

SASKATCHEWAN INSTITUTE OF PEDOLOGY

GEOLOGY OF THE PONTEIX SALINITY PROJECT
SASKATCHEWAN

Report 0083-010 November 25, 1985

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November 25, 1983

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Saskatoon, Saskatchewan
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Attention: Dr. J.L. Henry

Dear Dr. Henry:

Enclosed are six copies of:

- (a) information sheet (Drawing 0083-010-01),
- (b) cross sections A-A' and B-B' (Drawing 0083-010-02,03),
- (c) geological logs, and
- (d) five history of deglaciation phases (Figs. 1-5).

The regional cross section (Drawing 0083-010-02) shows two bedrock aquifers: namely, the Judith River and Cypress Hill formations. The piezometric surface of the Judith River Formation is below the Notukeu Creek valley alluvium and, consequently, is not responsible for salinizing the valley. Groundwater discharge from the Cypress Hills Formation is through contact springs at the base of the formation and is too remote to affect the Notukeu Creek valley except through runoff.

Two aquifers occur in or are associated with glacial deposits. Glacial sands occur between bedrock and till in cross section B-B' (Drawing 0083-010-03). Groundwater in these sands is thought to be responsible for at least some of the salinization along the southern part of Notukeu Creek valley. A zone of disturbed bedrock, up to a least 30 feet thick, occurs over much of the Ponteix area. The

disturbance was caused by glacial action during the erosion of the bedrock surface. Disturbed bedrock is orders of magnitude more permeable than undisturbed bedrock and is the cause of most soil salinity in the uplands of the Ponteix area.

The history of deglaciation of the Ponteix and surrounding region is shown in five sketches (Figs. 1-5). This interpretation is based on Christiansen (1959,1979), Parizek (1964), and Whitaker (1965) and on further refinements made during field and office studies.

During Phase 1 (Fig. 1), meltwater flowed through the Pelletier channel and a series of lakes (glacial Lake Kincaid) and spillways along the glacier margin into the Wood Creek spillway. Lake Kincaid stood at about 2750 feet during this time. Deposition of quartzite and chert gravels with minor amounts of granite pebbles were initiated during this phase at the mouth of the Pelletier channel northwest of Ponteix. This deposition of gravels continued between Phases 1 and 2 (Figs. 1, 2) as the glacier receded and Lake Kincaid fell from 2750 to 2625 feet as a result of the opening of the Twelve Mile Lake channel. During this interval between Phases 1 and 2, sands were deposited at the mouth of Notukeu Creek in the Cadillac area.

Phase 2 (Fig. 2) marks the closing of the Pelletier Channel and the opening of the Braddock channel north of the map area. Meltwater flowed through the Braddock channel, through a series of lakes (Lake Kincaid at 2625'), and through the Twelve Mile Lake channel of the Big Muddy spillway. Between Phase 2 and 3 (Figs. 2,3), the glacier retreated to the Thomson Lake moraine. During this retreat Lake Kincaid continued to stand at 2625 feet.

During Phase 3 meltwater continued to flow through the Braddock channel into Lake Kincaid and through the Twelve Mile Lake channel of the Big Muddy spillway. Between Phase 3 and 4 (Figs.3,4), the Braddock channel was closed, the Neidpath channel north of the map-area was opened, and Lake Kincaid fell

from 2625 to 2500 feet. As the lake fell between Phases 3 and 4, it was separated into two lakes by an upland trending east of Ponteix (Fig. 4). Glacial Lake Gravelbourg formed during this interval.

During Phase 4 (Fig. 4), the glacier continued to stand at the Thomson Lake moraine. Meltwater flowed through the Neidpath channel into Lake Gravelbourg, through the Notukeu spillway into Lake Kincaid, and through Twelve Mile Lake channel of the Big Muddy spillway. The sands and gravels between Ponteix and Aneroid were deposited at this time from materials eroded during the cutting of the Notukeu spillway. Rapid flow of meltwater through this spillway resulted in the valley being eroded 100 feet below its present valley bottom (Appendix 1, testhole SIP Ponteix 85-205).

Between Phases 4 and 5 (Figs. 4,5), the glacier retreated to the Ettington moraine, and Lake Gravelbourg fell from 2500 to 2375 feet. During this interval, Notukeu creek reversed its flow through the Notukeu spillway establishing its present course. During Phase 5, meltwater flowed through the Neidpath channel into Lake Gravelbourg north of the map-area which drained through the Big Muddy spillway east of the map-area.

Christiansen, E.A. 1959. Glacial geology of the Swift Current area, Saskatchewan. Saskatchewan Department of Mineral Resources, Report 32, 62p.

Christiansen, E.A. 1979. The Wisconsinan deglaciation of southern Saskatchewan and adjacent areas. Canadian Journal of Earth Sciences, v.16, p. 913-938.

Parizek, P.P. 1964. Geology of the Willow Bunch Lake area (72-H), Saskatchewan. Saskatchewan Research Council, Geology Division, Report 4, 46p.

Whitaker, S.H. 1965. Geology of the Wood Mountain area (72-G), Saskatchewan. Ph.D Thesis, University of Illinois, Urbana, Illinois, 151p.

Sincerely yours,



E.A. Christiansen

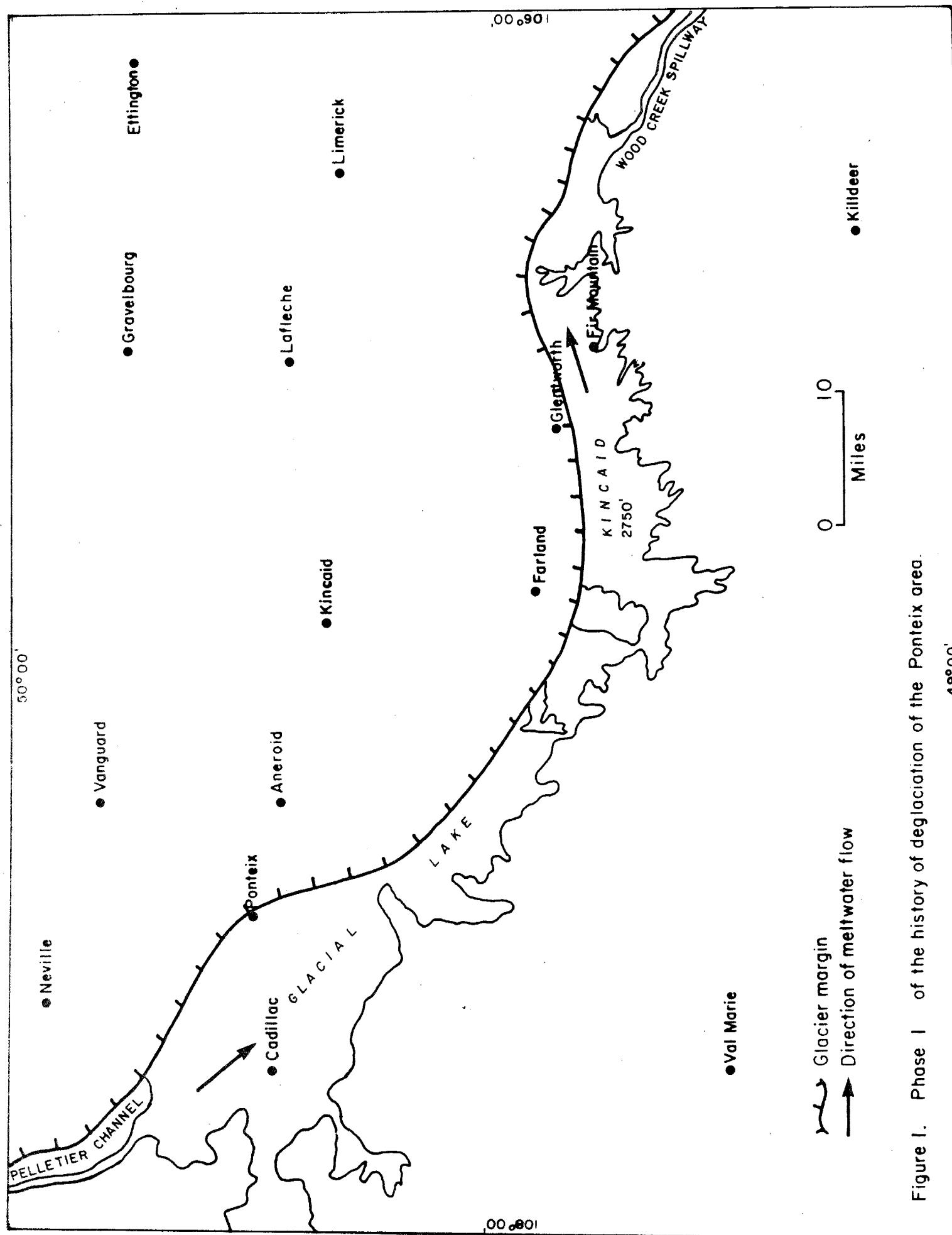


Figure 1. Phase I of the history of deglaciation of the Ponteix area.

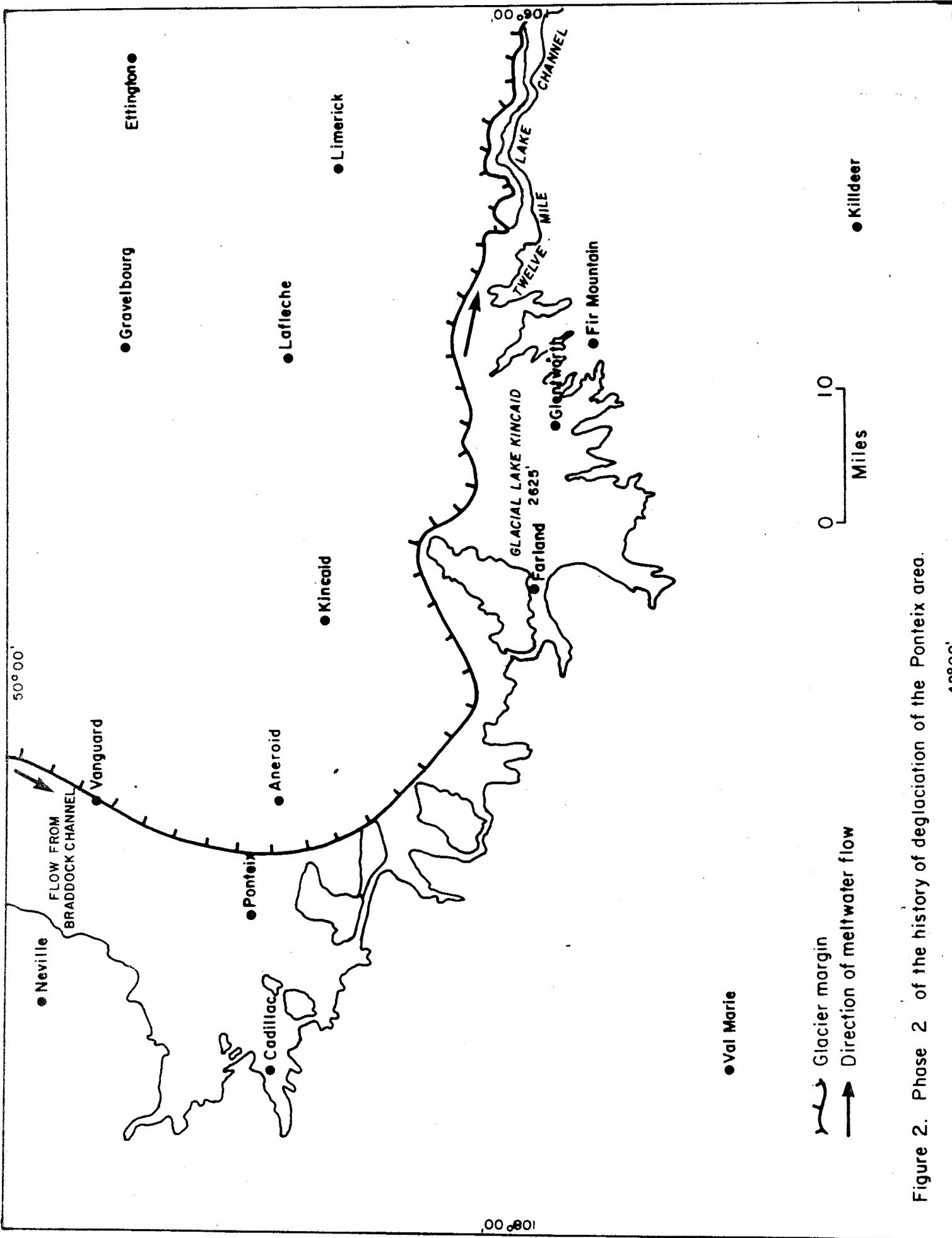


Figure 2. Phase 2 of the history of deglaciation of the Ponteix area.

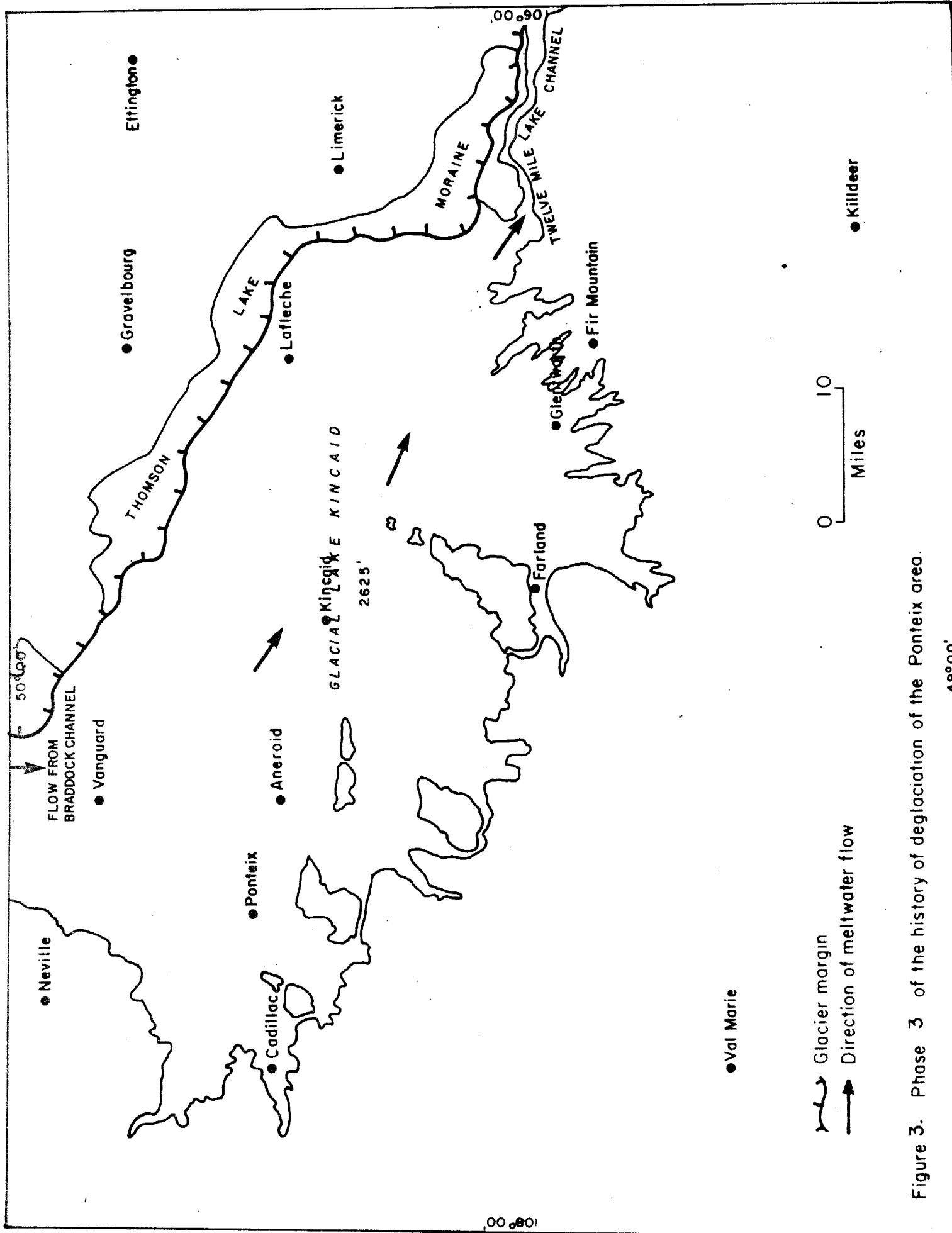


Figure 3. Phase 3 of the history of deglaciation of the Ponteix area.

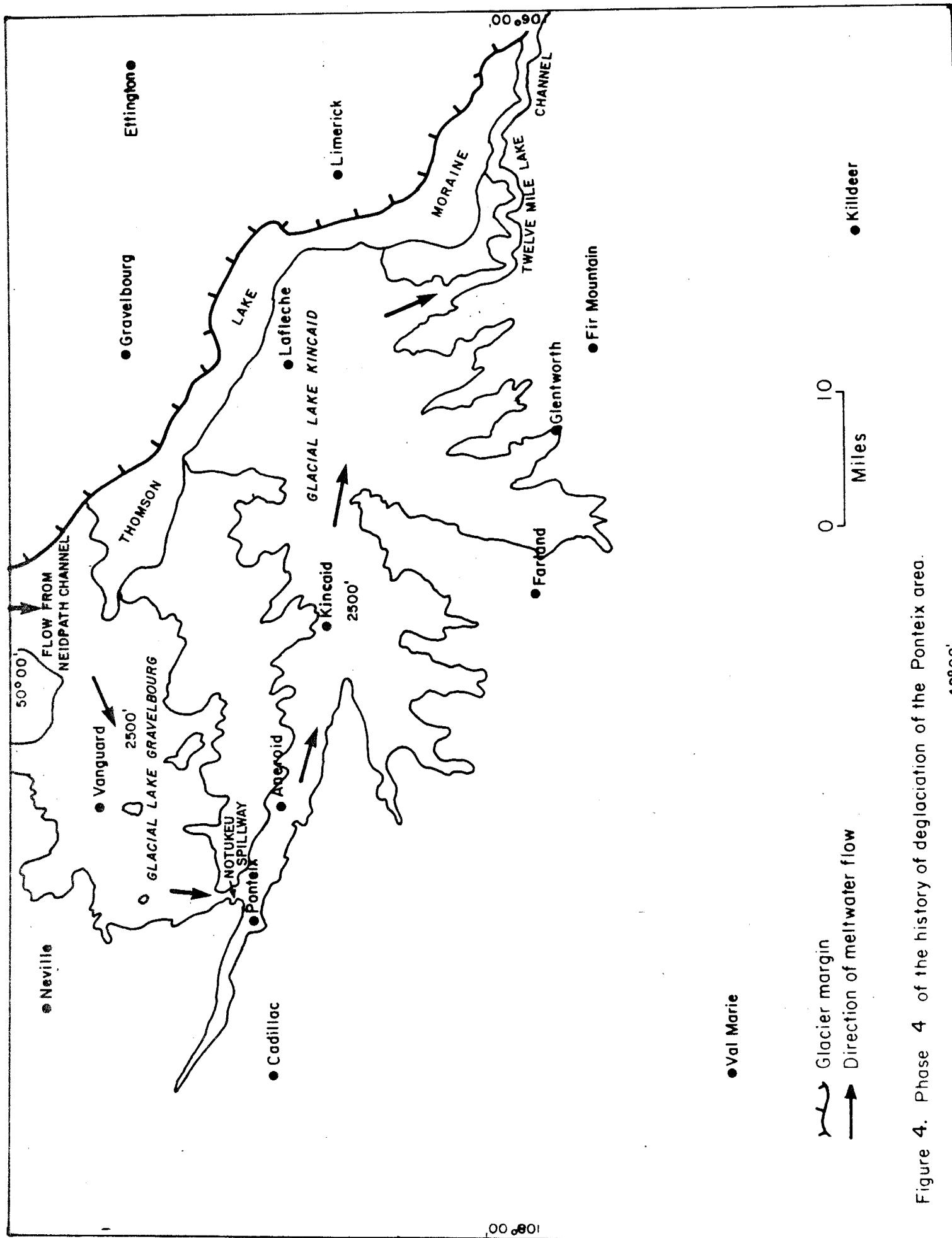


Figure 4. Phase 4 of the history of deglaciation of the Ponteix area.

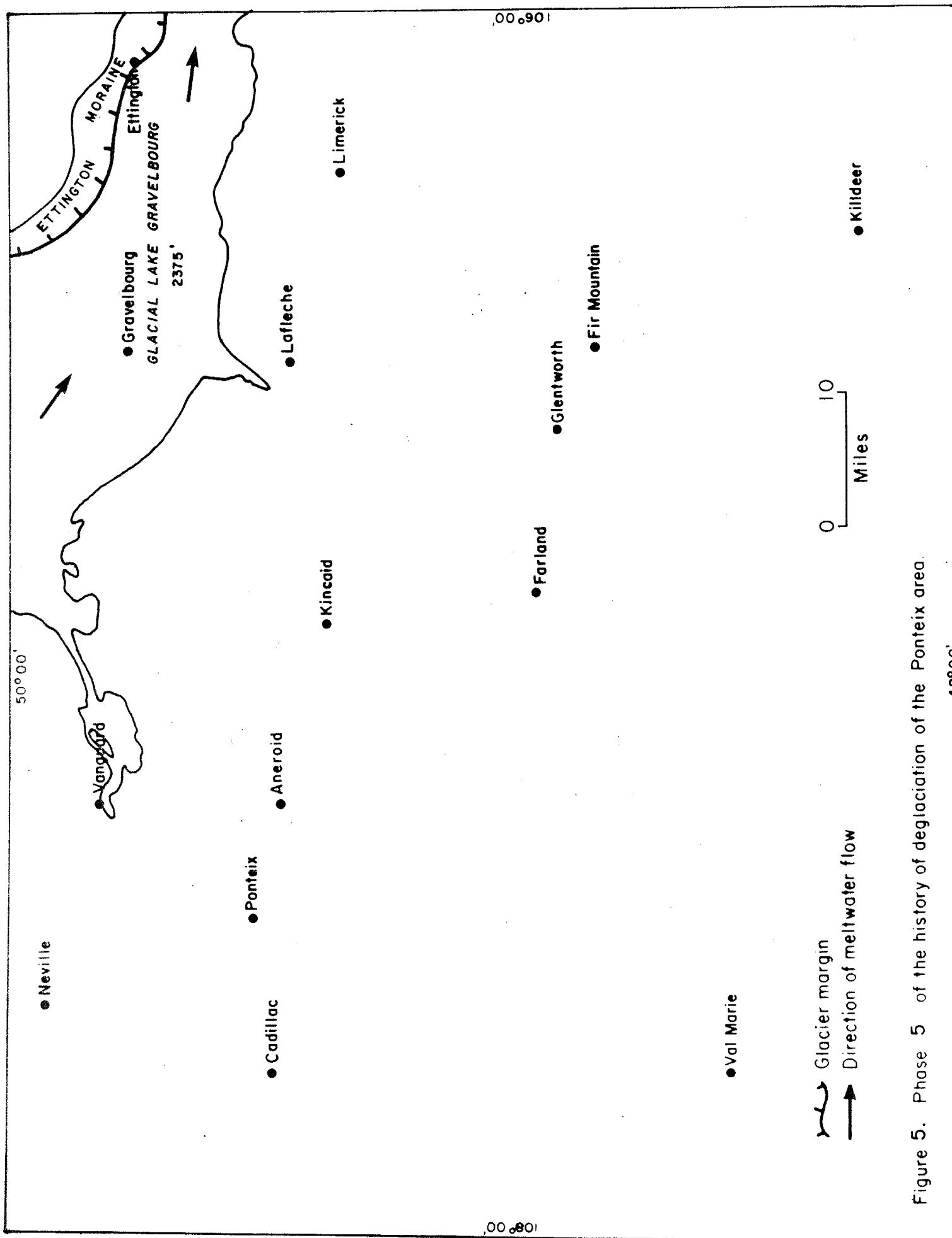
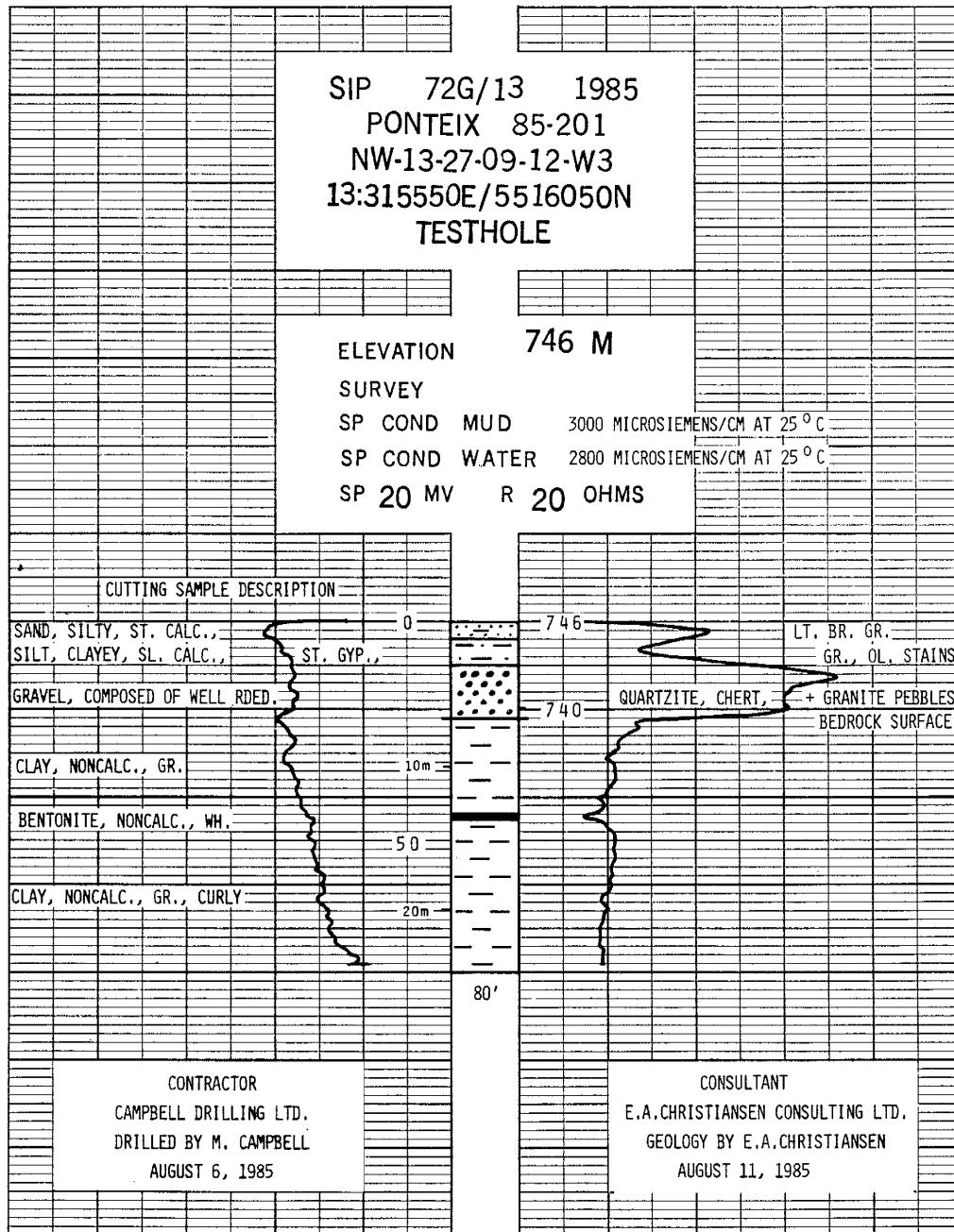
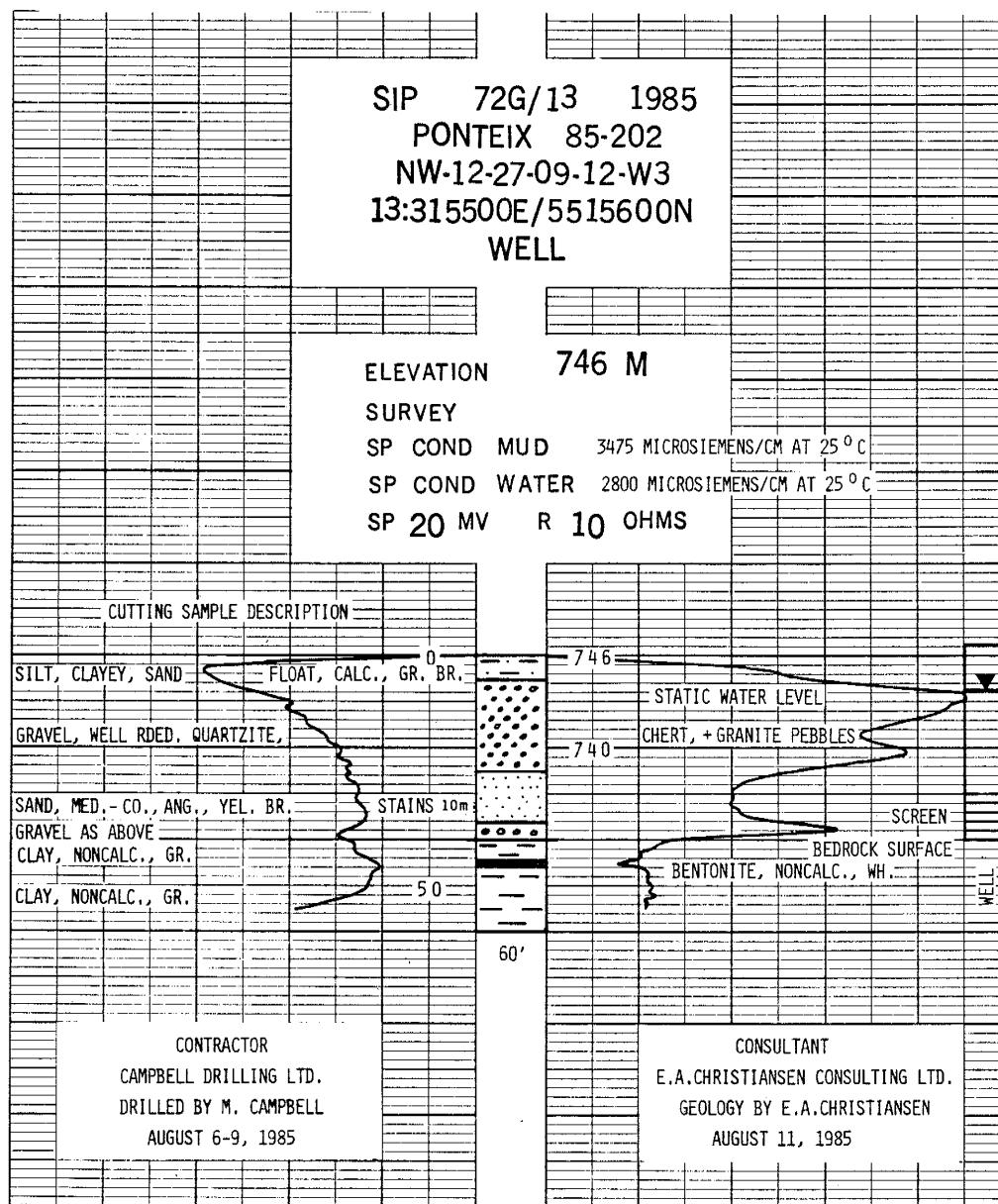
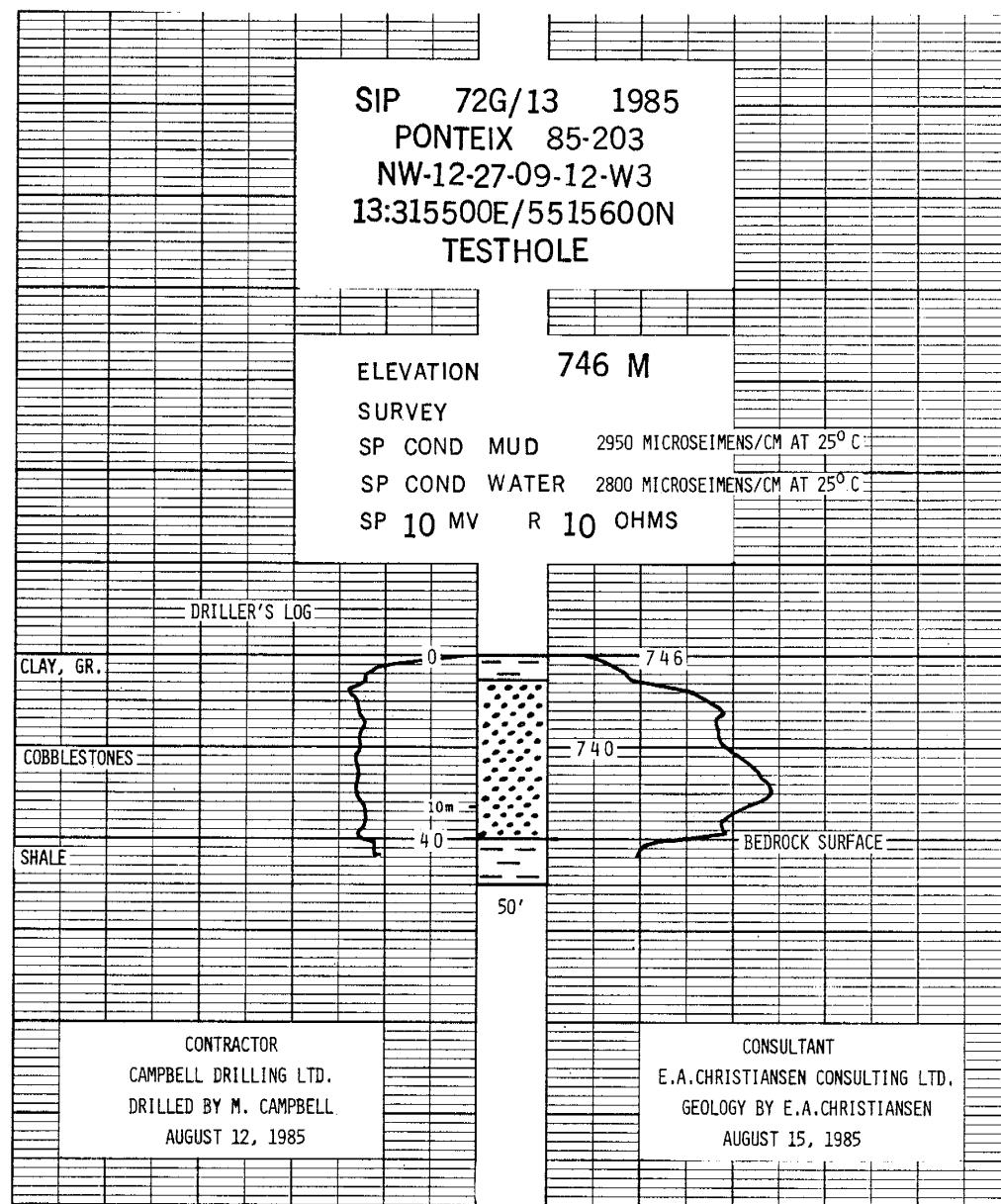


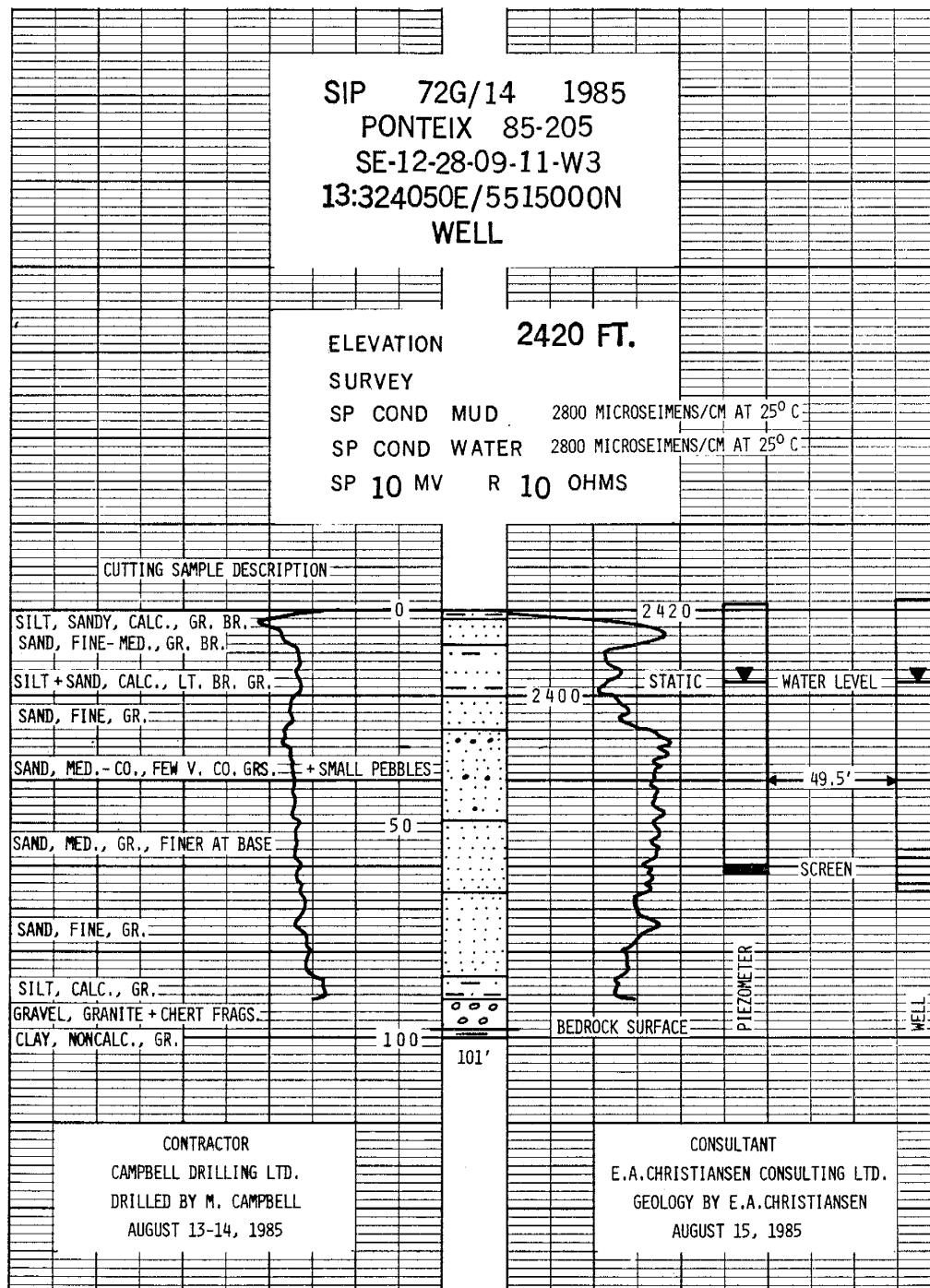
Figure 5. Phase 5 of the history of deglaciation of the Ponteix area.

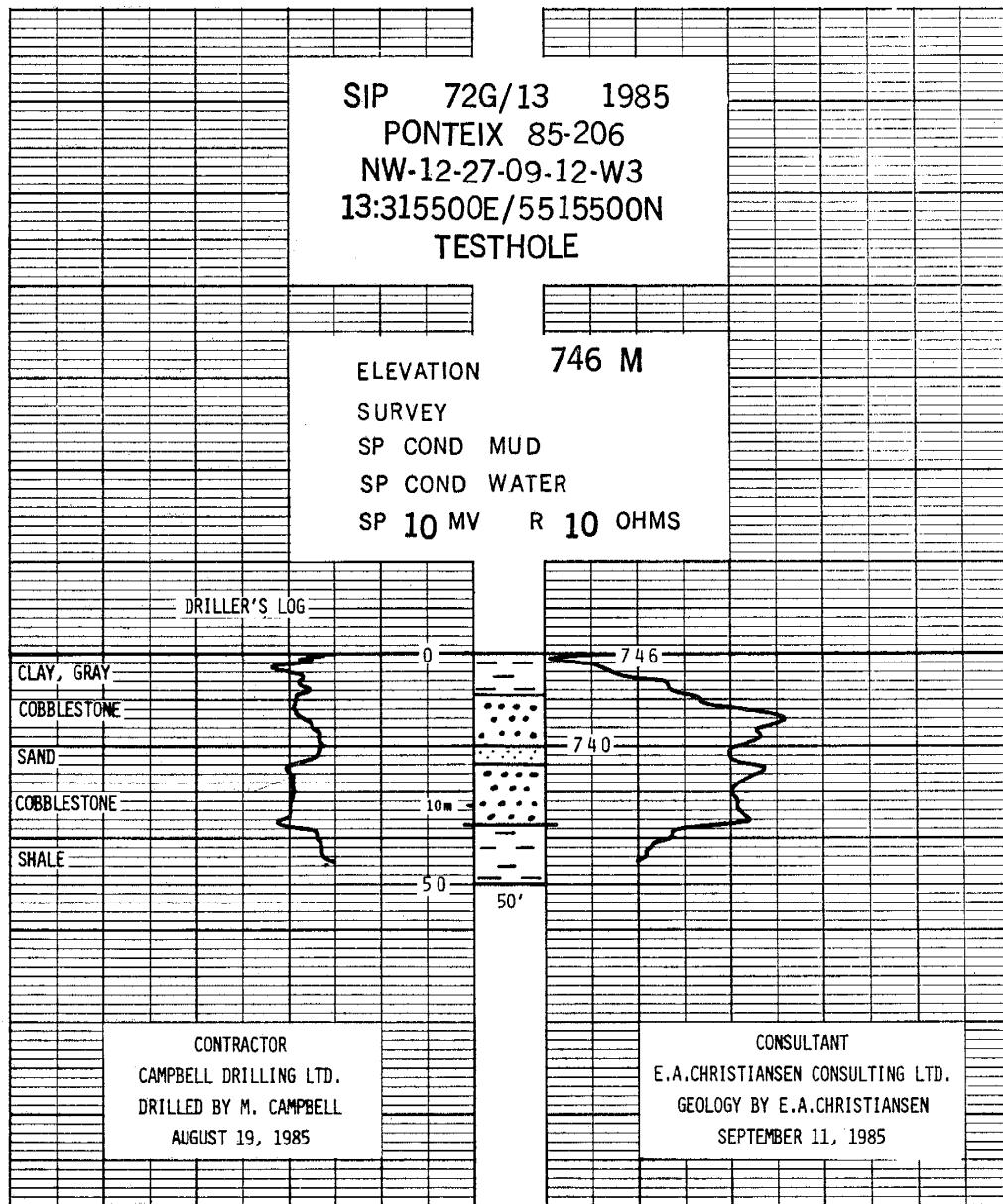
Appendix 1. Geological logs.

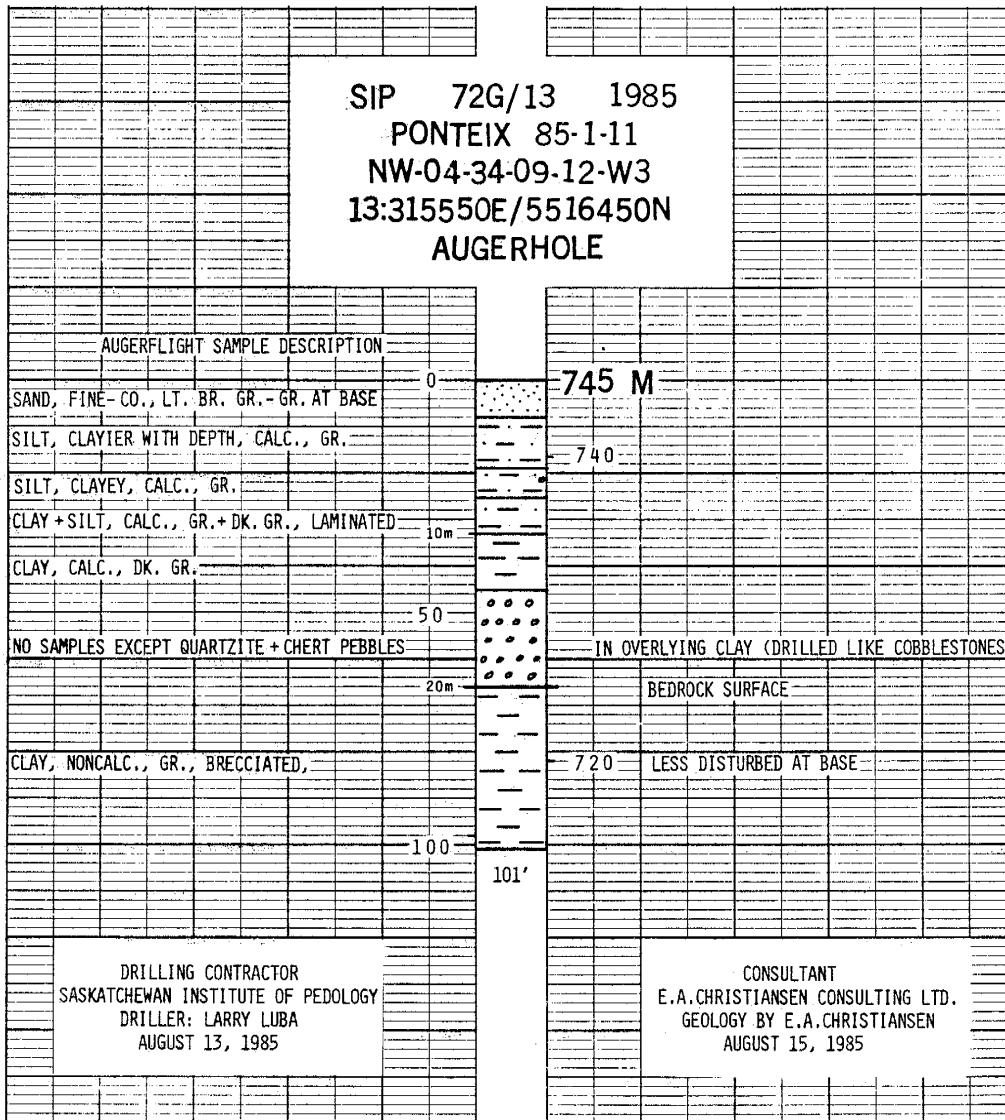


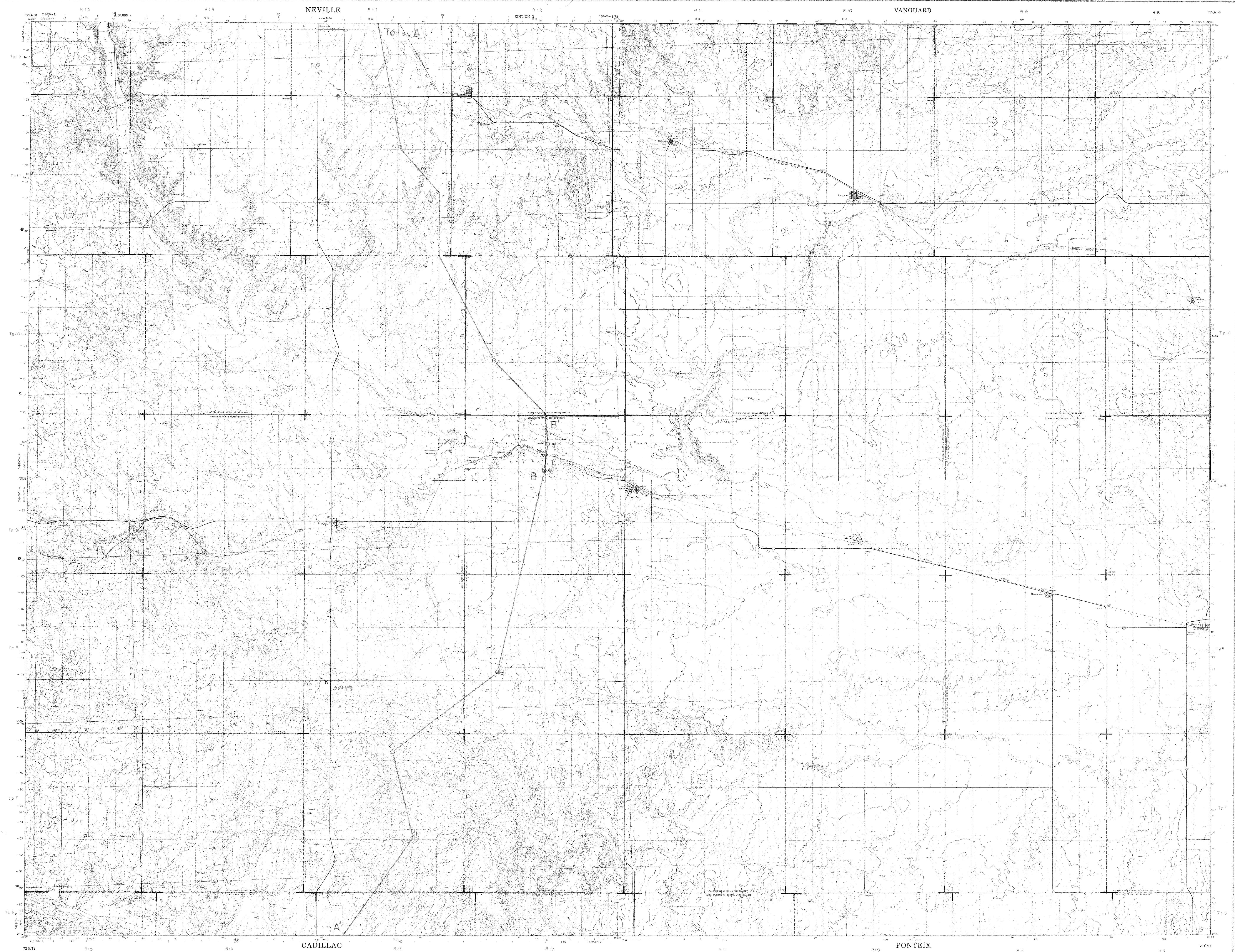












INFORMATION SHEET OF THE PONTEIX SALINITY PROJECT

- TESTHOLES**
- Ⓐ Electric logs, cutting samples, and cores
 - Ⓑ Electric logs and cutting samples
 - Ⓒ Electric and driller's logs
 - Ⓓ Electric and/or gamma-ray logs
 - Ⓔ Augerhole logs
 - Ⓕ Cutting samples
 - Ⓐ Cross section log number
 - Ⓐ Cross section

- WELLS AND PIEZOMETERS**
- Ⓐ Electric logs, cutting samples, and cores
 - Ⓑ Electric logs and cutting samples
 - Ⓒ Electric and driller's logs
 - Ⓓ Electric and/or gamma-ray logs
 - Ⓔ Augerhole logs
 - Ⓕ Cutting samples

0 1 2 3 4 5
Miles
0 1 2 3 4 5
Kilometres
Contour interval = 25 Feet
Base map by Energy, Mine and Resources, Ottawa

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Drawing No. 0083-010-01
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Date 23 November 1985

