

CasingGaurd™ Swaging Technology

Presented By: Mike Nailor



Old Technology



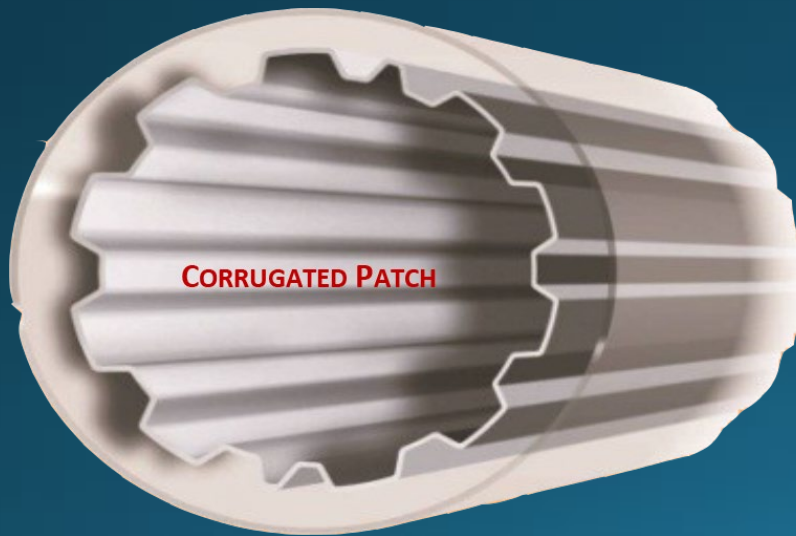
This is the old corrugated style patch utilizing 3 plates to press the stainless-steel patch out to the ID of the well casing. It does not provide for a cylindrical fit to the ID of the casing compromising the overall structural integrity of the patch.

Old Technology Vs New

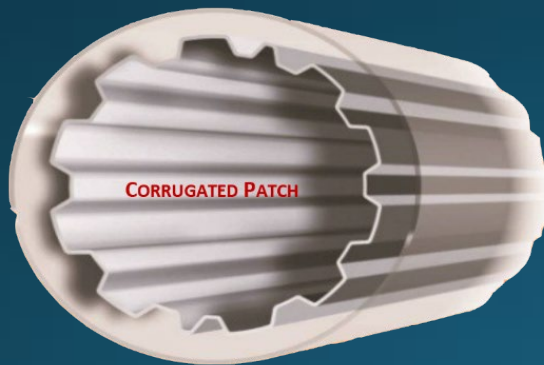
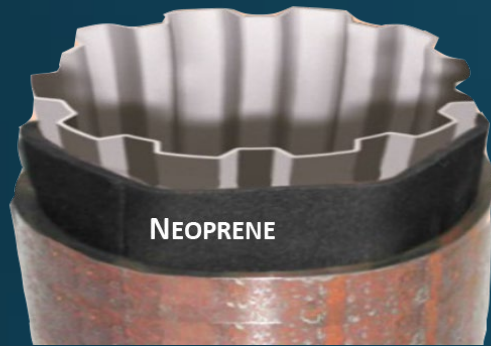


Not all Swage Systems are Created Equal

- Hydraulic Swage System
- Sleeve is vertically Corrugated
- Tool is repeatedly rotated in an attempt to create a cylindrical patch.



Get Back to Production Faster with Minimal Interference



Our FDA approved Neoprene backing, seals in damaged areas of the casing.

- Repair Holes in Damaged & Deteriorated Casing
- Minimum Interference
- Improve Water Quality
- Effective Alternative to Drilling a New Well

New CasingGuard™ Swage Technology



The New CasingGuard™ Swage Technology utilizes a perfectly round piece of Sch 10 Stainless Steel Pipe and an inflatable packer element to grab and swage the patch into place, providing a perfect cylindrical fit to the ID of the well casing.

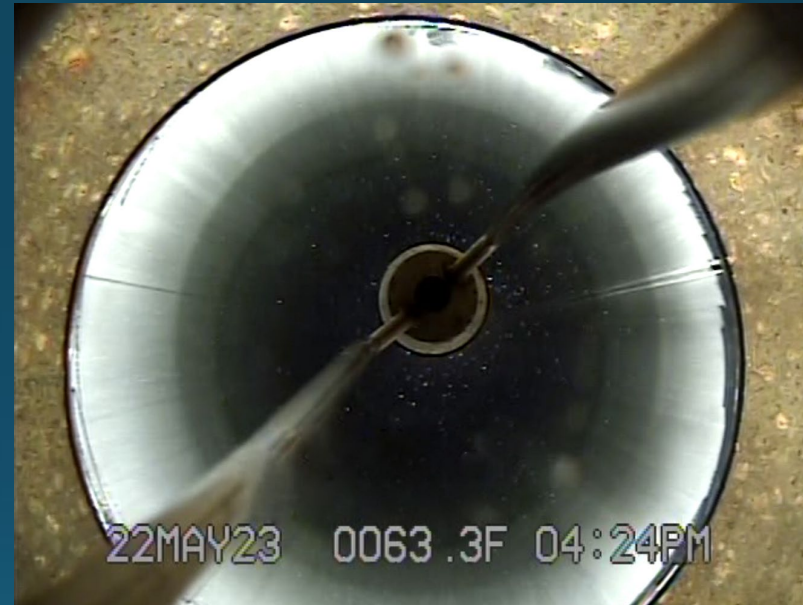
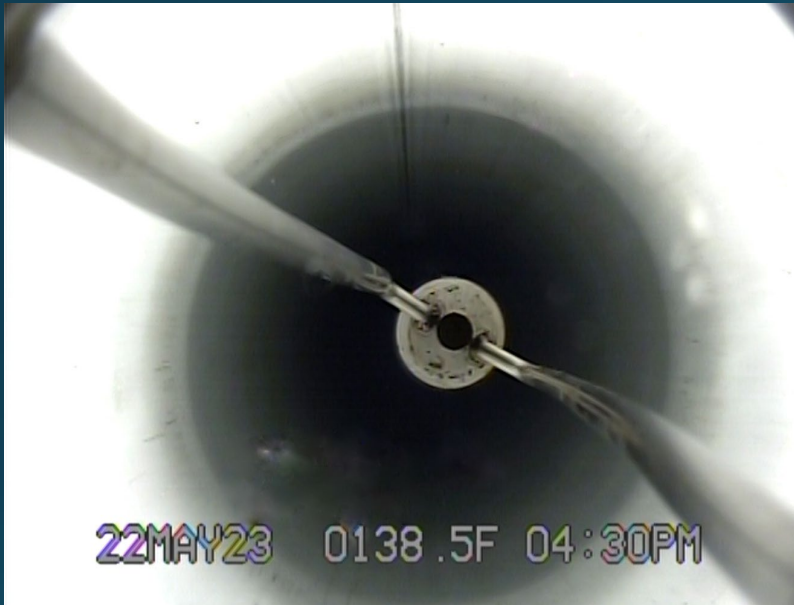
Benefits of CasingGuard™ Vs. Mechanical Swaging

- Inflatable Packer
- Packer is Faster +60ft Daily
- Swages 5ft at a time
- 360 ° Uniform Coverage
- Less Susceptible to lose liner
- Runs off Air & Water
- Can be used for “Fishing”
- Mechanical Swaging
- It would take a Week or More
- Roughly one Ft at a time
- Defects in the swaging liners
- Hangs off of chains
- Pressured by Hydraulic Oil
- Limited Ability to “Fish”

States CasingGuard™ Has Been Utilized

- Illinois
- Wisconsin
- Georgia
- Florida
- Iowa
- Kansas
- Missouri
- Michigan
- Indiana

Final Installation



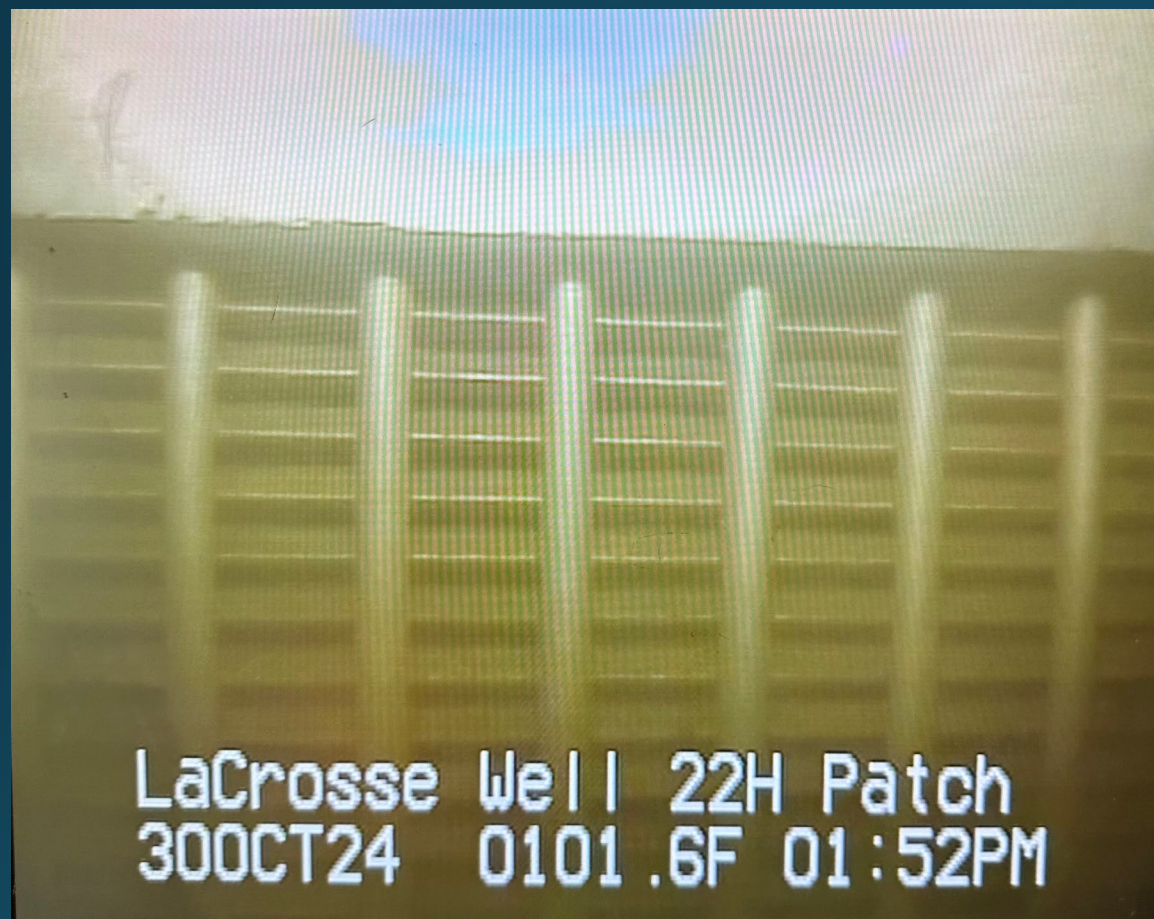
The final installation provides a perfect cylindrical fit to the ID of the casing with very minimal reduction to the diameter of the well.

Kalamazoo, MI





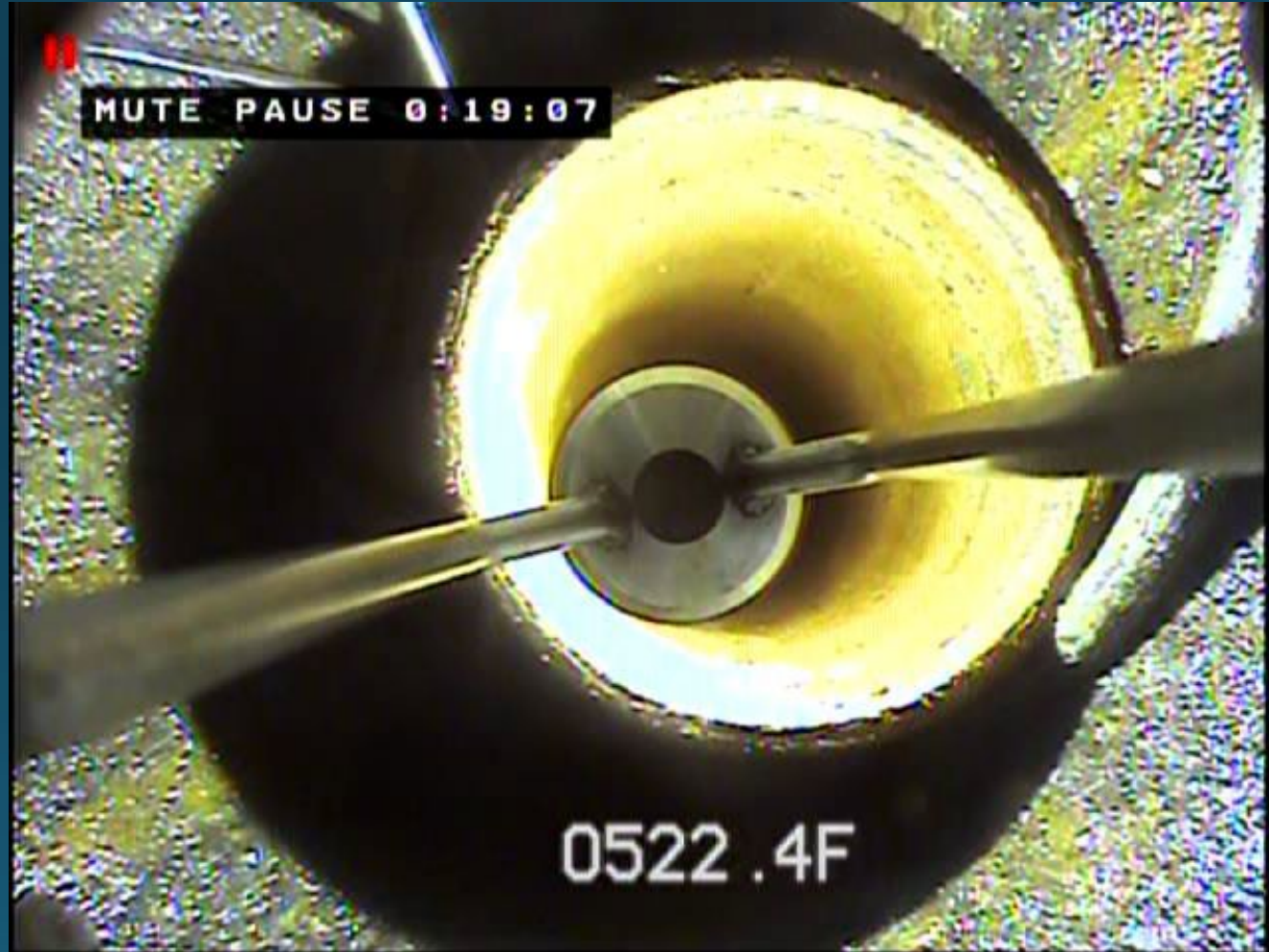




We Went Fishing!!!



Fishing Application



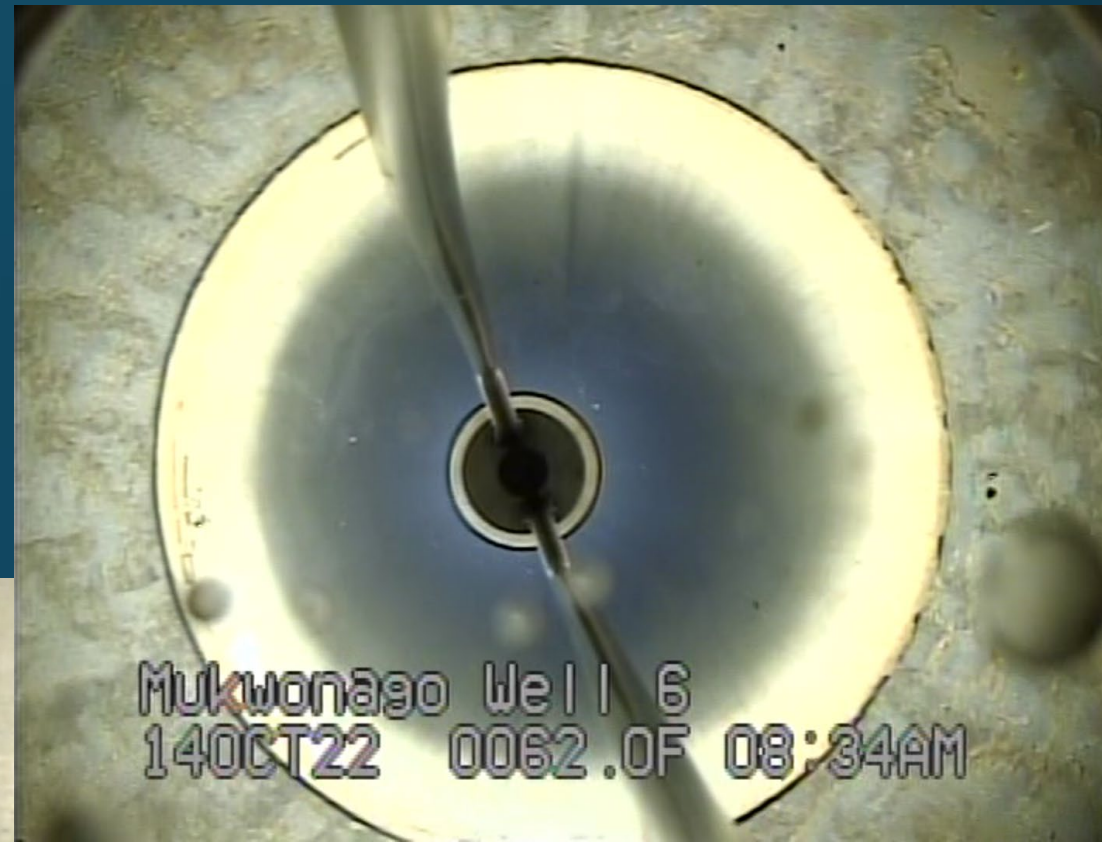


FISHING
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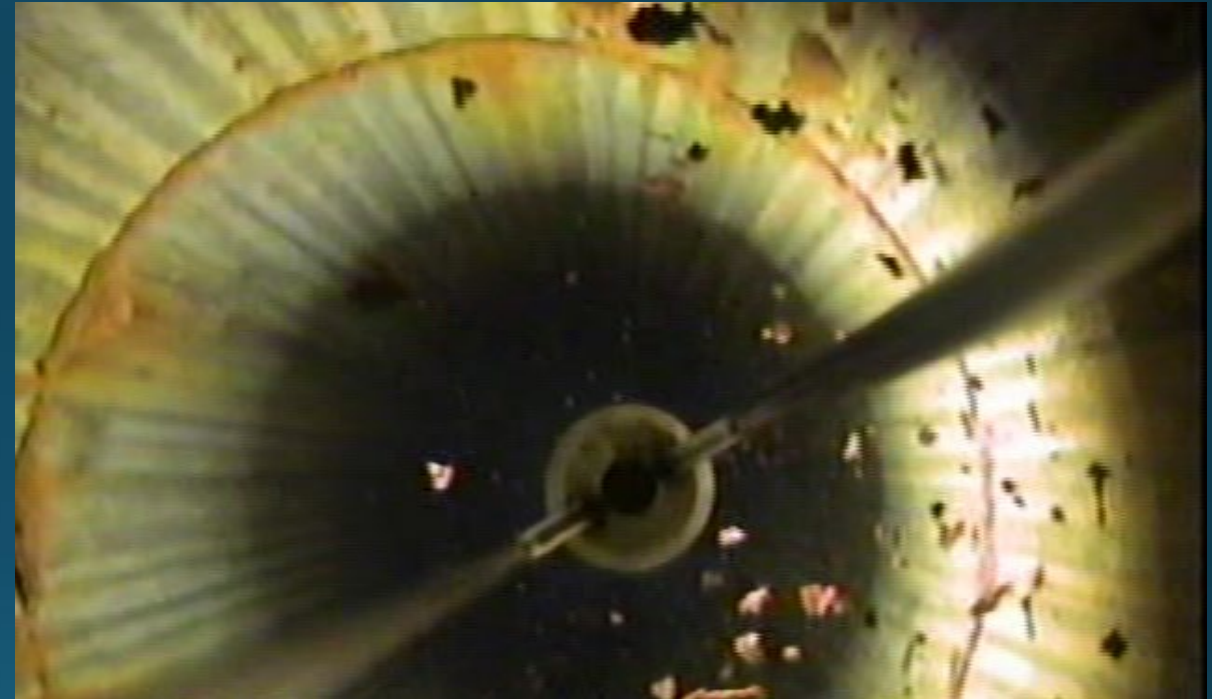
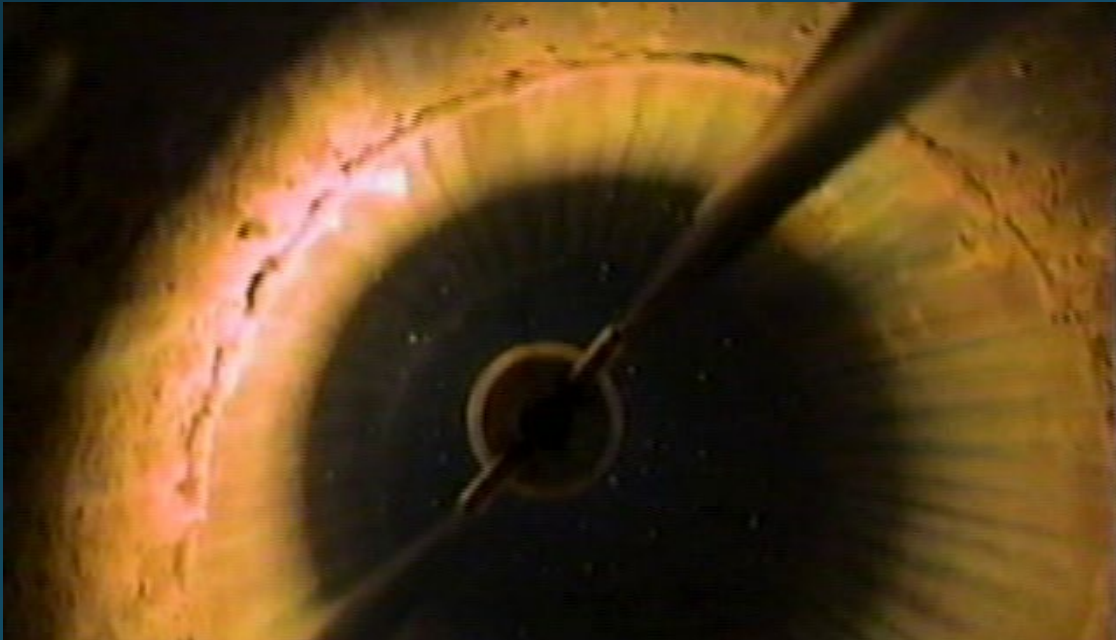
Results of Well Repair

- Top of Liner with smooth transition.
- Bottom of Liner with smooth transition.



Not all Swage Systems are Created Equal

- Hydraulic Swage System
- Swage Tool cannot evenly press out Corrugation.
- Difficult to get a smooth transition.



IPI Packers Alternative Uses!

- Village of Union Grove Well #4
- 15" ID with 1,343' Total Depth.
- Contractor Drops Submersible Test Pump to the Well Bottom.
- After countless attempts, and very high cost, the contractor determines the pump removal to be impossible.
- Well was in consideration for total replacement by Village.

WISCONSIN UNIQUE WELL NUMBER				Form 3300-77A	
SOURCE: SWAP PROJECT KEYED				Department Of Natural Resources, Box 7921	
				Madison, WI 53707	
				(Rev 12/00)	
Property Owner UNION GROVE, VILLAGE OF		Telephone Number 414 - 878 - 1818		1. Well Location V T=Town C=City V=Village of UNION GROVE	
Mailing Address 1015 STATE ST				Depth 1343 FT	
City UNION GROVE	State WI	Zip Code 53182		Fire#	
County of Well Location 52	SE	Co Well Permit No W	Well Completion Date January 1, 1985	Street Address or Road Name and Number NEW ST #4	
Well Constructor LAYNE CHRISTENSEN		License # 582	Facility ID (Public) 252020010	Subdivision Name	Lot#
Address W229 N5005 DUPLAINVILLE		Public Well Plan Approval# 64-0392		Block #	
City PEWAUKEE	State WI	Zip Code 53072	Date Of Approval 07/16/1964	Gov't Lot Section 30 T 3 N R 21 E	1/4 of SE 1/4 of
Hicap Permanent Well # 84879	Common Well # 004	4.9 gpm/ft		Latitude 42 Deg 48 Min	Longitude 88 Deg 29 Min
3. Well Serves # of homes and or (eg: barn, restaurant, church, school, industry, etc.)		High Capacity: Well?		2. Well Type 1 1=New 2=Replacement (See item 12 below) 3=Reconstruction of previous unique well # constructed in	
M M=Manic O=OTM N=NonCom P=Private Z=Other X=NonPut A=Anode L=Loop H=Drillhole		Property?		Reason for replaced or reconstructed Well?	
4. Is the well located upslope or sideslope and not downslope from any contamination sources, including those on neighboring properties?		9. Downspout/ Yard Hydrant		17. Wastewater Sump	
Well located in floodplain?		10. Privy		18. Paved Animal Barn Pen	
Distance in feet from well to nearest: (including proposed)		11. Foundation Drain to Clearwater		19. Animal Yard or Shelter	
1. Landfill		12. Foundation Drain to Sewer		20. Silo	
2. Building Overhang		13. Building Drain		21. Barn Gutter	
3. 1=Septic 2= Holding Tank		1=Cast Iron or Plastic 2=Other		22. Manure Pipe 1=Gravity 2=Pressure	
4. Sewage Absorption Unit		14. Building Sewer 1=Gravity 2=Pressure		1=Cast iron or Plastic 2=Other	
5. Nonconforming Pit		1=Cast Iron or Plastic 2=Other		23. Other manure Storage	
6. Buried Home Heating Oil Tank		15. Collector Sewer: ___ units ___ in. diam.		24. Ditch	
7. Buried Petroleum Tank		16. Clearwater Sump		25. Other NR 812 Waste Source	
8. 1=Shoreline 2= Swimming Pool					
5. Drillhole Dimensions and Construction Method		8. Geology		From To	
From To Upper Enlarged Drillhole Lower Open Bedrock		Types, Caving/Noncaving, Color, Hardness, etc		(ft.) (ft.)	
Dia. (in.)	(ft.) (ft.)				
20.0	surface 146	M SILT		0 45	
19.0	146 426	C CLAY		45 130	
15.0	426 1343	L DOLOMITE SILURIAN		130 255	
		H SHALE MAQ		255 415	
		L DOLOMITE GAL PLAT		415 700	
		NL SANDSTONE W DOLOMITE STP		700 790	
		L DOLOMITE PDC		790 835	
		NL DOLOMITE TREMP		835 865	
		N SANDSTONE-FRANCONIAN		865 900	
		P_N SANDSTONE-IRONTON		900 910	
		N SANDSTONE-GALESVILLE		910 1020	
		NH SANDSTONE & SHALE-EAU		1020 1095	
6. Casing Liner Screen Material, Weight, Specification		From To			
Dia. (in.) Manufacturer & Method of Assembly		(ft.) (ft.)			
20.0	STEEL	surface	146		
16.0	STEEL	2	426		

Village of Union Grove Well #4

- 6.75" Packer with lead-in bullnose.
- Fabricated off set guide.
- Used exploratory camera to guide tool.
- Stabbed guide into pipe.
- Lowered packer into pipe.
- Inflated packer to secure in pipe.



Village of Union Grove Well #4

- Recovered pipe and pump in single run.
- Entire pump assembly was removed from the well.
- Salvaged well from replacement.



IRWA

Questions?

Presenters:

Mike Nailor – Senior Project Manager

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