

RESULTS OF PRODUCTION TEST AND CHLORIDE STUDIES

ON

CITY OF WASHINGTON WELL NO. 5

October 14-15, 1946

Well Name: Washington city well No. 5.

Location: NW $\frac{1}{4}$ SW $\frac{1}{4}$ SW $\frac{1}{4}$ NE $\frac{1}{4}$ Sec. 17 T. 75 N., R. 7 W., Washington Township,
Washington County.

Elevation: Drilling curb. top of 28-inch casing, 761.7 feet above sea level.

Owner: City of Washington, Iowa.

Engineers: Howard R. Green Engineering Company, Cedar Rapids, Iowa.

Contractors: Thorpe Bros. Well Co., Des Moines, Iowa.

Drillers: Guy Elam, Wesley Thorpe, and Ray Megrew

Drilling Dates: June 21, 1946 to October 9, 1946.

Present Depth: 1900 feet below top of 28-inch casing.

Casing and hole data: 70 feet of 28-inch casing (curb) from surface to 70 feet.
444 feet of 20-inch steel casing from surface to 444 feet, cemented from
surface to 70 feet.

258'7" of 16-inch steel liner set from 541'5" to 800 feet.

993 feet of 13-inch steel casing set from 407 feet to 1400 feet, cemented
in at bottom and for 52 feet at top.

500 feet of open hole from 1400 to 1900 feet.

Surface sections of 24 feet of 42-inch casing and 36 feet of 38-inch
casing set at surface and later removed.

Test Pump: Turbine, setting 280 feet below top of 28-inch casing with 20
feet of suction pipe. Pump powered by Diesel engine with belt drive.

Bailer: The bailer used to collect water samples was 4 inches in diameter
and 29.8 feet long. Ball type valves were in place at the top and
near the bottom of the bailer. As the bailer was lowered in the water
the balls were raised off the seat which allowed passage of water
through the bailer. When coming up the hole the balls would seat and
trap the water in the bailer at the point where the bailer was stopped
and surged. The bailer was tied to the sand line of the drilling rig.
The sample from the bailer was collected through a tapped hole in wall
of bailer about 3 feet from bottom of bailer.

Water level measurements: The water level in well No. 5 was referred to
the rim of the hole in the pump base through which the bailer was in-
serted at an elevation of 2.25 feet above the top of the 28-inch pipe.
The water level in well No. 3, which was used as an observation well
during test, was referred to the top of the inner rim of manhole cover
in cement covering over well pump.

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Discharge measurements: The discharge from well No. 5 was measured with a rectangular box type weir with baffle plates and 12-inch opening.

Temperature measurements: The temperature of the water from well No. 5 was measured at the end of 75 feet of 10-inch discharge pipe.

Remarks: City well No. 4 was pumped during test at rate of 525 gallons per minute.

Time	Depth to Water (feet)	Discharge Weir Reading	Rate G.P.M.	Temp.	Bailer or Pump Discharge	Chlorides P.P.M.	Remarks
10-14-46							
9:30 am 152.90							
1/10:30					1450'	460	After flow of 30 sec. from bailer
					1450'	455	After flow of 1 min. 15 sec. from bailer
					1450'	455	After flow of 2 min. from bailer
1/ Bailer was raised 1450' in 8 min. First water sample was fairly clear, last two samples were muddy. Bailer surged 10 to 12 times.							
2/11:03 am							
					1650'	460	After flow of 30 sec. from bailer
					1650'	460	After flow of 1 min. 15 sec. from bailer
					1650'	290	After flow of 2 min. from bailer
2/ Bailer was surged 10-15 times. Bailer raised 1650 feet in 6 min. First sample, second sample, and third sample fairly muddy.							
3/11:33 am							
					1750'	450	After flow of 30 sec. from bailer
					1750'	200	After flow of 1 min. 15 sec. from bailer
					1750'	80	After flow of 2 min. from bailer
3/ Bailer surged 15-20 times. Bailer raised 1750 feet in 6 min. First and second sample fairly muddy, third sample fairly clear.							
4/12:12 pm							
					1875'	460	After flow of 30 sec. from bailer
					1875'	445	After flow of 1 min. 15 sec. from bailer
					1875'	425	After flow of 2 min. from bailer
4/ Bailer surged 15-20 times. Bailer raised 1875 feet in 7 min. All three samples muddy. Measurement to bottom hole was 1875' + 35' indicating that all preceding depth measurements were 10' high if the hole is correctly 1900' deep.							
12:25 pm							
1:30	152.90					85	Sample water well No. 4
1:45	152.90						Zero on Weir is 11-3/8" below
1:48	173.04						Reference level
1:50	165.35	5 1/2	396	60 1/2			Pumping started 1:47 pm.
1:53	163				Discharge	460	Water dirty brown
1:57	162.50	5-3/8	409				Pump speed 960 r.p.m.
2:01	162.25			64 1/2	Discharge	350	Water dirty brown

Time	Depth to Water (feet)	Discharge Weir Reading	Rate G.P.M.	Temp.	Bailer or Pump Discharge	Chlorides P.P.M.	Remarks
2:06	162.20	5-3/8	409	67 $\frac{1}{2}$			Water dirty brown
2:11	162.40	5-3/8	409	69.5			Water clearing
2:17	162.40				Discharge	79	Water fairly clear
2:21	162.60	5-3/8	409	71			Water cloudy
2:27	162.65	5-3/8	409	71 $\frac{1}{2}$			Water slightly cloudy
2:32	162.85				Discharge	79	Water medium clear
2:36	162.93						
2:42	162.87						
2:47	163.00	5-7/16	417	72	Discharge	70	Water medium clear
2:53	163.15						
2:59	163.10				Discharge	70	Water medium clear
3:05	163.00	5-7/16	417	72.5			Water almost clear
3:10	163.20						
3:16	163.00				Discharge	70	Water almost clear
3:20	163.00	5-7/16	417	72.5			Water almost clear
3:30	163.00	5-7/16	417	72.5			Water almost clear
3:47	162.90				Discharge	69	Pump speeded up at 3:50
3:53	175.40	7-3/4	678				Pump speed 1055 r.p.m.
4:00	176.35	7-3/4	678				
4:14		7-3/4	678	73	Discharge	69	Water a bit milky
4:15	175.80						Well No. 4 shut off
4:25	173.40						
4:32		7-5/8	670	73			Water a bit milky
4:34							Well No. 4 started pumping
4:37	174.15				Discharge	70	
4:46	174.85	7-3/8	640	73			Water almost clear
5:00	175.10	7-3/8	640	73.5			Water almost clear
5:15	175.30						
5:32	177.60	7-5/8	640	73			Water almost clear
5:33							Changed speed of pump
							Minor mechanical trouble.
							Intermittent.
5:37							Pump speeded - steady
5:39		8-3/4	799				Pump speed 1158 r.p.m.
5:40	187.10				Discharge	70	Water almost clear
5:48	191.80	8-7/8		73			
6:00	190.04	8-3/4	799	73	Discharge	70	Water somewhat milky
6:45							Well No. 4 stopped pumping
7:15							Well No. 4 started pumping
7:27	188.20	8-11/16	790				Water milky
7:40	188.70				Discharge	70	Water clear
7:57							Pump stopped. Burned out clutch on Diesel Engine
							Recovery measurements
8:00	151.78						
8:02	151.04						
8:04	150.65						
8:06	150.36						
8:08	150.00						
8:11	149.87						
8:16	149.28						
8:32	148.57						
9:30	148.05						

Time	Depth to Water (feet)	Discharge Rate		Temp.	Bailer or Pump Discharge	Chlorides P.P.M.	Remarks
		Weir Reading	G.P.M.				
10-15-46							
7:25 AM	148.46						
8:22	148.55						
8:27	148.50						Shut down well No. 4
8:31	148.55						
8:33	148.50						
8:34	147.40						
8:35	147.08						
8:36	146.80						
8:37	146.50						
8:38	146.40						
8:39	146.20						
8:40	146.00						
8:45	145.60						
8:50	145.30						
8:55	145.10						
9:02	144.95						
9:30					1450'	170	After flowoff 30 sec.
					1450'	73	After flow of 1 min. 15 sec
					1450'	70	After flow of 2 min.
9:45 am					1650'	74	After flow of 30 sec.
					1650'	65	After flow of 1 min. 15 sec
					1650'	66	After flow of 2 min.
10:15					1450'	80	After flow of 30 sec.
					1450'	70	After flow of 1 min. 15 sec
					1450'	70	After flow of 2 min.
11:05					1750'	70	After flow of 30 sec.
					1750'	70	After flow of 1 min. 15 sec
					1750'	70	After flow of 2 min.
11:30					1875'	70	After flow of 30 sec.
					1875'	80	After flow of 1 min. 15 sec
					1875'	94	After flow of 2 min.