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Coal Resources of the Springfield Coal Bed in Western Kentucky

William M. Andrews Jr., Robert E. Andrews, and John K. Hiett

Introduction

Historically, the Springfield (Western Kentucky No. 9) coal bed has been the leading source of production in the Western Kentucky Coal Field. The Springfield coal is known for its lateral continuity in terms of both thickness and coal quality. It is estimated to have the largest original and remaining resource in the Western Kentucky Coal Field (Greb and others, 1992).

Map Compilation

The outcrop area of the Springfield coal bed was digitized from 1:125,000-scale Mylar compilations that were generalized from U.S. Geological Survey 1:24,000-scale geologic quadrangle maps.

Data for coal-thickness interpolation (Fig. 1) were compiled from the coal borehole database at the Kentucky Geological Survey. Some of the boreholes were drilled during KGS projects, but most data were submitted to KGS by coal companies and other government agencies. The data were entered into the database, and coal beds were manually correlated and tagged. Seam height, parting thickness, and elevation from 2,258 boreholes (Fig. 2) were extracted from the data for digital interpolation. An inverse-distance weighted algorithm was used to produce the interpolated continuous thickness map from the point data.

Mine outlines were manually generalized from 1:24,000-scale maps compiled by the Kentucky Department of Mines and Minerals onto 1:100,000-scale base maps, which were then digitized. The resulting maps are considered accurate to a scale of 1:250,000 (Fig. 3). The mine data represent only those maps on file at the Kentucky Department of Mines and Minerals, which are known to be incomplete for mines closed prior to the 1950's. Many early mines were not mapped, or the original maps have been lost. The locations of several 19th-century mines were compiled from maps in Eavenson (1942).

Coal Thickness and Mining

Across most of its extent in western Kentucky, the Springfield coal is greater than 42 inches thick (Fig. 1). Most of the variation in thickness can be attributed to gradual tapering of the coal bed in a northeast direction or to abrupt erosional truncation by sandstone channels. No major splits in the Springfield coal have been documented in western Kentucky, although some splitting may occur in the vicinity of sandstone channels.

The Springfield coal bed has been mined since at least 1820, and it is still the source of the majority of coal production from the Western Kentucky Coal Field. Early mines were near the navigable waterways, and relied on river transportation to distribute the coal (Fig. 3). Mines in the Springfield were underground operations until the extensive development of surface mines in the 1950's and 1960's. A majority of the coal produced during the late 1990's, approximately 70 percent, has been mined by underground methods.

Coal Resources

Resource estimates for the Springfield coal bed in western Kentucky (Table 1) were calculated using 30-meter grid representations of the data. An average value of 1,800 tons per acre-foot of coal was used for the analysis. Original resources of the Springfield are estimated at 9,923 billion tons. The coal removed or lost in mining is estimated at 2,95 billion tons; 516 million tons have been lost to surface mining, and 2,43 billion tons lost to underground mining. This leaves an estimated total remaining resource of 6,975 billion tons.

Remaining coal resources were estimated for the Springfield coal across all of western Kentucky. Coal that has been mined out or lost to mining was subtracted from the estimated original resource to derive the values shown in Table 1. Figure 4 shows the areas of remaining thick Springfield coal. Although coal thicker than 14 inches is included in the totals shown in Table 1, only coal 28 inches thick or greater is shown in Figure 4. Large areas of the original Springfield coal resource remain in western Kentucky, but significant areas are not available for production, because of regulatory or technological factors. Most of the coal greater than 70 inches in thickness has already been mined out (Fig. 4).

Acknowledgments

Numerous colleagues have given significant assistance, without which this project would not have been possible. Ernie Thacker completed much of the borehole data entry, and established preliminary stratigraphic tags for some of the data. Discussions with Jerry Weisenfluh, Dave Williams, and Steve Greb helped to clarify many of the features and factors involved in these analyses. This work was funded by the Coal Availability and National Coal Assessment Programs of the U.S. Geological Survey.

References Cited

Eavenson, H.N., 1942, The first century and a quarter of American coal industry: Baltimore, Md., Waverly Press, 701 p.
Greb, S.F., Williams, D.A., and Williamson, A.D., 1992, Geology and stratigraphy of the Western Kentucky Coal Field: Kentucky Geological Survey, ser. 11, Bulletin 2, 77 p.

County	Original Resource	Lost to Mining		Total	Remaining Resource
		Surface	Underground		
Daviess	299	58	2	60	238
Henderson	1,887	24	123	147	1,740
Hopkins	1,747	111	516	627	1,120
McLean	955	27	8	35	920
Muhlenberg	1,213	164	551	714	499
Ohio	582	115	231	346	236
Union	1,863	5	605	609	1,254
Webster	1,378	12	397	409	969
TOTAL	9,923	516	2,432	2,948	6,975

Table 1. Resource estimates calculated for the Springfield coal in western Kentucky, in million tons. Totals may not equal sum of components because of independent rounding.

All maps universal transverse Mercator, zone 16, 1927 North American datum

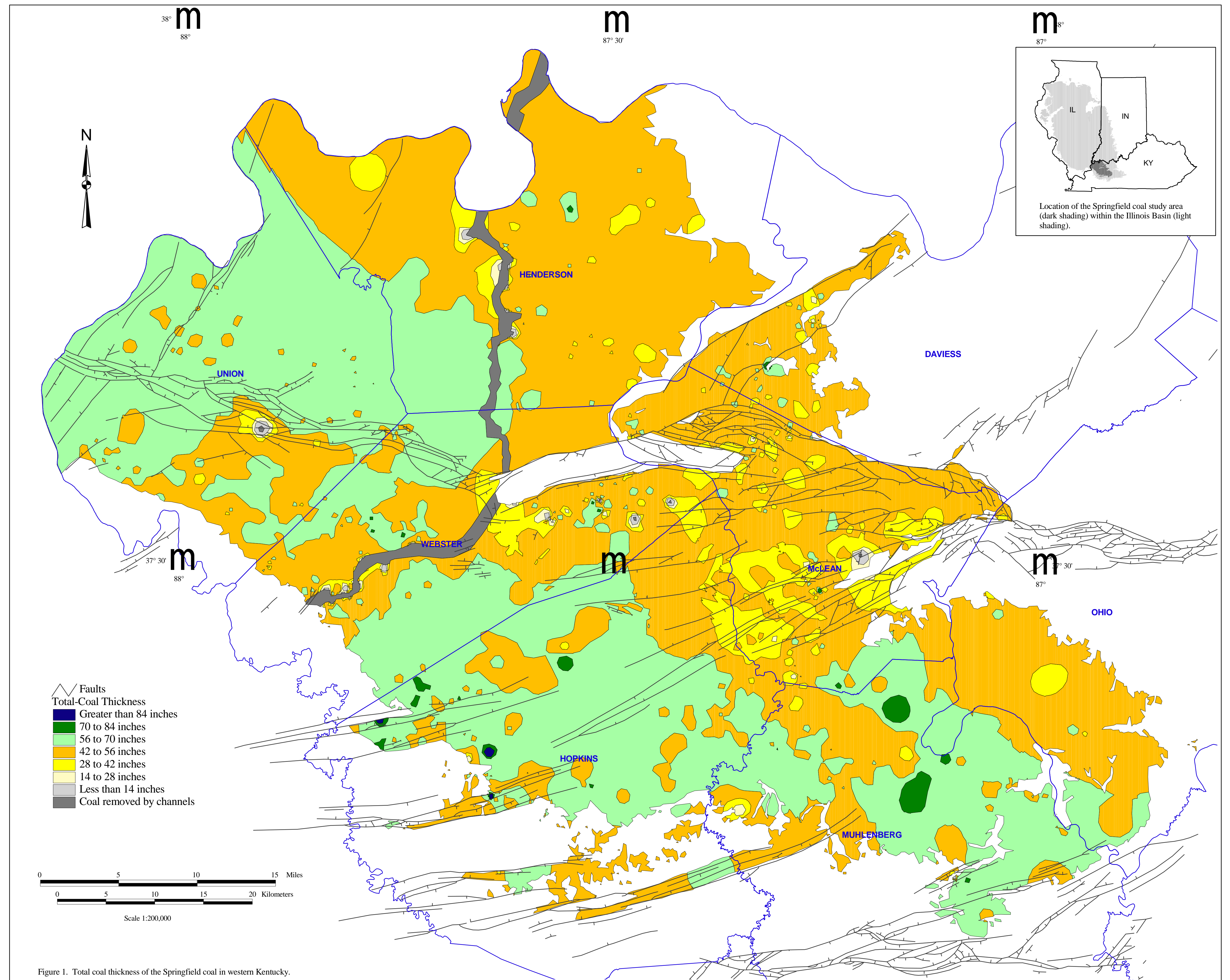


Figure 1. Total coal thickness of the Springfield coal in western Kentucky.

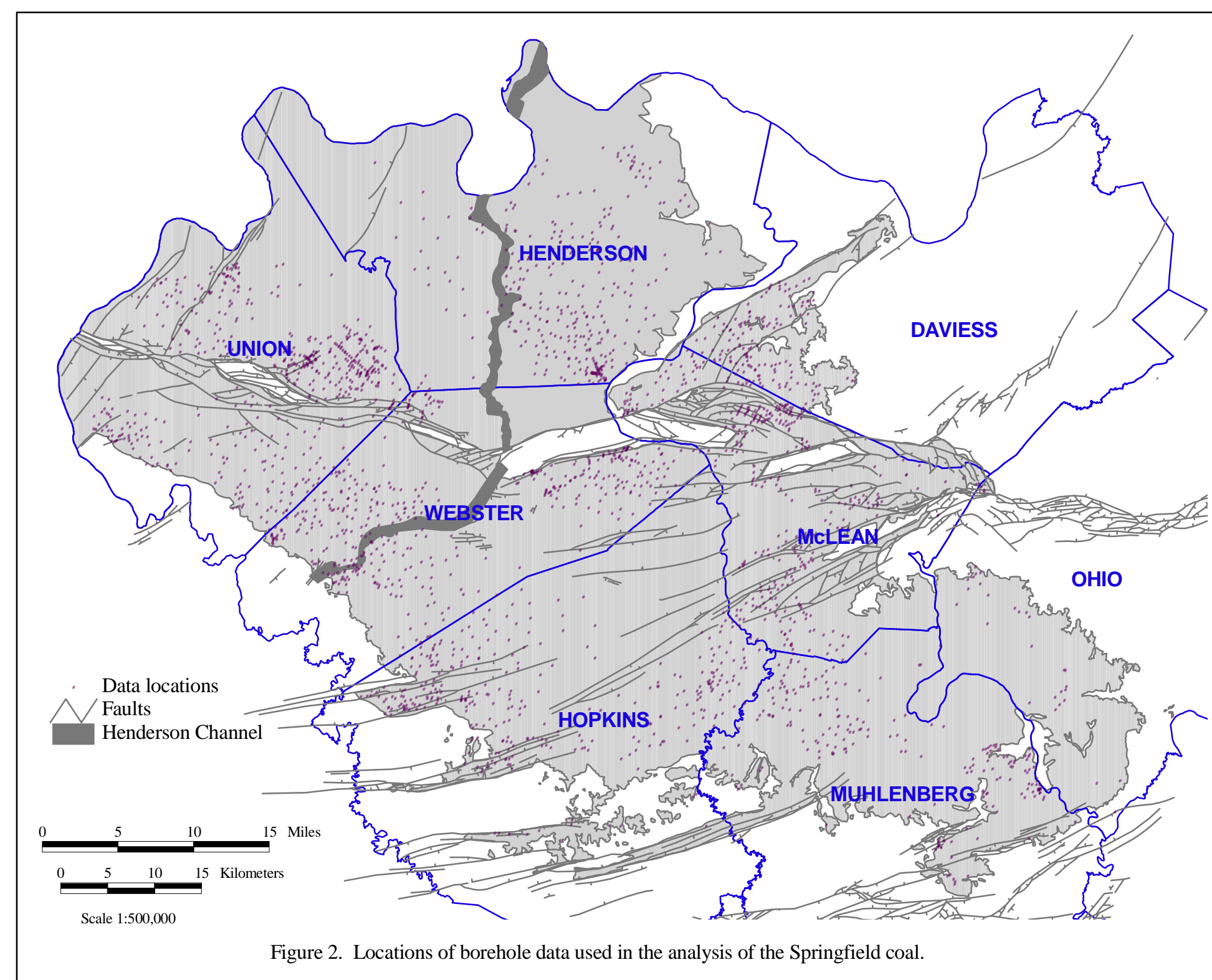


Figure 2. Locations of borehole data used in the analysis of the Springfield coal.

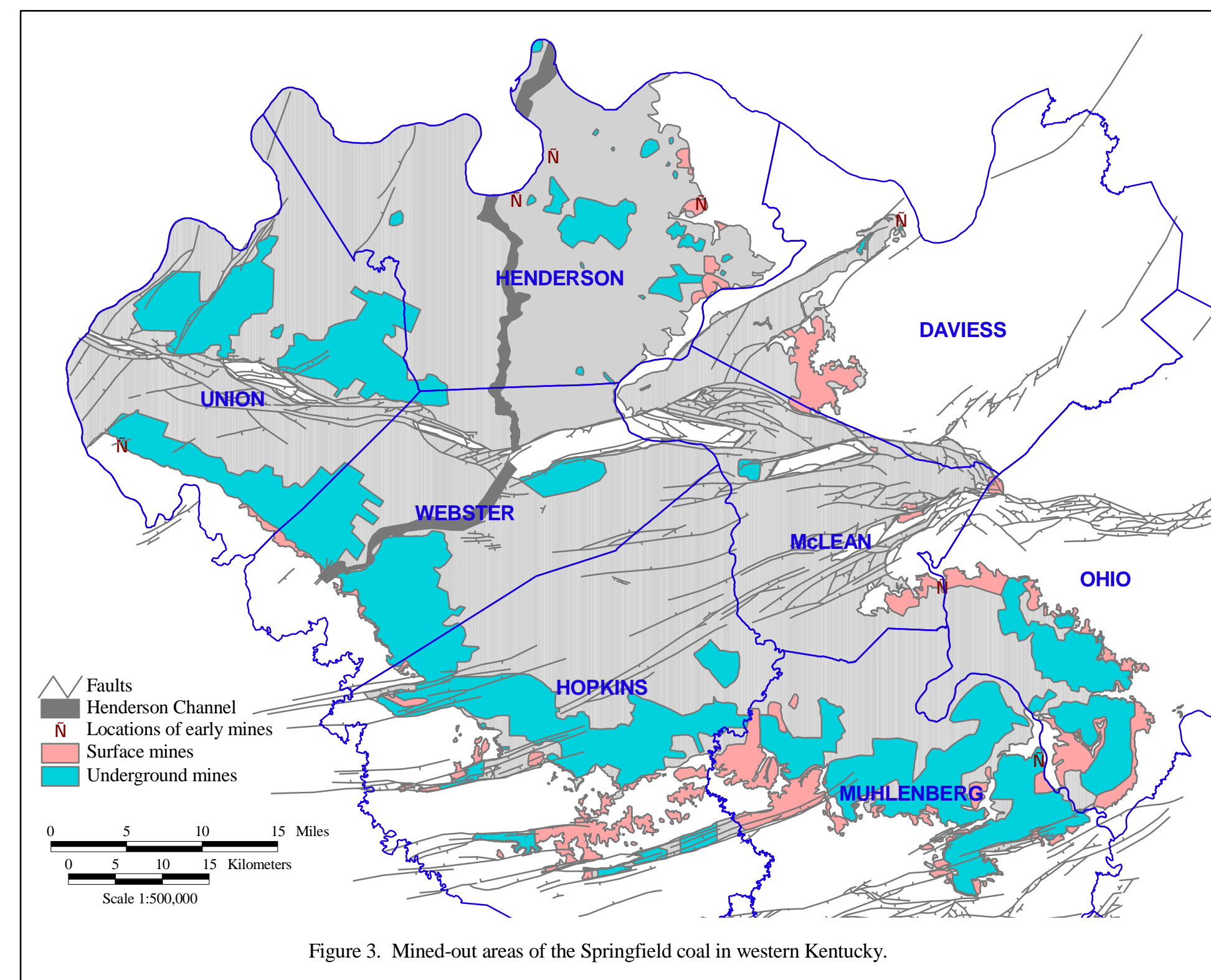


Figure 3. Mined-out areas of the Springfield coal in western Kentucky.

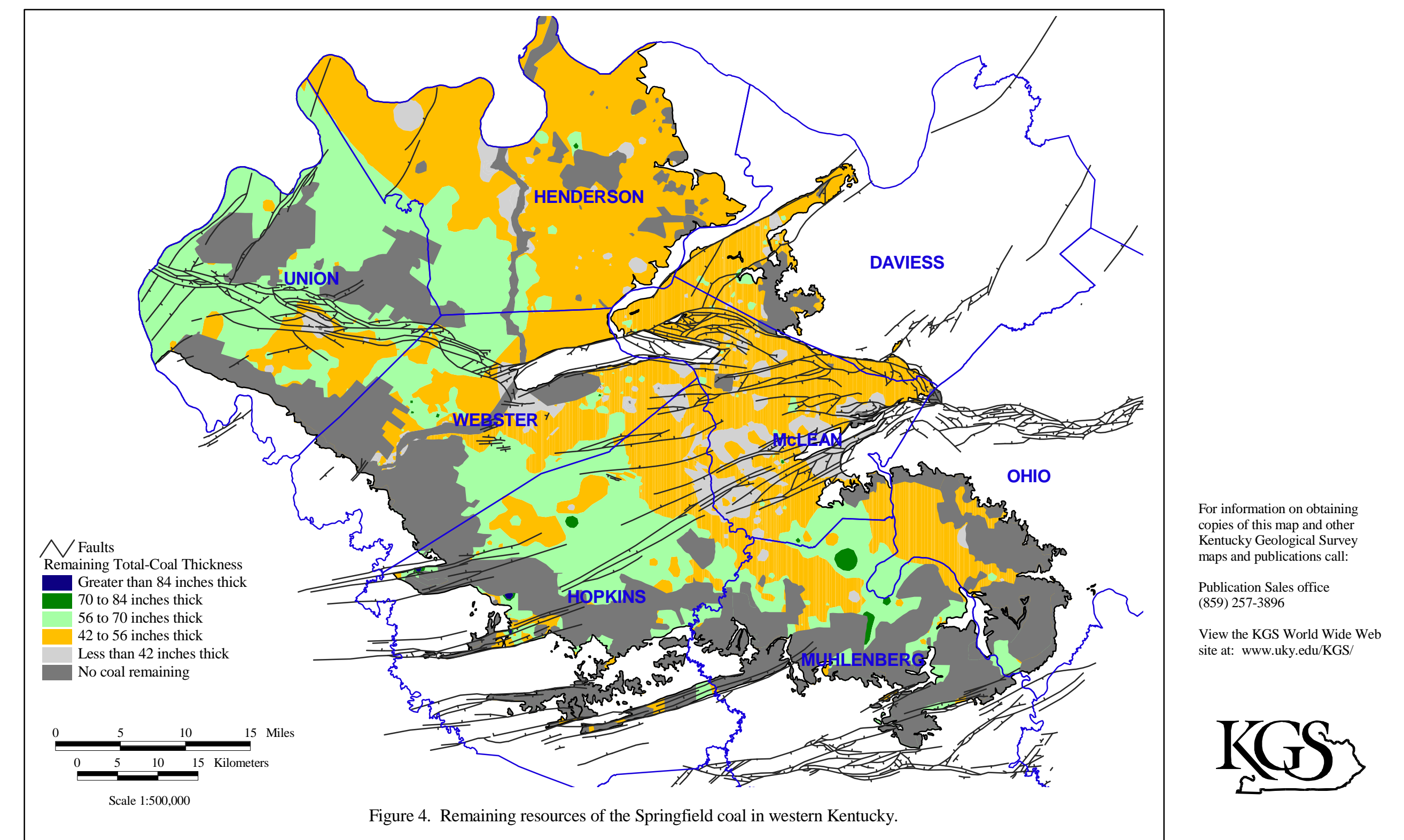


Figure 4. Remaining resources of the Springfield coal in western Kentucky.

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