STATE OF INDIANA
HENRY F. SCHRICKER, GOVERNOR

DEPARTMENT OF CONSERVATION
KENNETH M. KUNKEL, DIRECTOR
INDIANAPOLIS

DIVISION OF GEOLOGY
CHARLES F. DEISS, STATE GEOLOGIST
BLOOMINGTON

REPORT OF PROGRESS NO. 2

STRATIGRAPHY OF THREE WELLS IN SULLIVAN AND VIGO COUNTIES, INDIANA

BY

D. F. BIEBERMAN

PRINTED BY AUTHORITY OF THE STATE OF INDIANA

BLOOMINGTON, INDIANA
JANUARY 1949

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CONTENTS

Page

Introduction 3

Section from Riggs No. 1 well 5

Section from Wallace No. 2 well 6

Section from Campbell No. 1 well 7

Stratigraphy and lithology 8

Devonian 8

Silurian 9

Possible pay zones 9

ILLUSTRATIONS

Page

FIGURE 1. Index maps of Sullivan and Vigo counties 4

INTRODUCTION

Recent oil discoveries have stimulated drilling activity in Sullivan and Vigo counties. The discovery well of the Wilfred Pool, Siepman No. 1 well, was completed in August, 1948. Since then, approximately 80 test wells have been drilled in these two counties. Three new pools have been opened in the Devonian limestone, Wilfred and Marts in Sullivan County, and Spring Hill in Vigo County. Additional wells have been drilled in three old pools, Riley and Prairie Creek in Vigo County, and Siosi on the Sullivan-Vigo county line. This report is written in response to requests for immediate information on the Devonian formations and the possible Devonian pay zones in this area. The purpose of this paper is to make available to the public some of the geologic information now being assembled. As the present study of the subsurface Devonian is still in progress, correlations are tentative.

The report includes short descriptions of the Pennsylvanian and Mississippian beds and detailed sections of the Devonian formations in three wells in Sullivan and Vigo counties. The wells are; Riggs No. 1, by Felmont Corporation, sec. 36, T. 8 N., R. 9 W., a Sullivan County wildcat; Leon Wallace No. 2, by F. B. Cline, sec. 30, T. 9 N., R. 8 W., Wilfred Pool, Sullivan County; and R. B. Campbell No. 1, by Sage and Farley, sec. 24, T. 11 N., R. 8 W., Riley Pool, Vigo County. These particular wells were selected because they penetrate the entire Devonian section. The Riggs No. 1 well and the Campbell No. 1 well were cable-tool tests into the Trenton, and the Wallace No. 2 well was a rotary test that penetrated 361 feet of the Silurian rocks. The three wells are aligned in a north-south direction (Fig. 1) and show lithologic changes in the Devonian formations. The conclusions given in the paper are also based on information from many other wells in the Sullivan and Vigo county area.

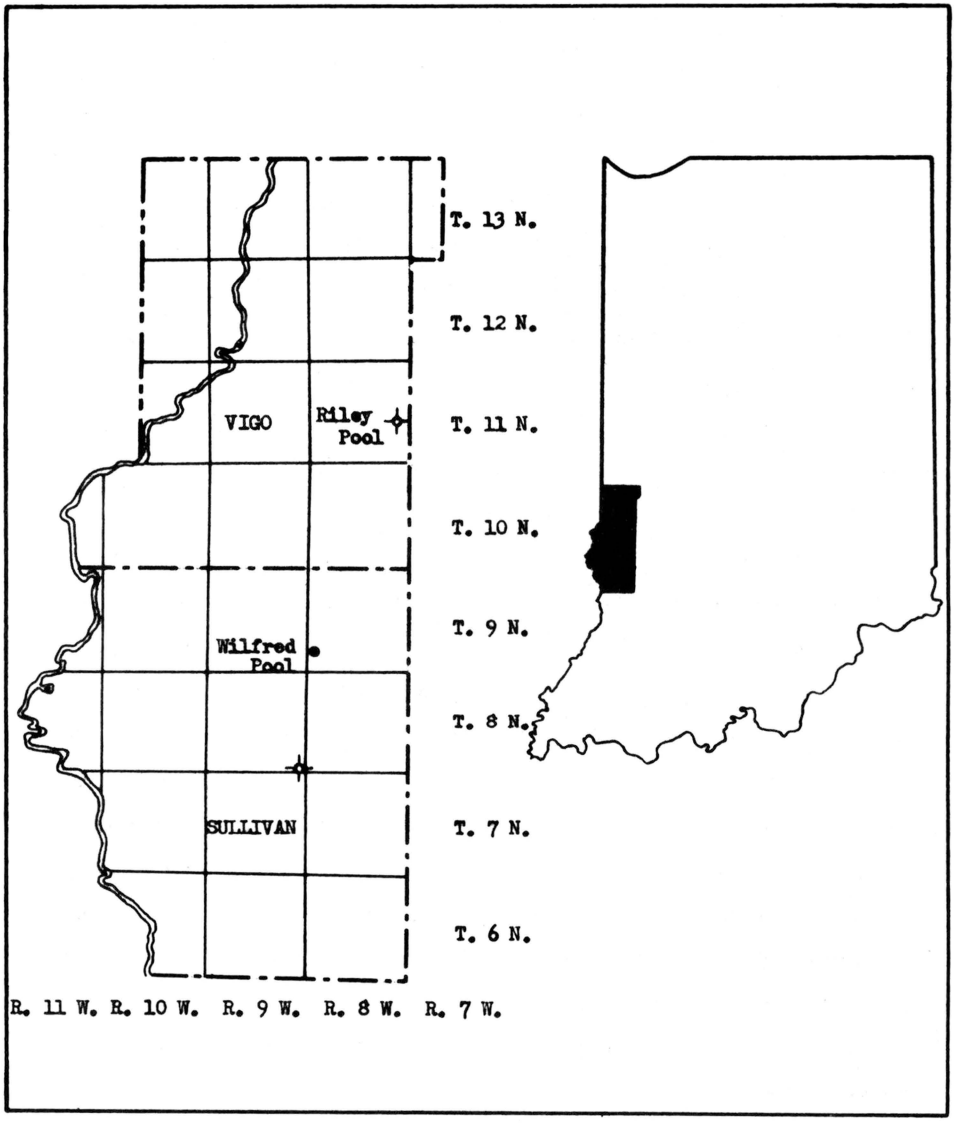
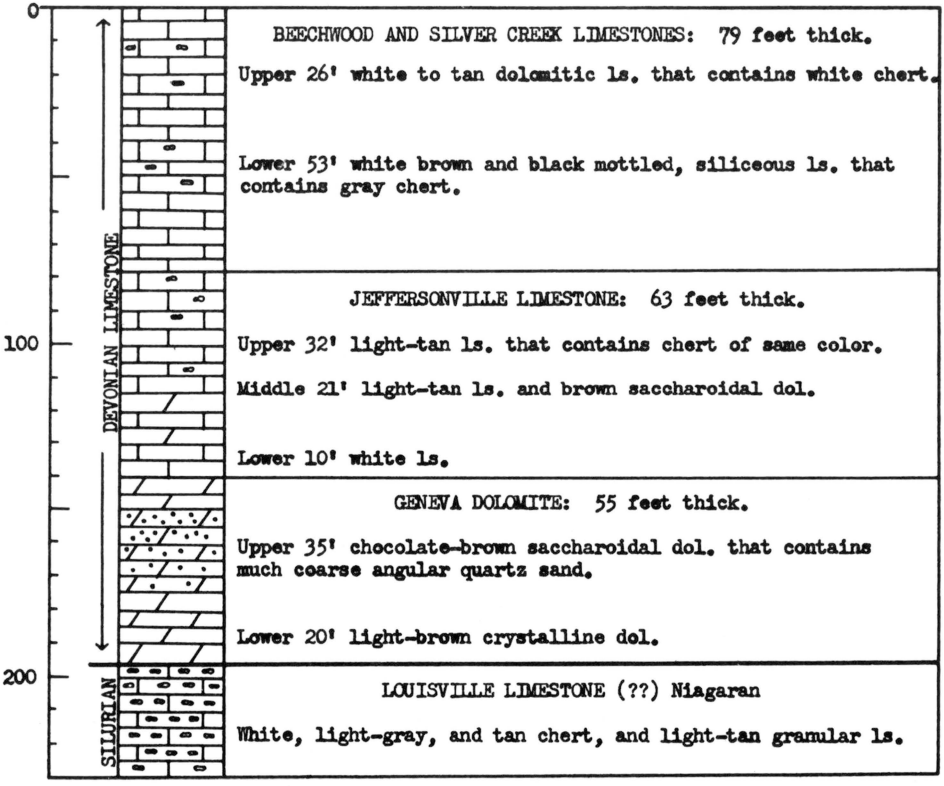


FIGURE 1. Index maps of Sullivan and Vigo counties.

Riggs No. 1, by Felmont Corporation, SE¼SE¼NW¼ sec. 36, T. 8 N., R. 9 W. Sullivan County, wildcat. Elevation 481'. Total depth 4160'. Dry hole.

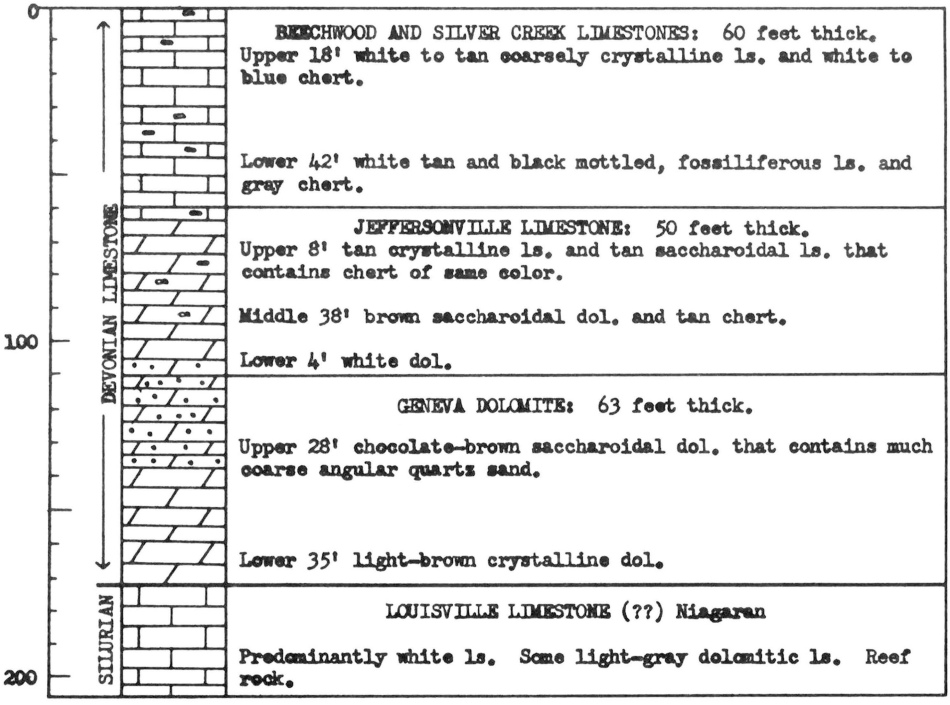
Pennsylvanian — 815 feet thick. Predominantly shale and ss., coal in upper 350'.
Mississippian
Chester — 225 feet thick. Oolitic to sub-oolitic ls. Ss. finer than Penn. ss. Shale predominantly gray to green, some red and black.
Ste. Genevieve and St. Louis — 345 feet thick. Upper 140' white to tan oolitic ls. separated by tan to brown ls. and dol. Middle 120' tan to brown ls. and dol. containing chert and gypsum. Lower 82' dark-gray, brown, and black shaly ls. and dol.
Salem — 150 feet thick. Predominantly brown ls. containing brown to dark-gray Endothyra and dwarfed fauna. Some brown saccharoidal dol.
Harrodsburg and Borden — 585 feet thick. Upper 140' white, tan, and gray ls. containing chert in upper 10'. Middle 145' gray siliceous ls., some shale, and abundant gray chert. Lower 300' dark-gray shale which is greenish-gray in lower 50'.
Rockford — Absent.
Devonian
New Albany — 150 feet thick. Black shale.
Devonian limestone -- 197 feet thick. See detailed section.
Silurian — 650 feet thick. See detailed section.



SECTION FROM WALLACE NO. 2 WELL

Leon Wallace No. 2, by F. B. Cline, SW¼NE¼NW¼ sec. 30, T. 9 N., R. 8 W., Sullivan County, Wilfred Pool. Elevation 542'. Total depth 2466'. Producing from the Geneva.

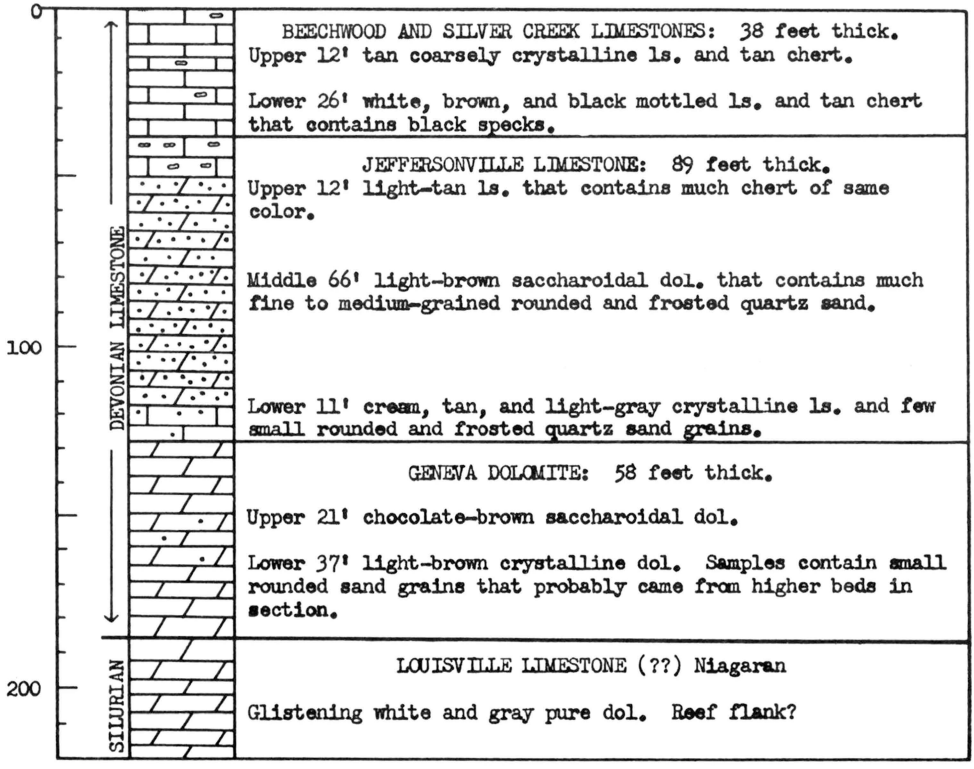
Pennsylvanian — 834 feet thick. Predominantly ss. and gray to black shale.
Mississippian
Chester — Cut out by erosion.
Ste. Genevieve and St. Louis — 300 feet thick. Upper 80' predominantly fine-grained ls. and dol. One white and tan oolitic ls. zone. Lower 220' light-tan and greenish-gray fine-textured dol., brown ls., and dark brown to black shaly ls. Gypsum and gray chert intercalated throughout.
Salem — 120 feet thick. Brown ls. containing brown to gray Endothyra and dwarfed fauna.
Harrodsburg and Borden — 556 feet thick. Upper 275' white, tan, and gray ls. Some blue opaque chert. Middle 251' predominantly gray to black shale. Lower 30' green shale.
Rockford — 8 feet thick. Greenish-gray and pink crinoidal ls.
Devonian
New Albany — 108 feet thick. Black shale.
Devonian limestone — 173 feet thick. See detailed section.
Silurian — Penetrated 361 feet. See detailed section.



SECTION FROM CAMPBELL NO. 1 WELL

R. B. Campbell No. 1, by Sage and Farley, 330'SL 660'EL NE¼NW¼ sec. 24, T. 11 N. R. 8 W., Vigo County, Riley Pool. Elevation 618'. Total depth 3000'. Dry hole.

Pennsylvanian — 630 feet thick. Predominantly ss. and gray to black shale.
Mississippian
Chester — Cut out by erosion.
Ste. Genevieve and St. Louis — 205 feet thick. Upper 80' white to tan oolitic ls. separated by tan to gray ls. and dol. Lower 125' light-tan and greenish-gray extremely fine-textured dol., brown ls. containing gypsum, and dark brown to black shaly ls.
Salem — 105 feet thick. Upper 30' brown saccharoidal dol. Lower 75' brown ls. containing brown to gray Endothyra and dwarfed fauna.
Harrodsburg and Borden — 582 feet thick. Upper 84' white, brown, and gray ls. and much gray and white mottled chert. Middle 451' predominantly gray to black shale. Some gray dolomitic siltstone and a few cherty ls. beds. Lower 47' green shale.
Rockford — 6 feet thick. Light greenish-gray shaly ls.
Devonian
New Albany — 104 feet thick. Black shale.
Devonian limestone — 185 feet thick. See detailed section.
Silurian — 525 feet thick. See detailed section.



STRATIGRAPHY AND LITHOLOGY

Devonian

Although the Beechwood and Silver Creek limestones (Hamilton) show a pronounced thinning to the north, 76 feet thick in the Riggs No. 1 well, Sullivan County, and only 38 feet thick in the Campbell No. 1 well, Vigo County, they do not change strikingly in lithology. The upper zone (see sections) is white to light-tan coarsely crystalline limestone, and may be equivalent to the Beechwood limestone of the outcrop. The lower zone is composed of white tan and black mottled, fossiliferous, siliceous limestone that contains gray chert, and seems to be traceable across the state to the outcrop of the Silver Creek.

In contrast with the Beechwood and Silver Creek, the Jeffersonville limestone (Onondaga) thickens to the north and changes in lithology between the Wallace No. 2 well in the Wilfred Pool and the Campbell No. 1 well in the Riley Pool. The brown saccharoidal dolomite of the middle unit is a lighter shade of brown in the Campbell No. 1 well and contains much fine to medium-grained rounded and frosted quartz sand. This sandy unit in the Jeffersonville has been noted in other wells in Vigo County, north in Parke and Fountain counties, and east in Clay, Owen, Morgan, and Marion counties. The amount of sand changes laterally from well to well, and vertically from bed to bed in the same well. Some cores and samples contain as much as 95 percent sand.

The Geneva dolomite (Schoharie) is an excellent subsurface marker-bed over a large part of Indiana. Its chocolate-brown color usually sets it apart from the white, gray, and tan Devonian limestones and the white Silurian limestones and dolomites. In Sullivan County, however, the Jeffersonville is also brown and saccharoidal. Where saturated with oil, it is not easily distinguishable from the Geneva, if the Geneva itself has not been drilled. Three lithologic characteristics help differentiate the two formations. The Jeffersonville is finer in texture. The Geneva contains coarse angular quartz sand. The two formations are separated by a thin compact bed of white to light-tan limestone or dolomite. Sand in the

Geneva occurs in both of the Sullivan County wells, but not in the Vigo County well. Although sand occurs in the Devonian of both counties, in Sullivan County the sand is in the Geneva and is coarse and angular, whereas in Vigo County the sand is in the Jeffersonville and is fine-grained, rounded, and frosted.

Silurian

The Silurian section in the three wells is of special interest because the rock differs in each. The Riggs No. 1 well is located on normal regional dip (off structure), the Wallace No. 2 well is high on a domal structure, and the Campbell No. 1 well is on the flank of a structure. As shown in the detailed sections, the Silurian rock in the off structure well (Riggs No. 1) is light-tan granular limestone that contains much chert. This probably represents the normal Silurian country rock. The Silurian rock in the well on the flank of a structure (Campbell No. 1) is glistening white and gray dolomite. This may represent dolomotized coral sand on the reef flank. The Silurian rock in the well on top of the Wilfred dome (Wallace No. 2) is predominantly white fossiliferous limestone. This limestone is similar to the Silurian limestone found in other wells high on structure, and may represent reef rock.

POSSIBLE PAY ZONES

The Devonian limestone in Sullivan and Vigo counties contains three possible pay zones: the Beechwood-Silver Creek pay, the Jeffersonville pay, and the Geneva pay. Wells drilled in northern Sullivan and southern Vigo counties may contain one or all of these pay zones. Porosity determines, to a large extent, the presence of oil saturation zones. Wells in the same pool, therefore, may produce from different pay zones. The assumption cannot be made that an offset well is dry if it does not contain oil in the first or even in the second zone. Saturated zones are easily overlooked in the Devonian, especially with rotary drilling, and electric logs may fail to indicate possible pay zones. The best method of locating saturated zones is by coring. Ultra-violet light shows saturation in samples which cannot be

seen under ordinary light.

Devonian pools in Sullivan and Vigo counties contain the following pay zones:

Dodds Bridge, sec. 3, 10, T. 8 N., R. 10 W., Geneva.

Heien, sec. 1, 2, T. 8 N., R. 10 W., gas from Beechwood-Silver Creek and basal Jeffersonville or upper Geneva and small amounts of oil from Geneva.

Wilfred, sec. 30, T. 9 N., R. 8 W., Jeffersonville and Geneva, possible pay in Beechwood-Silver Creek.

Marts, sec. 17, 19, T. 9 N., R. 9 W., Jeffersonville and Geneva and possible pay in Beechwood-Silver Creek.

Siosi, sec. 5, 6, T. 9 N., R. 10 W., and sec. 31, 32, T. 10 N., R. 10 W., Beechwood-Silver Creek, Jeffersonville, and Geneva.

Prairie Creek, sec. 9, 10, 15, 16, T. 10 N., R. 10 W., Beechwood-Silver Creek and Jeffersonville.

Spring Hill, sec. 10, 11, 14, 15, T. 11 N., R. 9 W., Beechwood-Silver Creek.

Riley, sec. 24, 25, T. 11 N., R. 8 W., Beechwood-Silver Creek.