

INTRODUCTION

In 1978 the U.S. Geological Survey began a 4-year study of aquifers in the northern Great Plains. The purpose of this map, which is a product of that study, is to show the cumulative thickness of sandstone in the Swift Formation. Other maps show the altitude of the top (Feltis, 1982a) and the total thickness (Feltis, 1982b) of the Swift Formation. These maps are part of a series that describes the geology and potentiometric surface of selected rock units of Jurassic or younger age in the plains area of Montana.

SOURCE OF DATA

Most geologic data used to compile the map have been obtained from records of oil and gas exploration wells on file in offices of the Montana Department of Natural Resources and Conservation and the U.S. Geological Survey. The data were derived from interpretation of geophysical logs of oil or gas test wells. One site per township was the optimum density of data selected for map compilation; however, geophysical logs were not available for all townships.

SWIFT FORMATION

The Middle and Upper Jurassic Swift Formation of the Ellis Group is the product of a marine transgressive-regressive cycle. A generalized description of the formation across the study area is given by Imlay and others (1948) as follows: "The Swift Formation consists mainly of a sequence of glauconitic sandstone and shale. In the western part of Montana in the Little Belt** [and Castle** (Mountains)]** the formation consists mainly of medium- to thick-bedded sandstone that is fine- to coarse-grained***. Elsewhere in Montana the lower part of the Swift Formation contains more or less shale which thickens eastward as the overlying sandstone thins, resulting thereby in a predominantly shale sequence in eastern Montana***. Likewise both shaly and sandy beds become more calcareous eastward until the designation of certain beds as sandstone or limestone becomes an arbitrary matter."

The Swift unconformably overlies the Middle Jurassic Rierdon Formation of the Ellis Group throughout much of Montana east of the Rocky Mountains but also overlies rocks of Paleozoic age in some areas. In southeast Montana the Swift overlies the Hulet Sandstone Member of the Sundance Formation. The Swift is conformably overlain by the Morrison Formation with a gradational change from deposition of marine glauconitic sediments to nonmarine sediments.

CUMULATIVE SANDSTONE THICKNESS

As shown on the map, the cumulative thickness of sandstone in the Swift Formation ranges from about 25 feet in the eastern two-thirds of the study area to 200 feet at locations in the western one-third.

REFERENCES CITED

Dobbin, C. E., and Erdmann, C. E., 1955, Structure contour map of the Montana Plains: U.S. Geological Survey Oil and Gas Investigations Map OM-178B, scale 1:1,000,000.

Feltis, R. D., 1982a, Map showing altitude of the top of the Swift Formation, Montana: U.S. Geological Survey Water-Resources Investigations 82-4029, scale 1:1,000,000.

1982b, Map showing total thickness of the Swift Formation, Montana: U.S. Geological Survey Water-Resources Investigations 82-4031, scale 1:1,000,000.

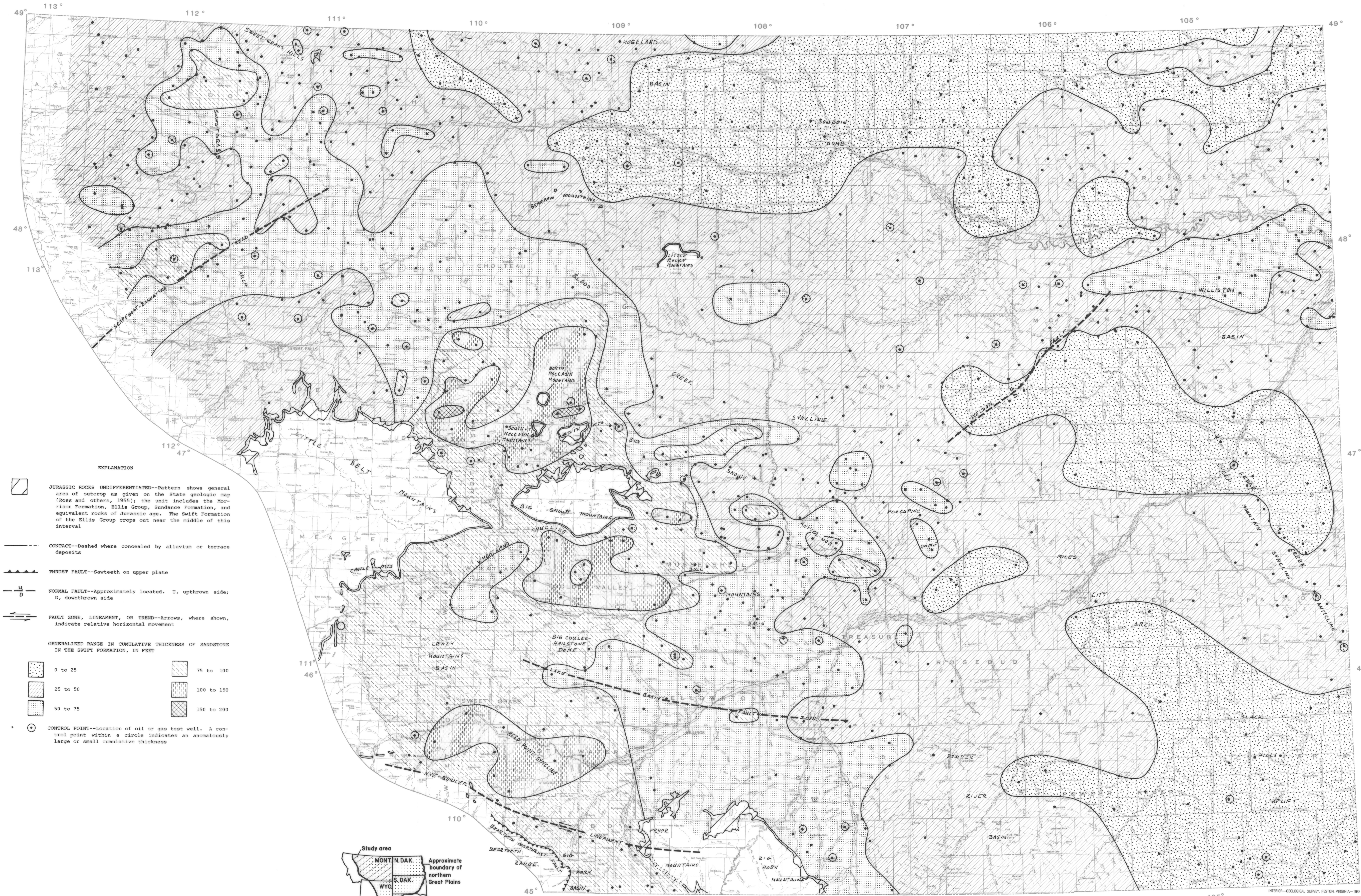
Imlay, R. W., Gardner, L. S., Rogers, C. P., Jr., and Hadley, H. D., 1948, Marine Jurassic formations of Montana: U.S. Geological Survey Oil and Gas Investigations Preliminary Chart 32.

Ross, C. F., Andrews, D. A., and Witkind, I. J., 1955, Geologic map of Montana: U.S. Geological Survey, scale 1:500,000, 2 sheets.

METRIC CONVERSION TABLE

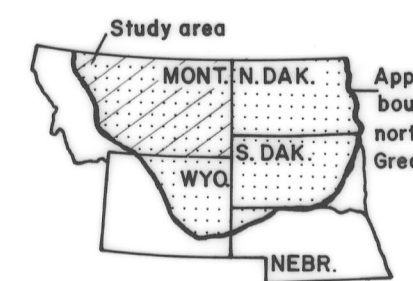
The following factors can be used to convert inch-pound units in this report to the International System of units (SI):

Multiply inch-pound unit	By	To obtain SI unit
foot	0.3048	meter
mile	1.609	kilometer



EXPLANATION

- JURASSIC ROCKS UNDIFFERENTIATED--Pattern shows general area of outcrop as given on the State geologic map (Ross and others, 1955); the unit includes the Morrison Formation, Ellis Group, Sundance Formation, and equivalent rocks of Jurassic age. The Swift Formation of the Ellis Group crops out near the middle of this interval.
- CONTACT--Dashed where concealed by alluvium or terrace deposits
- THRUST FAULT--Sawtooth on upper plate
- NORMAL FAULT--Approximately located. U, upthrown side; D, downthrown side
- FAULT ZONE, LINEAMENT, OR TREND--Arrows, where shown, indicate relative horizontal movement
- GENERALIZED RANGE IN CUMULATIVE THICKNESS OF SANDSTONE IN THE SWIFT FORMATION, IN FEET**
- 0 to 25
- 25 to 50
- 50 to 75
- 75 to 100
- 100 to 150
- 150 to 200
- CONTROL POINT--Location of oil or gas test well. A control point within a circle indicates an anomalously large or small cumulative thickness



Base on U.S. Geological Survey State base map, 1968

Scale 1:1 000 000

0 10 20 30 40 MILES

0 10 20 30 40 KILOMETERS

Geologic contacts from Ross, Andrews, and Witkind (1955). Structural features from Dobbin and Erdmann (1955)

MAP SHOWING CUMULATIVE THICKNESS OF SANDSTONE IN THE SWIFT FORMATION, MONTANA

by
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