

A GRAVITY SURVEY OF THE BABLER
STATE PARK AREA, MISSOURI

by

Arthur Paul Whipple, B. S.

A digest presented to the Faculty of the
Graduate School of Saint Louis University
in partial fulfillment of the requirements
for the degree of Master of Science (Research).

1958

A geophysical study of a portion of the northeast flank of the Ozark dome was undertaken in an effort to determine (1) whether the Eureka anticline and associated faulting extend northwestward into the Babler area; (2) whether a southwestward expression of the St. Charles trend (a northeast-southwest fault trend following the Missouri River in the vicinity of St. Charles, Missouri) can be discovered, and (3) the cause of the anomalous northeastward course of the Missouri River in its turning from a southeast to a northeast direction between Washington and Labadie, Missouri..

A gravity survey was decided upon, since the writer suspected from the outset that basement features would be related to the answers to the questions at hand, and the contact of basement rock with the basal Paleozoics was expected to provide a density contrast that would reveal structure involving the Paleozoic sediments. Also, it was felt that this gravity survey would complement other gravity and magnetic surveys in the vicinity.

The Babler area is located on the northeast projection of the northeast flank of the Ozark dome. This projection of the Ozark dome is defined by the courses of the Missouri and Mississippi Rivers to their confluence. A gravity survey was made covering the northwestward extension of the Eureka anticline; the area into which the

projected St. Charles trend should extend; and both sides of the Missouri River. A Bouguer gravity map was made, and from it a graphical residual and a second derivative map were made. Structures conforming to the effects displayed by the maps were then postulated and their effects computed by one of several different methods.

The Eureka trend was found to extend a short distance into the Babler area but is definitely terminated as shown on both the Bouguer and second derivative maps.

It was also concluded that a fault, downthrown to the southeast, its trace oriented northeast along the Missouri River, with a throw of about 400 feet at the Cambrian, pre-Cambrian contact, may exist on the south flank of a pre-Cambrian hill lying under the Missouri River. The northeast extent of the fault could not be determined but it terminates to the southwest within the area of the survey. Thus the Missouri River appears to follow a gravity maximum over a portion of its course from Howell Island to Bonhomme Island. Though faulting may be present, no surface expression of it is apparent.

No relation between gravity anomalies and the epicenters of two small earthquakes (at Defiance and Hamburg, Missouri) could be determined, possibly because the data were too sparse and of insufficient precision.