



MISCELLANEOUS  
PAPER  
80-1

## Appendix B

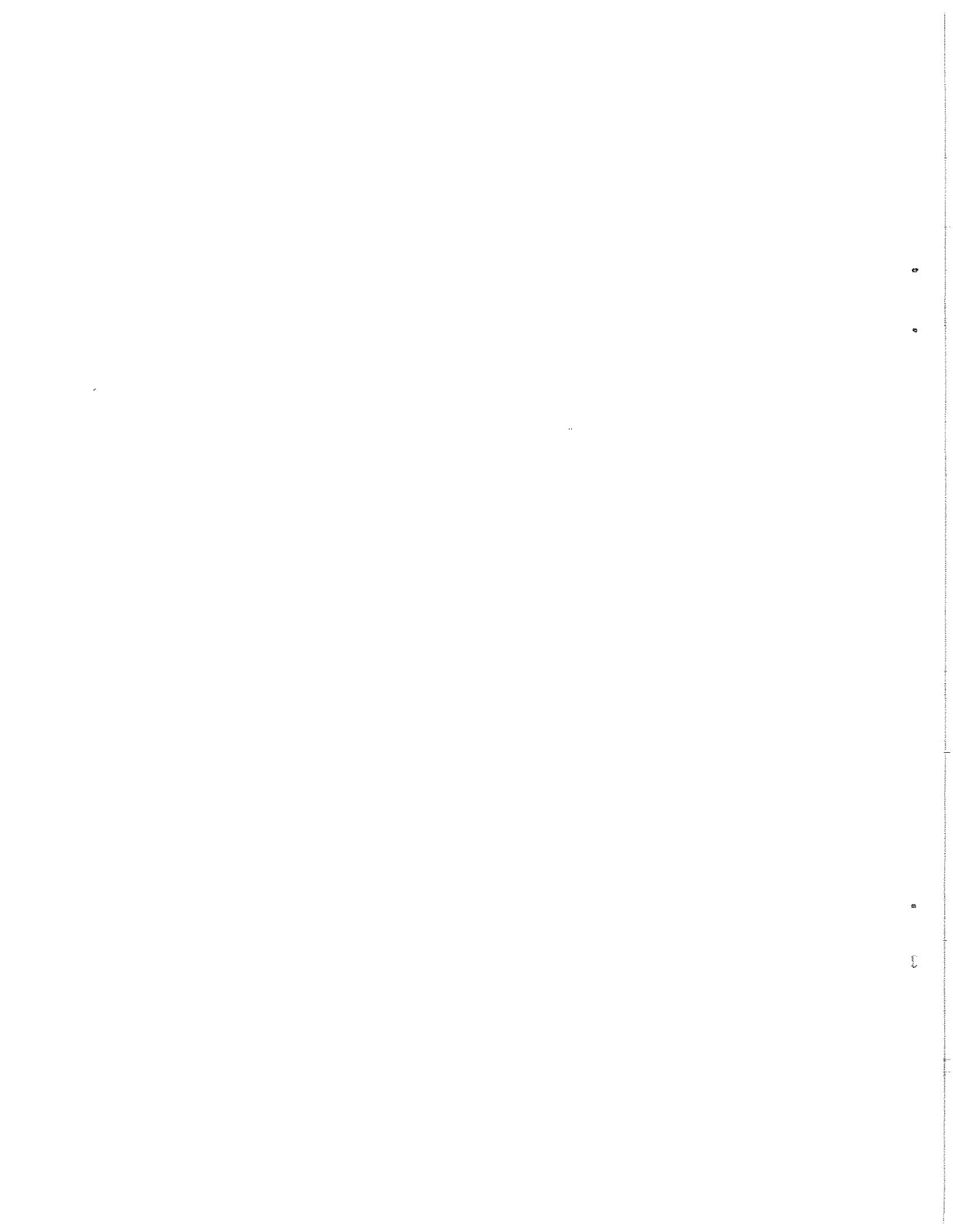
### Drought and Ground-Water Levels in Northern Wisconsin

## DATA FOR SELECTED WELLS IN NORTHERN WISCONSIN

*Companion Volume to Geoscience Wisconsin Volume 5, 1980*

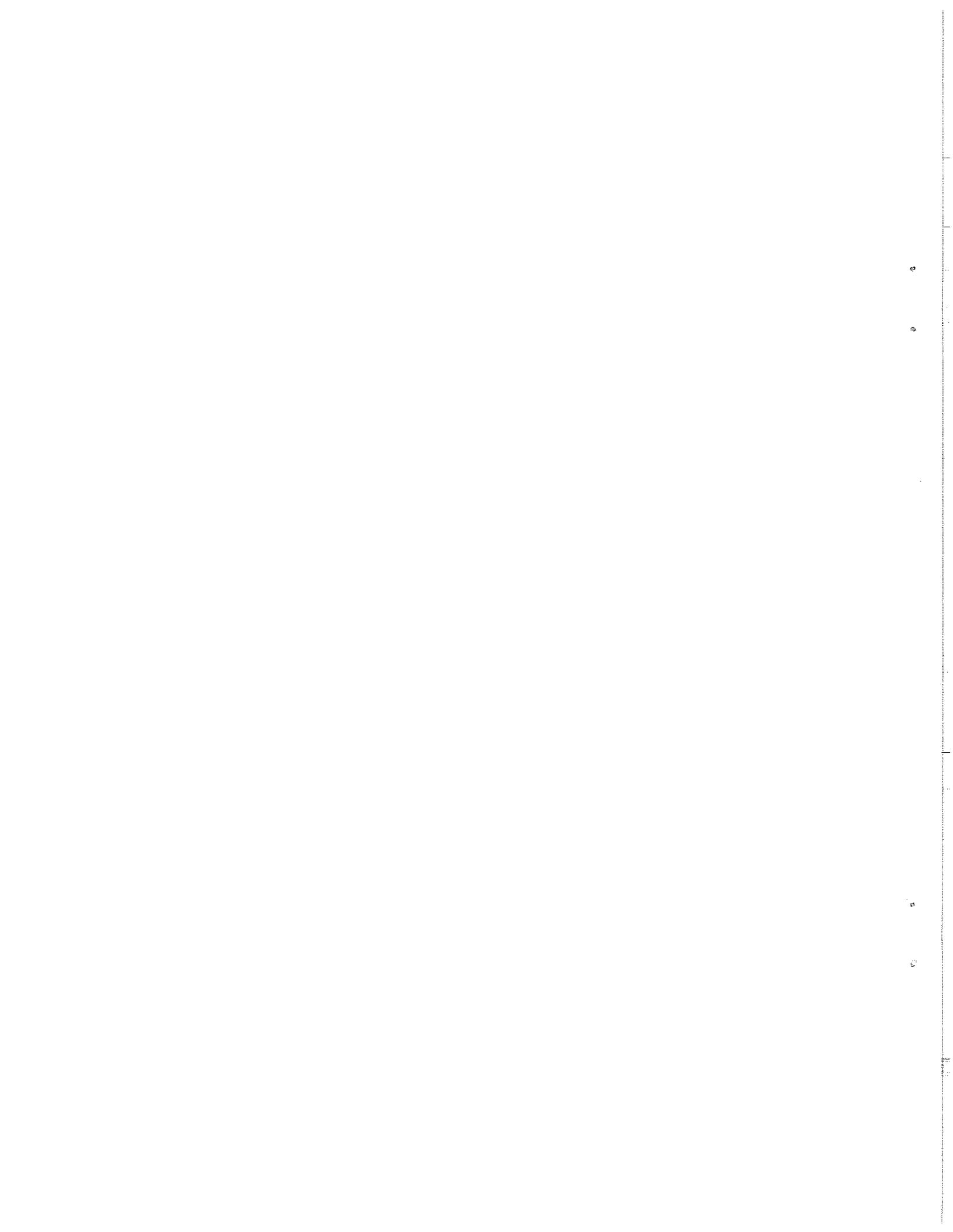
by A. Zaporozec

available from  
Geological and Natural History Survey  
University of Wisconsin-Extension  
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Madison, Wisconsin  
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# WELL DATA FOR SELECTED WELLS IN NORTHERN WISCONSIN<sup>1</sup>

by

A. Zaporozec<sup>2</sup>

## INTRODUCTION

In 1976-1977, much of the United States experienced a serious water shortage caused by a prolonged period of deficient precipitation. One of the areas most severely affected by this drought was the Upper Midwest, especially Minnesota and Wisconsin. During the drought, state officials had to set up emergency service to provide water for stock and domestic purposes in areas where the wells failed, and later on, to help with the replacement and deepening of inadequate wells. These additional expenditures created a concern by state officials involved in providing emergency water supplies, especially the Wisconsin Department of Emergency Government (DEG), who requested and sponsored a study to determine the extent and periodicity of historical droughts in Wisconsin and their effect on ground-water levels, and to develop a method or warning system which would minimize the failures of the wells during a drought.

The study was supported by the National Science Foundation (NSF) Grant OSS 77-23964. The proposal for the study was submitted by the author to the NSF Science for Citizens Program in May 1977. The grant was awarded by the NSF in September 1977. The Wisconsin DEG served as a host institution for the duration of the project from June 26, 1978 to June 25, 1979.

Statistical analysis of precipitation for the state area, and water-level measurements taken on seven observation wells in northern Wisconsin have been used to evaluate the periods of deficient precipitation, related periods of low water levels, and also their overall trends for the period of record (which is for precipitation since 1881, and for ground-water levels since 1937).

The results of the study were summarized in the report entitled "Drought and Ground-Water Levels in Northern Wisconsin" and published in Geoscience Wisconsin, Volume 5, 1980. The analysis presented in the study was based on data from seven wells aligned in a cross-section from Burnett to Marinette County in a west to east direction, and from Lincoln to Portage County in a north to south direction (see Figure A). Data in this volume are published separately in a form of an appendix to enable interested readers to use the processed data in other studies of northern Wisconsin; or to use the tables and graphs as an example of various statistical methods which can be used in any hydrogeological investigation.

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<sup>1</sup> Appendix B of Drought and Ground-Water Levels in Northern Wisconsin Geoscience Wisconsin, Volume 5, 1980

<sup>2</sup> Wisconsin Geological and Natural History Survey, University of Wisconsin--Extension

The wells are arranged alphabetically by county. The data are presented numerically in tables and graphically in diagrams. Figure B contains the symbols used for the classification of hydrologic years in the well-tables 4 and figures 4 for each well. A complete set for each well contains the following:

#### Well Description Sheet

Figure 1. Location Map

Table 1. Summary of Ground-Water Levels

Table 2. Average Monthly Ground-Water Levels

Figure 2. Hydrograph of Monthly High Water Levels

Figure 3. Relation of Annual Ground-Water Levels to Precipitation

Table 3. Longest Duration of Extreme Ground-Water Levels

Table 4. Probability of Exceedance of Ground-Water Levels

Table 5. Frequency of Weekly Ground-Water Levels

Figure 4. Frequency Distribution of Weekly Water Levels

Table 6. Exceedance of Weekly Ground-Water Levels

Table 7. Total Precipitation (at the nearest station)

Table 8. Monthly Mean Discharge (if applicable)

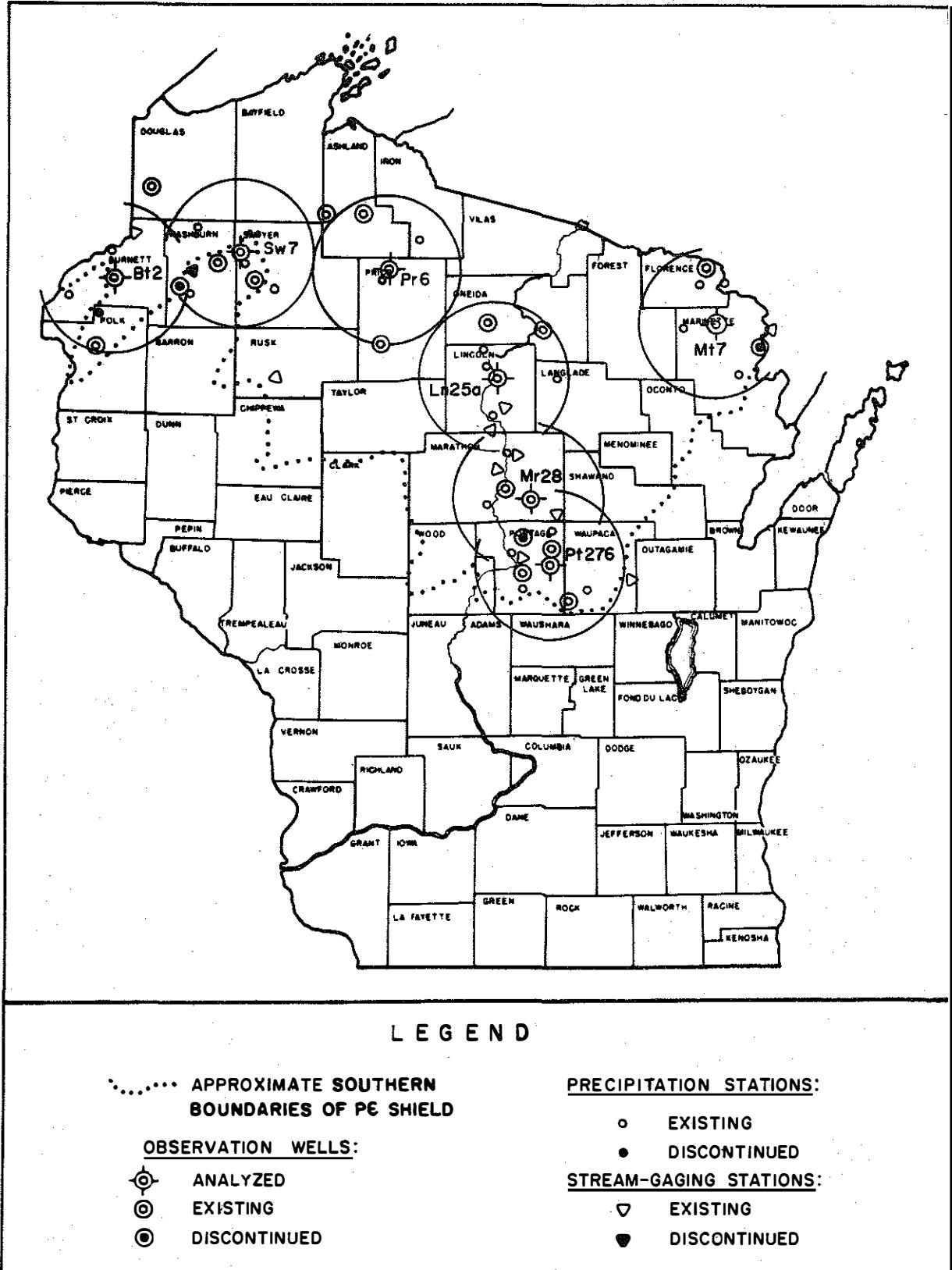


Figure A. Location of Analyzed Wells

Figure B. CLASSIFICATION SCALE OF HYDROLOGIC YEARS  
BASED ON PROBABILITY OF EXCEEDANCE  
OF AVERAGE ANNUAL LEVELS

Probability (%)	Average Annual Level	Symbol
0.00-10.00	Extremely high	EH
10.01-40.00	High	H
40.01-60.00	Average	A
60.01-90.00	Low	L
90.01-100.00	Extremely low	EL

NOTE: Probability of exceedance was calculated from the Chegodayev formula

$$p = \frac{m - 0.3}{n + 0.4} \cdot 100$$

O B S E R V A T I O N   W E L L   B t   2

## WELL DESCRIPTION SHEET

WELL NO.: Bt 2		OWNER: Wisconsin DNR
LOCATION		
Township/Range General Detail	NW-NE-NE S17, T39N, R16W S end of Webster, Burnett County at Ranger Station, between the railroad and STH 35	
Altitude Drainage Basin	981 ft above msl ST. CROIX R.: Clam R.	
NEAREST OBSERVATION POINTS		
Precipitation Stations	Danbury (since 1919) - 9.5 mi N Frederic (1941-1970) - 15 mi SSW Grantsburg (since 1892) - 16.5 mi WSW (reloc. in 1950) Spooner (since 1894) - 24 mi E	
Stream-Gaging Stations	05333500 St. Croix R. nr. Danbury (since 1914) - 10 mi N	
Observation Wells	Wb1 (1948-1971) - 23 mi E Pk40 (since 1957) - 25 mi SSW Ds 329 (since 1968) - 31.5 mi NNE	
Other	--	
WELL DATA		
Depth: 46 ft Aquifer(s) Tapped Well Log	Casing: depth - 44.5 ft; diameter 8 in. Pleistocene sand Available: yes - <input checked="" type="checkbox"/>	
MEASUREMENTS		
Measuring Point	Pointer on float-type gage	
Equipment	4.87 ft above lsd Kinnison float gauge	
Frequency	Weekly (daily from 08/09/37 to 12/29/42; weekly or more frequently from 12/29/42 to 07/31/48)	
First Measured Period of Record Interrupted	Date: May 26, 1937 ; 36.83 ft below lsd May 1937 - present Occasionally, except in 1938, 1941-43, 1961, 1971 and 1973 when winter months are missing.	
Notes	Record fairly complete, 6.26% of measurements missing. (48% of missing data occurred in 1938-44, and 22% in 1971-74).	

5/31/79

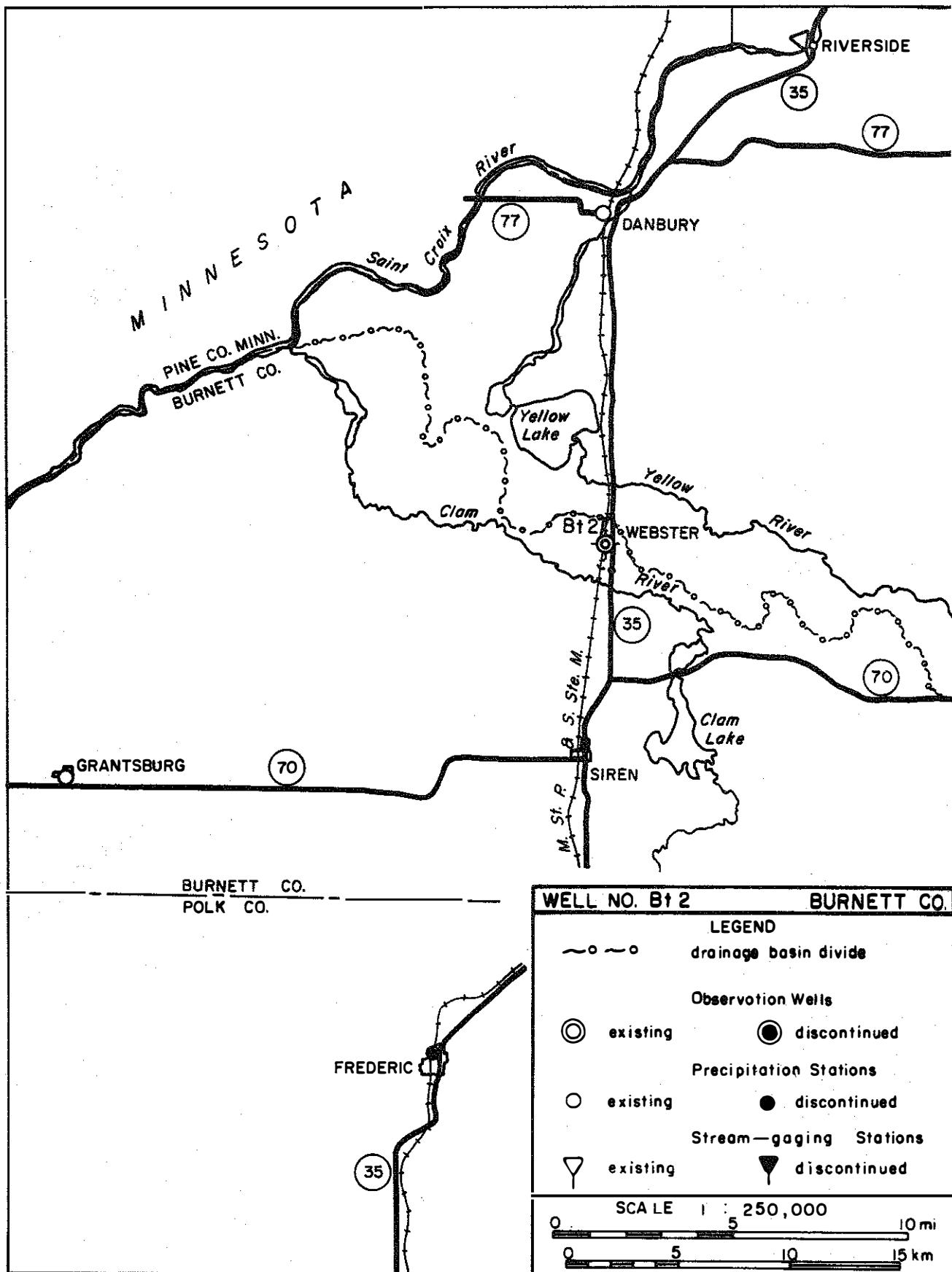


Figure 1. LOCATION MAP OF WELL NO. Bt 2

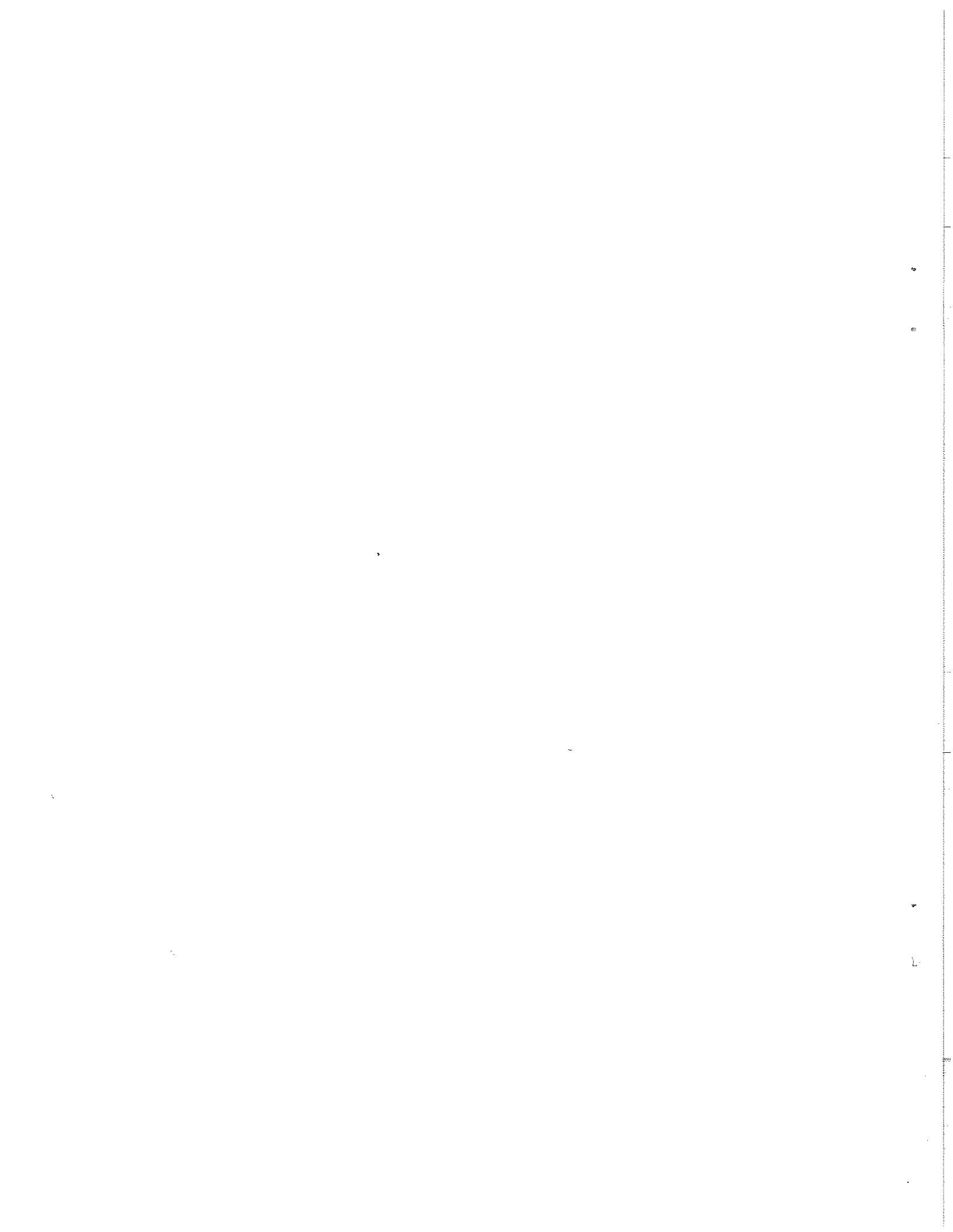


Table 1. SUMMARY OF GROUND-WATER LEVELS IN OBSERVATION WELL Bt 2

Characteristics	Feet below lsd	Date
Mean Level	33.89	(calculated)
Highest Monthly Mean	33.83	June
Lowest Monthly Mean	33.97	March
Highest Average Annual Level	32.62	1955
Lowest Average Annual Level	36.95	1938
Highest Average Monthly Level	32.52	December 1956
Lowest Average Monthly Level	37.16	March, 1938
Highest Recorded Level	30.60	04/30/54
Lowest Recorded Level	37.32	03/03/78
$H_{10\%}$ (level exceeded by 10% days/yr)	32.98	(calculated)
$H_{90\%}$ (level exceeded by 90% days/yr)	35.05	(calculated)
Average Annual Amplitude	1.04 ft.	
Maximum Amplitude (between record levels)	6.72 ft.	
Fluctuability ( $H_{10\%} - H_{90\%}$ )	2.07 ft.	
Years Above Average	1945-48, 1953-61, 1969-70, 1972-77	
Years Below Average	1938-42, 1949-52, 1963-68, 1978	
Average Year(s)	1943, 1943, 1962, 1971	
Longest Duration of:		
Extremely Low Levels	see Table 3A	
Extremely High Levels	see Table 3B	

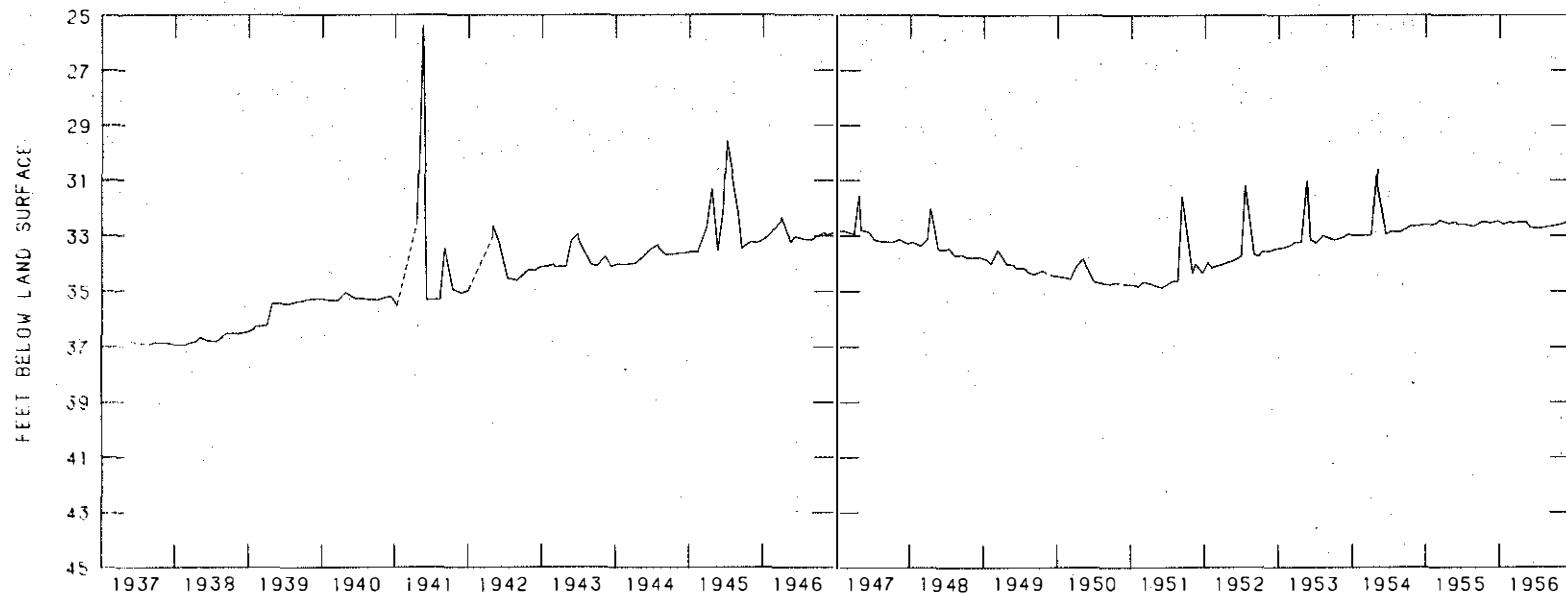
Table 2. AVERAGE AND EXTREME GROUND-WATER LEVELS IN OBSERVATION WELL Bt 2

Water Year	Average Monthly Water Levels (in feet below 1.s.d.)												Avg. Annual Level	Extreme Levels (in ft below 1.s.d.)				
	O	N	D	J	F	M	A	M	J	J	A	S		Lowest		Highest		
	Date	ft.	Date	ft.														
1938*	36.99	37.03	36.92	36.95	36.97	37.16	37.04	36.96	36.95	36.92	36.89	36.69	36.95	03/03/38	37.32	09/10/38	36.52	.80
1939*	36.64	36.61	36.60	36.56	36.56	36.56	36.08	35.61	35.57	35.56	35.52	35.50	36.11	03/07/39	36.79	08/22/39	35.39	1.40
1940*	35.48	35.49	35.42	35.45	35.46	35.45	35.46	35.25	35.37	35.38	35.39	35.41	35.42	11/02/39	35.67	04/29/40	35.05	.62
1941*	35.44	35.42	35.40	35.50	35.51	35.39	34.13	35.37	35.41	35.37	35.36	35.09	35.28	01/18/41	35.69	04/20/41	32.56	3.13
1942*	35.15	35.11	35.06	35.02	35.00	34.98	34.55	33.55	34.28	34.60	34.67	34.54	34.71	10/22/41	35.26	05/02/42	32.65	2.61
1943	34.42*	34.35*	34.26*	34.14	34.10	34.15	34.14	33.87	33.15	34.48*	34.14	34.17	34.03	10/16/42	34.52	06/27/43	32.94	1.58
1944	34.08	34.07	34.06	34.09	34.07	34.07	33.99	33.88	33.65	33.60	33.61*	33.74*	33.91	12/09/43	34.14	07/28/44	33.32	.82
1945	33.71*	33.69*	33.68*	33.64*	33.66*	33.49*	33.16*	33.64	33.45*	33.59	33.61*	33.51	33.57	10/16/44	33.76	04/23/45	31.30	2.46
1946	33.44*	33.32	33.30	33.22	33.14	33.17	32.99	33.28	33.19	33.20	33.19	33.14	33.22	10/24/45	33.48	04/03/46	32.34	1.14
1947	33.10	33.06	32.92	32.94	32.88	33.04	32.78	32.99	33.00	33.12	33.25	33.29	33.03	09/01/47	33.31	04/22/47	31.53	1.78
1948	33.28	33.29	33.35	33.35	33.44	33.39	33.35	33.53	33.60	33.63	33.74	33.81	33.45	09/30/48	33.83	04/11/48	32.01	1.82
1949	33.82	33.84	33.83	33.93	34.03	34.08	34.07	34.09	34.19	34.25	34.36	34.41	34.08	09/01/49	34.42	12/11/48	33.77	.65
1950	34.38	34.42	34.48	34.53	34.61	34.64	34.50	34.45	34.63	34.71	34.76	34.81	34.58	09/16/50	34.84	10/15/49	34.28	.56
1951	34.79	34.78	34.79	34.81	34.86	34.83	34.85	34.86	34.90	34.72	34.67	34.59	34.79	03/24/51	34.97	09/12/51	34.35	.62
1952	34.46	34.27	34.40	34.19	34.19	34.14	34.04	33.96	33.87	33.84	33.77	33.70	34.07	10/13/51	34.54	08/31/52	33.67	.87
1953	33.61	33.57	33.51	33.48	33.38	33.36	33.32	33.19	33.21	33.30	33.16	33.17	33.36	10/04/52	33.64	05/01/53	32.81	.83
1954	33.15	33.06	32.98	32.99	32.98	33.00	33.04	32.59	32.96	32.92	32.88	32.80	32.95	10/03/53	33.18	04/30/54	30.60	2.58
1955	32.67	32.65	32.63	32.62	32.57	32.53	32.63	32.60	32.65	32.65	32.70	32.59	32.62	10/02/54	32.74	03/11/55	32.43	.31
1956	32.55	32.57	32.54	32.61	32.60	32.64	32.62	32.63	32.73	32.76	32.72	32.69	32.64	07/06/56	32.77	12/23/55	32.47	.30
1957	32.66	32.60	32.52	32.69	32.77	32.79	32.78	32.78	32.82	32.86	32.88	32.78	32.74	08/30/57	32.90	12/07/56	32.43	.47
1958	32.88	32.71	32.77	32.85	32.93	33.00	33.03	32.99	33.01	33.07	33.11	33.10	32.96	08/22/58	33.15	11/22/57	32.66	.49
1959	33.10	33.01	33.02	33.10	33.12	33.27	33.31	33.32	33.44	33.45	33.44	33.49	33.26	09/11/59	33.52	11/21/58	32.91	.61
1960	33.42	33.42	33.51	33.51	33.56	33.65	33.62	33.70	33.62	33.59	33.61	33.61	33.57	04/29/60	33.71	10/23/59	33.36	.35
1961	33.56	33.51	33.58	33.66	33.70	33.69	33.24	33.60	33.60	33.68	33.73	33.74	33.61	05/05/61	33.77	04/14/61	32.41	1.36
1962	33.76	33.76	33.76	33.82	33.90	33.94	33.81	33.74	33.89	34.00	34.06	34.07	33.87	08/31/62	34.09	5/25/62	32.89	1.20
1963	34.09	34.09	34.06	34.12	34.15	34.23	34.21	34.30	34.37	34.42	34.43	34.51	34.25	09/27/63	34.53	11/09/62	34.04	.49
1964	34.56	34.55	34.56	34.58	34.70	34.75	34.72	34.62	34.67	34.77	34.80	34.83	34.67	09/18/64	34.85	05/15/64	34.47	.38
1965	34.83	34.85	34.92	34.93	34.94	35.07	34.08	33.72	34.55	34.77	34.80	34.69	34.76	03/26/65	35.10	05/07/65	30.45	4.65

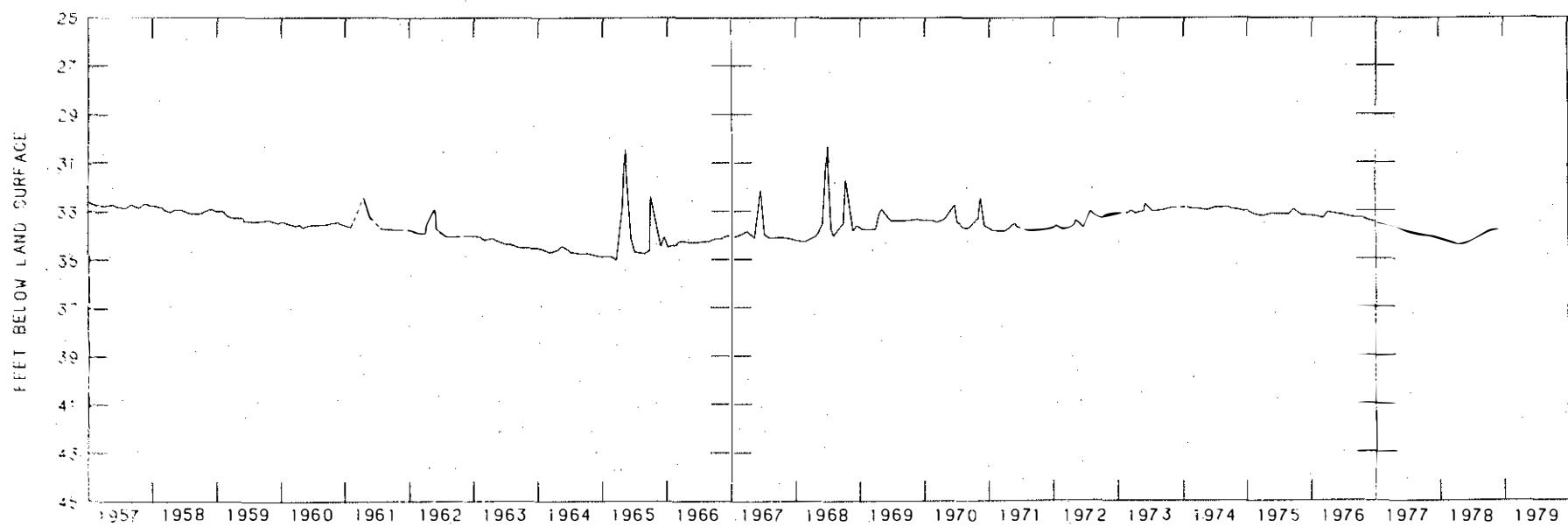
Table 2. AVERAGE AND EXTREME GROUND-WATER LEVELS IN OBSERVATION WELL Bt 2  
(cont'd)

Water Year	Average Monthly Water Levels (in feet below l.s.d.)												Avg. Annual Level	Extreme Levels (in ft below l.s.d.)				
	O	N	D	J	F	M	A	M	J	J	A	S		Lowest Date	ft.	Highest Date	ft.	Diff.
1966	34.50	34.54	34.32	34.57	34.50	34.41	34.38	34.33	34.36	34.30	34.27	34.22	34.39	10/29/65	34.67	12/17/65	34.09	.58
1967	34.17	34.14	34.09	34.10	34.09	34.16	34.05	34.12	33.40	34.06	34.14	34.12	34.05	03/17/67	34.33	06/16/67	32.13	2.20
1968	34.11	34.14	34.19	34.25	34.30	34.32	34.29	34.15	33.96	33.99	34.08	33.97	34.14	03/29/68	34.39	05/31/68	33.54	.85
1969	33.88	33.91	33.70	33.80	33.83	33.78	33.34	33.38	33.45	33.43	33.43	33.43	33.61	10/04/68	34.02	05/02/69	32.94	1.08
1970	33.41	33.40	33.43	33.46	33.44	33.56	33.51	33.53	33.30	33.61	33.73	33.74	33.51	09/18/70	33.76	06/19/70	32.77	.99
1971	33.66	33.44	33.72	33.82	33.84	33.91	33.86	33.76	33.75	33.79	33.81	33.82	33.76	03/19/71	33.96	10/30/70	33.30	.66
1972	33.83	33.76	33.75	33.68	33.79	33.79	33.70	33.60	33.70	33.38	33.22	33.36	33.63	10/22/71	33.84	07/28/72	32.99	.85
1973	33.25	33.16	33.17	33.16	33.14	33.06	33.10	33.05	32.95	33.02	33.01	32.98	33.09	10/06/72	33.31	06/01/73	32.70	.61
1974	32.93	32.93	32.91	32.92	32.93	32.95	32.98	33.01	32.92	32.88	32.88	32.87	32.93	05/10/74	33.06	09/13/74	32.85	.21
1975	32.94	32.98	33.02	33.03	33.15	33.21	33.22	33.20	33.17	33.14	33.19	33.10	33.11	05/09/75	33.28	10/04/74	32.92	.36
1976	33.18	33.21	33.22	33.26	33.32	33.32	33.16	33.18	33.19	33.23	33.27	33.34	33.24	02/27/76	33.38	04/02/76	33.06	.32
1977	33.36	33.41	33.45	33.50	33.56	33.64	33.73	33.80	33.88	33.96	34.07	34.11	33.70	09/30/77	34.14	10/15/76	33.29	.85
1978	34.15	34.10	34.16	34.24	34.28	34.32	34.36	34.35	34.34	34.15	34.04	33.96	34.20	04/28/78	34.44	09/29/78	33.39	.55
Means 1938- 1978	33.94	33.91	33.90	33.93	33.95	33.97	33.84	33.84	33.83	33.88	33.91	33.89	33.89	03/03/38	37.32	04/30/54	30.60	6.72
	NOTE: *Calculated from daily measurements. Underlined values are estimated.																	

Figure 2. HYDROGRAPH OF MONTHLY HIGH WATER LEVEL IN OBSERVATION WELL Bt2  
(Computer print-out courtesy U.S. Geological Survey)



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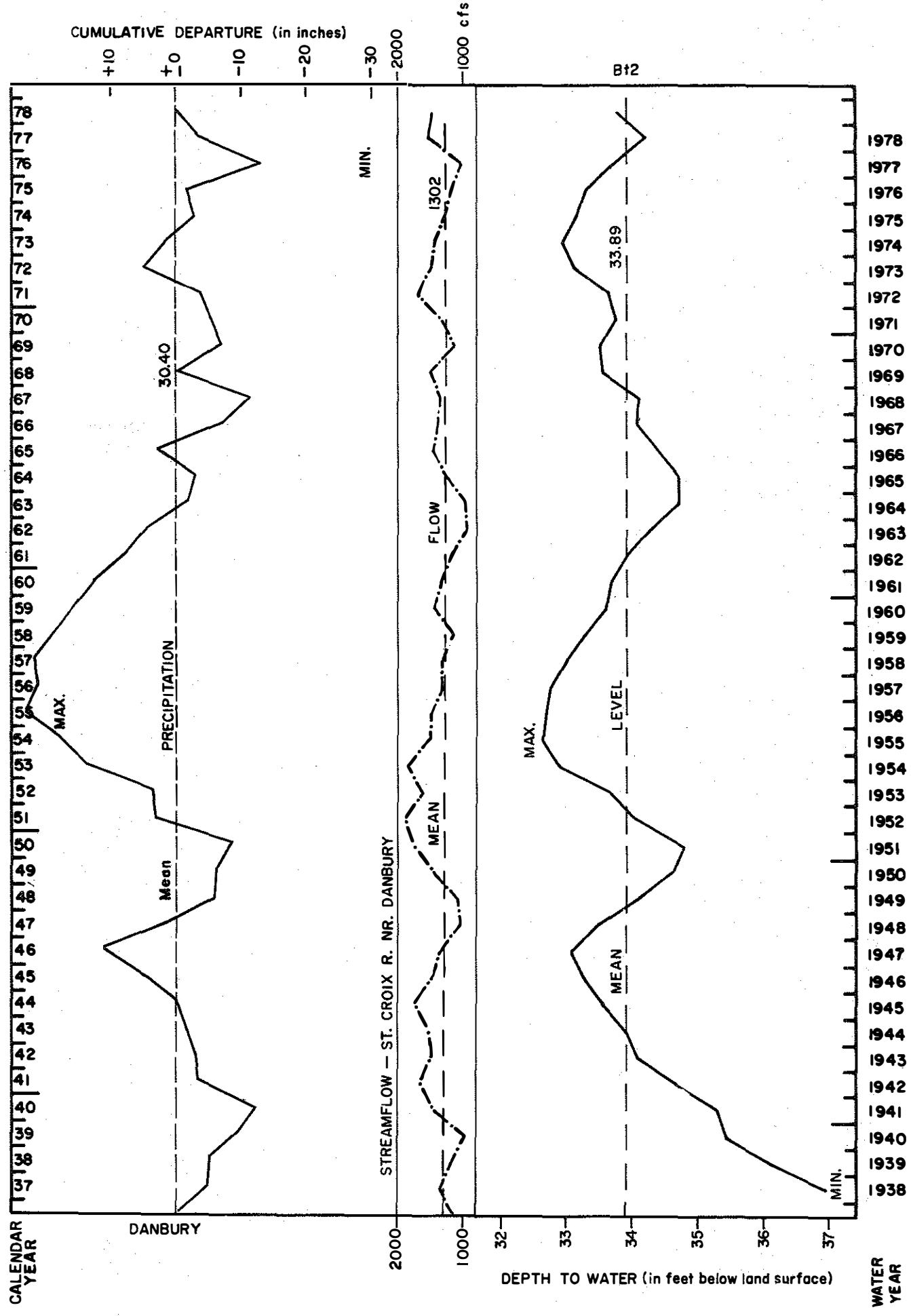


Figure 3. RELATION OF ANNUAL GROUND-WATER LEVELS IN OBSERVATION WELL NO. Bt2 TO PRECIPITATION AT DANBURY

Table 3. LONGEST DURATION OF EXTREME GROUND-WATER LEVELS IN OBSERVATION WELL Bt 2  
 (all periods listed)

A. Extremely Low Levels ( $> H_{90\%}$ ) Lasting		Total No. of Days
From	To	
May 26, 1937	Apr. 8, 1941	1414
Jan. 31, 1964	Apr. 10, 1965	569
May 13, 1950	Sept. 10, 1951	486
Apr. 25, 1941	Apr. 20, 1942	361
May 13, 1965	Sept. 24, 1965	135
June 20, 1942	Sept. 12, 1942	85
Oct. 15, 1965	Nov. 19, 1965	36
Jan. 8, 1966	Feb. 7, 1966	31

B. Extremely Low Levels ( $< H_{10\%}$ ) Lasting		
From	To	
Nov. 2, 1953	Jan. 27, 1959	1913
Dec. 22, 1972	Feb. 8, 1975	779
Sept. 2, 1946	July 5, 1947	307
July 4, 1975	July 25, 1975	21

Allowance for inaccuracies of measurements

low levels: 1.5%

high levels: 0.5%

Table 4. PROBABILITY OF EXCEEDANCE OF GROUND-WATER LEVELS IN OBSERVATION WELL Bt 2  
 (median: 33.70 ft)

No.	Water Year	Water Level (in ft.)	P (%)	Class.	No.	Water Year	Water Level (in ft.)	P (%)	Class.
1.	1955	32.62	1.69	EH	22.	1971	33.76	52.41	A
2.	1956	32.64	4.11	EH	23.	1962	33.87	54.83	A
3.	1957	32.74	6.52	EH	24.	1944	33.91	57.24	A
4.	1974	32.93	8.94	EH	25.	1943	34.03	59.66	A
5.	1954	32.95	11.35	H	26.	1967	34.05	62.08	L
6.	1958	32.96	13.77	H	27.	1952	34.07	64.49	L
7.	1947	33.04	16.18	H	28.	1949	34.08	66.91	L
8.	1973	33.09	18.60	H	29.	1968	34.15	69.32	L
9.	1975	33.11	21.01	H	30.	1978	34.20	71.74	L
10.	1946	33.22	23.43	H	31.	1963	34.25	74.15	L
11.	1976	33.24	25.84	H	32.	1966	34.39	76.57	L
12.	1959	33.26	28.26	H	33.	1950	34.58	78.48	L
13.	1953	33.36	30.68	H	34.	1964	34.68	81.40	L
14.	1948	33.45	23.09	H	35.	1942	34.71	83.82	L
15.	1970	33.51	35.51	H	36.	1965	34.76	86.23	L
16.	1945	33.57	37.92	H	37.	1951	34.79	88.65	L
17.	1960	33.57	40.34	A	38.	1941	35.28	91.06	EL
18.	1961	33.61	42.75	A	39.	1940	35.42	93.48	EL
19.	1969	33.62	45.17	A	40.	1939	36.11	95.89	EL
20.	1972	33.63	47.58	A	41.	1938	36.95	98.31	EL
21.	1977	33.70	50.00	A					

Table 5. FREQUENCY OF WEEKLY GROUND-WATER LEVELS IN OBSERVATION WELL Bt 2

Interval (feet below land surface)	Frequency (n)		Cumulative Frequency (duration)	
	Absolute (n)	Relative ( $\frac{n}{N}$ )	Absolute ( $\leq n$ )	Relative ( $\frac{\leq n}{N}$ )
31.50-32.00	1	0.05	1	0.05
32.01-32.50	14	0.65	15	0.70
32.51-33.00	309	14.44	324	15.14
33.01-33.50	499	23.32	823	38.46
33.51-34.00	469	21.91	1292	60.37
34.01-34.50	401	18.74	1693	79.11
34.51-35.00	218	10.19	1911	89.30
35.01-35.50	118	5.51	2029	96.81
35.51-36.00	31	1.45	2060	96.26
36.01-36.50	3	0.14	2063	96.40
36.51-37.00	64	2.99	2127	99.39
37.01-37.50	13	0.61	2140	100.00
TOTALS	2140	100.00%		

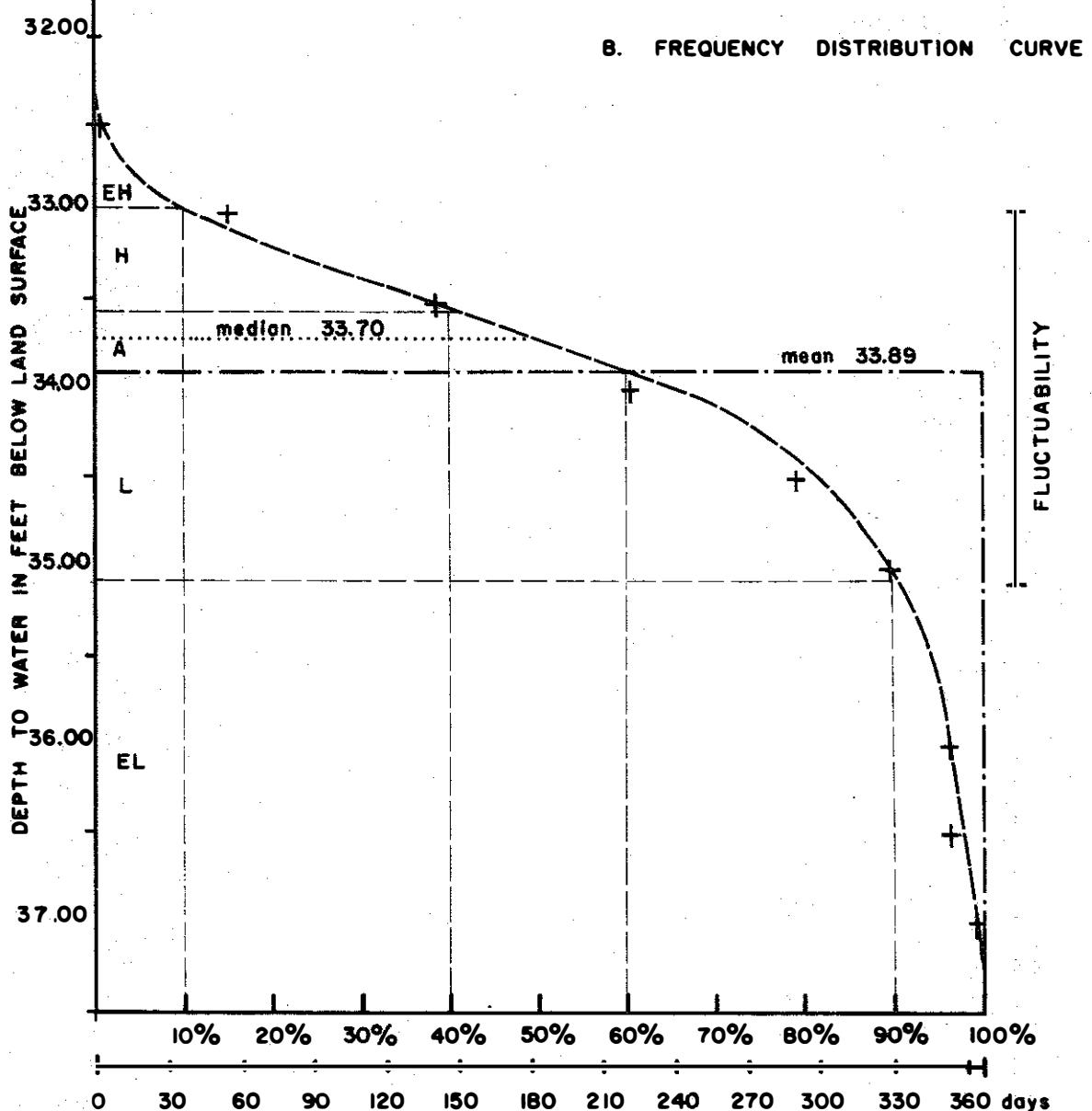
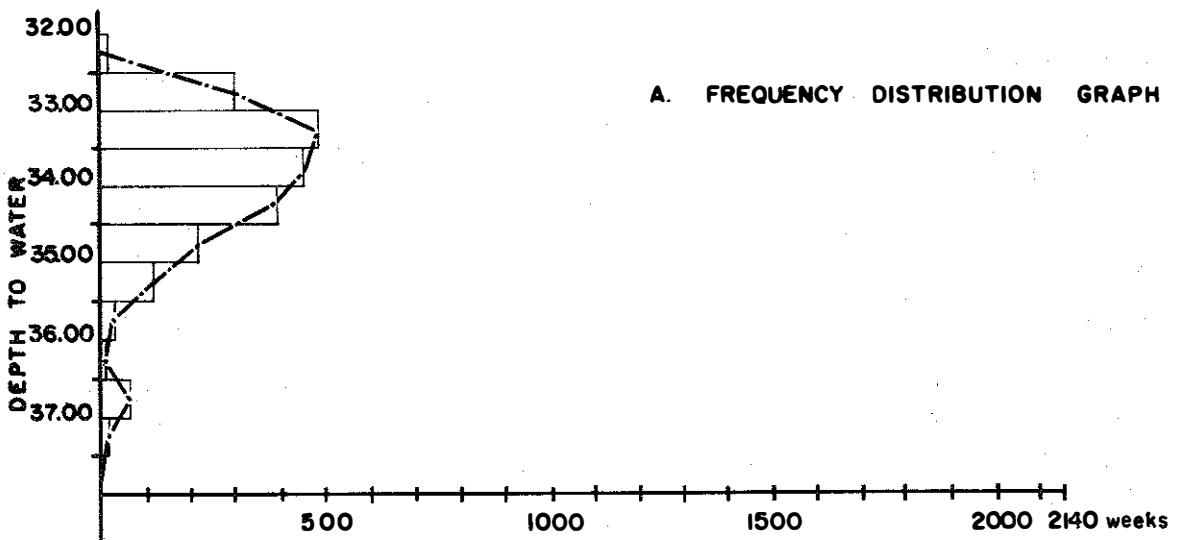


Figure 4. FREQUENCY DISTRIBUTION OF WEEKLY WATER LEVELS IN OBSERVATION WELL NO. Bt2



Table 6. EXCEEDANCE OF WEEKLY GROUND-WATER LEVELS IN OBSERVATION WELL Bt 2

A. For "n" days per year

Ground-water levels exceeded on the average for a period of												
	30	60	90	120	150	180	210	240	270	300	330	360
days per year:												
ft.	32.95	33.14	33.29	33.66	33.58	33.69	33.86	33.98	34.20	34.54	35.02	36.70
below 1sd												

B. In percent

Ground-water levels exceeded on the average for a period of									
	10	20	30	40	50	60	70	80	90
percent of days per year:									
ft.	32.98	33.20	33.37	33.60	33.70	33.88	34.10	34.43	35.05
below 1sd									

Table 7. TOTAL PRECIPITATION - DANBURY  
(in inches)

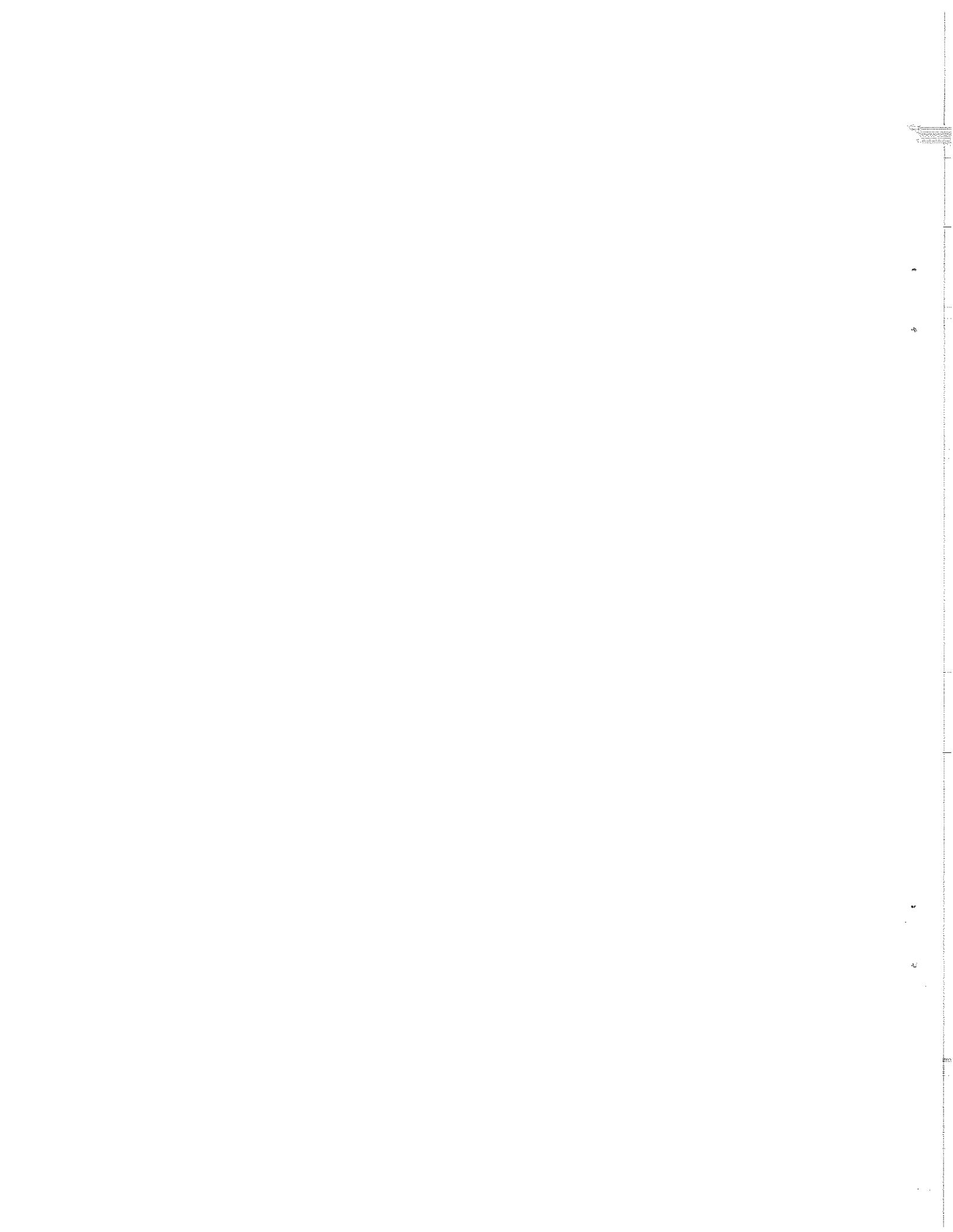
(Record available since September 1920)

Year	Monthly Total												Annual Total	Precip.
	J	F	M	A	M	J	J	A	S	O	N	D	(in.)	Dept. from normal
1937	1.20	1.60	.50	3.27	4.43	2.64	2.46	3.66	3.03	.92	.99	.57	25.27	- 5.46
1938	1.80	.85	1.25	2.62	6.53	2.43	3.90	2.78	5.29	.80	1.11	.92	30.28	- .45
1939	1.22	1.55	.54	1.39	4.39	5.98	1.79	5.07	1.02	2.30	T	.70	25.95	- 4.78
1940	.40	2.37	2.21	2.19	5.05	2.29	1.75	4.26	.99	2.30	2.87	.95	27.63	- 3.10
1941	1.41	1.85	2.22	2.67	3.94	5.68	2.78	6.42	6.43	3.89	1.19	.83	39.31	8.58
1942	.20	.25	1.97	2.19	6.63	5.12	2.51	4.01	5.20	1.29	.67	.95	30.99	.26
1943	1.00	.54	1.54	1.62	4.78	8.23	2.11	4.42	3.92	2.30	1.06	.12	31.64	.91
1944	.68	.51	1.63	2.45	5.02	7.32	2.86	6.40	2.39	.48	1.78	.57	32.09	1.36
1945	1.07	1.53	3.08	(3.98)	1.33	7.05	4.37	6.55	2.82	.45	1.48	1.52	35.23	4.50
1946	1.14	1.13	.56	1.37	2.28	14.00	1.32	(1.60)	5.32	4.37	2.02	1.50	36.61	5.88
1947	.40	.22	.49	2.86	3.33	3.15	1.17	2.96	2.38	.84	2.91	.18	20.89	- 9.84
1948	.66	1.42	3.20	3.00	.44	2.31	3.40	3.52	.58	.45	2.84	1.05	22.87	- 7.86
1949	1.62	.23	2.35	1.05	6.20	3.75	5.42	2.64	2.31	2.49	1.27	1.00	30.33	- .40
1950	(2.10)	(.67)	2.07	3.33	4.62	2.02	(3.21)	1.38	2.19	2.34	1.97	(2.04)	27.94	- 2.79
1951	(.39)	(1.72)	2.49	2.06	2.73	8.42	4.42	6.78	4.58	3.82	2.69	(1.97)	42.07	11.34
1952	1.32	.50	2.25	1.92	1.53	7.51	8.37	5.30	.67	.26	1.21	.22	31.06	.33
1953	1.83	1.65	1.49	4.07	5.95	5.15	1.86	11.64	1.71	.25	2.65	1.97	40.22	9.49
1954	.93	.61	1.06	6.69	3.44	5.76	4.98	3.33	4.39	2.21	.87	.17	34.44	3.71
1955	.56	.87	1.15	1.80	1.90	2.97	10.27	6.49	4.05	2.25	2.22	1.03	35.56	4.83
1956	.26	.13	1.50	1.51	2.85	5.95	4.55	4.55	1.61	3.32	1.80	.40	28.43	- 2.30
1957	.13	.96	1.06	1.62	5.29	5.95	5.37	4.75	2.75	.99	2.38	.21	31.45	.73
1958	.74	.08	.74	1.99	1.78	5.30	5.33	3.78	3.96	.86	1.80	.33	26.69	- 4.04
1959	.36	.43	.37	1.19	5.76	2.36	2.10	5.93	3.65	2.95	.57	2.17	27.84	- 2.89
1960	.99	.42	.46	2.44	5.51	4.07	1.61	5.08	2.47	1.44	2.09	.59	27.17	- 3.56

Table 7 continued.

TOTAL PRECIPITATION - DANBURY  
(in inches)

Year	Monthly Total												Annual	Precip.
	J	F	M	A	M	J	J	A	S	O	N	D	Total (in.)	Dept. from normal
1961	.14	.53	2.47	3.18	5.11	1.53	2.56	1.22	3.01	2.38	2.25	1.14	25.52	- 5.21
1962	.75	1.57	1.38	.76	6.59	1.94	4.24	2.49	5.45	1.26	.46	.38	27.27	- 3.46
1963	.28	.65	1.16	2.96	2.91	2.85	3.39	3.76	3.52	.73	1.10	.67	23.98	- 6.75
1964	.43	.22	1.10	4.15	4.74	2.12	2.92	6.19	4.33	.51	1.20	1.26	29.17	- 1.56
1965	.40	1.35	3.52	3.05	5.03	1.95	6.34	2.46	5.14	1.24	3.18	2.45	36.11	5.38
1966	.77	1.27	2.23	1.50	1.42	2.19	1.95	5.43	.51	1.45	.57	.95	20.24	-10.49
1967	2.90	.58	.86	1.36	1.34	9.68	1.58	4.84	.63	1.12	.17	1.24	26.30	- 4.43
1968	.75	.23	1.80	3.85	3.55	8.38	5.72	1.19	5.47	5.10	.83	4.60	41.47	10.47
1969	3.47	.05	.47	3.13	.77	2.69	2.59	1.16	2.66	2.74	1.90	2.18	23.81	- 6.92
1970	.32	.29	1.54	3.20	3.59	2.89	3.07	3.02	2.94	6.67	3.34	.98	31.85	1.12
1971	1.48	2.15	1.69	1.24	3.11	3.33	2.94	3.28	2.95	6.45	2.50	1.14	32.26	1.53
1972	1.57	.78	1.52	1.81	4.24	7.37	8.56	4.72	2.20	2.46	1.86	1.95	39.04	8.31
1973	.90	.49	2.11	1.10	4.78	2.61	3.47	7.75	2.51	3.54	2.19	1.20	27.75	- 2.98
1974	.41	.72	.64	2.15	3.30	3.86	2.06	5.95	1.89	1.26	2.82	.57	25.66	- 5.07
1975	3.20	.71	2.35	2.22	1.43	7.14	.62	2.97	3.44	1.23	5.34	.65	31.30	.57
1976	1.83	1.15	3.96	1.29	.44	3.56	2.65	1.87	.66	.78	.30	.37	18.86	-11.87
1977	.74	.73	4.10	2.36	4.66	4.06	6.59	5.42	5.30	3.02	1.36	1.65	39.99	9.26
1978	.36	.26	1.43	3.11	3.47	2.70	8.38	6.24	5.22	.32	1.61	.98	34.08	3.35
Normals 1941- 1970													30.73	Standard Deviation
Mean 1937- 1978													30.40	33.54



O B S E R V A T I O N      W E L L      L n      2 5 a

# WELL DESCRIPTION SHEET

WELL NO.: Ln 25a	OWNER: U.S. Geological Survey
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## LOCATION

Township/Range General Detail	SE-SE-NE $\frac{1}{4}$ S36, T34N, R6E 2.5 mi N of Irma, Lincoln County between U.S.H. 51 and C.M.St.P&P railroad
Altitude Drainage Basin	1435 ft above msl +20' WISCONSIN R.: Little Pine Cr.

## NEAREST OBSERVATION POINTS

Precipitation Stations	Merrill (since 1913) - 15 mi S Tomahawk Spirit Reservoir (1934-1977) - 5 mi NW Rice Reservoir (since 1949+) - 11 mi NNW
Stream-Gaging Stations	05394500 Prairie R. nr. Merrill (since 1939) - 11 mi S 05395000 Wisconsin R. at Merrill (since 1902) - 15.5 mi S
Observation Wells	On 23 (since 1944) - 20 mi. N On 24 (since 1944) - 22.5 mi NE Pr 6 (since 1937) - 53 mi NW
Other	--

## WELL DATA

Depth: 21.8 ft Aquifer(s) Tapped Well Log	Casing: depth - 20 ft; diameter 1 $\frac{1}{4}$ in. Pleistocene sand Available: <del>xxx</del> - no
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## MEASUREMENTS

Measuring Point	Top of pipe
Equipment	3 ft above lsd Hand tape
Frequency	Weekly (11/21/44 - 11/02/73); irregular (2/48-10/49; 5/66-10/71); monthly (10/14/74-present).
First Measured Period of Record Interrupted	Date: 11/21/44 ; 9.06 ft below lsd Nov. 1944 - July 1955 as Ln25; July 1955-present as Ln25.a Frequently. Missing record: 2 months - 1948, 1971, 1973-75, 1977-78; 4 mo. - 1970, 1976; 6 mo. 1949, 1967, 1969.
Notes	New well (Ln25a) drilled next to the old one (Ln 25). Poor record; 25% of measurements missing, esp. 1966-1971 (53% missing).

3/12/79

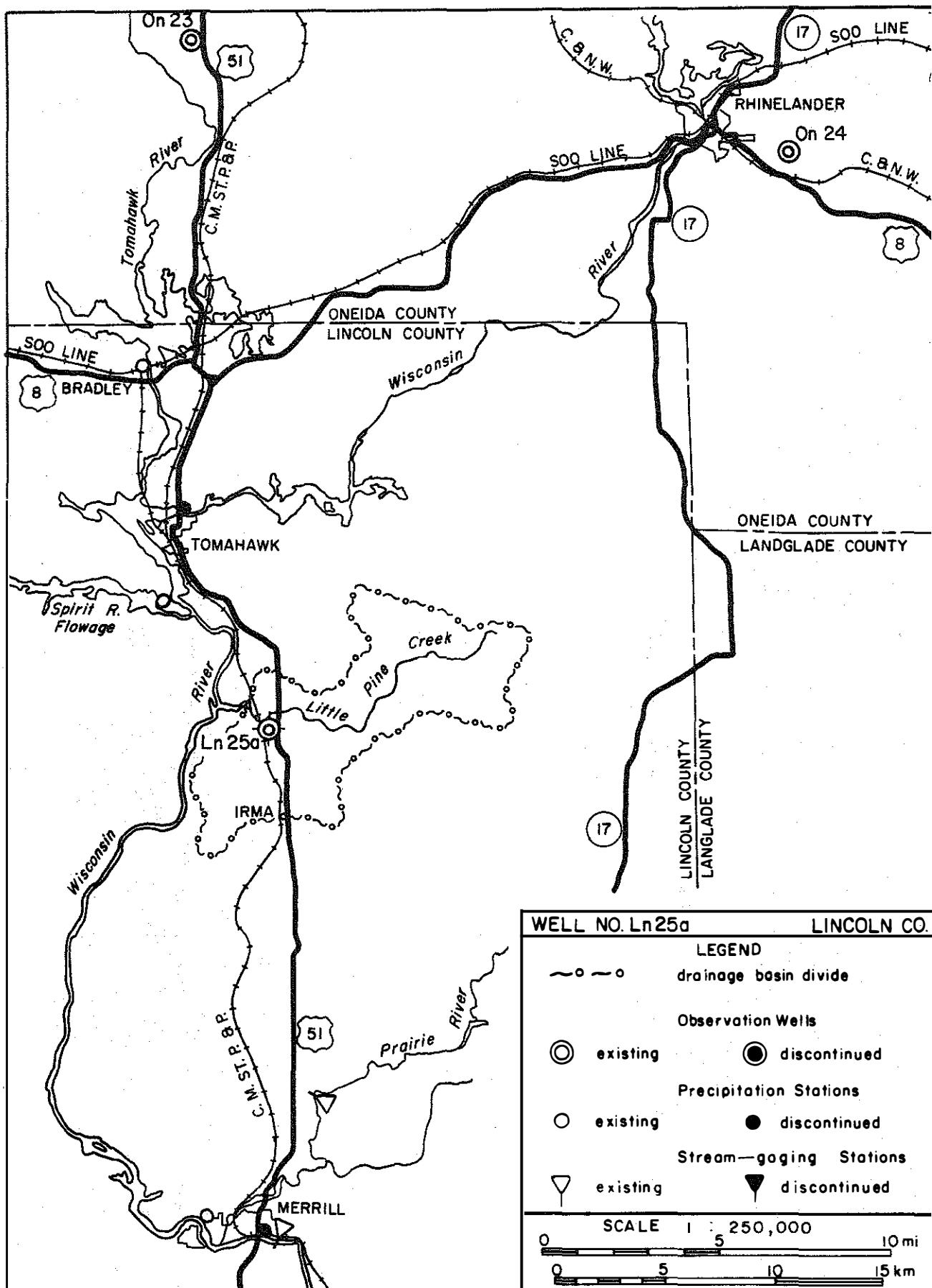


Figure 1 - LOCATION MAP OF WELL NO. Ln 25a



Table 1. SUMMARY OF GROUND-WATER LEVELS IN OBSERVATION WELL Ln25a

Characteristics	Feet below lsd	Date
Mean Level	8.62	(calculated)
Highest Monthly Mean	7.84	May
Lowest Monthly Mean	9.14	February
Highest Average Annual Level	7.85	1973
Lowest Average Annual Level	9.35	1964
Highest Average Monthly Level	6.75	May 1974
Lowest Average Monthly Level-meas. -estim.	10.38 10.49	January 1977 February 1977
Highest Recorded Level	6.38	05/15/60
Lowest Recorded Level	10.38	01/17/77
$H_{10\%}$ (level exceeded by 10% days/yr)	7.75	(calculated)
$H_{90\%}$ (level exceeded by 90% days/yr)	9.33	(calculated)
Average Annual Amplitude	1.82 ft.	
Maximum Amplitude (between record levels)	4.00 ft.	
Fluctuability ( $H_{10\%}$ - $H_{90\%}$ )	1.58 ft.	
Years Above Average	1946, 1951-53, 1955, 1960, 1966, 1968-69, 1972-73, 1978	
Years Below Average	1948-49, 1956-59, 1963-65, 1970, 1977	
Average Year(s) ( $\pm 1\%$ )	1945, 1947, 1950, 1954, 1961-62, 1967 1971, 1974-76	
Longest Duration of:		
Extremely Low Levels	see Table 3A	
Extremely High Levels	see Table 3B	

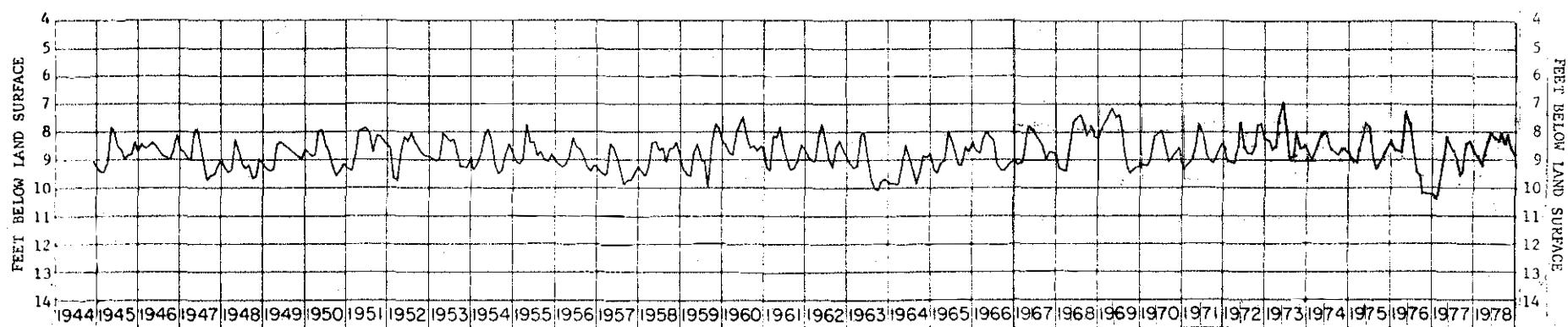
Table 2. AVERAGE AND EXTREME GROUND-WATER LEVELS IN OBSERVATION WELL Ln25a

Water Year	Average Monthly Water Levels (in feet below 1.s.d.)												Avg. Annual Level	Extreme Levels (in ft below 1.s.d.)				
	O	N	D	J	F	M	A	M	J	J	A	S		Lowest	Highest	Diff.		
1945	8.72	(9.06)*(9.19)	9.34	9.27	8.42	7.68	7.88	8.06	8.47	8.61	8.50	8.60	02/04/45	9.42	04/22/45	7.59	1.83	
1946	8.56	8.22	8.46	8.17	8.50	7.97	8.07	8.39	8.29	8.21	8.43	8.60	03/02/46	9.01	03/17/46	7.58	1.43	
1947	8.48	8.00	8.36	8.66	8.81	8.61	7.89	7.80	8.30	8.90	9.32	9.39	8.54	08/10/47	9.70	05/18/47	7.70	2.00
1948	9.42	8.84	8.94	9.13	9.40	(8.61)(8.22)	8.44	9.00	(9.05)(9.07)	(9.48)	8.91	09/29/48	9.65	04/21/48	8.22	1.43		
1949	(9.58)	(8.95)	9.19	9.14(9.36)	9.03	(8.41)(8.34)*	8.54	8.98	9.34	9.32	9.01	10/11/48	9.59	03/02/49	8.29	1.30		
1950	8.71	8.70	(8.62)*	8.66(8.83)	8.59	7.66	7.62	8.24	8.43	9.04	9.29	8.54	09/11/50	9.56	05/08/50	7.35	2.21	
1951	9.17	9.01	9.13	9.27	9.26	8.49	7.49	7.57	7.64	7.97	8.43	8.07	8.46	02/04/51	9.42	04/08/51	7.31	2.11
1952	8.12	8.05	8.25	8.55	9.12	9.54	8.69	8.01	7.99	7.68	7.93	8.43	8.36	03/04/52	9.54	08/05/52	7.59	1.95
1953	8.71	8.81	8.80	8.97	8.97	8.35	7.80	8.01	7.99	7.98	8.29	9.08	8.48	09/21/53	9.24	06/23/53	7.66	1.58
1954	9.21	9.09	8.77	9.20	8.82	8.55	8.07	7.71	8.17	8.62	9.16	8.79	8.68	01/17/54	9.39	05/03/54	7.56	1.83
1955	8.40	8.36	8.69	8.93	8.98	8.31	7.67	8.08	7.92	8.67	8.58	8.93	8.46	02/14/55	9.18	06/13/55	7.56	1.62
1956	8.98	8.78	8.96	9.10	9.23	9.11	8.07	8.12	8.41*	8.55	8.69	9.11	8.76	09/30/56	9.27	04/16/56	7.75	1.52
1957	9.38	9.19	9.23	9.41	9.55	8.98	8.38	8.38	8.68	9.26	9.73	9.60	9.14	08/20/57	9.86	05/20/57	8.26	1.60
1958	9.67	9.34	9.19	9.38	9.51	9.15	8.43	8.31	8.54	8.40	8.97	8.42	8.94	10/21/57	9.71	05/06/58	8.26	1.45
1959	8.50	8.28	8.75	9.17	9.51	9.39	8.56	8.38	8.76	8.70	8.79	8.10	8.74	03/08/59	9.60	09/28/59	7.41	2.19
1960	7.44	7.63	6.25	8.40	8.68	8.85	7.94	6.85	7.37	7.99	8.40	8.44	8.02	03/27/60	8.87	05/15/60	6.38	1.49
1961	8.62	8.45	8.52	8.99	9.34	8.55*	8.09	7.70	8.35	8.87	9.16	9.24	8.66	02/06/61	9.40	05/15/61	7.57	1.83
1962	8.94	8.40	8.55	8.179	9.08	8.93	7.81	7.51	8.07	8.78	9.12	8.38	8.53	10/03/61	9.06	05/20/62	7.30	1.76
1963	8.26	8.54	8.77	9.03	9.22	8.91	8.12	7.95	8.48	9.36	9.83	9.90	8.86	09/09/63	10.09	05/19/63	7.83	2.26
1964	9.71	9.64	9.65	9.83	9.83	9.55	8.91	8.27	8.79	9.32	9.67	9.05	9.35	02/23/64	9.87	05/17/64	8.11	1.76
1965	8.72	(8.72)	8.91	9.23	9.46	9.10	8.42	7.75	8.09	8.59	9.04*(9.02)	8.75	02/28/65	9.49	05/25/65	7.62	1.87	
1966	8.42	8.53	(8.33)	8.51	8.63	8.25	7.86	(7.88)(8.23)	8.89	(9.26)(9.45)	8.51	09/12/66	9.40	05/02/66	7.69	1.71		
1967	8.92	(9.08)	9.10*	9.13	9.28	9.10	7.53	7.73	(8.00)	7.86	8.64*	8.94	8.61	10/23/66	9.44	04/17/67	8.34	1.10
1968	8.71	8.59	8.94	9.22	9.26	9.04	8.31	7.68	7.31	7.21	7.96	7.86	8.34	03/04/68	9.63	07/21/68	7.08	2.35
1969	7.82	8.10	(8.31)	8.41	8.65	8.18	6.99	7.40*	7.43*	7.79	8.65	9.44	8.10	09/21/69	9.50	04/14/69	6.70	2.80
1970	9.19	8.73	8.93	9.18*	9.22*	8.98*	8.23*	8.03*	8.07*	8.58	9.13*	9.11	8.78	10/12/69	9.33	06/09/70	8.07	1.26

Table 2.  
(cont'd)

AVERAGE AND EXTREME GROUND-WATER LEVELS IN OBSERVATION WELL Ln25a

Figure 2. HYDROGRAPH OF MONTHLY LOW WATER LEVEL IN OBSERVATION WELL La 25a  
(From: WGNHS Information Circulars 9 and 21)



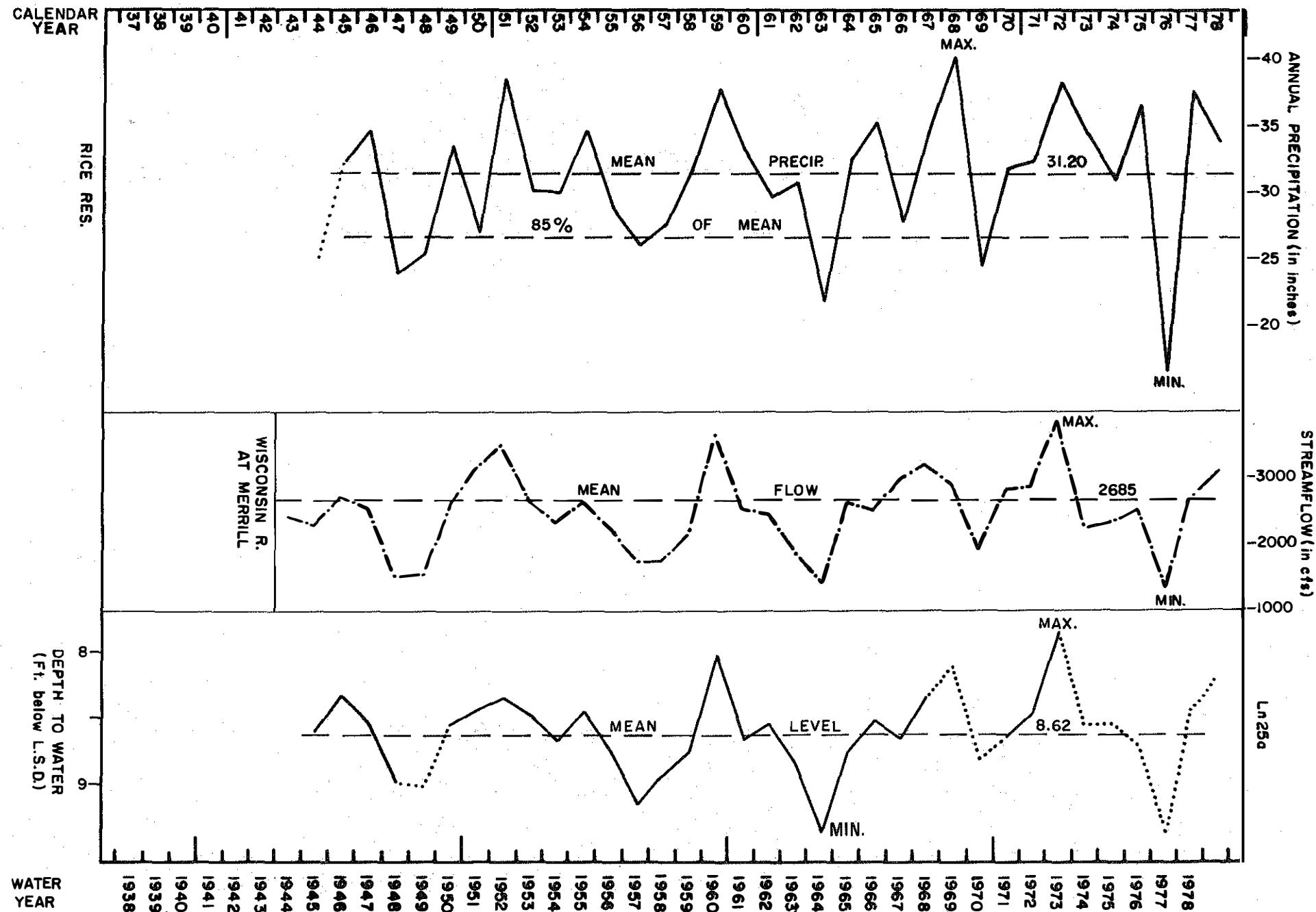


Figure 3. RELATION OF ANNUAL GROUND-WATER LEVELS IN OBSERVATION WELL NO. Ln25a TO PRECIPITATION AT RICE RES.

Table 3. LONGEST DURATION OF EXTREME GROUND-WATER LEVELS IN OBSERVATION WELL Ln 25a  
 (only periods lasting 100 or more days listed)

A. Extremely Low Levels ( $> H_{90\%}$ ) Lasting		Total No. of Days
From	To	
June 15, 1976	April 15, 1977	305
June 30, 1963	April 19, 1964	295
June 1, 1948	March 20, 1949	293
July 1, 1957	March 31, 1958	274
July 14, 1966	March 26, 1967	256
August 24, 1969	March 29, 1970	218
September 6, 1955	April 1, 1956	209
August 7, 1950	February 25, 1951	203
August 28, 1956	March 17, 1957	201
October 1, 1944	March 12, 1945	163
October 26, 1964	April 5, 1965	162
July 10, 1949	November 6, 1949	120
November 15, 1970	March 21, 1971	118
December 3, 1967	March 24, 1968	113
July 15, 1947	November 3, 1947	112
June 15, 1977	September 30, 1977	108
December 15, 1958	March 31, 1959	107
July 10, 1961	October 24, 1961	107

B. Extremely High Levels ( $< H_{10\%}$ ) Lasting		
From	To	
April 21, 1968	November 21, 1968	214
March 19, 1953	August 16, 1953	150
March 16, 1969	August 3, 1969	140
April 23, 1953	August 14, 1978	123
April 3, 1960	July 31, 1960	119
April 1, 1951	July 23, 1951	114
March 12, 1973	July 3, 1973	113
March 14, 1955	June 20, 1955	112
April 3, 1967	July 23, 1967	110
May 7, 1952	August 18, 1952	108

5% difference allowed for inaccuracies of measurements.

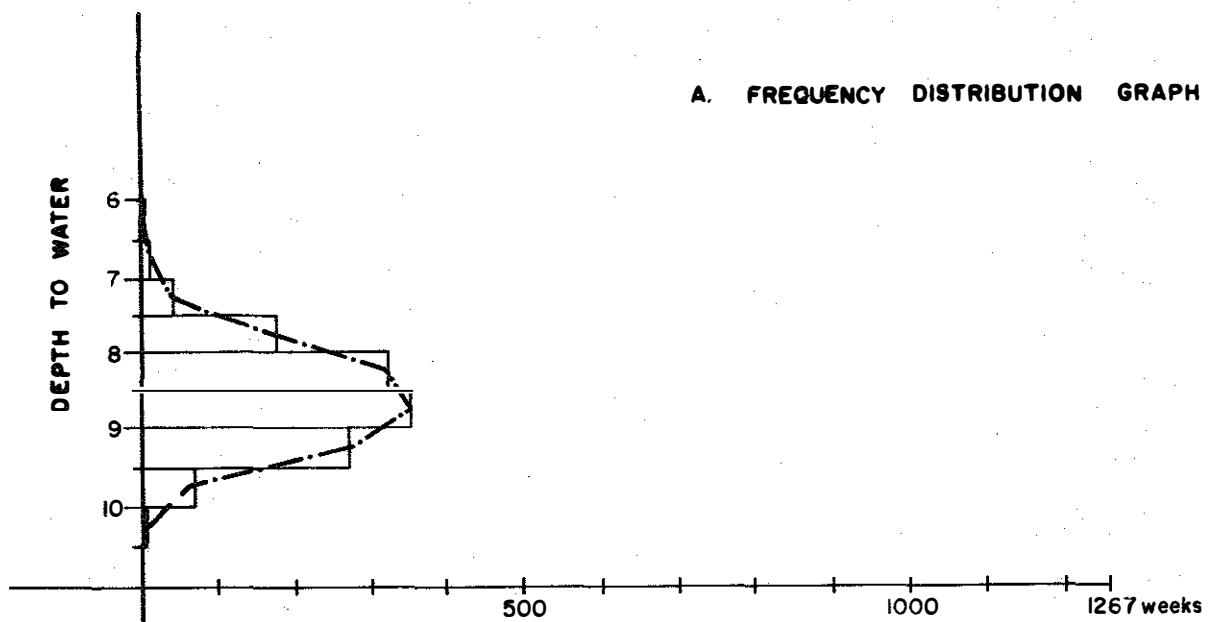
Table 4. PROBABILITY OF EXCEEDANCE OF GROUND-WATER LEVELS IN OBSERVATION WELL Ln25a  
 (median : 8.58 ft)

No.	Water Year	Water Level (in ft.)	p (%)	Class.	No.	Water Year	Water Level (in ft.)	p (%)	Class.
1.	1973	7.85	2.03	EH	18.	1945	8.60e	51.5	A
2.	1960	8.02	4.94	EH	19.	1961	8.62	54.4	A
3.	1969	8.10e	7.85	EH	20.	1971	8.61e	57.3	A
4.	1946	8.32	10.8	H	21.	1967	8.61e	60.2	L
5.	1968	8.34e	13.7	H	22.	1954	8.68	63.1	L
6.	1952	8.36	16.6	H	23.	1976	8.69e	66.0	L
7.	1951	8.46	19.5	H	24.	1959	8.74e	68.9	L
8.	1955	8.46	22.4	H	25.	1956	8.76	71.8	L
9.	1972	8.47	25.3	H	26.	1965	8.76	74.7	L
10.	1978	8.48e	28.2	H	27.	1970	8.78e	77.6	L
11.	1953	8.48	31.1	H	28.	1963	8.86	80.5	L
12.	1966	8.51	34.0	H	29.	1958	8.94	83.4	L
13.	1962	8.52	36.9	H	30.	1948	8.97	86.3	L
14.	1950	8.54	39.8	H	31.	1949	9.01e	89.2	L
15.	1947	8.54	45.6	A	32.	1957	9.14	92.2	EL
16.	1975	8.54e	42.7	A	33.	1977	9.33	95.1	EL
17.	1974	8.56e	48.5	A	34.	1964	9.35e	98.0	EL

Table 5. FREQUENCY OF WEEKLY GROUND-WATER LEVELS IN OBSERVATION WELL Ln 25a  
 (Nov. 1944 - Dec. 1968 & Mar. 1971 - Nov. 1973)

Interval (feet below land surface)	Frequency (n)			Cumulative Frequency (duration)		
	Absolute (n)	Relative ( $\frac{n}{N}$ )		Absolute ( $\leq n$ )	Relative ( $\frac{\leq n}{N}$ )	
6.01 - 6.50	2	.16	1.03	2	.16	1.03
6.51 - 7.00	11	.87		13	1.03	
7.01 - 7.50	49	3.86	17.99	62	4.89	19.02
7.51 - 8.00	179	228	14.13	241	19.02	
8.01 - 8.50	321	679	25.33	562	44.35	72.61
8.51 - 9.00	358		28.26	920	72.61	
9.01 - 9.50	272	344	21.47	1192	94.08	
9.51 - 10.00	72		5.68	1264	99.76	99.76
10.00 - 10.50	3	3	.24	1267	100.00	100.00
TOTALS		1267	100.00			

A. FREQUENCY DISTRIBUTION GRAPH



B. FREQUENCY DISTRIBUTION CURVE

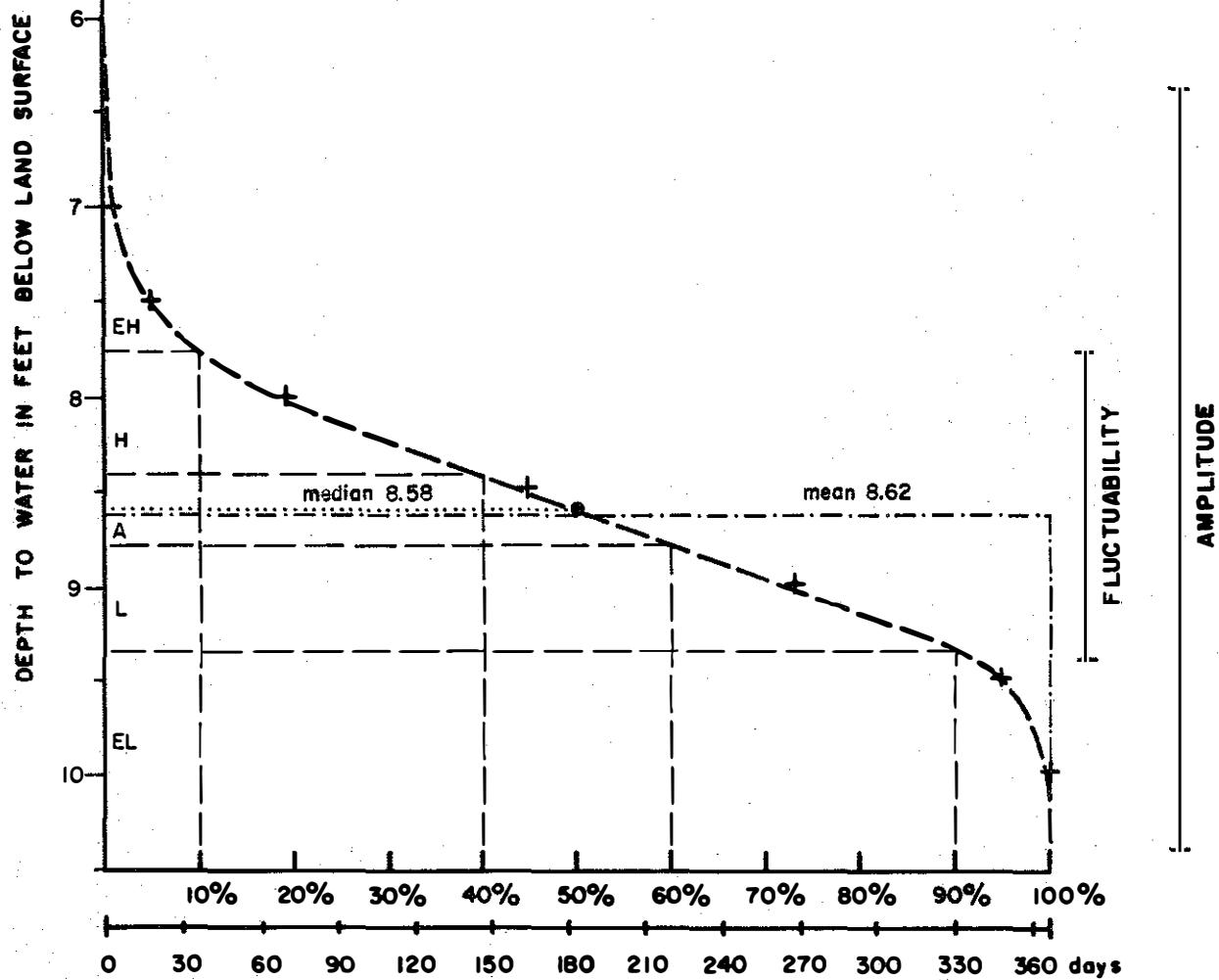


Figure 4. FREQUENCY DISTRIBUTION OF WEEKLY WATER LEVELS IN OBSERVATION WELL NO. Ln25a



Table 6. EXCEEDANCE OF WEEKLY GROUND-WATER LEVELS IN OBSERVATION WELL Ln 25a

A. For "n" days per year

Ground-water levels exceeded on the average for a period of												
	30	60	90	120	150	180	210	240	270	300	330	360
days per year:												
ft.	7.68	7.95	8.12	8.27	8.43	8.59	8.71	8.87	9.01	9.16	9.32	(9.77)
below lsd												

B. In percent

Ground-water levels exceeded on the average for a period of									
	10	20	30	40	50	60	70	80	90
percent of days per year:									
ft.	7.75	8.03	8.23	8.40	8.61	8.78	8.92	9.13	9.33
below lsd									

Table 7. TOTAL PRECIPITATION - RICE RESERVOIR  
(in inches)

Year	Monthly Total												Annual Total (in.)	Dept. from mean
	J	F	M	A	M	J	J	A	S	O	N	D		
1945	.51	2.25	1.89	4.10	3.57	2.56	4.02	2.90	3.47	1.37	3.44	1.96	32.04	.84
1946	2.07	.96	.86	.42	2.83	8.66	2.32	3.59	5.69	3.44	2.39	1.17	34.40	3.20
1947	.47	.59	.75	2.84	3.20	2.86	1.96	4.79	2.46	1.26	2.15	.65	23.98	- 7.22
1948	.40	.83	.95	1.96	1.17	2.94	4.93	4.28	3.26	1.12	2.64	.65	25.13	- 6.07
1949	1.55	.24	1.64	1.29	4.26	3.23	8.14	3.03	3.56	3.19	1.75	1.39	33.27	2.07
1950	2.66	.72	2.22	2.25	2.98	3.15	3.67	2.41	.91	2.62	1.73	1.68	27.00	- 4.20
1951	.27	1.54	2.57	3.18	4.85	5.14	4.62	4.58	5.07	3.63	1.73	1.14	38.32	7.12
1952	1.46	.35	1.28	1.81	3.98	5.98	6.10	5.57	.67	.14	.90	.78	29.02	- 2.18
1953	.53	1.81	1.99	3.17	3.08	8.24	3.11	1.93	1.00	.13	1.92	2.08	28.99	- 2.21
1954	.51	.68	1.42	3.46	3.83	7.38	3.09	1.62	7.08	4.17	1.00	.27	34.51	3.31
1955	.45	.83	1.72	2.32	4.54	3.07	4.07	4.62	1.86	3.29	.99	1.05	28.81	- 2.39
1956	.43	.34	1.22	1.38	2.94	6.73	3.72	3.80	1.22	.68	3.10	.48	26.04	- 5.16
1957	.27	.90	.73	1.39	3.91	3.51	1.83	7.26	3.37	1.17	2.37	.59	27.30	- 3.90
1958	.44	.06	.60	2.08	3.63	2.37	6.39	5.63	5.09	3.55	1.64	.32	31.80	.60
1959	.49	.54	.65	2.50	3.37	2.03	4.97	9.85	6.58	4.04	.66	2.10	37.78	6.58
1960	.93	.49	.22	2.94	6.30	4.33	3.59	5.79	3.53	2.25	2.18	.53	33.08	1.88
1961	.13	1.60	1.97	1.50	3.10	2.25	4.87	2.30	4.63	3.90	2.14	1.32	29.71	- 1.49
1962	.80	1.94	1.06	1.82	5.89	2.64	2.14	6.01	4.04	2.87	.76	.75	30.72	- .48
1963	.46	.54	1.22	2.38	3.15	2.03	2.22	3.08	3.54	1.49	.74	1.01	21.86	- 9.34
1964	.80	.33	1.03	3.42	4.51	1.57	3.69	6.43	4.87	.43	3.73	1.64	32.45	1.25
1965	.58	1.13	2.24	3.58	4.34	4.16	4.49	3.07	5.72	.85	3.19	1.91	35.26	4.06
1966	.85	.66	3.27	2.15	.76	2.96	1.40	6.51	2.31	3.90	1.59	1.54	27.90	- 3.30
1967	3.09	1.66	1.59	4.42	2.32	6.35	1.72	6.42	2.72	3.31	.36	.64	34.60	3.40
1968	.94	.22	1.36	2.93	6.93	9.88	5.46	1.42	4.98	2.86	.80	2.47	40.25	9.05
1969	2.70	.21	.91	1.36	3.43	5.37	2.26	.77	1.53	3.37	1.22	1.51	24.64	- 6.56
1970	.97	.27	1.11	1.15	4.69	1.85	4.36	1.87	7.23	4.54	2.59	1.33	31.96	.76

Table 7 continued. TOTAL PRECIPITATION - RICE RESERVOIR  
(in inches)

Year	Monthly Total												Annual Precip.	
	J	F	M	A	M	J	J	A	S	O	N	D	Total (in.)	Dept. from mean
1971	2.27	2.81	.86	.78	3.85	3.63	4.43	3.24	3.77	3.16	1.68	1.86	32.34	1.14
1972	1.03	1.06	2.27	2.20	1.93	3.87	4.41	8.14	6.08	2.54	2.36	2.60	38.49	7.29
1973	.84	.52	3.31	2.90	7.75	2.18	3.77	4.69	3.75	1.66	1.31	1.50	34.18	2.98
1974	.42	.79	.52	3.68	3.90	3.79	3.50	5.82	4.39	1.16	2.22	.67	30.86	-.34
1975	1.39	1.13	1.44	3.15	1.88	8.79	1.11	4.36	5.56	1.22	4.96	1.70	36.69	5.49
1976	1.69	1.10	3.25	2.23	1.51	1.39	1.55	1.69	.67	.36	.25	.48	16.17	-15.03
1977	.51	.69	4.53	4.85	1.08	4.70	3.53	5.20	5.35	2.20	2.98	1.85	37.47	6.27
1978	.55	.48	.25	2.86	3.84	4.11	8.18	4.86	4.43	.81	2.14	1.40	33.91	2.71
Mean 1945- 1978													31.20	
	NOTE: Station known as Tomahawk X prior 1947; located 4 mi S.													

Table 8. MONTHLY MEAN DISCHARGE (in cfs)

Station: 5395000 Wisconsin River at Merrill - period of October 1944 to September 1978  
 (Record available from December 1902)

Water Year	Monthly Mean Discharge												Annual Mean	Record Published
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.		
1944	2193	2502	2230	1977	2061	2009	2148	5167	3667	1935	1610	1470	2416	
1945	1347	1484	1358	1317	1483	3824	4184	3163	3522	2081	1785	2012	2298	
1946	2084	2619	2147	2269	2531	4771	2169	1985	4515	3169	1960	2125	2695	
1947	2275	3364	2619	2319	2330	1539	4160	3665	2446	2155	1988	1801	2553	
1948	1368	1387	1321	1549	1358	2183	2370	1574	1379	1272	1101	1024	1491	
1949	833	946	980	1187	1722	1748	1984	2163	1303	2505	1604	1542	1543	
1950	1634	1846	2048	2335	2221	1642	5857	5053	2258	2153	1963	1656	2555	
1951	1472	1494	1622	1864	1589	2115	7581	4906	4208	4077	2623	3869	3118	
1952	4821	3899	3202	2866	2898	2377	5850	2582	3443	4355	3229	2386	3491	
1953	1825	1578	1719	2020	1909	3267	3978	2369	4150	3768	2892	1997	2625	
1954	1652	1596	2012	2037	1969	1808	3231	4453	3053	2127	1785	2315	2337	
1955	3635	2612	2710	2366	2214	2025	4849	2100	3357	1745	2095	1715	2616	
1956	1834	1844	2104	2149	2045	1445	4134	2087	2193	2601	2333	2068	2234	
1957	1812	1895	2081	1814	1591	1893	2424	1931	1626	1511	1309	1545	1787	
1958	1418	1606	1675	1748	1620	1602	2532	1668	1760	2454	1508	1910	1791	
1959	1855	1940	1987	1965	1580	1391	2805	2164	1483	2033	2385	4878	2204	
1960	6138	3326	2693	2787	2786	2152	4217	8755	3665	2325	2443	2715	3674	
1961	2337	2873	2693	2313	2011	2784	3431	4174	2074	1920	1835	2039	2544	
1962	2090	2528	2519	2365	2149	2155	4050	3647	2152	1845	1841	2289	2469	
1963	2085	2007	2262	2013	1574	2069	2575	2667	1692	1397	1200	1123	1892	
1964	1078	1121	1311	1299	1210	1208	2012	2318	1248	1191	1263	1789	1420	
1965	1427	2049	1707	1755	1764	1658	6288	5991	3147	1927	1768	1834	2609	
1966	1830	2209	3087	2614	2548	3786	3852	2617	2433	1866	1820	1744	2533	
1967	2034	1975	2033	2219	2214	2612	8795	2893	3966	2511	2153	2191	2959	
1968	2209	2107	2065	1818	1685	2177	3070	4474	7093	5862	2278	3597	3203	
1969	2984	2715	2764	3126	2979	2619	5136	3200	3399	2450	2130	1756	2934	
1970	1736	1835	2010	2005	1863	1992	2532	2429	1927	1827	1468	1499	1927	

Table 8. MONTHLY MEAN DISCHARGE (in cfs)

Station: 5395000 Wisconsin River at Merrill - continued

Water Year	Monthly Mean Discharge												Annual Mean	Record Published
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.		
1971	2113	2769	2810	2577	2546	2626	6125	3233	2594	2166	2127	2009	2804	Water Resources Data for Wisconsin
1972	2357	2503	2619	2348	1986	2287	6094	2829	2094	2139	3180	3557	2830	
1973	4111	4581	2656	2677	2504	5873	5585	8485	3175	2010	2103	2650	3877	
1974	2477	2378	2179	2016	1928	2019	3577	1944	2693	1791	1918	2020	2243	
1975	1905	2141	2012	2019	2121	2169	5366	2708	2573	1826	1534	1872	2349	
1976	1576	2736	2618	2283	2559	4215	6420	2680	1994	1421	1288	975	2559	
1977	760	775	913	1023	1007	1600	2887	1357	1310	1268	1058	2240	1348	
1978	2550	2497	2471	2500	2218	1929	3389	2309	2528	3905	3067	3829	2767	
Mean 1902- 1977	2469	2315	1985	1906	1859	2569	4912	3864	3208	2434	2127	2543	2685	

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O B S E R V A T I O N      W E L L      M r      2 8

# WELL DESCRIPTION SHEET

WELL NO.: Mr 28		OWNER: U.S. Geological Survey
LOCATION		
Township/Range General Detail	NE-NE $\frac{1}{4}$ S31 T27N, R9E 12 mi E of Mosinee, Marathon Co. corner of STH 113 (CTH K) and CTH J	
Altitude	Rosenburg School Dist. #3, inside rear fence at school house 1229 ft above msl	
Drainage Basin	WISCONSIN R.: Little Eau Claire River	
NEAREST OBSERVATION POINTS		
Precipitation Stations	Wausau FAA AP (since 1937) - 12.7 mi NW Eau Pleine Reservoir (since 1939) - 14.5 mi W Merrill (since 1913) - 30 mi NNW	
Stream-Gaging Stations	05397500 Eau Claire R. at Kelly (since 1939) - 10.2 mi NNW 05398000 Wisconsin R. at Rothschild (since 1944) - 10.5 mi NW 05400650 Little Plover R. at Plover (since 1959) - 21.5 mi S	
Observation Wells	Mr 139 (since 1968) - 9.5 mi WNW Pt 15 (since 1950) - 19.5 mi SE Pt 40 (1950-1965) - 13.2 mi SSW Pt 276 (since 1958) - 22 mi SSE	
Other		
WELL DATA		
Depth: 27 ft Aquifer(s) Tapped Well Log	Casing: depth - 25 ft; diameter $1\frac{1}{4}$ in. Pleistocene deposits Available: <del>XXX</del> - no	
MEASUREMENTS		
Measuring Point	Top of collar on casing 0.8 ft above lsd	
Equipment	Hand tape	
Frequency	Weekly	
First Measured Period of Record Interrupted	Date: November 17, 1944 ; 18.19 ft below lsd November 1944 to present Occasionally	
Notes	Good record, only 3.2% of measurements missing	
3/21/79		

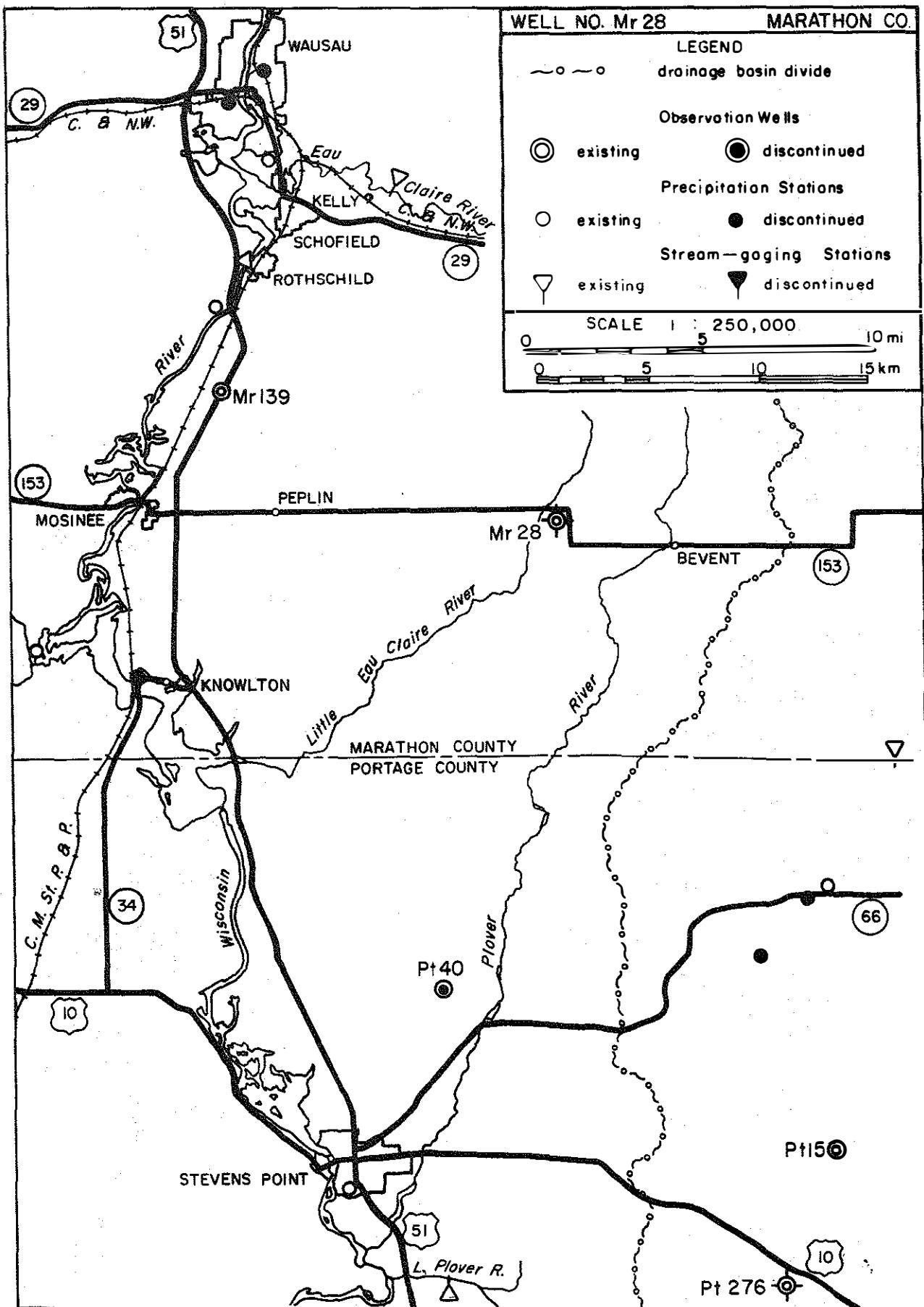


Figure 1 - LOCATION MAP OF WELL NO. Mr 28

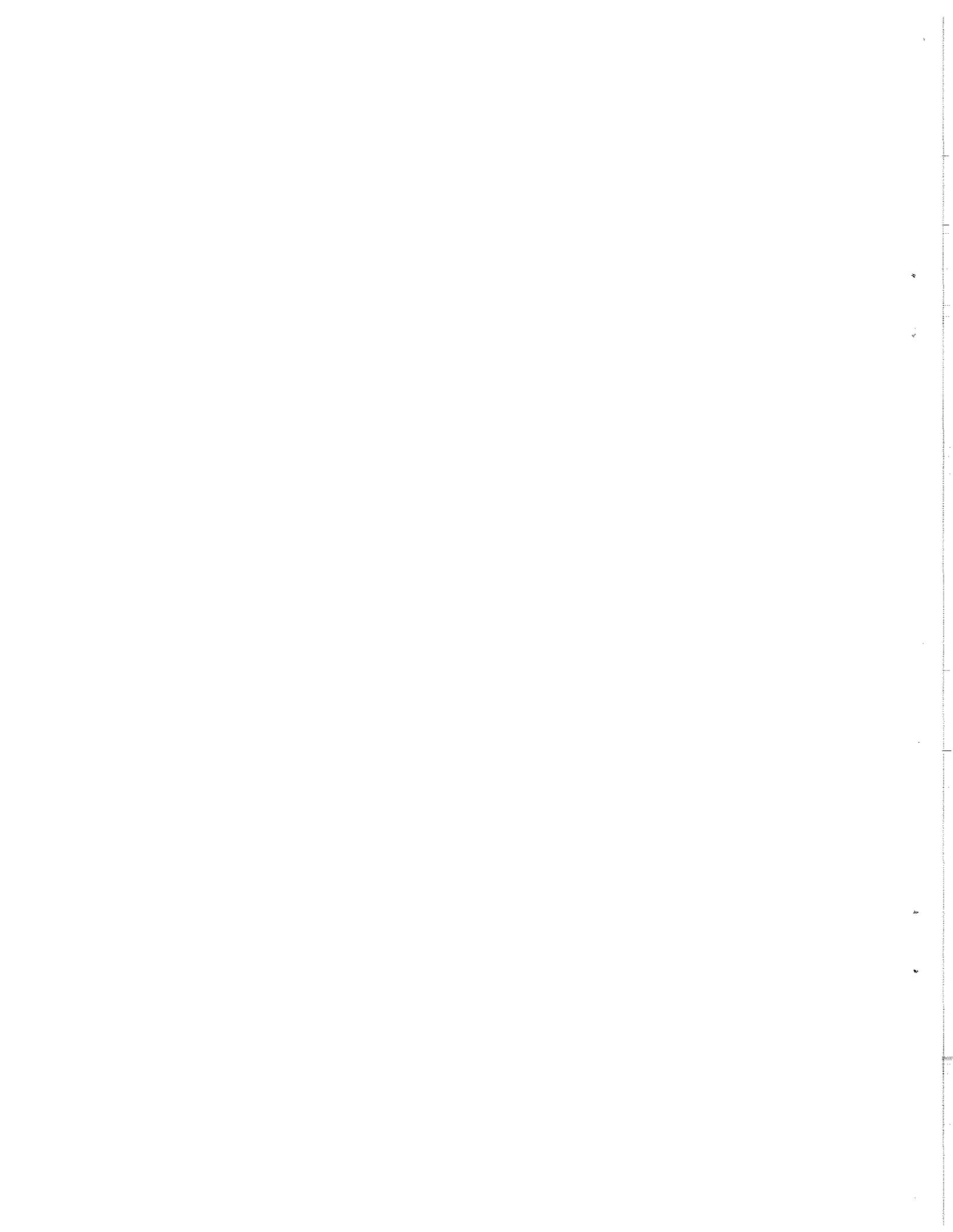


Table 1. SUMMARY OF GROUND-WATER LEVELS IN OBSERVATION WELL Mr 28

Characteristics	Feet below lsd	Date
Mean Level	20.36	(calculated)
Highest Monthly Mean	20.18	July
Lowest Monthly Mean	20.76	March
Highest Average Annual Level	15.09	1973
Lowest Average Annual Level	25.66	1959
Highest Average Monthly Level	12.77	July 1973
Lowest Average Monthly Level	26.04	March 1959
Highest Recorded Level	12.77	July 14, 1973
Lowest Recorded Level	26.09	March 30, 1959
$H_{10\%}$ (level exceeded by 10% days/yr)	16.76	(calculated)
$H_{90\%}$ (level exceeded by 90% days/yr)	23.67	(calculated)
Average Annual Amplitude	2.02 ft.	
Maximum Amplitude (between record levels)	13.32 ft.	
Fluctuability ( $H_{10\%} - H_{90\%}$ )	6.91 ft.	
Years Above Average	1945-47, 1961, 1963, 1966-67, 1969-76	
Years Below Average	1948-1960, 1964-65, 1978	
Average Year(s) (+1%)	1962, 1968, 1977	
Longest Duration of:		
Extremely Low Levels	see Table 3A	
Extremely High Levels	see Table 3B	

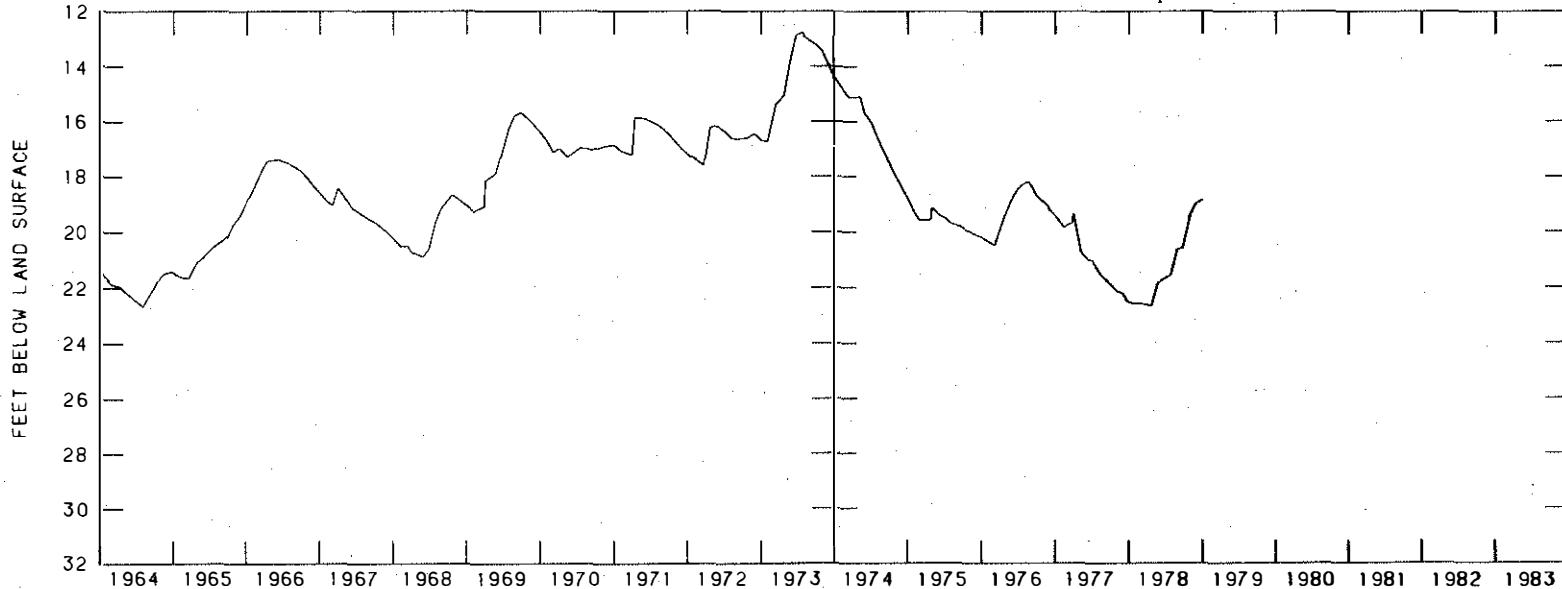
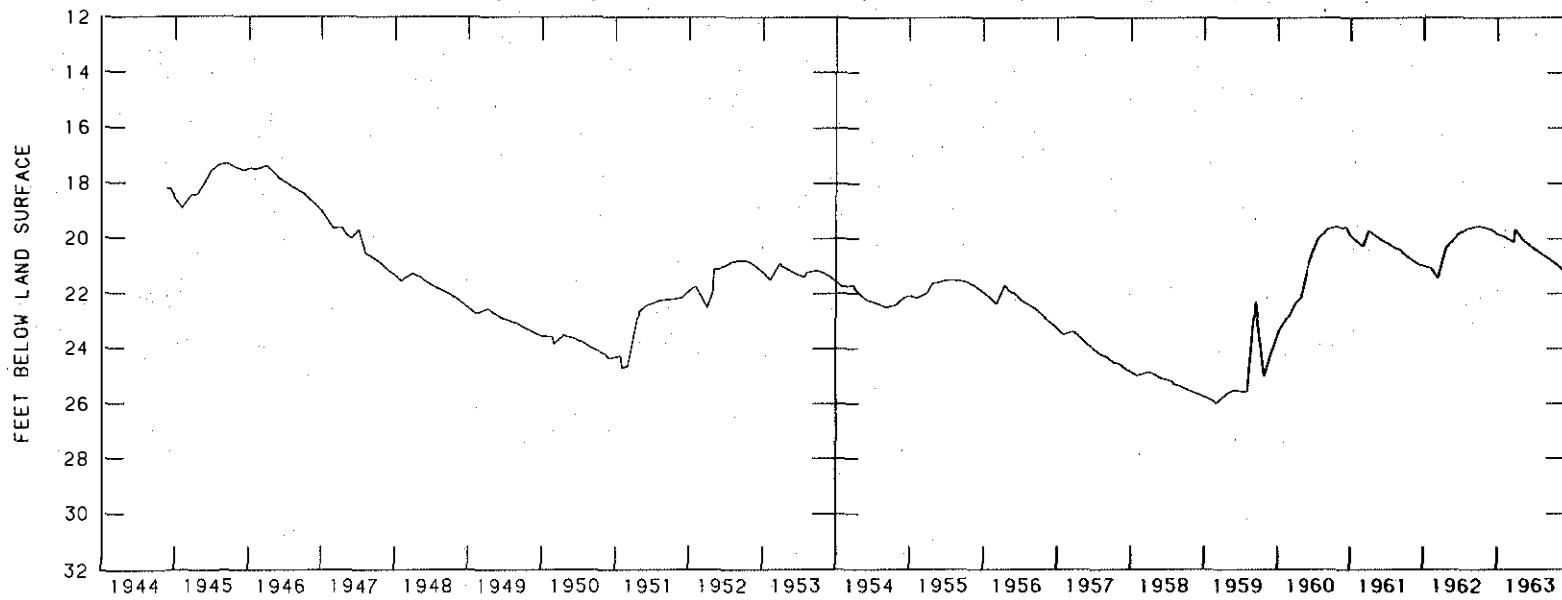
Table 2. AVERAGE AND EXTREME GROUND-WATER LEVELS IN OBSERVATION WELL Mr 28

Water Year	Average Monthly Water Levels (in feet below l.s.d.)												Avg. Annual Level	Extreme Levels (in ft below l.s.d.)				
	O	N	D	J	F	M	A	M	J	J	A	S		Lowest	Highest	Diff.		
1945	18.03	18.19	18.39	18.71	19.03	18.95	18.49	18.37	17.71	17.44	17.35	17.34	18.17	03/12/45	19.35	09/10/45	17.30	2.05
1946	17.45	17.55	17.60	17.50	17.62	17.61	17.47	17.67	17.88	18.03	18.18	18.29	17.74	09/30/45	18.32	10/01/45	17.36	.96
1947	18.44	18.63	18.85	19.15	19.45	19.74	19.68	19.90	20.15	20.22	20.58	20.72	19.63	09/29/47	20.79	10/07/46	18.40	2.39
1948	20.87	21.03	21.23	21.42	21.61	21.60	21.32	21.44	21.60	21.76	21.86	21.98	21.48	09/27/48	22.02	10/06/47	20.81	1.21
1949	22.08	22.28	22.59	22.60	22.80	22.81	22.60	22.74	22.88	22.98	23.03	23.18	22.71	09/19/49	23.23	10/04/48	22.05	1.18
1950	23.26	23.38	23.57	23.60	23.64	23.89	23.75	23.58	23.66	23.77	23.89	24.0	23.66	09/25/50	24.02	10/03/49	23.22	-.80
1951	24.14	24.26	24.42	24.49	24.73	24.74	23.18	22.51	22.41	22.37	22.26	22.24	23.48	03/26/51	24.84	09/20/51	22.23	2.61
1952	22.23	22.21	22.03	21.85	22.27	22.57	22.02	21.15	21.12	20.95	20.84	20.82	21.67	03/17/52	22.63	09/15/52	20.80	1.83
1953	20.86	20.96	21.13	21.29	21.55	21.40	21.06	21.15	21.32	21.47	21.26	21.19	21.22	03/16/53	21.76	10/13/52	20.82	-.94
1954	21.22	21.30	21.47	21.70	21.87	21.93	21.95	22.13	22.27	22.38	22.43	22.61	21.94	09/27/54	22.90	10/05/53	21.18	1.72
1955	22.57	22.24	22.12	22.10	22.14	21.69	21.60	21.53	21.61	21.59	21.55	21.91	10/18/54	22.90	07/25/55	21.50	1.4	
1956	21.60	21.70	21.84	22.03	22.23	22.46	21.95	21.93	22.12	22.28	22.43	22.58	22.95	09/24/56	22.64	10/03/55	21.57	1.07
1957	22.76	22.96	23.15	23.37	23.56	23.53	23.58	23.75	23.89	24.07	24.22	24.36	23.6	09/30/57	24.43	10/01/56	22.66	1.77
1958	24.51	24.58	24.77	24.89	25.01	24.93	24.89	25.00	25.11	25.2	25.32	25.41	24.97	09/29/58	25.46	10/07/57	24.48	-.98
1959	25.57	25.60	25.69	25.81	25.90	26.04	25.68	25.57	25.53	25.56	25.60	25.45	25.66	03/30/59	26.09	09/14/58	25.28	-.81
1960	25.17	24.53	23.94	23.42	22.82	22.70	22.26	21.57	20.70	20.15	19.84	19.65	22.23	10.05/59	25.28	09/12/60	19.63	5.65
1961	19.60	19.63	19.73	19.95	20.19	20.30	19.76	19.92	20.07	20.21	20.36	20.47	20.01	09/25/61	20.55	12/12/60	19.55	1.00
1962	20.65	20.82	20.96	21.01	21.12	21.43	20.54	20.15	19.92	19.72	19.62	19.58	20.46	03/27/62	21.50	09/18/62	19.56	1.94
1963	19.59	19.64	19.72	19.86	20.04	20.26	19.86	20.10	20.25	20.41	20.58	20.72	20.08	09/24/63	20.78	10/09/62	19.55	1.63
1964	20.90	21.08	21.31	21.66	21.75	21.94	22.01	22.20	22.38	22.58	22.73	22.41	21.91	09/01/64	22.83	10/01/63	20.82	2.01
1965	21.77	21.52	21.45	21.54	21.69	21.75	21.34	21.03	20.77	20.58	20.39	20.23	21.17	10/06/64	21.92	09/28/65	20.15	1.77
1966	19.84	19.52	19.10	18.75	18.45	17.96	17.48	17.45	17.40	17.45	17.56	17.72	18.22	10/05/65	19.99	06/14/66	17.38	2.61
1967	17.90	18.11	18.42	18.72	18.94	19.31	18.59	18.67	19.17	19.29	19.44	19.58	18.84	09/26/67	19.62	10/04/66	17.81	1.81
1968	19.74	19.93	20.11	20.36	20.62	20.63	20.85	20.95	20.73	20.08	19.34	19.08	20.20	05/21/68	20.97	09/17/68	19.10	1.87
1969	18.80	18.81	18.92	19.16	19.37	19.39	18.20	18.02	17.61	16.69	15.93	15.72	18.05	03/17/69	19.63	09/24/69	15.68	3.95
1970	15.79	15.99	16.26	16.55	16.88	17.20	17.10	17.39	17.10	17.02	17.01	17.07	16.78	05/21/70	17.47	10/01/69	15.69	1.78

Table 2. AVERAGE AND EXTREME GROUND-WATER LEVELS IN OBSERVATION WELL Mr. 28  
 (cont'd)

NOTE: Underlined values are estimated.

Figure 2. HYDROGRAPH OF MONTHLY HIGH WATER LEVEL IN OBSERVATION WELL Mr28  
(Computer print-out courtesy U.S. Geological Survey)



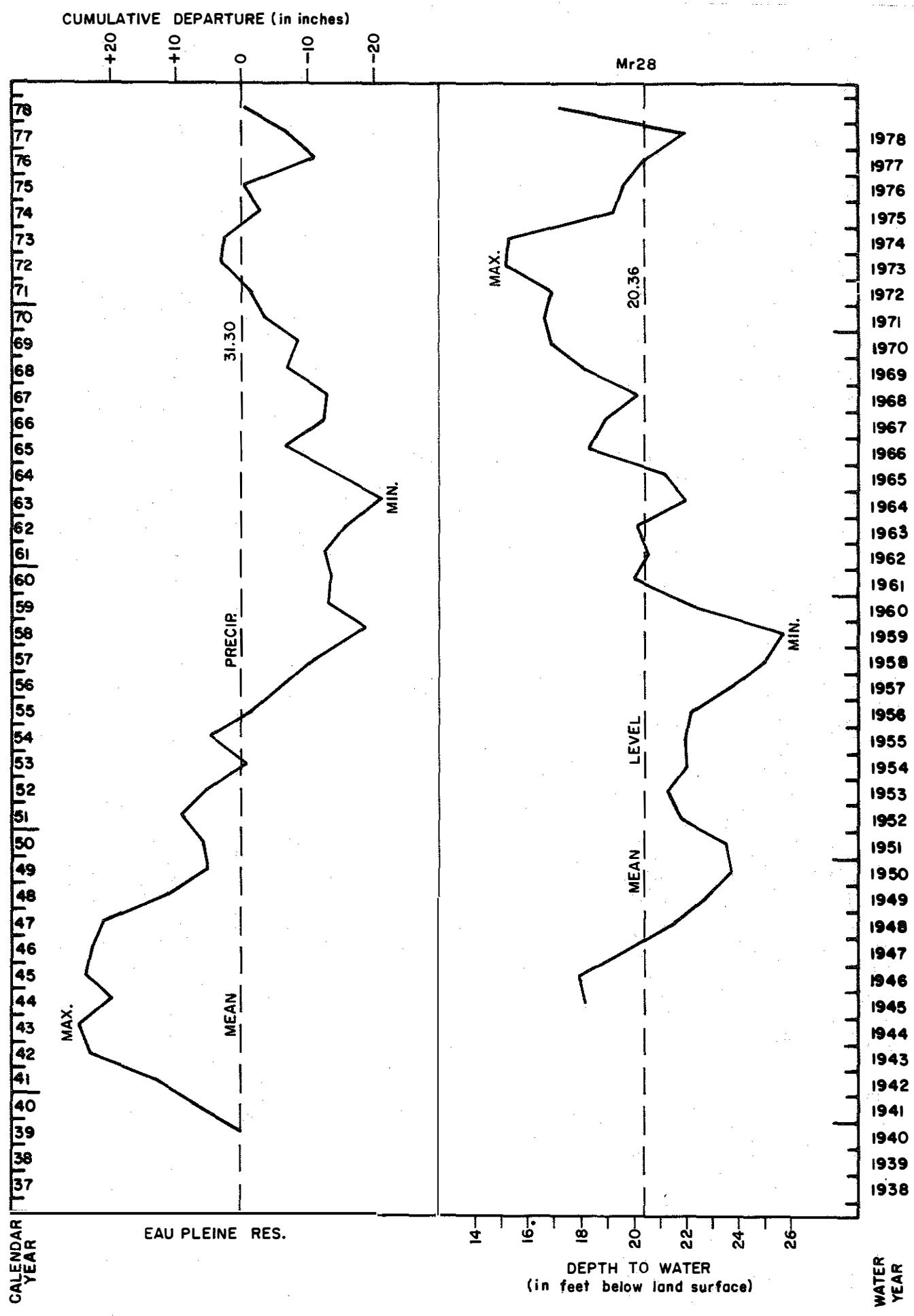


Figure 3. RELATION OF ANNUAL GROUND-WATER LEVELS IN OBSERVATION WELL NO. MR 28 TO PRECIPITATION AT EAU PLEINE RES.

Table 3. LONGEST DURATION OF EXTREME GROUND-WATER LEVELS IN OBSERVATION WELL Mr 28  
 (all periods listed)

A. Extremely Low Levels ( $> H_{90\%}$ ) Lasting		Total No. of Days
From	To	
January 14, 1957	January 25, 1960	1106
November 7, 1949	April 9, 1951	518
B. Extremely High Levels ( $< H_{10\%}$ ) Lasting		
From	To	
April 20, 1972	August 29, 1974	861
April 3, 1971	December 5, 1971	245
July 5, 1969	February 28, 1970	237
December 1, 1970	January 25, 1971	56
July 30, 1970	August 23, 1970	24
July 3, 1970	July 19, 1970	17
October 26, 1970	November 6, 1970	13
April 5, 1970	April 11, 1970	7
1.4% difference allowed for inaccuracies of measurements		

Table 4. PROBABILITY OF EXCEEDANCE OF GROUND-WATER LEVELS IN OBSERVATION WELL Mr 28  
 (median : 20.37 ft)

No.	Water Year	Water Level (in ft.)	p (%)	Class.	No.	Water Year	Water Level (in ft.)	p (%)	Class.
1.	1973	15.09	2.0	EH	18.	1962	20.46	51.5	A
2.	1974	15.19	4.9	EH	19.	1965	21.17	54.4	A
3.	1971	16.57	7.8	EH	20.	1953	21.22	57.3	A
4.	1970	16.78	10.8	H	21.	1948	21.47	60.2	L
5.	1972	16.86	13.7	H	22.	1952	21.67	63.1	L
6.	1946	17.74	16.6	H	23.	1978	21.86	66.0	L
7.	1969	18.05	19.5	H	24.	1955	21.91	68.9	L
8.	1945	18.17	22.4	H	25.	1964	21.91	71.8	L
9.	1966	18.22	25.3	H	26.	1954	21.94	74.7	L
10.	1967	18.84	28.2	H	27.	1956	22.09	77.6	L
11.	1975	19.18	31.1	H	28.	1960	22.23	80.5	L
12.	1976	19.47	34.0	H	29.	1949	22.71	83.4	L
13.	1947	19.63	36.9	H	30.	1951	23.48	86.3	L
14.	1961	20.01	39.8	H	31.	1957	23.60	89.2	L
15.	1963	20.08	42.7	A	32.	1950	23.66	92.2	EL
16.	1968	20.20	45.6	A	33.	1958	24.97	95.1	EL
17.	1977	20.27	48.5	A	34.	1959	25.66	98.0	EL

Table 5. FREQUENCY OF WEEKLY GROUND-WATER LEVELS IN OBSERVATION WELL

Mr 28

Interval (feet below land surface)	Frequency (n)		Cumulative Frequency (duration)	
	Absolute (n)	Relative ( $\frac{n}{N}$ )	Absolute ( $\leq n$ )	Relative ( $\frac{\leq n}{N}$ )
12.01-13.00	10	.56	10	.56
13.01-14.00	20	1.13	30	1.69
14.01-15.00	12	.68	42	2.37
15.01-16.00	53	2.99	95	5.36
16.01-17.00	113	6.37	208	11.73
17.01-18.00	170	9.58	378	21.31
18.01-19.00	145	8.17	523	29.48
19.01-20.00	239	13.46	762	42.94
20.01-21.00	229	12.90	991	55.84
21.01-22.00	288	16.22	1279	72.06
22.01-23.00	243	13.69	1522	85.75
23.01-24.00	96	5.41	1618	91.16
24.01-25.00	80	4.51	1698	95.67
25.01-26.00	73	4.11	1771	99.78
26.01-27.00	4	.22	1775	100.00
TOTALS	1775	100.00%		

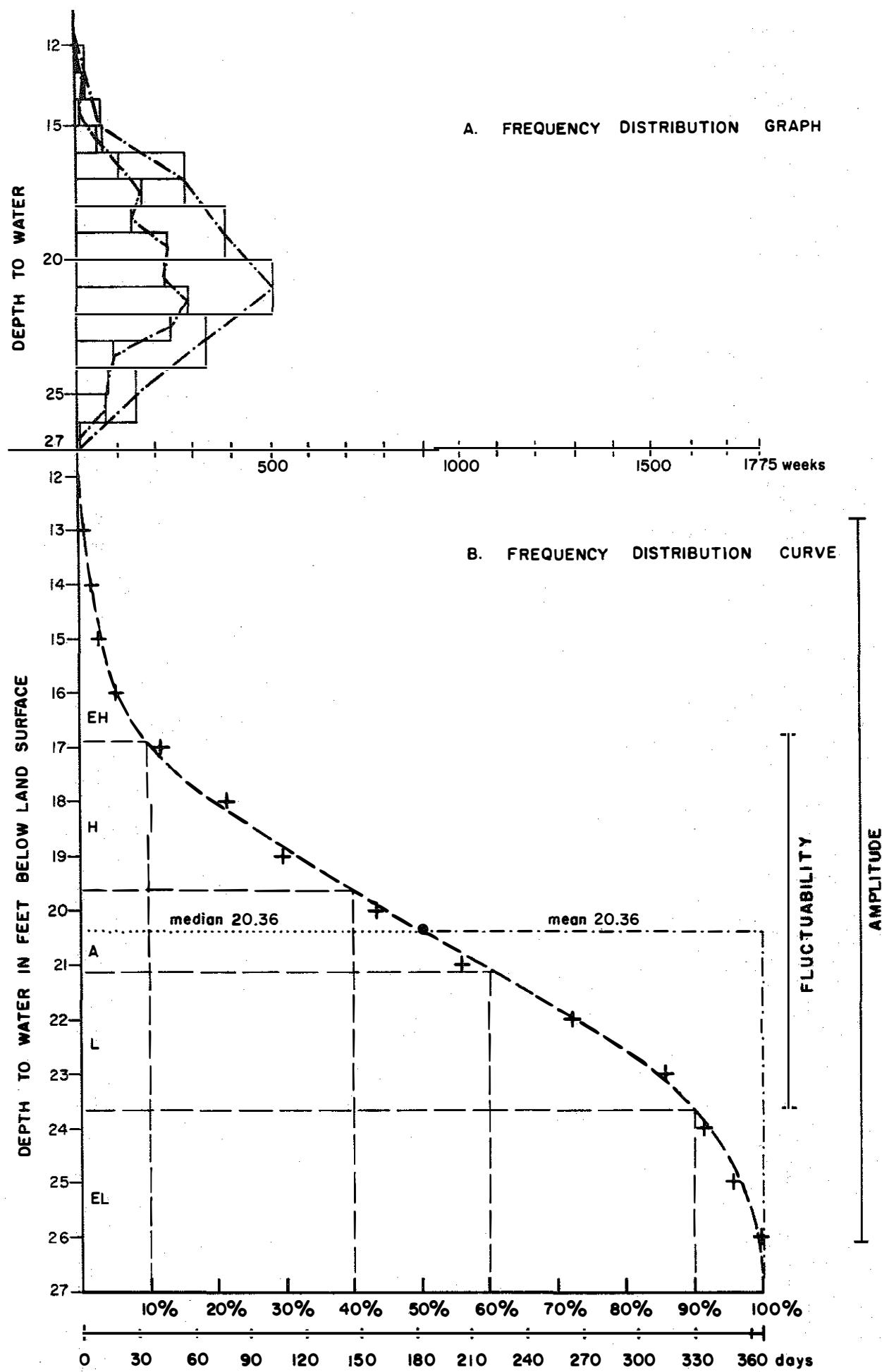
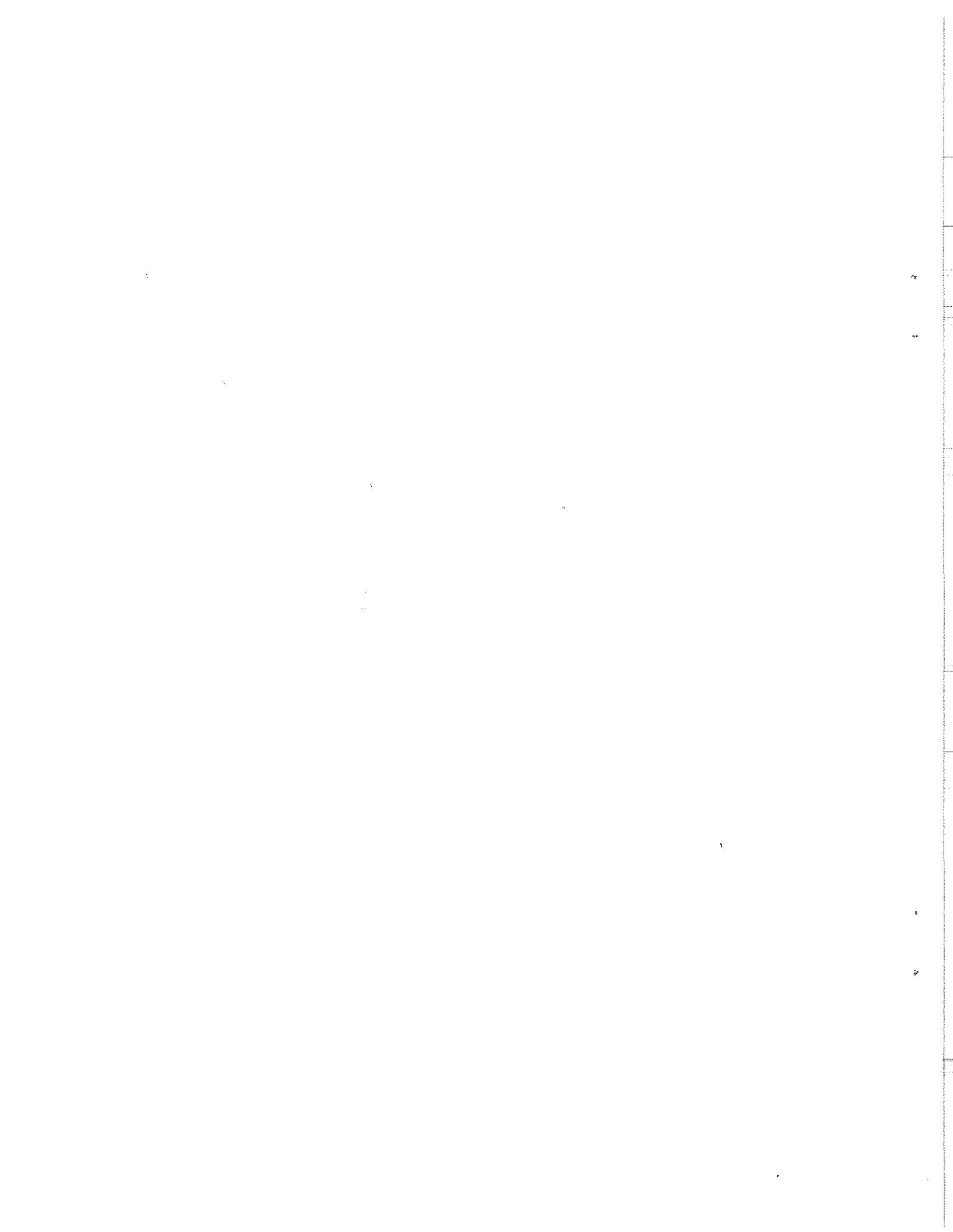


Figure 4. FREQUENCY DISTRIBUTION OF WEEKLY WATER LEVELS IN OBSERVATION WELL NO. Mr 28



**Table 6.** EXCEEDANCE OF WEEKLY GROUND-WATER LEVELS IN OBSERVATION WELL Mr 28

#### A. For "n" days per year

B. In percent

Table 7. TOTAL PRECIPITATION - EAU PLEINE RESERVOIR  
(in inches)

Year	Monthly Total												Annual Total (in.)	Dept. from mean
	J	F	M	A	M	J	J	A	S	O	N	D		
1940	.82	.76	1.62	2.92	3.61	13.70	1.26	4.04	1.28	2.19	4.20	1.98	38.38	7.08
1941	.92	.25	.78	3.50	5.39	.79	2.80	3.54	6.58	8.45	1.22	2.12	36.36	5.06
1942	.37	.44	3.01	2.52	9.18	5.10	3.48	1.01	9.13	3.66	1.59	2.22	41.91	10.61
1943	1.70	.46	1.43	1.57	5.87	7.16	1.79	4.03	2.84	3.78	2.48	0.00	33.11	1.81
1944	.97	1.16	1.40	1.18	2.61	6.69	2.41	4.30	2.61	.35	2.04	.61	26.33	- 4.97
1945	.78	2.37	2.32	3.60	6.38	2.54	2.76	3.57	3.65	1.04	4.25	1.92	35.18	3.88
1946	2.26	1.48	1.60	.86	3.22	6.29	1.87	2.56	4.97	2.01	2.44	1.04	30.60	- .70
1947	.71	.14	1.39	2.99	4.14	3.17	2.18	5.35	3.95	2.17	1.76	1.00	28.95	- 2.35
1948	.27	1.03	1.69	1.73	1.20	2.79	4.37	1.80	1.51	1.23	3.09	1.23	21.94	- 9.36
1949	1.66	.42	2.21	2.57	1.28	5.84	4.93	1.36	1.89	(1.19)	1.11	1.03	(25.49)	- 5.81
1950	2.38	(.78)	2.30	2.93	2.76	4.12	6.16	3.54	1.75	1.54	(2.00)	1.69	31.95	.65
1951	.57	1.56	3.82	3.96	3.10	3.78	4.14	2.92	3.82	3.48	2.22	.97	34.34	3.04
1952	1.63	.73	2.03	1.75	2.91	3.44	6.93	4.95	.36	.10	1.83	1.10	27.76	- 3.54
1953	.83	2.61	2.26	4.41	1.64	3.53	3.19	3.91	.62	.42	.80	1.51	25.73	- 5.57
1954	.39	1.06	1.45	5.76	3.17	5.26	4.06	3.42	5.68	4.10	.92	.43	35.70	4.40
1955	.36	1.16	1.63	2.81	3.91	3.75	2.04	2.81	1.40	3.67	.75	.98	25.27	- 6.03
1956	.55	.51	3.23	1.80	2.98	4.78	3.88	2.44	2.24	.71	2.74	.57	26.43	- 4.87
1957	.24	.51	.70	2.13	3.99	2.60	4.12	3.88	2.52	1.50	3.24	.67	26.10	- 5.20
1958	.32	.08	.42	2.77	1.80	3.59	3.06	4.83	3.22	2.50	1.93	.11	24.63	- 6.67
1959	.57	1.53	2.42	1.81	3.99	2.15	3.39	5.74	7.70	3.80	1.41	2.26	36.77	5.47
1960	1.74	.40	.13	2.62	5.03	6.34	2.57	4.85	2.72	2.63	1.57	.37	30.97	- .33

Table 7 continued.

## TOTAL PRECIPITATION - EAU PLEINE RESERVOIR

TABLE 7. TOTAL PRECIPITATION - MERRILL

(in inches)

Year	Monthly Total												Annual Total (in.)	Dept. from normal
	J	F	M	A	M	J	J	A	S	O	N	D		
1944	.90	.43	1.13	1.52	3.75	4.97	1.01	3.49	2.68	.74	2.65	.46	23.73	- 7.62
1945	.43	2.42	1.92	3.95	3.90	1.57	4.95	3.84	3.36	1.01	3.80	1.34	32.49	1.14
1946	2.19	.88	1.39	.70	4.05	7.55	.87	2.69	6.36	2.60	2.71	1.06	33.05	1.70
1947	.75	.33	.65	3.10	4.68	2.93	3.90	5.87	2.93	1.14	1.59	.84	28.71	- 2.64
1948	.28	.84	.84	2.19	.79	3.66	4.09	1.30	2.74	.84	2.92	(.64)	21.13	- 9.82
1949	(1.98)	.17	1.81	1.57	2.20	4.90	6.85	2.15	3.70	1.76	3.04	1.13	31.26	- 1.19
1950	2.75	.61	2.10	2.52	2.83	3.32	4.19	2.56	1.19	(1.58)	(.59)	(1.90)	(26.14)	- 8.24
1951	(.47)	(1.10)	(2.73)	(2.88)	4.47	5.25	4.31	5.94	3.04	2.39	1.67	.46	(34.71)	1.72
1952	1.33	.33	.96	1.22	2.75	6.17	6.12	3.64	1.05	.07	1.11	.95	25.70	- 5.65
1953	.51	2.12	2.11	3.01	3.10	6.98	3.86	2.98	.84	.15	1.47	1.46	28.59	- 2.76
1954	.34	.96	1.36	3.47	3.77	5.74	2.76	2.20	6.39	2.95	.81	.22	30.97	- .38
1955	.45	1.13	2.34	2.35	3.55	5.48	4.61	6.86	1.94	3.27	.56	.81	33.35	2.00
1956	.40	.25	1.92	1.19	2.97	4.52	3.48	3.13	1.27	.72	3.32	.52	23.69	- 7.66
1957	.19	.45	.59	1.80	3.44	2.29	3.03	3.27	3.03	1.50	3.00	.44	23.03	- 8.32
1958	.21	.01	.50	3.45	2.88	3.29	5.39	3.36	3.92	2.98	1.95	.15	28.09	- 3.26
1959	.54	.53	1.72	1.63	3.17	1.70	3.75	8.01	9.31	4.46	1.09	1.91	37.82	6.47
1960	.96	.35	.14	2.54	6.99	5.88	3.05	6.99	2.44	2.63	2.21	.48	34.66	3.31
1961	.18	1.87	3.46	1.83	2.73	3.76	6.68	3.73	4.26	4.01	2.80	1.37	36.68	5.33
1962	.49	2.53	.71	2.17	4.54	2.78	2.87	8.62	4.54	1.83	.46	.72	32.26	.91
1963	.32	.69	2.21	2.33	3.24	1.85	3.89	2.48	3.99	1.10	1.19	.88	24.17	- 7.18
1964	1.25	.23	1.35	3.10	4.17	2.03	2.94	3.34	7.42	.47	3.47	1.26	31.03	- .32
1965	.56	.92	2.25	3.84	4.52	4.11	6.55	3.06	6.94	.97	3.72	2.38	39.82	8.47
1966	.91	.64	3.67	2.69	1.13	3.38	2.44	5.09	1.50	2.81	1.20	1.54	27.00	- 4.35
1967	3.35	.93	1.09	4.35	2.31	8.36	2.12	4.06	3.92	3.60	.14	.79	35.02	3.67
1968	1.96	.05	1.41	3.92	6.77	7.54	4.52	1.69	6.52	2.69	1.67	3.30	42.04	10.69
1969	2.74	.15	1.43	1.93	4.73	5.94	3.42	1.42	2.12	3.55	.65	1.64	29.72	- 1.63
1970	.86	.16	1.54	1.47	5.63	2.27	4.85	1.06	6.54	4.51	2.64	.99	32.52	1.17

TABLE 7. (con't.) TOTAL PRECIPITATION - MERRILL  
 (in inches)



O B S E R V A T I O N      W E L L      M t      7

## WELL DESCRIPTION SHEET

WELL NO.: Mt 7		OWNER: Wisconsin DNR
LOCATION		
Township/Range General Detail	NE-NW-NE $\frac{1}{4}$ S. 34, T37N, R20E 0.6 mi E. of Pembine, Wis., on U.S.H. 8 Between U.S. 8 and S. Br. Pemebonwon R.	
Altitude Drainage Basin	980 ft above msl MENOMINEE R.: Pemebonwon R. (left bank)	
NEAREST OBSERVATION POINTS		
Precipitation Stations	Iron Mountain, Mich. (since 1899)-13 mi N (reloc. in 1934) Wausauke (since 1951+)-18 mi S Goodman (since 1959)-18.2 mi W Breakwater (since 1922)-18.5 mi NW	
Stream-Gaging Stations	04066000 Menominee R. nr. Pembine (since 1949)-10 mi ESE	
Observation Wells	Mt 9 (1950-64)-13 mi SE Fc 33 (since 1966)-12 mi N	
Other	-	
WELL DATA		
Depth: 33 ft Aquifer(s) Tapped Well Log	Casing: depth - 33 ft; diameter 8 in. Pleistocene deposits Available: yes - no	
MEASUREMENTS		
Measuring Point	Pointer on float gauge	
Equipment	4.00 ft above lsd Kinnison float gauge	
Frequency	Weekly (daily from 3/5/39 to 2/8/45; monthly from 12/25/51 to 10/28/52)	
First Measured Period of Record Interrupted	Date: 3/5/39 ; 21.03 ft below lsd March 1939 - present April 1949, Nov. 1950, Nov. 1958	
Notes	Good record; only 2.26% of weekly measurements missing	

2/28/79

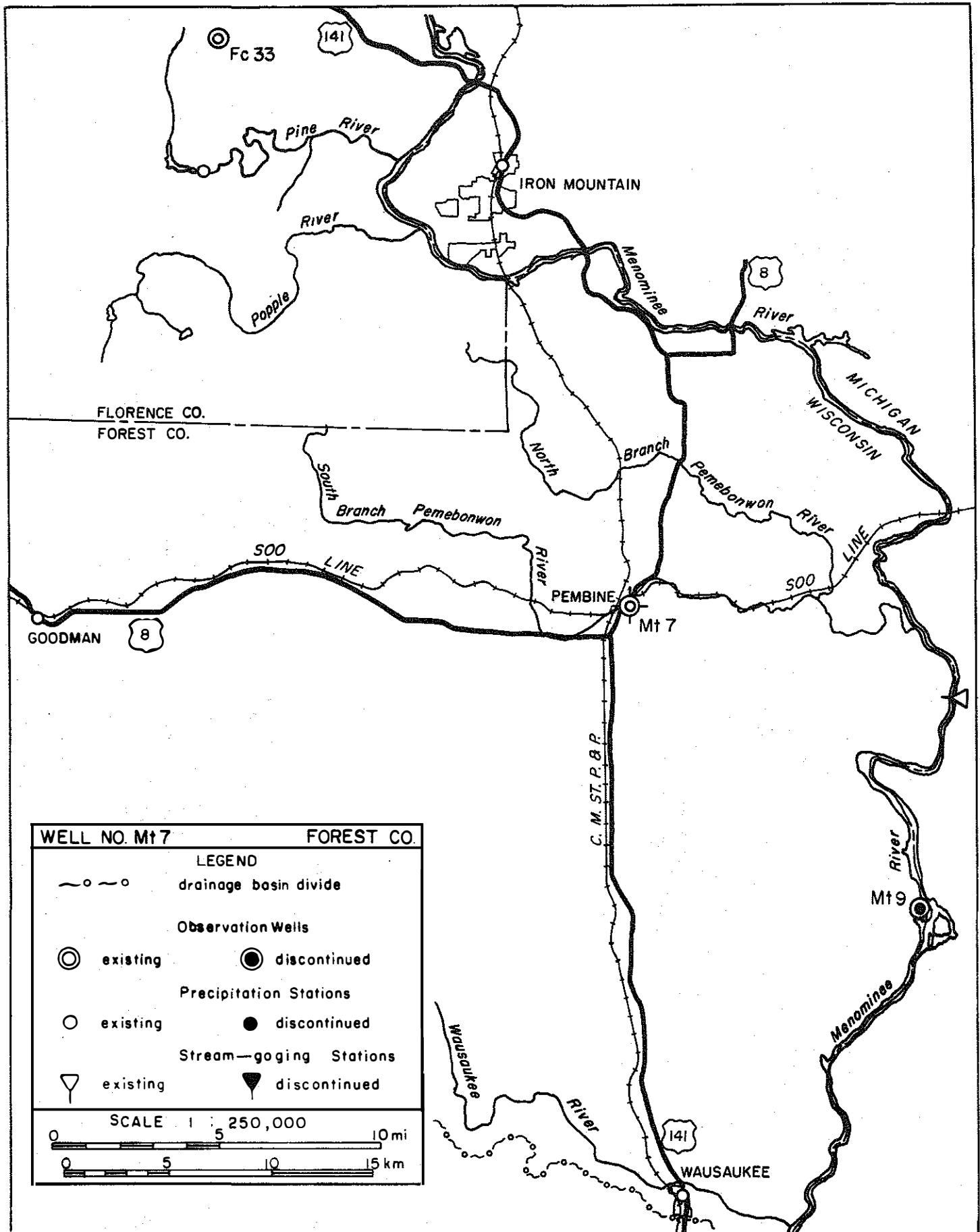


Figure 1 - LOCATION MAP OF WELL NO. Mt7

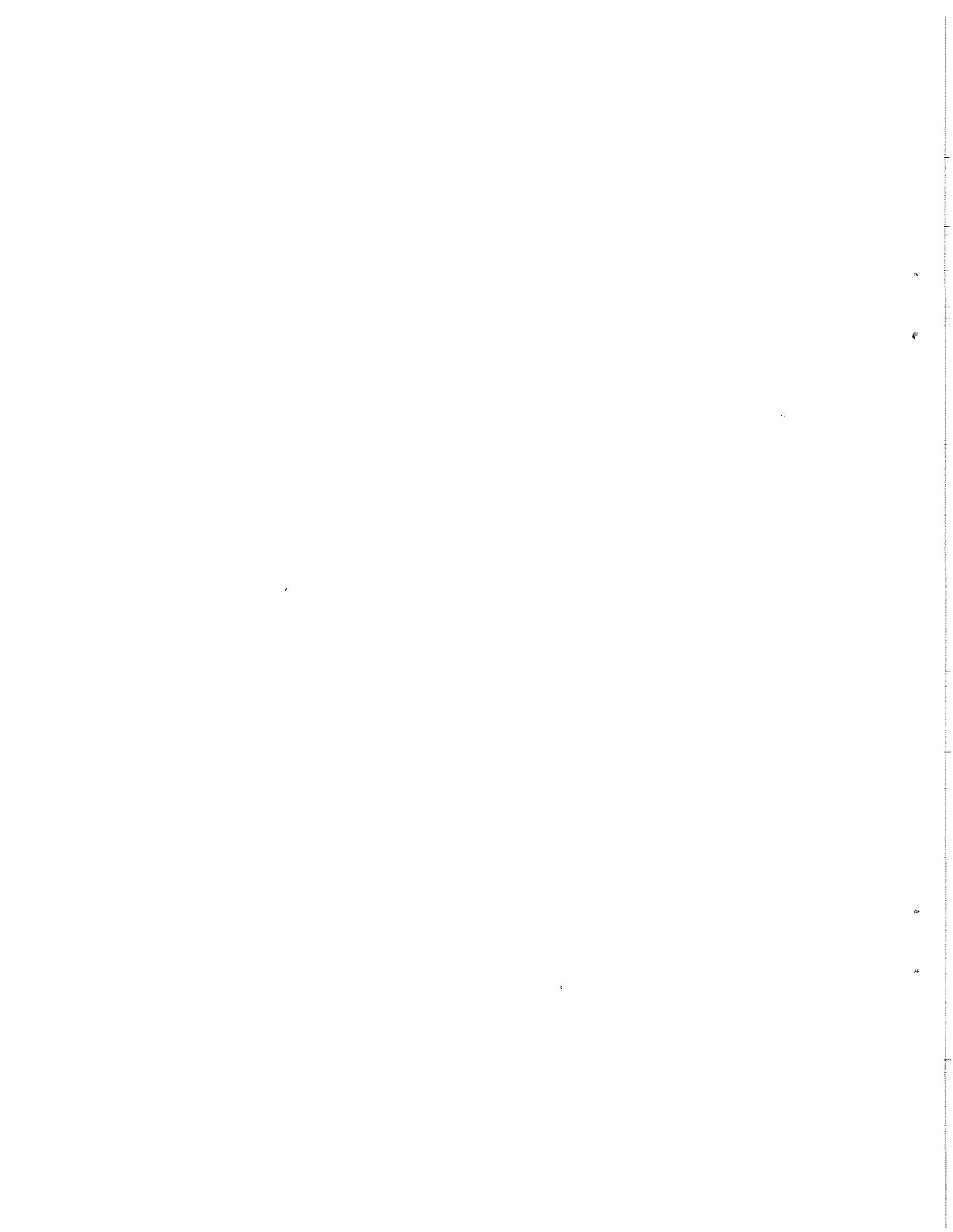


Table 1. SUMMARY OF GROUND-WATER LEVELS IN OBSERVATION WELL Mt 7

Characteristics	Feet below lsd	Date
Mean Level	21.19	(calculated)
Highest Monthly Mean	20.61	May
Lowest Monthly Mean	21.63	February
Highest Average Annual Level	19.81	1960
Lowest Average Annual Level	22.65	1949
Highest Average Monthly Level	18.43	June 1960
Lowest Average Monthly Level	23.19	October 1948
Highest Recorded Level	18.01	May 17, 1960
Lowest Recorded Level	23.26	November 2, 1948
$H_{10\%}$ (level exceeded by 10% days/yr)	20.08	(calculated)
$H_{90\%}$ (level exceeded by 90% days/yr)	22.27	(calculated)
Average Annual Amplitude	1.55 ft.	
Maximum Amplitude (between record levels)	5.25 ft.	
Fluctuability ( $H_{10\%} - H_{90\%}$ )	2.19 ft.	
Years Above Average	1942-43, 1952, 1960-61, 1966-69, 1971-76	
Years Below Average	1944-45, 1947-50, 1954-59, 1963-64, 1977	
Average Year(s) (+1%)	1940-41, 1946, 1951, 1953, 1962, <u>1965, 1970, 1978</u>	
Longest Duration of:		
Extremely Low Levels	see Table 3A	
Extremely High Levels	see Table 3B	

Table 2. AVERAGE AND EXTREME GROUND-WATER LEVELS IN OBSERVATION WELL Mt 7

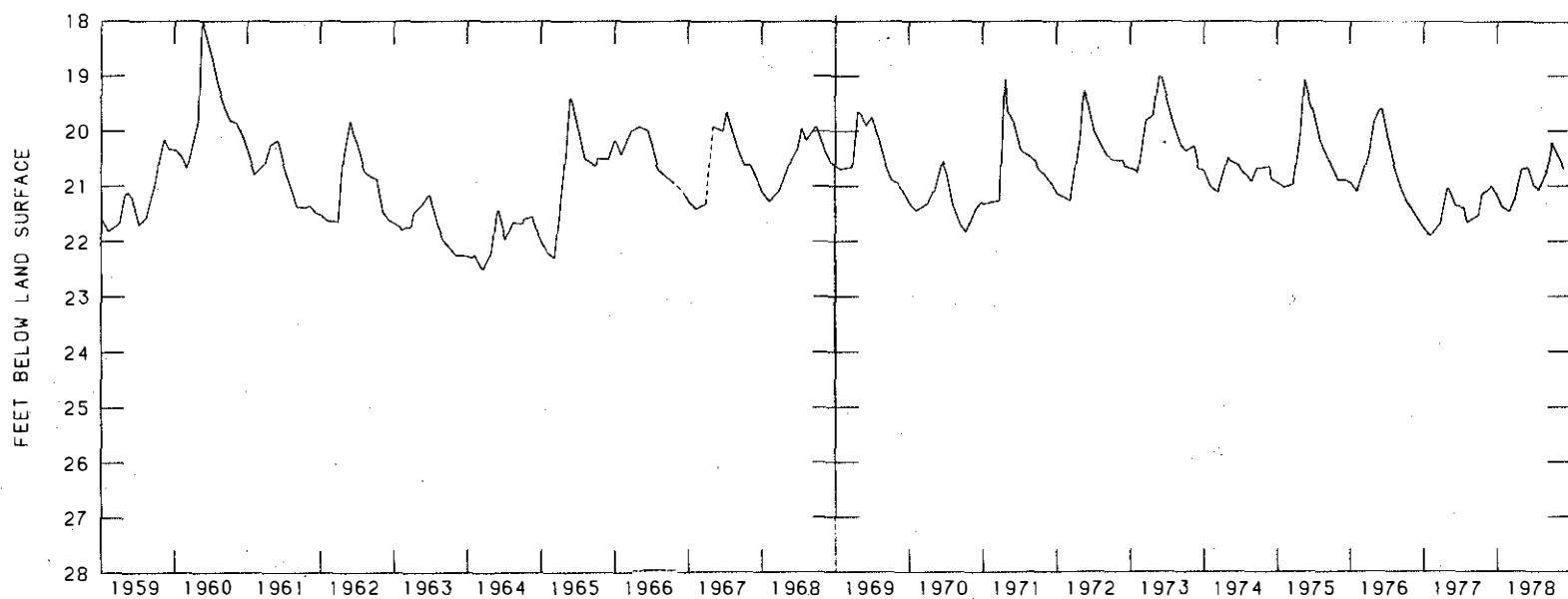
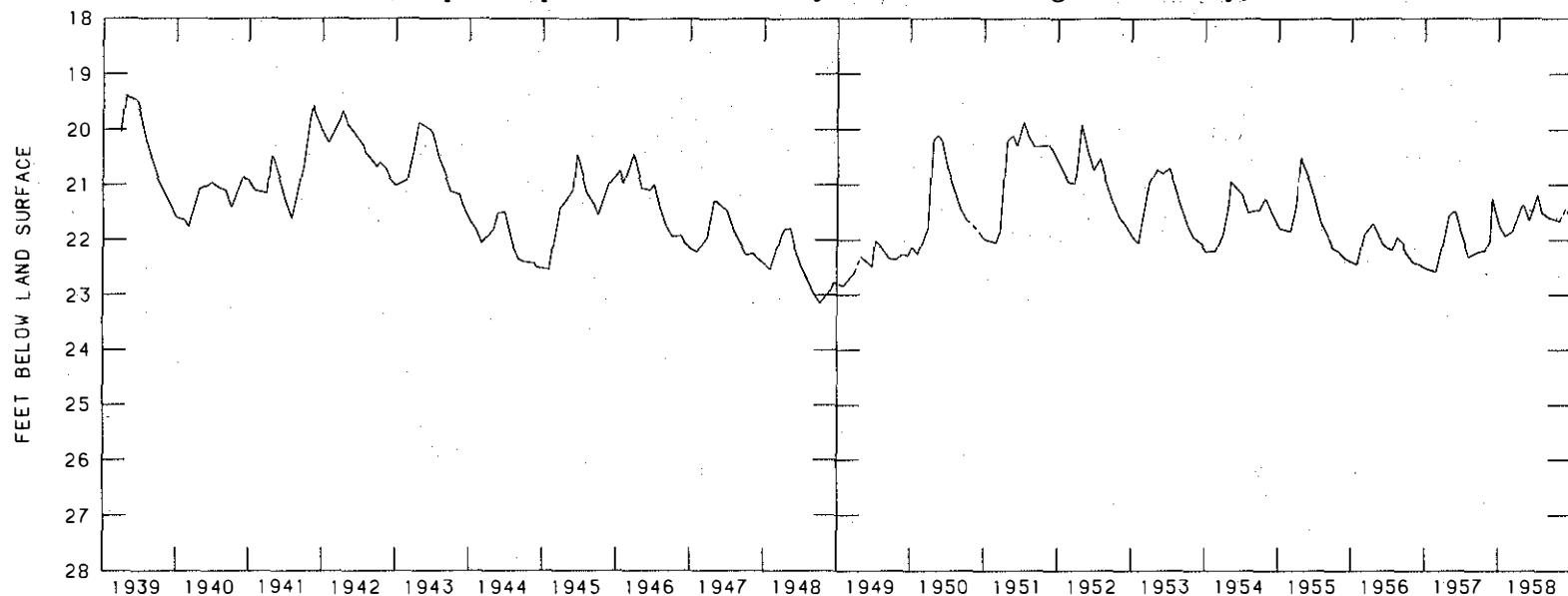
Water Year	Average Monthly Water Levels (in feet below 1.s.d.)												Avg. Annual Level	Extreme Levels (in ft below 1.s.d.)					
														Lowest		Highest		Diff.	
	O	N	D	J	F	M	A	M	J	J	A	S		Date	ft.	Date	ft.	ft.	
1940*	20.96	21.22	21.44	21.63	21.70	21.85	21.47	21.16	21.04	21.08	21.15	21.32	21.32	03/26/40	21.94	10/01/39	20.89	1.05	
1941*	21.46	21.21	20.90	21.03	21.14	21.26	20.76	20.64	20.98	21.39	21.75	21.18	21.14	08/29/41	21.90	04/23/41	20.49	1.41	
1942*	20.28	19.71	19.90	20.15	20.30	20.30	19.75	20.01	20.20	20.41	20.57	20.81	20.20	09/14/42	20.92	11/17/41	19.57	1.35	
1943*	20.68	20.79	20.96	21.06	21.14	20.96	20.00	20.01	20.13	20.24	20.62	20.95	20.63	02/18/43	21.18	04/25/43	19.89	1.29	
1944*	21.20	21.29	21.51	21.71	21.92	22.13	22.09	21.65	21.55	21.78	22.19	22.41	21.79	09/15/44	22.45	10/01/43	21.12	1.33	
1945	22.48*	22.53*	22.57*	22.63*	22.62	22.03	21.35	21.32	20.65	20.81	21.28	21.45	21.81	12/30/44	22.67	06/19/45	20.45	2.22	
1946	21.59	21.21	21.10	20.92	21.05	20.72	20.77	21.14	21.15	21.16	21.56	21.82	21.18	09/24/46	21.91	03/26/46	20.44	1.47	
1947	22.01	21.99	22.11	22.19	22.27	22.15	21.52	21.34	21.45	21.55	21.94	22.14	21.89	03/04/47	22.34	05/06/48	21.28	1.06	
1948	22.33	22.28	22.38	22.47	22.58	22.32	21.83	21.87	22.30	22.61	22.85	23.06	22.41	09/28/48	23.11	05/11/48	21.79	1.32	
1949	23.19	23.05	22.83	22.84	22.90	22.80	22.39	22.39	22.65	22.13	22.25	22.40	22.65	11/02/48	23.26	07/12/49	22.02	1.24	
1950	22.42	22.36	22.33	22.20	22.28	22.04	20.65	20.17	20.41	20.84	21.19	21.51	21.53	10/04/49	22.48	05/16/50	20.11	2.37	
1951	21.69	21.80	21.92	22.04	22.15	21.87	20.71	20.18	20.32	20.00	20.19	20.40	21.11	02/20/51	22.20	07/17/51	19.87	2.33	
1952	20.35	20.35	20.46	20.70	20.89	21.01	29.93	20.19	20.59	20.53	20.78	21.38	20.60	03/25/52	20.98	04/29/52	19.91	1.07	
1953	21.46	21.68	21.79	21.98	22.07	21.69	20.87	20.80	20.83	20.89	21.13	21.54	21.39	03/10/53	22.14	07/07/53	20.70	1.44	
1954	21.82	22.01	22.08	22.24	22.29	22.21	21.62	21.00	21.07	21.32	21.69	21.48	21.74	03/09/54	22.36	05/11/54	20.94	1.42	
1955	21.39	21.37	21.66	21.83	21.86	21.68	20.72	20.79	21.02	21.42	21.76	22.02	21.46	03/01/55	21.94	04/26/55	20.50	1.44	
1956	22.17	22.25	22.34	22.42	22.50	22.19	21.98	21.81	22.20	22.25	22.06	22.11	22.19	02/28/56	22.55	04/17/56	21.70	.85	
1957	22.34	22.44	22.47	22.57	22.63	22.44	21.86	21.52	21.65	22.08	22.38	22.32	22.22	02/05/57	22.67	05/21/57	21.47	1.20	
1958	22.30	22.05	21.61	21.82	22.01	21.91	21.56	21.45	21.74	21.40	21.64	21.71	21.77	10/15/57	22.50	07/15/58	21.20	1.30	
1959	21.79	21.54	21.54	21.72	21.89	21.94	21.27	21.16	21.43	21.78	21.84	21.41	21.61	03/17/59	22.03	09/29/59	20.92	1.11	
1960	20.50	20.19	20.45	20.37	20.54	20.74	20.00	18.54	18.43	18.89	19.37	19.67	19.81	03/22/60	20.82	05/17/60	18.01	2.81	
1961	19.93	19.95	20.17	20.54	20.88	20.92	20.32	20.23	20.43	20.82	21.14	21.44	20.56	09/26/61	21.50	10/04/60	19.82	1.68	
1962	21.44	21.42	21.49	21.53	21.68	21.70	20.85	20.12	20.07	20.46	20.86	20.85	21.04	03/06/62	21.74	05/29/62	19.82	1.92	
1963	21.16	21.52	21.69	21.87	21.84	21.91	21.54	21.43	21.34	21.39	21.81	22.05	21.63	09/24/63	22.10	10/09/62	20.88	1.22	
1964	22.18	22.29	22.36	22.38	22.39	22.56	22.36	21.69	21.65	22.08	21.77	21.86	22.13	02/31/64	22.64	06/02/64	21.43	1.21	
1965	21.63	21.64	21.84	22.08	22.26	22.32	21.41	19.97	19.61	20.20	20.64	20.74	21.195	03/30/65	22.38	06/01/65	19.41	2.91	
1966	20.53	20.61	20.37	20.26	20.45	20.17	19.97	20.02	20.07	20.47	20.74	20.84	20.37	09/27/66	20.87	04/26/66	19.93	.94	
1967	20.91	21.02	21.16	21.32	21.47	21.53	20.62	19.96	20.05	19.73	20.11	20.47	20.70	03/21/67	21.63	07/11/67	19.65	1.98	
1968	20.65	20.70	20.94	21.23	21.39	21.27	20.95	20.59	20.38	20.10	20.25	20.11	20.71	02/27/68	21.48	09/24/68	19.92	1.56	
1969	20.18	20.46	20.65	20.73	20.77	20.79	20.01	19.73	19.96	19.91	20.31	20.72	20.35	03/11/60	20.87	04/22/69	19.65	1.22	
1970	20.90	20.99	21.19	21.39	21.47	21.50	21.21	21.13	20.76	21.09	21.49	21.75	21.24	09/22/70	21.80	06/16/70	20.55	1.25	

Table 2. AVERAGE AND EXTREME GROUND-WATER LEVELS IN OBSERVATION WELL MT 7  
(cont'd)

Water Year	Average Monthly Water Levels (in feet below l.s.d.)												Avg. Annual Level	Extreme Levels (in ft below l.s.d.)						
														Lowest		Highest		Diff.		
	O	N	D	J	F	M	A	M	J	J	A	S		Date	ft.	Date	ft.	ft.		
1971	21.89	21.49	21.33	21.37	21.30	21.29	20.07	19.70	20.00	20.41	20.49	20.58	20.83	10/20/70	21.91	04/27/71	19.53	2.38		
1972	20.74	20.86	21.02	21.15	21.25	21.31	20.93	19.41	19.66	20.05	20.33	20.58	20.61	03/14/72	21.35	05/16/72	19.27	2.08		
1973	20.57	20.59	20.72	20.79	20.86	20.14	19.86	19.25	19.16	19.68	20.12	20.28	20.17	02/27/73	20.98	05/22/73	19.00	1.98		
1974	20.44	20.47	20.75	20.81	21.11	21.16	20.76	20.59	20.66	20.86	21.04	20.86	20.79	03/05/74	21.22	11/13/73	20.27	.95		
1975	20.81	20.76	20.89	20.96	21.08	21.12	20.65	19.38	19.70	19.84	20.37	20.58	20.52	03/18/75	21.20	05/20/75	19.07	2.13		
1976	20.76	20.95	20.95	21.03	21.15	21.03	19.98	19.73	19.77	20.30	20.76	21.12	20.63	03/16/76	21.27	06/08/76	19.60	1.67		
1977	21.31	21.50	21.68	21.83	21.97	21.85	21.30	21.17	21.48	21.49	21.74	21.71	21.59	03/08/77	22.05	05/03/77	21.04	1.01		
1978	21.22	21.14	21.02	21.08	21.35	21.44	21.00	20.62	20.59	20.91	21.02	20.52	20.99	03/02/78	21.47	09/26/78	20.22	1.25		
Means 1940-1978	21.32	21.33	21.40	21.51	21.63	21.54	20.95	20.61	20.70	20.88	21.16	21.28	21.19	11/02/48	23.26	05/17/60	18.01	5.25		
	NOTE: *Calculated from daily measurements. Underlined values are estimated																			

Figure 2. HYDROGRAPH OF MONTHLY HIGH WATER LEVEL IN OBSERVATION WELL Mt 7

(Computer print-out courtesy of U.S. Geological Survey)



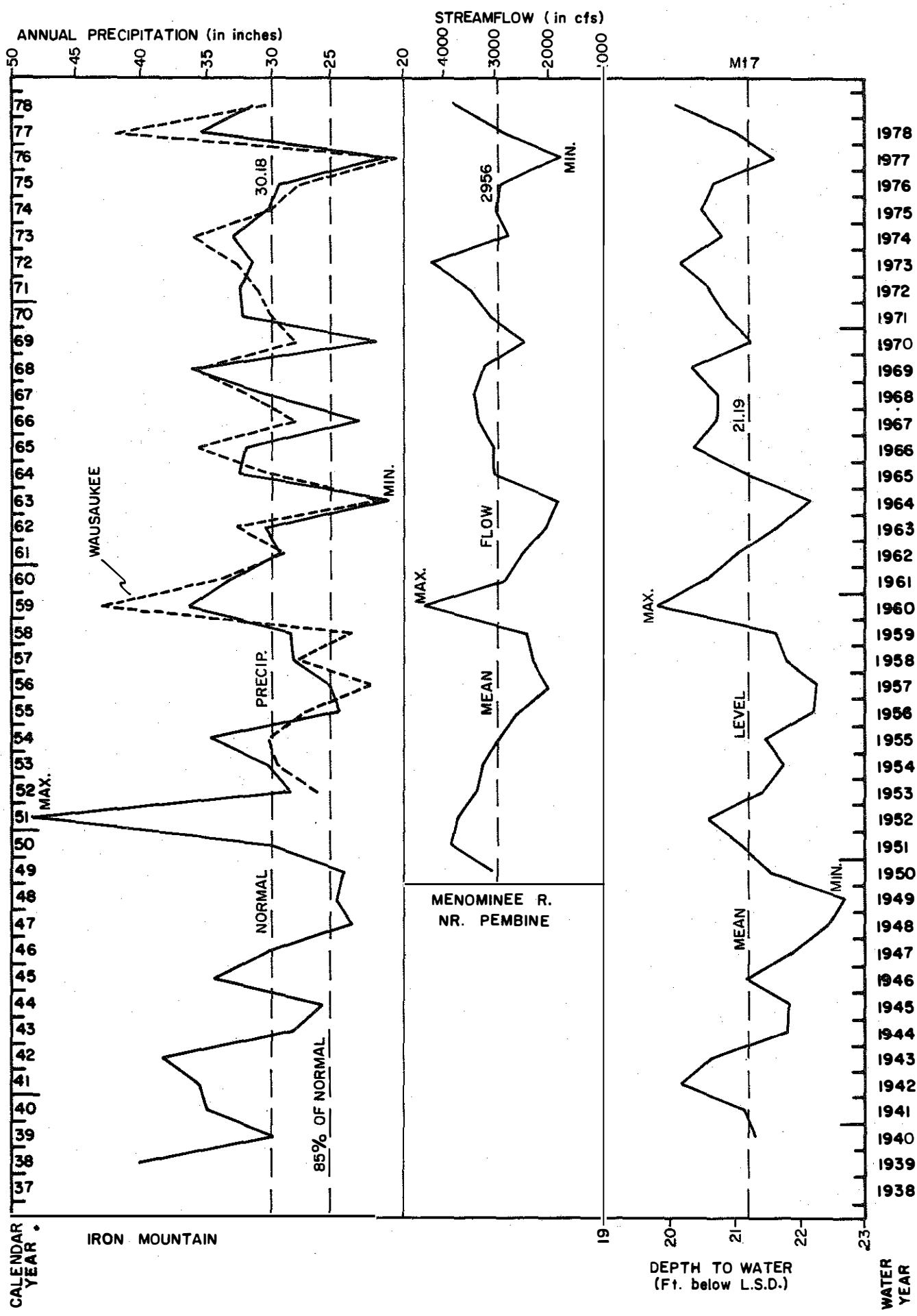


Figure 3. RELATION OF ANNUAL GROUND-WATER LEVELS IN OBSERVATION WELL NO. Mt7 TO PRECIPITATION AT IRON MOUNTAIN

Table 3. LONGEST DURATION OF EXTREME GROUND-WATER LEVELS IN OBSERVATION WELL Mt 7  
 (all periods listed)

A. Extremely Low Levels ( $> H_{90\%}$ ) Lasting		Total No. of Days
From	To	
June 1, 1948	March 21, 1950	669
June 6, 1956	April 16, 1957	315
July 20, 1944	March 13, 1945	237
August 19, 1947	March 28, 1948	223
August 27, 1963	May 5, 1964	223
September 20, 1955	April 3, 1956	197
September 24, 1946	April 1, 1947	190
October 27, 1953	April 6, 1954	162
July 2, 1957	November 19, 1957	142
January 1, 1965	April 10, 1965	100
January 1, 1953	March 17, 1953	75
February 1, 1958	March 25, 1958	59
February 28, 1944	April 25, 1944	57
January 16, 1951	February 27, 1951	43
February 1, 1977	March 8, 1977	40

B. Extremely High Levels ( $< H_{10\%}$ ) Lasting		
From	To	
October 13, 1941	July 26, 1942	287
April 5, 1960	December 27, 1960	267
April 17, 1951	December 11, 1951	239
December 7, 1965	July 12, 1966	223
March 13, 1973	October 16, 1973	222
June 11, 1968	November 12, 1968	155
April 20, 1967	September 5, 1967	149
April 8, 1969	August 26, 1969	142
March 28, 1939	August 11, 1939	141
April 25, 1972	September 3, 1972	132
April 29, 1975	August 19, 1975	120
April 6, 1976	July 25, 1976	116
April 1, 1943	July 16, 1943	107
April 13, 1971	July 20, 1971	99
May 11, 1965	July 27, 1965	78
April 24, 1962	July 10, 1962	71
April 18, 1950	June 13, 1950	56

1.5% difference allowed for inaccuracies of measurement

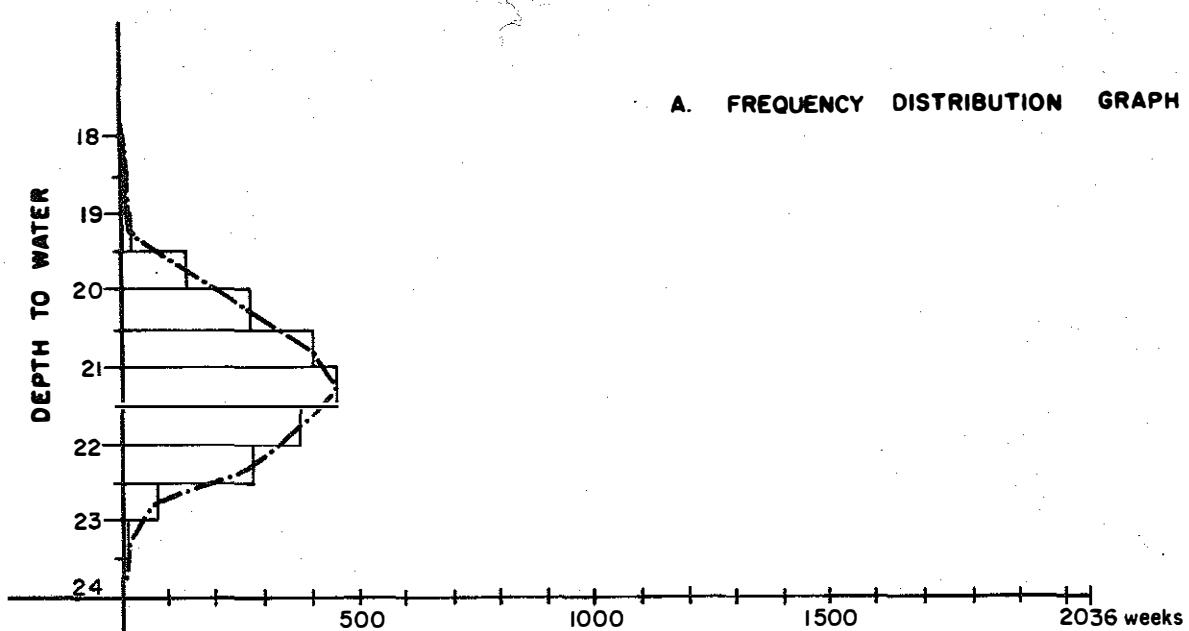
Table 4. PROBABILITY OF EXCEEDANCE OF GROUND-WATER LEVELS IN OBSERVATION WELL Mt 7  
 (median : 21.18 ft)

No.	Water Year	Water Level (in ft.)	p (%)	Class.	No.	Water Year	Water Level (in ft.)	p (%)	Class.
1.	1960	19.81	1.78	EH	21.	1965	21.19	52.54	A
2.	1973	20.17	4.31	EH	22.	1970	21.24	55.08	A
3.	1942	20.20	6.85	EH	23.	1940	21.32	57.61	A
4.	1969	20.35	9.39	EH	24.	1953	21.39	60.15	L
5.	1966	20.37	11.93	H	25.	1955	21.46	62.69	L
6.	1975	20.52	14.47	H	26.	1950	21.53	65.23	L
7.	1961	20.56	17.00	H	27.	1977	21.59	67.77	L
8.	1952	(20.60)	19.54	H	28.	1959	21.61	70.30	L
9.	1972	20.61	22.08	H	29.	1963	21.63	72.84	L
10.	1976	20.627	24.62	H	30.	1954	21.74	75.38	L
11.	1943	20.628	27.16	H	31.	1958	21.77	77.92	L
12.	1967	20.70	29.70	H	32.	1944	21.79	80.46	L
13.	1968	20.71	32.23	H	33.	1945	21.81	82.99	L
14.	1974	20.79	34.77	H	34.	1947	21.89	85.53	L
15.	1971	20.83	37.31	H	35.	1964	22.13	88.07	L
16.	1978	20.99	39.85	H	36.	1956	22.19	90.61	EL
17.	1962	21.04	42.39	A	37.	1957	22.22	93.15	EL
18.	1951	21.11	44.92	A	38.	1948	22.41	95.69	EL
19.	1941	21.14	47.46	A	39.	1949	22.65	98.22	EL
20.	1946	21.18	50.00	A					

Table 5. FREQUENCY OF WEEKLY GROUND-WATER LEVELS IN OBSERVATION WELL Mt 7

Interval (feet below land surface)	Frequency (n)		Cumulative Frequency (duration)	
	Absolute (n)	Relative ( $\frac{n}{N}$ )	Absolute ( $\leq n$ )	Relative ( $\frac{\leq n}{N}$ )
18.01-18.50	6	.3	6	.3
18.51-19.00	6	.3	12	.6
19.01-19.50	21	1.03	33	1.63
19.51-20.00	135	6.63	168	8.26
20.01-20.50	268	13.16	436	21.42
20.51-21.00	402	19.74	838	41.16
21.01-21.50	456	22.40	1294	63.56
21.51-22.00	373	18.32	1667	81.88
22.01-22.50	283	13.90	1950	95.78
22.51-23.00	76	3.73	2026	99.51
23.01-23.50	10	0.49	2036	100.00
TOTALS	2036	100.00%		

A. FREQUENCY DISTRIBUTION GRAPH



B. FREQUENCY DISTRIBUTION CURVE

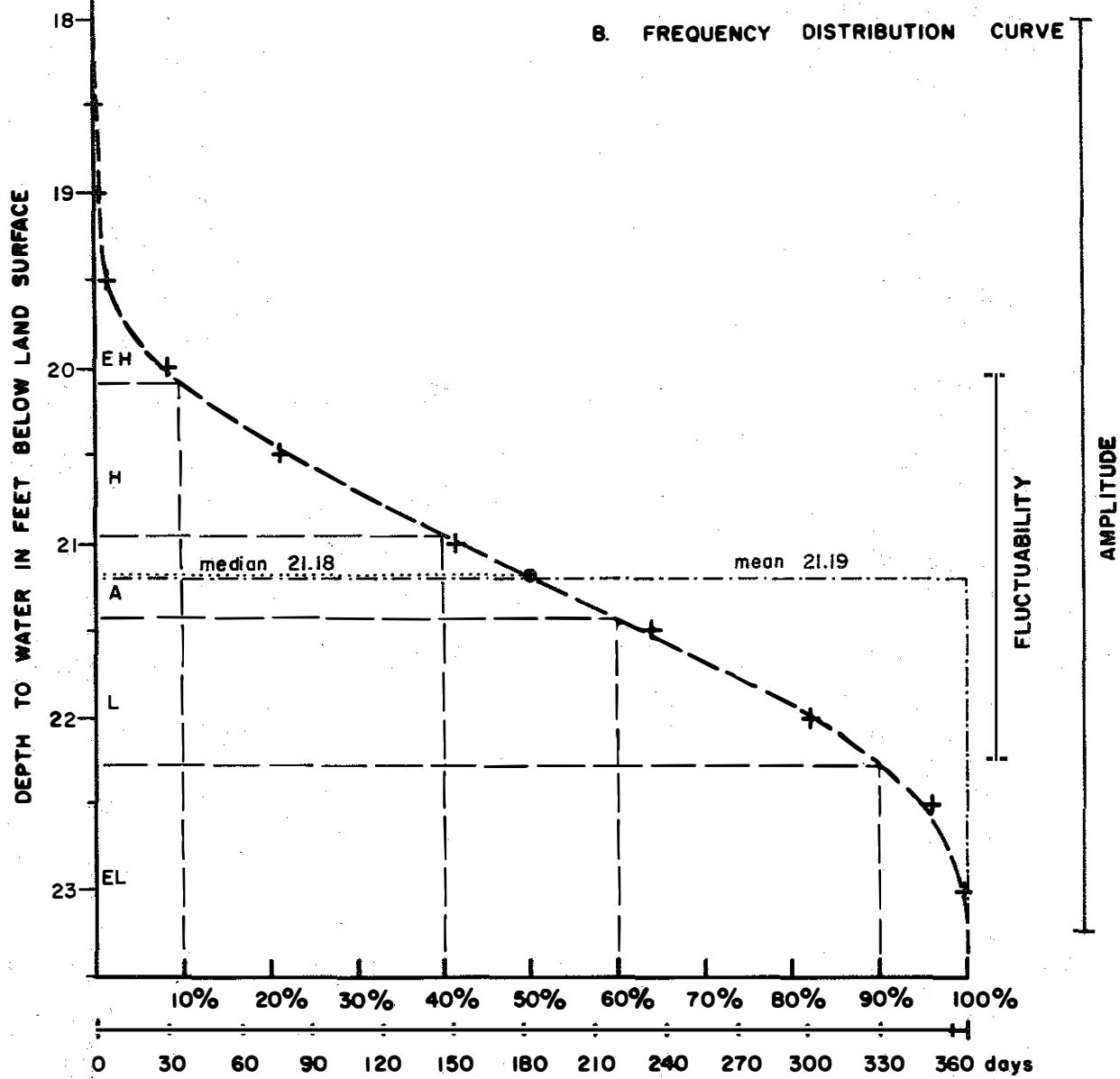
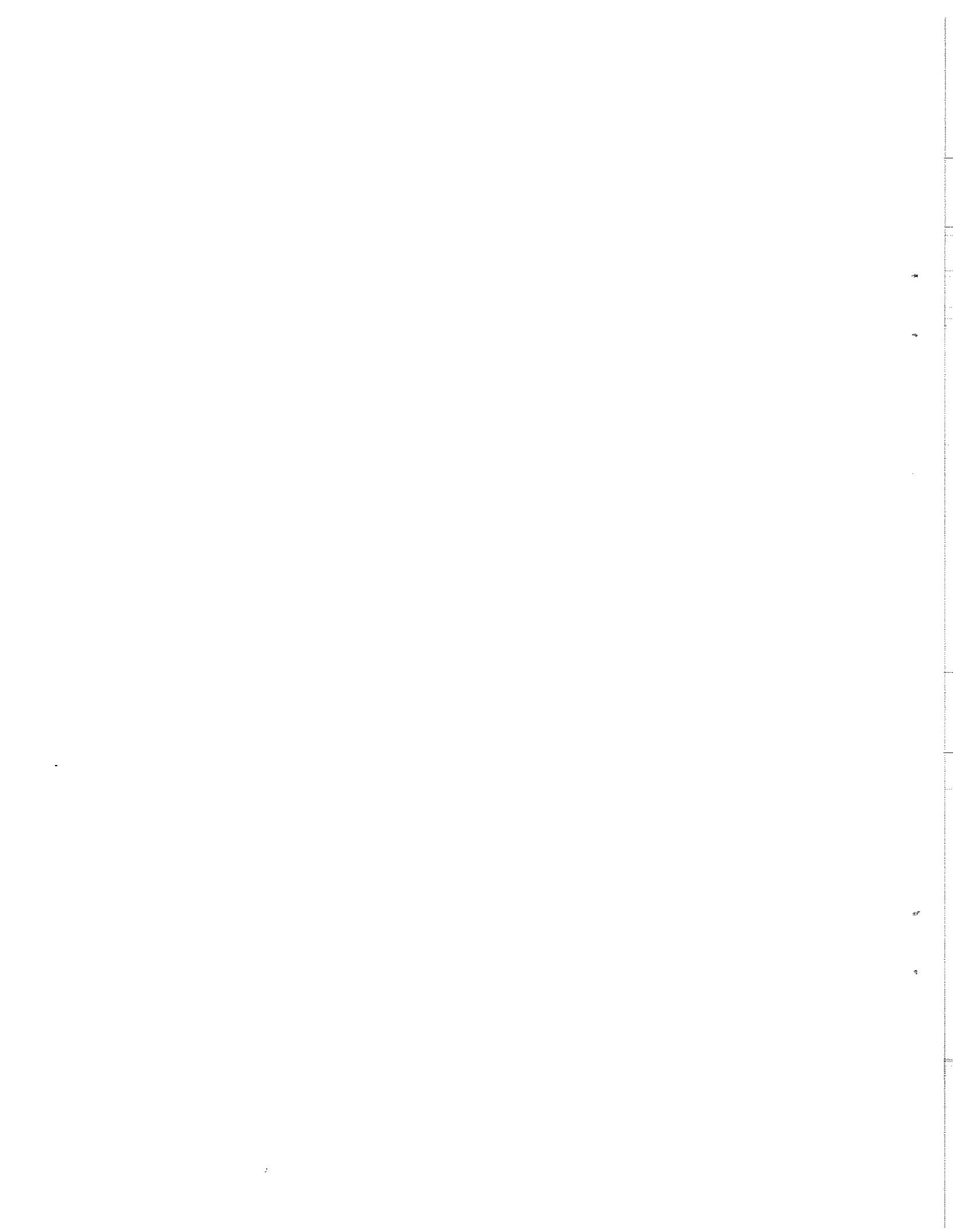


Figure 4. FREQUENCY DISTRIBUTION OF WEEKLY WATER LEVELS IN OBSERVATION WELL NO. Mt7



**Table 6.** EXCEEDANCE OF WEEKLY GROUND-WATER LEVELS IN OBSERVATION WELL Mt 7

#### A. For "n" days per year

### B. In percent

Table 7. TOTAL PRECIPITATION - IRON MOUNTAIN  
(in inches)

Year	Monthly Total												Annual Total (in.)	Dept. from normal
	J	F	M	A	M	J	J	A	S	O	N	D		
1938	1.91	1.57	3.20	2.85	5.08	3.83	6.89	5.28	3.11	2.28	1.21	2.99	40.20	10.02
1939	2.65	2.25	2.26	2.09	5.15	4.58	1.46	3.82	1.56	1.62	.89	1.63	29.96	-.49
1940	1.46	2.29	1.23	1.95	4.58	5.93	3.65	4.00	1.62	2.93	3.61	1.75	35.00	4.82
1941	1.19	.67	.82	1.87	3.13	.91	2.47	11.15	6.41	3.93	1.47	1.31	35.33	5.15
1942	.33	.84	3.88	1.79	5.12	6.83	5.92	2.18	4.44	2.82	2.25	1.99	38.39	8.21
1943	1.67	1.25	2.53	2.57	2.78	6.29	2.26	3.33	1.71	1.48	2.39	.04	28.30	-1.88
1944	.97	.68	1.69	2.06	3.41	3.89	2.97	3.07	3.95	.48	2.54	.48	26.19	-3.99
1945	.72	2.62	1.35	4.48	3.20	2.57	2.70	3.46	4.40	1.74	5.58	1.55	34.37	4.19
1946	2.73	.92	1.00	.85	2.78	6.45	2.42	2.23	4.32	2.14	2.31	2.02	30.17	-.01
1947	.71	.53	.99	3.77	2.90	2.34	1.76	3.07	3.01	1.62	2.22	.90	23.82	-6.36
1948	1.01	1.33	1.29	2.30	.84	3.04	3.09	3.00	1.48	.98	5.91	.82	25.09	-5.09
1949	1.77	.59	1.28	.62	2.17	4.15	3.78	1.72	2.99	2.23	2.11	1.24	24.65	-5.53
1950	3.13	1.17	2.32	3.38	3.24	2.98	4.81	3.12	1.22	1.09	1.59	2.20	30.25	.07
1951	.64	1.50	3.45	7.07	3.40	7.31	7.81	6.68	4.53	2.91	1.71	1.21	48.22	18.04
1952	1.92	.97	2.23	1.47	1.49	3.36	8.66	4.40	1.15	.14	1.45	1.39	28.63	-1.55
1953	.95	2.01	2.01	3.51	3.35	5.32	4.40	3.39	1.77	.60	1.46	1.44	30.21	.03
1954	1.04	1.40	2.29	5.38	2.88	4.29	2.41	3.43	6.88	3.09	1.18	.50	34.77	4.59
1955	.74	.98	3.33	2.35	2.87	3.16	2.32	1.72	.97	3.37	1.28	1.89	24.98	-5.20
1956	.67	.32	1.11	1.32	2.42	4.26	4.00	5.89	1.76	.63	2.11	1.14	25.63	-4.55
1957	.47	1.15	.86	2.81	3.45	1.83	2.07	4.20	5.17	1.63	3.57	1.19	28.40	-1.78
1958	.48	.08	.61	2.03	2.74	5.07	4.52	4.41	1.87	3.00	3.04	.85	28.70	-1.48
1959	.55	.45	1.90	2.25	2.42	2.29	3.43	9.85	4.54	4.22	1.06	3.19	36.15	5.97
1960	1.60	.65	.31	3.58	6.98	4.11	4.14	3.24	3.08	2.87	2.19	.29	33.04	2.86

Table 7. TOTAL PRECIPITATION - IRON MOUNTAIN (continued)  
 (in inches)

Table 8. MONTHLY MEAN DISCHARGE (in cfs)

Station: 4066000 Menominee River nr. Pembine-period of October 1949 to September 1978  
(Full Record)

Table 8. MONTHLY MEAN DISCHARGE (in cfs)  
 Station: 4066000 Menominee River nr. Pembine - continued

Water Year	Monthly Mean Discharge												Annual Mean	Record Published
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.		
1971	2036	3444	2919	2184	1971	2700	8591	4694	2975	2154	1538	1461	3053	Water Resources Date for Wisconsin, 1971 - 1978
1972	3015	2723	2631	2132	1893	2255	7253	8037	2920	2307	3470	3058	3478	
1973	4207	4015	2619	2706	2325	7461	8036	9170	3217	2232	2541	2274	4239	
1974	2375	2971	2329	2248	2332	2392	4778	3359	3464	2100	2554	2306	2764	
1975	1813	3132	2412	2181	2136	2197	6034	6765	3855	1732	1316	2088	2970	
1976	1463	2245	2819	2468	2479	3194	9469	4895	2751	1294	1148	1009	2928	
1977	1028	1043	1167	1080	1203	2493	4321	2220	1676	1315	1003	2819	1778	
1978	3075	2654	2887	2219	1879	1928	3671	3651	2683	2470	3124	3910	2850	
Means 1950- 1978	2338	2504	2169	2072	1975	2595	5978	5286	3528	2628	2113	2278	2956	



O B S E R V A T I O N      W E L L      P t      2 7 6

## WELL DESCRIPTION SHEET

WELL NO.: Pt 276		OWNER: Portage County
LOCATION		
Township/Range General Detail	SE-NE <sup>1/4</sup> Sec. 18, T23N, R10E 3/4 mi. W of Amherst Jct; Portage County At custodian's house in the park on the N shore of Lake Emily	
Altitude Drainage Basin	1,090 ft above msl WOLF-FOX R.: Tomorrow R. (Waupaca R.)	
NEAREST OBSERVATION POINTS		
Precipitation Stations	Waupaca (since 1895) - 15 mi. SE (relocated 4 times) Rosholt (since 1941) - 11 mi. N (relocated in 1958) Coddington (since 1921) - 12 mi. SW Stevens Point (since 1893) - 13 mi. W (relocated in 1954)	
Stream-Gaging Stations	04079602 L. Wolf R. nr. Galloway (since 1973) - 15 mi. N 04079000 Wolf R. at New London (since 1896) - 30 mi. E	
Observation Wells	Pt 15 (since 1950) - 4 mi. NE Wp 63 (since 1958) - 14 mi. SE  Pt 376 (since 1960) - 9 mi. W	
Other		
WELL DATA		
Depth: 17.5 ft Aquifer(s) Tapped Well Log	Casing: depth - 16 ft; diameter 1 <sup>1</sup> / <sub>4</sub> in. Glacial drift Available: no	
MEASUREMENTS		
Measuring Point	Hole in cap on casing	
Equipment	2.30 ft above lsd Hand tape	
Frequency	Weekly from April 18, 1960 (monthly from July 1958 to April, 1960)	
First Measured Period of Record Interrupted	Date: July 2, 1958 ; 9.66 ft below lsd July 1958 to present Occasionally, except in 1973 when Jan. and Feb. is missing	
Notes	Good record, only 2.8% of measurements missing; mostly in the last 5 years (over 65% of all missing data)	

4/6/79

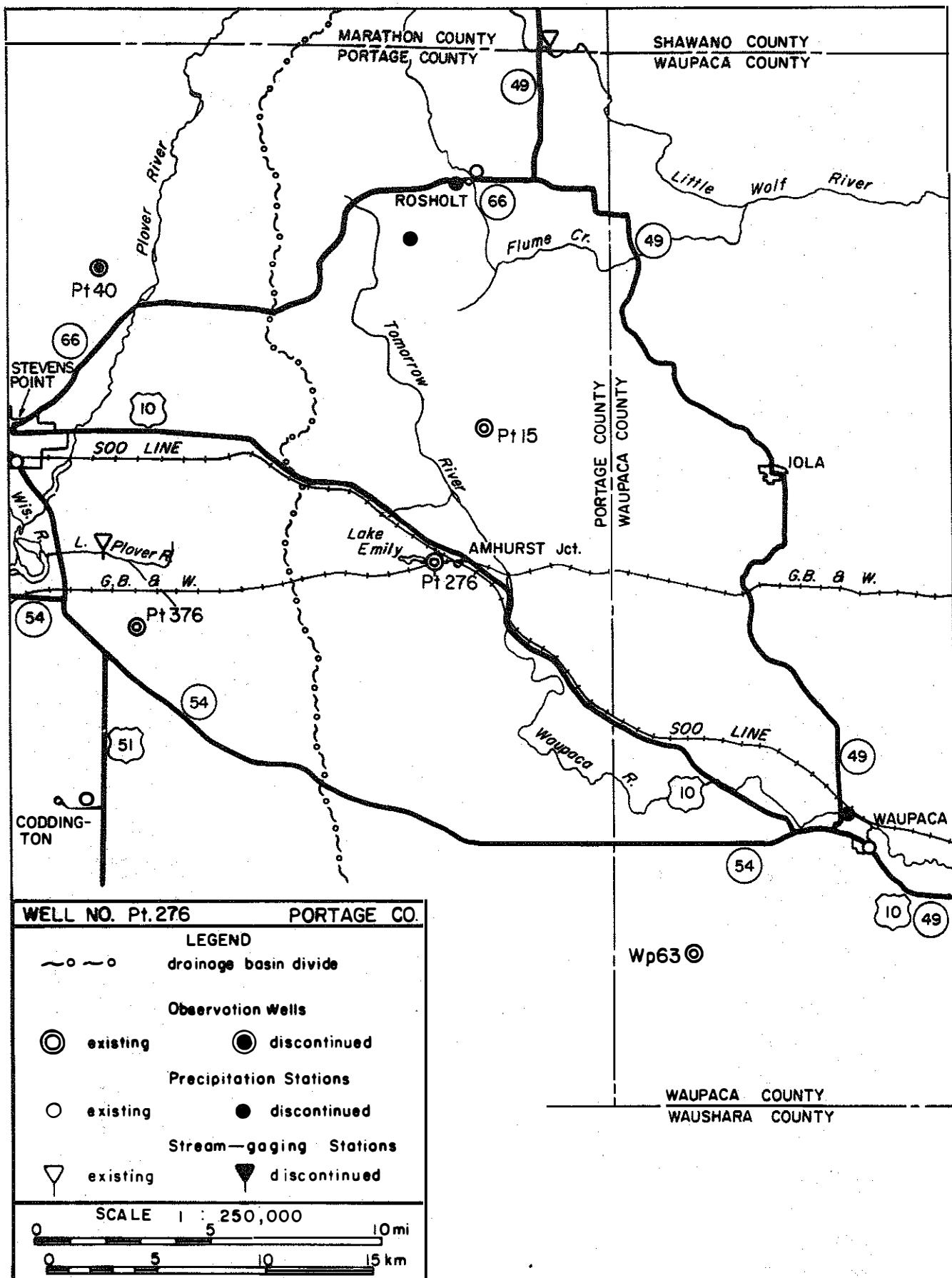


Figure 1 - LOCATION MAP OF WELL NO. Pt 276

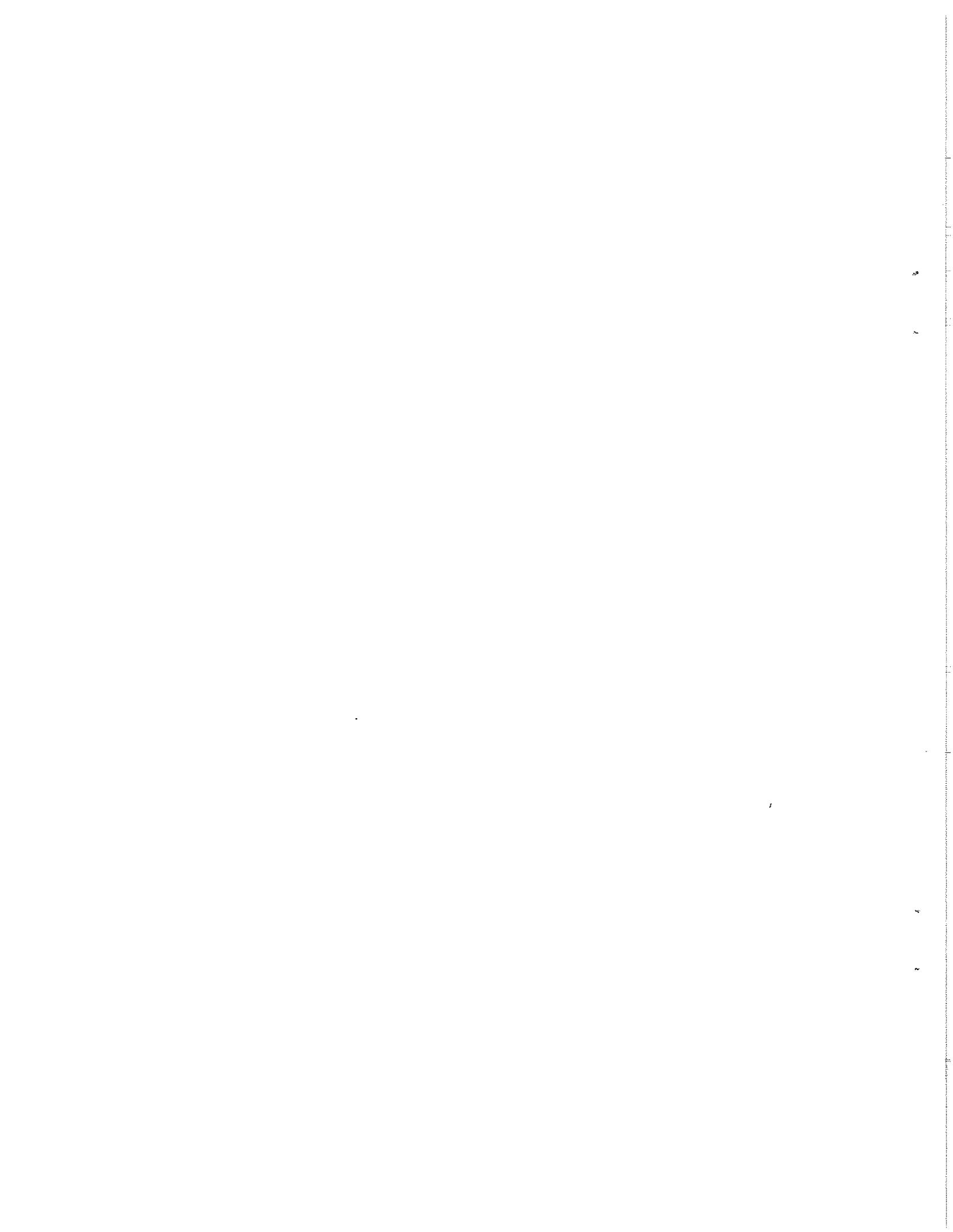


Table 1. SUMMARY OF GROUND-WATER LEVELS IN OBSERVATION WELL Pt 276

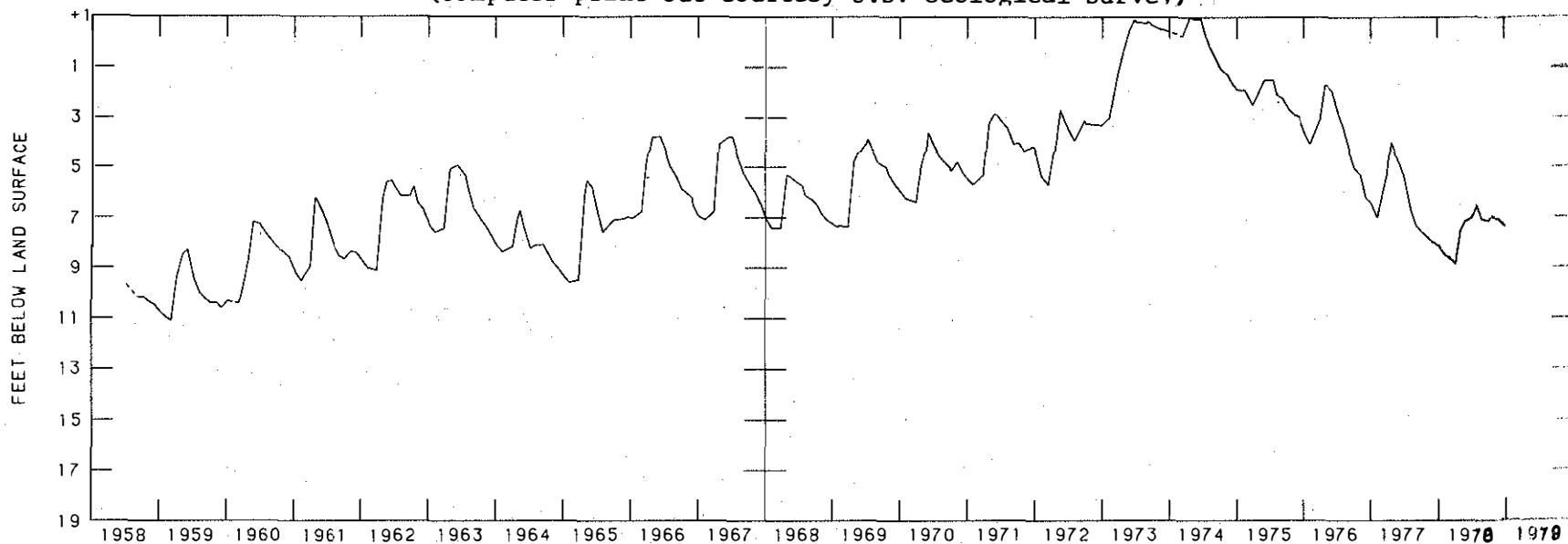
Characteristics	Feet below lsd	Date
Mean Level	5.74	(calculated)
Highest Monthly Mean	4.43	May
Lowest Monthly Mean	6.88	February
Highest Average Annual Level	.31	1974
Lowest Average Annual Level	9.97	1959
Highest Average Monthly Level	.89	May 1974
Lowest Average Monthly Level	11.09	March 1959
Highest Recorded Level	+1.01	04/22/74
Lowest Recorded Level	11.09	03/03/59
$H_{10\%}$ (level exceeded by 10% days/yr)	2.27	(calculated)
$H_{90\%}$ (level exceeded by 90% days/yr)	9.13	(calculated)
Average Annual Amplitude	3.01 ft.	
Maximum Amplitude (between record levels)	12.10 ft.	
Fluctuability ( $H_{10\%} - H_{90\%}$ )	6.86 ft.	
Years Above Average	1970-76	
Years Below Average	1959-65, 1968, 1978	
Average Year(s) (+4%)	1966, 1967, 1969, 1977	
Longest Duration of:		
Extremely Low Levels	see Table 3A	
Extremely High Levels	see Table 3B	

Table 2. AVERAGE AND EXTREME GROUND-WATER LEVELS IN OBSERVATION WELL Pt 276

Water Year	Average Monthly Water Levels (in feet below l.s.d.)												Avg. Annual Level	Extreme Levels (in ft below l.s.d.)				
	O	N	D	J	F	M	A	M	J	J	A	S		Lowest	Highest	Diff.		
														Date	ft.	Date	ft.	
1959*	10.19	10.36	10.47	10.77	10.94	11.09	9.38	8.48	8.30	9.44	10.00	10.23	9.97	03/03/59	11.09	06/12/59	8.30	2.79
1960	10.41* 10.40*	10.61* 10.22*	10.37* <u>10.42*</u>	9.52	7.72	7.30	7.46	7.81	8.11	9.20			12/01/59	10.61	05/23/60	7.18	3.43	
1961	8.43	8.47	8.83	9.30	9.59	9.47	6.73	6.42	7.00	7.79	8.32	8.67	8.25	03/20/61	9.68	04/24/61	6.21	3.47
1962	8.83	8.49	8.54	8.81	9.09	9.15	7.41	5.74	5.60	5.93	6.30	6.40	7.52	03/05/62	9.18	06/18/62	5.54	3.64
1963	6.07	6.57	7.01	7.44	7.69	7.75	5.48	5.13	5.22	5.65	6.20	6.79	6.42	03/11/63	7.88	06/10/63	4.93	2.95
1964	7.14	7.46	7.86	8.24	8.46	8.48	7.40	6.92	7.85	8.36	8.48	8.21	7.90	03/16/64	8.62	05/11/64	6.72	1.90
1965	8.57	8.83	9.18	9.44	9.66	9.61	7.77	5.71	6.10	7.08	7.80	7.58	8.11	03/01/65	9.79	05/10/65	5.54	4.25
1966	7.29	7.32	7.09	7.16	6.94	5.87	4.00	3.81	3.92	4.52	5.12	5.57	5.71	11/09/65	7.61	06/06/66	3.75	3.86
1967	5.98	6.28	6.70	7.03	7.18	7.21	4.52	4.17	4.06	4.20	4.90	5.41	5.64	03/20/67	7.41	06/19/67	3.75	3.66
1968	5.85	6.14	6.58	7.20	7.56	7.69	5.65	5.54	5.74	5.85	6.20	6.42	6.37	03/04/68	7.79	04/29/68	5.31	2.48
1969	6.65	6.98	7.34	7.48	7.46	7.58	5.46	4.52	4.30	4.00	4.57	4.99	5.94	03/17/69	7.76	07/07/69	3.84	3.92
1970	5.08	5.43	5.76	6.07	6.35	6.52	5.40	4.74	3.79	4.43	6.84	5.04	5.29	03/16/70	6.61	06/01/70	3.59	3.02
1971	5.23	4.94	5.39	5.58	5.72	5.60	4.09	3.04	2.93	3.32	3.67	4.13	4.47	03/08/71	5.77	05/24/71	2.86	2.91
1972	4.21	4.42	4.23	4.73	5.55	5.78	5.04	2.80	3.23	3.64	3.88	3.62	4.26	03/20/72	5.86	05/16/72	2.68	3.18
1973	3.33	3.32	3.48	3.30	3.36	2.18	.68	+.19	1.76	+.69	+.71	+.72	1.38	02/26/73	3.65	06/25/73	+.89	4.54
1974	+.60	+.50	+.46	+.49	+.35	+.19	+.77	+.89	+.74	+.10	.31	.74	+0.34	09/23/74	0.92	04/22/74	+1.01	1.93
1975	1.17	1.40	1.67	2.02	2.35	2.52	2.35	1.59	1.53	1.69	2.31	2.33	1.91	03/09/75	2.54	10/02/74	1.05	1.49
1976	2.80	3.03	3.19	3.83	4.11	3.92	1.98	1.74	2.19	3.08	3.62	4.93	3.20	03/01/76	4.20	05/03/76	1.70	2.50
1977	5.17	5.65	6.34	6.73	7.03	6.54	4.14	4.50	5.07	5.78	6.87	7.44	5.95	09/23/77	7.55	04/22/77	3.98	3.57
1978	7.66	7.81	8.07	8.31	8.61	8.78	7.58	7.06	6.84	6.40	6.96	6.98	7.59	03/22/78	8.86	06/01/78	6.68	2.18
Means 1959- 1978	5.97	6.14	6.39	6.66	6.88	6.80	5.19	4.43	4.46	4.89	5.39	5.64	5.74					
	NOTE: *Monthly measurement only. Underlined values are estimated.																	

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Figure 2. HYDROGRAPH OF MONTHLY HIGH WATER LEVEL IN OBSERVATION WELL Pt 276  
(Computer print-out courtesy U.S. Geological Survey)



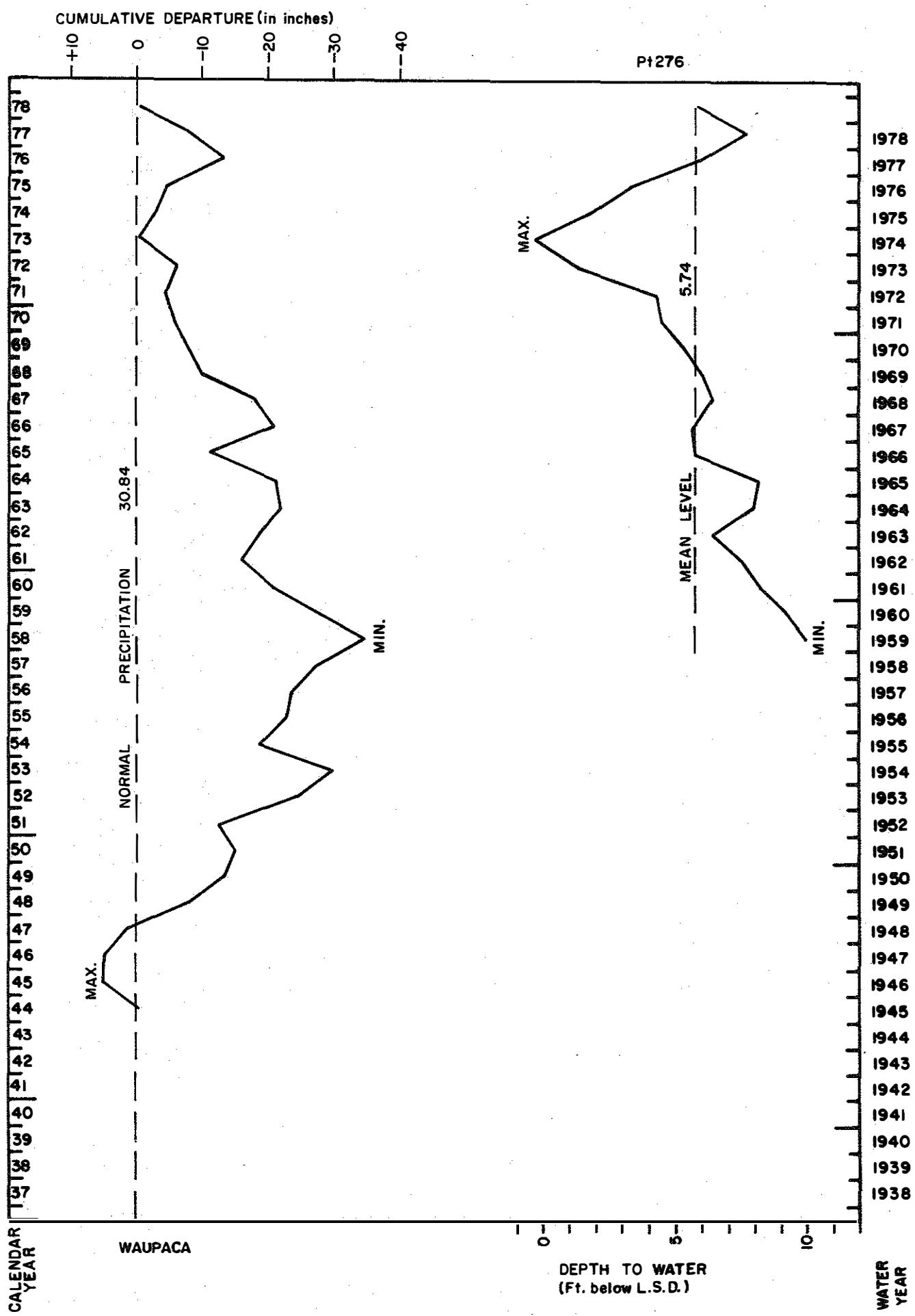


Figure 3. RELATION OF ANNUAL GROUND-WATER LEVELS IN OBSERVATION WELL NO. PT276 TO PRECIPITATION AT WAUPACA

Table 3. LONGEST DURATION OF EXTREME GROUND-WATER LEVELS IN OBSERVATION WELL Pt 276  
 (all periods listed)

A. Extremely Low Levels ( $> H_{90\%}$ ) Lasting		Total No. of Days
From	To	
July 2, 1958	April 20, 1959	(293) (incomplete)
June 20, 1959	April 23, 1960	308
November 26, 1964	April 10, 1965	136
December 19, 1960	March 20, 1961	99
January 22, 1962	March 29, 1962	67

B. Extremely High Levels ( $< H_{10\%}$ ) Lasting		
From	To	
March 17, 1973	January 21, 1975	676
April 26, 1975	August 1, 1975	96
April 13, 1976	June 7, 1976	56

1.5% difference allowed for inaccuracies of measurements

Table 4. PROBABILITY OF EXCEEDANCE OF GROUND-WATER LEVELS IN OBSERVATION WELL Pt 236

(median : 5.94 ft)

No.	Water Year	Water Level (in ft.)	P (%)	Class.	No.	Water Year	Water Level (in ft.)	P (%)	Class.
1.	1974	.34	3.4	EH	11.	1969	5.94	52.5	A
2.	1973	1.38	8.3	EH	12.	1968	6.37	57.3	A
3.	1975	1.91	13.2	H	13.	1963	6.42	62.2	L
4.	1976	3.20	18.1	H	14.	1962	7.52	67.2	L
5.	1972	4.26	23.0	H	15.	1978	7.59	72.0	L
6.	1971	4.47	28.0	H	16.	1964	7.90	77.0	L
7.	1970	5.29	32.8	H	17.	1965	8.11	81.9	L
8.	1967	5.64	37.8	H	18.	1961	8.25	86.8	L
9.	1966	5.72	42.6	A	19.	1960	9.20	91.7	EL
10.	1977	5.94	47.5	A	20.	1959	9.97	96.6	EL

Table 5. FREQUENCY OF WEEKLY GROUND-WATER LEVELS IN OBSERVATION WELL Pt 276

Interval (feet below land surface)	Frequency (n)		Cumulative Frequency (duration)	
	Absolute (n)	Relative ( $\frac{n}{N}$ )	Absolute ( $\Sigma n$ )	Relative ( $\frac{\Sigma n}{N}$ )
+1.99-1.00	1	0.10	1	0.10
+.99-0.00	62	5.94	63	6.04
0.01-1.00	14	1.34	77	7.38
1.01-2.00	44	4.22	121	11.60
2.01-3.00	44	4.22	165	15.82
3.01-4.00	94	9.01	259	24.83
4.01-5.00	107	10.26	366	35.09
5.01-6.00	156	14.96	522	50.05
6.01-7.00	136	13.04	658	63.09
7.01-8.00	162	15.53	820	78.62
8.01-9.00	113	10.83	933	89.45
9.01-10.00	51	4.89	984	94.34
10.01-11.00	56	5.37	1040	99.71
11.01-12.00	3	0.29	1043	100.00
TOTALS	1043	100.00%		

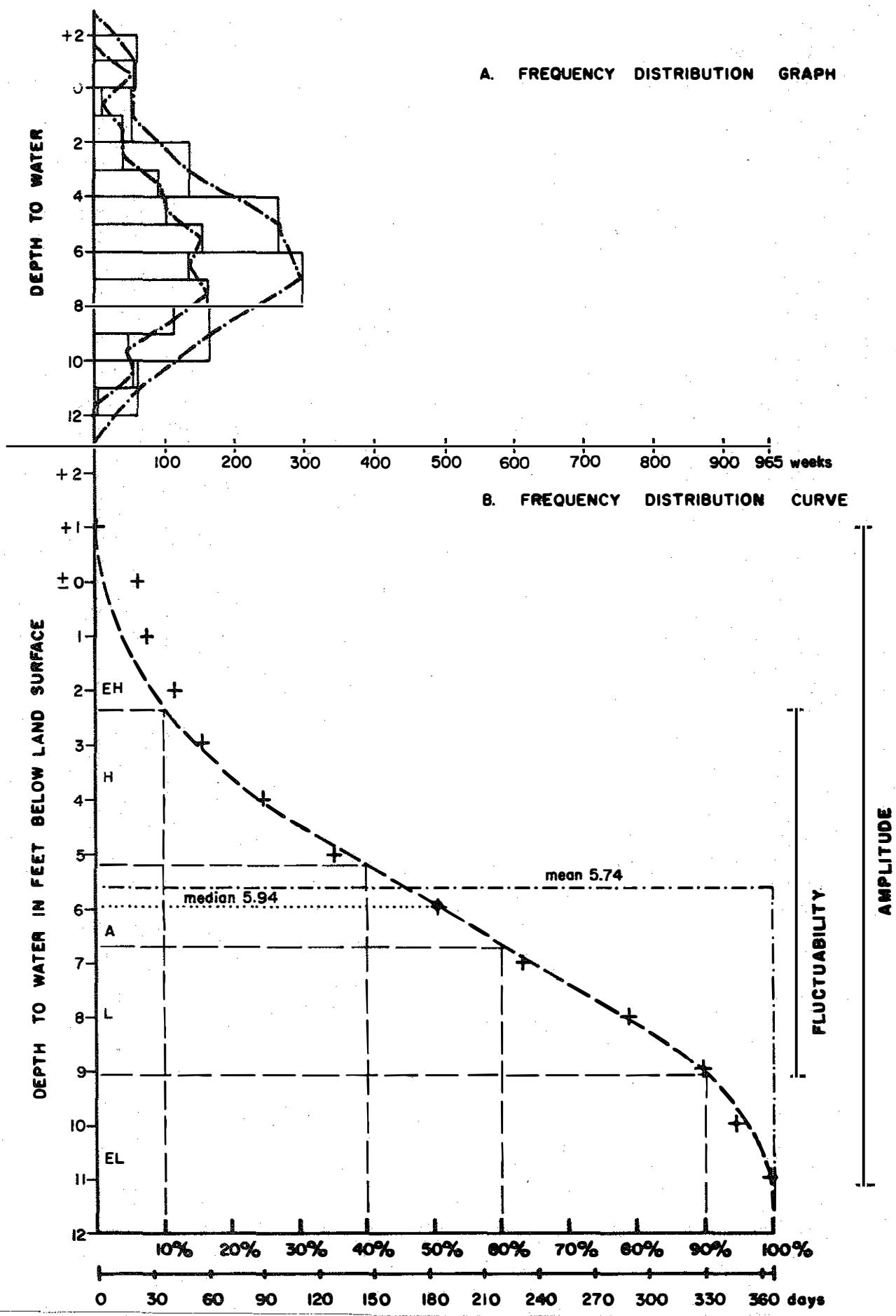


Figure 4. FREQUENCY DISTRIBUTION OF WEEKLY WATER LEVELS IN OBSERVATION WELL NO. Pt276

Table 6. EXCEEDANCE OF WEEKLY GROUND-WATER LEVELS IN OBSERVATION WELL Pt 276

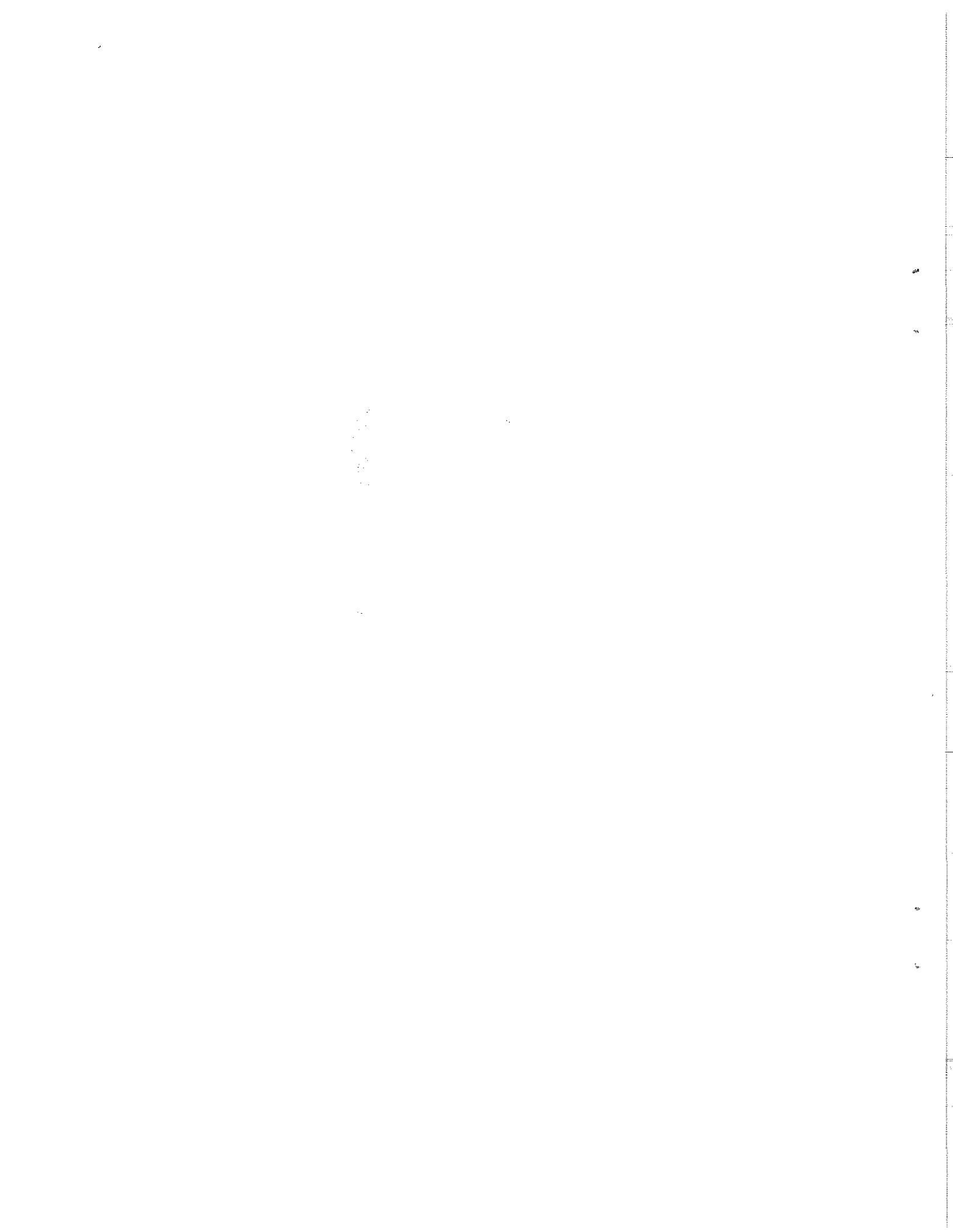
A. For "n" days per year

### B. In percent

Table 7. TOTAL PRECIPITATION - WAUPACA  
 (in inches)

Year	Monthly Total												Annual Total (in.)	Dept. from normal
	J	F	M	A	M	J	J	A	S	O	N	D		
1944-  1951	.62	1.23	1.44	1.66	2.73	8.27	2.65	4.72	2.61	.52	3.50	.63	30.58	-.26
	.27	1.56	.99	4.18	5.49	6.04	2.13	4.31	3.30	.84	5.59	1.10	35.80	4.96
	1.31	.30	1.78	1.34	4.09	7.41	1.62	3.54	3.02	1.88	3.08	1.32	30.69	-.15
	.88	.12	1.21	4.24	2.83	3.65	2.55	4.02	3.41	1.73	1.57	1.00	27.21	-3.63
	.27	.96	2.34	2.19	1.92	3.13	1.83	1.21	1.68	1.07	3.80	1.07	21.47	-9.37
	1.55	.29	3.03	3.29	1.05	5.02	4.03	2.11	.84	1.48	1.42	.96	25.07	-5.77
	2.35	.75	2.67	2.70	1.86	2.97	6.98	3.93	2.56	.69	.83	1.71	30.00	-.84
	.78	1.15	3.09	4.88	2.40	4.29	3.85	3.15	2.86	4.52	1.63	.41	33.01	2.17
	1.45	.62	1.52	1.43	2.85	2.31	2.94	2.06	.56	.14	1.59	1.39	18.86	-11.98
	.74	2.44	1.76	5.69	1.72	4.17	1.54	3.13	1.32	.41	.73	1.71	25.36	-5.48
	.88	1.07	1.77	4.89	5.88	5.06	3.96	2.68	8.86	5.40	1.00	.81	42.26	11.42
	.48	1.23	2.13	3.69	3.31	2.90	4.03	1.51	1.20	4.40	.91	1.03	26.82	-4.02
	.73	.67	2.17	2.76	4.16	5.09	3.27	4.11	2.45	.89	2.84	.65	29.79	-1.05
	.21	.79	.58	3.20	4.63	2.70	2.90	2.91	3.27	1.54	3.42	.90	27.05	-3.79
	.46	.04	.60	2.75	2.03	3.57	2.70	4.46	4.21	1.24	1.43	.15	23.64	-7.20
	1.33	2.25	2.12	2.19	6.07	1.90	3.37	5.18	4.36	5.22	1.43	2.62	38.04	7.20
	1.38	.73	.24	3.44	5.77	4.03	2.27	6.35	7.20	4.24	1.65	.26	37.56	6.72
	.20	1.65	3.59	1.97	2.76	4.01	3.76	3.10	6.08	3.66	3.26	1.52	35.56	4.72
	.72	1.92	1.77	2.17	3.02	4.27	3.59	3.78	1.85	3.52	.52	.96	28.09	-2.75
	.36	.46	2.66	1.69	3.05	3.25	6.29	1.91	4.07	1.45	1.91	.65	27.75	-3.09
	.50	.33	1.00	2.19	4.60	2.14	6.58	4.55	6.33	.47	1.57	1.20	31.46	.62
	.60	1.05	2.28	5.16	4.41	2.89	2.95	6.19	8.62	1.38	2.55	2.83	40.91	10.07
	1.32	1.78	2.84	1.49	1.25	1.84	2.06	4.04	1.38	.23	1.05	2.09	21.37	-9.47
	3.35	1.23	1.27	2.56	2.03	9.55	2.64	2.29	1.62	4.81	1.33	.83	33.51	2.67
	1.05	.58	.61	4.43	4.60	6.81	3.70	4.32	6.96	1.18	.84	3.94	39.02	8.18
	3.71	T	1.41	3.61	5.28	6.51	2.48	.64	2.61	4.54	.52	1.50	32.81	1.97
	.58	.18	1.99	.90	8.24	2.16	2.90	3.35	5.45	3.02	2.87	1.21	32.85	2.01

Table 7. TOTAL PRECIPITATION - WAUPACA (continued)  
 (in inches)



O B S E R V A T I O N      W E L L      P r      6

## WELL DESCRIPTION SHEET

WELL NO.: Pr 6		OWNER: Wis. DNR
LOCATION		
Township/Range General Detail	SW-NE-SW Sec. 24, T. 40 N, R. 1 W. SE end of Park Falls, Price County Corner of STH 182 and Case Ave. (Old STH 13)	
Altitude Drainage Basin	1,510 ft above msl ( $\pm$ 20) CHIPPEWA R. : Flambeau R. (left bank)	
NEAREST OBSERVATION POINTS		
Precipitation Stations	Park Falls (since 1910) - .5 mi W. Flambeau Reservoir (since 1926) - 14 mi NE	
Stream-Gaging Stations	05360500 Flambeau R. near Bruce (since 1951) - 54 mi SW	
Observation Wells	As 54 (since 1967) - 20 mi NNW As 6 (since 1959) - 27 mi NW Pr 11 (since 1965) - 27 mi S	
Other		
WELL DATA		
Depth: 18 ft Aquifer(s) Tapped Well Log	Casing: depth - 14 3/4 ft; diameter 8 in. Alluvial and glacial deposits Available: yes — no	
MEASUREMENTS		
Measuring Point Equipment	Pointer on float gage 3.98 ft above lsd Kinnison float gage	
Frequency	Weekly (daily from 04/15/37 to 02/01/45)	
First Measured Period of Record Interrupted	Date: 03/07/37 ; 2.82 ft below lsd April 1937 - present Occasionally up to 1971 (1.2% of measurements missing); more frequently since 1972 (11.9% of measurements missing)	
Notes	Record fairly complete; only 2.9% of weekly measurements missing, period of 1972-78 being responsible for almost 70% of missing measurements. 2/28/79	

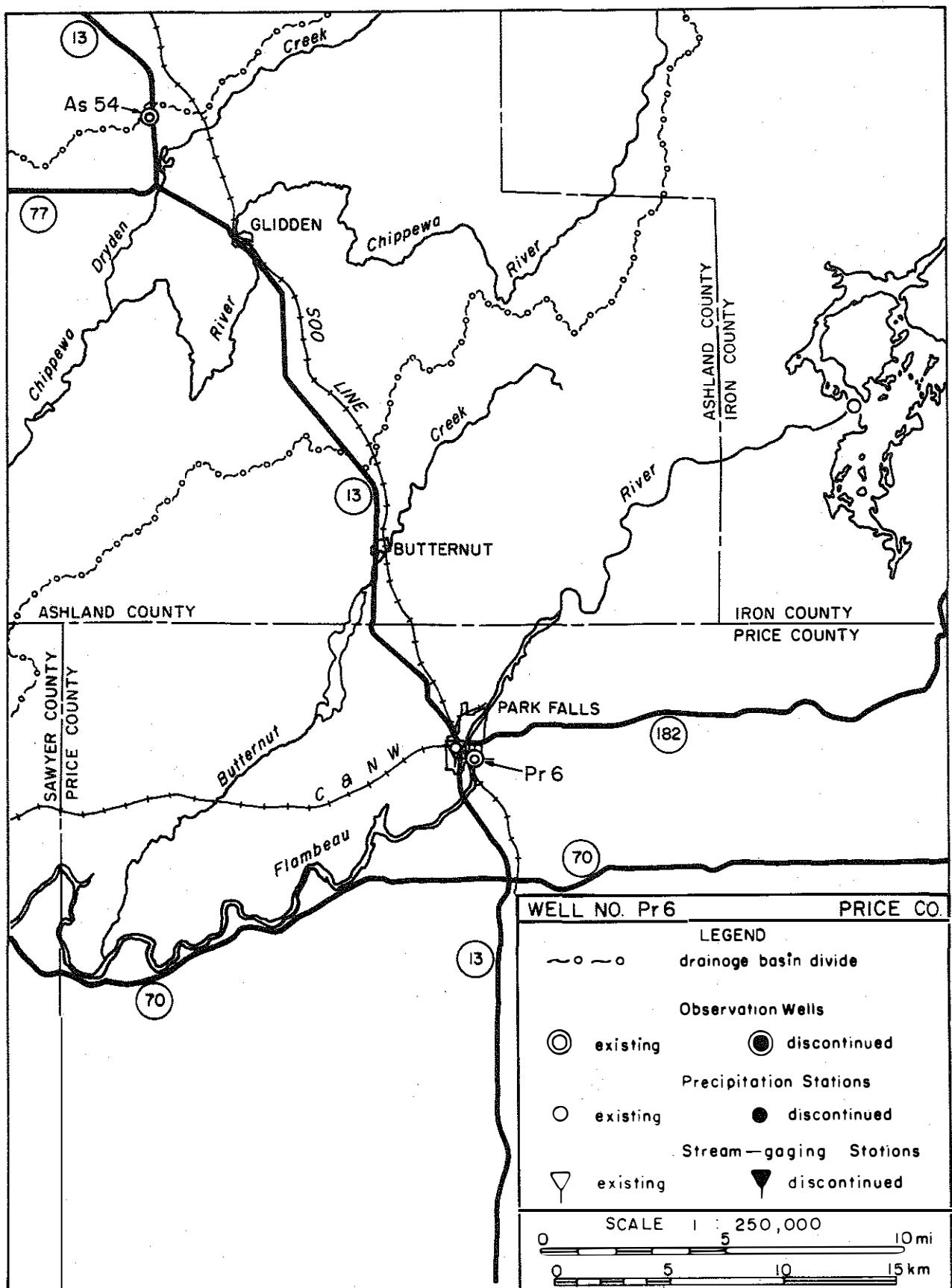


Figure 1 - LOCATION MAP OF WELL NO. Pr6

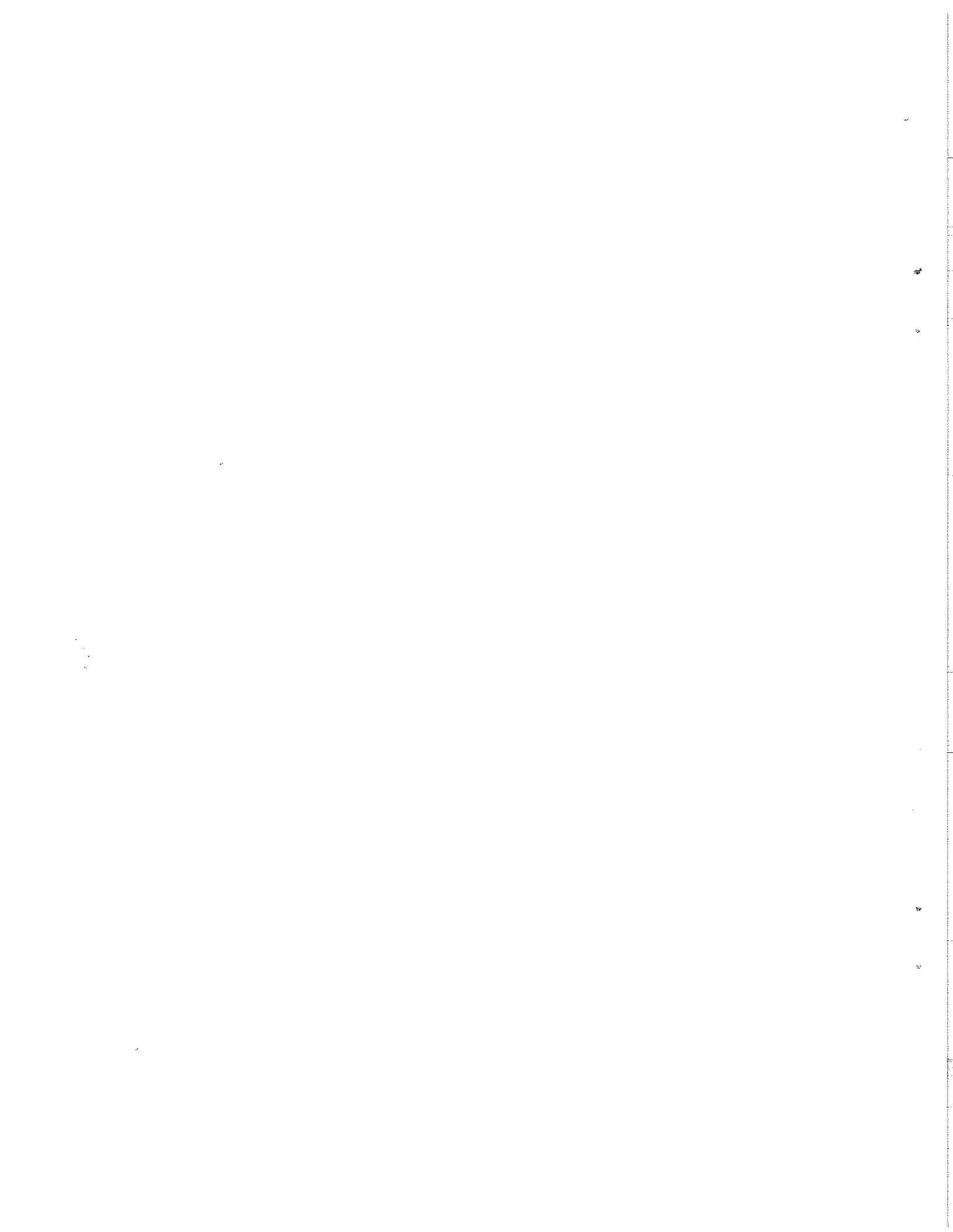


Table 1. SUMMARY OF GROUND-WATER LEVELS IN OBSERVATION WELL Pr 6

Characteristics	Feet below lsd	Date
Mean Level	2.30	(calculated)
Highest Monthly Mean	1.38	April
Lowest Monthly Mean	3.39	February
Highest Average Annual Level	1.10	1973
Lowest Average Annual Level	4.30	1949
Highest Average Monthly Level	.29	April 1960
Lowest Average Monthly Level	5.55	October 1949
Highest Recorded Level	+.41	06/29/46
Lowest Recorded Level	5.67	10/31/48
$H_{10\%}$ (level exceeded by 10% days/yr)	.97	(calculated)
$H_{90\%}$ (level exceeded by 90% days/yr)	3.68	(calculated)
Average Annual Amplitude	3.12 ft.	
Maximum Amplitude (between record levels)	6.08 ft.	
Fluctuability ( $H_{10\%} - H_{90\%}$ )	2.71 ft.	
Years Above Average	1939, 1942-43, 1952-55, 1959-1962, 1966-1976, 1978	
Years Below Average	1938, 1940-41, 1944-46, 1948-50, 1957-58, 1963-65, 1977	
Average Year(s) (+ 5%)	1947, 1951, 1956, <u>1968</u> , 1970	
Longest Duration of:		
Extremely Low Levels	see Table 3A	
Extremely High Levels	see Table 3B	

Table 2. AVERAGE AND EXTREME GROUND-WATER LEVELS IN OBSERVATION WELL Pr 6

Water Year	Average Monthly Water Levels (in feet below 1.s.d.)												Avg. Annual Level	Extreme Levels (in ft below 1.s.d.)				
	O	N	D	J	F	M	A	M	J	J	A	S		Lowest	Highest	Diff.		
1938*	3.05	3.06	3.40	3.67	3.56	2.87	2.16	1.53	1.52	2.03	2.33	2.30	2.60	01/15/38	3.80	06/01/38	.85	2.95
1939*	2.60	2.07	2.45	2.60	2.84	2.80	1.71	1.78	1.14	1.52	2.00	2.24	2.14	03/01/39	3.05	06/19/39	.55	2.50
1940*	2.70	2.92	3.04	3.40	3.64	3.26	2.23	2.39	2.20	2.63	2.38	2.49	2.77	02/15/40	3.68	06/07/40	1.77	1.91
1941*	2.92	2.43	2.75	2.81	2.98	2.69	1.75	2.16	2.30	2.48	2.47	1.60	2.44	02/28/41	3.13	09/11/41	1.06	2.07
1942*	1.39	1.34	1.86	2.40	2.27	2.06	1.41	1.61	1.67	1.69	2.44	2.24	1.86	08/26/42	3.25	05/03/42	.71	2.54
1943*	2.40	2.27	2.97	3.04	3.06	1.92	.65	1.31	1.00	1.72	1.83	2.24	2.03	02/19/43	3.27	06/17/43	.08	3.19
1944*	2.55	2.50	3.16	3.56	3.31	3.51	2.71	1.92	1.49	2.36	3.45	3.39	2.83	08/29/44	4.17	06/05/44	.31	3.86
1945	3.11*	3.40*	3.82*	4.41*	4.64	2.72	1.91	2.66	1.30	2.08	2.75	2.49	2.94	02/17/45	4.70	06/02/45	.04	4.66
1946	2.90	2.94	3.35	3.29	3.42	2.86	2.08	2.74	1.61	2.21	2.62	2.21	2.69	12/31/45	3.68	06/29/46	+.41	4.09
1947	2.06	1.61	2.31	2.85	3.06	3.08	1.04	.58	1.52	2.44	2.77	3.15	2.20	09/10/47	3.36	04/12/47	.53	2.83
1948	3.56	3.60	3.78	4.07	4.44	3.56	1.57	3.02	3.88	4.06	4.34	4.78	3.72	09/25/48	5.13	04/10/48	1.39	3.74
1949	5.55	5.20	4.90	5.18	5.40	4.52	3.66	3.09	3.87	3.07	3.50	3.71	4.30	10/31/48	5.67	05/07/49	2.43	3.24
1950	3.78	3.55	3.80	4.09	4.30	4.32	2.11	1.62	2.44	2.73	2.90	3.54	3.26	03/11/50	4.33	05/06/50	.11	4.22
1951	3.73	3.64	3.83	4.16	3.85	1.84	-.48	1.51	1.61	1.29	1.77	1.04	2.40	02/17/51	4.36	04/07/51	.14	4.22
1952	1.55	1.27	1.56	2.06	2.21	2.22	-.95	1.07	1.27	-.91	1.01	1.78	1.49	03/15/52	2.31	07/21/52	.50	1.81
1953	2.40	2.78	2.97	3.39	3.73	2.66	1.37	1.09	-.72	-.79	-.93	1.85	2.06	03/07/53	3.74	06/20/53	+.19	3.93
1954	2.66	2.82	2.48	3.06	2.69	2.29	-.98	-.51	-.38	1.02	1.85	1.54	1.85	02/06/54	3.34	05/01/54	.16	3.50
1955	1.23	1.64	2.24	2.77	3.11	2.01	-.82	1.39	1.10	1.55	1.23	2.27	1.78	02/26/55	3.18	08/06/55	.45	2.73
1956	2.32	2.16	2.78	3.19	3.41	2.78	1.07	1.41	1.95	2.15	1.74	2.55	2.29	03/03/56	3.54	04/07/56	.66	2.88
1957	3.23	3.24	3.32	3.79	4.21	2.69	1.72	2.31	2.40	2.85	3.58	2.68	3.00	02/23/57	4.32	03/23/57	1.36	2.96
1958	3.26	3.02	3.40	3.93	4.31	3.20	2.35	2.35	2.60	1.38	1.90	1.17	2.74	02/22/58	4.50	07/12/58	.98	3.52
1959	1.64	1.42	2.21	2.68	3.57	3.35	1.50	1.52	2.38	1.64	2.13	-.86	2.07	03/14/59	3.68	09/26/59	.05	3.73
1960	-.30	1.18	1.59	1.85	2.42	2.75	-.29	-.32	-.60	1.28	1.67	-.80	1.25	03/15/60	2.80	10/03/59	.12	2.92
1961	1.63	1.19	1.61	2.44	3.08	2.56	-.85	-.86	1.46	1.89	2.03	2.54	1.84	02/11/61	3.13	04/22/61	.53	2.60
1962	2.33	1.80	2.49	3.17	3.51	2.46	1.35	-.98	1.22	1.67	2.01	1.17	2.01	03/10/62	3.55	05/19/62	.58	2.97
1963	1.56	2.03	2.38	3.04	3.42	2.87	1.80	1.58	1.95	2.89	3.15	3.26	2.49	03/09/63	3.57	04/30/63	1.34	2.23
1964	3.31	3.20	3.36	3.90	4.17	3.25	1.88	1.37	2.17	3.03	3.75	2.64	3.00	02/22/64	4.27	05/09/64	.70	3.57
1965	2.64	2.76	3.27	3.63	3.91	3.04	1.16	-.84	1.49	2.21	2.88	2.64	2.54	02/27/65	4.03	05/08/65	.32	3.71

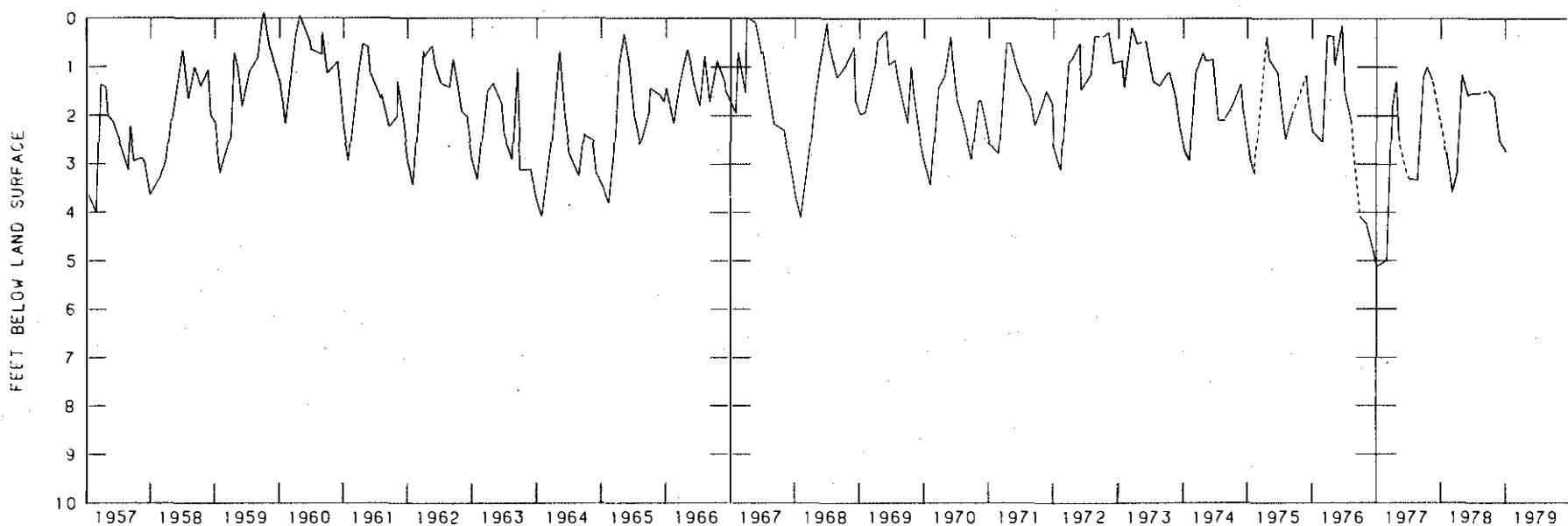
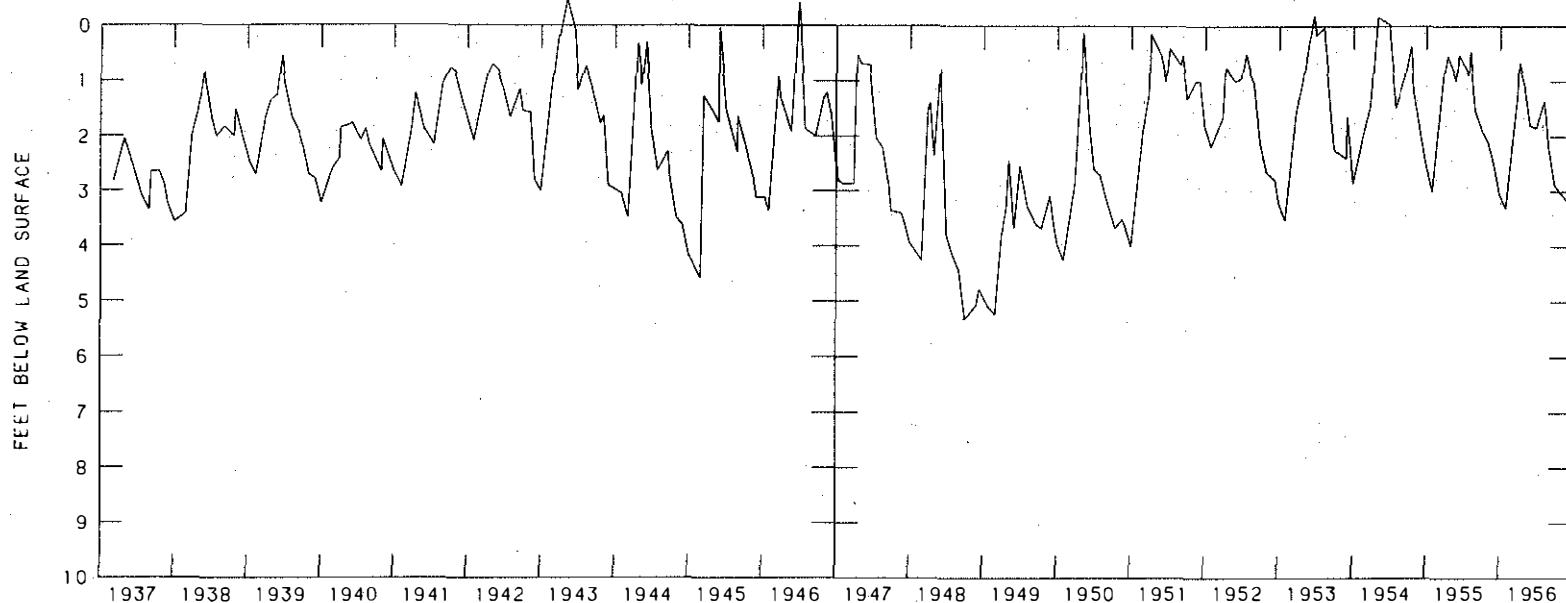
Table 2.  
(cont'd.)

## AVERAGE AND EXTREME GROUND-WATER LEVELS IN OBSERVATION WELL Pr 6

Water Year	Average Monthly Water Levels (in feet below 1.s.d.)												Avg. Annual Level	Extreme Levels		(in ft below 1.s.d.)		Diff. ft.		
														Lowest		Highest				
	O	N	D	J	F	M	A	M	J	J	A	S		Date	ft.	Date	ft.			
1966	1.91	2.01	1.92	2.28	2.53	1.79	-.99	1.05	1.42	2.29	-.97	1.88	1.75	02/05/66	2.88	04/30/66	.65	2.23		
1967	1.60	1.52	1.91	2.19	2.58	2.25	-.45	-.67	-.86	1.10	1.84	2.50	1.62	03/04/67	2.84	04/01/67	+.02	2.86		
1968	2.61	2.65	3.09	3.94	4.23	3.53	1.81	1.40	-.85	-.74	1.42	1.28	2.30	03/02/68	4.49	06/29/68	.10	4.39		
1969	1.16	-.98	1.71	2.37	2.16	1.59	-.68	-.74	1.08	1.21	1.74	2.43	1.49	01/25/69	3.06	05/31/69	.26	2.80		
1970	1.70	1.93	2.67	3.06	3.46	2.23	1.58	1.01	1.24	2.09	2.93	3.31	2.27	09/05/70	3.73	05/30/70	.38	3.35		
1971	2.68	1.92	2.38	2.70	3.14	2.19	-.84	-.83	1.12	1.65	2.08	2.30	1.98	02/13/71	3.77	04/10/71	.51	3.26		
1972	1.94	1.68	1.86	2.90	3.22	2.53	1.00	-.74	1.61	1.51	-.92	-.75	1.72	02/19/72	3.30	08/19/72	.36	2.94		
1973	-.60	-.52	1.27	1.20	1.93	-.85	-.65	-.57	-.68	1.52	1.59	1.80	1.10	02/23/73	2.70	03/16/73	.18	2.52		
1974	1.56	1.93	2.42	2.92	3.05	1.88	-.87	1.21	1.41	2.15	2.37	2.17	1.99	01/18/74	3.20	04/19/74	.72	2.48		
1975	2.05	1.69	2.45	3.08	3.24	2.30	-.89	1.10	1.38	1.97	2.64	2.19	2.08	02/14/75	3.28	04/18/75	.37	2.91		
1976	2.01	1.51	2.04	2.55	2.68	1.27	-.47	1.23	1.12	2.29	2.67	3.70	1.96	02/13/76	2.95	06/18/76	.35	2.60		
1977	4.21	4.39	4.79	5.28	5.20	3.77	2.03	2.86	3.10	3.44	3.46	1.43	3.66	02/05/77	5.44	04/22/77	1.29	4.15		
1978	1.26	1.40	1.67	2.42	3.18	2.10	.89	1.34	1.24	1.37	1.32	1.32	1.63	02/10/78	3.60	04/07/78	.79	2.81		
Means 1938- 1978	2.38	2.32	2.71	3.15	3.39	2.64	1.38	1.47	1.62	1.97	2.28	2.25	2.30	10/31/48	5.67	06/29/46	+.41	6.08		
	NOTE: *Weekly average calculated from daily measurement. Underlined values are estimated.																			

Figure 2. HYDROGRAPH OF MONTHLY HIGH WATER LEVEL IN OBSERVATION WELL Pr6

(Computer print-out courtesy U.S. Geological Survey)



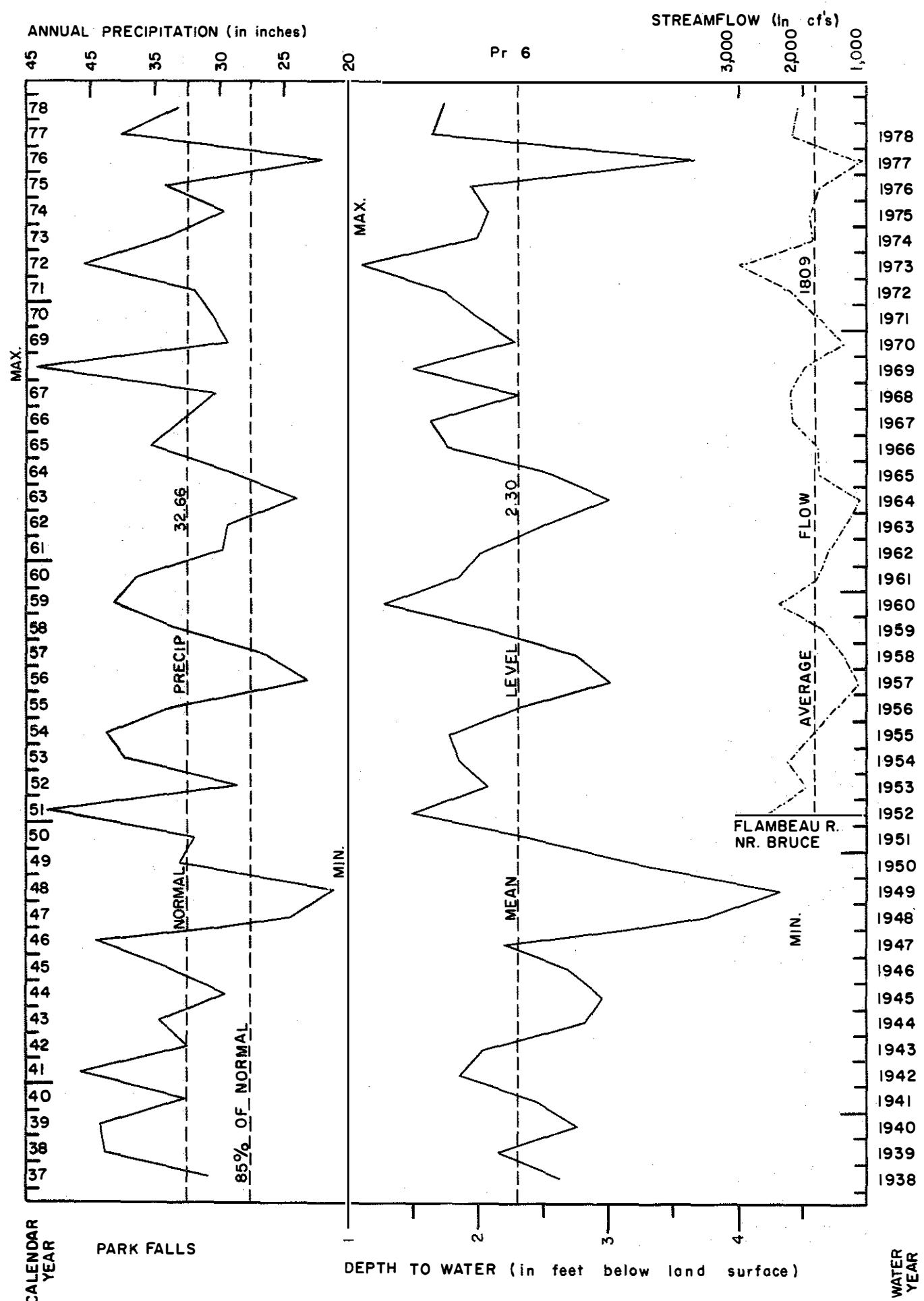


Figure 3. RELATION OF ANNUAL GROUND-WATER LEVELS IN OBSERVATION WELL NO. PR6 TO PRECIPITATION AT PARK FALLS

Table 3. LONGEST DURATION OF EXTREME GROUND-WATER LEVELS IN OBSERVATION WELL Pr 6  
 (all periods above 30 days listed)

A. Extremely Low Levels ( $> H_{90\%}$ ) Lasting		Total No. of Days
From	To	
June 7, 1948	April 18, 1949	316
August 24, 1949	March 25, 1950	207
September 13, 1976	March 7, 1977	180
September 21, 1950	February 17, 1951	149
December 8, 1947	March 20, 1948	104
December 6, 1944	March 10, 1945	95
January 6, 1968	March 9, 1968	63
January 4, 1958	February 22, 1958	49
December 31, 1963	March 7, 1964	41
January 9, 1957	March 9, 1957	40
January 23, 1965	February 27, 1965	35
May 31, 1949	June 30, 1949	33

B. Extremely High Levels ( $< H_{10\%}$ ) Lasting		
From	To	
March 9, 1973	June 30, 1973	112
August 19, 1972	December 2, 1972	105
April 1, 1967	July 8, 1967	98
March 31, 1960	July 1, 1960	92
April 17, 1954	July 10, 1954	84
April 3, 1971	June 12, 1971	70
March 28, 1969	May 17, 1969	49
April 15, 1972	May 27, 1972	42
March 27, 1976	May 7, 1976	42
September 26, 1959	November 1, 1959	36
April 9, 1966	May 14, 1966	35
June 15, 1968	July 20, 1968	35

1% difference allowed for inaccuracies of measurements.

Table 4. PROBABILITY OF EXCEEDANCE OF GROUND-WATER LEVELS IN OBSERVATION WELL Pr 6

(median : 2.14 ft)

No.	Water Year	Water Level (in ft.)	p (%)	Class.	No.	Water Year	Water Level (in ft.)	p (%)	Class.
1.	1973	1.10	1.09	EH	22.	1947	2.20	52.41	A
2.	1960	1.25	4.11	EH	23.	1970	2.27	54.83	A
3.	1969	1.49	6.52	EH	24.	1956	2.29	57.24	A
4.	1952	1.49	8.94	EH	25.	1968	2.30	59.66	A
5.	1967	1.62	11.35	H	26.	1951	2.40	62.08	L
6.	1978	1.63	13.77	H	27.	1941	2.44	64.49	L
7.	1972	1.72	16.18	H	28.	1963	2.49	66.91	L
8.	1966	1.75	18.60	H	29.	1965	2.54	69.32	L
9.	1955	1.78	21.01	H	30.	1938	2.62	71.74	L
10.	1961	1.84	23.43	H	31.	1946	2.69	74.15	L
11.	1954	1.85	25.84	H	32.	1958	2.74	76.57	L
12.	1942	1.86	28.26	H	33.	1940	2.77	78.98	L
13.	1976	1.96	30.68	H	34.	1944	2.83	81.40	L
14.	1971	1.98	33.09	H	35.	1945	2.94	83.82	L
15.	1974	1.99	35.51	H	36.	1957	3.00	86.23	L
16.	1962	2.01	37.92	H	37.	1964	3.00	88.65	L
17.	1943	2.03	40.34	A	38.	1950	3.26	91.06	EL
18.	1953	2.06	42.75	A	39.	1977	3.66	93.48	EL
19.	1959	2.07	45.17	A	40.	1948	3.72	95.89	EL
20.	1975	2.08	47.58	A	41.	1949	4.30	98.31	EL
21.	1939	2.14	50.00	A					

Table 5. FREQUENCY OF WEEKLY GROUND-WATER LEVELS IN OBSERVATION WELL Pr 6

Interval (feet below land surface)	Frequency (n)		Cumulative Frequency (duration)	
	Absolute (n)	Relative ( $\frac{n}{N}$ )	Absolute ( $\leq n$ )	Relative ( $\frac{\leq n}{N}$ )
.49 - 0.00	10	.47	10	.47
0.01 - 0.50	47	2.20	57	2.67
0.51 - 1.00	196	9.16	253	11.83
1.01 - 1.50	296	13.83	549	25.66
1.51 - 2.00	361	16.87	910	42.53
2.01 - 2.50	344	16.07	1,254	58.60
2.51 - 3.00	340	15.89	1,594	74.49
3.01 - 3.50	263	12.29	1,857	86.78
3.51 - 4.00	157	7.33	2,014	94.11
4.01 - 4.50	74	3.46	2,088	97.57
4.51 - 5.00	22	1.03	2,110	98.60
5.01 - 5.50	25	1.17	2,135	99.77
5.51 - 6.00	5	.23	2,140	100.00
TOTALS	2,140	100.00%		

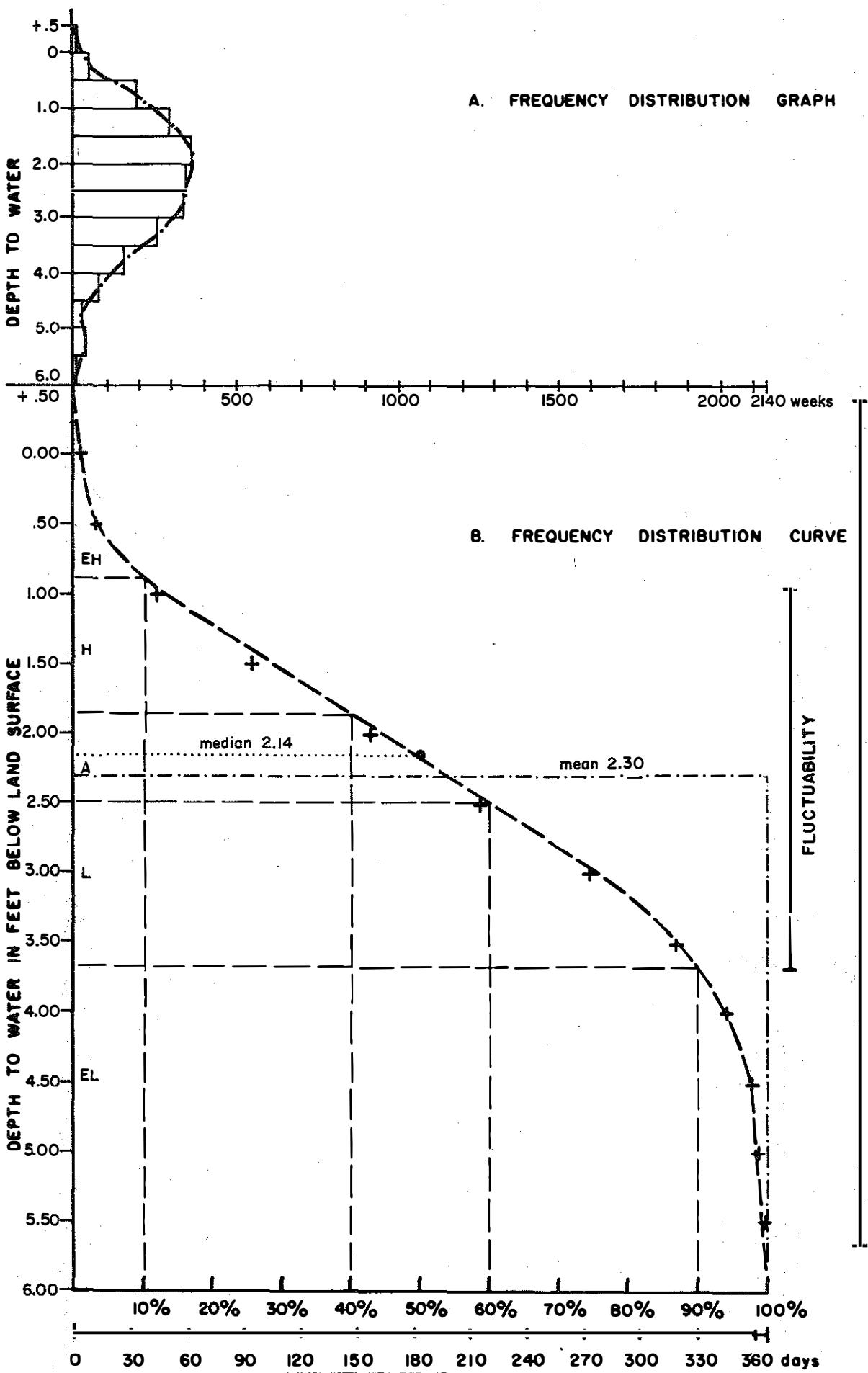


Figure 4. FREQUENCY DISTRIBUTION OF WEEKLY WATER LEVELS IN OBSERVATION WELL NO. Pr6

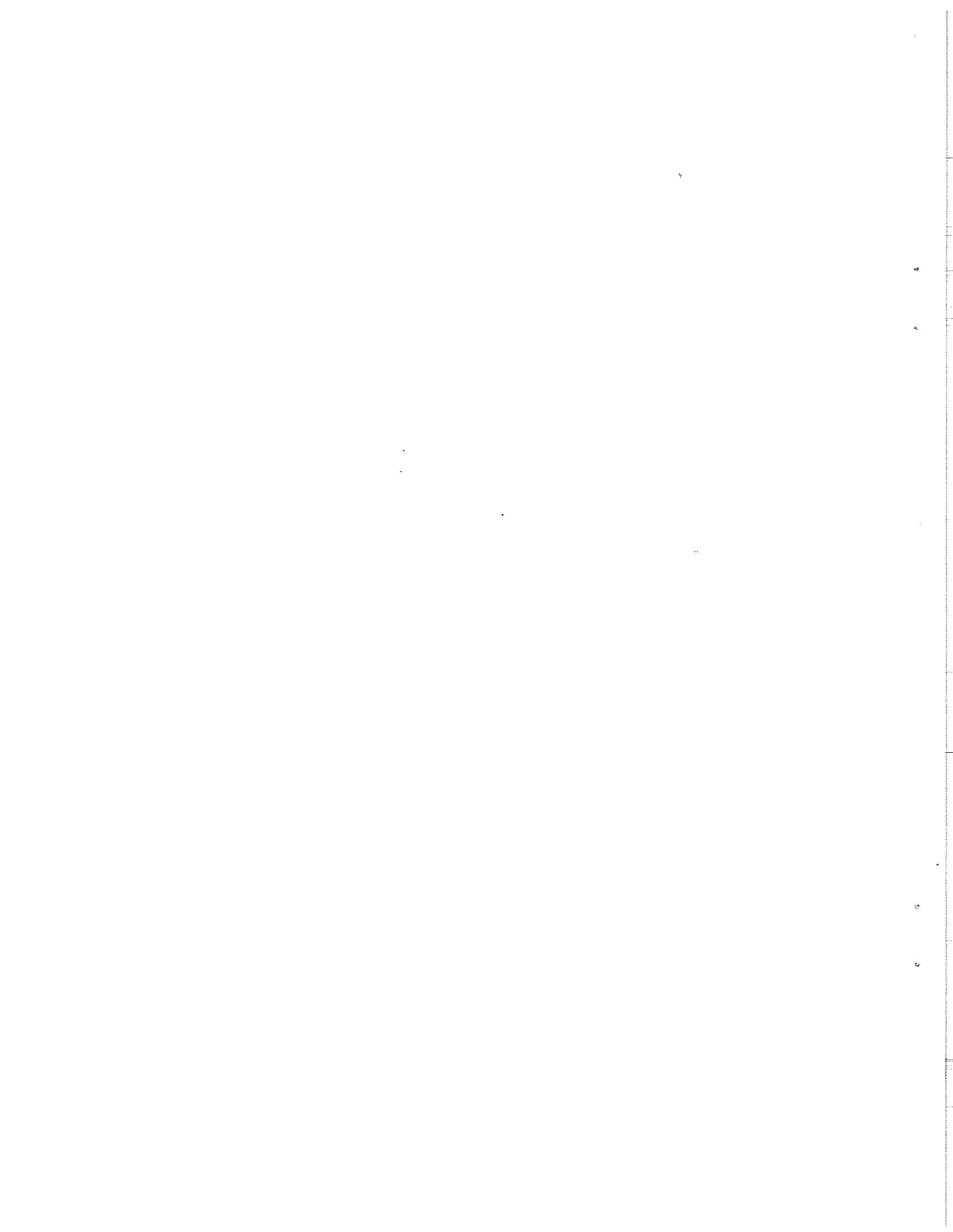


Table 6. EXCEEDANCE OF WEEKLY GROUND-WATER LEVELS IN OBSERVATION WELL Pr 6

A. For "n" days per year

Ground-water levels exceeded on the average for a period of												
30	60	90	120	150	180	210	240	270	300	330	360	
days per year:												
ft.	.81	1.13	1.47	1.63	1.88	2.12	2.40	2.67	2.97	3.23	3.70	6.92
below 1sd												

B. In percent

Ground-water levels exceeded on the average for a period of										
10	20	30	40	50	60	70	80	90		
percent of days per year:										
ft.	.88	1.22	1.55	1.76	2.14	2.49	2.82	3.17	3.68	
below 1sd										

Table 7. TOTAL PRECIPITATION - PARK FALLS  
(in inches)

Year	Monthly Total												Annual Total (in.)	Precip. Dept. from normal
	J	F	M	A	M	J	J	A	S	O	N	D		
1937	1.79	2.26	.05	1.53	2.95	1.74	4.46	5.29	6.03	2.32	1.93	.71	31.06	-1.60
1938	1.31	.34	2.39	4.72	5.70	5.39	4.74	4.14	3.26	2.34	3.50	1.19	39.02	6.36
1939	1.63	2.10	1.11	2.23	5.04	12.59	2.81	4.93	2.83	1.84	.23	1.96	39.30	6.64
1940	.67	1.71	.92	2.63	4.34	3.74	4.31	7.50	1.79	1.48	2.42	1.20	32.71	.05
1941	.62	.76	.85	3.02	3.55	3.63	6.75	9.48	4.68	5.49	1.07	.91	40.81	8.15
1942	.41	.53	2.83	1.33	5.64	3.68	4.68	1.63	6.30	2.56	1.43	1.66	32.68	.02
1943	1.34	.64	1.95	1.34	3.92	10.12	2.69	4.79	2.93	2.42	2.49	.17	34.80	2.14
1944	1.07	.65	2.31	1.82	4.33	9.11	1.91	2.20	3.89	.50	1.16	.77	29.72	-2.94
1945	.65	2.13	1.67	4.44	5.15	5.02	4.31	3.73	2.80	.88	2.23	1.27	34.28	1.62
1946	1.45	.75	.84	.39	3.11	13.01	4.30	2.01	4.49	5.38	2.40	1.32	39.45	6.79
1947	.46	.51	.57	3.84	3.02	3.40	2.29	4.60	2.74	.43	2.41	.59	24.86	-7.80
1948	.69	2.25	1.07	2.34	.61	3.05	3.77	3.03	.63	.50	2.57	.83	21.34	-11.32
1949	1.92	.54	1.30	1.35	3.87	7.04	6.86	2.56	2.46	1.87	2.82	.60	33.19	.53
1950	3.13	.40	2.48	3.09	2.68	5.24	4.42	2.91	.84	1.82	2.66	2.41	32.08	-1.58
1951	.58	2.73	2.58	3.75	4.61	7.00	6.15	5.51	4.58	3.58	1.59	.76	43.42	10.76
1952	1.81	.20	2.30	2.58	2.90	4.55	5.76	5.32	1.08	.18	1.33	.75	28.76	-3.90
1953	1.05	1.38	2.25	2.93	6.25	7.43	2.97	7.82	.80	.12	2.26	2.32	37.58	4.92
1954	.79	.69	2.65	7.92	4.55	5.21	2.74	3.19	4.90	4.33	1.42	.60	38.99	6.33
1955	.70	.56	1.64	2.15	3.46	3.09	7.69	5.76	2.10	3.01	2.33	1.47	33.96	1.30
1956	.42	.29	.94	1.37	2.04	4.07	3.16	5.25	1.67	1.20	2.39	.51	23.31	-9.35
1957	.30	1.34	1.06	1.56	3.41	3.69	2.42	5.62	2.61	1.40	2.69	.67	26.77	-5.89
1958	.72	.21	.63	2.21	3.11	4.62	7.10	4.63	4.80	2.83	1.98	.71	33.55	.89
1959	.46	.64	.62	1.04	4.24	3.80	3.53	7.21	10.59	2.52	1.20	2.29	38.14	5.48
1960	.99	.57	.45	5.49	3.60	5.00	3.84	6.28	4.56	2.41	2.28	.98	36.45	3.79

Table 7. TOTAL PRECIPITATION - PARK FALLS (continued)  
 (in inches)

Table 8. MONTHLY MEAN DISCHARGE (in cfs)

Station: 5360500 Flambeau River nr. Bruce - period of October 1951 to September 1978  
(Record available from September 1951)

Water Year	Monthly Mean Discharge											Annual Mean	Record Published	
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.		
1952	3143	3134	1973	1509	1501	1415	5559	2521	2381	3632	2900	1529	2600	
1953	1017	944	853	974	982	2636	3090	3309	3195	2873	2524	1371	1987	
1954	925	932	1225	1021	1286	1189	5077	6082	3928	1849	1246	1943	2225	
1955	3107	2044	1508	1474	1429	1463	4066	1503	1992	1112	1796	978	1872	
1956	1146	1316	1083	1063	1076	1053	3184	1395	1913	1491	1845	988	1460	
1957	661	819	834	889	895	1335	2550	1606	1444	1197	701	1121	1170	
1958	773	1061	859	875	949	1061	2140	1189	909	3203	1141	1909	1341	
1959	1429	1624	1066	950	892	971	1295	2159	1351	1640	2116	4612	1676	
1960	3108	1844	1403	1546	1343	1449	4597	4117	2133	1587	2198	2955	2356	
1961	1331	2146	1710	1249	1230	1752	3022	3810	1533	1233	1198	1106	1779	
1962	1104	1482	1055	1043	1094	1597	2679	3444	1556	1116	1097	1887	1597	
1963	1618	1198	1169	962	1030	1545	2001	2202	1666	815	929	731	1324	
1964	656	672	572	636	771	1035	2443	2472	919	780	728	1912	1131	
1965	692	568	731	804	870	1326	5326	5275	1921	1310	1086	1237	1764	
1966	1324	1230	2041	1375	1377	3552	2826	1977	1553	1075	1754	1151	1774	
1967	1658	1212	1202	1231	1334	1910	6782	2456	4223	1737	1213	1016	2159	
1968	911	1022	1009	959	956	1365	2168	3755	6066	4339	1425	2527	2207	
1969	2749	1605	1492	1707	2411	2030	4104	1752	1670	1943	1444	1131	1999	
1970	1111	1039	1045	1126	1062	1053	2222	1966	2822	1255	869	815	1364	
1971	1339	1701	1248	921	965	1397	5092	2759	2022	1433	1120	760	1729	
1972	1724	2013	1485	1255	1162	1513	4420	2208	1636	1903	3765	2821	2158	
1973	3354	3597	1629	2006	1725	5490	3611	5644	3276	1373	1343	1653	2900	
1974	1876	1667	1410	1135	1031	1296	3924	2365	2818	1249	1638	1530	1828	
1975	1198	1971	1314	1474	1332	1655	4531	2813	2119	1329	1148	1222	1840	
1976	890	2145	1668	1339	1324	2334	5628	1723	1303	1008	886	491	1723	
1977	363	430	382	451	474	1019	1753	929	883	1261	1234	3555	1059	
1978	2854	1953	1694	1355	1175	1171	2910	1473	2802	2614	3508	2815	2197	
Mean 1952-1977	1508	1516	1229	1153	1173	1709	3619	2747	2201	1684	1513	1724	1809	Water Resources Data for Wisconsin

O B S E R V A T I O N      W E L L      S w      7

## WELL DESCRIPTION SHEET

WELL NO.: Sw 7		OWNER: Wisconsin DNR
LOCATION		
Township/Range General Detail	SE-NE-SE $\frac{1}{4}$ S28, T41N, R9W 1 mi S of Hayward, Sawyer County; at Hayward Ranger Station, on the corner of STH 27 and Town Road	
Altitude Drainage Basin	1,190 ft above msl ST. CROIX R.: Namekagon R. - 800 ft. from the L bank	
NEAREST OBSERVATION POINTS		
Precipitation Stations	Hayward (since 1937) - at the station Spooner (since 1894) - 23 mi SW Gordon (since 1953) - 22 mi NW Minong R.S. (since 1939) - 16.5 mr. WNW Minong 5 WSW (since 1965) - 20 mi W	
Stream-Gaging Stations	05333500 St. Croix R. nr. Danbury (since 1914) - 37 mi W 05332000 Namekagon R. at Trego (1927-1970) - 18 mi SW	
Observation Wells	Sw 59 (since 1969) - 10 mi SSE Wb 1 (1948 - 1971) - 23 mi SW Wb 42 (since 1968) - 9 mi W (different aquifer)	
Other		
WELL DATA		
Depth: 25 ft Aquifer(s) Tapped Well Log	Casing: depth - 22 ft; diameter 8 in. Pleistocene sand and gravel Available: yes - <del>XXX</del>	
MEASUREMENTS		
Measuring Point	Pointer on float-type gage	
Equipment	4.58 ft above lsd Kinnison float gage	
Frequency	Weekly (daily from 04/09/37 to 06/02/45)	
First Measured Period of Record Interrupted	Date: April 9, 1937 ; 16.52 ft below lsd April 1937 - present Occasionally; not measured in March-June 1947, June 1959, and June 1976.	
Notes	Record very good, only 1.6% of measurements missing	

5/31/79

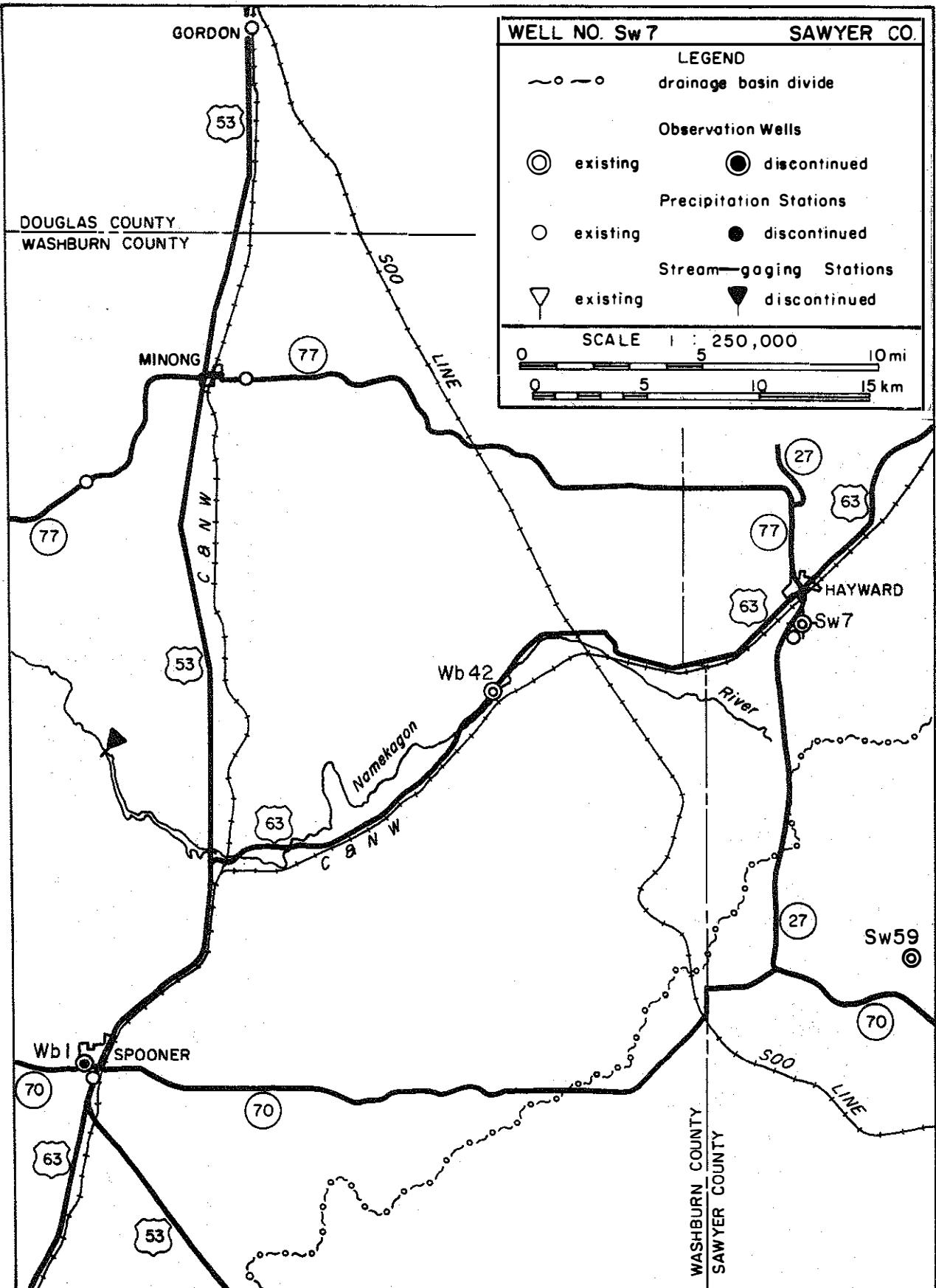


Figure 1 - LOCATION MAP OF WELL NO. Sw7

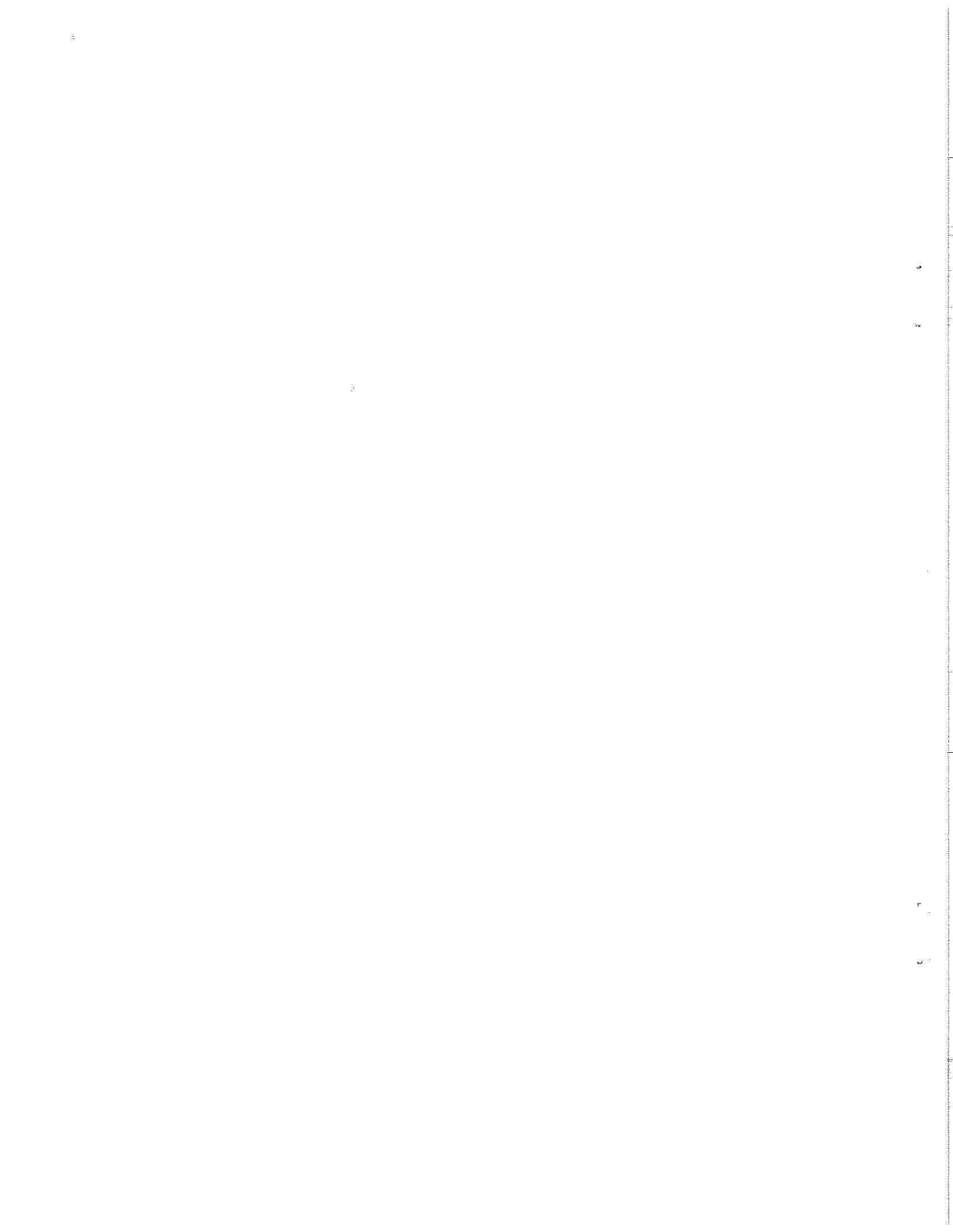


Table 1. SUMMARY OF GROUND-WATER LEVELS IN OBSERVATION WELL Sw 7

Characteristics	Feet below lsd	Date
Mean Level	16.46	(calculated)
Highest Monthly Mean	16.05	May
Lowest Monthly Mean	16.78	February
Highest Average Annual Level	16.12	1945
Lowest Average Annual Level	16.86	1964
Highest Average Monthly Level	14.11	September 1941
Lowest Average Monthly Level	17.29	October 1968
Highest Recorded Level	13.07	09/03/41
Lowest Recorded Level	17.31	10/23/48
$H_{10\%}$ (level exceeded by 10% days/yr)	15.90	(calculated)
$H_{90\%}$ (level exceeded by 90% days/yr)	16.92	(calculated)
Average Annual Amplitude	1.35 ft.	
Maximum Amplitude (between record levels)	4.24 ft.	
Fluctuability ( $H_{10\%}$ - $H_{90\%}$ )	1.02 ft.	
Years Above Average	1939, 1941-47, 1951-52, 1954-55, 1958, 1966-69, 1972-73, 1978	
Years Below Average	1940, 1948-50, 1957-59, 1961-65, 1970, 1975-77	
Average Year(s) (+ 0.1%)	1938, 1953, 1956, 1960, 1971, 1974	
Longest Duration of:		
Extremely Low Levels	see Table 3A	
Extremely High Levels	see Table 3B	

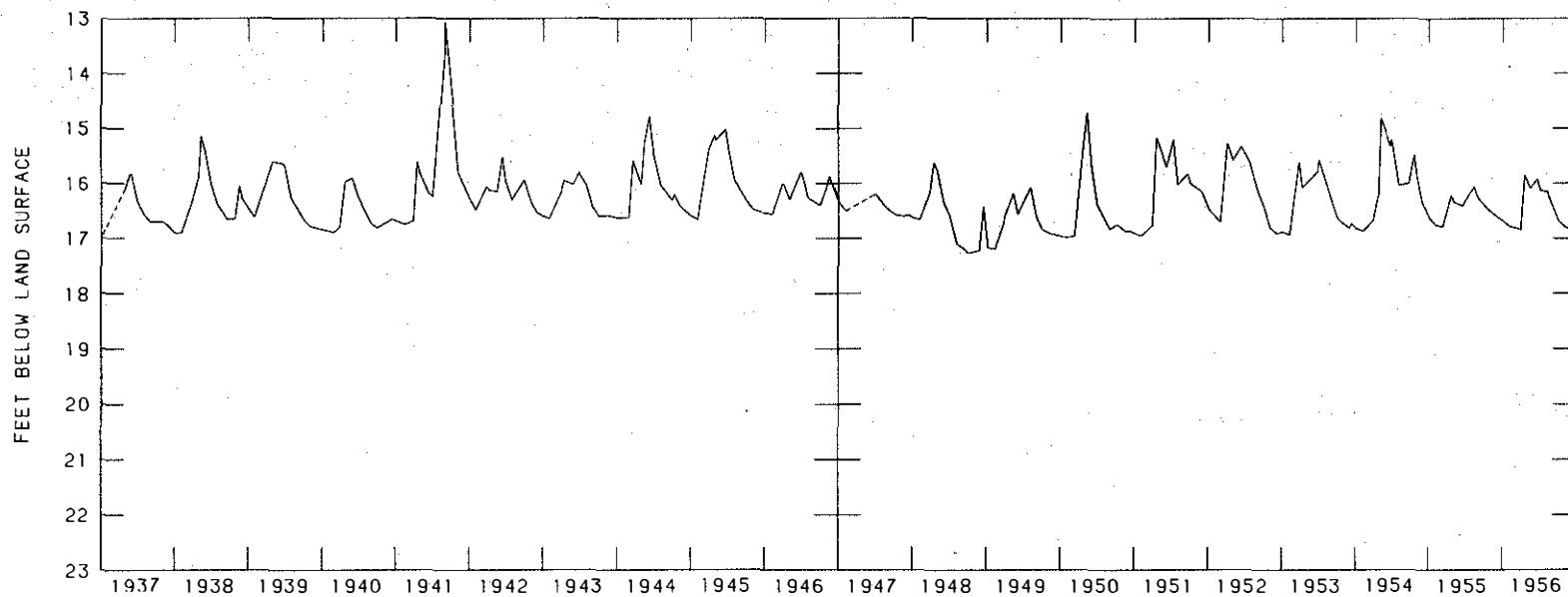


Table 2. AVERAGE AND EXTREME GROUND-WATER LEVELS IN OBSERVATION WELL Sw 7  
(cont'd)

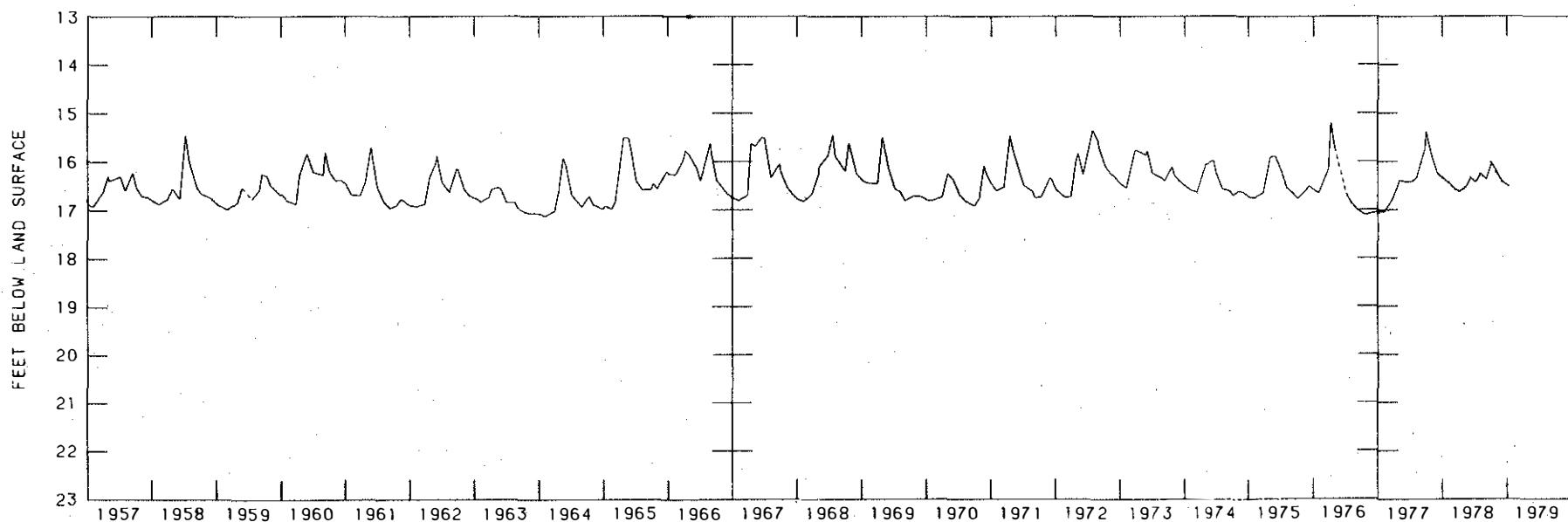
Water Year	Average Monthly Water Levels (in feet below l.s.d.)												Avg. Annual Level	Extreme Levels (in ft below l.s.d.)				
	O	N	D	J	F	M	A	M	J	J	A	S		Lowest Date	ft.	Highest Date	ft.	Diff. ft.
1966	16.49	16.64	16.41	16.36	16.45	16.12	15.81	16.06	16.19	16.44	16.05	16.08	16.20	11/22/65	16.67	08/29/66	15.62	1.05
1967	16.45	16.59	16.70	16.78	16.82	16.82	15.73	16.04	16.12	15.87	16.42	16.29	16.39	03/20/67	16.88	06/19/67	15.50	1.38
1968	16.36	16.58	16.70	16.78	16.84	16.74	16.52	16.12	16.10	15.60	16.21	16.35	16.41	03/04/68	16.88	07/22/68	15.45	1.43
1969	15.84	16.00	16.33	16.41	16.48	16.54	16.17	15.82	16.35	16.58	16.69	16.83	16.34	09/15/69	16.87	04/28/69	15.50	1.37
1970	16.74	16.72	16.76	16.81	16.84	16.82	16.49	16.29	16.48	16.72	16.89	16.96	16.71	09/14/70	16.98	05/04/70	16.25	.73
1971	16.82	16.29	16.36	16.54	16.62	16.61	15.83	15.97	16.30	16.58	16.70	16.81	16.45	10/05/70	16.96	04/19/71	15.47	1.49
1972	16.74	16.48	16.42	16.67	16.76	16.77	16.42	15.99	16.38	16.14	15.69	15.93	16.37	03/20/72	16.79	07/31/72	15.36	1.43
1973	16.19	16.25	16.38	16.48	16.59	16.14	15.93	16.01	15.94	16.44	16.42	16.44	16.27	02/26/73	16.62	04/02/73	15.77	.85
1974	16.29	16.37	16.48	16.55	16.63	16.65	16.38	16.14	16.13	16.43	16.60	16.65	16.44	04/01/74	16.76	06/17/74	15.98	.78
1975	16.75	16.63	16.67	16.75	16.78	16.74	16.34	15.96	16.09	16.33	16.62	16.69	16.53	03/17/75	16.81	06/02/75	15.89	.92
1976	16.80	16.73	16.54	16.62	16.66	16.51	15.38	16.03	16.49	16.74	16.90	17.04	16.54	09/27/76	17.07	04/12/76	15.20	1.87
1977	17.10	17.11	17.07	17.04	17.04	16.87	16.65	16.50	16.44	16.49	16.38	15.95	16.72	11/22/76	17.12	09/26/77	15.75	1.37
1978	15.55	16.07	16.30	16.39	16.54	16.63	16.26	16.20	16.41	16.23	16.19	15.91	16.22	03/13/78	16.68	10/03/77	15.39	1.29
Mean 1938-1978	16.52	16.58	16.63	16.72	16.78	16.71	16.19	16.05	16.16	16.27	16.47	16.45	16.46	10/23/48	17.31	09/03/41	13.07	4.24
	NOTE: * Calculated from daily measurements. Underlined values are estimated.																	

Figure 2. HYDROGRAPH OF MONTHLY HIGH WATER LEVEL IN OBSERVATION WELL Sw7

(Computer print-out courtesy U.S. Geological Survey)



-124-



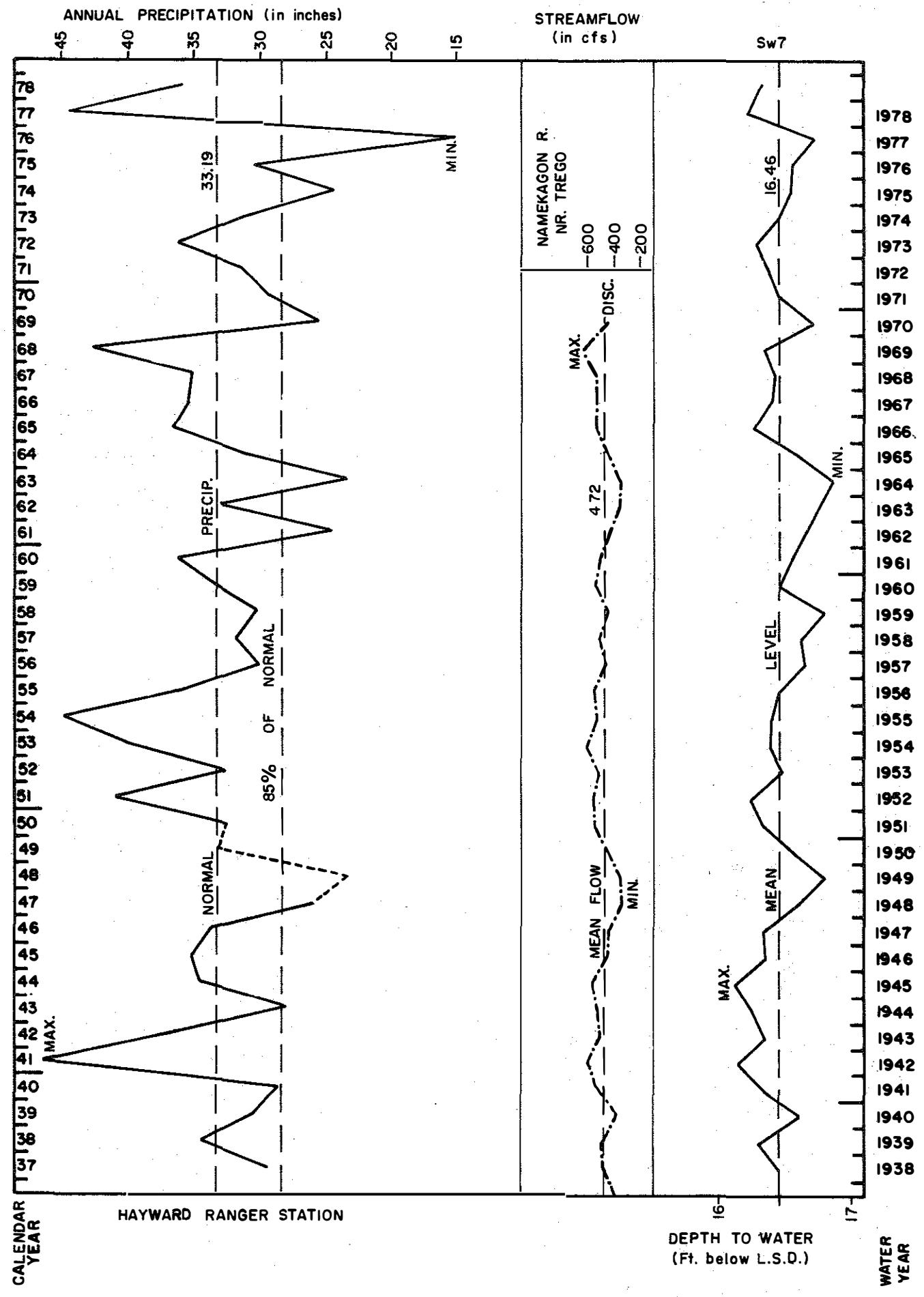


Figure 3. RELATION OF ANNUAL GROUND-WATER LEVELS IN OBSERVATION WELL NO. SW7 TO PRECIPITATION AT HAYWARD

Table 3. LONGEST DURATION OF EXTREME GROUND-WATER LEVELS IN OBSERVATION WELL Sw 7  
 (only periods lasting 50 or more days listed)

A. Extremely Low Levels ( $< H_{90\%}$ ) Lasting		Total No. of Days
From	To	
June 28, 1963	April 13, 1964	291
July 20, 1964	April 5, 1965	260
July 20, 1948	March 24, 1949	248
July 29, 1976	March 17, 1977	232
September 27, 1949	March 27, 1950	182
October 17, 1950	March 24, 1951	159
December 11, 1958	May 6, 1959	146
November 3, 1956	March 23, 1957	141
November 4, 1952	March 22, 1953	138
November 27, 1961	March 27, 1962	121
December 16, 1939	March 27, 1940	115
December 11, 1937	March 13, 1938	92
January 2, 1954	March 21, 1954	79
January 7, 1963	March 22, 1963	75
January 14, 1958	March 26, 1958	72
August 5, 1970	October 11, 1970	68
August 4, 1961	November 2, 1961	60
February 2, 1960	March 28, 1960	56

B. Extremely High Levels ( $> H_{10\%}$ ) Lasting		Total No. of Days
From	To	
April 24, 1945	August 6, 1945	105
April 14, 1951	July 28, 1951	105
April 4, 1939	July 14, 1939	102
May 4, 1944	July 20, 1944	98
April 27, 1954	July 29, 1954	94
August 30, 1941	November 28, 1941	88
April 28, 1938	June 28, 1938	62
September 14, 1977	November 9, 1977	57
April 16, 1950	June 10, 1950	56
July 23, 1972	September 15, 1972	55

0.5% allowed for inaccuracies of measurement.

Table 4. PROBABILITY OF EXCEEDANCE OF GROUND-WATER LEVELS IN OBSERVATION WELL Sw 7  
 (median : 16.45 ft)

No.	Water Year	Water Level (in ft.)	p (%)	Class.	No.	Water Year	Water Level (in ft.)	p (%)	Class.
1.	1945	16.12	1.69	EH	22.	1960	16.45	52.41	A
2.	1942	16.14	4.11	EH	23.	1971	16.45	54.83	A
3.	1978	16.22	6.52	EH	24.	1938	16.46	57.24	A
4.	1952	16.22	8.94	EH	25.	1953	16.47	59.66	A
5.	1944	16.25	11.35	H	26.	1975	16.53	62.08	L
6.	1966	16.26	13.77	H	27.	1976	16.54	64.49	L
7.	1973	16.27	16.18	H	28.	1961	16.54	66.91	L
8.	1939	16.28	18.60	H	29.	1950	16.57	69.32	L
9.	1947	16.31	21.01	H	30.	1948	16.59	71.74	L
10.	1941	16.33	23.43	H	31.	1965	16.59	74.15	L
11.	1951	16.33	25.84	H	32.	1940	16.60	76.57	L
12.	1943	16.33	28.26	H	33.	1958	16.62	78.48	L
13.	1969	16.34	30.68	H	34.	1957	16.66	81.40	L
14.	1946	16.36	33.09	H	35.	1962	16.66	83.82	L
15.	1972	16.37	35.51	H	36.	1970	16.71	86.23	L
16.	1954	16.38	37.92	H	37.	1977	16.72	88.65	L
17.	1967	16.39	40.34	H	38.	1963	16.75	91.06	EL
18.	1955	16.40	42.75	A	39.	1949	16.78	93.48	EL
19.	1968	16.41	45.17	A	40.	1959	16.78	95.89	EL
20.	1974	16.44	47.58	A	41.	1964	16.86	98.31	EL
21.	1956	16.45	50.00	A					

Table 5. FREQUENCY OF WEEKLY GROUND-WATER LEVELS IN OBSERVATION WELL Sw 7

Interval (feet below land surface)	Frequency (n)		Cumulative Frequency (duration)	
	Absolute (n)	Relative ( $\frac{n}{N}$ )	Absolute ( $\Sigma n$ )	Relative ( $\frac{\Sigma n}{N}$ )
14.01 - 14.25	1	0.05	1	0.05
14.26 - 14.50	2	0.09	3	0.14
14.51 - 14.75	2	0.09	5	0.23
14.76 - 15.00	4	0.19	9	0.42
15.01 - 15.25	15	0.70	24	1.12
15.26 - 15.50	35	1.64	59	2.76
15.51 - 15.75	80	3.74	139	6.50
15.76 - 16.00	146	6.83	285	13.33
16.01 - 16.25	293	13.70	578	27.03
16.26 - 16.50	423	19.79	1001	46.82
16.51 - 16.75	586	27.41	1587	74.23
16.76 - 17.00	454	21.23	2041	95.46
17.01 - 17.25	90	4.21	2131	99.67
17.26 - 17.50	7	0.33	2138	100.00
TOTALS	2138	100.00%		

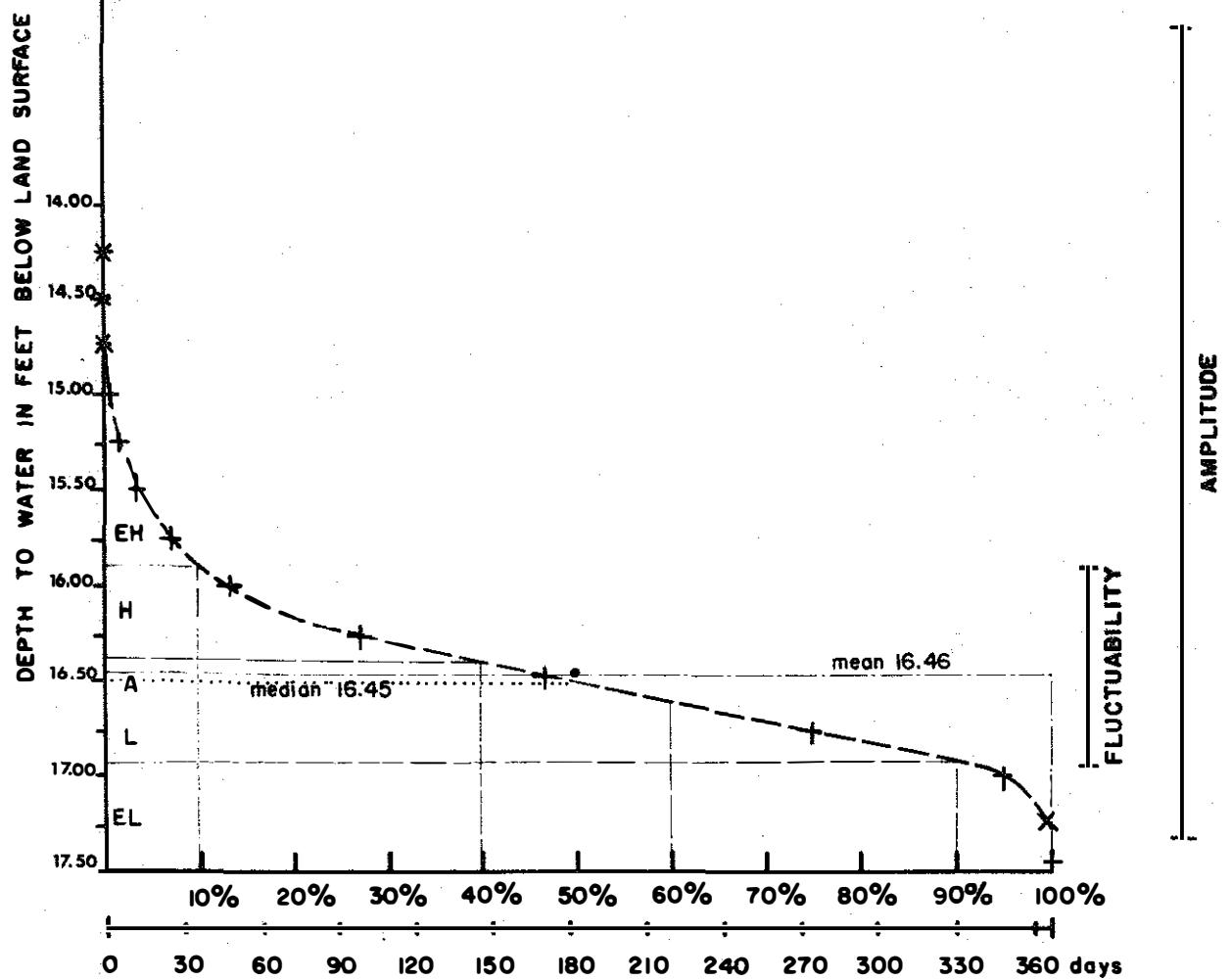
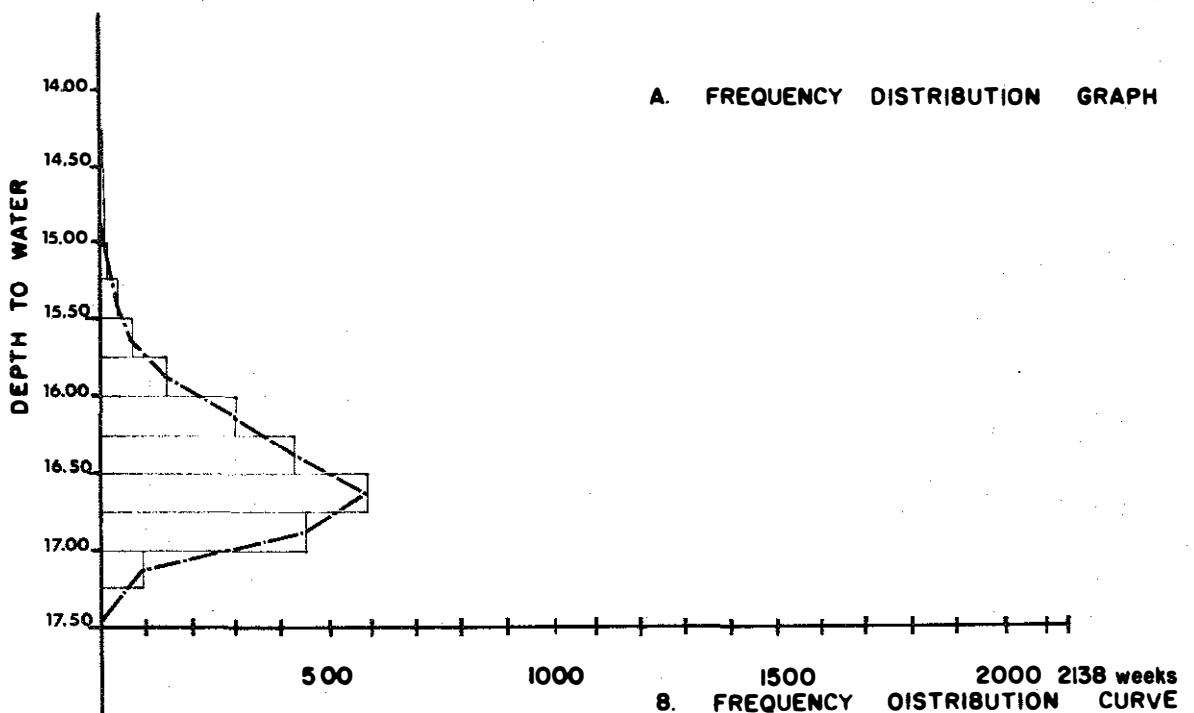


Figure 4. FREQUENCY DISTRIBUTION OF WEEKLY WATER LEVELS IN OBSERVATION WELL NO. Sw7

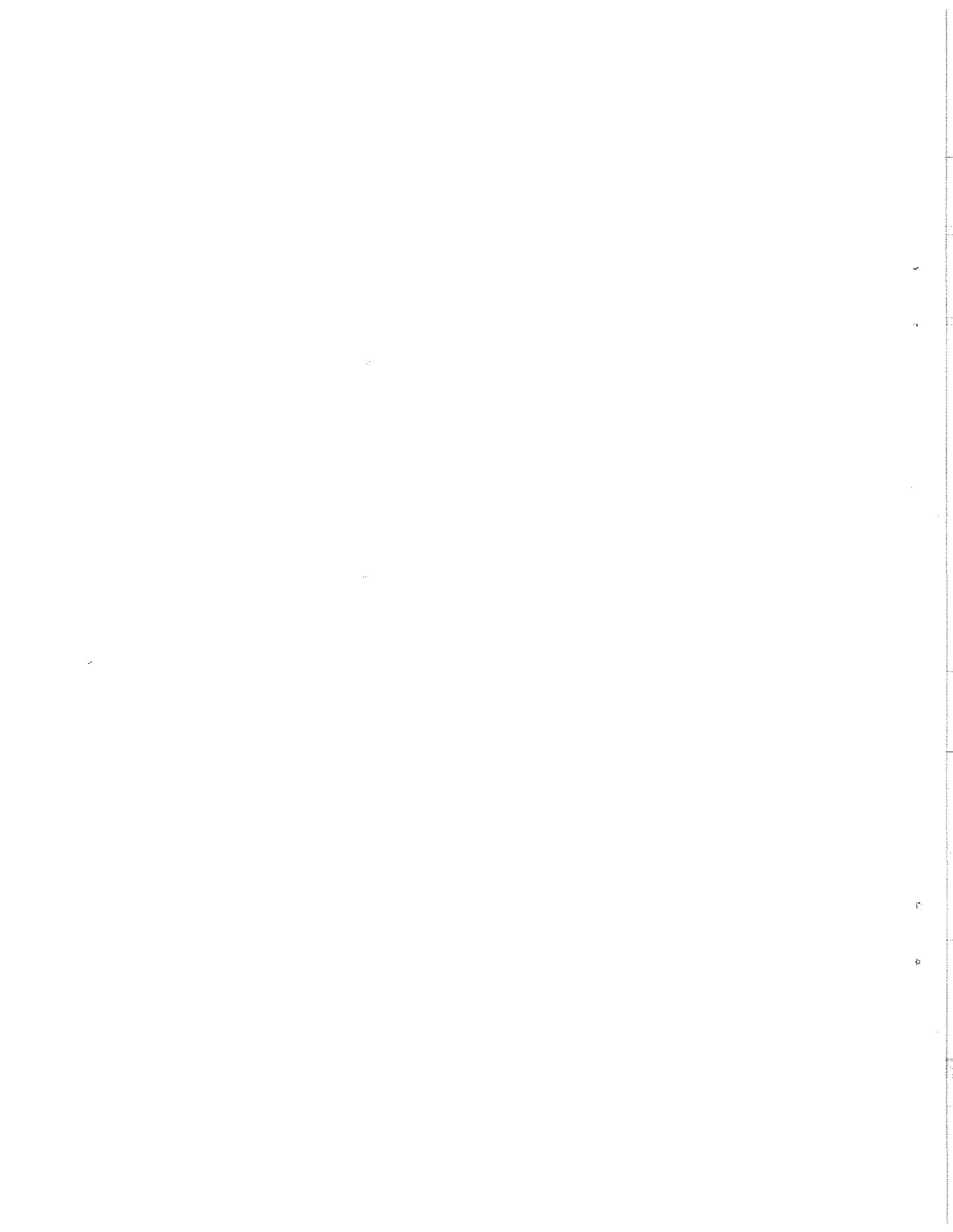


Table 6. EXCEEDANCE OF WEEKLY GROUND-WATER LEVELS IN OBSERVATION WELL Sw 7

A. For "n" days per year

Ground-water levels exceeded on the average for a period of												
	30	60	90	120	150	180	210	240	270	300	330	360
days per year:												
ft.	15.84	16.07	16.22	16.34	16.42	16.49	16.58	16.67	16.74	16.81	16.93	17.15
below 1sd												

B. In percent

Ground-water levels exceeded on the average for a period of									
	10	20	30	40	50	60	70	80	90
percent of days per year:									
ft.	15.90	16.15	16.30	16.42	16.50	16.60	16.71	16.80	16.92
below 1sd									

Table 7. TOTAL PRECIPITATION - HAYWARD RANGER STATION  
(in inches)

Year	Monthly Total												Annual Precip.	
	J	F	M	A	M	J	J	A	S	O	N	D	Total (in.)	Dept. from normal
1937	1.29	1.10	.26	2.57	5.73	2.90	4.91	3.72	3.39	2.13	1.10	.28	29.38	- 3.80
1938	1.16	.61	1.83	4.50	6.71	4.52	3.68	2.74	2.89	2.96	2.28	.27	34.15	.97
1939	1.79	2.19	1.12	2.43	5.91	6.22	1.67	5.38	.86	1.27	.15	1.33	30.32	- 2.86
1940	.21	1.61	1.45	3.21	4.32	3.89	2.21	4.45	1.16	1.30	4.05	1.27	29.13	- 4.05
1941	1.19	1.65	1.62	1.82	4.54	3.50	3.55	17.41	5.36	4.41	1.36	.46	46.87	13.69
1942	.19	.27	2.46	1.46	8.99	5.56	4.89	4.47	5.36	1.41	.70	.94	36.70	3.52
1943	.96	.50	1.87	1.90	3.65	5.95	2.69	4.67	2.73	1.14	1.75	.03	27.84	- 5.34
1944	.87	1.10	1.97	2.47	6.36	8.16	1.78	4.86	4.55	.78	.96	.59	34.45	1.27
1945	.68	2.22	3.02	4.56	1.79	7.05	5.26	4.34	2.13	.73	1.61	1.64	35.03	1.85
1946	1.27	.59	.61	1.22	1.76	8.55	4.31	1.36	6.21	3.95	2.52	1.30	33.65	.47
1947	.40	.34	.34	4.98	3.29	2.74	1.04	5.71	2.12	1.07	3.26	.58	25.87	- 7.31
1948	.53	1.84	2.25	2.08	.74	2.96	1.90	1.65	2.09	.66	3.04	1.78	21.52	-11.66
1949	.94	.34	2.17	1.37	4.13	2.59	11.41	2.22	3.18	2.01	1.92	.77	33.05	- .13
1950	3.04	.68	2.36	4.07	4.06	3.43	4.82	1.82	2.28	3.44	1.98	2.05	34.03	.85
1951	.36	1.57	2.84	2.38	4.90	6.22	6.30	6.35	5.07	2.15	1.41	1.25	40.80	7.62
1952	1.81	.40	2.47	2.10	2.38	5.51	7.10	7.55	1.58	.28	.94	.43	32.55	- .63
1953	1.17	1.52	1.84	2.64	5.32	6.33	3.23	7.00	.99	.25	2.56	2.12	34.97	1.79
1954	.88	.59	1.63	5.91	5.24	7.14	5.06	5.96	5.19	5.48	1.25	.38	44.71	11.53
1955	.56	.75	1.43	1.77	1.92	4.23	10.51	5.87	2.47	2.95	2.07	1.18	35.71	2.53
1956	.43	.23	1.61	1.19	4.14	7.59	3.53	5.36	1.10	2.22	1.93	.57	29.90	- 3.28
1957	.24	1.43	.96	1.52	2.71	6.21	3.52	5.65	5.41	1.33	2.25	.66	31.89	- 1.29
1958	.67	.14	.68	1.89	1.81	3.79	9.76	4.76	2.89	1.24	1.81	.71	30.15	- 3.03
1959	.49	.51	.42	.87	5.44	3.13	3.30	7.75	5.74	2.70	.79	2.24	33.38	.20
1960	1.22	.52	1.05	2.79	5.16	4.57	3.21	8.28	3.52	1.83	3.29	.58	36.02	2.84

Table 7 continued.

TOTAL PRECIPITATION - HAYWARD RANGER STATION  
(in inches)

Year	Monthly Total												Annual	Precip.
	J	F	M	A	M	J	J	A	S	O	N	D	Total (in.)	Dept. from normal
1961	.11	1.18	2.24	2.18	4.16	1.02	2.16	1.28	4.09	2.54	1.88	1.44	24.28	- 8.90
1962	.91	1.76	1.22	1.39	6.01	2.15	4.15	4.87	6.78	2.13	.66	.96	33.01	- .17
1963	.44	.60	1.11	1.82	3.03	2.32	3.57	4.18	3.38	1.33	.68	.90	23.36	- 9.82
1964	.64	.51	1.40	3.89	4.59	2.48	3.26	4.29	6.01	.81	1.79	1.50	31.17	- 2.01
1965	.60	1.85	2.73	2.01	6.96	2.29	4.44	2.93	5.32	1.30	3.39	2.70	36.52	3.34
1966	.78	.80	2.75	2.33	1.24	4.92	7.67	7.75	2.24	2.66	.83	1.41	35.38	2.20
1967	3.22	.94	1.15	1.98	2.11	9.52	2.79	5.31	4.74	2.30	.46	.74	35.26	2.08
1968	.82	.24	1.92	3.54	3.94	8.37	5.16	2.37	5.98	5.83	.96	3.46	42.59	9.41
1969	3.20	.17	.19	2.34	1.26	2.65	5.15	1.62	2.54	3.08	1.17	2.16	25.53	- 7.65
1970	.68	.49	1.08	1.48	3.85	2.27	4.63	1.35	4.22	5.25	2.87	1.05	29.22	- 3.96
1971	1.97	2.30	1.14	1.52	3.61	2.48	3.12	4.02	2.76	4.20	2.72	1.26	31.10	- 2.08
1972	1.96	.73	1.24	.97	3.25	4.14	8.33	6.44	2.66	3.06	1.44	1.92	36.14	2.96
1973	1.40	.59	1.76	1.08	5.34	3.43	2.63	5.63	3.60	3.53	1.07	1.18	31.24	- 1.94
1974	.43	.72	.80	2.21	2.94	3.86	2.71	4.09	2.80	1.60	2.11	.38	24.65	- 8.53
1975	1.84	.83	1.93	1.35	4.52	4.85	1.52	4.11	2.93	1.02	4.20	1.20	30.30	- 2.88
1976	1.88	.52	2.31	1.66	.67	3.80	2.18	1.07	.86	.48	.17	.32	15.92	-17.26
1977	.74	.52	3.03	3.63	5.01	4.90	8.13	5.63	7.01	2.85	1.83	1.27	44.55	11.37
1978	.72	.35	.67	3.37	2.56	3.18	7.28	7.59	4.43	2.28	1.70	1.68	35.81	2.63
Normal 1941- 1970													33.18	
Mean 1937- 1978													32.57	
	NOTE: Opened in 1932 as Fire Weather Station at the Hayward Ranger Station, where the earlier records (prior 1948) are available.													

**Table 8. MONTHLY MEAN DISCHARGE (in cfs)**  
**Station: 5332500 Namekagon River nr. Trego-period of October 1937 to September 1970 (discontinued)**  
**(Record available from Oct. 1927)**

Water Year	Monthly Mean Discharge												Annual Mean	Record Published
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.		
1937	303	328	304	309	294	330	612	658	513	385	323	368	394	WSP NO. 1308
1938	352	362	293	284	301	469	682	905	597	456	342	384	453	
1939	366	506	377	381	345	481	378	595	639	467	439	362	475	
1940	332	330	332	276	298	342	577	612	490	334	325	310	380	
1941	291	387	345	335	322	338	779	483	436	357	420	1834	525	
1942	873	721	547	428	410	504	666	699	732	539	455	626	601	
1943	512	460	386	375	375	411	778	607	887	504	515	418	519	
1944	403	462	366	349	364	386	655	986	1093	524	448	435	539	
1945	480	430	373	343	343	778	936	568	993	650	508	511	576	
1946	433	432	384	405	378	593	543	400	622	452	348	406	450	
1947	468	518	425	370	328	365	716	635	496	341	339	343	445	
1948	312	360	322	293	277	450	696	448	336	289	265	257	359	
1949	252	297	284	268	262	350	461	479	315	644	390	339	363	
1950	336	327	297	273	286	336	996	1156	463	426	334	302	461	
1951	374	336	333	306	304	366	921	718	824	799	523	750	546	1728
1952	592	596	470	420	406	423	1075	576	533	733	600	502	577	
1953	389	374	372	348	342	556	730	743	722	650	687	426	529	
1954	383	412	424	367	385	296	827	1146	912	744	567	624	600	
1955	710	546	461	396	383	438	765	462	503	553	660	479	530	
1956	506	528	445	420	383	414	846	644	728	608	639	448	551	
1957	417	448	415	364	359	460	663	481	598	576	398	576	480	
1958	444	474	416	389	373	441	588	429	422	1026	505	547	506	
1959	443	479	371	355	340	397	447	627	487	422	429	611	451	
1960	563	433	418	407	386	390	736	834	661	486	524	769	550	
1961	529	570	496	395	384	486	685	889	515	396	353	399	509	1914
1962	371	396	347	322	317	399	547	753	512	414	363	562	442	
1963	490	407	343	324	311	384	491	516	359	267	290	297	374	
1964	292	293	268	265	264	311	566	817	408	824	278	380	369	
1965	344	311	270	273	273	211	939	896	522	433	385	433	450	

Table 8. MONTHLY MEAN DISCHARGE (in cfs)  
 Station: 5332500 Namekagon River nr. Trego-period of October 1937 to September 1970 (discontinued)  
 (Record available from Oct. 1927)

Water Year	Monthly Mean Discharge												Annual Mean	Record Published
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.		
1966	468	375	524	388	386	681	791	572	592	434	590	464	523	2114
1967	497	412	374	374	364	434	998	564	910	557	464	501	537	
1968	469	413	375	344	323	456	618	679	789	862	550	636	543	
1969	893	606	538	531	512	506	1084	738	517	566	406	392	607	
1970	511	479	420	377	363	408	647	619	514	368	305	328	445	
Means 1927- 1970	440	430	377	349	342	432	702	645	572	485	415	471	472	
	Station: 5333500	St. Croix River nr. Danbury-period (Record available from March 1914)									October 1970	to Septem	ber 1978	
1968	1038	940	911	758	597	1167	1880	2014	2069	2560	1214	1572	1395	WSP
1969	2489	1530	1423	1423	1368	1372	3454	1715	1150	1203	869	927	1577	
1970	1185	1274	1145	989	921	1059	2175	1833	1190	835	729	766	1175	2114
1971	1300	1780	1115	1003	931	1133	2988	1735	1216	980	938	898	1334	
1972	1688	2028	1436	1070	1097	1545	2573	2031	1245	2254	1961	1367	1693	Water Resources
1973	1472	1557	1077	1129	1236	2930	1863	2133	1532	984	1474	1319	1561	
1974	2019	1480	1173	952	989	1077	2230	1843	2112	951	1283	1052	1431	Data for
1975	970	1438	1025	1012	1007	1139	2653	1784	1376	1387	762	862	1284	Wisconsin,
1976	847	1295	1413	1020	969	1579	3331	1102	834	744	634	588	1194	
1977	671	666	616	619	666	1203	1342	978	982	902	1044	2744	1035	1971 - 1978
1978	2197	1419	1384	1014	919	1410	2428	1391	1406	1816	1896	1624	1579	
Means 1914- 1978	1134	1175	985	876	862	1298	2342	1864	1549	1285	1045	1172	1302	

