New Reef Structures in Daviess County, Indiana

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Introduction

There are two broad areas of reef development crossing the state (1). The northernmost one is called the Fort Wayne Reef Bank. It sweeps across the northern counties from Lake to Adams with an average width of approximately 30 miles. It forms a broad shelf which outlines the southern flank of the Michigan Basin.

Many of the reefs in the Fort Wayne Reef Bank are exposed in quarries and occasionally in road cuts. The accessability of these northern structures has greatly aided in our understanding of their formation (3,4,7,9,10). The individual reefs that make up this Bank are relatively small structures. Generally, they are less than one square mile in area with a few notable exceptions. The small structures have been variously classified as pinnacle reefs, biohermal mounds or patch reefs. The reefs occur in Silurian age rocks but the overlying formations are often bowed upward and sometimes thin as they pass over the central part of the structural high.

The study we have undertaken centers upon the southern belt of reefs in southwestern Indiana called the Terre Haute Reef Bank. They outline the eastern edge of the Illinois Basin and are not exposed at the surface. They run in a 25-mile-wide belt from the Ohio River area of Spencer County northwesterly to the Indiana-Illinois state boundary in Vermillion County (1). Previous studies from Indiana and Illinois (2,11,12) have shown that subsurface structure maps and isopach maps can locate reefs.

A good example of this is Noel's study of the Plummer Field (8). His structure maps drawn on tops of Renault Formation, Salem Limestone, and Middle Devonian Limestone clearly illustrate the underlying reef. His isopach maps of the Ste. Genevieve Limestone, Salem Limestone, and New Albany Shale indicates a thinning of these beds as they pass over the reef core.

Discussion

We decided that it should be possible to find undiscovered reefs by drawing structure maps and isopach maps on various formations in the five county area of Clay, Vigo, Sullivan, Greene, and Daviess Counties. We were also aware that a number of other geologists have already done such structure maps since this is an area of oil exploration.

We acquired a database of approximately 3,300 well logs from Scout Check of Evansville. The information each well log contains such as well location, oil production and formation tops is now stored in our program. We used INDIMAP, a program maintained by the Indiana Geological Survey, to change all the well locations to Lambert Coordinates for ease of plotting the well sites. We then proceeded to write a program to draw structure maps and isopach maps from information in our well database using the DI-3000 Contouring package produced by Precision Visuals.

In order to test the program, we chose those localities which contained known reef structures. We produced subsurface contour maps and isopach maps of each of the following strata: Barlow Limestone, Upper Paint Creek Limestone, Lower Paint Creek For-

mation, Upper Renault Formation, Lower Renault Formation, Aux Vases Formation, Ste. Genevieve Limestone, Salem Limestone, and New Albany Shale. Not all of these formations were present in each of our wells but generally enough information was available to produce usable maps from a number of rock formations. We used the premise that two or more formations had to show a structural high in the same locality before we assumed there was an underlying reef.

The program clearly located the following reefs from subsurface structure maps: Marts, Plummer, Riley South, Prairie Creek, Terre Haute South, and Fairbanks. It did not locate the following reefs: Blackhawk, Cory, Riley, and Staunton. We believe the program is useful since it located most of the reefs that cover areas greater than 250 acres.

Summary

We have located thirteen new subsurface structures on the Terre Haute Reef Bank of southwestern Indiana that have the characteristics of previously discovered pinnacle reefs. These are scattered over a five-county area but eight of them are concentrated in Daviess County. Most cover areas ranging between 200-600 acres. There are no obvious surface indications of these structures but subsurface structure maps indicate doming of some formations and, in a few cases, isopach maps indicate formation thinning over some of the structures.

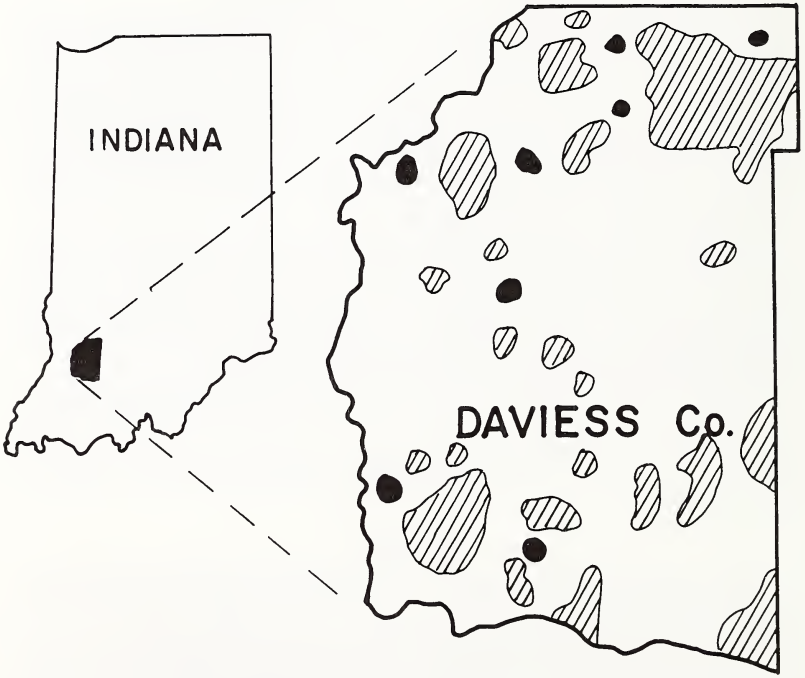

FIGURE 1. Reef structures in Daviess County. Lined areas are known reefs. Black areas are new reefs found in this study.

Acknowledgments

We wish to acknowledge the following grants provided by Indiana University which defrayed part of the cost of this research.

Grant-in Aid of Research No. 22-631-07, 1983.
Grant-in Aid of Research No. 22-631-08, 1986.

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