RESULTS OF PUMPING TEST, CITY WELL FOUR, PULLMAN, WASHINGTON

By

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INTRODUCTION

The Geological Survey, on July 10, 1957, was requested by the Washington State Department of Conservation to participate in a pumping test to be made by the city of Pullman on their city well 4, scheduled to begin July 15, 1957. The area was visited on July 11 by Mr. Holmberg, and on July 14 by Mr. Foxworthy, both of the Geological Survey. Measurements of water level on city well 4 and on nearby wells were continued by them into July 16. Results of the pumping test are described in this report, and tabulations of water-level measurements, hydrographs, and descriptions of pertinent wells are included.

Preliminary Water-level Measurements

To determine water-level trends and fluctuations under essentially normal conditions of summertime pumping, measurements were made in 6 wells beginning July 11 to compare with similar measurements during and following the pumping test on well 4. On July 14, measurements were started on one additional well, 14/45-5B3. During the period of these measurements, on July 11 and 12, city well 2 was pumped for about 30 hours. Well 4 also was pumped briefly on July 12 to check the pump installation. Also during the period from July 11 to July 16, city wells 1 and 3 and College wells 2, 3, and 4 were pumped intermittently.

Description of wells

The seven wells for which measurements were made during the period July 11-16, 1957, and which are tabulated at the end of this report, are described in the following table. All the wells listed tap artesian basalt aquifers.

Well number	Depth (feet)	Diameter (inches)	Depth of casing (feet)	Method of measurement
City No. 2 (15/45-32N1)	231	16	24	Air line
City No. 3 (14/45-5D3)	167	16	40	. .do. .
City No. 4 (inner) (15/45-32N2	954	16 12	239 399	Wetted tape and electric line
City No. 4 (outer) (15/45-32N3) 1/	230±	20	110	Wetted tape
W. S. C. No. 1 (14/45-5B1)	145	4	?	Electric line
W. S. C. Farm well (14/45-4N1)	110	6	?	Wetted tape
W. S. C. No. 4 (14/45-5B3	223	16-12	27	. .do. .

1/ Annular space between casings

All the wells in which water levels were measured are in the same general area. The location of six of them with respect to well 4 are as follows:

City 2 (15/45-32N1)	-	65 feet north
City 3 (14/45-5D3)	-	1,600 feet southwest
W.S.C. 1 (14/45-5B1)	-	2,250 feet southeast
W.S.C. Farm (14/45-4N1)	-	7,000 feet southeast
W.S.C. 4 (14/45-5B3)	-	2,300 feet southeast

City well 4 consists of 2 wells, one drilled inside the other, with cement grout at two places providing a more-or-less effective hydraulic seal between the two wells. The production well, the one with the 16-inch casing, has been given the U.S.G.S. well number 15/45-32N2. It is cased to a depth of 399 feet, and reflects artesian pressures in basalt aquifers below that depth, from 399 to 954 feet. The annular space between the 16- and 20-inch casings constitutes another well which reflects artesian

levels in the basalt aquifers from a depth of 110 feet to about 230 feet below the surface (from the bottom of the 20-inch casing of the outer well to the top of a grout seal around the bottom of the 16-inch casing of the inner well). This outer well, 15/45-32N3, is not pumped; it is used only for observation of water levels.

Details of Pumping Test, Well 15/45-32N2

Prior to the pumping test, city well 4 had been idle 63 hours and city well 2 had been idle 60 hours. Throughout the period of measurements the College wells and the other city wells were pumped intermittently. The daily withdrawal from College wells and the pumping times of the city wells are shown on the hydrographs attached.

On July 15, at 11:05 a. m. the pumping test on well 4 (-32N2) was started. At 11:06, the pump was stopped briefly to reconnect power-factor instruments to the pump motor, and pumping was resumed at 11:08. Except for another 2-minute shutdown (12:07 to 12:09 p.m.) that same day to disconnect those instruments, pumping proceeded continuously and at a nearly constant rate until 11:40 a.m. on July 16. The total pumping time was 24 hours 31 minutes. Throughout the period of pumping, and until the evening of July 16, measurements of water level were continued in all the wells listed in the foregoing table. Also during the pumping of well 4, periodic measurements of the discharge of that well were made using a 6-inch orifice and manometer tube provided and installed by the pump company. Except for city well 3, hydrographs for all the wells were plotted from the attached tabulation of water-level measurements.

Analysis of Data

Although the ratio of orifice to pipe diameter was not satisfactory for accurate determinations of discharge, the yield of city well 4

(-32N2) during the pumping test probably averaged about 1,000 gpm (gallons per minute). Pumping at this estimated rate produced a maximum drawdown of about 18½ feet in the pumping well. Thus, the indicated specific capacity of the well is about 54 gpm per foot of drawdown. The recovery of the water level in this well was very rapid--to within 0.1 foot of the pre-pumping level 10 minutes after pumping was stopped.

The pumping of well 4 (-32N2) produced a drawdown in the outer casing (-32N3) of as much as 0.4 foot, and a drawdown of about 1/2 to 3/4 foot in city well 2. Conversely, the pumping of well 2 on July 11 and 12 apparently produced a drawdown of about 1/4 foot in inner well 4 (-32N2) and about 1/2 foot in outer well 4 (-32N3). No attempt has been made to evaluate the effects of the pumping of well 4 upon water levels in the other city wells or in the college wells. Such an evaluation appears impossible because of a lack of adequate data on pumping times for each well and the impossibility of obtaining water-level data of sufficient accuracy from some of the wells.

Conclusions

Although it is obvious that some degree of hydraulic connection exists between the aquifers tapped by city well 2 (15/45-32N1) and wells 15/45-32N2 and -N3 (outer and inner well 4, respectively), the connection of each of these wells with the other two evidently is poor, because the heavy pumping of either of the production wells (city wells 2 and 4) produces drawdowns of less than one foot in the others. Such poor hydraulic connection between the city wells 2 and inner well 4, would be expected because the wells tap aquifers in different depth ranges. On the other hand, the poor connection between well 2 and the outer well 4 is surprising

inasmuch as those wells were believed to tap aquifers in a somewhat comparable depth range in the basalt sequence (24-231 feet below land surface for well 2 and 110-230 feet for outer well 4) and the wells are only 65 feet apart. The lack of marked hydraulic continuity between these two wells indicates that the two must not tap the same aquifers and that the main aquifer of well 2 possibly may be shallower than 110 feet below land surface, the depth at which the casing in the outer well 4 (-32N3) was landed.

The lack of hydraulic continuity between aquifers tapped by inner well 4 and those tapped by well 2 indicates, at least for short-term pumping periods, that only a minor, and perhaps unimportant, amount of pumping interference between these two wells will result. Short-term withdrawal of water from the deeper aquifers tapped by well 4 apparently will cause only slight decline of artesian levels in the shallower zones tapped by well 2 and outer well 4. However, the possible long-term effects that the pumping of well 4 might have upon the levels in the shallower artesian zones in the subbasin could be determined only by making water-level measurements during longer sustained periods of withdrawal. If the deeper aquifers are recharged by sources of water essentially separate from those recharging the shallow artesian zone, increased withdrawal from well 4, accompanied by a corresponding decrease in the amount of pumpage from the shallower wells, should result in a lessening of the annual decline of artesian levels in the shallow zone in the immediate area. Conversely, if the hydraulic connection between the deeper and shallower zones is found to be considerable over long-term pumping periods, the existing relation between pumping withdrawals and water-level declines in the subbasin will continue even though much of the demand is obtained from the deeper well.

Sufficient data are at hand so that with the collection of a small increment of additional information during, say, the next 2 or 3 years, an evaluation of the overall effects of pumping of well 4 probably can be made at that time.

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UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

~~File No.~~ { Washington, Whitman
District Pullman

Water Level Measurements, Pullman City Well 2 (15/45-32N1)

Date	Hour	Depth to Water in feet (Airline meas.)	Remarks	Date	Hour	Depth to Water in feet (Airline meas)	Remarks
7-11-57	8:45A	52-	Pumping	7-16-57	7:10A	26-	Off
	2:00P	52-	do		8:32A	26-	do
	7:40P	52-	do		9:46A	25.5	do
7-12	12:10A	26	Off (at 10:10)		10:52A	25.5	do (Well 4 off at 11:40A)
	5:50A	25.5	do		12:12P	25+	do
	8:05P	52.5	On (at 7:10A)		1:30P	25	do
	11:10P	25.5	Off		3:30P	25	do
7-13	7:30A	25	do		5:50P	25	do
	11:05P	25	do				
7-14	7:20A	25.5	do				
	11:55A	25	do				
	3:55P	25	do				
	7:40P	25	do				
	11:40P	25+	do				
7-15	6:00A	25+	do				
	8:24A	25+	do				
	9:50A	25	do				
	11:20A	25.5	do (Well 4 on at 11:05)				
	11:32A	26-	do				
	11:47A	25.5	do				
	12:30P	26-	do				
	1:00P	26-	do				
	2:30P	26-	do				
	3:10P	26-	do				
	4:37P	26-	do				
	5:50P	25.5	do				
	7:50P	25.5	do				
	9:40P	25+	do				
	10:10P	25+, or					
		25.5	do				
7-16	12:10A	25.5	do				
	3:50A	25.5	do				

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~~File No~~ { Washington, Whitman
District Pullman

Water-Level Measurements, City of Pullman Well 3 (14/45-5D3)

Date	Hour	Depth to Water (Airline)	Remarks
7-11-51	8:30A	32-	Pumping
	2:30P	32-	do
	7:45P	32	do
7-12	12:25A	18.5	Off
	6:00A	18.5	do , on at 6:10A
	1:45P	32+	Pumping
	8:10P	32	do
	11:25P	32	do
7-13	8:10A	32	do
	11:15P	18	Off
7-14	7:40A	18	do
	11:50A	32	Pumping
	4:00P	18	Off
	7:50P	32	Pumping
7-15	6:05A	18+	Off
	8:20A	32	Pumping
	12:20P	18.5	Off
	1:23P	18+	do
	4:40P	32-	Pumping
	7:50P	32	do
7-16	12:17A	19-	Off
	4:00A	32-	Pumping
	7:20A	19	Off
	9:55A	32	Pumping
	1:40P	32	do
	6:20P	32	do

Measured by Foxworthy & Holmberg

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UNITED STATES
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~~Wash.~~ Whitman
~~Idaho~~ Pullman

Water Level Measurements, City of Pullman Well 4, Inner (16") casing (15/45-32N2)

Date	Hour	Tape Reading at Meas. Point	Tape Reading at Water Level	Depth to water, feet below M.P.	Depth to water, feet below L.S.D	Remarks
7-11-57	9:00A	30.0	3.77	26.23	25.23	Off
	1.50 P	31.0	4.77	26.23	25.23	do
	7:45P	27.0	0.81	26.19	25.19	do
7-12	12:15A	29.0	2.91	26.09	25.09	do
	5:55A	27.0	1.08	25.92	24.92	do
	6:50A	27.0	1.02	25.98	24.98	do
	7:35A	27.0	0.85	26.15	25.15	do
	check	33.0	6.86	26.14	25.14	do
	8:10A	27.0	0.86	26.14	25.14	do
	9:05A	28.0	1.84	26.16	25.16	do
	11:20A	28.0	1.83	26.17	25.17	do
	2:50P	28.0	1.88	26.12	25.12	do
	3:30P	34.0	7.90	26.10	25.10	do
	3:35P	Well 4 pump started				do
	5:10P	Well 4 pump stopped				do
	5:12P	40.0	5.40	34.60	33.60	do [1]
	8:00P	29.0	2.85	26.15	25.15	Off
	11:15P	27.0	1.04	25.96	24.96	do
7-13	7:35A	27.0	1.21	25.79	24.79	do
	11:10P	27.0	1.42	25.58	24.58	do
7-14	7:25A	27.0	1.24	25.76	24.76	do
	12:00N	26.0	0.23	25.77	24.77	do
	3:55P	26.0	0.26	25.74	24.74	do
	7:40P	26.0	0.26	25.74	24.74	do
	11:45P	27.0	1.23	25.77	24.77	do
7-15	6:00A	26.0	0.25	25.75	24.75	do
	8.25A	28.0	2.19	25.81	24.81	do
	9:28A	25.33	+0.53	25.86	24.86	Off [1]
	9:30A	26.0	0.21	25.79	24.79	Off
	9:48A	25.36	+0.53	25.89	24.89	Off [1]
	9:50A	26.0	0.17	25.83	24.83	Off
	11:03A	28.0	2.08	25.93	24.93	do

Date	Hour	Tape Reading at Meas. Point	Tape Reading at Water Level	Depth to water, feet below M.P.	Depth to water, feet below L.S.D	Remarks
7-15	11:09A	43.09	+.53	43.62	42.62	On at 11:05A [2]
	11:12A	43.20	+.53	43.73	42.73	On [1]
	11:14A	43.27	+.53	43.80	42.80	do
	11:16A	43.28	+.53	43.81	42.81	do
	11:18A	43.28	+.53	43.81	42.81	do
	11:23A	43.31	+.53	43.84	42.84	do
	11:24A	43.31	+.53	43.84	42.84	do
	11.29A	43.68	+.53	44.21	43.21	(?) do
	11.30A	43.64	+.53	44.17	43.17	On [1]
	11:34A	43.66	+.53	44.19	43.19	do
	11:37A	43.66	+.53	44.19	43.19	do
	11:43A	43.67	+.53	44.20	43.20	do
	11:53A	43.64	+.53	44.17	43.17	do
	12:04P	43.74	+.53	44.27	43.27	do
	12:06:40	Pumping interrupted				
	12:07:40	25.62	+0.53	26.15	25.15	off [1]
	12:09P	Pumping resumed				
	12:11P	43.79	+0.53	44.32	43.32	(?) On [1]
	12:15P	43.77	+.53	44.30	43.30	On [1]
	12:17P	43.81	+.53	44.34	43.34	do
	12:33P	43.85	+.53	44.38	43.38	do
	12:43P	43.86	+.53	44.39	43.39	do
	12:57P	43.88	+.53	44.41	43.41	do
	1:15P	43.89	+.53	44.42	43.42	do
	1:29P	43.89	+.53	44.42	43.42	do
	2:29P	43.92	+.53	44.45	43.45	do
	3:03P	43.95	+.53	44.48	43.48	do
	3:33P	43.94	+.53	44.47	43.47	do
	4:33P	43.94	+.53	44.47	43.47	do
	5:35P	43.93	+.53	44.46	43.46	do
7-15	7:43P	43.98	+.53	44.51	43.51	do
	9:32P	43.88	+.53	44.41	43.41	do

[1] Measured with electric line

[2] Pumping was started at 11:05 AM, interrupted at 11:06, and resumed at 11:08 AM

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~~File No.~~ { Washington, Whitman
District, Pullman

Water-Level Measurements, City of Pullman Well 4, Inner (16") casing (15/45-32N2)

Date	Hour	Tape Reading at Meas. Point	Tape Reading at Water Level	Depth to Water, feet below M.P.	Depth to Water, feet below L.S.D.	Remarks
7-15-57	10:04P	43.80	+.53	44.33	43.33	On [1]
7-16	12:05A	43.75	+.53	44.28	43.28	do
	12:50A	43.76	+.53	44.29	43.29	do
	3:47A	43.72	+.53	44.25	43.25	do
	7:05A	43.92	+.53	44.45	43.45	do
	8:25A	43.92	+.53	44.45	43.45	do
	9:41A	43.89	+.53	44.42	43.42	do
	10:49A	43.98	+.53	44.51	43.51	do
	11:24A	43.96	+.53	44.49	43.49	
	11:40A	Pumping stopped				
	11:41A	25.68	+.053	26.21	25.21	(?) Off [1]
	11:46A	27.0	0.97	26.03	25.03	Off
	11:48A	27.0	0.975	26.02	25.02	do
	11:50A	29.0	2.99	26.01	25.01	do
	11:52A	27.0	0.99	26.01	25.01	do
	11:55A	27.0	1.01	25.99	24.99	do
	11:58A	29.0	3.01	25.99	24.99	do
	12:00P	27.0	1.02	25.98	24.98	do
	12:06P	28.0	2.02	25.98	24.98	do
	12:10P	30.0	4.03	25.97	24.97	do
	12:15P	28.0	2.03	25.97	24.97	do
	12:25P	25.0	1.03	25.97	24.97	do
	12:35P	30.0	4.02	25.98	24.98	do
	12:50P	27.0	1.02	25.98	24.98	do
	1:24P	27.0	1.03	25.97	24.97	do
	2:29P	27.0	1.05	25.95	24.95	do
	3:28P	27.0	1.07	25.93	24.93	do
	5:47P	27.0	1.08	25.92	24.92	do

[1] Measured with electric line

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File No. { Washington, Whitman
District Pullman

Water-Level Measurements, City of Pullman Well 4, Outer (20") casing (15/45-32…

Date	Hour	Tape Reading at Meas. Point	Tape Reading at Water Level	Depth to Water, feet below M.P.	Depth to Water, feet below L.S.D.	Remarks	Date	Hour	Tape Reading at Meas. Point	Tape Reading at Water Level	Depth to Water, feet below M.P.	Depth to Water, feet below L.S.D.	Remarks
7-11-57	9:00A	33.0	6.52	26.48	25.45	Off	7-15-57	11:06A	27.0	0.62	26.38	25.35	On
	11:50P	30.0	3.49	26.51	25.48	off		11:06A	Pumping interrupted				
	11:55P	30.0	3.50	26.50	25.47	check		11:08A	Pumping resumed				
	7:47P	28.0	1.53	26.47	25.44	Off		11:11	28.0	1.57	26.43	25.40	On
7-12	12:18A	30.0	3.85	26.15	25.12	do		11:13	29.0	2.56	26.44	25.41	do
	6:00A	31.0	5.01	25.99	24.96	do		11:15	27.0	0.55	26.45	25.42	do
	6:55A	28.0	1.96	26.04	25.01	do		11:17	28.0	1.54	26.46	25.43	do
	7:40A	35.0	8.59	26.41	25.38	do		11:19	29.0	2.54	26.46	25.43	do
	8:10A	28.0	1.60	26.40	25.37	do		11:22	30.0	3.53	26.47	25.44	do
	9:10A	29.0	2.55	26.45	25.42	do		11:27	2[illegible].0	0.52	26.48	25.45	do
	Check	30.0	3.56	26.44	25.41	do		11:31	28.0	1.50	26.50	25.47	do
	11:20A	29.0	2.57	26.43	25.40	do		11:35	29.0	2.47	26.53	25.50	do
	2:55P	29.0	2.61	26.39	25.36	do		11:38	27.0	0.47	26.53	25.50	do
	3:30P	34.0	7.63	26.37	25.34	do		11:44	28.0	1.[illegible]7	26.53	25.50	do
	3:35P	Pumping started (inner casing)						12:05P	30.0	3.47	26.53	25.50	do
	5:10P	Pumping stopped						12:06:40	Pumping interrupted				
	5:15P	30.0	3.55	26.45	25.42	Off		12:08P	33.0	6.94	26.06	25.03	Off
	5:18P	30.0	3.56	26.44	25.41	do		12:09	Pumping resumed				
	8:00P	28.0	1.60	26.40	25.37	do		12:12	27.0	0.50	26.50	25.47	On
	11:15P	28.0	1.98	26.02	24.99	do		12:17	30.0	3.49	26.51	25.48	do
7-13	7:35A	29.0	3.16	25.84	24.81	do		12:25	27.0	0.50	26.50	25.47	do
	11:15P	32.0	6.36	25.74	24.71	do		12:35	27.0	0.50	26.50	25.47	do
7-14	7:25A	28.0	2.19	25.81	24.78	do		12:45	27.0	0.48	26.52	25.49	do
	12:00N	27.00	1.18	25.82	24.78	do		12:58	27.0	0.46	26.54	25.51	do
	3:55P	27.00	1.21	25.79	24.76	do		1:18	27.0	0.47	26.53	25.50	do
	7:45P	27.0	1.22	25.78	24.75	do		1:30	27.0	0.47	26.53	25.50	do
	11:45P	28.0	2.17	25.83	24.80	do		2:30	27.0	0.46	26.54	25.51	do
7-15	6:00A	27.0	1.20	25.80	24.77	do		3:07	27.0	0.43	26.57	25.54	do
	8:25A	29.0	3.14	25.85	24.82	do		3:35	35.0	8.45	26.55	25.52	do
	9:31A	27.0	1.13	25.87	24.84	do		4:34	27.0	0.44	26.56	25.53	do
	11:02A	27.0	1.02	25.98	25.95	do		5:37P	27.0	0.51	26.49	25.46	do
	11:05A	Pumping started (inner casing)					7-15	Check	28.0	1.52	26.48	25.45	do

UNITED STATES
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~~File No.~~ Washington, Whitman
District Pullman

Water Level Measurements, City of Pullman Well 4, Outer (20") casing (15/45-32N3)

Date	Hour	Tape Reading at Meas. Point	Tape Reading at Water Level	Depth to Water, feet below M.P.	Depth to Water, feet below L.S.D.	Remarks
7-15-57	7:45P	33.0	6.42	26.58	25.55	On
	9:35	27.0	0.59	26.41	25.38	do
	10:06	27.0	0.66	26.34	25.31	do
7-16	12:07A	27.0	0.66	26.34	25.31	do
	12:50	30.0	3.67	26.33	25.30	do
	3:50	27.0	0.65	26.35	25.32	do
	7:08	30.0	3.46	26.54	25.51	do
	8:29	27.0	0.46	26.54	25.51	do
	9:43	27.0	0.45	26.55	25.52	do
	10:50	27.0	0.44	26.56	25.53	do
	11:30	27.0	0.44	26.56	25.53	do
	11:40	Pumping stopped				
	11:43	27.0	0.89	26.11	25.08	Off
	11:47	28.0	1.93	26.07	25.04	do
	11:49	28.0	1.93	26.07	25.04	do
	11:54	28.0	1.96	26.04	25.01	do
	11:57	28.0	1.96	26.04	25.01	do
	12:03P	27.0	0.97	26.03	25.00	do
	12:09	29.0	2.98	26.02	24.99	do
	12:14	27.0	0.99	26.01	24.98	do
	12:26P	28.0	1.97	26.03	25.00	do
	12:30	28.0	1.97	26.03	25.00	do
	12:55	28.0	1.97	26.03	25.00	do
	1:25	28.0	1.98	26.02	24.99	do
	2:30	28.0	1.99	26.01	24.98	do
	3:30	28.0	2.02	25.98	24.95	do
7-16	5:46P	27.0	1.02	25.98	24.95	do

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9-330

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

~~File No.~~ Washington Whitman
District Pullman

Water-Level Measurements, WSC Test Well (14/45-5B1)

Date	Hour	Tape Reading at Meas. Point	Tape Reading at Water Level	Depth to Water, feet below M.P.	Depth to Water, feet below L.S.D	Remarks Well 2 (-5B2)	Remarks Well 3 (-5G1)	Remarks Well 4 (-5B3)
7-11-57	9:45A	45.59	+.59	46.18	44.68	—	On	On
	2:40P	45.59	+.59	46.18	44.68	—	do	do
	7:50P	45.58	+.59	46.17	44.67	—	do	do
7-12	12:30A	45.52	+.59	46.11	44.61	—	do	do
	6:10A	45.40	+.59	45.99	44.49	—	do	do
	10:00A	45.40	+.59	45.99	44.49	—	do	do
	2:00P	45.57	+.59	46.16	44.66	—	do	do
	5:50P	46.60	+.59	47.19	45.69	On(?)	do	do
	11:30P	45.41	+.59	46.00	44.50	—	do	do
7-13	7:50A	45.30	+.56	45.86	44.36	Off	—	do
	1:05P	45.03	+.56	45.59	44.09	do	—	do
	11:20P	43.68	+.56	44.24	42.74	do	—	Off
	Check	43.70	+.56	44.26	42.76	do	—	do
7-14	7:30A	45.00	+.56	45.56	44.06	do	—	On
	12:30P	43.98	+.56	44.54	43.04	do	—	Off
	4:05P	43.99	+.56	44.55	43.05	do	—	do
	7:55P	43.98	+.56	44.54	43.04	do	—	do
	11:55P	44.06	+.56	44.62	43.12	Off	On	do
7-15	6:10A	45.29	+.56	45.85	44.35	do	do	On
	8:10A	44.05	+.56	44.61	43.11	do	do	Off
	12:30P	45.40	+.55	45.95	44.45	do	do	On
	1:45P	45.54	+.55	46.09	44.59	do	do	do
	5:00P	45.53	+.55	46.08	44.58	do	do	do
	8:00P	45.51	+.55	46.06	44.56	do	do	do
7-16	12:28A	44.13	+.55	44.68	43.18	do	do	Off
	4:07A	44.14	+.55	44.69	43.19	do	do	do
	7:30A	45.50	+.55	46.05	44.55	do	do	On
	10:25A	45.33	+.55	45.88	44.38	do	do	do
	1:40P	45.19	+.55	45.74	44.24	do	do	do
	6:00P	45.15	+.55	45.70	44.20	do	do	do

1/ Measured with electric line

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UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

~~File No.~~ { Washington, Whitman
District Pullman

Water-Level Measurements, WSC Farm Well (14/45-4N1)

Date	Hour	Tape Reading at Meas. Point	Tape Reading at Water Level	Depth to Water, feet below M.P.	Depth to Water, feet below L.S.D	Remarks						
7-11-51	10:00A	65.0	7.55	57.45	60.25	MP 2.80 ft below						
	2:50P	60.0	2.58	57.42	60.22	L S D						
	8:00P	59.0	1.59	57.41	60.21							
7-12	12:35A	59.0	1.57	57.43	60.23							
	6:20A	59.0	1.61	57.39	60.19							
	10:10A	59.0	1.61	57.39	60.19							
	2:05P	58.0	0.67	57.33	60.13							
	6:05P	60.0	2.70	57.30	60.10							
	11:45P	60.0	2.70	57.30	60.10							
7-13	8:05A	59.0	1.71	57.23	60.03							
	1:10P	59.0	1.71	57.29	60.09							
	11:35P	59.0	1.78	57.22	60.02							
7-14	7:45A	60.0	2.72	57.28	60.08							
	12:10P	59.0	1.69	57.31	60.11							
	4:10P	58.0	0.72	57.28	60.08							
	8:00P	59.0	1.70	57.30	60.10							
7-15	12:20A	59.0	1.64	57.36	60.16							
	6:25A	59.0	1.63	57.37	60.17							
	8:05A	58.0	0.62	57.38	60.18							
	12:40P	59.0	1.64	57.36	60.16							
	1:55P	58.0	0.66	57.34	60.14							
	5:20P	60.0	2.67	57.33	60.13							
	8:12P	58.0	0.64	57.36	60.16							
7-16	12:40A	59.0	1.64	57.36	60.16							
	check	59.0	1.63	57.37	60.17							
	7:45A	58.0	0.62	57.38	60.18							
	10:40A	59.0	1.62	57.38	60.18							
	1:50P	58.0	0.65	57.35	60.15							
	6:10P	58.0	0.66	57.34	60.14							

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9-230

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

~~File No.~~ Washington, Whitman
District, Pullman

Water-Level Measurements, WSC Well 4 (14/45-5B3)

Date	Hour	Tape Reading at Meas. Point	Tape Reading at Water Level	Depth to Water, feet below M.P.	Depth to Water, feet below L.S.D	Remarks
7-15-57	12:05A	48.0	2.11	45.89	44.69	Off
	6:18A	53.0	4.16	48.84	47.64	On
	8:12A	50.0	4.07	45.93	44.73	Off
	12:35P	50.0	0.89	49.11	47.91	On
	1:50P	51.0	1.84	49.16	47.96	do
	5:10P	52.0	2.92	49.08	47.88	do
	8:05P	53.0	3.86	49.14	47.94	do
7-16	12:33A	47.0	0.98	46.02	44.82	Off
	4:10A	47.0	0.94	46.06	44.86	do
	7:35A	58.0	9.06	48.94	48.74	On
	10:32A	51.0	2.06	48.94	47.74	do
	1:43A	51.0	2.18	48.82	47.62	do
	6:05P	51.0	2.26	48.74	47.54	do

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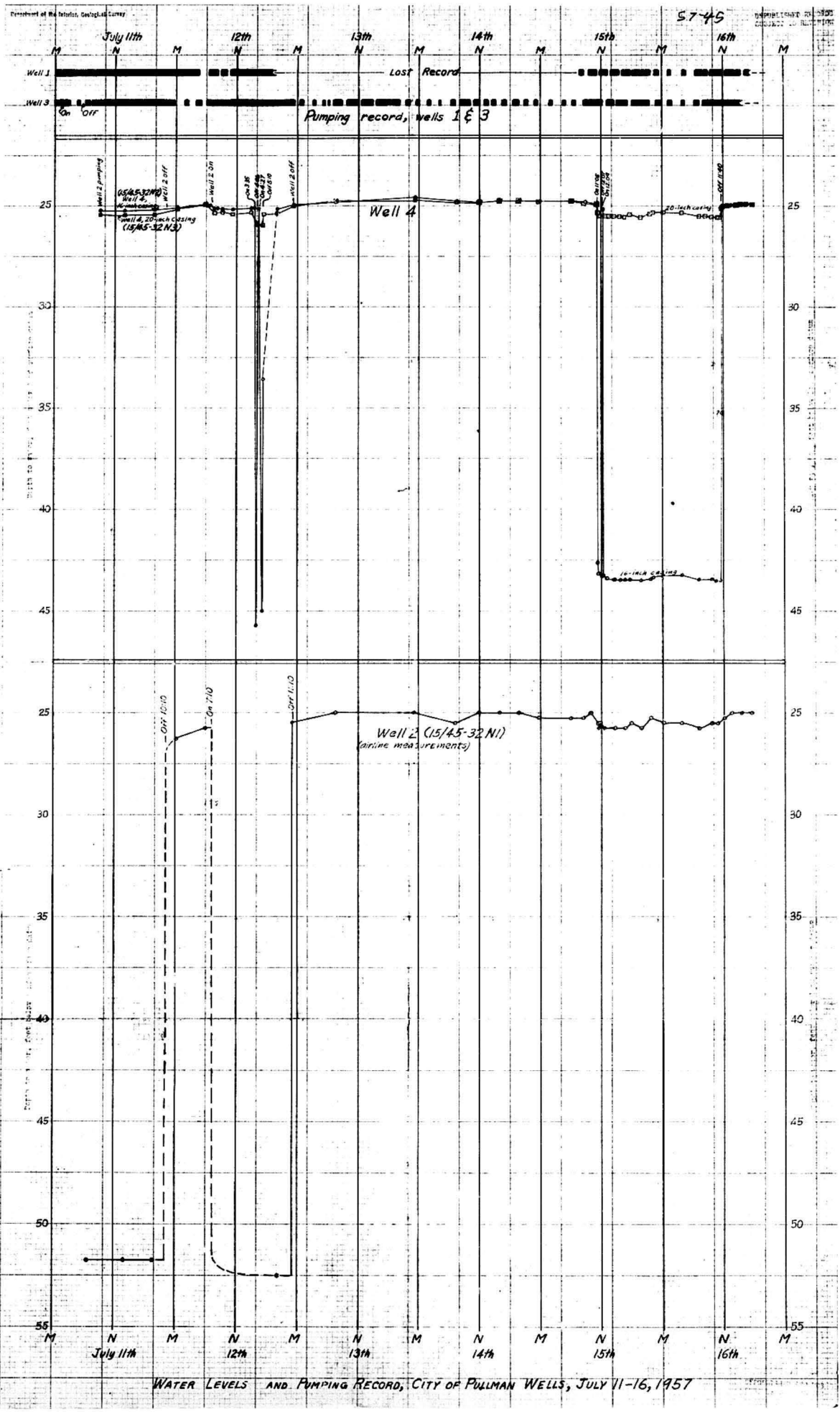
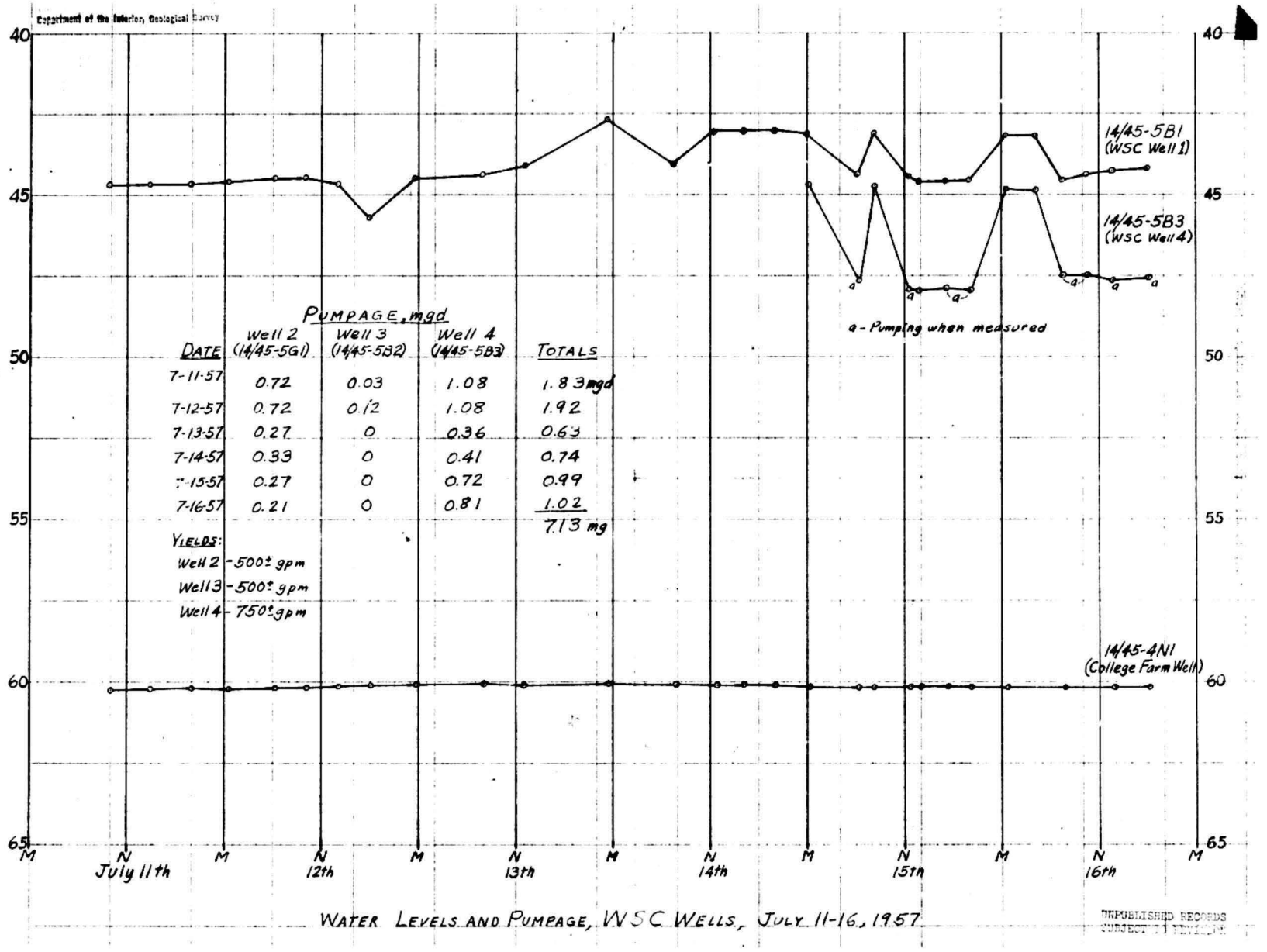


WATER LEVELS AND PUMPING RECORD, CITY OF PULLMAN WELLS, JULY 11-16, 1957

Department of the Interior, Geological Survey



PUMPAGE, mgd

DATE	Well 2 (14/45-5G1)	Well 3 (14/45-5B2)	Well 4 (14/45-5B3)	TOTALS
7-11-57	0.72	0.03	1.08	1.83 mgd
7-12-57	0.72	0.12	1.08	1.92
7-13-57	0.27	0	0.36	0.63
7-14-57	0.33	0	0.41	0.74
7-15-57	0.27	0	0.72	0.99
7-16-57	0.21	0	0.81	1.02
				7.13 mg

YIELDS:
Well 2 - 500± gpm
Well 3 - 500± gpm
Well 4 - 750± gpm

WATER LEVELS AND PUMPAGE, WSC WELLS, JULY 11-16, 1957