UNITED STATES, GEOLOGICAL SURVEY

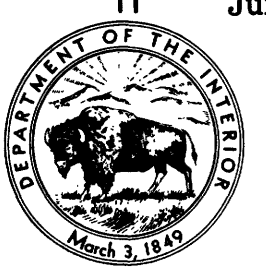
TEI-347A

RADIOACTIVITY OF COAL AND ASSOCIATED ROCK IN THE COAL FIELDS OF EASTERN KENTUCKY AND SOUTHERN WEST VIRGINIA

By
Stewart W. Welch

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

June 1953



Prepared by the Geological Survey for the
UNITED STATES ATOMIC ENERGY COMMISSION
Technical Information Service, Oak Ridge, Tennessee

Subject Category, GEOLOGY AND MINERALOGY.

This report concerns work done on behalf of the Division of Raw Materials of the U. S. Atomic Energy Commission.

Trace Elements Investigation Report 347A.

CONTENTS

ILLUSTRATION

TABLES

RADIOACTIVITY OF COAL AND ASSOCIATED ROCK IN THE COAL FIELDS

By Stewart W. Welch

ABSTRACT

A reconnaissance study was made of radioactivity of coal and associated rock in the coal fields of eastern Kentucky and Logan and Mingo counties, W. Va. Sixty-one localities were visited and 98 samples, 90 of coal and two each of carbonaceous shale, marine shale, flint clay, and dike rock, were collected. Radioactivity of the samples was measured with portable assay equipment prior to being shipped to the Trace Elements laboratory in Washington, D. C. for final determinations of radioactivity. The results showed the coal to have little or no radioactivity - 0.000 to 0.001 percent equivalent uranium, and other rock sampled to have slight radioactivity - about 0.002 percent equivalent uranium.

INTRODUCTION

A reconnaissance for radioactivity in coals of the eastern United States has been undertaken by the U. S. Geological Survey for the Division of Raw Materials of the Atomic Energy Commission. As a part of this investigation, samples, mainly of minable coals, have been collected from the coal fields of eastern Kentucky and tested for radioactivity. Field work was carried on during parts of September, October, and November 1952 by S. W. Welch, J. L. Snider, J. W. Huddle, and W. E. T. Brown.

The area included in this investigation is underlain by the coal-bearing rocks of eastern Kentucky and Logan and Mingo counties, W. Va. Topographic quadrangle maps at scales of 1:62,500 or 1:125,000 are available

for all of the region, and 7½-minute sheets at a scale of 1:24,000 are available for part of the area.

Both the Kentucky Geological Survey and the West Virginia Geological Survey (Hennen and Reger, 1914) have published county and regional reports that furnish limited geologic data for most of the area. McFarlan (1943) presents a good summary of the coal fields of eastern Kentucky. The U. S. Geological Survey has published a report on the coals of Pike County, Ky., and is at the present engaged in geologic mapping in the Hazard Field in eastern Kentucky. Wanless (1939, 1946) presents data collected in a regional study of the area. His correlations of the coals are used in this report with only slight modification. (See table 1.)

Nelson and Brill (1948) visited 22 localities in the area covered by this report. Most of the exposures at these localities included coal and associated rock. These rocks when tested for radioactivity with a portable Geiger counter contained 0.001 or less percent equivalent uranium for coals of minable thickness and 0.001 to 0.003 for associated shales and sandstones.

Kronstadt (1951) gives equivalent uranium contents of ashed samples of coal from 8 localities in the area under present investigation. These results indicated the radioactivity of each of the original coal samples to be less than 0.001 percent equivalent uranium.

Most of the localities visited during the present investigation were operating coal mines; a few were road cuts and natural outcrops. Field work consisted of collecting channel samples of minable beds of coal and a few samples of rocks associated with coal, such as partings in coal and roof shale; at one locality an igneous dike intruded into coal-bearing strata was sampled. The samples were then crushed and their radioactivity measured with portable assay equipment. Later they were shipped

to the Trace Elements laboratory in Washington, D. C. for measurements of radioactivity with more sensitive instruments. The samples showed no significantly high radioactivity in either the field or the laboratory tests.

GEOLOGY

Stratigraphy

The coal-bearing strata in eastern Kentucky and southern West Virginia are of Pennsylvanian age and are generally divided into two formations: the Lee formation, at the base of the Pennsylvanian, and the Breathitt formation. Younger rocks outcropping in the northeastern part of the area have been correlated with the Conemaugh formation of southwestern Pennsylvania.

The Lee formation overlies the Pennington formation of Mississippian age, and is composed of thick units of massive, conglomeratic sandstone separated by relatively thin units of carbonaceous shale and coal. With few exceptions, outcrops of the Lee formation are restricted to narrow belts along Pine Mountain and Cumberland Mountain in the extreme southeastern part of Kentucky, and a broader belt trending northeast and forming the western margin of the area of outcrop of Pennsylvanian rocks. The coals of the Lee formation are generally thin but locally some of them are relatively thick, minable beds, especially in the southwestern part of the area studied. The Lee formation has a maximum thickness of about 1,400 feet in southern Kentucky and becomes thinner toward the north to less than 100 feet in Greenup County.

The Breathitt formation overlies the Lee formation and is generally considered to include the youngest Pennsylvanian strata in Breathitt County, Ky., for which it has been named. The Breathitt consists of carbonaceous shale, channel sandstone, coal, marine shale, and thin beds of limestone. Some of the marine shale and limestone have been useful in correlation.

This formation contains nearly all of the commercially important beds of coal of the area studied. Names and correlations of these coals are given in table 1. The Breathitt formation, like the Lee, thins from south to north. It has a thickness of about 2,000 feet in Bell County and thins to about 500 feet in Greenup County.

In northeastern Kentucky, parts of Boyd, Carter, and Lawrence counties are underlain by rocks considered to be younger than those of the Breathitt formation. These rocks have been correlated with the Conemaugh formation and are believed to be the youngest strata in eastern Kentucky. They are composed mainly of massive sandstone and carbonaceous shale, but include thin beds of coal and limestone.

Table 1.--Correlation of important coals in eastern Kentucky*

	Logan-Williamson Field	Big Sandy-Elkhorn Field	Hazard Field	Harlan Field	Southern Appalachian Field
Breathitt Formation	No. 5 Block	Richardson	Helton Hindman	High Splint	Red Springs Upper Hignite
	Broas or Stockton	Torchlight	Fugate or Francis		Lower Hignite
	Lewiston or Belmont	Lewiston or Belmont	Hazard No. 7	Cornett	Peewee
	Coalburg	Peach Orchard	Hazard No. 6 or Leatherwood		Red Ash
	Buffalo Creek	Lower Peach Orchard	Haddix		
**	Fossil limestone	Fossil limestone	Magoffin limestone	Fossil limestone	Fossil limestone
	Winifrede	Winifrede	Hamlin	Limestone coal	Sterling
	Chilton or Taylor	Flatwoods	Fire Clay	Wallins Creek	Dean
	Hernshaw	Whitesburg	Whitesburg	Low Splint	Mills
	Dingess limestone	Kendrick shale	Kendrick shale	Kendrick shale	Kendrick shale
**	Williamson	Williamson	Amburgy	Creech Darby or "D"	Mason
	Upper Thacker, Island Creek, or Upper Cedar Grove	Elkhorn No. 3	Elkhorn No. 3	Kellioka or "C"	
	Lower Thacker or Lower Cedar Grove	Elkhorn No. 2	Elkhorn No. 2	"B"	Moss
	Alma	Elkhorn No. 1	Elkhorn No. 1	Harlan	Jellico
	Pond Creek or Eagle	Lower Elkhorn		Imboden	Blue Gem or Rich Mtn.
	Powellton				
	Matewan	Bingham			
	Lower War Eagle				Lily, River Gem, or Horse Creek
Lee Formation					Barren Fork Stearns No. 2 Stearns No. 1½ Stearns No. 1

* Coals of the Princess Field are not included here because of the uncertainty as to their correlation with coals of the other fields.

** Dashed lines underscore marine zones which have been used as key horizons for correlation between coal fields.

Structure

The area covered by this report occupies a part of a large basin known as the Appalachian basin. Its axis trends in a northeasterly direction crossing Knox, Breathitt, and Lawrence counties. This part of the basin is bounded on the west by the Cincinnati Arch, and the massive, cliff-forming sandstones of the Lee formation outline the basin boundary in the form of an escarpment. The strata dip gently toward the axis of the basin with many small, random-trending undulations, but dips may be steep where associated with faulting.

One of the more striking structural features of the area is the Cumberland overthrust. The overthrust block is about 125 miles long and 25 miles wide in southeastern Kentucky and adjacent parts of Tennessee and Virginia. It has been thrust in a northwesterly direction a distance of about seven miles (Butts, 1927), and is bounded on both ends by tear faults. The thrust crops out along Pine Mountain, where a narrow belt of Devonian and Mississippian rocks overlie the Breathitt formation. Southeast of Pine Mountain, directly behind the trace of the thrust, is a broad syncline called the Middlesboro syncline which occupies most of Harlan County and parts of Letcher and Bell counties, and extends into adjacent states. The forces responsible for the movement of the Cumberland overthrust block are considered to be the same as those which produced the intense folding and thrusting of the Folded Appalachians.

The Kentucky River fault zone is another prominent structural feature of the area. This zone extends from the Blue Grass region of central Kentucky into Wolfe, Morgan, Magoffin, Johnson, and Elliott counties. The fault zone in these counties has an easterly trend. The individual faults in this zone are characteristically normal, and the south sides are down-

thrown. The strata dip steeply toward the faults on the downthrown sides and dip gently away from the faults on the upthrown sides. Two of the best known of these faults are the Irvine-Paint Creek fault and the Johnson Creek fault.

The only igneous rock known to occur in the area is in Elliott County, Ky. It is a peridotite dike containing numerous phenocrysts of olivine and angular inclusions of the enclosing rock. It is not known whether this dike is in any way related to the faulting of this area.

RADIOACTIVITY MEASUREMENTS

Measurements of the equivalent uranium content of crushed samples were obtained with portable assay equipment, and from determinations made by the Trace Elements laboratory in Washington, D. C. Neither the field nor laboratory measurements showed abnormal radioactivity of any of the samples. The results showed that most of the coal samples contain less than 0.001 percent equivalent uranium, and a few contain 0.001 percent. Samples of carbonaceous shale, flint clay, calcareous shale, and dike rock contain about 0.002 percent equivalent uranium.

The following table gives descriptions of the samples tested, measurements of radioactivity, and the percent uranium in the ash of some of the samples.

Table 2.--Descriptions of rocks tested, measurements of radioactivity, and percent uranium contained in ashed samples.

Loc. No.	Location	Thickness Ft.	Thickness In.	Lithology	eU[1] percent	U in Ash[2] percent	U in Sample percent
1	Greenup Co., Ky. I. L. Griffith's truck mine in unnamed coal 4 miles south of Riverton on State Highway 1 and 0.7 mile east on dirt road. Greenup quadrangle: 7,700' N. 38°30'[3] 6,600' E. 82°50'	3		Sandstone, fine-grained, massive			
		1	3	Shale, grayish-black, thin-bedded			
			11	Coal, lower 2" dull	a		
		1	2	Underclay and bone coal			
		1		Coal, bright	a		
			1	Underclay, root imprints			
2	Boyd Co., Ky. Ferguson's truck mine in Coalton coal 1 mile northeast of Coalton on U. S. Highway 60 and 0.6 mile northwest on dirt road. Kenova quad: 20,000' N. 38°20' 21,000' E. 82°50'		6	Shale, light-gray, poorly bedded			
		1	11	Coal, bright, fusain stringers	a		
			2	Shale, brownish-gray			
		2		Coal, lower 1" dull	a		
			1	Underclay, brownish-gray			

1/ Analysts were Benjamin A. McCall and Julius H. Goode, U. S. Geological Survey.

2/ Analysts were Audrey Pietsch and Joan Smith, U. S. Geological Survey.

3/ Distances from coordinates on published topographic maps are given to permit relocation in case land marks are destroyed.

a Less than 0.001 percent.

Table 2.--Descriptions of rocks tested, measurements of radioactivity, and percent uranium contained in ashed samples-Continued.

Loc. No.	Location	Thickness Ft.	Thickness In.	Lithology	eU percent	U in ash percent	U in sample percent
3	Elliott Co., Ky. Stream outcrop of dike rock intruded into Pennsylvanian strata 1 mile west of Stephens on gravel road and in small drain south of road. Kenova quad: 11,600' S. 38°10' 7,700' E. 83°00'			Dike rock, soft, numerous inclusions of sandstone, limestone, and carbonaceous material.	.002		
				Dike rock, hard, few inclusions, scattered phenocrysts	.001		
4	Morgan Co., Ky. Truck mine in Hazard No. 6 (?) coal 1.5 miles southwest of West Liberty on U. S. Highway 460 on south side of gap. Salyersville quadrangle: 25,200' N. 37°50' 18,400' E. 83°20'	2		Coal, medium-banded	a		
			4	Flint fire clay			
		1	1	Coal, dull			
			2	Shale, light-gray, not sampled	a		
			7	Coal, blocky			
			8	Underclay, light-gray			
5	Breathitt Co., Ky. Spurlock Coal Co. truck mine in uncorrelated coal 2.5 miles north of Frozen Creek P.O. on State Highway 15 and on hill east of highway. Salyersville quadrangle: 13,200' S. 37°40' 20,500' W. 83°20'	8		Shale, dark-gray, carbonaceous			
		2	3	Coal, bright, has $\frac{1}{4}$" shale parting			
			4	Shale, light-gray, not sampled	a		
		1	5	Coal, bright, has $\frac{1}{4}$" shale parting			
			1	Shale, dark-gray, carbonaceous			

Table 2.--Descriptions of rocks tested, measurements of radioactivity, and percent uranium contained in ashed samples-Continued.

Loc. No.	Location	Thickness Ft.	Thickness In.	Lithology	eU percent	U in Ash percent	U in sample percent
6	Breathitt Co., Ky. Robert Hounschell's truck mine in Elkhorn No. 2 (?) coal 3 miles north of Elkatawa on gravel road and 0.4 mile west of road. Salyersville quad: 30,000' N. 37°30' 23,000' W. 83°20'	4		Shale, medium-gray, thin-bedded			
		2	1	Coal, medium-bright, fusain stringers			
			1	Shale, black, not sampled			
			2	Coal, moderately bright			
			3	Shale, carbonaceous, not sampled	a		
			2	Coal, moderately bright			
			1	Shale, carbonaceous, not sampled			
			8	Coal, moderately bright			
			2	Underclay, root imprints			
7	Breathitt Co., Ky. Gramble Little's truck mine in Elkhorn No. 2 (?) coal 1.6 miles west of Jackson on State Highway 30 on north side of highway. Salyersville quad: 16,200' N. 37°30' 21,600' W. 83°20'	1		Sandstone, very fine-grained			
			6	Coal, few pyrite fusain stringers			
			2	Coal, dull			
		1	4	Coal, bright, few fusain stringers	a		
			6	Coal, bright, thin shale partings			
		1		Underclay, root imprints			
8	Breathitt Co., Ky. Abandoned truck mine in Fire Clay Rider (?) coal 9 miles east of Booneville on State Highway 30 just east of Owsley-Breathitt County line. Manchester quad: 12,400' S. 37°30' 13,400' W. 83°30'	2		Shale, dark-gray, contains marine fossils			
		1	11	Coal, bright, few fusain and bone partings	a		
			4	Shale, carbonaceous			
		1	2	Coal, thin shale and pyrite partings	.001		
			1	Underclay, medium-gray			

Table 2.--Descriptions of rocks tested, measurements of radioactivity, and percent uranium contained in ashed samples-Continued.

Loc. No.	Location	Thickness Ft.	Thickness In.	Lithology	eU percent	U in Ash percent	U in Sample percent
9	Breathitt Co., Ky. M. M. Redwine's truck mine in Hazard No. 6 coal 6.5 miles north of Jackson on State Highway 15 and about 5 miles east on gravel road to left head of Cope Fork. Salyersville quad: 12,700' S. 37°40' 11,400' E. 83°20'	3		Shale, light-gray			
		2	4	Coal, moderately dull	a		
			1	Shale, carbonaceous, not sampled			
		1	2	Coal, bright			
			1	Shale, silty			
10	Breathitt Co., Ky. Road cut in Magoffin beds 1 mile southeast of Rousseau on State Highway 30. Salyersville quad: 28,100' S. 47°40' 15,500' W. 83°10'	1	8	Siltstone, calcareous, has marine fossils			
		10		Shale, dark-gray, marine fossils	.002		
		1		Limestone, dense, marine fossils			
		1	4	Shale, dark-gray, abundant fossils			
			4	Limestone, fragmental fossils			
			4	Coal, has several thin partings			
		2		Underclay, olive-gray			
11	Magoffin Co., Ky. Truck mine in Hazard No. 6 coal 10 miles northeast of Rousseau on State Highway 30 and 0.2 mile north up small drain. Salyersville quad: 8,200' S. 37°40' 0' 83°10'	5		Shale, light-gray, silty			
		1		Coal, dull	a		
			1	Shale, carbonaceous, not sampled			
		1	11	Coal, mainly dull			
			2	Shale, very carbonaceous, not sampled			
			1	Coal, bright			
			6	Underclay, light-gray			

Table 2.—Descriptions of rocks tested, measurements of radioactivity, and percent uranium contained in ashed samples-Continued.

Loc. No.	Location	Thickness Ft.	Thickness In.	Lithology	eU percent	U in Ash percent	U in Sample percent
12	Magoffin Co., Ky. Dickson Pink's truck mine in Whitesburg coal 0.5 mile southwest of Ivyton. Prestonsburg quad: 14,400' N. 37°40' 6,350' E. 83°00'	1		Shale, very carbonaceous			
			6	Coal, bright	a		
			2	Shale, dark-gray, not sampled			
		2		Coal, moderately dull, few bone partings			
		1		Underclay, root imprints			
13	Magoffin Co., Ky. Domestic opening in Hazard No. 7 coal about 4 miles south of Swampton on Came Branch of Half Mountain Creek. Salyersville quad: 22,300' S. 37°40' 5,100' W. 83°00'	3		Sandstone and shale interbedded			
			4	Cannel coal, moderately bright	a		
		2	5	Coal, few bone partings			
			3	Underclay, medium light-gray			

Table 2.—Descriptions of rocks tested, measurements of radioactivity, and percent uranium contained in ashed samples-Continued.

Loc. No.	Location	Thickness Ft.	Thickness In.	Lithology	eU percent	U in Ash percent	U in Sample percent
14	Breathitt Co., Ky.	2		Shale, very carbonaceous			
	United Electric Coal Co.		5	Bone coal, not sampled			
	strip mine in Helton (?)		5	Coal, moderately bright	)		
	coal on ridge 1.5 miles		1	Shale, black, not sampled	)		
	northwest of Evanston.		8	Coal, bright	)		
	Salyersville quad:		2	Shale, grayish-black, not	)		
	24,000' N. 37°30'			sampled	)		
	13,900' W. 83°00'	2	9	Coal, moderately dull	)		
			4	Shale, black, not sampled	)		
		1		Coal, bright	)		
			6	Shale and bone, not sampled	)		
		1	9	Coal, moderately bright	)		
			2	Bone coal, not sampled	) a		
		2	4	Coal, moderately bright	)		
			2	Bone coal, not sampled	)		
			4	Coal, moderately bright	)		
			1	Shale, light-gray, not sampled	)		
			4	Coal, moderately bright	)		
			4	Shale and bone, not sampled	)		
			10	Coal, bright, few pyrite stringers	)		
			3	Bone coal	)		
		2	7	Coal, bright	)		
			1	Shale, dark-gray, not sampled	)		
		1	2	Coal, bright	)		
			2	Shale, very thin-bedded carbonaceous			

Table 2.--Descriptions of rocks tested, measurements of radioactivity, and percent uranium contained in ashed samples-Continued.

Loc. No.	Location	Thickness Ft.	Thickness In.	Lithology	eU percent	U in Ash percent	U in Sample percent
15	Breathitt Co., Ky.	40		Sandstone, massive			
	United Electric Coal Co.		2	Coal, bright			
	strip mine in Helton		2	Shale, dark-gray, thin-bedded			
	(?) coal on ridge 2.5		7	Coal, moderately bright			
	miles northwest of Evanston.		2	Cannel coal, dull			
	Salyersville quad:		11	Coal, bright			
	23,700' N. 37°30'		2	Bone coal, not sampled			
	21,500' W. 83°00'	2	5	Coal, bright	a		
			4	Bone coal, not sampled			
		1		Coal, bright, fusain stringers			
			2	Bone coal, not sampled			
			2	Bone coal, moderately dull			
		1	1	Shale carbonaceous			
		1	3	Coal, mainly bright, fusain stringers			
		1	3	Shale, greenish-gray, plant imprints			
			3	Coal, very bright			
			4	Bone coal and shale			
		2	2	Coal, bright, thin pyrite and fusain stringers, thin shale partings near base			
			3	Bone coal, not sampled	a		
			4	Coal, bright			
			7	Bone coal, not sampled			
		1	2	Coal, bright, fusain stringers			
			4	Underclay, root imprints			

Table 2.--Descriptions of rocks tested, measurements of radioactivity, and percent uranium contained in ashed samples-Continued.

Loc. No.	Location	Thickness Ft.	Thickness In.	Lithology	eU percent	U in Ash percent	U in Sample percent
16	Knott Co., Ky. Domestic opening in Fugate coal 0.4 mile northeast of Decoy P. O. Salyersville quad: 4,800' N. 37°30' 24,100' W. 83°00'		6	Shale, medium-gray, thin-bedded			
			11	Coal, bright, fusain stringers)			
			3	Shale, dark-gray, not sampled)			
			9	Coal, bright, fusain stringers)			
			4	Shale, dark-gray, not sampled)	a		
			10	Coal, moderately bright)			
		1		Shale, dark-gray, not sampled)			
		1	2	Coal, bright)			
			1	Underclay, root imprints			
17	Breathitt Co., Ky. Pond Creek Pocahontas slope mine in Elkhorn No. 3 coal 4 miles southeast of Evanston on gravel road. Prestonsburg quad: 3,300' N. 37°30' 1,350' E. 83°00'	1		Shale, medium dark-gray			
			6	Bone coal			
			3	Coal, bright)			
			2	Bone coal, not sampled)	a		
		2	5	Coal, bright)			
			1	Underclay, root imprints			
18	Floyd Co., Ky. Edgemont Fuel Co. rail mine in Elkhorn No. 3, Elkhorn No. 2, and Elkhorn No. 1 coals 0.5 mile south of McDowell on State Highway 122. Pikeville quad: 11,900' N. 37°25' 4,000' E. 82°45'	5		Sandstone, very fine-grained			
		2	4	Coal, bright, few thin shale partings	a		
			1	Underclay, light-gray			
		?		Concealed interval			
		5		Sandstone, fine-grained			
		3	9	Coal, mainly bright, few pyrite and fusain stringers	a		
			3	Underclay, root imprints			
		?		Concealed interval			
			9	Shale, carbonaceous			
		3	2	Coal, mainly bright, few fusain stringers	a		
			1	Shale, light-gray			

Table 2.--Descriptions of rocks tested, measurements of radioactivity, and percent uranium contained in ashed samples-Continued.

Loc. No.	Location	Thickness Ft.	Thickness In.	Lithology	eU percent	U in Ash percent	U in Sample percent
19	Pike Co., Ky. Domestic opening in Elkhorn No. 1 coal about 4 miles southeast of Gulnare on State Highway 304 and 1 mile south on Miller Creek. Harold quad: 100' S. 37°35' 6,600' W. 82°30'		6	Shale, medium-gray			
		3	5	Coal, mainly bright, few fusain and thin bone partings	a		
			1	Underclay, light-gray, hard			
20	Martin Co., Ky. Winco Block Coal Co. rail mine in Coalburg coal 0.5 mile southeast of Naugatuck, W. Va. Naugatuck quad: 11,250' N. 37°45' 2,850' W. 82°20'		1	Sandstone, fine-grained			
			7	Coal, bright			
			1	Shale, dark-gray, not sampled			
			4	Coal, bright			
			5	Shale, medium-gray, not sampled			
			10	Coal, moderately bright	a		
			4	Bone coal			
		1	9	Coal, moderately bright			
		1	2	Shale, medium-gray, not sampled			
		1	6	Coal, moderately bright			
			1	Underclay, light-gray			
21	Logan Co., W. Va. Winisle Coal Co. rail mine in Alma coal 0.5 mile north of Phico on State Highway 10 and 1.5 miles west on gravel road to just north of Godby Branch-Kanawha Branch Gap. Logan quad: 12,900' S. 38°00' 1,300' E. 82°00'		1	Shale, medium-gray, thin-bedded			
			6	Coal, bright			
			2	Coal, dull	a		
		3	5	Coal, moderately bright			
			7	Coal, moderately dull to dull			

Table 2.--Descriptions of rocks tested, measurements of radioactivity, and percent uranium contained in ashed samples-Continued.

Loc. No.	Location	Thickness Ft.	Thickness In.	Lithology	eU percent	U in Ash percent	U in Sample percent
22	Logan Co., W. Va. Superior Eagle Coal Co. truck mine in Chilton coal about 4 miles northeast of Pecks Mill on gravel road. Logan quad: 12,050' N. 37°55' 3,800' W. 81°55'		1	Sandstone, very fine-grained			
		1	10	Coal, bright, few fusain stringers)			
			6	Flint fire clay, dark, not sampled)	a		
		2		Coal, moderately dull)			
			10	Coal, moderately bright)			
23	Logan Co., W. Va. Switzer Domestic Coal Co. truck mines in Williamson and Island Creek coals 0.6 mile south of Rossmore on U. S. Highway 119. Logan quad: 12,600' S. 37°50' 4,900' E. 82°00'		6	Shale, light bluish-gray			
			11	Coal, bright)			
			1	Bone coal, not sampled)	a		
		2	3	Coal, mainly bright)			
			2	Shale, medium-gray, silty			
		?		Concealed interval			
			1	Shale, medium-gray			
		1	1	Coal, bright, fusain and pyrite stringers)			
		1	4	Coal, moderately dull)	a		
			4	Shale, poorly-bedded, not sampled)			
		3	9	Coal, medium bright, few fusain and pyrite stringers)			
24	Logan Co., W. Va. Utility Coal Co. rail mine in Eagle coal 0.4 mile north of Kistler, Logan quad: 4,550' N. 37°45' 8,150' W. 81°50'		6	Shale, dark-gray			
		3	6	Coal, moderately bright, several thin bone partings and fusain stringers	a		
			6	Shale, carbonaceous			
		2	8	Coal, moderately bright	a		
			1	Shale, medium-gray			

Table 2.--Description of rocks tested, measurements of radioactivity, and percent uranium contained in ashed samples-Continued.

Loc. No.	Location	Thickness Ft.	Thickness In.	Lithology	eU percent	U in Ash percent	U in Sample percent
25	Logan Co., W. Va. Powellton Coal Co. rail mines in Powellton and Eagle (?) coals at Christian. Gilbert quad: 9,300' N. 37°40' 5,500' W. 81°50'		1	Sandstone, fine-grained			
		2	8	Coal, medium bright, fusain stringers	a		
			1	Underclay, silty, root imprints			
		?		Concealed interval			
			3	Shale, irregularly-bedded			
		3	2	Coal, bright, several thin shale partings	a		
			2	Shale, light-gray			
26	Logan Co., W. Va. Domestic opening in Lower War Eagle coal 0.4 mile south of Christian on State Highway 80. Gilbert quad: 7,250' N. 37°40' 5,800' W. 81°50'		6	Shale, dark-gray, carbonaceous			
			2	Bone coal			
		3	7	Coal, moderately bright, few dull streaks and fusain stringers	a		
			1	Shale, carbonaceous, thin-bedded			
27	Logan Co., W. Va. Crystal Block Coal and Coke Co. Mine No. 6 in Upper Cedar Grove and Lower Cedar Grove coals 1 mile south of Sarah Ann on U. S. Highway 119. Gilbert quad: 11,500' N. 37°40' 2,000' E. 82°00'		4	Shale, thin-bedded, plant imprints			
		3	9	Coal, moderately bright, fusain stringers	a		
			1	Bone coal			
			2	Coal, moderately dull			
		?		Concealed interval			
			6	Shale, medium-gray, carbonaceous			
			11	Coal, moderately dull, thin shale parting at base	a		
		2	8	Coal, moderately bright			
			1	Underclay, root imprints			

Table 2.--Descriptions of rocks tested, measurements of radioactivity, and percent uranium contained in ashed samples--Continued.

Loc. No.	Location	Thickness Ft.	Thickness In.	Lithology	eU percent	U in Ash percent	U in Sample percent
28	Mingo Co., W. Va. Dayton Coal Co. mine in Upper Thacker coal 1.2 miles southeast of Lobata on State Highway 49 and 1.2 miles east to head of Ferrell Branch. Matewan quad: 7,100' S. 37°40' 4,000' E. 82°10'	1		Shale, medium light-gray			
		1		Coal, bright	a		
			2	Coal, dull			
			8	Coal, bright			
			2	Coal, dull			
			2	Coal, bright			
			2	Coal, dull			
			11	Coal, bright, thin pyrite lenses and shale partings near base			
			1	Shale, medium dark-gray			
29	Mingo Co., W. Va. Standard Alma Coal Co. rail mine in Alma coal 2 miles southeast of Lobata on State Highway 49. Matewan quad: 11,050' S. 37°40' 350' W. 82°10'		1	Shale, carbonaceous			
		1	6	Coal, moderately bright	a		
			1	Bone coal			
		1	1	Coal, bright			
			1	Coal, dull			
			2	Coal, bright			
			1	Coal, dull			
30	Mingo Co., W. Va. Crystal Block Coal Co. rail mine in Pond Creek coal 1.5 miles northwest of Merrimac on State Highway 49. Matewan quad: 6,400' S. 37°40' 8,650' E. 82°15'	2		Shale, thin-bedded, plant imprints			
			6	Coal, medium bright	a		
			7	Coal, dull			
		2	2	Coal, bright, few fusain stringers			
			5	Coal, medium bright to dull			
			2	Bone coal			
			5	Coal, bright			
			1	Underclay, medium-gray			

Table 2.--Descriptions of rocks tested, measurements of radioactivity, and percent uranium contained in ashed samples Continued.

Loc. No.	Location	Thickness Ft.	Thickness In.	Lithology	eU percent	U in Ash percent	U in Sample percent
31	Pike Co., Ky. Kentland Elkhorn Coal Co. No. 1 Mine in Pond Creek coal 1.1 miles east of Nigh on State Highway 194 and 2 miles north on Second Fork. Hurley quad: 13,500' N. 37°25' 4,300' E. 82°15'		6	Shale			
			9	Coal	)		
			10	Laminated coal	)	a	
		3	2	Coal, bright, few fusain stringers	)		
			3	Underclay, silty, root imprints			
32	Pike Co., Ky. Republic Coal Co. mines in Elkhorn No. 3 and Lower Elkhorn coals about 5 miles northeast of Elkhorn City at head of Left Fork of Beaver Creek. Regina quad: 6,700' N. 37°20' 7,400' E. 82°20'		6	Shale			
			8	Coal, bright	)		
			1	Shale, dark-gray, not sampled	)		
		2	2	Coal	)	.001	
			6	Shale, not sampled	)		
		3	10	Coal, bright	)		
		1		Sandstone and shale			
		180		Concealed interval			
		1		Laminated coal)			
		4	7	Coal, bright)		.001	
33	Pike Co., Ky. Republic Coal Co. mines in Elkhorn No. 3 and Lower Elkhorn coals 3 miles northwest of Belcher on State Highway 80 and 3 miles northeast to left head of Road Creek. Regina quad: 12,000' S. 37°25' 7,800' W. 82°20'		6	Shale			
		3	8	Coal		a	
		1		Bone and underclay			
			3	Sandstone			
		140		Concealed interval			
		5		Shale, weathered brown			
		5	11	Coal, bright, thin shale parting in upper 1' 4"		a	
			1	Shale, dark-brown			

Table 2.--Descriptions of rocks tested, measurements of radioactivity, and percent uranium contained in ashed samples-Continued.

Loc. No.	Location	Thickness Ft.	Thickness In.	Lithology	eU percent	U in Ash percent	U in Sample percent
34	Letcher Co., Ky. Elkhorn-Jellico Coal Co. abandoned tunnel in Elkhorn No. 3 (?) coal 1.8 miles northwest of Whitesburg on State Highway 15 and 0.3 mile west on small drain. Whitesburg quad: 11,500' S. 37°10' 100' W. 82°50'	1		Shale, dark-gray, carbonaceous			
		2	3	Coal, bright, few pyrite and fusain stringers	a	a	a
		1		Underclay, light-gray, plastic			
		1		Coal, bright)			
			2	Shale, carbonaceous, not sampled)	a	.001	a
		1	6	Coal)			
35	Letcher Co., Ky. Ed Sexton's truck mine in Fire Clay coal and Lawrence Maggard's truck mine in Whitesburg coal 5.7 miles north of Whitesburg on State Highway 15 and 0.2 mile west. Whitesburg quad: 4,600' N. 37°10' 700' E. 82°50'	2		Sandstone, fine-grained			
		2	5	Coal, bright	a	.003	a
			5	Flint fire clay, brownish-gray	.002	.001	.001
		1		Coal, dull)			
			11	Coal, bright)	a	.002	a
			1	Bone coal			
		?		Concealed interval			
			1	Siltstone, light-gray			
			10	Coal, dull)			
		2	8	Coal, bright)	a	.001	a
			2	Shale, carbonaceous			

Table 2.--Descriptions of rocks tested, measurements of radioactivity, and percent uranium contained in ashed samples-Continued.

Loc. No.	Location	Thickness Ft.	Thickness In.	Lithology	eU percent	U in Ash percent	U in Sample percent
36	Knott Co., Ky. Abandoned strip mine in Hindman coal 2 miles west of Hindman on State Highway 80 and 2.5 miles northeast to head of Ogden Branch. Hindman quad: 11,500' N. 37°20' 3,450' E. 83°00'	6	4	Shale, light bluish-gray, disc shaped limestone concretions near center, contains marine fossils	.002		
		4	5	Concealed interval			
		4	2	Coal, bright, few pyrite stringers	a		
			2	Shale, very carbonaceous			
			1	Coal, bright)			
			3	Bone coal)	a		
			5	Coal, bright)			
			1	Bone coal)			
37	Knott Co., Ky. Abandoned mines in Hazard No. 7 and Haddix coals 0.5 mile west of Emmalena on State Highway 80 and 0.5 mile north on dirt road. Troublesome quad: 3,100' N. 37°20' 1,400' E. 83°05'	3		Sandstone, fine-grained, massive			
		1	8	Coal, bright, 1/2" shale parting near top)			
			2	Bone coal)	a		
		2	2	Coal, moderately bright)			
			1	Underclay, medium light-gray			
		75		Mostly sandstone, fine-grained			
		1	3	Coal, bright)			
		1	1	Coal, bright, several thin) shale partings)	a		
		1	3	Underclay, medium light-gray			
		1	10	Coal, mainly bright)			
			5	Coal, moderately dull, bony)	a		
			1	Underclay			

Table 2.--Descriptions of rocks tested, measurements of radioactivity, and percent uranium contained in ashed samples-Continued.

Loc. No.	Location	Thickness Ft.	Thickness In.	Lithology	eU percent	U in Ash percent	U in Sample percent
38	Perry Co., Ky. Domestic opening in Fugate coal 0.5 mile northwest of Stacy on right fork of Noble Branch. Troublesome quad: 2,600' S. 37°25' 10,600' E. 83°15'	4		Shale, weathered olive-gray			
		1	3	Coal, bright)			
			2	Shale, carbonaceous)			
			5	Coal)	a		
			1	Shale, carbonaceous)			
			10	Coal)			
			2	Shale, carbonaceous			
		1	5	Coal, moderately dull	a		
		1		Shale, carbonaceous, poorly-bedded	.002		
		1	2	Coal, moderately dull	a		
			2	Shale, carbonaceous, thin-bedded			

Table 2.--Descriptions of rocks tested, measurements of radioactivity, and percent uranium contained in ashed samples--Continued.

Loc. No.	Location	Thickness Ft.	Thickness In.	Lithology	eU percent	U in Ash percent	U in Sample percent
39	Perry Co. Ky. Road cuts	4		Shale, medium dark-gray			
	or abandoned openings in	1	3	Coal)			
	Hindman, Hazard No. 7, and		3	Bone coal)	a		
	Hazard No. 6 coals about	3		Coal, blocky)			
	1 mile west of Hazard		3	Underclay, plastic			
	along gravel road up	112		Concealed interval			
	Messer Branch.	13		Interbedded sandstone and siltstone			
	Cornettsville quad:	20		Sandstone, medium-grained, massive			
	2,300' S. 37°15'	1	9	Siltstone, carbonaceous, ironstones			
	11,000' E. 83°15'	4	8	Coal, bright, blocky	a		
			2	Shale, black, hard			
		2	1	Underclay, medium dark-gray			
		8		Siltstone, medium dark-gray			
		4		Concealed interval			
		21		Sandstone, very fine-grained			
		1	6	Laminated coal and shale			
		12	6	Sandstone, very fine-grained			
		1	6	Laminated coal and shale			
		6	2	Siltstone, medium-gray			
		3		Coal	a		
		3		Siltstone, carbonaceous			
40	Perry Co., Ky. Road cut	10		Shale, dark-gray, unevenly bedded			
	in Francis coal about 3		10	Sandstone, very fine-grained			
	miles southeast of		8	Coal, bright)			
	Hazard on State Highway		2	Shale, carbonaceous, not sampled)			
	15 and 2.5 miles south-		2	Coal)			
	west on gravel road to	1	8	Underclay, not sampled)			
	head of Buffalo Creek.		3	Coal)	a		
	Cornettsville quad:		3	Laminated coal and shale)			
	13,500' N. 37°10'		2	Underclay, not sampled)			
	8,200' W. 83°10'		6	Coal)			
			5	Underclay, silty			

Table 2.--Descriptions of rocks tested, measurements of radioactivity, and percent uranium contained in ashed samples-Continued.

Loc. No.	Location	Thickness Ft.	Thickness In.	Lithology	eU percent	U in Ash percent	U in Sample percent
41	Leslie Co., Ky. Phipple Bros. abandoned truck mine in Amburgy coal 2.4 miles north of Hyden on State Highway 257 and 0.1 mile west on Asher Branch. Hyden quad: 6,500' N. 37°10' 9,300' E. 83°25'	5		Shale, light-gray, silty			
		2	7	Coal, bright	a		
			1	Shale, medium light-gray			
			8	Coal, moderately dull	a		
			2	Shale, very carbonaceous			
42	Leslie Co., Ky. Shamrock Coal Co. truck mine in Fire Clay coal 2.1 miles north of Hyden on State Highway 257 and 0.2 mile southwest on right of small drain. Hyden quad: 4,200' N. 37°10' 9,700' E. 83°25'	5		Shale, plant imprints on bedding			
			3	Coal, dull			
			1	Shale, carbonaceous			
		3	4	Coal, bright	a		
			3	Bone coal			
		1		Coal, bright, few pyrite and fusain stringers			
			5	Flint fire clay, brownish-gray	.002		
			3	Coal, bright			
			1	Underclay, light brownish-gray			
43	Perry Co., Ky. Road cut in Leatherwood coal 3.4 miles south of Slemp on State Highway 448 and 3 miles west on gravel road up Clover Fork. Cornettsville quad: 14,500' N. 37°00' 1,400' W. 83°10'	7		Shale, medium dark-gray			
		2	1	Coal, bright			
			7	Coal, dull, fusain stringers			
			10	Coal, bright			
			10	Coal, moderately dull	a		
			1	Coal, dull and fusain			
			4	Coal, bright			
			1	Coal, dull			
		1	2	Coal, bright			
			9	Shale, poorly-bedded, scattered ironstones			

Table 2.--Descriptions of rocks tested, measurements of radioactivity, and percent uranium contained in ashed samples-Continued.

Loc. No.	Location	Thickness Ft.	Thickness In.	Lithology	eU percent	U in Ash percent	U in Sample percent
44	Harlan Co., Ky. International Harvester Mines in "D", "C", and "B" coals 0.8 mile east of Benham on State Highway 160 and 0.2 mile north. Big Stone Gap quad: 11,300' S. 37°00' 5,300' W. 82°55'		6	Shale, carbonaceous			
		1	1	Coal, bright)			
			5	Coal, moderately dull)	a	.002	a
		1	5	Coal, moderately bright)			
			7	Underclay, root imprints			
			9	Laminated coal and shale			
			9	Coal, bright			
			1	Bone coal			
		?		Concealed interval			
		1		Clay, medium-gray carbonaceous			
		4	8	Coal, bright, thin bone partings	.001 (?)	.002	a
			1	Underclay, medium-gray			
		?		Concealed interval			
		2		Sandstone, fine-grained			
		2	4	Coal, moderately bright)			
			3	Coal, moderately dull)			
			5	Coal, bright)	a	.001	a
			6	Coal, dull)			
		2		Underclay, silty			
45	Harlan Co., Ky. Mary Helen Coal Corp. rail mine in Low Splint coal about 6.5 miles southeast of Harlan on U. S. Highway 421 and 3 miles northeast to head of Turtle Creek. Nolansburg quad: 4,500' S. 36°50' 8,150' E. 83°15'		6	Shale, medium-gray, plant imprints			
			9	Coal, bright)			
			1	Shale, medium-gray)	a	a	a
		3	6	Coal, medium bright)			
			6	Shale, medium-gray			

Table 2.—Descriptions of rocks tested, measurements of radioactivity, and percent uranium contained in ashed samples—Continued.

Loc. No.	Location	Thickness Ft.	Thickness In.	Lithology	eU percent	U in Ash percent	U in Sample percent
46	Harlan Co., Ky. Blue Diamond Coal Co. rail mines in Creech and Harlan coals about 5.5 miles southeast of Harlan on U. S. Highway 421 and 1 mile north on Enoch Branch. Harlan quad: 2,500' S. 36°50' 5,500' W. 83°15'		3	Shale, thin uneven-bedded			
		1		Coal, very bright			
			8	Shale, thin-bedded, carbonaceous			
			10	Coal, very bright	.001(?)	.002	a
			2	Shale, very carbonaceous			
			3	Coal, bright)			
			1	Fusain and shale)			
			2	Coal, bright)			
			3	Coal, dull)	a	.001	a
			3	Coal, bright)			
			4	Coal, dull)			
		1	11	Coal, bright)			
			1	Shale, medium light-gray			
		450		Concealed interval			
			5	Shale, carbonaceous			
			2	Coal, moderately bright)			
			2	Coal, dull)			
			1	Coal, moderately bright)	a	.001	a
			1	Bone coal)			
		3	10	Coal, medium bright)			
47	Bell Co., Ky. Better Coal Co. truck mine in Mason (?) coal about 5 miles west of Middlesboro on State Highway 74. Cumberland Gap quad: 16,900' S. 36°40' 15,500' E. 83°50'		3	Shale, carbonaceous			
			2	Coal, moderately bright)			
			2	Bone coal)			
		1	4	Coal, very bright)	a	.001	a
			2	Shale, very carbonaceous)			
			8	Coal, bright, fusain stringers)			
		3		Shale, medium-gray, poorly-bedded			
		1	8	Coal, bright, fusain stringers	a	.001	a
		1		Sandstone, very fine-grained			

Table 2.--Descriptions of rocks tested, measurements of radioactivity, and percent uranium contained in ashed samples-Continued.

Loc. No.	Location	Thickness Ft.	Thickness In.	Lithology	eU percent	U in Ash percent	U in Sample percent
48	Bell Co., Ky. Garmeade Coal Co. rail mine in Red Springs coal about 10 miles west of Middlesboro on State Highway 74 and north 1.5 miles to gravel road to head of Stoney Fork. Cumberland Gap quad: 9,300' S. 36°40' 3,000' W. 83°50'	2		Shale, medium dark-gray			
			6	Coal, bright			
			5	Underclay, dark-gray	.001	.002	.001
			8	Coal, bright			
			2	Coal, dull			
		2	1	Coal, bright			
			1	Shale	a	.002	a
			1	Coal, bright			
			1	Bone coal			
			1	Underclay, medium light-gray			
49	Bell Co., Ky. Pruden Coal Co. rail mine in Hignite coal about 2.5 miles north of Fondy on State Highway 74 and gravel road to near head of Sowder Creek. Cumberland Gap quad: 16,500' S. 36°40' 13,800' W. 83°50'	1		Sandstone, ironstones in base			
			4	Coal and thin shale partings			
		3	3	Coal, bright, few fusain stringers and pyrite nodules	a	.001	a
			6	Underclay, light-gray, plastic			
50	Claiborne Co., Tenn. Pruden Coal Co. rail mine in Rich Mountain coal about 1 mile northeast of Pruden on State Highway 90. Cumberland Gap quad: 26,300' N. 36°30' 19,000' W. 83°50'	3		Shale, thin-bedded, plant imprints			
			2	Coal, bright, thin shale parting			
			3	Shale, dark-gray, carbonaceous			
		1	8	Coal, bright, few fusain stringers			
			2	Shale, dark-gray, carbonaceous	a	.002	a
			11	Coal, bright			
			6	Underclay, light-gray, plastic			

Table 1.--Descriptions of rocks tested, measurements of radioactivity, and percent uranium contained in ashed samples

Loc. No.	Location	Thickness Ft.	Thickness In.	Lithology	eU percent	U in Ash percent	U in Sample percent
51	Claiborne Co., Tenn.	2		Shale, light-gray, plant imprints			
	Pruden Coal Co. strip	1	5	Coal, moderately bright)			
	mine in Mason coal		1	Clay, light-gray)	a	.001	a
	about 2 miles northwest		4	Coal, moderately bright)			
	of Pruden on dirt road.		3	Shale, very carbonaceous			
	Cumberland Gap quad:	2		Coal, medium bright	a	.002	a
	30,000' N. 37°30'		1	Underclay, light-gray, plastic			
	18,400' E. 84°00'						
52	Whitley Co., Ky. Packard	3		Sandstone, fine-grained			
	Coal Co. truck mine in	2		Coal, bright, few fusain)			
	Jellico coal 4 miles			stringers)	a	.003	a
	southwest of Williamsburg		1	Shale, carbonaceous)			
	on State Highway 92 and 1		4	Coal, very bright)			
	mile south to left head		1	Underclay, medium-gray			
	of Briar Creek.						
	Williamsburg quad:						
	10,900' N. 36°40'						
	7,800' W. 84°10'						
53	Whitley Co., Ky. Bobo	8		Clay, medium-gray, massive			
	and Denham Coal Co. strip		5	Bone coal, pyrite stringers)			
	mine in River Cem coal 4	1	8	Coal, bright)	a	.001	a
	miles east of Holly Hill on		1	Underclay, medium-gray, silty			
	State Highway 92 and 2 miles						
	north on gravel road.						
	Williamsburg quad:						
	12,400' N. 36°40'						
	19,000' E. 84°20'						

Table 2.--Descriptions of rocks tested, measurements of radioactivity, and percent uranium contained in ashed samples--Continued.

Loc. No.	Location	Thickness Ft.	Thickness In.	Lithology	eU percent	U in Ash percent	U in Sample percent
54	McCreary Co., Ky. B. R. Campbell & Son Coal Co. truck mine in Blue Gem coal 2.4 miles west on State Highway 92 and 2 miles south on gravel road. Williamsburg quad: 16,500' S. 36°40' 9,800' W. 84°20'	3		Shale, dark-gray, ironstone nodules			
			7	Coal, moderately bright)			
			4	Coal, moderately dull)	.002(?)	a	a
			9	Coal, moderately bright)			
			2	Underclay, root imprints			
55	McCreary Co., Ky. Stearns Coal & Lumber Co. rail mine in Stearns No. 2 coal 1.5 miles southwest of Barthell on west side of Cumberland River. Barthell quad: 5,200' N. 36°40' 14,600' W. 84°30'	2		Shale, dark-gray, thin-bedded			
		3	3	Coal, moderately bright	a	.003	a
			2	Ironstone layer, disseminated pyrite			
			5	Bone coal and shale			
56	McCreary Co. Ky. Stearns Coal & Lumber Co. rail mine in Stearns No. 1½ coal at Worley. Barthell quad: 11,800' N. 36°40' 9,100' W. 84°30'	4		Shale, thin-bedded, plant imprints			
		1	1	Coal, medium bright)			
			2	Bone coal)	a	.001	a
		2	10	Coal, moderately bright)			
			1	Shale, medium-gray			

Table 2.--Descriptions of rocks tested, measurements of radioactivity, and percent uranium contained in ashed samples-Continued.

Loc. No.	Location	Thickness Ft.	Thickness In.	Lithology	eU percent	U in Ash percent	U in Sample percent
57	McCreary Co., Ky. Stearns Coal & Lumber Co. rail mine in Stearns No. 1 coal at Oz Station. Barthell quad: 14,900' S. 36°45' 2,300' E. 84°35'	2		Sandstone, very fine-grained			
		2	1	Coal, bright	a	.002	a
			2	Coal, dull			
		1	9	Coal, medium bright			
			1	Siltstone, light-gray			
58	Whitley Co., Ky. Osbourne Mining Co. strip mine in Lily coal 3 miles south of Woodbine on State Highway 26 and 0.5 mile west. Williamsburg quad: 7,600' N. 37°50' 3,400' E. 84°10'	3		Shale, plant imprints			
			7	Coal, bright, pyrite in top	a		
			2	Bone coal			
		1	8	Coal, bright, fusain stringers			
			6	Underclay, root imprints			
59	Laurel Co., Ky. Pine Creek Coal Co. truck mine in Barren Fork (?) coal about 4 miles southwest of Bernstadt on gravel road. London quad: 10,600' S. 37°10' 19,800' W. 84°10'	4		Shale, silty, thin-bedded			
			2	Cannel coal	a		
		2	8	Coal, moderately bright, pyrite stringers			
			1	Cannel coal			

Table 2.--Descriptions of rocks tested, measurements of radioactivity, and percent uranium contained in ashed samples-Continued.

Loc. No.	Location	Thickness Ft.	Thickness In.	Lithology	eU percent	U in Ash percent	U in Sample percent
60	Laurel Co., Ky. Truck mine in Lily coal 0.7 mile north on gravel road. London quad: 8,800' N. 37°10' 10,100' E. 84°10'	5		Shale, dark-gray			
			9	Cannel coal	.001		
		1	3	Coal, bright	a		
			2	Underclay, medium light-gray			
61	Clay Co., Ky. House Branch Coal Co. truck mine in Horse Creek coal about 6 miles southwest of Manchester on State Highway 80 and 0.5 mile north on House Branch. Manchester quad: 18,500' S. 37°10' 2,900' E. 83°50'	6		Shale, light-gray, ironstone layers			
		2	7	Coal, bright	a		
			3	Underclay, root imprints			

CONCLUSIONS

Coals in the coal fields of eastern Kentucky and Mingo and Logan counties, W. Va. examined during this investigation contain 0.001 percent or less equivalent uranium. Some of the rock associated with the coals contain as much as 0.002 percent equivalent uranium.

No correlation between radioactivity and stratigraphic position nor between radioactivity and structural relationship was detected.

LITERATURE CITED

Butts, C., 1927, Fensters in the Cumberland overthrust block in southwest Virginia: Virginia Geol. Survey Bull. 28, 12 p.

Hennen, R. V., and Reger, D. B., 1914, Logan and Mingo Counties: West Virginia Geol. Survey, 776 p.

Kronstadt, R., A study of uranium in coal ash, 1951, U. S. Bureau of Mines Preliminary Rept. of Inv. for the Atomic Energy Commission, 10 p.

McFarlan, A. C., 1943, Geology of Kentucky, p. 96-108, 130-145: Univ. Kentucky.

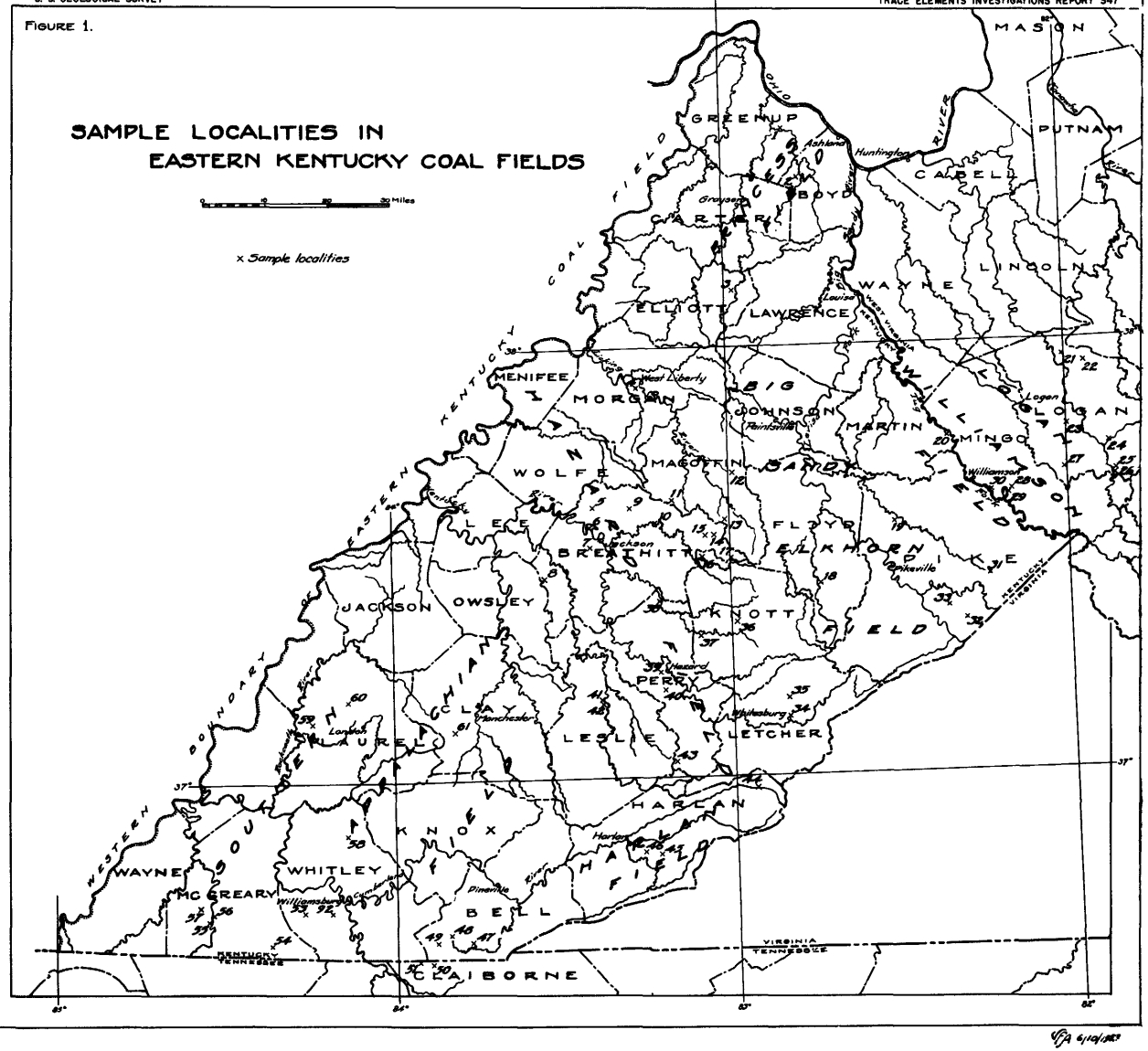
Wanless, H. R., 1939, Pennsylvanian correlations in the eastern Interior and Appalachian coal fields: Geol. Soc. America Spec. Paper No. 17, VII, 130 p.

_____, 1946, Pennsylvanian geology of a part of the southern Appalachian coal field: Geol. Soc. America Mem. 13, XI, 162 p.

UNPUBLISHED REPORT

Nelson, J. M., and Brill, K. G., Jr., 1948, Preliminary report on radioactivity of asphaltites, coals, and shales, in Tennessee, Kentucky, West Virginia, and Pennsylvania: U. S. Geol. Survey Trace Elements Inv. Rept. 43.

FIGURE 1.


SAMPLE LOCALITIES IN
EASTERN KENTUCKY COAL FIELDS
Miles
x Sample localities
EASTERN KENTUCKY COAL FIELD
WESTERN COAL FIELD BOUNDARY
OHIO RIVER
KENTUCKY VIRGINIA
KENTUCKY TENNESSEE
VIRGINIA TENNESSEE
MASON
GREENUP
PUTNAM
BOYD
CARTER
CAMPBELL
LINCOLN
WAYNE
ELLIOTT
LAWRENCE
MENIFEE
MORGAN
JOHNSON
MARTIN
LOGAN
WILLIAMSON
WOLFE
MAGOFFIN
BIG SANDY
FLOYD
ELKHORN
KNOTT
JACKSON
OWSLEY
BREATHITT
PERRY
CLAY
LESLIE
LETCHER
KNOX
HARLAN
WHITLEY
WAYNE
MC CREARY
BELL
CLAIBORNE
83°
84°
85°
86°
37°