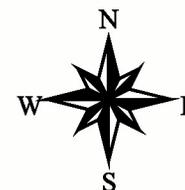
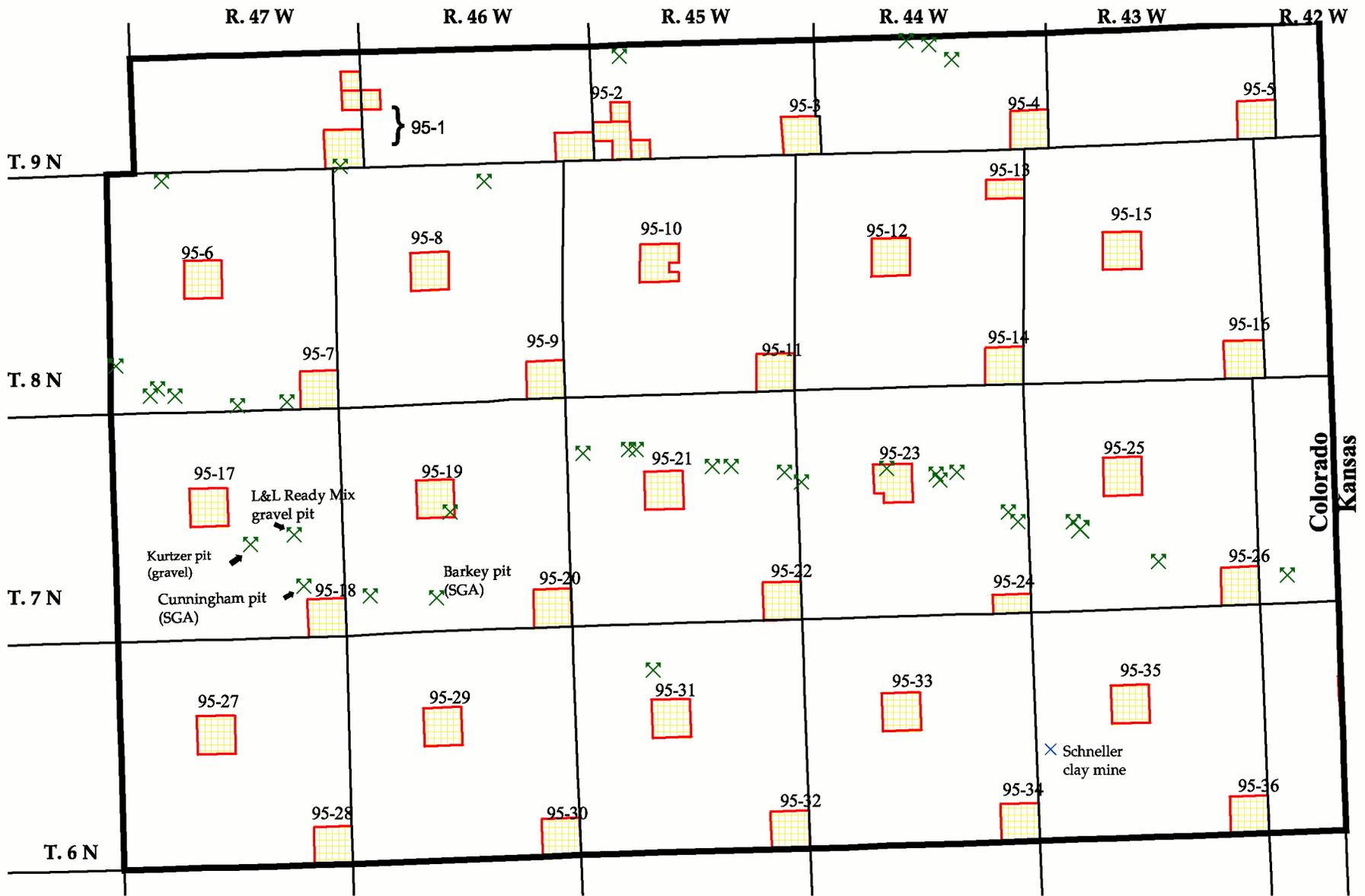


Phillips County Tract Index Map



-  Phillips county boundary
-  State owned mineral acres
-  Township lines

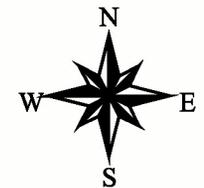


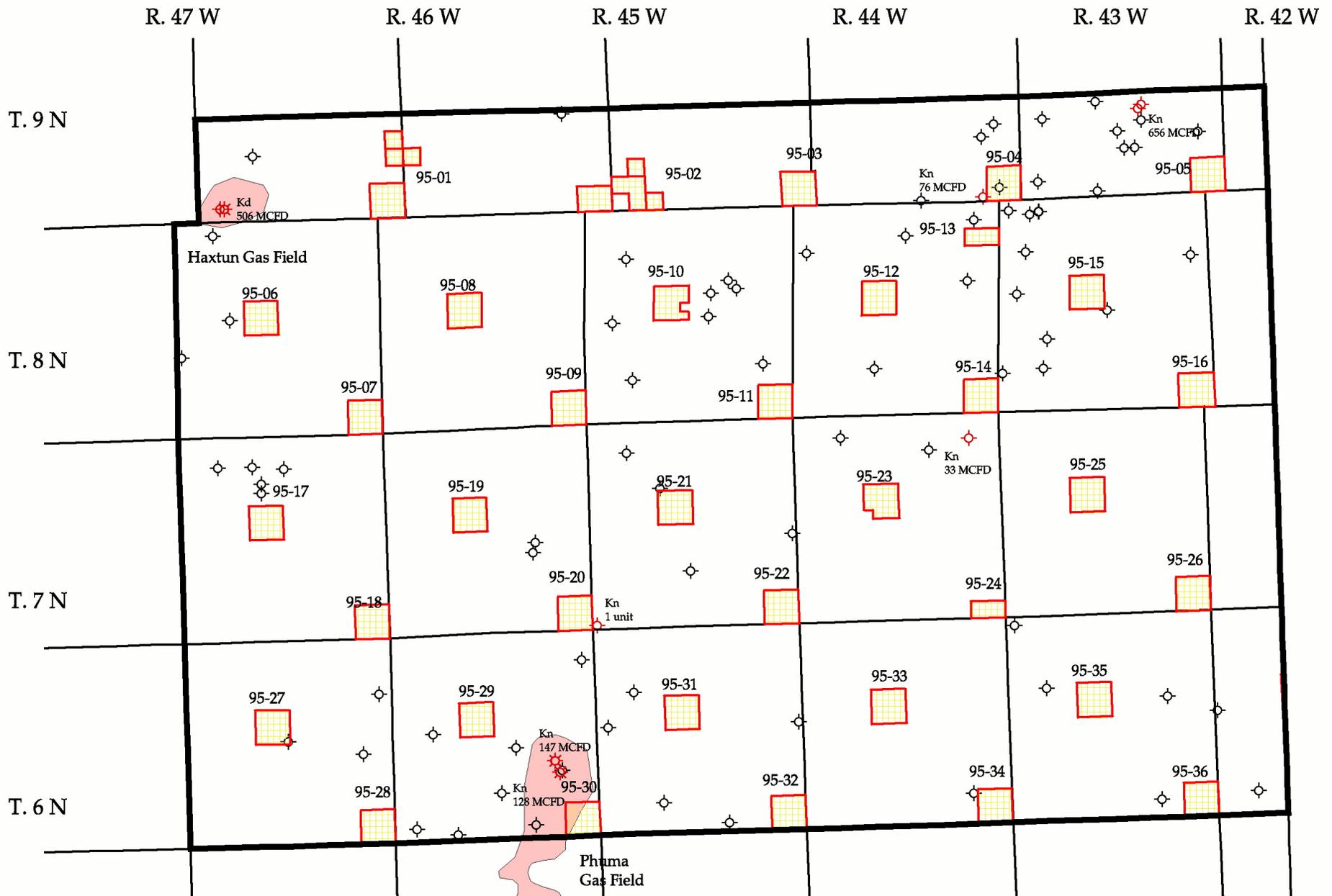


Industrial mineral map for Phillips county



-  Township lines
-  Phillips county boundary
-  Mineral acreage evaluated
-  Industrial mineral prospects

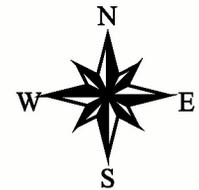




Phillips County Oil and Gas Map

0 8 16 Miles

- Phillips county boundary
- State owned mineral acres
- Township lines
- Wells with oil and gas shows
- Producing wells
- Dry Holes
- Gas fields

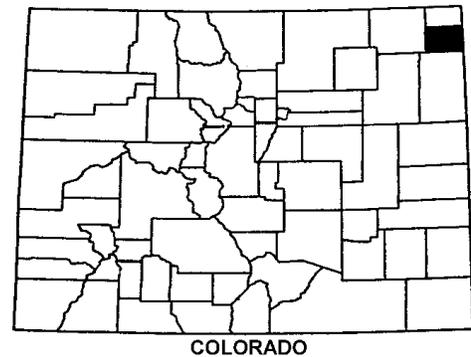
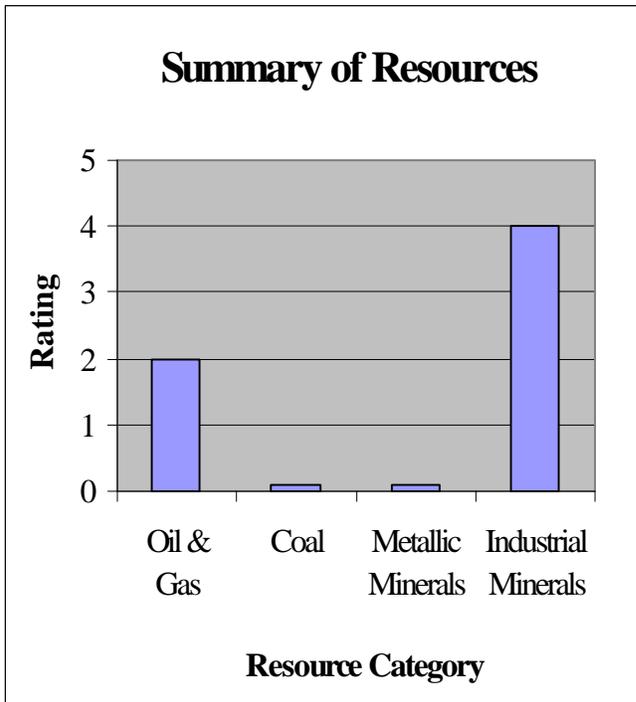


STATE LAND BOARD MINERAL INVENTORY - RATINGS

RATING	Oil & Gas	Coal	Metallic Minerals	Industrial Minerals- Construction Materials
0.1 Little or no potential	Lacks all the essential elements of hydrocarbon accumulation*. Includes areas where intrusive rocks, metamorphic rocks, or a thin veneer of sedimentary rocks are exposed.	Lacks strata that may contain coal; not in a coal basin.	Lacks rock types or structures that may contain metallic minerals	Lacks rock types or structures that may contain industrial minerals or construction materials.
1 Poor	Sedimentary rocks in the tract lack one or more of the essential elements*.	Tract contains strata that may contain coal; in a coal basin. No coal occurrences within 5 miles	Tract contains permissive rock types and structures to host metallic mineral deposits. No mineral occurrences within 5 miles	
2 Fair	All essential elements* exist in tract; however, existing geological control is insufficient to determine presence of a local trap or reservoir. Some production nearby.	Tract contains strata that may contain coal; in a coal basin. No coal occurrences within 1 mile.	Tract contains permissive rock types and structures to host metallic mineral deposits. No mineral occurrences within 1 mile.	Tract contains permissive rock types and structures to host industrial minerals or construction material deposits.
3 Moderate	All essential elements* in immediate area. Production within 1-2 miles or tract is on trend with existing production. Geological control is insufficient to determine presence of a local trap or reservoir	Tract is in a known coal basin, contains known coal bearing strata. A <u>HYPOTHETICAL RESOURCE</u> can be estimated	Tract contains permissive rock types and structures to host metallic mineral deposits. May contain mineralization. <u>UNDISCOVERED RESOURCES</u> can be estimated	
4 Good	Geological control strongly suggest all essential elements* exist . Production or strong show within a mile or along a geological trend .	Tract contains coal beds that can be classed as <u>IDENTIFIED RESOURCE</u>	Tract contains metallic minerals that can be classed as <u>IDENTIFIED RESOURCE</u>	Tract contains industrial minerals or construction materials that can be classed as <u>IDENTIFIED RESOURCE</u>
5 Proven	<u>PROVEN DEVELOPED</u> or <u>PROVEN UNDEVELOPED</u> Reserves	Tract contains <u>DEMONSTRATED RESERVES</u> and is producing coal	Tract contains <u>DEMONSTRATED RESERVES</u> and is producing metallic minerals.	Tract contains <u>DEMONSTRATED RESERVES</u> and is producing industrial minerals or construction materials.

* Essential elements of a hydrocarbon accumulation are: 1) Reservoir, 2) Trap, and 3) Source rock with appropriate timing of generation of migration.

STATE LANDBOARD MINERAL INVENTORY



TRACT IDENTIFIER : #95-1

COUNTY: Phillips

LOCATION: T.9 N., R.47 W., Sections 24, 25, & 36
T.9 N., R.47 W., Sections 25

APPROXIMATE ACREAGE: 1,120 acres

QUADRANGLE NAME(S): Haxtun East Quadrangle

OVERVIEW OF GEOLOGY:

This State land tract is located on the open plains in northeastern Colorado. The surface topography is relatively flat and the bedrock geology is poorly exposed. Extensive dry land and irrigated farmland development masks most outcrops. Visible outcrops in the area consist of fluvial deposits of Miocene Ogallala Formation cropping out south of the South Platte River. These deposits generally consist of grayish orange-pink ash, pebbly sand and silt capped by pale-red dense pisolitic caliche layers, and brecciated limestone forming a cap rock at the surface. The Pleistocene Peoria Loess overlies the Ogallala Formation, but not in the area of this State Land Tract. This unit generally consists of

slightly clayey yellowish-brown, sandy, blocky, non-stratified wind-blown calcareous silt and sand.

OIL AND GAS RESOURCES:

Gas is being produced from the Muddy J-sandstone at Haxtun Field located approximately four miles west of this tract. But, as of this writing, no oil or gas resources have been established on this tract. The essential elements, which include reservoir, trap, and source rocks with the appropriate timing of generation of migration, do exist in the sedimentary rocks in this area. However existing geological control is insufficient to determine the presence of a trap.

COAL RESOURCES:

There are no coal measures in any of the sedimentary units in this tract.

METALLIC MINERAL RESOURCES:

There are no metallic mineral resources in this tract.

INDUSTRIAL MINERALS AND CONSTRUCTION MATERIALS RESOURCES:

Area Inactive Sand and Gravel Pits:

T. 9 N., R. 47 W.

Borrow Pit –SE ¼ NE ¼ NW ¼, Section 26, T9N, R47W

Borrow Pit –NE ¼ NE ¼ NE ¼, Section 25, T9N, R47W

Unnamed Pit– SW ¼ SW ¼ SW ¼, Section 36, T9N, R47W

The sand and gravel pits are located in a fluvial point bar deposits in Wildhorse Creek in the southwest ¼ of section 36.

Identified Sand and Gravel Resources:

The surface bedrock consists of fluvial deposits containing sand and gravel from a small creek in section 24, Wildhorse Creek in the southeast ¼ of section 36, and two abandoned gravel pits in the area. A small east-northeast flowing creek crosses the northwest corner of section 24. Wildhorse Creek, which flows southeast, meanders across the southwest ¼ of section 36. The creek has deposited several well-developed sandbars and point-bars along its meandering path. Detailed geologic maps showing the distribution of these alluvial deposits on the state tract are not available, but using geomorphological features obtained from the 1:50,000 scale Phillips County topographic map, an estimate of their areal extent has been made.

Identified resources of 1.2 million tons of sand and gravel of unknown quality cover an aggregate of 49 acres in this tract. Calculations in all cases are based upon volume to tonnage conversion factor of 18 cubic feet/ton (111 lbs./cubic foot) for sand and gravel. A breakdown of the sand and gravel resources present in each of the locales is presented below:

Small unnamed tributary to Wildhorse Creek

Present day flood plain deposits: Section 24 - 49.1 acres

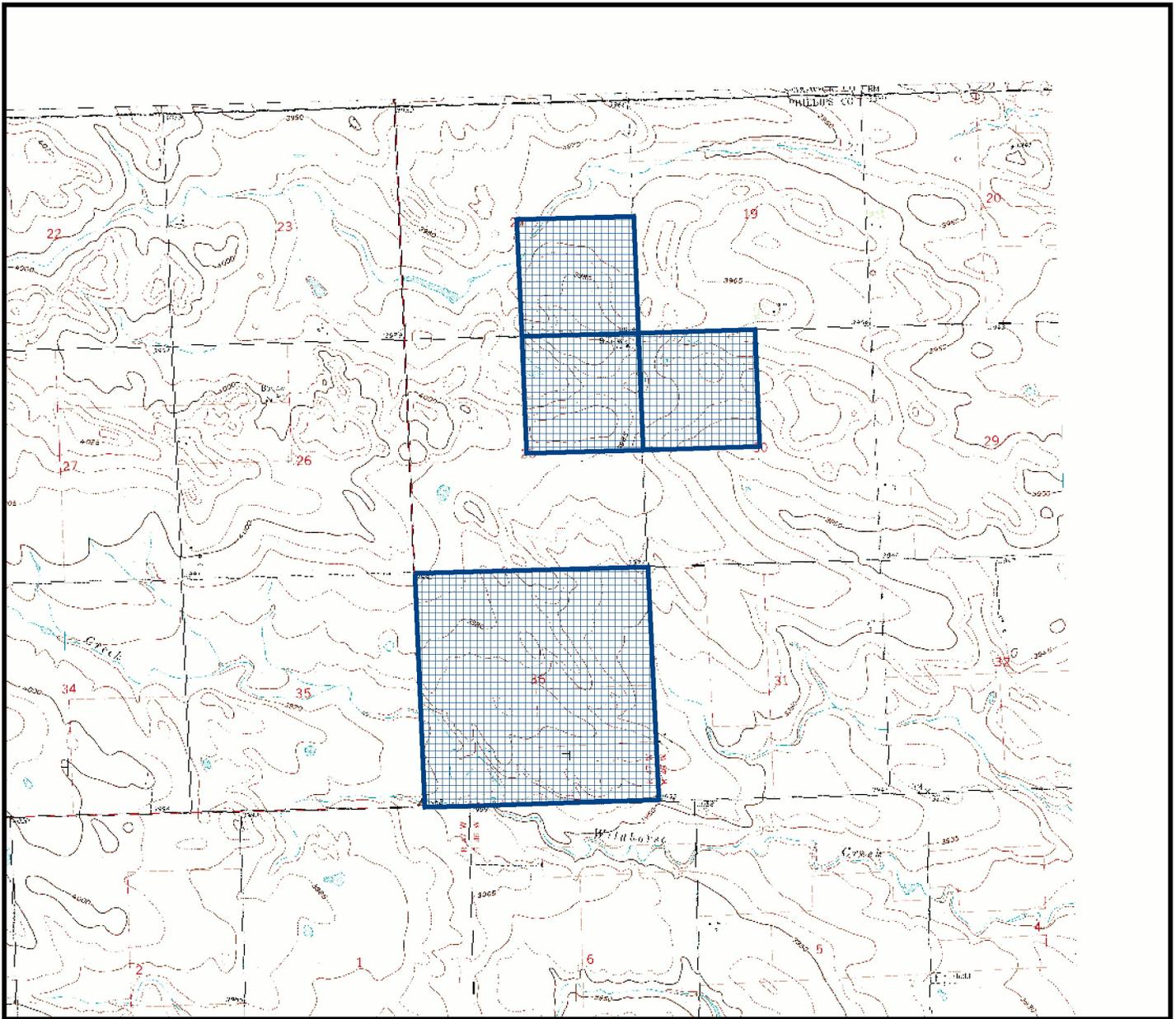
(2,139,022 sq. ft.) X 10 ft. thick/ 18 cubic feet/ton = 1.2 million tons of sand and gravel.

REFERENCES:

Lawson, A. D., 1998, Active Permitted Mine Operations in Colorado, 1996-97, Colorado Geological Survey, Department of Natural Resources, Denver Colorado, Information Series 45, 58 p.

Schwochow, S.D., 1981, Inventory of non-metallic mining and processing operations in Colorado, Colorado Geological Survey, Department of Natural Resources, Denver Colorado, Map Series 17

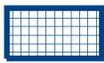
Scott, G. R., 1978, Map showing Geology, structure, and oil and gas fields in the Sterling 1° X2° Quadrangle, Colorado, Nebraska, and Kansas, US Geological Survey Miscellaneous Investigation Series I-1092

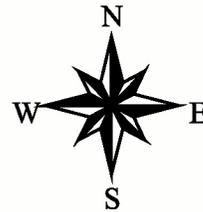


95-01

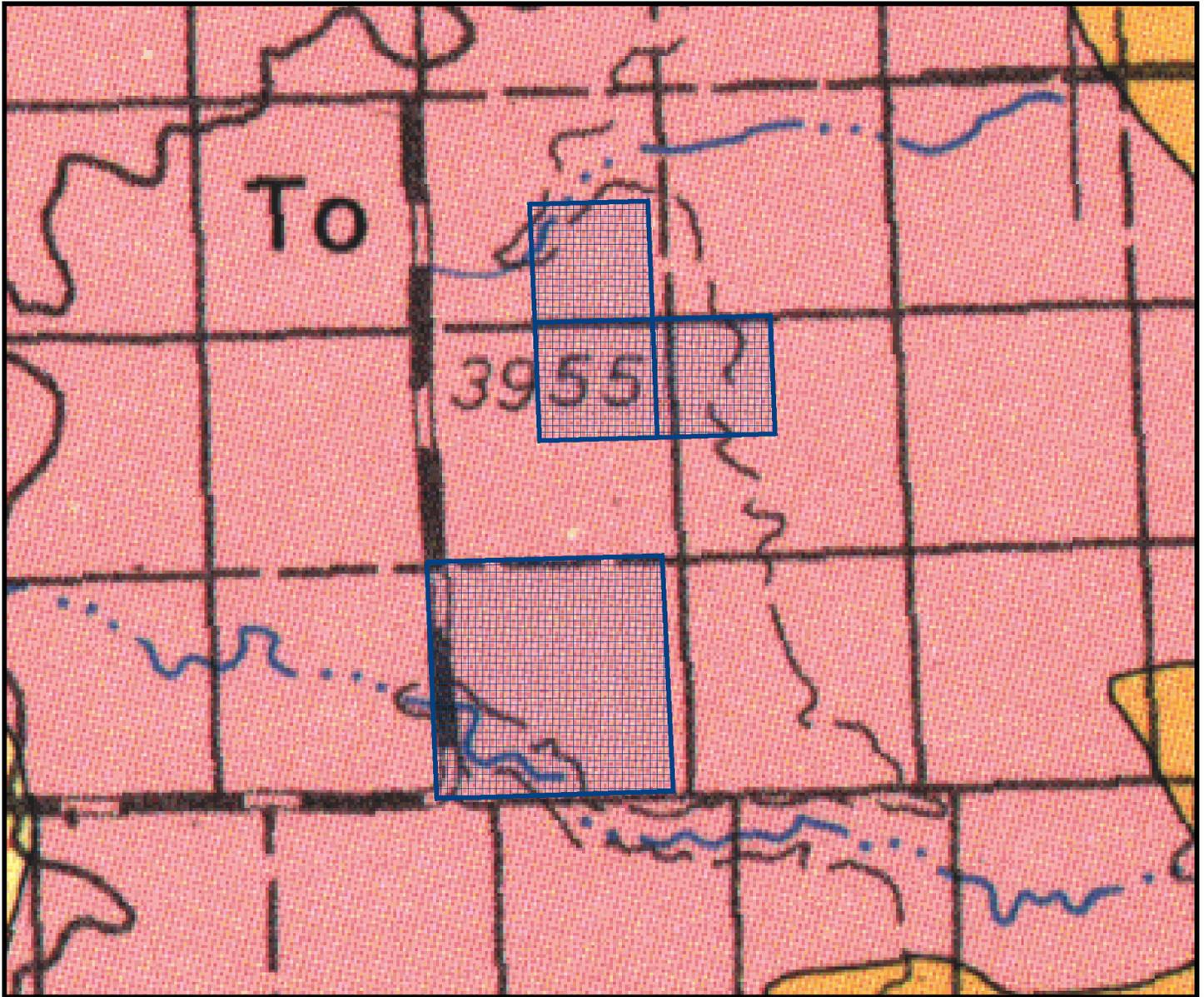
Location: T. 9 N, R. 47 W
Section: 24,25,36
Location: T. 9 N, R. 46 W
Approximate total acreage - 760



 Mineral acreage evaluated

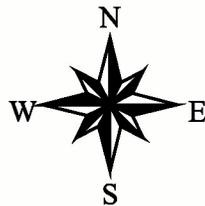


1:43500



Geologic Map for 95-01

Location: T. 9 N, R. 47 W
 Section: 24,25,36
 Location: T. 9 N, R. 46 W
 Approximate total acreage - 760



 *Mineral acreage evaluated*

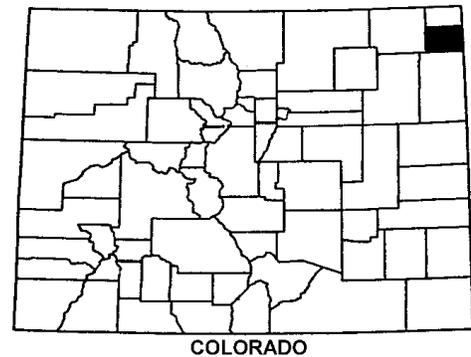
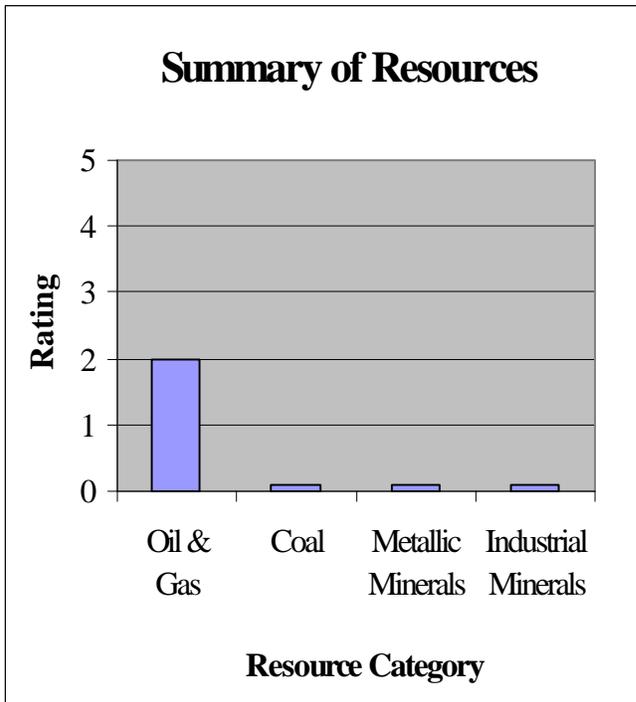
To - Ogallala Formation (Miocene) Fluvial deposits of grayish orange-pink ash, pebbly sand and silt capped by pale-red dense pisolitic caliche layers and brecciated limestone.

0 1 2 Miles



1:43500

STATE LANDBOARD MINERAL INVENTORY



TRACT IDENTIFIER : #95-2

COUNTY: Phillips

LOCATION: T.9 W., R.46 W., Section 36
T.9 W., R.46 W., Section 30, 31, 32

APPROXIMATE ACREAGE: 1,282 acres

QUADRANGLE NAME(S): Holyoke N.W.

OVERVIEW OF GEOLOGY:

This State land tract is located on the open plains in northeastern Colorado. The surface topography is relatively flat and the bedrock geology is poorly exposed. Extensive dry land and irrigated farmland development masks most outcrops. Visible outcrops in the area generally consist of wind blown calcareous silt and clayey yellowish brown sand of the Pleistocene Peoria Loess and well sorted, wind blown, and dune forming sands of the Holocene and Pleistocene.

OIL AND GAS RESOURCES:

No oil or gas resources have been established on this tract. The essential elements, which include reservoir, trap, and source rocks with the appropriate timing of generation of migration, do exist in the sedimentary rocks in this area. However existing geological control is insufficient to determine the presence of a trap.

COAL RESOURCES:

There are no coal measures in any of the sedimentary units in this tract.

METALLIC MINERAL RESOURCES:

There are no metallic mineral resources in this tract.

INDUSTRIAL MINERALS AND CONSTRUCTION MATERIALS RESOURCES:

Area Inactive Sand and Gravel Pits:

T9N, R46W

Unnamed Pit – SE ¼ SE ¼ NE ¼, Section 3, T9N, R46W

This sand and gravel pit is located in a fluvial point bar deposited in Wildhorse Creek.

T9N, R45W

Unnamed Pit – NW ¼ NW ¼ NE ¼, Section 19, T9N, R45W

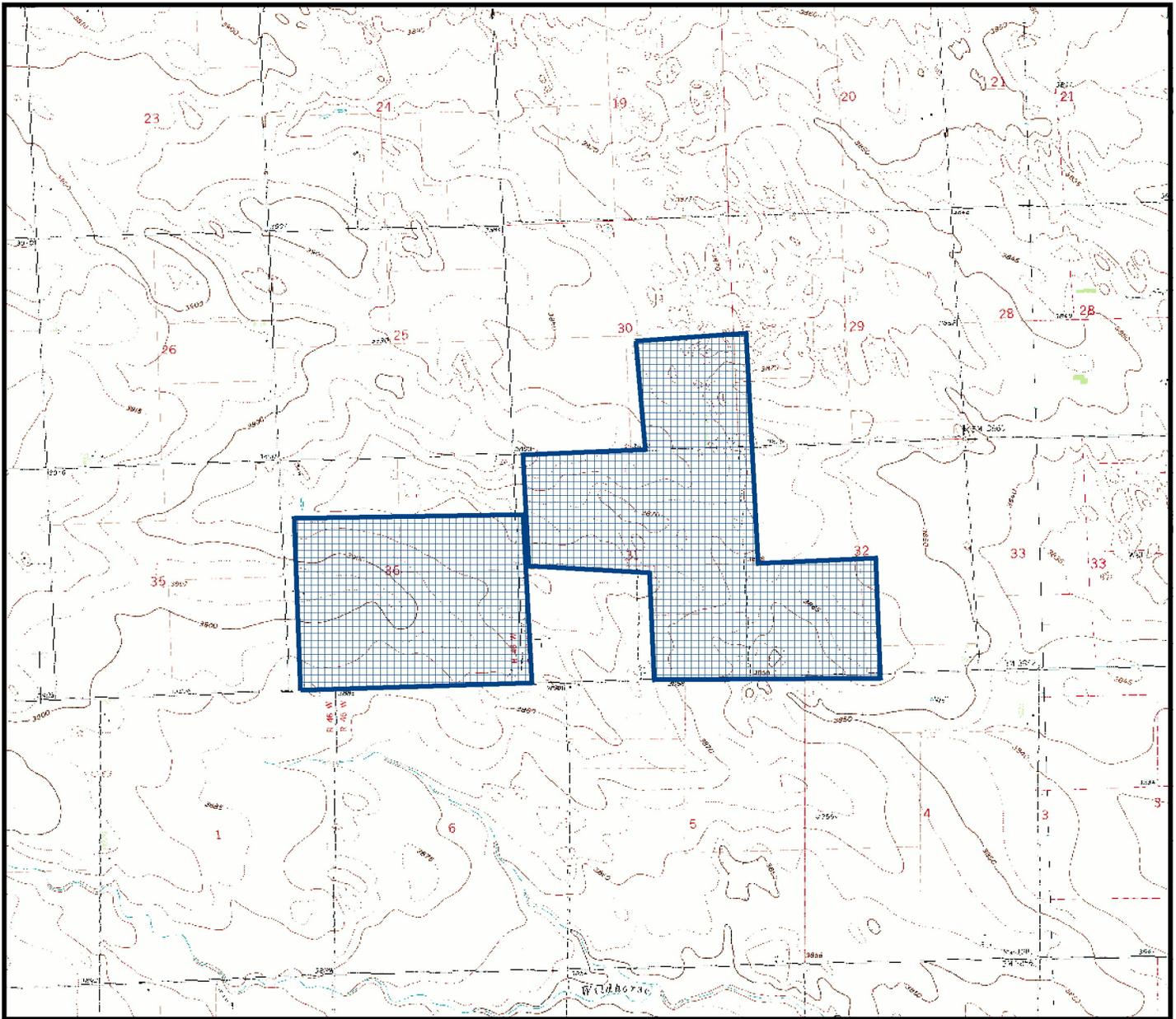
Identified Sand and Gravel Resources:

The surface bedrock consists primarily of wind blown deposits containing poor industrial grade minerals (sand and gravel) in the SE ¼ of section 30. The eolian sands in this area are estimated at 50 – 75 feet in thickness, but have little value. There are no commercial sand and gravel companies currently extracting this resource. The remaining part of the tract is covered with a blanket of buff colored calcareous silt and yellowish brown clayey sand of the Pleistocene Peoria Loess containing low industrial mineral value.

REFERENCES:

Schwochow, S.D., 1981, Inventory of non-metallic mining and processing operations in Colorado, Colorado Geological Survey, Department of Natural Resources, Denver Colorado, Map Series 17

Scott, G. R., 1978, Map showing Geology, structure, and oil and gas fields in the Sterling 1° X2° Quadrangle, Colorado, Nebraska, and Kansas, US Geological Survey Miscellaneous Investigation Series I-1092

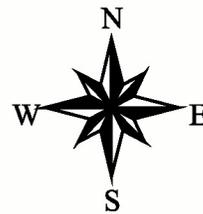


95-02

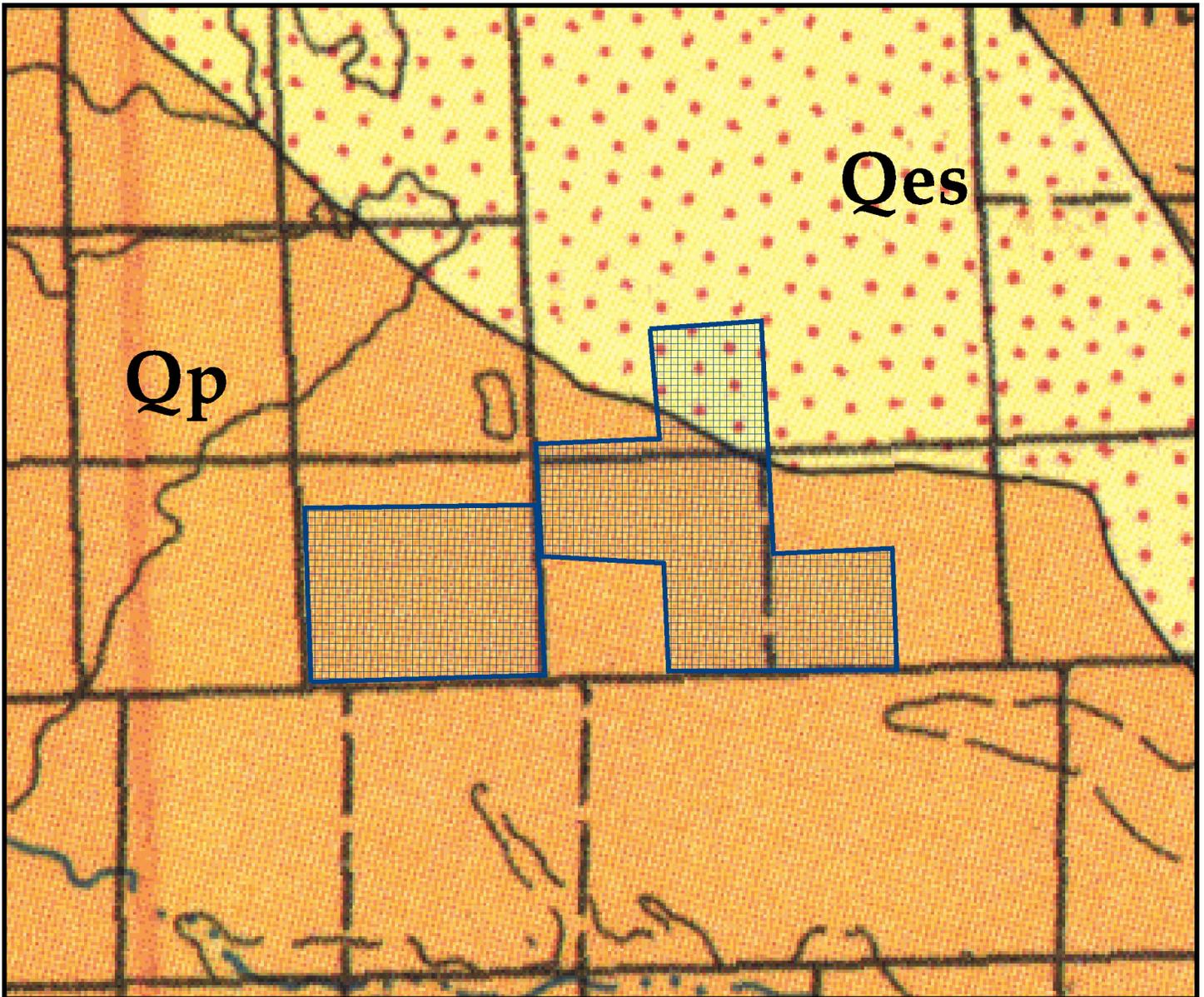
Location: T. 9 N, R. 46 W
Section: 36
Location: T. 9 N, R. 45 W
Section: 30,31,32
Approximate total acreage - 1280



 Mineral acreage evaluated



1:43500



Geologic Map for 95-02

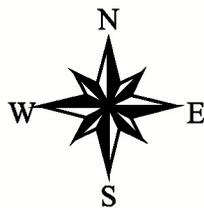
Location: T. 9 N, R. 46 W

Section: 36

Location: T. 9 N, R. 45 W

Section: 30,31,32

Approximate total acreage - 1280



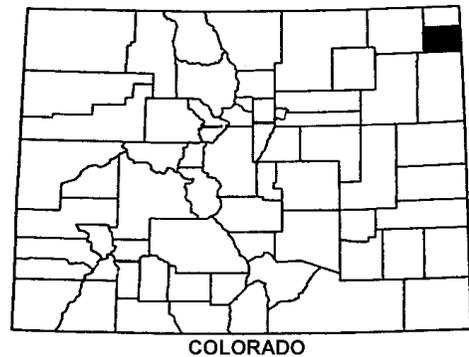
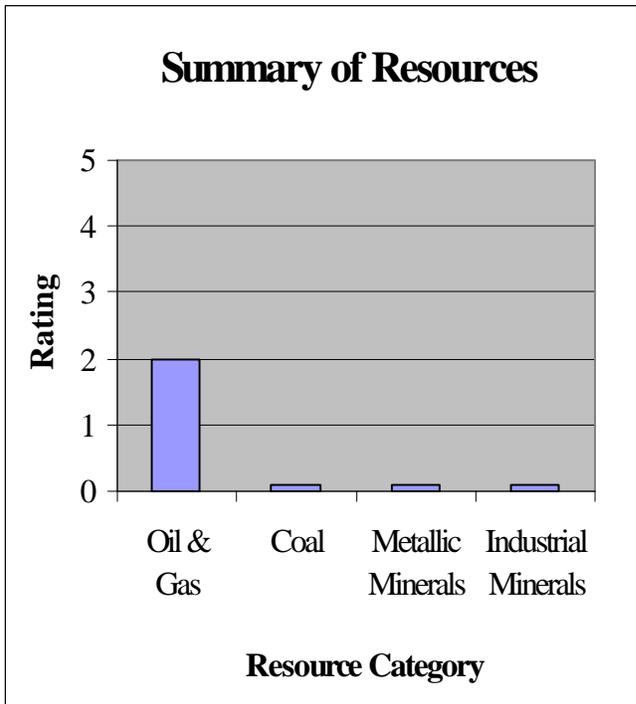
 *Mineral acreage evaluated*

Qes - Eolian Sand (Holocene/Pleistocene) Pale yellowish brown well-sorted wind blown sand.

Qp - Peoria loess (Pleistocene) Slightly clayey yellowish brown, sandy, blocky, non-stratified wind-blown calcareous-silt and sand.

1:43500

STATE LANDBOARD MINERAL INVENTORY



TRACT IDENTIFIER : 95-3

COUNTY: Phillips

LOCATION: T.9N., R.45W., Section 36

APPROXIMATE ACREAGE: 640 acres

QUADRANGLE NAME(S): Holyoke N.E.

OVERVIEW OF GEOLOGY:

This State land tract is located on the open plains in northeastern Colorado where the surface topography is relatively flat and the bedrock geology is poorly exposed. Extensive dry land and irrigated farmland development masks most outcrops. Visible outcrops in the area generally consists of Pleistocene glacial deposits and loess. The glacial deposits consist of slightly clayey yellowish-brown, sandy, blocky, non-stratified wind-blown calcareous-silt and sand that can reach a thickness of up to 130 feet. The Peoria Loess is wind-blown dust deposited during Pleistocene time.

OIL AND GAS RESOURCES:

No oil or gas resources have been established on this tract. The essential elements, which include reservoir, trap, and source rocks with the appropriate timing of generation of migration, do exist in the sedimentary rocks in this area. However existing geological control is insufficient to determine the presence of a trap.

COAL RESOURCES:

There are no coal measures in any of the sedimentary units in this tract.

METALLIC MINERAL RESOURCES:

There are no metallic mineral resources in this tract.

INDUSTRIAL MINERALS AND CONSTRUCTION MATERIALS RESOURCES:

Area Inactive Sand and Gravel Pits:

T9N, R45W

Unnamed Pit – NW ¼ NW ¼ NE ¼, Section 19, T9N, R45W

T9N, R44 W

Unnamed Pit – NW ¼ NE ¼ NW ¼, Section 21, T9N, R44W

Unnamed Pit – NW ¼ SW ¼ NW ¼, Section 22, T9N, R44W

Unnamed Pit – SE ¼ SW ¼ SE ¼, Section 22, T9N, R44W

These three unnamed pits are associated with sandbars along an east-southeast flowing unnamed creek.

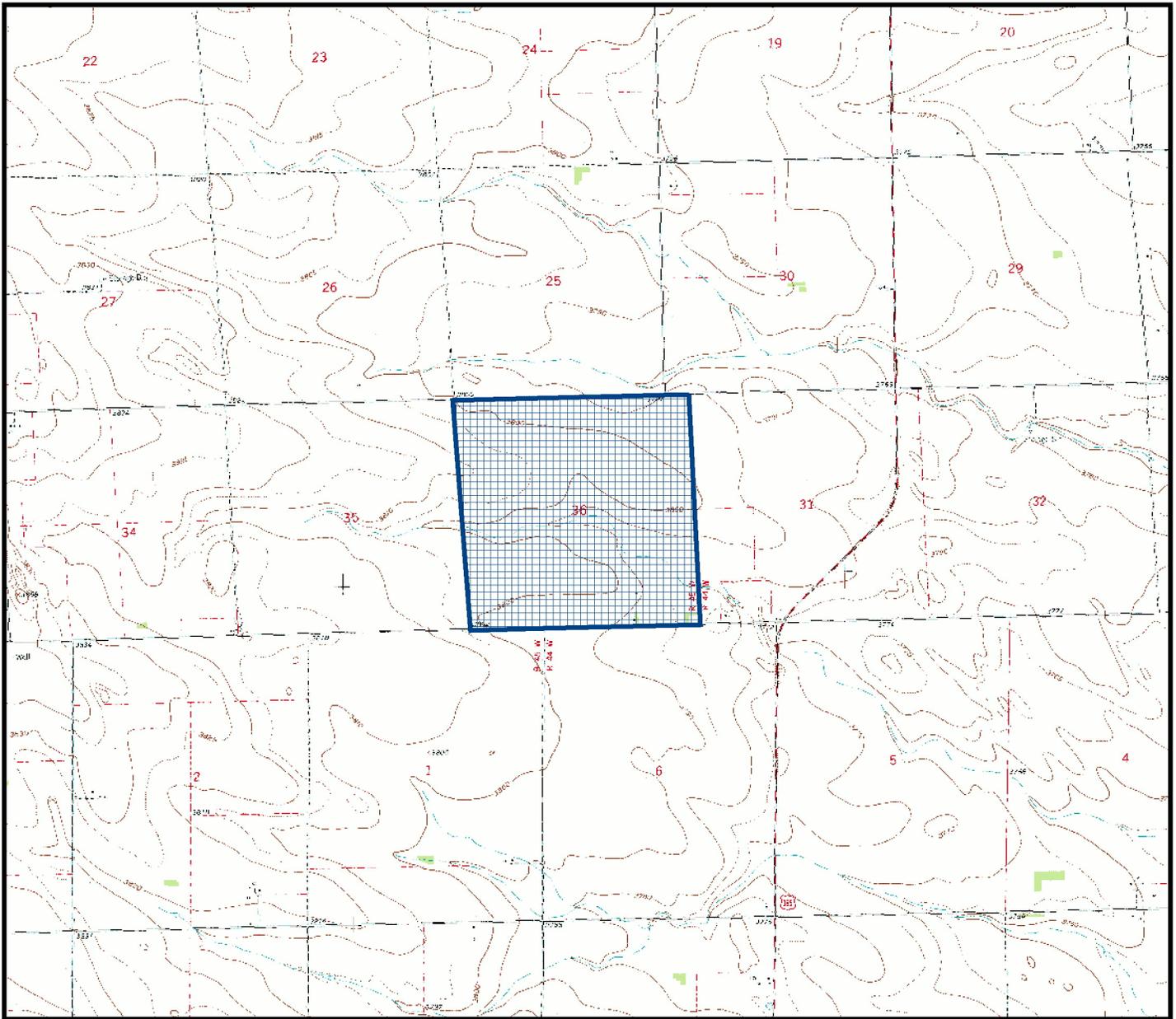
Identified Sand and Gravel Resources:

The surface bedrock consists primarily of buff colored calcareous wind blown silt and sand (Loess), which is judged to contain low industrial mineral value. One small of intermittent stream crosses the tract from west to east. The proximity of this tract to the headwaters of this stream and its flat gradient is not conducive to the deposition of large amounts of sand and gravel. The bedrock lacks the necessary rock types that would contain industrial type minerals or construction materials.

REFERENCES:

Schwochow, S.D., 1981, Inventory of non-metallic mining and processing operations in Colorado, Colorado Geological Survey, Department of Natural Resources, Denver Colorado, Map Series 17

Scott, G. R., 1978, Map showing Geology, structure, and oil and gas fields in the Sterling 1° X2° Quadrangle, Colorado, Nebraska, and Kansas, US Geological Survey Miscellaneous Investigation Series I-1092

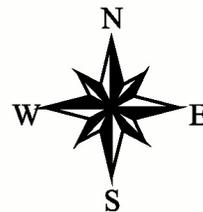


95-03

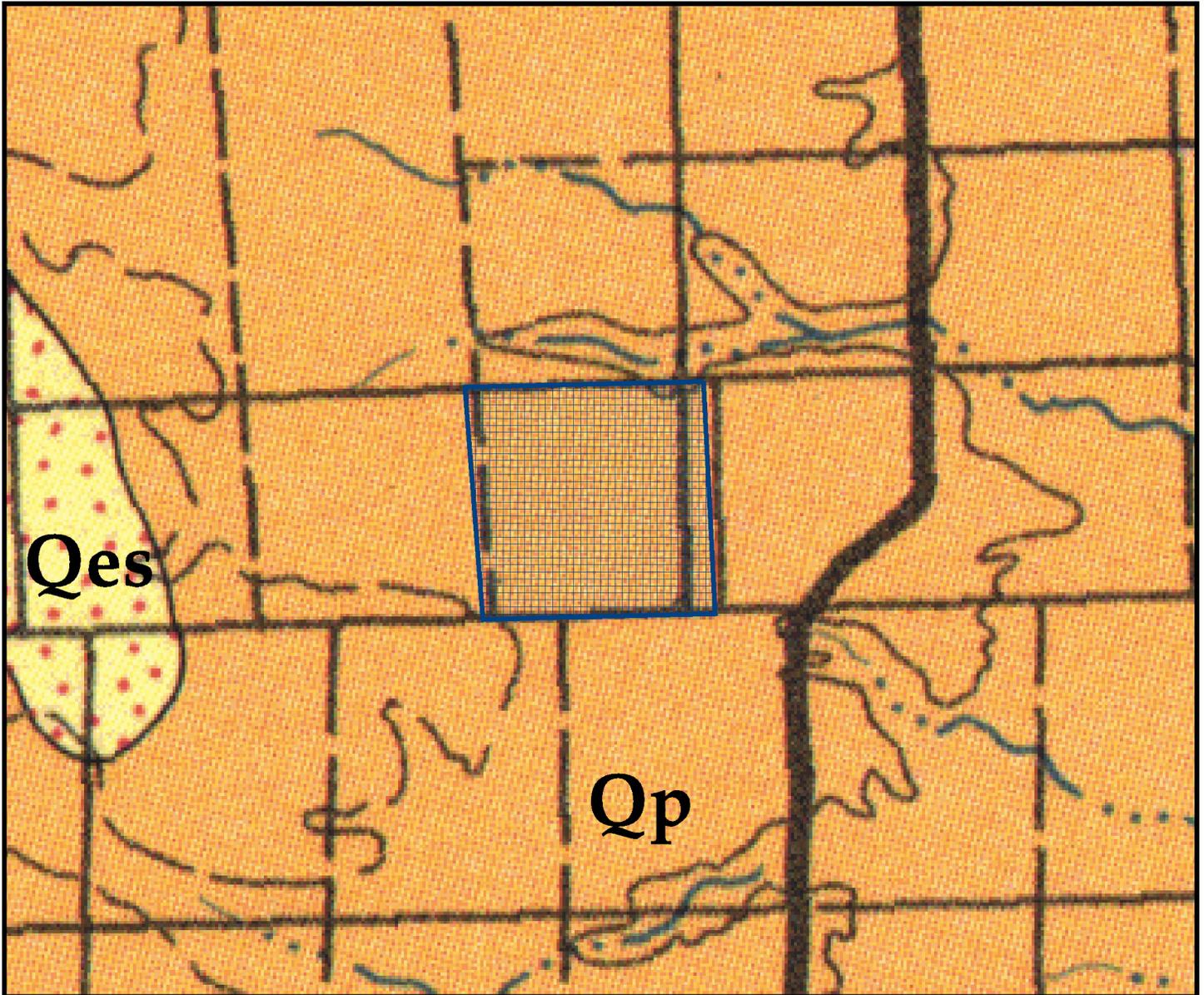
Location: T. 9 N, R. 45 W
Section: 36
Approximate total acreage - 640



 *Mineral acreage evaluated*

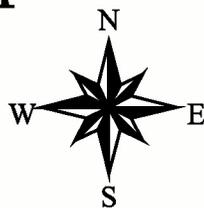


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Geologic Map for 95-03

Location: T. 9 N, R. 45 W
 Section: 36
 Approximate total acreage - 640



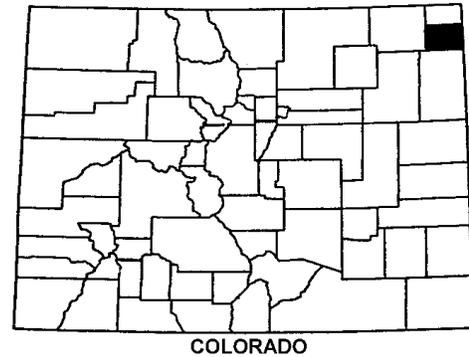
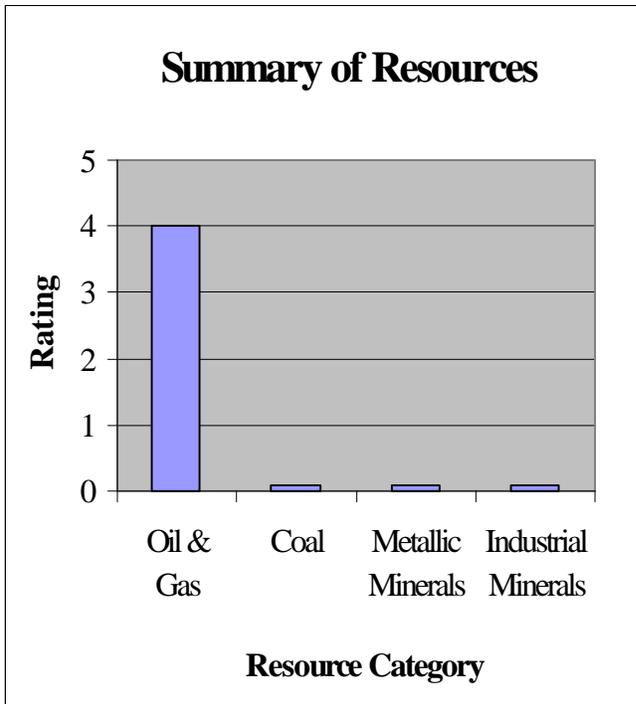
 *Mineral acreage evaluated*

Qp - Peoria loess (Pleistocene) Slightly clayey yellowish brown, sandy, blocky, non-stratified wind-blown calcareous-silt and sand.

Qes - Eolian Sand (Holocene/Pleistocene) Pale yellowish brown well-sorted wind blown sand.

1:43500

STATE LANDBOARD MINERAL INVENTORY



TRACT IDENTIFIER : #95-4

COUNTY: Phillips

LOCATION: T.9N., R.44W., Section 36

APPROXIMATE ACREAGE: 640 acres

QUADRANGLE NAME(S): Amherst

OVERVIEW OF GEOLOGY:

This State land tract is located on the open plains in Phillips County of northeastern Colorado. The surface topography is relatively flat and the bedrock geology is poorly exposed. Extensive dry land and irrigated farmland development masks most outcrops. Visible outcrops in the area consist of Pleistocene glacial deposits and loess. The glacial deposits consist of slightly clayey yellowish-brown, sandy, blocky, non-stratified wind-blown calcareous-silt and sand that can reach a thickness of up to 130 feet. The Peoria Loess is wind-blown dust deposited during Pleistocene time.

OIL AND GAS RESOURCES:

No oil or gas resources have been established on this tract to date. Aladdin Petroleum drilled the State #1 well in the center of the NESE ¼ of this 640-acre tract. The well was drilled in 1950 to test the Dakota D and J sands and TD at a depth of 3,848 feet tagging Jurassic Morrison sediments. Gas shows were recorded but no production was ever established. The well was ultimately plugged and abandoned. Petroleum Information's records indicate the well was part of Amherst Field. No records of this field having actually produced hydrocarbons were found in the Colorado Oil and Gas records. In 1978 Amoco Production Company drilled the #1 Demmel well in the center of the SESE ¼ of section 35 T9N R44W. This well, which is only a few hundred yards west of this tract, established gas from the Niobrara Formation at a rate of 76 Mcfd at a depth of 2432- 2474. Shakespeare Oil drilled five successful Niobrara gas wells adjacent to the south and southeast corner of this tract. Their most recent and best well-drilled in 1982 flowed 420 Mcfd. Bowers Oil and Gas Company completed a gas well in the Niobrara in the same area at an undisclosed flow rate in 1984.

Geological control strongly suggests that potential for gas production from Niobrara Chalks in the tract is good.

COAL RESOURCES:

There are no coal measures in any of the sedimentary units in this tract.

METALLIC MINERAL RESOURCES:

There are no metallic mineral resources in this tract.

INDUSTRIAL MINERALS AND CONSTRUCTION MATERIALS RESOURCES:

Area Inactive Sand and Gravel Pits:

Unnamed Pit – NW ¼ SW ¼ NW ¼, Section 22, T9N, R44 W

Unnamed Pit – SE ¼ SW ¼ SE ¼, Section 22, T9N, R44 W

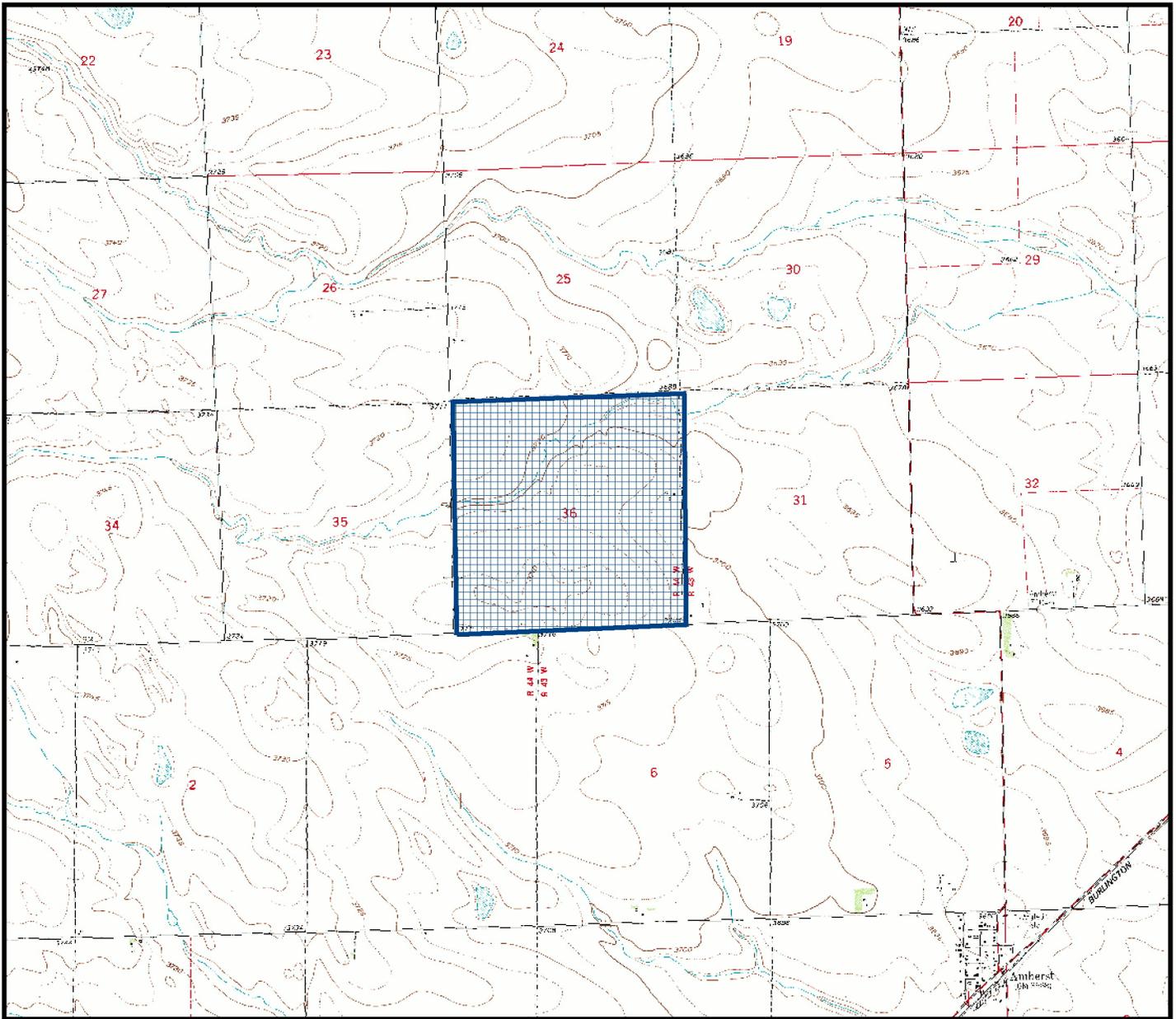
Identified Sand and Gravel Resources:

The surface bedrock consists primarily of buff colored calcareous wind blown silt and sand (Loess), which is judged to contain low industrial mineral value due to its clay content. Streams in the general area are restricted exclusively to the Loess deposits. One small of intermittent stream meanders across the tract from west to east. The meanders are associated with point bar deposits containing sand, silt and gravel (?) and are similar to the source of sediments in the unnamed pits located in section 22 listed above.

REFERENCES:

Schwochow, S.D., 1981, Inventory of non-metallic mining and processing operations in Colorado, Colorado Geological Survey, Department of Natural Resources, Denver Colorado, Map Series 17

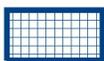
Scott, G. R., 1978, Map showing Geology, structure, and oil and gas fields in the Sterling 1° X2° Quadrangle, Colorado, Nebraska, and Kansas, US Geological Survey Miscellaneous Investigation Series I-1092

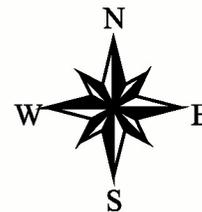


95-04

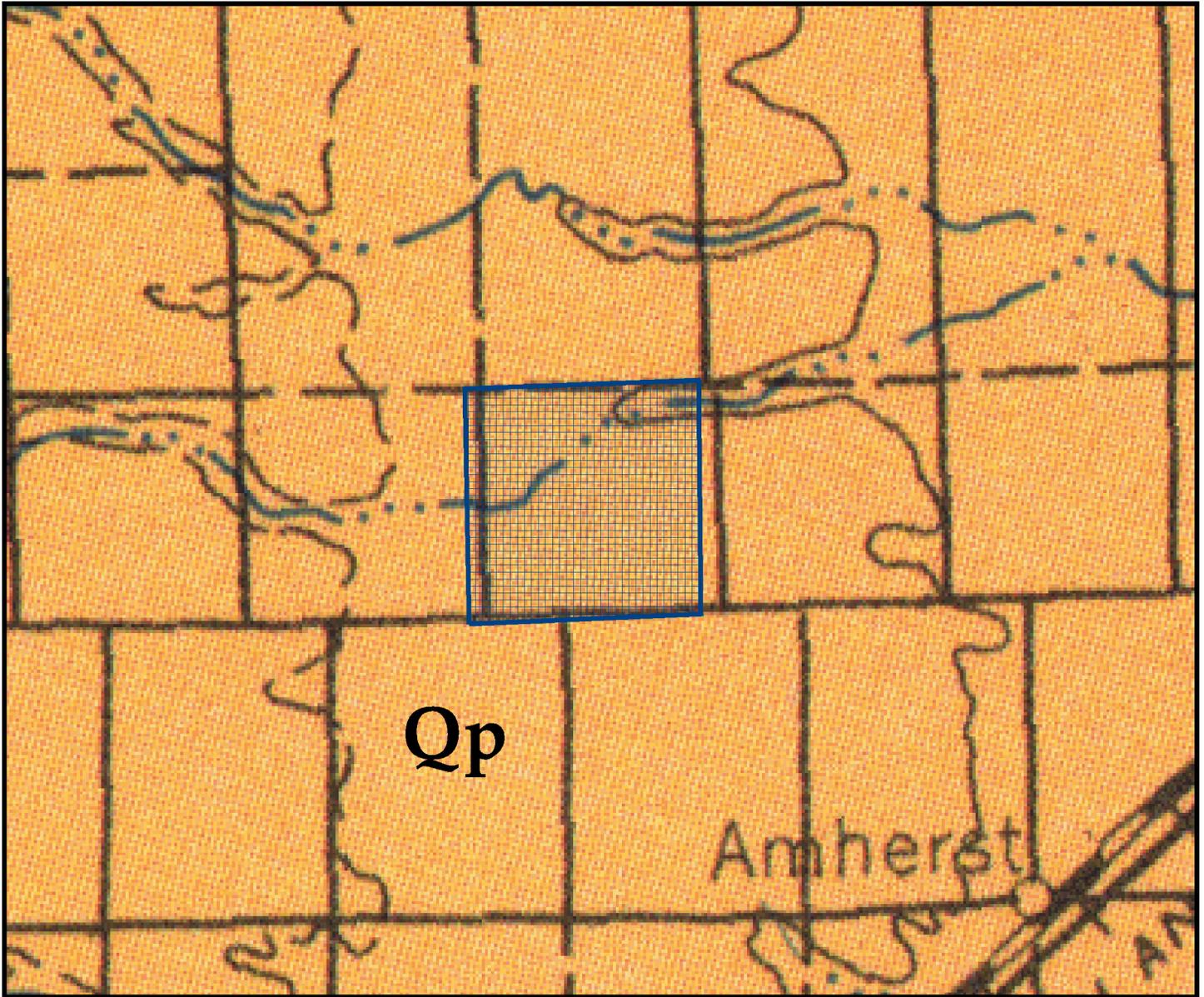
Location: T. 9 N, R. 4 W
Section: 36
Approximate total acreage - 640



 Mineral acreage evaluated

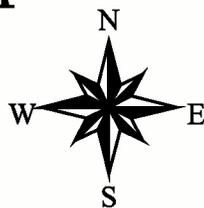


1:43500



Geologic Map for 95-04

Location: T. 9 N, R. 4 W
Section: 36
Approximate total acreage - 640



 *Mineral acreage evaluated*

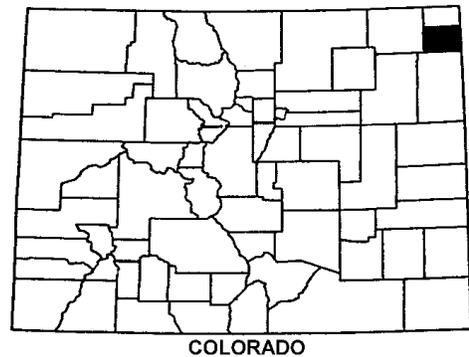
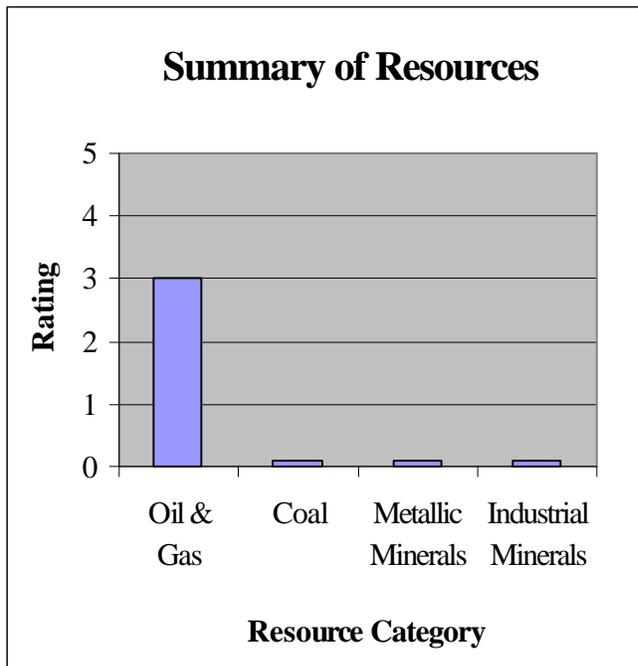
Qp - Peoria loess (Pleistocene) Slightly clayey yellowish brown, sandy, blocky, non-stratified wind-blown calcareous-silt and sand.

0 1 2 Miles



1:43500

STATE LANDBOARD MINERAL INVENTORY



TRACT IDENTIFIER : #95-5

COUNTY: Phillips

LOCATION: T.9N., R.43W., Section 36

APPROXIMATE ACREAGE: 640 acres

QUADRANGLE NAME(S): Amherst

OVERVIEW OF GEOLOGY:

This State land tract is located on the open plains in northeastern Colorado. The surface topography is relatively flat and the bedrock geology is poorly exposed. Extensive dry land and irrigated farmland development masks most outcrops. Visible outcrops in the area consist of fluvial deposits of Miocene Ogallala Formation cropping out south of the South Platte River. These deposits generally consist of grayish orange-pink ash; pebbly sand and silt capped by pale-red dense pisolitic caliche layers and brecciated limestone forming a cap rock at the surface. The Pleistocene Peoria Loess overlies the Ogallala Formation in the extreme southwest corner of this State Land Tract. This unit generally consists of slightly clayey yellowish-brown, sandy, blocky, non-stratified wind-blown calcareous silt and sand.

OIL AND GAS RESOURCES:

No exploratory wells, establishing oil or gas resources, have been drilled on this tract as of this date. One exploratory well was drilled $\frac{3}{4}$ of a mile north of this tract. Cities Service drilled the Harold A #1 well in the NW $\frac{1}{4}$ of Section 25, T9N R43W to a depth of 2,573 feet to test Niobrara Chalks. No production was established and the well was plugged and abandoned in 1981. Two miles northwest of this tract, in SE $\frac{1}{4}$ of section 22, Shakespeare Oil Company established gas in their #1 Schlachter well from the Niobrara Formation at a rate of 656 Mcfd in 1990.

Geological control is insufficient to determine the presence of a local trap. But, the essential elements, which include reservoir, trap, and source rocks with the appropriate timing of generation of migration, do exist in the sedimentary rocks in this area.

COAL RESOURCES:

There are no coal measures in any of the sedimentary units in this tract.

METALLIC MINERAL RESOURCES:

There are no metallic mineral resources in this tract.

INDUSTRIAL MINERALS AND CONSTRUCTION MATERIALS RESOURCES:

Area Inactive Sand and Gravel Pits

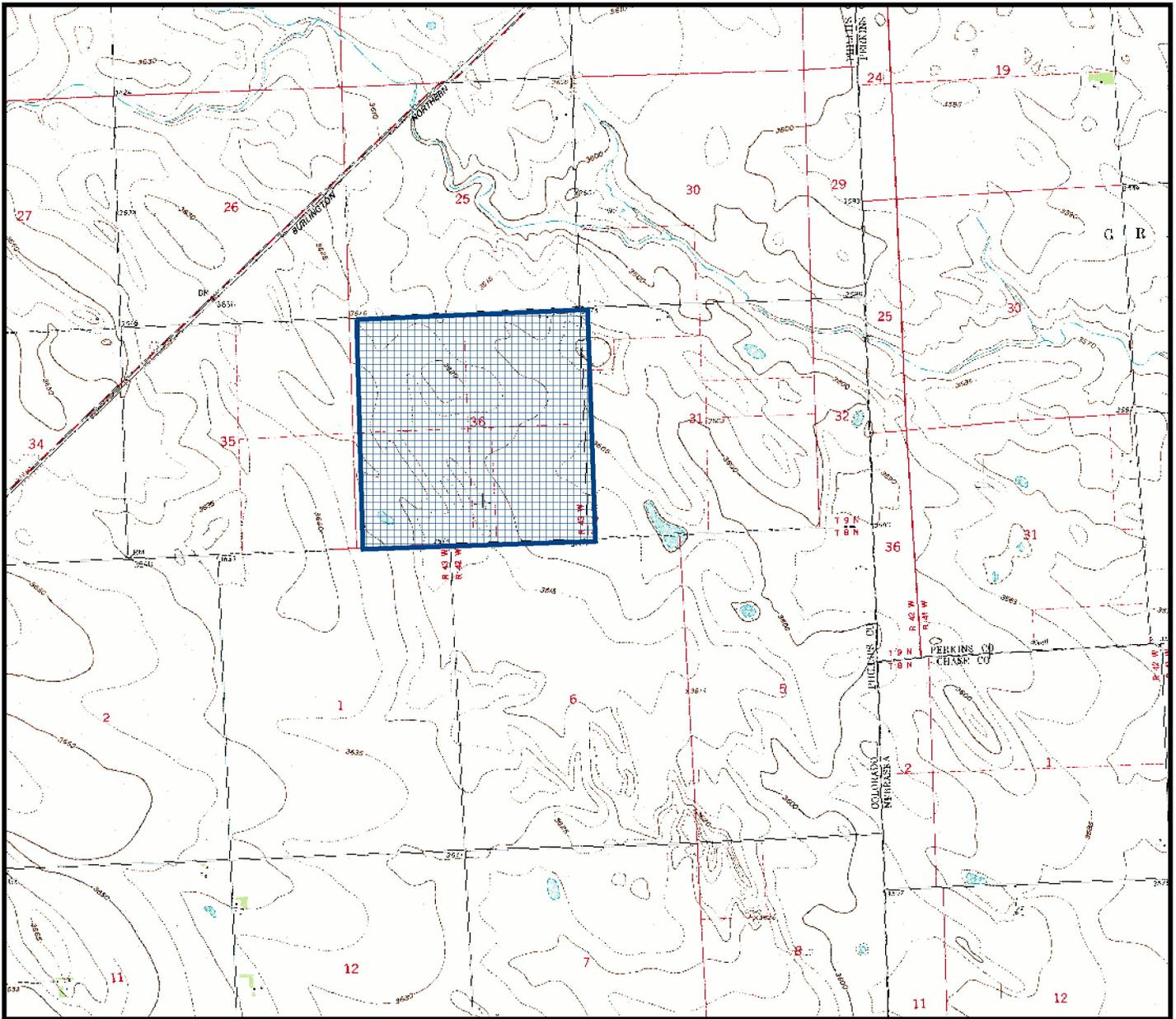
None

Sand and Gravel Resources

The surface bedrock consists of fluvial deposits containing low-grade industrial minerals (sand, gravel, and aggregate). The surface is being farmed and there are no streams or creeks draining the tract. The bedrock lacks the necessary rock types for commercial volumes of industrial type minerals or construction materials.

REFERENCES:

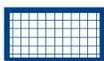
Scott, G. R., 1978, Map showing Geology, structure, and oil and gas fields in the Sterling 1° X2° Quadrangle, Colorado, Nebraska, and Kansas, US Geological Survey Miscellaneous Investigation Series I-1092

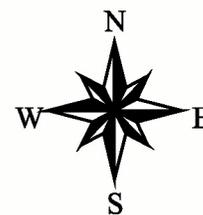


95-05

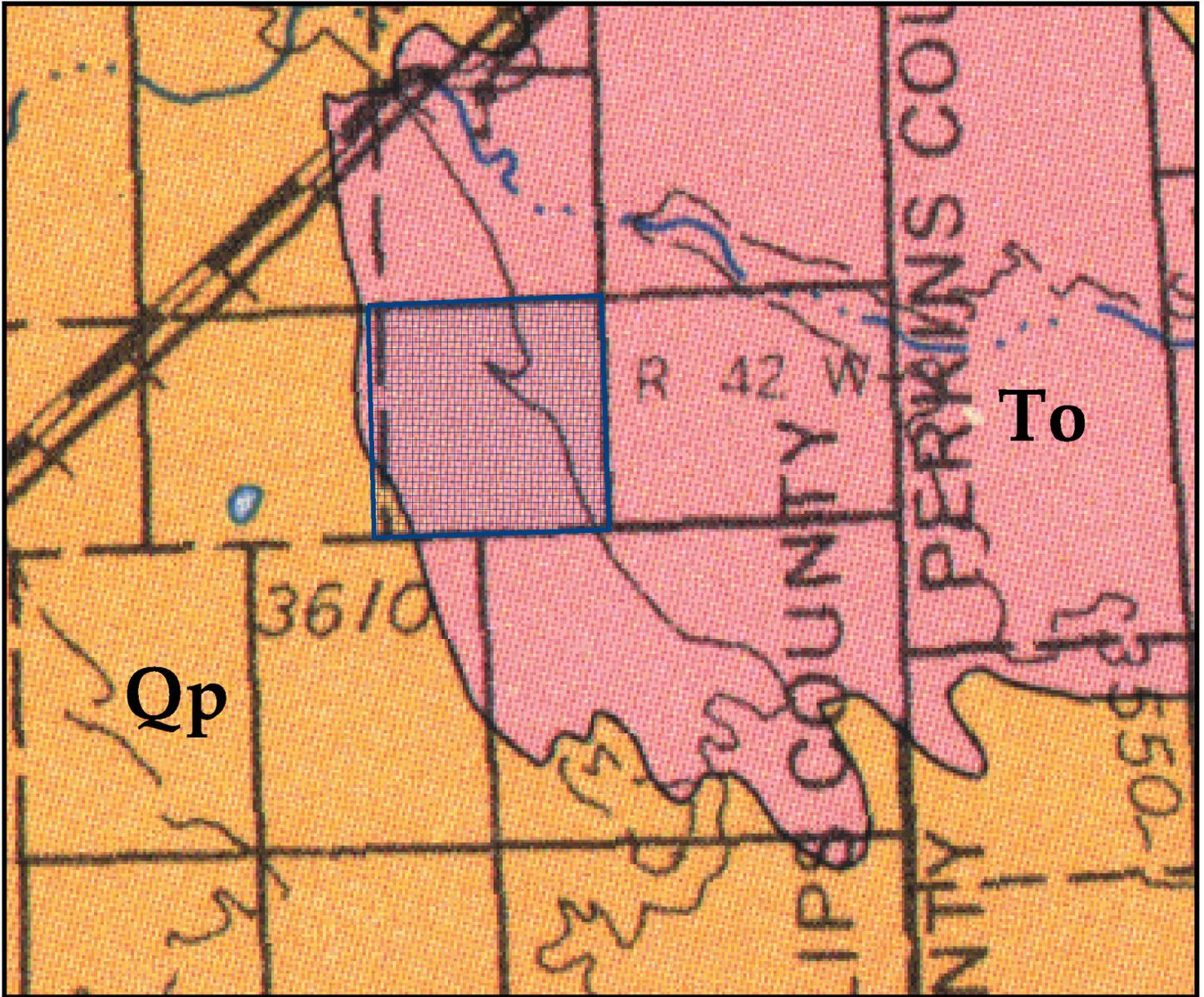
Location: T. 9 N, R. 43 W
 Section: 36
 Approximate total acreage: 640



 Mineral acreage evaluated

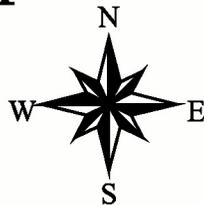


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Geologic Map for 95-05

Location: T. 9 N, R. 43 W
 Section: 36
 Approximate total acreage: 640



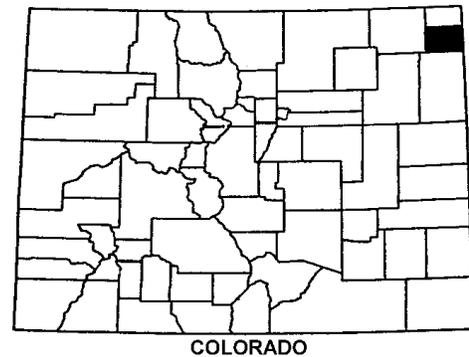
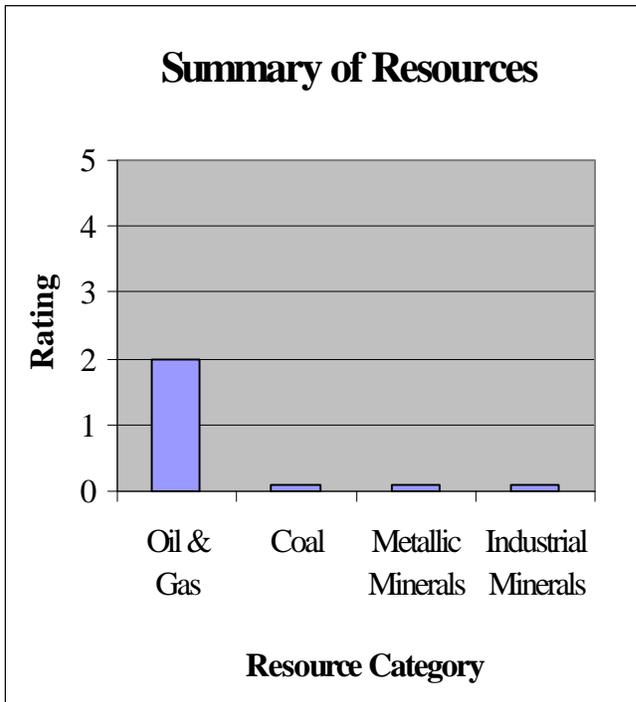
1:43500

 *Mineral acreage evaluated*

Qp - Peoria loess (Pleistocene) Slightly clayey yellowish brown, sandy, blocky, non-stratified wind-blown calcareous-silt and sand.

To - Ogallala Formation (Miocene) Fluvial deposits of grayish orange-pink ash, pebbly sand and silt capped by pale-red dense pisolitic caliche layers and brecciated limestone.

STATE LANDBOARD MINERAL INVENTORY



TRACT IDENTIFIER : #95-6

COUNTY: Phillips

LOCATION: T.8N. R.47W., Section 16

APPROXIMATE ACREAGE: 640 acres

QUADRANGLE NAME(S): Haxtun East

OVERVIEW OF GEOLOGY:

This State land tract is located on the open plains in Phillips County of northeastern Colorado. The surface topography is relatively flat and the bedrock geology is poorly exposed. Extensive dry land and semi arid vegetation in the upper few inches of brown soil masks most outcrops. The few visible outcrops in this area consists of well-sorted, wind-blown, and dune-forming sands of the Holocene and Pleistocene that covers an area of approximately 25 square miles in the northwest corner of this county. These dune deposits, which are more areally extensive in the south-southeast part of the county, overlie unconformably the Pleistocene Peoria Loess and Miocene Ogallala formations.

OIL AND GAS RESOURCES:

No exploratory wells, establishing oil or gas resources, have been drilled on this tract as of this date. The essential elements, which include reservoir, trap, and source rocks with the appropriate timing of generation of migration, do exist in the sedimentary rocks in this area. One exploratory well was drilled ¼ mile from the west edge of this tract. Kansas-Nebraska Natural Gas drilled the Chaney #1 well in the SE ¼ of Section 17, T8N R47W to a depth of 3,202 feet to test the Cretaceous Niobrara Formation. No production was established and no indications of oil or gas were observed and recorded from any of the overlying horizons. The well was plugged and abandoned in 1979. The closest production to this tract is Haxtun Field, located 3 ½ miles north, which is currently producing gas from the Muddy J-Sandstone at approximately 4,000 feet.

COAL RESOURCES:

There are no coal measures in any of the sedimentary units in this tract.

METALLIC MINERAL RESOURCES:

There are no metallic mineral resources in this tract.

INDUSTRIAL MINERALS AND CONSTRUCTION MATERIALS RESOURCES:

Area Inactive Sand and Gravel Pits:

T8N, R47W

Unnamed Pit – NW¼ NE¼ NW¼, Section 5, T8N, R47W

Unnamed Pit – SW¼ SW¼ SW¼, Section 30, T8N, R47W

Both of the above pits are located in the eolian dune deposits and were probably used for mud reduction on dirt roads.

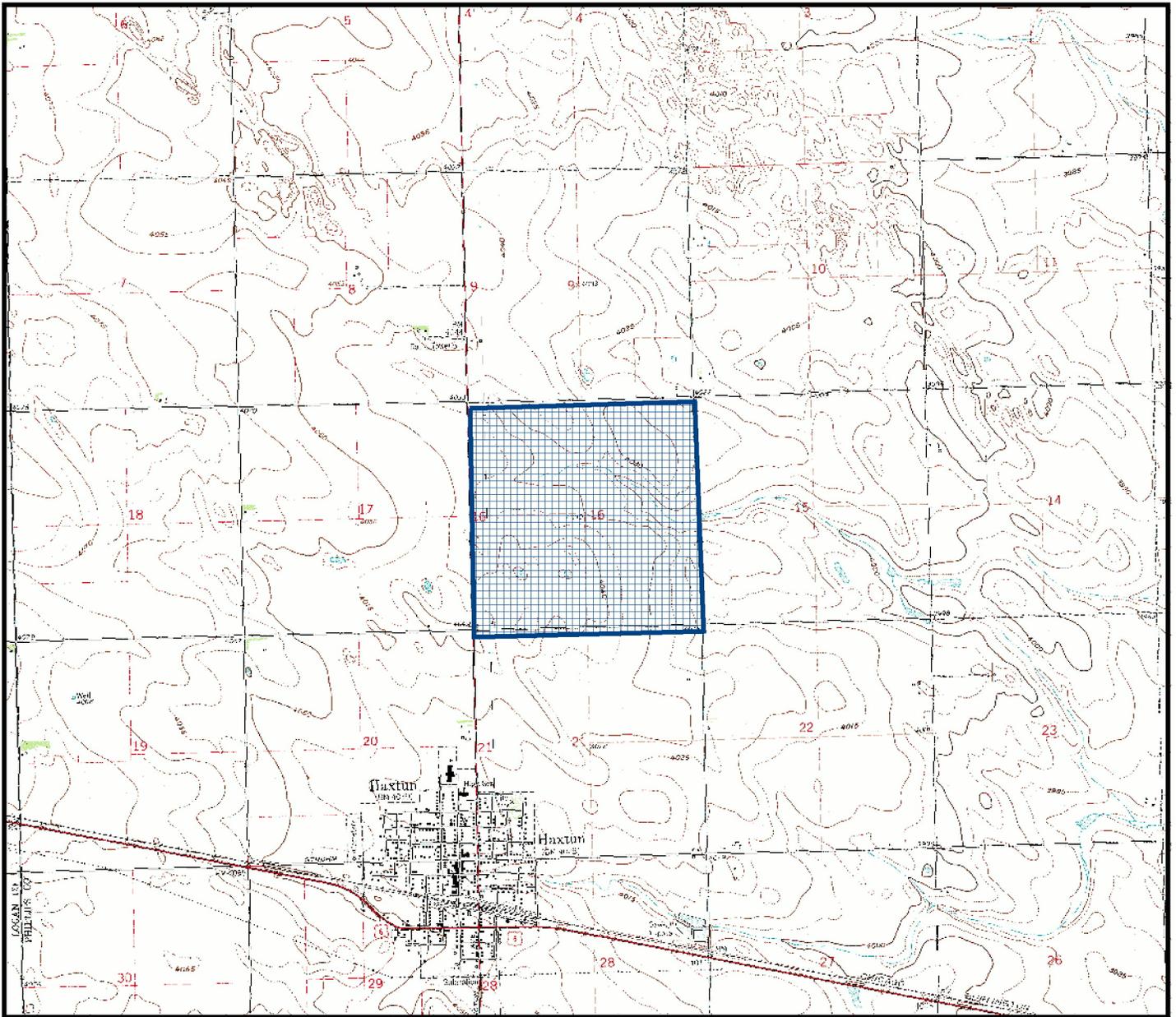
Sand and Gravel Resources

The surface bedrock consists primarily of wind blown deposits containing mostly sand covering the entire tract. The sand in this area is estimated to be 50 – 75 feet in thickness. These eolian sand deposits are areal extensive and have little value for their industrial mineral content. Intermittent water accumulations indicate clay high clay contents in the blowout areas of the dunes. One small intermittent stream drains the east central area of this tract. The stream is laced with intermittent ponds indicating high clay content associated with the sand.

REFERENCES:

Schwochow, S.D., 1981, Inventory of non-metallic mining and processing operations in Colorado, Colorado Geological Survey, Department of Natural Resources, Denver Colorado, Map Series 17

Scott, G. R., 1978, Map showing Geology, structure, and oil and gas fields in the Sterling 1° X2° Quadrangle, Colorado, Nebraska, and Kansas, US Geological Survey Miscellaneous Investigation Series I-1092

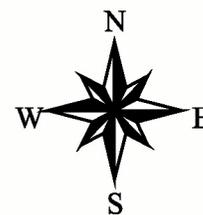


95-06

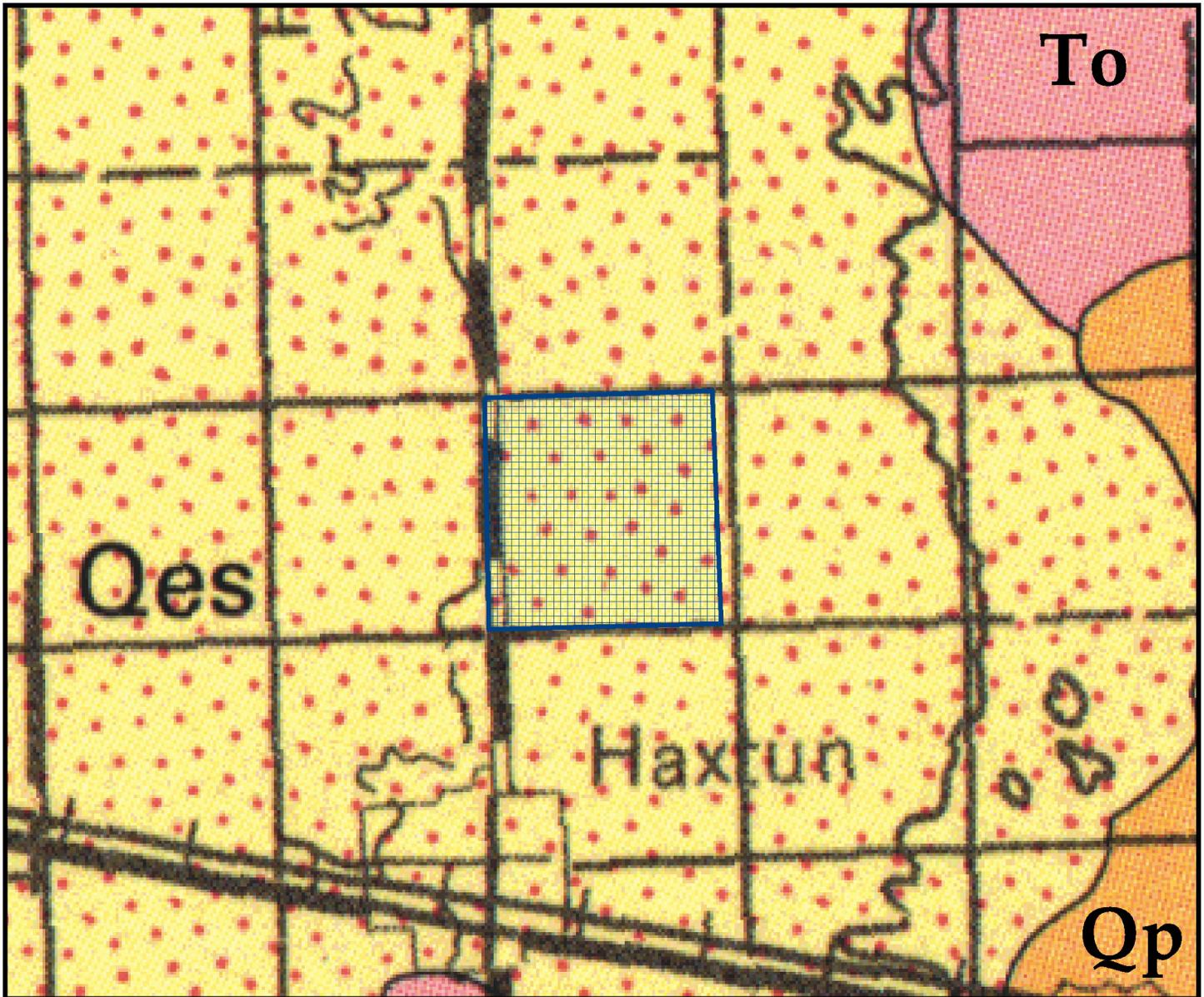
Location: T. 8 N, R. 47 W
Section: 16
Approximate total acreage - 640



 *Mineral acreage evaluated*

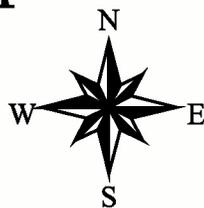


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Geologic Map for 95-06

Location: T. 8 N, R. 47 W
 Section: 16
 Approximate total acreage - 640



 *Mineral acreage evaluated*

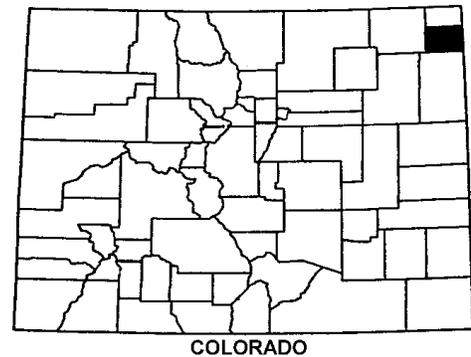
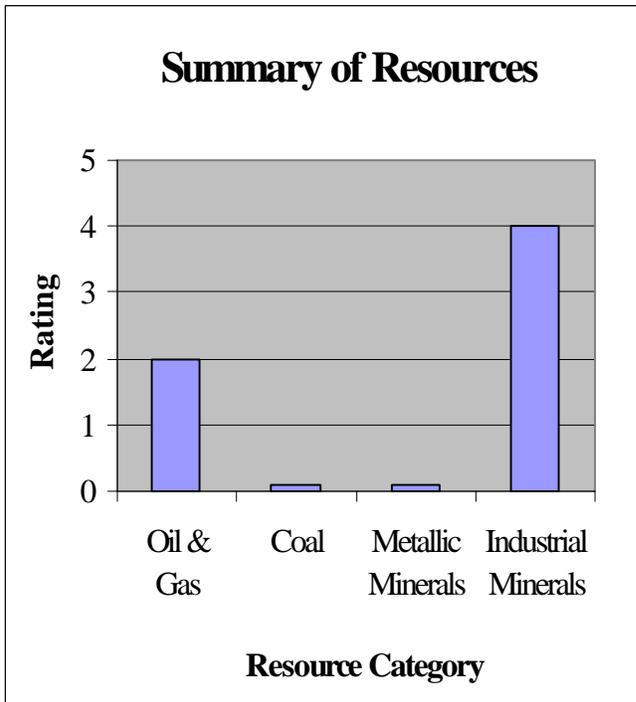
Qp - Peoria loess (Pleistocene) Slightly clayey yellowish brown, sandy, blocky, non-stratified wind-blown calcareous-silt and sand.

To - Ogallala Formation (Miocene) Fluvial deposits of grayish orange-pink ash, pebbly sand and silt capped by pale-red dense pisolitic caliche layers and brecciated limestone.

Qes - Eolian Sand (Holocene/Pleistocene) Pale yellowish brown well-sorted wind blown sand.

1:43500

STATE LANDBOARD MINERAL INVENTORY



TRACT IDENTIFIER : #95-7

COUNTY: Phillips

LOCATION: T.8N., R.47W., Section 36

APPROXIMATE ACREAGE: 640 acres

QUADRANGLE NAME(S): Haxtun East

OVERVIEW OF GEOLOGY:

This State land tract is located on the open plains in northeastern Colorado. The surface topography is relatively flat and the bedrock geology is poorly exposed. Extensive dry land and irrigated farmland developed masks most outcrops. The few visible outcrops in this area consist of wind blown sand deposits of the Pleistocene Peoria Loess and fluvial deposits of the Miocene Ogallala Formation. Three-fourths of the surface bedrock in this tract consists of clayey yellowish-brown, sandy, blocky, non-stratified wind blown calcareous-silts and sands of the Peoria Loess. This Pleistocene glacial deposit overlies unconformably the Tertiary Ogallala Formation, which consists of fluvial sediments and crops out over much of the northeast part of the State. The sediments consist of red pale

dense pisolitic caliche layers or limestone brecciated and recemented forming a cap rock at the surface. Below the cap rock, the sediments consist of semi-consolidated ashy sand and silt beds and volcanic ash beds. One small intermittent stream flows east and parallel to the southern boundary of this tract.

OIL AND GAS RESOURCES:

No oil or gas resources have been established on this tract. The essential elements, which include reservoir, trap, and source rocks with the appropriate timing of generation of migration, do exist in the sedimentary rocks in this area. However existing geological control is insufficient to determine the presence of a trap.

COAL RESOURCES:

There are no coal measures in any of the sedimentary units in this tract.

METALLIC MINERAL RESOURCES:

There are no metallic mineral resources in this tract.

INDUSTRIAL MINERALS AND CONSTRUCTION MATERIALS RESOURCES:

Area Inactive Sand and Gravel Pits

T8N, R47 W

Unnamed Pit – SE ¼ NW ¼ SE ¼, Section 35, T8N, R47W

Unnamed Pit – NE ¼ SW ¼ SW ¼, Section 33, T8N, R47W

Unnamed Pit – NE ¼ NE ¼ NW ¼, Section 32, T8N, R47W

Unnamed Pit – NE ¼ NW ¼ NW ¼, Section 32, T8N, R47W

Unnamed Pit – SE ¼ SE ¼ NE ¼, Section 31, T8N, R47W

T7N, R46W

Unnamed Pit – SE ¼ NE ¼ SE ¼, Section 16, T7N, R46 W

The above sand and gravel pits are located in point bars associated with the North Fork of Frenchman Creek west and south of this tract.

Active Mines

T7N, R47 W

Kurtzer Gravel Pit - sand, gravel, and aggregate – SW ¼ SW ¼ NE ¼, Section 22, T7N, R47 W – Approximately 4 miles southwest of this tract.

L&L Ready Mix Gravel Pit - sand, gravel, and aggregate – SW ¼ NW ¼ NW ¼, Section 24, T7N, R47 W – Approximately 3 ¼ miles south of this tract.

T7N, R45W

Cunningham Pit - sand, gravel, and aggregate - L&L Ready Mix – NE ¼ NW ¼ SE ¼, Section 25, T7N, R47 W – Approximately 4 ¾ miles south of this tract.

Identified Sand and Gravel Resources

The surface bedrock consists primarily of buff colored calcareous wind blown silt and sand (Loess) that is interpreted to have low industrial mineral value. This type bedrock contains a high clay and silt content. The North Fork of Frenchman Creek crosses the SE

¼ of the tract eroding the Peoria Loess and exposing fluvial deposits of the Ogallala Formation containing sand, gravel, and aggregate in gravel bars parallel to the creek bed increasing the industrial mineral value.

Identified resources of 170 thousand tons of sand and gravel of unknown quality covers an aggregate of approximately 7 acres in this tract. Calculations in all cases are based upon volume to tonnage conversion factor of 18 cubic feet/ton (111-lbs./cubic foot) for sand and gravel. A breakdown of the sand and gravel resources present in each of the locales is presented below:

North Fork of Frenchman Creek

Present day flood plain deposits: Section 24 - 7 acres

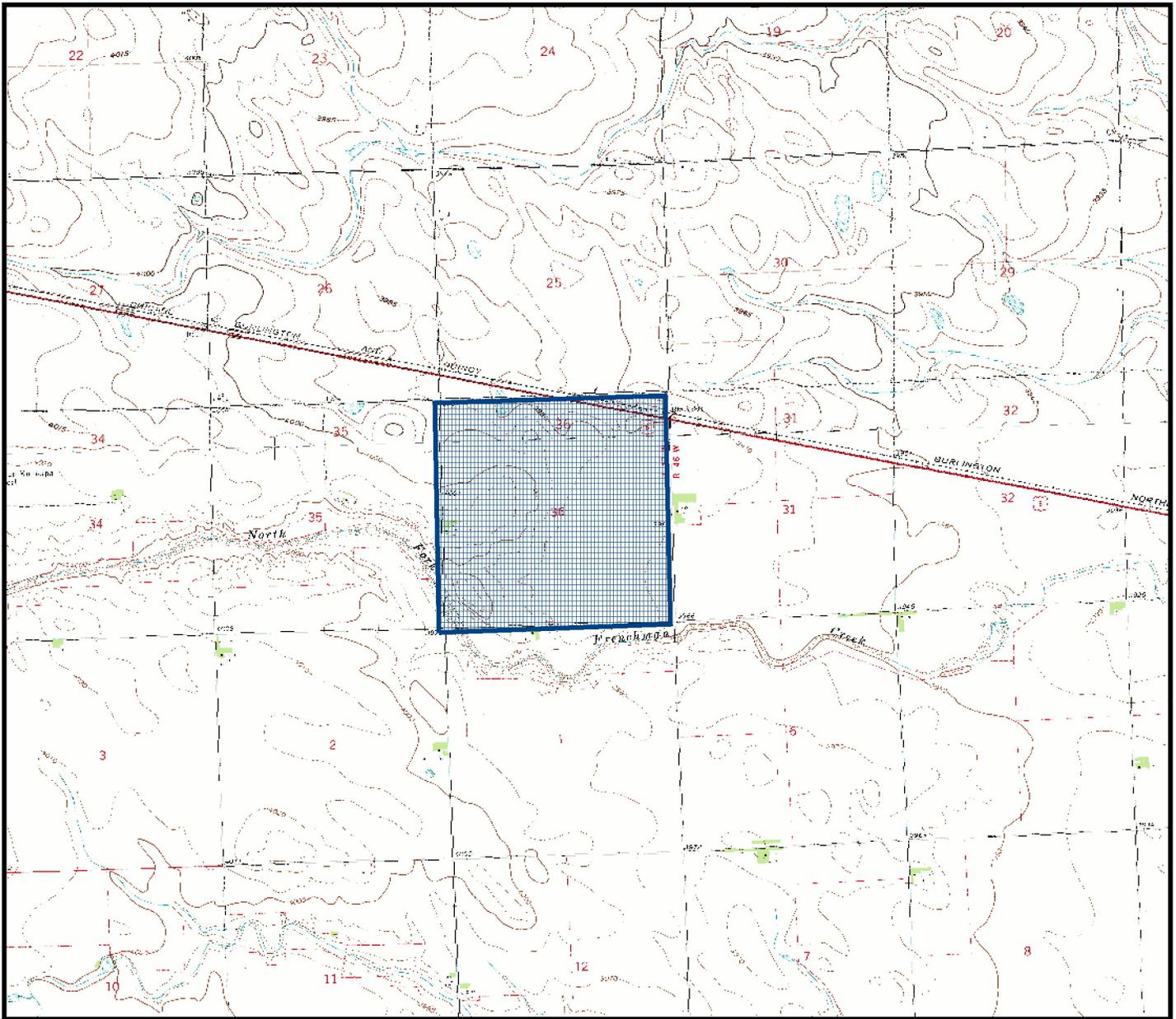
(310003 sq. ft.) X 10 ft. thick/ 18 cubic feet/ton = 172 thousand tons of sand and gravel.

REFERENCES:

Lawson, A. D., 1998, Active Permitted Mine Operations in Colorado, 1996-97, Colorado Geological Survey, Department of Natural Resources, Denver Colorado, Information Series 45, 58 p.

Schwochow, S.D., 1981, Inventory of non-metallic mining and processing operations in Colorado, Colorado Geological Survey, Department of Natural Resources, Denver Colorado, Map Series 17

Scott, G. R., 1978, Map showing Geology, structure, and oil and gas fields in the Sterling 1° X2° Quadrangle, Colorado, Nebraska, and Kansas, US Geological Survey Miscellaneous Investigation Series I-1092

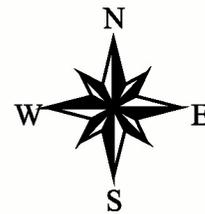


95-07

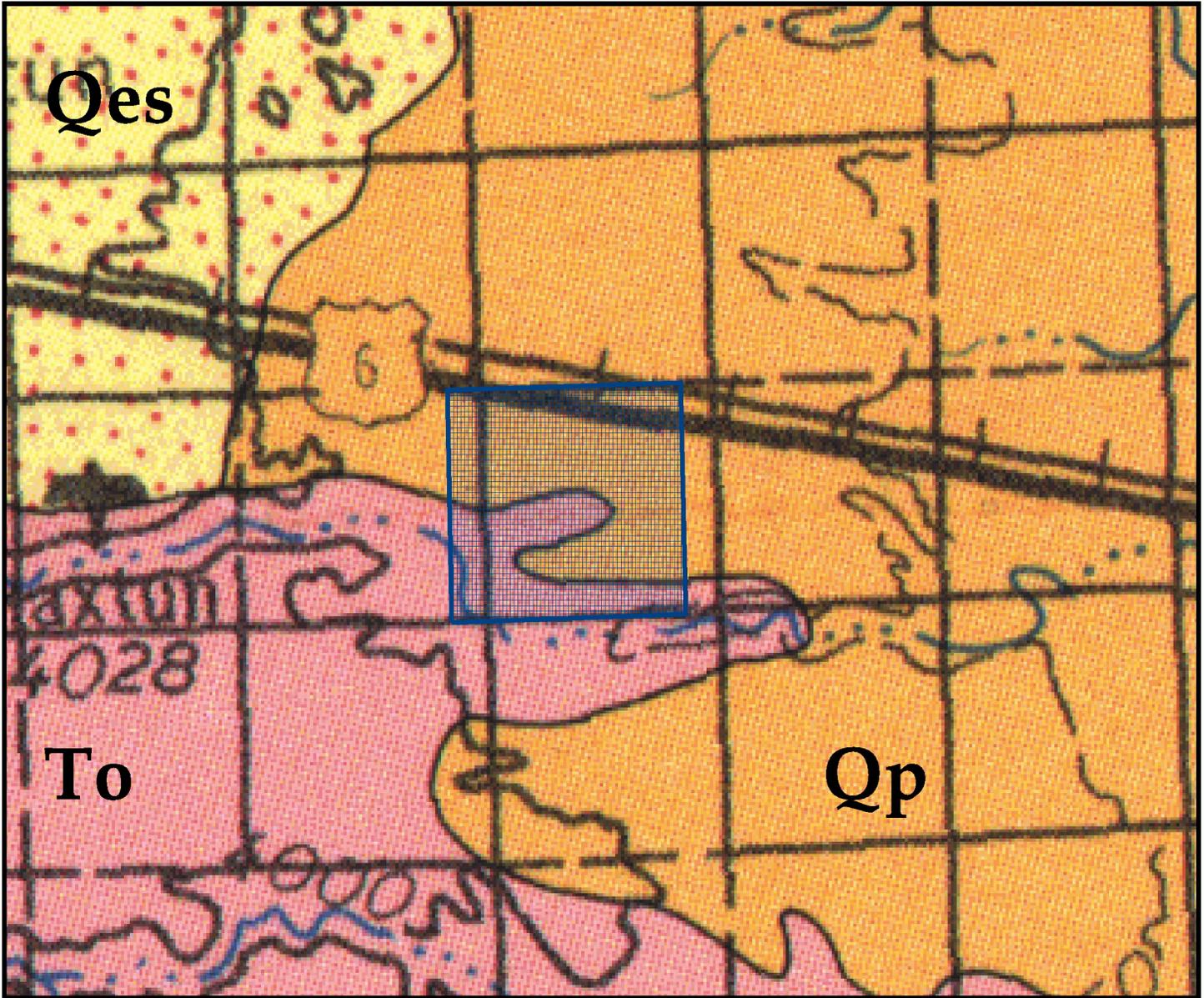
Location: T. 8 N, R. 47 W
Section: 36
Approximate total acreage - 640



 Mineral acreage evaluated

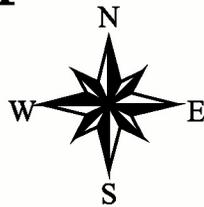


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Geologic Map for 95-07

Location: T. 8 N, R. 47 W
 Section: 36
 Approximate total acreage - 640



1:43500

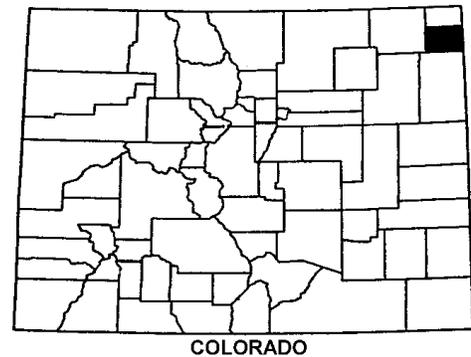
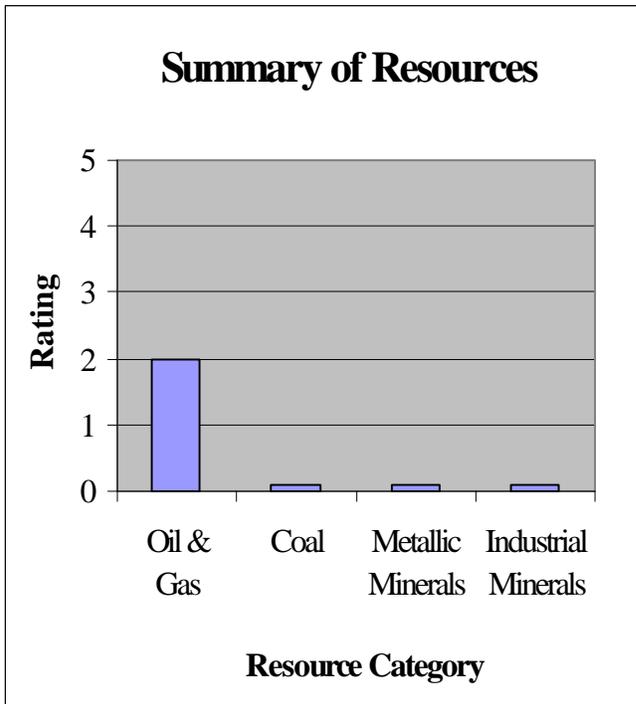
 *Mineral acreage evaluated*

Qp - Peoria loess (Pleistocene) Slightly clayey yellowish brown, sandy, blocky, non-stratified wind-blown calcareous-silt and sand.

To - Ogallala Formation (Miocene) Fluvial deposits of grayish orange-pink ash, pebbly sand and silt capped by pale-red dense pisolitic caliche layers and brecciated limestone.

Qes - Eolian Sand (Holocene/Pleistocene) Pale yellowish brown well-sorted wind blown sand.

STATE LANDBOARD MINERAL INVENTORY



TRACT IDENTIFIER : #95-8

COUNTY: Phillips

LOCATION: T.8N., R.46W., Section 16

APPROXIMATE ACREAGE: 640 acres

QUADRANGLE NAME(S): Haxtun East, Holyoke NW

OVERVIEW OF GEOLOGY:

This State land tract is located on the open plains in northeastern Colorado. The surface topography is relatively flat and the bedrock geology is poorly exposed. Extensive dry land and irrigated farmland developed masks most outcrops. The few visible outcrops in this area consist of wind blown sand and calcareous silt deposits of the Pleistocene Peoria Loess. There are four intermittent ponds on the tract, which are probably the result blowouts in the wind blown deposits. The Miocene Ogallala Formation crops out approximately one mile to the northwest and southeast of this tract. This formation rests unconformably below the Peoria Loess and consists of fluvial sediments and crops out over much of the northeast part of the State. The sediments consist of red pale dense

pisolitic caliche layers or limestone brecciated and recemented forming a cap rock at the surface. Below the cap rock, the sediments consist of semi-consolidated ashy sand and silt beds and volcanic ash beds.

OIL AND GAS RESOURCES:

No oil or gas resources have been established on this tract. The essential elements, which include reservoir, trap, and source rocks with the appropriate timing of generation of migration, do exist in the sedimentary rocks in this area. However existing geological control is insufficient to determine the presence of a trap.

COAL RESOURCES:

There are no coal measures in any of the sedimentary units in this tract.

METALLIC MINERAL RESOURCES:

There are no metallic mineral resources in this tract.

INDUSTRIAL MINERALS AND CONSTRUCTION MATERIALS RESOURCES:

Area Inactive Sand and Gravel Pits:

T8N, R46 W

Unnamed Pit – NW¹/₄ SW¹/₄ NW¹/₄, Section 3, T8N, R46W

T9N, R47W

Unnamed Pit – SW¹/₄ SW¹/₄ SW¹/₄, Section 36, T9N, R47W

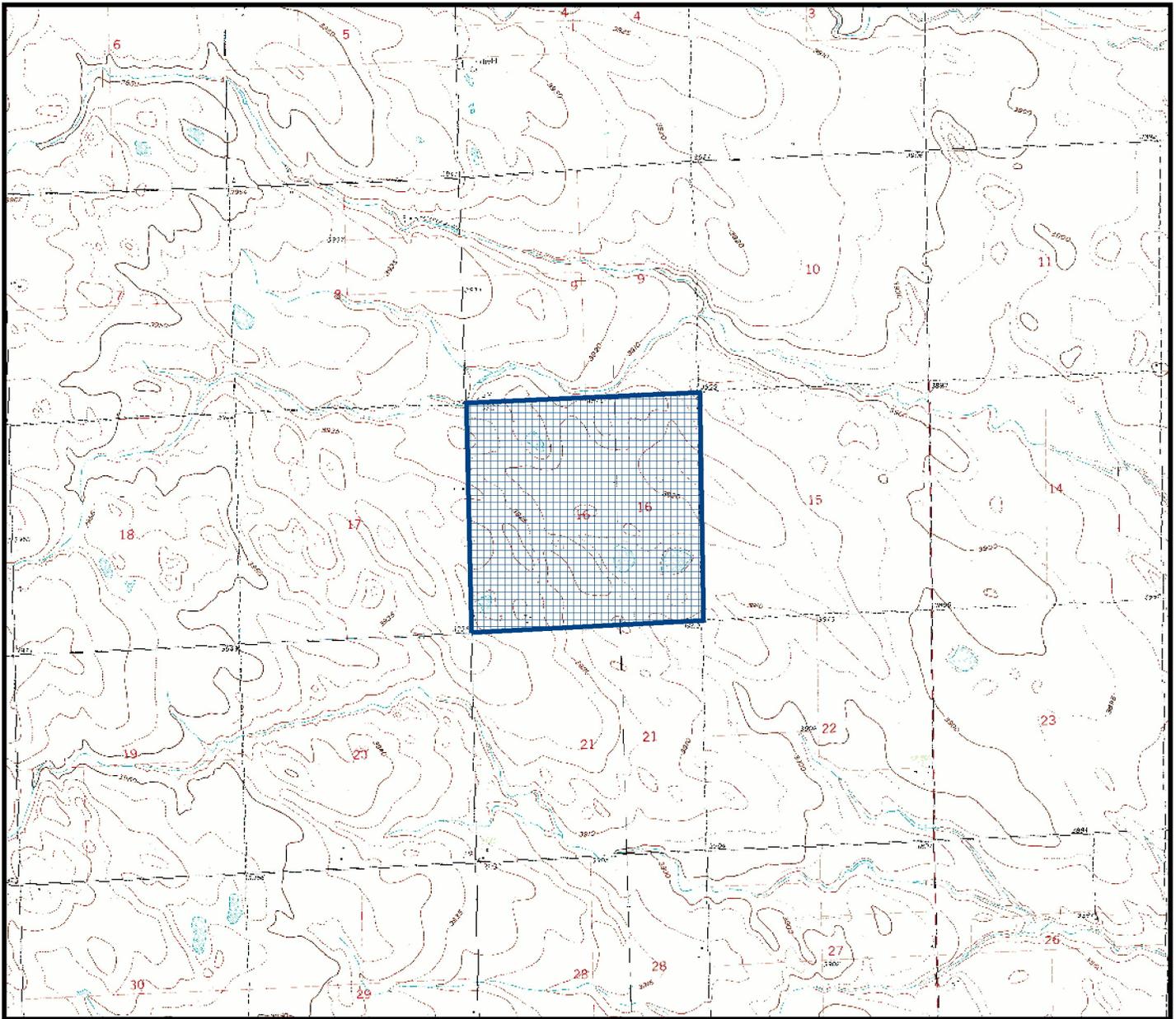
Sand and Gravel Resources

The surface bedrock consists primarily of buff colored calcareous wind blown calcareous-silt and sand (Loess) that is interpreted to have low industrial mineral value. This type bedrock contains a high clay and silt content.

REFERENCES:

Schwochow, S.D., 1981, Inventory of non-metallic mining and processing operations in Colorado, Colorado Geological Survey, Department of Natural Resources, Denver Colorado, Map Series 17

Scott, G. R., 1978, Map showing Geology, structure, and oil and gas fields in the Sterling 1° X2° Quadrangle, Colorado, Nebraska, and Kansas, US Geological Survey Miscellaneous Investigation Series I-1092

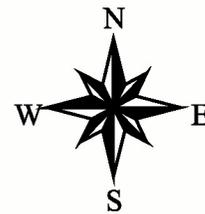


95-08

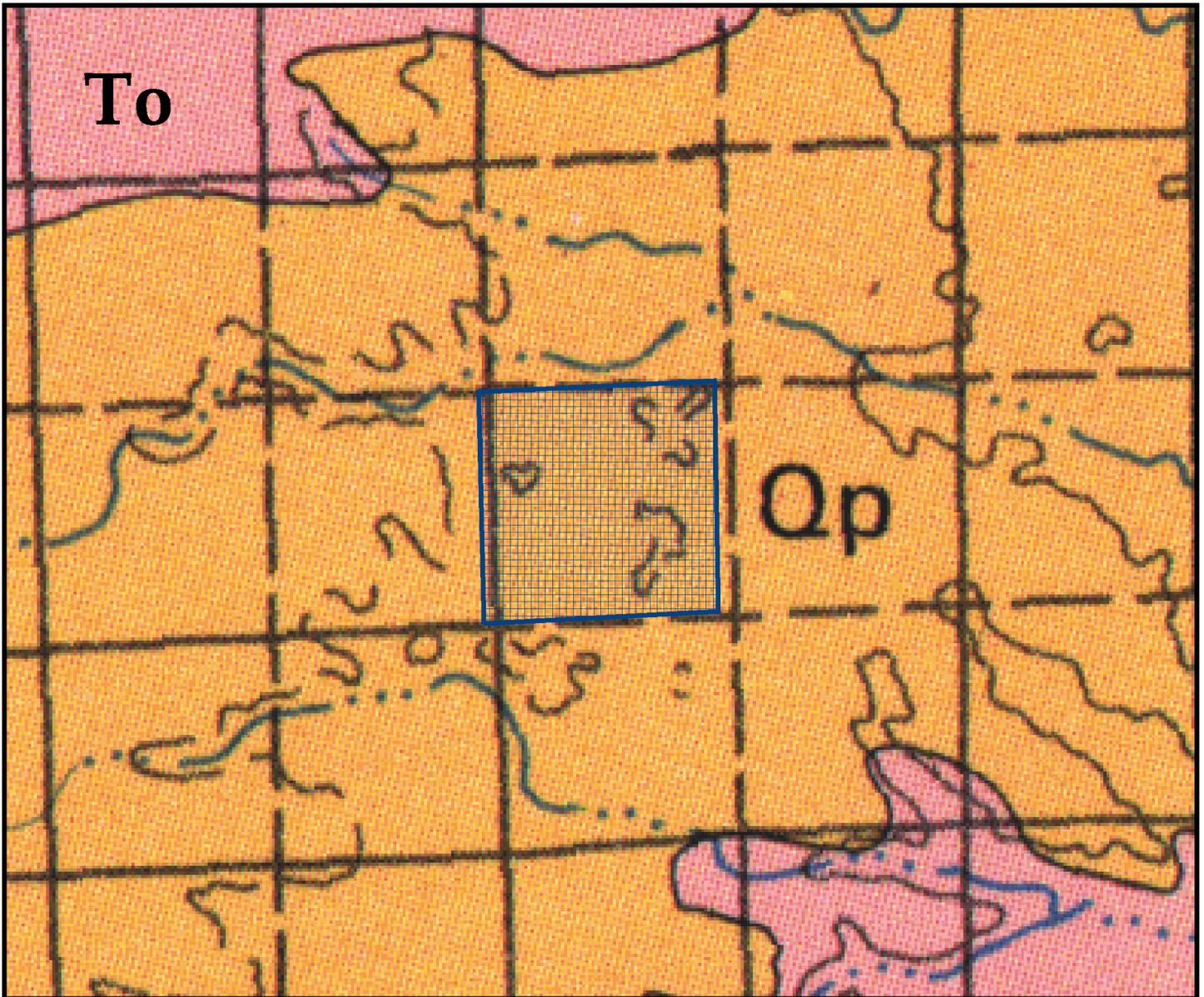
Location: T. 8 N, R. 46 W
Section: 16
Approximate total acreage - 640



 Mineral acreage evaluated

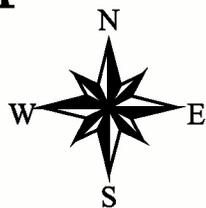


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Geologic Map for 95-08

Location: T. 8 N, R. 46 W
 Section: 16
 Approximate total acreage - 640



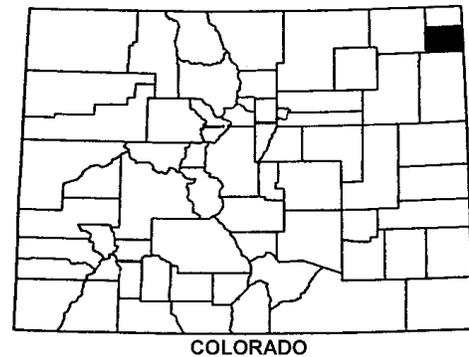
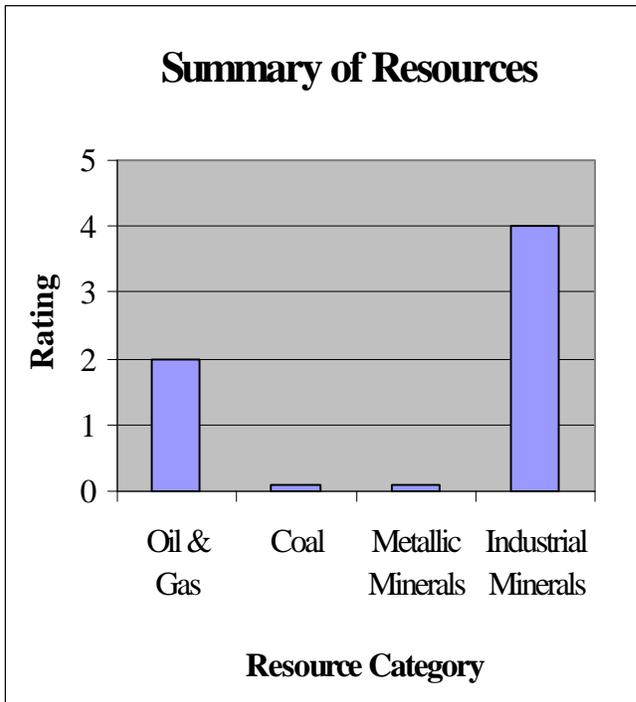
 *Mineral acreage evaluated*

Qp - Peoria loess (Pleistocene) Slightly clayey yellowish brown, sandy, blocky, non-stratified wind-blown calcareous-silt and sand.

To - Ogallala Formation (Miocene) Fluvial deposits of grayish orange-pink ash, pebbly sand and silt capped by pale-red dense pisolitic caliche layers and brecciated limestone.

1:43500

STATE LANDBOARD MINERAL INVENTORY



TRACT IDENTIFIER : #95-9

COUNTY: Phillips

LOCATION: T8N R46W Section 36

APPROXIMATE ACREAGE: 640 acres

QUADRANGLE NAME(S): Holyoke NW, Paoli

OVERVIEW OF GEOLOGY:

This State land tract is located on the open plains in northeastern Colorado. The surface topography is relatively flat and the bedrock geology is poorly exposed. Extensive dry land and irrigated farmland development masks most outcrops. Visible outcrops in the area consist of fluvial deposits of Miocene Ogallala Formation cropping out south of the South Platte River. These deposits generally consist of grayish orange-pink ash; pebbly sand and silt capped by pale-red dense pisolitic caliche layers and brecciated limestone forming a cap rock at the surface. The Pleistocene Peoria Loess, which crops out approximately ½ mile north, overlies the Ogallala Formation but not in the area of this State Land Tract. This unit generally consists of slightly clayey yellowish-brown, sandy,

blocky, non-stratified wind-blown calcareous silt and sand. The North Fork of Frenchman Creek flows east through the center of this tract. This creek is generally associated with excellent deposits of sand and gravel in point bars.

OIL AND GAS RESOURCES:

No oil or gas resources have been established on this tract. The essential elements, which include reservoir, trap, and source rocks with the appropriate timing of generation of migration, do exist in the sedimentary rocks in this area. However existing geological control is insufficient to determine the presence of a trap.

COAL RESOURCES:

There are no coal measures in any of the sedimentary units in this tract.

METALLIC MINERAL RESOURCES:

There are no metallic mineral resources in this tract.

INDUSTRIAL MINERALS AND CONSTRUCTION MATERIALS RESOURCES:

Area Inactive Sand and Gravel Pits:

T8N, R47 W

Unnamed Pit – NW ¼ SW ¼ NW ¼, Section 3, T8N, R46W

T7N, R46W

Unnamed Pit – SE ¼ NE ¼ SE ¼, Section 16, T7N, R46W

T7N, R45W

Unnamed Pit – NE ¼ SW ¼ NW ¼, Section 7, T7N, R45W

Unnamed Pit – NW ¼ NE ¼ SE ¼, Section 8, T7N, R45W

Unnamed Pit – SW ¼ SW ¼ NW ¼, Section 9, T7N, R45W

Unnamed Pit – NW¼ SW¼ SE¼, Section 10, T7N, R45W

Unnamed Pit – NW¼ SW¼ SW¼, Section 11, T7N, R45W

The above five sand and gravel pits, located in T7N, R45W, are point bars associated with the South Fork of Frenchman Creek located south and east of this tract.

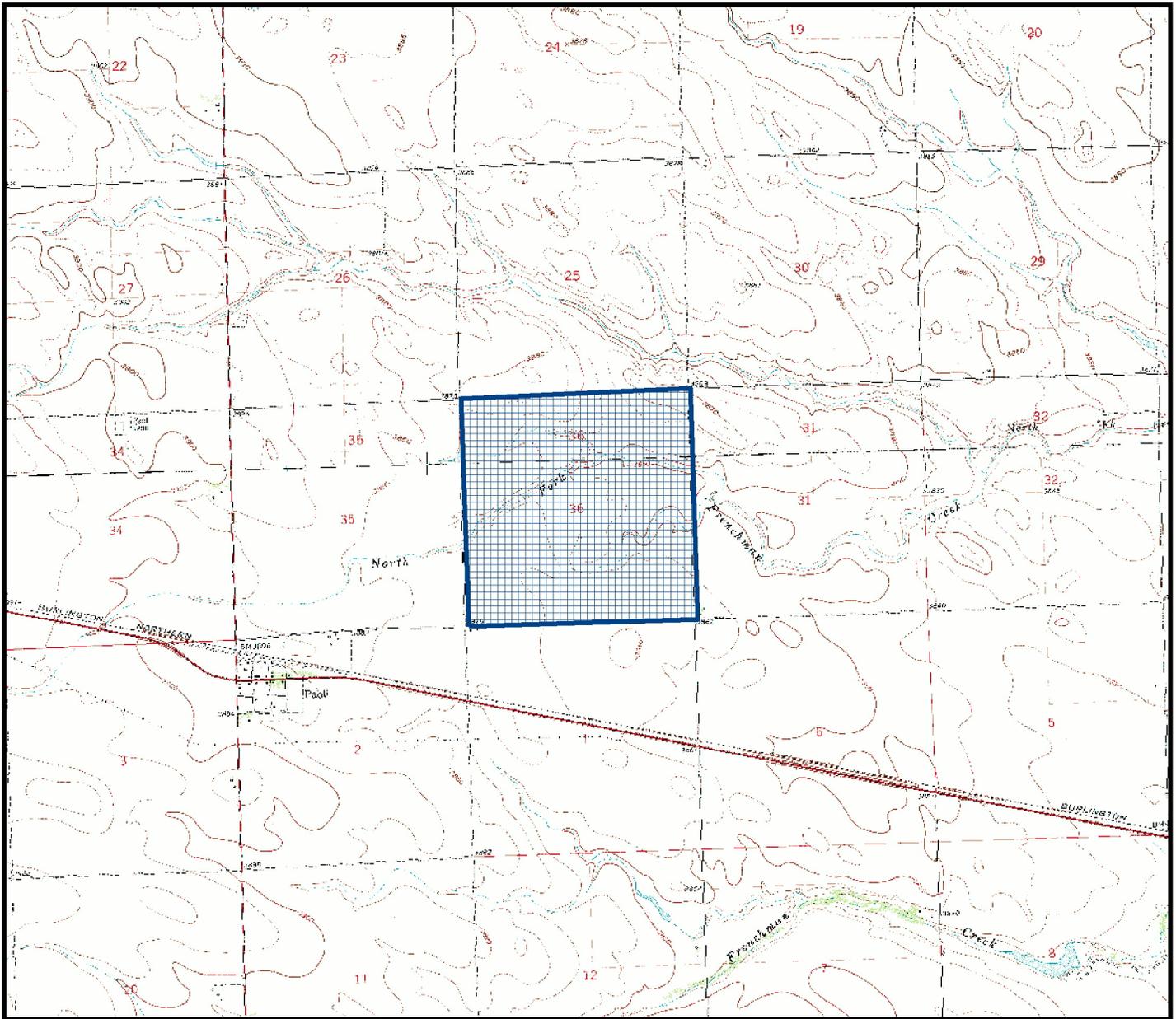
Sand and Gravel Resources

The surface bedrock consists of fluvial deposits in the Miocene Ogallala Formation consisting of ash, pebbly sand and silt capped by pale-red dense pisolitic limestone. As the North Fork of Frenchman Creek flows eastward through the center of the tract, it down cuts into the Ogallala Formation and concentrates high quality sand and gravel in point bar deposits and sandbars. These sandbars and point bars are excellent resources of industrial sand and gravel.

REFERENCES:

Schwochow, S.D., 1981, Inventory of non-metallic mining and processing operations in Colorado, Colorado Geological Survey, Department of Natural Resources, Denver Colorado, Map Series 17

Scott, G. R., 1978, Map showing Geology, structure, and oil and gas fields in the Sterling 1° X2° Quadrangle, Colorado, Nebraska, and Kansas, US Geological Survey
Miscellaneous Investigation Series I-1092

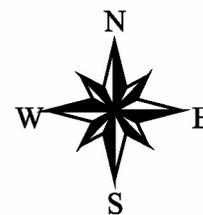


95-09

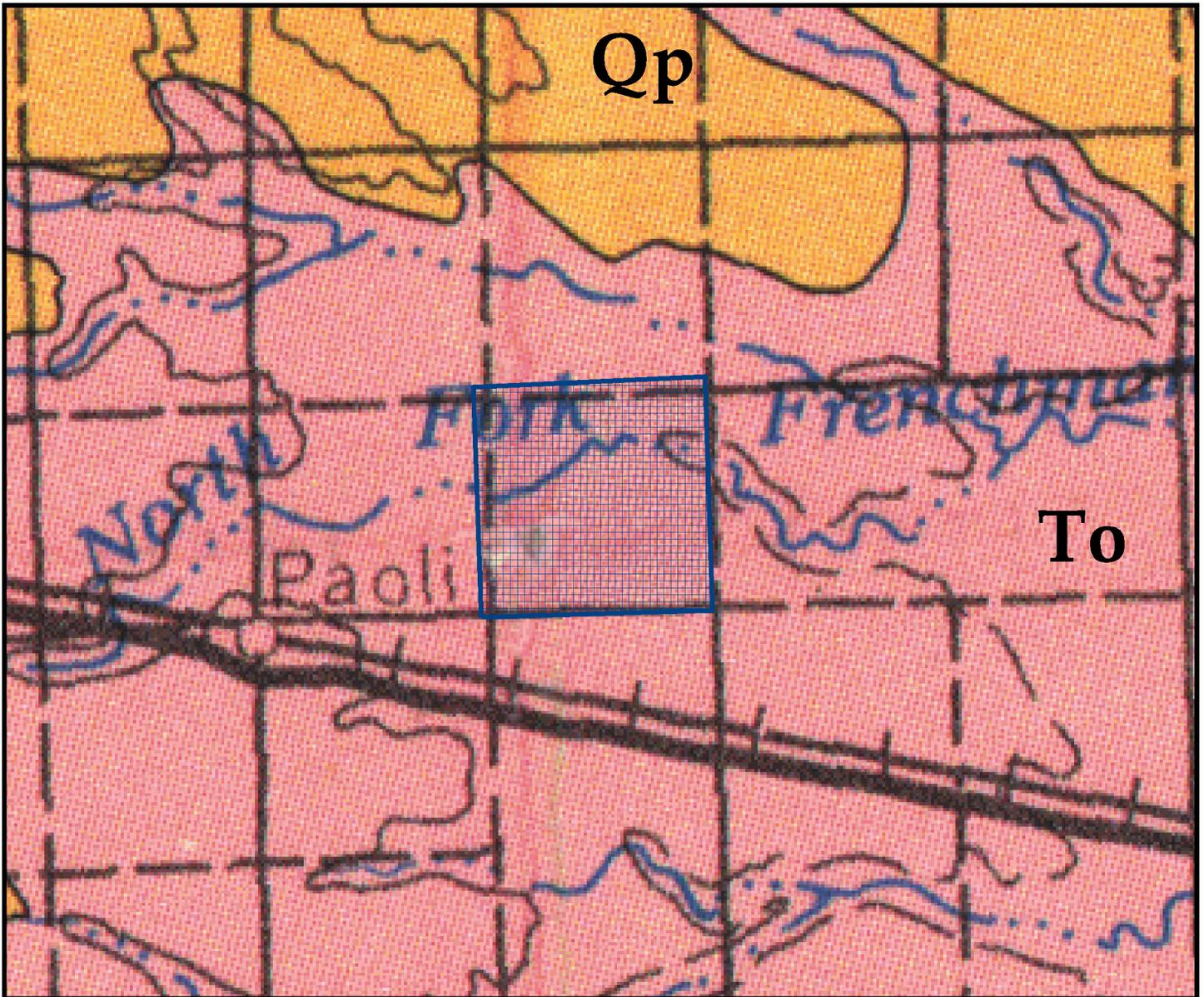
Location: T. 8 N, R. 46 W
 Section: 36
 Approximate total acreage - 640



 Mineral acreage evaluated

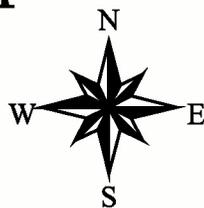


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Geologic Map for 95-09

Location: T. 8 N, R. 46 W
 Section: 36
 Approximate total acreage - 640



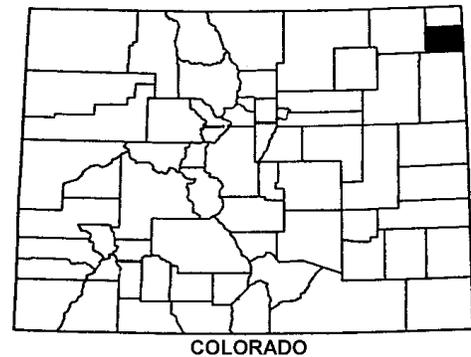
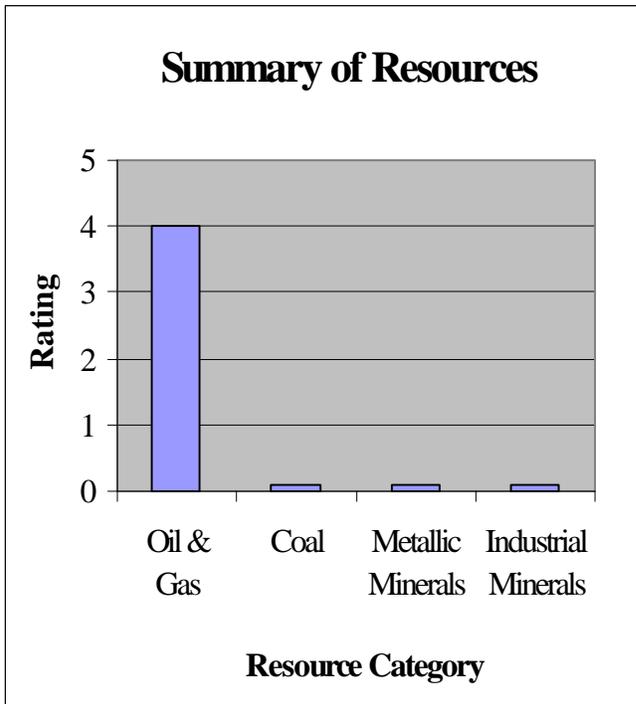
 *Mineral acreage evaluated*

Qp - Peoria loess (Pleistocene) Slightly clayey yellowish brown, sandy, blocky, non-stratified wind-blown calcareous-silt and sand.

To - Ogallala Formation (Miocene) Fluvial deposits of grayish orange-pink ash, pebbly sand and silt capped by pale-red dense pisolitic caliche layers and brecciated limestone.

1:43500

STATE LANDBOARD MINERAL INVENTORY



TRACT IDENTIFIER : #95-10

COUNTY: Phillips

LOCATION: T.8N., R.45W., Section 16

APPROXIMATE ACREAGE: 600 acres

QUADRANGLE NAME(S): Holyoke NW

OVERVIEW OF GEOLOGY

This State land tract is located on the open plains in northeastern Colorado. The surface topography is relatively flat and the bedrock geology is poorly exposed. Extensive dry land and irrigated farmland developed masks most outcrops. The few visible outcrops in this area consist of wind blown sand and calcareous silt deposits of the Pleistocene Peoria Loess. The Miocene Ogallala Formation crops out approximately one mile to the southwest and southeast of this tract. This formation rests unconformably below the Peoria Loess and consists of fluvial sediments and crops out over much of the northeast part of the State. The sediments generally consist of grayish orange-pink ash, pebbly

sand and silt capped by pale-red pale dense pisolitic caliche layers and brecciated limestone.

OIL AND GAS RESOURCES:

No exploratory wells, establishing oil or gas resources, have been drilled on this tract as of this date. The essential elements, which include reservoir, trap, and source rocks with the appropriate timing of generation of migration, do exist in the sedimentary rocks in this area. Several exploratory wells have been drilled within one to two miles of this tract. Underlick Contracting drilled the Leblanc #1 well in the SE ¼ of Section 15, T8N R45W to a depth of 3,955 feet to test the Cretaceous Dakota Formation. Oil staining was reported during drilling and a drill stem test was conducted between 3,502' and 3,509 feet. The test recovered 440 feet of highly gas cut water. No production was established and no other indications of oil or gas were observed and recorded from any of the overlying horizons. The well was plugged and abandoned in 1951. Three other wells were drilled in vicinity, one well was a follow up on the Dakota gas show and the other two tested the Niobrara Chalks in the area. The most recent well drilled was in 1981. All three were plugged and abandoned after failing to establish production.

COAL RESOURCES:

There are no coal measures in any of the sedimentary units in this tract.

METALLIC MINERAL RESOURCES:

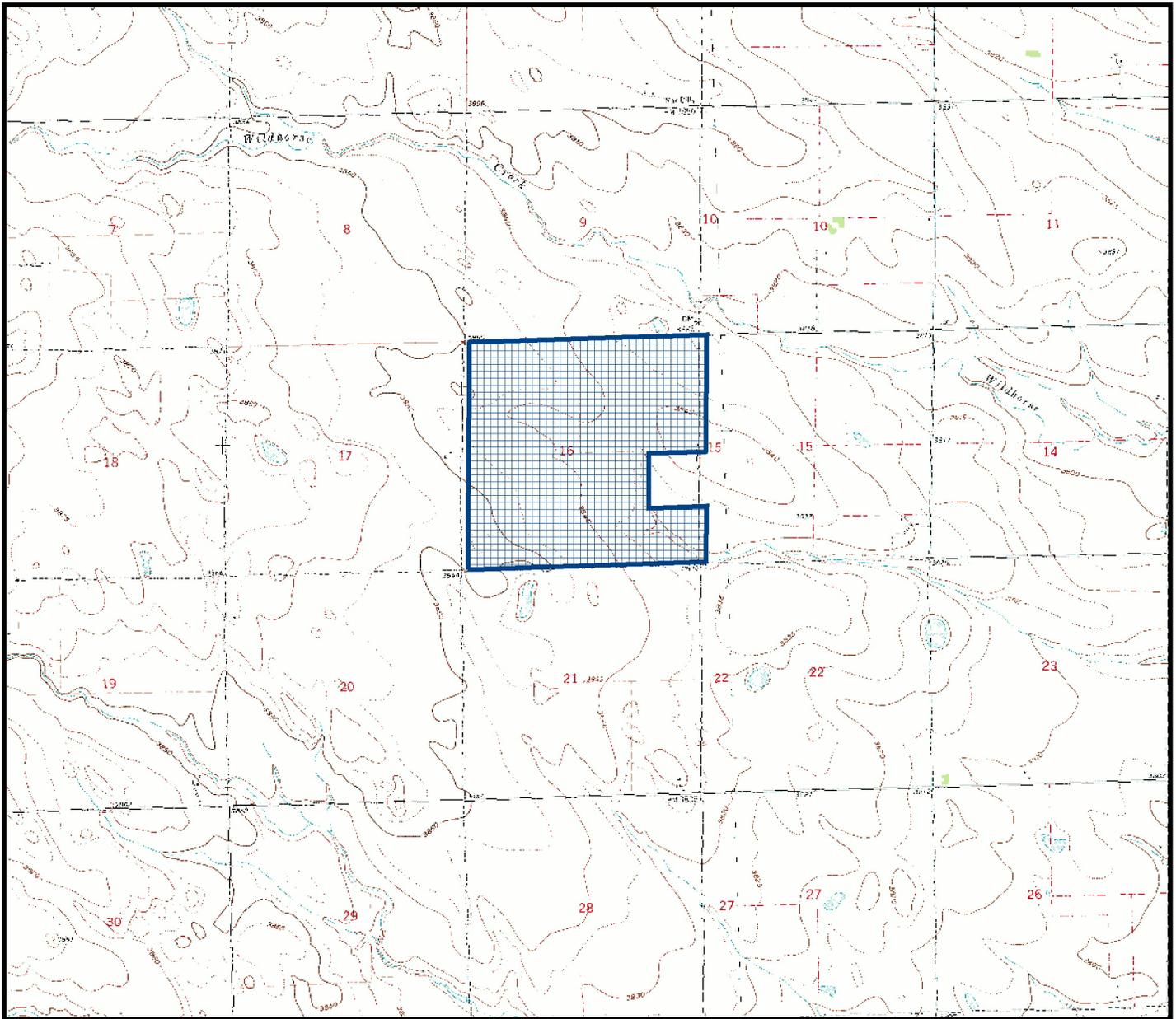
There are no metallic mineral resources in this tract.

INDUSTRIAL MINERALS AND CONSTRUCTION MATERIALS RESOURCES:

The surface bedrock consists primarily of buff colored calcareous wind blown silt and sand (Loess) containing low industrial mineral value. The bedrock lacks the necessary rock types that would contain industrial type minerals or construction materials.

REFERENCES:

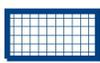
Scott, G. R., 1978, Map showing Geology, structure, and oil and gas fields in the Sterling 1° X2° Quadrangle, Colorado, Nebraska, and Kansas, US Geological Survey Miscellaneous Investigation Series I-1092

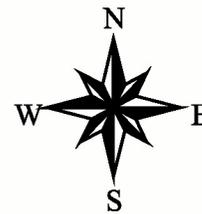


95-10

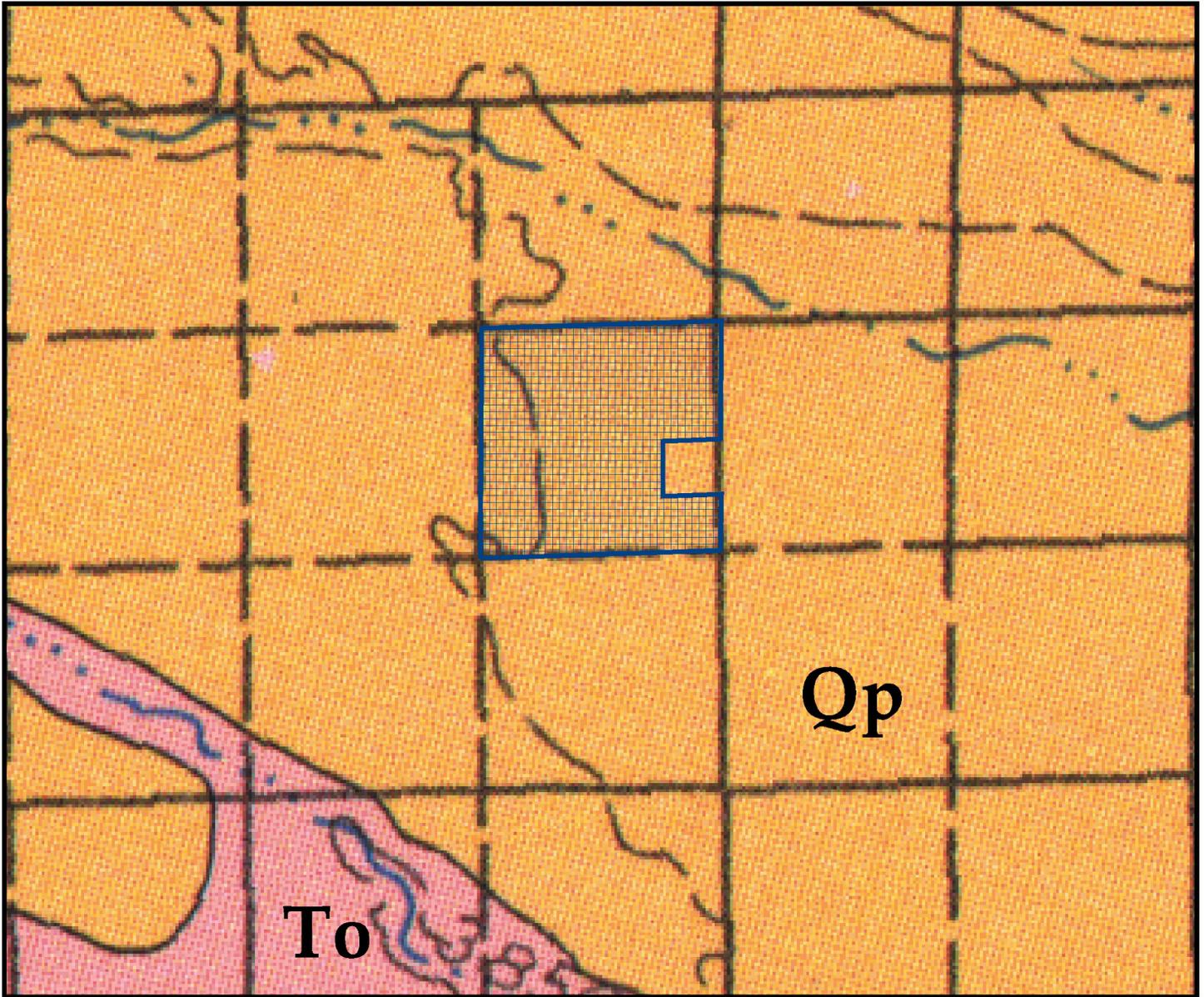
Location: T. 8 N, R. 45 W
Section: 16
Approximate total acreage - 600



 *Mineral acreage evaluated*

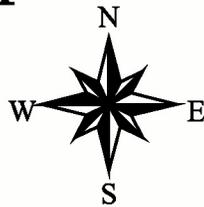


1:43500



Geologic Map for 95-10

Location: T. 8 N, R. 45 W
Section: 16
Approximate total acreage - 600



0 1 2 Miles

A horizontal scale bar with markings at 0, 1, and 2 miles.

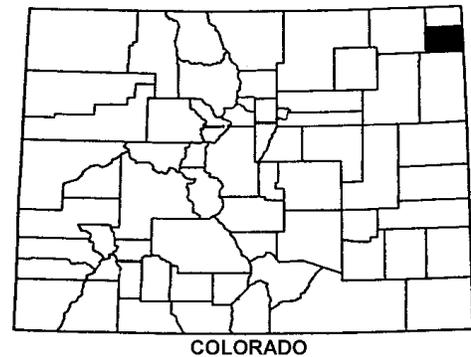
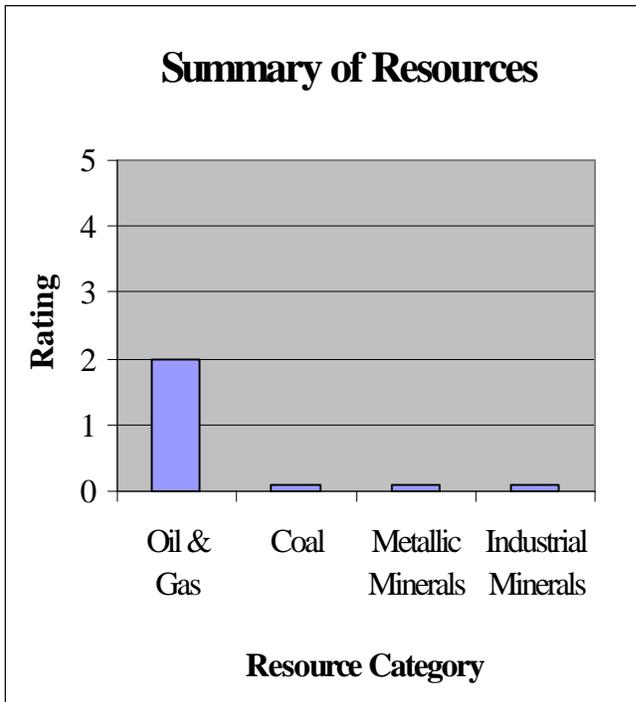
 *Mineral acreage evaluated*

Qp - Peoria loess (Pleistocene) Slightly clayey yellowish brown, sandy, blocky, non-stratified wind-blown calcareous-silt and sand.

To - Ogallala Formation (Miocene) Fluvial deposits of grayish orange-pink ash, pebbly sand and silt capped by pale-red dense pisolitic caliche layers and brecciated limestone.

1:43500

STATE LANDBOARD MINERAL INVENTORY



TRACT IDENTIFIER : #95-11

COUNTY: Phillips

LOCATION: T.8N., R.45W., Section 36

APPROXIMATE ACREAGE: 640 acres

QUADRANGLE NAME(S): Holyoke, Holyoke NE

OVERVIEW OF GEOLOGY:

This State land tract is located on the open plains in northeastern Colorado. The surface topography is relatively flat and the bedrock geology is poorly exposed. Extensive dry land and irrigated farmland masks most outcrops. The few visible outcrops in this area consist of wind blown sand and calcareous silt deposits of the Pleistocene Peoria Loess. The Miocene Ogallala Formation crops out approximately two miles to the west of this tract. This formation rests unconformably below the Peoria Loess and consists of fluvial sediments and crops out over much of the northeast part of the State. The sediments generally consist of grayish orange-pink ash, pebbly sand and silt capped by pale-red pale dense pisolitic caliche layers and brecciated limestone.

OIL AND GAS RESOURCES:

No exploratory wells, establishing oil or gas resources, have been drilled on this tract as of this date. The essential elements, which include reservoir, trap, and source rocks with the appropriate timing of generation of migration, do exist in the sedimentary rocks in this area. One exploratory well was drilled $\frac{3}{4}$ of a mile north of this tracts northwest corner. The Stream Inc. Hassler #1 well was drilled in the NW $\frac{1}{4}$ of Section 25, T8N R45W to a depth of 4,108 feet to test the Cretaceous Dakota Formation. No production was established and no indications of oil or gas were observed and recorded from any of the overlying horizons. The well was plugged and abandoned in 1973.

COAL RESOURCES:

There are no coal measures in any of the sedimentary units in this tract.

METALLIC MINERAL RESOURCES:

There are no metallic mineral resources in this tract.

INDUSTRIAL MINERALS AND CONSTRUCTION MATERIALS RESOURCES:

Area Inactive Sand and Gravel Pits:

T7N, R45W

Unnamed Pit– NE $\frac{1}{4}$ SW $\frac{1}{4}$ NW $\frac{1}{4}$, Section 7, T7N, R45W

Unnamed Pit – NW $\frac{1}{4}$ NE $\frac{1}{4}$ SE $\frac{1}{4}$, Section 8, T7N, R45W

Unnamed Pit – SW $\frac{1}{4}$ SW $\frac{1}{4}$ NW $\frac{1}{4}$, Section 9, T7N, R45W

Unnamed Pit – NW $\frac{1}{4}$ SW $\frac{1}{4}$ SE $\frac{1}{4}$, Section 10, T7N, R45W

Unnamed Pit – NW $\frac{1}{4}$ SW $\frac{1}{4}$ SW $\frac{1}{4}$, Section 11, T7N, R45W

Unnamed Pit – NE $\frac{1}{4}$ NE $\frac{1}{4}$ NE $\frac{1}{4}$, Section 14, T7N, R45W

Unnamed Pit – SE $\frac{1}{4}$ NW $\frac{1}{4}$ NW $\frac{1}{4}$, Section 13, T7N, R45W

T7N, R44W

Unnamed Pit – NW $\frac{1}{4}$ NE $\frac{1}{4}$ NW $\frac{1}{4}$, Section 16, T7N, R44W

Unnamed Pit – NE $\frac{1}{4}$ SW $\frac{1}{4}$ NE $\frac{1}{4}$, Section 15, T7N, R44W

Unnamed Pit – NE $\frac{1}{4}$ SE $\frac{1}{4}$ NE $\frac{1}{4}$, Section 15, T7N, R44W

The above ten sand and gravel pits, located in T7N, R45 & 44W, are point bars associated with the South Fork of Frenchman Creek located southwest and southeast of this tract.

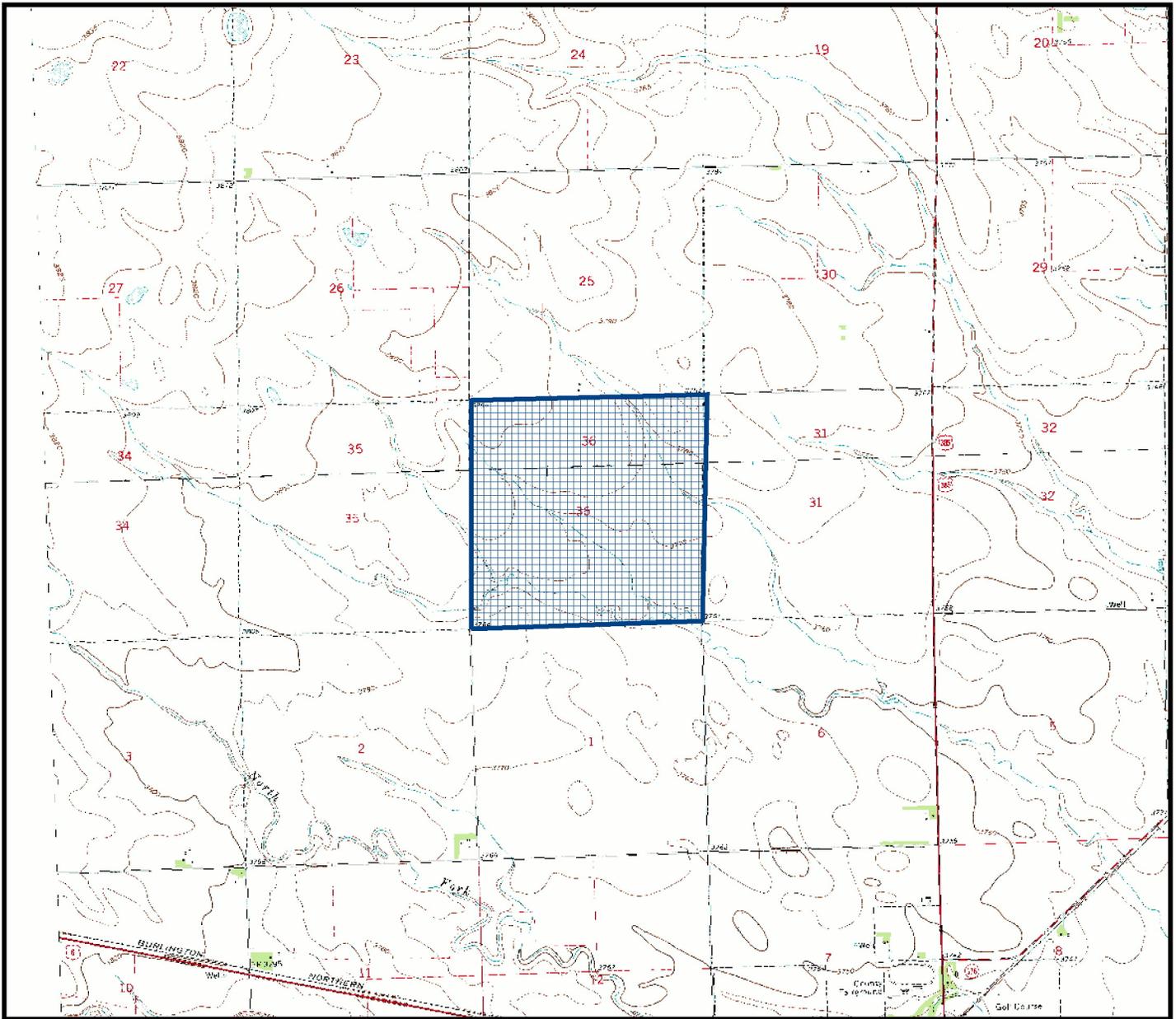
Sand and Gravel Resources

The surface bedrock consists primarily of buff colored calcareous wind blown silt and sand (Loess) containing low industrial mineral value. Several small intermittent creeks cross the tract, but do not appear to contribute to the industrial mineral value until they reach the southeast corner of the tract where they begin to meander and develop point bar sand deposits. The general bedrock (Loess), which is rich in silts and clay, lacks the necessary rock types that would contain industrial type minerals or construction materials.

REFERENCES:

Schwochow, S.D., 1981, Inventory of non-metallic mining and processing operations in Colorado, Colorado Geological Survey, Department of Natural Resources, Denver Colorado, Map Series 17

Scott, G. R., 1978, Map showing Geology, structure, and oil and gas fields in the Sterling 1° X2° Quadrangle, Colorado, Nebraska, and Kansas, US Geological Survey Miscellaneous Investigation Series I-1092

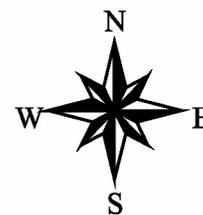


95-11

Location: T. 8 N, R. 45 W
Section: 36
Approximate total acreage - 640



 Mineral acreage evaluated

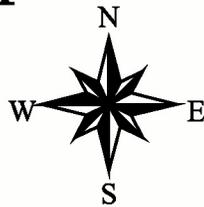


1:43500



Geologic Map for 95-11

Location: T. 8 N, R. 45 W
 Section: 36
 Approximate total acreage - 640



 *Mineral acreage evaluated*

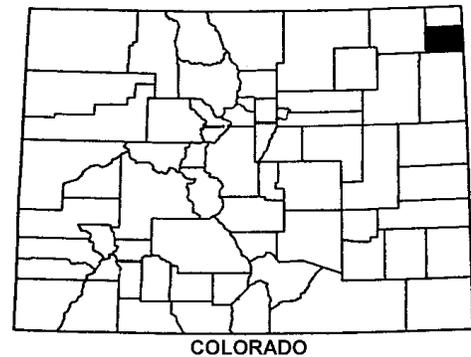
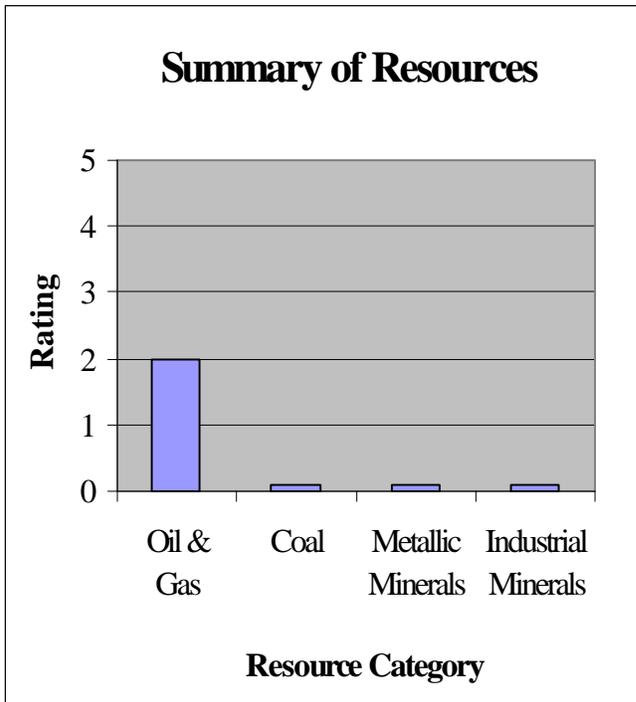
Qp - Peoria loess (Pleistocene) Slightly clayey yellowish brown, sandy, blocky, non-stratified wind-blown calcareous-silt and sand.

0 1 2 Miles



1:43500

STATE LANDBOARD MINERAL INVENTORY



TRACT IDENTIFIER : #95-12

COUNTY: Phillips

LOCATION: T.8N., R.44W., Section 16

APPROXIMATE ACREAGE: 640 acres

QUADRANGLE NAME(S): Holyoke NE

OVERVIEW OF GEOLOGY:

This State land tract is located on the open plains in northeastern Colorado. The surface topography is relatively flat and the bedrock geology is poorly exposed. Extensive dry land and irrigated farmland masks most outcrops. The few visible outcrops in this area consist of wind blown sand and calcareous silt deposits of the Pleistocene Peoria Loess. This sand unconformably overlies the Miocene Ogallala Formation, which crops out over much of the northeast part of the state and consist of red pale dense pisolitic caliche layers or limestone brecciated and recemented forming a cap rock at the surface. Below the cap rock, the sediments consist of semi-consolidated ashy sand and silt beds and volcanic ash beds. The closest outcrop is approximately six miles from this tract.

OIL AND GAS RESOURCES:

No oil or gas resources have been established on this tract. The essential elements, which include reservoir, trap, and source rocks with the appropriate timing of generation of migration, do exist in the sedimentary rocks in this area. However existing geological control is insufficient to determine the presence of a reservoir and trap.

COAL RESOURCES:

There are no coal measures in any of the sedimentary units in this tract.

METALLIC MINERAL RESOURCES:

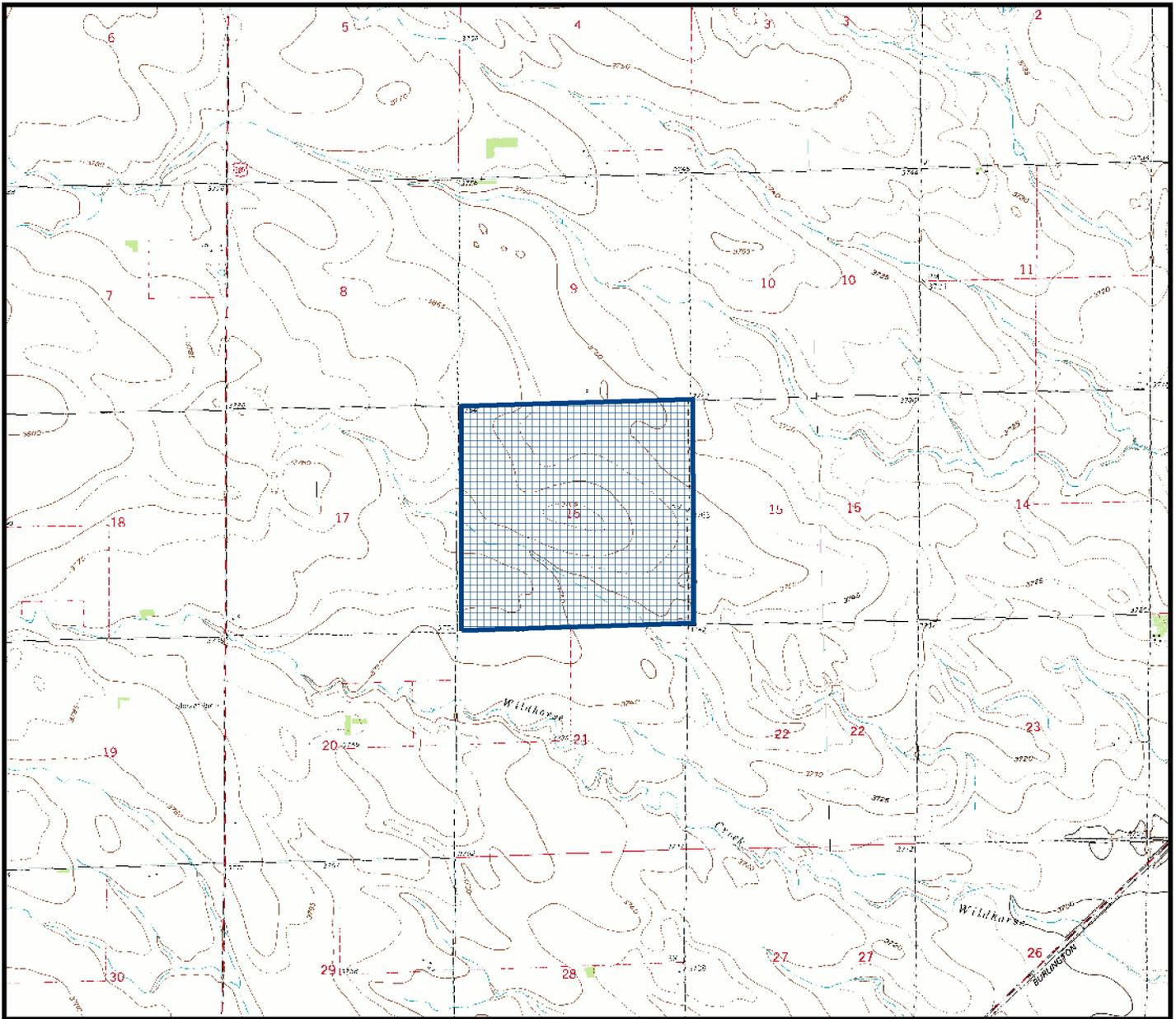
There are no metallic mineral resources in this tract.

INDUSTRIAL MINERALS AND CONSTRUCTION MATERIALS RESOURCES:

The surface bedrock consists primarily of buff colored calcareous wind blown silt and sand containing low industrial mineral value. One small intermittent creek crosses the tract, but does not appear to contribute to the industrial mineral value of this tract. The general bedrock (Loess), which is rich in silts and clay, lacks the necessary rock types that would contain industrial type minerals or construction materials.

REFERENCES:

Scott, G. R., 1978, Map showing Geology, structure, and oil and gas fields in the Sterling 1° X2° Quadrangle, Colorado, Nebraska, and Kansas, US Geological Survey
Miscellaneous Investigation Series I-1092

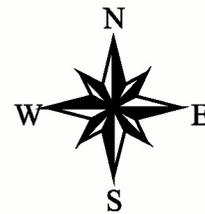


95-12

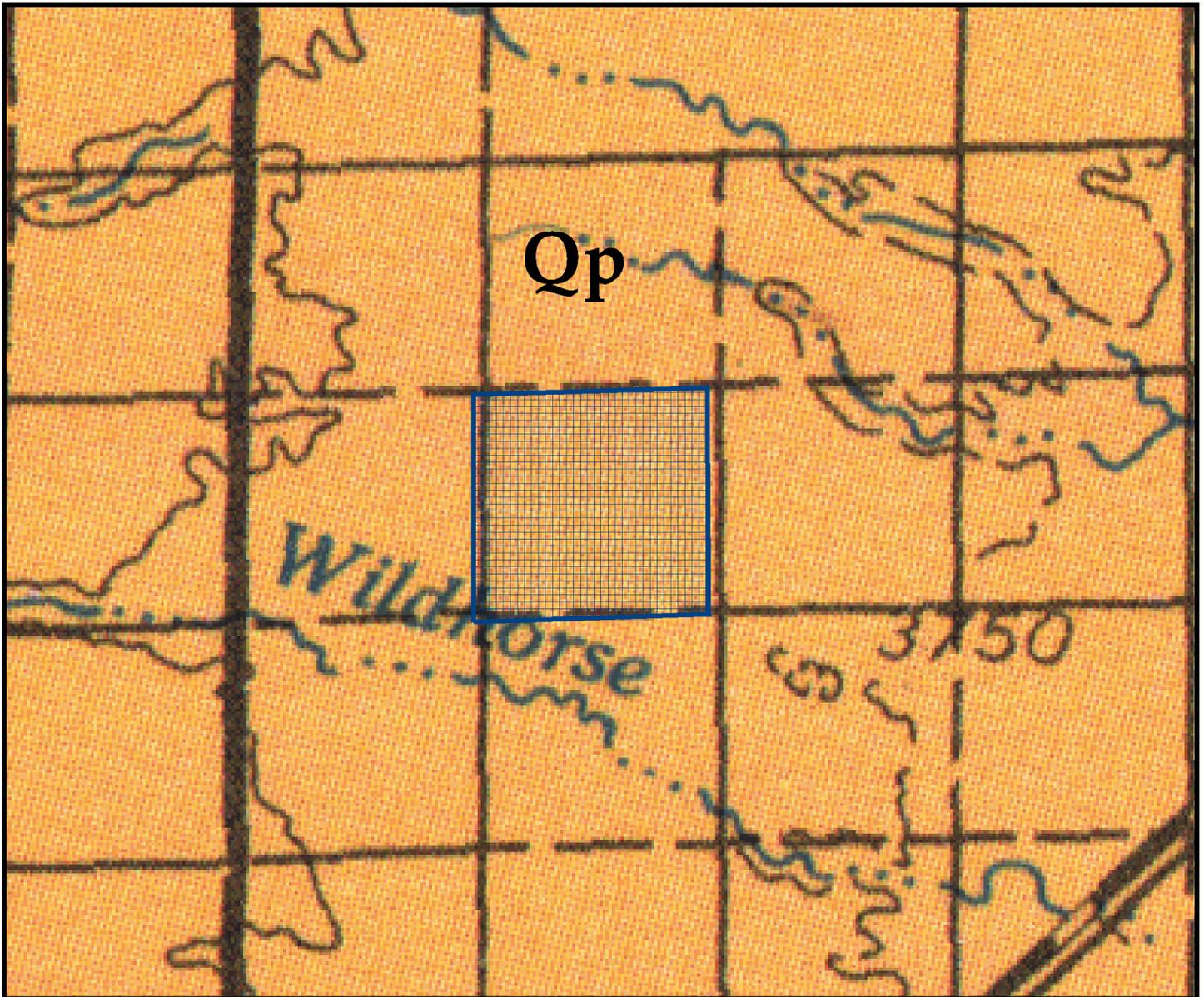
Location: T. 8 N, R. 44 W
Section: 16
Approximate total acreage - 640



 Mineral acreage evaluated

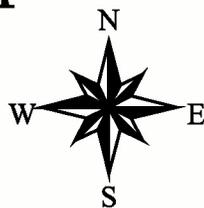


1:43500



Geologic Map for 95-12

Location: T. 8 N, R. 44 W
Section: 16
Approximate total acreage - 640



 *Mineral acreage evaluated*

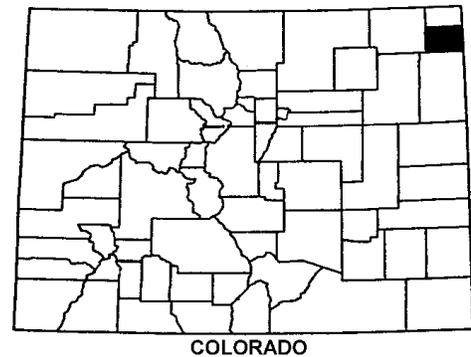
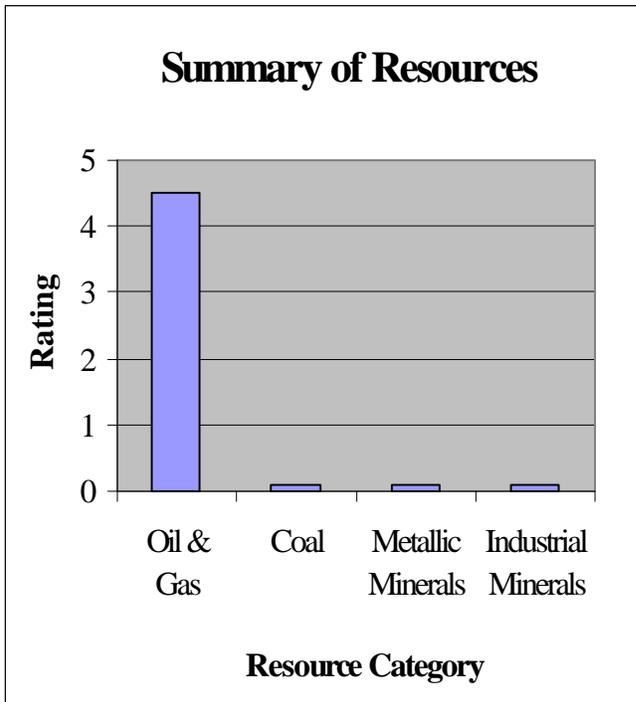
Qp - Peoria loess (Pleistocene) Slightly clayey yellowish brown, sandy, blocky, non-stratified wind-blown calcareous-silt and sand.

0 1 2 Miles



1:43500

STATE LANDBOARD MINERAL INVENTORY



TRACT IDENTIFIER : #95-13

COUNTY: Phillips

LOCATION: T.4 N., R.44 W., Section 1

APPROXIMATE ACREAGE: 320 acres

QUADRANGLE NAME(S): Amherst

OVERVIEW OF GEOLOGY:

This State land tract is located on the open plains in northeastern Colorado. The surface topography is relatively flat and the bedrock geology is poorly exposed. Extensive dry land and irrigated farmland development masks most outcrops. The few visible outcrops in this area consist of wind blown sand and calcareous silt deposits of the Pleistocene Peoria Loess. This sand unconformably overlies the Miocene Ogallala Formation, which crops out over much of the northeast part of the state and consist of red pale dense pisolitic caliche layers or limestone brecciated and recemented forming a cap rock at the surface. Below the cap rock, the sediments consist of semi-consolidated ashy sand and

silt beds and volcanic ash beds. The closest outcrop is approximately six miles from this tract.

OIL AND GAS RESOURCES:

No exploratory wells, establishing oil or gas resources, have been drilled on this tract as of this date. In 1978 Amoco Production Company drilled the #1 Demmel well in the center of the SESE ¼ of section 35 T9N R44W. This well, which is only a few hundred yards west of this tract, established gas from the Niobrara Formation at a rate of 76 Mcfd at a depth of 2432- 2474. Shakespeare Oil drilled five successful Niobrara gas wells adjacent to the north and northeast corner of this tract. Their most recent and best well-drilled in 1982 flowed 420 Mcfd. Their Brinkema #1 well, located in the center of the NW ¼ of Section 1, T8N R44W and only a few hundred yards north of this tract, was completed in Niobrara chinks for an undisclosed flow rate in 1978.

Geological control strongly suggests that the essential elements needed for production do exist in the sedimentary rocks in this tract and that potential for gas production may exist in the Niobrara Chinks.

COAL RESOURCES:

There are no coal measures in any of the sedimentary units in this tract.

METALLIC MINERAL RESOURCES:

There are no metallic mineral resources in this tract.

INDUSTRIAL MINERALS AND CONSTRUCTION MATERIALS RESOURCES:

Area Inactive Sand and Gravel Prospects:

Unnamed Pit – NW ¼ SW ¼ NW ¼, Section 22, T9N, R44W.

Unnamed Pit – SE ¼ SW ¼ SE ¼, Section 22, T9N, R44 W.

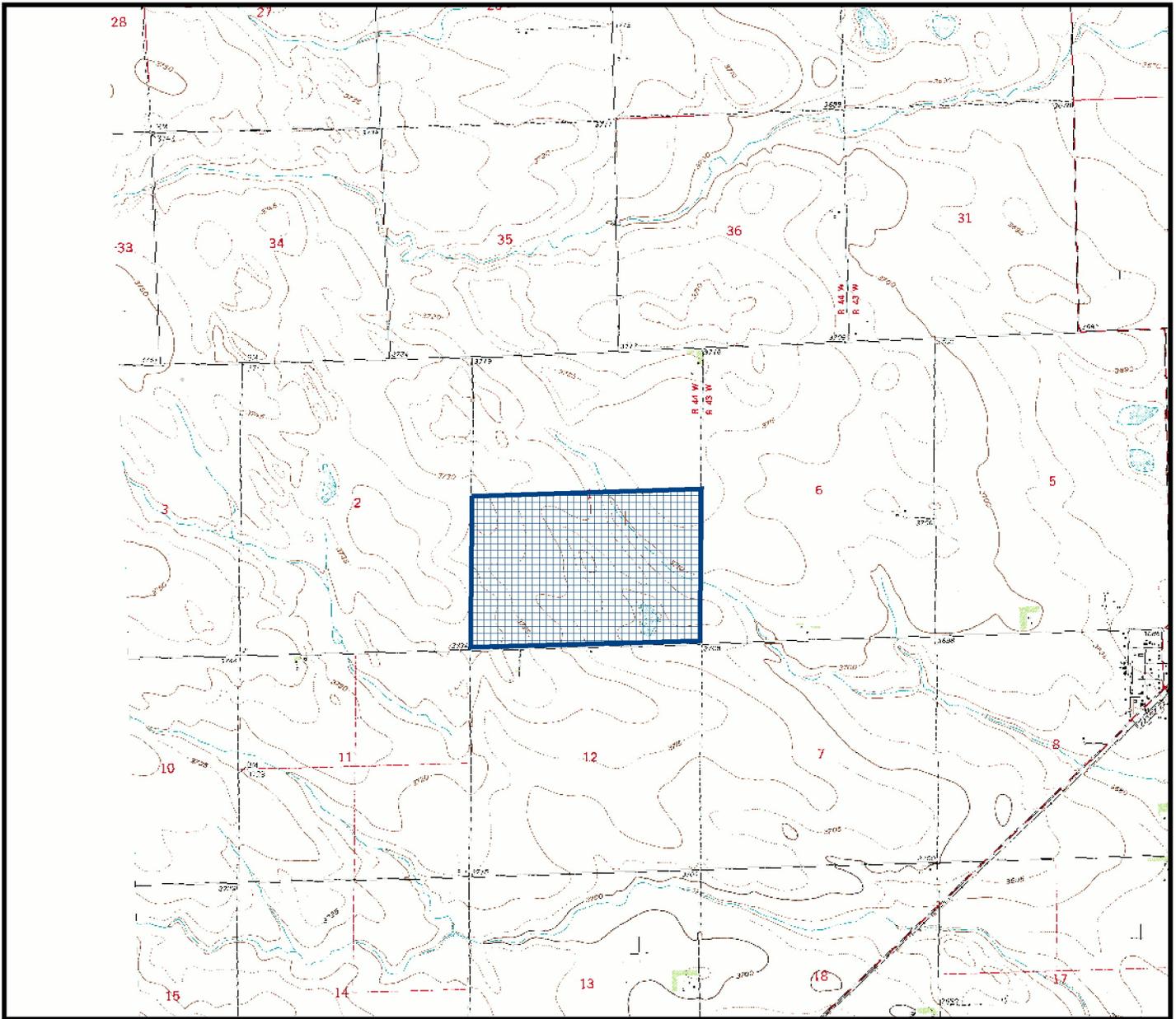
Sand and Gravel Resources:

The surface bedrock consists primarily of buff colored calcareous wind blown silt and sand (Loess) containing low industrial mineral value. One small intermittent creek crosses the tract from northwest to southeast. The creek is straight with no meanders or point bar deposits and therefore does not appear to contribute to the industrial mineral value. There are two small intermittent ponds that collect water in blowouts resulting from wind blown and clay rich sediments. The bedrock appears to be deficient in the necessary sediment types that would contain industrial type minerals or construction materials.

REFERENCES:

Schwochow, S.D., 1981, Inventory of non-metallic mining and processing operations in Colorado, Colorado Geological Survey, Department of Natural Resources, Denver Colorado, Map Series 17

Scott, G. R., 1978, Map showing Geology, structure, and oil and gas fields in the Sterling 1° X2° Quadrangle, Colorado, Nebraska, and Kansas, US Geological Survey Miscellaneous Investigation Series I-1092

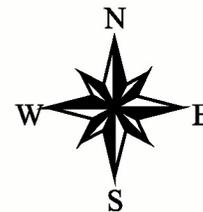


95-13

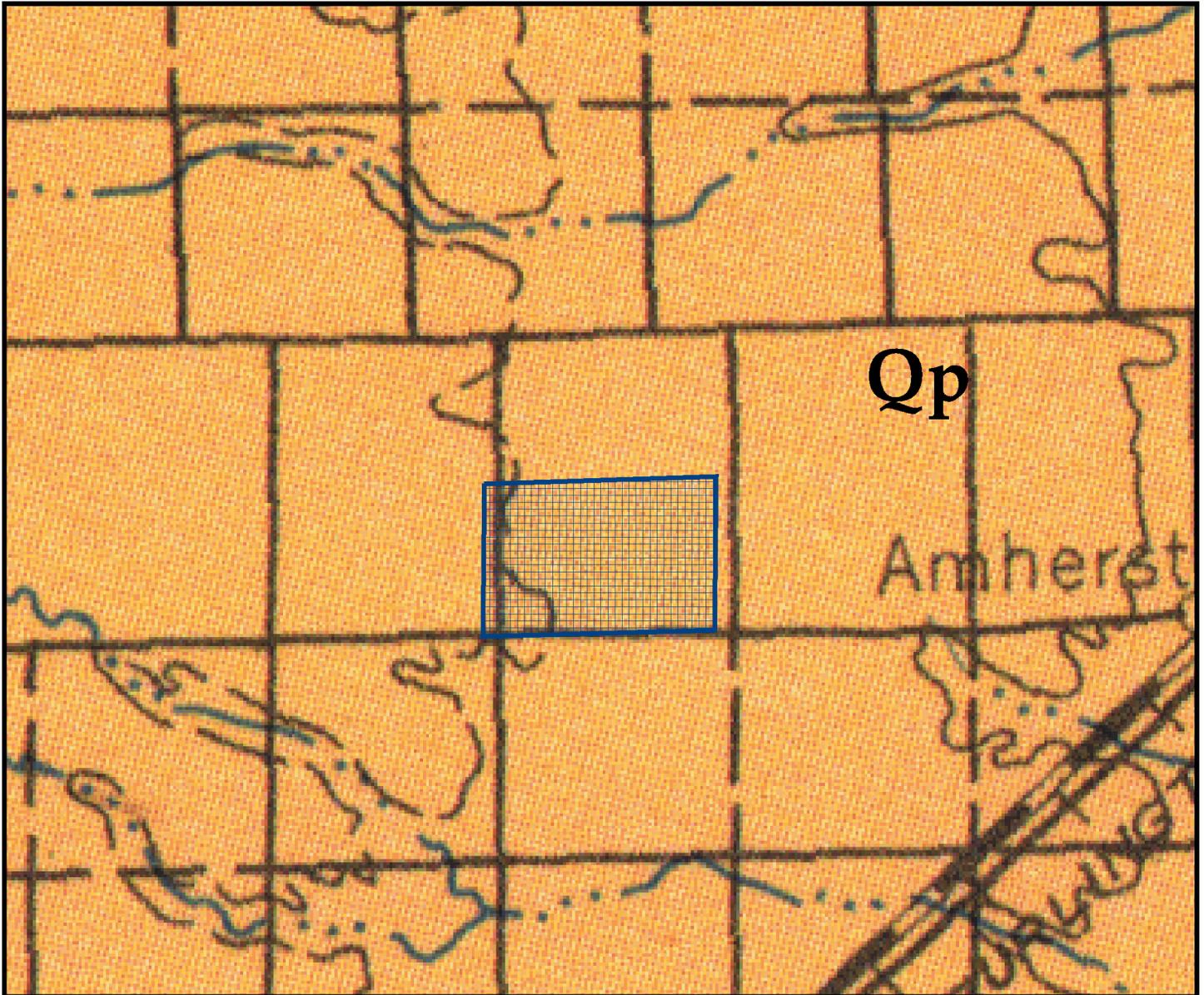
Location: T. 8 N, R. 44 W
Section: 1
Approximate total acreage - 320



 *Mineral acreage evaluated*

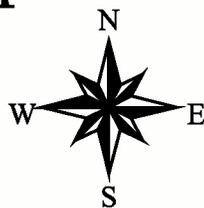


1:43500



Geologic Map for 95-13

Location: T. 8 N, R. 44 W
 Section: 1
 Approximate total acreage - 320



 *Mineral acreage evaluated*

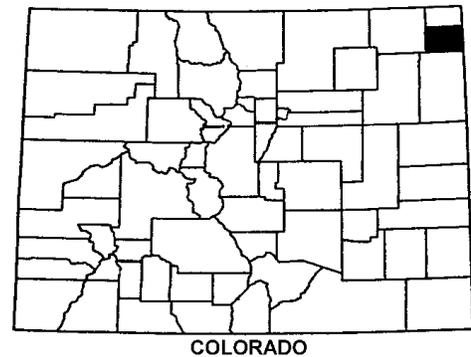
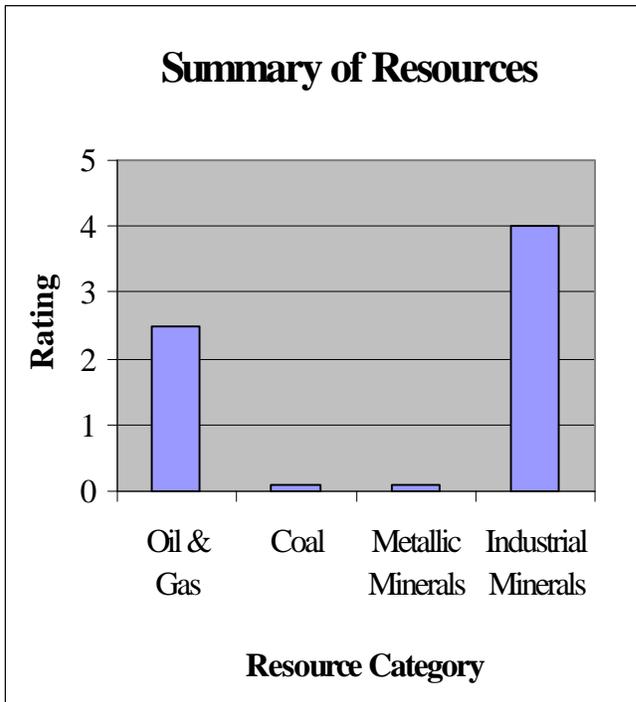
Qp - Peoria loess (Pleistocene) Slightly clayey yellowish brown, sandy, blocky, non-stratified wind-blown calcareous-silt and sand.

0 0.9 1.8 Miles



1:43500

STATE LANDBOARD MINERAL INVENTORY



TRACT IDENTIFIER : #95-14

COUNTY: Phillips

LOCATION: T.8N., R.44W., Section 36

APPROXIMATE ACREAGE: 640 acres

QUADRANGLE NAME(S): Amherst, Amherst SW

OVERVIEW OF GEOLOGY:

This State land tract is located on the open plains in northeastern Colorado. The surface topography is relatively flat and the bedrock geology is poorly exposed. Extensive dry land and irrigated farmland development masks most outcrops. The few visible outcrops in this area consist of wind blown sand and calcareous silt deposits of the Pleistocene Peoria Loess. These deposits unconformably overly the Miocene Ogallala Formation, which crops out over much of the northeast part of the state and consist of red pale dense pisolitic caliche layers or limestone brecciated and recemented forming a cap rock at the surface. Below the cap rock, the sediments consist of semi-consolidated ashy sand and

silt beds and volcanic ash beds. The closest outcrop is approximately four and one half miles east of this tract.

OIL AND GAS RESOURCES:

No exploratory wells, establishing oil or gas resources, have been drilled on this tract as of this date. The essential elements, which include reservoir, trap, and source rocks with the appropriate timing of generation of migration, do exist in the sedimentary rocks in this area. South of this tract, in the SW ¼ of section 1 of T7N R44W, Amoco Production Company drilled and completed the #1 Ortnier well in the Niobrara Formation with an initial production of 33 Mcfd in 1980. In the SW ¼ of Section 30, T8N R43W, Texota Oil drilled the Elmer B Hansen #1 well to a depth of 5,919 feet tagging basement. Ten feet of mud-cut-oil was recovered from a drill stem test at 5000 feet in the Pennsylvanian Topeka Formation. No production was established. The well was plugged and abandoned in 1961.

COAL RESOURCES:

There are no coal measures in any of the sedimentary units in this tract.

METALLIC MINERAL RESOURCES:

There are no metallic mineral resources in this tract.

INDUSTRIAL MINERALS AND CONSTRUCTION MATERIALS RESOURCES:

Area Inactive Sand and Gravel Pits:

T7N, R44W

Unnamed Pit – NW ¼ NE ¼ NW ¼, Section 16, T7N, R44W

Unnamed Pit – NE ¼ SW ¼ NE ¼, Section 15, T7N, R44W

Unnamed Pit – NE ¼ SE ¼ NE ¼, Section 15, T7N, R44W

Unnamed Pit – NW ¼ SE ¼ NW ¼, Section 14, T7N, R44W

Unnamed Pit – SW ¼ NE ¼ NE ¼, Section 24, T7N, R44W

Unnamed Pit – SE ¼ SE ¼ NW ¼, Section 20, T7N, R44W

Unnamed Pit – SE ¼ SE ¼ NW ¼, Section 20, T7N, R44W

The above seven sand and gravel pits, located in T.7N., R.44W., are point bars associated with the South Fork of Frenchman Creek located southwest and southeast of this tract.

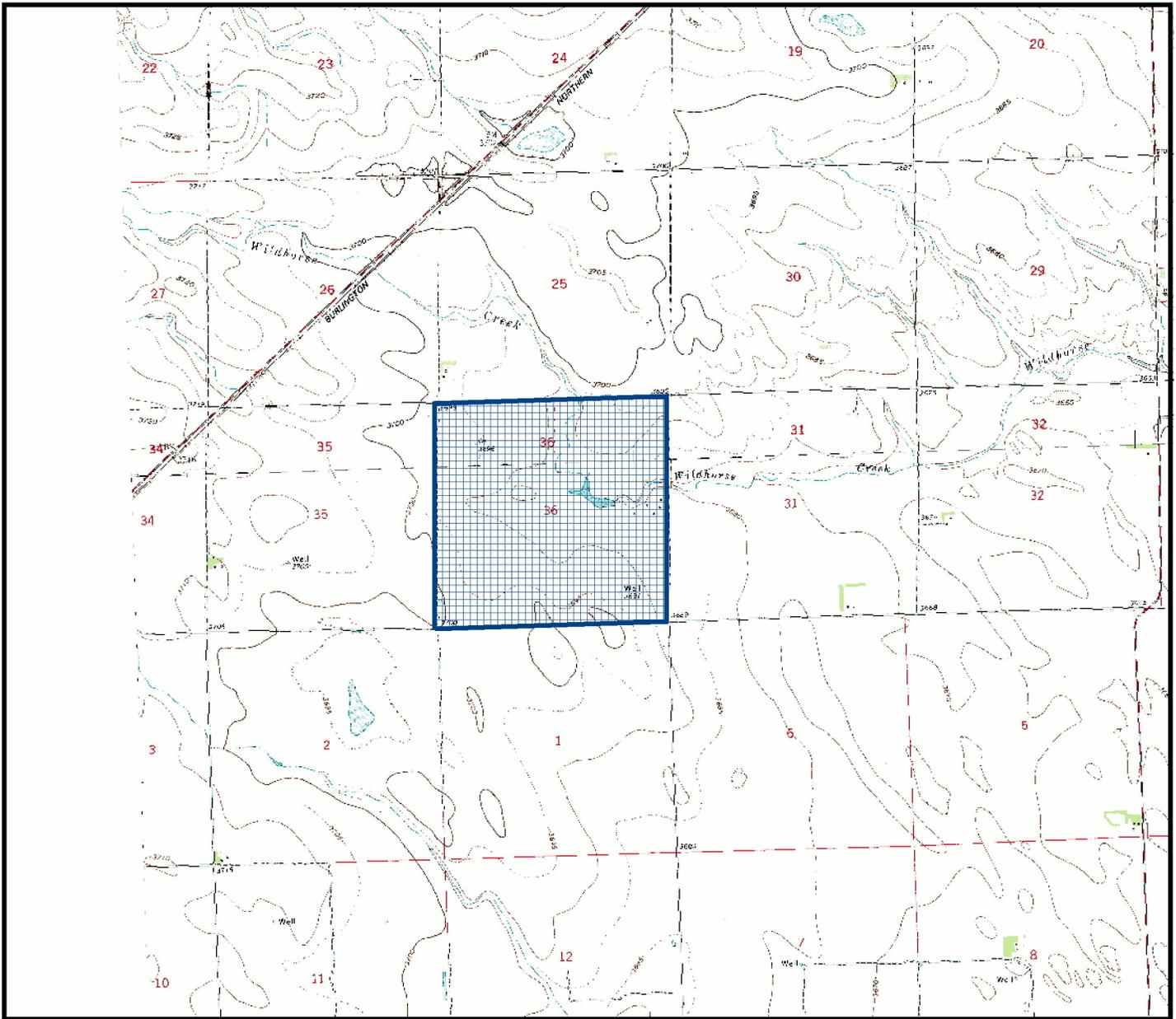
The surface bedrock consists primarily of buff colored calcareous wind blown silt and sand (Loess) which is interpreted to contain low industrial mineral value. Wildhorse Creek crosses the northeast quadrant of this tract. The creek meanders its way east depositing some sand and point bar gravels, but does not appear to contribute to the industrial mineral resource like the South Fork of the Frenchman Creek located 2 ½ miles south.

REFERENCES:

Lawson, A. D., 1998, Active Permitted Mine Operations in Colorado, 1996-97, Colorado Geological Survey, Department of Natural Resources, Denver Colorado, Information Series 45, 58 p.

Schwochow, S.D., 1981, Inventory of non-metallic mining and processing operations in Colorado, Colorado Geological Survey, Department of Natural Resources, Denver Colorado, Map Series 17

Scott, G. R., 1978, Map showing Geology, structure, and oil and gas fields in the Sterling 1° X2° Quadrangle, Colorado, Nebraska, and Kansas, US Geological Survey Miscellaneous Investigation Series I-1092

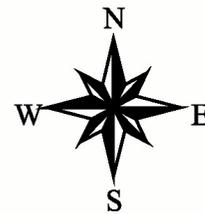


95-14

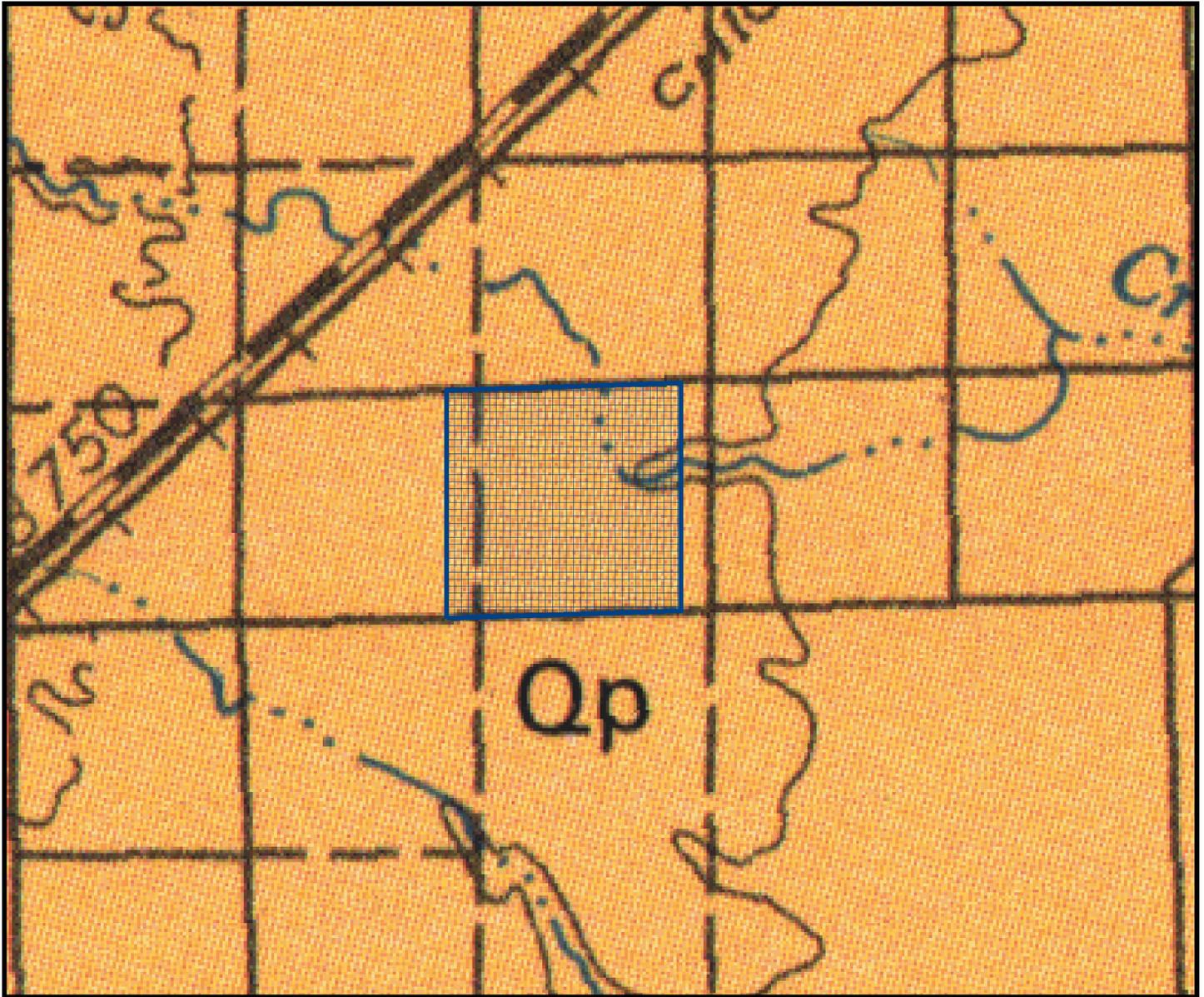
Location: T. 8 N, R. 44 W
Section: 36
Approximate total acreage - 640



 Mineral acreage evaluated

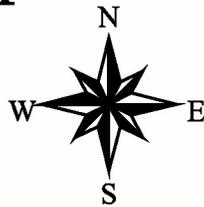


1:43500



Geologic Map for 95-14

Location: T. 8 N, R. 44 W
 Section: 36
 Approximate total acreage - 640



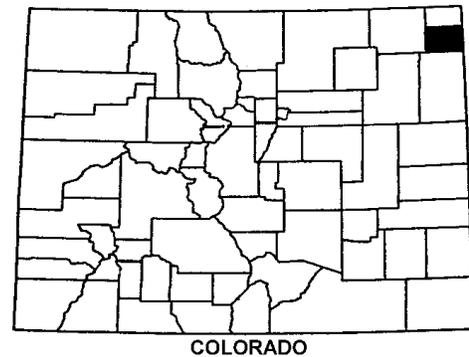
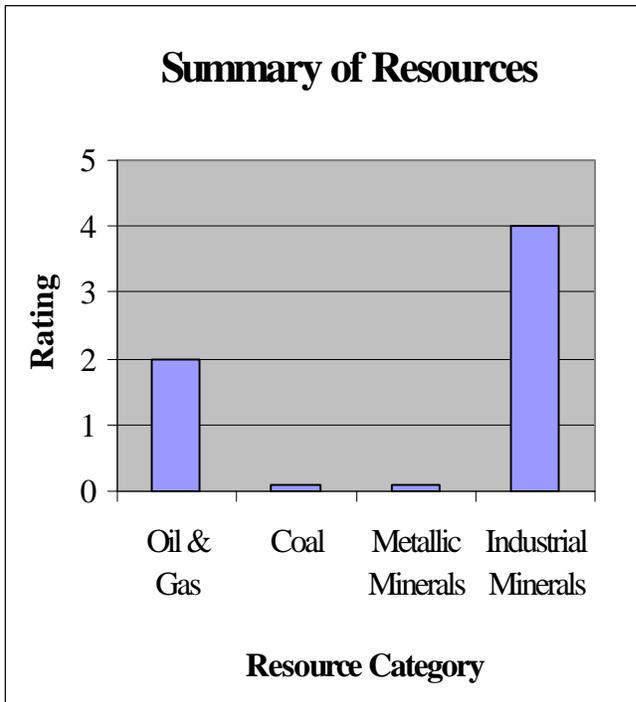
0 1 2 Miles

 *Mineral acreage evaluated*

Qp - Peoria loess (Pleistocene) Slightly clayey yellowish brown, sandy, blocky, non-stratified wind-blown calcareous-silt and sand.

1:43500

STATE LANDBOARD MINERAL INVENTORY



TRACT IDENTIFIER : #95-15

COUNTY: Phillips

LOCATION: T.8N., R.43W., Section 16

APPROXIMATE ACREAGE: 640 acres

QUADRANGLE NAME(S): Amherst

OVERVIEW OF GEOLOGY:

This State land tract is located on the open plains in northeastern Colorado. The surface topography is relatively flat and the bedrock geology is poorly exposed. Extensive dry land and irrigated farmland development masks most outcrops. The few visible outcrops in this area consist of wind blown sand and calcareous silt deposits of the Pleistocene Peoria Loess. These deposits unconformably overly the Miocene Ogallala Formation, which crops out over much of the northeast part of the state and consist of red pale dense pisolitic caliche layers or limestone brecciated and recemented forming a cap rock at the surface. Below the cap rock, the sediments consist of semi-consolidated ashy sand and

silt beds and volcanic ash beds. The closest outcrop is approximately three and one half miles northeast of this tract.

OIL AND GAS RESOURCES:

No exploratory wells, establishing oil or gas resources, have been drilled on this tract as of this date. The essential elements, which include reservoir, trap, and source rocks with the appropriate timing of generation of migration, do exist in the sedimentary rocks in this area. One exploratory well was drilled in the NWNWNW ¼ of Section 22 adjacent to the southeast corner of this tract. The Hope Oil –F&R Anderson #1 well was drilled 300 feet. No production was established and no indications of oil or gas were observed and recorded from any of the horizons penetrated. The well was plugged and abandoned in 1953.

COAL RESOURCES:

There are no coal measures in any of the sedimentary units in this tract.

METALLIC MINERAL RESOURCES:

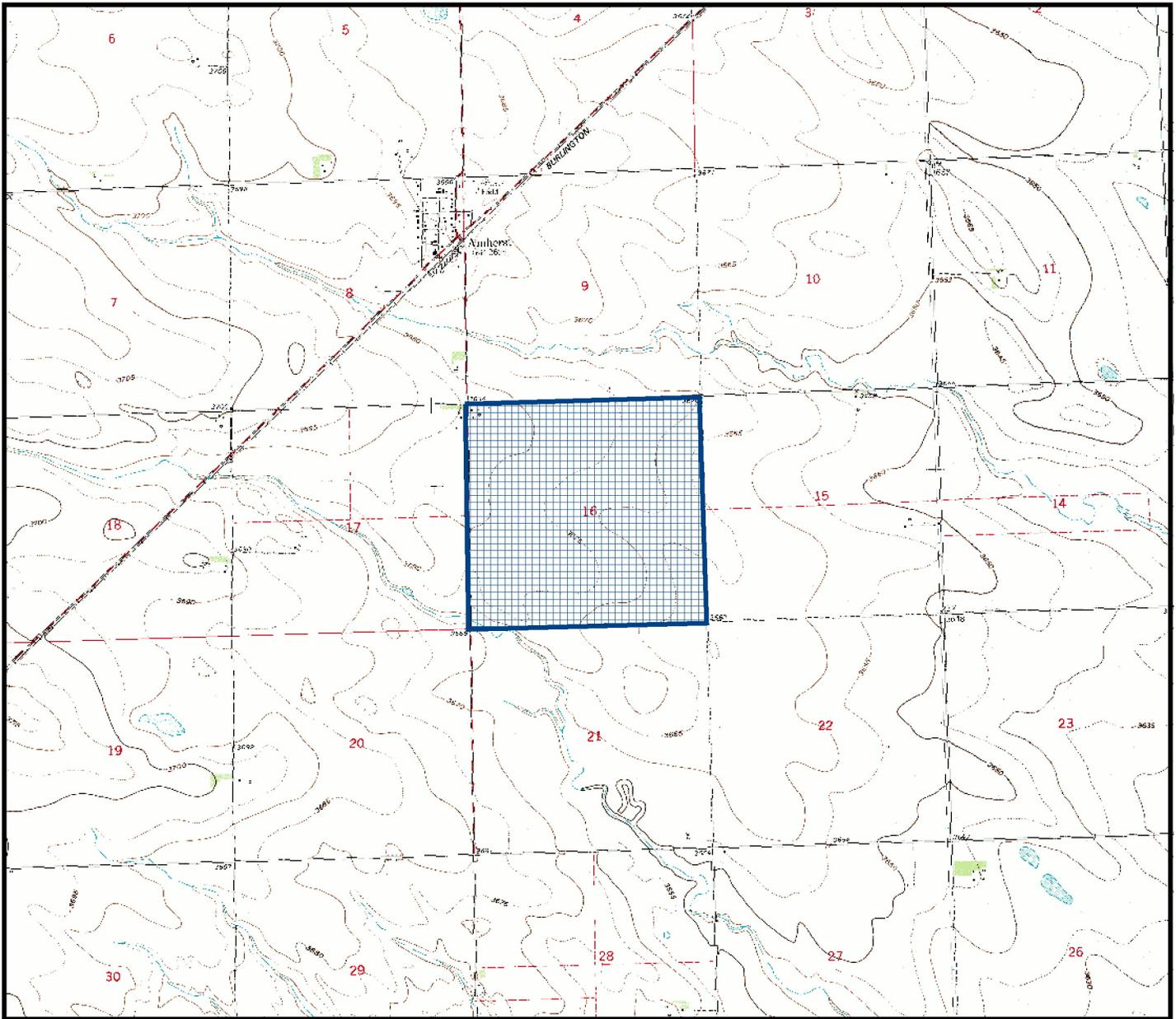
There are no metallic mineral resources in this tract.

INDUSTRIAL MINERALS AND CONSTRUCTION MATERIALS RESOURCES:

The surface bedrock consists primarily of buff colored calcareous wind blown silt and sand (Loess) which is interpreted to contain low industrial mineral value. The bedrock lacks the necessary rock types that would contain industrial type minerals or construction materials. One small tributary creek, which eventually drains into Wildhorse Creek several miles to the east, crosses the extreme southwest corner of this tract. Sand and gravel sediments are most likely deposited in the creek bed, but in small non-commercial volumes.

REFERENCES:

Scott, G. R., 1978, Map showing Geology, structure, and oil and gas fields in the Sterling 1° X2° Quadrangle, Colorado, Nebraska, and Kansas, US Geological Survey Miscellaneous Investigation Series I-1092

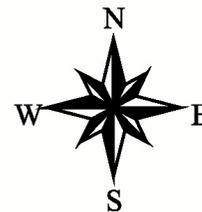


95-15

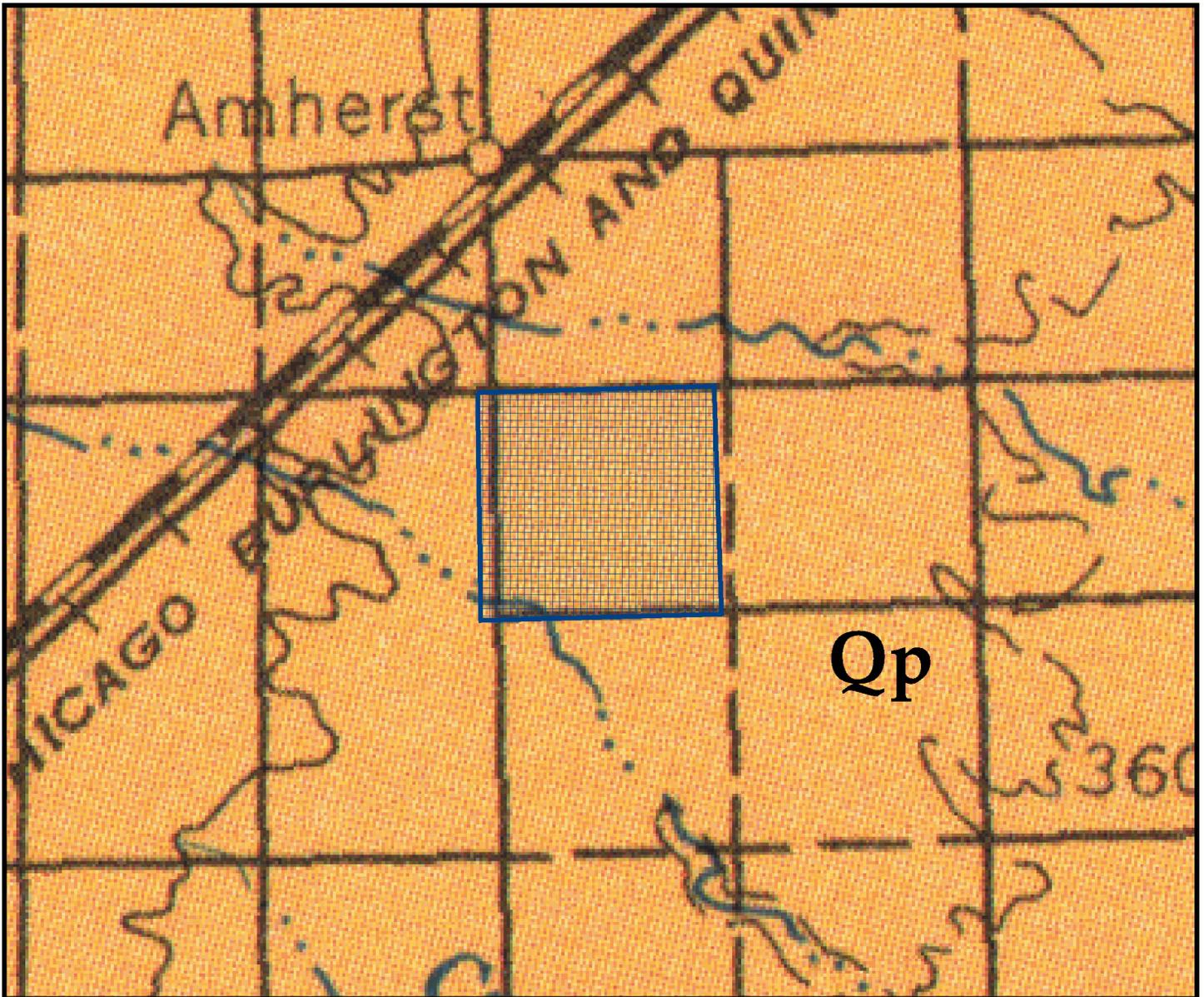
Location: T. 8 N, R. 43 W
Section: 16
Approximate total acreage - 640



 *Mineral acreage evaluated*

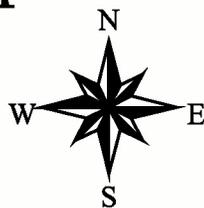


1:43500



Geologic Map for 95-15

Location: T. 8 N, R. 43 W
 Section: 16
 Approximate total acreage - 640



 *Mineral acreage evaluated*

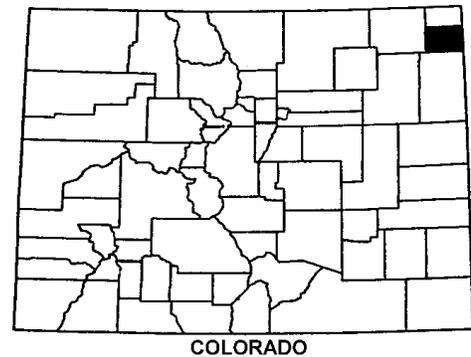
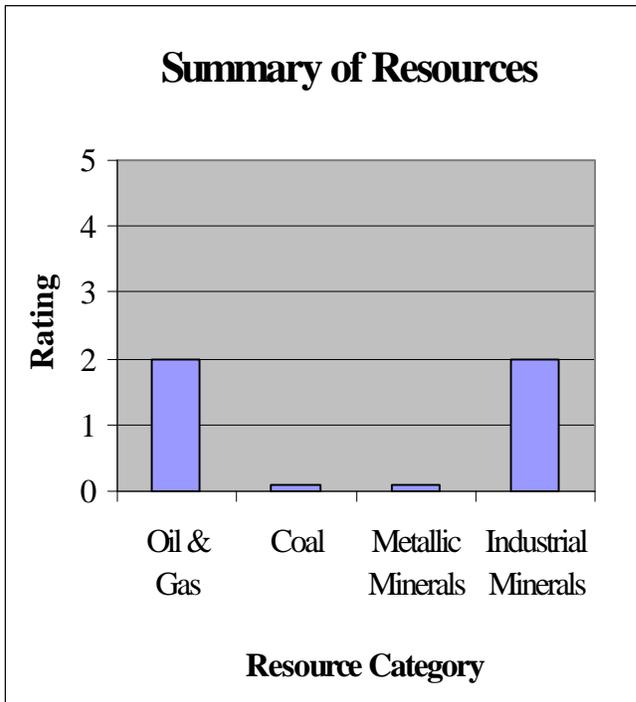
Qp - Peoria loess (Pleistocene) Slightly clayey yellowish brown, sandy, blocky, non-stratified wind-blown calcareous-silt and sand.

0 1 2 Miles



1:43500

STATE LANDBOARD MINERAL INVENTORY



TRACT IDENTIFIER : #95-16

COUNTY: Phillips

LOCATION:

APPROXIMATE ACREAGE:

QUADRANGLE NAME(S):

OVERVIEW OF GEOLOGY:

This State land tract is located on the open plains in northeastern Colorado. The surface topography is relatively flat and the bedrock geology is poorly exposed. Extensive dry land and irrigated farmland development masks most outcrops. The few visible outcrops in this area consist of wind blown sand and calcareous silt deposits of the Pleistocene Peoria Loess. These deposits unconformably overly the Miocene Ogallala Formation, which crops out over much of the northeast part of the state and consists of red pale dense pisolitic caliche layers or limestone brecciated and recemented forming a cap rock at the surface. Below the cap rock, the sediments consist of semi-consolidated ashy sand and silt beds and volcanic ash beds. The southeast flowing unnamed tributary, which passes

through the extreme southwest corner of Tract 95-15, cuts due east through the center of the north half of this tract depositing small amounts of sand and gravel associated with its meandering course.

OIL AND GAS RESOURCES:

No oil or gas resources have been established on this tract. The essential elements, which include reservoir, trap, and source rocks with the appropriate timing of generation and migration, do exist in the sedimentary rocks in this area. However existing geological control is insufficient to determine the presence of a trap.

COAL RESOURCES:

There are no coal resources. There are no coal measures in any of the sedimentary units in this tract.

METALLIC MINERAL RESOURCES:

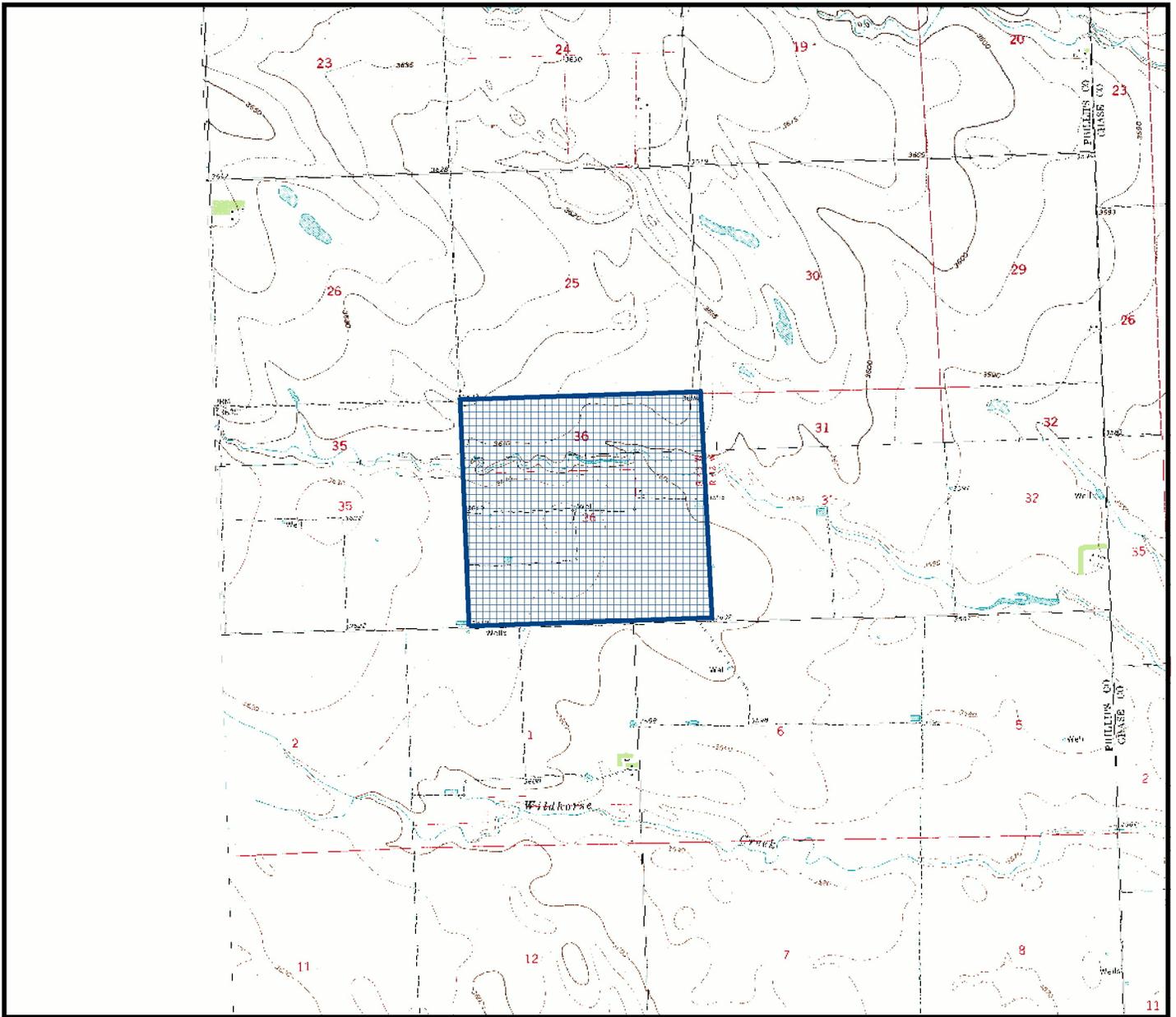
There are no metallic mineral resources in this tract.

INDUSTRIAL MINERALS AND CONSTRUCTION MATERIALS RESOURCES:

The surface bedrock consists primarily of buff colored calcareous wind blown silt and sand (Loess), which is interpreted to contain small amounts of industrial mineral resources. This type bedrock lacks the necessary rock types that would contain industrial type minerals or construction materials. One small-unnamed creek crosses the northern ½ of the tract eroding the Peoria Loess and exposing fluvial deposits of the Ogallala Formation. The unnamed meandering creek has small associated sand and gravel deposits. But, due to their size, the industrial mineral value is interpreted as low.

REFERENCES:

Scott, G. R., 1978, Map showing Geology, structure, and oil and gas fields in the Sterling 1° X2° Quadrangle, Colorado, Nebraska, and Kansas, US Geological Survey Miscellaneous Investigation Series I-1092

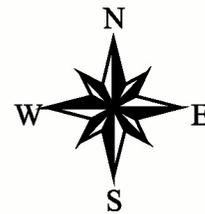


95-16

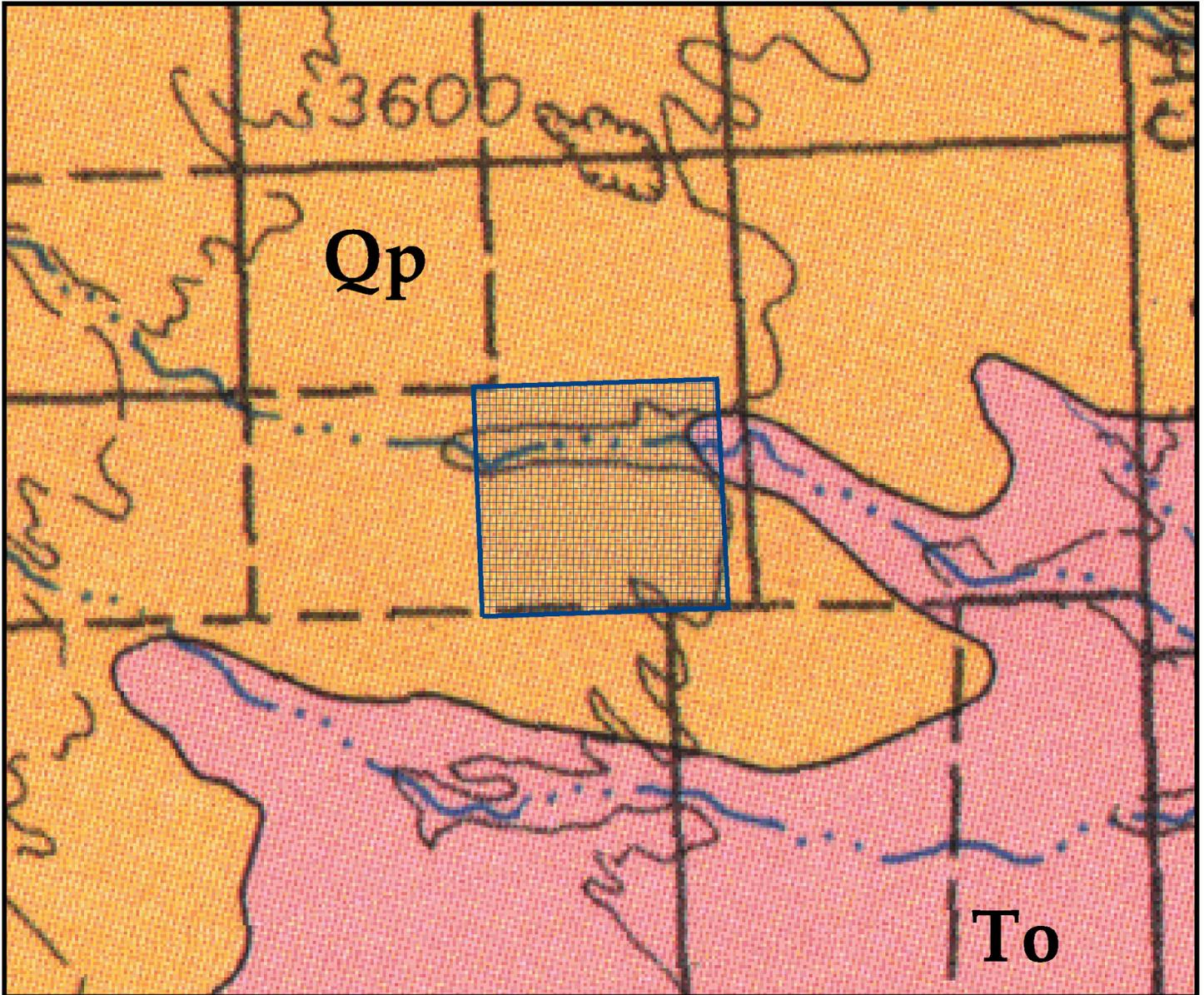
Location: T. 8 N, R. 43 W
Section: 36
Approximate total acreage - 640



 *Mineral acreage evaluated*

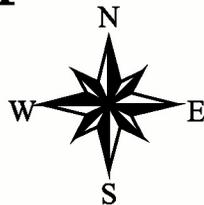


1:43500



Geologic Map for 95-16

Location: T. 8 N, R. 43 W
Section: 36
Approximate total acreage - 640



0 1 2 Miles

A horizontal scale bar with markings at 0, 1, and 2 miles.

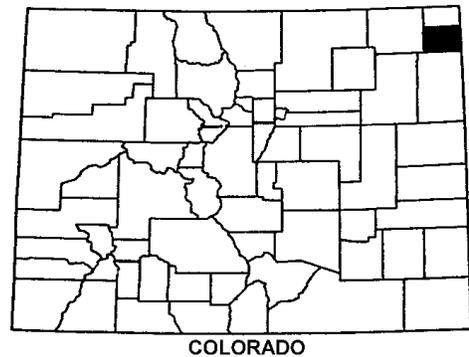
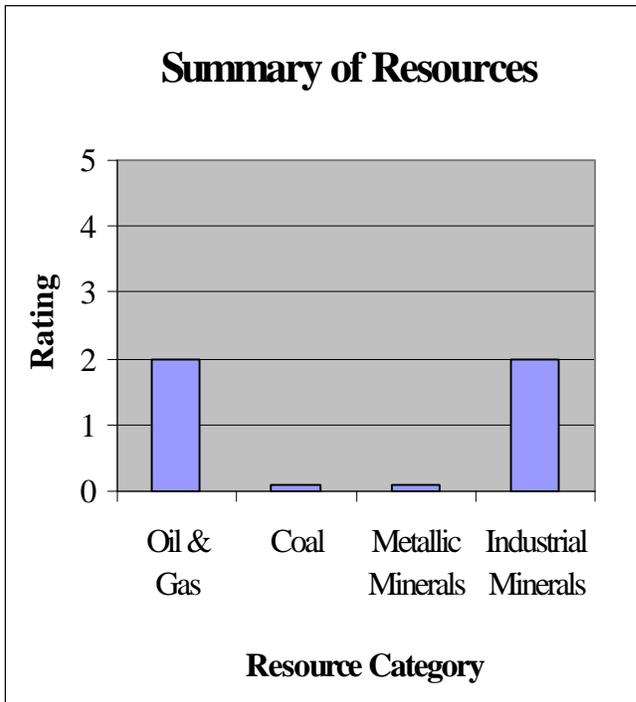
 *Mineral acreage evaluated*

Qp - Peoria loess (Pleistocene) Slightly clayey yellowish brown, sandy, blocky, non-stratified wind-blown calcareous-silt and sand.

To - Ogallala Formation (Miocene) Fluvial deposits of grayish orange-pink ash, pebbly sand and silt capped by pale-red dense pisolitic caliche layers and brecciated limestone.

1:43500

STATE LANDBOARD MINERAL INVENTORY



TRACT IDENTIFIER : #95-17

COUNTY: Phillips

LOCATION: T.7 N., R.47 W., Section 16

APPROXIMATE ACREAGE: 640 acres

QUADRANGLE NAME(S): Rockland, Haxtun SE

OVERVIEW OF GEOLOGY:

This State land tract is located on the open plains in northeastern Colorado. The surface topography is relatively flat and the bedrock geology is poorly exposed. Extensive dry land and irrigated farmland development masks most outcrops. Visible outcrops in the area consist of fluvial deposits of Miocene Ogallala Formation cropping out south of the South Platte River. These deposits generally consist of grayish orange-pink ash; pebbly sand and silt capped by pale-red dense pisolitic caliche layers and brecciated limestone forming a cap rock at the surface. The Pleistocene Peoria Loess overlies the Ogallala Formation, but not in the area of this State Land Tract.

OIL AND GAS RESOURCES:

No exploratory wells, establishing oil or gas resources, have been drilled on this tract as of this date. The essential elements, which include reservoir, trap, and source rocks with the appropriate timing of generation of migration, do exist in the sedimentary rocks in this area. Three exploratory wells were drilled within a mile of this tract near the northern boundary. The Toltec Drlg - Suesz #1 well and the MD Fuesz – Fuesz Farms Inc. #1 well both tested the Cretaceous Dakota J Sand. The interval was determined non-productive with no evidence of oil or gas. The Fuesz Farms Inc. #1 well bore was sold to Frenchman Creek and deepened to a depth of 5,236 feet to test the Paleozoic Pennsylvanian Cherokee Formation. Again, no production was established. The well was temporarily abandoned with questionable oil shows in 1954. Both well are located in Section 9 T7N R47W.

COAL RESOURCES:

There are no coal measures in any of the sedimentary units in this tract.

METALLIC MINERAL RESOURCES:

There are no metallic mineral resources in this tract.

INDUSTRIAL MINERALS AND CONSTRUCTION MATERIALS RESOURCES:

Area Inactive Sand and Gravel Pits and Permitted Mines:

T8N, R47 W

Unnamed Pit – SW $\frac{1}{4}$ NW $\frac{1}{4}$ SW $\frac{1}{4}$, Section 30, T8N, R47 W

Unnamed Pit – SE $\frac{1}{4}$ SE $\frac{1}{4}$ NE $\frac{1}{4}$, Section 31, T8N, R47 W

Unnamed Pit – NE $\frac{1}{4}$ NW $\frac{1}{4}$ NW $\frac{1}{4}$, Section 32, T8N, R47 W

Unnamed Pit – NE $\frac{1}{4}$ NE $\frac{1}{4}$ NW $\frac{1}{4}$, Section 32, T8N, R47W

Unnamed Pit – NE $\frac{1}{4}$ SW $\frac{1}{4}$ SW $\frac{1}{4}$, Section 33, T8N, R47W

Unnamed Pit – SE $\frac{1}{4}$ NW $\frac{1}{4}$ SE $\frac{1}{4}$, Section 35, T8N, R47W

T7N, R46W

Unnamed Pit – NW $\frac{1}{4}$ SW $\frac{1}{4}$ SE $\frac{1}{4}$, Section 30, T7N, R46W

The above seven sand and gravel pits, located in T7N, R45 & 44W, are point bars associated with the South Fork of Frenchman Creek located north of this tract.

T7N, R47 W

Kurtzer Gravel Pit - sand, gravel, and aggregate – SW $\frac{1}{4}$ SW $\frac{1}{4}$ NE $\frac{1}{4}$, Section 22, T7N, R47W – This is an active permitted mine located approximately $\frac{1}{2}$ mile southeast of this tract.

L&L Ready Mix Gravel Pit - sand, gravel, and aggregate – SW $\frac{1}{4}$ NW $\frac{1}{4}$ NW $\frac{1}{4}$, Section 24, T7N, R47W – This is an active permitted mine located approximately 2 miles east-southeast of this tract.

Cunningham Pit - sand, gravel, and aggregate - L&L Ready Mix – NE $\frac{1}{4}$ NW $\frac{1}{4}$ SE $\frac{1}{4}$, Section 25, T7N, R47W – This is an active permitted mine located approximately 2 $\frac{1}{2}$ miles southeast of this tract.

Sand and Gravel Resources:

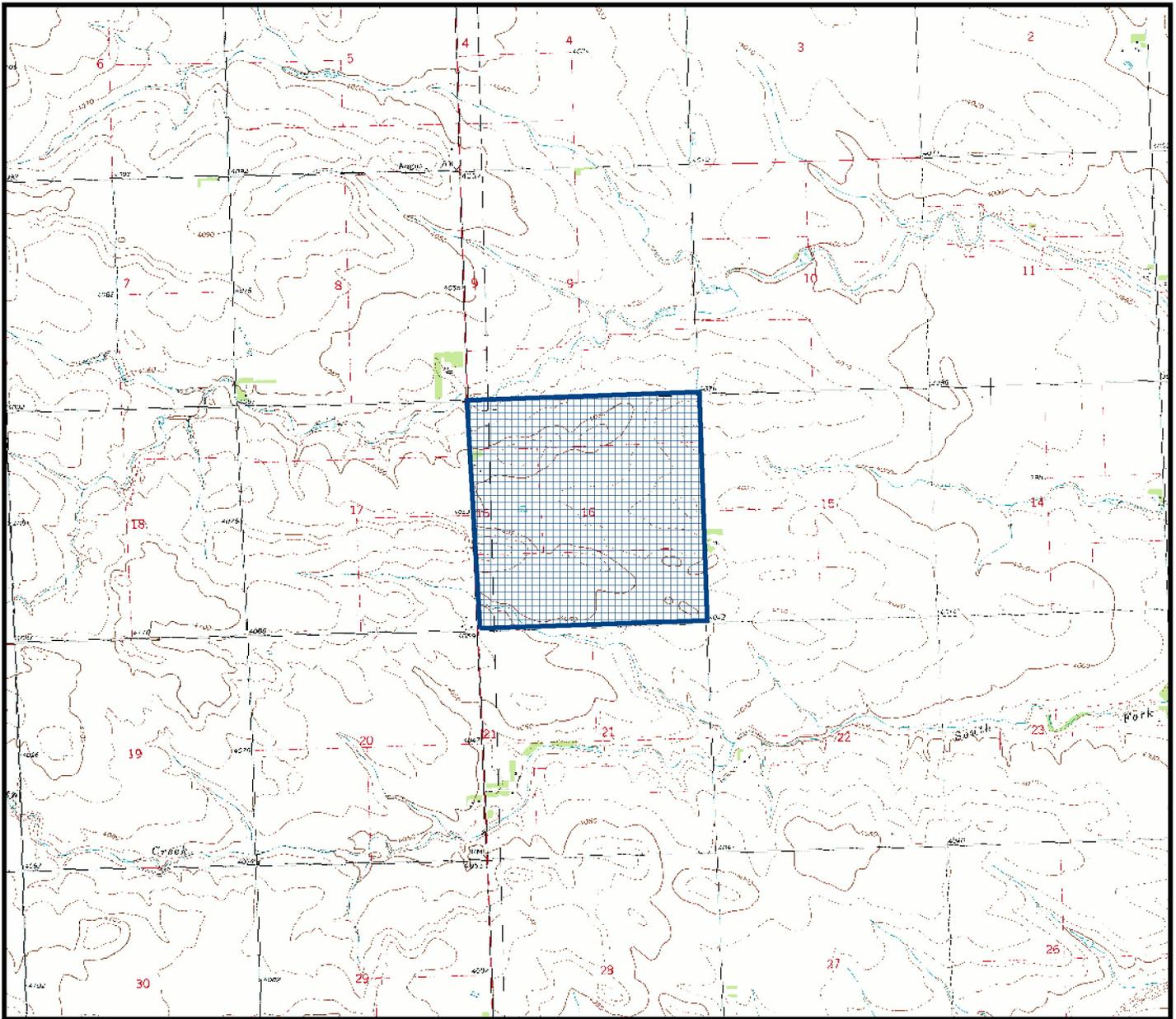
The surface bedrock consists of fluvial deposits containing ash, pebbly sand and silt capped by caliche layers and brecciated limestone forming a cap rock. Several small eastward flowing tributaries cross the area and connect with the South Fork of Frenchman Creek and Sandy Creek. One small tributary crosses the extreme southwest corner of this tract, but offers only limited volumes of sand and gravel. Other small creeks in the area do appear to contribute appreciable amounts sand, gravel and aggregate to the industrial mineral resource as indicated by active permitted mines above.

REFERENCES:

Lawson, A. D., 1998, Active Permitted Mine Operations in Colorado, 1996-97, Colorado Geological Survey, Department of Natural Resources, Denver Colorado, Information Series 45, 58 p.

Schwochow, S.D., 1981, Inventory of non-metallic mining and processing operations in Colorado, Colorado Geological Survey, Department of Natural Resources, Denver Colorado, Map Series 17

Scott, G. R., 1978, Map showing Geology, structure, and oil and gas fields in the Sterling 1° X2° Quadrangle, Colorado, Nebraska, and Kansas, US Geological Survey Miscellaneous Investigation Series I-1092

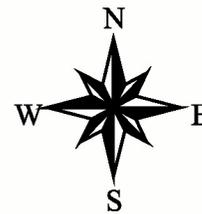


95-17

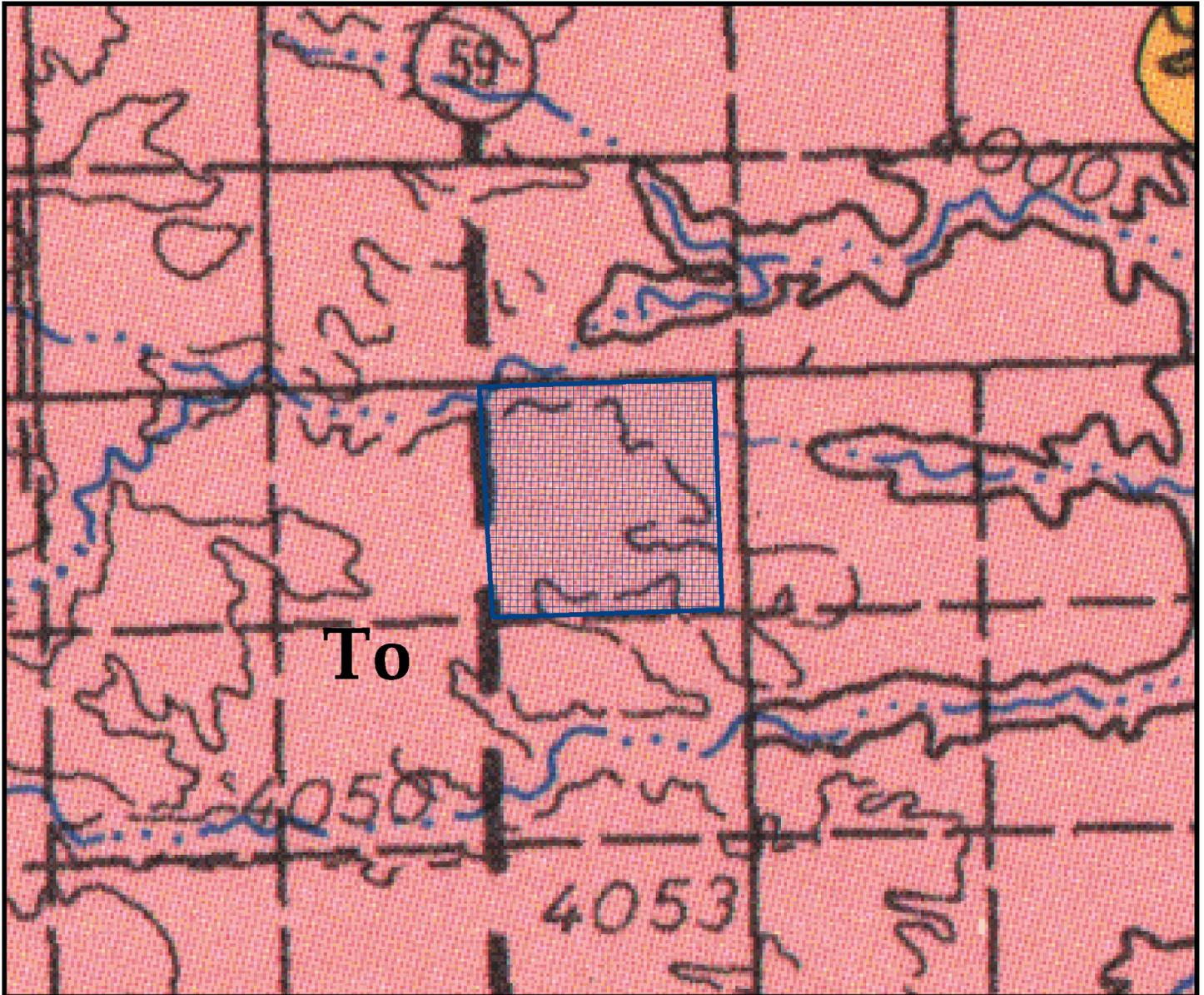
Location: T. 7 N, R. 47 W
Section: 16
Approximate total acreage - 640



 *Mineral acreage evaluated*

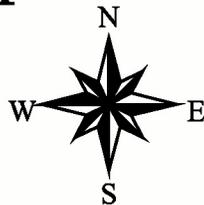


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Geologic Map for 95-17

Location: T. 7 N, R. 47 W
 Section: 16
 Approximate total acreage - 640

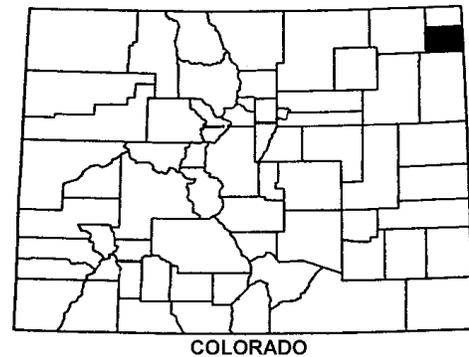
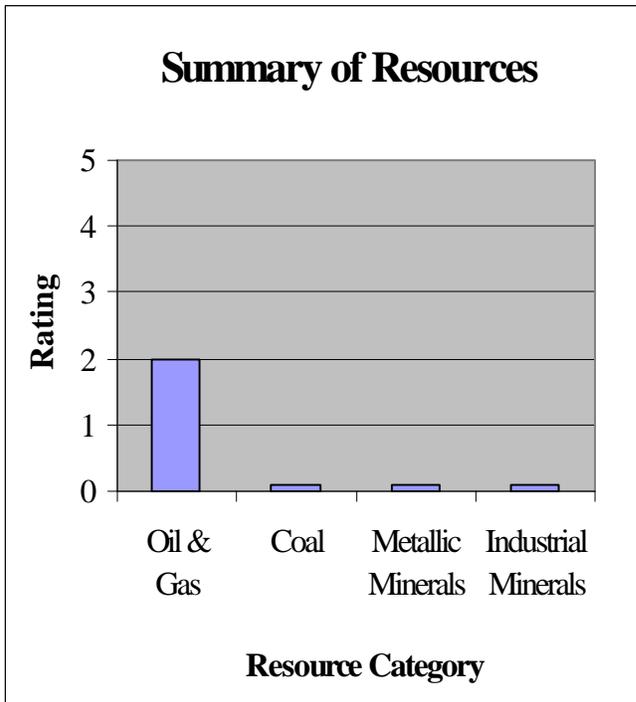


 *Mineral acreage evaluated*

To - Ogallala Formation (Miocene) Fluvial deposits of grayish orange-pink ash, pebbly sand and silt capped by pale-red dense pisolitic caliche layers and brecciated limestone.

1:43500

STATE LANDBOARD MINERAL INVENTORY



TRACT IDENTIFIER : #95-18

COUNTY: Phillips

LOCATION: T.7N., R.47W., Section 36

APPROXIMATE ACREAGE: 640 acres

QUADRANGLE NAME(S): Haxtun SE

OVERVIEW OF GEOLOGY:

This State land tract is located on the open plains in northeastern Colorado. The surface topography is relatively flat and the bedrock geology is poorly exposed. Extensive dry land and irrigated farmland development masks most outcrops. Visible outcrops in the area consist of fluvial deposits of Miocene Ogallala Formation cropping out south of the South Platte River. These deposits generally consist of grayish orange-pink ash; pebbly sand and silt capped by pale-red dense pisolitic caliche layers and brecciated limestone forming a cap rock at the surface. The Pleistocene Peoria Loess overlies the Ogallala Formation, but not in the area of this State Land Tract.

OIL AND GAS RESOURCES:

No oil or gas resources have been established on this tract. The essential elements, which include reservoir, trap, and source rocks with the appropriate timing of generation of migration, do exist in the sedimentary rocks in this area. However, existing geological control is insufficient to determine the presence of a trap.

COAL RESOURCES:

There are no coal measures in any of the sedimentary units in this tract.

METALLIC MINERAL RESOURCES:

There are no metallic mineral resources in this tract.

INDUSTRIAL MINERALS AND CONSTRUCTION MATERIALS RESOURCES:

Area Inactive Sand and Gravel Pits:

T7N, R46W

Unnamed Pit – NW ¼ SW ¼ SE ¼, Section 30, T7N, R46W

Unnamed Pit-S ½ NE ¼ SE ¼, Section 16, T7N, R46W

Area Active Permitted Mines:

T7N, R47 W

Kurtzer Gravel Pit - sand, gravel, and aggregate – SW ¼ SW ¼ NE ¼, Section 22, T7N, R47W – Located approximately 2½ miles northwest of this tract.

L&L Ready Mix Gravel Pit - sand, gravel, and aggregate – SW ¼ NW ¼ NW ¼, Section 24, T7N, R47W – Located approximately 2 miles north of this tract.

Cunningham Pit - sand, gravel, and aggregate - L&L Ready Mix – NE ¼ NW ¼ SE ¼, Section 25, T7N, R47W – Located approximately ½ mile north of this tract.

Barkey Pit - sand, gravel, and aggregate – NE ¼ NW ¼ NW ¼, Section 33, T7N, R46W – Located approximately 2 miles east of this tract.

Sand and Gravel Resources

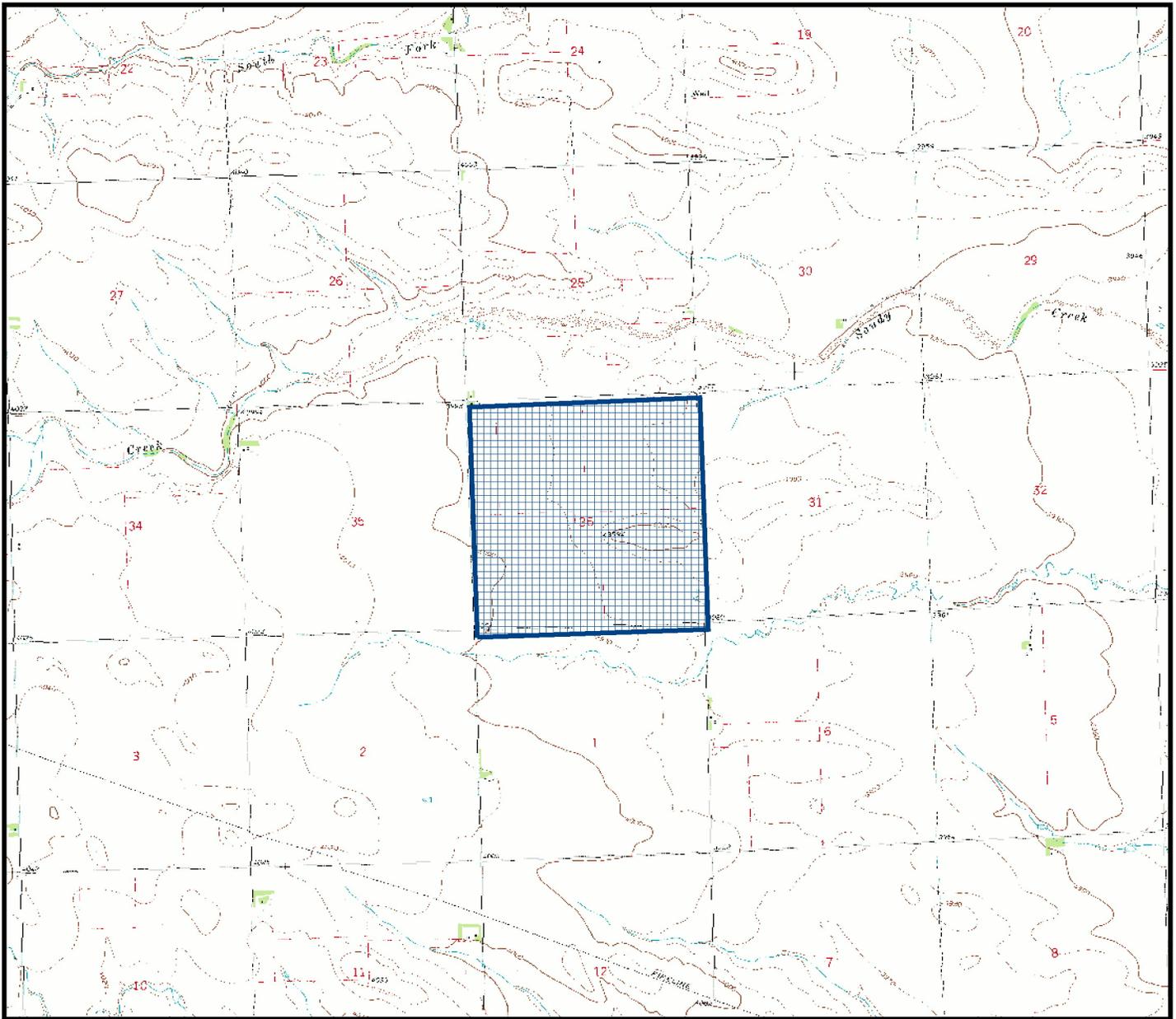
The surface bedrock consists of fluvial deposits containing ash, pebbly sand, and silt capped by caliche layers and brecciated limestone forming a cap rock. Several small eastward flowing tributaries cross the area and connect with the South Fork of Frenchman Creek and Sandy Creek. No tributary crosses tract. Other small creeks in the area do appear to contribute appreciable volumes of sand, gravel, and aggregate to the industrial mineral resource as indicated by active permitted mines above.

REFERENCES:

Lawson, A. D. 1998, Active Permitted Mine Operations in Colorado, 1996-97, Colorado Geological Survey, Department of Natural Resources, Denver Colorado, Information Series 45, 58 p.

Schwochow, S.D., 1981, Inventory of non-metallic mining and processing operations in Colorado, Colorado Geological Survey, Department of Natural Resources, Denver Colorado, Map Series 17

Scott, G. R., 1978, Map showing Geology, structure, and oil and gas fields in the Sterling 1° X2° Quadrangle, Colorado, Nebraska, and Kansas, US Geological Survey Miscellaneous Investigation Series I-1092

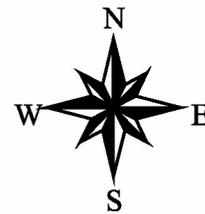


95-18

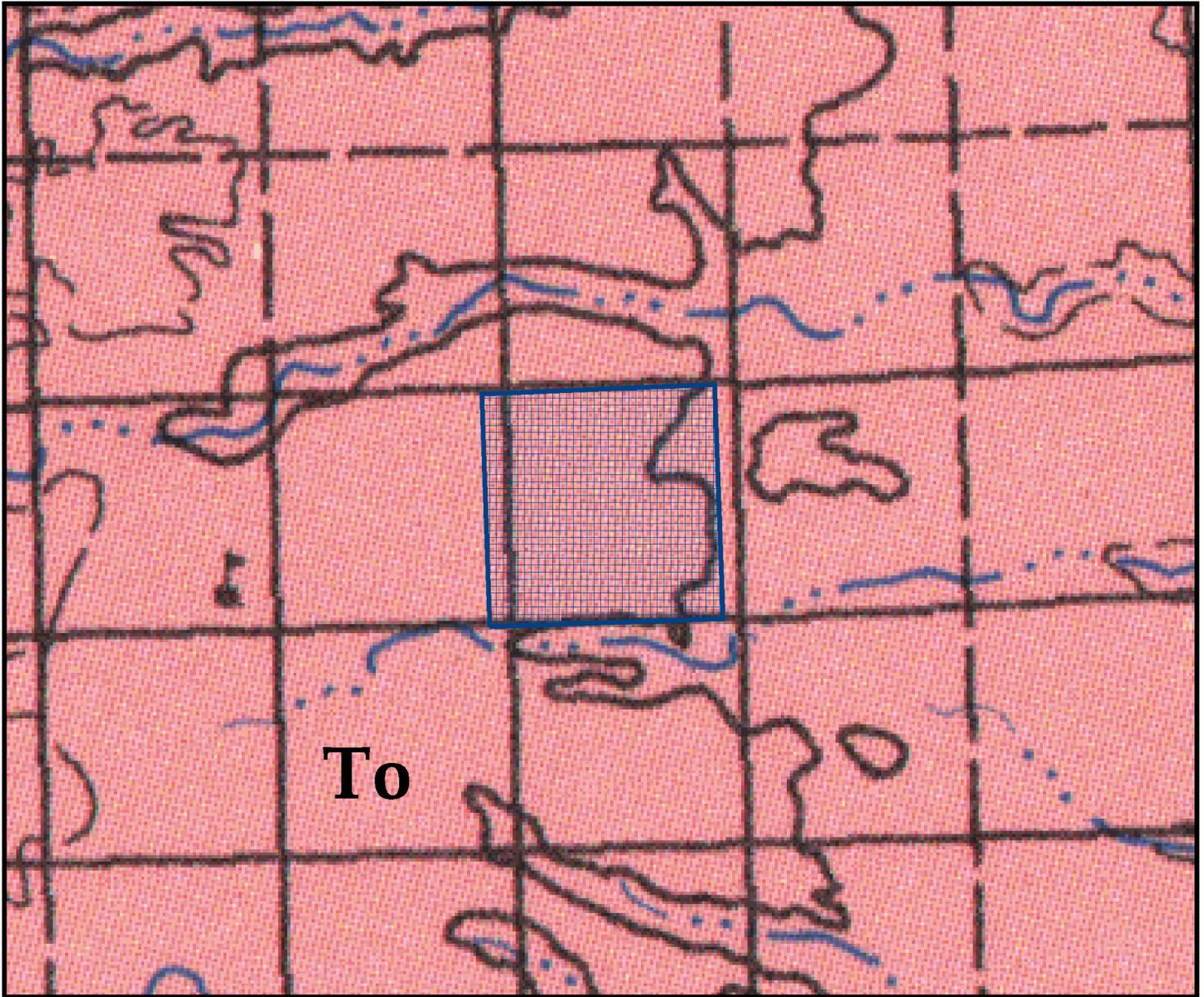
Location: T. 7 N, R. 47 W
Section: 36
Approximate total acreage - 640



 *Mineral acreage evaluated*

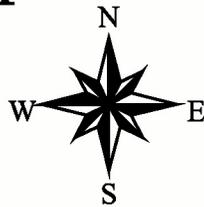


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Geologic Map for 95-18

Location: T. 7 N, R. 47 W
 Section: 36
 Approximate total acreage - 640



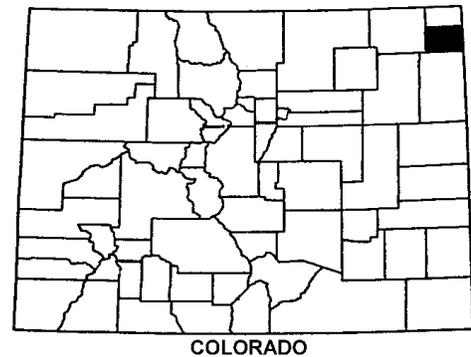
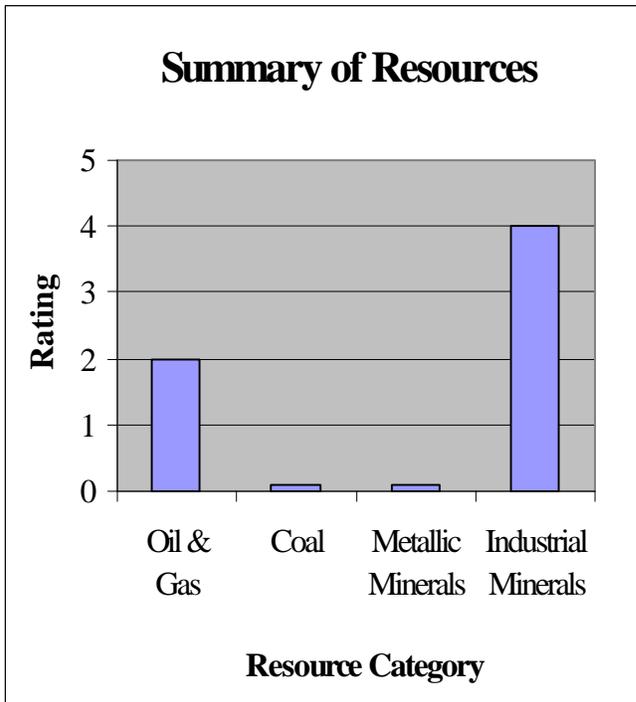
 *Mineral acreage evaluated*

To - Ogallala Formation (Miocene) Fluvial deposits of grayish orange-pink ash, pebbly sand and silt capped by pale-red dense pisolitic caliche layers and brecciated limestone.



1:43500

STATE LANDBOARD MINERAL INVENTORY



TRACT IDENTIFIER : #95-19

COUNTY: Phillips

LOCATION: T.7N., R.46W., Section 16

APPROXIMATE ACREAGE: 640

QUADRANGLE NAME(S): Haxtun SE, Paoli

OVERVIEW OF GEOLOGY:

This State land tract is located on the open plains in northeastern Colorado. The surface topography is relatively flat and the bedrock geology is poorly exposed. Extensive dry land and irrigated farmland development masks most outcrops. Visible outcrops in the area consist of fluvial deposits of Miocene Ogallala Formation cropping out south of the South Platte River. These deposits generally consist of grayish orange-pink ash; pebbly sand and silt capped by pale-red dense pisolitic caliche layers and brecciated limestone forming a cap rock at the surface. The Pleistocene Peoria Loess overlies the Ogallala Formation, but not in the area of this State Land Tract.

OIL AND GAS RESOURCES:

No oil or gas resources have been established on this tract. The essential elements, which include reservoir, trap, and source rocks with the appropriate timing of generation of migration, do exist in the sedimentary rocks in this area. However existing geological control is insufficient to determine the presence of a reservoir and trap.

COAL RESOURCES:

There are no coal measures in any of the sedimentary units in this tract.

METALLIC MINERAL RESOURCES:

There are no metallic mineral resources in this tract.

INDUSTRIAL MINERALS AND CONSTRUCTION MATERIALS RESOURCES:

Area Inactive Sand and Gravel Pits:

T7N, R46W

Unnamed Pit – NW ¼ SW ¼ SE ¼, Section 30, T7N, R46W

Unnamed Pit - S ½ NE ¼ SE ¼, Section 16, T7N, R46W

Unnamed Pit – NE ¼ NW ¼ NW ¼, Section 7, T7N, R45W

Area Active Permitted Mines:

T7N, R47 W

Kurtzer Gravel Pit - sand, gravel, and aggregate – SW ¼ SW ¼ NE ¼, Section 22, T7N, R47W – Located approximately 4½ miles west-southwest of this tract.

L&L Ready Mix Gravel Pit - sand, gravel, and aggregate – SW ¼ NW ¼ NW ¼, Section 24, T7N, R47W – Located approximately 3 miles west-southwest of this tract.

Cunningham Pit - sand, gravel, and aggregate - L&L Ready Mix – NE ¼ NW ¼ SE ¼, Section 25, T7N, R47W – Located approximately 3 ¼ miles southwest of this tract.

T7N, R46W

Barkey Pit - sand, gravel, and aggregate – NE ¼ NW ¼ NW ¼, Section 33, T7N, R46W – Located approximately 2 miles south of this tract.

Identified Sand and Gravel Resources:

The surface bedrock consists of fluvial deposits normally containing low-grade industrial minerals. But, due to the South Fork of Frenchman Creek traversing this tract from northwest to southeast, quality deposits of sand, gravel, and aggregate have been deposited in this tract. The creek has deposited several well-developed sandbars and point-bars along its meandering path. Detailed geologic maps showing the distribution of these alluvial deposits on the state tract are not available, but using geomorphological features obtained from the 1:50,000 scale Phillips County topographic map, an estimate of their areal extent has been made.

Identified resources of 2.1 million tons of sand and gravel of unknown quality cover an aggregate of 87 acres in this tract. Calculations in all cases are based upon volume to tonnage conversion factor of 18 cubic feet/ton (111-lbs./cubic foot) for sand and

gravel. A breakdown of the sand and gravel resources present in each of the locales is presented below:

Unnamed Sand and Gravel Prospect along the South Fork of Frenchman Creek

Present day flood plain deposits: Section 24 - 87 acres

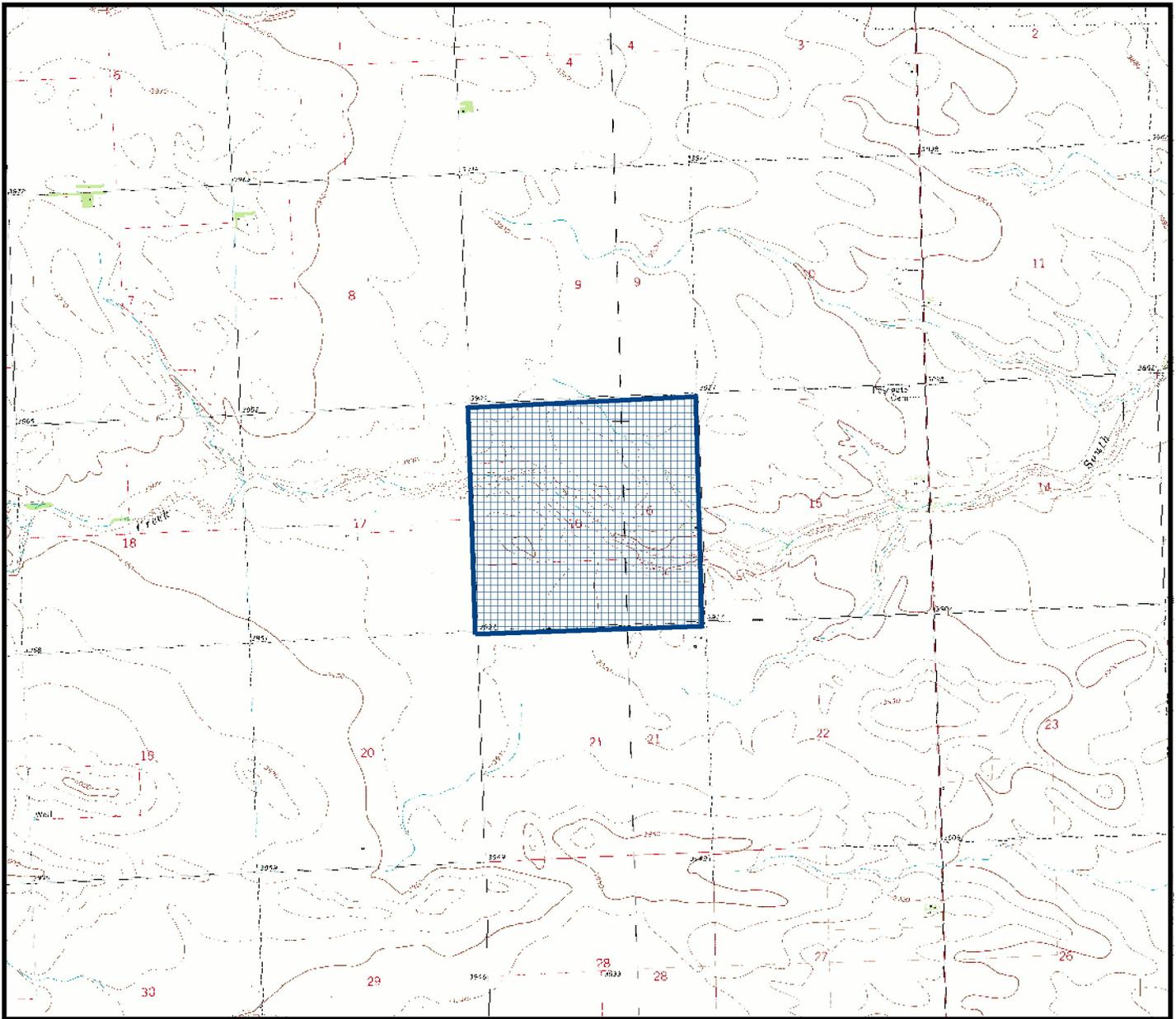
(3.8 million sq. Ft.) X 10 ft. thick/ 18 cubic feet/ton = 2.1 tons of sand and gravel.

REFERENCES:

Lawson, A. D., 1998, Active Permitted Mine Operations in Colorado, 1996-97, Colorado Geological Survey, Department of Natural Resources, Denver Colorado, Information Series 45, 58 p.

Schwochow, S.D., 1981, Inventory of non-metallic mining and processing operations in Colorado, Colorado Geological Survey, Department of Natural Resources, Denver Colorado, Map Series 17

Scott, G. R., 1978, Map showing Geology, structure, and oil and gas fields in the Sterling 1° X2° Quadrangle, Colorado, Nebraska, and Kansas, US Geological Survey Miscellaneous Investigation Series I-1092

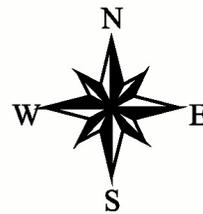


95-19

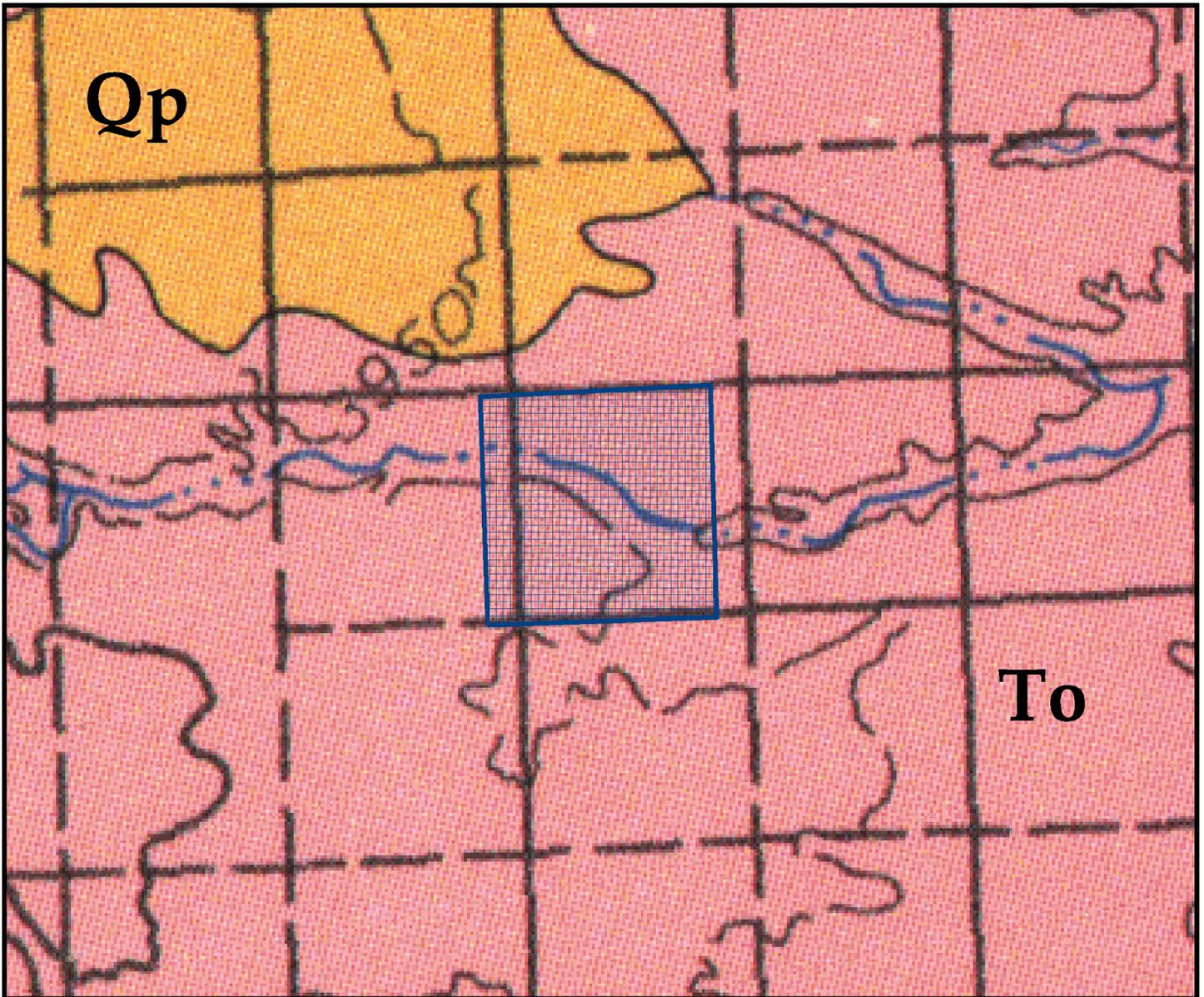
Location: T. 7 N, R. 46 W
Section: 16
Approximate total acreage - 640



 *Mineral acreage evaluated*

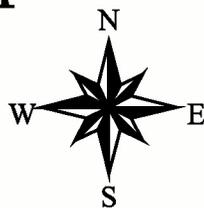


1:43500



Geologic Map for 95-19

Location: T. 7 N, R. 46 W
Section: 16
Approximate total acreage - 640



0 1 2 Miles

A horizontal scale bar with three segments. The first segment is labeled '0', the second '1', and the third '2 Miles'.

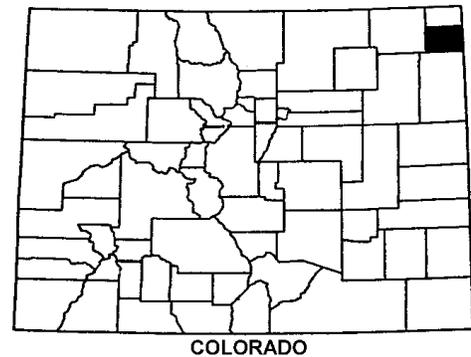
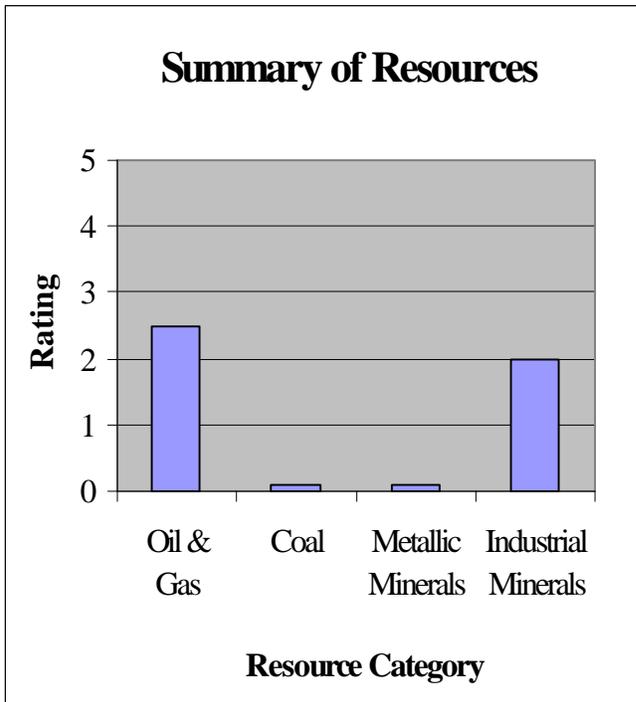
 *Mineral acreage evalutated*

Qp - Peoria loess (Pleistocene) Slightly clayey yellowish brown, sandy, blocky, non-stratified wind-blown calcareous-silt and sand.

To - Ogallala Formation (Miocene) Fluvial deposits of grayish orange-pink ash, pebbly sand and silt capped by pale-red dense pisolitic caliche layers and brecciated limestone.

1:43500

STATE LANDBOARD MINERAL INVENTORY



TRACT IDENTIFIER : #95-20

COUNTY: Phillips

LOCATION: T.7N., R.46W., Section 36

APPROXIMATE ACREAGE: 640

QUADRANGLE NAME(S): Paoli

OVERVIEW OF GEOLOGY:

This State land tract is located on the open plains in northeastern Colorado. The surface topography is relatively flat and the bedrock geology is poorly exposed. Extensive dry land and irrigated farmland development masks most outcrops. Visible outcrops in the area consist of fluvial deposits of Miocene Ogallala Formation cropping out south of the South Platte River. These deposits generally consist of grayish orange-pink ash; pebbly sand and silt capped by pale-red dense pisolitic caliche layers and brecciated limestone forming a cap rock at the surface. The Pleistocene Peoria Loess overlies the Ogallala Formation, but not in the area of this State Land Tract. ashy sand and silt beds and volcanic ash beds.

OIL AND GAS RESOURCES:

No exploratory wells, establishing oil or gas resources, have been drilled on this tract as of this date. The essential elements, which include reservoir, trap, and source rocks with the appropriate timing of generation of migration, do exist in the sedimentary rocks in this area. Two exploratory wells were drilled within a mile of this tract. Both wells were drilled to a depth to test the Smoky Hill Member of the Niobrara Formation. No production was established from the CSG Millage #1 well located in section 1 T6N R46W. However, production was established from the Niobrara Formation in the Shakespeare Oil - Clinton Keasling #1 well located in the SW ¼ of Section 31, T7N R45W. The well was stimulated and completed from a 30 foot fractured interval in Niobrara Chalks at an unknown rate in 1978. The operator reported an undisclosed amount of gas. Current records indicate status of this well to be a producing gas well.

COAL RESOURCES:

There are no coal measures in any of the sedimentary units in this tract.

METALLIC MINERAL RESOURCES:

There are no metallic mineral resources in this tract.

INDUSTRIAL MINERALS AND CONSTRUCTION MATERIALS RESOURCES:

Area Inactive Sand and Gravel Pits:

T7N, R46W

Unnamed Pit - SW ¼ SE ¼, Section 30, T7N, R46W

Unnamed Pit - S ½ NE ¼ SE ¼, Section 16, T7N, R46W

T7N, R45W

Unnamed Pit - SE ¼ NW ¼, Section 7, T7N, R45W

Unnamed Pit - NE ¼ SE ¼, Section 8, T7N, R45W

Unnamed Pit - SW ¼ NW ¼, Section 9, T7N, R45W

T6N, R45W

Unnamed Pit - NW ¼ NW ¼, Section 9, T6N, R45W

Area Active Permitted Mines:

Barkey Pit - sand, gravel, and aggregate – NE ¼ NW ¼ NW ¼, Section 33, T7N, R46W
– Located approximately 2 miles south of this tract.

Sand and Gravel Resources

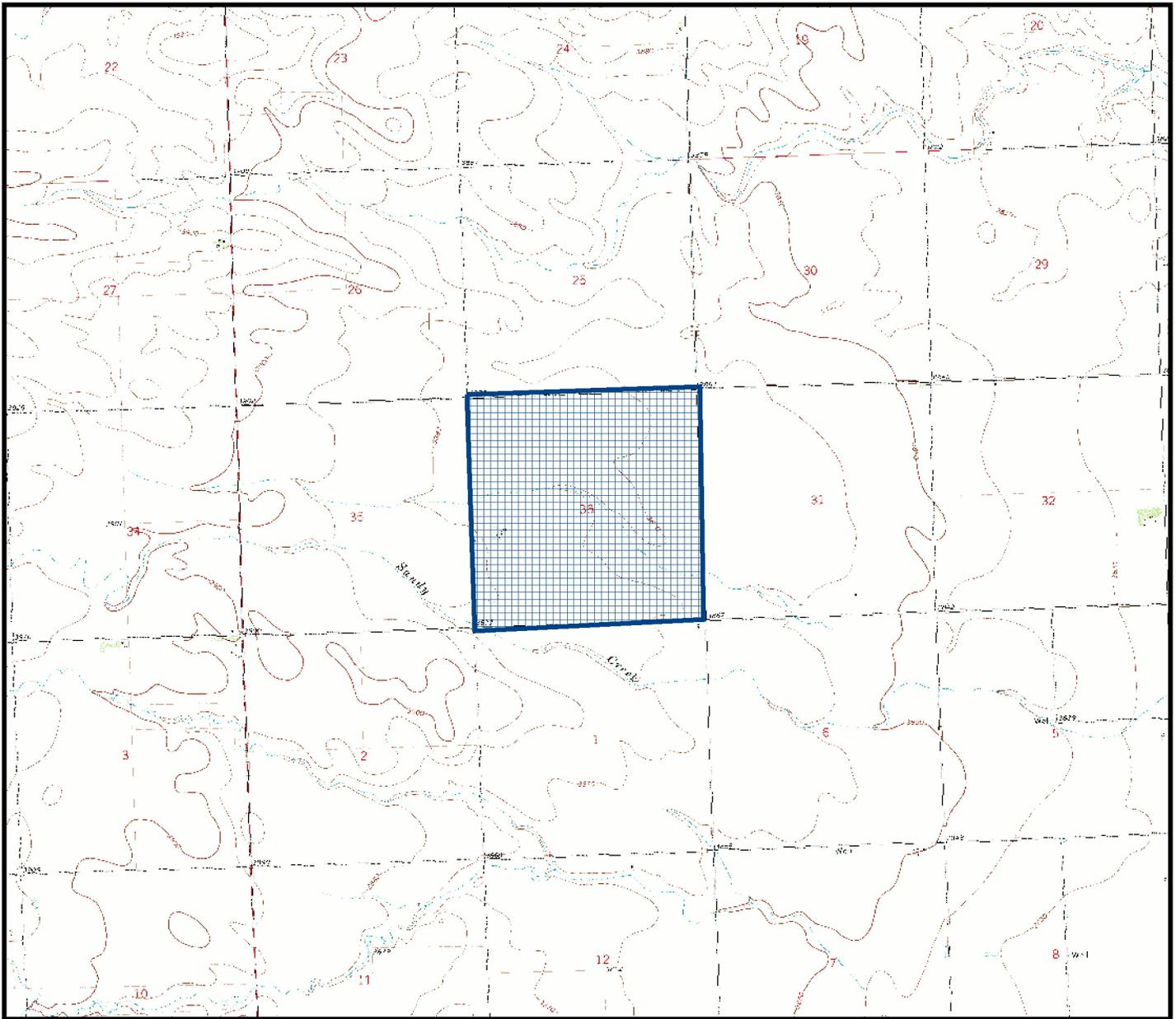
The surface bedrock consists of fluvial deposits containing ash, pebbly sand, and silt capped by caliche layers and brecciated limestone forming a cap rock. Several small eastward flowing tributaries cross the area and connect with Sandy Creek. One small relatively straight creek drains east-southeast through the center of the tract. There are no meanders associated with this creek. Therefore, the industrial mineral value is rated low. A few small creeks to the west and south of this tract do appear to contribute variable amounts sand and gravel to the industrial mineral resource as indicated by active permitted mines above.

REFERENCES:

Lawson, A. D., 1998, Active Permitted Mine Operations in Colorado, 1996-97, Colorado Geological Survey, Department of Natural Resources, Denver Colorado, Information Series 45, 58 p.

Schwochow, S.D., 1981, Inventory of non-metallic mining and processing operations in Colorado, Colorado Geological Survey, Department of Natural Resources, Denver Colorado, Map Series 17

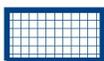
Scott, G. R., 1978, Map showing Geology, structure, and oil and gas fields in the Sterling 1° X2° Quadrangle, Colorado, Nebraska, and Kansas, US Geological Survey Miscellaneous Investigation Series I-1092

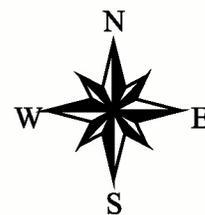


95-20

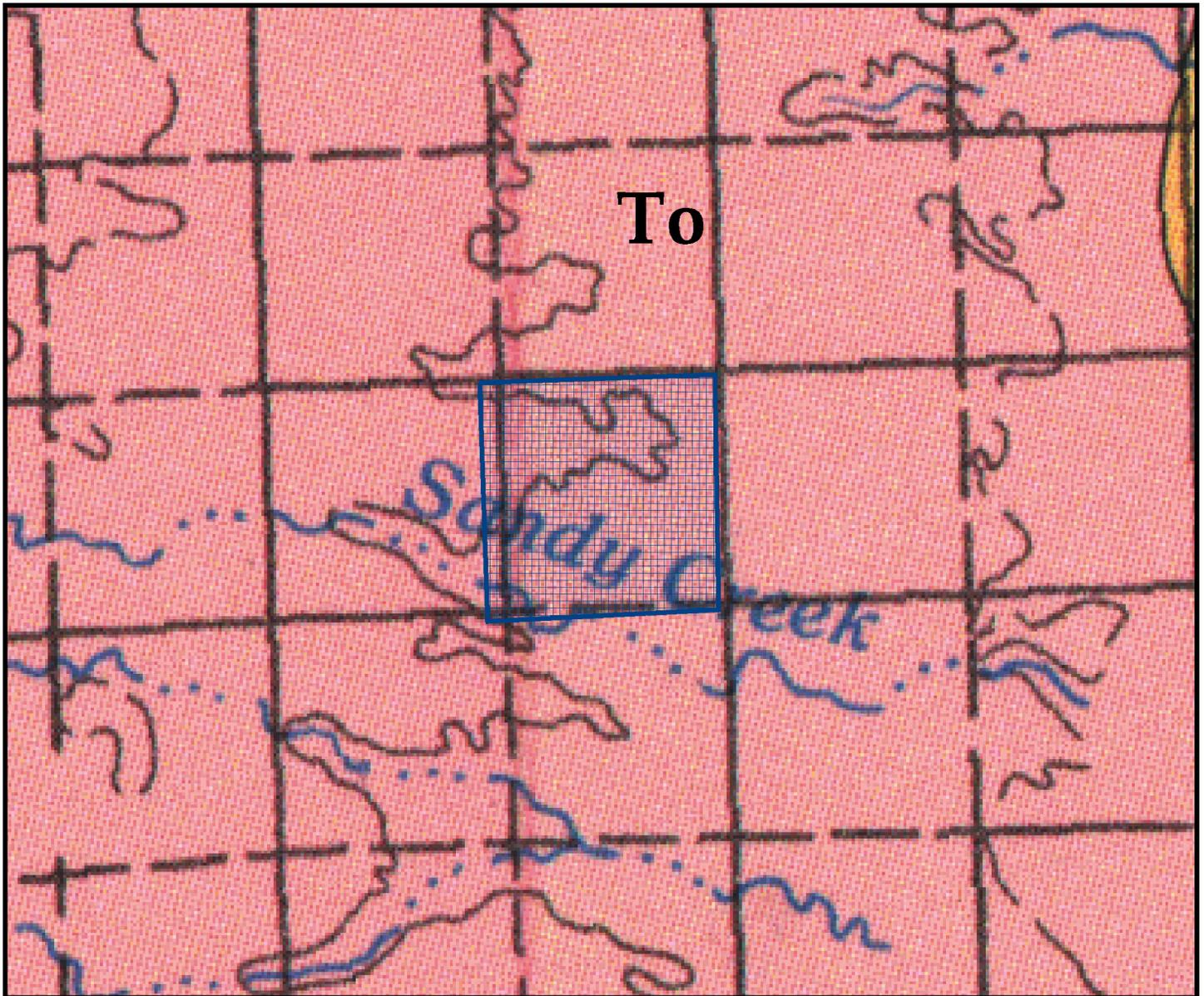
Location: T. 7 N, R. 46 W
Section: 36
Approximate total acreage - 640



 Mineral acreage evaluated

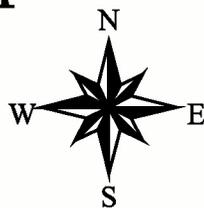


1:43500



Geologic Map for 95-20

 *Mineral acreage evaluated*



Location: T. 7 N, R. 46 W
Section: 36
Approximate total acreage - 640

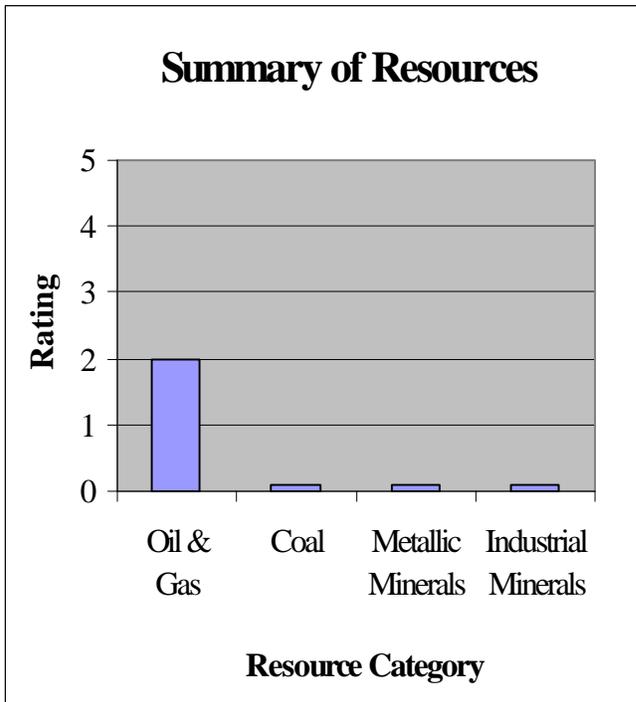
0 1 2 Miles



To - Ogallala Formation (Miocene) Fluvial deposits of grayish orange-pink ash, pebbly sand and silt capped by pale-red dense pisolitic caliche layers and brecciated limestone.

1:43500

STATE LANDBOARD MINERAL INVENTORY



TRACT IDENTIFIER : #95-21

COUNTY: Phillips

LOCATION: T.7N., R.45W., Section 16

APPROXIMATE ACREAGE: 640 acres

QUADRANGLE NAME(S): Paoli

OVERVIEW OF GEOLOGY:

This State land tract is located on the open plains in northeastern Colorado. The surface topography is relatively flat and the bedrock geology is poorly exposed. Extensive dry land and irrigated farmland developed masks most outcrops. The few visible outcrops in this area consist of wind blown sand deposits of the Pleistocene Peoria Loess and fluvial deposits of the Miocene Ogallala Formation. The majority of the surface bedrock in this tract consists of clayey yellowish-brown, sandy, blocky, non-stratified wind blown calcareous-silts and sands of the Peoria Loess. These Pleistocene glacial deposits overly unconformably the Tertiary Ogallala Formation, which consists of fluvial sediments and is deposited over much of the northeast part of the State. The sediments consist of red

pale dense pisolitic caliche layers or limestone brecciated and recemented forming a cap rock at the surface. Below the cap rock, the sediments consist of semi-consolidated ashly sand and silt beds and volcanic ash beds.

OIL AND GAS RESOURCES:

No exploratory wells, establishing oil or gas resources, have been drilled on this tract as of this date. The essential elements, which include reservoir, trap, and source rocks with the appropriate timing of generation of migration, do exist in the sedimentary rocks in this area. One exploratory well was drilled within an eighth of a mile of this tract near the northwest corner. The Ryan Oil -W Richard Means #1 well was drilled in the SW ¼ of Section 9, T7N R45W to a depth of 3,983 feet to test the Jurassic Morrison Formation. No production was established and no indications of oil or gas were observed and recorded from any of the overlying horizons. The well was plugged and abandoned in 1951.

COAL RESOURCES:

There are no coal measures in any of the sedimentary units in this tract.

METALLIC MINERAL RESOURCES:

There are no metallic mineral resources in this tract.

INDUSTRIAL MINERALS AND CONSTRUCTION MATERIALS RESOURCES:

Area Inactive Sand and Gravel Pits:

T7N, R45W

Unnamed Pit – NE ¼, SE ¼ NW ¼, Section 7, T7N, R45W

Unnamed Pit – N ½, NE ¼ SE ¼, Section 8, T7N, R45W

Unnamed Pit – SW¼ SW ¼ NW ¼, Section 9, T7N, R45W

Unnamed Pit – SW ¼ SW ¼ SE ¼, Section 10, T7N, R45W

Unnamed Pit – SW ¼ NW ¼ SW ¼, Section 11, T7N, R45W

Unnamed Pit – NE ¼ NE ¼ NE ¼, Section 14, T7N, R45W

Unnamed Pit – SE ¼ NE ¼ NE ¼, Section 13, T7N, R45W

The above seven sand and gravel pits, located in T7N, R45W, are point bars associated with the South Fork of Frenchman Creek located north of this tract.

Sand and Gravel Resources

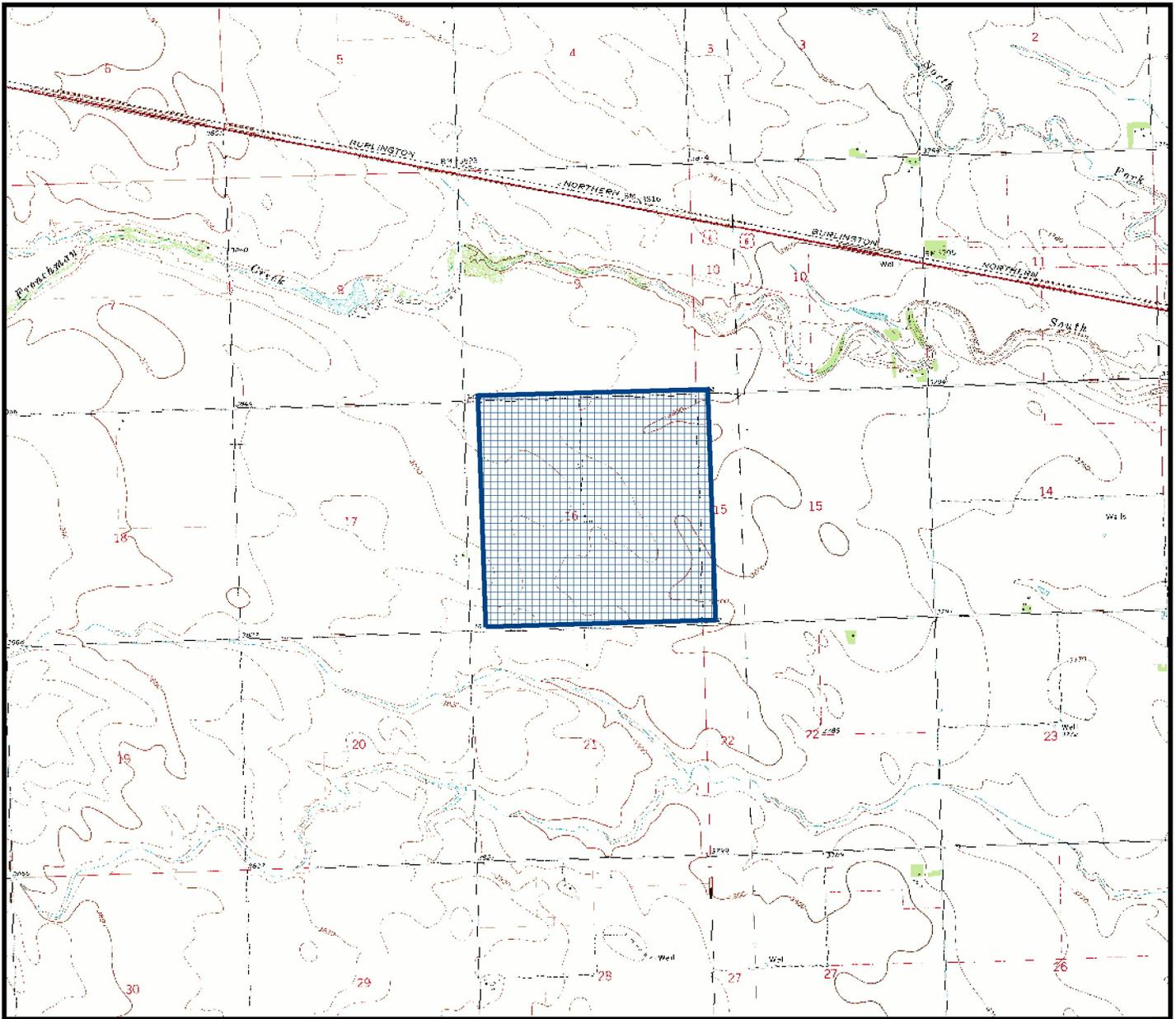
Agricultural crops that cover the bedrock entirely occupy the surface land in this tract. The underlying sediments consist primarily of buff colored calcareous wind blown silt and sand (Loess), which is interpreted to contain low industrial mineral value.

REFERENCES:

Lawson, A. D, 1998, Active Permitted Mine Operations in Colorado, 1996-97, Colorado Geological Survey, Department of Natural Resources, Denver Colorado, Information Series 45, 58 p.

Schwochow, S.D., 1981, Inventory of non-metallic mining and processing operations in Colorado, Colorado Geological Survey, Department of Natural Resources, Denver
Colorado, Map Series 17

Scott, G. R., 1978, Map showing Geology, structure, and oil and gas fields in the Sterling 1° X2° Quadrangle, Colorado, Nebraska, and Kansas, US Geological Survey
Miscellaneous Investigation Series I-1092

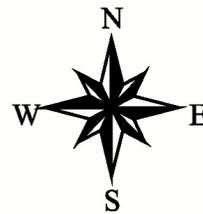


95-21

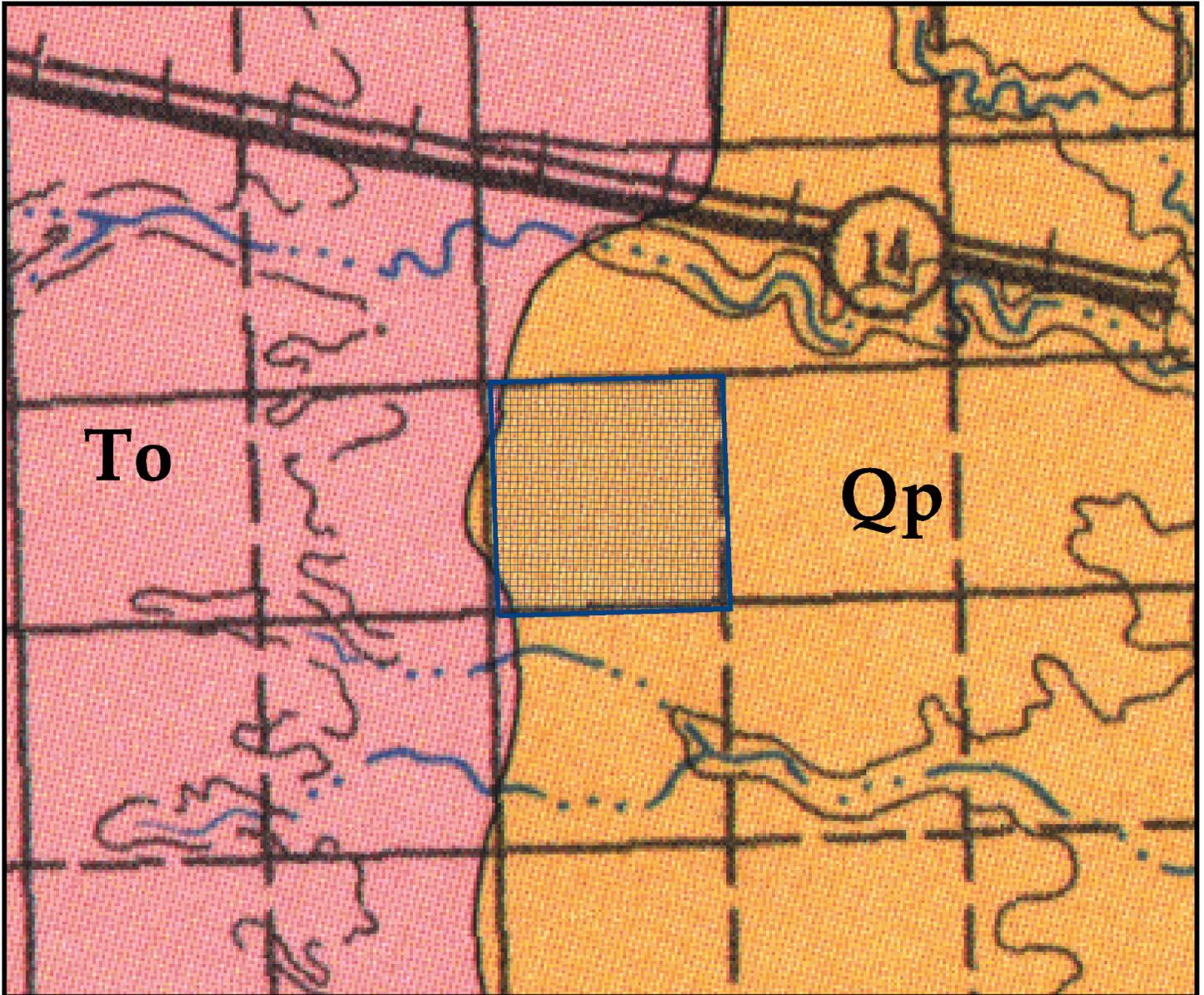
Location: T. 7 N, R. 45 W
Section: 16
Approximate total acreage - 640



 Mineral acreage evaluated

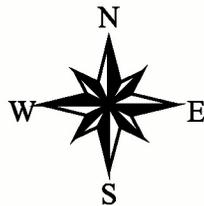


1:43500



Geologic Map for 95-21

Location: T. 7 N, R. 45 W
 Section: 16
 Approximate total acreage - 640



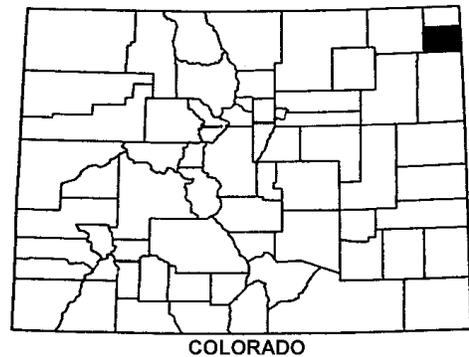
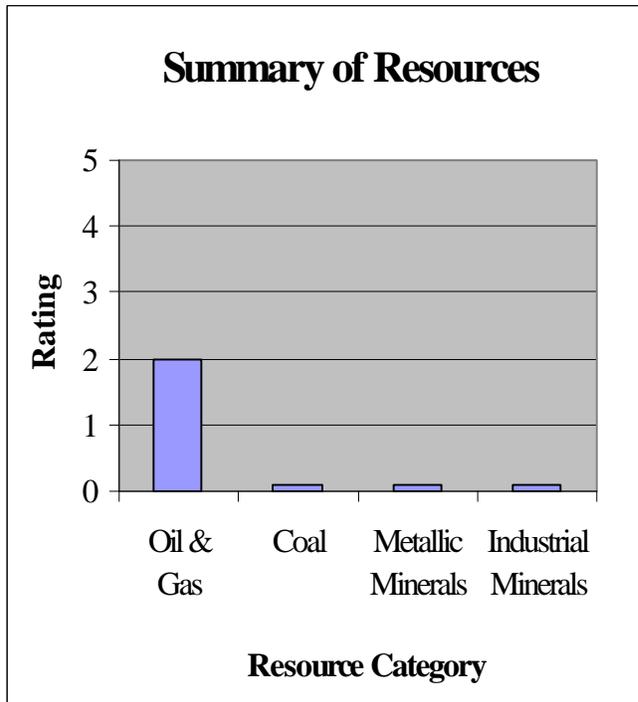
 *Mineral acreage evaluated*

Qp - Peoria loess (Pleistocene) Slightly clayey yellowish brown, sandy, blocky, non-stratified wind-blown calcareous-silt and sand.

To - Ogallala Formation (Miocene) Fluvial deposits of grayish orange-pink ash, pebbly sand and silt capped by pale-red dense pisolitic caliche layers and brecciated limestone.

1:43500

STATE LANDBOARD MINERAL INVENTORY



TRACT IDENTIFIER : #95-22

COUNTY: Phillips

LOCATION:

APPROXIMATE ACREAGE: 640 acres

QUADRANGLE NAME(S): Holyoke

OVERVIEW OF GEOLOGY:

This State land tract is located on the open plains in northeastern Colorado. The surface topography is relatively flat and the bedrock geology is poorly exposed. Extensive dry land and irrigated farmland developed masks most outcrops. The few visible outcrops in this area consist of wind blown sand deposits of the Pleistocene Peoria Loess. The surface bedrock in this tract consists of clayey yellowish-brown, sandy, blocky, non-stratified wind blown calcareous-silts and sands of the Peoria Loess. These Pleistocene glacial deposits overly unconformably the Tertiary Ogallala Formation.

OIL AND GAS RESOURCES:

No oil or gas resources have been established on this tract. The essential elements, which include reservoir, trap, and source rocks with the appropriate timing of generation of migration, do exist in the sedimentary rocks in this area. However existing geological control is insufficient to determine the presence of a trap.

COAL RESOURCES:

There are no coal measures in any of the sedimentary units in this tract.

METALLIC MINERAL RESOURCES:

There are no metallic mineral resources in this tract.

INDUSTRIAL MINERALS AND CONSTRUCTION MATERIALS RESOURCES:

Area Inactive Sand and Gravel Pits:

T7N, R45W

Unnamed Pit – N ½, NE ¼ SE ¼, Section 8, T7N, R45W

Unnamed Pit – SW¼ SW ¼ NW ¼, Section 9, T7N, R45W

Unnamed Pit – SW ¼ SW ¼ SE ¼, Section 10, T7N, R45W

Unnamed Pit – SW ¼ NW ¼ SW ¼, Section 11, T7N, R45W

Unnamed Pit – NE ¼ NE ¼ NE ¼, Section 14, T7N, R45W

Unnamed Pit – SE ¼ NE ¼ NE ¼, Section 13, T7N, R45W

T7N, R44W

Unnamed Pit – NE ¼ NW ¼ NW ¼, Section 16, T7N, R44W

Unnamed Pit – NE ¼ SW ¼ NE ¼, Section 15, T7N, R44W

Unnamed Pit – NE ¼ SE ¼ NE ¼, Section 15, T7N, R44W

The above nine sand and gravel pits, located in T7N, R45W, are point bars associated with the South Fork of Frenchman Creek located north of this tract.

Sand and Gravel Resources

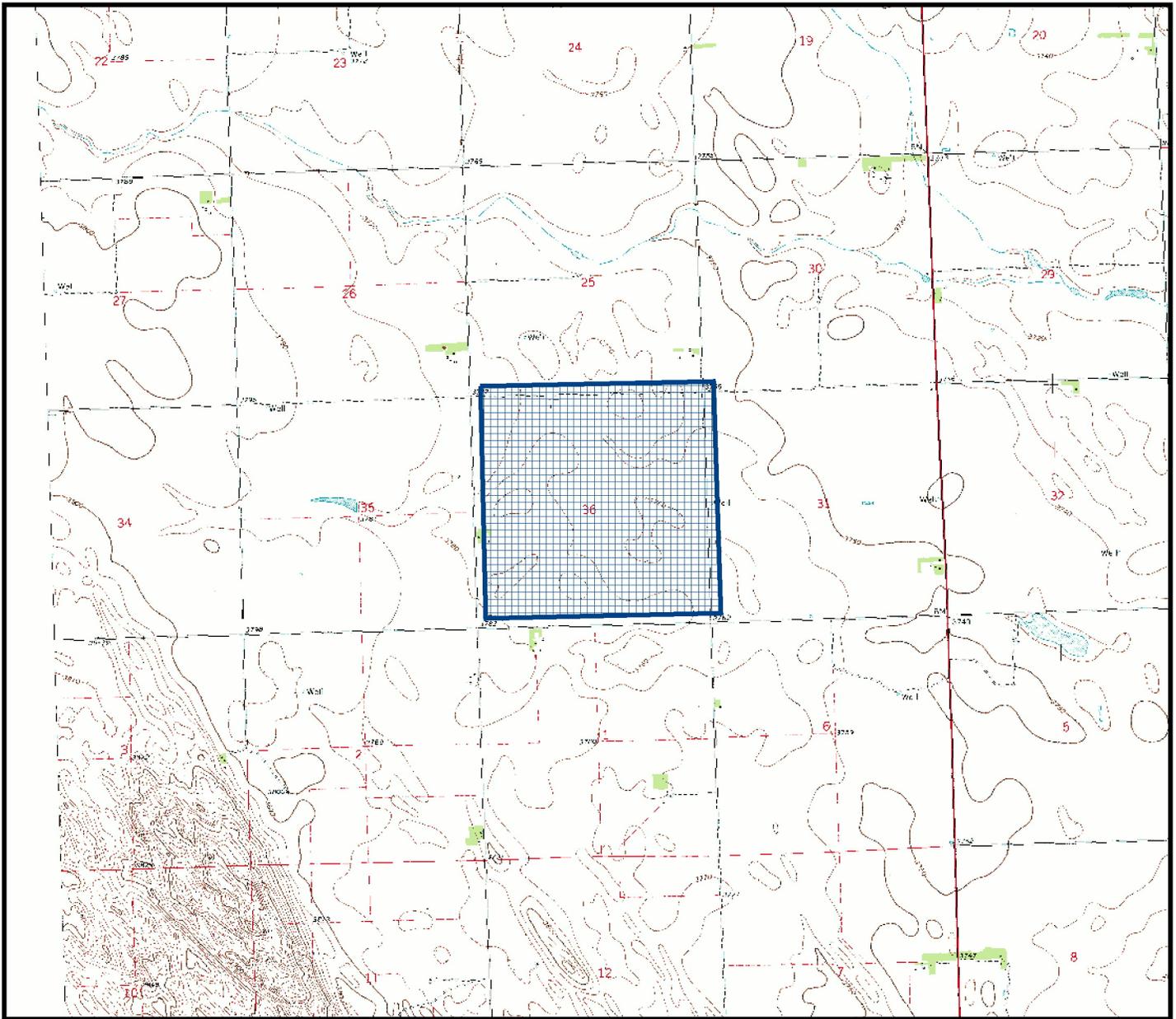
Agricultural crops that cover the bedrock entirely occupy the surface land in this tract. The underlying sediments consist primarily of buff colored calcareous wind blown silt and sand (Loess), which is interpreted to contain low industrial mineral value.

REFERENCES:

Lawson, A. D., 1998, Active Permitted Mine Operations in Colorado, 1996-97, Colorado Geological Survey, Department of Natural Resources, Denver Colorado, Information Series 45, 58 p.

Scott, G. R., 1978, Map showing Geology, structure, and oil and gas fields in the Sterling 1° X2° Quadrangle, Colorado, Nebraska, and Kansas, US Geological Survey Miscellaneous Investigation Series I-1092

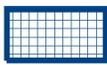
Schwochow, S.D., 1981, Inventory of non-metallic mining and processing operations in Colorado, Colorado Geological Survey, Department of Natural Resources, Denver Colorado, Map Series 17

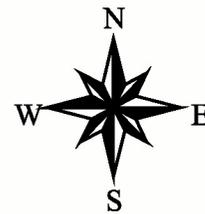


95-22

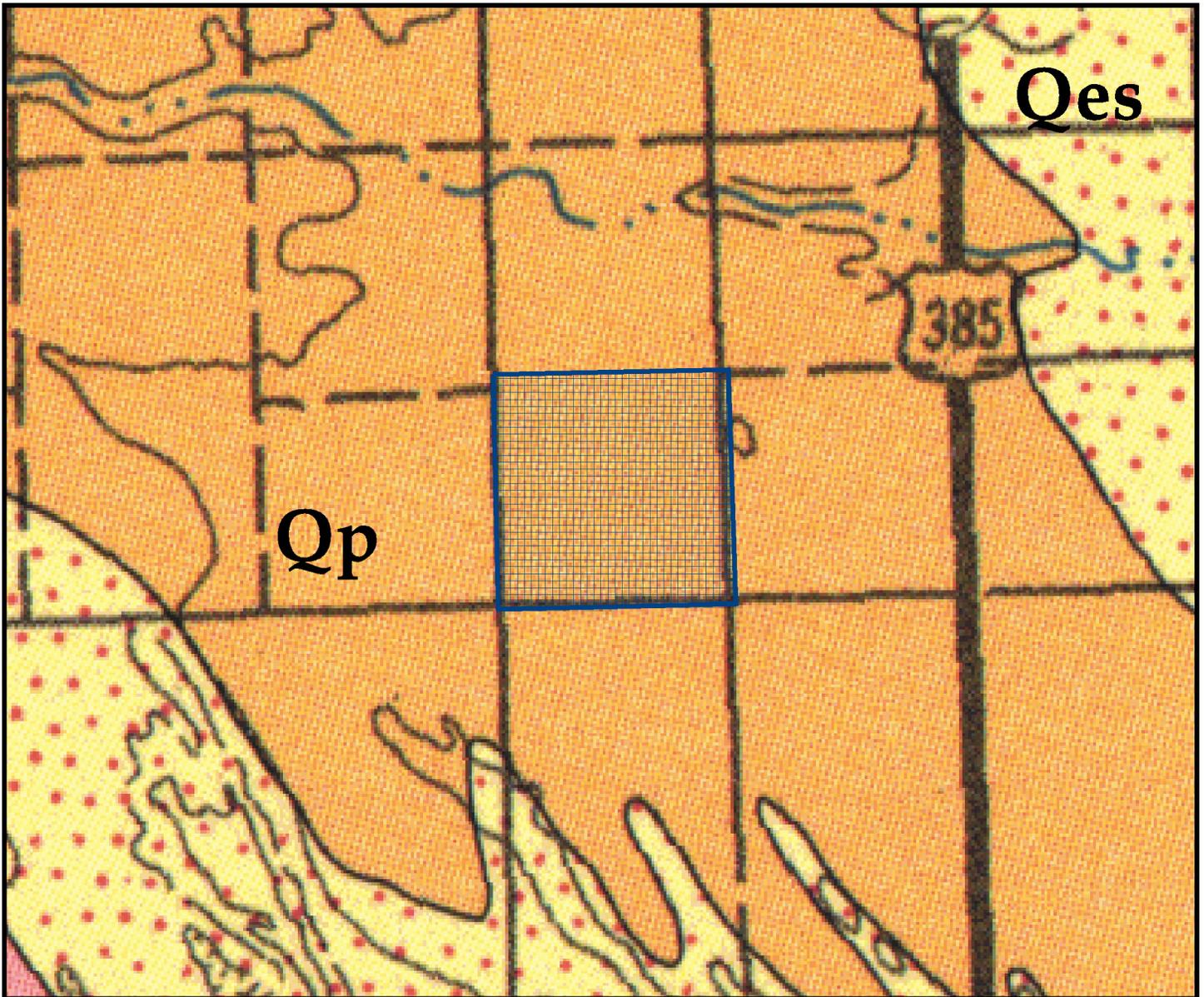
Location: T. 7 N, R. 45 W
Section: 36
Approximate total acreage - 640



 *Mineral acreage evaluated*

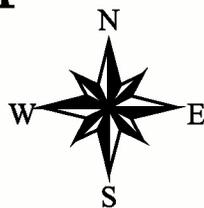


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Geologic Map for 95-22

Location: T. 7 N, R. 45 W
 Section: 36
 Approximate total acreage - 640



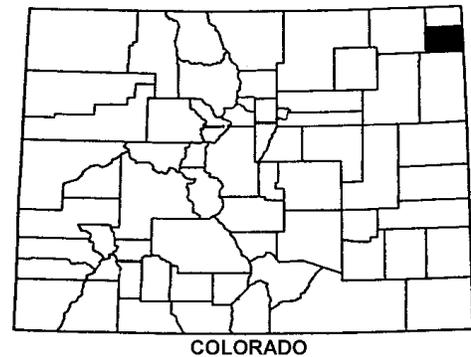
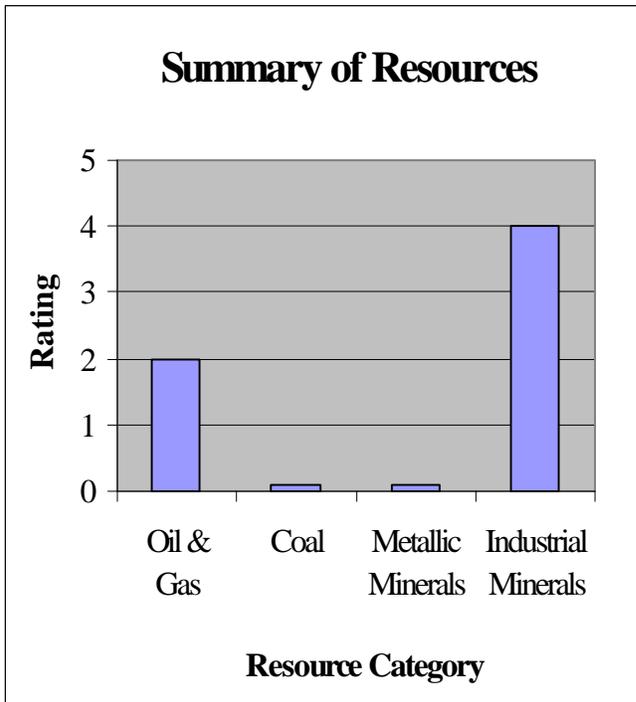
 *Mineral acreage evaluated*

Qp - Peoria loess (Pleistocene) Slightly clayey yellowish brown, sandy, blocky, non-stratified wind-blown calcareous-silt and sand.

Qes - Eolian Sand (Holocene/Pleistocene) Pale yellowish brown well-sorted wind blown sand.

1:43500

STATE LANDBOARD MINERAL INVENTORY



TRACT IDENTIFIER : #95-23

COUNTY: Phillips

LOCATION: T.7N., R.44W., Section 16

APPROXIMATE ACREAGE: 640 acres

QUADRANGLE NAME(S): Holyoke

OVERVIEW OF GEOLOGY:

This State land tract is located on the open plains in northeastern Colorado. The surface topography is relatively flat and the bedrock geology is poorly exposed. Urbanization, dry land, and irrigated farmland developed on the tract masks most outcrops. The few visible outcrops in this area consist of wind blown sand deposits of the Pleistocene Peoria Loess and Eolian sand dunes. The surface bedrock in this tract consists of clayey yellowish-brown, sandy, blocky, non-stratified wind blown calcareous-silts and sands of the Peoria Loess and yellow-brown well-sorted eolian deposits. These Pleistocene deposits overly unconformably the Tertiary Ogallala Formation.

OIL AND GAS RESOURCES:

No oil or gas resources have been established on this tract. The essential elements, which include reservoir, trap, and source rocks with the appropriate timing of generation of migration, do exist in the sedimentary rocks in this area. However existing geological control is insufficient to determine the presence of a trap.

COAL RESOURCES:

There are no coal resources. There are no coal measures in any of the sedimentary units in this tract.

INDUSTRIAL MINERALS AND CONSTRUCTION MATERIALS RESOURCES:

Area Inactive Sand and Gravel Pits:

T7N, R45W

Unnamed Pit – SW $\frac{1}{4}$ SW $\frac{1}{4}$ SE $\frac{1}{4}$, Section 10, T7N,

Unnamed Pit – SW $\frac{1}{4}$ NW $\frac{1}{4}$ SW $\frac{1}{4}$, Section 11, T7N, R45W

Unnamed Pit – NE $\frac{1}{4}$ NE $\frac{1}{4}$ NE $\frac{1}{4}$, Section 14, T7N, R45W

Unnamed Pit – SE $\frac{1}{4}$ NE $\frac{1}{4}$ NE $\frac{1}{4}$, Section 13, T7N, R45W

T7N, R44W

Unnamed Pit – NE $\frac{1}{4}$ NW $\frac{1}{4}$ NW $\frac{1}{4}$ of this tract.

Unnamed Pit – NE $\frac{1}{4}$ SW $\frac{1}{4}$ NE $\frac{1}{4}$, Section 15, T7N, R44W

Unnamed Pit – NE $\frac{1}{4}$ SE $\frac{1}{4}$ NE $\frac{1}{4}$, Section 15, T7N, R44W

Unnamed Pit – SW $\frac{1}{2}$ SE $\frac{1}{4}$ NW $\frac{1}{4}$, Section 14, T7N, R44W

Unnamed Pit – NW $\frac{1}{4}$ NW $\frac{1}{4}$ NE $\frac{1}{4}$, Section 24, T7N, R44W

Unnamed Pit – SW $\frac{1}{2}$ NE $\frac{1}{4}$ NE $\frac{1}{4}$, Section 24 T7N, R44W

T7N, R43W

Unnamed Pit – SE $\frac{1}{4}$ SE $\frac{1}{4}$ NW $\frac{1}{4}$, Section 20, T7N, R43W

Unnamed Pit – N $\frac{1}{2}$ NW $\frac{1}{4}$ SE $\frac{1}{4}$, Section 20, T7N, R43W

The above twelve sand and gravel pits, located in T7N, R43-45W, are point bars associated with the South Fork of Frenchman Creek located north of this tract.

Identified Sand and Gravel Resources:

Urbanization and agricultural crops that cover the bedrock entirely occupy the surface land in this tract except where the South Fork of Frenchman Creek crosses the northern half from west to east. The underlying sediments consist primarily of silt and sand (Loess) of which approximately one third is covered by eolian dune deposits and is interpreted to contain low industrial mineral value. Quality deposits of sand, gravel, and aggregate have been deposited in the northern half of this tract where the South Fork of Frenchman Creek crosses and deposits several well-developed sandbars and point-bars along its meandering path. Detailed geologic maps showing the distribution of these alluvial deposits on the state tract are not available, but using geomorphological features obtained from the 1:50,000 scale Phillips County topographic map, an estimate of their areal extent has been made.

Identified resources of 790 thousand tons of sand and gravel of unknown quality cover an aggregate of 33 acres in this tract. Calculations in all cases are based upon volume to tonnage conversion factor of 18 cubic feet/ton (111-lbs./cubic foot) for sand and gravel. A breakdown of the sand and gravel resources present in each of the locales is presented below:

Unnamed Sand and Gravel Prospect along a tributary of Frenchman Creek

Present day flood plain deposits: Section 24 - 33 acres

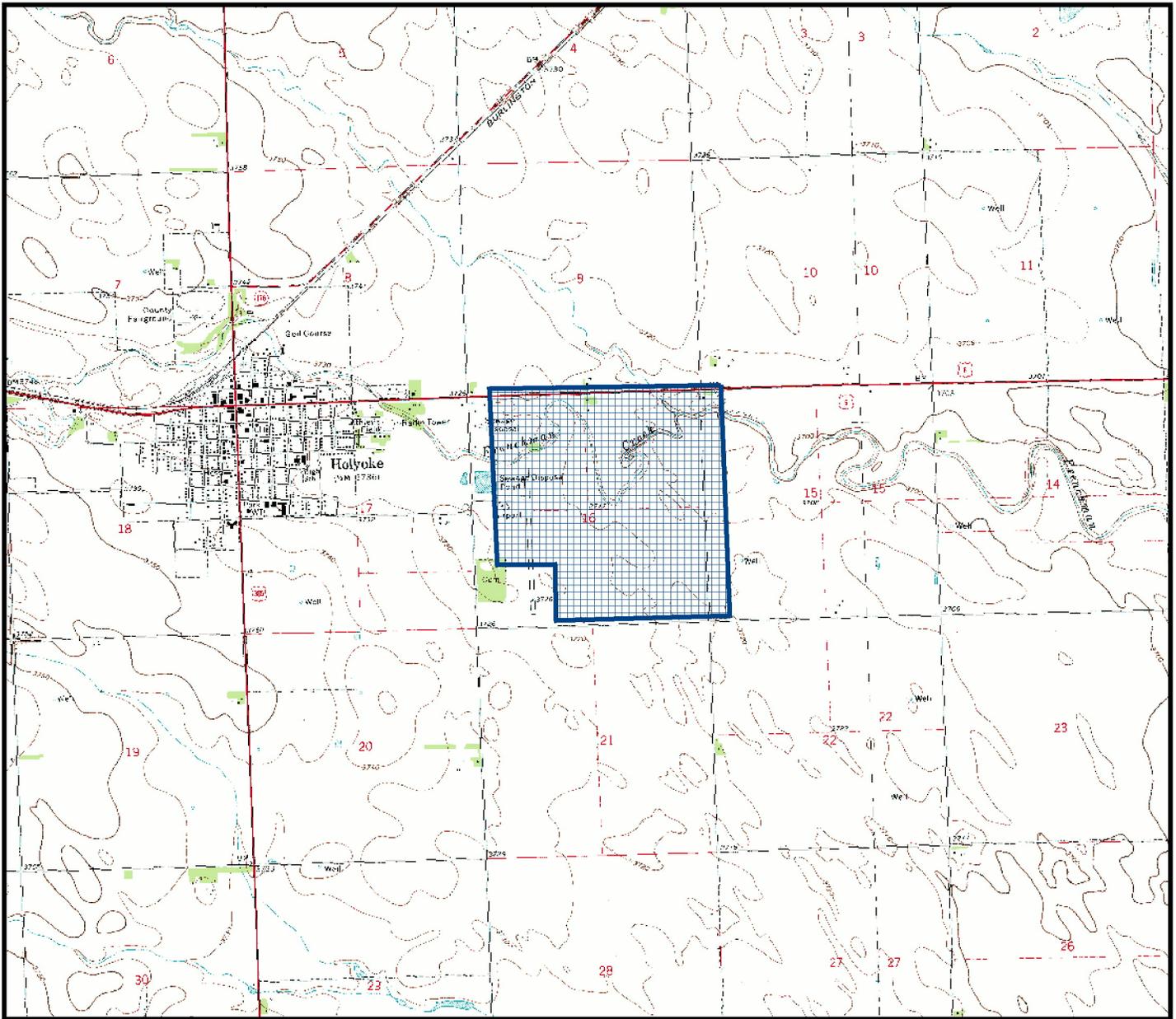
(1.4 million sq. ft.) X 10 ft. thick/ 18 cubic feet/ton = 790 thousand tons of sand and gravel.

REFERENCES:

Lawson, A. D., 1998, Active Permitted Mine Operations in Colorado, 1996-97, Colorado Geological Survey, Department of Natural Resources, Denver Colorado, Information Series 45, 58 p.

Schwochow, S.D., 1981, Inventory of non-metallic mining and processing operations in Colorado, Colorado Geological Survey, Department of Natural Resources, Denver Colorado, Map Series 17

Scott, G. R., 1978, Map showing Geology, structure, and oil and gas fields in the Sterling 1° X2° Quadrangle, Colorado, Nebraska, and Kansas, US Geological Survey Miscellaneous Investigation Series I-1092

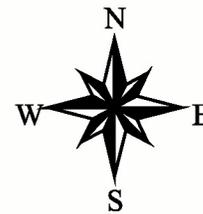


95-23

Location: T. 7 N, R. 44 W
Section: 16
Approximate total acreage - 640



 *Mineral acreage evaluated*

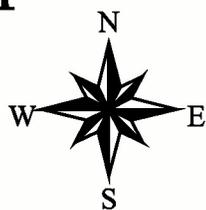


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Geologic Map for 95-23

Location: T. 7 N, R. 44 W
Section: 16
Approximate total acreage - 640



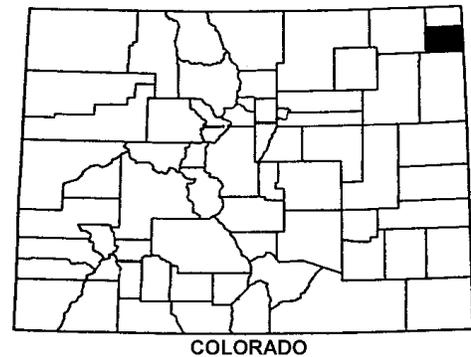
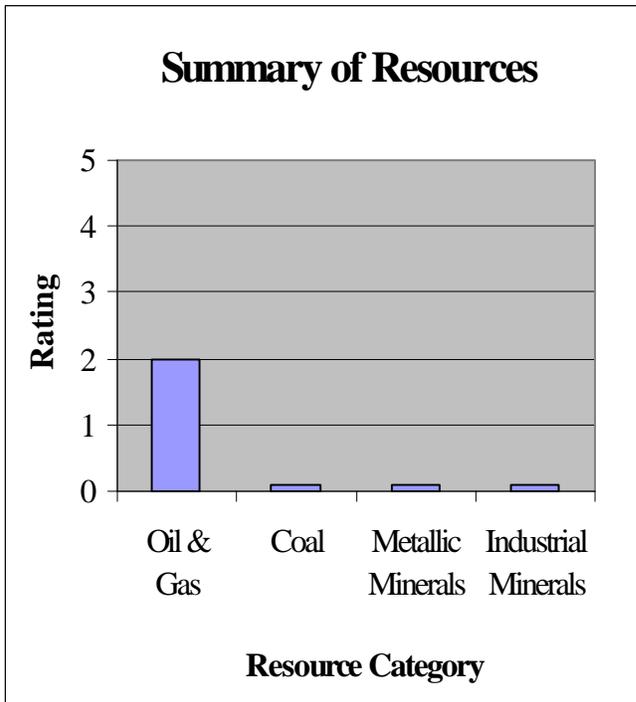
 *Mineral acreage evaluated*

Qp - Peoria loess (Pleistocene) Slightly clayey yellowish brown, sandy, blocky, non-stratified wind-blown calcareous-silt and sand.

Qes - Eolian Sand (Holocene/Pleistocene) Pale yellowish brown well-sorted wind blown sand.

1:43500

STATE LANDBOARD MINERAL INVENTORY



TRACT IDENTIFIER : #95-24

COUNTY: Phillips

LOCATION: T.7N., R.44W., Section 36

APPROXIMATE ACREAGE: 320 acres

QUADRANGLE NAME(S): Amherst SW

OVERVIEW OF GEOLOGY:

This State land tract is located on the open plains in northeastern Colorado. The surface topography is relatively flat and the bedrock geology is poorly exposed. Extensive dry land and irrigated farmland development masks most outcrops. The few visible outcrops in this area consist of wind blown sand deposits of the Pleistocene Peoria Loess and Eolian Dune deposits. The surface bedrock in this tract consists of clayey yellowish-brown, sandy, blocky, non-stratified wind blown calcareous-silts and sands of the Peoria Loess. These Pleistocene glacial deposits overly unconformably the Tertiary Ogallala Formation.

OIL AND GAS RESOURCES:

No oil or gas resources have been established on this tract. The essential elements, which include reservoir, trap, and source rocks with the appropriate timing of generation of migration, do exist in the sedimentary rocks in this area. However existing geological control is insufficient to determine the presence of a reservoir and trap.

COAL RESOURCES:

There are no coal measures in any of the sedimentary units in this tract.

METALLIC MINERAL RESOURCES:

There are no metallic mineral resources in this tract.

INDUSTRIAL MINERALS AND CONSTRUCTION MATERIALS RESOURCES:

Area Inactive Sand and Gravel Pits:

T7N, R44W

Unnamed Pit - NE ¼ NW ¼ NW ¼, Section 16, T7N, R44W

Unnamed Pits – one in the SW ¼ NE ¼ and one in the SE ¼ NE ¼, Section 15, T7N, R44W

Unnamed Pit – SW ½ SE ¼ NW ¼, Section 14, T7N, R44W

Unnamed Pits – one in the NW¼ and one in the SW ¼ of the NW ¼ NE ¼, Section 24, T7N, R44W

T7N, R43W

Unnamed Pits – one in the SE ¼ NW ¼ and one in the NW ¼ SE ¼ Section 20, T7N, R43W

Unnamed Pit – NW½ SE ¼ NW ¼, Section 27, T7N, R43W

The above nine sand and gravel pits, located in T7N, R43-44W, are point bars associated with the South Fork of Frenchman Creek located north of this tract.

Sand and Gravel Resources

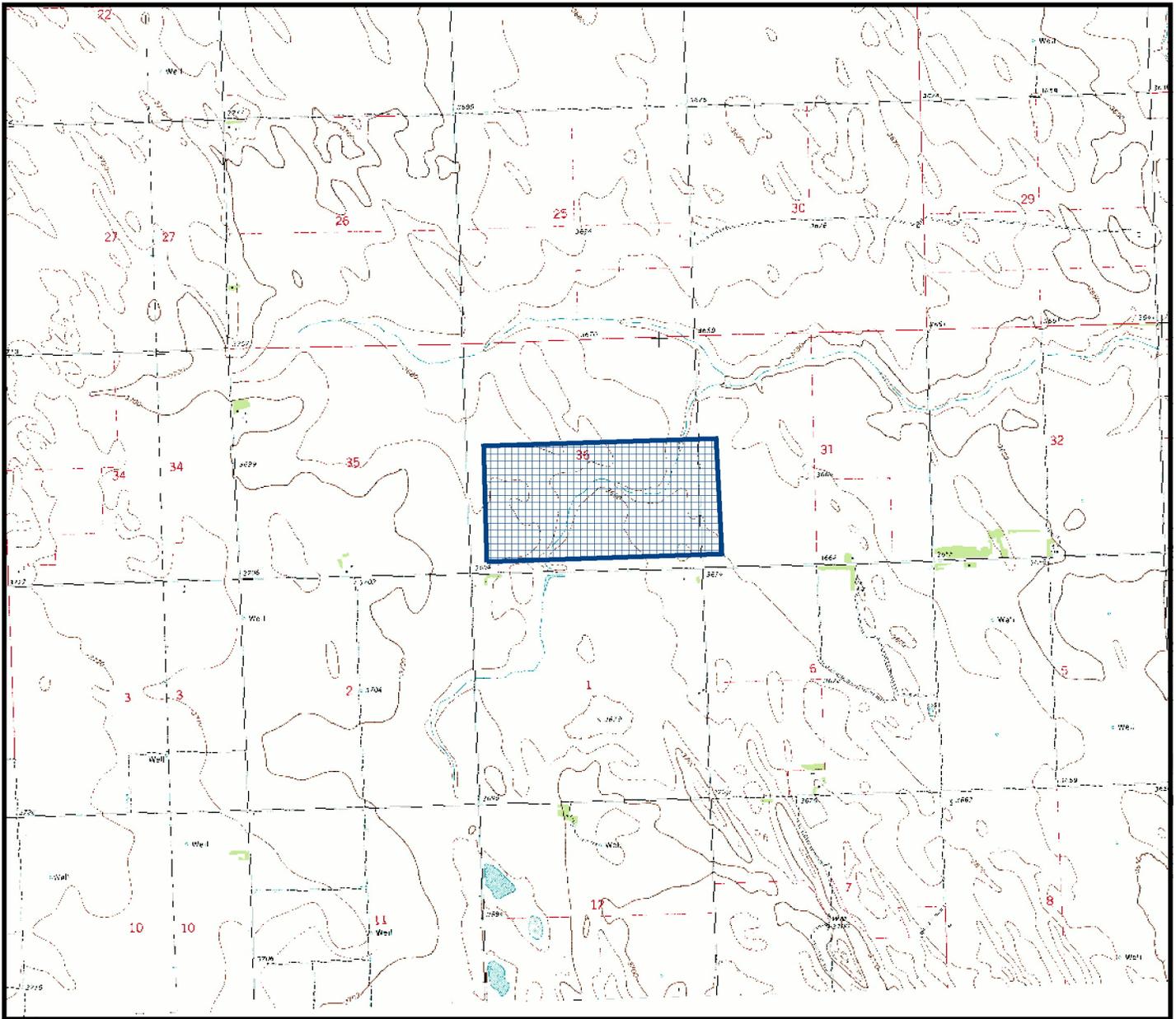
Agricultural crops that cover the bedrock occupy the surface land in this tract along with an intermittent tributary, which drains northeast into the South Fork of Frenchman Creek. The underlying sediments consist primarily of calcareous wind blown silt and sand (Loess), which is interpreted to contain low industrial mineral resources. The northeast flowing tributary may have associated sandbars, but the industrial mineral resource is rated low because of its intermittent occurrence.

REFERENCES:

Lawson, A. D., 1998, Active Permitted Mine Operations in Colorado, 1996-97, Colorado Geological Survey, Department of Natural Resources, Denver Colorado, Information Series 45, 58 p.

Schwochow, S.D., 1981, Inventory of non-metallic mining and processing operations in Colorado, Colorado Geological Survey, Department of Natural Resources, Denver Colorado, Map Series 17

Scott, G. R., 1978, Map showing Geology, structure, and oil and gas fields in the Sterling 1° x2° Quadrangle, Colorado, Nebraska, and Kansas, US Geological Survey Miscellaneous Investigation Series I-1092

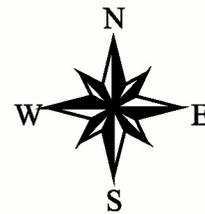


95-24

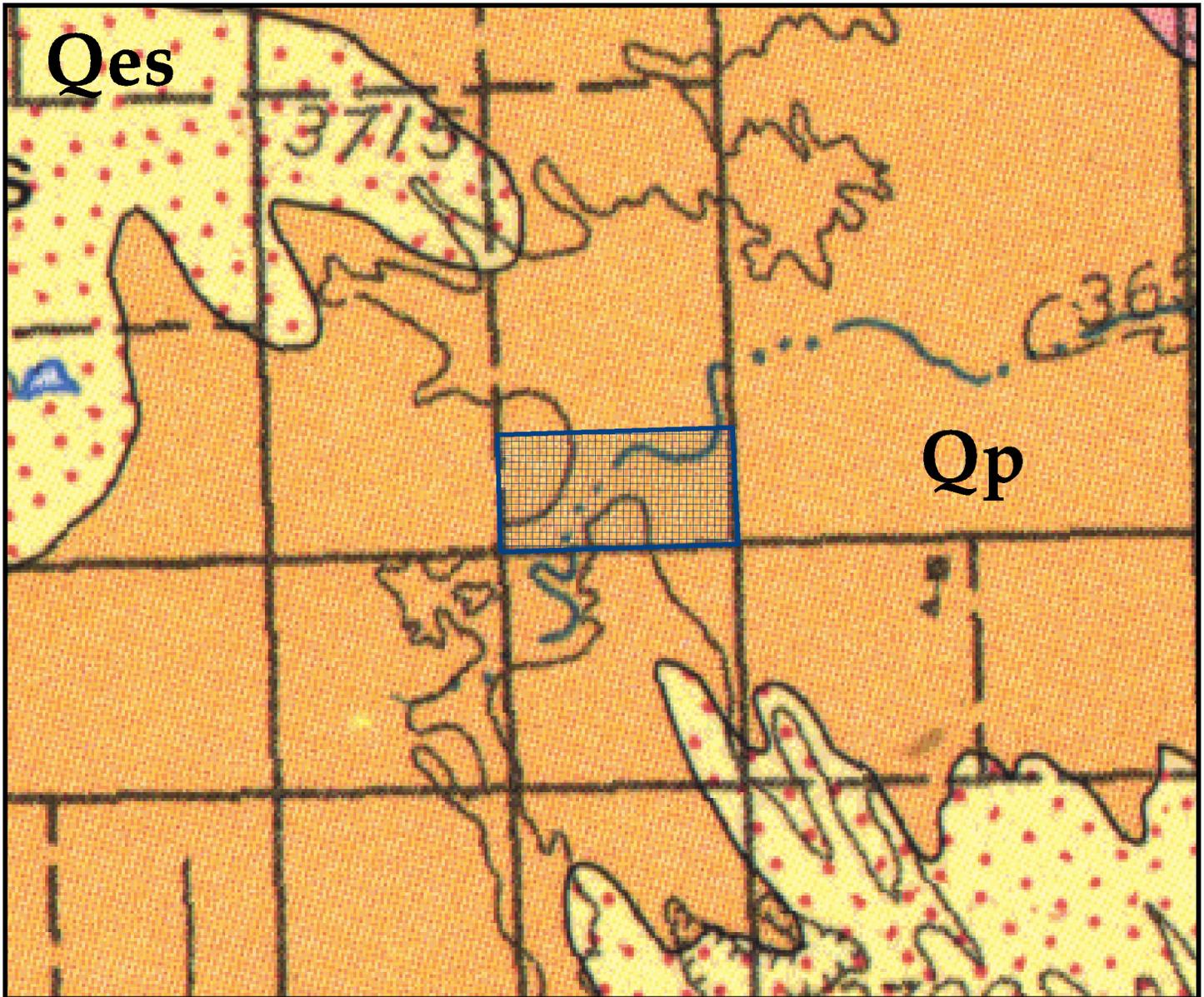
Location: T. 7 N, R. 44 W
Section: 36
Approximate total acreage - 320



 *Mineral acreage evaluated*



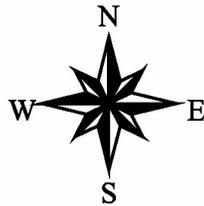
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Geologic Map for 95-24

 *Mineral acreage evaluated*

Location: T. 7 N, R. 44 W
Section: 36
Approximate total acreage - 320



0 1 2 Miles

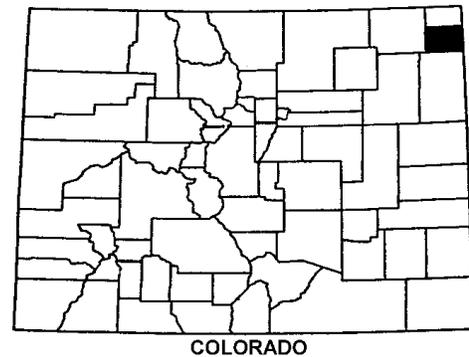
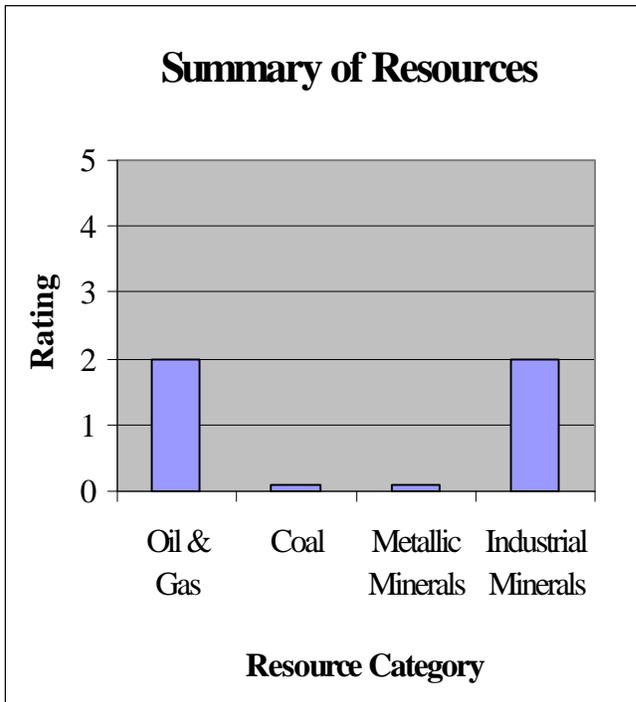


Qp - Peoria loess (Pleistocene) Slightly clayey yellowish brown, sandy, blocky, non-stratified wind-blown calcareous-silt and sand.

Qes - Eolian Sand (Holocene/Pleistocene) Pale yellowish brown well-sorted wind blown sand.

1:43500

STATE LANDBOARD MINERAL INVENTORY



TRACT IDENTIFIER: #95-25

COUNTY: Phillips

LOCATION: T.7N., R.43W., Section 16

APPROXIMATE ACREAGE: 640 acres

QUADRANGLE NAME(S): Amherst SW

OVERVIEW OF GEOLOGY:

This State land tract is located on the open plains in northeastern Colorado. The surface topography is relatively flat and the bedrock geology is poorly exposed. Extensive dry land and irrigated farmland development masks most outcrops. The few visible outcrops in this area consist of wind blown sand and calcareous silt deposits of the Pleistocene Peoria Loess. These deposits unconformably overly the Miocene Ogallala Formation, which crops out over much of the northeast part of the state and consist of red pale dense pisolitic caliche layers or limestone brecciated and recemented forming a cap rock at the surface. Below the cap rock, the sediments consist of semi-consolidated ashy sand and silt beds and volcanic ash beds. The closest outcrop is approximately $\frac{1}{4}$ to $\frac{1}{2}$ mile southwest and east of this tract.

OIL AND GAS RESOURCES:

No oil or gas resources have been established on this tract. The essential elements, which include reservoir, trap, and source rocks with the appropriate timing of generation of migration, do exist in the sedimentary rocks in this area. However existing geological control is insufficient to determine the presence of a trap.

COAL RESOURCES:

There are no coal measures in any of the sedimentary units in this tract.

METALLIC MINERAL RESOURCES:

There are no metallic mineral resources in this tract.

INDUSTRIAL MINERALS AND CONSTRUCTION MATERIALS RESOURCES:

Area Inactive Sand and Gravel Pits:

T7N, R44W

Unnamed Pits – one in the SW ¼ NE ¼ and one in the SE ¼ NE ¼, Section 15, T7N, R44W

Unnamed Pit – sand and gravel prospect – SW ½ SE ¼ NW ¼, Section 14, T7N, R44W

Unnamed Pits – one in the NW¼ and one in the SW ¼ of the NW ¼ NE ¼, Section 24, T7N, R44W

T7N, R43W

Unnamed Pits – one in the SE ¼ NW ¼ and one in the NW ¼ SE ¼ Section 20, T7N, R43W

Unnamed Pit – NW½ SE ¼ NW ¼, Section 27, T7N, R43W

T7N, R42W

Unnamed Pit – SE½ NE ¼ NW ¼, Section 31, T7N,

The above nine sand and gravel pits, located in T7N, R42-44W, are point bars associated with the South Fork of Frenchman Creek located south of this tract.

Sand and Gravel Resources:

Agricultural crops that cover the bedrock entirely occupy the surface land in this tract.

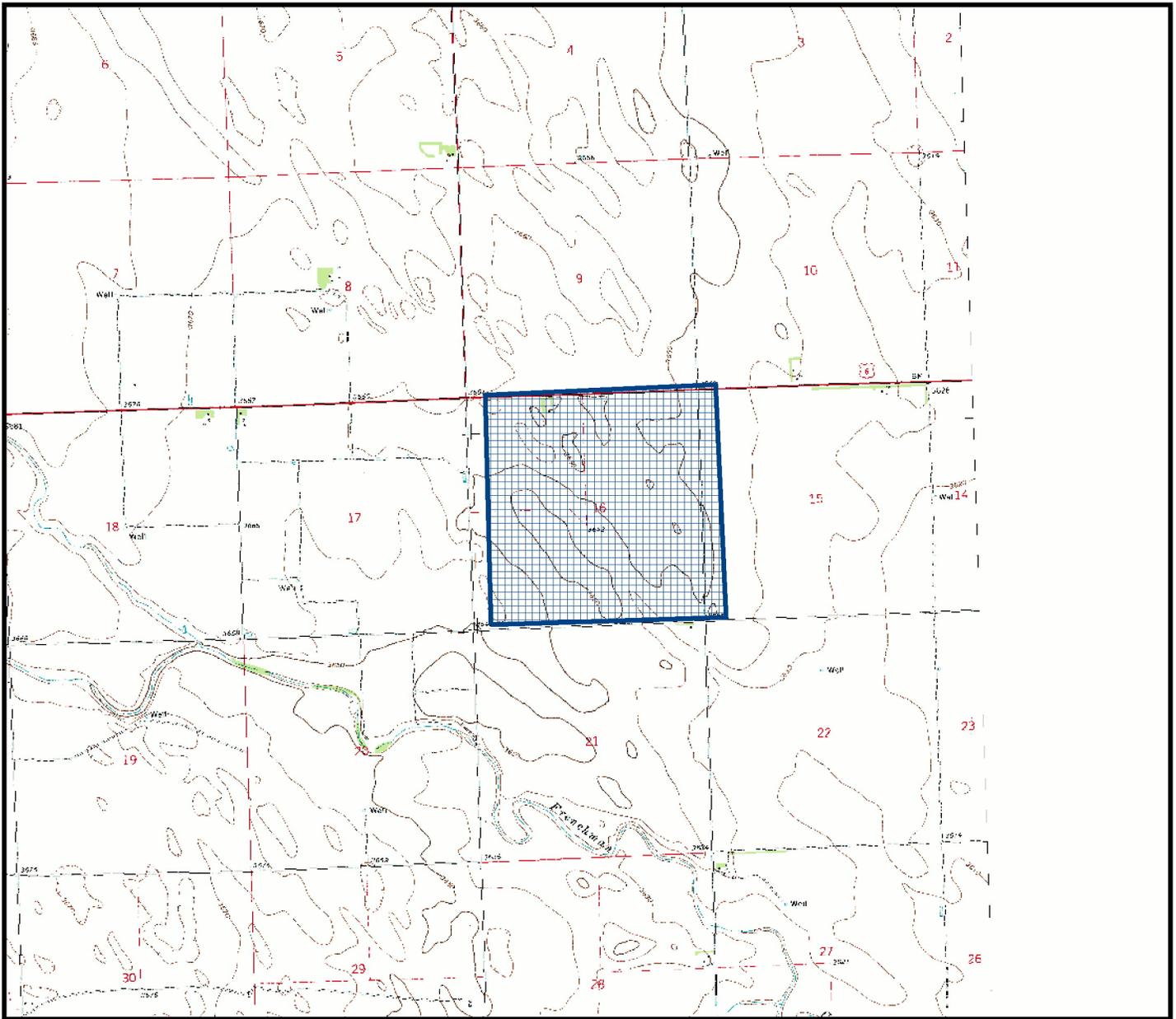
The underlying sediments consist primarily of buff colored calcareous wind blown silt and sand (Loess), which is interpreted to contain low industrial mineral value.

REFERENCES:

Lawson, A. D., 1998, Active Permitted Mine Operations in Colorado, 1996-97, Colorado Geological Survey, Department of Natural Resources, Denver Colorado, Information Series 45, 58 p.

Schwochow, S.D., 1981, Inventory of non-metallic mining and processing operations in Colorado, Colorado Geological Survey, Department of Natural Resources, Denver Colorado, Map Series 17

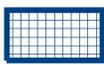
Scott, G. R., 1978, Map showing Geology, structure, and oil and gas fields in the Sterling 1° x2° Quadrangle, Colorado, Nebraska, and Kansas, US Geological Survey Miscellaneous Investigation Series I-1092

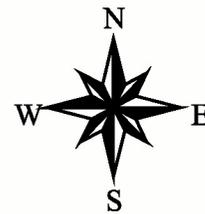


95-25

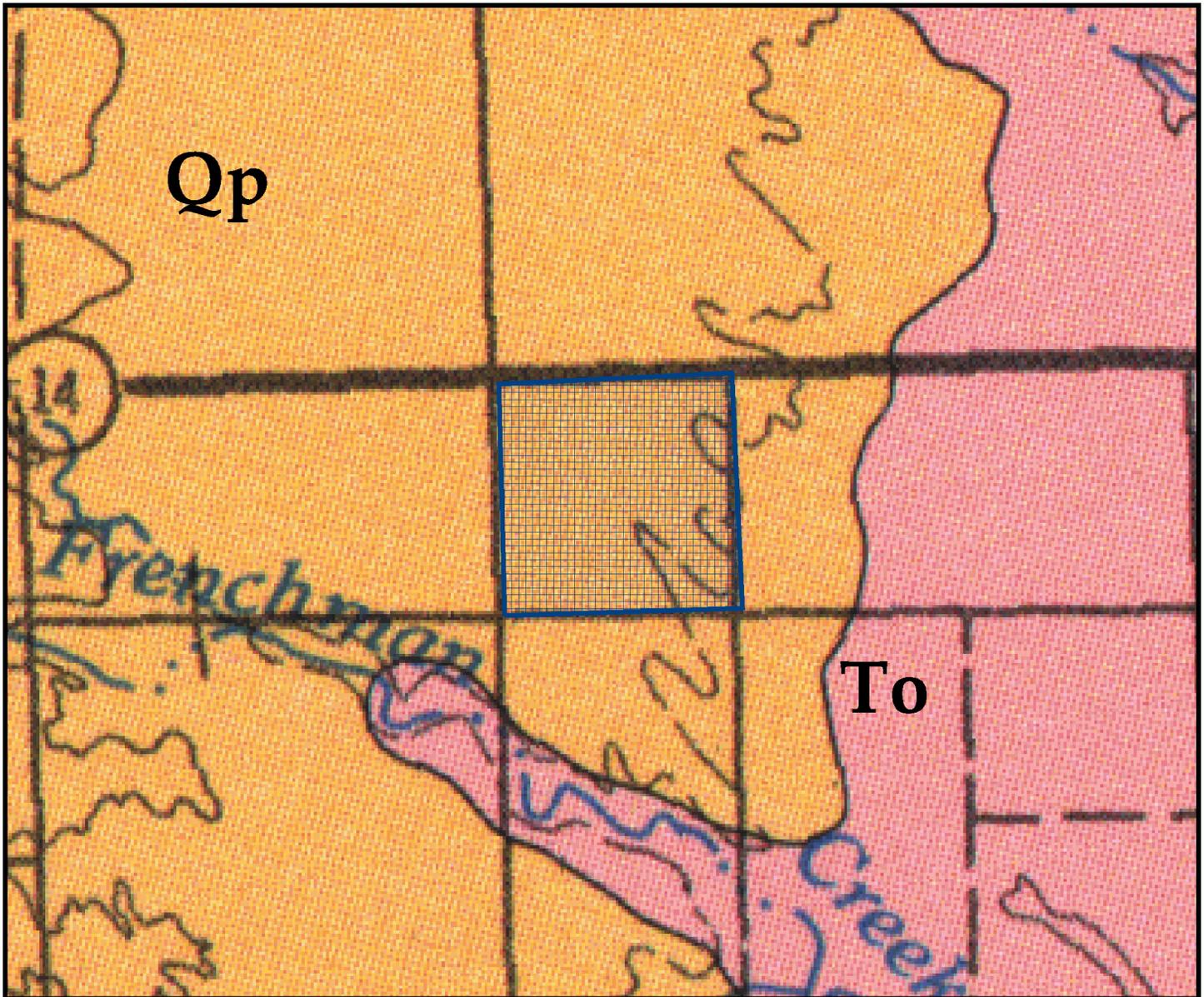
Location: T. 7 N, R. 43 W
Section: 16
Approximate total acreage - 640



 Mineral acreage evaluated



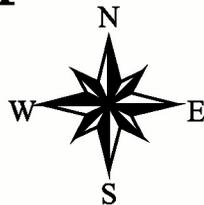
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Geologic Map for 95-25

 *Mineral acreage evaluated*

Location: T. 7 N, R. 43 W
Section: 16
Approximate total acreage - 640



0 1 2 Miles

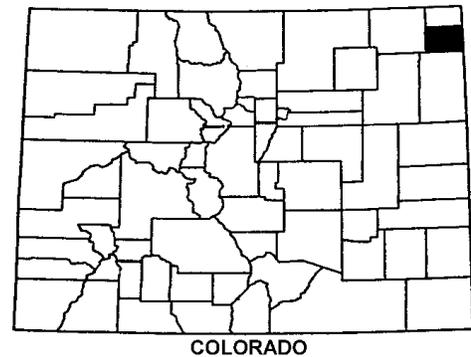
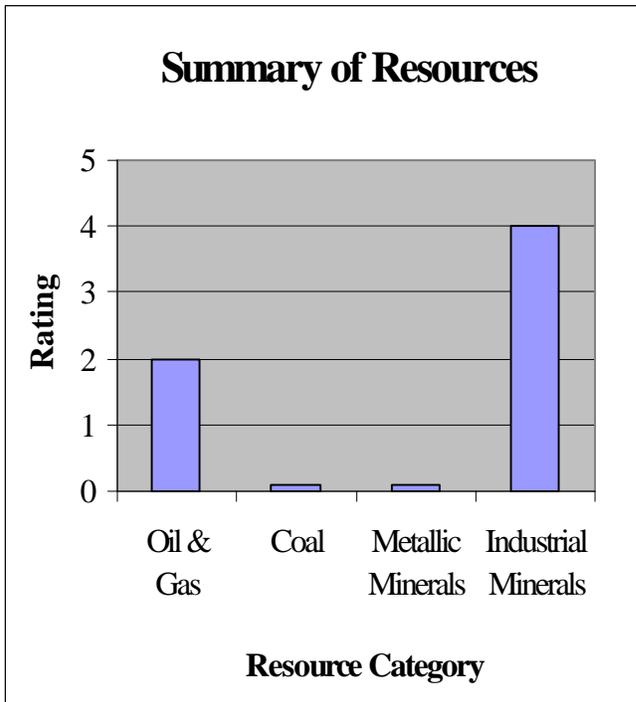


Qp - Peoria loess (Pleistocene) Slightly clayey yellowish brown, sandy, blocky, non-stratified wind-blown calcareous-silt and sand.

To - Ogallala Formation (Miocene) Fluvial deposits of grayish orange-pink ash, pebbly sand and silt capped by pale-red dense pisolitic caliche layers and brecciated limestone.

1:43500

STATE LANDBOARD MINERAL INVENTORY



TRACT IDENTIFIER : #95-26

COUNTY: Phillips

LOCATION: T.7 N., R.43 W., Section 36

APPROXIMATE ACREAGE: 640 acres

QUADRANGLE NAME(S): Amherst SE

OVERVIEW OF GEOLOGY:

This State land tract is located on the open plains in northeastern Colorado. The surface topography is relatively flat and the bedrock geology is poorly exposed. Extensive dry land and irrigated farmland development masks most outcrops. Visible outcrops in the area consist of fluvial deposits of Miocene Ogallala Formation overlain by Pleistocene Eolian Dune deposits. These deposits generally consist of grayish orange-pink ash; pebbly sand and silt capped by pale-red dense pisolitic caliche layers and brecciated limestone forming a cap rock at the surface. The Pleistocene dunes are pale yellowish-brown well sorted and wind blown.

OIL AND GAS RESOURCES:

No oil or gas resources have been established on this tract. The essential elements, which include reservoir, trap, and source rocks with the appropriate timing of generation of migration, do exist in the sedimentary rocks in this area. However existing geological control is insufficient to determine the presence of a reservoir and trap.

COAL RESOURCES:

There are no coal measures in any of the sedimentary units in this tract.

METALLIC MINERAL RESOURCES:

There are no metallic mineral resources in this tract.

INDUSTRIAL MINERALS AND CONSTRUCTION MATERIALS RESOURCES:

Area Inactive Sand and Gravel Pits:

T7N, R43W

Unnamed Pits— one in the SE ¼ NW ¼ and one in the NW ¼ SE ¼ Section 20, T7N, R43W

Unnamed Pit – NW½ SE ¼ NW ¼, Section 27, T7N, R43W

T7N, R42W

Unnamed Pit – SE½ NE ¼ NW ¼, Section 31, T7N, R42W

Identified Sand and Gravel Resources:

Quality deposits of sand, gravel, and aggregate exist along Frenchman Creek in the north half of this tract. Several well-developed sandbars and point-bars are deposited along its meandering path. Detailed geologic maps showing the distribution of these alluvial deposits on the state tract are not available, but using geomorphological features obtained from the 1:50,000 scale Phillips County topographic map, an estimate of their areal extent has been made.

Identified resources of 1.04 million tons of sand and gravel of unknown quality cover an aggregate of 43 acres in this tract. Calculations in all cases are based upon volume to tonnage conversion factor of 18 cubic feet/ton (111-lbs./cubic foot) for sand and gravel. A breakdown of the sand and gravel resource is presented below:

Unnamed Sand and Gravel Prospect along a tributary of Frenchman Creek

Present day flood plain deposits: Section 24 – 43 acres

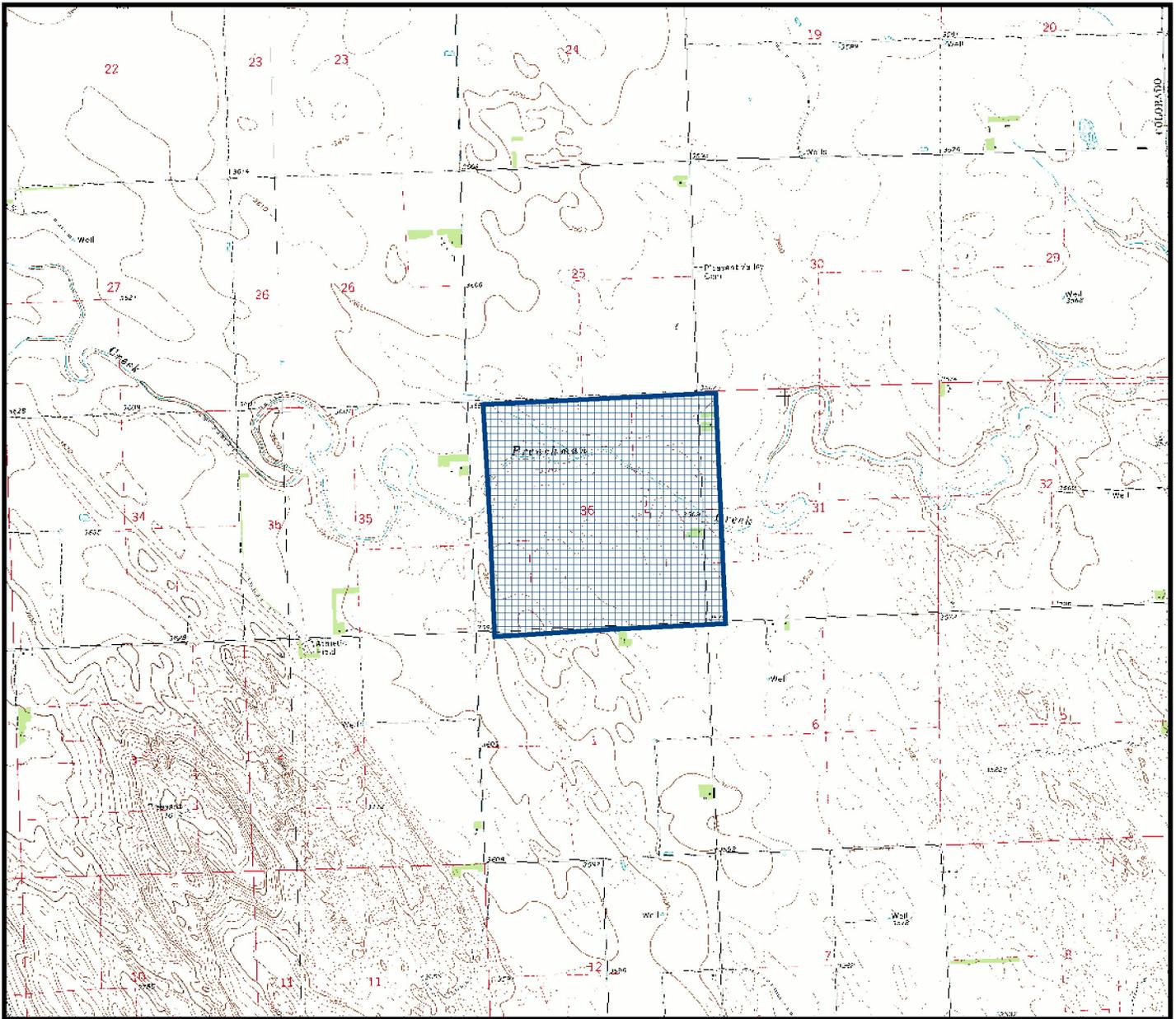
(1.9 million sq. ft.) X 10 ft. thick/ 18 cubic feet/ton = 1.04 million tons of sand and gravel.

REFERENCES:

Lawson, A. D., 1998, Active Permitted Mine Operations in Colorado, 1996-97, Colorado Geological Survey, Department of Natural Resources, Denver Colorado, Information Series 45, 58 p.

Schwochow, S.D., 1981, Inventory of non-metallic mining and processing operations in Colorado, Colorado Geological Survey, Department of Natural Resources, Denver Colorado, Map Series 17

Scott, G. R., 1978, Map showing Geology, structure, and oil and gas fields in the Sterling 1° x2° Quadrangle, Colorado, Nebraska, and Kansas, US Geological Survey Miscellaneous Investigation Series I-1092

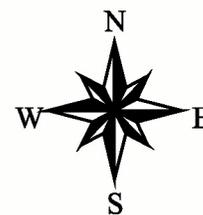


95-26

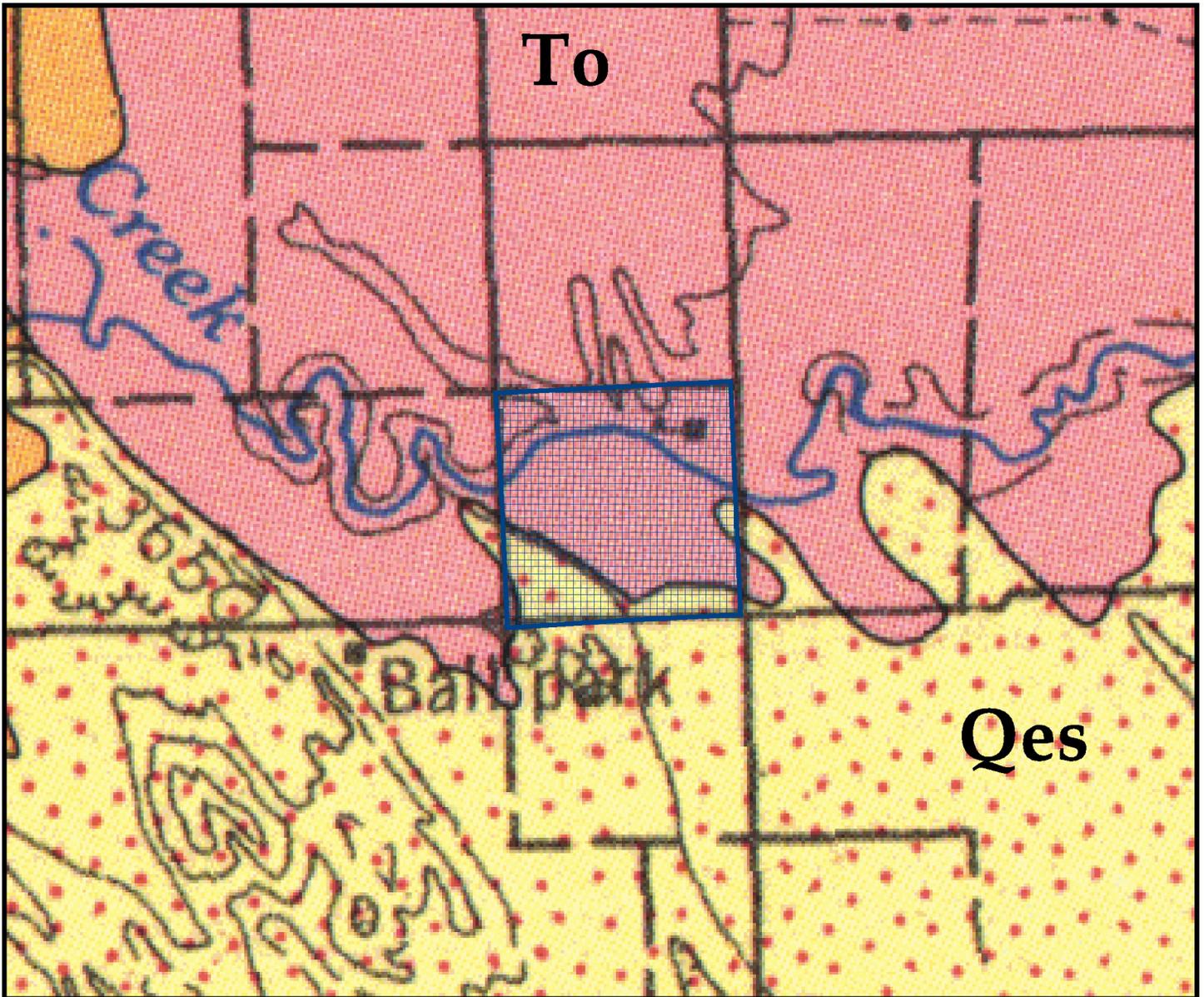
Location: T. 7 N, R. 43 W
Section: 36
Approximate total acreage - 640



 Mineral acreage evaluated

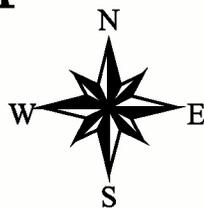


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Geologic Map for 95-26

Location: T. 7 N, R. 43 W
 Section: 36
 Approximate total acreage - 640



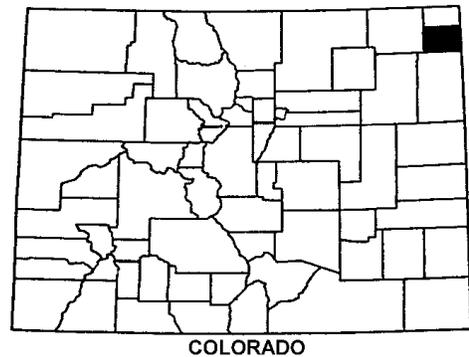
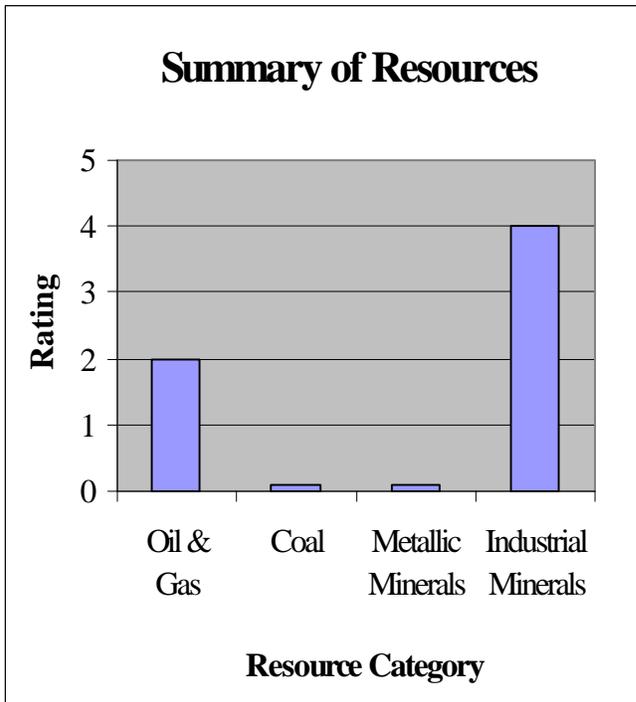
 *Mineral acreage evaluated*

To - Ogallala Formation (Miocene) Fluvial deposits of grayish orange-pink ash, pebbly sand and silt capped by pale-red dense pisolitic caliche layers and brecciated limestone.

Qes - Eolian Sand (Holocene/Pleistocene) Pale yellowish brown well-sorted wind blown sand.

1:43500

STATE LANDBOARD MINERAL INVENTORY



TRACT IDENTIFIER: #95-27

COUNTY: Phillips

LOCATION: T.6 N., R.47 W., Section 16

APPROXIMATE ACREAGE: 640 acres

QUADRANGLE NAME(S):Clarkville, Clarkville NE

BEDROCK GEOLOGY:

This State land tract is located on the open plains in northeastern Colorado. The surface topography is relatively flat and the bedrock geology is poorly exposed. Extensive dry land and irrigated farmland development masks most outcrops. Visible outcrops in the area consist of fluvial deposits of Miocene Ogallala Formation cropping out south of the South Platte River. These deposits generally consist of grayish orange-pink ash; pebbly sand and silt capped by pale-red dense pisolitic caliche layers and brecciated limestone forming a cap rock at the surface. The Pleistocene Peoria Loess overlies the Ogallala Formation, but not in the area of this State Land Tract.

OIL AND GAS RESOURCES:

One exploratory well has been drilled on this tract. No production was established and no indications of oil or gas were observed and recorded from any of the overlying horizons. The SD Johnson -State #1 well was drilled in the SE ¼ of this tract to a depth of 3,910 feet to test the Dakota J sand. The well was plugged and abandoned in 1953. Two of the essential elements, which include reservoir and source rocks with the appropriate timing of generation of migration, do exist in the sedimentary rocks in this area. A trapping element may still exist in the northwest half of this tract in the Cretaceous Niobrara Formation.

COAL RESOURCES:

There are no coal measures in any of the sedimentary units in this tract.

METALLIC MINERAL RESOURCES:

There are no metallic mineral resources in this tract.

INDUSTRIAL MINERALS AND CONSTRUCTION MATERIALS RESOURCES:

Area Active Sand and Gravel Permitted Mines:

T7N, R47 W

Kurtzer Gravel Pit - sand, gravel, and aggregate – SW ¼ SW ¼ NE ¼, Section 22, T7N, R47W – Located approximately 4½ miles north of this tract.

L&L Ready Mix Gravel Pit - sand, gravel, and aggregate – SW ¼ NW ¼ NW ¼, Section 24, T7N, R47W – Located approximately 5 miles northeast of this tract.

Cunningham Pit - sand, gravel, and aggregate - L&L Ready Mix – NE ¼ NW ¼ SE ¼, Section 25, T7N, R47W – Located approximately 4 miles north of this tract.

Identified Sand and Gravel Resources:

Quality deposits of sand, gravel, and aggregate are exist along Patent Creek, which crosses this tract from west to east in the north half of this tract. Several well-developed sandbars and point-bars are deposited along its meandering path. Detailed geologic maps showing the distribution of these alluvial deposits on the state tract are not available, but using geomorphological features obtained from the 1:50,000 scale Phillips County topographic map, an estimate of their areal extent has been made.

Identified resources of 2.4 million tons of sand and gravel of unknown quality cover an aggregate of 99 acres in this tract. Calculations in all cases are based upon volume to tonnage conversion factor of 18 cubic feet/ton (111-lbs./cubic foot) for sand and gravel. A breakdown of the sand and gravel resources is presented below:

Unnamed Sand and Gravel Prospect along Patent Creek

Present day flood plain deposits: Section 24 - 99 acres

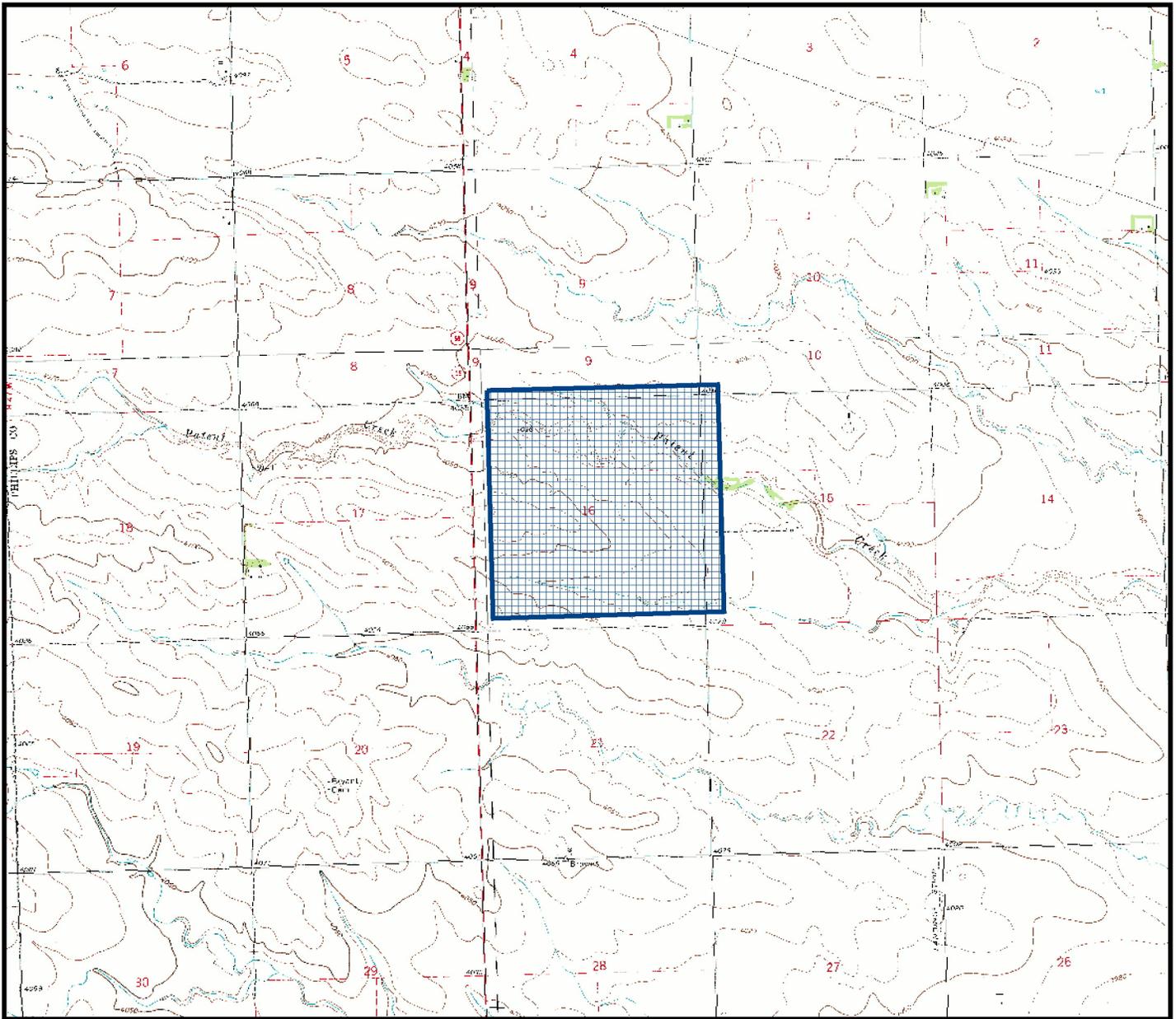
4.3 million sq. ft.) X 10 ft. thick/ 18 cubic feet/ton = 2.4 million tons of sand and gravel.

REFERENCES:

Lawson, A. D., 1998, Active Permitted Mine Operations in Colorado, 1996-97, Colorado Geological Survey, Department of Natural Resources, Denver Colorado, Information Series 45, 58 p.

Schwochow, S.D., 1981, Inventory of non-metallic mining and processing operations in Colorado, Colorado Geological Survey, Department of Natural Resources, Denver Colorado, Map Series 17

Scott, G. R., 1978, Map showing Geology, structure, and oil and gas fields in the Sterling 1° x2° Quadrangle, Colorado, Nebraska, and Kansas, US Geological Survey Miscellaneous Investigation Series I-1092

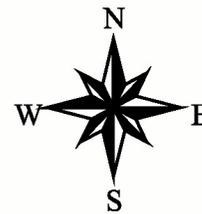


95-27

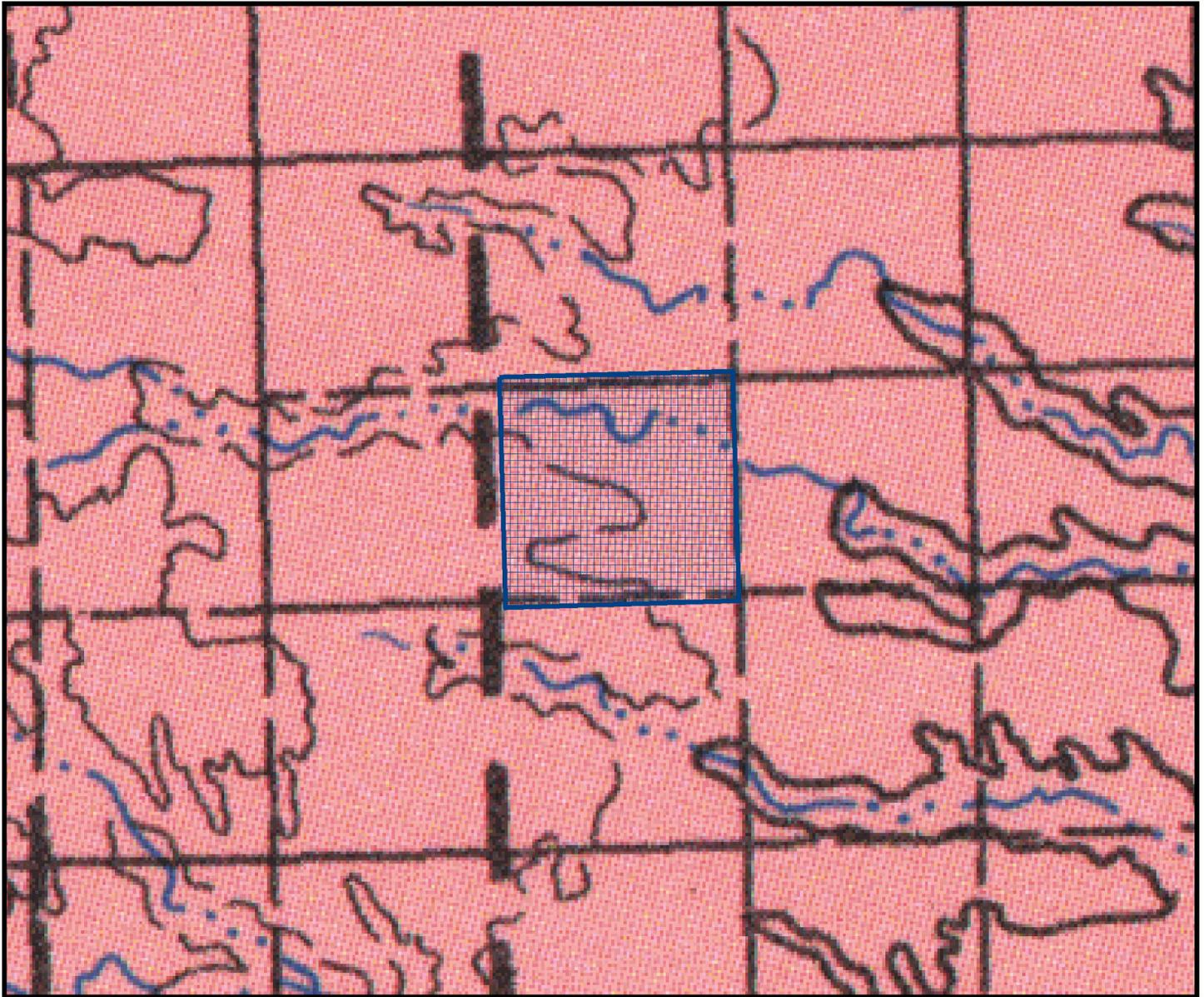
Location: T. 6 N, R. 47 W
Section: 16
Approximate total acreage - 640



 Mineral acreage evaluated



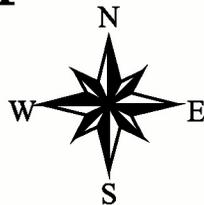
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Geologic Map for 95-27

 *Mineral acreage evaluated*

Location: T. 6 N, R. 47 W
Section: 16
Approximate total acreage - 640



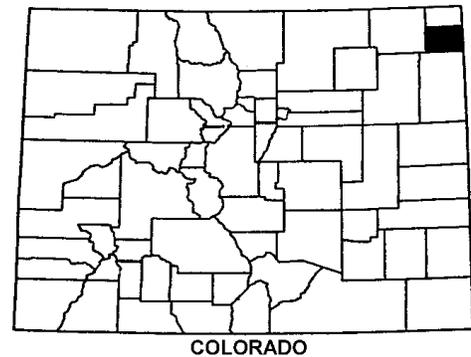
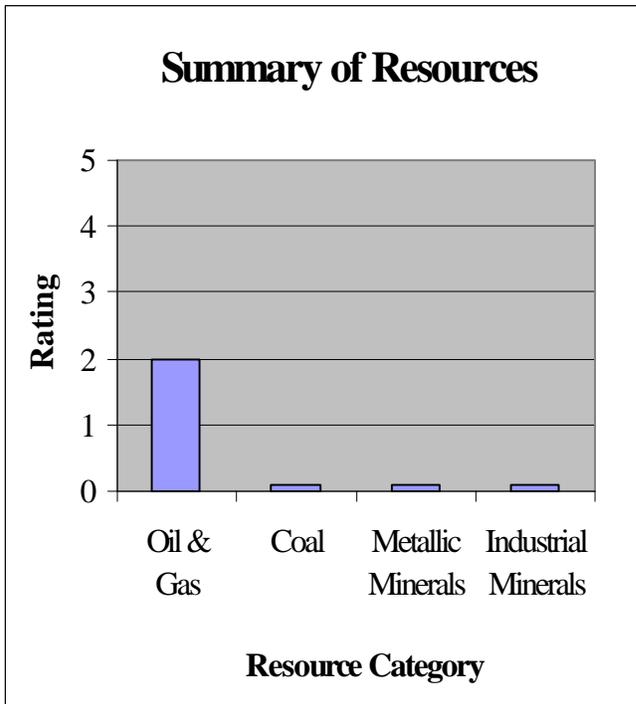
0 1 2 Miles



To - Ogallala Formation (Miocene) Fluvial deposits of grayish orange-pink ash, pebbly sand and silt capped by pale-red dense pisolitic caliche layers and brecciated limestone.

1:43500

STATE LANDBOARD MINERAL INVENTORY



TRACT IDENTIFIER : #95-28

COUNTY: Phillips

LOCATION: T.6 N., R.47 W., Section 36

APPROXIMATE ACREAGE: 640 acres

QUADRANGLE NAME(S): Clarkville, Clarkville NE

OVERVIEW OF GEOLOGY:

This State land tract is located on the open plains in northeastern Colorado. The surface topography is relatively flat and the bedrock geology is poorly exposed. Extensive dry land and irrigated farmland development masks most outcrops. Visible outcrops in the area consist of fluvial deposits of Miocene Ogallala Formation cropping out south of the South Platte River. These deposits generally consist of grayish orange-pink ash; pebbly sand and silt capped by pale-red dense pisolitic caliche layers and brecciated limestone forming a cap rock at the surface. The Pleistocene Peoria Loess overlies the Ogallala Formation, but not in the area of this State Land Tract.

OIL AND GAS RESOURCES:

No exploratory wells, establishing oil or gas resources, have been drilled on this tract as of this date. The essential elements, which include reservoir, trap, and source rocks with the appropriate timing of generation of migration, do exist in the sedimentary rocks in this area. One exploratory well was drilled east of and within a mile of this tract. The Burlington Northern Inc-Bailey #33 well was drilled in the SE ¼ of Section 31, T6N R46W to a depth of 3,800 feet to test the Cretaceous Dakota J Sand. No production was established and no indications of oil or gas were observed and recorded from any of the overlying horizons. The well was plugged and abandoned in 1979.

COAL RESOURCES:

There are no coal measures in any of the sedimentary units in this tract.

METALLIC MINERAL RESOURCES:

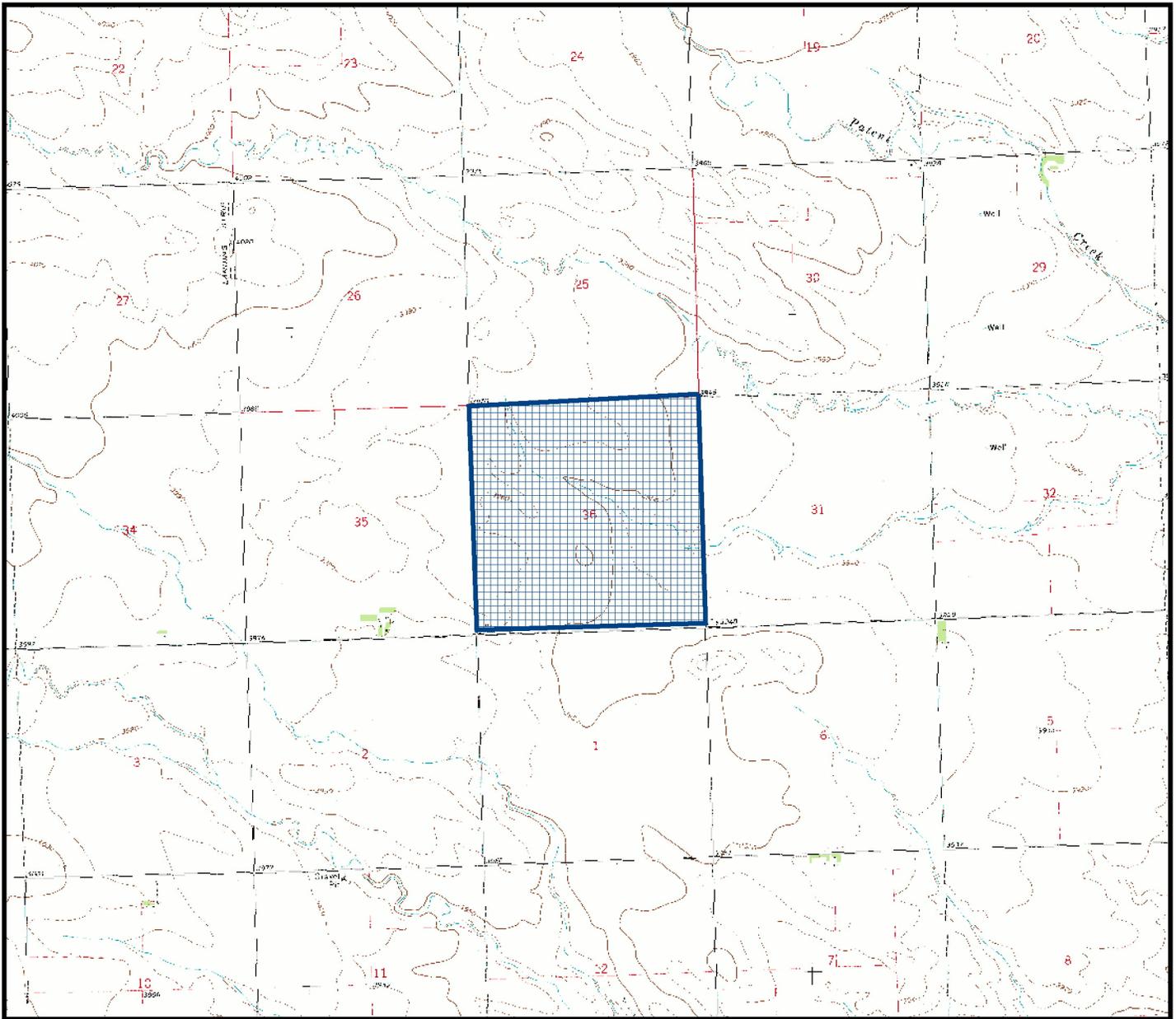
There are no metallic mineral resources in this tract.

INDUSTRIAL MINERALS AND CONSTRUCTION MATERIALS RESOURCES:

The surface bedrock consists primarily of fluvial deposits of ash, silt, pebbly sand, and capped with caliche. It is interpreted as containing low industrial mineral resources unless reworked by streams or creeks. One small-unnamed creek crosses the tract in a southeast direction. The creek bed may contain sand deposits, but does not appear to meander sufficiently to deposit point-bars. This tract is located in an area of farming and lacks the necessary water volumes in the creeks to erode, transport, and deposit commercial volumes of industrial type minerals or construction materials.

REFERENCES:

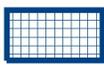
Scott, G. R., 1978, Map showing Geology, structure, and oil and gas fields in the Sterling 1° X2° Quadrangle, Colorado, Nebraska, and Kansas, US Geological Survey Miscellaneous Investigation Series I-1092

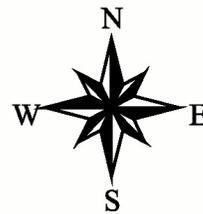


95-28

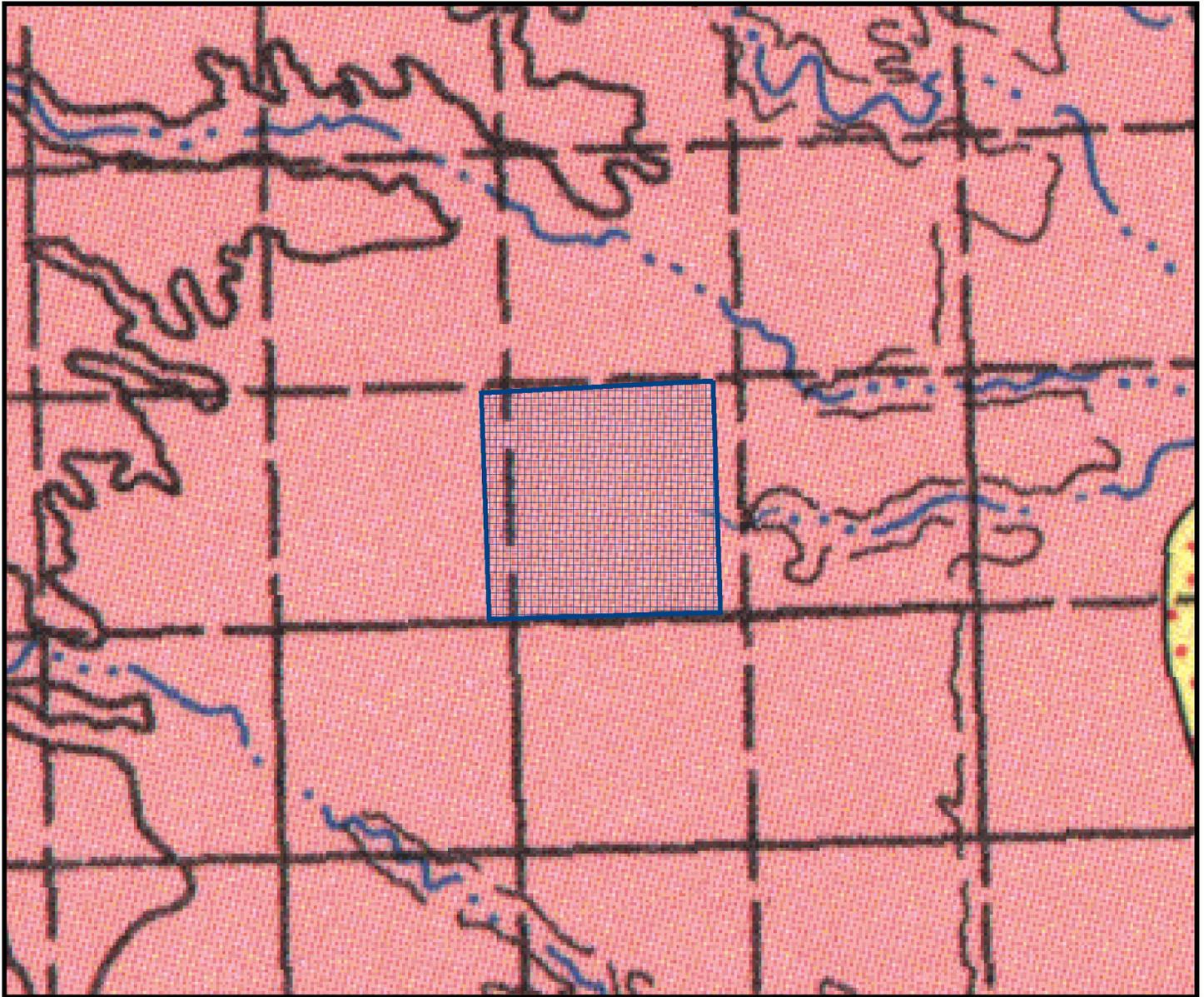
Location: T. 6 N, R. 47 W
Section: 36
Approximate total acreage - 640



 Mineral acreage evaluated

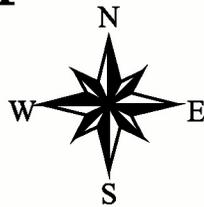


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Geologic Map for 95-28

 *Mineral acreage evaluated*



Location: T. 6 N, R. 47 W

Section: 36

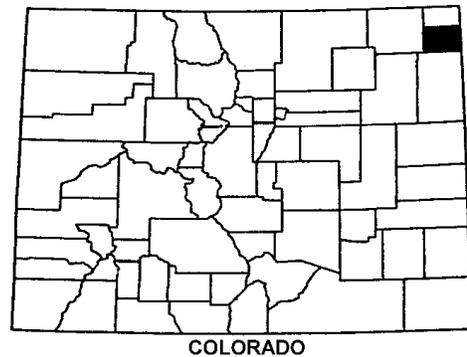
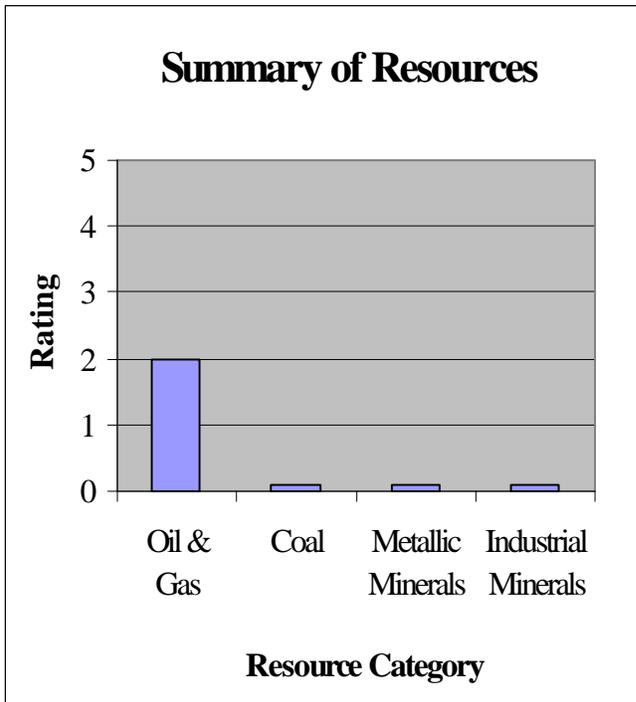
Approximate total acreage - 640



To - Ogallala Formation (Miocene) Fluvial deposits of grayish orange-pink ash, pebbly sand and silt capped by pale-red dense pisolitic caliche layers and brecciated limestone.

1:43500

STATE LANDBOARD MINERAL INVENTORY



TRACT IDENTIFIER : #95-29

COUNTY: Phillips

LOCATION: T.6 N., R. 46 W., Section 16

APPROXIMATE ACREAGE: 640 acres

QUADRANGLE NAME(S): Clarkville NE, Fiddler Peak

BEDROCK GEOLOGY:

This State land tract is located on the open plains in northeastern Colorado. The surface topography is relatively flat and the bedrock geology is poorly exposed. Extensive dry land and irrigated farmland development masks most outcrops. Visible outcrops in the area consist of fluvial deposits of Miocene Ogallala Formation cropping out south of the South Platte River. These deposits generally consist of grayish orange-pink ash; pebbly sand and silt capped by pale-red dense pisolitic caliche layers and brecciated limestone forming a cap rock at the surface. The Pleistocene Peoria Loess overlies the Ogallala Formation, but not in the area of this State Land Tract.

OIL AND GAS RESOURCES:

No exploratory wells, establishing oil or gas resources, have been drilled on this tract as of this date. The essential elements, which include reservoir, trap, and source rocks with the appropriate timing of generation of migration, do exist in the sedimentary rocks in this area. One exploratory well was drilled within a mile of this tract near the northwest corner. The C E Stout -Fiedler #1 well was drilled in the SW ¼ of Section 17, T6N R46W to a depth of 4,063 feet to test the Jurassic Morrison Formation. No production was established and no indications of oil or gas were observed and recorded from any of the overlying horizons. The well was plugged and abandoned in 1950.

COAL RESOURCES:

There are no coal measures in any of the sedimentary units in this tract.

METALLIC MINERAL RESOURCES:

There are no metallic mineral resources in this tract.

INDUSTRIAL MINERALS AND CONSTRUCTION MATERIALS RESOURCES:

Area Active Sand and Gravel Permitted Mines:

Cunningham Pit - sand, gravel, and aggregate - L&L Ready Mix – NE ¼ NW ¼ SE ¼, Section 25, T7N, R47W – Located approximately 4 ½ miles northwest of this tract.

Barkey Pit - sand, gravel, and aggregate – NE ¼ NW ¼ NW ¼, Section 33, T7N, R46W – Located approximately 3 miles north of this tract.

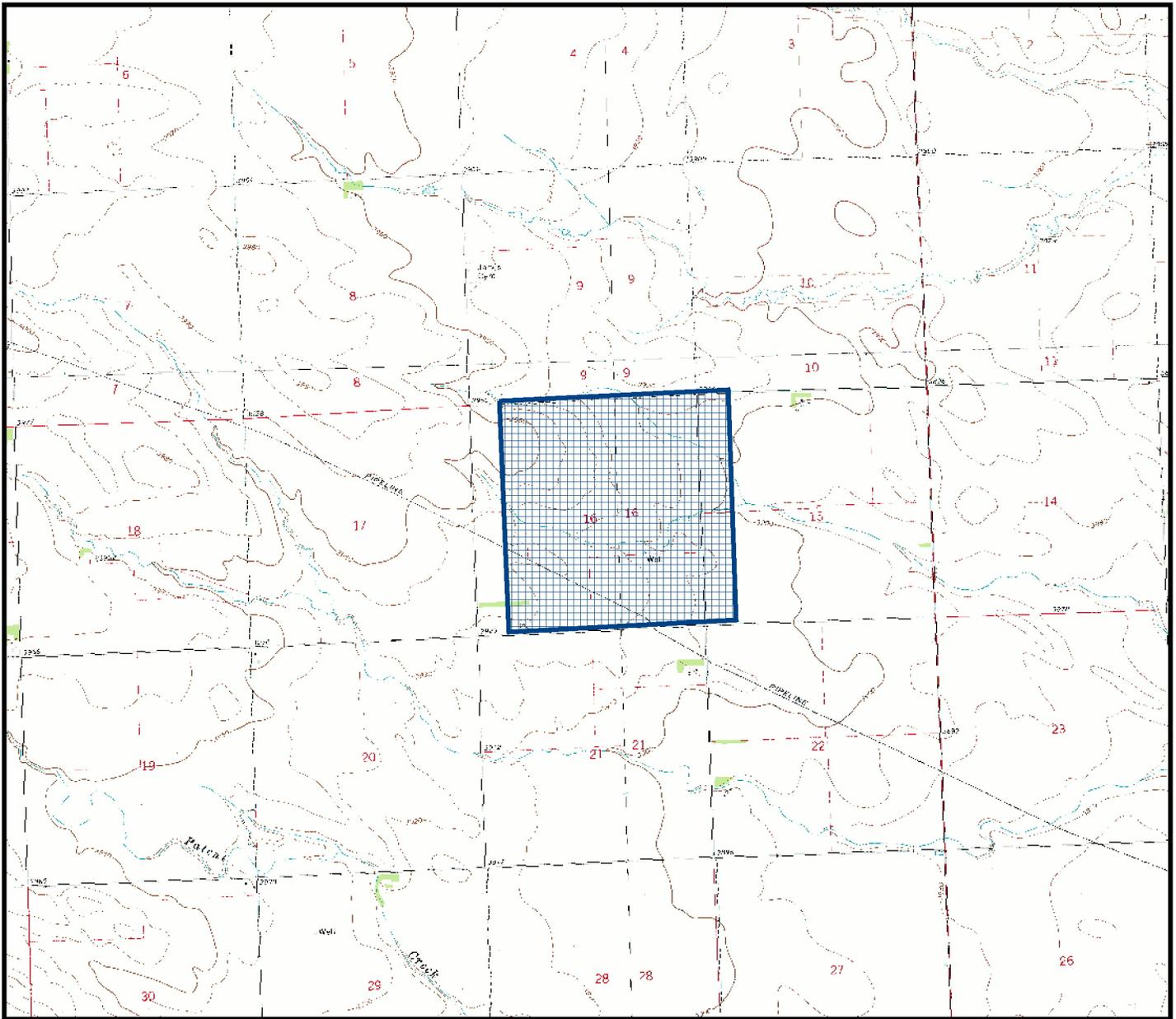
Sand and Gravel Resources:

The surface bedrock consists primarily of fluvial deposits of ash, silt, pebbly sand, and capped with caliche. It is interpreted as containing low industrial mineral resources unless reworked by streams or creeks. One small-unnamed creek crosses the tract from west to east. The creek bed may contain sand deposits, but does not appear to meander sufficiently to develop point-bars. This tract is located in an area of farming and lacks the necessary water volumes in the creeks to erode, transport, and deposit commercial volumes of industrial type minerals or construction materials.

REFERENCES:

Schwochow, S.D., 1981, Inventory of non-metallic mining and processing operations in Colorado, Colorado Geological Survey, Department of Natural Resources, Denver Colorado, Map Series 17

Scott, G. R., 1978, Map showing Geology, structure, and oil and gas fields in the Sterling 1° X2° Quadrangle, Colorado, Nebraska, and Kansas, US Geological Survey Miscellaneous Investigation Series I-1092

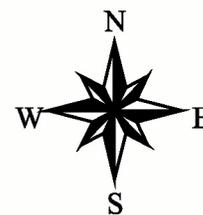


95-29

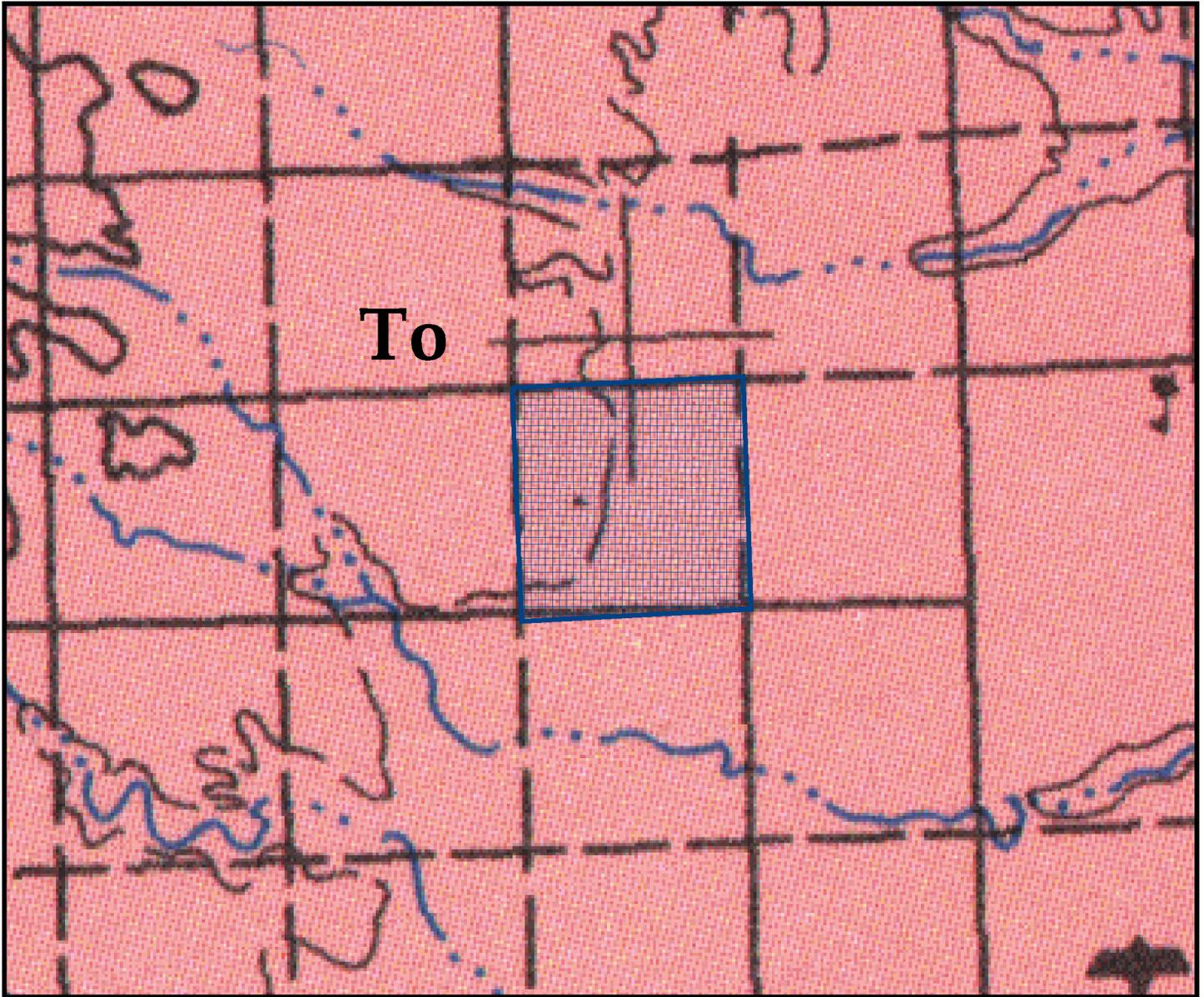
Location: T. 6 N, R. 46 W
Section: 16
Approximate total acreage - 640



 Mineral acreage evaluated

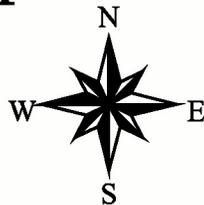


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Geologic Map for 95-29

 *Mineral acreage evaluated*



Location: T. 6 N, R. 46 W

Section: 16

Approximate total acreage - 640

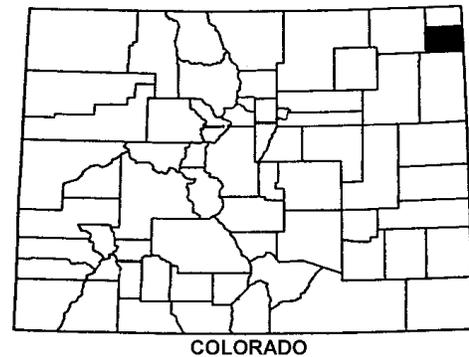
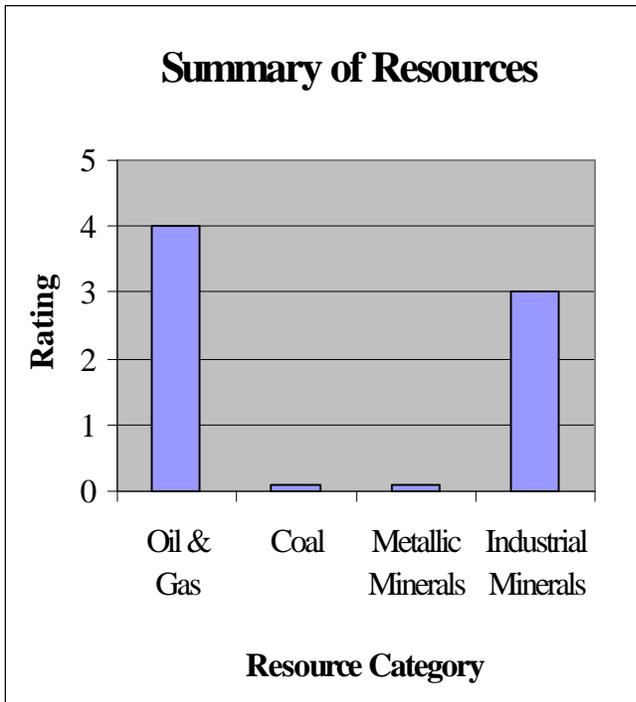
0 1 2 Miles



To - Ogallala Formation (Miocene) Fluvial deposits of grayish orange-pink ash, pebbly sand and silt capped by pale-red dense pisolitic caliche layers and brecciated limestone.

1:43500

STATE LANDBOARD MINERAL INVENTORY



TRACT IDENTIFIER: #95-30

COUNTY: Phillips

LOCATION: T.6N., R.46W. , Section 36

APPROXIMATE ACREAGE: 640 acres

QUADRANGLE NAME(S): Fiddler Peak

OVERVIEW OF GEOLOGY:

This State land tract is located on the open plains in northeastern Colorado. The surface topography is relatively flat and the bedrock geology is poorly exposed. Extensive dry land and irrigated farmland development masks most outcrops. Visible outcrops in the area consist of fluvial deposits of Miocene Ogallala Formation overlain by Pleistocene Eolian Dune deposits. These deposits generally consist of grayish orange-pink ash; pebbly sand and silt capped by pale-red dense pisolitic caliche layers and brecciated limestone forming a cap rock at the surface. The Pleistocene dunes are pale yellowish-brown well sorted and wind blown.

OIL AND GAS RESOURCES:

No exploratory wells, establishing oil or gas resources, have been drilled on this tract as of this date. Geological control strongly suggests that all of the essential elements, which include reservoir, trap, and source rocks with the appropriate timing of generation of migration, do exist in the sedimentary rocks in this area. The tract is located southeast of and adjacent to the Phuma Gas Field. Five wells have been drilled within a mile northwest and west of this tract penetrating formations down to the Cretaceous Dakota D sand. Two of the wells, the Canada Southern Oil – George Leonard #1 (T6N R46W, Sec.26) and the Caza Exploration – Nieman #1 (T6N R46W, Sec. 35), failed to establish production and were ultimately plugged and abandoned. As encouragement to the area the Nieman #1 well encountered oil staining in the Niobrara formation. Two additional wells were drilled by Mountain Petroleum in the area. The Lett #1 and Ferguson #1 were drilled in T6N R46W, sections 23 and 26 respectively. Both wells established gas production from the Smokey Hill Member of the Niobrara Formation extending the Phuma Gas Field two and one-half miles north into Phillips County (Fig. ____). The Lett #1 was completed with an initial flow of 147 Mcfd from 2620 ft.-2632 ft. in the Niobrara Chalk. Perforating and stimulating the well with a saltwater, sand, and nitrogen frac assisted in established production. The Ferguson #1 was completed with an initial flow of 128Mcf from 2614 ft.-2628 ft. in the same horizon. Perforating and stimulating the well with a saltwater and sand frac established production in this well.

COAL RESOURCES:

There are no coal measures in any of the sedimentary units in this tract.

METALLIC MINERAL RESOURCES:

There are no metallic mineral resources in this tract.

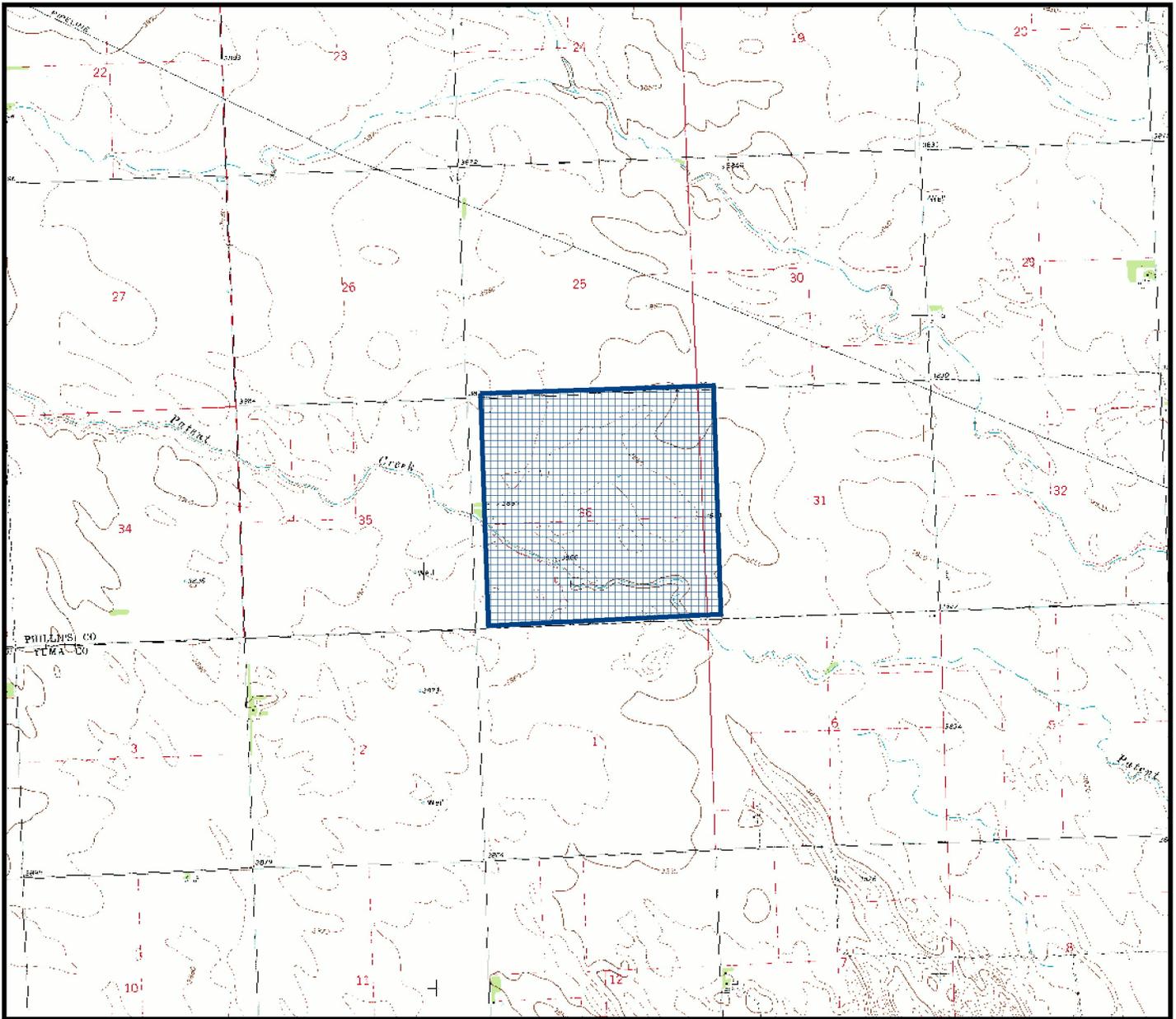
INDUSTRIAL MINERALS AND CONSTRUCTION MATERIALS RESOURCES:

This State tract is located in the south-central part of the County where Patent Creek separates large sand dune deposits to the south from farming to the north and west. The sub-surface bedrock consists primarily of fluvial deposits of ash, silt, pebbly sand, and capped with caliche overlain by eolian sand deposits in the southwest corner. Patent Creek crosses the tract in a southeast direction. It is one of several southeast flowing creeks to drain water, develop meanders, and deposit sediments in the southern part of this county during and after intermittent thunderstorms.

Patent Creek contains some well-developed sand, gravel, and aggregate associated with point-bars and sandbars along its drainage. But due to its proximity to urbanization, major highways, and towns, the source is considered secondary to industrial mineral resources found along Wildhorse and Frenchman creeks located in the central part of the county.

REFERENCES:

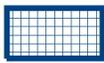
Scott, G. R., 1978, Map showing Geology, structure, and oil and gas fields in the Sterling 1° X2° Quadrangle, Colorado, Nebraska, and Kansas, US Geological Survey Miscellaneous Investigation Series I-1092

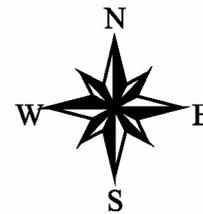


95-30

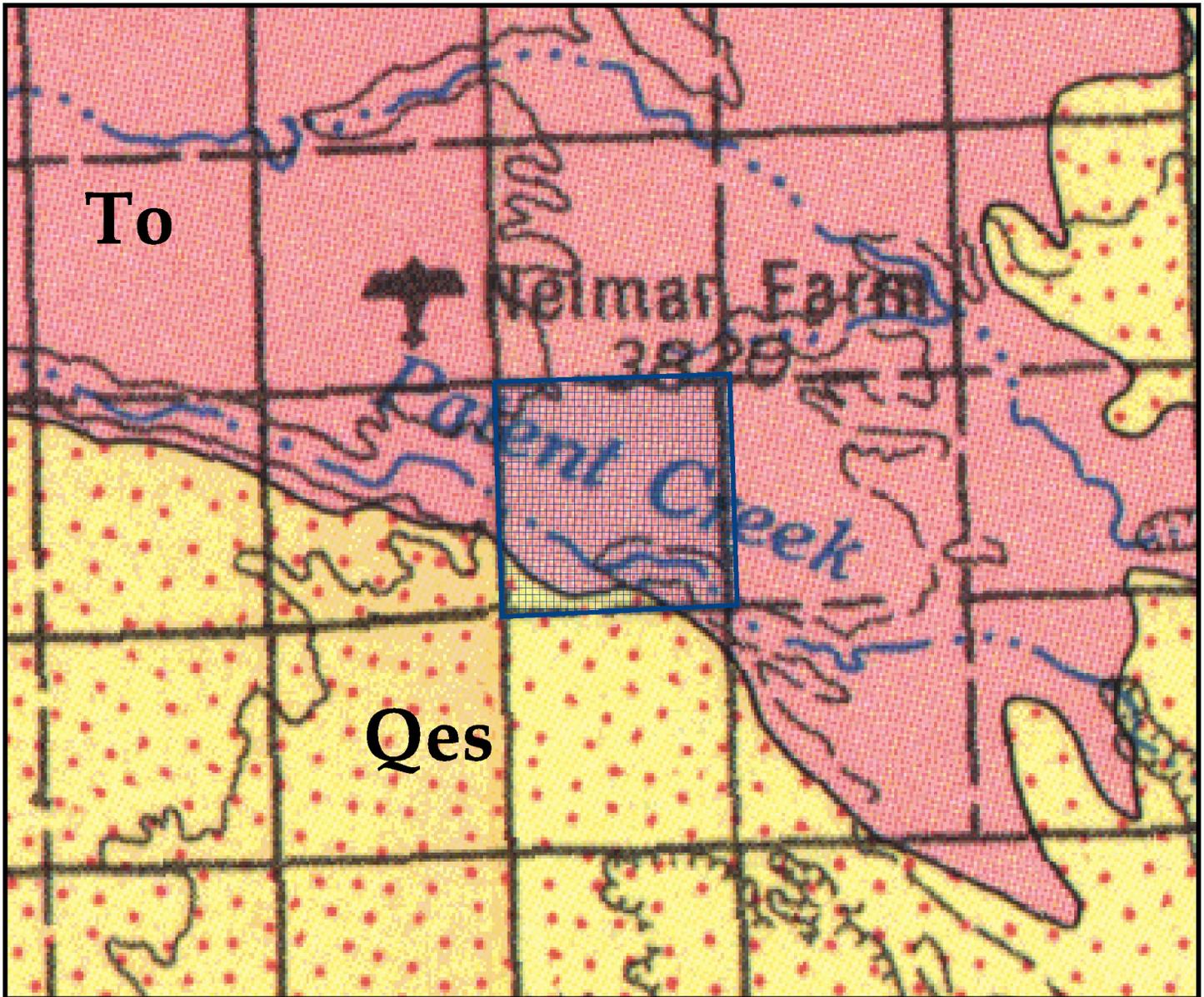
Location: T. 6 N, R. 46 W
Section: 36
Approximate total acreage - 640



 Mineral acreage evaluated



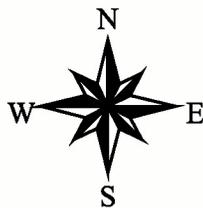
1:43500



Geologic Map for 95-30

 *Mineral acreage evaluated*

Location: T. 6 N, R. 46 W
Section: 36
Approximate total acreage - 640



0 1 2 Miles

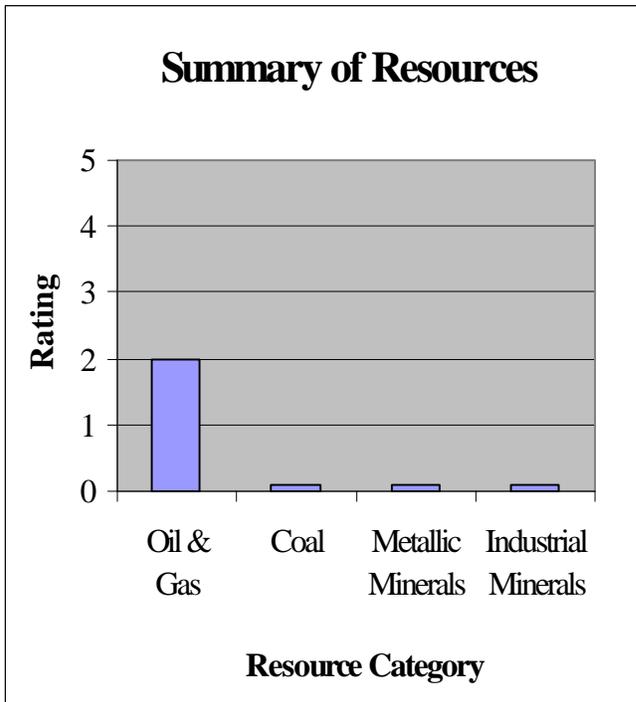


To - Ogallala Formation (Miocene) Fluvial deposits of grayish orange-pink ash, pebbly sand and silt capped by pale-red dense pisolitic caliche layers and brecciated limestone.

Qes - Eolian Sand (Holocene/Pleistocene) Pale yellowish brown well-sorted wind blown sand.

1:43500

STATE LANDBOARD MINERAL INVENTORY



TRACT IDENTIFIER : #95-31

COUNTY: Phillips

LOCATION: T.6 N., R.45 W., Section 16

APPROXIMATE ACREAGE: 640 acres

QUADRANGLE NAME(S): Fiddler Peak

OVERVIEW OF GEOLOGY:

This State land tract is located on the open plains in northeastern Colorado. The surface topography is relatively flat and the bedrock geology is poorly exposed. Extensive dry land and irrigated farmland development masks most outcrops. Visible outcrops in the area consist of fluvial deposits of Miocene Ogallala Formation overlain by Pleistocene Eolian Dune deposits. These deposits generally consist of grayish orange-pink ash; pebbly sand and silt capped by pale-red dense pisolitic caliche layers and brecciated limestone forming a cap rock at the surface. The Pleistocene dunes are pale yellowish-brown well sorted and wind blown.

OIL AND GAS RESOURCES:

No exploratory wells, establishing oil or gas resources, have been drilled on this tract as of this date. The essential elements, which include reservoir, trap, and source rocks with the appropriate timing of generation of migration, do exist in the sedimentary rocks in this area. One exploratory well was drilled west of and within a mile of this tract. The JW Operating -Colglazier #1 well was drilled in the NW ¼ of Section 17, T6N R43W to a depth of 2,615 feet to test the Cretaceous Niobrara Formation. No production was established and no indications of oil or gas were observed and recorded from any of the overlying horizons. The well was plugged and abandoned in 1978.

COAL RESOURCES:

There are no coal measures in any of the sedimentary units in this tract.

METALLIC MINERAL RESOURCES:

There are no metallic mineral resources in this tract.

INDUSTRIAL MINERALS AND CONSTRUCTION MATERIALS RESOURCES:

Area Inactive Sand and Gravel Pits:

Unnamed Pit – NW ¼ NW ¼, Sec. 9, T6N, R45W

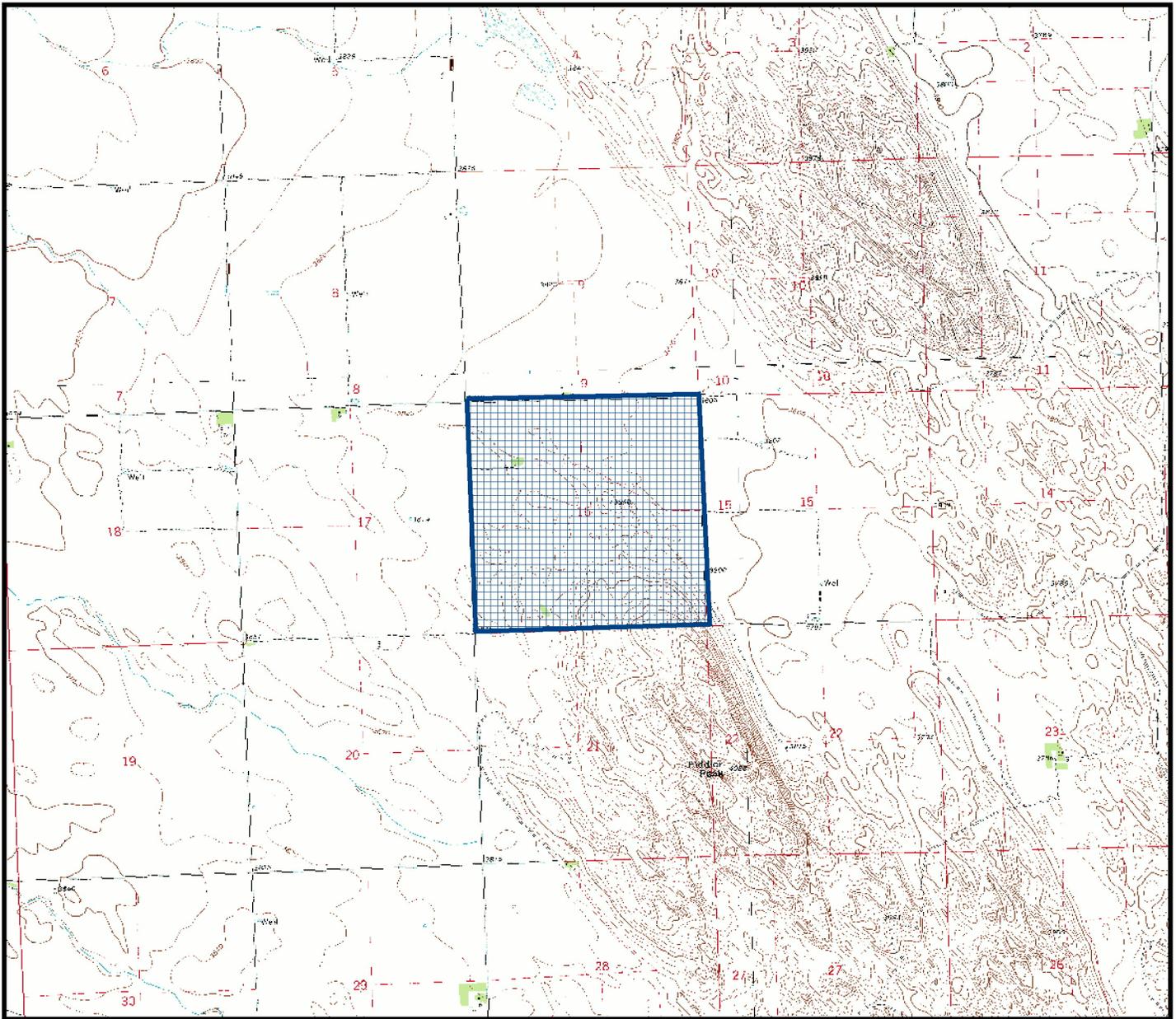
Sand and Gravel Resource:

This tract is located in the south-central part of the County where large sand dune deposits have created a southern boundary from farming to the north. The sub-surface bedrock consists primarily of fluvial deposits of ash, silt, pebbly sand, and capped with caliche overlain by eolian sand dune ridges several hundreds of feet thick trending northwest through the central part of this tract. There are no creeks draining this tract and the majority of the surface bedrock consists primarily of wind-blown silt and sand containing low industrial mineral resources.

REFERENCES:

Schwochow, S.D., 1981, Inventory of non-metallic mining and processing operations in Colorado, Colorado Geological Survey, Department of Natural Resources, Denver Colorado, Map Series 17

Scott, G. R., 1978, Map showing Geology, structure, and oil and gas fields in the Sterling 1° X2° Quadrangle, Colorado, Nebraska, and Kansas, US Geological Survey Miscellaneous Investigation Series I-1092

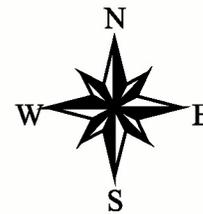


95-31

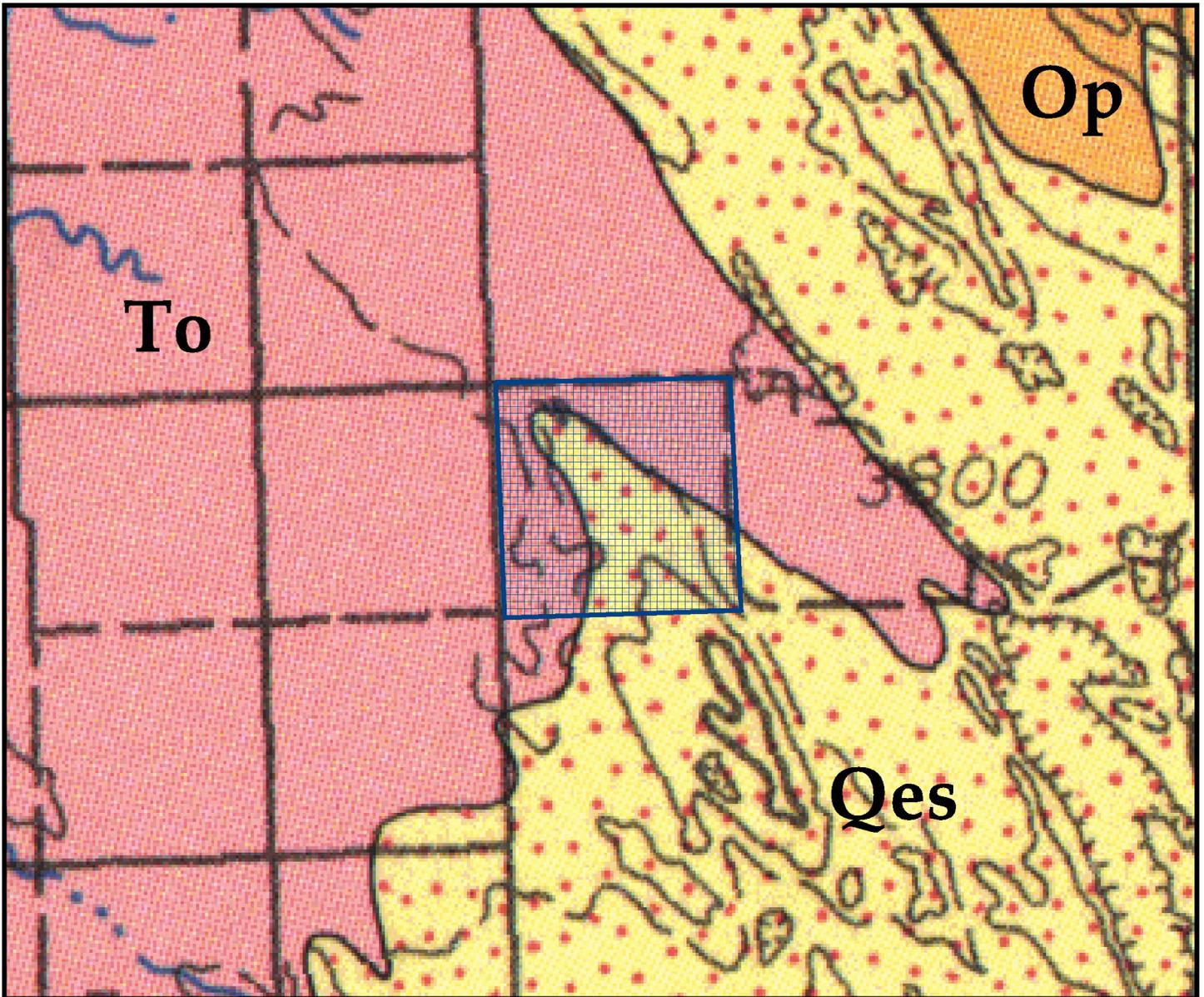
Location: T. 6 N, R. 45 W
Section: 16
Approximate total acreage - 640



 Mineral acreage evaluated

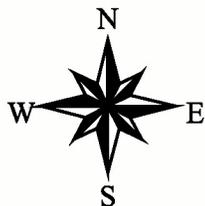


1:43500



Geologic Map for 95-31

Location: T. 6 N, R. 45 W
Section: 16
Approximate total acreage - 640



 *Mineral acreage evaluated*

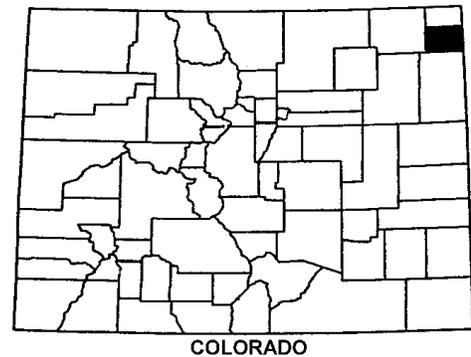
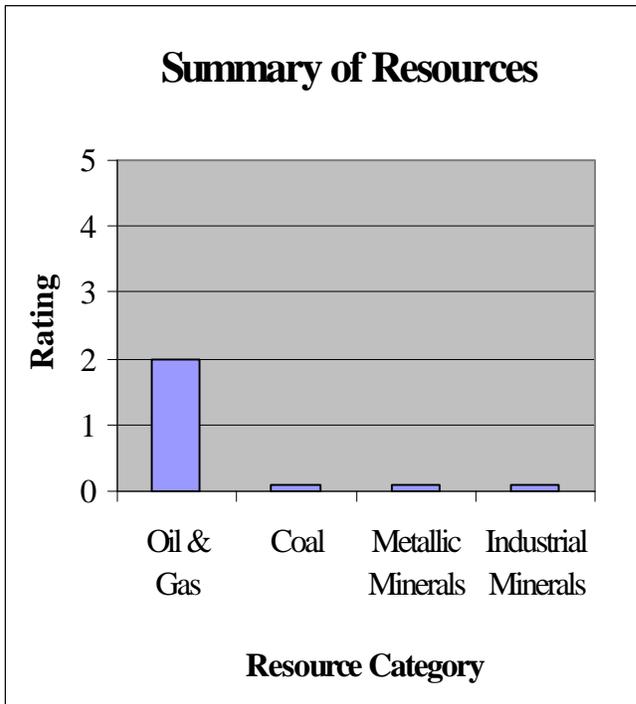
Qp - Peoria loess (Pleistocene) Slightly clayey yellowish brown, sandy, blocky, non-stratified wind-blown calcareous-silt and sand.

To - Ogallala Formation (Miocene) Fluvial deposits of grayish orange-pink ash, pebbly sand and silt capped by pale-red dense pisolitic caliche layers and brecciated limestone.

Qes - Eolian Sand (Holocene/Pleistocene) Pale yellowish brown well-sorted wind blown sand.

1:43500

STATE LANDBOARD MINERAL INVENTORY



TRACT IDENTIFIER : #95-32

COUNTY: Phillips

LOCATION: T.6 N., R. 45 W., Section 36

APPROXIMATE ACREAGE: 640 acres

QUADRANGLE NAME(S): Wauneta NE

OVERVIEW OF GEOLOGY:

This State land tract is located on the open plains in Phillips County of northeastern Colorado. The surface topography is relatively flat and the bedrock geology is poorly exposed. Extensive dry land and semi arid vegetation in the upper few inches of brown soil masks most outcrops. The few visible outcrops in this area consists of well-sorted, wind-blown, and dune-forming sands of the Holocene and Pleistocene are areally extensive and hundreds of feet high in the south-central and southeastern part of the County. They overlie unconformably the Pleistocene Peoria Loess and Miocene Ogallala formations.

OIL AND GAS RESOURCES:

No oil or gas resources have been established on this tract. Two essential elements, which include reservoir and source rocks with the appropriate timing of generation of migration, do exist in the sedimentary rocks in this area. However existing geological control is insufficient to determine the presence of a local trap.

COAL RESOURCES:

There are no coal measures in any of the sedimentary units in this tract.

METALLIC MINERAL RESOURCES:

There are no metallic mineral resources in this tract.

INDUSTRIAL MINERALS AND CONSTRUCTION MATERIALS RESOURCES:

Area Sand and Gravel Pits:

Unnamed Pit – NW ¼ NW ¼, Sec. 9, T6N, R45W

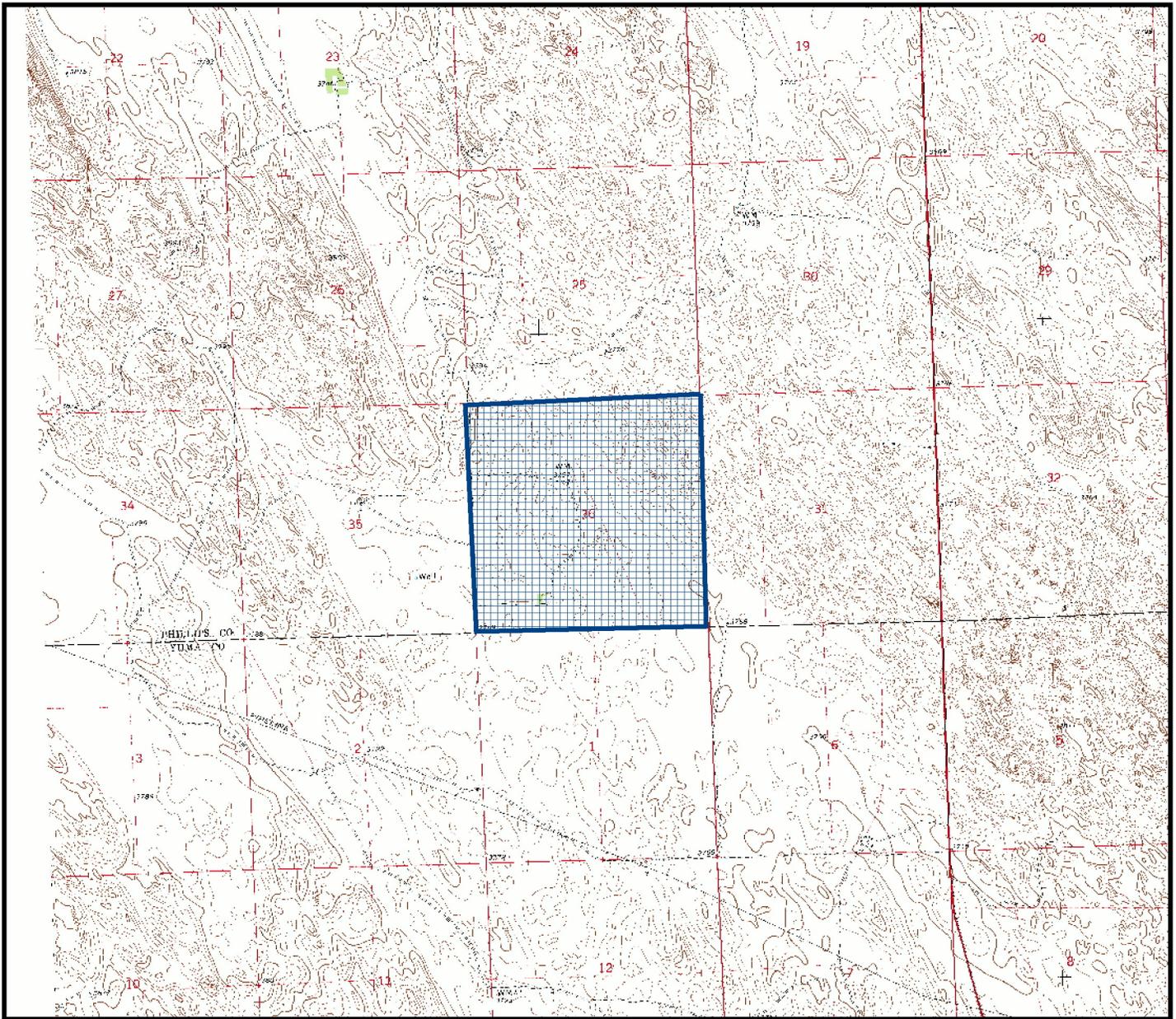
Sand and Gravel Resource:

This tract is located in the south-central part of the County where large sand dune deposits have created a southern boundary from farming to the north. The surface bedrock primarily consists of eolian sand dune ridges, several hundreds of feet thick, trending northwest. There are no creeks draining this tract and the majority of the surface bedrock consists primarily of wind-blown silt and sand containing low industrial mineral resources.

REFERENCES:

Schwochow, S.D., 1981, Inventory of non-metallic mining and processing operations in Colorado, Colorado Geological Survey, Department of Natural Resources, Denver Colorado, Map Series 17

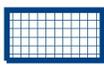
Scott, G. R., 1978, Map showing Geology, structure, and oil and gas fields in the Sterling 1° X2° Quadrangle, Colorado, Nebraska, and Kansas, US Geological Survey Miscellaneous Investigation Series I-1092

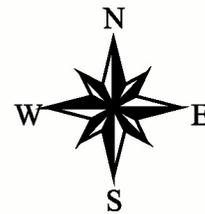


95-32

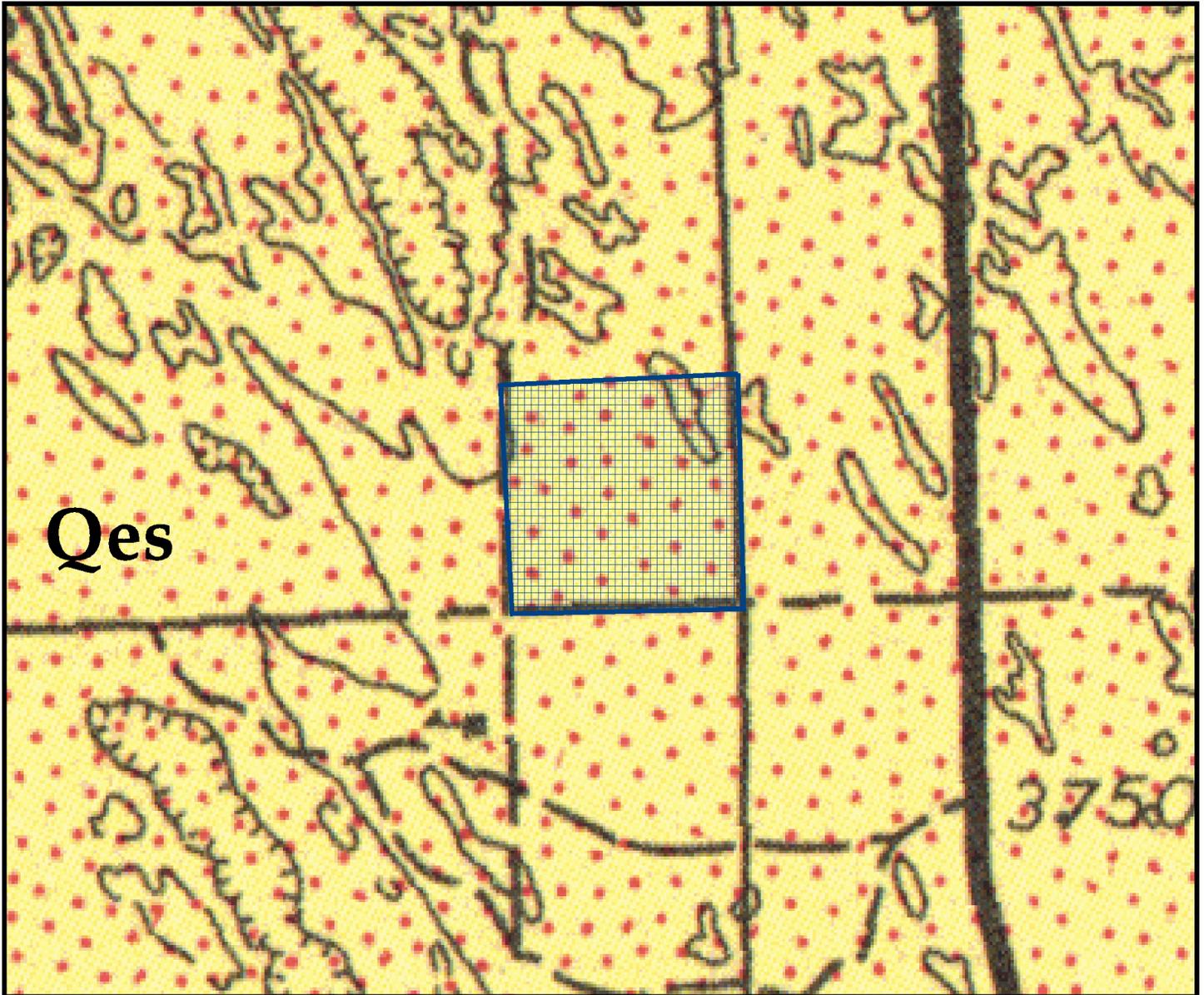
Location: T. 6 N, R. 45 W
Section: 36
Approximate total acreage - 640



 Mineral acreage evaluated

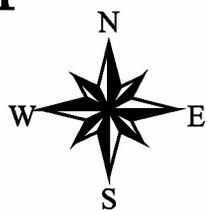


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Geologic Map for 95-32

Location: T. 6 N, R. 45 W
 Section: 36
 Approximate total acreage - 640



 *Mineral acreage evaluated*

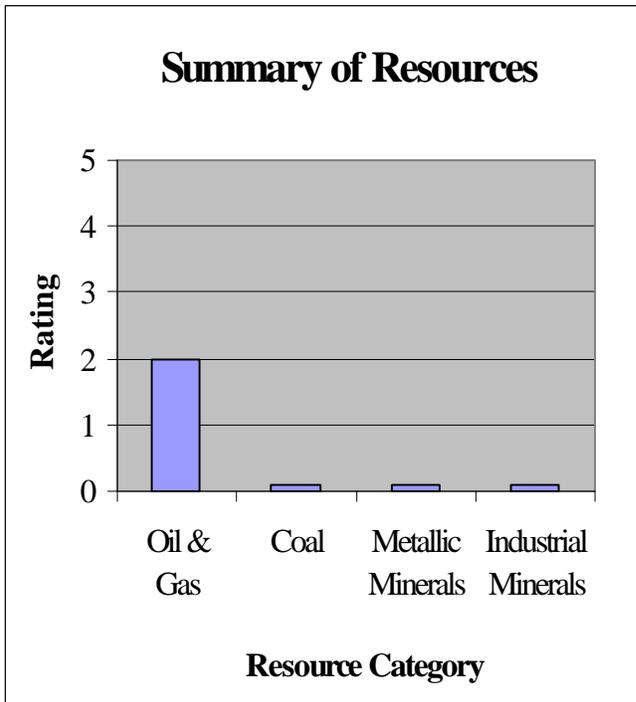
Qes - Eolian Sand (Holocene/Pleistocene) Pale yellowish brown well-sorted wind blown sand.

0 1 2 Miles



1:43500

STATE LANDBOARD MINERAL INVENTORY



TRACT IDENTIFIER : #95-33

COUNTY: Phillips

LOCATION: T.6 N., R.44 W., Section 16

APPROXIMATE ACREAGE: 640 acres

QUADRANGLE NAME(S): Wauneta NE

OVERVIEW OF GEOLOGY:

This State land tract is located on the open plains in northeastern Colorado. The surface topography is relatively flat and the bedrock geology consists of wind blown sand deposits of the Pleistocene Peoria Loess and well sorted, wind blown, and dune forming sands of the Holocene and Pleistocene. These deposit overly the Miocene Ogallala Formation.

OIL AND GAS RESOURCES:

No oil or gas resources have been established on this tract. The essential elements, which include reservoir, trap, and source rocks with the appropriate timing of generation of

migration, do exist in the sedimentary rocks in this area. However existing geological control is insufficient to determine the presence of a reservoir and trap.

COAL RESOURCES:

There are no coal measures in any of the sedimentary units in this tract.

METALLIC MINERAL RESOURCES:

There are no metallic mineral resources in this tract.

INDUSTRIAL MINERALS AND CONSTRUCTION MATERIALS RESOURCES:

Area Active Permitted Mines:

Schneller Clay Pit – Clay - NW ¼ NW ¼, Sec. 19, T6N, R43W – Located approximately 3 miles east of this tract.

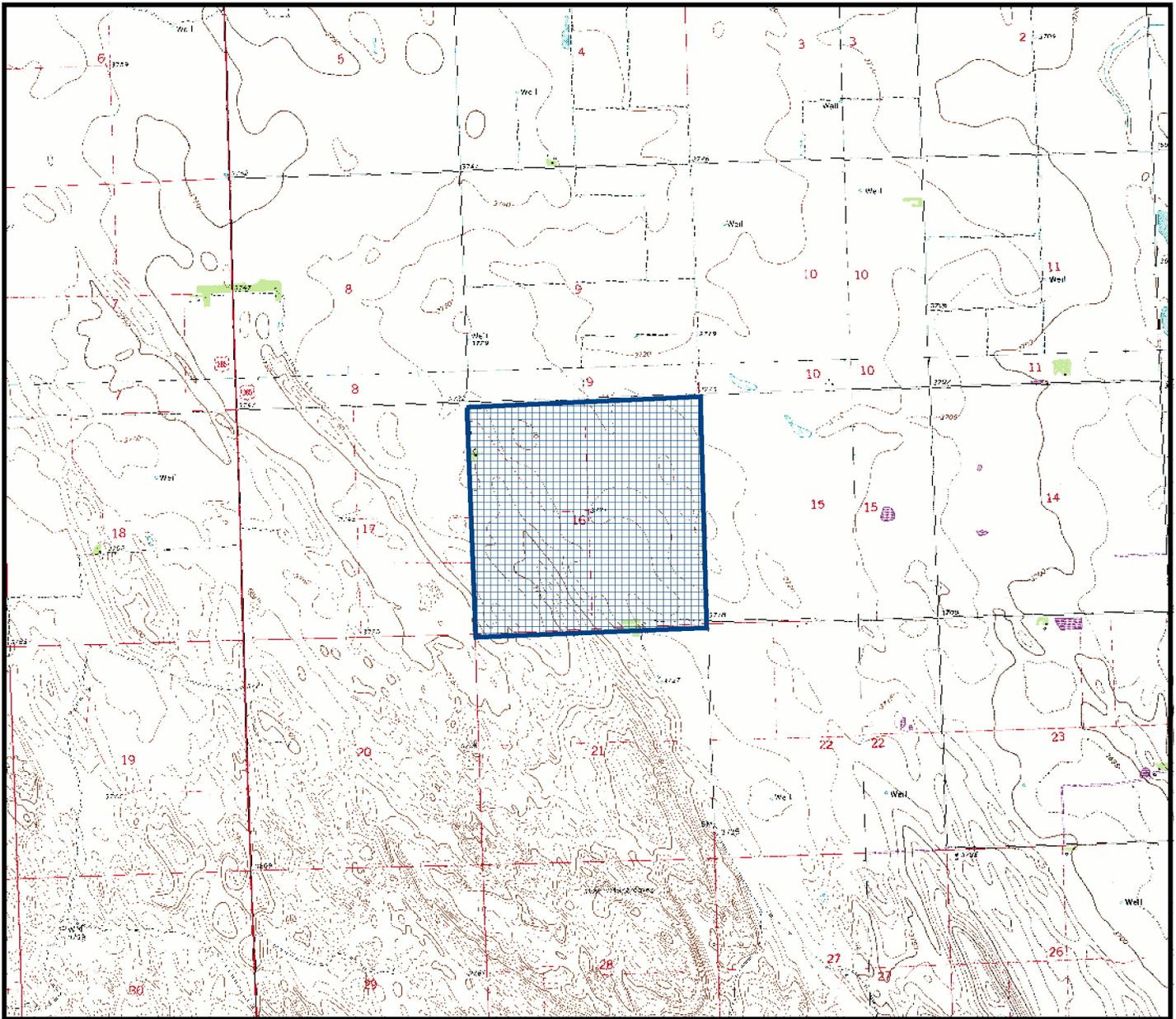
Sand and Gravel Resource:

This tract is located in the south-central part of the County where large sand dune deposits have created a southern boundary from farming to the north. The surface bedrock consists of primarily eolian sand dune ridges, several hundreds of feet thick, trending northwest with exposures of Peoria Loess between the dune ridges. There are no creeks draining this tract and the majority of the surface bedrock consists primarily of wind-blown silt and sand containing low industrial mineral resources.

REFERENCES:

Lawson, A. D., 1998, Active Permitted Mine Operations in Colorado, 1996-97, Colorado Geological Survey, Department of Natural Resources, Denver Colorado, Information Series 45, 58 p.

Scott, G. R., 1978, Map showing Geology, structure, and oil and gas fields in the Sterling 1° X2° Quadrangle, Colorado, Nebraska, and Kansas, US Geological Survey Miscellaneous Investigation Series I-1092

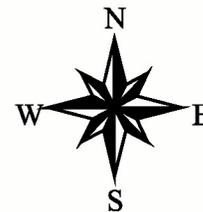


95-33

Location: T. 6 N, R. 44 W
Section: 16
Approximate total acreage - 640



 Mineral acreage evaluated



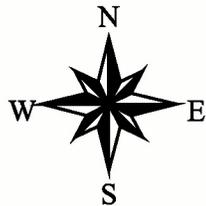
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Geologic Map for 95-33

 *Mineral acreage evaluated*

Location: T. 6 N, R. 44 W
Section: 16
Approximate total acreage - 640



0 1 2 Miles

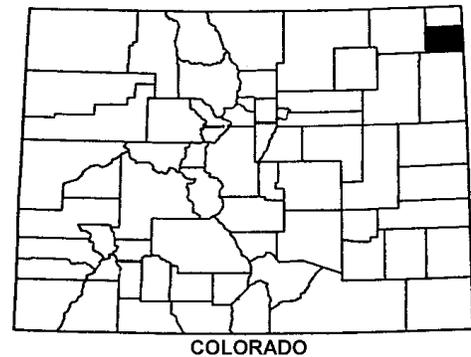
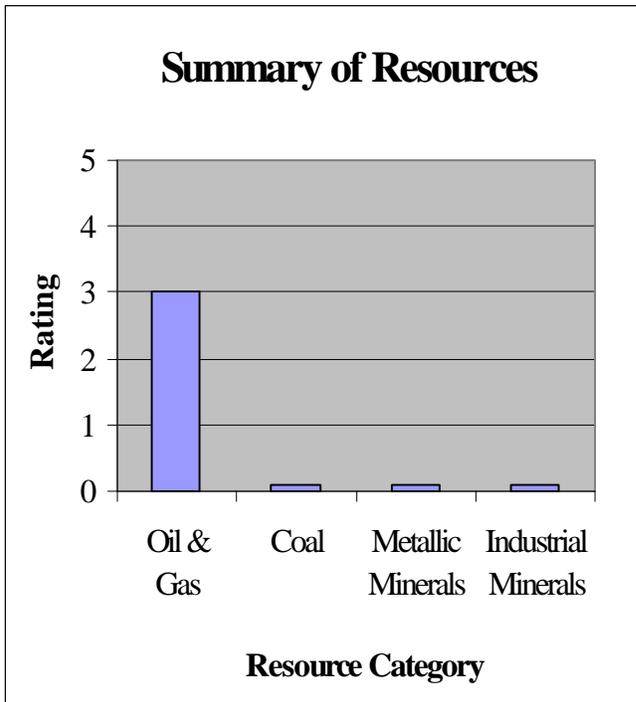


Qp - Peoria loess (Pleistocene) Slightly clayey yellowish brown, sandy, blocky, non-stratified wind-blown calcareous-silt and sand.

Qes - Eolian Sand (Holocene/Pleistocene) Pale yellowish brown well-sorted wind blown sand.

1:43500

STATE LANDBOARD MINERAL INVENTORY



TRACT IDENTIFIER: #95-34

COUNTY: Phillips

LOCATION: T. 6 N., R.44 W., Section 36

APPROXIMATE ACREAGE: 640 acres

QUADRANGLE NAME(S): Alvin NW

OVERVIEW OF GEOLOGY:

This State land tract is located on the open plains in Phillips County of northeastern Colorado. The surface topography is relatively flat and the bedrock geology consists of well-sorted, wind-blown, and dune-forming sands of the Holocene and Pleistocene. This eolian sand overlies the Miocene Ogallala Formation, which consists of fluvial sediments.

OIL AND GAS RESOURCES:

No exploratory wells, establishing oil or gas resources, have been drilled on this tract as of this date. The essential elements, which include reservoir, trap, and source rocks with the appropriate timing of generation of migration, do exist in the sedimentary rocks in this area. One exploratory well was drilled within a mile of this tract near the northwest

corner. The JW Operating -Moon #1 well was drilled in the NE ¼ of Section 35, T6N R44W to a depth of 2,570 feet to test the Cretaceous Niobrara Formation. No production was established and no indications of oil or gas were observed and recorded from any of the overlying horizons. The well was plugged and abandoned in 1979.

COAL RESOURCES:

There are no coal measures in any of the sedimentary units in this tract.

METALLIC MINERAL RESOURCES:

There are no metallic mineral resources in this tract.

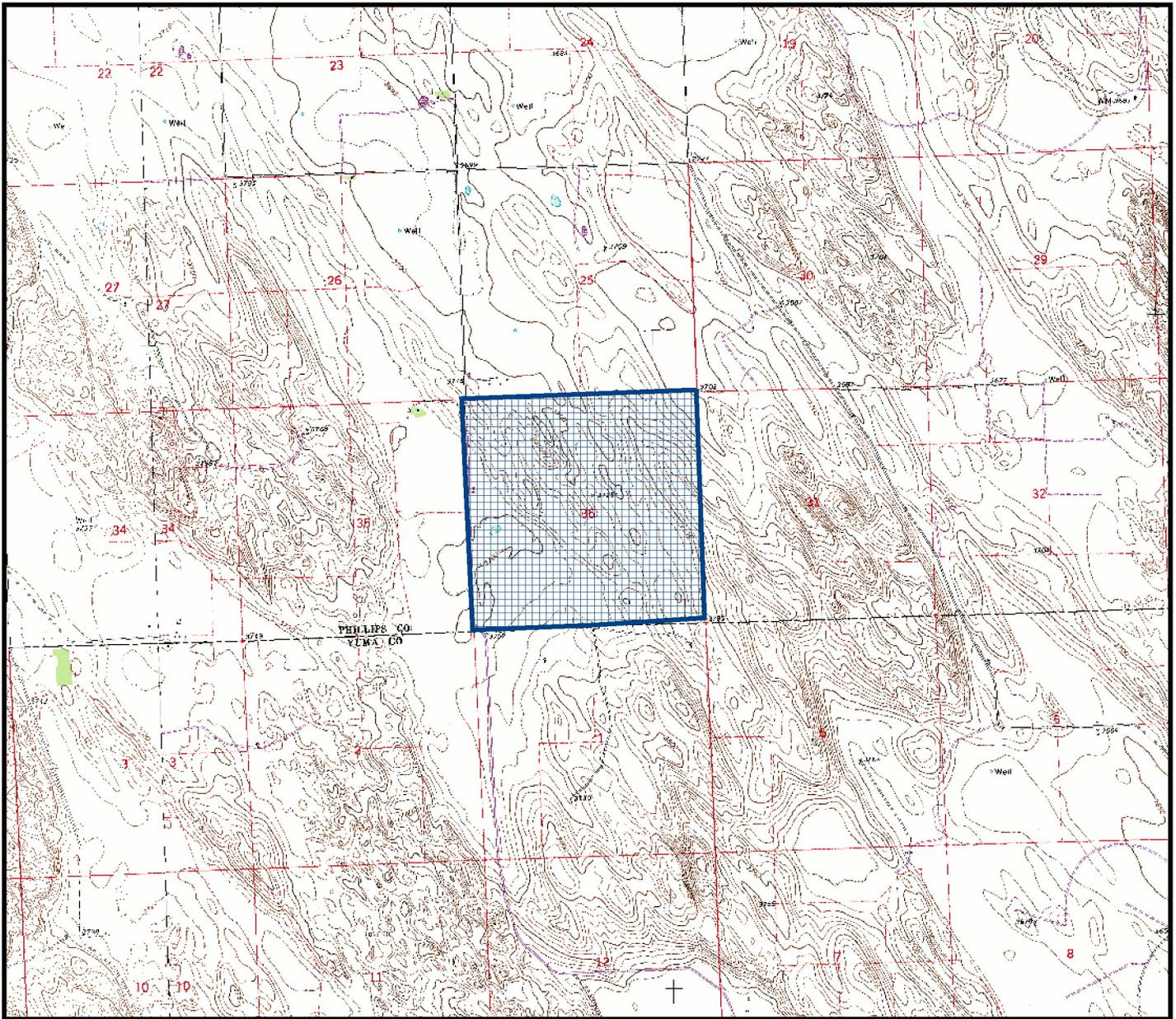
INDUSTRIAL MINERALS AND CONSTRUCTION MATERIALS RESOURCES:

This tract is located in the south-central part of the County where large sand dune deposits have created a southern boundary from farming to the north. The surface bedrock consists of primarily eolian sand dune ridges, several hundreds of feet thick, trending northwest. There are no creeks draining this tract and the majority of the surface bedrock consists primarily of wind-blown silt and sand containing low industrial mineral resources.

REFERENCES:

Lawson, A. D., 1998, Active Permitted Mine Operations in Colorado, 1996-97, Colorado Geological Survey, Department of Natural Resources, Denver Colorado, Information Series 45, 58 p.

Scott, G. R., 1978, Map showing Geology, structure, and oil and gas fields in the Sterling 1° X2° Quadrangle, Colorado, Nebraska, and Kansas, US Geological Survey Miscellaneous Investigation Series I-1092

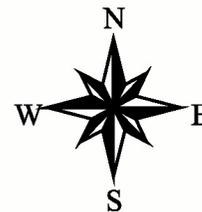


95-34

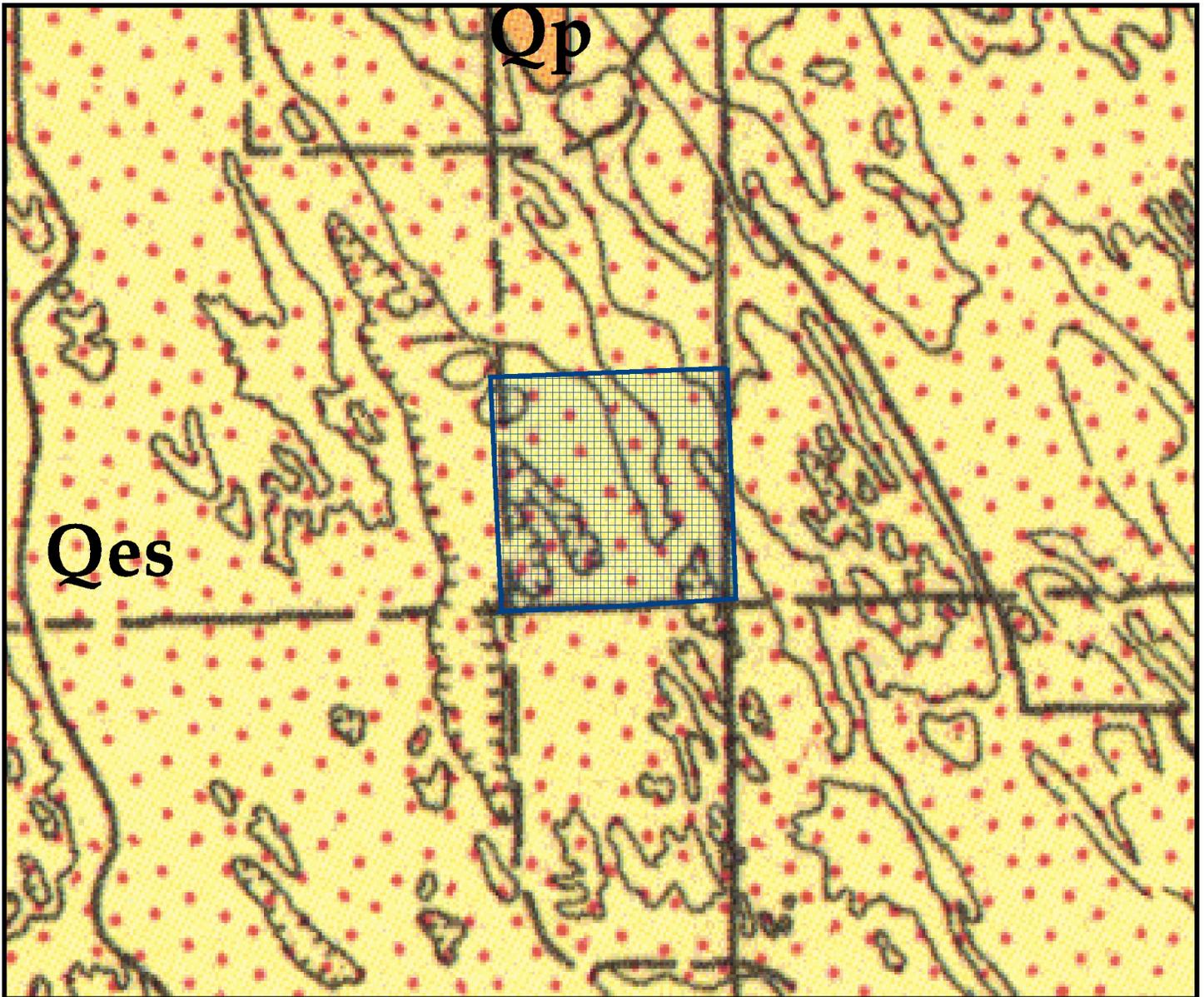
Location: T. 6 N, R. 43 W
Section: 16
Approximate total acreage - 640



 Mineral acreage evaluated



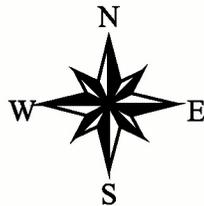
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Geologic Map for 95-34

 *Mineral acreage evaluated*

Location: T. 6 N, R. 44 W
Section: 36
Approximate total acreage - 640



0 1 2 Miles

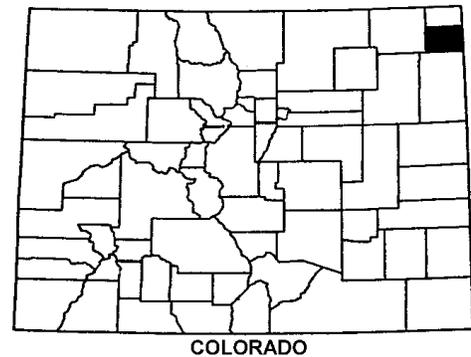
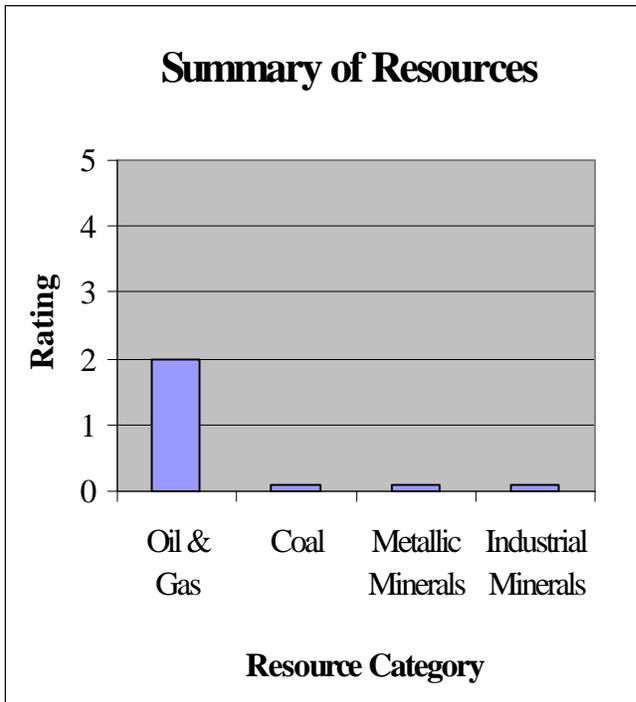


Qp - Peoria loess (Pleistocene) Slightly clayey yellowish brown, sandy, blocky, non-stratified wind-blown calcareous-silt and sand.

Qes - Eolian Sand (Holocene/Pleistocene) Pale yellowish brown well-sorted wind blown sand.

1:43500

STATE LANDBOARD MINERAL INVENTORY



TRACT IDENTIFIER : #95-35

COUNTY: Phillips

LEGAL DESCRIPTION: T.6 N., R.43 W., Section 16

SURFACE AND MINERAL ACRES: 640 acres

QUADRANGLE NAME(S): Alvin NW

OVERVIEW OF GEOLOGY:

This State land tract is located on the open plains in Phillips County of northeastern Colorado. The surface topography is relatively flat and the bedrock geology is poorly exposed. Extensive dry land and semi arid vegetation in the upper few inches of brown soil masks most outcrops. The few visible outcrops in this area consist of well-sorted, wind-blown, and dune-forming sands of the Holocene and Pleistocene are areally extensive and hundreds of feet high in the south-central and southeastern part of the County. They overlie unconformably the Pleistocene Peoria Loess and Miocene Ogallala formations.

OIL AND GAS RESOURCES:

No oil or gas resources have been established on this tract. Two essential elements, which include reservoir and source rocks with the appropriate timing of generation of migration, do exist in the sedimentary rocks in this area. However existing geological control is insufficient to determine the presence of a local trap.

COAL RESOURCES:

There are no coal measures in any of the sedimentary units in this tract.

METALLIC MINERAL RESOURCES:

There are no metallic resources in this tract.

INDUSTRIAL MINERALS AND CONSTRUCTION MATERIALS RESOURCES:

Area Active Permitted Mines:

Schneller Clay Pit – Clay - NW ¼ NW ¼, Section 19, T6N, R43W – Located approximately 2 miles west of this tract.

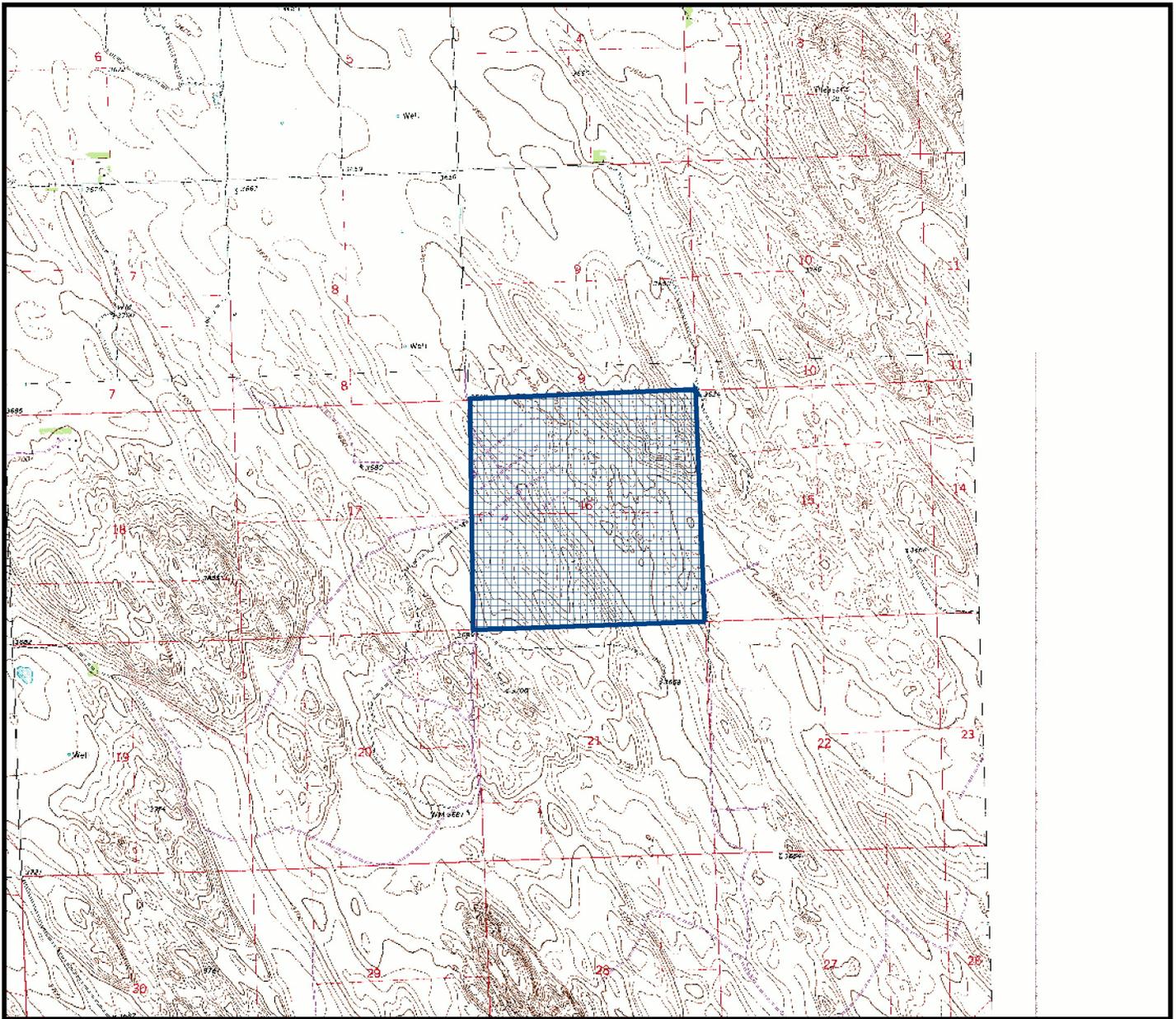
Sand and Gravel Resource:

This tract is located in the south-central part of the County where large sand dune deposits have created a southern boundary from farming to the north. The surface bedrock consists of primarily eolian sand dune ridges, several hundreds of feet thick, trending northwest. There are no creeks draining this tract and the majority of the surface bedrock consists primarily of wind-blown silt and sand containing low industrial mineral resources.

REFERENCES:

Lawson, A. D., 1998, Active Permitted Mine Operations in Colorado, 1996-97, Colorado Geological Survey, Department of Natural Resources, Denver Colorado, Information Series 45, 58 p.

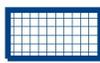
Scott, G. R., 1978, Map showing Geology, structure, and oil and gas fields in the Sterling 1° X2° Quadrangle, Colorado, Nebraska, and Kansas, US Geological Survey Miscellaneous Investigation Series I-1092

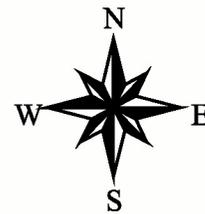


95-35

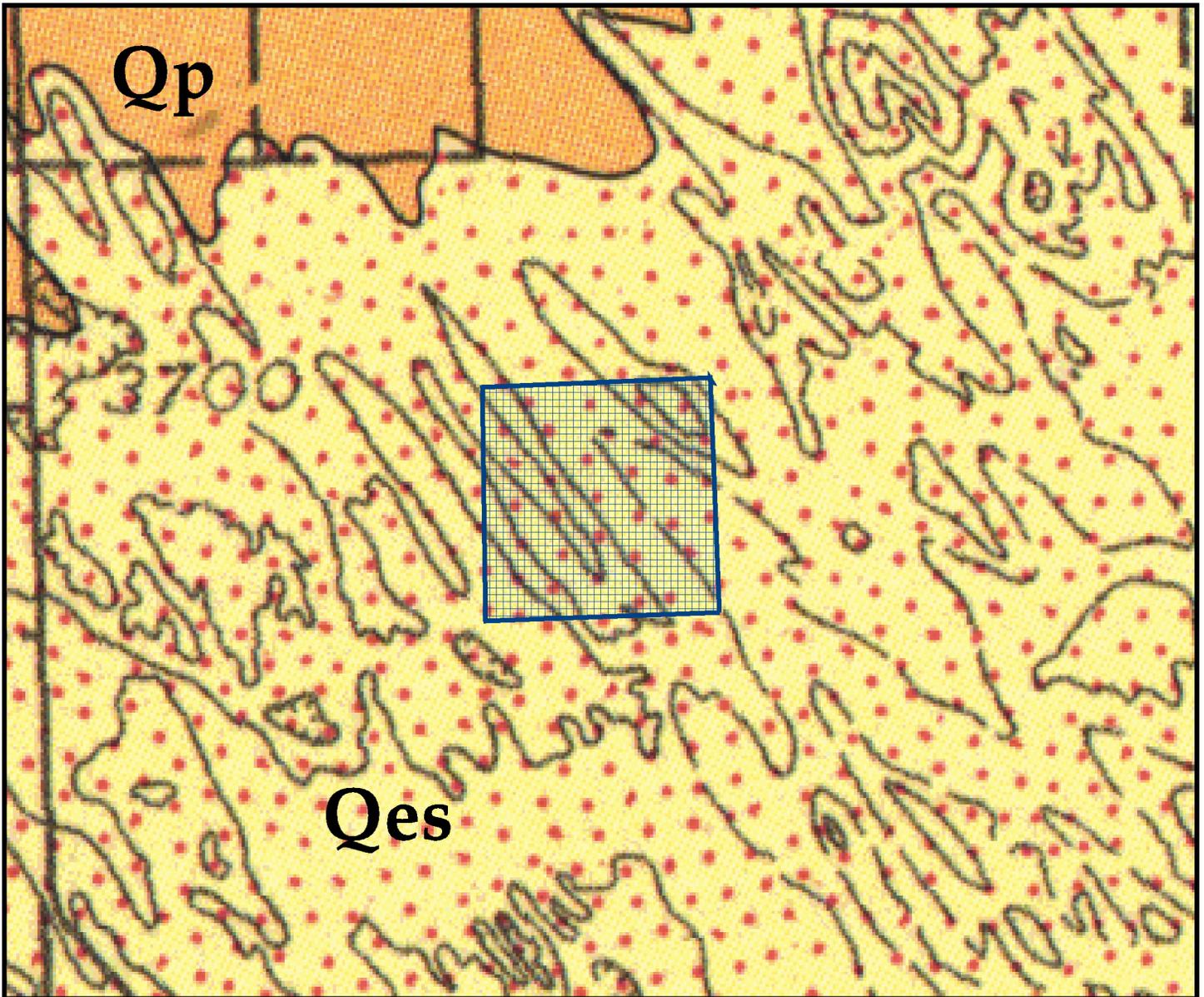
Location: T. 6 N, R. 43 W
Section: 16
Approximate total acreage - 640



 *Mineral acreage evaluated*

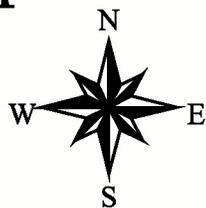


1:43500



Geologic Map for 95-35

Location: T. 6 N, R. 43 W
 Section: 16
 Approximate total acreage - 640



0 1 2 Miles

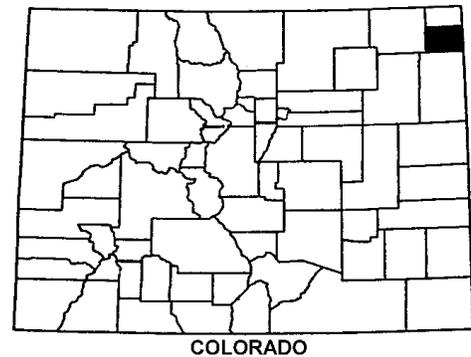
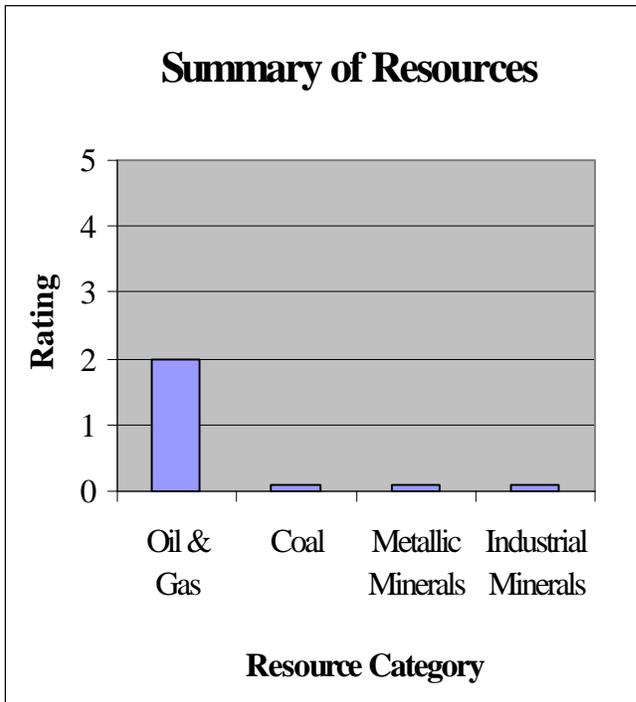
 *Mineral acreage evaluated*

Qp - Peoria loess (Pleistocene) Slightly clayey yellowish brown, sandy, blocky, non-stratified wind-blown calcareous-silt and sand.

Qes - Eolian Sand (Holocene/Pleistocene) Pale yellowish brown well-sorted wind blown sand.

1:43500

STATE LANDBOARD MINERAL INVENTORY



TRACT IDENTIFIER : #95-36

COUNTY: Phillips

LOCATION: T.6 N., R.43 W., Section 36

APPROXIMATE ACREAGE: 640 acres

QUADRANGLE NAME(S): Alvin NE

OVERVIEW OF GEOLOGY:

This State land tract is located on the open plains in Phillips County of northeastern Colorado. The surface topography is relatively flat and the bedrock geology is poorly exposed. Extensive dry land and semi arid vegetation in the upper few inches of brown soil masks most outcrops. The few visible outcrops in this area consist of well-sorted, wind-blown, and dune-forming sands of the Holocene and Pleistocene are areally extensive and hundreds of feet high in the south-central and southeastern part of the County. They overlie unconformably the Pleistocene Peoria Loess and Miocene Ogallala formations.

OIL AND GAS RESOURCES:

No exploratory wells, establishing oil or gas resources, have been drilled on this tract as of this date. The essential elements, which include reservoir, trap, and source rocks with the appropriate timing of generation of migration, do exist in the sedimentary rocks in this area. One exploratory well was drilled west of and within a mile of this tract. The Amoco -Poe Della #1 well was drilled in the NW ¼ of Section 35, T6N R43W to a depth of 2,712 feet to test the Cretaceous Niobrara Formation. No production was established and no indications of oil or gas were observed and recorded from any of the overlying horizons. The well was plugged and abandoned in 1980.

COAL RESOURCES:

There are no coal resources. There are no coal measures in any of the sedimentary units in this tract.

METALLIC MINERAL RESOURCES:

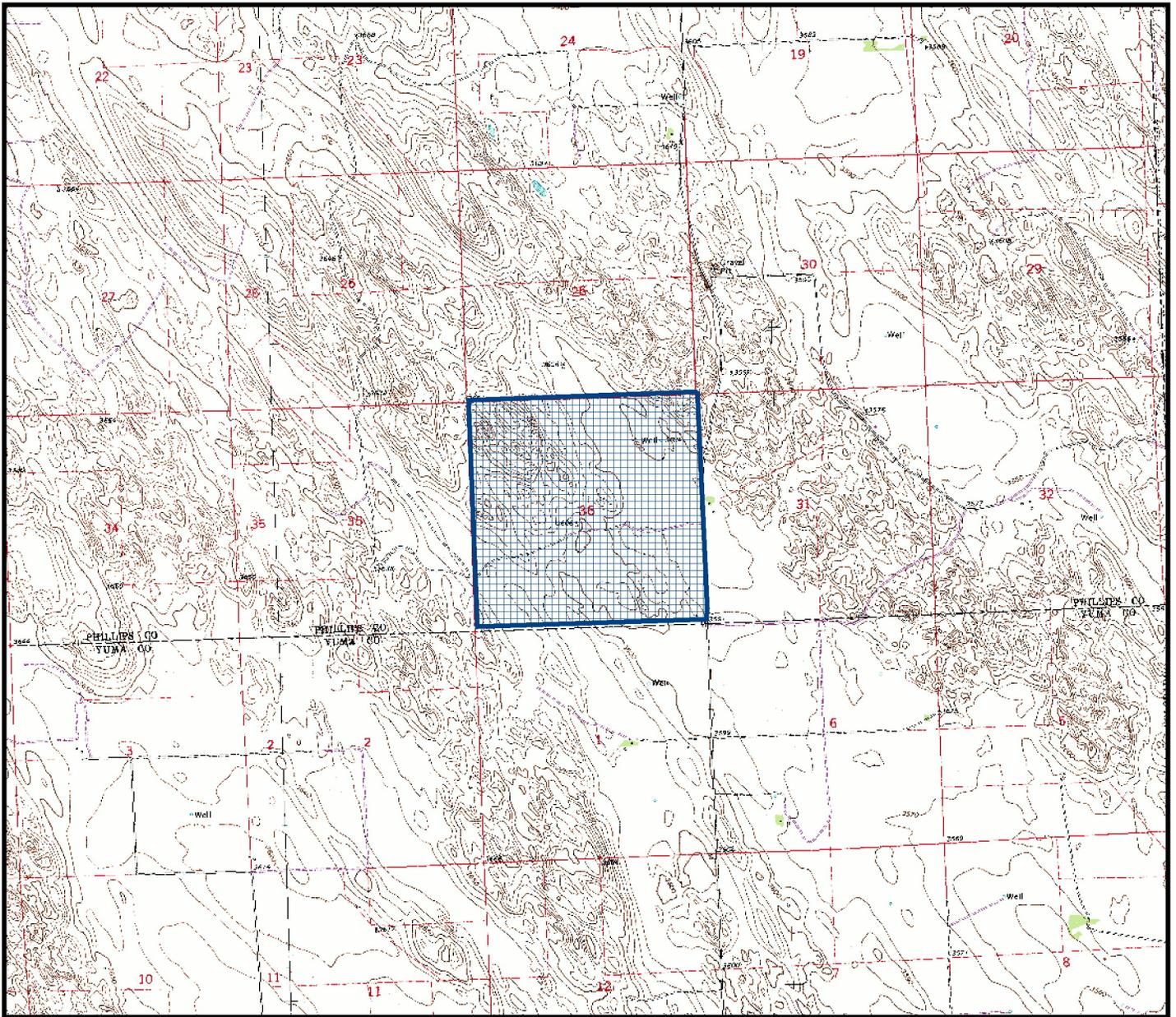
There are no metallic mineral resources in this tract.

INDUSTRIAL MINERALS AND CONSTRUCTION MATERIALS RESOURCES:

This tract is located in the south-central part of the County where large sand dune deposits have created a southern boundary from farming to the north. The surface bedrock consists of primarily eolian sand dune ridges, several hundreds of feet thick, trending northwest. There are no creeks draining this tract and the majority of the surface bedrock consists primarily of wind-blown silt and sand containing low industrial mineral resources.

REFERENCES:

Scott, G. R., 1978, Map showing Geology, structure, and oil and gas fields in the Sterling 1° X2° Quadrangle, Colorado, Nebraska, and Kansas, US Geological Survey Miscellaneous Investigation Series I-1092

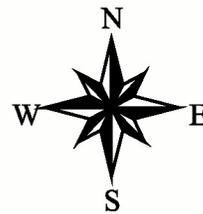


95-36

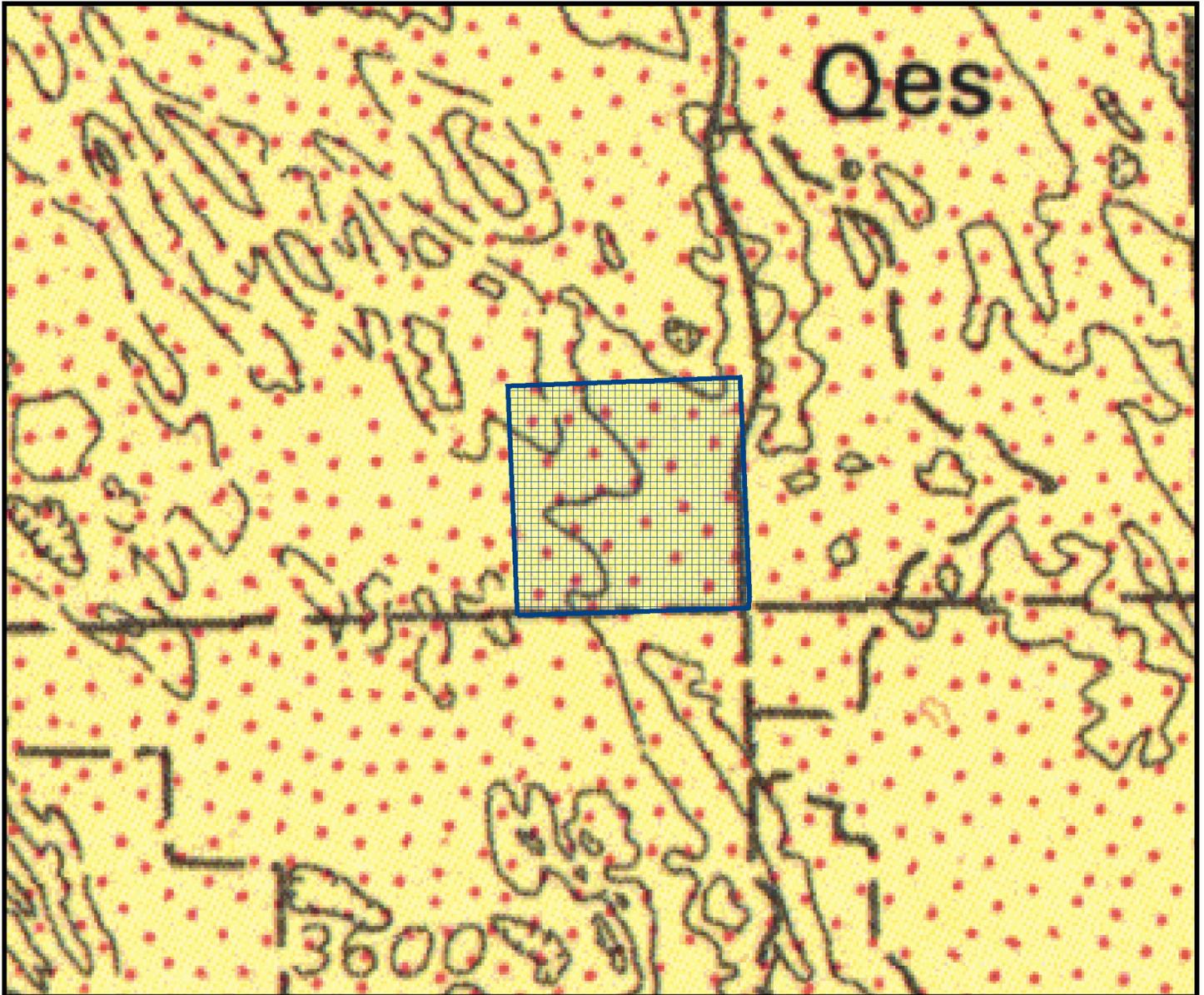
Location: T. 6 N, R. 43 W
Section: 36
Approximate total acreage - 640



 *Mineral acreage evaluated*

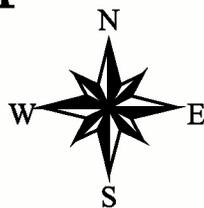


1:43500



Geologic Map for 95-36

Location: T. 6 N, R. 43 W
 Section: 36
 Approximate total acreage - 640



 *Mineral acreage evaluated*

Qes - Eolian Sand (Holocene/Pleistocene) Pale yellowish brown well-sorted wind blown sand.

1:43500