

**KANSAS GEOLOGICAL SURVEY
OPEN-FILE REPORT 48-2**

**GEOLOGIC REPORT ON VINE CREEK DOME,
OTTAWA COUNTY, KANSAS**

By

Anthony Folger

Disclaimer

The Kansas Geological Survey does not guarantee this document to be free from errors or inaccuracies and disclaims any responsibility or liability for interpretations based on data used in the production of this document or decisions based thereon. This report is intended to make results of research available at the earliest possible date, but is not intended to constitute final or formal publications.

Kansas Geological Survey
1930 Constant Avenue
University of Kansas
Lawrence, KS 66047-3726

KGS
OF
48-2

ANTHONY FOLGER
CONSULTING GEOLOGIST
238 NORTH RIDGEWOOD DRIVE
WICHITA 6, KANSAS

Iowa City, Iowa
June 5, 1948

Mr. William Lorenzen
Box 1144
Salina, Kansas

Dear Sir:

On October 26, 1947 following a conference with you in Wichita, Kansas, I was retained to investigate the potential value of a block of acreage already partially assembled in T.10S; R.1W. Ottawa County, Kansas, with the thought in mind that if suitable surface and subsurface conditions prevailed a test well would be drilled by you on that block to Arbuckle dolomite. The following day was spent in checking the regional and local subsurface structure of the area and inquiry was made into nearby dry holes. These factors being found favorable it was decided to proceed with the investigation. Accordingly on October 28 I accompanied you to Bennington where we were joined by my associate who was to map the surface structure. Together the three of us spent the day in a study of the surface outcrops exposed on and adjacent to your block.

Surface mapping was begun November 5 and proceeded for 16 days. Following this a preliminary contour map was prepared by me in Midland, Texas, after which 6 additional days were spent during December in a further surface examination. Early in January 1948 a final contour map was prepared, sent to my associate for checking, and returned for drafting into final form. Copies of the completed map were forwarded you January 11, together with a block map recommending the assembly of a block of some 13,000 acres, and a letter of recommendation which set forth that an Arbuckle test well should be drilled at any one of the four locations offsetting the center of S.27; T.10S; R.1W. Subsequent to this, and for reasons over which I had no control and which have been explained to you confidentially, it has been impossible to prepare the final report until this date. At your request however a 3 page statement relative to your block was forwarded May 26 so that it could be presented in Topeka on June 2 at a hearing concerning your Application By Qualification for a permit to drill a test well.

Surface Stratigraphy

The surface rocks exposed in southeastern Ottawa and portions of adjacent counties are of Cretaceous and Permian age. The majority of exposures belong to the Terra Cotta member of the Dakota formation and to the Kiowa shale, both of Cretaceous age. At some few places the uppermost portion of Wellington shales and limes of Permian age are exposed. Some 200 feet of exposed beds were used in mapping. These are described and presented graphically in the Columnar Section of Exposed Rocks on the contour map appended to this report. Marker beds used in mapping are marked "M". Exposed rocks are mostly quartzitic sandstone and clays. Datum horizon used for contouring was the Dakota sand-Kiowa shale contact. Elevations were procured by altimeter.

Surface Structure

The surface mapping of your block demonstrates the presence of a major northeast-southwest anticlinal axis, crossed by a transverse fold, resulting in some 50 feet of surface closure which will be termed the Vine Creek Dome. This anticline has been mapped for some 25 miles extending from T.8S; R.1E. southwestward to T.12S; R.2W. The area of closure of the Vine Creek Dome is some 8 miles north and south, and varies from 2 to 4 miles in width. The apex of the dome is at the center of S.27; T.10S; R.1W. It is the first anticlinal axis west of the well known Lindsborg anticline on which oil production has been developed in the Salina pool some 20 miles to the south and in the Lindsborg pool some 35 miles to the south. The Vine Creek Dome is one of the most prominent surface structures in this portion of the Salina basin.

Seismic Survey

Some years ago Carter Oil Company made a seismic survey of this area. Subsequent to these geophysical operations they took a block of acreage including all or parts of Sections 21, 22, 23, 24, 26, 27, 28, 29, 32, 33, 34, and 35; T.10S; R.1W. The pertinent details of their seismic picture reflects a prominent closure with a broad and flat apical area having its apex at about the center of the north half of S.27; T.10S; R.1W. Most importantly the seismic picture reflects a valid subsurface closure whose size and shape approximates the size and shape of the surface closure. Thus it demonstrates that surface closure is present at depth, and that more closure is present on top of the Arbuckle dolomite than exists at the surface. The Vine Creek Dome is thus a valid surface and subsurface closure and is well worthy of a deep test. A test well was never drilled on this block by Carter, and presumably for general policy reasons they released the block.

Shallow Test On Vine Creek Dome

Subsequent to the releasement of the Carter block, acreage was re-assembled by a Mr. Emrich of Wichita and a cable tool derrick built at the southwest corner of S.23; T.10S; R.1W. The test was spudded and drilled to a depth of 65 feet in order to hold the leases. For some reason this test was never drilled deeper, and the location was abandoned November 29, 1944.

Deep Test On Vine Creek Anticline

The only deep test which has been drilled on the Vine Creek anticline, within the immediate area of your block, is at the southwest corner of S.15; T.11S; R.1W. Here a test was drilled by Phillips and completed in April 1944 to a depth of 3630 feet in Arbuckle dolomite. This Phillips location is some 5 miles south of the apex of the Vine Creek Dome. It is outside of the area of immediate closure, and is some 50 feet structurally down-dip on a Dakota-Kiowa surface datum. No showings of oil or gas were found in this test, and it does not constitute a valid test of Vine Creek Dome.

Dry Holes Some Distance From Vine Creek Dome

Five Arbuckle tests and one pre-Cambrian test have been drilled in townships adjacent to the Vine Creek Dome. Their locations and pertinent structural details are indicated on the block map attached to this report. None of them condemn the untested Vine Creek Dome. But it is significant that a test drilled by Phillips in October 1944 at the northeast corner of S.28; T.9W; R.1W. (see block map) did show oil saturation in Simpson sand from 3510-3520 feet. This location is about 6 miles north of the apex of Vine Creek Dome and is almost 100 feet structurally lower on a Dakota-Kiowa surface datum.

Potential Oil Pay Zones

The Vine Creek Dome is underlain by at least six potential oil pay zones. In descending order these are Lansing-Kansas City, Mississippi lime, Hunton dolomite, Viola dolomite, Simpson sand and Arbuckle dolomite. The depths to these respective six zones have been set forth by Huntsman Haworth on page 2 of his letter to you dated April 3, 1948, and are for all practical purposes the same estimated depths as made previously by me. The top of the Arbuckle dolomite should be found between 3580 and 3600 feet, and it is recommended that a 4000-foot contract be let. The test well should be drilled into Arbuckle dolomite until fluid of some kind is encountered.

Recommendation For Deep Test

Despite the fact that oil or gas have not been developed to date this far north in the Salina basin (with the exception of the small amount of Mississippian lime oil encountered at Wakefield years ago) it is nonetheless true that many of the Arbuckle tests drilled to date in this portion of the Salina basin have not been situated on the apices of good surface closures. The Vine Creek closure is one of the largest and most prominent of the surface closures in this part of the Salina basin and is by all means worthy of a test well drilled deep enough to penetrate fluid in Arbuckle dolomite. Furthermore a location drilled at the apex of the Vine Creek Dome in Section 27 is rendered the more attractive by the fact that it is located in the northeastern portion of the Salina basin. This is the part of the basin in which oil or gas would be anticipated because of the regional southwestward tilt which was given to this entire area in post-Permian time.

Because of the prominent and strong surface closure developed in Township 10S., R.1W., because of the fact that seismic operations carried on by Carter Oil Company demonstrates that the surface and subsurface apex of this dome fall at almost exactly the same position, because the Vine Creek Dome is untested by any deep well and is virgin territory for oil and gas exploration, and finally because the Vine Creek Dome is situated in that part of the Salina basin which is considered most favorable for oil and gas accumulation, I strongly recommend that a test well be drilled at any one of the four locations offsetting the center of S.27; T.10S; R.1W., and that this well be drilled deeply enough to penetrate fluid horizons in the upper portion of the Arbuckle dolomite.

Recommendation For the Assembly Of Acreage

Attached to this report is a block map on which has been outlined in YELLOW the area recommended for leasing in T.10 and 11S; R.1W. Within the limits of this block are some 13,000 acres. It is not manifest that this acreage be leased solidly. But it is important for your own protection that acreage in and adjacent to Section 27 be blocked solidly if possible. The limits of the block have been so drawn that it will not be necessary to lease outside of the area of the block even for safety sake.

Conclusion

The surface mapping which has been accomplished at your request

adequately controls the size and shape of the Vine Creek Dome, and adequately establishes the location of its apex. Accordingly no supplemental core drilling is necessary. Since the geophysical picture of Carter Oil Company establishes the presence of an Arbuckle closure with depth and demonstrates the conformity of surface and subsurface apices, it follows that a test drilled on the apex of the surface closure in Section 27 to Arbuckle dolomite will test adequately all subjacent oil pay zones.

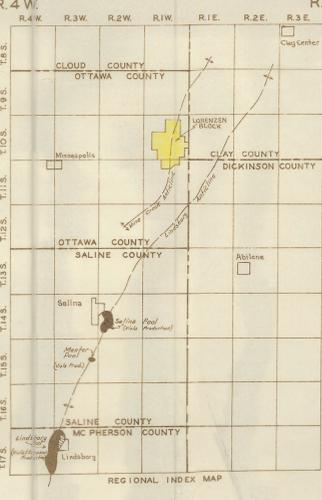
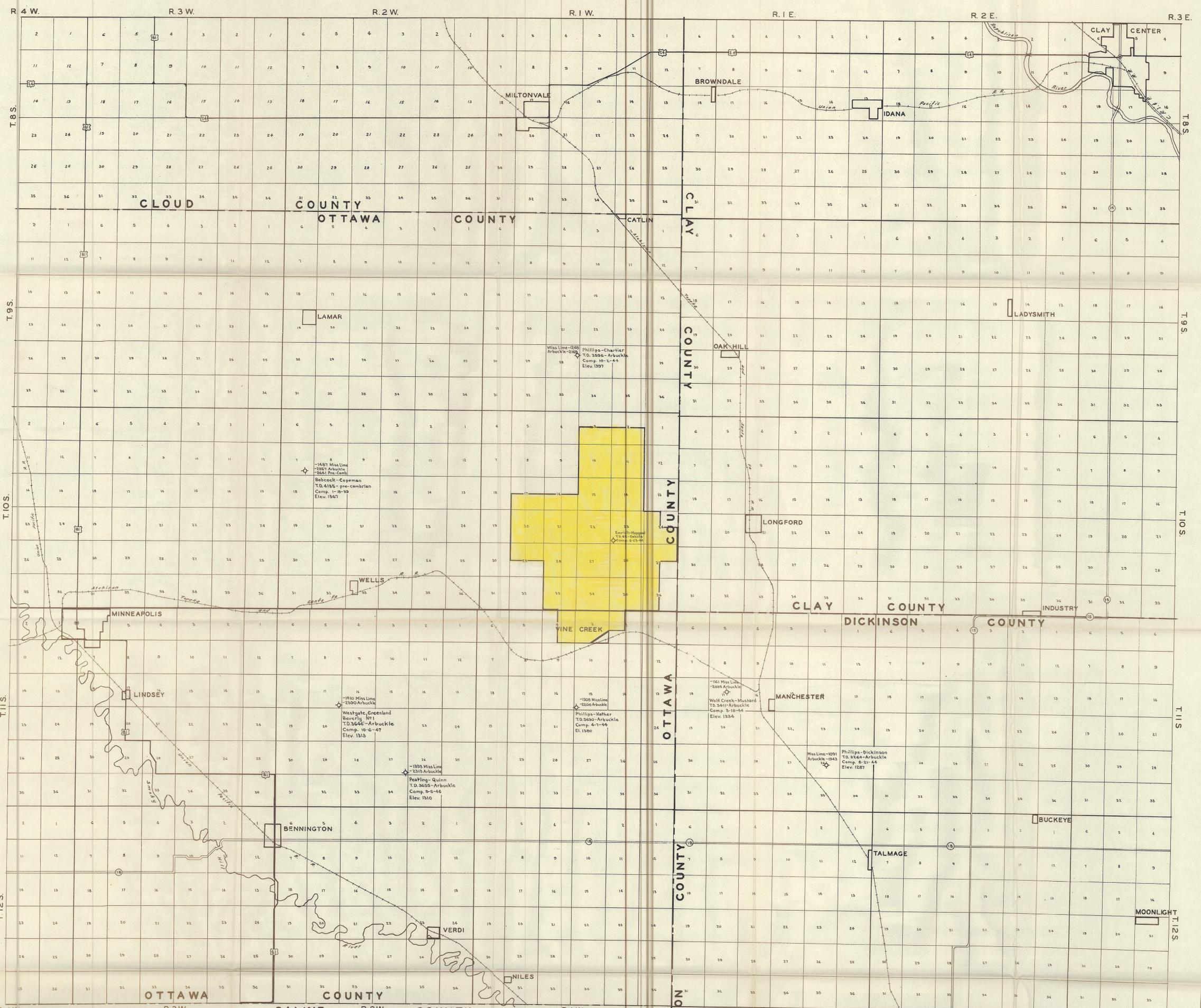
While there is no guarantee that any wildcat test will produce oil or gas if drilled, I feel strongly that the proposed location in S.27; T.10S; R.1W., is one of the most favorable which remain to be drilled in this portion of the Salina basin. As a wildcat prospect it has many things in its favor, and I recommend without qualification that it be drilled.

Very truly yours,

Anthony Folger

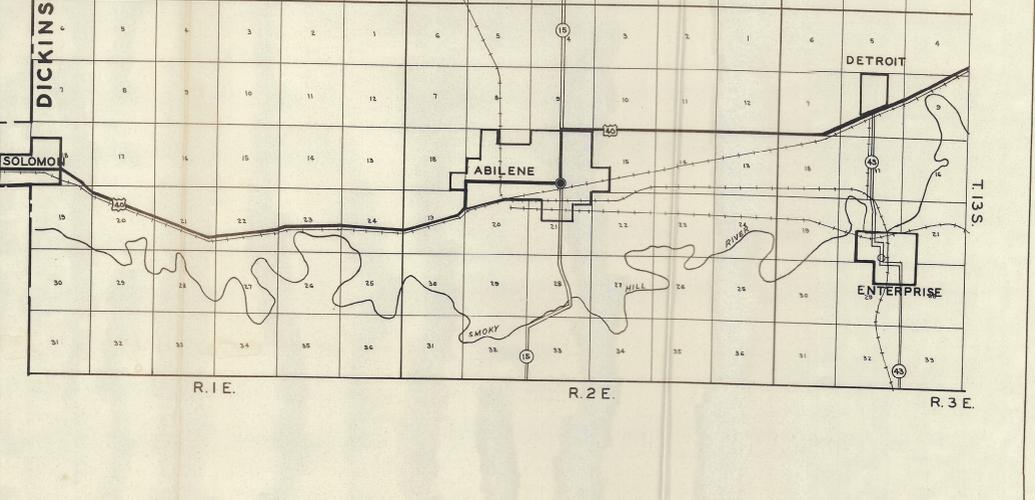
Anthony Folger

AF:AEH



RECOMMENDED AREA
WITH
DATA ON SURROUNDING ARBUCKLE TESTS
ANTHONY FOLGER JANUARY 1948

■ LORENZEN BLOCK
-1393=DEPTH BELOW SEA LEVEL TO TOP MISS LIME
-2313=DEPTH BELOW SEA LEVEL TO TOP ARBUCKLE DOLOMITE

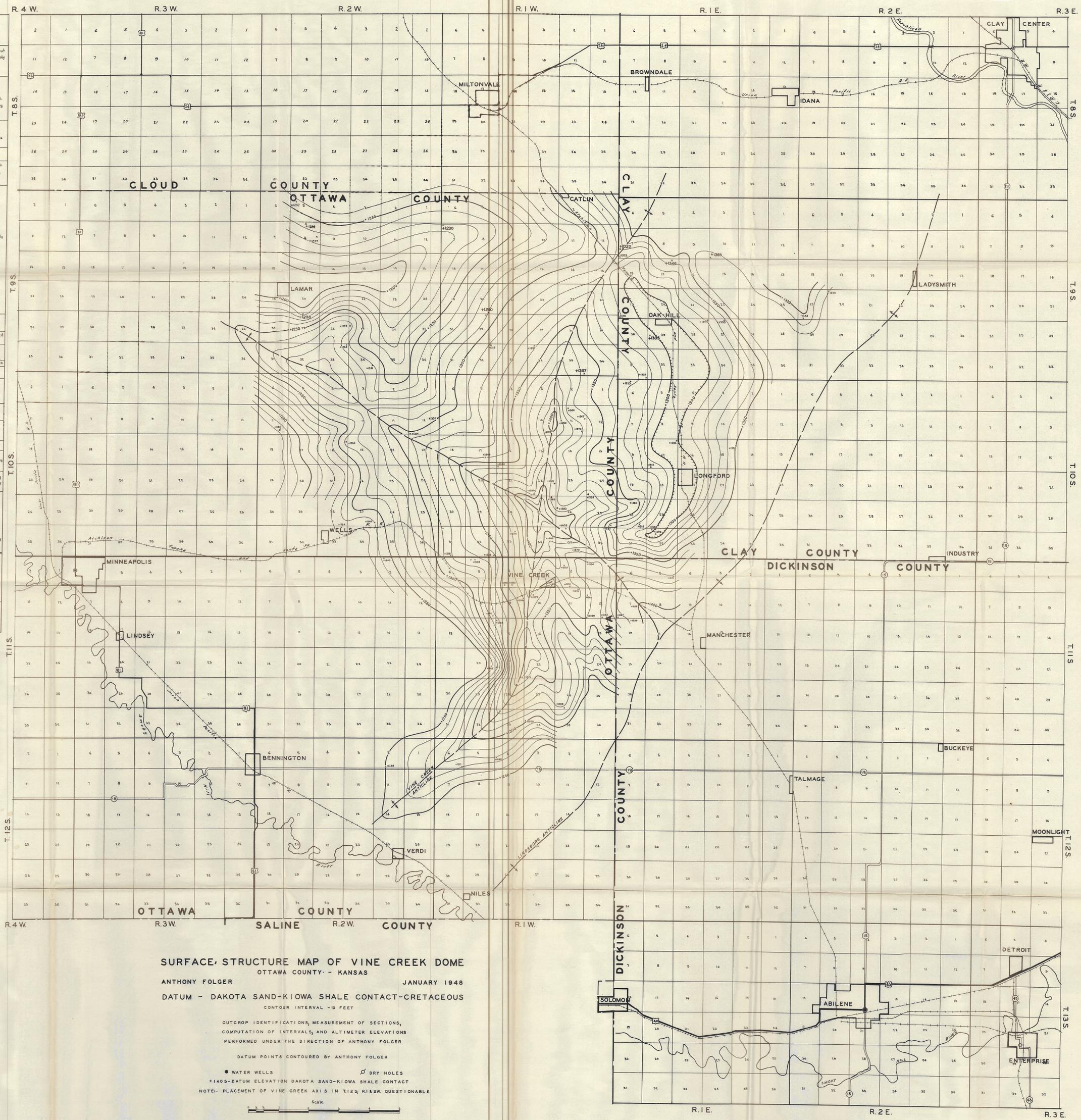


COLUMNAR SECTION OF EXPOSED ROCKS

SYSTEM	FORMATION	MEMBER	LITHOLOGY	THICKNESS	DESCRIPTION
CRETACEOUS	DAKOTA FORMATION - (TERRA-COTTA MEMBER)	M	[Symbol]	10'	Sandstone, ferruginous & quartzite-like, but not concretions. Reliable as a marker only when lower beds are exposed.
				20'	Clay, silty, light gray. Mottled with yellow and red. Commonly contains discontinuous beds of light gray to buff fine sandstone or silt. This interval is usually poorly exposed. Internal occasionally composed entirely of sandstone.
				10'	Sandstone, commonly quartzite, concretionary and calcareous. May be gray, pink or brown. If not concretionary, the sandstone is ferruginous, fibular and extremely hard. This interval may be entirely a quartzite.
				10'	Sandstone, commonly quartzite, concretionary, but not calcareous. More likely to be highly ferruginous with plastic appearance due to weathering out of "pebbles" of clay. May contain several feet of buff sandstone.
				50'	Clay, silty, light gray. May be mottled with yellow and red. Commonly contains irregularly distributed friable sandstone or silt. In places, particularly west of Tracy, Pa., this interval appears to be largely a buff sandstone with thin beds of light-colored silty clay. This interval is usually poorly exposed.
				10'	Quartzite at top underlain by gray to yellow silty clay may vary to a slightly silty clay mottled with gray and red.
				10'	Sandstone, fine grained, grading to thin-bedded light gray, buff or yellow silt.
				10'	Quartzite, gray, concretionary, calcareous and finely siliceous. When not present grades from a silt to a gray to buff fine sandstone. Clay, light gray, containing hematite limonite.
				30'	Sandstone, gray, with silty brown and red mottled clay in places colored yellow.
				10'	Clay, plastic to silty, light gray with some yellow. Locally contains irregular joints filled with limonite.
PERMIAN	KIOWA SHALE FORMATION	M	[Symbol]	25'	Clay, plastic to silty, light gray with some yellow. Locally contains irregular joints filled with limonite.
				4'	Clay, plastic to silty. Color almost black. Locally lignitic and gypsiferous.
				60'	Clay, fairly plastic to silty, gray & yellow. May contain calcite.
				10'	Quartzite, locally present.
				10'	Silt, to silty clay, gray to yellow. Grades locally to buff, fine-grained sandstone. May weather out with thin flakes of resistant silt.
				10'	Quartzite, gray, concretionary, calcareous and finely siliceous. May be hematitic. Generally underlain with concretionary limestone.
				25'	Shale, gray to dark gray, fissile, containing gypsum crystals and bands of ironstone concretions.
				4'	Grades internally to silt or silty clay commonly bedded characteristically with fairly large areas of hematitic red or to light colored fine-grained and even bedded argillaceous sandstone.
				60'	Lower part of interval is usually dark fissile shale unless replaced locally by sand.
				10'	Shale and limestone.

COLUMNAR SECTION OF UNEXPOSED ROCKS

SYSTEM	STRATIGRAPHIC UNITS
PERMIAN	WELLINGTON
	CHASE
	COUNCIL GROVE
	ADMIRE
	WABAUNSEE
PENNSYLVANIAN	SHAWNEE
	DOUGLAS
	PEDEE
	LANSING
	KANSAS CITY
MISSISSIPPIAN	BRONSON
	MARMATON
	CHEROKEE
	MISSISSIPPI LIME
	KINDERHOOK SHALE
DEVONIAN AND SILURIAN	HUNTON (DOLOMITE & LIME)
	MAQUOKETA (SHALE & DOLOMITE)
ORDOVICIAN	VIOLA (DOLOMITE LIME & CHERT)
	SIMPSON (SAND & GREEN SHALE)
	ARBUCKLE DOLOMITE
CAMBRO-ORDOVICIAN	ARBUCKLE DOLOMITE
PRE-CAMBRIAN	



SURFACE STRUCTURE MAP OF VINE CREEK DOME
OTTAWA COUNTY - KANSAS

ANTHONY FOLGER
JANUARY 1948
DATUM - DAKOTA SAND-KIOWA SHALE CONTACT-CRETACEOUS
CONTOUR INTERVAL - 10 FEET

OUTCROP IDENTIFICATIONS, MEASUREMENT OF SECTIONS,
COMPUTATION OF INTERVALS, AND ALTIMETER ELEVATIONS
PERFORMED UNDER THE DIRECTION OF ANTHONY FOLGER
DATUM POINTS CONTOURED BY ANTHONY FOLGER
● WATER WELLS ∅ DRY HOLES
+1405-DATUM ELEVATION DAKOTA SAND-KIOWA SHALE CONTACT
NOTE: PLACEMENT OF VINE CREEK AXIS IN T.12 S, R.1 & 2 W. QUESTIONABLE

