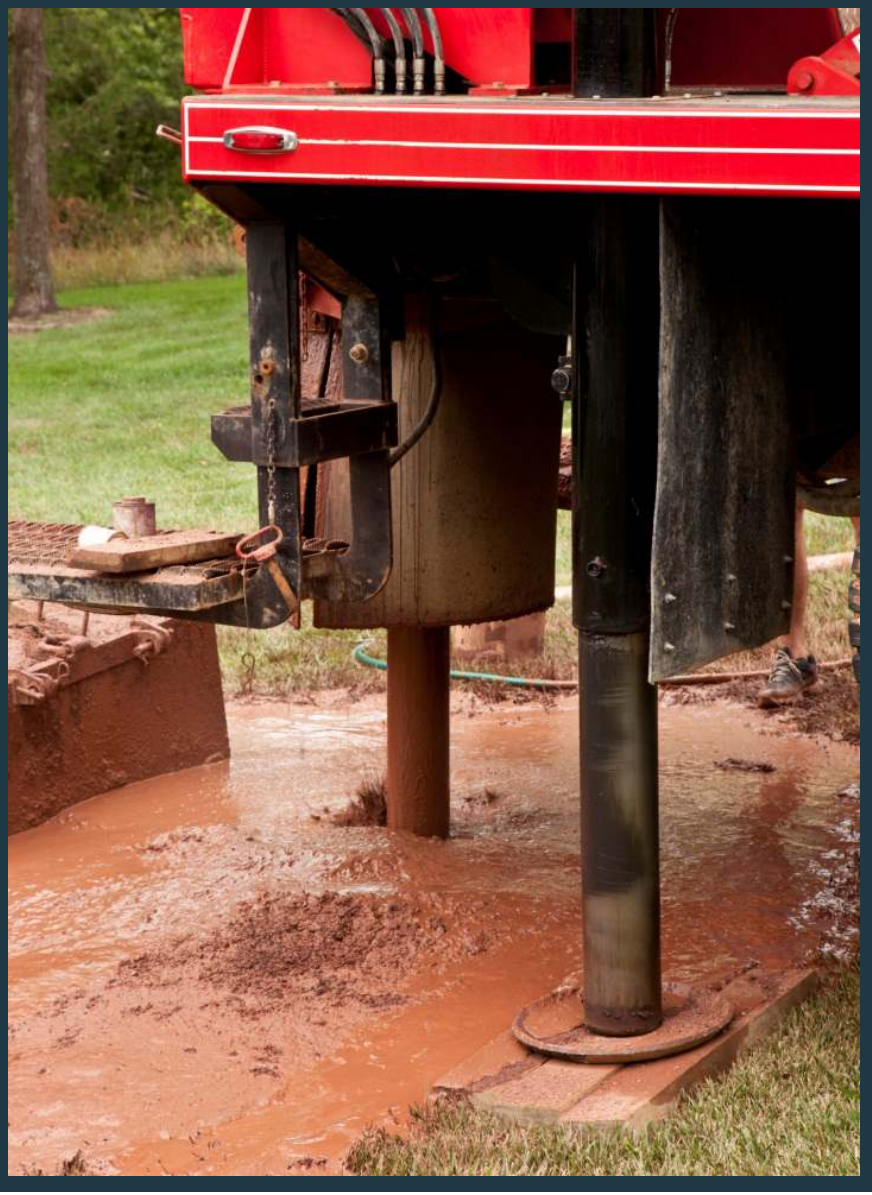
Private Water Well Basics

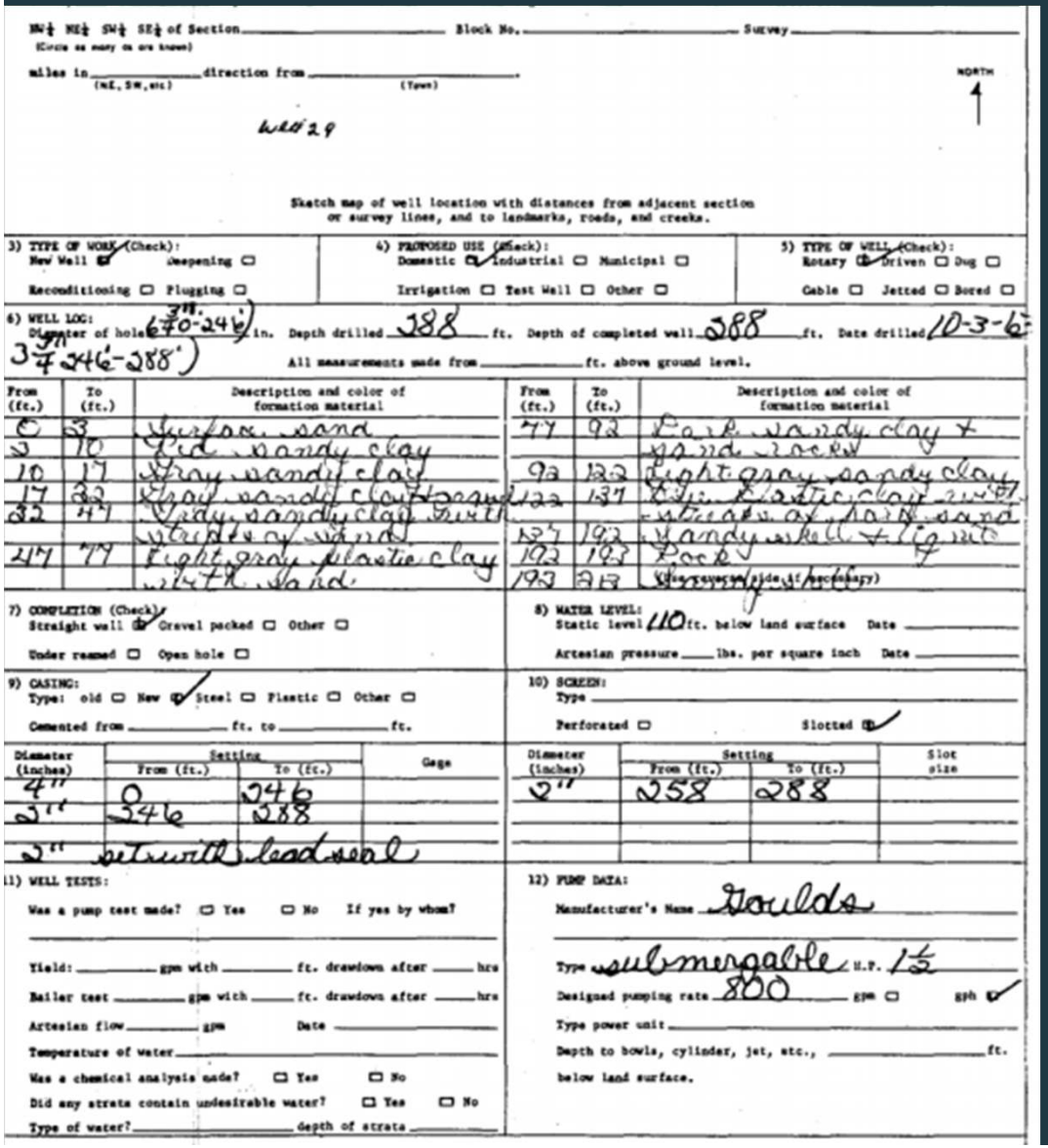
TWON
TEXAS
Well Owner
NETWORK

Information about Your Well

- Record the Locations (GPS)
- Water Quality Tests
- Keep Well Logs
- Registration or Permit with Groundwater Conservation District



Well Logs



NW¼ NE¼ SW¼ SE¼ of Section _____ Block No. _____ Survey _____
(Circle as many as are known)

miles in _____ direction from _____.
(mi., SW, etc.) (Town)

NORTH

well 29

Sketch map of well location with distances from adjacent section or survey lines, and to landmarks, roads, and creeks.

3) TYPE OF WORK (Check): New Well ☑ Deepening ☐ Reconditioning ☐ Plugging ☐

4) PROPOSED USE (Check): Domestic ☑ Industrial ☐ Municipal ☐ Irrigation ☐ Test Well ☐ Other ☐

5) TYPE OF WELL (Check): Rotary ☑ Driven ☐ Dug ☐ Cable ☐ Jetted ☐ Bored ☐

6) WELL LOG: Diameter of hole 6¾" (0-246') 3¾" (246'-288') in. Depth drilled 288 ft. Depth of completed well 288 ft. Date drilled 10-3-67

All measurements made from _____ ft. above ground level.

From (ft.)	To (ft.)	Description and color of formation material
0	3	Surface sand
3	10	Red sandy clay
10	17	Gray sandy clay
17	32	Gray sandy clay & sand
32	47	Gray sandy clay with streaks of sand
47	77	Light gray plastic clay with sand
77	92	Red sandy clay & sand rock
92	93	Rock
93	122	Light gray sandy clay
122	127	Gray plastic clay with streaks of hard sand
127	192	Sandy shell & lignite
192	193	Rock
193	218	Sandy shale (Use reverse side if necessary)

7) COMPLETION (Check): Straight wall ☑ Gravel packed ☐ Other ☐ Under reamed ☐ Open hole ☐

8) WATER LEVEL: Static level 110 ft. below land surface Date _____ Artesian pressure _____ lbs. per square inch Date _____

9) CASING: Type: old ☐ New ☑ Steel ☐ Plastic ☐ Other ☐ Cemented from _____ ft. to _____ ft.

Diameter (inches)	Setting From (ft.)	Setting To (ft.)	Gage
4"	0	246	
2"	246	288	
2"	set with lead seal		

10) SCREEN: Type _____ Perforated ☐ Slotted ☑

Diameter (inches)	Setting From (ft.)	Setting To (ft.)	Slot size
2"	258	288	

11) WELL TESTS: Was a pump test made? ☐ Yes ☐ No If yes by whom?

Yield: _____ gpm with _____ ft. drawdown after _____ hrs

Bailer test _____ gpm with _____ ft. drawdown after _____ hrs

Artesian flow _____ gpm Date _____

Temperature of water _____

Was a chemical analysis made? ☐ Yes ☐ No

Did any strata contain undesirable water? ☐ Yes ☐ No

Type of water? _____ depth of strata _____

12) PUMP DATA: Manufacturer's Name Goulds

Type submergable H.P. 1½

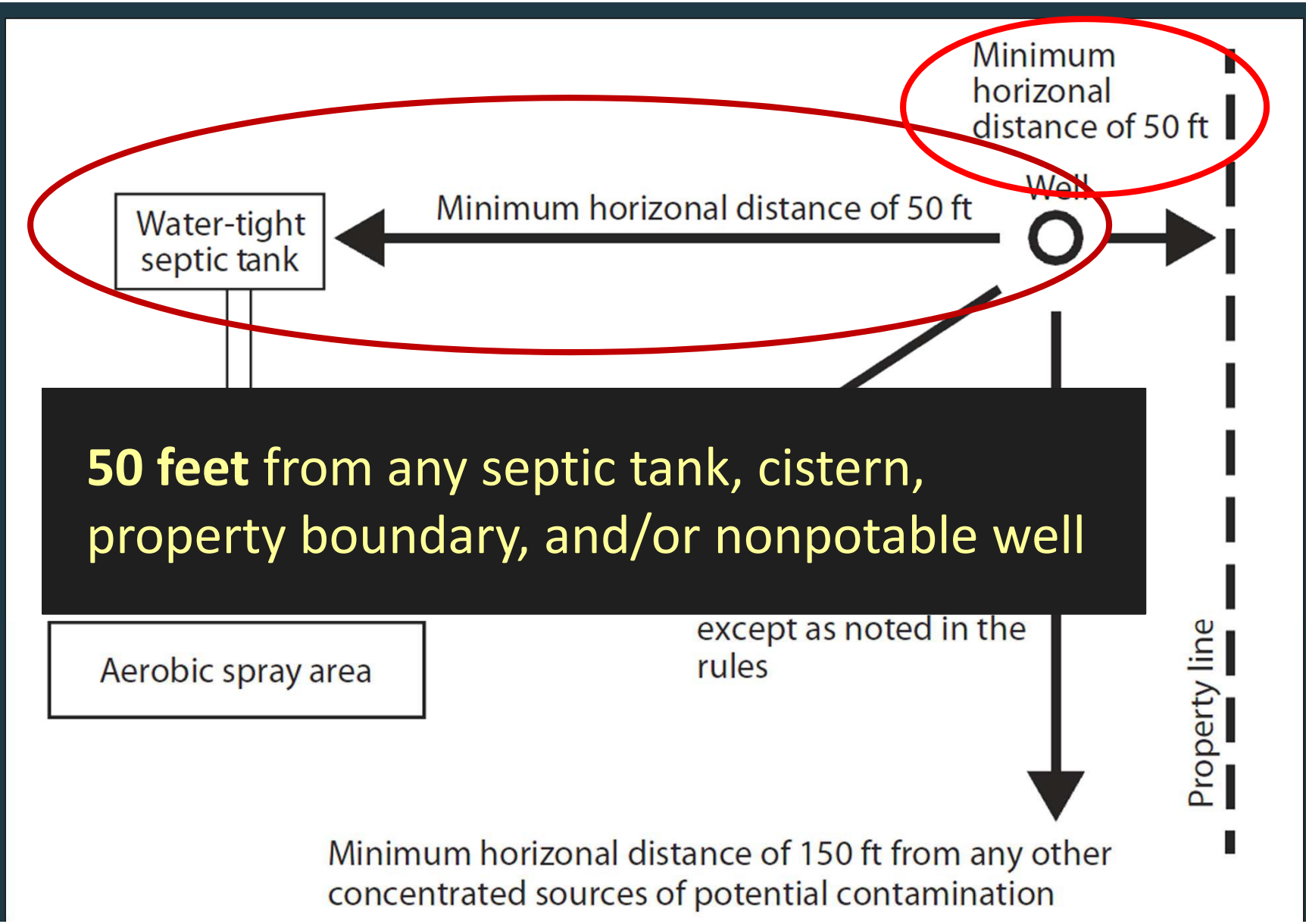
Designed pumping rate 800 gpm ☐ gph ☑

Type power unit: _____

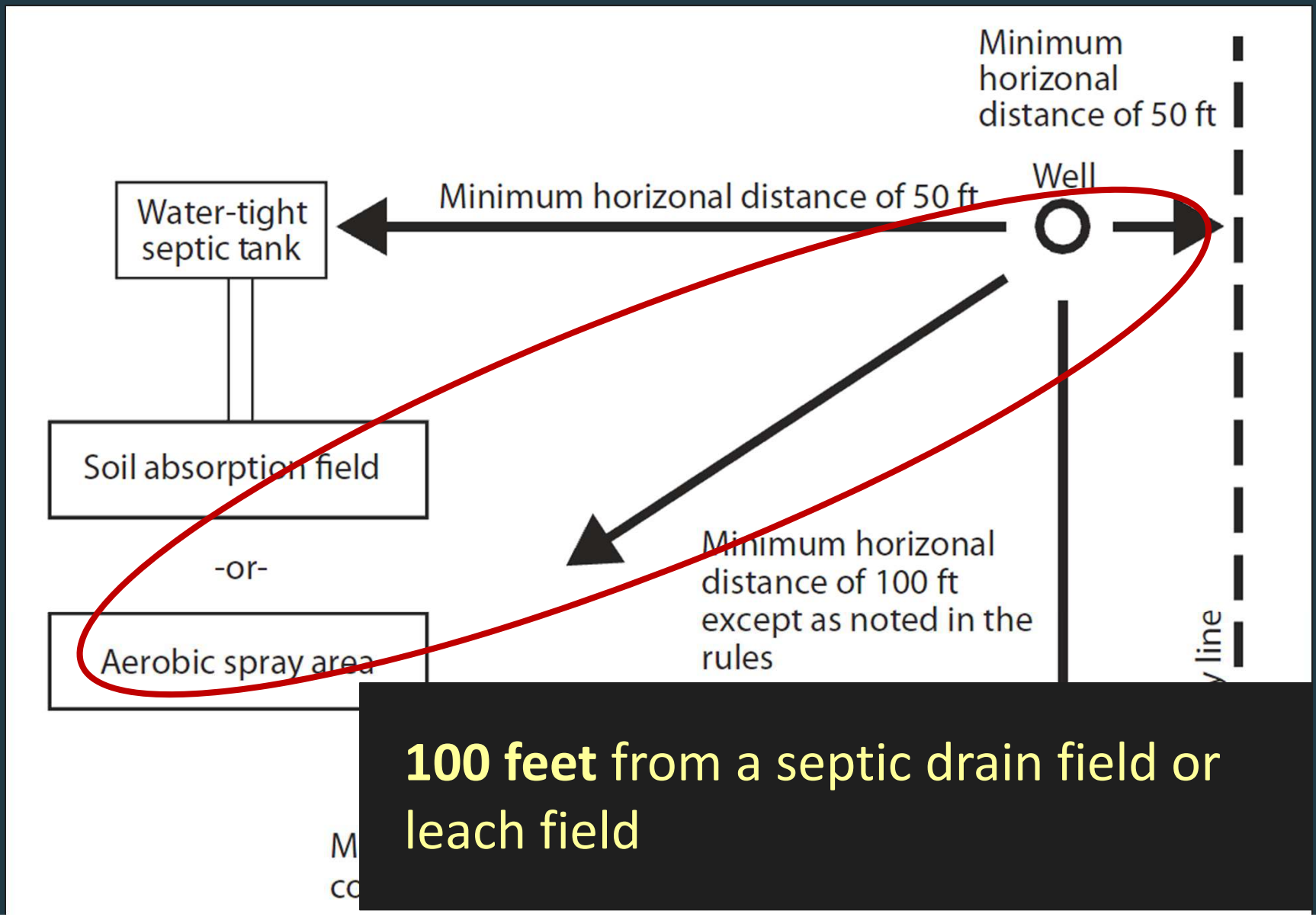
Depth to bowls, cylinder, jet, etc., _____ ft. below land surface.

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

Well Siting Regulations



Well Siting Regulations

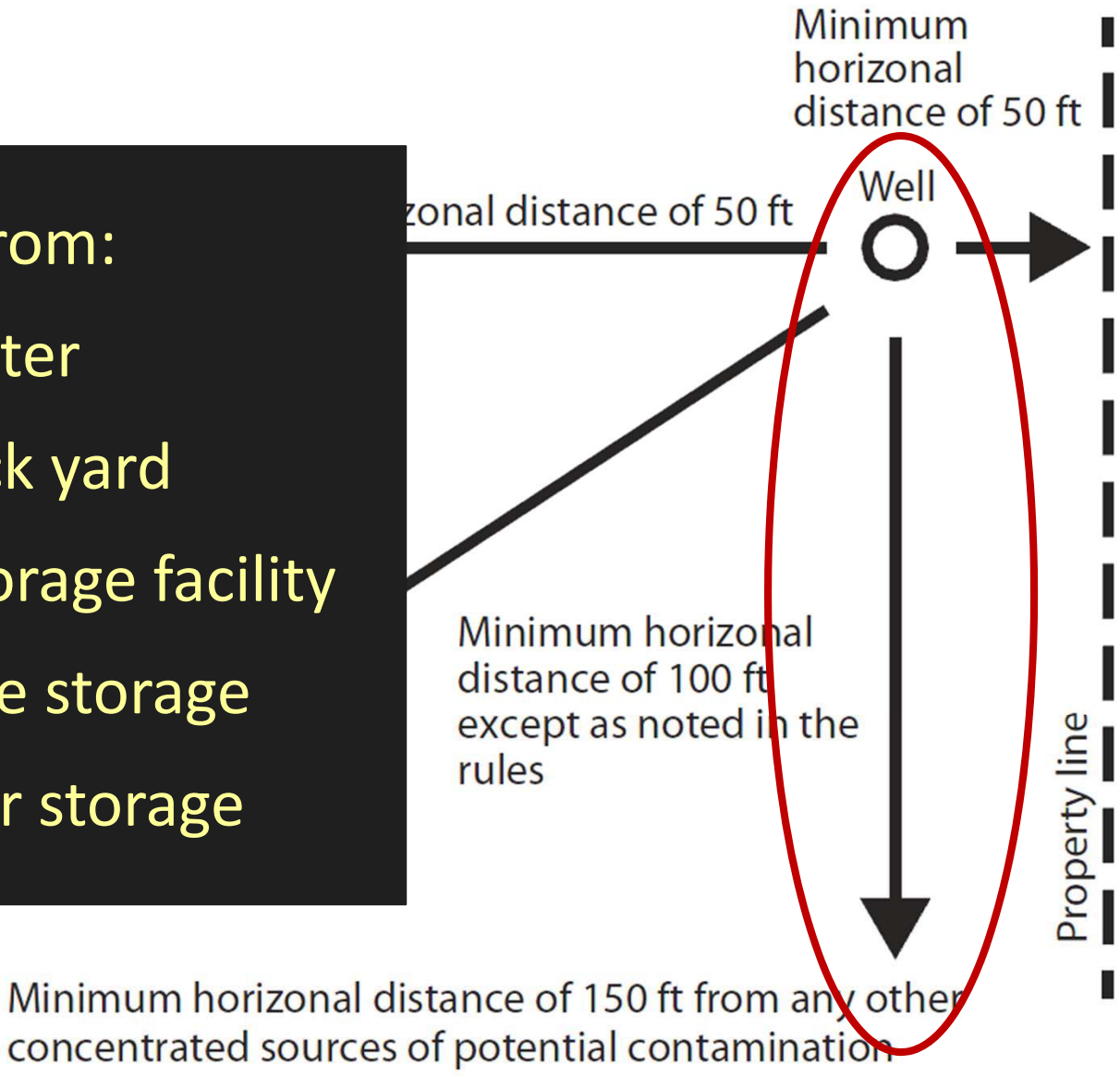


100 feet from a septic drain field or leach field

Well Siting Regulations

150 feet from:

- Pet shelter
- Livestock yard
- Feed storage facility
- Pesticide storage
- Fertilizer storage



Keeping a Safe Distance

Keep animals away that could contaminate your well

Not only protect well from damage by animals, but also keep a larger buffer from potential run-off

Don’t Get Carried Away !

Proper Well Construction

- Contract a licensed driller
- Water Well Drillers and Pump Installers Administrative Rules
  - 76.1000. Technical Requirements. Locations and Standards for Completion for Wells (TDLR)
- Well Construction
  - Ten feet of annular cement
  - Sloping cement slab that extends 2 feet in all directions
  - Casing extending 12 inches above land surface

http://www.license.state.tx.us/LicenseSearch

Texas Department of
Licensing and Regulation

P.O. Box 12157 Austin, Texas
800-803-9202 / TDD: 800-73

License Data Search Results. Search Again | Back

Water Well Drillers, Pump Installers 4 Records Found

License#	Exp Date	Name	City	Zip	County	Phone
WWD - 989	12/03/2013	REEL, WILLIAM C	BURKEVILLE TX	75932	NEWTON	(409) 565-2569
WWD - 1148	08/29/2013	DAVIS, LLOYD GRAHAM	NEWTON TX	75966	NEWTON	(409) 397-5362
WWD - 1449	07/07/2013	BISHOP, NATHAN L	NEWTON TX	75966	NEWTON	(409) 379-8186
WWD - 2067	08/06/2013	BISHOP, DAVID G	NEWTON TX	75966	NEWTON	(409) 379-8537

If license not found, please contact Customer Service at 800-803-9202

Search Again | Back

http://www.license.state.tx.us/LicenseSearch

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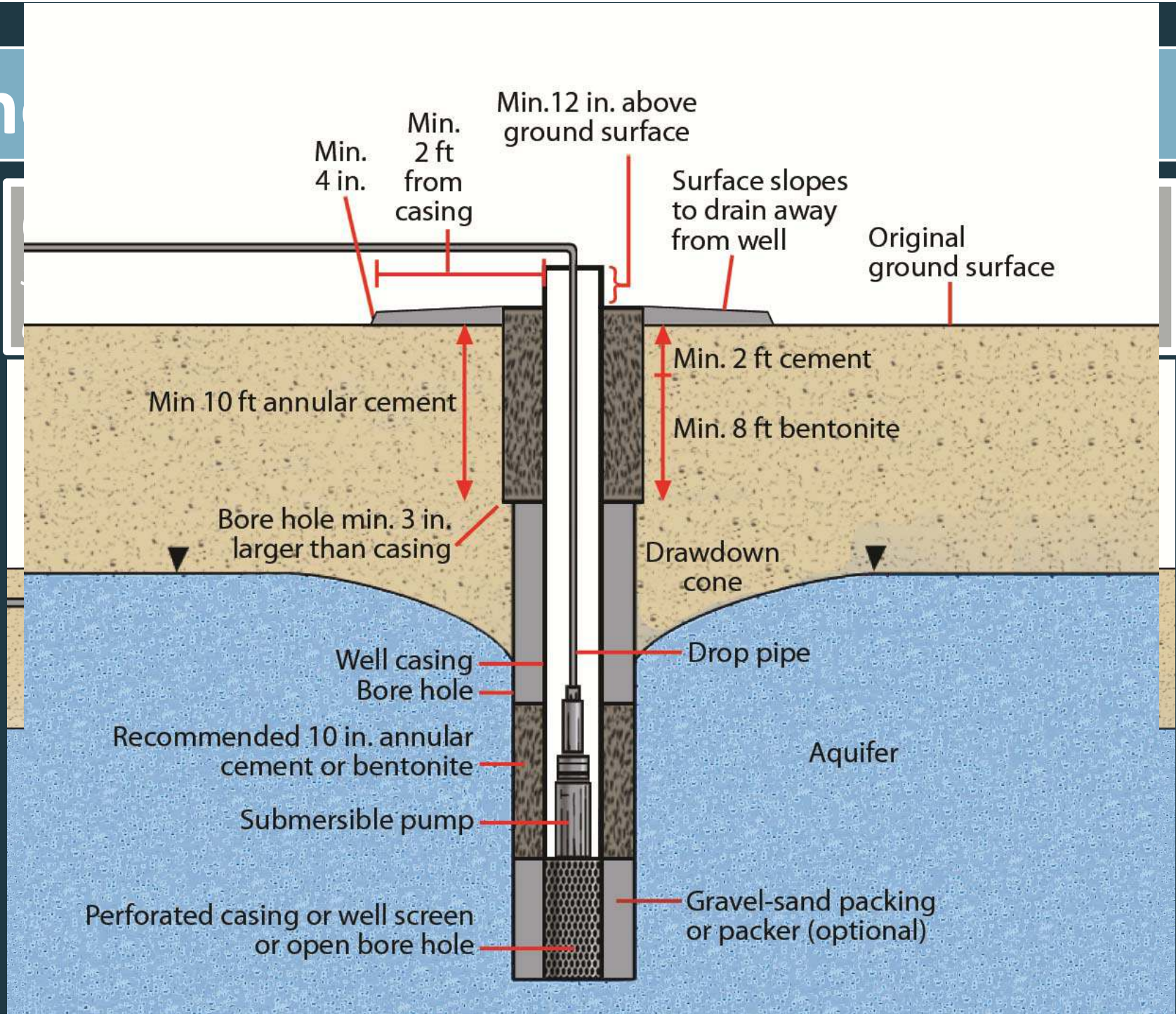
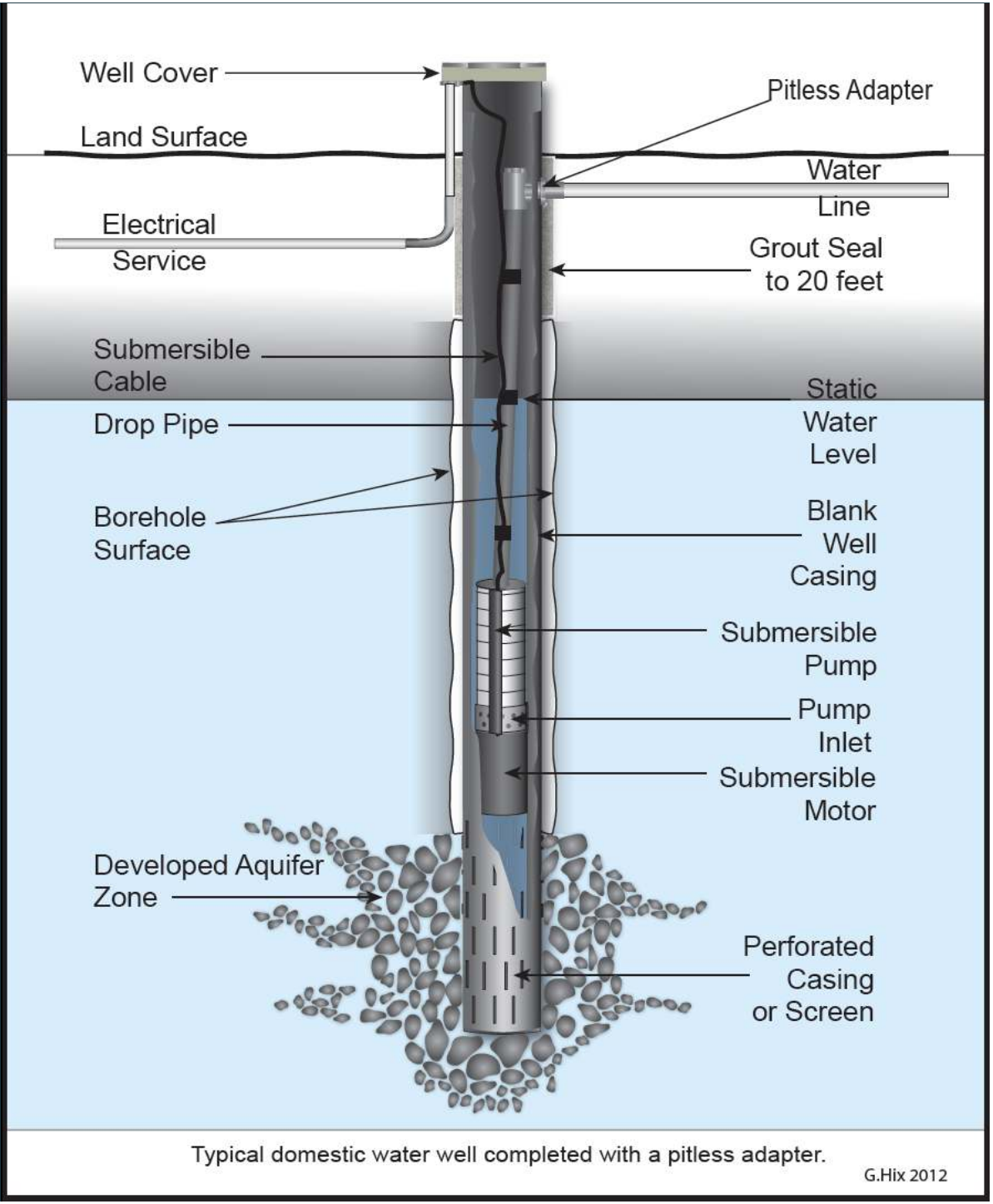
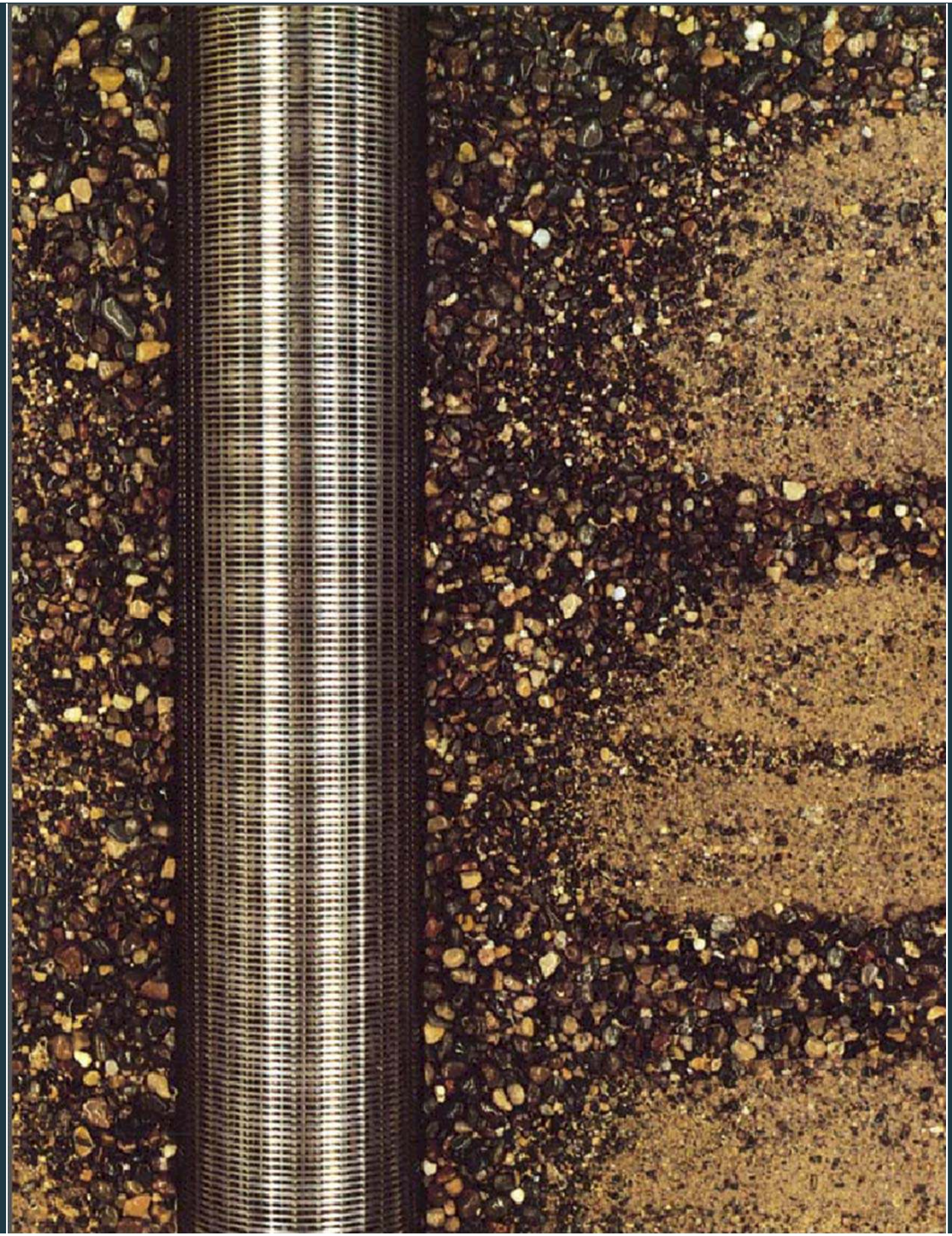

Min.
4 in.
Min.
2 ft
from
casing
Min.12 in. above
ground surface
Surface slopes
to drain away
from well
Original
ground surface
Min 10 ft annular cement
Min. 2 ft cement
Min. 8 ft bentonite
Bore hole min. 3 in.
larger than casing
Drawdown
cone
Well casing
Bore hole
Drop pipe
Recommended 10 in. annular
cement or bentonite
Aquifer
Submersible pump
Perforated casing or well screen
or open bore hole
Gravel-sand packing
or packer (optional)

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

- Well Casing
- Grout
- Well Screen
- Gravel Packs





Gravel Pack

Protecting Your Pump

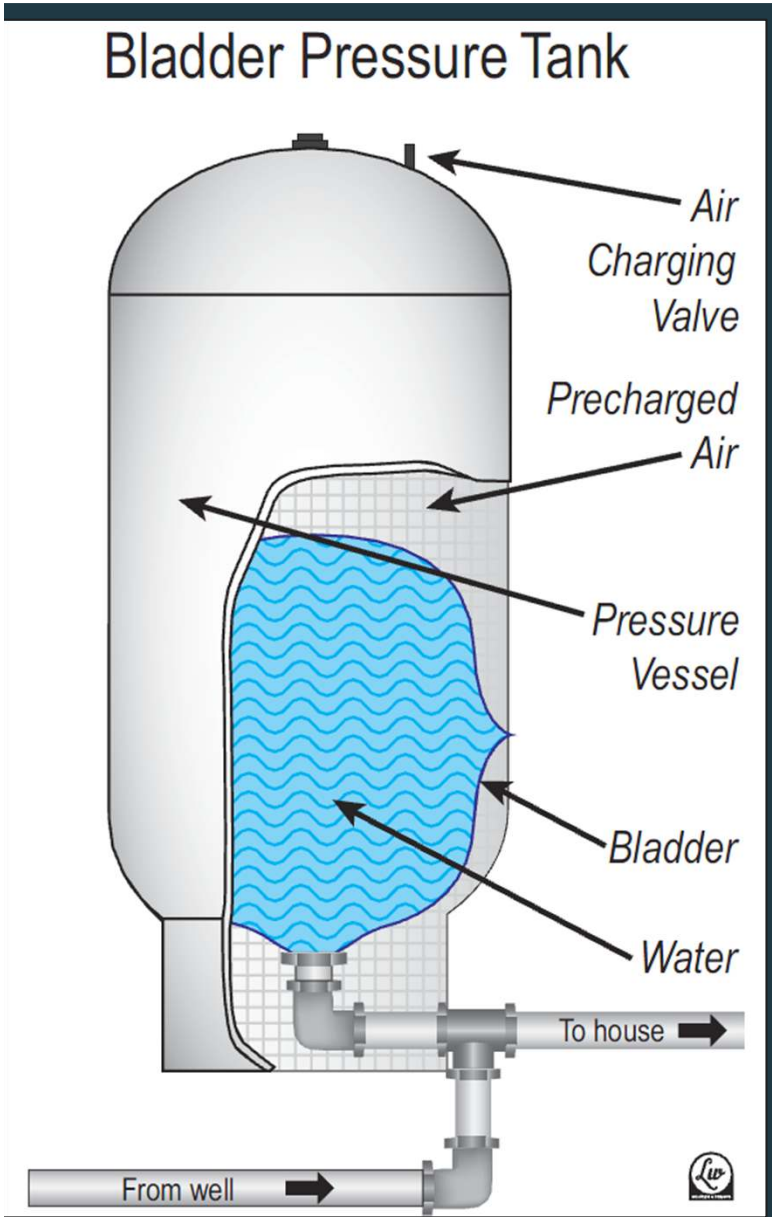
Help your pump last longer

- Reduce cycling more than it needs
- Be aware of sediment issues

Common Problems

- Rapid cycling
- Pump running excessively
- Pump breaker trips

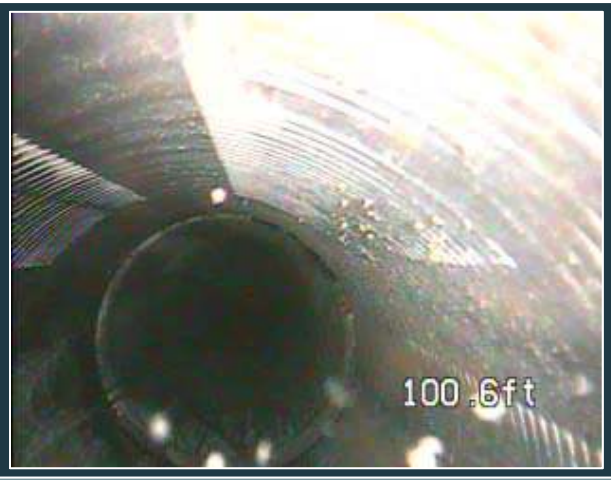
Storage Tanks



Low Yielding Wells

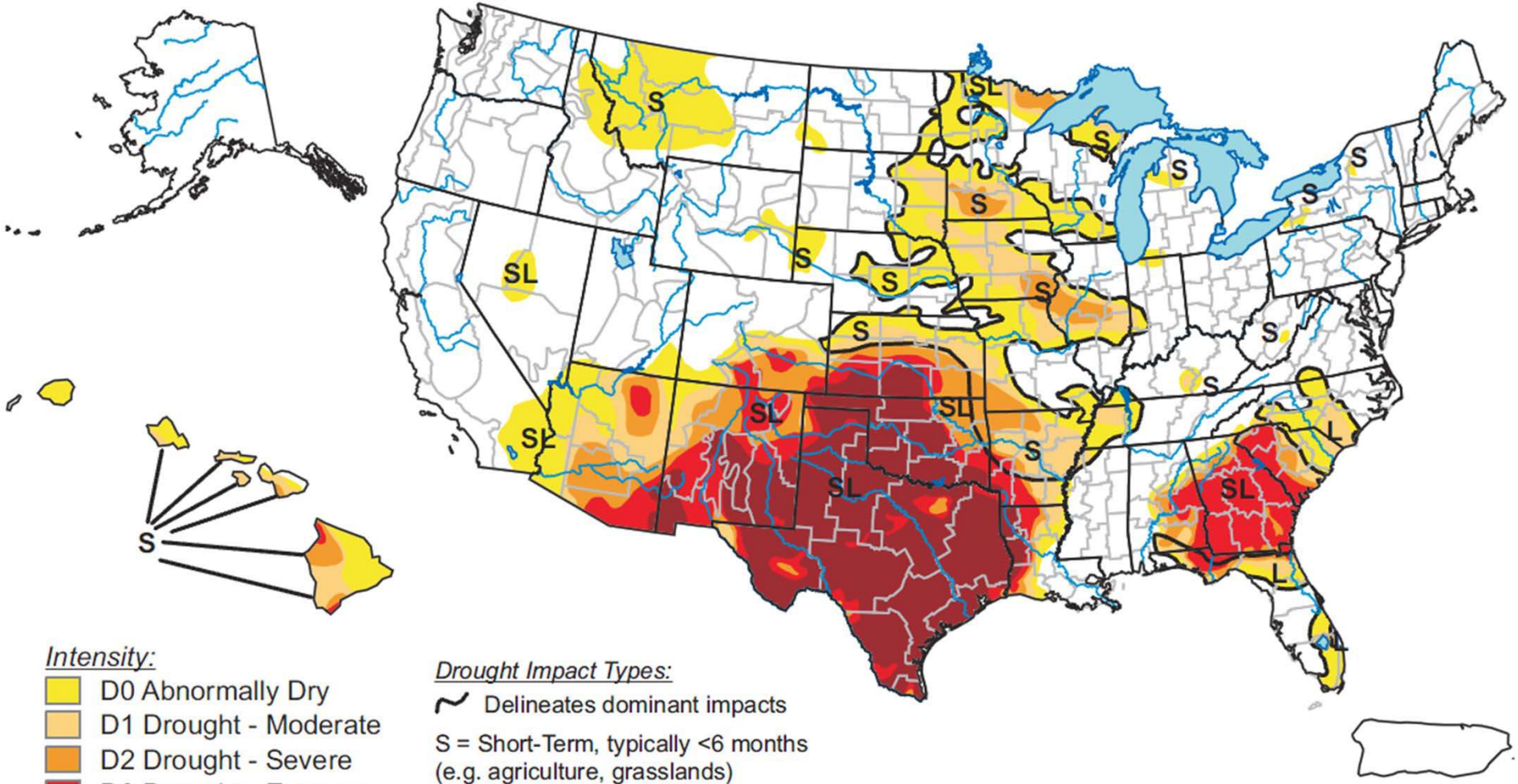
Several factors reduce well yield

- Lowered water table
- Development of scale
- Accumulation of bacteria



U.S. Drought Monitor

October 4, 2011
Valid 8 a.m. EDT



Intensity:
- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

Drought Impact Types:

Delineates dominant impacts

S = Short-Term, typically <6 months (e.g. agriculture, grasslands)

L = Long-Term, typically >6 months (e.g. hydrology, ecology)

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

http://droughtmonitor.unl.edu/

USDA | National Drought Mitigation Center | NOAA

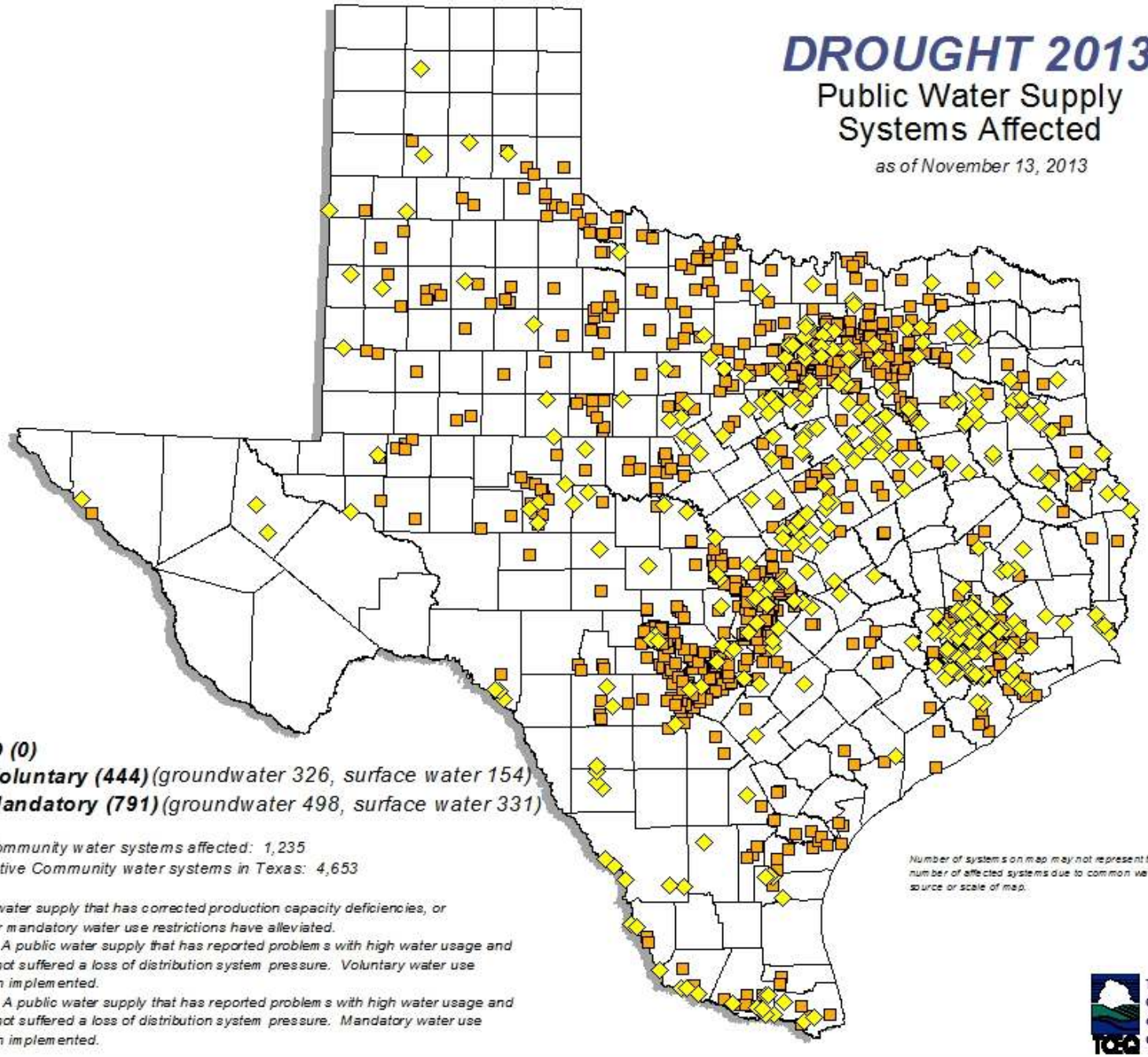
Released Thursday, October 6, 2011

Author: Rich Tinker, CPC/NCEP/NWS/NOAA

DROUGHT 2013

Public Water Supply Systems Affected

as of November 13, 2013



RESOLVED (0)

WATCH - Voluntary (444) *(groundwater 326, surface water 154)*

WATCH - Mandatory (791) *(groundwater 498, surface water 331)*

Total number of Community water systems affected: 1,235
Total number of active Community water systems in Texas: 4,653

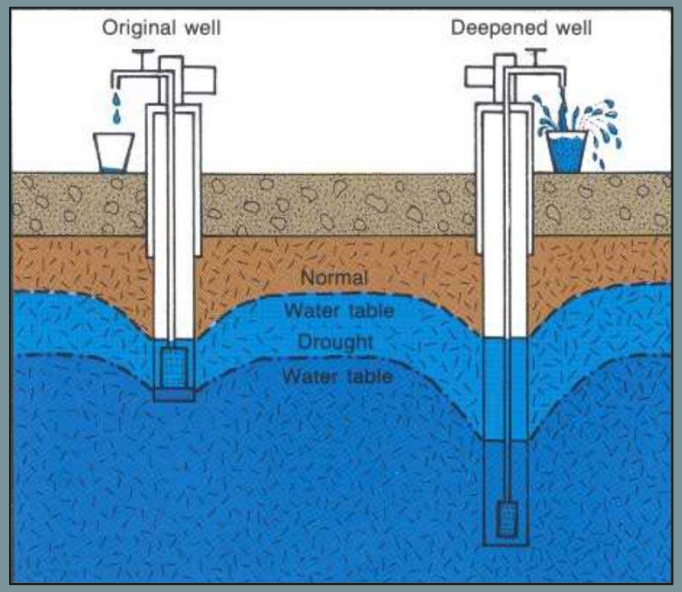
Resolved *A public water supply that has corrected production capacity deficiencies, or drought conditions for mandatory water use restrictions have alleviated.*

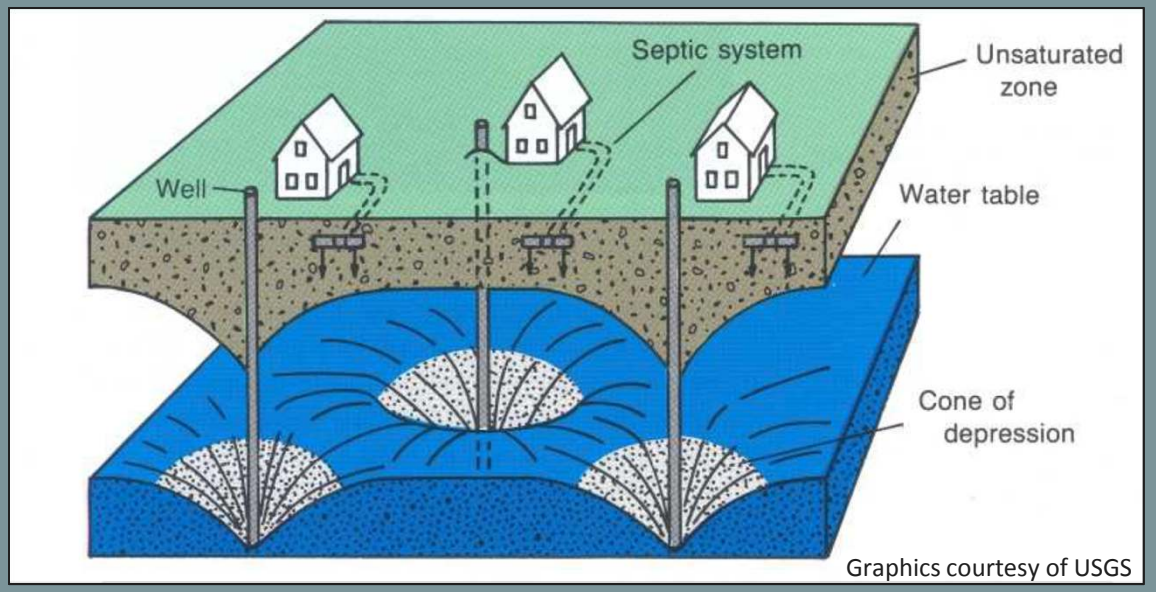
Watch - Voluntary *A public water supply that has reported problems with high water usage and production, but has not suffered a loss of distribution system pressure. Voluntary water use restrictions have been implemented.*

Watch - Mandatory *A public water supply that has reported problems with high water usage and production, but has not suffered a loss of distribution system pressure. Mandatory water use restrictions have been implemented.*

Number of systems on map may not represent total number of affected systems due to common water source or scale of map.

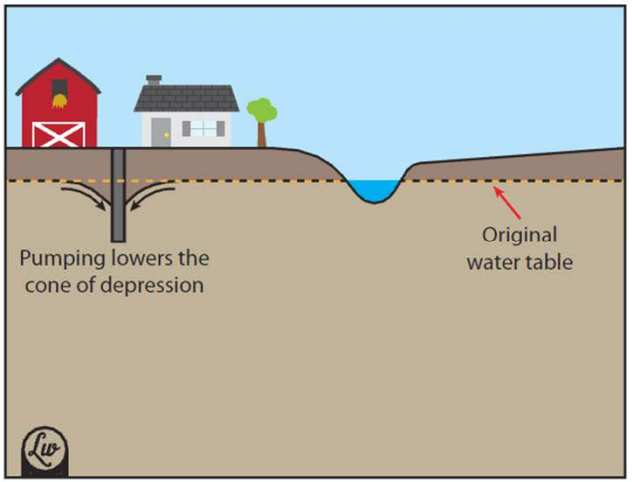
Texas Commission on Environmental Quality

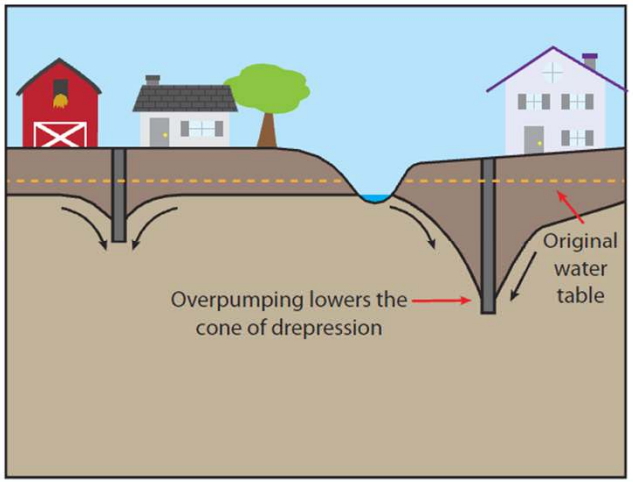


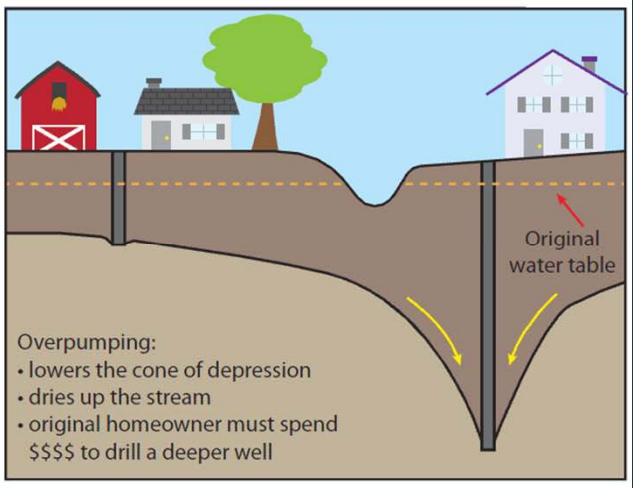


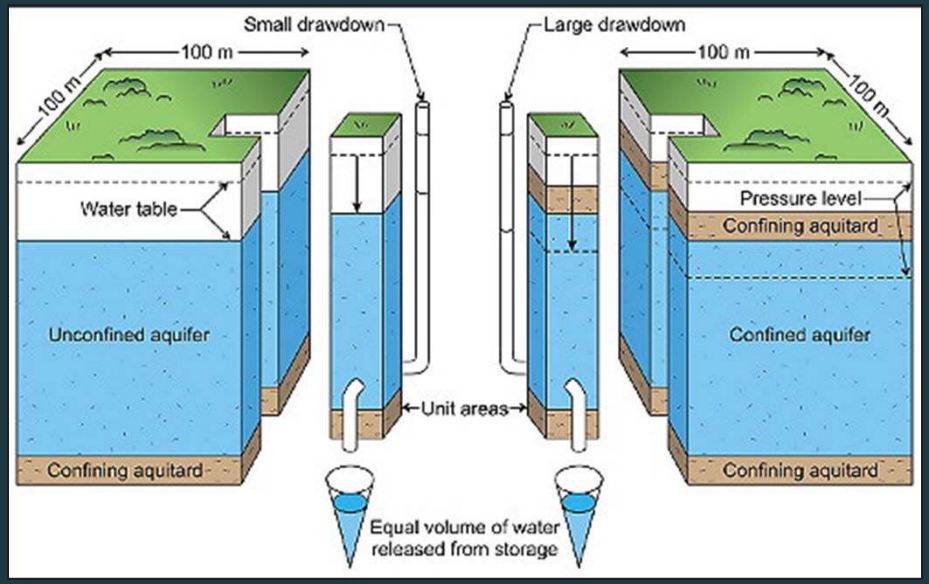
Graphics courtesy of USGS

How Wells Affect Aquifers: Cones of Depression

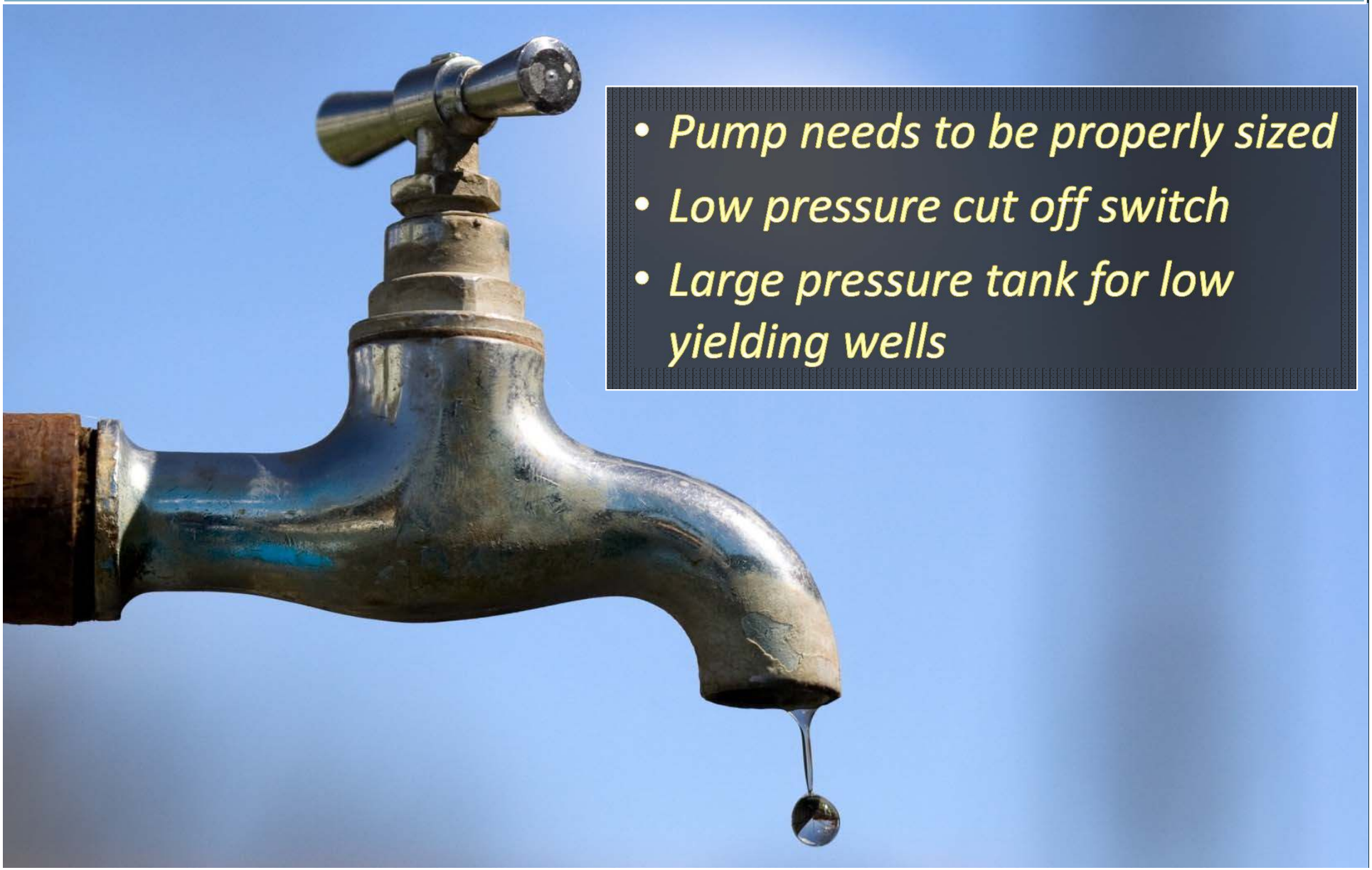








Low Yielding Wells



- Pump needs to be properly sized
- Low pressure cut off switch
- Large pressure tank for low yielding wells

Protecting Your Water Supply

- Water Quality Problems
- Well maintenance
- Plugging abandoned wells
- Capping abandoned wells

Why Check for Fecal Coliform?

- Indicator bacteria
  - Indicates disease risk from other organisms that are pathogenic
- Cost effective
- MCL (maximum contaminant level) is 0 colonies/100 ml
- Test annually and each time the well is opened or repaired

Treating Bacteria

Shock Chlorination

- Method of disinfecting a water well
- **Not a long term solution**
- Should be done anytime well system is "opened"
- **Recommended to contract a licensed well driller**
- If homeowner does it, make sure to follow correct procedure

Laundry bleach (about 5.25% hypochlorite)					
Standing water depth in well (in feet)	Casing diameter				
	4 inches	6 inches	8 inches	10 inches	12 inches
10	1/2 cup	1 cup	1 1/2 cups	1 pint	2 pints
25	1 cup	1 pint	2 pints	3 pints	4 1/2 pints
50	1 pint	1 quart	2 quarts	3 quarts	1 gallon
100	1 quart	2 quarts	1 gallon	1 1/2 gallons	2 gallons
150	3 pints	3 quarts	1 1/2 gallons	2 gallons	3 gallons

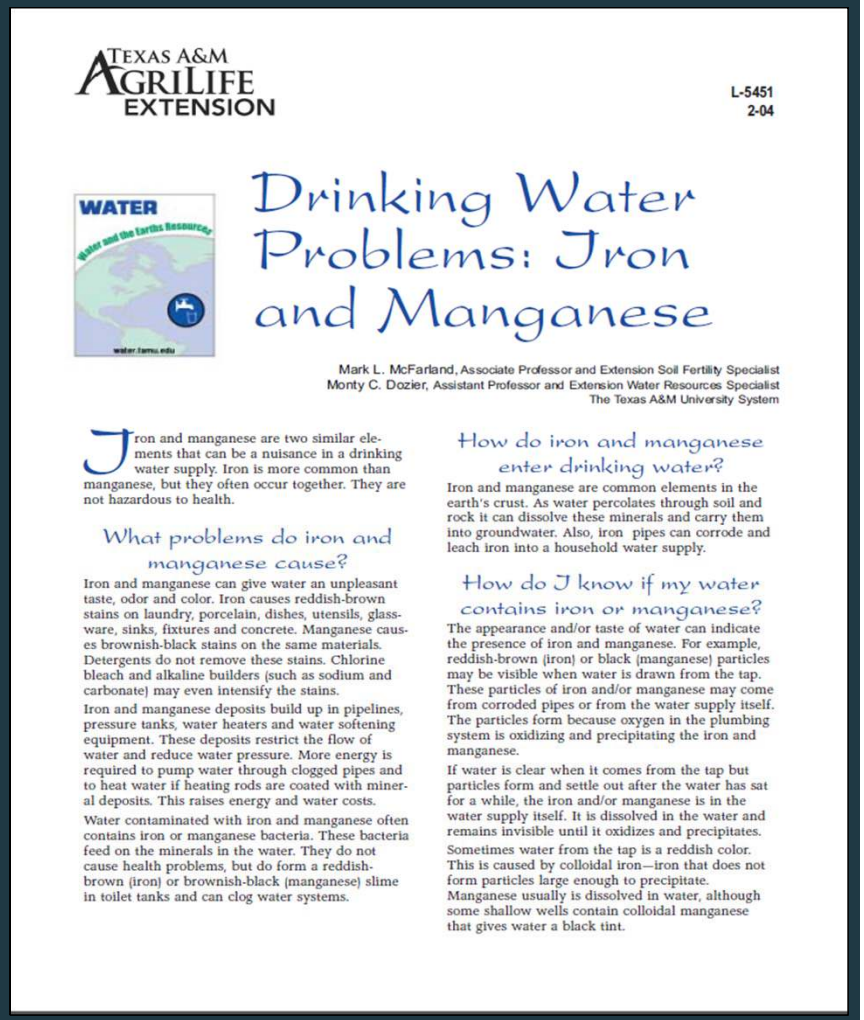
Iron and Manganese

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

Iron and Manganese Treatment

Treatment depends on type and concentration

- Initially clear, but particles form and settle out
- Water from tap has solid particles or has a tint
- Iron/manganese bacteria- reddish or black slime in toilet or faucets.



TEXAS A&M AGRILIFE EXTENSION

L-5451
2-04

WATER

Drinking Water Problems: Iron and Manganese

Mark L. McFarland, Associate Professor and Extension Soil Fertility Specialist
Monty C. Dozier, Assistant Professor and Extension Water Resources Specialist
The Texas A&M University System

Iron and manganese are two similar elements that can be a nuisance in a drinking water supply. Iron is more common than manganese, but they often occur together. They are not hazardous to health.

What problems do iron and manganese cause?

Iron and manganese can give water an unpleasant taste, odor and color. Iron causes reddish-brown stains on laundry, porcelain, dishes, utensils, glassware, sinks, fixtures and concrete. Manganese causes brownish-black stains on the same materials. Detergents do not remove these stains. Chlorine bleach and alkaline builders (such as sodium and carbonate) may even intensify the stains.

Iron and manganese deposits build up in pipelines, pressure tanks, water heaters and water softening equipment. These deposits restrict the flow of water and reduce water pressure. More energy is required to pump water through clogged pipes and to heat water if heating rods are coated with mineral deposits. This raises energy and water costs.

Water contaminated with iron and manganese often contains iron or manganese bacteria. These bacteria feed on the minerals in the water. They do not cause health problems, but do form a reddish-brown (iron) or brownish-black (manganese) slime in toilet tanks and can clog water systems.

How do iron and manganese enter drinking water?

Iron and manganese are common elements in the earth's crust. As water percolates through soil and rock it can dissolve these minerals and carry them into groundwater. Also, iron pipes can corrode and leach iron into a household water supply.

How do I know if my water contains iron or manganese?

The appearance and/or taste of water can indicate the presence of iron and manganese. For example, reddish-brown (iron) or black (manganese) particles may be visible when water is drawn from the tap. These particles of iron and/or manganese may come from corroded pipes or from the water supply itself. The particles form because oxygen in the plumbing system is oxidizing and precipitating the iron and manganese.

If water is clear when it comes from the tap but particles form and settle out after the water has sat for a while, the iron and/or manganese is in the water supply itself. It is dissolved in the water and remains invisible until it oxidizes and precipitates.

Sometimes water from the tap is a reddish color. This is caused by colloidal iron—iron that does not form particles large enough to precipitate. Manganese usually is dissolved in water, although some shallow wells contain colloidal manganese that gives water a black tint.

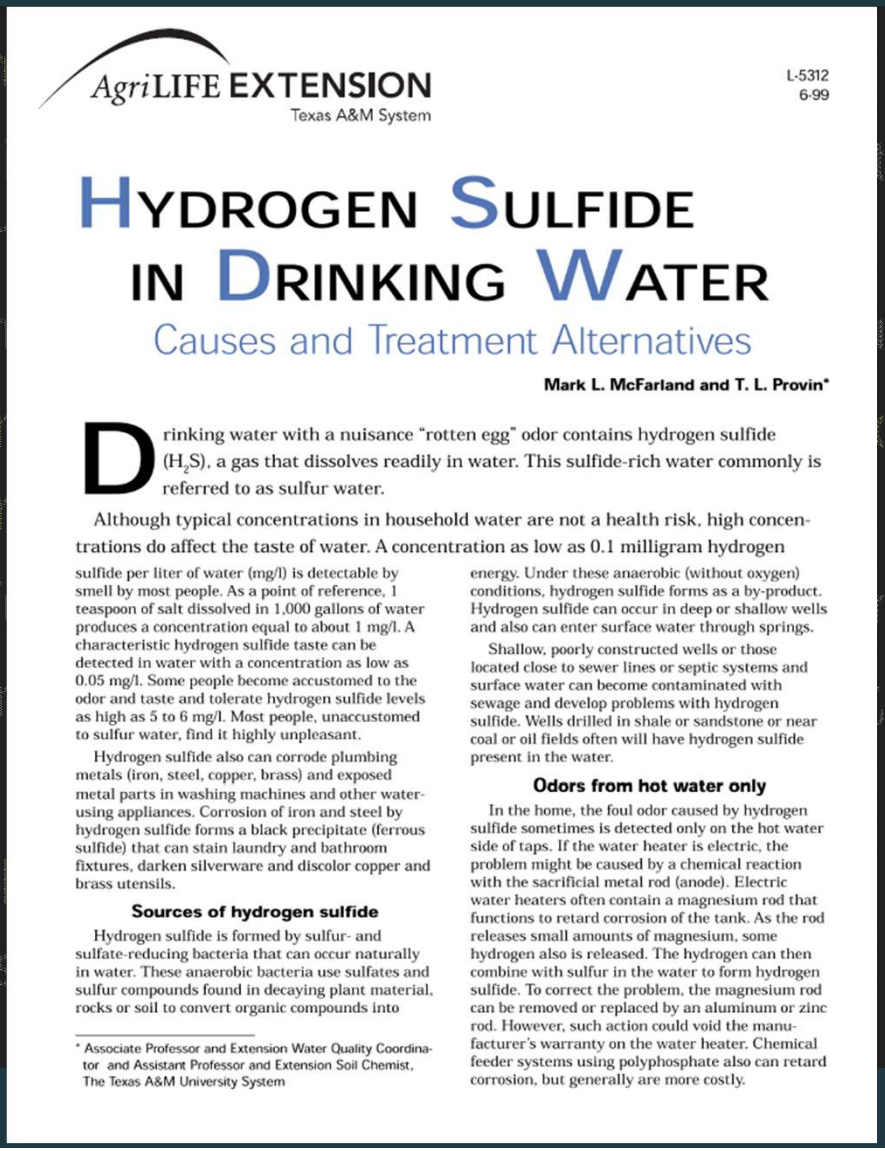
Treatment: Phosphate injection, water softener, oxidizing filter, aeration/filtration, shock treatment and filtration

Hydrogen Sulfide

- Colorless gas with a “rotten egg” odor
- Formed by sulfur- and sulfate-reducing bacteria that can occur naturally in groundwater

Hydrogen Sulfide (H_2S) Treatment

- Only in your h
  - Problem m … tion with the magnesium
  - Can be rem … m rod.
- Cause and cor … d before appropriate tr
  - If from sulf … nation may treat.
  - If H_2S natur … , a carbon filter may treat.
- Treatment dep
  - Need to tes



AgriLIFE EXTENSION
Texas A&M System

L-5312
6-99

HYDROGEN SULFIDE IN DRINKING WATER

Causes and Treatment Alternatives

Mark L. McFarland and T. L. Provin*

Drinking water with a nuisance "rotten egg" odor contains hydrogen sulfide (H_2S), a gas that dissolves readily in water. This sulfide-rich water commonly is referred to as sulfur water.

Although typical concentrations in household water are not a health risk, high concentrations do affect the taste of water. A concentration as low as 0.1 milligram hydrogen sulfide per liter of water (mg/l) is detectable by smell by most people. As a point of reference, 1 teaspoon of salt dissolved in 1,000 gallons of water produces a concentration equal to about 1 mg/l. A characteristic hydrogen sulfide taste can be detected in water with a concentration as low as 0.05 mg/l. Some people become accustomed to the odor and taste and tolerate hydrogen sulfide levels as high as 5 to 6 mg/l. Most people, unaccustomed to sulfur water, find it highly unpleasant.

Hydrogen sulfide also can corrode plumbing metals (iron, steel, copper, brass) and exposed metal parts in washing machines and other water-using appliances. Corrosion of iron and steel by hydrogen sulfide forms a black precipitate (ferrous sulfide) that can stain laundry and bathroom fixtures, darken silverware and discolor copper and brass utensils.

Sources of hydrogen sulfide

Hydrogen sulfide is formed by sulfur- and sulfate-reducing bacteria that can occur naturally in water. These anaerobic bacteria use sulfates and sulfur compounds found in decaying plant material, rocks or soil to convert organic compounds into energy. Under these anaerobic (without oxygen) conditions, hydrogen sulfide forms as a by-product. Hydrogen sulfide can occur in deep or shallow wells and also can enter surface water through springs.

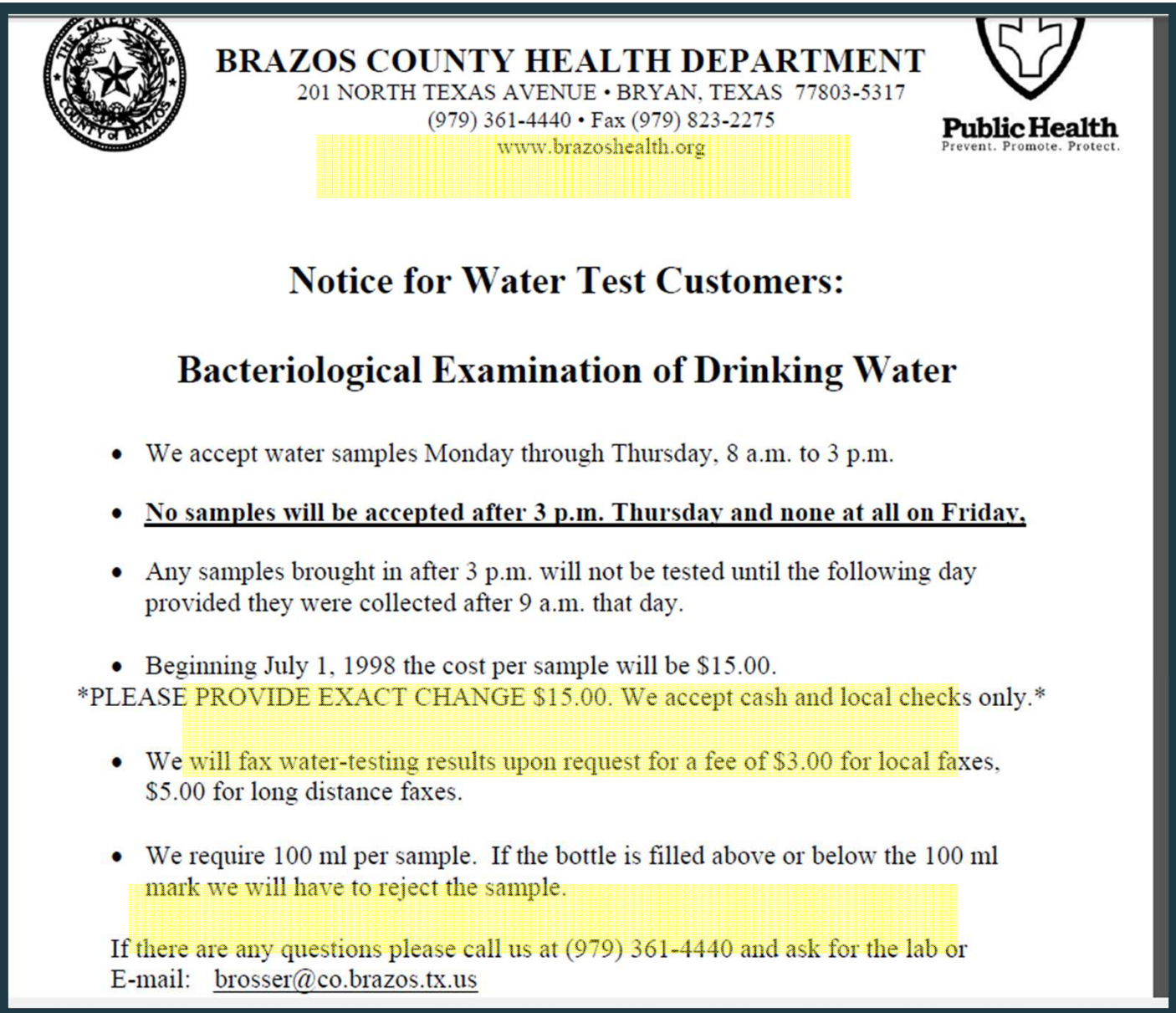
Shallow, poorly constructed wells or those located close to sewer lines or septic systems and surface water can become contaminated with sewage and develop problems with hydrogen sulfide. Wells drilled in shale or sandstone or near coal or oil fields often will have hydrogen sulfide present in the water.

Odors from hot water only

In the home, the foul odor caused by hydrogen sulfide sometimes is detected only on the hot water side of taps. If the water heater is electric, the problem might be caused by a chemical reaction with the sacrificial metal rod (anode). Electric water heaters often contain a magnesium rod that functions to retard corrosion of the tank. As the rod releases small amounts of magnesium, some hydrogen also is released. The hydrogen can then combine with sulfur in the water to form hydrogen sulfide. To correct the problem, the magnesium rod can be removed or replaced by an aluminum or zinc rod. However, such action could void the manufacturer's warranty on the water heater. Chemical feeder systems using polyphosphate also can retard corrosion, but generally are more costly.

* Associate Professor and Extension Water Quality Coordinator and Assistant Professor and Extension Soil Chemist, The Texas A&M University System

Brazos County Health Department Analyses



BRAZOS COUNTY HEALTH DEPARTMENT
201 NORTH TEXAS AVENUE • BRYAN, TEXAS 77803-5317
(979) 361-4440 • Fax (979) 823-2275
www.brazoshealth.org

Public Health
Prevent. Promote. Protect.

Notice for Water Test Customers:

Bacteriological Examination of Drinking Water

- We accept water samples Monday through Thursday, 8 a.m. to 3 p.m.
- **No samples will be accepted after 3 p.m. Thursday and none at all on Friday.**
- Any samples brought in after 3 p.m. will not be tested until the following day provided they were collected after 9 a.m. that day.
- Beginning July 1, 1998 the cost per sample will be $15.00.

PLEASE PROVIDE EXACT CHANGE $15.00. We accept cash and local checks only.

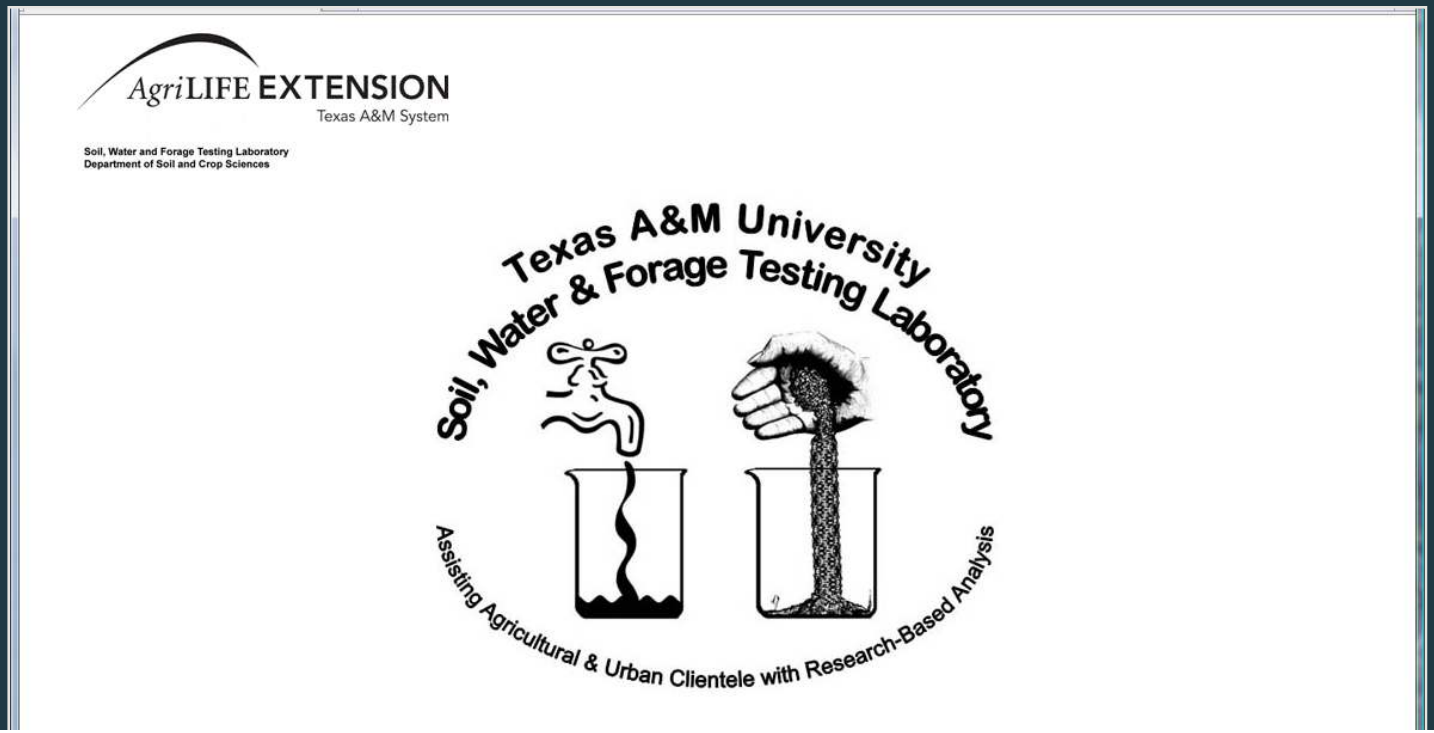
- We will fax water-testing results upon request for a fee of $3.00 for local faxes, $5.00 for long distance faxes.
- We require 100 ml per sample. If the bottle is filled above or below the 100 ml mark we will have to reject the sample.

If there are any questions please call us at (979) 361-4440 and ask for the lab or
E-mail: brosser@co.brazos.tx.us

PRIVATE WELL TESTING

Irrigation and Livestock:

- Texas AgriLife Extension Service Soil, Water and Forage Testing Laboratory (SWFTL) in the Dept. of Soil and Crop Sciences (http://soiltesting.tamu.edu/)



PRIVATE WELL TESTING

AgriLIFE EXTENSION
Texas A&M System

Soil, Water and Forage Testing Laboratory
Department of Soil and Crop Sciences
Texas AgriLife Extension Service

D-617a

W 11b

WATER SAMPLE INFORMATION FORM

Please submit this completed form and payment with samples. Mark each sample bottle with your sample identification and ensure that it corresponds with the sample identification written on this form. *See sampling and mailing instructions on the back of this form.
(PLEASE DO NOT SEND CASH)

SUBMITTAL AND INVOICE INFORMATION: This information will be used for all official invoicing and communication.

Name ____ County where sampled ____________________

Address ____ Phone ______________________________

City ______________________________ State______ Zip ______ ______________________________

CLIENT NAME: Client name will only be included with information above on result reports.

Name ____

Lab Use only

Payment (DO NOT SEND CASH)
☐ Check
☐ Money Order
☐ Credit Card – requires additional form*

Amount Paid $____________________
Make Checks Payable to: **Soil Testing Laboratory**
*Credit card payment forms can be downloaded at http://soiltesting.tamu.edu

Sample ID **SAMPLE INFORMATION (Required)** (see options listed below)

Laboratory # (For Lab Use)	Your Sample ID		Water Source	Water Use:	Requested Analyses
		☐ Public ☐ Private	☐ Well ☐ Other ☐ Pond ☐ Lake ☐ Steam ☐ Processing Plant	☐ Aquaculture ☐ Irrigation-turf ☐ Commercial ☐ Irrigation-vegetables ☐ Domestic ☐ Livestock ☐ Greenhouse ☐ Recreation ☐ Hydroponics ☐ Other ☐ Irrigation-forage ☐ Irrigation-ornamentals	☐1 ☐2 ☐3 ☐4 ☐5
		☐ Public ☐ Private	☐ Well ☐ Other ☐ Pond ☐ Lake ☐ Steam ☐ Processing Plant	☐ Aquaculture ☐ Irrigation-turf ☐ Commercial ☐ Irrigation-vegetables ☐ Domestic ☐ Livestock ☐ Greenhouse ☐ Recreation ☐ Hydroponics ☐ Other ☐ Irrigation-forage ☐ Irrigation-ornamentals	☐1 ☐2 ☐3 ☐4 ☐5
		☐ Public ☐ Private	☐ Well ☐ Other ☐ Pond ☐ Lake ☐ Steam ☐ Processing Plant	☐ Aquaculture ☐ Irrigation-turf ☐ Commercial ☐ Irrigation-vegetables ☐ Domestic ☐ Livestock ☐ Greenhouse ☐ Recreation ☐ Hydroponics ☐ Other ☐ Irrigation-forage ☐ Irrigation-ornamentals	☐1 ☐2 ☐3 ☐4 ☐5

Describe any problems you have observed and want to correct:

1. Routine Analysis (R) $20 per sample
   (Conductivity, pH, Na, Ca, Mg, K, CO_3^{2-}, HCO_3^-, SO_4^{2-}, Cl^-, P, B, Nitrate-N, Hardness, and SAR)
2. R + Metals $35 per sample
   In addition to Routine Analysis includes: (Zn, Fe, Cu, and Mn)

Pricing is subject to change. The latest pricing can be downloaded at the laboratory's website: soiltesting.tamu.edu

3. R + Titrate of Drip Irrigation $27.50 per sample
4. R + Metals + Titrate for Drip Irrigation $42.50 per sample
5. R + Metals + Heavy metals and Fluoride $70 per sample

FormW1-0411

AgriLIFE EXTENSION
Texas A&M System

Water Analysis Report

Soil, Water and Forage Testing Laboratory
Department of Soil and Crop Sciences
345 Heep Center, 2474 TAMU
College Station, TX 77843-2474
979-845-4816

Visit our website:
http://soiltesting.tamu.edu

Format based on publication SCS-2002-12

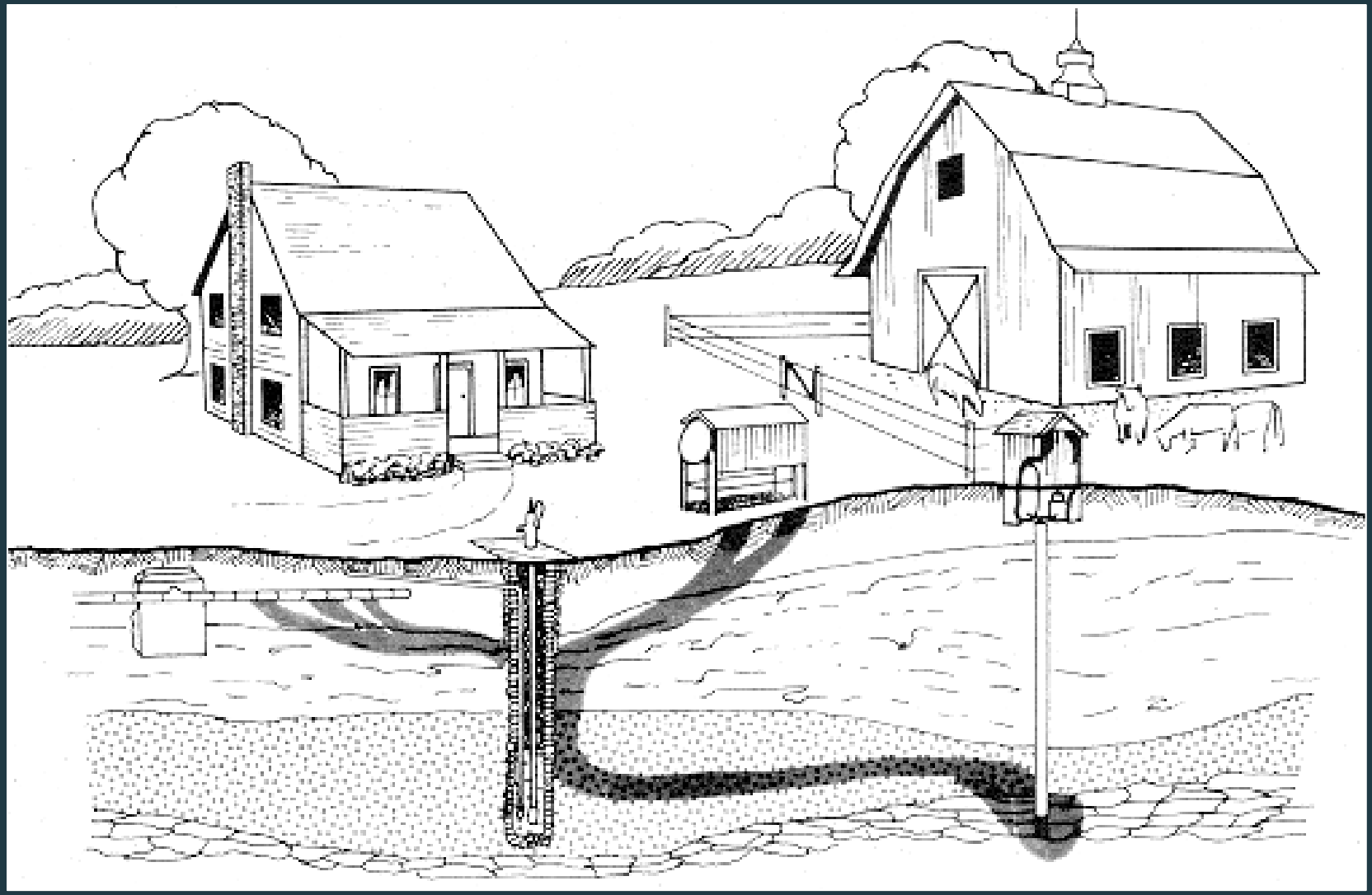
Laboratory #: 16390
Customer Sample ID: MVD #47 Mont Co.
Date Processed: 3/23/2010
Sample from Montgomery County
Water Source =Other Water Use =Domestic

Parameter analyzed		Results	Units	Method	V. Limiting	Limiting	Acceptable
Calcium (Ca)		11	ppm	ICP			*****
Magnesium (Mg)		2	ppm	ICP			*****
Sodium (Na)		139	ppm	ICP		*****	
Potassium (K)		4	ppm	ICP			*****
Boron (B)		0.17	ppm	ICP			*****
Carbonate (CO_3)		0	ppm	Titr.			*****
Bicarbonate (HCO_3)		313	ppm	Titr.			*****
Sulfate (SO_4-calculated from total S)		22	ppm	ICP			*****
Chloride (Cl-)		48	ppm	Titr.			*****
Nitrate-N (NO_3-N)	<	0.01	ppm	Cd-red.			*****
Phosphorus (P)		0.02	ppm	ICP			*****
pH		7.52		ISE			*****
Conductivity		609	umhos/cm	Cond.			*****
Hardness		2	grains CaCO3/gallon	Calc.			*****
Hardness		36	ppm CaC03	Calc.			*****
Alkalinity		256	ppm CaC03	Calc.		*****	
Total Dissolved Salts (TDS)		538	ppm	Calc.		*****	
SAR		10.1		Calc.	N/A		
Iron (Fe)	<	0.01	ppm	ICP			*****
Zinc (Zn)		0.06	ppm	ICP			*****
Copper (Cu)		0.07	ppm	ICP			*****
Manganese (Mn)	<	0.01	ppm	ICP			*****
Arsenic (As)							
Barium (Ba)							
Nickel (Ni)							
Cadmium (Cd)							
Lead (Pb)							
Chromium (Cr)							
Flouride (F)							
Charge Balance (cation/anion*100)		98		Calc.			

ppm=parts per million=milligrams per liter
N/A, not applicable for this water use

Abandoned Wells

- What is it?
  - Unused for six consecutive months
  - Or a non-deteriorated well with casing, pump or has been capped
- Why a problem?
  - Safety
  - Nuisance
  - Environmental
  - Legal
- Who can plug the well?
  - Licensed well driller
  - Licensed pump installer
  - Landowner



Abandoned wells can be pathways for pollutants

Abandoned Wells

Abandoned Wells

Local News

Text message saves Kemp police chief after falling in abandoned well

Credit: WFAA
Kemp Police Chief Jimmy Council was rescued from an abandoned water well Tuesday morning after he fell in while responding to a loose livestock call.

Tweet 4 Recommend 310 +1 MORE

by JOSH DAVIS

WFAA
Posted on May 7, 2013 at 12:20 PM
Updated yesterday at 12:20 PM

KEMP -- Kemp Police Chief Jimmy Council was rescued from an abandoned water well Tuesday morning after he fell in while responding to a loose livestock call.

Gallery

SEE ALL 3 PHOTOS »

Around 9 a.m., Chief Council met a Kaufman County Sheriff's deputy at the scene near FM 2860 about halfway between US Highway 175 and FM 1985.

A short time later, the chief contacted Kemp City Hall by text message to

Who Should Plug the Well?

A landowner may plug wells with less than 100 feet of standing water in the well.

But, a contractor may have **better equipment** and **understanding** of the **geological conditions** that affect how the well should be plugged.

Capping Abandoned Wells

- Under Texas law, the landowner is responsible for plugging abandoned water wells and is liable for any water contamination or injury that results
- Another alternative is to cap the well
  - If the well is “non-deteriorated” and in good condition

Capping a Well

Three criteria for capping a well

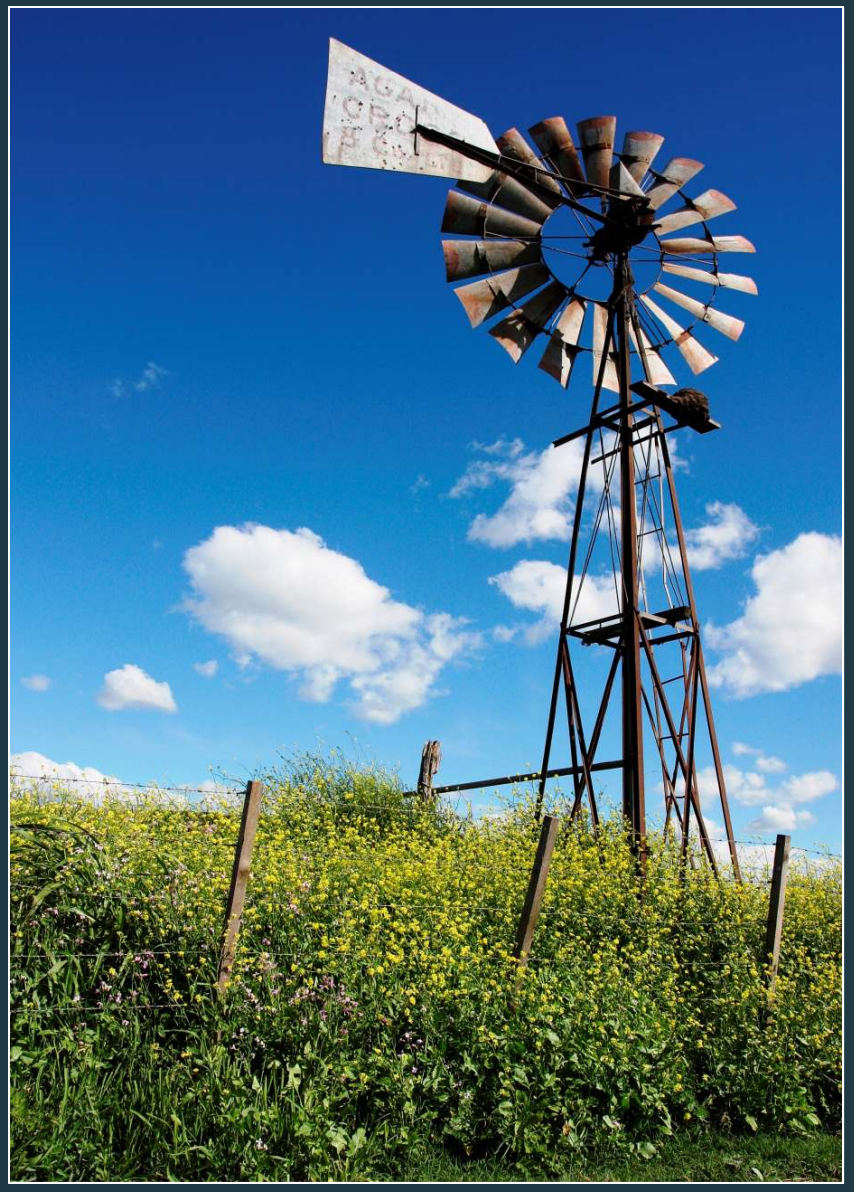
- A cap must fit tightly and be properly sealed to prevent surface pollutants from entering well
- The cap should support 400 pounds to minimize the risk of a person falling into the well
- To protect children and animals, the cap should not be easily removed by hand and not easy to lift.

Water Well Construction Checklist

- ✓ Locate well, septic tank, drain field
- ✓ Well construction records
- ✓ Always use a licensed driller
- ✓ Proper separation
- ✓ Well depth
- ✓ Well yield

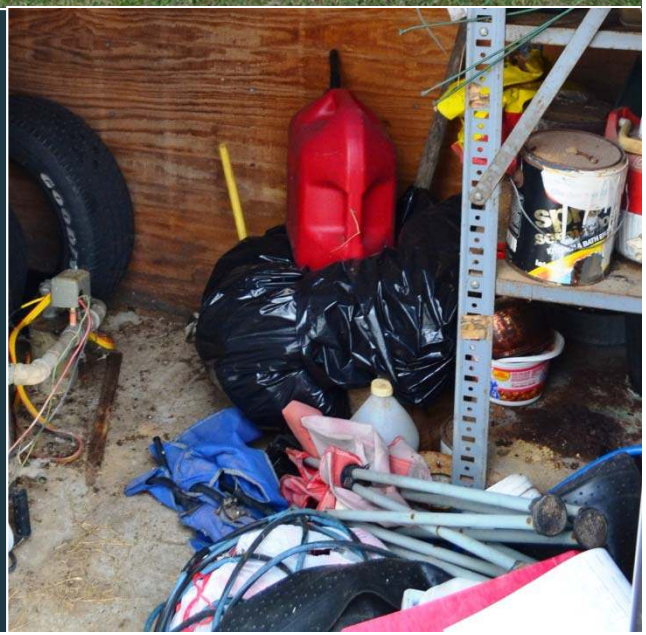
Homeowner's Maintenance Checklist

- ✓ Annual test
- ✓ Check well cover
- ✓ Keep hazardous material away
- ✓ Prevent backflow from outdoor faucets
- ✓ Landscaping - keep slope away from well
- ✓ Beware of changes
- ✓ Have your septic tank pumped
- ✓ Limit lawn and garden chemicals

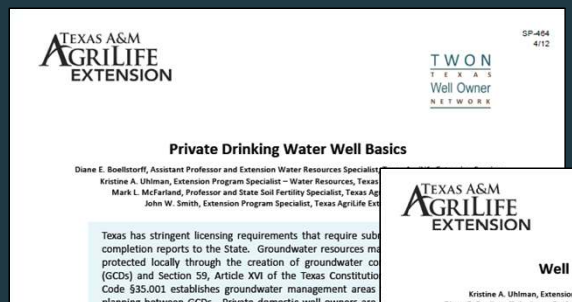


Well Maintenance Tips

- 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



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



Texas A&M AgriLife Extension

SP-464
4/12

TWON Texas Well Owner Network

Private Drinking Water Well Basics

Diane E. Boellstorff, Assistant Professor and Extension Water Resources Specialist
Kristine A. Uhlman, Extension Program Specialist – Water Resources, Texas
Mark L. McFarland, Professor and State Soil Fertility Specialist, Texas Ag
John W. Smith, Extension Program Specialist, Texas AgriLife Ext

Texas has stringent licensing requirements that require subr
completion reports to the State. Groundwater resources ma
protected locally through the creation of groundwater co
(GCDs) and Section 59, Article XVI of the Texas Constitutio
Code §35.001 establishes groundwater management areas
planning between GCDs. Private domestic well owners are
maintenance and monitoring of their own wells to assure safe

Where is your well?

The management of a private drinking water supply from a domestic well i
landowner. To protect your water supply, find and record the locations of
Maintain a file of all your well records – each well will have a unique well id
by the driller for reporting. The well tracking number is a 5 or 6-digit numb
tracking any additional historical information available for your well from t

- Texas Water Development Board (TWDB) Groundwater Dat

Texas A&M AgriLife Extension

SP-465
4/12

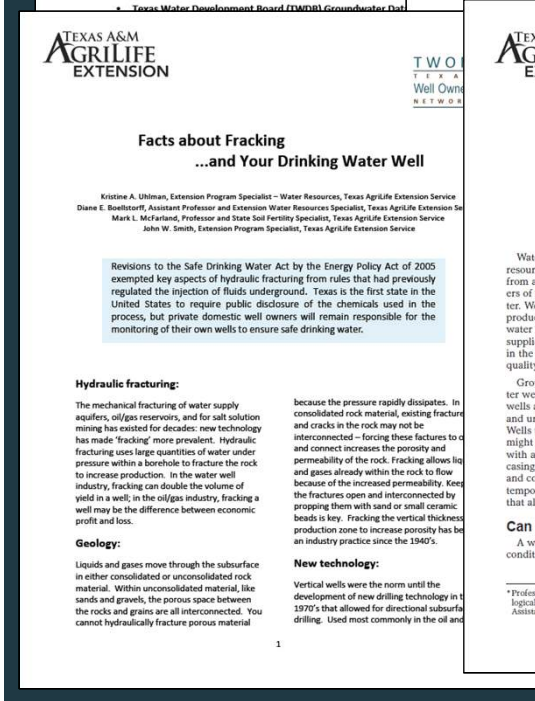
TWON Texas Well Owner Network

Well Owner Drought Response

Kristine A. Uhlman, Extension Program Specialist – Water Resources, Texas AgriLife Extension Service
Diane E. Boellstorff, Assistant Professor and Extension Water Resources Specialist, Texas AgriLife Extension Service
Mark L. McFarland, Professor and State Soil Fertility Specialist, Texas AgriLife Extension Service

During periods of severe drought, groundwater resources are relied upon to provide water. The combination of increased pumping and the loss of recharge often results in lowered water table elevations. It should be noted that some aquifers are less reliant on recent recharge and/or may be responding to climate conditions that occurred during decades prior to the current drought. Regardless of the cause of lowered water tables, there are several best management practices recommended to protect your water supply.

- Monitor your pump. Rapid cycling of the pump on and off over short periods of time is the result of lowered water tables and slow static water level recovery. Rapid pump cycling will burn out the motor. Heat generated by a submersible pump in lowered water tables can damage the drop-pipe if it is constructed of PVC. Allow your pump to rest or, if possible, throttle-down your pumping rate



Texas A&M AgriLife Extension

TWO
TEXA
Well Owne
NETWOR

Facts about Fracking ...and Your Drinking Water Well

Kristine A. Uhlman, Extension Program Specialist – Water Resources, Texas AgriLife Extension Service
Diane E. Boellstorff, Assistant Professor and Extension Water Resources Specialist, Texas AgriLife Extension Se
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Revisions to the Safe Drinking Water Act by the Energy Policy Act of 2005 exempted key aspects of hydraulic fracturing from rules that had previously regulated the injection of fluids underground. Texas is the first state in the United States to require public disclosure of the chemicals used in the process, but private domestic well owners will remain responsible for the monitoring of their own wells to ensure safe drinking water.

Hydraulic fracturing:

The mechanical fracturing of water supply aquifers, oil/gas reservoirs, and for salt solution mining has existed for decades: new technology has made 'fracking' more prevalent. Hydraulic fracturing uses large quantities of water under pressure within a borehole to fracture the rock to increase production. In the water well industry, fracking can double the volume of yield in a well; in the oil/gas industry, fracking a well may be the difference between economic profit and loss.

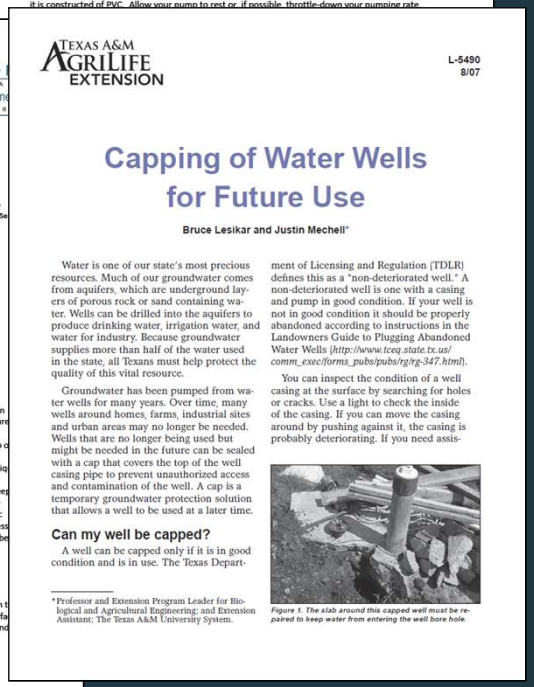
Geology:

Liquids and gases move through the subsurface in either consolidated or unconsolidated rock material. Within unconsolidated material, like sands and gravels, the porous space between the rocks and grains are all interconnected. You cannot hydraulically fracture porous material because the pressure rapidly dissipates. In consolidated rock material, existing fracture and cracks in the rock may not be interconnected – forcing these factures to c and connect increases the porosity and permeability of the rock. Fracking allows liq and gases already within the rock to flow because of the increased permeability. Keep the fractures open and interconnected by propping them with sand or small ceramic beads is key. Fracking the vertical thickness production zone to increase porosity has be an industry practice since the 1940's.

New technology:

Vertical wells were the norm until the development of new drilling technology in t 1970's that allowed for directional subsurfa drilling. Used most commonly in the oil and

1



Texas A&M AgriLife Extension

L-5490
8/07

Capping of Water Wells for Future Use

Bruce Lesikar and Justin Mechell*

Water is one of our state's most precious resources. Much of our groundwater comes from aquifers, which are underground layers of porous rock or sand containing water. Wells can be drilled into the aquifers to produce drinking water, irrigation water, and water for industry. Because groundwater supplies more than half of the water used in the state, all Texans must help protect the quality of this vital resource.

Groundwater has been pumped from water wells for many years. Over time, many wells around homes, farms, industrial sites and urban areas may no longer be needed. Wells that are no longer being used but might be needed in the future can be sealed with a cap that covers the top of the well casing pipe to prevent unauthorized access and contamination of the well. A cap is a temporary groundwater protection solution that allows a well to be used at a later time.

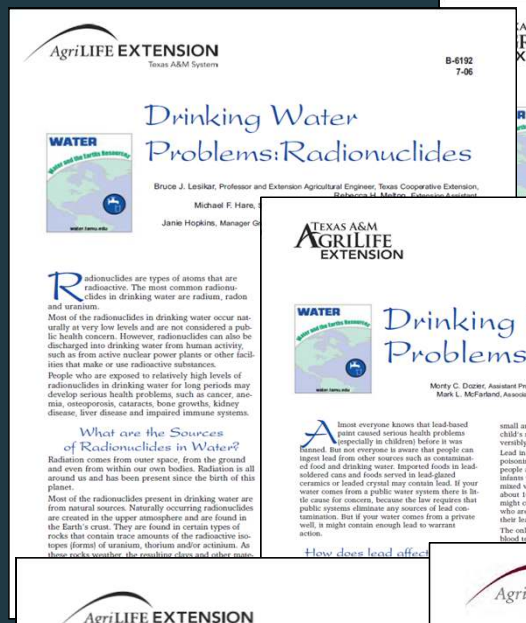
Can my well be capped?

A well can be capped only if it is in good condition and is in use. The Texas Department of Licensing and Regulation (TDLR) defines this as a "non-deteriorated well." A non-deteriorated well is one with a casing and pump in good condition. If your well is not in good condition it should be properly abandoned according to instructions in the Landowners Guide to Plugging Abandoned Water Wells (*http://www.tceq.state.tx.us/comm_exec/forms_pubs/pubs/rg/rg-347.html*).

You can inspect the condition of a well casing at the surface by searching for holes or cracks. Use a light to check the inside of the casing. If you can move the casing around by pushing against it, the casing is probably deteriorating. If you need assis-

Figure 1. The slab around this capped well must be repaired to keep water from entering the well bore hole.

*Professor and Extension Program Leader for Biological and Agricultural Engineering; and Extension Assistant; The Texas A&M University System.



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Texas A&M System

B-6192
7-06

WATER

Drinking Water Problems:Radionuclides

Bruce J. Lesikar, Professor and Extension Agricultural Engineer, Texas Cooperative Extension,
Michael F. Hare,
Janie Hopkins, Manager G

Radionuclides are types of atoms that are radioactive. The most common radionuclides in drinking water are radium, radon and uranium.

Most of the radionuclides in drinking water occur naturally at very low levels and are not considered a public health concern. However, radionuclides can also be discharged into drinking water from human activity, such as from active nuclear power plants or other facilities that make or use radioactive substances.

People who are exposed to relatively high levels of radionuclides in drinking water for long periods may develop serious health problems, such as cancer, anemia, osteoporosis, cataracts, bone growths, kidney disease, liver disease and impaired immune systems.

What are the Sources of Radionuclides in Water?

Radiation comes from outer space, from the ground and even from within our own bodies. Radiation is all around us and has been present since the birth of this planet.

Most of the radionuclides present in drinking water are from natural sources. Naturally occurring radionuclides are created in the upper atmosphere and are found in the Earth's crust. They are found in certain types of rocks that contain trace amounts of the radioactive isotopes (forms) of uranium, thorium and/or actinium. As those rocks weather, the resulting clays and other mate-

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L-5452
2-04

WATER

Drinking Water Problems: Lead

Monty C. Dozier, Assistant Professor and Extension Water Resources Specialist
Mark L. McFarland, Associate Professor and Extension Soil Fertility Specialist
The Texas A&M University System

Almost everyone knows that lead-based paint caused serious health problems (especially in children) before it was banned. But not everyone is aware that people can ingest lead from other sources such as contaminated food and drinking water. Imported foods in lead-soldered cans and foods served in lead-glazed ceramics or leaded crystal may contain lead. If your water comes from a public water system there is little cause for concern, because the law requires that public systems eliminate any sources of lead contamination. But if your water comes from a private well, it might contain enough lead to warrant action.

small amounts of it. Lead poisoning can cause a child's mental and physical development to be irreversibly stunted.

Lead in drinking water is not a main source of lead poisoning, but it can increase the amount of lead people are exposed to. This is particularly risky for infants who drink baby formulas and juices that are mixed with water containing lead. On average, about 10 to 20 percent of a child's lead exposure might come from drinking water; however, infants who are fed formula could get 40 to 60 percent of their lead intake from water.

The only way to detect lead poisoning is with a blood test. The Centers for Disease Control and

How does lead affect

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Texas A&M System

WATER

Drinking Water Problems: Corrosio

Mark L. McFarland, Tony L. Provin, and Diane E.

Corrosion is one of the most common problems affecting domestic water supplies. Chemical processes slowly dissolve metal, causing plumbing pipes, fixtures and water-using equipment to deteriorate and fail. Corrosion can cause three types of damage:

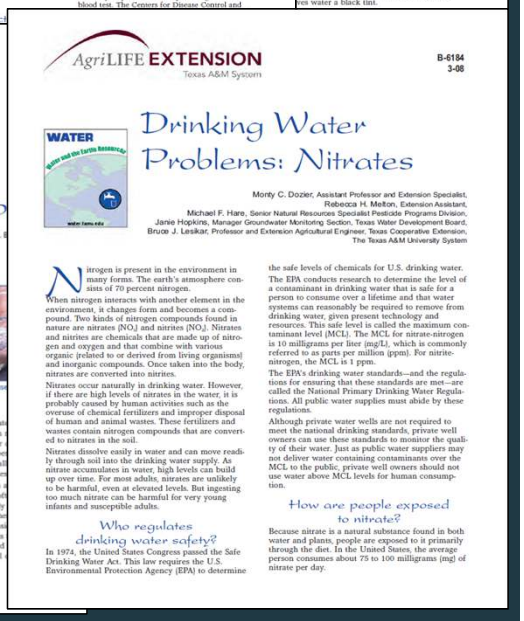
- The entire metal surface gradually thins and red stains appear in iron or steel plumbing systems or blue-green stains in copper and brass plumbing systems (Fig. 1).

Figure 2. Pinhole leaks in copper tubing caus internal corrosion.

Figure 1. Corrosion at a connection on a water heater indicated by the blue-green color.

- Deep pits appear that can penetrat tank walls. This type of corrosion add significant amounts of iron or to the water, but can eventually pe a pipe or tank, and cause potentiall water damage to a home or busines
- Copper or other metals oxidize in similar to the rusting of steel. It of reduces water flow through supply and destroys water valves and othe control surfaces, creating leaks ins outside of valves and faucets. This corrosion is not necessarily caused chemistry, but by exposure to soil corrosive environments.

Professor and Extension Water Quality Coordinator, Professor and Extension Water Testing Laboratory Director, Assistant Professor and Extension Water Resources Specialist, Texas AgriLife Extension Service, The Texas A&M System



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B-6184
3-08

WATER

Drinking Water Problems: Nitrates

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Bruce J. Lesikar, Professor and Extension Agricultural Engineer, Texas Cooperative Extension,
The Texas A&M University System

Nitrogen is present in the environment in many forms. The earth's atmosphere consists of 70 percent nitrogen.

When nitrogen interacts with another element in the environment, it changes form and becomes a compound. Two kinds of nitrogen compounds found in nature are nitrates (NO_3) and nitrites (NO_2). Nitrates and nitrites are chemicals that are made up of nitrogen and oxygen and that combine with various organic (related to or derived from living organisms) and inorganic compounds. Once taken into the body, nitrates are converted into nitrites.

Nitrates occur naturally in drinking water. However, if there are high levels of nitrates in the water, it is probably caused by human activities such as the overuse of chemical fertilizers and improper disposal of human and animal wastes. These fertilizers and wastes contain nitrogen compounds that are converted to nitrates in the soil.

Nitrates dissolve easily in water and can move readily through soil into the drinking water supply. As nitrate accumulates in water, high levels can build up over time. For most adults, nitrates are unlikely to be harmful, even at elevated levels. But ingesting too much nitrate can be harmful for very young infants and susceptible adults.

Who regulates drinking water safety?

In 1974, the United States Congress passed the Safe Drinking Water Act. This law requires the U.S. Environmental Protection Agency (EPA) to determine the safe levels of chemicals for U.S. drinking water. The EPA conducts research to determine the level of a contaminant in drinking water that is safe for a person to consume over a lifetime and that water systems can reasonably be required to remove from drinking water, given present technology and resources. This safe level is called the maximum contaminant level (MCL). The MCL for nitrate-nitrogen is 10 milligrams per liter (mg/L), which is commonly referred to as parts per million (ppm). For nitrite-nitrogen, the MCL is 1 ppm.

The EPA's drinking water standards—and the regulations for ensuring that these standards are met—are called the National Primary Drinking Water Regulations. All public water supplies must abide by these regulations.

Although private water wells are not required to meet the national drinking standards, private well owners can use these standards to monitor the quality of their water. Just as public water suppliers may not deliver water containing contaminants over the MCL to the public, private well owners should not use water above MCL levels for human consumption.

How are people exposed to nitrate?

Because nitrate is a natural substance found in both water and plants, people are exposed to it primarily through the diet. In the United States, the average person consumes about 75 to 100 milligrams (mg) of nitrate per day.