

THE NEW HARMONY GROUP (LOWER DEVONIAN) REVISITED

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ABSTRACT. The New Harmony Group is present only in the subsurface of southwestern Indiana, contains in ascending order the Grassy Knob Chert, The Backbone Limestone, and the Clear Creek Chert, and ranges in thickness from zero at its eroded limit to almost 900 feet (820 m). This study uses more than six times the control previously reported, yet the pattern of thickness variation shown herein differs modestly from that shown on previous maps. The most significant difference is the position of the zero thickness line (the erosional limit) of the group.

Keywords: Devonian, New Harmony Group, subsurface Indiana

Collinson et al. (1967) were the first to recognize Lower Devonian rocks in the subsurface of Indiana, and Becker (1974) produced the first maps showing the distribution of these formations in the subsurface of southwestern Indiana. Becker's report utilized the data from eight deep test wells in southwestern Indiana and from one deep test well in White County, Illinois (a few miles (km) west of the Indiana-Illinois state line), to establish the approximate boundaries of the Lower Devonian formations in Indiana.

The name New Harmony Group was proposed by Becker & Droste (1978) to include the Grassy Knob Chert, Backbone Limestone, and Clear Creek Chert (Fig. 1), which comprise the Lower Devonian Series of the subsurface in southwestern Indiana. Becker & Droste (1978) used data from approximately 60 wells in Indiana, characterized several types of Lower Devonian limestones from thin-section study of samples from White County, Illinois core (Superior No. C-17 Ford), and described the facies relationships among the three formations of the New Harmony Group. Droste & Shaver (1987), using data from 110 wells, expanded the earlier study by Becker & Droste (1978) to show the distribution of the New Harmony Group in the central Illinois Basin throughout Indiana, Illinois, and Kentucky. The map illustrating the thickness of the New Harmony Group (Droste

& Shaver 1987, fig. 6) was subsequently slightly modified by Rupp (1991, fig. 21).

The purpose of the present report is to update the thickness distribution of the New Harmony Group in the subsurface of Indiana through the use of data from many new wells. The control for the present study is based on data from 430 wells in Indiana (Fig. 2). Most of the new control is from wells where the New Harmony Group is less than 300 feet (270 m) thick. Only five of the new wells, which have been drilled since 1987 and which penetrate rocks older than the New Harmony Group, provide additional control in areas where the New Harmony is greater than 300 feet (270 m) thick. Almost all the new control wells have been logged (principally electric logs) and have samples for study on file at the Indiana Geological Survey.

STRATIGRAPHY

The stratigraphy of the New Harmony Group remains the same as that presented by Droste & Shaver (1987) where interested readers will find more extensive details than are summarized below. The New Harmony Group generally includes, in ascending order, the Grassy Knob Chert, Backbone Limestone, and Clear Creek Chert (Fig. 1). The group consists of two basic facies of variably colored, mainly light brown and light gray to white carbonate rocks. The basinward (western) facies is very fine-grained to medium-grained, sparsely cherty limestone and dolomite to almost pure chert and represents the

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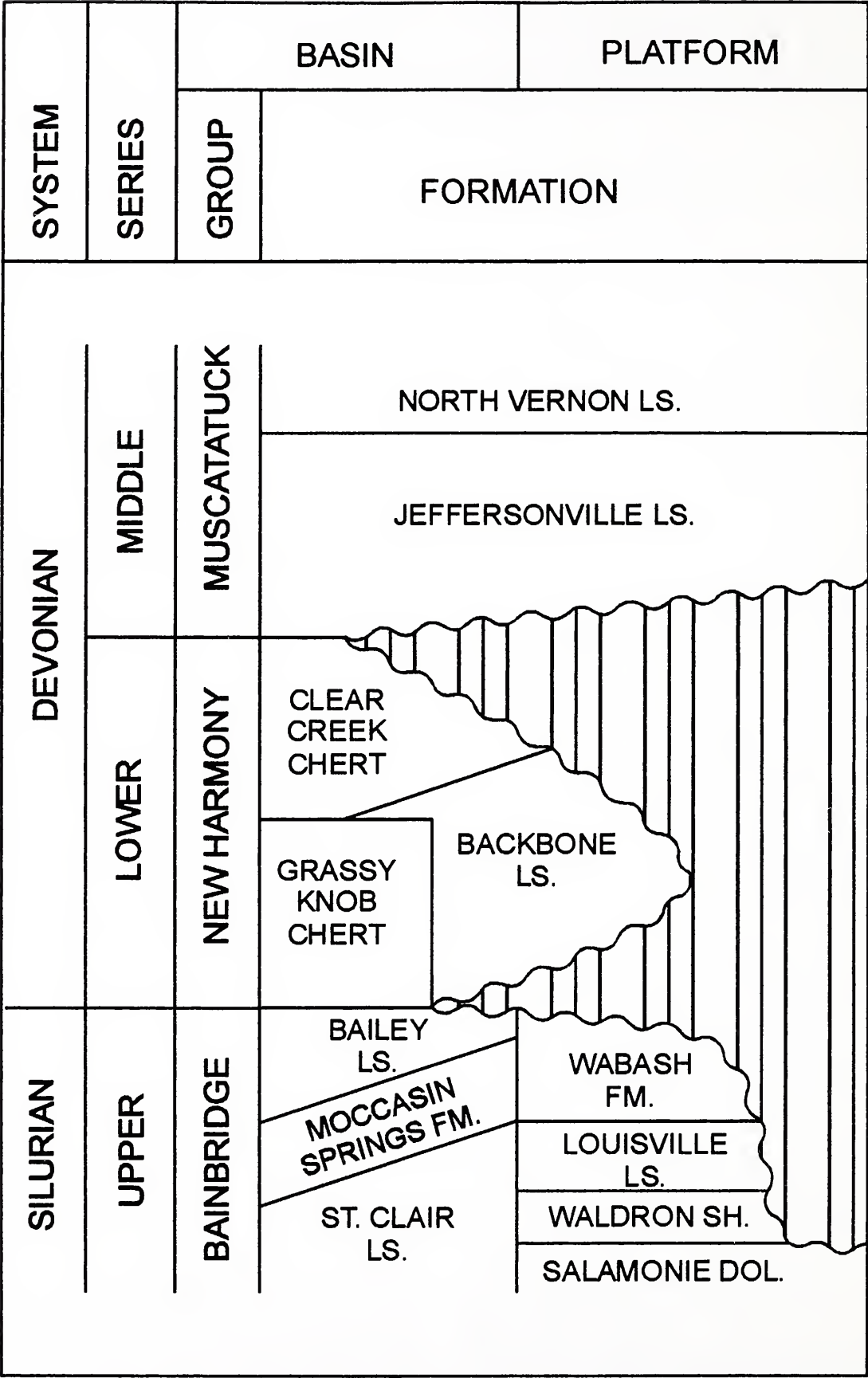


Figure 1.—Chart showing stratigraphic nomenclature used in this report. Modified from Becker & Droste (1978) and Droste & Shaver (1987). *Abbreviations:* LS = limestone, DOL = dolomite, SH = shale, FM = formation.

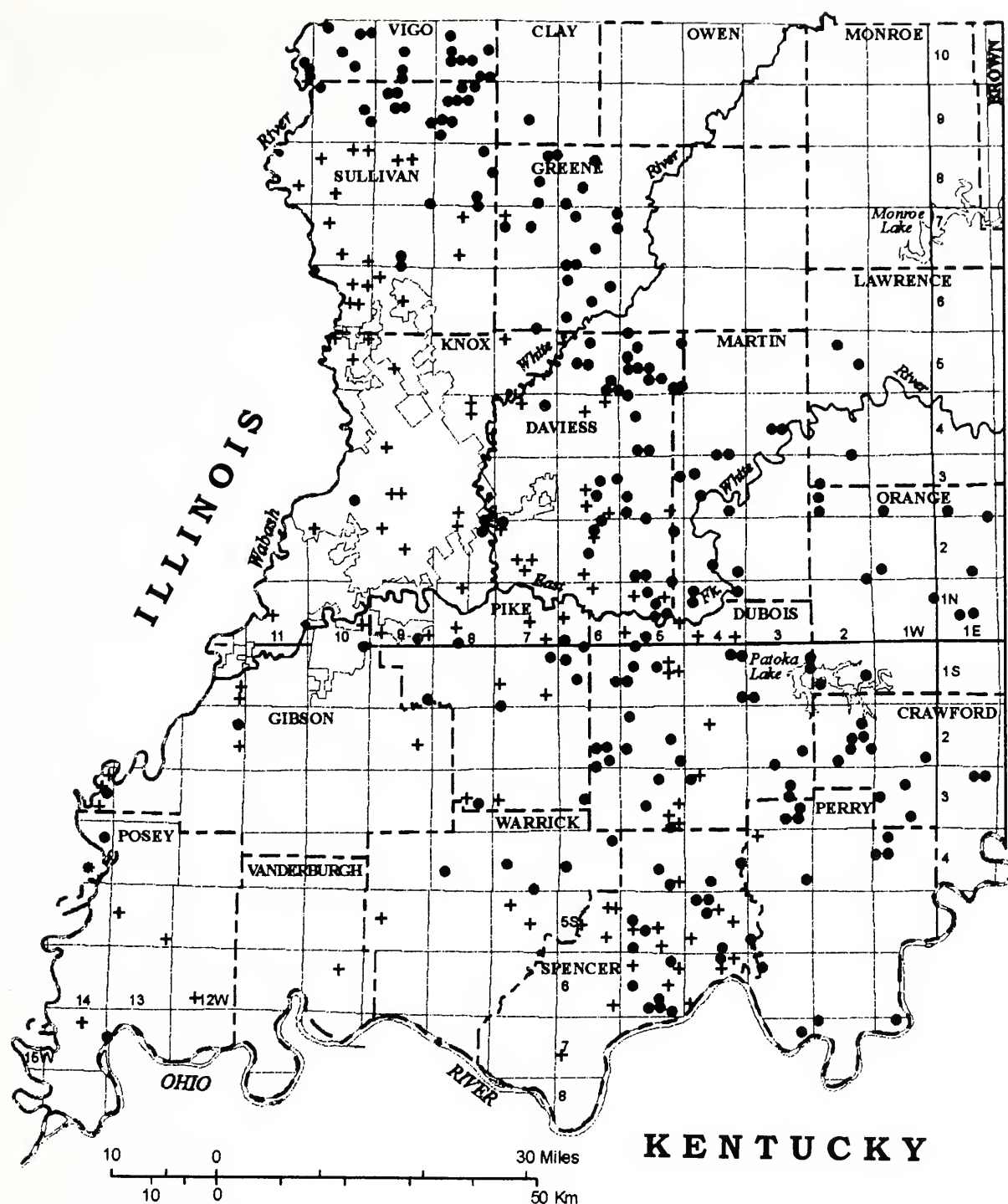


Figure 2.—Map showing the study area and the location of wells used in this study. Dots show locations of wells in which total depth is in Silurian or older rocks. Crosses show location of wells in which total depth is within rocks of the New Harmony Group. The star marks the location of the Superior #C17 Ford well (see text).

Grassy Knob and Clear Creek Cherts. The basin-margin (eastern) facies is very light colored medium- to coarse-grained high-purity biolclastic limestone and dolomite of the Backbone Limestone. Each facies contains tongues of the other facies. An arbitrary vertical cutoff is used to separate the Grassy Knob Chert from the Backbone Limestone. The formational cutoff is defined as the basin-

most extent of the lowest tongue of the Backbone-like lithology. The Backbone-Clear Creek contact is placed at the change from coarser-grained and purer carbonate rocks below (Backbone facies) to finer grained and somewhat cherty carbonate rocks above (Clear Creek facies).

In southwesternmost Indiana (Posey County), the New Harmony is probably conform-

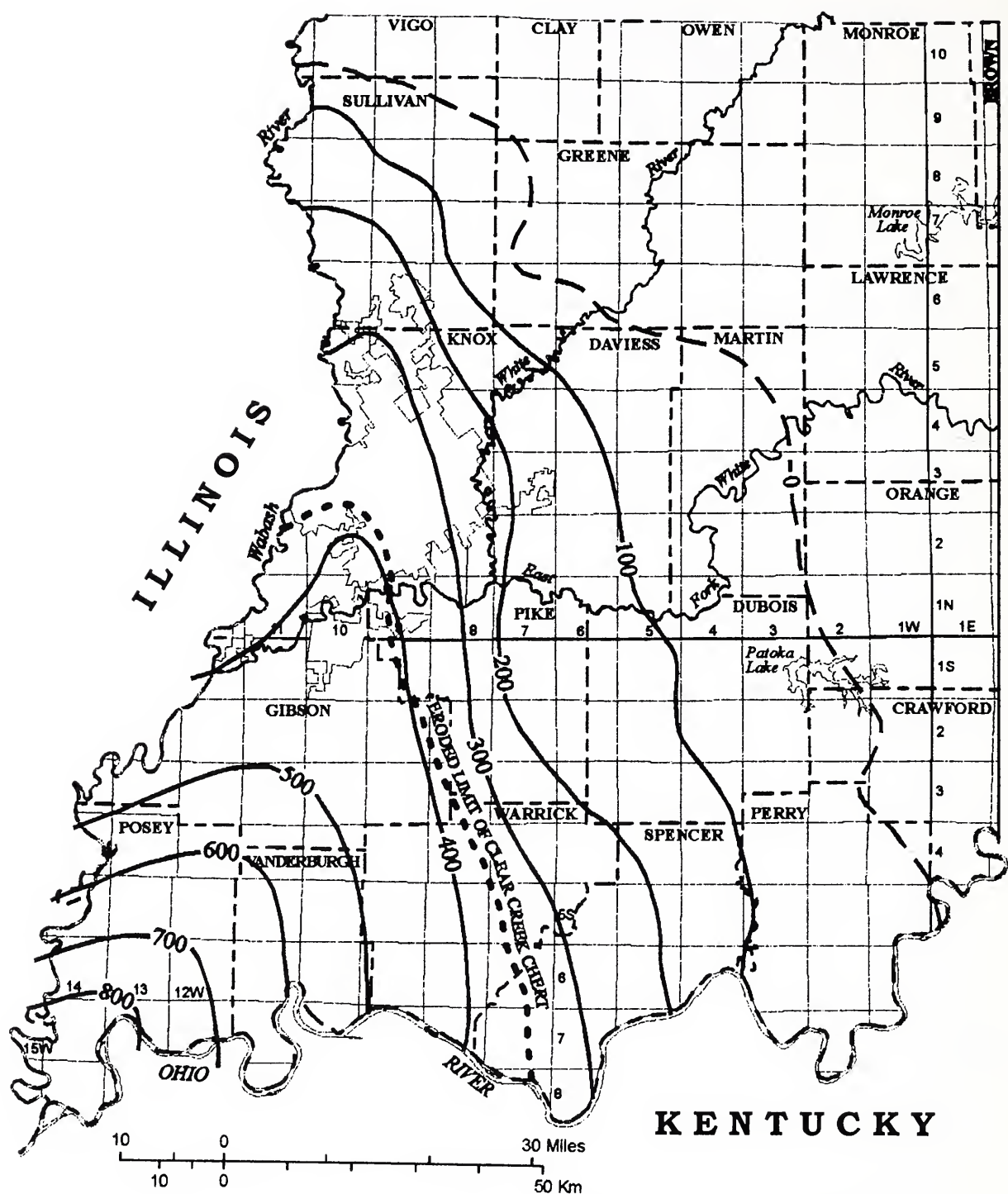


Figure 3.—Map showing the thickness of the New Harmony Group in Indiana. Contour interval = 100 feet (91 m).

able with Silurian rocks below and Middle Devonian (Jeffersonville Limestone) rocks above. Elsewhere in Indiana, the upper and lower contacts of the New Harmony are unconformable to Silurian rocks below and Middle Devonian rocks above.

In Indiana the New Harmony is present only in the subsurface of Indiana and ranges in thickness from 0 at its eroded limit to almost 900 feet (820 m) in southwesternmost Posey County (Fig. 3). Certainly the zero

thickness line (Fig. 3) represents eastward pre-Middle Devonian erosional truncation. Likewise, the limit line of the Clear Creek Chert (Fig. 3) also represents eastward pre-Middle Devonian erosional truncation. Our new control does not significantly modify the paleoenvironmental patterns of sedimentation during Early Devonian time as interpreted by Droste & Shaver (1987, p. 21, figs. 11C, D, & E).

The pattern of thickness of the New Harmony shown here (Fig. 3) differs from that

shown on previous maps (Rupp 1991, p. 45, fig. 21; Droste & Shaver 1987, p. 10, fig. 6) in two significant details. Based on sample studies from wells in northeastern Pike, northwestern Dubois, and southern Daviess Counties, the area of thin New Harmony centered in northeastern Pike County on the earlier maps, is not confirmed by our work. Secondly, the zero thickness line, i.e., the eroded limit line (Fig. 3) that we show is different from the zero thickness line on both previous maps. The position of the eroded limit (zero thickness line) of the New Harmony rocks certainly will change with future drilling. We believe that the zero thickness of the group is a much more irregular line than we depict (Fig. 3). Additionally, we expect that the eroded limit of the Clear Creek Chert (Fig. 3) will become more irregular with control from future drilling; and, because we present little additional data in areas where the New Harmony Group is thicker than 300 feet (270 m), deeper drilling in Gibson, Warrick, Vanderburgh, and Posey Counties may yield significant variation in the thickness pattern we show (Fig. 3).

SUMMARY

Although this report utilizes more than six times the number of wells used in two earlier reports (Becker & Droste 1989; Droste & Shaver 1987) only modest variations in thickness interpretations have been introduced. The general stratigraphic framework for the New Harmony Group in the subsurface of Indiana remains unchanged from earlier reports. The great majority of the new control wells are located where the group is less than 300 feet (270 m) thick, and so it follows that the differences from earlier reports occur in the area

of more severe pre-Middle Devonian erosional truncation.

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