CGR-081

STATE OF ARKANSAS

ARKANSAS GEOLOGICAL SURVEY

Bekki White, State Geologist and Director

COUNTY GEOLOGIC REPORT 081

GEOLOGIC REPORT

OF

LITTLE RIVER COUNTY

by

William D. Hanson

Little Rock, Arkansas

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2007

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PREFACE

This report is an accompaniment to the geologic map of Little River County, Arkansas. The geologic map is a mosaic of the 7.5 minute quadrangle geologic maps which make up the county printed at 1:50,000 scale. This publication is available on CD, paper, or the agencies website, www.geology.arkansas.gov

Geologic Report of Little River County, Arkansas

Little River County is located in southwestern Arkansas and borders Oklahoma to the west and Texas to the south. The county has a population estimated to be 13,227 and has an approximate area of 532 square miles (U.S. Census Data, 2005). It is roughly bounded by latitude coordinates 33^0 57' 30" on the north and 33^0 32' 30" on the south, and longitude 93^0 49' 30"on the east and 94^0 28' 37" on the west. The entire county is within the West Gulf Coastal Plain Physiographic Province. The highest elevations (~ 480') occur on the Arkinda 7.5-minute quadrangle while the lowest elevations (~240') are on the Fulton 7.5-minute quadrangle at the confluence of the Little River and the Red River. These major drainages principally flow west to east and serve as the northern and southern boundaries of the county, respectively.

The sedimentary deposits of Little River County are Cretaceous (144 – 66.4 million years before present) and Quaternary (1.6 million years – present) in age and consist primarily of sand, clay, gravel, water-laid tuff, limestone, marl, and chalk. Lower Cretaceous formations are the Kiamichi and Goodland. Upper Cretaceous formations are the Woodbine, Tokio, Brownstown, Ozan, Annona, and Marlbrook. These formations strike east-west and typically dip to the south at about 1 degree. Quaternary deposits consist of sand, gravel, and clay units that dip very gently to the south.

The Lower Cretaceous Kiamichi and Goodland Formations consist of marl, limestone, and sandy limestone and are exposed only in Little River County in Arkansas. These units can be observed about one half mile north of the community of Cerrogordo, Arkansas, and along the Little River at the Little River Country Club, approximately four miles to the east of the Cerrogordo community. Together these units total approximately 50 feet in thickness and were deposited in a near shore marine environment. They are separated from the overlying Upper Cretaceous units by a major unconformity.

The Upper Cretaceous Woodbine Formation consists of gravel, water-laid tuff, minor amounts of calcareous cemented sandstone, tuffaceous sand, and red to dark gray clay. Gravel beds occurring at the base

of the unit may be up to 60 feet thick, but are typically about 30 feet thick and cross-bedded. Gravels range in size from pea gravel to cobbles, with the average size being about 2 inches. They are sub-rounded to round and are composed primarily of novaculite. Some highly altered igneous pebbles are present within the unit. The water-laid tuffs are cross-bedded and are blue to green in color when fresh. Weathering of the tuff produces red, waxy distinctive clay. Cross-bedded sands occur throughout the unit. The Woodbine was deposited in a near shore marine environment, and is about 200 feet thick.

Figure 1. Basal gravels in the Woodbine Fm.

The Tokio Formation was deposited, following an unconformity, in a near shore marine environment and is about 300 feet thick. The formation consists of sand, clay, and gravel. A gravel bed occurs at the base of the unit and averages about 20 feet thick. It is composed of sub-rounded to round pebbles ranging from pea gravel to cobbles 6 inches in diameter. The average size is one inch, and the gravels are composed of novaculite, chert, quartz, sandstone, and quartzite. Clays occurring in the middle and upper parts of the unit are dark gray to gray to off white. The dark gray clays occurring in the middle part of the unit are contains fossil plant fragments and imprints, and small shell imprints. Some of the lighter colored clays are altered volcanic ash beds. The clay content in the unit increases westward. Sands are fine- to medium-grain, sub-rounded to round, and cross-bedded. Glauconite and ilmenite are noted accessory minerals.

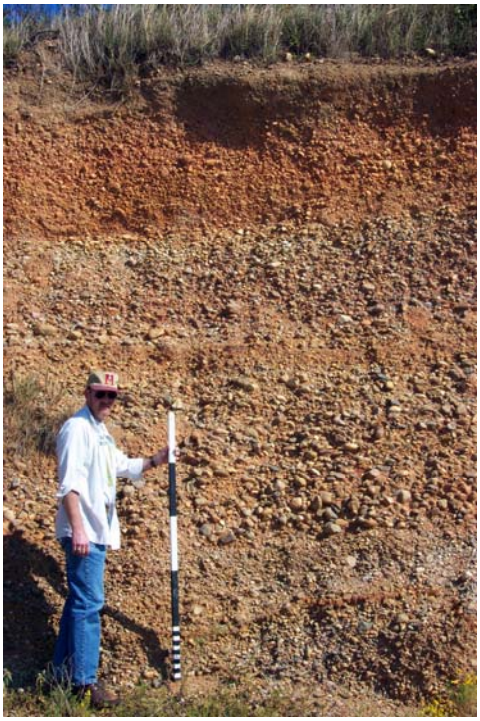

Figure 2. Basal gravels in the Tokio Fm.

The Brownstown Formation was deposited, following an unconformity, in a near shore marine environment and is about 200 feet thick. The formation consists of fossiliferous gray to dark gray marl and sandy marl. The most recognizable fossil is the oyster *Exogyra ponderosa*. These marls are fairly uniform in composition and thickness across the county.

Figure 3a. Exogyra ponderosa, bottom view.

Figure 3b. Exogyra ponderosa, top view.

The Ozan Formation was deposited, following an unconformity, in a near shore marine environment. The formation consists of marl, sandy marl, glauconitic marl, and sand. The Buckrange Sand Member occurs at the base of the unit. This sandy interval contains glauconite, phosphate nodules, black chert, and shark teeth. Marls are dark gray and fossiliferous. Notable fossils include *Exogyra ponderosa*, *Ostrea plumosa*, and *Ostrea falcatta* (Dane, 1929). Mosasaur teeth and bones are also known to occur in this unit. The Buckrange Sand is about 20 feet thick whereas the entire unit is about 200 feet thick.

Figure 4. Ostrea falcatta.

The Annona Formation was deposited, following an unconformity, in a near shore marine environment and is about 100 feet thick. The formation consists of massive, thick bedded, slightly fossiliferous

chalk. Samples exhibits conchodial fracture. On a fresh surface the chalk is blue-gray, but weathers white. A notable fossil is the echinoid *Echinocorys cf. E. texana* (Dane, 1929).

Figure 5. Echinocorys cf. E. texana.

The Marlbrook Formation was deposited in a near shore marine environment following an unconformity. The formation consists of uniform chalky marl. When not weathered, the marl is gray blue to dark blue. When weathered, the marl is off white in color. The unit is slightly fossiliferous in the lower part and moderately fossiliferous in the upper part. Notable fossils are the *Ostrea falcatta, Exogyra ponderosa, Exogyra cancellata, Gryphaea vesicularis,* and reptilian remains (Dane, 1929). The unit is about 120 feet thick and dips to the south approximately 80 feet per mile.

Figure 6a. Mosasaur tooth.

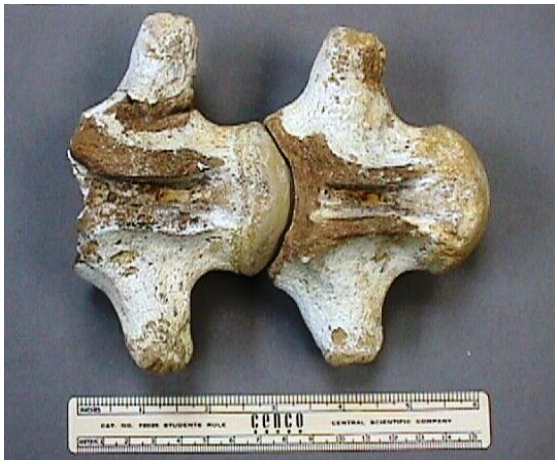

Figure 6b. Mosasaur bones.

Quaternary age alluvium and terraces (1.6 million years – present) occur along streams and rivers. The alluvial deposits are still receiving and losing sediments and consist of sand, clay, and gravel. Alluvial gravels of variable size are composed of novaculite, chert, sandstone, quartz, and quartzite. Terraces deposits are remnants of past floodplains that are set topographically above present day alluvial valleys. They consist of sand, clay, and gravel. Terrace

gravels are composed of novaculite, chert, sandstone, quartz, and quartzite. Within the county, Quaternary deposits vary in thickness, but rarely exceed 50 feet.

Mineral Resources

Present mining

Mineral resources mined from the county are primarily utilized as aggregate and for the production of cement (Howard, 2006). Sand and gravel beds of the Cretaceous Woodbine and Tokio Formations, and Quaternary deposits are produced for aggregate. The Annona Formation, along with a small amount of the Ozan Formation, are mined for use in the manufacturing of Portland cement. Some clay is mined in the vicinity of chalk outcrops. This clay is then used as an additive in the production of cement.

Historical mining

In the past, mining has concentrated on aggregate and chalk production. A chalk pit located in section 36, T11S, R29W, is now abandoned due to the remoteness of the location and the rock's silica content. Chalk from this location was mined for agricultural lime purposes and as raw material for the production of cement.

Figure 7. Abandoned chalk pit.

Water Resources

Surface water resources occur as rivers, streams and man-made lakes. Ground water resources occur in the sand and gravel beds in the West Gulf Coastal Plain area. County water well records examined give initial outputs ranging from about 10 to 400 gallons per minute and depth to water-bearing formations from less than 50 feet to more than 400 feet. Presently, plans are being formulated to provide irrigation for agricultural purposes along the Red River. Water for this project would likely be drawn from the Red River.

Fossil Fuels

The county has the potential for fossil fuel production. At the present time, neither oil nor gas production exists, but some of the wells drilled in the county had shows of petroleum. Approximately 80

wells have been drilled in the county as of December, 2006 (Looney, personal comm.). Being located at the up dip limits of the majority of the oil producing formations in the state and having an apparent lack of good structural or stratigraphic traps makes discovery of producible zones in the subsurface difficult in this county.

Geohazards

Although limestone occurs in the county there is little or no threat from karst development. The limestone beds are thin and interbedded with clay that prevents the movement of water. Calcareous clays have the potential to shrink-swell. These clay beds can affect foundations. Landslide potential is low except where induced by human activity. The greatest threat to the county appears to be from pollution of the water supply, both above ground and below ground, and from flooding along rivers that border much of the county.

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DIGITAL GEOLOGIC COUNTY MAP
LITTLE RIVER COUNTY, ARKANSAS
CGM-AR-05081

GEOLOGIC MAP OF LITTLE RIVER COUNTY, ARKANSAS

Geology by William D. Hanson and Benjamin F. Clardy
1994
Arkansas Geological Commission, Bekki White, State Geologist
Digital compilation by Tiffaney L. Celis
2006

Symbols

- Contact
- Sand and Gravel Pit
- Abandoned Sand and Gravel Pit
- Reclaimed Sand and Gravel Pit
- Chalk Pit
- Abandoned Chalk Pit

Correlation of Map Units

Qal	Quaternary	CENOZOIC
Qt		
UNCONFORMITY		
Km	Upper Cretaceous	MESOZOIC
UNCONFORMITY		
Ka		
UNCONFORMITY		
Ko		
UNCONFORMITY		
Kb		
UNCONFORMITY		
Kto		
UNCONFORMITY		
Kw		
UNCONFORMITY		
Kkg	Lower Cretaceous	

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Description of Map Units

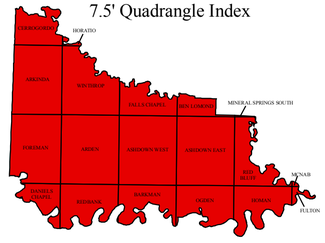
Qal **Alluvium** *(Quaternary)* - Variably sized gravel overlain by unconsolidated sand, silt, and clay comprises the unit. This unit occurs in the floodplains of streams and rivers. The sediments form a rich loam and are excellent for agriculture. Gravels, primarily novaculite, originated in the Ouachita Mountain region and from local Cretaceous formations. Thickness varies from 0 to 30 feet. Areas of alluvium are presently receiving sediment deposition.

Qt **Terrace Deposit** *(Quaternary)* - Terrace deposits generally grade from basal gravel to silt and clay at the top. Gravels, primarily novaculite, originated in the Ouachita Mountain region and from local Cretaceous formations. Thicknesses are generally less than 50 feet. Terraces are topographic features which are former floodplains of nearby streams and/or rivers. The sediments form a rich loamy soil. The basal gravel is sometimes utilized for water-well production and gravel-mining operations.

Km **Marlbrook Marl** *(Upper Cretaceous)* - The Marlbrook Marl is a uniform chalky marl that is blue-gray when freshly exposed and weathers white to light brown. The unit is moderately fossiliferous in the upper part and slightly fossiliferous in the lower part. Notable fossils include *Exogyra, Gryphaea*, and *Ostrea* oyster species and reptilian remains. The Marlbrook Marl is approximately 80 feet thick in the mapped area. The unit strikes to the northeast and has a dip of approximately 80 feet per mile to the southeast in this quadrangle. The Marlbrook Marl was deposited in a nearshore marine environment and rests unconformably on top of the Annona Formation.

Ka **Annona Chalk** *(Upper Cretaceous)* - The Annona Chalk is a hard, massive, thick-bedded, fossiliferous chalk. The chalk is gray-blue when fresh and weathers white. Notable fossils occurring in the unit are *Gryphaea, Echinocory texana,* and *Inoceramus*. The unit outcrops from north of Columbus, AR, southwest to the Arkansas-Oklahoma state line near Foreman, AR, and dips to the south approximately 80 feet per mile. The thickness in the area is about 120 feet. The unit was deposited in a nearshore marine environment following an unconformity separating it from the underlying Ozan Formation.

7.5' Quadrangle Index



Ko **Ozan Formation** *(Upper Cretaceous)* - The Ozan Formation consists of sandy marl, marl, and a sandy glauconitic marl. The unit is fossiliferous, micaceous, and weathers to a yellow-brown sticky clay. The basal sandy glauconitic marl, known as the Buckrange Sand Lentil, has shark teeth and phosphate nodules, and is about 15 feet thick. Thickness of the unit on this quadrangle is about 150 feet. Notable fossils are the *Exogyra ponderosa* and *Gryphaea.* The outcrop belt extends from west of Arkadelphia, southwest to the Arkansas-Oklahoma border, and dips approximately 80 feet per mile to the southwest. The unit was deposited in a nearshore marine environment and rests unconformably on the Brownstown Marl.

Kb **Brownstown Marl** *(Upper Cretaceous)* - The Brownstown Marl consists of dark-gray calcareous clay, marl, and sandy marl. The unit is fossiliferous and weathers yellow to gray in color. Notable fossils are the *Exogyra ponderosa* and *Inoceramus*. The outcrop belt extends from east of Arkadelphia, AR, southwest to the Arkansas-Oklahoma state line, and dips approximately 80 feet per mile to the south. The approximate thickness in the quadrangle is 100 feet. The unit was deposited in a nearshore marine environment and rests uncomformably on the Tokio Formation.

Kto **Tokio Formation** *(Upper Cretaceous)* - The Tokio Formation consists of cross-bedded sand, gravel, gray clay, and volcanic ash. Basal cross-bedded gravels are approximately 30 feet thick. Minor sand and clay lenses occur within the gravel, while sand commonly fills the interstitial spaces around the gravel. Thinner beds (less than 1 foot in thickness) and lenses of gravel occur within the formation's sand intervals. The gravels range from pea-size to 6 inches in diameter and are composed of quartz, novaculite, sandstone, and quartzite. Iron-oxide-cemented conglomerates may be present locally. The cross-bedded sands are medium-to-fine-grained quartz with minor amounts of heavy minerals, glauconite, iron-oxide concretions, and rip-up clasts of gray clay. Sands weather yellow to orange-red in color. Gray clays are lignitic, pyritic, fossiliferous, and may contain leaf imprints. The volcanic ash is light gray to white and has altered to kaolinitic clay. The source area for much of the formation's sediment was the Ouachita Mountain region. The formation outcrop belt extends from near Arkadelphia, southwest to the Arkansas-Oklahoma state line, and dips to the south at approximately 300 feet per mile. The approximate thickness in the quadrangle is 80 feet. The unit was deposited in a nearshore marine environment on an unconformable surface which separates it from the underlying Woodbine Formation (Upper Cretaceous).

Kw **Woodbine Formation** *(Upper Cretaceous)* - The Woodbine Formation consists of water-laid, cross-bedded tuffs, tuffaceous sands, gravel, and red and gray clay. Basal cross-bedded gravels are approximately 20 feet thick. Gravels are ½ to 6 inches in diameter, well-rounded and are composed of novaculite, quartz, sandstone, and quartzite. Iron-cemented conglomerates may be present locally. Igneous rock pebbles and cobbles are interbedded within the tuffs. Unweathered tuffs range from the area between Murfreesboro and Lockesburg, Arkansas. The source area for the gravels was the Ouachita Mountain region west of the Arkansas-Oklahoma state line, and dips approximately 80 feet per mile to the south. The unit was deposited in a near-shore marine environment following a major unconformity which separates it from the underlying Trinity Group (Lower Cretaceous). The approximate thickness in the quadrangle is 120 feet.

Kkg **Kiamichi Clay and Goodland Limestone** *(Lower Cretaceous)* - The Kiamichi Formation consists of gray and green marls with lenses of gray fossiliferous limestone. The unit is approximately 20 feet thick in the mapped area. The prevalent fossil is the *Gryphaea navia*. The unit was deposited in a near-shore marine environment and is conformable with the underlying Trinity Group. The Goodland Limestone consists of limestones interbedded with calcareous clay and thinly-bedded calcareous sandstone. Limestone beds range from 6 to 24 inches in thickness. The unit is approximately 35 feet thick in the quadrangle. The Goodland Limestone was deposited in a near-shore marine environment. Outcrops of these formations can only be found ½ mile north of Cerrogordo, Arkansas, and at the Little River Country Club, Little River County, Arkansas.

Research supported by the U.S. Geological Survey, National Cooperative Geologic Mapping Program, under USGS award number 1434-94-A-1223. The views and conclusions contained in the document are those of the authors and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the U.S. Government.

Scale 1:100,000

1 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 Kilometers

1 0 1 2 3 4 5 6 7 8 9 10 Miles

5°

ARKANSAS GEOLOGICAL COMMISSION

Little River County Mineral Commodity Map

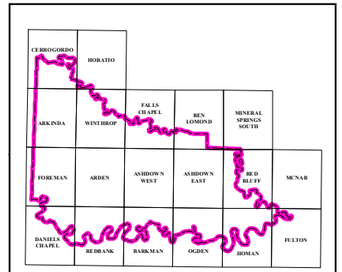
Arkansas Geological Commission, Bekki White, State Geologist
Project Manager, William D. Hanson
Edited by William D. Hanson and J. Michael Howard
Digital Compilation by Nathan H. Taylor

2007

References

Howard, J. M., 2006, Arkansas Mineral Commodity Database, In-house data: Arkansas Geological Commission.

The base map shapefiles used in the making of this map were acquired from GeoStor (www.geostor.arkansas.gov).



Little River County 7.5' Quadrangles

Symbols

- Active Mine/Quarry
  CH - Chalk
- Active Pit
  SG - Sand/Gravel
- Abandoned Mine/Quarry
  CH - Chalk
- Abandoned Pit
  SG - Sand/Gravel
- Reclaimed Pit
  SG - Sand/Gravel

R33W R32W R31W R30W R29W R28W R27W R26W

T 10 S T 11 S T 12 S T 13 S T 14 S

Winthrop Foreman Wilton Ashdown Ogden

380 41 234 108 32 71 317

Scale 1:200,000

0 1.25 2.5 5 7.5 10 Miles

DISCLAIMER

Although this map was compiled from digital data that was successfully processed on a computer system using ESRI ArcGIS 9.2 software at the Arkansas Geological Commission (AGC), no warranty, expressed or implied, is made by the AGC regarding the unity of the data on any other system, nor shall the act of distribution constitute any such warranty. The AGC does not guarantee this map or digital data to be free of errors or liability for interpretations from this map or digital data, or decisions based thereof.

The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the Arkansas Geological Commission.

COUNTY	COMMODITY	TOPO_MAP	SECTION	TOWNSHIP	RANGE	LAT	LONG	SITE_NAME	AKA	OPERATOR	CONTACT	ADDRESS	PHONE	ROCK_UNIT	STATUS	DATASOURCE	DATE_	NOTES	Symbol
Little River	chalk	Foreman	33	12S	32W	33.67970000000	-94.41715000000	Foreman Quarry		Ash Grove Cement Company	G. Stephen Minshall	PO Box 25900, Overland Park, KS 66225		Annona	A	Topo map 1975, MSHA 2002	8/27/2001	formerly Arkansas Cement Company	Quarry
Little River	chalk	Foreman	33	12S	32W	33.68292000000	-94.41818000000	Foreman Quarry		Ash Grove Cement Company	G. Stephen Minshall	PO Box 25900, Overland Park, KS 66225		Annona	A	Topo map 1975, MSHA 2002	8/27/2001	formerly Arkansas Cement Company	Quarry
Little River	chalk	Foreman	33	12S	32W	33.67979000000	-94.42504000000	Foreman Quarry		Ash Grove Cement Company	G. Stephen Minshall	PO Box 25900, Overland Park, KS 66225		Annona	A	Topo map 1975, MSHA 2002	8/27/2001	formerly Arkansas Cement Company	Quarry
Little River	chalk	Foreman	28, 33	12S	32W	33.69138000000	-94.41834000000	Strip mine symbol		Ash Grove Cement Company	G. Stephen Minshall	PO Box 25900, Overland Park, KS 66225		Annona	A	USBM Bull. 645, Topo map 1975, MSHA 2002	8/27/2001	formerly Arkansas Cement Company	Mine
Little River	chalk	Foreman	5	13S	32W	33.67615000000	-94.43543000000	Deposit						Annona	U	USBM Bull. 645	8/27/2001	massive chalk	
Little River	chalk	Foreman	32, 33, 34	12S	32W	33.68374000000	-94.42048000000	Deposit						Annona	U	USBM Bull. 645	8/27/2001	massive chalk extends e-w across these sections	
Little River	chalk	Ben Lomond	36	11S	29W	33.76463000000	-94.05774000000	White Cliffs						Annona	Ab	1998 AGC STATEMAP geologic map, USBM Bull. 645	11/27/2001	labelled as gravel pit on topo map, 1975; high silica content of this chalk has foiled several commercial attempts to use it for cement and whiting, 120 million tons of chalk reserves estimated at this location in 1940 by the USGS; now part of Arkansas N	
Little River	sand & gravel	Falls Chapel	26, 27	11S	30W	33.77592000000	-94.18612000000	Little River #902	Gifford-Hill gravel pit	Hanson Aggregates West, Inc.	Daryl Grimes, Plant Manager	PO Box 9, Ashdown, AR 71822	870-898-5183	Alluvium	A	ADEQ, MSHA 2002, AGC 2005 field data	6/26/2001	formerly Gifford-Hill; AI Atlas 2001 has incorrect lat./lon. for this site; property consists of 1000 acres; lat/lon is for plant site	Pit
Little River	sand & gravel	Foreman	35	12S	32W	33.68099000000	-94.37677000000	Gravel pit						Terrace	Ab	Topo map 1975, AGC 2005 field notes	8/27/2001	scrub and grass covered	
Little River	sand & gravel	Foreman	35	12S	32W	33.68189000000	-94.37636000000	Gravel pit						Terrace	Ab	Topo map 1975, AGC 2005 field notes	8/27/2001	scrub and grass covered	
Little River	sand & gravel	Foreman	26	12S	32W	33.70378000000	-94.38671000000	Gravel pit						Terrace	R	Topo map 1975, AGC 2005 field notes	8/27/2001	pine tree covered	
Little River	sand & gravel	Foreman	21	12S	32W	33.71696000000	-94.41520000000	Gravel pit						Terrace	Ab	Topo map 1975, AGC 2005 field notes	8/27/2001	gated and abandoned	
Little River	sand & gravel	Foreman	16	12S	32W	33.72515000000	-94.41665000000	Gravel pit						Terrace	A	AGC 2002 field notes	5/24/2002		Pit
Little River	sand & gravel	Foreman	14	12S	32W	33.72142000000	-94.38166000000	Gravel pit						Terrace	R	Topo map 1975, AGC 2005 field notes	8/27/2001	pasture and pond	
Little River	sand & gravel	Foreman	14	12S	32W	33.72447000000	-94.37655000000	Strip mine symbol						Terrace	R	Topo map 1975, AGC 2005 field notes	8/27/2001	pasture and pond	
Little River	sand & gravel	Foreman	11	12S	32W	33.73777000000	-94.37908000000	Gravel pit						Terrace	A	AGC 2002 field notes	4/24/2002		Pit
Little River	sand & gravel	Foreman	2	12S	32W	33.74876000000	-94.38424000000	Pit, strip mine symbol						Terrace	Ab	Topo map 1975, AGC 2005 field notes	8/27/2001		
Little River	sand & gravel	Foreman, Arkinda	2	12S	32W	33.75026000000	-94.38507000000	Pit, strip mine symbol						Terrace	Ab	Clardy/Hanson field sheet, Topo map 1975, AGC 2005 field notes	8/27/2001		
Little River	sand & gravel	Foreman, Arkinda	2	12S	32W	33.75004000000	-94.38785000000	Pit, strip mine symbol						Terrace	Ab	Clardy/Hanson field sheet, Topo map 1975, AGC 2005 field notes	8/27/2001		
Little River	sand & gravel	Arkinda	2	12S	32W	33.75077000000	-94.38997000000	Pit, strip mine symbol						Terrace	Ab	Clardy/Hanson field sheet, Topo map 1975, AGC 2005 field notes	8/27/2001		
Little River	sand & gravel	Arkinda	2	12S	32W	33.75215000000	-94.39007000000	Pit, strip mine symbol						Ozan	Ab	Clardy/Hanson field sheet, Topo map 1975, AGC 2005 field notes	8/27/2001		
Little River	sand & gravel	Falls Chapel	31	11S	29W	33.76500000000	-94.13934000000	Pit, strip mine symbol						Alluvium	Ab	1976 AGC Worksheet, Topo map 1975, AGC 2005 field notes	8/27/2001	fenced and cutoff from access	
Little River	sand & gravel	Falls Chapel	30, 31	11S	29W	33.77278000000	-94.14137000000	Pit, strip mine symbol						Alluvium	Ab	1976 AGC Worksheet, Topo map 1975, AGC 2005 field notes	8/27/2001	fenced and cutoff from access	
Little River	sand & gravel	Falls Chapel	15	11S	30W	33.80485000000	-94.18796000000	Gravel pit	Original Gifford-Hill gravel pit					Alluvium	Ab	1976 AGC Worksheet, Topo map 1975, AGC 2005 field notes	12/10/2001		
Little River	sand & gravel	Ashdown West	22	12S	30W	33.70049000000	-94.19312000000	Pit, strip mine symbol						Terrace	R	1976 AGC Worksheet, Topo map 1975, AGC 2005 field notes	8/27/2001	sand pit, now pond on site	
Little River	sand & gravel	Falls Chapel	26	11S	30W	33.77168000000	-94.17310000000	Sand pit						Alluvium	Ab	AGC 2005 field notes	11/19/2005	grass covered	
Little River	sand & gravel	Ashdown East	21	12S	29W	33.70078000000	-94.10144000000	Pit, strip mine symbol						Terrace	Ab	1976 AGC Worksheet, Topo map 1975, AGC 2005 field notes	8/27/2001		
Little River	sand & gravel	Ashdown East	22	12S	29W	33.69880000000	-94.09004000000	Pit, strip mine symbol						Terrace	Ab	Topo map 1975, AGC 2005 field notes	11/18/2005	sand pit, grass covered	
Little River	sand & gravel	Arkinda	34	11S	32W	33.77559000000	-94.39288000000	Pit, strip mine symbol						Terrace	Ab	Clardy/Hanson field sheet, Topo map 1975, AGC 2005 field notes	8/27/2001		
Little River	sand & gravel	Arkinda	27, 34	11S	32W	33.77811000000	-94.39645000000	Pit, strip mine symbol						Terrace	Ab	Clardy/Hanson field sheet, Topo map 1975, AGC 2005 field notes	8/27/2001		
Little River	sand & gravel	Arkinda	33	11S	32W	33.76958000000	-94.42545000000	Gravel pit						Terrace	Ab	AGC 2005 field notes	11/18/2005	3-4 acres	
Little River	sand & gravel	Arkinda	33	11S	32W	33.76705000000	-94.42128000000	Gravel pit						Terrace	Ab	AGC 2005 field notes	11/18/2005	grass and pine trees	
Little River	sand & gravel	Arkinda	32	11S	32W	33.77689000000	-94.42566000000	Gravel pit						Terrace	Ab	AGC 2005 field notes	11/18/2005	grass covered	
Little River	sand & gravel	Arkinda	20	11S	32W	33.80657000000	-94.42744000000	Gravel pit						Terrace	R	AGC 2005 field notes	11/18/2005	grass covered	
Little River	sand & gravel	Arkinda	9	11S	32W	33.82561000000	-94.41186000000	Pit, strip mine symbol						Terrace	Ab	Clardy/Hanson field sheet, Topo map 1975, AGC 2005 field notes	8/27/2001		
Little River	sand & gravel	Arkinda	9	11S	32W	33.82723000000	-94.41521000000	Pit, strip mine symbol						Terrace	I	Clardy/Hanson field sheet, Topo map 1975, AGC 2005 field notes	8/27/2001	materials stored on site for later use	Pit
Little River	sand & gravel	Arkinda	9	11S	32W	33.83477000000	-94.41367000000	Pit, strip mine symbol						Terrace	Ab	Clardy/Hanson field sheet, Topo map 1975, AGC 2005 field notes	8/27/2001		
Little River	sand & gravel	Arkinda	9	11S	32W	33.82945000000	-94.41808000000	Gravel pit						Terrace	Ab	AGC 2005 field notes	11/18/2005	pine tree covered	
Little River	sand & gravel	Arkinda	4	11S	32W	33.83894000000	-94.41467000000	Pit, strip mine symbol						Terrace	Ab	Clardy/Hanson field sheet, Topo map 1975	8/27/2001	pastureland with junk cars	
Little River	sand & gravel	Arkinda	4	11S	32W	33.84044000000	-94.41652000000	Pit, strip mine symbol						Terrace	R	Clardy/Hanson field sheet, Topo map 1975	8/27/2001	pastureland	
Little River	sand & gravel	Arkinda	4	11S	32W	33.84240000000	-94.41661000000	Pit, strip mine symbol						Terrace	Ab	Clardy/Hanson field sheet, Topo map 1975	8/27/2001	pine tree covered	
Little River	sand & gravel	Arkinda	4	11S	32W	33.84150000000	-94.42177000000	Pit, strip mine symbol						Terrace	Ab	Clardy/Hanson field sheet, Topo map 1975	8/27/2001	pine tree covered	
Little River	sand & gravel	Arkinda	4	11S	32W	33.84270000000	-94.41397000000	Gravel pit						Terrace	Ab	AGC 2005 field notes	11/18/2005		
Little River	sand & gravel	Arkinda	5	11S	32W	33.83887000000	-94.43483000000	Pit, strip mine symbol		Little River County				Terrace	A	Clardy/Hanson field sheet, Topo map 1975	8/27/2001	George Evans& Weyerhauser properties, 97 acres, extends from original pit near road to 33.84377, -94.42781, activated by county in 2000	Pit
Little River	sand & gravel	Arkinda	5	11S	32W	33.84277000000	-94.42850000000	Pit, strip mine symbol						Terrace	Ab	Clardy/Hanson field sheet, Topo map 1975, AGC 2005 field notes	8/27/2001	pine tree covered	
Little River	sand & gravel	Arkinda	4	12S	32W	33.75970000000	-94.41173000000	Gravel pits						Terrace	Ab	AGC 2005 field notes	11/18/2005	2 gravel pits on opposite sides of the road	
Little River	sand & gravel	Arkinda	2	12S	32W	33.75219000000	-94.39015000000	Gravel pit						Terrace	R	AGC 2005 field notes	11/18/2005	now a pond	
Little River	sand & gravel	Arkinda	2	12S	32W	33.75073000000	-94.38990000000	Gravel pit						Terrace	R	AGC 2005 field notes	11/18/2005	pastureland	
Little River	sand & gravel	Arden	31	12S	31W	33.67760000000	-94.35500000000	Pit, strip mine symbol						Terrace	Ab	USBM Bull. 645, Topo map 1975, 1976 AGC Worksheet, AGC 2005 field notes	8/27/2001	pastureland	
Little River	sand & gravel	Arden	31	12S	31W	33.68022000000	-94.35242000000	Gravel pit						Terrace	Ab	AGC Field Notes 2002, AGC 2005 field notes	5/24/2002	overgrown	
Little River	sand & gravel	Arden	12	12S	32W	33.73785000000	-94.37125000000	Gravel pit						Terrace	Ab	AGC Field Notes 2002, AGC 2005 field notes	5/24/2002	covered by grass and scrub	
Little River	sand & gravel	Arden	12	12S	32W	33.74026000000	-94.36108000000	Gravel pit						Terrace	Ab	AGC Field Notes 2002, AGC 2005 field notes	5/24/2002	being filled by building materials and trash	
Little River	sand & gravel	Arden	12	12S	32W	33.74099000000	-94.36442000000	Gravel pit						Terrace	R	AGC 2005 field notes	11/18/2005	now a pond	
Little River	sand & gravel	Arden	12	12S	32W	33.73515000000	-94.36786000000	Gravel pit						Terrace	A	AGC 2005 field notes	11/18/2005	new presently active pit	Pit
Little River	sand & gravel	Arden	13	12S	32W	33.72386000000	-94.37161000000	Gravel pit						Terrace	R	AGC Field Notes 2002, AGC 2005 field notes	5/24/2002	pastureland	
Little River	sand & gravel	Arden	13	12S	32W	33.72524000000	-94.36026000000	Gravel pit						Terrace	Ab	AGC Field Notes 2002, AGC 2005 field notes	5/24/2002		
Little River	sand & gravel	Arden	13	12S	32W	33.72383000000	-94.36272000000	Gravel pit						Terrace	Ab	AGC 2005 field notes	11/18/2005	pond on site	
Little River	sand & gravel	Arden	25	12S	32W	33.69131000000	-94.36015000000	Pit, strip mine symbol						Terrace	Ab	1976 AGC Worksheet, Topo map 1975, AGC 2005 field notes	8/27/2001	gravel pit was only on north end of this cleared area, the rest is pasture	
Little River	sand & gravel	Arden	25	12S	32W	33.69239000000	-94.36590000000	Pit, strip mine symbol						Terrace	Ab	1976 AGC Worksheet, Topo map 1975, AGC 2005 field notes	8/27/2001	unable to visit because gate was locked but road appears abandoned	
Little River	sand & gravel	Arden	36	12S	32W	33.68048000000	-94.36635000000	Gravel pit						Terrace	Ab	AGC Field Notes 2002, AGC 2005 field notes	5/24/2002		
Little River	sand & gravel	Arden	36	12S	32W	33.67825000000	-94.35974000000	Gravel pit						Terrace	R	AGC Field Notes 2002, AGC 2005 field notes	5/24/2002	grass covered	
Little River	sand & gravel	Arden	7, 12	12S	31W	33.73744000000	-94.35630000000	Pit, strip mine symbol						Terrace	R	1976 AGC Worksheet, Topo map 1975, USBM Bull. 645, AGC 2005 field notes	8/27/2001	extends into section 12, T12S, R32W; pine tree covered	
Little River	sand & gravel	Arden	20	12S	31W	33.70433000000	-94.33534000000	Gravel pit						Terrace	Ab	AGC Field Notes 2002, AGC 2005 field notes	5/24/2002	on both sides of road	
Little River	sand & gravel	Arden	6	13S	31W	33.66773000000	-94.34237000000	Gravel pit						Terrace	Ab	AGC Field Notes 2002, AGC 2005 field notes	5/24/2002	overgrown, being filled with trash	
Little River	sand & gravel	Arden	1	13S	32W	33.66499000000	-94.36241000000	Gravel pit						Terrace	Ab	AGC Field Notes 2002, AGC 2005 field notes	5/24/2002	4-wheel drive road for access	
Little River	sand & gravel	Falls Chapel	25	11S	30W	33.77991000000	-94.15026000000	sandbar dredge operation						Alluvium	R	USBM Bull. 645, Topo map 1975, AGC 2005 field notes	8/27/2001	extends from section 25, north to section 12 approximately 2.25 miles, dredged for new road bed and bridge approaches on new highway, now flooded	
Little River	sand & gravel	Red Bluff	28	12S	28W	33.68301000000	-93.99700000000	Pit, strip mine symbol						Terrace	Ab	Topo map 1975, AGC 2005 field notes	11/18/2005	sand pit, road now double gated and locked out. 20' red sand	
Little River	sand & gravel	Cerrogordo	1	10S	33W	33.93528000000	-94.47363000000	Gravel pit						Alluvium/Terrace	Ab	USBM Bull. 645, AGC STATEMAP geologic map 1998	8/27/2001	pond on recent topo	
Little River	sand & gravel	Cerrogordo	10, 11	10S	32W	33.91956000000	-94.38577000000	Gravel pit						Alluvium	Ab	USBM Bull. 645, AGC STATEMAP geologic map 1998	8/27/2001	pond on recent topo	