GEOLOGY OF WESTERN PAYNE COUNTY, OKLAHOMA

Ву

ARTHUR JOHN GARDEN

Bachelor of Science

Oklahoma State University

Stillwater, Oklahoma

1971

Submitted to the Faculty of the Graduate College of the Oklahoma State University in partial fulfillment of the requirements for the Degree of MASTER OF SCIENCE May, 1973

OCT \$ 1973

GEOLOGY OF WESTERN PAYNE COUNTY, OKLAHOMA

Thesis Approved:

John M. Helton
Thesis Adviser

John D. Maff

Celey R. Ross

Dean of the Graduate College

PREFACE

This thesis is a geologic study of the surface rocks of western Payne County, Oklahoma. Included is a geologic map of the study area and a summary of the general geologic features, including paleocurrent trends, depositional environments, and measured sections of the Permian rocks that crop out in the area. Also, presented is a shallow subsurface structural contour map, correlation section of stratigraphic units, and reconnaissance map of the depth to the salt water-fresh water contact.

The writer is grateful to individuals and companies who assisted in this study. Dr. John W. Shelton suggested and supervised the investigation. Dr. John D. Naff and Dr. Alex R. Ross served on the author's committee and made helpful suggestions, comments, and criticisms of this study. Dr. Tommy B. Thompson and Dr. Zuhair Al-Shaieb helped in petrographic study, and Dr. John E. Stone assisted with physiography and soils. Dr. Charles J. Mankin, Director of the Oklahoma Geological Survey, provided financial support for field investigation, aerial photographs, and a base map. Plane-table geologic maps were provided by Mr. G. E. McKinley and A. D. Buzzalini with the Skelly Oil Company, Mr. Fred Oglesby and R. Strom with Cities Service Oil Company, and Mr. J. G. Ruby and M. H. Udden with Sun Oil Company. The subsurface data was made available by Mr. Jack Berry of Thomas N. Berry and Company and the Oklahoma City Geologic Society Well Log Library. The author owes a special thanks to John S. Ross who offered many helpful suggestions.

Appreciation is expressed to Darrel Haston for drafting and to Mrs. Frank Roberts for final typing of the manuscript. A grateful thanks goes to both my parents and my wife, Jeannette, whose financial help, constant understanding, sacrifices, and encouragement enabled the completion of this study. Also, the suggestions, criticisms, and humor of my fellow graduate students enlightened and stimulated the author during this study.

TABLE OF CONTENTS

Chapte	er	Page
Į.	ABSTRACT	1
II.	INTRODUCTION	3
	Objectives and Methods	3 5
III.	PHYSIOGRAPHY AND SOILS	7
IV,	STRATIGRAPHY	10
	Permian System	10
	Wolfcampian Series	10
	Herington Limestone	10
	Leonardian Series	11
	Wellington Formation	11
	Lower Unit and Lower Key Bed Middle Unit	12 13 15
	Quaternary	17
	Terrace Deposits	17 19
V.	STRUCTURE	21
VI.	PETROLOGY	24
	Sandstones	24
	Structures	24 28
	Carbonates	35
	Depositional Framework of Surface Rocks	39

Cnapter	: Pa	age
VII.	ECONOMIC GEOLOGY	41
	Petroleum	41
	Construction Materials	41
	Ground Water	42
	Engineering Properties of Soils	43
	Kirkland-Zaneis Association	45
	Vernon-Lucien Association	45
	Doughtery-Teller-Vanoss Association	45
	Yahola-Port Association	46
VIII.	SUMMARY	47
SELECTE	D BIBLIOGRAPHY	49
APPEND]	X - MEASURED STRATIGRAPHIC SECTIONS	52

LIST OF TABLES

Tab	le								Page
	I,	Highway	Engineeri	ng Char	acterist	ics of	Soil S	Series	 . 44
	9.								

LIST OF FIGURES

Figu	re	Page
1.	Location map	. 4
2,	Geologic map of western Payne County In I	Pocket
3.	Correlation section of stratigraphic units that crop out in Payne County	Pocket
4.	Sandstone Pw-460 showing multilateral development	14
5.	Sandstones Pw-240 through Pw-300 as a continuous exposure .	. 16
6.	Large-scale cross-bedding in sandstone Pw-660	. 18
7.	Exposure of terrace sand	, 20
8.	Strike frequency diagram of joints	. 23
9,	Medium-scale cross-bedding and horizontal bedding in sand- stone Pw-580	. 25
10,	Contact between mudrock and sandstone Pw-200	. 27
11.	Paleocurrent diagram of sandstones of the lower unit, Wellington Formation	, 29
12.	Paleocurrent diagram of sandstones of the middle unit, Wellington Formation	. 30
13.	Paleocurrent diagram of sandstones of the upper unit, Wellington Formation	. 31
14.	Composite paleocurrent diagram of Wellington sandstones	. 32
15,	Carbonate, clay-pebble conglomerate in upper unit of Wellington Formation	. 33
16.	Clay-pebble conglomerate in upper unit of Wellington Formation	. 34
17.	Photomicrograph of Pw-200	. 36
1Ω	Photomicrograph of Pu-600	37

rigu:	re .	Page
19,	Nodular dolomite bed in upper unit of Wellington Formation	. 38
20.	Photomicrograph of nodular dolomite	. 40
21.	Depth of base of fresh water map in western Payne County	?ocket

CHAPTER I

ABSTRACT

The study area in western Payne County, Oklahoma, is in the Central Redbed Plains and is almost entirely within the Cimarron River drainage basin. Only the extreme northern part lies in the Arkansas River drainage basin. Maximum elevation is 1175 ft in the west, and minimum elevation is 825 ft in the southeast; local relief commonly is about 100 ft, Major soil associations include the Kirkland-Zaneis, Vernon-Lucien, Dougherty-Teller-Vanoss, and Yahola-Port.

The surface rocks are Early Permian (Leonardian) in age; all units become progressively younger westward. The stratigraphic section is composed of units assigned to the Wellington Formation. The section is characterized by red beds in a repetitious sequence of shale, lenticular sandstone, and nodular dolomite. The sandstones are fine- to very fine-grained, feldspar-rich subarkose to quartz-rich subarkose, with an overall paleocurrent trend of N35°W. The sandstones exist as single genetic units, up to 25 ft thick, multistoried complexes, as much as 80 ft thick, and widespread multilateral units. The sandstones characteristically have undulatory erosional bases, although some have gradational bases. The amount of sandstone increases southward at the expense of mudrock and nodular dolomite. In general, sand deposition during arid climatic conditions was in a tide-dominated deltaic environment. The area lies southeast and south of prominent mudrock with thin

well-defined carbonate beds representative of tidal-flat conditions.

The area is characterized by gentle westerly homoclinal dip, generally 40 to 60 ft/mi. Local structural noses, averaging 1 sq mi in areal extent, are present in the subsurface as larger complexes, which increase in size and intensity with depth. Two sets of vertical joints, with mean trends of N55°E and N45°W, are similar to those of central Payne County.

Petroleum is the major mineral resource, with cumulative production of some 45 million bbl and 183 million cu ft of gas primarily from Pennsylvanian and Ordovician sandstones. Other resources include sandstone for local road subbase material; nodular dolomite for local county road material; sand for fill, asphalt, masonry purposes, and concrete; and clay for brick. Potable ground water is best developed in irregularly distributed sandstones and in terrace and floodplain sands of the Cimarron River. The distribution of the fresh ground water reflects local sandstone development, topography, and saline influent from Cimarron River.

CHAPTER II

INTRODUCTION

Payne County is located in north-central Oklahoma, west of Tulsa and north-northeast of Oklahoma City. The study area consists of about 350 sq mi in western Payne County and includes all or parts of Ts 17, 18, 19, 20N; Rs 2E, 1E, and 1W (Fig. 1). The county seat and largest city is Stillwater, located on the eastern edge of the study area. The city of Perkins is along the Cimarron River in the southeast corner of the area. Interstate 35 in the west and U, S. 177 in the east are north-south highways in the study area. State Highways 51 and 33 extend east-west across the area, and Highway 86 extends northward from 51 in the northwestern part of the county. County roads are generally well kept with periodic grading and a surface of crushed rock. The only rail service in the area is to Stillwater from the northeast by the Atcheson, Topeka, and Santa Fe Railroad.

Objectives and Methods

The main objectives of this study are to prepare a geologic map of western Payne County and to describe the general geologic features of the area. Secondary objectives include determination of general depositional environments and paleocurrents.

Preparation of the geologic map (Fig. 2), included use of the following data: (1) local, unpublished, detailed maps of petroleum

^

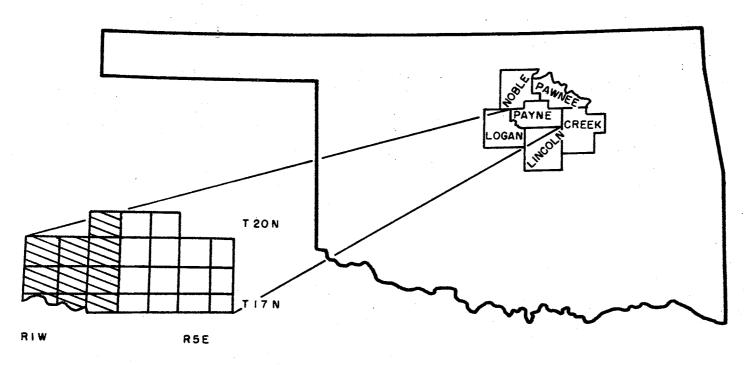


Fig. 1.-Location map of study area.

geologists, including maps by Ellison, Hudson, Rixleben, Peabody, Castile, and Schmurr; (2) unpublished geologic map of Payne County by P. P. Chandler; (3) county soil report and map by Cobb and Hawker (1918); (4) Oklahoma soil report and map by Gray and Galloway (1959); (5) soil report and map by Hayes et al. (1967); (6) unpublished geomorphologic map of Stillwater Creek by Voss, White, and Wafaie; (7) aerial photographs; (8) U. S. Geological Survey topographic maps; and (9) electric logs of wells drilled for oil and gas. Because lateral persistence of units is uncommon in the area, methods had to be improvised for mapping. Shallow subsurface structural contour maps for western Payne County (Fig. 2) were prepared of carbonate units cropping out in eastern Payne County, and a stratigraphic correlation section (Fig. 3) was compiled of the surface formations from electric log data. The stratigraphic position of each bed on the surface was then estimated by comparing the elevation of each bed with that of the key bed in each well and on the structural contour maps. Further control was obtained from the unpublished maps, which were used as a supplement to the surface data plotted on aerial photographs and topographic maps.

Measured sections were prepared on forms prepared by Shelton (1963) as graphic records of some of the surface units for sedimentologic and stratigraphic study. From rose diagrams paleocurrent directions and trends were estimated for each sandstone studied, for 3 unnamed units of the Wellington Formation, and the entire formation.

Previous Investigations

Although many independent studies by petroleum geologists of surface and subsurface geology of western Payne County have been conducted,

none of these has been published. Most of the work was conducted during the 1920's and 1930's when exploration work for structural traps did not generally include seismic techniques. Maps which were made available to the writer through John Ross were contributed by various companies. These maps include those prepared by C. W. Ellison (1951; courtesy of William A. Jenkins), H. K. Hudson (courtesy of Cities Service Oil Company), Rixleben (1930; courtesy of Skelly Oil Company), and H. W. Peabody, Castile, and C. Schmurr (1922-1932; courtesy of Sun Oil Company). Philip P. Chandler prepared a geologic map of Payne County during the early 1960's. A short report of the surface, subsurface, and petroleum geology of Payne County was assembled by Koschmann (1930). Hayes et al. (1967) constructed a general map of Payne County showing the geologic units with engineering significance. A soil report and map of Payne County were prepared by Cobb, Hawker, and Bennett (1918). Brief reports of some of the geologic materials of Payne County which might be utilized in construction were made by Gould (1911, 1927) and Snider (1911). Gould (1905) also noted the ground water features of Payne County.

CHAPTER III

PHYSIOGRAPHY AND SOILS

Physiographically western Payne County lies in the Central Redbed Plains just west of the Northern Limestone Cuesta Plains (Curtis and Ham, 1957). The area has the typical Redbed Plains characteristics; i.e., rolling plains with broad valleys and hills formed by nonresistant, red shales and lenticular sandstones, respectively. Several cuesta-like ridges formed by sandstone show some continuity. For example, a sandstone in the upper part of the Wellington (Pw-620) forms a ridge which is 7 mi in length in the northwestern part of Payne County, extending from highway 86 to I-35 (Fig. 2).

Drainage anomalies at the Ramsey oil field, Stillwater Airport oil field, and Lost Creek oil field are slight. However, they reflect the effects of local structure on topography. All these fields show structural nosing at the Lower Permian Fort Riley and Red Eagle Limestone horizons, as well as the Pennsylvanian Oswego Limestone.

The overall slope of western Payne County is to the south and southeast. Surface elevation is approximately 1130 ft immediately south of Long Branch Creek in the north. In western and west-central parts of the area the elevation is as much as 1175 ft. The lowest elevation in the area is 827 ft along the Cimarron River just south of Perkins.

Local relief commonly approaches 100 ft; in some cases it ranges upward to as much as 150 ft.

The bulk of western Payne County lies within the Cimarron River drainage basin; a small area in the extreme northern part of the area is drained by Long Branch Creek of the Arkansas River basin. The major tributaries of the Cimarron River, all of which are intermittent streams, are Stillwater Creek in the north, Lost Creek in the southeast, Wild Horse Creek in the south, and Clear Creek in the west. Cimarron River exhibits characteristics of both a braided and a meandering stream.

Western Payne County has a mild climate with an annual mean temperature of 59°F; seasonal means range from 79°F in the summer to 38°F in the winter. The average yearly rainfall is 34 inches.

The soils of the study area consist of four main types: the Kirkland-Zaneis association, Vernon-Lucien association, Doughtery-Teller-Vanoss association, and Yahola-Port association. The geology of the area exerts a strong influence on the type soil developed. The Kirkland-Zaneis association is a very well developed brown soil that forms on Permian red beds where the Redbed Plains type of topography is present. The parent material of the Kirkland series is claystone, and that of the Zaneis series is sandstone. The Vernon-Lucien association is a poorly developed red soil that also forms on Permian red beds. parent material of the Vernon series is claystone and that of the Lucien series is sandstone. The Doughtery-Teller-Vanoss association is the dominant soil of the terrace and associated eolian deposits. They are generally present in the southern part of the study area along the Cimarron River. The Yahola-Port association is the major soil that . forms on the floodplain sediments of the Cimarron River and major creeks of the area. The Yahola series characterizes the Cimarron River

floodplain soils, and the Port series dominates the soils of the major creeks (Cobb and Hawker, 1918; Gray and Galloway, 1959; Ross, 1972). In a number of upland areas, scarplets, generally 1 to 3 ft high, occur along stream gullies, creeks, and terraces on silt or silty loam soils. They are thought to be related to a veneer of loess on upland areas (Ross, 1972).

CHAPTER IV

STRATIGRAPHY

The surface rocks of the study area are of Early Permian age. The stratigraphic section, which is included in the Wellington Formation of the Sumner Group, Leonardian Series, is approximately 800 ft thick. It extends upward from the top of the Herington Limestone at the base of the Wellington Formation. The surface exposure of successively younger beds in a westerly direction is due to the gentle westward structural dip in that direction.

During Early Permian the area was part of the Oklahoma platform, which as a slowly subsiding feature was the site for deposition of lenticular sandstones, red mudrock, and very thin discontinuous carbonates.

Permian System

Wolfcampian Series

Herington Limestone. The Herington Limestone is the uppermost unit of the Chase Group and of the Wolfcampian Series. In Noble County, the Herington grades southward from a fossiliferous grainstone-packstone, less than 8 ft thick, to a thin sequence of red, nodular, dolomitic limestone and interbedded sandstone (Shelton, 1973). In Payne County, the Herington Limestone is essentially identical to the red, nodular, dolomitic limestone and interbedded sandstone of southern Noble County.

It occurs in lenses, less than 1 ft thick, which can be traced southward to the Lincoln-Payne County line only by extrapolating stratigraphic thicknesses at points of subsurface control and mapping overlying sandstones (Fig. 2). In the northern part of the county, the nodules which are pink and finely crystalline, are associated with a thin, lenticular sandstone. This very fine-grained sandstone is less than 5 ft thick and exhibits initial dip (Ross, 1972). South of Stillwater Creek the nodules are red, sandy, and interlaced with calcite or dolomite veinlets.

Leonardian Series

<u>Wellington Formation</u>. The Wellington Formation is the lowest unit of the Sumner Group and of the Leonardian Series. In Noble County, the Wellington is a sequence of red shale or claystone, lenticular sandstones, gray-green shale and thin dolomite beds. Aside from the red color the most dominant characteristic of the Wellington in Noble County is its facies change whereby the lenticular sandstones are developed southward at the expense of red mudrock and thin dolomite units (Shelton, 1973). The formation in western Payne County is not only lithologically similar to the Wellington of Noble County but it also is characterized by better sandstone development southward.

The Wellington was subdivided by Patterson (1933) into a lower member, the Fallis, dominated by sandstone, and an upper member, the Iconium, dominated by shale. This subdivision is difficult to follow in the study area because of the continuing southward increase of sandstone through Noble and Payne Counties. In Noble County, Shelton (1973) subdivided the Wellington into 4 unnamed units using three key beds. In Payne County, the Wellington is subdivided into 3 unnamed units using

two relatively prominent sandstone sequences as key beds. The key sandstones, 200 and 600 ft above the base of the Wellington and designated Pw-200 and Pw-600, respectively, separate the formation into lower, middle, and upper units. Each bed mapped is designated by a symbol which consists of the formational abbreviation and the footage above the base of the formation.

Lower unit and lower key bed. The lower unit of the Wellington Formation, some 200 ft thick, is characterized by red mudrock, discontinuous lenticular sandstones and thin, discontinuous carbonate beds. The interval between the Herington Limestone and Pw-200 has no sandstone which is continuous throughout the area, but several units are locally developed. Sandstone Pw-40 is relatively continuous in the north but discontinuous in the south, and Pw-80, Pw-100, and Pw-160 are quite restricted and/or discontinuous in development. Pw-120 and Pw-180 are sandstone sequences mappable only in the north, whereas Pw-20 and Pw-60 are developed only in the south. Several of these sandstone sequences are multistoried and multilateral complexes which range up to 50 ft thick and a mi or more in outcrop length (Section 2, p. 54). Pw-140 is associated with a carbonate which is a clay-pebble conglomerate, less than one ft thick in the north, and a nodular dolomite or dolomite-cemented, cellular sandstone, 1-2 ft thick, with animal trails in the south (Section 1, p. 53).

The lower key bed, Pw-200, is a series of lenticular sandstones, with an overlapping area of development at approximately the same stratigraphic position. It ranges in thickness from less than 5 ft thick for a genetic unit in Sec. 21, T20N, R2E, to a multistoried

complex over 50 ft thick (Section 3, p. 55). It is generally characterized by a sharp undulatory base, although a gradational base is locally developed (Section 3, p. 55). Pw-200 is fine- to very fine-grained, exhibits moderate to good sorting, and contains occasional intraformational rocks fragments (Section 4, p. 56).

Middle unit. Red mudrock, multilateral, lenticular sandstones, nodular dolomite, and algal-mat carbonate beds characterize the middle 400 ft of the Wellington Formation. The mapped sandstones are fine- to very fine-grained, and many have sharp undulatory bases and sharp lateral contacts.

The 400-ft interval between Pw-200 and Pw-600 has several relatively continuous sandstone sequences. Pw-320, Pw-380, Pw-420, Pw-460, and Pw-500 extend across the county. Pw-380 is a multilateral sandstone sequence from less than 5 ft to almost 40 ft thick, with some carbonaceous material. Pw-460 is also a good example of a multilateral sequence (Fig. 4). Pw-240 and Pw-260 are developed in the north, whereas Pw-280 is a multilateral, multistoried, carbonate-cemented sandstone in the south (Section 5, p. 57). Pw-400 is developed only in the area south of Lake Carl Blackwell. Pw-480, Pw-560, and Pw-580 are discontinuous sandstones occurring only in the south. Pw-480 and Pw-580 have intraformational fragments. The thickness of Pw-480 increases southward from as little as 2 ft to over 20 ft in Sec. 32, T18N, R1E. This southward increase in sandstone thickness characterizes several other units, especially those from 240 to 300 ft above the base. That interval contains several thin sands in T18N, Rs 1 and 2E, but is largely sandstone at Horsethief Canyon in Lincoln County, just south of the

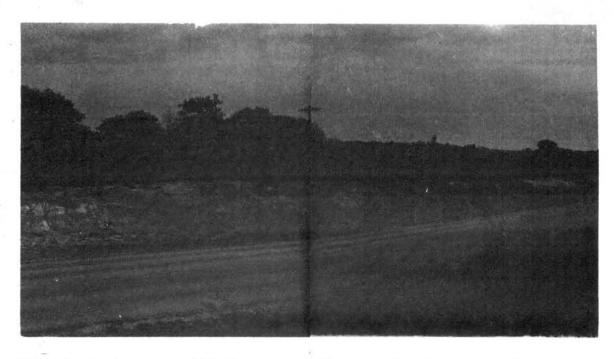


Fig. 4.-Sandstone Pw-460 showing multilateral development in Sec. 21, T19N, R1E.

Cimarron River (Fig. 5; Section 6, p. 58). Pw-500 in Sec. 10, T19N, R1W, is a 5-ft genetic unit associated with nodular dolomite (Section 10, p. 61), whereas it is over 20 ft thick in Sec. 17, T18N, R1E (Section 12, p. 63). At the latter locality the multistoried sandstone contains carbonate-cement, intraformational fragments, iron replacing wood fragments, and crinoid fragments. Farther south in Sec. 31, T18N, R1E, Pw-500 is a multilateral, multistoried complex, almost 50 ft thick, with 3 dolomite, clay-pebble conglomerates (Section 11, p. 62).

Dolomite lenses are locally developed at various stratigraphic positions in the middle unit of the Wellington Formation. The most impressive outcrop of dolomite in the study area is a sequence of algalmat carbonate beds in Sec. 15, T19N, RIW (Section 14, p. 64), which contain stromatolites similar to the type-SS structures found in low intertidal areas (Logan, Rezak, and Ginsburg (1962).

Upper unit and upper key bed. The upper part of the Wellington Formation exposed in Payne County includes 180 ft of rather persistent sandstone sequences, composed of individually lenticular units, thin nodular dolomite, and thin carbonate beds.

The upper key bed, Pw-600, is a fairly continuous sandstone throughout the area, with lenticular bodies developed at approximately the same stratigraphic position. It is 5 to 15 ft thick, is characterized by a sharp undulatory base, is fine- to very fine-grained, and well sorted (Section 17, p. 67). Locally nodular dolomite is associated with Pw-600.

Pw-620, Pw-640, Pw-660, Pw-680, Pw-700, and Pw-740 are similar in range of thickness, lateral continuity, and grain size. Pw-640 and



Fig. 5.-Sandstones Pw-240 through Pw-300 as a continuous exposure, approximately 60 ft high, in Sec. 14, T17N, R1E, Logan County, just south of the Cimarron River.

Pw-660, with some medium-grained beds, is coarser than other beds (Sections 19 and 20, pp. 68 and 69). Pw-640 contains fossil fragments in Sec. 8, T19N, RIW. Pw-640 and Pw-740 are not so continuous as the other beds. Thin limestone and nodular dolomite beds are commonly associated with Pw-620. In Secs. 1 and 13, T18N, RIW, 2 nodular dolomite beds are present, whereas 3 limestone beds are locally present to the south (Section 16, p. 66). Pw-660 in Sec. 5, T19N, RIW, contains large-scale spill-over cross-bedding (Bernard, 1970; Fig. 6; Section 21, p. 69). Pw-680 was quarried in Sec. 17, T19N, RIW, for subbase material for I-35 (Fig. 2). Intraformational clay and carbonate fragments are locally present in many of the sandstones in the upper unit (Sections 18, 19, 20, and 22, pp. 67, 68, 69, and 70).

Quaternary

The Quaternary deposits of Payne County are alluvial sand, silt, and clay and eolian sand and silt. These sediments, except for eolian silt, occur on the floodplain and terraces of the Cimarron River and along major creeks.

Terrace Deposits

Terraces are mapped along and north of the Cimarron River and along the major creeks. They are best developed along the Cimarron River and Stillwater Creek. The Cimarron terraces are composed primarily of sand, with small amounts of gravel, silt, and clay. Silt occurs as loess blanketing parts of the terraces and uplands. Tree-covered sand dunes are present on the lower Cimarron terrace surfaces. In Sec. 24, T18N, RIW, 4 miles north of the river and 120 feet above it, a sand pit



Fig. 6.-Large-scale cross-bedding (LX) in sandstone Pw-660 is the spill-over type. Location is in Sec. 5, T19N, R1W; fence post is about 5 ft high.

contains over 20 ft of terrace deposits (Fig. 7; Section 23, p. 70). High terraces may be present in the upland areas as a veneer-like cover of very fine-grained sand as far north as Highway 51.

Alluvial Deposits

Alluvial deposits are present on the floodplain and in the channel of the Cimarron River and major creeks. The river deposits consist primarily of sand, with some gravel at low-water level and silt-clay interbeds. Along Stillwater Creek the thickest exposure of alluvium is about 20 ft of very fine-grained sand and silt, with clay.

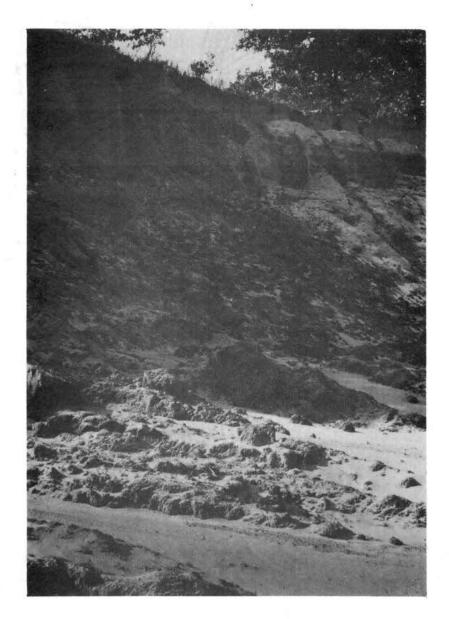


Fig. 7.-Exposure of terrace sand with some 20 ft shown; total thickness is 40 ft. Location is in Sec. 24, T18N, R1W, or 4 mi north of and 120 ft above the Cimarron River.

CHAPTER V

STRUCTURE

A shallow subsurface structural map (Fig. 2) was prepared with the Permian Fort Riley Limestone as the key bed. The map illustrates gentle, homoclinal westward dip in the eastern and central part of the area, with a slight shift to the west-southwest in the two westernmost townships. Payne County is part of the Prairie Plains homocline, a regional feature dipping off the Ozark uplift (Arbenz, 1956; Fig. 2). The average dip of the area ranges from 40 to 60 ft per mi, with local increases to as much as 100 ft per mi. The structural configuration of the Fort Riley is comparable to that of the stratigraphically lower Permian Red Eagle and Pennsylvanian Oswego Limestones. Very gentle folds, or noses and saddles, were formed by local flattening and steeping of the homoclinal dip. In some cases, the subtle structures are expressed topographically by drainage anomalies. The only structures in western Payne County with eastward dip are the Stillwater Airport oil field in T20N, R2E (Fig. 2), and the Lost Creek oil field in T18N, R2E (Fig. 2), both of which are about 1 sq mi in areal extent. They combine with other less prominent noses to form complexes which are several miles in areal extent. Earlier, Shannon (1917), Koschmann (1930), and Powers (1931) had indicated folding of the region increases in intensity with depth. The larger structures at depth are thought to be the result of differential vertical uplift of basement blocks (Powers, 1931;

Clayton, 1965) along upthrust faults. Some of the smaller structures, however, are more likely the result of differential compaction, associated with buried hills or isolated, lenticular sand bodies (Clayton, 1965; Ross, 1972).

Although no faults were noted on the surface of western Payne County, one may be present in the shallow subsurface at the Stillwater Airport oil field. Open joints are not uncommon on the surface in western Payne County in sandstones. These joints are usually vertical to near vertical and are thought to be extensional in nature. A plot of strike frequency for 51 joints (Fig. 8) shows two sets, averaging N55°E and N45°W, respectively, directions which are very similar to those in central Payne County (Ross, 1972), Noble County (Shelton, 1973), and the large area north and northwest of the Ouachita Mountains (Melton, 1931). The northwest set is subparallel to individual faults of the en echelon fault zones in eastern Payne County and Creek County.

Tectonically Payne County is part of the Central Oklahoma platform, which corresponds to the southern portion of the Prairie Plains homocline (Arbenz, 1956). The north-trending Nemaha Ridge, with basement fault blocks and gently folded Pennsylvanian beds, is located about 15-25 mi west of the area.

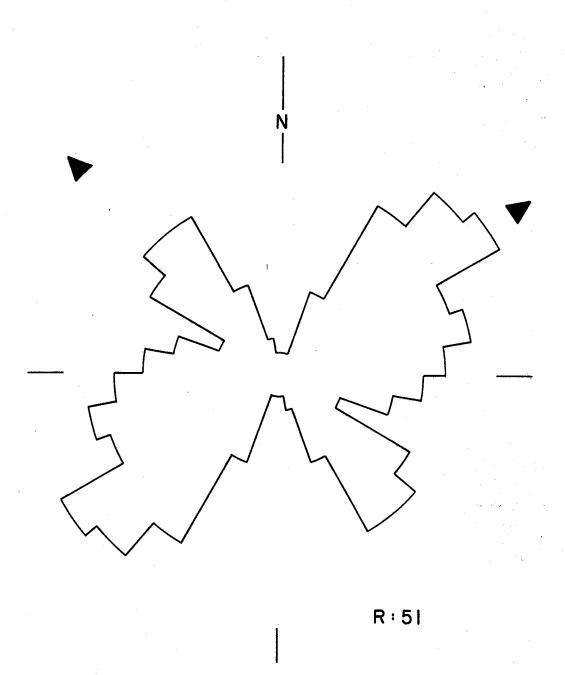


Fig. 8.-Strike frequency diagram of 51 joints, showing N55°E and N45°W directions. A 30-degree sliding average was used in preparation of the diagram.

CHAPTER VI

PETROLOGY

The most prominent rock type at the surface in western Payne County is sandstone, but mudrock, including mudstone with some shale, is the most abundant rock type. Very thin, irregularly distributed carbonate units at the surface are dolomite and, less commonly, limestone. Sedimentary structures, textural features, and composition were examined for sandstones. For the most part only field observations were made of mudrock and carbonate.

Sandstones

Structures

The observed sedimentary structures in western Payne County sandstones in order of abundance are: medium-scale cross-bedding (148 readings), initial dip, with associated large-scale cross-bedding, (100 readings), small-scale cross-bedding (78 readings), parting lineation (64 readings), and cut-out (7 readings). Medium-scale cross-bedding is recognized in the field as a surface which represents the foreset beds of migratory sand dunes (Fig. 9). These foreset beds dip in the migrating direction of the dunes, and they are either festoon or planar in nature. In some exposures a major problem was separation of initial dip and medium-scale cross-bedding. The initial dip is separated from



Fig. 9.-Medium-scale cross-bedding (MX) above and below the hammer and horizontal bedding (HB) in upper part of sandstone Pw-580, in Sec. 2, T18N, R1W.

medium-scale cross-bedding generally by a lower angle, larger size, and a parallel relationship to associated cut-outs. The presence of shale interbeds also reflects the presence of initial dip. However, where it was not possible to make a certain decision, those directional data were not recorded. Of all the paleocurrent indicators medium-scale cross-bedding has the widest range of direction.

Initial dip is a cross-stratification feature that forms on and parallel to a depositional slope (Fig. 10), and the dip direction is generally perpendicular to the paleocurrent. Medium-scale cross-bedding foresets are expected to be perpendicular to the associated initial dip, but some foreset dips were observed which are subparallel to the initial dip. Allen (1968) indicates that certain foreset beds of medium-scale cross-bedding may form an acute angle to initial dip. Large-scale cross-bedding (Fig. 6) noted in Pw-660, in Sec. 5, T19N, R1W, has been designated by Bernard et al. (1970) as spill-over cross-bedding, and it is analogous to initial dip of foreset beds of deltas in certain large Pleistocene lakes. The paleocurrent direction of initial dip in the study area gives a very wide range of direction.

Small-scale cross-bedding represents the foreset beds of small migratory ripples, with the foreset dip indicating depositional current direction. Small-scale cross-beds in the area reveal a rather narrow range of paleocurrent direction. Parting lineation in horizontal beds generally parallels depositional trend. Parting lineation, which is present more commonly near the top of the sandstone bodies, reveals a rather narrow range in depositional trend. Cut-outs are of 3 separate types: single genetic sandstone units cutting into mudrock (Fig. 10); multilateral sandstone complexes with multiple cut-outs in mudrock and



Fig. 10.-Contact between mudrock (dark) and sandstone Pw-200 (light), showing initial dip (ID) and cutout (CO) in Sec. 16, T20N, R2E. Fence post is 5 ft high.

sandstone alike (Fig. 4); and small lenses of siltstone and mudstone in the upper part of some multistoried sandstone units. Other structures noted in the field include deformed bedding, burrows, and trails.

A total of 397 paleocurrent measurements were made from Wellington sandstones. The lower unit of the Wellington Formation, some 200 ft thick, has an average direction of N30°E with a minor direction of S30°W (Fig. 11). The middle unit of the Wellington, from Pw-200 to Pw-600, has a major direction of N55°W and a minor trend of N55°E (Fig. 12). The upper unit of the Wellington, from Pw-600 to Pw-780, has a major direction of N45°W and a minor direction of N50°E (Fig. 13). The cumulative major paleocurrent for the Wellington Formation is N35°W with minor directions of N40°E, S35°E, and S60°W (Fig. 14).

Texture and Composition

Conglomeratic beds are present at the base of several sandstones. Two types are present in all 3 Wellington units in the study area: (1) carbonate, clay-pebble conglomerate and (2) clay-pebble conglomerate. The carbonate, clay-pebble conglomerate contains pebbles, up to 80 mm in diameter in a matrix of clay, carbonate, and fine- to very fine-grained sand (Fig. 15). Clay-pebble conglomerates in the area consist of pebbles, as much as 100 mm in diameter, in a matrix of red to maroon clay and fine- to very fine-grained sand, with carbonate coating some of the pebbles (Fig. 16). The carbonate pebbles are thought to have been derived from local breaking up of tidal-flat carbonates. The clay pebbles are locally derived from erosion of tidal flats, interdistributary bays, or distributary banks (Ross, 1972).

Sandstones of western Payne County are generally well sorted and

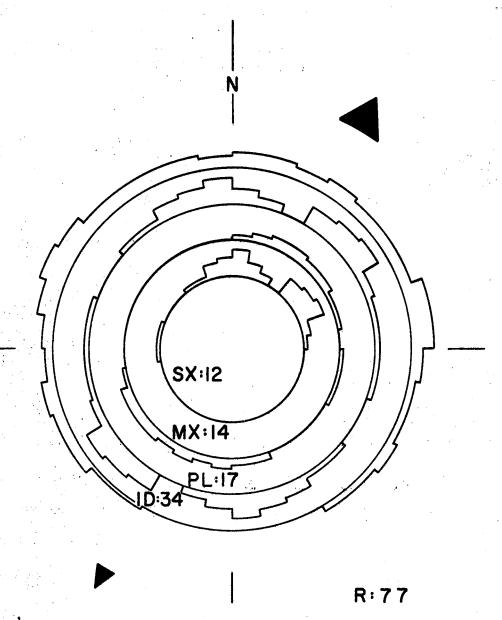


Fig. 11.-Paleocurrent diagram of sandstones in the lower unit,
Wellington Formation, showing a primary direction of
N30°E and secondary direction of S30°W. Size of
arrow indicates prominence of direction. SX =
small-scale cross-bedding, MX = medium-scale crossbedding, PL = parting lineation, ID = initial dip,
LX = large-scale cross-bedding, CO = cut-out trend,
and R = total number of readings. A 30-degree
sliding average was used in preparation of diagram.

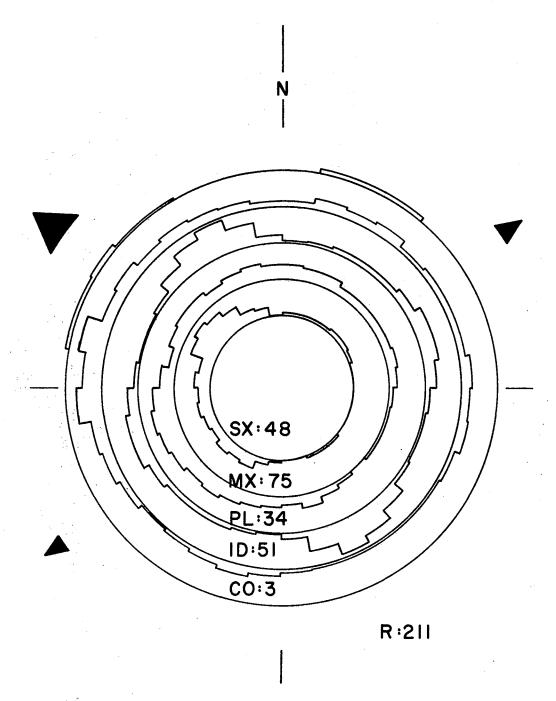


Fig. 12.-Paleocurrent diagram of sandstones in the middle unit, Wellington Formation. Primary direction is N55°W. Secondary trend is N55°E. Key for symbols is in Figure 11.

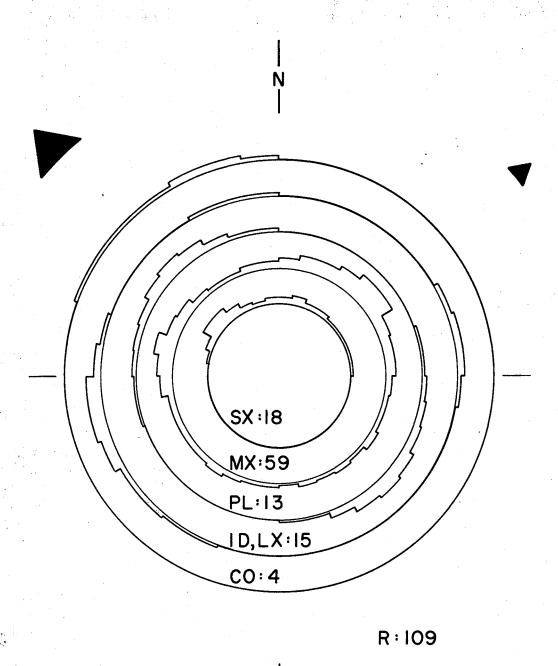


Fig. 13.-Paleocurrent diagram of sandstones in the upper unit,
Wellington Formation. Primary direction is N45°W.
Secondary direction is N50°E. Key for symbols is in
Figure 11.

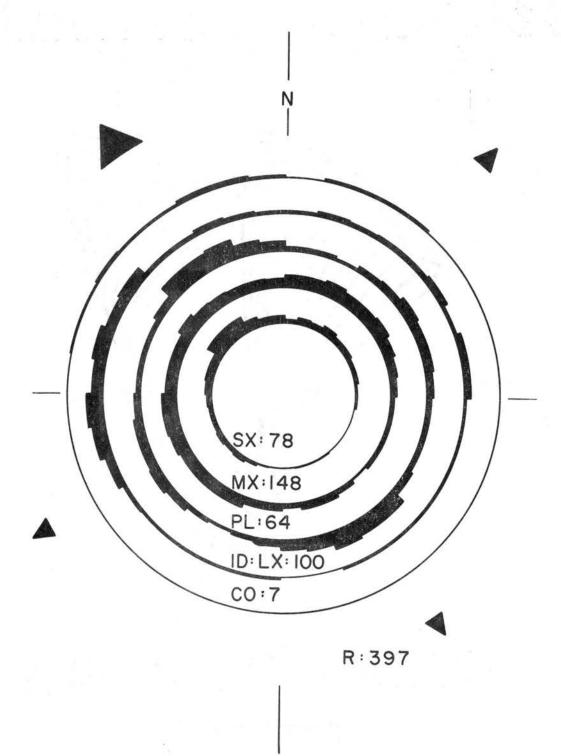


Fig. 14.-Composite paleocurrent diagram of Wellington sandstones of western Pavne County, showing an average major direction of N35°W with secondary directions of N40°E, S35°E, and S60°W. Key for symbols is in Figure 11.



Fig. 15.-Carbonate, clay-pebble conglomerate in upper unit of Wellington Formation, in Sec. 23, T18N, R1W. Width of photograph is 3 ft.



Fig. 16.-Clay-pebble conglomerate (CP) in upper unit of Wellington Formation, with carbonate (C) coating many pebbles.

Location is Sec. 9, T18N, R1W.

medium- to very fine-grained. In the field most of the sandstones are friable as a result of limited cementation. Varying amounts of reddish stain are present in most sandstones, although some are white to tan. Green siltstone has been observed at the base of several sandstone units. The color is probably the result of reduction of the iron oxide and/or the presence of chlorite as a clay mineral.

Pw-200 and Pw-600 are considered typical Wellington sandstones. Both sandstones are well sorted. The average grain size of the former is 0.15 mm and the grains are dominantly subangular, with angularity ranging from subrounded to angular (Fig. 17). Concavo-convex, line, and point contacts are present. Many grains are coated by hydrous iron oxide. The rock is classified as a feldspar-rich subarkose; it contains approximately 70 percent quartz, 25 percent feldspar, 3 percent musco-vite and sericite, 1 percent hematite, and a trace of carbonate. Average grain size of Pw-600 is 0.09 mm; grains are generally subangular; and contacts are concavo-convex, line, and point. It is a quartz-rich subarkose composed of 93 percent quartz, 3 percent feldspar, 2 percent hematite, 1 percent carbonate, and less than 1 percent muscovite and sericite (Fig. 18). The matrix is of clay and iron oxide.

Carbonates

Lenses of nodular dolomite (Fig. 19) and dolomitic nodules within mudrock are the main types of occurrences of carbonate in the area. Carbonate minerals are also present as pebbles in conglomerates, cement in sandstone, and fossil fragments. A petrographic study of nodular dolomite Pw-620 indicates that it is a grain-supported, muddy carbonate (a packstone). The supporting grains are pellet-like and average 0.15

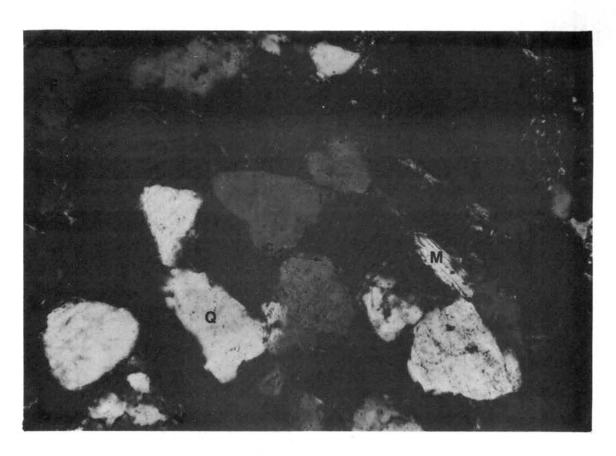


Fig. 17.-Photomicrograph of Pw-200 with quartz (Q), feldspar (F), muscovite (M), and hydrous iron oxide rimming many grains. Concavo-convex (c) and line (1) contacts indicate close packing of grains, which are dominantly subangular. Crossed nicols. Width of photograph is 0.90 mm.

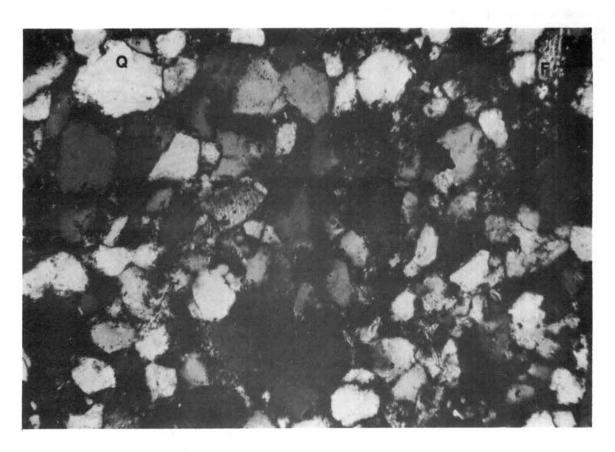


Fig. 18.-Photomicrograph of Pw-600 with quartz (Q), feldspar (F), and occasional muscovite and sericite. The average grain is subangular and contacts range from point to concavoconvex. Crossed nicols. Width of photograph is 0.90 mm.



Fig. 19.-One of 2 beds of nodular dolomite in the upper unit of Wellington Formation in Secs. 1 and 13, T18N, R1W. Hammer and notebook for scale.

mm in diameter. Many of the pellets have a thin accretionary rim. The mud includes iron-oxide-stained clay, or micrite, and silt-sized quartz grains. Secondary sparry calcite is also present as veinlet and vug linings (Fig. 20). One vug containing secondary kaolinite was noted.

Depositional Framework of Surface Rocks

The average environmental conditions were those of a delta. The lenticular sandstones are thought to represent regressive deposits in distributary and tidal channels. Sandstones with gradational bases and horizontal interbeds are believed to represent delta fringe. Mudrock is thought to have been deposited in interdistributary bays and on tidal flats. During maximum regression mud may have been deposited in flood basins. Tidal-flat conditions are suggested by the thin nodular dolomites. Each dolomite is thought to represent supratidal conditions during a minor transgression, with seasonal and storm tides supplying water for deposition. The northwesterly trend of paleocurrents suggests a northeasterly depositional strike (Fig. 14). The general climate during the deposition of the red beds was probably arid (Walker, 1967).

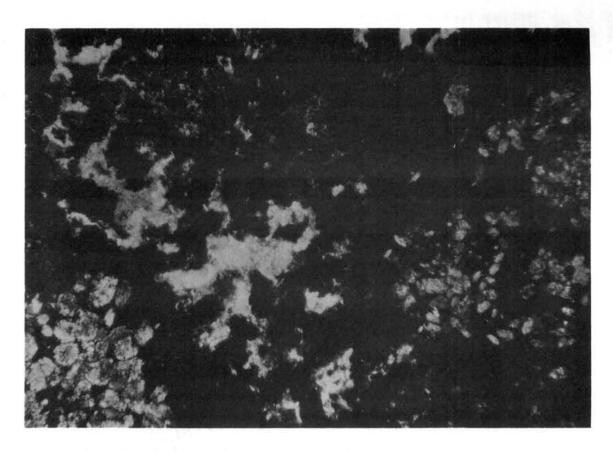


Fig. 20.-Photomicrograph of nodular dolomite Pw-620 with pelletlike grains, patches of mud (dark), and secondary carbonate calcite filling veinlets and vugs (clear). Crossed nicols. Width of photograph is 0.90 mm.

CHAPTER VII

ECONOMIC GEOLOGY

Mineral resources of economic importance in western Payne County consist of petroleum, ground water, and construction material for local uses. Presently uneconomical ore deposits of copper, silver, gold, and uranium occur in central Payne County; however, no deposits have been noted in the area of study.

Petroleum

Since the discovery of oil in 1926 in western Payne County, 45 million bbl of oil and 683 million cu ft of gas have been produced (International Oil Scouts Assoc., 1971). Although petroleum production is from various fields throughout the study area, almost 46 percent of the total has been from Ramsey oil field. Production from Stillwater field accounts for 12 percent of the total, and Orlando field has contributed a similar amount.

Major reservoirs of western Payne County are primarily of lenticular Pennsylvanian and Ordovician Simpson sandstones. Relatively minor production has been from Devonian and Mississippian reservoirs.

Construction Materials

Sandstones of western Payne County have been used locally as building stone, but they are considered to be too friable for modern

construction purposes. However, Pw-680 was quarried in Sec. 17, T19N. RIW, for subbase material for Interstate Highway 35 (Fig. 2). Locally in western Payne County nodular dolomite is used as a road metal for county roads. The mudstone throughout the study area may be suitable for brick (Snider, 1911; Gould, 1911). It is likely, however, that poor response to high temperature limits its use as material for lightweight aggregate (Burwell, 1954). Abundant sand, present on the floodplain and terraces of the Cimarron River, with small amounts of gravel, is available for use as subbase material and in fills, asphalt, concrete, and masonry work. Basically, the material of the terraces is used for fill and in asphalt. The sand pits in both the terrace deposits near Perkins and high-level terrace deposits in Sec. 4, T18N, RIW, are intermittently in operation (Fig. 2). The sand from the floodplain is class A and masonry grade. A slurry operation, southwest of Perkins, which produces approximately 50,000 tons annually, supplies local concrete plants and masonry contractors (Ross, 1972; Fig. 2).

Ground Water

Ground water at shallow depths is locally plentiful in terrace and floodplain deposits of the Cimarron River. Some 443 electric logs of wells drilled for oil and gas were used in preparing a preliminary map showing depth of base of fresh water in the study area. Where the sandstones of the surface rocks are locally well developed as in T18N, R1 and 2E, an excellent source of potable water is available (Fig. 21). Another local area where the depth of fresh water units is greater than 150 ft is north of Stillwater. Other areas of significant potable water may be present but are not noted because of sparsity of useful

data. The distribution of ground water is thought to reflect sandstone development primarily and topography and saline influent from the Cimarron River secondarily.

Engineering Properties of Soils

Hayes et al. (1967) have compiled the highway engineering characteristics of the soils of Oklahoma, including Payne County. The grain size and various soil "constants," which are liquid limit, plastic index, shrinkage limit, and subgrade suitability are used in describing major soil associations in western Payne County. Liquid limit is the moisture content, in percent related to a dried sample, at which a soil goes from a plastic to a liquid state. The lower the percentage the better a soil is suited for subgrade material. Plastic limit is the moisture content, in percent of oven-dry soil at which the soil changes from a semisolid state to a plastic state. The lower the percentage, the more favorable the soil. The plastic index is the numerical difference between liquid limit and plastic limit. The symbol NP indicates that a soil is nonplastic. Shrinkage limit is the moisture content, in percent of oven-dry soil at which a wet soil will not experience further shrinkage. A larger percentage is generally considered more favorable than a lower percentage. Suitability categorizes the soil as to its qualities for a subgrade material in highway construction. The soil constants, particle size, and subgrade suitability of the soils in western Payne County, tabulated by Hayes, et al. (1967), are given in Table I.

TABLE I
HIGHWAY ENGINEERING CHARACTERISTICS OF SOIL SERIES*

HIGHWAY	1110	INEER		CILATO	CTERI			SOIL	SERI		·	
Soil Series & Horizons	(Sie Analy % Pas	sis	,		rticl izes	е		Soil nstan		Sui	Subgrade .tability
by County	No. 10	No. 40	No. 60	No. 200	%Sand	%Silt	%Clay	Liguęd	Plastic	Shrinkage	poog	Fair Poor
Kirkland A B	100 100	100 100	98 100	81 88	34 19	46 39	20 42	29 51	9 26	17 10	Х	x
Zaneis A B C	100 100 100	99 100 100	98 99 99	73 85 85	41 27 38	39 34 34	20 39 28	36 46 39	12 21 19	17 12 15	x x	x
Vernon A B	100 100	99 99	99 99	93 97	16 7	49 34	35 59	41 62	19 31	11 18	X	X
Lucien A AC C	100 100 100	95 100 99	99 99 99	51 64 41	52 53 69	34 33 19	14 14 12	25 26 22	.5 6 2	17 17 17	X X X	
Dougherty A B C	100 100 100	98 99 99	74 88 72	19 34 13	91 69 90	7 4 3	2 27 7	NP 33 NP	NP 15 NP	- 17 -	X X X	
Teller A B C	100 100 100	99 98 99	81 88 95	45 58 69	69 56 53	22 21 26	9 23 21	NP 29 32	NP 12 12	- 13 17	X X X	
Vanoss A B C	100 100 100	99 97 98	91 79 81	65 65 42				19 33 24	4 13 7	- 29 -	x x	X
Yahola A C	100 100	100 97	99 67	64 14	62 14	30 5	38 2	NP NP	NP NP	1 1	X X	
Port A C	100 100	100 100	99 99	81 52	38 63	45 17	27 10	26 NP	7 NP	-	X X	

^{*} After Hayes <u>et al</u>. (1967).

Kirkland-Zaneis Association

The Kirkland and Zaneis association is brown well developed soils which formed on Permian red beds present on the Central Redbed Plains type of topography. The Kirkland series formed on claystone. It has 2 distinct horizons, with the A horizon rated good for subgrade material, and the B horizon poor for subgrade material.

The Zaneis series is a well developed soil on sandstone. It has 3 distinct horizons. The A and C horizons are good subgrade material, but the B horizon is rated a poor subgrade material.

Vernon-Lucien Association

The Vernon-Lucien association are red poorly developed soils on the Permian red beds present on the Central Redbeds Plains type of topography. The Vernon series which formed on claystone, has 2 horizons. The A horizon is considered a good subgrade material, whereas the C horizon is rated a poor subgrade material.

The Lucien series is a poorly developed soil on sandstone. Between the A horizon and the C horizon is an intermediate AC horizon, and all 3 horizons are rated good for subgrade material.

Dougherty-Teller-Vanoss Association

The Dougherty-Teller-Vanoss association soils are developed on the terrace and eolian deposits along the Cimarron River. The Dougherty series has 3 horizons, which are all good subgrade material. The Teller series also has 3 horizons which are considered good subgrade material. The Vanoss series has 3 horizons, with 2 of them considered as good

subgrade material. The B horizon, however, is only fair subgrade material.

Yahola-Port Association

The Yahola-Port association soils are found on the floodplain along the Cimarron River and its tributaries in western Payne County. The Yahola series is found along the Cimarron River. It has 2 horizons, and they are good subgrade material. The Port series is developed on the major tributaries of the Cimarron River. It has 2 horizons which are rated good for subgrade suitability.

CHAPTER VIII

SUMMARY

The principal conclusions resulting from this study are as follows:

- 1. The study area contains red beds of the Leonardian Wellington Formation, about 780 ft thick.
- 2. The stratigraphic section is represented by a sequence of lenticular sandstone, mudrock, and nodular dolomite.
- 3. The various sandstone sequences in the section exist as genetic units from less than 2 ft to as much as 25 ft thick and, in some cases, multilateral and multistoried complexes with a maximum thickness of 80 ft. The sandstone bodies are characterized by undulatory bases, medium-scale cross-bedding, initial dip, small-scale cross-bedding, parting lineation, and cut-out. However, in the lower part of the section a few of the sandstones have gradational bases. Locally trails and burrows are present, as well as fossil fragments.
- 4. The grain size of the sandstone units ranges from medium- to very fine-grained. The sandstones are moderate to well sorted, subangular to subrounded, feldspar-rich subarkose to quartz-rich subarkose.
- 5. The nodular dolomites are dismicrites and packstones.
- 6. The major paleocurrent trend is about N35°W. A tide-dominated delta characterizes the Wellington interval. The source areas

- are the Ouachita, Arbuckle, and Wichita Mountains in southern Oklahoma.
- 7. The area is characterized by homoclinal dip to the west at 40 to 60 ft/mi. Subtle structural noses, with local dip as much as 100 ft/mi, increase in size and intensity with depth. The local structures, which are less than 1 sq mi in areal extent, combine to form complexes several times that size.
- 8. Two joint sets strike N55°E and N45°W respectively; these directions are similar to those of sets in central Payne County.

 The northwesterly direction is sub-parallel to the en echelon fault zone in eastern Payne County and Creek County.
- 9. Petroleum is the major mineral resource. Some sandstone can be used locally as road subbase material; nodular dolomite is used locally as a county road base material; mudrock may be a source material for brick; and sand is used for fill, asphalt, masonry, and concrete. Potable ground water is best developed in irregularly distributed sandstones and in terrace and floodplain sands of the Cimarron River. Distribution of fresh water reflects local sandstone development, topography, and saline influent from the Cimarron River.

SELECTED BIBLIOGRAPHY

- Allen, J. R., 1968, Current ripples: their relation to patterns of water and sediment motion: Amsterdam, North-Holland Pub. Co., 433 p.
- Arbenz, J. K., 1956, Tectonic map of Oklahoma: Okla. Geol. Survey.
- Bernard, H. A., C. F. Major, Jr., B. S. Parrott, and R. J. Le Blanc, Sr., 1970, Recent Sediments of Southeast Texas, a field guide to the Brazos alluvial and deltaic plains and the Galveston barrier island complex: Texas Bureau of Economic Geology, 73 p.
- Branson, C. C., A. L. Burwell, and G. C. Chase, 1955, Uranium in Oklahoma, 1955: Okla. Geol. Survey Min. Rept. 27, 22 p.
- Burwell, A. L., 1954, Lightweight aggregate from central Oklahoma shales: Okla. Geol. Survey Min. Rept. 24, 20 p.
- Clayton, J. M., 1965, Paleodepositional environments of the "Cherokee" sands of central Payne County, Oklahoma: M.S. Thesis, Univ. Okla., 46 p.
- Cobb, W. B., and H. W. Hawker, 1918, Soil survey of Payne County, Oklahoma: U. S. Dept. Agr., Bur. Soils, 39 p.
- Curtis, N. M., and W. E. Ham, 1957, Physiographic map of Oklahoma: Okla. Geol. Survey Educ. Series 4.
- Dunham, R. J., 1962, Classification of carbonate rocks according to depositional texture, p. 108-121, in W. E. Ham, ed., Classification of carbonate rocks, a symposium; Am. Assoc. Petroleum Geologists Mem. 1, 277 p.
- Folk, R. L., 1962, Spectral subdivision of limestone types, p. 62-84, <u>in</u> W. E. Ham, ed. Classification of carbonate rocks, a symposium: Am. Assoc. Petroleum Geologists Mem. 1, 277 p.
- Frost, V. L., 1940, Ramsey oil pool, Payne County, Oklahoma: Am. Assoc. Petroleum Geologists Bull., v. 24, p. 1995-2005.
- Gaither, A., 1953, A study of porosity and grain relationships in experimental sands: Jour. Sed. Petrology, v. 23, p. 180-195.
- Gould, C. N., 1905, Geology and water resources of Oklahoma: U. S. Geol. Survey Water-Supply Paper 148, 178 p.

- Gould, C. N., 1911, Structural materials of Oklahoma: Okla. Geol. Survey Bull. 5, 182 p.
- and R. A. Wilson, 1927, The Upper Paleozoic rocks of Oklahoma:
 Okla. Geol. Survey Bull. 41, 66 p.
- Gray, F., and H. M. Galloway, 1959, Soils of Oklahoma: Okla. Agr. Exp. Sta. Misc. Pub. 56, 65, p.
- Green, D. A., 1937, Major divisions of Permian in Oklahoma and southern Kansas: Am. Assoc. Petroleum Geologists Bull., v. 21, p. 1515-1533.
- Hayes, C. J., et al., 1967, Engineering classification of geologic ma- ✓ terials, division four: Okla. Hwy. Dept., Res. Dev. Div., 284 p.
- International Oil Scouts Association, 1971, International oil and gas development, Pt. 2 Production, yearbook 1970, v. 41, p. 300-311.
- Koschmann, A. H., 1930, Payne County, in oil and gas in Oklahoma: Okla, / Geol. Survey Bull. 40, v. 3, p. 159-167.
- Logan, B. W., R. Rezak, and R. N. Ginsburg, 1962, Classification and environmental significance of alagal stromatolites: Jour. Geology, v. 72, p. 68-83.
- McBride, E. F., 1963, A classification of common sandstones: Jour. Sed. Petrology, v. 33, p. 664-669.
- Merritt, C. A., 1940, Copper in the red beds of Oklahoma: Okla. Geol. Survey Min. Rept. 8, 15 p.
- Melton, F. A., 1931, Joint studies in the southwest and their bearing on tectonic history (abs.): Geol. Soc. America Bull., v. 42, p. 321.
- Olson, E. C., 1967, Early Permian vertebrates: Okla. Geol. Survey Circular 74, p. 44-51.
- Patterson, J. M., 1933, Permian of Logan and Lincoln Counties, Oklahoma: Am. Assoc. Petroleum Geologists Bull., v. 17, p. 241-253.
- Powers, S., 1931, Structural Geology of northeastern Oklahoma: Jour. Geology, v. 39, p. 117-132.
- Ross, J. S., 1972, Geology of central Payne County, Oklahoma: M.S. Thesis, Okla. State Univ., 87 p.
- Shannon, C. W., 1917, Petroleum and natural gas in Oklahoma: Okla. Geol. Survey Bull., 19, pt. 2, p. 413-423.
- Shelton, J. W., 1963, Measured sections of sandstones and shales: Am. Assoc. Petroleum Geologists Bull., v. 47, p. 2047-2050.

- Shelton, J. W., 1964, Authigenic Kaolinite in sandstone: Jour. Sed. Petrology, v. 34, p. 102-111.
- 1973, (in press) Geology of Noble County, Oklahoma: Okla. / Geol. Survey Bull.
- Snider, L. C., 1911, Preliminary report on the clays and clay industry of Oklahoma: Okla. Geol. Survey Bull., 7, 240 p.
- Stringer, C. P., 1957, Subsurface Geology of Western Payne County, Oklahoma: Shale Shaker, v. 7, p. 3-20.
- Walker, T. R., 1967, Formation of red beds in modern and ancient deserts: Geol. Soc. America Bull., v. 78, p. 353-368.

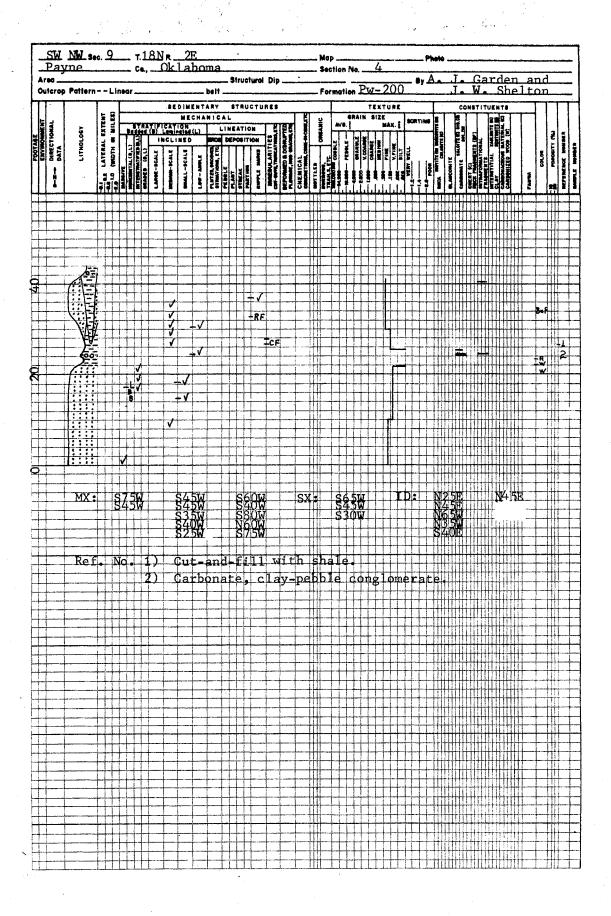
APPENDIX

MEASURED STRATIGRAPHIC SECTIONS

1	E	SW_se	ı	20	_	т.1	81	IR.	2F	CT	10							_	Mej	·		1	_					700	.		_	_	_							-
Ar	9 6											_ 1	iruc	ture	Dip	·		_	300	TION				_			By .	Α	_	Ţ		G	a.	cd	er	_			_	-
L^	terep	Pettera-	_	Lin	007	_	_		DIM																			_		_				NT			_		_	
L	,	- 1		9					-11	CHA	NIC	AL					CMEMICAL CONTINUE CONTINUE		2		GR.	LIN	812	E		20	RTIN		T	È	Ť	Ϊ	3	2	T	Γ	1			
	1101	5	6	፤	*	Ŧ	(O)	HEL	HEB	41		OE	POST	ON	E	H				Ī	ij.	T		Ī	Ť	H	-	1	2		1	ď,		į			1	5	1	
FOOTAGE Envisor	DRIECTIONAL BATA	THECOST	LATERAL EXTENT	LLO (SPECITA IN	3		7	MEL	1	-	T.	Ī	ĪĪ	Ti	Ē			r				Ų		Į	E L	Į.			١.	Ī				CAMPOULCEBUS MATERIAL ICT			5	PORCENTY	1	i
	1	- 1				ı,	LABOR-BCALE	1				١,		3	3		MICA	į	15	Ĭ.						è	11	1			2			- GET		١,		ē	REPT IN INC.	5
Ш	1		1	Ĩ.			3		I	3	56				1	25	58	ı	12		ij	لل	ì	لىل	1	li		l			1	睢	4	33	1	1		1	Ī	1
E			\pm		\pm				_			$oxed{\mathbb{H}}$				E	1	Н	1 1			\pm		\pm	-				\blacksquare	\mathbf{n}	\mathbf{n}	ш	777	\blacksquare	пп	I	\pm	\prod	E	E
F]=_	7	H	Ŧ	H	F	F	<u> </u>	-		H	$\overline{\mathbf{H}}$	+	-	-	-	\prod	-	+	$\overline{\mathbf{H}}$	\perp	H	\exists		H	+	-	\mathbb{H}		\mathbb{H}	$\left\{ \cdot \right\}$	₩	\prod		+	De	+	2	-
F			Ŧ	H	7	1	-	F		7	-	H	H	7	-		F	\blacksquare			H	H	Ŧ	H	I	H	+		\blacksquare	\blacksquare				\prod		F	Bu	4	F	-
F] <u>-</u> -	Ŧ	H	Ŧ	H	-	F	F	F	-	H	H	F	F	-	F	\prod		Ŧ	H	\perp	-	\mathbb{H}	1		+		\blacksquare	\mathbb{H}		H	${\mathbb{H}}$	\blacksquare	Н	E		#		\vdash
			+	\prod	+	H	F	\vdash	-		F	H	+	\vdash	-	-	1	\prod			П	H		H		H	H		\mathbb{H}		Щ	\prod	\mathbb{H}	\prod		I	, no	Ш	Ţ	Į.
4		7	Ŧ	H	1	H	F		-	-	-	H	\blacksquare	F	F	F		H	7	+	$\overline{\mathbf{H}}$	H	Ŧ	\blacksquare	,1	П	\blacksquare		\prod	F	H	\prod		\prod		F	Br		2	+-
F		(;;; <u>;</u>	7	H	-	+		-			_	H	\prod	F	F	-		\prod		\perp	H	H	Ŧ	\mathbb{H}	4	H	+		-	Ш	H	$\ $	\mathbb{H}		Н	Ţ.,	+	H	-1 3	+
T		نننا	7	+	-	4	F	F	F		_	H	+	F	+	F	-	\prod		+	-	Ŧ	H	H	4		\exists		$\frac{1}{1}$	İ	\prod	Щ	#	\mathbb{H}	Ш	-	ø,	1	3	 -
H			7	H	-	#	F	Ţ.	-		_	H	\Box	-	-	<u> </u>	-	Ш		Π-	H	\mp	H	H	T	\square	+-	-	\prod	-		Щ	\prod	\prod		-	-	+		-
\blacksquare		RF:	7		7	OF.	-	-	TT		N	7	W	-	-	F	F			7	H	Ŧ	7	\Box	7	H	\blacksquare			\mathbb{H}				H		Ŧ	+	1	T	-
			7		8	竓	F	#					11	\vdash	-	-	F			7	11		7		1	-										+	-	\mathbb{H}	-	-
		Ref	<u>+</u>		+		1)		2	3 7				1	1	1	ar	Ш		1	H	#	#	+	7	Ħ	+		#	₩			#	 		-	Ŧ	-	ļ-	+-
		ĸeı	1	Ħ	+	#	2)	1	1	1	1	1 1	1 -1	1	1	1	e.	115		10	m	E	e.		1	#	11	1	Ш	##		##		\parallel		Ŧ	+-	Щ	+	1-
士			1	\ddagger	+	#	R)	1	1	1	1	1 1	1 1	1	1	1	cs.	118	1 5	1	1	<u>, 1</u>	C				1	-#	#			\parallel	##	#		‡	丰		+	#
井			#	\parallel	‡	#		‡			111.1			VE.	-	E	5	1		7		+) -		115	1	\Box		\parallel	#	Ш	#	#	#		ŧ	丰	+++	F	-
1			+	Ħ	‡	#	1	1			<u> </u>		#	1	1	 				1	Ħ	H	+	H	7	H	H			Щ	П	###	1	Щ		-	+		+	F
丰			1	H	+	†	1	‡	-		-		#	+	-	\vdash		П		+	H	\Box	7	\parallel	+		+	П	H	Щ	1	\prod	H	\prod	Щ	-	Ŧ	\mathbb{H}	L	ļ
-			7	#	-	\mp	F	-		_	_	H	+	1	\vdash	F	-	1		+	H	H	7	\blacksquare			+	-	H				\prod			-	Ŧ	1		-
#			7	\parallel	1	Ħ	1	1	1	-	_	Ħ	\parallel	‡	-	1	-		Н	+	\dashv		7		+	H	\Box	4	#	1						F	\mp	1		
#			+		‡	#	-	-	F	Ι_	ļ	Ħ	\parallel	1	1	-	-	1		+	Ħ	H		\mathbb{H}	7	\parallel	\Box	-	\parallel	╫		\prod	₩		-	F	Ŧ	\prod	F	-
#			#	+	+	#	-	+-	-	_	<u> </u>		1	+	F	\vdash	-	H	H	+	Ħ	\exists	H	H	+	H	H	\exists	\mathbb{H}	\prod		\prod	\parallel			F	Ŧ	\blacksquare		\vdash
Ħ			#	\parallel	#	#	_	1_	-		_		#	1	-	_	_			1	H	H	H	H	7	П	\Box	4	111	\prod	Ш	\prod	\prod	\prod	Ш	F	Ŧ	\prod	F	-
			#		+	#	1	 	_		E	H	#	1	-	\vdash				#	+	+	1	+1	-	H	11	4	111	H		$\parallel \mid$	\parallel	Щ	Ш	-	+	\mathbb{H}	F	H
H			#	Ħ	#	#	‡	‡	尸		ļ	H	\parallel	1	1	1	-		H	1	H	H	1	\mathbb{H}	#	Ħ	\mp		#	\prod		Ц	\parallel	\prod	Щ	+	F	\parallel	F	F
#			#	\parallel	+	#	-			F		1	H	Ŧ	F	-	-		П		H	\mathbb{H}	H	\prod	7	\square	\mathbb{H}		111	H	$\left\{ \right\}$	₩	H			F	T	Щ	F	F
#			#	\parallel	+	#	1	-			-	H	#	+	+	<u> </u>	F		H	7	\prod	Ŧ	1	\exists	1	H	+1	\parallel		\prod	\prod		H	H		-				
#			#	#	+	#	1	‡		-	1	Ħ	H	‡	F	F	-	\parallel		+	Ħ	Ħ	7	+	+	Ħ	77	-	#	\mathbb{H}		#	₩	₩		F	+	1	+	F
#			#	H	#	#	-	#	F	-	-	Ħ	\Box	1	-	F	1		H	#	H	T	7	\exists	7	H	+										Ŧ	TI	T	F
丰			#	\parallel	#	#	1	‡=	<u> </u>	-	 	H	\parallel	+	1		ŧ		1 1	+	H	\Box	4	7	7	H	7	4	$\parallel \parallel$	\parallel			$\parallel \parallel$	\parallel		F	+			F
#			‡	H	+	#	1	‡=	-	-	_	#	##	+	1		1		ļ-	+	Ħ	\exists	#	\exists	+	#	+	-	₩	#		#	##	#		+	+	Щ	F	
H			#	\parallel	+	Ħ		丰	_			H	#	-	1		-			+	\Box	H	7	\prod	+	\exists	\Box	-#	₩	₩		Щ	₩	₩	Ш	┼-	Ŧ		T	F
#			+	#	#	H		\vdash	-	-	-	#	##	#	-	F	1	Щ		7	\parallel	\exists	7	\Box	7	Ħ	\parallel	#	$\parallel \parallel$	\prod	\parallel	#	#	\parallel		F	7	111	1	į
#			+	#	‡	#	 	‡-				H	#	+	-	_	-			+	\Box	\exists	1	\parallel	+	#	+	-#	#		\parallel	#	#	\parallel		+	#	#	I	F
#			#	\sharp	+	#		\vdash				H	\parallel	1	1			\prod		+	#	\parallel	1	#	7	11	\parallel	-#	₩	₩	H	₩	₩	₩	H	+-	7	\prod	F	F
廿			#	\parallel	‡	#		‡			_	#	#	1	1	1	-			+	#	\sharp	#	Ħ	#	#	\parallel	#	\parallel	$\parallel \parallel$		Щ	#	\parallel		+	1	#		F
井			#	#	1	#	\vdash	1		_		#	#	1	F	-	1			#	#	\parallel	#	\exists	+	H	1	- 11	Ш	111	П	Ш	Ш	Ш		1	Ŧ		F	F
廿			+	\parallel	#			\vdash			-	Ħ	#	#	1	1			H	+		\downarrow	+	$\downarrow \downarrow$	+	#	+	#	\parallel	#	##	#	#	#		-	T	Ш	1	
H			\pm	廿	\pm	士	<u> </u>	1	上		<u> </u>	廿	Ш	士	1_	<u> </u>		Ш		士	廿	\pm	士	Ц	1	H		\perp	Ш	Ш	11		Ш	Ш	Ш	I	1		上	

	E. J	SE se	ء2	O 72	ON O	2F				,		Map _		2		M	hete					_	
Are Out	4 1789	Pattern	Li	neer			be	Stru	atural	Dip				w- '	200	_ By A		[a_0]	ard S	en e helt	nd on		•
	$\overline{}$		18			ME	ENTARY		UCTUR	8.8	T E			N SIZE		BORTING		6 1	TITUENT		\prod	\top	
POOT ARE ENVIRONMEN	DATA	LITHOLOGY	44 10 (WOTH BE BULES)	TAL(B,L)	31	MOINE MENT	CONTRACTOR OF STREET	DEPOS	TION TOWN	MACCOL ANITYES ON-OFFE VERSITY ES	CHEMICAL		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			17 May 17 17 17 17 17 17 17 17 17 17 17 17 17	MACA COLUMNIC (SECONDES)	CARBOHATE CALGATES HE AND CHERT (C) PROCESS (MY)	FRANCHIATIONAL PROBLEM PRANCHIATION OF CLAY SOCIETY AL SOCIETY OF CLAY SOCIETY	tel deen ellisoders	SE PERSONNY (TEL		
											1-11												
	\exists																				+		
g		<u></u>								\pm													-
	\exists		H													#							ŀ
	\equiv															##							
07	+	/									11					##					1 1		į
	1						7			co													
	1														4						+		
																					+ + +		٠.
2	\dashv	2																					
	+					1	V		+	C0	+					#							:
	4			7			7																:
	十			V						1								ШЦ					
	\exists	7														++							
.	1	PL:	H	30W 25W		N20	W		Ti	enc	1:	N 4 8	¥			\overline{H}		HHH					i
										#	+H					Ш					$+ \parallel$:
																+H							į
	1								1	+						##							
-	1		H													\mathbb{H}	Т						
	1		Н							1						\prod							
	1								+							+++	4+++4	Ш				-	
	\dashv																шш	ШШ		ШШ	$+ \parallel$		
					Ħ																		
	1					\mp										+++		+++++			+ + + + + + + + + + + + + + + + + + +		
	_					_				_	+					丗							

																								-															į
-	NI P	יעו געו	SWL se	<u>3</u>	2_	. T.	19	Yr. Ok	_2 1.a	E. hc	ms		· 			_				dap Sect	ion	No.	_	3			-		e1e										_
	rea uter		Pettern	L	inea	r					bet		Stru	uts	rai	Dip				Form	natio		Ρw	<u>-</u>	20	0	. B	, Α	•	Ţ		G: W	r	de Sh	n e 1	a ت	nd on		_
П	ب			E 8	E			.81	DIM	CH /		CAL			TUP	ES] §	١			BRA	T I	EXT	TUR	, ,	ORT	1848	<u>.</u>	13	CON	111	BI	T 8	7	\dashv	\prod	T	T
387	SMECTIONAL		LITHOLOGY	TAL EX	Ħ,		(B)	HCL	ROTE	1(1)	ENC	9	EPOI	ITIO	-	TIES ETIONALEN	SACAL E		į		T	ž	Ĭ			İ			THE STATE OF	KETTER H	2	1	EAST. CONT.	MATERIA OCO (W)				2	ž.
0			5	LATE	¥		1 (0) E	1-0CAL	-BCAL	100-400LE	FLUTER, SEEDONS	١	Pt. AIPT STINEAR	2	3	MALTERED	0 0 0	HICAL	9		1	1	3 1		¥ 7	11 S		1		See Te	9	N. C.	THE	# 6227H			2		
Ц	1	\perp	<i>i</i> ,	SA LATERAL EXTENT	3	T A	3		1	8	5	ž	31.00	1	Ē	¥ 5	DEF	CHEMICAL CHICHETHAM, COM, BICCHELTIC	5			\$:		a a	1 = 1 1 1	֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓	<u> </u>	2.0	1	GLANCOMTE CALETTES 319.18	1		E.	33		FAWEA	Ц	CALL PRODUCTY (%)	E VE
		1		Н			+	Ī		1-									$\dagger \dagger \dagger$	1		+				Ħ		#	\blacksquare									Ш	1
H	\vdash	\downarrow	 !:::4	H	\parallel	+	‡	+	-	-	+		+					-			$\dagger \dagger$	+	+	+	+	##	+	+							#				+
H					\prod		-				-			H							\prod	-				H									Щ				1
8			튙					Ė											Ш	1																		\blacksquare	_
H	+	\downarrow_{ℓ}				#	+	+	-	+	+		+				-	+		#	#	+	+	+	+	H		+	╫										+
		-)- <u>-</u> -						F		-			H							\prod	1	\mp				H												1
	1						Ė							1					\prod	1	\exists																	\mathbb{H}	1
8	_					\parallel	-	7		+	+			H			-	F		+	#	‡	+	\parallel		#			╫		Ш	#			₩				+
H	E						-	+						H	√					1		\perp																	1
H		1					1	+v							v			E		1																	ÌΙ		1
		‡			$\frac{1}{1}$	\parallel	-	+	-	F	-			H	_			-		+	$\dagger \dagger$	\pm			+	 	H								\parallel		1		#
80		Ī	屋				-						#							\exists	\prod				1														7
			崖			V					E									1			+		- [3		+	₩		\mathbb{H}	Ш						#	#
+	+-	-	<i>'5</i> =		\parallel	\prod	+	+	+	+	+		+	+			Def	-		+	+		+		- -	+	††		#			Н			Ш			#	1
09	E		臺		\parallel		-	-	E	-								ļ		4					+		$\frac{1}{1}$	T	Ш		Ш	Ш	Ш	Ш	TIT			#	7
H							E	1			E									1					-														1
			Ξ					İ		E	-	1	1												1			\blacksquare	\prod		\blacksquare	Н							1
+	\vdash				+	#	+	+	\vdash	-	-		+	+		C0		T		+	+		+		#		H		TIT		Ш		Ш	Ш	Ш		1		+
104			\mathcal{L}				F	7	-	-			-							+					\parallel	H		\mathbb{H}	\mathbf{H}		Н	H		Щ	Н				7
H		1			Н	#	Ė	Ŧ		E															#	П		Ш	Ш.		Ш	Ш	Ш	Ш	Ш			${\mathbb H}$	#
H	-	\dashv	^		+-+	#		+	 -	F	+-		+	#	_			-	Ш	+		H			Ţ	II.	П	\mathbb{H}	\mathbb{H}		\prod			1	##			₩	+
		1	Ţ		\prod		F	-		1	- v			H						7			1		-				\prod					#	$\frac{1}{11}$		Ŕ-G		7
20	E						Ŧ				E												1																1
Ħ	-	+				$\frac{1}{1}$	E			L	Ė									1	H							1 1	₩		₩	##		₩	₩		H	\blacksquare	1
H					++	$\frac{1}{1}$	F	-		-	-							-		+		\pm	-		- -	Ħ	H		₩			₩			#				+
	E												\perp					<u> </u>	Ш	1			-															#	7
0	1	\pm	MX:		\$ 1	士	1	1	SX	\pm	1	36	+				D	<u> </u>	Щ	90		\perp		\perp	L	廿			╫	+++	₩	Hr		+++	+++				\pm



	SW sec		<u></u> 1	r.1.81 Ca	Ol Ol	2E (la	ho						M S	ap action	n No.	5				Phot			· · ·					_	
Area Outcro	p Pattern-	- Li	near_				bd	ı	tructu		_		F	or ma	tion .) By	Α.	Ţ		I.	Sh	n a elt	on	_	_	
¥ 7		TEMT 11. ES)		TRATIF	.SE	MEC	HAN	ICAL	TRUC				ě	AV	e. [IN S	MA	RE X. į	SORTI	W8 15	1	П	TITUE	9 2	1	+			
FOOTAGE ENVIRONMENT DARECTIONAL BATA	Patiern-	CATERAL EXT	VE MITAL (B, L)	(1'0) 02 (1'0) 02 (1'0) 02	HGLI	NED VED	3 10	POD DE	Ш	RIPPLE MANNES TO THE STREET	PR, TTERCATIONS, E.	CHEMICAL	LES ORBANIC	TRANS, CT.	- PERMIT	V. Challer	T 1985	V.F196	SORTH	BOTTE OF SECON	CALCITORS	160 POL. (90. 19	PRACTICAL TIONAL PRACTICAL STANDARD	CLAY SEPTEMBLE IN CATERIAL (C) CARBONISTE WOOD (W)		00100	POSCETTY (%)	SAMPLE BURBER	
1111			MASS	LARG	1	1	3 8	3.6634	PART		200	2 5	Ē		9 9 44	# <u> </u>	₽₽₽	111	<u> </u>	1	3	3 52		335	1		=		ı
	C						1				\pm		\prod											Ш	#	A		1	
	灵	+	 	#	+	+	7	+		RF-C	SF.	\pm		\pm				<u>ر</u>	+					Ш					
					1		1			-								1	\parallel										
8				Ħ	Ė	-	1			70	F	+		\pm	\pm				\perp		#						Ш		
	V.E	+		#	‡		1	1	##		C.F	+	╫	3	+	+			+	Н						7	╫	‡	
		\prod	L				√ √	\prod				+	#																l
	<i>[::::</i>]		L		-t		1						₩					f	†							1	₩	+	
		+		#	-		1		+	\dashv	+	+	╫	+	#	\parallel		1	+		╫				#			+	
											7	1	₩	$\frac{1}{1}$					#	Н									İ
	ID:		65	W		XX:	\pm	S25 S20	E		SX	•	\$2	25E												\perp	#	+	
			25 65 85 25	W	+-				#	1	+	+	₩	#	+	\dagger			#	H					#		₩	+	!
							1				\mp																#	1	
			Ш		1			#																				-	,
						- +	+	+			+		₩		\parallel	#			#	\Box	TIT		11111		╫			+-	ı
		$oxed{\parallel}$	Ш	<u> </u>			\downarrow				1		₩						\blacksquare		\blacksquare				\coprod			1	!
							1				\pm		\blacksquare	\pm							${\mathbb H}$				H	oxdot	\coprod	1	
							1	\dashv		+		-	$\frac{1}{11}$	#		#			+	П	Ш		Щ		₩-			-	
		\prod		+			#	#	\prod	1		+	₩		H	H			#		\mathbb{H}				Н	$oxed{\bot}$	₩	1	
									H		+	+	\mathbb{H}	\pm	\sharp				TT			Ш			₩		\coprod	+	
		$\mathbf{I}.\mathbf{I}$			+		-	+	##		+	+-	₩	+	#	+	+		\dagger	H	\mathbb{H}	###	\mathbb{H}		\mathbf{H}			+	
		#	Ш		<u> </u>		4	#	\prod		1	+	#	Ħ	\parallel	H		H	#	Н	\mathbb{H}				-		₩	+	,
		\blacksquare					\pm	\pm		1					#		Ħ		#		₩							+	I
							#	+	#	+	+	+		\dagger	+	$\frac{1}{1}$			\ddagger	╁╫	╫		╫╫		₩-	$\exists \exists$		\pm	
							1	#			_	-		Ŧ		H			H	П	Ш		$\mathbb{H}\mathbb{H}$		\mathbf{H}			F	
		\sharp	H				#				+	1	₩		\ddagger				#	1 11	1111	1111	11111	11111	111	$\exists \exists$	Π	1	i i
			Ш		+-		#	#			+	1			#		#		$\frac{1}{1}$	1 11			11111					+	
		Ħ		#-						7	1	-	₩	\parallel	H	Ħ		ПТ	\top	Ш	Ш		Ш	11111	TII			Ī	
\ <u> </u>	 	+			+	\vdash	-+	-++	+++	+				++			$\dagger \dagger$	+++	₩	†††	Ш	1	††††		+++-	++	111	+-	



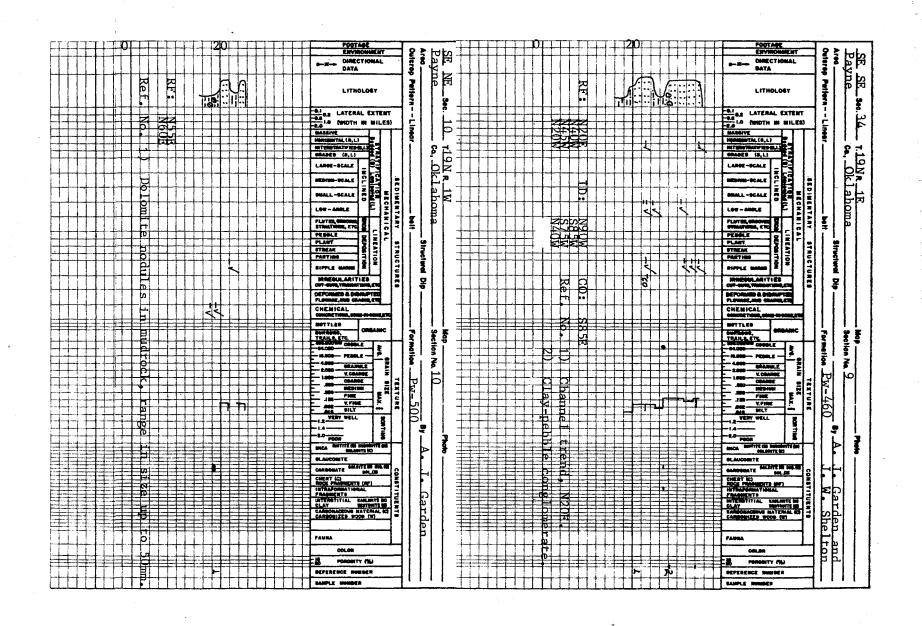
Ref. No. 1) Springs and seeps from lowermost sandstone.

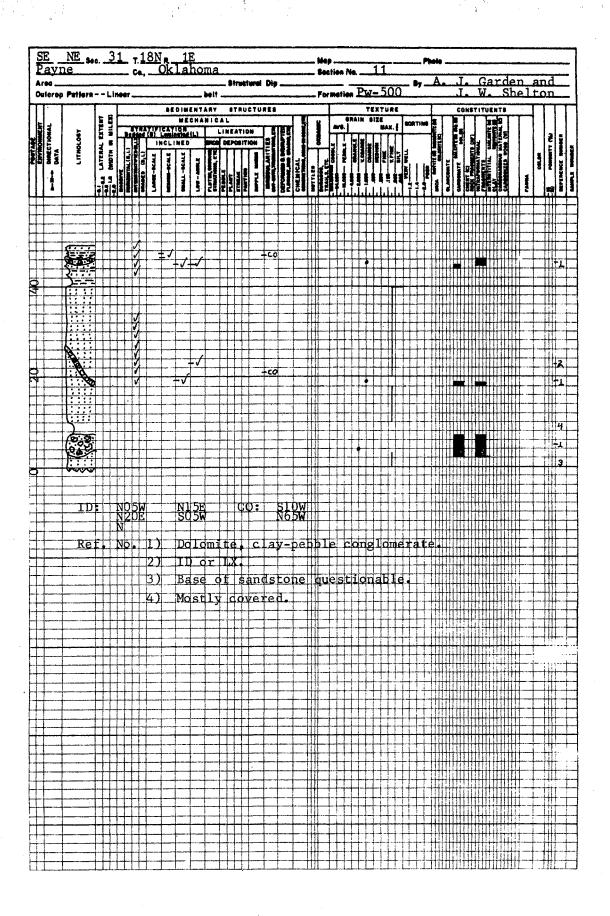
2) Fe_2O_3 stains.

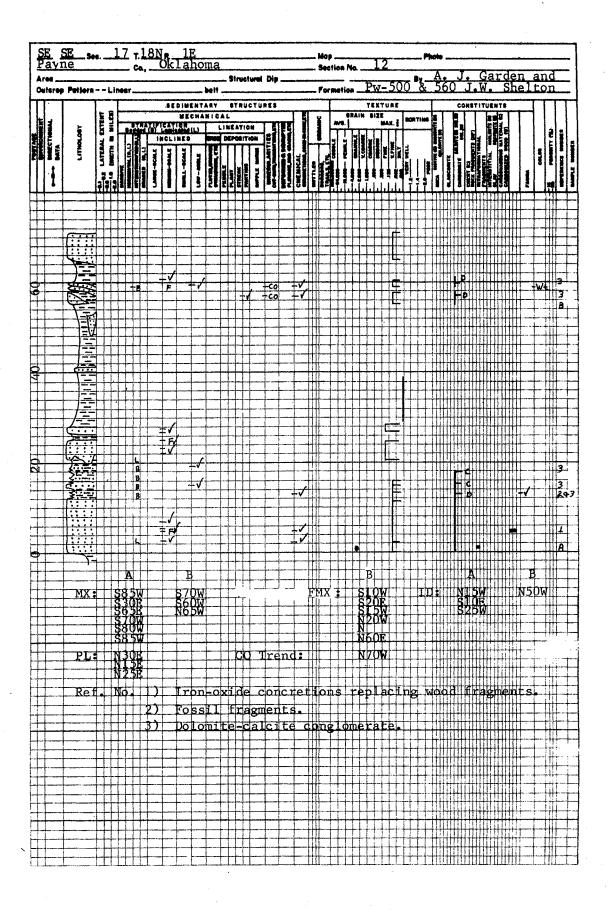
Mostly covered.

T		Potjera		Τ				INE	MTA		8	rau	CTU	RE				y mat		TE	XT	UNE			T		COM	.I.	uEN	ar		Π	T	H
CHARLANG	P-S- BATA	LITHOLOGY	מינים מינובאיר פרודמיר ביניבאיר	E (3,43)	A 17 (2 Common of 12 Common of	Tron-servi	GL I	SECT - SCOTE SEC		Į.	A LANGE CO.	OB.IT	1011	BRESH ARITIES	SCTORES & SAMETHE	CHEMICAL CHEMICAL	Butter October	TRAM A LTC.	TOWNS TO THE PARTY OF THE PARTY		-	AX.		RTIM	THE PERSON	OL ANDRETTE	CHEST IN THE PARTY OF THE PARTY	MOCK PROCESSITS OF	MATERIAL MALENTE IN	23 ALCA 427/1806-5	FASSEA		* 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	#20mm 7.6mm
														E									\exists		Ш		Ш	###	****	###				\exists
			\mathbf{H}									+		L		1	\prod	\pm				\coprod	\coprod		\prod		Ш	Ш	Ш	Ш			111	出
												+		+	上	\vdash		\downarrow			+	#	+		$\exists \exists$		#		₩		‡	-	#	$\downarrow \downarrow$
1												#	-	+-		F		#			H	#	#	+			#	Ш		##;	‡		 	\exists
		 -	#	#	7			7				1	-	+	+	_	\prod	+				+:	+	+			\prod		Щ		-	H	₩	Ή
9				Π	Ž			7			+		-	+	-	-	-	+			H	<u>-</u> ዩ				\Box	+	+++					Щ	
干		/===	H+						_								\mathbb{H}										\coprod	1111	1111		7	-	-	
E		₫:::		\blacksquare			.J		1				V	4			\blacksquare	††		1		H	++	+			Ш	Ш			1	-	1	$\pm i$
H		/												1	-	<u> </u>		+		+	+	1					Ш	Ш	TH			-	#	71
8				$\!$									-	+ +√		1	#	#			\parallel	#	#	\perp	\prod				Ш		L	-	Щ.	
1				#					.V					Ţ	_	-	TIT	#	H	1		1	Ħ	+	111		711	Ш	Ш	1111	1	1	11	+
1		نون ا		#				-	. 1			7	ř	±/		‡=	#	#			Ħ	Ц	H	\exists		#	\prod	111			-		Щ	
H				-	V		.V -	1	.√					1				\mathbf{H}			$\overline{\mathbb{H}}$	F					Ш	Ш	Ш		I	-		
\pm									1				-	V	4	<u> </u>	╫	+				Ц	#	#		+++	₩	╫╫	++	HII.		G _n	+++-	#1
9		- {		\parallel	1			✓	_				Ĺ	+	‡	+		#	++-	#	#	+2	+	#	-++	 			##		-	YB M		+
+				#							+		-	+	1	1-	#	#		Π.	#	†#	+	+			#				-	7/3		+
+		MX:	N.	1 41.			TI):		SS			F	S	X :	 	13.5	W		R	-	$\overline{+}$	N	20	W		H	1.3	Ш	S6	ÓΨ		#	-
7			IN S							79 56			F		<u> </u>	1	80 90	W			H	\bot	N	15	W	+++	₩	₩	++++	###	-	1		
			A.							80 CO CO CO CO CO CO CO CO CO CO CO CO CO	BE.			t:	Ţ	Ti	en	<u>d</u>		Ŋ	30	E	#	+	#		Ш	+++			+		#	
			\$	5dv						у <u>ў</u>	WO		#	+	1		#	#	#	N S	65 87	W	#	1	- 1		1111	1111	1111	11 ()	+-	-	Щ	+
1				#	+				_				F	+	-	 	#	\mp	H	++-			\prod				1111	1111	IT !!		1		#	
H		Ref.	No	1.	1.		Μo	st	1	7_9	сo	ve	re	ed.	at	t	.i.t.i	0	E	1				1	Щ			II []		##	-			
				\coprod								H	\vdash	\perp	<u> </u>		₩.	#		+		#	$\downarrow \downarrow$	+	#			Щ	Ш		1	L	 -	
				#									-	+	-		#	#	++		+	#	+	1	+		##	111	##		-	†	1177	+ 1
#		<u> </u>		#							+		t	+-	-	+-		#	H	H	 	Ħ	#		111	1 3 7 1		1111	1111	11111	1			
F				#	H								E					\coprod				H	\coprod	1	\mathbb{H}			\prod	\prod				\parallel	
E											Ŧ	H	E	+	+	\pm	Ш	$+\Gamma$		4	#	#	1	+				Ш	Ш		1			
片				#					\exists		+	H		+	-	1		#		1	#	++	#		#	##	#	Щ	##	11	1_		Π	\dagger
+				#								+	+-	-	+	†	Ш	#		+	+	H	++	+	-	 	##		+ + +	Щ	+	1	H	
#													L	E	-			11	Ш				Ţ	\exists	Ш		Щ	Щ		1111	-	ļ.,,	-	
H				H	H						\perp	H	E	F	1		壯	\pm			H	H	\Box	+		Ш	#	+	111	ш	-	-		
\equiv				H	H								-	‡	-		#	#			1	#	+	\mp	1	#	##					-	Ш	± 1
1					#				_		#		-	‡-	+	+	\parallel	#		+	ļ - ļ -	+	+	#		H+-		##	+-+	114		-	111	+1
			#	\parallel	1						+	H	‡-	†-	+	+	#	#	+		H	Ħ	Ħ	#1	++ 11		111	H	++	++++	-		##	+
<u> </u>	<u>. </u>	L	<u> </u>		<u></u>	L	·		1		ا		—				للنت		نسه					ند. د								•		

				SEDIME		STRUC	TURES					XYURE		\Box	ÇOI	1871748		口	T	П	
5 3		CATTENT .	370.47	NEO.	HANIGA	L MEATIO		TEC 1	1	440.	IAIN SI	MAX.	9081	100	2		9				
TOPT AND A SECOND	LITHOLOGY		1 130 1	INCLINED	-	DEPOSITH			-				- i						- { ≿		
26 13	5	LATERAL						13 5		3	6 3 8						1				
		3 3						12 8	E			### .1.1.1			2 B	교리를 다음을		1	24	ij	l
			###		##	####	_		-				++1						-#	-	1
- -			1111		1	###	4	- -	#			##	111	7#	111111	111111			4	-	1
			111	111		 	+	1	#	#		\Box	\Box	 							
	Æ			111		1111			1111			-		7#				-			}
H)=					444	-			H											
8	<i>f::::</i>																				}
H		HH						1									Ш			2	}
								-7	1111					-+						2	-
				+4								111			ШШ						1
	1.40.0b			#5-1	J	<u> </u>	_		Ш			1#	1	1#	\mathbb{I}					4	1
	97;:= 		17/	111			_		卌			###	##	1111					-		
				+++					#-			###		.1111	ШШ	ШШ	ШШ		-#		1
	ID:	S	5 5W	MX:	S	ow	S	X: .	9 7.5	W.	I P	1	S	3RW					-		1.
	Ref	N	2, 1)		77	15.1		nolo	1111	atte	2#	 						14	-11		1
				300	m w	Fb ¢	alc	nglo	Щ.							st į				Η-	}
			(2)	Dol	omit	e co	ncr	etic calc nglo th c	ns i te	in	san	dst nt	one	≥ up	ţο	100	liniini .				}
			3)	Cla	y-pe	bb16	co	nglo	mer	ate	in	sa	ınds	ston	e;	larg	est		$\exists \parallel$		
<u> </u>			1111	peb	ple	7 5mm	ı wi	th c	alc	ite		1								1	
1		Note		He ₂	O _g ce	ment	ed	sand	stc	ne	010	CKS	; a		se						1
			++++ -	###		1111				##				###						-	1
			##		_		#		#			###	411						711		
			###	111		1111			##-	H	+1-	- -	+	-144	Щ						1
H- -			+H+						-	H		± 1		-++}}	╁╫╫		HHH		-11		}
														1111					_#	<u> </u>	1
									卌					111				:			İ
			111				1							1111					Щ		1
#	<u> </u>		###			####	+-	1-	-	##	+++	111	4#	###		#####		7	-##	#	1
						###	_		Ш				##	1##						1	1
#=	ļ ———		###	++-		+++	-		-	\mathbf{H}			\blacksquare						111]
H																				: ! - :]
														 					-		1
				+					 -	壯				1111							1
H		Ш							₩-	壯			丗	144					#		1
				###	_			##	#	##		##	扣				###		#		
			1111	: 1	1 1	1 1 3 1		4		4.44.				-+++-	++++	11111111	++++++		111		1
			\mathbb{H}	444		\mathbb{H}		+-+-	₩	+++	H.			-+++	###	HHHH	++++	-+		+	1







:	<u>D 0.4</u>	<u>sw</u> me	3e c.		<u> </u>	-	T. #	.01	.	1 1a	<u>h-</u> -	mo							M	1 P			-	ר				het	•										
	رات Vrec					-	Ca,		<u>کا</u> لا	Lä	πo			ltru	lure	l Die				betic				_2			By .	A		J	•	G	ar	: d	en	1 7	an	d	_
[Juler	op Palte	rn -	- L	no	67.						bell				. 54			F	H MI	tie		Ρv	7 -	58	O	-,.			Ĵ	٠	W	•	Ŝ	hе	I.	to	n	
П	Τ	1	Т.	- 2	L				- 51	DIM				TR	J G T (RE				I				XTU	RE			I		C¢	NB1	170	H.	T9			Т	Т	Τ
	5 3] ,		BILES	\vdash	_	W	ŢŲ.	(CA)	ION	CHA			EAT	ON				ı		/O.			14	x, {		RYING					MTEACOMATIONAL PRACOLITY	::	2	Τ	٦		1	
3	DIRECTIONAL	LITHOLOGY	1	3	۲		1		HCL	INE			94	P001	7141		li		1	7	1	1				Γ		770		CARBONATE PERMITS SEL	1	4			1	- [ş	
701100			7474	(MICTAL BE		MERCHANIST (8°C)		3	3	3	,	PUTTE, CT.	П	П	1	ā	PLANE AND	,		الإي	1			Į	1	THE MENT			١,		E	1	1	9	-	J	300	PORCETT CIG.	
П	1	İ		, 9	ž	É	SEASOES (B.L.	LABOR-BOALE	Marie Peal	PRELL -BCALE	100 - MBLE	Į.	빏	. 3		1	H	CHEMICAL	11.6	뵕	1		4	Ш	 # 5	Ę			O. AUCOMITE	Ī	먇	H	Ē			- 4	8	8	PETER NO.
Ц	Ī	1	Ę		ä			3	1	1	3	ŞĒ	E	Ē	1	E	55	5	2				ΪĪ	- ب ارا،	ı.	Ì	1	1	3	3	翻	ŧ	13	3		TAUR.	Į,		5 3
H	-	+-		+	F	H	-	F	-		-	\vdash	H	\overline{H}	-	H	F		₩	H	Ŧ	-	H	+	Ŧ	Ħ	\Box	4		H	П	\blacksquare	\prod	Ш			7		+
H	1	1,-	-	7	1		1		1	-			H	11			Ι.		#	#	1		\Box			Ħ	\sharp	#		Щ			#	Ш			#		#
Н	1				Ė	ľ	_		7	1			廿	\perp		<u> </u>			#	\pm	\pm		\vdash	\pm		\perp	Н		Ш	Ш	Hi	Ш	Ш	Ш			\pm	H	<u>+</u>
Н	士			\pm	1	Н	+	_	√ √ √ √	V	_			1	1	1			╫	\pm	+-	-	H	+	#	╁	+	+#	+++	111	+++	₩	₩	Н	#		-	\parallel	+
Н	\vdash	1		\mp	F	H	-		_	Ξ,		_	H	\Box	-	-	-7		#	H	Ŧ	H	H	\perp		-	\prod		Н	Ш	Ш	Щ	Щ	Ш	#	-	-	Щ	-
ğ	#	6:	•6	7	#	П	#		-	₹			H	\Box	#	1			#		#	II.	Ħ	\mp	Щ	Ħ	\sharp	1		Щ		##	Щ	Щ	Щ	#	\Box	Ш	土
Ì			=	\pm	1		#							\sharp	_	士			#	<u> </u>			##	± 1		廿	\perp	1	Ш	Ш	#	Ш	₩	Ш		_	+		1
Н	+-	+	+	+	+	Н	+	-	├	-		-	╫	╁	╁	┝	 	+	₩-	╫	+	+	╁	+	+-	╁	+	44	#	+++	₩	₩	#	Ш	# -	+	-Ŧ	#	+
H	 	- 5	X:	7	N	7	ıw			NZ	ΩW		H	М	x :	Ι,	350	JW.	#	\mp		514	\Box	Ė	Ļ	-	514	111	##	Ш	Щ	#	#		#	_	1	#	
	1			#	Š	5	W			N4 S2	5W		I		•		\$50 \$7 \$7	\$W	#	#	Ú.	5W 5W	\Box	\dagger	Š	6	W	Ш	1	Ш	Ш	Щ	Ш	Ш	Щ	_	1	Ш	1
Н	_			\pm	N.	#	W							$\pm \pm$	1	t .	ŀ .	1 1		l i		1 1	11	łi	- 1	! !	11'	111	111	is	Ш	╫	₩	+++	+	-+			-
H	+-	R		Т		П	T	L)	-		са		$\Gamma \Gamma$	10	n-(X.	.de		ع ا	1	4	at		9	P -	01		SB	n	15	ŧс	4719	e.	Ш	#	4		\parallel	+
1	Œ	NW ne	Sec.		1.5	5	r3	.91	Ve.	1	N									····							_ P							101.11					***
]	ay	ne				_ (٦a,		0k	Ιą	no									•	e N	a		1	+					Ţ		~		_					
	rec . wter	op Pette		. 1 1			-	<u> </u>						iruc	ture	Dip	-		F	-			P	w.	-6	σđ	, -	. A	•	. ا		(ić	ır	ae	n.				
H	1	7			т									TRI	ICTU					Т				TU				T	_	co	WET	170				<u> </u>	_	T	_
۱	با	1	E	MILES)						WE	CHA	N I C	AL					5	¥	1	*.	AIN				908	TING	1			T	9	9	Ť	T	┪	1		
			- 15	-		. 3	I RA	7.0	CAT	OH.		i i	LINE	ITA	ON	I 5	IEE	I # II	3	L								Æ	•	F si		12	: 812	اد!		- 1	- 1.	- 1	
y	Į	1 3	19	×	Н	ч	۳	100	CLI	MED			DE	100	HON	sí	151	I₩I	ı	П	IJ	-	IJ.	П	Т			18			3		Ιŧ			- 1	- [1	2	
COLLAGE	MECTION	THOLOG	TERAL ES	OTH ME		17.0	1	3	ICLI	MED		18	DE	1	non	SIL			1	100	7	COLDE		¥	F17	ī					Con the			800a					
POUTABE	DARECTIONAL	LITHOLOGY	LATERAL	DESCRIPTION OF AN AN	me	FT24_(8,1.)	(1'8) 82	C-BCALE	ICLI	MED	3	A	10E1	001	TION	PACAMITIES .	ALCO & DESIGNATION OF THE PERS	MICAL MTTHER, ORDER	3 1	37000	- PERE -	V. COLINE	1	į	# F188	TTOM MOT	3	MANAGED CONTRACTOR	BORN TE.	MATE MEDITER	The Control (sec)		MACEDIA MATERIA	D 4004 (32)16			00.00	POROBIT (P.	1
POUTAGE	P-E- DANCCTION	LITHOLOG	CALLES LATERAL ES	ALLO DESCRIPE MINE	PARKINE	Implemental (8,1.)	(1'0) 020700		ICLI	MED	1780 - 100 T	STREET, CTC.	1 A SELEC	-00	TION I	DRESULARITIES OF ORL TREATMEN	PLANNEL AND GLAND	CHEMICAL CHEMITANE, ORDER	Deference One	370000	H.000 PERM.	C. COLABOL	3		200 LF100C	TIDA AKIA BIT		MCA BROTTE ON BROTTE SCO	e. Automite	CAMBONATE SALBITES	MOCK PROPERTY (SE)	C. L. C. C. C. C. C. C. C. C. C. C. C. C. C.	CANONADORA MATERIA	CAMBORIZES WOOD OF	1111	PAUM	1	H	2) Mary 1, 1988
POUTABE		LITHOLOG	LATERAL	TATOM TO THE REAL PROPERTY NAME OF	BARRINE	Material (8,1.)	(1'0) 0247900	Treat-serv	ICLI	MED	278er-301	FLUTCh COMPANY	DEL TANK	- TEA	non a	COT-COTA, TRANSPORT	PLETONICO & DEFEND	·	Separate On	37,0000	- N.000 - PERS. 2	LACO COLLEGE	200000		1 SEC. T.	TIBM MEM BETT	T1100	CALLED THE CALLED THE	0. A##0##7E	CAMESONATE SALINTE SI SALINE	COCK PROPERTY (SC)	F1446011	CANONION INTER	CAMPONIZES WOOD OF				The second second	SAME TIMES
POUTAGE		FOTOHUT T	LATERAL	THE PERSON IN IN IN	BABBINE	Interestative (0, L.)	7 (1'0) 030000	Trope-servi	ICLI	MED	27800 - SOT	FLUTES, COMPANY STRUCTORM, CTC	100 L	386	10H	ONT-GREAT TRESSESSES	PLANTED & DESIGN			370000 00000	- NOOD - PERM 2	CAN COAME			1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	TIZM MEN.		ASSET OF SECULOR SECUL	0.AU00M1E	CAMBONATE BALIFTE	Contraction (sec	711400CHT	CAMPORAGENCE MATERIA	CAMBORISES WOOD OF					Charle Printer
POOTAGE		POTOMJ17	LATERAL	M HIDTH M M	BARRINE	Introduction (8,L)	(1'0) 020000	THOSE-SCHIT	ICLI	MED	27800 - SO1	FLATES, COMPANY ST	3750	NUMBER OF THE PERSON NAMED IN COLUMN 1	Table 1	OT-OFF, TREMENTAL	PLYMETE & DEFINE			370000 00000	- NA29 - PERE E -	CASO CAMBEL	388785 - GS		2012 SELT	TIZM MEM PL		MCA BROTTE CO BESSET	9. AMBORNTE	CAMEDONATE SALERTE BELL	SOCK PRESENTS (AC)	118200111	CAMPONAGENCE BATCH	STANDONISCO MODE					COMMENT THE STATE OF THE STATE
POUTABE		11.	LATERAL	M MICHAEL BEST M M M	BABEIVE	Management (8, L.)	0 (1') (1')	Treat-acets	ICLI	MED	273mr-iso1	FLUTES, GREENING TO	71001	OLIVERY CONTRACTOR	The state of the s	DESCRIPTION OF COTORS, TRANSPORT	PLPONESCO & DIBRILIP			379800		CANAGE CONTRACT	300000			773m AKSA 81		CARLLEG THE VOICE VOICE CO.	91/800/812	OAMBONATE BALIFTED	SOCIAL PROPERTY (ACT	(CAAAAC W 1	E CAY	EL SOOM CEENINGSPEC					Charle District
POOTAGE		Тиного	LATERAL	TOTAL DESCRIPTION IN IN	Beautiful	Application (0, L.)	(1'0) 63690	2 2700a-38001	ICLI	MED	F1007 - 607	PLATES, CREEK			THE PLANE	MACOULANT TES	PLANTED & DESCRIPTION OF PRINCES			370000 444000	- 1 1000 - 1000	CARD CRANCE	- C - CONTROL			773m ASSA 71		CONTROL OF TAXABLE AND ADDRESS OF TAXABLE OF	61.AUG0817E	CAMBONATE SALINTER	SOCIAL TRANSPORTED (SPC)	FRANK NT	CLAY CONTROL OF THE PARTY OF TH	2) 4004 (32)1608775					COMMENT OF THE PARTY OF THE PAR
()			I I I I I I I I I I I I I I I I I I I	THE PARTY IN IN	BATHE	A (1) (8) (1) (8) (7)	(1'0) 024700 (1'0)	Z Z Z Z Z Z Z Z Z Z Z Z Z Z Z Z Z Z Z	ICLI	MED	27807 - 207	PLATER, COMPANY, CT-2		201/2/15	TION TOOL	IMMEDIALARITY ES	Paris de Constant			170000 garage 7	- 1000 - PERSON	COARSE COARSE	200000 -020			TIZM ACIA ACIA		CONTRACTOR TOWN	21.000m12	CAMBONATE SALBITES	SOCIAL PROPERTY (SC)	F01400011	CLAY CONTROL OF THE CAMPONIA BATTER	N 400# (12)H0#975					Comme Diagram
(4L)			LATERAL	TOTAL DESCRIPTION IN IN	Baserve	TO THE PROPERTY OF THE PARTY OF	(1'0) 02000	279730-384971	ICLI	MED	7 TOIS - 1001	S CALLET CASE	LEST LEST	3357	TON STATE STATE	DIMESMIAANTT ES	Americ des Tanant L			370000 944574	- 2 MEZA 000M PERK 2	CONTRACT CONTRACT	Obvior Con			713m AUDA 8 1-		ACT THE PROPERTY OF PERSONS ASSESSMENT TO SERVICE THE PERSONS ASSESSMENT T	0./weom/1E	OAMBONATE WATTER	SOCK PROPERTY (SC)	F84696 17	777 C. C. C. C. C. C. C. C. C. C. C. C. C.	N ecca (1216GEV2)					
14.0			I I I I I I I I I I I I I I I I I I I	THE PROTECT OF THE PROTECT IN IN	BARRINE	Managental (8,1.)	(1) (1) (1) (1) (1)	Trope-seems	ICLI	MED	Tam-301	PLATES, COMPANY CTO, CO.		2007	TON GREEN TAGES	MARSHA, ARITH ES	PETCHAND & DRIVER			370000 (40070)	- 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	C EAST CONTRACT	- CONTROL			TIZM AKIM BETT													Communication of the Communica
10 (10)			1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1	ATOME OF THE PERSON NEWS	BABEINE	(8,1,2) (8,1,2) (8,1,2)	(1) (1) (1) (1) (1) (1) (1) (1) (1) (1)	Z Z Z Z Z Z Z Z Z Z Z Z Z Z Z Z Z Z Z	ICLI	MED	278er-207]	FLATO, CONTRACTOR OF STREET		- 08 / 1	TON BEEN THEIR	IMPENIANTIES Cor-cort/Tressmina.	Amena e Cannol II			370000 (6010	- 1000- PERC	CAMPLE CAMPLE	- Career			773A AZIA ⁸ 1													Comment of the commen
(4D)			I I I I I I I I I I I I I I I I I I I	O CHIOTH M	BARRINE	Management (8, L.)	(1'0) 030000	ZYPOR-DARFY]	ICLI	MED	- 100 - 100	D Branch Carlot		387	TON THE PLANT	STATUTE OF CONTRACTION	Americ des Samoria			370000 000000	- 1000 - PEREC	CANAGE CANAGE	CONTRACT			TIRA ACOL BY													
POUTAGE			- ATTEND	2 1000TH MI W	Separate Sep	1 (7) (8) (1) (8) (7) (7) (8) (7) (7) (7) (7) (7) (7) (7) (7) (7) (7	(1'0) 02000	279730-200971	ICLI	MED	278er - 607	TLYTCh Charge		2017	TON THE PARTY OF T	83 (1) AAL JANGARAN	America dos Tuestoria			370000 (1,107)	- THERE 1000	P. COD GRANELE	- CO-100			173A ACCA 51													
				200 1 200 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2	PARETYE	The control of the co	C.C. C.C.	27700-20097	ICLI	MED	Tam-201	CTUTAL COMPANY CT			TON STATE THE PARTY OF THE PART	IMPERIALITIES CON-CONT. CONT. OUNDS & DEMAN	-V		170000 and 170	- Table	CONTRACTOR CONTRACTOR	- CO.			TIM ACCU.														
7.0)				E HOLL O LEGIT E	I BARBONE	Application (19,1.)	Company (a)	7797-30071	ICLI	MED	- 100 - 100	DE STATES COMMENT CLS	La La La La La La La La La La La La La L		TON SEPT TAKE	MACSULLATTIES OF COT COTT. TREASTER.	Amen a Canonia	-V		370000	- 1000 -	CONTRACT CON	204W00			TIME ACCES.													
				THE REPORT OF THE PERSON AS A PERSON AS A	Madrie	(C) (S) (No. C) (S) (S) (S) (S) (S) (S) (S) (S) (S) (S	Company (Co.)	2 27920-20077	ICLI	MED	77600 - 2071	DE TOLUMNIA		77311	TON SEPTE TAGES	INDEDITARITY ES	America estimatura	-V		370000	- 2 m24 - 600	CALANCE CONTRACT CONT	CONTROL CONTROL			TIAN AGAN BIT													
				THE PERSON IN TH	- Invative	(1) (1) The control of the control o	(1'0) (2'0)	Trop-part	ICLI	MED	278m - 607]	DO COLUMNIA CLO			TON	INTERNATIVES	STATES & COMMONDER TO THE STATES & COMMONDER TO THE STATES OF THE STATES	<i>y</i>		370000 control	- 1000- P201.	CALNUL COALUL	- CONTRACT C			TIZM AUGUS T											†		
				M M MORAL OF THE MANAGEMENT M M	3. A PATRICIA CONTRACTOR CONTRACT	(C) (S) (C) (S) (S) (S) (S) (S) (S) (S) (S) (S) (S	(1'0) 0.0000	Treat-beer 1	ICLI	MED	73m-207	D monato			TON THE PLANT OF T	ESTATION AND THE CONTROL AND T	America en Turneria	✓ - ✓		77000 (MINISTER)	- 7 1000 - 0001	CANNET	- CONTRACT C			TIAN ALLE											†		
				M M M M M M M M M M M M M M M M M M M	JAMPOTAL I	(7'0) (10'1)	(10) 02000	27772-20077	ICLI	MED	7300-207	B manufactive (standard)			THE THE PARTY OF T	STATUS AND AND AND AND AND AND AND AND AND AND	Ameri e Comocifi	✓ - ✓		77000 august 7		CANANT.	CONTRACTOR CONTRACTOR			772M AETT											A RO		
				2001 1000 1000 1000 1000 1000 1000 1000	BALLINE	Managemental, (4), (2)		Tropage 1	ICLI	MED	7300-007]	D State of the sta			The Table	MATERIAL ARTITUS	Ameri e Canada	<i>y</i>		770000 gaginga 7		CANANT.				713A AUA T											A RO		
				M M HOULD GIVE	AAPSWEET TO THE TOTAL TO	STATE OF THE PROPERTY CATEGORIES	1 (1'0) 02-70-0	Tropage 1	ICLI	MED	7367-601	TLATEL COMPANY CTS			The state of the s	MACOUL ANTTE	America de Caracita (Caracita de Caracita	✓ ✓		370000 grants	- 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1	SAMM.				1724 AUA T											Property of		
				196 1961 BEDTH I	THE THE THE THE THE THE THE THE THE THE	September 19 Septe	(1,0) (1,0)	This seems are a seems as a seems are a seem are a seem are a seems are a seem	Try and the control of the control o	MED	73er-501	NG PARTY OF THE PA			TON THE PARTY OF T		America de Transcrito	ý		370000 G-00176						TIDM ALDA											A RO		
024				196 1961 BEDTH I	ON INSERTE	September 19 Septe	(1,0) (1,0)	Trouble sales	Try and the control of the control o	THE STATE OF THE S	73er-501	B Trings (Life Committee)			Tool Tool Tool Tool Tool Tool Tool Tool			ý								TIM AUM T											Property of		

SW SE see, 5 7, 19 N 1W some some some seed of the second seed of the seed of																								
Payme co. Oklahoma series No. 15 Area involved by principle by A. J. Garden and Discovery Payments Pix-520 by A. J. Garden and Discovery Payments Pix-520 by A. J. Garden and Discovery Payments Pix-520 by A. J. Garden and Discovery Payments Pix-520 by A. J. Garden and Discovery Pix-520 by A. J. Ga																					Sec.	*	, \$, .	
Payme co. Oklahoma series No. 15 Area involved by principle by A. J. Garden and Discovery Payments Pix-520 by A. J. Garden and Discovery Payments Pix-520 by A. J. Garden and Discovery Payments Pix-520 by A. J. Garden and Discovery Payments Pix-520 by A. J. Garden and Discovery Pix-520 by A. J. Ga	S	W	SE .		5 1	191	N 1V	Ī					an				P4						•	
Schwiczkie Studien Priese - Libert - Li			ne		(اا	Oklab	ioma					-	No	15			Α.	-			J		
THE THE PARTY OF T			o Pettern	L	Dear			ba!		tural	Dip	7	ormati	on	Pw-	620	By	A	J		Sl	ien iel	_ar tor	<u> </u>
The state of the s				Τ	Т		BEDIME			CTUR	E s		T					<u> </u>	co		UENTE	,	T	
The state of the s	E	7		1 E S		TRATIF	MEC	HANI		. T	RIER	5 9				x. 1 ×		8		T	2 2 C		7	
MX: N 3 NSW RP: N60W Ref. No. 1) Dolomine moderes in much services in much	¥	110	970	3 .	1 1.17		MCLINED	ERC				1 8			2 2					3				3
MX: AM NSW RF: NGUM Ref. No. 1) Dollowing machines in vuctorial states and st	2001 ERM	DATA	Ē	AT TO	100	3 3		,				¥ 8	<u>,</u>	30,	3 i !		i in			. H.	TIAL.		5	
MX: N/3h NSSW RFS NGUN Ref. No. L) Dollowing modules, rameing in eize up to 18 mg. 2 mg. 2 mg. 3 mg. 2 mg. 3 mg. 2 mg. 3 mg. 3 mg. 2 mg. 3		1						- 1	111	2								1					1	15
MX: NOW RF: NGOW Ref. No. 1) Dollaring angle 126 supply 136 states and 136 states	Ш	•	ļ	100		18 3		3 21	EEEE		8 8 4		F	44	444	تلبا	Ŧ	<u> </u>		OH XL	300		-+	-
MX: N/3W N8/3W RF: NGOW Ref. No. 1) Dollowing modules, reserving to mid-less up to -160 mm; in mud-less (1) No. 13 mm; in mud-less (2) Mostly covered.			1-1]	H	#		-	$\Pi\Pi$	1			+				+	ПП		ШП				
MX: N/3W NS.W RE: NGOW Ref. No. 1) Dollomita rodules unancing in the color much solve may in much solv	1				111	#				##		7	+		H	Œ.	+			\mathbb{H}		Ш	-	
MX: N7W N8W RF: N60W Ref. No. 1) Dolomics spdules, ranging in size of the control	1	ļ	100		114	#	111			\mp			-11			Ē	-	111		7777	1111	-		1
A B MX: N7W N83W RF: N60W Ref. No. 1) Dolomits nodules, ranging in much rock. 839W RF: N60W RF: N60W RF: N60W RF: No. 1) Mostly covered.	1		مية كبرا		Щ		14	+	###	17			-		H	=	#		11111	₩			+	#
MX: N/N NSW RF: NGUW Ref. No. 1) Dolomine nonules. MX: N/N NSW RF: NGUW Ref. No. 1) Dolomine nonules. MX: N/SW NSW TOWN RF: NGUW Ref. No. 1) Mostly covered. MX: N/SW NSW TOWN RF: NGUW Ref. No. 1) Mostly covered.	4	_			##	1		1	1111	+	26		##		H		#			Ш			+	Ą
The state of the s			-{::::‡	111	1 3	3		· V	###	+ +			44		H		##		11 1 1 1 1		Ш	##	-	
The state of the s	1		1::::		117	++-	Į, į		111	+		,	111				#			###		Ш	+	Щ,
**************************************	ij.			111	##	#-	1	=	###	+			-##		\mathbf{H}	1	#	###			Ш	##	Ι	1 2
MX: N/5W N85W RF: N60W Ref. No. 1) Dollowing modules, cameing in elege up to 100 mm; im mud-rock. 3.75W N85W TOWN REW TOWN REF. No. 1) Mostly covered.	1		7		###	11	\Box			\Box			\Box				#	Щ		$\parallel \parallel$	$\Pi\Pi$			
MX: N/3W N85W RF: N60W Ref. No. 1) Dolomite nodwies, N6W N70W S5W Tameing in size up to 160 mm; in mud- N6W S10W S75W N90W 2) Mostly covered.			\$74.9		 		1		##	1.,	#		111			5	#			Ш		##-	Sen P	
MX: N/3W N85W RF: N60W Ref. No. 1) Dolomine modules, ranging in elize up to elemin; in much solvers. N/3W N85W to elemin; in much rock. N/3W N90W 2) Mostly covered.			1000	###		++	┿╌┿		╃	+ *			-++		├─ ┿┈	-		4-444	++++	++++	+++++			
MX: N/5W NS5W RF: NGOW Ref. No. 1) Do Louize nodules ranging in #4.2e up to 100 mm; in nud- NS5W NS5W rook; in nud- NS5W N96W 2) Mostly covered.					1 1 1	7	++		++++	+-+					1		-+		++++	₩		++++		Hi-
							B										#							111
			MX:	Ŋ	A / 5W		NTR SU		RF		760W		lef.	No		1)	Do I				o di	ıle,		111
			MX:	N N N	/5w		NTR SU		RF		160W		lef.	No.		1)	Do 1		1 1 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6		040	ile:		111
			MX:	ZZZZZ			NTR SU		RF		V6OW		le f	NG H		1)	Do 1	on an o o	111 80 100 k.	i i ig n	0 4 m	ne,		up d-
			MX:	ZZZZZ			NTR SU		RF		V60W		lef.	No		L)	Do 1	on an o o	111 80 100 k.	in in in in in in in in in in in in in i	odi in ere	I e.	zė mu	up d-
			MX:	ZZZZ			NTR SU		RF		160W		le f	ŊĠ		1)	Do 1	on an o o	111 80 100 k.	n le le	odi di e i	I e	zė mu	up d-
			MX:	ZZZZZ	**************************************		NTR SU	I I I	RF.		N6 OW		ef.	ŊĠ		1)	Do 1	0	111 80 100 k.	a n 18 2 m	odi in ere	Le: s: i:n	s, ze mu	up d-
			MX:	ZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZZ	*SW 550 S		NTR SU		RF		N6 DW		Ref.	NG		2)	Doll r	4 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	111 00 00 k	19 18 10 10 10 10 10		•d•	s, ze mu	ip d
			MX:	N N N N N O	**************************************		NTR SU		RF		76 OW		e f	NG		2)	Doll r	on an o oc t1	11100 k.				s, ze mu	P.d.
			MX:	ZZZZO	A 553 553 553 553 553 553 553 553 553 55		NTR SU				N6 OW		le f	No		2)	Mos	om an o oc t1	######################################				s , zé mu	Hap-
			MX:	N N N N N	75W		NTR SU				N6OW					2)	Mos	om an o oc t1	######################################				S, ze mu	up d-
			MX:				NTR SU				V(6 OW					2)	Do la la la la la la la la la la la la la	om an oc t1	<u>1111</u>	2	odn Heir		S 2 2 2 mu	up d-
			MX:				NTR SU				NG OW					2)	Do la la la la la la la la la la la la la	om an oc t1	<u>1111</u>	2	odn Heir		ze mu	up d-
			MX:				NTR SU				NG DW					2)	Do II	on an oc t1	1111 8111 k.		ers		ze mu	up d-
			MX:				NTR SU				NEOW					2)	Do II	om an o oc t1	######################################		ere	1	S & P P P P P P P P P P P P P P P P P P	up d-
			MX:				NTR SU				NEOW					2)	Mos	om o o t 1	######################################		odin Ha	4	S ; ¿ ¿ · mu	up de-
			MX				NTR SU				NG OW					2)	Mos	om o o t 1	######################################		odin Ha	4	S ; Z e mu	up d-
			MX:				NTR SU				N6 DW					2)	Do I	om oo t1	11000 10000				SS 9 Z C muu	up d-
			MX:				NTR SU				NEOW					2)	Do I	on and o be	11:40		odin in ere		Se a ce ce ce ce ce ce ce ce ce ce ce ce ce	up d-
┧╏╸┧╶┈╸┞╏╏╏╏╏┩┩┡┈╿┈╏╸╿┈╏╸┪┩┞╿┇╸╃╸┦╸ ╏╍╬╬ ┍┩┢╇┢┆╏╎╎┦┦╗╛┦┩╟╟╟╟╟╟╟╟╟ ╟╟╫			MX				NTR SU				NG OW					2)	Do I	on and o be	11:40		odin in ere		Se a ce ce ce ce ce ce ce ce ce ce ce ce ce	up d-
┧╏╸┧╶┈╸┞╏╏╏╏╏┩┩┡┈╿┈╏╸╿┈╏╸┪┩┞┞┇╸╃╸┦╸ ╏╍╬╬ ┍┩┢╇┢┆╏╎╎┦┦╗╛┦╣╟╟╟╟╟╟╟╟╟ ╟╟╫			MX				NTR SU				NG DW					2)	Do I	om an oc t1	1144 814 944 144 144 144 144 144 144 144 144 1		ada in m;		se de la companya de	Up co-
┧╏╸┧╶┈╸┞╏╏╏╏╏┩┩┡┈╿┈╏╸╿┈╏╸┪┩┞┞┇╸╃╸┦╸ ╏╍╬╬ ┍┩┢╇┢┆╏╎╎┦┦╗╛┦╣╟╟╟╟╟╟╟╟╟ ╟╟╫			MX:				NTR SU				N6 DW					2)	Do II	on o t 1	114 110 110 110 110 110 110 110 110 110		odi in m;		se de la companya de	Up co-
			MX				NTR SU				NG OW					2)	Do I	on su o o o o	114 811 10 10 10				s, ze int	up de
			MX				NTR SU				NG DW					2)	Do I	ora sur	114 110 110 110 110 110 110 110 110 110		odi in m;		S, Zè mu	up de

1	ayı	SE 🐝			_ Ca	à,	Ök	1	ah	on	ıa.								_	Maj Sec		N	٠	1	5_				hate A		-		· · ·		_			3		-
Are		Petiern	L	nec	·····						belt		itro	etw		Dip				For	-	ion	P	w-	-6	20	ς'	By	عد	J.	•	w.				to				-
1				1			.1	8 E D	iMS				TR	Ų C 1	UR	E S	_			-				TEX	_			_	_	_	CO	MET		NYE		-	1			H
	.]		CATERAL EXTENT (MOTH IN MILES)						M 2 C	HA								Γ!	Г	ų.			MIN		E		908	71105			1	T	18	90	T	Т	1			
POSTABLE ENT		ě	EXT.		4	ΥX	1	ATIC	444	F	_		_	ION	4		2			OMBRE	**	,,, ,		Т	MAI	-			1	ı		4						2		П
	2	LITHOLOGY	A S		ᅴ	_}	INC	LIN	¥ 1			h	T	TIO	Н			li	-	_	ž			ij		* F 28 E	3				5 1		1 3				١.	Ē	ı	1
		5	LATERA			8	E-BCAL	ĕ	\$	- MBB.E		Ш	П				ALTO A DEPOSATE	3	١.	7	8	1	X, Charles	8	3	7	Ĕ	l le	Marrie Can	Ĕ	ij,	, ii					3	1	7	
11.	1		23	151		3	i H	8	MAL -BCALE		FLAFER, 8	7.000			7	ij		CWEMICAL	1	TRAME CTC.	į	İ	į	ŧ	自身	i			á		CAMBORATE METITION STATE	CX PROPERTY (NE.)	I	CLAN MATERIAL IN		1		CAS TREASURE CALL		
11	-1		7 7	Щ		4	3		-	ţ	5.2		15		_	į	85	ů		3.5	ů.	μļ	ΨĪ	4	4	44	İ	H		•	8			CAMMA	1	1	L	17	•	
\pm	\perp			\pm		1		_				Ħ			\exists				\blacksquare					\pm	\Box	+-		+	Ш		Ш	Ш	Ш	##	Ш		L	Ш		
		v		\mathbb{H}		+	-		-		-	H	-	+	-			-	#		-	Н	+	+-	H	+	4	+	+ + + + + + + + + + + + + + + + + + +		₩		₩			+	\vdash		-	H
#				#		#		1				Ħ		1	_				Ш			H	\Box	1	\Box	1			Щ		#	#	Ш	Ш	Щ	<u> </u>	1	Ш		
++			++	+	+1	+	-+	-	-			╁	+1	+	-	-		-	\mathbb{H}		+	H	Н	+	H	+-	+	╁┼	+ + + +	#	₩	₩	₩	+++	+++	+-	┼-	\mathbb{H}		Н
17				H	-	7	1		_			H			4			F			H	H	H	Ŧ	H	\blacksquare		H	Щ	\prod	\prod	\prod	\prod	Ш		Ţ	F	\prod		
+		1931		\perp	V	\pm		-				廿		\pm	-	_	_	V				П	\forall		\Box	1		廿						Ш	Ш	-	-	\coprod		
4		1//	++	+	- 1	+		-	-			₩	Н	4	\dashv			-	+		-	++	╫	+	Н	- -	+	╁┼			₩			НН	++i	+	-	╫	-	\vdash
	\exists	7=	口土	#	\parallel	1		1				口		#	_			1				H	\Box	1	#	1		+	Ш				Ш	Щ	Щ		1			-1
++	+	+==	H+	+	-+-	+		+	-			╁	+	+		-		+-	\mathbb{H}		+	╁	+	+	+	+			+ + + +	Н	╫	₩		HH	Н	-	+-	₩		-
		eoc	П	П		7	-	-				H	\Box		_			-	4		T	H	\blacksquare	_	H	7	Ţ.	П	\mathbb{H}			Щ.		Щ	T	1	Ţ.	Щ	5	
+	$\equiv \uparrow$	1000		#	1	1		_				廿	1	土	j			T	#			Ħ	廿		Ħ			<u>tt</u>	Ш		Π	111	Ш	Ш			1-		5 .	
-11		4		+		+			-	_		╁┽.	Н	4-	-			<u> </u>	4	-	-	╁	+	+	┼┼	+	+	┼┤.						HH			+	Н,	-1	\vdash
a l		<u> </u>			V	士		1		_									Ш					I	Ħ	Ì	I		Ш		Ш							Ш		
+			┞┼┼	+	-++	+	-+	-	-			╁	+		-			┼	+		+	╁	+-	+	+	+	-	++	₩			₩		\blacksquare	+	+-	+	\mathbf{H}		\vdash
				\Box				1		_		11	T	T	7			1	\mathbb{I}		1	П	П		П		T	\Box	Ш	Щ	Щ	Щ	Ш	Щ	Ш		İ			П
++	\dashv	 		+			+	-+		-	-	$\dagger \dagger$	+	+				-	+	-	H	Н	\dagger	-	H		+	tt	丗	Ш	₩	₩	Ш		+++	+-	1	1:1	1	
11	=		Щ.	11	7	-						H	П	4	-			_	Ш	-		-	+	+	+	4	+		Щ	#		Щ	Ш	Щ	-		Ļ.	\mathbf{H}	-	Н
					Ш	1	士		1			廿		_					Ш			Ц	П					茸	Ш		Ш	Ш	Ш		Ш	1	İ,			
H		ket.	No	•	1		<u> 51</u>	X:	-1	nc	<u>n</u>	ļ.Þ	ę٥	1:	-1	0	5 S	L	4	Ÿ	CU	L,	-0	41	+	þΣ	7	sa	nd	S	tρ	13K	1	10	a	me	₹1	•		Н
廿					2)	No	di	uΙ	aı		ф	Τ,ς	2111	i	e.	Ъ	ec	Ľ,	1_			\Box	1	П		I	II	1,11	Ш	Ш	Ш	Ш	Ш		1	-			
++	\dashv		\vdash	+	+	+	-+-	+	-			╁	+	+	+			-	₩	-	+	H	+	+	${}^{+}$	+	+	++	++++					Ш	#	╁	╁		-	\vdash
#				\blacksquare	1	1		7	_			П	\Box	Ŧ	1		_	-	\prod	<u> </u>	1	H	H		H			H	Ш	4	H	\prod	Щ	Щ		F	L			
+	-+		++	+	+		_	\pm			_	\vdash	\pm	\pm	-			_	Ш				$\dagger \dagger$	1	Н			\Box	Ш	Ш	Ш	Ш	Ш		Ш	T	L	Ш	-	
\Box			\square	H	\Box	1	4-	_			_	H	$\overline{+}$			-		-	₩	ļ	+	H	H	+	H	-		₩	₩		₩		Ш	+++		┼	┼-	₩	-	H
				П		Ι,	\perp	\perp										L	Щ		I	П		1	П			\Box	Щ	Ш	Ш	Ш	Ш	Щ	Щ		1	111		
			H +	+	+	+	-+	+				++	+	+				-	H		+	++	+	+	++			H	Ш	#	Ш	#	Ш	Ш	-	+	\pm			Н
			Ш	\prod		1						П		-		_		<u> </u>	Щ		Ţ	H	\prod	Ţ	H	\Box	1	Ц	Ш					Щ	Ц.	Į	L	\mathbb{H}		
++				\pm		+	士	+				廿		\perp					₩	<u> </u>	士		Ħ	1	#		1	11	1111	111	111	ĦĦ	Ш	Ш	Ш	+-	1	##		H
H			$H\overline{I}$	+			\mp	4			_	H	+-	+		\dashv		 	H	-	-	H	H	+	╀			1		11	111	111	1111	1111	111	+	+	ΤŢ		H
1	_		坩	#	\parallel	#		\pm			_	#	口	丰		二		†	Ш			Ħ	H	1	Ħ		7	Ħ		Щ	#	H	Щ	44		†-	1-			口
+++			++	+		+	\dashv	_	_	_	_	\vdash	+	-	-	_		\vdash	+	-		Н	Ш	1	Н		1	\vdash	Ш	Ш	##	\parallel	Ш	Ш	Ш	+	+-	+1+		H
77			Ш	\Box	\exists	7		4	_				-	Ŧ	7	-		F	\prod			\prod	F	T	11	H	Ŧ	FF	Щ	₩	#	\prod	H	H	H	1	!		-	
			廿	\pm	廿	1	_	\pm			_	H	廿	1	1	_		<u> </u>	#	1		廿	Ħ	1	Ħ	\dagger	1	1-		#	Щ	#	Ш	Ш	Щ	1	Ţ.	1		口
4			1	\mathbb{H}	+	+		+				H	+-	+-	-+				₩	ļ		++	H	+	H	+	+	1		╫	₩	₩	HH	₩	Ш	+	+	1#	-	H
				\sharp	#	#	_	#				#	Ħ	1	7						7	H	11	1		1	#	H	Щ	#	111	Щ	Щ	Щ	Щ	1	1			\Box
++	\dashv		+++	+	++	+	+	+	-		_	H	+	+	+			-	H	-	+	\vdash	$^{\dagger \dagger}$	+	+	-44	+		Ш	Ш	Ш	╁	Шt	Ш	1	\perp	T	111		\exists
#	_				\mp	丰	1	7	-			H	\exists	7	-	_		-	\parallel	F	1	H	H	Ŧ	H	\mathbb{H}	-	H	1	111	411	111	1111	Ш	111	ī	F	П		H
$\pm \pm$	士				廿	士	士	_				Ħ	廿	#	\exists				Щ		1	H	#	1	Ħ	#	1										L	#		口
H	7		HŦ	+Ī	- 7	+	Ŧ	+		\dashv		H	\mathbb{H}	+	-{	\dashv		-	H	+-		1	+	+	+	+	+-	++		₩	╫	₩	₩	HH	Hi	\vdash	┧			:
廿	\exists			#	井	1	#	#				H	11	#	7			ļ	\parallel	\Box	1	Γİ	$\parallel \parallel$	1	Ħ	\blacksquare	1	H	Щ	1	Щ	#			Щ	F	-		ļ	. 1
+	+		+++	H	+	+	_	+	\exists			H	1-	+	+				Ш				\pm	1		\pm	1	H	Ш	Ш	#	Ш	Ш	Ш	+++	+_	+-	##		Н
4	_			11	\Box	I	1	4	_			П	П	T	7	_		E	Ш		Ţ	П	П	Ţ	H	\prod	Į	H	Щ	111	#	Щ	Щ	$\mathbb{H}_{\mathbf{i}}$	Щ	ļ	L		ļ	
+	-+			+	\pm	\pm		\pm	_			廿	\mathbb{H}	\pm	_				Ш		+	П	Н	1	Ħ	-1 5	+	IT	1111	111	Ш	ĦÌ	111	Ш	111		1	1.1		口
1			H	H	\exists	+	4	7	7	\exists		H	H	\mp	7			F	H	+-	-	H	H	Ŧ	H	+	+	H	Ш	₩	Щ	Щ	H	Ш	4	-		Ш		H
+	\exists			\forall	± 1	土		+				廿	Ħ	士	1	1			\mathbf{H}		1	1	11		廿		1			Ш	1#	Ш	+++	##	T!	1_	1			口
177			Ш	IJ		\perp		_	- -[Ц	44	1	_			<u> </u>	Щ		+	11	44	4	1-1	+	1	₩.	Ш	Ш	##	Щ.	Ш	##	44	ļ	ļ			Ш
++			1		- 1 1	- 5		- 1	- 1	i		1	1	1		1		:	Ш			! !	1 1	- 1		1 1	1	1 1	1111	111	. 1 1	1 1 2	111	1 1	11:	1	ļ	111		

	Petiern					HAN		RUGT	URES						-	PTING			87170	NTS	lr	П	T	H
FROTTARE ESPRICEMENT AT ENTRY	LITMOLOGY	TATE OF TATE O	10,13 10,13 10,13	11.0 P. C. C. C. C. C. C. C. C. C. C. C. C. C.		100 - Marie 1		ATION SELTION		CHEMPCAL CHEMPCAL	The Late		3 mm	MAX.	TANK MEET		108	CANADAMATE	Chester Constitution of the Constitution of th	C) THE SAME OF THE	1	Cale	STATE OF THE PERSON	
					1	\pm	\pm		++					++-		#		#				-1		
													\blacksquare								E		II.	
	<i>- أ</i> لبر			11	+	+	#	#	14					+							#			
8			_V					\coprod				\Box												
					, -	+		#	++			++	##			#								
					F			$oxed{\pm}$														H	ļ-	
				##	-		#	#	+			###	\parallel			++-	Ш		###					
	منسا																	Ш					1	
		#		##		_		#	++			+ + +	+++	##			###				# :	1	<u> </u>	
	MX:	S	9W 9W		ζef.	No	0.	1)	Bott	om	o f	sar	ds	on	e i	no t	se	en					Ι.	
		Se	5W				$\pm \pm 1$	#				##	111								<u> </u>			
h							11	11			11-1-	Ħ	<u>+++</u>	+++		111	11111		+++++	1+1+1	++-	1 1	1	
3753	1177		7	1 0 3 7	4 T.T																			- 1
NE Pay	NE s		Z_ T.	18N Ok	1W Lah	oma					Map Sect	ion N	1	8			oto		<u> </u>					-
Pay Area	NE se	1		18N , Ok	1W Lah			rueture	ni Dip		_ 3e ct	ion N		8 w-6	520	• · /		J.	Ga	rde	n			
Pay Area_ Outcre	Pettern	e1 Li	1007		EDIME	be	\$1 Y	rueture			- Sect	nation	P	W-6		• · /			ST17U	NTS	n T		<u> </u>	
Pay Area_ Outcre	Pettern	EXTENT	100r	Granes	EDIME	HAHI	# \$1 	RUCT	J 418		- Sect	en eve. j	P TE AIN SI	W-C		By			ST17U	NTS	n T			-
POOTAGE ENVIRONMENT DATE DATE DATE	Pettern	e1 Li	1007	Granes	EDIME MEG TIGN INED	HTAR	SI IT SI ICAL LINE DEP	ATION	ANTIES PACES	CHEBICAL CHEBICAL	Form	en eve. j	P	W-C		By			ST17U	NTS	n	COLOR	RETTERES BASSES	THE STATE SAME
Pay Area_ Outcre	Pettern	EXTENT	100r	INC INC	EDIME MEG TIGN INED	HTAR	SI SI SI SI SI SI SI SI SI SI SI SI SI S	ATION	ANTIES PACES	$\exists \exists$	POTTER COMMENT	en eve. j	P TE AIN SI	W-C		ETIMO MODEL OF	SECA CONTINUE SECURITY OF SECU	CARBOMATE CASHTER DELIS	ST17U	CANDONACIONE MATERIAL ED CANDONACIONE MATERIAL	Year	Ш	REFERENCE BROOKS	TANKE TANKE
POOTAGE ENVIRONMENT DATE DATE DATE	Pettern Apological	T TOTAL STATEMENT BY BYLLESS	100r	INC INC	EDIME MEG TIGN INED	HTAR	SI IT SI ICAL LINE DEP	ATION	ANTIES PACES		Fore Comment	en eve. j	P TE AIN SI	W-C		ETIMO MODEL OF	BACA WATTIT (IN THE WORTH) AND COLUMNIT OF	CARBONATE CASTRIB BLIB	MOCA PASSAGETS (SC) INTRACOMATIONAL ARABITATA UNTRICTIVAL UNALINET 823	CLAY BETTATTO E CANDONALION BATTERIAL TO TO CANDONALION BATTERIAL TO TO CANDONICES BOOD (V)	Zeer			UDDAMA T-MYTE
POOTAGE ENVIRONMENT DATE DATE DATE	Pettern Apological	T TOTAL STATEMENT BY BYLLESS	100r	INC INC	EDIME MEG TIGN INED	HTAR	SI IT SI ICAL LINE DEP	ATION	ANTIES PACES		Fors	en eve. j	P TE AIN SI	W-C		ETIMO MODEL OF	BECA DESTITE (IN BROWNTY CO.	CARBONATE CASTITUTE NUMBER	MOCH PASSENTS (RF) 65 INTRACOMATIONAL ATTACOMATION ATTACOMATICOMATION ATTACOMATICOMATION ATTACOMATICO	CLAY BETTAGETS TO CASE CASE CASE CASE CASE CASE CASE CASE	, year			Demos Tlave
Area — Outcree	APOTOMALT	T TOTAL STATEMENT BY BYLLESS	MARGINAL (4,1.)	INC INC	EDIME MEC VIGE MERINAL INED	HTAR	SI IT SI ICAL LINE DEP	ATION DESTION	S STATEMENT AND ADD		Form	en eve. j	D TE	W-6		By ARTING	Bec. OFFITE CR. STREET SET	CARROTAN CARROTAN BELLIN	NOCI POLIMENTE (RF) INTRACORATIVARIA ANAMENTE UTTORITIES UTTORITIES G	CAMERON BATTERNAL TO CAMERO BATTERNAL TO CAMERO BATTERNAL TO CAMERO BATTERNAL TO CAMERO BATTERNAL TO CAMERO TO CAMER	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \			VIDENCE TARYS
POOTAGE ENVIRONMENT DATE DATE DATE	APOTOMALIT	TI TI TI TI TI TI TI TI TI TI TI TI TI T	MATERIAL (G,L)	THE CONTRACTOR OF THE CONTRACT	EDIME MEC TYGE LINED	HTAR	SI IT SI ICAL LINE DEP	TRUCT ATION DOITION WILLIAM VILLAM VI	STATISTICS OF THE PROPERTY OF		Form	en eve. j	D TE	W-6	173a MASS 41	Sy A	BACA BATTI (I) EMBANTI (I) CALANOMI (I) CALANOMI (I)	CARRET EX	INTERVENTAL DESCRIPTION OF TAXABLE TO SECURITION OF TAXABLE TO SECURITION OF TAXABLE TO SECURITION OF TAXABLE TO SECURITION OF TAXABLE TO SECURITION OF TAXABLE TO SECURITION OF TAXABLE TO SECURITION OF TAXABLE TO SECURITION OF TAXABLE TO SECURITION OF TAXABLE TO SECURITION OF TAXABLE TO SECURITION OF TAXABLE TO SECURITION OF TAXABLE TO SECURITION OF TAXABLE TO SECURITION OF TAXABLE TO SECURITION OF TAXABLE TO SECURITION OF TAXABLE TO SECURITIES OF TAXABLE TO SECURITION OF TAXABLE TA	CARROWAND BUTCHAN TO				TAVE
Area — Outcree	APOTOMALIT	TI TI TI TI TI TI TI TI TI TI TI TI TI T	HALABOVE TO THE PARTY OF THE PA	ING (18)	WEC TO THE CONTROL OF	HTAR	SI IT SI ICAL LINE DEP	ATION DESTROY	AT TRANSPORT (MANAGEMENT)		Form 1	en eve. j	D TE	W-6	173a MASS 41	Sy Sold Sold Sold Sold Sold Sold Sold Sold	BECA BETTI (A BROWNTY OR D	CARDONATE CASTITUTE NO. 18	INTERACE (ATTANCAM TO ATTANCAM	CAMBONIAL BATTERAL IN CAMBONIAL BATTERAL IN CAMBONIAL BATTERAL IN CAMBONIAL BATTERAL IN CAMBONIAL BATTERAL IN CAMBONIAL BATTERAL IN CAMBONIAL BATTERAL IN CAMBONIAL BATTERAL IN CAMBONIAL BATTERAL IN CAMBONIAL BATTERAL IN CAMBONIAL BATTERAL IN CAMBONIAL BATTERAL IN CAMBONIAL BATTERAL IN CAMBONIAL BATTERAL IN CAMBONIAL BATTERAL IN CAMBONIAL BATTERAL IN CAMBONIAL BATTERAL IN CAMBONIAL BATTER				
Area — Outcree	APOTOMALIT	TI TI TI TI TI TI TI TI TI TI TI TI TI T	HALABOVE TO THE PARTY OF THE PA	1 (1) (1) (1) (1) (1) (1) (1) (1) (1) (1	WEC TO THE CONTROL OF	HTAR	SI IT SI ICAL LINE DEP	TRUCT ATION DOITION WILLIAM VILLAM VI	AT TRANSPORT (MANAGEMENT)		Form	en eve. j	Two barries and All Theresa are a second and	W-6	1 SS 11 11 11 11 11 11 11 11 11 11 11 11	Sy Sold Sold Sold Sold Sold Sold Sold Sold	BECA BETTI (A BROWNTY OR D	CARDONATE CASTITUTE NO. 18	INTERACE (ATTANCAM TO ATTANCAM	CAMBONIAL BATTERAL IN CAMBONIAL BATTERAL IN CAMBONIAL BATTERAL IN CAMBONIAL BATTERAL IN CAMBONIAL BATTERAL IN CAMBONIAL BATTERAL IN CAMBONIAL BATTERAL IN CAMBONIAL BATTERAL IN CAMBONIAL BATTERAL IN CAMBONIAL BATTERAL IN CAMBONIAL BATTERAL IN CAMBONIAL BATTERAL IN CAMBONIAL BATTERAL IN CAMBONIAL BATTERAL IN CAMBONIAL BATTERAL IN CAMBONIAL BATTERAL IN CAMBONIAL BATTERAL IN CAMBONIAL BATTER				
Pay Area — Outcree Durante Control Day Area — Outcree Durante Control Durante Control Day On the Control Day	APOTOMALIT	TI THE TALENT TO	TOTAL CALL TOTAL CALL	1 (B) (B) (B) (B) (B) (B) (B) (B) (B) (B)	MEC V	HTAR	SI IT SI ICAL LINE DEP	ATION DESTROY	STILLY TAGGET		Form	en eve. j	D TE	WTURNESS MAX.	1 SO 1111 ALL OF THE PROPERTY	Sy Sold Sold Sold Sold Sold Sold Sold Sold	BECA BETTI (A BROWNTY OR D	CARDONATE CASTITUTE NO. 18	INTERACE (ATTANCAM TO ATTANCAM	CAMBONIAL BATTERAL IN CAMBONIAL BATTERAL IN CAMBONIAL BATTERAL IN CAMBONIAL BATTERAL IN CAMBONIAL BATTERAL IN CAMBONIAL BATTERAL IN CAMBONIAL BATTERAL IN CAMBONIAL BATTERAL IN CAMBONIAL BATTERAL IN CAMBONIAL BATTERAL IN CAMBONIAL BATTERAL IN CAMBONIAL BATTERAL IN CAMBONIAL BATTERAL IN CAMBONIAL BATTERAL IN CAMBONIAL BATTERAL IN CAMBONIAL BATTERAL IN CAMBONIAL BATTERAL IN CAMBONIAL BATTER			71	
Pay Area — Outcree Durante Control Day Area — Outcree Durante Control Durante Control Day On the Control Day	APOTOMALIT	TI THE TALENT TO	TOTAL CONTROL OF THE PROPERTY	1 (B) (B) (B) (B) (B) (B) (B) (B) (B) (B)	MEC V	HTAR	SI IT SI ICAL LINE DEP	ATION DESTROY	S S S S S S S S S S S S S S S S S S S		Form 11 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	en eve. j	D4 0 30000 001 000 000 000 000 000 000 000	W X T URL MILE TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TOTAL TO THE TOTAL TOTAL TO THE TOTAL TOTAL TOTAL TO THE TOTAL	12U	BY STING	BACA GRANING COMPANY OF THE COMPANY	STAGE CONTRACT STAGES	INTERPORT PRINT INTERPORT PRINT INTERPORT INTERPORT INTERPORT INTERPORT INTERPORT INTERPORT INTERPORT INTERPORT INTERPORT INTERPORT INTERPORT INTERPORT INTERPORT INTERPORT INTERPORT INTERPORT INTERPORT INTERPORT INTERPORT	O CATO BEAUTY CONTROL OF THE CONTROL	Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y Y		71	
Pay Area _ Outcree _ Jan Jan Jan Jan Jan Jan Jan Jan Jan Jan	Approximately 1	TI THE TALENT TO	TOTAL CALL TOTAL CALL	1 (B) (B) (B) (B) (B) (B) (B) (B) (B) (B)	MEC V	HTAR	SI IT SI ICAL LINE DEP	ATION DESTROY	STILLY TAGGET		Form	en eve. j	D4 0 30000 001 000 000 000 000 000 000 000	W X T URL MILE TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TOTAL TO THE TOTAL TOTAL TO THE TOTAL TOTAL TOTAL TO THE TOTAL	2 SS 1713 ASS 1	RTING	BIC SERVIC (II MARKALL (II MAR	CALPONATY (ALTHUR MAIN	AND THE PROPERTY OF THE PROPER	CAMPAGE ATTERNATION TO CAMPAGE ATTERNATION TO			71	
Pay Area _ Outcree _ Jan Jan Jan Jan Jan Jan Jan Jan Jan Jan	APOTOMALIT	1 (S) IN M. M. MAN OF INT. TO	A CONTRACTOR OF THE CONTRACTOR	1 (B) (B) (B) (B) (B) (B) (B) (B) (B) (B)	WEC WEEL STATE OF THE STATE OF	HARI	STATE OF THE PROPERTY OF THE P	ATION STATES WITH STATES AND STAT	SILLIVE TANGENTO		Form	en eve. j	PARTICIA CONT.	W X T URL MILE TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TO THE TOTAL TOTAL TO THE TOTAL TOTAL TO THE TOTAL TOTAL TOTAL TO THE TOTAL	2 SS 1713 ASS 1	RTING	BIC SERVIC (II MARKALL (II MAR	CALPONATY (ALTHUR MAIN	AND THE PROPERTY OF THE PROPER	CAMPAGE ATTERNATION TO CAMPAGE ATTERNATION TO			71	
Pay Area _ Outcree _ Jan Jan Jan Jan Jan Jan Jan Jan Jan Jan	Pertion	1 (S) IN M. M. MAN OF INT. TO	TOTAL CALL TOTAL CALL	1 (B) (B) (B) (B) (B) (B) (B) (B) (B) (B)	MEC V	HARI	STATE OF THE PROPERTY OF THE P	ATION STATEMENT OF THE PROPERTY OF THE PROPERT	STILLY TAGGET	5 <u>E</u> 5 <u>E</u> 00E	Form	en en en en en en en en en en en en en e	PARTICIA CONT.	W-6	2 SS 1713 ASS 1	ETIMO PETIMO	Direction and the second secon	CARDEN CASTER NO.	INTERVOLUCIONE INTERV	TOTAL CONTROL BY THE BY THE TOTAL BY THE BY	distribution of the control of the c		-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1	

Outcrep Patie	- Linear bell - BEDIMENTARY	Structured Dip	
POSTARE ENVIRONMENT P-E- BATA BATA LITHOLDEY	HE STATES MO	Description Description	MITTERSON GO
<u> </u>			
1			1112
		-co	++++
3 1 3 11 12 2	:::::::::::::::::::::::::::::::::::::::		
	10 ± V	+/	
	グ ² 1 1 -8 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		4
			\square
H +mx	: N50W N30E		
	1	FMX : S10W ID: SE0W S55W S75E	
	1 86 50 1 1 2 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5		
	N 5 5	NŽÔW HILLIAM H	
			####
Re	f No. 1) Carbona sandsto	e. clay- pebble conglomerate. base of e at intersecting road. ds are NE to NW.	###
	' ' 2) 'FMX' tre	ds are NE to NW.	
			- ! i
		┞╶┠╶┦╶┈┦┈╶┦┈┈╽┪╏┈╎┈┋╏╎╏╏╏╏╏╏╏╏	##-#-
		┞╃╀┾╼╌┼┈╊┈╌╂╾╫╬╫╌┼╌╃╟┼┼┞┼╅┈╀┾┪┞┼╀┼╟╫╫╬╣╬╫╬╫╬╟╬╬╗┰╌╂═	\mathbb{H}
•			

															*		C
SE NE Payne	bec1		8N _Ok1:		a			op action No	20		Photo						
Outcrop Peties	nL	near			el1	urel Dip	F	ormation			By Ae			elto	nd n	_	
I W	EXTENT BILLES	BYRA		MECHAN		TURES		6R	TEXT AIN SIZE		TIME E	CONS	SEC SES	П			
POSTAGE ERTHOUSE DAME CTION DATA	LATERAL ES	171	INCLIN		POR DEPOSITI					1 2 2		F 2	Table 1		CAS YTER		
	12.0	MANY CONTRACTOR	T C	7			EMICAL Free				1 2 4	T 50		1	100		
	7 7	1853	3 1	8 5 8	5 E E 2 E E	1 . 2 8	38 8 8		ببب	444 7	3 3 8	3 8 8	52533	1 2	22		
منبنا			FV				1 111									1	
800	:		PV PV														
							1-11										
MX:	H	/5W		-+	 - - - - - 	MX:	N15W									#	
	N S	OH I		##			1	###	####	###	++++				-##	\pm	
Ref	N		Pro	babl	y not	tota	1 thi	ckne	66.								
SW SW		5_ 1 .1		1W	-1-1-1-1-1		+ - + - 	<u> </u>	1111		Photo		!!! ! 	11111			
Payne		Ca,	_ Ok 1	ahon		urat Dip	Sc	ection No			ву Де	J.	Garde	en a	nd		
Outcrop Patie	nL	near		la de					T)	660		T TT		1			
111 1	T	T	SED	IMENTA	RY STRUC	TURES	F	rmation	Pw-	-000	Ι	J. W	She	elto	n I	=	
	EXTENT MILES	Boddor	Al Alexani	MECHAN	RY STRUC IGAL LINEATIO	* § E		I	TEXT	-000 -000	17100 E				n		
Feetrase Envisionalist Data Data Litholost	ITERAL EXTENT	100 (1) (0) (0) (0) (0) (0) (0) (0) (0) (0) (0		MECHAN	RY STRUC	* § E		•R	TEXT	URE	I				10 TT 100		
	LATERAL S GWOTH B	MANE (8,1.)	INCLIN	MECHAN MECHAN CN (L)	I CAL LINEATIO	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	TTLE ORDER	Ave.	TEXT AIM BIZE	AX. # SO	171100 SUMMER SU	COMPANY CALCIFIES SALES CONTROL SALES	TAMPONIAL TORON. TOTAL CALINITY IN AN OFFICE OF TAMPONIAL IN AN OFFICE OF TAMPONIAL IN TOTAL CALINITY IN AN OFFICE OF TAMPONIAL IN TOTAL CALINITY IN TOTAL CAL	1	POROBITY Sk.	MATERIAL STREET	
POTTAL ENTROMETRIAL P-E- DATA LITHOLOGY	LATERAL S GWOTH B	BASSETTE (3,1) CONTROL OF CONTROL	INCLIN	MECHAN MECHAN CN (L)	RY STRUC IGAL LINEATIO	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	CHEROCAL CONSTRUCAL MOTTLE MOTTLE COMME	Ave.	TEXT AIM BIZE	AX. # SO	R71000 100 100 100 100 100 100 100 100 10	CAMPONITE GALSHING NA. 18 CO. CO. CO. CO. CO. CO. CO. CO. CO. CO.	FORMER TO STANDARD	- Tank	D CONCERT (No.	2 3	
	EAST CATERAL	TOTAL STATE OF THE	INCLINATION OF THE PROPERTY OF	MECHAN MECHAN CN (L)	I CAL LINEATIO	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	CONTINUE CON	Ave.	TEXT AIM BIZE	URE ALLE	17 1800 13 14 15 15 15 15 15 15 15 15 15 15 15 15 15	CONTRACTOR OF THE PARTY OF THE	FRANKE TO STANKE		Cathan	2 3	
i		(1'g) TANSENS (1'g) (1'g	INCL IN	IMENTAN MEGHAN MINISTED BR	TO AL LINEATION DEFORMS TO A STANDARD DEFORMS TO A STANDARD DEFORMS TO A STANDARD TO A	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	CHE BICAL. CONDERTING COMMERCE. CONDERTING COMMERCE. CONDERTING COMMERCE.	Ave.	TEXT AIN BIZE ANALYSIS ANALYS ANA	URE SOLL SALE ST.	#71100 ### FT## FT## FT## FT## FT## FT## FT#	CO 11 12 12 12 12 12 12 12 12 12 12 12 12	The second secon		ON LLEGON ME	2 3	
i	TOTAL TANKS	(1'E) GAMPINE (1'E) GAMPINE (1'E) TALEMENTE AMPRITUE (1'E) TALEMENTE (1'E) TAL	(9) Lender INGL IN IN IN IN IN IN IN IN IN IN IN IN IN I	IMENTAN MEGHAN MINISTED BR	TO ALL MEATING DEPOSITY OF THE PROPERTY OF THE	COLLEGE O COMMANDE	TOTAL CHESTICAL	Ave.	TEXT AIN BIZE ANALYSIS ANALYS ANA	URE SOI TILL AND TILL	TO MANUAL CO.	C BY 10 11 1100 1 1 1 1 1 1 1 1 1 1 1 1 1 1	TATALON CONTRACTOR CON	vard .	CHLAN	2 3	
1	TOTAL TANKS	(1'E) GAMPINE (1'E) GAMPINE (1'E) TALEMENTE AMPRITUE (1'E) TALEMENTE (1'E) TAL	(9) Lender INGL IN IN IN IN IN IN IN IN IN IN IN IN IN I	MECHAN ME	AY STAUG	N CO	CONTENT OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF T	71000 - 17000	TEXT AIM SIZE MARKET OF THE PROPERTY OF THE PR	URE SO TIME AND TIME	17 1100 Management (2) 111	CONTRACTOR OF THE STATE OF THE	Minden (1994)		COLLEGE AND AND AND AND AND AND AND AND AND AND	2 3	
1	TOTAL TANKS	(1'E) GAMPINE (1'E) GAMPINE (1'E) TALEMENTE AMPRITUE (1'E) TALEMENTE (1'E) TAL	(9) Lender INGL IN IN IN IN IN IN IN IN IN IN IN IN IN I	MECHAN ME	AY STAUG	COLLEGE O COMMANDE	CONTENT OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF T	71000 - 17000	TEXT OF THE PROPERTY OF THE PR	URE SO TIME AND TIME	17 1100 Management (2) 111	CONTRACTOR OF THE STATE OF THE	Minden (1994)		COLLEGE AND AND AND AND AND AND AND AND AND AND	2 3	
1	COCOCC STREET		(9) Lender INGL IN IN IN IN IN IN IN IN IN IN IN IN IN I	MECHAN ME	TO AL LINEATION DEFORMS TO A STANDARD DEFORMS TO A STANDARD DEFORMS TO A STANDARD TO A	N CO		71000 - 17000	TEXT AIM BIZE ME AMERICA ME AMERI	URE SO TIME AND TIME	TO STATE OF THE ST	COMMUNITY CONTRACTOR OF THE PERSON CONTRACTOR	THE PROPERTY OF THE PROPERTY O	142 120W	COLUMN TO THE PROPERTY CANADA	2 3	
	ATERNAL ATERNAL	A CONTROL OF THE CONT	(9) Leader	MECHAN ME	AY STAUG	N CO	CALENCAL CALENCAL	71000 - 17000	TEXT AIM BIZE ME AMERICA ME AMERI	URE SO TIME AND TIME	TO STATE OF THE ST	C MAN STREET THEORY AS THE STREET STR	The state of the s	12 20 20 30	TO THE PROPERTY OF	2 3	
1	SOCOO	TO CAMPINE (1'10) CAM	(9) Leader	MECHAN ME	AY STAUG	N CO		71000 - 17000	TEXT AIM BIZE ME AMERICA ME AMERI	URE SO TIME AND TIME	TO WAR AND THE PROPERTY OF THE	COMPANY ATTEMOSPALE TO THE STATE OF THE STAT	This comment is a second of the comment of the comm	204	TO THE PROPERTY OF	2 3	
	COOCO	EXECUTION INTERPRETATION OF THE PROPERTY OF TH	(9) Leader	MECHAN ME	TO THE PROPERTY OF THE PROPERT	N CO		7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	TEXT AIM DIZE MARKET MA	URE SO TIME AND TIME	TIME SHAPE TO SHAPE T	COMMUNITY OF STATE OF	THE PROPERTY OF THE PROPERTY O	142 120W	20 Transport 25	2 3	
	COCCO		(9) Leader	MECHAN ME	TO THE PROPERTY OF THE PROPERT	N CO		71000 - 17000	TEXT AIM DIZE MARKET MA	URE SO TIME AND TIME	17 100 11 11 10 10 10 10 10 10 10 10 10 10	COMPANY TIMESTON TIME	The state of the s	12 20W	TO THE PROPERTY OF	2 3	
	AND STATE OF		(S) Length (S) Length	MECHAN ME	TO THE PROPERTY OF THE PROPERT	N CO	CALENCAL CALENCAL	7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	TEXT AIM DIZE MARKET MA	O U R E SO TIAL MAN TI	10 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	COM	The state of the s	12 20W	CAS LABORAT MA	2 3	
	AND THE PROPERTY OF THE PROPER	A THE TRANSPORT OF THE	(S) Length (S) Length	MECHAN ME	TO TAUL	N CO		7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	TEXT AIM DIZE MARKET MA	O U R E AX	TIME SHIP TO S	COMPANY TYPESON AT THE PARTY OF	The state of the s	1947 120W	TO THE PROPERTY OF	2 3	

Area	ec. <u>17</u> т. <u>191</u> са, С	Structurel Di		w-700 ⁸ y —	A. J. Garden
Outcrop Patters	7 7	BEDIMENTARY STRUCTURES		W-/UU	J. W. Shelt
1 1	TATERAL EXTENT (MICAL) (MANAGERIA) (MANAGERIA) (MALI) (MAL	MECHANICAL	E U GRAIN S		E 1 E 1 E 1 E 1 E 1 E 1 E 1 E 1 E 1 E 1
FOOTAGE ENVIRONMENT DIRECTIONAL DATA LITHOLOGY	3 = Boster (8)	TCATION LINEATION LINEATION BEING DEPOSITION STATEMENT S	2017/03 - 081 2017/03 - 087 20		CAMPITED COLUMNICS CAMPORATE CAMPITED COMPOSED CONTROL COMPOSED CONTROL CONTRO
	MINOTH COLUMN	CALE SCALE	DECOMBE O DESCRIPTION OF STREET, COMMENTED OF STREE	A PER PER PER PER PER PER PER PER PER PER	ALMONITE ALMONI
	-0.1 LATE -0.2 LATE -0.2 LATE -0.2 LATE -0.1 MASSIVE M	MESSING - CCALE MACHINE LOT - AMEL FORMAL	CHEMICA CHEMICA CHEMICA CHEMICA CHEMICA TRAILS, TY TRAILS, CO.		CAMPILIES CARONATE CAROCOMITE CAR
11.		8 8 3 56 4 56 8 3 48	2 58 3 EFF 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7		3 5 68 52 53 53 5
٠٠٠		1/1/1/11/11/11			
3					
		1/F			
9.0.0					
<u> </u>		7/1			
3 12					
<u> </u>					
MX:	NSOW	SX: N75H III	NE NZOW PT		CO: N20W
	N45W N50W N15W N90W		N85W		
21					
NE NW se	e. <u>24 —</u> т.181 ——— са, "С	Na 1W	Map Section No. 23	Pho	lo
Area		Structural Dip		By A	. J. Garden
Outcrop Patiers	r Linear	.aedimentary structures	Formation _Te		
	l _ L				CAMPETERIOR ST
	5 5	MECHANICAL	T UI 45419 4	EXTURE SORTING	CONSTITUENTS
TIONAL TOWAL	Batted (B)	MECHANICAL	T UI 45419 4		a lest
POSTAGE ENVIRONMENT DATE CTOMAL DATA		MECHANICAL ICATION LINEATION Longrad(L) LINEATION NGLINED EXCHORAGE	Week Table	HAX. \$ CONTING	a lest
FOUTAGE FRYSOMEET BRECTIONAL GATA LITHOLOST	CONTRACTOR IN COLUMNICATION IN COLUMNICA	MECHANICAL ICATION LINEATION Longrad(L) LINEATION NGLINED EXCHORAGE	Week The State of the State of	MAX. SORTING	MATERIAL STATES OF THE STATES
BUTTOLOGY LITHOLOGY	4-1-2 LATERAL CATERAL CATERAT	MECHANICAL ICATION LINEATION Longrad(L) LINEATION NGLINED EXCHORAGE	Ave.	EXTURE ELECTION OF THE STATE OF	COLUMN TO THE PROPERTY OF THE
TOURSET ENVIRONMENT ENVIRONMENT ENVIRONMENT LITHOLOGY	CONTRACTOR IN COLUMNICATION IN COLUMNICA	MECHANICAL ICATION LINEATION Longrad(L) LINEATION NGLINED EXCHORAGE	Week The State of the State of	EXTURE ELLAND EL	MATERIAL STATE OF THE STATE OF
POTAGETT PARTY ENTERTONAL PARTY BATTA	CONTRACTOR IN COLUMNICATION IN COLUMNICA	MECHANICAL ICATION LINEATION Longrad(L) LINEATION NGLINED EXCHORAGE	Week The State of the State of	XTURE 2007TING 200	CALCIONTE MASSINGS AND AND AND AND AND AND AND AND AND AND
TOTALGETT POSTAGETT	CONTRACTOR IN COLUMNICATION IN COLUMNICA	MECHANICAL ICATION LINEATION Longrad(L) LINEATION NGLINED EXCHORAGE	DEFORMED & RECOGNIZA CHERICAL	XTURE MAX. 9 SORTING BULLER MAX. 1 SORTING BULLER MAX. 1 SORTING BULLER MAX. 2 SORTING BULLER MAX. 3 SORTING BULLER MAX. 3 SORTING BULLER MAX. 4 SORTING BULLER MAX. 5 SORTING	CALCONECT READER CO. CO. CO. CO. CO. CO. CO. CO. CO. CO.
TOTALETT TOTALETT TOTALETT PARTA LITHOLOGY	CONTRACTOR IN COLUMNICATION IN COLUMNICA	MECHANICAL ICATION LINEATION Longrad(L) LINEATION NGLINED EXCHORAGE	AND CONTROL OF SECURAL	XYURE IZEMAX, SORTING BULLER	CALCONECT READER CO. CO. CO. CO. CO. CO. CO. CO. CO. CO.
TENOLOGY PATE PATE PATE TO THE PATE PATE PATE PATE PATE PATE PATE PAT	CONTRACTOR IN COLUMNICATION IN COLUMNICA	MECHANICAL ICATION LINEATION Longrad(L) LINEATION NGLINED EXCHORAGE	DEFONMEND & SERDINFTEE CHESTICAL	12 E MAX	COLUMNIA COL
	CANTOLLOL OF THE CANTOL	MECHANICAL ICATION LINEATION Longrad(L) LINEATION NGLINED EXCHORAGE	DEFORMED & RECOGNIZA A LA SECTION OF THE SECTION O	22 MAX	CONTRACTOR CONTRACTOR
	AND AND AND AND AND AND AND AND AND AND	MECHANICAL ICATION LINEATION Longrad(L) LINEATION NGLINED EXCHORAGE	DEFORMED & RECORDED S RECORDER CORP. CHE BILLAL. CHE BILL. CHE BILLAL. CHE BI	22 MAX	CONTRACTOR CONTRACTOR
	TYPE-MAN) TYPE-MAN) TYPE-MAN) TYPE-MAN) TYPE-MAN) TYPE-MAN)	MECHANICAL ICATION LINEATION Longrad(L) LINEATION NGLINED EXCHORAGE	CONTRACTOR OF SECONDAL SECONDA	SERVICE STATES OF THE STATES O	CALIFORNIA CONTRACTOR
	LATERAL LATERA	MECHANICAL ICATION LINEATION Longrad(L) LINEATION NGLINED EXCHORAGE	DEFORMED & RECORDED A RECORDED B RECORDER CORP. CHE BILLY. CHE BI	22 MAX	CONTRACTOR CONTRACTOR
	ANDERSON SELECTI	MECHANICAL ICATION LINEATION Longrad(L) LINEATION NGLINED EXCHORAGE	DECOMBOD & RESIDENT ALMERT AND COMMAND ALMER	SORTING BURNESS STATES	COLLEGATION TO COLLEGATION COL
	TYPE-MAY' TYPE-MAY TYPE-	MECHANICAL ICATION LINEATION Longrad(L) LINEATION NGLINED EXCHORAGE	DECOMPTO & RECOGNIZA PART	22 MAX	CO COOK CONTRACTORY (In Cook Cook Cook Cook Cook Cook Cook Coo
	LATERAL LATERA	MECHANICAL ICATION LINEATION Longrad(L) LINEATION NGLINED EXCHORAGE	DESCRIPTION DESCRIPTION	22 MAX	CO COOK CONTRACTORY (In Cook Cook Cook Cook Cook Cook Cook Coo
	LATERAL LATERA	MECHANICAL ICATION LINEATION Longrad(L) LINEATION NGLINED EXCHORAGE	TOTAL COMMENTS POLYCOMED S RECOGNETS POLYCO	22 MAX	CO COOK CONTRACTORY (In Cook Cook Cook Cook Cook Cook Cook Coo
	AND TALL TO THE TALL	MECHANICAL ICATION LINEATION Longrad(L) LINEATION NGLINED EXCHORAGE	TOTAL COMMEND A DESCRIPTION OF THE PROPERTY OF	22 MAX. # SORTING BUILDING BUI	CONTRACTOR CONTRACTOR
	AND TANKAL LATERAL LAT	MECHANICAL ICATION LINEATION Longrad(L) LINEATION NGLINED EXCHORAGE	TOTAL COMMEND A DESCRIPTION OF THE PROPERTY OF	22 MAX. # SORTING BUILDING BUI	CONTRACTOR CONTRACTOR
	AND TANKAL LATERAL LAT	MECHANICAL LIGHTANICAL LIGHTANICAL LIGHTANICAL MCLINED ENGINERAL ENGINER	TORONOMIC CONTROL CONT	22 MAX.	CO COOR CONTRACTOR CON
	AND AND AND AND AND AND AND AND AND AND	MECHANICAL LIGHTANICAL LIGHTANICAL LIGHTANICAL MCLINED ENGINERAL ENGINER	TORONOMIC CONTROL CONT	22 MAX.	CO COOR CONTRACTOR CON
	AND AND AND AND AND AND AND AND AND AND	MECHANICAL LIGHTANICAL LIGHTANICAL LIGHTANICAL MCLINED ENGINERAL ENGINER	TORONOMIC CONTROL CONT	22 MAX.	CO COOR CONTRACTOR CON
Re	AND AND AND AND AND AND AND AND AND AND	MECHANICAL LIGHTANICAL LIGHTANICAL LIGHTANICAL MCLINED ENGINERAL ENGINER	A COMMEND A REPORTED TO THE PROPERTY OF THE PR	SET MAN : SORTING BEAUTY OF THE PROPERTY OF TH	CO COOR CONTRACTOR CON

CATIV

Arthur John Garden

Candidate for the Degree of

Master of Science

Thesis: GEOLOGY OF WESTERN PAYNE COUNTY, OKLAHOMA

Major Field: Geology

Biographical:

Personal Data: Born in Pittsburgh, Pennsylvania, November 16, 1947, the son of John and Dorothy Garden.

Education: Graduated from Bethel Park Senior High School, Bethel Park, Pennsylvania, in June, 1965; completed the requirements for a Bachelor of Science degree in geology from Oklahoma State University, Stillwater, Oklahoma, in January, 1971, received degree in May, 1971; completed requirements for the Master of Science degree at Oklahoma State University in May, 1973, with a major in geology.