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Journal Title: Sphalerite in coals from southeastern Iowa, Missouri, and southeastern Kansas /

Volume: **Issue:**
Month/Year: 1976 **Pages:**

Article Author: J. R. Hatch, M. J. Avcin, Jr., W. K. Wedge, and L. L. Brady,

Article Title: Sphalerite in coals from southwestern Iowa, Missouri, and southeastern Kansas,

Imprint: [Reston, Va.] ; U.S. Dept. of the Interi

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U.S. GEOLOGICAL SURVEY
Reston, VA 22092

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TITLE: Sphalerite in coals from southeastern Iowa, Missouri, and southeastern Kansas

AUTHOR(S): Joseph R. Hatch, Matthew J. Avcin, W. Keith Wedge, and Lawrence L. Brady

CONTENTS: 27 p., ____ pls., 7 figs., 5 tables.

Map scale: _____

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Report No. 76-796

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UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

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Open-file report 76-796
1976

This report is preliminary and has not been edited or reviewed for conformity with U.S. Geological Survey standards and nomenclature.

Sphalerite in coals from southeastern Iowa, Missouri, and southeastern Kansas

by

Joseph R. Hatch[1/], Matthew J. Avcin[2/], W. Keith Wedge[3/], and Lawrence L. Brady[4/]

Abstract

Zinc and cadmium determinations on 174 samples of coal from southeastern Iowa, Missouri, and southeastern Kansas and observation of minerals in cleat-fillings in the field are indicative of three large areas of sphalerite mineralization. The distribution of the secondary sphalerite appears to be related to the proximity of the coal to several of the major lead-zinc mining districts of Missouri and to two major structural features of the Midcontinent region: the 38th-parallel lineament, and the Mississippi River arch. Local variations in the amount of sphalerite appear to be related to cleat frequency and to the thickness of these fractures in the coal. Core samples from Iowa show an increase in the amount of cadmium relative to zinc in stratigraphically higher coals. Coals having high zinc and cadmium contents are also enriched, relative to other United States coals, in antimony, cobalt, copper, lead, molybdenum, nickel, and silver.

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3/ Missouri Division of Geology and Land Survey, Rolla, Mo.

4/ Kansas Geological Survey, Lawrence, Kans.

Introduction

During the course of a State Geological Survey-U.S. Geological Survey cooperative effort to collect and chemically analyze representative coal samples from the United States, unusually high zinc and cadmium contents were noted in many samples from southeastern Iowa, northeastern, north-central and southwestern Missouri, and southeastern Kansas. High zinc and cadmium concentrations in coal from northwestern and southeastern Illinois have previously been described by Gluskoter, Hatch, and Lincahl (1973) and Hatch, Gluskoter, and Lindahl (1976), who attributed the high values to sphalerite mineralization along cleats in the coal. Because of possible environmental and technological problems and because of the potential for economical recovery of the two metals from coal, additional sampling and field investigations were conducted by personnel from the U.S. Geological Survey, the Iowa Geological Survey, the Missouri Division of Geology and Land Survey, and the Kansas Geological Survey. Preliminary results of these investigations are summarized in this report.

Coal analyses

Descriptive and analytical data for 174 coal samples from the Western region of the Interior coal province are divided into sets from southeastern Iowa-northeastern Missouri, north-central Missouri, and southwestern Missouri-southeastern Kansas (fig. 1). All coal samples were ashed at 525°C and the percent of ash was determined gravimetrically. Cadmium and zinc contents in ash were determined by atomic absorption spectrometry. The cadmium and zinc concentrations in whole coal were calculated from analyses of coal ash. The methods used in sampling and in chemical analysis of the coal are described in Swanson and Huffman (1976).

Locations, brief descriptions, percent of ash, and cadmium and zinc contents in parts per million (ppm) in both coal ash and whole coal for 91 southeastern Iowa-northeastern Missouri coal samples are listed in Table 1. The distribution of samples from this area is shown in Figure 2. Similiar information for 27 north-central Missouri and 56 southwestern Missouri-southeastern Kansas coal samples is listed in Tables 2 and 3 and illustrated in Figures 3 and 4, respectively. For reference, the stratigraphy of the principal coal beds of Missouri and Kansas is shown in Figure 5. The stratigraphy of Iowa coal beds is discussed in Landis and Van Eck (1965).

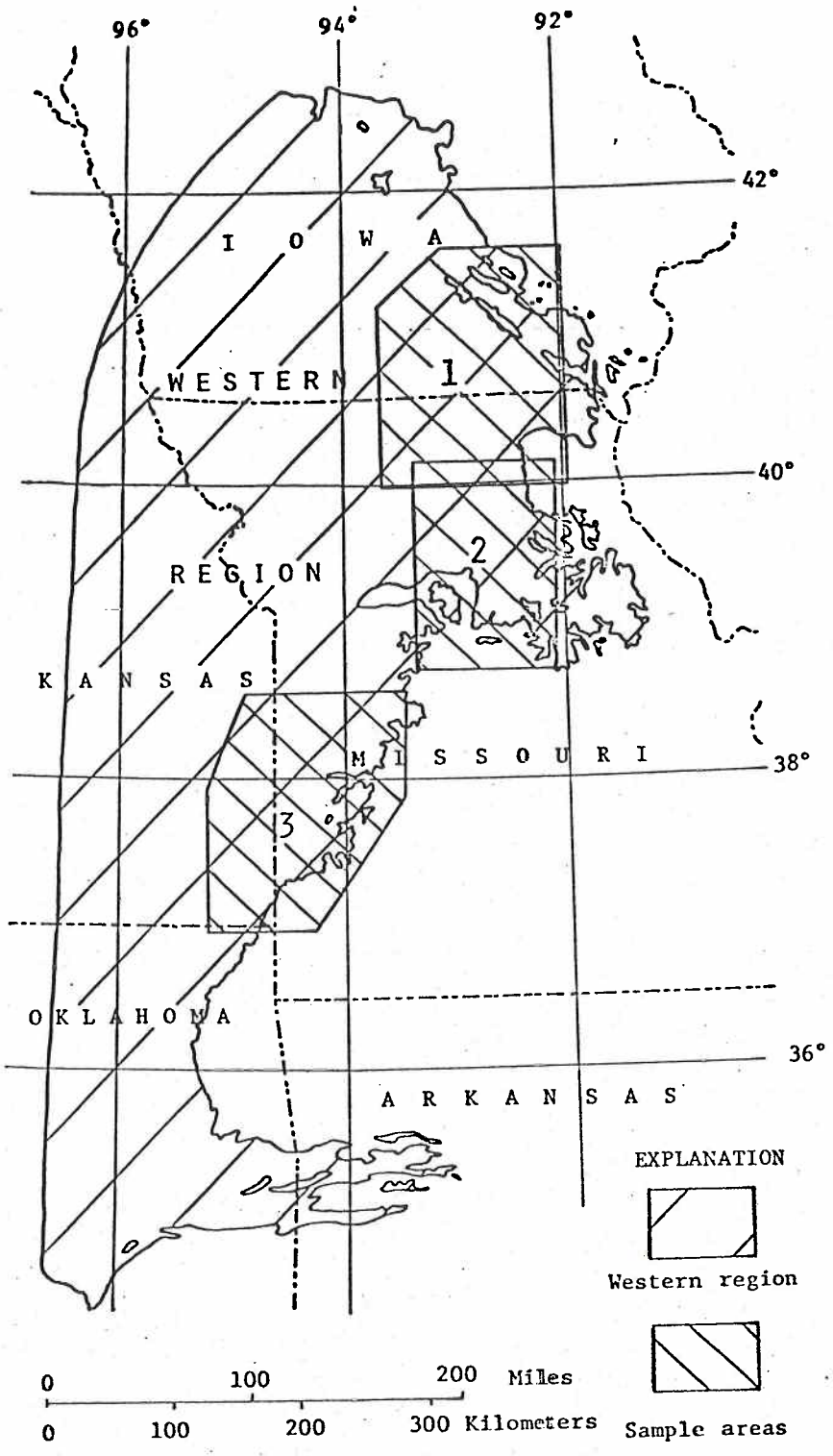

Figure 1.--Map of the Western region of the Interior coal province showing the locations of areas discussed in the text: 1 = southeastern Iowa-northeastern Missouri, 2 = north-central Missouri, and 3 = southwestern Missouri-southeastern Kansas.

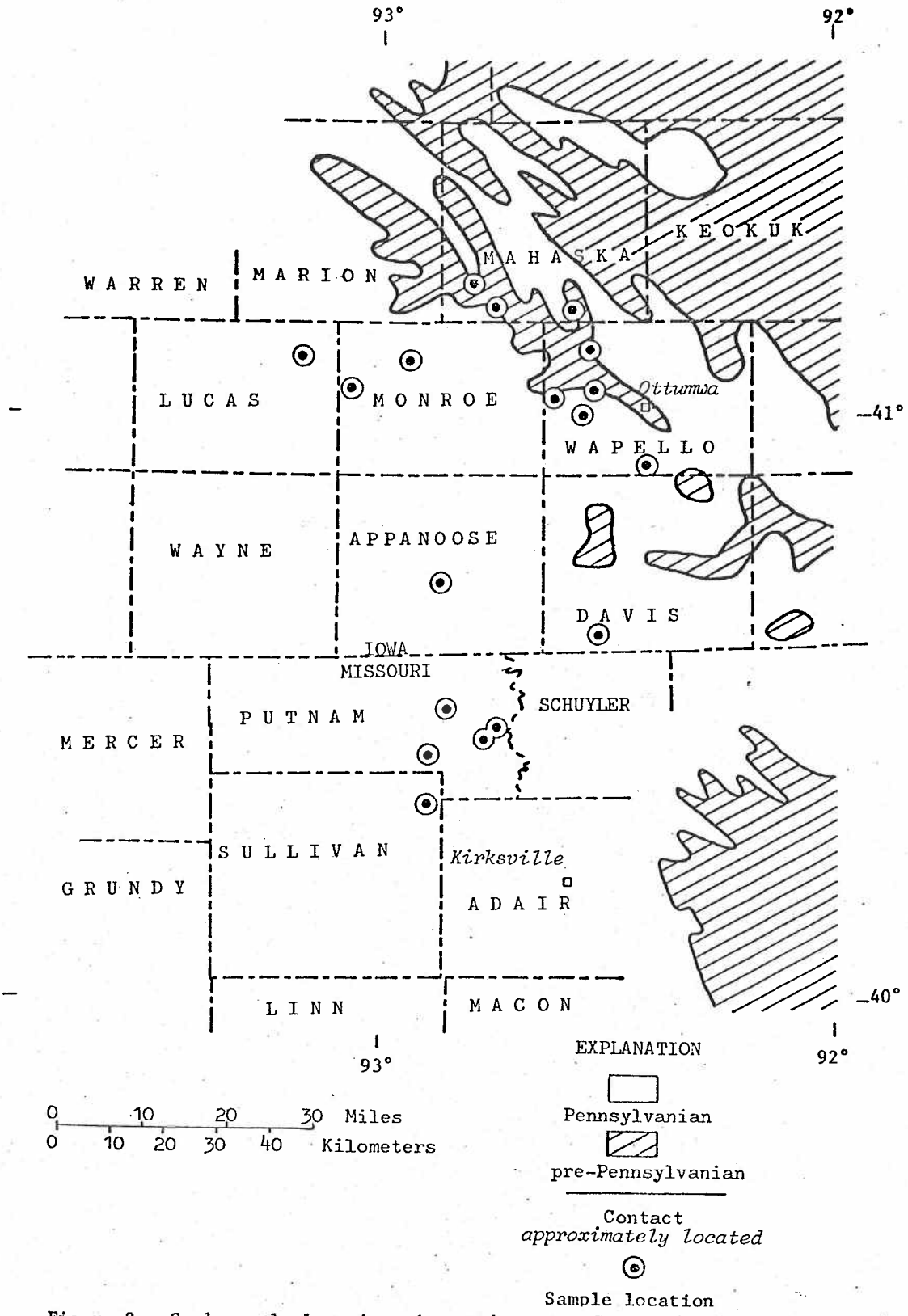

Figure 2.--Coal sample locations in southeastern Iowa and northeastern Missouri.

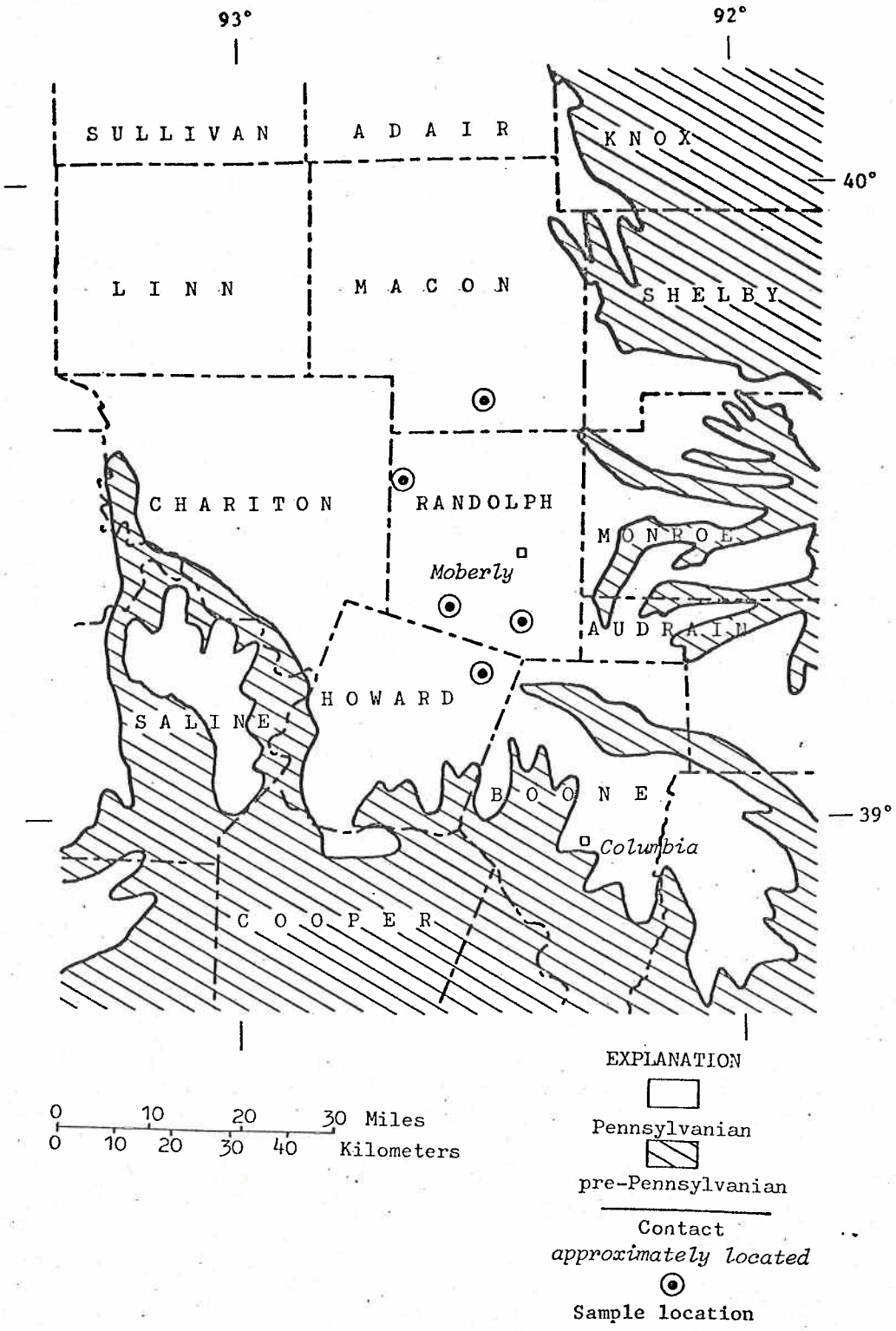

Figure 3.--Coal sample locations in northcentral Missouri.