

## KANSAS GEOLOGICAL SURVEY

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November 14, 2005

Mr. Melvin Fast  
411 S. Harvey  
Burrton, KS 67020

Dear Mr. Fast:

I want to thank you again for the opportunity to visit your farm and examine the sinkholes. At that time I promised to send you copies of the data I collected and the oil well data from the Kansas Geological Survey (KGS) database. I have enclosed two maps: one plotted on a 2002 orthophotograph and the other on the USGS topographic map. Both maps contain the oil well locations with the spud data used to identify the well, the centers of the sinkholes (red crosses) with the station number and initiation date, and karst polygons with the id number in the polygon. Karst polygons include sinkholes and an unidentified circular feature visible on the 2002 orthophotograph. The unidentified feature (labeled 7) is located within the limits of the pond in the southeast portion of your property and may or may not be a sinkhole. The oil well locations are approximate—for example, you said that the 1963 well at the first stop was south of the 1934 well. The database shows the 1934 well to the south. You're correct.

I've also attached three spread sheets with the data. The first spreadsheet contains the oil and gas well data, and you should use the spud date (shown in red) to identify the wells on the map. The second spread sheet contains the field data I collected, and the points represent the approximate centers of the sinkholes. The third spreadsheet contains the data for the karst polygons in the map figure.

I agree with you that the six features we visited are sinkholes. The causes of these sinkholes are difficult to determine. Station 1 (the pond in the southwest portion of your land) has an oil well casing and I am reasonably certain that the oil well played a role in the subsidence at this site. Station 2 (the second site we visited) has an oil well at the southeast end of the feature (the oil well on the map may be plotted inaccurately). However, no oil wells are observed within the limits of the sinkhole. None of the other sinkholes have oil wells within their boundaries. Thus, for the remaining sinkholes, the role of oil wells is uncertain, but it cannot be ruled out. For example, along the west boundary of your property an injection well is in line with station (sinkhole) 3 and the oil well with a leaking casing. Injection should be occurring below the salt, but you can't rule out water migrating up fractures into the salt at the location of the sinkhole. However, possible leakage up along fractures at this location is speculation. It is important to remember that your land is located in an area of natural dissolution of the salt. Other natural sources of subsidence might be considered including shrinking soils or

volumetric changes in the Equus beds due to ground-water pumping. Thus, some sinkholes may have natural causes.

It was clear that your attempt to drain the sinkholes has had no effect on the subsidence. This implies that the subsidence is being controlled by processes in the subsurface. Unfortunately, this also implies that nothing you can do at the surface will stop the subsidence. I'm not sure what can be done in the subsurface.

As I promised, I told our geophysicist about your sinkholes, but he has not responded. Issues related to oil wells and subsidence can be taken to the Oil and Gas Conservation Division of the Kansas Corporation Commission. I would recommend that you contact them at:

Oil and Gas Conservation Division  
Kansas Corporation Commission  
130 S. Market, Ste 2078  
Wichita, KS 67202  
(316) 337 6200

If you have further questions, feel free to contact me at the above address, (785) 864-2194, or [ohlmac@kgs.ku.edu](mailto:ohlmac@kgs.ku.edu).

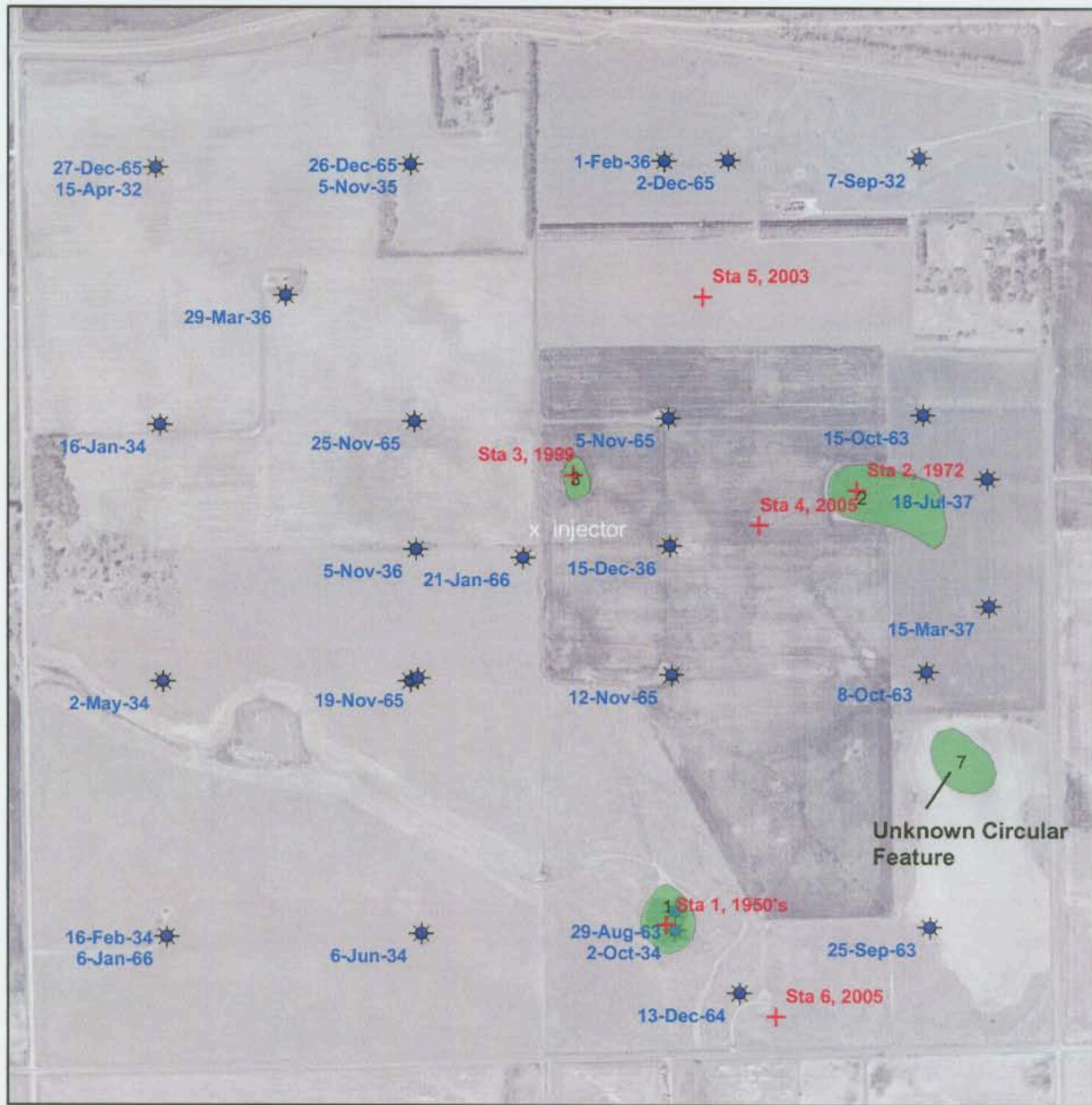
Sincerely,

A handwritten signature in black ink, appearing to read 'Gregory C. Ohlmacher', with a stylized, flowing script.

Gregory C. Ohlmacher, P. G.  
Engineering Geologist & Associate Scientist

Enc:  
Maps and Spreadsheets

# Section 25 T23S R04W



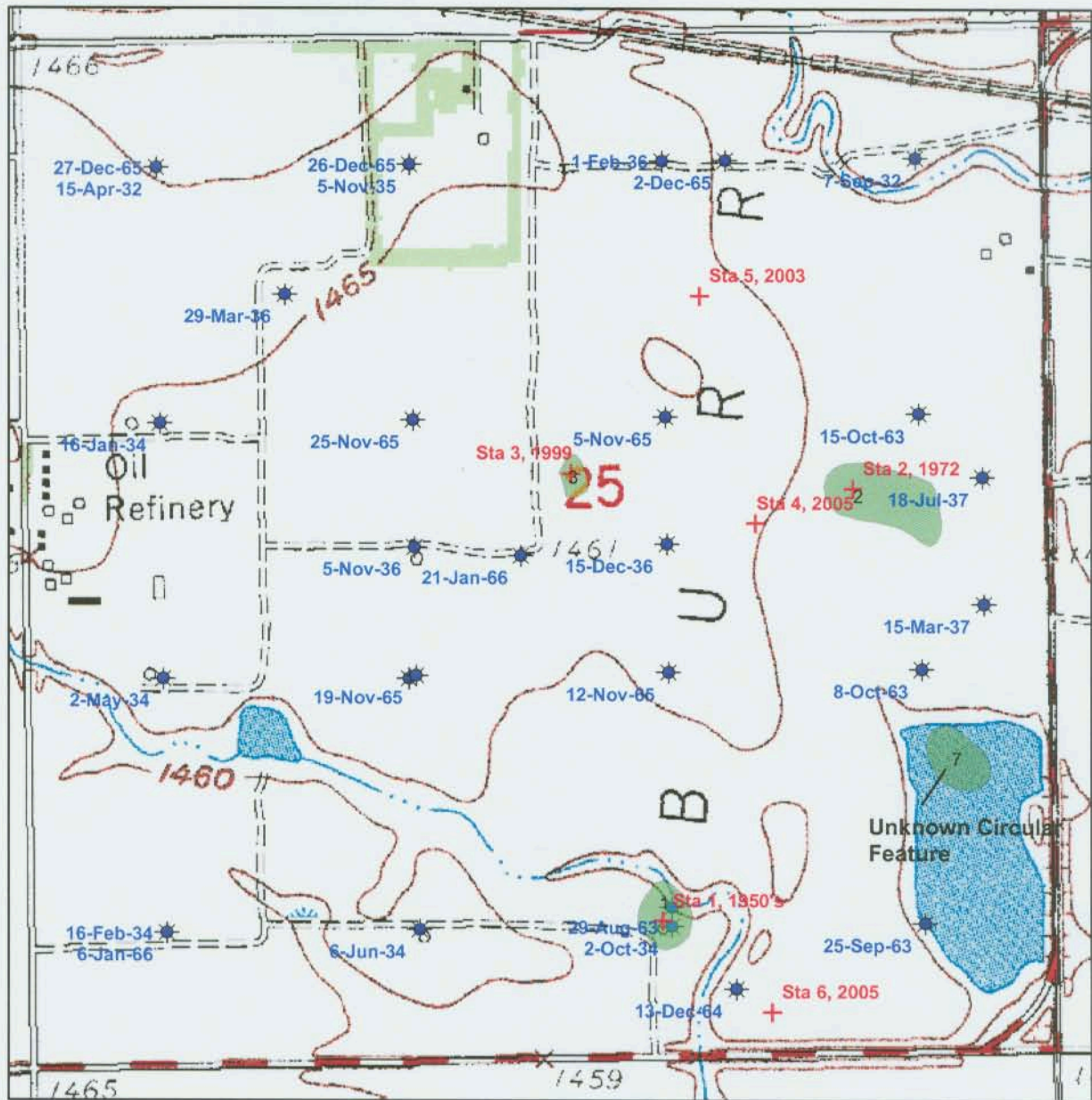
300 150 0 300 Meters



## Legend

- + Karst Points
- ★ Oil Wells
- Karst Polygons

# Section 25 T23S R04W



## Legend

- + Karst Points
- ★ Oil Wells
- Karst Polygons

Oil well data for section 25 T235 R4W

| KID        | API NUMBER   | LEASE AND WELL    | FIELD   | LATITUDE  | LONGITUDE  | TOWNSHIP | TWN DIR | RANGE | RANGE DIR | SECTION | SPOT        | FEET NORTH | FEET EAST | FOOT REF | OPERATOR                               | ELEVATION | ELEV REF | DEPTH | FORM AT DEPTH |
|------------|--------------|-------------------|---------|-----------|------------|----------|---------|-------|-----------|---------|-------------|------------|-----------|----------|----------------------------------------|-----------|----------|-------|---------------|
| 1008912319 | 15-155-70346 | W. L. ADKINS 3    |         | 38.019400 | -97.713170 | 23       | S       | 4     | W         | 25      | NE SW       |            |           |          | S & K OIL CO.                          | 1461      | TOPO     | 3371  |               |
| 1001275659 | 15-155-01666 | FAST 8            | BURRTON | 38.015820 | -97.703870 | 23       | S       | 4     | W         | 25      | C SE SE     | 660        | -660      | SE       | S & K OIL CO                           | 1462      | KB       | 3370  | 25            |
| 1001275649 | 15-155-02841 | ROBERTS 2         | BURRTON | 38.023070 | -97.717620 | 23       | S       | 4     | W         | 25      | C SW NW     | 3300       | -4620     | SE       | OLSON OIL                              | 1466      | DF       | 3375  | 16            |
| 1002939637 | 15-155-03162 | FAST 12           | BURRTON | 38.023070 | -97.708460 | 23       | S       | 4     | W         | 25      | C SW NE     | 3300       | -1980     | SE       | S & K OIL                              | 1468      | KB       | 3376  | MISSISSIPPIAN |
| 1002939646 | 15-155-03171 | J. FAST 3         | BURRTON | 38.026700 | -97.702730 | 23       | S       | 4     | W         | 25      | C NW NE     | 4620       | -1980     | SE       | OLSON                                  | 1469      | DF       | 3386  | MISSISSIPPIAN |
| 1002939647 | 15-155-03172 | FAST 5            | BURRTON | 38.020350 | -97.702730 | 23       | S       | 4     | W         | 25      | C NE NE SE  | 2310       | -330      | SE       | OLSON                                  | 1469      | DF       | 3386  | CHART         |
| 1002939611 | 15-155-30008 | FAST 11           | BURRTON | 38.014920 | -97.707310 | 23       | S       | 4     | W         | 25      | SE SW SE    | 330        | -1650     | SE       | S & K OIL CO                           | 1463      | KB       | 3386  | MISSISSIPPIAN |
| 1002939650 | 15-155-30100 | FAST 13           | BURRTON | 38.019440 | -97.708460 | 23       | S       | 4     | W         | 25      | C NW SE     | 1980       | -1980     | SE       | S & K OIL COMPANY                      | 1465      | KB       | 3350  | MISSISSIPPIAN |
| 1002939665 | 15-155-30117 | FAST W-15         | BURRTON | 38.021120 | -97.711110 | 23       | S       | 4     | W         | 25      | E2 E2 W2    | 2640       | 2590      | SW       | S & K OIL COMPANY                      | 1464      | KB       | 3342  | MISSISSIPPIAN |
| 1001275666 | 15-155-70337 | FAST 14           | BURRTON | 38.026700 | -97.702730 | 23       | S       | 4     | W         | 25      | C E2 NW NE  | 4620       | -1650     | SE       | S & K OIL CO                           | 1465      | KB       | 3345  | 2-            |
| 1002939645 | 15-155-03170 | ROBERTS 7         | BURRTON | 38.021280 | -97.713040 | 23       | S       | 4     | W         | 25      | C E2 W2     | 2640       | -3300     | SE       | OLSON                                  | 1462      | DF       | 3374  | 5-            |
| 1002939649 | 15-155-30099 | ROBERTS 8         | BURRTON | 38.019440 | -97.713040 | 23       | S       | 4     | W         | 25      | C NE SW     | 1980       | -3300     | SE       | S & K OIL COMPANY                      | 1465      | KB       | 3365  | MISSISSIPPIAN |
| 1001275662 | 15-155-70339 | J. H. GOERING, A7 | BURRTON | 38.024880 | -97.715330 | 23       | S       | 4     | W         | 25      | C NW        | 3960       | -3960     | SE       | OLSON OIL, INC.                        | 1472      | DF       | 3590  | 19-           |
| 1027706204 | 15-155-90340 | FAST & SMITH 7    |         | 38.020350 | -97.702730 | 23       | S       | 4     | W         | 25      | NE NE SE    | 2310       | -330      | SE       | Sara Kahan Trust DBA S & K Oil Company | 1458      | TOPO     |       | 29            |
| 1001275652 | 15-155-70344 | ROBERTS 10        | BURRTON | 38.026700 | -97.713040 | 23       | S       | 4     | W         | 25      | C NE NW     | 4620       | -3300     | SE       | S & K OIL CO                           | 1470      | KB       | 3346  | 26-           |
| 1001275650 | 15-155-02845 | ROBERTS 6         | BURRTON | 38.026700 | -97.713040 | 23       | S       | 4     | W         | 25      | C NE NW     | 4620       | -3300     | SE       | OLSON OIL                              | 1467      | DF       | 3641  | 5-1           |
| 1001275651 | 15-155-70343 | ROBERTS 9         | BURRTON | 38.023070 | -97.713040 | 23       | S       | 4     | W         | 25      | C SE NW     | 3390       | -3300     | SE       | S & K OIL CO                           | 1468      | KB       | 3347  | 25-           |
| 1001275653 | 15-155-02643 | ROBERTS 4         | BURRTON | 38.015820 | -97.713040 | 23       | S       | 4     | W         | 25      | C SW SW     | 660        | -4620     | SE       | OLSON OIL                              | 1463      | DF       | 3367  | 16-           |
| 1001275654 | 15-155-02644 | ROBERTS 5         | BURRTON | 38.015820 | -97.713040 | 23       | S       | 4     | W         | 25      | C SE SW     | 660        | -3300     | SE       | OLSON OIL                              | 1460      | DF       | 3371  | 6-            |
| 1001275656 | 15-155-01667 | FAST 9            | BURRTON | 38.019440 | -97.703870 | 23       | S       | 4     | W         | 25      | C NE SE     | 1980       | -660      | SE       | S & K OIL CO                           | 1464      | KB       | 3370  | 8-4           |
| 1001275660 | 15-155-01665 | FAST 7            | BURRTON | 38.016900 | -97.708460 | 23       | S       | 4     | W         | 25      | S2 N2 SW SE | 760        | -1980     | SE       | S & K OIL CO                           | 1468      | KB       | 3370  | 29-           |
| 1001275662 | 15-155-02638 | FAST 2            | BURRTON | 38.015820 | -97.708460 | 23       | S       | 4     | W         | 25      | C SW SE     | 660        | -1980     | SE       | OLSON OIL                              | 1458      | DF       | 3370  | 2-4           |
| 1001275663 | 15-155-36937 | ROBERTS 12        | BURRTON | 38.015820 | -97.717620 | 23       | S       | 4     | W         | 25      | C SW SW     | 660        | -4620     | SE       | S & K OIL CO                           | 1467      | KB       | 3360  | 6-            |
| 1001275664 | 15-155-02842 | ROBERTS 3         | BURRTON | 38.019440 | -97.717620 | 23       | S       | 4     | W         | 25      | C NW SW     | 1980       | -4620     | SE       | OLSON OIL                              | 1463      | DF       | 3374  | 2-4           |
| 1001275668 | 15-155-01668 | FAST 10           | BURRTON | 38.023070 | -97.703870 | 23       | S       | 4     | W         | 25      | C SE NE     | 3300       | -660      | SE       | S & K OIL CO                           | 1462      | KB       | 3370  | 15-           |
| 1001275670 | 15-155-02636 | FAST 6            | BURRTON | 38.022160 | -97.702730 | 23       | S       | 4     | W         | 25      | C SE SE NE  | 2970       | -1330     | SE       | OLSON OIL, INC.                        | 1461      | DF       | 3392  | 18-           |
| 1001275872 | 15-155-02639 | J. FAST 4         | BURRTON | 38.021280 | -97.708460 | 23       | S       | 4     | W         | 25      | C W2 E2     | 2640       | -1980     | SE       | OLSON OIL                              | 1463      | DF       | 3377  | 18-           |
| 1001275873 | 15-155-70345 | ROBERTS 11        | BURRTON | 38.026700 | -97.717630 | 23       | S       | 4     | W         | 25      | C NW NW     | 4620       | -4620     | SE       | S & K OIL CO                           | 1470      | KB       | 3329  | 27-4          |
| 1001275874 | 15-155-02640 | ROBERTS 1         | BURRTON | 38.026700 | -97.717630 | 23       | S       | 4     | W         | 25      | C NW NW     | 4620       | -4620     | SE       | OLSON OIL                              | 1467      | DF       | 3377  | 15-           |
| 1001275871 | 15-155-02637 | FAST 1            | BURRTON | 38.026700 | -97.703870 | 23       | S       | 4     | W         | 25      | C NE NE     | 4620       | -660      | SE       | OLSON OIL                              | 1459      | DF       | 3370  | 7-8           |

Section 25 T235 R04W

| LONGITUDE  | TOWNSHIP | TWN_DIR | RANGE | RANGE_DIR | SECTION | SPOT        | FEET_NORTH | FEET_EAST | FOOT_REF | OPERATOR                               | ELEVATION | ELEV_REF | DEPTH | FORM_AT_DEPTH | SPUD      | COMPLETION | PLUGGING | STATUS   | STATUS2               |                       |
|------------|----------|---------|-------|-----------|---------|-------------|------------|-----------|----------|----------------------------------------|-----------|----------|-------|---------------|-----------|------------|----------|----------|-----------------------|-----------------------|
| -97.713170 | 23       | S       | 4     | W         | 25      | NE SW       |            |           |          | S & K OIL CO.                          | 1461      | TOPO     | 3371  |               |           |            |          | 1-Nov-68 | OIL                   | Plugged and Abandoned |
| -97.703870 | 23       | S       | 4     | W         | 25      | C SE SE     | 660        | -660      | SE       | S & K OIL CO                           | 1462      | KB       | 3370  |               | 25-Sep-63 | 27-Nov-63  | 1-Oct-73 | OIL      | Plugged and Abandoned |                       |
| -97.717820 | 23       | S       | 4     | W         | 25      | C SW NW     | 3300       | -4620     | SE       | OLSON OIL                              | 1466      | DF       | 3376  | MISSISSIPPIAN | 16-Jan-64 | 11-Mar-64  |          | OIL      | Plugged and Abandoned |                       |
| -97.708460 | 23       | S       | 4     | W         | 25      | C SW NE     | 3300       | -1980     | SE       | S & K OIL                              | 1466      | KB       | 3375  | MISSISSIPPIAN | 5-Nov-65  | 17-Feb-66  |          | OIL      | Plugged and Abandoned |                       |
| -97.708460 | 23       | S       | 4     | W         | 25      | C NW NE     | 4620       | -1980     | SE       | OLSON                                  | 1462      | DF       | 3386  | CHAT          | 1-Feb-66  | 14-Feb-66  |          | OIL      | Plugged and Abandoned |                       |
| -97.702730 | 23       | S       | 4     | W         | 25      | C NE NE SE  | 2310       | -330      | SE       | S & K OIL CO                           | 1459      | DF       | 3385  | MISSISSIPPIAN | 15-Mar-67 | 1-May-67   |          | OIL      | Well Drilled          |                       |
| -97.707310 | 23       | S       | 4     | W         | 25      | C SE SW SE  | 330        | -1650     | SE       | S & K OIL CO                           | 1463      | KB       | 3366  | MISSISSIPPIAN | 13-Dec-64 | 5-Feb-65   |          | OIL      | Well Drilled          |                       |
| -97.708460 | 23       | S       | 4     | W         | 25      | C NW SE     | 1980       | -1980     | SE       | S & K OIL COMPANY                      | 1465      | KB       | 3350  | MISSISSIPPIAN | 16-Jun-66 | 16-Jun-66  |          | OIL      | Well Drilled          |                       |
| -97.711110 | 23       | S       | 4     | W         | 25      | E2 E2 W2    | 2640       | 2590      | SW       | S & K OIL COMPANY                      | 1464      | KB       | 3342  | MISSISSIPPIAN | 21-Jan-66 | 16-Mar-66  |          | W-NU     | Plugged and Abandoned |                       |
| -97.707310 | 23       | S       | 4     | W         | 25      | C E2 NW NE  | 4620       | -1650     | SE       | S & K OIL CO                           | 1465      | KB       | 3345  |               | 2-Dec-65  | 16-Jun-66  | 1-May-72 | OIL      | Plugged and Abandoned |                       |
| -97.713040 | 23       | S       | 4     | W         | 25      | C E2 W2     | 2640       | -3300     | SE       | OLSON                                  | 1462      | DF       | 3374  |               | 5-Nov-66  | 11-Dec-66  | 1-Nov-59 | OIL      | Plugged and Abandoned |                       |
| -97.713040 | 23       | S       | 4     | W         | 25      | C NE SW     | 1980       | -3300     | SE       | S & K OIL COMPANY                      | 1465      | KB       | 3365  | MISSISSIPPIAN | 19-Nov-65 | 7-Dec-65   | 1-Nov-74 | OIL      | Plugged and Abandoned |                       |
| -97.716330 | 23       | S       | 4     | W         | 25      | C NW        | 3960       | -3960     | SE       | OLSON OIL INC                          | 1472      | DF       | 3590  |               | 29-Mar-66 |            | 1-Oct-68 | OIL      | Plugged and Abandoned |                       |
| -97.702730 | 23       | S       | 4     | W         | 25      | NE NE SE    | 2310       | -330      | SE       | Sara Kahan Trust DBA S & K Oil Company | 1458      | TOPO     |       |               |           |            |          | EOR      | Plugged and Abandoned |                       |
| -97.713040 | 23       | S       | 4     | W         | 25      | C NE NW     | 4620       | -3300     | SE       | S & K OIL CO                           | 1470      | KB       | 3346  |               | 26-Dec-65 | 16-Jun-66  | 1-Apr-72 | OIL      | Plugged and Abandoned |                       |
| -97.713040 | 23       | S       | 4     | W         | 25      | C NE NW     | 4620       | -3300     | SE       | OLSON OIL                              | 1467      | DF       | 3641  |               | 5-Nov-65  | 24-Feb-66  |          | OIL      | Plugged and Abandoned |                       |
| -97.713040 | 23       | S       | 4     | W         | 25      | C SE NW     | 3300       | -3300     | SE       | S & K OIL CO                           | 1466      | KB       | 3347  |               | 25-Nov-65 | 16-Feb-66  | 1-Aug-76 | OIL      | Plugged and Abandoned |                       |
| -97.713040 | 23       | S       | 4     | W         | 25      | C SE NW     | 660        | -3300     | SE       | OLSON OIL                              | 1460      | DF       | 3371  |               | 6-Jun-64  | 10-Jul-64  |          | OIL      | Plugged and Abandoned |                       |
| -97.703870 | 23       | S       | 4     | W         | 25      | C NE SE     | 1980       | -660      | SE       | S & K OIL CO                           | 1464      | KB       | 3370  |               | 8-Oct-63  | 27-Nov-63  | 1-Oct-68 | OIL      | Plugged and Abandoned |                       |
| -97.708460 | 23       | S       | 4     | W         | 25      | S2 N2 SW SE | 760        | -1980     | SE       | S & K OIL CO                           | 1466      | KB       | 3370  |               | 29-Aug-63 | 26-Sep-63  | 1-Oct-68 | OIL      | Plugged and Abandoned |                       |
| -97.708460 | 23       | S       | 4     | W         | 25      | C SW SE     | 660        | -1980     | SE       | OLSON OIL                              | 1458      | DF       | 3370  |               | 2-Oct-64  |            | 1-Sep-64 | OIL      | Plugged and Abandoned |                       |
| -97.717620 | 23       | S       | 4     | W         | 25      | C SW SW     | 1980       | -4620     | SE       | S & K OIL CO                           | 1467      | KB       | 3380  |               | 6-Jan-66  | 8-Mar-66   |          | OIL      | Plugged and Abandoned |                       |
| -97.717620 | 23       | S       | 4     | W         | 25      | C NW SW     | 4620       | -1980     | SE       | OLSON OIL                              | 1463      | DF       | 3374  |               | 2-May-64  | 16-Jun-64  | 1-Aug-74 | OIL      | Producing             |                       |
| -97.703870 | 23       | S       | 4     | W         | 25      | C SE NE     | 3300       | -660      | SE       | S & K OIL CO                           | 1462      | KB       | 3370  |               | 18-Oct-63 | 27-Nov-63  |          | OIL      | Producing             |                       |
| -97.702730 | 23       | S       | 4     | W         | 25      | C SE SE NE  | 2970       | -330      | SE       | OLSON OIL INC                          | 1461      | DF       | 3392  |               | 18-Jul-67 |            |          | D&A      | Producing             |                       |
| -97.708460 | 23       | S       | 4     | W         | 25      | C W2 E2     | 2640       | -1980     | SE       | OLSON OIL                              | 1463      | DF       | 3377  |               | 15-Dec-66 |            | 1-Mar-47 | OIL      | Plugged and Abandoned |                       |
| -97.717630 | 23       | S       | 4     | W         | 25      | C NW NW     | 4620       | -4620     | SE       | S & K OIL CO                           | 1470      | KB       | 3329  |               | 27-Dec-65 | 16-Jun-66  | 1-Jun-74 | OIL      | Plugged and Abandoned |                       |
| -97.717630 | 23       | S       | 4     | W         | 25      | C NW NW     | 4620       | -660      | SE       | OLSON OIL                              | 1467      | DF       | 3377  |               | 15-Apr-62 | 12-Jun-62  | 1-Jan-47 | OIL      | Plugged and Abandoned |                       |
| -97.703870 | 23       | S       | 4     | W         | 25      | C NE NE     | 4620       |           | SE       | OLSON OIL                              | 1459      | DF       | 3370  |               | 7-Sep-62  |            |          | OIL      | Plugged and Abandoned |                       |

| Karst Points E½ Section 25 T23S R04W |            |           |          |                     |          |                                       |
|--------------------------------------|------------|-----------|----------|---------------------|----------|---------------------------------------|
| Id                                   | Date_Acq   | Longitude | Latitude | PLSS                | Feature  | Comments                              |
| 1                                    | 10/24/2005 | -97.70894 | 38.01591 | SW SE S25 T23S R04W | sinkhole | oil well casing still in lake, photos |
| 2                                    | 10/24/2005 | -97.70539 | 38.02202 | SE NE S25 T23S R04W | sinkhole | fissure in surface at beginning, 4'   |
| 3                                    | 10/24/2005 | -97.71050 | 38.02229 | SW NE S25 T23S R04W | sinkhole | scarp, 25' tape, extending south      |
| 4                                    | 10/24/2005 | -97.70717 | 38.02155 | SW NE S25 T23S R04W | sinkhole | swale attempted to drain              |
| 5                                    | 10/24/2005 | -97.70813 | 38.02479 | NW NE S25 T23S R04W | sinkhole | possible new development              |
| 6                                    | 10/24/2005 | -97.70698 | 38.01459 | SW SE S25 T23S R04W | sinkhole | swale, attempted to drain             |
|                                      |            |           |          |                     |          | possible new sink                     |
|                                      |            |           |          |                     |          | 1950's                                |
|                                      |            |           |          |                     |          | 1972                                  |
|                                      |            |           |          |                     |          | 1999                                  |
|                                      |            |           |          |                     |          | 2005                                  |
|                                      |            |           |          |                     |          | 2003                                  |
|                                      |            |           |          |                     |          | 2005                                  |



| Karst Polygons E½ Section 25 T23S R04W |           |           |          |                     |          |                                                                |
|----------------------------------------|-----------|-----------|----------|---------------------|----------|----------------------------------------------------------------|
| Id                                     | Date_Acq  | Longitude | Latitude | PLSS                | Feature  | Comment_                                                       |
| 1                                      | 11/9/2005 | -97.70891 | 38.01597 | SW SE S25 T23S R04W | Sinkhole | shape and size based on 2002 orthophoto, not measured in field |
| 2                                      | 11/9/2005 | -97.70481 | 38.02187 | SE NE S25 T23S R04W | Sinkhole | shape and size based on 2002 orthophoto, not measured in field |
| 3                                      | 11/9/2005 | -97.71046 | 38.02224 | SW NE S25 T23S R04W | Sinkhole | shape and size based on 2002 orthophoto, not measured in field |
| 7                                      | 11/9/2005 | -97.70358 | 38.01816 | NE SE S25 T23S R04W | unknown  | circular feature in lake visible on 2002 orthophoto            |