WELL RECORD 73163

Iowa Department of Natural Resources – Geological Survey
109 Trowbridge Hall, Iowa City, IA 52242-1319 PH (319) 335-1575

PWTS Well No. WL07

PWTS Permit No. 2010-0264W

County Permit No. PWSID 5751035

Site identification

Property Owner Marion Municipal Water Other ID WL 07

Address 1225 6th Ave., Suite 150

~~Tenant~~ Marion, IA 52302

Well Depth 1658 ft Date completed 10/25/10

Location

County Linn

0.01 mi (N/S) and 044 mi (E/W) of intersection of Alburnett Rd and Echo Hill Rd.

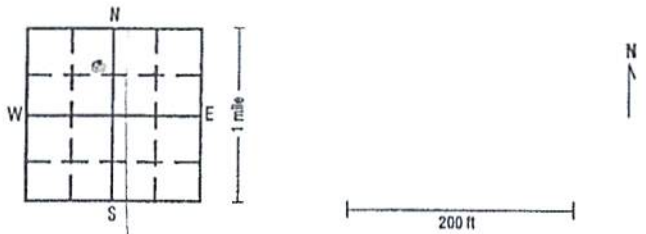
SE 1/4 of the NE 1/4 of the NW 1/4 of Sec 24 TWP 84N RNG 7 (E/W)

GPS Coordinates (NAD83 datum only) decimal degrees:

41° 54.036 N. Latitude 088° 12.933 W. Longitude.

3496778.68 N 543246.80 E

Show exact location of well in section grid with a dot (●). Sketch map of well location on property.



☐ upland ☐ hillside ☐ valley ☒ level surface Elevation (if known) 874

Formation log

From	To	Color	Hardness	Formation description
				See Attached Log

use additional sheets as needed

RECEIVED
DEC 02 2010
By

Remarks

(including depth of lost drilling fluids, materials, or tools)

Lost Circulation in limestone @200' to 330' - 439 sk. Bent. + 2250 sk. cement

Well use

☐ Domestic ☐ Livestock ☐ Test well
☐ Heat pump ☒ Municipal ☐ Public supply ☐ Irrigation
☐ Commercial ☐ Monitoring ☐ Other

Drill method

☒ rotary ☐ auger ☐ cable other

Hole size

34 inch from 0 ft to 213 ft
27 inch from 213 ft to 808 ft

hole size continued

23 inch from 808 ft to 1163 ft
15 inch from 1163 ft to 1658 ft

Record all depth measurements from ground level (GL). Use (+) for above GL measurements.

Casing

Drive shoe (yes / no) Pitless adapter (yes / no)

Size (ID/OD)	Type / Wt	Depth top	Depth bottom	Amount (length)
28"OD	Stl. 0.500"	0	200'	200'
22"OD	Stl. 0.500"	+2	796'	798'
16"OD	Stl 0.500"	796'	1163'	367'

Perforated or slotted casing? (yes / no)

Perforated / slotted from ____ ft to ____ ft

Perforated / slotted from ____ ft to ____ ft

Casing grouted? (yes / no)

Placement method 2.5" tubing

*1-5% Bentonite

Type	Depth top	Depth bottom	Amount (vol/wt)
Neat Cement*	0	200	1,178 sk
Neat Cement*	0	1163	980 sk

Well screen? (yes / no)

Diameter	Slot size	Depth top	Depth bottom	Length	Material
	0.___				
	0.___				

Bottom capped (yes / no) with ____

Seals / Packers (yes / no) kind ____ depth ____ ft

Gravel packed (yes / no) from ____ ft to ____ ft

type ____ amount ____

Well developed? (yes / no)

Explain Acidized Twice with 4,000 gal. 20% B Muriatic

(pumped) airlifted, bailed) for 17.5 hrs at Up to 2100 GPM

Pump installed? (yes / no)

Date ____ / ____ / ____

Installer's name ____

Type of pump ____ Depth to intake ____ ft

Pump diameter ____ Rated capacity ____ GPM

Water information

Aquifer: ☐ sand / gravel ☒ limestone ☒ sandstone

Main water-supply zone from ____ ft to ____ ft ☐ seepage well

Static water level 416 ft (below / above) GL: ☐ tape ☒ airline ☐ E-line ☐ estimate

Pumping water level 493 ft below GL: ☐ tape ☒ airline ☐ E-line ☐ estimate

At yield of 1551 GPM: ☒ orifice ☐ volumetric ☐ estimate for 24 hours

Measurements taken at 8:00 (AM / PM) Date 10/16/10

Water quality test? (yes / no)

Sampled Date tested 10/16/10

Tested by City's sample to IA Hygienic Lab

Contractor Layne-Western

Address 721 W. Illinois Ave, Aurora, IL 60506

Driller Derek Good & Gregory Thomas Certification no. 8011, 8012

Send original form to: **Iowa Department of Natural Resources – Geological Survey**

Make photocopies for: **Well Contractor, Customer, and County Health Department**

WELL LOG

Feet		Feet	Description
0	to	10	CLAY
10	to	50	CLAY, SMALL GRAVEL
50	to	90	SANDY LIME
90	to	100	BROKEN ROCK
100	to	151	GRAY LIME
151	to	235	TAN LIME
235	to	280	NO RETURNS
280	to	360	WHITE LIME
360	to	465	WHITE SANDY LIME
465	to	500	GRAY LIME AND WHITE
500		565	SHALEY LIME
565	to	625	GRAY LIME
625	to	695	SHALE AND LIME
695	to	985	BROWN LIME
985	to	1030	SHALEY LIME
1030	to	1050	BROWN LIME
1050	to	1205	GRAY LIME
1205	to	1285	SANDSTONE WITH LIME MIX
1285	to	1470	SANDSTONE WITH WHITE LIME
1470	to	1495	SANDSTONE WITH TAN LIME
1495	to	1590	SANDSTONE
1590	to	1630	GRAY LIME WITH SAND
1630	to	1658	GRAY LIME
	to		
	to		
	to		
	to		
	to		
	to		

73163

WELL INFORMATION - ROCK WELLS

Layne®-Western

a division of Layne Christensen Company

PROFESSIONAL SERVICES FOR WATER SYSTEMS

721 West Illinois Avenue • Aurora, Illinois 60506-2892 • Phone 630/897-6941
229 West Indiana Avenue • Beecher, Illinois 60401 • Phone 708/946-2244

Name Of Job MARION MUNICIPAL WATER DEPARTMENT Date OCTOBER 22, 2010

City MARION State IOWA

Well No. 7 Drillers DEREK GOOD, STANLEY ALWARDT, GREG THOMAS Toolpusher – ED HALL

Well Location _____ ft. (_____) and _____ ft. (_____) of the _____ corner of

the SE 1/4 of Section 24 ,Twp. 84 (North), Range 7 (West) Linn County

Otherwise located as 450 ECHO HILL ROAD N = 3496778 E = 5434246

Work Began: 7/14/10 Work Completed: October 25, 2010

Casing Record:

Amount	Dia.	Wt. or Thickness	Material					
200'	28" O.D.	0.500"	Steel	with	Weld	joints from	0	to 200'
798'	22" O.D.	0.500"	Steel	with	Weld	joints from	+2'	to 796'
367'	18" O.D.	0.500"	Steel	with	Weld	joints from	796'	to 1,163'
Swage	22" x 18"	0.500"	Steel	with	Weld	joints from	At 22" O.D.	to 18" O.D.

Hole Record:

34	inch from	0	to	213'	
27	inch from	213'	to	808'	
23	inch from	808'	to	1,163'	
15	inch from	1,163'	to	1,658' TD	
	inch from		to		bottom of hole

Cementing Record: 28" cemented from 200' to surface. Loss zones cemented 180' to 240' several times. 22" x 18" long string cemented 1,163' to surface with Portland neat cement.

Well Test Data: Static Level 416' ; pumping level 526' after 19.5 hours pumping at 2,010 g.p.m.

Length of test 24 hrs. See Well Test Data Sheet Dated October 15-16, 2010

Remarks Last 4.5 hours of test at 1,551 gpm with 493' PL. SC = 20.1 Elev: 874.5

NOTE: Well acidized twice with 4,000 gallons 20° B. muriatic acid. PWSID #5751035 – Facility #WL07

Layne Job No. 16600392B Well Permit No.: 2010-00264W PW

W-96

SEE OTHER SIDE

73163

NEW GROUNDWATER SOURCE SAMPLING REQUIREMENTS

Compounds for Groundwater Only from IAC 567–43.3(7)"c"(2)

Alkalinity 280 mg/L as $CaCO_3$
pH 7.2
Calcium 69 mg/L
Chloride 66 mg/L
Copper .01 mg/L
Hardness 320 mg/L as $CaCO_3$
Iron 0.29 mg/L Total
Magnesium 36 mg/L
Manganese 0.03 mg/L
Potassium 12 mg/L
Silica 9.2 mg/L
Specific Conductance 870 umho/cm
Sodium 68 mg/L
Sulfate 130 mg/L
Filterable and Nonfilterable Solids TSS = 3 mg/L
Zinc < .02 mg/L TDS = 516 mg/L

Inorganic Chemicals from IAC 567–41.3(1)"b"(1)

Contaminant	MCL (mg/L)
Antimony ✓	0.006 < 0.005
Arsenic ✓	0.05 < 0.001
[illegible]	7 million fibers/L (>10µm long)
Barium ✓	2 < .05
[illegible]	0.004
Cadmium ✓	0.005 < .001
Chromium ✓	0.1 < .01
[illegible]	0.2
Fluoride ✓	4 (recommended is 1.1) 1.41 mg/L
Mercury ✓	0.002 < .0002
Nitrate ✓	10 (as nitrogen) < .20
Nitrite ✓	1 (as nitrogen) < .02 mg/L
Total Nitrate and Nitrite ✓	10 (as nitrogen) ✓
Selenium ✓	0.05 < .01
Thallium ✓	0.002 < .001

Radionuclides from IAC 567—41.8(1)"b"(1)

Contaminant	MCL (pCi/L)
Gross alpha ✓	15 9.9
Combined Radium-226 & 228 ✓	5 3.2
Uranium* ✓	30 µg/L < 1 us/L

*Gross alpha can be substituted for Uranium if conditions of IAC 567—41.8(1)"e"(6) are met.

Updated 7-21-2010 per conversation with Anne Lynam at IDNR

73163

Synthetic Organic Chemicals from IAC 567—41.5(1)"b"(1)

Contaminant	MCL (mg/L)
Alachlor ✓	0.002 <0.0001
[illegible]	0.003
[illegible]	0.002
[illegible]	0.004 < 0.0001
Atrazine ✓	0.003
Benzo(a)pyrene ✓	0.0002 <.0001
[illegible]	0.04
[illegible]	0.002 <.001
2,4-D ✓	0.07
Dalapon ✓	0.2 <.001
[illegible]	0.0002
Di(2-ethylhexyl)adipate ✓	0.4 <.0006
Di(2-ethylhexyl)phthalate ✓	0.006 <.0006
Dinoseb ✓	0.007 <.0005
[illegible]	0.02
[illegible]	0.1
[illegible]	0.002
[illegible]	0.00005
[illegible]	0.7
[illegible]	0.0004
[illegible]	0.0002
[illegible]	0.001
[illegible]	0.05
[illegible]	0.0002
[illegible]	0.04
[illegible]	0.2
Pentachlorophenol ✓	0.001 <.0005
Picloram ✓	0.5 <.0005
[illegible]	0.0005
Simazine ✓	0.004 < 0.0001
[illegible]	3×10^{-8}
2,4,5-TP (Silvex) ✓	0.05 <0.0002
[illegible]	0.003

UNKNOWNS

Ammonia 0.89 mg/L

TDS 50 mg/L

H_2S

Coliform Bacteria —

Updated 7-21-2010 per conversation with Anne Lynam at IDNR

73163

Volatile Organic Chemicals from IAC 567–41.5(1)"b"(1)

Contaminant	MCL (mg/L)
Benzene	0.005
Carbon tetrachloride	0.005
Chlorobenzene (mono)	0.7
1,2-Dichlorobenzene (ortho)	0.6
2,4-Dichlorobenzene (para)	0.075
1,2-Dichloroethane	0.005
1,1-Dichloroehtylene	0.007
cis-1,2-Dichloroethylene	0.07
trans-1,2-Dichloroethylene	0.1
Dichloromethane (methylene chloride)	0.005
1,2-Dichloropropane	0.005
Ethylbenzene	0.7
Styrene	0.1
Tetrachloroethylene	0.005
Toluene	1
1,1,1-Trichloroethane	0.2
Trichloroethylene	0.005
1,2,4-Trichlorobenzene	0.07
1,1,2-Trichloroethane	0.005
Vinyl chloride	0.002
Xylenes (total)	10 ← 0.5 ug/L (all)

Updated 7-21-2010 per conversation with Anne Lynam at IDNR