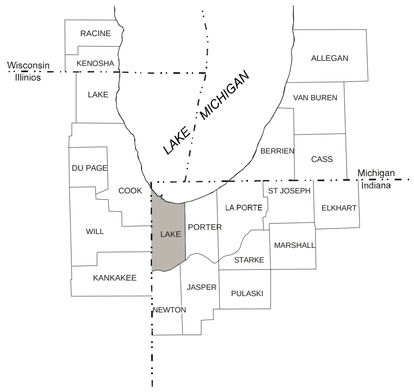
NORMAN C. HESTER, STATE GEOLOGIST

INDIANA UNIVERSITY
INDIANA GEOLOGICAL SURVEY

OPEN-FILE MAP 96-20
Geologic Terrain Map of the Crown Point, Indiana 7.5 Minute Quadrangle
Plate 1 of 3

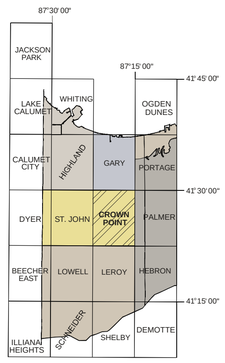
Counties of the Lake Michigan Rim

Lake County shaded



Sources of Information*

Lake County indexed by USGS 7.5 minute quadrangles



- Brown and Thompson, 1995
- Brown (with contributions by T. A. Thompson), 1994
- Bleuer and Woodfield, 1993
- Brown, S.E., this study.
- Geologic map area, this plate
- Brown and others, 1996

* Complete references provided in companion booklet

EXPLANATION*

LAKE MICHIGAN SEQUENCE

- M — Modified units
- LMA1 — Alluvium
- LMA2 — **Alluvium over older valley fill**

Toleston terrain
- LMTS — Strandplain
- LMTD — Dunes
- LMTL — Lagoon

Calumet terrain
- LMCN — Nearshore
- LMCD — Dunes
- LMCL — Lagoon

Glenwood terrain
- LMGD — Dunes, nearshore
- LMGS — Spit
- LMGP — Spit platform

LAKE BORDER SEQUENCE

Lake terrain
- LBL1 — Glenwood embayment fill
- LBL2 — Glenwood beach, colluvial slope and fan-delta complex
- LBL3 — Ice-margin lake complex

Moraine terrain
- LBM1 — Lake Border ridges
- LBM2 — **Tinley ridge**
- LBM3 — **Tinley, outer fringe**
- LBM4 — **Ice-marginal drainage trough**
- LBR1 — **Tinley inner ramp**
- LBR2 — **Tinley collapsed ramp**

VALPARAISO MEGASEQUENCE

Moraine terrain
- vR1 — Inner ramp
- vR2 — Hummocky inner ramp
- vR3 — Dissected ramp
- vM1 — Collapsed head-of-fan
- vM2a — **Broad upland**
- vM2b — **Core upland**
- vM3 — Inner fringe
- vM4 — Outer fringe
- vM5 — Outermost fringe
- vM6 — Meltwater-scoured
- vM7 — Intra-channel low
- vM8 — Intra-moraine low/collapsed drainage

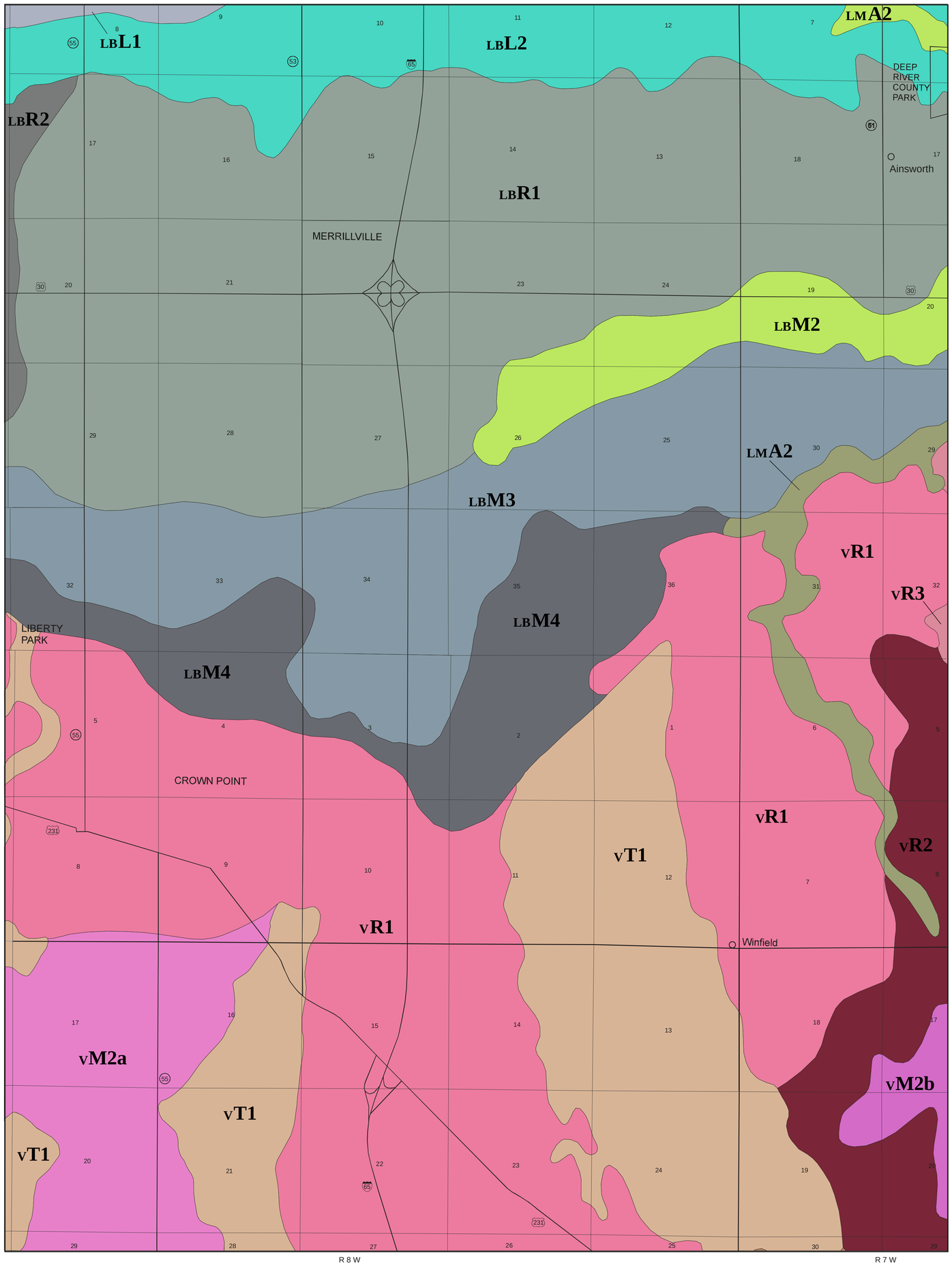
Outwash-fan terrain
- vF1 — Upper surface, ice proximal
- vF2 — Collapsed
- vF3 — Mixed materials
- vF4 — Lower surface, ice distal
- vF5 — Open channels

Tunnel Channel terrain
- vT1 — **Collapsed**
- vT2 — **Filled**
- vT3 — Dissected walls

Kankakee terrain
- vS — Sand dunes, lower fan
- vK — Kankakee River floodplain

* Map unit names shown in black appear on this map. An explanation of these map units is provided in the companion booklet.

An illustrated explanation of all map units is provided in Geologic Terrain of the Southern Lake Michigan Rim Open-File Report 96-13.



OPEN-FILE MAP 96-20 INCLUDES THE FOLLOWING:

Plate 1: Geologic Terrain Map of the Crown Point, Indiana 7.5 Minute Quadrangle

Plate 2: Facies Distribution of Glacial Deposits and 3-D Concepts of Map Units

Plate 3: Data Point Map of the Crown Point, Indiana 7.5 Minute Quadrangle

Companion booklet: Explanation of Map Units

Base map digitized from latest U.S. Geological Survey topographic quadrangle map, scale 1:24,000.

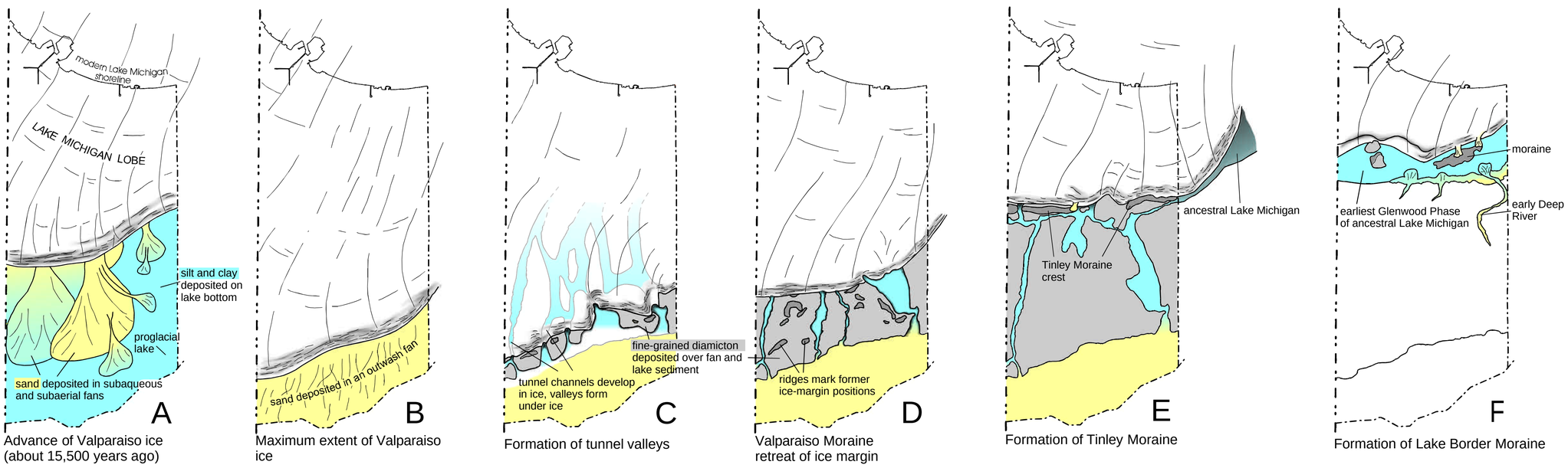
GEOLOGIC TERRAIN MAP OF THE CROWN POINT, INDIANA 7.5 MINUTE QUADRANGLE

by
Steven E. Brown

1996

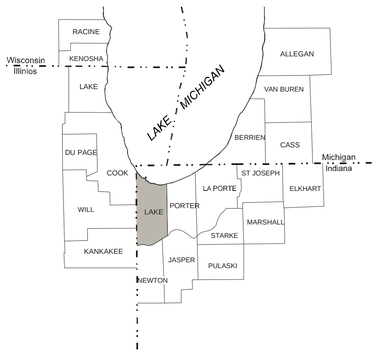
Drafted by Kimberly H. Sowder and Kari A. Lancaster

Produced in cooperation with the United States Geological Survey, National Geologic Mapping Program

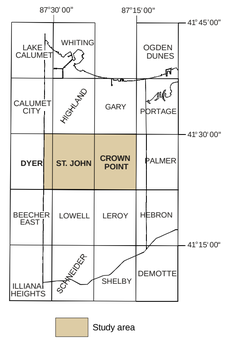


Counties of the Lake Michigan Rim

Lake County shaded



Lake County indexed by USGS 7.5 minute quadrangles



EXPLANATION

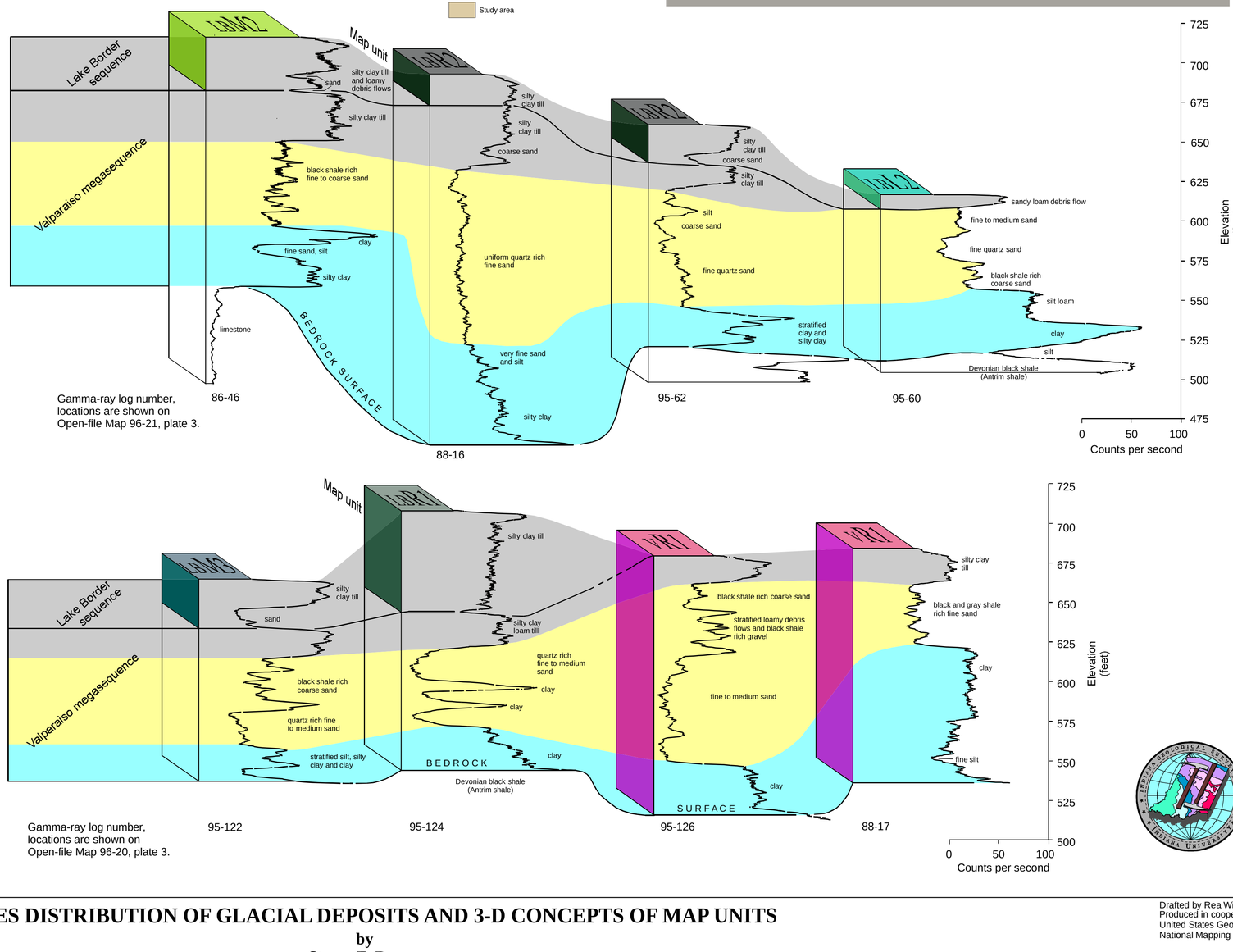
Depositional environment	Dominant sediment
SUBGLACIAL to PROGLACIAL	Fine-grained diamicton and minor sand and gravel
SUBAQUEOUS to SUBAERIAL FAN(S)	Fine to coarse sand and minor fine-grained diamicton, silt, and silty clay
ICE-DISTAL LAKE *	Silt, clay, and silty clay and minor very fine sand *

The colors gray, yellow and blue shown in the gamma-ray log illustrations below, represent three depositional environments that are composed of characteristic sediments. In those illustrations, the colors depict the vertical arrangement of those sediments in the subsurface. In the six diagrams above the same colors depict the lateral arrangement of those same sediments.

* Refers to diagram A only.

Gamma-Ray Log Illustrations

examples from the Tinley and Valparaiso Moraines



Gamma-ray log number, locations are shown on Open-file Map 96-21, plate 3.

Gamma-ray log number, locations are shown on Open-file Map 96-20, plate 3.

A tool for interpreting glacial terrains:
Natural gamma-ray logs

The Indiana Geological Survey (IGS) approach to mapping differs from that commonly employed for Quaternary materials. As we define it, "glacial terrain" includes in concept both the wide-ranging assemblage of surface topographic forms and near-surface materials produced by glacial processes, that is, the assemblage typically mapped in most regions. But most importantly, its foundation is the mapping of the greater lateral and vertical sequence(s) that constitute those forms. Rock or sediment bodies are thought of not as individual correlatable units, (for example, layers of sand, clay, and so on) but as parts of whole depositional systems. Analysis of such systems involves documentation of lateral facies distributions and vertical sequences, and their comparison with modern analogs. In this process, single sections and individual units within a sequence are less important than the relationship between whole sequences

The means of establishing the nature of sequences across large depositional basins is, of necessity, based upon down-hole geophysical analysis. The core of current glacial studies by the IGS is the characterization of the total vertical sequence based primarily upon interpretation of downhole natural gamma-ray logs and description of mud-rotary drill cuttings. The IGS has carried out an active down-hole geophysical logging program for more than 15 years oriented directly toward obtaining subsurface information about unconsolidated deposits, and maintains a database with more than 2,900 natural gamma-ray logs. IGS operates two vehicle-mounted gamma-ray logging units that are capable of producing both analog and digital logs. Under most circumstances our field personnel work daily with private water-well drillers, sampling cuttings and logging mud-rotary drill holes. This "holes of fortune" technique has proven to be an inexpensive, effective, and efficient method of collecting high-quality downhole data. When integrated with other subsurface data, such as material descriptions from water-well records and engineering borings, natural gamma-ray logging is the best available method for identifying and correlating glacial sequences.

OPEN-FILE MAPS 96-20 AND 96-21 INCLUDE THE FOLLOWING:

Plate 1: Geologic Terrain Map

Plate 2: Facies Distribution of Glacial Deposits and 3-D Concepts of Map Units

Plate 3: Data Point Map

Companion booklet: Explanation of Map Units

FACIES DISTRIBUTION OF GLACIAL DEPOSITS AND 3-D CONCEPTS OF MAP UNITS

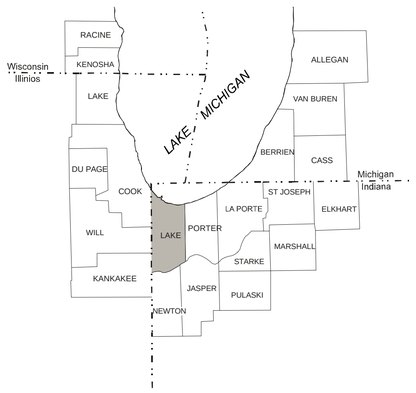
by
Steven E. Brown

1996

Drafted by Rea Williams Kersey
Produced in cooperation with the United States Geological Survey, National Mapping Program

Counties of the Lake Michigan Rim

Lake County shaded



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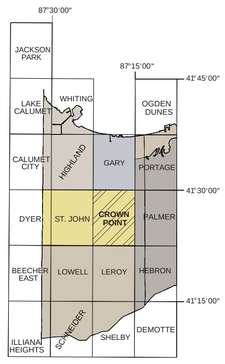

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EXPLANATION

- Indiana Geological Survey down-hole natural gamma-ray log
- **95-126** Numbered gamma log illlustrated on Plate 2
- Water well
  Source of water-well records:
  Indiana Department of Natural Resources, Division of Water
- Engineering boring
  Source of information:
  Indiana Department of Transportation

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References

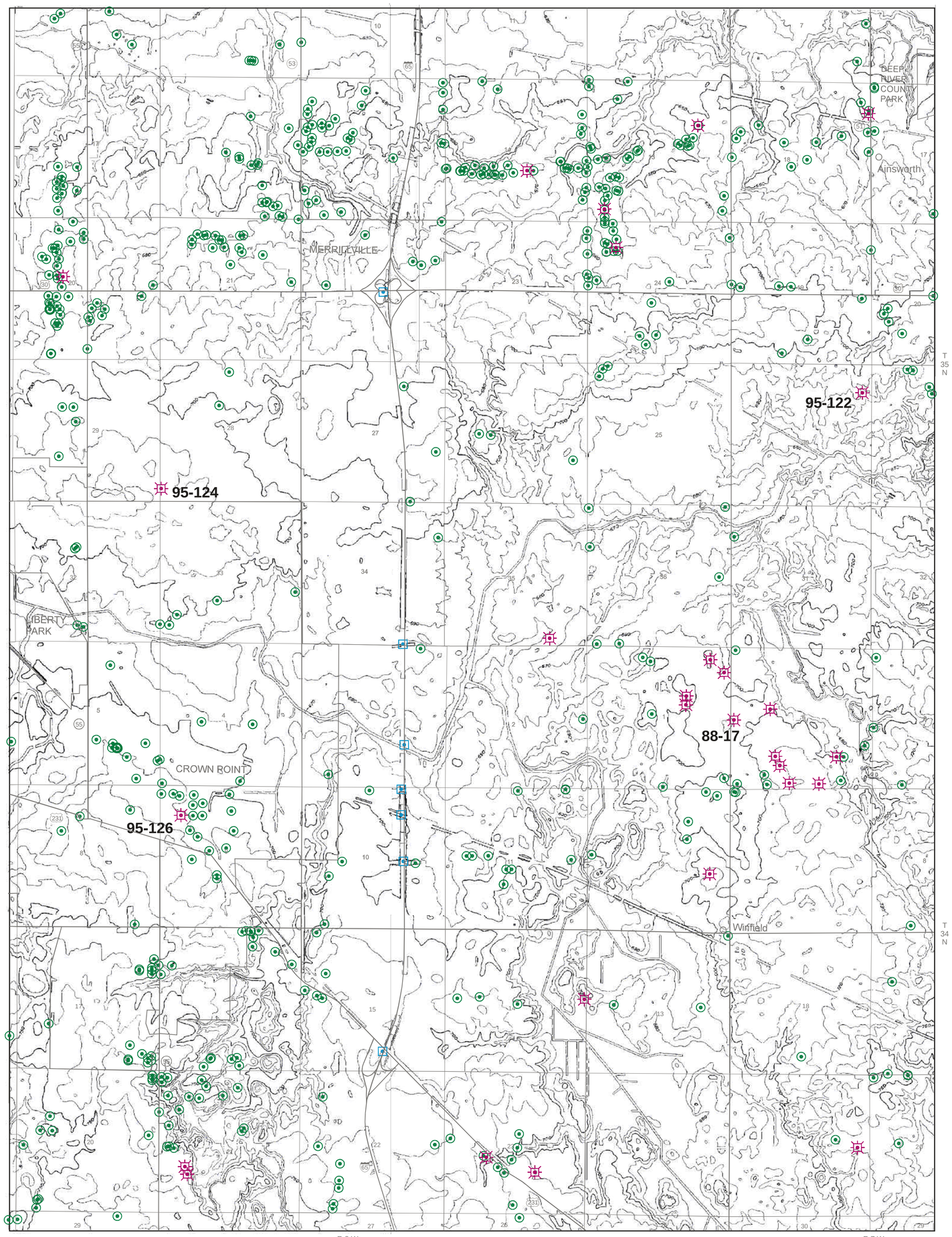
Bleuer, N.K., and Woodfield, M.C., 1993, Geologic terrain, sequences, and aquifer sensitivity, Porter County, Indiana: Indiana Geological Survey Open-file Report 93-02.

Brown, S.E., 1994, Geologic terrains of the Gary quadrangle: Indiana Geological Survey Open-file Report 94-15.

Brown, S.E., and Thompson, T.A., 1995a, Geologic terrains of northwestern Lake County, Indiana: Indiana Geological Survey Open-file Report 95-05, 4 plates.

Brown, S.E., and Thompson, T.A., 1995b, Geologic terrains of the Chicago 30X60 minute quadrangle in Indiana: Indiana Geological Survey Open-file Map 95-09.

Brown, S.E., Bleuer, N.K., and Thompson, T.A., 1996, Geologic terrain map of the southern Lake Michigan rim: Indiana Geological Survey Open-file Map 96-12.



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