QUATERNARY} PENNSYLVANIAN

DESCRIPTION OF UNITS

	ARTIFICIAL FILM - Mapped in large dams, airports, and trainroads
Qa	ALLUVIUM (QUARTZITE) - Gravel, sand, and clay on flood plains of present-day streams
Qb	TERRACE DEPOSITS (QUARTZITE) - Subaqueous to subaerially deposited, gravel, sand, and silt, forming a veneer, generally about 4 to 10 ft. thick on the surfaces of terraces that stand about 15-20 ft. above the beds of the streams
Qc	SAND AND SAND (QUARTZITE) - Unconsolidated gravel, sand, silt, and clay in abandoned river channel found at elevations well above modern flood plains. Main constituents of the sand and gravel are quartz, quartzite, chert, flint, Jasper, and silted wood. Thickness varies from an estimated maximum of 50 ft. to 10 ft.
Pt	THURMAN FORMATION (PENNSYLVANIA) - Predominantly gray quartzite (10W7T4) to very dark gray (10W8T2) and black (10W9T4) very fine to fine-grained sandstone, mostly thick to medium bedded, with flint to irregular bedded, and in places, large angle cross-bedding; self-sedimentation deposited in place and in some places, possibly also abundant, bedded sandstone fragments of chert and quartz. Above the lower sandstone unit the beds consist of interbedded gray quartzite (10W7T4) shales and fine-grained sandstone (10W8T2) and shales. The beds are 100 to 150 feet thick.

[illegible]

Fav SAVANNA FORMATION (PENNSYLVANIA). Predominantly pale yellowish brown (10YR6/2) olive gray (5YR3/2) to medium dark gray (N4Y4) to moderate reddish brown (10R4/8), fine- to very coarse grained, noncalcareous sandstone units. Some sandstones are massive to bedded, some bedded (5YR4/4) to grayish orange (7YR4) to shales (reddish brown (10R4/8), fine- to very fine grained, noncalcareous sandstone units. Foliation, ripple marks and ripple marks and in places contain abundant small sediment deformation features. (Remarks: trace fossils; brush and prod marks; small-scale ripple marks are locally present in some sandstone units). In many places within the McClester quadrangle, particularly where beds dip steeply or crop out in structurally complex areas, the sandstones and shales of the Savanna Formation are interbedded, and in some areas, the sandstones and shales of the Savanna Formation were probably once in the Savanna, but none was observed in Outcrop. Thickness: 1,000-1,200 ft.

Pm **MAcLESTER FORMATION (PENNSYLVANIAN)** - Predominantly dark gray (N5 to dark N10), blocky shales containing abundant (rustone) concretions. McCurtain Sandstone (Pm1) is the base is -500-600 ft thick. The Warner Sandstone (Pm2) is 100-150 ft thick. The McArthur Shale Member (Pm3) is a resistant, yellowish-brown, fine-grained, cross-bedded sandstone of variable thickness. Where exposed in a small area north and west of Keokuk, it is mapped as Pm1 (i), a thick sandstone unit containing intertonguing shales, a middle shale unit, Pm1wsh(i) and an upper sandstone unit, Pm1u(i). Two named moderate brown (5YR3.4), very fine grained, blocky sandstone units occur in the shale (Pm) above the Warner Sandstone (Pm2). The McAlester sandstone member (Pm3c), and Keokuk Sandstone (Pm3k) are also present. The McAlester coal, about 2-4.0 ft thick, occurs in the shale unit above the McAlester sandstone. It has been grossly very thin in the McAlester area. Thickness: 1,600-1,700 ft.

Ph **HARTSHORNE FORMATION (PENNSYLVANIAN)** - Grayish orange (10YR7/4) to moderate reddish orange (10R6/6) to very light gray (N8), very fine grained, ripple-marked, bioturbated, bedded to massive sandstone interbedded with silty, medium-gray (N5) shale. Contains the Lower and Upper Hartshorne coal beds. The Lower Hartshorne coal ranges in thickness from 0.5 to 6.0 ft. - average thickness is ~4.0 ft.; the Upper Hartshorne coal ranges in thickness from 0.5 to 3.5 ft. - average thickness is ~3 ft. Thickness: approximately 250-300 ft.

Pa **ATOKA FORMATION (PENNSYLVANIAN)** - Predominantly silty, medium dark gray (iv) to black (5Y2/1) noncalcareous shale (Pa) with one discontinuous sandstone unit (Pass) exposed just south of the Penitentiary fault. Only the upper part of the formation is exposed in the quadrangle. Thickness unknown. Subsurface thickness: 5,500-6,000 ft.

SYMBOLS

CONTACT - Dashed where approximately located

COAL BOUNDARY - Approximate outer boundary of coal bed (named on map); queried where probable; triangle indicates exposure of coal

THRUST FAULT - Sawtooth on upper plate; dashed where approximately located, dotted where concealed

FAULT - Arrows show relative horizontal movement; dashed where approximately located, dotted where concealed; queried where probable

FAULT - Dashed where inferred; dotted where concealed; queried where probable; U = upthrown side, D = downthrown side

ANTICLINE - Showing crestline; arrow along axis shows direction of plunge; dashed where approximately located; dotted where concealed

SYNCLINE - Showing troughline; arrow along axis shows direction of plunge; dashed where approximately located; dotted where concealed






ABANDONED STONE QUARRY OF OPEN SHALE PIT

INACCESSIBLE TUNNEL, ADIT, OR SLOPE



SPOIL PILES FROM ABANDONED COAL MINE

SURFACE COAL MINE - Abandoned or area reclaimed

STRIKE AND DIP OF BEDS

-  Strike and dip of beds, upright
-  Undulatory beds, average dip
-  Vertical beds, ball indicates top of beds
-  Horizontal beds
-  Overturned beds

OIL AND GAS WELLS

-  Dry hole, abandoned
-  Gas well

32 Number on map corresponds to list of w

LIST OF WELLS SPUDDED BEFORE JANUARY 1, 1997

MAP NO.	OPERATOR	LEASE	SPUD DATE	TOTAL DEPTH (ft)
1	KWB Oil Property Management Inc.	1 Ross	05/07/80	7313
2	Joe D. Davis	1-18 Steele	09/13/87	3620
3	An-son	1 Lowe	11/26/63	3716
4	Joe D. Davis	2-17 Lowe	07/03/87	3750
5	Joe D. Davis	1-16 Buxbaum	12/01/87	3980
6	Astral Oil Co. Inc.	1-16 Rodd	05/02/67	4055
7	KWB Oil Property Management Inc.	2-16 Rodd	04/02/82	4050
8	Dyco Petroleum	1 Arnot Estate	06/26/75	4190
9	Jack Corman	2 Arnot Estate	03/01/89	4326
10	Dyco Petroleum	1 Lena Stubblefield	09/23/75	4423
11	Samedan Oil	1 Clemens Unit	11/21/67	4400
12	Natoli Petroleum	1-A Clemens	07/07/68	4419
13	Jack Corman	2 Stubblefield	12/21/88	4362
14	Dyco Petroleum	1 Browning	05/23/76	4550
15	Montgomery Exploration	1 Brassfield	06/18/77	4435
16	Hutton Gas	1-19 Crawford	10/31/88	3650
17	Samson Resources Co.	1 Lenora	07/08/87	7754
18	Dyco Petroleum	1 McCullough (work over)	03/04/75	3618
19	Samson Resources Co.	1 McConathy	03/20/88	3900
20	Bell Oil & Gas Company	1 Carney Unit	10/03/64	3710
21	H. Huffman & Co.	1-A Carman	11/18/70	3670
22	Jack Corman	2 Carman	12/15/87	3819
23	Skelly Oil Co.	1 Compelube Unit	10/21/66	3820
24	Texaco Inc.	2 Compelube	10/31/90	3950
25	Snee & Eberly	1 Bane	04/22/67	3995
26	Eberly & Meade, Inc.	2-22 Bane	06/24/87	4128
27	C M Exploration	3-22 Bane	12/06/90	4220
28	Opco Oil & Gas	1 Tribal	12/03/70	4315
29	Apache Corporation	1 Departmental tract 9 unit	08/13/62	4140
30	Bell Oil & Gas Company	1 Patrick Unit	05/23/64	3778
31	Hutton Gas	2-30 Patrick	05/06/89	3801
32	Sunray DX Oil Co.	1 Carman Unit	05/15/66	3678
33	Sun Exploration & Production Co.	2 Carman Unit	04/16/83	0625 junked & abandoned
34	J & T Operating	1 Carman	04/10/91	2243
35	Sun Exploration & Production Co.	3 Carman Unit	04/24/83	3814
36	Sunray DX Oil Co.	1 George Carman Unit	11/25/66	3825
37	Kaiser-Francis Oil	2A George Carman	07/01/91	3763
38	Galaxy Oil	1 Arnote	03/04/69	3850
39	Bell Oil & Gas Co.	1 Sanders Unit	08/28/64	3670
40	Jones & Pellow	1 Bighouse	12/12/74	4434
41	Nadel & Gussman	1 H.D. Parsons	08/08/56	2000
42	?	?	?/7/36	1730
43	Sandra Corp.	1-6 Watkins	12/28/88	1850
44	Sandra Corp.	1 Willy	09/12/88	1421
45	British-American	1 O.F. Mitchell	?	0947
46	Gulf Oil Co.	1-4 Choctaw-State	10/22/81	9235
47	Sandra Corp.	1 Blake Watkins	12/31/87	2752
48	British-American	1 Ben Childers	?	7963
49	Wood Oil Co. (work over)	1 Childers	?	9350
49	Devon Corp.	1-8 Mitchell	06/20/80	9900
49	Sandro (work over)	1 Shelly	04/03/89	PTED 3138
50	Oxley Petroleum Co.	1 Crawley	09/02/92	9691
51	Oxley Petroleum Co.	1 Adams	12/22/92	7100
52	American Land & Trading	1 Watson	10/15/80	2800
53	Apache Corp.	1 Watson Unit	04/16/66	2800
54	Ferguson Oil	1 Lehnhard	11/01/73	8743
55	Apache Corp.	1 Lehnhard	09/14/67	9751
56	Hudson Oil	1 Crawley	06/18/72	9900
57	Texas Oil & Gas (old well drilled deeper)	1 Sherrill "A"	08/17/76	9928
57	Midwest Energy	1 A Sherrill	01/25/91	7800
58	Unit Petroleum Co.	1 Sherrill	12/18/90	4488 junked & abandoned
59	Van-Dorf Exploration	1 Lehnhard	12/27/82	2969
60	Arkoma Basin Exploration	1-20 Peaceable	?	4072
61	?	?	?	1465
62	Quannah Petroleum	1-21 Sherrill Estate	03/08/82	4433
63	Skelly Oil Co.	1 Witt-Stanton	08/23/67	8000
64	Arkoma Basin Exploration	1-22 Stanton	01/05/85	4500
65	Leede Oil & Gas Inc.	1 Stanton	06/01/79	4550
65	Fugo Services (work over)(re-entry)	1-22-A Stanton	?	4560
66	Arkoma Basin Exploration	1-23 Harden	10/17/84	4500
66	Trafalgar House Oil & Gas	1-23-A Harden	12/10/85	4400
67	Steve Gose	1 Shuman	05/31/65	3130
68	Skelly Oil Co.	2 Shuman	07/23/85	4325
69	Monsanto	1 Shuman	06/17/72	9573
70	Oxley Petroleum Co.	1 Stanton	03/08/91	7900