

STATE OF MONTANA
BUREAU OF MINES AND GEOLOGY
E. G. Koch, Director

BULLETIN 50-B

BASIC WATER DATA REPORT NO. 2
WESTERN AND SOUTHERN PARTS OF JUDITH BASIN,
MONTANA

by

Everett A. Zimmerman
U. S. Geological Survey

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MONTANA COLLEGE OF MINERAL SCIENCE AND TECHNOLOGY
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This section, Part B, contains the data upon which the interpretive report, Part A, is based. Inasmuch as all the information is statistical, it is presented in tabular form for ease of reference. Explanation of the site-numbering system is included in Part A, therefore it is not repeated herein.

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Table B-1.--Water levels in observation wells in the Judith Basin, Mont.
(In feet below land-surface datum)

Date	Water level	Date	Water level	Date	Water level	Date	Water level	Date	Water level	Date	Water level						
11-15-3bc						12-15-1bc											
1959			1960			1961			1959			1960			1961		
Aug. 21	6.86	Sept. 15	7.80	Oct. 25	9.80	July 17	5.42	July 22	6.13	July 26	7.00						
Oct. 2	7.50	Dec. 1	8.63	Feb. 7	8.64	Aug. 19	6.21	Sept. 19	8.00	Aug. 25	7.79						
Dec. 9	6.85	Feb. 3	8.82	April 19	8.32	Oct. 1	7.19	Nov. 30	8.79	Oct. 26	8.84						
April 8	6.21	April 13	8.79	June 25	5.47	Dec. 8	6.49	Feb. 2	8.36	Feb. 5	8.76						
June 24	6.29	July 25	9.23			April 7	5.92	April 12	7.55	April 19	6.76						
July 21	6.95	Aug. 24	9.51			June 21	5.59										
11-15-14dd						12-15-4cd											
1959			1960			1961			1959			1960			1961		
Aug. 19	5.32	Sept. 15	5.18	Aug. 24	6.20	Aug. 19	7.32	July 22	7.52	April 12	8.83						
Oct. 2	5.52	Nov. 30	4.93	Oct. 25	6.30	Oct. 1	7.85	Sept. 19	8.04	July 26	9.14						
Dec. 8	4.59	Feb. 2	5.07	Feb. 5	5.26	Dec. 8	8.00	Nov. 30	8.59	Aug. 25	8.35						
April 7	4.54	April 12	4.87	April 18	4.86	April 7	7.86	Feb. 2	8.87	Feb. 6	9.00						
June 21	3.89	July 25	5.87	June 25	3.61	June 23	7.34										
July 21	4.74																
11-15-24dd						12-15-6dcl											
1959			1960			1961			1959			1960			1961		
June 25	23.25	July 21	21.84	Aug. 24	21.05	July 21	5.50	Sept. 15	6.18	Feb. 7	7.10						
Aug. 19	23.73	Sept. 15	21.04	Oct. 25	21.10	Aug. 19	5.90	Dec. 1	6.67	April 19	6.91						
Sept. 30	22.47	Nov. 30	20.86	Feb. 5	21.93	Oct. 1	6.24	1961	6.67	June 25	5.14						
Dec. 8	22.28	Feb. 2	21.14	April 18	22.45	Dec. 9	6.13	Feb. 3	7.00	Sept. 18	5.54						
April 7	22.70	April 12	21.24	June 25	20.72	April 8	6.23	April 13	6.98	Sept. 18	5.72						
June 21	22.28	July 25	21.02	Sept. 19	16.47	June 24	5.66	July 25	6.81	1963							
						July 21	5.89	Aug. 24	6.82								
								Oct. 25	7.06								
11-16-3ca						12-15-10aa3											
1959			1960			1961			1959			1960			1961		
July 6	5.48	Sept. 19	7.33	Oct. 26	8.48	Aug. 19	15.69	Sept. 19	16.57	Oct. 26	17.99						
Sept. 30	6.60	Nov. 30	7.40	1962		Oct. 1	16.07	Nov. 30	16.80	1962							
Dec. 8	5.95	Feb. 2	frozen at 7.87	April 18	7.61	Dec. 8	15.94	1961		Feb. 5	18.05						
April 7	5.98	April 12	7.22	June 25	6.92	April 7	14.75	Feb. 2	16.87	April 19	17.32						
June 21	6.21	July 25	8.23	Sept. 19	6.99	June 23	15.04	April 12	16.66	June 25	15.47						
						July 22	15.64	July 26	17.46	Sept. 19	16.48						
								Aug. 25	17.84								
11-16-6aa						12-15-10bb2											
1959			1960			1961			1959			1960			1961		
July 2	12.93	Sept. 15	14.13	Oct. 26	19.15	July 16	9.59	July 22	10.43	Aug. 25	11.10						
Sept. 30	15.03	Nov. 30	15.81	1962		Aug. 20	9.89	Sept. 19	10.73	Oct. 26	11.40						
Dec. 8	15.67	Feb. 2	16.67	April 18	18.36	Oct. 1	10.20	Nov. 30	11.11	1962							
April 7	13.47	April 12	17.05	June 25	13.15	Dec. 8	10.48	1961		Feb. 5	11.60						
June 21	11.36	July 25	17.52	Sept. 19	13.63	April 7	9.82	Feb. 2	11.58	April 19	11.17						
July 21	12.29	Aug. 24	18.08			June 23	10.49	April 12	11.78	June 25	9.44						
								July 26	11.13								
11-16-6bb						12-15-13bb											
1959			1960			1961			1959			1960			1961		
July 8	2.15	July 21	3.29	July 25	4.22	July 14	9.31	Oct. 1	12.23	April 7	7.74						
Aug. 19	3.77	Sept. 15	4.47	Aug. 24	4.69	Aug. 19	10.20	Dec. 8	8.75	June 21	6.48						
Sept. 30	4.04	Nov. 30	4.05	Oct. 26	4.36												
Dec. 8	2.36	Feb. 2	3.12	Feb. 5	2.56												
April 7	1.69	April 12	2.61	April 18	2.21												
June 21	2.25																
11-16-15cb						12-15-20bc2											
1959			1960			1961			1959			1960			1961		
July 1	3.97	July 21	5.90	Aug. 24	7.45	Aug. 11	16.04	Sept. 15	16.55	Oct. 25	18.20						
Aug. 19	6.08	Sept. 15	6.58	Oct. 25	6.47	Oct. 2	17.22	Dec. 1	16.88	1962							
Sept. 30	5.32	Nov. 30	6.28	1962		Dec. 9	17.60	1961		Feb. 7	18.93						
Dec. 8	4.04	Feb. 2	5.63	April 18	4.26	April 8	17.45	Feb. 3	17.20	April 19	18.77						
April 7	4.14	April 12	5.07	June 25	4.83	June 24	16.50	April 13	17.96	June 25	18.02						
June 21	4.88	July 25	6.81	Sept. 19	6.10	July 21	16.53	July 25	17.72	Sept. 19	17.85						
								Aug. 24	17.91								
12-14-11aa						12-15-22bc											
1959			1960			1961			1959			1960			1961		
Aug. 10	7.30	July 21	7.82	July 25	8.92	Aug. 12	4.75	July 21	4.77	July 25	6.57						
Oct. 1	7.33	Sept. 15	8.51	Aug. 24	8.40	Oct. 2	5.03	Sept. 15	5.35	Aug. 24	6.54						
Dec. 9	6.34	Dec. 1	7.37	Oct. 25	8.58	Dec. 9	5.09	Dec. 1	5.62	Oct. 25	7.20						
April 8	6.62	Feb. 3	7.21	Feb. 7	7.60	April 8	3.85	1961		Feb. 7	6.80						
June 24	7.08	April 13	6.92	April 19	7.91	June 24	4.25	Feb. 3	5.86	1962							
								April 13	5.91								
12-14-24da2						12-16-16dcl											
1959			1960			1961			1959			1960			1961		
Aug. 11	16.14	July 21	21.54	July 25	21.29	Aug. 19	7.99	Sept. 19	8.53	Aug. 25	8.02						
Oct. 2	13.74	Sept. 15	21.54	Aug. 24	20.44	Oct. 1	8.31	Nov. 30	8.45	Oct. 26	7.31						
Dec. 9	13.61	Dec. 1	17.05	Oct. 25	20.00	Dec. 8	7.50	1961		1962							
April 8	16.84	Feb. 3	16.42	Feb. 7	15.27	April 7	6.36	Feb. 2	8.10	Feb. 5	9.47						
June 24	17.88	April 13	17.85	April 19	21.14	June 21	7.06	April 12	7.90	April 19	5.09						
						July 21	7.73	July 25	7.96	June 25	3.88						

(continued)
(In feet below land-surface datum)

Date	Water level	Date	Water level	Date	Water level	Date	Water level	Date	Water level	Date	Water level
12-16-18aa1						13-14-35da					
1959		1960		1961		1959		1960		1962	
July 10	6.91	June 21	8.99 P/	April 12	13.04	July 22	28.70	Sept. 15	28.56	Feb. 7	29.47
Aug. 19	10.08	July 22	11.08 P/	Oct. 26	15.39	Aug. 19	28.37	Dec. 1	28.69	April 19	29.50
Oct. 1	11.18	Sept. 19	11.82 P/	1962		Oct. 1	28.20	1961		June 25	28.54
Dec. 8	11.01E/	Nov. 30	11.79	Feb. 5	14.40	Dec. 9	27.19	Feb. 3	28.89	Sept. 19	27.24
1960		1961		April 19	13.09	1960		April 13	29.01	1963	
April 7	7.69	Feb. 2	12.53			April 8	28.60	July 25	29.26	Sept. 18	28.39
P/ pumping						June 23	28.73	Aug. 24	29.28		
						July 21	28.66	Oct. 25	29.39		
12-16-30ab						13-15-17aa3					
1959		1960		1961		1959		1960		1961	
Aug. 19	6.45	Sept. 19	7.40	Oct. 26	7.70	July 29	2.72	Sept. 15	5.45	July 25	5.67
Oct. 1	6.82	Nov. 30	6.57	1962		Oct. 2	4.52	Dec. 1	5.42	Aug. 24	5.76
Dec. 8	2.70	1961		Feb. 5	4.06	Dec. 9	4.17	1961		Oct. 25	5.90
1960		Feb. 2	5.15	April 18	2.58	1960		Feb. 3	5.80	1962	
April 7	2.20	April 12	2.34	June 25	2.91	April 8	3.94	April 13	5.55	Feb. 7	frozen at
June 24	3.05 P/	July 25	7.24	Sept. 19	6.86	June 23	4.55				
July 21	5.20	Aug. 25	7.80								
P/ pumping											
12-16-30bb3						13-15-23db					
1959		1960		1961		1959		1960		1960	
July 9	4.84	July 21	4.89	July 25	5.35	July 29	12.26	Oct. 1	12.80	April 7	12.82
Aug. 19	5.08	Sept. 19	4.11	Aug. 25	5.48	Aug. 19	12.73	Dec. 8	12.65	June 23	12.45
Sept. 30	4.98	Nov. 30	5.08	Oct. 26	5.51						
Dec. 8	4.47	1961		1962							
1960		Feb. 2	5.10	Feb. 5	5.48						
April 7	4.59	April 12	4.96	April 18	5.29						
June 21	4.59										
12-16-31ac						13-15-26cd1					
1959		1960		1961		1959		1960		1961	
July 6	3.28	July 21	4.32	July 25	6.89	July 23	17.94	July 22	19.07	July 26	24.75
Aug. 19	5.98	Sept. 19	6.72	Aug. 24	8.40	Aug. 19	18.82	Sept. 19	21.47	Aug. 25	25.02
Sept. 30	6.99	Nov. 30	7.55	Oct. 26	8.97	Oct. 1	20.67	Nov. 30	23.47	Oct. 26	25.72
Dec. 8	4.90	1961		1962		Dec. 8	18.81	1961		1962	
1960		Feb. 2	7.78	Feb. 5	7.19	1960		Feb. 2	24.26	Feb. 6	caved at 24
April 7	2.04	April 12	7.39	April 18	7.18	April 7	17.75	April 12	24.17	June 25	19.43
June 21	2.68					June 23	18.40				
12-16-36ad						13-15-32ad					
1959		1960		1961		1959		1960		1961	
July 6	36.00	July 21	36.48	July 25	36.99	July 24	7.09	July 22	8.35	July 26	10.00
Aug. 19	35.99	Sept. 19	36.93	Aug. 24	36.93	Aug. 19	8.40	Sept. 19	9.85	Aug. 25	11.77
Sept. 30	36.16	Nov. 30	37.07	Oct. 26	37.21	Oct. 1	9.55	Nov. 30	9.87	Oct. 26	10.38
Dec. 8	36.91	1961		1962		Dec. 8	7.03	1961		1962	
1960		Feb. 2	36.95	Feb. 5	36.72	1960		Feb. 2	9.49	Feb. 6	8.14 E
April 7	36.02	April 12	36.60	April 18	36.46	April 7	6.99	April 12	7.95	April 19	8.55
June 21	36.37					June 23	7.10				
13-13-3aa1						13-15-36bb1					
1960		1961		1962		1959		1960		1961	
July 15	29.23	July 25	30.51	June 25	31.38	July 15	9.68	July 22	10.61	July 26	13.18
July 22	29.16	Aug. 24	30.66	Sept. 19	32.17	Aug. 20	13.51	Sept. 19	10.67	Aug. 25	14.10
Sept. 15	29.33	Oct. 25	30.76	Nov. 15	30.43	Oct. 1	12.18	Nov. 30	11.76	Oct. 26	12.78
Dec. 1	29.62	1962		1963		Dec. 8	10.62	1961		1962	
1961		Feb. 6	31.40	Aug. 20	29.39	1960		Feb. 2	12.61	Feb. 6	12.72
Feb. 3	29.95	April 19	31.31	Sept. 18	29.41	April 7	10.83	April 12	12.66	April 19	12.44
April 13	30.25					June 23	9.65				
13-13-12cc4						13-16-1ba					
1960		1961		1962		1959		1960		1961	
Aug. 16	2.47	April 13	0.92	April 20	1.22	July 20	69.99	July 22	69.80	Aug. 25	70.52
Sept. 15	2.31	July 25	2.78	June 25	1.62	Aug. 20	70.18	Sept. 19	70.19	Oct. 27	70.84
Dec. 1	1.19 I/	Oct. 25	1.83	Sept. 19	2.08	Oct. 1	69.86	Dec. 1	70.17	1962	
1961		1962				Dec. 9	70.77	1961		Feb. 6	71.33
Feb. 3	frozen	Feb. 6	1.63			1960		Feb. 3	69.79	April 19	71.46
I/ ice in well						April 8	70.63	April 13	69.79	June 25	70.94
						June 23	69.59	July 26	70.40	Sept. 19	69.85
13-14-4cb						13-16-4aa					
1959		1959				1959		1960		1961	
July 24	29.27	Aug. 20	30.08			Aug. 4	95.27	July 22	95.39	July 26	100.37
						Aug. 20	95.08	Sept. 19	95.78	Aug. 25	100.48
						Oct. 1	95.22	1961		1962	
						1960		April 13	99.69	April 19	101.31
						June 23	95.83				
13-14-34dd2						13-16-8aa					
1959		1960		1961		1959		1960		1961	
July 22	7.78	July 21	11.69	Aug. 24	12.93	July 31	19.33	July 22	19.98	Aug. 25	22.19
Aug. 19	9.22	Sept. 15	10.30	Oct. 25	13.29	Aug. 20	19.69	Sept. 19	20.23	Oct. 26	dry
Oct. 1	9.01	Dec. 1	11.21	1962		Oct. 1	19.69	Nov. 30	19.57	1962	
Dec. 9	9.34	1961		Feb. 7	13.58	Dec. 9	19.95	1961		Feb. 6	dry
1960		Feb. 3	12.04	April 19	12.46	1960		Feb. 2	19.27	April 19	19.20
April 8	10.12	April 13	12.65	June 25	9.54	April 7	19.95	April 12	19.34	June 25	17.04
June 24	9.45	July 25	13.53			June 23	19.69	July 26	21.48	Sept. 20	19.02

Table B-1.--Water levels in observation wells in the Judith Basin, Mont.
(continued)
(In feet below land-surface datum)

Date	Water level	Date	Water level	Date	Water level	Date	Water level	Date	Water level	Date	Water level	
13-16-15aa						14-15-24ca						
1959			1960			1961			1962			
July 13	51.68	June 23	50.26	April 13	53.13	April 13	5.94	Feb. 6	6.83	Nov. 15	7.12	
Aug. 20	51.60	July 22	50.63	July 26	53.68	July 26	7.73	April 19	6.29	1963		
Oct. 1	50.89	Sept. 19	51.54	Aug. 25	53.92	Aug. 25	8.11	June 26	5.51	Sept. 18	7.51	
Dec. 9	50.60	Dec. 1	52.63	Oct. 27	54.47	Oct. 27	8.56	Sept. 20	7.49			
1960			1961			1962						
April 8	49.82	Feb. 3	53.08	Feb. 6	54.99							
13-16-20bb						14-15-26dd						
1959			1960			1961			1962			
July 30	30.48	July 22	21.82	July 26	22.47	Aug. 6	6.43	Sept. 20	6.33	Aug. 25	7.36	
Aug. 20	19.34	Sept. 19	21.96	Aug. 25	22.50	Oct. 2	5.88	Dec. 1	5.79	Oct. 27	6.50	
Oct. 1	19.25	Nov. 30	22.07	Oct. 26	22.57	1960			1961			
Dec. 9	20.26			Oct. 26	22.57	April 8	5.20 $\frac{1}{2}$	Feb. 3	5.78	Feb. 6	5.70 $\frac{1}{2}$	
1960			1961			1962			1963			
April 7	20.07	Feb. 2	22.17	Feb. 6	22.67	June 23	5.91	April 13	5.80	April 19	5.45 $\frac{1}{2}$	
June 23	21.79	April 12	22.24	April 19	22.75	July 22	6.57	July 26	7.28			
13-16-23cc						14-16-11dd						
1959			1960			1961			1962			
Aug. 6	15.18	June 23	16.33	Feb. 3	18.38	Aug. 5	24.04	July 22	24.80	Aug. 25	22.84	
Oct. 1	15.66	April 13	16.70	April 13	16.17	Aug. 20	23.63	Sept. 19	25.30	Oct. 27	25.98	
Dec. 9	15.77	Sept. 19	17.28	July 26	20.00	Oct. 2	24.24	Dec. 1	25.48	Feb. 2	25.52	
1960			1961			1962			1963			
April 8	15.93	Dec. 1	16.34	Aug. 25	20.58	Dec. 9	24.06	Feb. 3	25.61	April 19	25.99	
13-17-18bb						14-16-13dd						
1959			1960			1961			1962			
Aug. 20	28.53	June 23	28.61	April 13	28.46	Aug. 4	10.00	July 22	11.06	July 26	11.60	
Oct. 2	28.51	July 22	28.58	July 12	28.62	Aug. 20	10.75	Sept. 19	11.23	Aug. 25	11.67	
Dec. 9	28.54	Sept. 19	28.53				Oct. 2	10.69	Dec. 1	11.46	Oct. 27	11.61
1960			1961			1962			1963			
April 8	28.51	Dec. 1	28.53				Dec. 9	10.39	Feb. 3	11.97	Feb. 6	13.25
14-12-2cc						14-16-15bb						
1962			1963			1964			1950			
Sept. 21	14.73	Aug. 19	16.24	April 21	15.55	Oct. 31	34.95	Dec. 1	34.19	Feb. 27	35.02	
Nov. 15	15.34	Sept. 18	16.93	May 21	11.56	Nov. 29	35.33	Dec. 30	34.47	Mar. 28	35.07	
1963			1964			1965			1951			
July 17	15.71	Oct. 29	17.53				Dec. 28	35.52	Jan. 29	34.67	Apr. 30	35.27
14-14-26cd						14-16-13dd						
1960			1961			1962			1960			
Sept. 20	2.22	July 25	dry	April 19	1.54	Feb. 1	34.72	Feb. 25	34.78	May 29	37.52	
Dec. 1	1.35	Aug. 24	dry	June 25	1.40	Feb. 28	34.85	Mar. 31	35.86	June 26	34.93	
1961			1962			1963			1964			
Feb. 3	1.79	Oct. 25	2.02	Sept. 19	0.97	Mar. 30	34.80	Apr. 29	34.88	July 31	34.89	
April 13	0.75	Feb. 6	0.63 $\frac{1}{2}$	Nov. 15	0.24	May 1	34.80	June 30	34.98	Aug. 29	34.97	
14-14-28bb						14-16-13dd						
1959			1960			1961			1962			
July 24	25.97	Sept. 15	27.01	Feb. 6	27.73	June 1	34.86	July 29	34.92	Oct. 1	35.10	
Aug. 20	25.43	Dec. 1	27.38	April 19	27.86	June 30	34.83	Aug. 31	34.82	Oct. 29	35.01	
Oct. 2	26.64			June 25	27.33	Aug. 1	34.76	Sept. 29	34.79	Nov. 29	35.01	
Dec. 9	24.23	Feb. 3	27.60	Sept. 19	26.65	Aug. 30	34.70	Nov. 30	36.41	Dec. 30	34.98	
1960			1961			1962			1963			
April 8	27.09	April 13	27.68	Nov. 15	27.08	Oct. 3	34.78	Oct. 29	34.79	Jan. 28	36.31	
June 23	27.14	July 25	27.77				Nov. 2	34.88	Nov. 30	36.41	Feb. 25	34.96
July 21	26.93	Aug. 24	27.64	Aug. 20	27.00	Dec. 1	34.83	Dec. 30	35.24	Mar. 28	35.25	
14-15-6ca2						14-16-13dd						
1960			1961			1962			1955			
July 15	6.41	July 26	7.41	June 25	5.69	Jan. 2	34.88	Jan. 28	35.13	Apr. 30	34.72	
July 23	6.37	Aug. 25	7.02	Sept. 19	6.23	Feb. 1	34.90	Feb. 28	34.87	May 28	34.65 $\frac{1}{2}$	
Sept. 21	5.81	Oct. 27	7.34	Nov. 15	5.81	Feb. 28	34.84	Mar. 31	35.11	June 27	34.28	
Dec. 1	6.50			Sept. 19	26.65	Apr. 1	33.37	Apr. 28	32.81	Aug. 29	34.10	
1961			1962			1963			1964			
Feb. 3	7.63	Feb. 6	7.17	Aug. 19	5.49	Apr. 30	33.15	May 31	34.09	Sept. 29	34.26	
April 13	8.70	April 19	7.45	Sept. 18	6.11	May 31	34.27	June 27	33.89	Oct. 30	34.45	
14-15-13cd1						14-16-13dd						
1959			1960			1961			1956			
July 2	5.51	July 22	5.88	Aug. 25	5.75	Jan. 30	34.81	Jan. 30	34.66	Jan. 29	34.80	
Aug. 20	6.45	Sept. 20	6.68	Oct. 27	6.87	Feb. 1	34.88	May 31	34.85	Feb. 26	35.55	
Oct. 2	6.57	Dec. 1	6.18				Mar. 27	35.24	June 26	35.51	Mar. 31	32.00
Dec. 9	5.04			Nov. 15	5.81	Apr. 30	35.59	Aug. 1	34.80	Apr. 28	34.10	
1960			1961			1962			1963			
April 8	4.80	Feb. 3	6.41	April 19	5.23	May 27	35.02	Aug. 29	34.86	Jan. 28	34.70	
June 23	5.85	April 13	5.87	June 26	4.36	June 30	34.78	Sept. 27	34.88	Mar. 1	34.76	
14-15-13cd1						14-16-13dd						
1959			1960			1961			1964			
July 2	5.51	July 22	5.88	Aug. 25	5.75	July 31	34.64	Oct. 31	35.35	Apr. 28	34.76	
Aug. 20	6.45	Sept. 20	6.68	Oct. 27	6.87	Sept. 1	34.48	Nov. 29	35.15	June 1	34.79	
Oct. 2	6.57	Dec. 1	6.18				Sept. 29	34.44	Dec. 27	35.02	June 29	34.80
Dec. 9	5.04			Nov. 15	5.81	Oct. 29	34.13	Feb. 1	35.22	Aug. 4	34.79	
1960			1961			1962			1963			
April 8	4.80	Feb. 3	6.41	April 19	5.23							
June 23	5.85	April 13	5.87	June 26	4.36							

$\frac{1}{2}$ / ice under 6 inches water
 $\frac{1}{2}$ / frozen

$\frac{1}{2}$ / well being pumped

Date	Water level	Date	Water level	Date	Water level	Date	Water level	Date	Water level	Date	Water level
14-16-15bb--continued											
1960				1962				1963			
Sept. 30	34.82	Jan. 31	35.50	Jan. 30	34.56	Sept. 26	17.91	Aug. 19	27.70	Jan. 8	27.96
Nov. 1	34.83	Feb. 26	35.77	Feb. 26	34.11	Nov. 15	20.64	Sept. 18	25.12	April 20	14.47
Nov. 29	34.87	Mar. 28	34.18	Mar. 26	34.53	1963		Oct. 29	29.24	May 19	14.05
Dec. 28	34.87	Apr. 25	34.84	Apr. 29	34.74	July 16	25.18				
1961				1964				16-12-16cc2			
Jan. 30	36.44	May 29	34.62	May 29	34.77	1962		1963		1964	
Feb. 28	35.94	June 7	34.36	June 26	34.64	Sept. 26	17.91	Aug. 19	27.70	Jan. 8	27.96
Apr. 1	35.30	June 27	32.10	July 29	34.35	Nov. 15	20.64	Sept. 18	25.12	April 20	14.47
Apr. 29	35.11	July 28	33.43	Aug. 27	34.24	1963		Oct. 29	29.24	May 19	14.05
June 1	36.76	Aug. 30	34.11	Sept. 27	34.13	July 16	25.18				
Aug. 1	35.44	Sept. 26	34.21	Oct. 29	34.60						
Aug. 30	35.34	Oct. 30	32.28								
Sept. 28	35.76	Nov. 28	34.36								
Nov. 1	35.27										
14-16-22ba											
1959				1960				1961			
Aug. 4	38.87	July 22	39.71	July 26	41.27	June 25	2.9	Sept. 18	4.82	April 21	4.63
Aug. 20	38.56	Sept. 19	39.82	Aug. 25	41.42	Sept. 25	4.20	Oct. 29	4.83	May 19	3.37
Oct. 2	38.29	Dec. 1	39.75	Oct. 27	41.65	Nov. 15	4.08	1964			
Dec. 9	38.18	1961		1962		1963		Jan. 7	4.98		
1960				1962				16-12-29aa3			
April 8	38.44	Feb. 3	40.09	Feb. 6	41.82	Sept. 25	30.24	Aug. 19	29.87	Jan. 7	30.35
June 23	39.47	April 13	40.60	April 19	39.99	Nov. 15	30.30	Sept. 18	29.97	April 21	29.95
14-16-25dc											
1959				1960				1961			
July 3	84.44	July 22	84.24	July 26	93.97	June 25	2.9	Sept. 18	4.82	April 21	4.63
Aug. 20	83.09	Sept. 19	86.61	Aug. 25	94.10	Sept. 25	4.20	Oct. 29	4.83	May 19	3.37
Oct. 1	82.21	Dec. 1	91.52	Oct. 27	94.41	Nov. 15	4.08	1964			
Dec. 9	87.50	1961		1962		1963		Jan. 7	4.98		
1960				1962				16-12-34db			
April 8	89.89	Feb. 3	92.84	Feb. 6	94.64	July 16	4.08	Sept. 25	30.24	Aug. 19	29.87
June 23	84.64	April 13	93.33	April 19	93.11			Nov. 15	30.30	Sept. 18	29.97
14-16-28da2											
1959				1960				1961			
July 31	49.16	Dec. 9	44.45	June 23	44.26	June 25	2.9	Sept. 18	4.82	April 21	4.63
Aug. 20	44.20	1960		July 22	44.33	Sept. 25	4.20	Oct. 29	4.83	May 19	3.37
Oct. 2	44.29	April 8	43.70	Sept. 19	44.43	Nov. 15	4.08	1964			
14-16-32cd											
1959				1960				1961			
July 15	65.28	July 22	64.73	July 26	93.97	June 25	2.9	Sept. 18	4.82	April 21	4.63
Aug. 20	64.93	Sept. 19	64.34	Aug. 25	94.10	Sept. 25	4.20	Oct. 29	4.83	May 19	3.37
Oct. 1	64.36	Nov. 30	64.58	Oct. 27	94.41	Nov. 15	4.08	1964			
Dec. 9	63.95	1961		1962		1963		Jan. 7	4.98		
1960				1962				16-12-34db			
April 7	64.70	Feb. 2	65.13	Feb. 6	66.62	July 16	41.66	Sept. 25	30.24	Aug. 19	29.87
June 23	64.92	April 12	65.54	April 19	66.20			Nov. 15	30.30	Sept. 18	29.97
14-16-28da2											
1959				1960				1961			
July 31	49.16	Dec. 9	44.45	June 23	44.26	June 25	2.9	Sept. 18	4.82	April 21	4.63
Aug. 20	44.20	1960		July 22	44.33	Sept. 25	4.20	Oct. 29	4.83	May 19	3.37
Oct. 2	44.29	April 8	43.70	Sept. 19	44.43	Nov. 15	4.08	1964			
14-16-32cd											
1959				1960				1961			
July 15	65.28	July 22	64.73	July 26	93.97	June 25	2.9	Sept. 18	4.82	April 21	4.63
Aug. 20	64.93	Sept. 19	64.34	Aug. 25	94.10	Sept. 25	4.20	Oct. 29	4.83	May 19	3.37
Oct. 1	64.36	Nov. 30	64.58	Oct. 27	94.41	Nov. 15	4.08	1964			
Dec. 9	63.95	1961		1962		1963		Jan. 7	4.98		
1960				1962				16-12-34db			
April 7	64.70	Feb. 2	65.13	Feb. 6	66.62	July 16	41.66	Sept. 25	30.24	Aug. 19	29.87
June 23	64.92	April 12	65.54	April 19	66.20			Nov. 15	30.30	Sept. 18	29.97
15-12-29aa2											
1962				1963				1964			
Sept. 21	12.28	Aug. 21	12.73	Jan. 7	11.00	June 25	2.9	Sept. 18	4.82	April 21	4.63
Nov. 15	12.59	Sept. 18	12.86	April 21	6.03	Sept. 25	4.20	Oct. 29	4.83	May 19	3.37
1963		Oct. 29	13.16	May 21	6.24	Nov. 15	4.08	1964			
July 17	10.63										
16-11-2cb											
1962				1963				1964			
Sept. 26	34.52	Sept. 17	34.77	Jan. 7	34.66	June 25	2.9	Sept. 18	4.82	April 21	4.63
Nov. 14	34.62	Oct. 28	34.78	May 21	34.57	Sept. 25	4.20	Oct. 29	4.83	May 19	3.37
1963						Nov. 15	4.08	1964			
Aug. 17	34.75										
16-12-8ad											
1962				1963				1964			
June 27	10.05	Aug. 16	11.63	Jan. 7	frozen	June 25	2.9	Sept. 18	4.82	April 21	4.63
Sept. 24	10.55	Sept. 17	12.30	April 20	10.68	Sept. 25	4.20	Oct. 29	4.83	May 19	3.37
Nov. 14	10.29	Oct. 28	11.73	May 19	9.67	Nov. 15	4.08	1964			
1963											
July 15	11.66										
16-12-13cd											
1962				1963				1964			
June 29	10.89	Aug. 16	13.65	April 20	12.35	June 25	2.9	Sept. 18	4.82	April 21	4.63
Sept. 26	12.42	Sept. 17	14.14	May 19	11.49	Sept. 25	4.20	Oct. 29	4.83	May 19	3.37
Nov. 14	12.62	Oct. 28	14.35			Nov. 15	4.08	1964			
1963											
July 15	12.78										
16-12-16aa											
1962				1962				1962			
June 20	13.16	Sept. 26	18.22	Nov. 14	13.28	June 25	2.9	Sept. 18	4.82	April 21	4.63

Date	level	Date	level	Date	level
17-13-6aa					
1962		1963		1964	
Sept. 25	8.50	Aug. 16	8.98	Jan. 7	8.69
Nov. 14	8.61	Sept. 17	8.96	April 20	7.55
1963		Oct. 28	8.93	May 19	6.88
July 15	8.51				
18-9-9cd					
1962		1963		1964	
Sept. 26	38.97	Aug. 17	39.38	Jan. 7	----
Nov. 14	39.24	Sept. 18	40.30	April 20	35.98
1963		Oct. 28	41.60	May 21	32.06
July 16	38.35				
18-9-31aa					
1962		1963		1964	
Sept. 26	12.67	Aug. 17	13.64	Jan. 8	13.20
Nov. 14	12.70	Sept. 18	13.86	April 20	12.57
1963		Oct. 28	13.91	May 21	11.84
July 16	12.22				
18-12-11bd					
1962		1963		1964	
July 20	11.80	Aug. 16	12.72	Jan. 7	12.79
Sept. 24	11.34	Sept. 17	12.68	April 20	12.70
Nov. 14	11.62	Oct. 28	12.73	May 19	12.44
1963					
July 15	12.68				
18-12-21ab					
1962		1963		1964	
July 24	1.83	Aug. 16	4.64	Jan. 7	frozen
Sept. 24	2.09	Sept. 17	4.51	April 20	frozen
Nov. 14	2.33	Oct. 28	4.38	May 19	1.92 ^{u/}
1963					
July 15	4.39				
^{u/} measuring point shifted					
18-12-31dd					
1962		1963		1964	
July 17	19.47	Aug. 16	21.04	Jan. 7	21.58
Sept. 24	19.24	Sept. 17	21.19	April 20	21.84
Nov. 14	19.38	Oct. 28	21.25	May 19	22.20
1963					
July 15	20.88				

Table B-2.--Logs of wells, oil-test holes, and test holes in the Judith Basin, Mont.

(Thickness and depths below land surface are given in feet.)
(Yield, where shown, is in gallons per minute (gpm).)

Oil test 11-15-12da

From	To	Thick- ness	Character
0	8	8	Soil
8	100	92	Sandstone
100	108	8	Shale, black
108	127	19	Sand, water
127	211	84	Shale, blue, black and sandy
211	226	15	Sand and water
226	254	28	Shale, blue
254	260	6	Limeshell, hard
260	265	5	Sand, water
265	270	5	Shale, gray
270	275	5	Limeshell, gray
275	285	10	Sand, water
285	395	110	Shale, gray
395	400	5	Sand, water
400	465	65	Shale, red and gray
465	515	50	Sand of Ellis Group
515	550	35	Limestone
550	562	12	Shale, red
562	609	47	Limestone, hard, gray
609	611	2	Shale, black, heavy, water
611	615	4	Limestone, hard, gray
615	632	17	Shale, brown
632	636	4	Limestone, gray, water
636	640	4	Shale, red
640	644	4	Limestone, gray
644	651	7	Shale, red
651	654	3	Limestone, hard, gray
654	657	3	Sand, fine, white
657	660	3	Limestone, gray, water
660	667	7	Shale, black
667	690	23	Limestone, light-gray
690	705	15	Shale, red
705	835	130	Limestone, dark-gray
835	853	18	Shale, green
853	860	7	Limestone, black, heavy, water
860	1,007	147	Shale, green and gray - showing oil
1,007	1,012	5	Limestone, gray
1,012	1,202	190	Shale, green, gray, black; water 1,116-18
1,202	1,220	18	Limestone, hard, good flow gas

Oil test 11-15-12db

From	To	Thick- ness	Character
0	15	15	Surface rocks and shale
15	85	70	Sand
85	176	91	Sand and shale
176	241	65	Sand
241	315	74	Sandy shale
315	374	59	Shale, red and gray
374	464	90	Shale and sand
464	516	52	Sand
516	565	49	Lime
565	585	20	Red shale and lime
585	659	74	Lime
659	740	81	Lime and red shale
740	841	101	Lime and shale
841	925	86	Lime and shale
925	1,274	347	Lime and shale
1,274	1,311	37	Anhydrite and shale
1,311	1,356	45	Sandstone
1,356	1,388	32	Sand
1,388	1,531	43	Sand and shale
1,531	1,700	169	Shale and lime
1,700	2,030	330	Lime
2,030	2,130	100	Lime and shale
2,130	3,032	902	Lime
3,032	3,036	4	Shale
3,036	3,215	179	Lime
3,215	3,390	175	Sandy lime
3,390	3,397	7	Lime
3,397	3,505	108	Sandy lime
3,505	3,524	19	Lime
3,524	3,584	60	Sandy lime
3,584	3,687	3	Lime
3,687	4,616	929	Lime and shale
4,616	4,809	193	Shale
4,809	4,822	14	Hard sand granite
4,822	T.D.		

Well 12-13-24ab3

From	To	Thick- ness	Character
0	16	16	Surface soil
16	19	3	Conglomerate and bentonite
19	21	2	Shale, hard, sandy
21	27	6	Cap rock, hard
27	33	6	Sand, ferruginous (water)
33	41	8	Sandstone, hard
41	43	2	Shale, calcareous
43	47	4	Limestone, sandy
47	49	2	Dolomite
49	61	12	Shale and limestone with sharp sand streaks
61	66	5	Sandstone, hard with limestone streaks
66	73	7	Shale, calcareous
73	137	64	Limestone with calcareous sandstone and shale streaks
137	156	19	Shale, red and variegated
156	175	19	Shale, variegated and limestone
175	232	57	Sandstone, sharp--dolomite and limestone
232	235	3	Shale, hard and limestone--hard streaks of sandstone
235	237	2	Sandstone, hard, tight
237	244	7	Sandstone, gray--good porosity--4 to 6 gpm artesian flow

Well 12-14-2dd

From	To	Thick- ness	Character
0	12	12	Gravel
12	56	44	Blue shale
56	130	74	Gray shale with bentonite layers
130	134	4	Hard sandstone
134	156	22	Gray shale (water within 3 feet of surface)

Well 12-14-6dd

From	To	Thick- ness	Character
0	10	10	Clay and gravel
10	26	16	Light sandy clay
26	37	11	Shale, light-colored
37	41.5	4.5	Bentonite
41.5	42.5	1	Water in sandy shale--rose 20 feet in the hole
42.5	59	16.5	Shale, blue, hard
59	105	46	Shale, light-colored
105	108	3	Shale and bentonite
108	188	80	Shale, light-colored, hard
188	196	8	Shale, dark, sandy
196	202	6	Shale, dark
202	212	10	Shale, dark--gravel--water over top of casing
212	234	22	Sandstone, gray, hard, fine-grained
234	?	?	Shale, gray
?	260	?	Sandstone and sandy shale, blue-gray
260	320	60	Shale, blue-gray
320	365	45	Shale, red
365	450	85	Shale, red with layers of sandstone
450	472	22	Shale, hard, sandy with layers of sandstone
472	481	9	Sandstone
481	507	26	Rock, hard
507	513	6	Sandstone, hard
513	530	17	Sandstone, very hard, fine-grained
530	531	1	Broken zone

Flowed about 20 gpm

Oil test 12-14-9ba

From	To	Thick- ness	Character
0	20	20	Shale, brown
20	35	15	Shale, sandy--water
35	40	5	Sandstone, soft
40	58	18	Sandstone, hard
58	66	8	Pink shale
66	76	10	Limestone and shale
76	96	20	Sandstone--artesian flow of water
96	101	5	Sandstone, hard
101	116	15	Sandstone, softer
116	129	13	Shale, red, soft
129	147	18	Shale
147	169	22	Limestone and shale
169	177	8	Clay, sticky
177	187	10	Sandstone
187	196	9	Limestone, hard
196	203	7	Sandstone, soft
203	212	9	Sandstone, hard
212	214	2	Shale, sandy, pink
214	240	26	Shale, red, sticky
240	241	1	Sandstone, hard
241	250	9	Sandstone, softer
250	255	5	Shale, red
255	275	20	Shale, red
275	280	5	Shale, green
280	283	3	Sand
283	284	1	Shale
284	290	6	Sandstone, hard
290	300	10	Sandstone, softer
300	310	10	Sandstone, shaly
310	340	30	Sandstone, very hard in places
340	351	11	Shale, brown
351	353	2	Sandstone, gray--water
353	356	3	Shale, gray, soft
356	358	2	Shale, lighter than above
358	373	15	Shale, gray, hard
373	377	4	Sandstone with lignite particles--water over casing top approximately 10 inches
377	408	31	Shale, sandy, gray to brown
408	415	7	Shale, black, carbonaceous

Heavy flow of water at 292 feet.

Well 12-14-11ad

From	To	Thick- ness	Character
0	15	15	Gravel
15	75	60	Gray and blue shale with bentonite
75	76	1	Hard coarse sandstone
76	89	13	Soft, water-bearing sandstone
89	90	1	Hard sandstone
90	103	13	Gray shale (water)

Well 12-14-18aal

From	To	Thick- ness	Character
0	8	8	Surface soil
8	20	12	Rock and boulders
20	40	20	Gravel--bedrock at 40 feet
40	80	40	Shale, brown and green--flecked with red at bottom
80	82	2	Shale, red
82	92	10	Limestone and yellow sandstone
92	110	18	Limestone and hard shale
110	130	20	Yellow sandstone
130	140	10	Shale, red
140	160	20	Hard limestone and red rock
160	180	20	Limestone and some yellow sand
180	192	12	Limestone, hard
192	215	23	Shale, red
215	230	15	Limestone, sandy and red shale
230	250	20	Rock and shale
250	270	20	Limestone, broken
270	278	8	Rock, very solid

Table B-2.--Logs of wells, oil-test holes, and test holes in the Judith Basin, Mont. - continued
 (Thickness and depths below land surface are given in feet.)
 (Yield, where shown, is in gallons per minute (gpm).)

Oil test 12-14-19bd--continued

From	To	Thick- ness	Character
278	286	8	Rock, very hard
286	306	20	Limestone and bentonite
306	320	14	Slate (probably hard shale)
320	336	16	Hard shell rock. Salt and pepper sandstone at 336 feet.
336	340	4	Sandstone, salt and pepper--producing water
450	470	20	Siltstone, pale-green, calcareous, tight.
470	490	20	Limestone, dolomitic, white to green, slightly chalky.
490	510	20	Shale, dark-gray with some limestone, white with red specks.
510	590	80	Dolomite and dolomitic limestone, white to light-gray, sandy in spots, trace varicolored shale.
590	630	40	Shale, light-gray to reddish-brown, very calcareous and silty. (Sample top Kibbey Sandstone: 650.)
630	730	100	Sandstone, light-gray to pink, fine- to medium-grained, porous, with calcareous cement.
730	760	30	Sandstone, orange-red, friable, medium-grained, porous with some gypsum.
760	800	40	Shale, light-gray, with some sandstone as above.
800	820	20	Sandstone, as above.
820	860	40	Shale, light-gray, soft and silty. (Sample top Charles: 860.)
860	900	40	Limestone, white to tan, slightly shaly.
900	910	10	Siltstone, red to salmon, blocky, slightly shaly and limy.
910	960	50	Limestone, as above.

Oil test 12-14-19bd

From	To	Thick- ness	Character
0	20	20	Surface gravel
20	80	60	Sandstone, reddish-brown, fine- to medium-grained, glauconitic, calcareous cement, tight with some red-gray shale.
80	120	40	Siltstone, light-gray, soft, shaly. Trace tan-yellow limestone and some shale as above. (Sample top Amnden Formation: 120.)
120	140	20	Shale, reddish-brown, silty.
140	250	110	Shale, reddish-brown, silty, with some gypsum and trace light-gray siltstone.
250	260	10	Dolomite, white, tan, pink, fine crystalline to sub-lithographic, trace green shale. (Sample top Otter Formation: 260.)
260	270	10	Siltstone, gray-green, trace of gypsum.
270	350	80	Shale, varicolored, some slightly silty and sandy.
350	370	20	Shale as above, calcareous.
370	390	20	Shale as above, not so calcareous.

Oil test 12-14-19bd--continued

From	To	Thick- ness	Character
390	410	20	Limestone, white light-gray, sub-lithographic some mottled green shale
410	450	40	Shale, green to gray, splintery, with some limestone as above and trace tan-brown silty dolomite.
960	970	10	Limestone, brown to dark-brown, slightly dolomitic, lithographic with many calcite veins (lost circulation at 966 feet).
970	990	20	Limestone, white to brown, sub-lithographic, hairline fractures, calcite filled.
990	1,100	110	Limestone, white, tan to buff, sub-lithographic to very finely crystalline, few calcite grains.
1,100	1,240	140	Limestone, white to buff and tan, some dolomitic. Slightly chalky and fossiliferous with occasional trace of milk white chert.
1,240	1,250	10	Limestone, medium-gray to brown, sub-lithographic, slightly chalky. (1251 - Lost circulation.)
1,250	1,260	10	No returns.
1,260	1,350	90	Limestone, light-gray to buff and brown, sub-lithographic to very finely crystalline, some calcite crystals. (1351 - Lost circulation.)
1,350	1,420	70	No returns.
1,420	1,430	10	Partial returns. Samples poor. Dolomite, white to light-gray, very finely crystalline with good porosity. Calcite crystals.
1,430	1,500	70	Partial returns. Samples poor, as above.
1,500	1,540	40	Limestone, dolomitic, chalky, some sub-lithographic, tan to brown.
1,540	1,550	10	Drilling break. Circulated samples. Dolomite, buff to tan, very finely crystalline with good porosity and permeability.
1,550	1,600	50	Dolomite, buff to tan, very finely crystalline, some white milky chert.
1,600	1,610	10	No returns.
1,610	1,640	30	Dolomite, light-gray to tan and brown, sub-lithographic, trace of dolomite, tan, very finely crystalline, with good porosity.
1,640	1,650	10	No returns.
1,650	1,660	10	Limestone, white to light-gray and buff, sub-lithographic, some chalky, trace white milky chert.
1,660	1,670	10	No returns.
1,670	1,710	40	Very poor returns. Dolomite, white, very finely crystalline, some porosity.

Oil test 12-14-19bd--continued

From	To	Thick- ness	Character
1,710	1,740	30	No returns.
1,740	1,765	25	Core #1 Cut 25', recovered 25'. 6 feet - dolomite, light-gray to tan, finely crystalline to microsugrosic, fair porosity. 14 feet - limestone, light-gray to tan, slightly vugular, sub-lithographic to very finely crystalline, slightly pyritic, few hairline fractures.
1,765	1,875	110	No samples, no returns.
1,875	1,900	25	Core #2 Cut 25', recovered 21'. 1.5 feet - Limestone, white to buff, dense, very oolitic. 2 feet - Limestone, dolomitic, tan, dense. 4 feet - Limestone, tan, dense, very oolitic. Oolites have red centers. 3.5 feet - Limestone, reddish-brown, dense, shaly, some dark-red streaks. 4 feet - Limestone, gray to tan, dense, some oolites. 1 foot - Limestone, white to buff, dense, very oolitic. Oolites have red centers. 5 feet - Limestone, red-brown, slightly fossiliferous, dense, slightly shaly.
1,900	2,593	693	No samples, no returns.
2,593	2,630	37	Core #3 Cut 37', recovered 20'. 3 feet - Dolomite, tan to dark-brown, finely crystalline with large vugs. Some pyrite. 10 feet - Dolomite, gray to dark-gray, dense with some vugs. Few fractures with calcite crystals. 3 feet - Dolomite, dark-gray to black, dense, some pyrite. 4 feet - Dolomite, gray to brown, dense. Few fractures with calcite and pyrite.
2,630	2,646	16	Core #4 Cut 16', recovered 7'. 7 feet - Dolomite, gray to dark-gray, dense, vugular. Few hairline fractures with calcite.
2,646	2,658	12	No samples, no returns.
2,658	2,707	49	Core #5 Cut 49', recovered 20'. 3 feet - Dolomite, dark-brown finely crystalline to dense. Hairline fractures. Trace of pyrite. 9 feet - Limestone, buff to brown, very finely crystalline with many vugs. Good porosity. Very slightly shaly. 2 feet - Dolomite, light-gray, dense, some calcite crystals. 1 foot - Shale, blue-green, very limy soapy lustre. 5 feet - Limestone, dark-gray to brown, dense to very finely crystalline. Hairline fractures filled with calcite.

Table B-2.--Logs of wells, oil-test holes, and test holes in the Judith Basin, Mont. - continued
(Thickness and depths below land surface are given in feet.)
(Yield, where shown, is in gallons per minute (gpm).)

Oil test 12-14-19bd--continued

From	To	Thick- ness	Character
2,707	2,751	45	No samples, no returns.
2,751	2,775	24	Core #6 Cut 24', recovered 20.5'. 20.5 feet - Limestone, white-buff to brown, finely crystalline with some brown banded streaks. Porosity fair, brackish odor on fresh break. Some calcite crystals, lining some vugs.
2,775	2,886	111	No samples, no returns.

Oil test 12-14-21cb

From	To	Thick- ness	Character
0	23	23	Clay, red, caving
23	27	4	Conglomerate
27	29	2	Shale, black
29	35	6	Sandstone boulders, artesian flow of water
35	65	30	Sandstone, shaly contains oyster shells
65	85	20	Sandstone, blue, hard
85	90	5	Shale, light-blue
90	101	11	Sandstone, blue, hard, contains shells
101	128	27	Shale, blue, sandy
128	131	3	Lime, gray, hard
131	143	12	Shale, red, clayey
143	210	67	Shale, red--sandy layers
210	228	18	Limestone, gray, hard
228	232	4	Limestone, brown
232	245	13	Shale, black-- limestone con- cretions
245	260	15	Shale, light-green
260	270	10	Shale, darker green
270	297	27	Shale, yellow, (bentonite?)-- swells and rises in casing
297	299	2	Limestone, gray, hard
299	302	3	Shale, red--caves
302	312	10	Shale, blue, soft
312	320	8	Clay, yellow--swells in hole
320	323	3	Limestone, gray
323	350	27	Shale; yellow, green, and black--caves badly
350	361	11	Limestone, gray
361	375	14	Shale, dull-green, hard
375	395	20	Shale, brilliant-green, compact
395	410	15	Shale, black
410	412	2	Limestone, gray, hard
412	490	78	Shale, brilliant-green --sandy at base
490	510	20	Shale, black
510	520	10	Sandstone, black, shaly to calcareous
520	540	20	Shale, brown, sandy
540	557	17	Shale, brown
557	559	2	Shale, green
559	565	6	Shale, brown
565	590	25	Limestone, coral bed near top--flows about 2,000 barrels of water a day (56 gpm).
590	610	20	Limestone, soft
610	620	10	Shale, black
620	649	29	Limestone--corals
649	650	1	Shale, black
650	655	5	Limestone, gray
655	685	30	Sandstone, shaly
685	700	15	Quartzite, pinkish
700	708	8	Sandstone, greenish
708	711	3	Shale, green
711	716	5	Shale, light-red
716	728	12	Shale, green, sandy
728	750	22	Sandstone, quartzitic
750	759	9	Shale, red, sandy
759	765	6	Sandstone, reddish
765	770	5	Shale, red

Oil test 12-14-21cb--continued

From	To	Thick- ness	Character
770	772	2	Gypsum
772	776	4	Shale, pink, sandy
776	780	4	Quartzite, pink
780	790	10	Sandstone, red
790	842	52	Shale, red, ribs of hard sandstone
842	867	25	Gypsum, white
867	873	6	Sandstone, hard
873	874	1	Sand, loose--tar
874	895	21	Shale, red--with layers of gypsum
895	900	5	Sandstone, hard
900	908	8	Quartzite
908	915	7	Shale, red, clayey
915	917	2	Gypsum
917	925	8	Shale, red
925	935	10	Sandstone, red-- increase in water flow
935	954	19	Clay, red
954	965	11	Limestone, gray
965	975	10	Limestone, bluish, shaly
975	978	3	Limestone, pink to cream
978	989	11	Limestone, gray, hard
989	1,115	26	Limestone, porous

Test hole 13-11-18 (E4)
Altitude 5,450 feet (approximate)

From	To	Thick- ness	Character
0	6	6	Silty sandy gravel
6	21	15	Sand: gravel, cobbles and boulders; clay matrix
21	25	4	Limestone: black, fine-grained
25	55	30	Limestone: black and gray, banded, fos- siferous, fine- grained, few horizontal joints with brown iron oxide coatings; few vugs with calcite crystals
55	77.5	22.5	Limestone: dark-gray, massive, crystalline, fossiliferous, coarse- grained; few vugs with calcite crystals.
75.5	100+	24.5+	Large cavity extended below 100 feet. (No water found-- circulation lost at several places.)

Well 12-15-22bd1

From	To	Thick- ness	Character
0	5	5	Overburden
5	7	2	Shale
7	18	11	Sandstone, broken
18	22	4	Shale
22	26	4	Sandstone
26	29	3	Shale
29	35	6	Shale
35	36	1	Sandstone, hard
36	40	4	Shale
40	135	95	Shale, blue with sandy layers
135	185	50	Sandstone
185	260	75	Shale, blue, sandy
260	445	185	Shale, blue with layers of sandstone and bentonite
445	505	60	Shale, blue
505	510	5	Sandstone
510	675	165	Shale, blue
675	695	20	Shale, gray
695	795	100	Shale, gray, sandy and layers of sandstone, green
795	825	30	Shale, gray
825	930	105	Shale, red
930	1,046	116	Sandstone in hard and soft layers (water) 6 gpm

Test hole 13-11-18bd
Altitude 5,490.3

From	To	Thick- ness	Character
0	10	10	Sandy silty gravel with traces of clay
10	24	14	Sandy silty gravel, increase of clayey matrix
24	28	4	Sand: tan to brown, fine- to medium- grained, sharp angular limestone fragments. Some clay
28	40	12	Limestone: brown to black, massive texture, very hard
40	44	4	Sandstone: brown, fine-grained, cal- careous
44	80	36	Limestone: brown to black, massive texture, very hard, hole slightly moist at 78 feet. Water found at about 80 feet rose to 70 feet.
80	100	20	Igneous rock: gray- green, andesitic, dense, very hard.

Static water level 58.8 feet

Test hole 13-12-8a
Altitude 4,826.4

From	To	Thick- ness	Character
0	1.5	1.5	Silty clay
1.5	5	3.5	Silty gravelly clay
5	7	2	Boulder
7	20	13	Rock fragments in clayey, silty matrix
20	45.5	25.5	Clay: red to brown mottled white, soft, contains rock fragments
45.5	51	5.5	Clay: black and gray bands with bentonite zone at 47.2 feet
51	63	12	Conglomerate: fine to coarse sandstone and shale fragments. Calcareous cement, moderately hard.
63	73.6	10.6	Syenite: hard, greenish-gray, few vertical fractures, open, chloritic coating
73.6	78.3	4.7	Shale: black, hard, platy, highly fractured, open, slickensides, cal- careous, dissemi- nated pyrite with some interbedded, hard, black lime- stone
78.3	79.5	1.2	Syenite: (as above)
79.5	89.2	9.7	Shale: black, hard, platy, fractures closely spaced, (diagonal and hori- zontal) with some interbedded hard, black limestone. Stylolites at 82.8 feet and 83.6 feet
89.2	92.2	3	Syenite: greenish-gray, hard
92.2	100	7.8	Shale: black to gray, hard, fractured, pyritized, with interbedded hard, black limestone

Water level after 9 days 63 feet

Table B-2.--Logs of wells, oil-test holes, and test holes in the Judith Basin, Mont. - continued
 (Thickness and depths below land surface are given in feet.)
 (Yield, where shown, is in gallons per minute (gpm).)

Oil test 13-14-6ab				Oil test 13-14-6ab--continued				Test hole 14-11-14aa Altitude 5,436.0			
From	To	Thick-ness	Character	From	To	Thick-ness	Character	From	To	Thick-ness	Character
0	45	45	Yellow clay	1,565	1,575	10	Red rock	0	2	2	Sandy silty clay
45	62	17	Blue shale	1,575	1,585	10	Sandy lime	2	11	9	Clayey sandy gravel
62	86	24	Blue shale	1,585	1,595	10	Hard lime, pink	11	16.7	5.7	Limestone: hard, tan, thin to massive bedded, sandy. Small solution cavities--bedding poorly defined; horizontal, steeply dipping joints. Some interbeds of hard calcareous shale.
86	102	16	Water sand rose 55 feet	1,595	1,600	5	Hard lime, brown	16.7	18.8	2.1	Sandstone: tan, fine-grained, calcareous, moderately hard--losing water
102	105	3	Blue shale	1,600	1,610	10	Red rock	18.8	35	16.2	Limestone: hard, tan, thin-bedded to massive, occasional small solution cavities. Some joints cemented with white calcite. Brown to black oxide staining. Lost drilling water at 25 feet.
105	335	230	Black shale	1,610	1,645	35	White lime, hard, little water	35	42	7	Limestone: hard, tan, massive to thin-bedded. Many small solution cavities, bedding poorly defined. Joints steeply dipping.
335	365	30	Water sand	1,645	1,660	15	Gray lime, water	42	51	9	Sandstone: hard, gray-brown, fine-grained, highly calcareous. Bedding inconspicuous, horizontal.
365	390	25	Sandy shale	1,660	1,705	45	White lime, water	51	80	29	Limestone: hard, tan, massive to thin-bedded. Bedding poorly defined, horizontal. Many small solution cavities. Joints steeply dipping. Few opened and stained with brown oxide. Some interbedded argillaceous limestone and highly calcareous shale.
390	400	10	Pink shale	1,705	1,730	25	Blue lime, water	80	93	13	Limestone: hard, tan, massive to thin-bedded, bedding poorly defined, gently dipping. Diagonal and vertical joints. Randomly spaced. Several joints opened with dark-brown to black calcite crystals. Some interbedded argillaceous limestone, calcareous shale, and occasional thin zones of soft shale.
400	405	5	Red rock	1,730	1,761	31	Gray lime	93	100	7	Shale (siltstone): clay (in part), hard, becoming soft below 97 feet, yellow-brown. Three feet of cave material. Bit dropped in places.
405	410	5	Gray sand								
410	470	60	Sandy gray shale								
470	485	15	Sandy shale gray and blue								
485	495	10	Pink shale								
495	500	5	Red rock								
500	504	4	Pink rock								
504	515	9	White								
515	540	25	Pink shale								
540	560	20	Red rock								
560	600	40	Water sand								
600	612	12	Red rock								
612	620	8	Sand								
620	630	10	Sand, hard, oil showing from 610 to 625								
630	637	7	Gray shale								
637	655	18	Red rock								
655	660	5	Gray sandy shale, showing of gas								
660	665	5	Red rock								
665	690	25	Sandy lime, 7 bailers of water								
690	700	10	Red rock								
700	712	12	Lime shell								
712	715	3	White sticky clay								
715	717	2	Red rock								
717	722	5	Lime shell								
722	725	3	Red rock								
725	730	5	Lime shell								
730	745	15	Red rock								
745	760	15	Gray shaly sand								
760	770	10	Sand and sandy shale (water)								
770	845	75	Water sand								
845	850	5	Coal								
850	870	20	Brown sandy clay								
870	875	5	Shale								
875	905	30	Sandy shale								
905	910	5	Shale								
910	920	10	Lime								
920	925	5	Shale								
925	940	15	Sandy lime								
940	950	10	Brown shale								
950	980	30	Brown shale								
980	985	5	Sandy lime								
985	990	5	Brown shale								
990	1,008	18	Blue slate								
1,008	1,010	2	Lime shell								
1,010	1,020	10	White slate								
1,020	1,033	13	Blue slate								
1,033	1,045	12	Blue slate								
1,045	1,050	5	Sandy white lime, hard								
1,050	1,055	5	White slate								
1,055	1,060	5	Yellow lime (cavey)								
1,060	1,075	15	Blue mud								
1,075	1,123	48	Gray lime, hard								
1,123	1,135	12	Gray lime, hard								
1,135	1,165	30	White sandy lime								
1,165	1,175	10	Gray lime, hard								
1,175	1,190	15	Red rock								
1,190	1,205	15	White lime, hard								
1,205	1,265	60	Sandy lime, water								
1,265	1,302	37	White lime, more water								
1,302	1,335	33	Red rock								
1,335	1,340	5	White lime								
1,340	1,390	50	Gray lime, hard								
1,390	1,397	7	Red clay								
1,397	1,400	3	Blue clay								
1,400	1,410	10	Gray lime, hard								
1,410	1,412	2	Dark-gray lime								
1,412	1,415	3	Red rock								
1,415	1,422	7	Gray lime, hard water								
1,422	1,426	4	White lime, hard								
1,426	1,433	7	Lime and red rock								
1,433	1,435	2	Red rock								
1,435	1,485	50	Gray lime (water)								
1,485	1,490	5	Red rock								
1,490	1,510	20	Gray lime								
1,510	1,515	5	Blue shale								
1,515	1,540	25	Gray lime, hard								
1,540	1,550	10	Sandy lime, little smell of gas								
1,550	1,565	15	Broken lime and red shale								

Table B-2.--Logs of wells, oil-test holes, and test holes in the Judith Basin, Mont. - continued
 (Thickness and depths below land surface are given in feet.)
 (Yield, where shown, is in gallons per minute (gpm).)

Well 14-13-16cc--continued

From	To	Thick- ness	Character
360	368	8	Hard sandstone
368	370	2	Soft sandstone
370	383	13	Hard sandstone
383	392	9	Sandy shale
392	398	6	Hard sandstone
398	404	6	Soft sandstone
404	480	76	Hard sandstone
480	489	9	Medium-hard sandstone
489	515	26	Soft sandstone

Test hole 14-13-20ac
 Altitude 4,535.0

From	To	Thick- ness	Character
0	2.5	2.5	Clayey sandy gravel
2.5	8	5.5	Sandy clay
8	23	15	Sand and gravel
23	43	20	Sandstone: hard, light-tan to gray, fine-grained, poorly graded, friable, few thin calcite and clay seams.
43	45.5	2.5	Sandy shale: tabular, platy, calcareous in lower half
45.5	48.6	3.1	Sandstone: hard (coarse siltstone), highly calcareous. Small (1/8") clay nodules
48.6	49	0.4	Shale: red, soft
49	74	25	Sandstone: tan to gray, banded with thin (1/16") beds of black sand. (Cyclic deposition) Calcareous throughout, few thin gray-green sandy clay zones, generally hard. One-inch clay zone, brown, plastic at 65.1 feet. One-fourth inch brown plastic clay zone at 65.7 feet.
74	80	6	Shale: red clayey, highly conchoidal. Fractures, upper 1 foot mottled light gray-green and red, soft to moderately hard.

Test hole 14-13-20ac

From	To	Thick- ness	Character
80	83	3	Clay shale: red, moderately firm plastic and clay; light gray-green, bentonitic.
83	92	9	Limestone: gray with fine sand, partly dolomitic in character, hard.
92	100	8	Sandstone: "salt and pepper" medium-grained, friable, poorly graded, hard.

Water level 57 feet.

Oil test 14-14-6ad

From	To	Thick- ness	Character
0	240	240	Sand, gravel and shale
240	270	30	Sandstone, medium- to dark-gray, very fine-grained, subangular, friable, abundant dark accessory minerals, micaceous, glauconitic, very clayey, bentonitic, with shale interbeds.

Oil test 14-14-6ad--continued

From	To	Thick- ness	Character
270	300	30	Sandstone and shale as above.
300	330	30	Sandstone as above, very glauconitic, with medium-gray soft silty bentonitic shale; trace of light-tan, very carbonaceous marl.
330	360	30	Shale, medium-gray, very sandy, glauconitic, medium-soft.
360	390	30	Shale as above.
390	420	30	Shale, medium-gray, micaceous, soft with bentonitic streaks.
420	450	30	Shale, light-gray, medium-gray as above.
450	480	30	Shale, medium-gray to dark-gray, firm blocky, micaceous.
480	530	50	Shale as above becoming hard and silty at base.
530	550	20	Shale as above with very hard, slightly calcareous shale.
550	605	55	Sandstone, very fine-grained, light-gray to very dark-gray, hard, tight, with thin laminated shale, amber clusters of sandstone associated with the light-gray sandstone. Sandstone becomes medium-grained, light-gray, glauconitic, very hard and tight and clay filled at base, some pink and green grains.
605	615	15	Shale, maroon to brick-red, micaceous, firm, silty to sandy.
615	650	35	Shale, as above, with increase in medium-gray shale, micaceous and silty.
650	680	30	Shale, medium- to dark-gray, micaceous, silty and firm.
680	690	10	Shale as above, fossil bone structure and shark tooth.
690	720	30	Bentonite (metabentonite), light-gray, firm, greenish cast at base.
720	730	10	Shale, metabentonitic as above, becoming darker, some mottled-red, some brick-red, silty shale, possibly cavings.
730	740	10	Shale, bright brick-red, medium-firm, silty to sandy, some white mottling.
740	750	10	Shale as above with increase in medium-gray sandy shale, and some fine-grained medium-gray subangular tight sandstone.
750	760	10	Sandstone, light-gray to dark-gray, very fine- to medium-grained, poorly sorted, subangular to subrounded. Poor to fair porosity and permeability, glauconitic, pyritic, generally friable.

Oil test 14-14-6ad--continued

From	To	Thick- ness	Character
760	773	13	Circulating 10' @ 773'. Top Second Cat Creek, porosity 765'. Sandstone, light-gray, very fine- to medium-grained, white clay filled, dark accessories in coarser sand, micaceous, subangular to subrounded, pyritic, generally poor porosity and permeability.
773	780	7	Sandstone as above with some medium-gray sandstone, fine-grained, glauconitic, hard and tight, clay filled. Trace of aragonite.
780	800	20	Sandstone, white, very fine to fine-grained, subrounded, good sorting, good porosity and permeability, friable to unconsolidated in cuttings, clear quartz grains. Some soft light-greenish-gray-tan waxy shale.
800	810	10	Probably sandstone as above with shale, red-maroon, silty with some greenish-light-gray light-tan waxy shale bentonite.
810	820	10	Sandstone as above, with some maroon, red and medium-gray soft bentonitic shale. Trace of pyrite, carbonaceous material associated with the sandstone.
820	840	20	Sandstone, white to light-gray, very fine-grained, friable, with interbeds of red and gray soft shale, silty in part.
840	860	20	Shale, medium- to dark-gray, soft, silty in part, some light-cream to tan waxy bentonitic shale, some light-cream soft cryptocrystalline limestone.
860	890	30	Shale, medium- to dark-gray, red, bentonitic, slightly silty, pyritic, medium-soft. Trace of cream cryptocrystalline limestone.
890	900	10	Shale as above, increase in red and maroon silty shale, interbedded with some light-cream cryptocrystalline soft limestone; some white, fine-grained clayey sand, mottled red and green in part.
900	910	10	Sandstone, light-gray to gray, maroon, very fine-grained to fine-grained, subangular, to subrounded, poor sorting, generally clay filled. Poor porosity and permeability, generally hard, trace of lignite, pyrite, may be interbedded with maroon silty and sandy shale.
910	930	20	Sandstone, white, very

Table B-2.--Logs of wells, oil-test holes, and test holes in the Judith Basin, Mont. - continued
 (Thickness and depths below land surface are given in feet.)
 (Yield, where shown, is in gallons per minute (gpm).)

Oil test 14-14-6ad--continued

From	To	Thick- ness	Character
930	944	14	fine-grained, sub- rounded, clear quartz grains, very calcare- ous, tight, poor porosity and permea- bility, grades to white cryptocrystal- line limestones.
944	956	12	Sandstone, white, fine- grained as above, but with better porosity and permeability and with interbedded white to light-buff cryptocrystalline limestone as above. Some of the sandstone is very friable.
956	968	12	Limestone, white, buff, light-pink, light-red, cryptocrystalline to microcrystalline, hard, dense.
968	979	11	sandstone, fine- to medium-grained, sub- rounded to rounded, clear quartz grains with some pink and gray quartz grains; trace of mica. In- crease in red cal- careous silty shale and tan sandy shale.
979	1,000	21	Shale, tan, very argil- laceous, appearing firm, very sandy and very fine-grained; white, dense, clay filled sandstone, tight, trace of lig- nite.
1,000	1,050	50	Sandstone, white, very fine-grained, gener- ally unconsolidated in cuttings, friable, subrounded to rounded, clear quartz grains, few dark chert grains. Good porosity and permeability. Circu- lated out at 1,000'. No shows.
1,050	1,088	36	Sandstone, medium- to dark-gray, fine- to medium-grained, generally unconsoli- dated in cuttings, subrounded quartz grains, 30-40 percent dark-gray subangular chert. Good to fair porosity and permea- bility. Some quartz grains have retained crystal faces; trace of pyrite. Some very fine-grained brown sandstone appears oil stained. Thin shale break between 1,040'- 1,050'.
1,086	1,100	14	Sandstone as above, slightly finer grained with in- crease in gray silty shale and light-tan to buff waxy shale. Sandstone becoming dirtier with some glauconite and glau- conitic shale.
1,100	1,129	29	Shale, medium-gray, micaceous, medium- soft, blocky, some light-colored meta- bentonitic shale, firm.
			Shale as above, mostly medium-gray with light-colored benton- itic shale, first abundance of lignite in 1,100' to 1,110' sample.

Oil test 14-14-6ad--continued

From	To	Thick- ness	Character
1,129	1,133	4	Sandstone, medium- to dark-gray, very fine- grained, friable, silty, fair porosity and permeability.
1,133	1,140	7	Shale, light-gray to tan, soft waxy ben- tonitic.
1,140	1,160	20	Shale, medium-gray, micaceous, soft, interbedded with hard, blocky, medium-tan, mica- ceous lignitic siltstone.
1,160	1,170	10	Siltstone, medium-gray, sandy and glauconitic, bentonitic, dirty, soft.
1,170	1,230	60	Shale, medium-gray, finely micaceous, soft, some tending silty, trace of argonite.
1,230	1,270	40	Sandstone, fine-grained, light-gray to medium- gray, subrounded, friable, micaceous, lignitic, generally clayey, with inter- bedded soft silt- stone, slightly glauconitic.
1,270	1,280	10	Shale, light-tan to light-green, soft, bentonitic, waxy.
1,280	1,290	10	Sandstone, very fine- grained, light-gray to medium-gray, pink and red staining, friable, calcareous, subrounded, fair sorting, fair porosity and permeability. Some red, maroon and green soft shale.
1,290	1,300	10	Shale, gray to green, soft, waxy, bentonitic limestone; light-brown to tan cryptocrystal- line, hard, dense, interbedded with shale.
1,300	1,350	50	Shale, light-gray to green, light-tan, maroon, soft, semi- waxy, tending bentonitic.
1,350	1,357	7	Shale, medium- to dark- gray, soft as above.
1,357	1,397	40	Sandstone, light-gray, very fine-grained, subrounded, well- sorted, fair porosity and permeability, micaceous, glauco- nitic, clay matrix, slightly carbonaceous in part, friable. Sandstone grain-size increases slightly in main body of sandstone interval.
1,397	1,404	7	Shale, medium-gray to tan, soft.
1,404	1,442	38	Sandstone as above with abundant fossil shell fragments, possible coquina at top of Piper limestone. Some thin soft lime- stone at base.
1,442	1,450	8	Limestone, light-cream, white, light-pink cryptocrystalline, dense, medium-soft, interbedded with thin orange, yellow, red, maroon silty soft shale which gives drilling breaks in dense limestone.
1,450	1,460	10	Limestone and shale as above with some lignite.

Oil test 14-14-6ad--continued

From	To	Thick- ness	Character
1,460	1,470	10	Limestone and shale as above.
1,470	1,480	10	Limestone as above with very dark-gray lignitic shale inter- bedded.
1,480	1,500	20	Limestone as above with red, maroon and greenish-gray soft silty shale.
1,500	1,510	10	Limestone, light-buff, light-pink, light- brown, cryptocrystal- line to microcrystal- line, dense, some with silt size sand grains.
1,510	1,530	20	Limestone as above, predominately light- tan.
1,530	1,540	10	Limestone, predomi- nately light-pink to red, cryptocrystalline to microcrystalline, soft with red, silty soft calcareous shale.
1,540	1,590	50	Limestone as above, pre- dominately light- buff to light-cream, white with thin sandy streaks (grain-size silt to very fine- grained); trace of maroon to red soft silty calcareous shale, probably caving. Occasional fossil fragments.
1,590	1,597	7	Limestone as above with increase in pink, red and tan; some soft red silty shale; some dark-gray silty shale.
1,597	1,604	7	Shale, soft, silty, calcareous.
1,604	1,610	6	Limestone as above, light-maroon.
1,610	1,625	15	Shale, medium-gray, tan, silty, soft, with some soft light-maroon sandy argillaceous limestone as above or limy shale, light- maroon, some medium- gray soft shale. Cir- culated samples at 1,620'.
1,625	1,630	5	Shale, medium-gray to greenish cast, very micaceous, silty, very soft, glauco- nitic.
1,630	1,660	30	Limestone, light- to medium-brown, crypto- crystalline, firm interbedded with some red to other soft silty calcareous shale.
1,660	1,675	15	Shale, ocher, red, maroon, very soft, slightly silty.
1,675	1,685	10	Limestone, light-brown, white, cryptocrystal- line to microcrystal- line, fairly soft with interbeds of light- green soft bentonitic shale.
1,685	1,725	40	Shale, ocher to brick- red, soft, calcareous, silty to fine sand.
1,725	1,735	10	Sandstone, white, very fine-grained, slightly calcareous, subrounded clear quartz grains.
1,735	1,740	5	Shale as above.
1,740	1,748	8	Basic igneous dike.
1,748	1,764	16	Shale as above with considerable cavings 1,740' - 1,748'.

Table B-2.--Logs of wells, oil-test holes, and test holes in the Judith Basin, Mont. - continued
(Thickness and depths below land surface are given in feet.)
(Yield, where shown, is in gallons per minute (gpm).)

Oil test 14-14-6ad--continued				Well 14-14-36ac				Well 14-15-19ca2			
From	To	Thick- ness	Character	From	To	Thick- ness	Character	From	To	Thick- ness	Character
1,764	1,850	86	Sandstone, very fine-grained to fine-grained, rounded, evenly sorted, pink, friable. Fair porosity and permeability; heavily hematite-stained in lower part, considerable cavings of basic dikes above. Lower part heavily hematite-cemented, fair porosity and permeability; some angular to well-rounded coarse quartz grains.	0	4	4	Overburden	0	14	14	Overburden
				4	17	13	Blue shale	14	16	2	Sandstone
				17	19	2	Sandstone	16	20	4	Shale
				19	23	4	Alternating layers of blue shale and sandstone	20	22	2	Sandstone
				23	71	44	Blue shale with streaks of sandstone	22	135	113	Shale
				71	74	3	Bentonite	135	276	141	Blue shale
				74	93	19	Blue shale	276	278	2	Sandstone
				93	104	11	Hard sandstone	278	305	27	Sandy shale
				104	118	14	Sandstone	305	312	7	Sandstone
				118	125	7	Blue shale	312	352	40	Sandy shale
				125	145	20	Hard sandstone	352	355	3	Bentonite
				145	155	10	Soft sandstone	355	365	10	Hard sandstone
				155	259	104	Blue shale	365	375	10	Sandy shale
				259	330	89	Blue shale with streaks of sandstone at 300 feet	375	378	3	Hard sandstone
1,850	1,860	10	Shale, red, maroon, yellow, soft, slightly calcareous, silty in part.	330	333	3	Blue shale	378	385	7	Sandy shale
				333	340	9	Hard sandstone	385	415	30	Soft sandstone
1,860	1,870	10	Siltstone, medium-gray, very micaceous, hard, slightly sandy with some medium-gray micaceous soft shale.	340	345	5	Soft sandstone	415	465	50	Sandy shale (little water running over)
				345	382	37	Blue shale	465	473	8	Hard sandstone
				382	386	4	Hard sandstone	473	507	34	Hard sandy shale
				386	387	1	Bentonite	507	512	5	Hard sandstone
				387	420	33	Blue shale	512	522	10	Sandy shale
				420	590	170	Sandstone and blue shale alternating	522	540	18	Shale
1,870	1,880	10	Sandstone, yellow, red, subangular to sub-rounded, hematite-cemented with occasional very coarse subrounded quartz grains.	590	620	30	Medium-hard shale	540	550	10	Hard sandstone
				620	740	120	Sandy gray shale	550	630	80	Sandy shale
				740	743	3	Hard sandstone	630	680	50	Blue shale
				743	770	27	Soft sandstone	680	690	10	Shale
				770	775	5	Hard sandstone	690	695	5	Sandstone
1,880	1,900	20	Shale, very dark-gray, firm blocky, silty in part with very fine carbonaceous material disseminated throughout shale and siltstone.	775	800	25	Medium-hard sandstone	695	760	65	Sandy shale
				800	815	15	Hard sandstone	760	775	15	Sandstone
				815	875	60	Medium-hard sandstone	775	812	37	Sandy shale
				875	905	30	Red shale	812	825	13	Sandstone
				905	935	30	Red sandy shale and soft sand 920-935 feet	825	830	5	Sandy shale
								830	857	27	Sandstone
1,900	1,917	17	Siltstone, medium-gray as above with abundance of carbonaceous material finely disseminated. Generally soft and bentonitic.	935	960	25	Medium-hard sand	857	859	2	Red shale
				960	1,090	130	Sandy shale and soft sand alternating	859	920	61	Red shale
				1,090	1,107	17	Hard sandstone and soft sand alternating	920	926	6	Sandstone
				1,107	1,217	110	Hard sandstone and soft sand alternating	926	960	34	Gray shale
1,917	1,920	3	Chert, dark-brown, with abundance of pyrite just above chert bed.	1,217	1,255	38	Hard and soft sandstone alternating	960	985	25	Sandy shale
				1,255	1,300	45	Hard sandstone	985	1,095	110	Gray shale
1,920	1,940	20	Shale, dark-gray, finely micaceous, slightly carbonaceous, very soft, finely laminated.	1,300	1,355	55	Soft sand going into medium-hard sandstone	1,095	1,195	100	Gray shale and sandstone
				1,355	1,357	2	Black shale	1,195	1,200	5	Red shale
1,940	1,975	35	Shale, medium-gray, soft, thinly laminated; micaceous, carbonaceous in part.				Well produced approximately 8 gpm	1,200	1,205	5	Red sandy shale
1,975	1,995	20	Sandstone, white, very fine-grained, sub-rounded to rounded, clean, well-sorted, friable, good porosity and permeability.					1,205	1,255	50	Sandy shale with layers of sandstone
1,995	2,005	10	Shale as above.					1,255	1,315	60	Medium-hard to hard sandstone
2,005	2,025	20	Shale as above with some red silty shale.					1,315	1,335	20	Soft, coarse-grained sandstone (water)
2,025	2,030	5	Shale, dark-brown, very hard, dense.								
2,030	2,050	20	Shale and siltstone, dark-gray, micaceous with carbonaceous fragments, generally hard.								
2,050	2,065	15	Shale, light-gray, micaceous, silty, generally soft.								
2,065	2,094	29	Sandstone, light-gray to white, very fine-grained, friable, rounded, silty to very clean, well-sorted; generally good porosity and permeability.								
2,094	2,110	6	Shale, dark-gray, firm, micaceous with some finely disseminated carbonaceous material.								
Total depth 2,110 feet.				Oil test 14-15-9ab				Oil test 14-15-20dd			
				From	To	Thick- ness	Character	From	To	Thick- ness	Character
				0	65	65	River gravel	0	35	35	Gray shale
				65	223	158	Gravel and gumbo	35	38	3	Shell
				223	1,013	790	Shale	38	70	32	Gray shale
				1,013	1,025	12	Sand and shale	70	75	5	Shell - show of oil and gas
				1,025	1,100	75	Shale	75	240	165	Gray shale (Sticky)
				1,100	1,153	53	Sandy shale	240	245	5	Sand (dry - show of oil and gas)
				1,153	1,203	50	Sand and shale	245	285	40	Sandy (Gray - hard streaks)
				1,203	1,280	77	Sand	285	292	7	Sand (Mosby Sandstone Member of Colorado Shale) water
				1,280	1,347	67	Sand and shale	292	340	48	Dark shale
				1,347	1,403	56	Shale and lime	340	343	3	Sand (dry)
				1,403	1,685	282	Sand and shale	343	360	17	Dark shale
				1,685	1,772	87	Shale	360	475	115	Gray shale (hard)
				1,772	1,825	53	Sandy shale	475	630	155	Gray shale (sandy in spots)
				1,825	1,922	97	Sand	630	636	6	Trapped in water pool
				1,922	1,973	51	Sand and shale	636	688	52	Dark shale (oil showing)
				1,973	2,170	197	Lime	688	850	162	Gray shale
				2,170	2,374	204	Sand and shale	850	960	110	Dark shale
				2,374	2,384	10	Shale	960	996	36	Gray shale (Sandy-water)
							Total depth	996	1,055	59	First red beds (Kootenai Formation)
								1,055	1,080	25	Sand (Sec. Dak. Top dry)
								1,080	1,110	30	Red and pink shale
								1,110	1,120	10	Good water sand
								1,120	1,140	20	Gray rotten shale (soft)
								1,140	1,212	72	Water sand (Morrison Formation)
								1,212	1,227	15	Dark-red shale (bone fragment)
								1,227	1,235	6	Sand (increase water)

Table B-2.--Logs of wells, oil-test holes, and test holes in the Judith Basin, Mont. - continued
 (Thickness and depths below land surface are given in feet.)
 (Yield, where shown, is in gallons per minute (gpm).)

Oil test 14-15-21bb

From	To	Thick- ness	Character
0	7	7	Gravel
7	60	53	Shale, blue, small pebbles, sticky
60	280	220	Shale and shells, blue, gray, brown; small show of oil 128-135 feet
280	285	5	Sandy shell, small water
285	335	50	Shale, gray and black, sandy streaks 285-300 feet
335	338	3	Shell, hard, gray, limy
338	340	2	Sand, big water
340	345	5	Shale, blue
345	355	10	Sandy gravel, water increases
355	439	84	Shale, gray; hard brown streaks
439	443	4	Water, 2 bailers per hour; sandy shale
443	713	270	Shale and shells, gray, blue, black
713	715	2	Sandy shale, 1 bailer water per hour
715	890	175	Shale, gray and black; show of oil 820 feet
890	895	5	Shale, sandy, show oil and gas
895	1,050	155	Shale, blue, brown, gray
1,050	1,065	15	Shale, sandy, gas and oil showing
1,065	1,080	15	Shale, pink, top of red beds
1,080	1,131	51	Red beds, cavity
1,131	1,159	28	Shale, pink and gray
1,159	1,166	7	Red beds
1,166	1,200	34	Shale, blue and red, gray streaks
1,200	1,208	8	Sandy shale, 3 bailers water
1,208	1,220	12	Shale, pink, sticky
1,220	1,231	11	Shale, white, gritty
1,231	1,233	2	Red rock, shell
1,233	1,243	10	Sand, 125 gallons water per hour, show of oil

Oil test 14-15-29ea

From	To	Thick- ness	Character
0	190	190	Dark shale and shells
190	240	50	Hard gray shale
240	260	20	Hard gray shale and bentonite
260	290	30	Hard sandy shale
290	410	120	Hard shale, lime shells
410	645	235	Soft shale, bentonite beds
645	648	3	Hard quartz shell
648	655	7	Salt and pepper sand, small flow water - 1/8 inch stream
655	690	35	Soft shale and bentonite
690	710	20	Hard black sandy shale
710	720	10	Hard dark lime
720	750	30	Gray clay
750	830	80	Dark sandy shale and bentonite
830	870	40	Gray shale and bentonite
870	940	70	Dark firm shale and bentonite
940	1,005	65	Hard sand with dark shale breaks
1,005	1,090	85	Red clay with hard streaks
1,090	1,120	30	Red and green shale
1,120	1,180	60	Various colored shale
1,180	1,200	20	Red and white clay
1,200	1,212	12	Various colored shale
1,212	1,216	4	Gray lime
1,216	1,218	2	Hard sand and red clay
1,218	1,222	4	Soft white sand
1,222	1,247	25	Salt and pepper sand, flow water, one-inch stream
1,247	1,250	3	Hard shell or lime
1,250	1,269	19	Various colored shale, hard shells

Well 14-16-18ab

From	To	Thick- ness	Character
0	20	20	Overburden
20	150	130	Blue shale
150	290	140	Blue shale with layers of sandstone and bentonite
290	630	340	Blue shale with sandy streaks
630	700	70	Blue shale with hard sandstone layers
700	890	190	Blue-gray shale
890	1,045	155	Gray shale streaked with layers of green sandstone
1,045	1,210	165	Sandy red shale and layers of sandstone
1,210	1,352	142	Medium-hard to hard sandstone with a few layers of red shale
1,352	1,375	23	Soft sandstone

Test hole 15-10-26dd
 Altitude 5,530 feet

From	To	Thick- ness	Character
0	1	1	Clayey silt
1	5.5	4.5	Sandy gravelly silt to silty gravel
5.5	18	12.5	Limestone and shale: fragments clay-coated
18	90.7	72.7	Brecciated limestone with angular fragments of shale and limestone. Horizontal orientation(?) moderately weathered, medium-hard, fairly well-cemented with calcareous cement. Joints moderately spaced, subhorizontal to low angle, uneven
90.7	96	5.3	Limestone breccia: hard, well-cemented, contact with overlying material is gradational
96	97	1	Shale: moderately hard, calcareous, yellow, dip 20°
97	100	3	Limestone breccia: hard, well-cemented

Well 15-11-8bd

From	To	Thick- ness	Character
0	25	25	Surface clay
25	35	10	Sand rock, brown
35	62	27	Brown, shale
62	85	23	Sandstone, red
85	100	15	Sandstone, brown
100	140	40	Blue shale
140	150	10	Sandstone, water-bearing
150	155	5	Black shale

Test hole 15-11-10da
 Altitude 4,797.8

From	To	Thick- ness	Character
0	2.4	2.4	Silty sandy clay
2.4	4	1.6	Silty clay, some rock fragments
4	24	20	Clay shale: mottled red, yellow, gray, sandy and silty in zones to clayey shale. Few clayey shear zones, plastic when damp (natural state), generally soft

Test hole 15-11-10da--continued

From	To	Thick- ness	Character
24	49	25	Shale: gray to black, few firm clayey zones. Few calcareous vertical and horizontal joints. Bedding partly formed, generally soft with occasional hard beds. Shear zones from 40.2 feet to 41.6 feet and from 47 feet to 49 feet. Slickensides at lower shear zone.
49	59	10	Shale: hard, mottled pale-red and gray-green
59	80	21	Shale: hard, massive, gray and red, some inclusions, horizontal and some vertical joints. Few iron oxide-stained surfaces. Shatter zone 63-66.7 feet.
80	100	20	Shale: gray, hard, massive, few vertical joints. Thin (hairlike) calcareous seams, mottled red, yellow and gray in horizontal bands, calcareous

Well 15-12-2ab
 Altitude 4,374.9

From	To	Thick- ness	Character
0	5	5	Clay
5	25	20	Shale: dark-gray, soft to moderately hard with thin interbeds of creamy bentonite
25	45	20	Shale: dark-gray, soft, sandy, plastic
45	70	25	Shale: medium- to dark-gray, moderately soft, plastic in part, with occasional thin bentonite beds
70	90	20	Shale: sandy and sandstone: shaly, dark-gray
90	112	22	Shale: medium- to dark-gray, soft, fissile, with thin bentonite interbeds
112	120	8	Shale: dark-gray, massive, soft to moderately hard
120	133	13	Shale: dark-gray, soft, fissile with interlaminated sandstone: gray, fine-grained
133	165	32	Shale: dark-gray, soft, thin-bedded to fissile, with occasional thin creamy bentonite beds and interlaminated sandstone
165	187	22	Shale: dark-gray, soft, massive
187	200	13	Shale: dark-gray, soft, thin-bedded to fissile
200	255	55	Shale: dark-gray, soft, thin-bedded to fissile, with occasional thin beds of white or creamy bentonite
255	262	7	Shale: dark-gray, soft, with interbedded sandstone: gray, hard, fine

Table B-2.--Logs of wells, oil-test holes, and test holes in the Judith Basin, Mont. - continued
(Thickness and depths below land surface are given in feet.)
(Yield, where shown, is in gallons per minute (gpm).)

Well 15-12-2ab--continued

From	To	Thick- ness	Character
262	282	20	Shale: dark-gray, soft to moderately hard, fissile
282	320	38	Shale: dark-gray, fissile and inter-laminated sandstone: fine, gray, moderately hard to soft
320	345	25	Shale: dark-gray, soft, thin-bedded, sandy and bentonitic in part
345	365	20	Shale: dark-gray, moderately hard, fissile and inter-bedded sandstone: gray, fine, soft, bentonitic
365	405	40	Sandstone: gray, fine to medium, "salt and pepper," soft to moderately hard
405	415	10	Sandstone: gray, fine, shaly with interbedded shale, brown
415	427	12	Shale: red, soft
427	453	26	Shale: variegated, red, maroon, pale-green and dark-gray, moderately hard to soft, plastic in part
453	462	9	Sandstone: gray, fine to medium, moderately hard
462	490	28	Shale: variegated, pale-green, maroon, purple, moderately hard to soft, thin-bedded to fissile
490	500	10	Shale: dark-gray, moderately hard and interbedded sandstone: gray, fine
500	525	25	Sandstone: gray, fine to medium, "salt and pepper"
525	539	14	Shale: dark-gray
539	553	14	Shale: dark-gray and red, interbedded
553	565	12	Shale: red with some pale-green, moderately hard, massive

Floved 1 gpm of water on completion
Pumped 11 gpm from 254 feet

Well 16-10-5bc2

From	To	Thick- ness	Character
0	8	8	Gravel
8	20	12	Decomposed sandstone and shale
20	28	8	Red shale
28	60	32	Hard sandstone with layers of colored shale
60	71	11	Hard gray limestone
71	126	55	Medium multicolored shale with layers of limestone
126	163	37	Soft porous water-bearing sandstone
163	170	7	Medium-hard sandstone with limestone layers

Well 16-11-10ac

From	To	Thick- ness	Character
0	12	12	Sand and gravel
12	100	88	Blue shale
100	280	180	Red and green shale with layers of sandstone
280	295	15	Sandstone
295	385	90	Hard sandstone--water (3 gpm) between 340 and 350 feet

Well 16-11-10ac--continued

From	To	Thick- ness	Character
385	402	17	Soft sandstone
402	451	49	Hard sandstone
451	490	39	Sandy shale--streaks of limestone
490	520	30	Soft coarse sandstone (water)

Test hole 16-11-18ad
Altitude 4,662

From	To	Thick- ness	Character
0	5	5	Overburden: silty clay and clayey sand, light-brown
5	23	18	Siltstone: tan to gray, moderately hard, closely jointed, 1- to 2-inch predominately horizontal, light-brown stains on joint, banded, silty clay beds at 13 feet and 15 feet, maroon color
23	68.5	45.5	Sandstone: light-brown, brown and gray, coarse- to fine-grained, massive, moderately hard, porous, open vertical and horizontal joints, brown iron-stained, closely jointed 1 inch to 3 inches. Occasional shale bed, light-gray, hard; fractured sandstone joint at 38 feet coated with black stain, possibly oil. Hole dry--lost drilling water at 35 feet
68.5	78	9.5	Shale: dark-gray to black, hard, sheared and slickensided, oil-coated fractures at 71.8 feet.
78	80	2	Coal: black pure 2-foot coal seam. Moderately hard.
80	89.2	9.2	Shale: dark-gray to black, moderately hard. Pyrite crystals
89.2	100	10.8	Shale and clay shale: gray, moderately hard to soft, sheared, silty, fissile

Hole dry at completion but water level at 54.0 on 3/3/60

Test Hole 16-11-23dd1

From	To	Thick- ness	Character
0	2	2	Black surface soil
2	18	16	Rock gravel - static level of water in this at 4 feet from surface
18	28	10	Gray shale
28	36	8	Gravel cemented together
36	40	4	Red shale
40	55	15	Gray sand
55	70	15	Red shale
70	77	7	Gray sand with small amount of bentonite

Test hole 16-11-23dd2

From	To	Thick- ness	Character
0	4	4	Black surface soil
4	23	19	Gravel - static water level at 7 feet from surface
23	28	5	Sand - water shut off
28	43	15	Sand - water
43	45	2	Red shale

Well 16-11-26dc

From	To	Thick- ness	Character
0	13	13	Surface soil
13	23	10	Cement gravel
23	36	13	Rock shell

Well 16-11-36ba

From	To	Thick- ness	Character
0	4	4	Overburden
4	45	41	Sandstone and sandy shale
45	118	73	Red shale
118	134	16	Sandstone
134	285	151	Layers of sandstone and sandy shale
285	304	119	Medium-hard sandstone
304	315	11	Medium-soft coarse sandstone
315	326	11	Hard sandstone
326	365	39	Hard sandstone with white tale layers
365	373	8	Very hard fine sandstone
373	398	25	Soft coarse sandstone produces 5-7 gpm
398	405	7	Hard sandstone

Well 16-12-5ba

From	To	Thick- ness	Character
0	19	19	Overburden
19	75	56	Alternating blue shale and sandstone
75	95	20	Sandstone and bentonite layers
95	111	16	Alternating hard sandstone and bentonite
111	114	3	Hard sandstone with bentonite layers
114	143	29	Gray shale and sandstone
143	152	9	Gray shale and sandstone with bentonite layers
152	218	66	Gray shale and hard sandstone
218	339	129	Sandstone and gray shale
339	359	20	Sandstone (water)
359	375	16	Gray shale and sandy layers (water)

Flows approximately 6 gpm

Well 16-12-7dc

From	To	Thick- ness	Character
0	20	20	Gravel and sandy clay
20	75	55	Blue sandy shale and sandstone
75	220	145	Shale with hard sand ribs
220	228	5	Blue shale
228	235	10	Sandstone (little water)
235	422	187	Sandstone, Blue shale with some bentonite
422	480	58	Medium-hard sandstone and gray shale
480	560	80	Red shale
560	600	40	Hard blue shale with sandstone
600	628	28	Red soft clay, red soft shale

Table B-2.--Logs of wells, oil-test holes, and test holes in the Judith Basin, Mont. - continued
(Thickness and depths below land surface are given in feet.)
(Yield, where shown, is in gallons per minute (gpm).)

Well 16-12-74e--continued

From	To	Thick-ness	Character
628	682	54	Hard sandstone
682	714	32	Sandstone and red shale
714	731	17	Soft sandy shale and medium-hard sandstone
731	799	68	Hard sandstone
799	930	131	Medium-hard and fine-grained sandstone
930	998	68	Hard sandstone
998	1,017	9	Soft sandstone
1,017	1,082	65	Hard sandstone
1,082	1,197	115	Hard sandstone and medium-hard sandstone
1,197	1,205	108	Hard sandstone
1,205	1,259	54	Shale and medium-hard sandstone

Flowing approximately 2 1/2 gpm 225-235.

Test hole 16-12-8cc
Altitude 4,295.5

From	To	Thick-ness	Character
0	3	3	Gravelly silty clay
3	6	3	Clayey sandy gravel
6	16	10	Clay: silty, indurated in part, fragments of hard shale; light-brown
16	21	5	Shaly siltstone: Gray with reddish-brown mottling, red-brown areas are highly oxidized, siltstone is soft to moderately hard, crumbly
21	37	16	Shale: Gray to black, silty, slightly plastic, mottled with gray siltstone, massive, moderately hard
37	44	7	Sandstone: mottled dark-gray and light-gray, moderately hard, contorted thin beds of black shale, slightly calcareous. Joints vertical and diagonal 10". Medium, "salt and pepper," to fine-grained
44	50	6	Shale: black, medium-hard, fissile.
50	53	3	Siltstone: mottled light and dark-gray, moderately hard. Joints 3 to 6 inches apart, horizontal
53	75.5	22.5	Shale: black, hard, fissile, open vertical joint
75.5	79	3.5	Bentonitic clay: light-to dark-greenish-gray, very plastic, soft
79	92	13	Shale: black, hard, fissile, vertical joints, no staining on joints
92	100	8	Sandstone: dark-gray with light-gray mottling, contains shale fragments, porous, joints 2-3 inches apart; 92-94 feet and 95-97 feet, joints possibly open, hard, fine-grained

Artesian flow when core hole reached 96 feet
Bailed 88 gallons in 10 minutes and lowered water level to 2.5 feet.

Well 16-12-8dc

From	To	Thick-ness	Character
0	22	22	Overburden
22	39	17	Blue shale
39	40	1	Sandstone
40	70	30	Blue shale
70	72	2	Sandy shale
72	80	8	Blue shale
80	101	21	Bentonite and sandstone layers
101	115	14	Blue shale

Hole cased with 4-inch galvanized pipe
Well produced approximately 5 gpm at 50 feet
Size of drilled hole 5 5/8 inches
Casing 4-inch galv.

Well 16-12-12bb

From	To	Thick-ness	Character
0	8	8	Gravel
8	25	17	Blue shale
25	45	20	Soft sandstone
45	55	10	Bentonite or mud
55	64	9	Sandstone
64	288	224	Blue shale
288	310	22	Soft sandstone
310	365	55	Harder sandstone
365	475	110	Layers of shale and sand
475	615	140	Blue shale
615	645	30	Hard light sandstone
645	725	80	Light-gray sandy shale
725	780	55	Red sandstone and shale
780	884	104	Soft red shale
884	?	?	Hard sandstone

Well 16-12-16bb4

From	To	Thick-ness	Character
0	40	40	Gravel and boulders
40	125	85	Blue or black shale
125	133	8	Dark sandy shale
133	170	37	Sandstone
170	280	110	Alternating layers of sandstone and dark shale
280	390	110	Gray sandy shale
390	485	95	Dark-blue shale
485	523	38	Hard gray sandy shale and shell
523	589	66	Soft gray shale
589	730	141	Red shale
730	744	14	Sandstone and limestone
744	943	199	Alternating layers of fine sandstone and red shale
943	1,033	90	Coarse-grained sandstone (water)

Well 16-12-16bd2

From	To	Thick-ness	Character
0	37	37	Gravel, cemented
37	60	23	Shale, blue
60	69	9	Shale, gray
69	94	25	Shale, blue
94	103	9	Shale, gray
103	171	68	Shale, blue
171	193	22	Sandstone

Well 16-12-17da2

From	To	Thick-ness	Character
0	30	30	Unconsolidated formation
30	42	12	Cemented sandstone
42	148	106	Shale
148	180	32	Fine gray sandstone
180	231	51	Sandy clay
231	540	209	Shale and coal
540	552	12	Shale and sand streaks
552	708	15	Shale
708	723	15	Hard sand rock
723	772	49	Hard shale and sandstone

Well 16-12-17da2--continued

From	To	Thick-ness	Character
772	776	4	Soft sandy shale
776	784	8	Hard sand rock
784	825	41	Soft sandy shale
825	836	11	Red shale
836	950	114	Sandy shale
950	968	18	Limestone
968	989	21	Shale and limestone
989	992	3	Sandstone
992	1,000	8	Hard sandy shale
1,000	1,030	30	Sandstone--bottom of hole

Flowed 9 gpm
48 psi shut off pressure
pumped 100 gpm

Well 16-12-22ca

From	To	Thick-ness	Character
0	11	11	Overburden
11	109	98	Blue and gray shale
109	115	6	Sandy shale
115	150	35	Alternating layers sandstone and sandy shale

Set 133 feet of 2-inch galv. pipe;
cemented in

Well 16-12-24dd

From	To	Thick-ness	Character
0	22	22	Gravel
22	105	83	Blue-gray shale
105	112	7	Soft sandstone
112	186	74	Gray shale
186	253	67	Blue shale with talc layers
253	261	8	Sandstone
261	285	24	Blue shale
285	311	26	Hard sandy blue shale with layers of hard sandstone
311	313	2	Hard sandstone
313	318.5	5.5	Soft, white, coarse-grained sandstone
318.5	320	1.5	Hard sandstone

Well 16-12-27cb

From	To	Thick-ness	Character
0	11	11	Overburden
11	33	22	Sandstone
33	165	132	Layers sandstone with blue shale
165	265	100	Blue shale
265	300	35	Blue shale with layers sandstone
300	340	40	Layers dark sandstone with alternating green sandstone and shale
340	365	25	Light fine sandstone
365	390	25	Gray shale with layers sandstone
390	520	130	Red shale
520	545	25	Red shale with layers sandstone
545	580	35	Sandstone
580	590	10	Hard sandstone
590	600	10	Soft coarse sandstone
600	610	10	Hard sandstone

Well producing about 3 gpm water

Table B-2.--Logs of wells, oil-test holes, and test holes in the Judith Basin, Mont. - continued
(Thickness and depths below land surface are given in feet.)
(Yield, where shown, is in gallons per minute (gpm).)

Well 16-12-28ab

From	To	Thick-ness	Character
0	11.5	11.5	Sandstone
11.5	53	41.5	Sandstone with thin layers of blue shale
53	185	132	Blue and gray shale in layers with small layers of white talc
185	285	100	Blue shale
285	320	45	Blue shale with layers of sandstone
320	360	40	Black sandstone with layers of greenish-black shale and talc
360	385	25	White coarse sandstone
385	410	25	Gray shale with layers of sandstone
410	495	80	Red shale
495	540	45	Red shale
540	575	35	Red shale with layers of sandstone
575	610	35	Sandstone
610	623	13	Hard sandstone
623	628	5	Soft coarse sandstone
628	649	21	Hard sandstone

Well produced approximately 2 gallons of water per minute

Well 16-12-28cd

From	To	Thick-ness	Character
0	100	100	Unreported
100	220	120	Gray shale
220	280	60	Gray shale with a few sandstone layers
280	310	30	Mostly hard green sandstone and hard sandy shale
310	480	170	Red shale with layers of sandstone
480	535	55	Sandstone with hard layers
535	538	3	Red shale
538	563	45	Hard, dense, sandy shale
563	614	51	Hard sandy shale to hard sandstone
614	624	10	Soft sandstone and sandy shale
624	690	66	Hard sandstone
690	697	7	Medium-hard shale
697	702	5	Medium-hard sandstone
702	724	22	Soft coarse sandstone
724	728	4	Hard, dark-gray, sandy shale
728	731	3	Soft sandstone
731	758	27	Fairly soft sandy shale with some black color
758	771	13	Hard sandy shale

Well 16-12-32dd

From	To	Thick-ness	Character
0	3	3	Silt
3	11	8	Brown shale
11	12	1	Sandstone
12	128	116	Blue shale
128	197	69	Gray shale with a few layers of sandstone
197	282	85	Red shale
282	390	108	Red shale with layers of sandstone
390	401	11	Soft sandstone
401	412	11	Hard sandstone
412	462	50	Layers of medium-hard to hard sandstone
462	485	23	Hard sandstone
485	534	49	Very hard sandstone
534	577	43	Soft salt and pepper sandstone
577	600	23	Sandstone

Well 16-12-35ac

From	To	Thick-ness	Character
0	3	3	Overburden
3	42	39	Sandstone
42	100	58	Blue shale
100	240	140	Blue shale
240	280	40	Sandstone
280	360	80	Blue shale
360	490	130	Shale, blue and gray
490	510	20	Red shale
510	520	10	Sandstone and shale
520	540	20	Hard sandstone
540	580	40	Soft sandstone
580	680	100	Hard sandstone
680	690	10	Soft sandstone
690	715	25	Hard sandstone
715	772	57	Hard and soft sandstone alternating
772	775	3	Red shale
775	925	145	Soft and medium sandstone alternating

Well 16-12-35ba

From	To	Thick-ness	Character
0	22	22	Soil, gravel and shale
22	62	40	Soft gray shale, sandstone
62	75	13	Shale and bentonite
75	110	35	Soft gray shale and bentonite
110	240	130	Soft gray shale with streaks of bentonite
240	303	63	Dark shale, harder, sandy shale - hard
303	308	5	Hard sandstone
308	315	7	Sandy shale, sandstone
315	328	13	Hard sandy shale and sandstone
328	370	42	Soft gray shale, sandy gray shale
370	375	5	Sandstone
375	475	100	Red shale
475	555	80	Sandstone and sandy red shale - water at 545-555 feet
555	608	53	Sandstone
608	655	47	Sandstone and sandy shale
655	680	25	Sandy shale
680	702	22	Fine sandstone
702	706	4	Hard sandstone
706	742	36	Pine sandstone - hard
742	768	26	Coarse sandstone, water

Well 16-12-36ca

From	To	Thick-ness	Character
0	10	10	Overburden
10	140	130	Alternating gray shale and sandstone
140	180	40	Gray and white sandstone
180	260	80	Alternating dark shale and sandstone
260	525	265	Dark shale
525	620	95	Gray shale and sandstone--gouge or fault
620	630	10	Hard sandstone
630	650	20	Hard light sandstone
650	680	30	Light-colored sandy shale
680	737	57	Red sandy shale
737	756	19	Red sandstone
756	833	77	Hard, fine sandstone
833	843	10	Hard, coarse sandstone
843	853	10	Coarse sandstone with altered limestone
853	863	10	Coarse salt and pepper sandstone (water)

Flowed 15 to 20 gpm

Well 11-16-20cd

From	To	Thick-ness	Character
0	20	20	Shale: light-gray, soft, sandy, weathered
20	35	15	Shale: tan to gray, soft, thin-bedded, partly weathered
35	45	10	Shale: reddish-pink, soft, plastic, thin-bedded
45	55	10	Shale: gray, soft, sandy
55	75	20	Sandstone: gray, fine to very fine, soft, with minor interbedded shale: gray, moderately hard, carbonaceous
75	95	20	Shale: gray, soft, sandy, thin-bedded
95	105	10	Shale: gray, soft, sandy, thinly interbedded with siltstone: tan, hard
105	115	10	Shale: gray, soft, thin-bedded
115	120	5	Sandstone: gray, fine, soft, thin-bedded
120	130	10	Shale: blue-gray, soft, thin-bedded
130	135	5	Sandstone: gray, fine, soft, thin-bedded
135	146	11	Sandstone and sandy shale: gray-brown, soft, carbonaceous
146	170	24	Shale: light-gray, soft, sandy, thin-bedded
170	224	54	Sandstone: gray, fine, soft, "salt and pepper"
224	225	1	Shale: dark-gray, soft

Well 17-9-5dc

From	To	Thick-ness	Character
0	3	3	Shale, red
3	45	42	Sandrock
45	48	3	Shale, red
48	55	7	Sandrock
55	62	7	Shale, blue
62	70	8	Sandrock
70	94	24	Shale, blue
94	100	6	Shale, red
100	144	44	Sandrock

61 1/4 feet of 7-inch casing
Estimated flow 100 gpm

Well 17-9-5dd

From	To	Thick-ness	Character
0	40	40	Sandrock
40	60	20	Shale, blue
60	65	5	Shale, red
65	68	3	Sandrock
68	92	24	Shale, blue
92	105	13	Sandrock, artesian flow

8-inch casing set at 44 1/2 feet

Well 17-9-8aa

From	To	Thick-ness	Character
0	35	35	Sandrock
35	38	3	Shale, blue
38	41	3	Sandrock
41	43	2	Shale, red
43	55	12	Sandrock, yellow
55	80	25	Shale, blue
80	120	40	Sandrock, gray
120	128	8	Shale, blue
128	135	7	Sandrock, gray
135	145	10	Shale, red
145	178	33	Sandy gray lime
178	219	41	Sandrock, gray

40 1/2 feet of 7-inch casing

Table B-2.--Logs of wells, oil-test holes, and test holes in the Judith Basin, Mont. - continued
(Thickness and depths below land surface are given in feet.)
(Yield, where shown, is in gallons per minute (gpm).)

Well 17-9-8cd

From	To	Thick-ness	Character
0	15	15	Surface soil and shale
15	30	15	Rock
30	40	10	Red shale
40	43	3	Blue shale
43	55	12	Rock
55	61	6	Red shale
61	66	5	Blue shale
66	88	22	Yellow rock
88	115	27	Red shale
115	254	139	Rock

Test hole 17-9-10bb
Altitude 4,313

From	To	Thick-ness	Character
0	6.5	6.5	Silty clay, dark-red
6.5	22	15.5	Clay shale: silty, brown-red and green-gray, interbedded
22	29	7	Shale, dark-red-brown, soft to moderately hard, sheared, light-green mottling at 29 feet
29	31	2	Shale: (siltstone) light-gray, moderately hard
31	52.4	21.4	Shale (siltstone and clay): dark-red-brown, soft to moderately hard, sheared
52.4	63	10.6	Clay shale: red, silty, sandy, medium-hard, mottled zones of gray-blue and green
63	76	13	Shale: (silty) blue-gray, highly sheared, soft to firm, plastic
76	82	6	Shale: (siltstone) gray with a red zone 78-80 feet, moderately hard, not sheared, joints along horizontal beds, joints 2-3 inches apart
82	83	1	Shale: dark-green to black, medium-hard, silty, massive
83	87.4	4.4	Shale: dark-green, medium-hard, fissile
87.4	90.7	3.3	Shale: dark-green to black, medium-hard, silty, massive
90.7	100	9.3	Sandstone: light-gray, fine- to medium-grained, slightly friable. Interbedded with dark-green soft shale laminae

Water level 22.0 feet 3/6/60

Well 17-9-27aa

From	To	Thick-ness	Character
0	14	14	Overburden
14	22	8	Alternating layers red shale, sandy shale
22	65	43	Layers of red, yellow and green shale
65	80	15	Hard and soft coarse sandstone
80	118	38	Soft sandstone
118	129	11	Hard liay sandstone

Well 17-10-5cd2

From	To	Thick-ness	Character
0	15	15	Overburden
15	175	160	Layers of blue sandy shale and sandstone
175	293	118	Red shale
293	310	17	Layers of sandstone and red shale
310	318	8	Medium-hard sandstone
318	325	7	Soft sandstone (5 to 8 gpm flow of water)
325	329	4	Hard sandstone

Well 17-10-6aci

From	To	Thick-ness	Character
0	23	23	Overburden
23	105	82	Gray shale and talc
105	130	25	Sandy gray shale with layers of sandstone
130	185	55	Sandy gray shale with layers of sandstone
185	220	35	Green sandstone with soft layers of green shale
220	235	15	Red shale
235	245	10	Green sandstone with shaly layers
245	312	67	Green shale with soft talc and sand layers
312	315	3	Hard sandstone
315	431	116	Alternating red shale and sandstone
431	454	23	Hard sandstone
454	495	41	Hard sandstone and hard sandy shale with layers of soft sandstone
495	514	19	Hard sandstone
514	537	23	Hard rock and sandstone
537	558	21	Medium to soft sandstone produces about 10 gpm of water
558	560	2	Hard sandstone

Well cased with 560 feet of 2-inch galvanized pipe cemented in from packer set at 60 feet back to 25 feet perforated 539-560-419-440 feet, 1/4 x 4-inch slots.

Well 17-10-6dd

From	To	Thick-ness	Character
0	28	28	Drift
28	54	26	Umbo, shale
54	90	36	Hard black shale
90	137	47	Gray shale
137	142	5	Red shale
142	165	23	Light-green shale
165	195	30	Sticky gray shale
195	217	22	Green shale
217	220	3	Gray shale
220	262	22	Brown shale
262	268	6	Red shale
268	272	4	Gray shale
272	290	18	Green shale
290	295	5	Soft red and gray shale
295	307	12	Gray shale
307	314	7	Red shale
314	320	6	Hard red shale
320	343	23	Buff and gray shale
343	348	5	Hard white rock
348	360	12	Hard gray limestone
360	380	20	Extra hard fine sandstone, 1st Kootenai water came to 10 feet of surface
380	410	30	Hard green shale and gray sandstone
410	430	20	Gray sandstone - flow of 15 gpm
430	436	6	Green shale
436	440	4	Gray shale
440	450	10	White limestone - water 25 gpm
450	460	10	Hard conglomerate - water 100 gpm
460	470	10	Black coarse sand
470	484	14	Hard brown sandy shale
484	493	9	Hard green sandy shale
493	496	3	Hard brown sandstone
496	500	4	Very hard gray rock

Estimated flow 250 - 300 gpm

Well 17-10-8cc

From	To	Thick-ness	Character
0	5	5	Gravel
5	20	15	Red shale
20	45	25	Red shale
45	52	7	Gray shale
52	80	28	Red shale
80	95	15	Gray and red shale mixed

Well 17-10-8cc--continued

From	To	Thick-ness	Character
95	97	2	Sandstone
97	105	8	Red and gray shale
105	138	33	Gray shale
138	142	4	Sandstone
142	170	28	Gray shale
170	185	15	Hard sandstone
185	206	21	Sandstone. About 1 quart water per minute
206	217	11	Salt and pepper sandstone. Running about 1 gpm
217	225	8	Some sandstone
225	256	31	Some sandstone

Well 17-10-16bb2

From	To	Thick-ness	Character
0	39	39	Overburden
39	115	76	Blue shale
115	155	40	Gray shale
155	298	143	Red shale
298	333	35	Alternating beds of sandstone and shale
333	382	49	Sandstone with layers of hard sandy shale
382	387	5	Sandstone
387	402	15	Sandstone
402	418	16	Hard sandstone
418	422	4	Soft talc(?) and limestone
422	440	18	Soft granular salt and pepper sandstone. Produces about 18 gpm of water
440	442	2	Red shale

Test hole 17-10-16db
Altitude 4,317.0

From	To	Thick-ness	Character
0	1	1	Silt
1	5.4	4.4	Silty gravel, compact
5.4	12	6.6	Silty, sandy gravel, loose, dry
12	18.2	6.2	Silty, sandy gravel
18.2	29	10.8	Silty, sandy gravel cemented in part
29	39	10	Gravel: cemented, tan, blue-gray and brown fragments in gray-brown matrix. Hard calcium carbonate cemented. Fragments well-rounded pebbles of sandstone, chert, quartz, siliceous shale. Fossiliferous
39	45	6	Clay: brownish-green, very soft, plastic, concretion at 43 feet, massive
45	60	15	Shale: gray-brown and gray, moderately hard, fissile, poorly bedded (fragmental), not calcareous. One vertical and several horizontal joints, brown-stained. Occasional thin brown sandstone beds
60	88	28	Shale: dark-gray to black, with gray mottling of siltstone, moderately hard, fissile
88	95	7	Shaly siltstone: Gray-green, massive, hard, steeply dipping joint at 94 feet, no staining
95	100	5	Shale: black with occasional green mottling, massive concretions and deep maroon clayey siltstone at 100 feet

Water level 8.0 feet - 3/4/60

Table B-2.--Logs of wells, oil-test holes, and test holes in the Judith Basin, Mont. - continued
 (Thickness and depths below land surface are given in feet.)
 (Yield, where shown, is in gallons per minute (gpm).)

Well 17-10-29cc				Well 17-12-21cd--continued				Test hole 18-8-12ba--continued			
From	To	Thick- ness	Character	From	To	Thick- ness	Character	From	To	Thick- ness	Character
0	12	12	Overburden, sandstone and red shale	735	890	155	Blue shale	35	49	14	Shale: light-gray, hard, irregularly interbedded, fine-grained sandstone laminae, fractured
12	48	36	Sandy red shale and sandstone	890	980	90	Gray shale with layers of green sandstone	49	76	27	Shale: dark-gray to black, mottled, poorly bedded, dense, silty, closely fractured, limonite stains on fractures
48	81	33	Hard limestone	980	1,053	73	Gray shale	76	83	7	Shale: dark-gray to black, hard, massive, dense, silty, closely fractured, limonite stains on fractures. Joints predominantly horizontal 2 to 3 inches apart
81	91	10	Sandy hard limestone	1,053	1,239	186	Red shale	83	100	17	Alternating laminae of shale and sandstone 1/16 inch thick. Shale: dark-gray to black. Sandstone: light-gray, cross-bedded and slightly calcareous, hard and very dense. Few fractures
91	108	17	Gray sandy shale	1,239	1,246	7	Sandstone	Water level 26.7 feet			
108	178	70	Sandy shale	1,246	1,254	8	Red shale	Well 18-9-13bbc			
178	191	13	Sandstone	1,254	1,272	18	Sandstone	From	To	Thick- ness	Character
				1,272	1,282	10	Red shale	0	10	10	Surface soil, black
				1,282	1,360	78	Sandstone	10	15	5	Surface clay, yellow
				1,360	1,470	110	Hard sandstone	15	25	10	Rock and gravel
				1,470	1,474	4	Fairly soft sandstone	25	38	13	Clay, yellow
				1,474	1,476	2	Red shale	38	55	17	Rock shells, brown - water
				1,476	1,482	6	Hard sandstone	55	60	5	Shale, blue
				1,482	1,494	12	Soft sandstone	Well 18-9-16ba			
				1,494	1,506	12	Hard sandstone	From	To	Thick- ness	Character
				1,506	1,508	2	Soft sandstone	0	40	40	Topsoil and gravel
				1,508	1,517	9	Hard sandstone	40	55	15	Black and gray shale, sandstone, small show of water
				1,517	1,521	4	Fairly soft sandstone	55	70	15	Black and gray shale, sandstone
				1,521	1,528	7	Soft sandstone	70	100	30	Hard, light-colored rock, good flow of water
				1,528	1,563	35	Fairly soft sandstone	100	130	30	Hard brown rock (faulty)
				Well produced approximately 4 gpm				130	145	15	Black shale (hard)
				Well 17-12-28ba				145	150	5	Black shale (some soft spots)
				From	To	Thick- ness	Character	150	bottom	?	Hard brown rock
				0	24	24	Gravel	Well 18-9-30da			
				24	124	100	Gray shale	From	To	Thick- ness	Character
				124	142	18	Alternating hard sandstone and gray shale	0	10	10	Yellow clay
				142	178	36	Gray shale - sandy layers bentonite	10	148	138	Blue shale
				178	270	92	Hard sandy shale - layers bentonite	148	150	2	Blue shell
				270	330	60	Hard sandstone - gray shale	150	199	49	Blue shale
				330	495	165	Gray shale - hard sandy layers	199	200	1	Water (120 gallons per hour)
				495	555	60	Alternating blue shale - hard sandstone	200	213	13	Blue shale
				555	570	15	Blue shale	213	217	4	Shell
				570	586	16	Medium to soft sandstone. Water produced 3 gpm	217	230	13	Blue shale
				586	587	1	Hard sandstone	230	249	19	Light-red shale
				Well 17-12-32db				249	269	20	Dark-red shale
				From	To	Thick- ness	Character	269	275	6	Blue shale
				0	12	12	Gravel and clay	275	308	33	Red shale
				12	87	75	Gray shale	308	333	25	Blue shale
				87	228	141	Gray shale and sandy layers with bentonite	333	345	12	Red shale
				228	231	3	Hard sandstone	345	348	3	Blue shale
				231	358	127	Bentonite and sandy shale	348	353	5	Red shale
				358	360	2	Hard sandstone	353	358	5	Blue shale
				360	390	30	Sandstone and gray shale	358	363	5	Red shale
				390	405	15	Sandstone	363	368	5	Blue shale
				405	425	20	Sandstone and gray shale	368	378	10	Red shale
				Test hole 18-8-12ba				378	387	9	Blue shale
				From	To	Thick- ness	Character	387	390	3	Red shale
				0	3.2	3.2	Gravelly sand	390	401	11	Red sandrock
				3.2	14.2	11	Syenite: light-brown to blue-gray, hard, dense, fine to coarsely crystalline; 60°-80° joints, some 5°-10° joints spaced 3 to 5 inches apart. Red-brown stains on fractures	401	427	26	Red shale
				14.2	35	20.8	Shale: dark-gray to black, poorly bedded, dense, hard, closely fractured, (slickensided) limonite stains on fractures. Several 2- to 3-inch beds of calcareous bentonitic shale, gray-white, firm. Jointing 0-10° and 60-90°				
				Well 17-12-21cd							
				From	To	Thick- ness	Character				
				0	3	3	Overburden				
				3	160	157	Blue shale with layers of bentonite and sandstone				
				160	168	8	Sandstone				
				168	253	25	Shale with layers of sandstone and bentonite				
				253	261	8	Hard sandstone				
				261	319	58	Black shale with layers of sandstone and bentonite				
				319	332	23	Sandstone				
				332	355	23	Blue-black shale				
				355	615	260	Blue shale				
				615	735	120	Blue shale with a few thin layers of sandstone				
				Water level 14 days after completion 7.0 feet							

Table B-2.--Logs of wells, oil-test holes, and test holes in the Judith Basin, Mont. - continued
(Thickness and depths below land surface are given in feet.)
(Yield, where shown, is in gallons per minute (gpm).)

Well 18-9-30da--continued

From	To	Thick-ness	Character
427	441	14	Blue shale
441	445	4	Shell
445	450	5	Red shale
450	462	7	Shell
462	466	4	Blue shale
466	481	15	Shell, red and gray
481	483	2	Blue shale
483	491	8	White limestone
491	523	22	Limestone, gray and sandy
523	542	19	Red shale
542	555	13	Sand, gray, hard and sharp
555	560	5	Red sand
560	570	10	Red sandy shale
570	580	10	Red shale
580	590	10	Gray limestone
590	601	11	Black basalt (probably sill of T1)
601	653	52	Gray limestone
653	695	42	Black basalt

Well 18-10-13ca

From	To	Thick-ness	Character
0	2	2	Overburden
2	46	44	Bentonite and layers of hard sandstone
46	127	81	Hard sandstone and hard sandy shale with layers of bentonite
127	213	86	Very hard black slaty shale with some bentonite
213	249	36	Hard sandy shale with layers of sandstone and bentonite
249	275	26	Hard sandy shale with layers of hard sandstone
275	385	110	Layers of hard sandstone and bentonite in a hard black sandy shale
385	440	55	Same as above
440	502	62	Hard sandy shale with a few sand and bentonite beds. Bentonite turning to a dark-blue shale toward the bottom
502	602	100	Soft blue shale
602	702	100	Soft bluish-gray shale
702	718	16	Blue shale with layers of hard sandstone
718	750	32	Hard sandy shale and hard sandstone layers
750	775	25	Hard sandy shale with layers of hard sandstone
775	800	25	Bluish-black shale with some gray particles
800	895	95	First signs of red shale
895	955	60	Red shale
955	975	20	Red shale
975	990	15	Red shale
990	998.5	8.5	Red shale turning to sandstone
998.5	1,008	9.5	Sandstone
1,008	1,017	9	Hard sandstone
1,017	1,024	7	Very hard sandstone
1,024	1,054	30	Sandstone
1,054	1,073	19	Hard sandstone
1,073	1,075	2	Hard sandstone
1,075	1,087.5	12.5	Hard sandstone
1,087.5	1,090	2.5	Soft sandstone
1,090	1,097	7	Medium-soft sandstone
1,097	1,112	15	Medium-hard sandstone
1,112	1,115.5	3.5	Soft sandstone
1,115.5	1,117	1.5	Hard sandstone
1,117	1,126	9	Hard sandstone
1,126	1,128	2	Hard sandstone
1,128	1,135	7	Hard sandstone
1,135	1,155	20	Hard sandstone
1,155	1,180	25	Medium-soft, fine sandstone
1,180	1,185	5	Hard sandstone
1,185	1,195	10	Soft sandstone
1,195	1,210	15	Medium-soft sand
1,210	1,223	13	Hard sandstone
1,223	1,226	3	Hard sandstone
1,226	1,230	4	Hard sandstone
1,230	1,246	16	Hard sandstone

Well 18-10-13ca--continued

From	To	Thick-ness	Character
1,246	1,253	7	Hard rock
1,253	1,267	14	Hard rock
1,267	1,271	4	Very hard rock
1,271	1,273	2	Very hard rock
1,273	1,275	2	Very hard rock
1,275	1,308	33	Sandstone
1,308	1,321	13	Hard sandstone
1,321	1,324	3	Hard sandstone
1,324	1,327	3	Hard sandstone
1,327	1,345	18	Hard rock
1,345	1,387	42	Hard sandstone

Set 2-inch galvanized casing
Poured in 6 1/2 sacks cement
Hole producing approx. 3 1/2 gal. of water per min.

Test hole 18-10-17cc

Altitude 4,122 feet

From	To	Thick-ness	Character
0	2	2	Clayey gravel
2	8.2	6.2	Shale: bentonitic, light-gray to blue-gray, soft. Joints are steeply dipping and horizontal, dark-gray-brown to black staining on joints 3 to 5 inches apart. Dendrites
8.2	30	21.8	Shale: grayish-white to yellow-gray, bentonitic medium-hard to soft, upper part calcareous, occasional siliceous concretion and dark-gray-brown coating on joints
30	47.5	17.5	Shale: occasional beds of siltstone. Shale dark-gray to black, soft, slightly bentonitic. Horizontal joints randomly spaced (1 to 4 feet)
47.5	53	5.5	Clay shale: black, soft, plastic. Thin-bedded
53	54.8	1.8	Sandstone: green, medium- to fine-grained, well-cemented
54.8	65	10.2	Clay shale: black, soft, plastic. Thin-bedded
65	72.5	7.5	Shale: dark-gray to black, soft, fissile, slightly bentonitic in zones
72.5	75	2.5	Sandstone: green, fine-grained, well-cemented. Randomly spaced shale laminae

Test hole 18-10-17cc--continued

From	To	Thick-ness	Character
75	84.5	9.5	Shale: dark-gray to gray, soft, fissile, bentonitic
84.5	100	15.5	Shale: dark-gray, firm to hard, thinly bedded, slightly bentonitic, siltstone laminae in shale

Water level 18.0 March 4, 1960

Well 18-10-35cd

From	To	Thick-ness	Character
0	121	121	Blue shale
121	122	1	Hard sandy reef
122	285	163	Blue sandy shale
285	385	100	Gray shale
385	455	70	Gray shale, alternating layers of hard sandstone and sandy shale
455	485	30	Alternating layers of hard sandstone and sandy shale

Well 18-10-35ed--continued

From	To	Thick-ness	Character
485	585	100	Sandy red shale
585	624	38	Soft muddy red shale
624	633	9	Alternating layers of hard sandstone and sandy shale
633	654	21	Sandy red shale
654	662	8	Sandstone
662	695	33	Red shale
695	704	9	Sandy red shale
704	710	6	Hard sandstone
710	721	11	Hard sandstone
721	764	43	Sandstone, Small amount of water at 760 feet
764	797	33	Sandstone
797	798	1	Hard sandstone
798	809	11	Soft coarse sandstone, about 15 gpm
809	811.5	2.5	Red shale

Well 18-11-28db

From	To	Thick-ness	Character
0	3	3	Overburden
3	33	30	Sandstone
33	36	3	Bentonite
36	65	29	Sandy shale, layers of sandstone and bentonite
65	69	4	Sandy shale with small layers of sandstone
69	83	14	Hard sandstone--about 10 gpm of water

Well 18-11-32bb
Altitude 4,038.8

From	To	Thick-ness	Character
0	5	5	Soil--silty clay and gravelly silty clay
5	25	20	Shale: dark-gray to brown, moderately hard, some bentonite
25	45	20	Shale: gray, thin-bedded, moderately hard
45	55	10	Shale with sandstone: gray
55	65	10	Shale, gray, bentonitic
65	145	80	Shale: gray to light-gray, moderately hard with soft zones
145	175	30	Shale: light-gray, soft, bentonitic and sandy zones
175	180	5	Shale: dark-gray, moderately hard
180	245	65	Shale: dark-gray to gray, soft, slightly sandy
245	250	5	Shale and bentonite
250	270	20	Shale: gray, sandy, thinly bedded, moderately hard
270	360	90	Shale: dark-gray, soft with moderately hard sandy zones. Thinly bedded
360	365	5	Shale: gray, bentonitic
365	435	70	Shale: gray to dark-gray, soft to moderately hard with sandy zones
435	560	125	Shale: dark-gray, moderately hard to soft, massive, occasional thin bentonite beds
560	630	70	Shale: gray, soft, with occasional greenish, sandy zone, thin-bedded
630	635	5	Sandstone and shale: greenish-gray and gray, soft
635	765	130	Shale: gray, soft, thinly bedded
765	795	30	Shale: red to green, soft to moderately hard

Table B-2.--Logs of wells, oil-test holes, and test holes in the Judith Basin, Mont. - continued
 (Thickness and depths below land surface are given in feet.)
 (Yield, where shown, is in gallons per minute (gpm).)

Well 18-11-32bb--continued

From	To	Thick- ness	Character
795	810	15	Shale: red and green, interbedded with sandstone, green-gray, soft to moderately hard
810	840	30	Shale: red and green soft to moderately hard
840	860	20	Shale: red, soft
860	868	8	Shale: green with sandstone
868	905	37	Shale: gray-green, soft to moderately hard
905	910	5	Sandstone: fine, gray, with interbedded soft shale
910	940	30	Shale: red, soft, with interbeds green-gray, moderately hard
940	980	40	Shale: red and green, soft to moderately hard with green-gray sandstone interbeds
980	985	5	Sandstone: gray-green, soft, friable with some interbedded shale
985	1,000	15	Shale: red and gray, soft with some interbedded sandstone
1,000	1,025	25	Shale: gray, soft
1,025	1,043	18	Shale: gray to red, soft to moderately hard, sandy zones
1,043	1,064	21	Sandstone, medium to fine, soft, friable
1,064	1,065	1	Shale: gray

Shut in pressure 25 psi
 Well flowed 6 gpm
 Drawdown to 102 feet when pumped at 10 gpm
 Drawdown to 158 feet when pumped at 20 gpm
 Drawdown to 380 feet when pumped at 45 gpm

Test hole 18-11-32bb2
 Altitude 4,039.3

From	To	Thick- ness	Character
0	1	1	Overburden: silty clay
1	5	4	Gravelly silty clay
5	17.5	12.5	Shaly siltstone: brown and gray, moderately hard, interbedded brown and gray laminae, calcite coating between bedding planes, sub-horizontal bedding
17.5	26.2	8.7	Bentonitic clay with interbedded shale bed at 18 feet, 6 inches thick, shale dark-gray, hard. Bentonitic clay: gray-brown and gray, very soft, plastic, massive, selenite crystals in clay
26.2	32	5.8	Shale with some laminae of siltstone, black, moderately hard, fissile, noncalcareous
32	44.3	12.3	Siltstone interbedded with thin laminae of shale. Siltstone: gray to dark-gray, hard, thinly bedded, noncalcareous, cross-bedded. Shale: dark-gray to black, very thin laminae, banded. Carbonaceous fragments
44.3	45.7	1.4	Bentonitic clay: gray, very soft, plastic
45.7	88	42.3	Shaly siltstone: light to dark-gray interbedded with very thin laminae of black shale, very hard, cross-bedded, banded,

Test hole 18-11-32bb2--continued

From	To	Thick- ness	Character
88	101	13	Silty shale: gray to black, thin beds of gray, siltstone interbedded with shale; crossbedded, banded, very hard, fossiliferous, joints horizontal, tight, not stained

Water level 30.0 feet after 20 days

Test hole 18-12-23bb
 Altitude 3,895

From	To	Thick- ness	Character
0	8	8	Overburden: gravelly silty clay
8	15.2	7.2	Gravelly sand, some silt
15.2	27	11.8	Clay shale: black, soft, plastic, massive
27	42.3	15.3	Clay shale: black, medium-soft, plastic, thin flat beds
42.3	61	28.7	Clay shale: black, medium-soft, interbedded with gray laminae. Thin vein of gypsum at about 55 feet
61	66	5	Clay shale: black, medium-hard
66	84	18	Clay shale: black, medium-hard, interbedded with gray clay laminae. Some fossil (shell) zones
84	100	16	Shale: black, soft, fissile, flat-bedded

Water level 82 feet 2/29/60
 (Slowly lost water from 74.5 on 2/16/60)

Well 18-12-36ba

From	To	Thick- ness	Character
0	18	18	Gravel and brown clay
18	25	7	Brown clay
25	110	85	Alternating blue shale and sandstone
110	140	30	Blue shale, hard layers sandstone
140	168	28	Blue shale--sandy layers
168	180	12	Hard sandy layers
180	215	35	Blue shale

Test hole 19-9-22bc
 Altitude 5,180

From	To	Thick- ness	Character
0	6	6	Clayey sand
6	19	13	Sandstone: gray, thin to medium-bedded, calcareous. Randomly spaced black contorted soft shale laminations. Light-brown oxide stains throughout, weathered, bedding subhorizontal
19	35	16	Sandstone: light-gray, thin-bedded with occasional thin interbeds of dark-gray, soft shale

Test hole 19-9-22bg--continued

From	To	Thick- ness	Character
35	80	45	Sandstone: hard, firm, gray, thin to medium-bedded, calcareous, randomly spaced, black, contorted shale lamination. Light-brown oxide stains in upper part
80	100	20	Sandstone: hard, firm, gray, thin to medium-bedded, calcareous shale alternating with the sandstone is black, thin to medium, with contorted bedding

Losses of drilling water throughout most of the drilling.
 Water level 52 feet on March 24, 1960.

Test hole 19-10-26ad
 Altitude 4,256.8

From	To	Thick- ness	Character
0	1.5	1.5	Silty clay, dark-brown
1.5	2.5	1	Clayey gravel, white
2.5	5	2.5	Silty gravel, gray
5	21	16	Silty sandy gravel
21	24	3	Sandy clay: red, brown, slightly plastic and crumbly
24	30	6	Shale: light-brown and blue-gray, silty
30	40	10	Shale: yellow-brown to gray, soft to moderately hard, closely jointed (fractured), red-brown stains on joints
40	43	3	Shale: platy, medium-brown
43	86	43	Clay shale: greenish-gray to dark-gray, very soft to moderately hard, bentonitic and calcareous, massive, randomly spaced diagonal joints
86	100	3	Shale with occasional sandy silt and calcite beds. Includes: shale: dark-greenish-gray, soft to moderately hard, massive. Shale or siltstone: light-gray, soft, calcareous, 1/4-inch and 4-inch beds

Water level after 24 days 5.0 feet.

Table B-3.--Table of wells and springs in the Judith Basin, Mont.

- (1) The well numbering system used is explained in the text of this report.
- (2) C, creek bank; H, hillside; L, level or nearly so; S, gentle slope; SD, shallow depression; U, undulating topography.
- (3) B, bored well; DD, dug and drilled well; Dn, driven well; Du, dug well; Sp, spring.
- (4) Reported depths below the land surface are given in feet; measured depths are given in feet and tenths below measuring points.
- (5) C, concrete (brick tile or pipe); N, none; P, iron or steel pipe; Pl, plastic; R, rock; Ru, rubber; T, clay tile; W, wood.
- (6) C, coal; Cl, clay and sandy clay; Cgl, conglomerate; Clb, blue sandy clay; Cly, yellow sandy clay; G, gravel; Ir, igneous rock; L, lignite; Ls, limestone; Q, quicksand; Qzs, quartz; R, rock undifferentiated; S, sand; Sh, shale; Sa, sandstone; St, silt; Sts, siltstone.
- (7) Geologic source: Qal, alluvium; Qco, colluvium; Qt, terrace deposits; Tl, igneous rocks; Kcl, Gloggett Shale; Ke, Eagle Sandstone; Ktcc, Telegraph Creek Formation and Colorado Shale; Kk, Kootenai Formation; Jm, Morrison Formation; Jc, Ellis Group; Ema, Assen Formation; Ms, Heath Shale; Mo, Otter Formation; Kk, Kibbey Sandstone; Ma, Madison Group; ld, landslide deposits.
- (8) Method of lift: B, bucket; C, horizontal centrifugal; CY, cylinder; F, natural flow; J, jet; N, none; P, pitcher pump; Pt, piston pump; R, rotary; S, submersible turbine; Sl, siphon; T, turbine; Vc, vertical centrifugal.
- (9) C, cooling; D, domestic; F, fish; G, game; I, irrigation; In, industrial; N, not being used; O, observation; P, public supply; S, stock.
- (10) Measured depths to water level are given in feet, tenths and hundredths; reported depths to water level are given in feet.

Well No. (1)	Owner or tenant	Year drilled	Topographic location (2)	Type of well (3)	Depth of well (4) (feet)	Diameter of well (inches)	Type of casing (5)	Principal water-bearing unit		Method of lift (8)	Use of water (9)	Depth to water below land surface (10) (feet)	Date of measurement	Remarks
								Character of material (6)	Geologic source (7)					
11-14-	lad1 Ben and Alice Peterson	----	H Sp	----	----	----	--	C	Qc	F	S	-----	1 gpm estimated flow	
	lad2	----	C Sp	----	----	----	--	G	Qc	F	S	-----	1 gpm estimated flow	
	1bb Alice Wildschutz	----	C Sp	----	----	----	--	C	Ktcc	F	S	-----	Small flow	
	2aa	----	C Sp	----	----	----	--	Se	Ktcc	F	S	-----	1 gpm estimated flow	
11-15-	3bc Wernli Estate	----	L Du	----	19.2	96	W,C	S,G	Kc	CY	S,O	5.86	8-21-59	
	4cd	1948	L Dr	----	60	6	P	Se	Kc	J	D	-----	-----	Tight installation
	5aa Hilliard McDonald	----	C Sp	----	-----	-----	--	Se,Sh	Kc	F	S	-----	-----	2 gpm estimated flow
	13ba Ed Williams	----	S Dr	----	94	6	P	Sh	Kc	CY	D,S	30	-----	Reported
	14dd Leo Mauve	----	U Du	----	17.2	36	W	Cl	Ktcc	CY	N,O	5.32	8-19-59	
	24ac1 Adolf Paridsen	1953	H Dr	----	48.8	6	P	Se	Ktcc	CY	D	28.77	6-25-59	
	24ac2	1908	H Du	----	24.2	18	R	S,Sh	Ktcc	CY	S	13.26	6- 2-59	
	24dd Emil Olson	1952	L Dr	----	100	6	P	Se	Ke	CY	N,O	23.25	6-25-59	
11-16-	2da1 Leo Lemson	1944	H Dr	----	68	8	P	S,Cl	Ke	J	D	-----	-----	
	2da2	1912	S Du	----	14.5	48	R	S,G	Ke	CY	S	13.8	7- 2-59	
	3aa James Raw	----	L Dr	----	60	6	P	Se	Ke	F	D,S	-----	7- 6-59	
	3ca1	----	S Du	----	10.7	42	R	S,G	Qco	CY	L,O	5.48	9- 6-59	
	3ca2	----	S Du	----	15.7?	6	P	S,G	Qco	C	S	8.18	7- 6-59	
	4bd E. A. Nickel	1930+	S Dr	----	18-20	----	P	S,G	Qal	CY	S	-----	7- 6-59	
	5cb1 Phil Bradley	1954	L Dr	----	71.4	6	P	Se	Ktcc	J	D	22.70	7- 1-59	
	5cb2	1916	L Du	----	22.7	72	R	Se	Ktcc	N	N	8.55	7- 1-59	Inadequate supply for pressure system
	5cb3	----	L Dr	----	18.1	6	P	Se	Ktcc	N	N	14.60	7- 1-59	
	6aa1 Garneill School District	----	S Du	----	25.7	----	--	S,G	Qal	CY	O	12.93	9- 2-59	
	6aa2 W. B. Elliot	1920+	S Dr	----	70	8	P	S,G	Qal	J	D	36	7- 2-59	
	6bb1 Wm. D. Gaugler	----	S Dr	----	23.8	6	P	S,G	Qal	CY	S	3.54	7- 8-59	
	6bb2	----	L Dr	----	17.0	6	P	S,G,Cl	Qal	CY	S,O	3.25	7- 8-59	
	7cd L. Fisher	----	S Dr	----	59.2	4	P	Se	Kc	N	N	5.88	7- 2-59	
	14ac George Brewington	1947	L Du	----	9	16	C	Se	Kcl	C	D	6	7- 1-59	
	15cb1 Phil Bradley	----	S Dr	----	-----	----	--	Cl,G	Kcl	J	D	-----	7- 1-59	
	15cb2	----	S Du	----	13.1	48	R	Cl,G	Kcl	N	O	3.97	7- 1-59	
	20cd U. S. Government	1960	H Dr	----	225	8	P	Se	Ke	?	D	46	-----	Altitude 4,628 feet
	21ac1 D. D. Grove	1912	U Dr	----	65	6	P	Cl,G	Kcl	CY	D	20	7- 1-59	
	21ac2	1912	U Dr	----	65	8	P	Cl	Kcl	CY	S	50	7- 1-59	
12-12-	1bd Wertheimer Ranch	----	H Sp	----	----	----	--	----	Mh	F	S	-----	9-13-60	1 gpm estimated flow
	2da	----	H Sp	----	----	----	--	Se	EMa	F	S	-----	9-13-60	1 gpm estimated
	2dd1	----	H Sp	----	----	----	--	Se	EMa	F	S	-----	-----	3 gpm estimated, 43°F
	2dd2	----	H Sp	----	----	----	--	Se	EMa	F	S	-----	-----	1 gpm estimated
	3aa Lear Flanagan & Sons	----	C Sp	----	----	----	--	Se	EMa	F	S	-----	-----	2 gpm estimated
	3ac	----	C Sp	----	----	----	--	Sh	Mh	F	S	-----	-----	1 gpm estimated
	3bb L. Phyllis Arnott	----	H Sp	----	----	----	--	Sh,La	Mh	F	S	-----	-----	2 1/2 gpm estimated 46°F
	3bc	----	H Sp	----	----	----	--	----	Mh	F	S	-----	-----	6 1/2 gpm estimated
	5ad	----	H Sp	----	----	----	--	La	ld	F	S	-----	-----	9 gpm reported
	8dc1 James Turner estate	----	S Du	----	----	----	--	G	Qt	CY	S	-----	9-28-60	
	8dc2	----	S Du	----	14.1	20	P	G	Qt	P	D,S	11.89	9-28-60	
	9cc Lear Flanagan & Sons	----	C Sp	----	----	----	--	Sh,La	Mh	F	S	-----	9-28-60	1 gpm estimated
	9cd	----	H Sp	----	----	----	--	Sh,La	Mh	F	S	-----	9-28-60	1/2 gpm estimated
	9db	----	H Sp	----	----	----	--	Sh,La	Mh	F	S	-----	-----	5 gpm measured
	10ad	----	H Sp	----	----	----	--	Sh	Mh	F	S	-----	10-12-61	1/4 gpm estimated
	10bd	----	H Sp	----	----	----	--	Sh	Mh	F	S	-----	9-27-60	1 gpm estimated
	11ad Montana State	----	H Sp	----	----	----	--	Se	EMa	F	S	-----	9-13-60	1 gpm estimated, 47°F
	11bb	----	H Sp	----	----	----	--	Se	EMa	F	S	-----	10- 9-61	1 gpm estimated
	12bb Montana State	----	H Sp	----	----	----	--	La	EMa	F	S	-----	9-13-60	5 gpm estimated, 43°F
	12bc	----	H Sp	----	----	----	--	La	EMa	F	S	-----	9-13-60	1 1/2 gpm estimated, 44°F
	12cc Wertheimer Ranch	----	C Sp	----	----	----	--	La	EMa	F	S	-----	8-30-60	20 gpm estimated
	13aa Montana State	----	H Sp	----	----	----	--	La?	EMa	F	S	-----	8-25-60	3 gpm estimated
	13dd Wertheimer Ranch	----	H Sp	----	----	----	--	Se	Kk	F	S	-----	8-26-60	1 gpm estimated, 47°F

19ba	-----do-----	----	C	Sp	-----	-----	--	Ss	Ja	F	D,S	----	7-27-60		
21bc1	Albert Dover	-----	C	Sp	-----	-----	--	Ss,G	Ja	F	S	----	7-26-60		
21bc2	-----do-----	1950	H	Dr	100	10	P	Se	Ja	F	D	20	7-26-60		
21cb	-----do-----	-----	C	Dr	1,115	10	P	-----	Mm	F	N	----	7-26-60	1/4 gpm estimated	
22ba1	Wern Watson	-----	H	Sp	-----	-----	----	Se,La	Ek	F	S	----	7-14-60	10 gpm estimated, 46°F	
22ba2	-----do-----	-----	H	Sp	-----	-----	----	Se	Kk	F	S	----	7-14-60	2 gpm estimated, 46°F	
24ab	Fred Mathews	-----	C	Sp	-----	-----	----	-----	Ktcc	F	S	----	8- 4-61	1/2 gpm estimated, 57°F estimated	
24ac	Frank A. Cromer	-----	S	Du	9.4	60	C	S,G,Cl	Qal,Qco	N	S	8.27	8- 4-61		
24da1	-----do-----	1959	L	Du	30.0	-----	C	Se	Ktcc	C	D	12.95	8-11-59		
24da2	-----do-----	1912	L	Du	24.3	24	T	Se	Ktcc	CY	S,O	16.14	8-11-59		
24db	-----do-----	-----	C	Du	11.0	36	R	-----	Ktcc	CY	S	5.33	8-11-59		
25ba1	-----do-----	-----	L	Sp	-----	-----	----	S,G	Qal,Qco	F	S	----	8- 4-61	3 gpm estimated	
25ba2	-----do-----	-----	C	Du	17.1	36	C	S,G	Qal,Qco	CY	S	6.40	8- 4-61		
25bb	-----do-----	-----	C	Du	11.5	-----	W	S,G	Qc	CY	S	2.50	9-16-60		
26ab	Montana State	-----	C	Sp	-----	-----	----	S,G	Qc	F	S	----	9-13-60	4 gpm estimated	
26bd	Charles Dover	1960	C	Du	10.2	36	N	Se,G	Ktcc	C	N	8.63	7-17-60		
26cd	Frank A. Cromer	-----	C	Sp	-----	-----	----	S,G	Qal,Qco	F	S	----	8- 3-61		
27ac1	Charles Dover	-----	H	Sp	-----	-----	----	Se	Kk	F	D,S	----	7-14-60	6 gpm estimated	
27ac2	-----do-----	-----	C	Sp	-----	-----	----	Se	Kk	F	S	----	7-14-60	3 gpm measured	
27ad	-----do-----	-----	S	Sp	-----	-----	----	Se	Kk	F	S	----	7-14-60	48°F	
27ca1	George Dover	-----	C	Du	9	48	C	S,G	Kk	J	D	5.64	7-14-60		
27ca2	-----do-----	-----	C	Sp	-----	-----	----	G	Kk	F	S	----	7-14-60	5 gpm estimated, 48°F	
27ca3	-----do-----	-----	C	Sp	-----	-----	----	Se?	Kk	F	S	----	7-14-60	2 gpm estimated, 47°F	
28db	-----do-----	-----	C	Sp	-----	-----	----	Se	Kk	F	S	----	7-14-60	5 gpm estimated	
30cd	John Dover	-----	C	Sp	-----	-----	----	Se,La	Ca	F	S	----	11-10-61	6 gpm measured	
35ca	Alice Wildschutz	-----	C	S	-----	-----	----	S,G	Qal,Qco	F	S	----	8- 3-61	2 gpm estimated	
36ac	-----do-----	-----	C	S	-----	-----	----	S,G	Qco	F	S	----	9-16-61	1/4 gpm estimated	
36ba	Jack Warbis	-----	U	Dr	-----	6	P	-----	Kk	F	S	----	9-16-61	oil test, leaking	
12-15-	1bc1	R. H. Wetzel	-----	S	Du	12.4	24	W	S,G	Qal	CY	S,O	5.42	7-17-59	
	1bc2	-----do-----	1953	S	Du	25	60	P	G	Qal	J	D	9.5	7-17-59	
	4cd1	Ted Wilhelm	-----	--	Du	20-16	36	C	-----	Qal	-----	D	8-12	7-21-59	40°F
	4cd2	-----do-----	1955	--	Du	16	42	C	S,G	Qal	CY	S,O	7.4	7-21-59	
	4dc	-----do-----	1955	L	Du	12-15	42	C	-----	Qal	CY	S	----	7-21-59	
12-15-	4dd1	L. G. Philpott	1948	L	Dr	1,380	2	P	-----	Kk	F	D	----	7-21-59	
	4dd2	-----do-----	1956	L	Du	20.6	48	C	S,G	Qal	C	I	6.57	7-21-59	
	4dd3	-----do-----	1956	L	Du	12	36	P	G	Qal	CY	S	7	7-21-59	
	4dd4	-----do-----	-----	--	Du	16.1	30-10	W	S,G	Qal	C	S	2.89	7-21-59	cold
	4dd5	-----do-----	1951	L	Du	20	48	C	S,G	Qal	J	D	----	7-21-59	
	5cd	Raymond K. Rung	1935	--	Du	12.3	3	C	S,G	Qc	C	D	6.3	7-21-59	
	6bc	Montana State	-----	L	Du	13.2	60	C	G	Qc	CY	S	7.50	8-31-61	
	6db	Fred Mathews	-----	L	Du	9.2	36	C	C	Qc	CY	S	5.07	7-21-59	
	6dc1	-----do-----	-----	L	Du	17.3	24	C	S,G	Qc	CY	D	5.50	7-21-59	
	6dc2	-----do-----	-----	L	Dr	92.5	5	P	-----	Ktcc	CY	N	6.13	7-21-59	
	7ac1	-----do-----	-----	L	Du	6	3	C	G	Qal	-----	D	5.5	8-10-59	
	7ac2	-----do-----	1958	L	Du	8.7	36	--	G	Qal	CY	S	5.04	8-10-59	
	7cd1	Lloyd Wilbus	1947	H	Dr	90	4	P	-----	Ktcc	N	N	----	8-10-59	
	7cd2	-----do-----	1947	H	Dr	60	4	P	-----	Ktcc	CY	D,S	----	8-10-59	
	8aa1	Elden and Beryl Jones	-----	--	Du	-----	3	----	-----	-----	J	D	----	7-21-59	
	8aa2	-----do-----	-----	L	Du	8.9	3	C	S,G	Qal	CY	S	5.56	7-21-59	
	8ad1	-----do-----	-----	S	Du	13.9	30	C	S,G	Qal	CY	S	2.47	7-21-59	
	8ad2	-----do-----	-----	S	Du	9.0	24	C	S,G	Qal	CY	S	5.66	7-21-59	
	9aa1	James Manday	1951	L	Du	10.4	60	C	S,G	Qal	CY	S	6.16	7-20-59	
	9aa2	Heinrich Plugge	-----	L	Dr	20.3	60	P	S,G	Qal	CY	D	7.88	7-20-59	
	10aa1	W. J. Griffith	1950	--	Du	12	24	C	S,G	Qal	J	D	7.0	7-17-59	
	10aa2	-----do-----	1959	L	Du	10.0	36	P	S,G	Qal	N	S	5.64	7-17-59	
	10aa3	-----do-----	-----	L	Dr	750	5	P	-----	Ktcc	H	O	15.88	7-17-59	
	10bb1	Joseph Hoffman	-----	L	Du	17.7	48	W	S,G	Qal	CY	D	7.08	7-16-59	
	10bb2	-----do-----	-----	L	Du	14.7	48	W	S,G	Qal	CY	O	9.59	7-16-59	
	10bb3	James Manday	1950	L	Du	18.3	48	C	S,G	Qal	C	D	7.37	7-20-59	
	10bc1	Ray Barta	1920	L	Du	10	42	C	S,G	Qal	J	D	5	7-16-59	
	10bc2	Ralph Wetzel	-----	L	Dr	16.6	36	C	S,G	Qal	J	D	10.24	7-16-59	
	11aa1	Lee Biehl	1947	H	Dr	175+	-----	----	-----	Ktcc	J	D	18.05	7-14-59	
	11aa2	-----do-----	1939	H	Du	19.6	36	W	S,G	Qc	CY	S	11.45	7-14-59	
	12dd1	Kenneth Marvey	1930	L	Du	15	48	C	-----	Qc	J	D,S	10	7-13-59	
	12dd2	-----do-----	1945	L	Du	15	60	--	G	Qc	N	I	----	7-13-59	
	13bb	Ben R. Peterson	-----	L	Dr	36.4	36	W	-----	Qc	J	D,S,O	9.31	7-14-59	
	18bd	Fred Mathews	-----	SD	Sp	-----	-----	----	-----	Ktcc	F	S	----	8- 4-61	4 gpm estimated
	19ac	Jack Warbis	-----	U	Dr	97	48	P	-----	Ktcc	F,CY	S	----	9- 5-61	1/4 gpm estimated
	19bc	Frank A. Cromer	1955	C	Du	22.6	48	C	-----	Qc	CY	S	3.58	8-11-59	
	20ac	Alice Wildschutz	-----	H	Sp	-----	-----	----	Se,Sh	Ktcc	F	S	----	8-30-61	not measurable, very small flow
	20bc1	John L. Miller	-----	L	Dr	27.1	48	P	-----	Qc	CY	S	15.38	8-11-59	
	20bc2	-----do-----	-----	L	Dr	52.5	48	P	-----	Qc	CY	N	16.64	8-11-59	
	20bc3	Werna E. Edwards	-----	SD	Sp	-----	-----	----	G	Qc	F	S	----	8-30-61	10 gpm estimated
	21ac1	Vacant	-----	L	Dr	136.5	48	P	-----	Ktcc	CY	O	77.90	8-20-59	
	21ac2	R. C. Dexter	1938	C	Du	12.8	40	W	-----	Ktcc	R	S	7.82	8-11-59	
	22bc1	Ben G. Peterson	1942	C	Du	10.2	36	W	G	Qc	CY	N	6.93	8-11-59	
	22bc2	-----do-----	1951	S	Du	7.1	36	C	G	Qc	CY	S,O	4.75	8-11-59	
	22bd1	-----do-----	1958	S	Dr	1,046	2	--	Se	Kk	F	S	----	8-11-59	7 1/2 gpm estimated
	22bd2	-----do-----	1940	S	Du	10.0	72	C,W	G	Qal	R	S	6.78	8-11-59	
	22bd3	-----do-----	1940	S	Du	7.7	48	R	G	Qal	C	D	4.65	8-11-59	
	22eb	-----do-----	1949	S	Du	6	48	C	G	Qc	C	D	7-8	8-11-59	
	25aa	John F. Hoffman	1919	S	Du	14.2	36	R	S,G	Qal	CY	S,I	5.31	7- 9-59	
	28da	Wilbur McDonald	-----	H	Du	32.9	36	R	-----	Ktcc	CY,J	D,S	24.09	8-31-61	
	29ea	Jack Warbis	-----	L	Du	10.3	60	R	G	Ktcc	N	N	8.13	9- 1-61	
	29nd	Alice Wildschutz	-----	H	Sp	-----	-----	----	-----	Qc	F	D,S	----	9- 1-61	5 gpm estimated
	29dd	Marie Redwood	1930	L	Du	15.2	36	R	S,G	Qc	CY	S	10.53	8-21-59	
	33aa1	Hillrod McDonald	1951	U	Dr	64	8	P	Sm(?)	Ktcc	J	D	24.32	9- 5-61	
	33aa2	-----do-----	-----	U	Du	11.9	84	R	-----	Ktcc	CY	S	9.11	9- 5-61	

33bb	Wilbur McDonald	1961	U	Du	10	----	--	G,Cl	Ktcc	N	S	6	8-31-61		
34aa	Wm. Gaugler	1963	--	Dr	80	----	----	----	Ktcc	--	S	16.5	7-22-63		
34bd	Wilbur McDonald	1947	H	Dr	115	6	R	G	Ktcc	CY	S	22	8-31-61		
35dc	Sam Bradley	1952	--	Dr	52-53	6	P	Sm	Ktcc	J	D	----	8-21-59		
12-16-	7bb	Lee Biehl	----	L	Du	15.2	42	--	S,G	Qal	CY	S	7.00	7-14-59	
16dc1	Bill Baldwin	1945	L	Dr	35.5	6-8	P	----	Ktcc	CY	S,O	6.80	7-10-59		
16dc2	-----do-----	1938	S	Du	20	----	P	S,G	Ktcc	J	D	6-7	7-10-59		
17bb1	Clarence Biehl	1920	L	Du	11.3	36	R	G	Qt	CY	S	3.63	7-10-59		
17bb2	-----do-----	1920	L	Du	13.6	60-70	R	----	Qt	CY	S	4.79	7-10-59		
18aa1	-----do-----	1920	L	Du	17.6	60-70	R	G	Qt	CY	S	6.91	7-10-59		
18aa2	-----do-----	1920	L	Du	23.2	36	R	----	Qt	C	I	8.27	7-10-59		
18aa3	-----do-----	1915	--	Dr	12	36	R	G	Qt	C	D	18-19	7-10-59		
18aa4	-----do-----	1952	L	Dr	385-390	4	--	Sh	Ktcc	N	N	----	7-10-59		
19cd1	Walter Peck	1957	L	Du	10-12	60	C	----	Qal	C	S	3-4	7- 9-59		
19cd2	-----do-----	1954	L	Dr	80	5	--	----	Ktcc	J	D,I	0	7- 9-59		
20bb	Clarence Biehl	1920	S	Du	35.9	6	P	----	Qt	CY	S	3.45	7-10-59		
22bc	Lao and Frank Haegen	1900	H	Du	40	36	C	G	Qt	J	D,S	15	7-10-59		
22cb	-----do-----	----	L	Du	10	30	N	S	Qt	J	D	6	7-10-59		
28ac1	Jens Larson	1943	H	Dr	60	6	P	----	Ka	CY	N	10-20	7- 8-59		
28ac2	-----do-----	1954	H	Dr	60	6	P	----	Ke	CY	N	10	7- 8-59		
29ac	John Hajengos	1951	--	Dr	14.0	48	C	S	Kc	J	D,S	7.50	7- 8-59		
30ab	Clifford Barkhoff	----	S	Du	11.9	48	R	S,G	Ktcc	CY	S,O	5.01	7- 9-59		
30bb1	John F. Huffman	1953	L	Dr	37.0	5	H	S,G	Qal	CY	S	5.89	7- 9-59		
30bb2	-----do-----	1936	L	Du	13	60	R	S,G	Qal	J	D	6.73	7- 9-59		
30bb3	-----do-----	1959	L	Dr	236	6	P	----	Ktcc	N	O	4.84	7- 9-59		
31ac	A. Songer	1949	L	Du,Dr	20	55	C,P	G	Qal	N	O	3.28	7- 6-59		
31cc1	Wm. Gaugler	----	H	Dr	49.7	6	P	S,G	Qal	N	N	3.90	7- 9-59		
31cc2	-----do-----	1948	H	Dr	106.5	6	P	----	Ktcc	CY	S	16.93	7- 8-59		
31cd	-----do-----	----	L	Dr	30.2	6	P	S,G	Qal	CY	S	6.50	7- 8-59		
31dc	L. K. Galbreth	1939	S	Du	14	36	T	Sm	Qal	C	D	8	7- 1-59		
32cc1	Glen Elliott	1948	L	Dr	71.6	8	P	----	Ke	T	I	18.43	7- 8-59		
32cc2	-----do-----	1953	L	Dr	250	----	--	----	Ke	J	D	----	7- 8-59		
32db1	John W. Peck	1925	H	Du	23-24	48	C,W	G	Ke	C	S	----	7- 6-59		
32db2	-----do-----	1918	H	Dr	60-70	6	P	----	Ke	C	D	13	7- 6-59		
36ad	Raymond Luther	1900	H	Dr	39.7	54	R	E	Qal	CY	O	36.00	7- 6-59		
13-11-	2ab	Hughes Livestock Co.	----	U	Dr	71.3	6	P	Sh,La	Mo	CY	N	25.88	9-14-63	
11bc	Montana State	1963	U	Du	7.5	84	N	S,G	Qeo	N	G	7	7-22-63		
11dc	-----do-----	----	H	Dr	182.9	4	P	La,Sh	Mo	N	N	168.45	7-24-63		
13ad	Julian Rogers	----	U	Dr	-----	4	P	La,Sh	Mo	CY	S	86.50	9-13-63		
14bc	Montana State	----	U	Dr	33.8	6	P	----	----	N	N	9.88	7-22-63		
14cc1	-----do-----	----	U	Dr	60.0	6	P	Se	Mk	N	N	31.29	7-23-63		
14cc2	-----do-----	----	U	Du	43.5	48	C	Se	Mk	N	N	39.48	7-23-63		
14dd	-----do-----	----	U	Dr	140	4	P	La	Mm(?)	S	D,S	100	7-22-63		
15ab	-----do-----	----	U	Dr	113.1	4	P	La	Mm(?)	N	N	68.30	7-22-63		
15ba	-----do-----	----	U	Dr	109.1	4	P	La(?)	Mm(?)	N	N	54.63	7-22-63		
16ca1	-----do-----	----	U	Du	13.6	72	R	----	----	N	N	10.85	7-23-63		
16ca2	-----do-----	----	U	Du	16.2	72	R	La(?)	Mm(?)	CY	D	14.85	7-23-63		
25da1	Wm. Korrell	----	L	Du	38	5	P	G	Qal	J	D,S	10	9-16-63		
25da2	-----do-----	----	L	Du	15.9	36	R	G	Qal	C	I	8.15	9-16-63		
25da3	-----do-----	----	L	Du	14.1	36	C	G	Qal	N	N	8.35	9-16-63		
26bd1	Montana State	----	U	Du	41.2	60	C	Se	Mk	N	N	60.05	7-16-63		
26bd2	-----do-----	----	S	Dr	196.9(?)	6	P	----	----	N	N	70.10	7-24-63		
35ab	U.S. Forest Service	----	U	Dr	-----	5	P	La	Mm	CY	D	12.97	6- 4-64		
36da	Montana State	----	U	Dr	73.7	6	P	La	Mm	N	N	73.39	9-28-60		
13-12-	2dc	Wertheimer Ranch	----	C	Sp	-----	----	--	La	EMa	F	S	----	9-21-60	4 gpm estimated
3aa1	Lear Flanagan	----	H	Sp	-----	----	--	----	Qal	F	S	----	9-29-60	1/2 gpm estimated	
3aa2	-----do-----	----	H	Sp	-----	----	--	Stc	Qal	F	S	----	9-29-60	1/2 gpm estimated	
3ad	Earl and Martha Bodley	----	H	Sp	-----	----	--	Stc	Mh	F	S	----	9-29-60	1 gpm estimated	
4bb	Lear Flanagan	----	H	Sp	-----	----	--	Se,La	ld	F	S	----	9-19-60	1/2 gpm estimated	
6aa	-----do-----	----	H	Sp	-----	----	--	Se	EMa	F	S	----	11- 7-63	1 gpm estimated	
7da	Julian Rogers	----	U	Sp	-----	----	--	La	----	F	S	----	9-12-63	1 gpm estimated, 48°F	
9dd1	Wertheimer Ranch	----	H	Sp	-----	----	--	Se	EMa(?)	F	S	----	9-17-61		
9dd2	-----do-----	----	H	Sp	-----	----	--	Se	EMa(?)	F	S	----	9-17-61	3 gpm estimated	
12bc	-----do-----	----	H	Dr	91.3	5	P	Se	EMa	N	N	81.38	9-14-60		
13ba	-----do-----	----	H	Dr	80.0	6	P	Se	EMa	CY	S	64.24	9-14-60		
14ab	-----do-----	----	H	Dr	49.7	5	P	Se	EMa	CY	S	17.78	9-14-60		
15ab	-----do-----	----	H	Sp	-----	----	--	La	EMa	F	S	----	9-21-60	5 gpm estimated	
15db	-----do-----	----	H	Sp	-----	----	--	La	EMa	F	S	----	9-21-60	3 gpm estimated, 47°F	
16ab	Montana State	----	H	Sp	-----	----	--	Se	EMa	F	S	----	8-17-61	10 gpm estimated	
17bb1	Julian Rogers	----	L	Du	13.6	72	R	G	Qal	J	D	10.52	9-12-63		
17bb2	-----do-----	1961	L	Du	14	30	P	G	Qal	S	S	11.5	9-12-63		
17bc1	Charles Hill	----	L	Du	15	4	F	G	Qal	Fr	D	8	8-14-61		
17bc2	L. Phyllis Arnott	----	L	Sp	-----	----	--	G	Qal	F	S	----	8-14-61	30 gpm estimated	
17ca	Kenneth Twiford	----	H	Dr	60	4	P	----	Qal	J	D	40	8-14-61		
18aa1	Julian Rogers	----	U	Sp	-----	----	--	Cgl	Qt	F	S	----	9-20-63	50 gpm estimated	
18aa2	Julian Rogers	----	U	Du	11.9	36	P	G	Qt	CY	N	11.00	9-16-63		
18ac	New Mine Sapphire Syndicate	----	C	Sp	-----	----	--	Cgl	Qt	F	N	----	8-23-61	30 gpm estimated	
18da	L. Phyllis Arnott	----	L	Sp	-----	----	--	G,La	Qal,Mo	F	S	----	8-13-61	20 gpm estimated	
18db1	New Mine Sapphire Syndicate	----	H	Dr	32.0	6	P	La	Mo	N	N	10.08	8-23-61		
18db2	-----do-----	----	H	Dr	31.0	6	P	La	Mo	N	N	11.66	8-23-61		
18dc1	L. Phyllis Arnott	----	L	Du	19	4 1/2	P	G	Qal	Fr	S	6.22	8-23-61		
18dc2	-----do-----	----	L	Du	12	36	C	G	Qal	Pt	D	8.5	8-13-61		
19ab	-----do-----	----	L	Du	10.1	54	C	G	Qal	C	D,S	9.66	8-13-61		
19ac	-----do-----	----	L	Du	16.1	36	C	G,Sh	Qal	Pt	S	11.78	8-23-61		
19bd	-----do-----	----	L	Du	17.0	36	C	G	Qal	CY	S	13.54	8-23-61		

19ca	-----do-----	---- L Du	16.6	36	C G	Qal	C D	13.81	8-23-61				
204d	-----do-----	---- H Sp	-----	-----	--- G	ld	F S	-----	9-29-60	2 gpm estimated			
224b	Charles Hill	---- H Dr	102.9*	6	P	-----	EMa	CY N	74.68	9-21-60			
274d	-----do-----	---- C Sp	-----	-----	--- Sa,La	EMa	F S	-----	9-21-60	5 gpm estimated, 44°F			
30ba	L. Phyllis Arnott	---- L Du	31.3	36	C G,Sh	Qal	CY S	17.54	8-23-61				
32ad	-----do-----	---- H Sp	-----	-----	--- S,Cl	Qco	F S	-----	8-13-61	1/8 gpm estimated			
34aa	Wertheimer Ranch	---- C Sp	-----	-----	--- La,Se	EMa	F S	-----	9-21-60	2 gpm estimated, 44°F			
34ac	Wa. Trask	---- H Sp	-----	-----	--- La	EMa	F S	-----	9-21-60	3 gpm estimated			
35aa	Wertheimer Ranch	---- H Sp	-----	-----	--- La	EMa	F S	-----	9-12-60	15 gpm estimated			
35bb	Montana State	---- H Sp	-----	-----	--- Sa,La	EMa	F S	-----	9-12-60	3/4 gpm estimated, 43°F			
35dd	-----do-----	---- H Sp	-----	-----	--- La	EMa	F S	-----	9-13-60	15 gpm estimated			
36bc	-----do-----	---- H Sp	-----	-----	--- La	EMa	F S	-----	9-12-60	1/4 gpm estimated, 44°F			
13-13-	3aa1 Anton Roseman	---- U Du	40.5	48	C Sa	Kk	N O	29.23	7-15-60				
	3aa2	---- C Sp	-----	-----	--- G	Kk	F S	-----	8- 8-60	1/4 gpm estimated			
	4bd	---- C Sp	-----	-----	--- Sa	Kk	F S	-----	8- 8-60	1/4 gpm estimated			
	4cb	Ray Swans	---- C Sp	-----	--- Sa	Kk	F S	-----	8- 9-60	2 gpm estimated			
	5bd	Wertheimer Ranch	---- C Sp	-----	--- Sa	Kk	F S	-----	9-22-60				
	5cc	-----do-----	1960	L Dr	-----	5	P	-----	?	F S	-----	8-18-60	3/4 gpm measured, 50°F
	5cd	-----do-----	-----	C Sp	-----	-----	--- Sa (?)	Kk	F S	-----	9-22-60		
	6aa	-----do-----	151.9	5	P	-----	Jm	CY S	53.72	9-22-60			
	6bd	-----do-----	-----	L Dr	-----	8	P	-----	EMa	F S	-----	9-22-60	15 gpm measured
	8ab	-----do-----	-----	C Sp	-----	-----	--- Sa,C	Kk	F S	-----	9-22-60		
	8ba	U.S. Government	---- H Sp	-----	--- Sa,C	Kk	F S	-----	9-22-60				
	8bb	Wertheimer Ranch	---- L Dr	176.0	-----	-----	--- Jm	N N	5.78	9-22-60			
	9cb	Montana State	---- C Sp	-----	--- Sa	Kk	F S	-----	8- 8-60	1/2 gpm estimated			
	10bc	D. W. MacKenzie	---- C Sp	-----	--- S,G	Kk	F S	-----	8- 8-60	1 1/2 gpm			
	11dd	Tom Watson	---- H Du	12	-----	-----	--- Sa	Qal	CY S	3	8- 3-60		
	12cc1	-----do-----	-----	L Du	10	48	C G	Qal	P D	3	8- 3-60		
	12cc2	-----do-----	-----	L Du	8.1	48	C C	Qal	C D	4.34	8- 3-60		
	12cc3	-----do-----	-----	C Du	15.4	36	R G	Qal	N N	1.10	8- 3-60		
	12cc4	-----do-----	-----	L Du	4.5	48	C S,G	Qal	C O	2.47	8-16-60		
	12cc5	-----do-----	-----	C Du	15	36	R G	Qal	N N	1	8- 3-60		
	14ab	Montana State	---- C Sp	-----	--- G,Cgl	Qco	F S	-----	8- 3-60				
	15ad	Flanagan Ranch	---- C Sp	-----	--- S,G	Qco	F S	-----	8-17-60	2 gpm estimated			
	15ba	-----do-----	-----	C Sp	-----	--- G	Ktcc	F S	-----	8-17-60	1 gpm estimated		
	17dc	Wertheimer Ranch	---- L Dr	113.0	4	P	Sa	Kk	CY S	68.32	8-19-60		
	19ac	-----do-----	-----	H Sp	-----	-----	--- Sa,Cgl	Jm	F S	-----	8-18-60	1/2 gpm estimated	
13-13-	21cc	H. E. Bingham	---- L Dr	240	4	P	-----	Kk	CY D,S	35	8-11-60		
	22ac	Flanagan Ranch	---- C Sp	-----	--- Sa,Cgl	Qt	F S	-----	8-17-60	5 gpm estimated			
	23cd	-----do-----	-----	U Sp	-----	-----	--- Sa	Qal	F D,S	-----	8-10-60	3 gpm estimated	
	23db	-----do-----	-----	L Sp	-----	-----	--- S,G	Qal	F S,I	-----	8-17-60	15 gpm estimated	
	25aa	Carrie Neasing	---- L Du	23.2	48	R	-----	Qt	N N	13.82	8- 2-60		
	25da	-----do-----	-----	C Dr	53.1	12	P	-----	Qt	CY N	9.21	8- 2-60	
	26ab	Flanagan Ranch	---- S Sp	-----	--- S,G	Qal	F S,I	-----	8-17-60	7 gpm estimated			
	26ac	-----do-----	-----	S Sp	-----	--- S,G	Qal	F S,I	-----	8-17-60	10 gpm estimated		
	27ab	-----do-----	-----	C Sp	-----	--- Sa	Kk	F S	-----	8-17-60	5 gpm estimated		
	28ba	H. E. Bingham	---- C Sp	-----	--- Sa	Kk	F S	-----	8-11-60	1 gpm estimated			
	28db	Wertheimer Ranch	---- C Sp	-----	--- Sa	Kk	F S	-----	8-17-60	20 gpm estimated			
	30dd1	-----do-----	-----	U Dr	52.3	4	P	-----	Je	N N	50.7	8-19-60	49°F
	30dd2	-----do-----	-----	U Dr	180.7	4	P	-----	Je	CY S	143.38	8-19-60	
	35ba	Lear Flanagan, Sr.	---- S Sp	-----	--- G	Qal	F S	I,S	-----	8-17-60	30 gpm estimated		
	36cc	Ernest Olson	---- H Dr	75.5	8	P	-----	Ktcc	CY S	43.6	6-24-59		
13-14-	3ab	Vern and Edna Watson	---- C Du	9.0	48	W	G	Qt	N N	4.15	7-11-60		
	3bc	-----do-----	-----	H Sp	-----	--- G	Qt	F S	-----	7-11-60	2 gpm measured		
	34d	R. H. and John Campbell	---- H Sp	-----	--- G	Qt	F S	-----	7-11-60	25 gpm estimated			
	4cb	Louis Behfus	---- L Du	31.2	48	H	G	Qt	CY O	29.27	7-24-59		
	10cd	Jens Annerud	1954	S Dr	100	4	P	Sa (?)	Ktcc	CY S	80	8-21-59	
	10dd	-----do-----	-----	C Sp	-----	-----	--- G	Qt	F S	-----	7-11-60	1/2 gpm estimated	
	16cc	Montana State	---- H Sp	-----	--- G	Qt	F S	-----	7-19-60	1/8 gpm estimated			
	20aa	Vern and Edna Watson	---- C Sp	-----	--- G	Qt	F S	-----	7-19-60	15 gpm estimated			
	20ca	-----do-----	-----	C Sp	-----	--- G	Qt	F S	-----	8- 2-60	5 gpm estimated		
	21dc	Irvin Wauer	1925	L Dr	84.2	4	P	G	Qt	J D,S	39.28	7-19-60	
	25bc	Hewell Nish	---- L Dr	54.8	4	P	G	Qt	N O	54.44	8-21-59		
	27bb	Irvin Wauer	---- C Du	6.0	60 ?	R	S,G	Qal	N N	4.23	7-12-60		
	28aa	-----do-----	-----	C Sp	-----	--- G	Qal	F S	-----	7-12-60	5 gpm estimated		
	29dd	Frank Cramer	---- C Sp	-----	--- G	Qal	F S	-----	7-25-60	46°F			
	30da	Carrie Neasing	---- L Du	18.1	60 ?	?	G	Qt	CY N	17.16	7-20-60		
	31bb	Ben Steel	---- L Dr	-----	2	P	Sa	Kk (?)	F S	-----	7-20-60	5 gpm estimated	
	31db	-----do-----	-----	C Du	12.6	60	C Sh	Ktcc	Pt D	8.95	7-25-60		
	34dd1	Joe Barta	1946	L Dr	90	7 1/2	P	G,Sh	Ktcc	CY S	-----	-----	
	34dd2	-----do-----	1946	L DD	65	4	P	G	Qt	CY I,O	7.78	7-22-59	Garden
	34dd3	-----do-----	-----	L Du	25	36	R	G	Qt	CY D	9	7-22-59	
	35ba	Hewell Nish	---- L Du	50	36	---	G	Qt	J	D,S	42	7-22-59	
	35da	H. A. Mathews	---- L Du	33.8	42	H	G	Qt	CY O	28.70	7-22-59		
	36aa	E. O. Johnson	---- H Sp	-----	--- G	Qt	F S	-----	8-28-61	3 gpm estimated			
	36cd1	Fred Mathews	---- L Du	47.5	48	W	-----	Qt	CY S	5.23	9-22-59		
	36cd2	-----do-----	-----	L Du	20	36	W	G	Qt	CY S	7.14	7-22-59	
13-15-	1ca1	Keith Boyston	1947	L Dr	20	4	---	G,S	Qal	J D	15	8- 7-59	
	1ca2	-----do-----	1949	L Dr	30	4	P	G	Qal	J S	15	8- 7-59	
	1ca3	-----do-----	1949	L Dr	20	4	P	G	Qal	CY S	15	8- 7-59	
	1cd	-----do-----	-----	S Dr	1,688	5	---	-----	Kk	F D	-----	5-28-64	20 gpm reported
	11bc	W. K. Turner	---- H Sp	-----	--- Sh	Ktcc	F S	-----	8-21-61	1/4 gpm estimated			
	11bd	Kenneth Turner	1955	L Du	3-4	12	C	G	Ktcc	J D	8	7-29-59	
	12ba	Keith Boyston	---- L Du	25.5	18	P	G	Qt	C In	24.69	3-29-61		
	12dc	Verz Ruth Gorman	---- H Dr	55.2	6	P	G	Qt	N N	44.22	8- 2-61		

13dd1	Manford Hannah	1952	--	Dr	460	4	P	Sa	Kc	CY	S	90-100	7-30-59			
13dd2	-----do-----	1938	--	Du	30	4	C	Sa	Kc	C	D	25	7-30-59			
13dd3	-----do-----	1917	--	Du	30	4	R	Sa	Kc	CY	S	25	7-30-59			
15cc	Alex and Johanna Hritasco	-----	S	Sp	-----	-----	---	G	Qal	F	S	-----	8-22-61	20 gpm estimated		
17aa1	O. A. Nasing	1952	H	Dr	1,975	2	P	----	Kc	F	D,S	-----	7-29-59	5 gpm reported		
17aa2	-----do-----	1939	H	Dr	65	6	P	Sh	Kccc	CY	N	15,20	7-29-59			
17aa3	-----do-----	-----	S	Du	15.3	36	C	G,Clb	Kccc	N	O	2,72	7-29-59			
22dc	Fred or Ethel Biehl	-----	H	Sp	-----	-----	---	Sh	Kccc	F	S	-----	8-22-61	1 gpm estimated		
23cc	Alex Hritasco	1940	L	Du	10	48	C	G	Qal	C	D	7	7-29-59			
23db	Wm. S. Gaugler	1932	S	Dr	14.2	6	N	G	Qt	N	O	12.26	7-29-59			
25cc	James Wichman	-----	S	Du	10.2	42	W	S,G	Qal	CY	S	2,59	7-15-59			
26ab	Wm. S. Gaugler	1950	--	Dr	40	96	N	----	Qal	J	D,S	-----	7-29-59			
26cc	-----do-----	-----	L	Dr	24.1	8	P	S,G	Qal	CY	S	6,50	7-29-59			
26cd1	Ida and Mabel Huether	-----	S	Du	26.0	48	---	G	Qal	CY	O	17,94	7-23-59			
26cd2	F. C. Biehl	-----	H	Du	21.7	48	---	G	Qal	C	D,I	15,10	7-23-59			
26cd3	Wm. S. Gaugler	-----	L	Du	22.3	48	W	S,G	Qal	CY	S	13,33	7-23-59			
26cd4	-----do-----	-----	S	Du	20.9	36	P	G	Qal	N	N	14,28	7-29-59			
26cd5	Ida and Mabel Huether	-----	S	Du	22.8	48	---	G	Qal	CY	N	16,51	7-23-59			
31bd	E. O. Johnson	-----	H	Sp	-----	-----	---	G	Qt	F	S	-----	8-28-61			
32ad	L. G. Philpott	-----	S	Du	25.1	54	C	G	Qt	N	O	7,09	7-24-59			
34aa1	Lao J. Horan	1915	L	Du	26	36	C	Sh	Qal	CY	S	7-12	7-23-59			
34aa2	-----do-----	1919	L	Du	37	36	C	Sh	Qal	C	D	7-12	7-23-59			
34aa3	-----do-----	1953	L	Dr	45	8	P	Sh	Qal	J	S	12	7-23-59			
35bb1	-----do-----	1911	L	Du	25	36	C	G	Qal	CY	D	10-15	7-23-59			
35bb2	-----do-----	1910	L	Du	20.0	36	C	G	Qal	CY	S	13,37	7-23-59			
36bb1	James Wichman	-----	S	Du	19.6	36	C	S,G	Qal	CY	O	9,68	7-15-59			
36bb2	-----do-----	1953	H	Dr	50-75	4	P	----	Kccc	J	D,S	-----	7-15-59			
13-16-1ba	J. Marvin	-----	L	Dr	127.7	5	P	G,Sh	Qt, Kccc	CY	O	69,99	7-20-59			
2bc	Mrs. J. H. Johnston	-----	L	Dd	215	24	R,P	G	Kccc	CY	D	75	7-16-59			
4aa	Ted Bradley	-----	L	Du	103.4	36	C	G	Qt	CY	O	95,27	8- 4-59			
7aa	Mrs. John Hickey	1947	S	Dr	50	3	P	Sh	Kccc	C	D	10	8- 4-59			
8aa	-----do-----	-----	S	Du	22.9	36	R	Sh	Qt	N	O	19,33	7-31-59			
11cb1	Wilmer Hertel	-----	L	Du	69.3	30	C	G	Qt	T	N	65,02	7-16-59			
11cb2	-----do-----	1949	L	Dr	270	4	P	Sa	Kccc	CY	D,S	5	8- 6-59			
12ab	Max Hertel	-----	L	Dr	250	2	P	----	Qt	CY	D,S	-----	8- 5-59			
12bd	Paul Asparig	-----	L	Du	33.2	36	C	G	Qt	CY	D	27,30	8- 5-59			
15aa	Trout Creek S. D. 10	-----	L	Du	55.4	48	---	G	Qt	CY	D,O	51,68	7-13-59			
15ca	Wilmer Hertel	1919	S	Du	12	30	C	G	Qal	Pt	D	8	8- 6-59			
15dd	J. Hannah	1951	S	Dr	195	6	P	Se	Kccc	J,F	D,S	-----	8- 6-59	4 or 5 gpm yield		
17aa	Barton Wright	1934	S	Du	22	60	R	Sa	Kccc	Pt	D,S	12	8- 4-59			
18dd	Daniel Borchmann	1907	L	Du	28	48	---	G	Qt	CY	D	-----	7- 3-59			
19bb	Ronald Nelson	1937	L	Dr	112	4	P	----	Kccc	J	D,S	62.5	7-30-59			
19da1	Louis Serucek	1952	L	Dr	560	4	P	----	Kc	S	S	130	8- 4-59			
19da2	-----do-----	1900	L	Du	47.1	48	W	G	Qt	J	D	44,13	8- 4-59			
20ab	Manford Hannah	1952	S	Dr	30	4	P	Se	Kccc	CY	S	25	7-30-59			
20bb	Louis Serucek	1915	S	Du	26.3	48	W	G	Qt	CY	O	20,48	7-30-59			
23bb	Charles Thomas	1950	S	Du	13	36	C	G	Qal	J	D	7.5	8- 6-59			
23cc	Herbert E. Hart	1949	S	Du	24.8	96	R	G	Qal	C	D,O	15,18	8- 6-59			
26ad	Clyde Thomas	1906	S	Du	14.1	30	R	Se	Je	J*	D	8.86	8- 6-59	*Hydraulic ram for emergency use		
26cd1	Max Hertel	1948	S	Dr	107	5	P	Sh	Je	J	D,I	17	8- 6-59			
26cd2	-----do-----	1930	S	Du	27	48	R	Cl,Sh	Je	CY	S	10	8- 6-59			
30dc	Roland Wright	1902	L	Du	20.4	36	R	S,G	Qal	J	D,S	8.45	7-14-59			
32bd1	O. K. Birch	1956	S	Dr	1,700+	4	P	Se	Kc	F	D	-----	7-14-59	4 or 5 gpm reported		
32bd2	-----do-----	-----	L	Du	17.6	36	R	G	Qal	J	D	6.04	7-14-59			
32bd3	-----do-----	-----	L	Du	9.4	24	W	G	Qal	J	S	4,77	7-15-59			
35bc1	Walter O'Brien	1935	S	Du	35-45	48	N	Se	Je	J	D	10	7-15-59			
35bc2	-----do-----	1947	S	Dr	90	4	P	Se	Je	CY	S	12-15	8- 5-59			
13-17-6bb	J. Marvin	-----	L	Du	97.7	-----	Pl	G	Qt	J	S	89.83	7-20-59			
18bb	Manfred Hannah	1900	--	Dr	52.9	3	P	Cl	Kc	N	O	28.53	7-30-59			
14-11-1ac	-----do-----	-----	H	Sp	-----	-----	---	Se	Jm	F	S	-----	8-21-63	5 gpm estimated		
2bc	C. E. Lillegard	-----	U	Sp	-----	-----	---	Ir	Ti	F	S	-----	7-29-63	10 gpm estimated		
2cb1	-----do-----	-----	U	Sp	-----	-----	---	La,Sh	Mo	F	D,S	-----	7-29-63	1 gpm estimated		
2cb2	-----do-----	-----	U	Sp	-----	-----	---	La,Sh	Mo	F	S	-----	7-29-63	200 gpm estimated		
3ab	-----do-----	-----	U	Sp	-----	-----	---	La,Sh	Mo	F	S	-----	7-29-63	75 gpm estimated		
3bb	-----do-----	-----	H	Du	8	60	C	La,Cl	Mk	J,F	D,S	-----	7-26-63			
4ca	Percy Goyin	-----	U	Sp	-----	-----	---	Se	Mk	F	S	-----	7-25-63	10 gpm estimated		
4cb	-----do-----	-----	S	Sp	-----	-----	---	-----	Mk	F	S	-----	7-25-63	30 gpm estimated		
5ad1	-----do-----	-----	H	Sp	-----	-----	---	-----	Mk	F	S	-----	7-25-63	8 gpm estimated 43°F		
5ad2	-----do-----	-----	H	Sp	-----	-----	---	-----	Ir	Ti	F	S	-----	7-25-63	5 gpm estimated	
5da	-----do-----	-----	H	Sp	-----	-----	---	-----	Ir	Ti	F	S	-----	7-25-63	5 gpm estimated 45°F	
6cb	U.S. Forest Service	-----	C	Sp	-----	-----	---	G	Qal	F	S	-----	9-24-63	1,000 gpm estimated		
12ad	Sarah Walker	-----	H	Sp	-----	-----	---	Se	Em	F	S	-----	8-21-63			
13aa	Hughes Livestock	-----	H	Sp	-----	-----	---	-----	Ir	Ti	F	S	-----	10-31-63	1 gpm estimated	
13dd	-----do-----	-----	U	Sp	-----	-----	---	-----	Sh	Mh	F	S	-----	10-31-63	1 gpm estimated	
22bc	U.S. Government	-----	H	Sp	-----	-----	---	-----	La,Ir	Mh	F	S	-----	9-28-63	1 gpm estimated	
23cd1	Henry Evans	-----	H	Sp	-----	-----	---	-----	Ir	Ti	F	S	-----	9-23-63	4 gpm estimated	
23cd2	-----do-----	-----	H	Sp	-----	-----	---	-----	La,Ir	Ti,Mo	F	S	-----	9-23-63	2 gpm estimated	
23cd3	-----do-----	-----	H	Sp	-----	-----	---	-----	La,Ir	Ti,Mo	F	S	-----	9-23-63	7 gpm estimated	
24bc	Hughes Livestock Co.	-----	U	Sp	-----	-----	---	-----	C,La	Mo	F	S	-----	10-31-63	10 gpm estimated	
24ca1	Henry Evans	-----	S	Sp	-----	-----	---	-----	C,La	Mo	F	S	-----	10-31-63	20 gpm estimated	
24ca2	-----do-----	-----	S	Sp	-----	-----	---	-----	G	Qal	F	S	-----	10-31-63	30 gpm estimated	
25bc	Hughes Livestock Co.	-----	H	Sp	-----	-----	---	-----	La	Em	F	S	-----	10-31-63	5 gpm estimated	
25da1	-----do-----	-----	H	Sp	-----	-----	---	-----	La	Em	F	S	-----	10-31-63	4 gpm estimated 42°F	
25da2	-----do-----	-----	H	Sp	-----	-----	---	-----	La	Em	F	S	-----	10-31-63	15 gpm estimated	
26bd	Henry Evans	-----	C	Sp	-----	-----	---	-----	-----	Ti	F	S	-----	9-20-63	5 gpm estimated	
26cb	-----do-----	-----	C	Sp	-----	-----	---	-----	-----	Ti	F	S	-----	9-20-63	1 gpm estimated	
26cc	-----do-----	-----	C	Sp	-----	-----	---	-----	-----	Ir	Ti	F	S	-----	9-20-63	3 gpm estimated 49°F

26db1	-----do-----	----	C	Sp	-----	----	----	----	Ir	Ti	F	S	----	9-20-63	2	gpm estimated
26db2	-----do-----	----	C	Sp	-----	----	----	----	Ir	Ti	F	S	----	9-20-63	1	gpm estimated
26db3	-----do-----	----	C	Sp	-----	----	----	----	Ir	Ti	F	S	----	9-20-63	5	gpm estimated 45°F
33bc	U.S. Forest Service	----	H	Sp	-----	----	----	----	La	Mm	F	S	----	9-13-63	1	gpm estimated
34db	Julian Rogers	----	H	Sp	-----	----	----	----	Ir	Ti	F	S	----	9-12-63	3	gpm estimated
35bd	-----do-----	----	H	Sp	-----	----	----	----	La, Sh	Mo	F	S	----	9-12-63	5	gpm estimated
36ca	Montana State	----	H	Sp	-----	----	----	----	La	EMa	F	S	----	9-12-63	5	gpm estimated
14-12-	1ac1 Milton Knutson	----	C	Sp	-----	----	----	----	G	Ktcc	F	S	----	8-30-63		
	1ac2 -----do-----	----	C	Du	-----	4			P	G	Ktcc	CY	N	8-30-63		
	2ab1 Larson Bros.	----	L	Du	-----	4	2		P	S, G	Ktcc	J	D	2	8-22-63	
	2ab2 -----do-----	----	H	Sp	-----	----	----	----		S, G	Qal	F	S	----	30	gpm estimated
	2ad -----do-----	----	L	Sp	-----	----	----	----		S, G	Qal	F	S	----	15	gpm estimated
	2ca1 H. S. Larson	----	L	Dr	-----	700+	4		P	Se	Kk	C	D, S	40	8-22-63	
	2ca2 -----do-----	----	L	Du	-----	10.4	48		C	G	Qal	Pt	D	7.78	9- 4-63	
	2cc School	----	L	Du	-----	20.6	48		C	G	Qal	N	O	14.73	9-21-62	
	2dc1 Dane Walker	----	H	Dr	-----	20				Se	Kk	CY, C	D		8-23-63	
	2dc2 -----do-----	----	H	Du	-----	16.7	60		C	G	Kk	J	D	12.48	8-23-63	
	2dd1 -----do-----	----	L	Sp	-----	----	----	----		S, G	Qal	F	S	----	8-23-63	
	2dd2 -----do-----	----	S	Du	-----	21.0	60		C	G	Qal	CY	S	11.13	8-23-63	
	3ba1 Mels Nelson	----	C	Sp	-----	----	----	----		Se	Kk	F	S	----	8-20-63	8 gpm estimated 46°F
	3ba2 -----do-----	----	C	Sp	-----	----	----	----		Se	Kk	F	D, S, I	----	8-20-63	10-12 gpm estimated
	4aa -----do-----	----	H	Sp	-----	----	----	----		Se	Kk	F	S	----	8-20-63	1 gpm estimated
	4ab -----do-----	----	C	Sp	-----	----	----	----		Se	Kk	F	S	----	8-20-63	4 gpm estimated
	4bc -----do-----	1945	C	Dr	-----	235	2		P	----	Kk	F	S	----	8-20-63	1 gpm estimated
	5bb Albert and William Kotchivar	----	U	Sp	-----	----	----	----		Se	Kk	F	S	----	8- 7-63	1 gpm estimated 47°F
	5ca -----do-----	----	C	Dr	-----	----	----	----		C	Jm	F	S	----	9-26-63	10 gpm estimated
	5cb -----do-----	----	U	Sp	-----	----	----	----		Se	Kk	F	S	----	9-26-63	1 gpm estimated
	7ab -----do-----	----	C	Sp	-----	----	----	----		Se	Kk	F	S	----	9-29-63	4 gpm estimated
	7bc -----do-----	----	C	Sp	-----	----	----	----		La, Se	Ca	F	S	----	9-27-63	1 gpm estimated
	7db -----do-----	----	H	Sp	-----	----	----	----		La	Kk	F	S	----	9-26-63	1/2 gpm estimated
	8bc -----do-----	----	H	Sp	-----	----	----	----		Se	Jm	F	S	----	9-26-63	5 gpm estimated
	8ca P. L. Matrovich	----	H	Sp	-----	----	----	----		Se	Jm	F	S	----	8-28-63	1 gpm estimated
	8db -----do-----	----	S	Du	-----	23	48		C	G, Se	Qal	CY	S	16-18	8-28-63	
	9dc Albert Rosman	----	S	Sp	-----	----	----	----		G	Kk	F	D, S	----	6-29-59	10 gpm estimated 45°F
	10aa Henry Larson	----	L	Du	-----	22.4	60		C	G	Qal	CY, C	N	17.94	8-22-63	
	10cc Albert Rosman	----	U	Sp	-----	----	----	----		Se	Kk	F	S	----	8-28-63	
	10cd -----do-----	----	U	Sp	-----	----	----	----		Se	Kk	F	D, S	----	8-28-63	1 gpm estimated 45°F
	10dc -----do-----	----	U	Sp	-----	----	----	----		Se	Kk	F	S	----	8-28-63	5 gpm estimated
	11bc Larson Bros.	----	U	Sp	-----	----	----	----		S, G	Qal	F	S	----	8-22-63	
	11dc Frank Humphrey	1961	U	Dr	-----	32	6		P	Se	Kk	CY, F	S	----	8-26-63	Very small flow
	14ab P. L. Matrovich	----	U	Sp	-----	----	----	----		Se	Kk	F	I	----	8-28-63	30 gpm estimated 46°F
	14ba -----do-----	----	U	Sp	-----	----	----	----		Se	Kk	F	D, S	----	8-28-63	20 gpm estimated 46°F
	14be1 Frank Humphrey	----	U	Sp	-----	----	----	----		Se	Kk	F	D, S	----	8-26-63	4 gpm estimated
	14be2 -----do-----	1962	U	Dr	-----	135	5 1/2		P	Se	Kk	S	S, I	50	8-26-63	
	15bc Arnold Smith	----	U	Sp	-----	----	----	----		Se	Kk	F	S	----	9- 3-63	5 gpm estimated
	15bd -----do-----	----	U	Du	-----	25.2	36		C	Se	Kk	J	D	16.38	8-30-63	
	17ad Vera Watson	----	H	Sp	-----	----	----	----		Se	Kk	F	S	----	8-29-63	2 gpm estimated 52°F
	19bb Hughes Livestock Co.	----	H	Sp	-----	----	----	----		Se	EMa	F	S	----	10-31-63	3 gpm estimated
	19bc1 -----do-----	----	U	Du	-----	16.4	24		C	La	EMa	C	D	10.39	7-31-63	
	19bc2 -----do-----	----	C	Sp	-----	----	----	----		Se	EMa	F	S	----	7-31-63	20 gpm estimated
	20ca Ratar Matrovich	----	C	Sp	-----	----	----	----		La	EMa	F	S	----	9- 3-63	15 gpm estimated
	21ac Arnold Smith	----	U	Sp	-----	----	----	----		Se	Jm	F	S	----	9- 3-63	20 gpm estimated, 47°F
	21ad -----do-----	----	U	Sp	-----	----	----	----		Se, La	Jm	F	S	----	9- 3-63	
	21da P. L. Matrovich	----	U	Sp	-----	----	----	----		Se	Jm	F	S	----	8-28-63	4 gpm estimated
	22ad -----do-----	----	U	Dr	-----	78.1	6		P	Se	Jm	CY	N	28.92	8-28-63	
	22bd Arnold Smith	----	U	Sp	-----	----	----	----		Se, La	Jm	F	S	----	9- 3-63	7 gpm estimated 46°F
	23aa Frank Humphrey	1932	U	Dr	-----	93±2	5		P	Se	Kk	CY	S	31.70	6-29-59	
	23ab -----do-----	1961	U	Dr	-----	90	6		P	Se	Kk	CY	S	20	8-26-63	
	26da E. H. Bodley	----	U	Sp	-----	----	----	----		Se	Je	F	S	----	7-22-63	1 gpm estimated
	27bd Roy Keating	----	C	Sp	-----	----	----	----		Se	EMa	F	S	----	9- 5-63	2 gpm estimated
	29cc Sarah Walker	----	U	Sp	-----	----	----	----		La	EMa	F	S	----	9- 5-63	3 gpm estimated 48°F
	29cd Henry Larson	----	H	Sp	-----	----	----	----		La	EMa	F	S	----	9- 5-63	1 gpm estimated
	30bb P. L. Matrovich	----	H	Sp	-----	----	----	----		La	EMa	F	S	----	8-28-63	1 gpm estimated 45°F
	31ac1 Hughes Livestock Co.	----	H	Sp	-----	----	----	----		Se	EMa	F	S	----	9-19-63	10 gpm estimated
	31ac2 -----do-----	----	H	Sp	-----	----	----	----		La	EMa	F	S	----	9-19-63	15 gpm estimated 45°F
	31ad -----do-----	----	U	Sp	-----	----	----	----		Se, Sh	EMa	F	S	----	9-19-63	2 gpm estimated
	32db -----do-----	----	H	Sp	-----	----	----	----		Se	ld	F	S	----	9-19-63	7 gpm estimated
	34bc Raymond Swans	----	C	Sp	-----	----	----	----		La	EMa	F	S	----	9- 4-63	10 gpm estimated
	34da Charles Waite	----	U	Du	-----	6.6	36		C	R	ld	B	S	5.60	9-11-63	
	35bc -----do-----	----	H	Sp	-----	----	----	----		La	EMa	F	S	----	9-11-63	15 gpm estimated
14-13-	6bc Milton Knutson	----	U	Sp	-----	----	----	----		G	Ktcc	F	S	----	8-30-63	1 gpm estimated
	15cc1 J. E. Sommons	----	L	Du	-----	30	40		R	G	Qal	J	D, S	20	8- 5-60	
	15cc2 -----do-----	----	L	Sp	-----	----	----	----		G	Qal	F	S	----	8- 5-60	1 gpm estimated
	15cd -----do-----	----	L	Sp	-----	----	----	----		G	Qal	F	S	----	8- 5-60	
	16cc Utica Women's Club	1959	L	Dr	-----	515	2		P	Se	Kk	F	D	----	11- 7-62	
	19cc Roy Keating	----	U	Sp	-----	----	----	----		Se	Jm	F	S	----	9- 5-63	
	21aa Lear Flanagan	----	L	Dr	-----	6.3	8		T	G	Qal	CY	N	2.40	8- 8-60	
	21db Ray Swans	1958	L	Du	-----	10.1	36		C	G	Qal	VC	S	8.65	8- 9-60	
	21dc -----do-----	----	L	Du	-----	15	48		R	G	Qal	J	D	11	8- 9-60	
	22aa1 J. K. McCollum estate	----	U	Sp	-----	----	----	----		G	Qal	F	S	----	8- 5-60	2 gpm estimated
	22aa2 -----do-----	----	L	Sp	-----	----	----	----		G	Qal	F	S	----	8- 5-60	1 1/2 gpm estimated
	22ab Elmer Isurman	----	L	Sp	-----	----	----	----		G	Qal	F	S	----	8- 5-60	15 gpm estimated
	22ac -----do-----	----	L	Dr	-----	55	5		P	G	Qal	J	D	----	8- 5-60	
	22bb Lear Flanagan & Sons	----	L	Sp	-----	----	----	----		G	Qal	F	S	----	8-18-60	200 gpm estimated 50°F

23bb1	James McCollum	----	L	Du	20	48	P	G	Qal	C	D	----	8-5-60	
23bb2	-----do-----	1953	L	Dr	45.0	5	P	G	Qal	C	S	10.74	8-5-60	
24ab	W. K. French	----	L	Du	6	2	P	C	Qal	J	D	----	8-4-60	
24ba1	-----do-----	----	H	Du	12	42	R	G	Qal	J	D,S	3	8-4-60	
24ba2	E. H. Bodley	----	L	Du	11.6	36	C	G	Qal	C	D	11.05*	8-4-60	*pumping
24bd	W. K. French	----	L	B	7.9	12	P	G	Qal	P	S	6.14	8-4-60	
24cb	-----do-----	----	S	Sp	-----	-----	---	G	Qal	F	S	----	8-4-60	4 gpm estimated
26cd	-----do-----	----	H	Dr	258.0	6	P	Se	Kk	CY	N	6.64	8-4-60	
27dc	-----do-----	1961	L	Du	10	-----	N	Sh	Kk	N	S	5 *	8-17-61	* estimated; Pit dug by bulldozer
28dd1	Ray Swann	----	L	Du	12.6	48	R	Sa	Kk	C	N	9.21	8-9-60	
28dd2	-----do-----	----	L	Du	13.4	60	R	Sa	Kk	P	N	10.46	8-8-60	
30ab	Roy Keating	1962	H	Dr	100	2	P	Se	Ja	F	S	----	7-22-63	49°F
30bc	Bodley-Kilham	----	H	Dr	-----	-----	---	Sa	Ja	S	S,I	----	9-8-63	
32cd	Wertheimer Ranch	----	C	Sp	-----	-----	---	Sa	Kk	F	S	----	9-22-60	1/8 gpm estimated
33bb	Ray Swann	----	C	Sp	-----	-----	---	Sa	Kk	F	S	----	8-9-60	1 gpm estimated
33da	Anton Rosman	----	L	Dr	53.3	6	P	Se	Kk	J,CY	D,S	27.42	8-8-60	
14-14-1bc	Gilkey Livestock Co.	----	H	Sp	-----	-----	---	G	Qe	F	D,S	----	7-5-60	70 gpm estimated
1cc	Thomas Brading	----	L	Du	10.7	48	P	G	CY	D	5.21	7-6-60		
1da1	Earl Grove	----	L	Du	9.0	24	P	G	Qe	J	D	5.08	7-5-60	
1da2	-----do-----	----	L	Du	8.8	18	P	G	Qe	N	D,I	5.10	7-5-60	
1dd1	Henry Nygren	----	H	Dr	42.0	4	P	G	Qe	J	D	18.93	7-5-60	
1dd2	Gilkey Livestock Co.	----	L	Dr	60	6	P	C	Qe	C	D	6	7-5-60	Wall buried
10bd	D. N. Hitch	----	L	Sp	-----	-----	---	G	Qal	F	S	----	7-7-60	25 gpm estimated
10ca1	-----do-----	1910	L	Du	12	48	R	G	Qal	J,CY	D,S	9	7-7-60	
10ca2	-----do-----	1909	L	Du	12.3	60	R	G	Qal	N	C	9.96	7-7-60	
10da1	-----do-----	----	H	Sp	-----	-----	---	G	Qe	F	S	----	7-7-60	40 gpm estimated
10da2	-----do-----	----	H	Sp	-----	-----	---	G	Qe	P	S	----	7-7-60	150 gpm estimated
11ac	Samuel Schiess	----	H	Sp	-----	-----	---	G	Qe	F	D,S	----	7-6-60	60 gpm estimated
11bd	-----do-----	----	H	Sp	-----	-----	---	G	Qe	F	D,S	----	7-6-60	
11cb1	D. N. Hitch	----	H	Sp	-----	-----	---	G	Qe	F	S	----	7-6-60	40 gpm estimated
11cb2	-----do-----	----	C	Sp	-----	-----	---	G	Qe	F	S	----	7-7-60	30 gpm estimated
12aa1	Mrs. T. Nicholson	----	H	Du	11.4	24	C	G	Qe	Pt	I	0.49	7-5-60	
12aa2	Henry Nygren	----	H	Sp	-----	-----	---	G	Qe	F	I	----	6-30-60	20 gpm estimated
12ab	Gilkey Livestock	----	H	Sp	-----	-----	---	G	Qe	F	D,S	----	7-5-60	
13bb	Carl Wauer	----	L	Du	20	36	C	G	Qe	Pt,CY	S	16	6-30-60	
13bc	-----do-----	----	H	Sp	-----	-----	---	G	Qe	F	S	----	6-30-60	1/2 gpm estimated
13bd1	Ray Dirksen	1949	L	Dr	65	7	P	G	Qe	J	D,S	5	6-30-60	
13bd2	-----do-----	----	H	Sp	-----	-----	---	G	Qe	F	S	----	6-30-60	200 gpm estimated
13bd3	-----do-----	----	H	Sp	-----	-----	---	G	Qe	F	S	----	6-30-60	
14ad	Ray Ludeman	----	H	Sp	-----	-----	---	G	Qe	F	S	----	7-6-60	1/2 gpm estimated
14db1	-----do-----	1916	L	Du	10.0	42	C	G	Qe	C,CY	D	5.69	7-6-60	
14db2	-----do-----	----	S	Sp	-----	-----	---	G	Qe	F	S	----	7-6-60	1 gpm estimated
17ab	Mrs. R. W. Brading	----	L	Du	14.5	24	W	G	Qe	J,CY	D	10.20	7-14-60	
18ac	-----do-----	----	H	Sp	-----	-----	---	G	Qal	F	S	----	7-15-60	500 gpm estimated
19aa	Ray Dirksen	----	L	Du	22.5	60	R	G	Qe	N	N	13.90	7-19-60	
21aa	Peter Nielsen	1907	L	Du	60±5	4	C	Se	Ktcc	J	D,S	58±2	6-29-59	
21ba	D. N. Hitch	----	L	Dr	107.6	4	P	Sh	Ktcc	CY	S	53.85	7-8-60	
22aa	Lubin Dirksen	----	L	Du	16.2	72	C	G	Qe	H	N	16	7-7-60	
23ac1	M. J. McDonald	----	L	Du	12.3	-----	---	G	Qe	J	D	8.83	7-7-60	
23ac2	-----do-----	----	H	Sp	-----	-----	---	G	Qe	F	S	----	7-7-60	1/4 gpm estimated 48°F
23ba	George Bleaker	----	C	Sp	-----	-----	---	G	Qe	F	S	----	7-8-60	1/8 gpm estimated
24ab1	Joe Jovan	1926	L	Du	9.4	24	C	G	Qe	C	D	4.08	6-28-60	
24ab2	-----do-----	----	L	Du	8	24	C	G	Qe	C	D	5	6-28-60	
24ab3	-----do-----	----	L	Du	8	24	C	G	Qe	----	S	5	6-28-60	
24ab4	-----do-----	----	S	Sp	-----	-----	---	G	Qe	F	I,F	----	6-28-60	
24bd1	Harry Pospisil	1958	S	Du	11.9	60	C	G	Qe	J	D	7.37	6-29-60	
24bd2	-----do-----	----	S	Du	16.1	60	R	G	Qe	CY	S	3.47	6-29-60	
24db	Joe Hoven	----	H	Sp	-----	-----	---	G	Qe	F	S	----	6-28-60	10 gpm estimated
26bb1	R. C. Fullbright	----	S	Sp	-----	-----	---	G	Qe	F	S	----	7-13-60	1/4 gpm estimated
26bb2	-----do-----	----	H	Sp	-----	-----	---	G	Qe	F	S	----	7-13-60	
26cd	Robert Sayers	----	S	Du	2.9	16	P	G	Qco	N	O	2.22	9-20-60	
27aa	R. C. Fullbright	----	L	Du	35.0	-----	---	G	Qe	J	D	11.48	7-13-60	
27cc	-----do-----	----	S	Sp	-----	-----	---	G	Qe	F	S	----	7-13-60	20 gpm estimated
28bb	Mika Fatte	----	L	Du	33.3	36	C	S,G	Qe	C	O	25.97	7-24-59	
28da	Robert Wiggin	----	H	Dr	65	6	P	----	Ktcc	J	D	----	7-8-60	
28dd	-----do-----	----	S	Sp	-----	-----	---	G	Qe	F	S	----	7-8-60	5 gpm estimated
29aa	-----do-----	----	L	Dr	66.0	6	P	G	Qe	CY	S	18.53	7-8-60	
32cc1	Jules Henke	----	L	Du	13.3	72	C	G	Qe	Pt	D	19.70	7-19-60	
32cc2	-----do-----	----	L	Sp	-----	-----	---	G	Qe	F	S	----	7-19-60	
35ad	E. J. Pittenger	1956	S	Du	14	48	C	G	Qe	Pt	D,S	----	6-30-60	
36ac	P. J. Hoven	1958	H	Dr	1,335	2	P	Sa	Kk	F	S	----	6-27-60	6 gpm measured
14-15-5cb	Great Northern Railway	----	H	Sp	-----	-----	---	G	Qe	F	S,I	----	8-7-61	10 gpm estimated
6ca1	Nellie Nicholson	1960	L	Dr	16.1	8	P	G	Qe	Pt	D	5.34	7-8-60	
6ca2	Town of Hobson	----	L	Du	10.5	60	R	G	Qe	C	I,O	6.41	7-14-60	Park, ice rink
6db1	Great Northern Railway	----	L	Du	-----	36	T	G	Qe	CY	S	----	7-5-60	
6db2	-----do-----	1907	L	Dr	605	8	P	Sa	Ktcc	F	N	----	-----	Formerly used; 13 gpm flow reported
7ba1	Mattie Phillips	----	L	Du	20.4	60	N	G	Qe	J	D	13.87	7-1-60	
7ba2	Charles Dirksen	----	L	Du	19.1	60	N	G	Qe	J,CY	D	12.10	7-1-60	
7ba3	Mrs. A. Loebach	----	L	Du	25	60	---	G	Qe	J,CY	D	4 or 5	7-5-60	
7ba4	V. C. Reimers	----	L	Du	17.9	36	R	G	Qe	J	D	9.45	7-1-60	
7ba5	John Boyd	----	L	Du	18.8	48	R	G	Qe	Pt	S	8.97	7-1-60	
7bb	Charles Nicholson	----	L	Du	19.9	36	C	G	Qe	CY	S	13.14	7-1-60	
8bc	Great Northern Railway	----	H	Sp	-----	-----	---	G	Qe	F	N	----	8-7-61	5 gpm estimated
8cb	Jamie Stevenson	----	H	Sp	-----	-----	---	G	Qe	F	D,S	----	6-29-60	60 gpm estimated
11ca	Walter O'Brien	----	C	Sp	-----	-----	---	G	Qe	F	S	----	8-8-61	15 gpm estimated
11db	-----do-----	----	C	Sp	-----	-----	---	G	Qe	F	S	----	8-8-61	

13cd1	-----do-----	----	L	Dr	23.3	5	F	G	Qc	CY	S,O	5.51	7-	2-59	
13cd2	-----do-----	----	L	Dr	18.1	6	P	G	Qc	T	S	4.88	7-	2-59	
13cd3	-----do-----	----	L	Du	9.2	48	R	G	Qc	CY	N	7.19	7-	2-59	
18aa	Virgil and Leo McDonnell	----	H	Du	18.7	40	C	G	Qc	CY	N	14.09	6-	29-60	
18bb1	W. K. Turner	----	H	Sp	-----	-----	--	G	Qc	F	S	----	6-	29-60	
18bb2	-----do-----	----	H	Sp	-----	-----	--	G	Qc	F	S	----	6-	29-60	10 gpm estimated
18dd	P. J. Hoven	1954	U	Dr	1,240	2	P	Se	Kk	F	D,S	----	6-	27-60	5 gpm reported
19bc	R. P. Matsinger	-----	H	Sp	-----	-----	--	G	Qc	F	N	----	6-	28-60	Flows only in fall and spring
19ca1	-----do-----	1952	H	Dr	430	6	P	Se	Ktcc	F	D	----	6-	28-60	2 1/2 gpm estimated
19ca2	-----do-----	1958	H	Dr	1,335	2	P	Se	Kk	F	S	----	6-	28-60	15 gpm estimated
14-15-20aa	P. J. Hoven	----	C	Sp	-----	-----	--	G	Qc	F	S	----	6-	27-60	1 gpm estimated
20dc	Kester Miller	-----	L	Dr	-----	8	P	Se	Kk	F	N	----	8-	20-59	10-15 gpm reported
23ba1	Harold Looney	-----	L	Du	10	36	R	G	Qc	P	D	8	7-	2-59	
23ba2	-----do-----	-----	L	Du	10	36	R	G	Qc	CY	S	8	7-	2-59	
24ca	-----do-----	-----	L	Dr	36.1	8	P	G	Qc	N	O	5.94	4-	13-61	
26dd	Kenneth Boyston	----	L	Du	8.6	48	C	G	Qc	P	O	6.43	8-	6-59	
28ba	Kester Miller	1930	S	Dr	360-380	3	P	Se	Ktcc	F,C	D,S	----	8-	20-59	2 gpm reported
28cb	Jamie Stevenson	1957	S	Dr	1,200+	2	P	Se	Kk	F	S	----	8-	7-59	5-8 gpm flow
29bb	-----do-----	1958	S	Dr	-----	-----	--	Se	Ktcc	F	N	----	6-	27-60	1 gpm leakage
30aa	-----do-----	1938?	H	Dr	-----	-----	--	Se	Ktcc	F	S	----	6-	27-60	20 gpm estimated
31cc	P. J. Hoven	----	C	Sp	-----	-----	--	Sh	Ktcc	F	S	----	6-	27-60	3 gpm estimated
32aa	U.S. Government	----	S	Du	16.8	42	C	Sh	Ktcc	N	N	9.80	7-	30-59	
33cd	W. K. Turner estate	-----	H	Sp	-----	-----	--	Sh	Ktcc	F	S	----	8-	16-61	
35aa1	E. Peterson	-----	S	Du	8	72	R	G	Qc	C	D	6	8-	7-59	
35aa2	V. E. Kent	-----	L	Du	-----	36	--	S,G	Qc	J	D	----	8-	6-59	
35aa3	E. Peterson	-----	L	Du	15-20	60	R	S,G	Qc	C	S	4-5	8-	7-59	
14-15- 9dd	Earl and Gertrude McGinnis	----	U	Du	106+	72	N	----	Qc	CY	N	29.33	6-	11-47	
11dd	Leo Couiter	----	L	Du	32.7	44	N	G	Qc	CY	S,O	24.04	8-	5-59	
13dc	T. J. Walker	1936	L	Du	40	44	N	S	Qc	CY	D,S	37-38	8-	20-59	
13dd	Wm. Serucek	1949	L	Du	16.1	36	P	G	Qc	CY	S,O	10.00	8-	4-59	
14dd	Edward Kolar	----	L	Du	32.1	48	N	G	Qc	CY	D,S	28.34	8-	4-59	
15ab1	R. E. Hruska	1908	--	Du	29.7	36	C	G	Qc	J	D	22.69	7-	27-59	
15ab2	-----do-----	1908	--	Du	24	36	N	G	Qc	N	D	14.54	7-	27-59	
15bb	J. J. Pospisil	-----	U	Du	38.5	48	C	S,G	Qc	CY	D,I,O	34.95	10-	31-50	
15cb	Town of Moore	1910	U	Du	60	120	C	G	Qc	T	P	55	7-	15-59	
15dc	Cemetery	----	U	Du	41.9	36	C	G	Qc	CY	I	41.2 *	7-	27-61	* estimated
18ab	Dula Bowman	1958	--	Dr	1,375	2	N	Se	Kk	F	O	----	7-	17-59	
19ac	Max Tyler	1942	L	Du	8	42	N	G	Ktcc	J	D	8.5	7-	15-59	
19db	Earl Tyler	1910	--	Du	20	42	C	S,G	Ktcc	C	D	22.5	7-	17-59	
21ad	Wilfred Miller	1910	--	Du	63	42	N	G	Qc	J	D,S	58	7-	24-59	
22ba	Wm. Petri	----	L	Du	46.0	30	N	G	Qc	CY	O	38.87	8-	4-59	
23ba	-----do-----	----	L	Du	26.9	48	N	G	Qc	CY	M	19.09	8-	4-59	
24cb	Niele and Helen Kirkemide	1920	--	Du	41.2	60	C	G	Qc	C	D,S	36.43	8-	5-59	
25dc	H. A. and C. B. Borcharding	----	L	Du	96.7	60	N	----	Qc	CY	O	84.44	7-	31-59	
26aa	Valentine Bros.	1920	L	Du	46.3	48	N	G	Qc	CY	D,S	38.41	8-	4-59	
27bb	E. A. Melicahar	1920	L	Du	100	60	C	G	Qc	J	D	94-95	8-	4-59	
28da1	Jack Craig	-----	L	Du	88.4	48	C	----	Qc	J	D	84.95	7-	31-59	
28da2	-----do-----	-----	L	Du	53.2	36	N	G	Qc	CY	O	49.16	7-	31-59	
32bb	R. McClelland	1920	U	Du	30.4	36	N	G	Qc	J	D	26.26	7-	31-59	
32cd	-----do-----	----	U	DD	67.87	24?	--	----	Qc	CY	O	65.28	7-	15-59	
32da	Francis Weinheimer	----	L	Du	84.5	24	--	----	Qc	CY	N	78.08	7-	15-59	
33da	H. A. Borcharding	1930	L	Dr	145	6	P	----	Qc	CY	D	115	7-	31-59	
34dd	J. H. Johnston	1910	L	Du	108.1	44	N	G	Qc	N	N	106.16	7-	20-59	
35ba1	M. L. Handerson	1909	L	Du	85	48	C	G	Qc	CY	O	75	7-	31-59	gallery at bottom
35ba2	-----do-----	1930	--	DD	276	6	P	Se	Ktcc	CY	N	70-80	7-	31-59	
36cc	J. W. Raw	----	L	Dr	200	6-8	P	Se,Sh	Ktcc	CY	D,S	125	7-	20-59	
15-10- 1bc	J. B. Hardenbrook	----	H	Sp	-----	-----	--	La	EMa	F	S	----	7-	16-62	10 gpm measured
2ad	-----do-----	----	C	Sp	-----	-----	--	Se	EMa	F	S	----	7-	16-62	4 gpm estimated
2bd	-----do-----	----	C	Sp	-----	-----	--	Se	EMa	F	S	----	7-	16-62	4 gpm measured
2dd	-----do-----	----	C	Sp	-----	-----	--	Se	EMa	F	S	----	7-	16-62	1 gpm estimated
3ab	J. W. Sisson	----	H	Sp	-----	-----	--	Sh	Mh	F	S	----	8-	27-62	1 gpm estimated
3bb	-----do-----	----	C	Sp	-----	-----	--	Sh,Se	Mh	F	S	----	8-	27-62	1 gpm estimated
3cc	-----do-----	----	U	Sp	-----	-----	--	Se,Sh	Mo	P	S	----	8-	27-62	3 1/2 gpm measured
11db	J. B. Hardenbrook	-----	H	Sp	-----	-----	--	Se,La	Mo	P	S	----	7-	16-62	1 gpm estimated
21ad	Fiedler Bros.	-----	H	Sp	-----	-----	--	Se,G	Mh	F	S	----	10-	15-63	20 gpm estimated
22bc	-----do-----	----	H	Sp	-----	-----	--	La	Mh	F	S	----	10-	15-63	12 gpm estimated
25ad	A. K. Neubert	-----	H	Sp	-----	-----	--	Se,Sh	Mh	F	S	----	6-	22-62	9 gpm measured
25bc	-----do-----	----	H	Sp	-----	-----	--	Se,La	Mo	F	S	----	6-	22-62	1 gpm measured
26ca	Fiedler Bros.	-----	L	Sp	-----	-----	--	Se,La	Mo	F	S	----	6-	22-62	10 gpm estimated
26da	A. K. Neubert	-----	C	Sp	-----	-----	--	La	Mo	F	S	----	6-	22-62	20 gpm estimated
15-11- 3da	Hughes Livestock Co.	----	L	Sp	-----	-----	--	G	Qc	F	S,I	----	10-	5-63	500 gpm estimated
3db1	-----do-----	1956	--	Dr	58	7	P	----	Qc	C	D	12	10-	3-63	
3db2	-----do-----	----	L	Sp	-----	-----	--	G	Qc	F	S,I	----	9-	24-63	1,000 gpm estimated
4aa	-----do-----	1954	L	Dr	182.6	7	P	Se	Ja	N	N	29.84	9-	24-63	
4bc	-----do-----	----	C	Sp	-----	-----	--	Se	Ja	F	S	----	6-	22-62	15 gpm measured
4cc	-----do-----	----	L	Sp	-----	-----	--	G	Qc	F	S	----	8-	9-62	2 gpm estimated
5dd	-----do-----	----	H	Sp	-----	-----	--	Se	EMa	F	S	----	9-	24-63	3 gpm estimated
6ba1	B. C. Schmitt	-----	C	Sp	-----	-----	--	Sh	EMa	F	S	----	8-	8-62	2 gpm estimated
6ba2	-----do-----	----	C	Sp	-----	-----	--	Se	EMa	F	S	----	8-	8-62	1 gpm measured
6ba3	-----do-----	----	C	Sp	-----	-----	--	Se	EMa	F	S	----	8-	8-62	1 gpm measured
7bc1	J. B. Hardenbrook	-----	H	Sp	-----	-----	--	Se	EMa	F	S	----	7-	16-62	drips
7bc2	-----do-----	----	H	Sp	-----	-----	--	Se	EMa	F	S,D	----	7-	16-62	6 gpm measured
8bd	B. C. Schmitt	-----	U	Dr	148	6	P	R	Id	CY	S	90	8-	8-62	
11ac1	Hughes Livestock Co.	-----	H	Sp	-----	-----	--	Se,C	Jm,Kk	F	S	----	10-	5-63	1 gpm estimated
11ac2	-----do-----	----	H	Sp	-----	-----	--	Se	Kk	F	S	----	10-	5-63	1 gpm estimated
11ac3	-----do-----	----	H	Sp	-----	-----	--	Se	Kk	F	S	----	10-	5-63	1 gpm estimated
11ba	-----do-----	----	H	Sp	-----	-----	--	Se	Kk	F	S	----	10-	5-63	1 gpm estimated

14bd	-----do-----	U	Sp	-----	-----	---	Ss	Kk	F	S	----	11- 5-63	2 gpm estimated
14dd	-----do-----	H	Sp	-----	-----	---	Ss	Kk	F	S	----	11- 5-63	4 gpm estimated
18dd1	-----do-----	L	Dr	47	4	P	Ss	Mo	---	D	----	10- 3-63	
18dd2	A. K. Heubert	H	Sp	-----	-----	---	---	Mh	F	S	----	6-22-62	3 gpm estimated
20dd	James and Joe Fladler	H	Sp	-----	-----	---	La	EMa	F	S	----	9-25-63	4 gpm estimated
21ba	Hughes Livestock Co.	H	Sp	-----	-----	---	La	EMa	F	S	----	9-25-63	4 gpm estimated 45°F
23bd	-----do-----	H	Sp	-----	-----	---	Ss	Jm	F	S	----	11- 5-63	1 gpm estimated
23cb	-----do-----	H	Sp	-----	-----	---	Ss	Kk	F	S	----	11- 5-63	1 gpm estimated
25nc	Petar Marcoff	C	Sp	-----	-----	---	Ss	Jm	F	S	----	7-31-63	2 gpm estimated
27bb	Hughes Livestock Co.	H	Sp	-----	-----	---	La	EMa	F	S	----	9-30-63	5 gpm estimated 46°F
28cb	-----do-----	H	Sp	-----	-----	---	La	EMa	F	S	----	9-26-63	20 gpm estimated 51°F
28cc	-----do-----	H	Sp	-----	-----	---	La	EMa	F	S	----	9-26-63	7 gpm estimated
28da	-----do-----	H	Sp	-----	-----	---	Ss	EMa	F	S	----	9-30-63	10 gpm estimated
28dc	-----do-----	L	Sp	-----	-----	---	G	Qal	F	S	----	9-30-63	
30bc	A. K. Heubert	H	Sp	-----	-----	---	Ss	Mh	F	S	----	6-22-62	4 gpm measured
30cb	Goyins Brothers	H	Sp	-----	-----	---	La, Sh	Mh	F	S	----	7-25-63	1/4 gpm measured
30cc	-----do-----	C	Sp	-----	-----	---	La, Sh	Mo	F	S	----	7-25-63	4 gpm estimated
31da	-----do-----	C	Sp	-----	-----	---	Ss	Mk	F	S	----	7-25-63	2 gpm estimated
32bc	-----do-----	H	Sp	-----	-----	---	Sh, La	Mh	F	S	----	7-25-63	1/8 gpm estimated
32ca	-----do-----	L	Du	25	----	---	C	Qal	CY	S	----	7-25-63	
32dc	-----do-----	H	Sp	-----	-----	---	G	Qt	F	S	----	7-25-63	50°F
33cc	C. E. Lillegard	U	Sp	-----	-----	---	R	Qal	F	S	----	7-29-63	150 gpm estimated
34cd	-----do-----	L	Sp	-----	-----	---	La, Sh	Mo	F	S	----	7-29-63	1/2 gpm estimated
15-12-1cb	Russell Ridgeway	U	Dr	-----	2 1/2	P	Ss	Kk	F	S	----	8-23-63	10 gpm measured
2ab	U.S. Government	H	Dr	565	----	P	Ss	Kk	F, S	D	----	-----	1 gpm flow; Altitude 4,375 feet
2ad	Russell Ridgeway	U	Dr	-----	-----	---	Ss	Kk	F	S	----	8- 2-63	1 gpm estimated
3aa1	Chester Miller	U	Du	10.6	----	---	S, G	Qal	C	S	4.9	6-25-62	
3aa2	-----do-----	U	Du	15-20	36	C	S, G	Qal	---	D	----	6-25-62	
3aa3	-----do-----	U	Du	12.7	30	C	S, G	Qal	C	D	5.3	6-25-62	
3dd	Clarence Mikkelsen	U	Dr	490	----	P	C	Jm	F, C	D, S	----	8- 2-63	
5bb	Hughes Livestock Co.	H	Sp	-----	-----	---	Ss	Kk	F	S, I	----	10- 4-65	5 gpm estimated 48°F
5bc1	-----do-----	H	Sp	-----	-----	---	Ss	Kk	F	S, I	----	10- 4-63	30 gpm estimated
5bc2	-----do-----	H	Sp	-----	-----	---	Ss	Kk	F	S	----	10- 4-63	3 gpm estimated
6cc	-----do-----	U	Sp	-----	-----	---	Ss	EMa	F	S	----	10- 4-63	1/4 gpm estimated
6db	-----do-----	U	Sp	-----	-----	---	Ss	EMa	F	S	----	10- 4-63	
10cb	Waven Schlepp	U	Sp	-----	-----	---	Sh, Ss	Ktcc	F	S	----	8- 2-63	
10dd	-----do-----	U	Dr	-----	4	P	Ss	Kk	F, C	D, S	----	8- 2-63	4 gpm measured
11cc	-----do-----	U	Sp	-----	-----	---	Ss	Qal	F	S	----	8- 2-63	1 gpm estimated
12ad	Russell Ridgeway	1958	L	Dr	-----	-----	Ss	Kk	F	D	----	9- 6-63	10 gpm estimated
12bd	Ray Ernst	L	Du	12.9	60	C	G	Qal	CY	N	8.12	9- 6-63	
12da1	John Tripp	L	Du	9.9	48	C	---	Qal	CY	S	6.25	8-19-63	
12da2	-----do-----	L	B	12-14	6	P	C	Qal	J	D	4	8-19-63	
12db1	-----do-----	L	Du	9.5	48	C	C	Qal	J	D, S	6.23	8-19-63	
12db2	-----do-----	L	Du	16.0	120	W	C	Qal	N	N	2.94	8-19-63	
14ca1	Albert Kotchivar	H	Dr	-----	30	P	Ss	Kk	F	S	----	9-25-63	3 gpm estimated
14ca2	-----do-----	H	Dr	-----	30	P	Ss	Kk	F	S	----	9-25-63	3 gpm estimated
15ba	Waven Schlepp	C	Sp	-----	-----	---	Sh	Ktcc	F	N	----	8- 2-63	1 gpm estimated
15cb	Albert Koval	L	Dr	-----	3	P	Ss	Kk	F	D	----	8- 5-63	1 1/2 gpm measured
15dd	Chester Miller	U	Du	16.0	36	C	Ss	Kk	P	S	12.33	8- 8-63	
16ca	Joe and Alice Soulsby	1945	H	Dr	800	2	P	Ss	Jm	F	S	7-22-63	1/2 gpm measured
20db	Byron Rosenquist	C	Sp	-----	-----	---	Ss	Kk	F	S	----	8- 5-63	
21db	Joe Soulsby	L	Du	250	----	---	C	Jm	F	S	----	8- 7-63	Old coal shaft 50 gpm measured
22ad	-----do-----	H	Dr	650	10	P	Ss	EMa	F	S	----	7-22-63	1,000 gpm reported
23ba1	Albert Kotchivar	L	Dr	-----	2 1/2	P	Ss	Kk	F	N	----	9-25-63	
23ba2	-----do-----	L	Dr	385	2 1/2?	---	Ss	Kk	F	D	----	9-25-63	15 gpm measured
23ba3	-----do-----	L	---	240	2 1/2	P	Ss	Kk	F	D, S	----	9-25-63	2 1/2 gpm measured
23bb	Joe Soulsby	L	Sp	-----	-----	---	G	Qal	F	S	----	8- 9-63	30 gpm estimated
23bd	Albert Kotchivar	L	Sp	-----	-----	---	G	Qal	F	S	----	9-25-63	1 gpm estimated
24ad	-----do-----	H	Dr	-----	-----	---	La ?	Ca	F	S	----	8-19-63	1 1/2 gpm measured oil test
25bd	-----do-----	SD	Sp	-----	-----	---	R	Qeo	F	S	----	9-25-63	
25cb	Montana State	SD	Sp	-----	-----	---	C	Qal	F	S	----	8-30-63	
25da	-----do-----	U	Sp	-----	-----	---	C	Qal	F	S	----	8-30-63	
25dd	-----do-----	U	Dr	72	6	P	Ss	Ktcc	CY	D, S	40	8-30-63	
26aa	Albert Kotchivar	S	Sp	-----	-----	---	G	Qal	F	S	----	9-25-63	
26bd	Alice Soulsby	L	Sp	-----	-----	---	G	Qal	F	D, S	----	8- 8-63	30 gpm estimated
27dc	David and Florence Welch	U	Dr	295	10	P	Ss?	Jm	CY	N	12.64	8- 1-63	
28ca	Joe Soulsby	L	Sp	-----	-----	---	Ss?	Kk	F	D, S	----	8- 7-63	40 gpm estimated
29aa1	Byron Rosenquist	H	Du	-----	-----	---	C	Jm	F	N	----	8- 5-63	mine drain
29aa2	-----do-----	U	Du	15.5	36	W	G?	Qeo	N	O	12.28	9-21-62	
29ba	Petar J. Marcoff	H	Du	-----	-----	---	---	Jm	F	N	----	8- 1-63	mine drain
29bd	-----do-----	H	Sp	-----	-----	---	Ss	Jm	F	S	----	8- 1-63	1 gpm estimated
30bc1	-----do-----	U	Dr	165	8	P	Ss	Jm	CY	D, S	----	7-30-63	
30bc2	-----do-----	U	Sp	-----	-----	---	Ss	Jm	F	S	----	7-31-63	1/8 gpm estimated
30bc3	-----do-----	H	Du	17.4	60	W	Ss?	Jm	CY	N	16.67	7-31-63	
30cc	-----do-----	H	Sp	-----	-----	---	Ss	Kk	F	S	----	7-31-63	1 gpm estimated
30da	Byron Rosenquist	U	Sp	-----	-----	---	Ss	Jm	F	S	----	8- 5-63	1 gpm estimated
31ba	-----do-----	U	Sp	-----	-----	---	Ss	Jm	F	S	----	8- 5-63	1 gpm estimated
32bc	Albert Kotchivar	U	Sp	-----	-----	---	Ss	Jm	F	S	----	8- 7-63	25 gpm estimated
32bd	-----do-----	C	Sp	-----	-----	---	Ss	Jm	F	S	----	8- 7-63	2 gpm estimated
32cd	-----do-----	H	Sp	-----	-----	---	Ss	Kk	F	N	----	8- 7-63	
33ab	Larson Brothers	C	Sp	-----	-----	---	Ss	Kk	F	S	----	8- 6-63	2 gpm estimated
34ba	-----do-----	U	Sp	-----	-----	---	Ss	Kk	F	S	----	8- 6-63	1 gpm estimated
35ab	-----do-----	L	Du	16.7	60	C?	S, G	Qal	J	D, S	----	8- 6-63	
35bd	-----do-----	L	Sp	-----	-----	---	G	Qal	F	S	----	8- 6-63	
35ca	-----do-----	U	Sp	-----	-----	---	C	Kk	F	S	----	8- 6-63	3 gpm estimated
35da	Lloyd Davidson	L	Du	15.6	36	R	C	Qal	CY	D	11.49	8-22-63	

16-9-	1ad1	Jack Stanfield	----	U	Du	14.2	72	R	Sa	Kk	CY	S	1.42	7-19-62	46°F
	1ad2	Chas. Van Horne	----	U	Du	20	48	R	Sa	Kk	CY, J	D	10	7-19-62	
	2ac	----- Bodner	----	U	Sp	-----	-----	--	Sa	Kk	F	S	-----	5-25-64	10 gpm estimated
	3dd	-----do-----	----	H	Sp	-----	-----	--	Sa	Kk	F	S	-----	5-24-64	10 gpm estimated
	4db	?	----	H	Sp	-----	-----	--	Sa	Kk	F	S	-----	5-17-64	30 gpm estimated 42°F
16-9-	9ac	Fiedler Brothers	----	H	Sp	-----	-----	--	Sa	Je	F	S	-----	5-24-64	5 gpm estimated
	9da	-----do-----	----	C	Sp	-----	-----	--	Sa	Je	F	S	-----	5-24-64	3 gpm estimated
	10ab	-----do-----	----	C	Sp	-----	-----	--	Sa	Kk	F	S	-----	5-25-64	15 gpm estimated
	10ac	-----do-----	----	C	Sp	-----	-----	--	Sa	Kk	F	S	-----	5-25-64	20 gpm estimated
	11ba	-----do-----	----	U	Sp	-----	-----	--	Sa	Kk, Jm	F	S	-----	5-25-64	20 gpm estimated
	11bb	---- Bodner	----	U	Sp	-----	-----	--	Sa	Kk, Jm	F	S	-----	5-25-64	5 gpm estimated
	11ca	-----do-----	----	C	Sp	-----	-----	--	Sa	Kk, Jm	F	S	-----	5-25-64	30 gpm estimated
	11cb1	-----do-----	----	H	Sp	-----	-----	--	Sa	Kk, Jm	F	S	-----	5-25-64	10 gpm estimated
	11cb2	-----do-----	----	H	Sp	-----	-----	--	Sa	Kk	F	S	-----	5-25-64	5 gpm estimated
	11da1	Frank Fiedler, et al	----	H	Sp	-----	-----	--	Sa	Kk	F	S	-----	9-10-62	1 gpm estimated
	11da2	-----do-----	----	H	Sp	-----	-----	--	Sa	Kk	F	S	-----	9-10-62	25 gpm estimated
	11da3	-----do-----	----	H	Sp	-----	-----	--	Sa, La	Kk	F	S	-----	9-10-62	1 gpm estimated
	12bc1	-----do-----	----	H	Sp	-----	-----	--	Sa	Kk	F	S	-----	9-10-62	1 gpm estimated
	12bc2	-----do-----	----	H	Sp	-----	-----	--	Sa	Kk	F	S	-----	9-10-62	1 1/2 gpm estimated
	12bd	-----do-----	----	C	Sp	-----	-----	--	Sa, Cgl	Kk	F	S	-----	9-10-62	5 gpm estimated
	12cd	V. M. Sandmeyer	----	C	Sp	-----	-----	--	Sa	Kk	F	S	-----	9-10-62	7 gpm estimated
	13bc	-----do-----	----	H	Sp	-----	-----	--	Sa	Jm	F	S	-----	8-30-62	2 1/2 gpm measured
	14da	-----do-----	----	H	Sp	-----	-----	--	La?	Mo	F	S	-----	8-30-62	3 gpm measured
	15ab	-----do-----	----	L	Sp	-----	-----	--	La	Mo	F	S	-----	5-24-64	100 gpm estimated 40°F
	15ba	U.S. Forest Service?	----	H	Sp	-----	-----	--	La, Sh	Mh	F	S	-----	5-24-64	15 gpm estimated
	16aa	Fiedler Brothers	----	H	Sp	-----	-----	--	La	Mh	F	S	-----	5-24-64	20 gpm estimated, 43°F
	16ab	-----do-----	----	C	Sp	-----	-----	--	La, Sh	Mh(?)	F	S	-----	5-24-64	30 gpm estimated
	24ba1	Albert Kolar	----	C	Sp	-----	-----	--	Sh	Mh	F	S	-----	9-10-62	3 gpm estimated
	24ba2	-----do-----	----	C	Sp	-----	-----	--	La, Ir	Mh, Ti	F	S	-----	9-10-62	5 gpm estimated
	24bd	-----do-----	----	H	Sp	-----	-----	--	Sh	Mh	F	S	-----	9-10-62	1 gpm estimated
	25ab	U. S. Forest Service	----	C	Sp	-----	-----	--	Ir	Ti, Mh	F	S	-----	8-30-62	1 gpm estimated
	25cc	-----do-----	----	C	Sp	-----	-----	--	La	Mh	F	S	-----	8-30-62	20 gpm estimated
16-10-	3da	Charles Oja	----	H	Sp	-----	-----	--	Sa	Je	F	S	-----	8-15-62	2 gpm estimated
	4cd	J. W. Sisson	----	L	Sp	-----	-----	--	G	Qal	F	S, D	-----	8-23-62	20 gpm estimated
	5aa	Edgar Anderson	----	U	Dr	46	5	P	----	Kk	CY	S, D	-----	7-19-62	
	5bc1	Vinson T. Sandmeyer	----	C	Sp	-----	-----	--	Sa	Kk	F	S	-----	8-30-62	1 gpm estimated
	5bc2	-----do-----	1962	S	Dr	170	----	P	Sa	Kk	----	S	-----	-----	
	5dc	-----do-----	----	C	Sp	-----	-----	--	Sa	Kk	F	S	-----	8-30-62	1 gpm estimated
	8ad	V. M. Sandmeyer	----	L	Sp	-----	-----	--	G	Qal	F	S, D	-----	8-30-62	
	8da	-----do-----	----	H	Sp	-----	-----	--	La, G	Mo	F	S	-----	8-31-62	200 gpm estimated
	9ad	J. W. Sisson	----	U	Sp	-----	-----	--	Sh, La	Mo	F	----	-----	8-23-62	20 gpm estimated
	9bc	V. M. Sandmeyer	----	H	Sp	-----	-----	--	La	Mo	F	S	-----	8-31-62	
	9da	-----do-----	----	C	Sp	-----	-----	--	La	Mo	F	S	-----	8-31-62	30 gpm estimated
	10bc	J. W. Sisson	----	H	Sp	-----	-----	--	La	Mo	F	S, I	-----	8-23-62	100 gpm estimated
	11ba	Charles Oja	----	H	Sp	-----	-----	--	La, Sh	Mh	F	S	-----	8-15-62	2/3 gpm estimated
	12cb	Fred Reed	----	C	Sp	-----	-----	--	Sh	Mh	F	S	-----	9-28-62	1/2 gpm estimated
	12db	-----do-----	----	C	Sp	-----	-----	--	Sh	Mh	F	S	-----	9-28-62	2 gpm estimated
	13bc	Fred Reed	----	U	Sp	-----	-----	--	La, Sh	Mo	F	S	-----	9-28-62	50 gpm estimated
	13cb	-----do-----	----	H	Sp	-----	-----	--	La	Mo	F	S	-----	9-28-62	30 gpm estimated
	14ba1	J. W. Sisson	----	S	Du	20.0	60	W	Sh	Mh	CY	N	17.70	8-23-62	
	14ba2	-----do-----	----	C	Sp	-----	-----	--	Sh	Mh	F	S	-----	8-23-62	1/4 gpm estimated
	17ad1	V. M. Sandmeyer	----	L	Sp	-----	-----	--	Sa, G	Mk, Qal	F	S	-----	8-30-62	10 gpm estimated 48°F
	17ad2	-----do-----	----	S	Sp	-----	-----	--	G?	Qal	F	S	-----	6-30-62	30 gpm estimated
	17cb	Montana State	----	L	Dr	3	P	Sa	Mk	F	S	-----	6-21-62	5 gpm estimated	
	18da	C. O. Anderson	1961	L	Dr	100	6	P	G, Se	Mk, Qal	CY	S	30	1961	10 gpm reported with 55 feet drawdown
	19cc	A. L. Kolar & Sons	----	H	Sp	-----	-----	--	Sa	Mh	F	S	-----	8-30-62	3 gpm estimated 48°F
	21ad	J. W. Sisson	----	H	Sp	-----	-----	--	La, Sh	Mo	F	S	-----	8-23-62	1 gpm estimated
	21da	-----do-----	----	U	Sp	-----	-----	--	Sa, Sh	Mh	F	S	-----	8-23-62	1 gpm measured
	21cd	Albert Kolar	----	H	Sp	-----	-----	--	G	ld	F	S	-----	8-23-62	10 gpm estimated
	22bc	J. W. Sisson	----	C	Sp	-----	-----	--	Sh, La	Mo	F	S	-----	8-23-62	1 gpm estimated
	23dd	Fred Reed	----	C	Sp	-----	-----	--	Sh, La	Mo	F	S	-----	9-27-62	10 gpm estimated
	24bc	-----do-----	----	C	Sp	-----	-----	--	La	Mo	F	S, I	-----	9-27-62	100 gpm estimated
	24db	-----do-----	----	H	Sp	-----	-----	--	Sa	Mh	F	S	-----	9-27-62	1 gpm estimated 48°F
	25ba	J. W. Sisson	----	H	Sp	-----	-----	--	Sa	Mh	F	S	-----	8-23-62	15 gpm measured
	25cb	King Colony	----	C	Sp	-----	-----	--	Sa	EMa	F	S	-----	9-28-62	25 gpm estimated
	26ab	J. W. Sisson	----	H	Sp	-----	-----	--	La, Sh	Mh	F	S	-----	8-24-62	3 gpm estimated
	26db	-----do-----	----	H	Sp	-----	-----	--	Sa	Mh	F	S	-----	8-24-62	25 gpm measured
	27cc	-----do-----	----	H	Sp	-----	-----	--	S, G	Qeo	F	S	-----	8-24-62	2 1/2 gpm measured
	28bd	-----do-----	----	H	Sp	-----	-----	--	Ir	ld	F	S	-----	8-24-62	1 1/2 gpm measured
	29ac	Albert Kolar	----	H	Sp	-----	-----	--	Ir	ld	F	S	-----	8-30-62	15 gpm estimated
	29bd	-----do-----	----	H	Sp	-----	-----	--	Ir	Qtm	F	S	-----	8-30-62	20 gpm measured
	29cd	-----do-----	----	H	Sp	-----	-----	--	Ir	Qtm	F	S	-----	8-30-62	8 gpm estimated
	33aa	J. W. Sisson	----	H	Sp	-----	-----	--	Sh	Qeo	F	S	-----	8-24-62	65 gpm estimated
	33dd	-----do-----	----	S	Sp	-----	-----	--	G, Sh	Mo	F	S	-----	8-27-62	100 gpm estimated
	34ba	-----do-----	----	C	Sp	-----	-----	--	S, G	ld	F	S	-----	8-24-62	2 gpm measured
16-11-	2cb	Kolar Livestock Co.	----	L	Du	38.6	48	R	----	Qr	CY	S, O	34.52	9-26-62	
	4cd1	King Colony	----	L	Dr	310	----	--	Sa	Kk	F	D	-----	9-28-62	11 gpm reported
	4cd2	-----do-----	----	L	Dr	110	2	P	Sa	Kk	F	S	-----	9-28-62	3 gpm estimated
	6bc	-----do-----	----	C	Sp	-----	-----	--	Sa	Kk	F	S	-----	9-29-62	7 gpm estimated
	10ac	-----do-----	----	L	Dr	320	2	P	Sa	Kk	F	S	-----	9-29-62	15 gpm measured
	12aa	Henry Evans	----	--	Dr	67	----	--	G	Qal	J	S	-----	9-20-63	
	12ad	Ed Stranger	----	U	Du	29.1	24	C	G	Qal	--	D	22.1	6-26-62	
	16ac	King Colony	----	C	Sp	-----	-----	--	Sa	Kk	F	S, I	-----	9-28-62	25 gpm estimated
	16cb	-----do-----	----	C	Sp	-----	-----	--	Sa	Kk	F	S	-----	9-28-62	5 gpm estimated 49°F
	17ba	-----do-----	----	S	Sp	-----	-----	--	Sa	Kk	F	S	-----	9-28-62	5 gpm estimated
	17bb	-----do-----	----	C	Sp	-----	-----	--	Sa	Kk	F	S	-----	9-28-62	2 gpm estimated
	18ba	Fred Reed	----	H	Sp	-----	-----	--	Sh	Mh	F	S	-----	9-27-62	1/2 gpm estimated
	18bc1	-----do-----	----	H	Sp	-----	-----	--	Sa	EMa	F	S	-----	9-27-62	3 gpm estimated
	18bc2	-----do-----	----	H	Sp	-----	-----	--	Sa	EMa	F	D	-----	9-27-62	
	18cc	-----do-----	----	H	Sp	-----	-----	--	Sa	EMa	F	S	-----	9-26-62	30 gpm estimated

20bd	King Colony	----	U	Dr	150.4	4	P	Se	Kk	J	S	49.93	9-28-62		
23ad	A. K. Neubert	----	L	Sp	-----	-----	---	G	Qal	F	S	----	6-29-62	200 gpm reported	
23ca	-----	----	U	Sp	-----	-----	---	G	Qc	F	S	----	11-1-63	10 gpm estimated	
25bd	Skelton Ranch Co.	----	U	Du	23	36	C	--	Qc	N	N	23.7	6-21-62		
26dc	A. K. Neubert	----	L	--	38	6	P	G	Qal	C	D	----	6-27-62		
27bc	-----	----	H	Sp	-----	-----	---	Se	Kk	F	S	----	6-27-62	1 gpm estimated	
27cb	-----	----	C	Sp	-----	-----	---	Se	Kk	F	S	----	6-27-62	1 1/4 gpm estimated	
28ad	-----	----	C	Sp	-----	-----	---	Se	Kk	F	S	----	6-27-62	40 gpm estimated	
28bc	-----	----	C	Sp	-----	-----	---	Se	Kk	F	S	----	6-27-62	2 gpm measured	
31del	B. C. Schmitt	----	H	Sp	-----	-----	---	Se	Flha	F	S	----	8-8-62	1 1/2 gpm measured	
31dc2	-----	----	H	Sp	-----	-----	---	Se	Flha	F	S	----	8-8-62	1/2 gpm reported	
32bc	-----	----	H	Sp	-----	-----	---	Se	Je	F	S	----	8-9-62	1 gpm estimated	
32cd	-----	----	C	Sp	-----	-----	---	Se	Je	F	S	----	8-8-62	4 gpm measured	
33aa	A. K. Neubert	----	H	Sp	-----	-----	---	Se	Kr	F	S	----	6-27-62	40 gpm estimated	
35bb	B. C. Schmitt	----	C	Sp	-----	-----	---	Se	Qal	F	S	----	8-9-62	2 gpm estimated	
35bc	-----	----	C	Sp	-----	-----	---	G	Qal	F	S	----	8-9-62	50 gpm estimated	
35bd1	-----	----	U	Du	13.9	36	C	G	Qal	Pr	D	9.62	8-9-62		
35bd2	-----	----	U	Du	15.4	48	C	G	Qal	C	S	10.84	8-9-62		
36ba	Geo. W. Carver	----	U	Dr	405	2	P	Se	Kk	F	S	----	6-20-62	5 gpm estimated	
16-12-2dd1	Gene Ernst	----	S	Sp	-----	-----	---	G	Qc	F	S	----	7-5-62		
2dd2	-----	----	L	Du	13.0	36	T	G	Qal	CY	S	4.06	7-5-62	47°F	
3bc	Skelton Ranch Co.	----	L	Du	36.1	30	W	G	Qc	CY	S	25.40	7-6-62		
3cc1	Virgil Muir	----	L	Dr	61.6	6	P	----	Qc	CY	N	30.20	7-6-62		
3cc2	-----	----	L	Du	40	-----	---	G	Qc	J	S	----	7-6-62		
3cc3	-----	----	L	Dr	100	4	P	Sh?	Ktcc	C	D,S	20	7-6-62	48°F	
4bb	Elvina Weir	----	SD	Sp	-----	-----	---	G	Qal	F	S	----	7-19-62		
5ba	Dean Baker	----	C	Dr	-----	-----	---	P	Se	Ktcc	F	S	----	4-21-64	Altitude 4,206.5 feet
7bb1	Kolar Livestock Co.	----	S	Dr	200	4	P	Se	Ktcc	S	D	60	6-27-62		
7bb2	-----	----	S	Dr	45	4	P	G	Qal	Pr	I	14	6-27-62		
7ca	Rusty Schmitt	----	H	Sp	-----	-----	---	G	Qal	F	S	----	6-27-62	10-12 gpm estimated	
7cb1	-----	----	C	Sp	-----	-----	---	G	Qal	F	S	----	6-27-62	47°F	
7cb2	-----	----	C	Sp	-----	-----	---	G	Qal	F	S	----	6-27-62		
7dal	M. A. Grosskopf	----	L	Du	8.7	48	C	G	Qal	Pr	D	3.5	6-26-62		
7da2	-----	----	L	Du	9.5	24	W	G	Qal	N	N	5.4	6-26-62	Altitude 4,304.9 feet	
7dc1	Dean Baker	----	L	Du	-----	-----	---	G	Qal	C	D	----	6-26-62		
7dc2	-----	----	1960	L	Dr	320	2	P	G	Qal	F	S	----	6-26-62	2 gpm reported
8ab	-----	----	L	Du	5.9	60	C	G	Qal	C	S	2.7	6-26-62	44°F	
8ad	Willard Hall	----	L	Du	14.6	48	W	G	Qc	C	S,O	10.05	6-27-62	47°F	
8dc	Dean Baker	1963	L	Dr	115	4	P	Se	Ktcc	N	N	----	10-30-63		
9cd	Paul Baker	----	L	Du	32	-----	---	C	G	Qc	CY,Je	D,S	24	6-6-62	47°F
9dc	-----	----	L	Du	24.4	36	C	G	Qc	J	D,S	18.18	7-6-62		
10cd	-----	----	S	Sp	-----	-----	---	G	Qal	F	S	----	7-2-62	3 gpm estimated	
12bb1	Gene Ernst	1949	L	Dr	1,120	2	P	Se	Kk	F	D,S	----	7-5-62	52°F	
12bb2	-----	----	L	Du	9.9	36	C	G	Qal	CY	S	4.17	7-5-62	47°F	
13ac	Aaron Leland	----	U	Dr	144.7	6	P	Ir	Tgn	CY	S	88.46	6-28-62		
13cd	Ross Whitfield	----	U	Dr	26	5	P	Sh	Ktcc	CY	S,O	10.89	6-28-62		
14cc	Gilbert Weller	----	U	Dr	258	2	P	Se	Ktcc	F	D,S	----	6-28-62	15 gpm reported	
14dd	Ross Whitfield	1948	U	Dr	115	5	P	Se?	Ktcc	S	D,S	----	6-29-62		
15ab	Aaron Leland	----	U	Du	4	72	C	G	Qc	N	N	3.13	6-28-62		
15bb	Dean Baker	----	U	Dr	-----	-----	---	P	Se	Ktcc	F	S	----	6-28-62	48°F
16aa	Stanford Town	1960	L	Dr	200	6	C	Se	Ktcc	S	I,O	13.16	6-20-62		
16bb1	Orvia LeMond	1962	L	Dr	50	4	Pl	G	Qc	C	I	25	7-22-63		
16bb2	Stanford Town	----	L	Dr	170	4	1/2	P	Se	Ktcc	CY	P	30	7-3-62	47°F
16bb3	Judith Basin County	----	L	Du	32.1	48	C	G	Qc	C	N	28.84	10-11-63		
16bb4	-----	----	L	Dr	1,033	2	P	Se	Kk	F	N	----	10-11-63	Plugged and covered	
16bd1	Stanford Town	1942	L	Dr	46.5	6	P	G	Qc	CY	P	22.78	8-9-63	14 gpm reported	
16bd2	Great Northern Railway	----	L	Dr	193	-----	---	Se	Ktcc	T	P	----	7-3-62	47°F	
16cc1	Byway Hotel and Cafe	1960	L	Dr	140	7	P	Se	Ktcc	J	D	----	9-29-62		
16cc2	-----	----	L	Dr	78.7	6	P	G	Qc	J	O	17.91	9-26-62		
17aa	Lloyd Schmitt	----	L	Dr	-----	-----	---	P	G	Qc	J	S,D	27.50	4-18-64	
17bb	Rusty Schmitt	----	L	Sp	-----	-----	---	G	Qal	F	N	----	6-27-62		
17dal	Town of Stanford	1928	L	Dr	167	8	P	Se	Ktcc	S	P	35	7-3-62		
17da2	-----	----	L	Dr	1,050	12	P	Se	Kk	F,T	P	----	7-3-62		
17da3	Ray Miller	----	L	Dr	85	6	P	G,S	Ktcc,Qc	N	H	25	9-28-62		
18ba	Rusty Schmitt	----	L	Du	7.3	36	C	G	Qal	T	D,S	3.7	6-26-62		
18cc	-----	----	L	Sp	-----	-----	---	G	Qal	F	S	----	6-27-62		
21cb	O. J. Galt	1951	S	Dr	460	-----	---	Se	Kk	F	S	----	-----		
22ac	Gilbert Weller	----	U	Sp	-----	-----	---	----	Qal	F	N	----	6-28-62		
22ca	Ross Whitfield	----	L	Dr	-----	-----	---	P	Se	Kk	F	S	----	6-29-62	2 gpm estimated
24bb	Katherine Seilatad	----	L	Du	35.6	36	C	Sh?	Ktcc	C	S	16.99	6-29-62		
24dal	C. K. Bailey	----	H	Sp	-----	-----	---	Sh	Ktcc	F	S	----	7-2-62	4 gpm estimated	
24da2	-----	----	H	Sp	-----	-----	---	Sh	Ktcc	F	S	----	7-2-62	5 gpm estimated	
24dd	Elvin Bailey	1956	L	Dr	320	2	P	Se	Ktcc	F	S	----	7-2-62	20 gpm measured	
25bd	Joe Soulsby	1955	L	Dr	250	2	P	Se	Ktcc	F	S	----	8-15-63	2 1/2 gpm reported	
25cb	-----	----	L	Dr	156	2	P	Se	Ktcc	F	S	----	7-22-63		
26cd	Elvin Bailey	1921	S	Du	23.5	36	C	Se	Ktcc	J	D	16.67	8-15-63		
27cb	-----	----	1962	S	Dr	610	2	S	Se	Kk	F	S	----	8-15-63	1 1/4 gpm measured
28ab1	L. L. Proctor	----	S	Dr	649	2	P	Se	Kk	F	S	55.04	6-26-62		
28ab2	-----	----	U	Du	29.8	54	C	----	Ktcc	CY	N	14.00	6-26-62		
28cd	John Ridgeway	1963	U	DD	771	2.48	P,C	Se	Kk	CY	D,S	----	6-25-62		
29aa1	Skelton Ranch Co.	----	U	Du	34	32	C	Se	Ktcc	N	N	19	6-25-62		
29aa2	-----	----	U	Dr	76	5	P	Se	Ktcc	N	N	20.7	6-25-62		
29aa3	-----	----	U	Du	44	36	C	Se	Ktcc	CY	O	30.24	9-25-62		
29bd	O. J. Galt	1951	U	Dr	460	2	P	Se	Kk	F	S	----	10-11-63	12 gpm reported	
29dd	Skelton Ranch Co.	----	U	Dr	-----	-----	---	Se	Kk	F	S	----	6-22-62	3 gpm estimated	
31aa	Geo. Carver	----	U	Dr	148	2	P	Se	Kk	Pr	D	----	6-20-62		
31ac1	-----	----	C	Sp	-----	-----	---	Se	Kk	F	S	----	6-20-62	less than 1 gpm	
31ac2	-----	----	H	Dr	404	5	P	Se,C	Kk,Jim	F	N	----	6-20-62	3/4 gpm estimated	
31bb	Riley	----	C	Sp	-----	-----	---	Se	Kk	F	S	----	6-25-62	10 gpm estimated	

32aa1	Joe Fiedler	----	U	Du	30.8	36	N	Se	Ktcc	CY	N	13.66	6-21-62	
32aa2	-----	----	U	Du	25.5	30	C	Se	Ktcc	CY	S	13.29	6-21-62	
32aa3	-----	----	U	Dr	180	-----	-----	Se	Kk	F, Pt	D	-----	6-21-62	Well is buried
32bd	George Carver	----	U	Du	14.2	60	C	Se	Kk	CY	N	3.77	6-20-62	
32dd	Joe Fiedler	----	C	Dr	600	2	P	Se	Kk	F	S	-----	6-21-62	3 gpm estimated
33aa	Byron Rosenquist	----	U	Du	10.7	24	C	Se	Ktcc	N	N	2.2	6-25-62	
34db	Don Rogers	----	L	Du	15.6	18	P	S, G	Qal	S	S, O	2.9	6-25-62	
35ac	Chester Miller	----	U	Dr	925	2	P	Se, C	Kk	F	S	-----	8-15-63	6 gpm measured
35ba	Elvin Bailey	1955	S	Dr	768	2	P	Se	Kk	F	S	-----	8-15-63	7 1/2 gpm measured
35cb	-----	----	C	Sp	-----	-----	-----	S, G	Qal	F	S	-----	8-15-63	
35cc1	L. L. Proctor	1948	U	Dr	720	1 1/2	P	Se	Kk	F, C	D, S	-----	6-26-62	5 gpm reported
35cc2	-----	----	U	Du	24.0	32	C	Se	Ktcc	CY	N	8.1	6-26-62	
36ca	Byron Rosenquist	----	U	Dr	863	2	P	Se	Kk	F	S	-----	8-15-63	3 gpm estimated
17-9-2aa	John Annala	----	U	Sp	-----	-----	-----	Se, Sh, Ir	Ktcc, Ti	F	S	-----	5-26-64	4 gpm estimated
3aa	Nels Backa	----	U	Dr	-----	-----	-----	Se	Kk	F	S	-----	5-26-64	
3ab	-----	1962	--	Dr	292	2	P	Se	Kk	F	S	-----	5-6-64	5 gpm
3cd1	Roy Kaiser	----	U	Dr	170	7-8	P	Se	Kk	F	S	-----	5-8-64	Flows a 3-inch stream about 4 feet
3cd2	-----	1950s	U	Dr	140	4	P	Se	Kk	C, F	D	-----	5-8-64	5 gpm estimated
4ac	Adam Schweitzer	----	--	Dr	65.6	4	P	Se	Kk	CY	N	24.06	5-20-64	
4cb	-----	----	U	Sp	-----	-----	-----	Se	Kk	F	S	-----	5-22-64	10 gpm estimated
4cd	Harold Colladay	----	U	Sp	-----	-----	-----	Se	Kk	F	S	-----	5-9-64	20 gpm estimated
4dc1	-----	----	U	Sp	-----	-----	-----	Se	Kk	F	S	-----	5-9-64	75 gpm estimated
4dc2	-----	----	U	Sp	-----	-----	-----	Se	Kk	F	D, S	-----	5-9-64	400 gpm estimated
5ad	Adam Schweitzer	----	H	Sp	-----	-----	-----	Se	Kk	F	S	-----	5-22-64	1/8 gpm estimated
5ab	-----	----	U	Sp	-----	-----	-----	Se	Kk	F	S	-----	5-25-64	50 gpm estimated
5dc	-----	----	U	Dr	144	7	P	Se	Kk	F	S	-----	5-25-64	18 gpm reported
5dd	-----	----	U	Dr	105	8	P	Se	Kk	F	S	-----	5-25-64	30 gpm measured
8aal	-----	----	U	Dr	-----	6	--	Se	Kk	F	S	-----	5-18-64	46°F
8aa2	-----	----	U	Dr	350+	7	P	Se	Kk	F	S	-----	5-18-64	10 gpm estimated
8ca1	-----	----	H	Dr	40	5	P	Se	Kk	F	N	-----	5-18-64	
8ca2	-----	----	H	Sp	-----	-----	-----	Se	Kk	F	S	-----	5-17-64	5 gpm estimated
8cd	-----	----	H	Dr	211.5	6	P	Se	Kk	N	N	64.5	5-18-64	45°F
9bb	Harold Colladay	----	U	Sp	-----	-----	-----	Se	Kk	F	S	-----	5-9-64	10 gpm estimated
9da	Adam Schweitzer	----	U	Du	-----	-----	-----	Se	Kk	CY	S	-----	5-22-64	
10cb	Emil Wirtala	----	U	Sp	-----	-----	-----	Se	Kk	F	S, I	-----	5-22-64	30 gpm estimated
10dd	-----	----	U	Sp	-----	-----	-----	Se	Kk	F	S	-----	5-26-64	40 gpm estimated
13cb	Sula Karjala	----	U	Sp	-----	-----	-----	Se	Kk	F	S, I	-----	7-20-62	10 gpm estimated
15ba	Emil Wirtala	1961	U	Dr	250	6	P	Se	Kk	S	D, S	70	5-6-64	
17ad	D. McKay	----	U	Sp	-----	-----	-----	Se	Kk	F	S	-----	5-28-64	5 gpm reported
22ad	Gary Bunday	----	C	Sp	-----	-----	-----	Se, Sh	Kk	F	S	-----	7-20-62	
22bd	-----	----	U	Sp	-----	-----	-----	Se, Sh	Kk	F	S	-----	7-20-62	3 gpm estimated
22ca	-----	----	U	Sp	-----	-----	-----	Se, Sh	Kk	F	S	-----	7-20-62	
22cb	Arthur Backa	----	U	Sp	-----	-----	-----	Se	Kk	F	S	-----	7-20-62	
22cc	-----	1946	--	Du	18	36	N	Se	Kk	Pt	D	15	7-20-62	
22dd	Gary Bunday	1961	U	Dr	52	6	P	Se	Kk	J	D, S	22	7-20-62	
24bc1	Sulo Karjala	----	U	Sp	-----	-----	-----	Se	Kk	F	S, I	-----	7-20-62	50 gpm estimated
24bc2	-----	----	U	Dr	70	3	P	Se	Kk	Pt	D	12	7-20-62	46°F
25ba	Ben Huotari	----	C	Sp	-----	-----	-----	G	Qal	F	S	-----	7-17-62	15 gpm estimated
25cb	David Richardson	----	L	Sp	-----	-----	-----	Se	Kk	F	S	-----	8-17-62	10 gpm estimated
25cd	Don McCallister	----	L	Sp	-----	-----	-----	Se	Kk	F	S	-----	7-18-62	6-7 gpm reported
26ad	David Richardson	----	C	Sp	-----	-----	-----	Se	Kk	F	S	-----	8-17-62	10 gpm estimated
26bb	Don McCallister	----	U	Sp	-----	-----	-----	Se	Kk	F	S	-----	7-18-62	10 gpm reported
26bd	-----	----	U	Dr	315	4	P	Se	Kk	S	S	48	7-18-62	
26cc	David Richardson	----	C	Sp	-----	-----	-----	Se	Kk	F	S	-----	8-17-62	5 gpm estimated
26dc	-----	----	C	Sp	-----	-----	-----	Se	Kk	F	S	-----	8-17-62	3 gpm estimated
26dd1	Don McCallister	1951	U	Dr	91	7	P	Se	Kk	J	D	-----	7-18-62	
26dd2	-----	----	U	Sp	-----	-----	-----	Se	Kk	F	S	-----	7-18-62	5-10 gpm estimated
27aa1	Henry Karjala	----	U	Sp	-----	-----	-----	Se	Kk	F	S	-----	7-25-62	4 gpm estimated
27aa2	-----	----	U	Du	15	72	R	Se	Kk	Pt	D	10	7-25-62	47°F
27aa3	-----	1962	U	Dr	129	6	P	Se	Kk	J	D, S	90	7-25-62	
28ad1	Henry Struss	----	U	Dr	60.4	5	P	Se	Kk	N	-----	37.70	4-28-64	
28ad2	-----	1958	U	Dr	210	5	P	Se	Kk	S	N	38.3	4-28-64	
28da	-----	----	U	Dr	310	6	P	Se	Kk	CY	D, S	40	4-28-64	
29ad	W. Thisted	----	H	Dr	-----	-----	-----	Se	Kk	CY	S	?	4-30-64	Altitude 4,853 feet
33bd	Mark Cockrill	----	U	Du	27	40	R	G, S	Qal, Kk	C	D	10	4-28-64	
33ca	-----	----	U	Sp	-----	-----	-----	Se	Kk	F	S	-----	4-28-64	5 gpm reported
35ba	Dave Richardson	----	U	Sp	-----	-----	-----	Se	Kk	F	D, S, I	-----	7-17-62	300 gpm estimated
35ca1	-----	----	C	Sp	-----	-----	-----	Se	Kk	F	S	-----	8-17-62	2 gpm estimated, 47°F
35ca2	-----	----	C	Sp	-----	-----	-----	Se	Kk	F	S	-----	8-17-62	2 gpm estimated
35cc	-----	----	C	Sp	-----	-----	-----	Se	Kk	F	S	-----	8-17-62	
36da	Don McCallister	----	C	Sp	-----	-----	-----	Se	Kk	F	S	-----	7-18-62	3 gpm reported
36db	-----	----	C	Sp	-----	-----	-----	Se	Kk	F	S	-----	7-18-62	
17-10-1ab1	Earl Rautio	----	S	Sp	-----	-----	-----	Sh, Se	Ktcc	F	N	-----	8-9-62	"Mid geyser"
1ab2	-----	----	S	Sp	-----	-----	-----	Sh, Se	Ktcc	F	N	-----	8-9-62	"Mid geyser"
1ba	-----	----	U	Sp	-----	-----	-----	G	Qt	F	S	-----	8-2-62	2 gpm estimated
1dd	Edward Antila	----	H	Dr	94.3	6	P	Se	Ktcc	CY	N	24.62	8-20-62	
2bd	Sig Anderson	----	S	Sp	-----	-----	-----	G	Qt	F	S, I	-----	8-10-62	5 gpm estimated
2cc	-----	----	S	Du	14.1	48	W	G	Qt	C	D	11.44	8-10-62	
3ac	-----	----	L	Sp	-----	-----	-----	G	Qal	F	S	-----	8-10-62	
3ba	-----	----	L	Du	6.9	72	C	G	Qal	N	N	5.82	8-10-62	
3cd	Leo Patesch	----	L	Sp	-----	-----	-----	G	Qal	F	S	-----	8-15-62	5 gpm estimated
3dc	Sig Anderson	----	L	Sp	-----	-----	-----	G	Qt	F	S	-----	8-10-62	
4dc	Leo Patesch	1946	L	Dr	608	2	P	Se	Kk	F	N	-----	8-15-62	Less than 1 gpm estimated
5bc	-----	----	L	Dr	675	2	P	Se	Kk	F	D, S	-----	8-29-62	Reported 35-40 psi
5cd1	Great Northern Railway	----	L	Dr	-----	12	P	Se	Kk	F	N	-----	8-21-62	30-40 gpm reported
5cd2	Laurance Dickson	1958	L	Dr	329	2	P	Se	Kk	F	D	-----	8-21-62	5 gpm reported; 30 psi
5cd3	-----	----	L	Du	13	36	P	G	Qal	C	I	8	8-21-62	Used for yard
5dd	Leo Patesch	----	L	Dr	35.3	6	P	G	Qt	C	S	14.64	8-29-62	

6ac1	John Annala	----	S	Du	35	60		C	G	Qt	C	D	20	5-	6-64		
6ac2	-----do-----	1962	S	Dr	500+	2		P	Se	Kk	F	D,S	----	5-	6-64	22 gpm reported	
6cc1	Neils Backa	1956	U	Dr	273	2		P	Se	Kk	F	D,S	----	5-	6-64	10+ gpm reported	
6dd	Judith Basin County	1935	S	Dr	500	5		P	Se	Kk	F	P	----	6-29-62		250-300 gpm flow; shut in pressure 65 psi	
7cc	Joe Nymann	1958	S	Dr	236	3		P	Se	Kk	F	S	----	7-12-62		6 gpm estimated	
8ba	Lawrence Dickson	-----	C	Sp	-----	-----		-----	-----	G	Qal	F	S	----	8-21-62		
8cc1	Sig Nasman	1949	L	Dr	256	2		P	Se	Kk	F	D,S	----	7-12-62		30 gpm reported, 46°F	
8cc2	-----do-----	-----	C	Sp	-----	-----		-----	-----	G	Qal	F	S	----	7-12-62		10 gpm estimated, 49°F
9ab	Edgar Sisson	-----	SD	Sp	-----	-----		-----	-----	G	Qal	F	S	----	7-26-62		15 gpm estimated
9dc1	-----do-----	-----	L	Dr	69.4	6		P	G	Qal	CY	N	41.07	7-25-62			
9dc2	-----do-----	1954	L	Dr	410	2		P	Se	Kk	F	D,S	----	7-25-62		13 gpm reported	
10dc	-----do-----	-----	L	Dr	53.3	6 1/2		P	G	Qt	N	O	48.48	7-26-62			
12ba	Edward Antila	-----	U	Sp	-----	-----		-----	-----	G	Qt	F	N	8-	7-62		10 gpm estimated
12dc	W. F. Lee & Sons	-----	C	Sp	-----	-----		-----	-----	G	Qt	F	S	----	8-	8-62	
13ba	-----do-----	-----	C	Du	11.4	60		C	G	Qal	CY	S,O	4.49	8-	8-62		
14ab1	Oliver Olson	1946	L	Dr	42.1	6		P	G	Qt	N	N	40.73	8-	7-62		
14ab2	-----do-----	1947	L	Dr	58	6		P	G	Qt	CY	S	34	8-	7-62		
14ab3	-----do-----	1950	L	Dr	38	6		P	G	Qt	J	D	35	8-	7-62		
15bb	Ed Nasman	1912	L	Du	32	6		P	G	Qt	CY	S	27	7-	11-62		
16bb1	Edward Antila	1946	L	Dr	433	3		P	Se	Kk	F	D	----	7-24-62		20 gpm reported, 48°F	
16bb2	-----do-----	1954	L	Dr	442	2		P	Se	Kk	F	D,S	----	7-24-62		48°F	
17ab1	Ed Nasman	1947	L	Dr	52	6		Ru	S	Qt	J	D	8-10	7-	11-62		
17ab2	-----do-----	-----	C	Du	20.9	48		C	St	Qal	CY	S	9.22	7-	11-62		
17bb	Don Morrison	-----	L	Dr	200	2 1/2		P	Se	Kk	F	D,S	----	7-12-62		20 gpm estimated, 46°F	
18dc	Sig Nasman	1948	L	Dr	114	3		P	Se	Kk	F	D,S	----	7-12-62		14 gpm estimated 48°F	
19ad1	Ben Huotari	-----	U	Sp	-----	-----		-----	-----	S	Qal	F	S,I	----	7-17-62		15 gpm estimated 47°F
19ad2	-----do-----	-----	U	Sp	-----	-----		-----	-----	G	Qal	F	D,I	----	7-17-62		50 gpm estimated
19cb	-----do-----	-----	C	Sp	-----	-----		-----	-----	G	Qal	F	S,I	----	7-17-62		100 gpm estimated
19da	-----do-----	-----	C	Sp	-----	-----		-----	-----	G	Qal	F	S	----	7-17-62		20 gpm estimated
20ac	-----do-----	-----	U	Sp	-----	-----		-----	-----	G	Qt	F	S	----	7-17-62		15 gpm estimated
20bd1	-----do-----	1951	U	Dr	110	3		P	Se	Kk	F	D,S	----	10-23-63		3 gpm estimated, 49°F 28.50' head	
20bd2	-----do-----	-----	U	Dr	70	6		P	-----	Kk	CY	S	5	7-	16-62		
21ad	Dave Luoma	1949	L	Dr	-----	2		P	Se	Kk	F	S	----	7-23-62		2/3 gpm measured	
22bd	Robert Evans	-----	Dr	-----	50	6		P	C	Qt	CY	S	25-26	8-	3-62		
22cb	Dave Luoma	-----	L	Dr	74.8	60		-----	-----	Se	Kk	J	D,S	39,77	7-	23-62	
23aa	W. F. Lee & Sons	-----	S	Sp	-----	-----		-----	-----	G	Qt	F	S	----	8-	8-62	4 gpm estimated, 47°F
23dd	Oliver Olson	-----	C	Du	4	60		W	G	Qt	N	S	1.5	8-	7-62		
24ab1	W. F. Lee & Sons	1952	U	Dr	1,160	4		-----	-----	Kk	F	D,S	----	8-	8-62		
24ab2	-----do-----	-----	U	Dr	48	6		P	Sh	Qt	J	S	14	8-	8-62	49°F	
24ab3	-----do-----	-----	U	Du	14	48		R	Sh	Qt	CY	S	10	8-	8-62		
24ba	-----do-----	-----	C	Sp	-----	-----		-----	-----	G	Qt	F	S	----	8-	8-62	3 gpm estimated, 48°F
26bb	-----do-----	1947	Dr	-----	350	4		P	-----	Kk	F	S	----	8-	8-62	1 1/3 gpm measured 48°F	
27dd	Robert Evans	-----	L	Dr	60.9	6		P	G	Qt	CY	S	20.32	8-	3-62		
28dc	Charles Oja	1956	L	Dr	320	2		P	Se	Kk	F	D,S	----	7-11-62		45 gpm reported, 46°F	
29ac1	Ben Huotari	1946	U	Dr	50	5		P	-----	Kk	CY	S	8	7-	17-62		
29ac2	-----do-----	-----	U	Sp	-----	-----		-----	-----	G	Qal	F	S	----	7-17-62		10 gpm estimated 46°F
29bd	-----do-----	1952	Dr	-----	600	3		P	-----	Kk	E	S	----	7-17-62		3 gpm estimated	
29cc	Jack Stanfield	1962	U	Dr	196	6		P	Se	Kk	CY	S	----	7-19-62			
31da	Don McCallister	1962	Dr	-----	181	4		C	Se	Kk	N	S	----	7-18-62			
31db	Charles VanHorne	-----	U	Sp	-----	-----		-----	-----	Se	Kk	F	S	----	7-19-62		3 gpm estimated
32dd	Jack Stanfield	-----	U	Dr	90	6		P	-----	Kk	CY	S	----	7-19-62			
33aa1	Montana State	-----	L	Du	49.3	36		C	G	Qal	N	O	26.45	7-	16-62		
33aa2	-----do-----	-----	S	Dr	-----	-----		-----	-----	G	Qt	F	S	----	7-16-62		10 gpm estimated
33ca	J. W. Sissons	1962	U	Dr	174	4		P	-----	Kk	S	S	38	6-	21-62		
35ab	Robert Evans	-----	U	Dr	80	6		P	-----	Kk	CY	S	20.87	8-	3-62	46°F	
35ba	-----do-----	-----	H	Dr	600-800	6		P	-----	Kk	J	D,S	82.25	8-	3-62		
36cb	King Colony	-----	L	Dr	410	-----		-----	-----	Kk	F	S	----	9-29-62		18 gpm measured	
17-11-3cb	Robbins Estate	-----	C	Sp	-----	-----		-----	-----	G	Qt	F	S	----	7-24-62		5 gpm estimated
4dd	-----do-----	-----	C	Sp	-----	-----		-----	-----	Se	Ktcc	F	S	----	7-24-62		
5bd	Gust Koski	-----	L	Du	22.3	4		C	G	Qt	CY	N	19.49	9-	19-62		
5db1	Mamie Mikeson	-----	L	Du	40	30		C	G	Qt	Pt	D	35	8-	2-62		
5db2	-----do-----	-----	L	Dr	406	5		P	Se	Ktcc	S	D,S	160	8-	2-62		
7cd	?	-----	U	Sp	-----	-----		-----	-----	Sh,G	Ktcc	F	S	----	2-	9-62	1 gpm estimated
7dd	Robert Evans	-----	U	Dr	31.6	36		C	Sh	Qt	CY	O	23.95	8-	3-62		
8da	Mamie Mikeson	-----	U	Dr	100	4		P1	Se	Ktcc	C	S	45	8-	3-62		
12ab	Montana State	-----	C	Sp	-----	-----		-----	-----	G	Qt	F	S	----	7-24-62		
12db	Irene Mikeson	-----	C	Du	15	30		C	G	Qt	J	D,S	6	7-	24-62		
18aa	W. F. Lee & Sons	-----	U	Du	14.5	48		C	G	Qt	CY	N	11.80	8-	7-62		
18da	-----do-----	-----	C	Sp	-----	-----		-----	-----	G	Qt	F	S	----	8-	8-62	10 gpm estimated
19cc	-----do-----	-----	C	Sp	-----	-----		-----	-----	G	Ktcc	F	S	----	8-	8-62	5 gpm estimated
23bd	Kolar Livestock	-----	U	Du	17.3	30		C	G	Qal	CY	S	10.52	11-	1-63		
25ab	John Kolar	-----	U	Sp	-----	-----		-----	-----	Sh	Ktcc	F	S	----	7-19-62		8 gpm estimated, 52°F
27ba	Kolar Livestock	-----	L	Dr	300-400	-----		-----	-----	Se	Kk	F	S	----	11-	5-63	
29db	Evans Bros.	-----	U	Sp	-----	-----		-----	-----	Se	Ktcc	F	S	----	7-18-62		25 gpm estimated
30ad	Robert Evans	-----	C	Sp	-----	-----		-----	-----	G	Qt	F	S	----	8-	3-62	1 gpm estimated
33ac	-----do-----	1963	L	Dr	568	4 1/2		P	G	Kk	N	S	----	7-	63		
33db	Evans Bros.	-----	L	Du	30	-----		-----	-----	G	Qal	CY,C	D	20	7-	63	
17-12-1dc1	Gilbert Matthews	-----	L	Du	17.4	36		C	G	Qt	Pt	O	14.33	7-	19-62	49°F	
1dc2	-----do-----	-----	L	Du	235	-----		N	G	Qt	?	S	17.57	7-	19-62	48°F	
1dc3	-----do-----	-----	L	Du	17.9	-----		-----	-----	G	Qt	S?	S	15.62	7-	19-62	46°F
3ab	Ostertag	1953	L	Du	11.3	42		C	S,G	Qal	-----	S	5.72	9-	19-62		
6ad1	Bert Alger	1962	L	Du	26.8	-----		-----	-----	G	Qt	-----	-----	19.80	7-	17-62	
6ad2	-----do-----	1953	L	DD	26-80	72		C	G	Qt	J	N	21-22	7-	17-62		
6ad3	-----do-----	-----	L	Du	29	48		C	G	Qt	J	D	22	7-	17-62		
6ad4	-----do-----	-----	L	Du	27.0	30		C	C	Qt	J	D	19.50	7-	17-62		
6ad5	-----do-----	-----	L	Du	34.2	60		C	G	Qt	J	D	19.79	7-	17-62		
6dc	Nick Mikeson	-----	L	-----	-----	-----		-----	-----	G	Qt	J	D	-----	7-	17-62	
10ad1	Jack Kulish	-----	L	Du	9.2	36		R	G	Qal	CY	S	5.85	10-	30-63		
10ad2	-----do-----	-----	L	Du	12-15	36		R	G	Qal	CY	S	7	10-	30-63		
10ad3	-----do-----	-----	L	Du	12	36		R	G	Qal	N	N	7	10-	30-63		
10ad4	-----do-----	-----	L	Du	12	48											

28bb	Marrimac Cattle Co.	----	L	Sp	-----	----	--	Ss	Ktcc	F	N	----	8-17-62	3 gpm estimated
29bd	----do-----	----	U	Sp	-----	----	--	Ir, Sh	Ktcc	F	D, S	----	8-17-62	20 gpm estimated
31ba	----do-----	----	U	Sp	-----	----	--	Sh	Ktcc	F	S	----	8-24-62	1 gpm estimated
32cb	----do-----	----	C	Sp	-----	----	--	G	Qal	F	S	----	8-24-62	5 gpm estimated
32cd	----do-----	----	U	Sp	-----	----	--	G	Qal	F	S	----	8-23-62	Less than 1 gpm estimated
33bd	----do-----	----	L	Sp	-----	----	--	Ss	Ktcc	F	S, I	----	8-16-62	30 gpm reported
35ad	Felix Hill Ranch	----	U	Dr	39.7	6	P	Ss	Ktcc	Sl	S	21.67	8-30-62	Siphons 2 gpm reported
19-11-20da	Glenn Woodbury	----	H	Sp	-----	----	--	G	Qt	F	S	----	9-20-62	5 gpm estimated
31bd	----do-----	----	U	Sp	-----	----	--	G	Qal	F	D, S, I	----	9-20-62	30 gpm estimated
32da1	----do-----	----	L	Du	10	48	P	Ss	Ktcc	J	S	8	9-21-62	
32da2	----do-----	----	L	Dr	68.1	8	P	Ss	Ktcc	J	N	10.14	9-21-62	
32da3	----do-----	----	L	Sp	-----	----	--	Ss	Ktcc	F	D, S	----	8-15-62	3 1/2 gpm measured
32db	----do-----	----	L	Du	-----	----	--	Ss, Sh	Ktcc	C	D	----	9-20-62	Tight installation
19-12-33cc	Irene Mikeson	1962	C	Dr	605	2	P	Ss	Ktcc	F	S	----	7-24-62	4 gpm reported, 56°F

Table B-4.--Temperature and specific conductance of water from wells and springs in the Judith Basin, Mont.-- continued

Well or spring	Temperature (°F)	Specific conductance (microhos at 25°C)	Well or spring	Temperature (°F)	Specific conductance (microhos at 25°C)	Well or spring	Temperature (°F)	Specific conductance (microhos at 25°C)
Colorado Shale								
11-14-2aa	--	970	14-11-2bc	--	740	17-10-2bd	49	910
12-14-2dd	57	8,000+	14-11-23dc1	--	300	17-10-2cc	--	710
12-14-3dd	47	580	14-11-23dc2	--	245	17-10-3de	--	850
12-14-4ba	46	730	14-11-34db	44	335	17-10-6ec1	49	1,200
12-14-6bc	51	420	16-10-29cd	43	300	17-10-21ad	46	660
12-14-7ac	--	550	16-12-13ac	51	1,550	17-11-3eb1	49	800
12-14-7bd	46	480	16-13-19aa	49	890	17-11-7dd	46	650
12-14-11ad	46	1,700				17-11-12ab	--	1,250
12-14-14ba	50	1,010				17-11-12ab	--	840
12-15-18bd	52	1,400				17-11-12ab	47	740
12-15-18bd	51	610				17-12-6dc	--	1,090
12-15-34bd	49	800				17-12-6dc	--	850
13-12-36cc	45	460				17-12-14cd2	51	850
13-14-31db	--	1,340				17-12-14cd2	--	790
13-15-11bc	--	4,100				17-12-24bb1	--	1,230
13-15-22ac	--	3,000				17-12-24bb2	48	2,050
14-15-19ca1	52	1,600				18-10-1bc	--	630
14-15-19ca2	59	1,580				18-10-1bd2	--	2,500
14-15-29bb	65	1,050				18-10-1bd3	--	1,030
14-15-30aa	62	1,000				18-10-234c	50	2,100
14-15-31cc	57	1,130				18-10-25ba	48	800
14-15-33cd	68	2,600				18-10-35ad2	53	700
15-12-10cb	--	700				18-10-35ad2	--	950
16-12-13cd	45	2,050				18-11-6cd2	49	1,500
16-12-14cd	47	1,950				18-11-6cd4	48	1,150
16-12-14cd	--	2,000				18-11-30ab	51	2,700
16-12-16ca	68	1,200				18-11-30cc2	--	1,500
16-12-16ca	45	2,750				18-11-31cb	47	1,800
16-12-24bb	--	780				18-11-32ab	--	1,260
16-12-24bb	45	1,700				18-11-32bb	51	2,100
16-12-25bd	48	960				18-11-35ca	--	2,200
16-12-25bb	46	900				18-12-28c2	--	3,100
16-12-26cd	--	650				18-12-7cd	--	1,900
16-12-28ab2	46	1,150				18-12-10aa1	47	3,900
16-12-29aa3	49	1,770				18-12-10aa2	55	4,400
16-12-32aa2	46	1,500				18-12-13ad	47	3,500
17-9-2aa	47	470				18-12-13ad	67	6,400
17-11-4dd	50	780				18-12-29ad	46	750
17-11-5dd2	48	630				18-12-34bd	46	1,280
17-11-8da	48	2,900				18-12-34bd	49	1,940
17-11-29bb	48	500				19-11-20ca	--	1,800
17-12-28ba	49	1,160						
17-12-32bb	--	370						
18-9-20bd	43	660						
18-10-1bd1	49	1,650						
18-10-2bd1	49	3,500						
18-10-2bd2	--	3,000						
18-10-13ca1	--	640						
18-10-24cb	--	830						
18-11-6cd5	--	1,900						
18-11-16da	50	1,280						
18-11-30cc1	--	1,400						
18-11-31cb2	--	1,070						
19-10-14da	--	610						
19-11-32aa1	--	1,680						
19-11-32aa3	51	2,300						
19-11-32bb	--	2,100						
19-12-33cc	56	1,500						
Basalt (?) Sandstones								
18-11-4eb	50	980						
Alluvium--continued								
14-13-23bb2	--	535	14-10-2bc	--	740	17-10-2bd	49	910
14-13-24ab	900		17-10-2cc	--	300	17-10-2cc	--	710
14-13-24bb2	610		17-10-3de	--	245	17-10-3de	--	850
14-13-26bd	1,080		17-10-6ec1	44	335	17-10-6ec1	49	1,200
14-14-10hd	460		17-10-21ad	46	300	17-10-21ad	46	660
14-14-10ca1	800		16-12-13ac	51	1,550	17-11-3eb1	49	800
14-14-18ac	475		16-13-19aa	49	890	17-11-7dd	46	650
15-11-4cc	1,100					17-11-12ab	--	1,250
15-11-33cc	820					17-11-12ab	--	840
15-12-3aa2	2,000					17-12-6dc	47	740
15-12-3aa3	2,000					17-12-6dc	--	1,090
15-12-12ad1	1,100					17-12-14cd2	51	850
15-12-24b1	950					17-12-24bb1	--	790
15-12-26bd	580					17-12-24bb2	48	2,050
15-12-35ab	710					18-10-1bc	--	630
16-10-4cd	800					18-10-1bd2	--	2,500
16-10-8ad	510					18-10-1bd3	--	1,030
16-11-26dc	550					18-10-234c	50	2,100
16-11-35bb	690					18-10-25ba	48	800
16-11-35bc	570					18-10-35ad2	53	700
16-11-35bd1	580					18-11-6cd2	49	1,500
16-12-74a	710					18-11-6cd4	48	1,150
16-12-74c1	950					18-11-30ab	51	2,700
16-12-74c2	620					18-11-30cc2	--	1,500
16-12-10cd	1,000					18-11-31cb	47	1,800
16-12-18ba	650					18-11-32ab	--	1,260
16-13-20cc1	1,800					18-11-32bb	51	2,100
16-13-20cc1	1,800					18-11-35ca	--	2,200
17-10-3ac	1,600					18-12-28c2	--	3,100
17-10-9ab	1,820					18-12-7cd	--	1,900
17-10-9ab	430					18-12-10aa1	47	3,900
17-10-9ab	1,900					18-12-10aa2	55	4,400
17-12-34b	3,500					18-12-13ad	47	3,500
17-12-34b	900					18-12-13ad	67	6,400
17-12-15bd1	900					18-12-29ad	46	750
17-12-15bd2	500					18-12-34bd	46	1,280
17-12-17ba2	620					18-12-34bd	49	1,940
17-12-18a1	1,000					19-11-20ca	--	1,800
17-12-18a2	1,200							
17-12-21ad	610							
17-12-21ad	650							
17-12-22bb	650							
17-12-30ad	750							
17-12-32ab	600							
17-12-32bb	570							
18-10-34c	650							
18-11-31ca2	1,070							
19-11-31bd	750							
Landslide deposits								
12-12-5ad	58	850	12-14-8cd	47	600	12-14-8cd	47	600
12-12-20bd	44	615	12-14-9cd1	--	870	12-14-9cd1	--	870
12-11-8bd	2,700		12-14-11cd	43	1,160	12-14-11cd	43	1,160
16-10-21cc	260		12-14-16aa	44	830	12-14-16aa	44	830
16-10-26bd	46	470	12-14-16bb1	44	650	12-14-16bb1	44	650
16-10-34a	--		12-14-18aa2	49	510	12-14-18aa2	49	510
			12-14-25ba1	37	640	12-14-25ba1	37	640
			12-14-35ca	32	530	12-14-35ca	32	530
			13-12-5ad2	47	2,200	13-12-5ad2	47	2,200
			13-12-17bb1	--	480	13-12-17bb1	--	480
			13-12-17cc	36	355	13-12-17cc	36	355
			13-12-17ca	37	840	13-12-17ca	37	840
			13-12-18da	48	2,050	13-12-18da	48	2,050
			13-12-18cd1	36	390	13-12-18cd1	36	390
			13-12-19ac	37	395	13-12-19ac	37	395
			13-12-30aa	47	340	13-12-30aa	47	340
			13-13-11cd	45	910	13-13-11cd	45	910
			13-13-12cc2	36	760	13-13-12cc2	36	760
			13-13-15cc	49	360	13-13-15cc	49	360
			14-12-2ab2	--	640	14-12-2ab2	--	640
			14-12-21cc	--	800	14-12-21cc	--	800
			14-13-18bb2	46	740	14-13-18bb2	46	740
			14-13-22aa	62	1,650	14-13-22aa	62	1,650
			16-10-29bd	43	180	16-10-29bd	43	180
			14-13-23bb1	52	600	14-13-23bb1	52	600