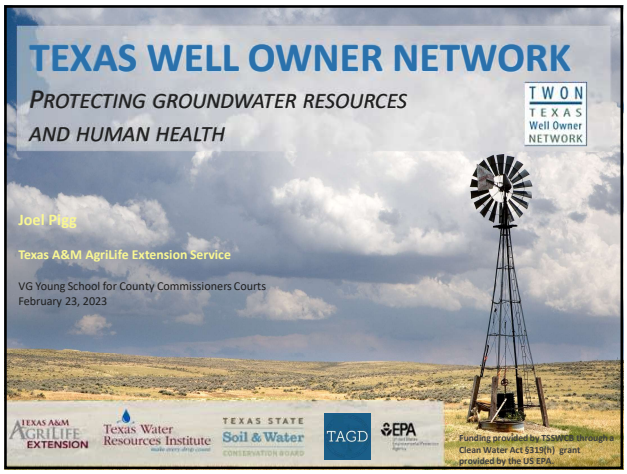
TEXAS WELL OWNER NETWORK
PROTECTING GROUNDWATER RESOURCES AND HUMAN HEALTH
TWON TEXAS Well Owner NETWORK
Joel Pigg
Texas A&M AgriLife Extension Service
VG Young School for County Commissioners Courts
February 23, 2023
Texas Water Resources Institute
TEXAS STATE Soil & Water CONSERVATION BOARD
TAGD
EPA
Funding provided by TSSWCB through a Clean Water Act §319(h) grant provided by the US EPA

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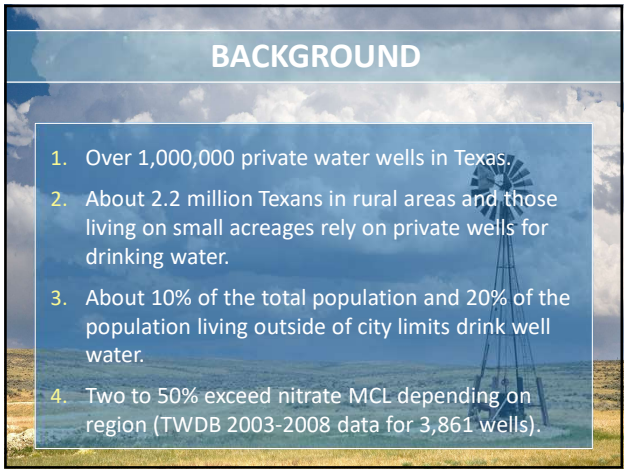

BACKGROUND
1. Over 1,000,000 private water wells in Texas.
2. About 2.2 million Texans in rural areas and those living on small acreages rely on private wells for drinking water.
3. About 10% of the total population and 20% of the population living outside of city limits drink well water.
4. Two to 50% exceed nitrate MCL depending on region (TWDB 2003-2008 data for 3,861 wells).

2


In Texas, a household well is exempt from water quality regulations, including exemption from water quality monitoring to assure the well water is safe to drink.
Groundwater pollution can often be prevented - the well owner is responsible for assuring safe drinking water.

3

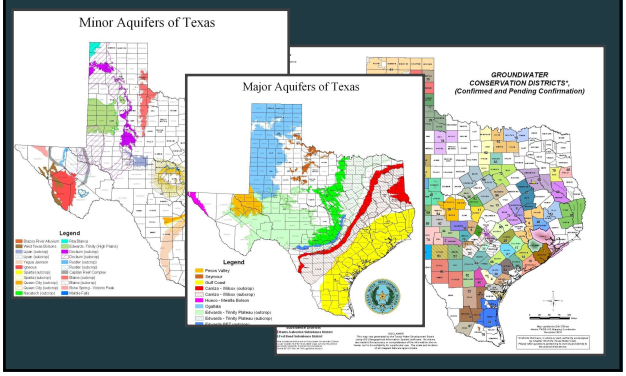
Texas Well Owner Network Program Goals

Desired Outcomes

1. Changes in knowledge, awareness, attitudes and actions of private well mangers.
2. Improvement of private well management to safeguard homeowner health and protect water resources.

4

Groundwater in Texas



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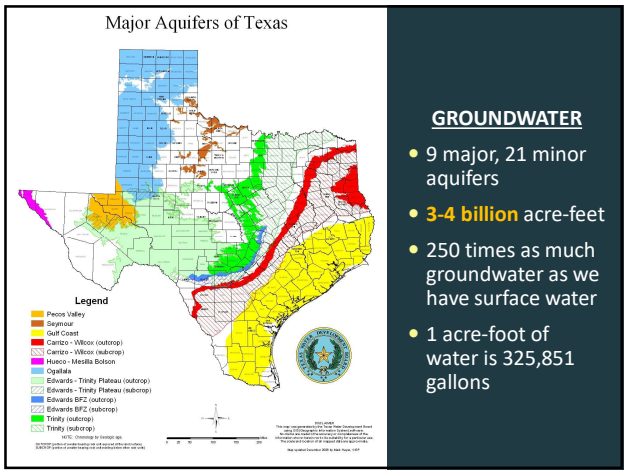


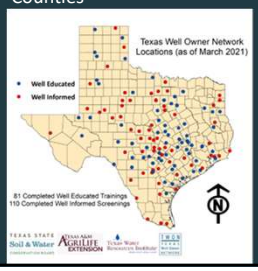
GROUNDWATER

- 9 major, 21 minor aquifers
- **3-4 billion** acre-feet
- 250 times as much groundwater as we have surface water
- 1 acre-foot of water is 325,851 gallons

6

Texas Well Owner Network

- TWON was established 2011
- 10,400 participants in workshops
- 200 events
- Covering 180 of the 254 Texas Counties



7

TWON Educational Trainings

Two Program Types

- *"Well Educated"*
  - 4 hour training program
  - Water sample screening
- *"Well Informed"*
  - 1 hour educational program
  - Water sample campaign
  - Screening result interpretation
  - Wellhead protection

8

TWON Educational Training

"Well Informed"

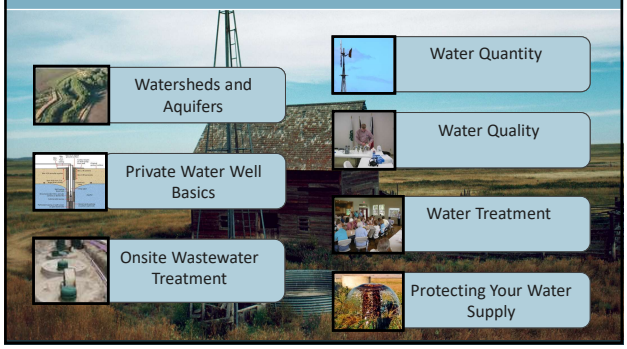
1 hour program

- *Water Sample Screening*
  - *E. coli* bacteria
  - Nitrates
  - Total Dissolved Solids
  - Arsenic (location driven)
- *Education Program*
  - Explanation of results
  - Wellhead protection
  - Stimulate initial interest and responsibility

9

TWON Educational Trainings

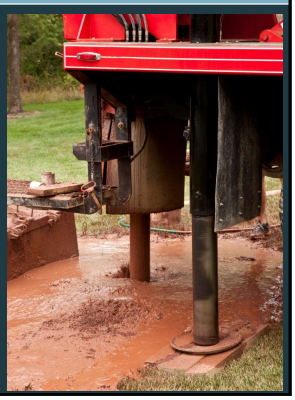
"Well Educated"



10

Information about Your Well

- Record the Locations (GPS)
- Keep Well Logs
- Registration or Permit with Groundwater Conservation District
- TWDB and TCEQ



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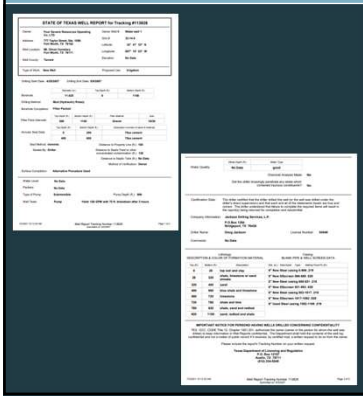
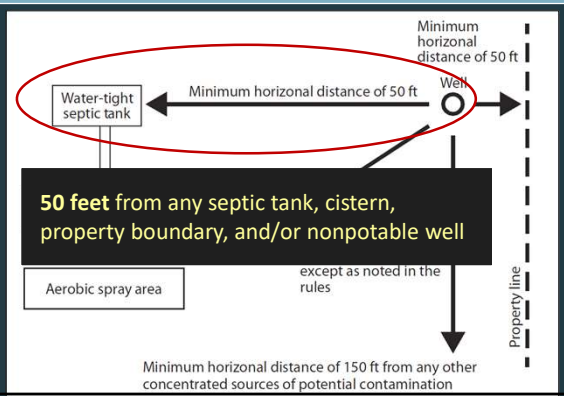
Well Logs



- Well number
- Owner and location information
- Well construction and driller information
- Well testing data
- Geologic formation

12

Well Siting Regulations



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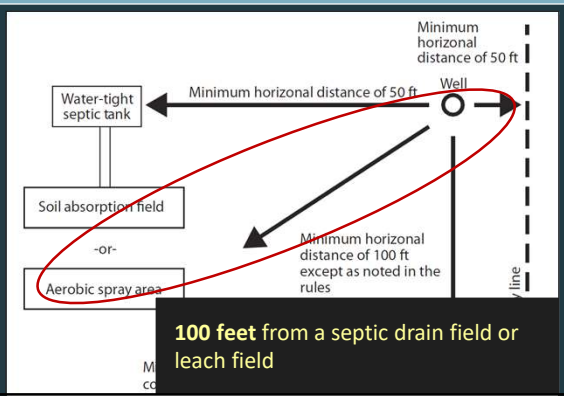
Well Siting Regulations



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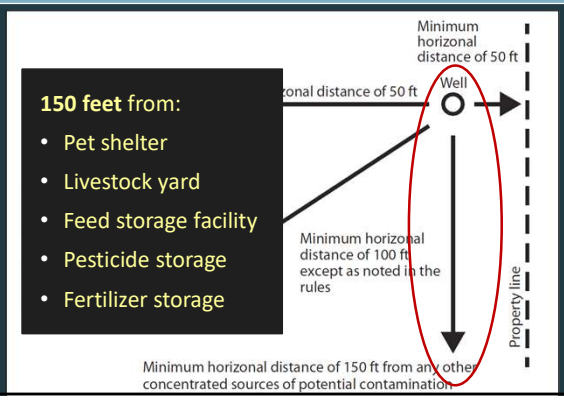
Well Siting Regulations

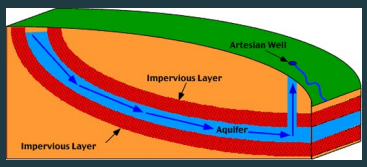


15

What Is an Aquifer?

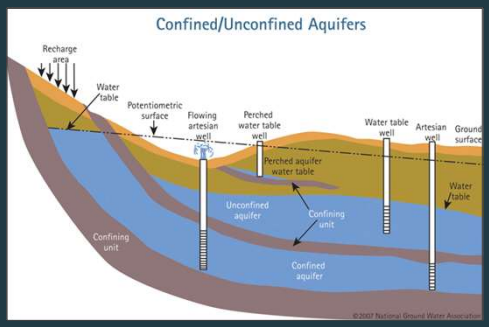
An aquifer is geologic media that can yield economically usable amounts of water.

An aquitard is geologic media that can NOT yield economically usable amounts of water.



16

Types of Aquifers



17

Groundwater In Texas

- Groundwater supplies about 60% of the water used in Texas
- Around 80% of groundwater used is for irrigation
- About 36% of water used by municipalities is from groundwater.

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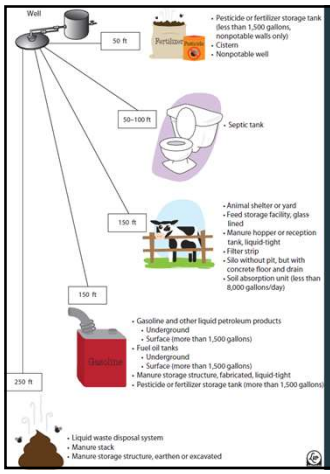

Protection starts at home

Keep potentially contaminating activities a safe distance from the wellhead

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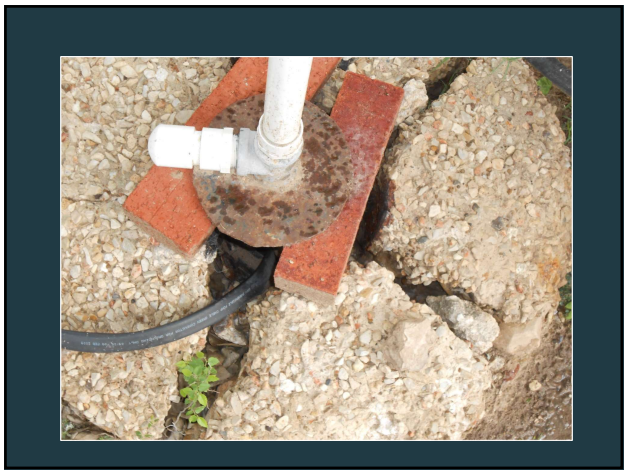


21

22

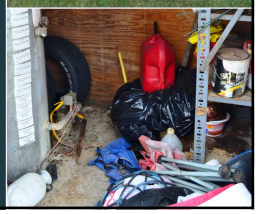
Why Does Well Construction Matter?

- Poor construction can affect drinking water quality
- Poor construction can contribute to groundwater pollution
- Proper construction can prolong the life and yield of the well and protect groundwater quality

23

Well Maintenance Tips

- Keep all records
  - Well log, water test, maintenance/repair information
- Do not use or store fertilizers, pesticides, oil or paint around well
- Keep area around the well clean and accessible
- Conduct a monthly, thorough visual inspection for cracks, cap, soil disturbance, flooding, damage
- Well inspection by a licensed well driller every 5 -10 years



24

Water Well Testing FAQs

How often should the well be tested?
- Annually for bacteria
- Every few years for general chemistry such as nitrates and salts
- As frequently as needed for other contaminants of concern

How much will it cost?
- Varies depending on analyses selected.
- Basic *E. coli* test should be less than $30

25

HOW DO I FIND A LAB?

Drinking Water Testing:

- County Health Departments and River Authorities
- NELAC-certified labs on TCEQ website
  - http://www.tceq.texas.gov/goto/certified_labs
  - 512-239-3754

26

Fecal Bacteria

- Microscopic organisms found in feces of humans and other warm-blooded animals
- Not all are harmful by themselves
- *Indicator* organisms: indicate presence of *pathogenic* bacteria, viruses, parasites
- Fecal coliform and *E. coli* are most commonly tested

27

Treating Bacteria

- If you have a positive test for *E. coli* bacteria, there are several steps that you should take:
  1. Boil all water intended for consumption
  2. Disinfect the well thoroughly with chlorine
  3. Monitor the water quality to ensure the problem does not recur

- If recurring, try to identify the source and fix the problem
- To kill bacteria and viruses:
  - Chlorination
  - Ultraviolet light
  - Ozone
  - Distillation

28

Reverse Osmosis (RO)

- Effective for a variety of contaminants
- Pressure forces water through a membrane
- Point-of-use
- Could overwhelm septic

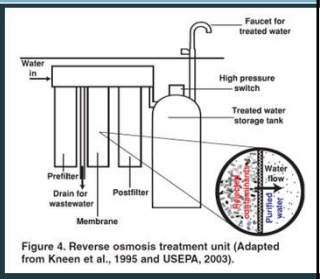


Figure 4. Reverse osmosis treatment unit (Adapted from Kneen et al., 1995 and USEPA, 2003).

Problem Pollutants	Aluminum, Arsenic, Asbestos, Barium, Cadmium, Chloride, Chlorine, Chromium, Copper, Fluoride, Iron, Hardness, Lead, Magnesium, Manganese, Mercury, Nitrate, Radium, Radon, Silver, Sodium, Sulfate, Endrin, Heptachlor, Lindane

29

Iron and Manganese

- Nuisance – can give water unpleasant taste odor, and color
- Secondary MCL:
  - Iron = 0.3 mg/L
  - Manganese = .05 mg/L
- Stains- Iron (reddish brown) Manganese (brownish black) stains on concrete, glassware, laundry, porcelain, sinks and plumbing fixtures

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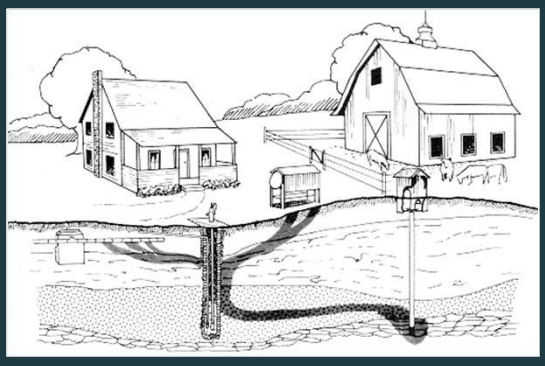


Abandoned wells can be pathways for pollutants

31

Abandoned Wells




32

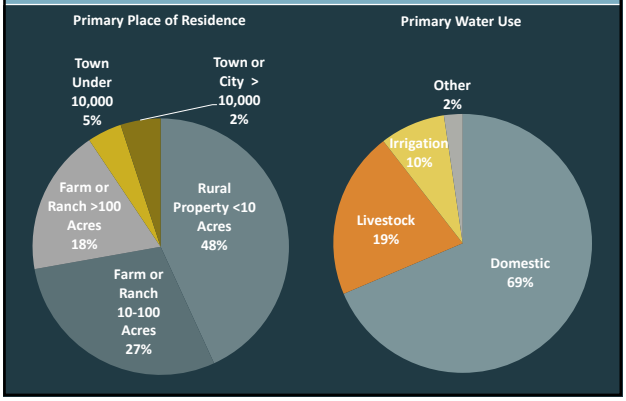
Capping a Well

Three criteria for capping a well

- A cap must fit tightly and be properly sealed to prevent surface pollutants from entering well
- The cap should support 400 pounds to minimize the risk of a person falling into the well
- To protect children and animals, the cap should not be easily removed by hand and not easy to lift.


33

Who is our audience?



34

PROGRAM EVALUATIONS

2-phase evaluation approach:

1. Pre-test/post-test
2. One year delayed questionnaire

To evaluate:

- Knowledge gained
- Satisfaction with program
- "Intentions to change"

35

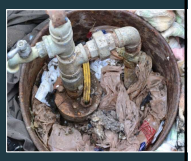
Evaluation Results

- *Knowledge Change*
  - Scores increased by 33 points
- *Satisfaction with the program*
  - 99%
- *Intentions to adopt BMPs*
  - Test my water once a year – 85%
  - Pump septic system regularly – 83%
  - Remove possible hazards from well house – 95%
  - Plug or cap any abandoned well on your property–85%

36

One Year Follow-up Results

- 90% of those needing to clean out hazards from their well house had done so.
- 74% of participants who had wells near contamination sources (pet shelters, livestock yards, etc.) had moved or removed the sources.
- 36% of participants who needed to, plugged or capped their unused/deteriorated wells.
- 55% of those with septic tanks that needed pumping had pumped their tanks.
- 76% had shared TWON resources/ materials with others not at the training.



37

Engaging the Well Owner

38

Resources on specific water quality issues available through: twon.tamu.edu

39


T W O N
T E X A S
Well Owner
N E T W O R K
Questions?
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40