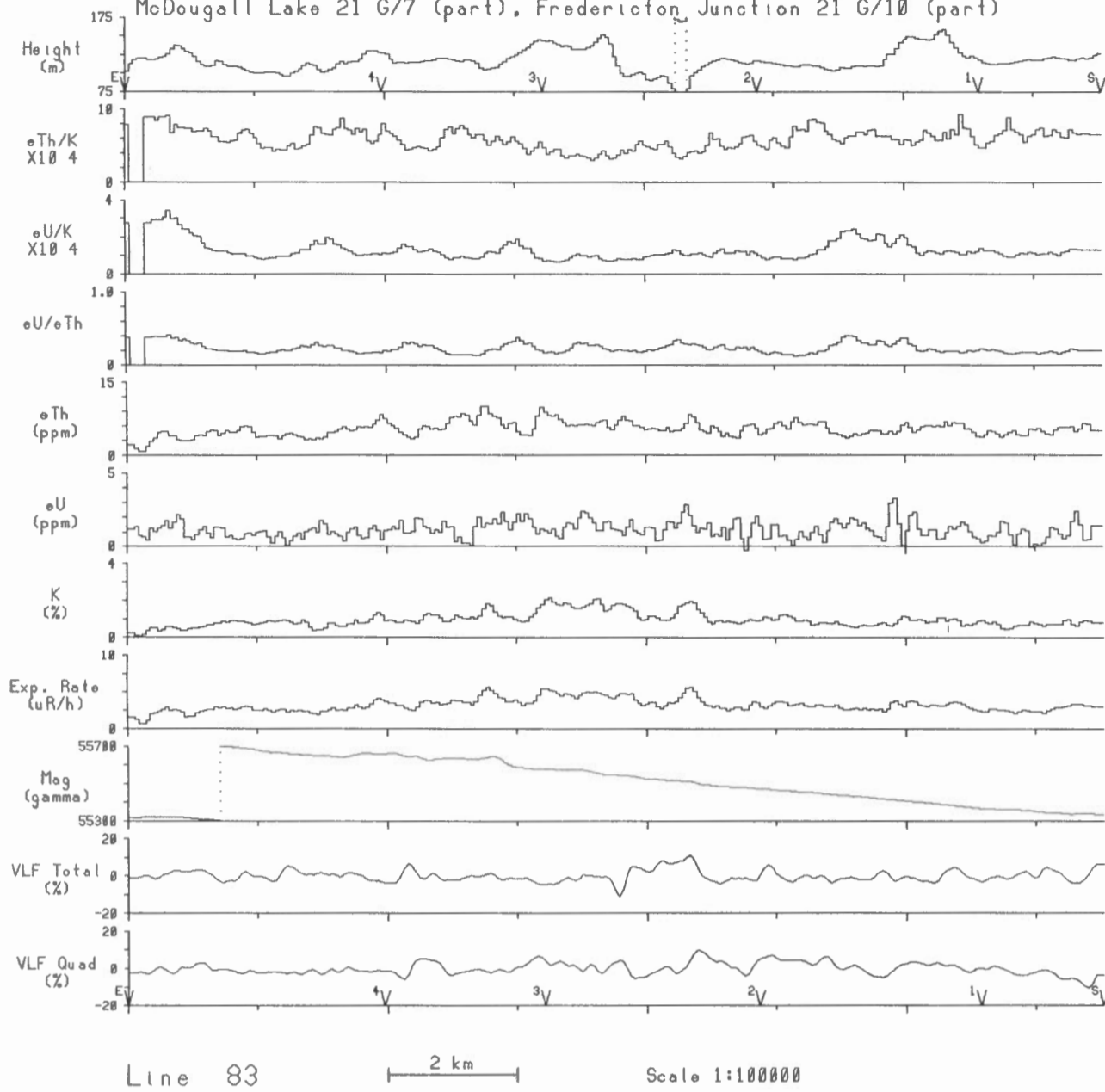
Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



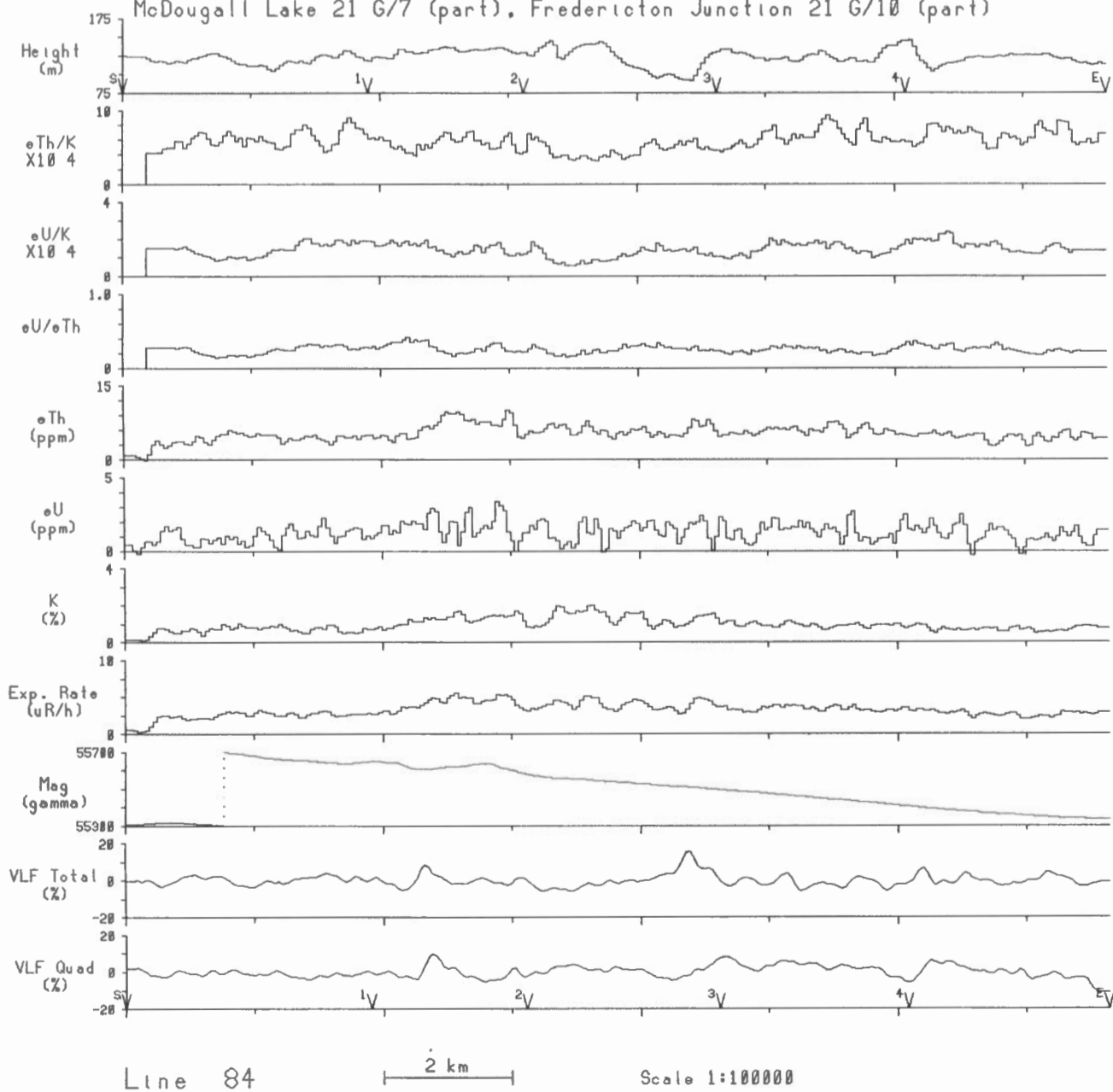
Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



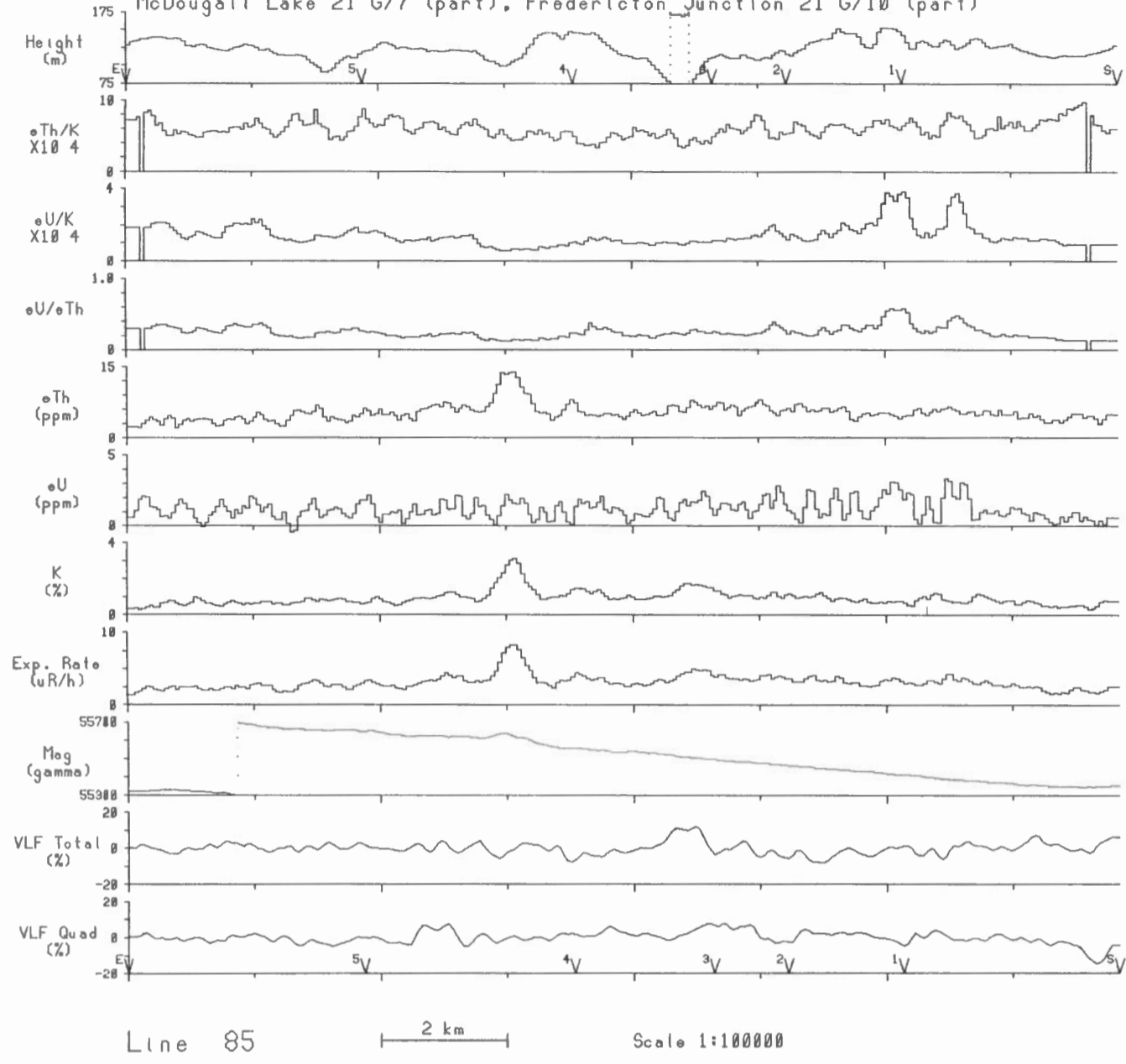
Mount Pleasant Caldera Survey, 1988 (250m line spacing)
McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



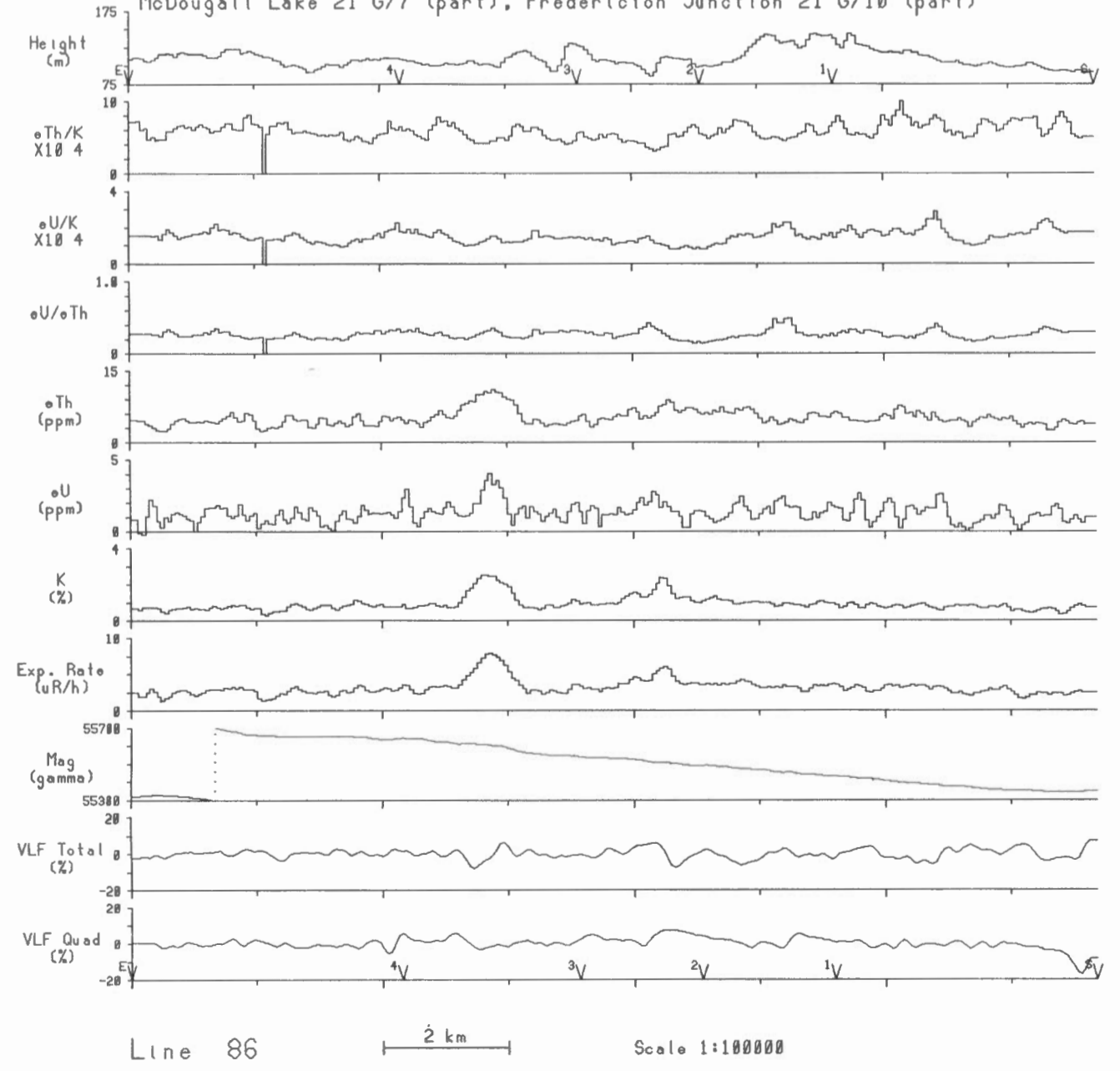
Mount Pleasant Caldera Survey, 1988 (250m line spacing)
McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



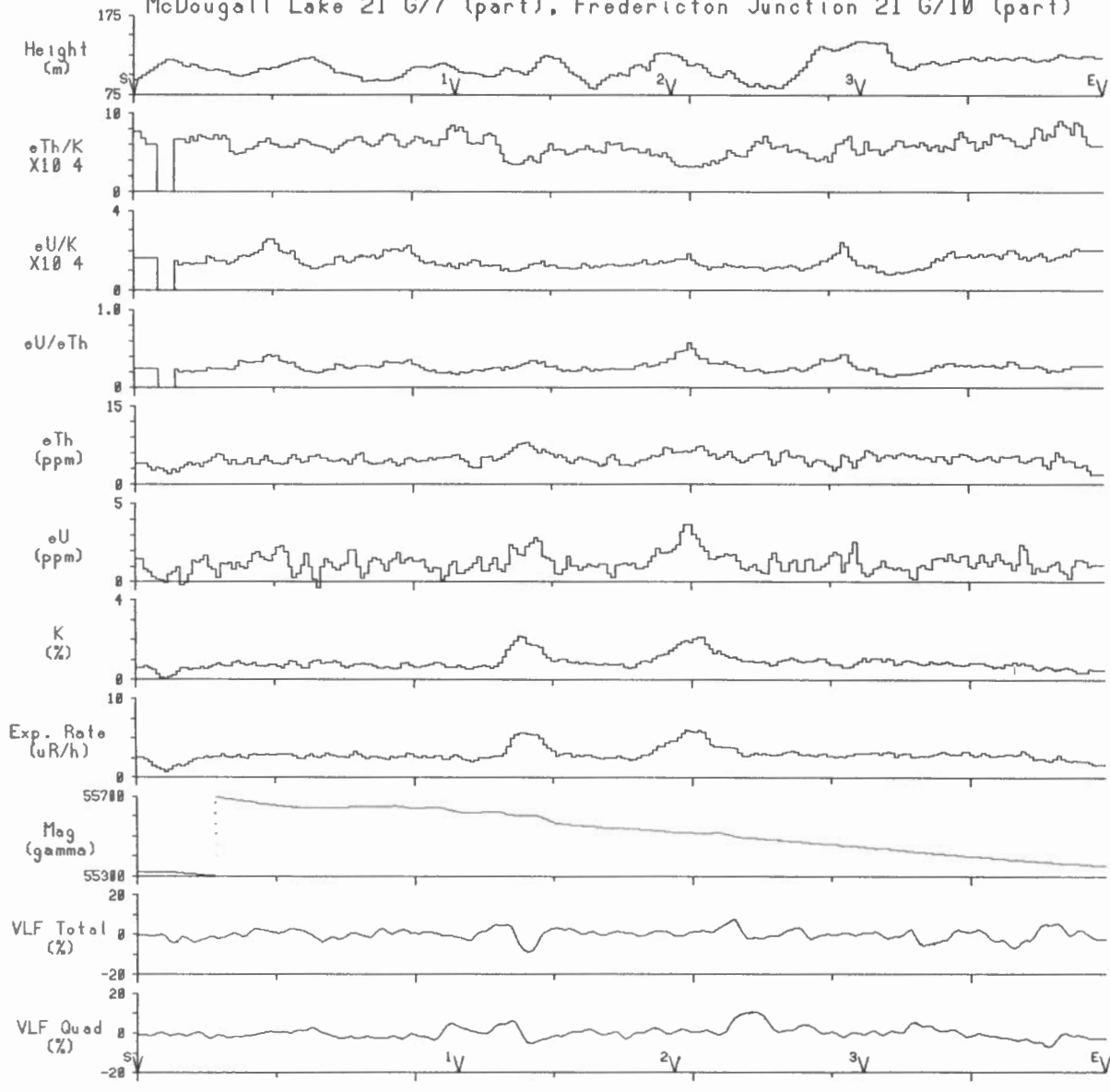
Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)

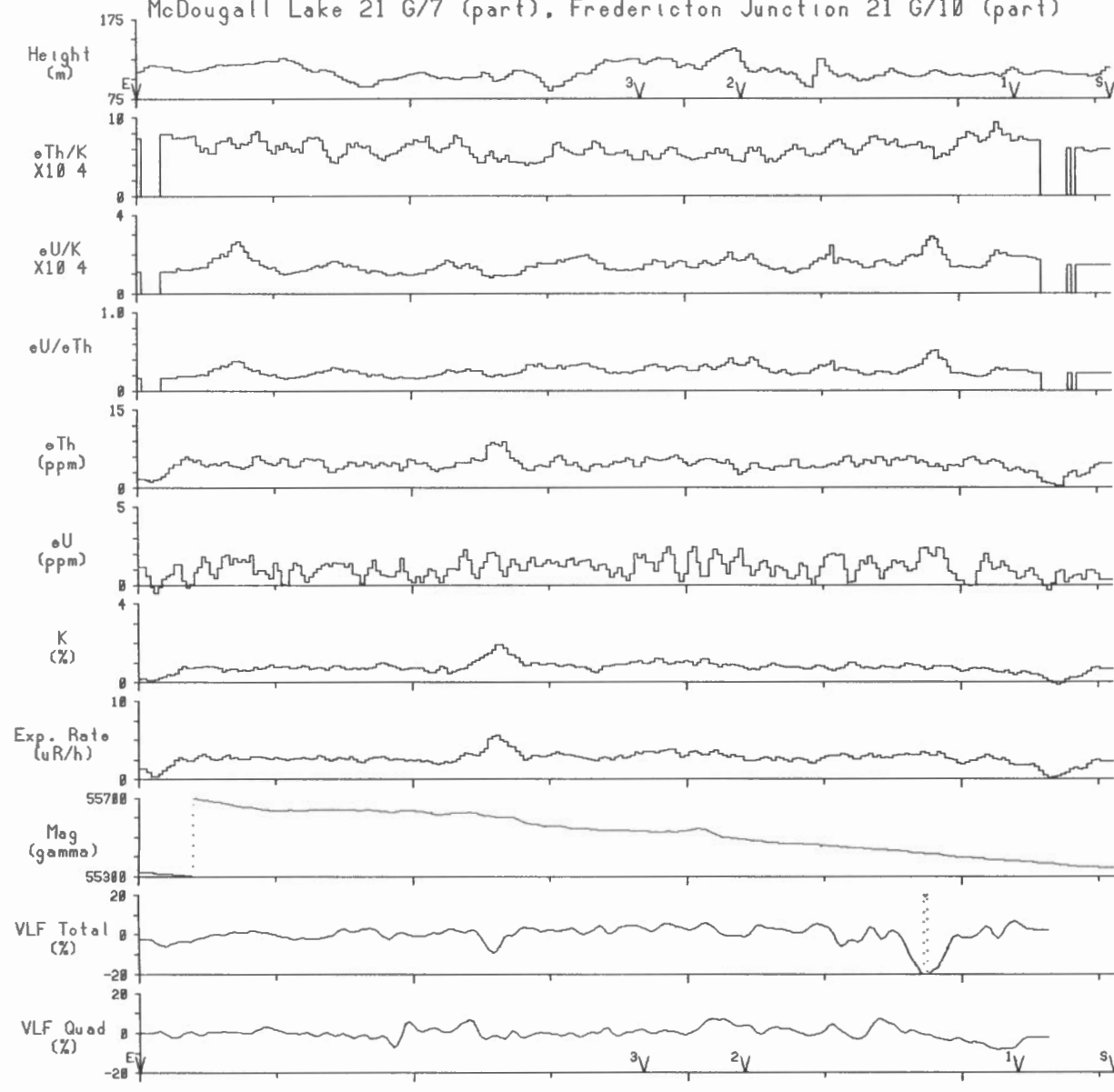


Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



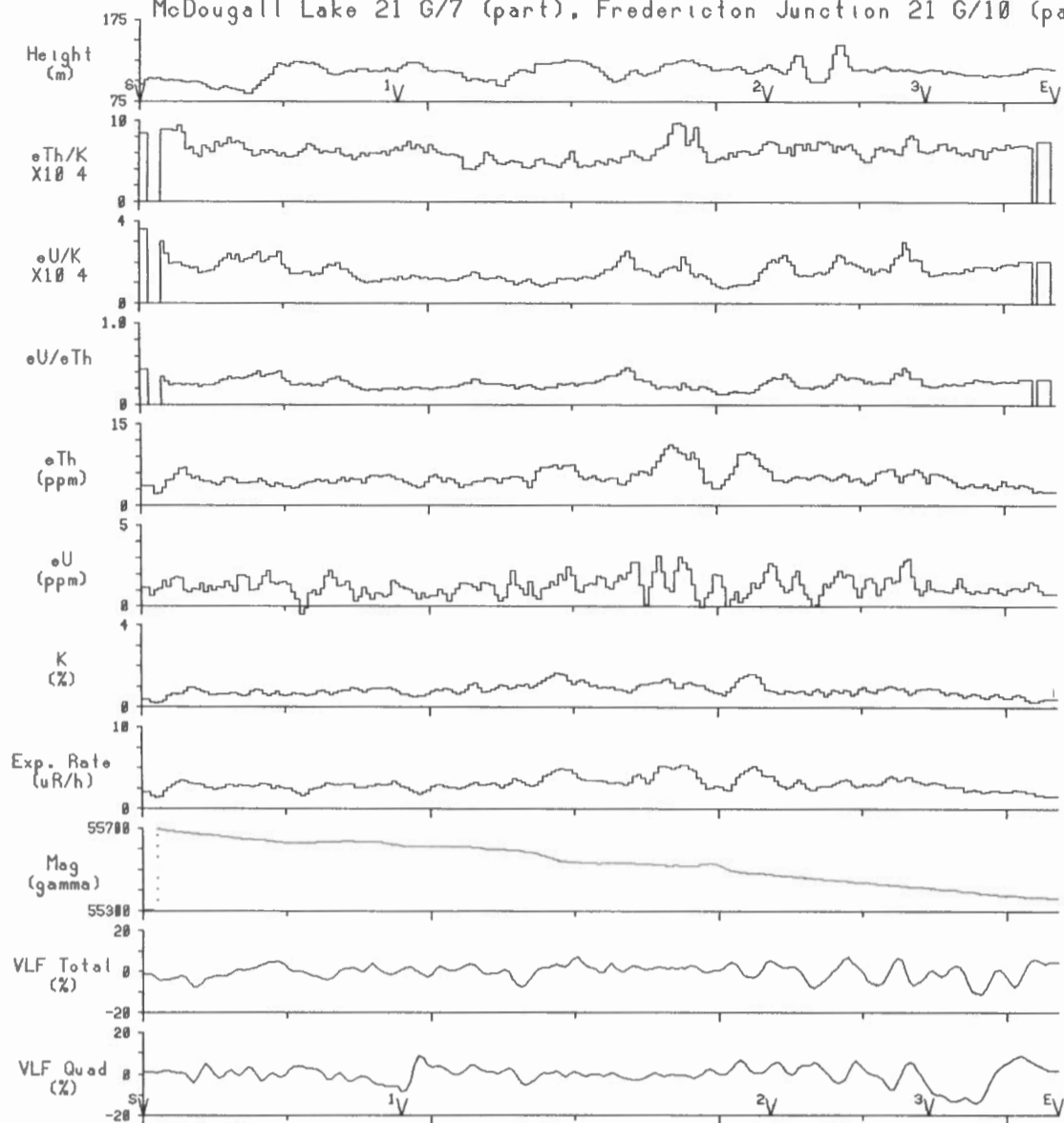
Line 87 2 km Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



Line 88 2 km Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)

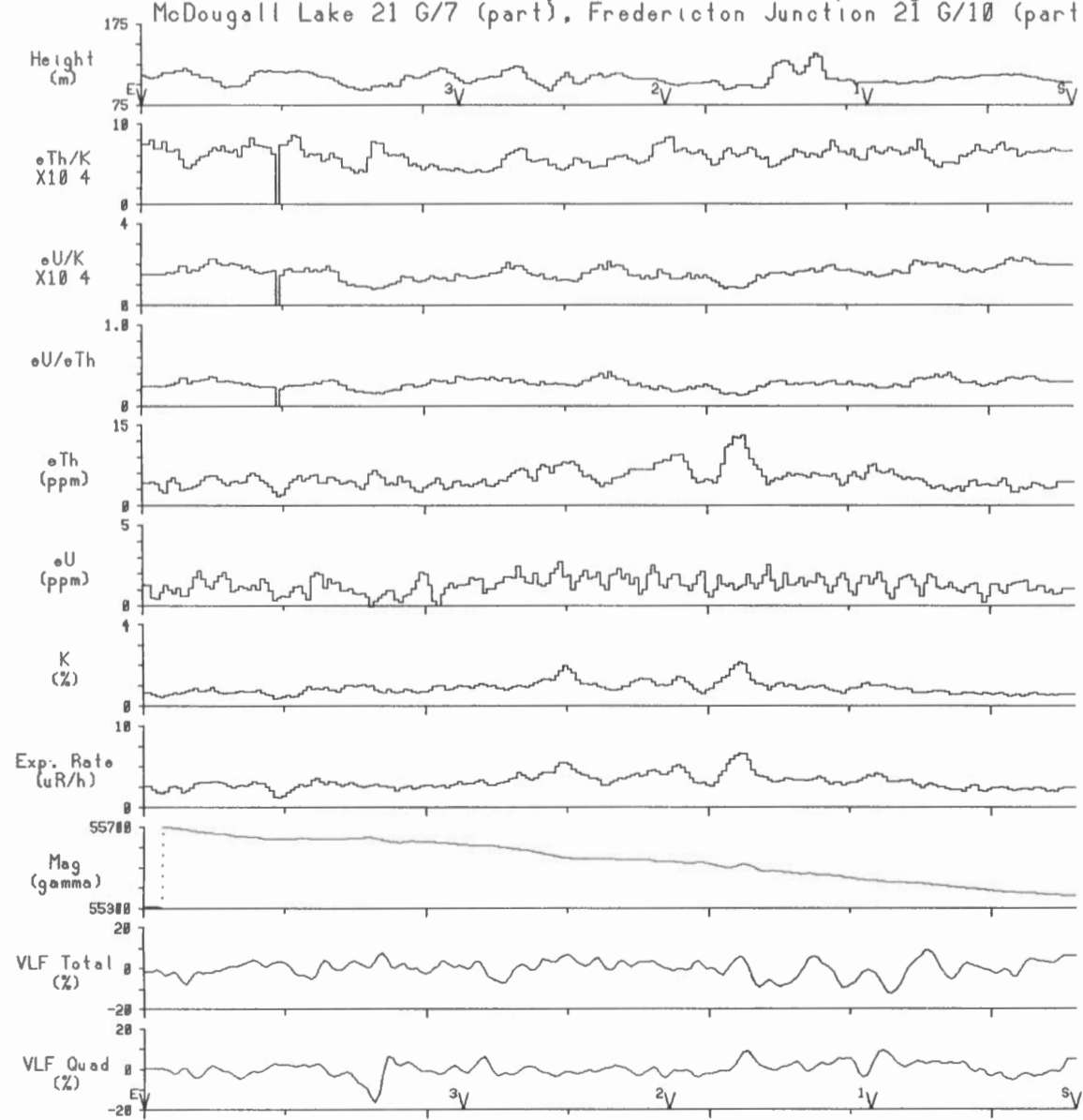


Line 89

2 km

Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)

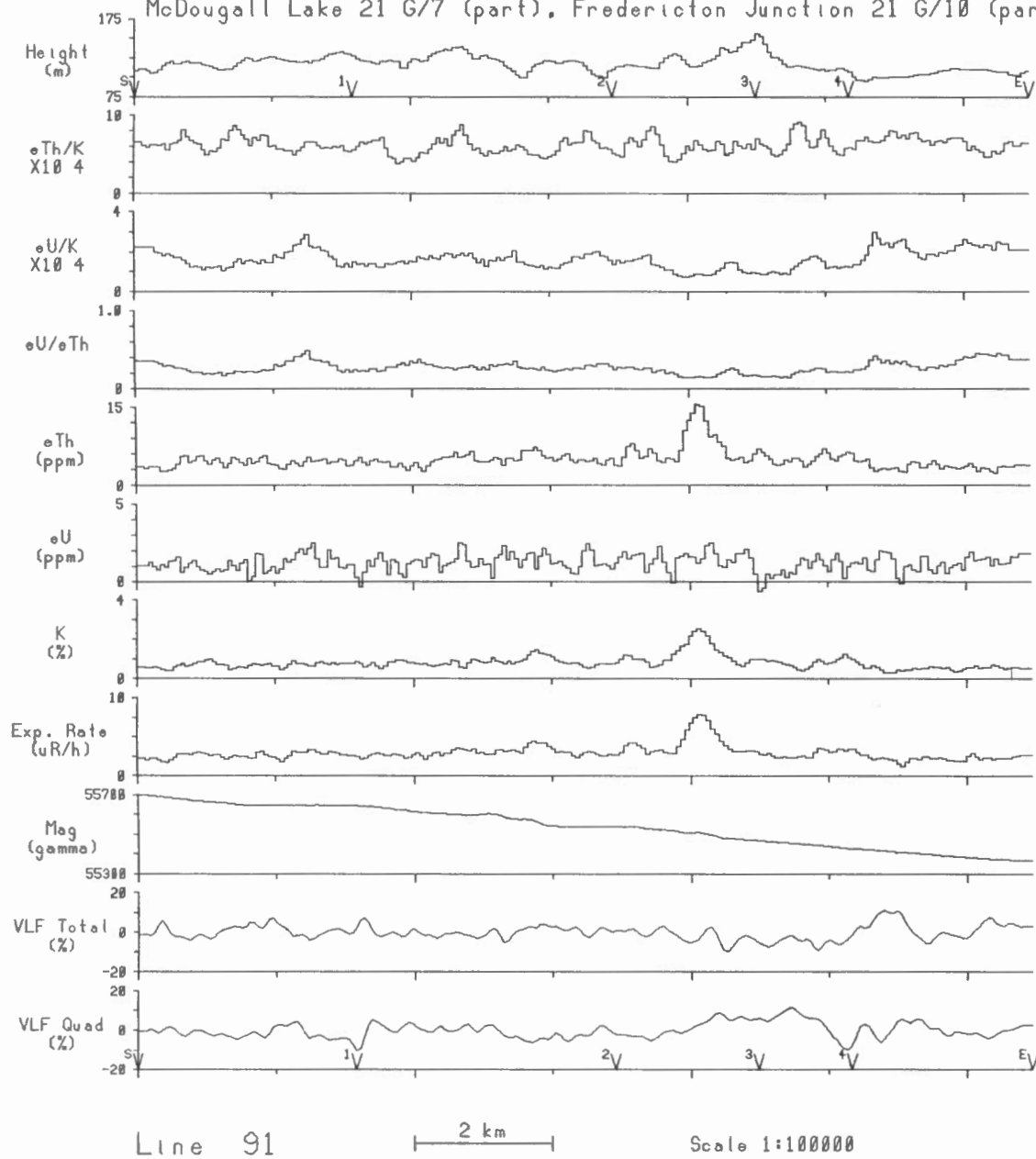


Line 90

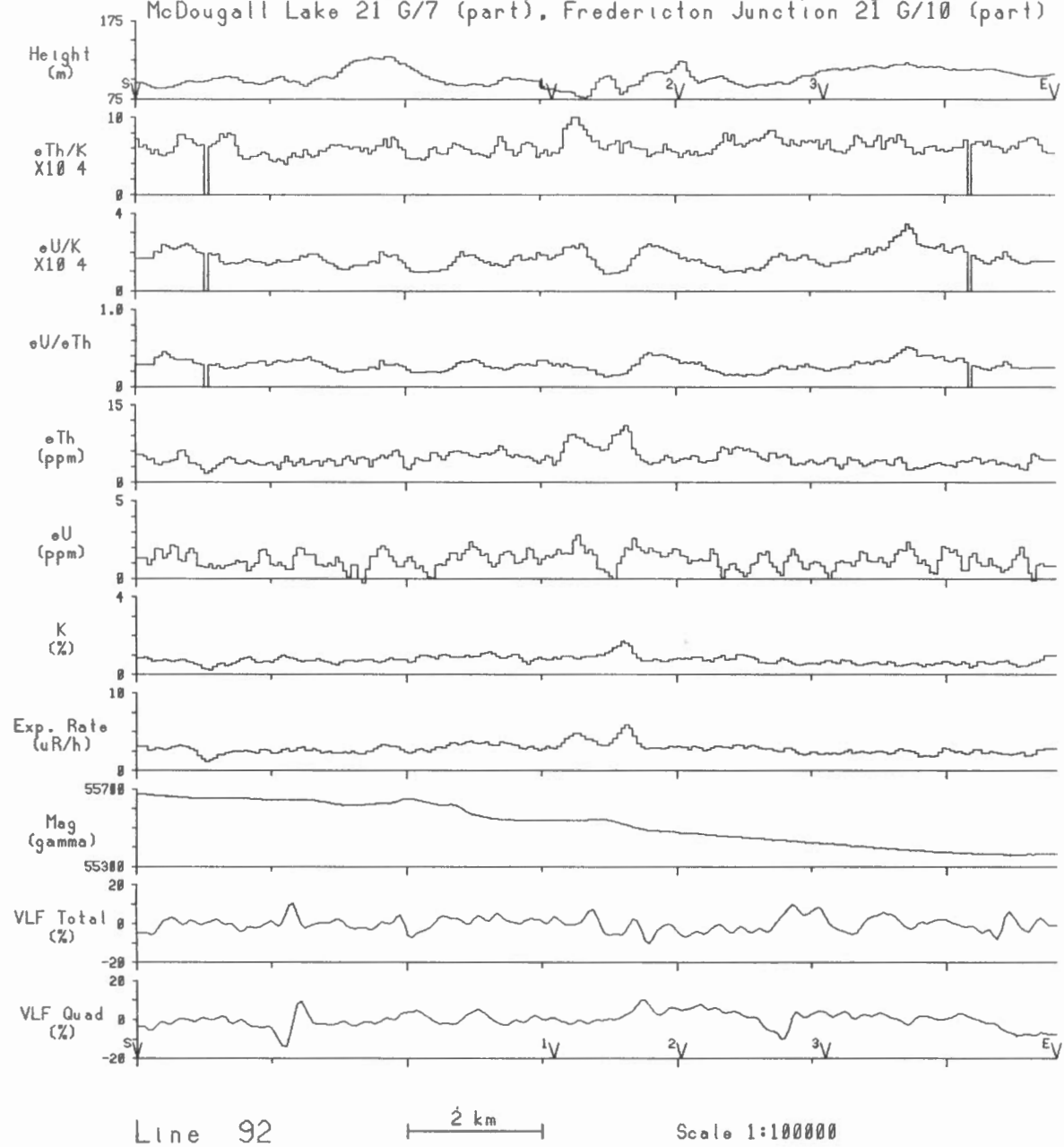
2 km

Scale 1:100000

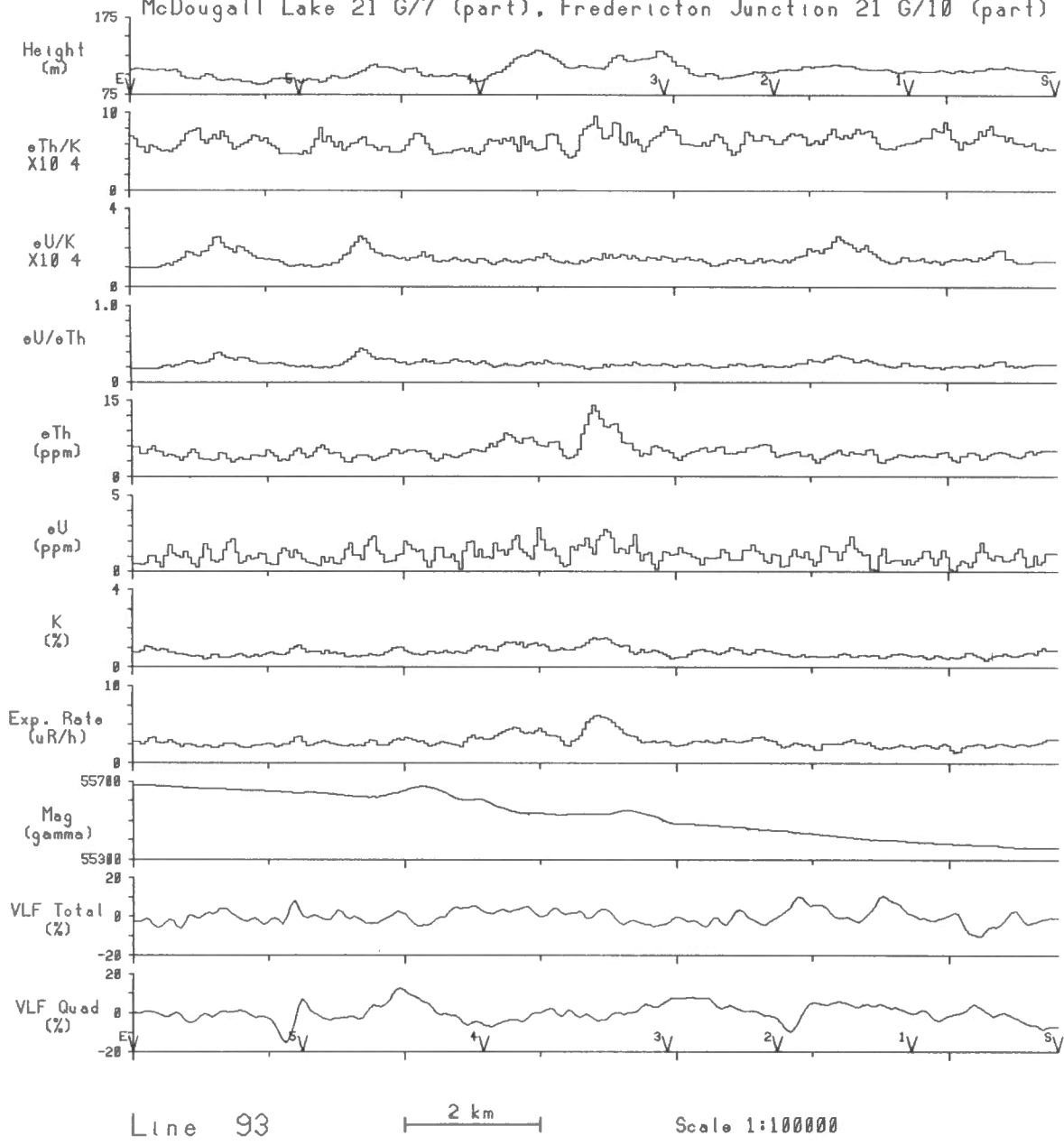
Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



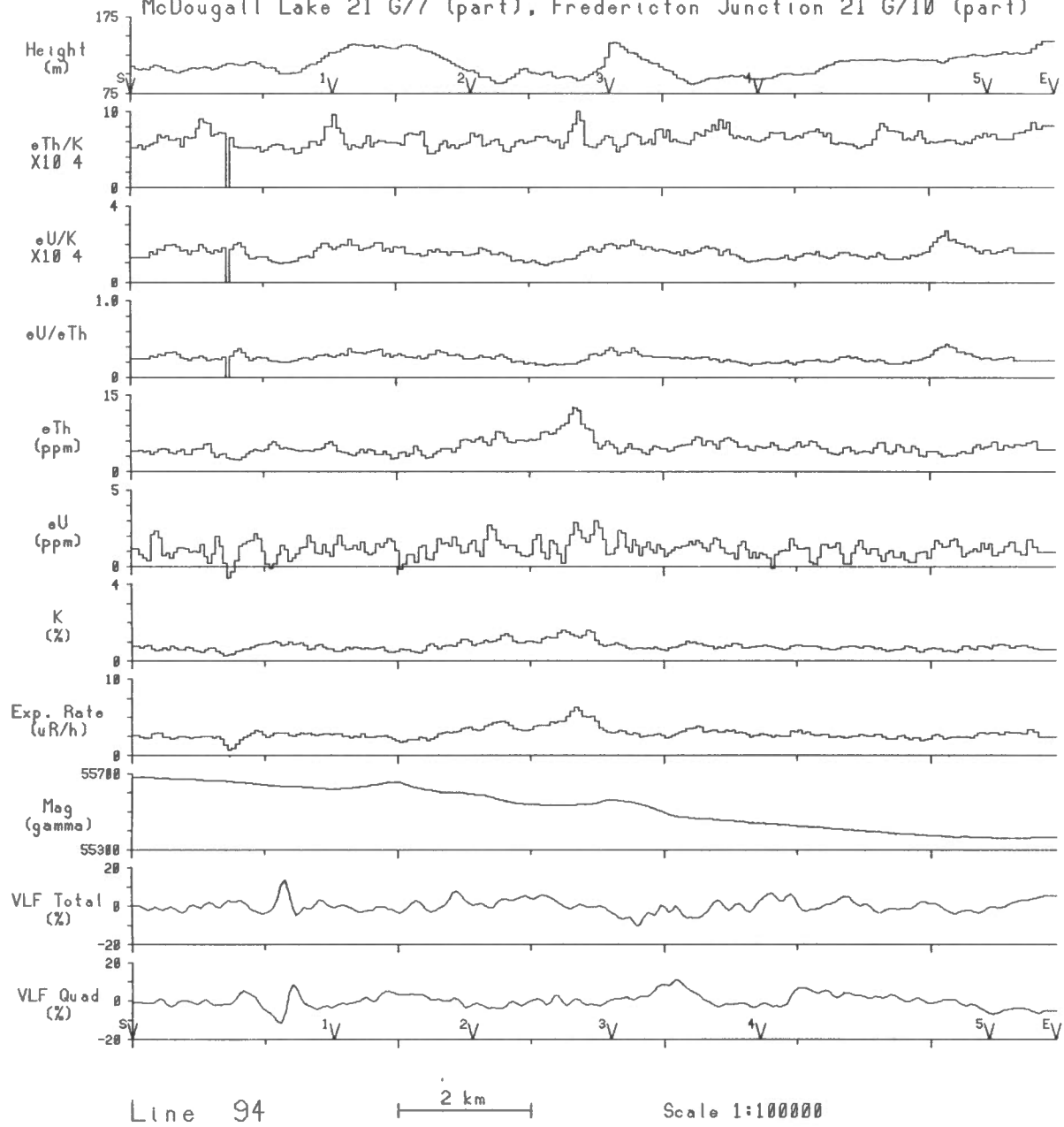
Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



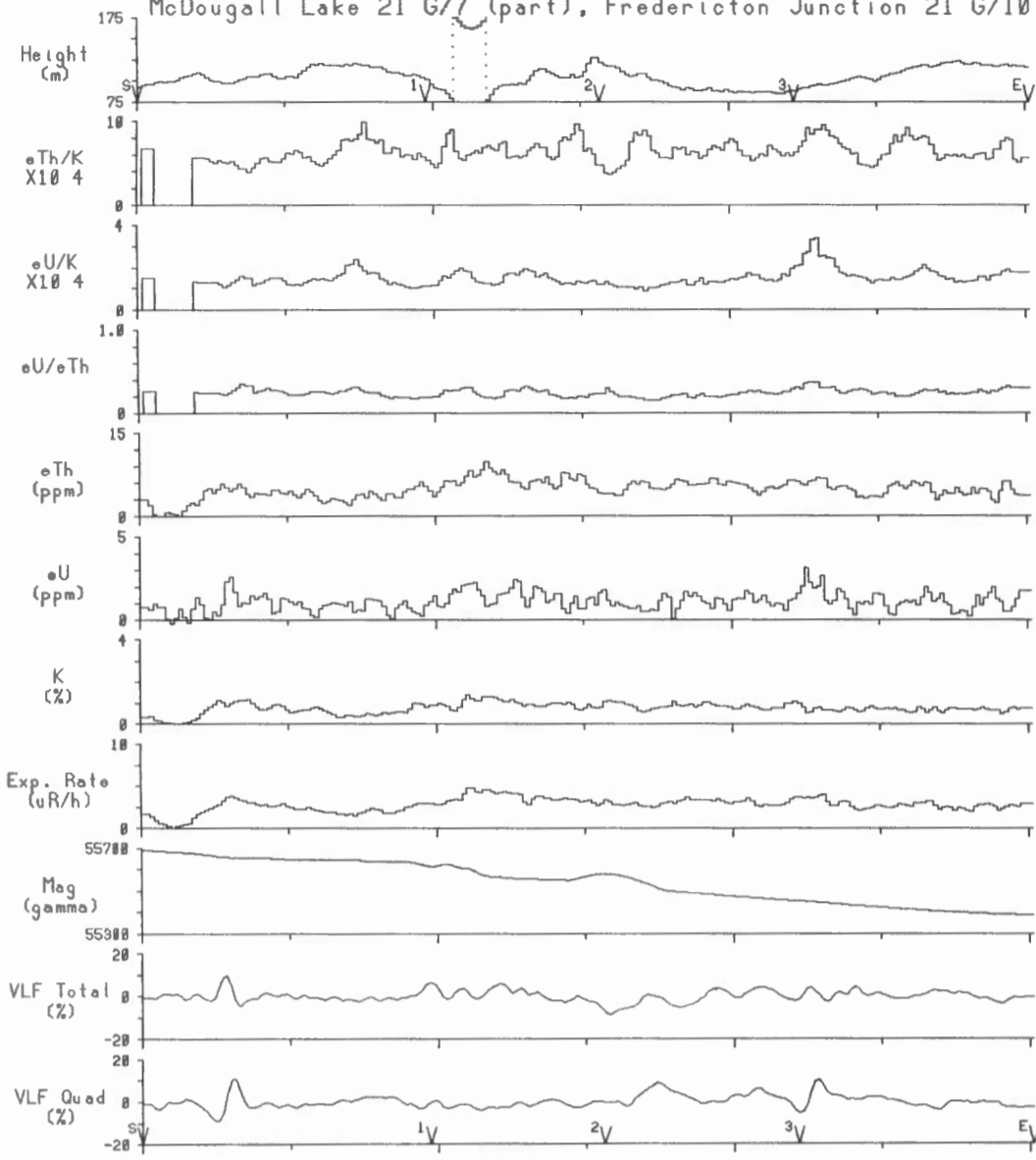
Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)

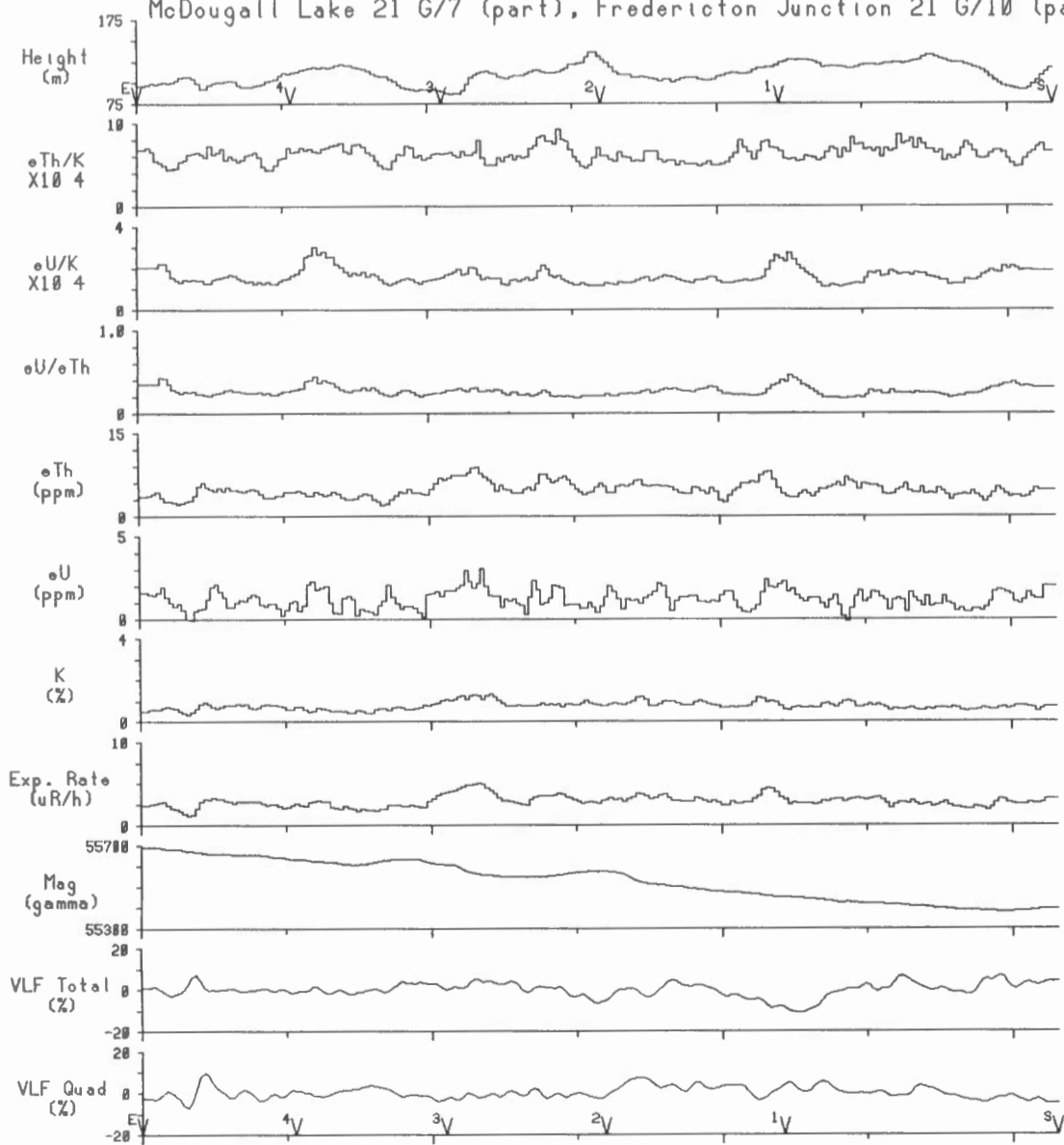


Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



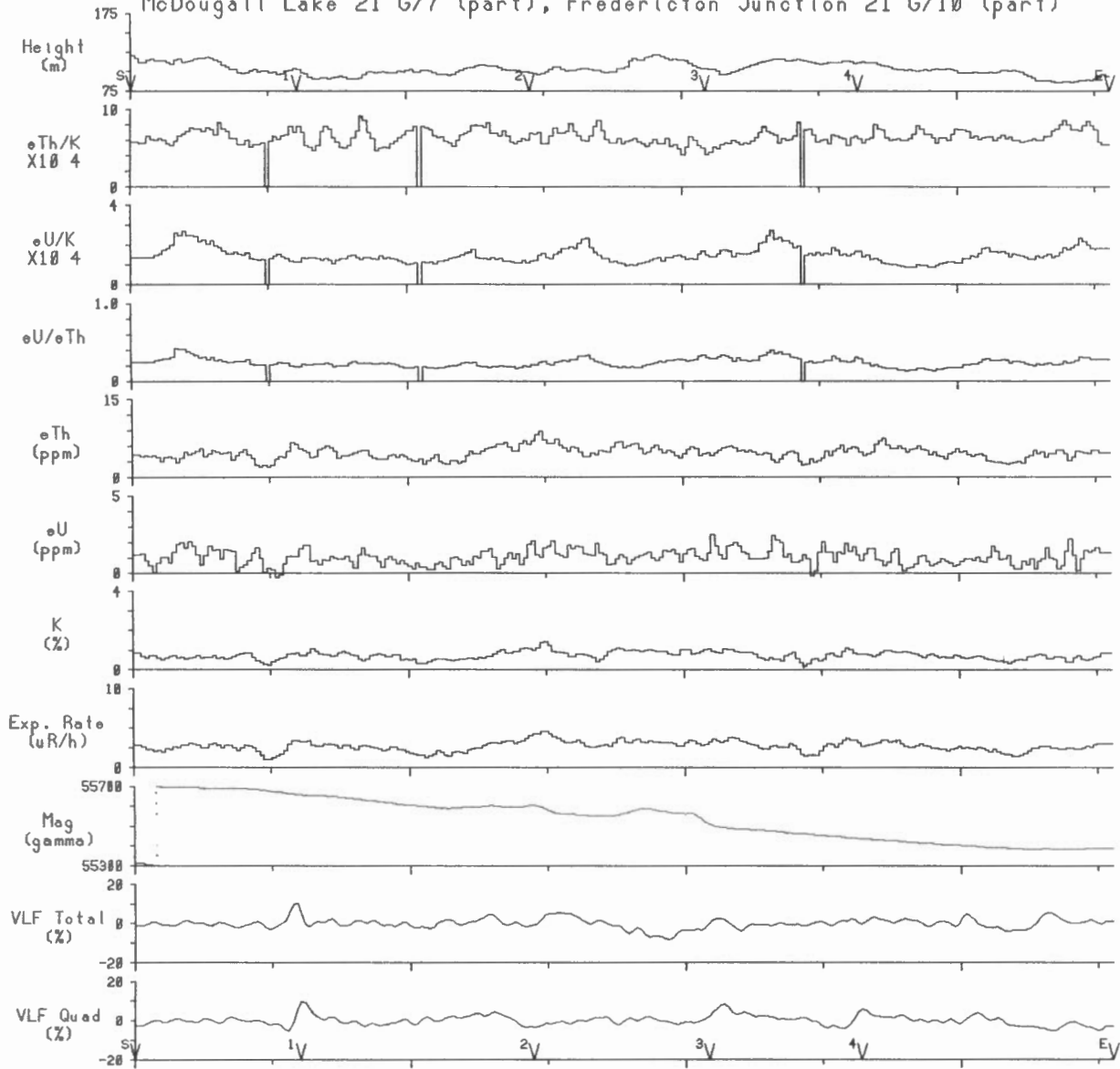
Line 95 2 km Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



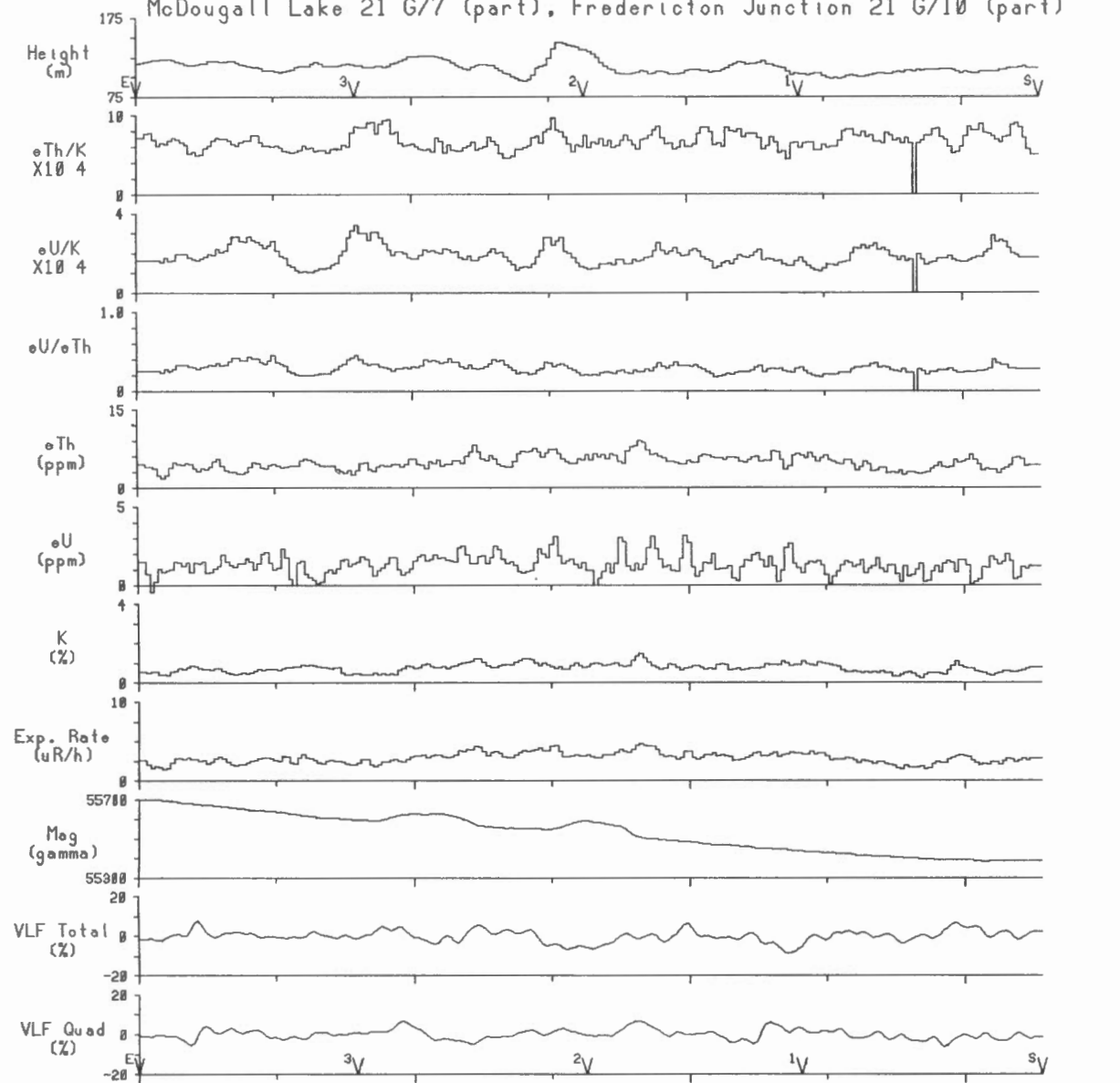
Line 96 2 km Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



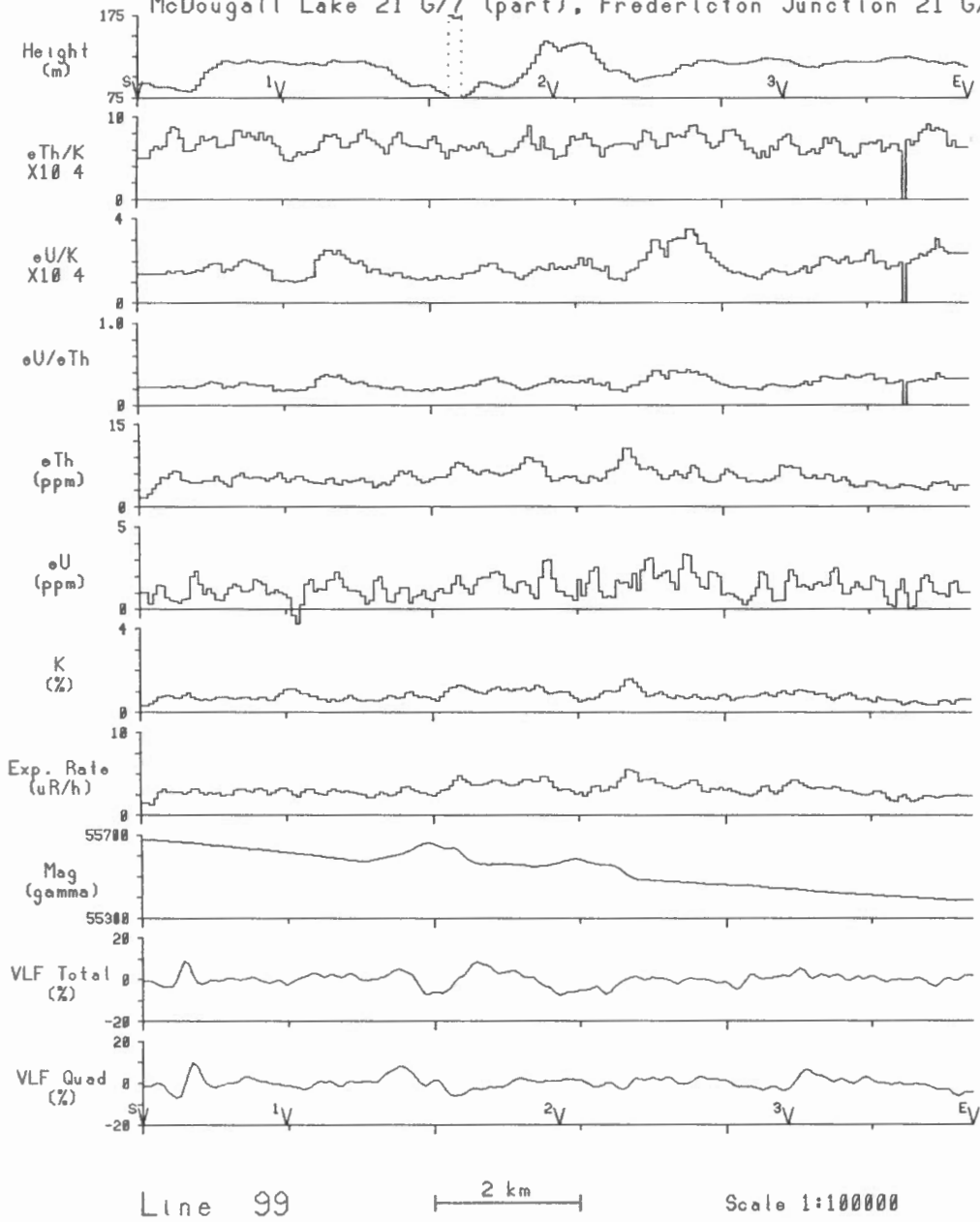
Line 97 2 km Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)

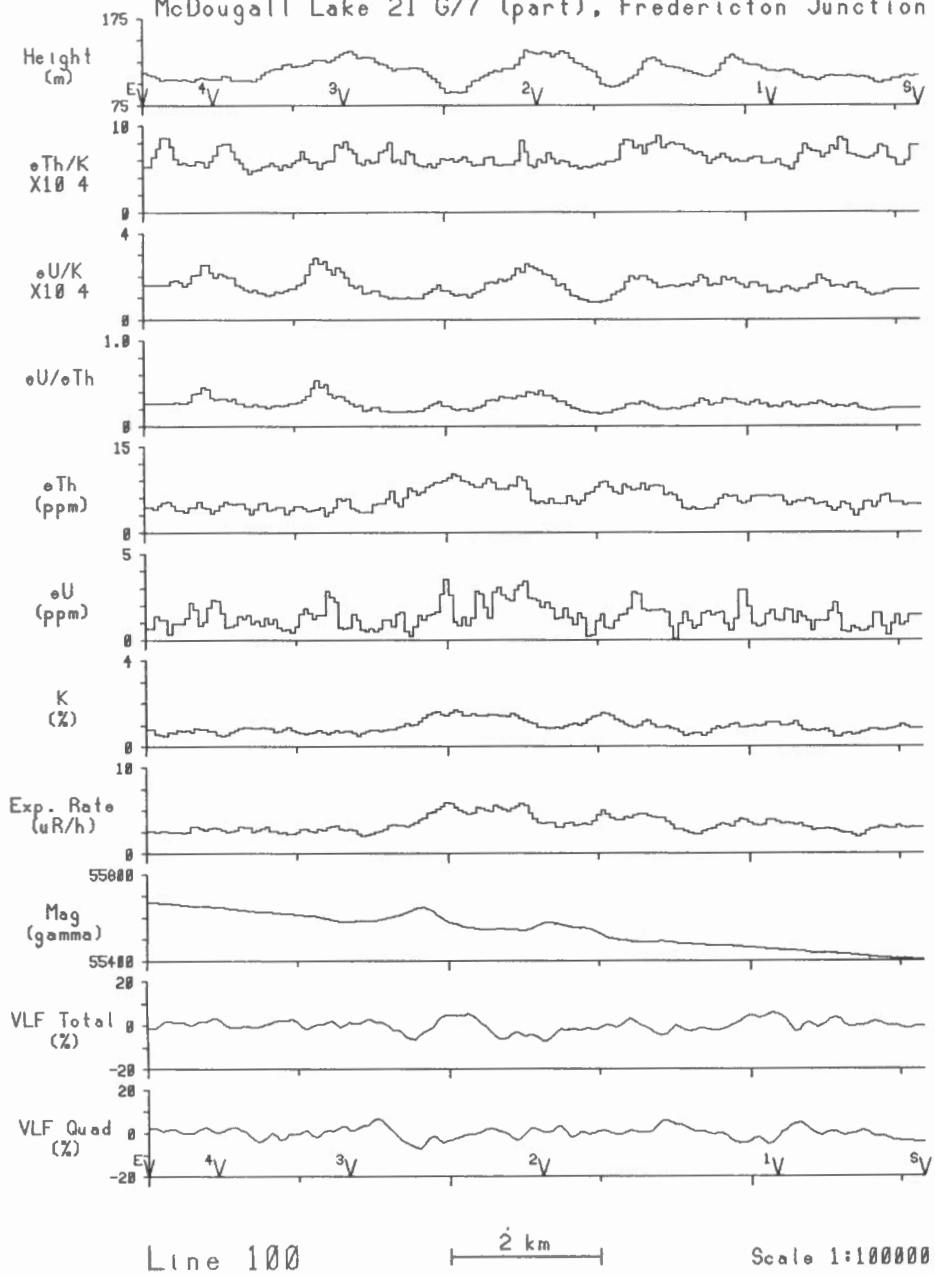


Line 98 2 km Scale 1:100000

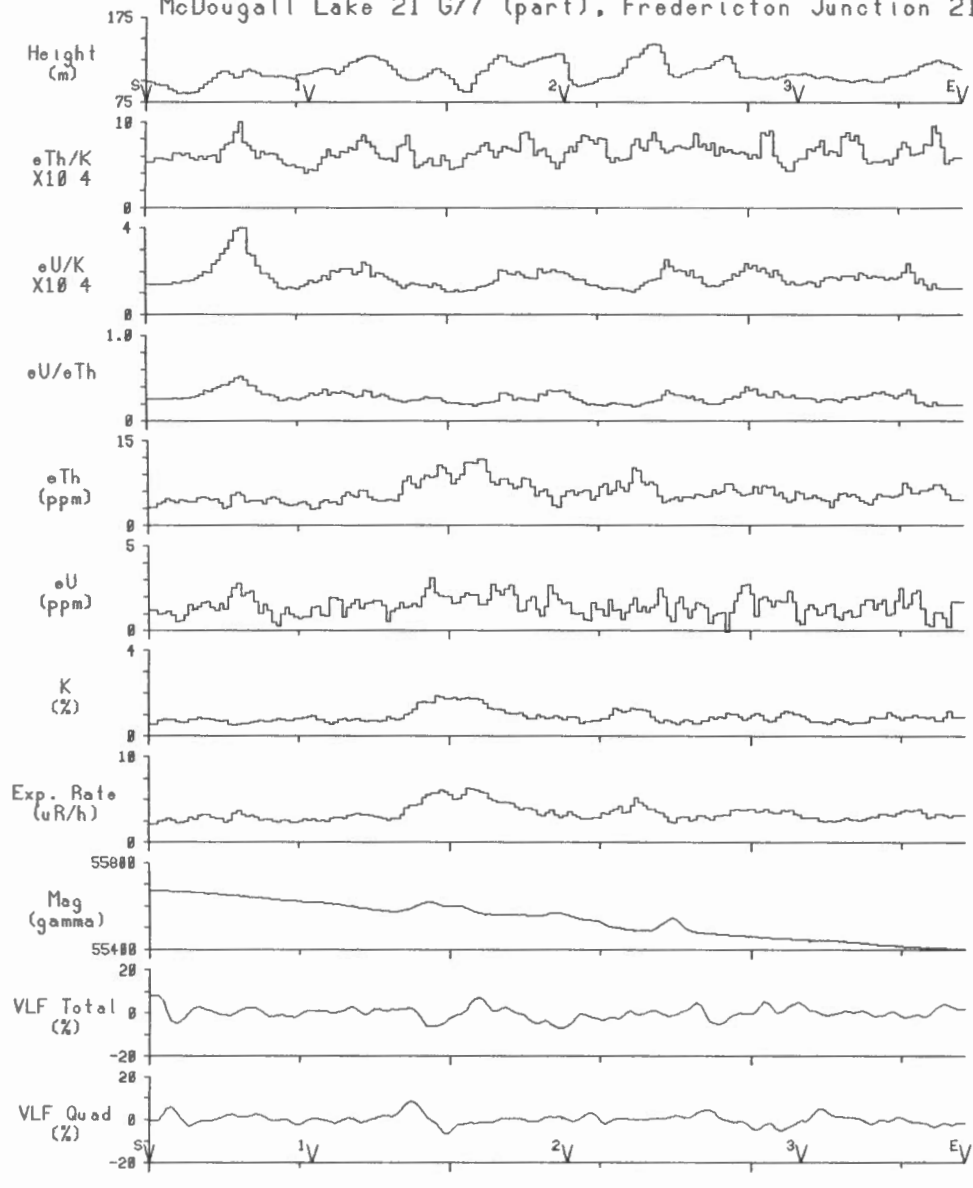
Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)

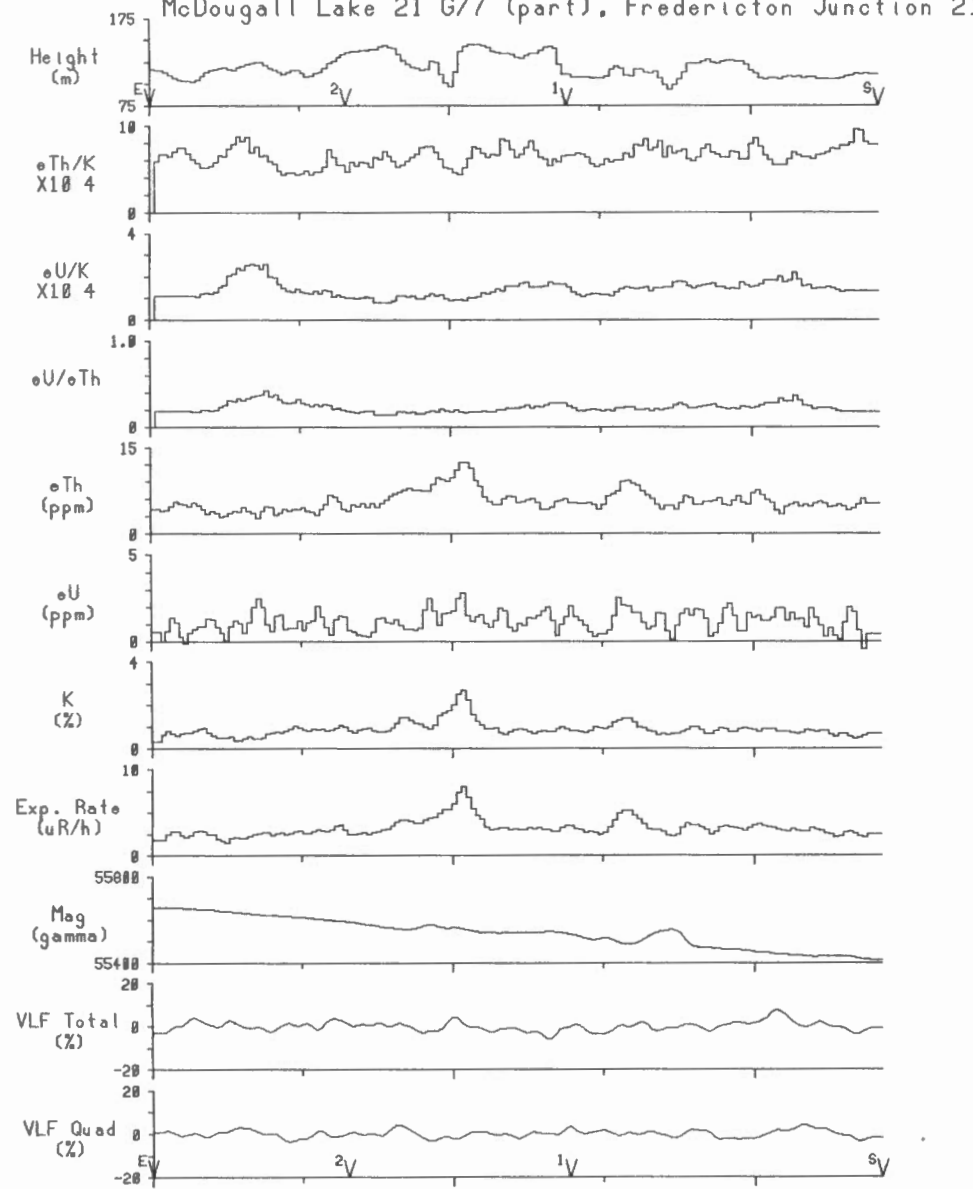


Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



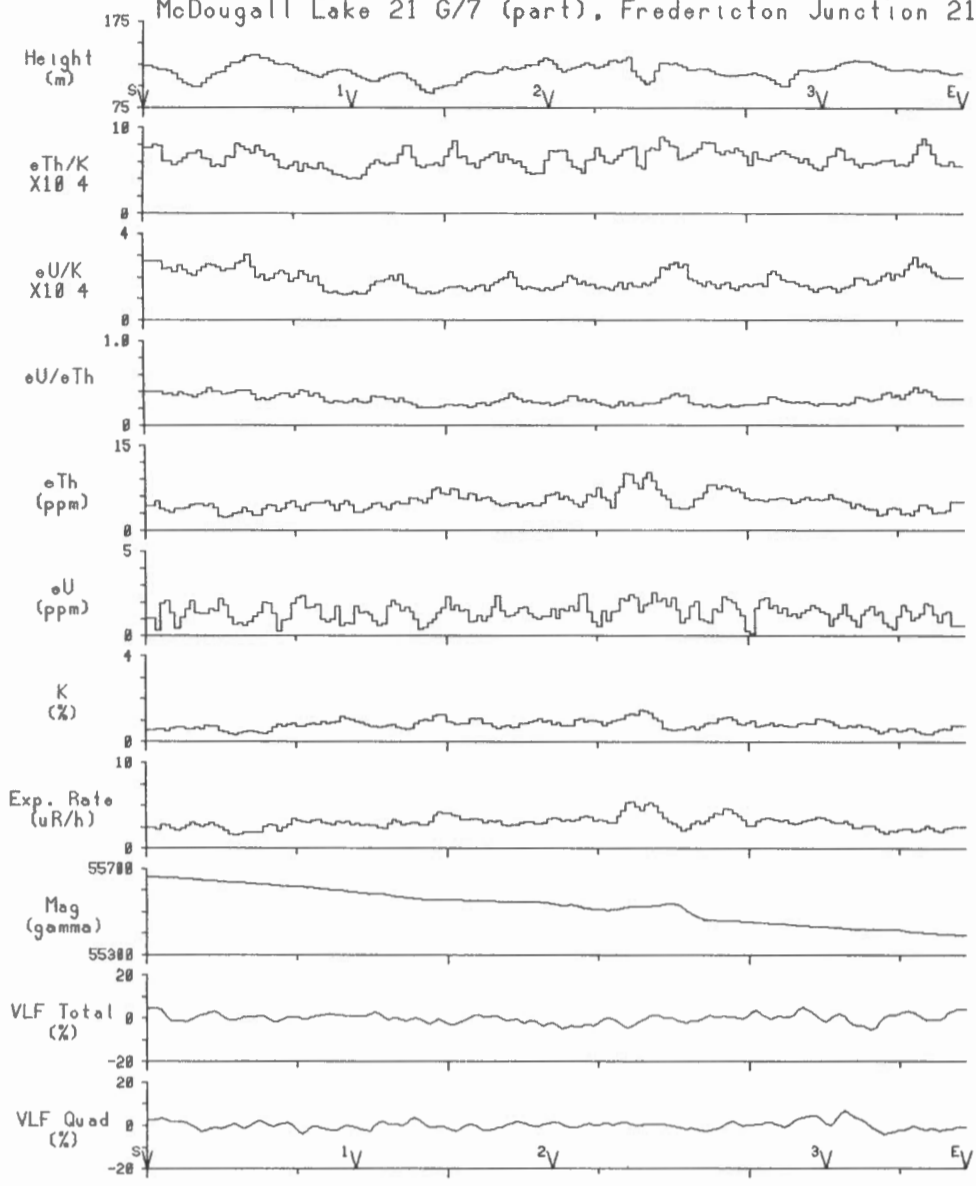
Line 101 2 km Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



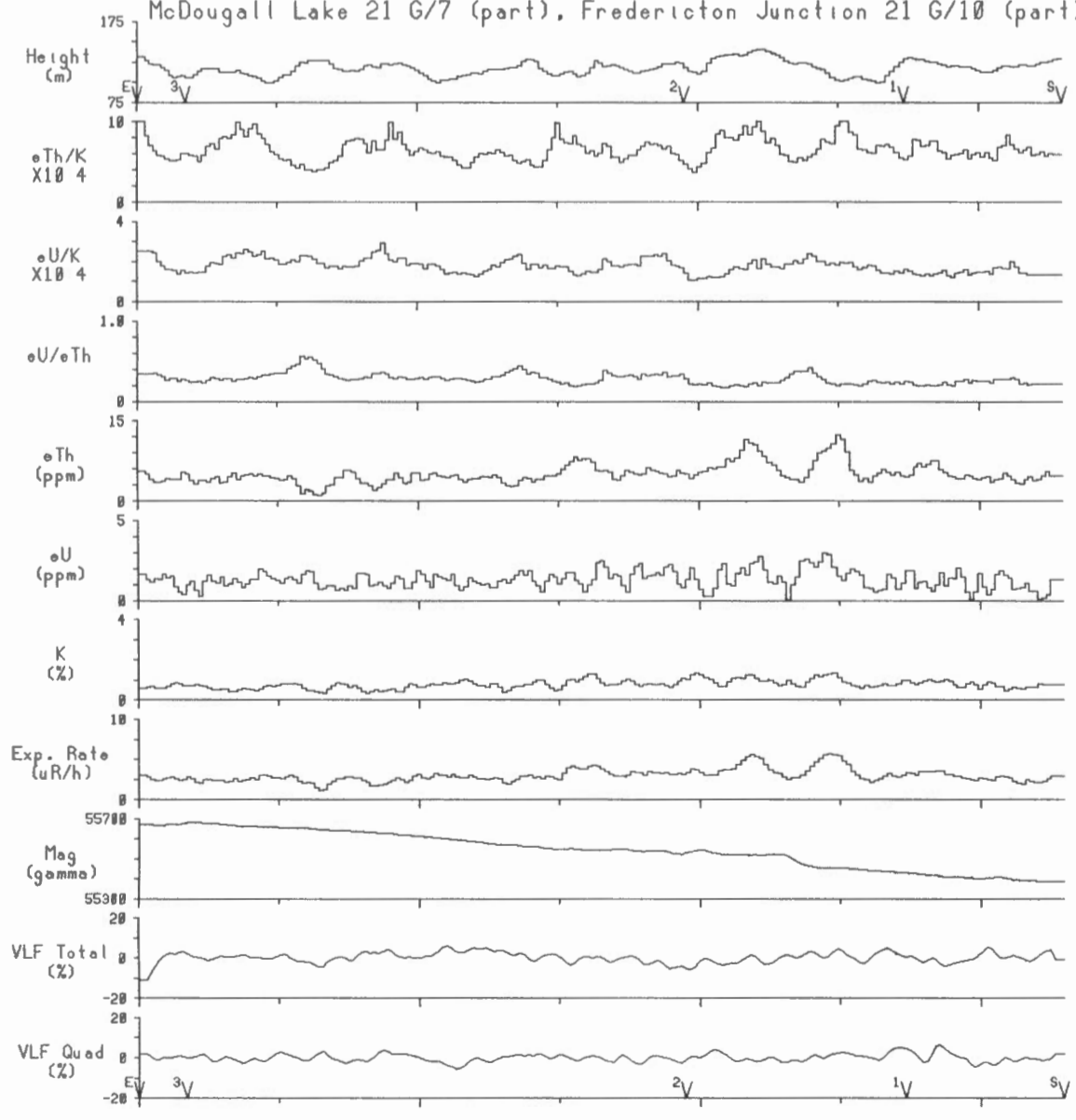
Line 102 2 km Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



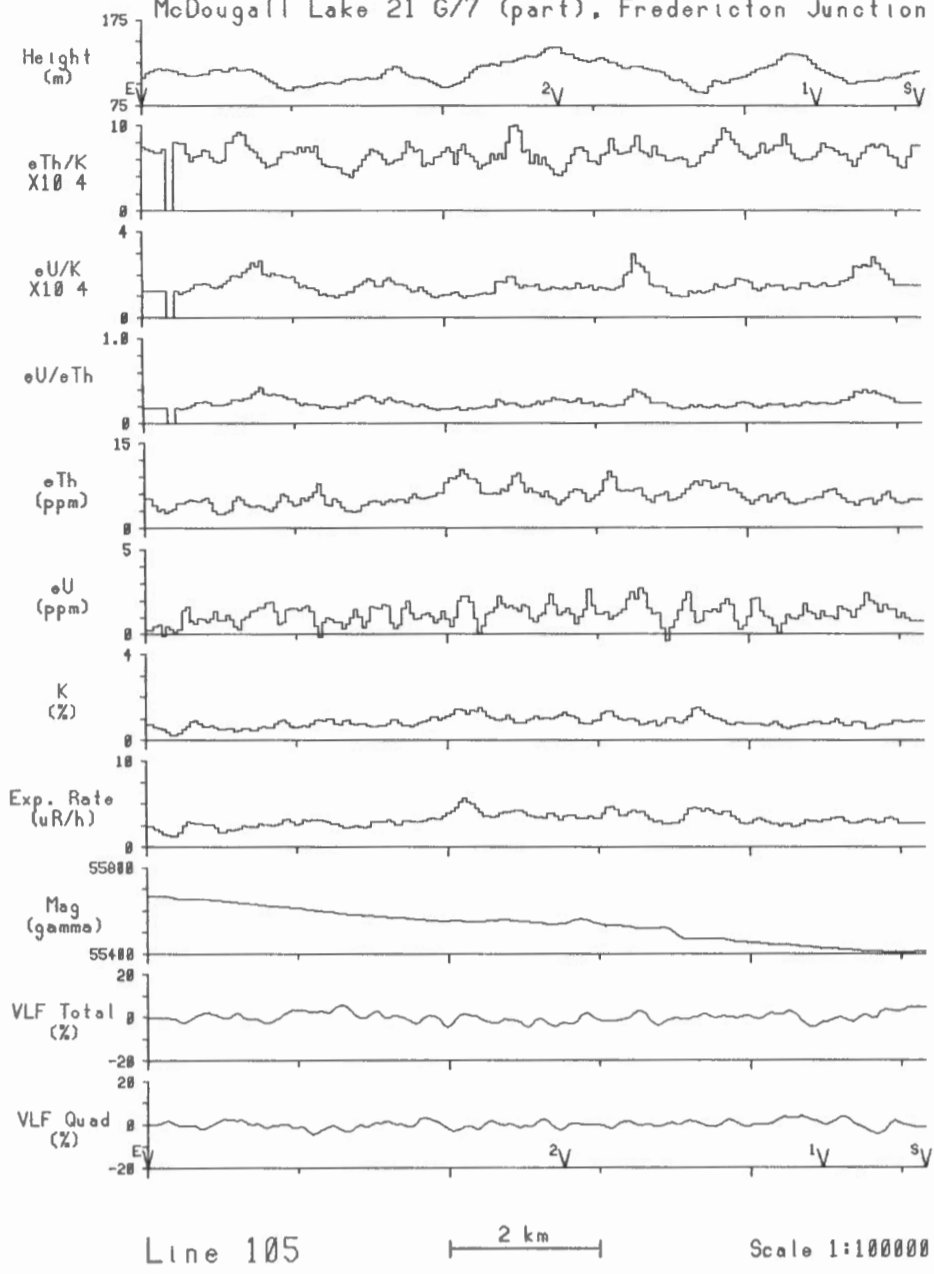
Line 103 2 km Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)

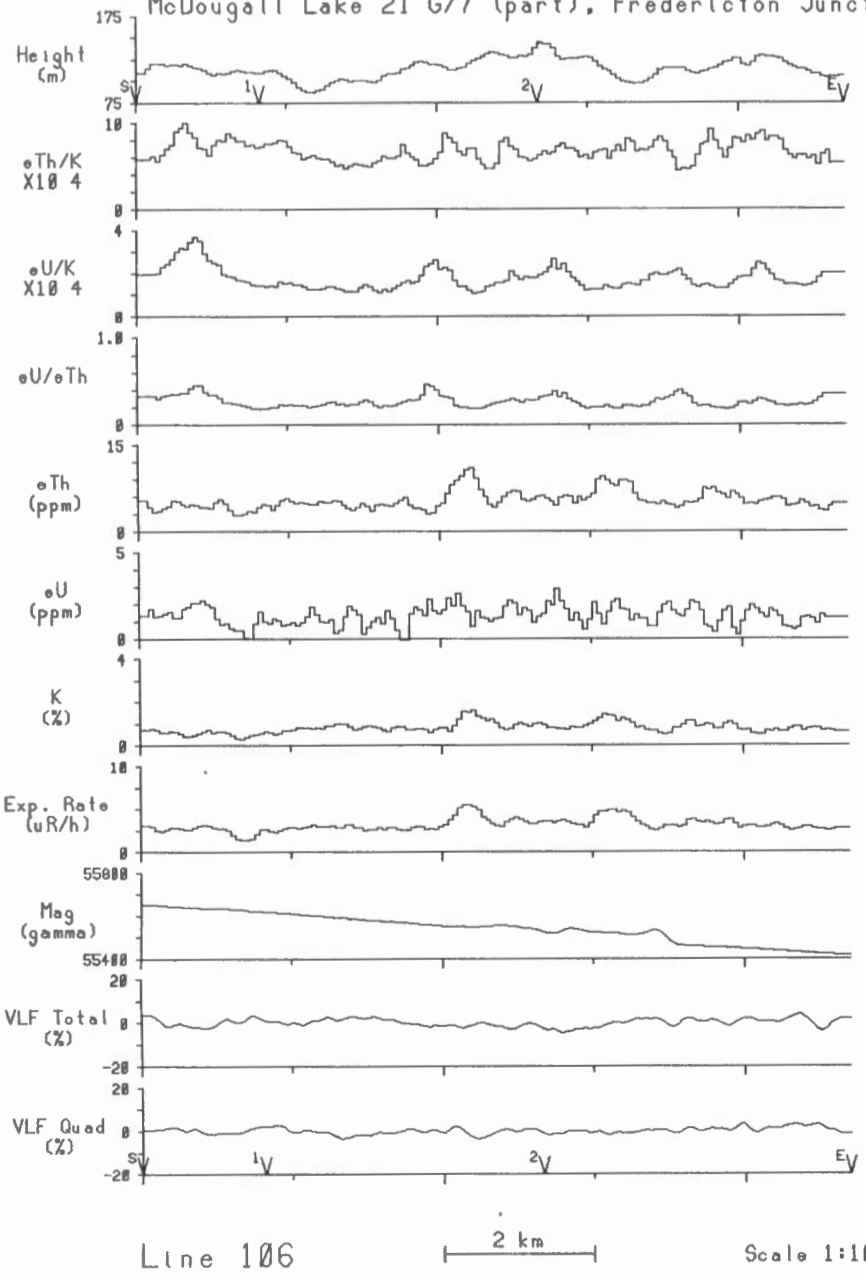


Line 104 2 km Scale 1:100000

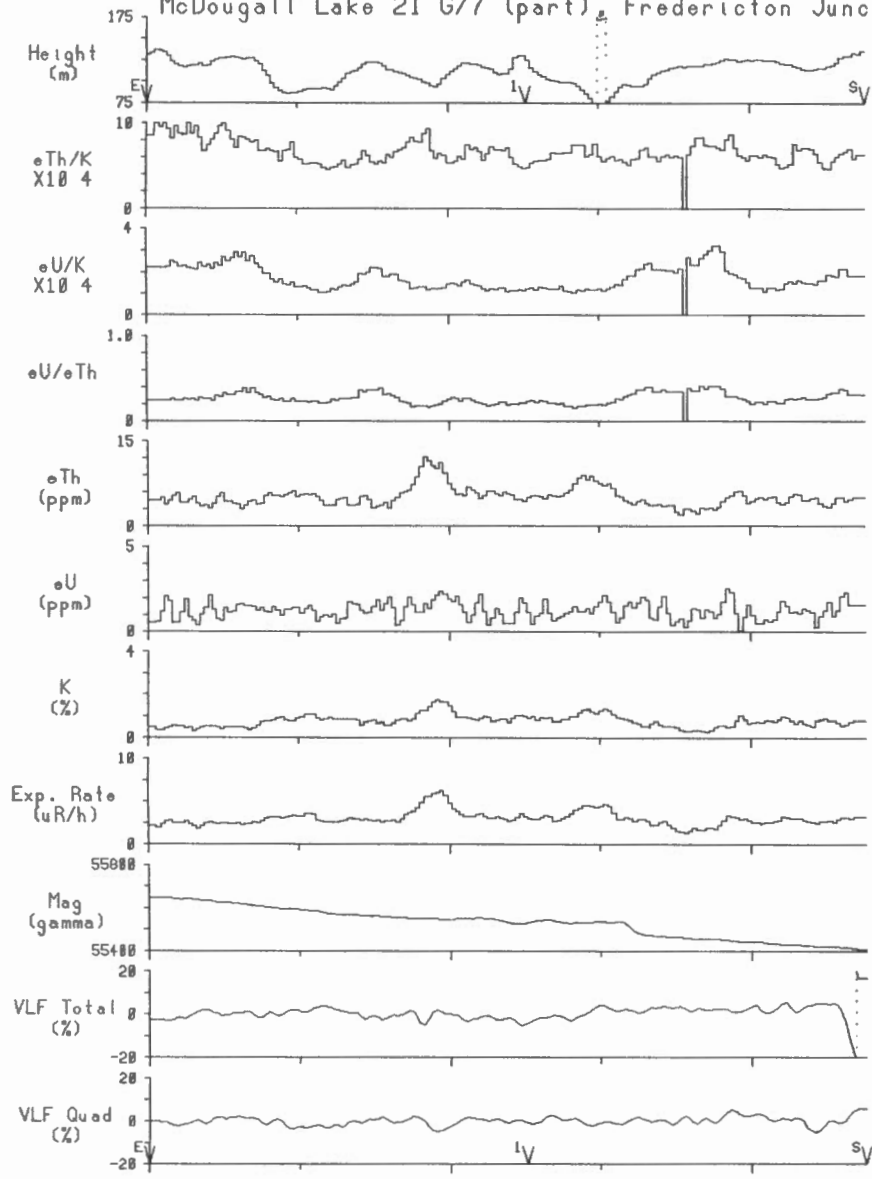
Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)

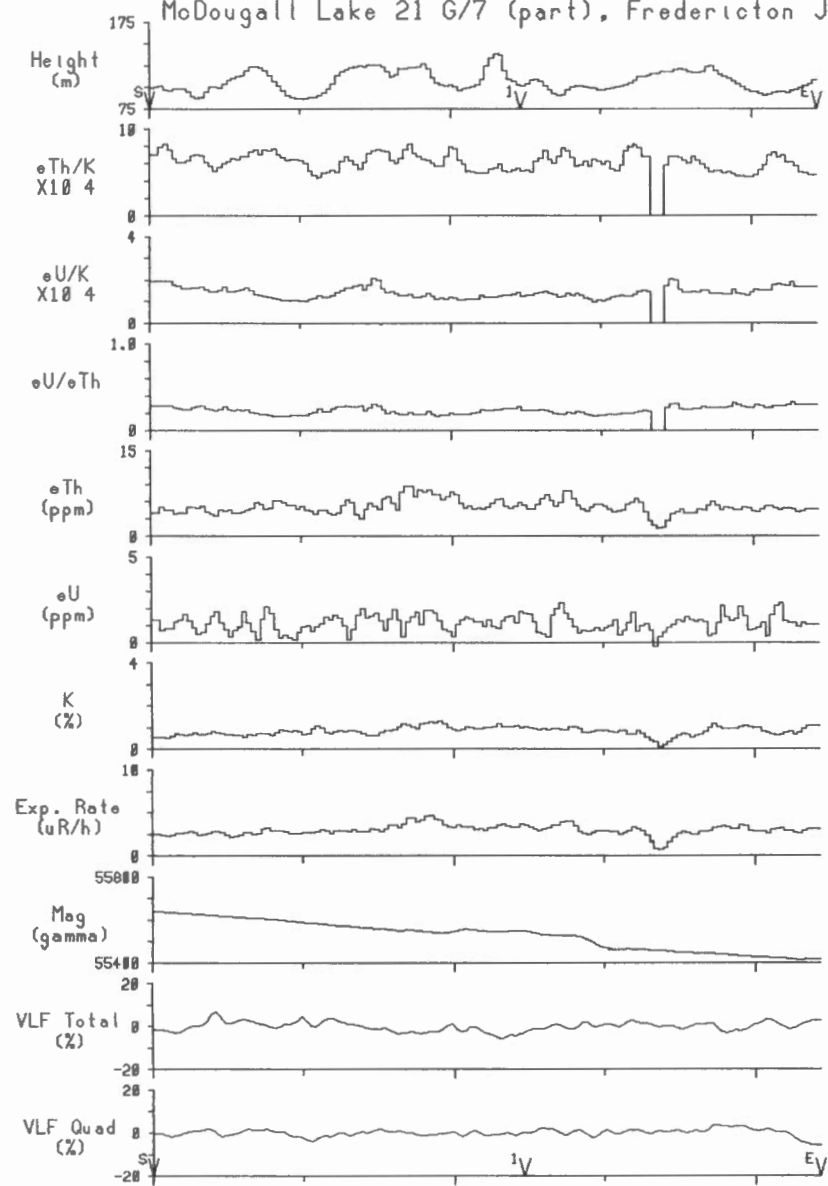


Line 107

2 km

Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)

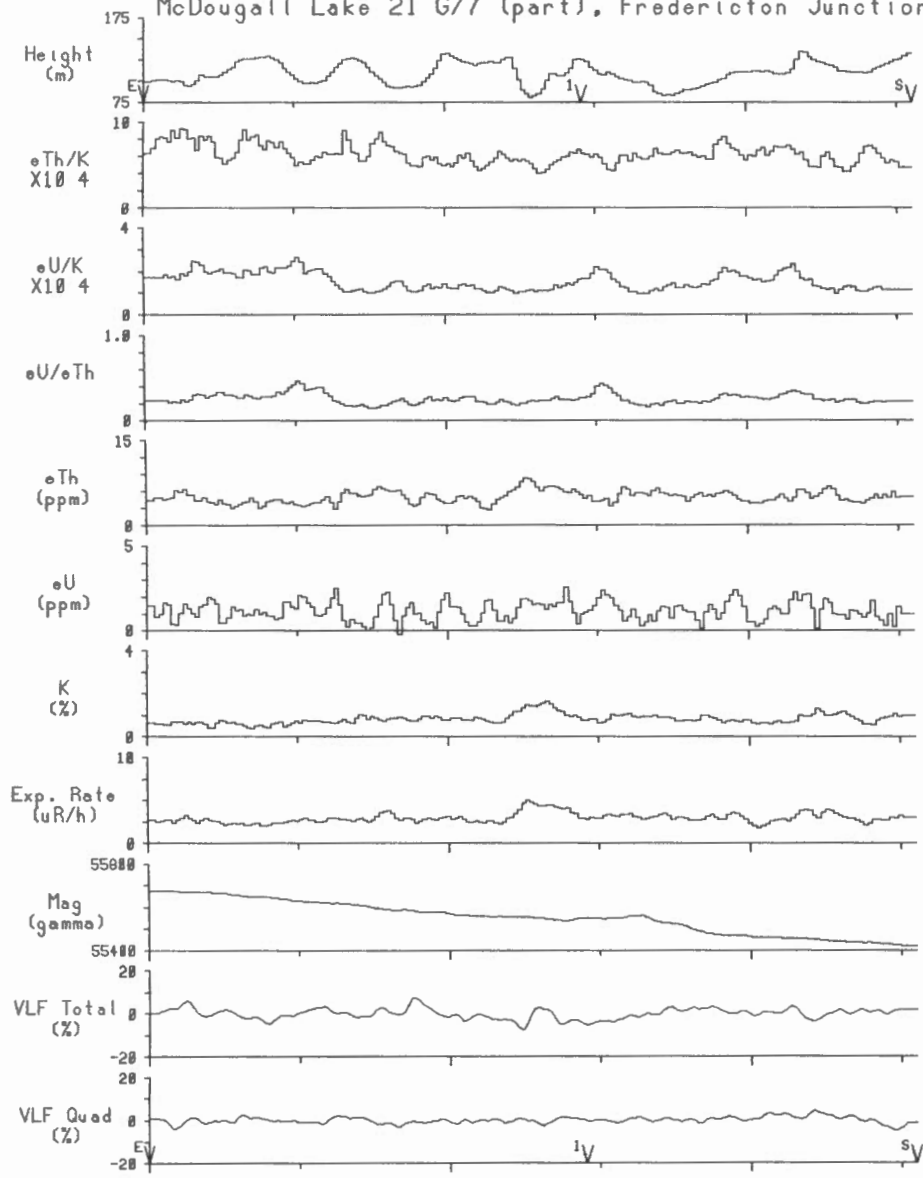


Line 108

2 km

Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)

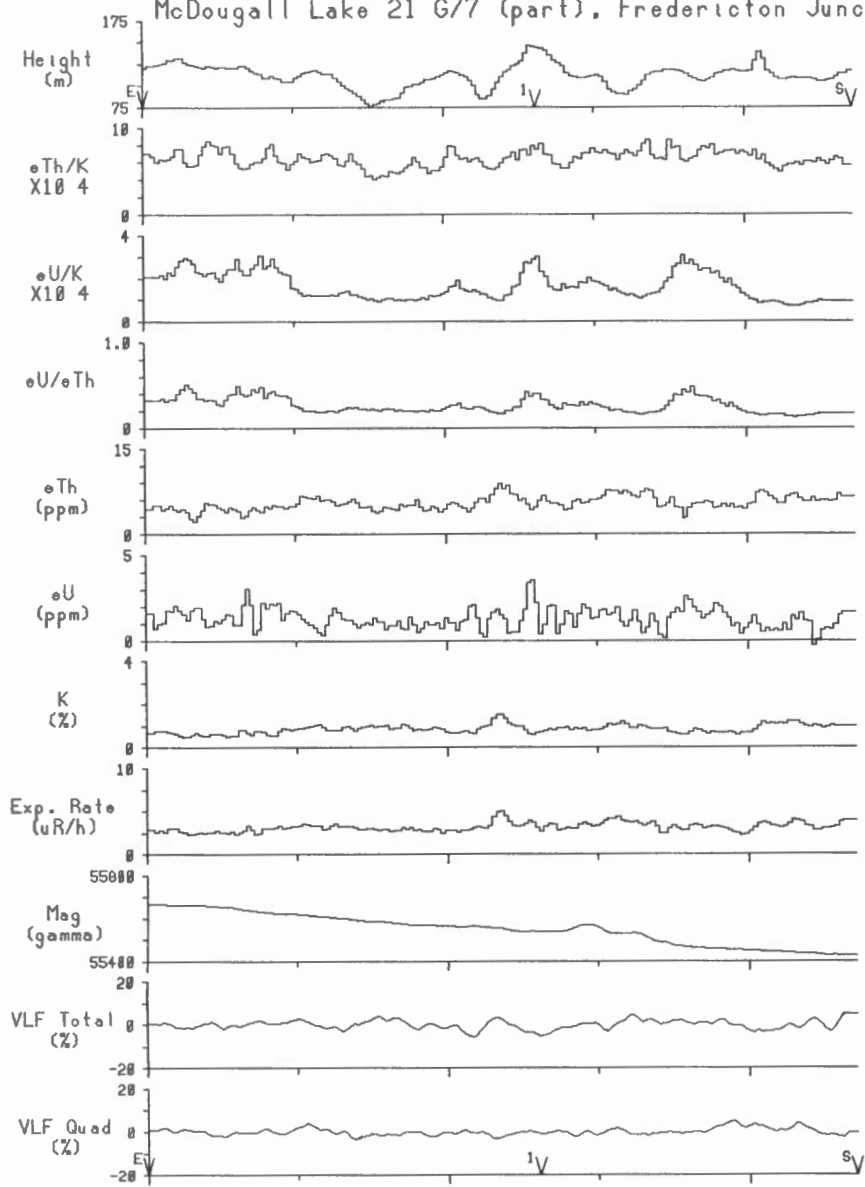


Line 109

2 km

Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)

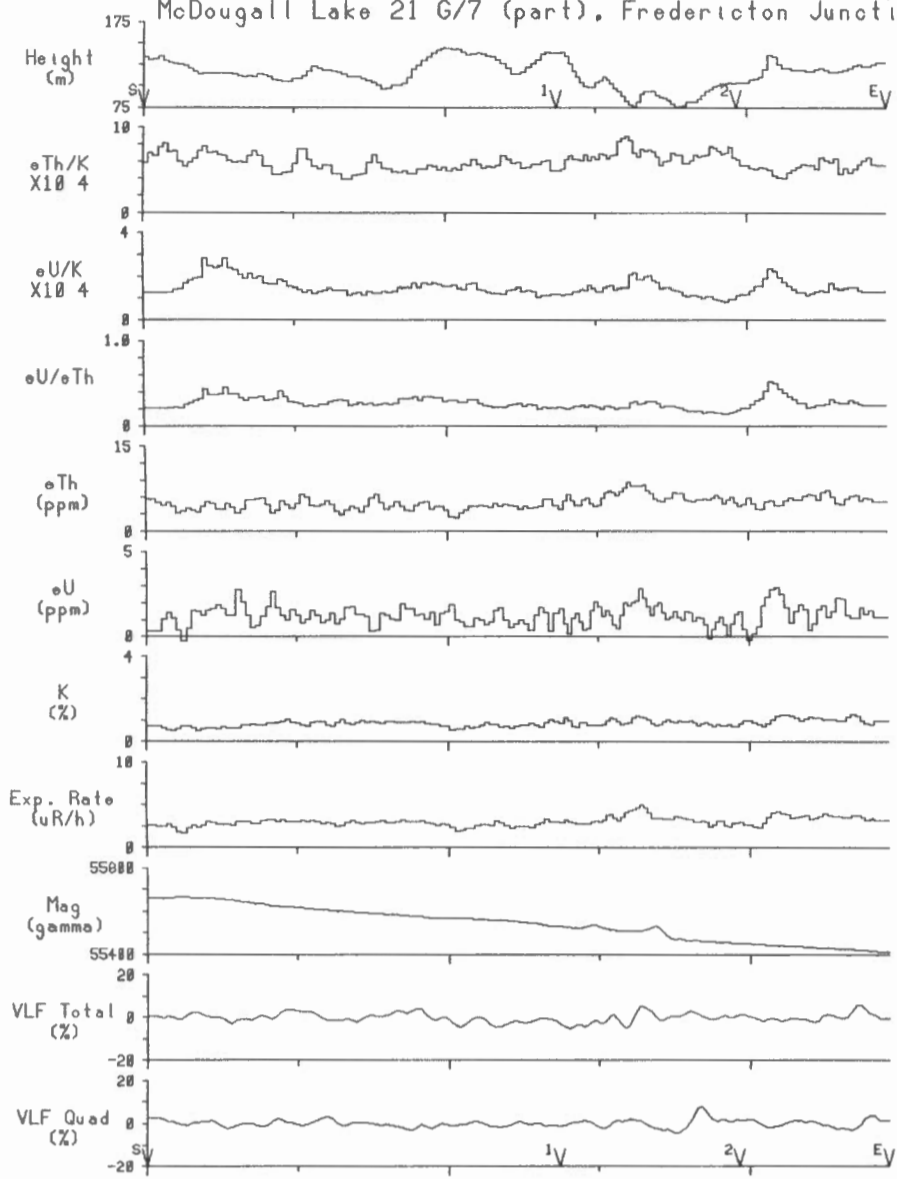


Line 110

2 km

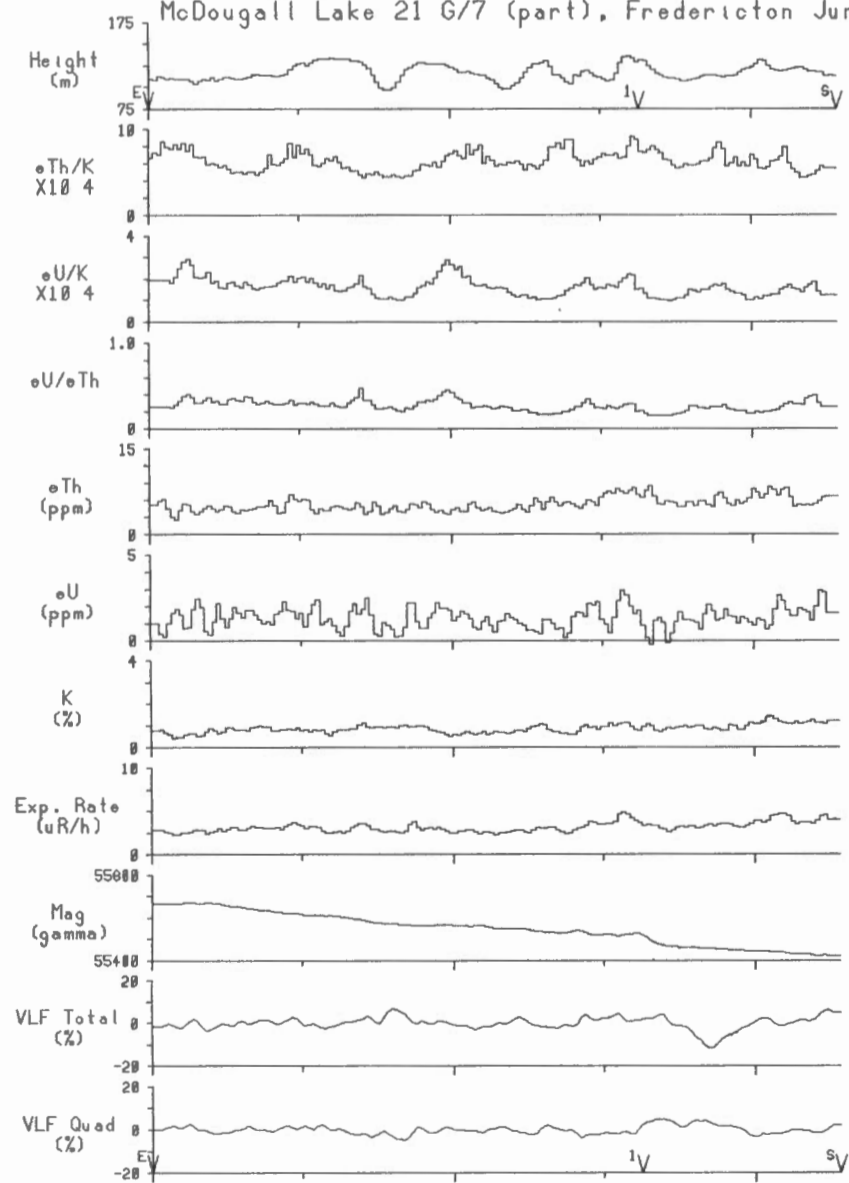
Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



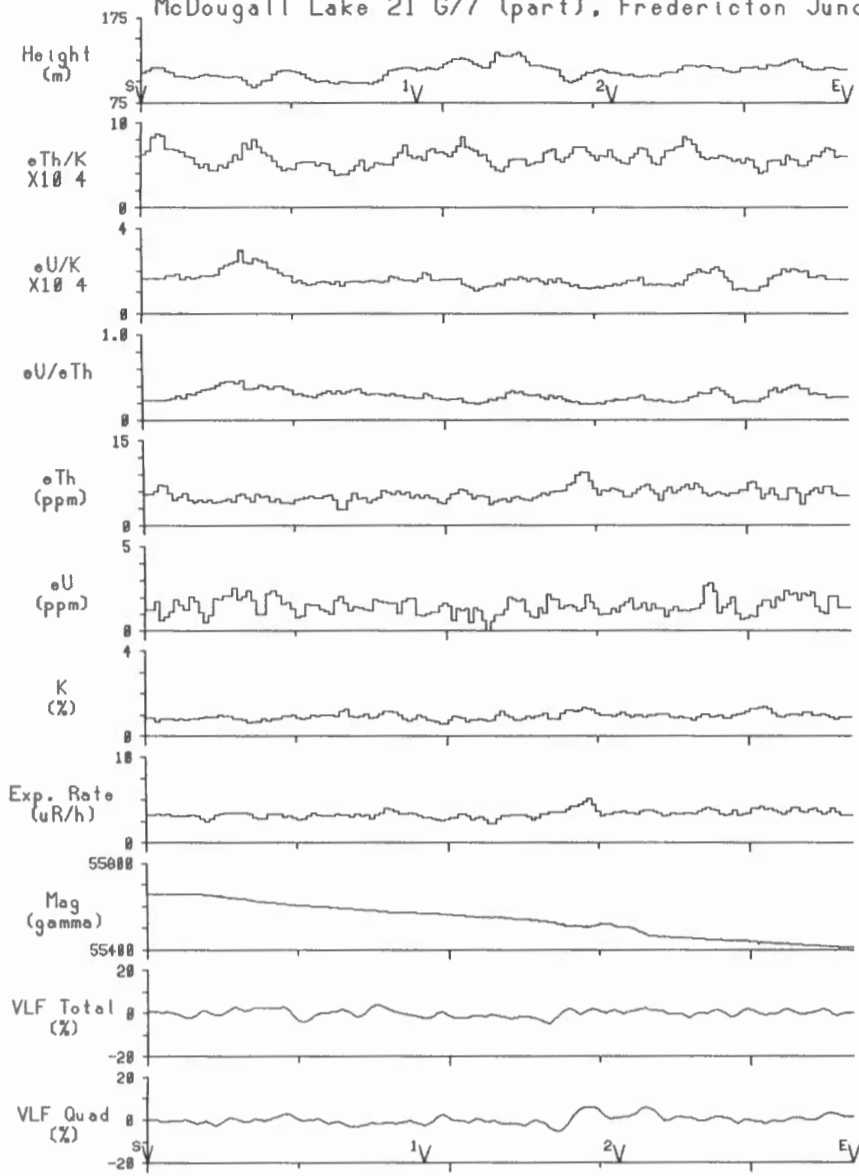
Line 111 2 km Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



Line 112 2 km Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)

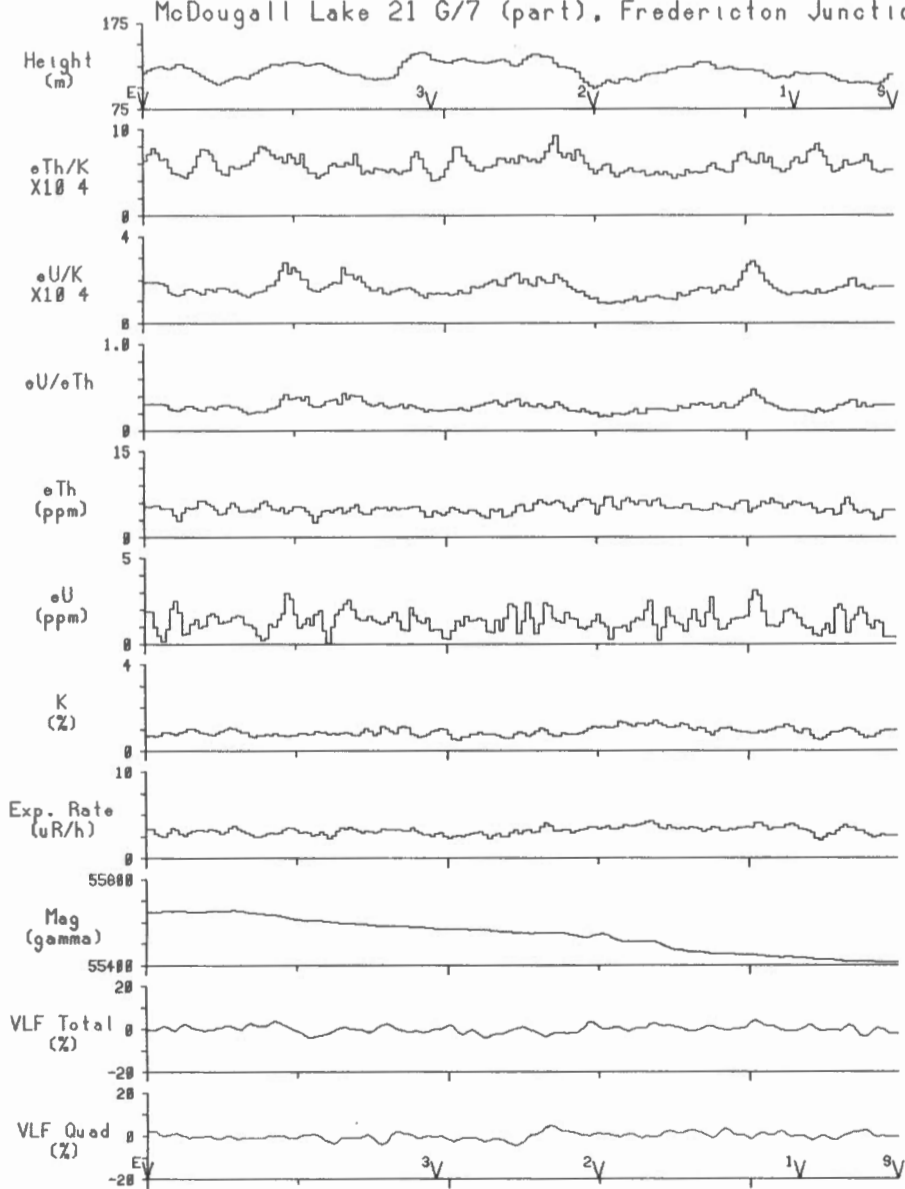


Line 113

2 km

Scale 1:100000

Mount Pleasant Caldera Survey, 1988 (250m line spacing)
 McDougall Lake 21 G/7 (part), Fredericton Junction 21 G/10 (part)



Line 114

2 km

Scale 1:100000