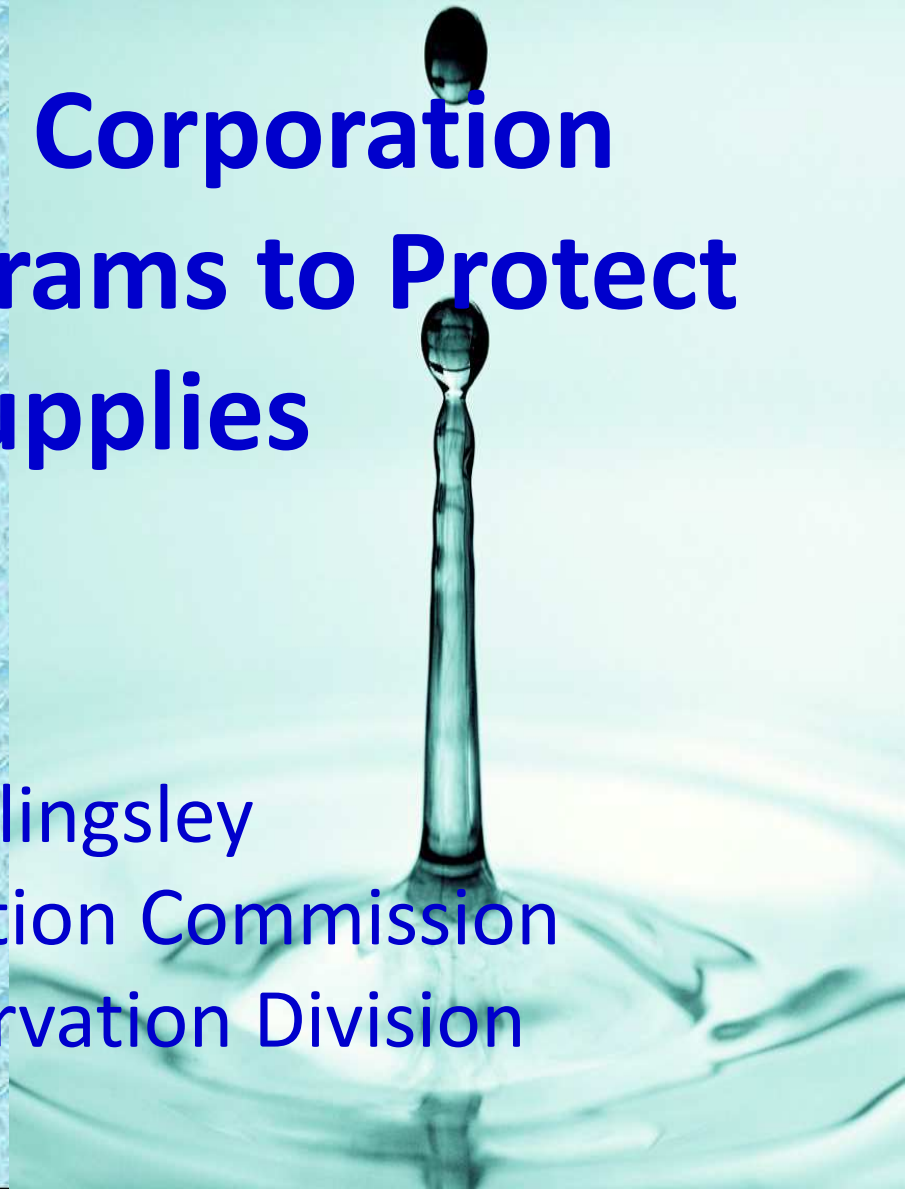
# Two Oklahoma Corporation Commission Programs to Protect Water Supplies



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Oklahoma Corporation Commission
Oil and Gas Conservation Division

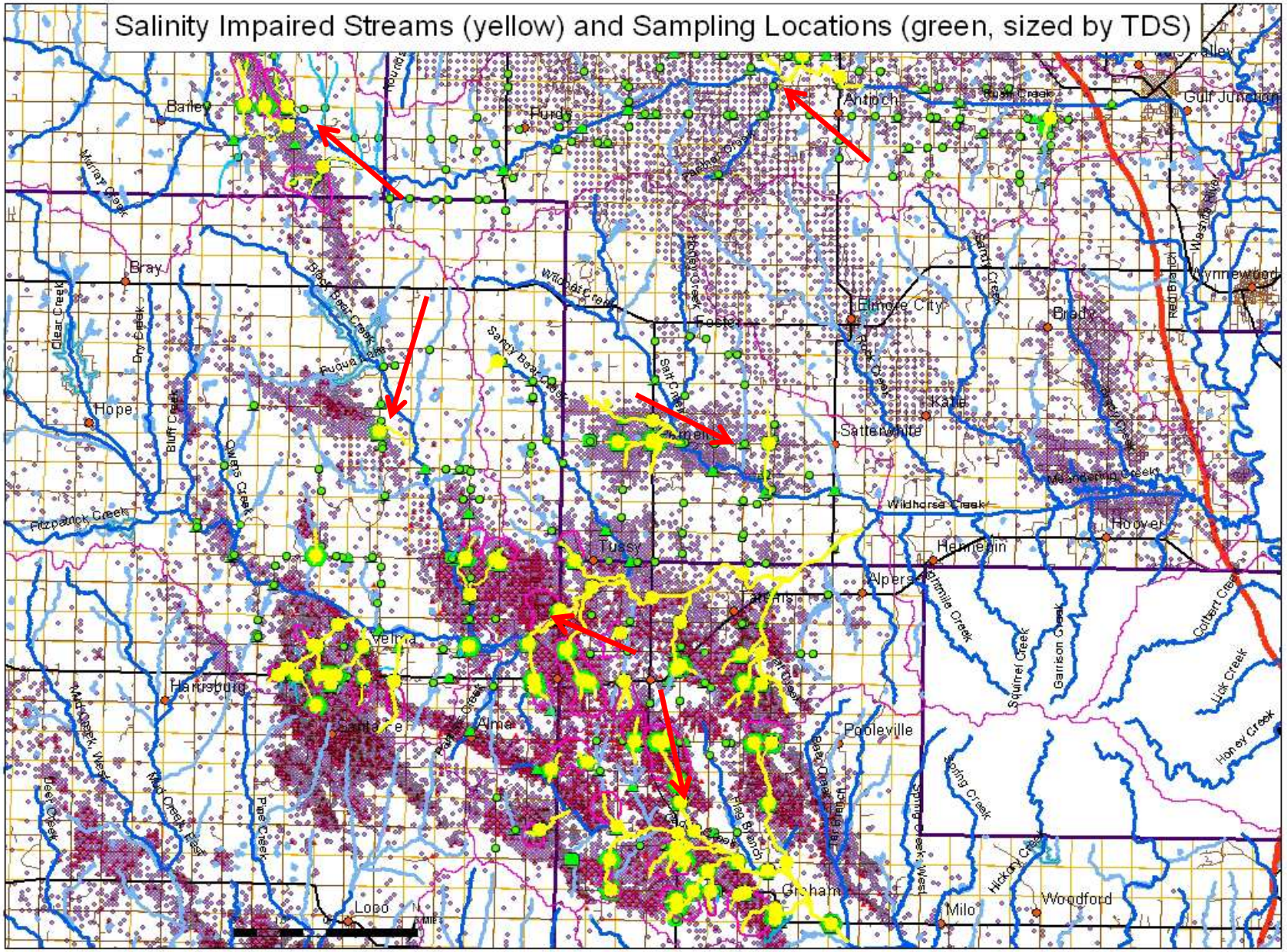
Today I will be talking about the two of the Commission's drinking water protection programs:

1. Special Field Rules and
2. Base of Treatable Water mapping for surface casing requirements.

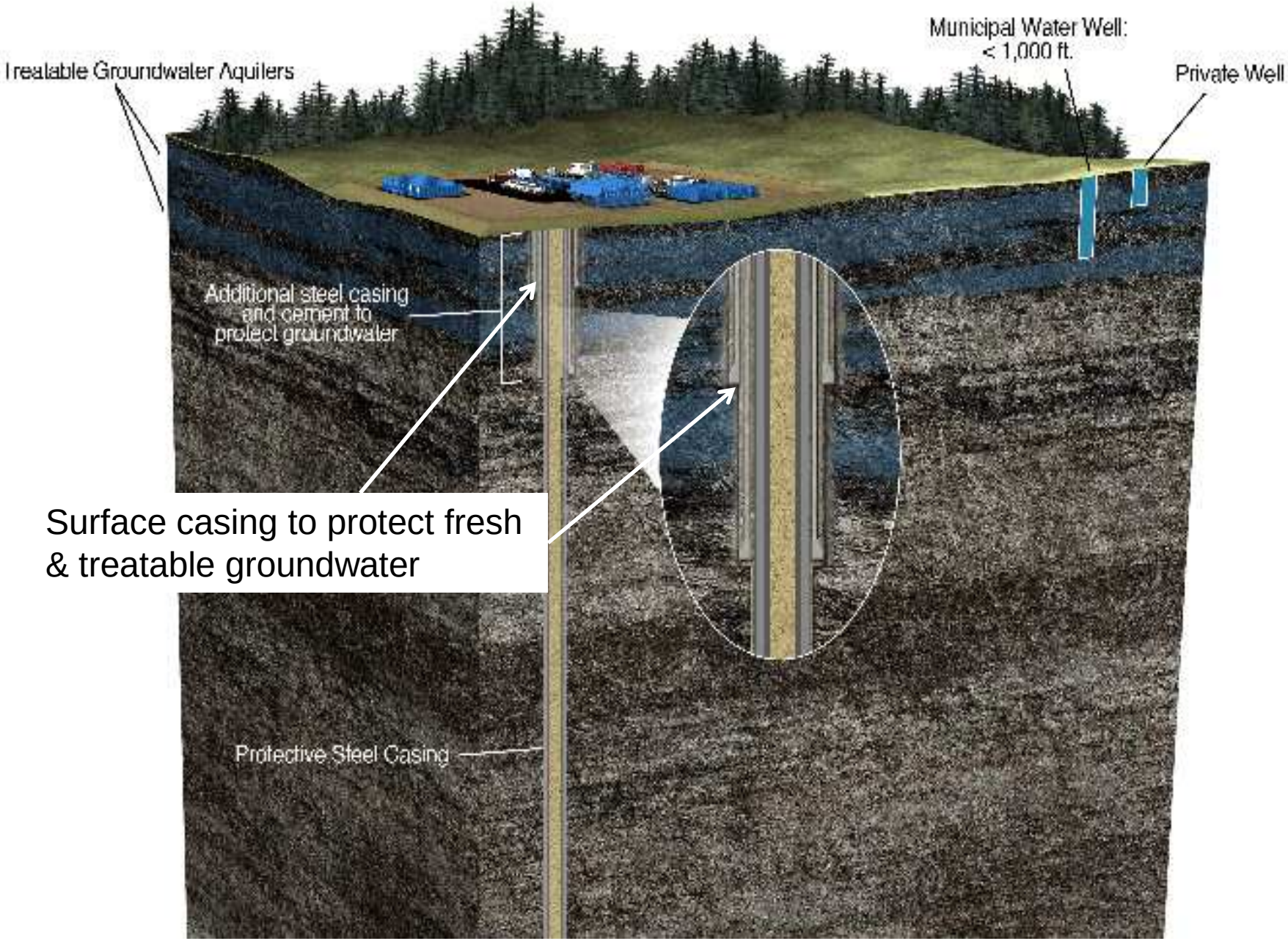
**Please do not snore loudly.**

# Current Oil and Gas Activities Can Affect Surface Waters at Wellsites

# Saline Streams, South OK



# O&G Activities Can Affect Groundwater




Surface casing to protect fresh & treatable groundwater

# To Protect Groundwater – Corp Comm Has General Requirements

- Clay or textile membrane lined pits
- Surface Casing –
  - steel cemented in place to protect fresh water aquifers from oil & other fluids in the well bore.
  - Oil and Gas wells must be cased through the fresh to mildly saline from the surface to 50’ below the Base of Treatable Water.
- NO drilling is allowed in a Wellhead Protection Area

However, while there are some erosion control and pit rules , there are few general rules specifically written to protect surface water.

Which is why we have the special Field rules.

# Corp Comm's Special Oil Field Rules

165: 10-7-6 Protection of Municipal **Water Supplies**

"The Commission, upon application of any municipality or other governmental subdivision, may enter an order establishing special field rules within a defined area to protect and preserve fresh water and fresh water supplies"

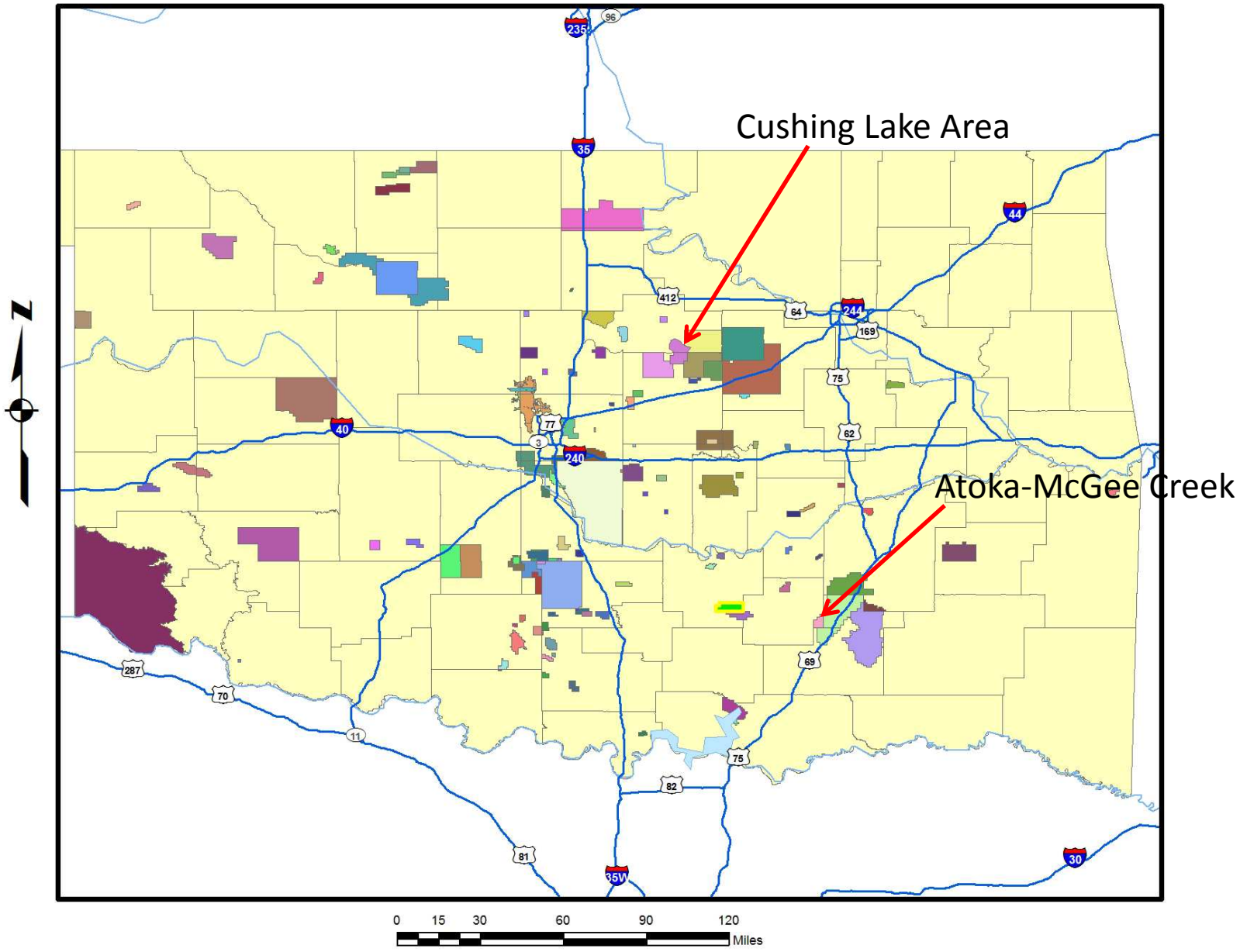
**Town & Rural Water District H2Os are covered**

# These Special Field Rules can be set by Rule or by Commission Administrative Law Order

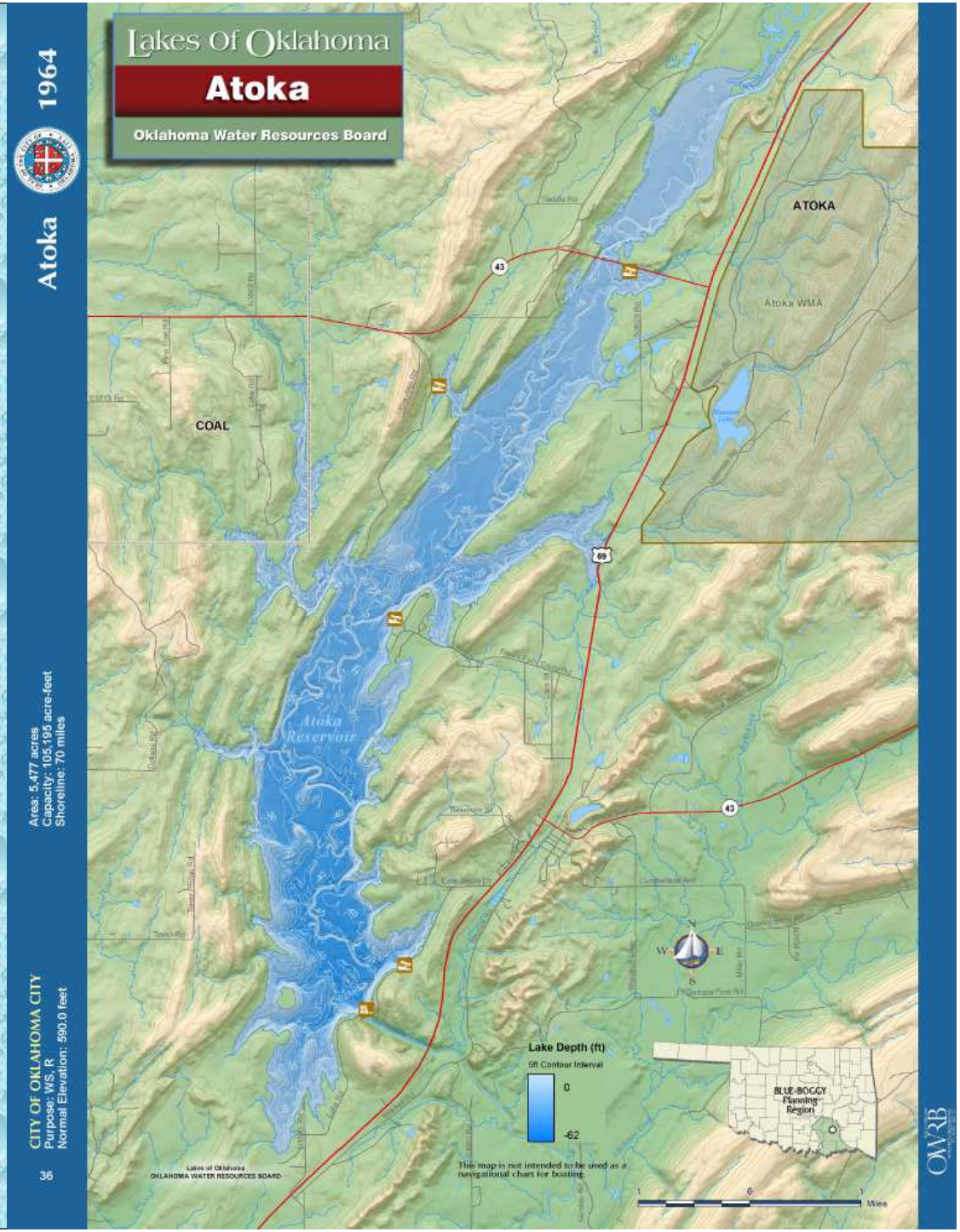
Exactly what rules are set depends on the needs of the town or rural water district.

Here are several very different examples

Oklahoma Corporation Commission
Field Rule Areas



Lake Atoka & the streams in its watershed are in steep-sided valleys; erosion and sediment infill were concerns.



# Special Field Rules Example #1 – Lake Atoka & McGee Creek Reservoir

- **(1) IN ATOKA COUNTY**
- (A) Sections 1-35 of Township 1 North, Range 12 East;
- (B) Sections 1-18, 21-28 and 35-36 of Township 1 North, Range 13 East;
- (C) Sections 1-36 of Township 1 North, Range 14 East;
- and so on

The first part of all field rules is to legally describe the whole area covered

# Example #1, Lake Atoka/McGee Creek

## Sediment, Stormwater Runoff and Pit Concerns

**Drill site containment.** During the drilling and completion of an oil and gas well the operator shall, **within six (6) miles of the maximum water surface level contour line**:

- (1) Maintain an earthen retaining wall downslope of the well, no closer than 50 feet from the wellbore. The retaining wall ……shall be of adequate size for the terrain involved with a minimum length of 330 feet and a minimum compacted height of two (2) feet; [to contain spills and muddy stormwater] and
- (2) Maintain a (stormwater) diversion ditch upslope of the well. [to keep stormwater from picking up pollutants by flowing over a wellsite]

# Example #1, Lake Atoka/McGee Creek

**Erosion control**. During the drilling phase of operations, silt fencing or other suitable materials or practices shall be used on the downslope side of the drill site to control runoff from the location.

**Pit Liner** - any pit shall be lined with a geomembrane liner that meets or exceeds each of the following specifications: [higher than standard requirements]

- (A) be made of linear low density polyethylene;
- (B) have a thickness of 20 millimeters; and
- (C) conform to the test requirements prescribed in GRI Test Method GM17;

And so on

# Example #2, Cushing Lake Area

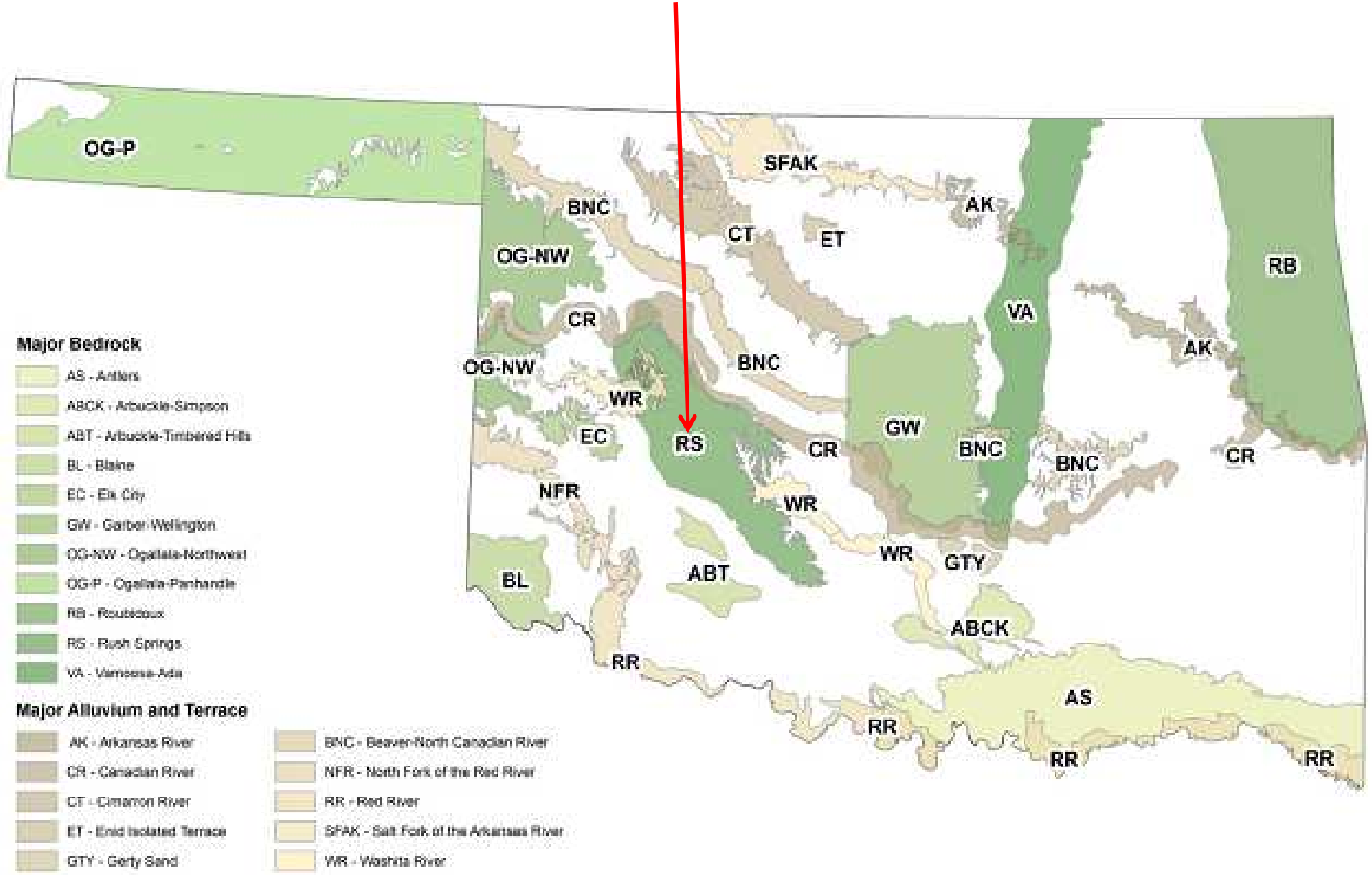
## Drilling Problems and Wastes were Concerns

1. Within 1350’ of the lake high water mark (840’ above sea level), the (well drilling) derrick must be completely sheeted (enclosed) before drilling starts **“as precaution against the spraying of oil due to blowouts or other causes”**;
2. Surface Casing –surface and production **casing cemented from 750’ up to ground surface**;
3. **All pits have a liner or impermeable mud layer**;

# Some Specific Rules for Cushing Lake Area

4. If there is any produced salt water, **the well must be shut down until "adequate means are had for the disposal of such salt water";**
5. Pits must be "sufficiently large" to hold all oils, sands etc. removed from the well;
6. All of such material **must be removed and deposited outside the water district** (i.e. no land application of drilling mud or cuttings within the district);

# Special Field Rules Example #3 - Rush Springs Aquifer



# Rush Springs – Simple Rule

## To Protect the Aquifer Outcrop- Recharge Area

- **165:10-29-3. Rush Springs Sandstone**
- (a) **Scope**

[List of all townships and sections in Aquifer outcrop area]

- (b) **Commercial pits prohibited.** The construction, enlargement, reconstruction or operation of any commercial pit (as defined in OAC 165:10-9-1) in any area listed in subsection (a) above, is prohibited.
- That is the entire rule

# To Start the Process Toward A Special Field Rule in Your Area

Contact :

(Position Open)

Manager of Pollution Abatement

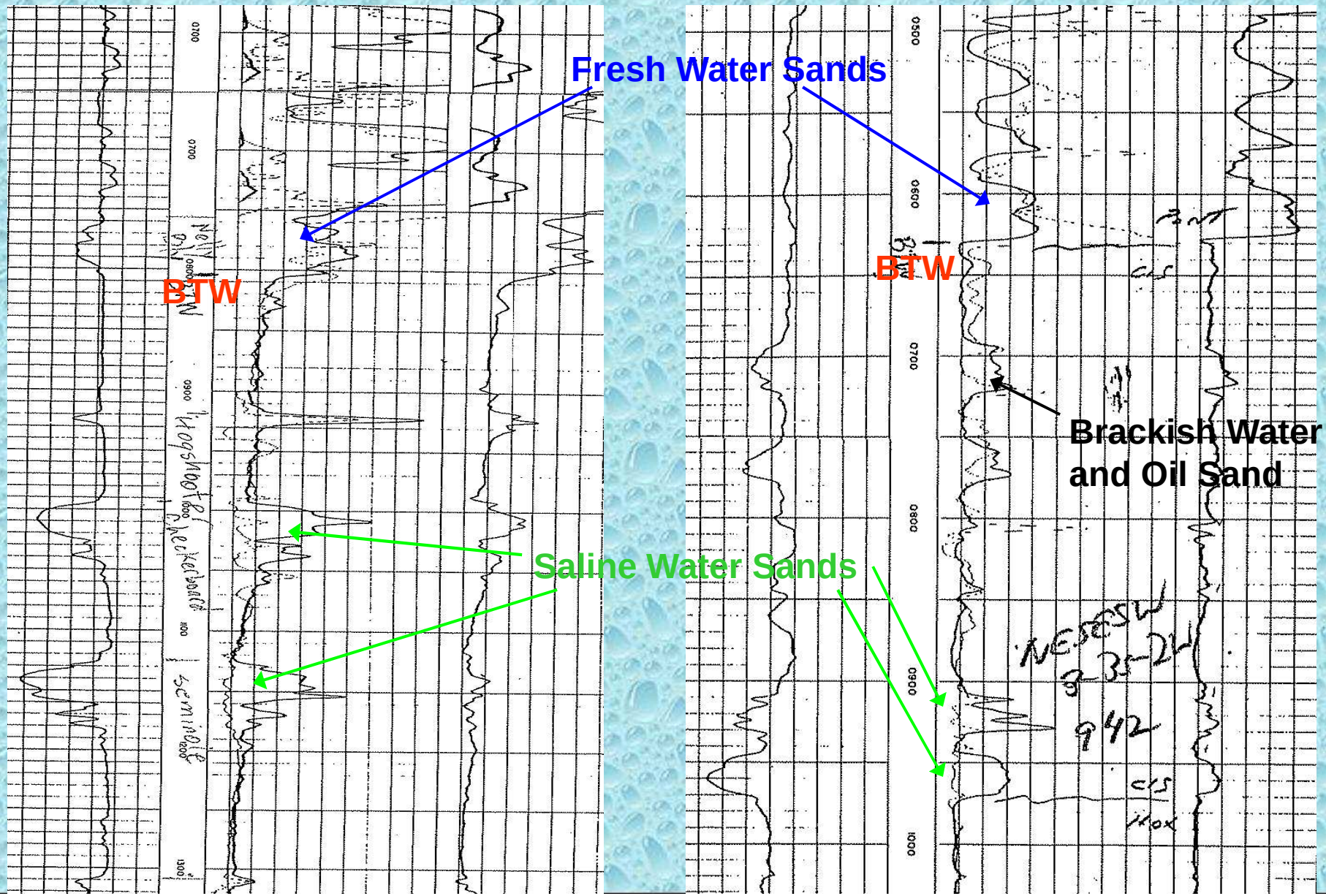
405-522-2763

# Base of Treatable Water (BTW) and Casing

- BTW – the base of fresh/usable groundwater, approximately 10,000 ppm total dissolved solids (TDS).
- Oil and Gas wells are required to be cased from the surface to 50’ below BTW, in order to protect fresh water aquifers from oil & gas, saline produced water, and drilling/fracing fluids in the well bore.
- Some pit requirements also use BTW

# Seminole & Carter Co. Wells

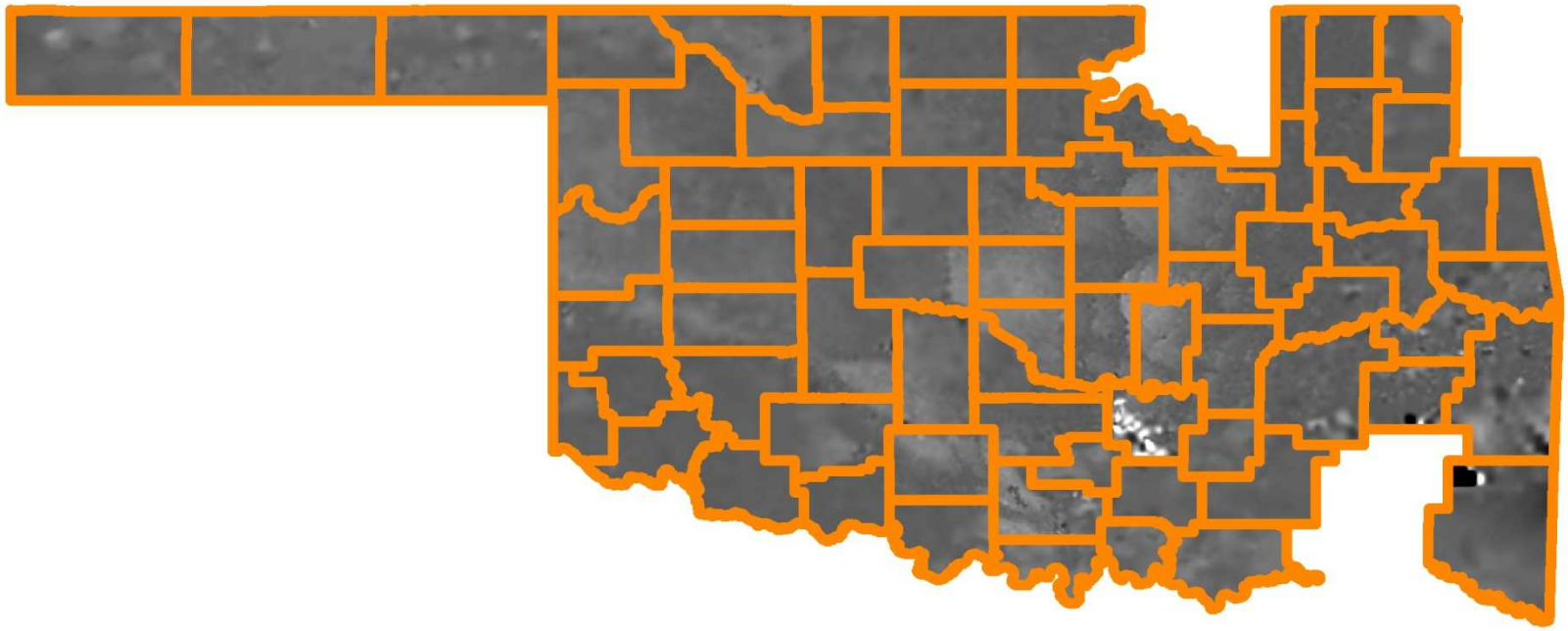
## BTW is picked from electric logs run in oil & gas wells



# Old BTW Maps

- During the 1980s the Corp Comm had a series of county BTW maps made
- These were used by Corp Comm to tell oil & gas drillers how much surface casing needed to be set in each well being drilled.
- The old maps were based on depth in the hole; calculations were needed at each well spot to figure casing needed from ground surface to new wells at differing elevations.

# Counties With Old BTW Data



Legend

BTW_county

grid

Value

High : 8995.25

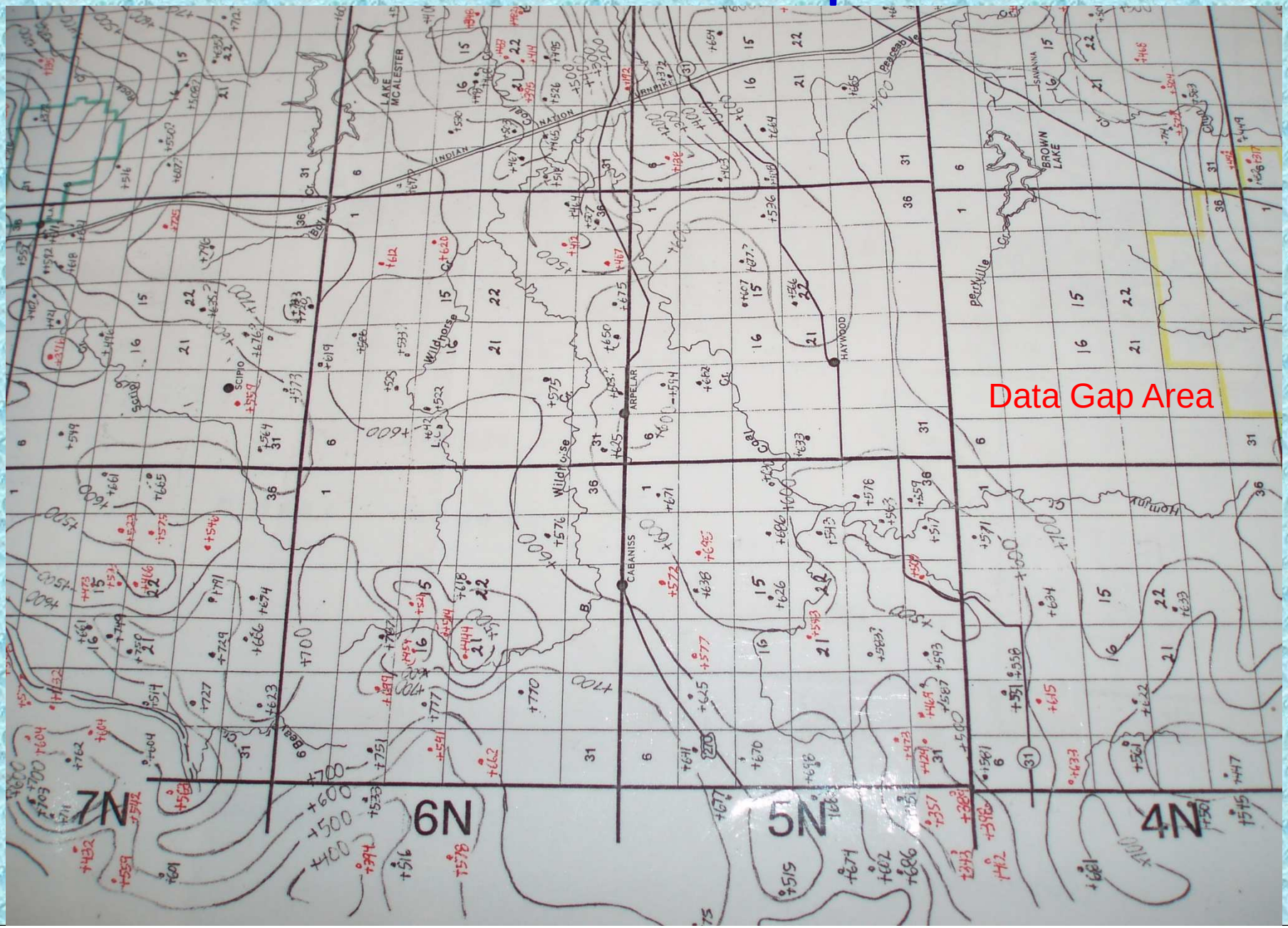
# Old BTW Maps

- Some square miles had only one data point from which maps were made.
- There were inaccuracies in some areas due the widely spaced data and the interpolation and mapping techniques then available, so groundwater not always protected.
- These old paper maps could only be used in our office, not made widely available.

# Old BTW Map


MCALESTER
KREBS
ALDERSON
BACHE
LAKE TALAWANDA NO. 1
LAKE TALAWANDA NO. 2
Mud Cr.
Fish Cr.
Miller Cr.
Peaceable Cr.

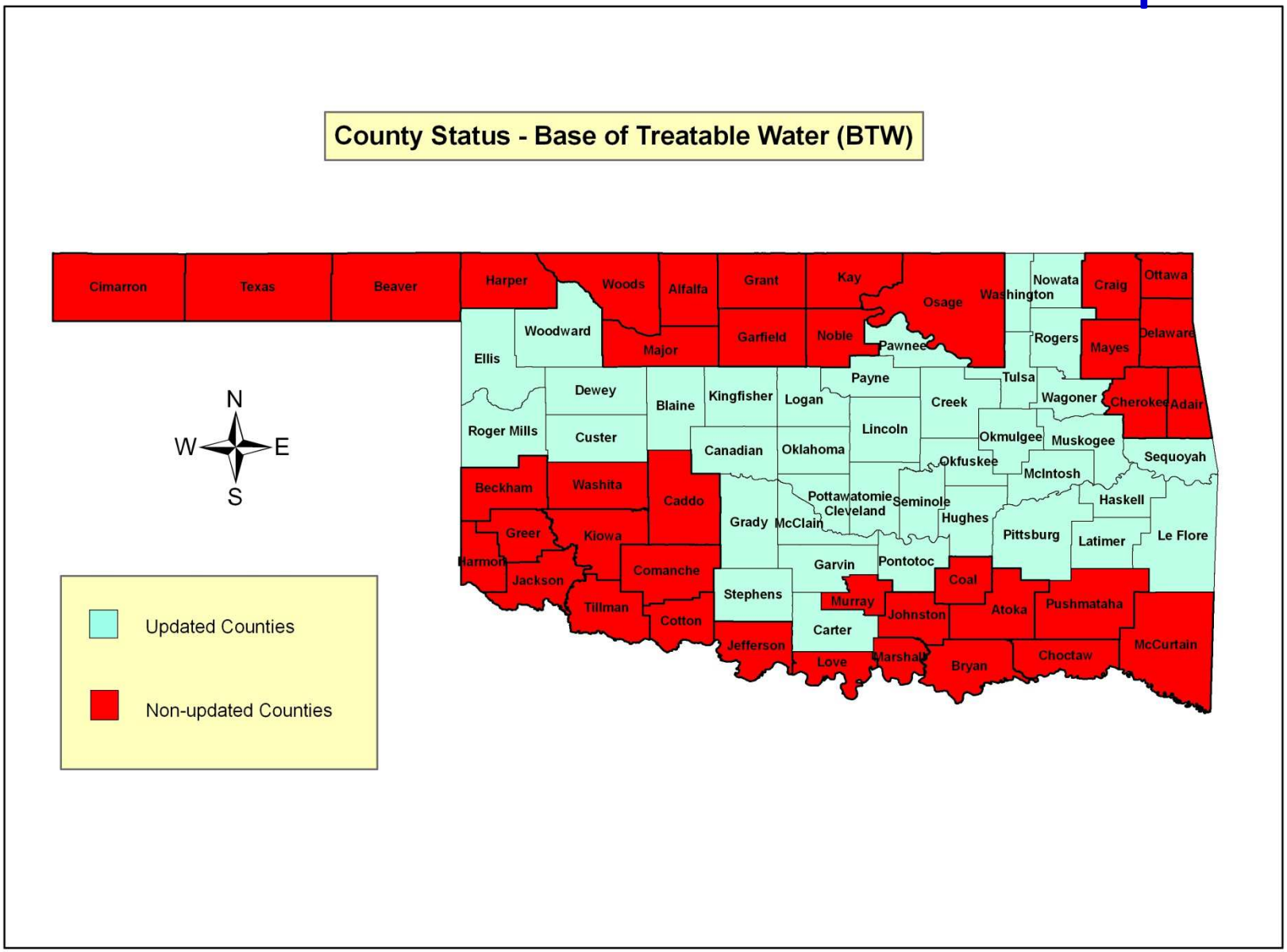
# Old BTW Map


Data Gap Area
7N
6N
5N
4N
LAKE MCALESTER
INDIAN NATION
SCIPIO
Wildhorse
ARPELAR
CABANISS
HAYWOOD
BROWN LAKE
Peaceable
Brockville

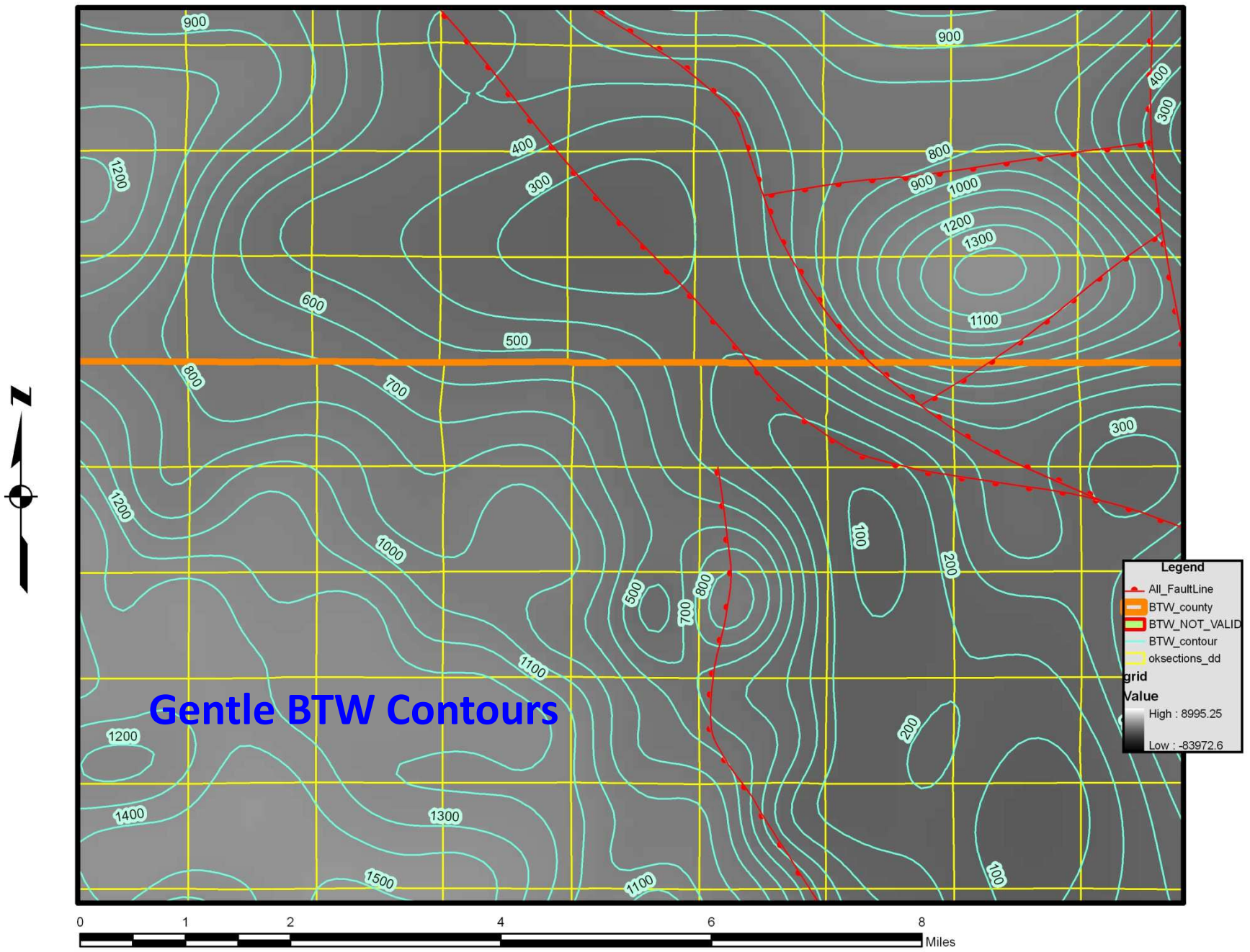
# New GIS-Based BTW Maps

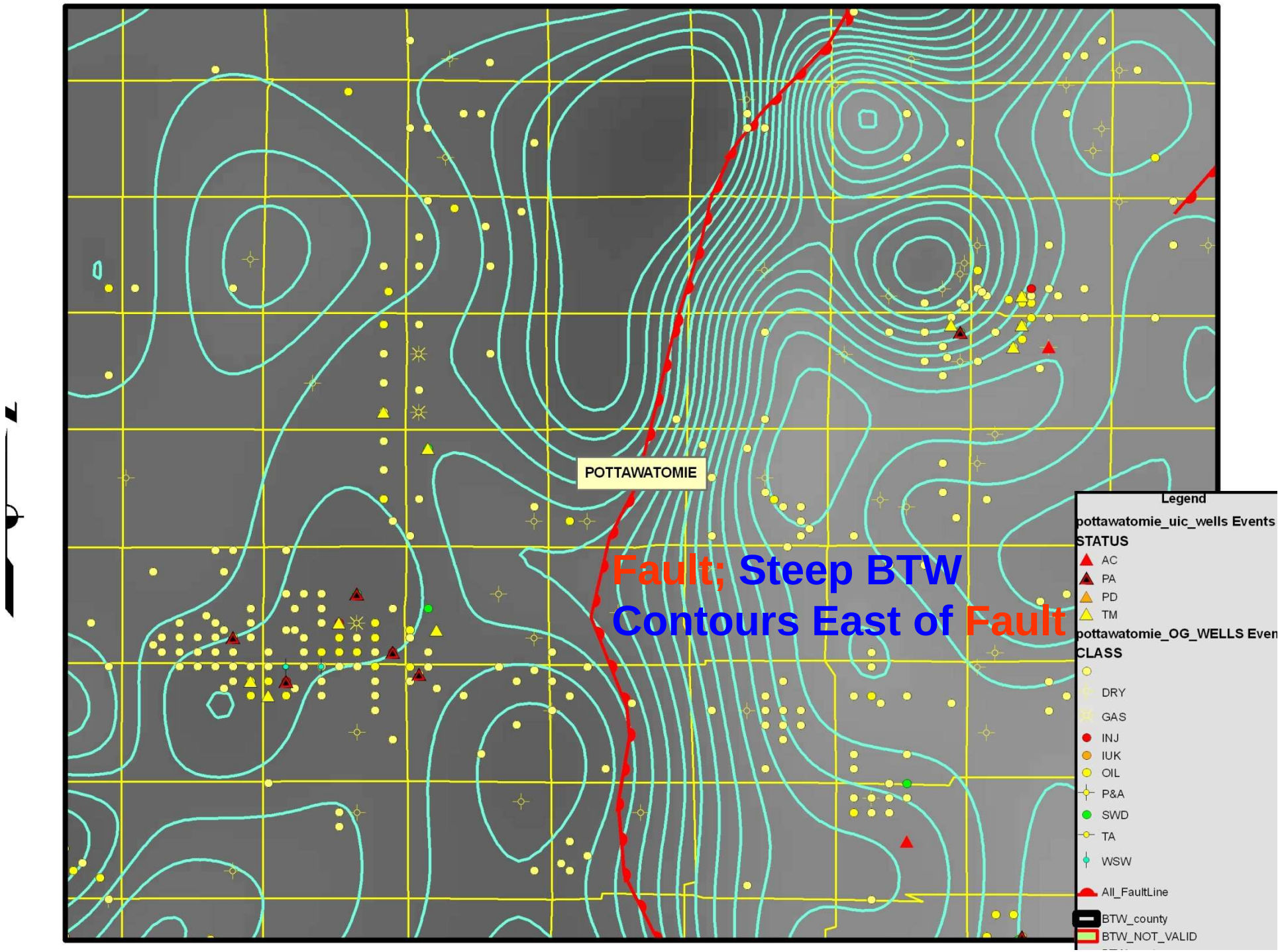
- Data used from at least one well per square mile in gently dipping areas;
- Data density is higher in steeply dipping, faulted and complex areas.
- Data is entered into GIS, contoured BTW maps are made. Color, other data added.
- New maps show **true depth to BTW**, & adjust automatically for elevation; casing depth can be read directly for each location.
- Data now available for most of the state.

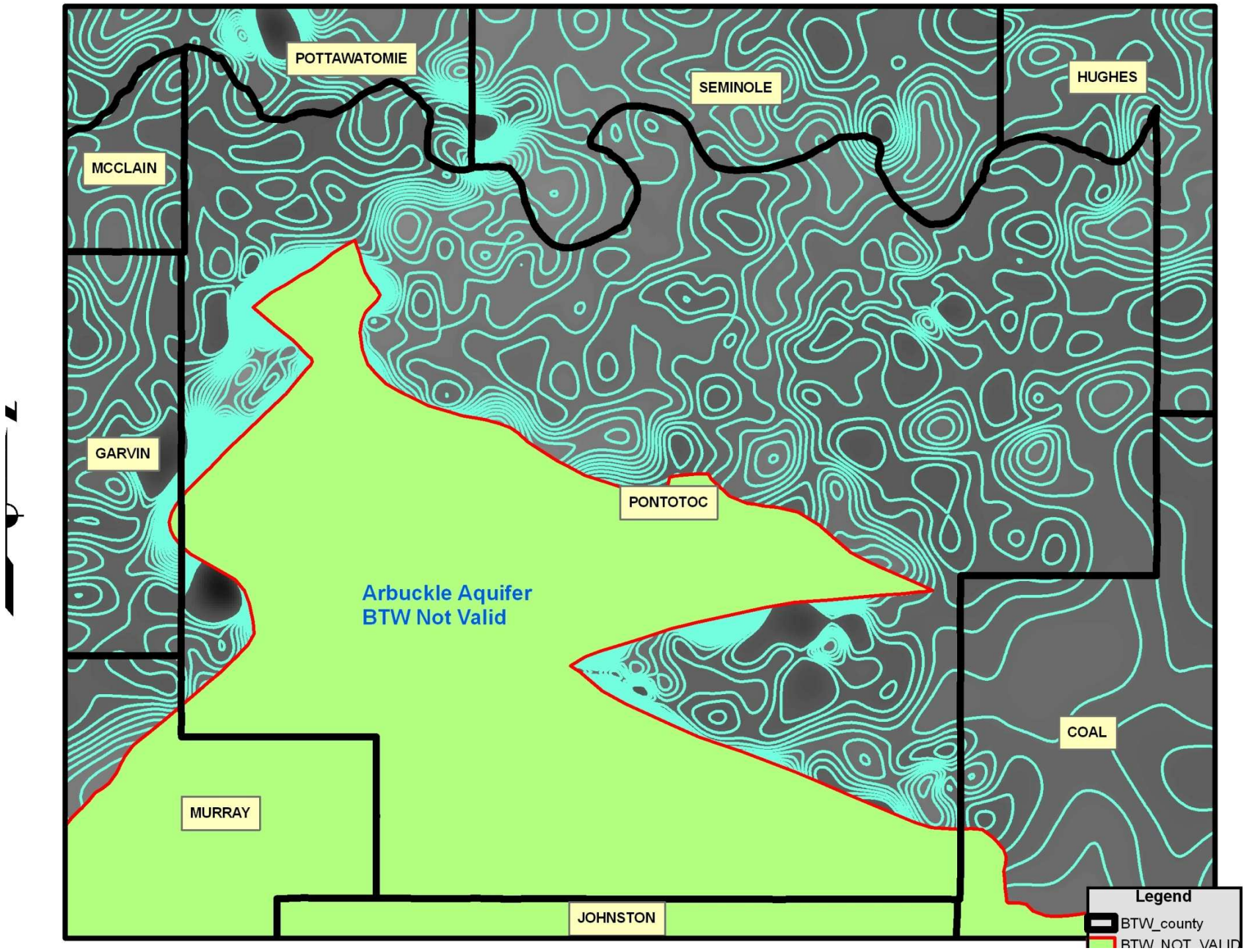
# Counties with new GIS-BTW maps



BTW - Feet below surface




POTTAWATOMIE
Fault; Steep BTW
Contours East of Fault
Legend
pottawatomie_uic_wells Events
STATUS
AC
PA
PD
TM
pottawatomie_OG_WELLS Even
CLASS
DRY
GAS
INJ
IUK
OIL
P&A
SWD
TA
WSW
All_FaultLine
BTW_county
BTW_NOT_VALID


POTTAWATOMIE
SEMINOLE
HUGHES
MCCLAIN
GARVIN
PONTOTOC
Arbuckle Aquifer
BTW Not Valid
COAL
MURRAY
JOHNSTON
Legend
BTW_county
BTW_NOT_VALID

# Future BTW Plans

1) Make these maps available on the web, so O&G drillers can plan casing needs in advance.

2) New Program -
   - Use the BTW maps & well log data to calculate the thickness (and later volume?) of fresh & treatable ground water in each county in the state
   - to help water districts determine the best locations for new water supply wells.