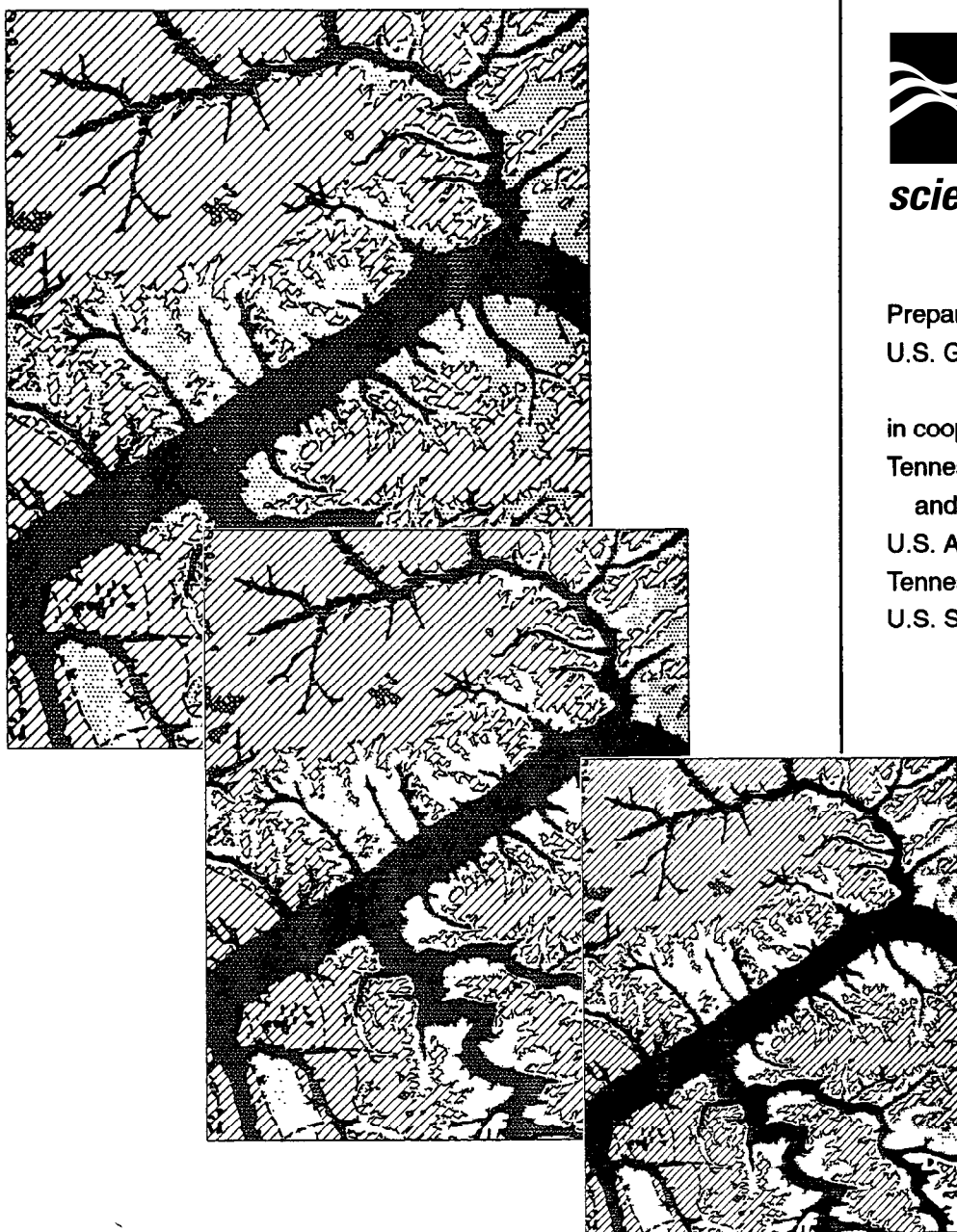


Conversion of Geologic Quadrangle Maps to Geologic Coverages

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Open-File Report 94-359



Prepared by the
U.S. Geological Survey

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Tennessee Division of Environment
and Conservation,
U.S. Army Corps of Engineers,
Tennessee Valley Authority, and the
U.S. Soil Conservation Service

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Nashville, Tennessee
1994

**U.S. DEPARTMENT OF THE INTERIOR
BRUCE BABBITT, Secretary**

**U.S. GEOLOGICAL SURVEY
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Conversion of Geologic Quadrangle Maps to Geologic Coverages

by Joseph F. Connell, William R. Barron, Jr., and Reavis L. Mitchell, III

ABSTRACT

Three hundred sixty-eight geologic maps of 7 $\frac{1}{2}$ -minute quadrangles in Tennessee were converted to geographic information system (GIS) coverages. The procedure used was documented and a list was made of the quadrangles included in the coverages. Maps were converted to GIS coverages by making film copies of scribe-coats of the maps. The film copies were scanned, vectorized, and written into a generate format. Coverage polygons were tagged with symbols to identify geologic units, and coverage lines were tagged with line types to designate stratigraphic contacts.

INTRODUCTION

Geologic coverages available to geographic information system (GIS) users typically have been made from 1:250,000-scale base maps. Maps at this scale provide insufficient resolution of detail needed for hydrogeologic and other studies of areas that are less than regional in scope. Studies of these smaller areas often require the more detailed information available on maps at a scale of 1:24,000. At present, this need is met by using geologic maps of quadrangles published at a scale of 1:24,000 by the U.S. Geological Survey (USGS) and the Tennessee Division of Geology. However, the use of paper copies of geologic maps to produce derivative maps is inefficient; in contrast, this task is handled quickly and efficiently with GIS technology. Therefore, the USGS, in cooperation with the Tennessee Department of Environment and Conservation, the U.S. Army Corps of Engineers, the Tennessee Valley Authority, and the U.S. Soil Conservation Service, initiated a project during spring 1990, to convert information on the 7 $\frac{1}{2}$ -minute geologic quadrangle maps to digital files that can be accessed with different types of GIS software.

Tennessee is divided into 811 quadrangles at a scale of 1:24,000. Of the 412 quadrangles for which geologic maps have been published by the USGS or the Tennessee Division of Geology (1992), maps for 368 quadrangles were converted to GIS coverages using ARC/INFO (Environmental Systems Research Institute, 1992) programs. This report describes the procedure used to convert the maps and lists the quadrangle names.

Many persons were involved in the project. The authors especially express their appreciation to Elaine Foust of the Tennessee Division of Geology for assistance in acquiring the scribe-coats and resolving questions concerning interpretation of the maps. The authors also extend their thanks to the 10 cooperative education students and USGS employees whose efforts contributed immeasurably to the completion of the project.

DATA CONVERSION

Scribecoats for 342 of the 371 geologic maps prepared by the Tennessee Division of Geology and printed by the Tennessee Valley Authority (TVA) were retrieved from TVA archives. Scribecoats also were obtained for 26 of the 36 geologic maps prepared by the USGS. Maps for some of the quadrangles on the borders of the State were combined with adjacent quadrangles (Tennessee Division of Geology, 1992). After filming the scribecoats, the film copies were converted to coverages.

Procedure

Film copies of the maps were scanned using a Contex FSS3012 full-scale scanner and converted to Hatachi raster format with CADImage software. The raster file was vectorized with CADCore software installed on a 386 personal computer. After vectorization, the drawing file was converted to an ARC/INFO generate-format file (Environmental Systems Research Institute, 1992) and transferred to a Data General (DG) workstation for conversion to an ARC/INFO coverage.

ARC/INFO loaded on DG Avion 300 workstations was used for conversion to digital data. The generate-format file was converted to an ARC/INFO GIS coverage and moved to ARCEDIT to remove dangling nodes so polygons could be completed. Tick marks were added and positioned so that their locations corresponded to the corners of the 7 $\frac{1}{2}$ -minute quadrangle maps. Tick marks from a quadrangle coverage of Tennessee in State Plane (SP) projection were used to transform the geologic coverage into SP projection. The projection parameters were (1) zone, 5301; (2) units, feet; and (3) datum, nad27. If the projection root mean square error was greater than 20 feet, the transformed coverage was reviewed for error. Larger errors generally were associated only with the older maps. For a final test of shape and agreement in location, the quadrangle boundary was retrieved from the corresponding SP quadrangle coverage and overlain with the transformed geologic coverage. If the boundaries matched, the geologic coverage was ready for cleanup and tagging. The transformed geologic coverage boundary was replaced with the boundary from the corresponding 7 $\frac{1}{2}$ -minute quadrangle coverage to ensure sliver polygons would not occur between the geologic coverages when appended along their common boundaries. Dangling arcs resulting from the boundary replacement were extended into the new boundary and dangling arcs outside the new boundary were removed. Pseudo nodes were removed from the arcs in order for new pseudo nodes to be added at locations along a line where a geologic contact changed. As a final step in this phase, label points were added to allow for tagging of the polygons.

Both the lines and the polygons were tagged for each geologic coverage. The lines were tagged as contacts, faults, or boundaries. The contacts were tagged as OUTCROP or APPROX to indicate the observed location or approximate location of a stratigraphic contact, respectively. The faults were tagged as FAULT or A-FAULT to indicate the observed location or approximate location of the fault, respectively. The boundaries were tagged as BOUNDARY or ST-LINE to indicate the boundary of the quadrangle or a state line. Next, the polygons were tagged with the same formation symbol as on the geologic map. For a final check, the completed geologic coverage was plotted and compared with the original published geologic map.

Problems Encountered

Some of the problems that arose during the conversion were:

- Only those geologic maps with a scannable scribecoat could be converted.
- Lake outlines were not delineated on the scribecoat of some maps; therefore, the geologic units associated with the lake outline were tagged as alluvium.
- In a few instances, the geologist subdivided a formation but did not extend the subdivision to a contact boundary. In order to complete the polygons for tagging, judgments were made concerning the placement of lines to manually close the polygons.
- Fault locations were grouped into one of two categories, either observed or approximate. Faults were not further categorized by type of fault.
- In a few instances, stratigraphic contacts on the coverage did not exactly overlay the corresponding contacts on the published map. This may be the result of different types of projections used. Additionally, geologic maps were constructed over a period of 30 years by different geologists; consequently, stratigraphic delineation may be more detailed on some geologic quadrangles than on adjacent quadrangles, and geologic interpretation may differ between adjoining quadrangles.

DATA OUTPUT

GIS coverages were completed for the 368 quadrangles listed in table 1, which is sorted by row and column, and in table 2, which is sorted by quadrangle name. Locations of the quadrangles are shown in figure 1, and an example plot of the geologic coverage for the Needmore quadrangle is shown in figure 2. The digital data are available in two output formats: (1) ARCEXPOR format (Environmental Systems Research Institute, Inc., 1992), which is machine independent, but requires ARC/INFO software, and (2) Standard Digital Line Graph format (U.S. Geological Survey, 1989), which is machine and software independent.

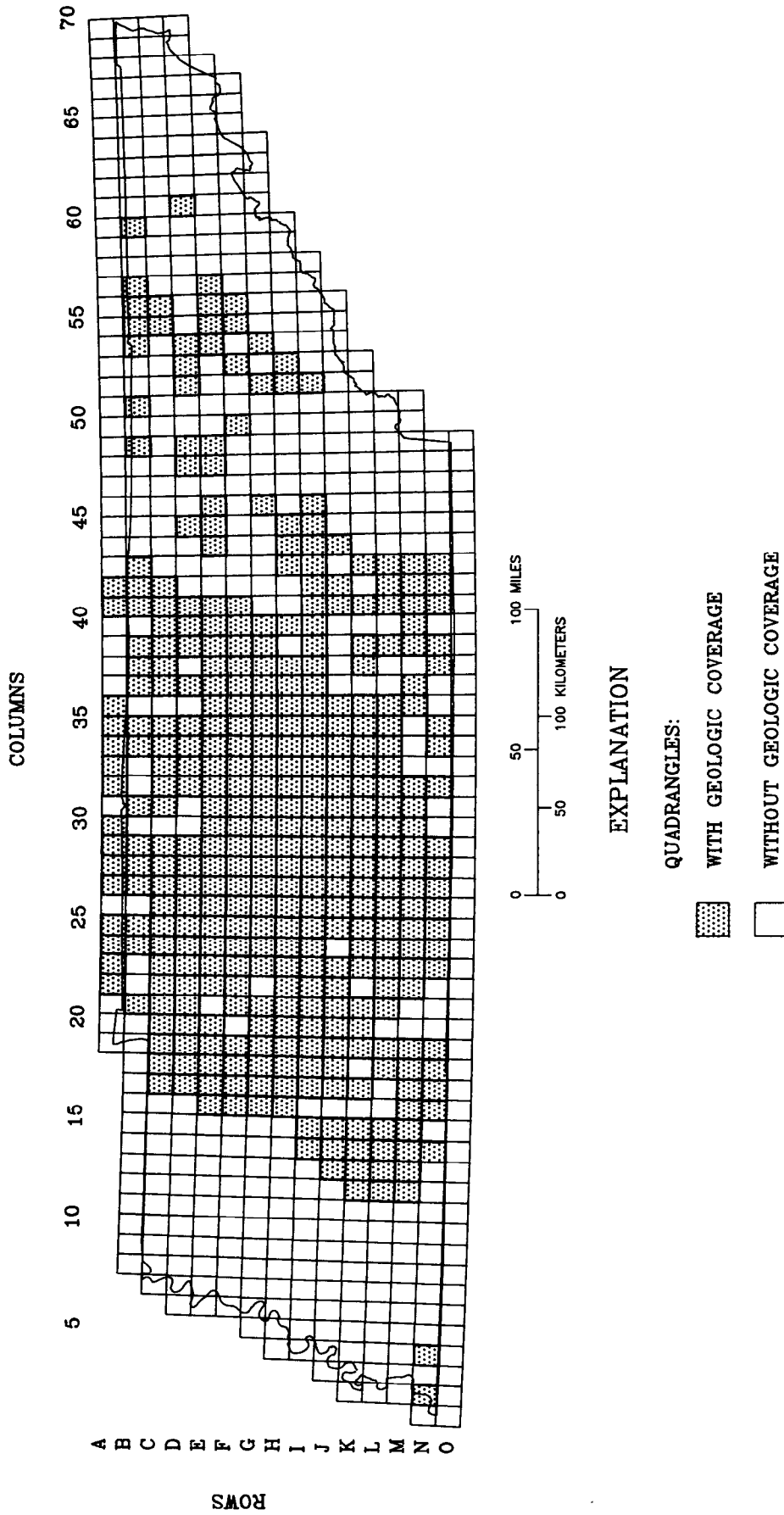


Figure 1. Location of quadrangles with geologic coverage for Tennessee.

Needmore quadrangle

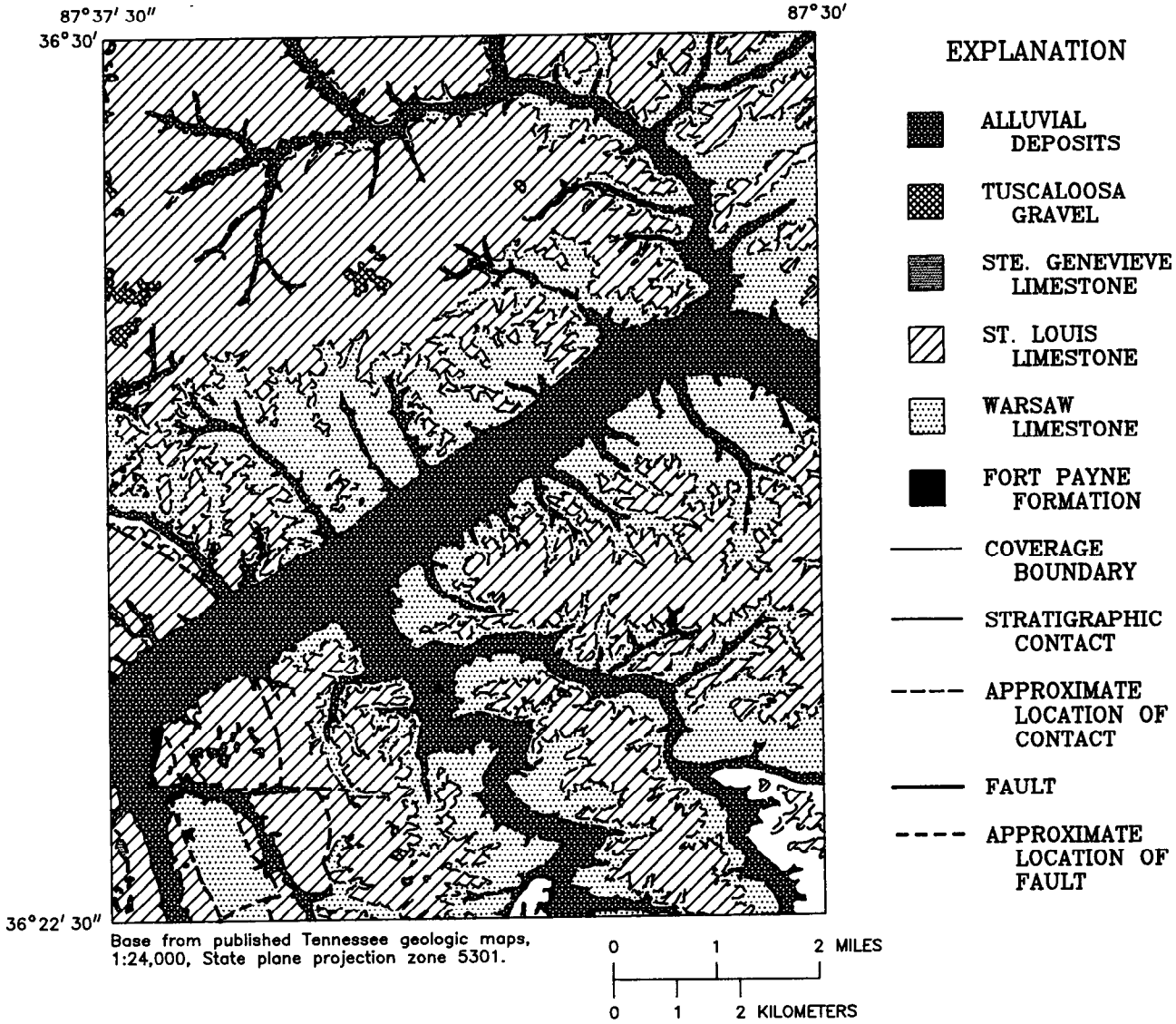


Figure 2. Example of a geologic coverage, Needmore quadrangle, Tennessee.

Table 1. Completed geologic coverages for Tennessee, sorted by row and column

[Row and column refer to figure 1. ID is quadrangle identification number assigned by Tennessee Valley Authority]

Row	Column	Quadrangle name	ID
A	22	ROARING SPRING	300 NW
A	23	HERNDON	300 NE
A	24	OAK GROVE	301 NW
A	25	TRENTON	301 NE
A	27	ALLENSVILLE	303 NE
A	28	DOT	306 NW
A	29	ADAIRVILLE	306 NE
A	30	PRICES MILL	309 NW
A	32	HICKORY FLAT	312 NW
A	33	ADOLPHUS	312 NE
A	34	PETROLEUM	316 NW
A	35	HOLLAND	316 NE
A	36	FOUNTAIN RUN	320 NW
A	41	FROGUE	329 NE
A	42	ALBANY	333 NW
B	21	BUMPUS MILLS	28 SE
B	24	NEW PROVIDENCE	301 SW
B	25	CLARKSVILLE	301 SE
B	27	ADAMS	303 SE
B	28	SPRINGFIELD NORTH	306 SW
B	29	YOUNGVILLE	306 SE
B	31	PORTLAND	309 SE
B	34	WESTMORELAND	316 SW
B	35	LAFAYETTE	316 SE
B	37	RED BOILING SPRINGS	320 SE
B	38	UNION HILL	324 SW
B	39	CELINA	324 SE
B	41	DALE HOLLOW RESERVOIR	329 SE
B	42	BYRDSTOWN	333 SW
B	43	MOODYVILLE	333 SE
B	49	KETCHEN	337 SE
B	51	JELLICO EAST	338 SE
B	54	MIDDLESBORO SOUTH	153 SW
B	55	WHEELER	153 SE
B	56	COLEMAN GAP	161 SW
B	57	BACK VALLEY	161 SE
B	60	LOONEYS GAP	179 SW
C	17	PURYEAR	8 NE
C	18	BUCHANAN	19 NW
C	19	PARIS LANDING	19 NE
C	20	STANDING ROCK	29 NW
C	21	DOVER	29 NE
C	22	CUMBERLAND CITY	38 NW
C	23	NEEDMORE	38 NE
C	24	PALMYRA	302 NW
C	25	EXCELL	302 NE
C	26	HENRIETTA	304 NW

Table 1. Completed geologic coverages for Tennessee, sorted by row and column--Continued

Row	Column	Quadrangle name	ID
C	27	PLEASANT VIEW	304 NE
C	28	SPRINGFIELD SOUTH	307 NW
C	29	GREENBRIER	307 NE
C	31	COTTONTOWN	310 NE
C	32	GALLATIN	313 NW
C	33	BETHPAGE	313 NE
C	34	HARTSVILLE	317 NW
C	35	HILLSDALE	317 NE
C	37	WILLETTE	321 NE
C	38	WHITLEYVILLE	325 NW
C	39	BURRISTOWN	325 NE
C	40	HILHAM	330 NW
C	41	LIVINGSTON	330 NE
C	42	ALPINE	334 NW
C	55	TAZEWELL	154 NE
C	56	HOWARD QUARTER	162 NW
D	17	PARIS	8 SE
D	18	WEST SANDY DIKE	19 SW
D	19	POPLAR CREEK	19 SE
D	20	MCKINNON	29 SW
D	21	STEWART	29 SE
D	22	ERIN	38 SW
D	23	ELLIS MILLS	38 SE
D	24	SLAYDEN	302 SW
D	25	CUMBERLAND FURNANCE	302 SE
D	26	CHEATHAM DAM	304 SW
D	27	ASHLAND CITY	304 SE
D	28	FOREST GROVE	307 SW
D	29	WHITES CREEK	307 SE
D	32	LAGUARDO	313 SW
D	33	HUNTERS POINT	313 SE
D	34	BELLWOOD	317 SW
D	35	DIXON SPRINGS	317 SE
D	37	GRANVILLE	321 SE
D	39	DODSON BRANCH	325 SE
D	40	WINDLE	330 SW
D	41	OKALONA	330 SE
D	45	BURRVILLE	115 SE
D	48	NORMA	128 SW
D	49	BLOCK	128 SE
D	52	WHITE HOLLOW	145 SW
D	53	MAYNARDVILLE	145 SE
D	54	POWDER SPRINGS	154 SW
D	61	BAILEYTON	180 SE
E	16	HENRY	9 NW
E	17	MANSFIELD	9 NE
E	18	MANLEYVILLE	20 NW
E	19	BIG SANDY	20 NE
E	20	HARMON CREEK	30 NW
E	22	WOOLWORTH	39 NW

Table 1. Completed geologic coverages for Tennessee, sorted by row and column--Continued

Row	Column	Quadrangle name	ID
E	23	RUSKIN	39 NE
E	24	VANLEER	48 NW
E	25	CHARLOTTE	48 NE
E	26	HARPETH VALLEY	305 NW
E	27	LILLAMAY	305 NE
E	28	SCOTTSBORO	308 NW
E	29	NASHVILLE WEST	308 NE
E	30	NASHVILLE EAST	311 NW
E	31	HERMITAGE	311 NE
E	32	MARTHA	314 NW
E	33	LEBANON	314 NE
E	34	SHOP SPRINGS	318 NW
E	35	NEW MIDDLETON	318 NE
E	36	GORDONSVILLE	322 NW
E	37	BUFFALO VALLEY	322 NE
E	38	BAXTER	326 NW
E	39	COOKEVILLE WEST	326 NE
E	40	COOKEVILLE EAST	331 NW
E	41	MONTEREY	331 NE
E	44	JONES KNOB	116 NW
E	45	TWIN BRIDGES	116 NE
E	46	PILOT MOUNTAIN	122 NW
E	48	FORK MOUNTAIN	129 NW
E	49	DUNCAN FLATS	129 NE
E	54	LUTTRELL	155 NW
E	55	JOPPA	155 NE
E	56	TALBOTT	163 NW
E	57	MORRISTOWN	163 NE
F	16	HUNTINGDON	9 SW
F	17	VALE	9 SE
F	18	BRUCETON	20 SW
F	19	CAMDEN	20 SE
F	21	WAVERLY	30 SE
F	22	MCEWEN	39 SW
F	23	TENNESSEE CITY	39 SE
F	24	DICKSON	48 SW
F	25	BURNS	48 SE
F	26	WHITE BLUFF	305 SW
F	27	KINGSTON SPRINGS	305 SE
F	28	BELLEVUE	308 SW
F	29	OAK HILL	308 SE
F	30	ANTIOCH	311 SW
F	31	LAVERGNE	311 SE
F	32	GLADEVILLE	314 SW
F	33	VINE	314 SE
F	34	WATERTOWN	318 SW
F	35	ALEXANDRIA	318 SE
F	36	LIBERTY	322 SW
F	37	CENTER HILL DAM	322 SE
F	38	SILVER POINT	326 SW

Table 1. Completed geologic coverages for Tennessee, sorted by row and column--Continued

Row	Column	Quadrangle name	ID
F	39	BURGESS FALLS	326 SE
F	40	DRY VALLEY	331 SW
F	41	MONTEREY LAKE	331 SE
F	50	CLINTON	137 SW
F	53	JOHN SEVIER	146 SE
F	55	NEW MARKET, TN	155 SE
F	56	JEFFERSON CITY	163 SW
G	16	PALMER SHELTER	10 NW
G	17	BUENA VISTA	10 NE
G	18	SEVENTEEN CREEK	21 NW
G	19	ROCKPORT	21 NE
G	20	HUSTBURG	31 NW
G	21	HURRICANE MILLS	31 NE
G	23	SPOT	40 NE
G	24	TEXAS HOLLOW	49 NW
G	25	LYLES	49 NE
G	26	CRAIGFIELD	56 NW
G	27	FAIRVIEW	56 NE
G	28	LEIPERS FORK	63 NW
G	29	FRANKLIN	63 NE
G	30	NOLENSVILLE	70 NW
G	31	SMYRNA	70 NE
G	32	WALTERHILL	315 NW
G	33	LASCASSAS	315 NE
G	34	MILTON	319 NW
G	35	AUBURNTOWN	319 NE
G	36	GASSAWAY	323 NW
G	37	SMITHVILLE	323 NE
G	38	SLIGO BRIDGE	327 NW
G	39	CASSVILLE	327 NE
G	40	SPARTA	332 NW
G	46	CARDIFF	123 NW
G	52	KNOXVILLE	147 NW
G	54	BOYDS CREEK	156 NW
H	16	CLARKSBURG	10 SW
H	17	YUMA	10 SE
H	18	HOLLADAY	21 SW
H	19	SUGAR TREE	21 SE
H	20	DANIELS LANDING	31 SW
H	21	LOBELVILLE	31 SE
H	22	COBLE	40 SW
H	23	WHITFIELD	40 SE
H	24	CENTERVILLE	49 SW
H	25	LITTLELOT	49 SE
H	26	PRIMM SPRINGS	56 SW
H	27	THETA	56 SE
H	28	SPRING HILL	63 SW
H	29	BETHESDA	63 SE
H	30	COLLEGE GROVE	70 SW
H	31	ROCKVALE	70 SE
H	32	MURFREESBORO	315 SW

Table 1. Completed geologic coverages for Tennessee, sorted by row and column--Continued

Row	Column	Quadrangle name	ID
H	33	DILLTON	315 SE
H	34	READYVILLE	319 SW
H	35	WOODBURY	319 SE
H	36	SHORT MOUNTIAN	323 SW
H	37	DIBRELL	323 SE
H	38	CAMPAIGN	327 SW
H	40	BALD KNOB	332 SW
H	43	VANDEVER	109 SE
H	44	GRASSY COVE	117 SW
H	45	RODDY	117 SE
H	52	MARYVILLE	147 SW
H	53	WILDWOOD	147 SE
I	14	CLAYBROOK	446 NW
I	15	JUNO	446 NE
I	17	CHESTERFIELD	11 NE
I	18	PARSONS	22 NW
I	19	JEANNETTE	22 NE
I	20	PINE VIEW	32 NW
I	21	CHESTNUT GROVE	32 NE
I	22	PLEASANTVILLE	41 NW
I	23	BEAVERDAM SPRINGS	41 NE
I	24	SUNRISE	50 NW
I	25	GREENFIELD BEND	50 NE
I	26	WILLIAMSPORT	57 NW
I	27	GODWIN	57 NE
I	28	CARTERS CREEK	64 NW
I	29	RALLY HILL	64 NE
I	30	CHAPEL HILL	71 NW
I	31	ROVER	71 NE
I	32	FOSTERVILLE	78 NW
I	33	WEBBS JUNGLE	78 NE
I	34	BEECH GROVE	85 NW
I	35	HOLLOW SPRINGS	85 NE
I	36	CENTERTOWN	92 NW
I	37	MCMINNVILLE	92 NE
I	38	CARDWELL MOUNTAIN	328 NW
I	39	WELCHLAND	328 NE
I	40	SPENCER	103 NW
I	41	SAMPSON	103 NE
I	42	BILLINGSLEY	110 NW
I	43	MELVINE	110 NE
I	44	PENNINE	118 NW
I	45	SPRING CITY	118 NE
I	46	TEN MILE	124 NW
I	52	BLOCKHOUSE	148 NW
J	13	JACKSON SOUTH	438 SE
J	14	BEECH BLUFF	446 SW
J	15	LURAY	446 SE
J	17	REAGAN	11 SE
J	18	SCOTTS HILL	22 SW
J	19	PERRYVILLE	22 SE

Table 1. Completed geologic coverages for Tennessee, sorted by row and column--Continued

Row	Column	Quadrangle name	ID
J	20	POPE	32 SW
J	21	LINDEN	32 SE
J	22	GRAVE SPRINGS	41 SW
J	23	KIMMINS	41 SE
J	25	MOUNT JOY	50 SE
J	26	MOUNT PLEASANT	57 SW
J	27	COLUMBIA	57 SE
J	28	GLENDALE	64 SW
J	29	VERONA	64 SE
J	30	FARMINGTON	71 SW
J	31	UNIONVILLE	71 SE
J	32	DEASON	78 SW
J	33	WARTRACE	78 SE
J	34	NOAH	85 SW
J	35	FREDONIA	85 SE
J	36	MORRISON	92 SW
J	41	BROCKDELL	103 SE
J	42	PIKEVILLE	110 SW
J	44	EVENSVILLE	118 SW
K	12	TEAGUE	439 NW
K	13	MEDON	439 NE
K	14	HENDERSON	12 ANW
K	15	JACKS CREEK	12 ANE
K	17	SARDIS	12 NE
K	19	BATH SPRINGS	23 NE
K	20	CLIFTON	33 NW
K	21	LEATHERWOOD	33 NE
K	23	RIVERSIDE	42 NE
K	24	HENRYVILLE	51 NW
K	25	SUMMERTOWN	51 NE
K	26	SANDY HOOK	58 NW
K	27	LYNNVILLE	58 NE
K	28	CAMPBELLS STATION	65 NW
K	29	LEWISBURG	65 NE
K	30	BELFAST	72 NW
K	31	BEDFORD	72 NE
K	32	SHELBYVILLE	79 NW
K	33	NORMANDY	79 NE
K	34	NORMANDY LAKE	86 NW
K	35	MANCHESTER	86 NE
K	36	HILLSBORO	93 NW
K	38	ALTAMONT	99 NW
K	39	COLLINS	99 NE
K	41	MOUNT AIRY	104 NE
K	43	GRAYSVILLE	111 NE
L	12	BOLIVAR EAST	439 SW
L	13	SILERTON	439 SE
L	14	MASSEYVILLE	12 ASW
L	15	MT. PETER	12 ASE
L	18	HOOKERS BEND	23 SW
L	19	OLIVEHILL	23 SE

Table 1. Completed geologic coverages for Tennessee, sorted by row and column--Continued

Row	Column	Quadrangle name	ID
L	21	WAYNESBORO	33 SE
L	22	NEGRO HOLLOW	42 SW
L	23	OVILLA	42 SE
L	24	DEERFIELD	51 SW
L	25	ETHRIDGE	51 SE
L	26	CAMPBELLSVILLE	58 SW
L	27	MILKY WAY	58 SE
L	28	BRICK CHURCH	65 SW
L	29	CORNERVILLE	65 SE
L	30	PETERSBURG	72 SW
L	31	BELLEVILLE	72 SE
L	32	LYNCHBURG WEST	79 SW
L	33	LYNCHBURG EAST	79 SE
L	34	TULLAHOMA	86 SW
L	35	CAPITOL HILL	86 SE
L	36	ALTO	93 SW
L	39	PALMER	99 SE
L	41	HENSON GAP	104 SE
L	42	SODDY	111 SW
L	43	GRASSHOPPER CREEK	111 SE
M	12	HEBRON	440 NW
M	13	HORNSBY	440 NE
M	14	ROSE CREEK	4 NW
M	15	PURDY	4 NE
M	16	STANTONVILLE	13 NW
M	17	PITTSBURG LANDING	13 NE
M	18	SAVANNAH	24 NW
M	19	WOLF PIT RIDGE	24 NE
M	22	COLLINWOOD	43 NW
M	23	WESTPOINT	43 NE
M	24	LONG BRANCH	52 NW
M	25	LAWRENCEBURG	52 NE
M	26	BODEHAM	59 NW
M	27	PULASKI	59 NE
M	28	TARPLEY	66 NW
M	29	FRANKEWING	66 NE
M	30	BOONSHILL	73 NW
M	31	FAYETTEVILLE	73 NE
M	32	MULBERRY	80 NW
M	36	SEWANEE	94 NW
M	37	MONTEAGLE	94 NE
M	39	WHITWELL	100 NE
M	40	KETNER GAP	105 NW
M	41	FAIRMOUNT	105 NE
M	42	DAISY	112 NW
M	43	SNOW HILL	112 NE
N	2	FLETCHER LAKE	404 SW
N	4	SOUTHEAST MEMPHIS	409 SW
N	14	CHEWALLA	4 SW
N	16	MICHIE	13 SW
N	17	COUNCE	13 SE

Table 1. Completed geologic coverages for Tennessee, sorted by row and column--Continued

Row	Column	Quadrangle name	ID
N	18	PICKWICK	24 SW
N	19	LOWRYVILLE	24 SE
N	23	ST. JOSEPH	43 SE
N	24	LORETTO	52 SW
N	25	BONNERTOWN	52 SE
N	26	APPLETON	59 SW
N	27	ASPEN HILL	59 SE
N	28	ELKTON	66 SW
N	29	DELLROSE	66 SE
N	32	FLINTVILLE	80 SW
N	34	BEANS CREEK	87 SW
N	35	PITCHER RIDGE	87 SE
N	38	SOUTH PITTSBURG	100 SW
N	39	SEQUATCHIE	100 SE
N	41	CHATTANOOGA	105 SE
N	42	EAST CHATTANOOGA	112 SW
N	43	OOLTEWAH	112 SE

Table 2. Completed geologic coverages in Tennessee, sorted by quadrangle name

[Row and column refer to figure 1. ID is quadrangle identification number assigned by Tennessee Valley Authority]

Row	Column	Quadrangle Name	ID
A	29	ADAIRVILLE	306 NE
B	27	ADAMS	303 SE
A	33	ADOLPHUS	312 NE
A	42	ALBANY	333 NW
F	35	ALEXANDRIA	318 SE
A	27	ALLENSVILLE	303 NE
C	42	ALPINE	334 NW
K	38	ALTAMONT	99 NW
L	36	ALTO	93 SW
F	30	ANTIOCH	311 SW
N	26	APPLETON	59 SW
D	27	ASHLAND CITY	304 SE
N	27	ASPEN HILL	59 SE
G	35	AUBURNTOWN	319 NE
B	57	BACK VALLEY	161 SE
D	61	BAILEYTON	180 SE
H	40	BALD KNOB	332 SW
K	19	BATH SPRINGS	23 NE
E	38	BAXTER	326 NW
N	34	BEANS CREEK	87 SW
I	23	BEAVERDAM SPRINGS	41 NE
K	31	BEDFORD	72 NE
J	14	BEECH BLUFF	446 SW
I	34	BEECH GROVE	85 NW
K	30	BELFAST	72 NW
L	31	BELLEVILLE	72 SE
F	28	BELLEVUE	308 SW
D	34	BELLWOOD	317 SW
H	29	BETHESDA	63 SE
C	33	BETHPAGE	313 NE
E	19	BIG SANDY	20 NE
I	42	BILLINGSLEY	110 NW
D	49	BLOCK	128 SE
I	52	BLOCKHOUSE	148 NW
M	26	BODEHAM	59 NW
L	12	BOLIVAR EAST	439 SW
N	25	BONNERTOWN	52 SE
M	30	BOONSHILL	73 NW
G	54	BOYDS CREEK	156 NW
L	28	BRICK CHURCH	65 SW
J	41	BROCKDELL	103 SE
F	18	BRUCETON	20 SW
C	18	BUCHANAN	19 NW
G	17	BUENA VISTA	10 NE
E	37	BUFFALO VALLEY	322 NE
B	21	BUMPUS MILLS	28 SE
F	39	BURGESS FALLS	326 SE

Table 2. Completed geologic coverages in Tennessee, sorted by quadrangle name--Continued

Row	Column	Quadrangle Name	ID
F	25	BURNS	48 SE
C	39	BURRISTOWN	325 NE
D	45	BURRVILLE	115 SE
B	42	BYRDSTOWN	333 SW
F	19	CAMDEN	20 SE
H	38	CAMPAIGN	327 SW
K	28	CAMPBELLS STATION	65 NW
L	26	CAMPBELLSVILLE	58 SW
L	35	CAPITOL HILL	86 SE
G	46	CARDIFF	123 NW
I	38	CARDWELL MOUNTAIN	328 NW
I	28	CARTERS CREEK	64 NW
G	39	CASSVILLE	327 NE
B	39	CELINA	324 SE
F	37	CENTER HILL DAM	322 SE
I	36	CENTERTOWN	92 NW
H	24	CENTERVILLE	49 SW
I	30	CHAPEL HILL	71 NW
E	25	CHARLOTTE	48 NE
N	41	CHATTANOOGA	105 SE
D	26	CHEATHAM DAM	304 SW
I	17	CHESTERFIELD	11 NE
I	21	CHESTNUT GROVE	32 NE
N	14	CHEWALLA	4 SW
H	16	CLARKSBURG	10 SW
B	25	CLARKSVILLE	301 SE
I	14	CLAYBROOK	446 NW
K	20	CLIFTON	33 NW
F	50	CLINTON	137 SW
H	22	COBLE	40 SW
B	56	COLEMAN GAP	161 SW
H	30	COLLEGE GROVE	70 SW
K	39	COLLINS	99 NE
M	22	COLLINWOOD	43 NW
J	27	COLUMBIA	57 SE
E	40	COOKEVILLE EAST	331 NW
E	39	COOKEVILLE WEST	326 NE
L	29	CORNERSVILLE	65 SE
C	31	COTTONTOWN	310 NE
N	17	COUNCE	13 SE
G	26	CRAIGFIELD	56 NW
C	22	CUMBERLAND CITY	38 NW
D	25	CUMBERLAND FURNANCE	302 SE
M	42	DAISY	112 NW
B	41	DALE HOLLOW RESERVOIR	329 SE
H	20	DANIELS LANDING	31 SW
J	32	DEASON	78 SW
L	24	DEERFIELD	51 SW
N	29	DELLROSE	66 SE
H	37	DIBRELL	323 SE

Table 2. Completed geologic coverages in Tennessee, sorted by quadrangle name--Continued

Row	Column	Quadrangle Name	ID
F	24	DICKSON	48 SW
H	33	DILLTON	315 SE
D	35	DIXON SPRINGS	317 SE
D	39	DODSON BRANCH	325 SE
A	28	DOT	306 NW
C	21	DOVER	29 NE
F	40	DRY VALLEY	331 SW
E	49	DUNCAN FLATS	129 NE
N	42	EAST CHATTANOOGA	112 SW
N	28	ELKTON	66 SW
D	23	ELLIS MILLS	38 SE
D	22	ERIN	38 SW
L	25	ETHRIDGE	51 SE
J	44	EVENSVILLE	118 SW
C	25	EXCELL	302 NE
M	41	FAIRMOUNT	105 NE
G	27	FAIRVIEW	56 NE
J	30	FARMINGTON	71 SW
M	31	FAYETTEVILLE	73 NE
N	2	FLETCHER LAKE	404 SW
N	32	FLINTVILLE	80 SW
D	28	FOREST GROVE	307 SW
E	48	FORK MOUNTAIN	129 NW
I	32	FOSTERVILLE	78 NW
A	36	FOUNTAIN RUN	320 NW
M	29	FRANKEWING	66 NE
G	29	FRANKLIN	63 NE
J	35	FREDONIA	85 SE
A	41	FROGUE	329 NE
C	32	GALLATIN	313 NW
G	36	GASSAWAY	323 NW
F	32	GLADEVILLE	314 SW
J	28	GLENDALE	64 SW
I	27	GODWIN	57 NE
E	36	GORDONSVILLE	322 NW
D	37	GRANVILLE	321 SE
L	43	GRASSHOPPER CREEK	111 SE
H	44	GRASSY COVE	117 SW
J	22	GRAVE SPRINGS	41 SW
K	43	GRAYSVILLE	111 NE
C	29	GREENBRIER	307 NE
I	25	GREENFIELD BEND	50 NE
E	20	HARMON CREEK	30 NW
E	26	HARPETH VALLEY	305 NW
C	34	HARTSVILLE	317 NW
M	12	HEBRON	440 NW
K	14	HENDERSON	12 ANW
C	26	HENRIETTA	304 NW
E	16	HENRY	9 NW
K	24	HENRYVILLE	51 NW

Table 2. Completed geologic coverages in Tennessee, sorted by quadrangle name--Continued

Row	Column	Quadrangle Name	ID
L	41	HENSON GAP	104 SE
E	31	HERMITAGE	311 NE
A	23	HERNDON	300 NE
A	32	HICKORY FLAT	312 NW
C	40	HILHAM	330 NW
K	36	HILLSBORO	93 NW
C	35	HILLSDALE	317 NE
H	18	HOLLADAY	21 SW
A	35	HOLLAND	316 NE
I	35	HOLLOW SPRINGS	85 NE
L	18	HOOKERS BEND	23 SW
M	13	HORNSBY	440 NE
C	56	HOWARD QUARTER	162 NW
D	33	HUNTERS POINT	313 SE
F	16	HUNTINGDON	9 SW
G	21	HURRICANE MILLS	31 NE
G	20	HUSTBURG	31 NW
K	15	JACKS CREEK	12 ANE
J	13	JACKSON SOUTH	438 SE
I	19	JEANNETTE	22 NE
F	56	JEFFERSON CITY	163 SW
B	51	JELICO EAST	338 SE
F	53	JOHN SEVIER	146 SE
E	44	JONES KNOB	116 NW
E	55	JOPPA	155 NE
I	15	JUNO	446 NE
B	49	KETCHEN	337 SE
M	40	KETNER GAP	105 NW
J	23	KIMMINS	41 SE
F	27	KINGSTON SPRINGS	305 SE
G	52	KNOXVILLE	147 NW
B	35	LAFAYETTE	316 SE
D	32	LAGUARDO	313 SW
G	33	LASCASSAS	315 NE
F	31	LAVERGNE	311 SE
M	25	LAWRENCEBURG	52 NE
K	21	LEATHERWOOD	33 NE
E	33	LEBANON	314 NE
G	28	LEIPERS FORK	63 NW
K	29	LEWISBURG	65 NE
F	36	LIBERTY	322 SW
E	27	LILLAMAY	305 NE
J	21	LINDEN	32 SE
H	25	LITTLELOT	49 SE
C	41	LIVINGSTON	330 NE
H	21	LOBELVILLE	31 SE
M	24	LONG BRANCH	52 NW
B	60	LOONEYS GAP	179 SW
N	24	LORETTO	52 SW
N	19	LOWRYVILLE	24 SE

Table 2. Completed geologic coverages in Tennessee, sorted by quadrangle name--Continued

Row	Column	Quadrangle Name	ID
J	15	LURAY	446 SE
E	54	LUTTRELL	155 NW
G	25	LYLES	49 NE
L	33	LYNCHBURG EAST	79 SE
L	32	LYNCHBURG WEST	79 SW
K	27	LYNNVILLE	58 NE
K	35	MANCHESTER	86 NE
E	18	MANLEYVILLE	20 NW
E	17	MANSFIELD	9 NE
E	32	MARTHA	314 NW
H	52	MARYVILLE	147 SW
L	14	MASSEYVILLE	12 ASW
D	53	MAYNARDVILLE	145 SE
F	22	MCEWEN	39 SW
D	20	MCKINNON	29 SW
I	37	MCMINNVILLE	92 NE
K	13	MEDON	439 NE
I	43	MELVINE	110 NE
N	16	MICHIE	13 SW
B	54	MIDDLESBORO SOUTH	153 SW
L	27	MILKY WAY	58 SE
G	34	MILTON	319 NW
M	37	MONTEAGLE	94 NE
E	41	MONTEREY	331 NE
F	41	MONTEREY LAKE	331 SE
B	43	MOODYVILLE	333 SE
J	36	MORRISON	92 SW
E	57	MORRISTOWN	163 NE
K	41	MOUNT AIRY	104 NE
J	25	MOUNT JOY	50 SE
L	15	MT. PETER	12 ASE
J	26	MOUNT PLEASANT	57 SW
M	32	MULBERRY	80 NW
H	32	MURFREESBORO	315 SW
E	30	NASHVILLE EAST	311 NW
E	29	NASHVILLE WEST	308 NE
C	23	NEEDMORE	38 NE
L	22	NEGRO HOLLOW	42 SW
F	55	NEW MARKET, TN	155 SE
E	35	NEW MIDDLETON	318 NE
B	24	NEW PROVIDENCE	301 SW
J	34	NOAH	85 SW
G	30	NOLENSVILLE	70 NW
D	48	NORMA	128 SW
K	33	NORMANDY	79 NE
K	34	NORMANDY LAKE	86 NW
A	24	OAK GROVE	301 NW
F	29	OAK HILL	308 SE
D	41	OKALONA	330 SE
L	19	OLIVEHILL	23 SE

Table 2. Completed geologic coverages in Tennessee, sorted by quadrangle name--Continued

Row	Column	Quadrangle Name	ID
N	43	OOLTEWAH	112 SE
L	23	OVILLA	42 SE
L	39	PALMER	99 SE
G	16	PALMER SHELTER	10 NW
C	24	PALMYRA	302 NW
D	17	PARIS	8 SE
C	19	PARIS LANDING	19 NE
I	18	PARSONS	22 NW
I	44	PENNINE	118 NW
J	19	PERRYVILLE	22 SE
L	30	PETERSBURG	72 SW
A	34	PETROLEUM	316 NW
N	18	PICKWICK	24 SW
J	42	PIKEVILLE	110 SW
E	46	PILOT MOUNTAIN	122 NW
I	20	PINE VIEW	32 NW
N	35	PITCHER RIDGE	87 SE
M	17	PITTSBURG LANDING	13 NE
C	27	PLEASANT VIEW	304 NE
I	22	PLEASANTVILLE	41 NW
J	20	POPE	32 SW
D	19	POPLAR CREEK	19 SE
B	31	PORTLAND	309 SE
D	54	POWDER SPRINGS	154 SW
A	30	PRICES MILL	309 NW
H	26	PRIMM SPRINGS	56 SW
M	27	PULASKI	59 NE
M	15	PURDY	4 NE
C	17	PURYEAR	8 NE
I	29	RALLY HILL	64 NE
H	34	READYVILLE	319 SW
J	17	REAGAN	11 SE
B	37	RED BOILING SPRINGS	320 SE
K	23	RIVERSIDE	42 NE
A	22	ROARING SPRING	300 NW
G	19	ROCKPORT	21 NE
H	31	ROCKVALE	70 SE
H	45	RODDY	117 SE
M	14	ROSE CREEK	4 NW
I	31	ROVER	71 NE
E	23	RUSKIN	39 NE
N	23	ST. JOSEPH	43 SE
I	41	SAMPSON	103 NE
K	26	SANDY HOOK	58 NW
K	17	SARDIS	12 NE
M	18	SAVANNAH	24 NW
J	18	SCOTTS HILL	22 SW
E	28	SCOTTSBORO	308 NW
N	39	SEQUATCHIE	100 SE
G	18	SEVENTEEN CREEK	21 NW

Table 2. Completed geologic coverages in Tennessee, sorted by quadrangle name--Continued

Row	Column	Quadrangle Name	ID
M	36	SEWANEE	94 NW
K	32	SHELBYVILLE	79 NW
E	34	SHOP SPRINGS	318 NW
H	36	SHORT MOUNTAIN	323 SW
L	13	SILERTON	439 SE
F	38	SILVER POINT	326 SW
D	24	SLAYDEN	302 SW
G	38	SLIGO BRIDGE	327 NW
G	37	SMITHVILLE	323 NE
G	31	SMYRNA	70 NE
M	43	SNOW HILL	112 NE
L	42	SODDY	111 SW
N	38	SOUTH PITTSBURG	100 SW
N	4	SOUTHEAST MEMPHIS	409 SW
G	40	SPARTA	332 NW
I	40	SPENCER	103 NW
G	23	SPOT	40 NE
I	45	SPRING CITY	118 NE
H	28	SPRING HILL	63 SW
B	28	SPRINGFIELD NORTH	306 SW
C	28	SPRINGFIELD SOUTH	307 NW
C	20	STANDING ROCK	29 NW
M	16	STANTONVILLE	13 NW
D	21	STEWART	29 SE
H	19	SUGAR TREE	21 SE
K	25	SUMMERTOWN	51 NE
I	24	SUNRISE	50 NW
E	56	TALBOTT	163 NW
M	28	TARPLEY	66 NW
C	55	TAZEWELL	154 NE
K	12	TEAGUE	439 NW
I	46	TEN MILE	124 NW
F	23	TENNESSEE CITY	39 SE
G	24	TEXAS HOLLOW	49 NW
H	27	THETA	56 SE
A	25	TRENTON	301 NE
L	34	TULLAHOMA	86 SW
E	45	TWIN BRIDGES	116 NE
B	38	UNION HILL	324 SW
J	31	UNIONVILLE	71 SE
F	17	VALE	9 SE
H	43	VANDEVER	109 SE
E	24	VANLEER	48 NW
J	29	VERONA	64 SE
F	33	VINE	314 SE
G	32	WALTERHILL	315 NW
J	33	WARTRACE	78 SE
F	34	WATERTOWN	318 SW
F	21	WAVERLY	30 SE
L	21	WAYNESBORO	33 SE

Table 2. Completed geologic coverages in Tennessee, sorted by quadrangle name--Continued

Row	Column	Quadrangle Name	ID
I	33	WEBBS JUNGLE	78 NE
I	39	WELCHLAND	328 NE
D	18	WEST SANDY DIKE	19 SW
B	34	WESTMORELAND	316 SW
M	23	WESTPOINT	43 NE
B	55	WHEELER	153 SE
F	26	WHITE BLUFF	305 SW
D	52	WHITE HOLLOW	145 SW
D	29	WHITES CREEK	307 SE
H	23	WHITFIELD	40 SE
C	38	WHITLEYVILLE	325 NW
M	39	WHITWELL	100 NE
H	53	WILDWOOD	147 SE
C	37	WILLETTE	321 NE
I	26	WILLIAMSPORT	57 NW
D	40	WINDLE	330 SW
M	19	WOLF PIT RIDGE	24 NE
H	35	WOODBURY	319 SE
E	22	WOOLWORTH	39 NW
B	29	YOUNGVILLE	306 SE
H	17	YUMA	10 SE

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