



WATER-RIGHT DOCKET

Mammoth Cave National Park

Docket No: 11

MT. KINLEY WELL

Supporting Hydro Data

06-04-1965: letter to superintendent from water resources division regarding pumping test of mt. mckinley test well no. 2



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Water Resources Division
Ground Water Branch

REPLY REFER TO:

522 W. Jefferson, Room 310
Louisville, Kentucky 40202
June 4, 1965

Mr. Paul McG. Miller
Superintendent
Mammoth Cave National Park
Mammoth Cave, Kentucky

Dear Mr. Miller:

The following data relating to the pumping test of the Mt. McKinley test well No. 2 (deepened access hole), begun on May 26, 1965, and finally completed on May 29, 1965, by M. T. Hopkins, D. V. Whitesides, and me, are furnished herewith for your records. We had several false starts due to pump and (or) power failure before finally getting the test underway. This well is located about 190 feet west of the Mt. McKinley test well No. 1, which we pump tested on November 17-18, 1964. Both wells produce water from the same horizon or zone and all things being equal the yield and quality should be about the same. The higher yield and lower quality of test well No. 2 is attributed to the different season of the year and the heavy rains just prior to the test. The water-level recorder at Mt. McKinley well No. 1 showed the level rising when the test was started. This is normal in limestone aquifers such as this, and consequently is a poor time to run a pumping test. The yield would naturally be higher than in late fall after a dry summer.

We did not get a copy of the driller's log for the last part of this well. We presume he furnished you with the log and would like to obtain a copy for our files at your convenience.

PUMP SETTING - Intake of 5 H.P. submersible pump set at 478 feet below top of casing which is 0.5 foot above land surface. The pump intake was about at the bottom of the water-yielding zone in the rock, which extends from about 462 feet to about 478 feet.

AIRLINE SETTING - Bottom end of 1/8-inch I.D. copper airline set at bottom of pump motor, 4.3 feet below pump intake. Total length of airline from bottom to center of gage (set 2.3 feet above top of casing) was 482.0 feet. This was the same airline (without alteration) that was used on Mt. McKinley No. 1 pumping test.

DISCHARGE PIPE - 2-inch plastic pipe discharging from top of pump column and about 20 feet down slope from well.

DURATION OF TEST - Pumped 24 hours, 09 minutes to waste. Final test began 0916 on May 28, 1965; ended at 0925 on May 29, 1965.

PUMPING RATE - Average for test was 9 gpm (gallons per minute) with an average drawdown of 31 feet.

STATIC WATER LEVEL AT START OF TEST - 427.0 feet below top of casing.

PUMPING LEVEL AT END OF PUMPING TO WASTE - 456.0 feet below top of casing.

SPECIFIC CAPACITY OF WELL - About 0.29 gpm per foot of drawdown.

CHEMICAL QUALITY OF WATER - The chemical quality of the water, based on field tests, shows that the water is very hard and generally of a poorer quality than the Mt. McKinley test well No. 1. The following data are from field tests:

Specific conductance - 1200 to 1400

Hardness - 1000 to 1400 ppm

pH - 6.8 to 7.3

Chloride (Cl) - 45 to 60 ppm

Hydrogen sulfide (H₂S) - 0.5 to 2.0 ppm (strong sulfur odor)

Iron (Fe) - 3.5 to 5.0 ppm.

A water sample was collected for laboratory analysis midway in the test and a second sample at the end. Copies of the analyses will be forwarded to you as soon as they are completed, and additional comments added if needed.

A summary of readings taken during the pumping test is given in the following table. The complete set of readings is on file at this office. Recorder charts showing the water level in the Mt. McKinley test well No. 1 during and after the pumping test are also on file here. We will move this recorder to the No. 2 well before you install your pump on the No. 1 well. Operating this recorder on the nearby well will give you a continuous check on the water level in the aquifer. This well will also be available for pumping in case it is ever needed.

Date and time (CST)	Airline reading (feet)	Net change from static level (feet)	Depth to water below top of casing (feet)	Yield of well (gpm)
5-28-65 0916	48	0	427.0	--
0920	32	-16	443.0	--
0923	26	-22	449.0	22
0929	18	-30	457.0	10
0944	11	-37	464.0	11
1021	12	-36	463.0	11
1135	12	-36	463.0	10
1430	13	-35	462.0	11
1700	17	-31	456.0	9
1900	16	-32	459.0	9
2400	13	-35	462.0	9
5-29-65 0330	17	-31	456.0	7
0500	18	-30	457.0	7
0700	18	-30	457.0	7
0800	18	-30	457.0	7
0920	19	-29	456.0	7
0925	Pump off - end of test			

Sincerely yours,

R. V. Cushman
District Geologistcc: Billy Vick, Mammoth Cave, Ky.
Al Vick, Richmond, Va.

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY2GW
Dec. 1953

WATER ANALYSIS

Location Mammoth Cave, Kentucky County Edmonson
 Source Drilled well (Mt. McKinley Test No. 1) Depth (ft) 492 Diam (in.) 8
 Cased to (ft) _____ Date drilled Oct.-Nov. 1964 Point of coll. At well
 Owner National Park Service
 Treatment 385 ft. pumping Use _____
 WBF Limestone, 463-478 feet WL 429 ft. below TC Yield 7 GPM pump measured
 Temp (°F) 60 Appear. when coll. Slightly cloudy (Static)
 Collected November 18, 1964, 0200 By Whitesides and Cushman
 Remarks Field test: Sp. cond. 525, pH 7.4, hardness 30 gr/gal., Fe 0.1 ppm, Cl 15 ppm,
H₂S 0.1 ppm. Sampled after pumping 6 hours. Well is to be used for public supply.

	ppm	epm		ppm	epm
Silica (SiO ₂)	8.8	--	Bicarbonate (HCO ₃)	157	2.57
Aluminum (Al)			Carbonate (CO ₃)	0 ✓	.00
Iron (Fe)	1.2	--			
Iron (Fe)			Sulfate (SO ₄)	232 ✓	4.83
Manganese (Mn)	.26	--	Chloride (Cl)	16 ✓	.45
			Fluoride (F)	1.3 ✓	.07
Calcium (Ca)	79	3.94			
Magnesium (Mg)	43 ✓	3.54			
			Nitrate (NO ₃)	.3	.01
Sodium (Na)	11	.48			
Potassium (K)	1.1	.03			
Total		7.99	Total		7.93

	ppm		
		Specific conductance (micromhos at 25° C)	733
Dissolved solids:			
Sum	471 ✓	pH	7.8 ✓
Residue on evaporation at 180° C	507	Color	5 ✓
Suspended solids			
Hardness as CaCO ₃ :			
Calcium, magnesium	374		
Noncarbonate	246		

Lab. No. Col 33193 Field No. 370924N-860413.1 Project KY MAMMOTH CAVE Q GW

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER ANALYSIS

2GW
Dec. 1953

Location Mammoth Cave, Kentucky County Edmonson
Source Drilled well (Mt. McKinley Test No. 1) Depth (ft) 492 Diam (in.) 8
Cased to (ft) 30 Date drilled Oct.-Nov. 1964 Point of coll. At well
Owner National Park Service
Treatment WB Limestone, 463-478 ft. WL 385 ft. below TC Yield 7 GPM Use pump measured
Temp (°F) 60 Appear. when coll. Slightly cloudy pumping
Collected November 18, 1964, 0800 By Whitesides and Cushman
Remarks Collected after pumping 13 hours. Water has sulfur odor and taste. Well is to be used for public supply.

	ppm	epm		ppm	epm
Silica (SiO ₂)			Bicarbonate (HCO ₃)		
Aluminum (Al)			Carbonate (CO ₃)		
Iron (Fe)					
Iron (Fe)			Sulfate (SO ₄)		
			Chloride (Cl)		
			Fluoride (F)		
Calcium (Ca)					
Magnesium (Mg)					
			Nitrate (NO ₃)		
Sodium (Na)					
Potassium (K)					
Total			Total		

	ppm		
		Specific conductance (micromhos at 25° C)	
Dissolved solids:		pH	
Sum			
Residue on evaporation at 180° C		Color	
Suspended solids			
Hardness as CaCO ₃ :		Sulfides as H ₂ S (ppm)	0.0 ✓
Calcium, magnesium			
Noncarbonate			

Lab. No. Col 33285 Field No. 370924N-860413.1 Project KY MAMMOTH CAVE Q GW

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER ANALYSIS

2GW
Dec. 1953

Location Mammoth Cave, Kentucky County Edmonson
Source Drilled well (Mt. McKinley Test No. 1) Depth (ft) 492 Diam (in.) 8
Cased to (ft) 30 Date drilled Oct.-Nov. 1964 Point of coll. At well
Owner National Park Service
Treatment WB Limestone, 463-478 ft. WL 385 ft. below TC Yield 7 GPM pump measured
Temp (°F) 60 Appear. when coll. Clear
Collected November 18, 1964 By D. V. Whitesides
Remarks Field test: H₂S 0.4 ppm. Sampled after pumping 23 hours. Well to be used for

public supply.	ppm	epm		ppm	epm
Silica (SiO ₂)			Bicarbonate (HCO ₃)		
Aluminum (Al)			Carbonate (CO ₃)		
Iron (Fe)					
Iron (Fe)			Sulfate (SO ₄)		
			Chloride (Cl)		
			Fluoride (F)		
Calcium (Ca)					
Magnesium (Mg)					
			Nitrate (NO ₃)		
Sodium (Na)					
Potassium (K)					
Total			Total		

	ppm		
		Specific conductance (micromhos at 25° C)	
Dissolved solids:		pH	
Sum		Color	
Residue on evaporation at 180°C			
Suspended solids		Sulfides as H ₂ S (ppm)	/ 0.0
Hardness as CaCO ₃ :			
Calcium, magnesium			
Noncarbonate			

Lab. No. Col 33286 Field No. 370924N-860413.1 Project KY MAMMOTH CAVE Q GW

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER ANALYSIS

PROVISIONAL RECORDS, SUBJECT TO REVISION
2GW
Dec. 1953

Location Mammoth Cave, Kentucky County Edmonson
 Source Drilled well (Bransford) Depth (ft) 427 Diam (in.)
 Cased to (ft) Date drilled 1953 Point of coll. At well
 Owner National Park Service
 Treatment Use Public supply
 WBF Limestone, 360-427 feet WL 314 ft. below TC Yield 15.7 GPM pump measured
 Temp (°F) 61 Appear. when coll. Clear (Static)
 Collected November 25, 1964 By D. V. Whitesides
 Remarks Sp. cond. 290, Hard. 239 ppm, Cl 5 ppm, pH 7.4, Fe 1.0 ppm, H₂S 0.0. Well
cleaned and tested 1964. Sampled after pumping 23 hours.

	ppm	epm		ppm	epm
Silica (SiO ₂)			Bicarbonate (HCO ₃)	117	1.92
Aluminum (Al)			Carbonate (CO ₃)	0	.00
Iron (Fe)					
Iron (Fe)	0.39	--	Sulfate (SO ₄)	84	1.75
			Chloride (Cl)	3.5	.10
			Fluoride (F)	1.6	.08
Calcium (Ca)					
Magnesium (Mg)					
			Nitrate (NO ₃)	.4	.01
Sodium (Na)					
Potassium (K)					
Total			Total		3.86

	ppm		
		Specific conductance (micromhos at 25° C)	370
Dissolved solids:		pH	7.9
Sum		Color	
Residue on evaporation at 180° C		Sulfides as H ₂ S (ppm)	.0
Suspended solids			
Hardness as CaCO ₃ :			
Calcium, magnesium	190		
Noncarbonate	94		

Lab. No. Col 33290 Field No. S-1,904.8-316.3 Project KY MAMMOTH CAVE Q GW

Docket Information

Number of Documents in Docket 7

Documents Dated from 12/15/1953 to 6/4/1965

Docket Compiled: 4/27/2011