

Lake Catamount Lot #1

Water Well Summary

This is a summary of the completion, testing and water quality of the water supply well located at Lot #1 at the Lake Catamount development. The well was drilled under our supervision by Aztec Drilling Company on October 4 and 5, 2000, and tested by Aztec on October 26 and 27, 2000. The well was drilled under permit number 224929, as approved by the State Engineer's Office on April 12, 2000 (Figure 1). Summarized below are the well completion details, pump test data, and water quality results.

Summary of Well Completion

Aztec Drilling constructed the well using air-percussion drilling methods. A nine-inch borehole was drilled to a depth of 42 feet, and a 6.25-inch borehole was drilled to a depth of 500 feet. Seven-inch diameter steel surface casing was installed to a depth of 42 feet to help maintain the borehole during the drilling process. 4.5-inch diameter PVC casing was installed to approximately 480 feet. The intervals from approximately 100 to 140 and 380 to 480 are cased with factory slotted PVC pipe. The measured static water level in the well on October 26, 2000 was approximately 26.9 feet below ground level. Figures 2 and 3 present a schematic diagram of the well completion and a copy of the well completion and test report, respectively.

Summary of Testing Program and Results

A 24-hour pump test was conducted by Aztec on October 26 and 27, 2000. The well was pumped at a rate of approximately 3 gallons per minute (gpm) for the first 19 hours of the test. The well was pumped using a 1-HP submersible pump set at 300 feet and a generator for power. During the test, the pumping rate was measured using a flow meter and water levels were measured using an m-scope. The pumping test data are summarized in Table 1 and the water level drawdown data are presented graphically in Figure 4. The maximum drawdown during the first 19 hours of the test was approximately 154 feet. Following the 19 hours of pumping at 3 gpm, the discharge was reduced to approximately 2 gpm for about 5 hours to evaluate a potential sustainable pumping rate and water level in the well. During this period, the pumping water level recovered approximately 24 feet, indicating a sustainable rate and water level for the well.

In order to determine aquifer characteristics and to project well yields for various periods of time, the drawdown data were analyzed using the standard Theis type-curve matching technique and the Theis equation, as shown in Figure 4. The analysis of the late-time data indicates an effective aquifer transmissivity of approximately 9.81 gallons per day per foot (gpd/ft) and a storage coefficient, representative of conditions in the pumping well, of approximately 1.05. We consider these values unusual and reflective of the difficulty of evaluating aquifer characteristics in an area that is heavily fractured. The well sustained a rate of 2 gpm in the late part of the test with rising water levels, which indicates that the aquifer can sustain and the water level may even recover at this rate. The well can probably produce higher pumping rates, but for shorter periods of time. Peak summer usage should be met with a combination of well production and adequate storage. The test data indicate that the well and a typical delivery and storage system should produce an adequate

supply for the proposed single-family lot.

The lot owner should practice common water conservation measures and limit outside irrigation uses to best utilize the water resources of the area. These measures include, but are not limited to, the use of low-flow devices for in-house uses, a high efficiency irrigation system, and landscaping with native plants. The water level in the well should be monitored frequently. It will fluctuate over time; and because of withdrawals by this well and other nearby wells, the static water level may decline. If well production is reduced because of lowered water levels, the well may require deepening or the well can be abandoned and another well permitted and constructed elsewhere on the parcel.

Water Quality

The State and county do not require water quality analyses for wells on 35-acre or larger parcels; however, water quality samples were collected during the pumping test of the Lot #1 well. The results of the water quality analyses are presented in Table 2. These results indicate that the water is of adequate quality and suitable for potable uses. One exception was iron, which is a secondary standard and typically regarded as an aesthetic consideration. The result for iron slightly exceeded the recommended standard by only 0.08 mg/L, and this level may decline as the well is pumped longer. If the well owner chooses to improve the water quality for personal preference, common filtration and in-house treatment techniques probably can be used to lower the concentrations of this parameter.

In accordance with the well permit, the well pumping rate is limited to 15 gpm. Outside irrigation of lawn and garden is limited in the permit to one acre, but may be limited to a smaller area by development covenant. When the well is equipped with a permanent pump and motor, we recommend installing the pump near the bottom of the well to accommodate maximum water level drawdown in the well.

Prepared by: Bishop-Brogden Associates, Inc.

WELL PERMIT NUMBER <u>224929</u>			
DIV. 6	WD 58	DES. BASIN	MD

APPLICANT

Lot: 1 Block: Filing: Subdiv: LAKE CATAMOUNT

CATAMOUNT DEVELOPMENT INC
% BISHOP-BROGDEN ASSOCIATES IN
333 W HAMPDEN, SUITE 1050
ENGLEWOOD, CO 80110-

(303) 806-8952

APPROVED WELL LOCATION

ROUTT COUNTY
NE 1/4 NE 1/4 Section 27
Township 5 N Range 84 W Sixth P.M.

DISTANCES FROM SECTION LINES

525 Ft. from North Section Line
1225 Ft. from East Section Line

PERMIT TO CONSTRUCT A WELL

ISSUANCE OF THIS PERMIT DOES NOT CONFER A WATER RIGHT

CONDITIONS OF APPROVAL

- 1) This well shall be used in such a way as to cause no material injury to existing water rights. The issuance of this permit does not assure the applicant that no injury will occur to another vested water right or preclude another owner of a vested water right from seeking relief in a civil court action.
- 2) The construction of this well shall be in compliance with the Water Well Construction Rules 2 CCR 402-2, unless approval of a variance has been granted by the State Board of Examiners of Water Well Construction and Pump Installation - Contractors in accordance with Rule 18.
- 3) Approved pursuant to CRS 37-92-602(3)(b)(I).
The use of ground water from this well is limited to fire protection, ordinary household purposes inside not more than three (3) single family dwellings, the irrigation of not more than one (1) acre of home gardens and lawns, and the watering of domestic animals. This well is to be located on Lot 1 of the Lake Catamount Development, Routt County.
- 5) The maximum pumping rate of this well shall not exceed 15 GPM.
- 6) This well shall be constructed not more than 200 feet from the location specified on this permit.

JD 4-11-2000

APPROVED
D2

Hel D. Simpson

State Engineer

DATE ISSUED **APR 12 2000**

Jess Deatly

By EXPIRATION DATE **APR 12 2002**

FIGURE 2

LOT 1 WELL AT LAKE CATAMOUNT
SCHEMATIC DIAGRAM

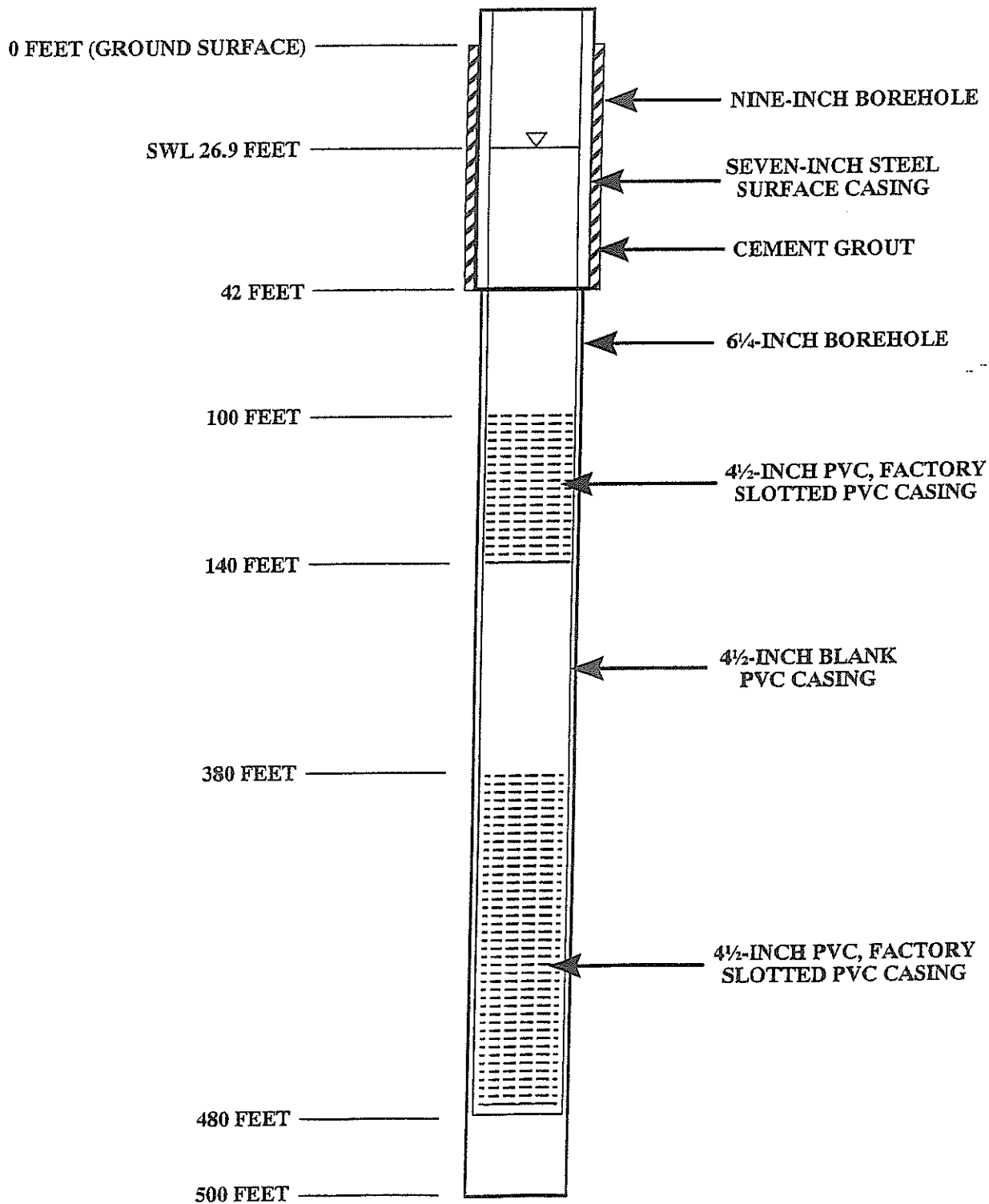


FIGURE 3

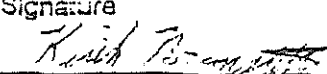
FORM NO. SWS-31 11/90	WELL CONSTRUCTION AND TEST REPORT STATE OF COLORADO, OFFICE OF THE STATE ENGINEER	For Office Use only																																																																																						
1. WELL PERMIT NUMBER <u>224929</u>		mailed = DWR - 12/5/00 Cataamount Dev - 12/5/00																																																																																						
2. OWNER NAME(S) <u>Catamount Development Inc</u> Mailing Address <u>P.O. Box 774707</u> City, St. Zip <u>Steamboat Springs, CO 80477</u> Phone (970) <u>871-9502</u>																																																																																								
3. WELL LOCATION AS DRILLED: <u>NE 1/4 NE 1/4, Sec. 27 Twp. 5 N Range 84 W</u> DISTANCES FROM SEC. LINES: <u>325</u> ft. from <u>North</u> Sec. line. and <u>1225</u> ft. from <u>East</u> Sec. line. OR <small>(north or south) (east or west)</small> SUBDIVISION: <u>Lake Catamount</u> LOT <u>1</u> BLOCK _____ FILING(UNIT) _____ STREET ADDRESS AT WELL LOCATION: _____																																																																																								
4. GROUND SURFACE ELEVATION _____ ft. DRILLING METHOD <u>Air Percussion</u> DATE COMPLETED <u>6 October, 2000</u> TOTAL DEPTH <u>500</u> ft. DEPTH COMPLETED <u>480</u> ft.																																																																																								
5. GEOLOGIC LOG: <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%;">Depth</th> <th>Description of Material (Type, Size, Color, Water Location)</th> </tr> </thead> <tbody> <tr><td>0-2</td><td>Fill</td></tr> <tr><td>2-139</td><td>Rock, black & white</td></tr> <tr><td>139-148</td><td>Rock, fractured w/water</td></tr> <tr><td>148-263</td><td>Rock, mostly black</td></tr> <tr><td>263-304</td><td>Quartz, white</td></tr> <tr><td>304-439</td><td>Rock, gray</td></tr> <tr><td>439-500</td><td>Rock, mostly black</td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </tbody> </table>	Depth	Description of Material (Type, Size, Color, Water Location)	0-2	Fill	2-139	Rock, black & white	139-148	Rock, fractured w/water	148-263	Rock, mostly black	263-304	Quartz, white	304-439	Rock, gray	439-500	Rock, mostly black																													6. HOLE DIAM. (in.) From (ft) To (ft) <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 20%;">9</td><td style="width: 20%;">0</td><td style="width: 20%;">40</td><td style="width: 20%;"></td></tr> <tr><td>6.25</td><td>40</td><td>500</td><td></td></tr> </table> 7. PLAIN CASING <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>OD (in)</th> <th>Kind</th> <th>Wall Size</th> <th>From (ft)</th> <th>To (ft)</th> </tr> </thead> <tbody> <tr><td>7</td><td>Steel</td><td>.272</td><td>+1</td><td>40</td></tr> <tr><td>5</td><td>PVC</td><td>.250</td><td>10</td><td>100</td></tr> <tr><td>5</td><td>PVC</td><td>.250</td><td>140</td><td>380</td></tr> </tbody> </table> PERF. CASING: Screen Slot Size: <u>30 slot</u> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th> </th> <th> </th> <th> </th> <th> </th> <th> </th> </tr> </thead> <tbody> <tr><td>5</td><td>PVC</td><td>.250</td><td>100</td><td>140</td></tr> <tr><td>5</td><td>PVC</td><td>.250</td><td>380</td><td>480</td></tr> </tbody> </table>	9	0	40		6.25	40	500		OD (in)	Kind	Wall Size	From (ft)	To (ft)	7	Steel	.272	+1	40	5	PVC	.250	10	100	5	PVC	.250	140	380						5	PVC	.250	100	140	5	PVC	.250	380	480
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12. WELL TEST DATA: <input type="checkbox"/> Check box if Test Data is submitted on Supplemental Form. TESTING METHOD <u>Air Lift</u> Static Level <u>33</u> ft. Date/Time measured <u>10/9/00</u> Production Rate <u>3</u> gpm. Pumping level _____ ft. Date/Time measured _____ Test length (hrs.) <u>3</u> Remarks _____																																																																																								
I have read the statements made herein and know the contents thereof, and that they are true to my knowledge. [Pursuant to Section 24-4-104 (13)(a) C.R.S., the making of these statements herein constitutes perjury in the second degree and is punishable as a class 1 misdemeanor.]																																																																																								
CONTRACTOR <u>Aztec Drilling Company</u> Phone <u>(970) 879-5252</u> Lic. No. <u>1198</u> Mailing Address <u>P.O. Box 772771 Steamboat Springs, CO 80477</u>																																																																																								
Name/Title (Please type or print) <u>Keith Branstetter</u>	Signature 	Date <u>12/4/00</u>																																																																																						

TABLE I

CATAMOUNT

LONG TERM PUMPING TEST DATA FOR LAKE CATAMOUNT LOT #1 WELL

Time Since Pumping Began (min)	Water Level Below Measuring Point (ft)	Water Level Below Ground Surface (ft)	Drawdown (ft)
0	28.92	26.92	0.00
0.5	31.17	29.17	2.25
1	33.04	31.04	4.12
2	35.92	33.92	7.00
3	38.04	36.04	9.12
4	39.21	37.21	10.29
5	39.92	37.92	11.00
6	40.00	38.00	11.08
7	40.33	38.33	11.41
8	40.33	38.33	11.41
9	40.58	38.58	11.66
10	41.33	39.33	12.41
12	42.71	40.71	13.79
14	43.82	41.82	14.90
16	44.88	42.88	15.96
18	45.92	43.92	17.00
20	46.83	44.83	17.91
25	48.67	46.67	19.75
30	50.46	48.46	21.54
35	52.10	50.10	23.18
40	53.79	51.79	24.87
52	58.83	56.83	29.91
55	59.56	57.56	30.64
70	61.92	59.92	33.00
75	63.00	61.00	34.08
90	66.54	64.54	37.62
105	70.29	68.29	41.37
120	73.50	71.50	44.58
140	78.75	76.75	49.83
160	84.33	82.33	55.41
183	89.25	87.25	60.33
200	92.66	90.66	63.74
220	95.60	93.60	66.68
240	98.50	96.50	69.58
270	102.56	100.56	73.64
300	106.13	104.13	77.21
330	109.38	107.38	80.46
360	112.29	110.29	83.37
420	117.58	115.58	88.66
480	121.00	119.00	92.08
540	123.25	121.25	94.33
600	125.50	123.50	96.58
660	127.66	125.66	98.74
720	130.00	128.00	101.08
780	132.00	130.00	103.08
840	134.00	132.00	105.08
900	135.66	133.66	106.74
960	137.25	135.25	108.33
1020	140.92	138.92	112.00
1080	157.25	155.25	128.33
1110	165.00	163.00	136.08
1170	182.75	180.75	153.83
1200	178.00	176.00	149.08
1230	175.00	173.00	146.08
1260	170.00	168.00	141.08
1290	165.00	163.00	136.08
1320	162.25	160.25	133.33
1350	160.16	158.16	131.24
1380	159.08	157.08	130.16
1410	158.75	156.75	129.83
1440	158.75	156.75	129.83

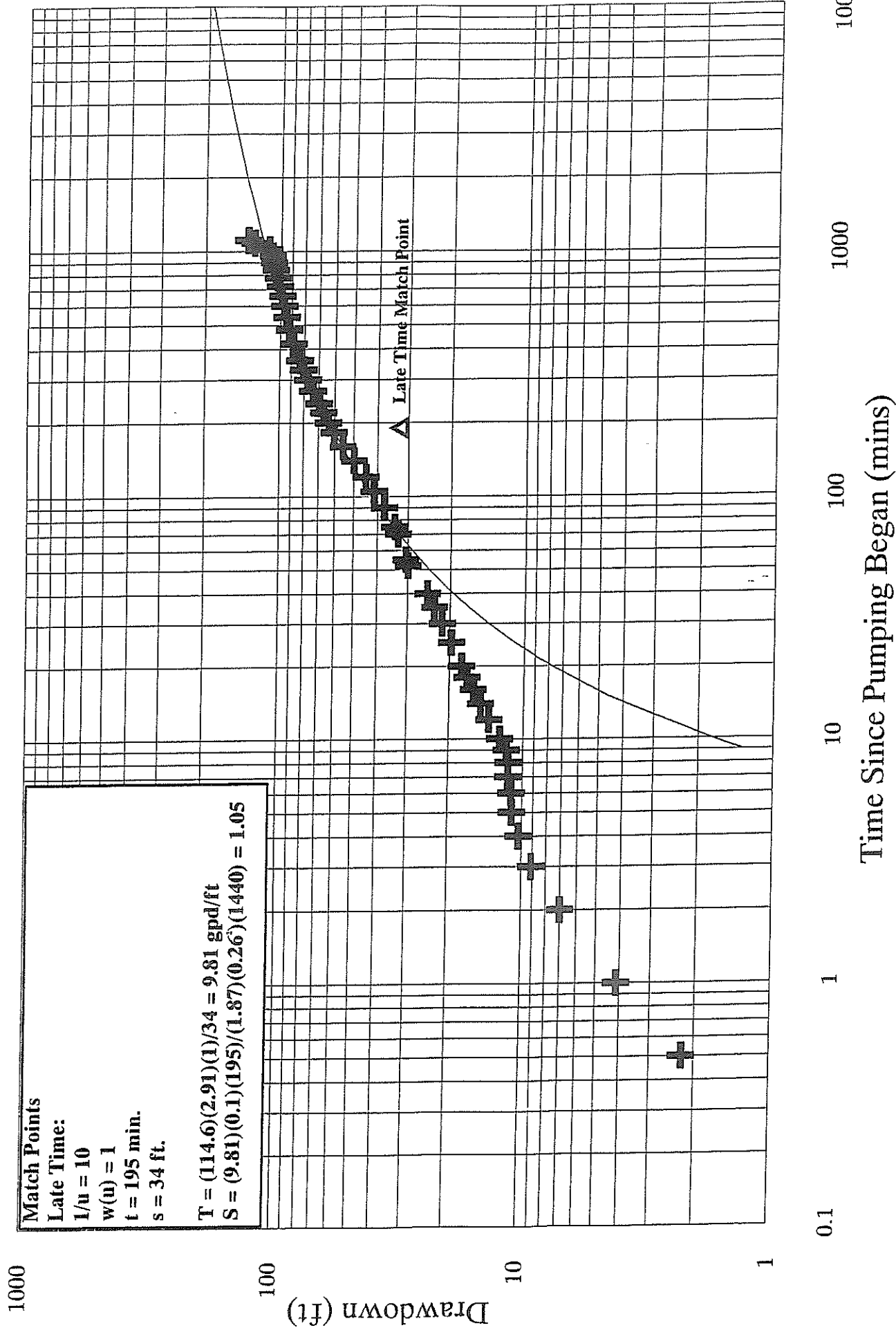
Notes:

- 1) Catamount Lot #1 pump test was performed on 10/26/00.
- 2) Pumping rate = 2.91 gallons per minute.
- 3) Measuring Point = Top of Casing, 2 feet above ground surface.
- 4) Discharge measured with totalizing flow meter.
- 5) Water level measured with m-scope.
- 6) Well Casing Diameter = 4.5 inches.

FIGURE 4

LAKE CATAMOUNT, LOT #1
TIME VS. DRAWDOWN PLOT
Q = 2.91 GAL/MIN, RADIUS = .26 FEET

Δ = THIS CURVE MATCH POINT



**LAKE CATAMOUNT LOT # 1
WATER QUALITY DATA**

Parameter		Results (mg/l)	Primary Drinking Water Standard (mg/l)	Secondary Drinking Water Standard (mg/l)
Bicarbonate	HCO ₃	134		
Carbonate	CO ₃	n/a		
Cyanide		<0.01	0.2	
Fluoride		<0.4	4.0	
Nitrate+Nitrite	NO ₂ +NO ₃ as N	0.12	10	
Nitrogen, Nitrate	NO ₃ as N	0.12	10	
Nitrogen, Nitrite	NO ₂ as N	<0.076	1	
Sulfate	SO ₄	4.4		
Total Dissolved Solids		176		500
Turbidity		2		
pH		7.06		
Antimony	Sb	<0.0006	0.006	
Arsenic	As	<0.0007	0.05	
Barium	Ba	0.076	2	
Beryllium	Be	<0.0002	0.004	
Cadmium	Cd	<0.00013	0.005	
Chromium	Cr	0.014	0.1	
Copper	Cu	0.013	1.3	
Iron	Fe	0.38		0.3
Lead	Pb	0.0015	0.015	
Magnesium	Mg	6.4		
Manganese	Mn	0.048		0.05
Mercury	Hg	<0.0002	0.002	
Nickel	Ni	0.002	0.1	
Selenium	Se	<0.00018	0.05	
Sodium	Na	10		20.0
Thallium	Tl	<0.00017	0.002	
Gross alpha, Total		5.1	15	
Gross beta, Total		2.1	50	
Radon		980		

Notes:

Outlined cells indicate parameters exceeding the primary or secondary drinking water standards.

Standards reflect requirements of water delivered to the consumer, the State does not apply the standards at the wellhead.

When gross alpha concentrations exceed the maximum contaminant level of 15 pc/L, additional analyses are required to determine the compliancy of the water source; additional parameters that need to be analyzed include radium-226, radium-228, radon and uranium.