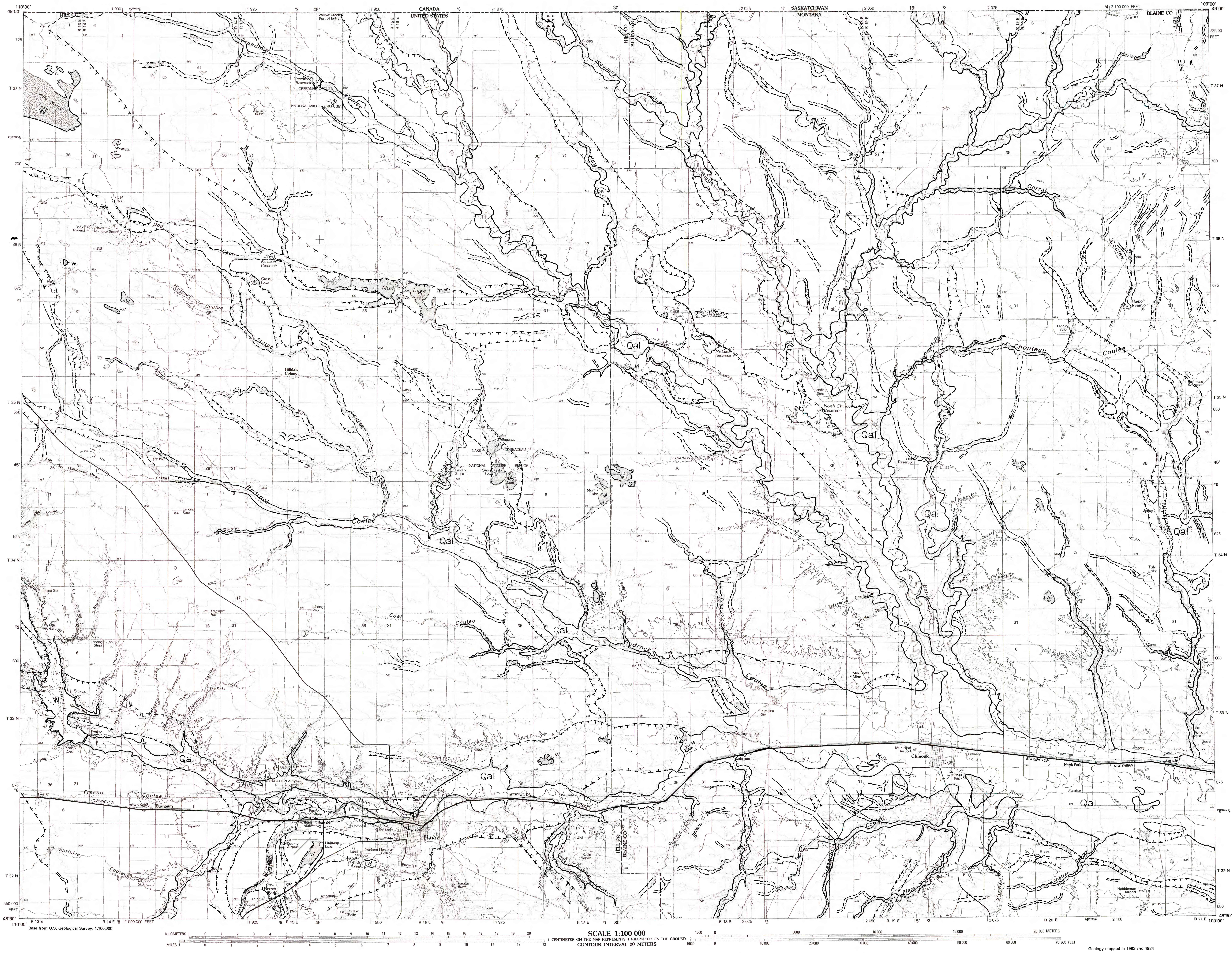
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

Prepared in cooperation with
MONTANA BUREAU OF MINES AND GEOLOGY

OPEN-FILE MAP 84-688
1 of 2 SHEETS



Geology mapped in 1983 and 1984

EXPLANATION OF MAP UNITS AND SYMBOLS

Qal	ALLUVIUM-- Stratified clay, silt sand and gravel; may include outwash sand and gravel in some areas
▭	Areas of thin to thick glacial deposits; includes small scattered to large outcrops of bedrock (Bearpaw Shale, Judith River Formation, Claggett Shale and igneous rocks)
W	WATER-- Ponds or large reservoirs
	BURIED SCARP OR VALLEY WALL
	BURIED STREAM CHANNEL OR ICE-MARGINAL CHANNEL; dotted lines show inferred continuity
	ABANDONED VALLEY, ICE-MARGINAL CHANNEL OR VALLEY NOW OCCUPIED BY UNDERFIT STREAM
→	INFERRED DIRECTION OF FLOW OF WATER IN BURIED, ABANDONED CHANNEL OR VALLEY
	CONTACT-- DASHED WHERE APPROXIMATELY LOCATED

This map was prepared in order to show the location of small thin shallow potential aquifers that were overridden and buried during glaciation. Many are now represented by long narrow sinuous to straight topographic sags. They can be seen stereoscopically on aerial photographs and are expressed by contours on topographic maps. Outcrops of thick till and sand and gravel also indicate the location of buried drainage. The presence of bedrock outcrops also helps indicate the presence or absence of buried drainage. Aerial photographs used in making these maps vary in scale from 1:19,400 to 1:24,000. Small scale (1:60,000) aerial photographs were also interpreted.

Glacial deposits in this and adjacent areas were studied and mapped during short field seasons in 1951, 1980, 1981, 1982, 1983 and 1984 by Roger B. Colton, David S. Fullerton and Thomas W. Patton. A map of the Havre 1 x 2 Quadrangle showing the distribution of glacial features and deposits was compiled by Colton (unpublished) in 1955.as part of the Glacial Map of Montana East of The Rocky Mountains (1961). Thomas W. Patton and Roger B. Colton spent two weeks in the Harlem 30' x 60' Quadrangle during the 1983 field season and three weeks in the Havre 30' x 60' Quadrangle during the 1984 field season. All field maps were compiled on U. S. Geological Survey topographic maps at a scale of 1:24,000. The only published maps of the area are by Hearn (1976), Pepperberg (1910), Stebinger (1917), Swenson (1951) and U. S. Department of Energy (1981).

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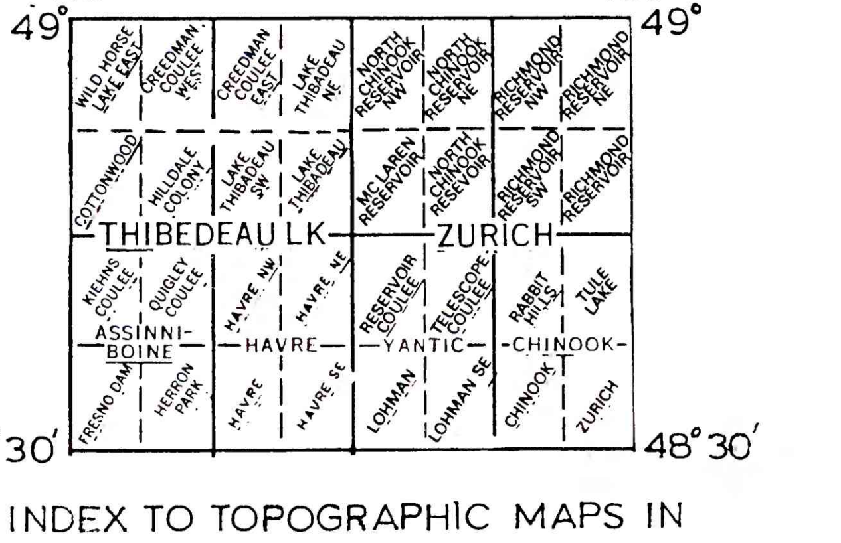

INDEX TO TOPOGRAPHIC MAPS IN HAVRE 30'X 60' QUADRANGLE

BURIED OR ABANDONED DRAINAGE IN THE HAVRE 30′ x 60′ QUADRANGLE MONTANA

By

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1984

* MONTANA BUREAU OF MINES AND GEOLOGY