



Working Well



**WORKING
WELL**

Clean water.
Well protected.

Program Background

- Coalbed Methane public information meetings in 2006
- Pilot (7 workshops)
 - Funded through Water for Life
- Program Launched in 2008
 - Cross-Ministry funding with 1/3 funding from Alberta Environment and Parks, Alberta Agriculture and Forestry, and Alberta Health



Working Well Program

- Steering Committee
 - Alberta Environment and Parks
 - Alberta Agriculture and Forestry
 - Alberta Health
 - Alberta Health Services
 - Alberta Water Well Drilling Association
 - Association of Alberta Agricultural Fieldmen



Working Well Program

- Technical Committee
 - 15 factsheets
 - 1 E-Learning video
 - 2 YouTube vides
 - Presentation content
- Delivery Staff
 - Sagewood Communications
 - Program delivery and coordination
 - Assistance from partner org's



10 Years of Working Well...

- 298 workshops
- over 7900 participants
- 200 communities
- The Working Well program maintains a proactive approach to encourage and empower private well owners to be stewards of our groundwater resources and is a non-regulatory approach to achieving safe, secure drinking water supplies.



Typical Workshop Agenda

- Understanding groundwater
- How your well works
- Water well problems
- Top 10 well enemies
- Shock chlorinating your well
- Taking water samples
- Take home messages





Understanding Groundwater

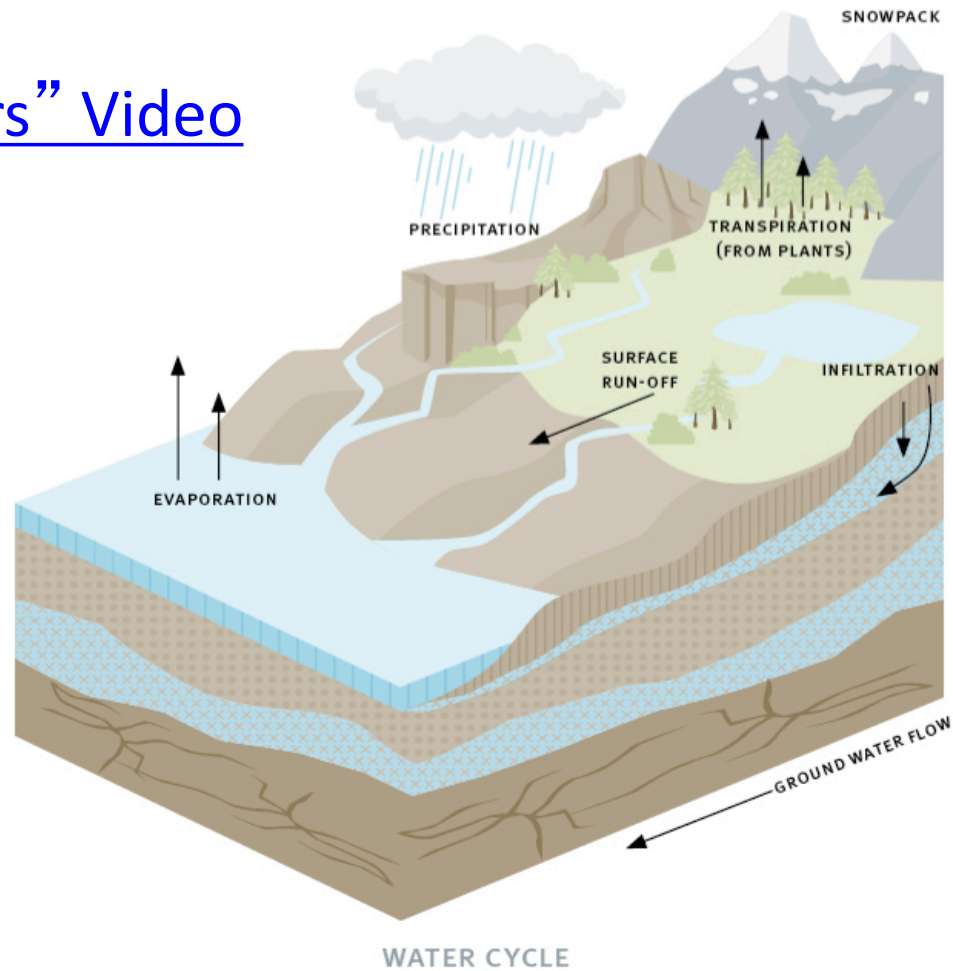


**WORKING
WELL**

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Well protected.

Understanding Groundwater

- [“Hidden Waters” Video](#)





How Your Well Works

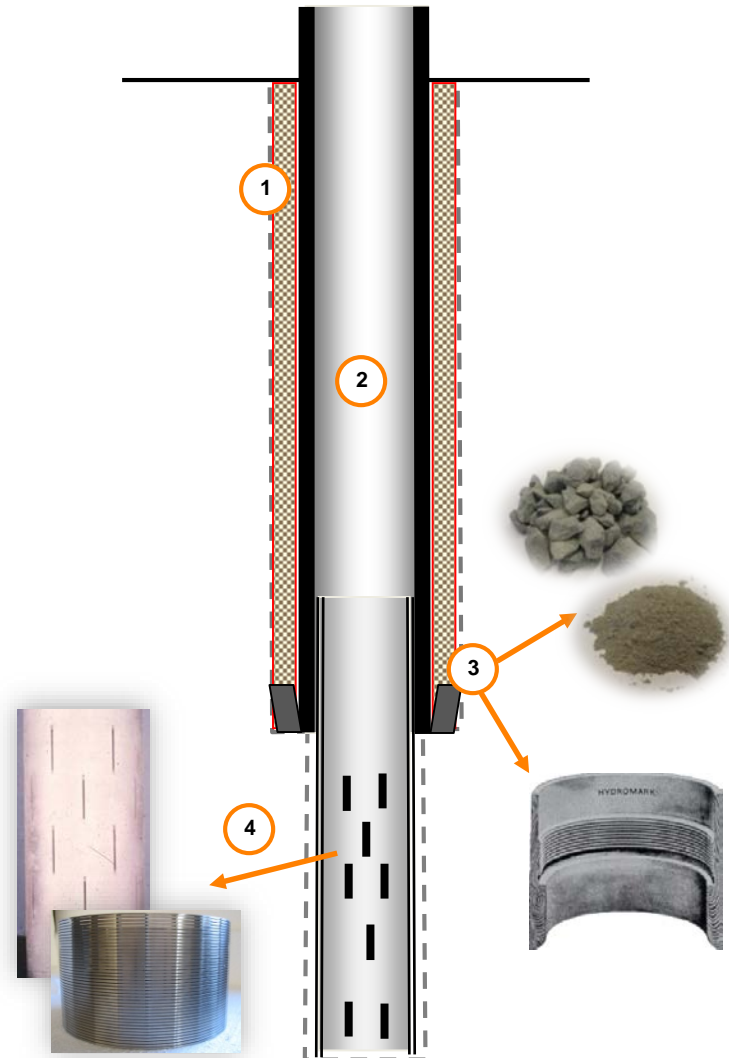


**WORKING
WELL**

Clean water.
Well protected.

Key Components of a Water Well

1. Borehole
 - Conduit to aquifer
2. Casing/Cribbing
 - Keeps borehole open
 - Houses pumping equipment
 - Excludes undesirable aquifers
3. Annular Seal
 - Prevents contamination from surface
 - Prevents mixing of aquifers
 - Sealing method is dependent on type of well construction (bentonite, drive shoe)
4. Well Intake
 - Allows groundwater into the well
 - Slotted liner/casing or screen



Key Components of a Water Well

5. Pitless Adaptor

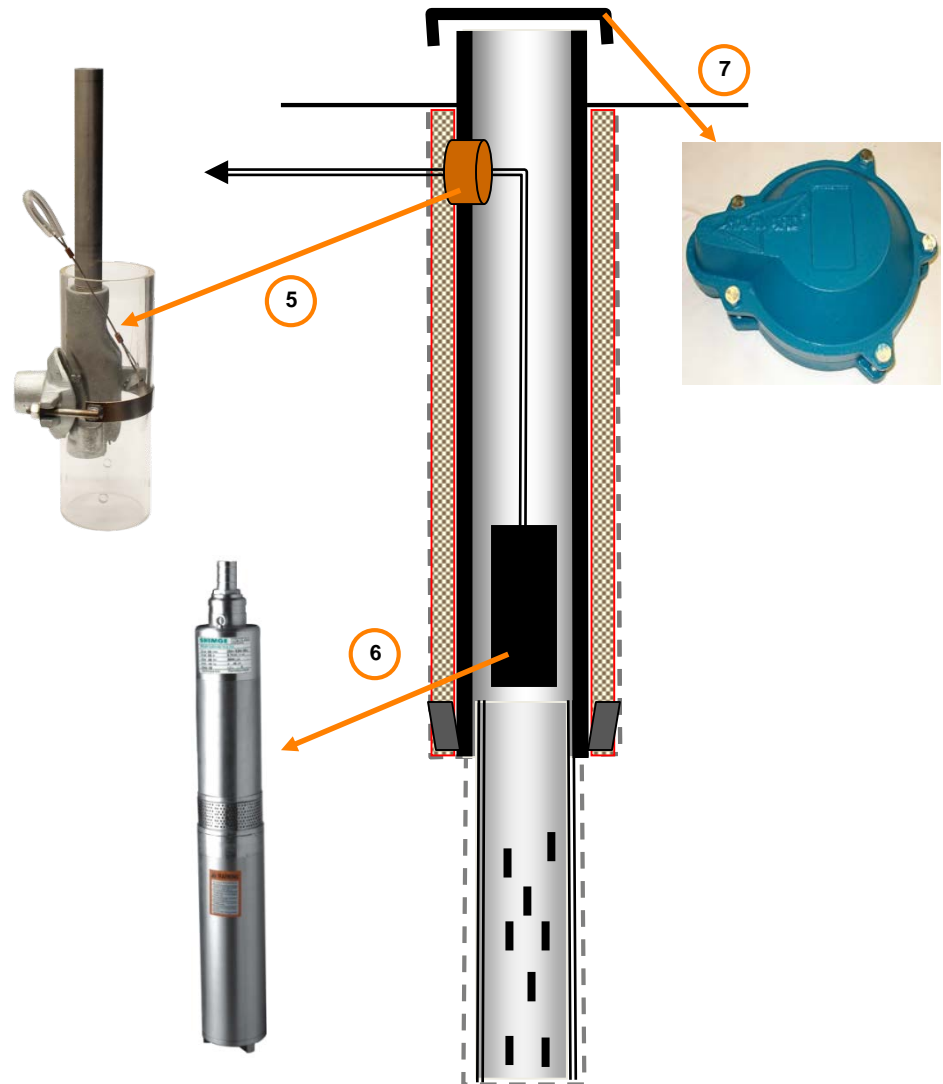
- Water-tight connection to distribution system
- Preferably non-obstructive type

6. Pump

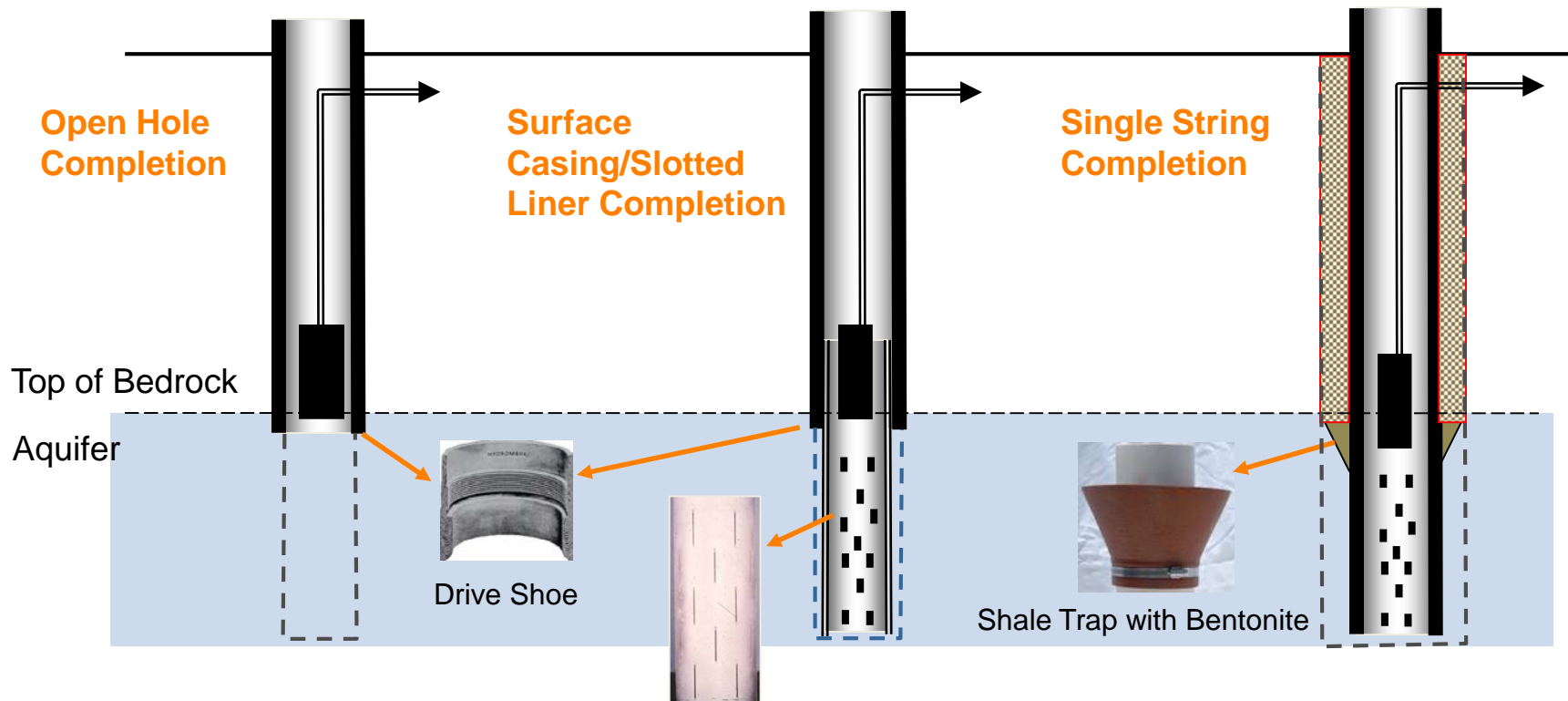
- Properly matched to recommended pumping rate

7. Well Cap

- Protects well from direct contamination

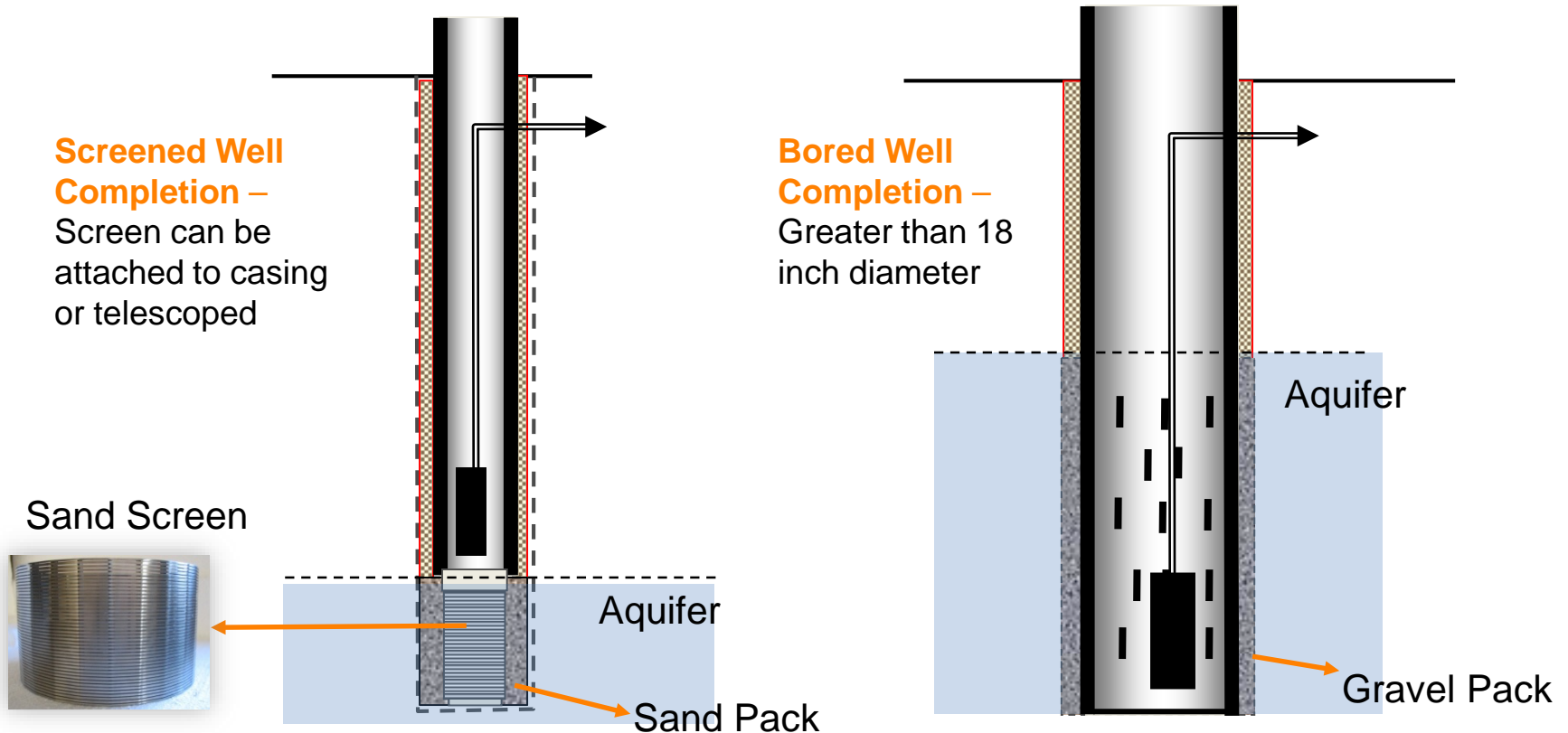


Typical Well Completions – *Bedrock Aquifers*



Well Completions used in **consolidated** bedrock formations (shale, sandstone)

Typical Well Completions – *Surficial Aquifers*



Well Completions used in **unconsolidated** surficial materials (sand, gravel)

Understanding Your Drilling Report

Government of Alberta **Water Well Drilling Report** [View in Metric](#)

The driller supplies the data contained in this report. The Province disclaims responsibility for its accuracy. The information on this report will be retained in a public database.

GIC Well ID: 9876543
GoA Well Tag No.: 2009/05/28

1. Well Identification and Location

Owner Name: Joe Smith
Address: Canal Street
Town: Albertatown
Province: AB
Postal Code: _____

Location: 1/4 or LSD: NE SEC 01 TWP 001 RGE 01 W of MER 4 Lot: _____ Block: _____ Plan: _____ Additional Description: _____

Measured from Boundary of _____ ft from _____ ft from _____

GPS Coordinates in Decimal Degrees (NAD 83)
Latitude: _____ Longitude: _____ Elevation: 0.00 ft
How Location Obtained: _____

2. Drilling Information

Method of Drilling: Rotary
Type of Work: New Well
Proposed Well Use: Domestic

3. Formation Log

Depth from ground level (ft)	Water Bearing	Lithology Description
45.00	Brown Clay	
62.00	Sand & Gravel	
109.00	Brown Clay	
121.00	Sand	
138.00	Gray Clay	
146.00	Gray Shale	
152.00	Bentonite	
156.00	Brown Shale	
168.00	Coal	
181.00	Green Shale	
220.00	Gray Sandstone & Coal	
222.00	Coal	
241.00	Gray Sandstone	
245.00	Gray Sandy Shale	

4. Well Completion

Total Depth Drilled: 245.00 ft
Finished Well Depth: 2008/07/09
Start Date: 2008/07/09
End Date: 2008/07/09

Borehole

Diameter (in): 7.88
From (ft): 0.00
To (ft): 245.00

Surface Casing (if applicable)

Plastic: _____ Well Casing/Liner: Plastic
Size OD: 6.00 in
Size ID: 4.50 in
Wall Thickness: 0.432 in
Wall Thickness: 0.237 in
Bottom at: 145.00 ft
Top at: 120.00 ft
Bottom at: 245.00 ft

Perforations

From (ft): 130.00
To (ft): 240.00
Diameter (in): 0.020
Interval (in): 2.00

Perforated by: Machine

Annular Seal Bentonite Chips/Tablets
Placed from 0.00 ft to 145.00 ft
Amount: _____
Other Seals: _____

Screen Type Unknown
Size OD: _____ in
From (ft): _____ To (ft): _____ Slot Size (in): _____

Attachment: Unknown
Top Fittings: Unknown
Bottom Fittings: Unknown

Pack
Type: Unknown
Grain Size: _____
Amount: Unknown

7. Contractor Certification

Name of Journeyman responsible for drilling/construction of well: A Water Well Driller
Company Name: A Water Well Drilling Company Ltd.
Certification No: _____
Copy of Well report provided to owner: _____ Date approval holder signed: _____

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GoA Well Tag No.: 2009/05/28

1. Well Identification and Location

Owner Name: Joe Smith
Address: Canal Street
Town: Albertatown
Province: AB
Postal Code: _____

Location: 1/4 or LSD: NE SEC 01 TWP 001 RGE 01 W of MER 4 Lot: _____ Block: _____ Plan: _____ Additional Description: _____

Measured from Boundary of _____ ft from _____ ft from _____

GPS Coordinates in Decimal Degrees (NAD 83)
Latitude: _____ Longitude: _____ Elevation: 0.00 ft
How Location Obtained: _____

Additional Information

Distance From Top of Casing to Ground Level: 14.00 in
Is Artesian Flow: _____ Describe: _____

Recommended Pump Rate: 5.00 gpm
Pump Installed: _____ Depth: _____
Recommended Pump Intake Depth (From TOC): _____ Type: SUB Model: GRUNDFOS H.P.: 5

Did you Encounter Saline Water (>4000 ppm TDS)? _____ Depth: _____ Well Discharged Upon Completion: _____
Gas: _____ Depth: _____ Geophysical Log Taken: _____ Submitted to GIC: _____ Result Attached: _____

Additional Comments on Well: _____ Sample Collected for Potability: _____

WATER FOR DRILLING FROM COIPANY SHOP WELL 08/07/09 8:00 AM 1250 GAL. BOREHOLE DIAMETER 7.875" CASING & 5.125" LINER

5. Yield Test

Test Date: 2008/07/10
Start Time: 12:00 AM
Static Water Level: 3.50 ft

Drawdown	Elapsed Time Minutes:Sec	Recovery
3.50	0:00	165.00
12.00	1:00	117.25
19.00	2:00	106.00
26.58	3:00	94.50
36.00	4:00	94.00
41.33	5:00	73.17
49.17	6:00	61.42
55.50	7:00	52.17
63.58	8:00	47.08
70.33	9:00	42.67
76.17	10:00	38.58
86.67	12:00	34.33
96.67	14:00	27.33
105.00	16:00	21.25
118.67	20:00	16.00
132.17	25:00	8.75
145.33	30:00	5.67
155.25	35:00	5.00
165.00	40:00	4.50
165.00	50:00	3.50
165.00	60:00	
165.00	75:00	
165.00	90:00	
165.00	105:00	
165.00	120:00	

Method of Water Removal

Type: Pump
Removal Rate: 5.00 gpm
Depth Withdrawn From: 165.00 ft

If water removal period was < 2 hours, explain why: MEASURED FROM TOC

6. Water Diverted for Drilling

Water Source: _____ Amount Taken: _____ g
Diversion Date & Time: _____

7. Contractor Certification

Name of Journeyman responsible for drilling/construction of well: A Water Well Driller
Company Name: A Water Well Drilling Company Ltd.
Certification No: _____
Copy of Well report provided to owner: _____ Date approval holder signed: _____

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Drawing Your Own Well – Bedrock Completions

Government of Alberta Water Well Drilling Report [View in Metric](#)

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GC Well ID: 9876543
GC Well Tag No.: 20090508
Date Report Received: 20090508

1. Well Identification and Location

Owner Name: Joe Smith
Address: Canal Street
Town: Albertstown
Province: AB
Postal Code:
Location: T4 or L5D SEC T4P1 RGE 001 Q1 4 W of MER Lot Block Plan Additional Description
Measured from Boundary of 8.0m GPS Coordinates in Decimal Degrees (NAD 83) Latitude Longitude Elevation 2.00 m
How Location Obtained New Location Obtained

Additional Information

Distance From Top of Casing to Ground Level: 18.00 m In Flow Control Installed:
In Artesian Flow:
Recommended Pump Rate: 1.00 gpm Pump Installed:
Did you Encounter Saline Water (>4000 ppm TDS) Depth: 8 m Well Discharged Upon Completion:
Additional Comments on Well: WATER FOR DRILLING FROM COPIPAHY SHOP WELL 080709 8:00 AM 1250 GAL BOREHOLE DIAMETER 7.875" CASING & 5.125" LINER

2. Yield Test

Test Date: 20090710 Start Time: 12:00 AM Static Water Level: 3.50 m

Measurement in Imperial

Drawdown	Flow Rate	Recovery
3.50	0.00	185.00
10	1.00	117.25
20	2.00	100.00
30	3.00	94.50
40	4.00	91.00
50	5.00	73.17
60	6.00	61.42
70	7.00	52.17
80	8.00	47.00
90	9.00	42.67
100	10.00	39.00
110	11.00	34.33
120	12.00	31.25
130	13.00	27.33
140	14.00	23.25
150	15.00	19.00
160	16.00	15.57
170	17.00	12.50
180	18.00	10.00
190	19.00	8.33
200	20.00	7.14
210	21.00	6.25
220	22.00	5.56
230	23.00	5.00
240	24.00	4.55
250	25.00	4.17
260	26.00	3.85
270	27.00	3.57
280	28.00	3.33
290	29.00	3.13
300	30.00	2.96
310	31.00	2.81
320	32.00	2.67
330	33.00	2.54
340	34.00	2.43
350	35.00	2.33
360	36.00	2.25
370	37.00	2.17
380	38.00	2.11
390	39.00	2.05
400	40.00	2.00
410	41.00	1.96
420	42.00	1.92
430	43.00	1.89
440	44.00	1.86
450	45.00	1.83
460	46.00	1.81
470	47.00	1.79
480	48.00	1.77
490	49.00	1.75
500	50.00	1.74
510	51.00	1.73
520	52.00	1.72
530	53.00	1.71
540	54.00	1.70
550	55.00	1.69
560	56.00	1.68
570	57.00	1.67
580	58.00	1.66
590	59.00	1.65
600	60.00	1.64
610	61.00	1.63
620	62.00	1.62
630	63.00	1.61
640	64.00	1.60
650	65.00	1.59
660	66.00	1.58
670	67.00	1.57
680	68.00	1.56
690	69.00	1.55
700	70.00	1.54
710	71.00	1.53
720	72.00	1.52
730	73.00	1.51
740	74.00	1.50
750	75.00	1.49
760	76.00	1.48
770	77.00	1.47
780	78.00	1.46
790	79.00	1.45
800	80.00	1.44
810	81.00	1.43
820	82.00	1.42
830	83.00	1.41
840	84.00	1.40
850	85.00	1.39
860	86.00	1.38
870	87.00	1.37
880	88.00	1.36
890	89.00	1.35
900	90.00	1.34
910	91.00	1.33
920	92.00	1.32
930	93.00	1.31
940	94.00	1.30
950	95.00	1.29
960	96.00	1.28
970	97.00	1.27
980	98.00	1.26
990	99.00	1.25
1000	100.00	1.24
1010	101.00	1.23
1020	102.00	1.22
1030	103.00	1.21
1040	104.00	1.20
1050	105.00	1.19
1060	106.00	1.18
1070	107.00	1.17
1080	108.00	1.16
1090	109.00	1.15
1100	110.00	1.14
1110	111.00	1.13
1120	112.00	1.12
1130	113.00	1.11
1140	114.00	1.10
1150	115.00	1.09
1160	116.00	1.08
1170	117.00	1.07
1180	118.00	1.06
1190	119.00	1.05
1200	120.00	1.04
1210	121.00	1.03
1220	122.00	1.02
1230	123.00	1.01
1240	124.00	1.00
1250	125.00	0.99
1260	126.00	0.98
1270	127.00	0.97
1280	128.00	0.96
1290	129.00	0.95
1300	130.00	0.94
1310	131.00	0.93
1320	132.00	0.92
1330	133.00	0.91
1340	134.00	0.90
1350	135.00	0.89
1360	136.00	0.88
1370	137.00	0.87
1380	138.00	0.86
1390	139.00	0.85
1400	140.00	0.84
1410	141.00	0.83
1420	142.00	0.82
1430	143.00	0.81
1440	144.00	0.80
1450	145.00	0.79
1460	146.00	0.78
1470	147.00	0.77
1480	148.00	0.76
1490	149.00	0.75
1500	150.00	0.74
1510	151.00	0.73
1520	152.00	0.72
1530	153.00	0.71
1540	154.00	0.70
1550	155.00	0.69
1560	156.00	0.68
1570	157.00	0.67
1580	158.00	0.66
1590	159.00	0.65
1600	160.00	0.64
1610	161.00	0.63
1620	162.00	0.62
1630	163.00	0.61
1640	164.00	0.60
1650	165.00	0.59
1660	166.00	0.58
1670	167.00	0.57
1680	168.00	0.56
1690	169.00	0.55
1700	170.00	0.54
1710	171.00	0.53
1720	172.00	0.52
1730	173.00	0.51
1740	174.00	0.50
1750	175.00	0.49
1760	176.00	0.48
1770	177.00	0.47
1780	178.00	0.46
1790	179.00	0.45
1800	180.00	0.44
1810	181.00	0.43
1820	182.00	0.42
1830	183.00	0.41
1840	184.00	0.40
1850	185.00	0.39
1860	186.00	0.38
1870	187.00	0.37
1880	188.00	0.36
1890	189.00	0.35
1900	190.00	0.34
1910	191.00	0.33
1920	192.00	0.32
1930	193.00	0.31
1940	194.00	0.30
1950	195.00	0.29
1960	196.00	0.28
1970	197.00	0.27
1980	198.00	0.26
1990	199.00	0.25
2000	200.00	0.24
2010	201.00	0.23
2020	202.00	0.22
2030	203.00	0.21
2040	204.00	0.20
2050	205.00	0.19
2060	206.00	0.18
2070	207.00	0.17
2080	208.00	0.16
2090	209.00	0.15
2100	210.00	0.14
2110	211.00	0.13
2120	212.00	0.12
2130	213.00	0.11
2140	214.00	0.10
2150	215.00	0.09
2160	216.00	0.08
2170	217.00	0.07
2180	218.00	0.06
2190	219.00	0.05
2200	220.00	0.04
2210	221.00	0.03
2220	222.00	0.02
2230	223.00	0.01
2240	224.00	0.00
2250	225.00	0.00

Government of Alberta Water Well Drilling Report [View in Metric](#)

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GC Well ID: 9876543
GC Well Tag No.: 20090508
Date Report Received: 20090508

1. Well Identification and Location

Owner Name: Joe Smith
Address: Canal Street
Town: Albertstown
Province: AB
Postal Code:
Location: T4 or L5D SEC T4P1 RGE 001 Q1 4 W of MER Lot Block Plan Additional Description
Measured from Boundary of 8.0m GPS Coordinates in Decimal Degrees (NAD 83) Latitude Longitude Elevation 2.00 m
How Location Obtained New Location Obtained

2. Drilling Information

Method of Drilling: Rotary
Type of Work: New Well
Proposed Well Use: Domestic

3. Well Completion

Measurement in Imperial

Depth From Ground Level (ft)	Water Bearing	Lithology Description
45.00	Brown Clay	
62.00	Sand & Gravel	
108.00	Brown Clay	
123.00	Sand	
138.00	Gray Clay	
148.00	Gray Shale	
152.00	Bedrock	
156.00	Brown Shale	
168.00	Coal	
183.00	Green Shale	
220.00	Gray Sandstone & Coal	
223.00	Coal	
241.00	Gray Sandstone	
245.00	Gray Sandy Shale	

4. Well Completion Details

Screen Type: Unknown
Size (in): 2.00
From (ft): 156.00 To (ft): 168.00
Slot Size (in): 0.01
Attachment: Unknown
Top Filtrage: Unknown Bottom Filtrage: Unknown
Pack: Type: Unknown Grain Size: Unknown Amount: Unknown

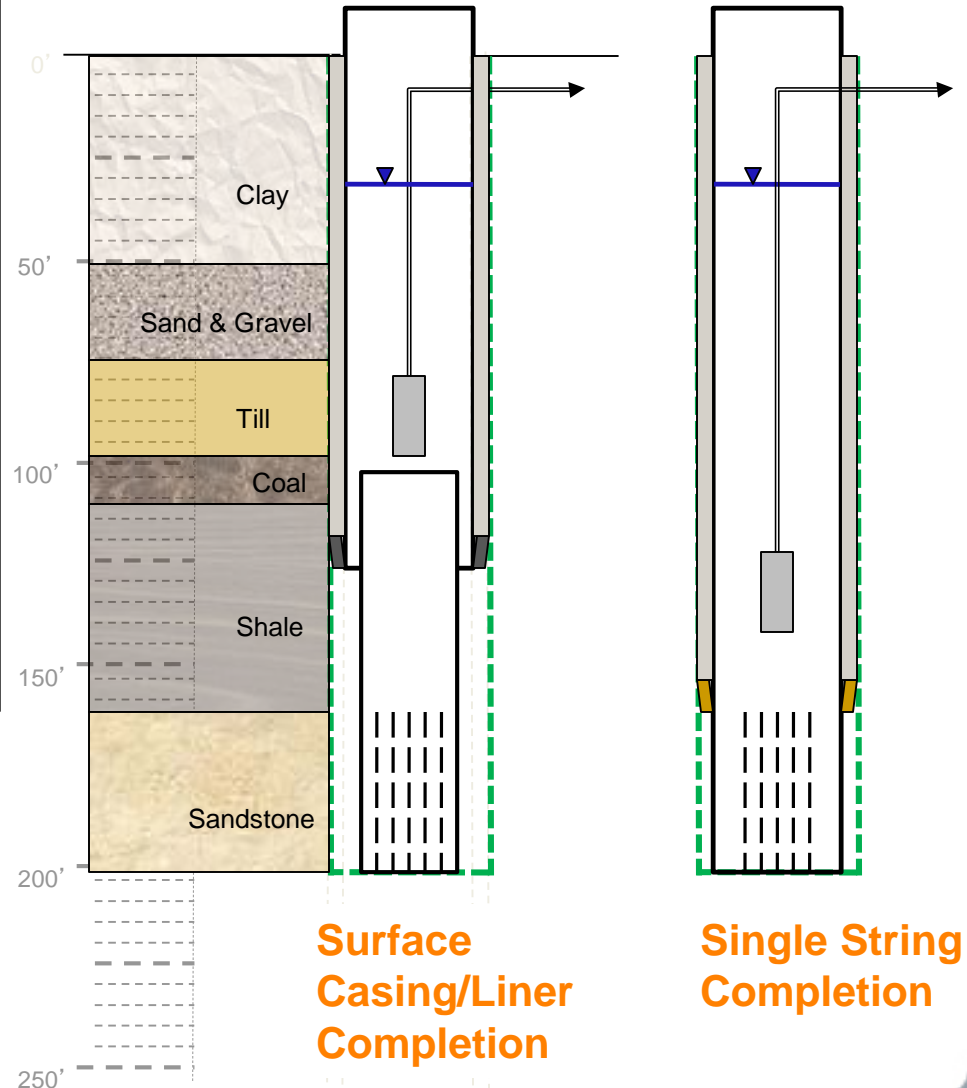
5. Contractor Certification

Name of Jurisdiction responsible for delineation of well:
A Water Well Driller
Company Name: A Water Well Drilling Company Ltd.
Certification No.:
Copy of Well report provided to owner:
Date approval holder signed:
Printed on 15/07/10 9:45:45 AM

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Page 1

Page 2



Surface Casing/Liner Completion

Single String Completion



Water Well Problems



**WORKING
WELL**

Clean water.
Well protected.

Introduction

- Common well problems include:
 - Reduction in yield
 - Changes in water quality
 - Sediment in water
- Causes of well problems
 - Biofouling
 - Over pumping



Biofouling – *What Is It?*

- Nuisance bacteria that accumulate in a well
 - Iron-related bacteria (IRB)
 - Sulphate-reducing bacteria (SRB)
 - Other slime forming bacteria
- Pumping a well increases nutrients and oxygen leading to an increase in production of slime



Biofouling - *Symptoms*

- Slime build-up in plumbing fixtures
- Changes in water quality such as:
 - Water discolouration
 - Staining of plumbing fixtures and laundry
 - Bad taste and odour (rotten egg smell)
- Gradual decrease in yield
- Increased corrosion of metal parts of your well



[Down-hole camera
video footage](#)

Biofouling – *What You Can Do*

- Regular disinfection (shock chlorination)
- May need to have well cleaned first by a licensed water well contractor



Over-pumping – *What Is It?*

Over-pumping occurs when the:

- Rate of pumping is greater than the well's capacity
- Pumping water level is drawn down below top of perforations or top of the aquifer

Problem accentuated when pump is placed inside intake portion of well

Over-pumping may lead to:

- Sediment in water
- Well failure
- Increased biofouling



Over-pumping – *What You Can Do*

- **Do not over-pump your well!**
- Check your drilling report for:
 - Recommended pump intake depth
 - Recommended pumping rate
 - Apply with caution!
 - Size pump properly to match well capability
- Conserve water
- Install flow control device and additional storage, if needed
- See the fact sheet *Over-pumping Your Well* (Issue 6)

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GWA Well Tag No.:
Date Report Received: 2009/05/28

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Owner Name: Jose Smith Address: Canal Street Town: Albertstown Province: AB Postal Code:
Location: 1/4 or L&D: SEC: TWP: RGE: W of MER: Lot: Block: Plan: Additional Description:
Measured from Boundary of:
GPG Coordinates in Decimal Degrees (NAD 83):
Latitude: Longitude: Elevation: 8.00 ft
How Location Obtained:
How Elevation Obtained:
Additional Information:
Distance From Top of Casing to Ground Level: 14.00 ft
Is Artesian Flow:
Rate:
Is Flow Control Installed:
Recommended Pump Rate: 5.00 gpm
Pump Installed:
Depth:
Recommended Pump Intake Depth (From TOC):
Type: 2000
Model: CSD/NCR 2000
W.P.: 5
Did you Encounter Saline Water?
GIC:
Depth:
Geophysical Log Taken:
Submitted to GIC:
Additional Comments on Well:
Sample Collected for Potability:
Result Attached:
WATER FOR DRILLING FROM: COMPANY SHOP WELL 09/07/09 8:00 AM 1200 GAL. BOREHOLE DIAMETER 7.875" CASING 6.5 125" LINER

5. Yield Test

Test Date: 2008/07/10 Start Time: 12:00 AM Static Water Level: 3.50 ft
Method of Water Removal:
Type: Pump
Removal Rate: 5.00 gpm
Depth Withdrawn From: 165.00 ft
If water removal period was < 2 hours, explain why:
MEASURED FROM TOC

Drawdown	Elapsed Time	Recovery
	Minutes:Sec.	
3.50	0:00	165.00
12.00	1:00	117.25
18.00	2:00	106.00
25.58	3:00	94.50
36.00	4:00	84.00
41.33	5:00	74.17
49.17	6:00	64.83
55.50	7:00	52.17
63.58	8:00	47.08
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132.17	25:00	8.75
145.33	30:00	5.67
155.25	35:00	5.00
165.00	40:00	4.50
165.00	50:00	3.50
165.00	60:00	
165.00	75:00	
165.00	90:00	
165.00	105:00	
165.00	120:00	

6. Water Diverted for Drilling

Water Source: Amount Taken: 1g Diversion Date & Time:
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7. Contractor Certification

Name of Journeyman responsible for drilling/construction of well: Certification No.:
A Water Well Driller
Company Name: Copy of Well report provided to owner: Date approval holder signed:
A Water Well Drilling Company Ltd.

More Problems...

- Mineral Incrustation/Scale
- Sediment Plugging
- Structural Failure



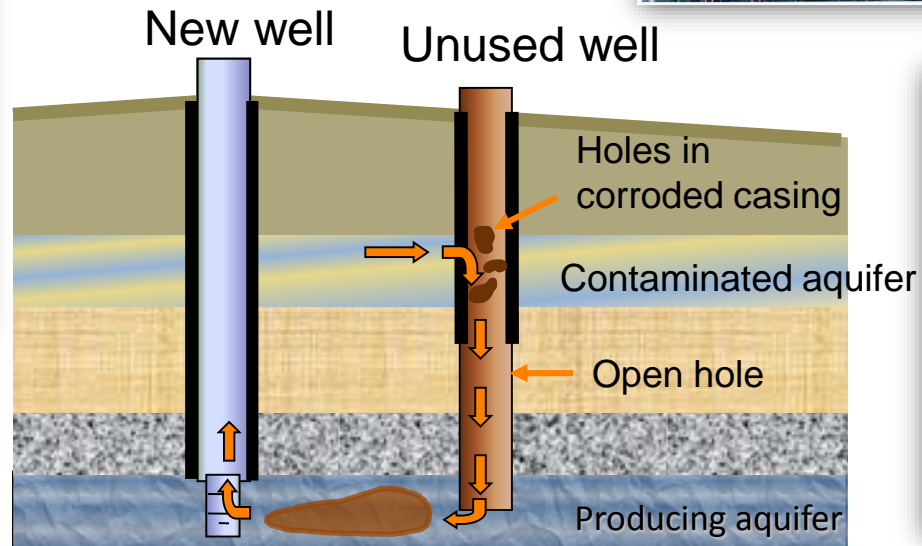
Top 2 Well Enemies



**WORKING
WELL**

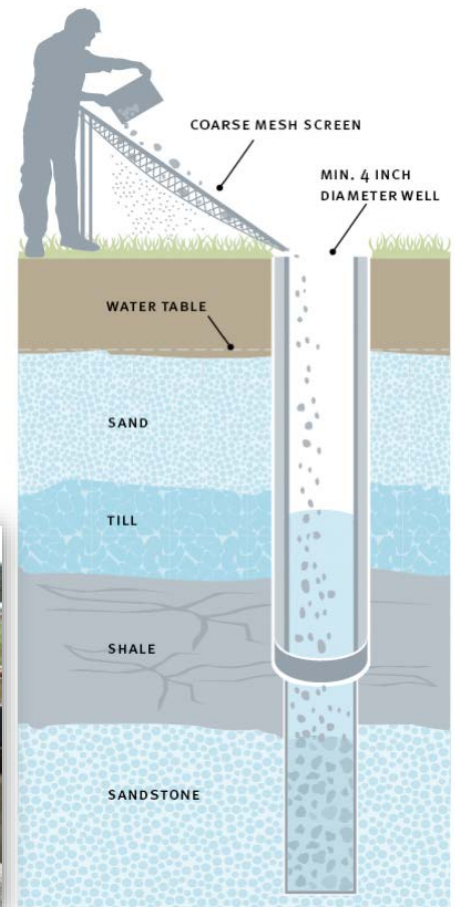
Clean water.
Well protected.

Enemy #1 – Old, Abandoned Wells

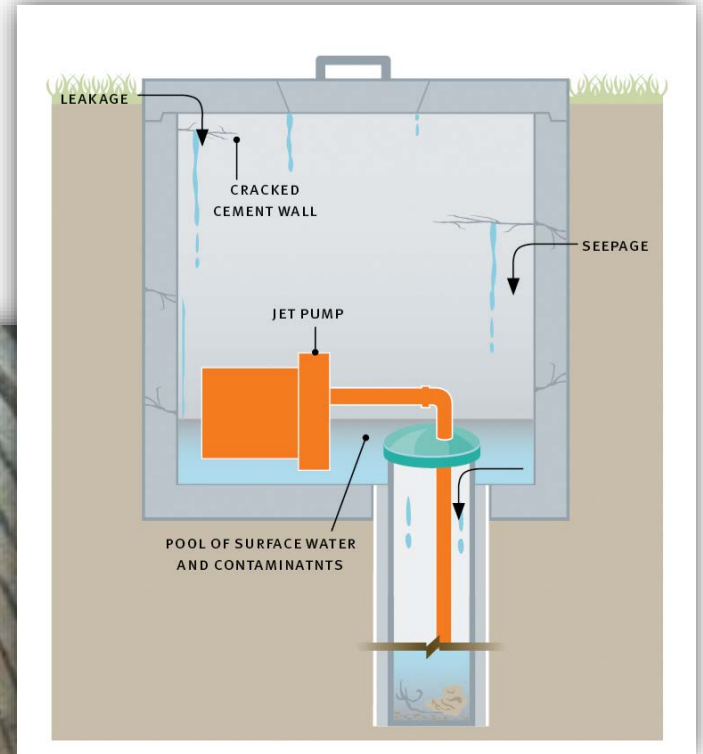


Enemy #1 – *What You Can Do*

- Properly plug all unused wells and holes
- Contact your licensed water well contractor or water specialist for recommendations
- See the fact sheet *Plugging Your Well (Issue 4)*



Enemy #2 – Well Pits ...



High water line is
the same level as
top of well casing

Metal plate cover on
well

Water in pit

Enemy #2 – and Wells in Basements



Well



Well in basement is susceptible to flooding and sewage backup



Well

Methane in water is a safety hazard

Excess nitrogen from water well blamed for deaths

Investigators say the deaths of two Alberta teens were not caused by poisonous air but a lack of oxygen in the family's root cellar.

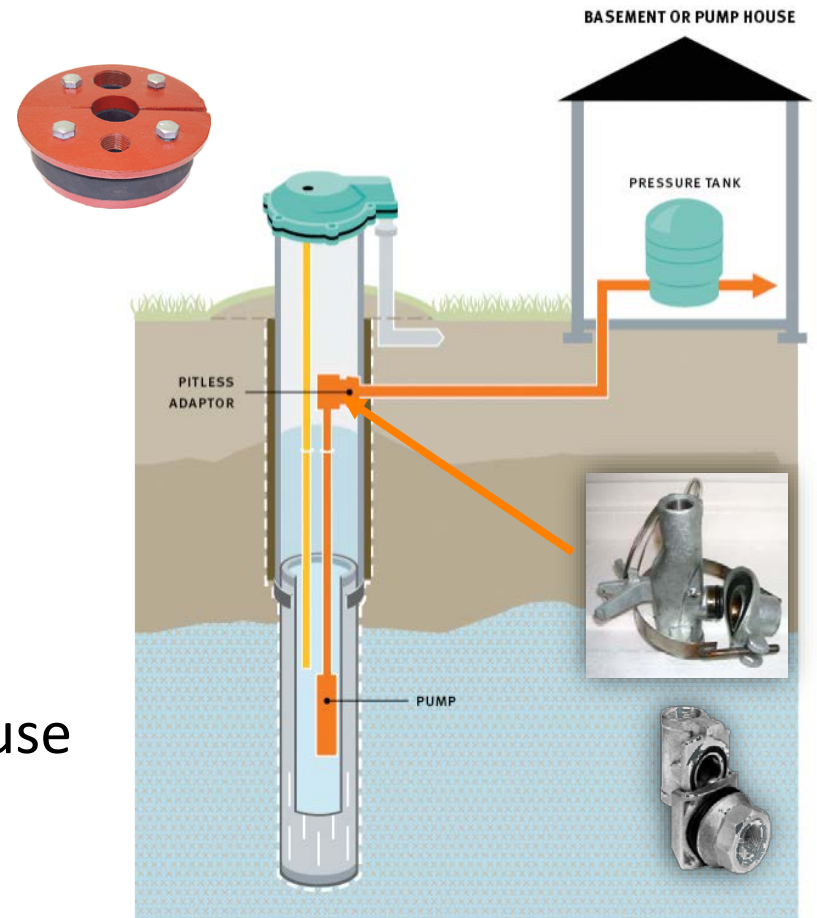
MITCH COOPER
SOUTHAM NEWSPAPERS

SYLVAN LAKE, Alta. — A freak geological occurrence killed two Sylvan Lake teens as they fetched vegetables from a root cellar on the family farm, an investigation has found.

The conclusions have also renewed warnings for rural Albertans to ensure adequate ventilation around underground well facilities.

Enemy #2 – *What You Can Do*

- Well pits:
 - Get rid of the pit
 - Install a pitless adapter
- Wells in basements:
 - Install a sanitary well seal
 - Have an emergency sump pump in basement
 - Or plug well and drill a replacement outside of house
- See the fact sheet *Upgrading Your Well in a Pit* (Issue 5)



More Enemies...

- Inadequate Well Seal
- Inadequate Well Cap
- Poor Siting and Landscaping
- Poor Septic Systems
- Hazardous Material Storage
- Poor maintenance practices
- Lack of Backflow Protection
- Poor Manure Management



Shock Chlorinating Your Well



**WORKING
WELL**

Clean water.
Well protected.

You Will Learn

- How to disinfect a contaminated well
- A preventative maintenance measure to control biofouling
- See the fact sheet ***Shock Chlorinating Your Well*** (Issue 3)



When To Shock Chlorinate

- Immediately after installing a new well
- Whenever you repair or replace your well, pump or distribution system
- Following contamination by flood water
- Following change in water clarity, colour, odour or taste
- When lab tests show coliform bacteria in water
- When slime is present in toilet tank
- Every year, to prevent biofouling

Risk ...

- More chlorine is not better ... ineffective, corrosive, etc.
- On older, poorly maintained wells:
 - loosening of rust and deposits may result in leaks in the distribution system
 - Shock chlorination may not be effective without **prior** professional cleaning by a licensed water well contractor



Dosage and Types of Chlorine

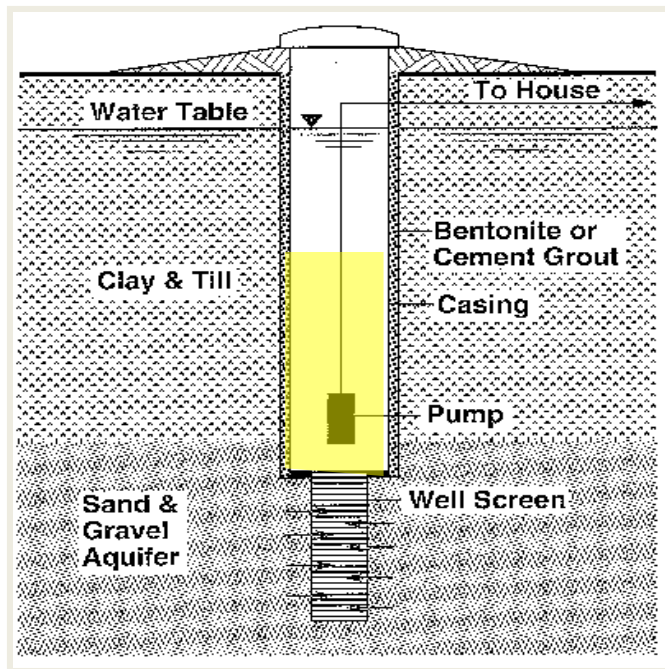
- Dosage – 200 mg/L chlorine solution
- Liquid
 - Household bleach - 5.25% sodium hypochlorite
 - Industrial strength - 12% sodium hypochlorite
 - Limited shelf life
- Pellets, granular or powder
 - 65 to 75% calcium hypochlorite

Treatment results are the same if proportionally the same amount of chlorine is used



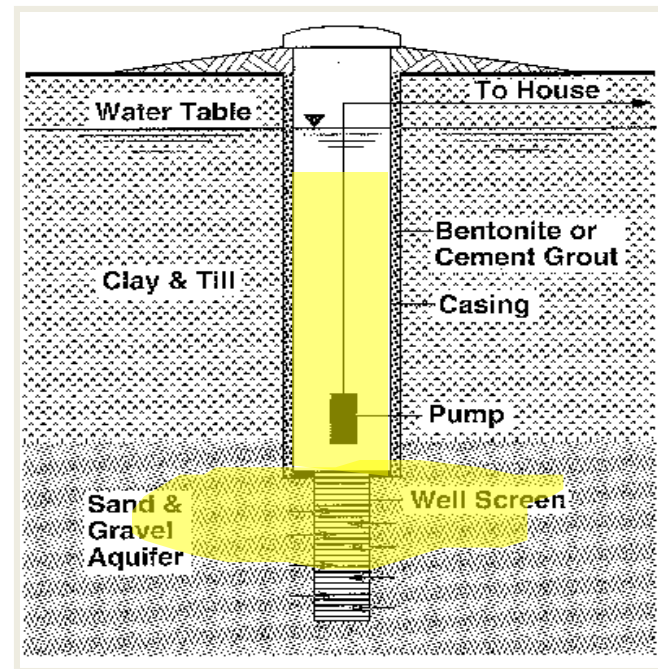
Methods of Shock Chlorination

1. Simple Chlorination



Poor Results

2. Bulk Displacement



Much Better Results!

Procedure for Small Diameter Wells

- The latest version of ***Water Wells That Last (WWTL)*** was updated to reduce the concentration of chlorine from 1000 ppm to 200 ppm

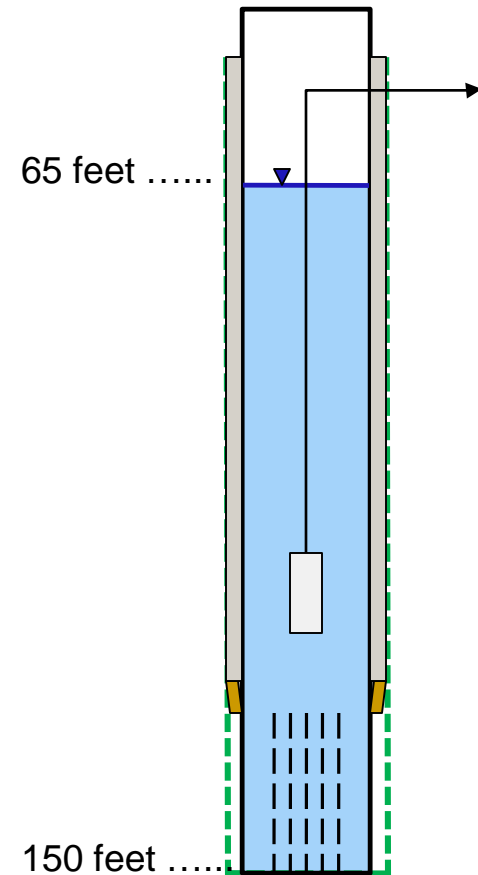


Procedure for Small Diameter Wells ...

Step 1:

Calculate depth of standing water
in your well

150 feet	–	65 feet	=	85 feet
<i>Total well depth</i>		<i>Non-pumping water level</i>		<i>Feet of water in your well</i>



Procedure for Small Diameter Wells ...

Step 2: Calculate volume of water needed to create a solution equal to 2 times the volume of standing water in the well. Place in clean tank.

85 feet	x	2.5 gal	=	213 gal
<i>Feet of water in your well (Step 1)</i>		<i>Water needed per foot (Table 1)</i>		<i>Volume of water for procedure</i>

Well Casing Diameter		Vol. of water needed / foot of water in your well		Vol. of chlorine bleach (5.25%) needed / foot of water in your well ¹
inches	mm.	gallons	litres	litres
4 in	100 mm	1	5 L	.02 L
6 in	150 mm	2.5	11 L	.04 L
8 in	200 mm	4	19 L	.07 L

Refer to Table 1 on fact sheet

Procedure for Small Diameter Wells ...

Step 3: Calculate volume of chlorine needed and add to tank.

$$\begin{array}{ccccc} \boxed{85 \text{ feet}} & \times & \boxed{.04 \text{ L}} & = & \boxed{3.4 \text{ L}} \\ \text{Feet of water in} & & \text{Chlorine needed} & & \text{Volume of} \\ \text{your well (Step 1)} & & \text{per foot (Table 1)} & & \text{chlorine bleach} \\ & & & & \text{for procedure} \end{array}$$

Well Casing Diameter		Vol. of water needed / foot of water in your well		Vol. of chlorine bleach (5.25%) needed / foot of water in your well ¹
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Refer to Table 1 on fact sheet

Procedure for Small Diameter Wells ...

Step 4: Siphon or pump chlorine solution into well



Procedure for Small Diameter Wells ...

- **Step 5:** Open all outlets in water distribution system. Run water until smell chlorine.
- **Step 6:** Shut off outlets and leave chlorine solution in well and distribution system for 8 to 48 hours
- **Step 7:** Open an outside outlet and run water until chlorine smell dissipates. Run water away from sensitive plants or landscaping.
Do not over-pump your well!
- **Step 8:** Run remaining outlets to flush distribution system

pH Adjusted Chlorination

- When conventional chlorination is not effective
- 1000 mg/L chlorine solution no longer recommended
 - Raises pH to 10.5
- Job for a **licensed water well contractor**
 - Reducing pH will increase the effectiveness of chlorine in high pH waters

Water pH	Biocidal Effect	Oxidative Effect
5.5	100%	0%
8	12%	88%
9	2%	98%
10	< 1%	>99%

Effectiveness

- Must be done regularly
- Should prevent premature well failure and avoid costly cleaning or treatment

Shock chlorination is to water wells what regular oil changes are to vehicles... it keeps them operating smoothly for years!!





Take Home Messages



**WORKING
WELL**

Clean water.
Well protected.

Keep Good Records and Monitor

- Water levels
- Water testing reports
- Record of maintenance (chlorination)
- Pump test reports
- Repairs
- Reconstruction details

[illegible]

Shock Chlorinate Regularly

- Required maintenance practice to keep bacteria buildup in check
- Annually or more frequently if needed
- Remember
 - 200 ppm available chlorine
 - Bulk displacement method
 - **Do not over-pump your well**
- Seek advice from a licensed water well contractor before chlorinating older, unmaintained wells



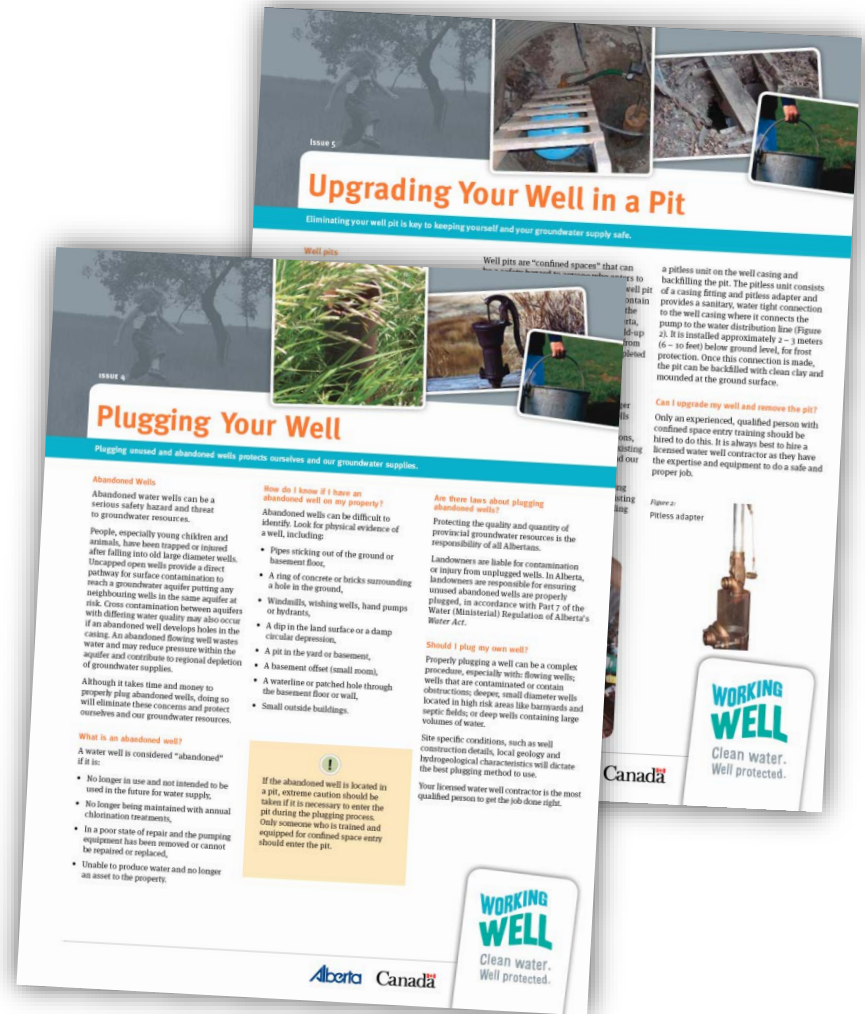
Test Water Regularly

- Bacteriological
 - Semi-annually
 - Additional testing for new births, unexplained illnesses, flood events, etc.
- Chemical
 - 2 to 5 years
 - Additional testing if sudden change in water
- Contact local health unit for
 - Sample bottles
 - Instructions
 - Drop off schedule
 - More information
- Keep records



Plug Old Wells and Eliminate Well Pits

- Contact a licensed water well contractor



Evaluation and Reporting

- Workshop Evaluation Form
- 6 month call back survey
 - Over 90% of workshop participants contacted have followed through on the beneficial activities they intended to do

Questions?



CONTACT US

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