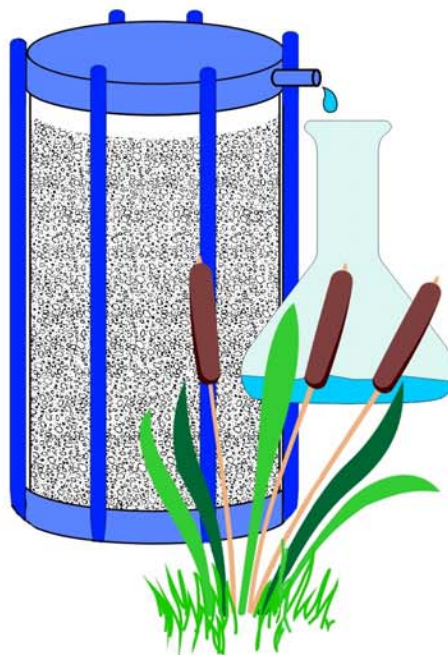


Environmental Sciences Laboratory

Variation in Hydraulic Conductivity Over Time at the Monticello Permeable Reactive Barrier

February 2005

Prepared for
U.S. Department of Energy
Grand Junction, Colorado



Work Performed Under DOE Contract No. DE-AC01-02GJ79491 for the U.S. Department of Energy
Approved for public release; distribution is unlimited.



Variation in Hydraulic Conductivity Over Time at the Monticello Permeable Reactive Barrier


February 2005

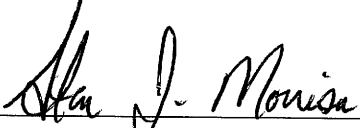
Work Performed by S.M. Stoller Corporation under DOE Contract No. DE-AC01-02GJ79491
for the U.S. Department of Energy Office of Legacy Management, Grand Junction, Colorado

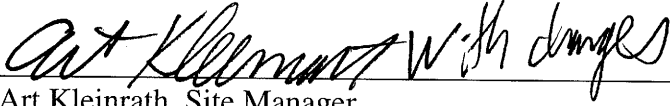
Signature Page

Variation in Hydraulic Conductivity Over Time at the Monticello Permeable Reactive Barrier

February 2005

Prepared By: 
Tim Bartlett, Monticello Project Hydrogeologist

Reviewed By: 
Stan J. Morrison, Manager
Environmental Sciences Laboratory

Approved By: 
Art Kleinrath, Site Manager
U.S. Department of Energy, Office of Legacy Management

Contents

Executive Summary	vii
1.0 Introduction	1
1.1 Description of the Monticello PRB	1
1.2 Report Objectives	2
1.3 Environmental Sciences Laboratory	2
2.0 Field Investigation.....	2
3.0 Analytical Methods	3
4.0 Results and Discussion.....	3
4.1 Slug Test Reproducibility	3
4.2 Time-Variation of Hydraulic Conductivity	4
4.3 Hydraulic Conductivity of PRB – November 2004.....	4
4.4 Groundwater Hydrology at PRB	4
5.0 Summary and Conclusions.....	5
6.0 Recommendations	6
7.0 References	6

Tables

Table 1. Estimated Hydraulic Conductivity Values From Slug Tests	9
--	---

Figures

Figure 1. Site Location Map	10
Figure 2. Site Features Map	11
Figure 3. Monticello Permeable Reactive Barrier	13
Figure 4. Summary of Hydraulic Conductivity Estimates From Slug Tests	14
Figure 5. Geometric Mean of Hydraulic Conductivity for PRB Zones	15
Figure 6. Hydraulic Conductivity Variation Among Alluvial Aquifer Wells, June 2000 to November 2004.....	16
Figure 7. Ratio of Variation in Hydraulic Conductivity, June 2000 to November 2004.....	17
Figure 8. Hydraulic Conductivity Estimates, November 2004 Slug Tests	18
Figure 9. Contour Map of the Logarithm of the Hydraulic Conductivity, November 2004 Slug Tests.....	19
Figure 10. Hydraulic Conductivity Distribution in PRB Zones, November 2004	20
Figure 11. Water Level Hydrographs for PRB Wells.....	21
Figure 12. Contour Map of Water Table at PRB, November 2004	22

Appendix

Appendix A—Slug Test Results.....	A-1
-----------------------------------	-----

Executive Summary

Gas displacement rising-head slug tests were performed in June 2000, August 2003, and November 2004 to monitor hydraulic conductivity in the permeable reactive barrier (PRB) at the Monticello Mill Tailings Site, Monticello, Utah. The Monticello PRB, installed in 1999, contains zero-valent iron as the reactive medium to treat the primary groundwater contaminants arsenic, molybdenum, selenium, uranium, and vanadium at the site. The PRB is about 105 feet in length, perpendicular to the direction of groundwater flow, by about 8 feet in width. It consists of three distinct zones: an upgradient, 2-foot wide pretreatment zone of pea gravel mixed with 13-percent ZVI by volume; a 4-foot width of 100-percent ZVI; and a 2-foot wide zone of 100-percent pea gravel. The PRB is keyed into competent bedrock at about 14 feet below ground surface. Bentonite-soil slurry walls funnel groundwater to the PRB. Estimated peak flow through the PRB is between 5 and 10 gallons per minute.

Slug tests were conducted in numerous monitoring wells completed in both zones containing ZVI and in monitoring wells completed in the alluvial aquifer upgradient of the PRB. The alluvial wells provided a control group by which variation in hydraulic conductivity in the PRB over time could be evaluated. Identical field and analytical procedures were used for all three test periods. On a well-by-well basis, hydraulic conductivity values estimated for the alluvial wells were very similar for each test period, indicating a high-degree of method reproducibility. Quantifying the control group variation revealed temporal changes in hydraulic conductivity within the PRB. Of primary importance, the results indicated that the bulk conductivity of the PRB has changed over time and is now less than that of the influent alluvium. Conductivity loss is greatest within the center of the ZVI zone, with over an order-of-magnitude decrease since installation of the PRB. These findings suggest that flow through the PRB will likely become negligible in several years at present rates of conductivity loss. Consequences include loss of groundwater treatment capability and possible adverse effect to current land use from groundwater mounding.

1.0 Introduction

A permeable reactive barrier (PRB) is an engineered subsurface zone of chemically reactive material that stabilizes or degrades dissolved contaminants during flow through of groundwater. A funnel-and-gate-type PRB was installed in the alluvial aquifer at the Monticello Mill Tailings Site, Monticello, Utah, in June 1999 to capture and treat the primary groundwater contaminants arsenic, molybdenum, selenium, uranium, and vanadium at the site. As part of an ongoing effort by the U.S. Department of Energy (DOE) and the U.S. Environmental Protection Agency (EPA) to investigate the long-term viability of reactive barrier treatment technology, numerous field and laboratory studies of the Monticello PRB have evaluated the chemical and hydraulic performances of this system (DOE 2002, 2004a, 2004b; Morrison 2003). This report describes the hydraulic behavior of the PRB since its installation based primarily on results of three separate rounds of slug tests and routine water-level monitoring.

1.1 Description of the Monticello PRB

The Monticello Mill Tailings Site ([Figure 1](#)) is being remediated by DOE in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). [Figure 2](#) shows the location of the PRB within Operable Unit III of the Monticello Mill Tailings Site. Operable Unit III comprises contaminated surface water and groundwater associated with past uranium and vanadium ore milling at the former Monticello millsite. Groundwater contamination is limited to shallow unconsolidated alluvium within a thin, narrow subsurface channel in the valley of a small perennial stream.

The Monticello PRB is approximately 105 feet (ft) in length, perpendicular to the direction of groundwater flow, and about 8 ft in width. It consists of three distinct zones: furthest upgradient is a 2-ft-wide pretreatment zone of pea gravel mixed with 13-percent zero valent iron (ZVI) by volume, next is a 4-ft-wide zone of 100-percent ZVI followed by a 2-ft-wide zone of 100-percent pea gravel. [Figure 3](#) presents these zones and the associated network of groundwater monitor wells. The corrugated outline of the PRB shown on the figure is the trace of sheet pilings used in its construction. Pilings were driven with a 127-ton crane and 140-ton hydraulic vibratory hammer until refusal in bedrock, forming a rectangular steel box. The sheet pilings were withdrawn after replacing alluvial materials with the PRB media.

The top of the PRB is 3 ft below ground surface; its base is keyed 1 to 2 ft into low-permeability claystone that underlies the alluvial aquifer at about 13 ft below ground surface. Groundwater is funneled to the PRB by low-permeability bentonite/soil slurry walls, also keyed into competent bedrock. The walls extend north and south of the PRB about 100 and 250 ft respectively, but do not fully span the width of the alluvial aquifer by several tens of feet, thus allowing some bypass flow.

The reactive medium (ZVI) used in the Monticello PRB originated as scrap cast iron cuttings from the automotive industry and was purchased from Peerless Metal Powders and Abrasives, Detroit, Michigan. It consists of elongate shavings graded in size between #8 and #20 U.S. Standard sieves (2.36 millimeter [mm] and 0.83 mm openings, respectively). The ZVI was emplaced in the PRB at a loose density of 115 pounds per cubic foot (lb/ft³) and porosity of about 60 percent. Falling head permeameter tests conducted in the laboratory before construction

of the PRB indicated a saturated hydraulic conductivity of 3.6×10^{-2} centimeters per second (cm/sec) (DOE 2002). Previous estimates indicated groundwater flow rates between 5 and 10 gallons per minute through the PRB (DOE 2002).

1.2 Report Objectives

Rising head gas-displacement slug tests were conducted on three occasions to determine the hydraulic conductivity of the PRB media and adjacent alluvium. The objective of the hydraulic tests were to evaluate or predict the longevity of the PRB as affected by possible conductivity loss as the PRB matured through geochemical or mechanical processes. In June 2000, eight wells completed in the alluvial aquifer and three wells completed in the PRB were tested. In August 2003, hydraulic tests included 42 wells completed in the PRB and 3 alluvial aquifer wells, 2 of which had been tested previously. Tests of the same 42 wells in the PRB were conducted in November 2004, along with 9 alluvial wells including 8 wells that were tested in June 2000. This report presents summaries of field test conditions, data analysis, and results for each test period, followed by an evaluation of temporal trends in hydraulic conductivity and their implications to PRB longevity.

1.3 Environmental Sciences Laboratory

The present study of the Monticello PRB is being conducted for DOE by the Environmental Sciences Laboratory (ESL) at the DOE Office of Legacy Management (LM) office in Grand Junction, Colorado. The ESL, established in 1991, provides the technical foundation for monitoring and evaluating the performance of surface and subsurface remediation technologies at DOE LM sites. The 4,500-square-foot ESL facility is equipped with bench space and equipment to conduct geochemical testing and research, treatability studies, and pilot tests to supplement contaminant fate-and-transport modeling and to evaluate remediation technologies. The ESL also maintains an ecology laboratory equipped to conduct design and performance testing of waste repository covers and phytoremediation technologies and operates a mobile laboratory used routinely for expedited site characterization.

2.0 Field Investigation

Under the direction of the ESL, the June 2000 tests were conducted by Oak Ridge National Laboratories (ORNL), Grand Junction, Colorado. August 2003 and November 2004 tests were performed by Kayenta Consulting Group (Kayenta), Grand Junction, Colorado, also under the direction of the ESL. An ESL representative was present to observe test conditions during each test period. The same apparatus, procedures, and field technician were used for all three test periods.

Each slug test was performed with a 2-inch (in.) inflatable packer or a 1-in. compression fitting to seal the top of the well, depending on its diameter. The casing seal was coupled to a standpipe and a "tree" adapted with a gas inlet, a solenoid valve for pressure release, and a compression fitting to accept cabling for a pressure transducer that was suspended near the bottom of the well and coupled to a portable field computer for measuring and recording water levels throughout each test.

After the apparatus was fitted to the well, nitrogen gas was injected under relatively low pressure (2 to 10 pounds per square in.) to slowly displace groundwater from the well. Generally, each test produced about 5 ft of drawdown, coincident with the top of the screen, at which point gas venting limited additional drawdown. Following a short (tens of seconds) period of stability, instantaneous release of the confining pressure allowed the groundwater to rise to its static level in the well. Hydraulic head was measured in 0.1-second (s) intervals through complete recovery, generally occurring within 0.5 minute. Tests were repeated in triplicate at each well. Real-time viewing of test progress was possible using AQTESOLV for Windows, version 3.5 (HydroSOLVE, Inc.). This same program calculated the hydraulic conductivity while in the field based on preliminary test parameter values that were later refined (see Section 3.0).

3.0 Analytical Methods

Provisional estimates of hydraulic conductivity as determined by ORNL and Kayenta are documented in DOE (2002 and 2004) and in Kayenta (2003 and 2004). In this report, analysis of all test results is based on actual test parameter values (e.g., well radius, static water level, and aquifer thickness) rather than those assumed in many of the ORNL and Kayenta analyses. The hydraulic conductivity estimates presented in this report are generally about two or three times less than and supersede those previously reported. ESL slug test analysis employed the solution of Bouwer and Rice (1976) incorporated in AquiferWin32, version 2.40 (Environmental Simulations, Inc.) to calculate hydraulic conductivity values. [Appendix A](#) presents site-specific inputs to the Bouwer and Rice solution (Tables A-1 to A-3) and water-level recovery plots for each test.

4.0 Results and Discussion

Values of hydraulic conductivity listed in [Table 1](#) represent the arithmetic average of the triplicate slug tests conducted at each well during the given measurement period. [Appendix A](#) includes a table of the individual test results for each well. The same results listed in [Table 1](#) are displayed graphically in [Figures 4](#) and [5](#) to compare the magnitude and general variation in hydraulic conductivity values over time among and between the different zones and materials tested. As a first approximation, it is apparent from the figures that the temporal variation in hydraulic conductivity values for the alluvial wells (wells R1-M2 through TW-06) was much less than among either of the PRB well groups. Additionally, a general decrease in hydraulic conductivity in the PRB over time is evident and the greatest conductivity loss appears to have occurred in the center of the ZVI zone (wells R4-M1 through TW-13). The following sections more fully develop each of these general observations.

4.1 Slug Test Reproducibility

Slug test reproducibility at the alluvial wells was evaluated to determine if the observations presented in [Section 4.0](#) represent measurable differences in hydraulic conductivity. The alluvial wells represented the control group where change in hydraulic conductivity is not expected unless by field method or sampling bias. This latter effect is likely unimportant owing to the

small difference in water levels between test dates and the relative consistency of strata in the test intervals.

To distinguish physical trends from method uncertainty, slug test reproducibility is defined as the collective range of the ratio of variation at each alluvial well between test periods. For each set of conductivity estimates, the greater of the two values (K) is divided by the lesser values (K') to provide the ratios of variation illustrated in [Figure 6](#). Negative ratios arbitrarily signify that the test conducted at the later date resulted in a lower value of hydraulic conductivity. Individual variation among all the control wells is shown to be within a factor of about ± 3 , while most variation is within a factor of ± 2 . This high degree of reproducibility between measurement events is similar to that for the triplicate tests among all wells (see Tables A-1, A-2, and A-3). No directional bias is evident among the control wells (see [Figure 4](#)). For these reasons, conductivity variation greater than a factor of ± 3 at a single well represents a measurable difference between test periods in this study.

4.2 Time-Variation of Hydraulic Conductivity

The limited data for June 2000 prevent a detailed analysis of the variation in hydraulic conductivity through August 2003. With the available information, however, the empirical criteria defined in the previous section identify a measurable decrease in hydraulic conductivity values at the center of the PRB (row 4 wells) between those dates. By August 2003, the hydraulic conductivity in that portion of the PRB approached that of the influent alluvium. Between August 2003 and November 2004, the magnitude of the ratios of variation shown on [Figure 7](#) imply that while measurable changes in hydraulic conductivity values occurred in each PRB zone in that period, the greatest effects were realized in the center of the ZVI zone and to a lesser degree in the downgradient portion of the ZVI (row 5 wells). Much of the decrease is attributed to precipitation of calcium carbonate and other ZVI corrosion products (Morrison 2003). Notably, there is no example of increases in hydraulic conductivity values in the PRB between either test period.

4.3 Hydraulic Conductivity of PRB – November 2004

[Figure 8](#) presents the hydraulic conductivity values for the November 2004 tests. A contour map of the logarithm of those results ([Figure 9](#)) depicts descending hydraulic conductivity as light to dark color shading. It is evident in these figures that (1) the PRB is now generally less conductive than the influent alluvium and (2) the center of the ZVI is the least conductive region of the PRB. These same observations are also apparent in [Figure 10](#), which compares hydraulic conductivity values (sorted in descending order) for November 2004 among the various zones. Of particular note, no zone of the PRB was uniformly less conductive than the alluvium and flow blockage was not complete as of November 2004. Preferential paths or windows of higher conductivity throughout the PRB may control flow through at present.

4.4 Groundwater Hydrology at PRB

Accompanying the loss in hydraulic conductivity is a progressive water level rise in the PRB relative to external conditions ([Figure 11](#)). Initially, a steep hydraulic gradient (approximately 3:5) characterized the influent and effluent interfaces of the PRB. The influent

gradient has since lessened in response to the conductivity loss. Initially, the water table within the PRB was essentially flat; all head loss appeared to occur outside the PRB. A mild gradient across the first two zones of the PRB has since developed, also in response to permeability loss. The steep exit gradient between the PRB and downgradient alluvium remains. Figure 12 depicts the water table surface at the PRB from November 2004 measurements (downgradient alluvial wells were not measured at that time).

The early configuration of the water table across the PRB is consistent with a boundary effect, whereby a vertical zone of low permeability, such as disturbed alluvium associated with installation activities, restricts flow to and from the initial high-permeability PRB. Results of groundwater modeling of hydraulic head distribution support the low permeability interface zones as did a PRB pumping test (DOE 2002). At present, such an interface along the effluent boundary that is less conductive than the PRB probably controls the outflow rate and, thus, prevents development of a pronounced hydraulic gradient within the PRB.

The effects of lower hydraulic conductivity in the PRB and low-permeability interfaces may also account, in part, for the rising water table mound observed along the influent boundary of the PRB (Figure 12, R1 wells), now within 3 or 4 ft of ground surface. A general site-wide rise in the water table may be a contributing factor to the mounding. Regardless, continued rise of the mound could adversely affect current land use (agriculture) in the near future or cause additional bypass flow. Montezuma Creek in this area of the site (see Figure 2) has historically been an influent stream (losing stream potential), but the water table is now about equal to creek stage at the PRB. Although groundwater discharge to the creek may ultimately stabilize the mound, the equilibrium elevation remains uncertain.

5.0 Summary and Conclusions

Analysis of hydraulic conductivity and water level trends at the Monticello PRB indicate that

- Bulk conductivity of the PRB is presently less than that of the influent alluvium.
- Conductivity loss in the PRB is greatest within the center of the 100-percent ZVI zone.
- Current hydraulic potentials indicate continued groundwater flow through the PRB, probably occurring through more permeable paths or windows.
- Continued loss of hydraulic conductivity at present rates will likely render the PRB ineffective within a short period (less than 5 years).
- In conjunction with permeability loss in the PRB, lower permeability influent and effluent interfaces exert a significant influence on groundwater flow through the PRB.
- Groundwater mounding at the influent interface is within 3 or 4 ft of ground surface and has not stabilized.

6.0 Recommendations

Although the PRB is not an integral component of the selected groundwater remedy for Operable Unit III (DOE 2004c), the findings presented in this report recommend specific actions relevant to the overall remedy objectives. These include developing strategies (1) to relieve groundwater mounding in anticipation of general hydraulic failure of the PRB and (2) to provide alternate treatment capability to meet possible future requirements. For those purposes, the following activities are recommended:

- Conduct short-term pumping tests at wells 92-07 and 88-85 (see Figure 2 for well locations) to evaluate sustainable extraction rates and the zone of influence. This activity is directly applicable to stabilizing the groundwater mound and decreasing bypass around the south slurry wall. Installation of one or two shallow piezometers is required for the pumping test at well 88-85.
- Route pumping test water through the PRB and monitor the hydraulic response to further evaluate the hydraulic capacity of the PRB and the interface zones.
- Install a nested pair or pairs of shallow piezometers in Montezuma Creek near the PRB. Measurement of groundwater levels in the piezometers and adjacent creek stage is applicable to evaluating gaining or losing stream conditions and groundwater mound stability.
- Conduct periodic reconnaissance of the creek bank near the PRB for groundwater seepage.
- Install an automated water-level recorder in well 88-85 for daily measurements and monthly data reviews for analysis of the groundwater mound. Water levels in all PRB wells should be measured during each semiannual monitoring event conducted for Operable Unit II.
- Develop a conceptual design for a small, serviceable ZVI treatment cell with groundwater collection and effluent distribution components that could be installed to provide alternate treatment capability.

7.0 References

Bouwer, H. and R.C. Rice, 1976. "A slug test for determining hydraulic conductivity of unconfined aquifers with completely or partially penetrating wells, *Water Resour. Res.*, Vol. 12, No. 3, pp 423-428.

Kayenta Consulting Group, 2003. *Hydraulic Conductivity Test Results from Monticello PRB Wells, Monticello Mill Tailings Site, Monticello, Utah, August 2003*, September.

Kayenta Consulting Group, 2004. *Hydraulic Conductivity Test Results from Monticello PRB Wells, Monticello Mill Tailings Site, Monticello, Utah, November 2004*, November.

Morrison, S. J., 2003. "Performance Evaluation of a Permeable Reactive Barrier Using Reaction Products as Tracers," *Environ. Sci. Technol.*, v. 37, pp. 2302-2309.

U.S. Department of Energy (DOE), 2002. *Monticello Mill Tailings Site, Operable Unit III, Evaluation of the Permeable Reactive Treatment Wall Treatability Study*, GJO-2002-346-TAC, prepared for the U.S. Department of Energy Grand Junction Office, Grand Junction, Colorado, September.

U.S. Department of Energy, 2004a. *Final Report, Rejuvenating Permeable Reactive Barriers by Chemical Flushing*, Environmental Sciences Laboratory, DOE-LM/GJ686-2004, ESL-RPT-2004-05, prepared for the U.S. Department of Energy Office of Legacy Management, Grand Junction, Colorado, August.

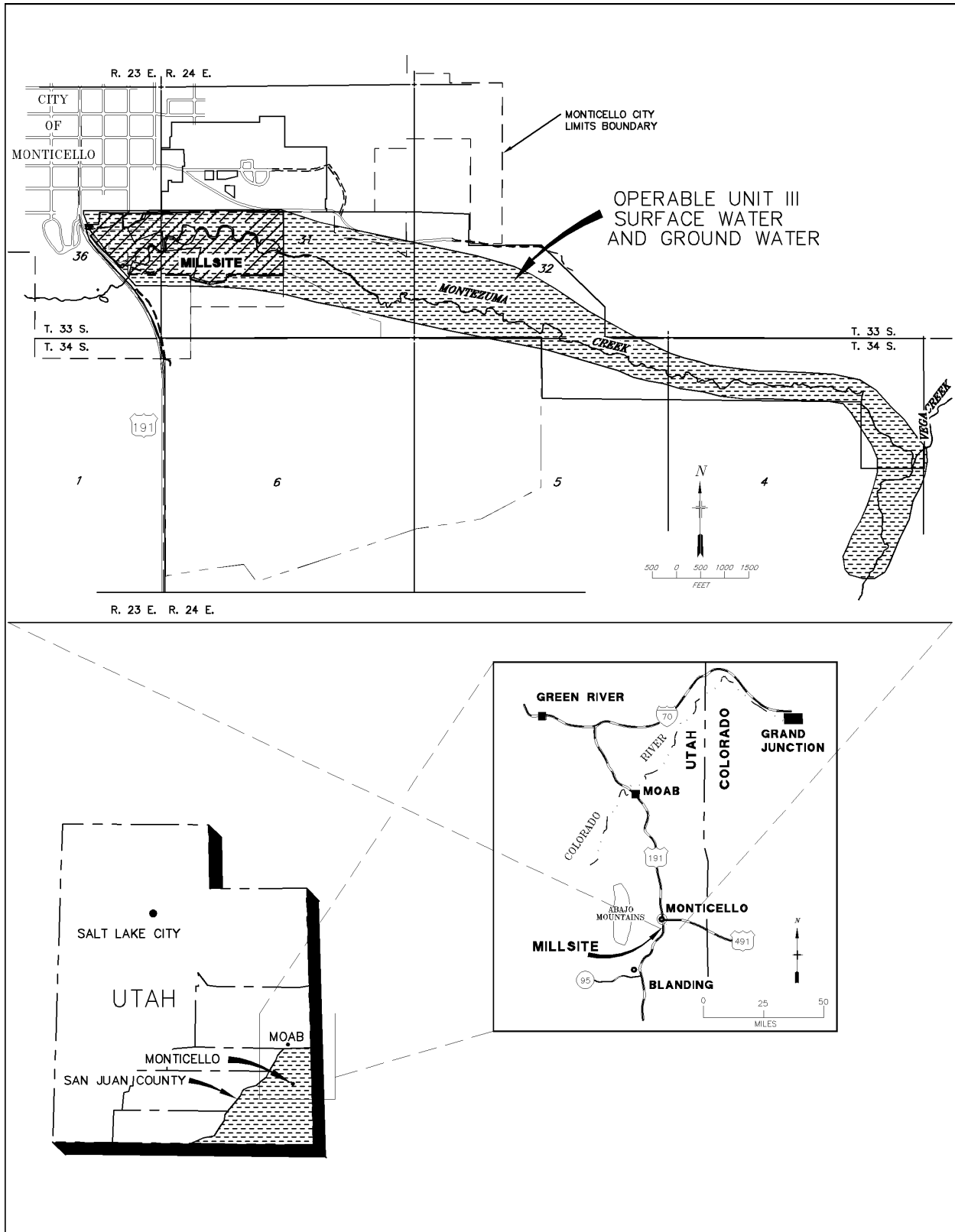
———, 2004b. *Final Report, Phase II: Performance Evaluation of Permeable Reactive Barriers and Potential for Rejuvenation by Chemical Flushing*, Environmental Sciences Laboratory, GJO-2004-552-TAC, ESL-RPT-2004-01, prepared for the U.S. Department of Energy, Grand Junction, Colorado, January.

———, 2004c. *Record of Decision for the Monticello Mill Tailings Site, Operable Unit III, Surface Water and Ground Water, Monticello, Utah*, DOE-LM/GJ629-2004, prepared for the U.S. Department of Energy Office of Legacy Management, Grand Junction, Colorado, June.

End of current text

Table 1. Estimated Hydraulic Conductivity Values From Slug Tests

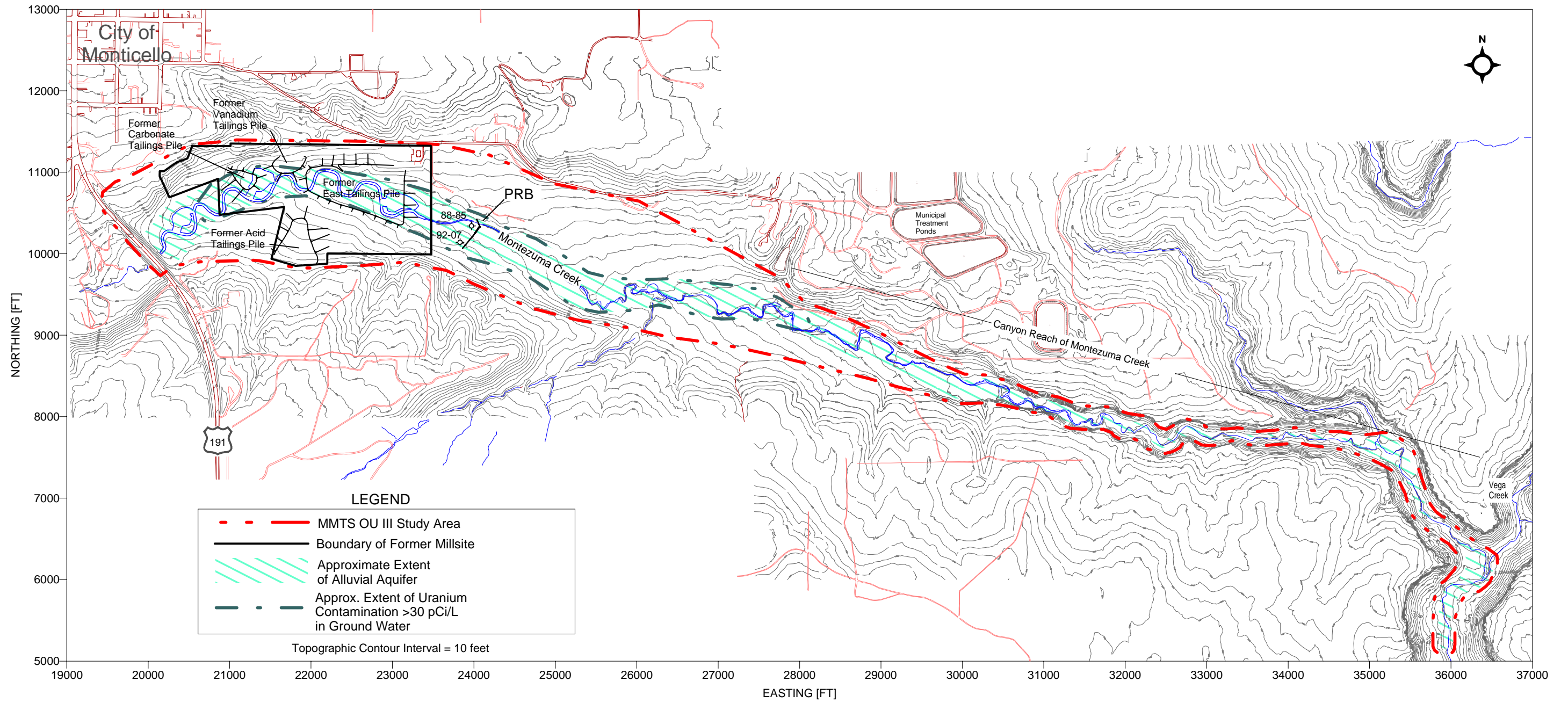
Well ID	Zone	Hydraulic Conductivity [cm/s]		
		Jun 2000	Aug 2003	Nov-2004
R1-M2	alluvium	1.4 E-03	2.3 E-03	4.8 E-03
R1-M3	alluvium	6.5 E-03	6.2 E-03	2.2 E-03
T1-D	alluvium	6.6 E-03		4.7 E-03
TW-01	alluvium	1.2 E-02		8.0 E-03
TW-02	alluvium	8.0 E-03		7.7 E-03
TW-03	alluvium	1.3 E-02		6.3 E-03
TW-04	alluvium	1.0 E-02		1.7 E-02
TW-05	alluvium	2.1 E-03		2.8 E-03
TW-06	alluvium	3.2 E-03		3.5 E-03
R2-M1	gravel/ZVI		6.9 E-03	2.8 E-03
R2-M2	gravel/ZVI		3.9 E-03	3.4 E-03
R2-M3	gravel/ZVI		3.6 E-03	2.9 E-03
R2-M4	gravel/ZVI		6.6 E-03	1.0 E-03
R2-M5	gravel/ZVI		8.0 E-03	2.0 E-03
R2-M6	gravel/ZVI		1.1 E-02	6.0 E-03
R2-M7	gravel/ZVI		3.7 E-03	1.0 E-03
R2-M8	gravel/ZVI		9.5 E-04	6.5 E-04
R2-M9	gravel/ZVI		1.3 E-02	9.7 E-03
R2-M10	gravel/ZVI		1.7 E-03	2.5 E-05
T2-D	gravel/ZVI		5.6 E-03	5.4 E-03
T2-S	gravel/ZVI		8.0 E-03	3.5 E-03
R3-M1	gravel/ZVI		1.6 E-03	1.4 E-03
R3-M2	gravel/ZVI		2.3 E-03	2.7 E-03
R3-M3	gravel/ZVI		2.9 E-03	2.8 E-03
R3-M4	gravel/ZVI		9.0 E-03	6.6 E-03
T3-D	gravel/ZVI		1.1 E-02	1.3 E-03
T3-S	gravel/ZVI		3.0 E-03	1.6 E-03
R4-M1	ZVI		1.1 E-03	1.4 E-04
R4-M2	ZVI	2.0 E-02	4.3 E-03	6.5 E-04
R4-M3	ZVI		5.1 E-04	3.2 E-05
R4-M4	ZVI		5.0 E-04	3.1 E-05
R4-M5	ZVI		3.5 E-03	2.9 E-04
R4-M6	ZVI		1.8 E-03	3.0 E-04
R4-M7	ZVI		3.0 E-03	4.7 E-04
R4-M8	ZVI	1.8 E-02	9.6 E-04	1.1 E-04
T4-D	ZVI	2.2 E-02	2.0 E-03	1.8 E-04
T4-S	ZVI		1.8 E-02	8.6 E-03
TW-12	ZVI		5.4 E-02	5.7 E-03
TW-13	ZVI		5.2 E-02	7.2 E-03
R5-M1	ZVI		6.6 E-03	1.0 E-03
R5-M2	ZVI		2.0 E-03	5.9 E-04
R5-M3	ZVI		4.3 E-03	4.9 E-04
R5-M4	ZVI		1.1 E-02	1.6 E-03
R5-M5	ZVI		6.4 E-03	4.2 E-03
R5-M6	ZVI		2.8 E-02	9.3 E-03
R5-M7	ZVI		2.1 E-02	9.2 E-03
R5-M8	ZVI		1.0 E-02	3.3 E-03
R5-M9	ZVI		9.9 E-04	1.9 E-04
R5-M10	ZVI		2.0 E-03	5.0 E-04
T5-D	ZVI		1.4 E-03	1.2 E-05
T5-S	ZVI		2.7 E-03	5.0 E-04



M:\LTS\111\0038\20\S01623\S0162300.DWG 01/27/05 12:53pm J50191

S0162300

Figure 1. Site Location Map



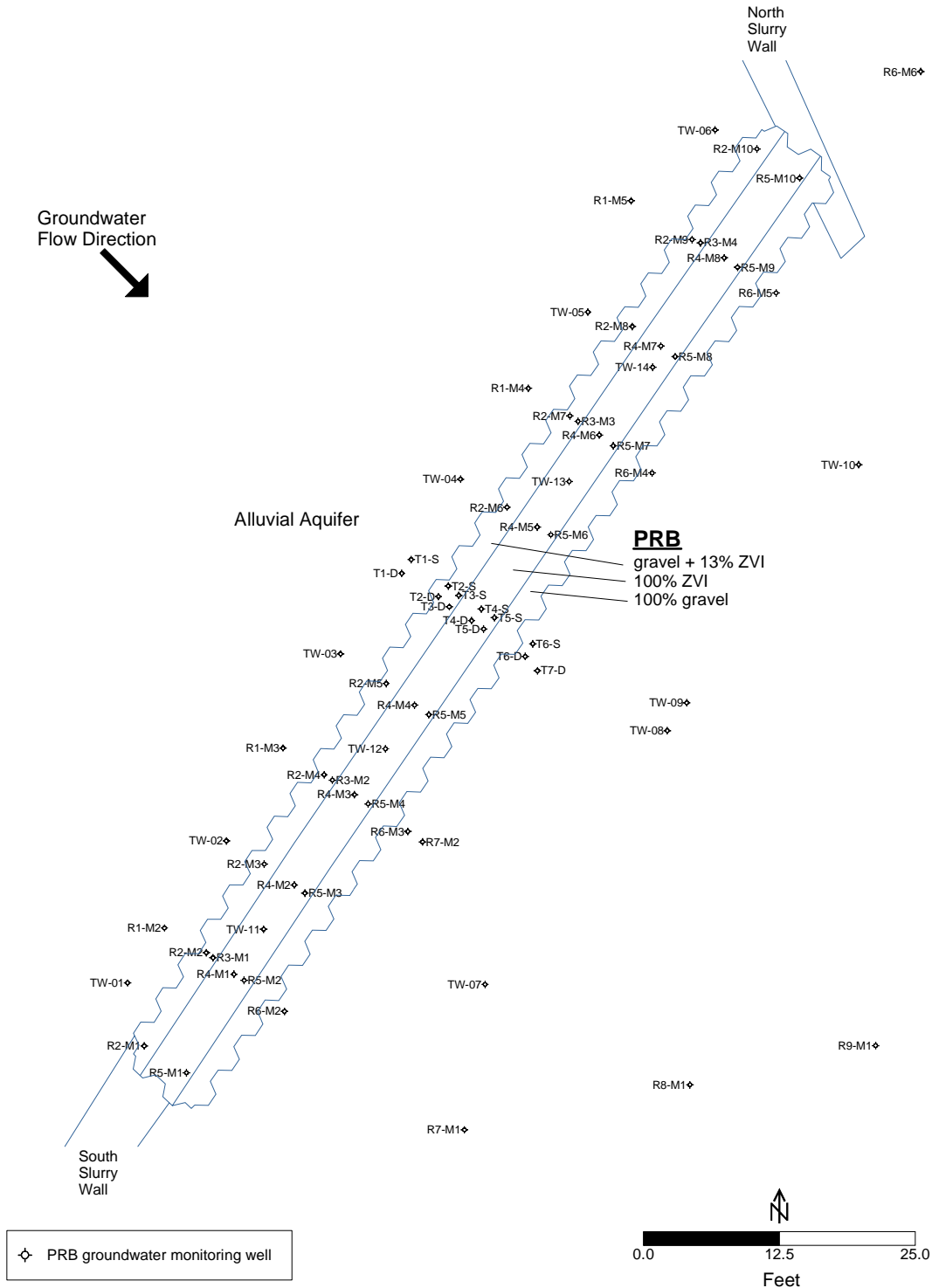


Figure 3. Monticello Permeable Reactive Barrier

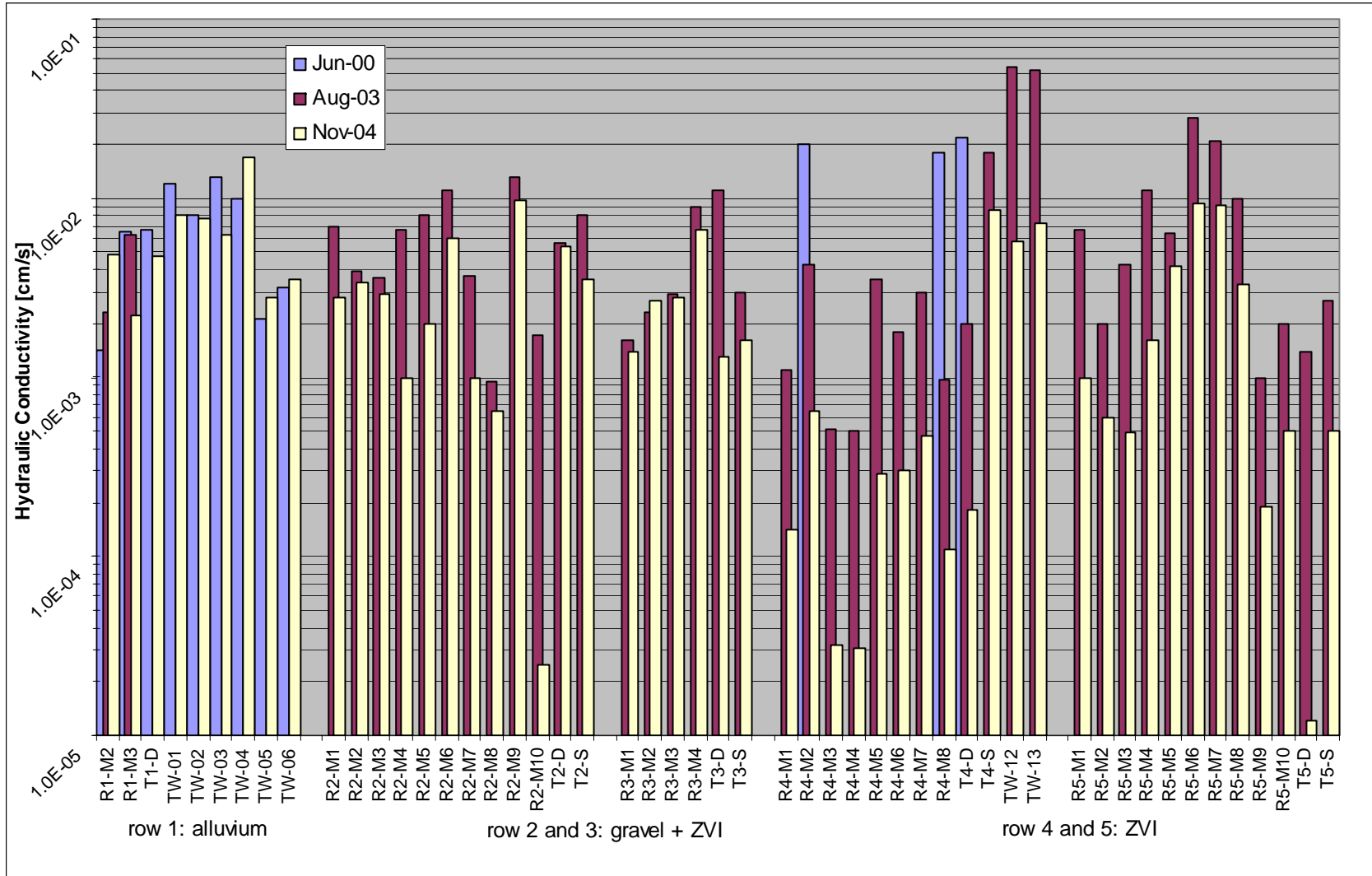


Figure 4. Summary of Hydraulic Conductivity Estimates From Slug Tests

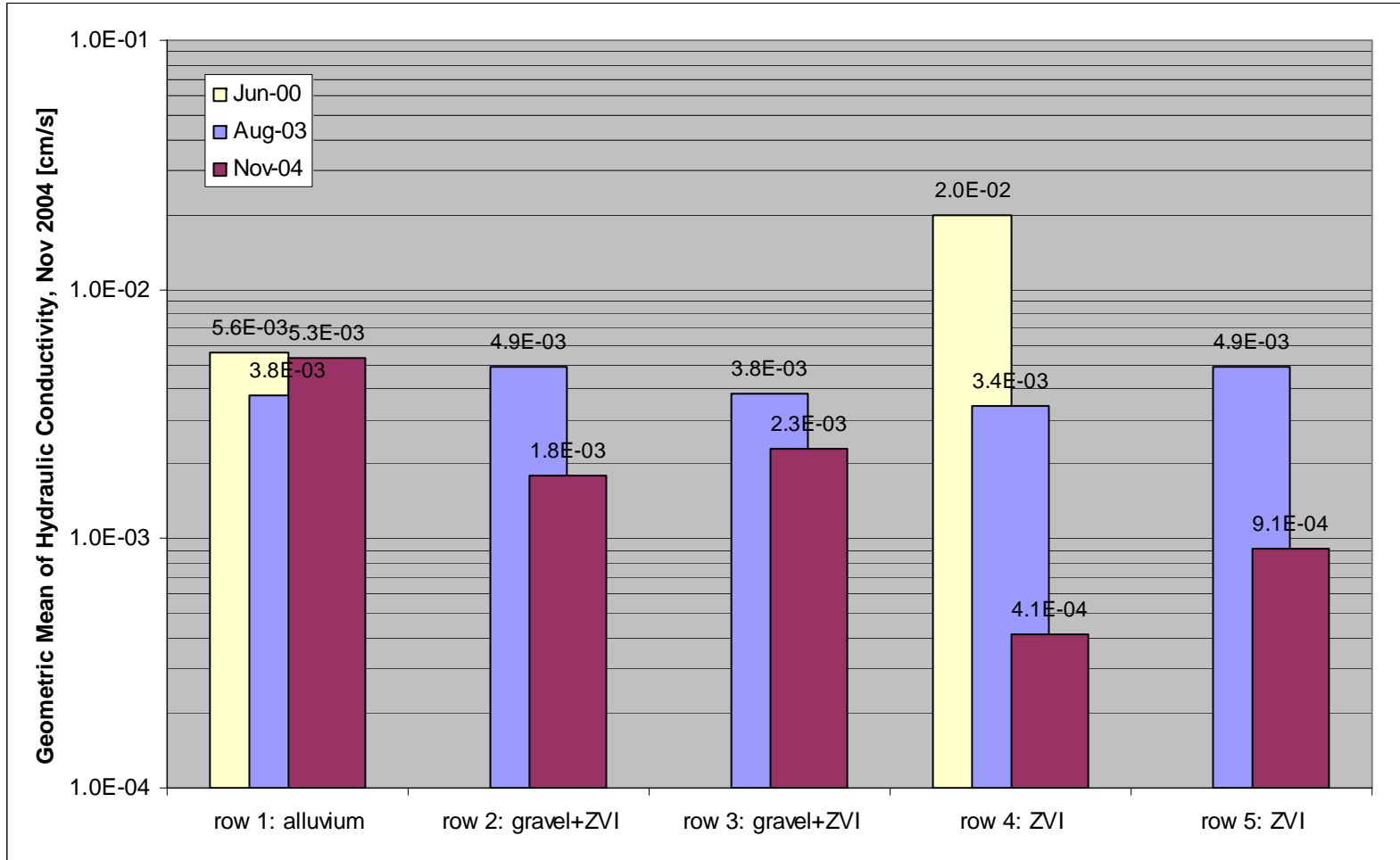


Figure 5. Geometric Mean of Hydraulic Conductivity for PRB Zones

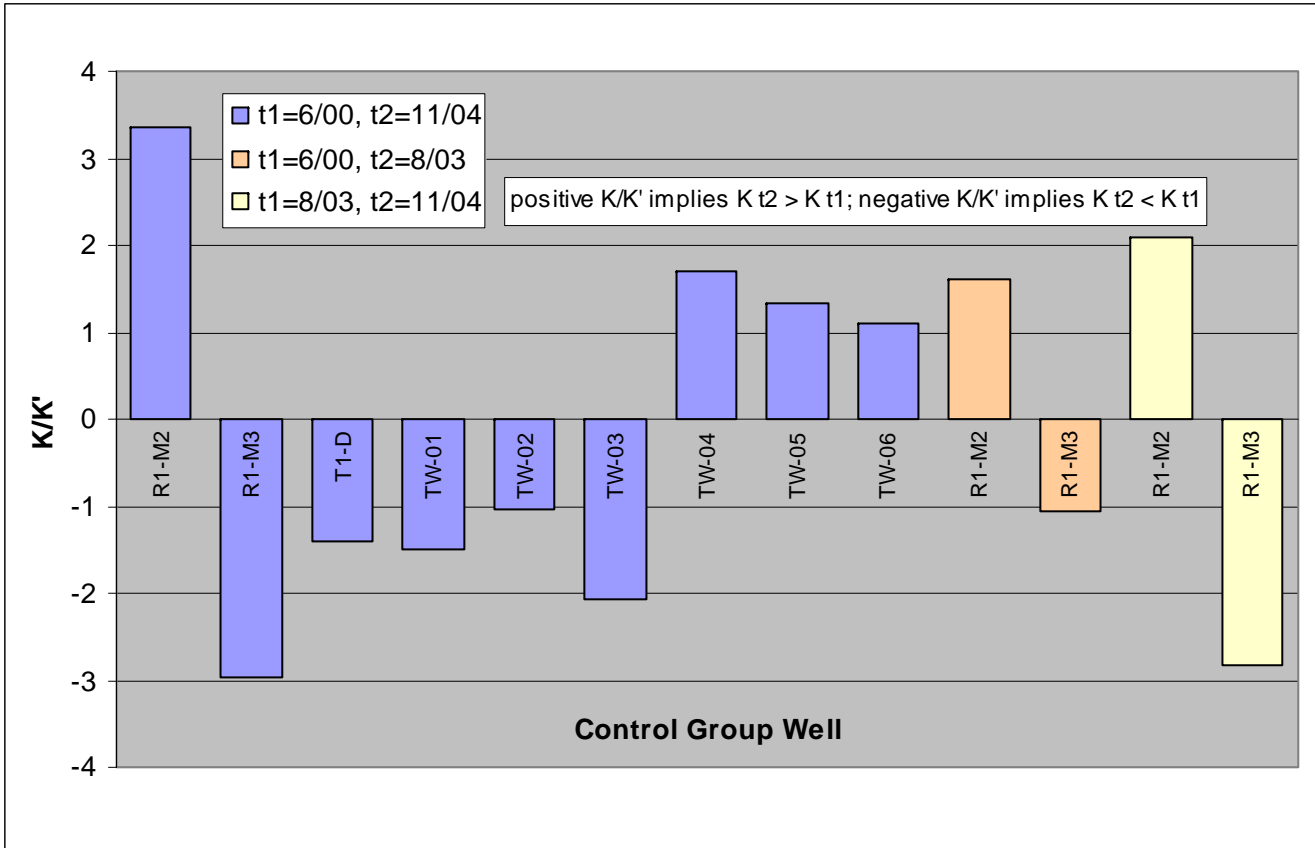


Figure 6. Hydraulic Conductivity Variation Among Alluvial Aquifer Wells, June 2000 to November 2004

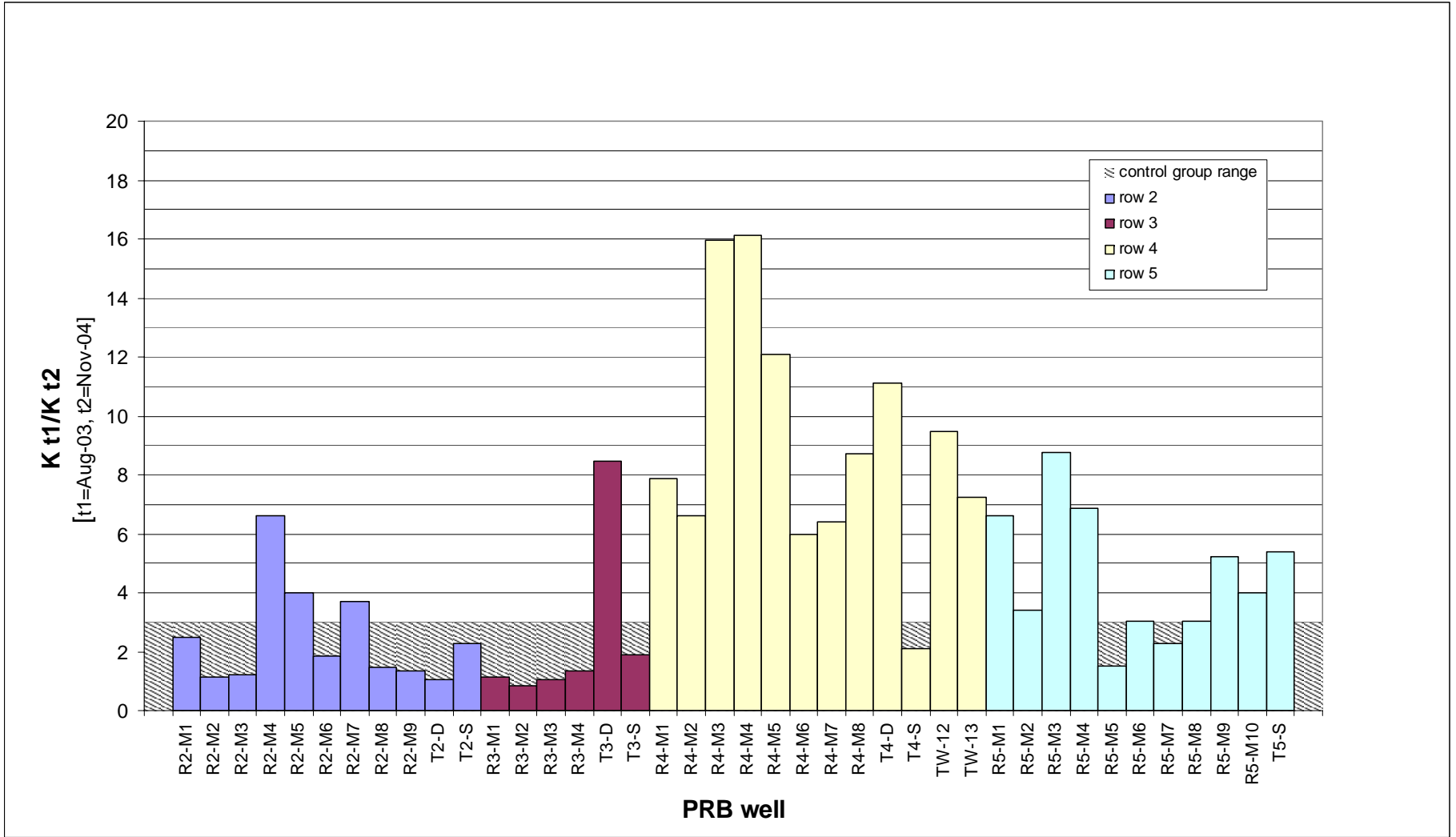


Figure 7. Ratio of Variation in Hydraulic Conductivity, June 2000 to November 2004

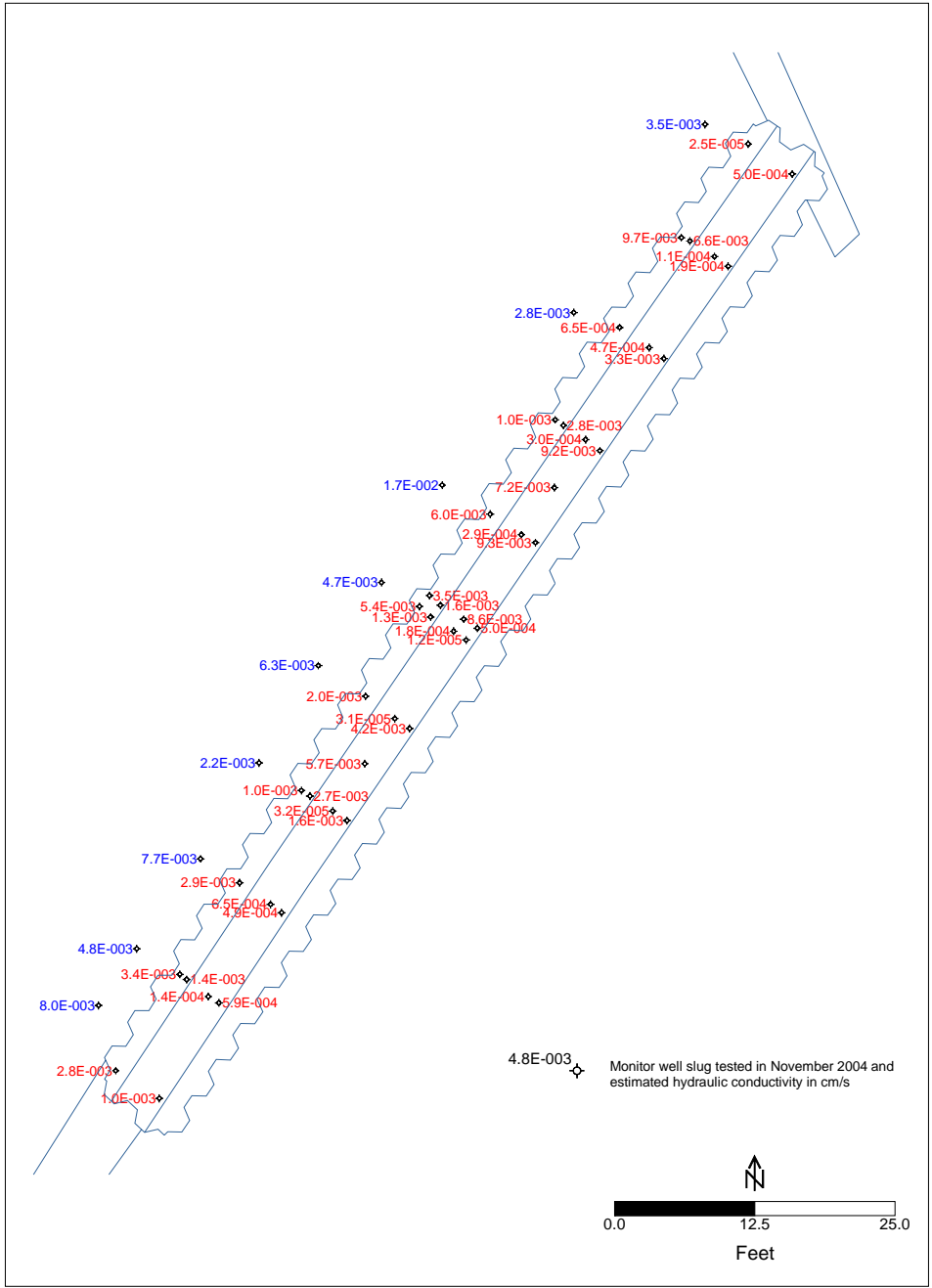


Figure 8. Hydraulic Conductivity Estimates, November 2004 Slug Tests

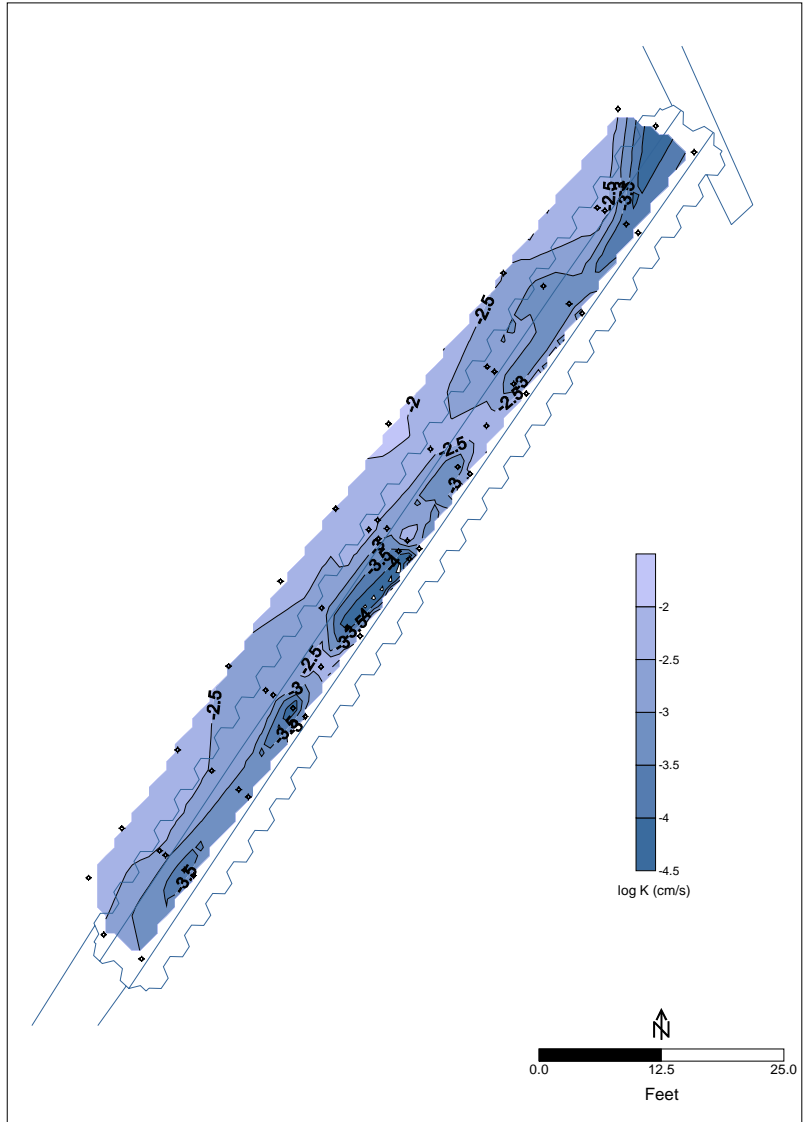


Figure 9. Contour Map of the Logarithm of the Hydraulic Conductivity, November 2004 Slug Tests

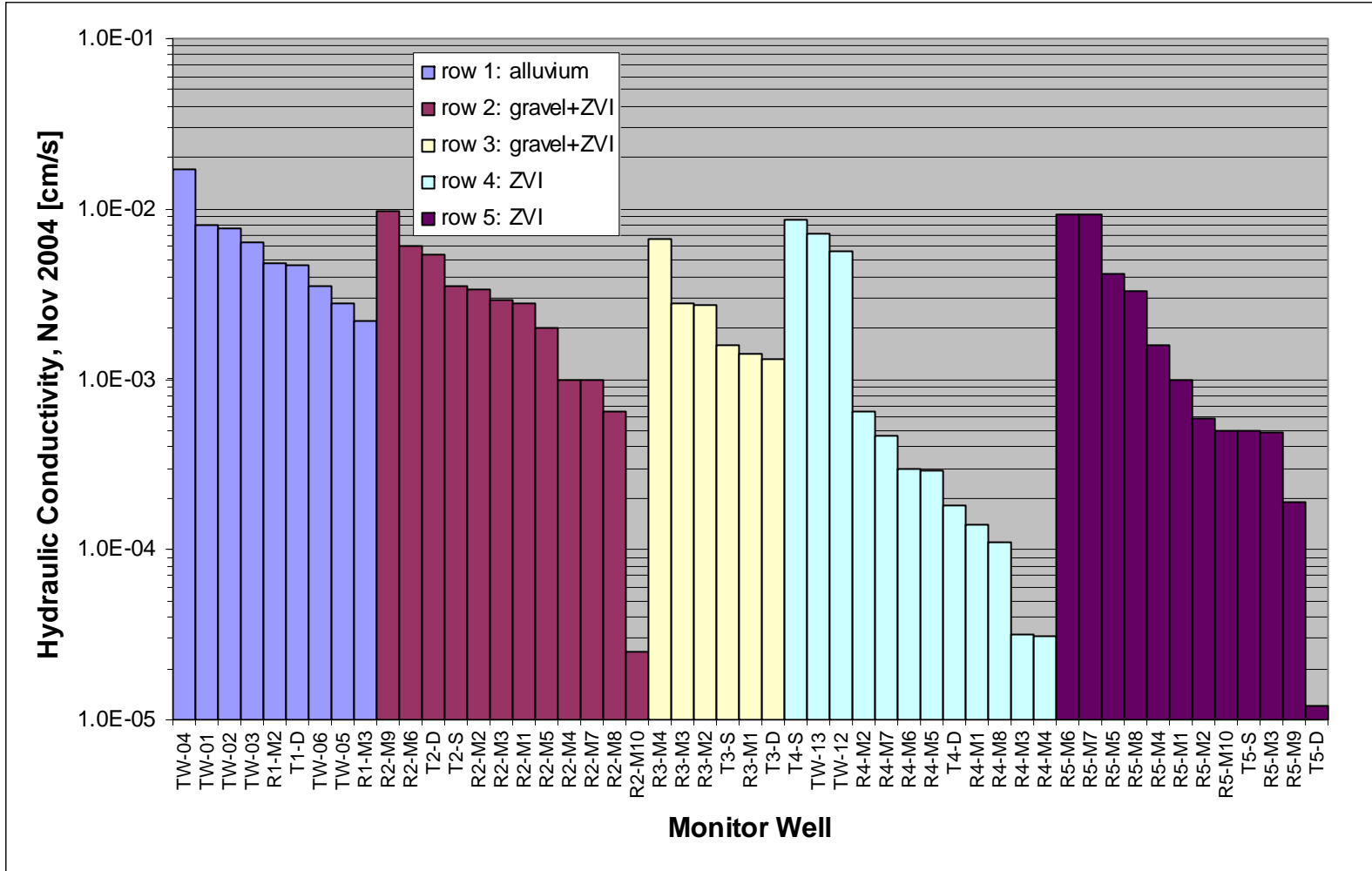


Figure 10. Hydraulic Conductivity Distribution in PRB Zones, November 2004

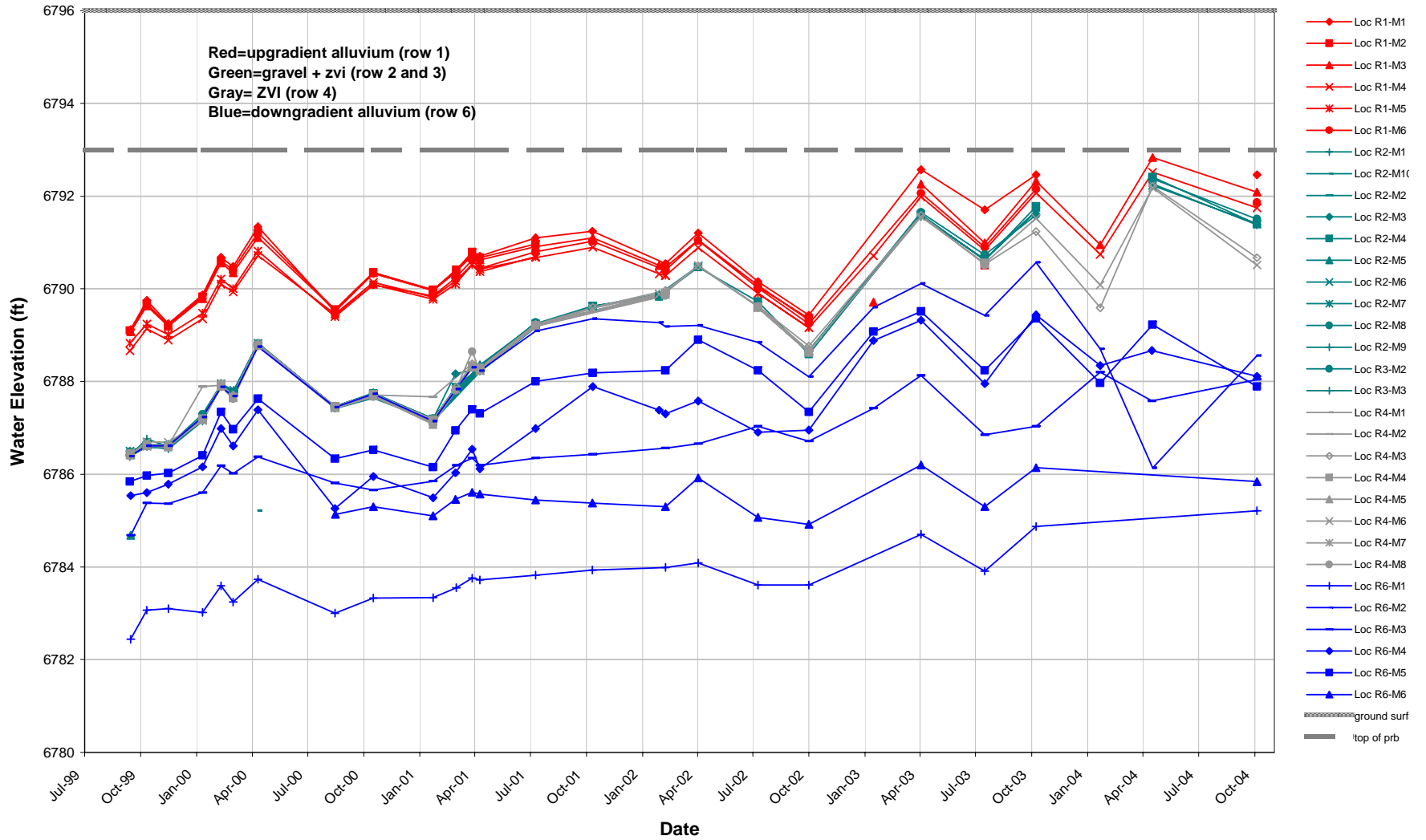


Figure 11. Water Level Hydrographs for PRB Wells

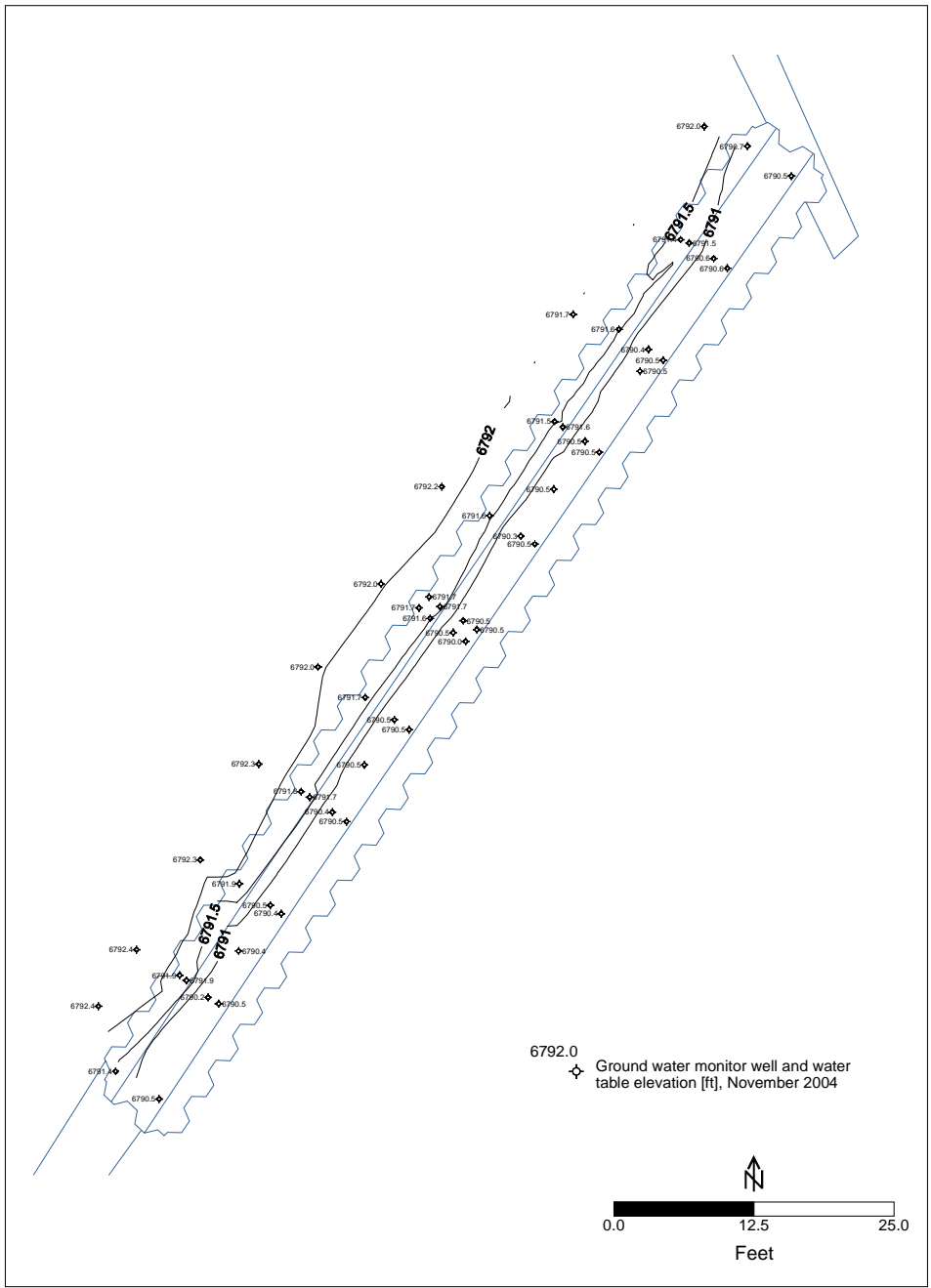


Figure 12. Contour Map of Water Table at PRB, November 2004

Appendix A
Slug Tests Results

Table A-1. June 2000 Slug Tests Results, Monticello PRB

Well	K ₁ cm/s	K ₂ cm/s	K ₃ cm/s	Mean cm/s
Alluvium				
R1M2	1.6×10^{-3}	1.3×10^{-3}	1.4×10^{-3}	1.4×10^{-3}
R1M3	7.3×10^{-3}	5.9×10^{-3}	6.2×10^{-3}	6.5×10^{-3}
TW01	1.1×10^{-2}	1.2×10^{-2}	1.2×10^{-2}	1.2×10^{-2}
TW02	7.3×10^{-3}	8.3×10^{-3}	8.3×10^{-3}	8.0×10^{-3}
TW03	1.3×10^{-2}	1.3×10^{-2}	1.3×10^{-2}	1.3×10^{-2}
TW04	1.1×10^{-2}	8.6×10^{-3}	1.1×10^{-2}	1.0×10^{-2}
TW05	2.1×10^{-3}	1.5×10^{-3}	1.7×10^{-3}	1.8×10^{-3}
TW06	3.2×10^{-3}	3.7×10^{-3}	3.7×10^{-3}	3.5×10^{-3}
T1-D	7.1×10^{-3}	5.5×10^{-3}	7.1×10^{-3}	6.6×10^{-3}
ZVI				
T4-D	1.8×10^{-2}	2.3×10^{-2}	2.0×10^{-2}	2.2×10^{-2}
R4-M2	2.0×10^{-2}	2.0×10^{-2}	2.0×10^{-2}	2.0×10^{-2}
R4-M8	1.8×10^{-2}	1.8×10^{-2}		

Table A-2. June 2000 Slug Test Parameters

Monticello PRB: 6_00 slug test parameters, water levels are approximate based on well hydrograph interpolation.									
Well	Depth to Bedrock [ft, bgs]	Depth to Bedrock [ft, btoc]	Stickup [ft, gs]	Well Depth [ft, btoc]	Bottom of Screen [ft, bgs]	Bottom of Screen [ft, btoc]	Top of Screen [ft, bgs]	Top of Screen [ft, btoc]	
R1-M2	13.8	13.8	0	15.49	15.09	15.09	10.09	10.09	
R1-M3	13.5	13.51	0.01	13.91	13.5	13.51	8.5	8.51	
R4-M2	14.8	14.77	-0.03	14.83	14.46	14.43	9.46	9.43	
R4-M8	14.7	14.67	-0.03	14.7	14.33	14.3	9.33	9.3	
T1-D	13.6	13.6	-0.08	13.49	13.17	13.09	8.17	8.09	
T4-D	15	15.03	0.03	14.97	14.54	14.57	9.54	9.57	
TW-01	13	12.64	-0.36	13.34	13.35	12.99	8.35	7.99	
TW-02	12.5	12.12	-0.38	12.42	12.45	12.07	7.45	7.07	
TW-03	12	11.71	-0.29	13.04	12.98	12.69	7.98	7.69	
TW-04	13.5	13.23	-0.27	13.34	13.26	12.99	8.26	7.99	
TW-05	13.5	13.09	-0.41	12.47	12.53	12.12	7.53	7.12	
TW-06	13	12.65	-0.35	12.74	12.74	12.39	7.74	7.39	
	6_00 DTW BTOC ft APPROX	D ft = sat thick	L = intake length ft	H = water table to bottom of intake ft	Screen Top Depth ft	rc ft	rw ft	diam casing ft	diam well ft
R1-M2	5.71	8.09	3.71	8.09	4.38	0.04167	0.09200	0.08333	0.18400
R1-M3	5.08	8.43	5	8.43	3.43	0.04167	0.09200	0.08333	0.18400
R4-M2	6.96	7.81	5	7.47	2.47	0.04167	0.04167	0.08333	0.08333
R4-M8	6.59	8.08	5	7.71	2.71	0.04167	0.04167	0.08333	0.08333
T1-D	5.29	8.31	5	7.8	2.8	0.04167	0.09200	0.08333	0.18400
T4-D	6.7	8.33	5	7.87	2.87	0.04167	0.04167	0.08333	0.08333
TW-01	5.61	7.03	4.65	7.03	2.38	0.08333	0.24000	0.16666	0.48000
TW-02	5	7.12	5	7.07	2.07	0.08333	0.24000	0.16666	0.48000
TW-03	5.07	6.64	4.02	6.64	2.62	0.08333	0.24000	0.16666	0.48000
TW-04	4.83	8.4	5	8.16	3.16	0.08333	0.24000	0.16666	0.48000
TW-05	5.09	8	5	7.03	2.03	0.08333	0.24000	0.16666	0.48000
TW-06	4.97	7.68	5	7.42	2.42	0.08333	0.24000	0.16666	0.48000

Table A-3. August 2003 Slug Test Results, Monticello PRB

Well	K ₁ cm/s	K ₂ cm/s	K ₃ cm/s	Mean cm/s
Alluvium				
R1M5	3.6×10^{-3}	3.8×10^{-3}	3.6×10^{-3}	3.7×10^{-3}
R1M2	2.6×10^{-3}	2.2×10^{-3}	2.1×10^{-3}	2.3×10^{-3}
R1M3	4.9×10^{-3}	7.2×10^{-3}	6.5×10^{-3}	6.2×10^{-3}
Gravel and ZVI				
R2M1	6.6×10^{-3}	6.9×10^{-3}	7.1×10^{-3}	6.9×10^{-3}
R2M10	1.6×10^{-3}	1.7×10^{-3}	1.9×10^{-3}	1.7×10^{-3}
R2M2	3.8×10^{-3}	3.9×10^{-3}	4.0×10^{-3}	3.9×10^{-3}
R2M3	3.6×10^{-3}	3.6×10^{-3}	3.7×10^{-3}	3.6×10^{-3}
R2M4	2.1×10^{-3}	2.3×10^{-3}	2.4×10^{-3}	2.3×10^{-3}
R2M5	7.5×10^{-3}	8.0×10^{-3}	8.5×10^{-3}	8.0×10^{-3}
R2M6	1.1×10^{-2}	1.1×10^{-2}	1.1×10^{-2}	1.1×10^{-2}
R2M7	3.5×10^{-3}	3.7×10^{-3}	3.9×10^{-3}	3.7×10^{-3}
R2M8	9.2×10^{-4}	9.8×10^{-4}	9.5×10^{-4}	9.5×10^{-4}
R2M9	1.2×10^{-2}	1.3×10^{-2}	1.3×10^{-2}	1.3×10^{-2}
T2D	5.7×10^{-3}	5.5×10^{-3}	5.7×10^{-3}	5.6×10^{-3}
T2S	7.8×10^{-3}	7.9×10^{-3}	8.4×10^{-3}	8.0×10^{-3}
R3M1	1.4×10^{-3}	1.6×10^{-3}	1.7×10^{-3}	1.6×10^{-3}
R3M2	2.1×10^{-3}	2.2×10^{-3}	2.6×10^{-3}	2.3×10^{-3}
R3M3	2.8×10^{-3}	3.0×10^{-3}	3.0×10^{-3}	2.9×10^{-3}
R3M4	8.9×10^{-3}	8.7×10^{-3}	9.5×10^{-3}	9.0×10^{-3}
T3D	1.2×10^{-2}	1.1×10^{-2}	1.0×10^{-2}	1.1×10^{-2}
T3S	2.4×10^{-3}	3.1×10^{-3}	3.4×10^{-3}	3.0×10^{-3}
ZVI				
R4M1	1.2×10^{-3}	1.1×10^{-3}	1.1×10^{-3}	1.1×10^{-3}
R4M2	4.4×10^{-3}	4.3×10^{-3}	4.3×10^{-3}	4.3×10^{-3}
R4M3	5.2×10^{-4}	5.1×10^{-4}	5.1×10^{-4}	5.1×10^{-4}
R4M4	5.0×10^{-4}	4.8×10^{-4}	5.2×10^{-4}	5.0×10^{-4}
R4M5	3.4×10^{-3}	3.5×10^{-3}	3.5×10^{-3}	3.5×10^{-3}
R4M6	1.8×10^{-3}	1.8×10^{-3}	1.8×10^{-3}	1.8×10^{-3}
R4M7	2.9×10^{-3}	3.0×10^{-3}	3.0×10^{-3}	3.0×10^{-3}
R4M8	9.8×10^{-4}	9.7×10^{-4}	9.3×10^{-4}	9.6×10^{-4}
T4D	2.1×10^{-3}	2.0×10^{-3}	1.9×10^{-3}	2.0×10^{-3}
T4S	1.9×10^{-2}	1.8×10^{-2}	1.8×10^{-2}	1.8×10^{-2}
TW13	5.3×10^{-2}	4.9×10^{-2}	5.4×10^{-2}	5.2×10^{-2}
TW12	5.5×10^{-2}	4.9×10^{-2}	5.7×10^{-2}	5.4×10^{-2}
R5M1	6.7×10^{-3}	6.8×10^{-3}	6.4×10^{-3}	6.6×10^{-3}
R5M2	2.1×10^{-3}	2.0×10^{-3}	2.0×10^{-3}	2.0×10^{-3}
R5M3	4.3×10^{-3}	4.2×10^{-3}	4.3×10^{-3}	4.3×10^{-3}
R5M4	1.1×10^{-2}	1.1×10^{-2}	1.1×10^{-2}	1.1×10^{-2}
R5M5	6.5×10^{-3}	6.3×10^{-3}	6.5×10^{-3}	6.4×10^{-3}
R5M6	3.0×10^{-2}	2.7×10^{-2}	2.7×10^{-2}	2.8×10^{-2}
R5M7	2.0×10^{-2}	2.0×10^{-2}	2.2×10^{-2}	2.1×10^{-2}
R5M8	9.9×10^{-3}	1.0×10^{-2}	1.1×10^{-2}	1.0×10^{-2}
R5M9	1.0×10^{-3}	1.0×10^{-3}	9.6×10^{-4}	9.9×10^{-4}
R5M10	2.1×10^{-3}	2.1×10^{-3}	1.7×10^{-3}	2.0×10^{-3}
T5D	1.5×10^{-3}	1.3×10^{-3}	1.3×10^{-3}	1.4×10^{-3}
T5S	2.6×10^{-3}	2.6×10^{-3}	2.8×10^{-3}	2.7×10^{-3}

Table A-4. August 2003 Slug Test Parameters

Monticello PRB: 8_03 Slug Test Parameters																
Well	Depth to	Stickup	Bottom of Screen		Top of Screen		8_03		Saturated	Intake	Water Table to		Screen Top	Casing		Screen plus Pack
	Bedrock [ft, btoc]	[ft, ags]	Slot [ft, btoc]	Slot [ft, btoc]	DTW [ft, btoc]	Thickness, D [ft]	Length, L [ft]	Bottom of Intake, H [ft]	Depth [ft]	Diameter [ft]	Diameter [ft]					
R1-M2	13.80	0.00	15.09	10.09	5.36	8.4	3.7	8.44	4.7	0.083	0.184					
R1-M3	13.51	0.01	13.51	8.51	4.70	8.8	5.0	8.81	3.8	0.083	0.184					
R1-M5	11.81	-0.19	11.44	6.44	4.90	6.9	5.0	6.54	1.5	0.083	0.184					
R2-M1	15.04	0.04	15.02	10.02	6.19	8.9	5.0	8.83	3.8	0.083	0.083					
R2-M10	15.51	-0.09	15.35	10.35	4.89	10.6	5.0	10.46	5.5	0.083	0.083					
R2-M2	16.33	0.03	16.15	11.15	5.61	10.7	5.0	10.54	5.5	0.083	0.083					
R2-M3	14.53	-0.07	14.55	9.55	5.21	9.3	5.0	9.32	4.3	0.083	0.083					
R2-M4	14.24	0.04	14.03	9.03	5.09	9.2	5.0	8.94	3.9	0.083	0.083					
R2-M5	14.51	-0.09	14.43	9.43	4.98	9.5	5.0	9.45	4.5	0.083	0.083					
R2-M6	14.41	-0.09	14.2	9.20	4.99	9.4	5.0	9.21	4.2	0.083	0.083					
R2-M7	13.80	0.00	13.34	8.34	5.10	8.7	5.0	8.24	3.2	0.083	0.083					
R2-M8	12.96	-0.04	12.59	7.59	5.05	7.9	5.0	7.54	2.5	0.083	0.083					
R2-M9	14.88	-0.12	14.54	9.54	4.90	10.0	5.0	9.64	4.6	0.083	0.083					
R3-M1	16.32	0.02	15.9	10.90	5.63	10.7	5.0	10.27	5.3	0.083	0.083					
R3-M2	14.10	-0.10	14.06	9.06	5.05	9.1	5.0	9.01	4.0	0.083	0.083					
R3-M3	13.76	-0.04	13.39	8.39	5.05	8.7	5.0	8.34	3.3	0.083	0.083					
R3-M4	14.65	-0.15	14.37	9.37	4.85	9.8	5.0	9.52	4.5	0.083	0.083					
R4-M1	16.31	0.01	16.31	11.31	5.68	10.6	5.0	10.63	5.6	0.083	0.083					
R4-M2	14.77	-0.03	14.43	9.43	5.23	9.5	5.0	9.20	4.2	0.083	0.083					
R4-M3	14.06	-0.04	14	9.00	5.05	9.0	5.0	8.95	4.0	0.083	0.083					
R4-M4	14.36	-0.04	14.26	9.26	4.97	9.4	5.0	9.29	4.3	0.083	0.083					
R4-M5	14.12	-0.08	14.05	9.05	5.05	9.1	5.0	9.00	4.0	0.083	0.083					
R4-M6	13.61	-0.09	13.38	8.38	5.03	8.6	5.0	8.35	3.4	0.083	0.083					
R4-M7	13.08	-0.12	12.71	7.71	4.91	8.2	5.0	7.80	2.8	0.083	0.083					
R4-M8	14.67	-0.03	14.3	9.30	5.01	9.7	5.0	9.29	4.3	0.083	0.083					
R5-M1	15.44	-0.06	15.38	10.38	6.13	9.3	5.0	9.25	4.3	0.083	0.083					
R5-M10	15.63	0.03	16.42	11.42	4.95	10.7	4.2	10.68	6.5	0.083	0.083					
R5-M2	16.29	-0.01	16.02	11.02	5.67	10.6	5.0	10.35	5.4	0.083	0.083					
R5-M3	14.88	0.08	14.4	9.40	5.24	9.6	5.0	9.16	4.2	0.083	0.083					
R5-M4	13.96	-0.04	13.95	8.95	5.04	8.9	5.0	8.91	3.9	0.083	0.083					
R5-M5	14.33	-0.07	14.1	9.10	4.92	9.4	5.0	9.18	4.2	0.083	0.083					
R5-M6	14.10	-0.10	14.09	9.09	5.02	9.1	5.0	9.07	4.1	0.083	0.083					
R5-M7	13.80	0.00	13.11	8.11	5.02	8.8	5.0	8.09	3.1	0.083	0.083					
R5-M8	12.92	-0.18	12.69	7.69	4.84	8.1	5.0	7.85	2.9	0.083	0.083					
R5-M9	14.96	-0.04	14.59	9.59	5.00	10.0	5.0	9.59	4.6	0.083	0.083					
T2-D	14.25	-0.05	14.26	9.26	5.08	9.2	5.0	9.17	4.2	0.083	0.083					
T2-S	14.21	-0.09	9.33	4.33	4.98	9.2	5.0	4.35	-0.7	0.083	0.083					
T3-D	14.93	-0.07	14.05	9.05	5.04	9.9	5.0	9.01	4.0	0.083	0.083					
T3-S	15.07	0.07	9.91	4.91	5.04	10.0	5.0	4.87	-0.1	0.083	0.083					
T4-D	15.03	0.03	14.57	9.57	5.03	10.0	5.0	9.54	4.5	0.083	0.083					
T4-S	14.77	-0.23	9.92	4.92	4.89	9.9	5.0	5.03	0.0	0.083	0.083					
T5-D	15.01	0.01	14.78	9.78	5.02	10.0	5.0	9.76	4.8	0.083	0.083					
T5-S	15.00	0.00	10.14	5.14	5.02	10.0	5.0	5.12	0.1	0.083	0.083					
TW-12	14.18	-0.12	13.83	6.33	5.05	9.1	5.0	8.78	1.3	0.167	0.184					
TW-13	13.81	-0.19	13.46	5.96	5.04	8.8	5.0	8.42	0.9	0.167	0.184					

Table A-5. November 2004 Slug Test Results, Monticello PRB

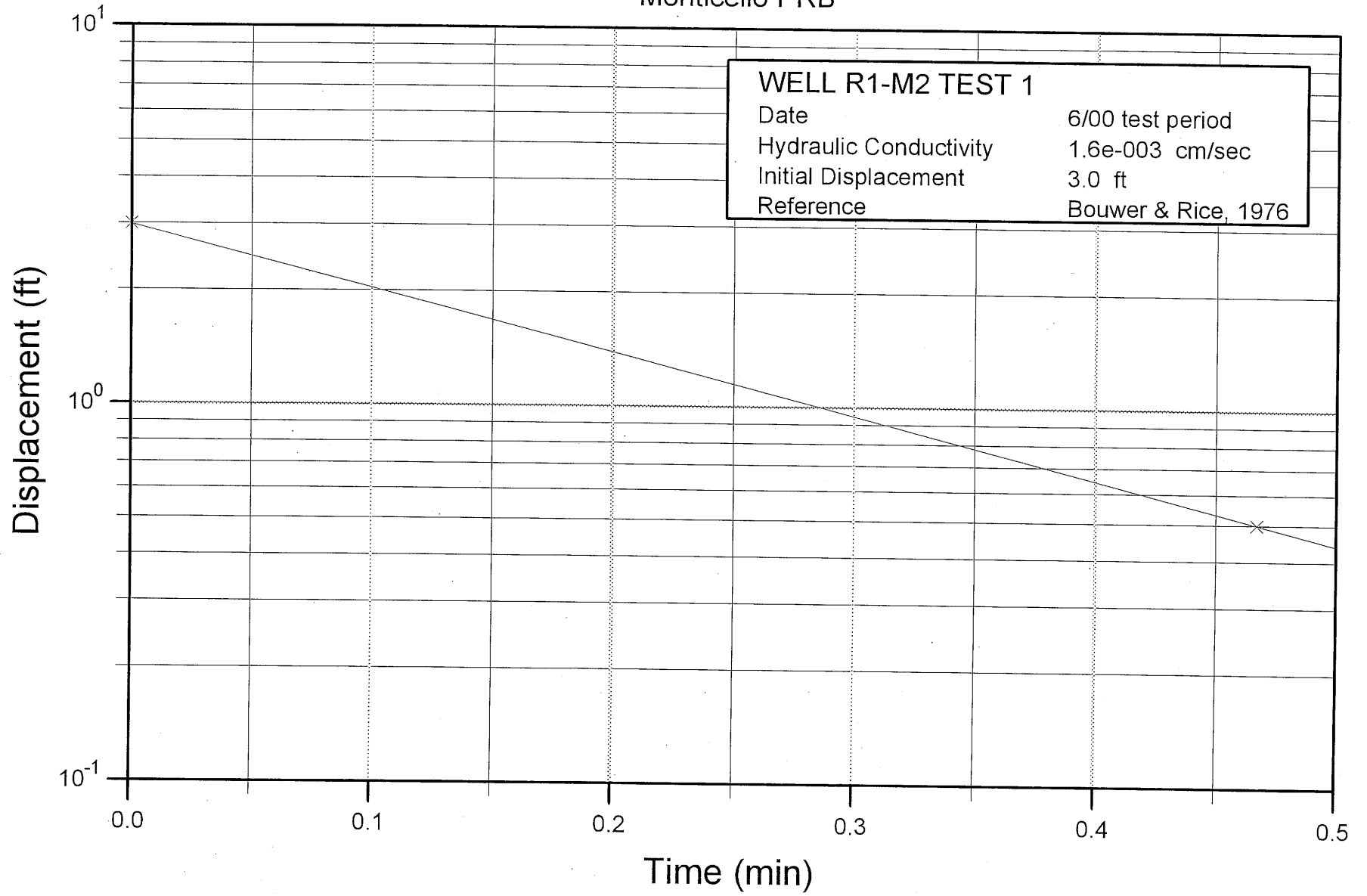
Well	K ₁ cm/s	K ₂ cm/s	K ₃ cm/s	Mean cm/s
Alluvium				
R1M2	4.8×10^{-3}	4.4×10^{-3}	5.2×10^{-3}	4.8×10^{-3}
R1M3	2.7×10^{-3}	2.1×10^{-3}	1.8×10^{-3}	2.2×10^{-3}
T1-D	5.0×10^{-3}	4.6×10^{-3}	4.4×10^{-3}	4.7×10^{-3}
TW01	8.3×10^{-3}	8.0×10^{-3}	8.0×10^{-3}	8.1×10^{-3}
TW02	7.6×10^{-3}	7.7×10^{-3}	7.7×10^{-3}	7.7×10^{-3}
TW03	6.5×10^{-3}	6.4×10^{-3}	6.0×10^{-3}	6.3×10^{-3}
TW04	1.8×10^{-2}	1.7×10^{-2}	1.7×10^{-2}	1.7×10^{-2}
TW05	2.9×10^{-3}	2.8×10^{-3}	2.7×10^{-3}	2.8×10^{-3}
TW06	3.3×10^{-3}	3.5×10^{-3}	3.5×10^{-3}	3.5×10^{-3}
Gravel and ZVI				
R2M1	2.8×10^{-3}	2.8×10^{-3}	2.9×10^{-3}	2.8×10^{-3}
R2M10	2.7×10^{-5}	2.9×10^{-5}	1.8×10^{-5}	2.5×10^{-5}
R2M2	3.4×10^{-3}	3.4×10^{-3}	3.4×10^{-3}	3.4×10^{-3}
R2M3	2.8×10^{-3}	3.0×10^{-3}	3.0×10^{-3}	2.9×10^{-3}
R2M4	8.6×10^{-4}	1.0×10^{-3}	1.0×10^{-3}	1.0×10^{-3}
R2M5	2.0×10^{-3}	2.0×10^{-3}	2.0×10^{-3}	2.0×10^{-3}
R2M6	6.1×10^{-3}	5.9×10^{-3}	6.1×10^{-3}	6.0×10^{-3}
R2M7	9.4×10^{-4}	1.0×10^{-3}	1.1×10^{-3}	1.0×10^{-3}
R2M8	6.0×10^{-4}	6.4×10^{-4}	7.2×10^{-4}	6.5×10^{-4}
R2M9	1.1×10^{-2}	8.9×10^{-3}	9.3×10^{-3}	9.7×10^{-3}
T2D	5.1×10^{-3}	5.2×10^{-3}	6.0×10^{-3}	5.4×10^{-3}
T2S	3.1×10^{-3}	3.6×10^{-3}	3.8×10^{-3}	3.5×10^{-3}
R3M1	1.4×10^{-3}	1.4×10^{-3}	1.5×10^{-3}	1.4×10^{-3}
R3M2	2.6×10^{-3}	2.7×10^{-3}	2.9×10^{-3}	2.7×10^{-3}
R3M3	2.7×10^{-3}	2.9×10^{-3}	2.8×10^{-3}	2.8×10^{-3}
R3M4	5.6×10^{-3}	6.2×10^{-3}	8.1×10^{-3}	6.6×10^{-3}
T3D	1.2×10^{-3}	1.3×10^{-3}	1.3×10^{-3}	1.3×10^{-3}
T3S	1.5×10^{-3}	1.6×10^{-3}	1.8×10^{-3}	1.6×10^{-3}
ZVI				
R4M1	1.4×10^{-4}	1.4×10^{-4}	1.5×10^{-4}	1.4×10^{-4}
R4M2	7.7×10^{-4}	6.1×10^{-4}	5.7×10^{-4}	6.5×10^{-4}
R4M3	3.3×10^{-5}	3.3×10^{-5}	3.0×10^{-5}	3.2×10^{-5}
R4M4	3.0×10^{-5}	3.0×10^{-5}	3.2×10^{-5}	3.1×10^{-5}
R4M5	2.7×10^{-4}	2.7×10^{-4}	3.2×10^{-4}	2.9×10^{-4}
R4M6	3.0×10^{-4}	3.0×10^{-4}	3.0×10^{-4}	3.0×10^{-4}
R4M7	5.0×10^{-4}	4.6×10^{-4}	4.6×10^{-4}	4.7×10^{-4}
R4M8	1.2×10^{-4}	9.7×10^{-5}	1.0×10^{-4}	1.1×10^{-4}
T4D	1.9×10^{-4}	1.8×10^{-4}	1.7×10^{-4}	1.8×10^{-4}
T4S	8.9×10^{-4}	8.6×10^{-4}	8.3×10^{-4}	8.6×10^{-4}
TW11	1.1×10^{-2}	1.1×10^{-2}	1.1×10^{-2}	1.1×10^{-2}
TW12	5.9×10^{-3}	5.5×10^{-3}	5.6×10^{-3}	5.7×10^{-3}
TW13	7.2×10^{-3}	7.1×10^{-3}	7.3×10^{-3}	7.2×10^{-3}
TW14	6.7×10^{-3}	--	--	6.7×10^{-3}
R5M1	1.1×10^{-3}	1.0×10^{-3}	9.8×10^{-4}	1.0×10^{-3}
R5M2	6.1×10^{-4}	5.8×10^{-4}	5.8×10^{-4}	5.9×10^{-4}
R5M3	5.1×10^{-4}	4.9×10^{-4}	4.8×10^{-4}	4.9×10^{-4}
R5M4	1.7×10^{-3}	1.6×10^{-3}	1.4×10^{-3}	1.6×10^{-3}
R5M5	4.3×10^{-3}	4.1×10^{-3}	4.1×10^{-3}	4.2×10^{-3}
R5M6	9.6×10^{-3}	9.3×10^{-3}	9.1×10^{-3}	9.3×10^{-3}
R5M7	9.5×10^{-3}	9.1×10^{-3}	9.1×10^{-3}	9.2×10^{-3}
R5M8	3.2×10^{-3}	3.3×10^{-3}	3.3×10^{-3}	3.3×10^{-3}
R5M9	1.9×10^{-4}	1.9×10^{-4}	1.9×10^{-4}	1.9×10^{-4}
R5M10	4.9×10^{-4}	5.0×10^{-4}	5.1×10^{-4}	5.0×10^{-4}
T5D	1.4×10^{-5}	1.7×10^{-5}	1.3×10^{-5}	1.5×10^{-5}
T5S	4.7×10^{-4}	5.2×10^{-4}	5.2×10^{-4}	5.0×10^{-4}

Table A-8. Water Level Data

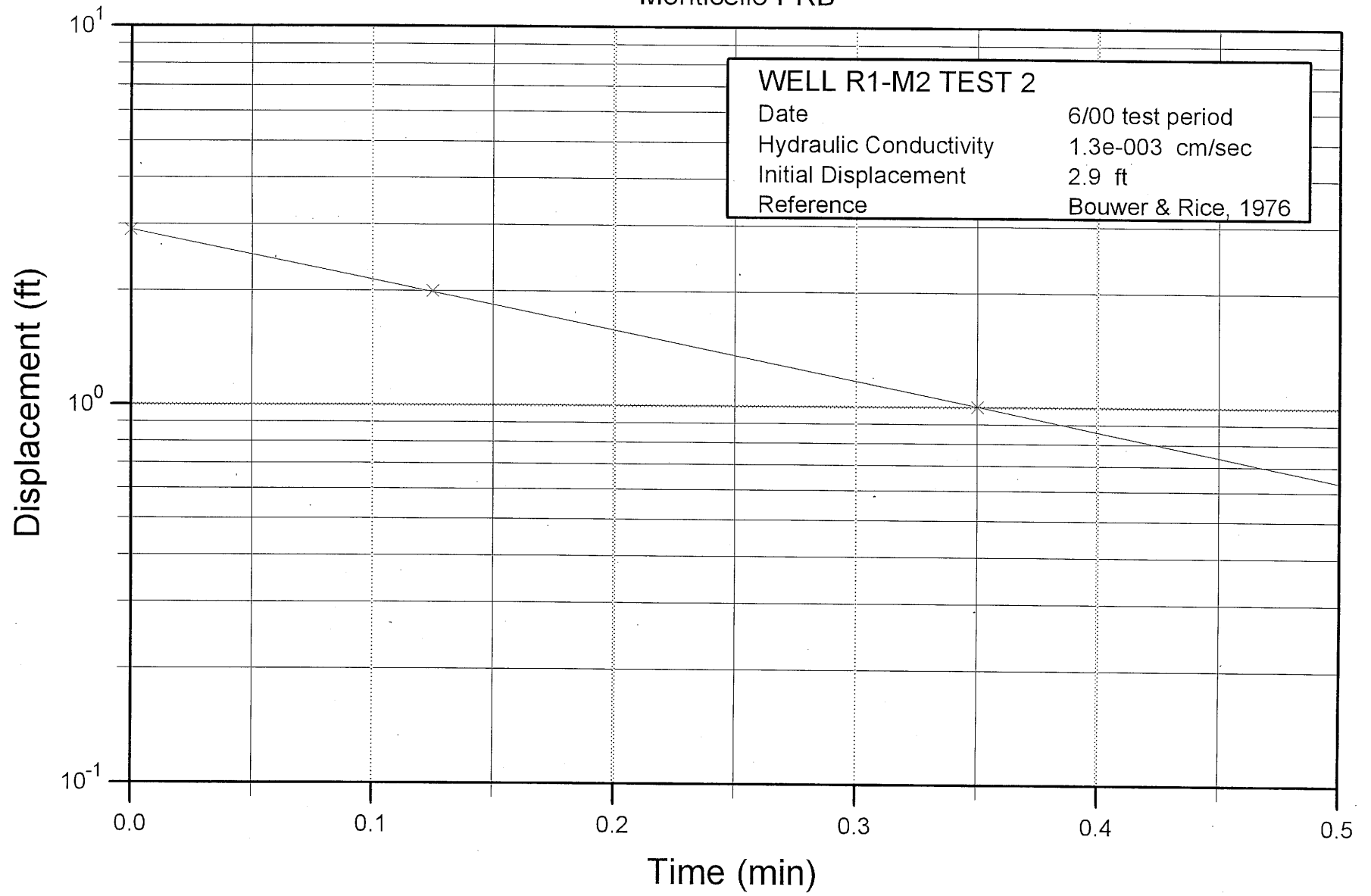
Well	Nov-04	Well	Aug-03	Well	Jun-00
R1-M2	4.21	R1-M2	5.36	R1-M2	5.71
R1-M3	3.58	R1-M3	4.70	R1-M3	5.08
R2-M1	5.53	R2-M1	6.19	R4-M2	6.96
R2-M2	4.58	R2-M2	5.61	R4-M8	6.59
R2-M3	4.11	R2-M3	5.21	T1-D	5.29
R2-M4	4.09	R2-M4	5.09	T4-D	6.70
R2-M5	4.01	R2-M5	4.98	TW-01	5.61
R2-M6	4.11	R2-M6	4.99	TW-02	5.00
R2-M7	4.27	R2-M7	5.10	TW-03	5.07
R2-M8	4.19	R2-M8	5.05	TW-04	4.83
R2-M9	4.17	R2-M9	4.90	TW-05	5.09
R2-M10	5.01	R2-M10	4.89	TW-06	4.97
R3-M1	4.52	R3-M1	5.63	June 2000 water levels are approx	
R3-M2	4.06	R3-M2	5.05		
R3-M3	4.18	R3-M3	5.05		
R3-M4	4.04	R3-M4	4.85		
R4-M1	6.23	R4-M1	5.68		
R4-M2	5.46	R4-M2	5.23		
R4-M3	5.33	R4-M3	5.05		
R4-M4	5.19	R4-M4	4.97		
R4-M5	5.43	R4-M5	5.05		
R4-M6	5.22	R4-M6	5.03		
R4-M7	5.19	R4-M7	4.91		
R4-M8	5.09	R4-M8	5.01		
R5-M1	6.37	R5-M1	6.13		
R5-M2	5.93	R5-M2	5.67		
R5-M3	5.59	R5-M3	5.24		
R5-M4	5.26	R5-M4	5.04		
R5-M5	5.12	R5-M5	4.92		
R5-M6	5.20	R5-M6	5.02		
R5-M7	5.17	R5-M7	5.02		
R5-M8	4.99	R5-M8	4.84		
R5-M9	5.08	R5-M9	5.00		
R5-M10	5.10	R5-M10	4.95		
T1-D	3.79	T2-D	5.08		
T2-D	4.09	T2-S	4.98		
T2-S	4.02	T3-D	5.04		
T3-D	4.18	T3-S	5.04		
T3-S	4.09	T4-D	5.03		
T4-D	5.20	T4-S	4.89		
T4-S	5.05	T5-D	5.02		
T5-D	5.67	T5-S	5.02		
T5-S	5.19	TW-11	5.48		
TW-01	4.11	TW-12	5.05		
TW-02	3.50				
TW-03	3.57				
TW-04	3.33				
TW-05	3.59				
TW-06	3.47				
TW-11	5.75				
TW-12	5.19				
TW-13	5.10				
TW-14	5.00				

June 2000

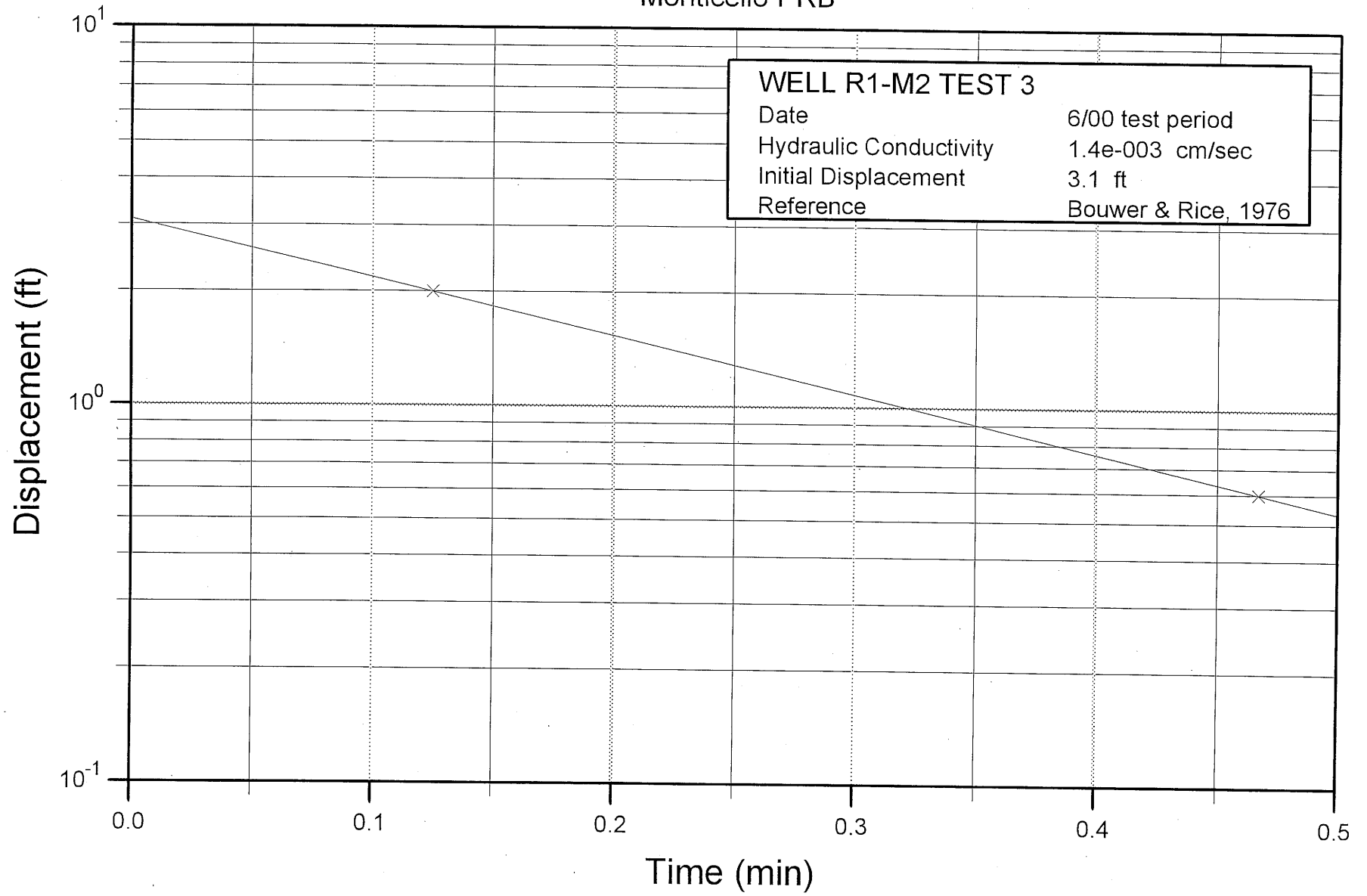
Monticello PRB



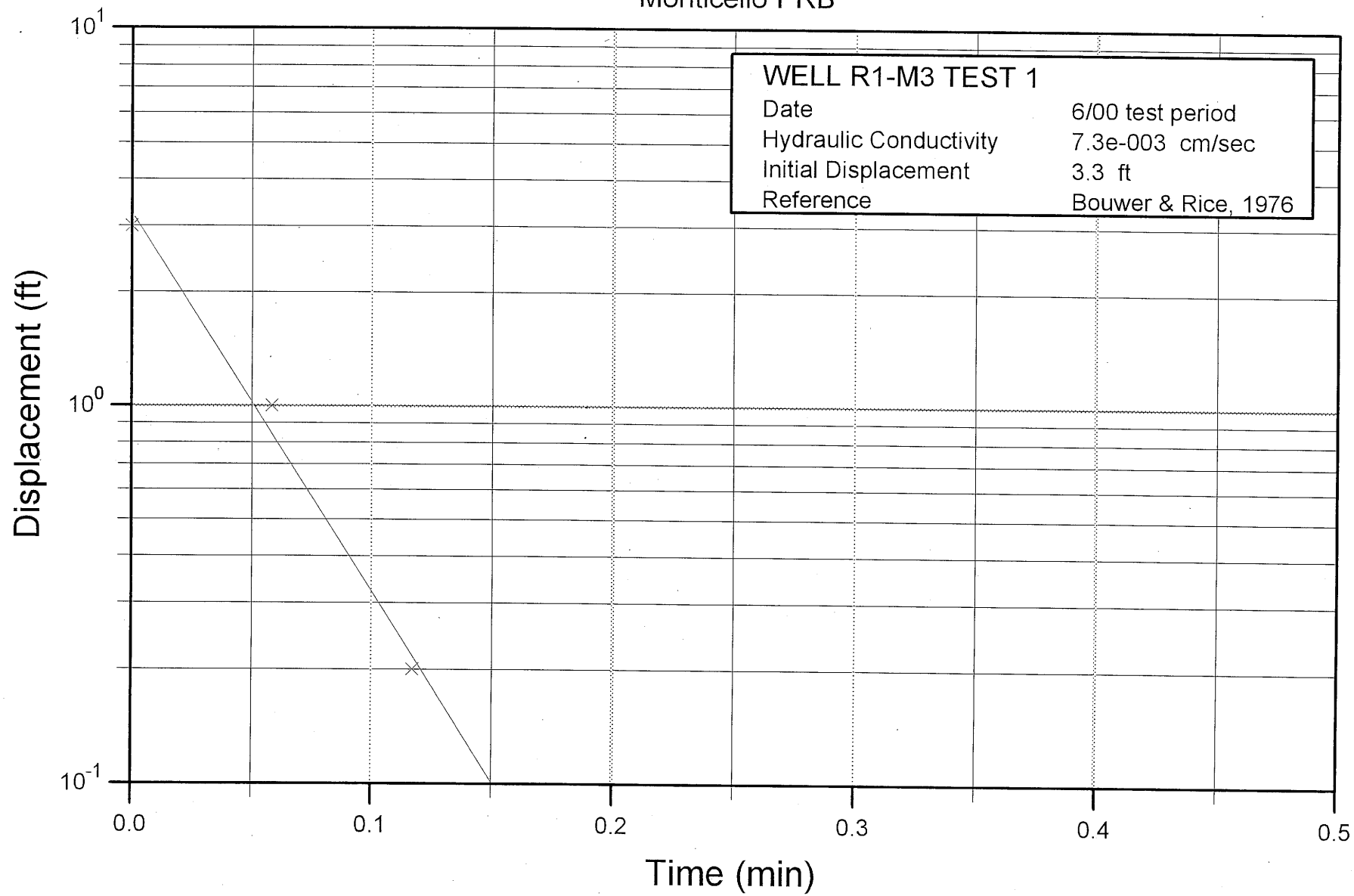
Monticello PRB



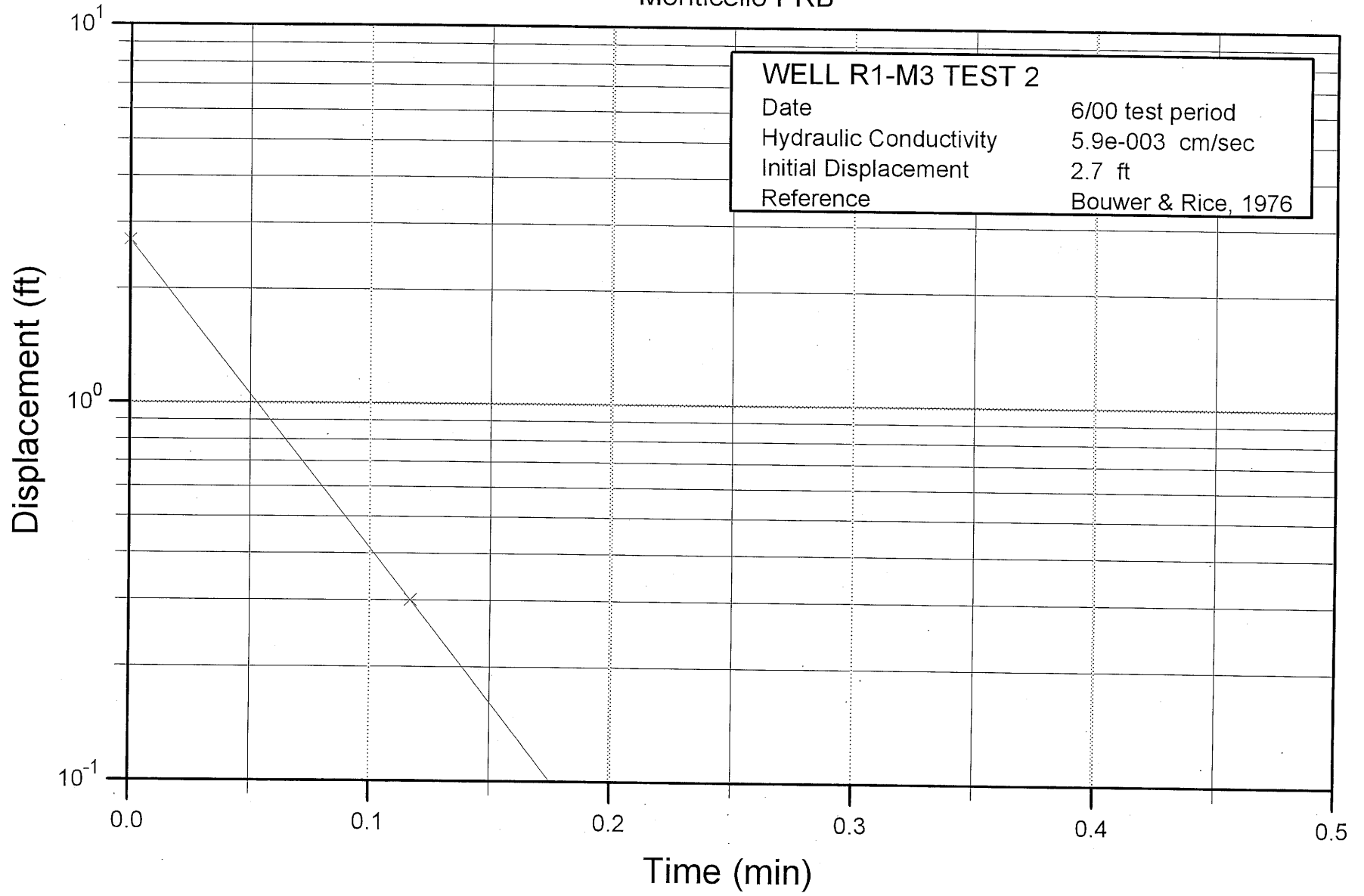
Monticello PRB



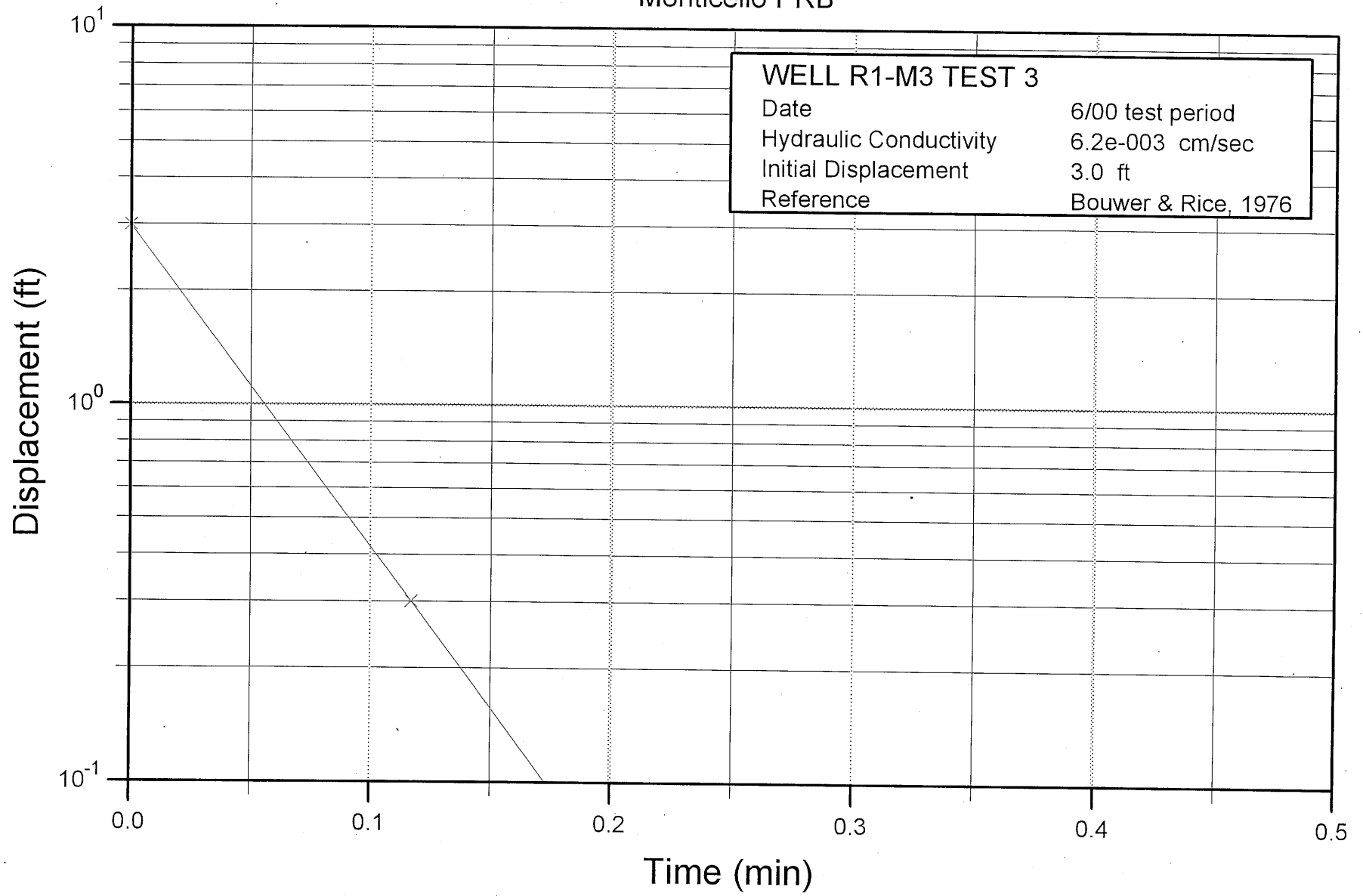
Monticello PRB



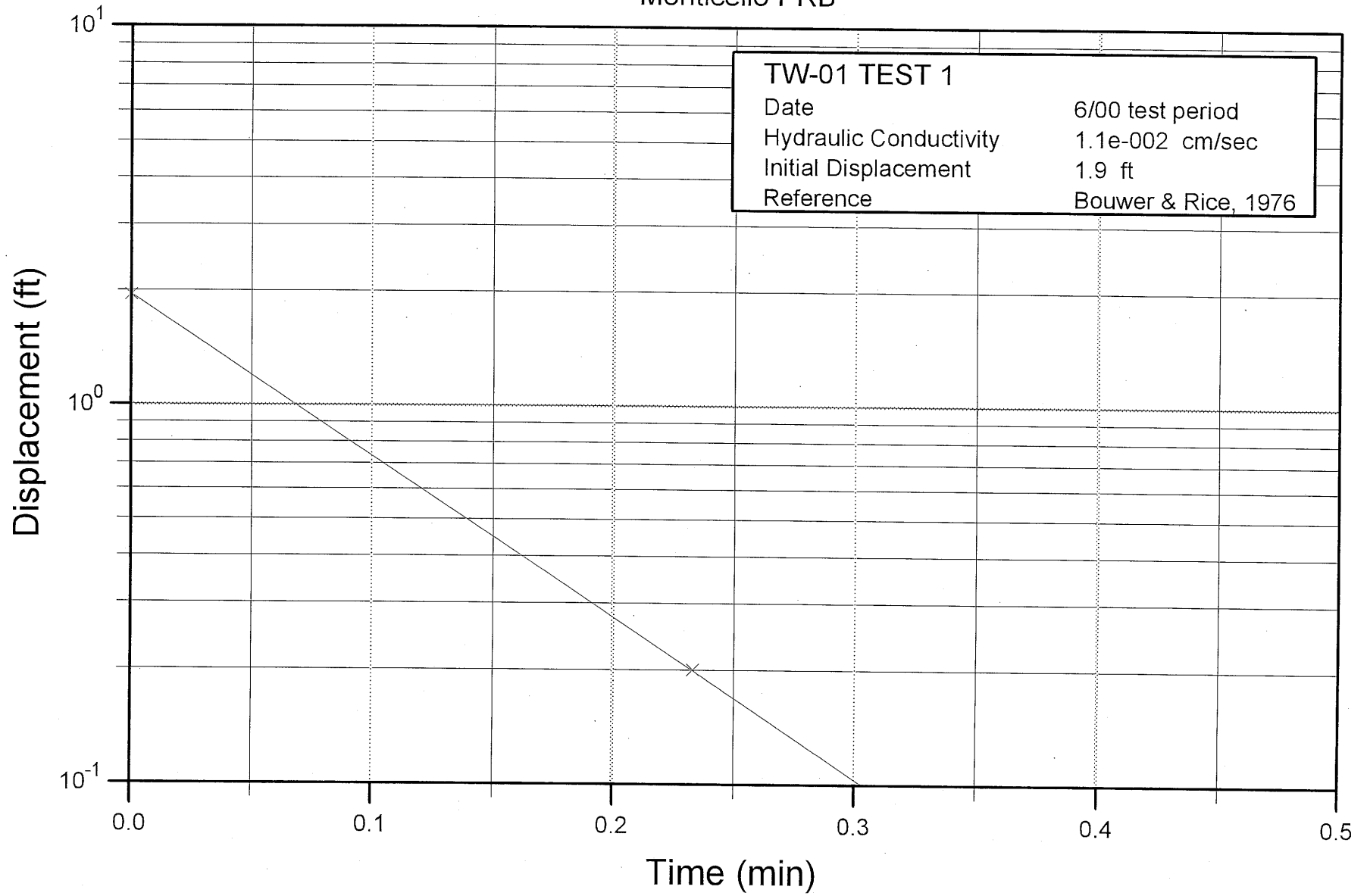
Monticello PRB



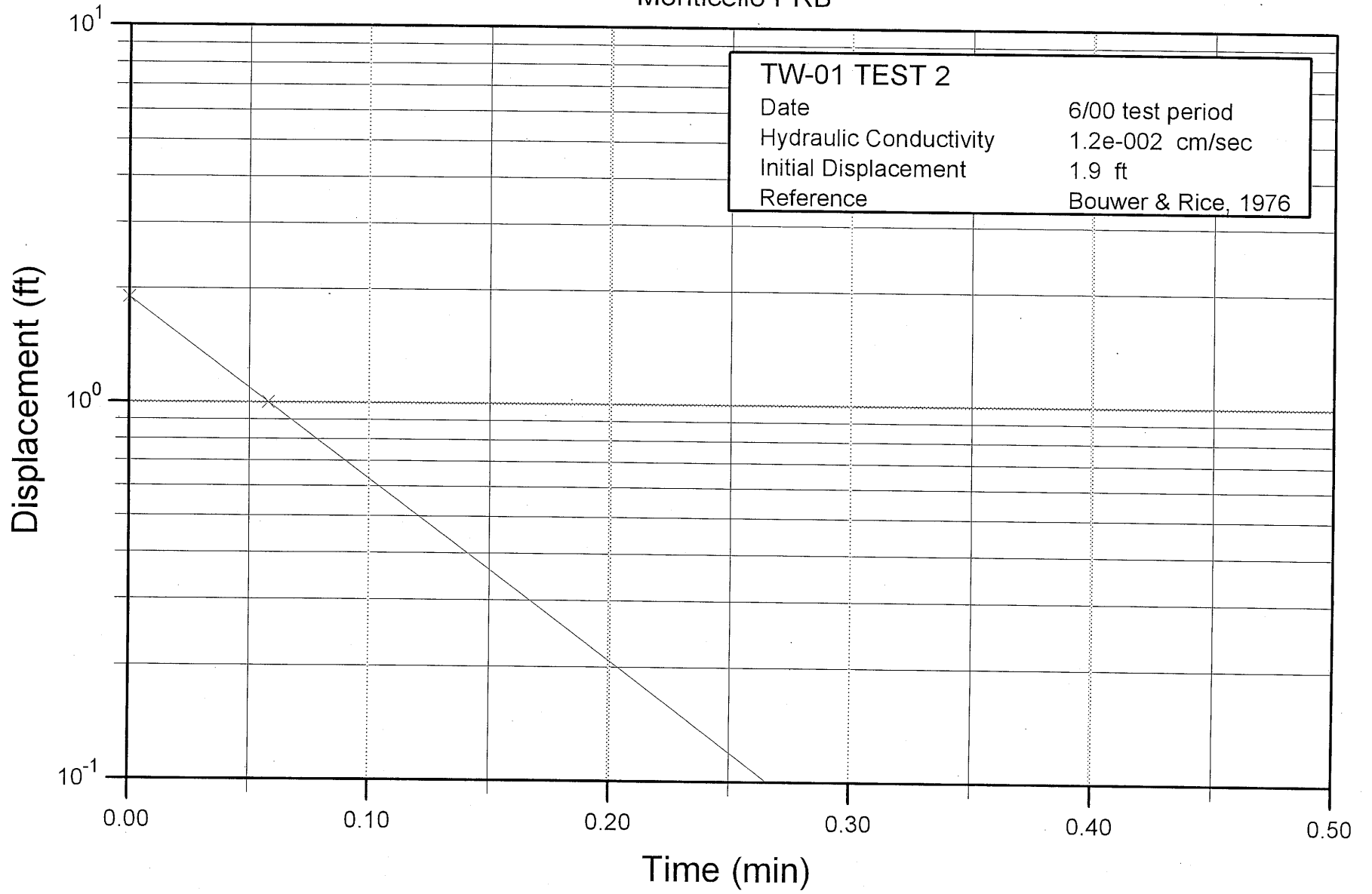
Monticello PRB



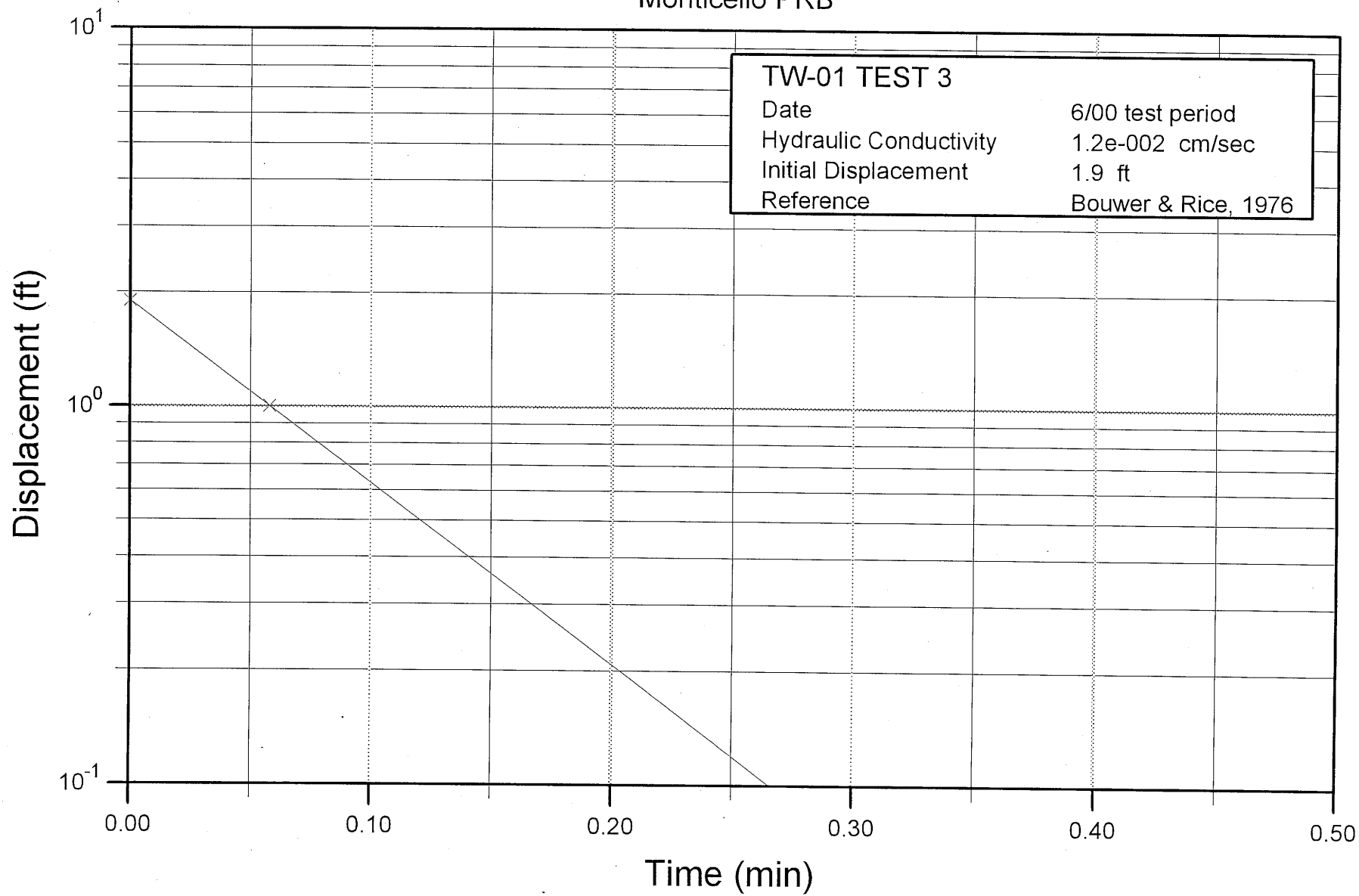
Monticello PRB



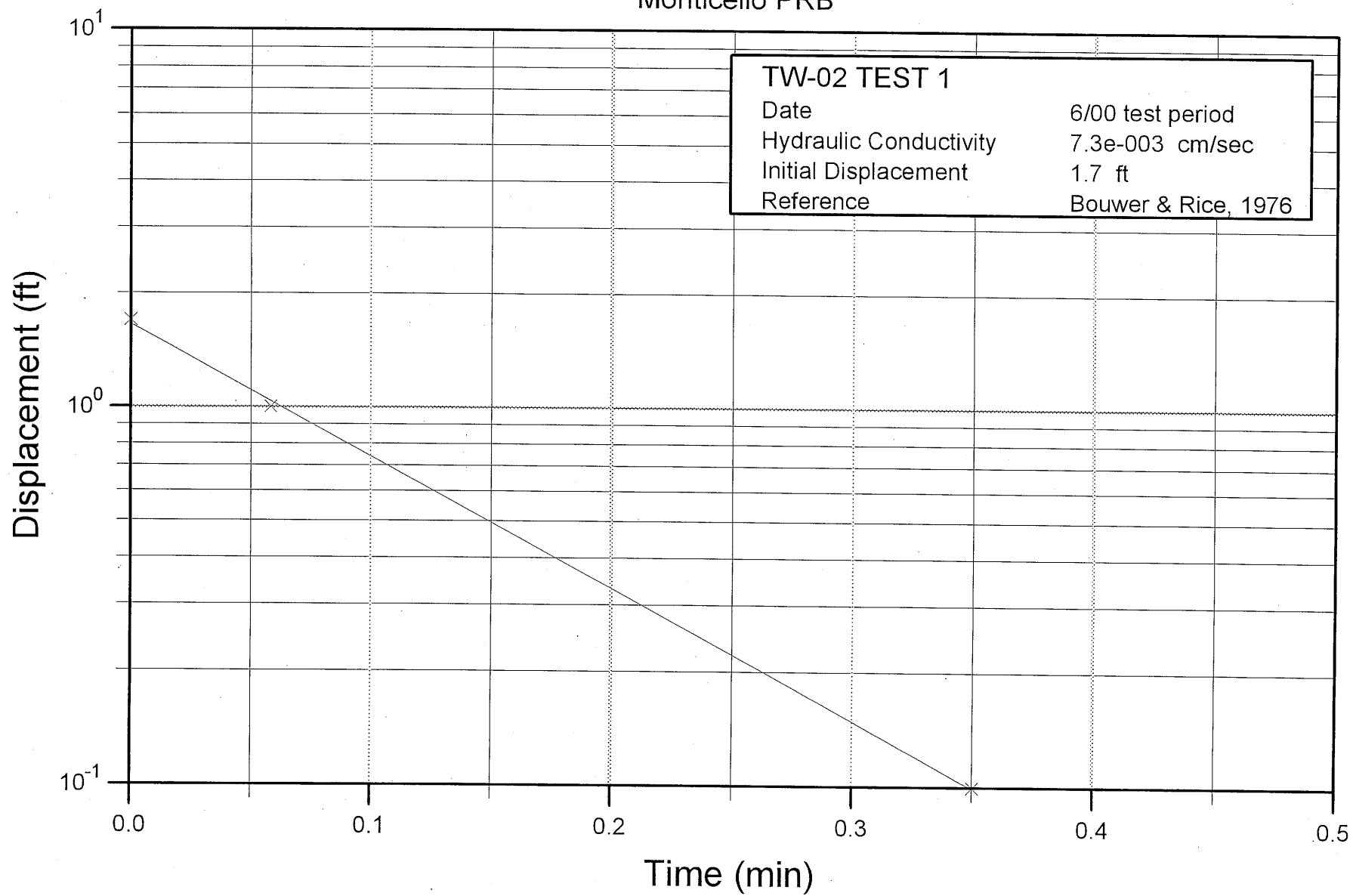
Monticello PRB



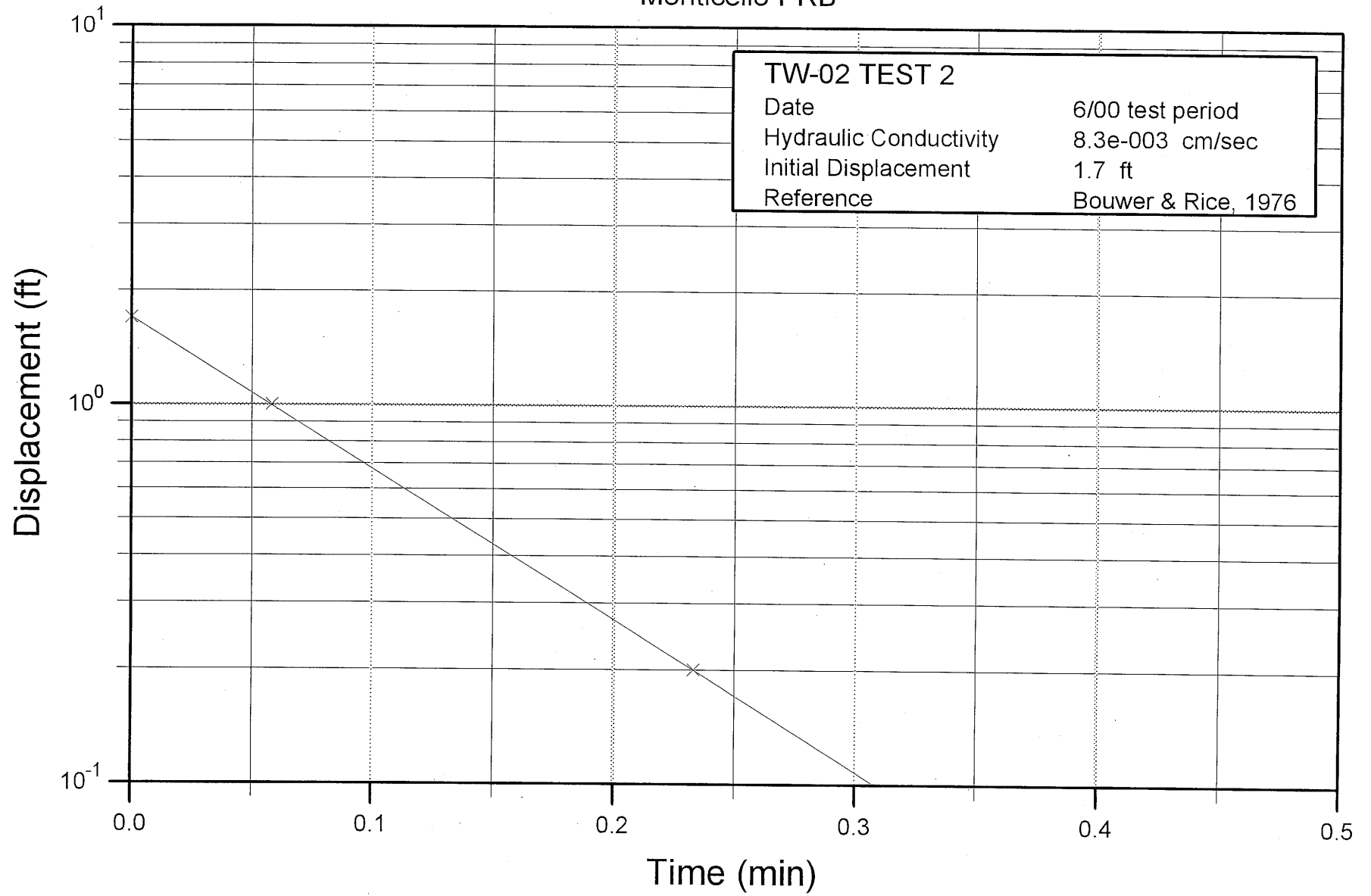
Monticello PRB



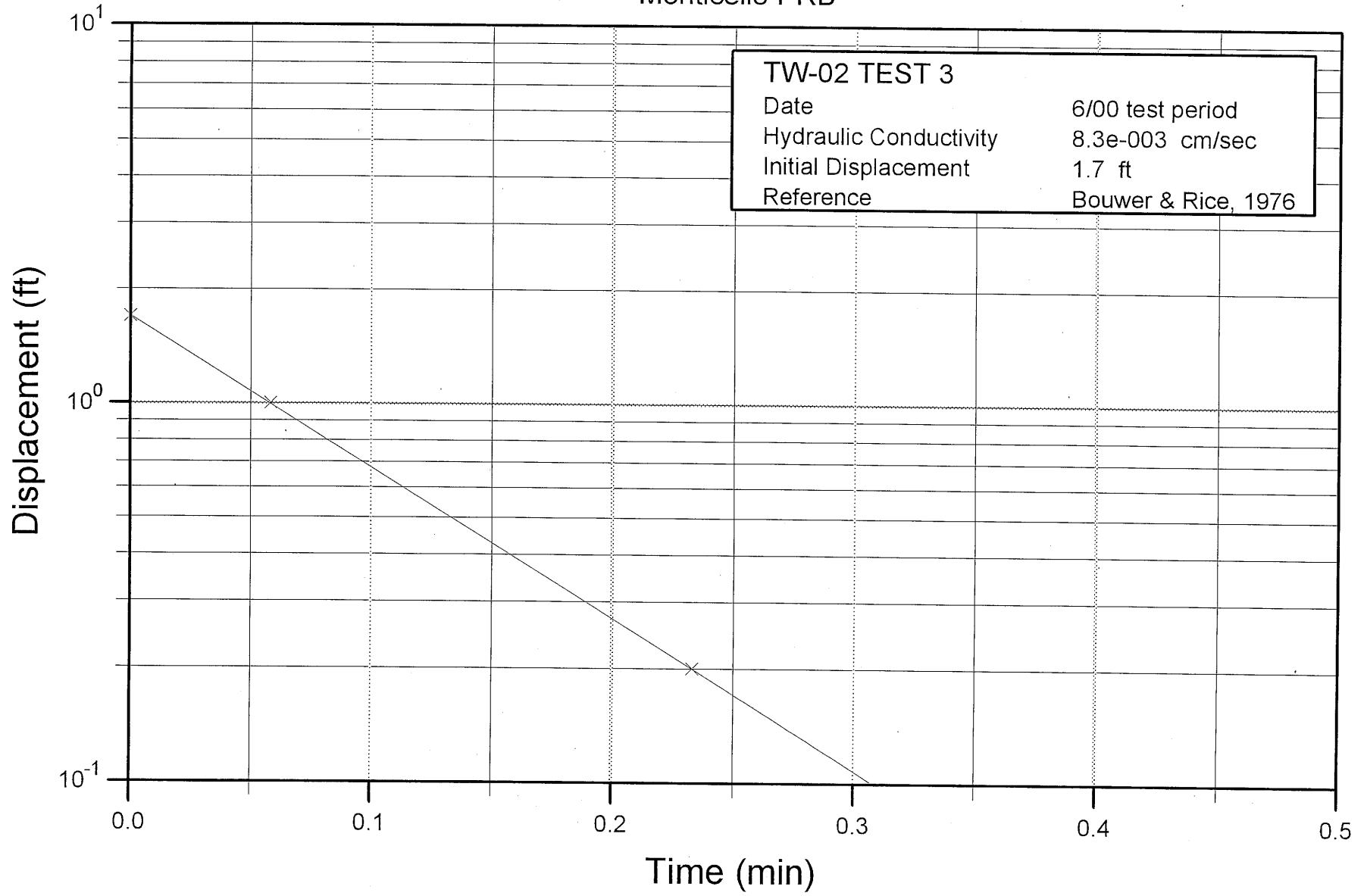
Monticello PRB



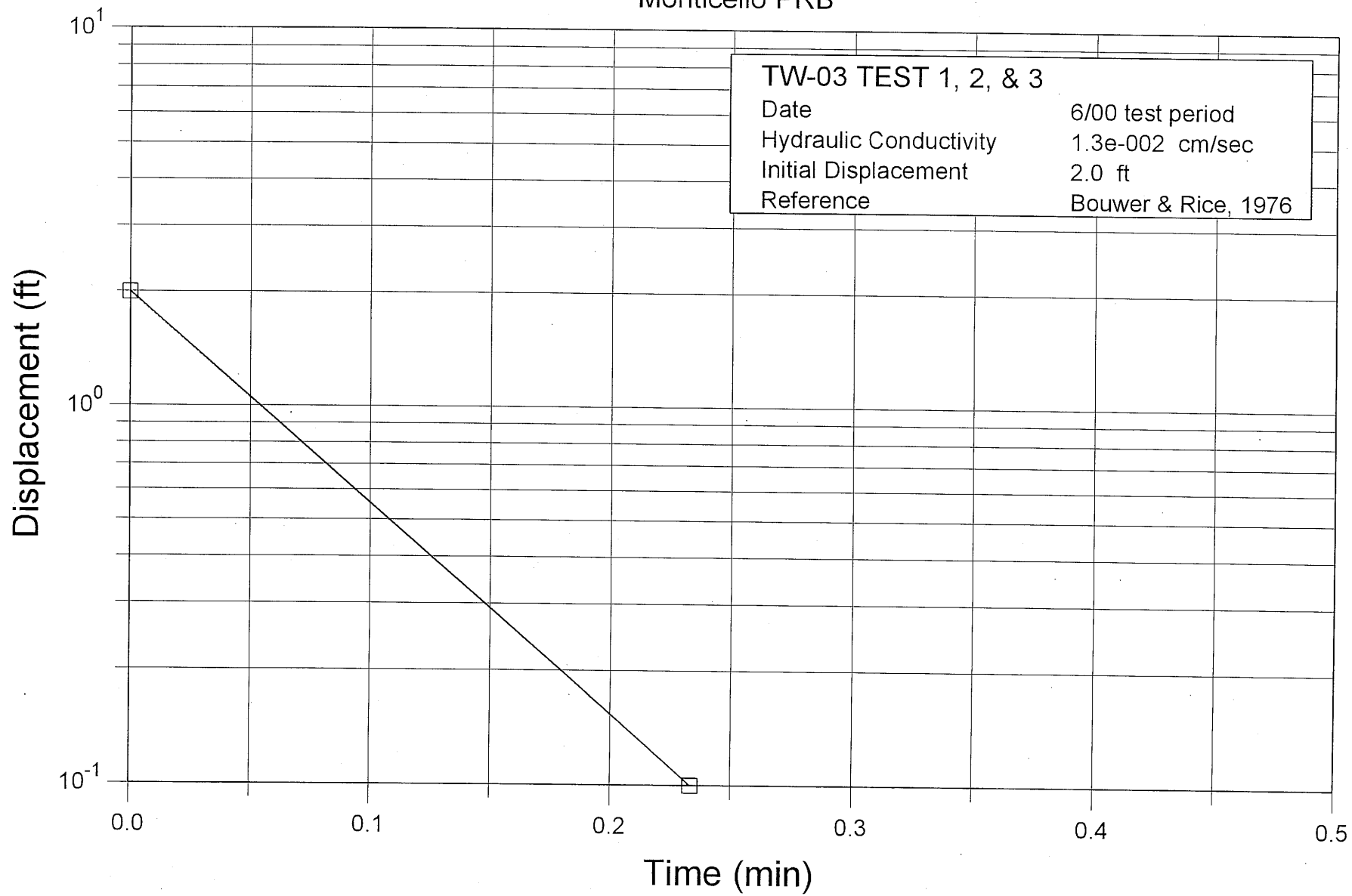
Monticello PRB



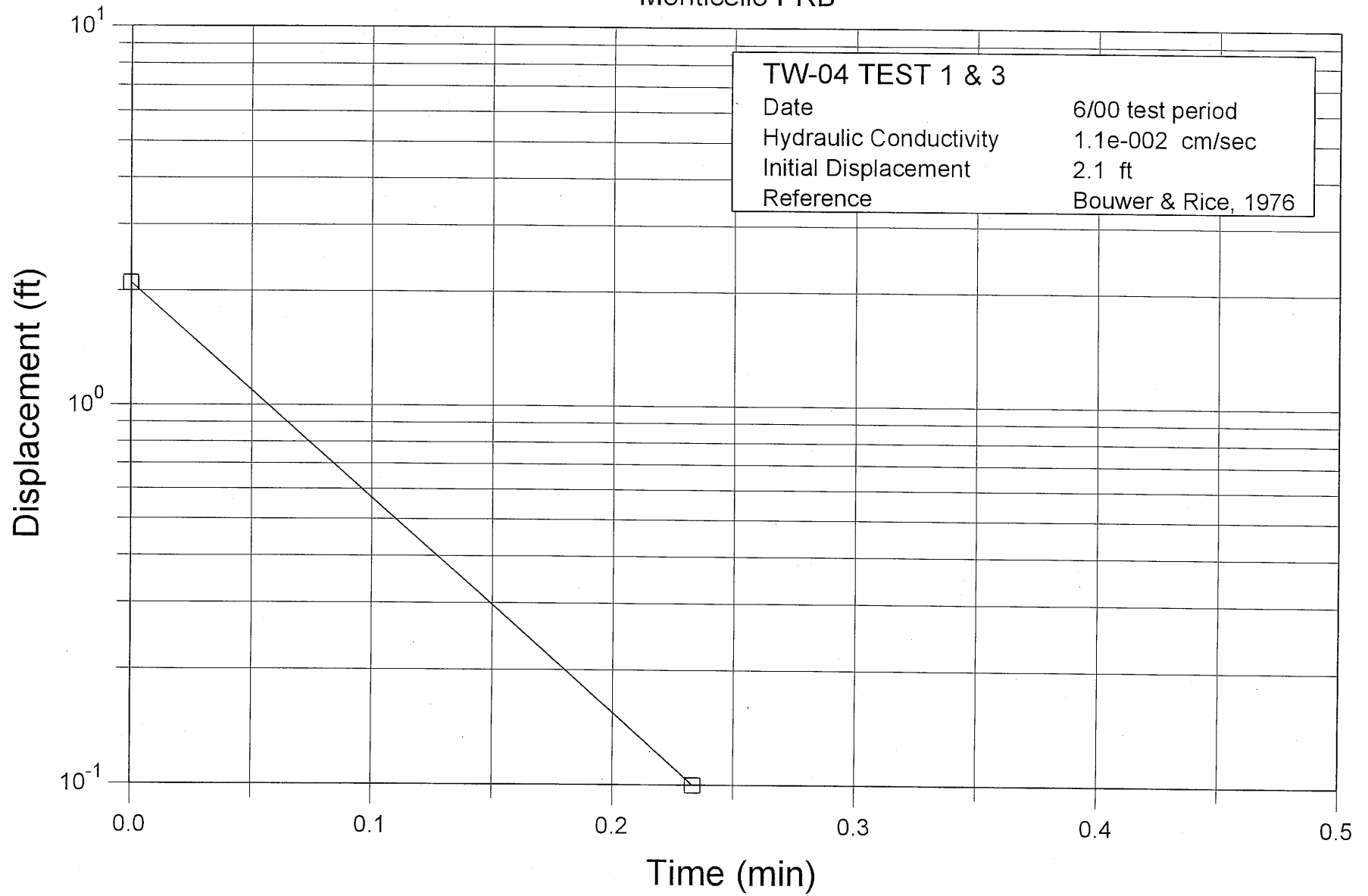
Monticello PRB



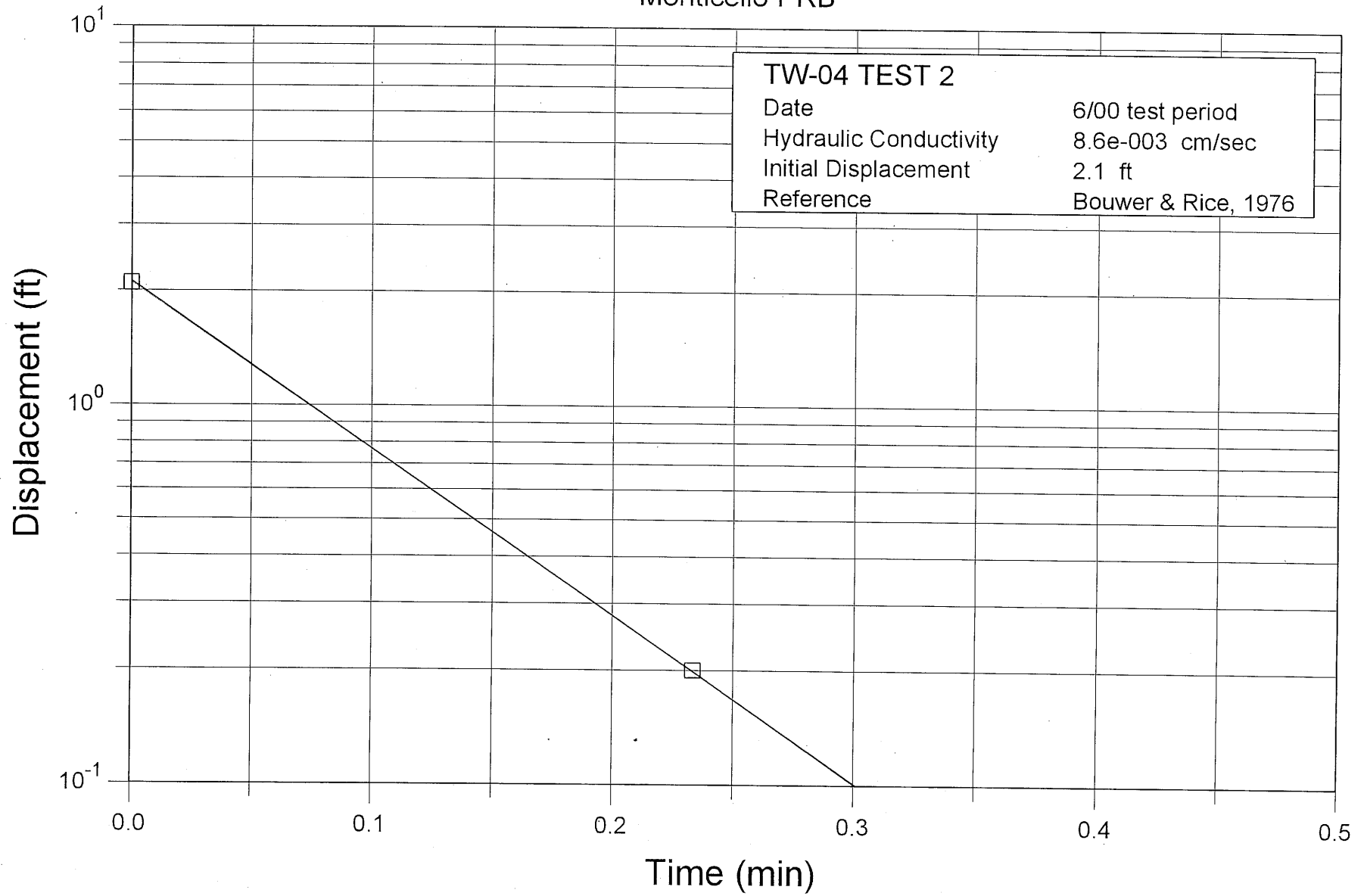
Monticello PRB



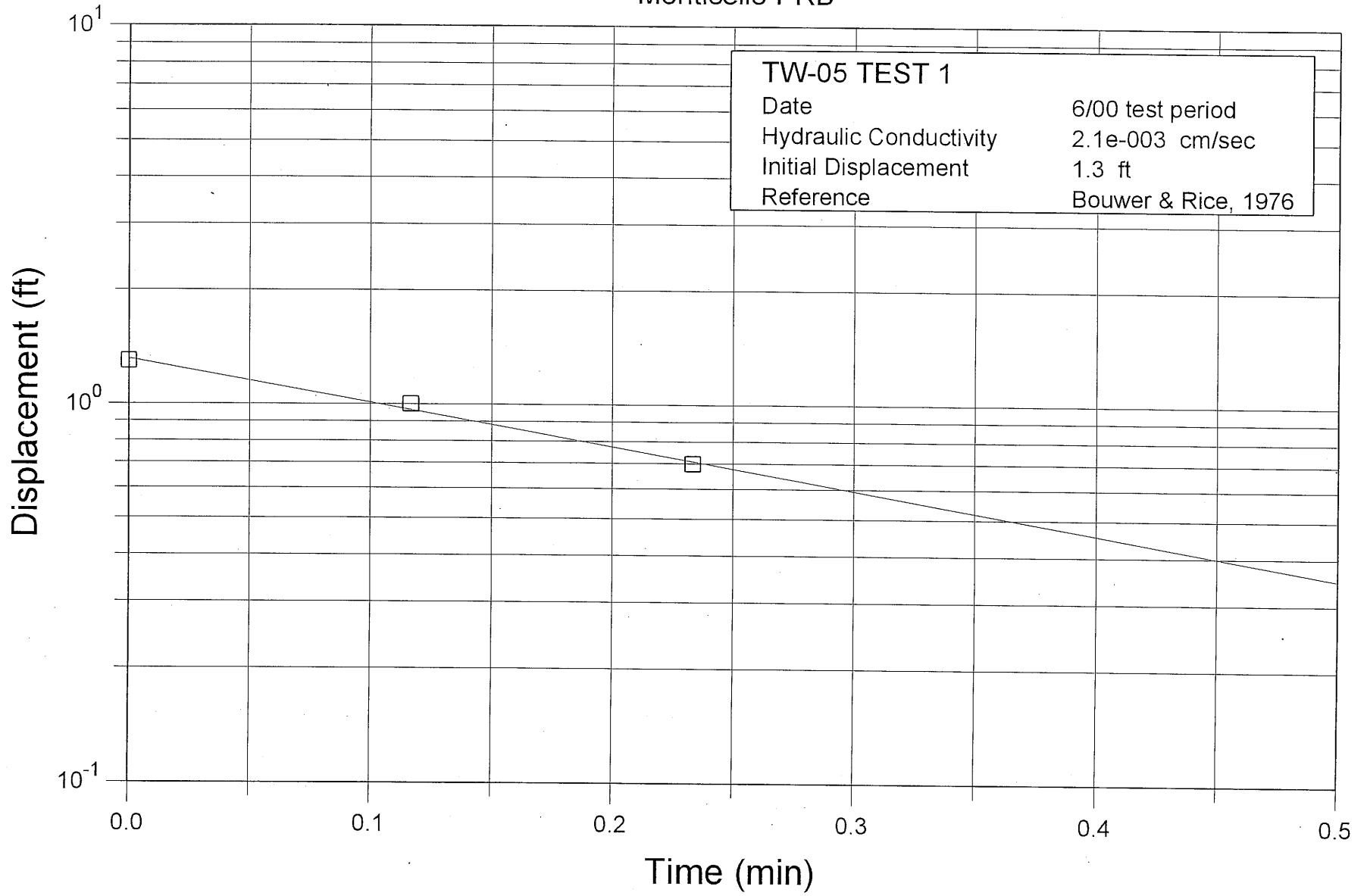
Monticello PRB



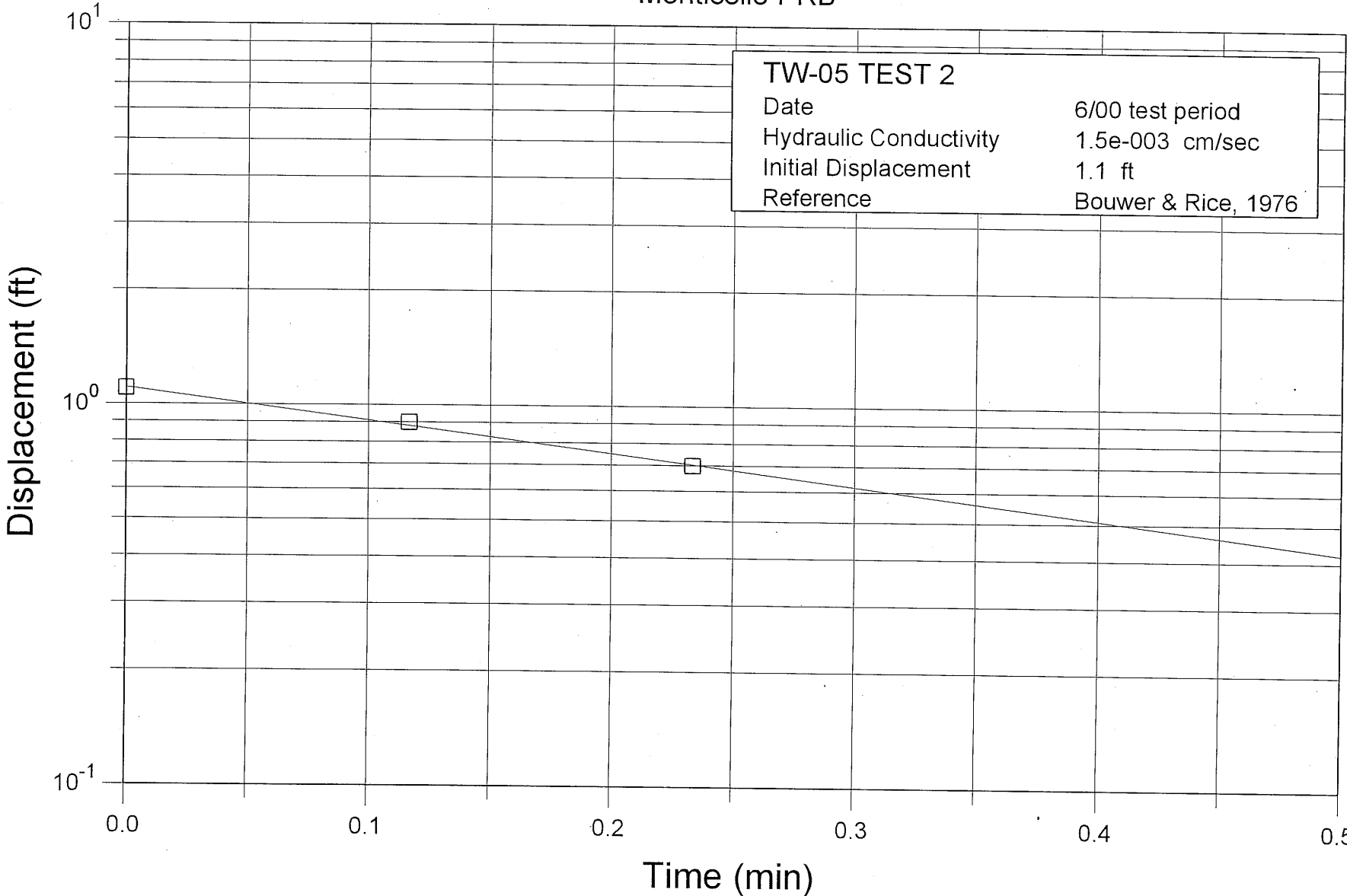
Monticello PRB



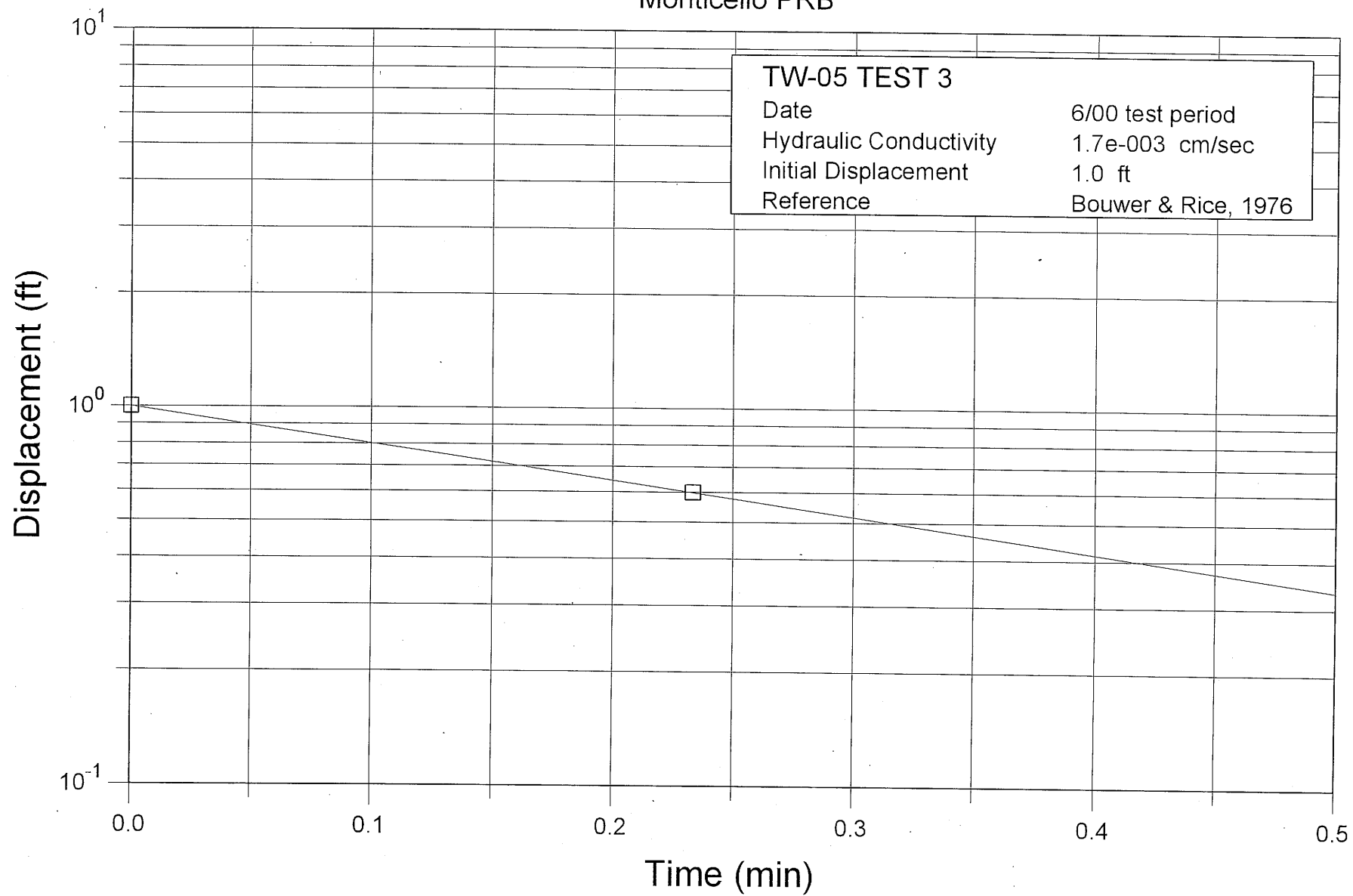
Monticello PRB



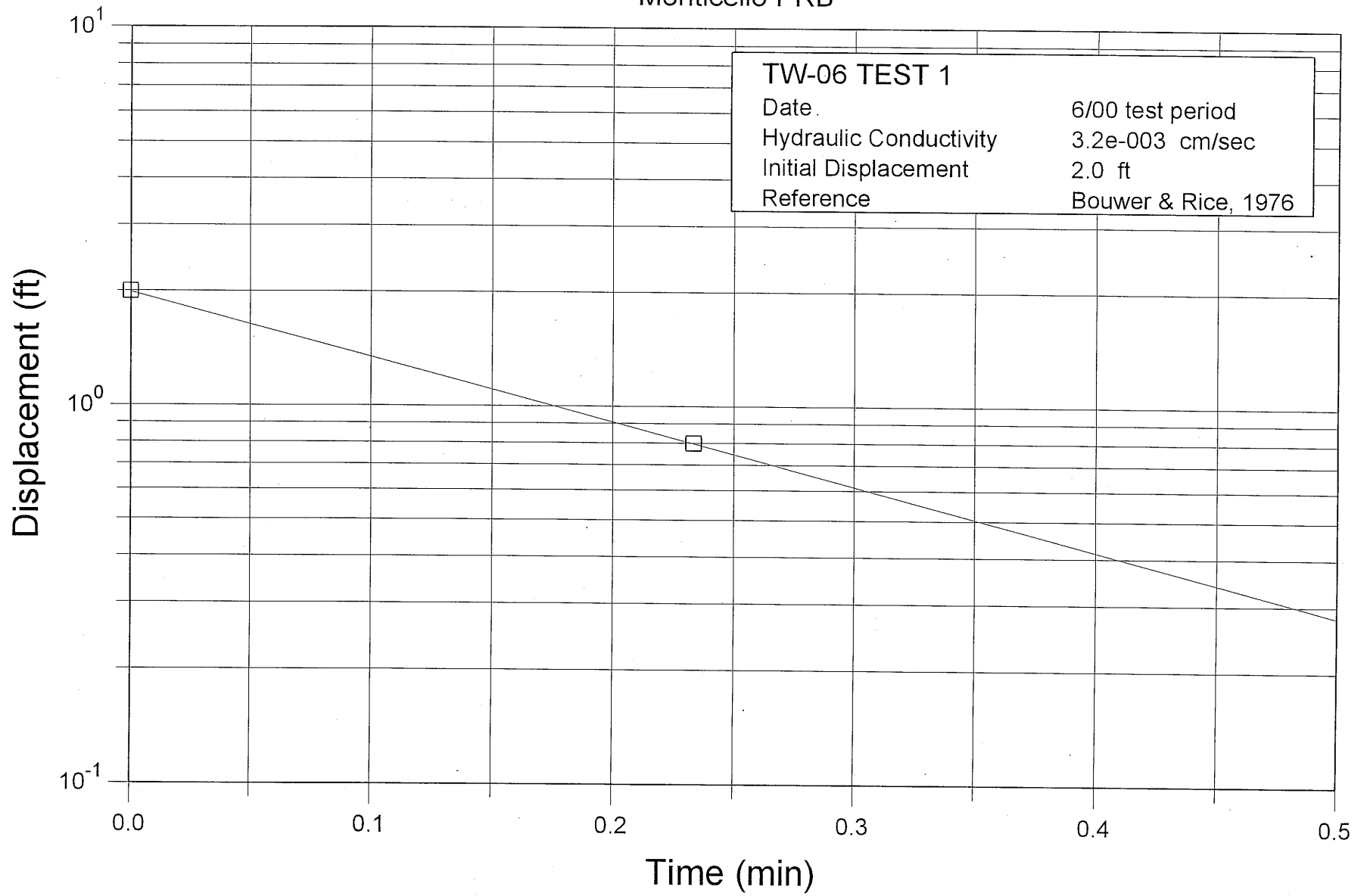
Monticello PRB



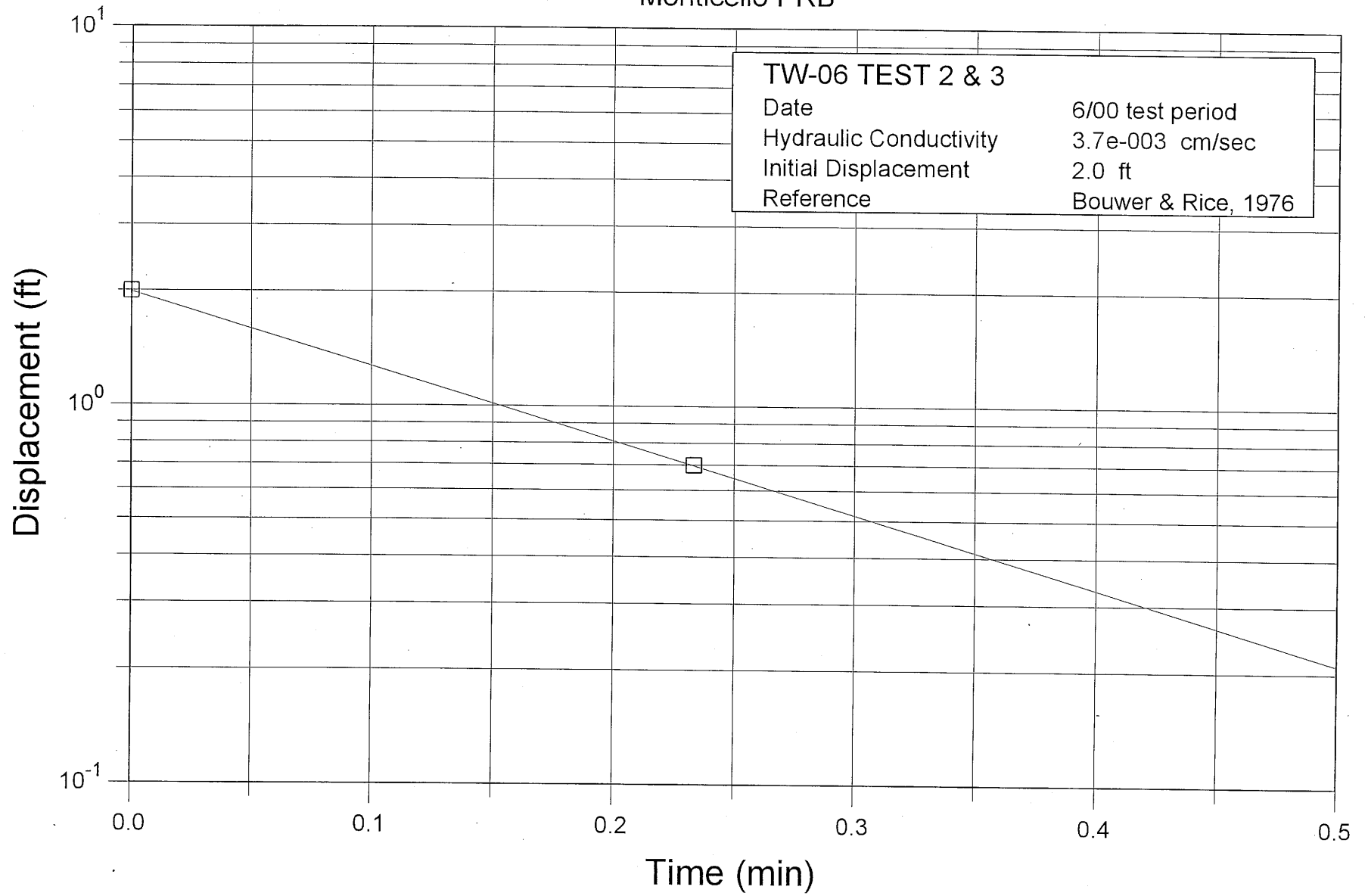
Monticello PRB



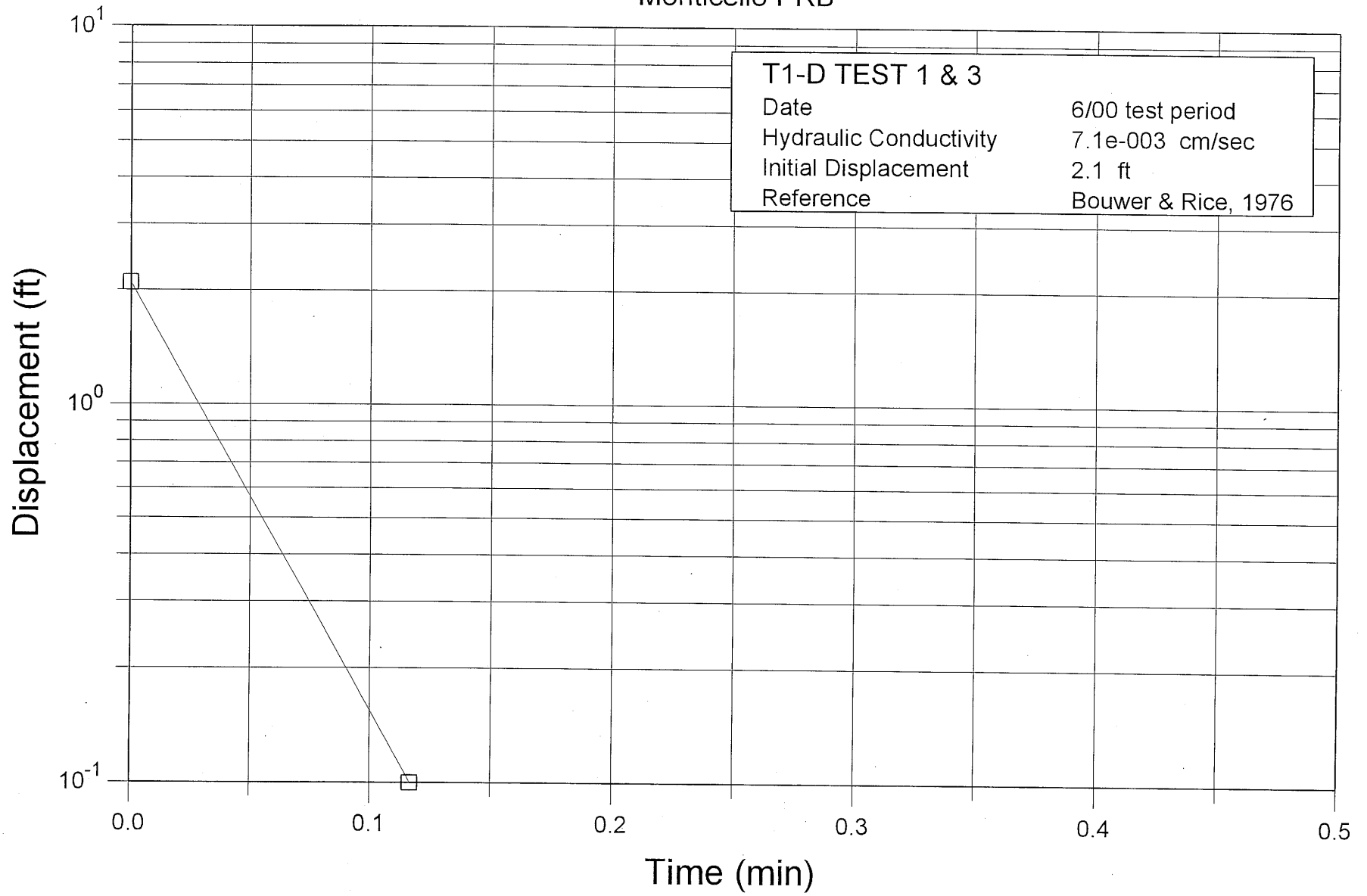
Monticello PRB



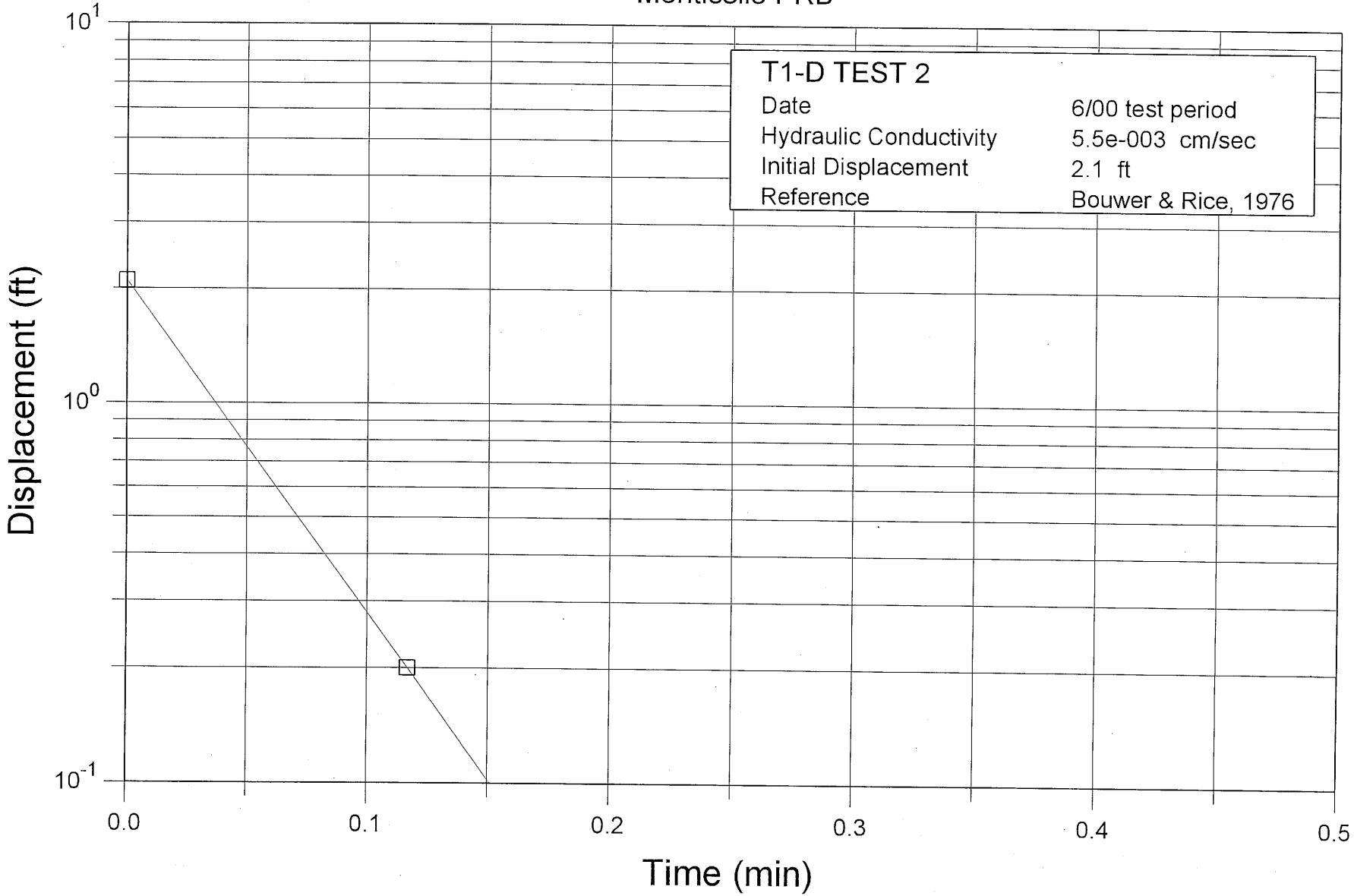
Monticello PRB



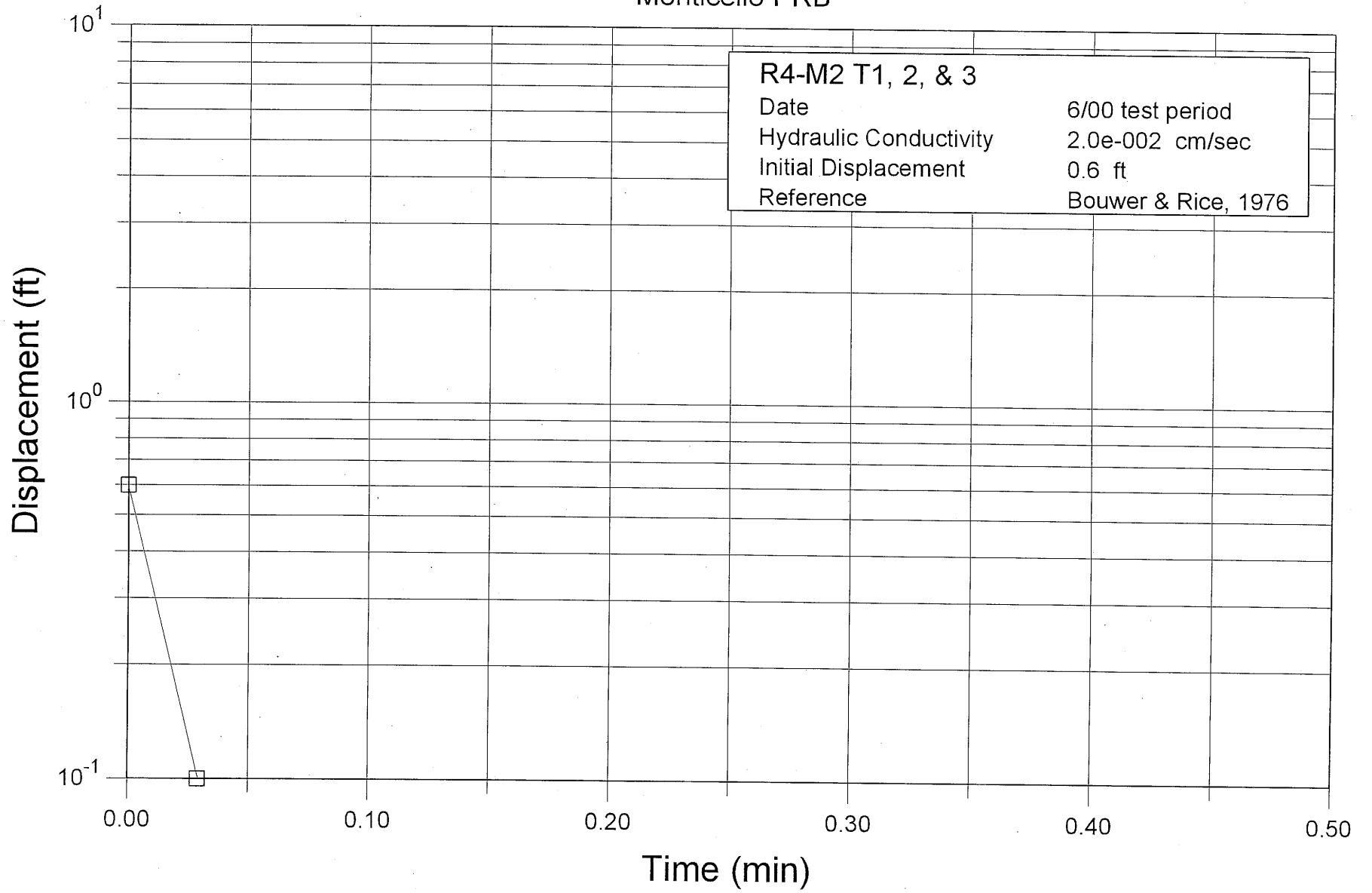
Monticello PRB



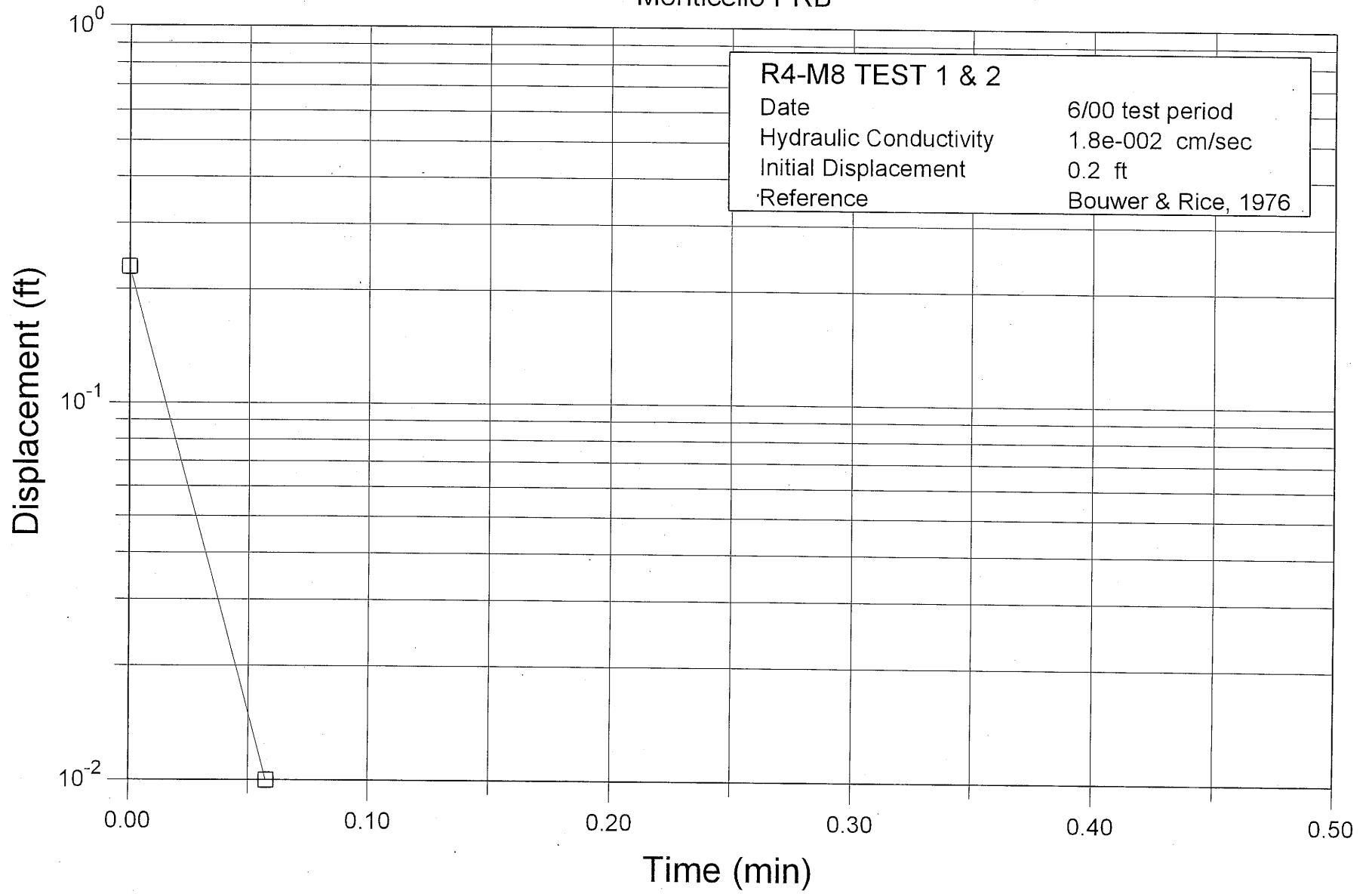
Monticello PRB



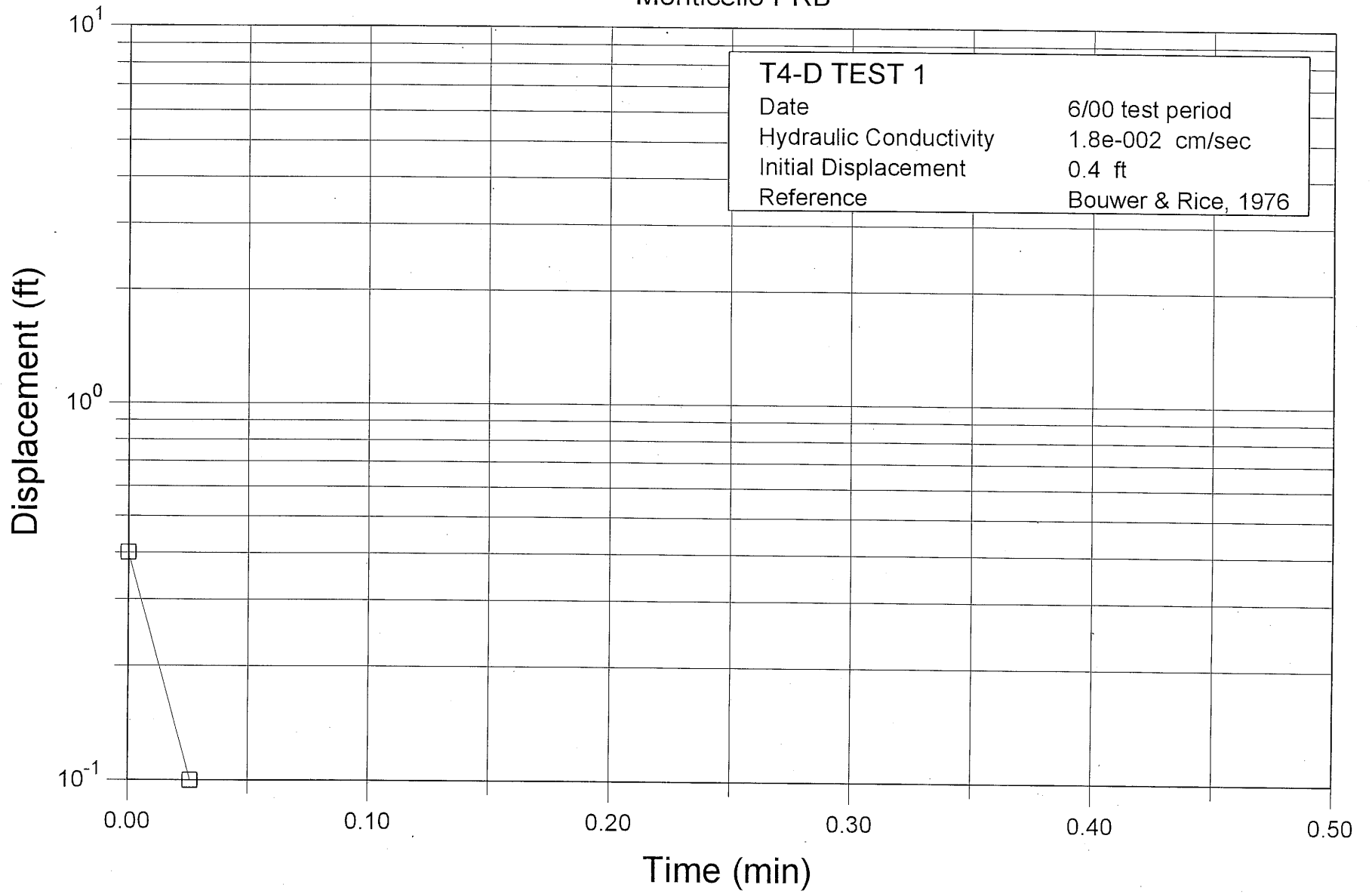
Monticello PRB



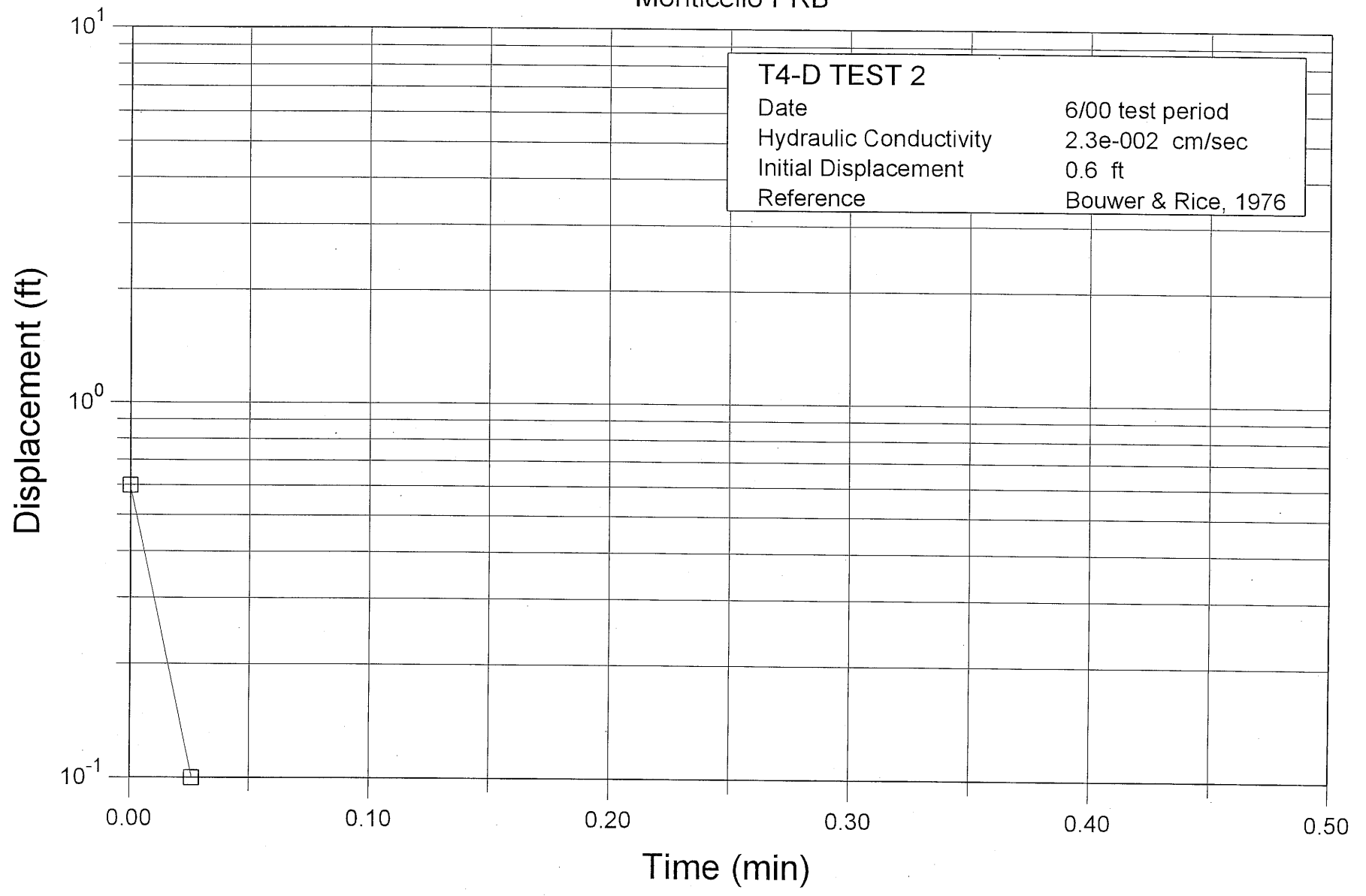
Monticello PRB



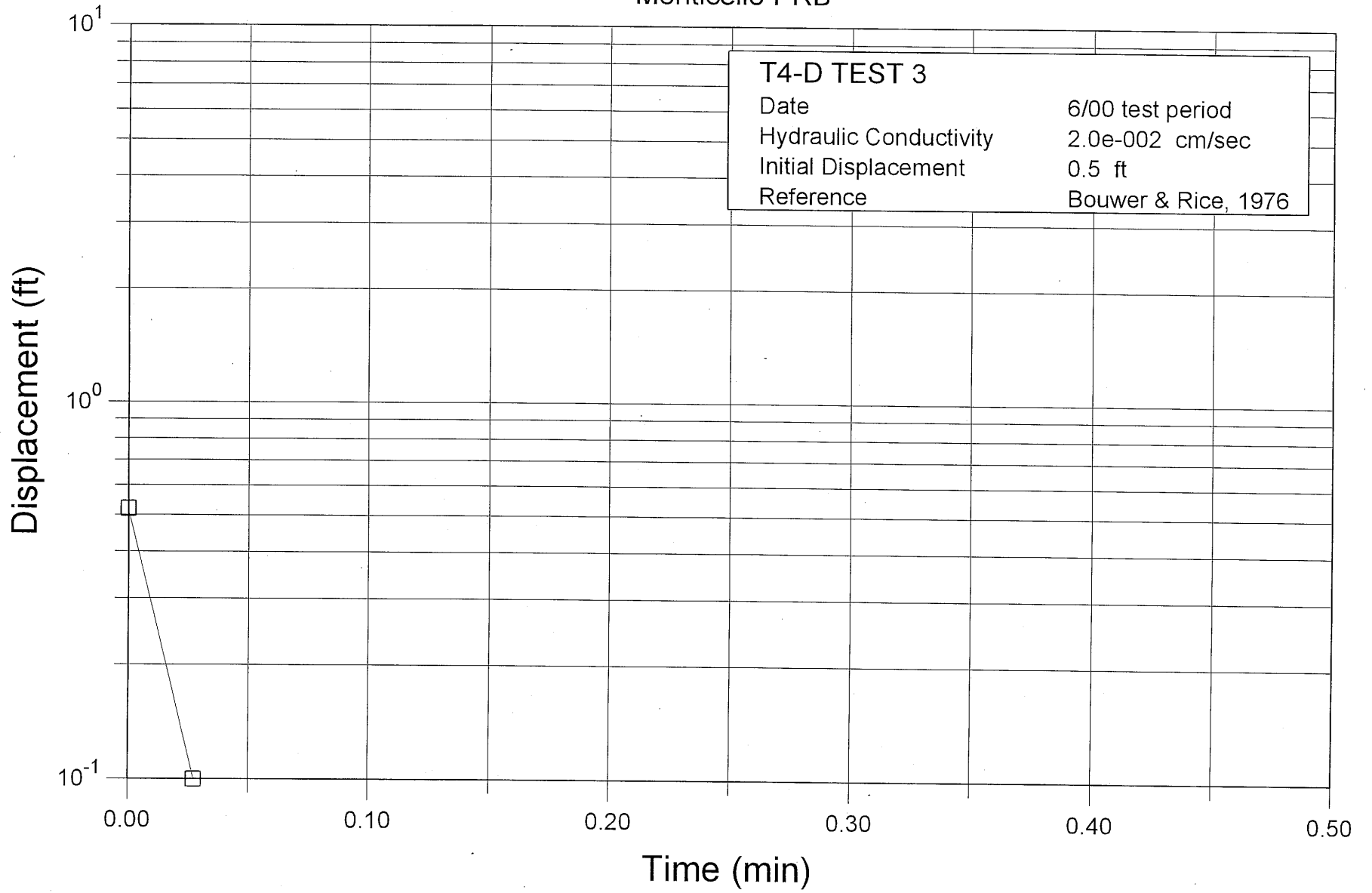
Monticello PRB



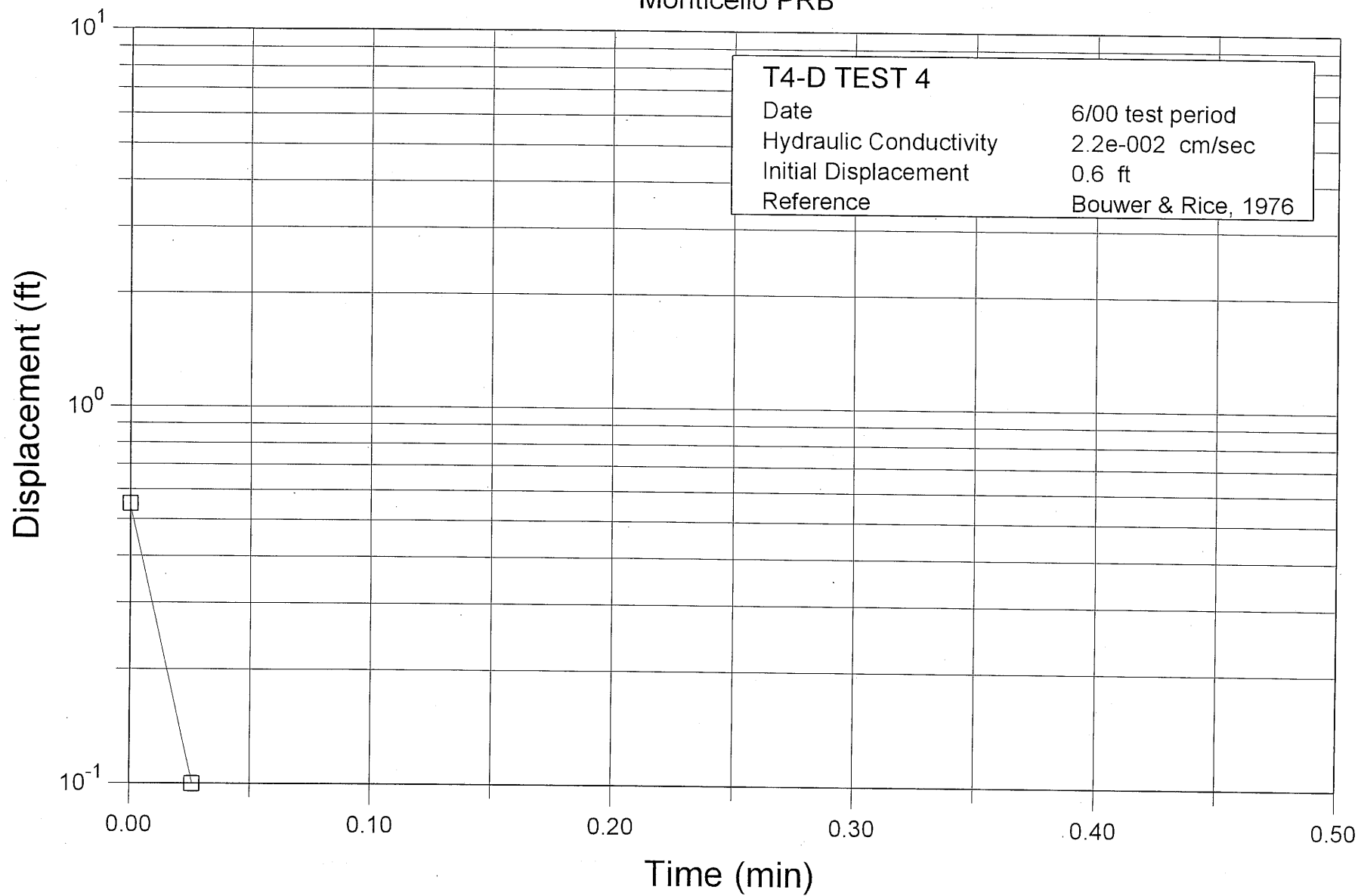
Monticello PRB



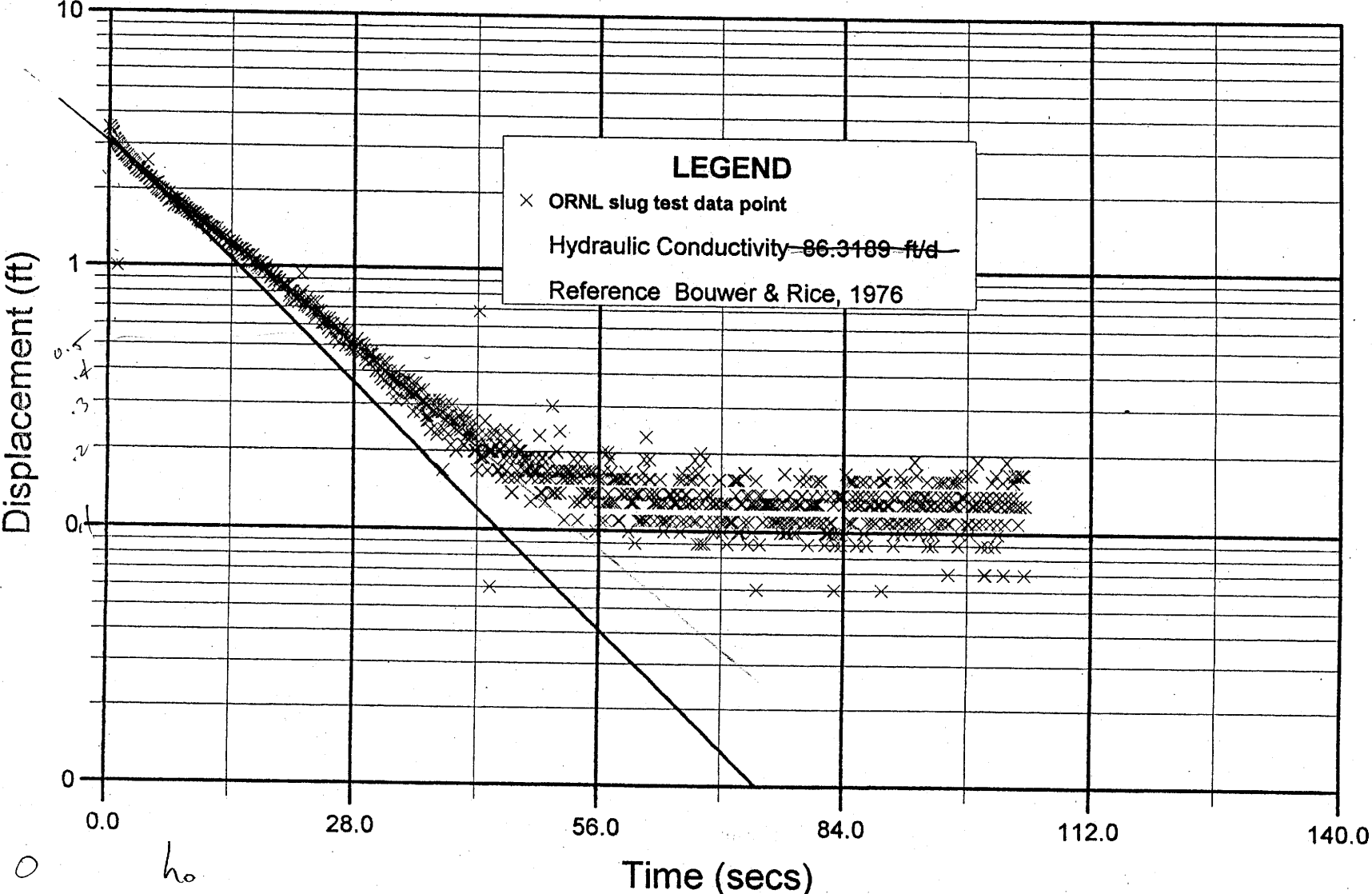
Monticello PRB



Monticello PRB

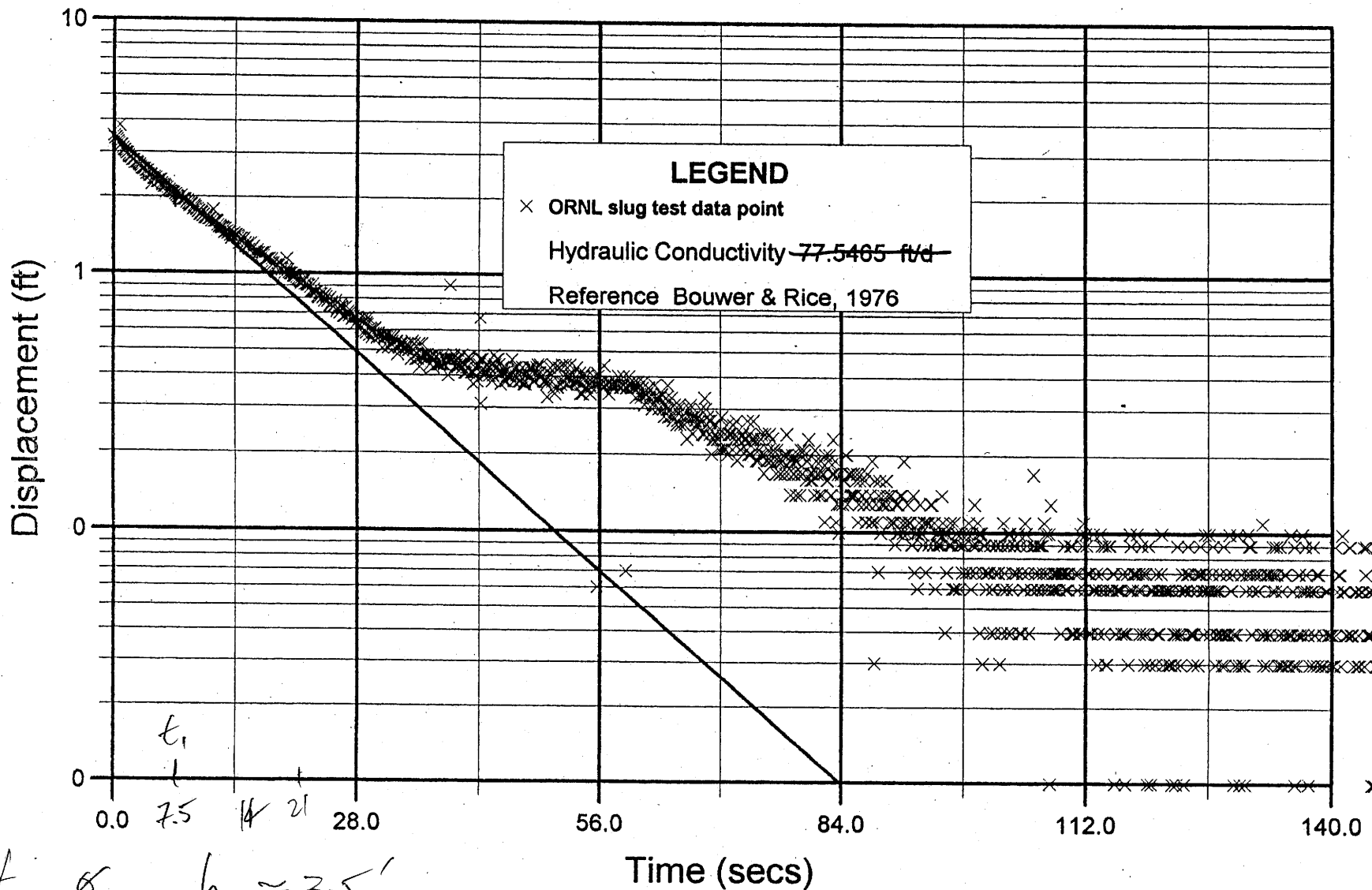


Well R1-M2 Test 1



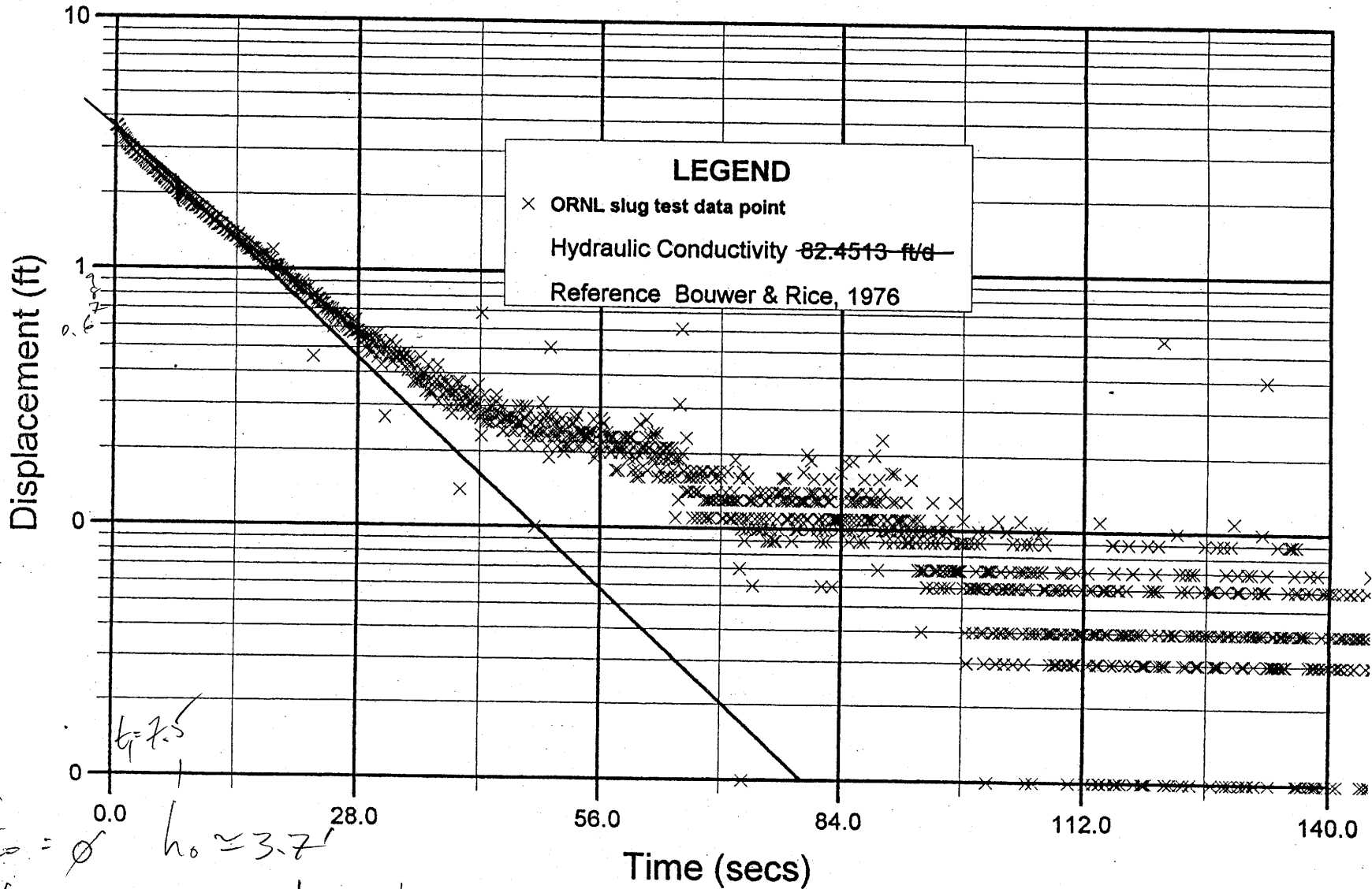
$t_0 = 0$ h_0
 $t_1 = 0$ $h_1 = 3'$
 $t_2 = 28_s = 0.467$ $h_2 = 0.5'$

Well R1-M2 Test 2

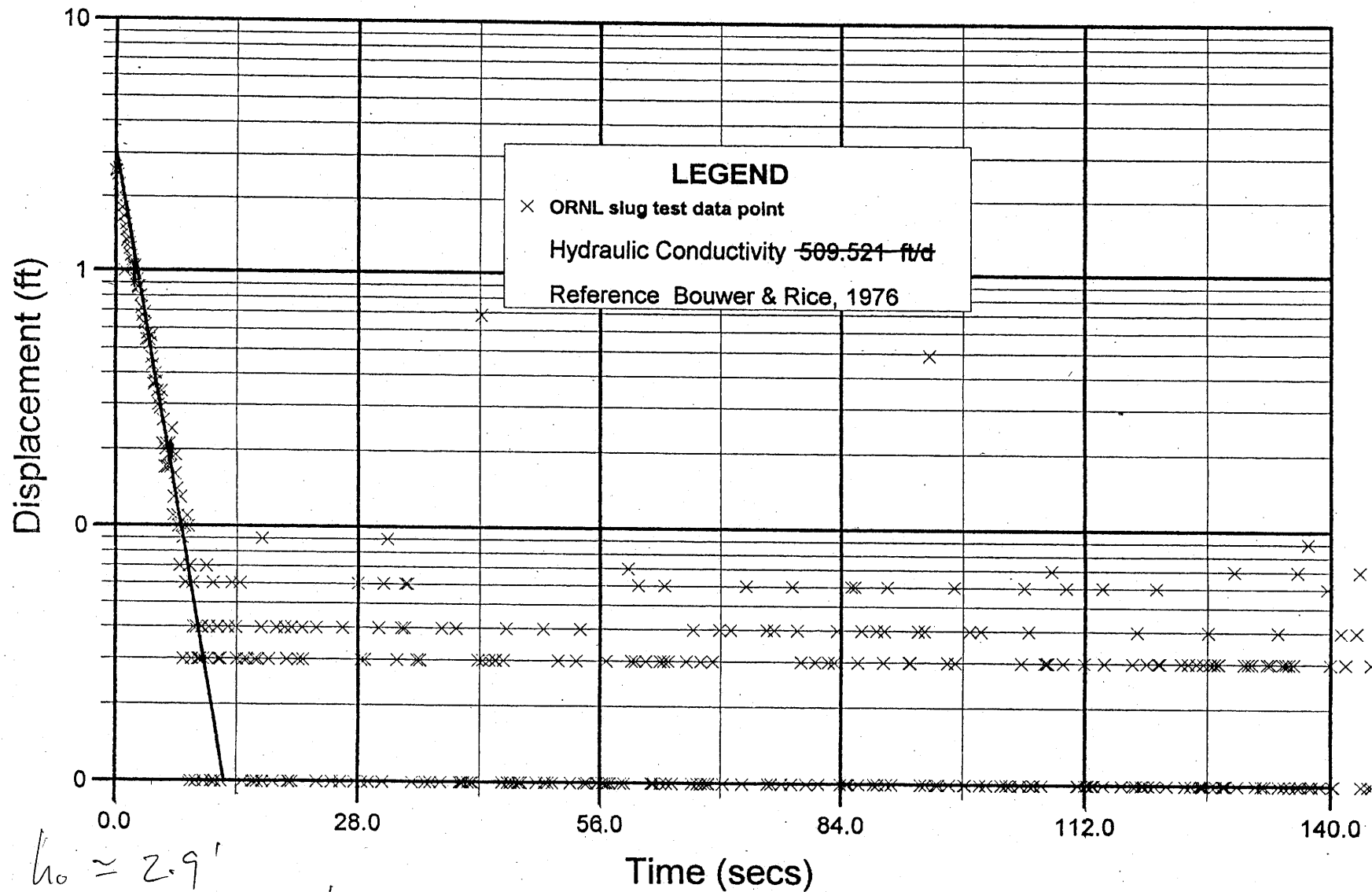


$t_0 = 0$ $h_0 = 3.5'$
 $t_1 = 7.5s = 0.125 \text{ min}$ $h_1 = 2'$
 $t_2 = 21s = 0.350 \text{ min}$ $h_2 = 1'$

Well R1-M2 Test 3

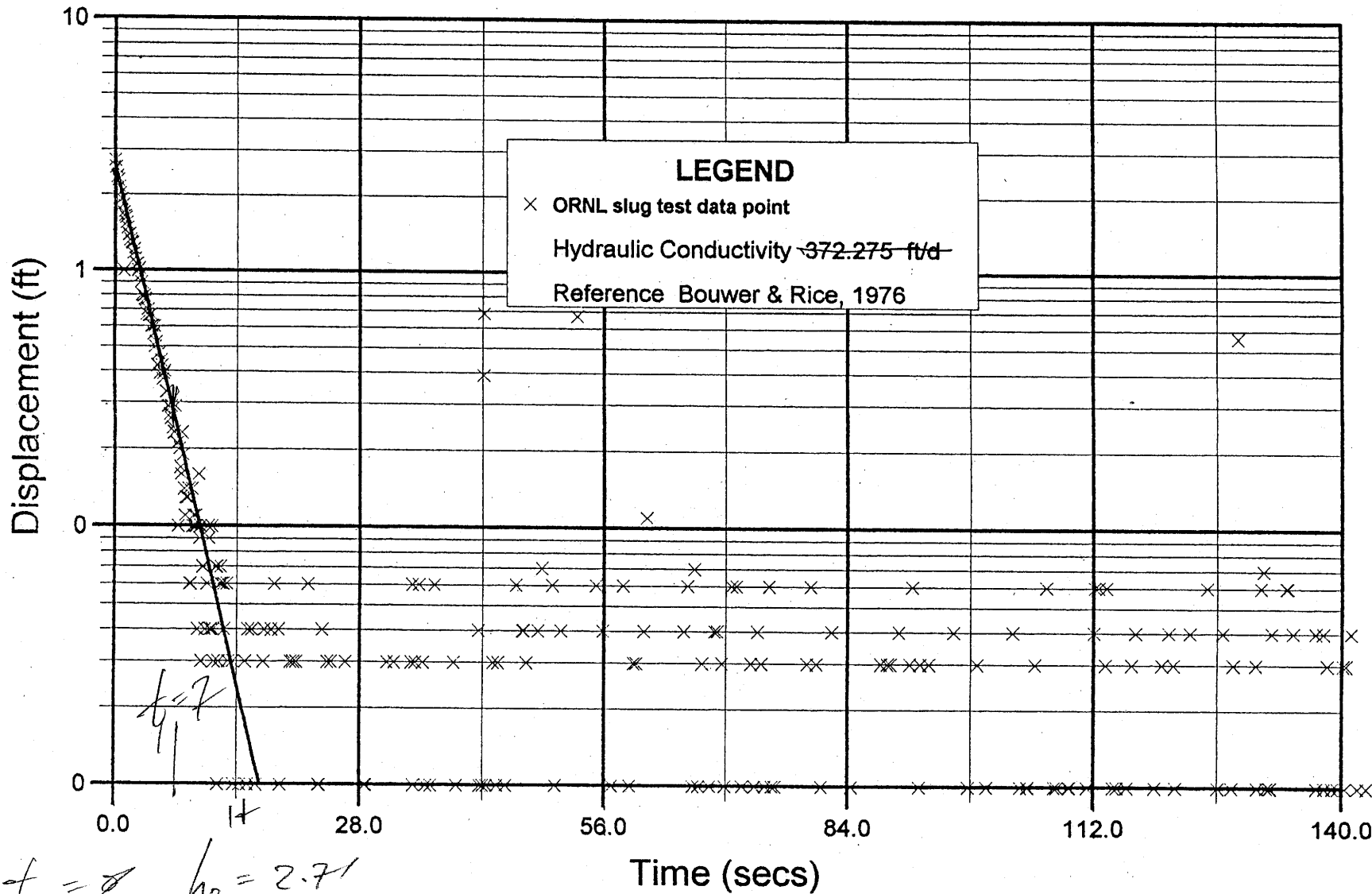


Well R1-M3 Test 1



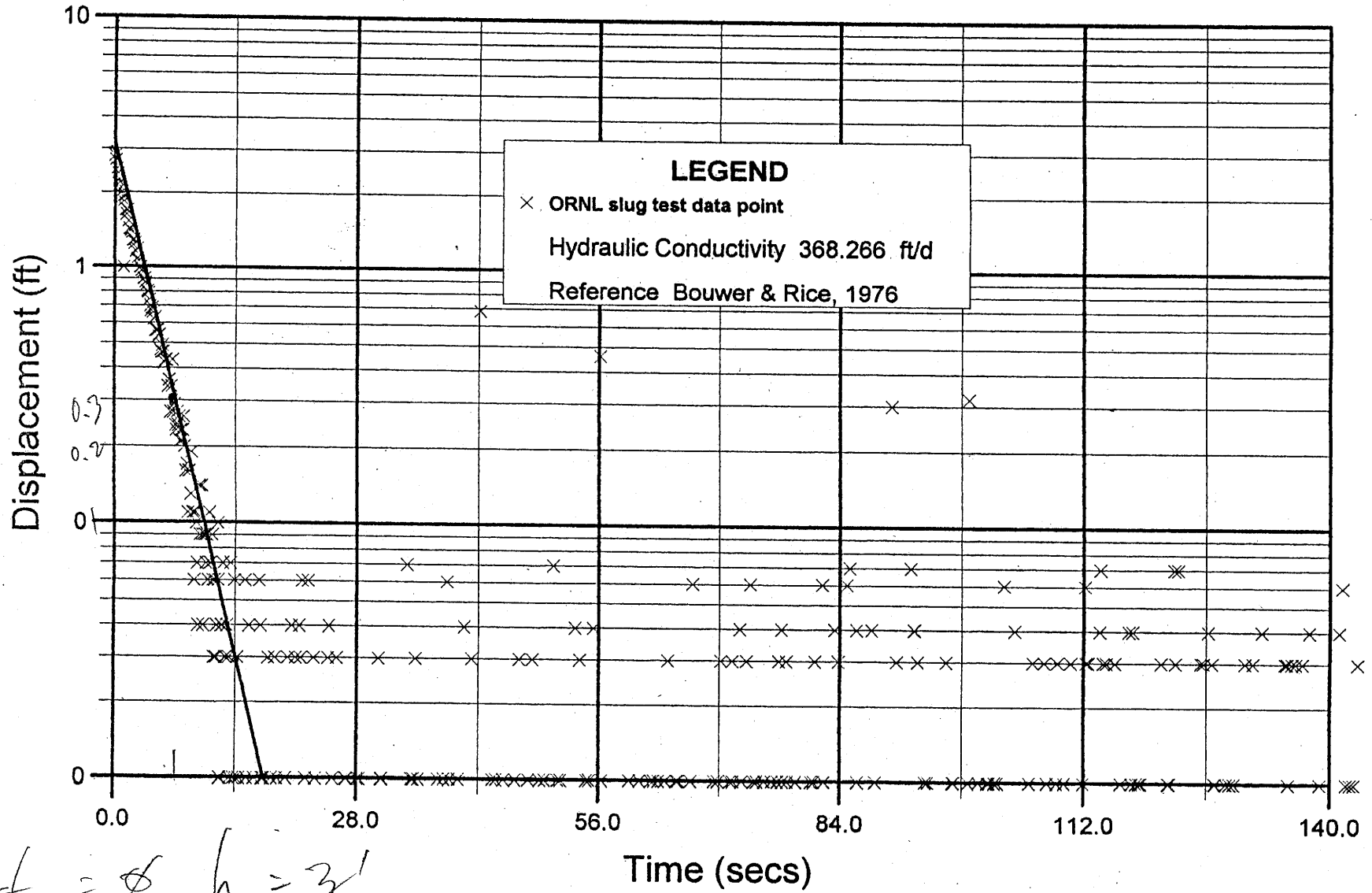
$h_0 \approx 2.9'$
 $t_1 = 3.5 \text{ sec}$ $h_1 = 1$
 $t_2 = 7 \text{ sec}$ $h_2 = 0.2$

Well R1-M3 Test 2



$t_0 = 7$
 $h_0 = 2.7'$
 $t_1 = 75 = 0.117 \text{ min}$
 $h_1 = 0.3'$

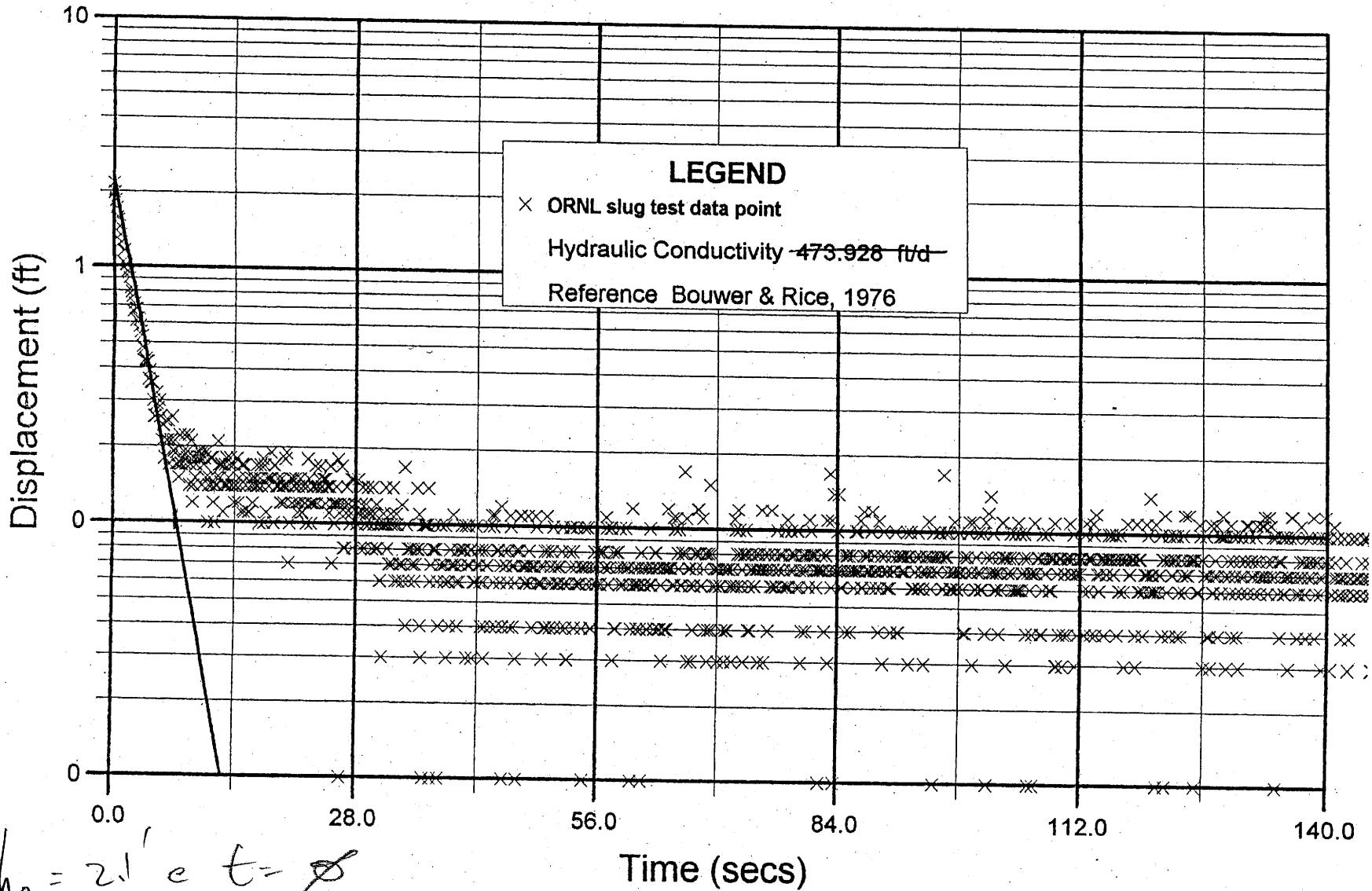
Well R1-M3 Test 3



$d_0 = \phi \quad h_0 = 3'$

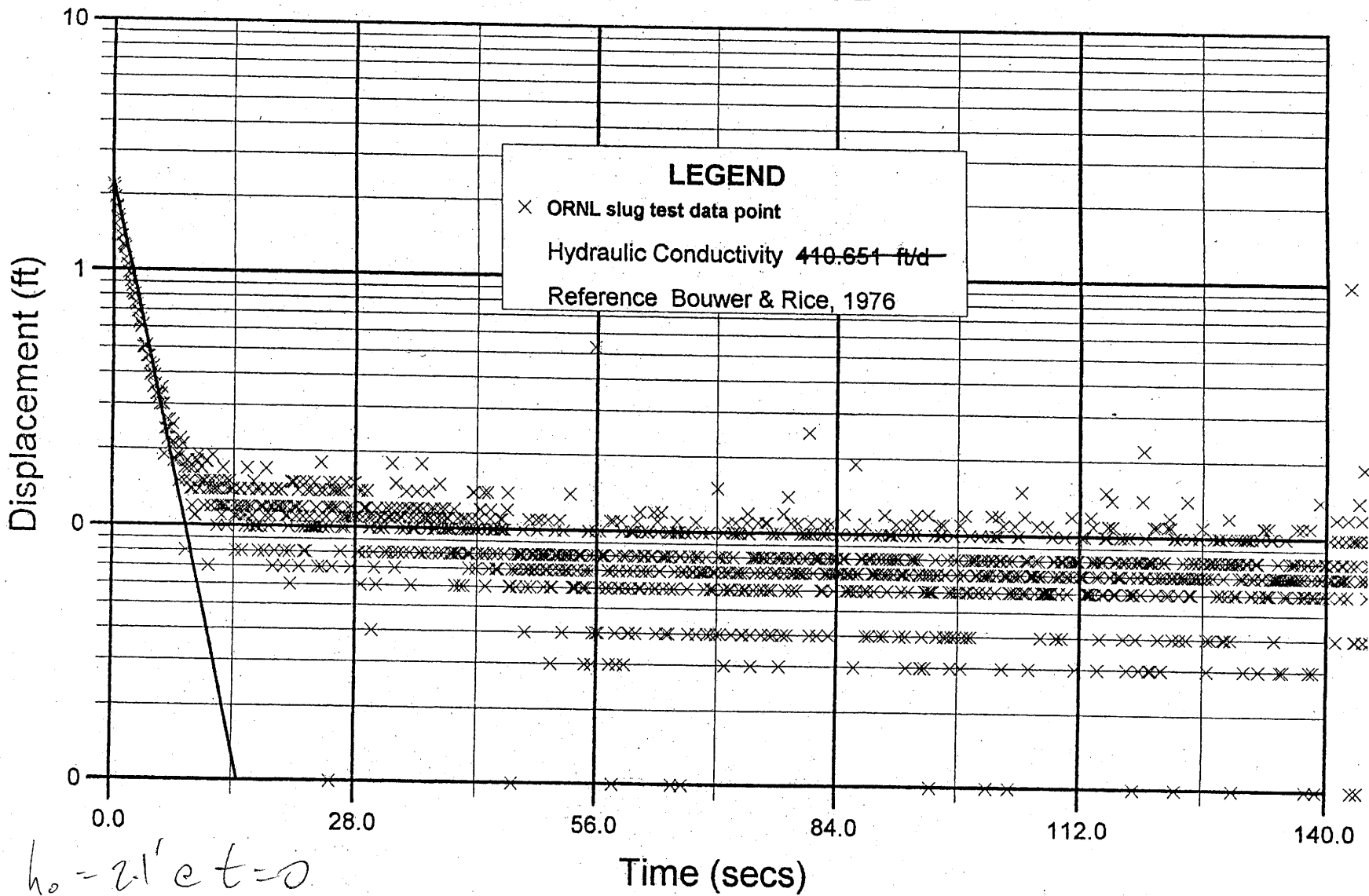
$t_1 = 7s = 0.117 \text{ min} \quad h_1 = 0.3'$

Well T1-D Test 1



$h_0 = 2.1' \text{ @ } t = 0$
 $h_1 = 0.1' \text{ @ } t_1 = 7 \text{ sec}$

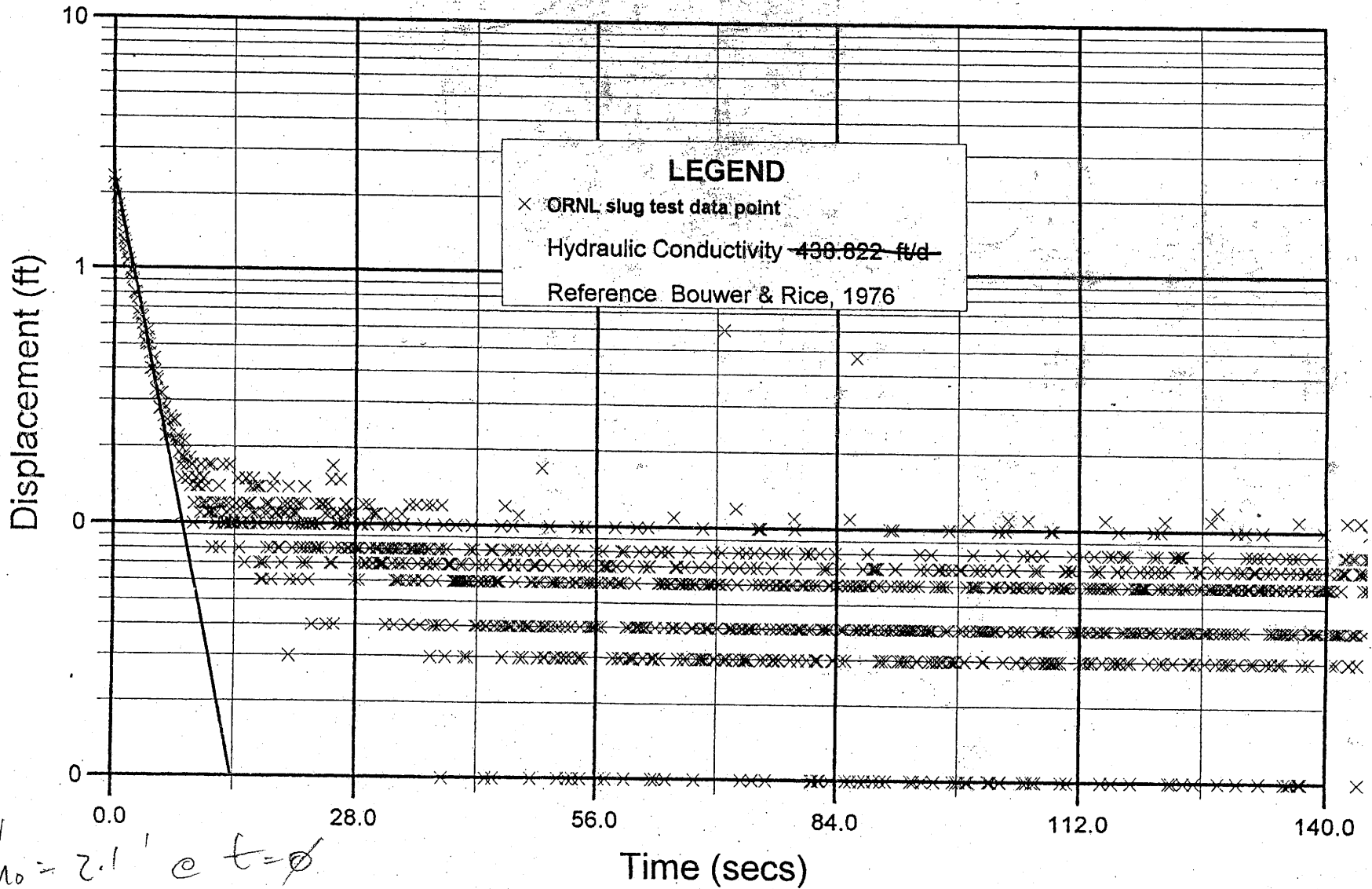
Well T1-D Test 2



$$h_0 = 2.1' \text{ at } t=0$$

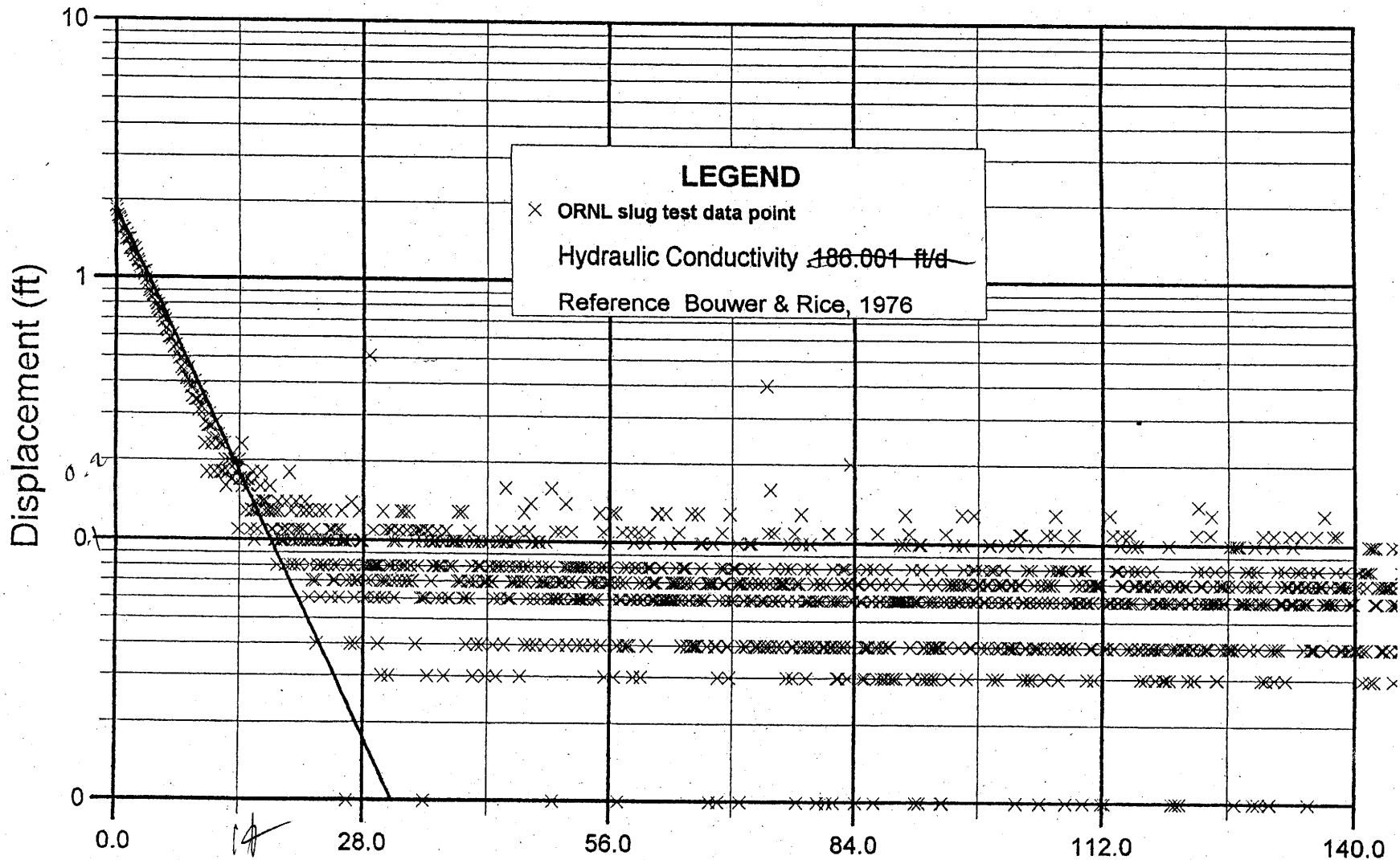
$$h_1 = 0.2' \text{ at } t=7 \text{ sec}$$

Well T1-D Test 3



$h_0 = 2.1'$ @ $t = 0$
 $h_1 = 0.1'$ @ $t = 7 \text{ sec}$

Well TW01 Test 1

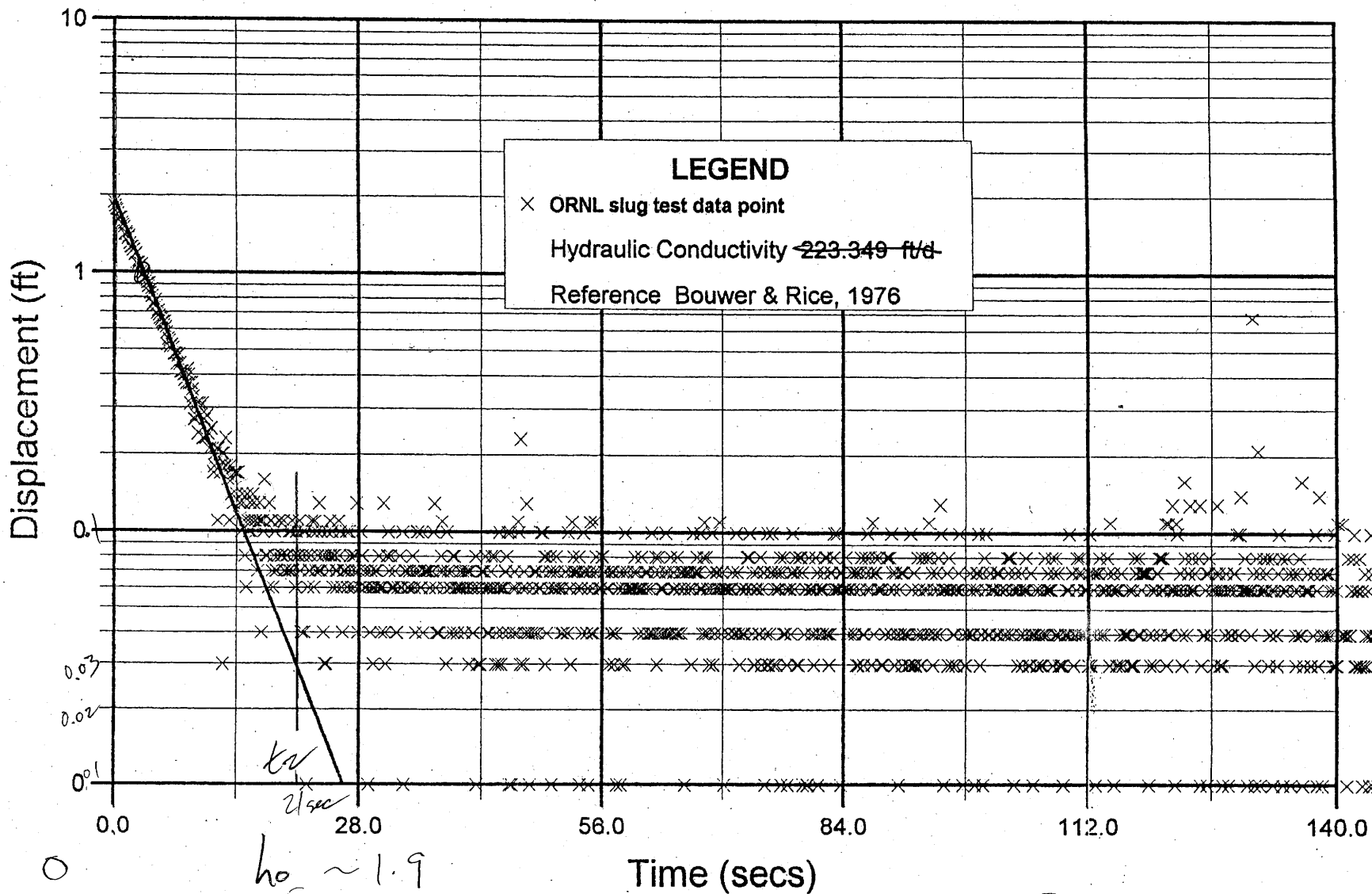


$t_0 = 0$
 $t_1 = 14 \text{ s} = 0.233 \text{ min}$
 $t_2 = \text{---}$
 $h_0 \sim 1.9'$
 $h_1 = 0.2'$
 $h_2 = \text{---}$

Time (secs)

$2.3 \times 10^{-3} \text{ cm/s}$

Well TW01 Test 2

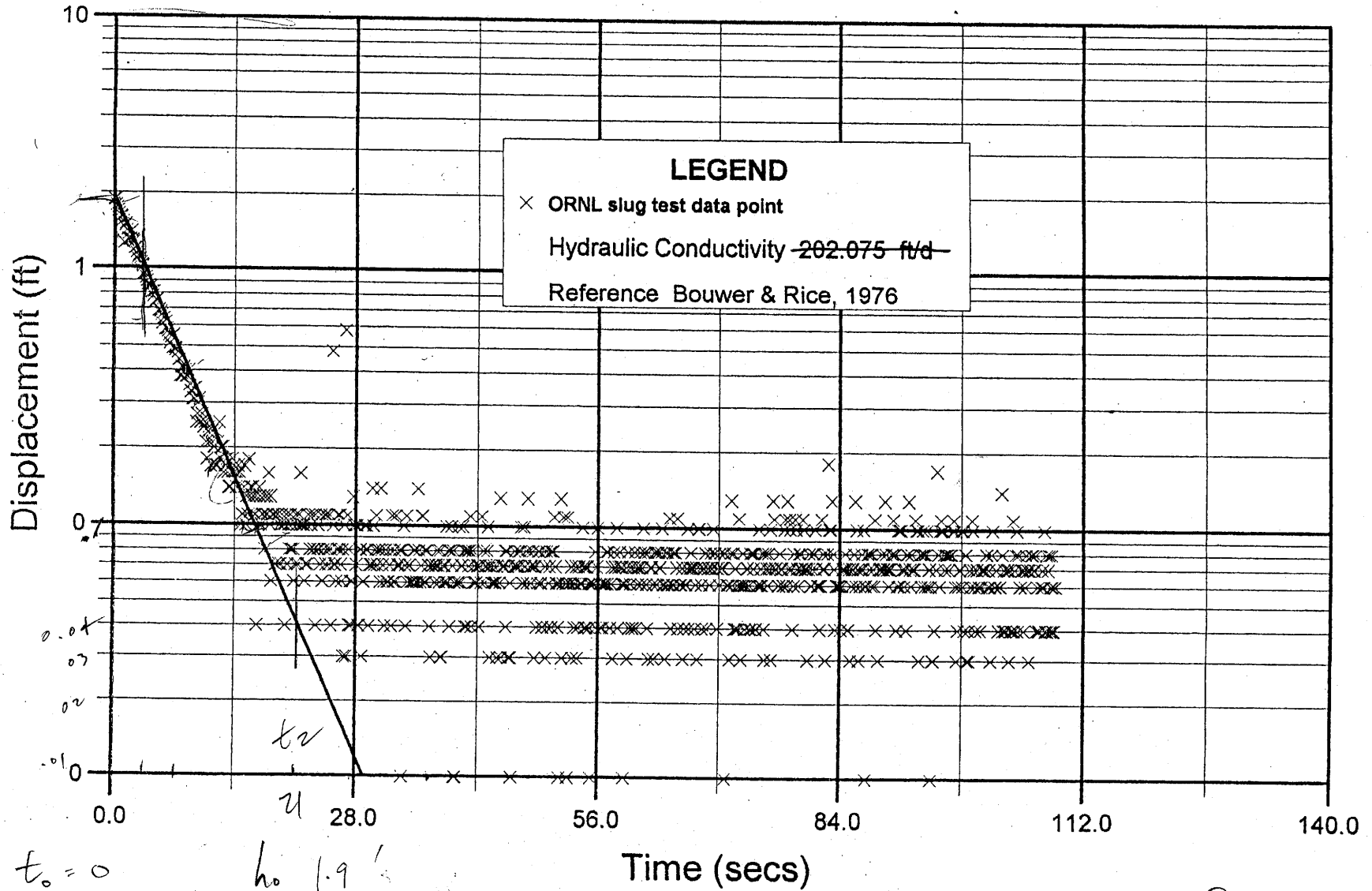


$t_0 = 0$
 $t_1 = 3.5s = 0.0583 \text{ m}$
 $t_2 = 21s = 0.35 \text{ min}$

$h_0 \sim 1.9$
 $h_1 = 1$
 $h_2 = 0.03$

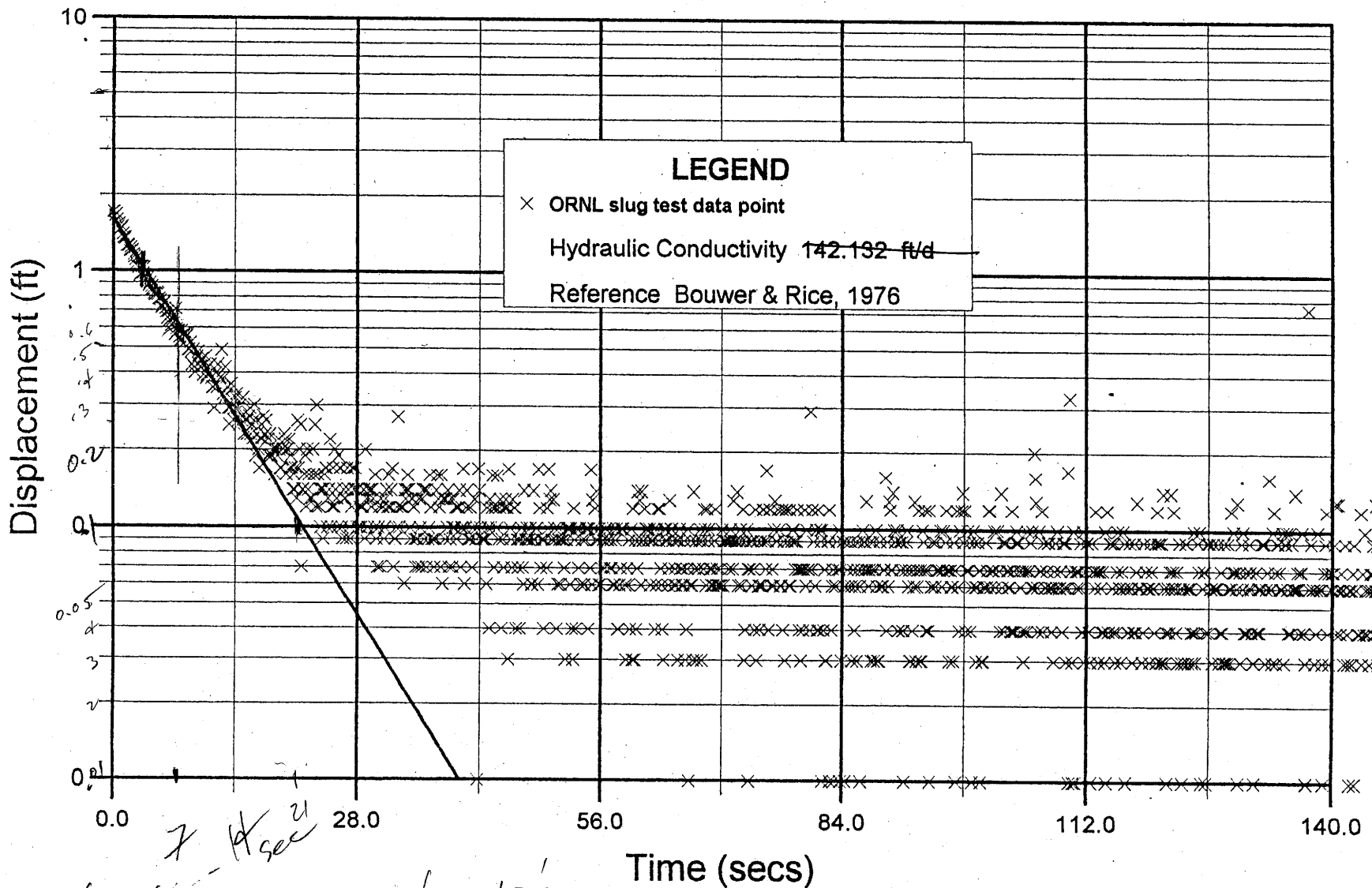
$2.8 \times 10^{-3} \text{ cm/sec}$

Well TW01 Test 3

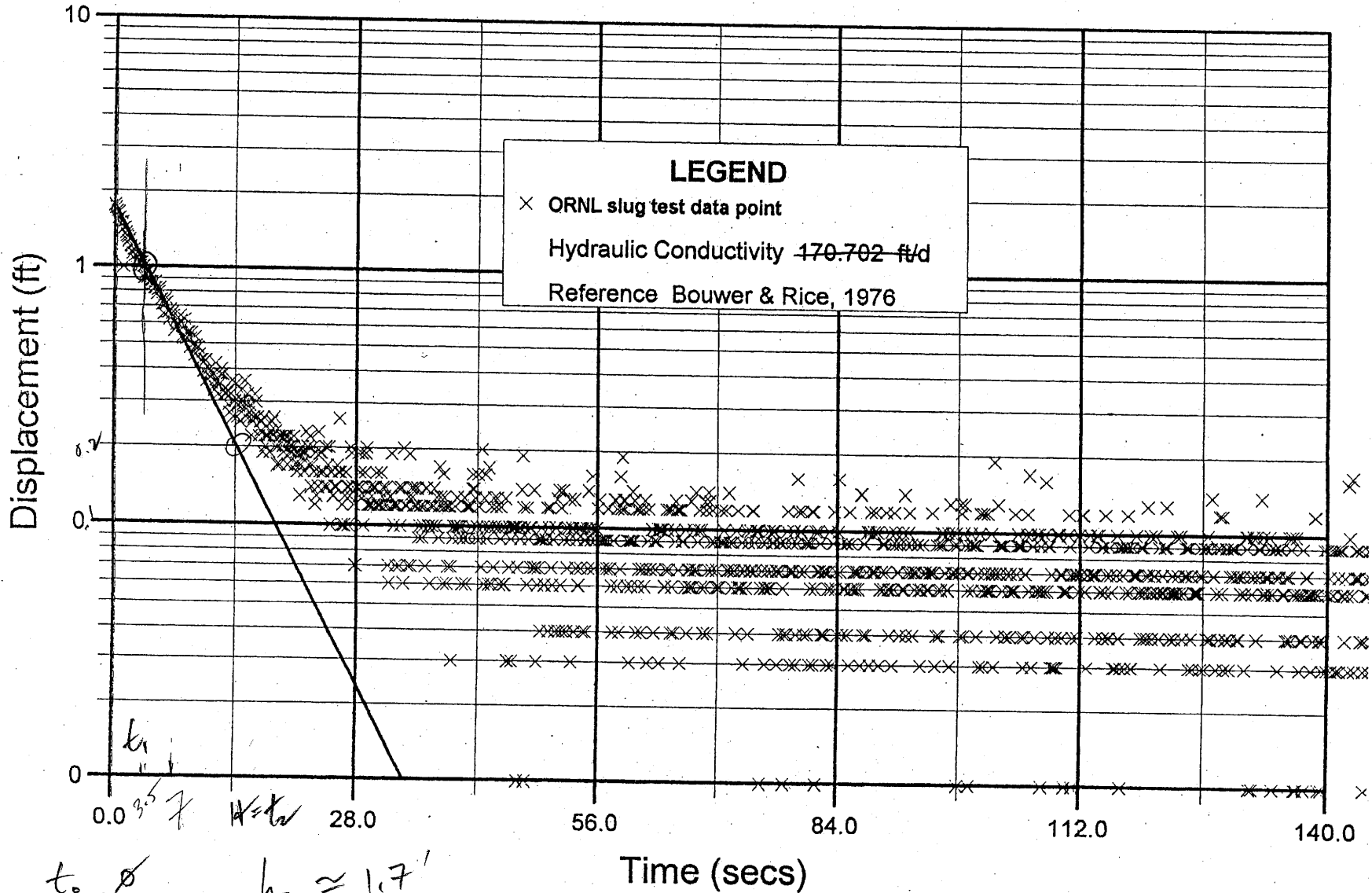


$2.6 \times 10^{-3} \text{ cm/sec}$

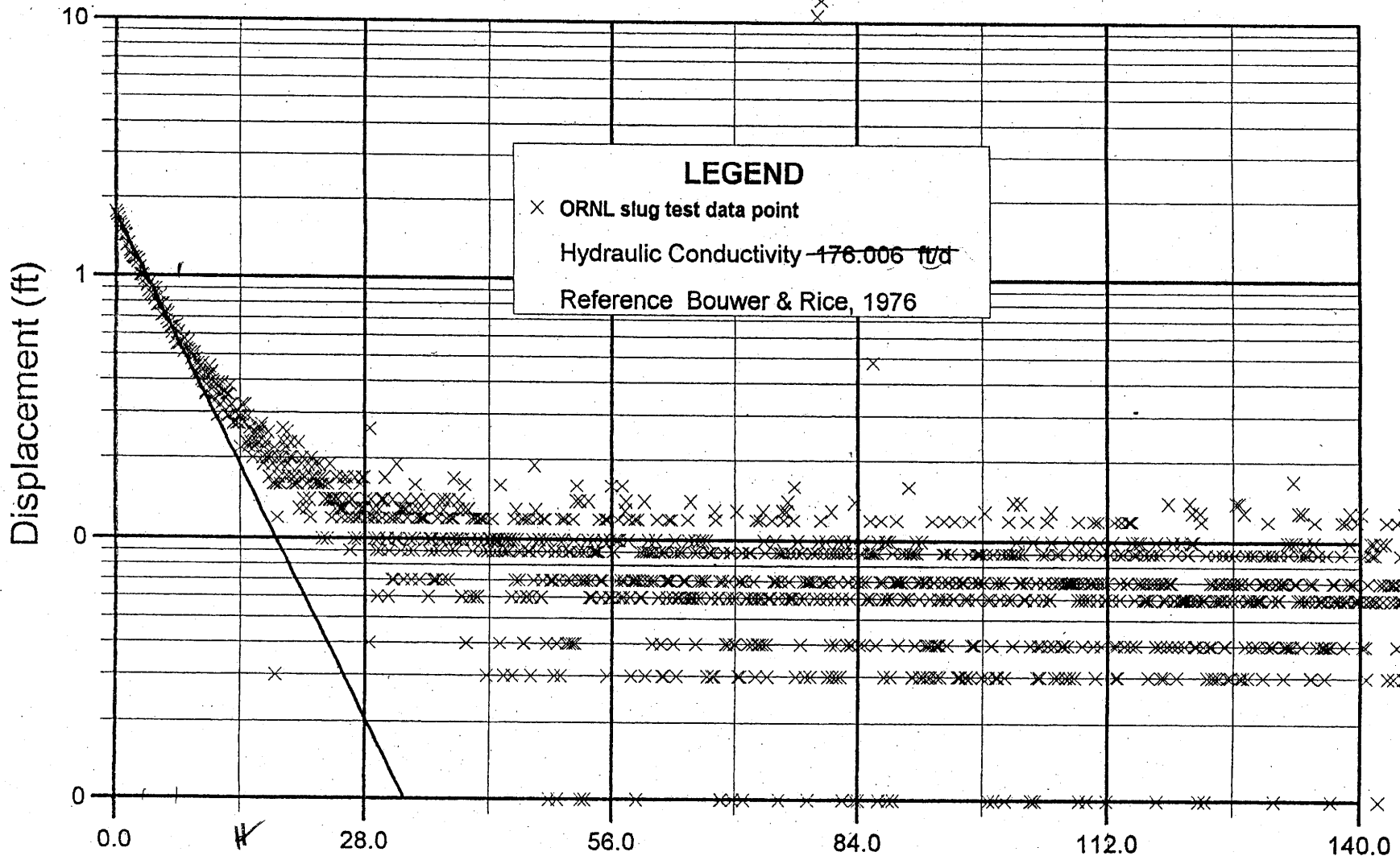
Well TW02 Test 1



Well TW02 Test 2



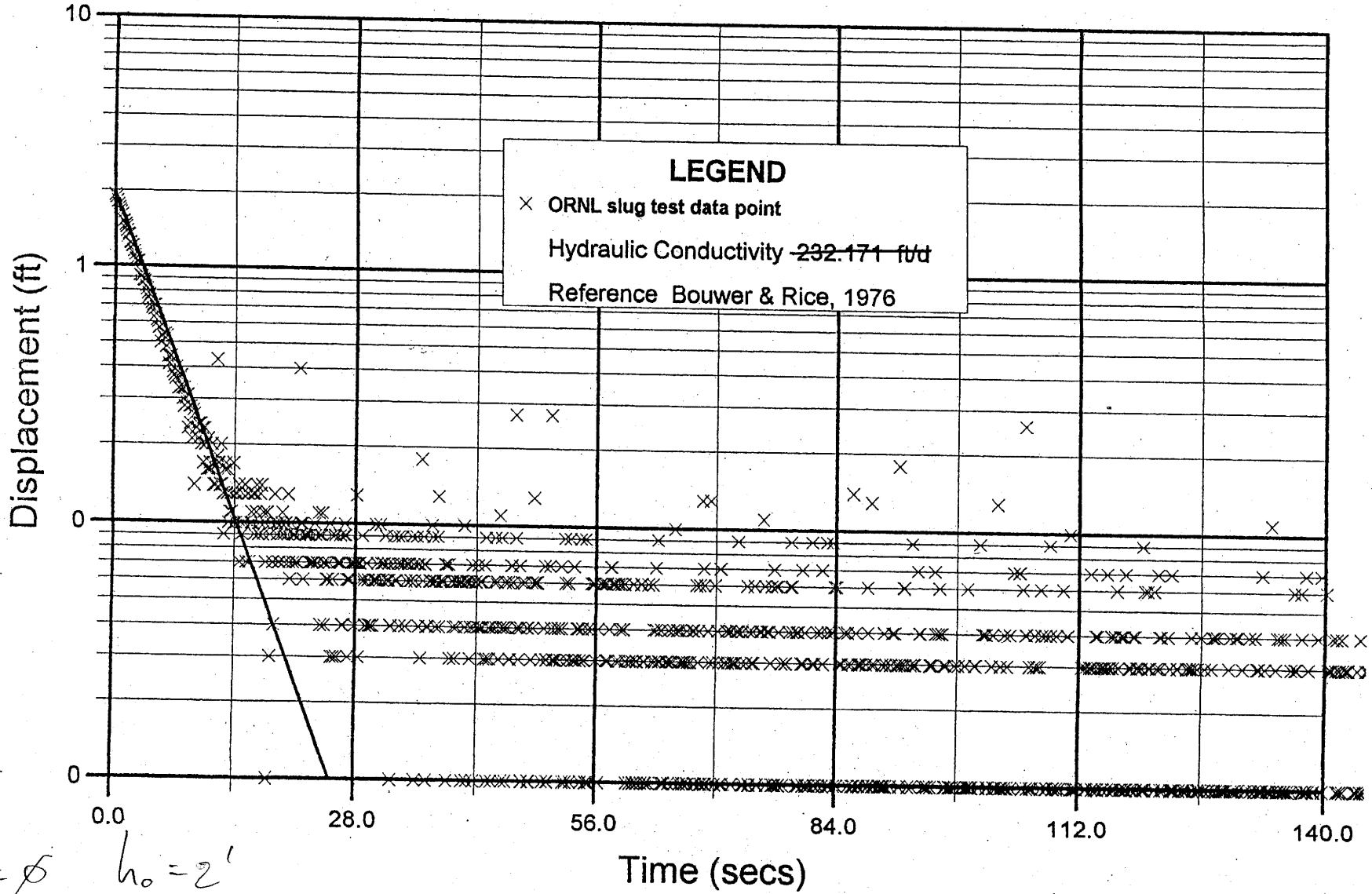
Well TW02 Test 3



t_0 0
 t_1 3.5 sec = 0.0583 min $h_0 \sim 1.7$
 t_2 4 sec = 0.233 min h_1 1
 h_2 0.2'

Time (secs)

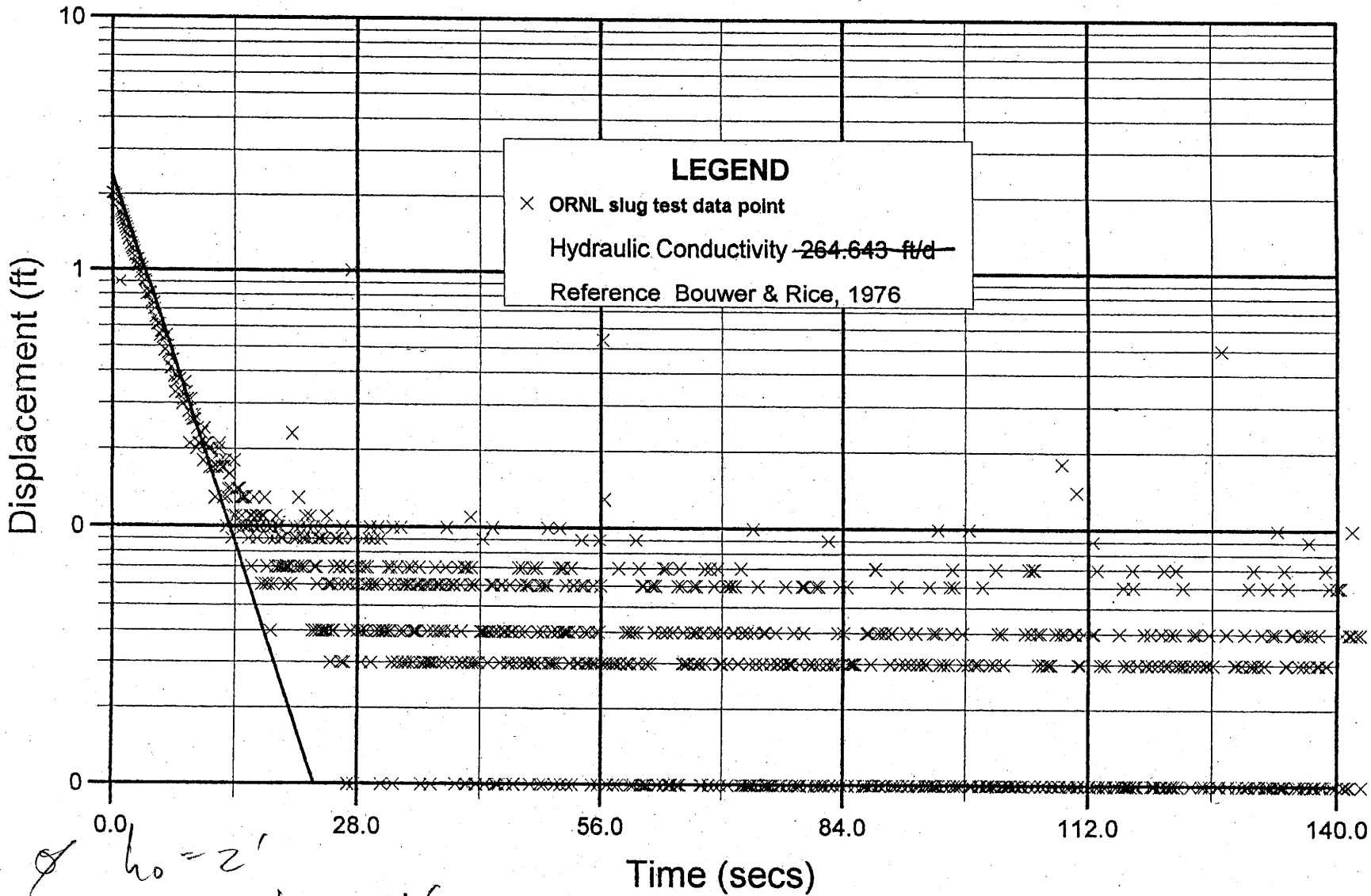
Well TW03 Test 1



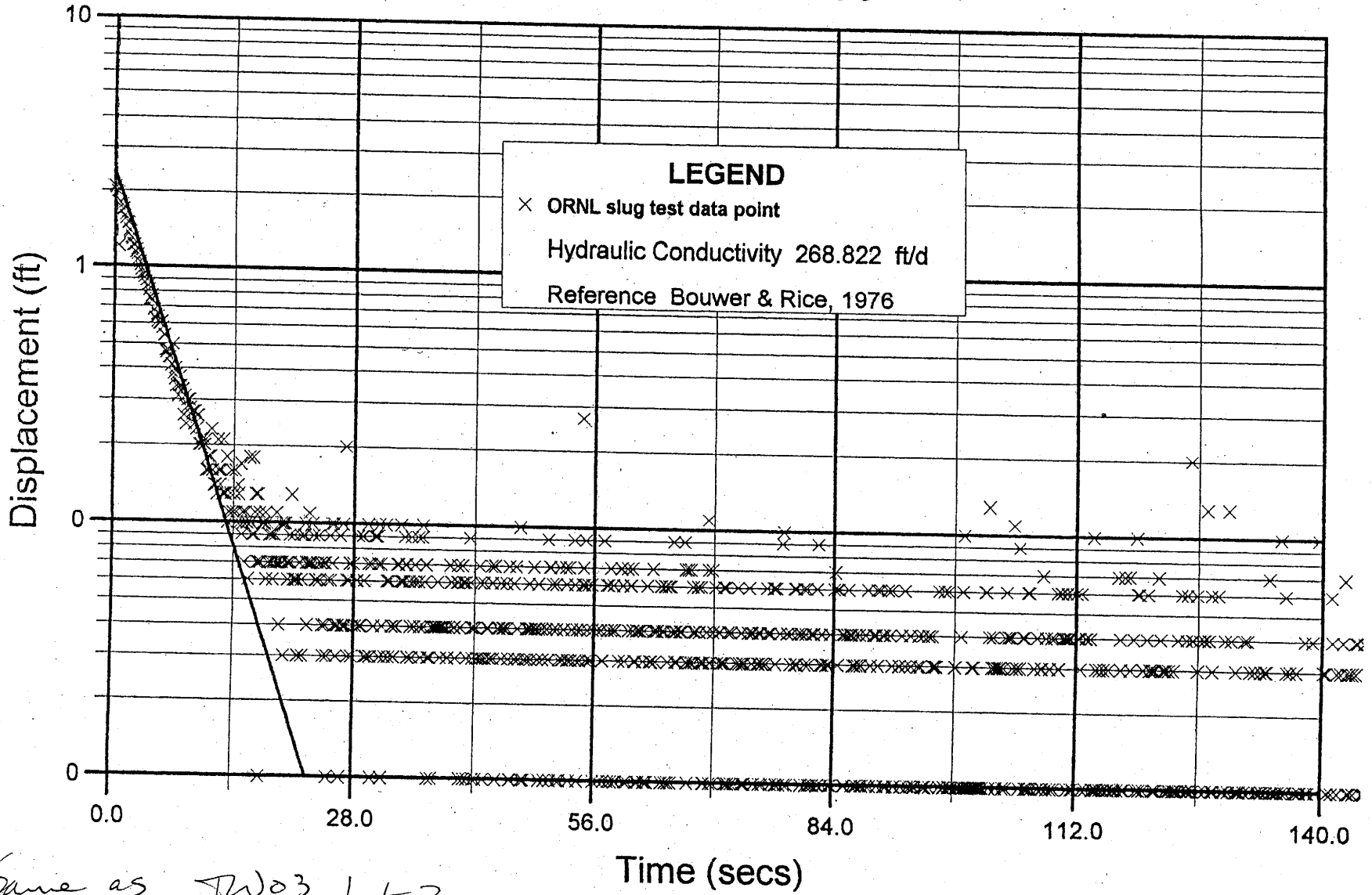
$t_0 = \phi \quad h_0 = 2'$

$t_1 = 14 \text{ sec} = 0.2333 \text{ min} \quad h_1 = 0.1'$

Well TW03 Test 2

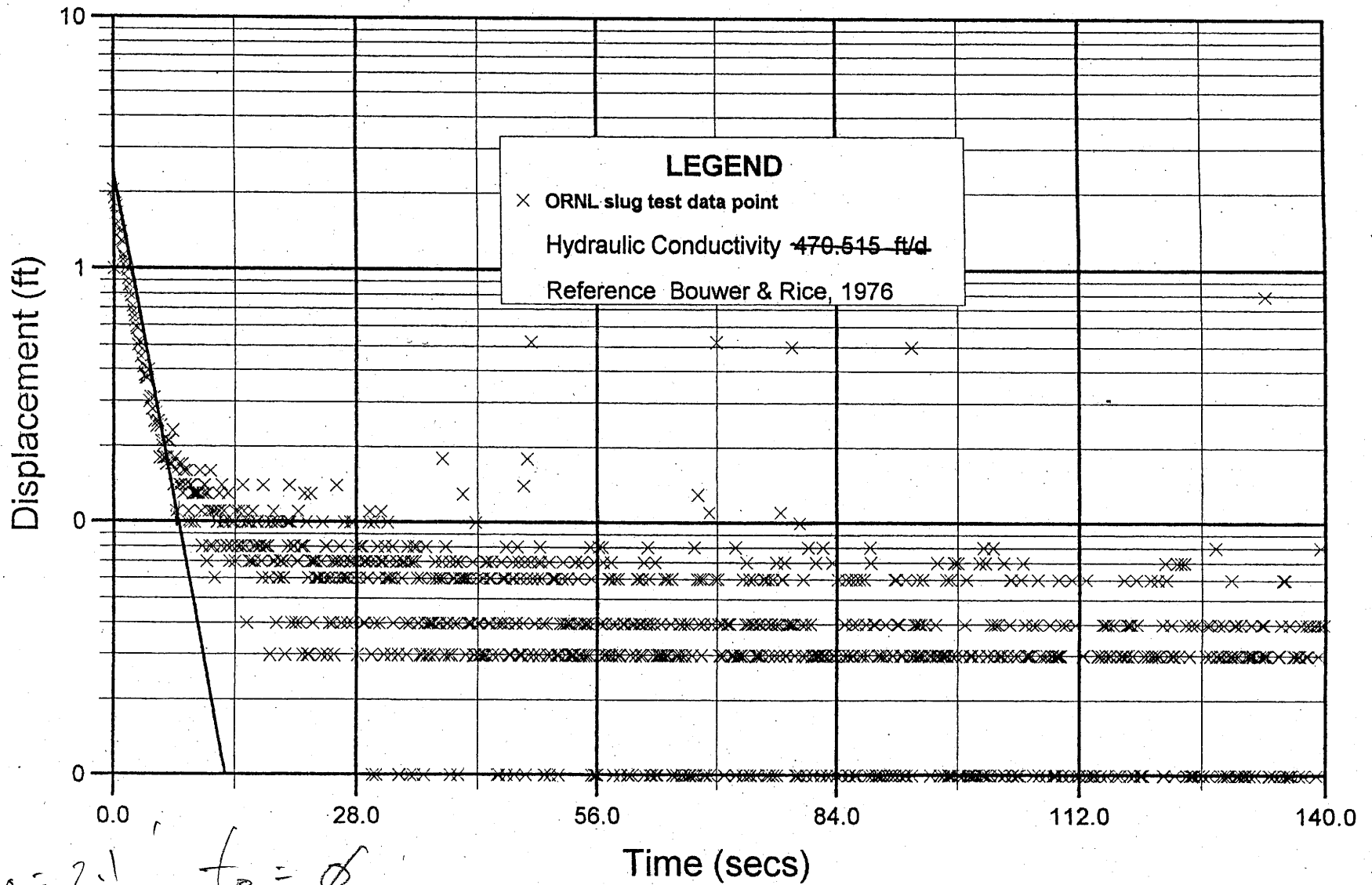


Well Tw03 Test 3



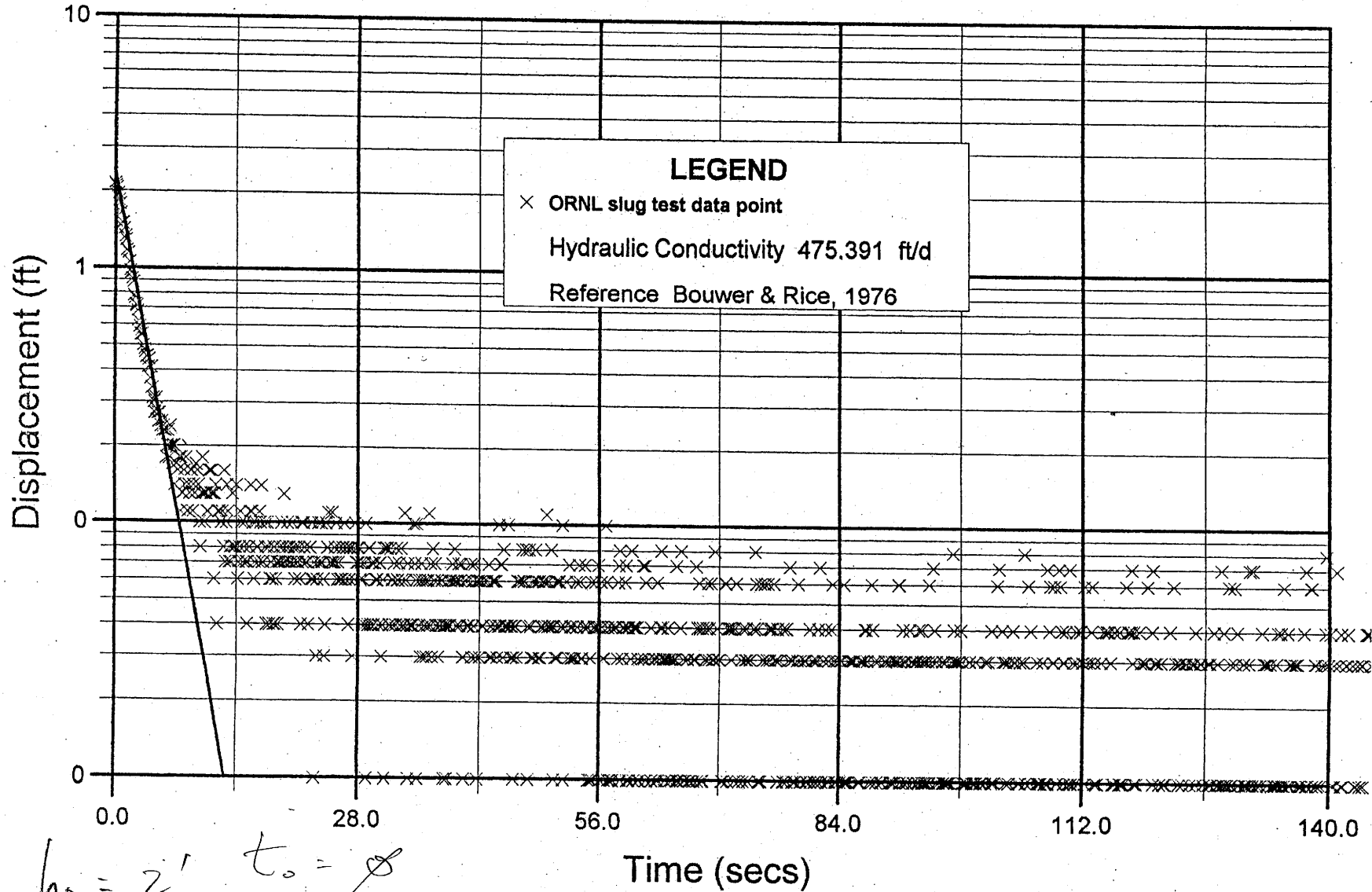
Same as Tw03 1 + 2

Well TW04 Test 1



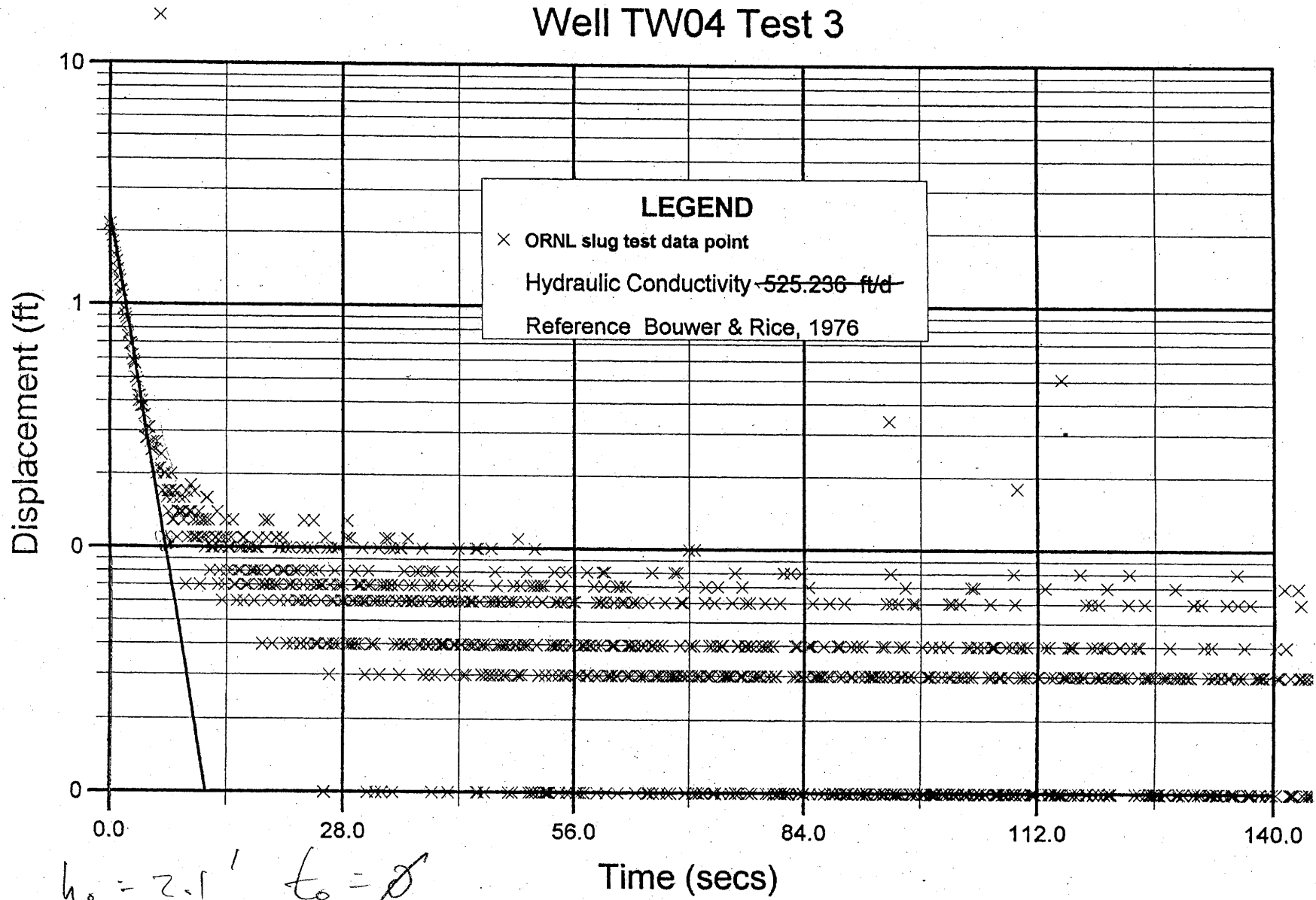
$h_0 = 2.1'$ $t_0 = \phi$
 $h_1 = 0.1'$ $t_1 = 14s = 0.233 \text{ min}$

Well TW04 Test 2

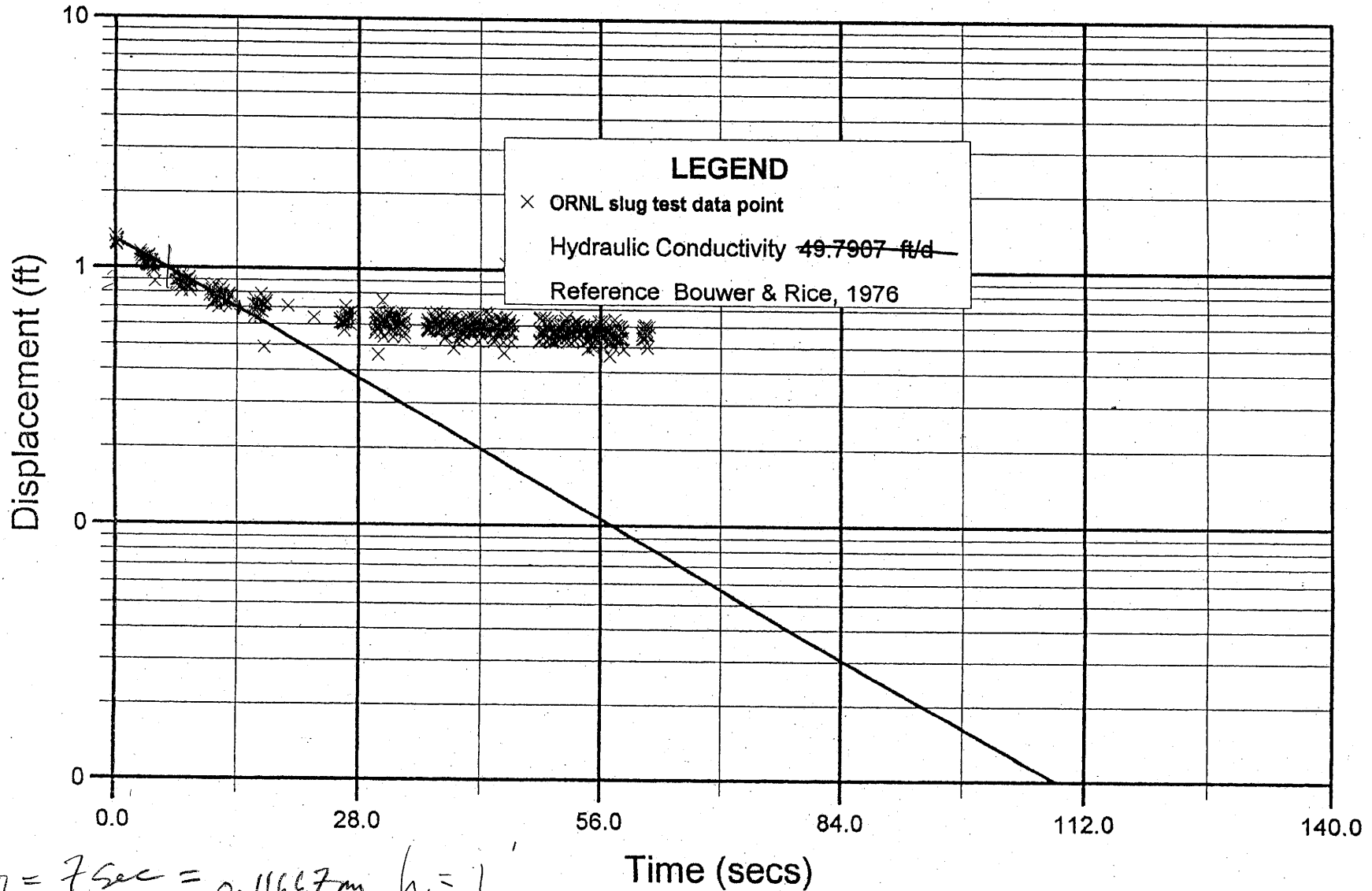


$h_0 = 2'$ $t_0 = \phi$
 $h_1 = 0.2'$ $t_1 = 0.233 \text{ min}$

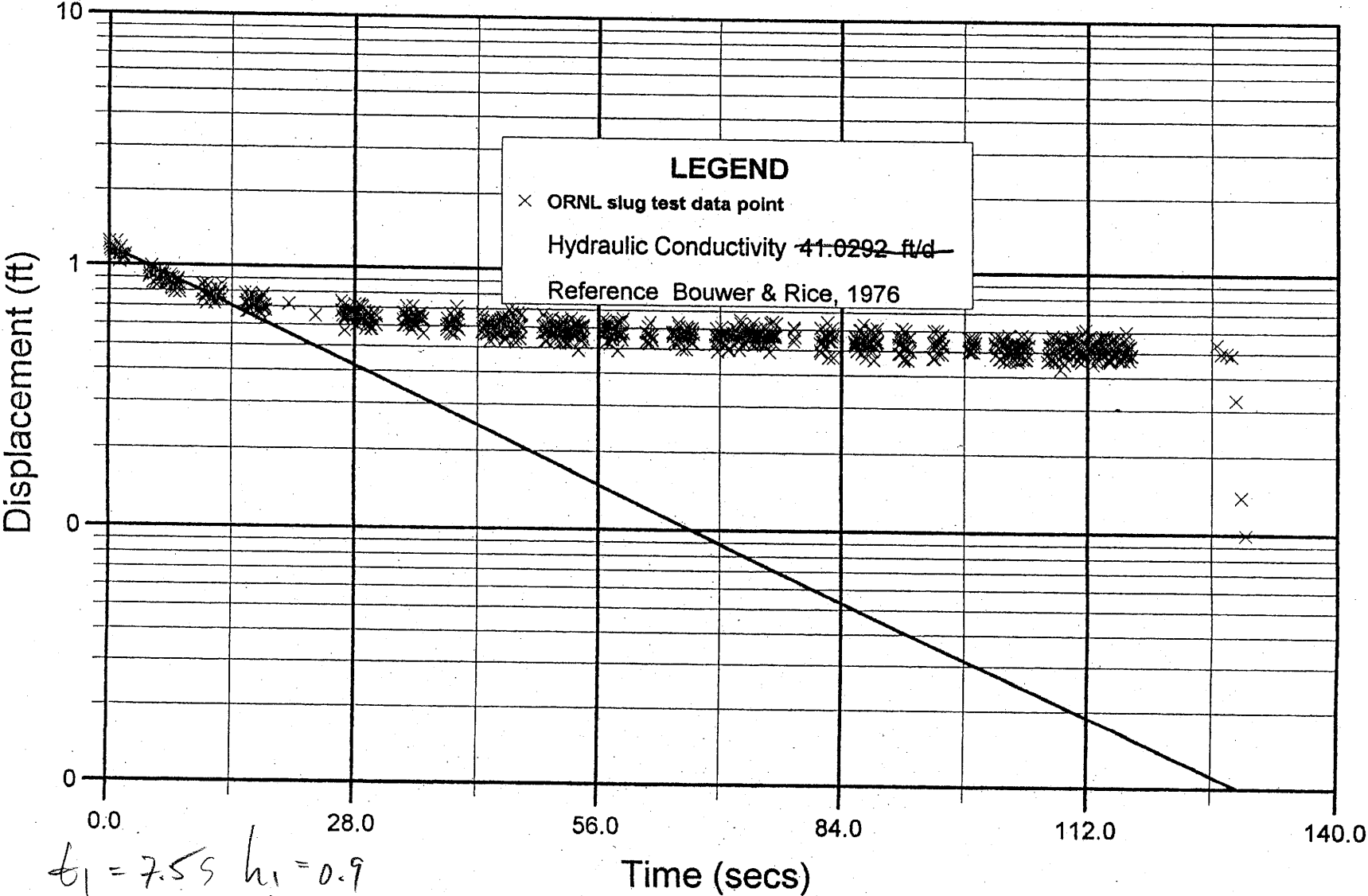
Well TW04 Test 3



Well TW05 Test 1

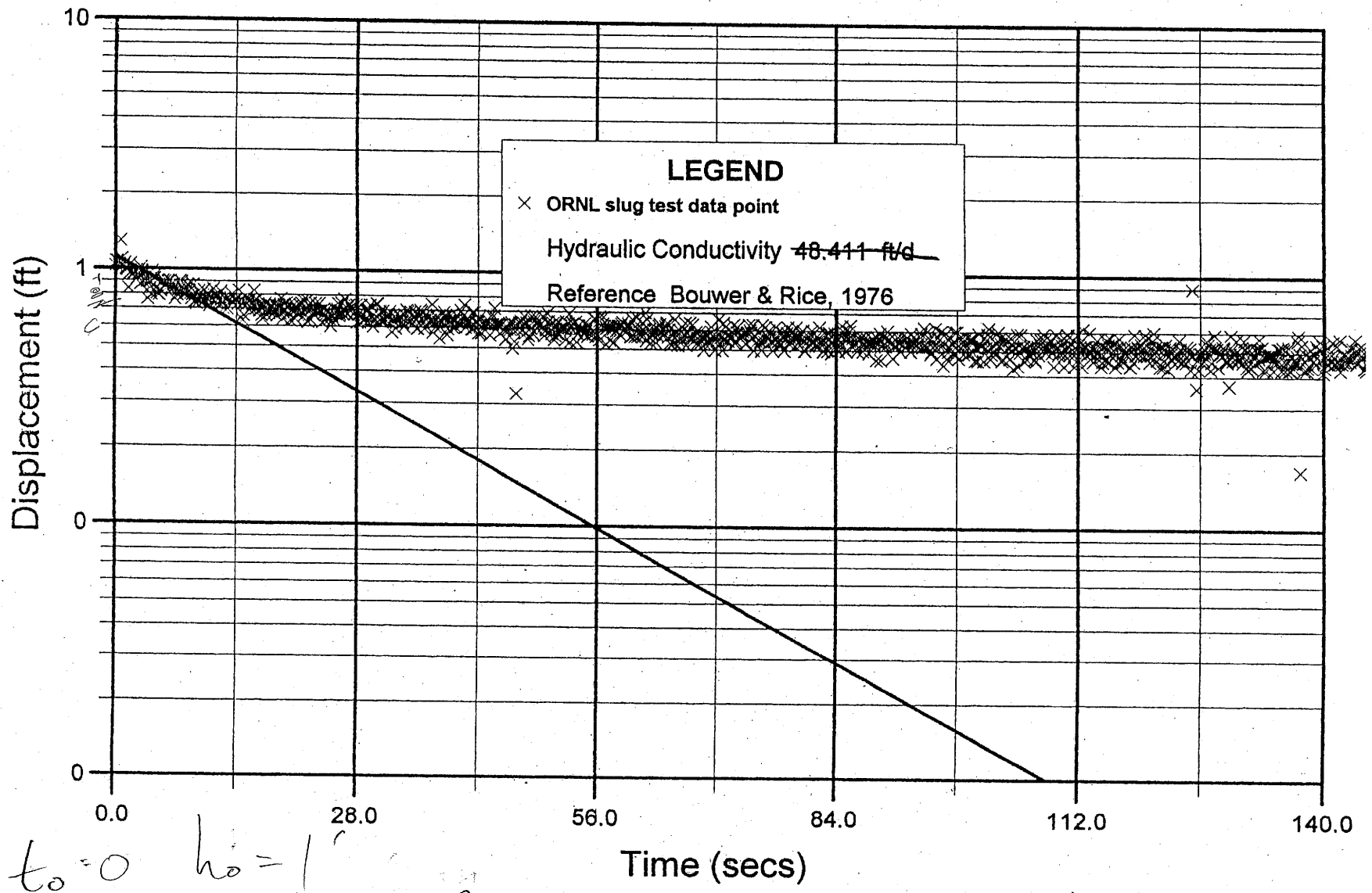


Well TW05 Test 2



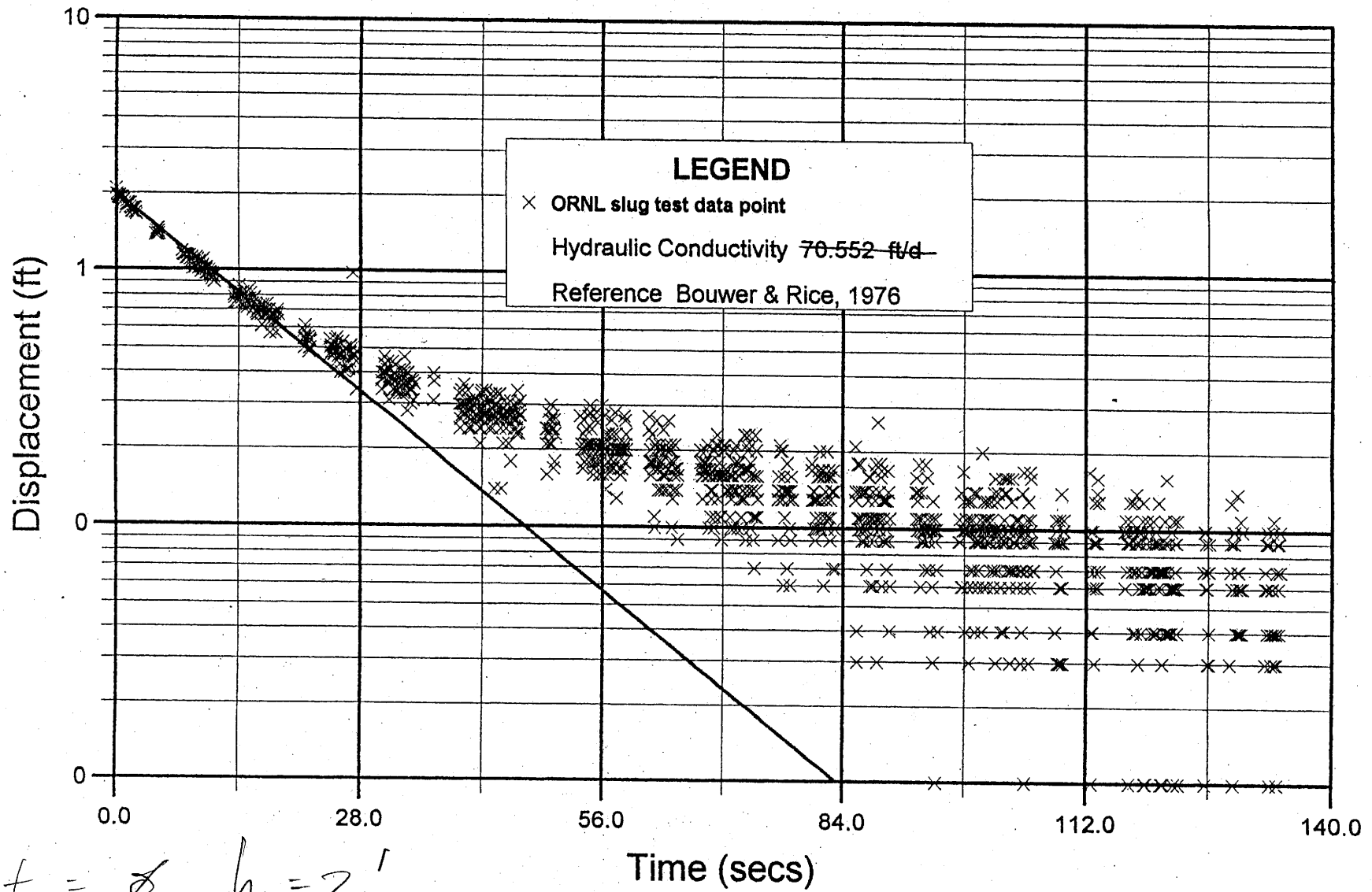
$t_1 = 7.55 \text{ s} \quad h_1 = 0.9$
 $t_2 = 14 \text{ s} \quad h_2 = 0.7$

Well TW05 Test 3



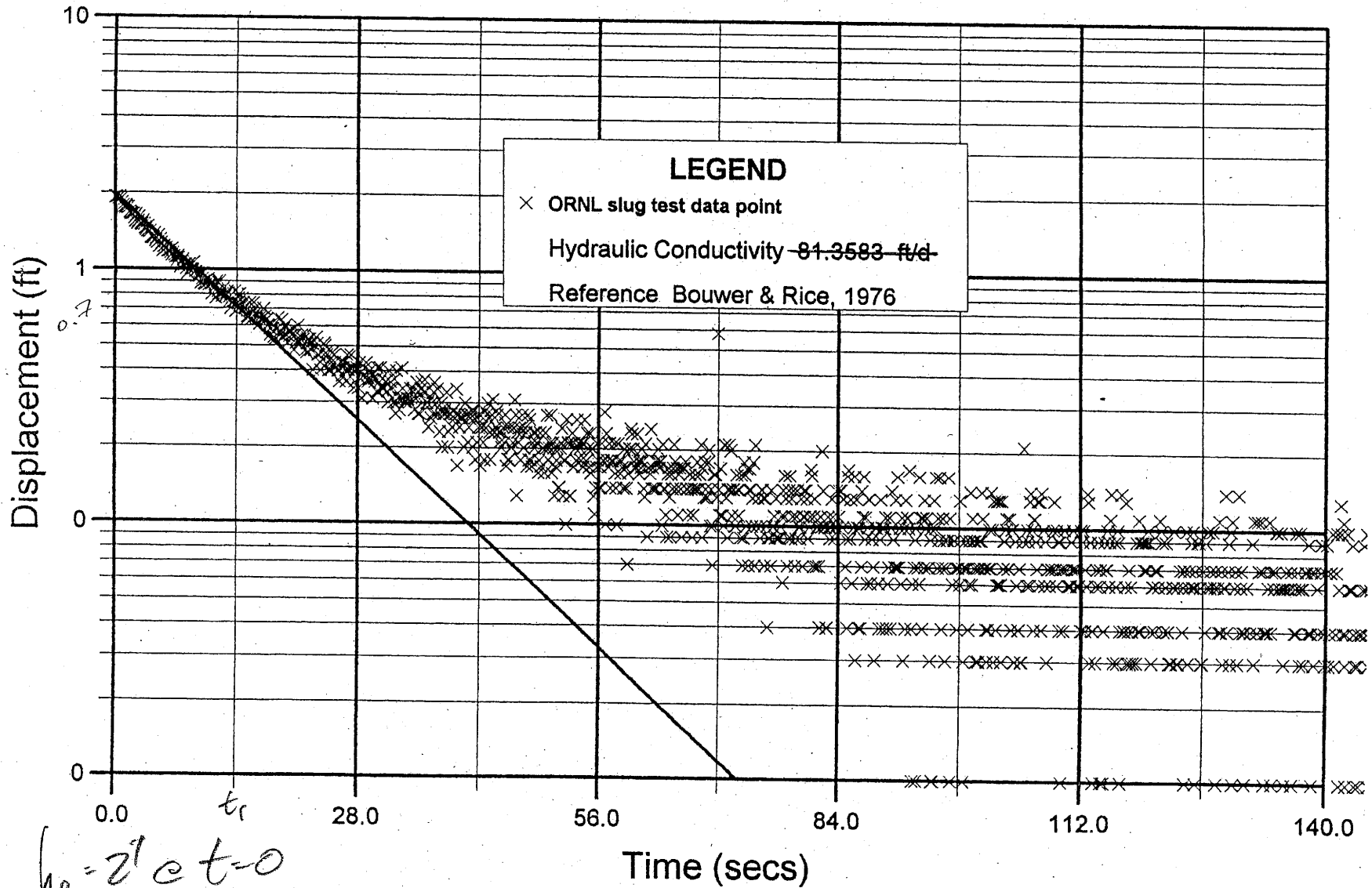
$t_0 = 0$ $h_0 = 1'$
 $t_1 = 14s$ $h_1 = 0.6'$

Well TW06 Test 1



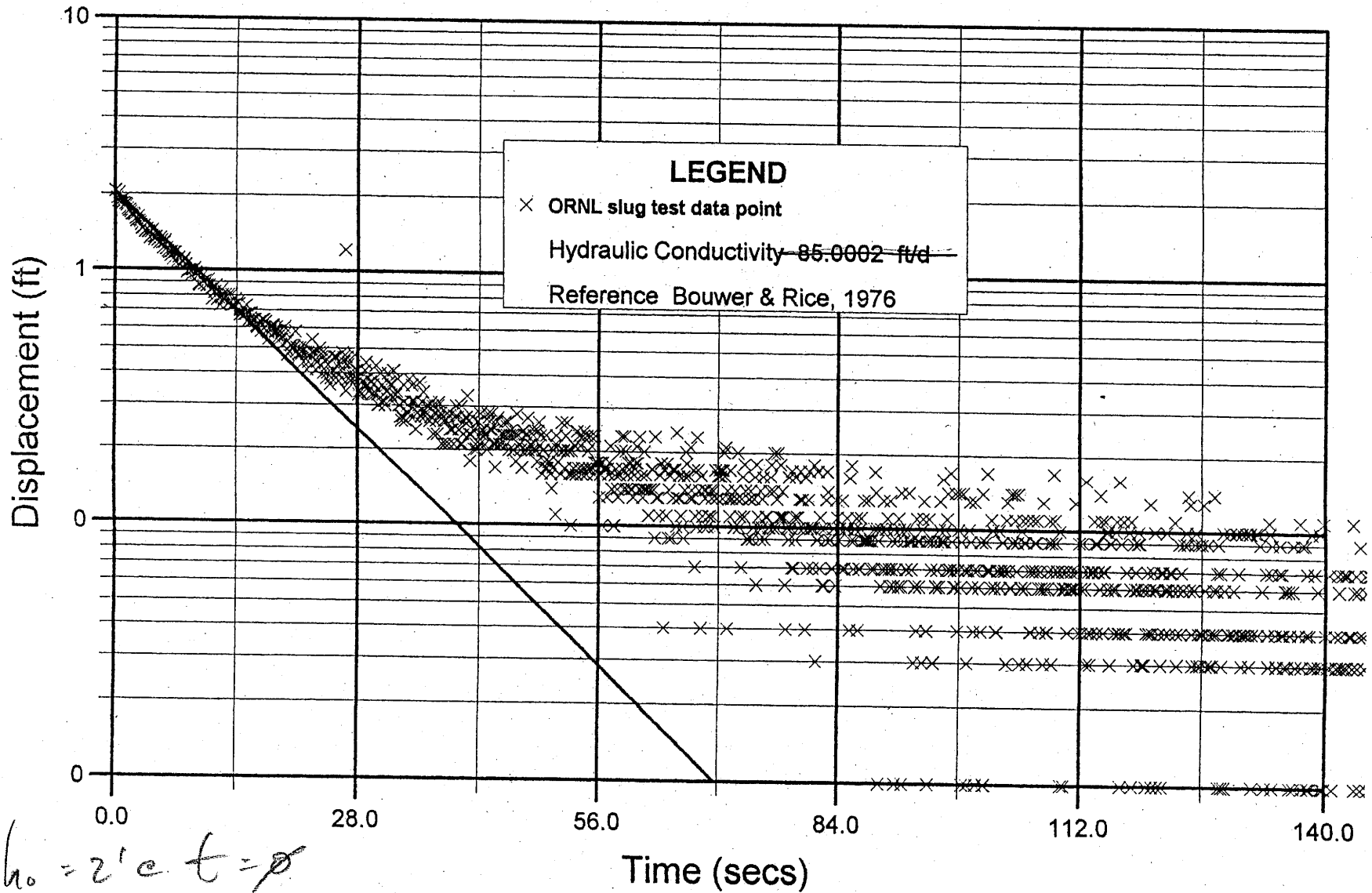
$t_0 = \phi$ $h_0 = 2'$
 $t_1 = 145$ $h_1 = 0.8$

Well TW06 Test 2



$h_0 = 2' \text{ at } t = 0$
 $h_1 = 0.7' \text{ at } t_1 = 0.233 \text{ min}$

Well TW06 Test 3

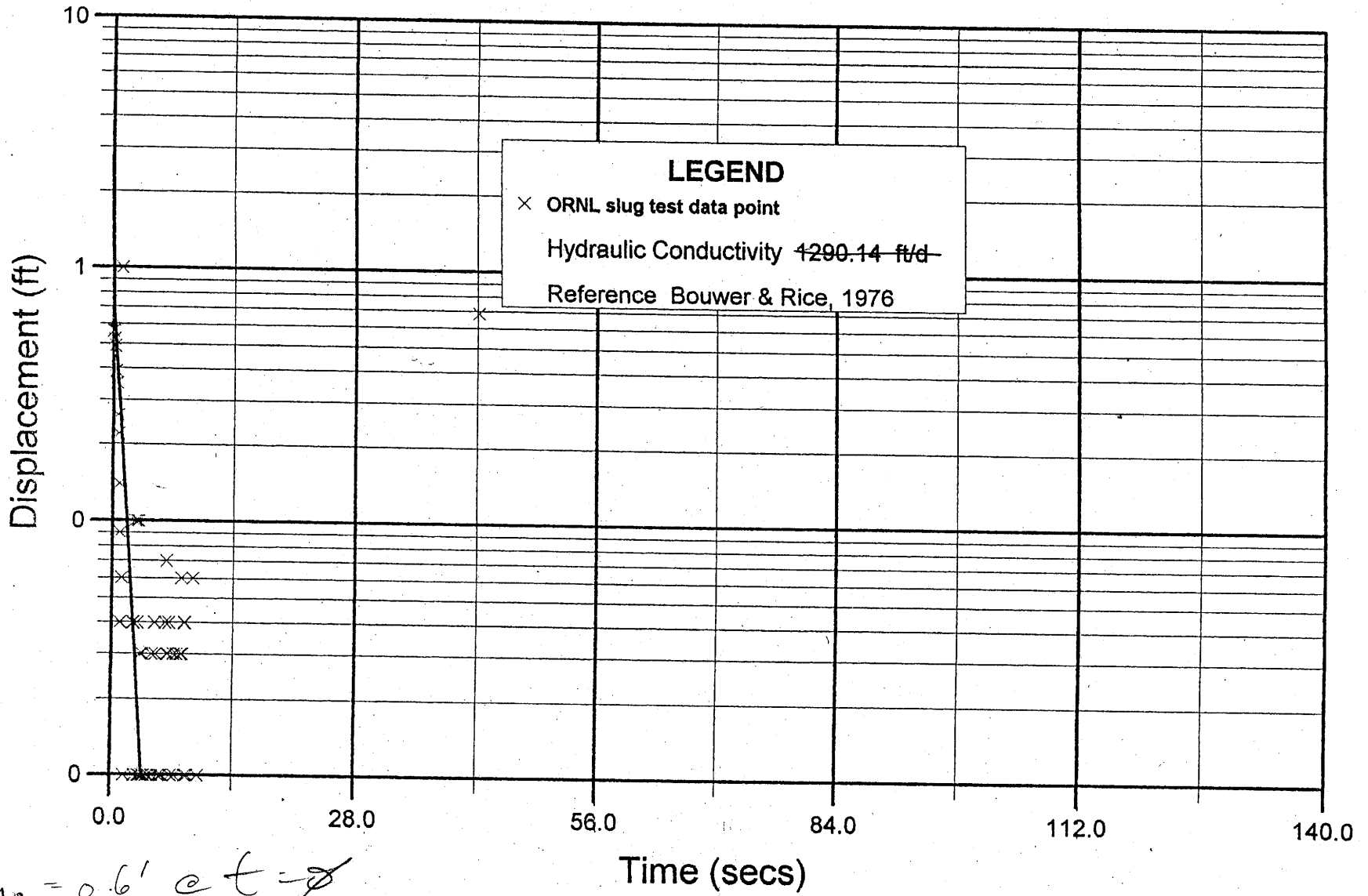


$$h_0 = 2' e^{-t/\tau} = \rho$$

$$h_c = 0.7 e^{-t/\tau} = 0.2333 \text{ min}$$

$$\frac{1 \text{ sec}}{32 \text{ unit}} \times \frac{40}{60} = t_{\text{min}} = 0.029 \text{ min}$$

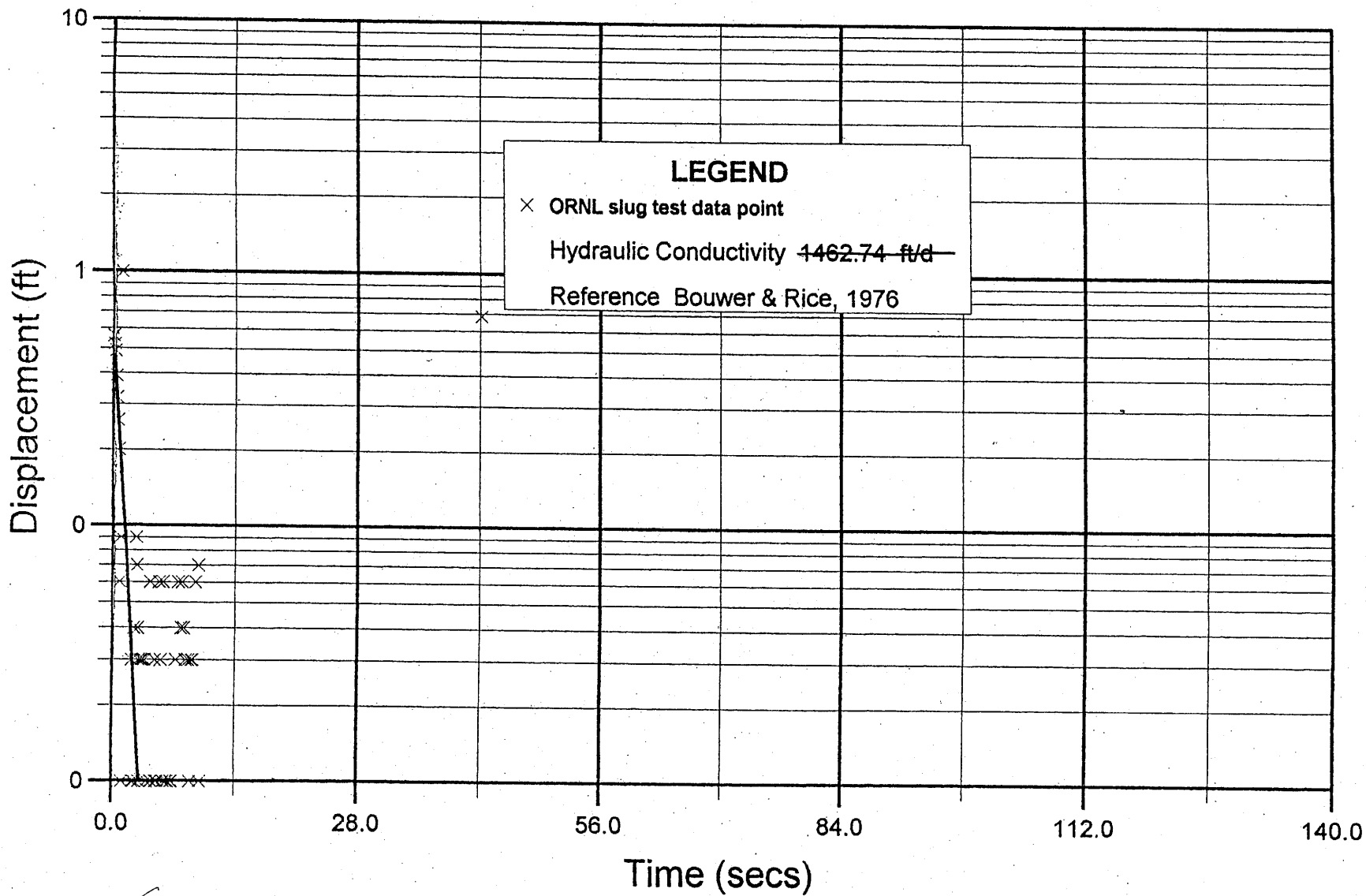
Well R4-M2 Test 1



$$h_0 = 0.6' \text{ at } t = 0$$

$$h_1 = 0.1' \text{ at } t_1 = 0.029 \text{ min}$$

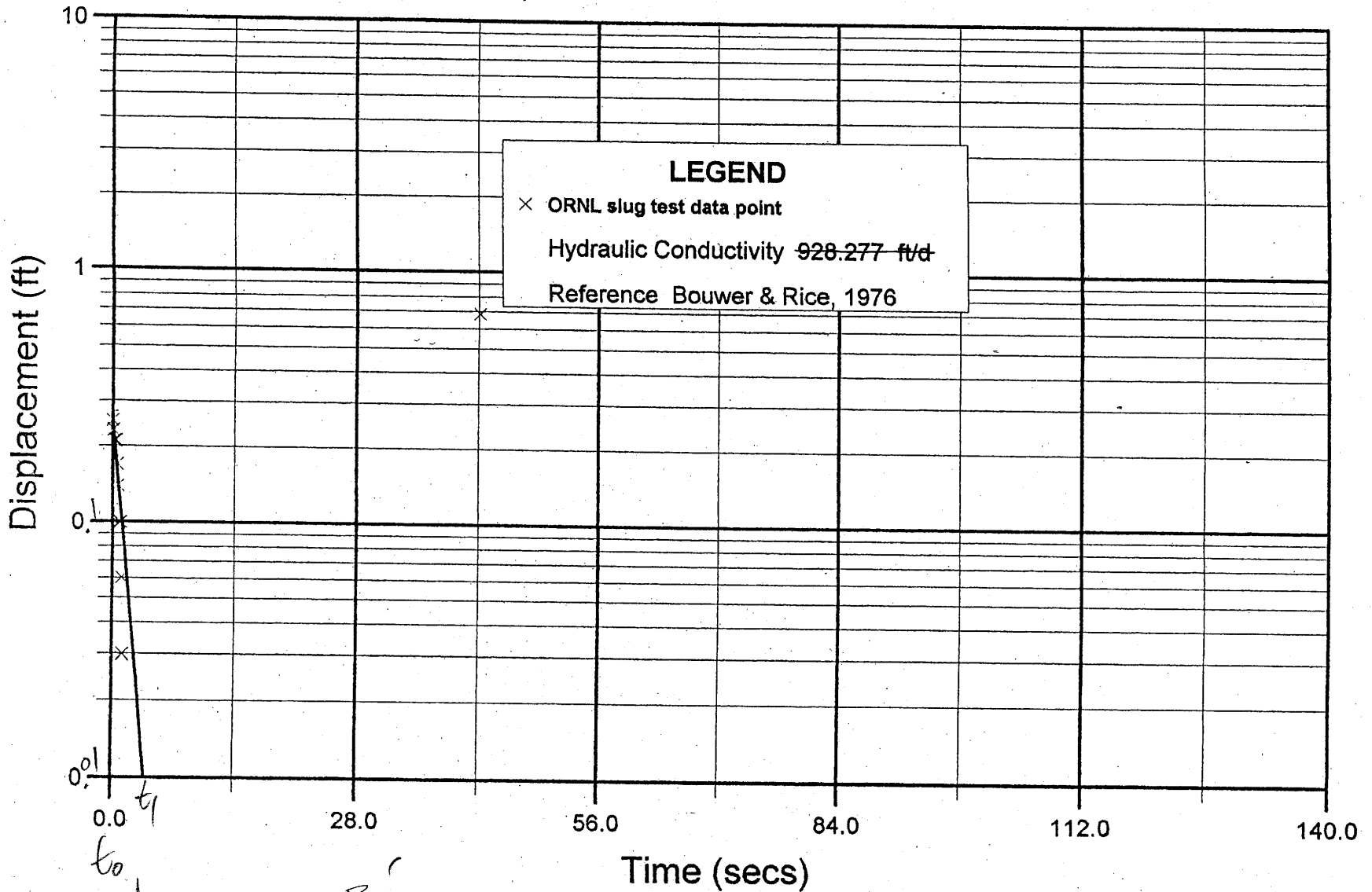
Well R4-M2 Test 3



Same

$$\frac{145}{320} \times \frac{90}{60} = \frac{t_i}{t_1} = 0.0656 \text{ min}$$

Well R4-M8 Test 1



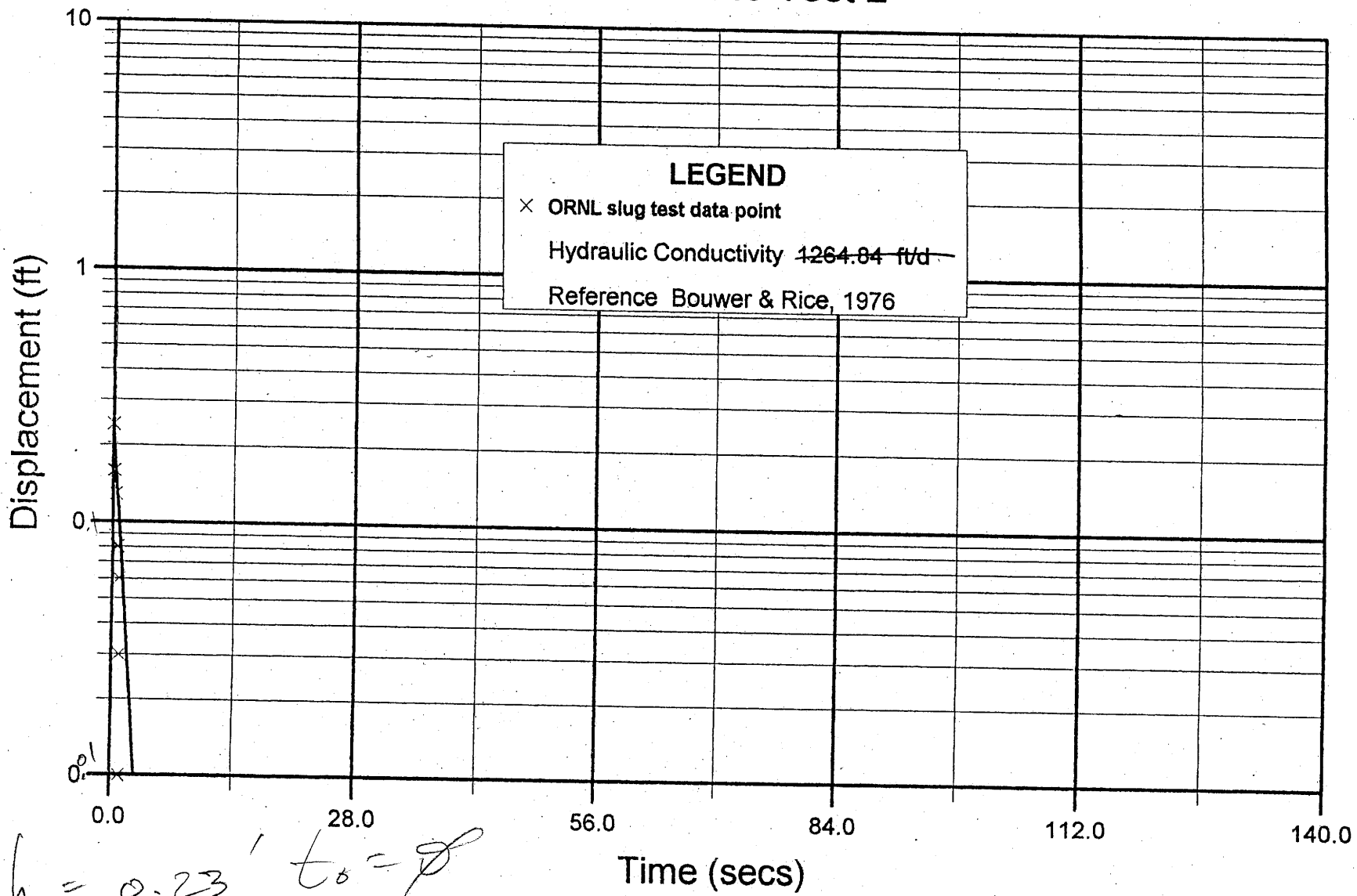
$$h_0 = 0.23$$

$$h_1 = 0.01$$

$$\frac{t_i}{t_1} = 0.0656 \text{ min}$$

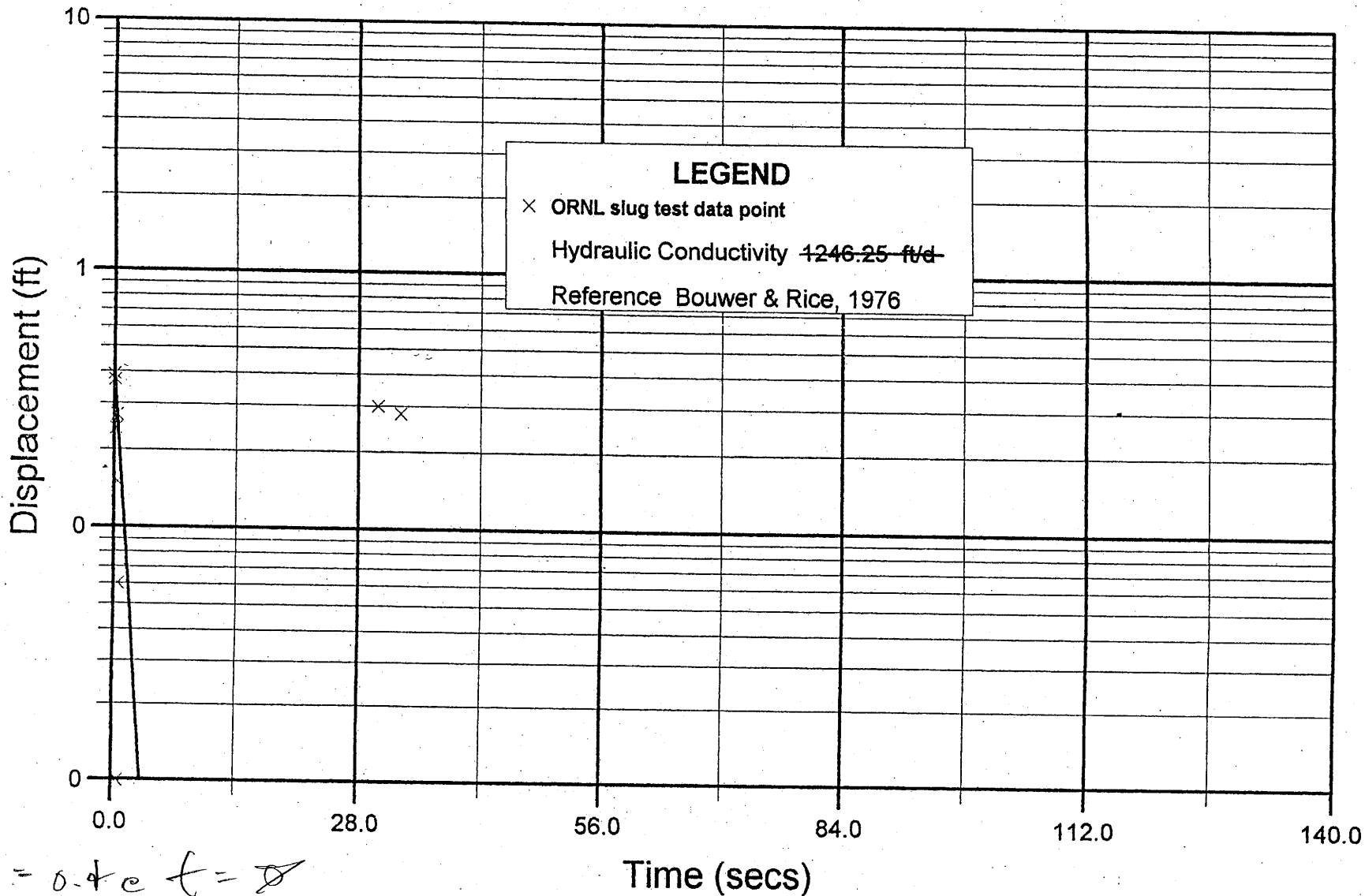
$$\frac{74}{60} \left(\frac{103}{32} \right) = t_1 = 0.05 \text{ min}$$

Well R4-M8 Test 2



$h_0 = 0.23'$ $t_0 = \phi$
 $h_1 = 0.01'$ $t_1 = 0.05 \text{ min}$

Well T4-D Test 1

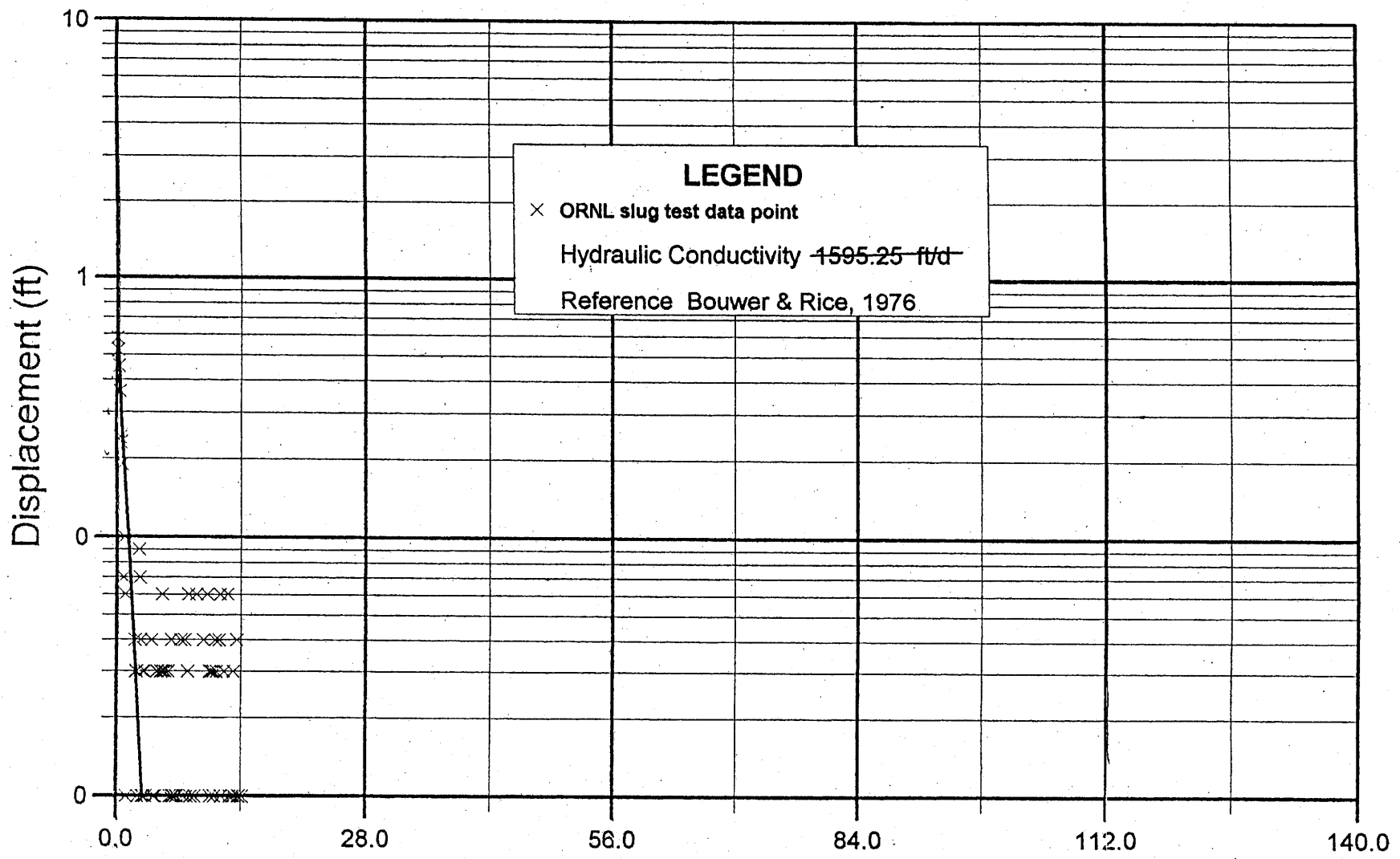


$$h_0 = 0.4 \text{ c } t_0 = \text{---}$$

$$t_1 = 3.5 \text{ units } \times \frac{1 \text{ sec}}{32 \text{ units}} = 1.5 \text{ sec} = 0.026 \text{ min } \quad h_1 = 0.1$$

40 scale
 14 sec
 32 units

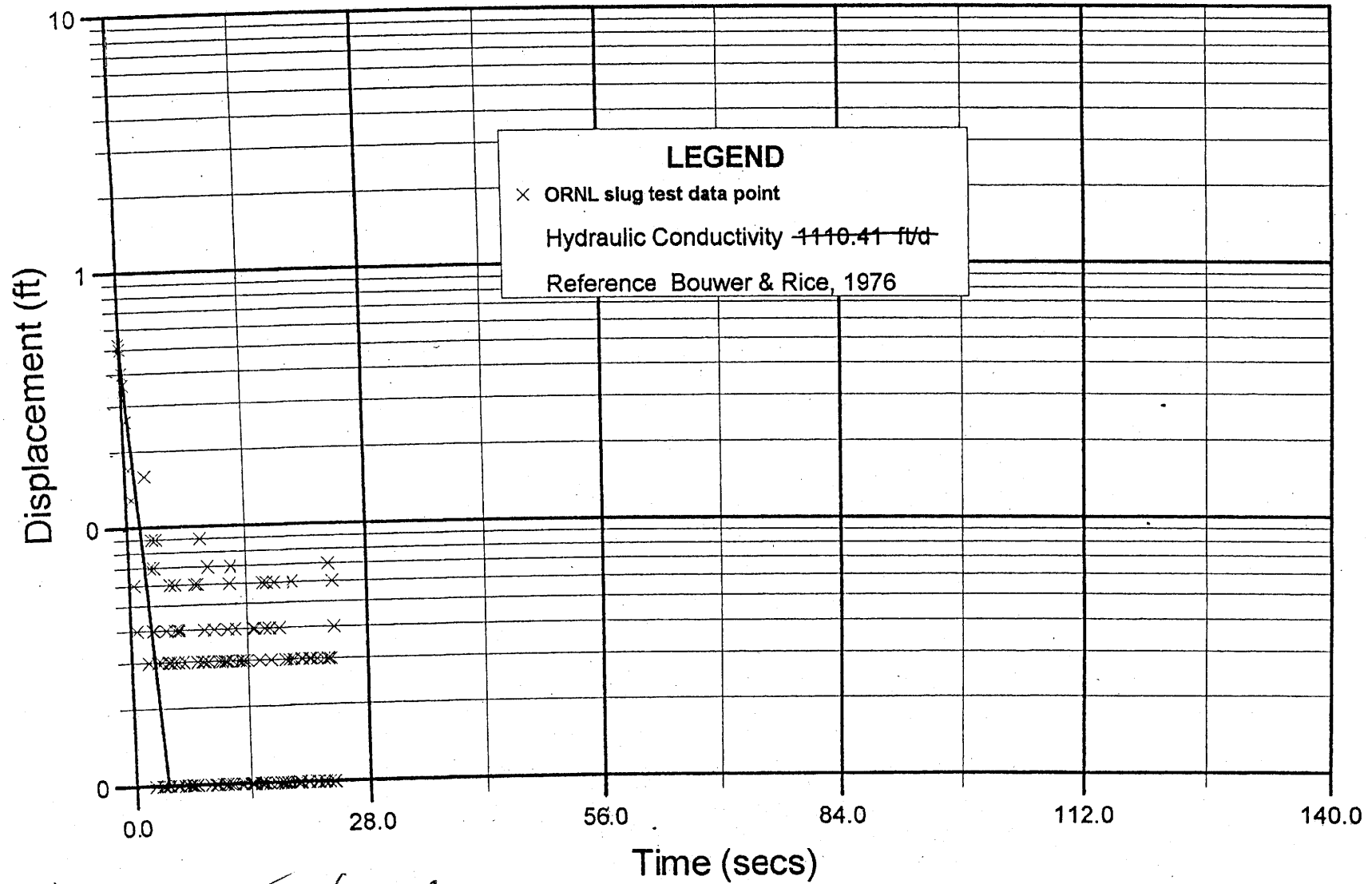
Well T4-D Test 2



$t_1 @ h_1 = 0.1' = 3.5 \text{ units}$ Time (secs)
 $\equiv 1.5 \text{ sec} = 0.026 \text{ min}$
 $t_0 @ h_0 = 0.6'$

$\frac{14 \text{ sec}}{30 \text{ units}}$

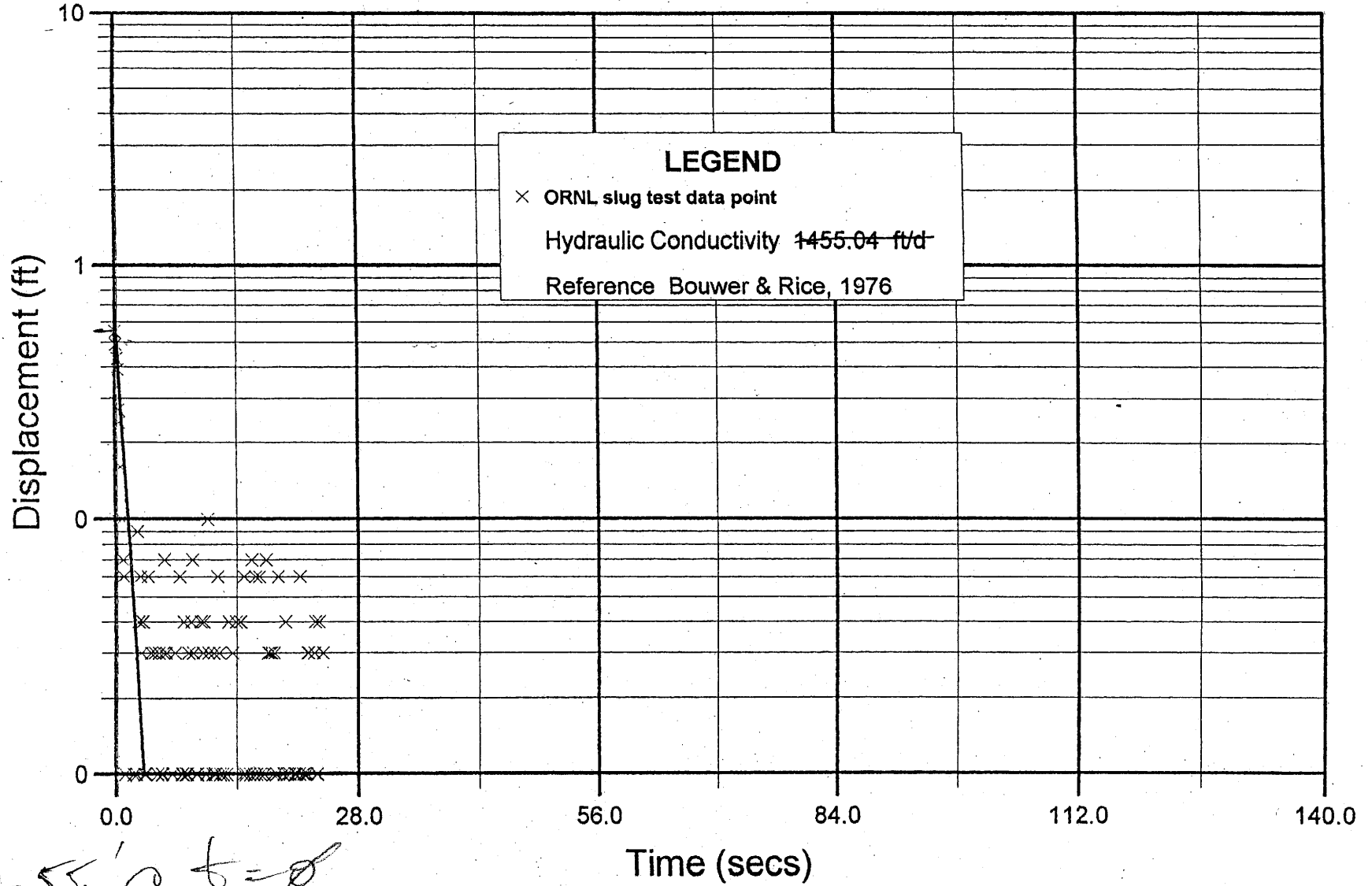
Well T4-D Test 3



$h_0 = 0.55 \text{ @ } t = 0$

$h_1 = 0.1 \text{ @ } t_1 = 3.5 \text{ units} \cdot \frac{14 \text{ s}}{30 \text{ units}} = 1.63 \text{ sec} = 0.0272 \text{ min}$

Well T4-D Test 4

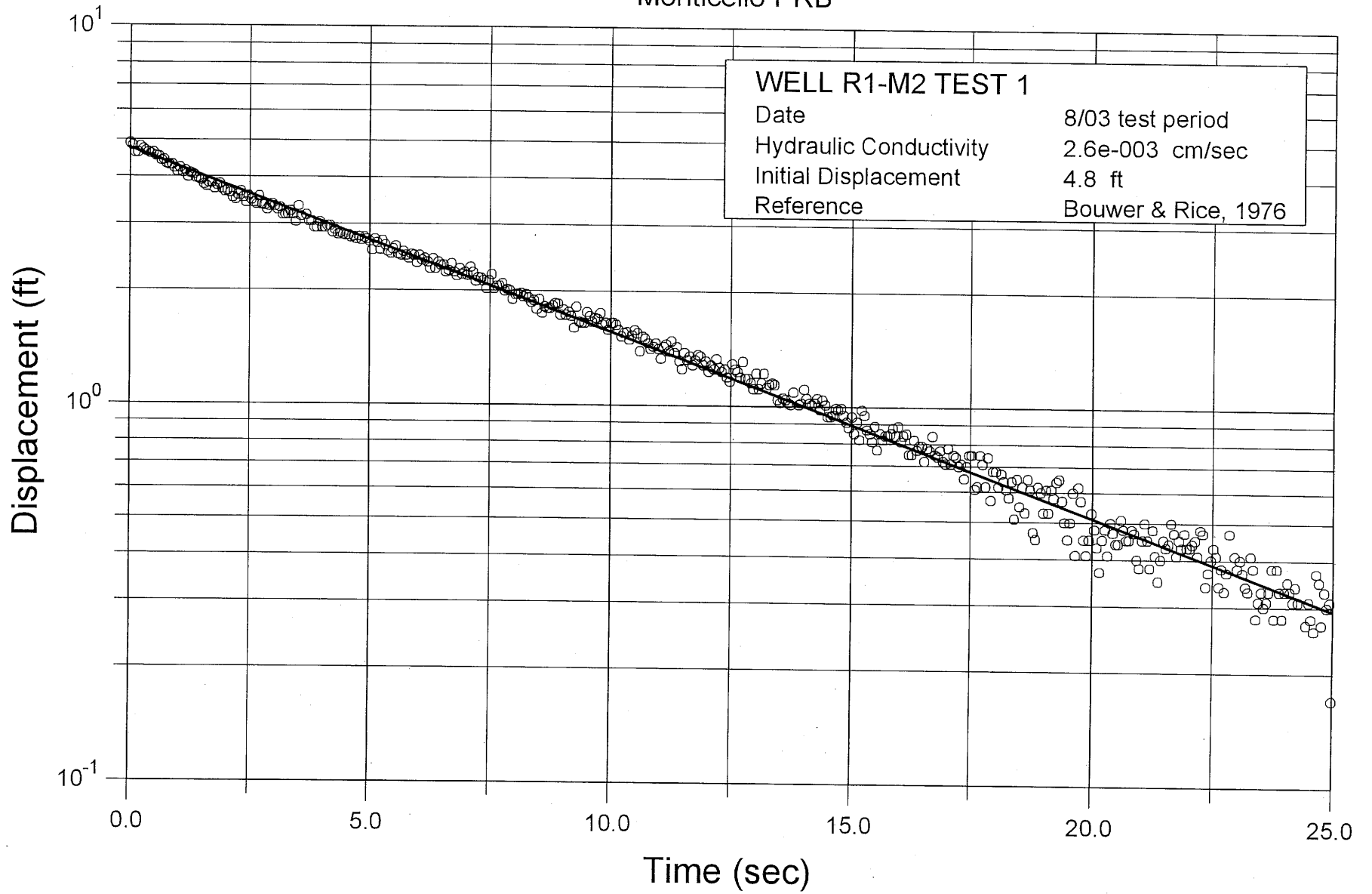


$h_0 = 0.55$ @ $t = 0$

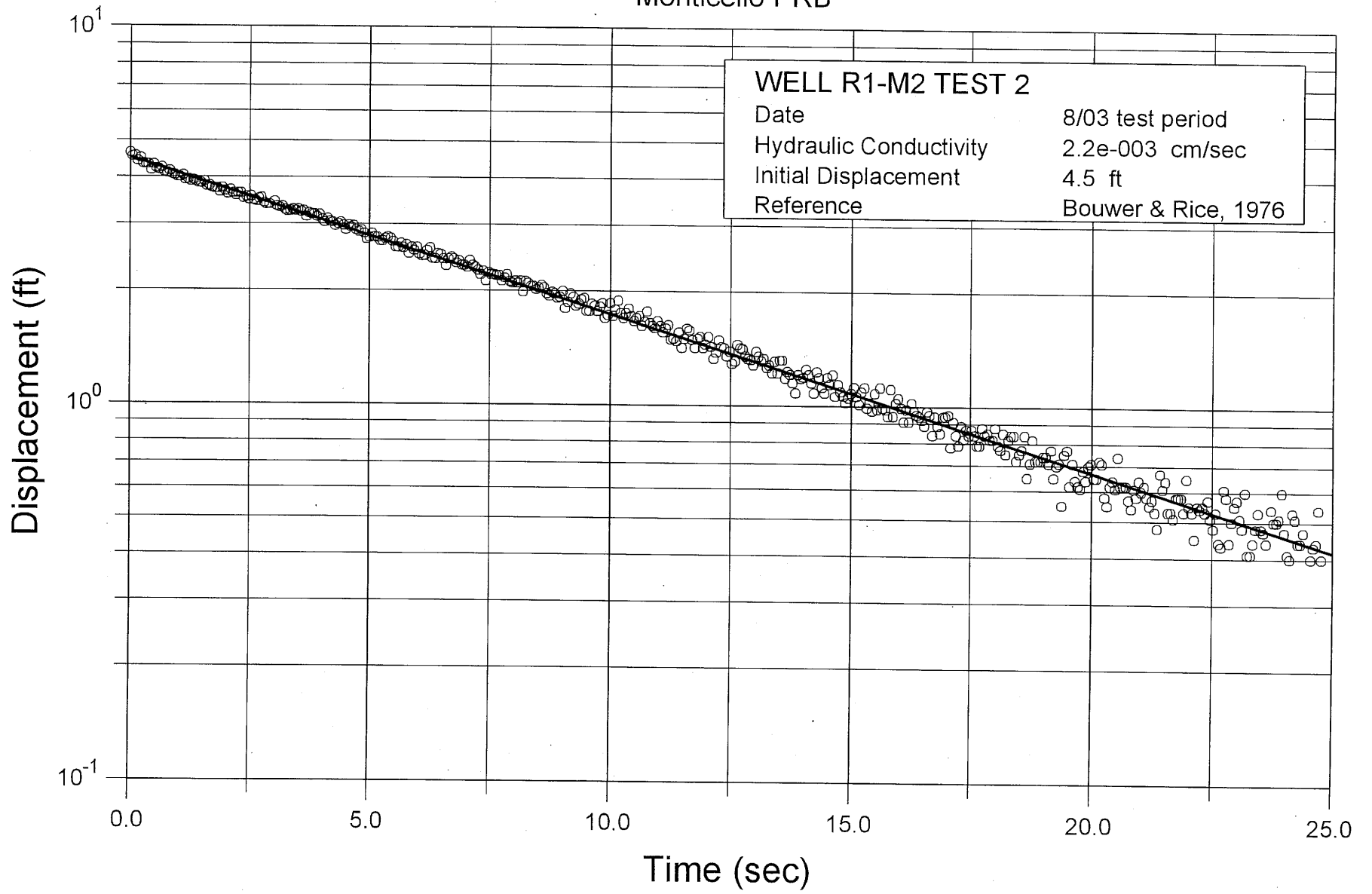
$h_1 = 0.1$ @ $t = 0.026$ min

August 2003

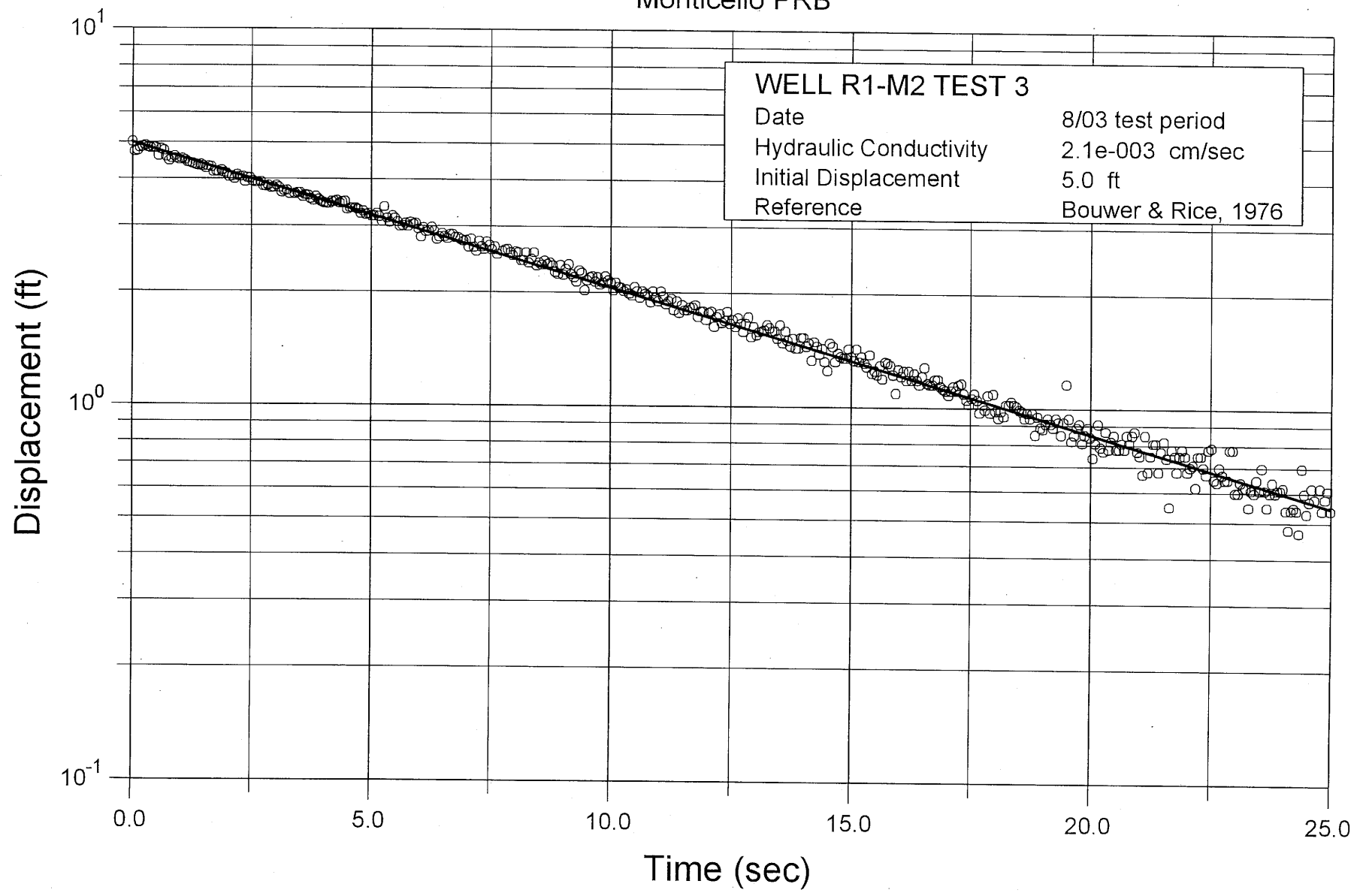
Monticello PRB



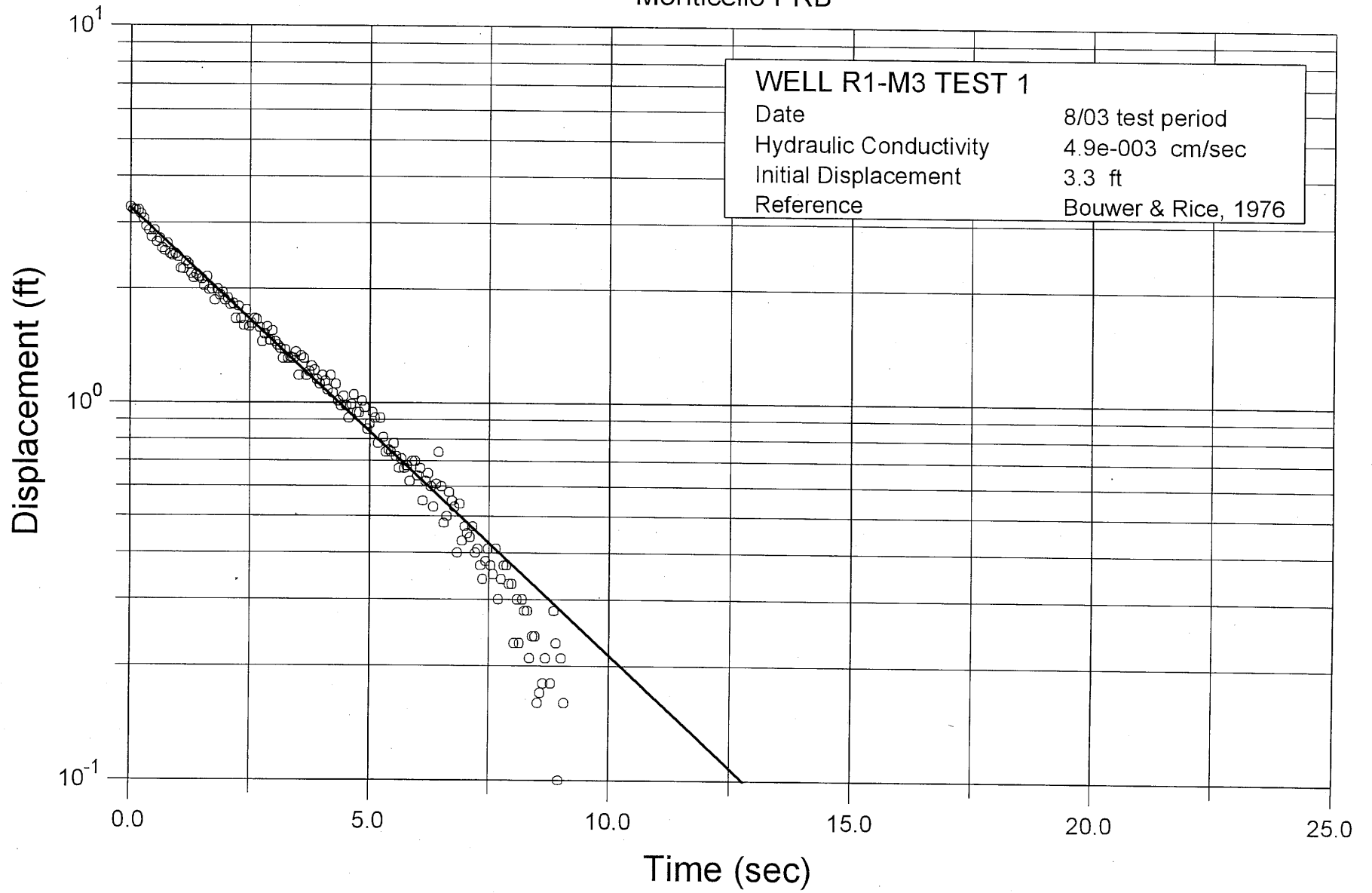
Monticello PRB



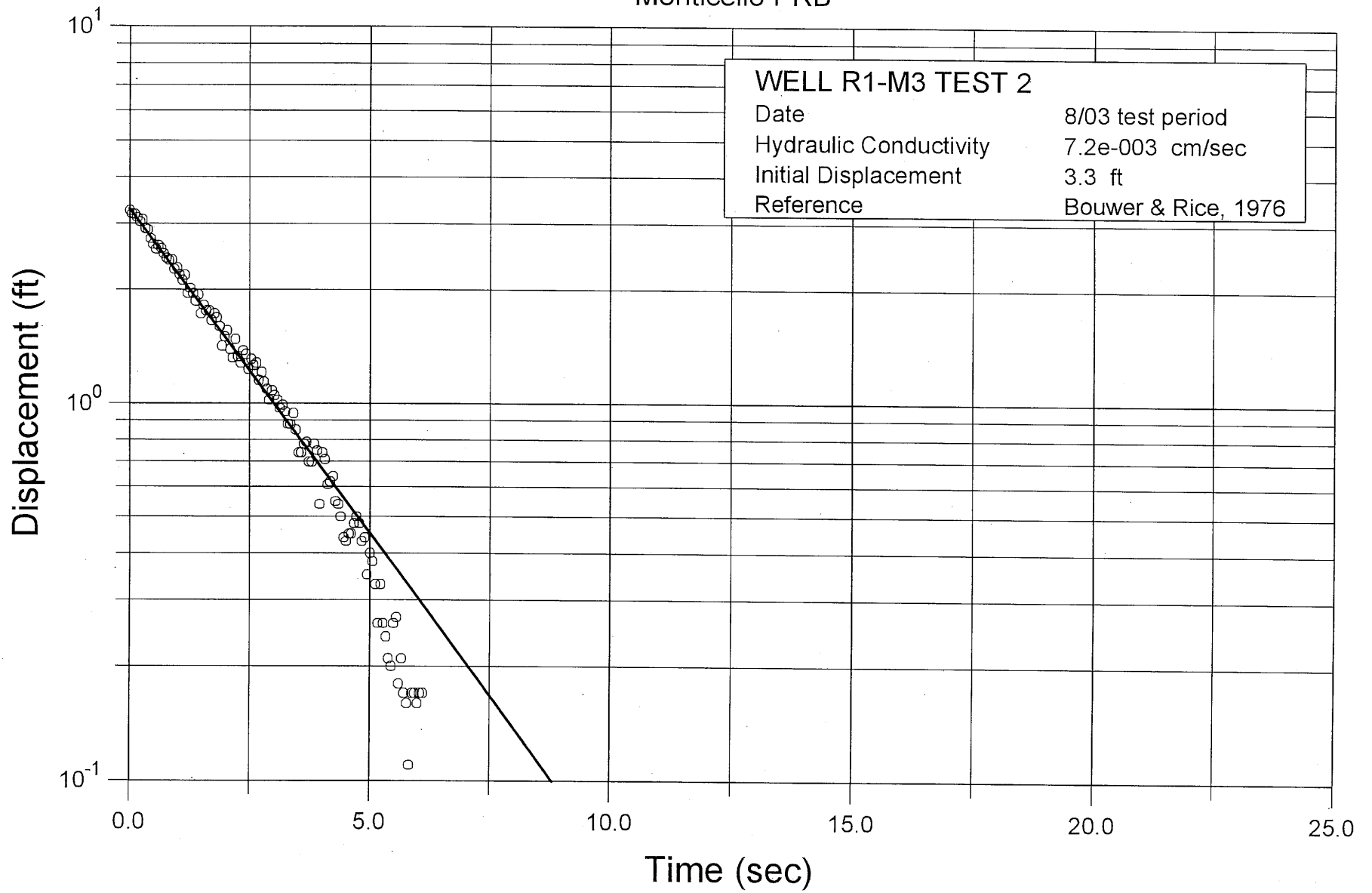
Monticello PRB



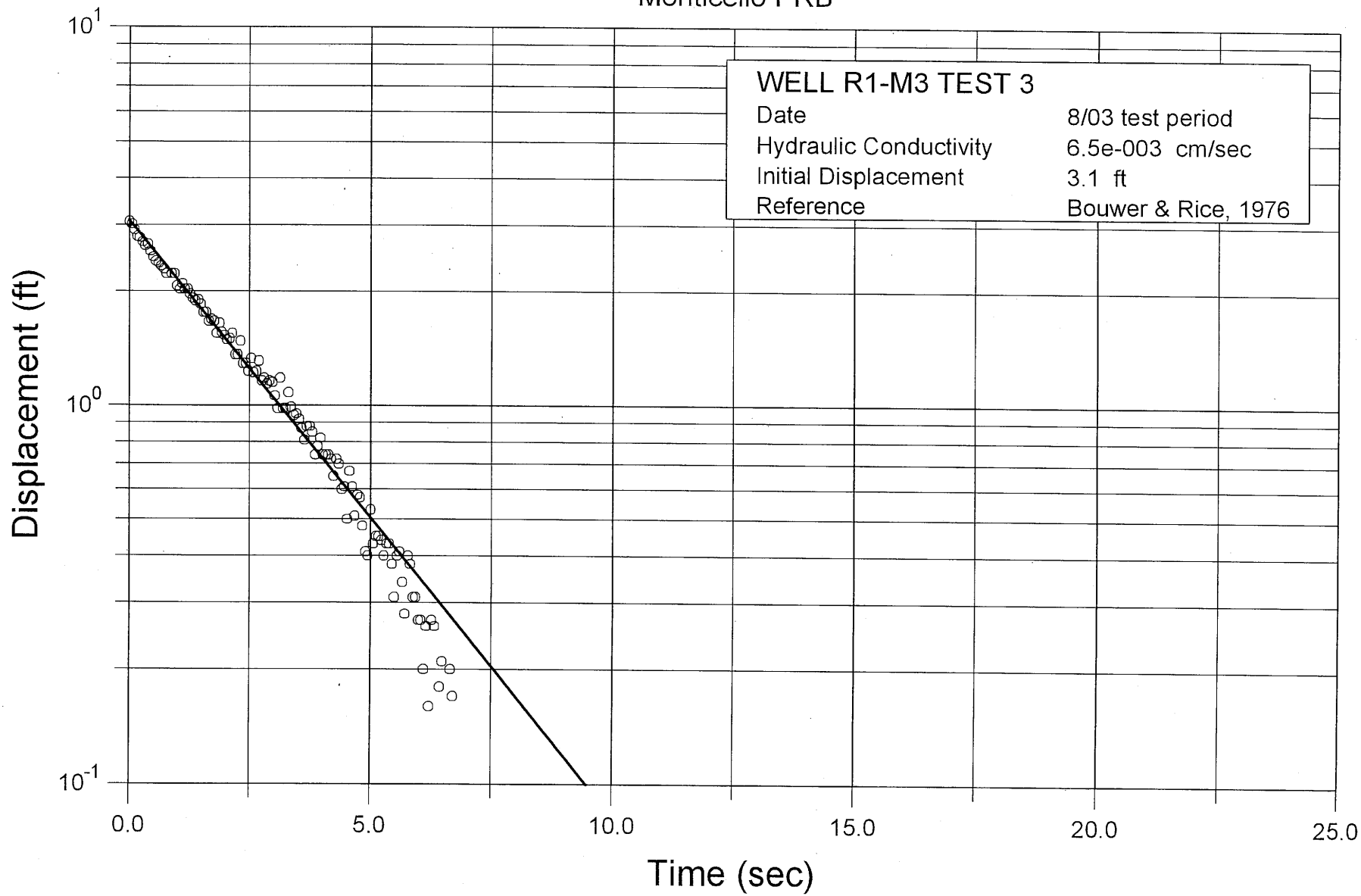
Monticello PRB



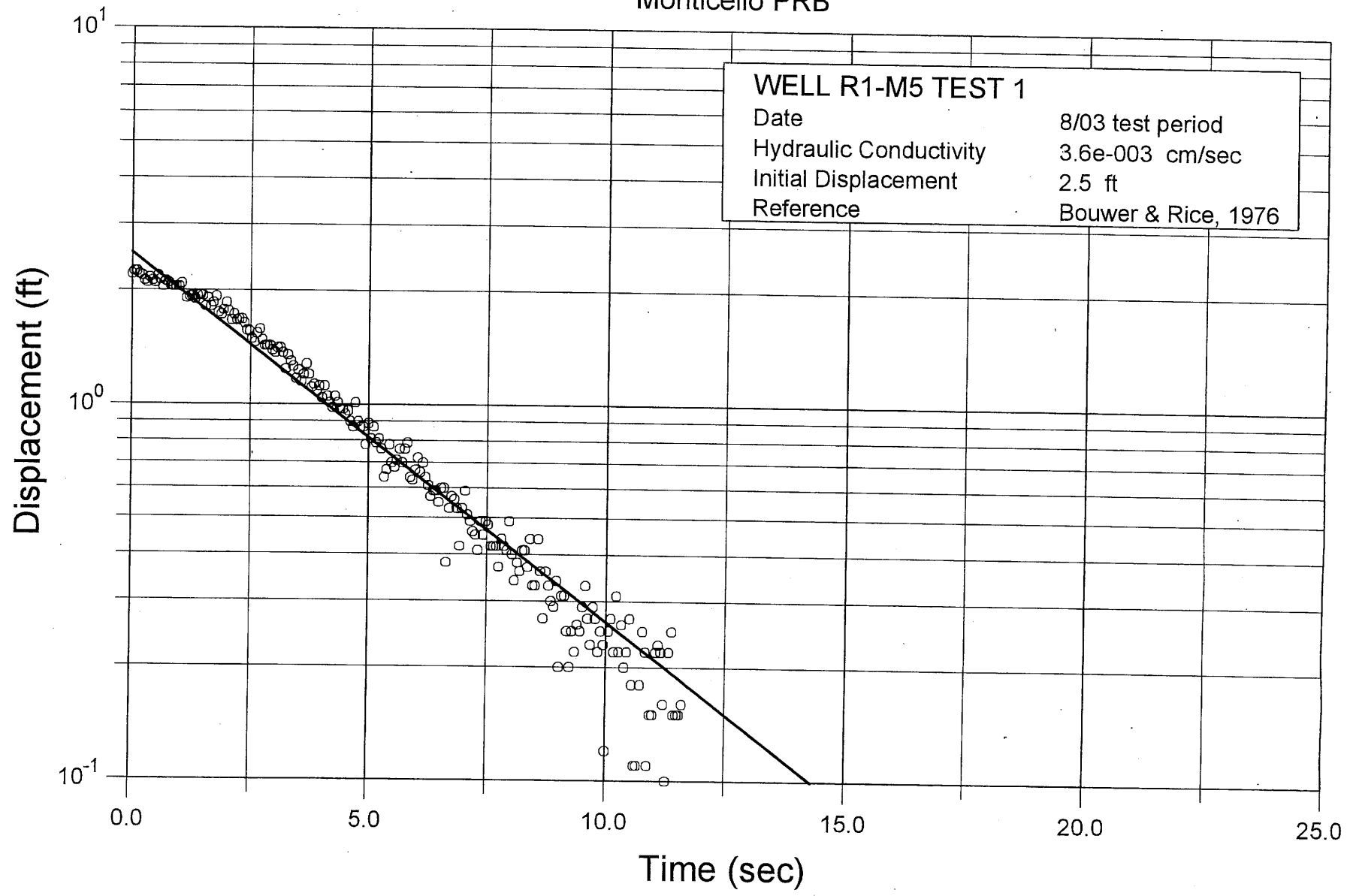
Monticello PRB



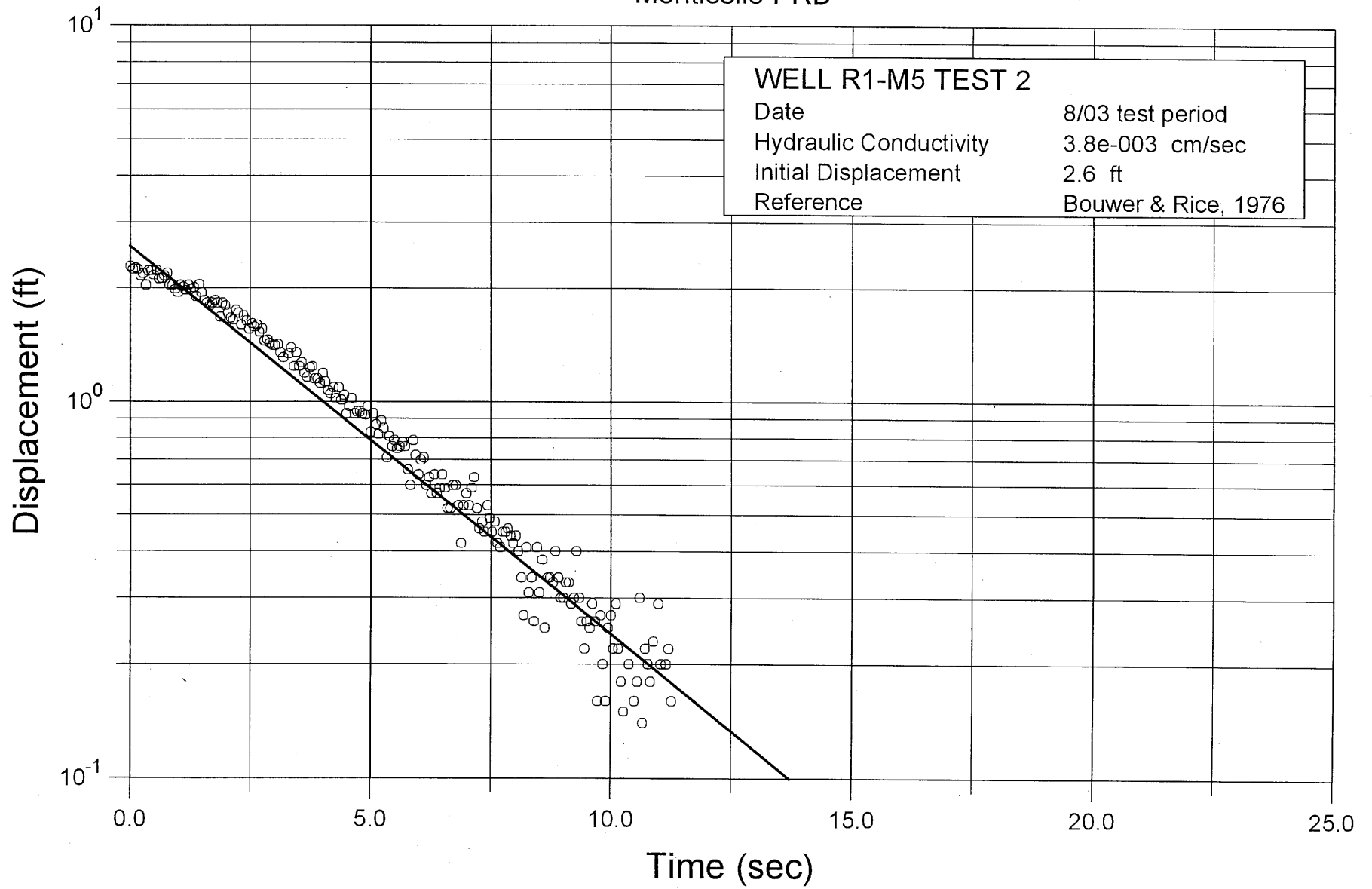
Monticello PRB



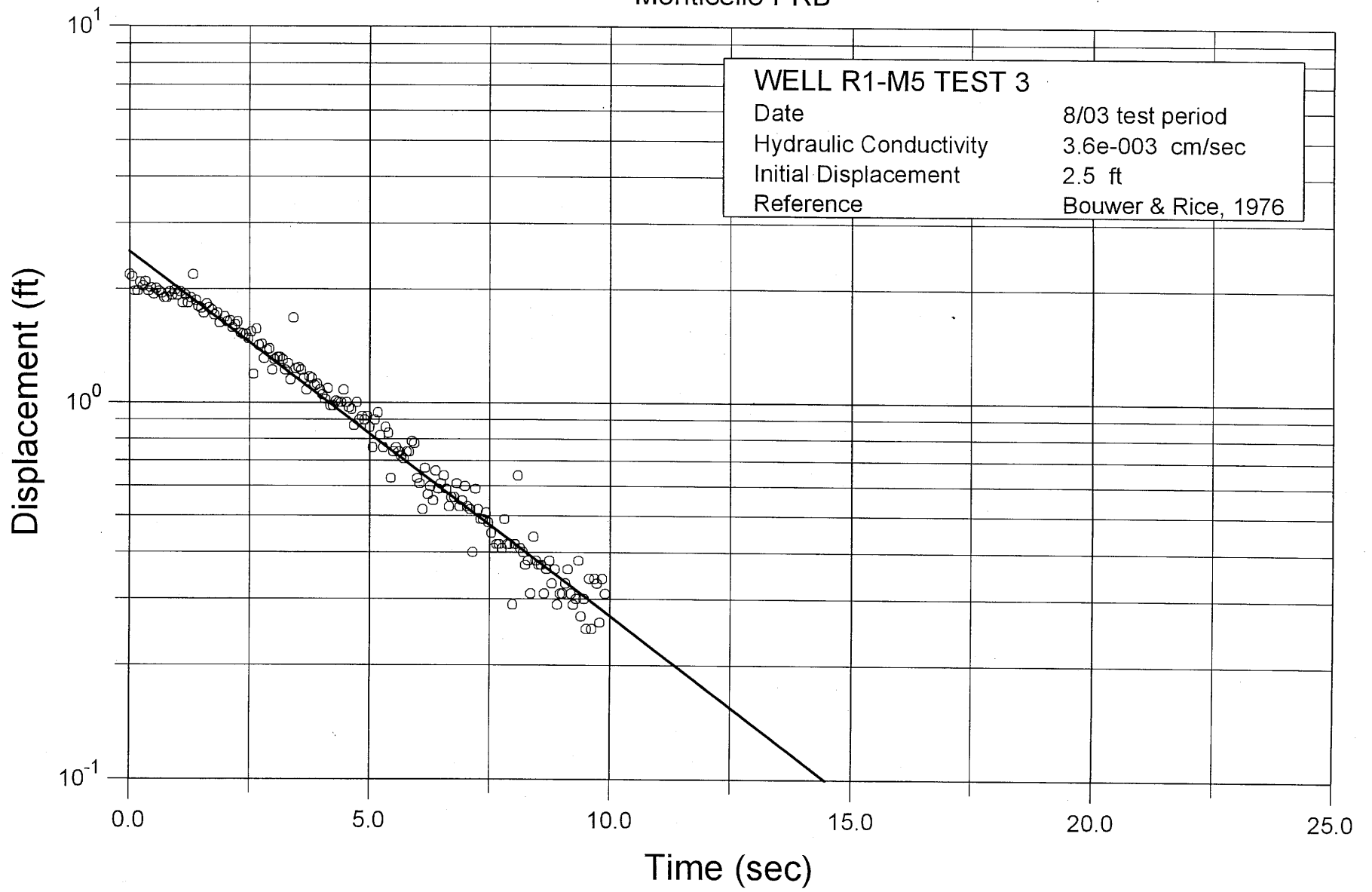
Monticello PRB



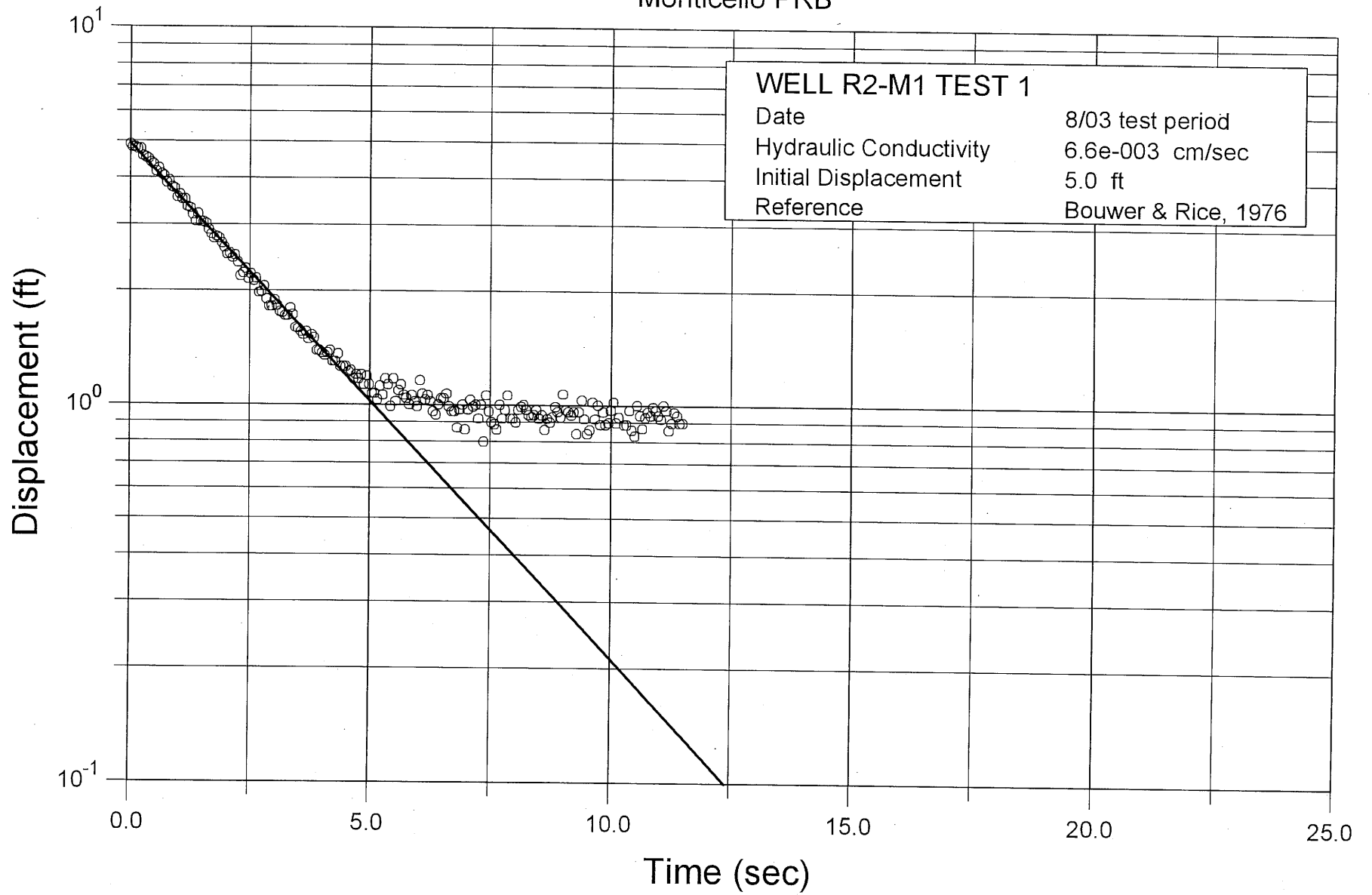
Monticello PRB



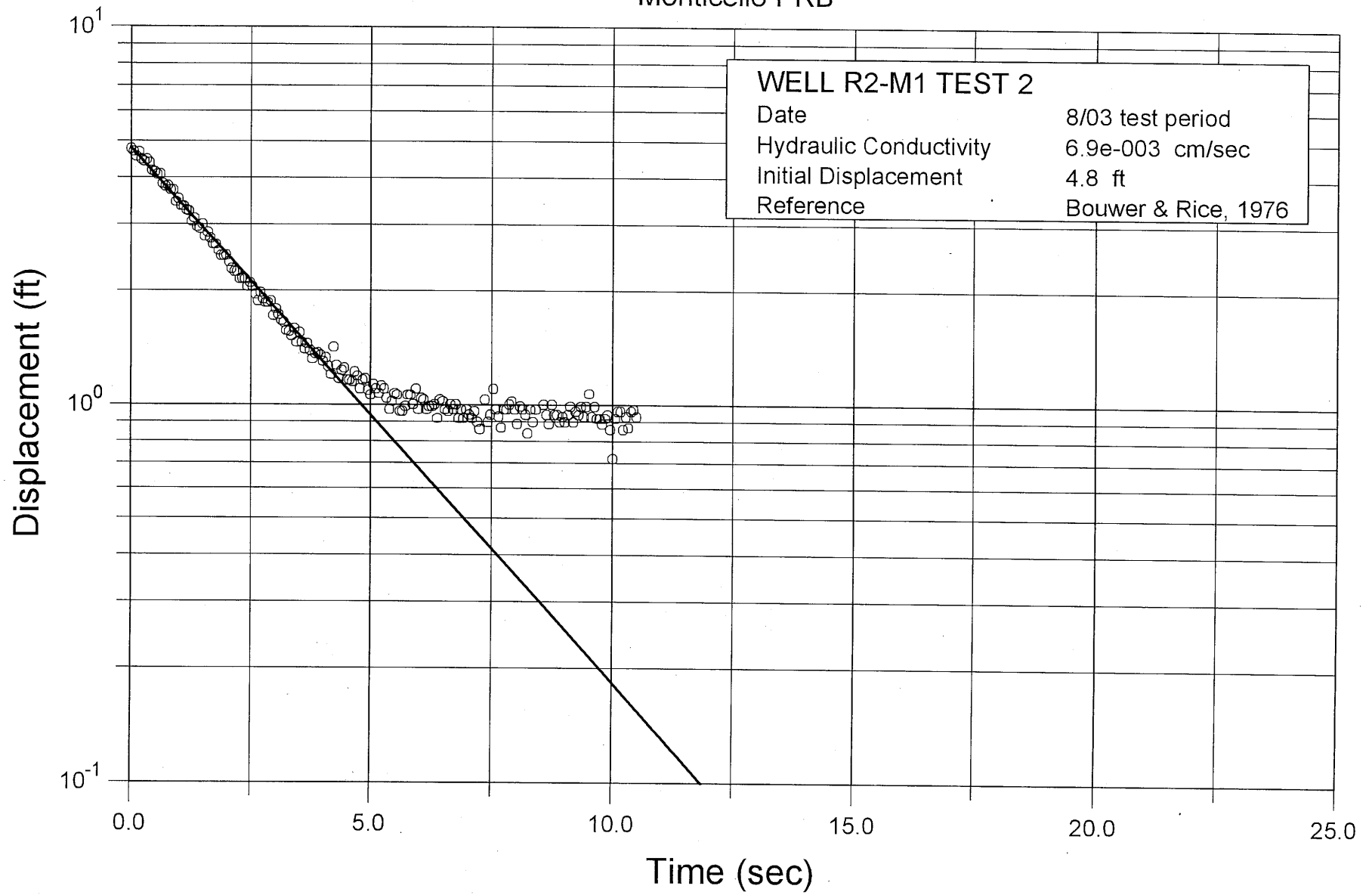
Monticello PRB



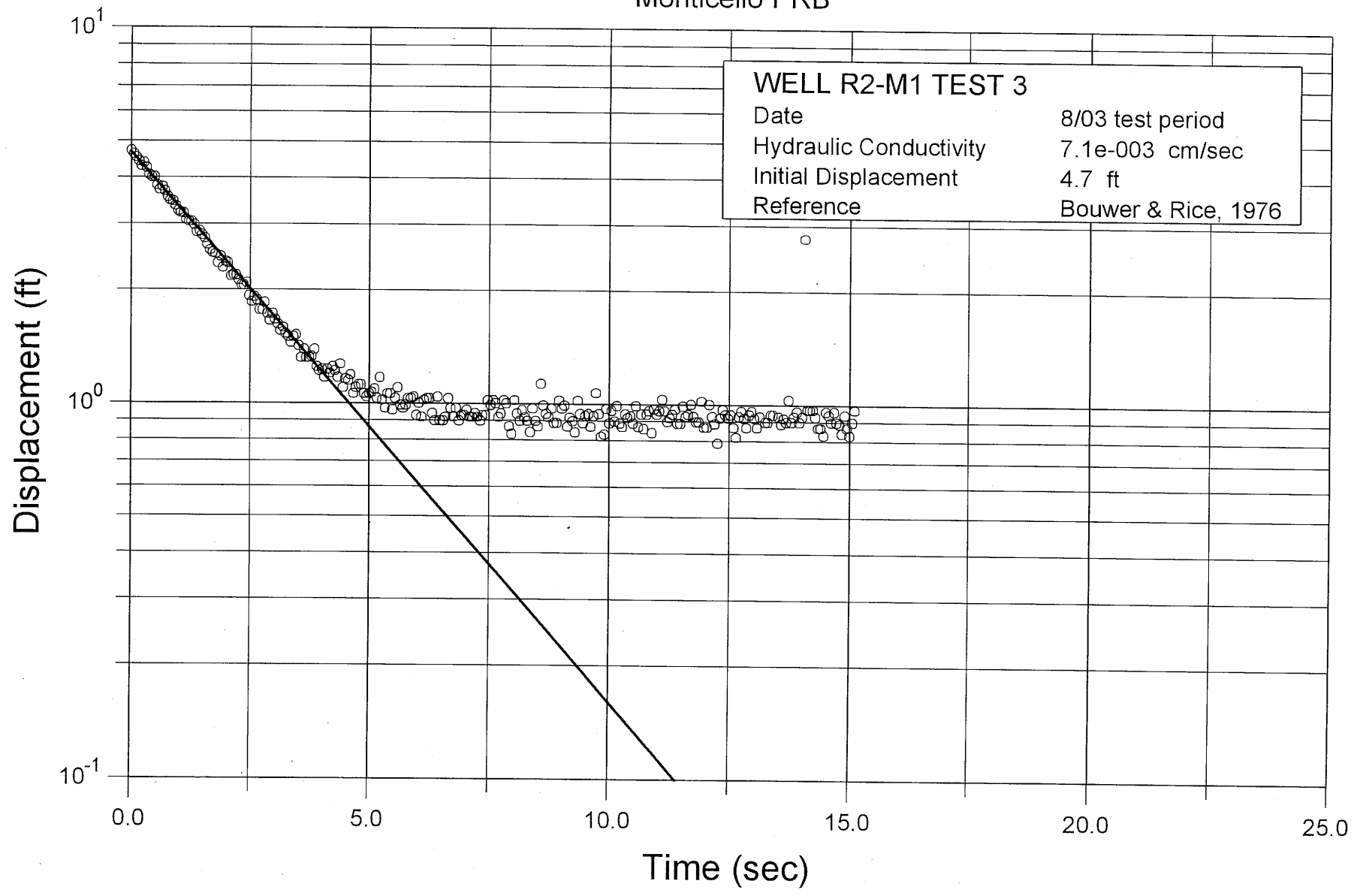
Monticello PRB



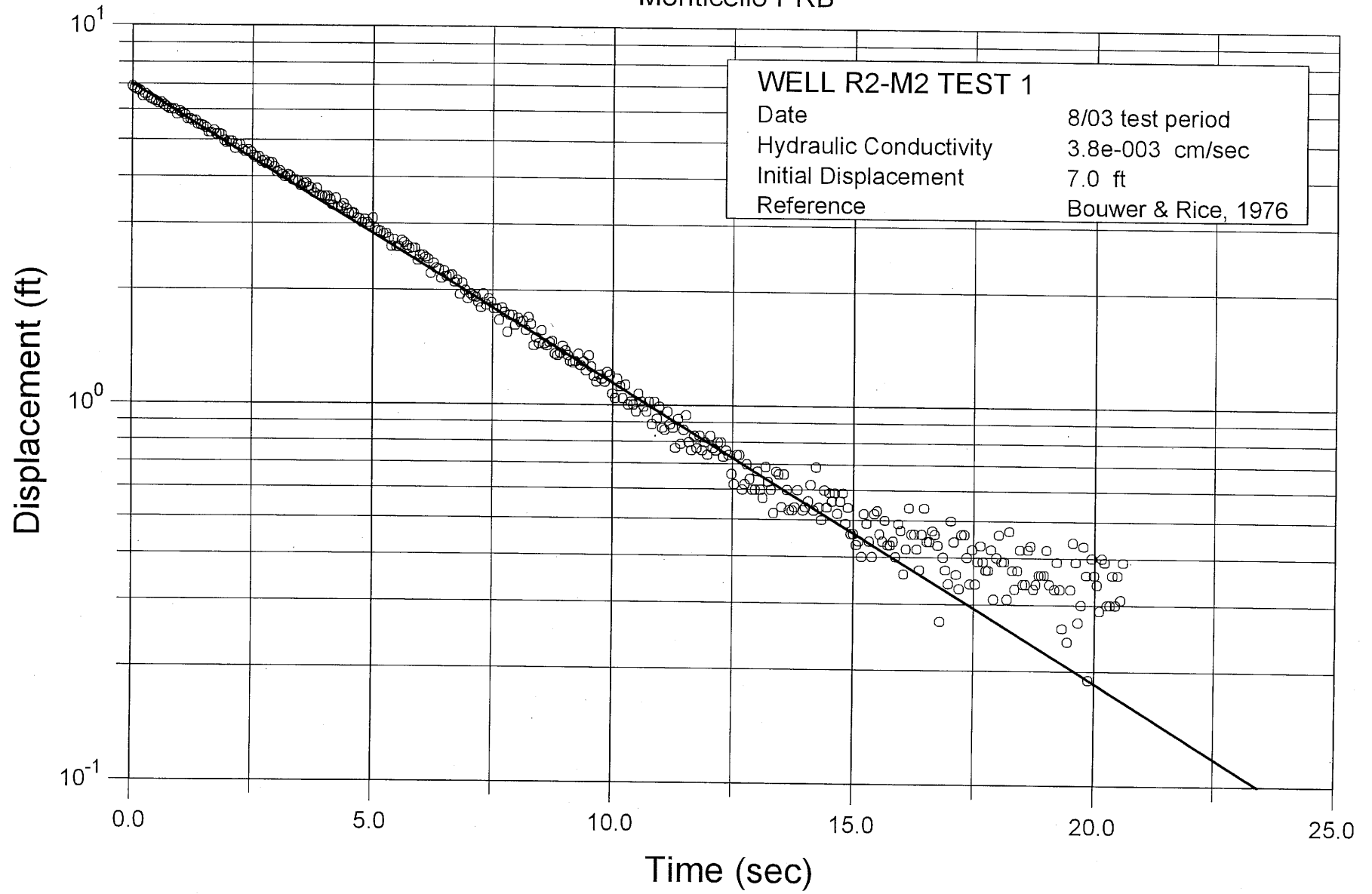
Monticello PRB



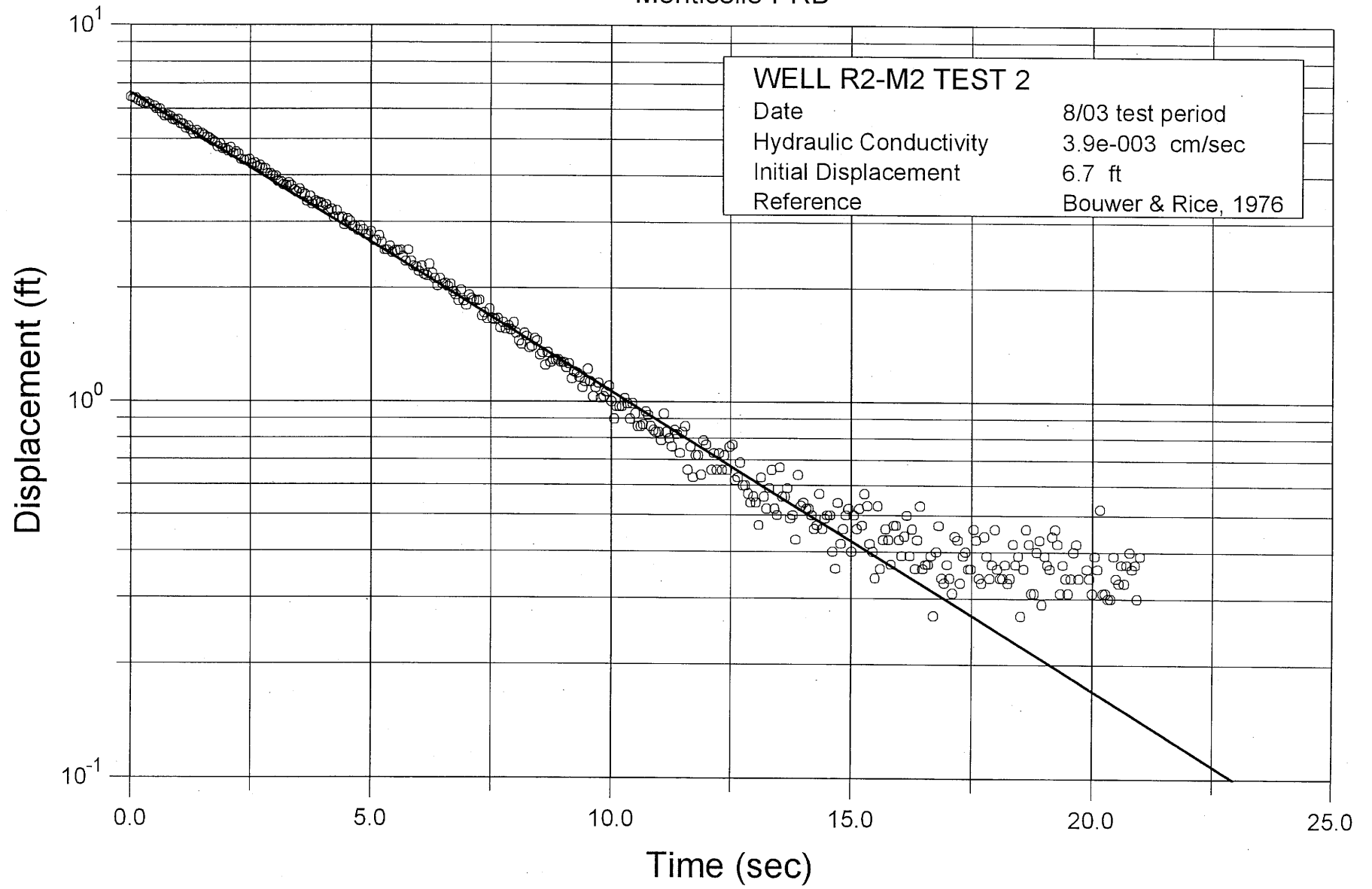
Monticello PRB



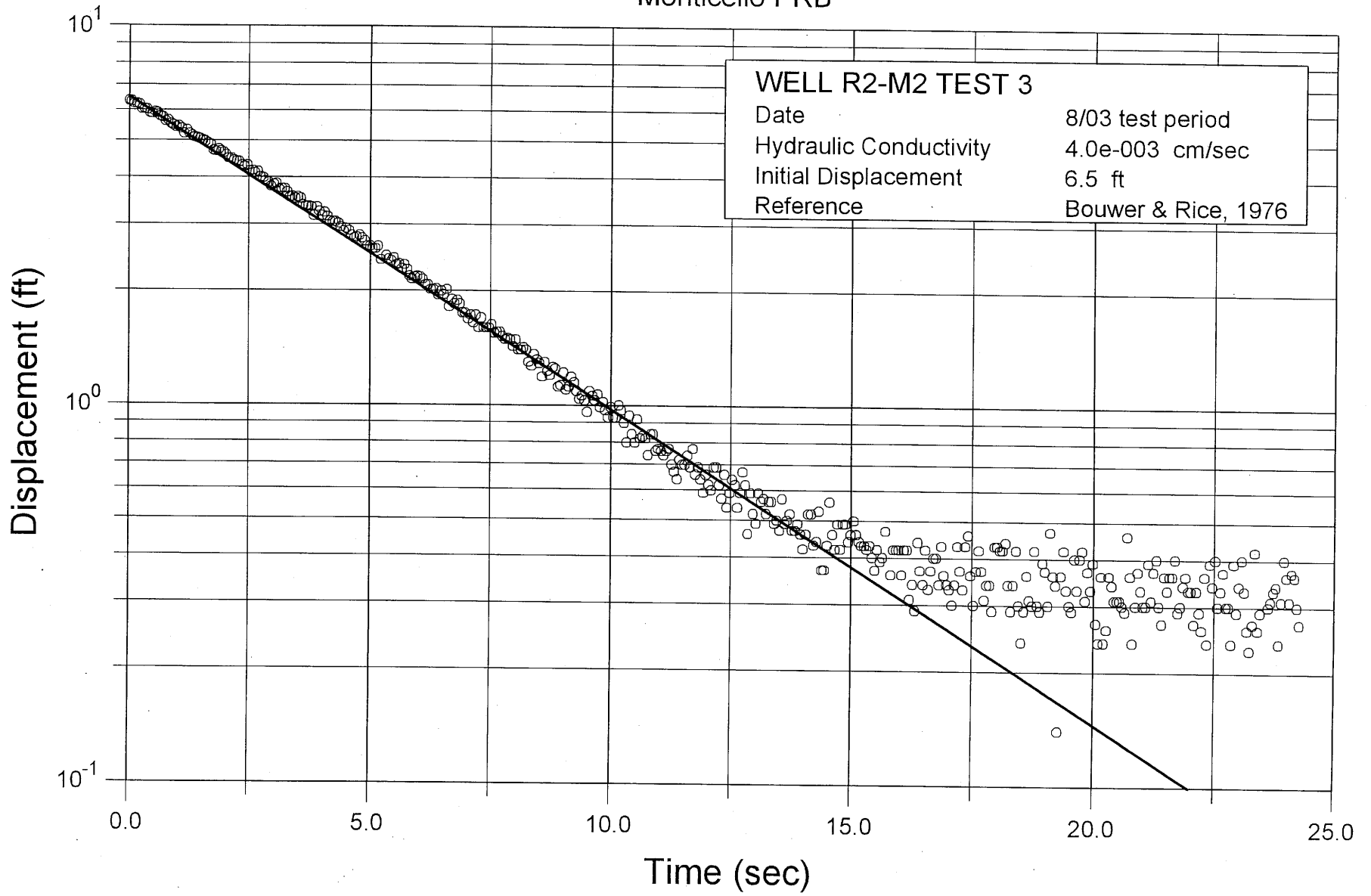
Monticello PRB



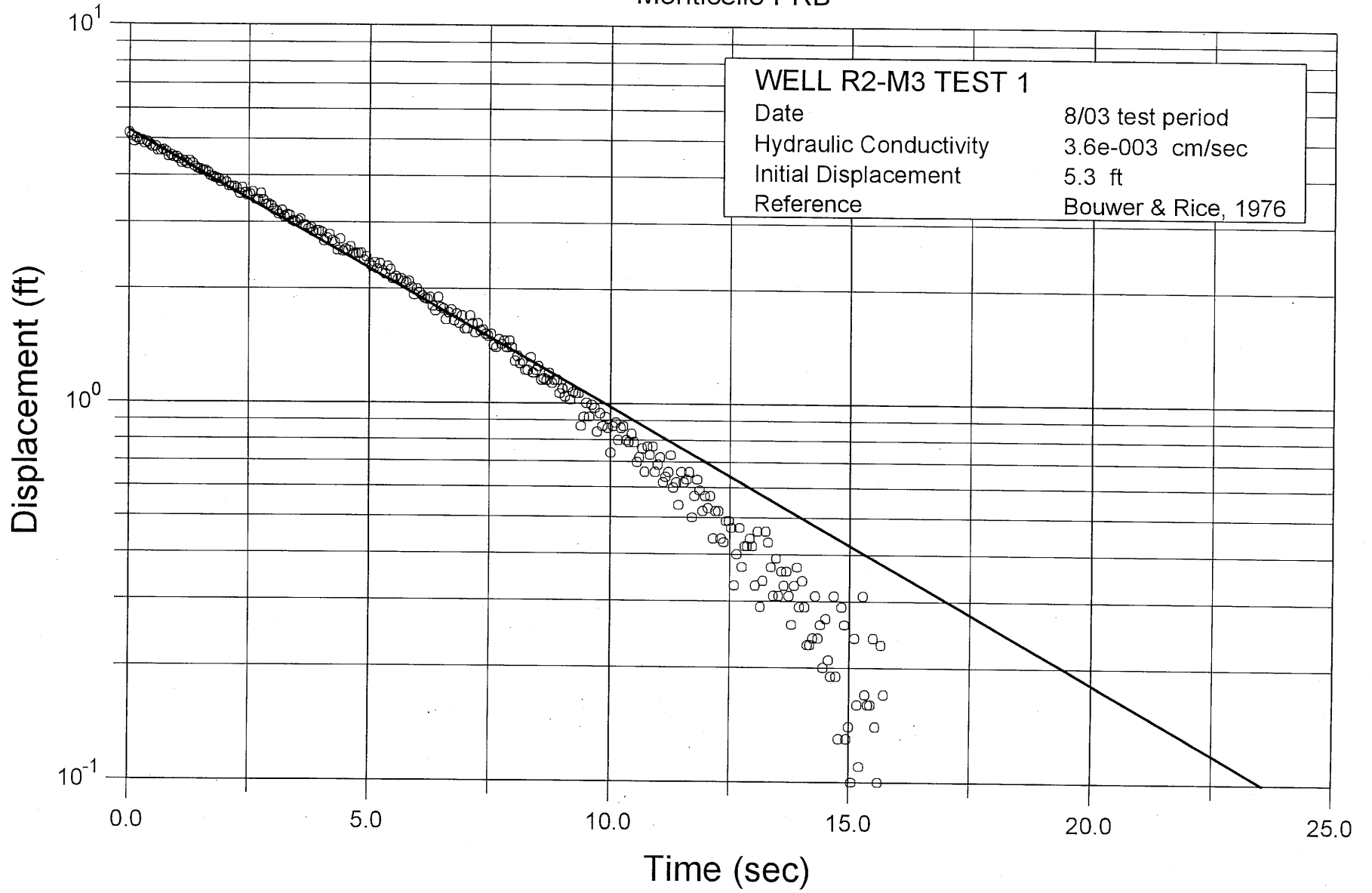
Monticello PRB



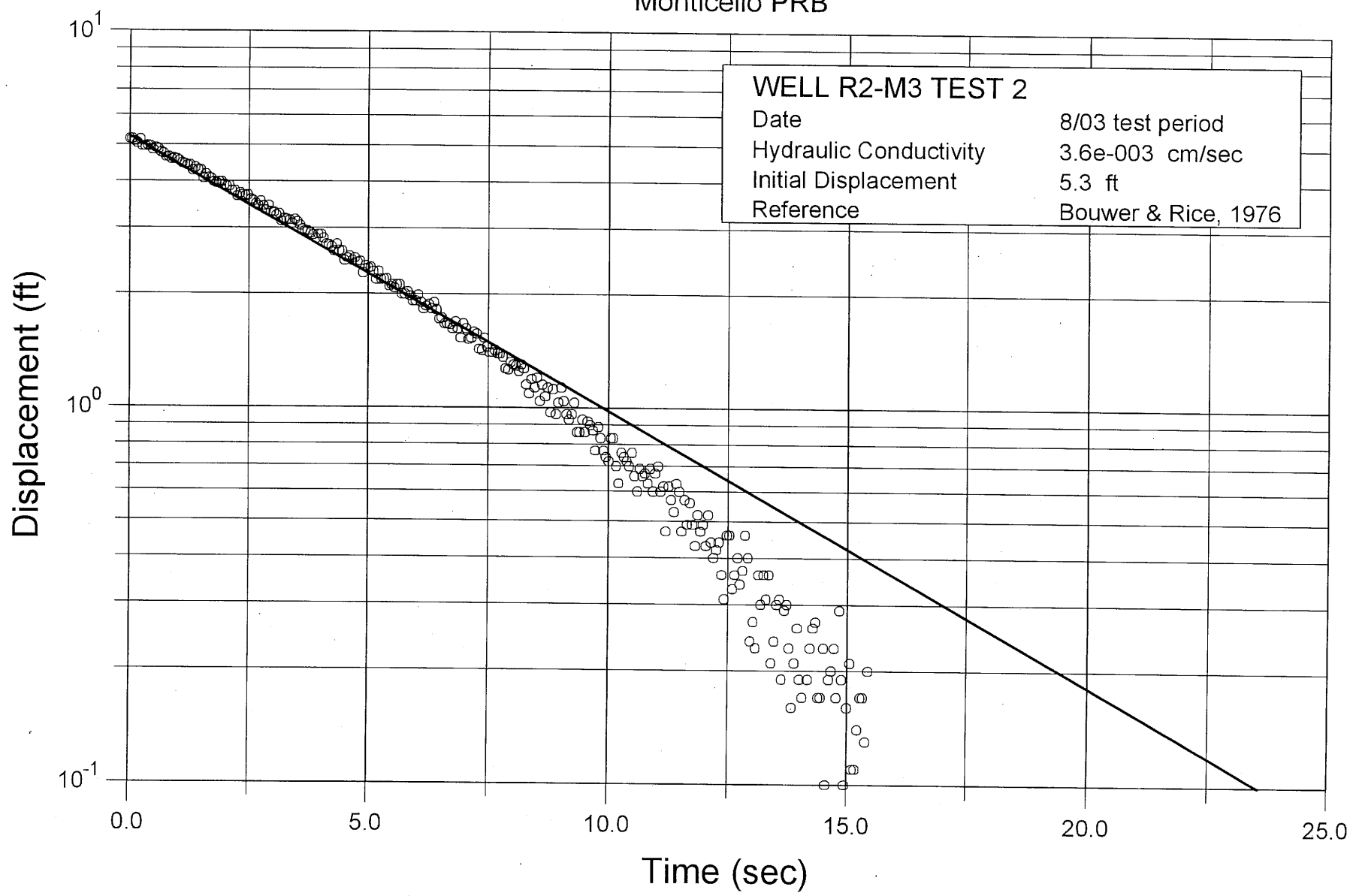
Monticello PRB



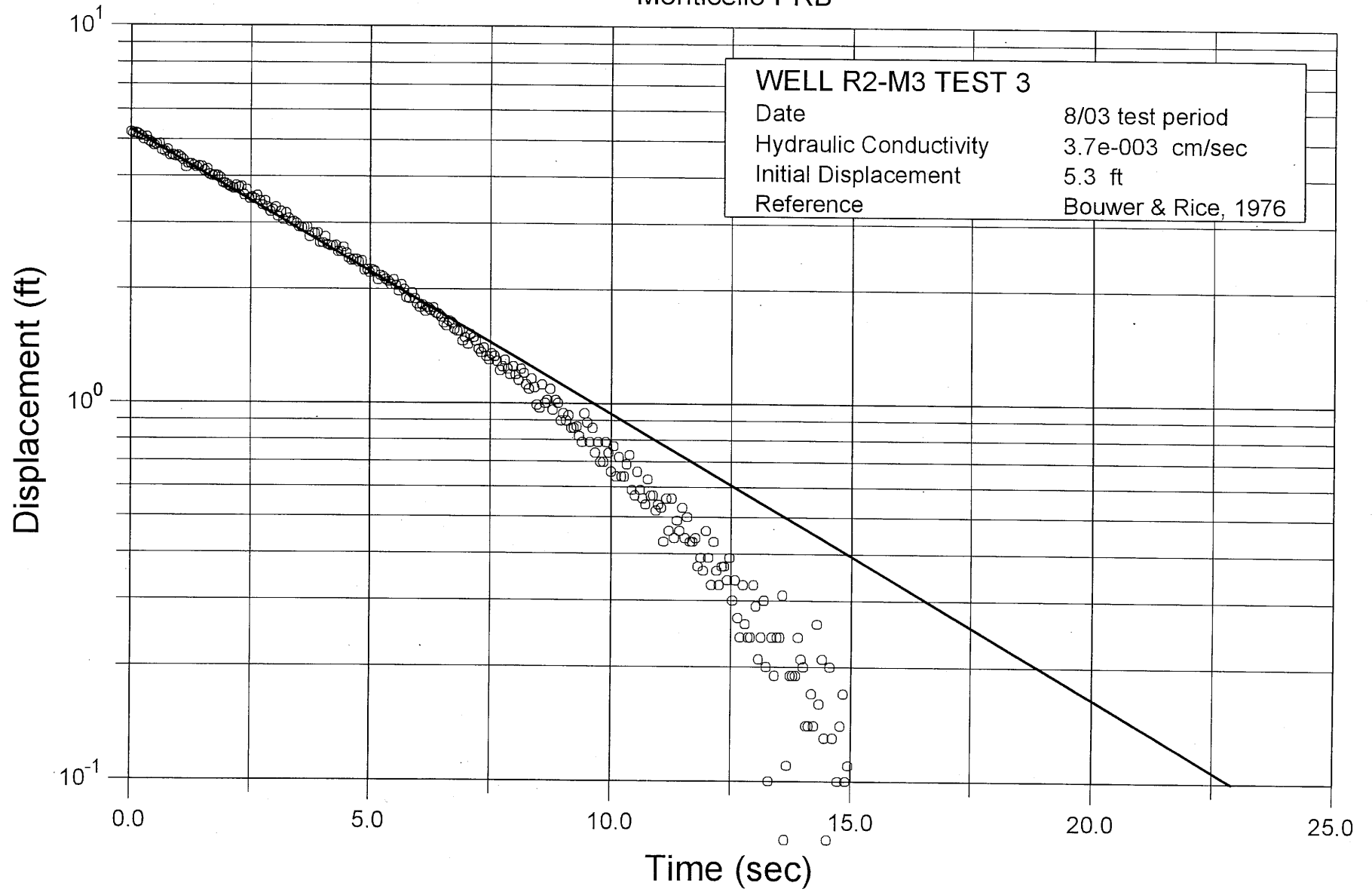
Monticello PRB



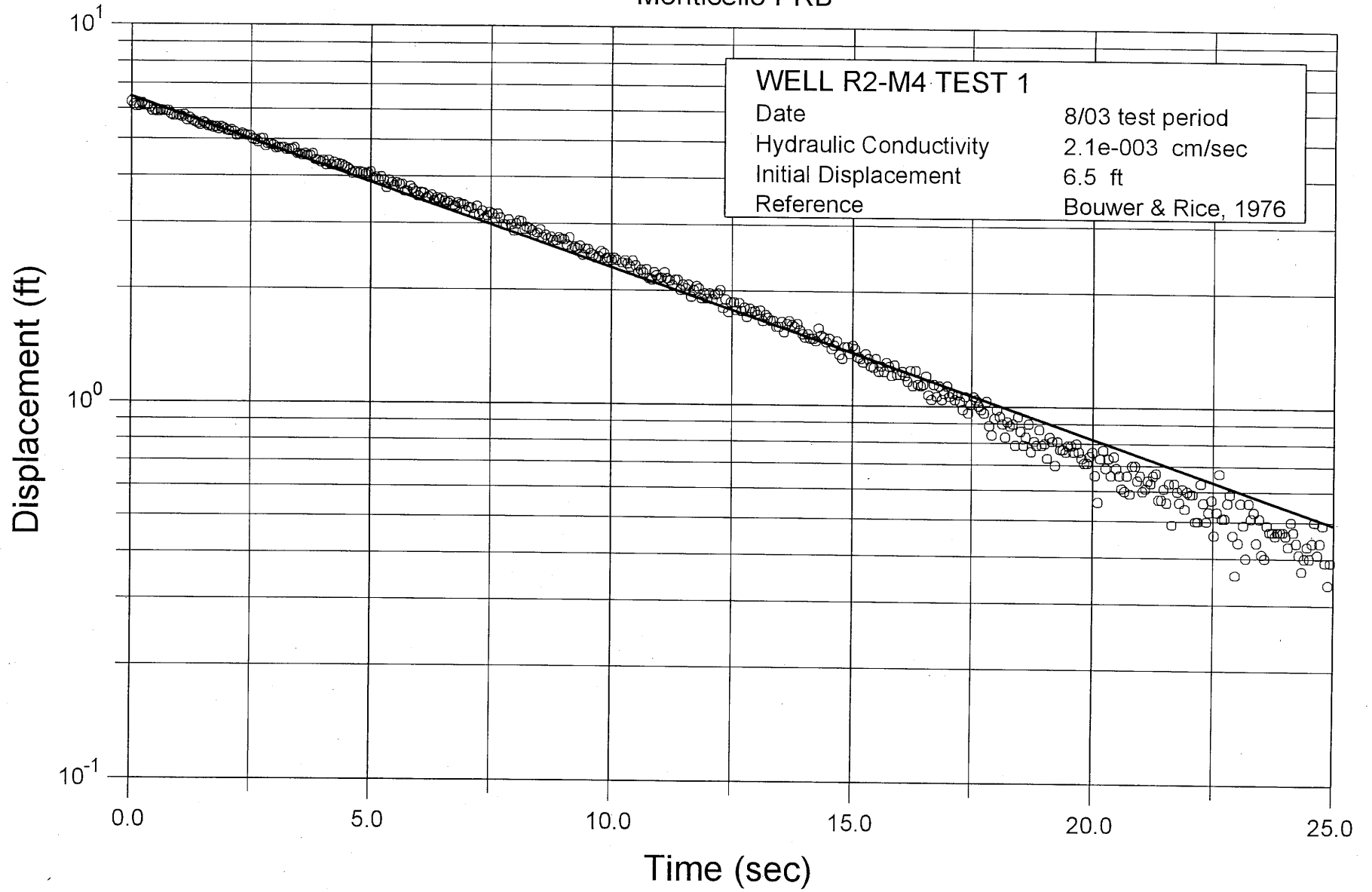
Monticello PRB



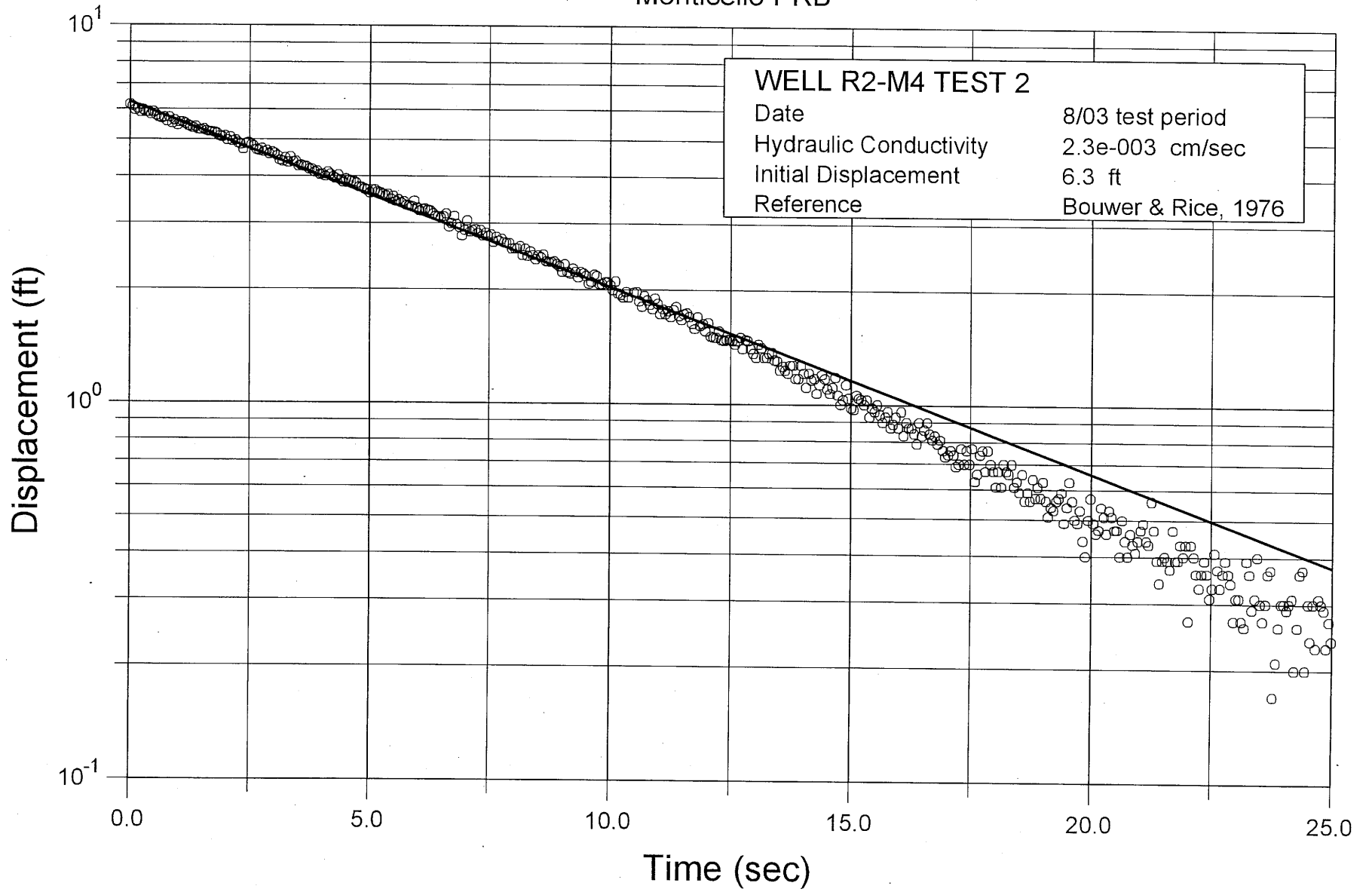
Monticello PRB



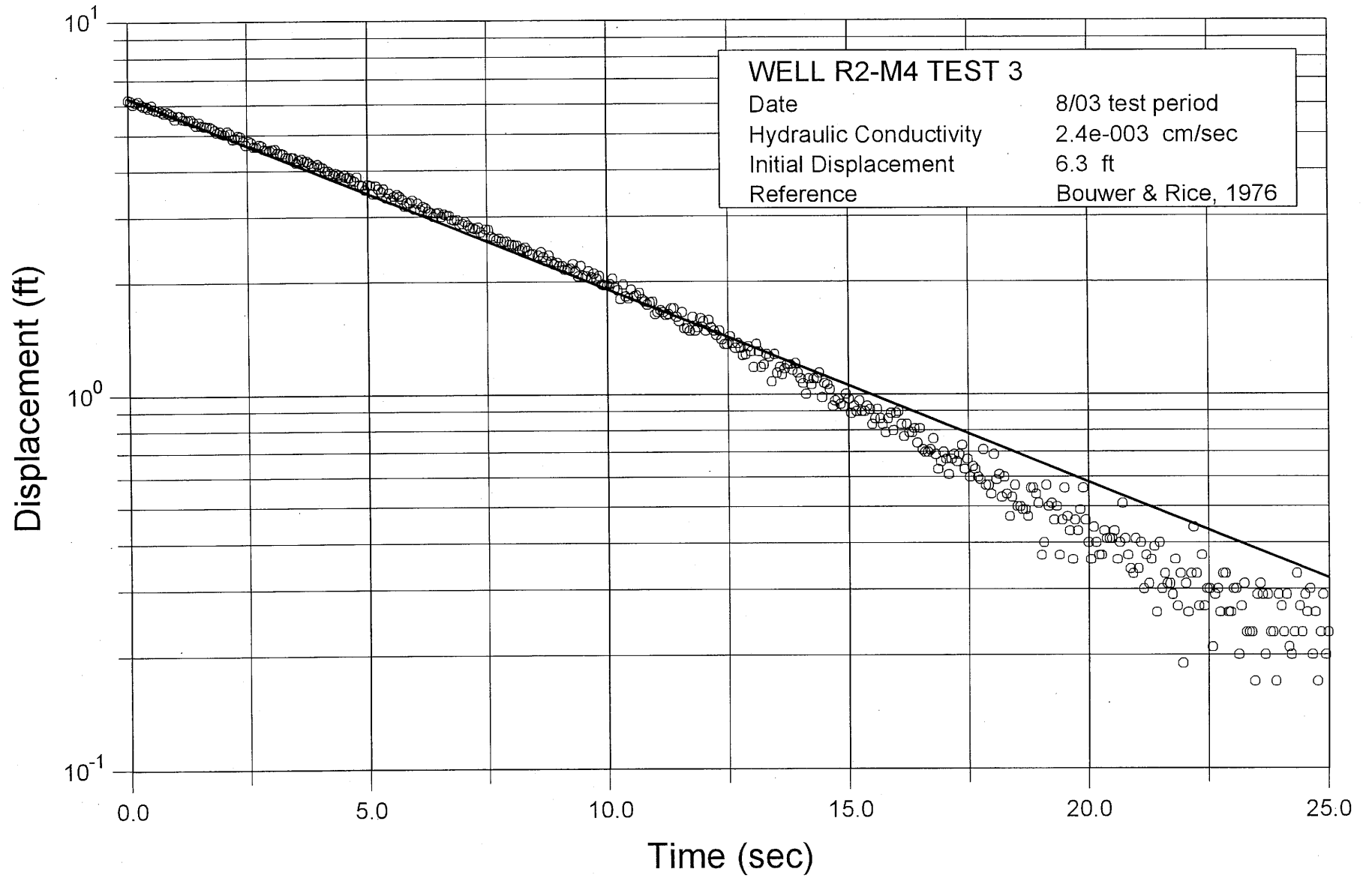
Monticello PRB



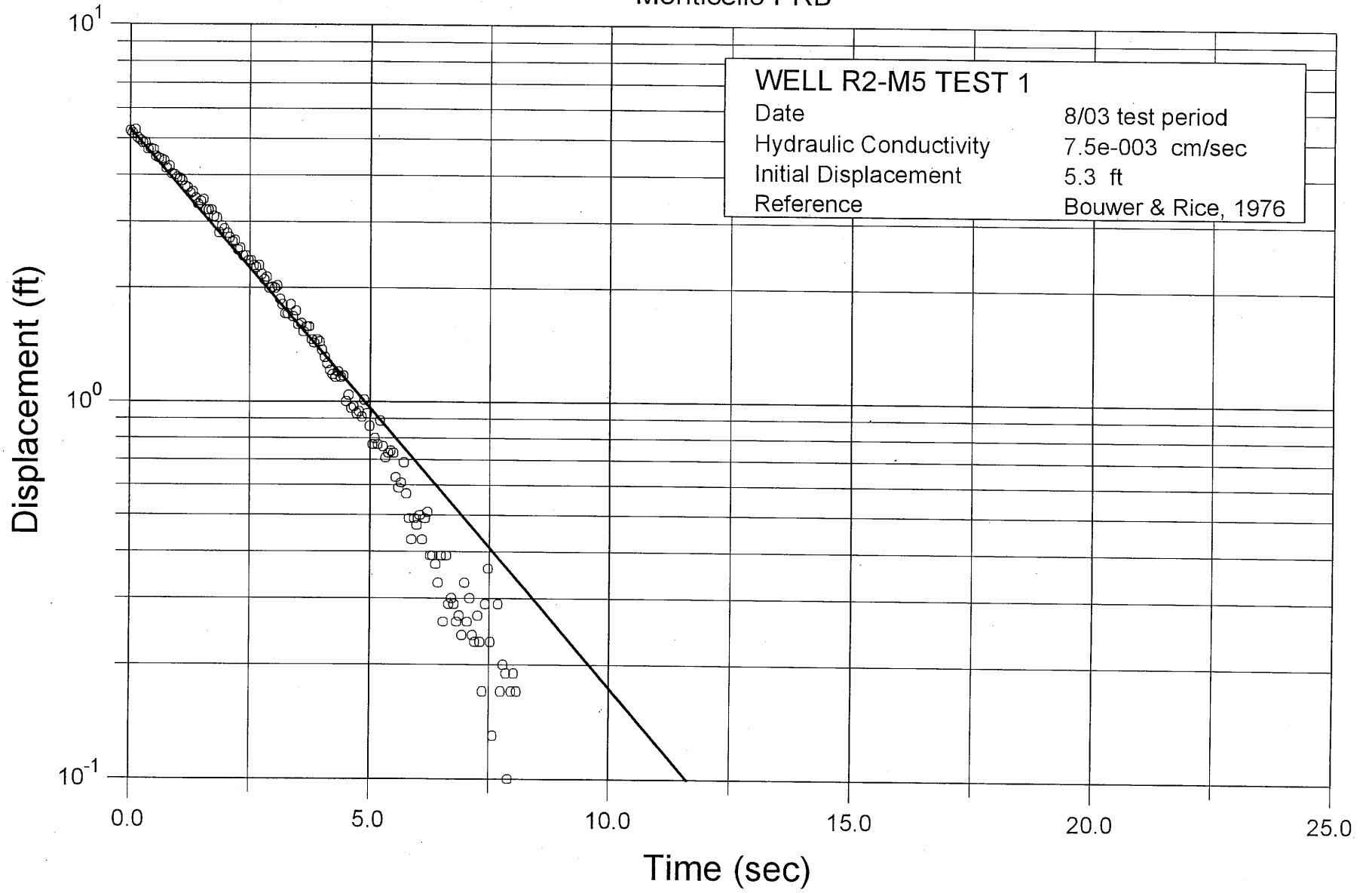
Monticello PRB



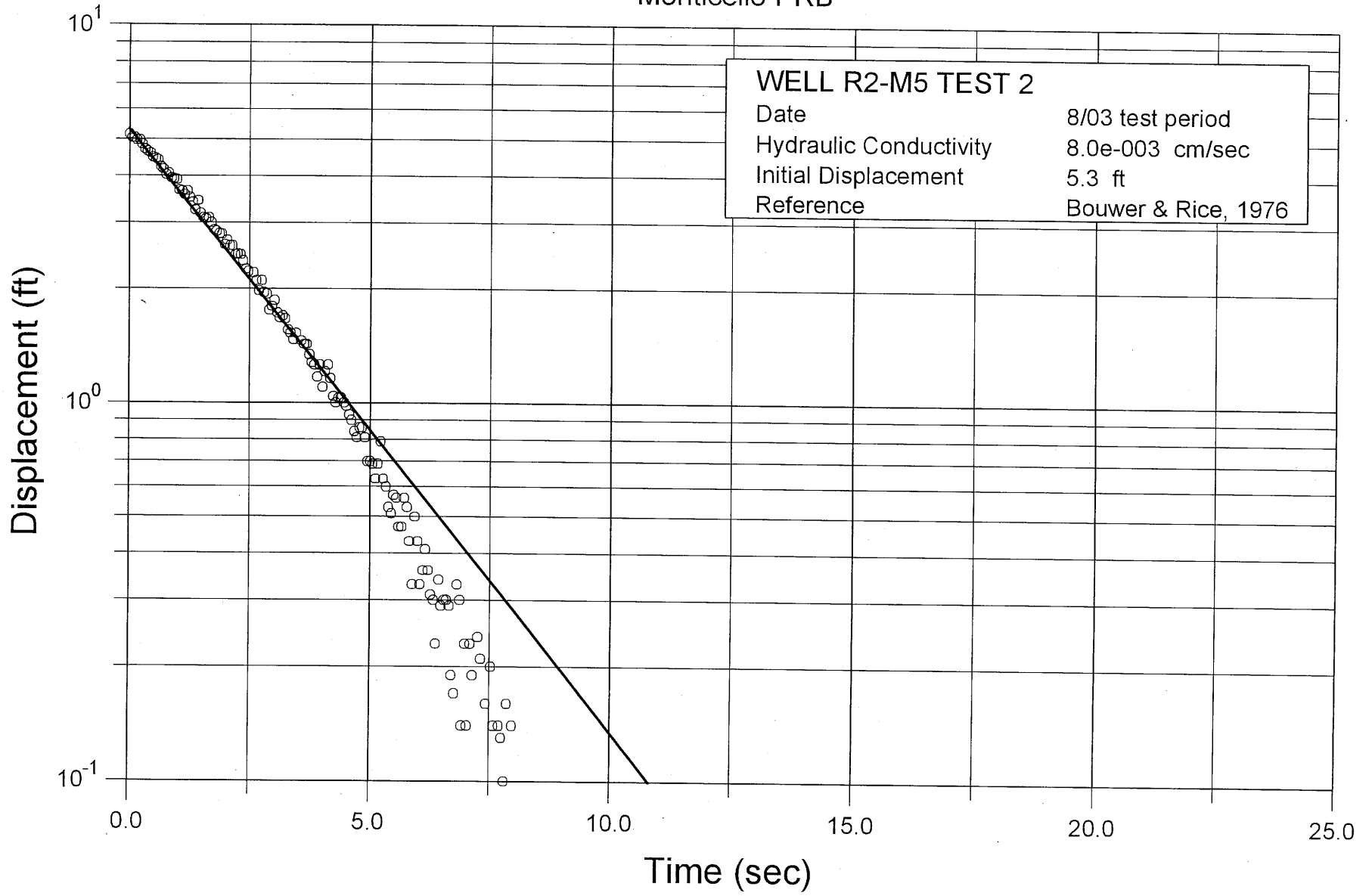
Monticello PRB



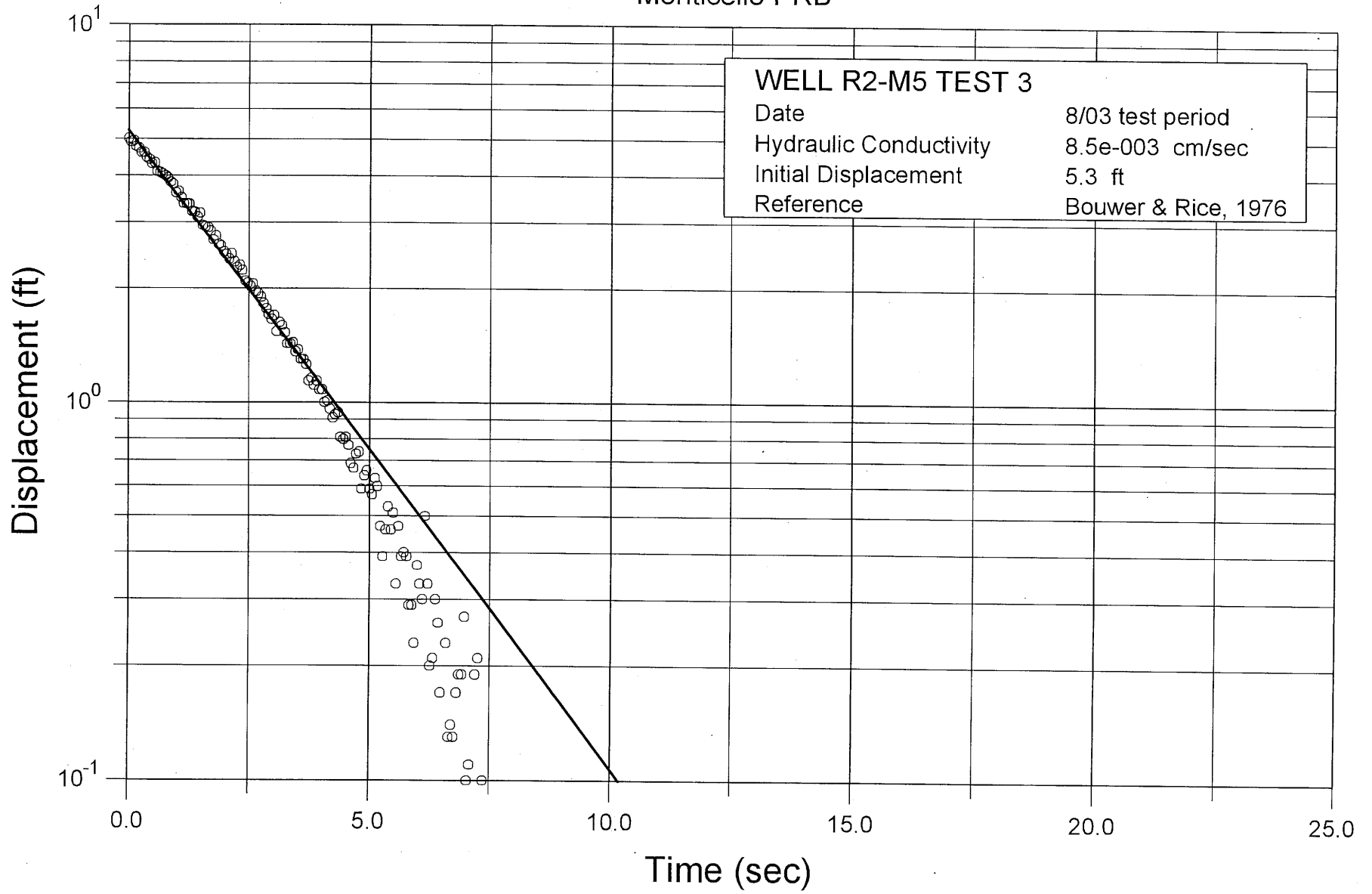
Monticello PRB



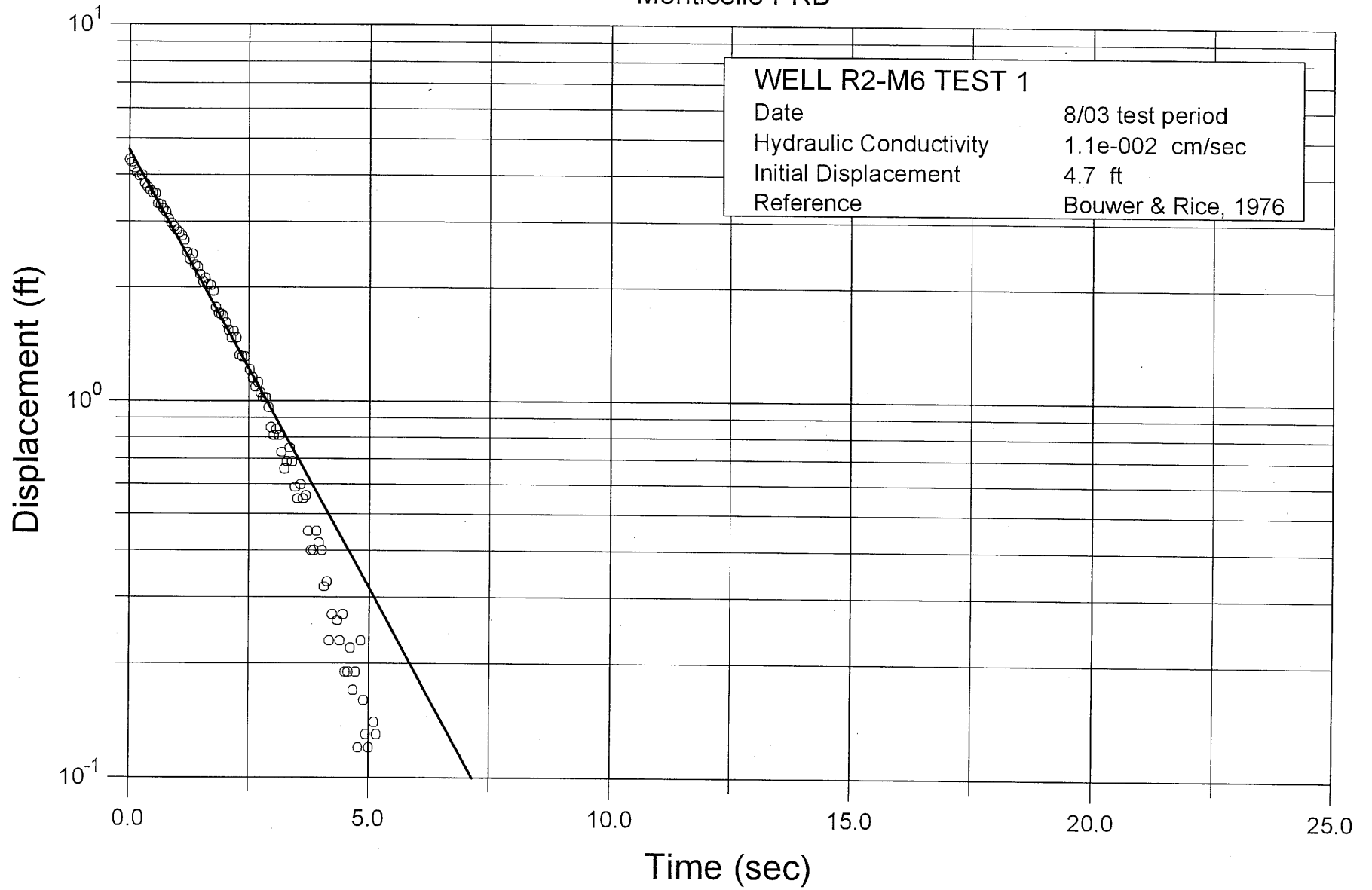
Monticello PRB



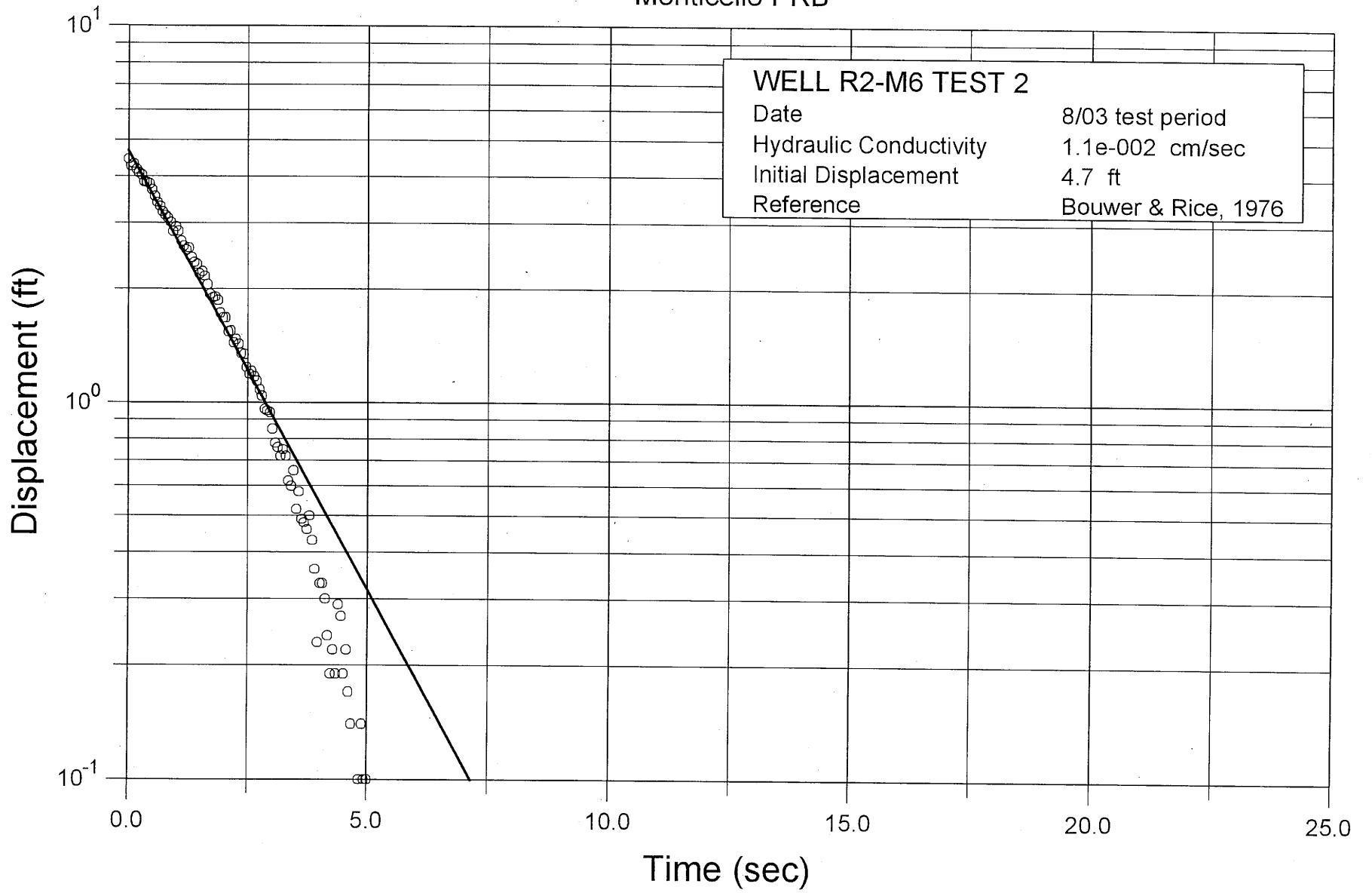
Monticello PRB



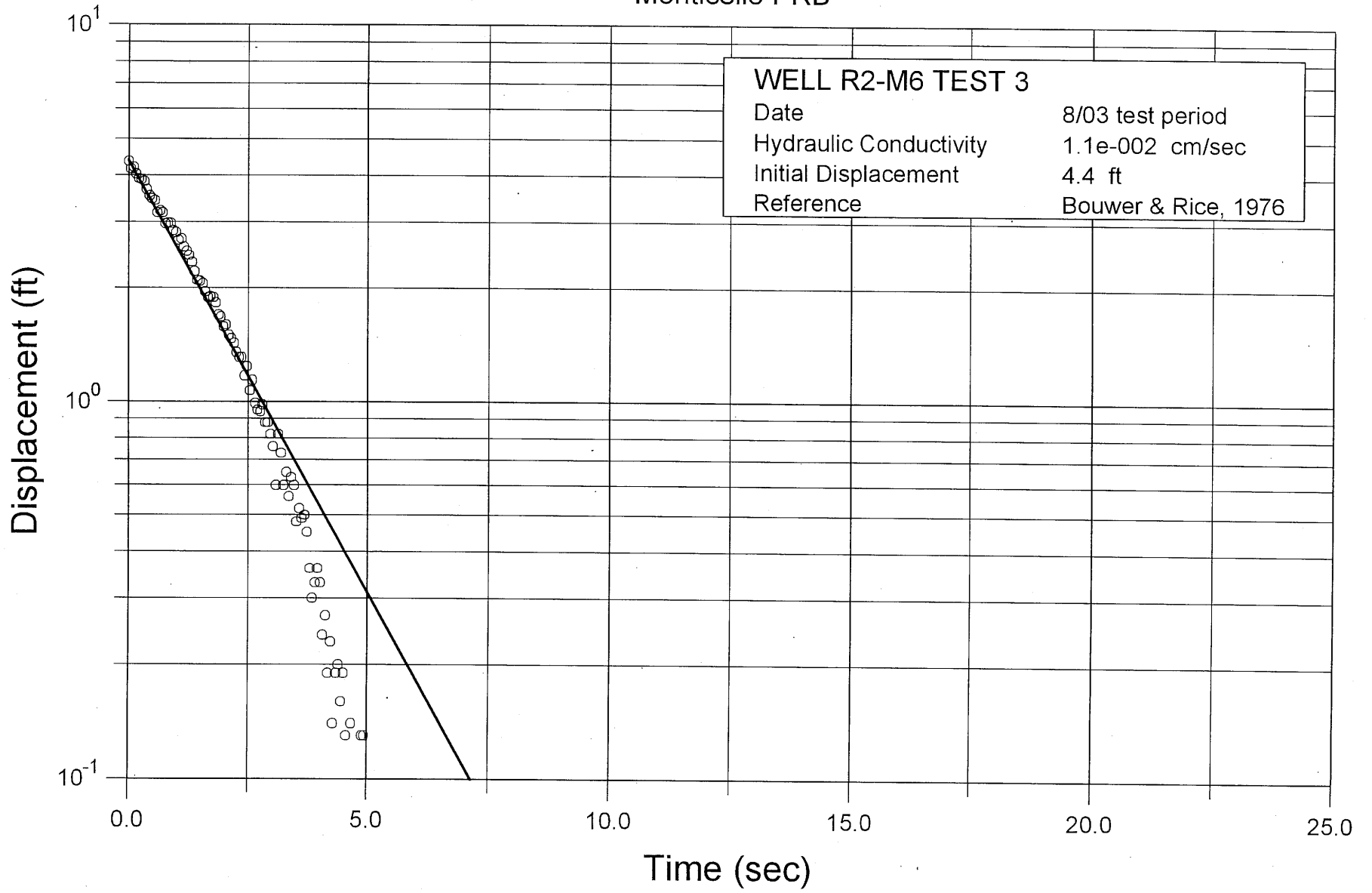
Monticello PRB



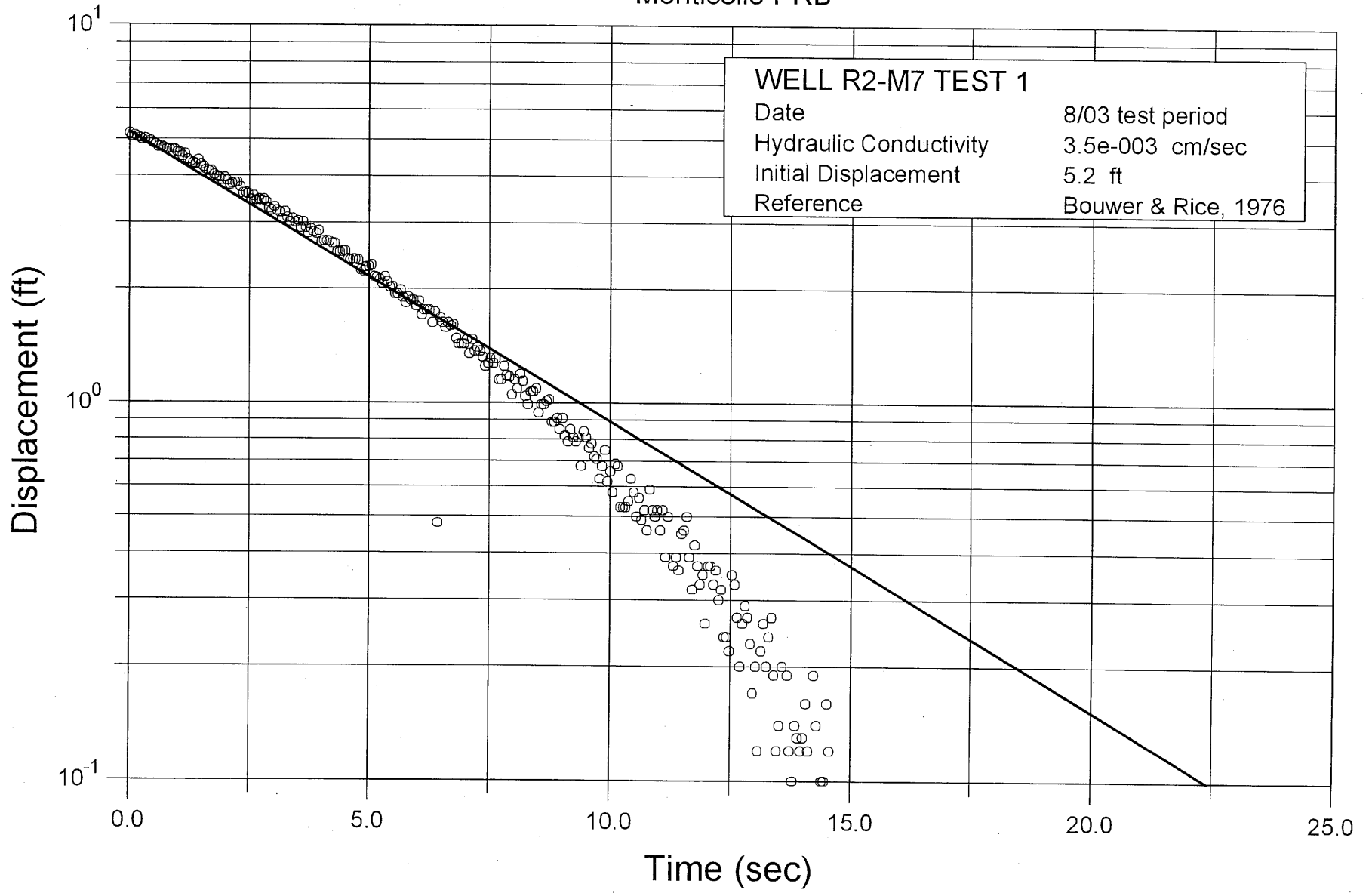
Monticello PRB



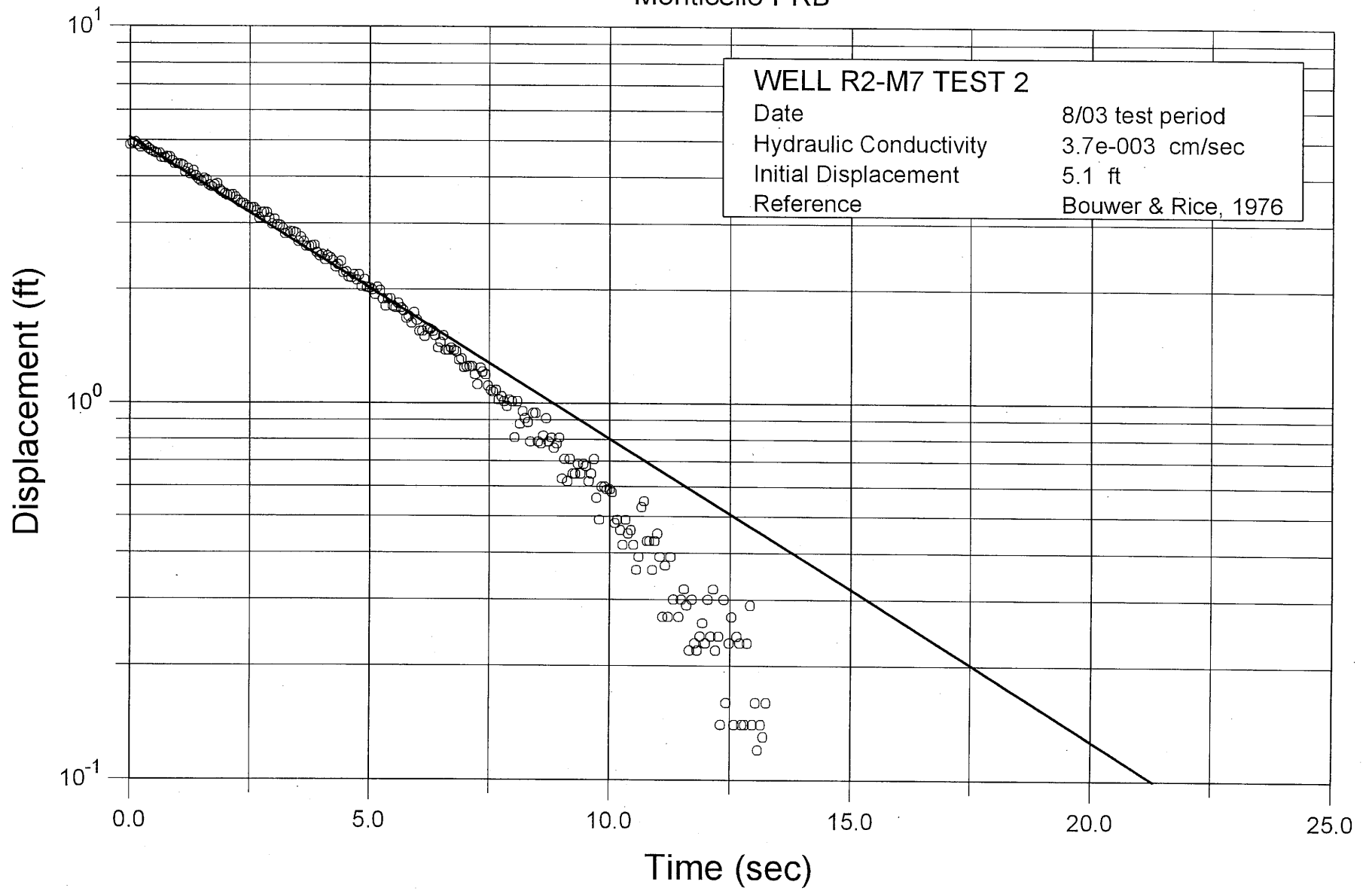
Monticello PRB



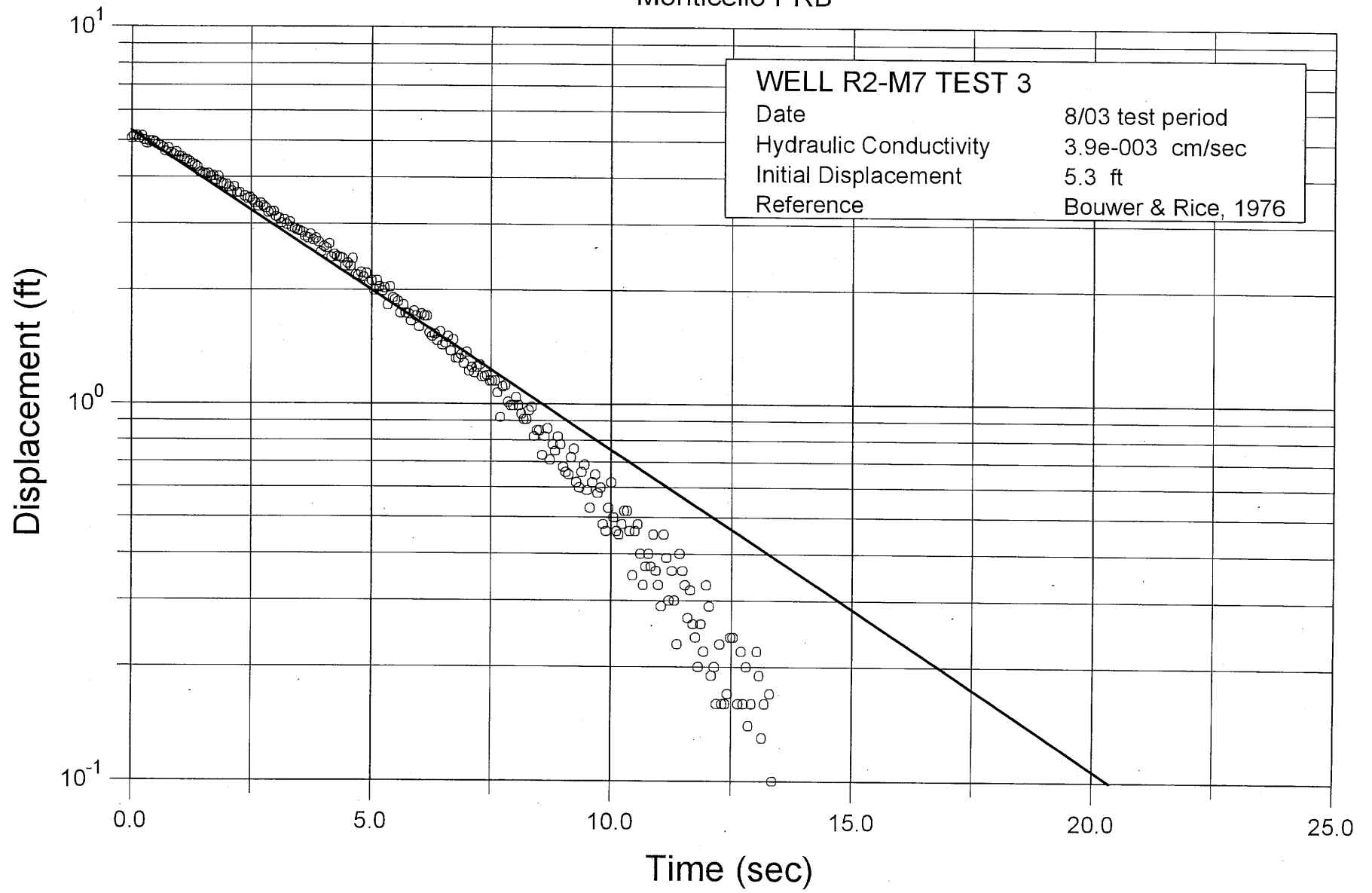
Monticello PRB



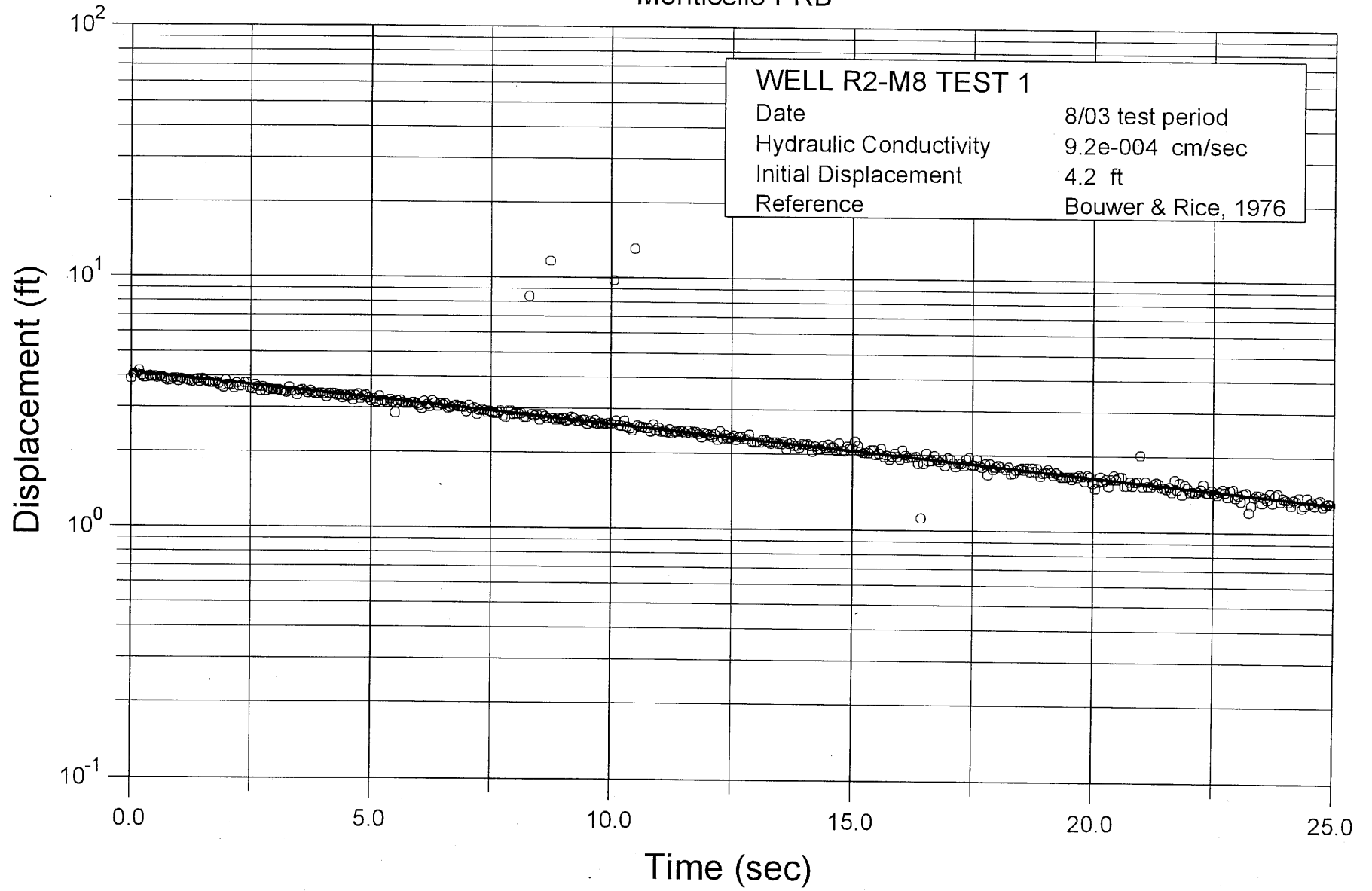
Monticello PRB



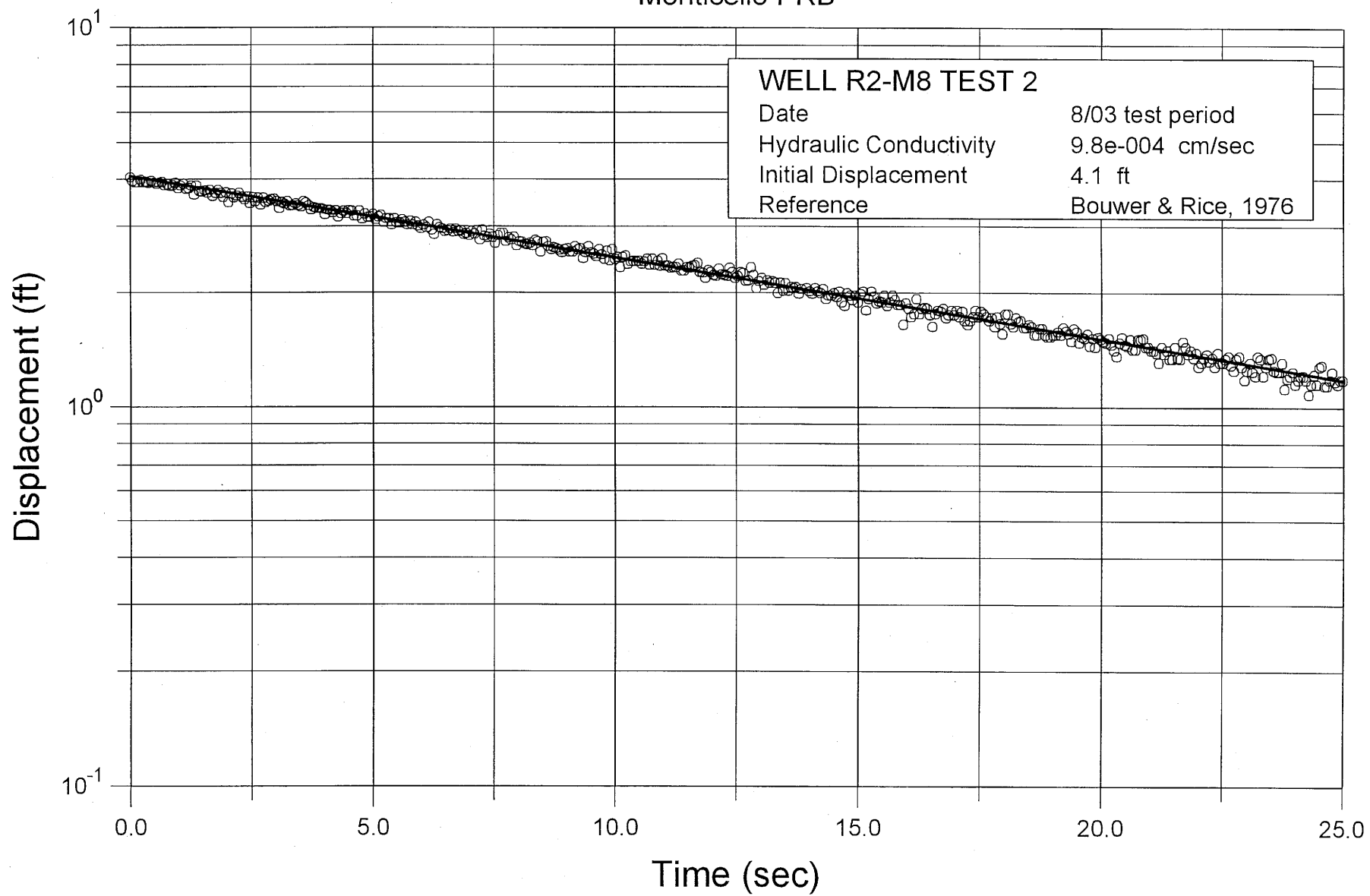
Monticello PRB



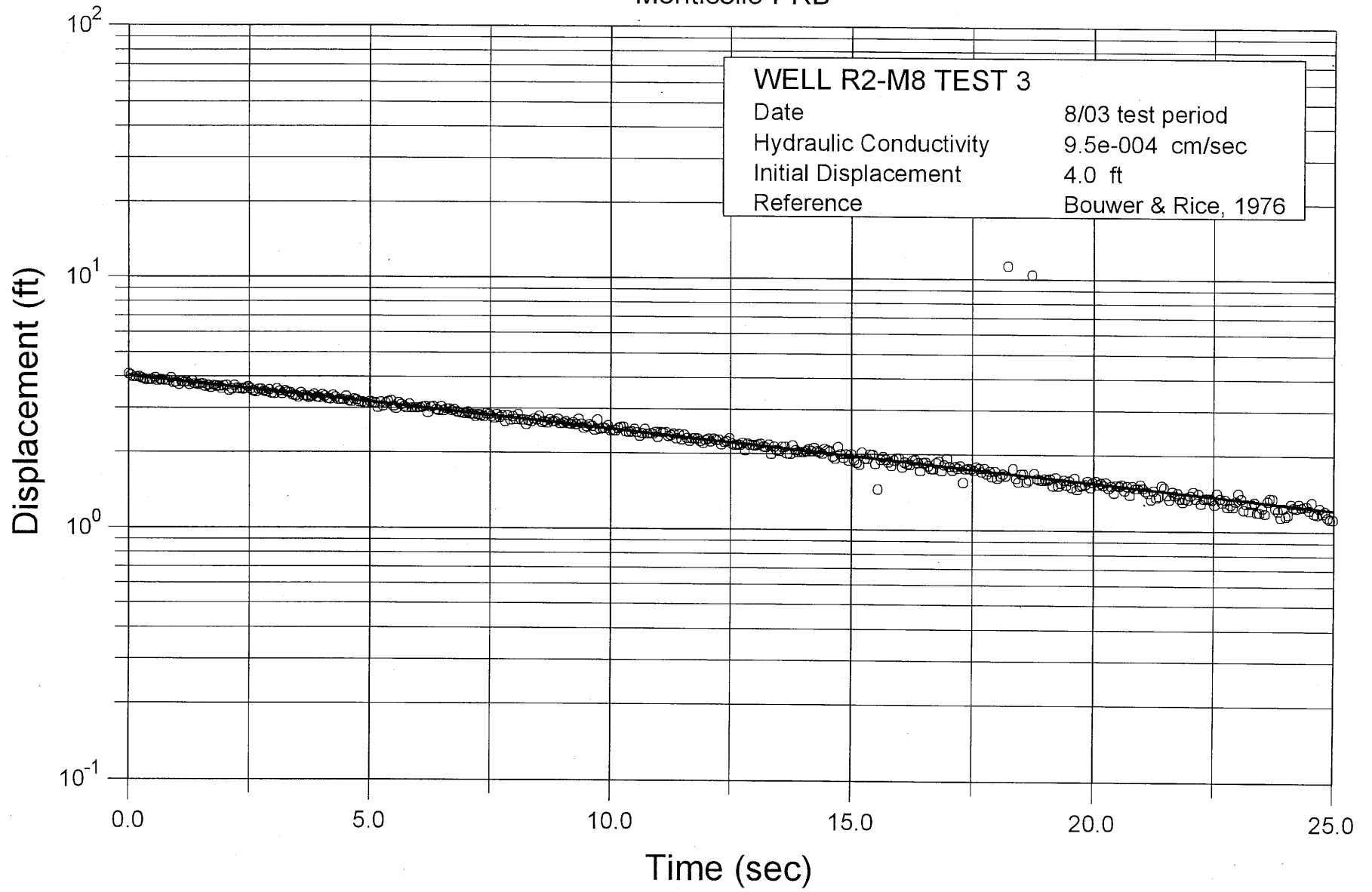
Monticello PRB



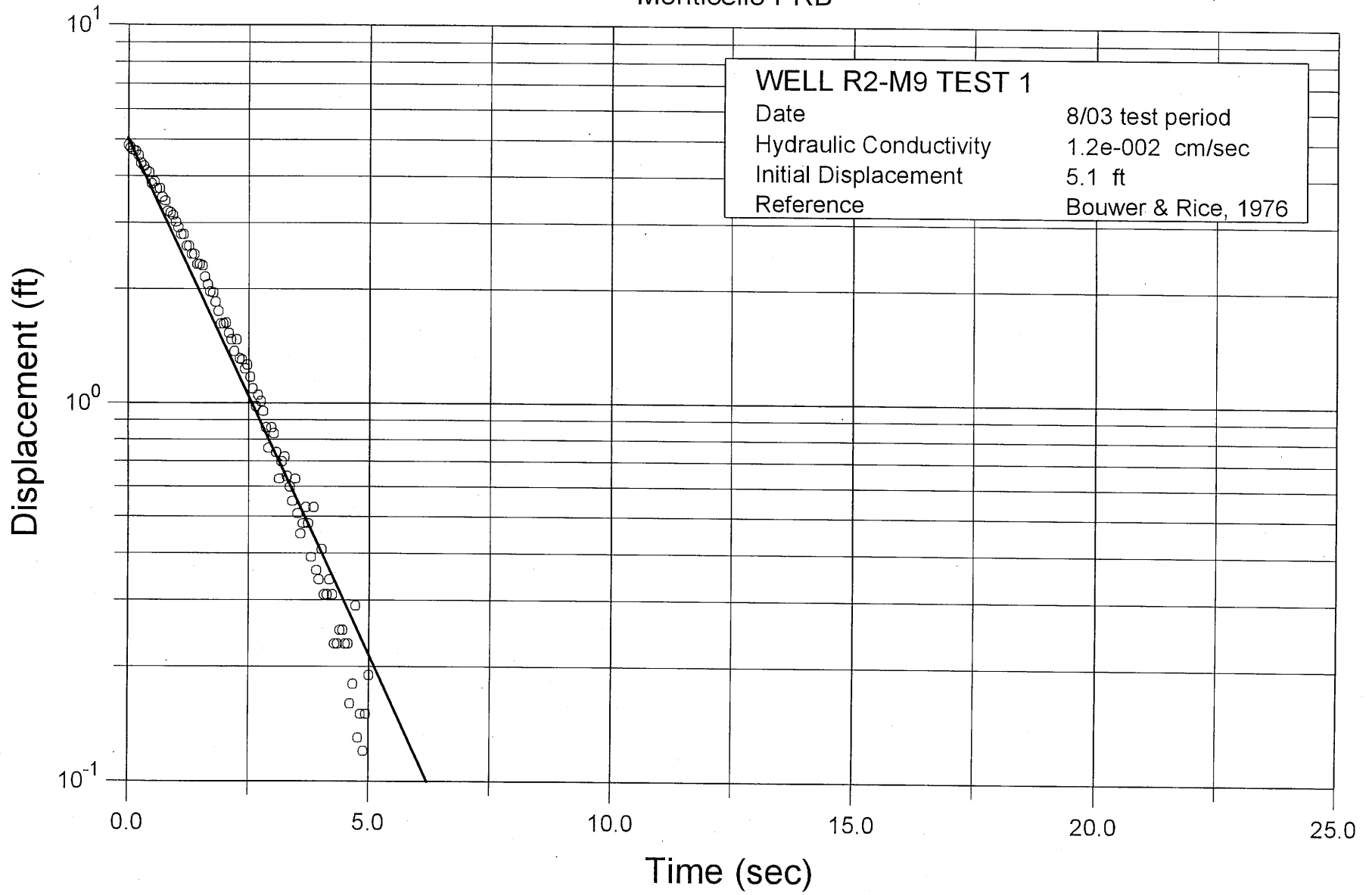
Monticello PRB



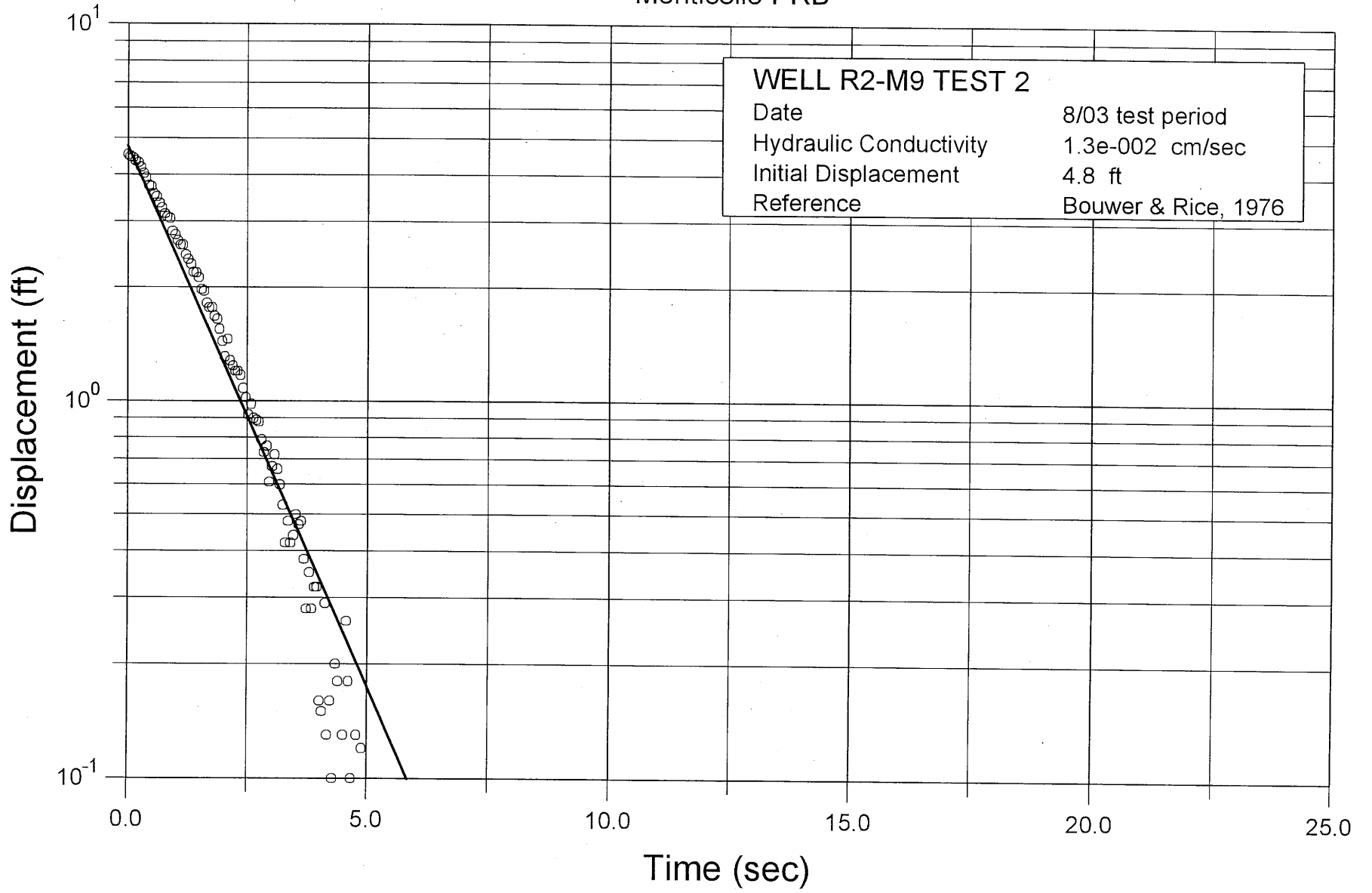
Monticello PRB



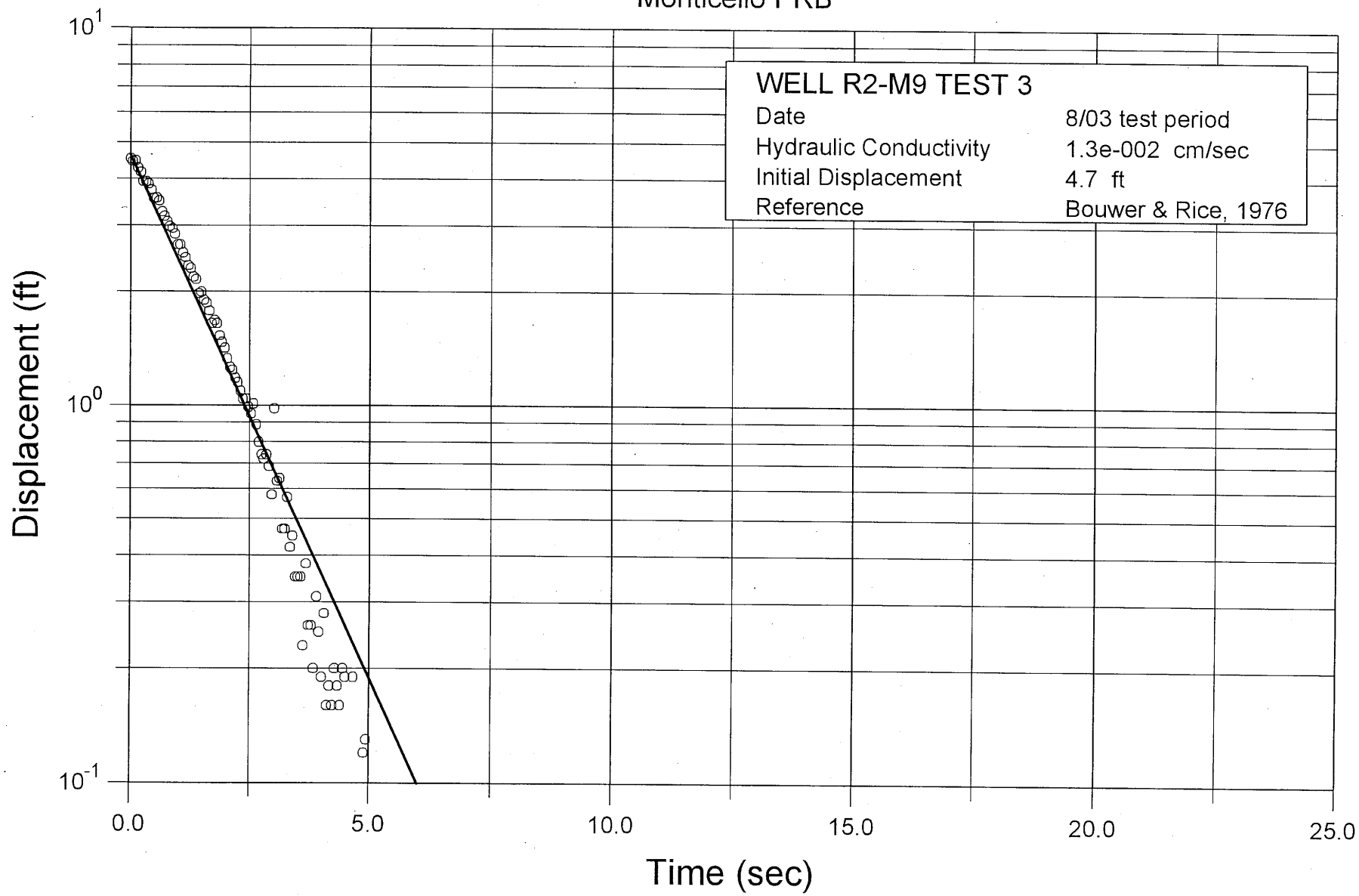
Monticello PRB



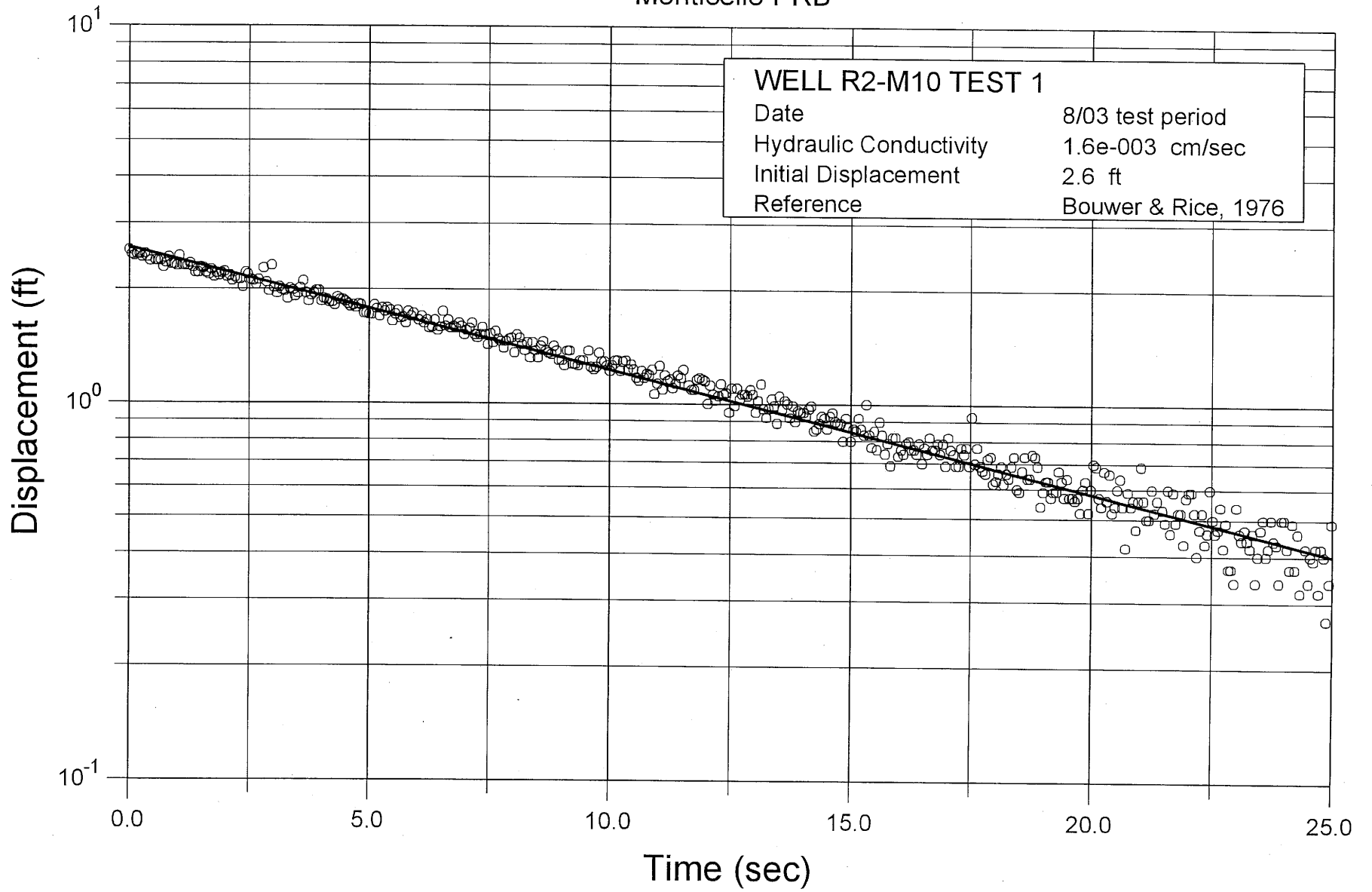
Monticello PRB



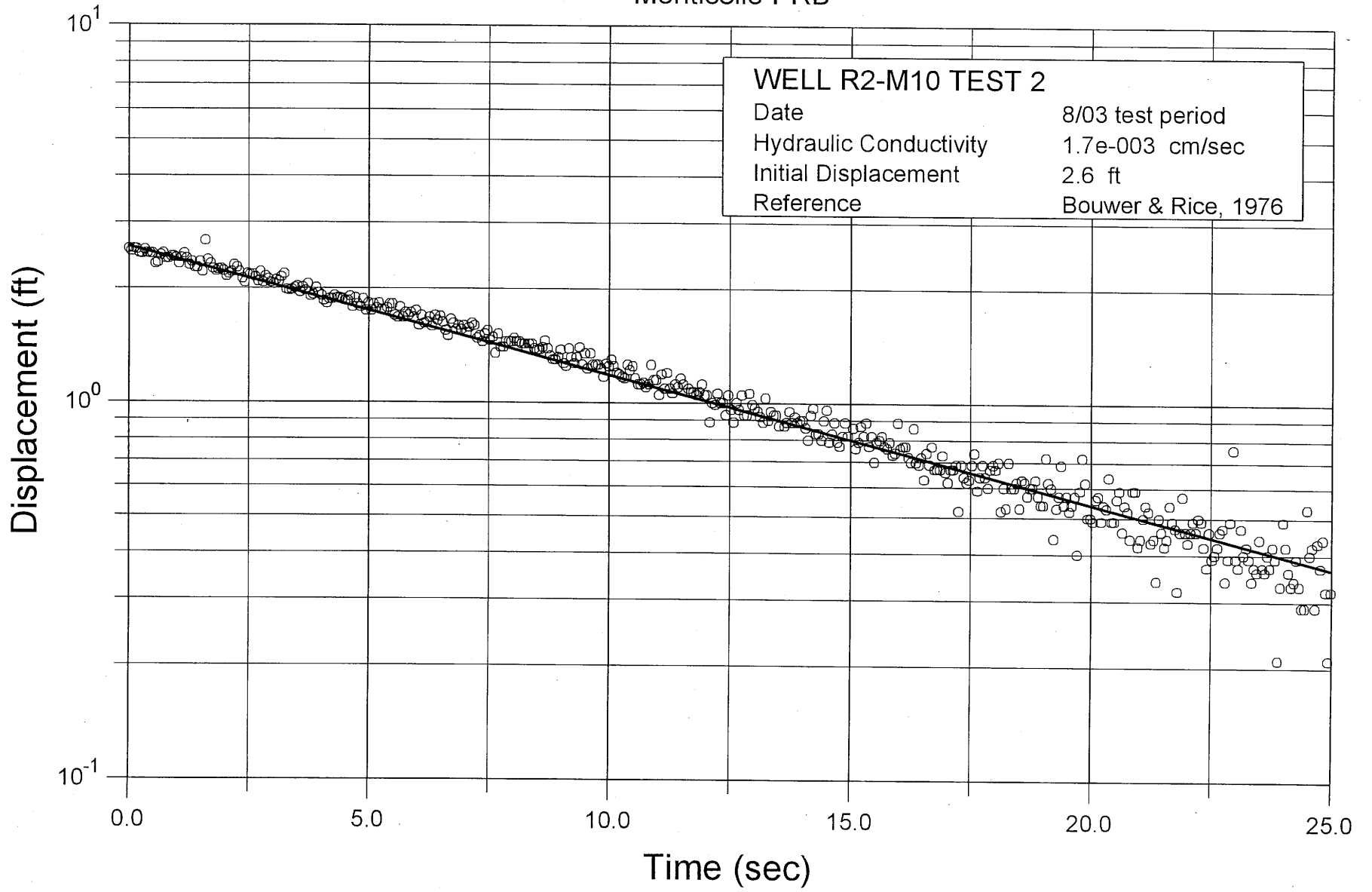
Monticello PRB



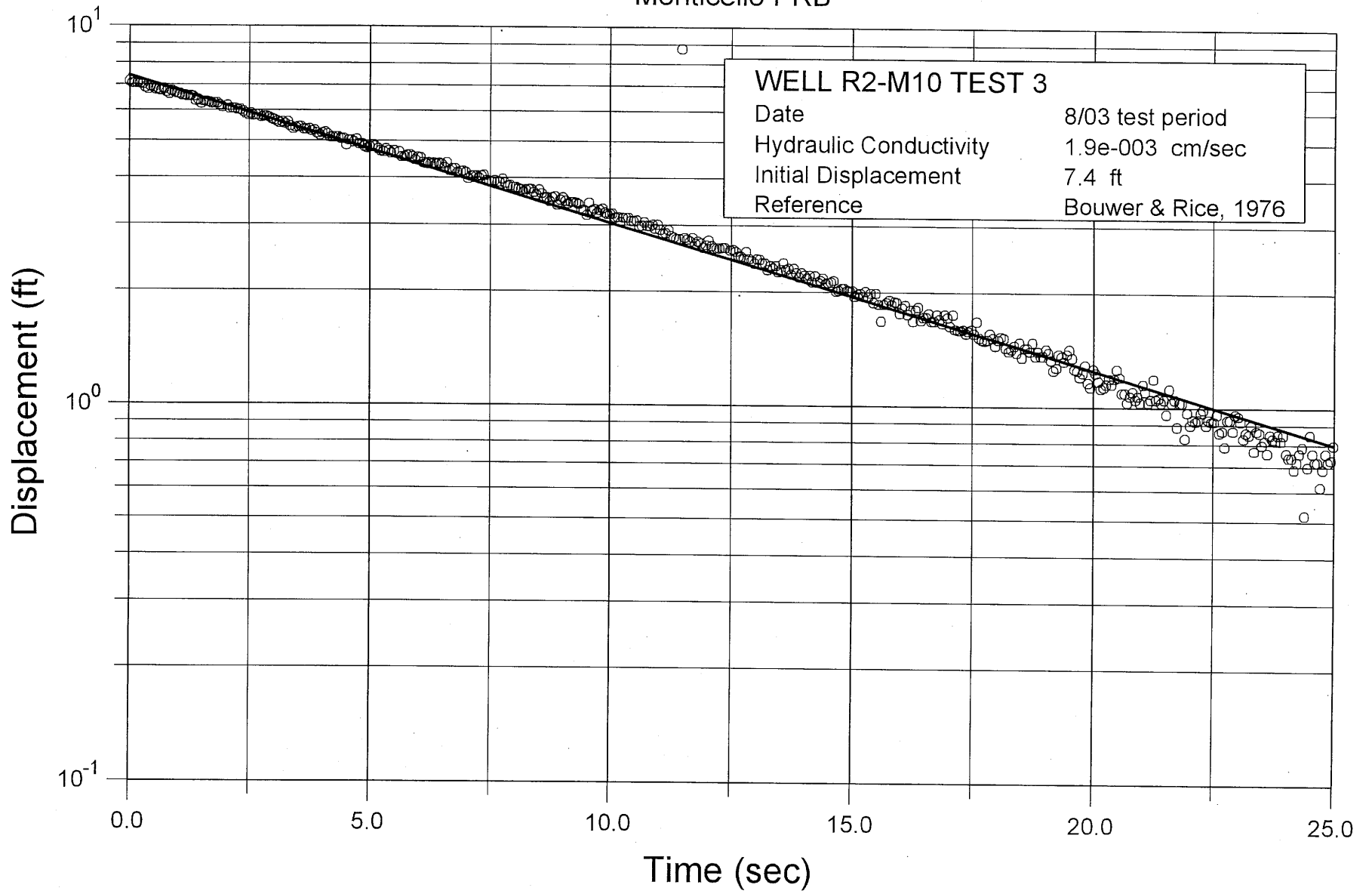
Monticello PRB



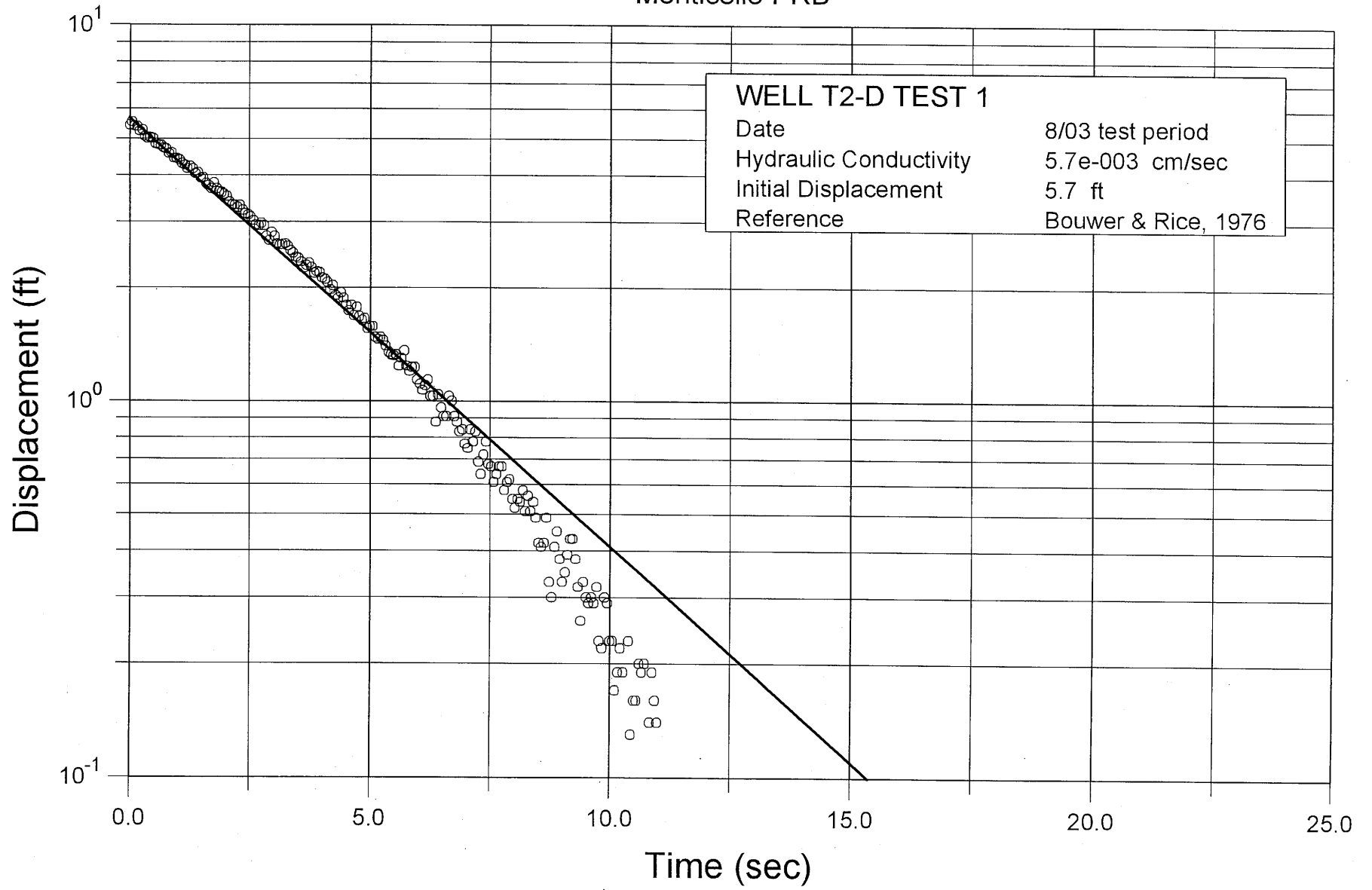
Monticello PRB



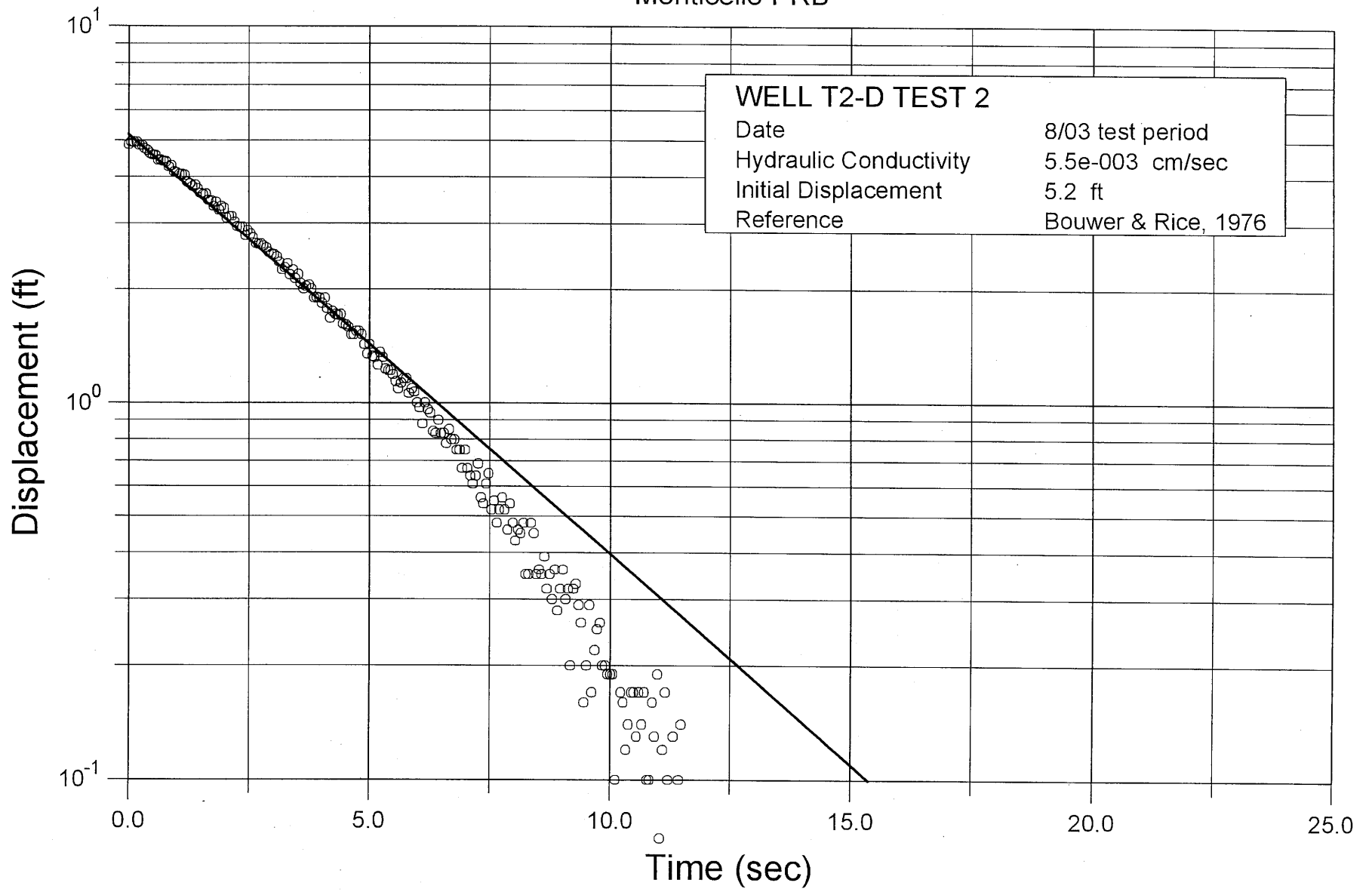
Monticello PRB



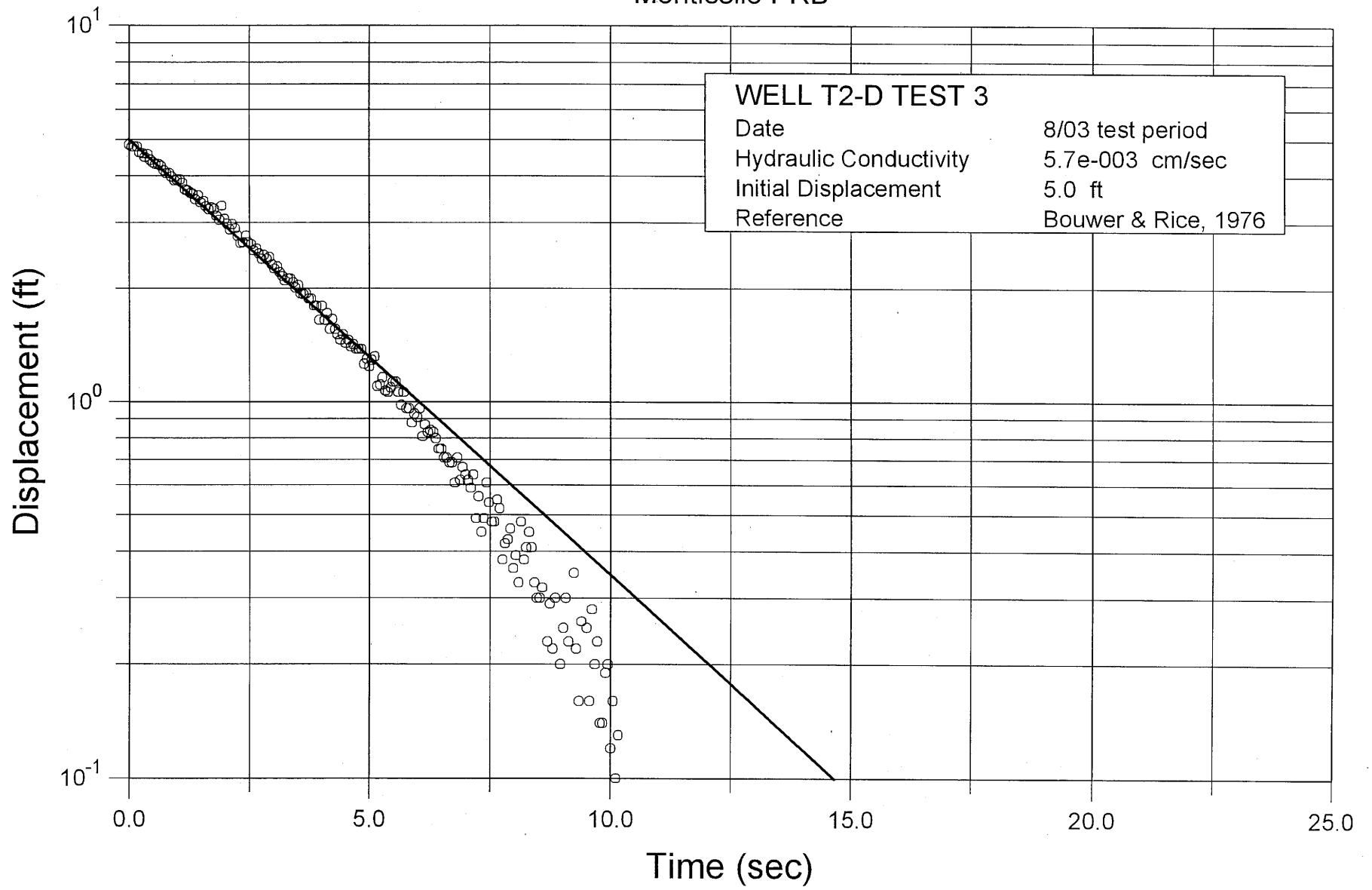
Monticello PRB



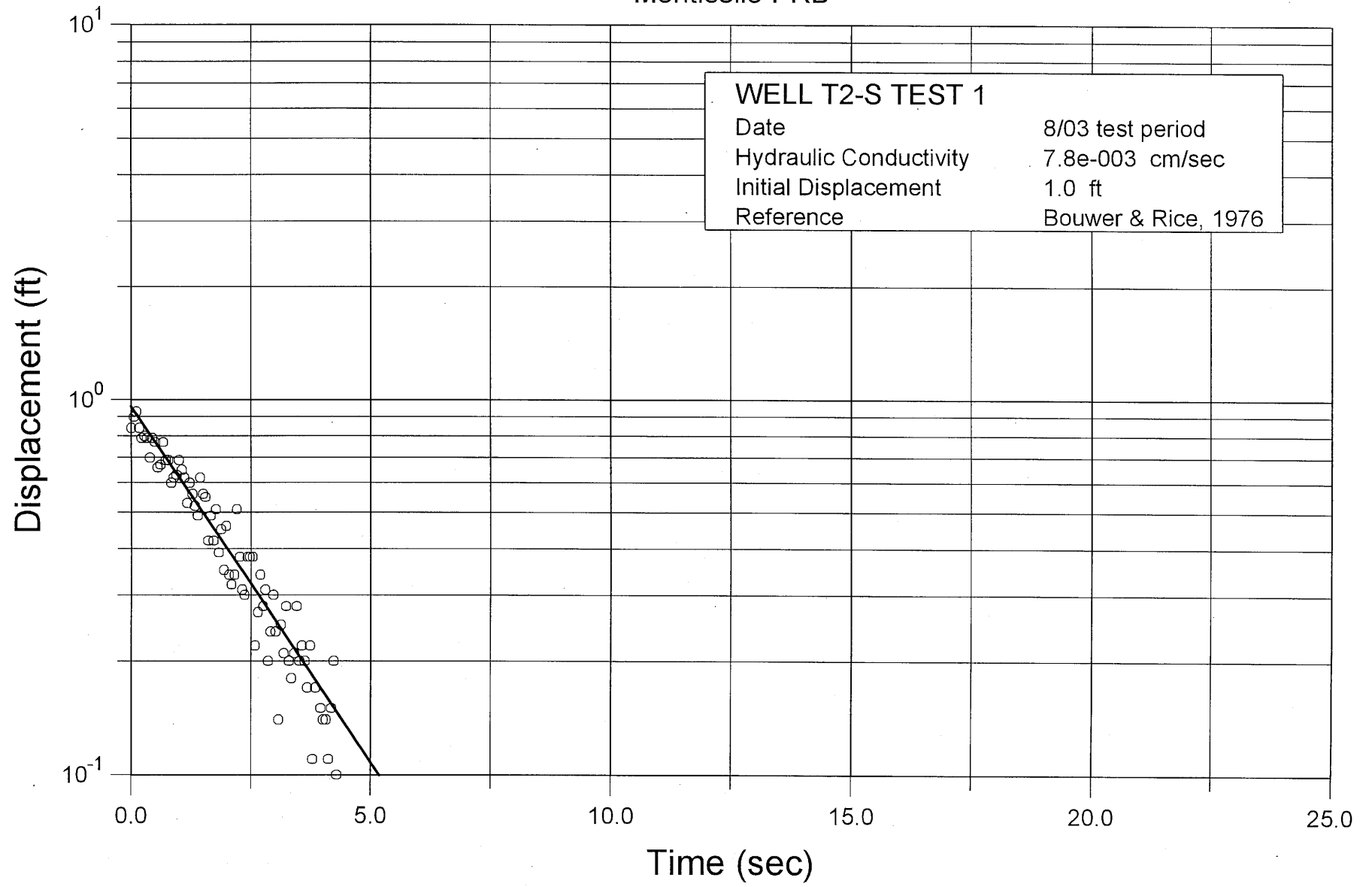
Monticello PRB



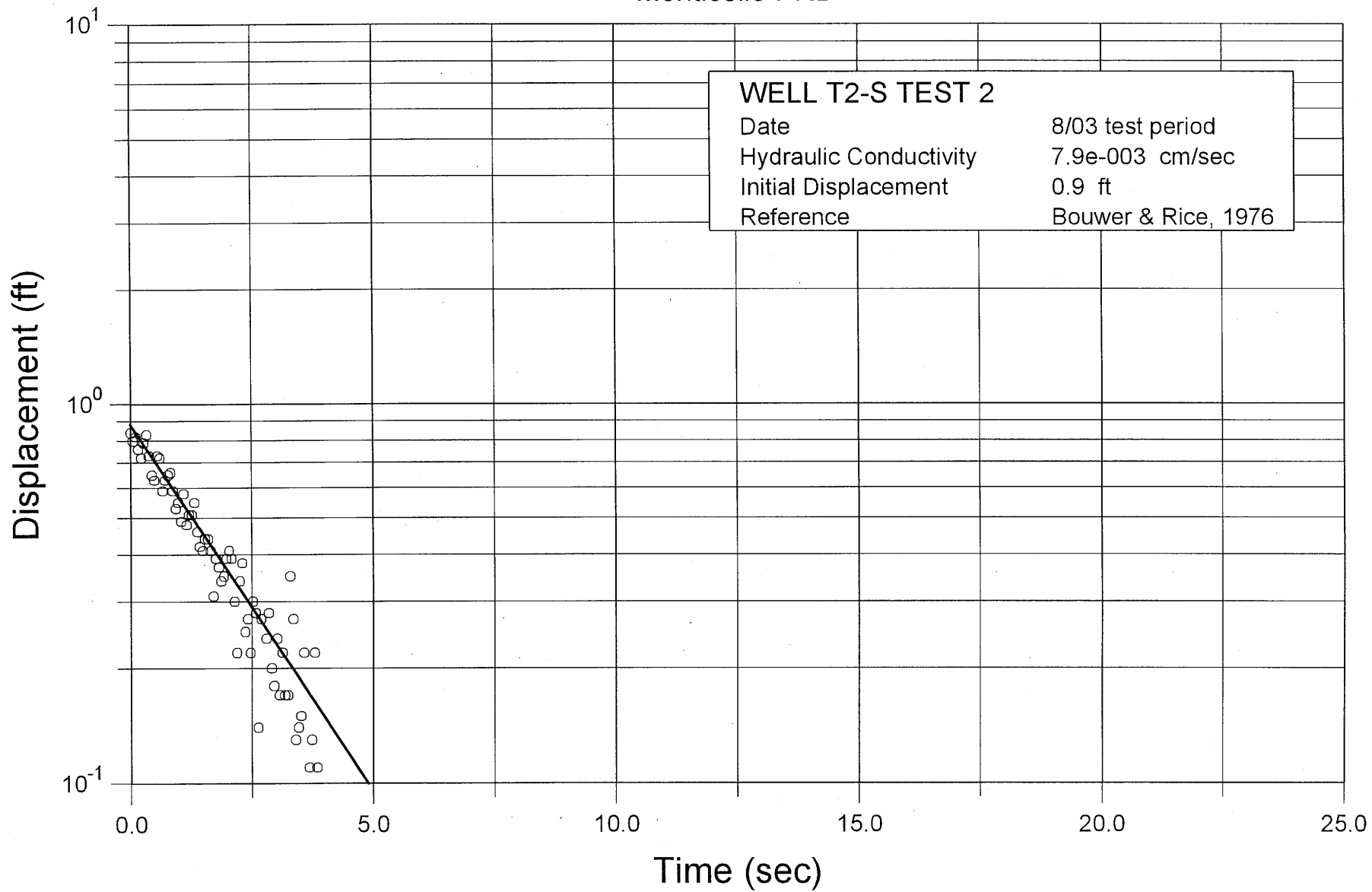
Monticello PRB



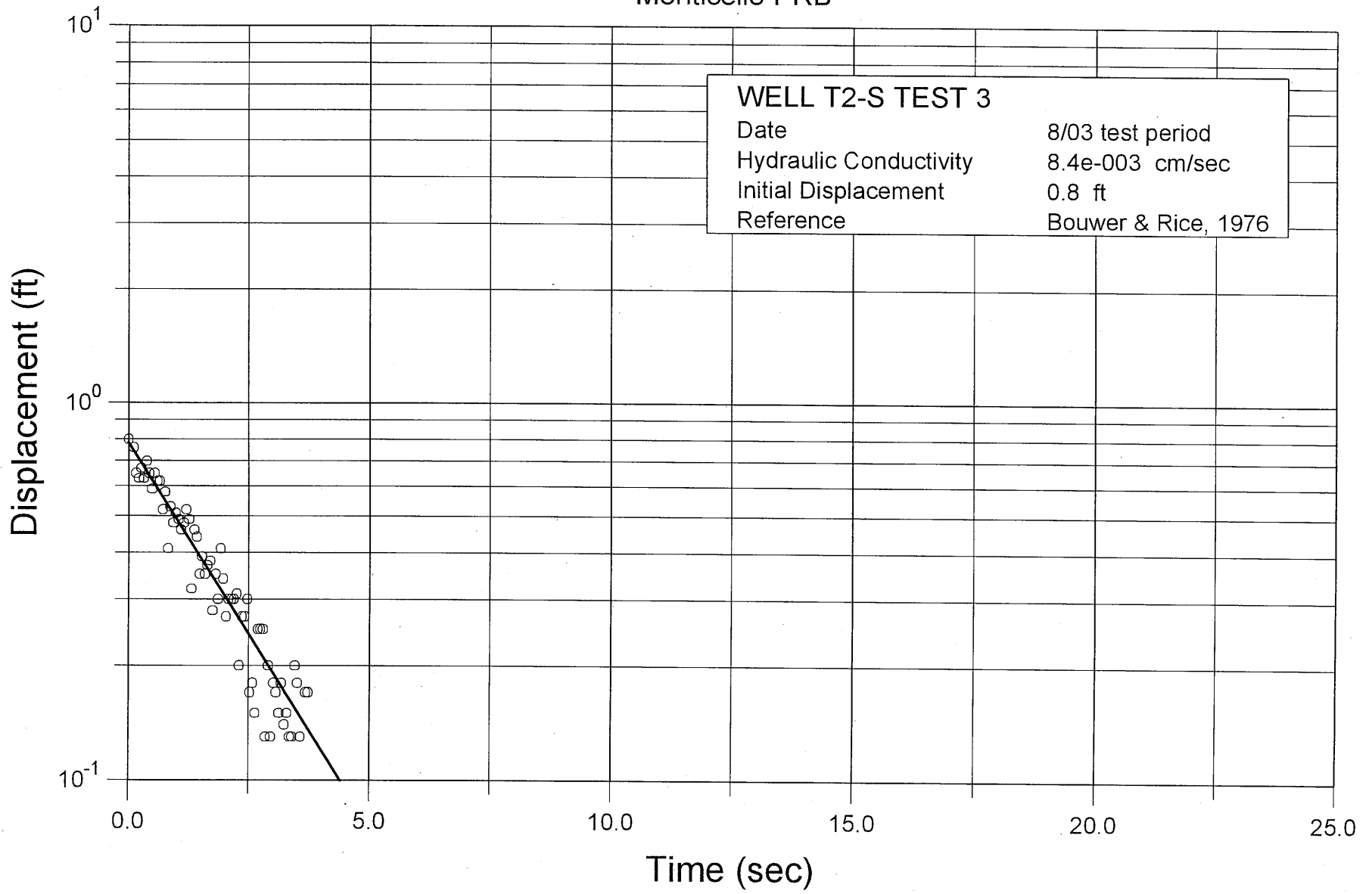
Monticello PRB



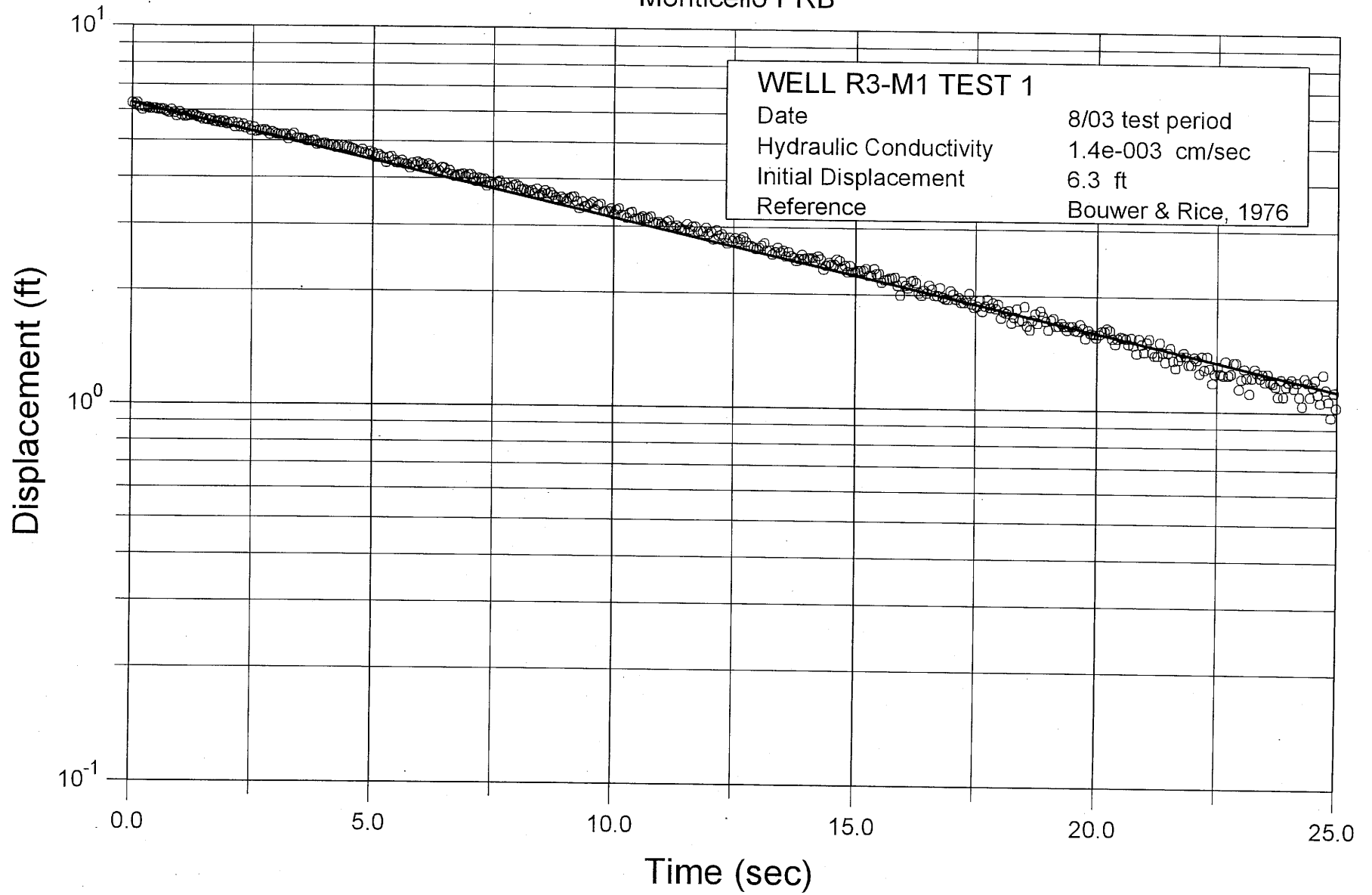
Monticello PRB



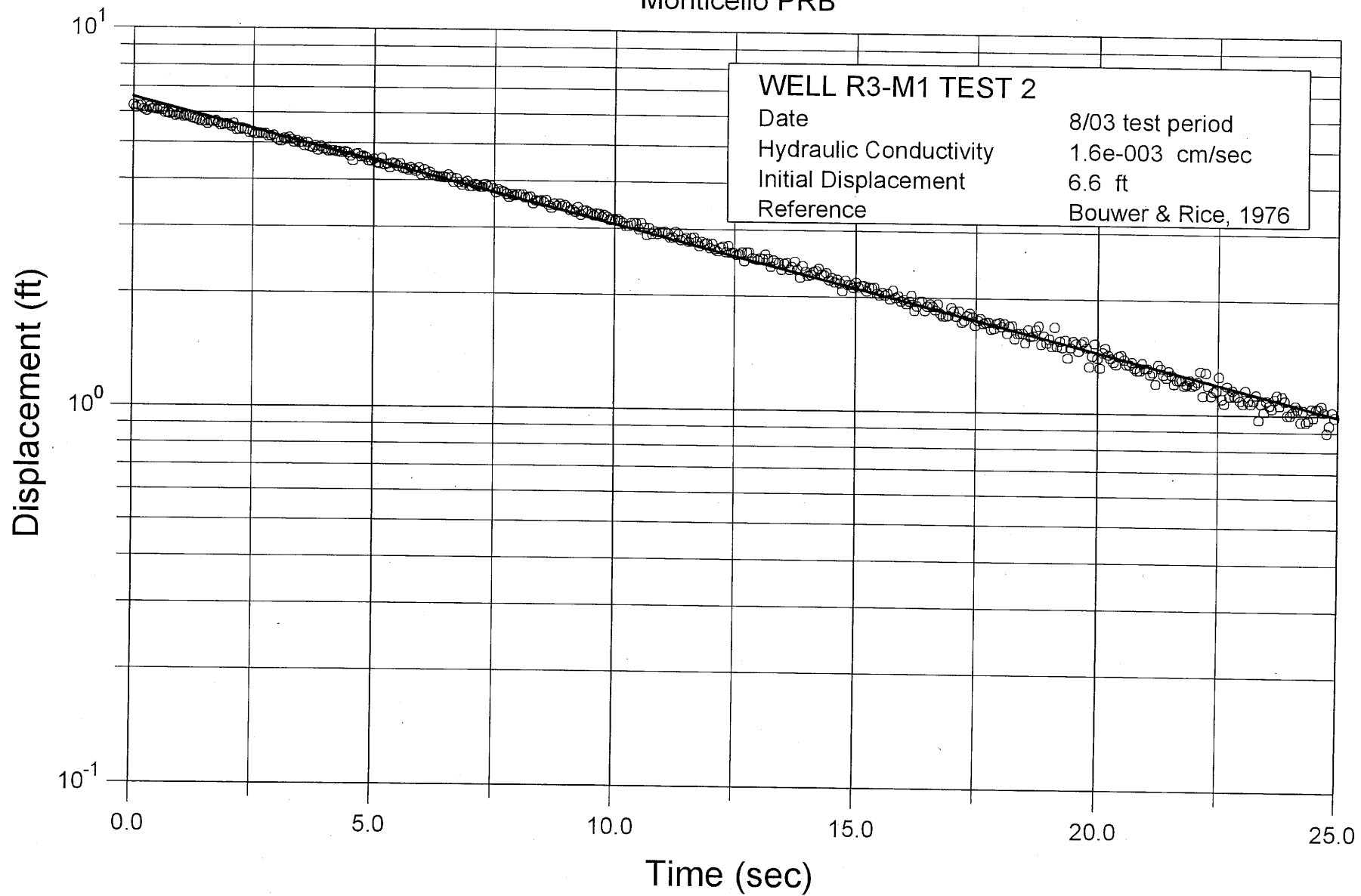
Monticello PRB



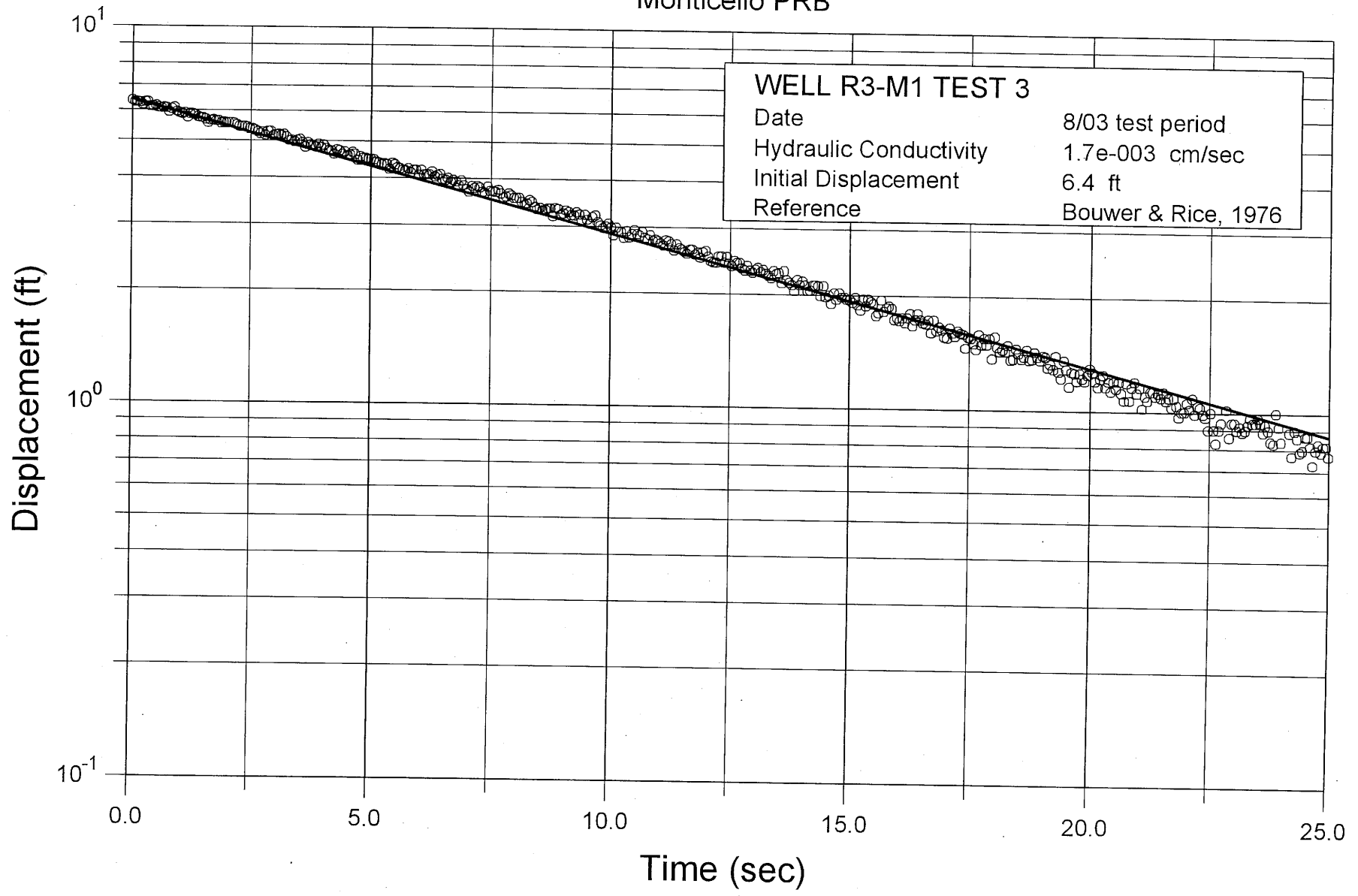
Monticello PRB



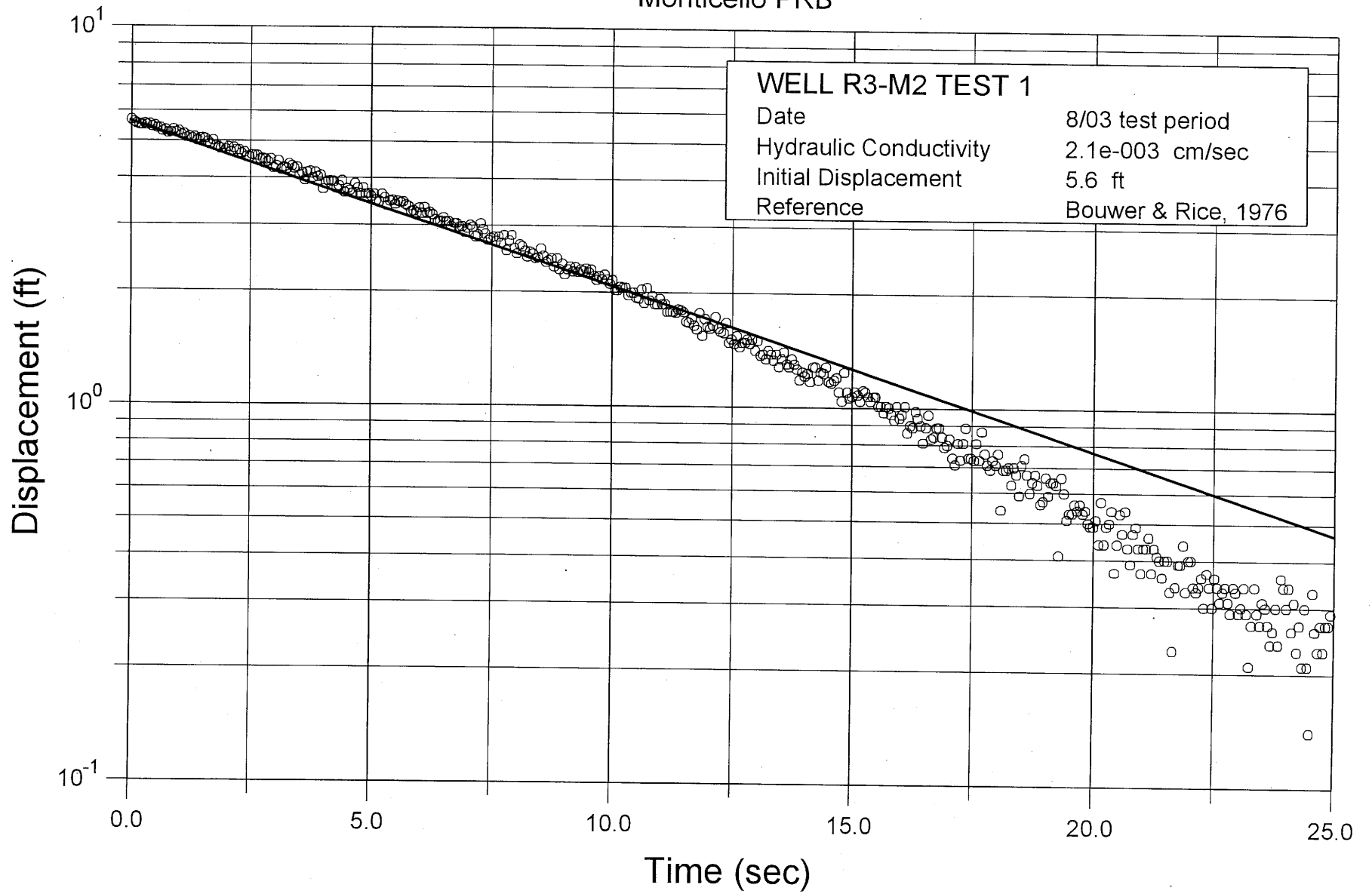
Monticello PRB



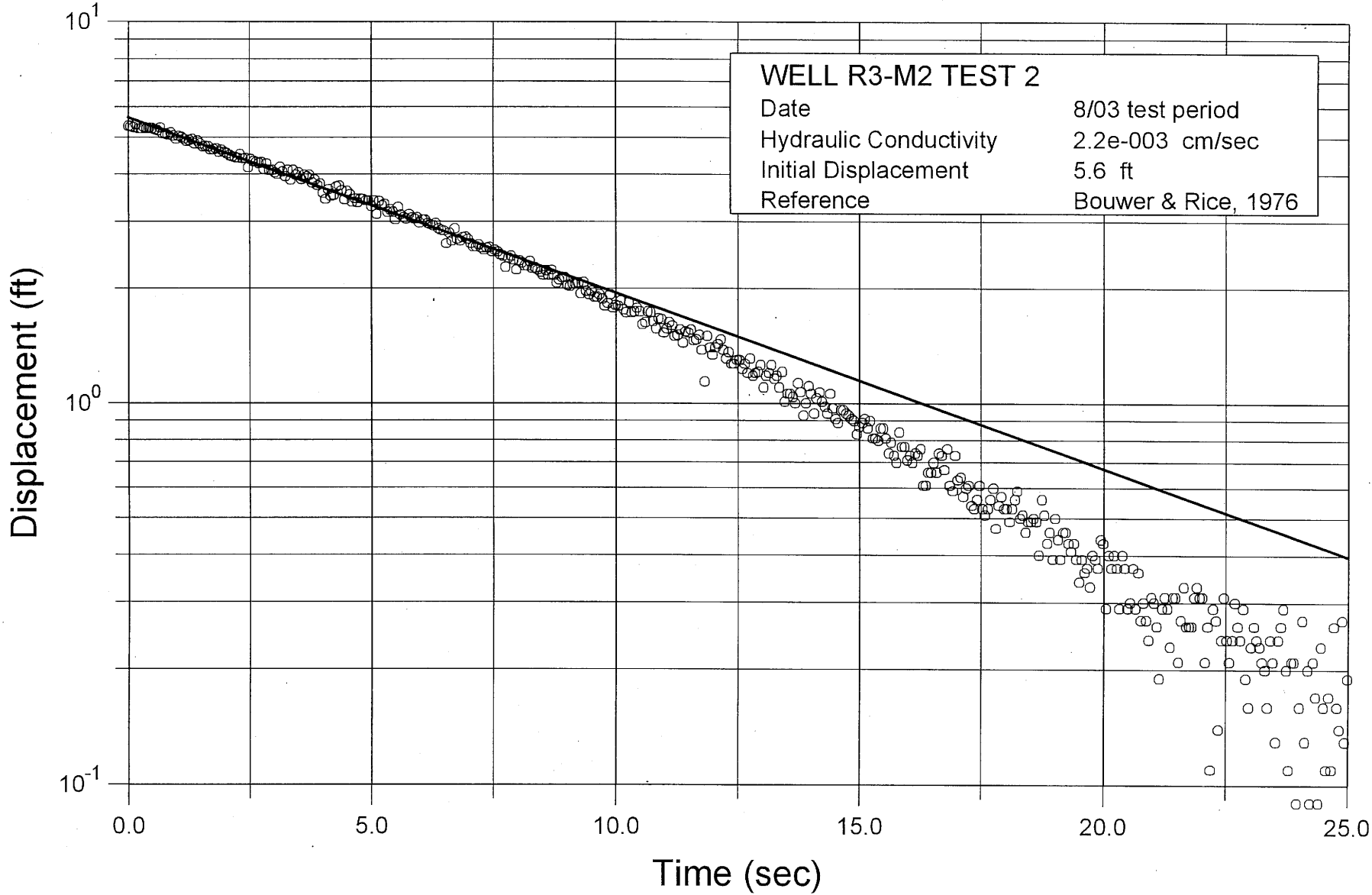
Monticello PRB



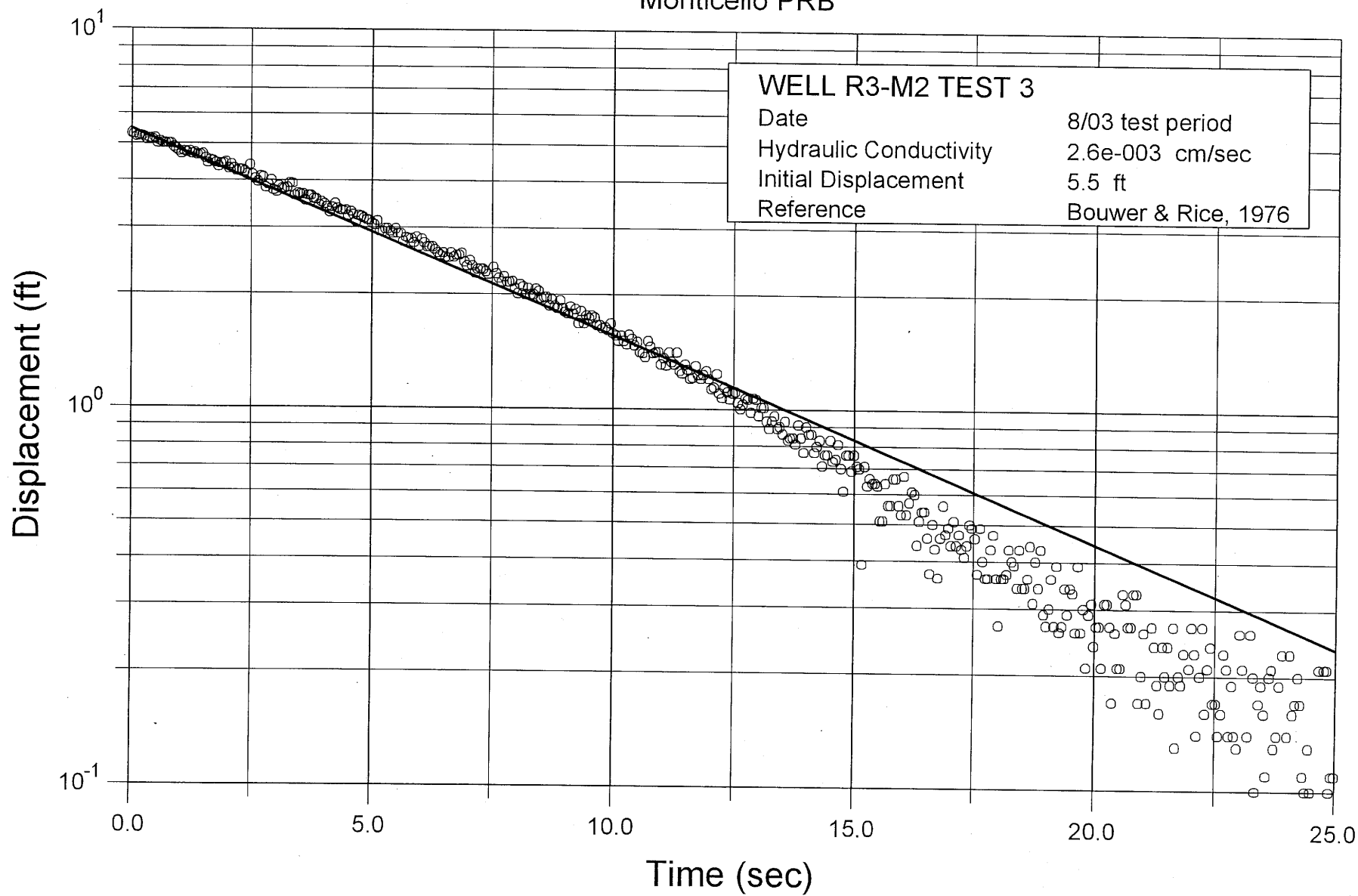
Monticello PRB



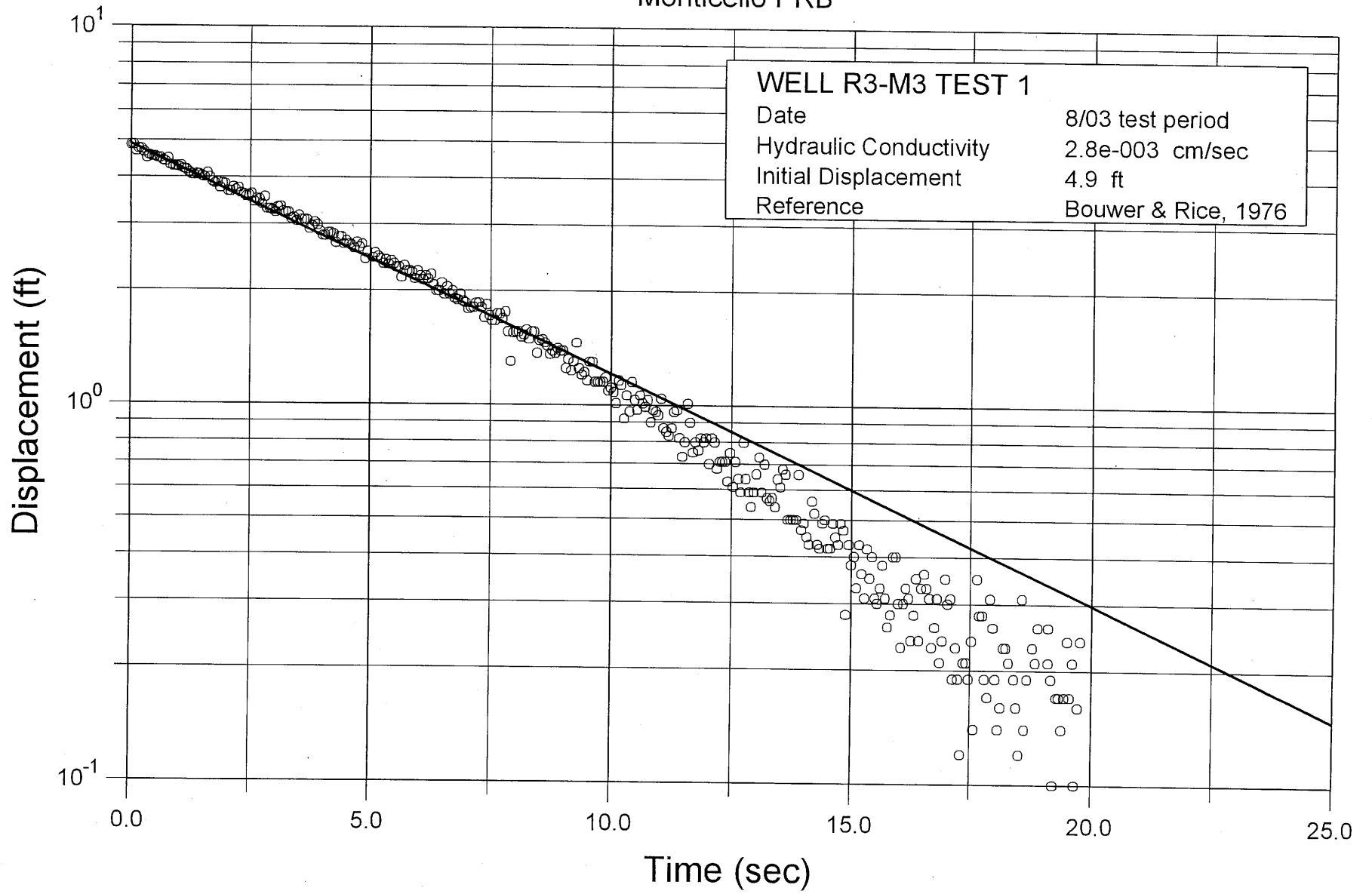
Monticello PRB



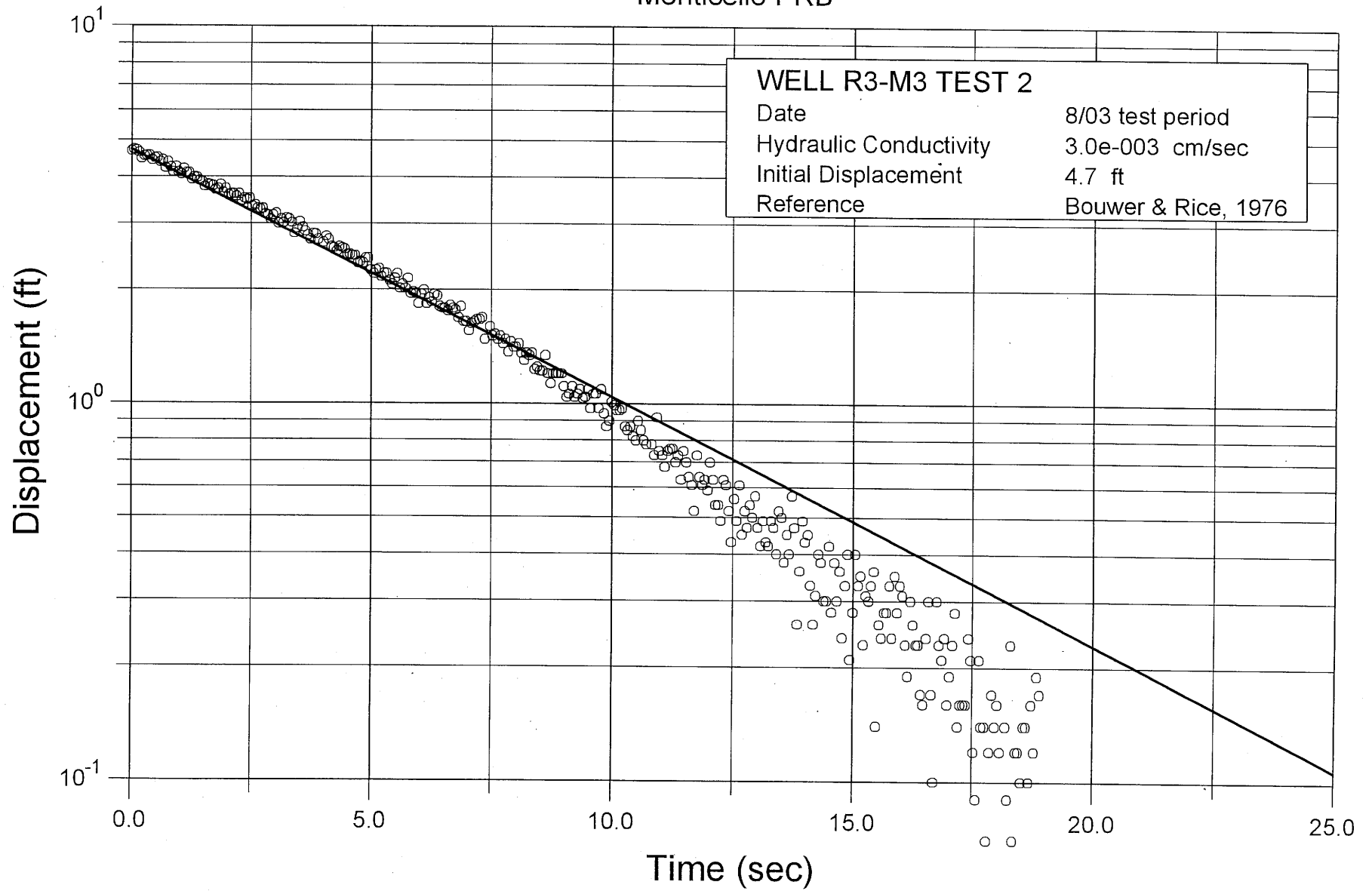
Monticello PRB



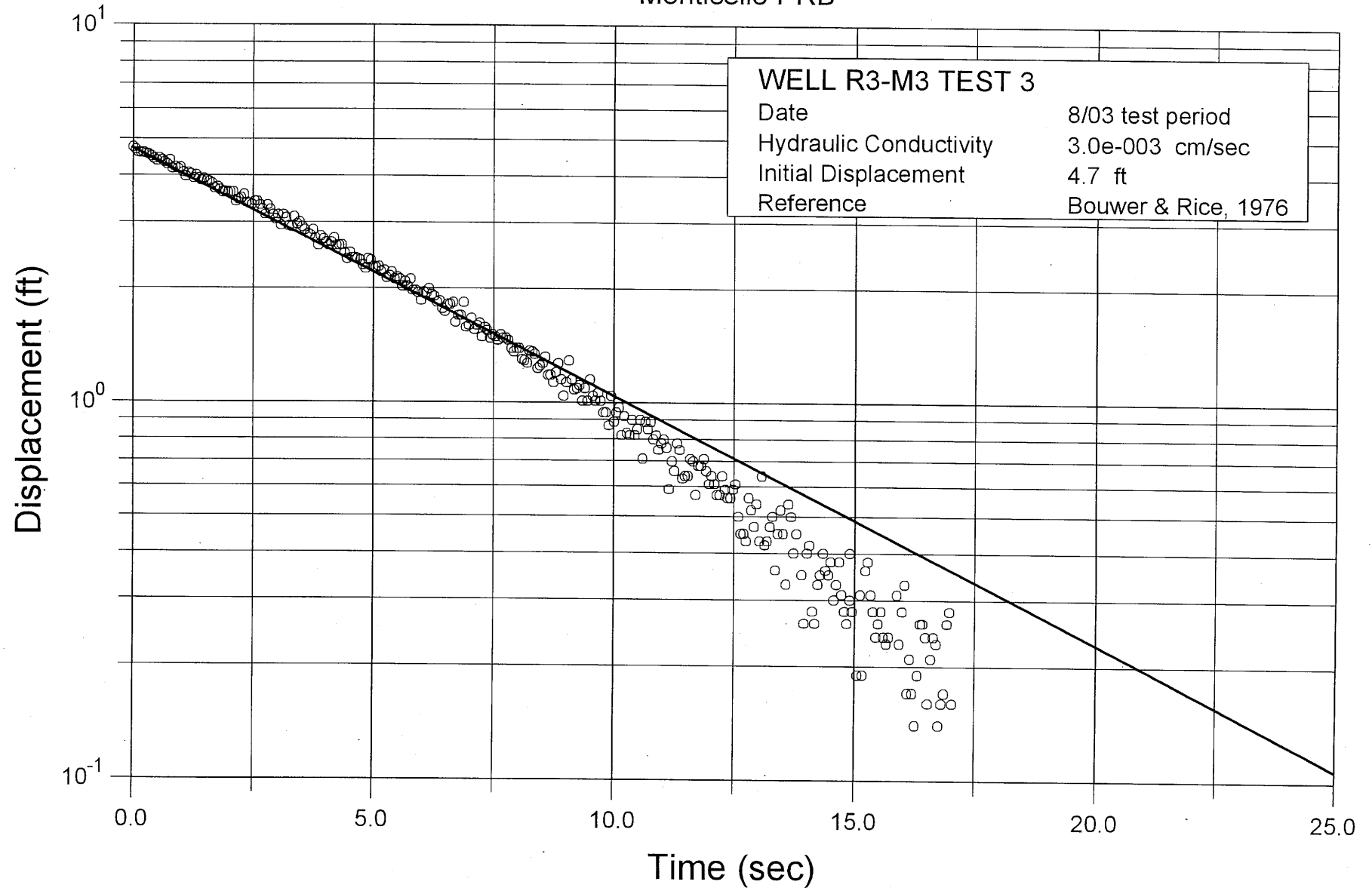
Monticello PRB



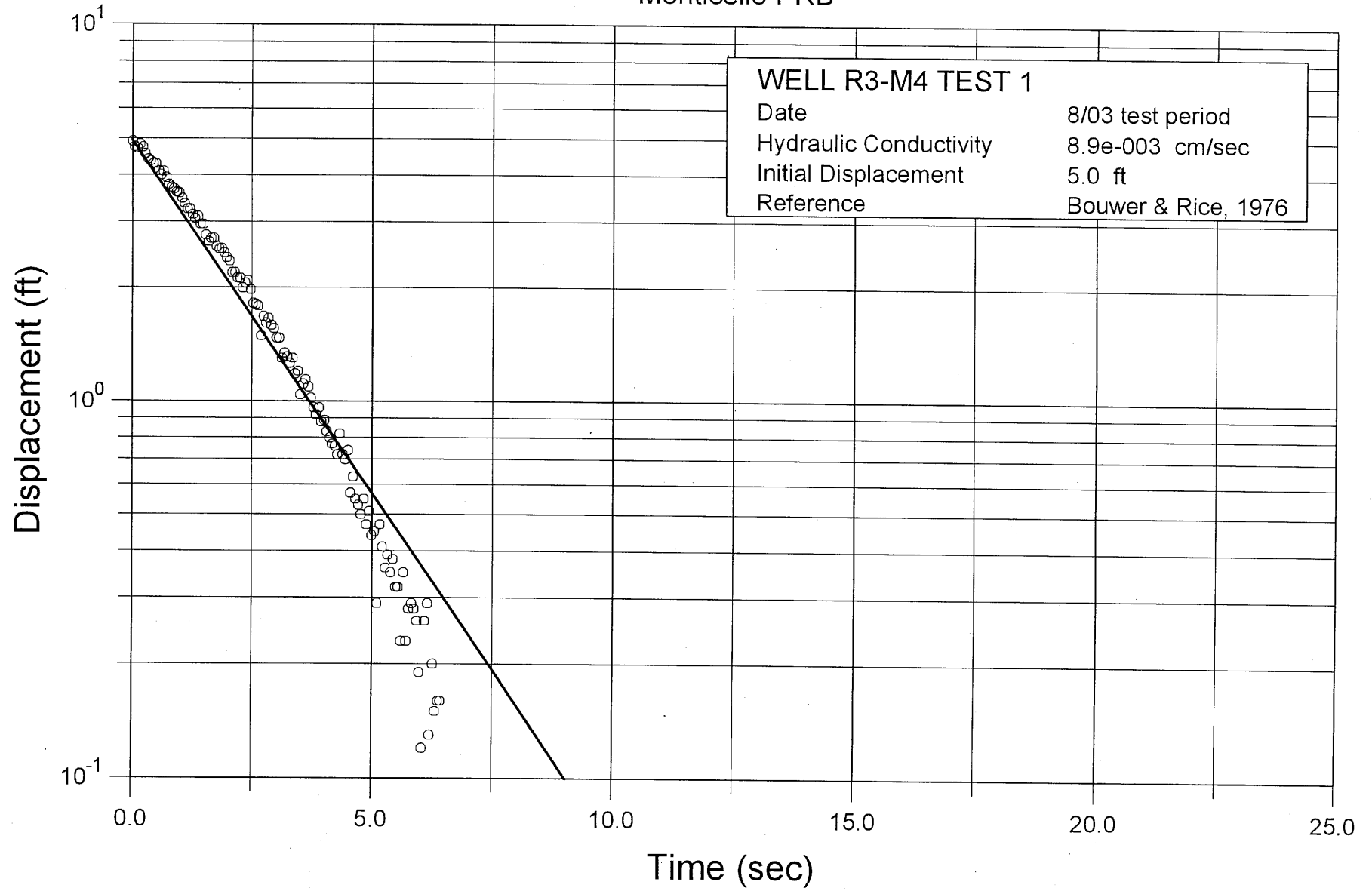
Monticello PRB



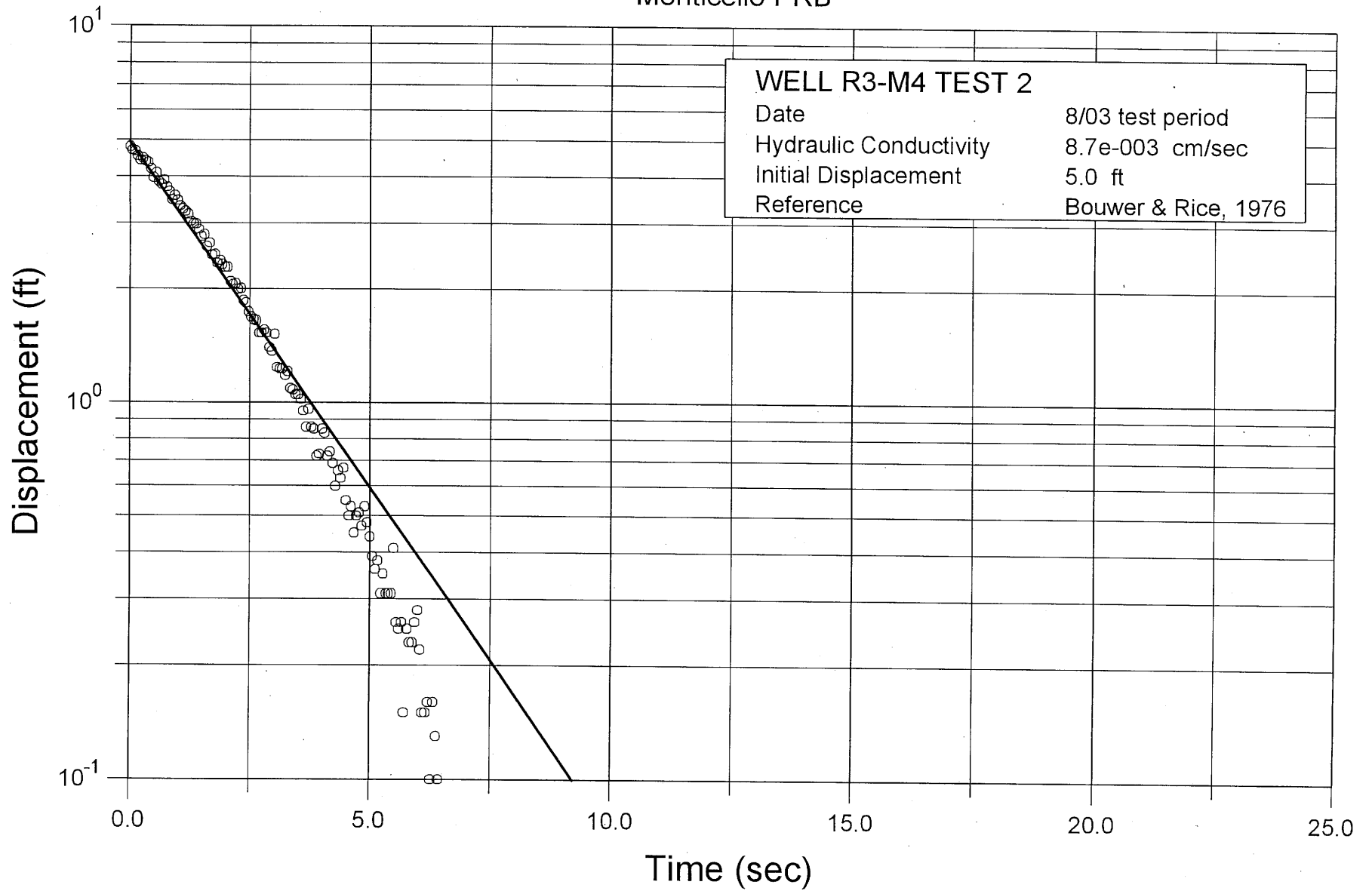
Monticello PRB



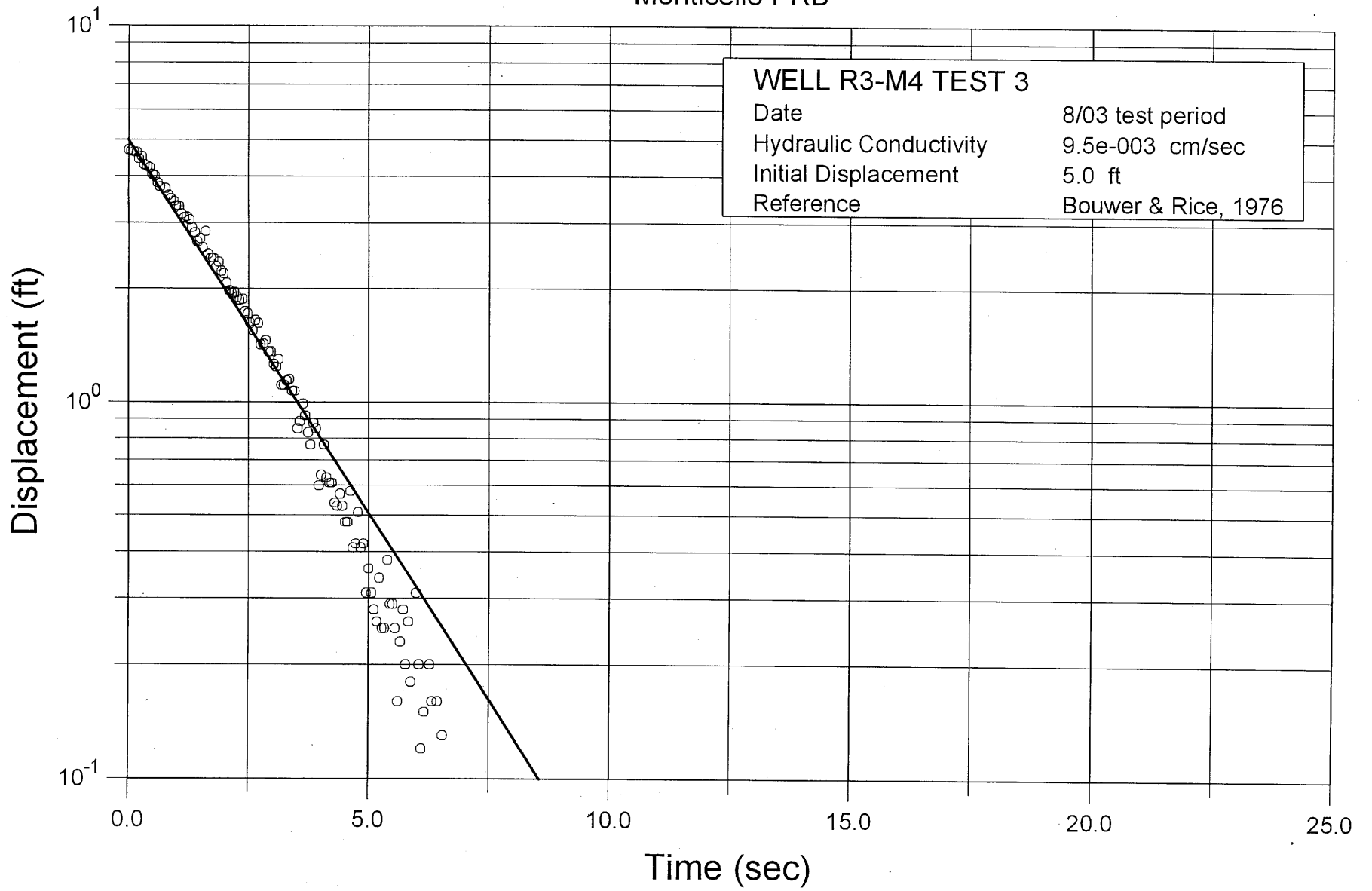
Monticello PRB



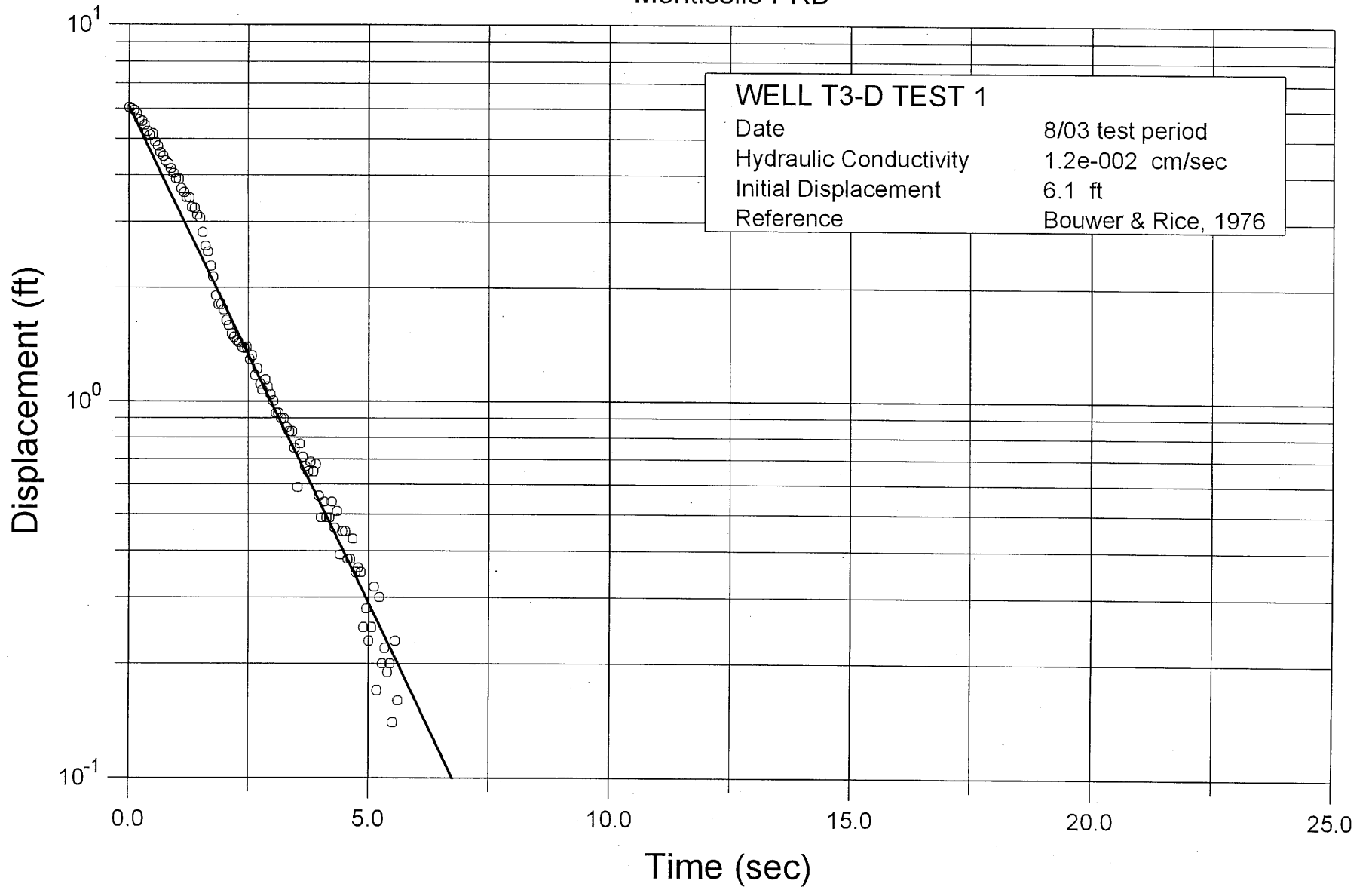
Monticello PRB



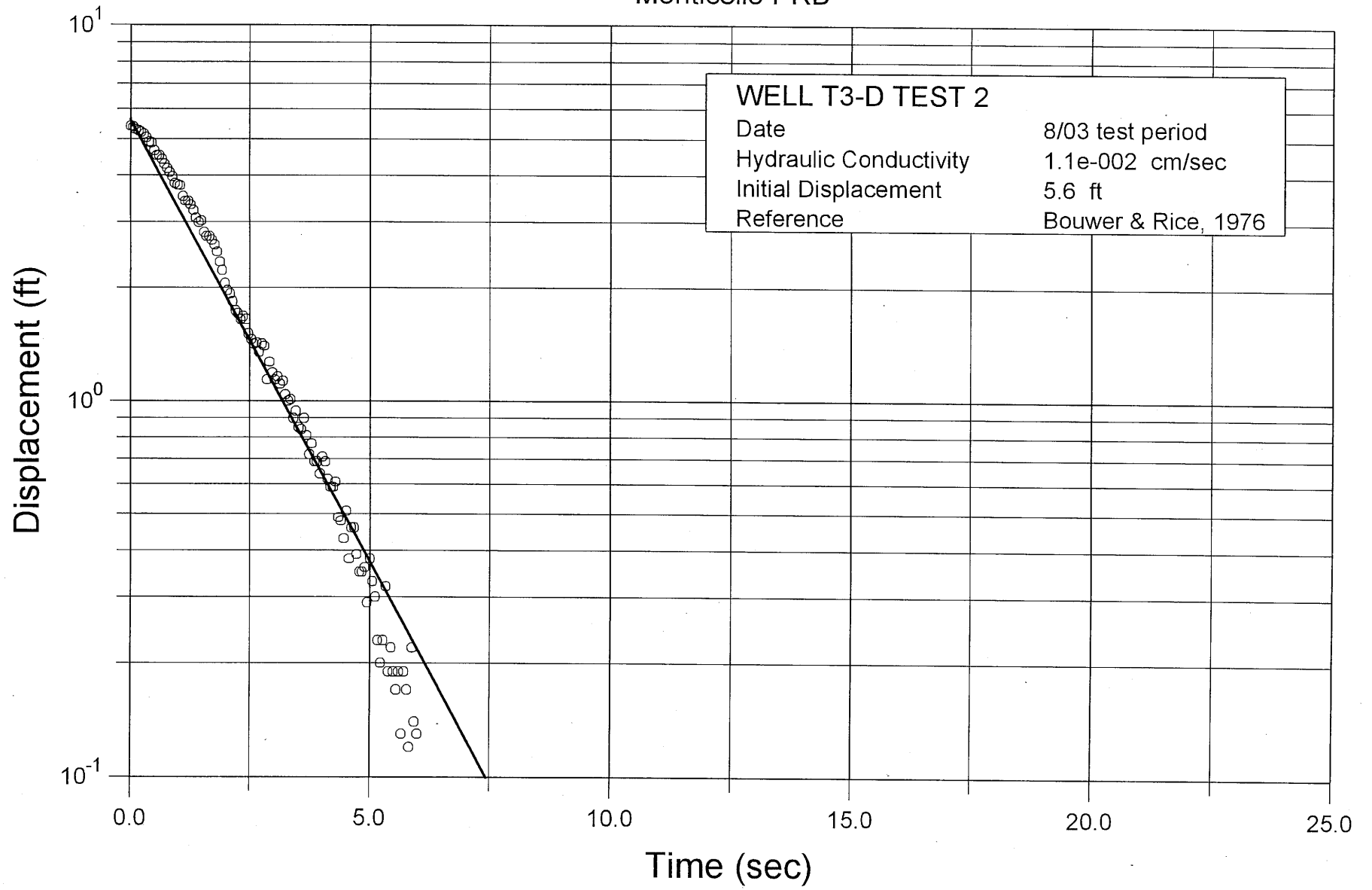
Monticello PRB



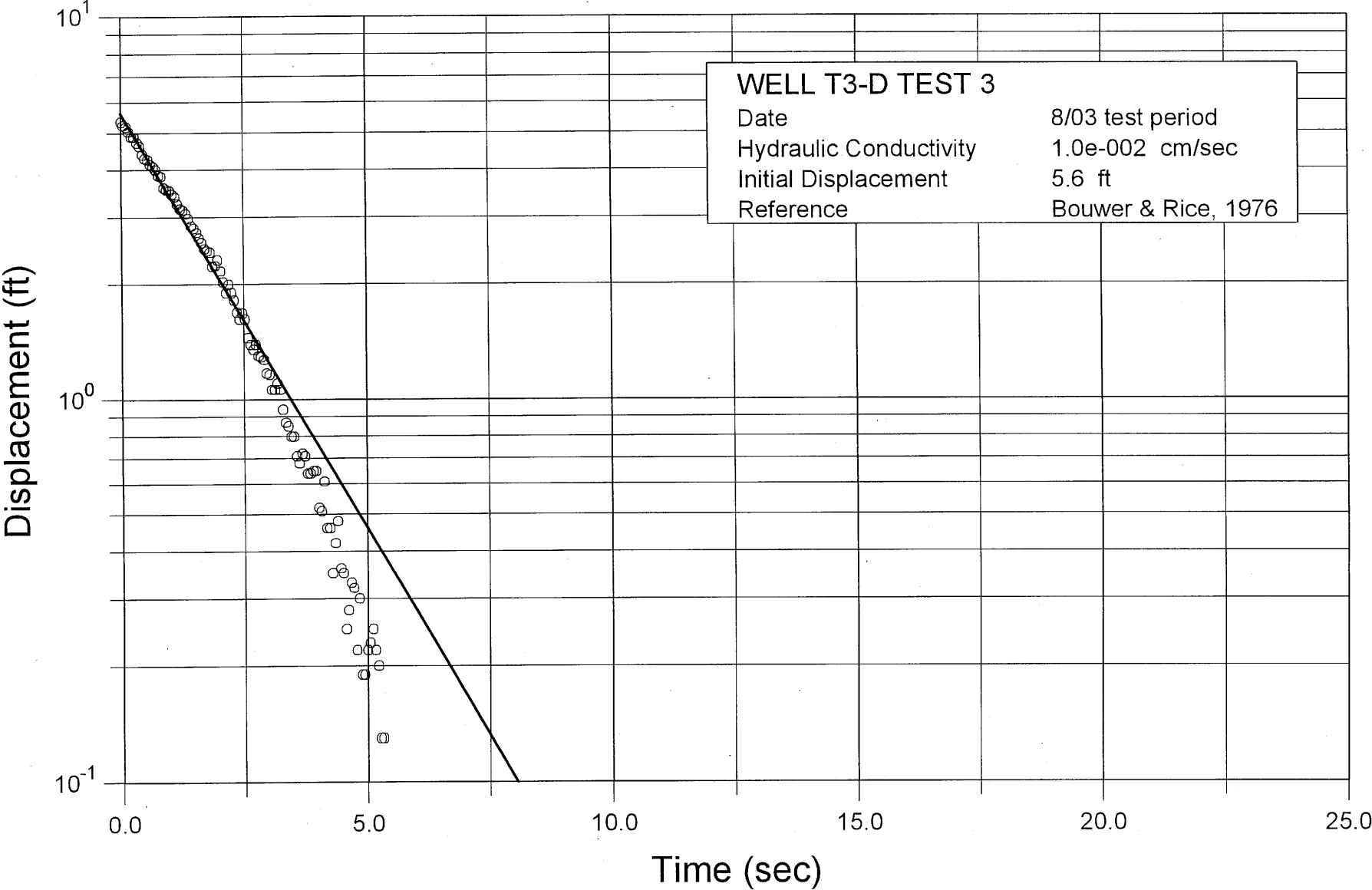
Monticello PRB



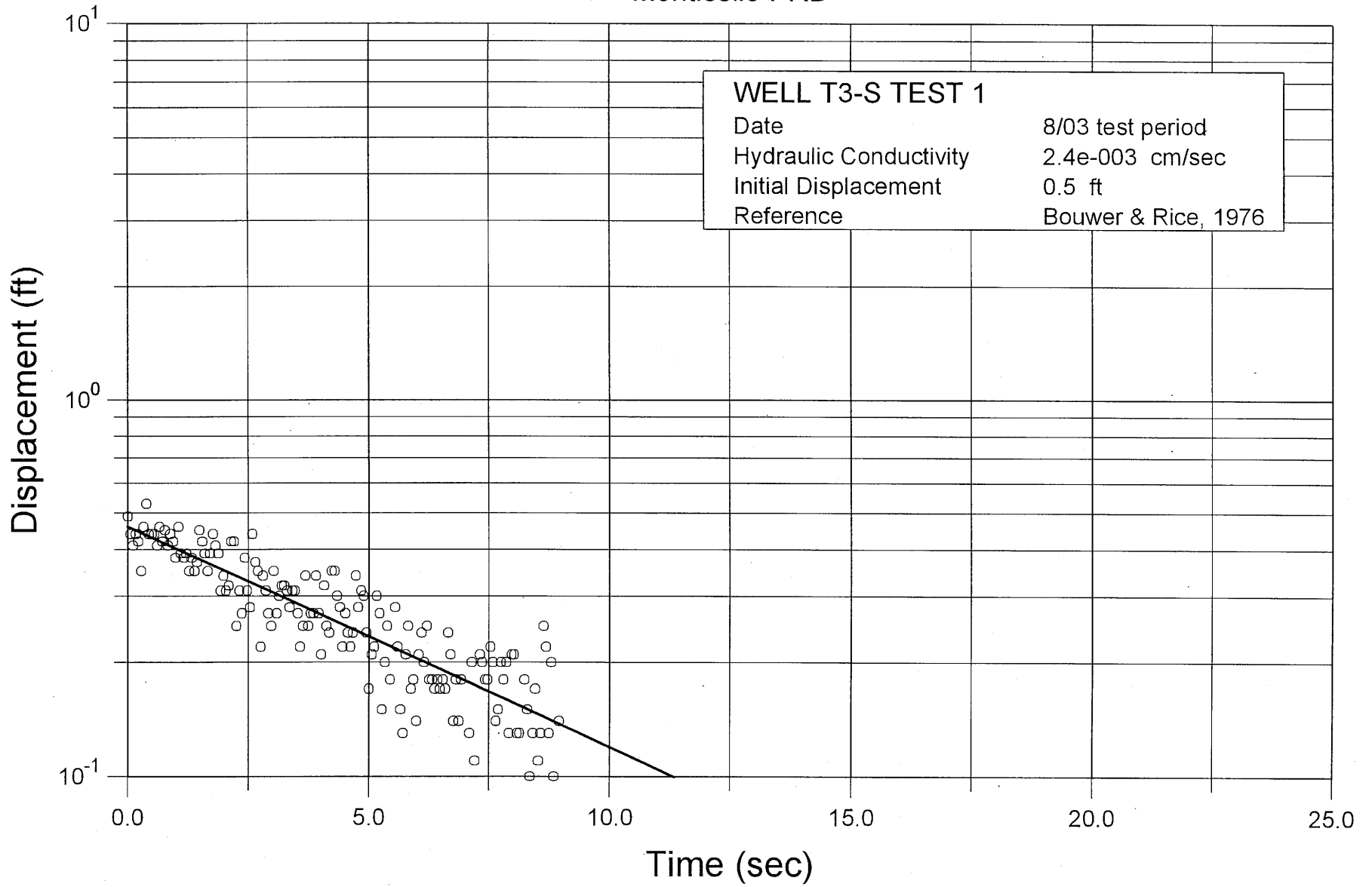
Monticello PRB



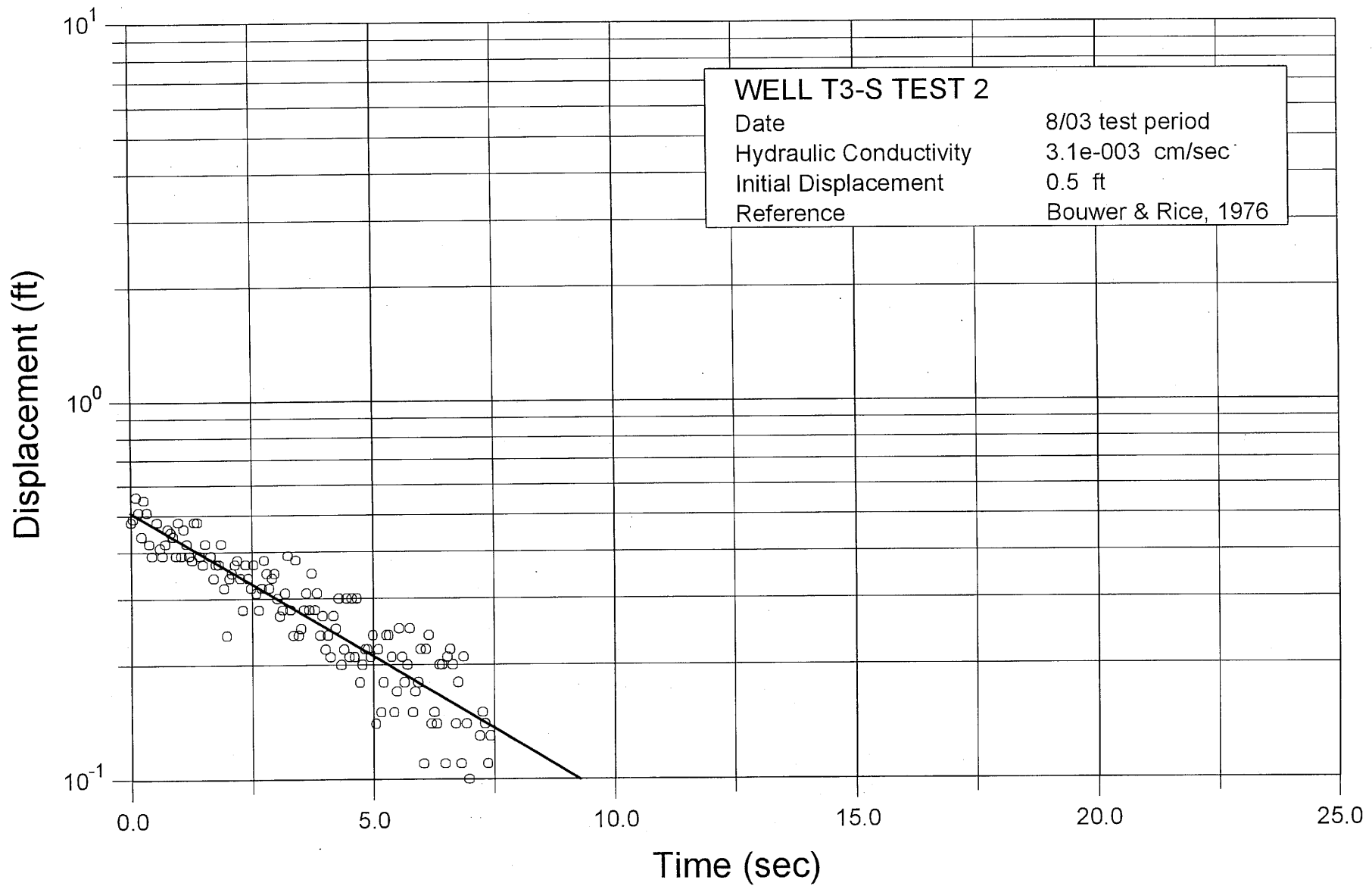
Monticello PRB



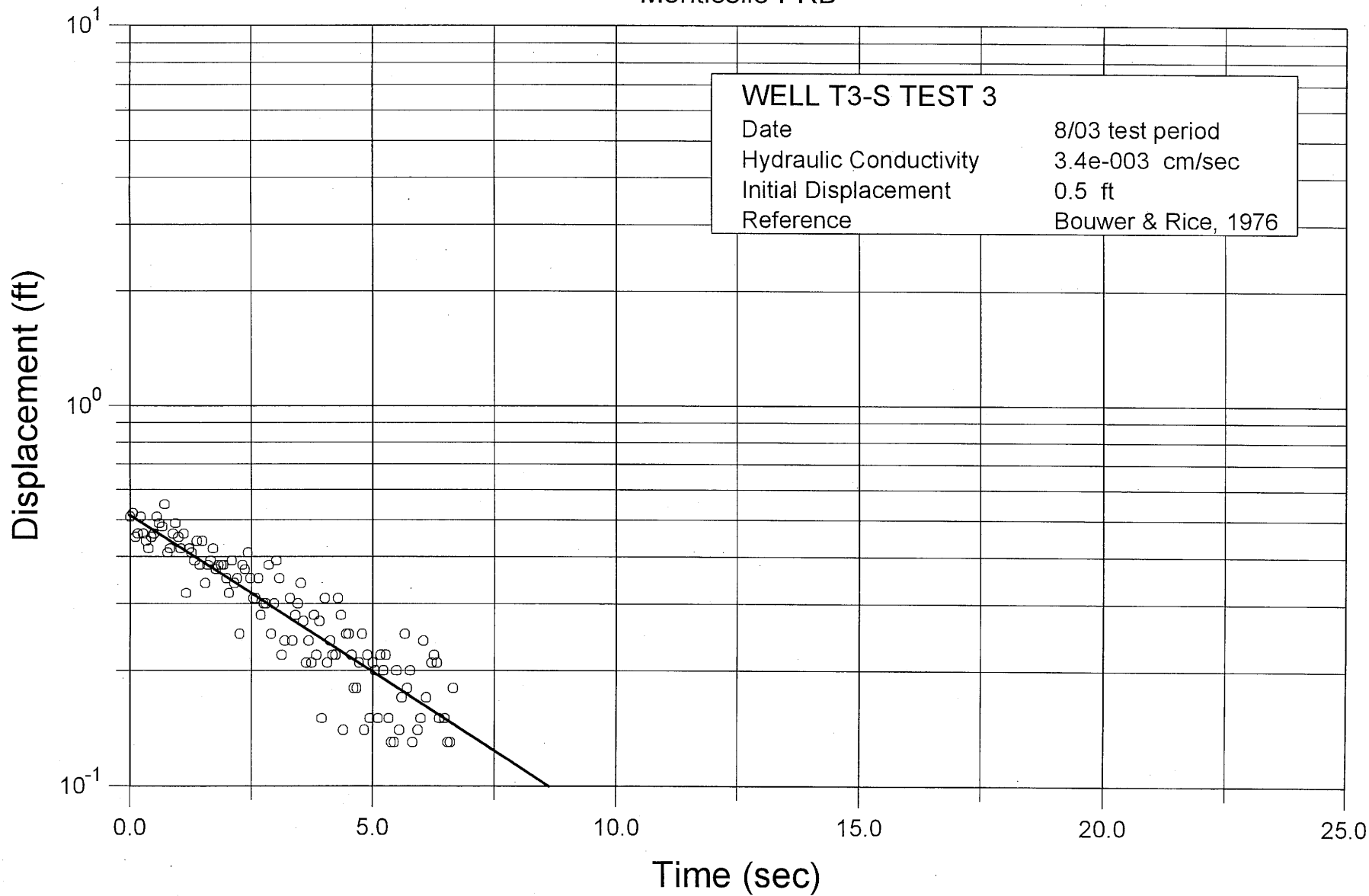
Monticello PRB



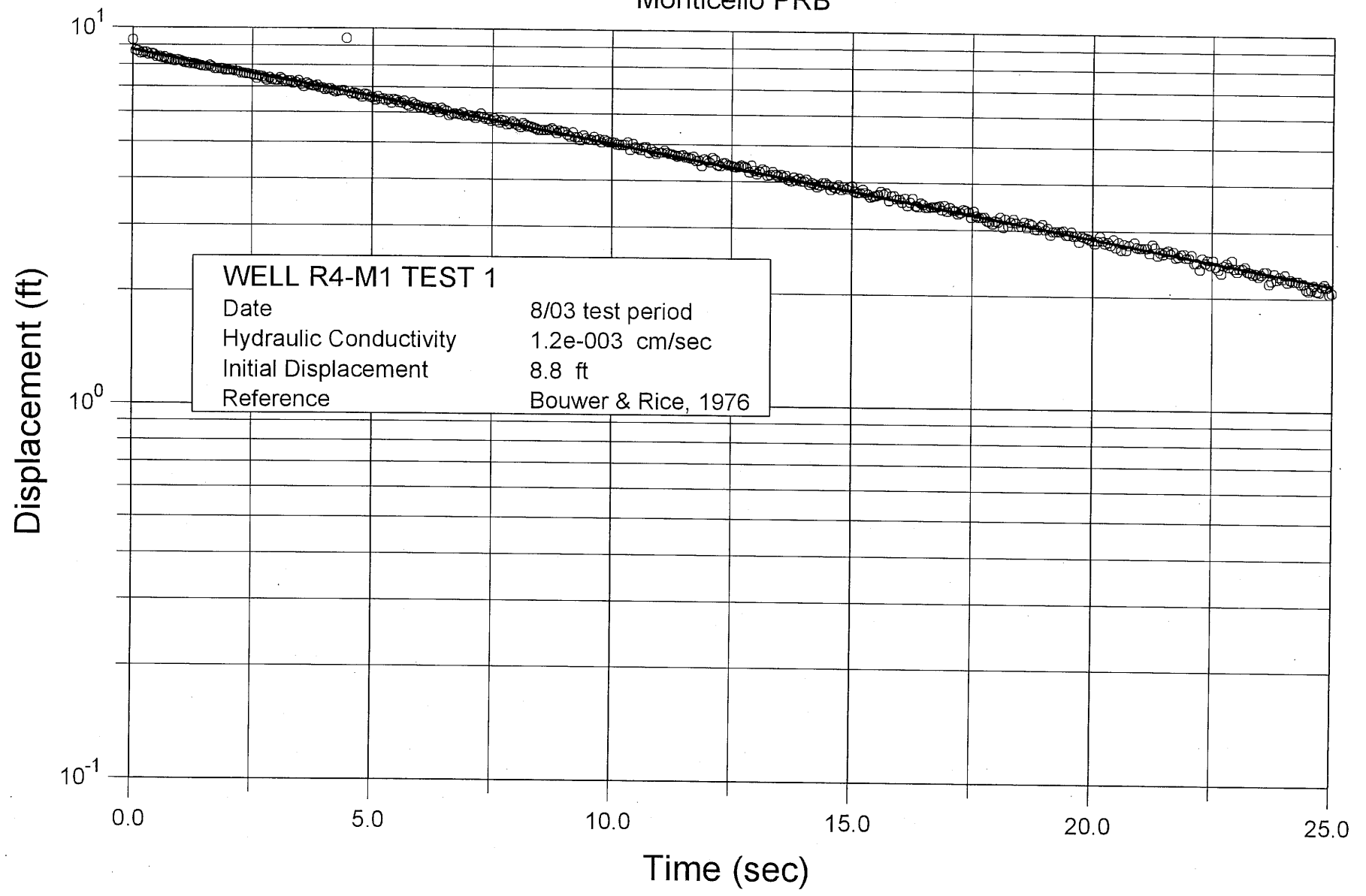
Monticello PRB



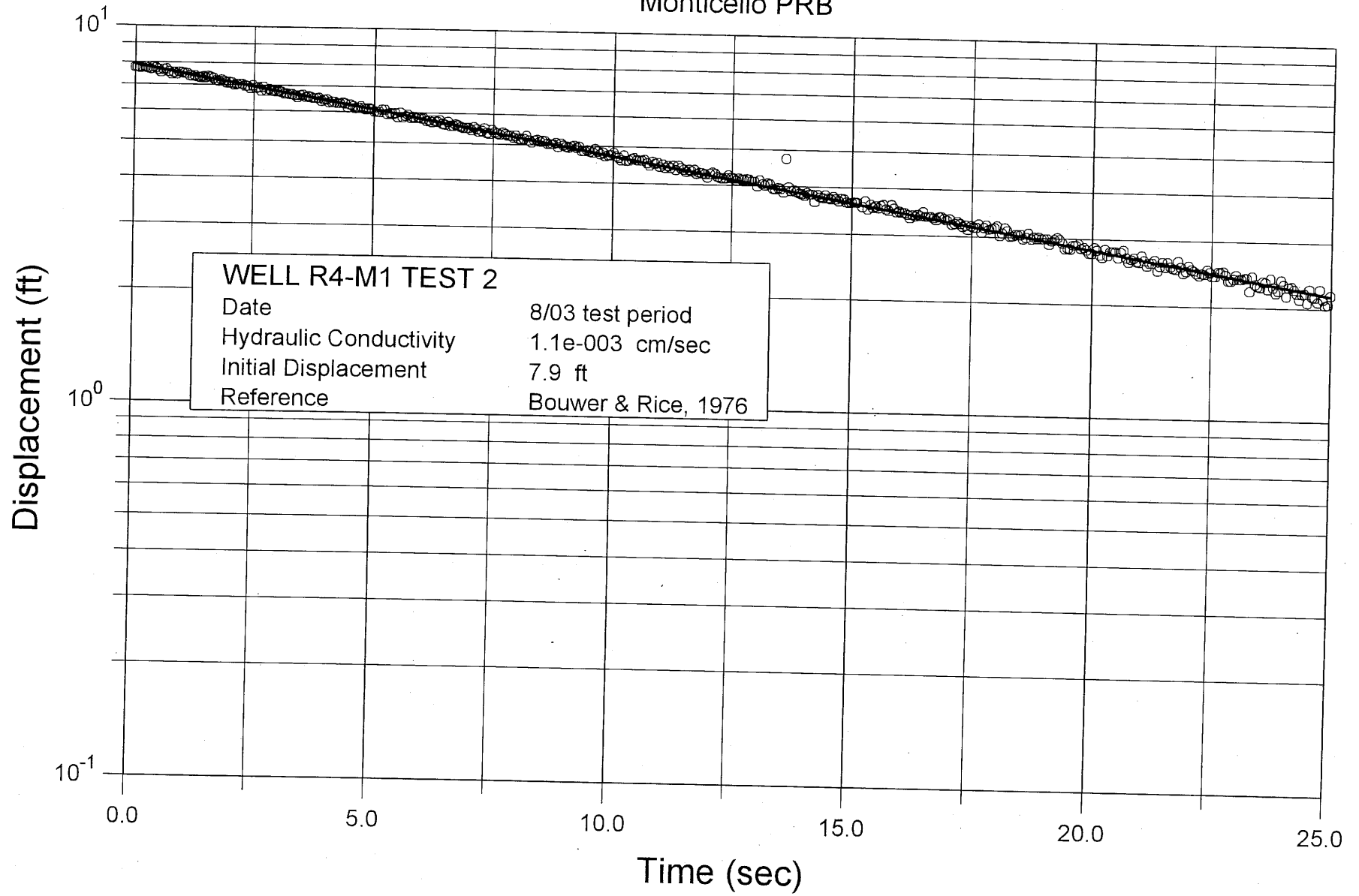
Monticello PRB



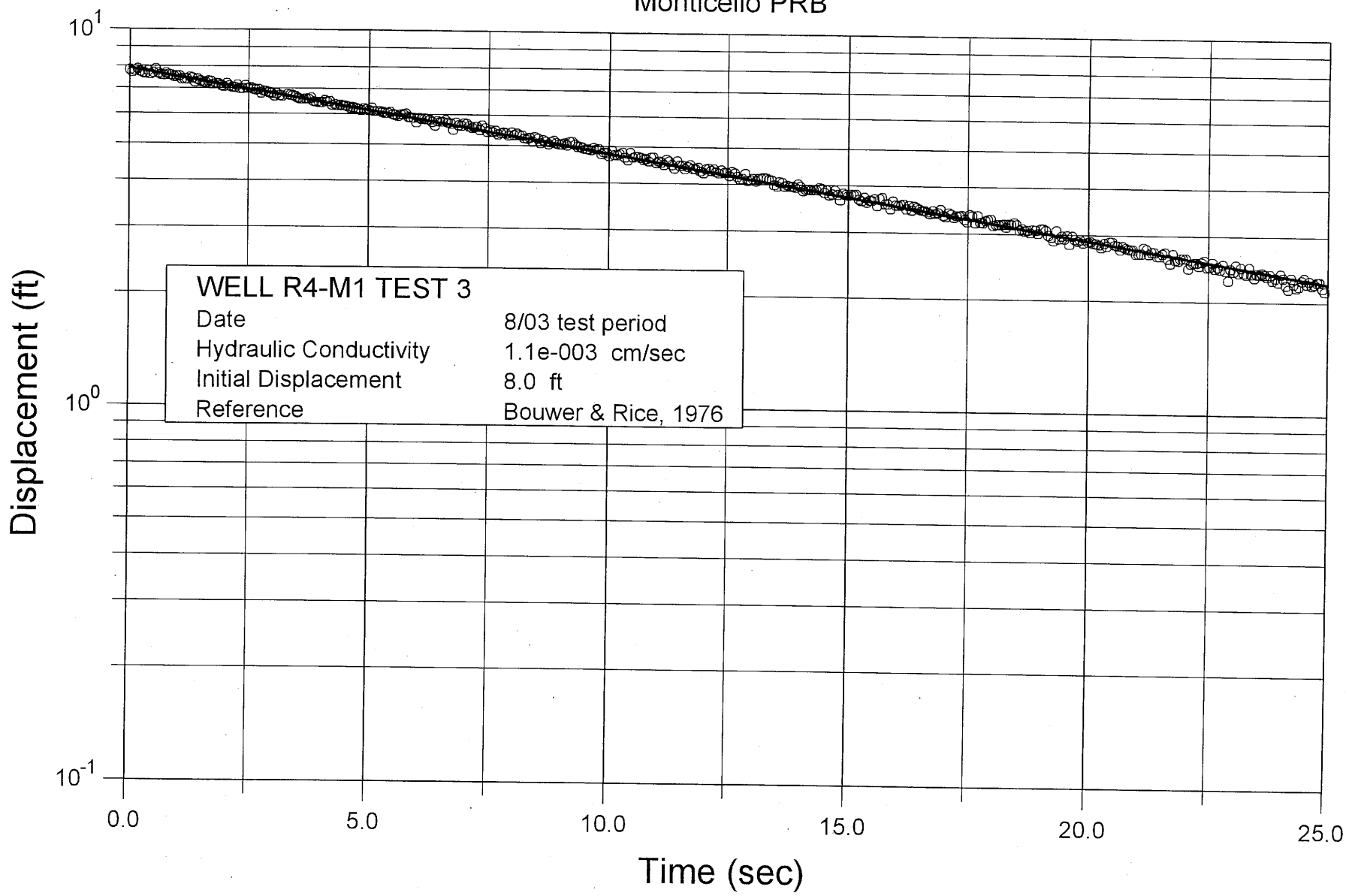
Monticello PRB



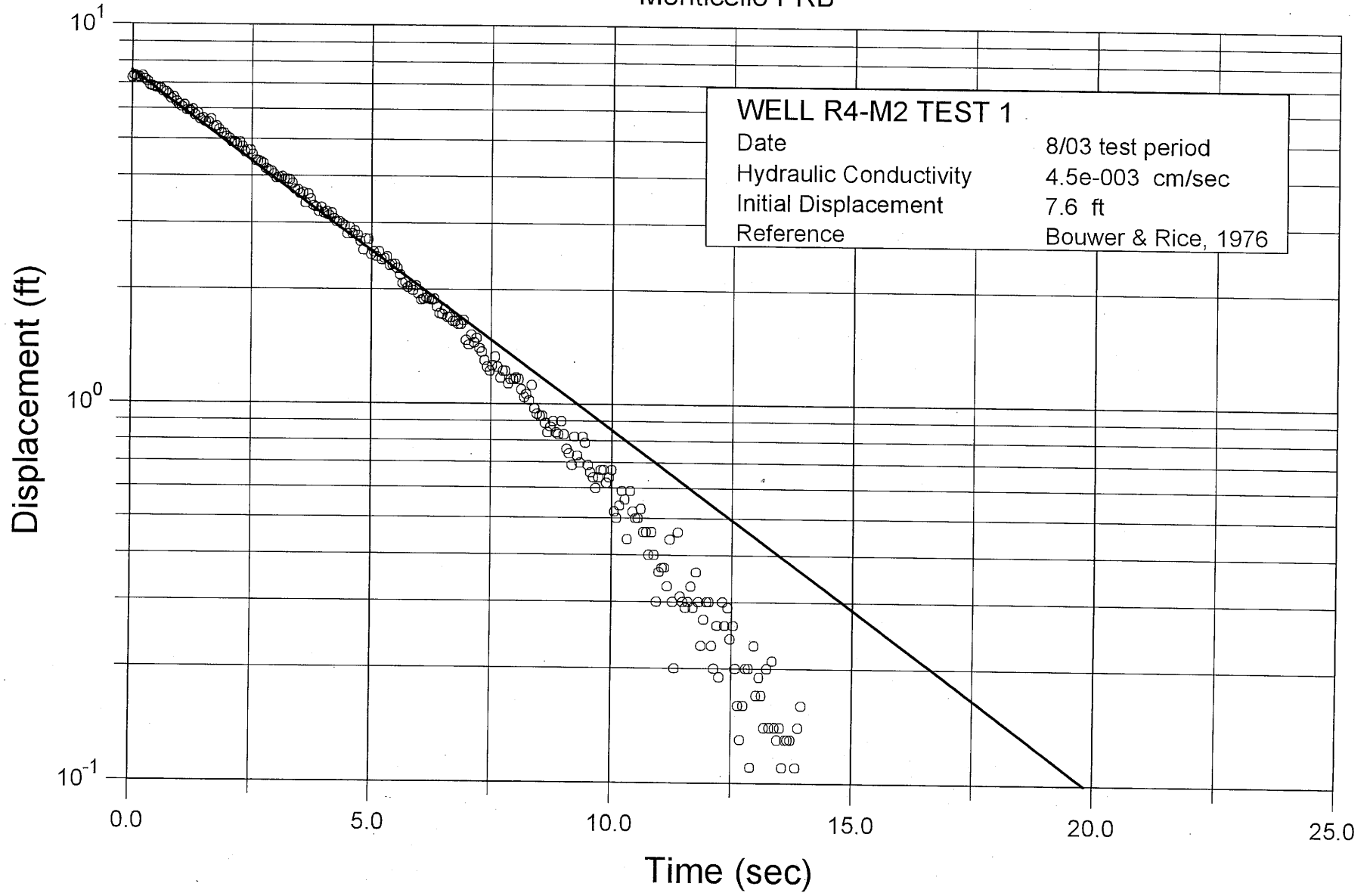
Monticello PRB



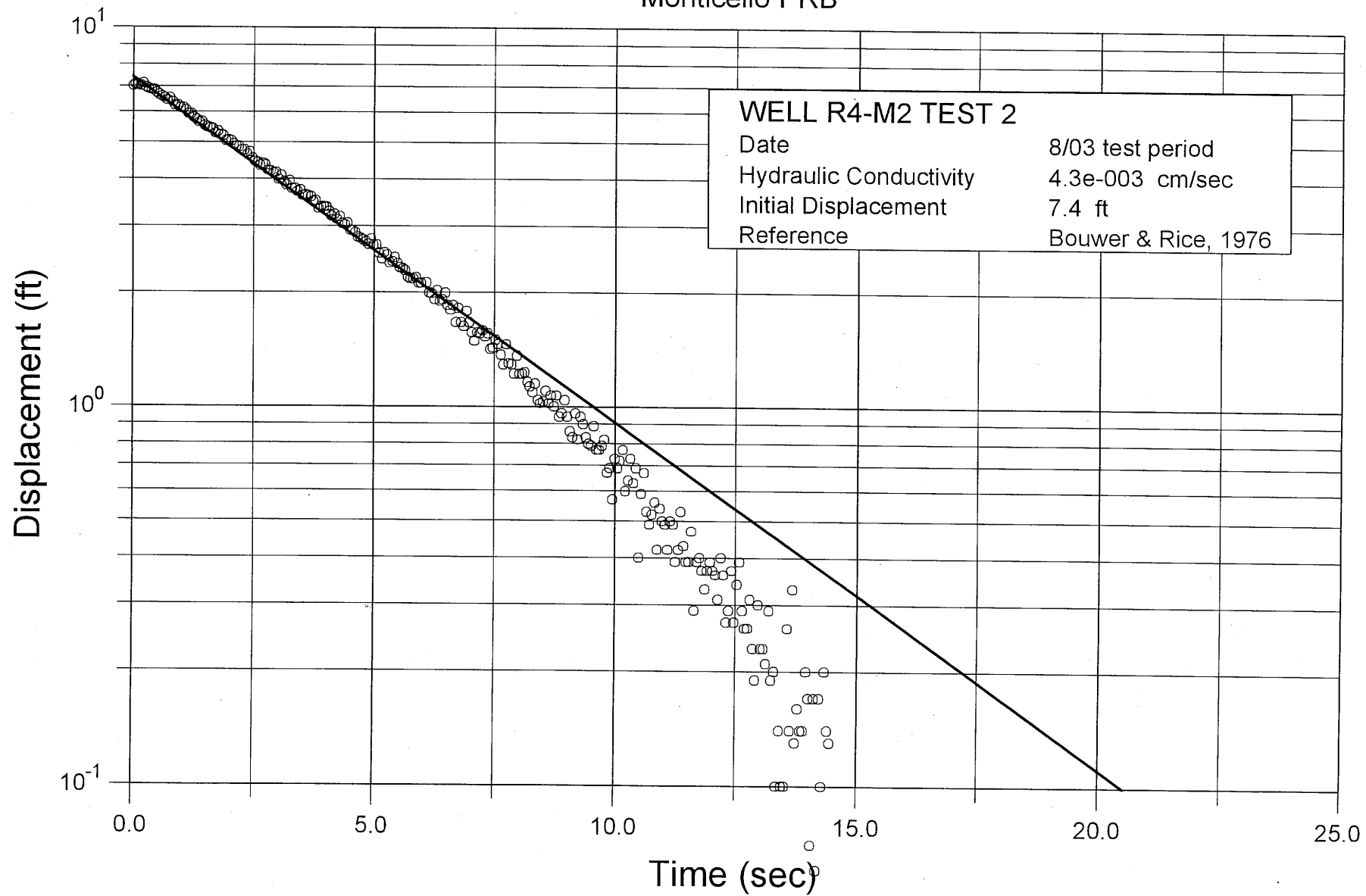
Monticello PRB



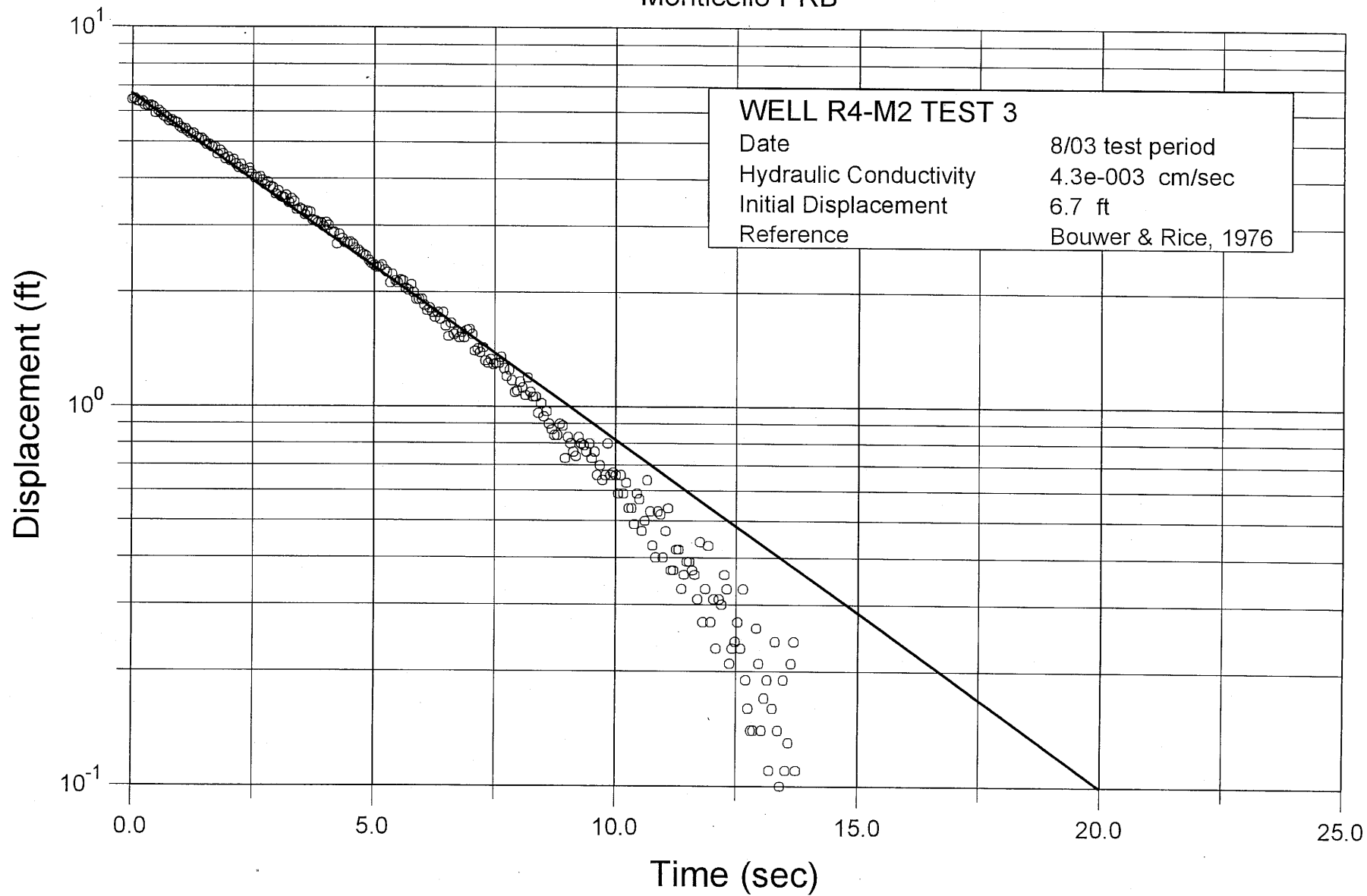
Monticello PRB



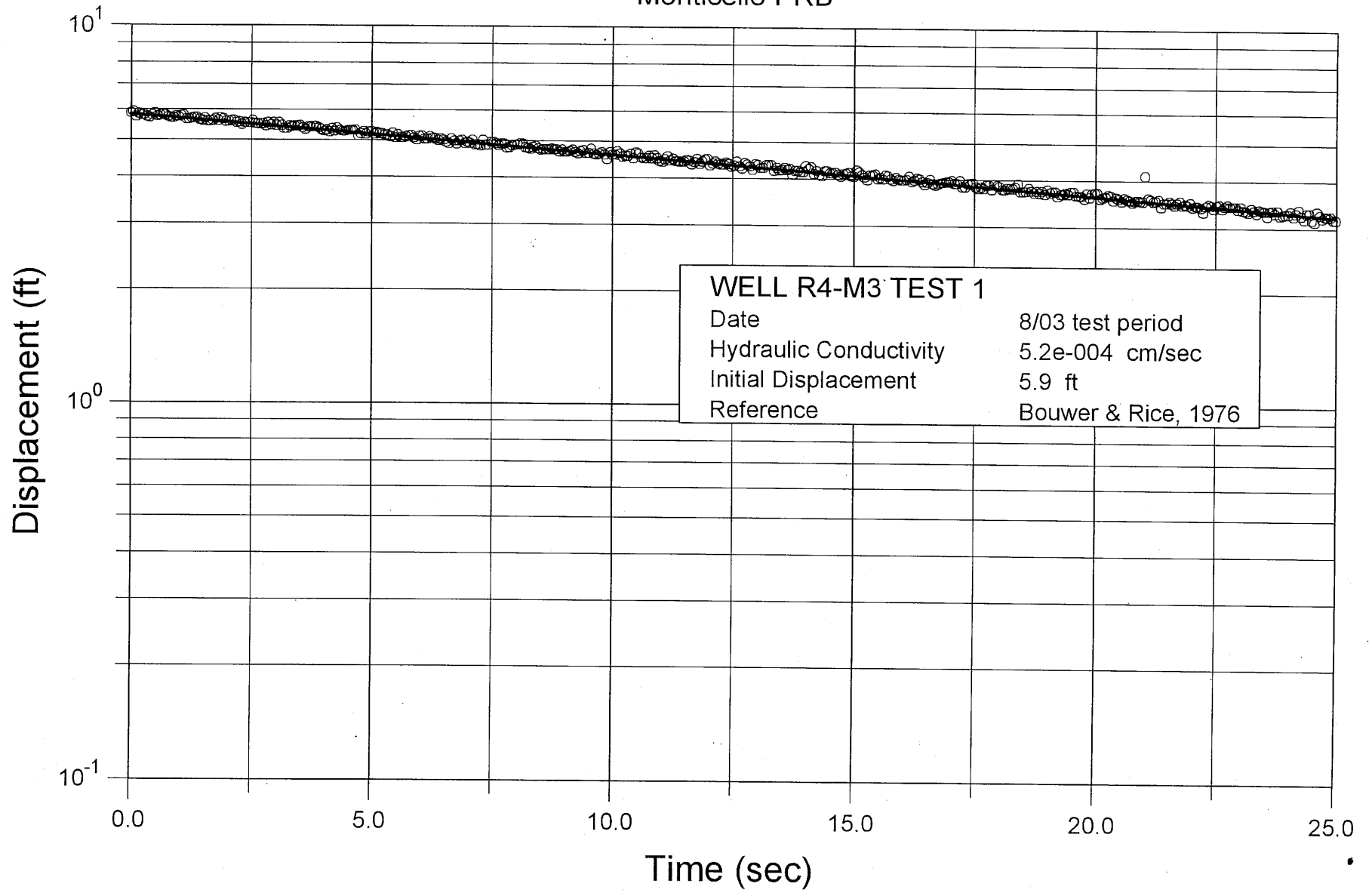
Monticello PRB



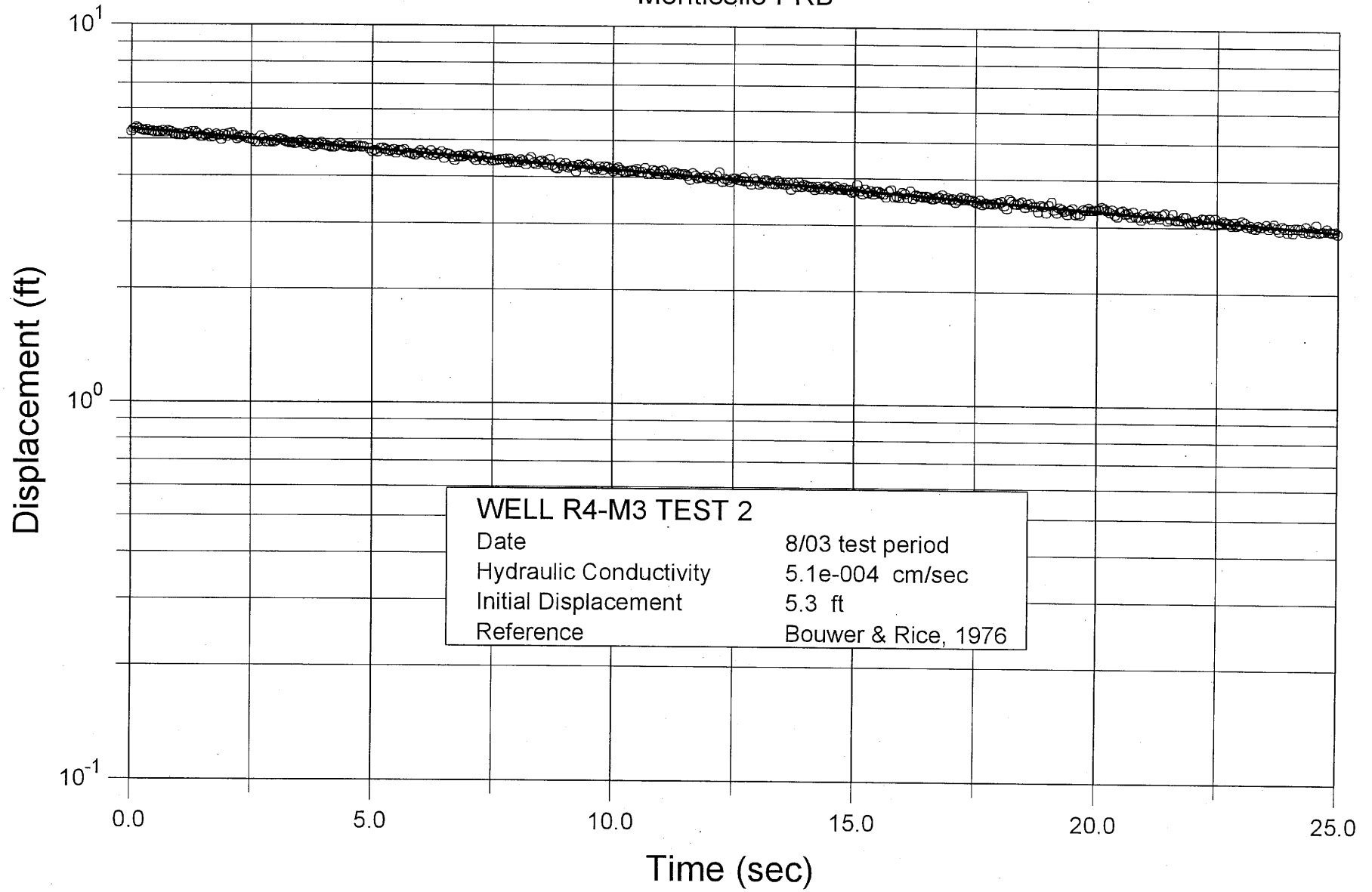
Monticello PRB



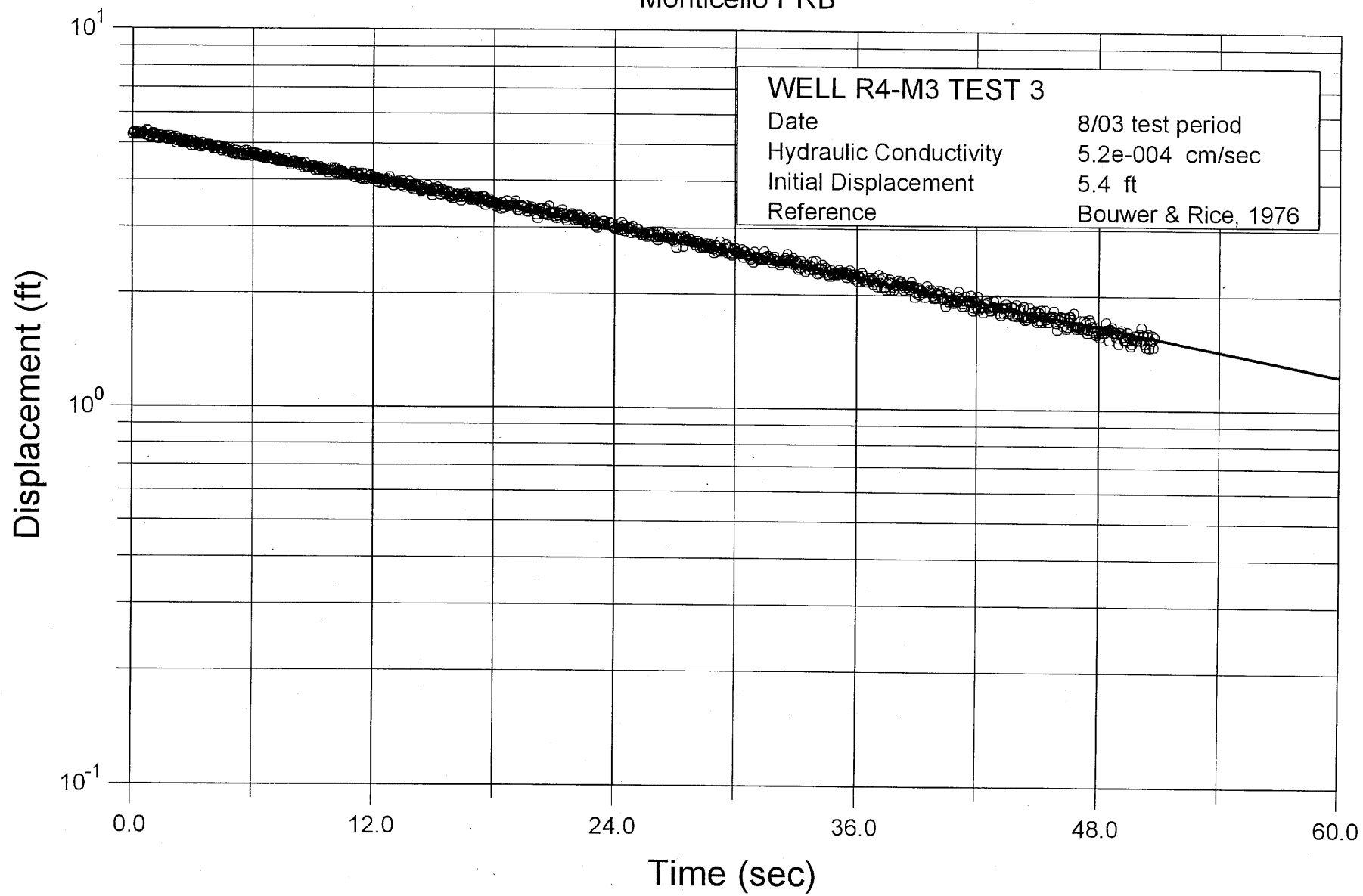
Monticello PRB



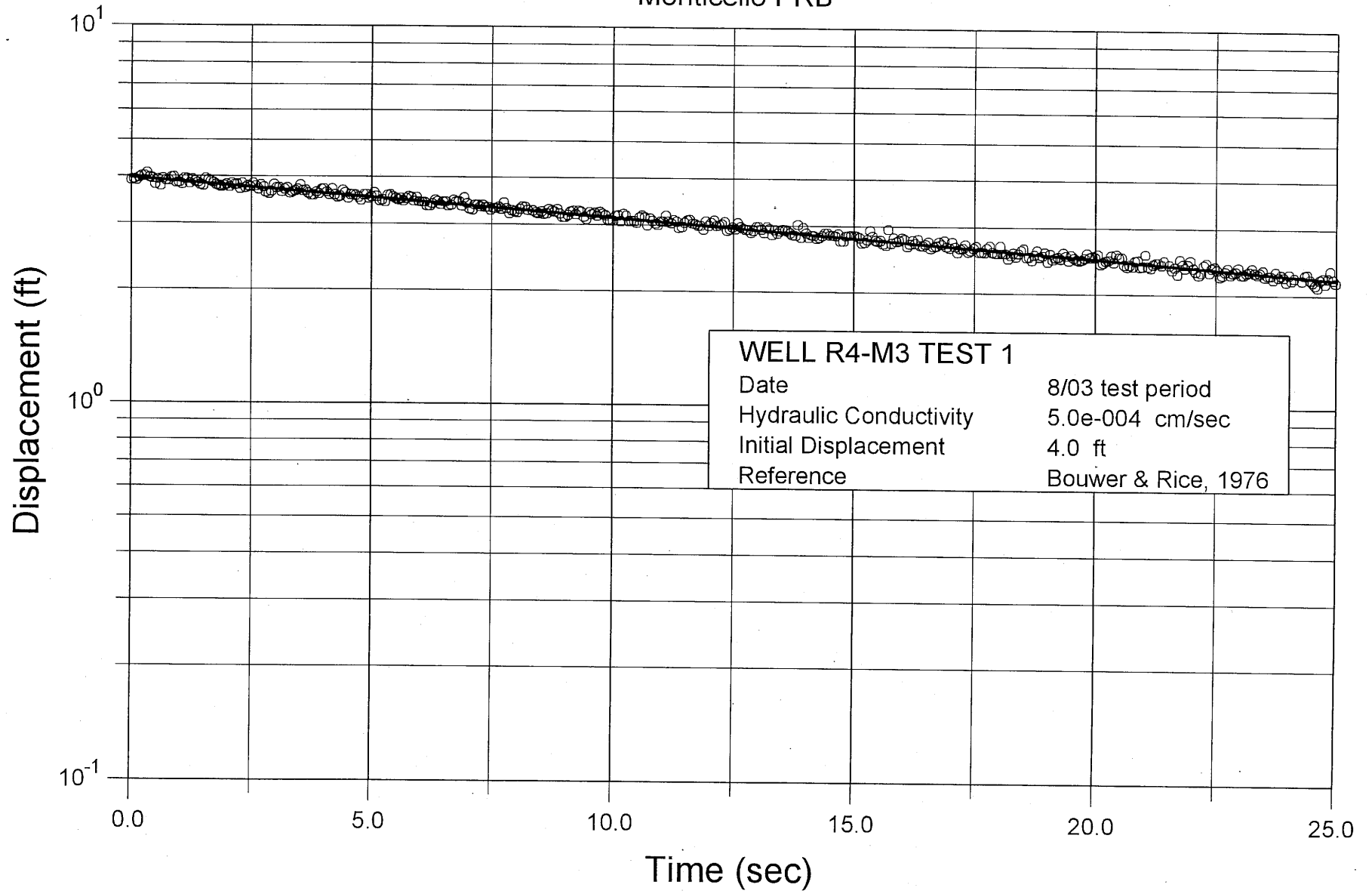
Monticello PRB



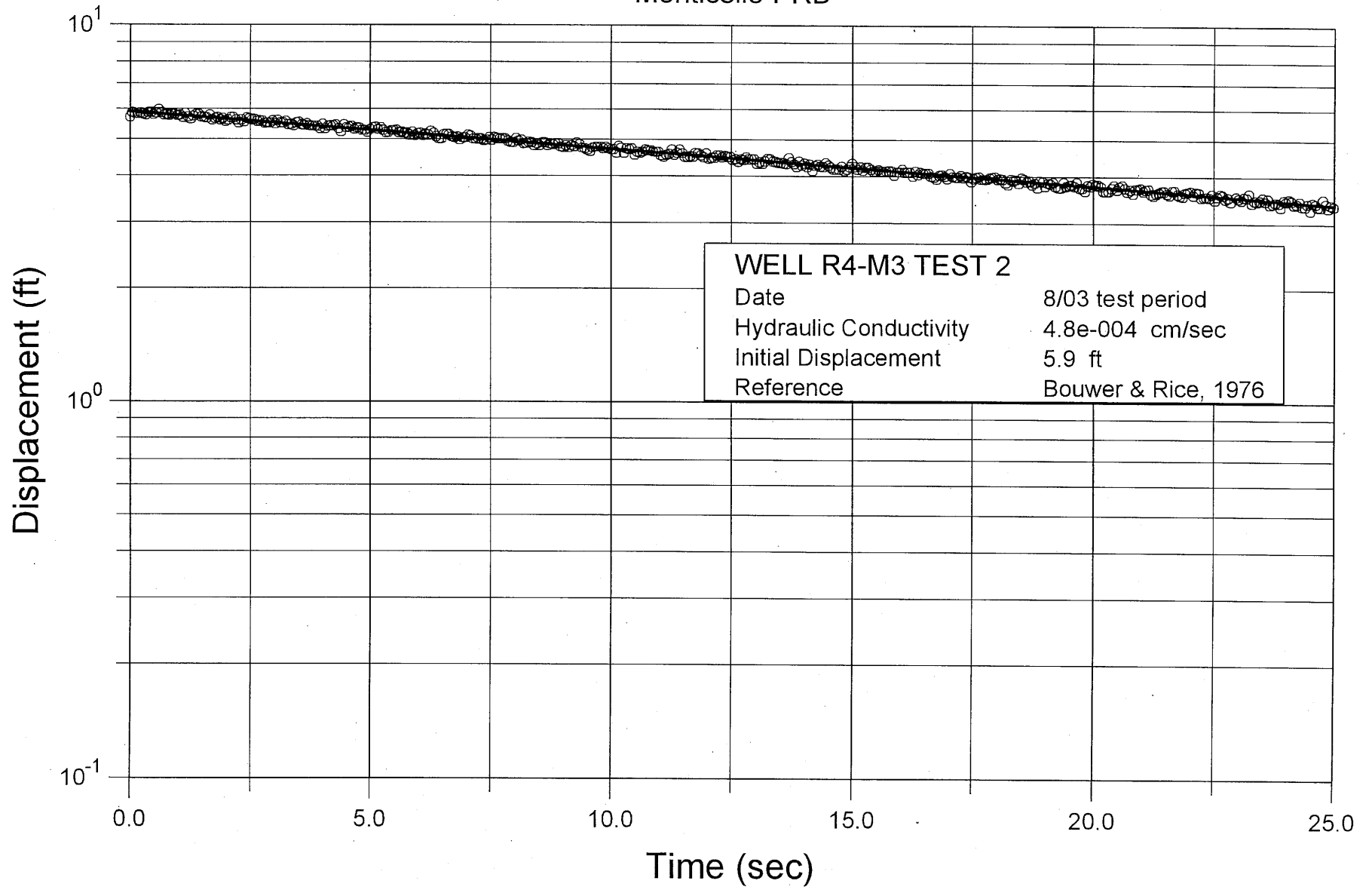
Monticello PRB



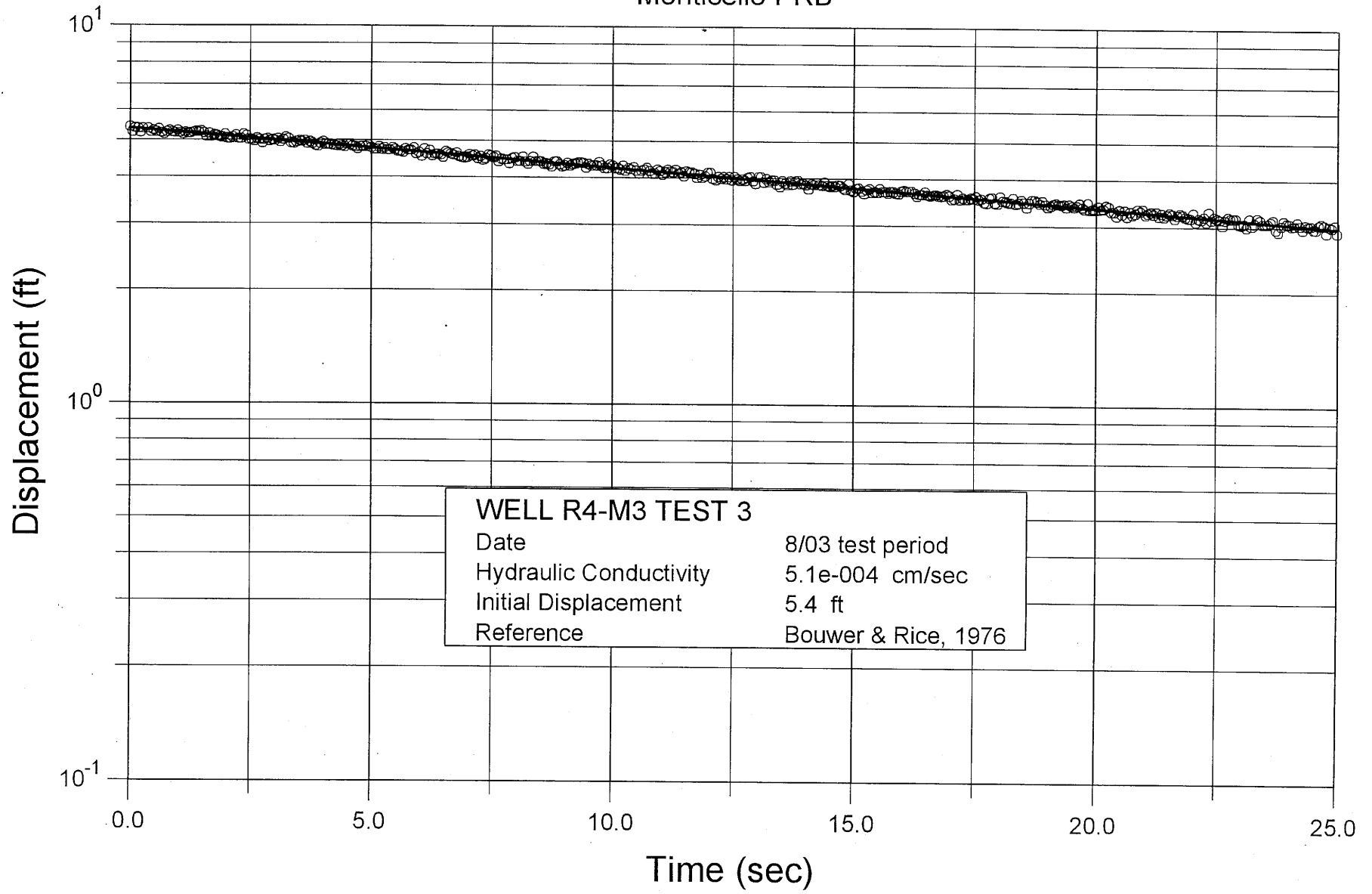
Monticello PRB



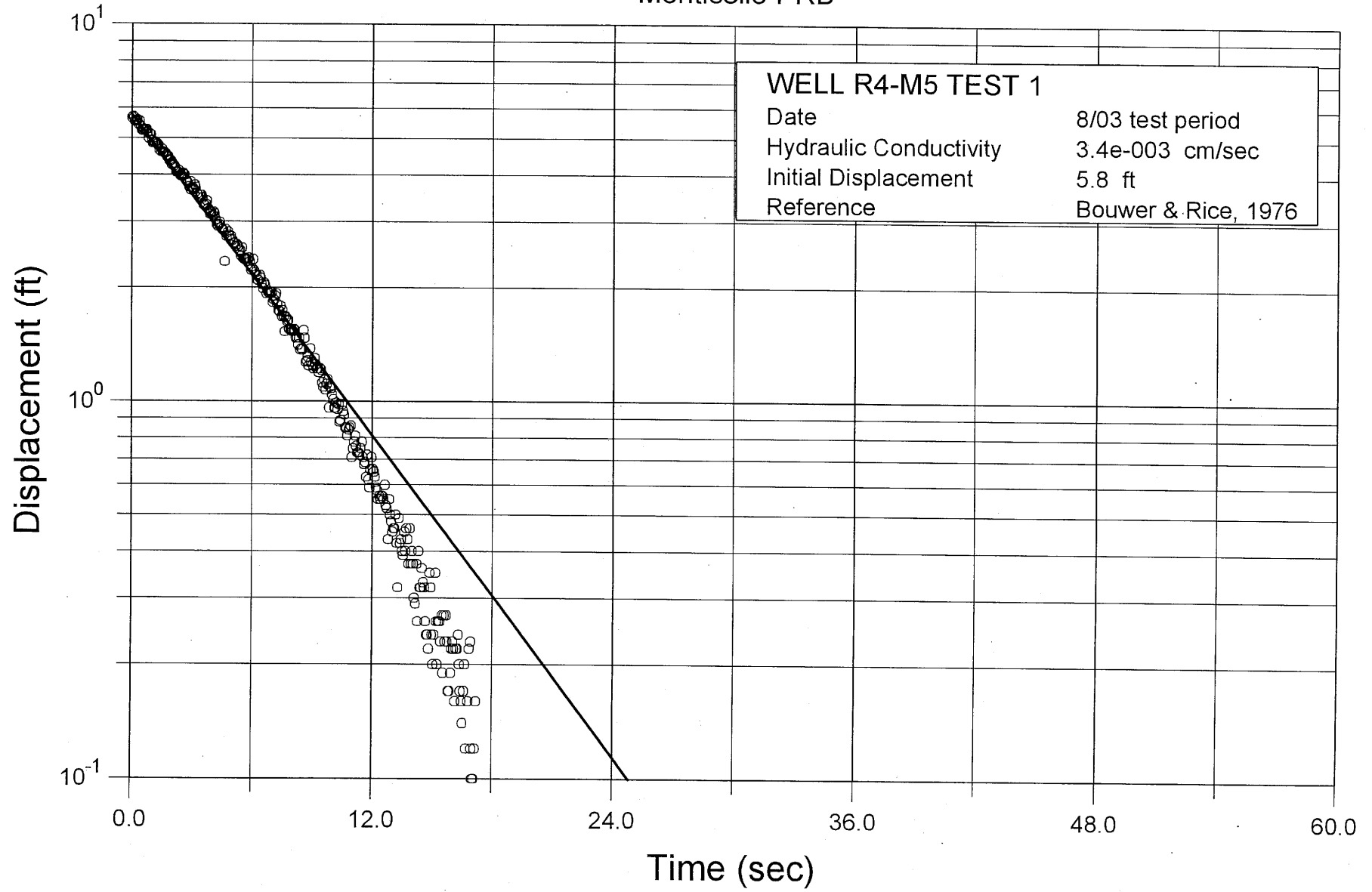
Monticello PRB



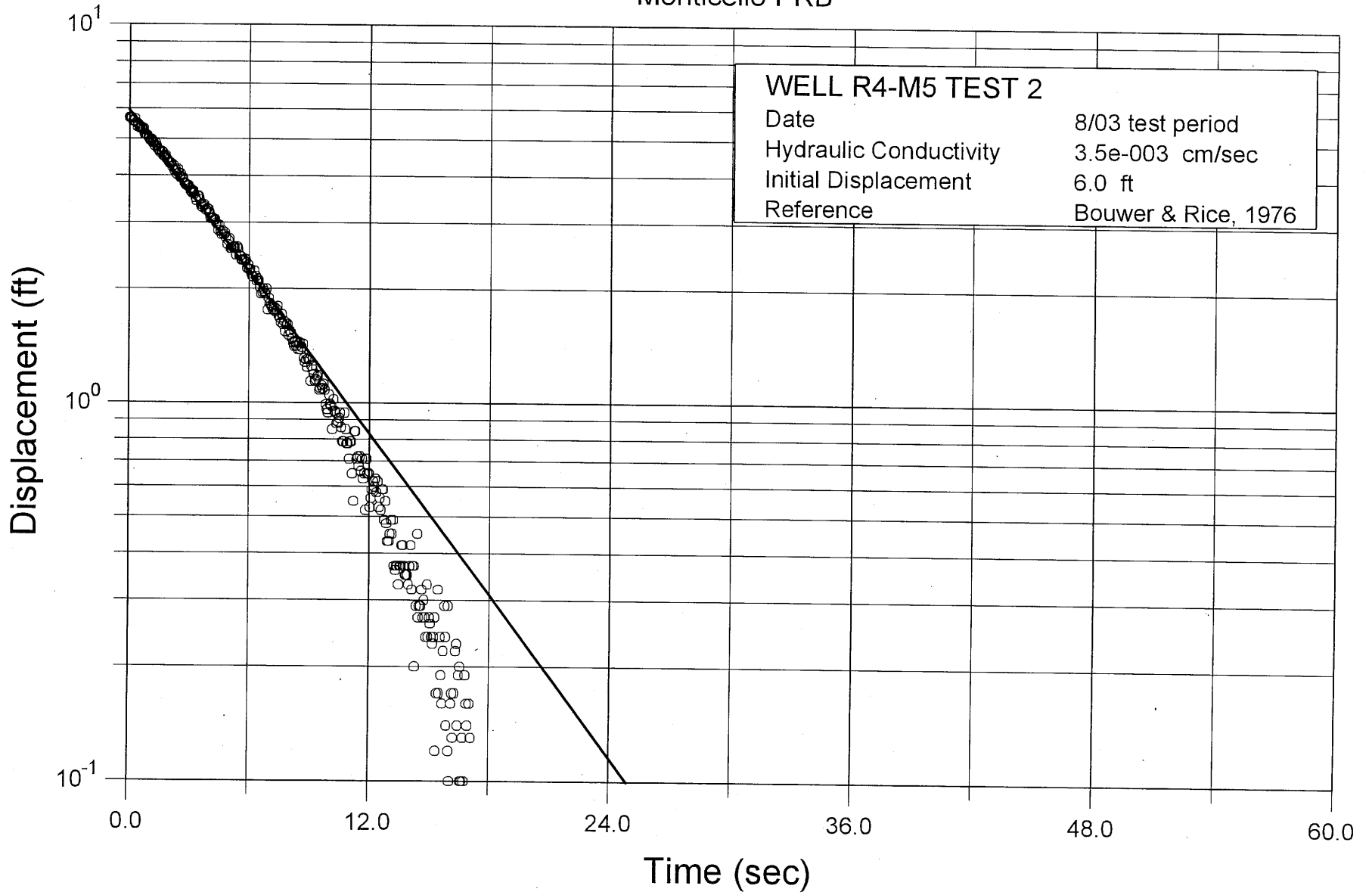
Monticello PRB



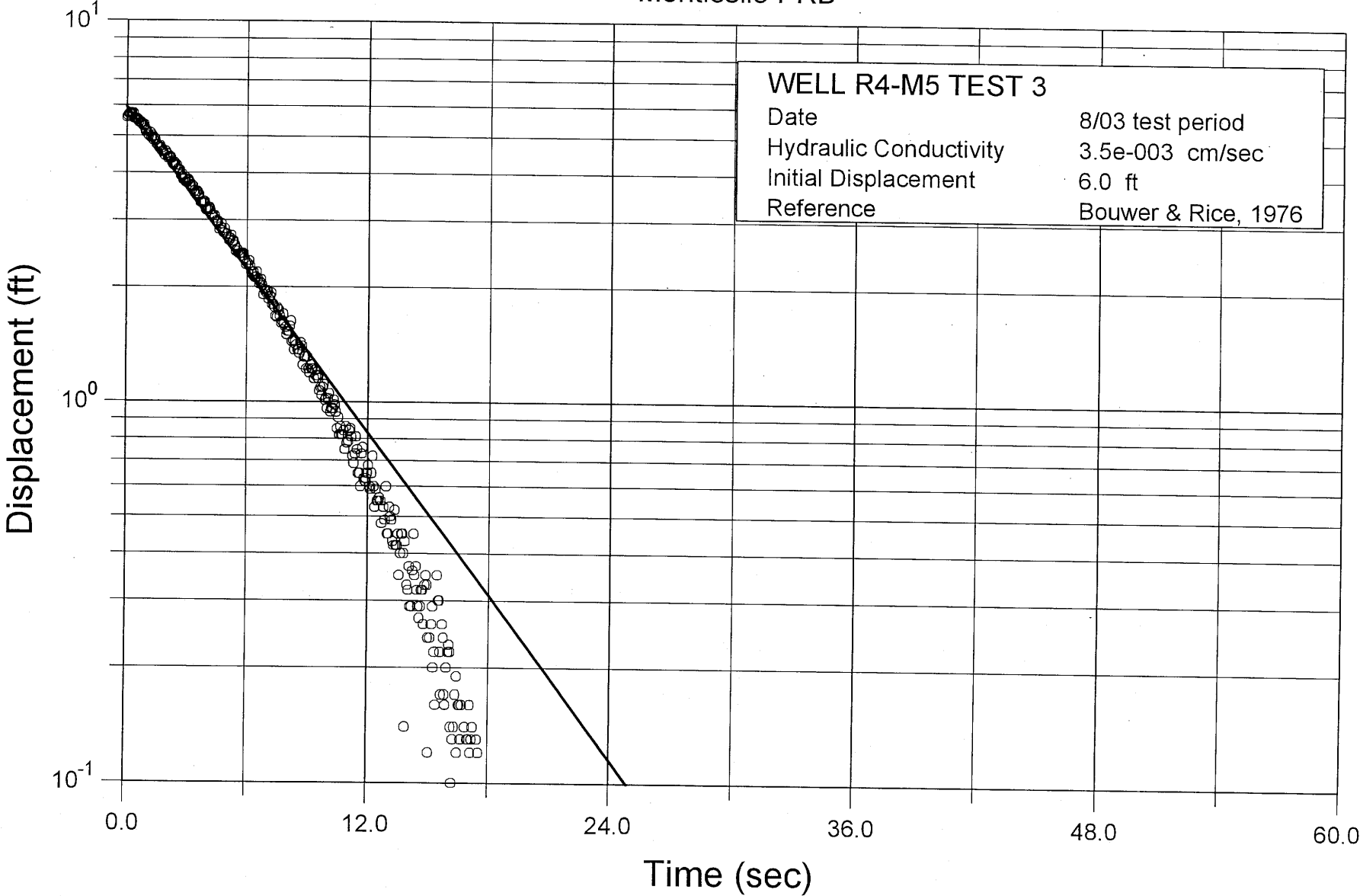
Monticello PRB



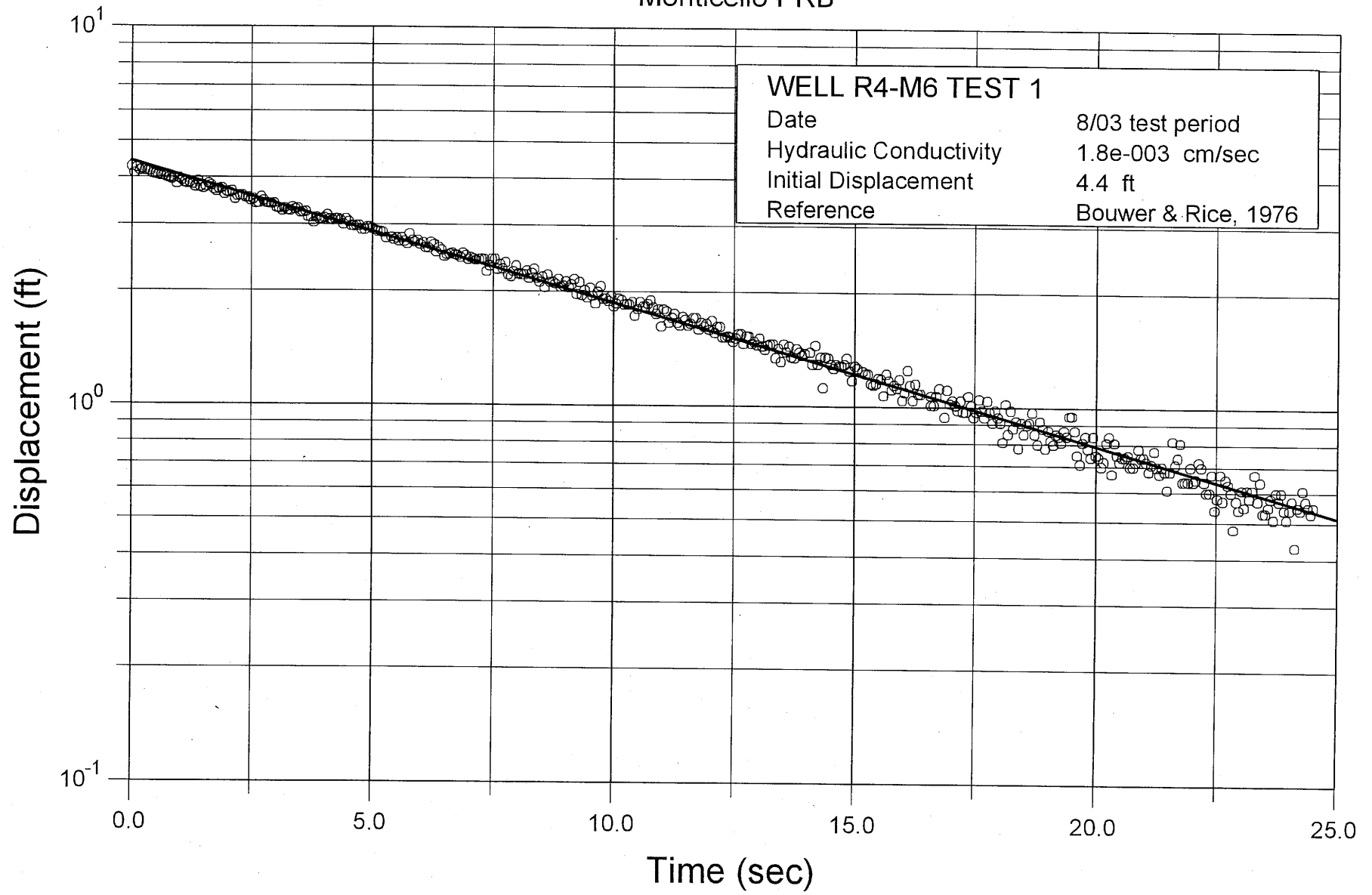
Monticello PRB



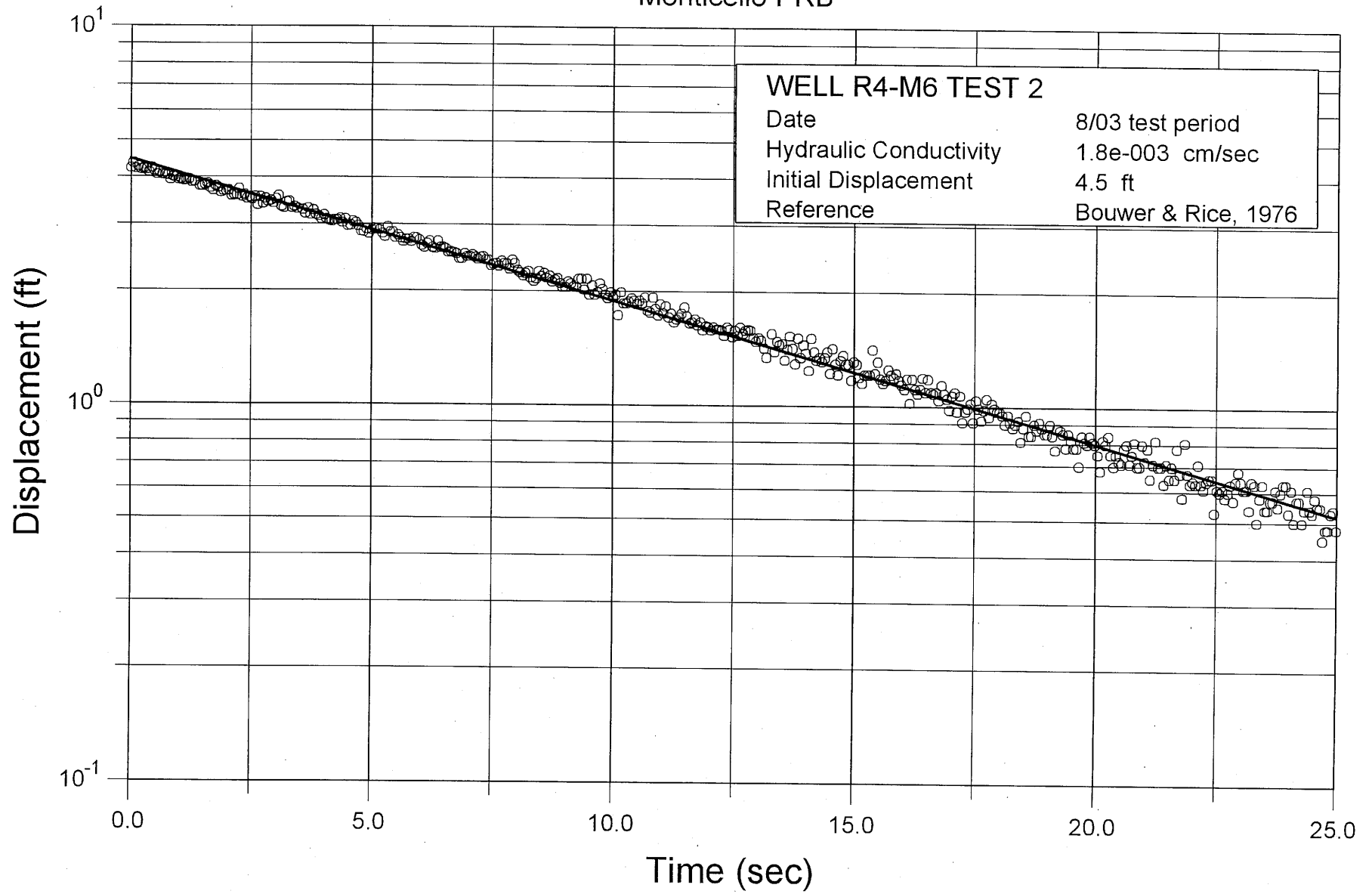
Monticello PRB



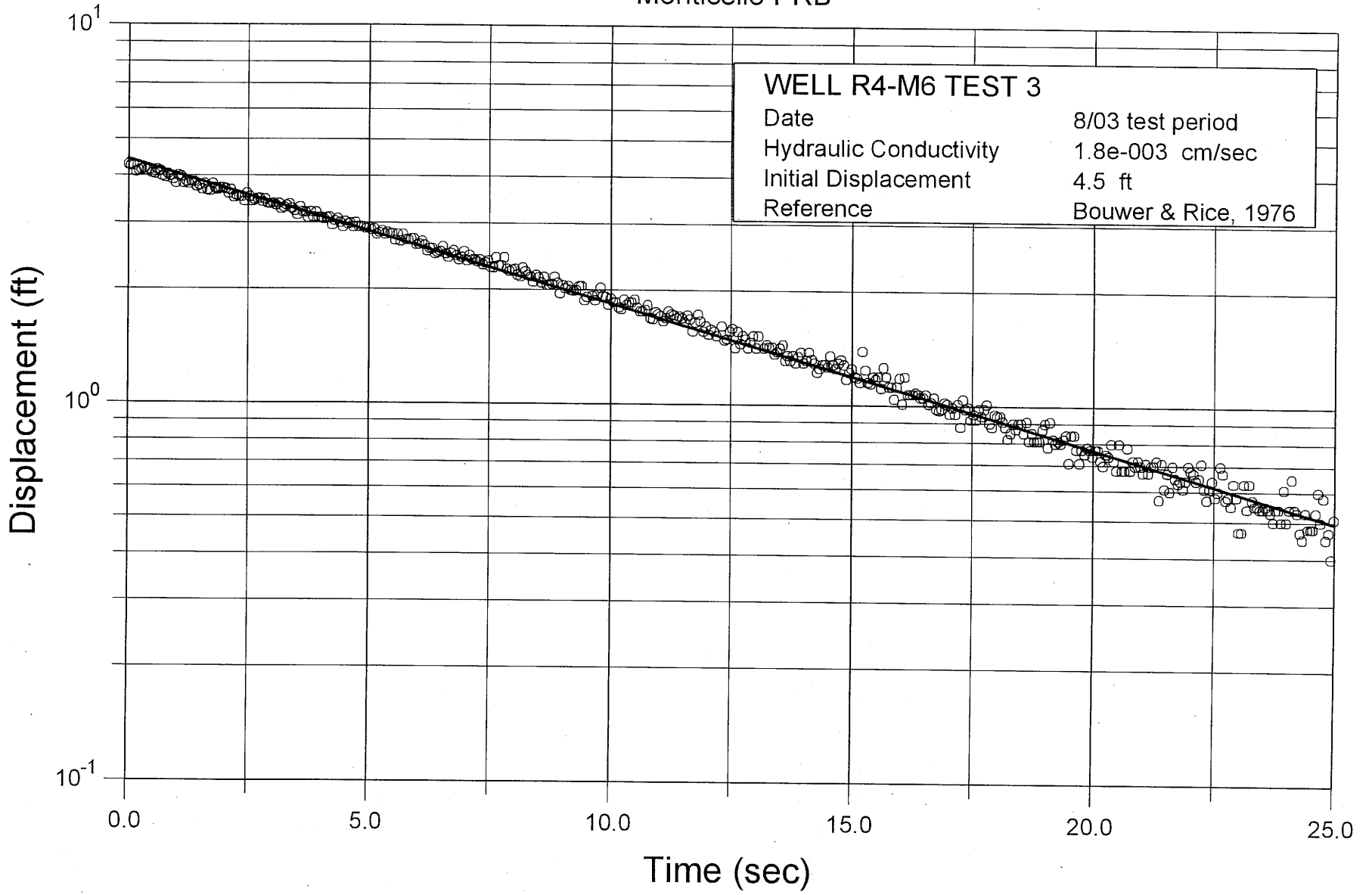
Monticello PRB



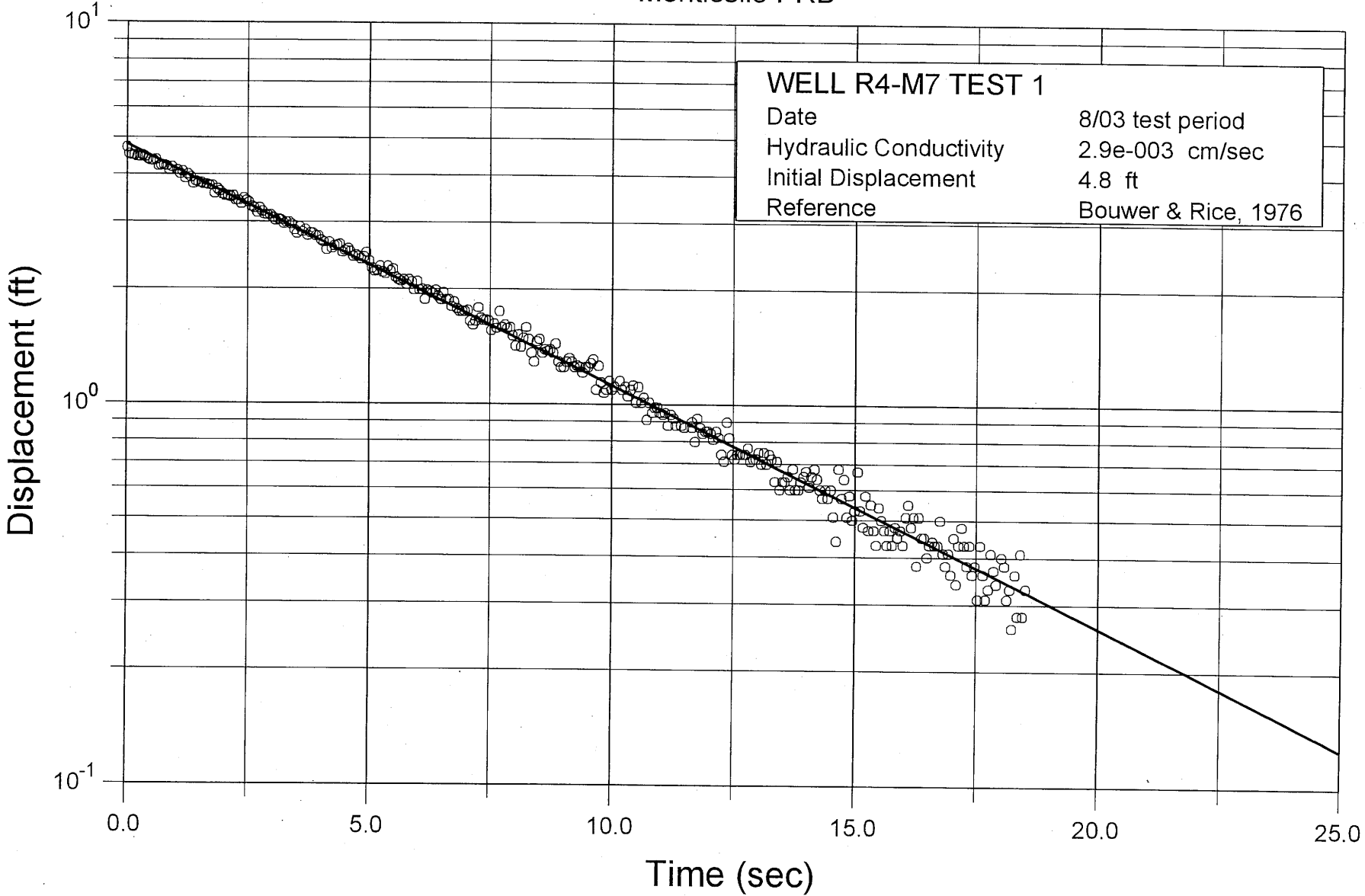
Monticello PRB



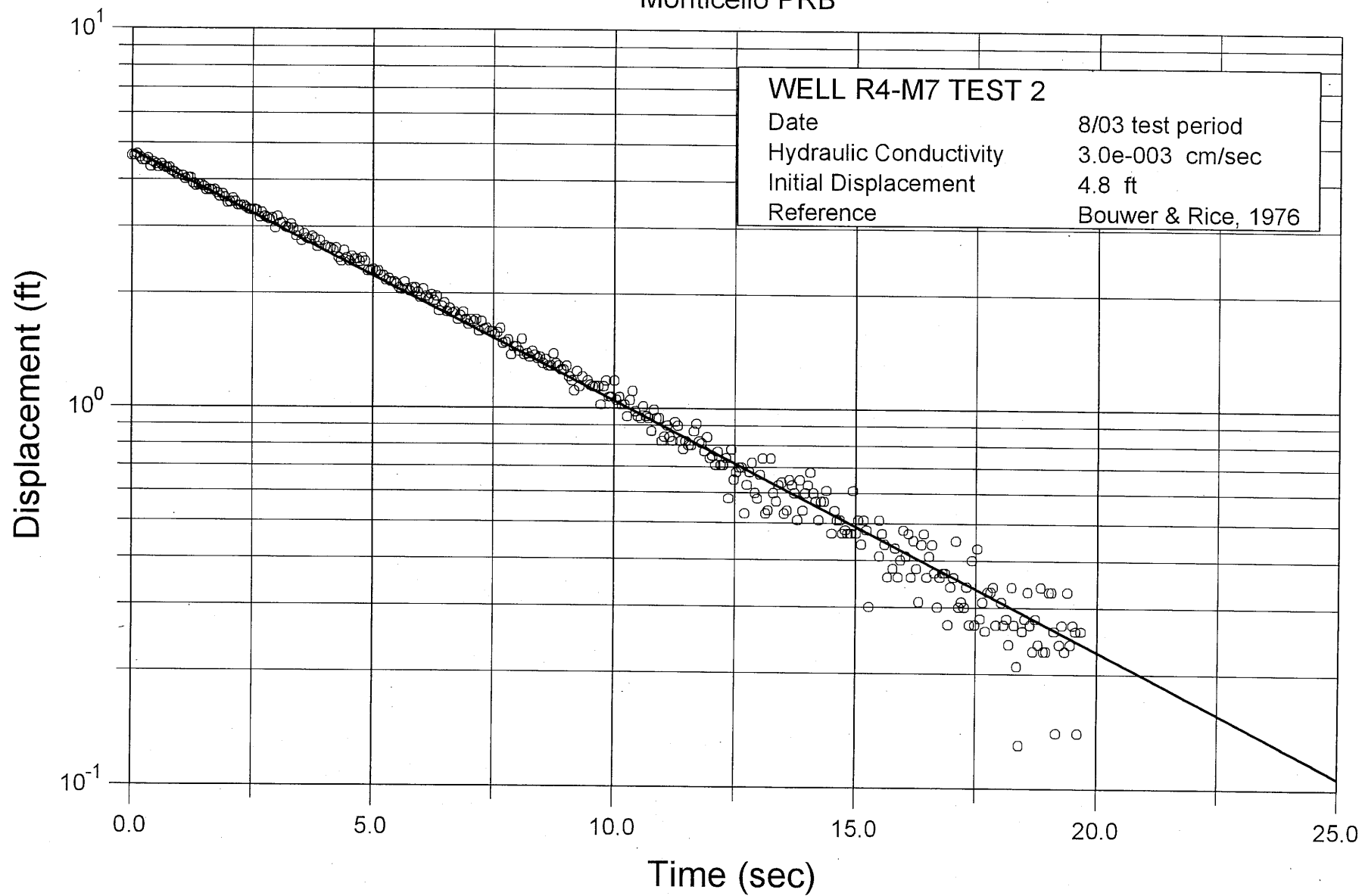
Monticello PRB



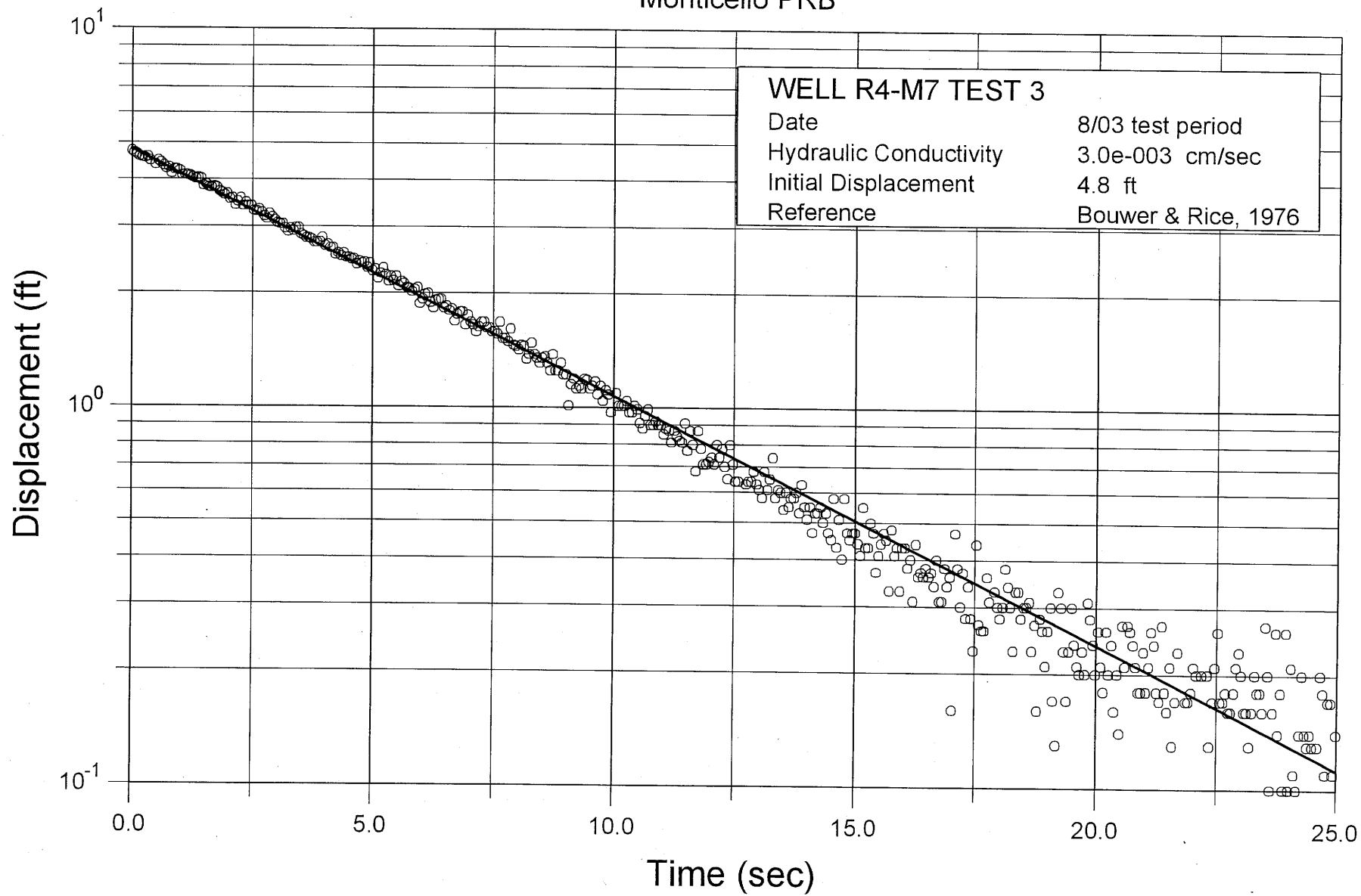
Monticello PRB



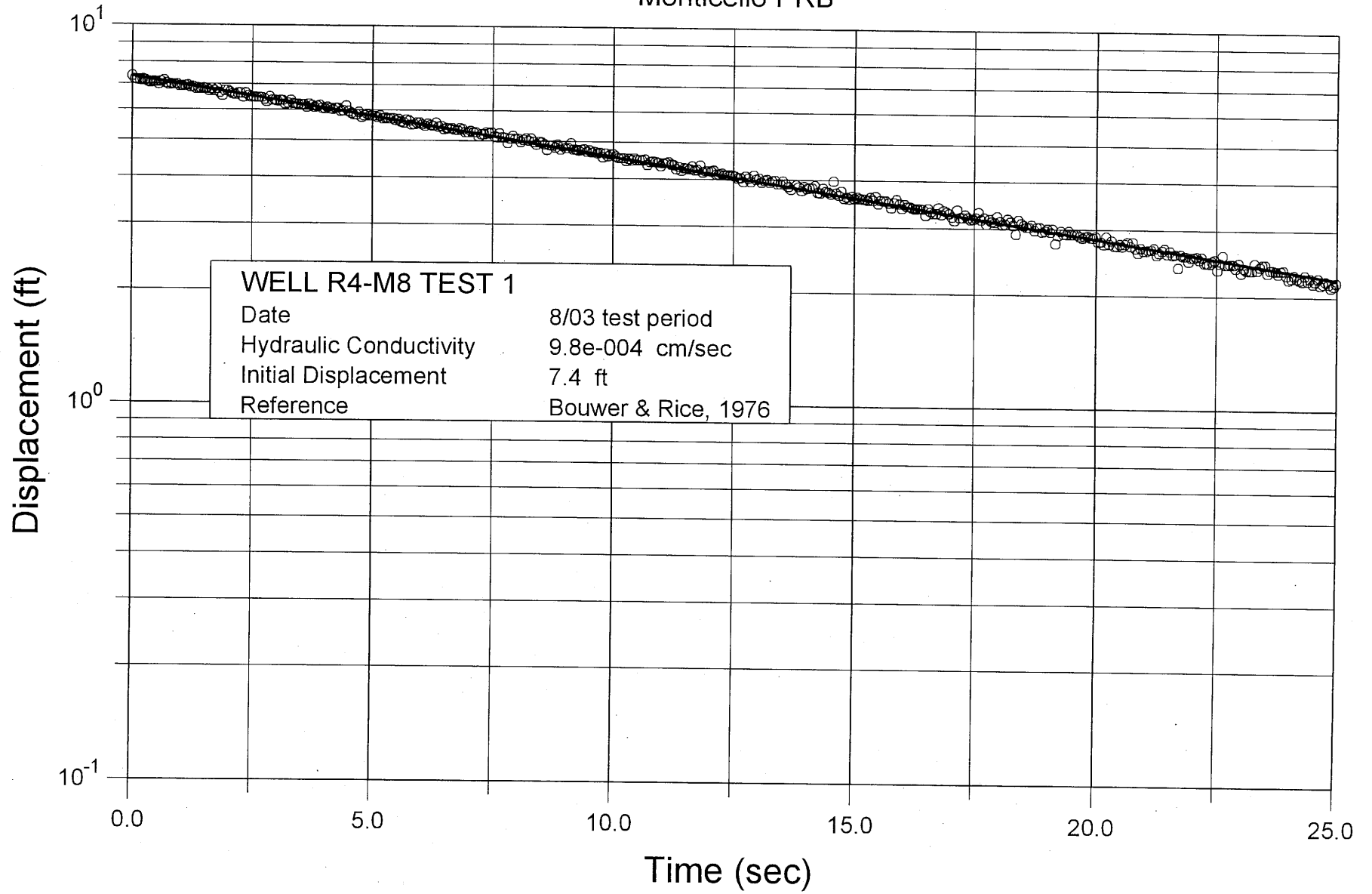
Monticello PRB



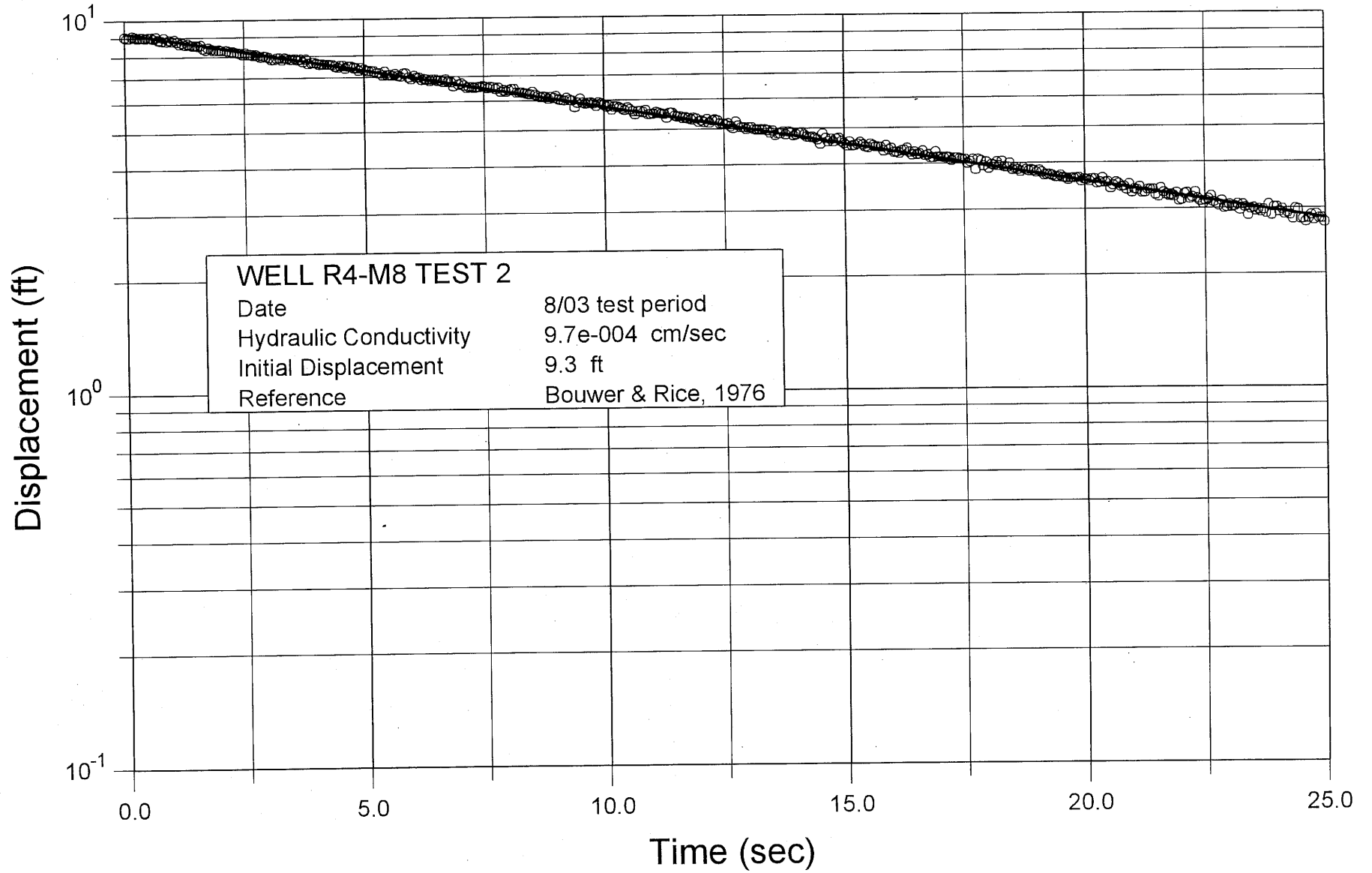
Monticello PRB



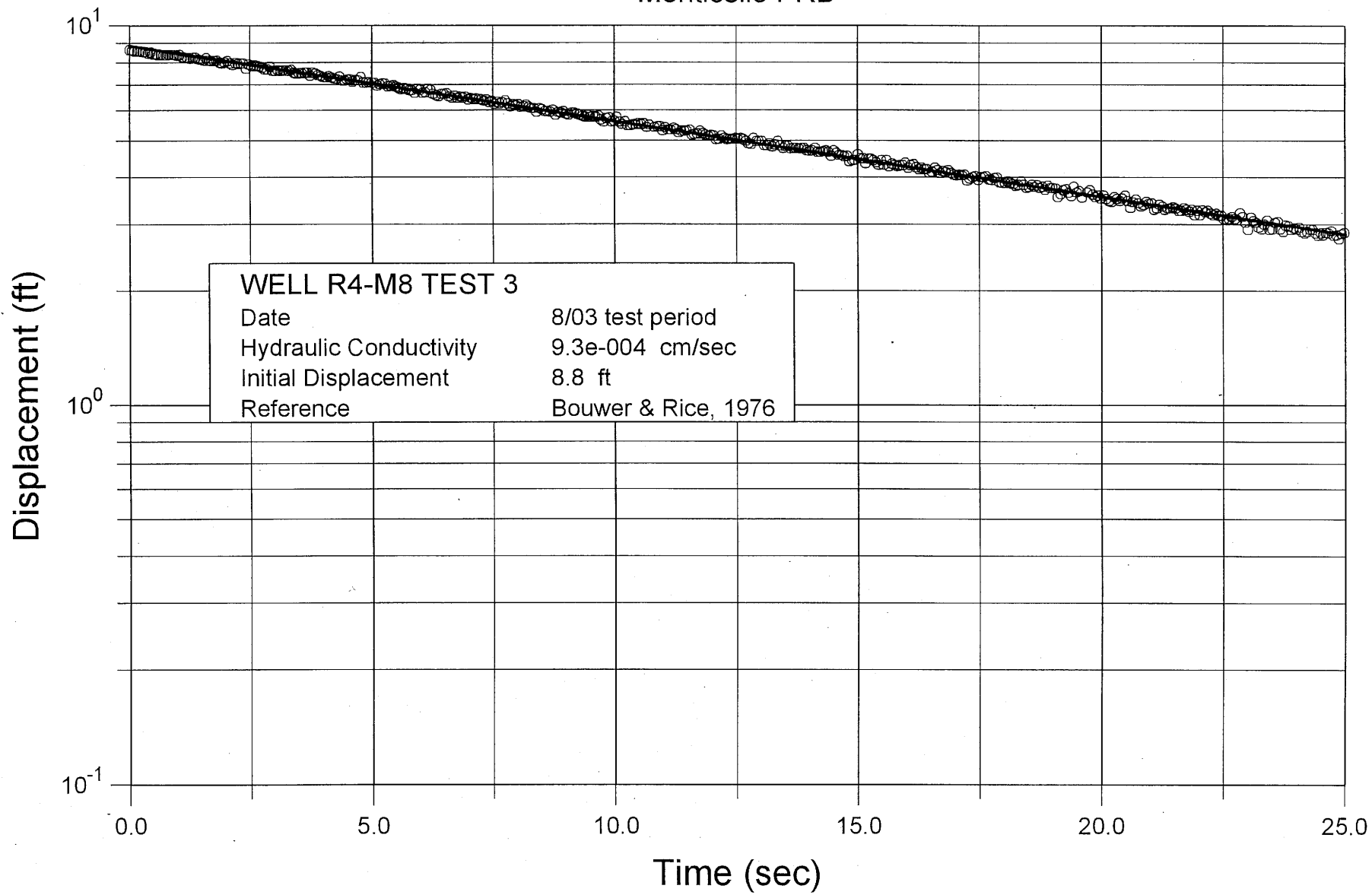
Monticello PRB



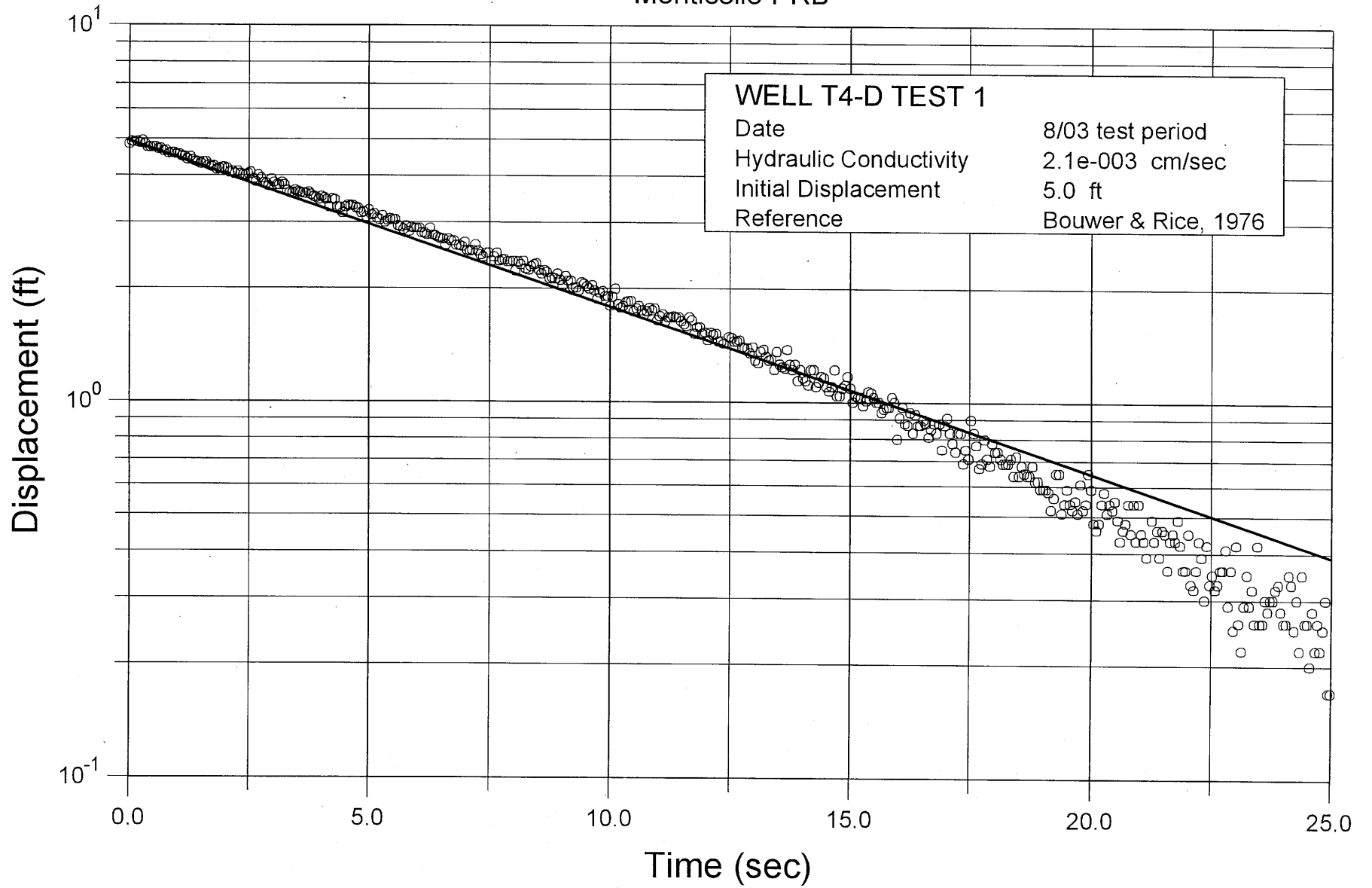
Monticello PRB



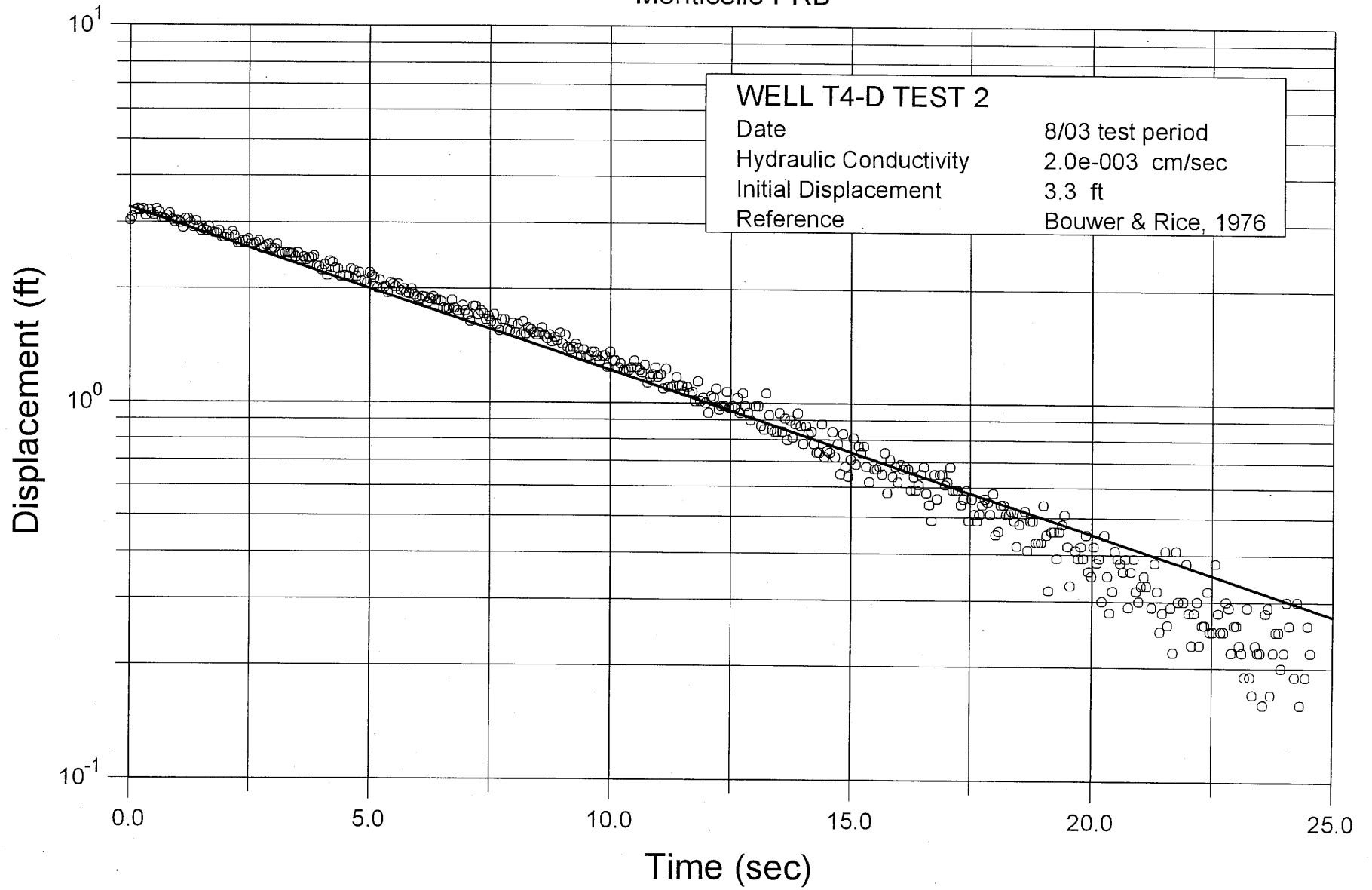
Monticello PRB



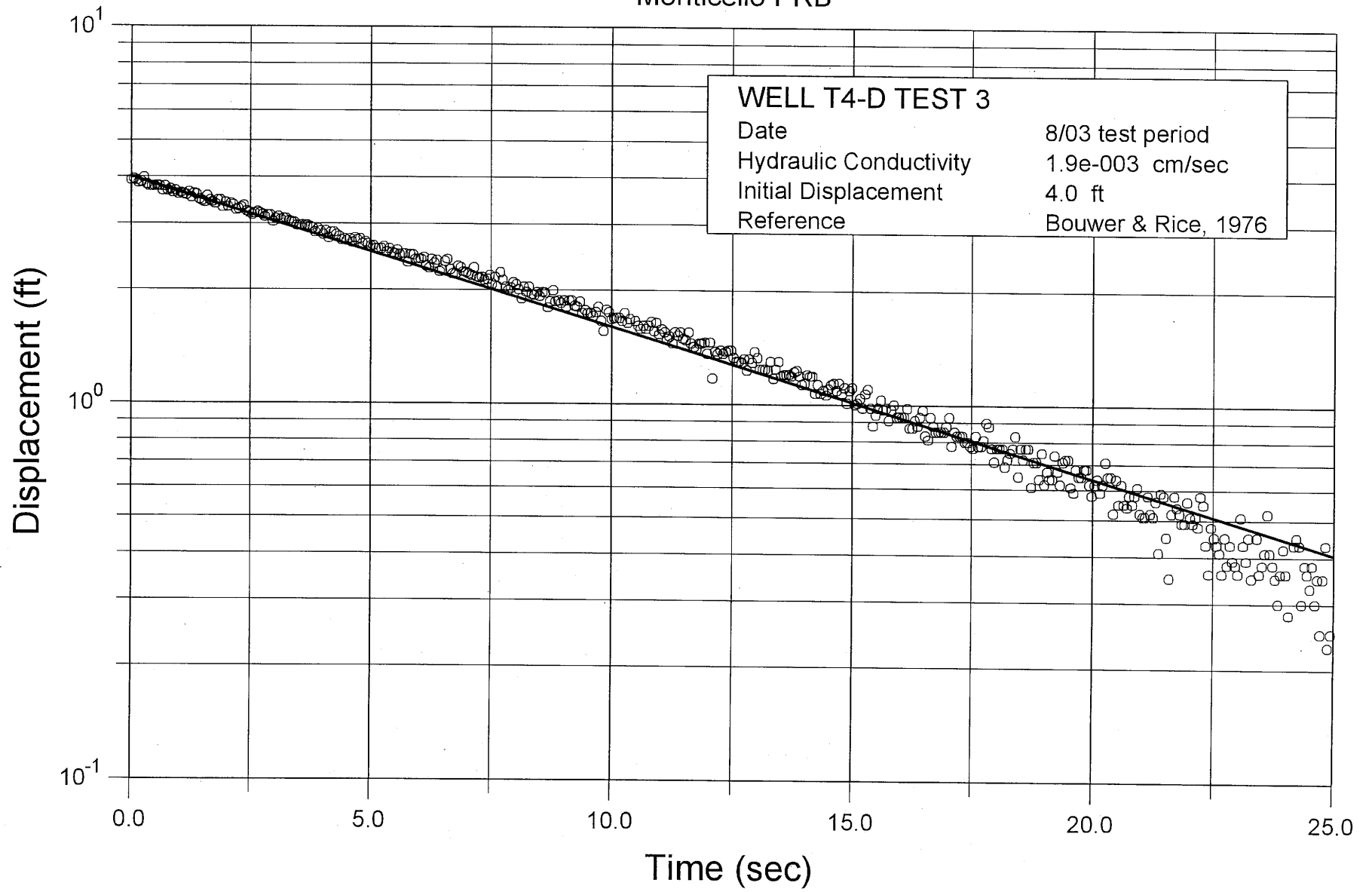
Monticello PRB



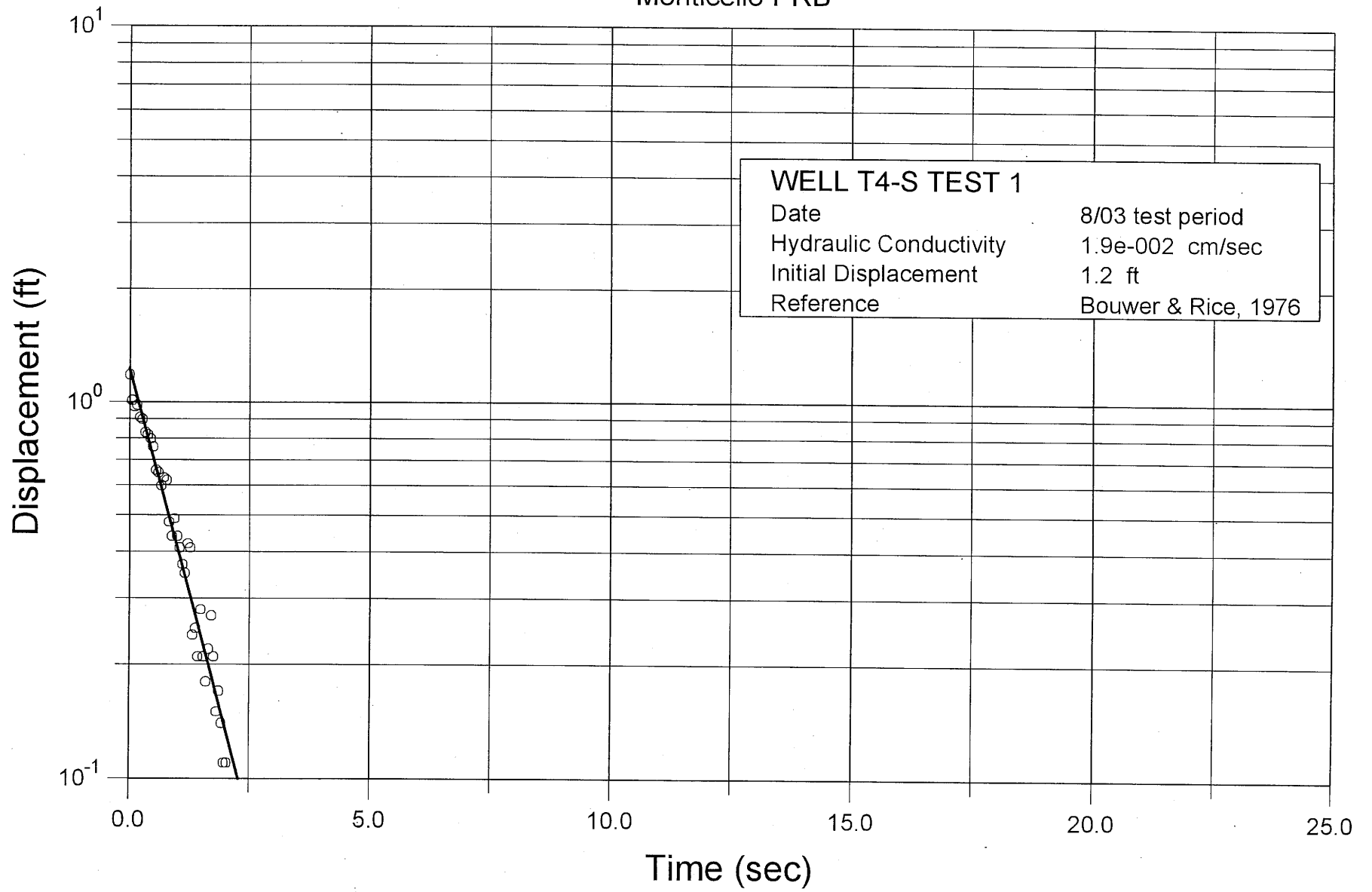
Monticello PRB



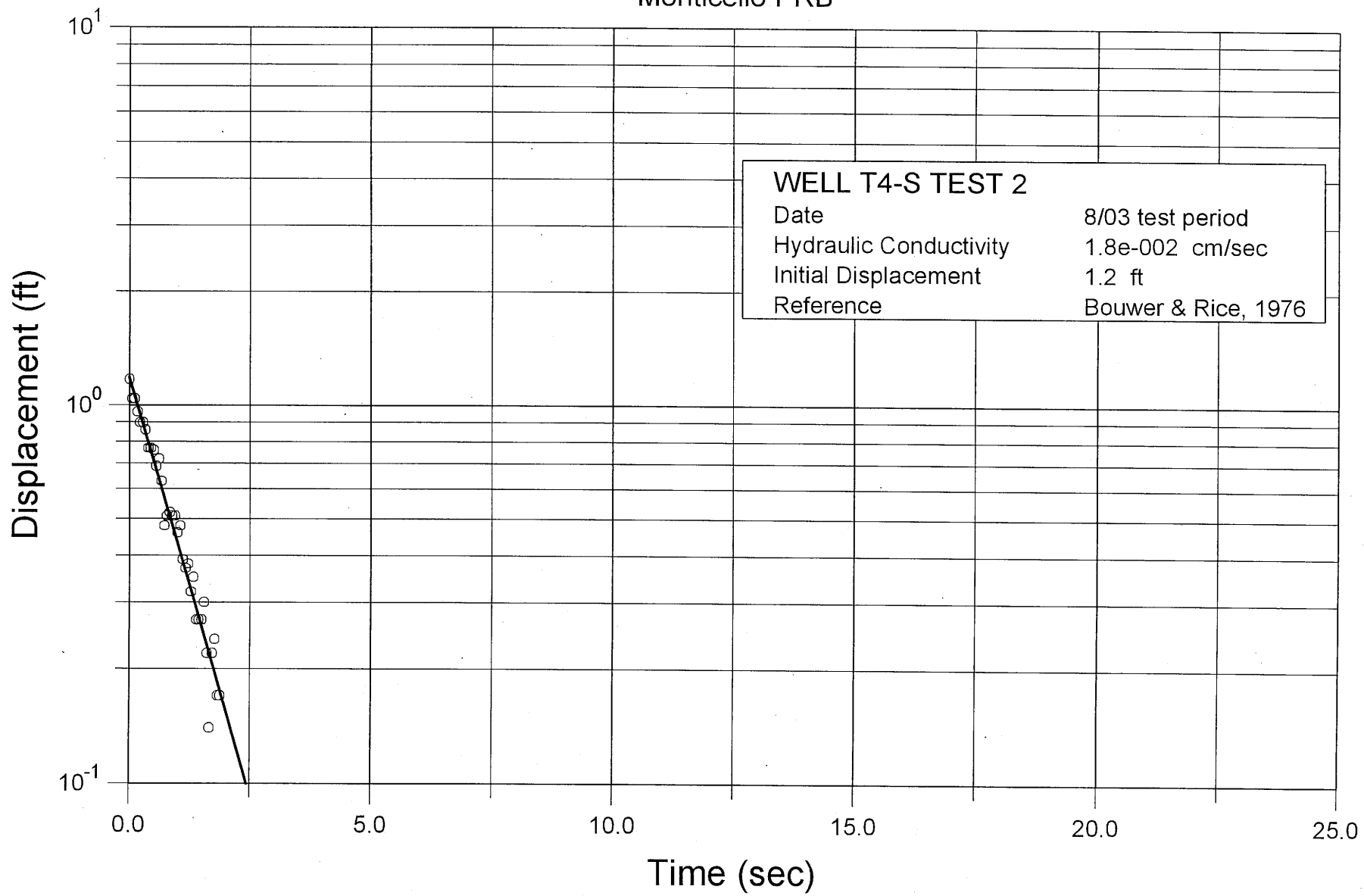
Monticello PRB



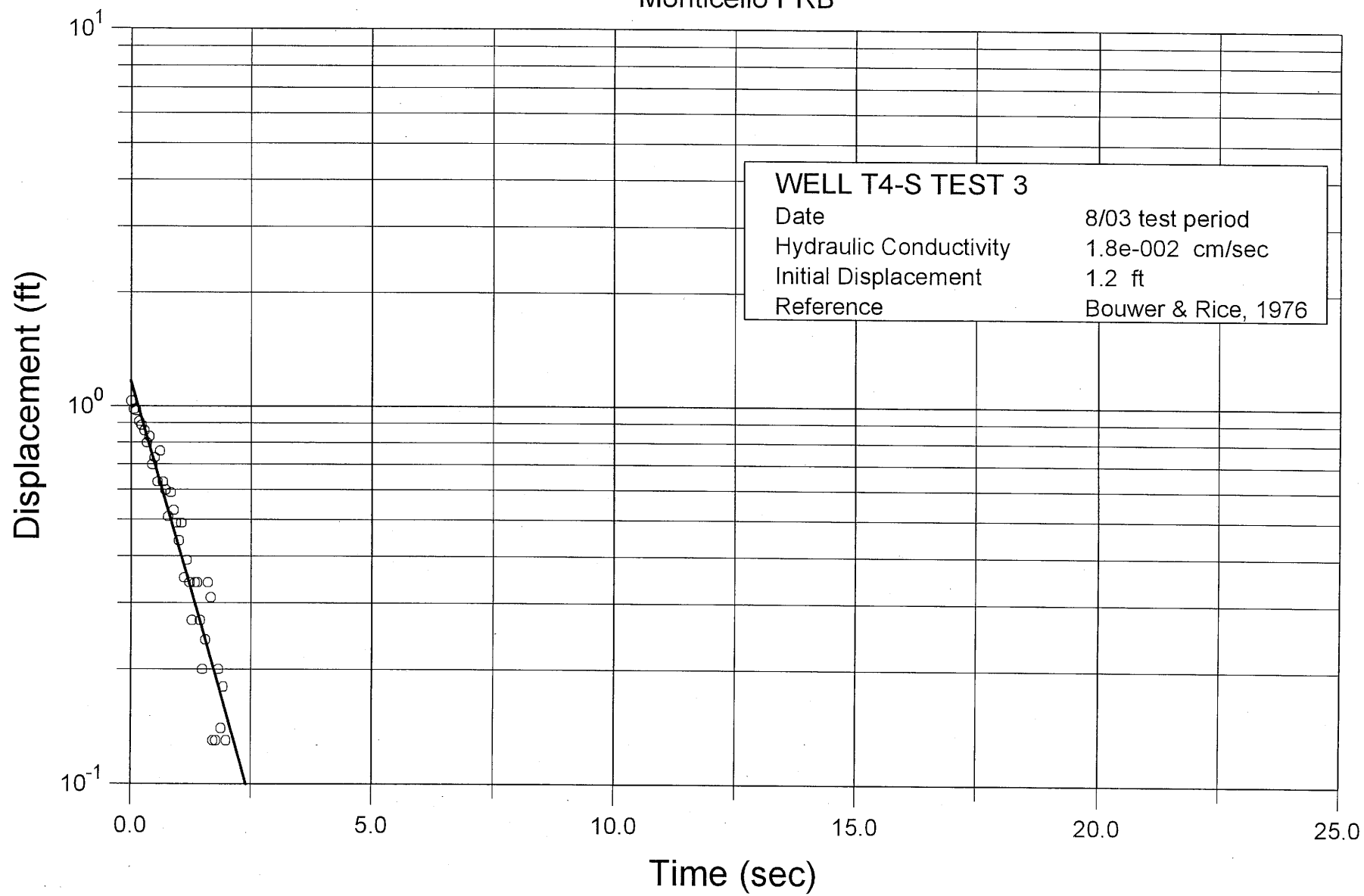
Monticello PRB



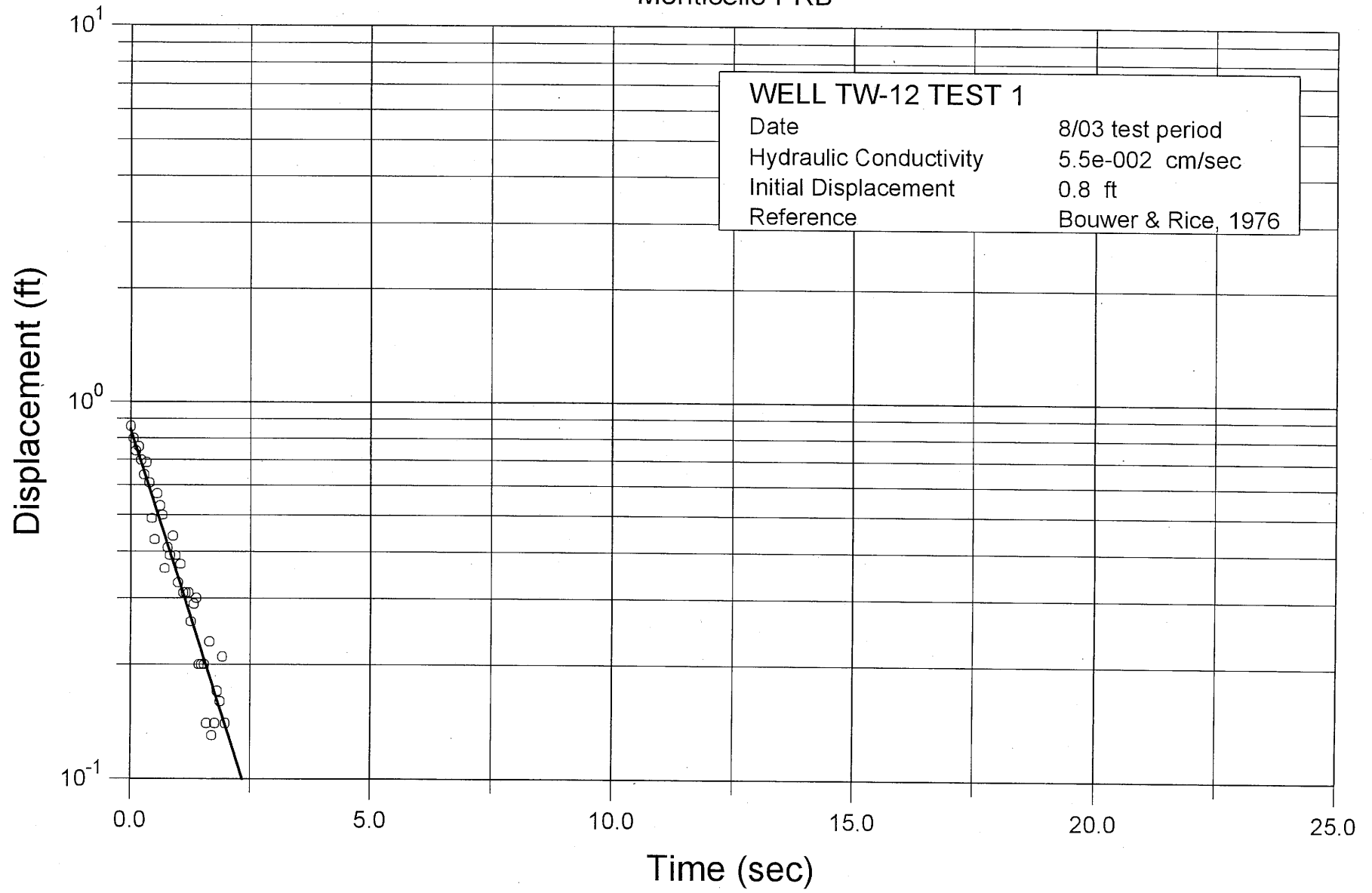
Monticello PRB



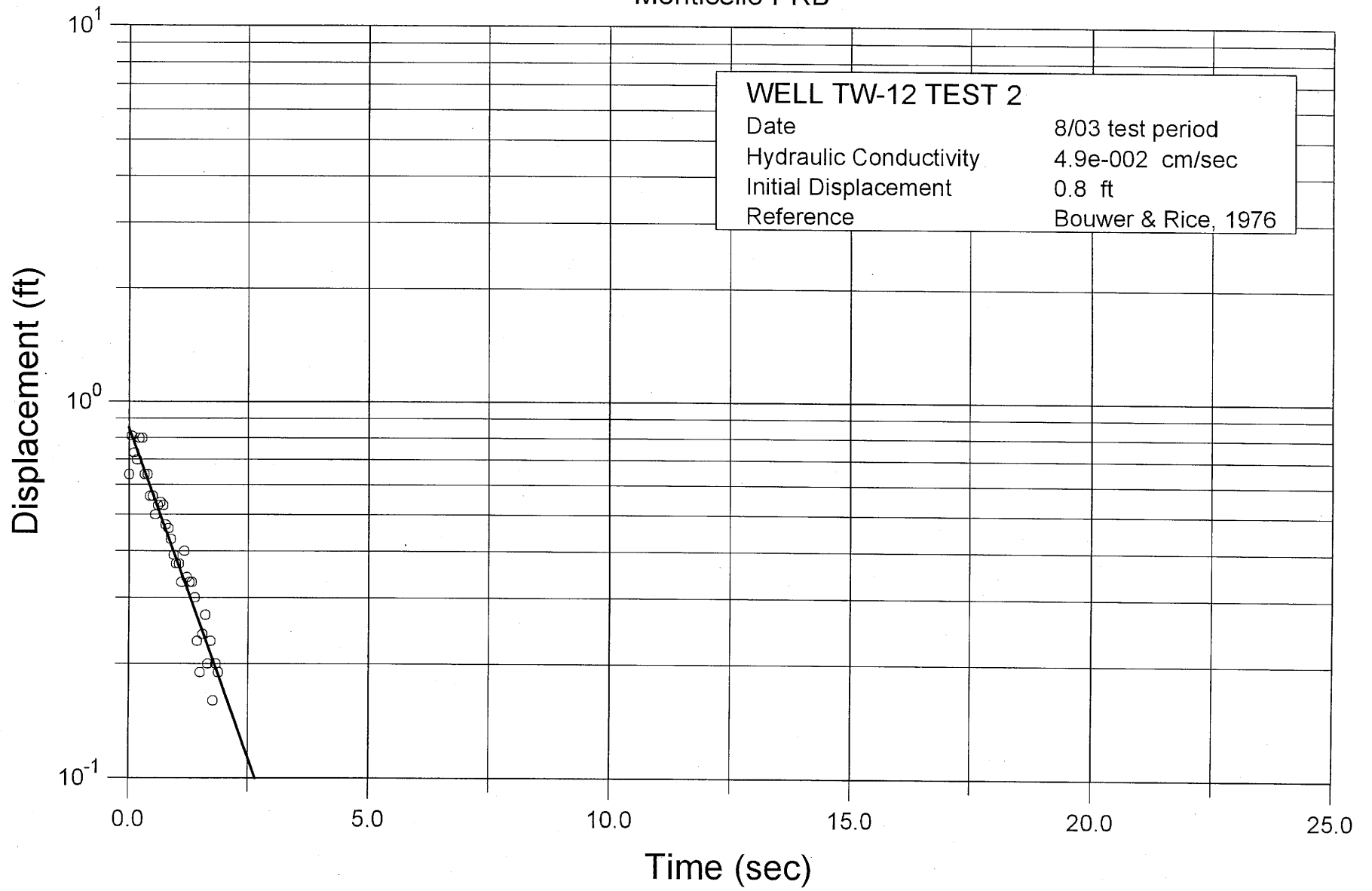
Monticello PRB



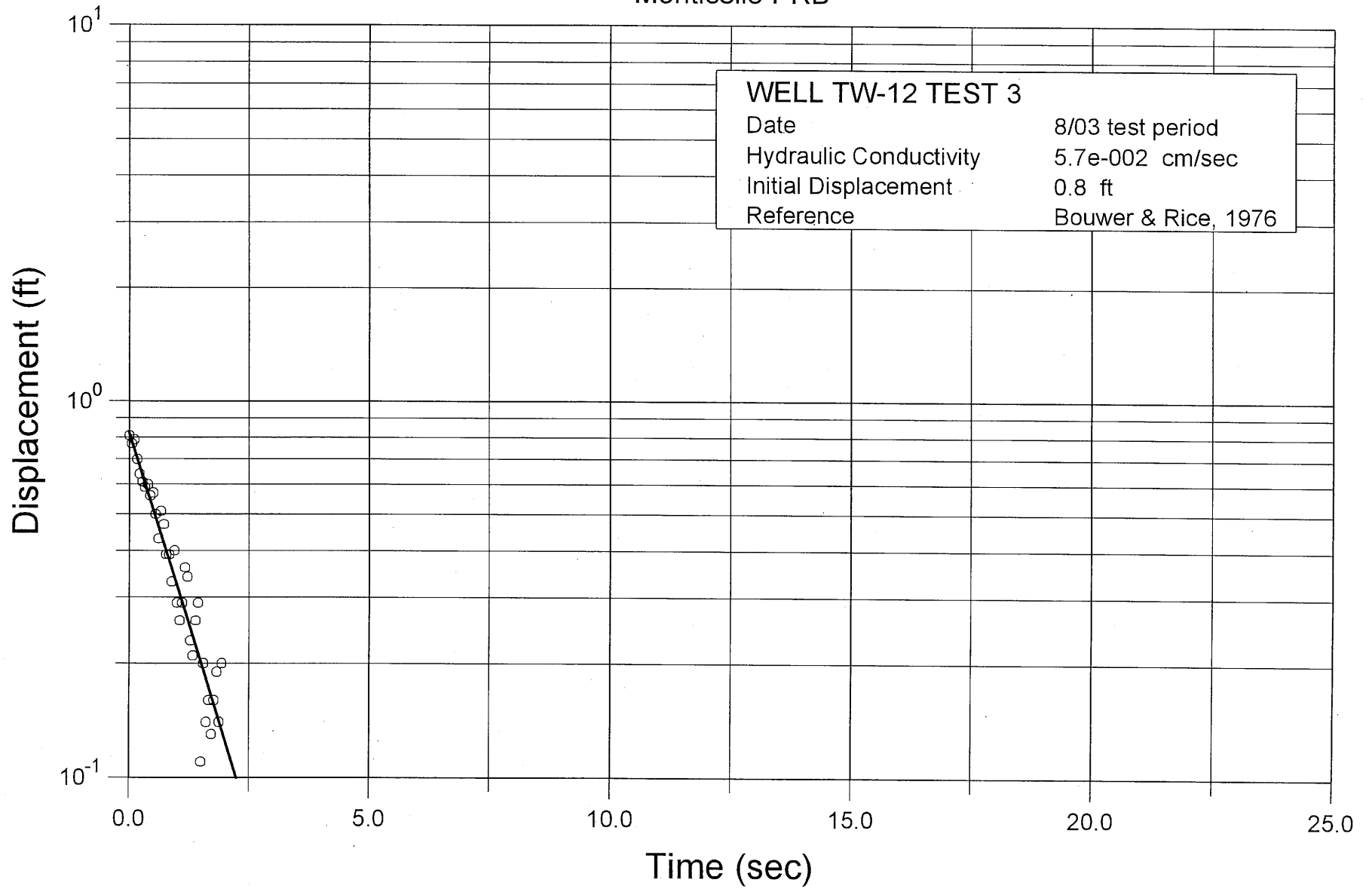
Monticello PRB



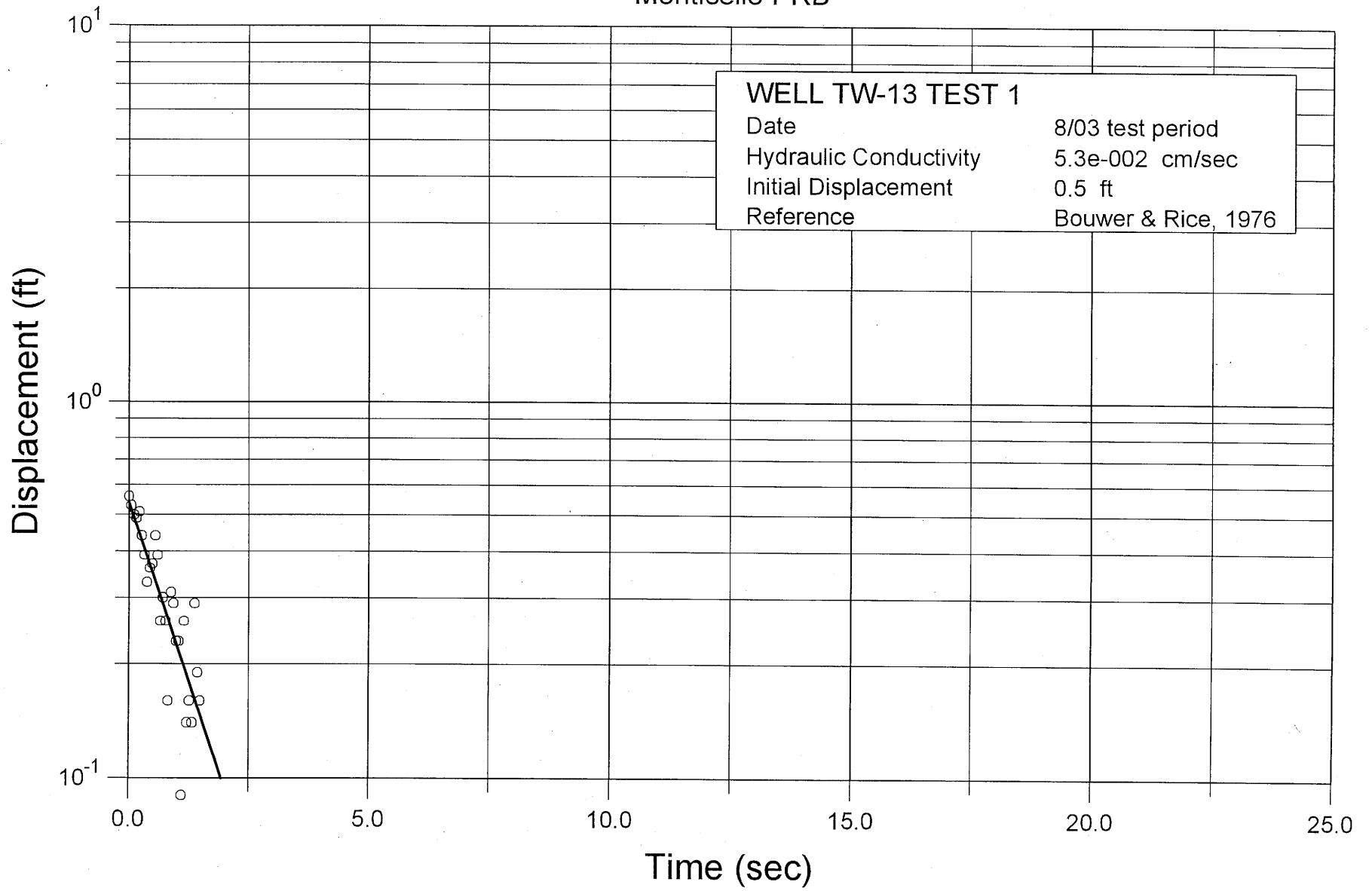
Monticello PRB



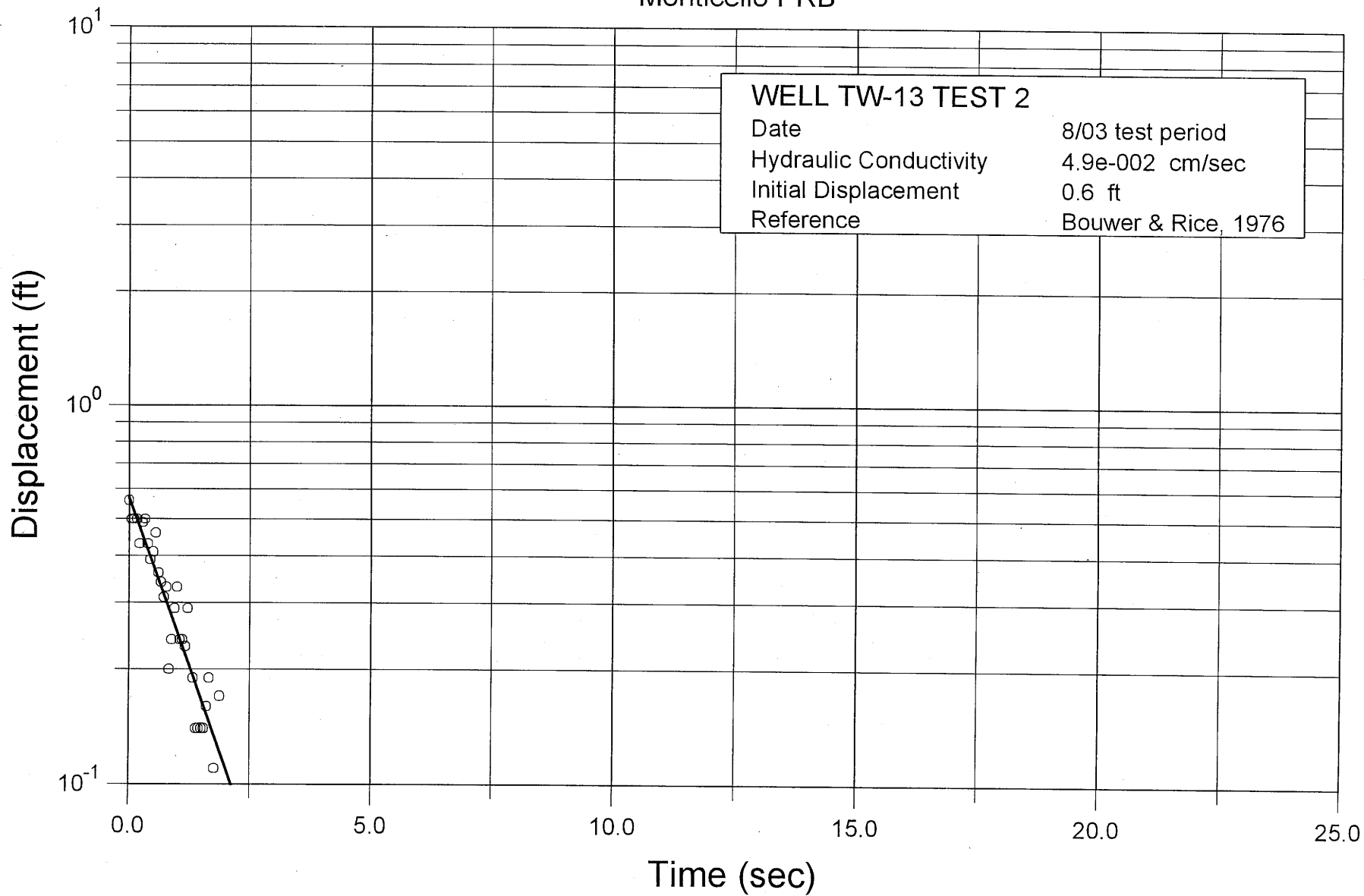
Monticello PRB



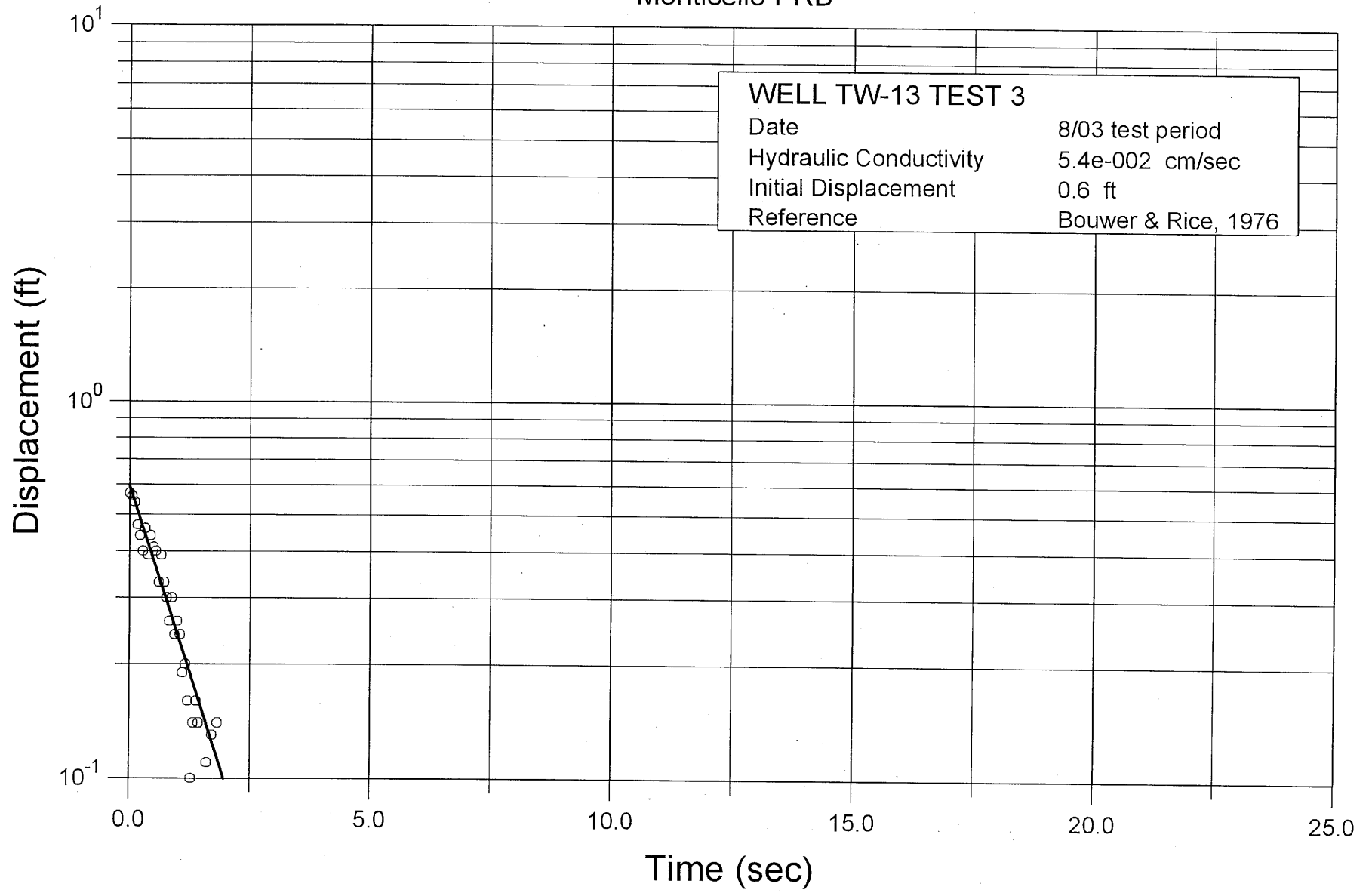
Monticello PRB



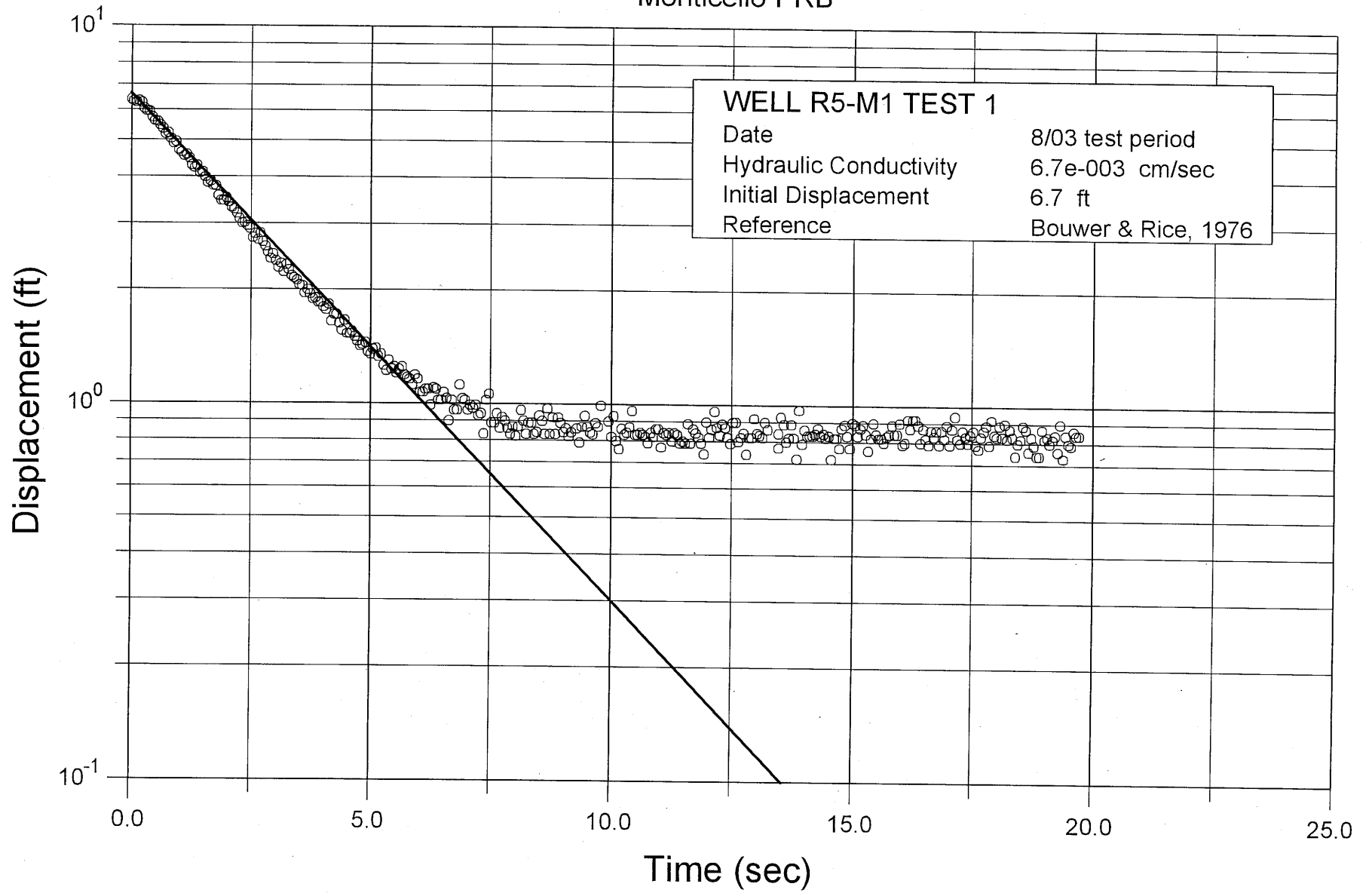
Monticello PRB



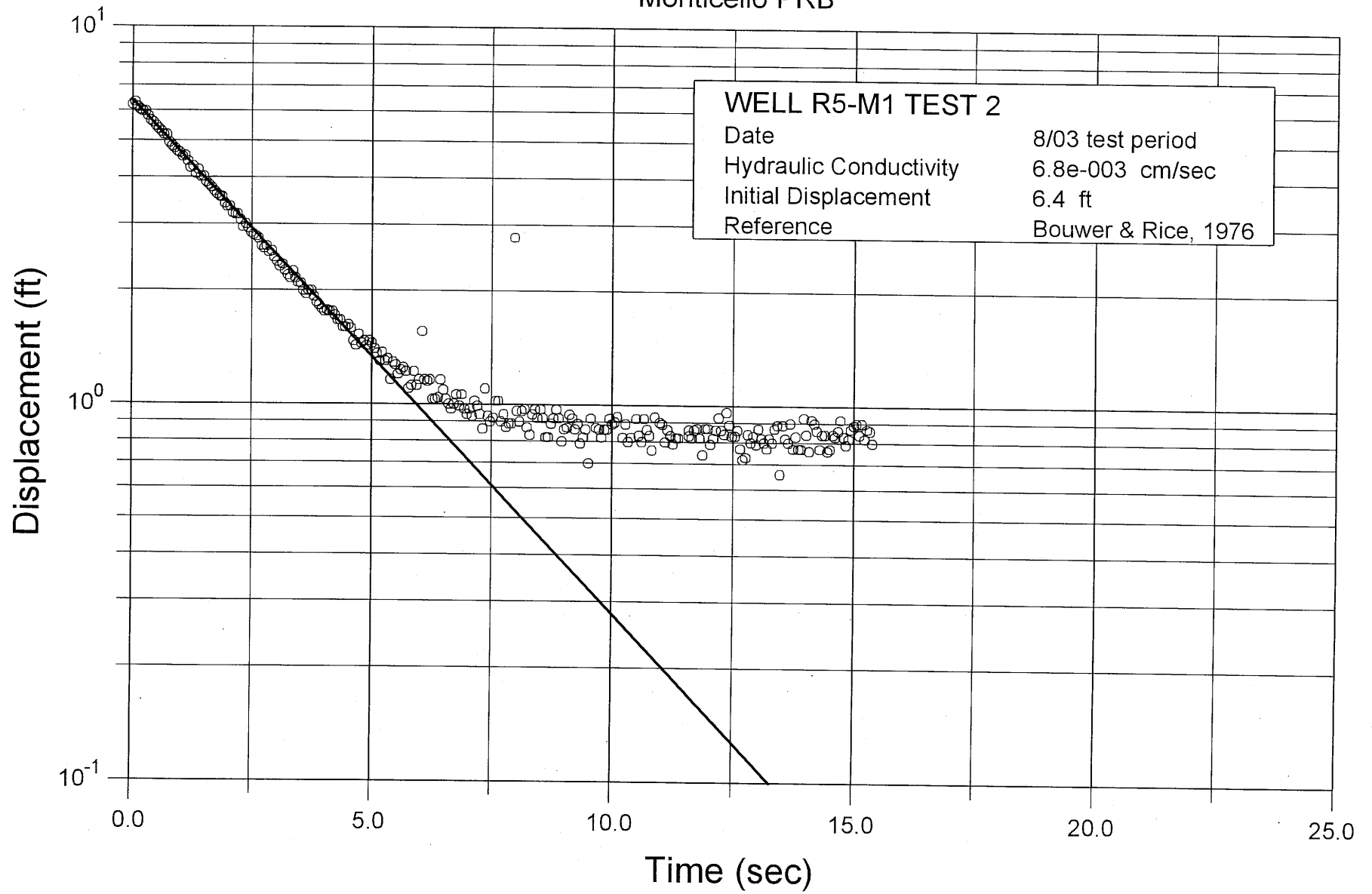
Monticello PRB



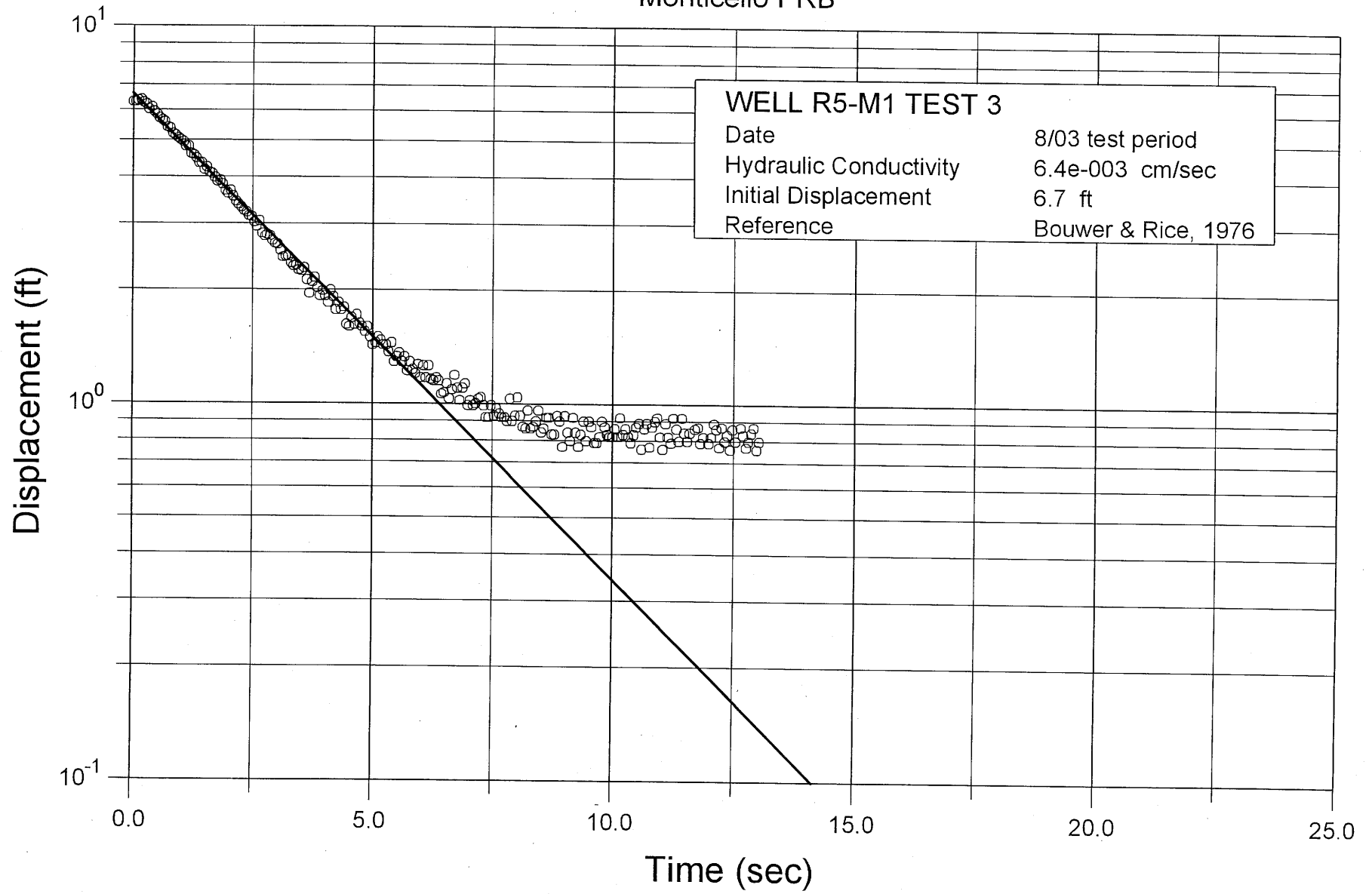
Monticello PRB



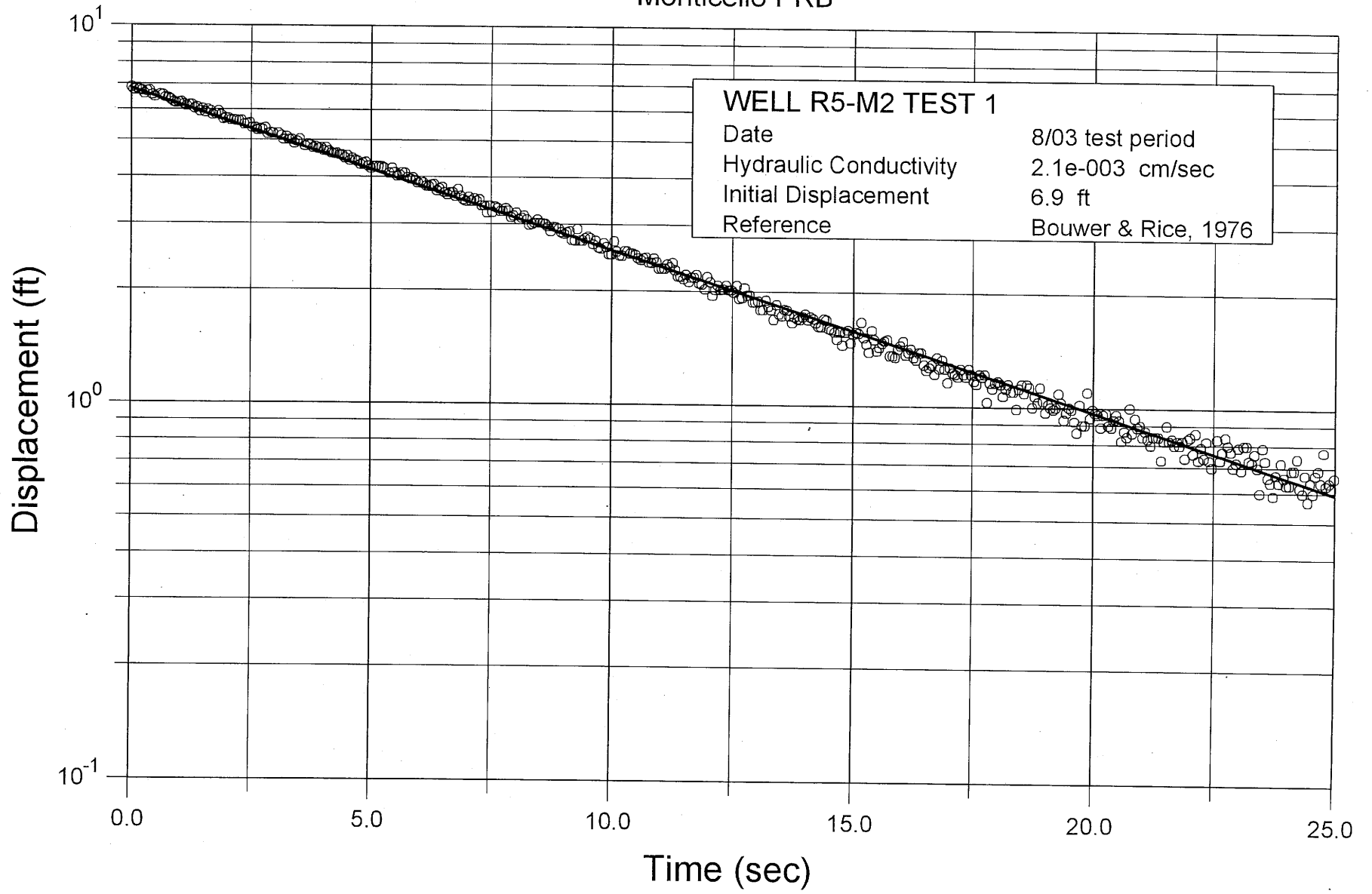
Monticello PRB



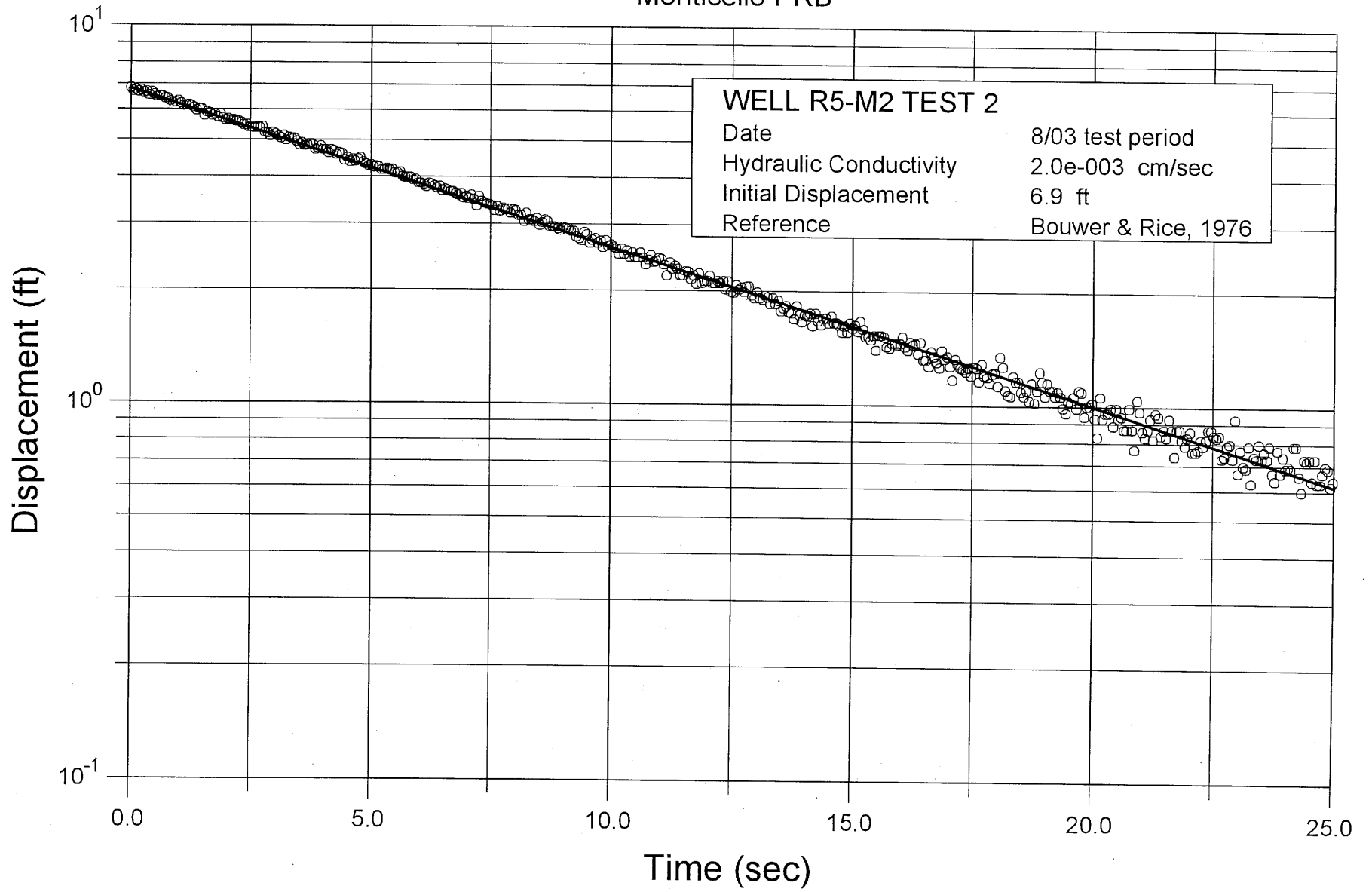
Monticello PRB



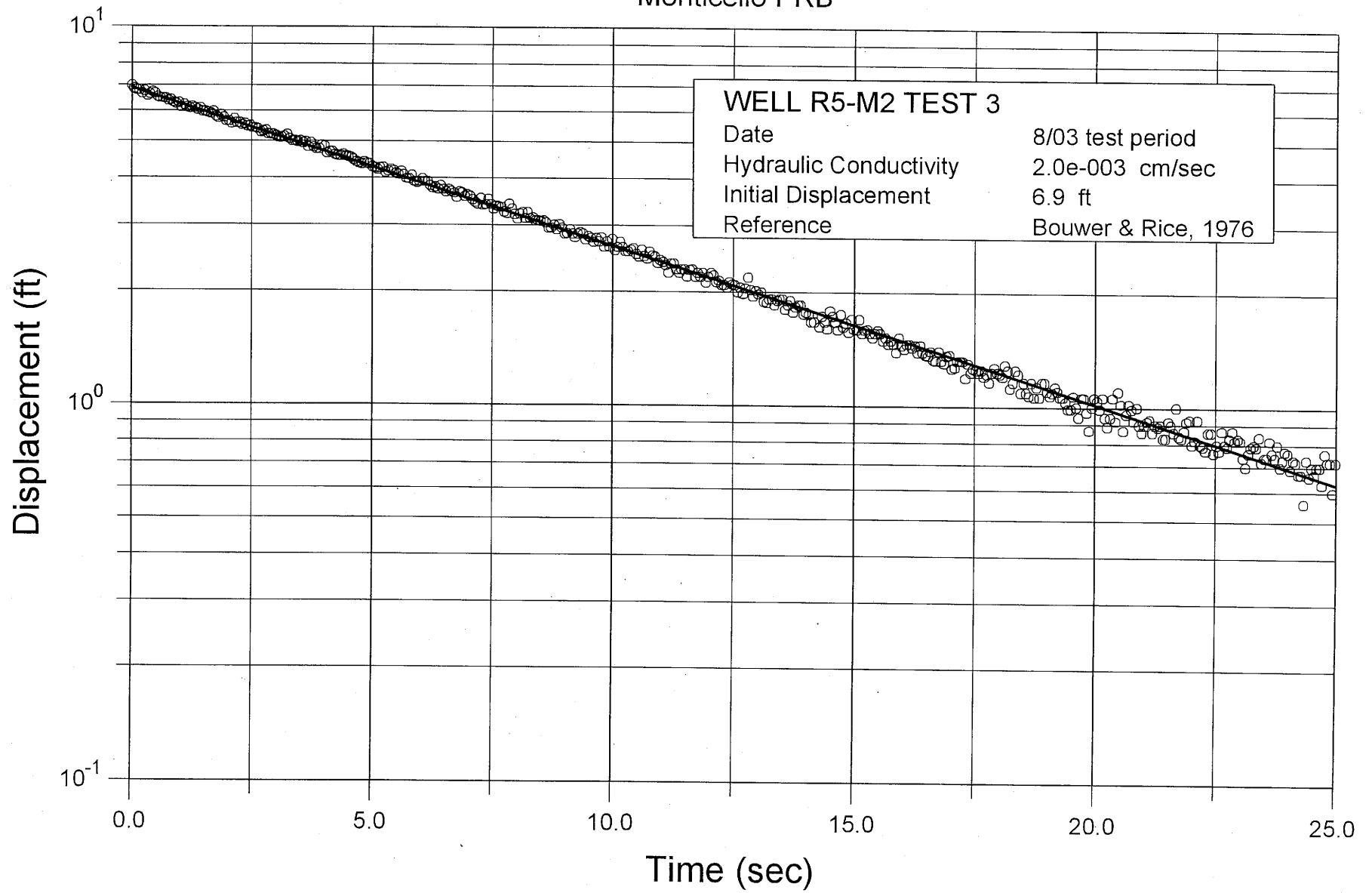
Monticello PRB



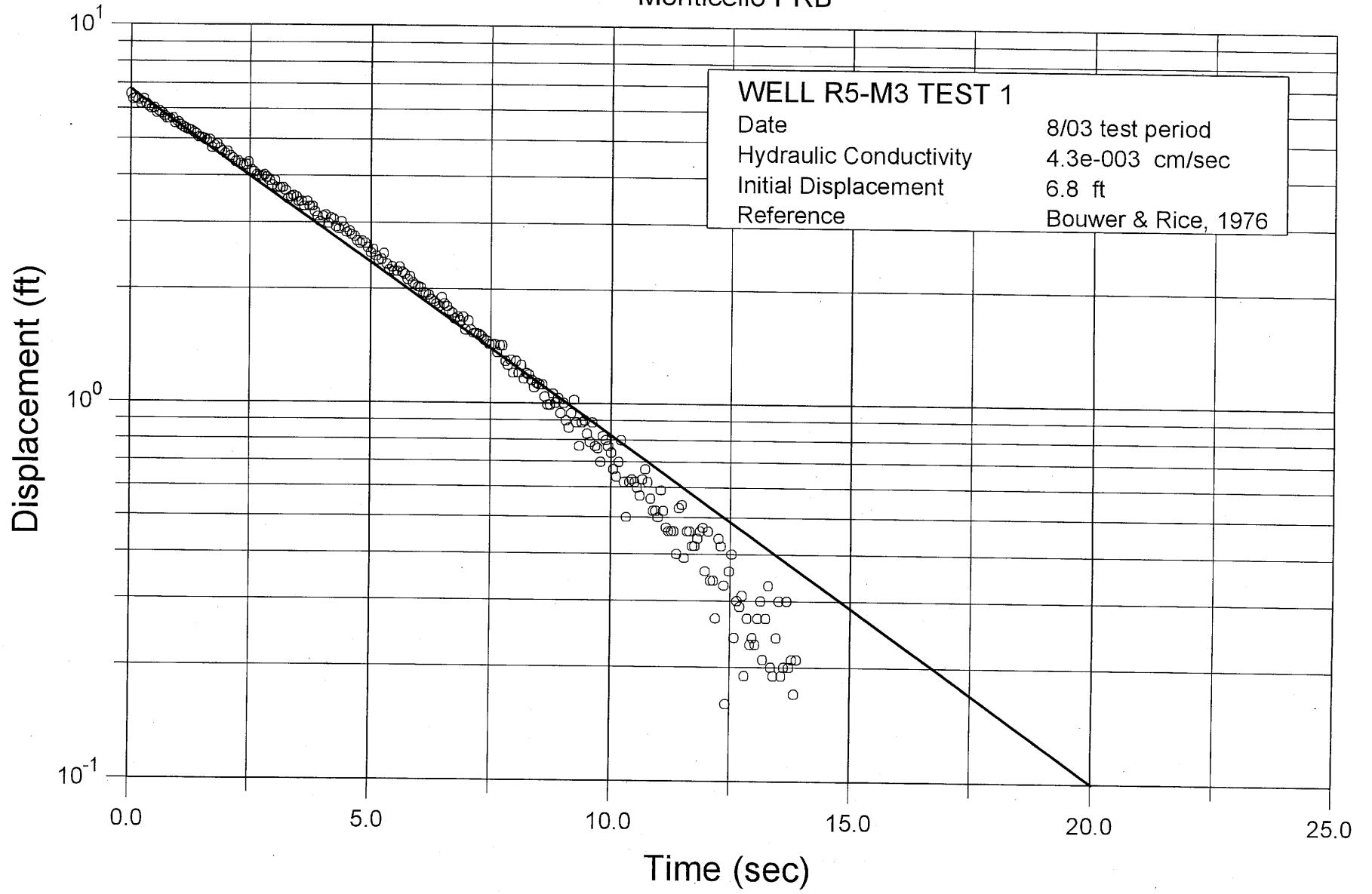
Monticello PRB



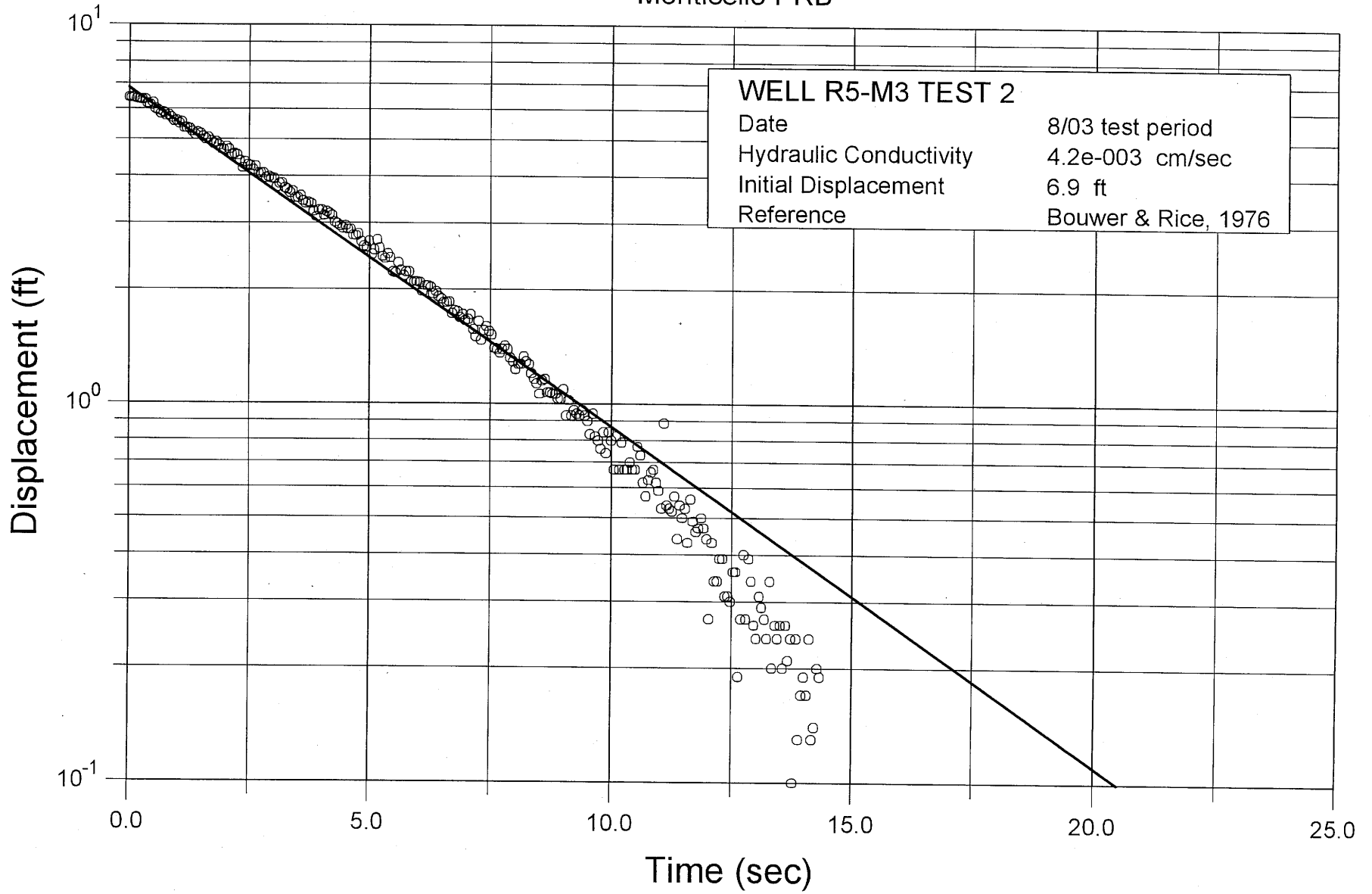
Monticello PRB



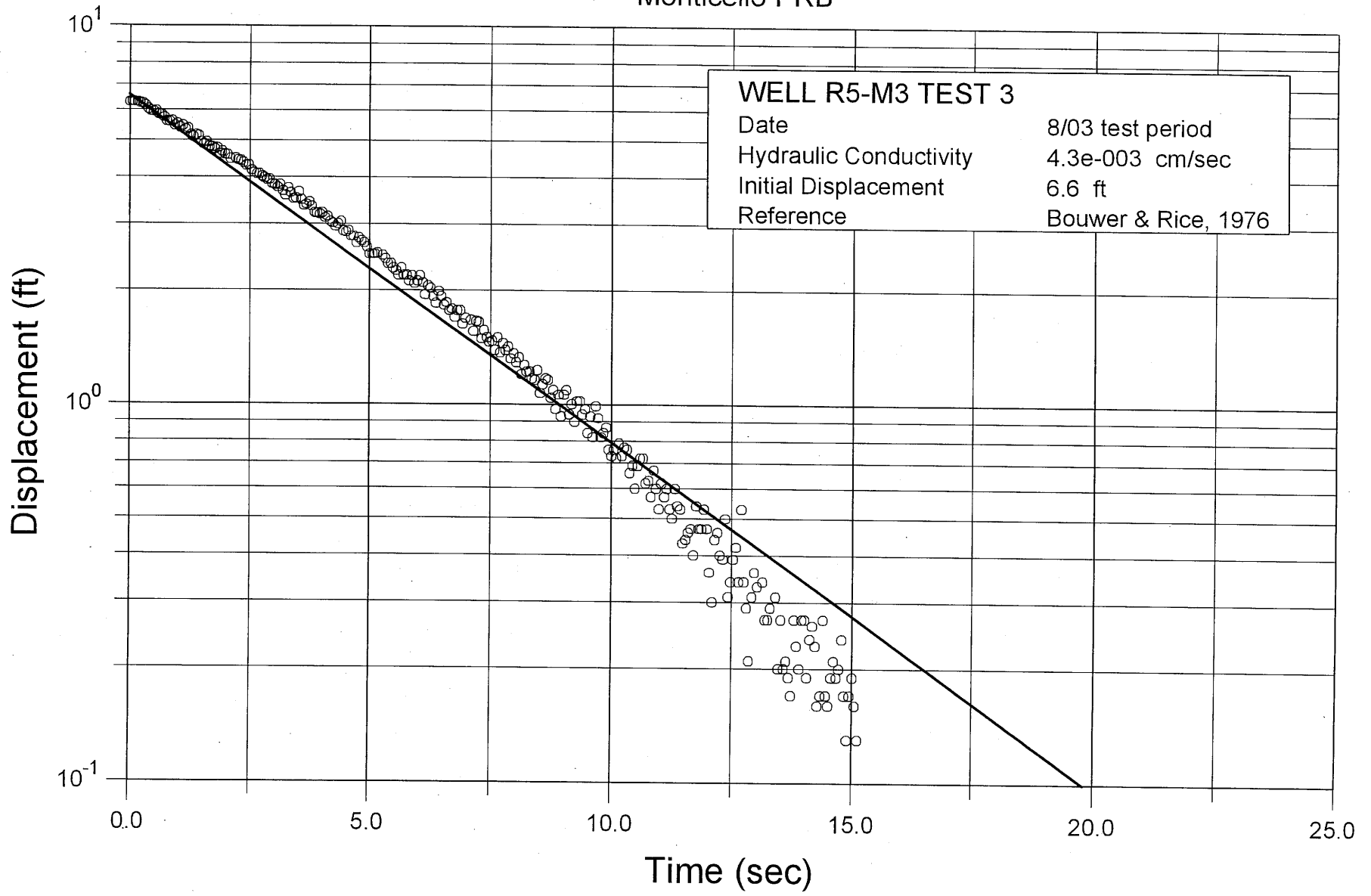
Monticello PRB



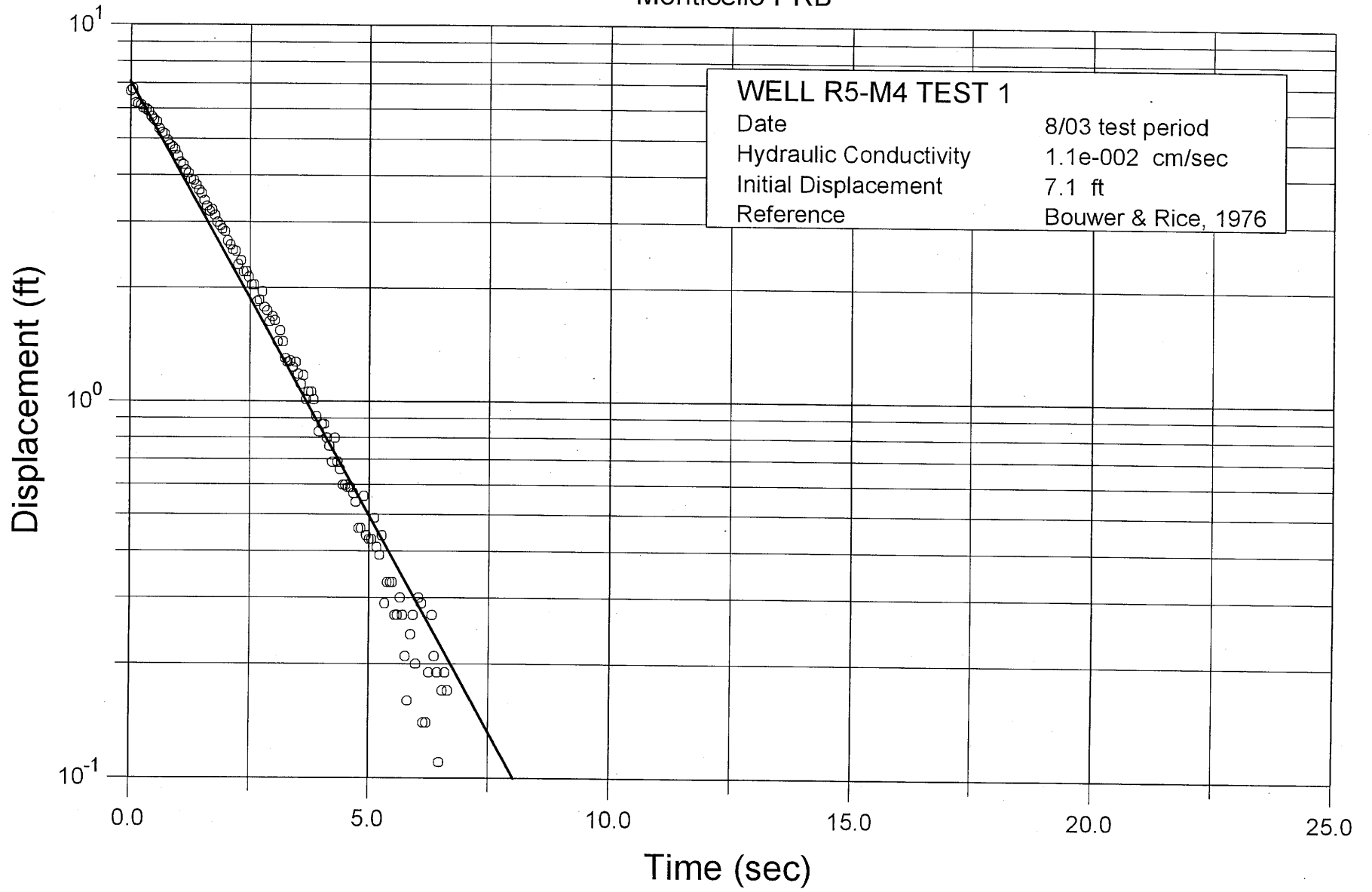
Monticello PRB



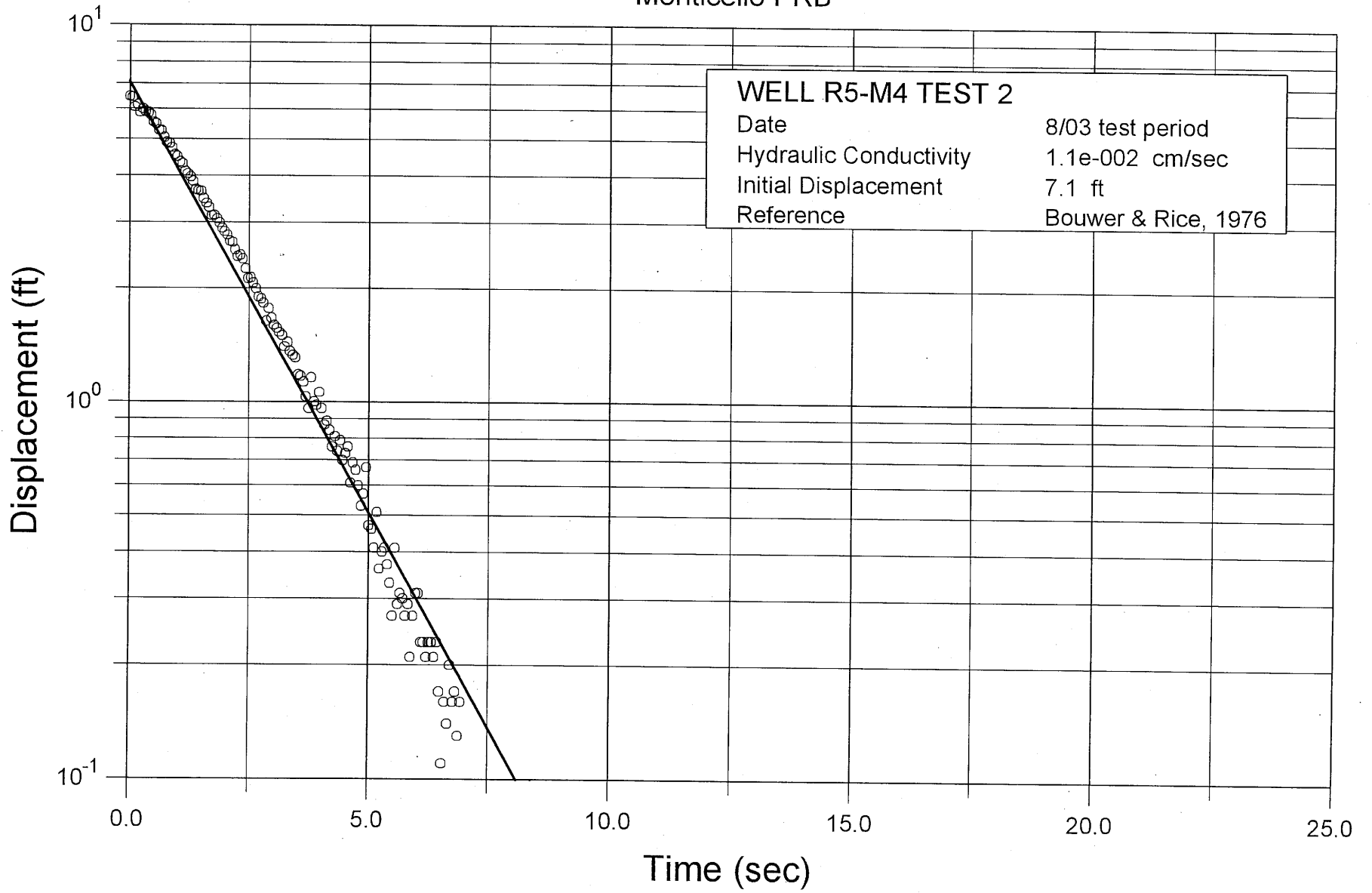
Monticello PRB



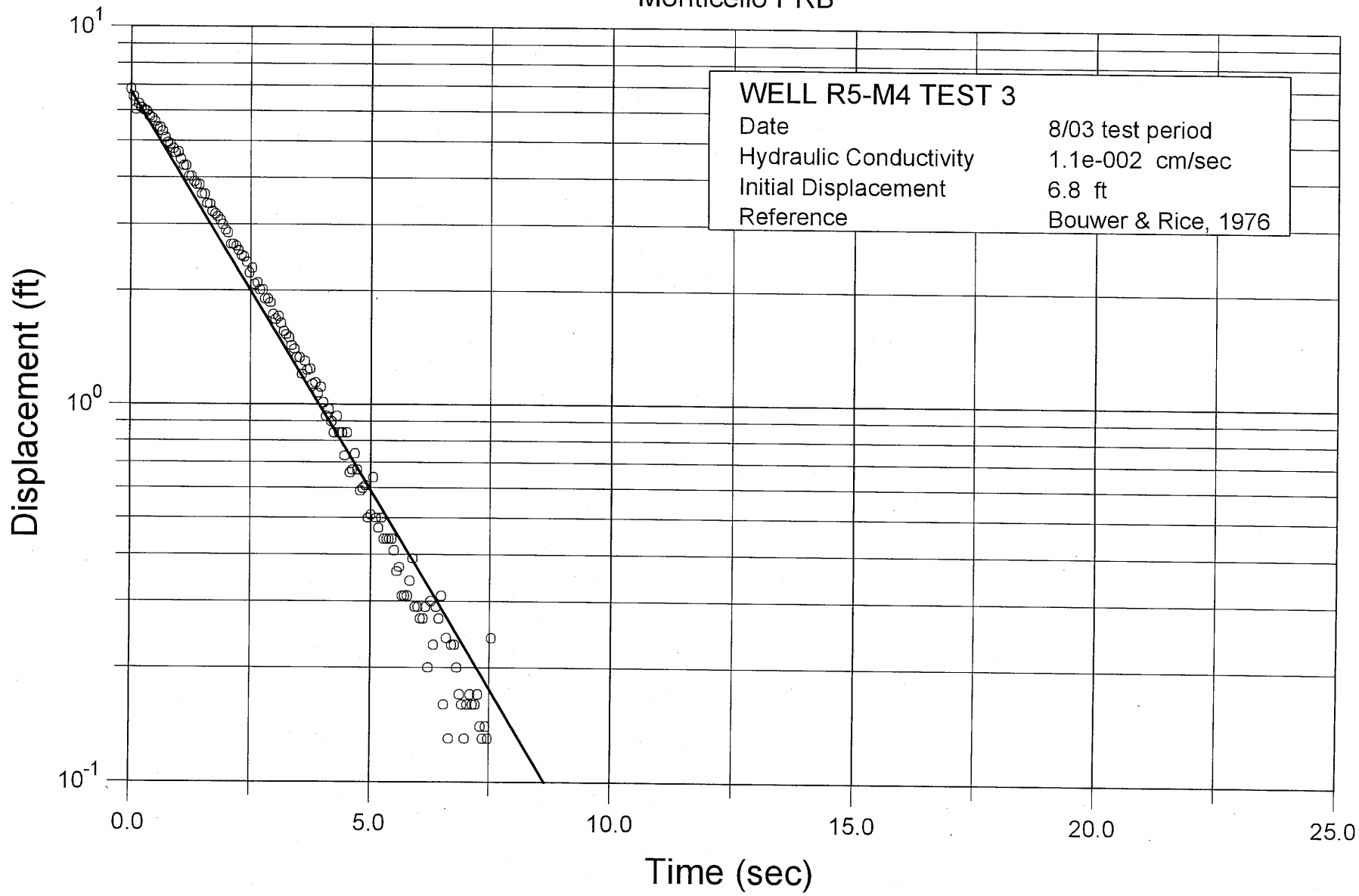
Monticello PRB



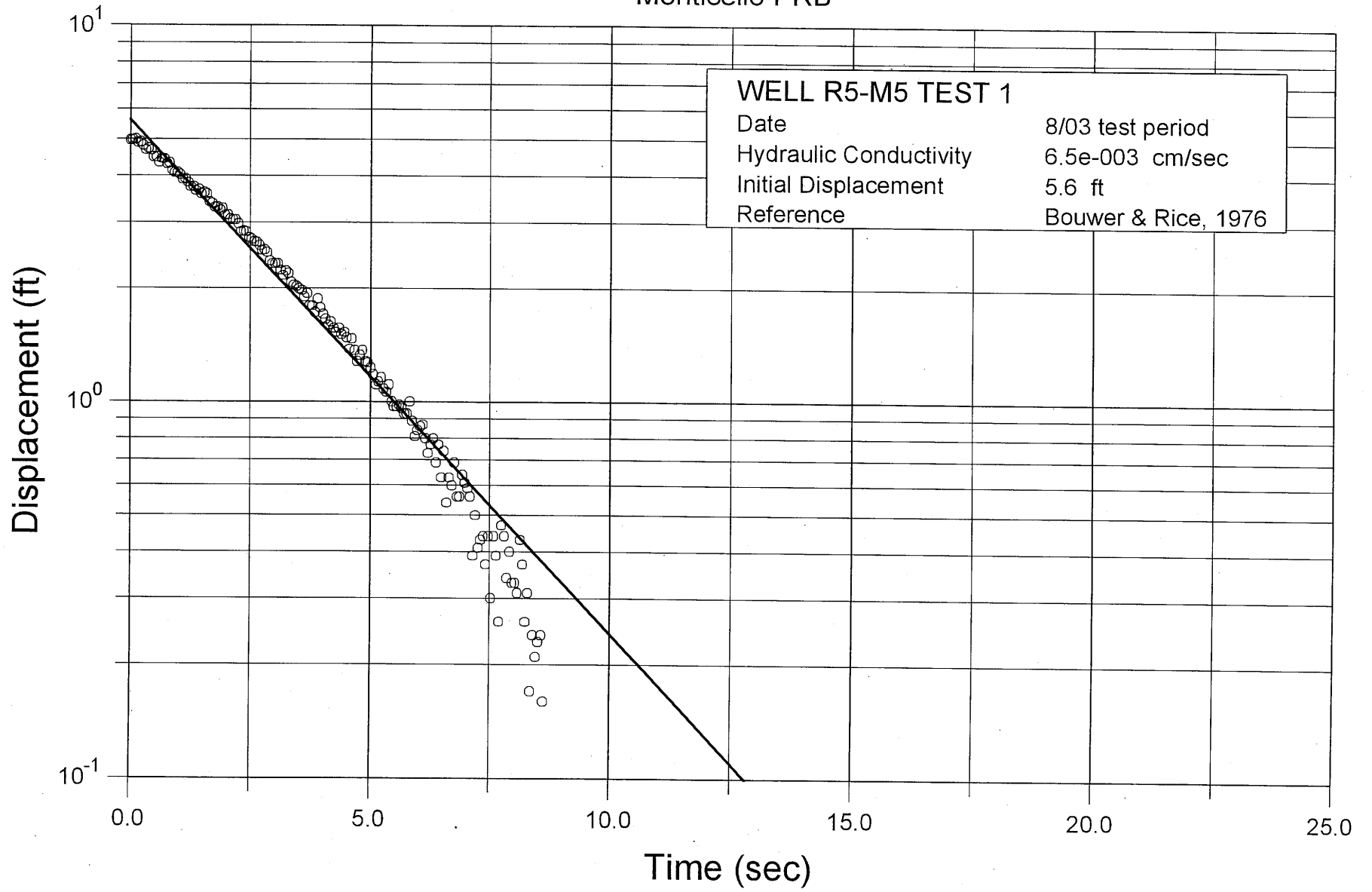
Monticello PRB



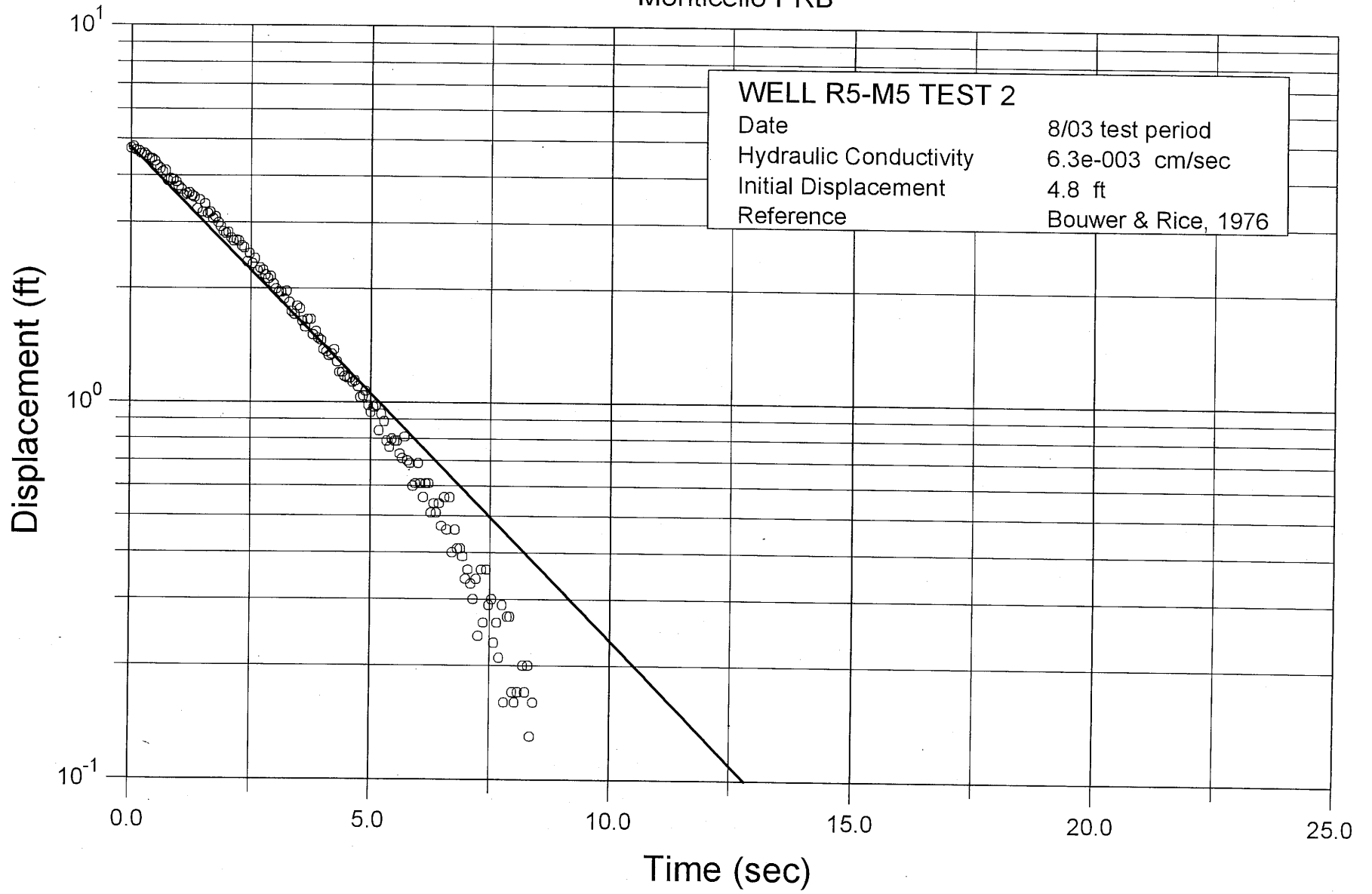
Monticello PRB



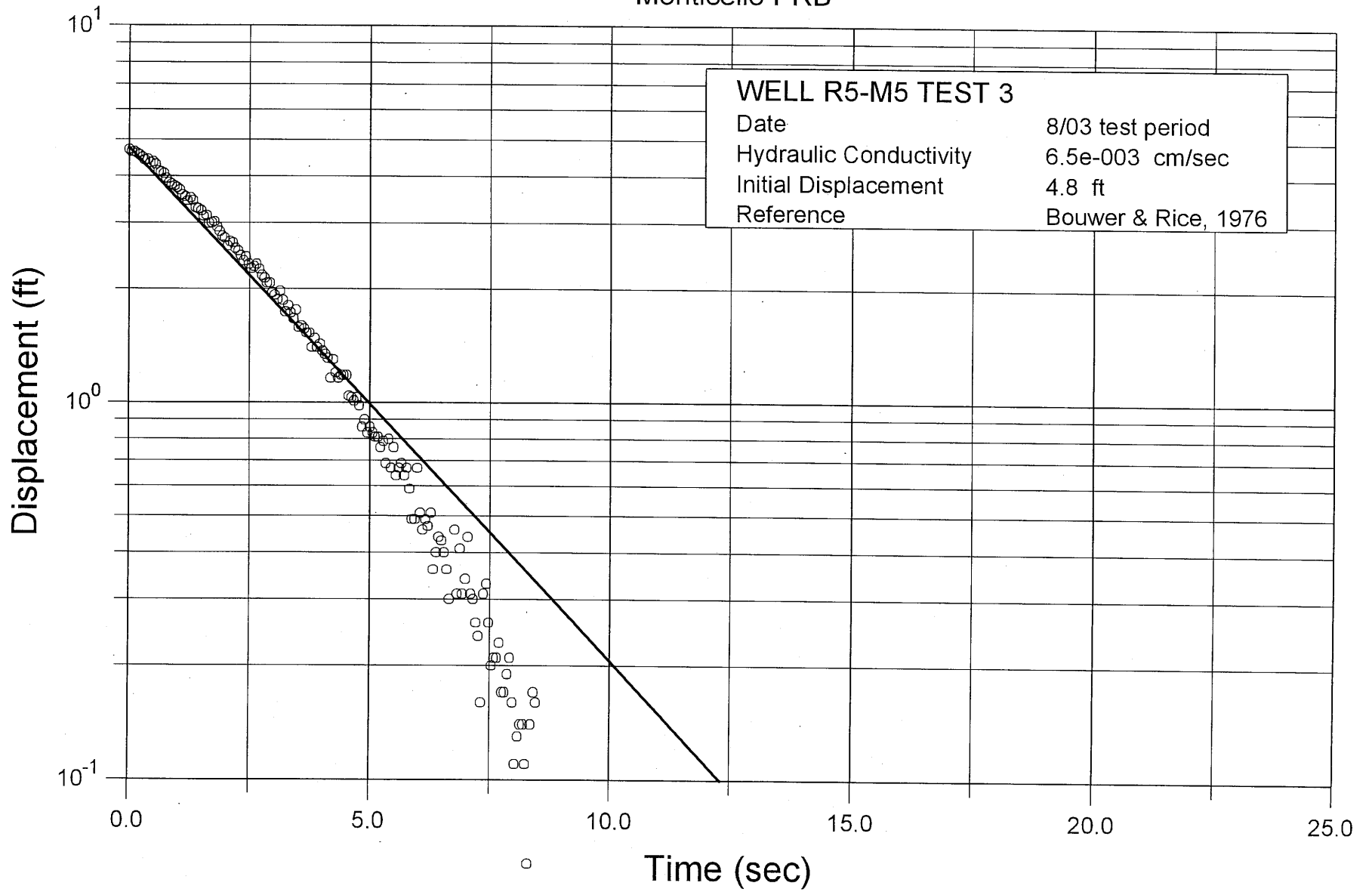
Monticello PRB



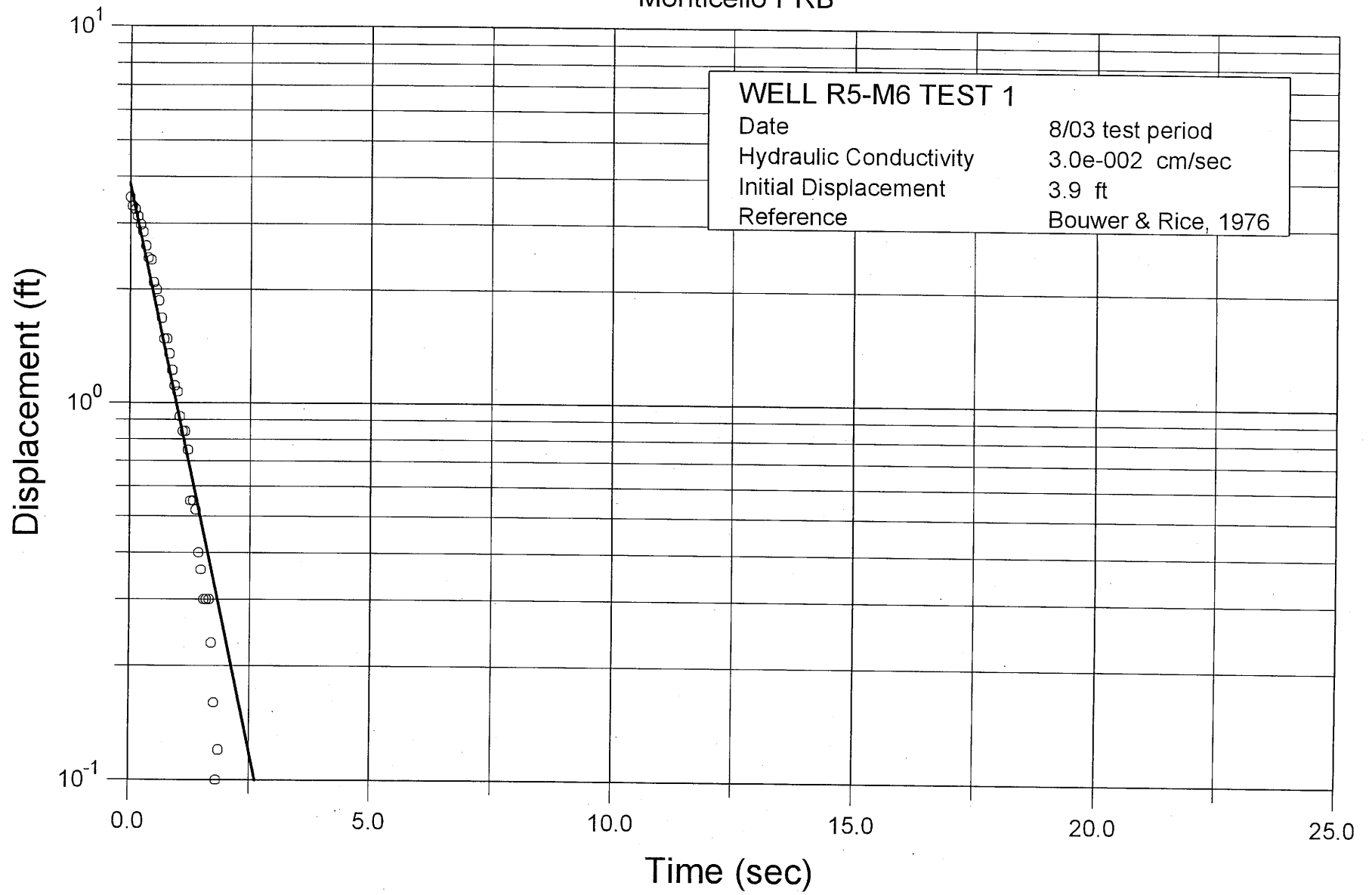
Monticello PRB



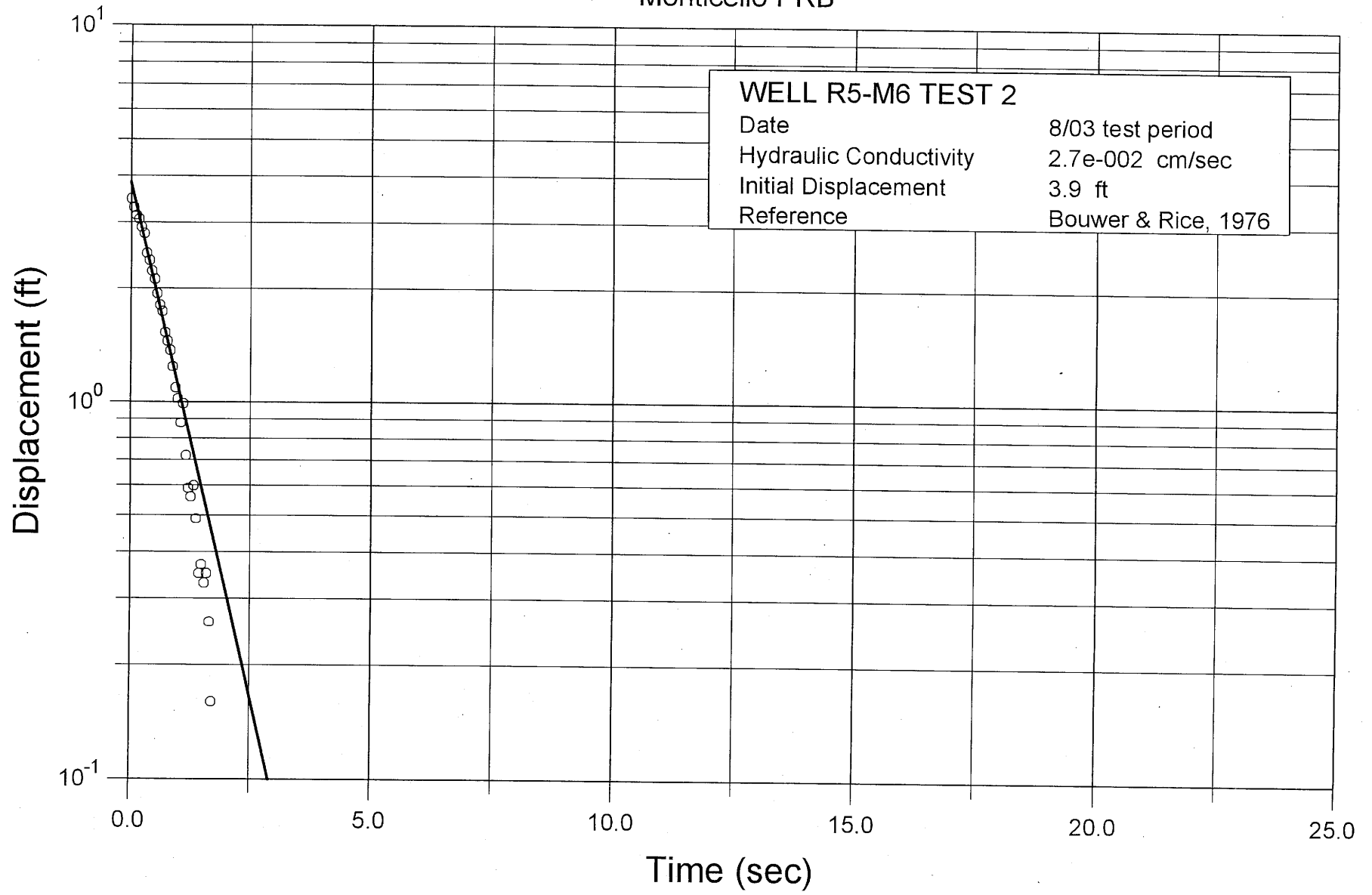
Monticello PRB



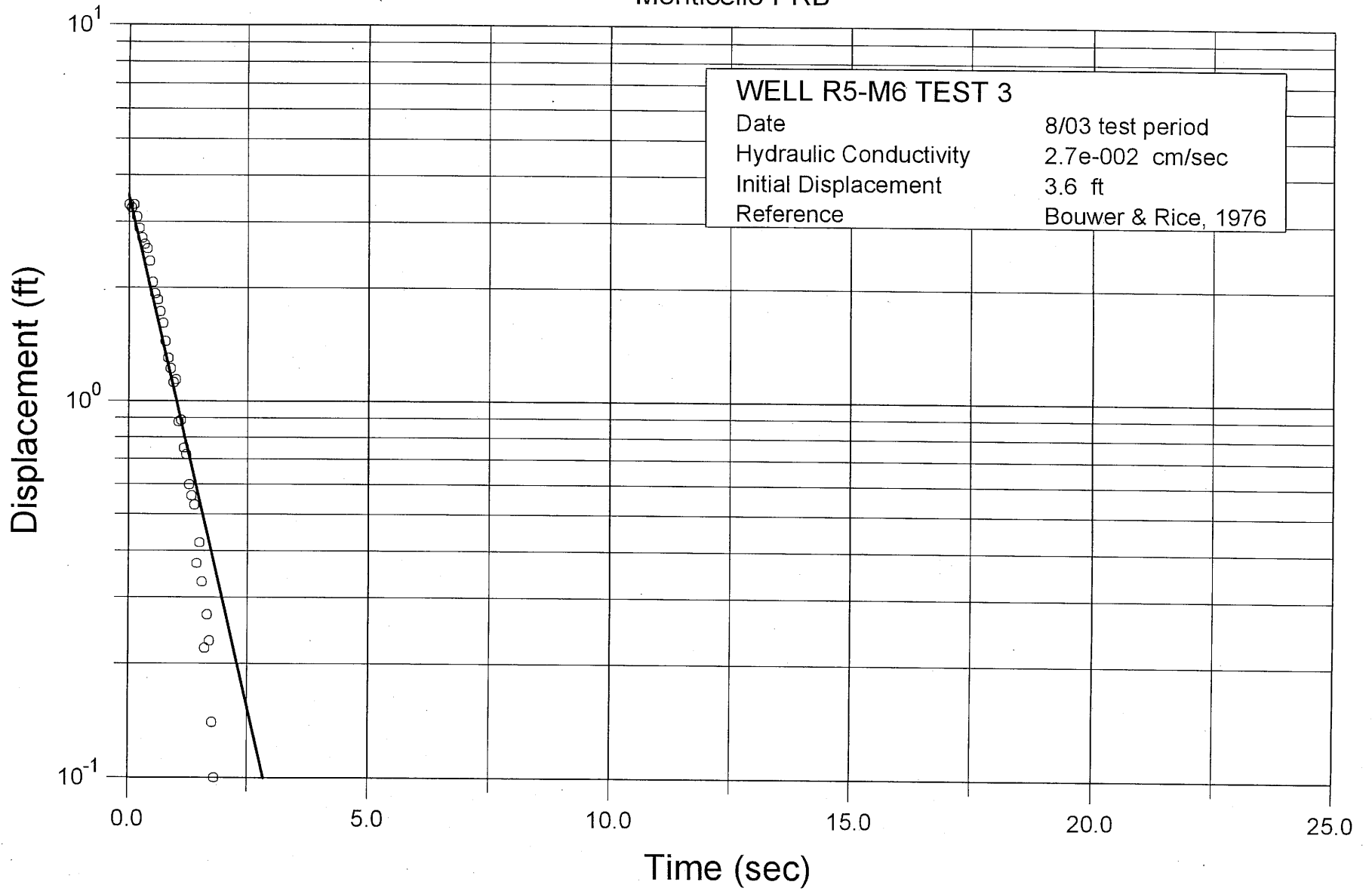
Monticello PRB



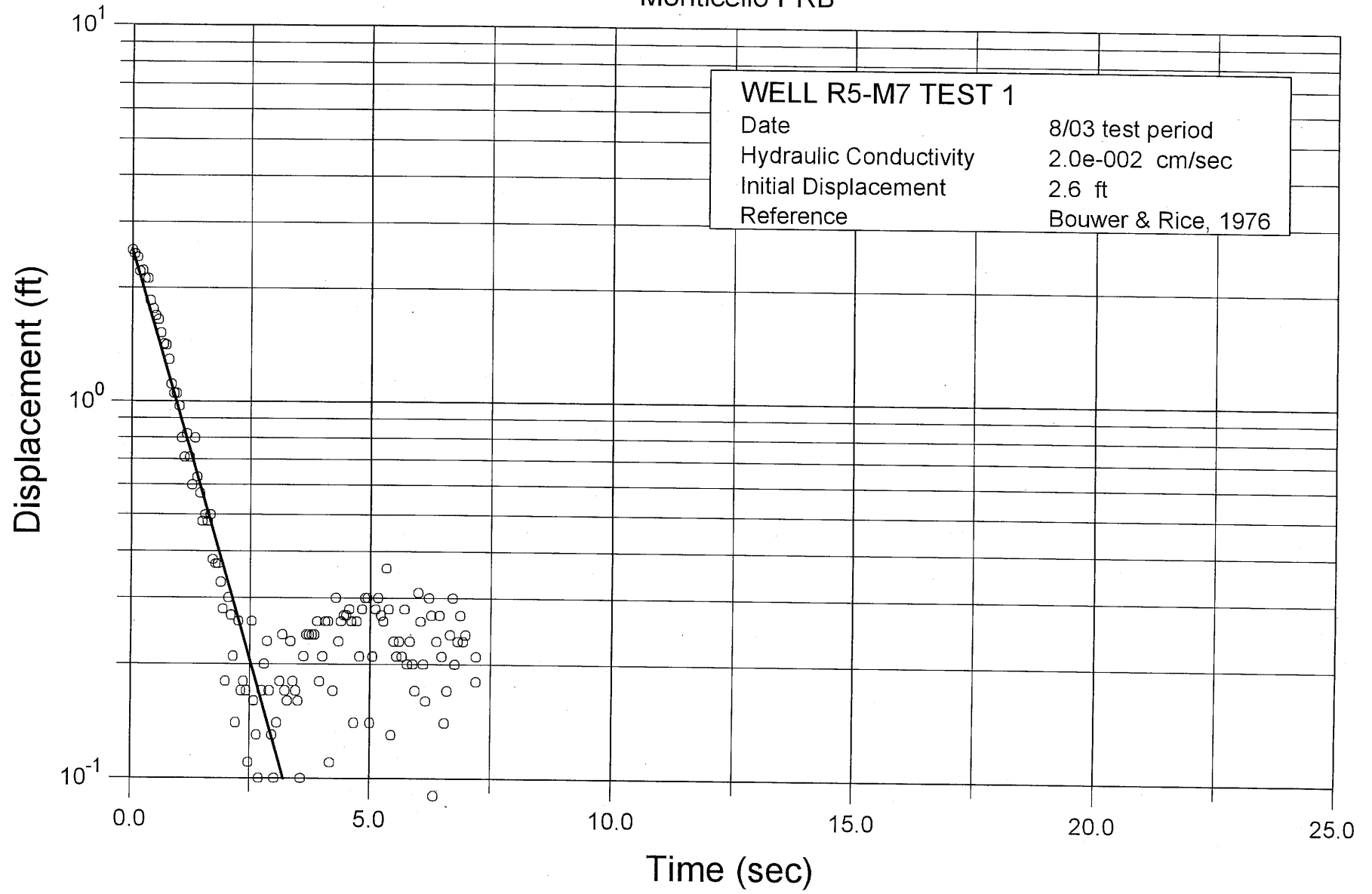
Monticello PRB



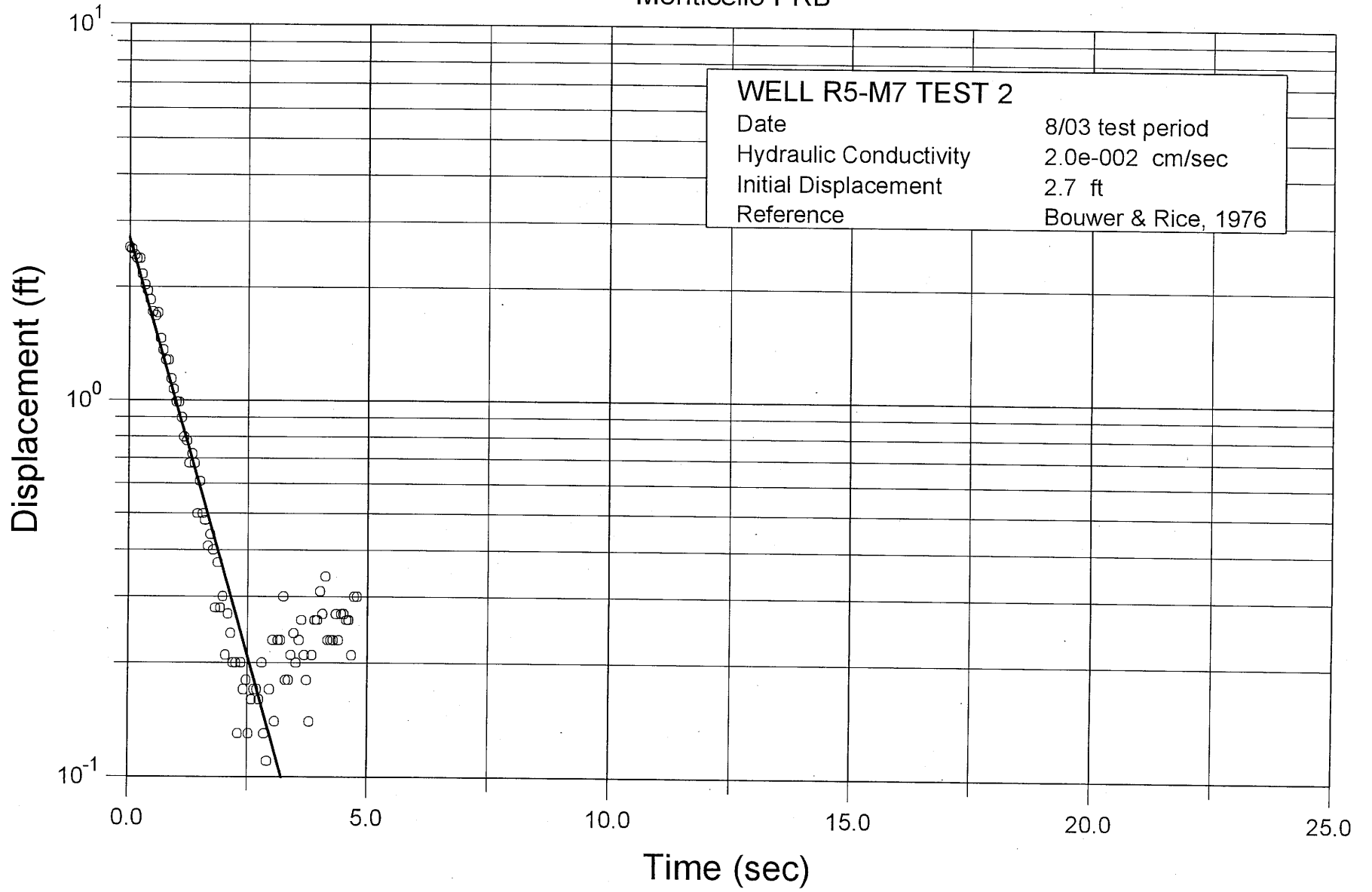
Monticello PRB



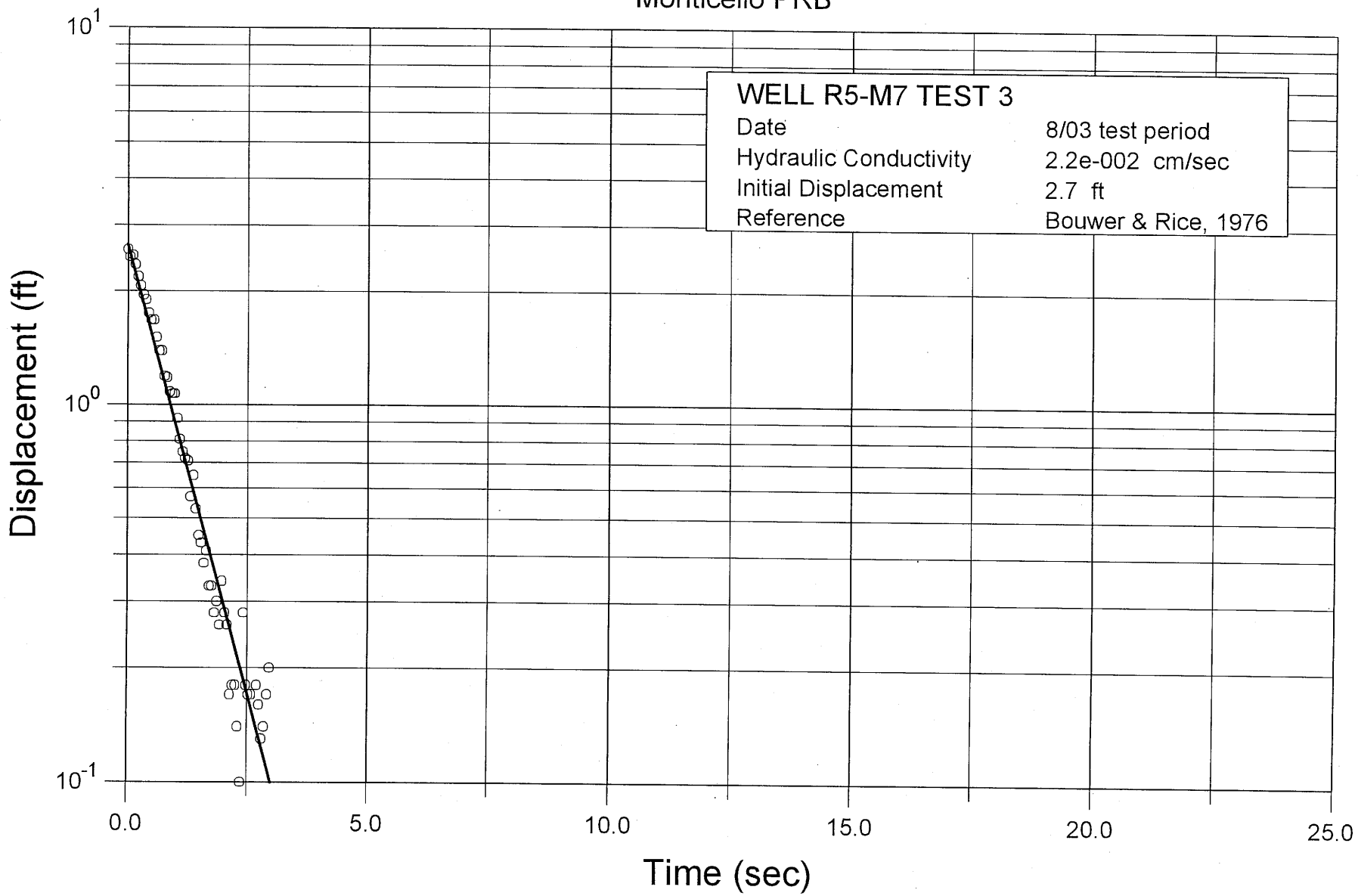
Monticello PRB



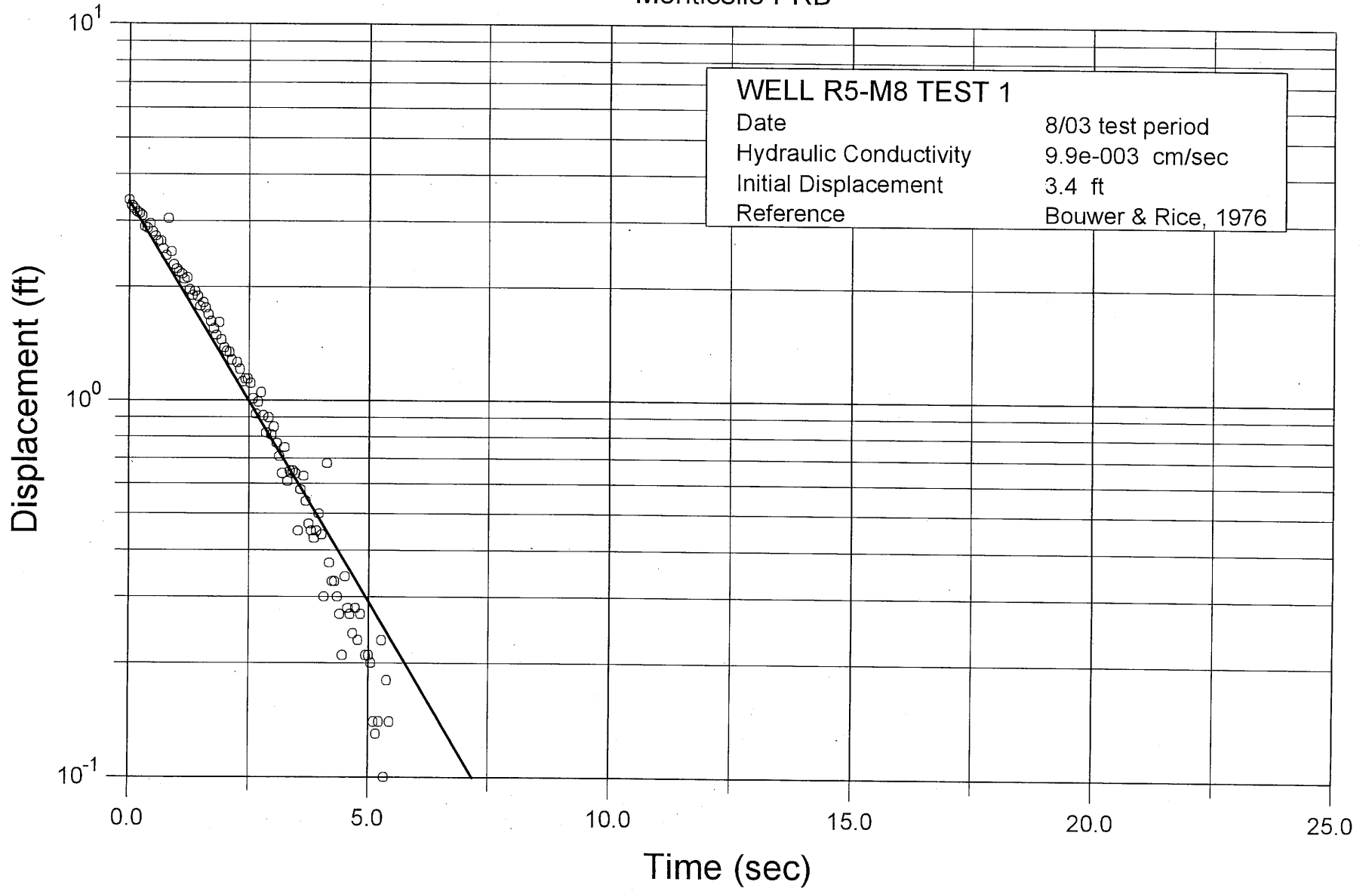
Monticello PRB



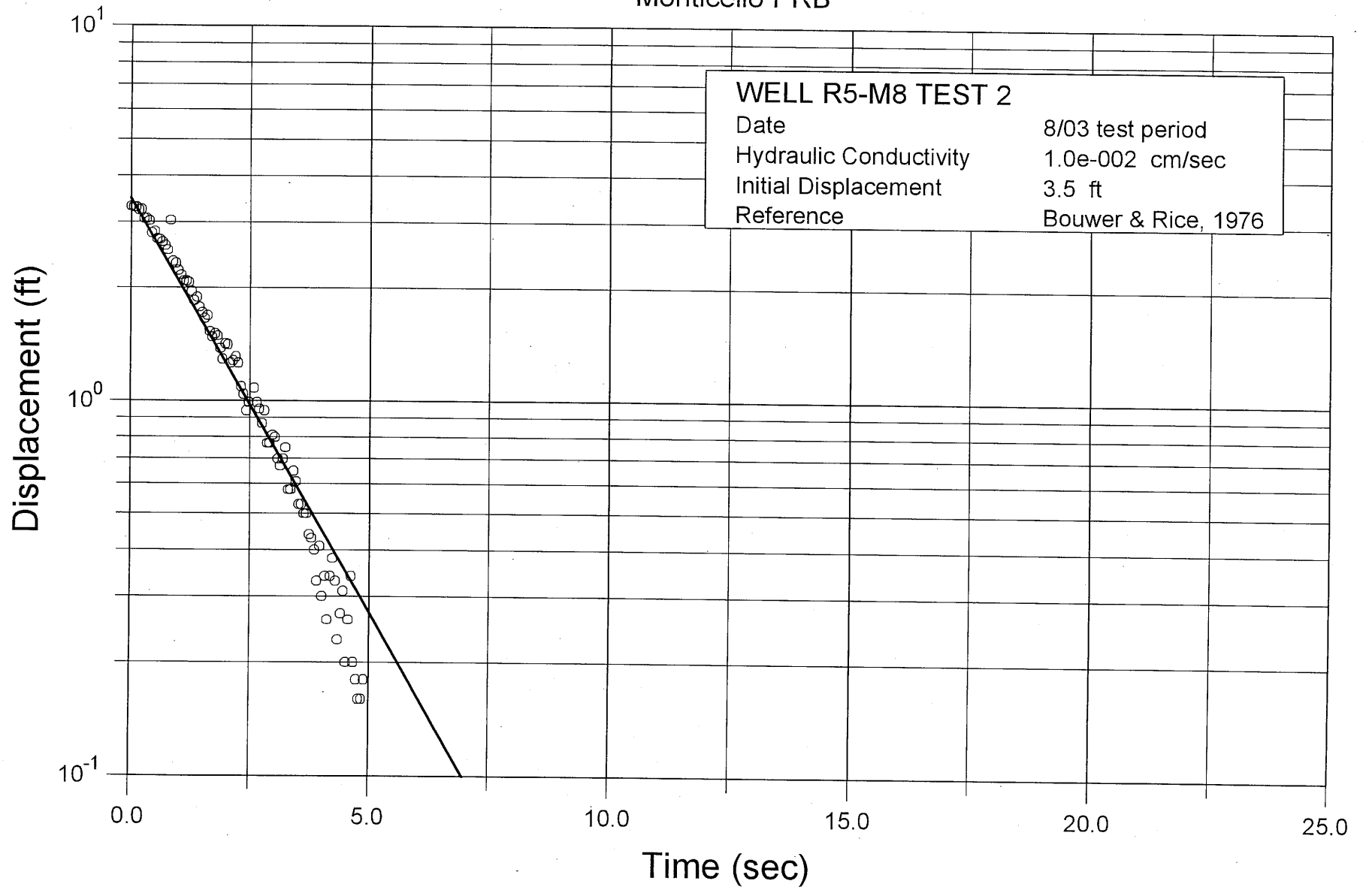
Monticello PRB



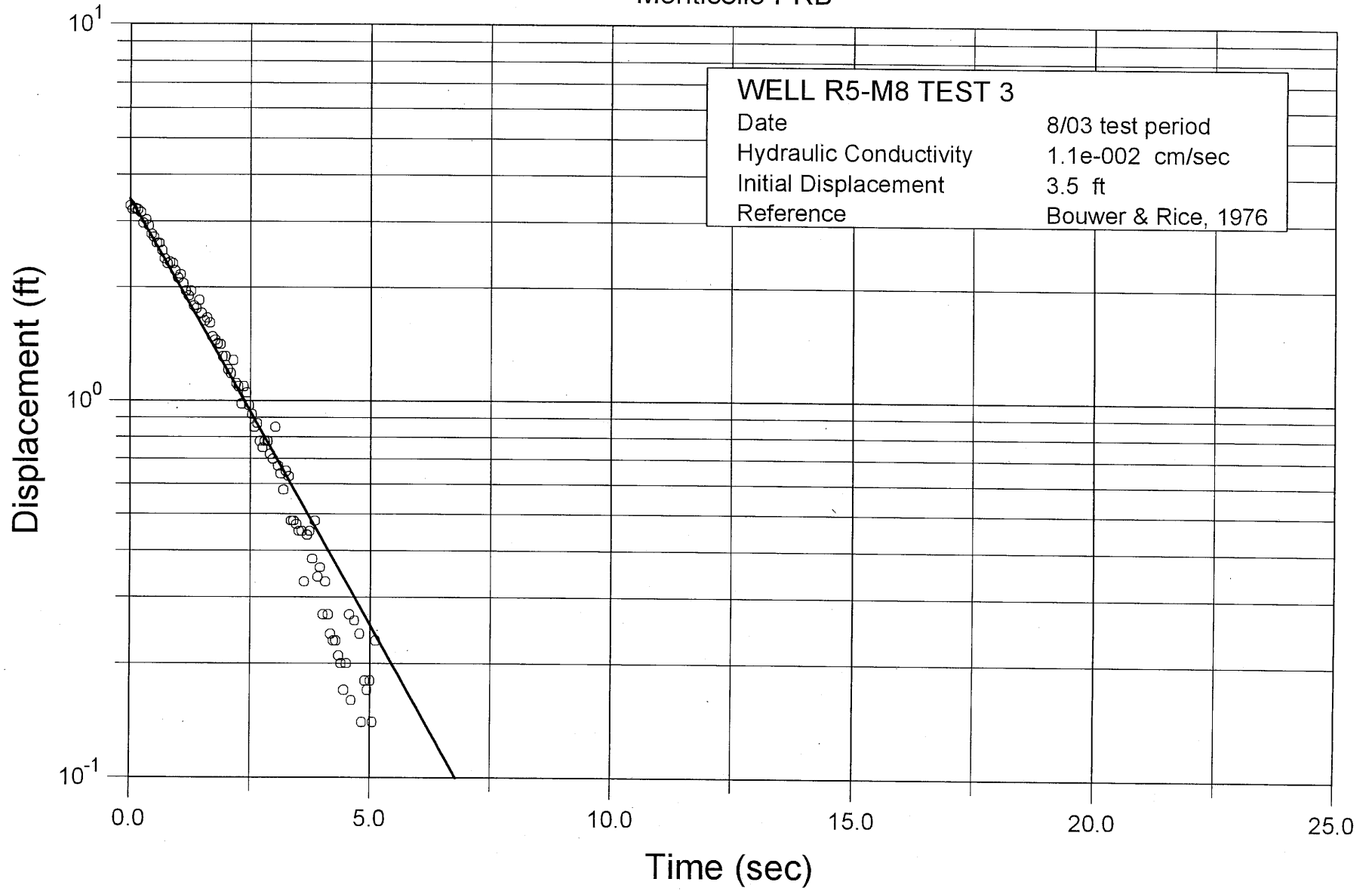
Monticello PRB



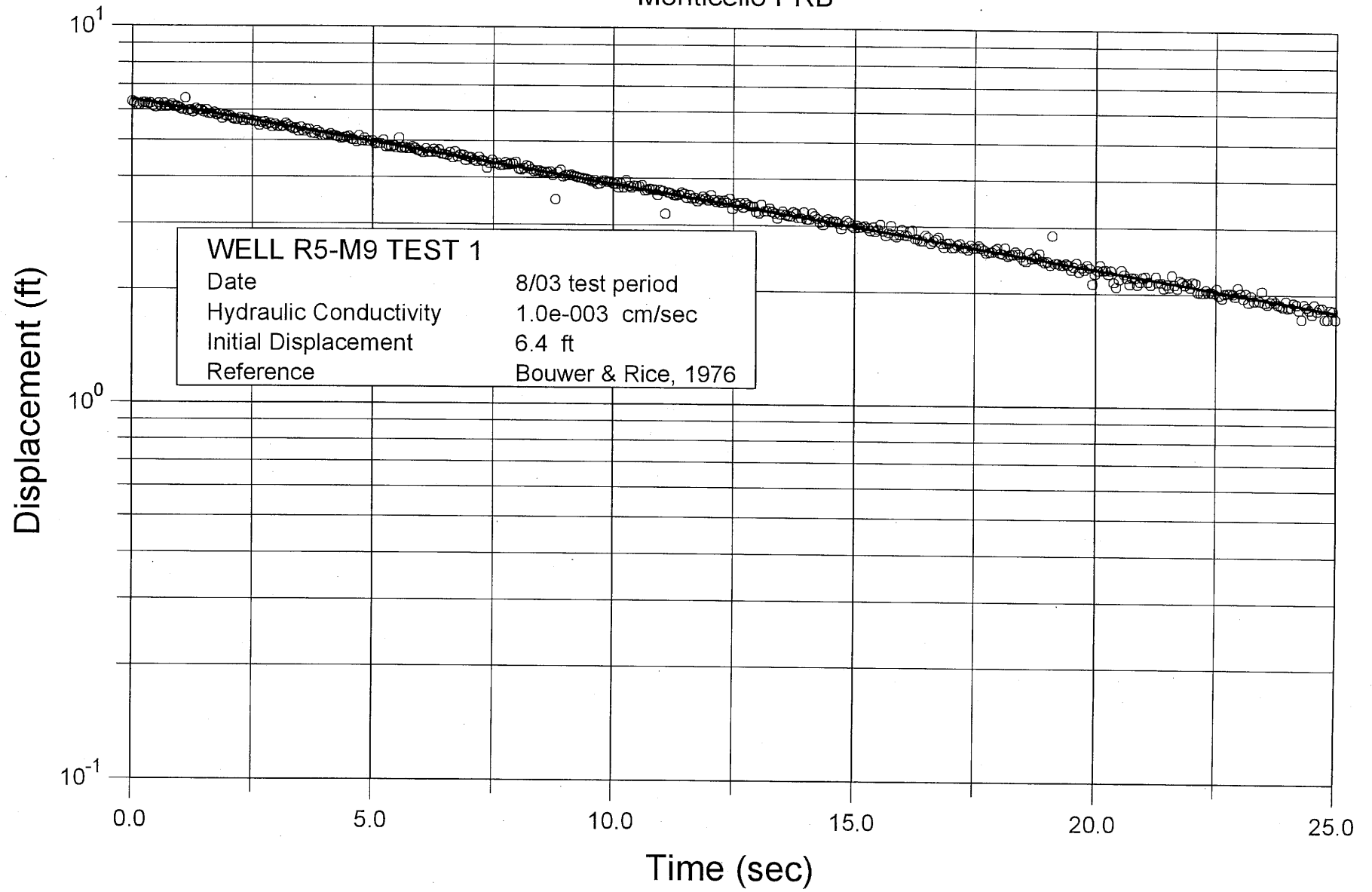
Monticello PRB



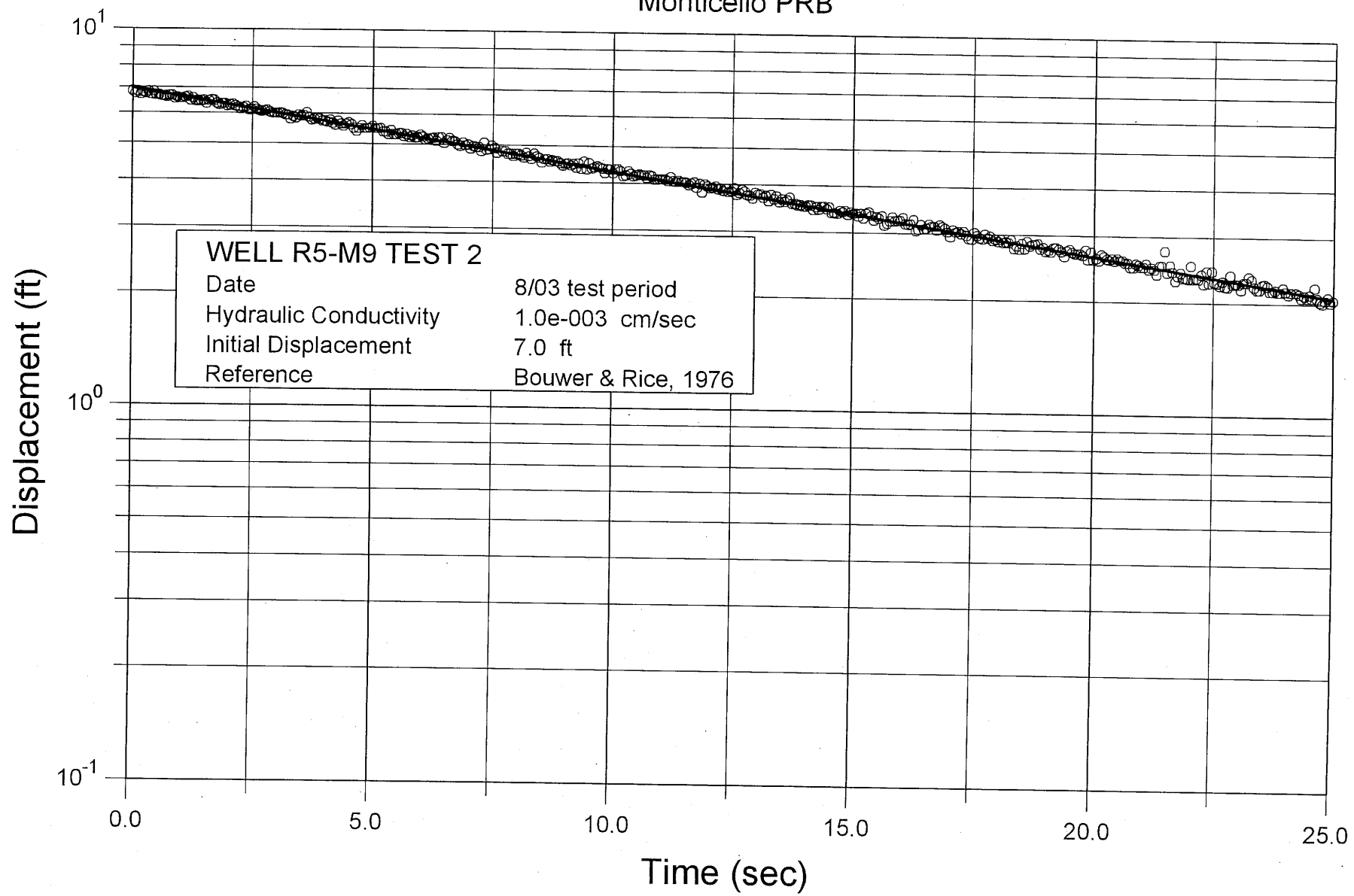
Monticello PRB



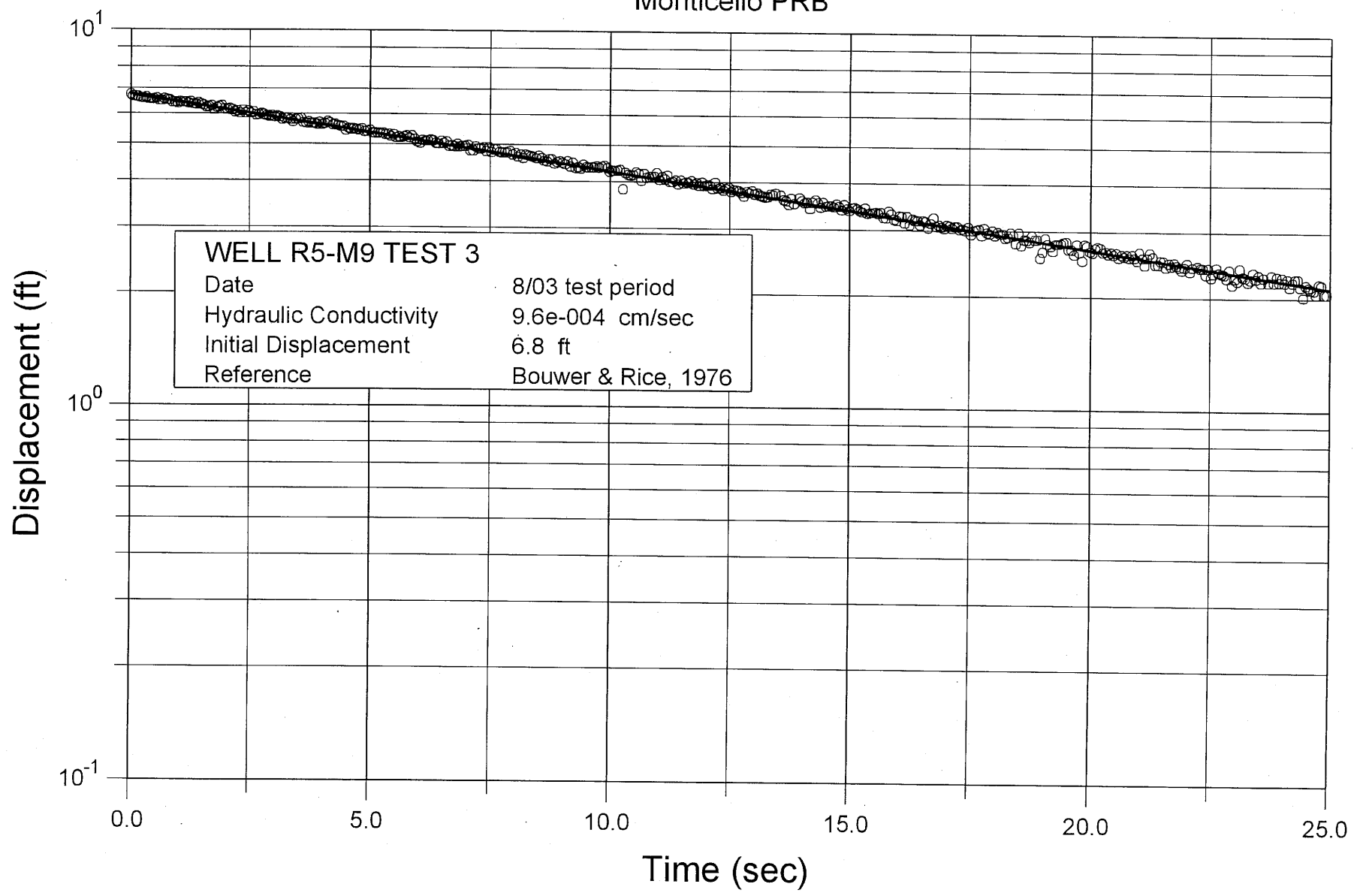
Monticello PRB



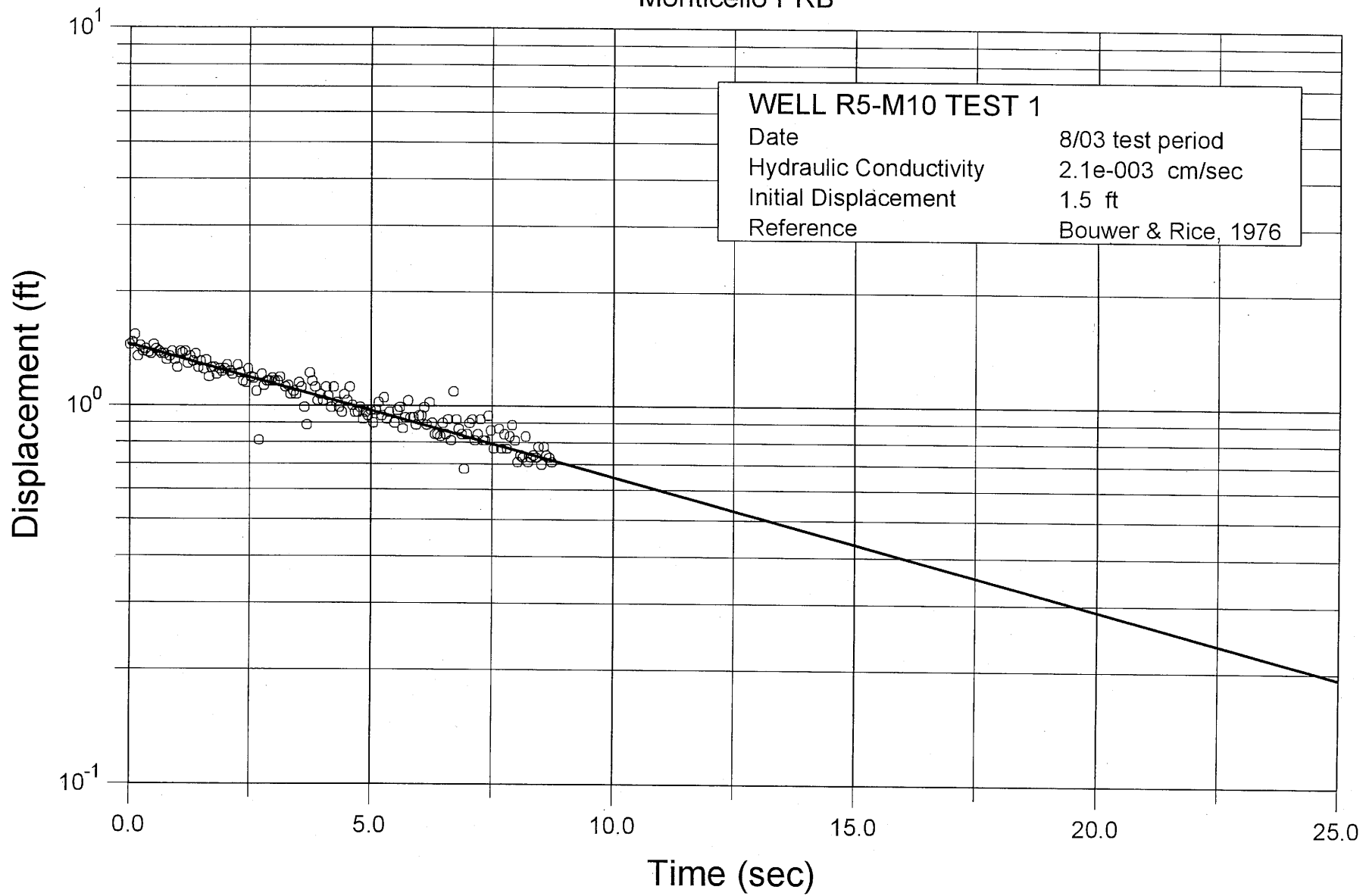
Monticello PRB



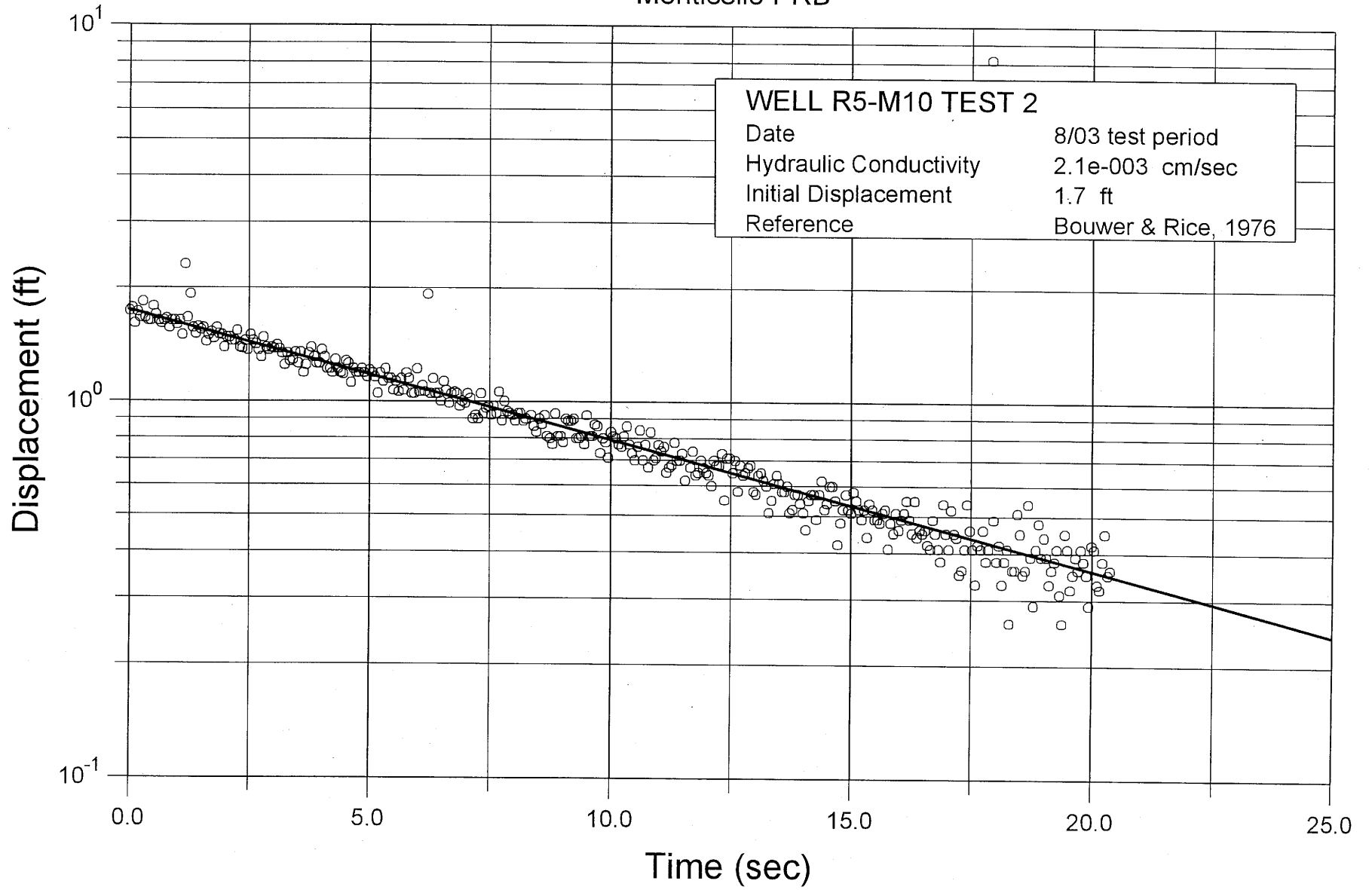
Monticello PRB



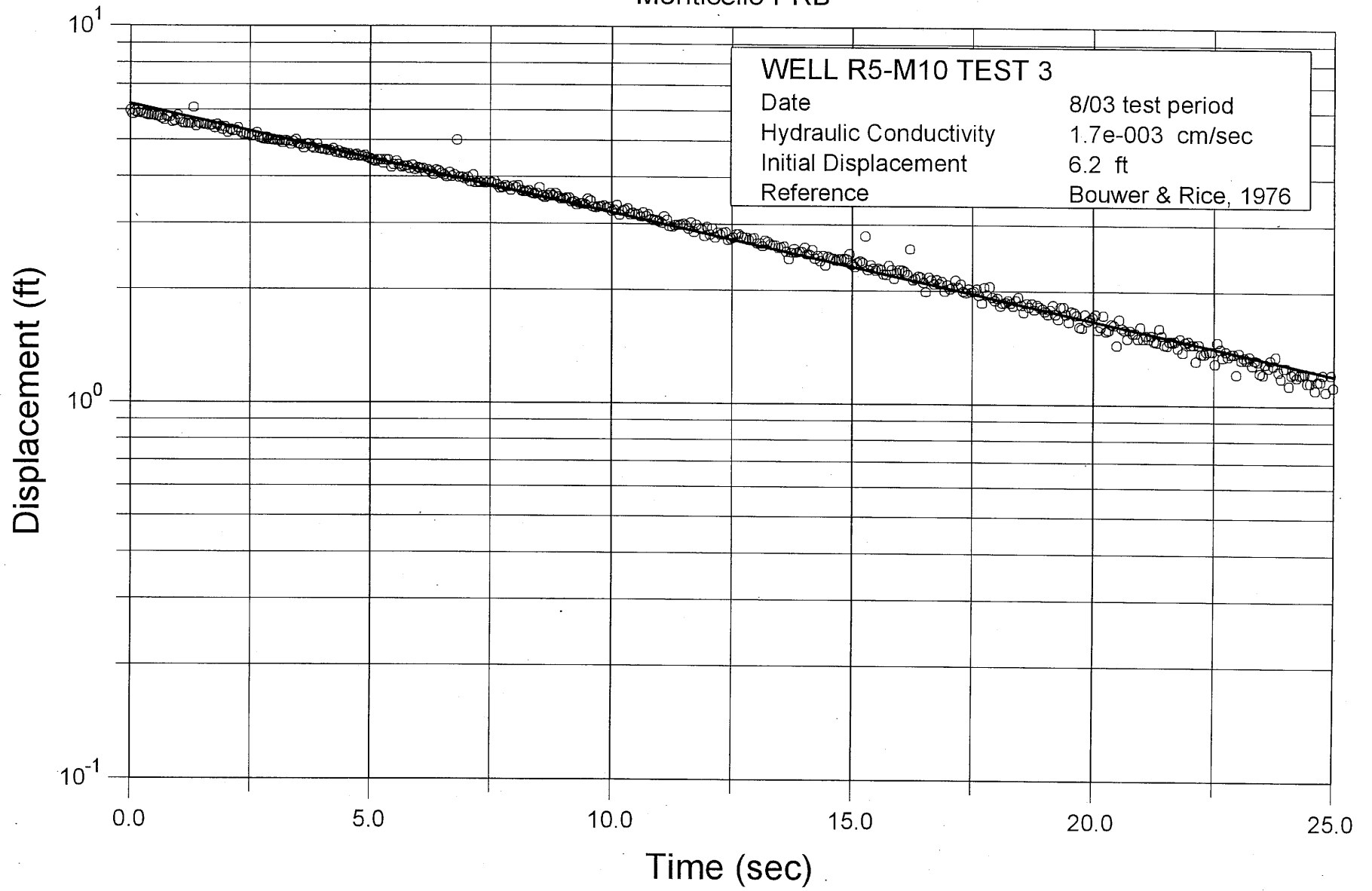
Monticello PRB



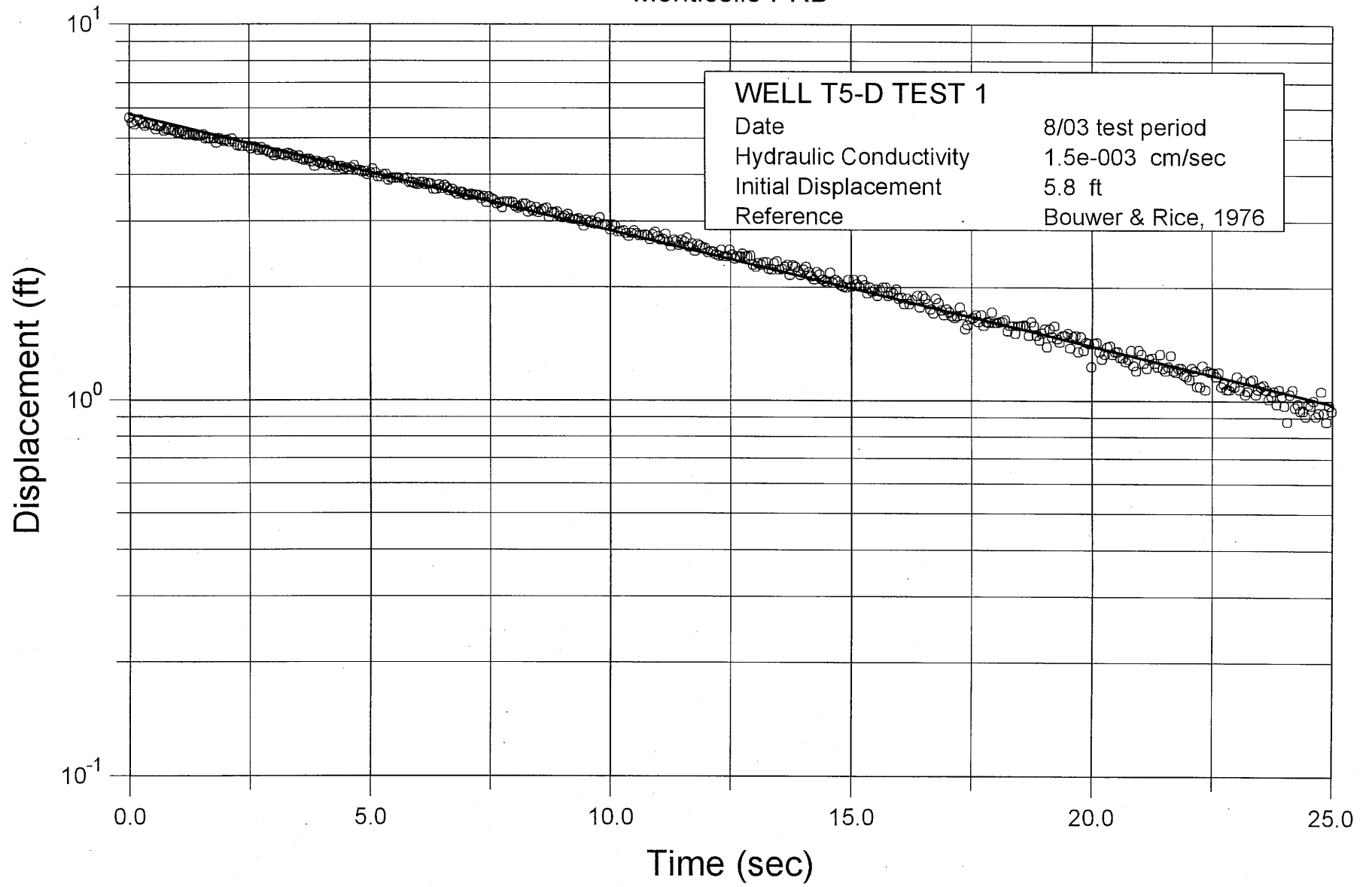
Monticello PRB



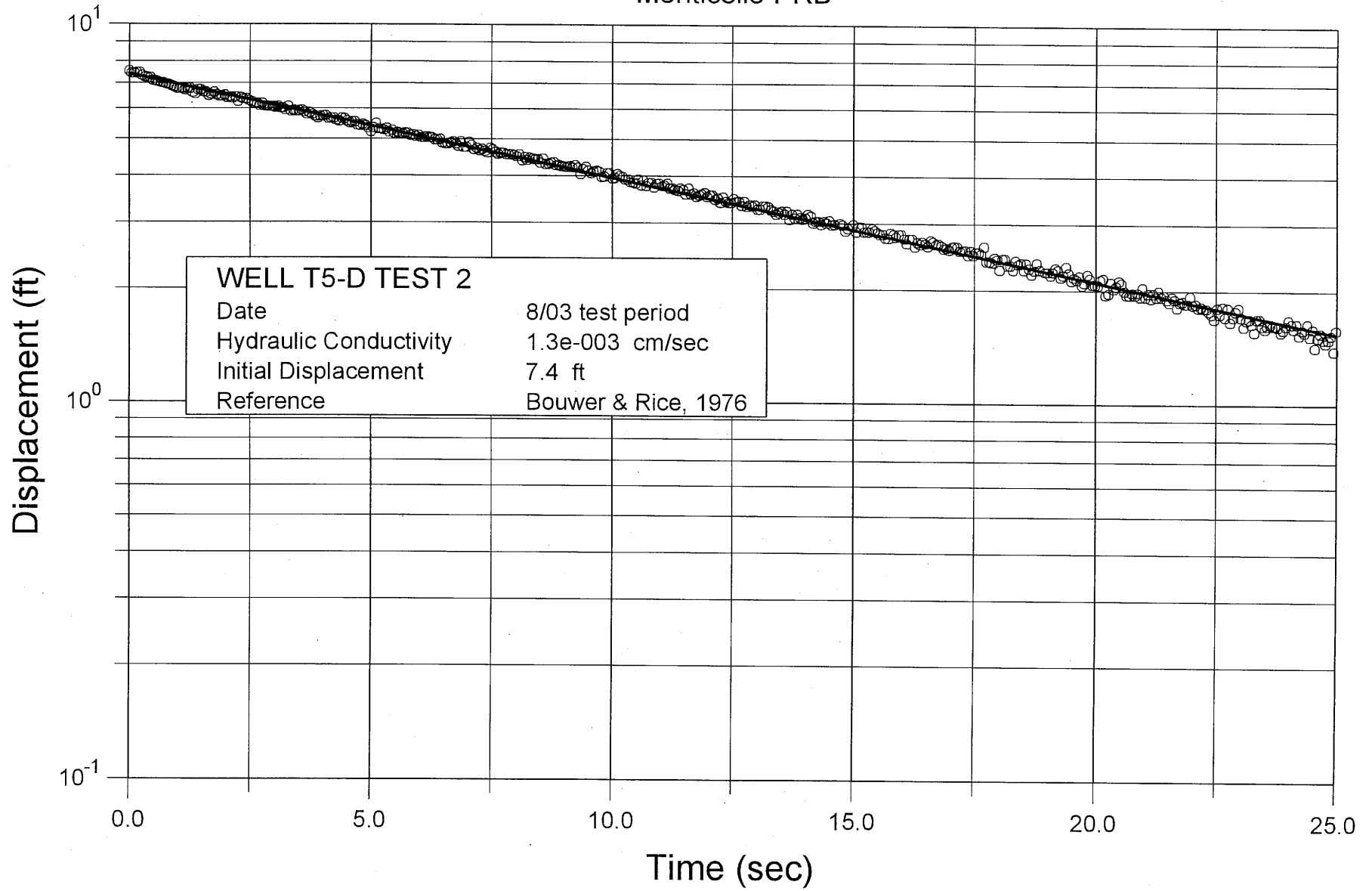
Monticello PRB



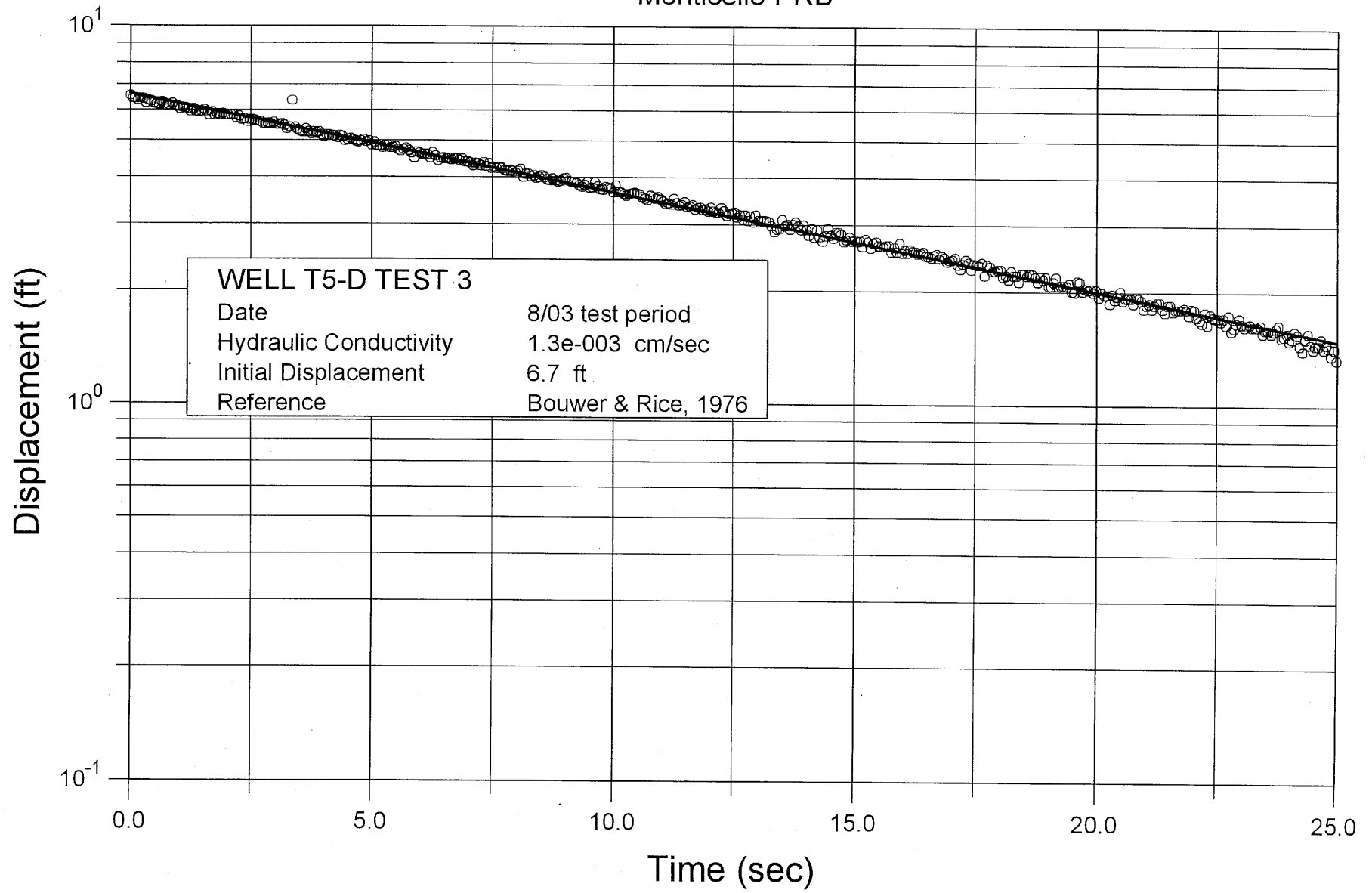
Monticello PRB



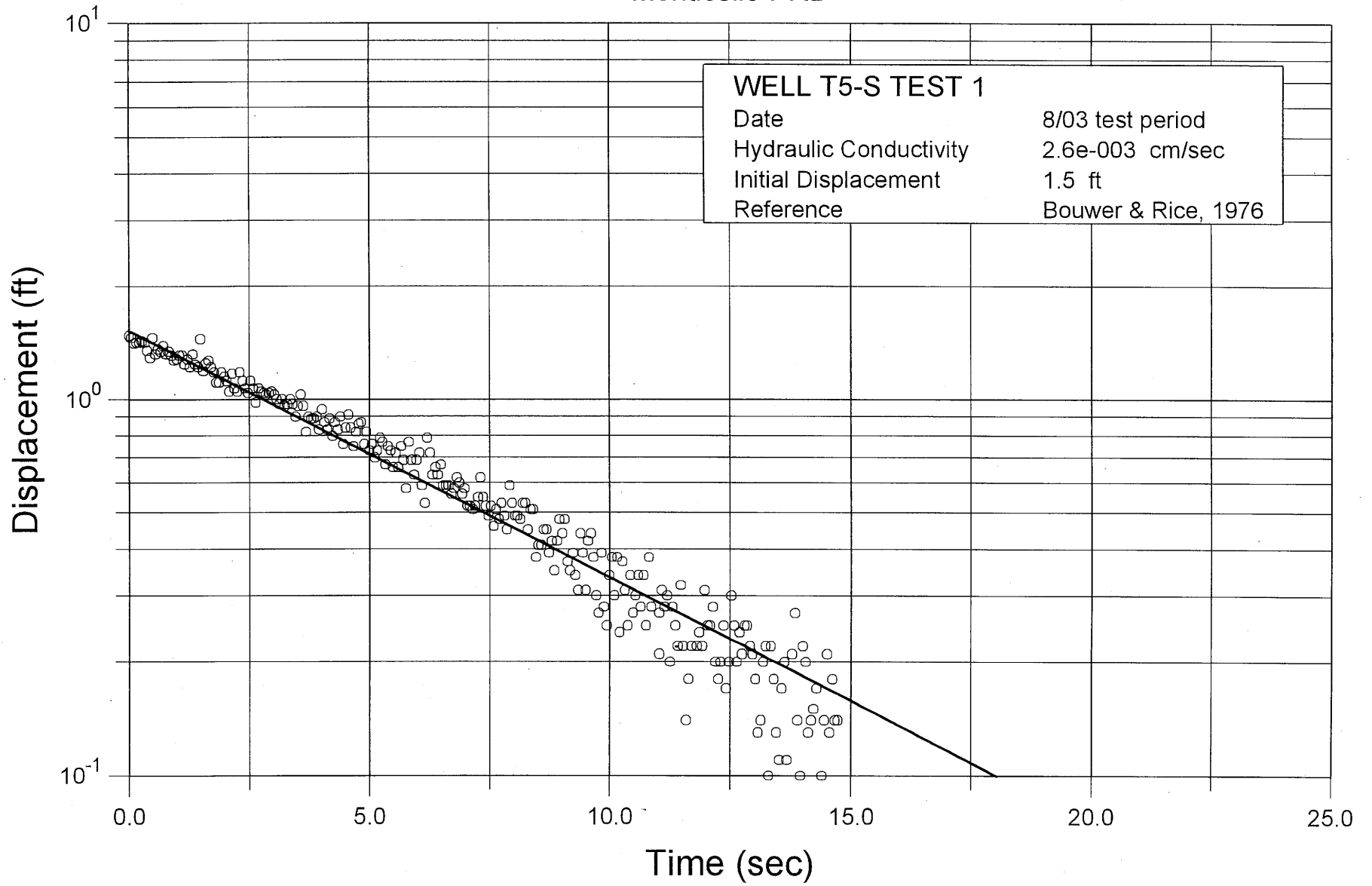
Monticello PRB



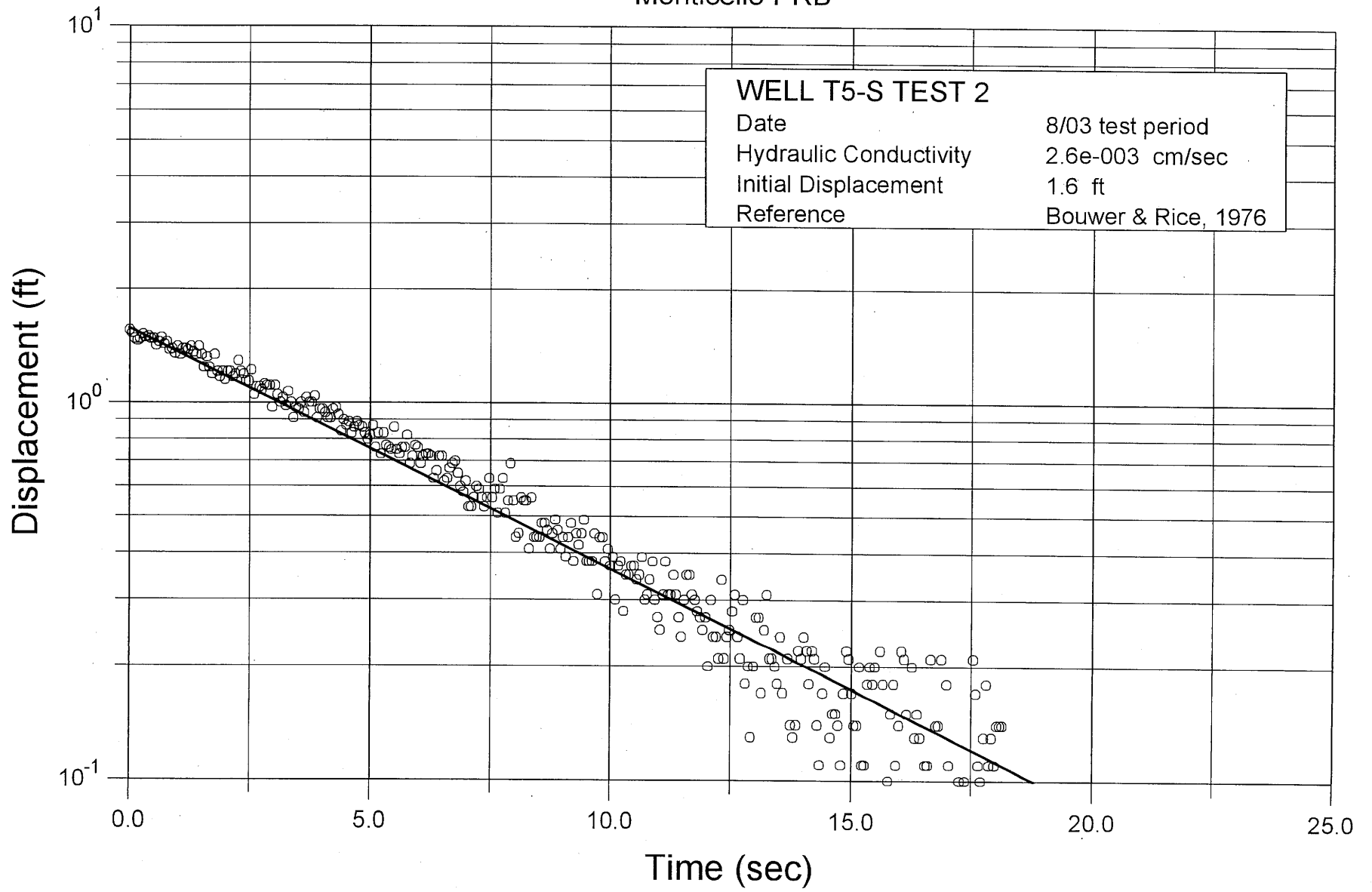
Monticello PRB



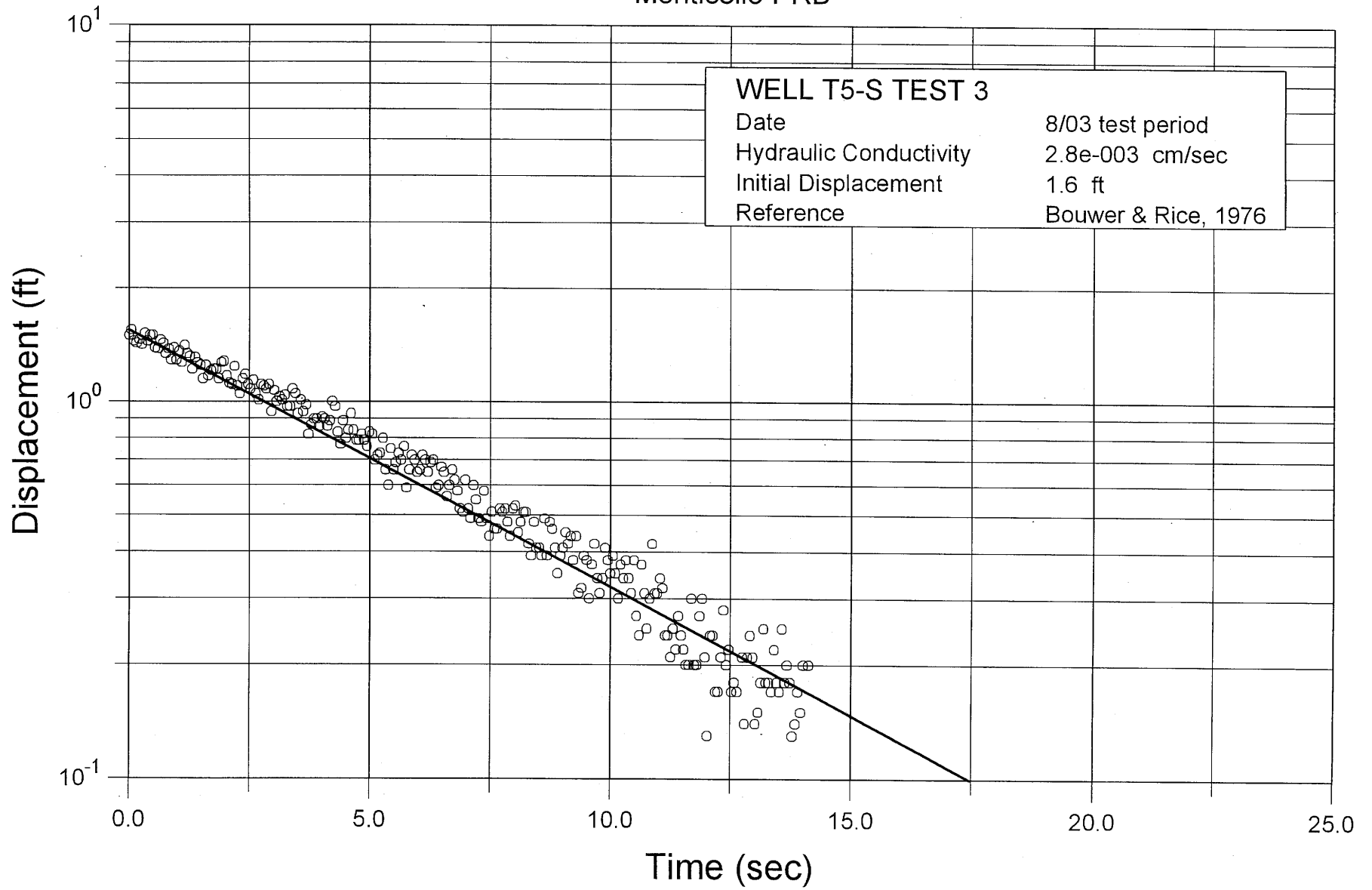
Monticello PRB



Monticello PRB

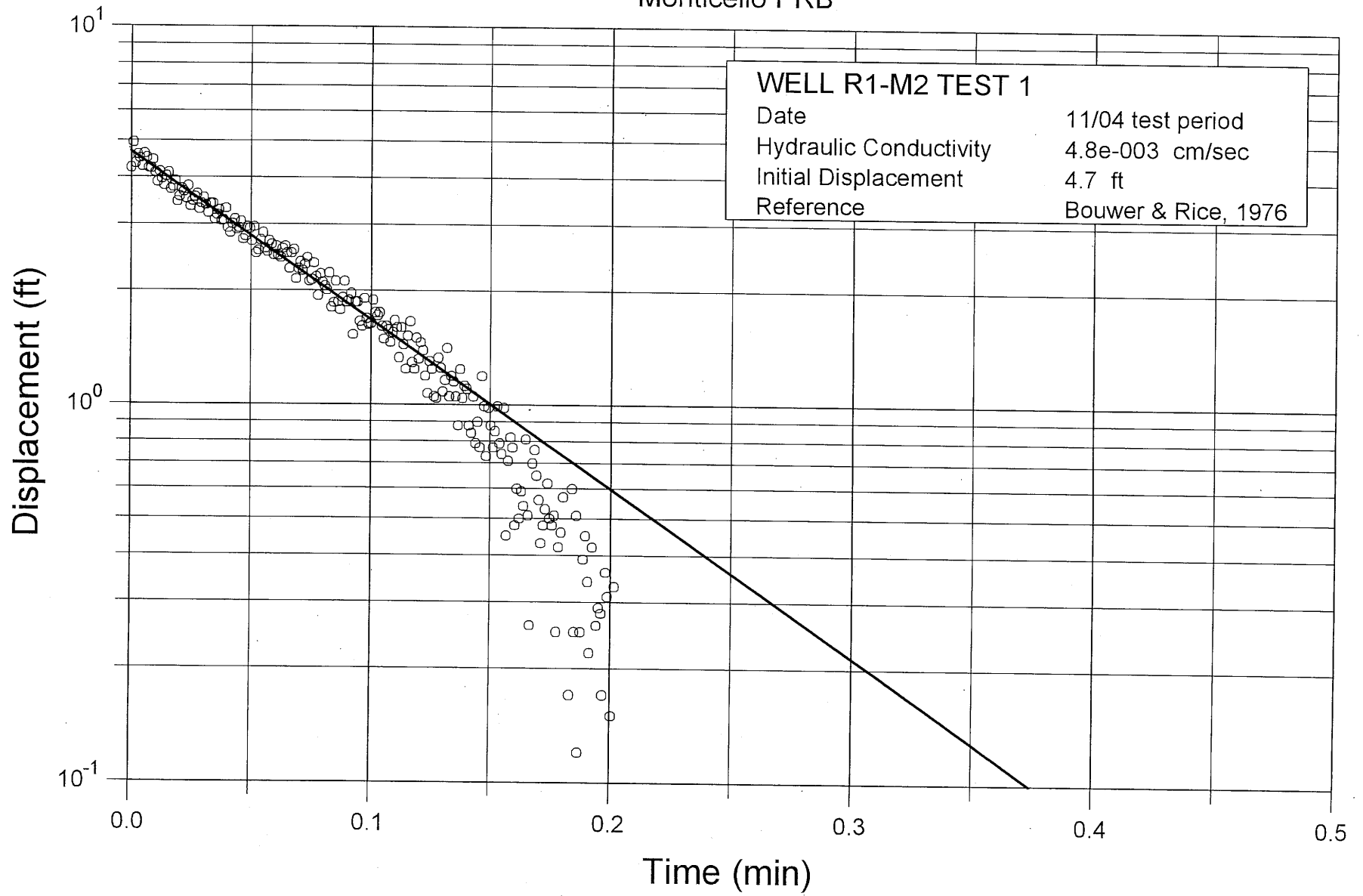


Monticello PRB

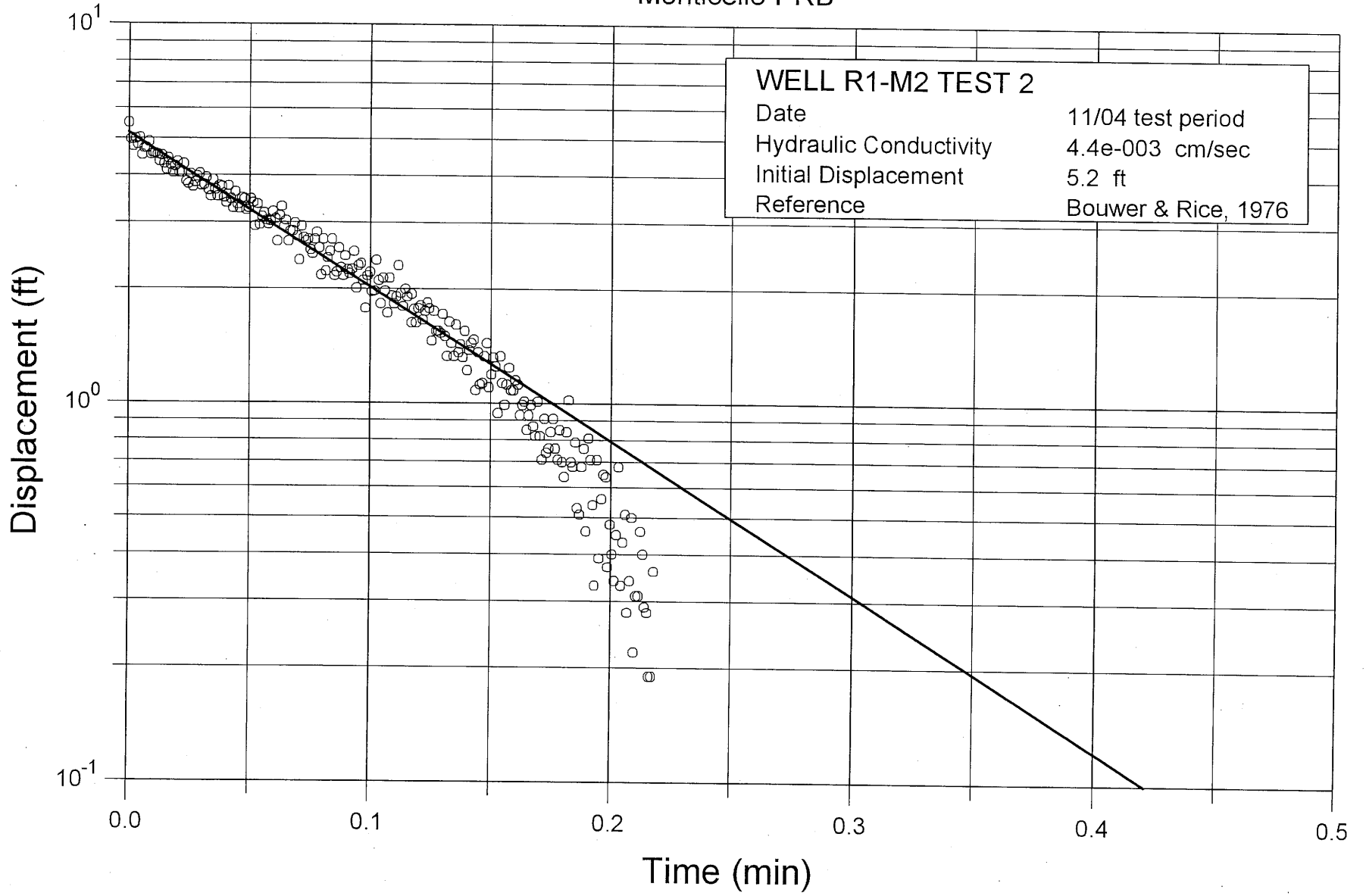


November 2004

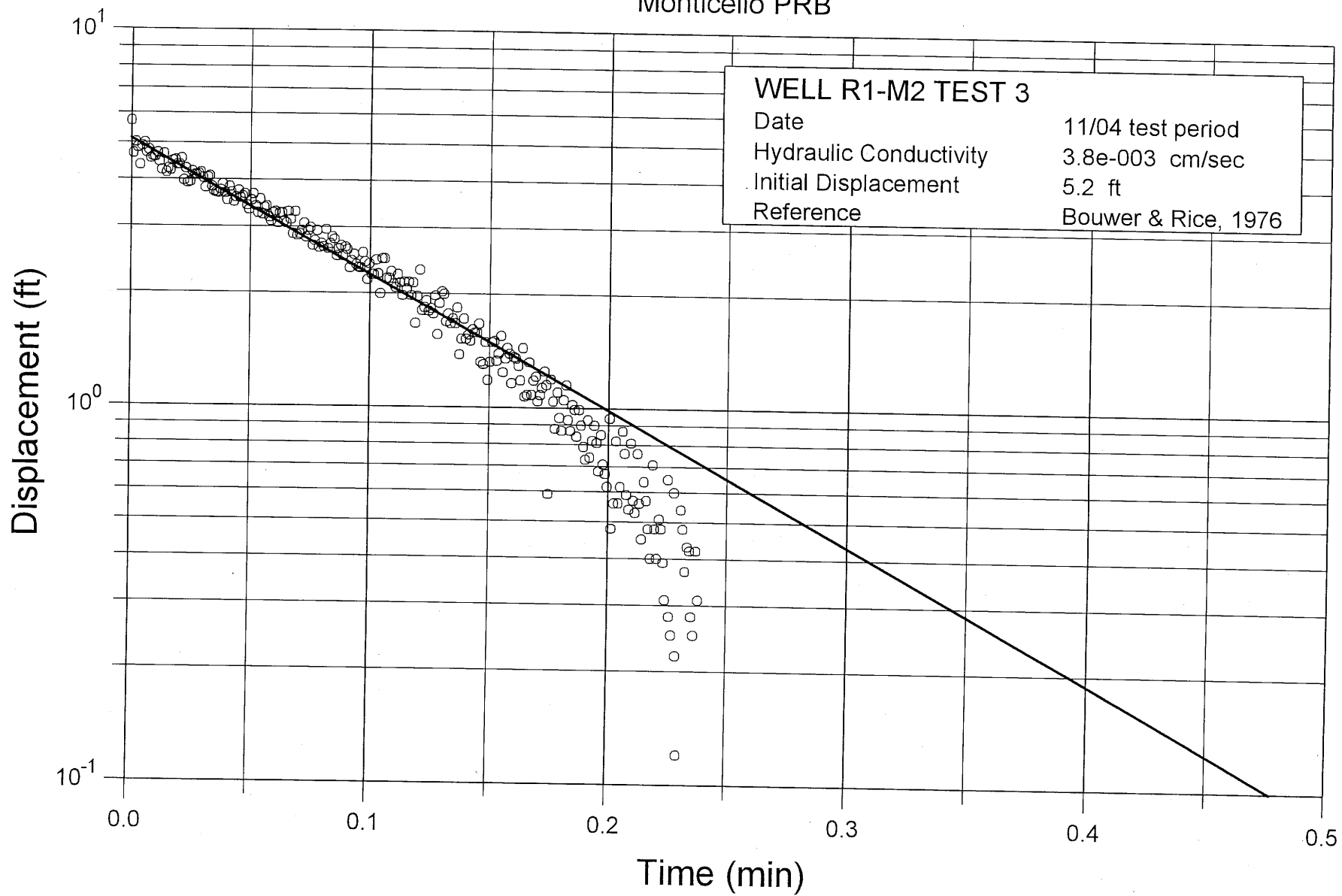
Monticello PRB



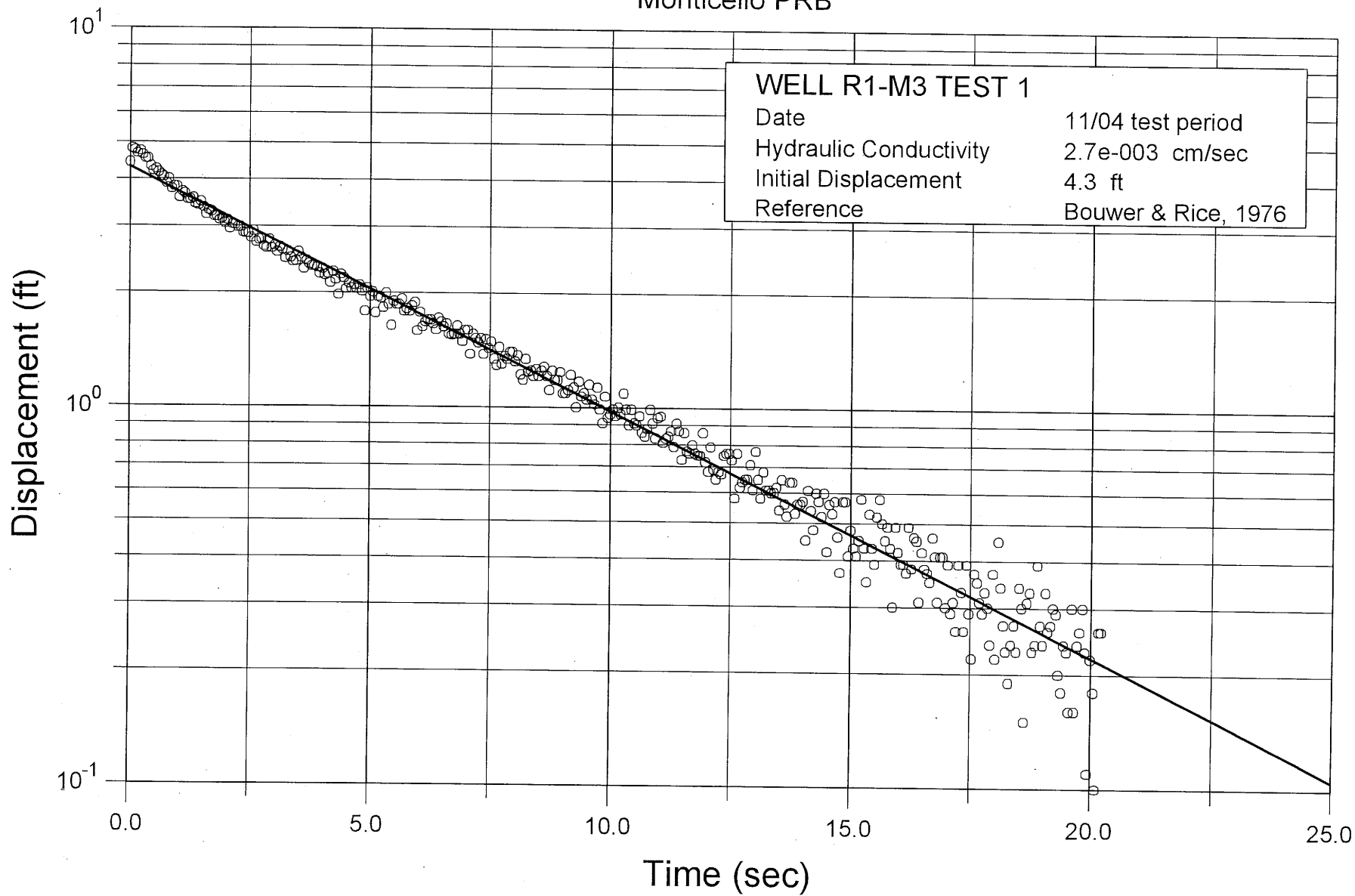
Monticello PRB



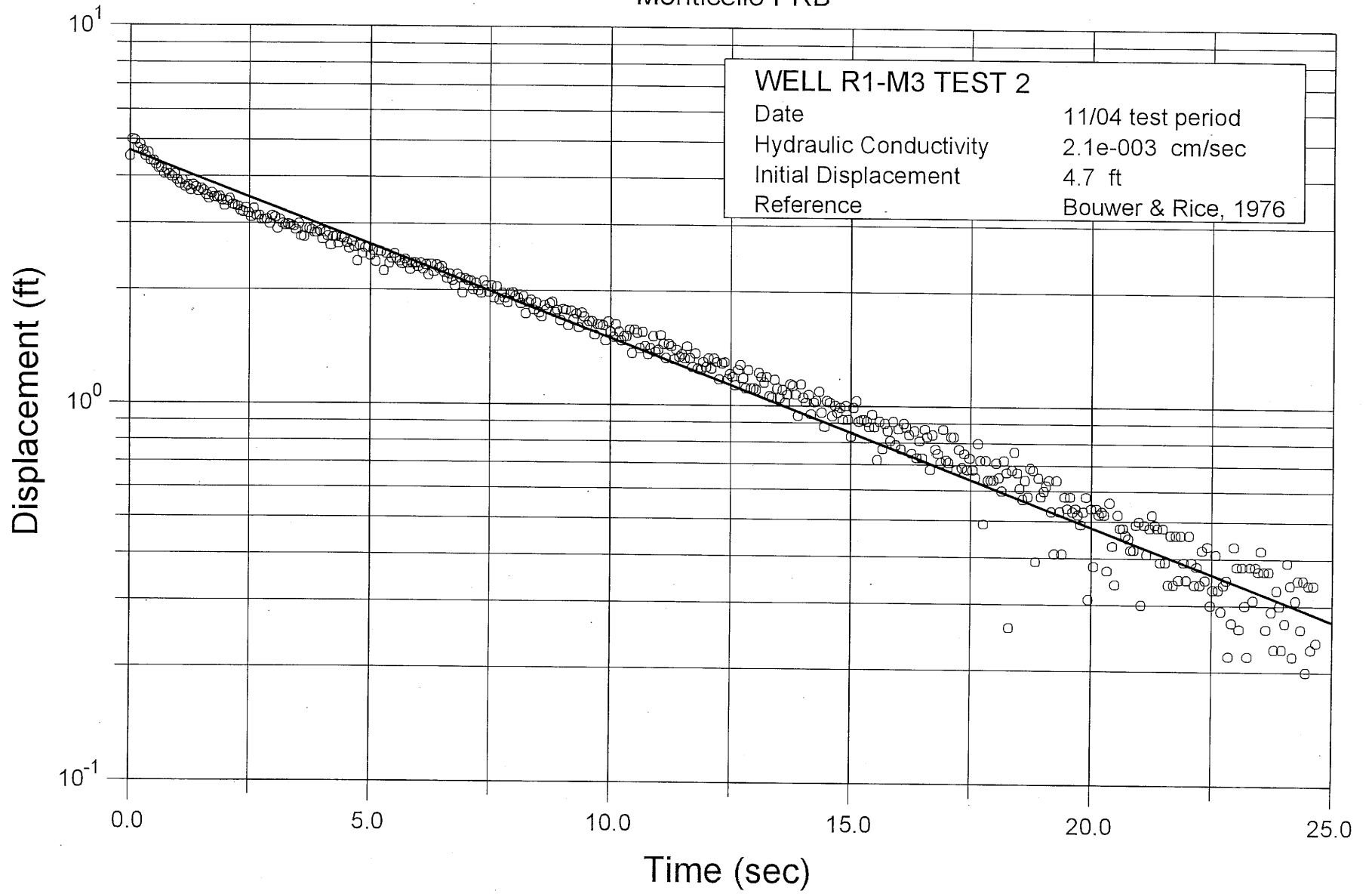
Monticello PRB



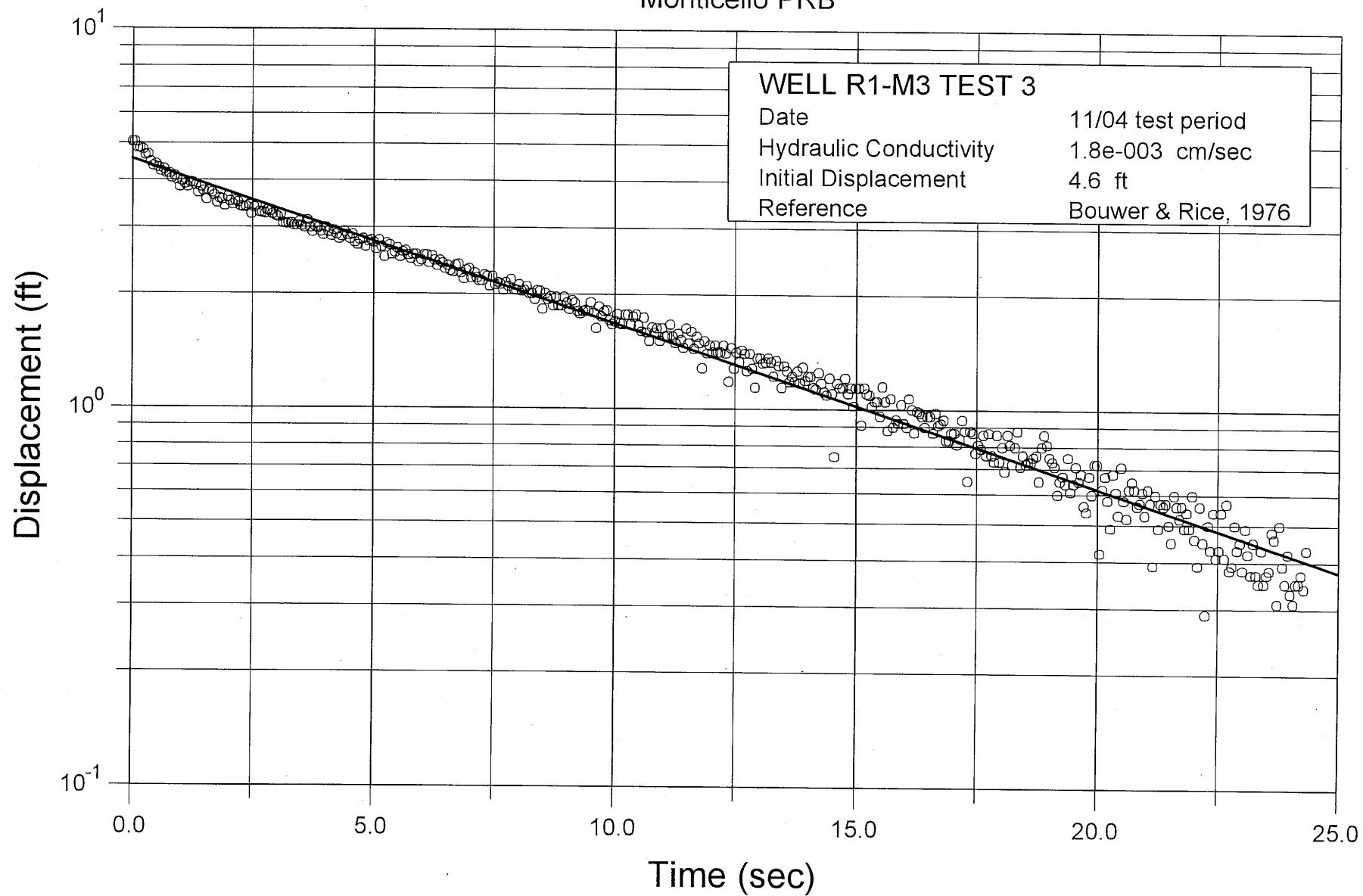
Monticello PRB



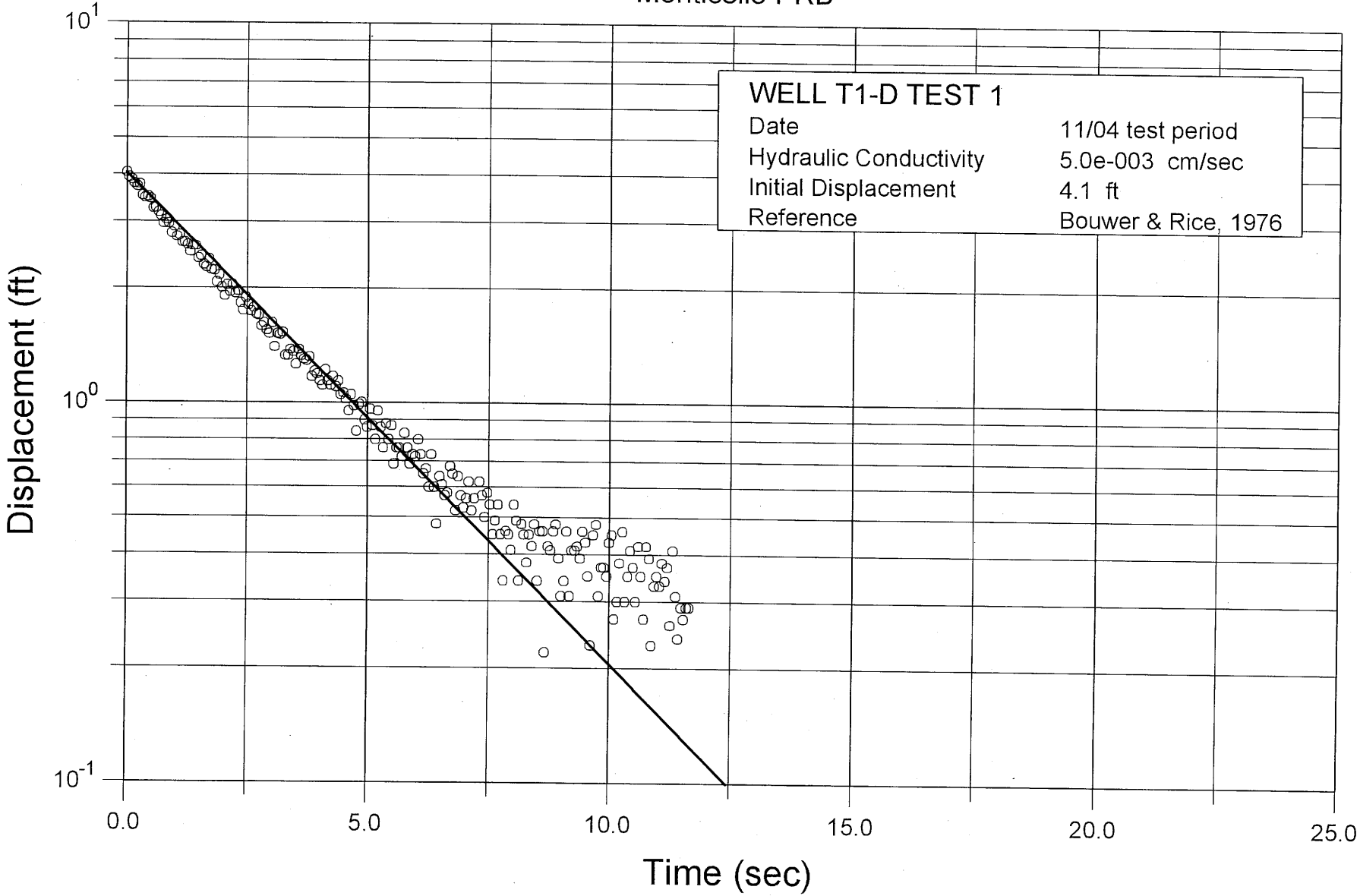
Monticello PRB



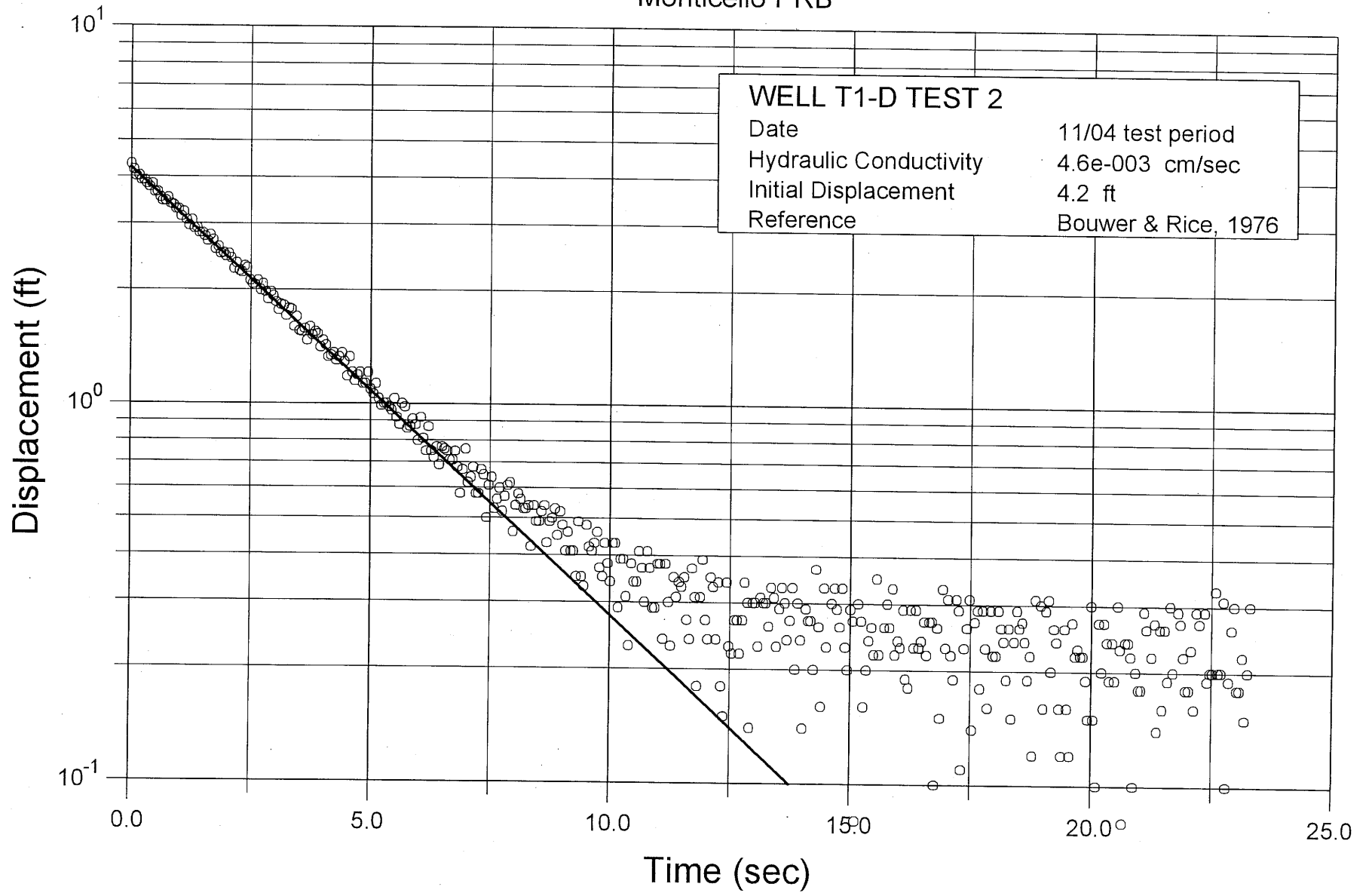
Monticello PRB



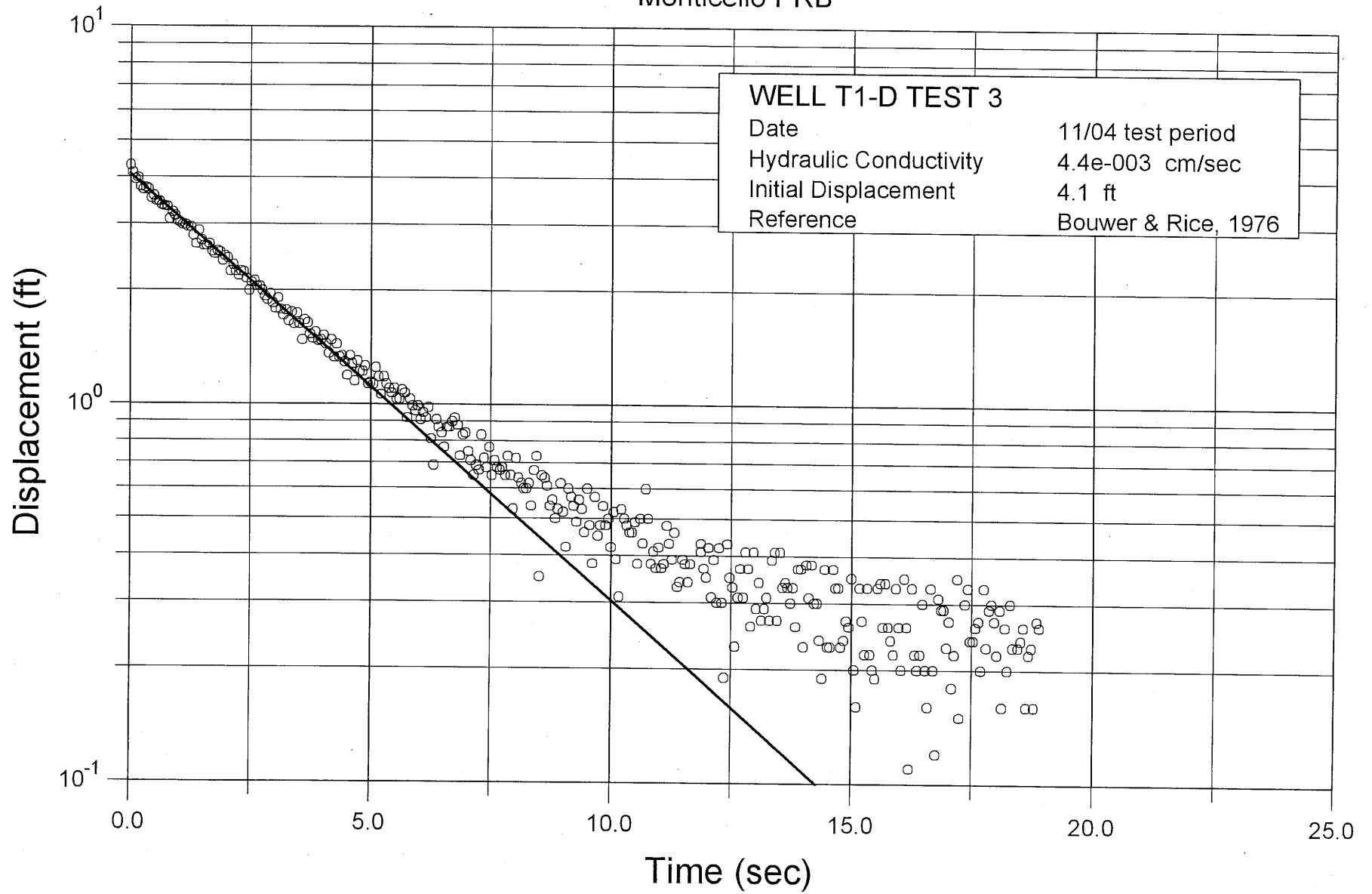
Monticello PRB



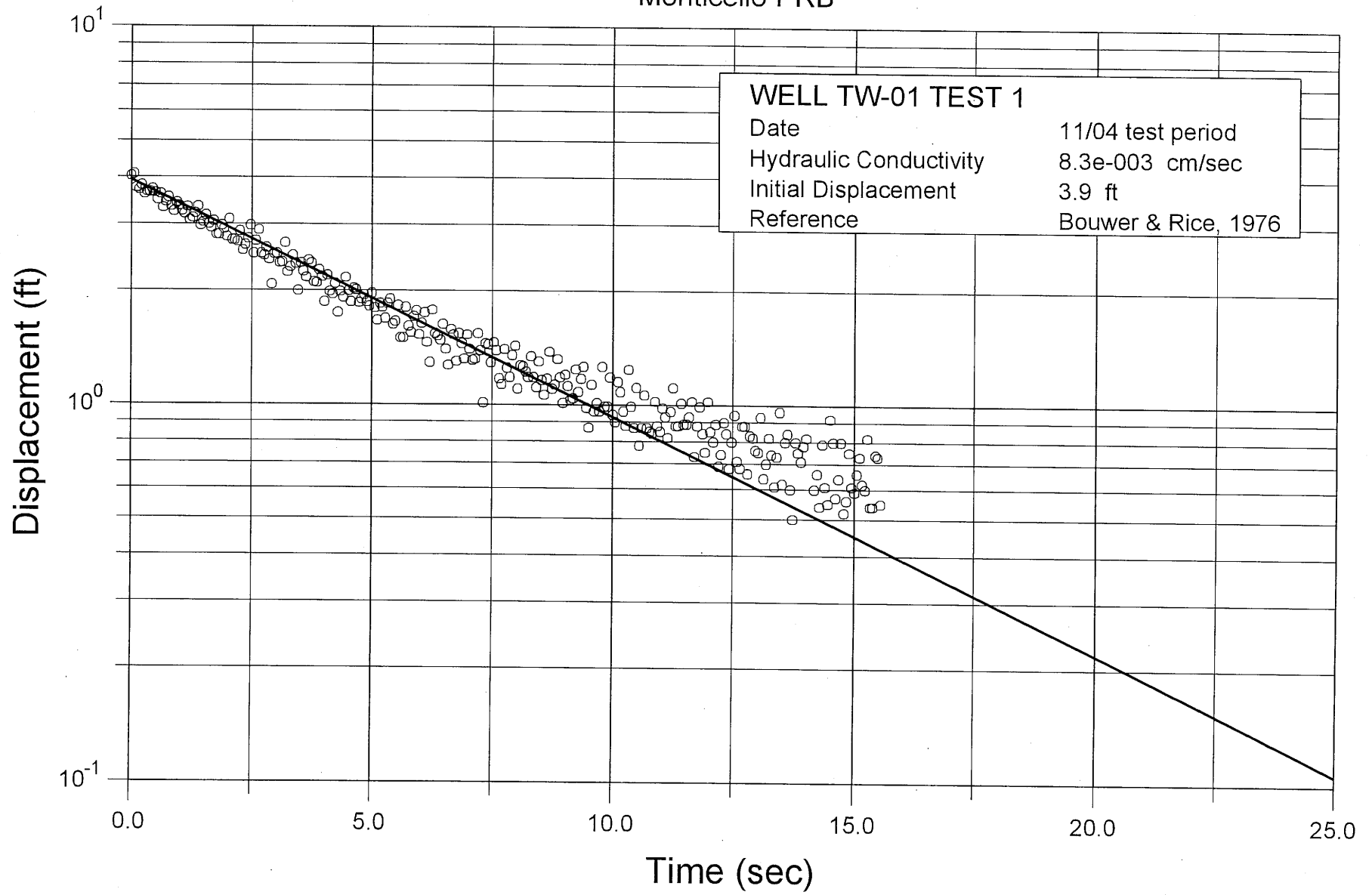
Monticello PRB



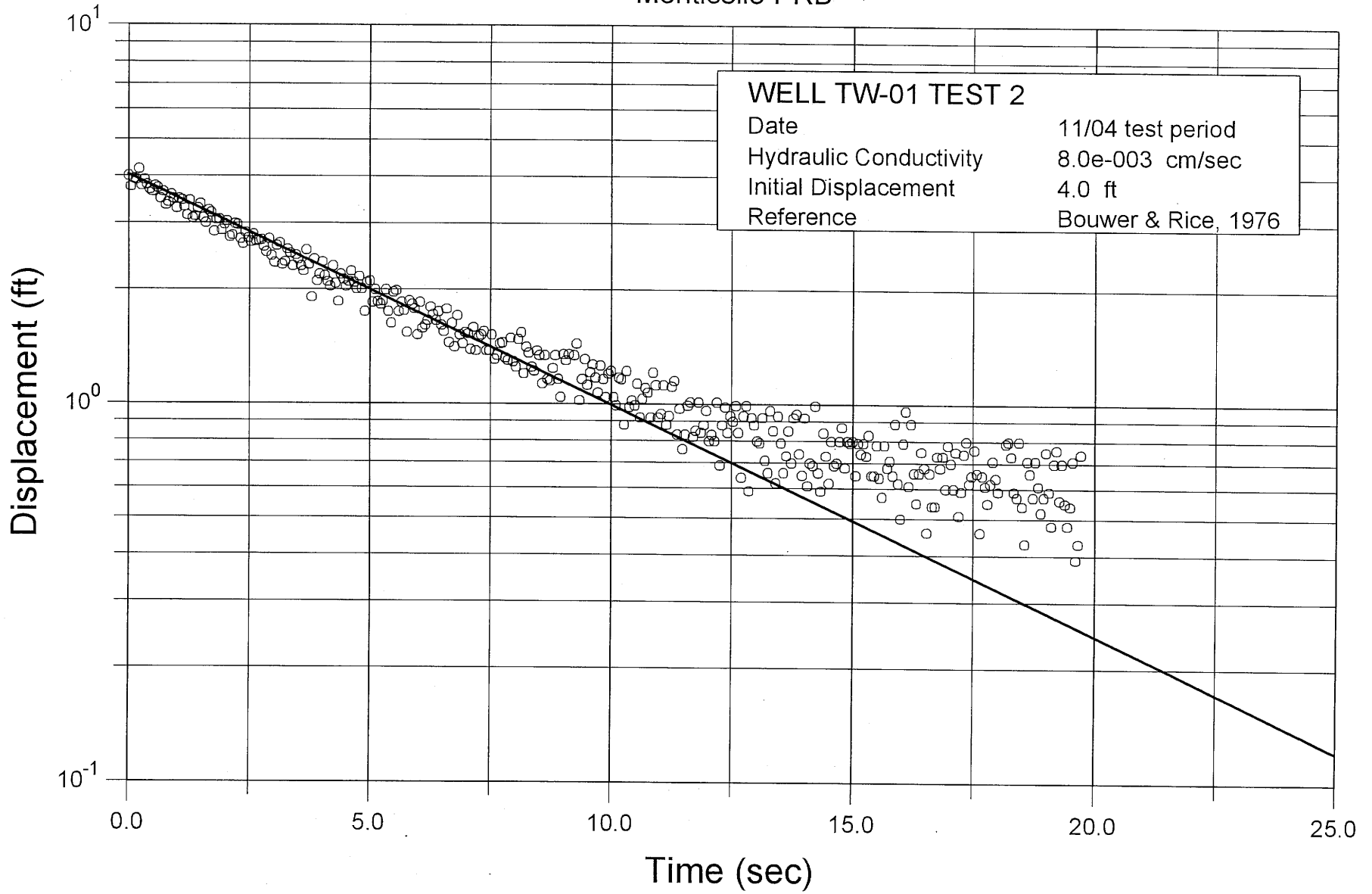
Monticello PRB



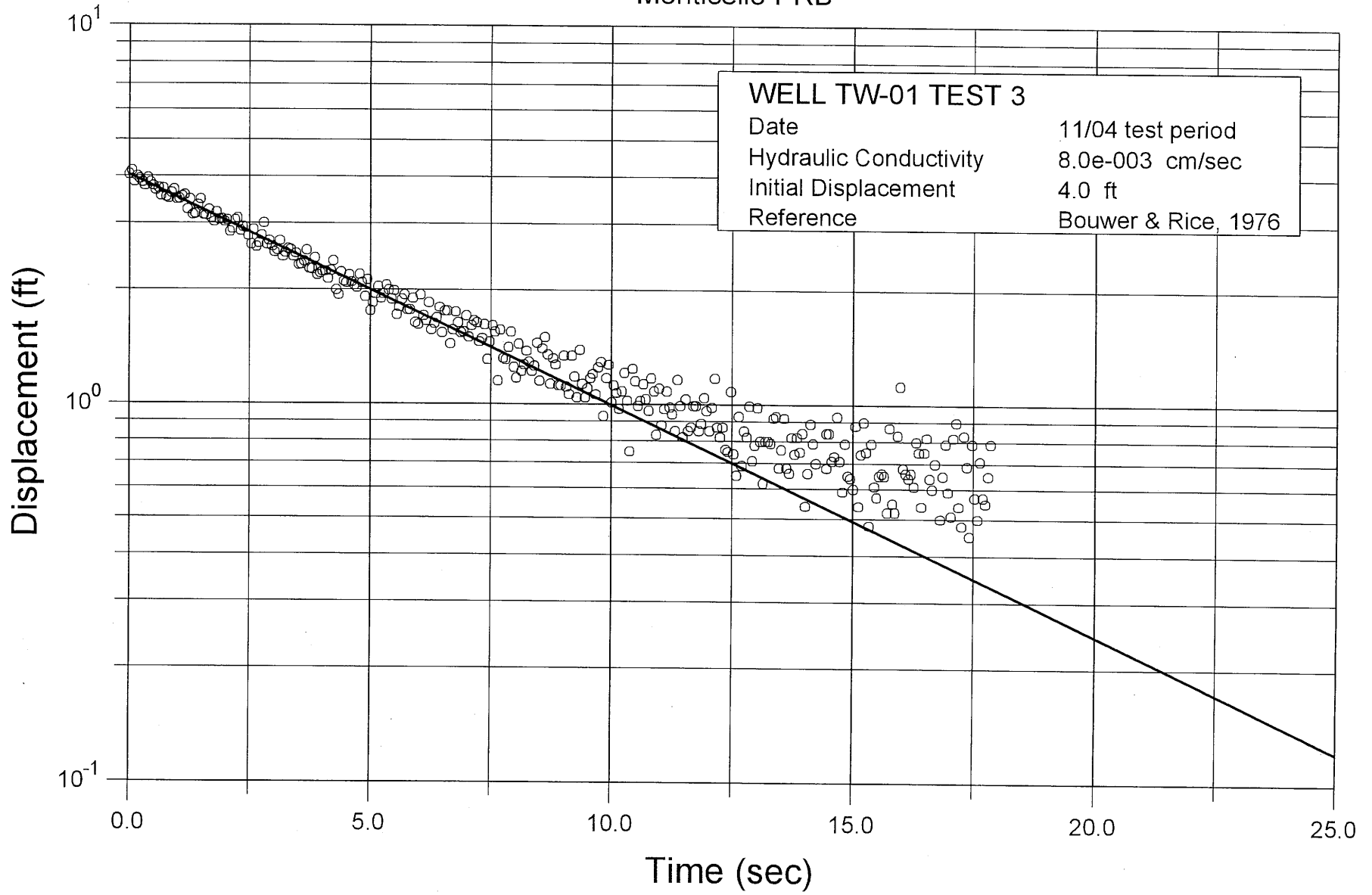
Monticello PRB



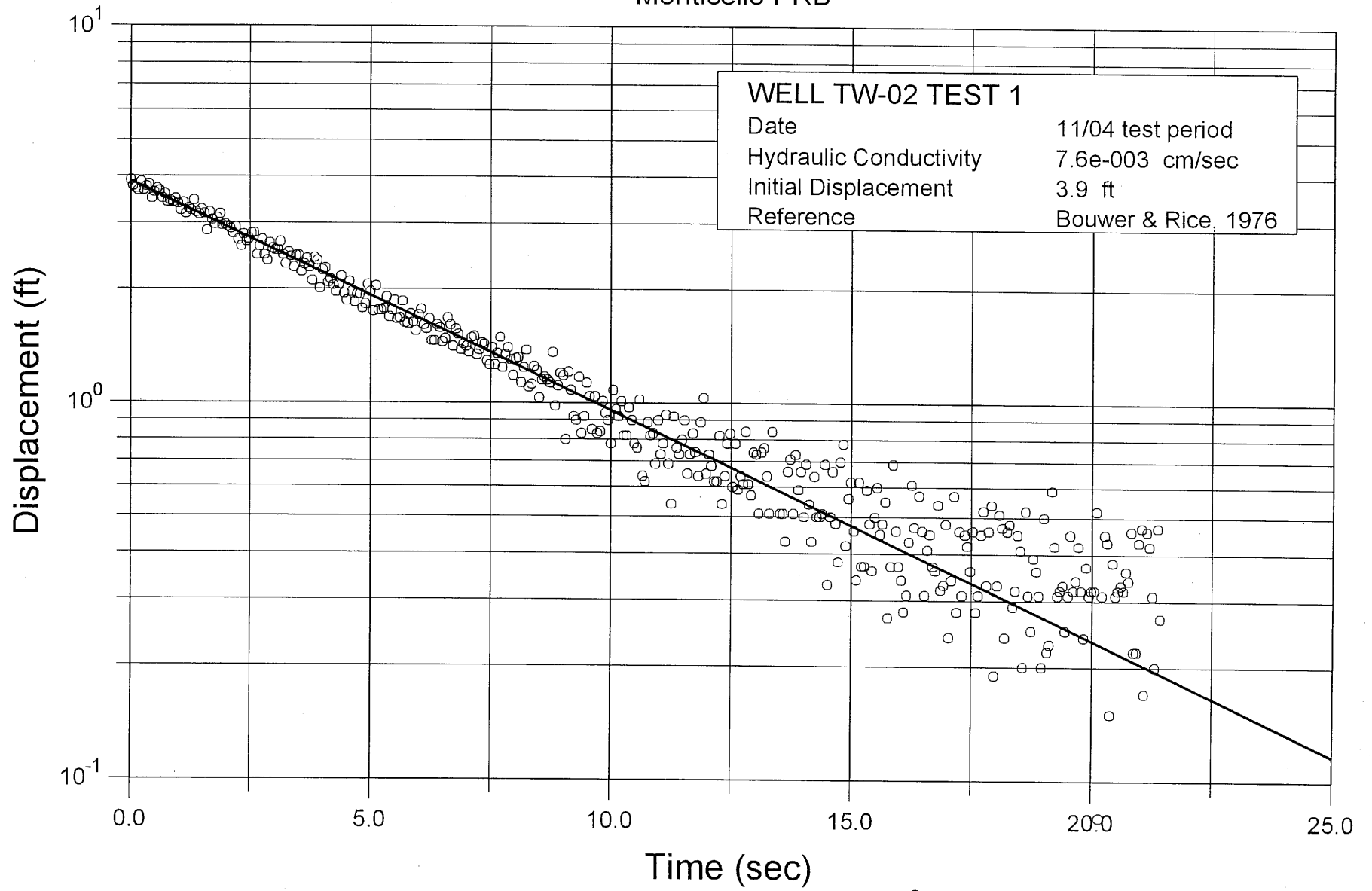
Monticello PRB



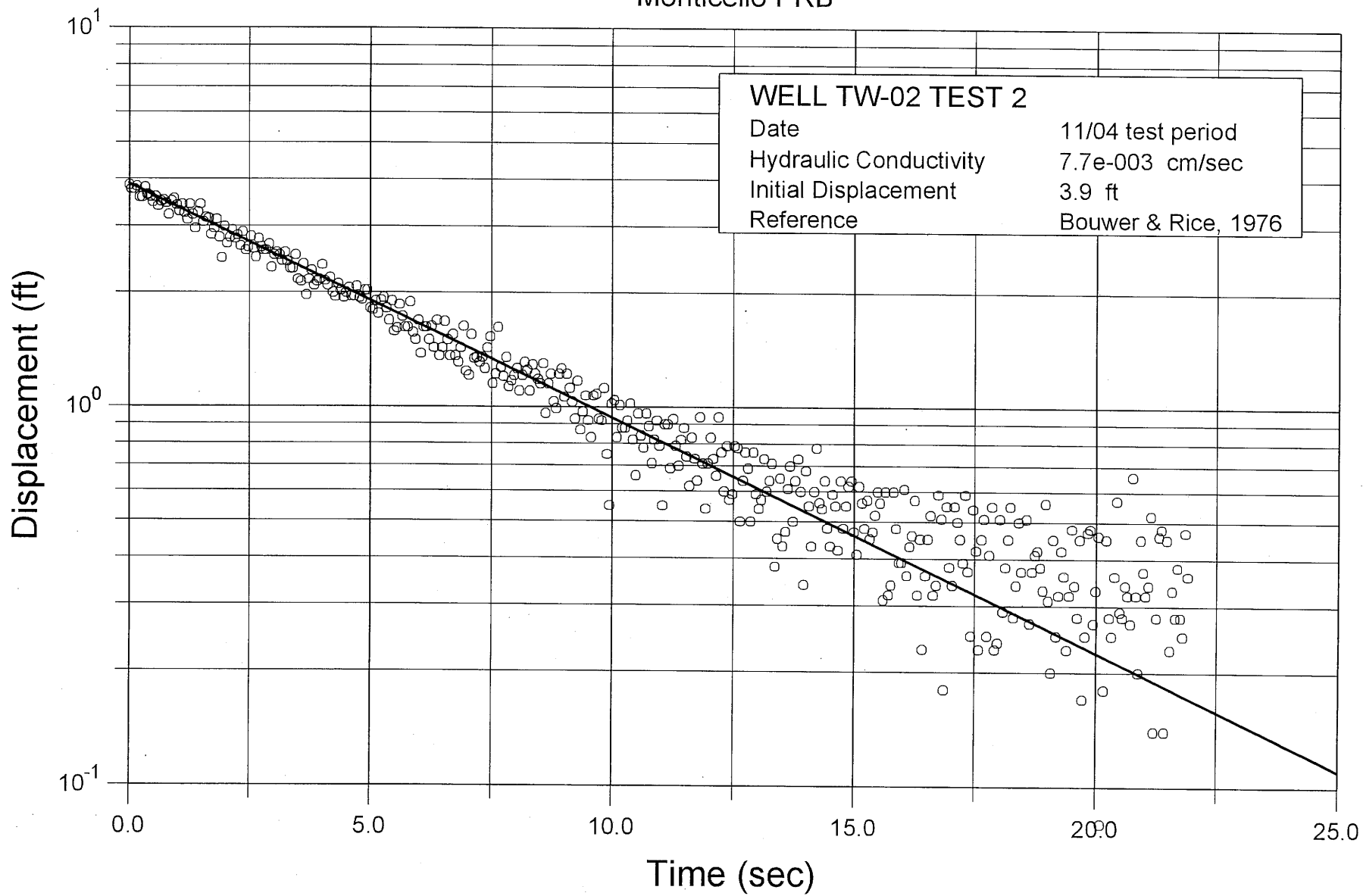
Monticello PRB



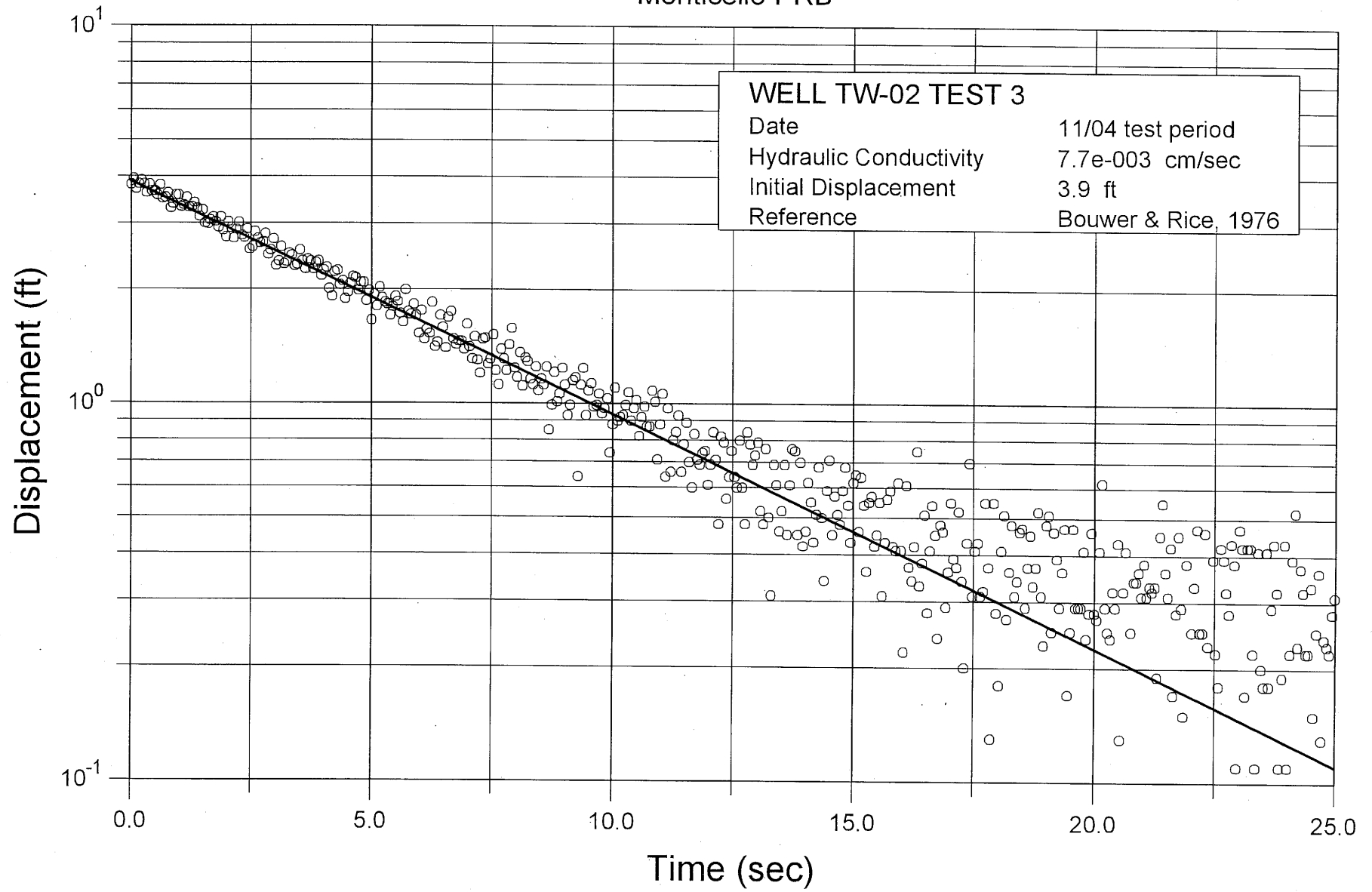
Monticello PRB



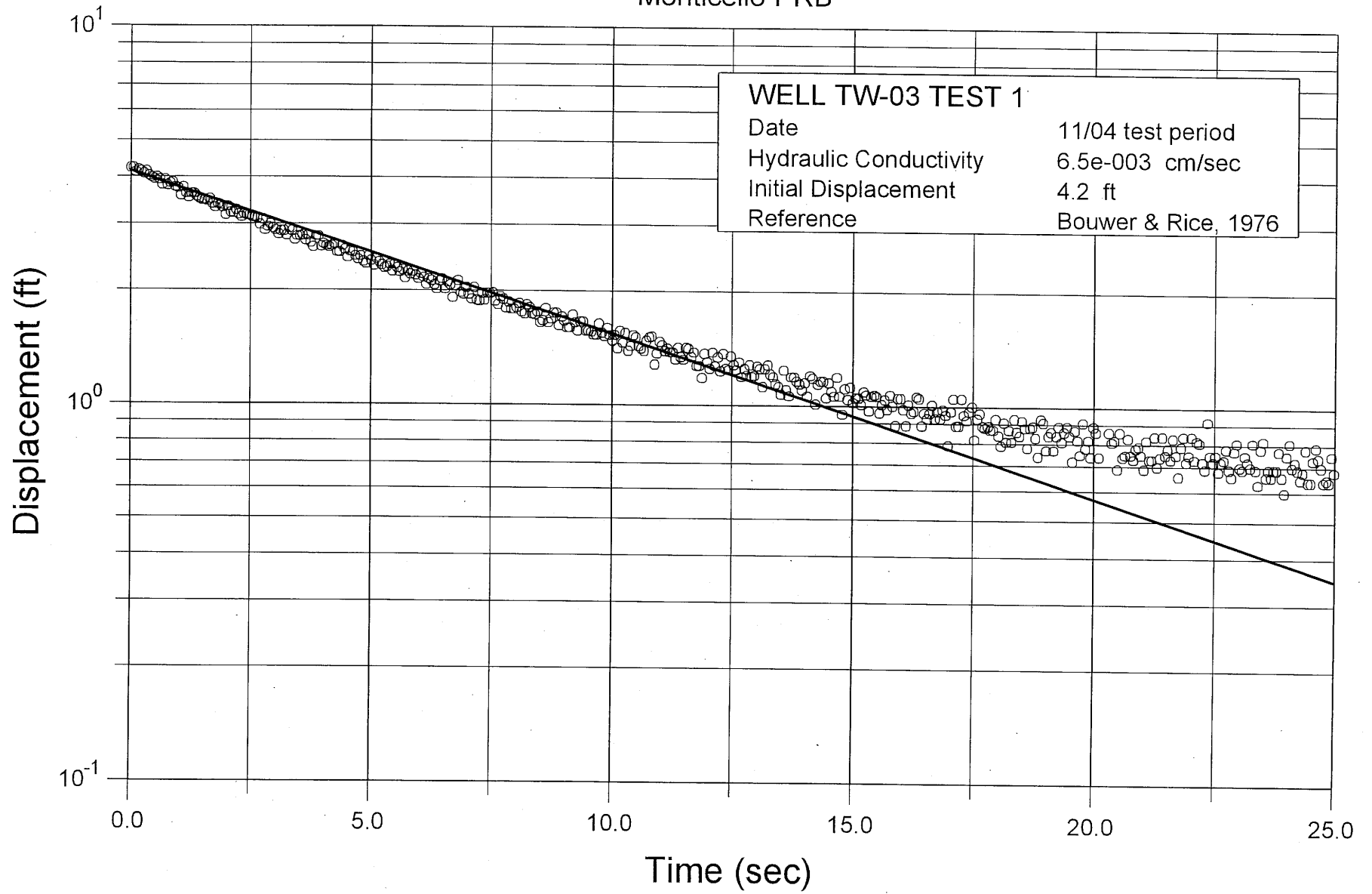
Monticello PRB



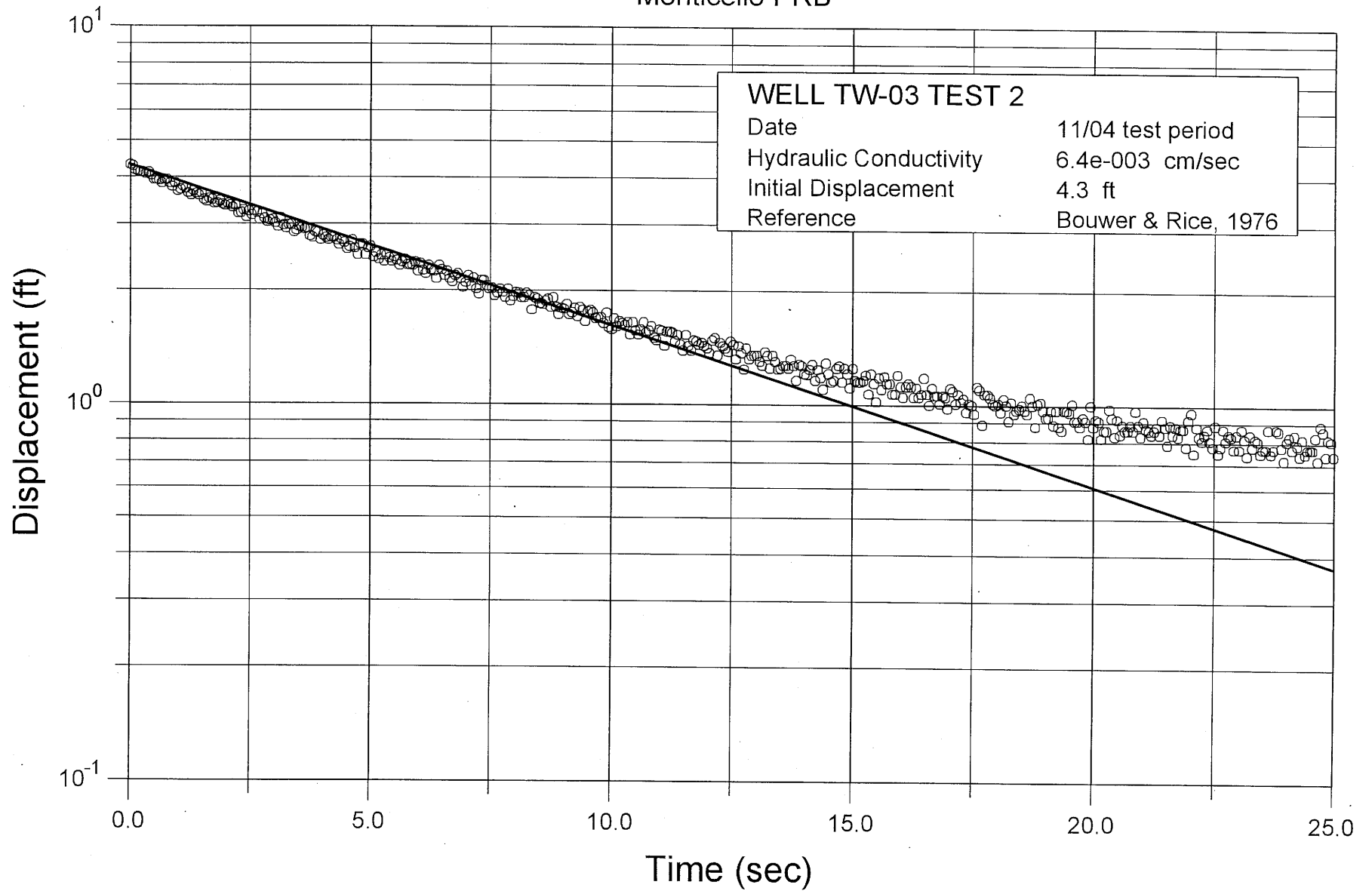
Monticello PRB



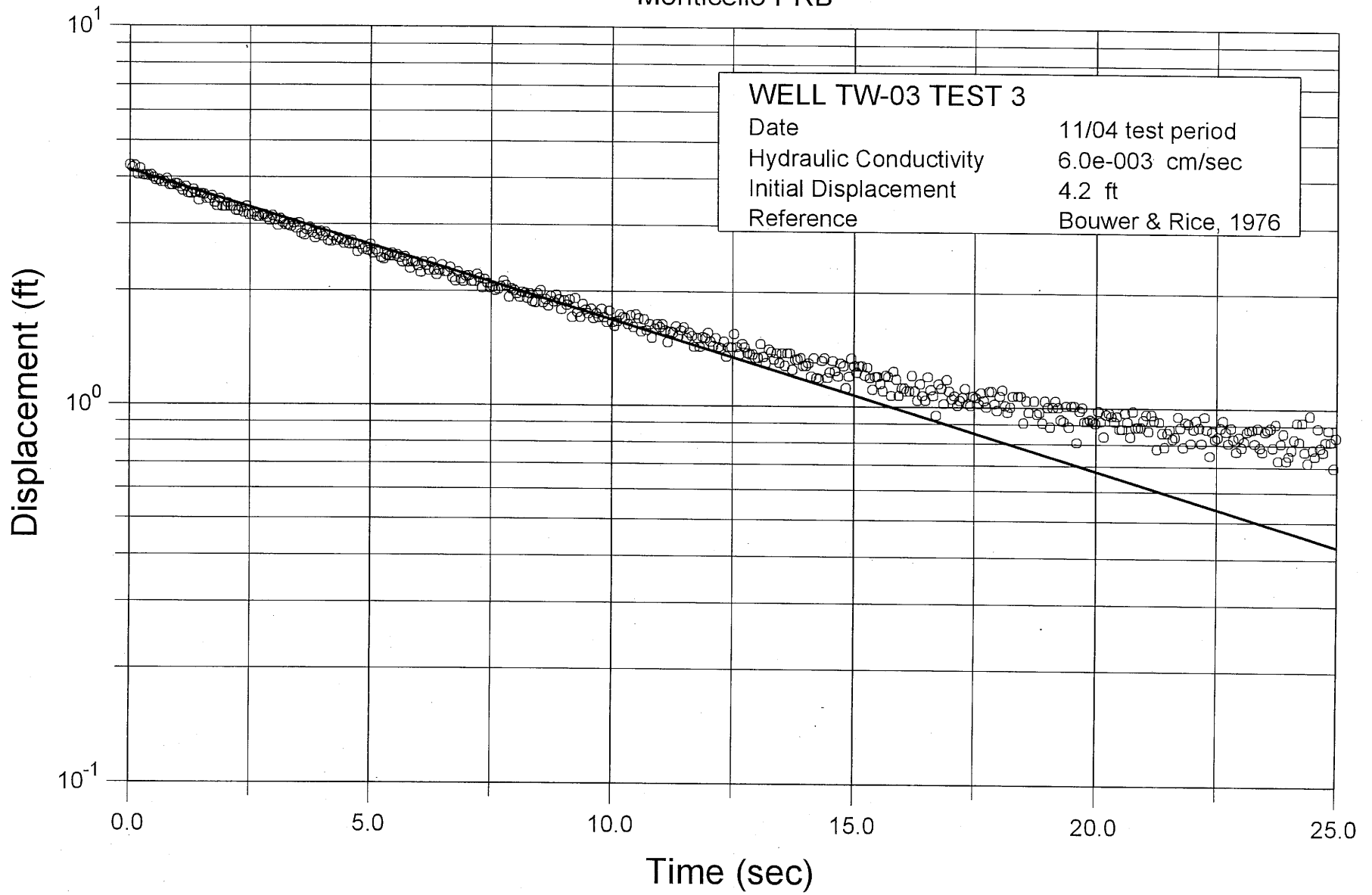
Monticello PRB



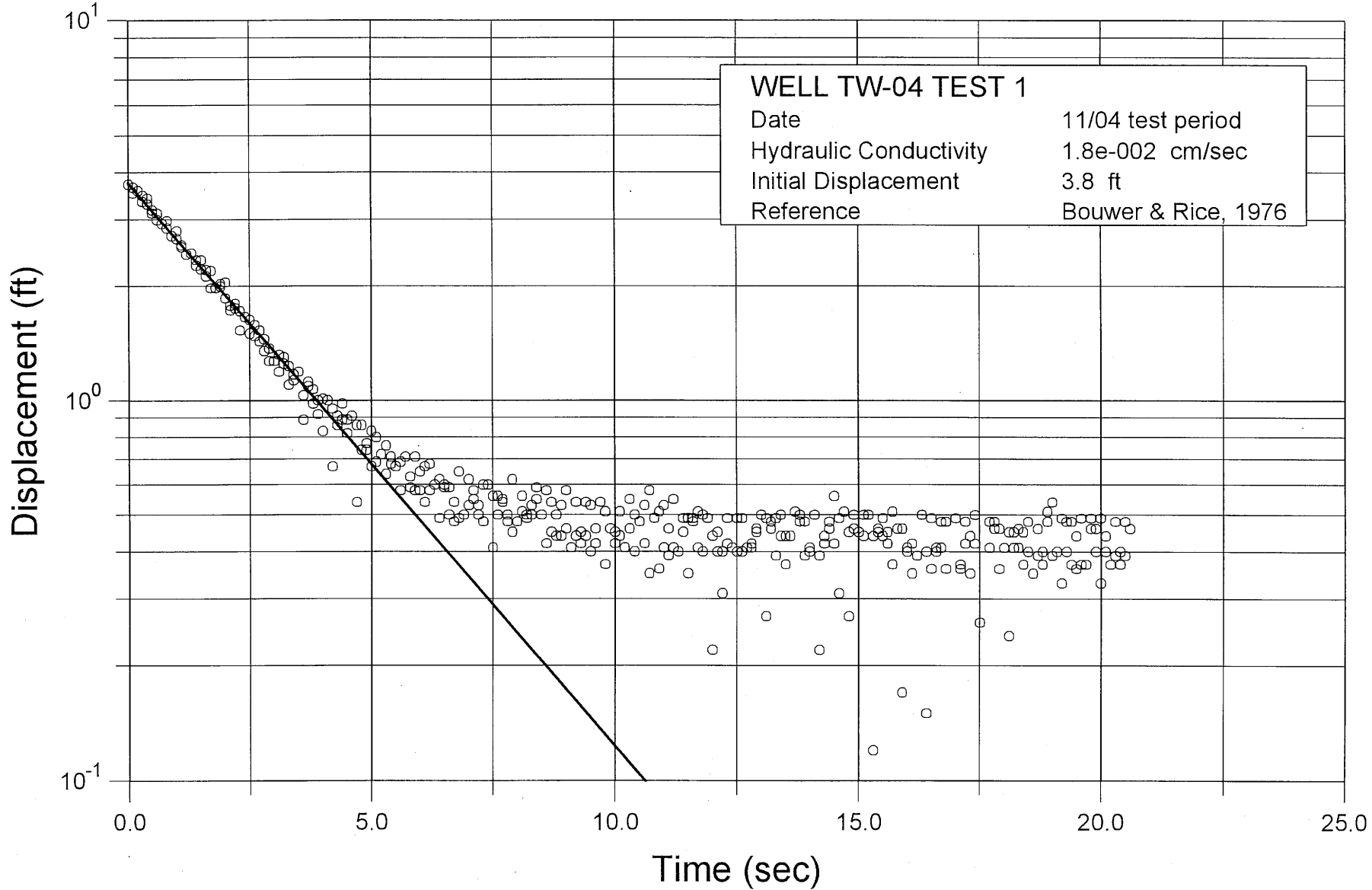
Monticello PRB



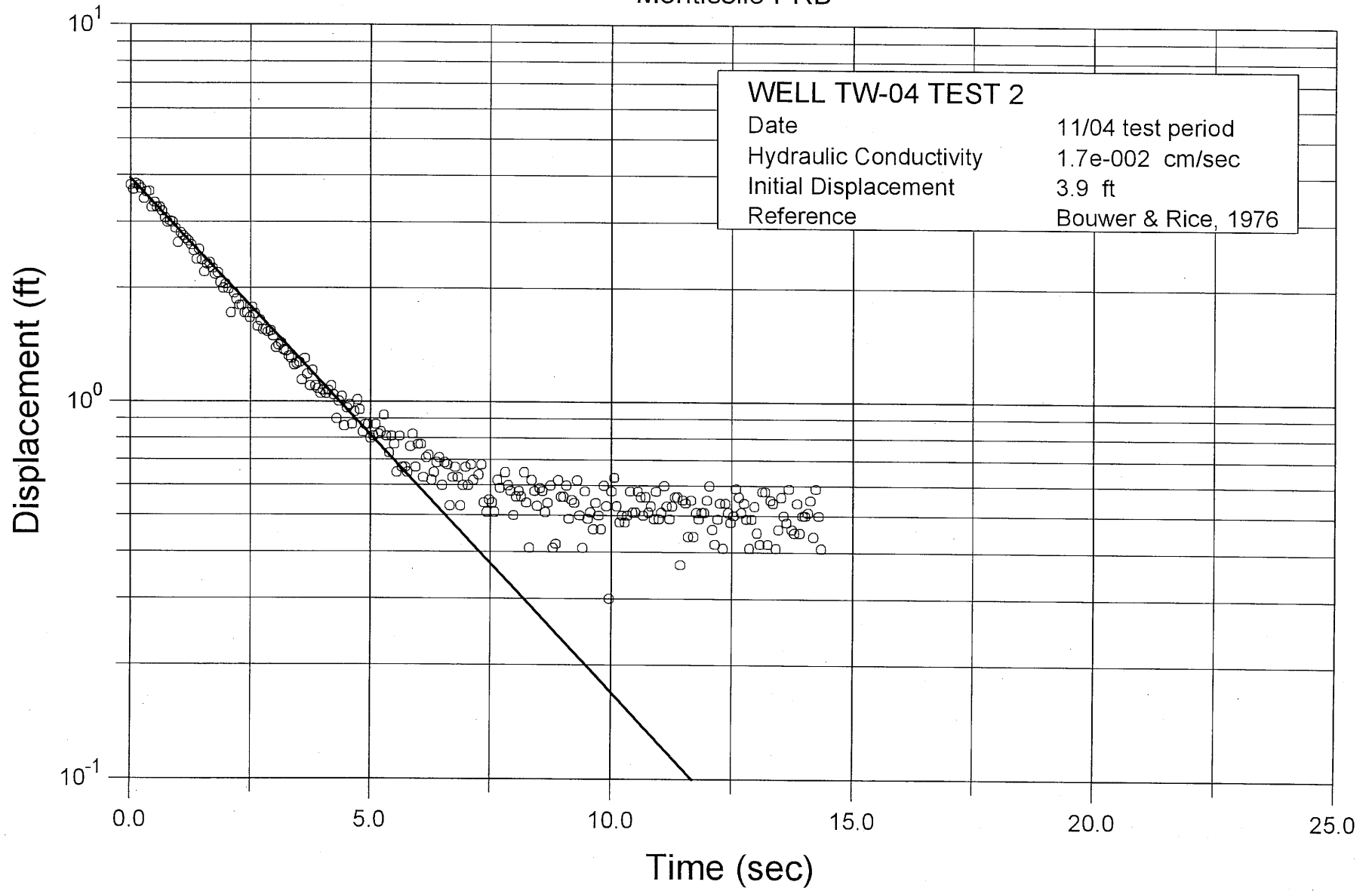
Monticello PRB



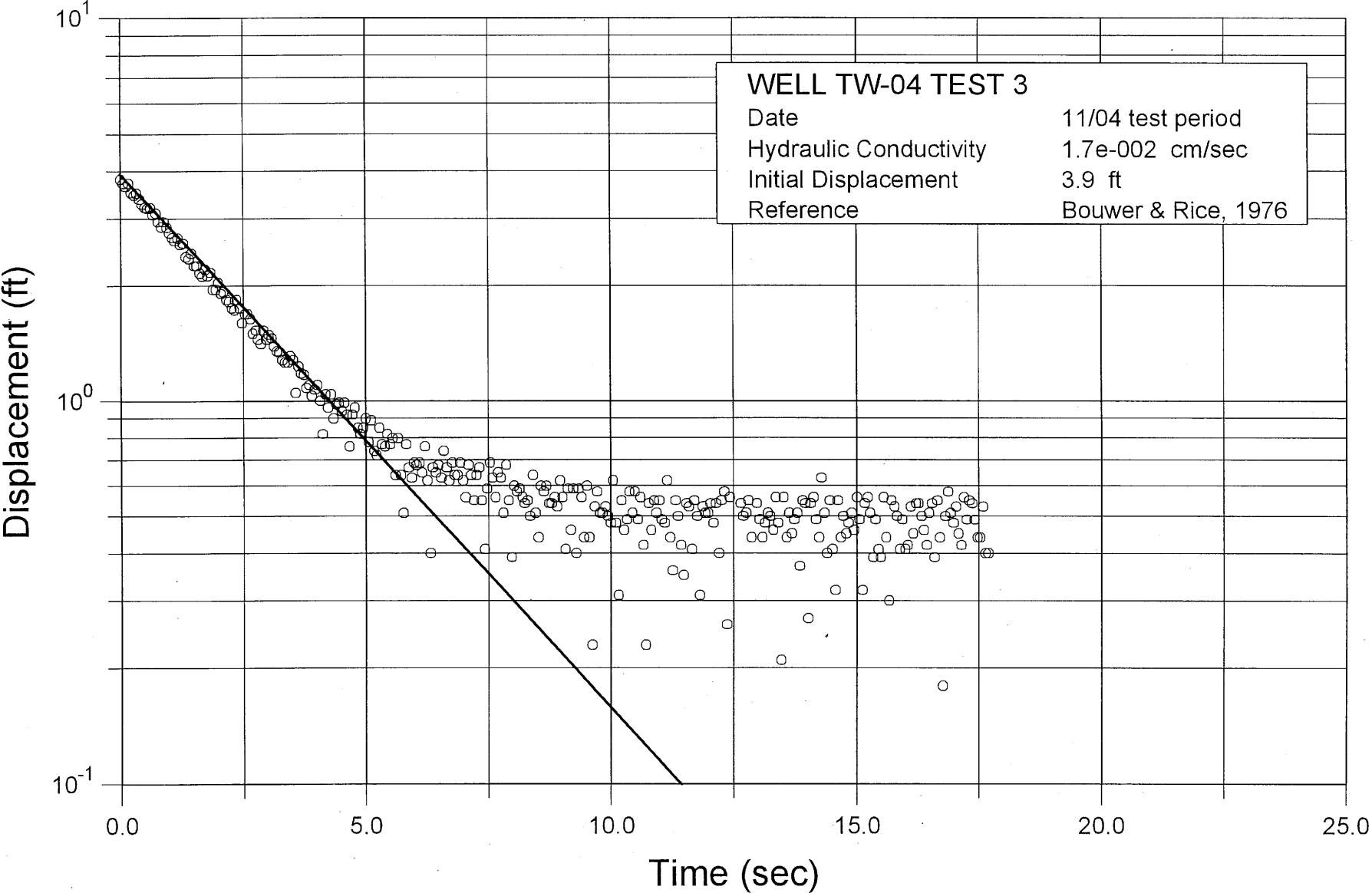
Monticello PRB



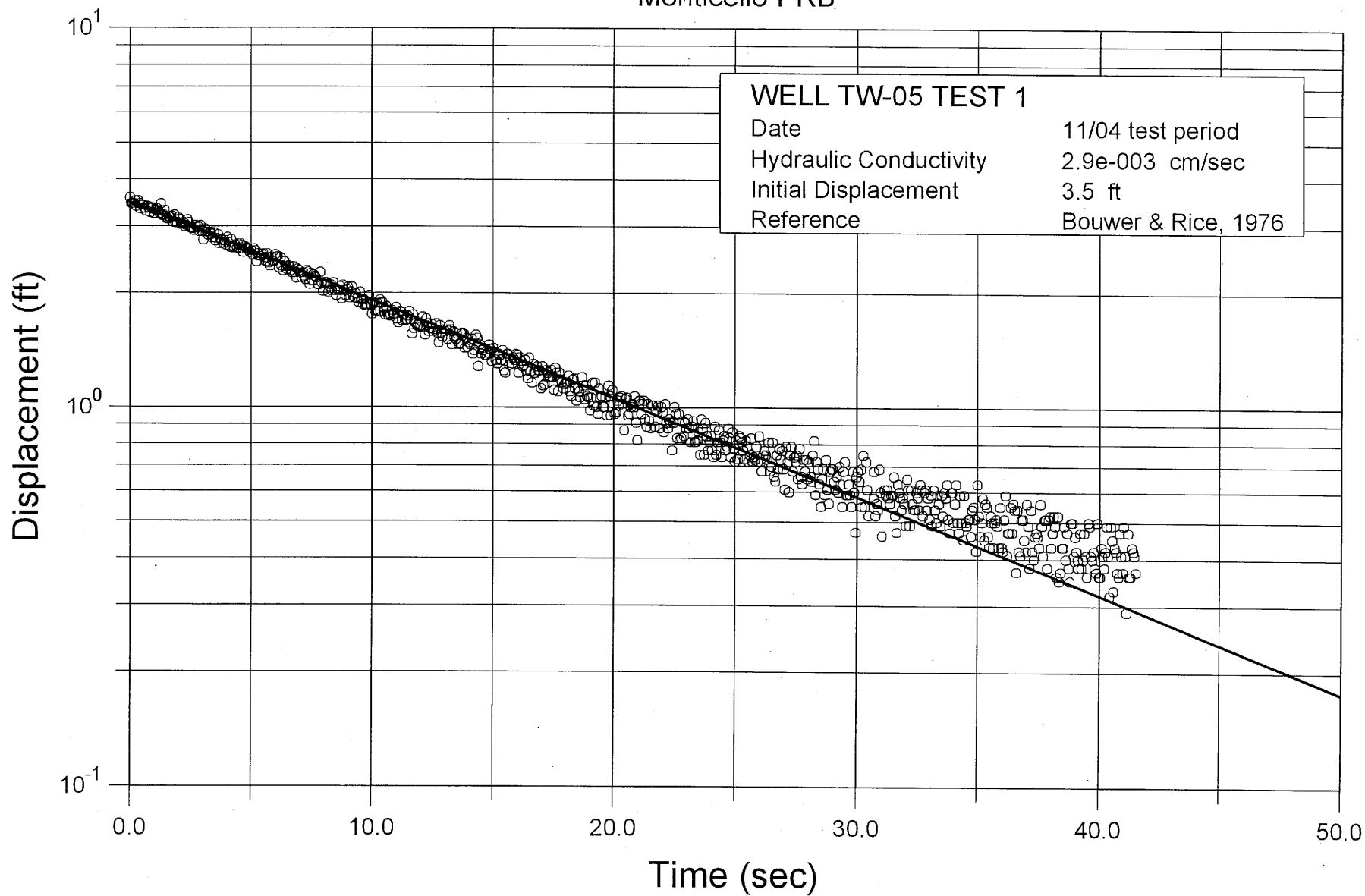
Monticello PRB



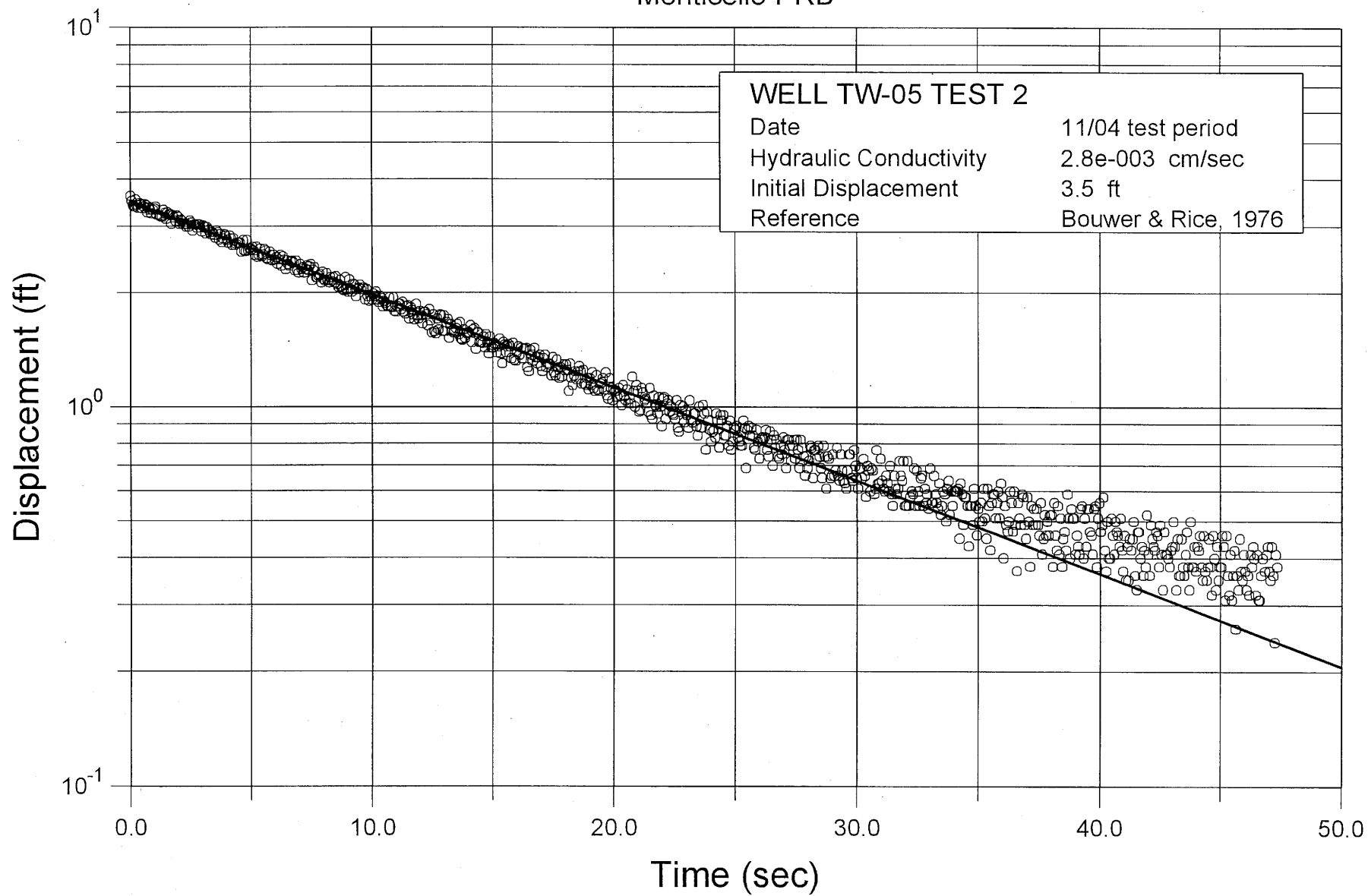
Monticello PRB



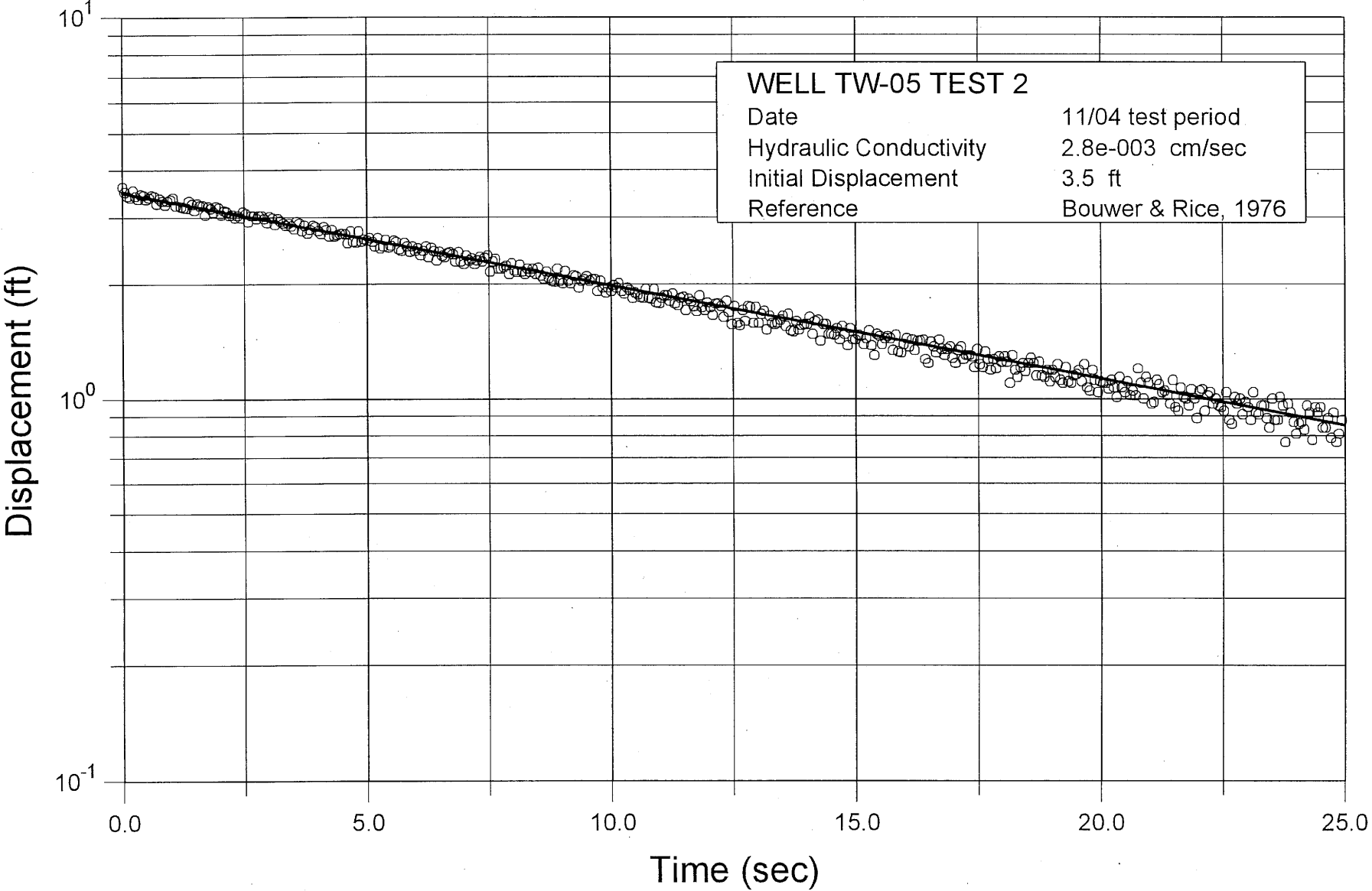
Monticello PRB



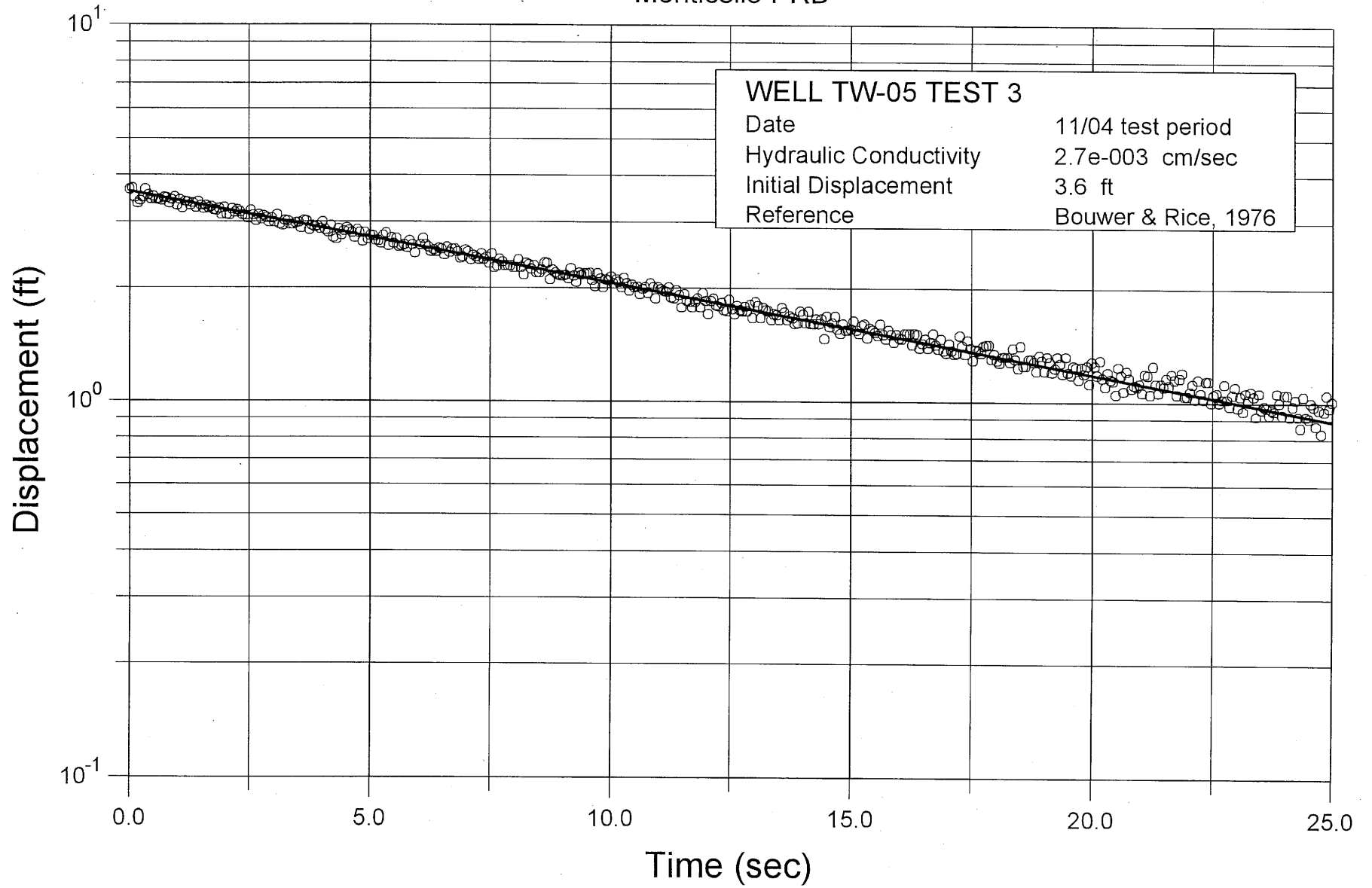
Monticello PRB



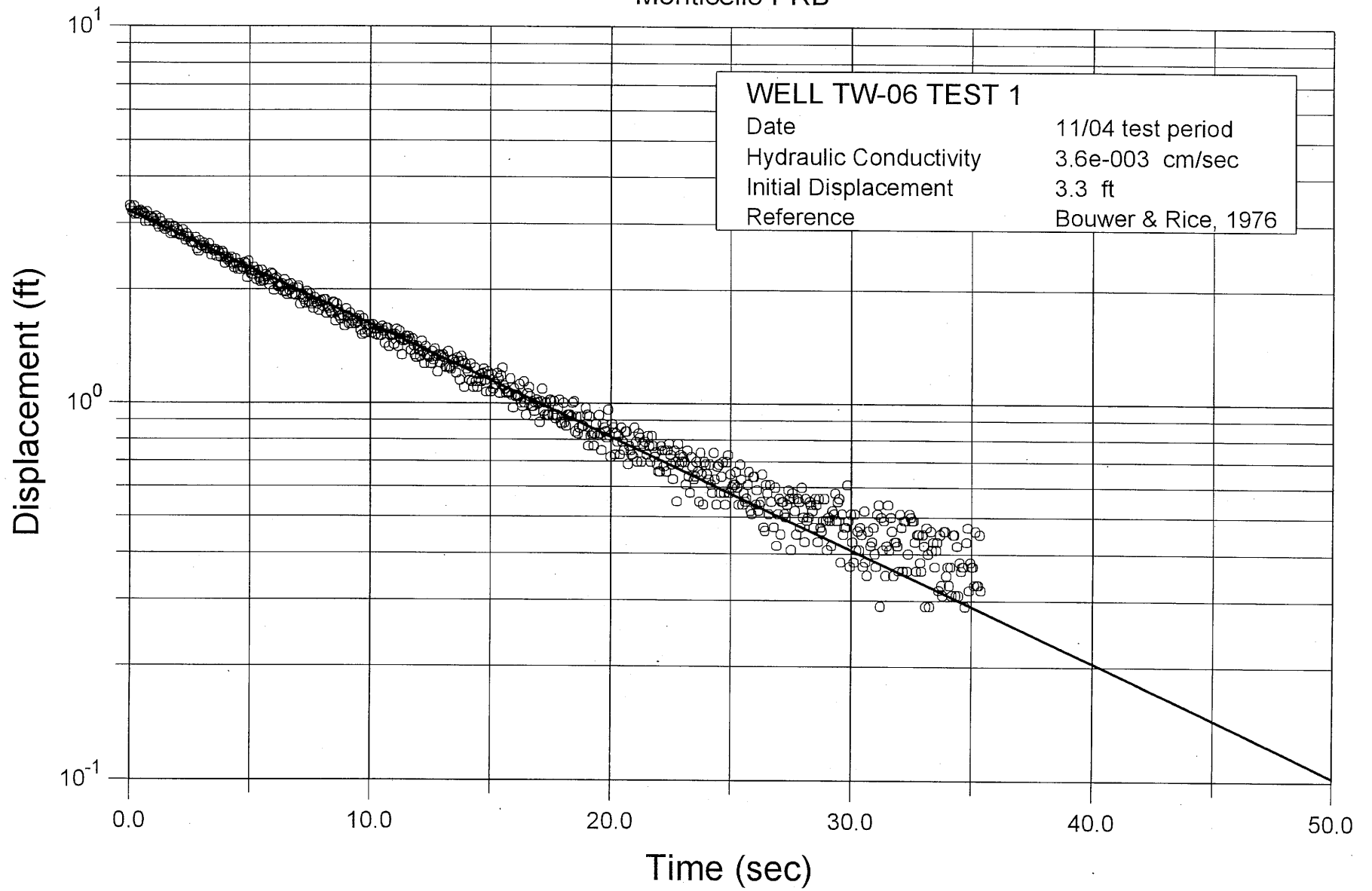
Monticello PRB



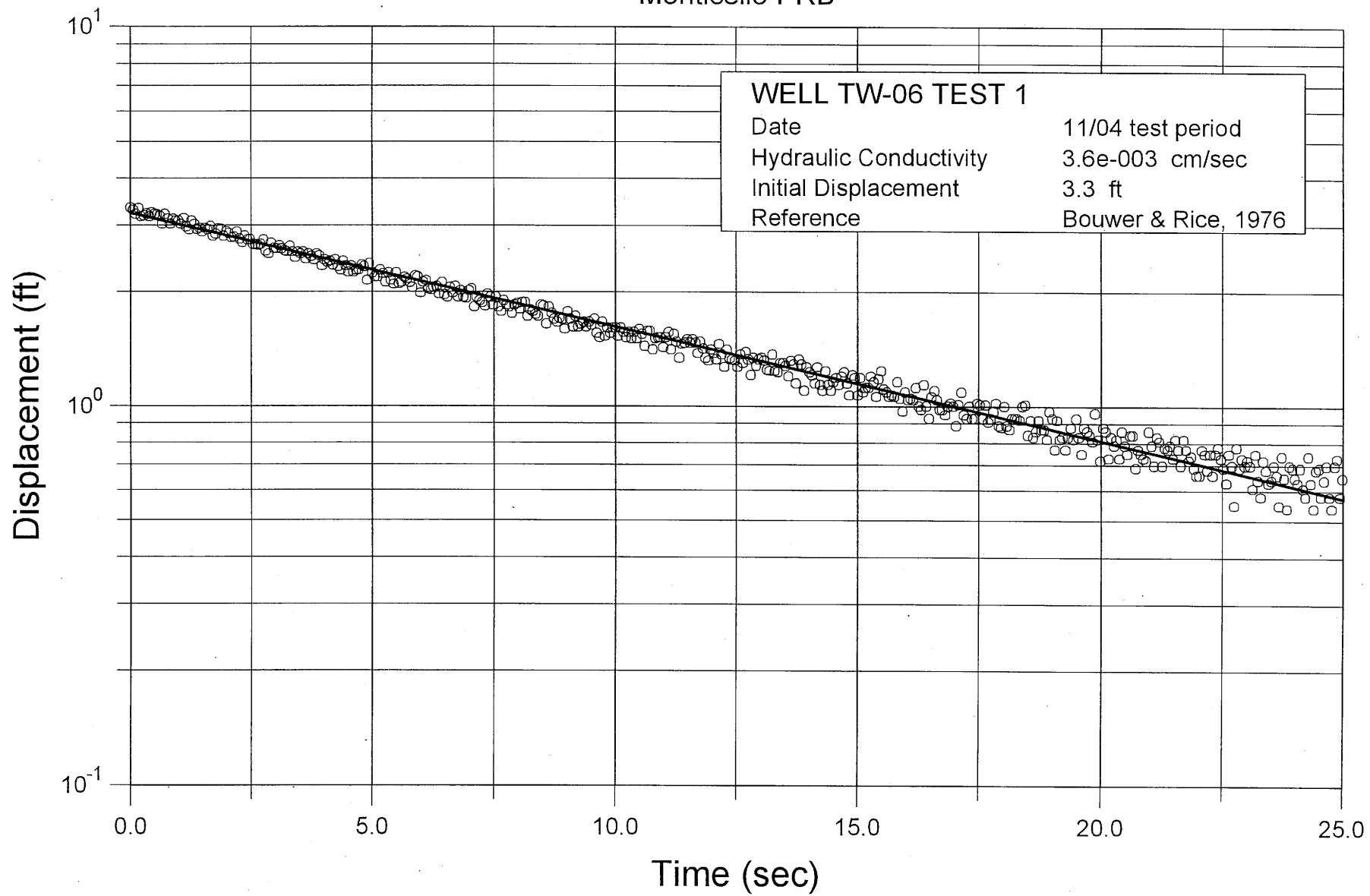
Monticello PRB



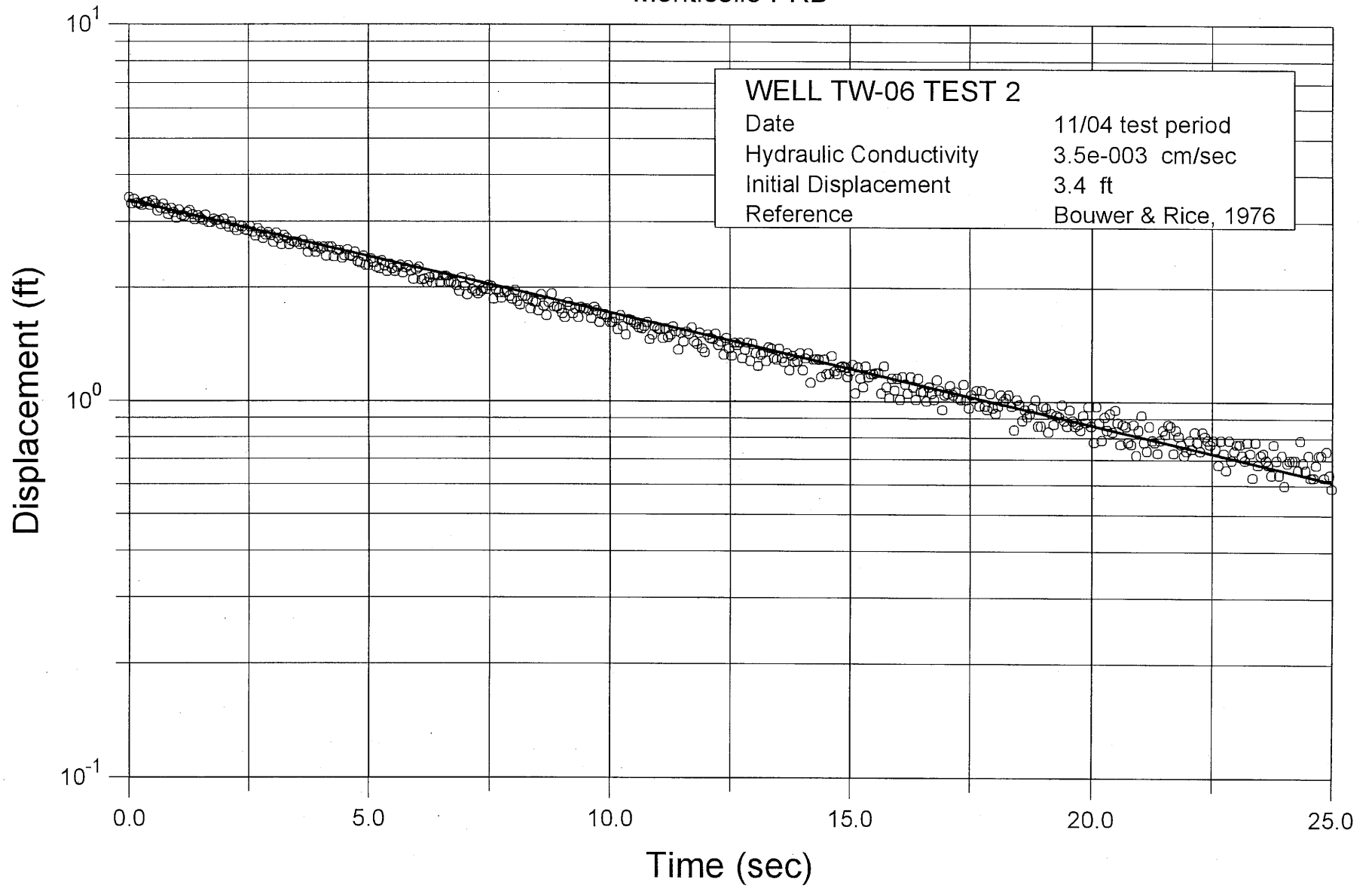
Monticello PRB



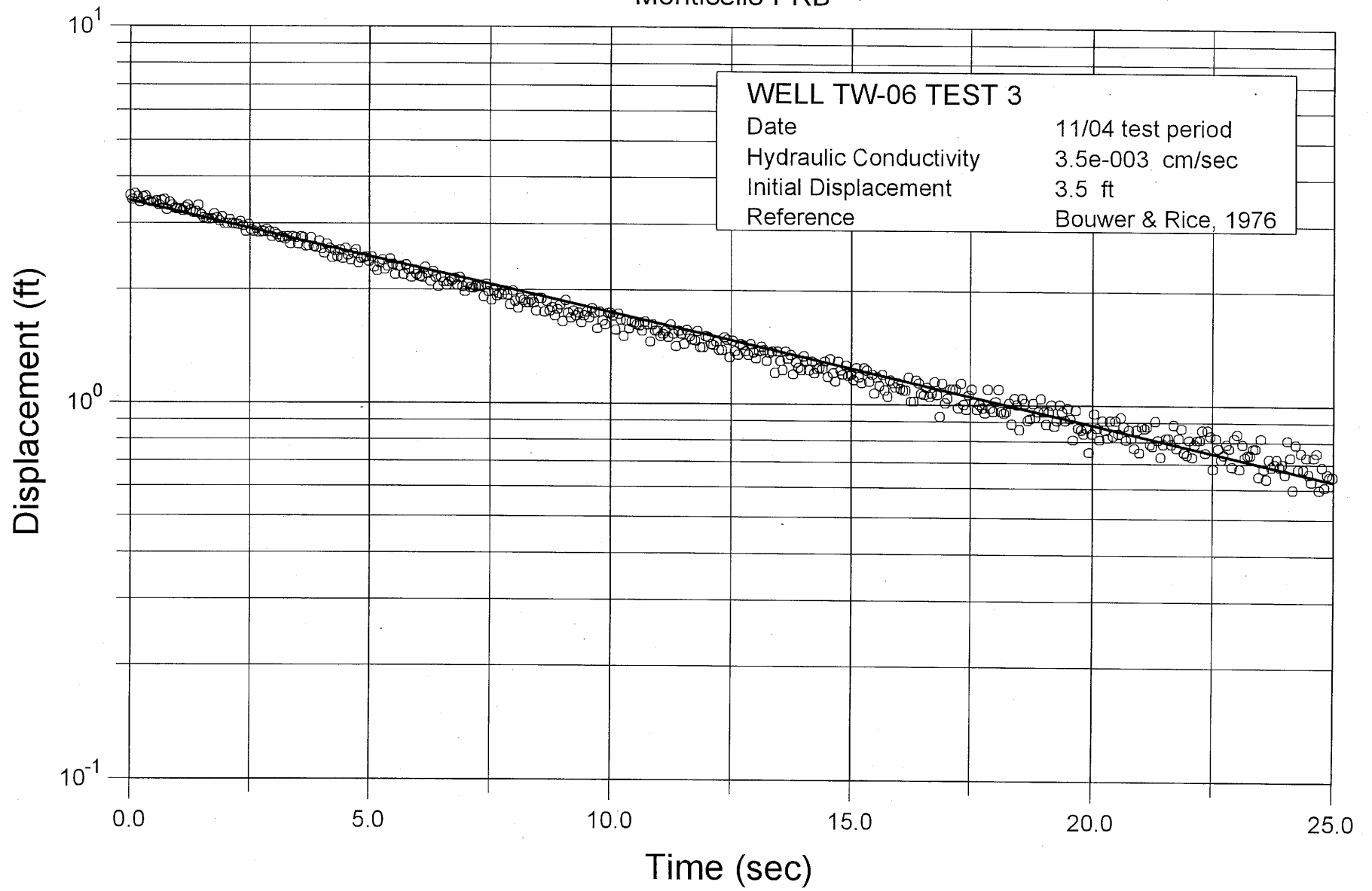
Monticello PRB



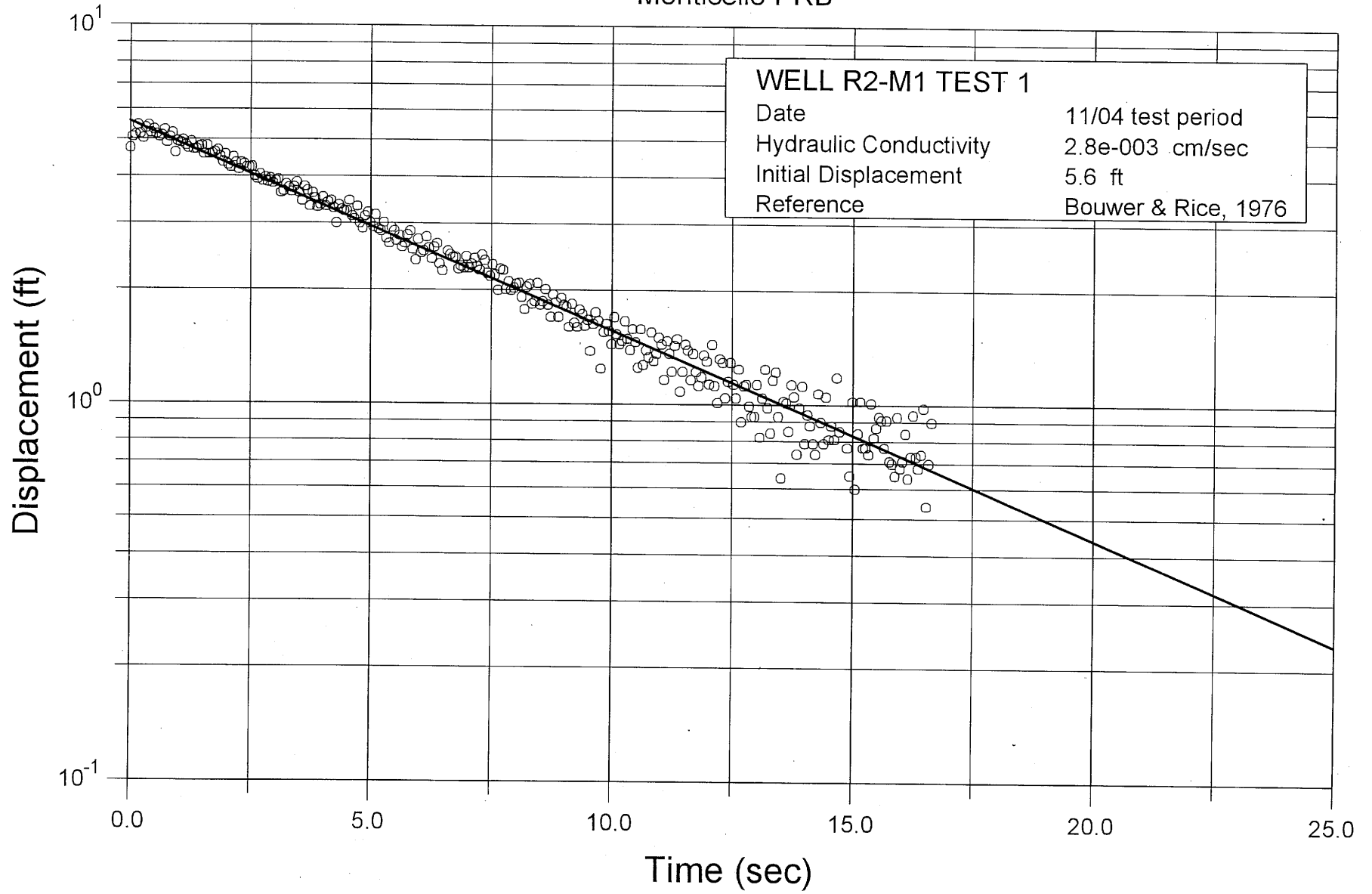
Monticello PRB



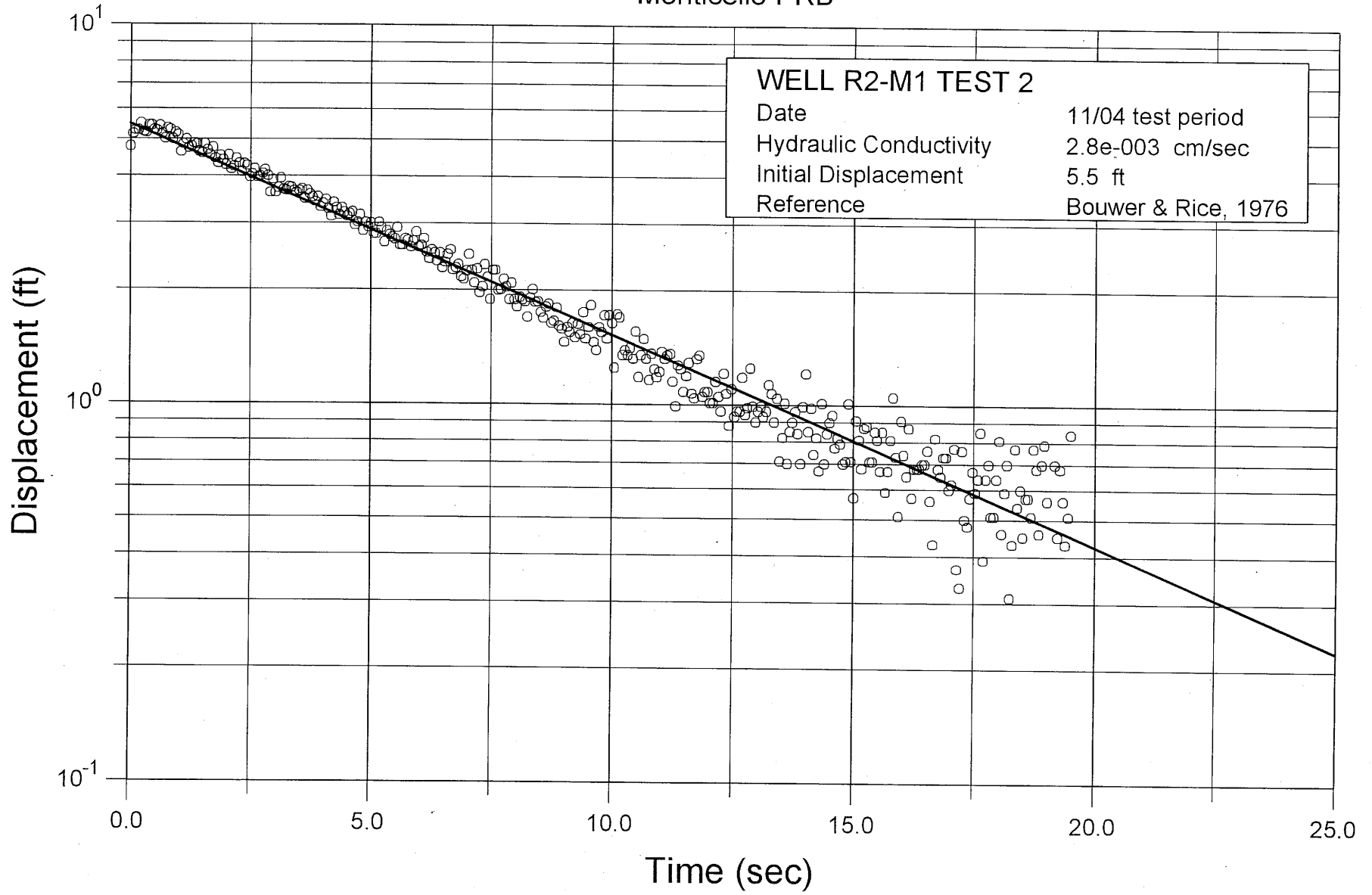
Monticello PRB



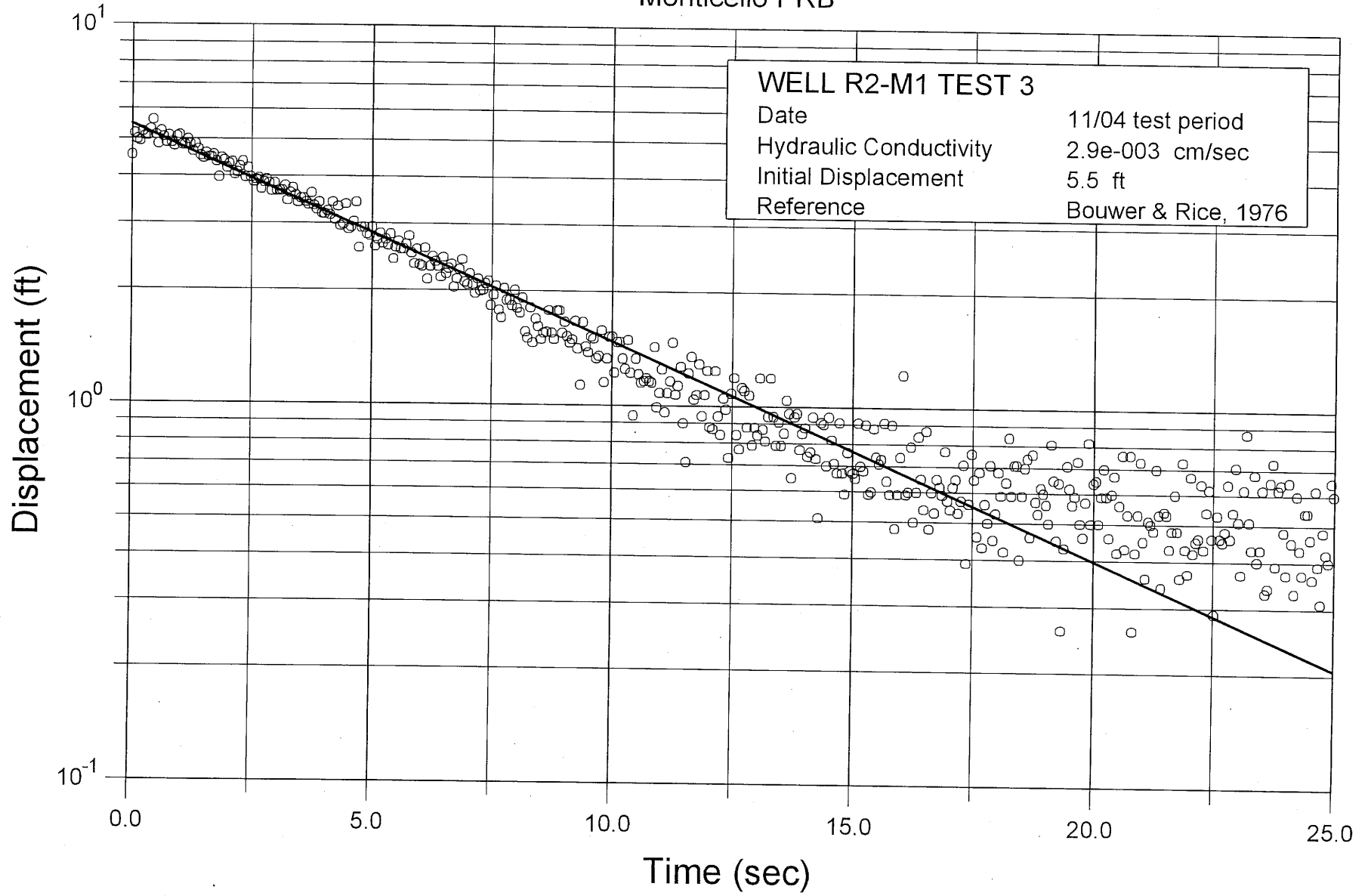
Monticello PRB



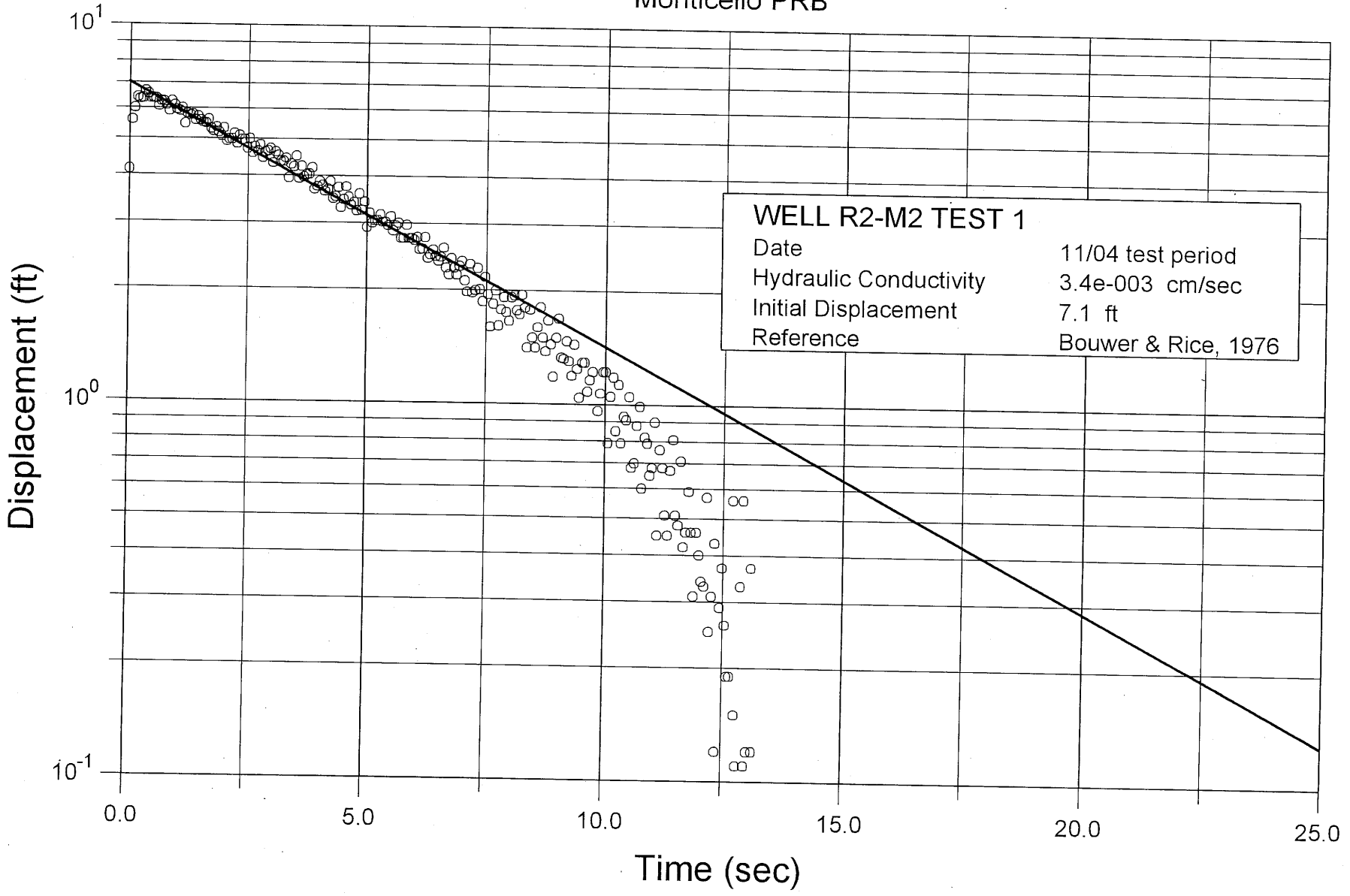
Monticello PRB



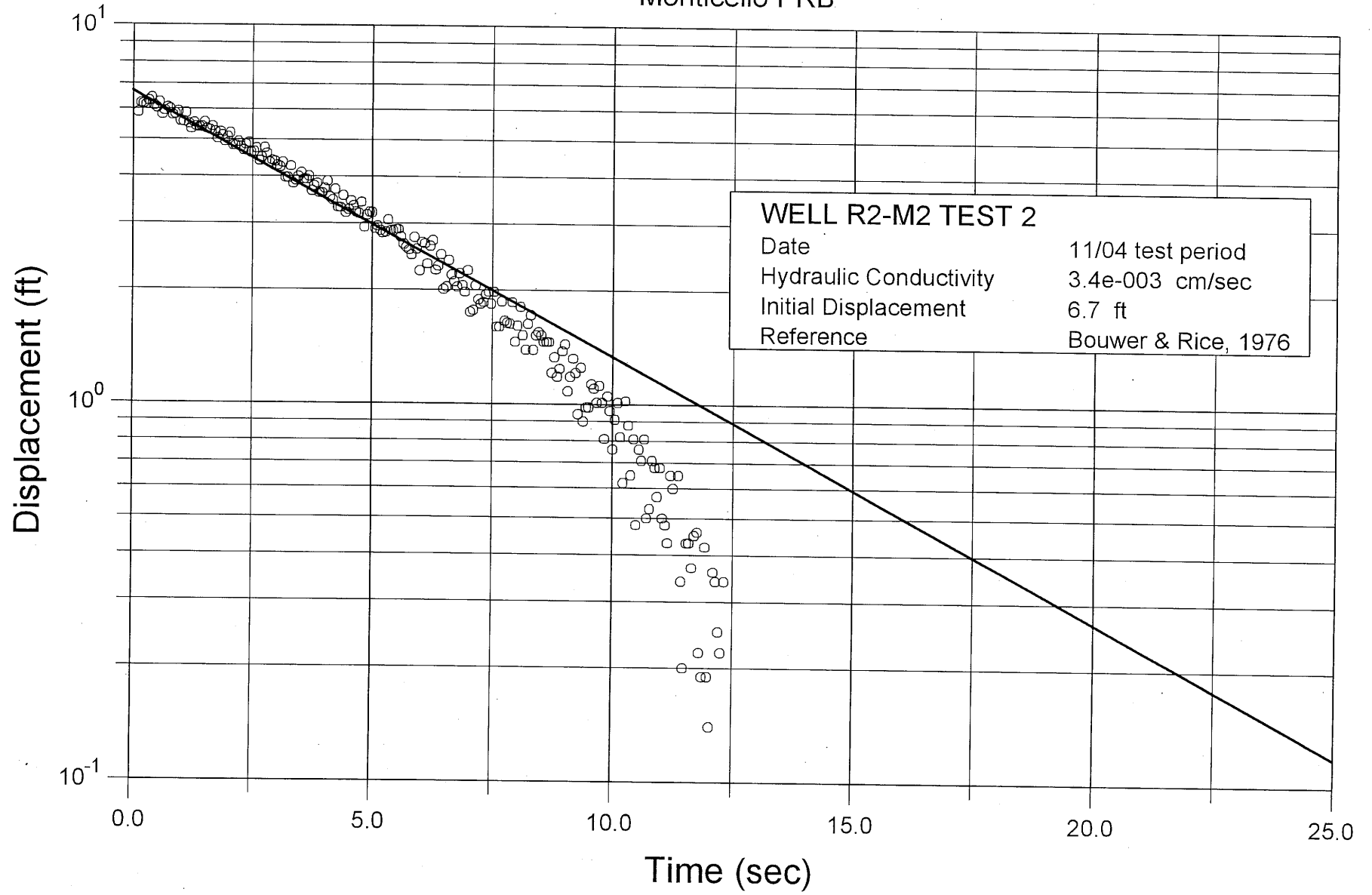
Monticello PRB



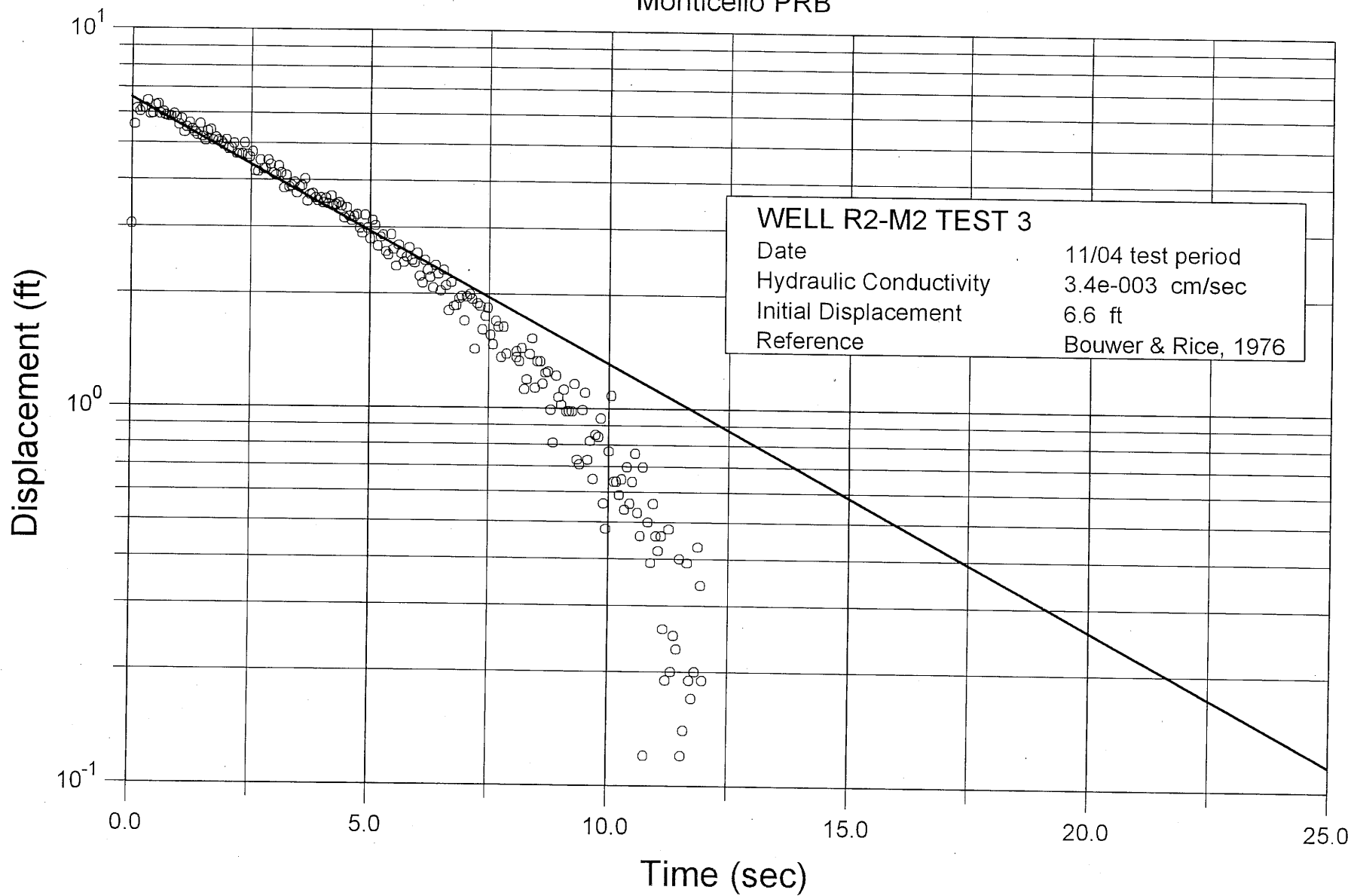
Monticello PRB



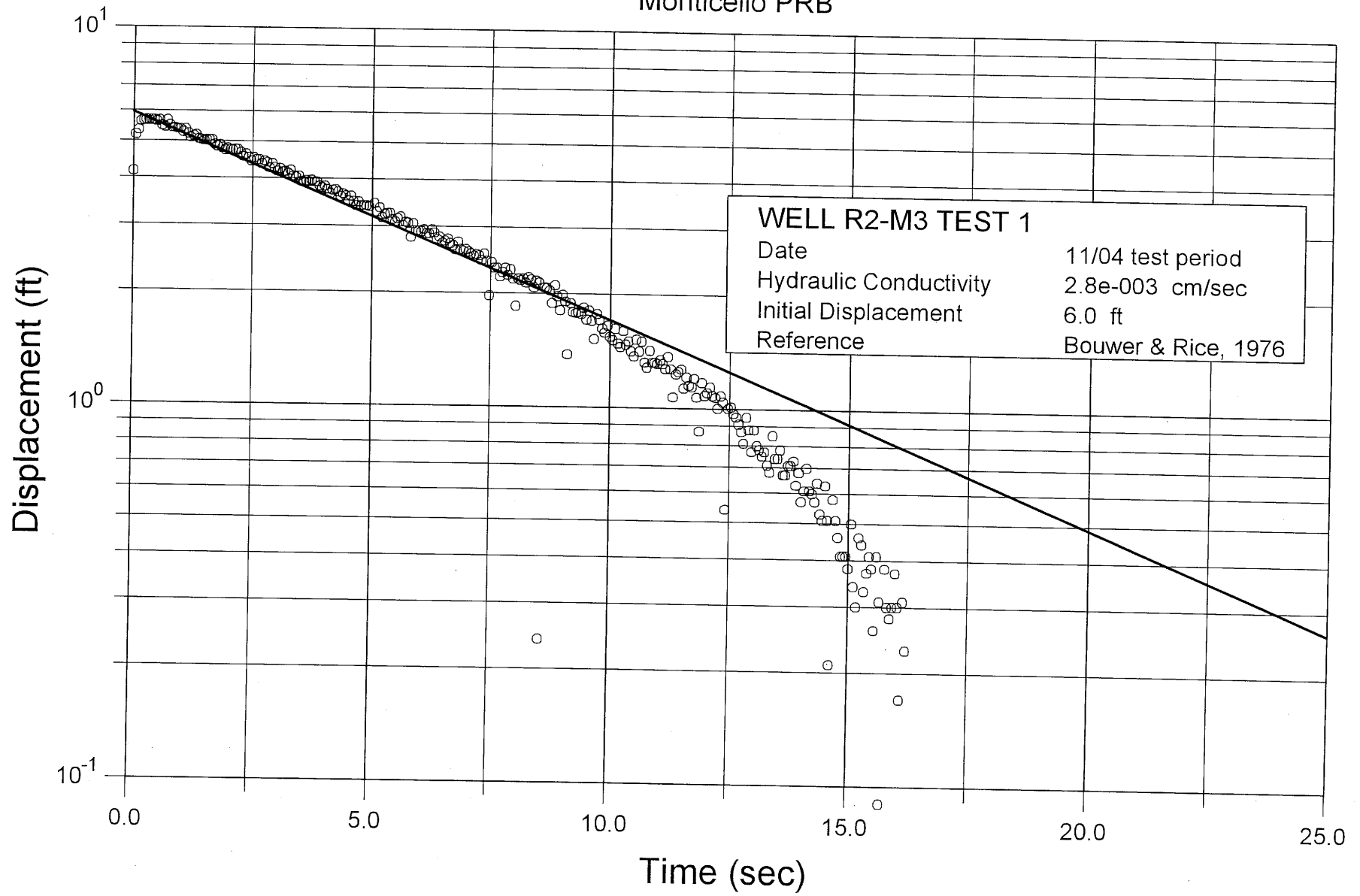
Monticello PRB



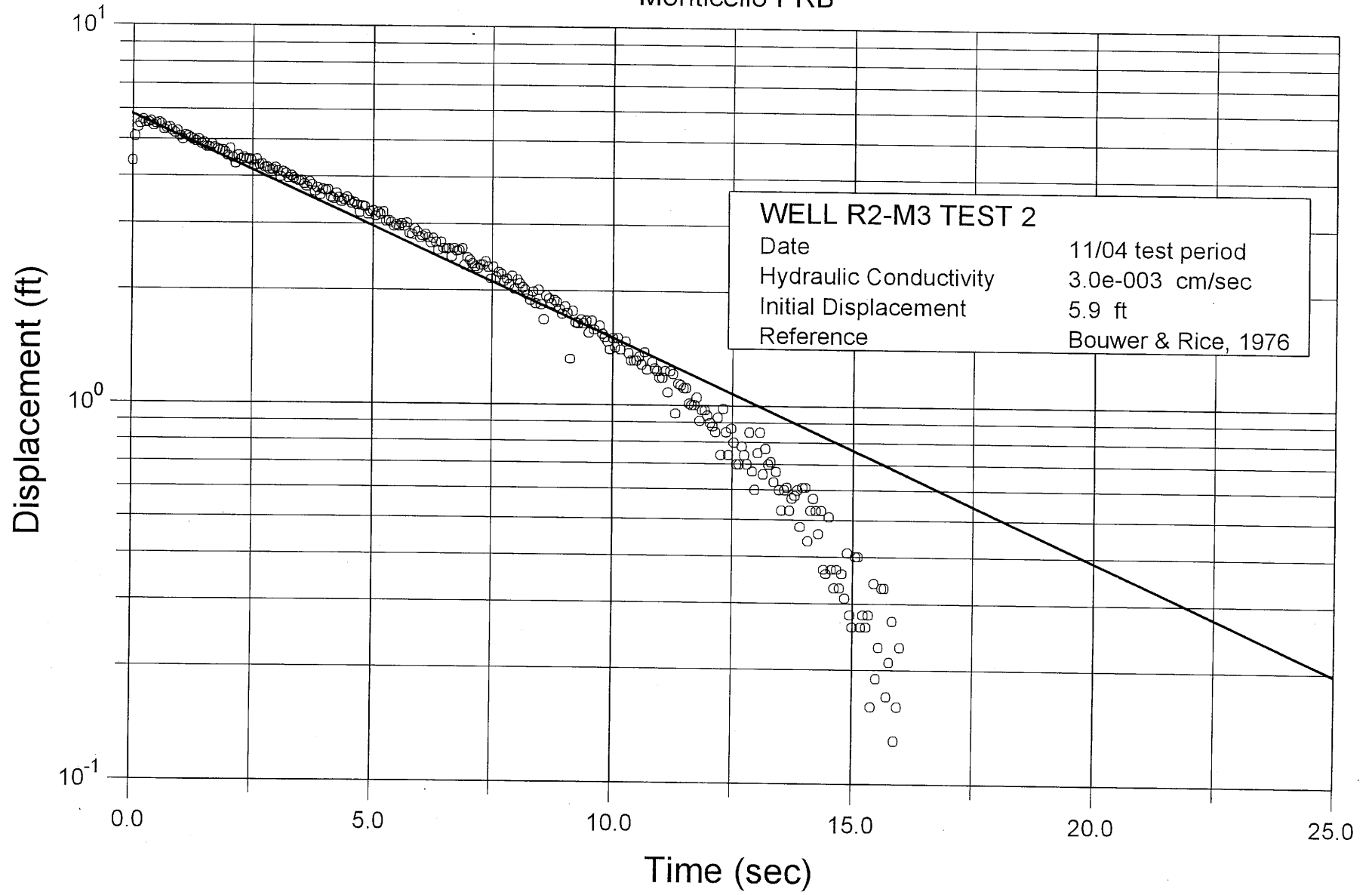
Monticello PRB



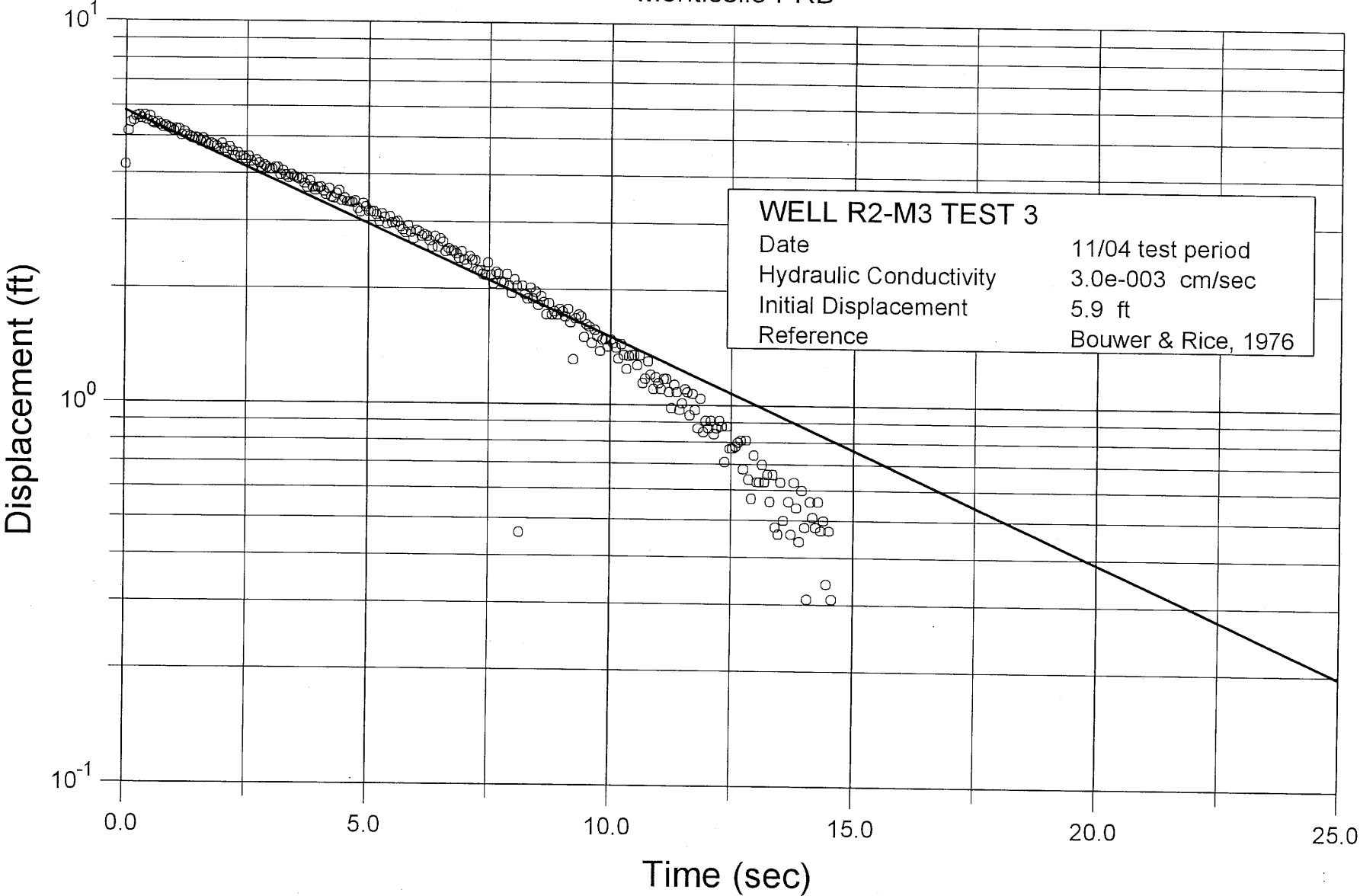
Monticello PRB



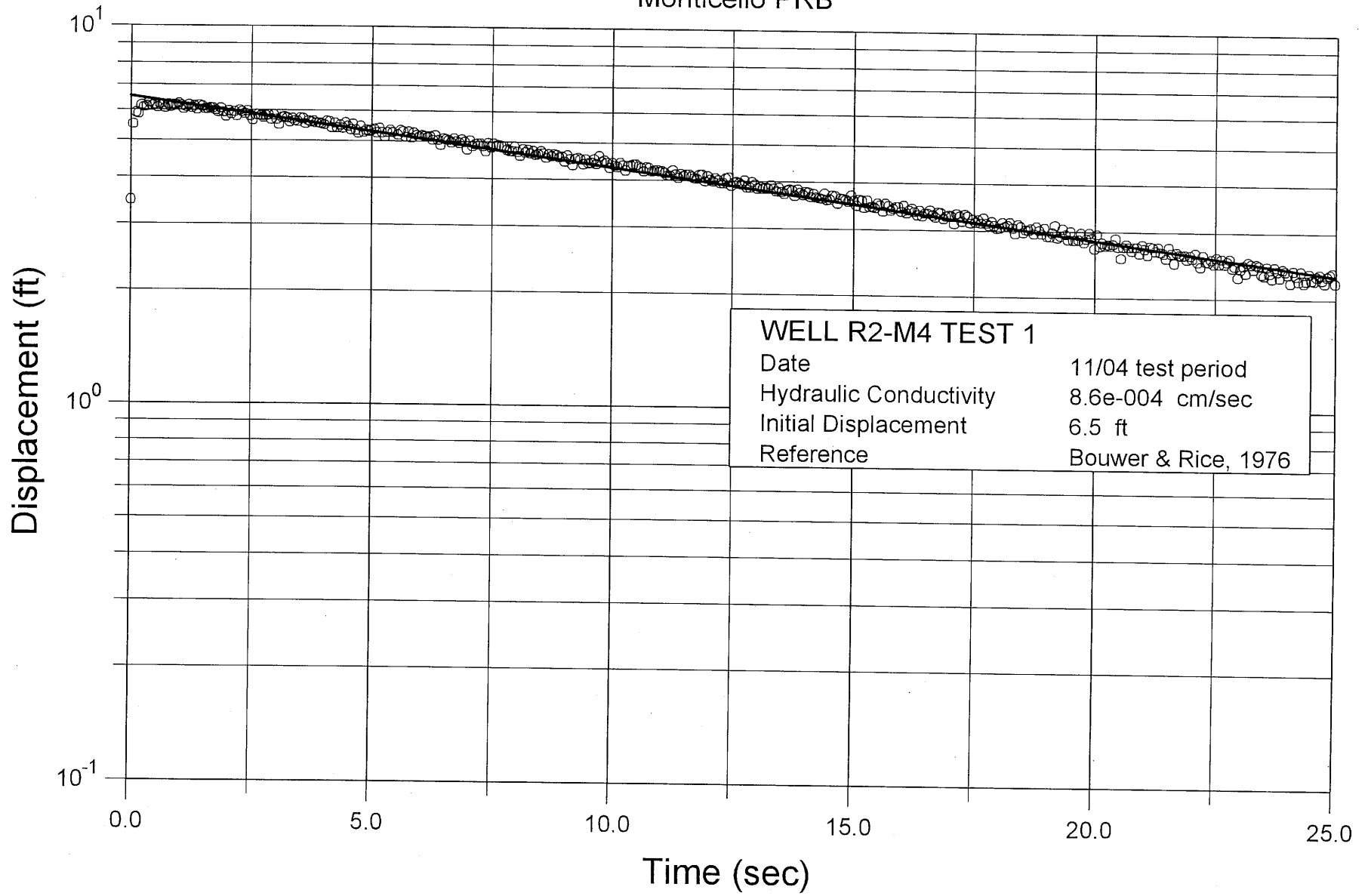
Monticello PRB



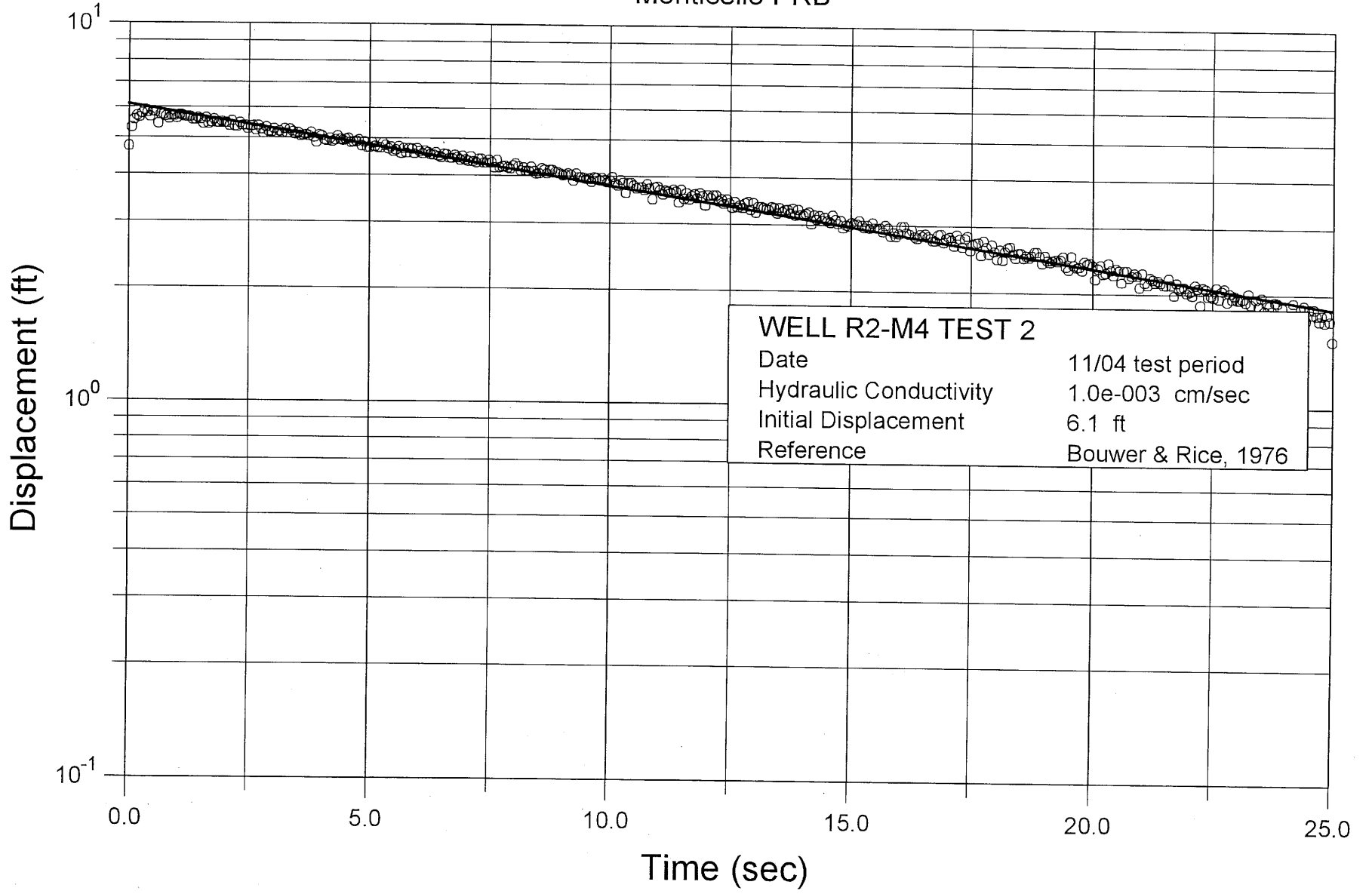
Monticello PRB



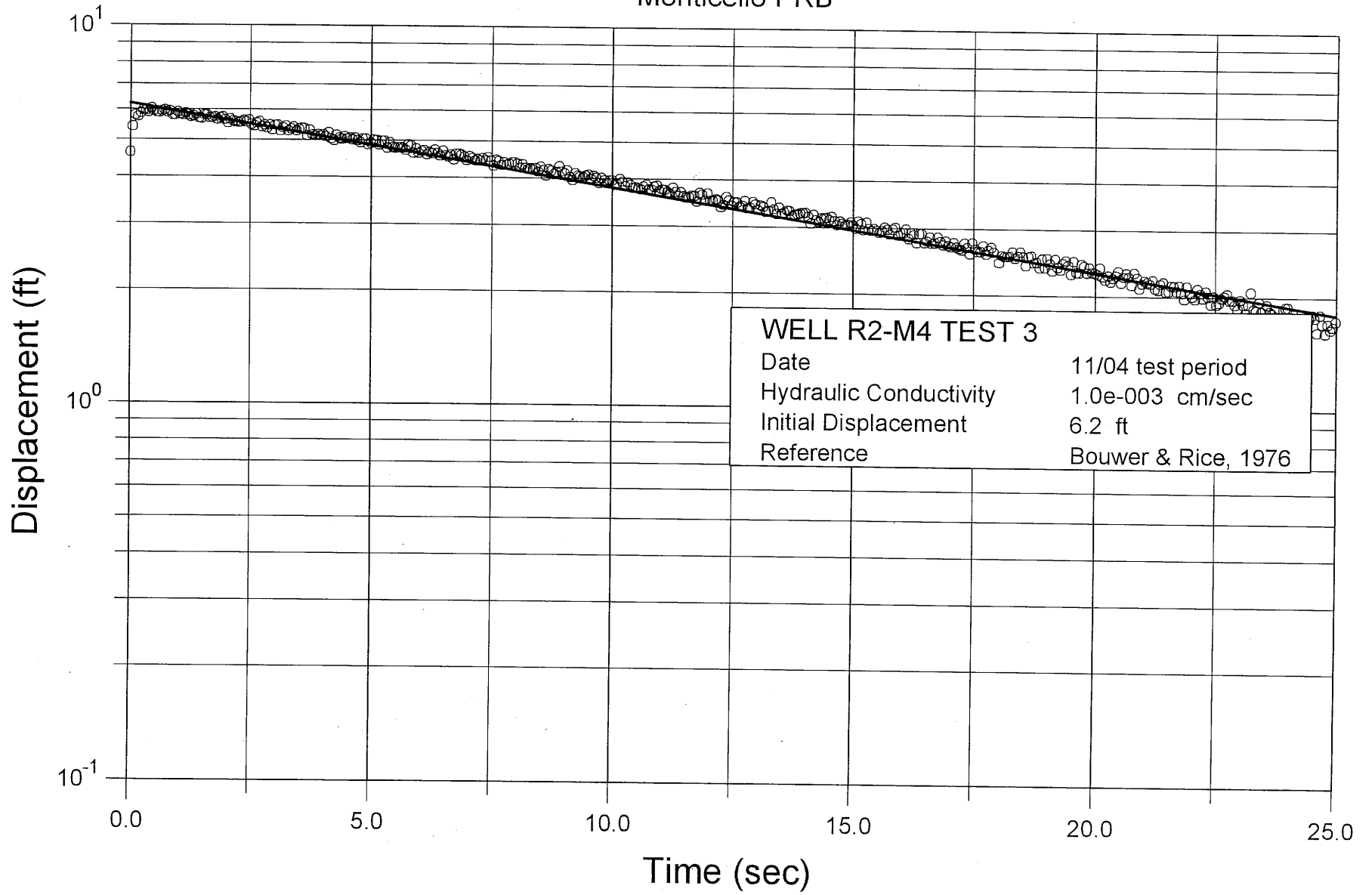
Monticello PRB



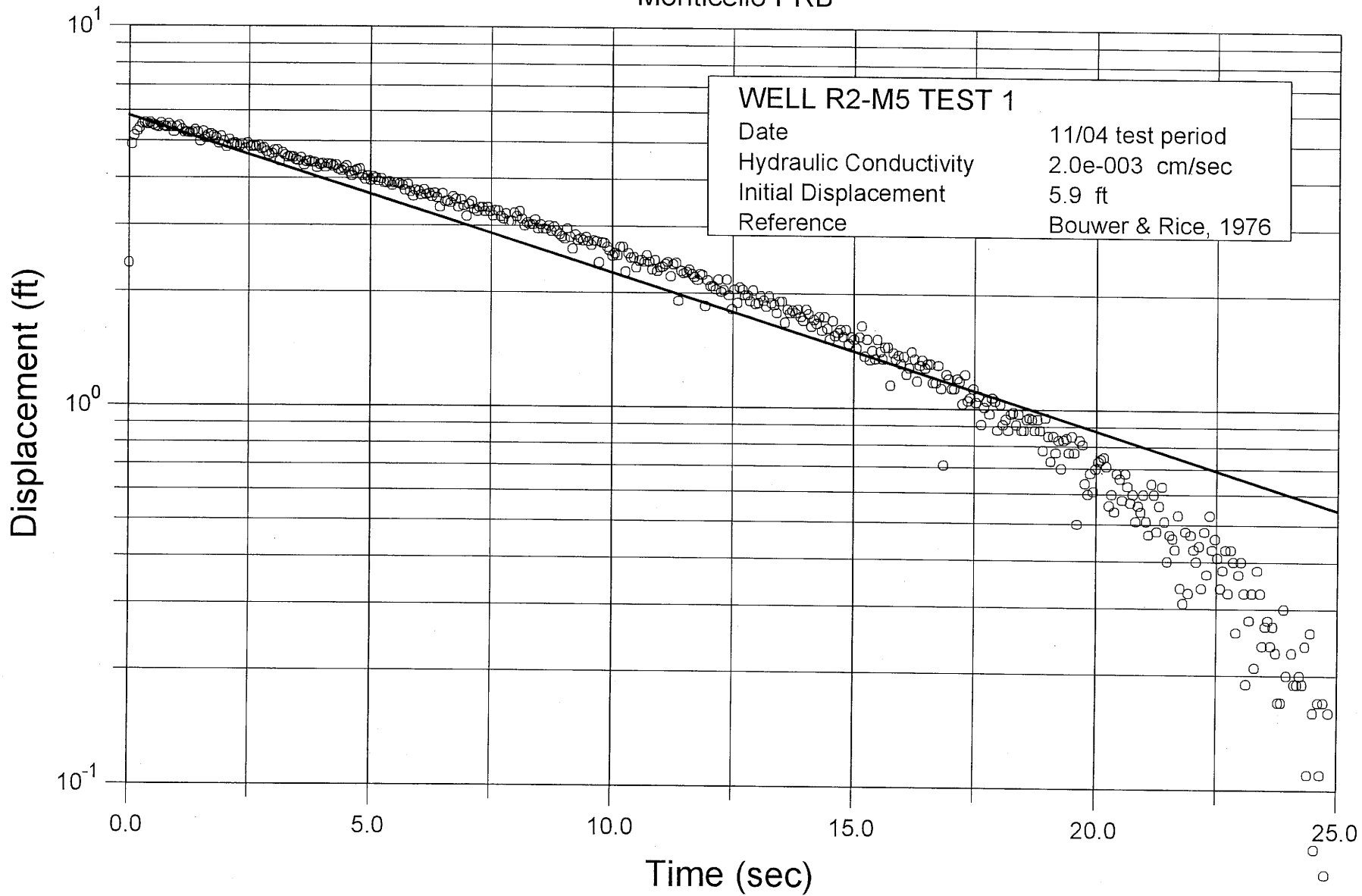
Monticello PRB



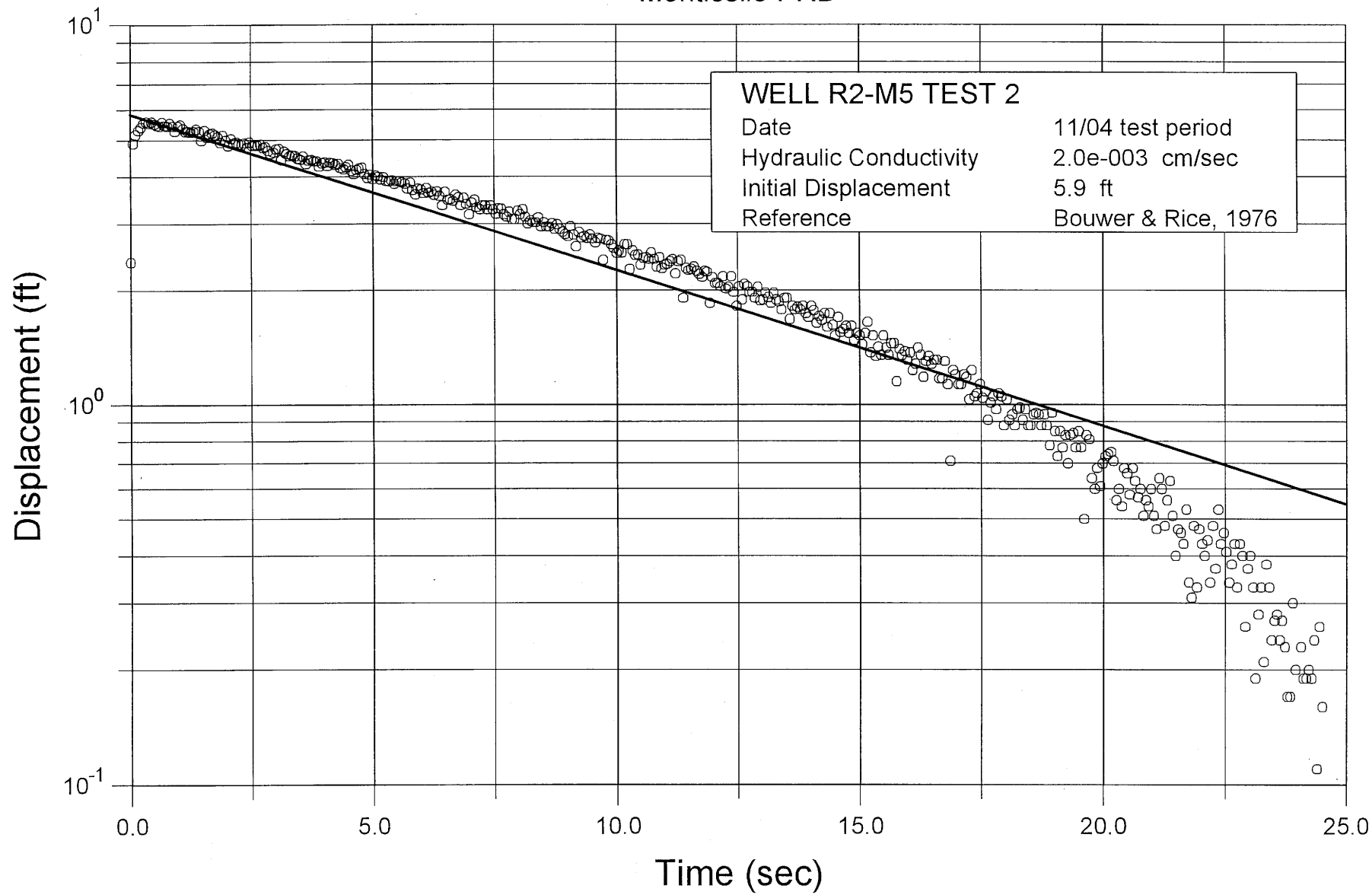
Monticello PRB



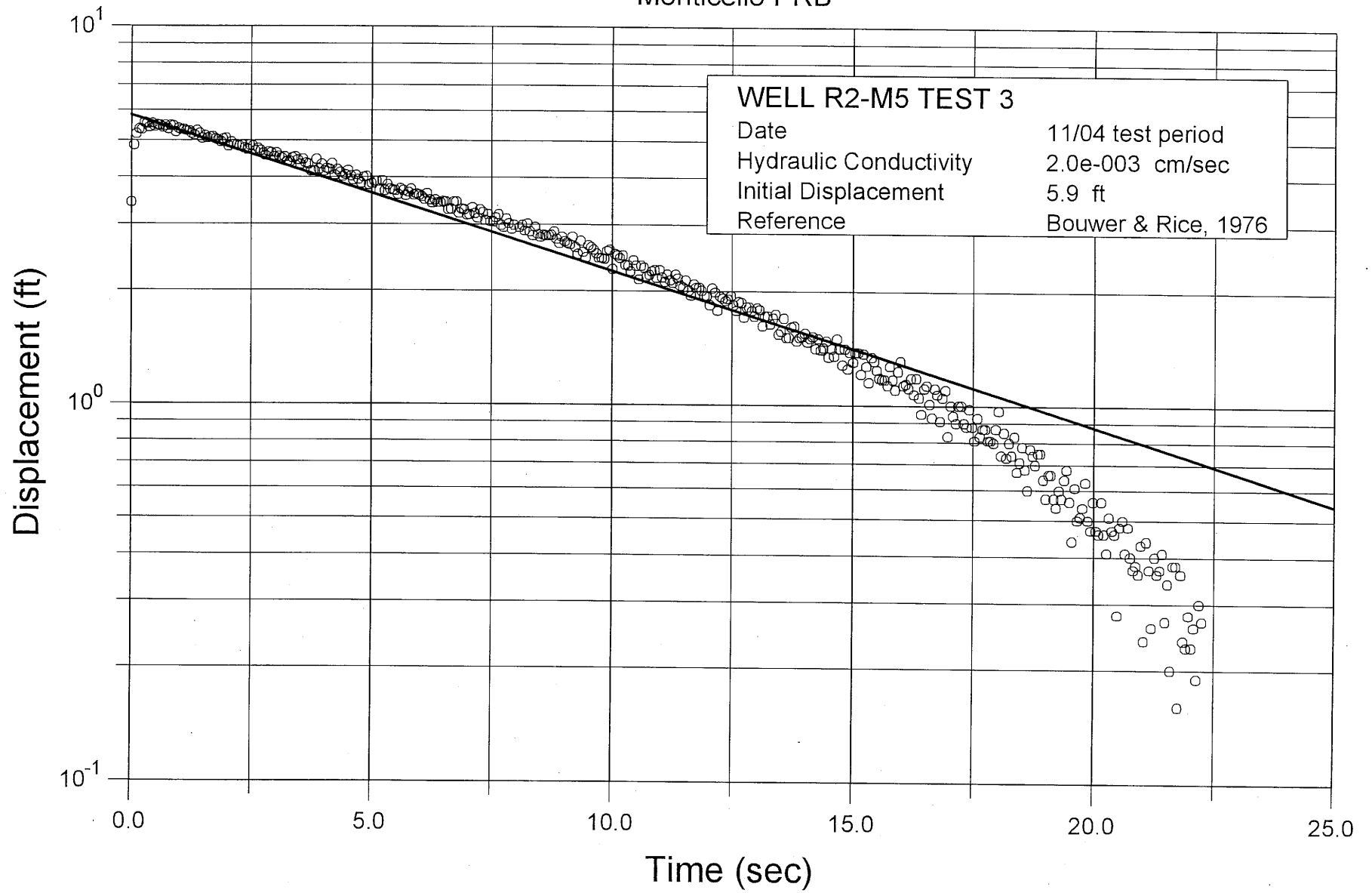
Monticello PRB



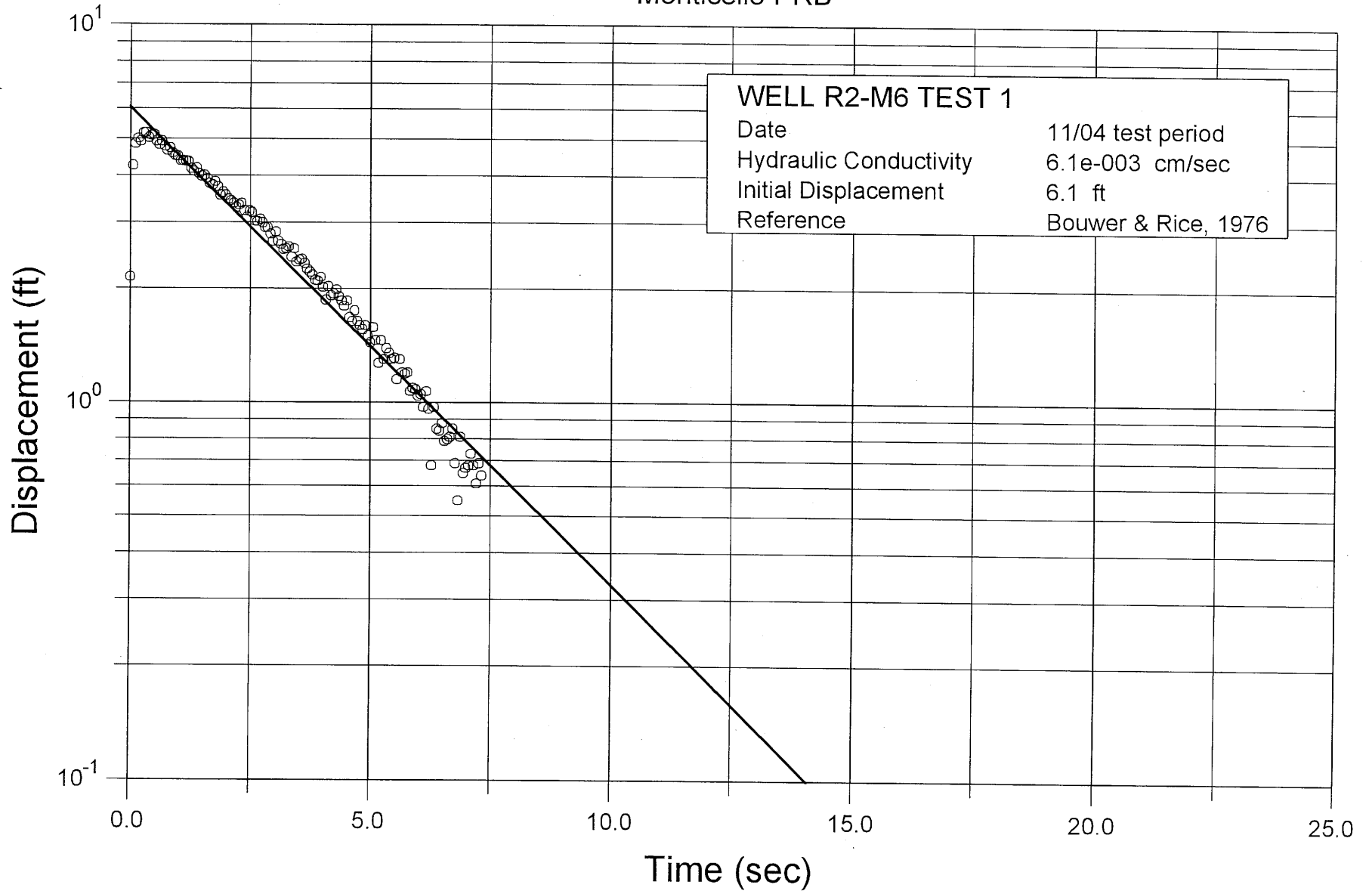
Monticello PRB



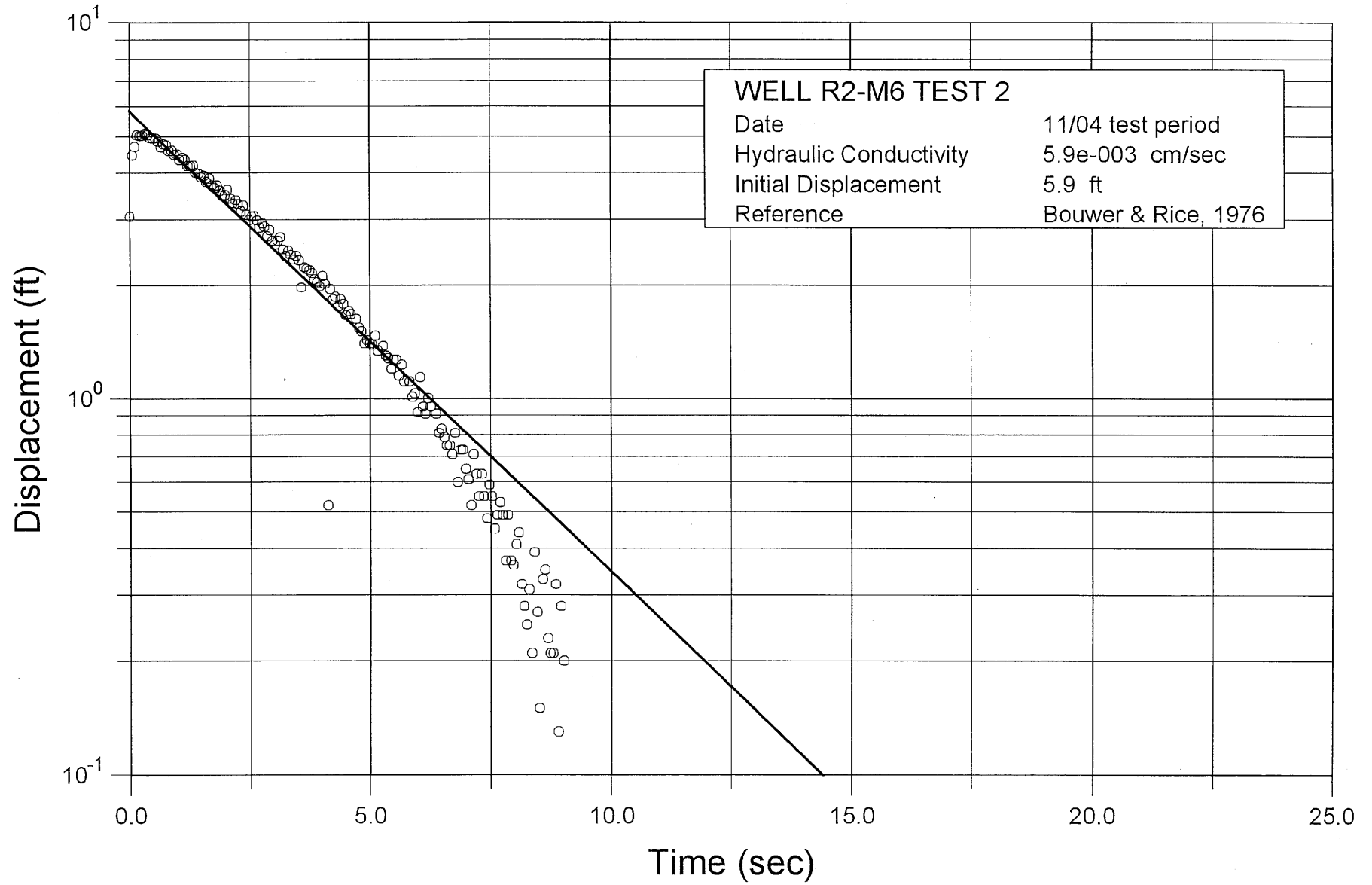
Monticello PRB



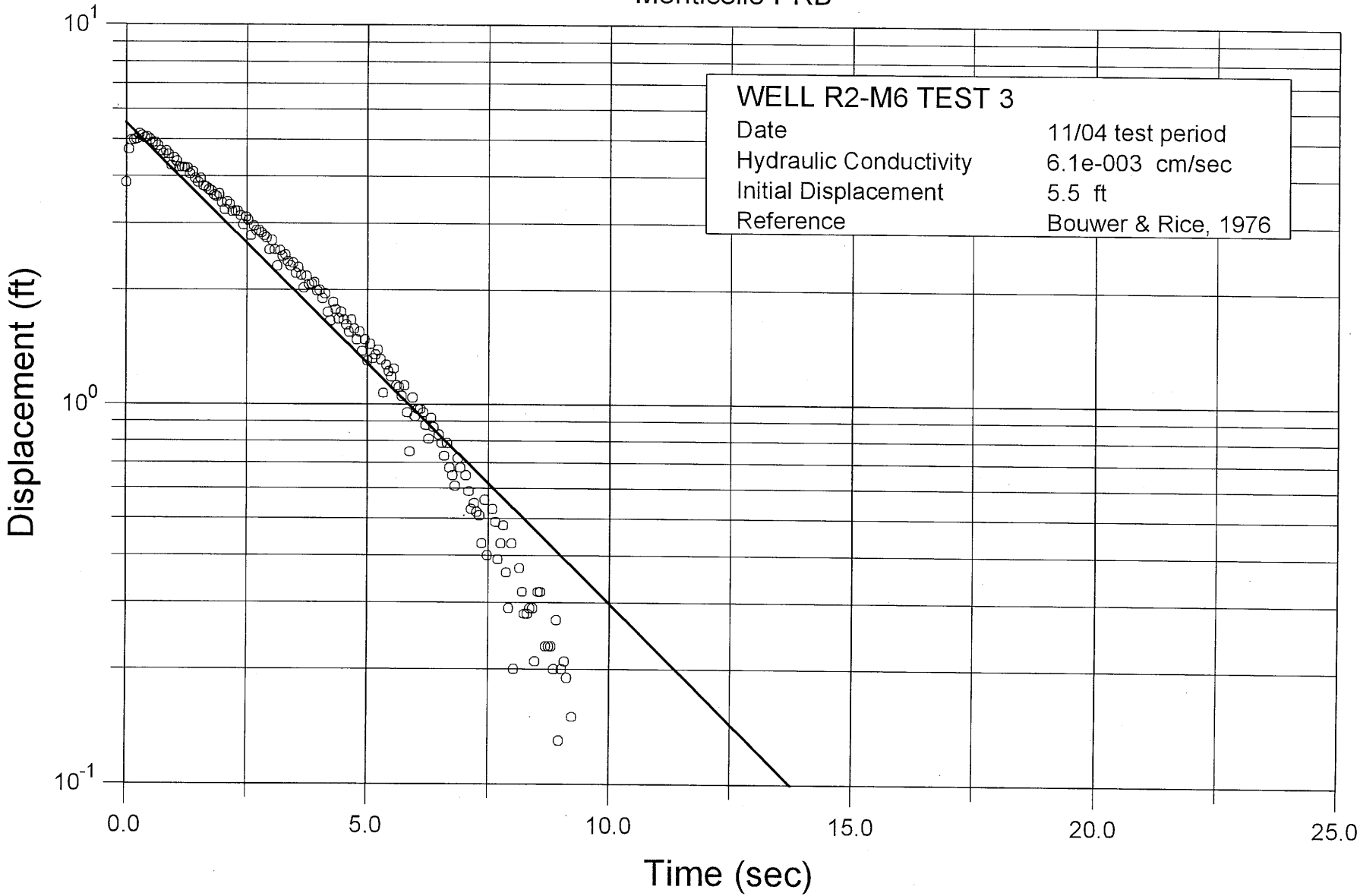
Monticello PRB



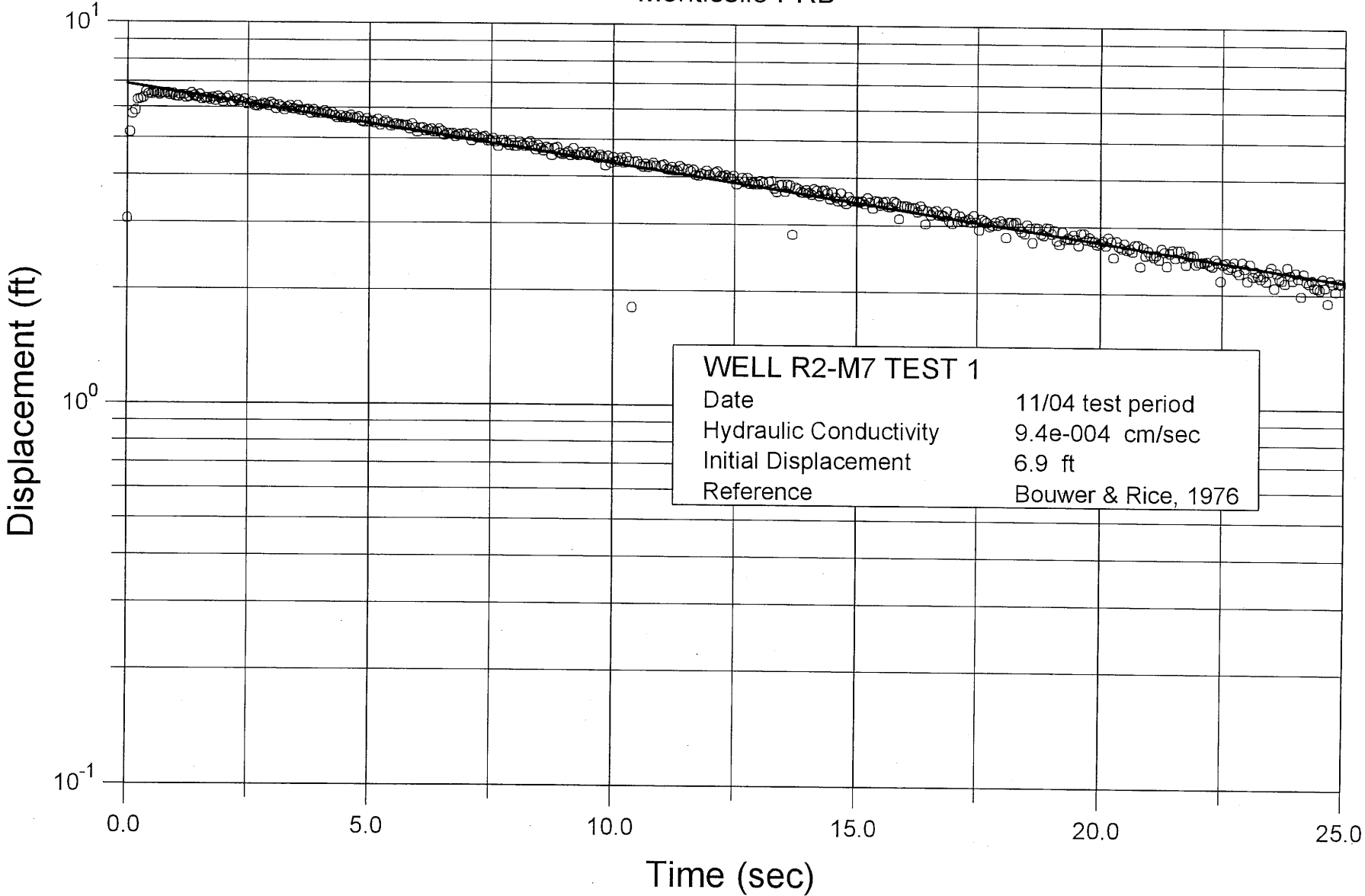
Monticello PRB



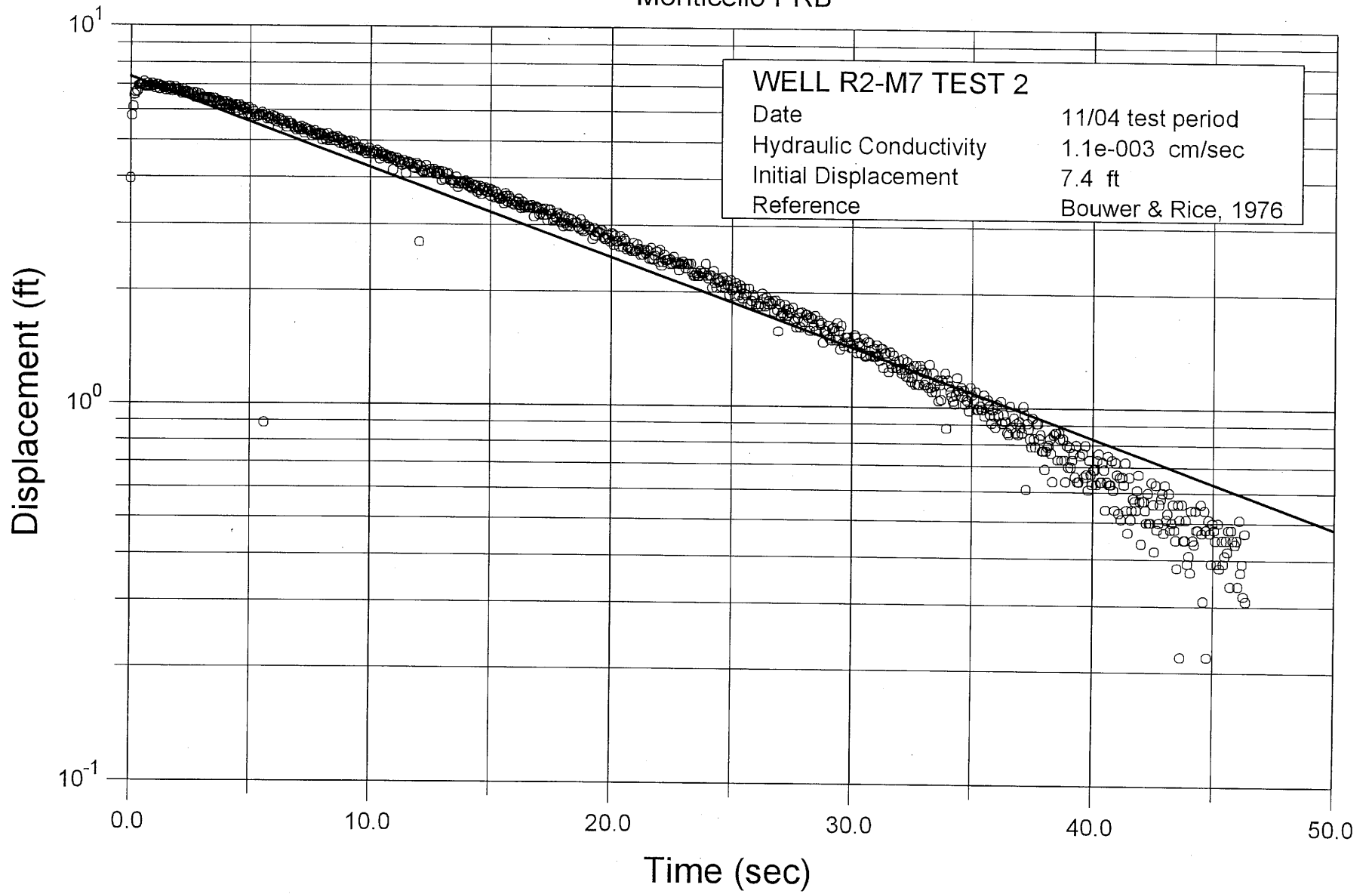
Monticello PRB



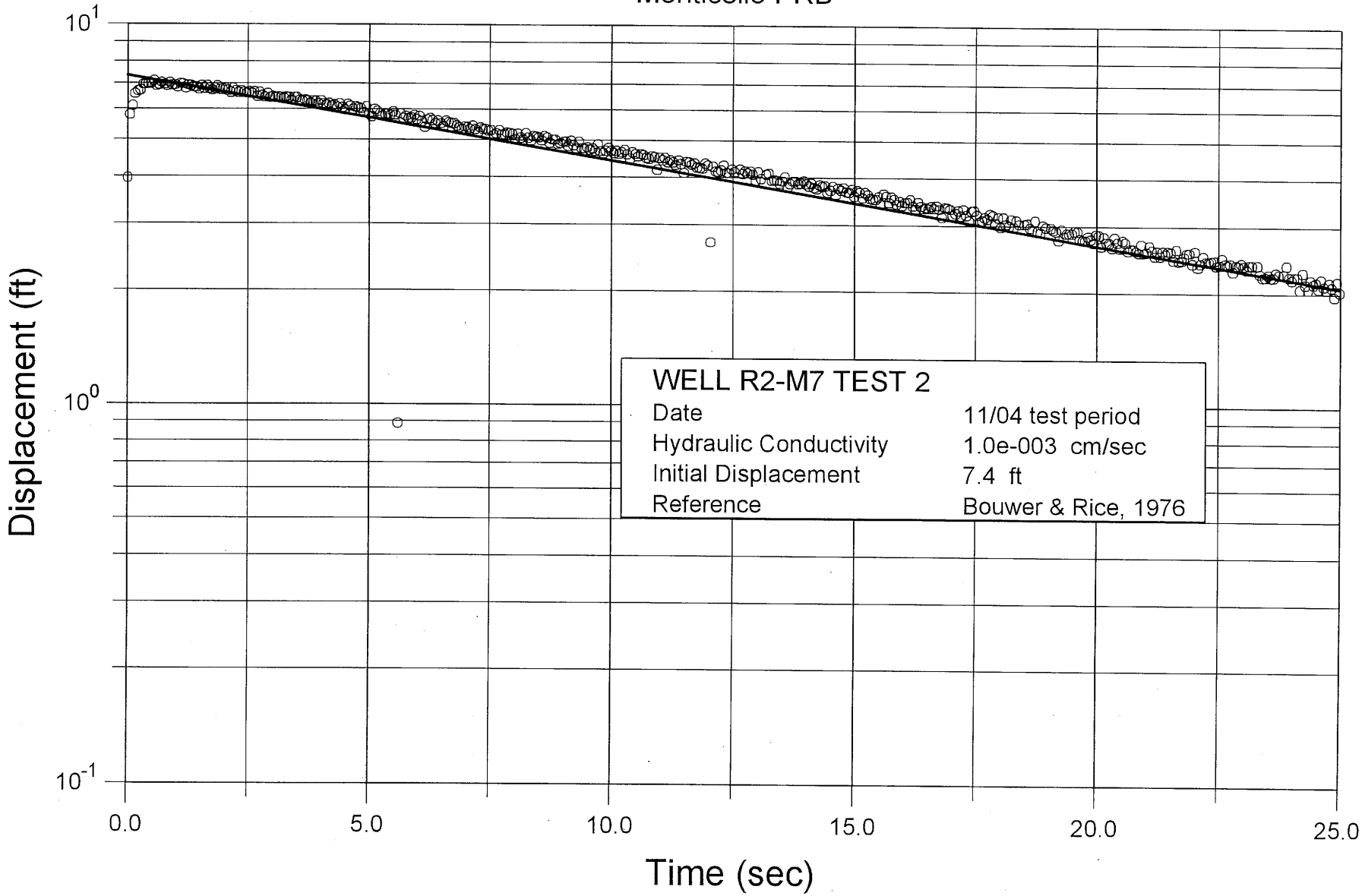
Monticello PRB



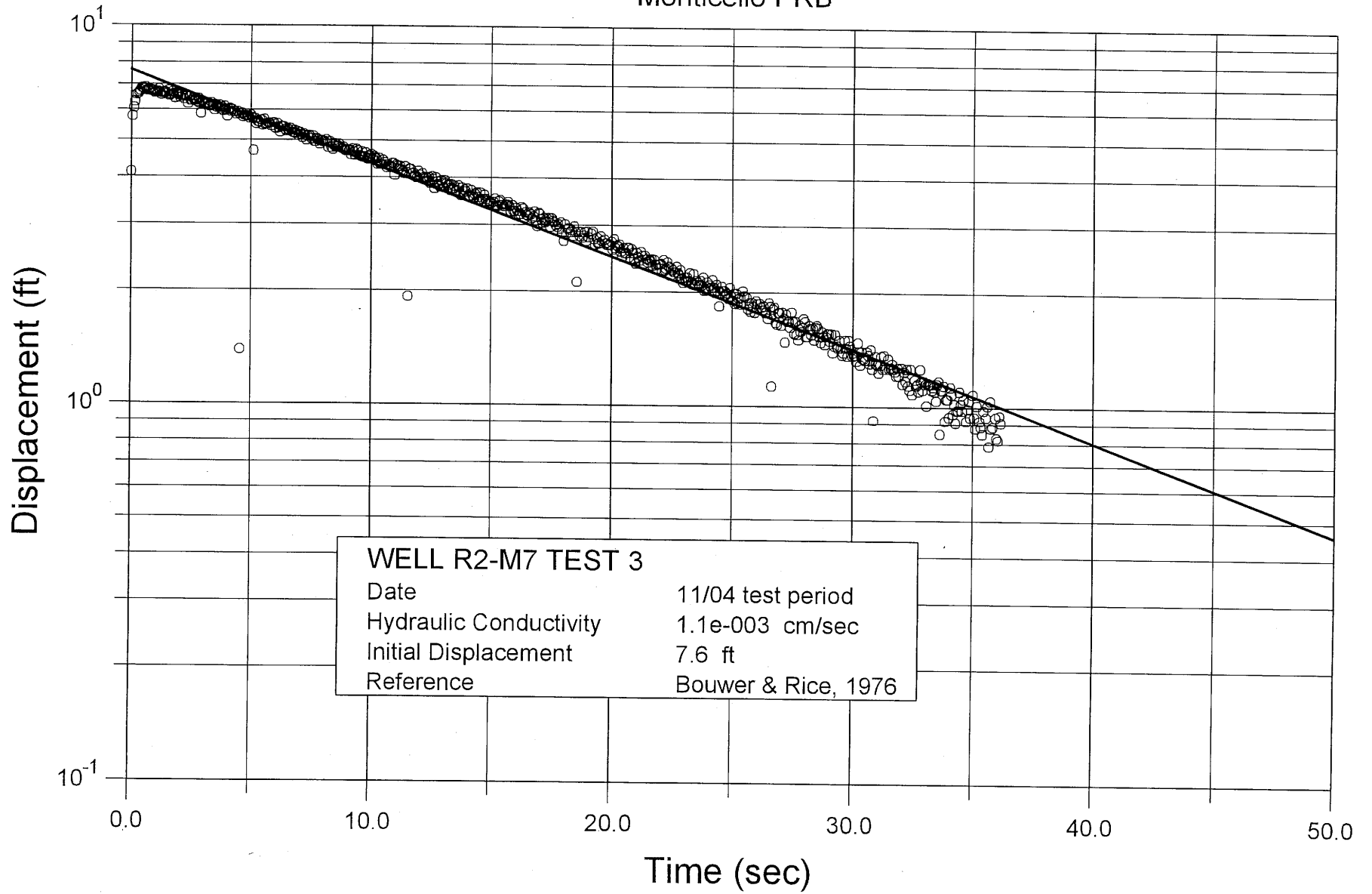
Monticello PRB



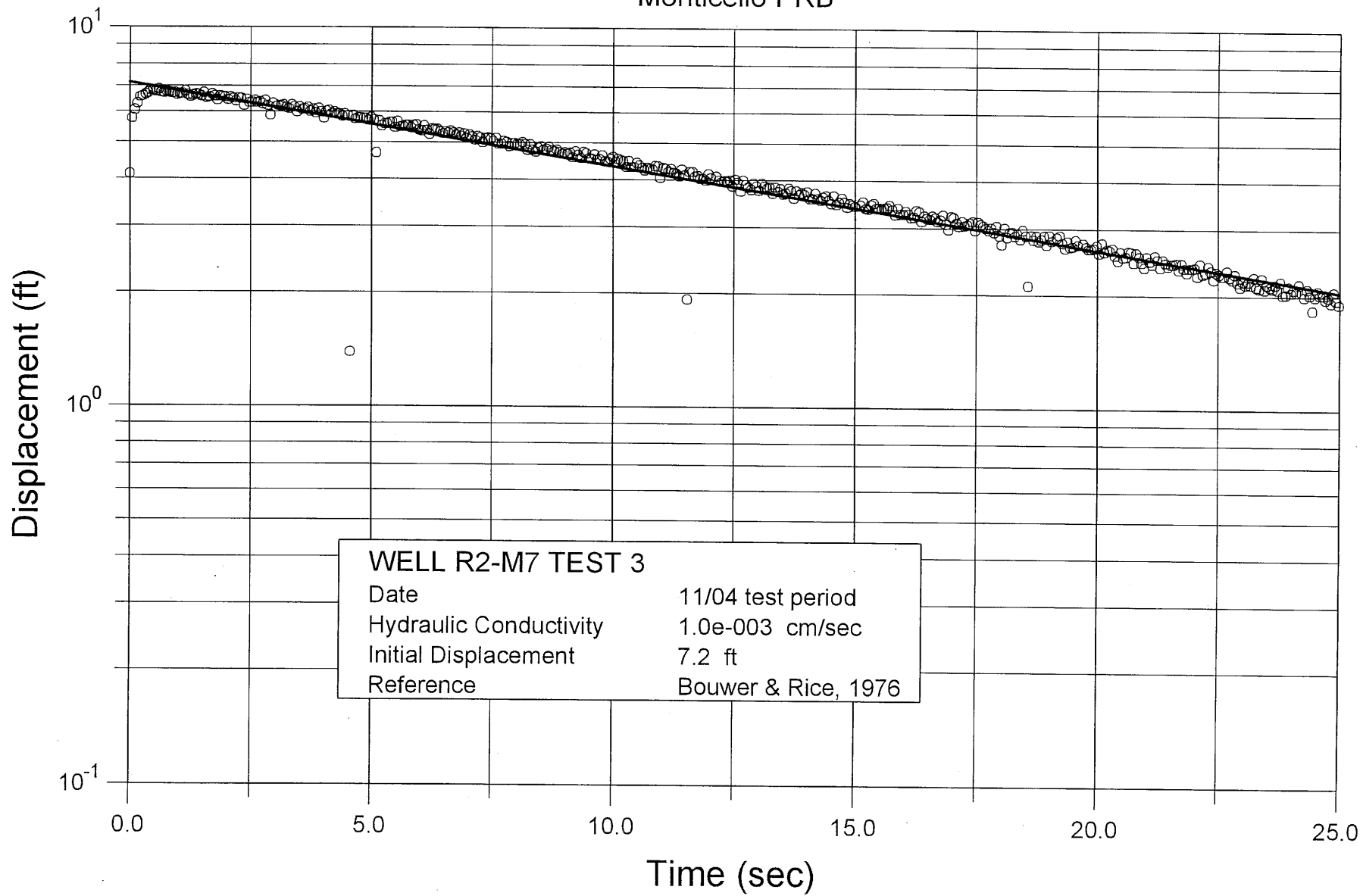
Monticello PRB



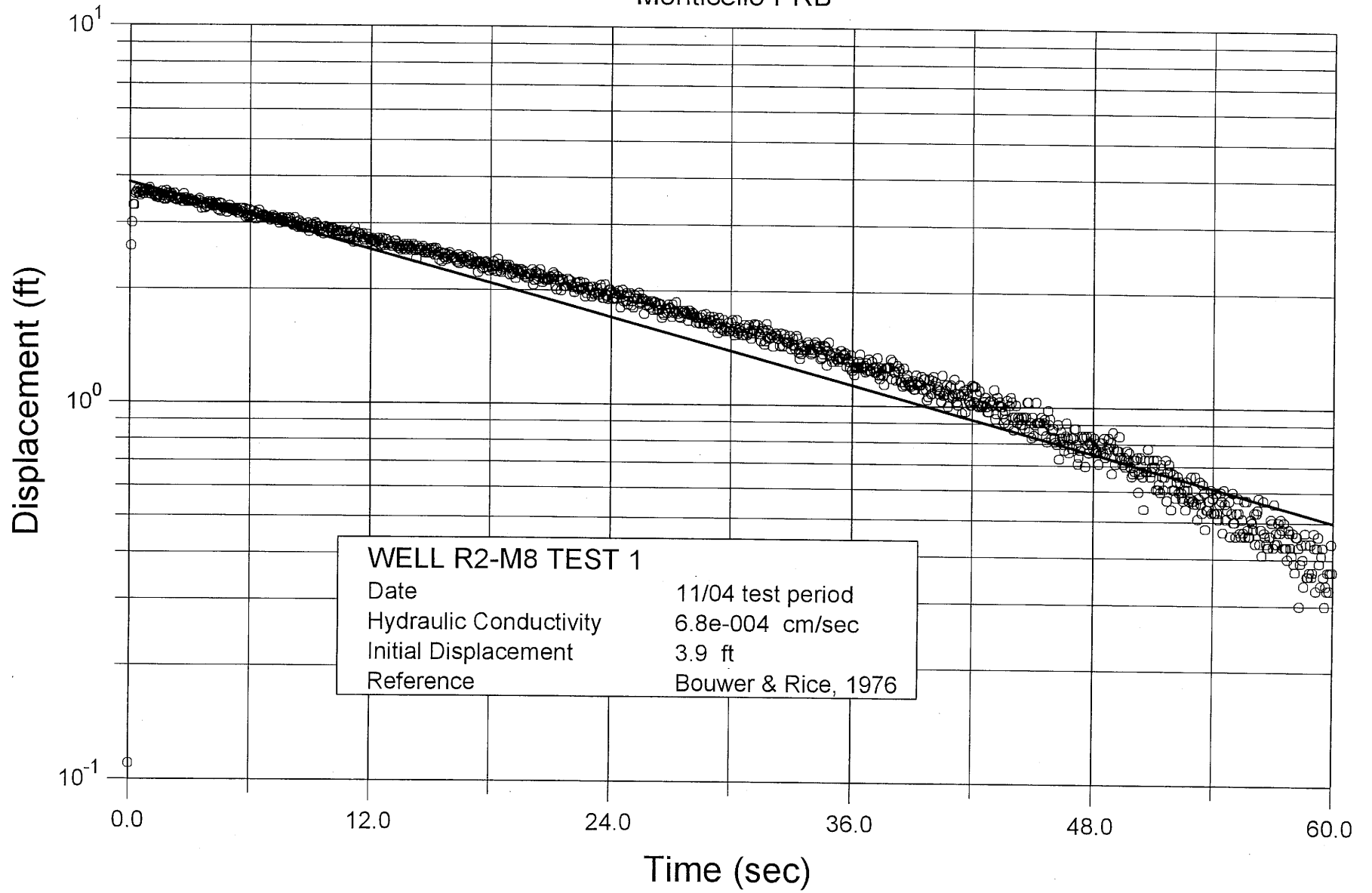
Monticello PRB



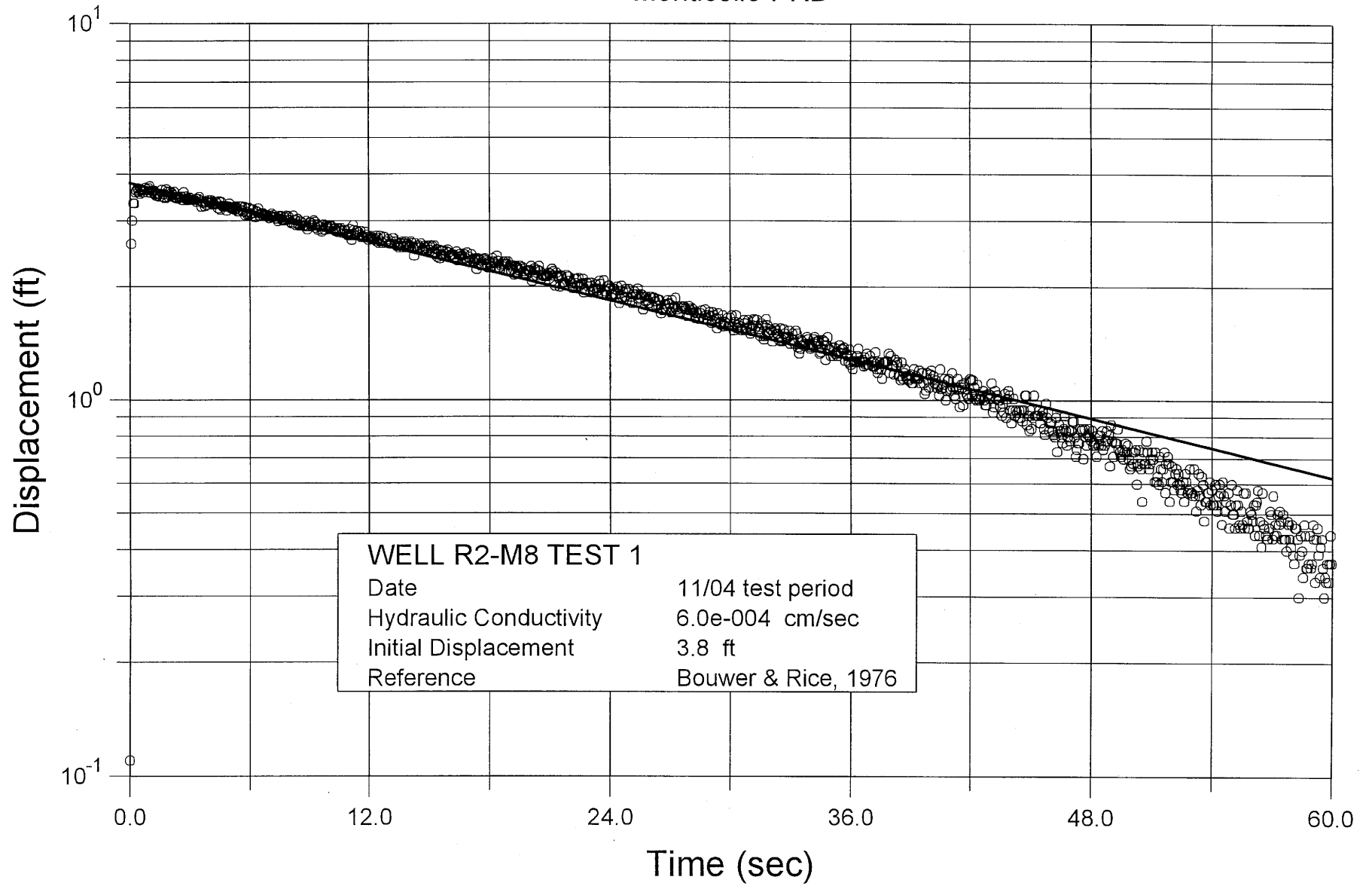
Monticello PRB



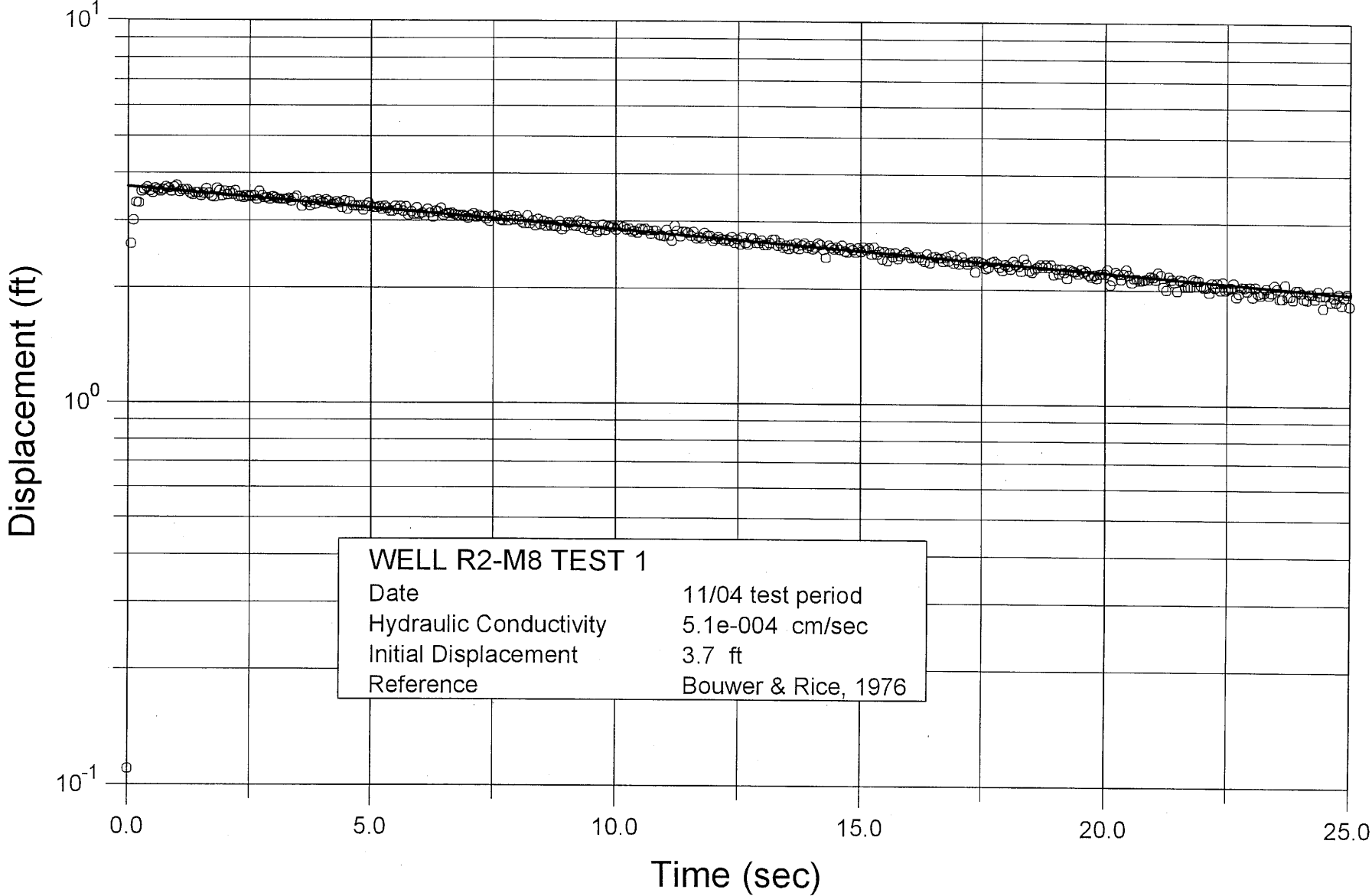
Monticello PRB



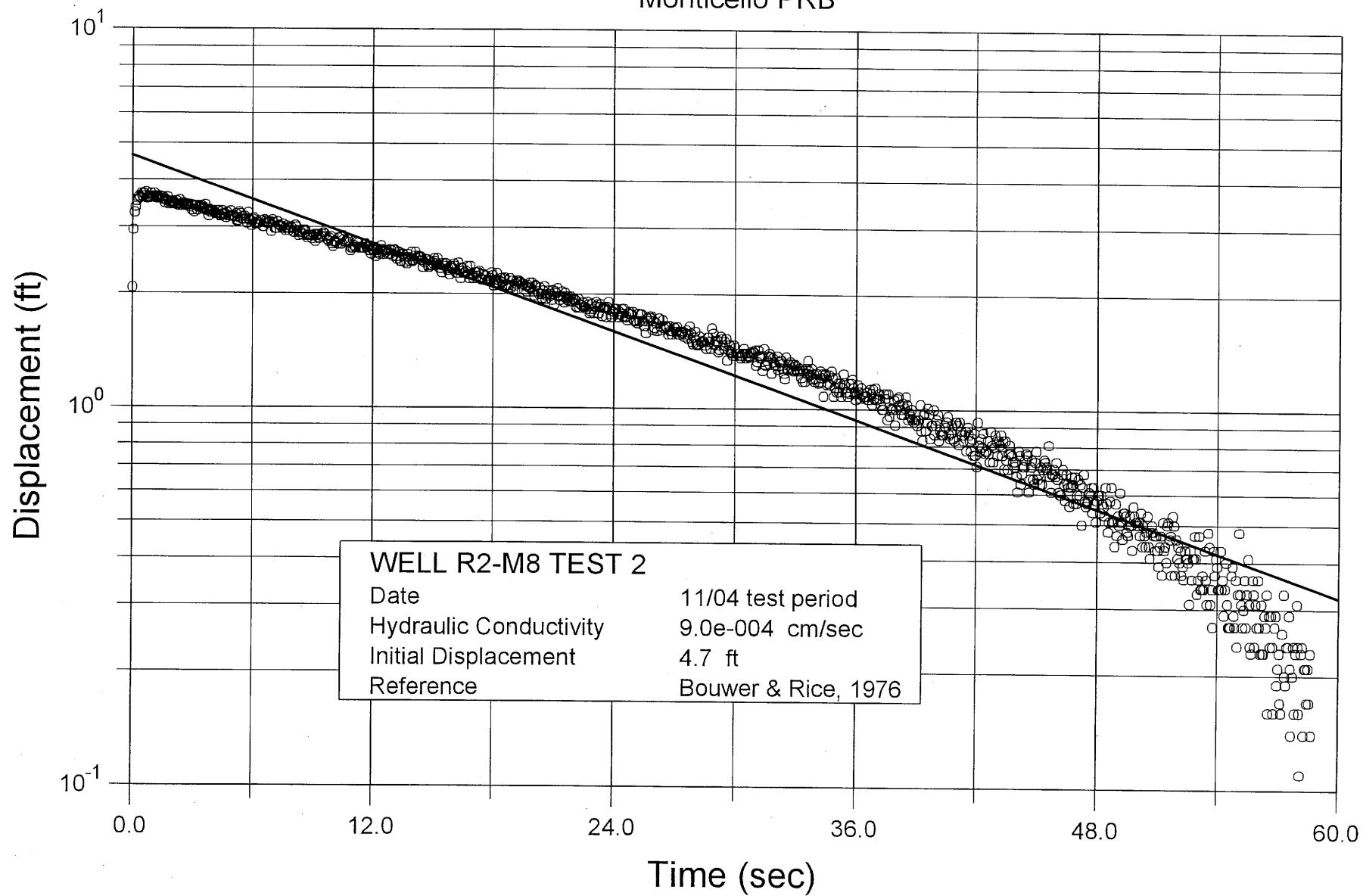
Monticello PRB



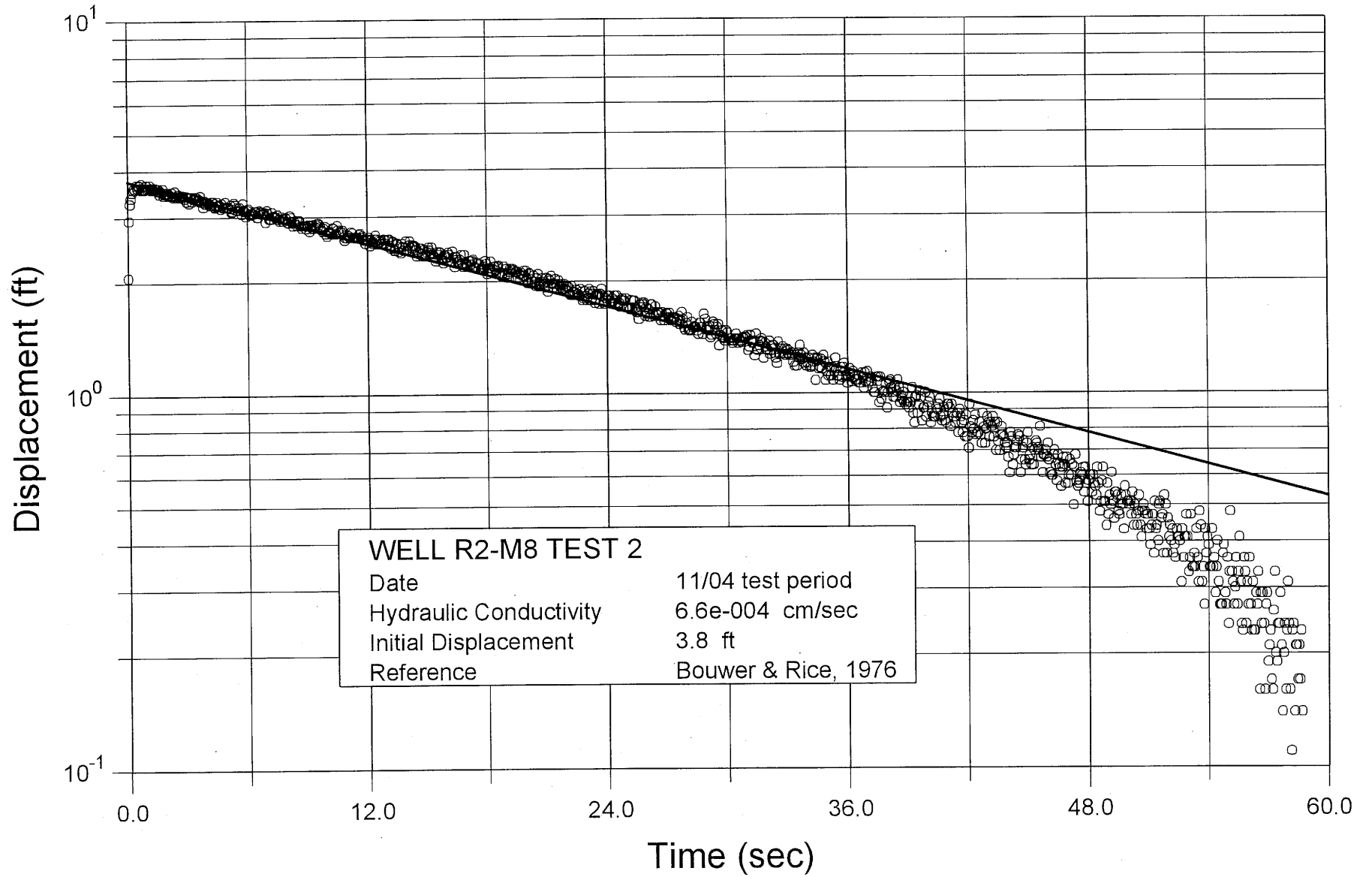
Monticello PRB



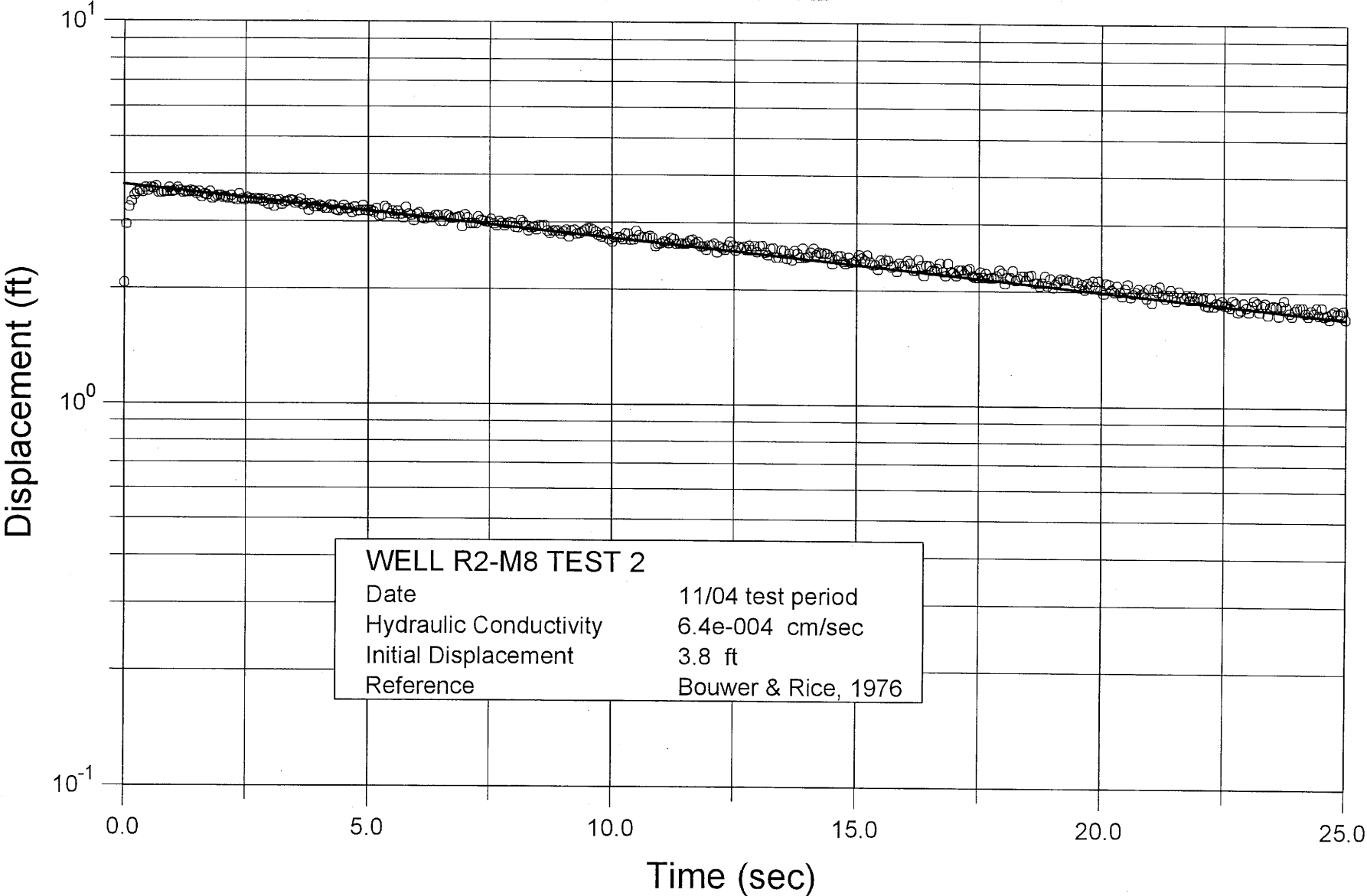
Monticello PRB



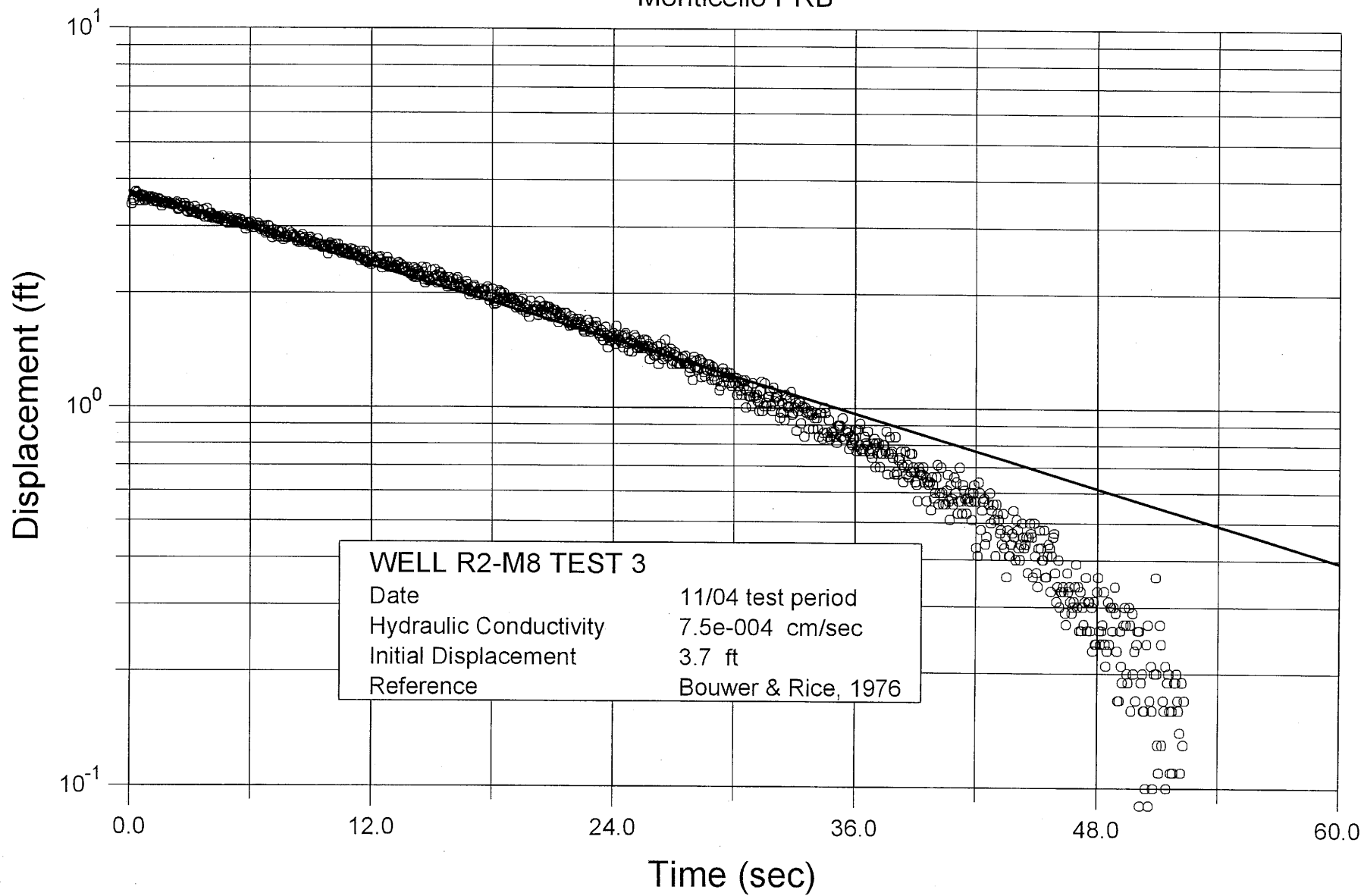
Monticello PRB



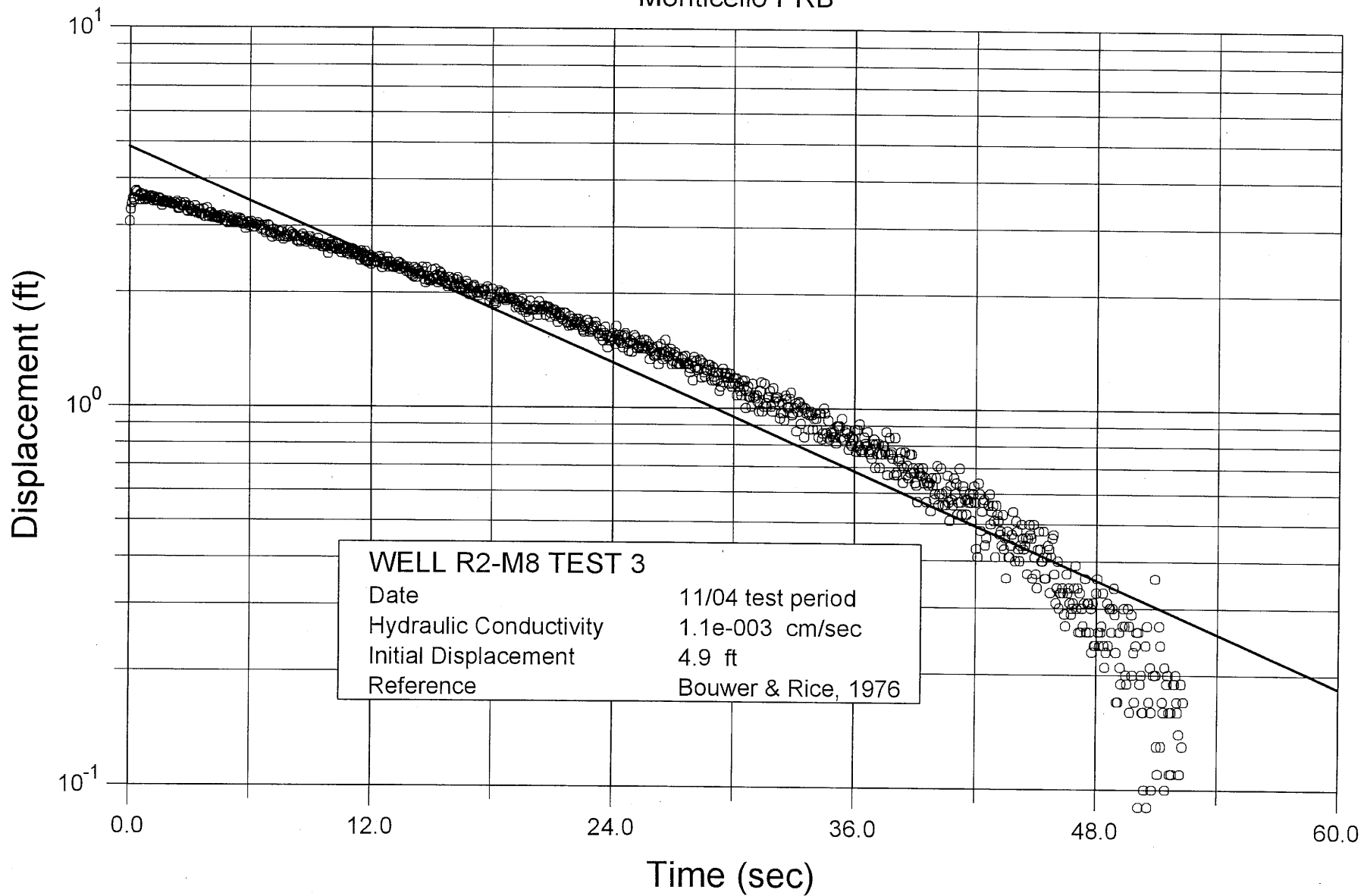
Monticello PRB



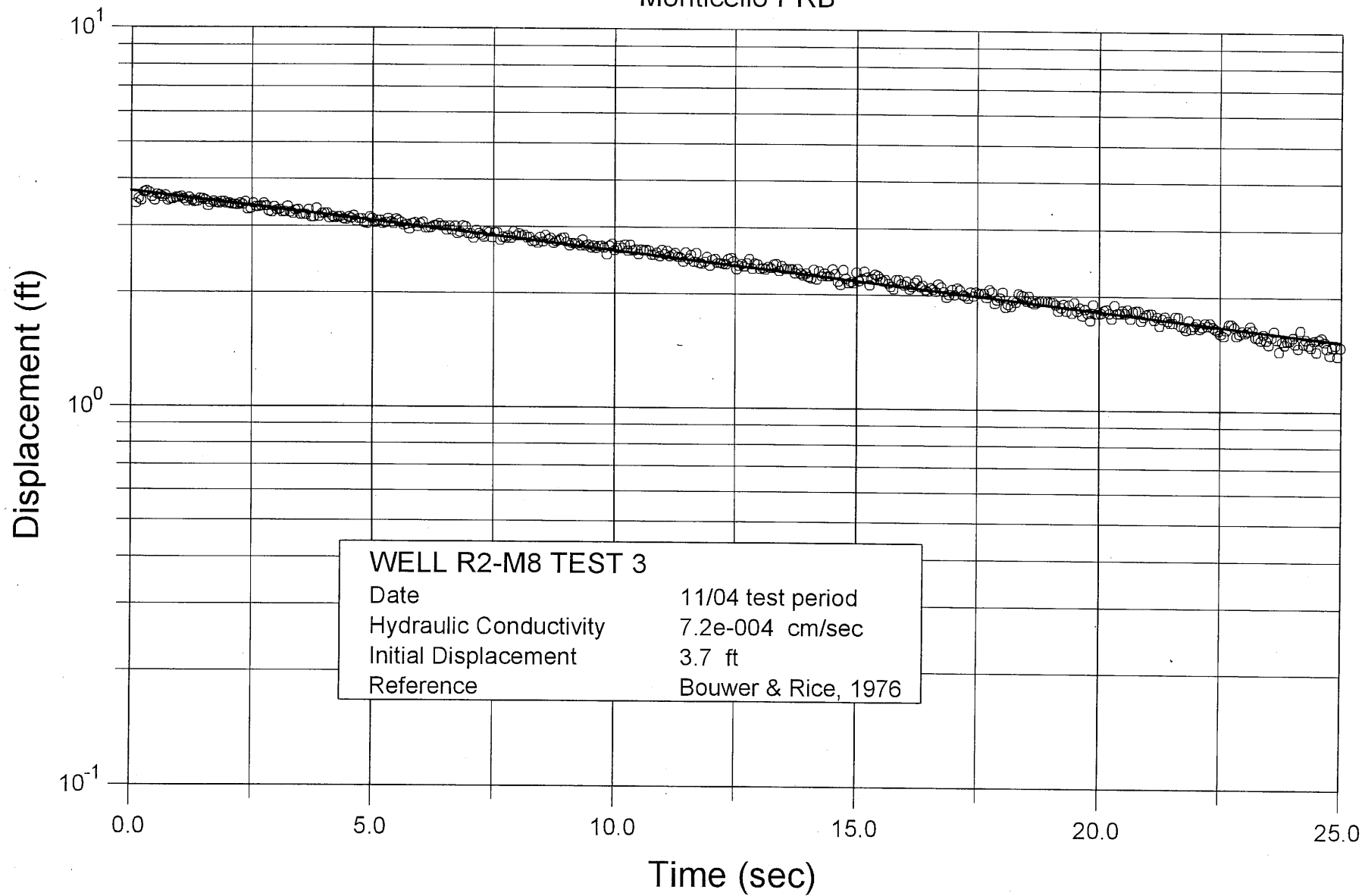
Monticello PRB



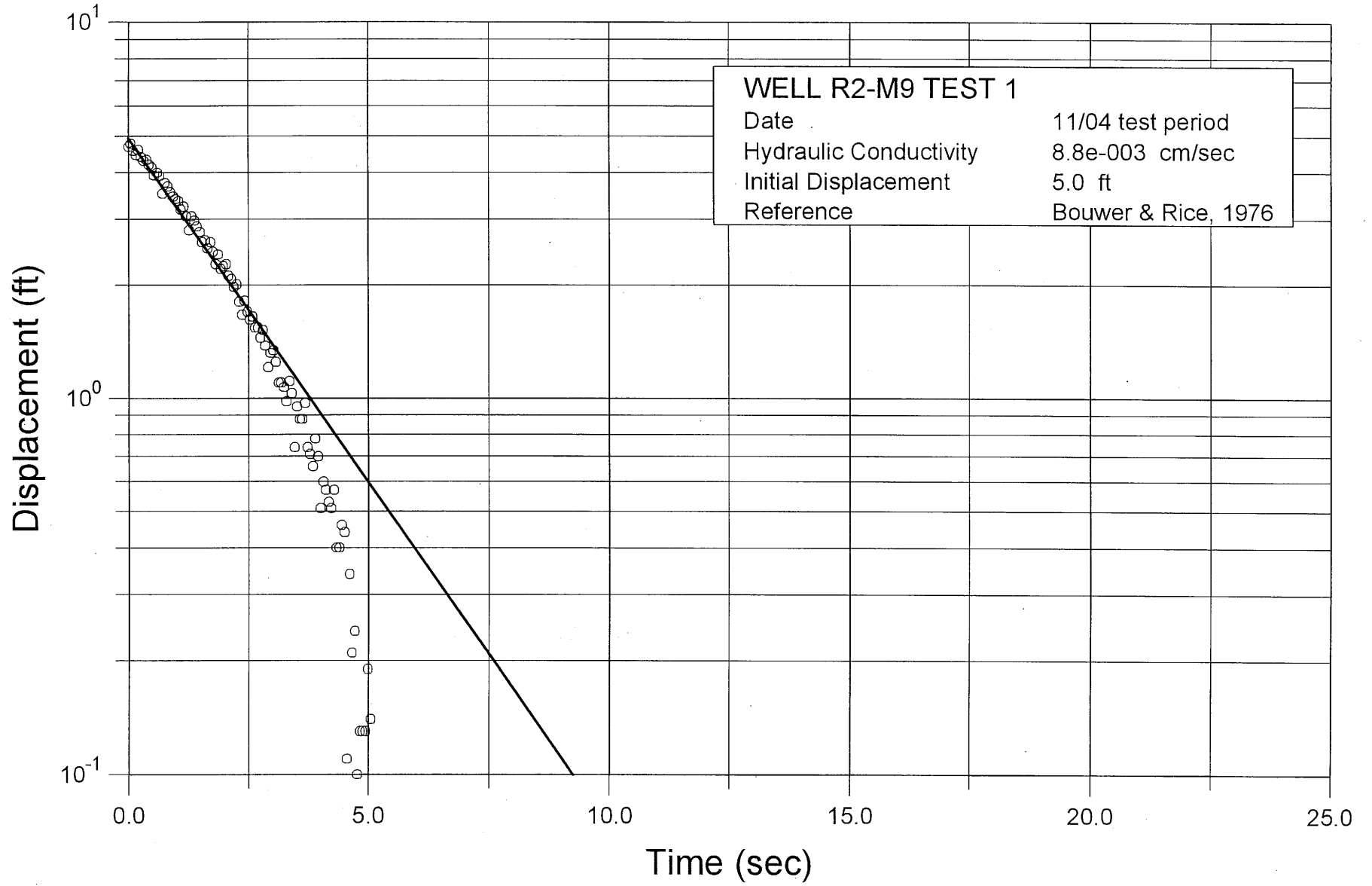
Monticello PRB



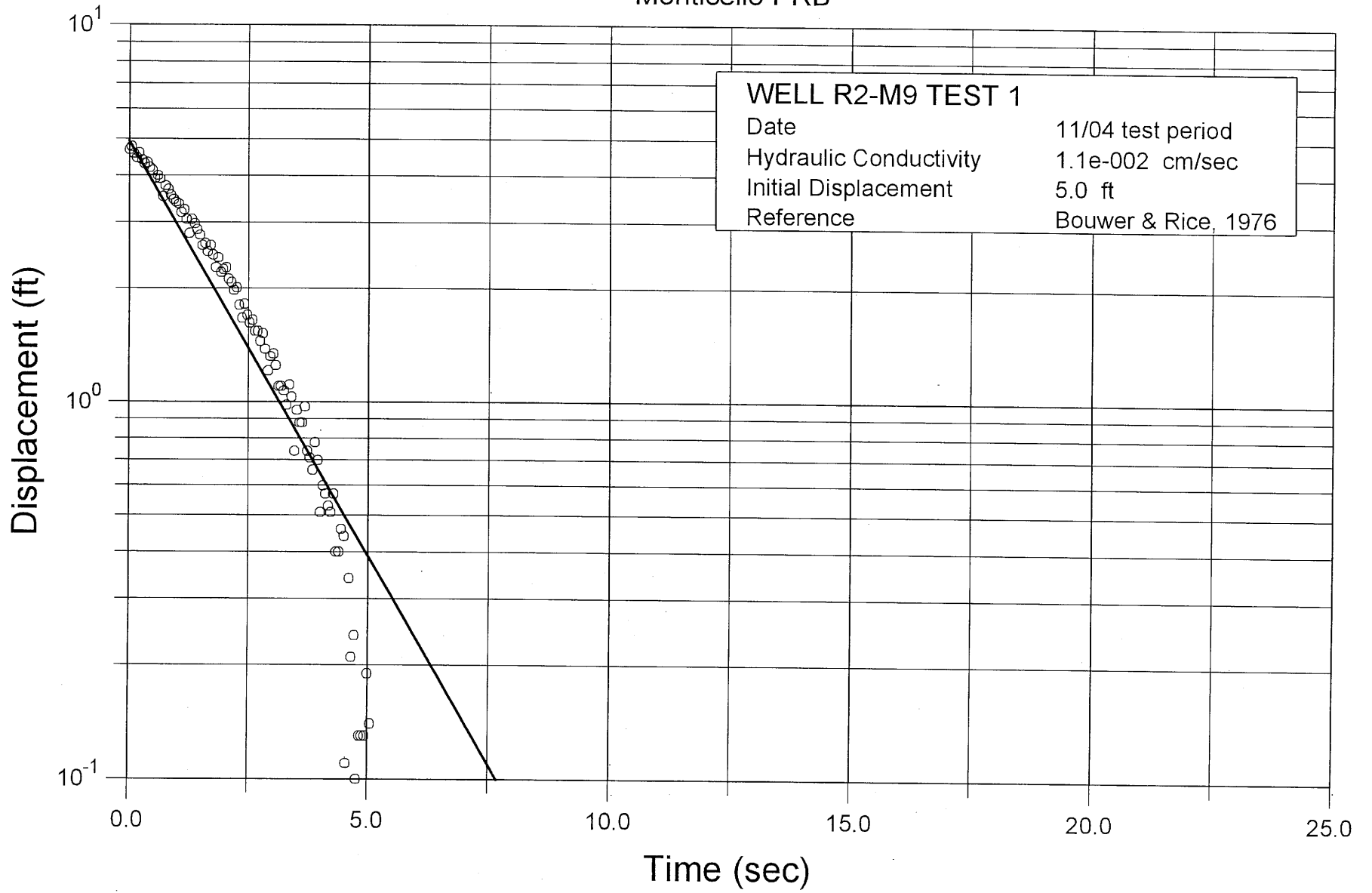
Monticello PRB



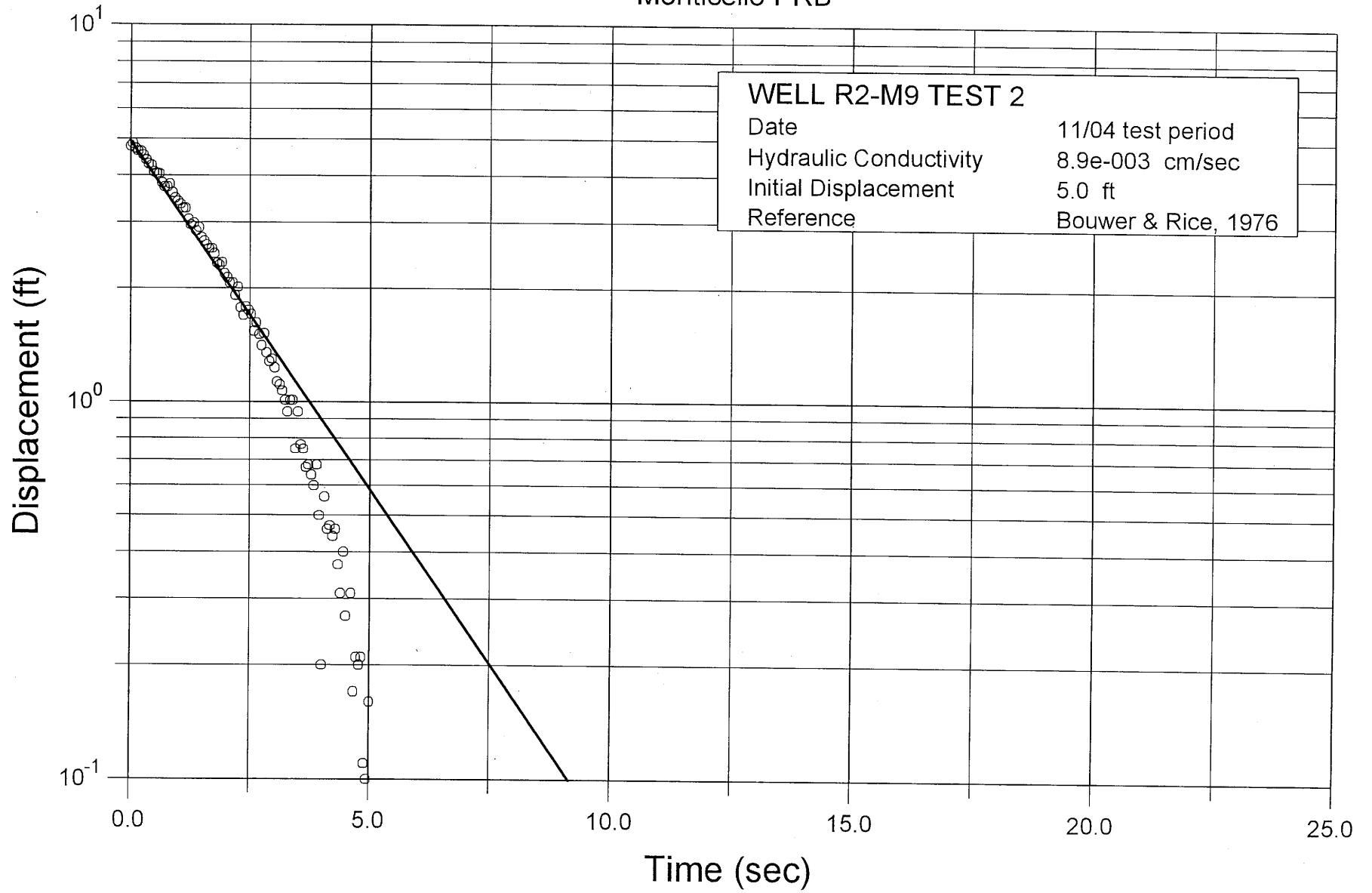
Monticello PRB



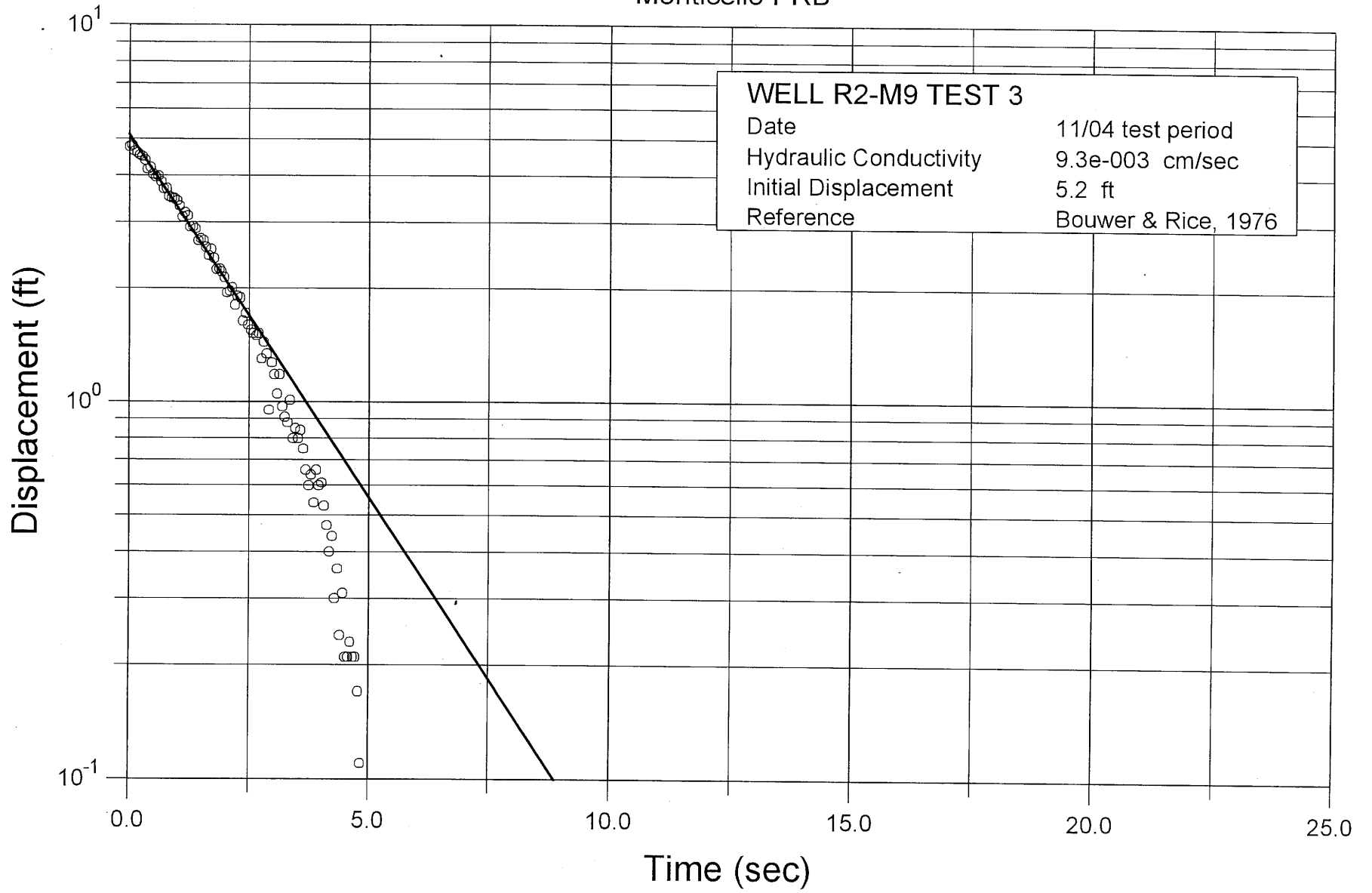
Monticello PRB



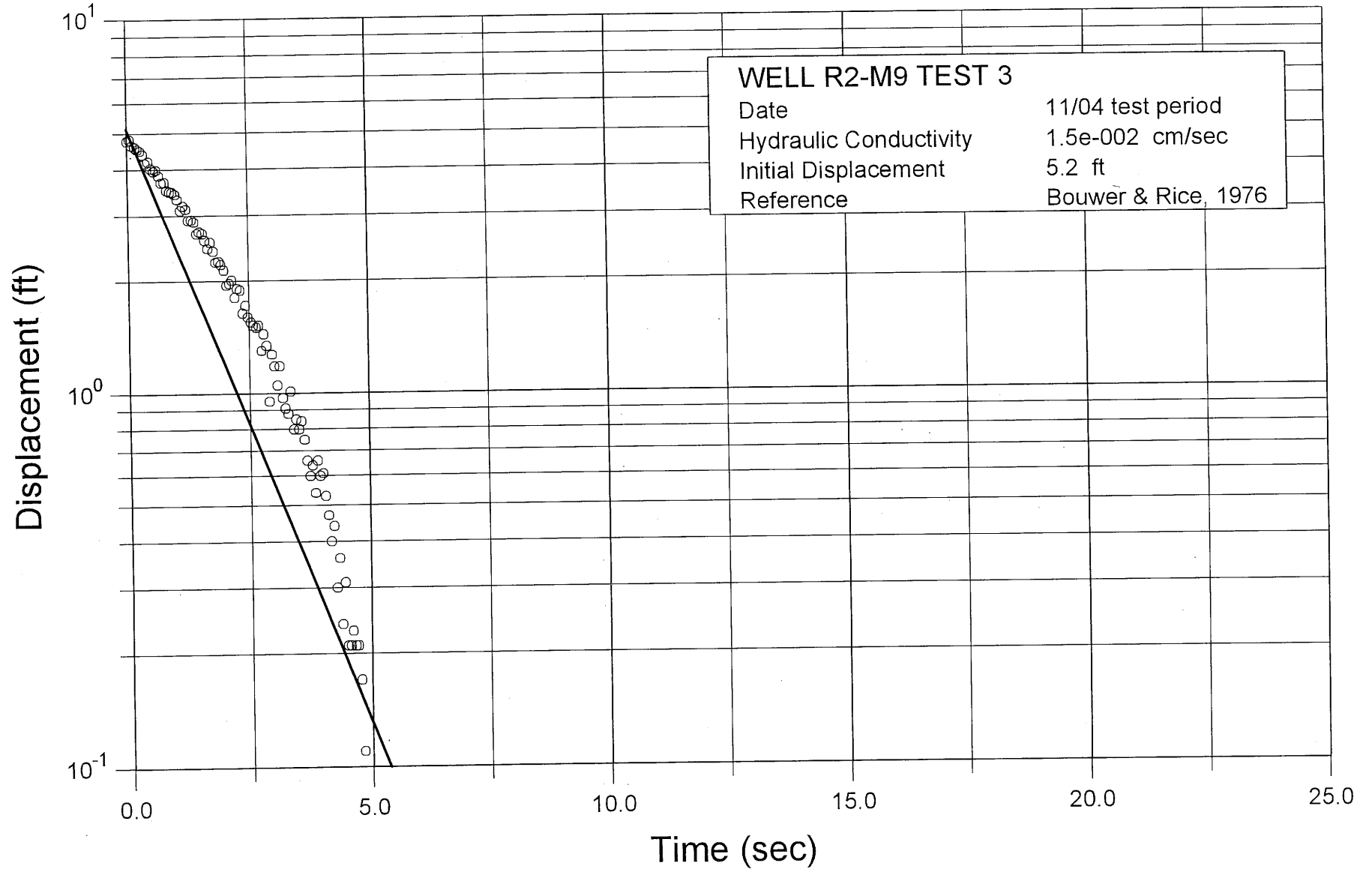
Monticello PRB



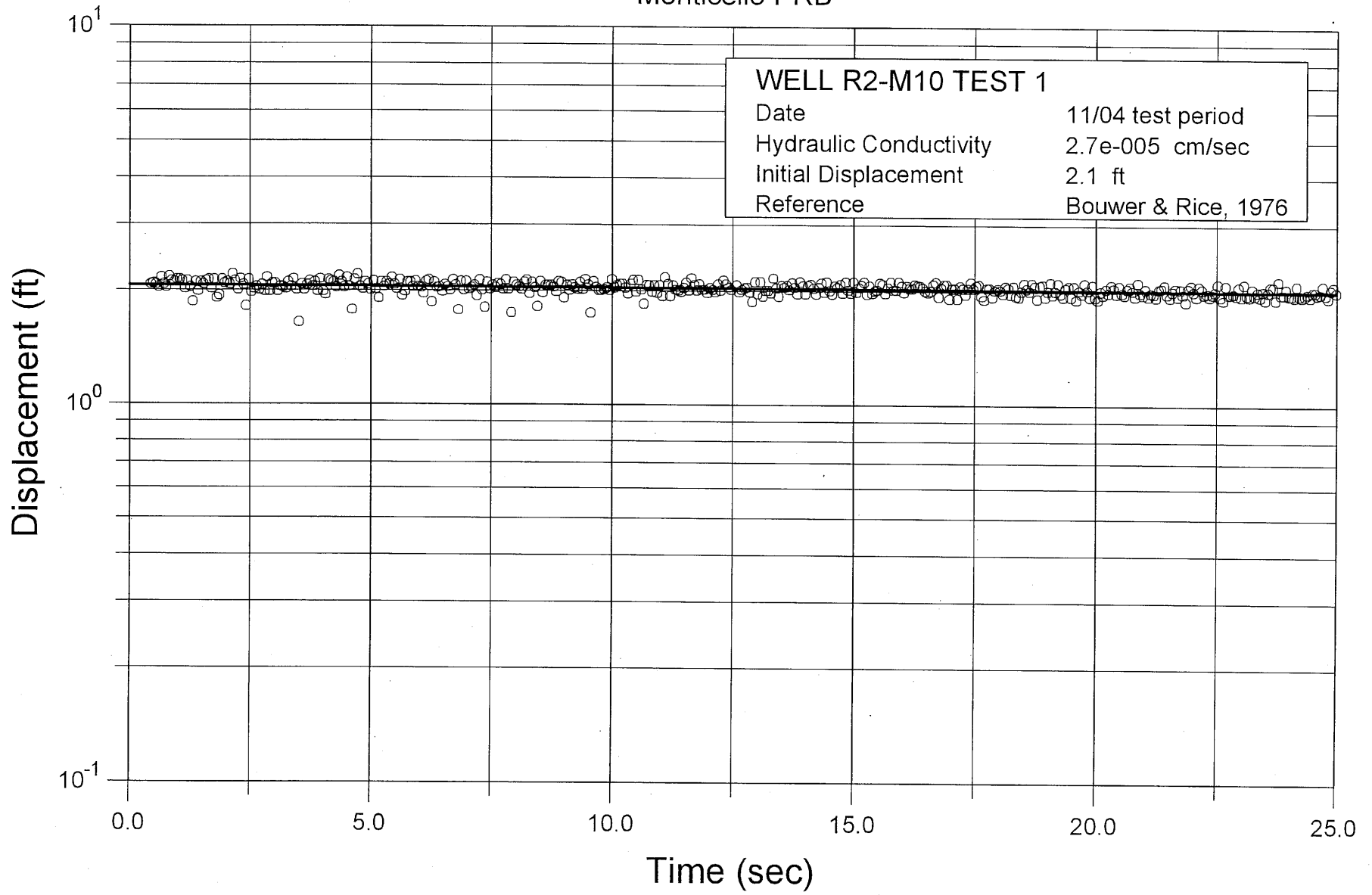
Monticello PRB



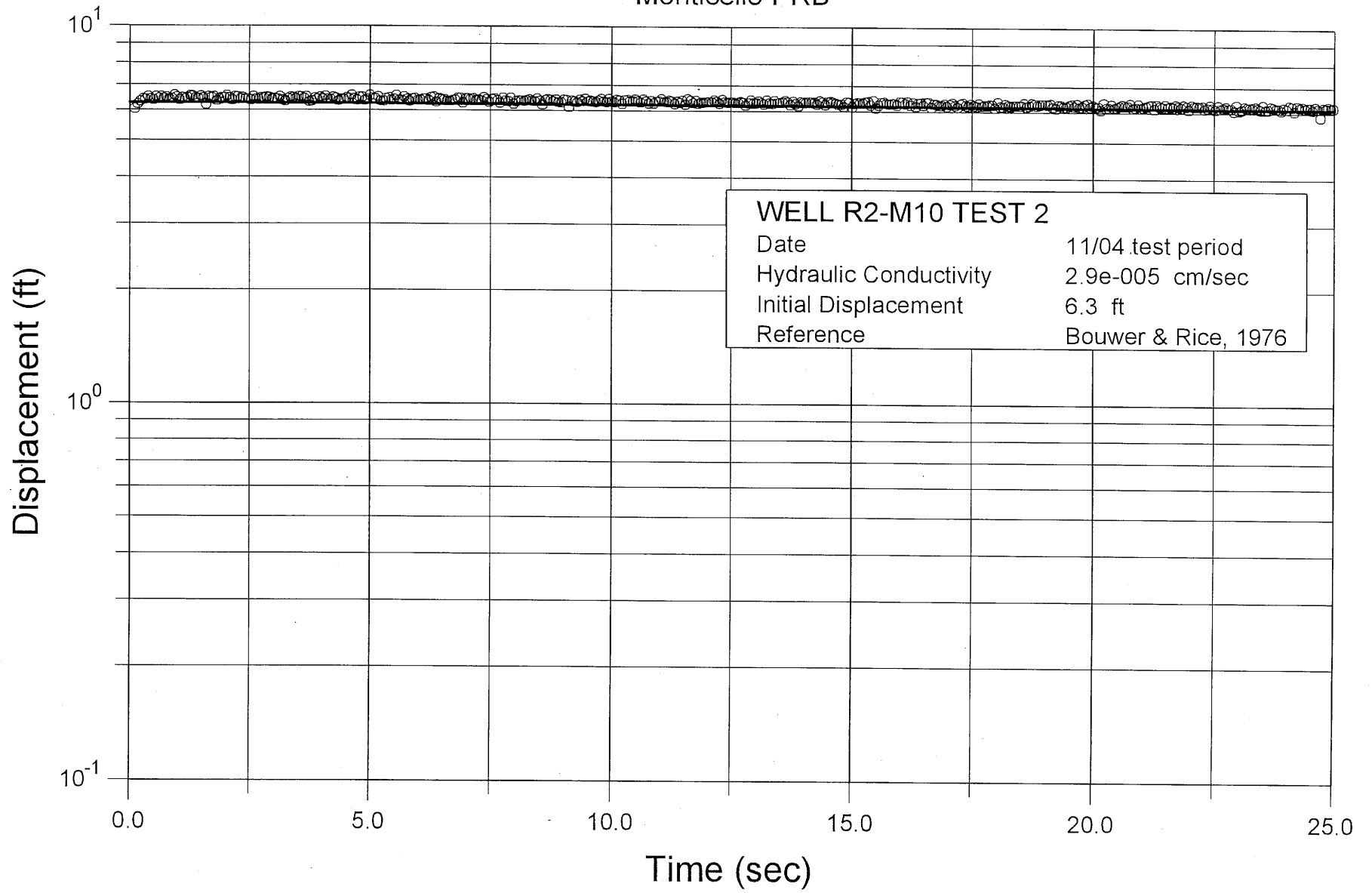
Monticello PRB



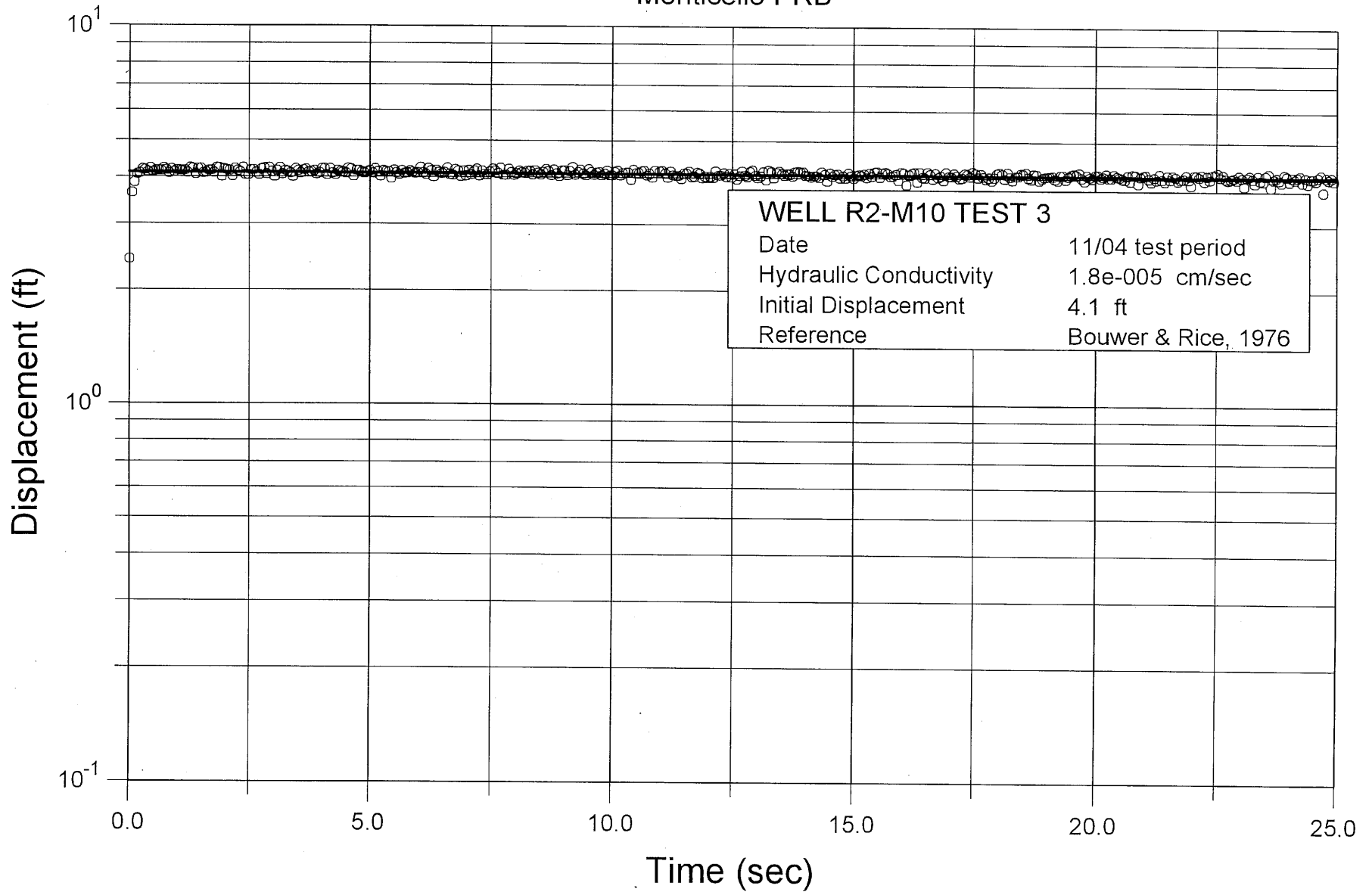
Monticello PRB



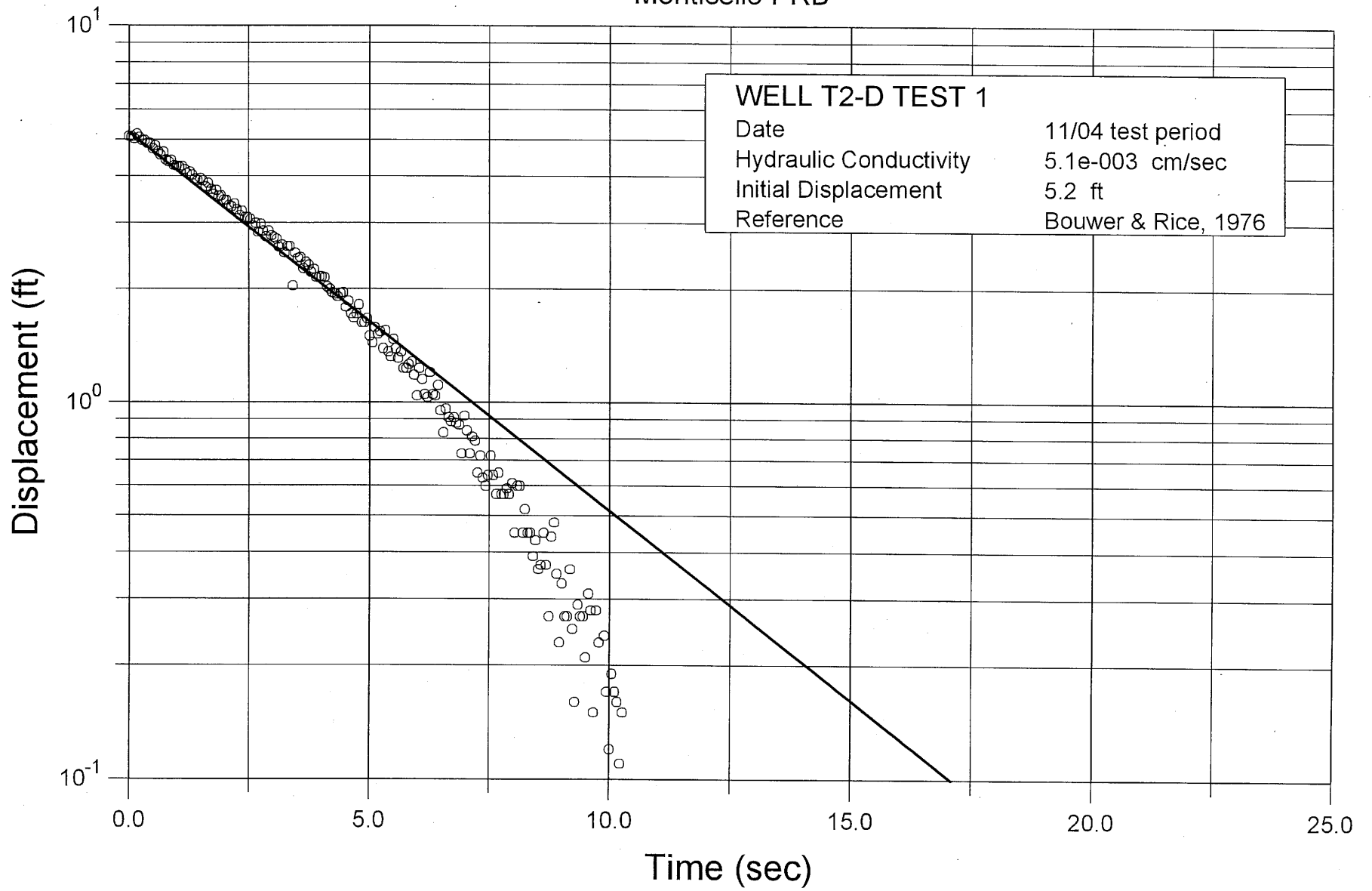
Monticello PRB



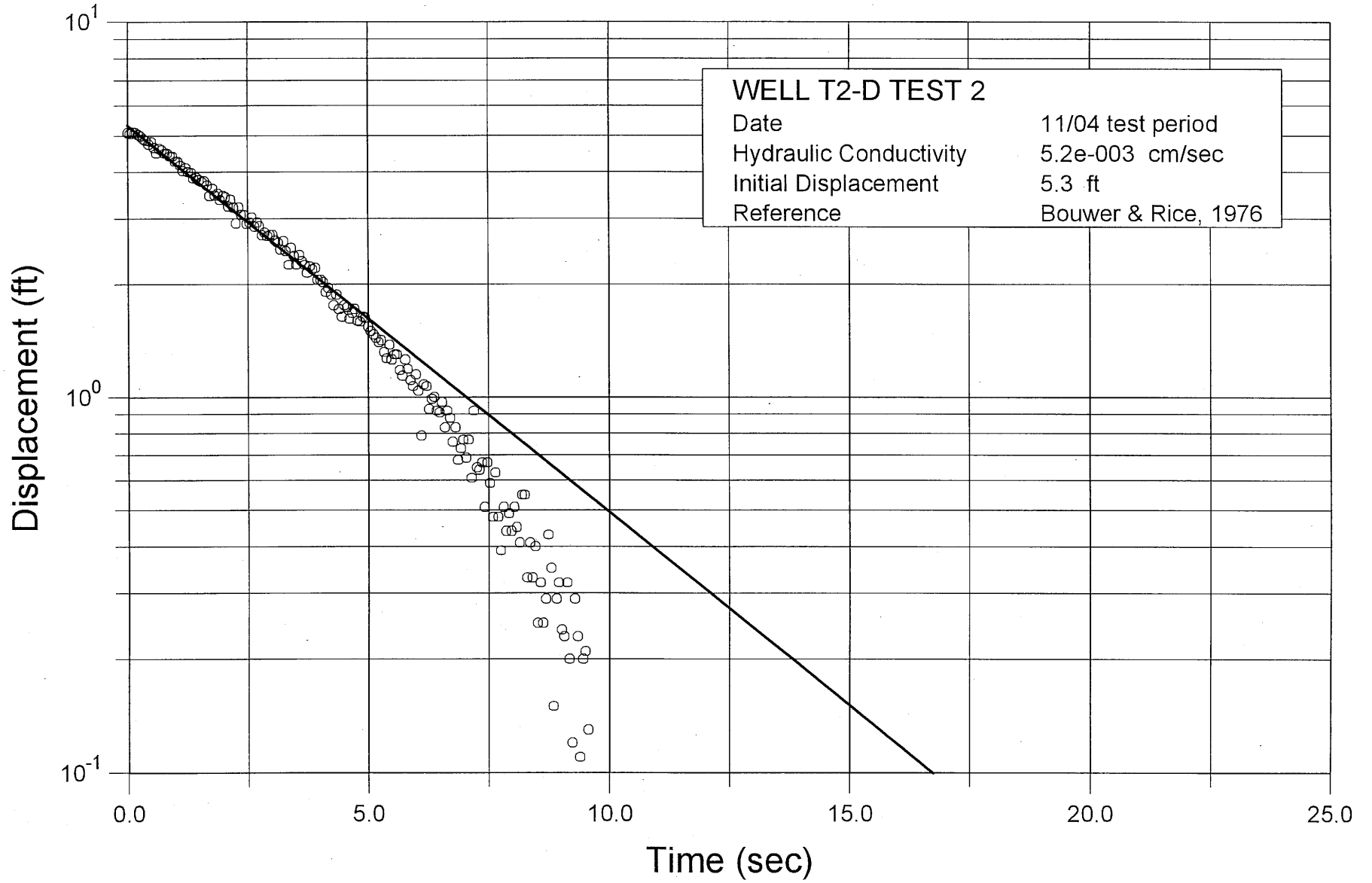
Monticello PRB



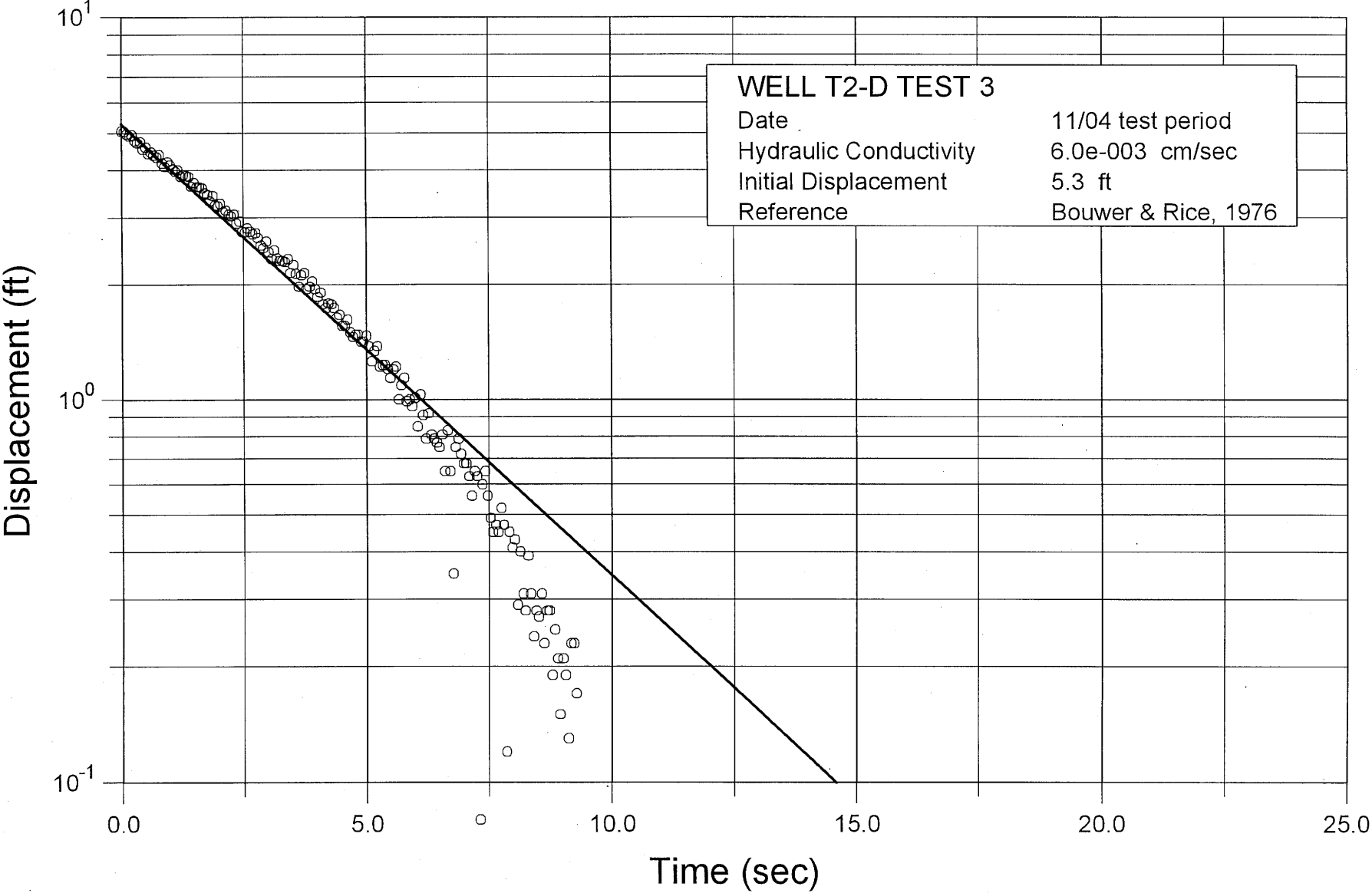
Monticello PRB



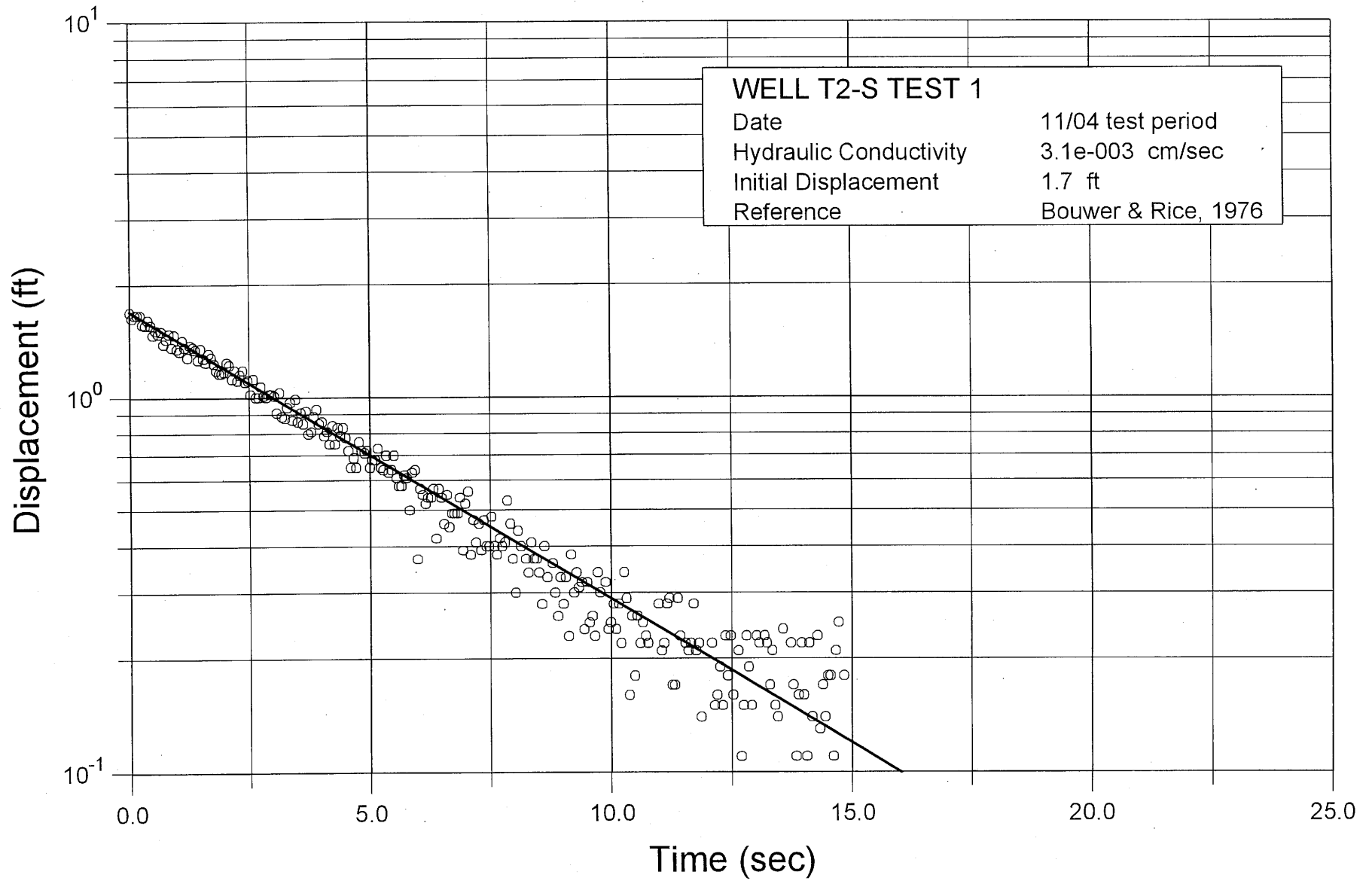
Monticello PRB



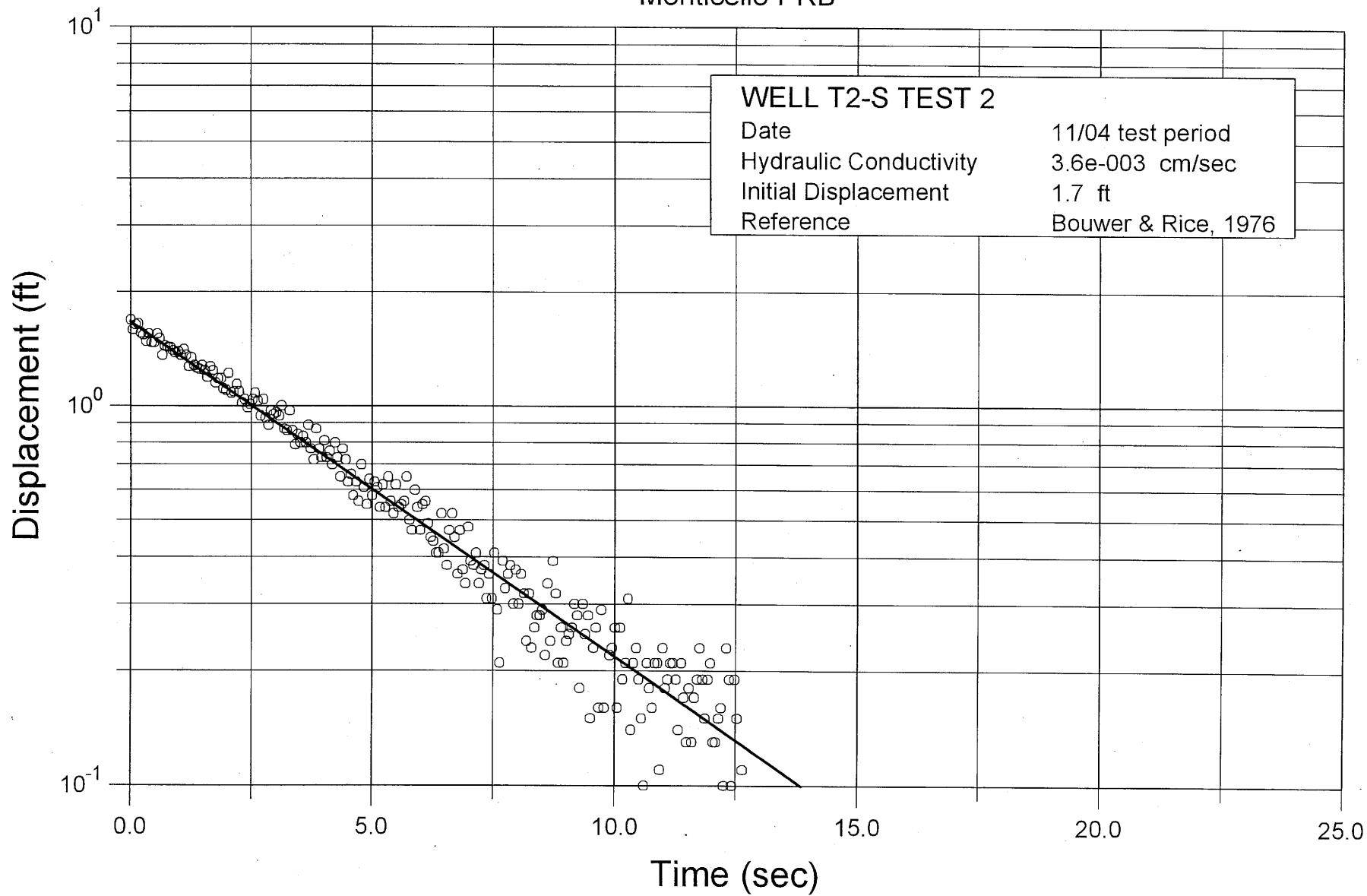
Monticello PRB



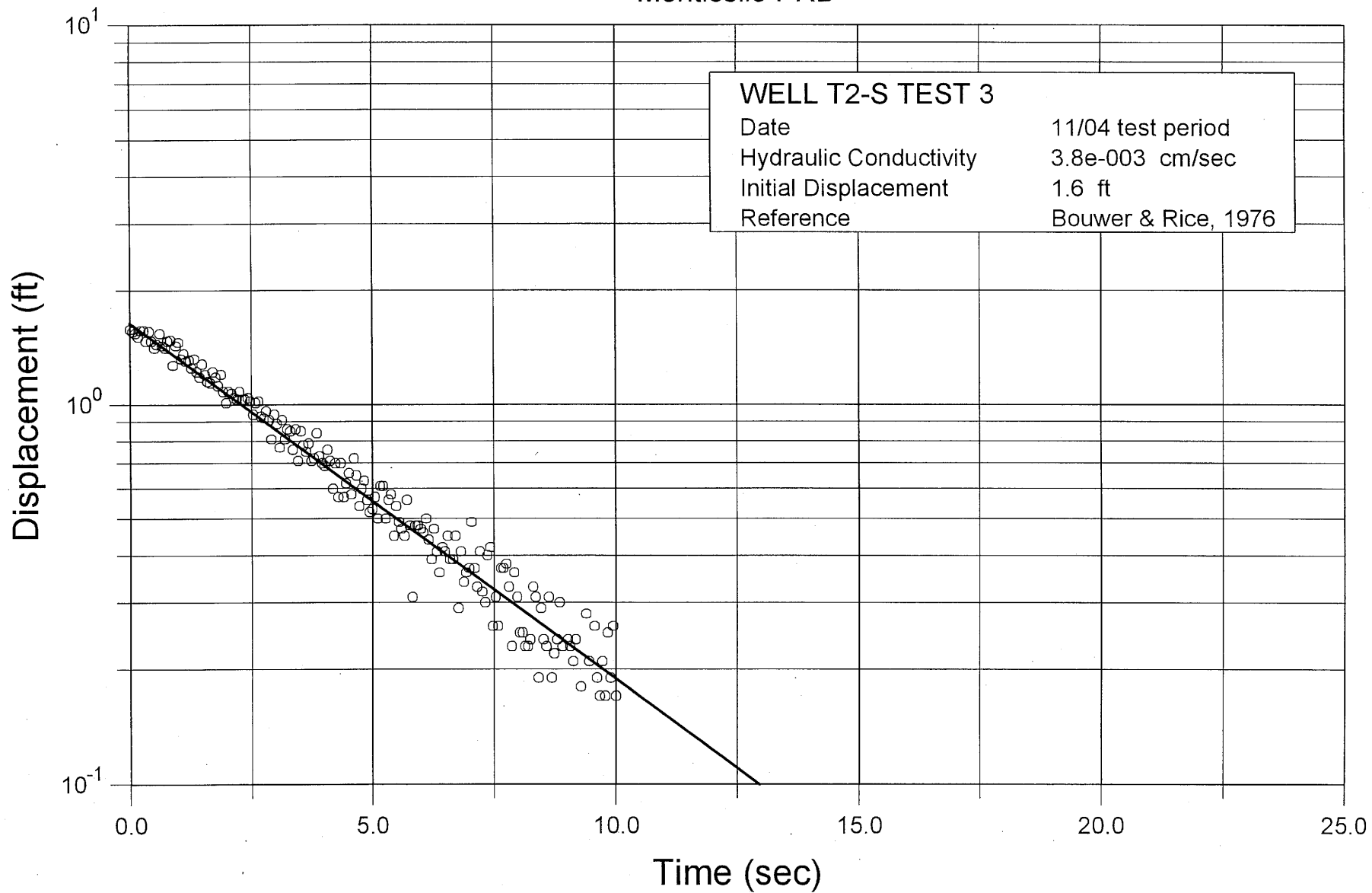
Monticello PRB



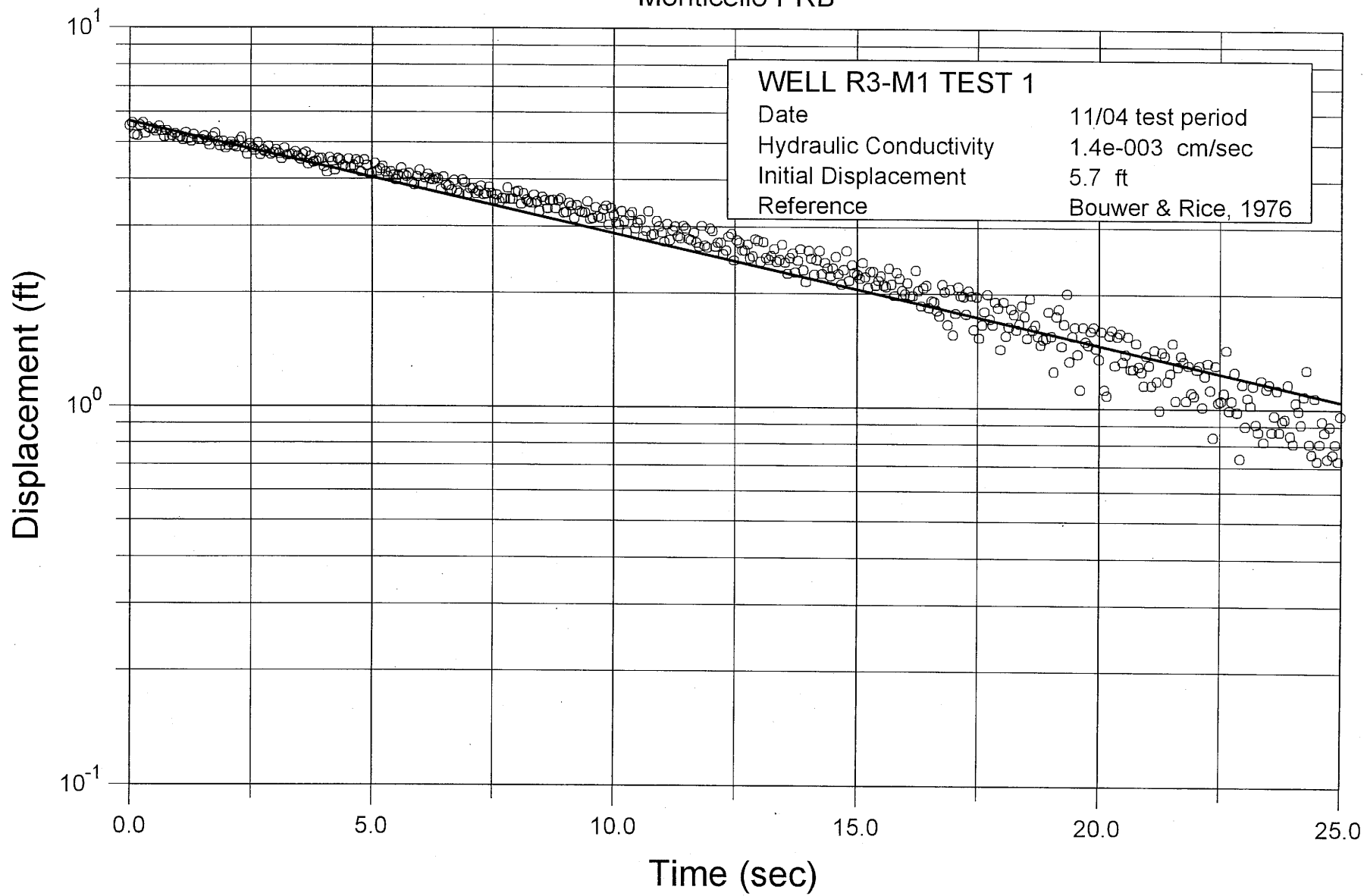
Monticello PRB



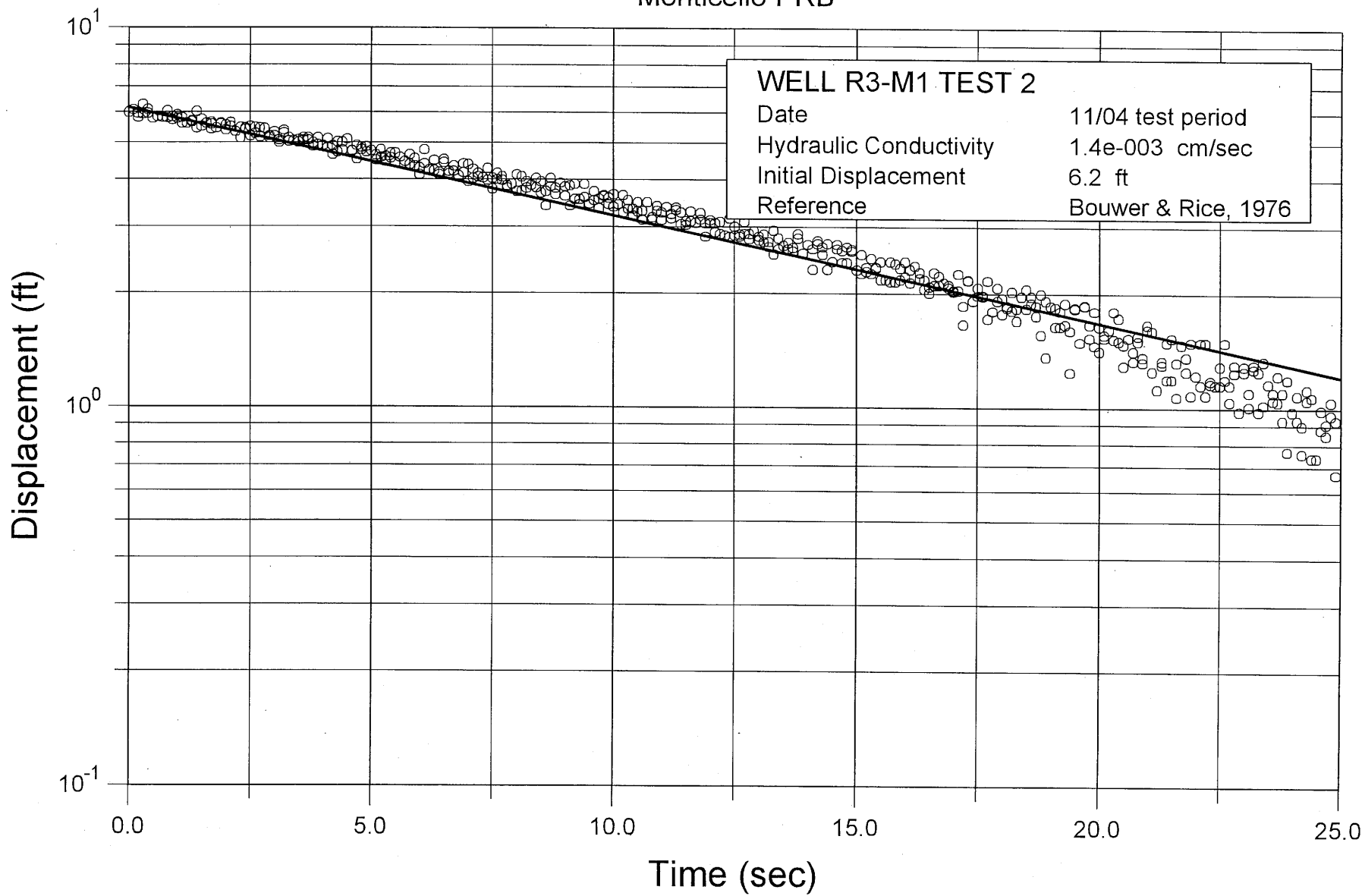
Monticello PRB



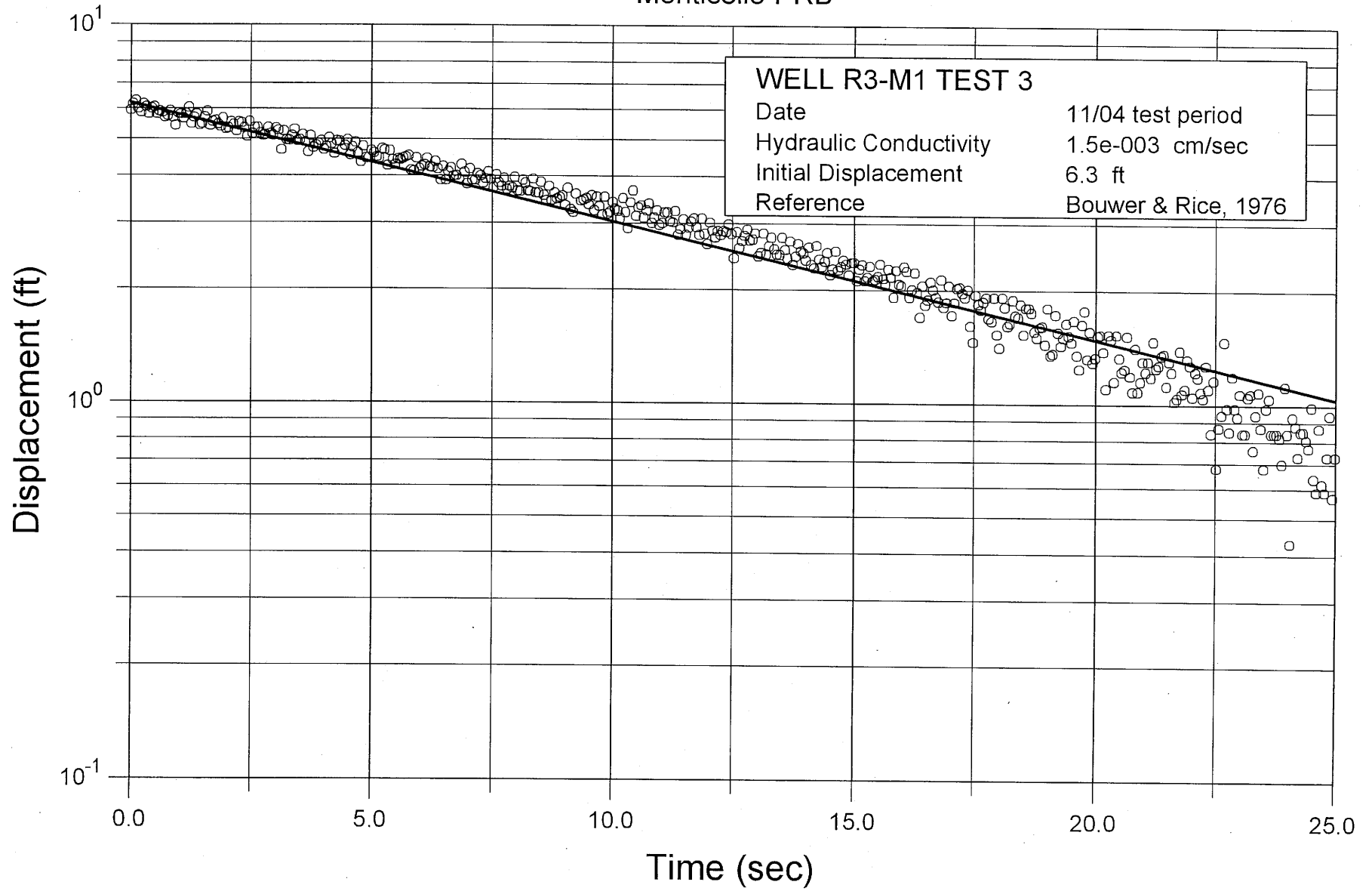
Monticello PRB



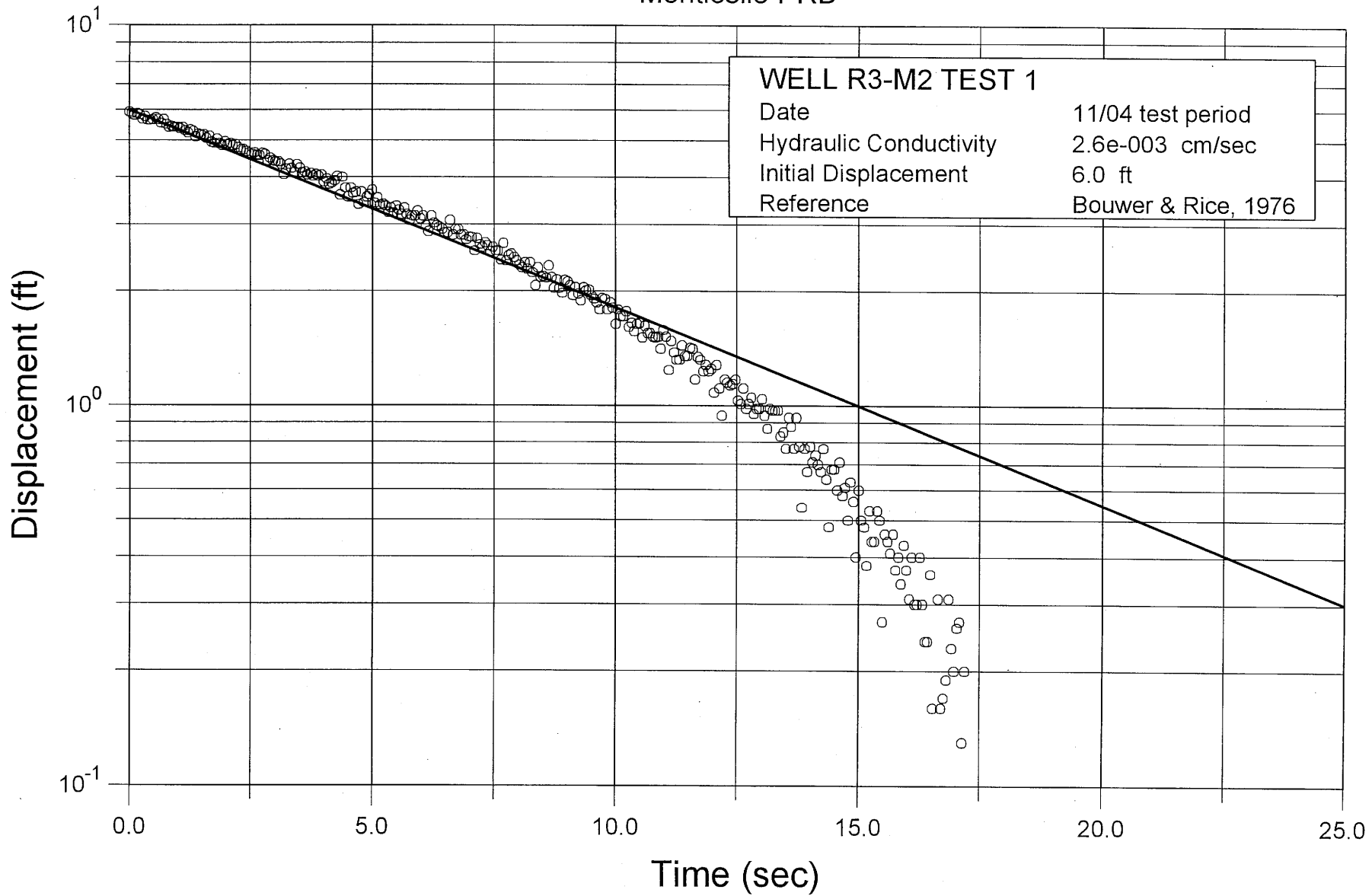
Monticello PRB



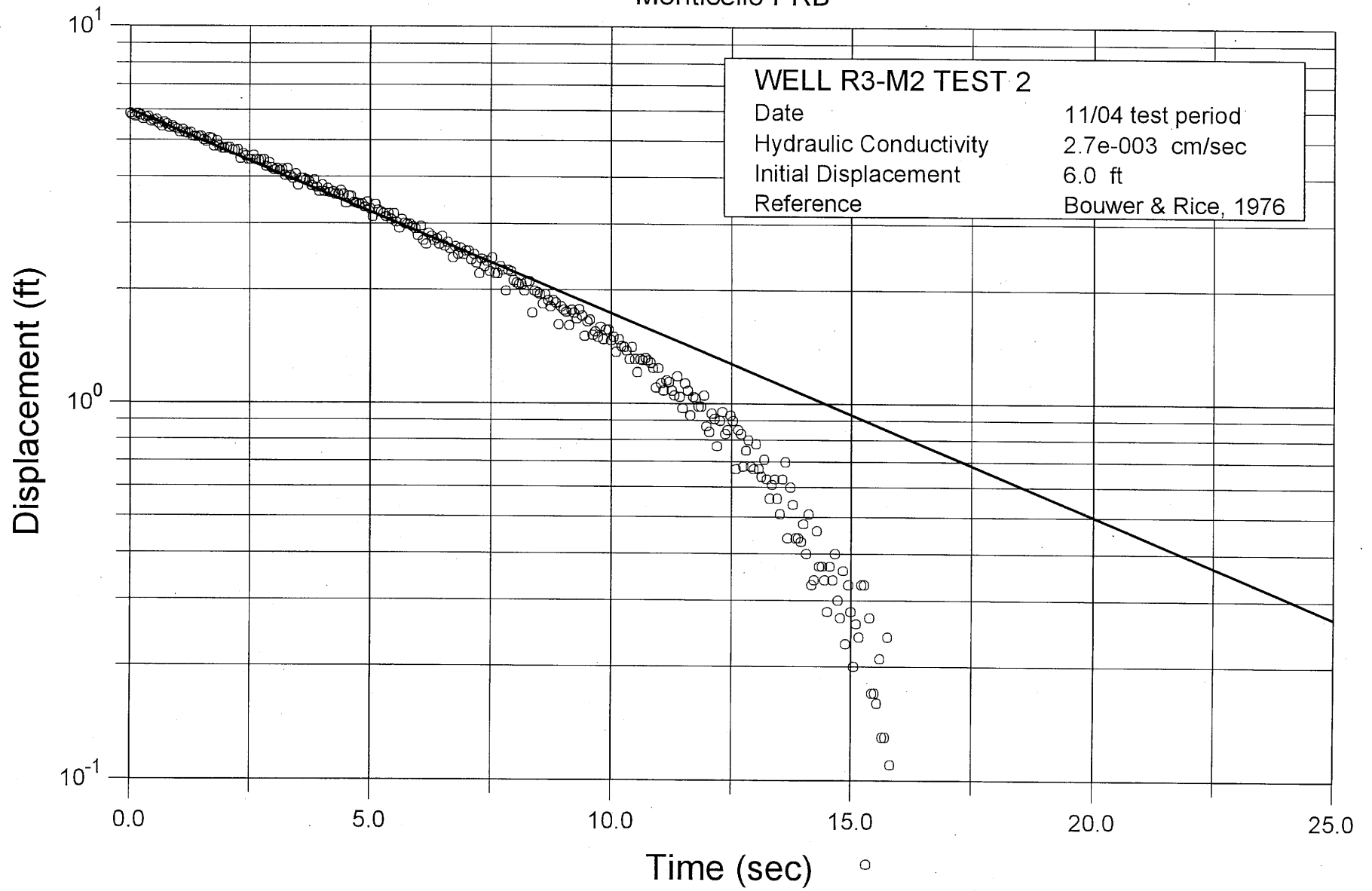
Monticello PRB



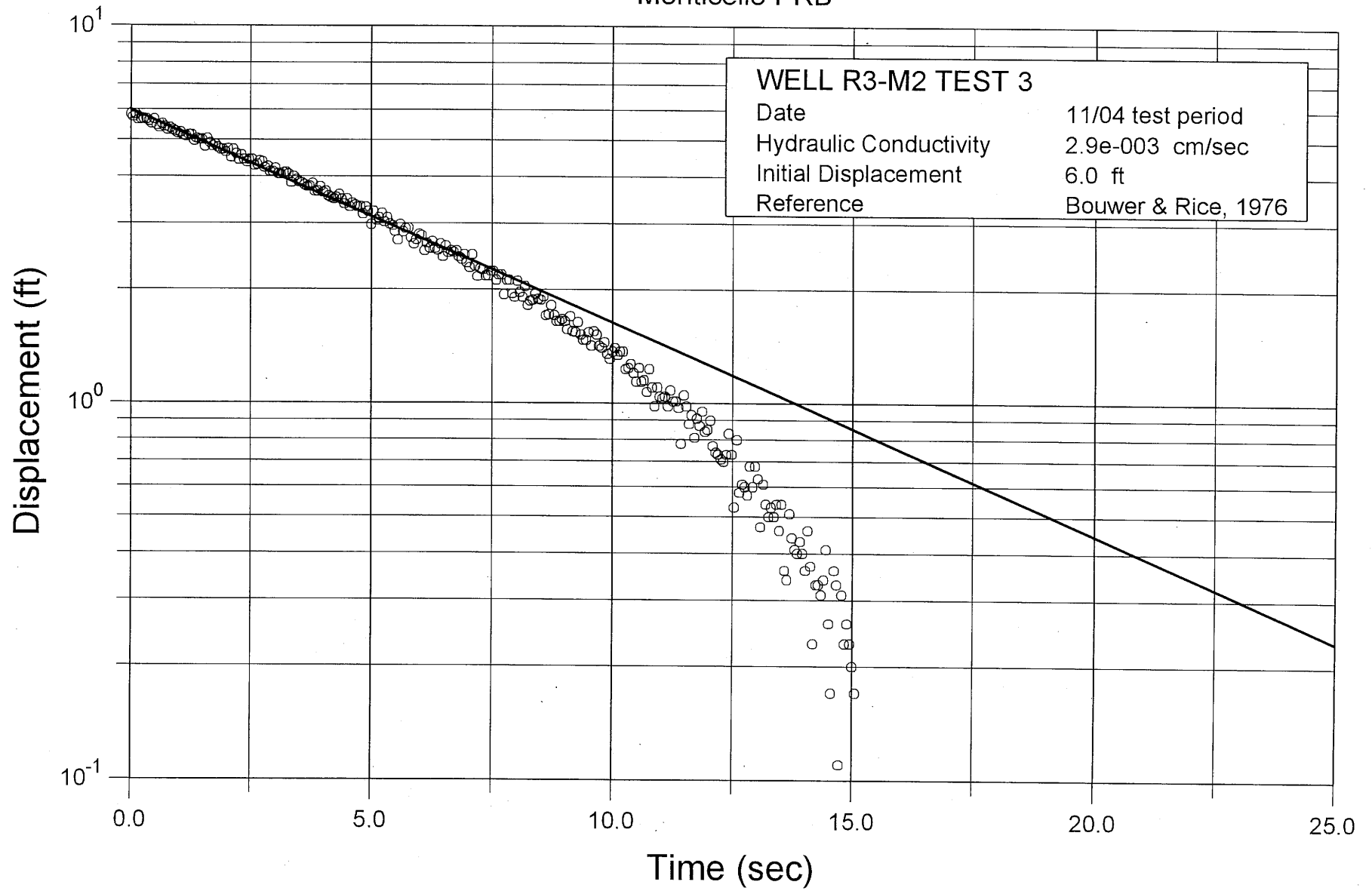
Monticello PRB



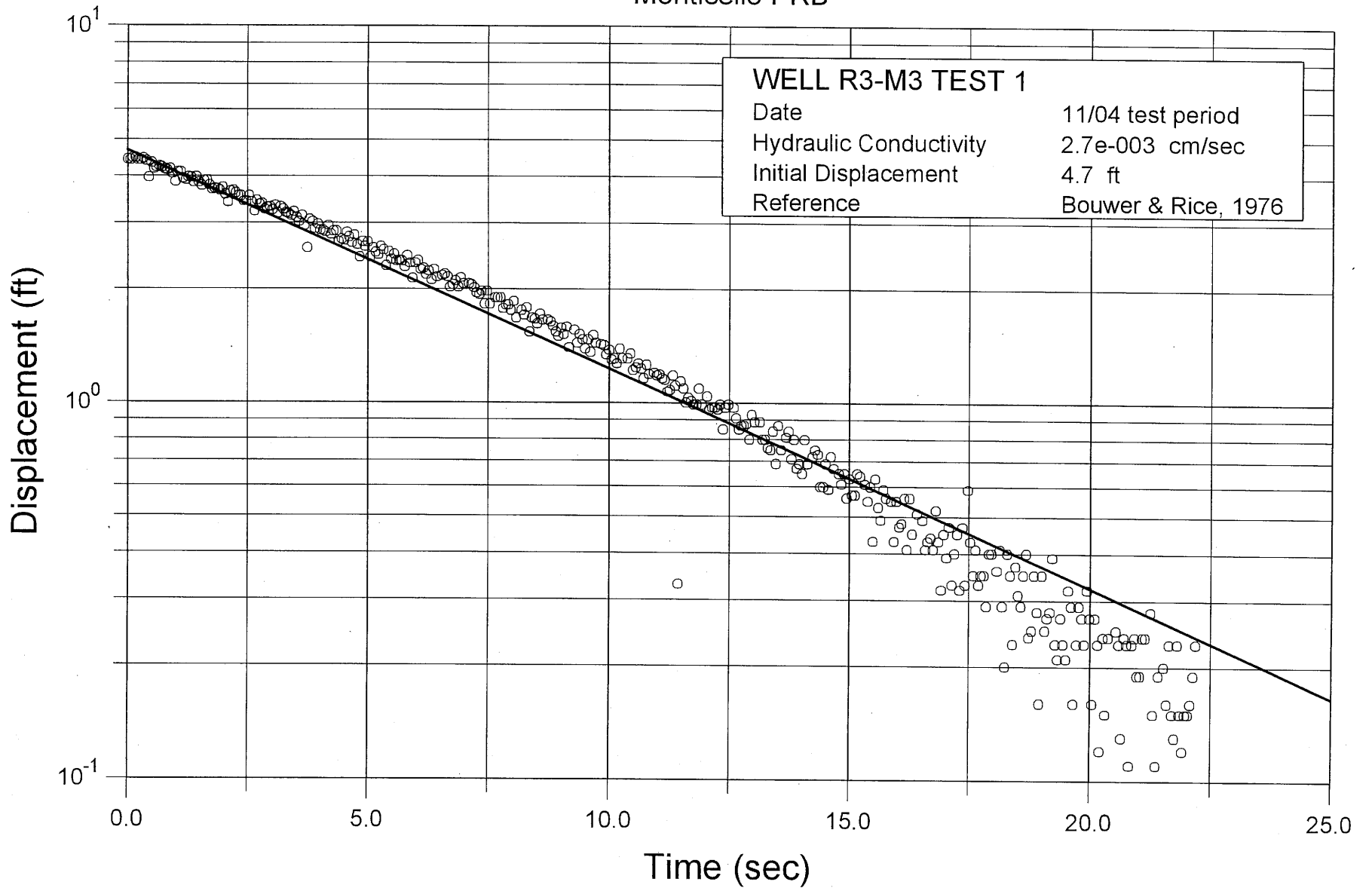
Monticello PRB



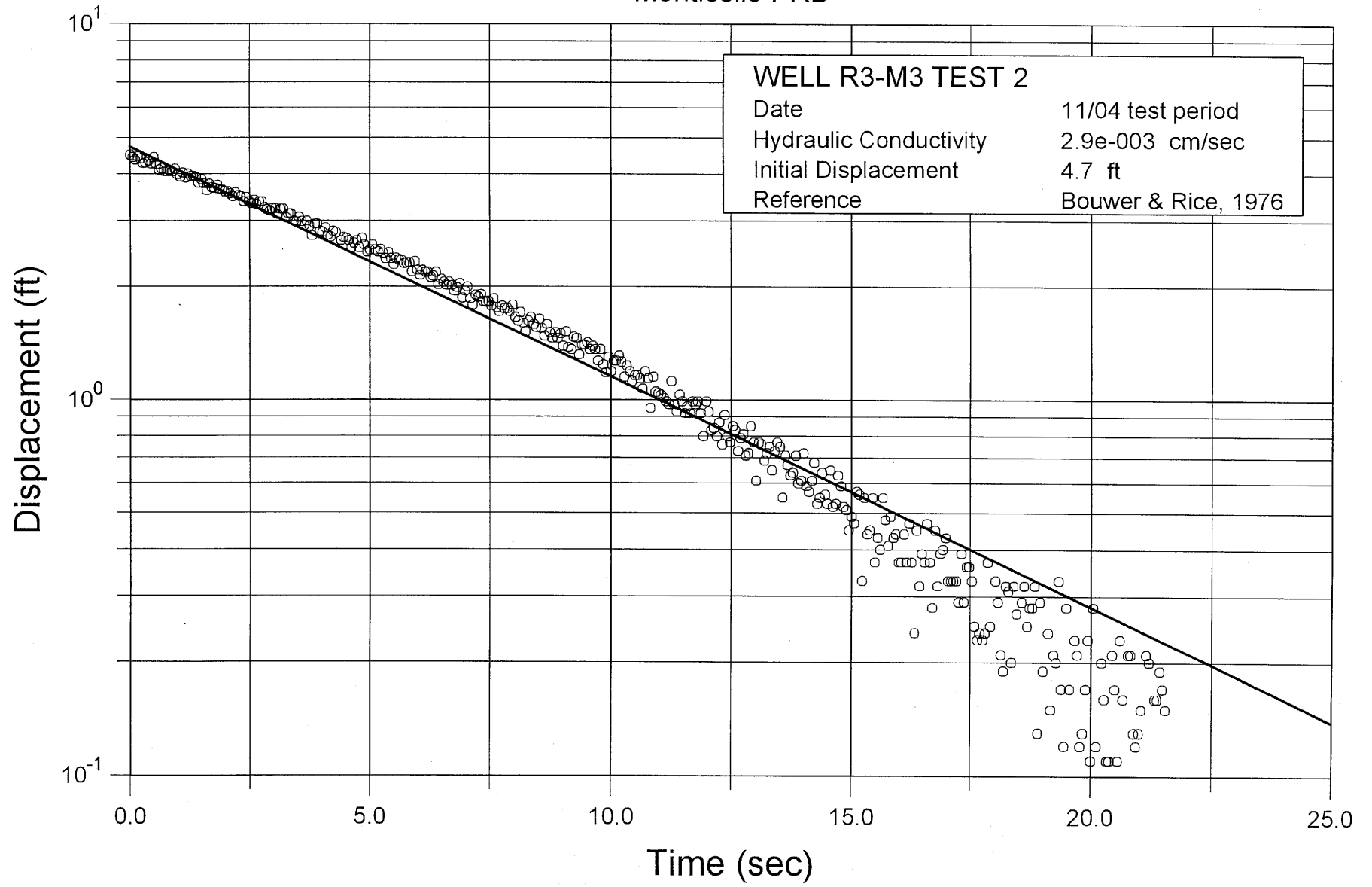
Monticello PRB



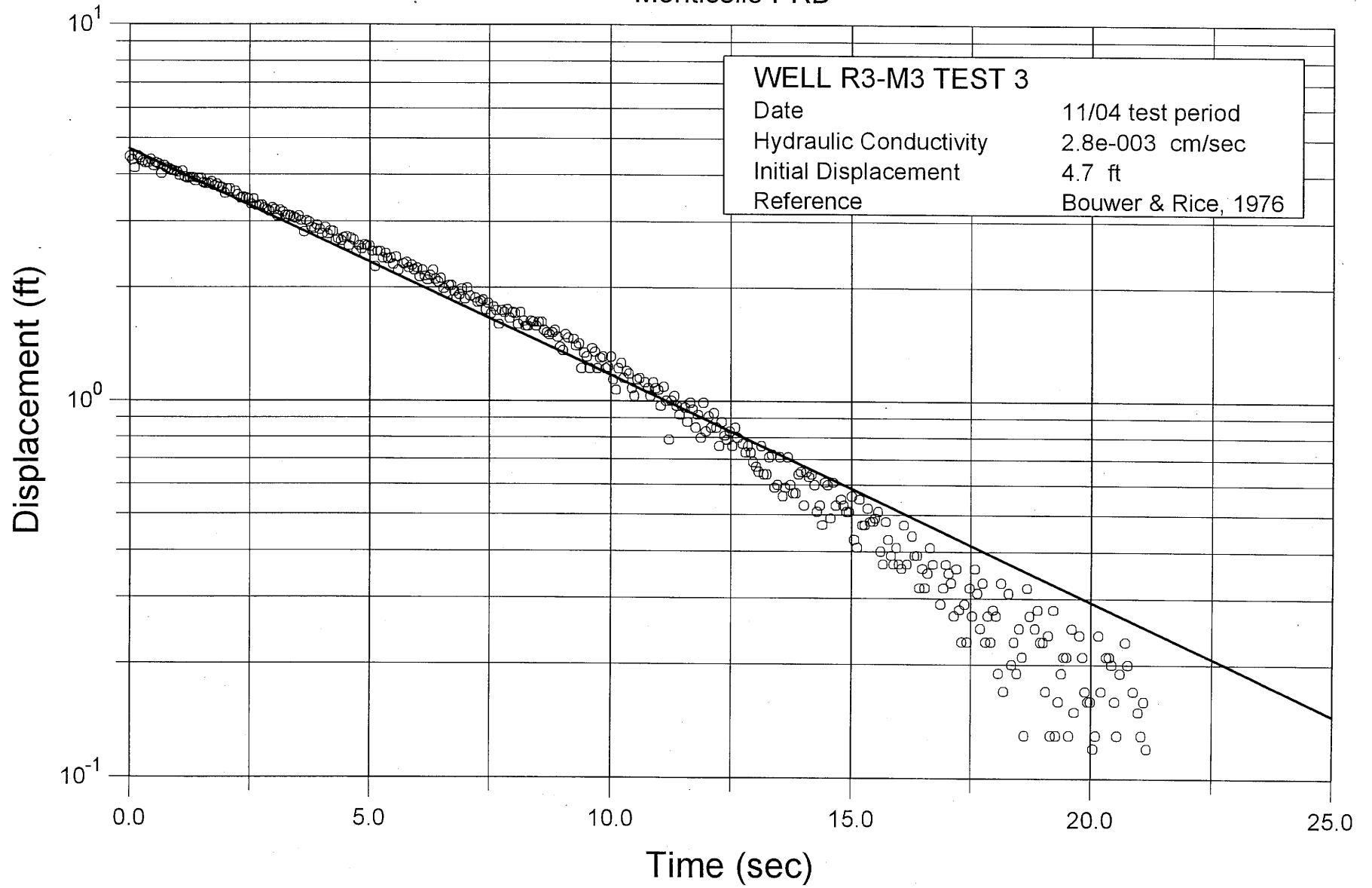
Monticello PRB



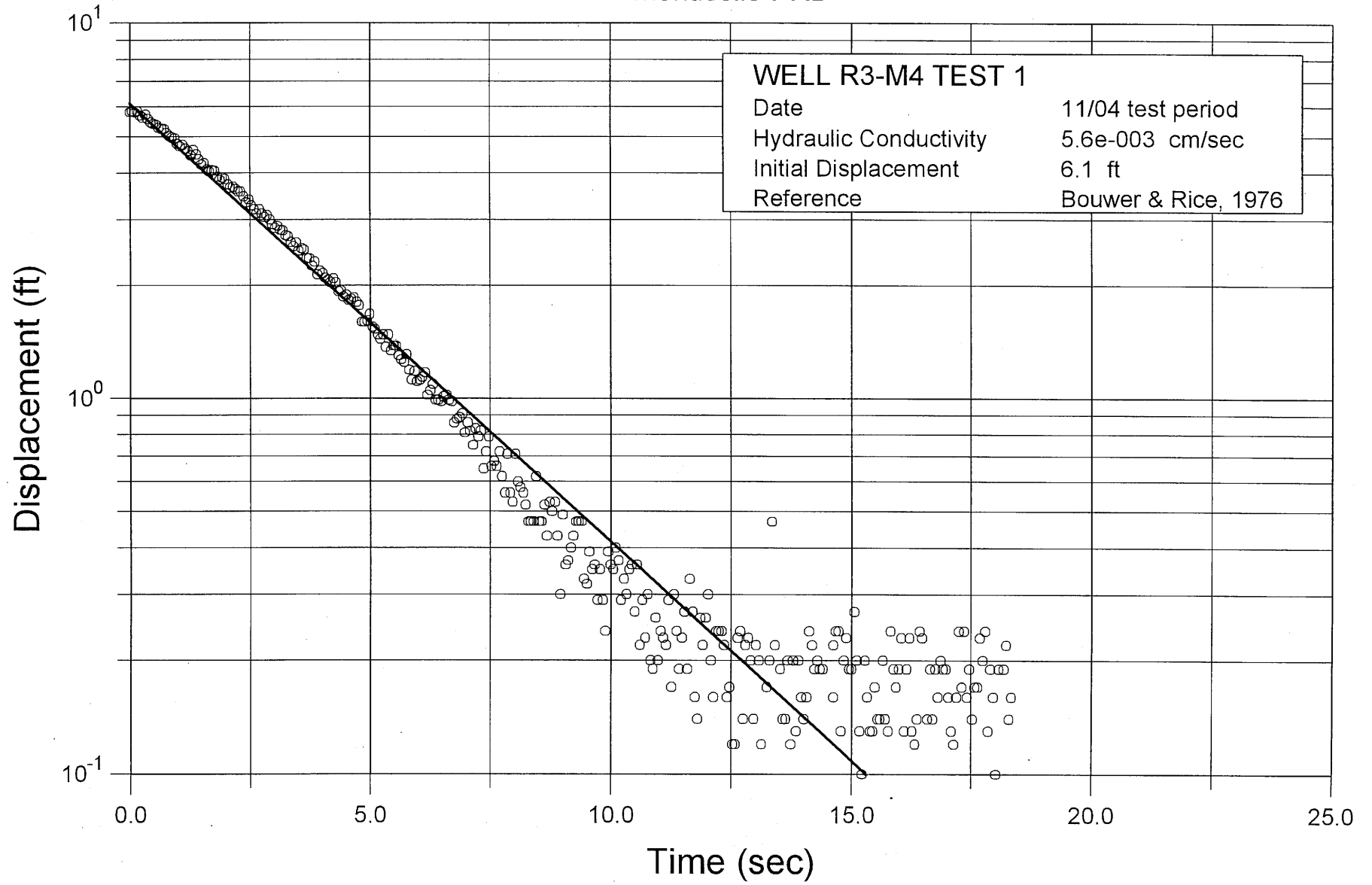
Monticello PRB



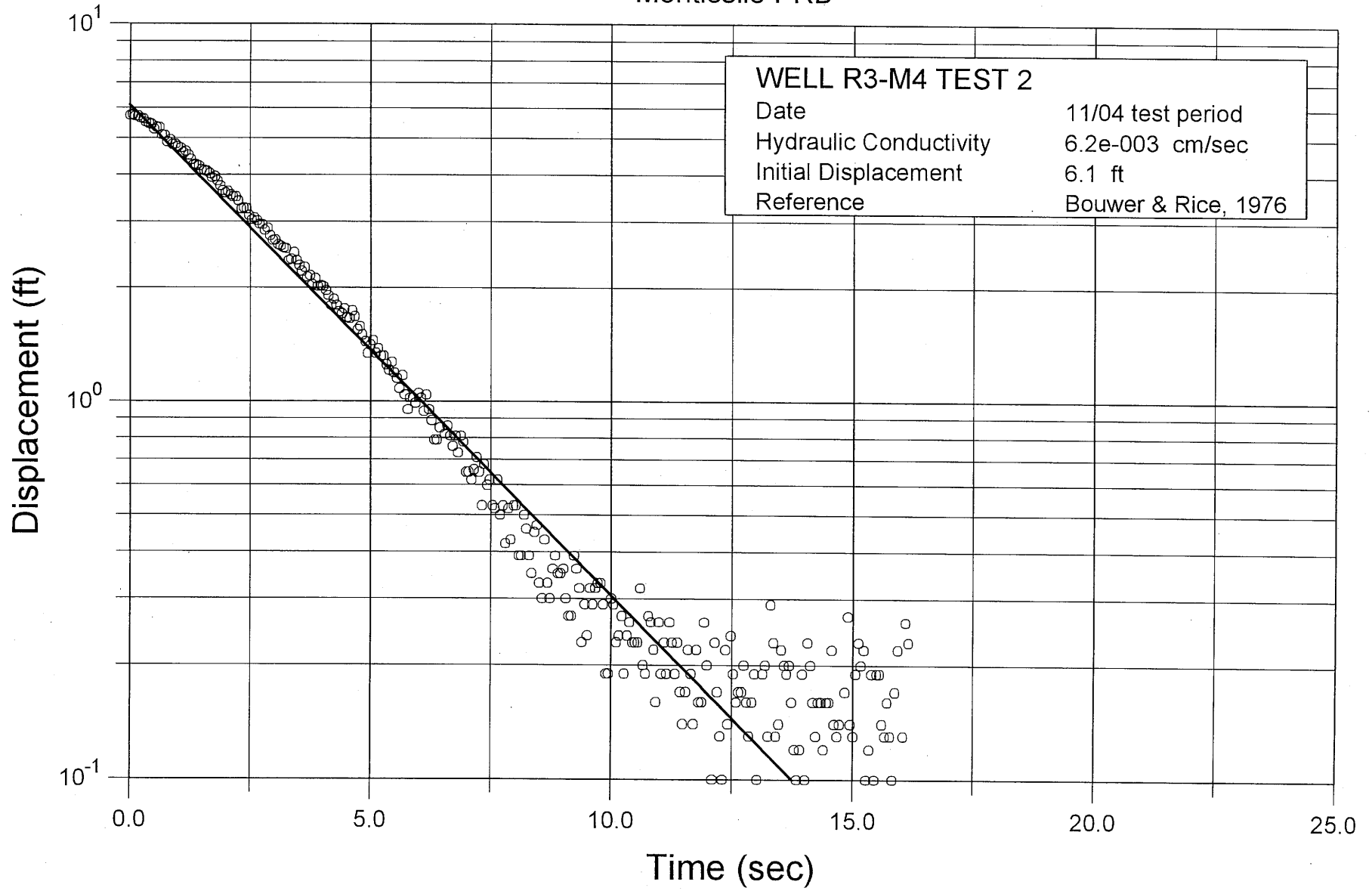
Monticello PRB



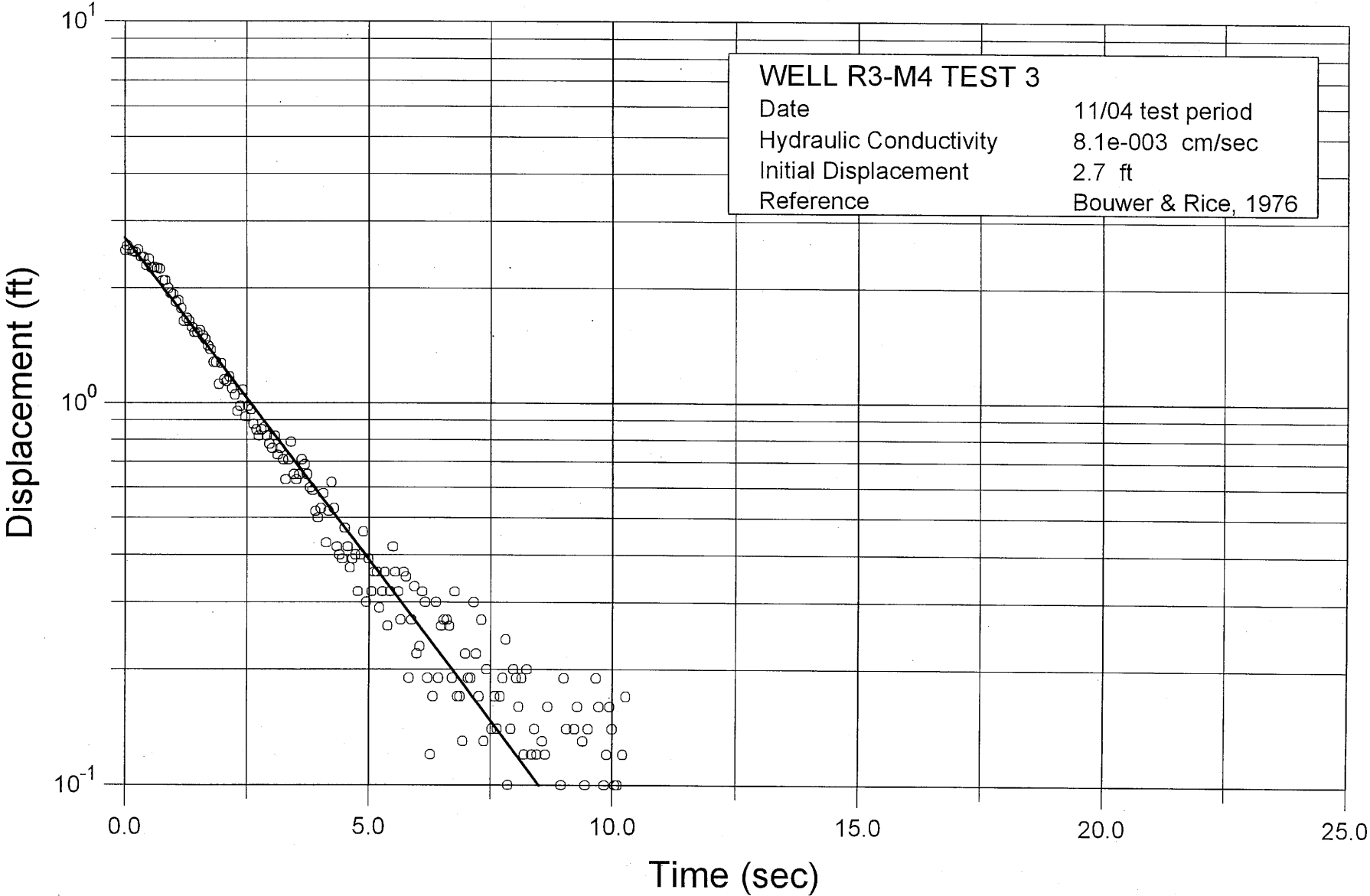
Monticello PRB



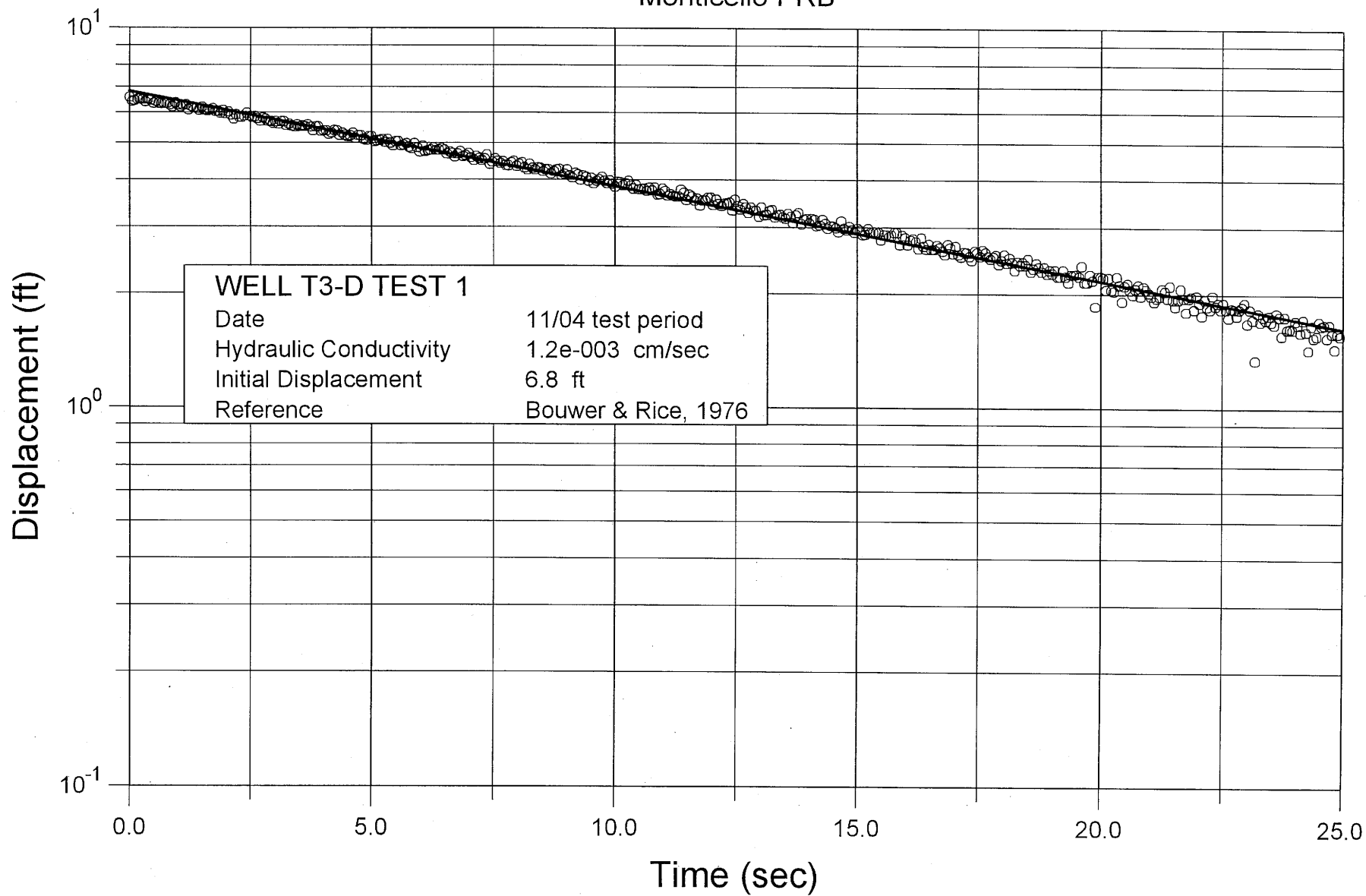
Monticello PRB



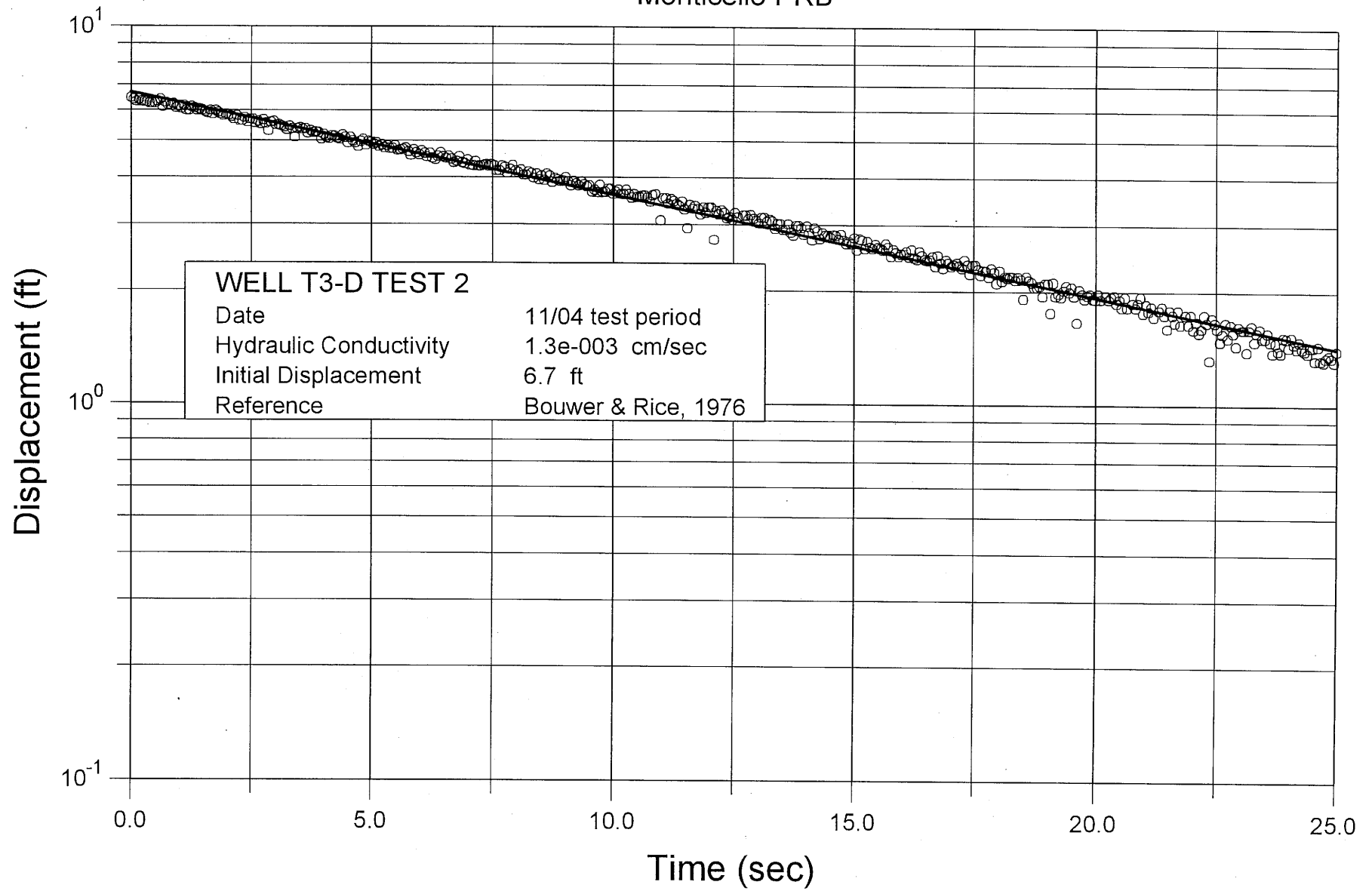
Monticello PRB



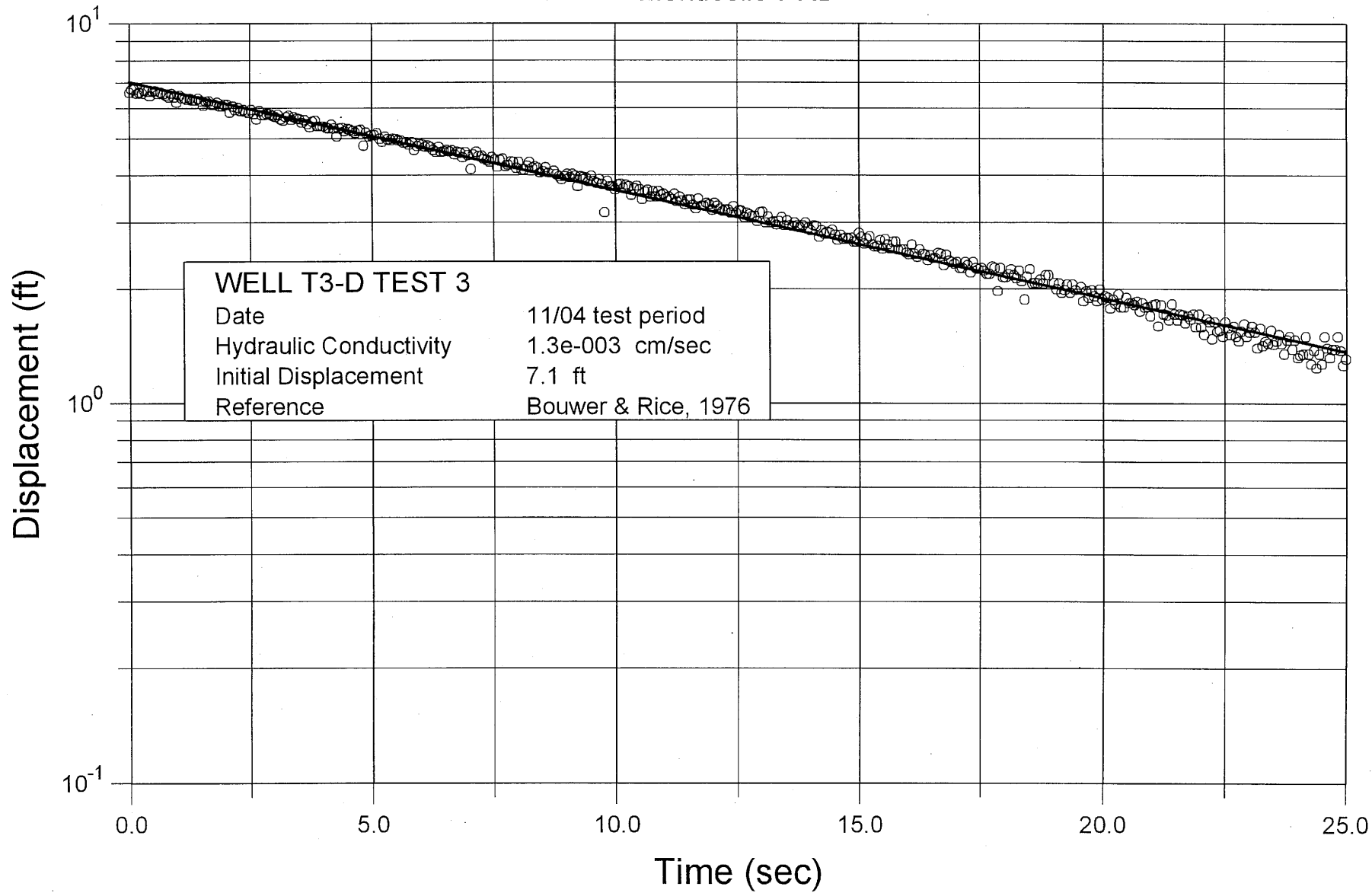
Monticello PRB



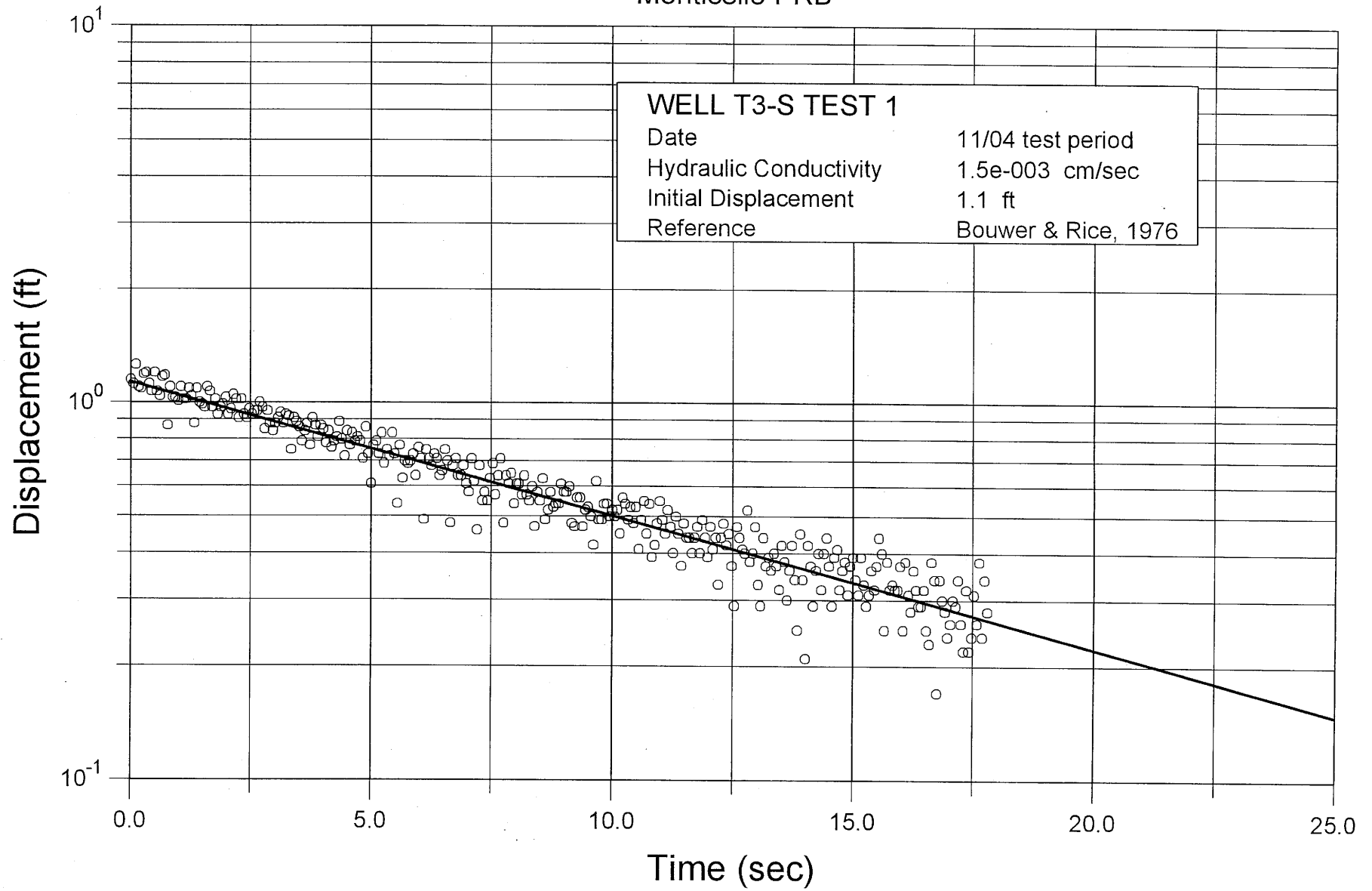
Monticello PRB



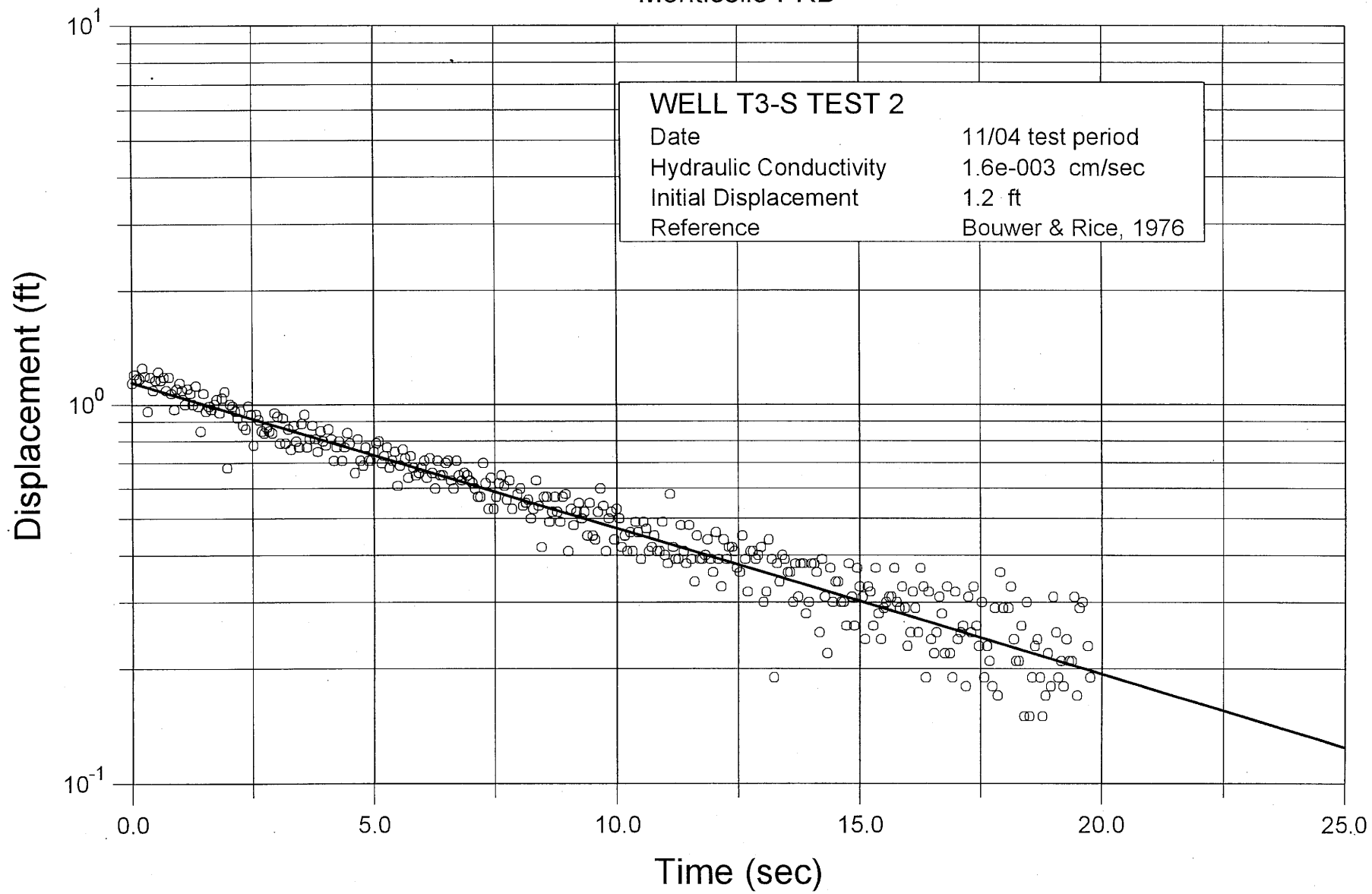
Monticello PRB



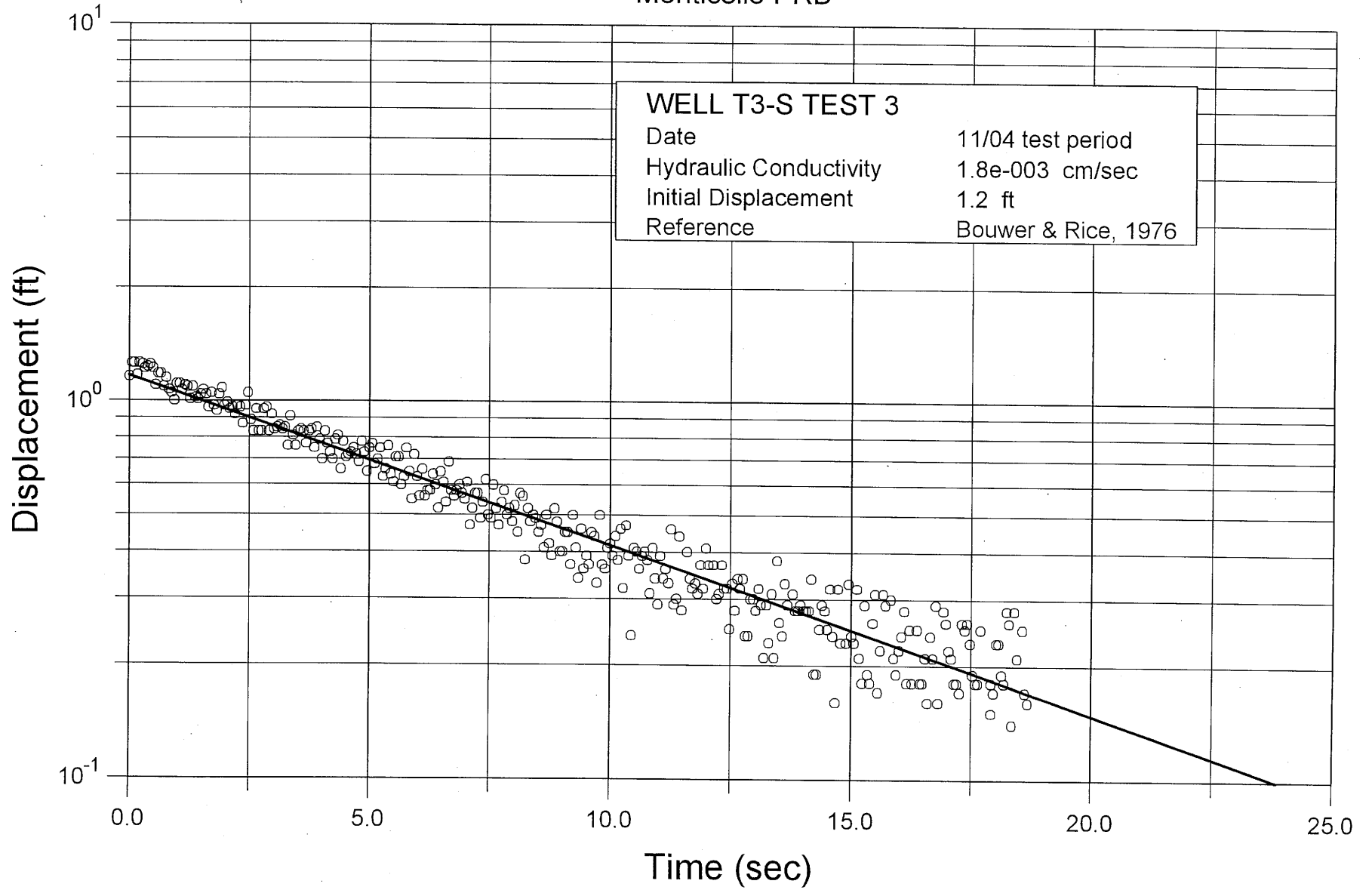
Monticello PRB



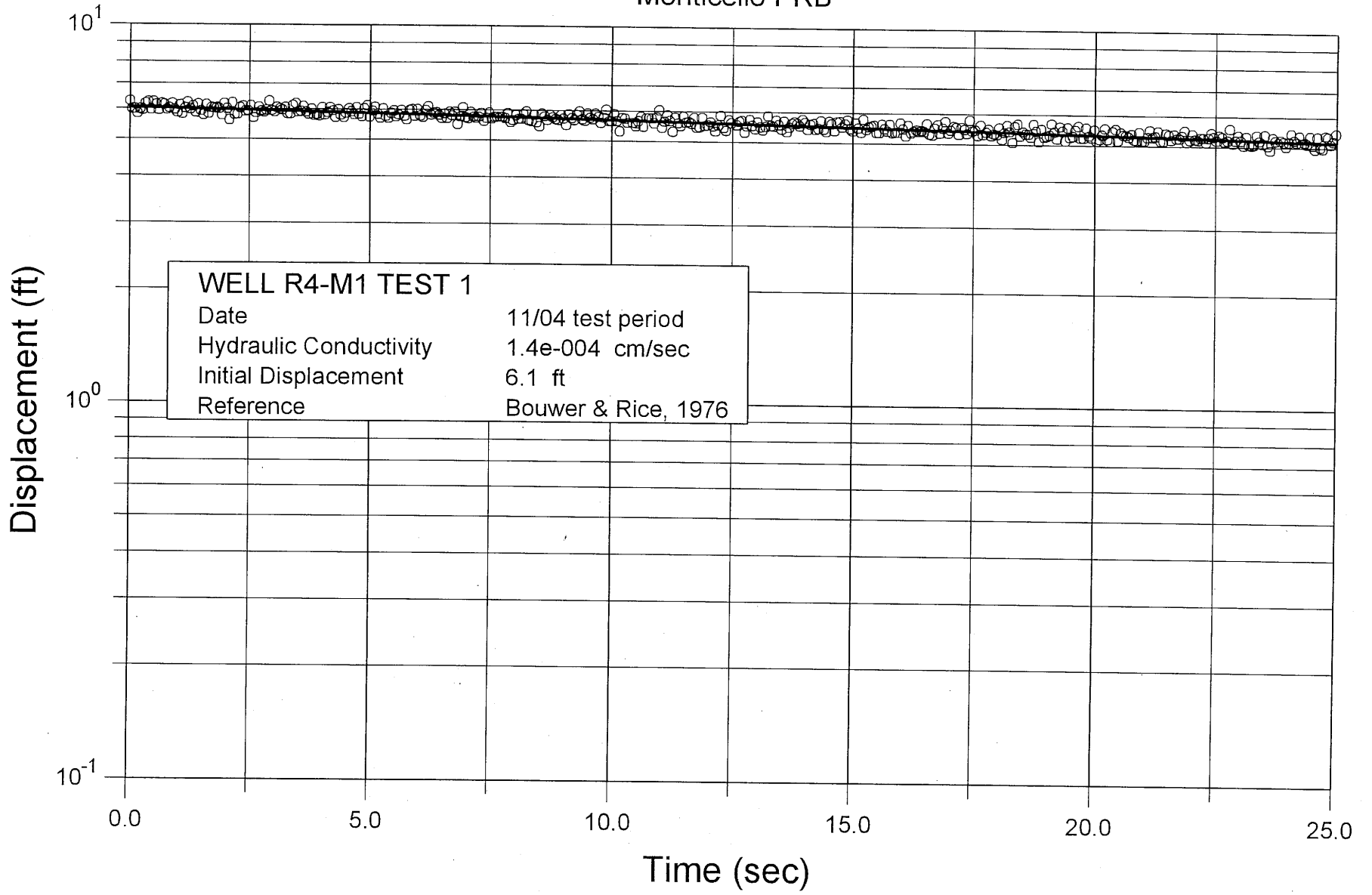
Monticello PRB



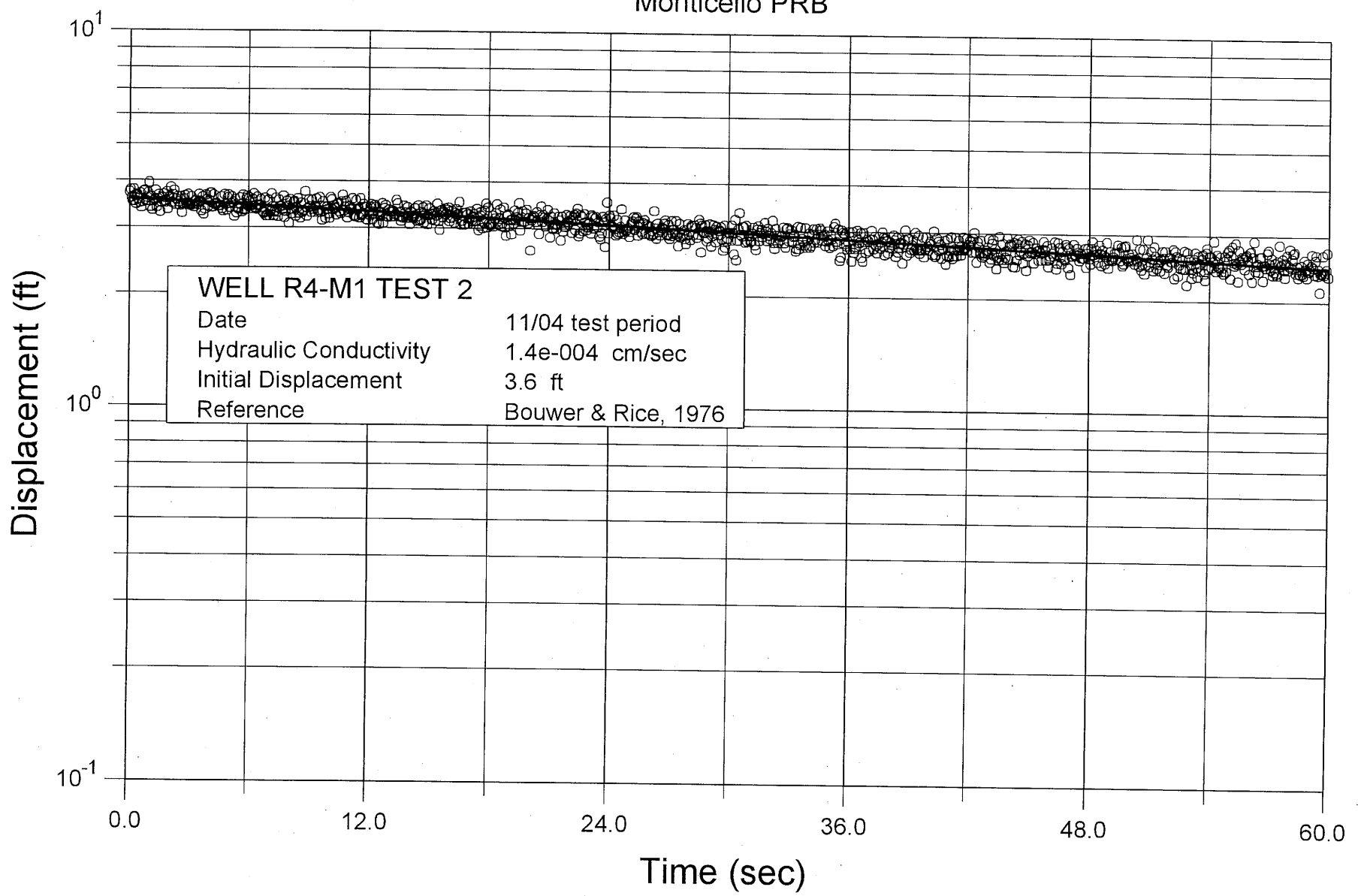
Monticello PRB



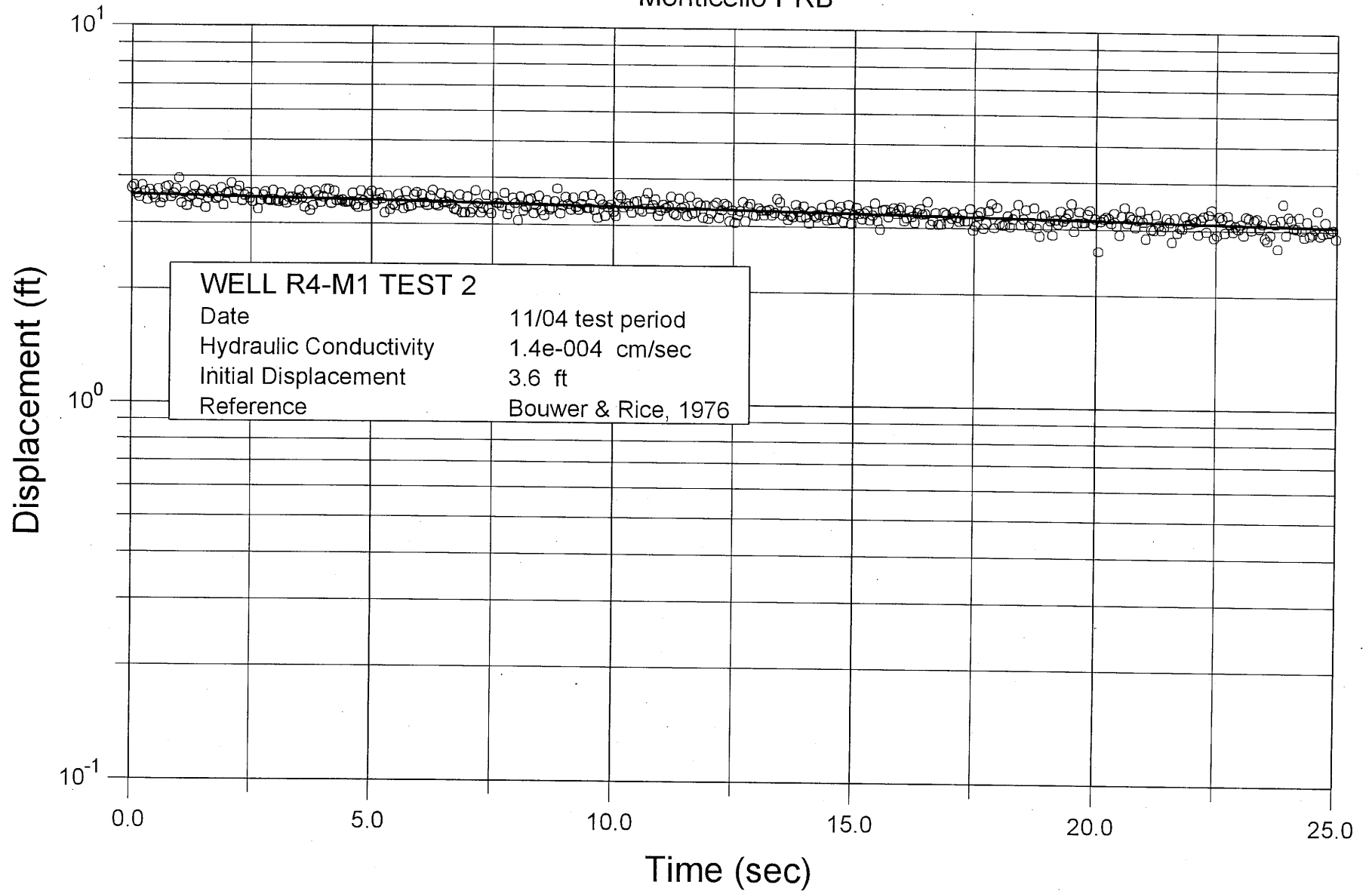
Monticello PRB



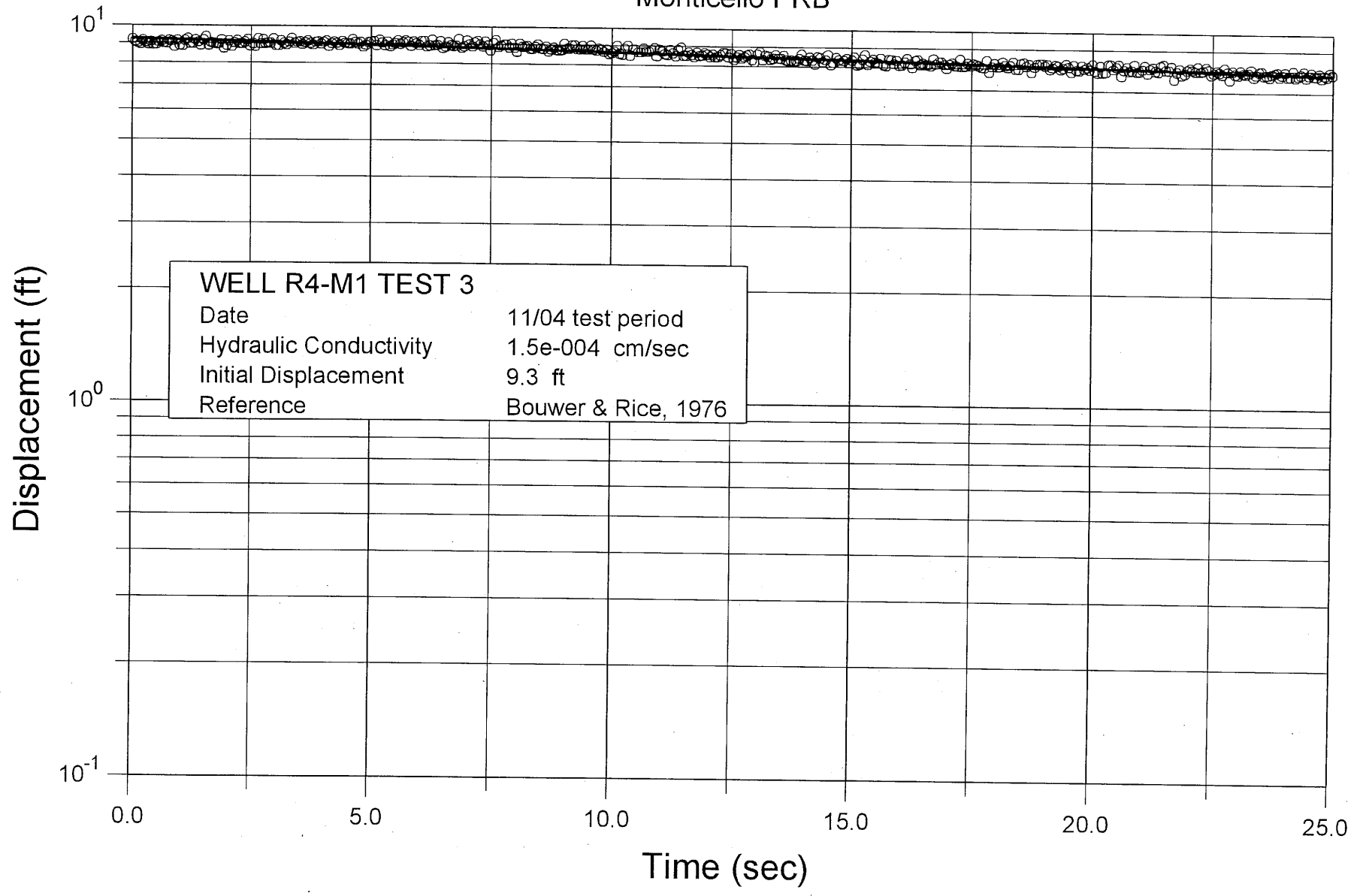
Monticello PRB



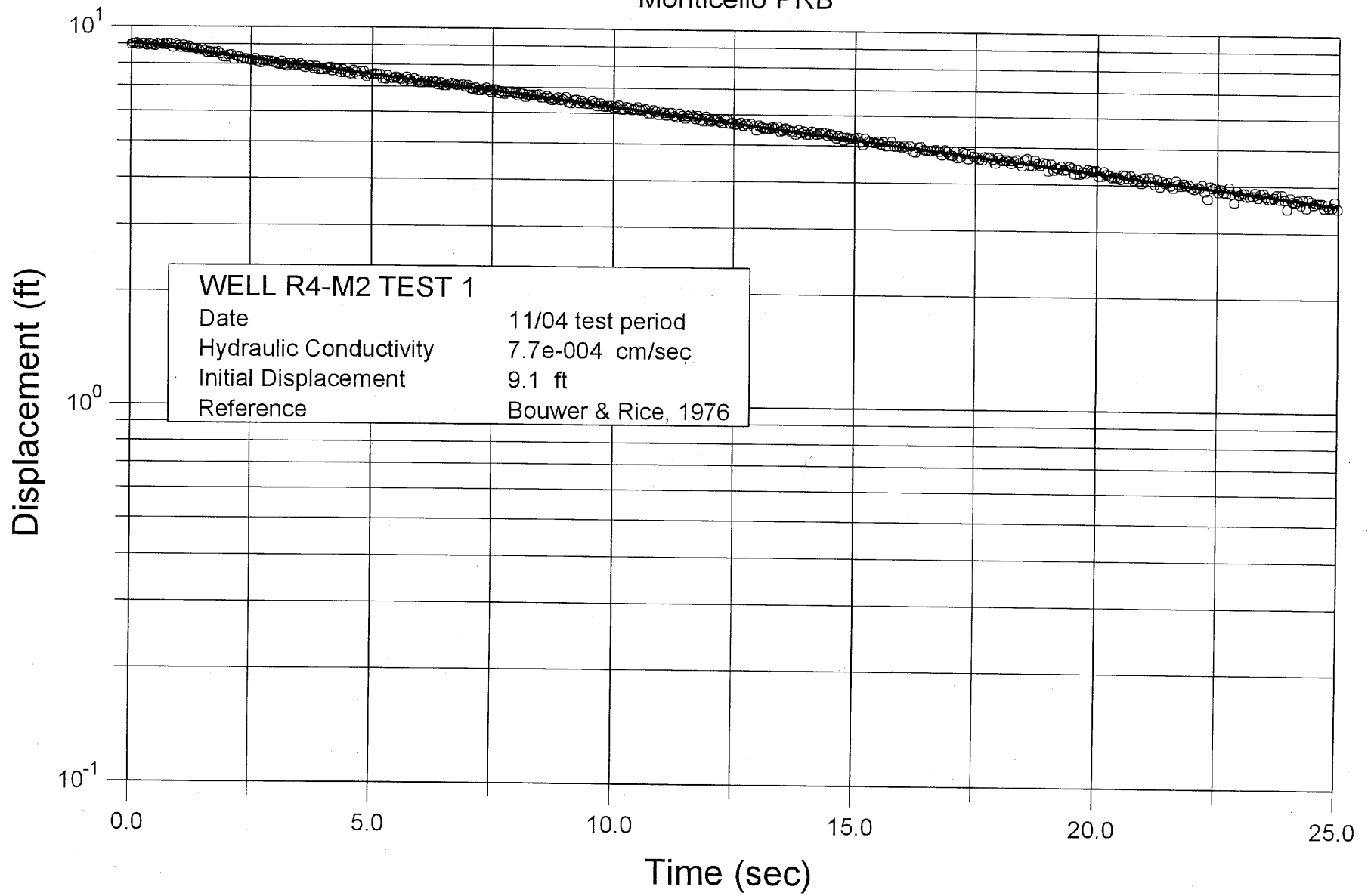
Monticello PRB



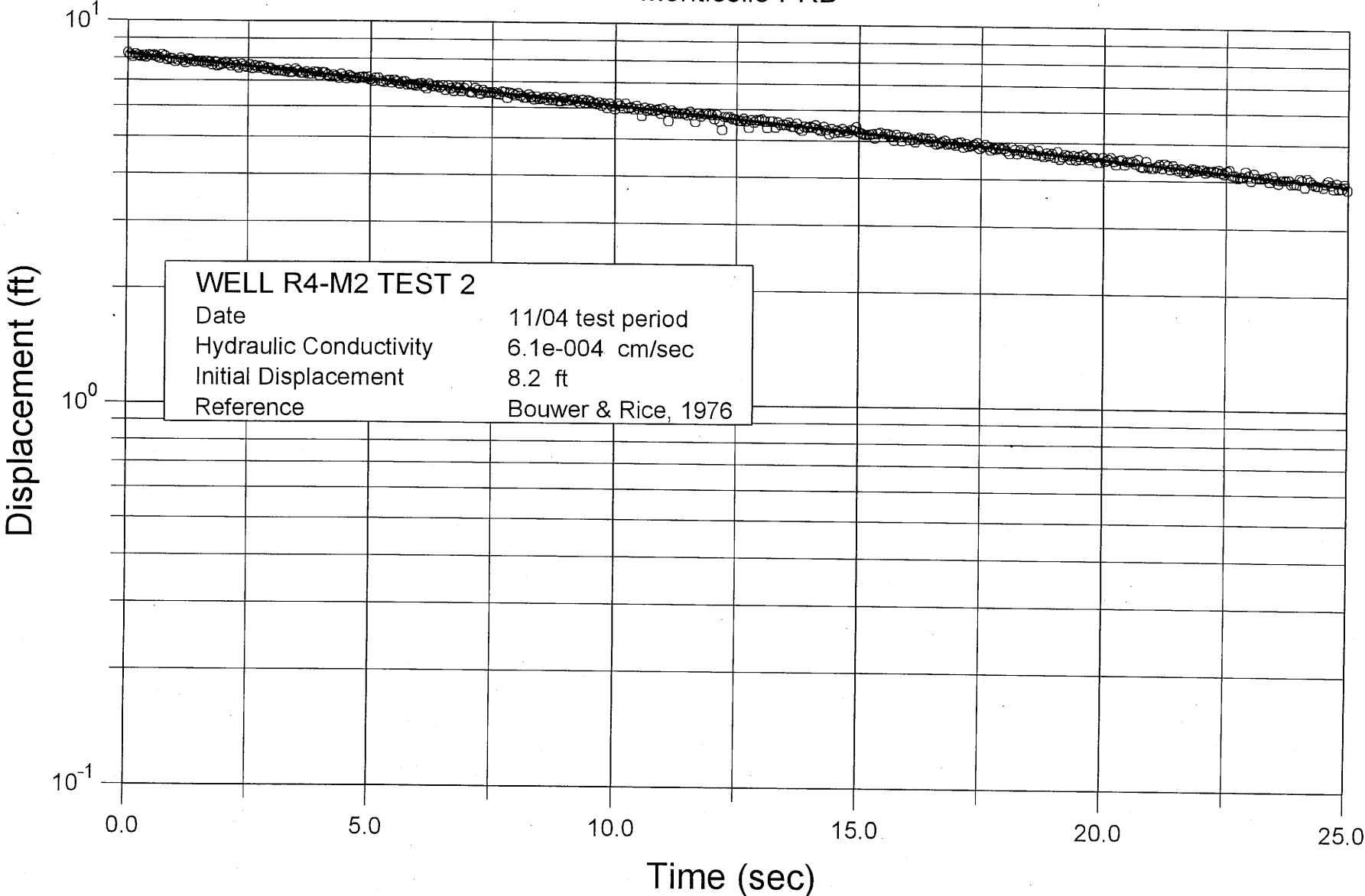
Monticello PRB



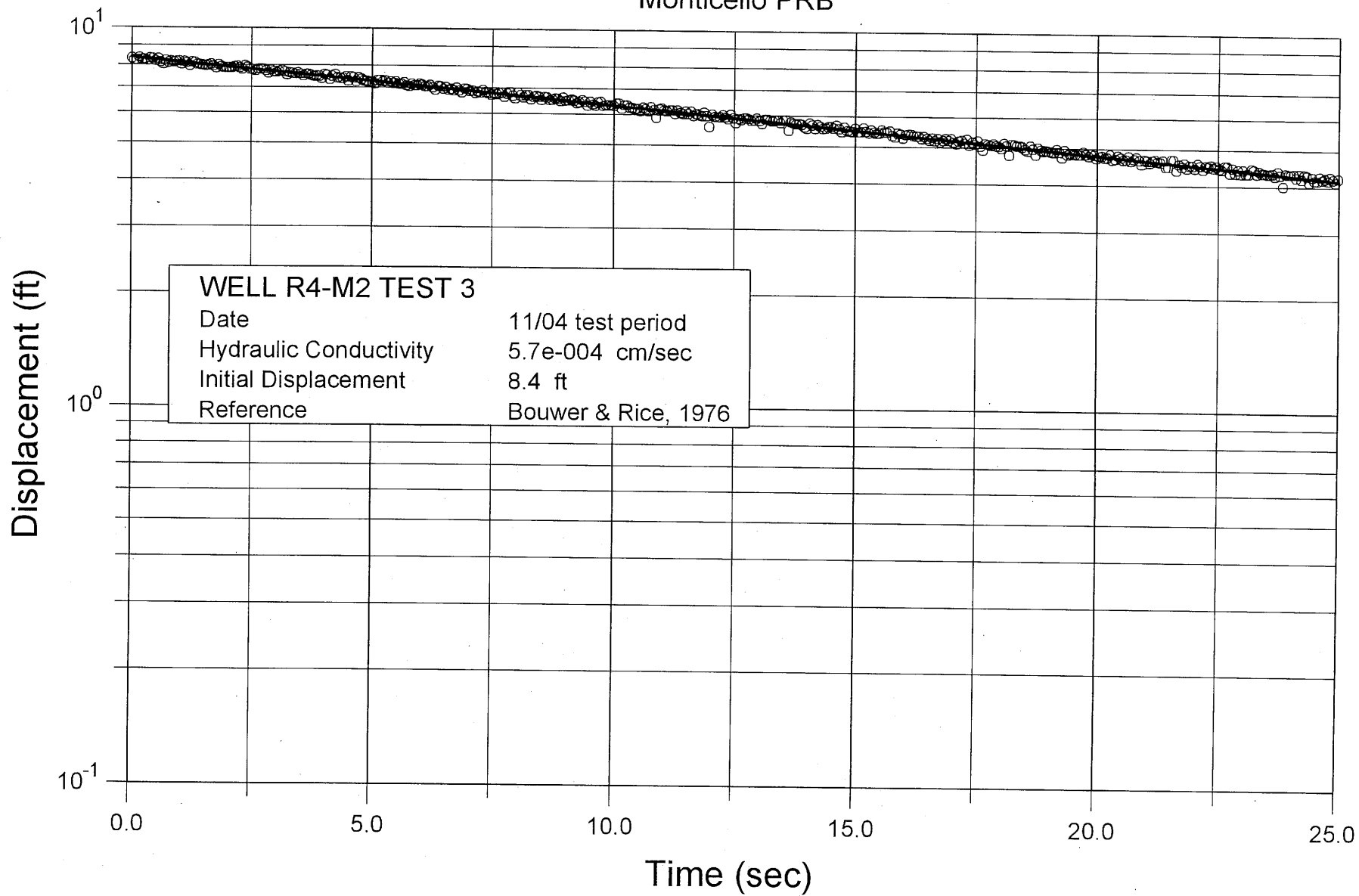
Monticello PRB



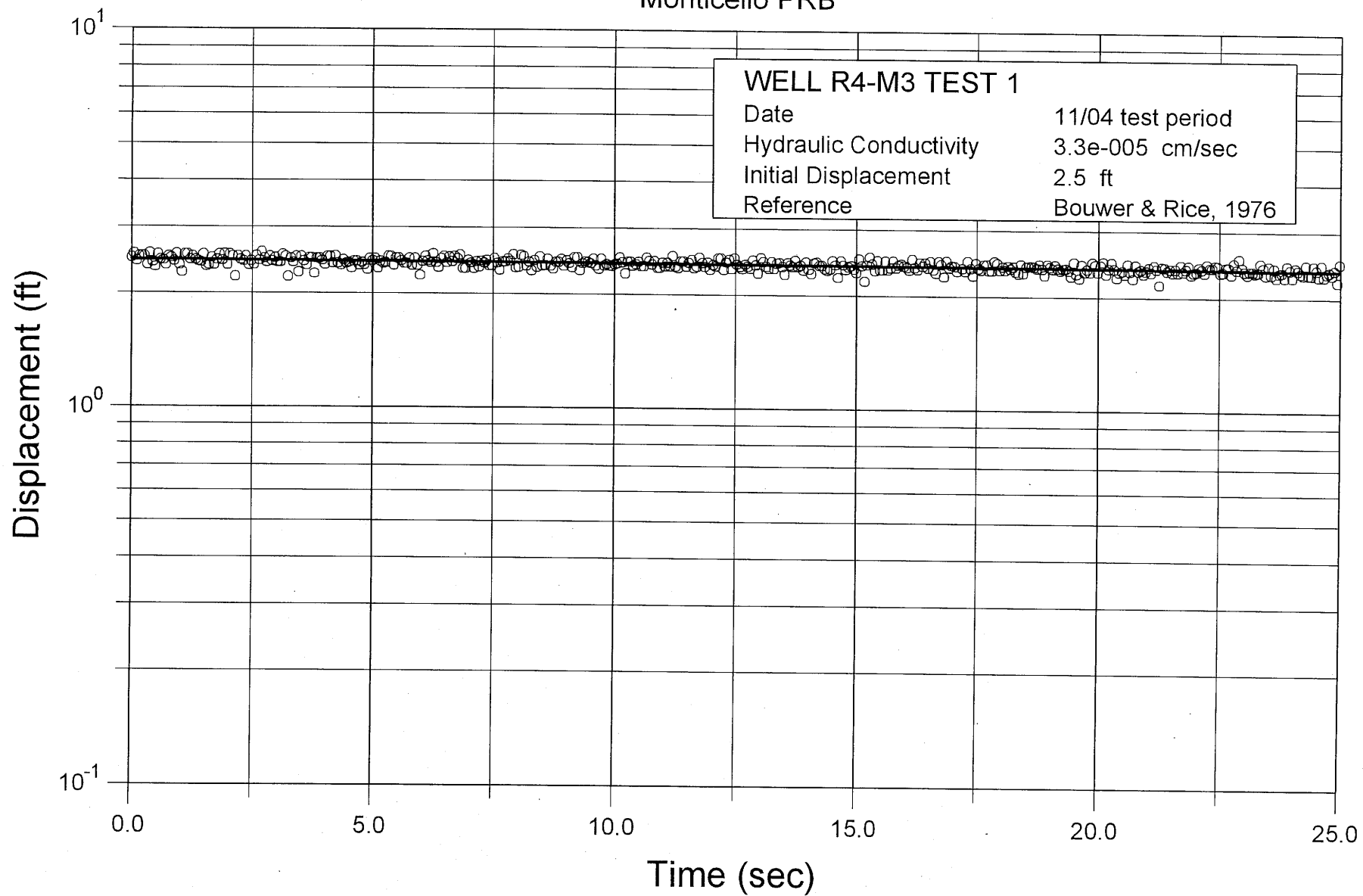
Monticello PRB



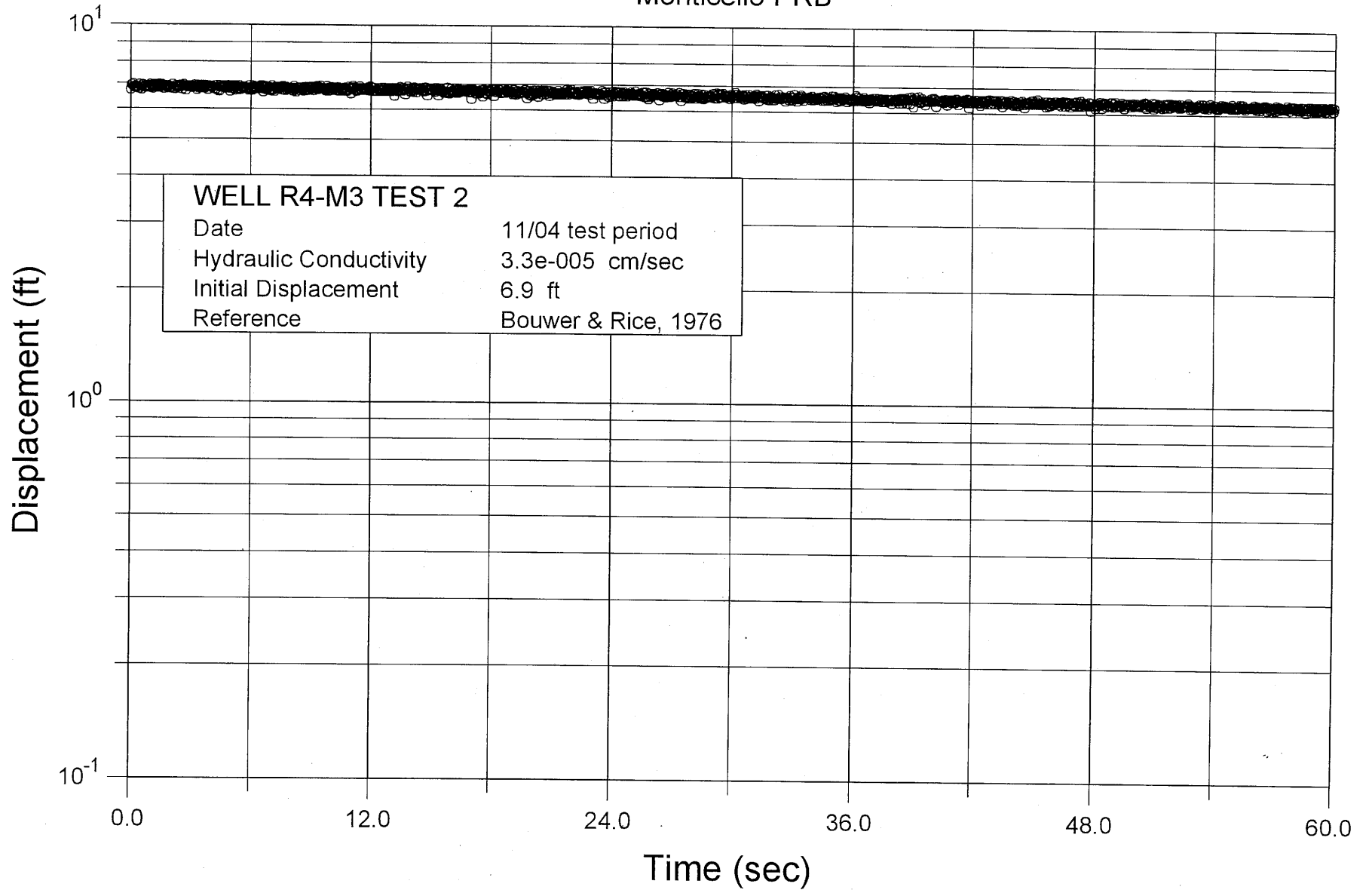
Monticello PRB



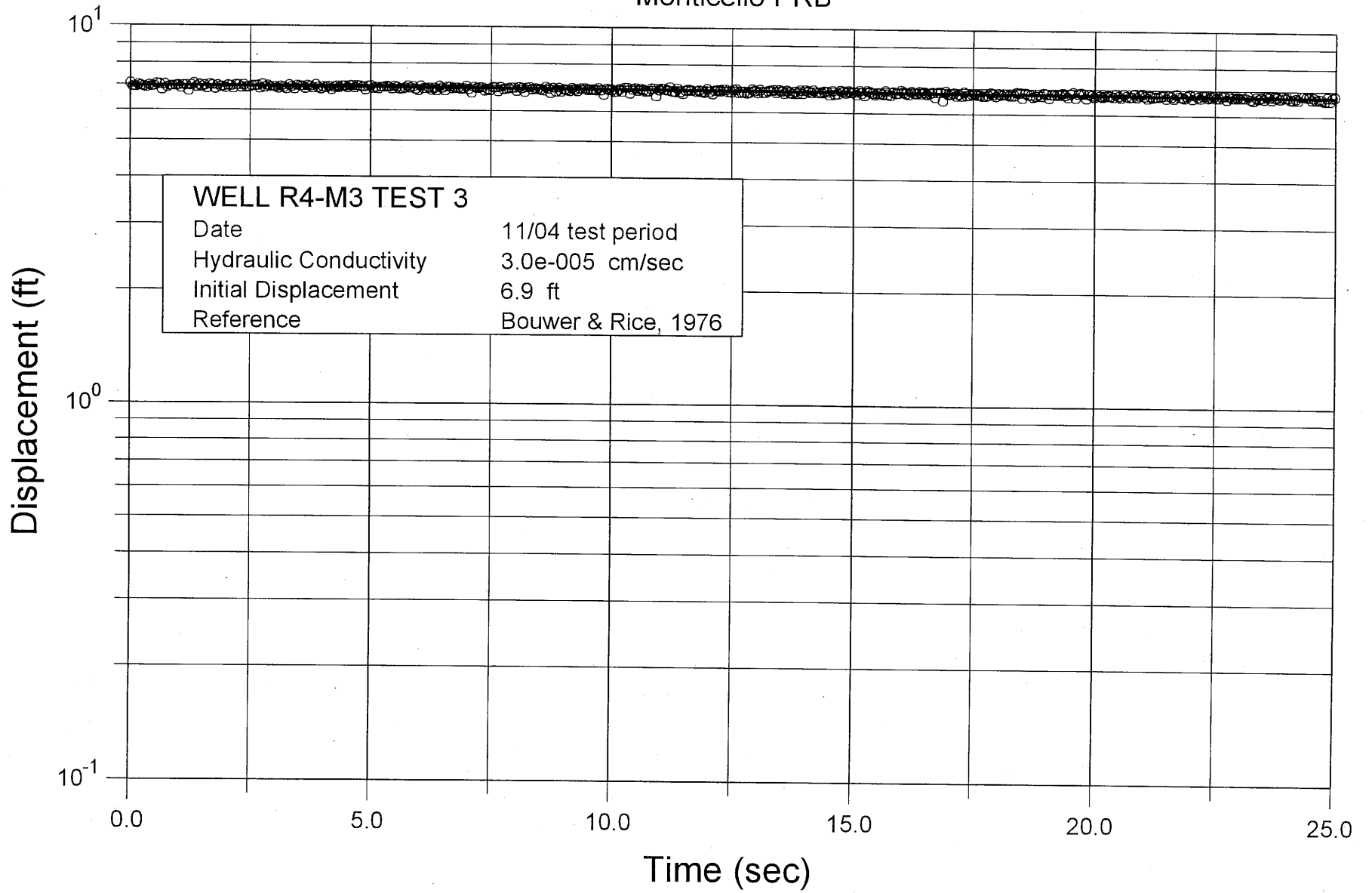
Monticello PRB



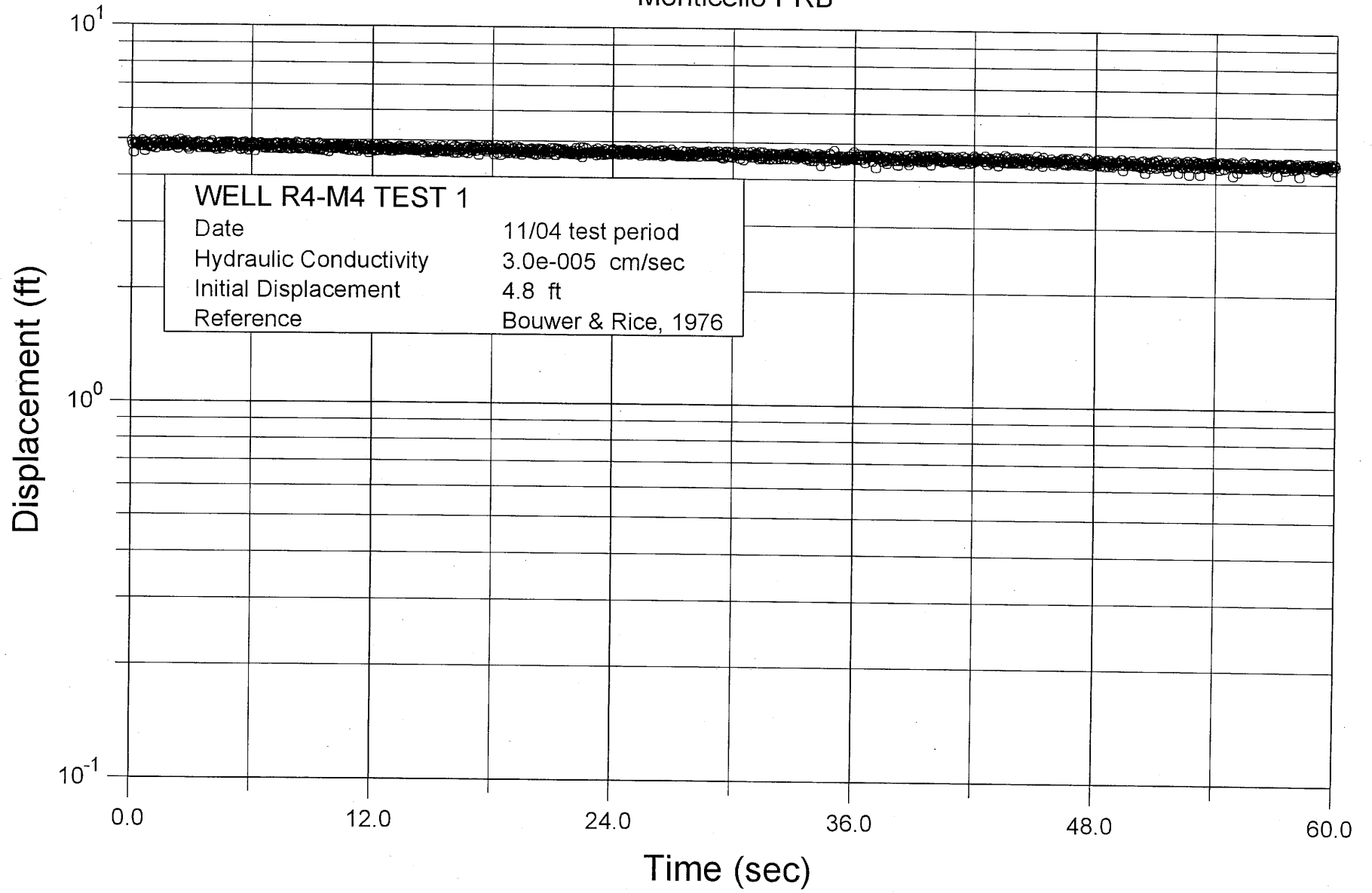
Monticello PRB



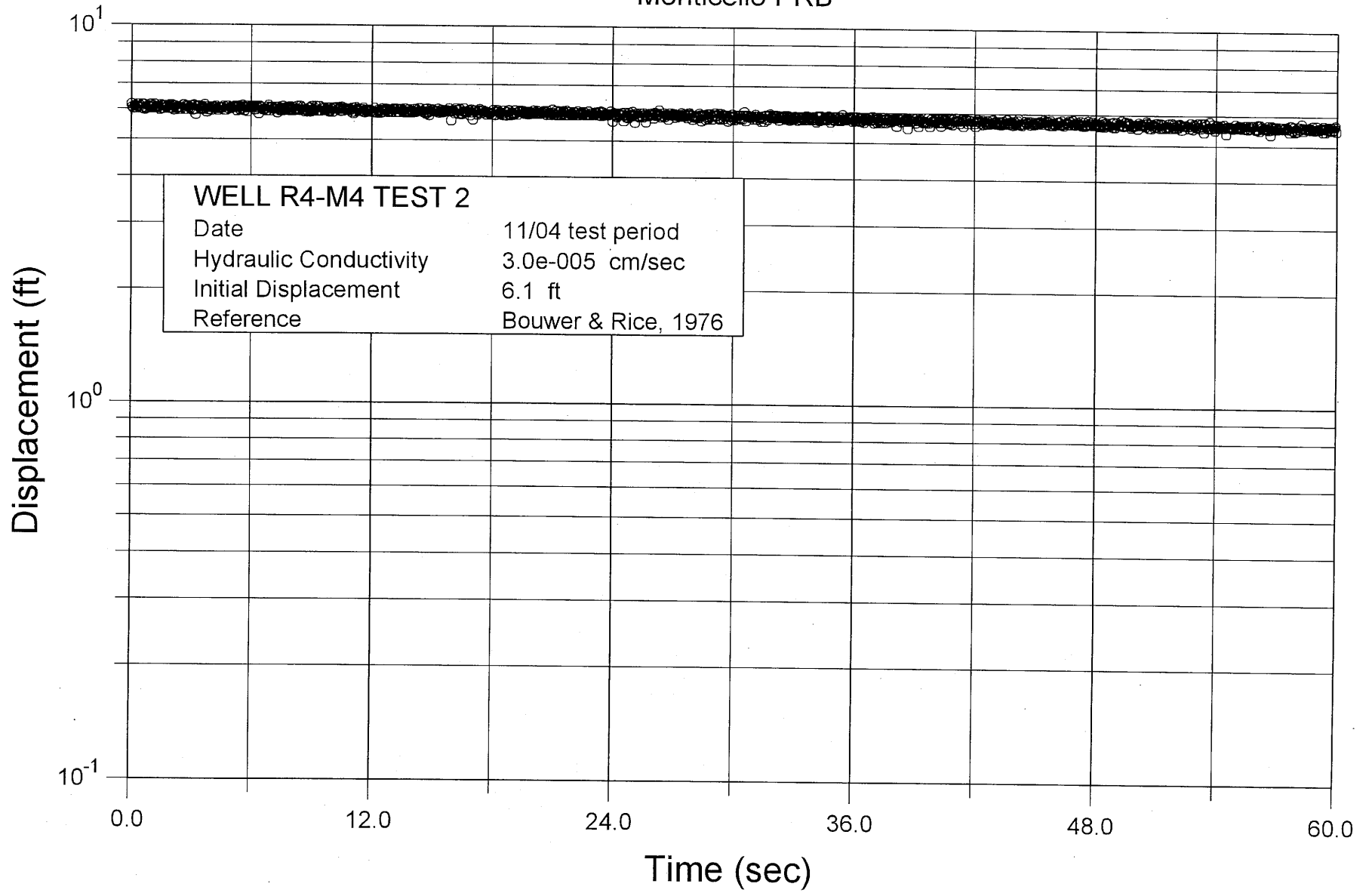
Monticello PRB



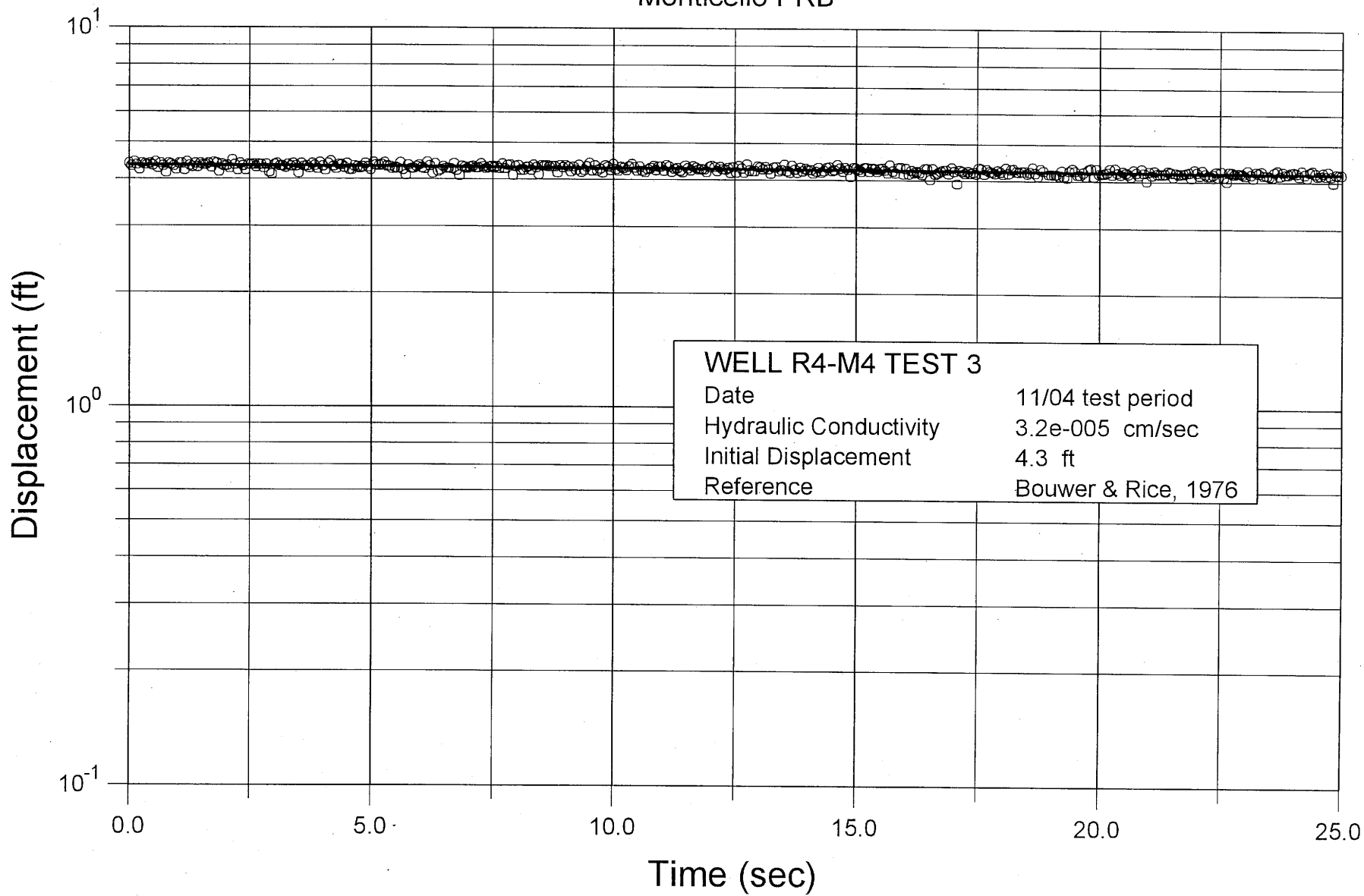
Monticello PRB



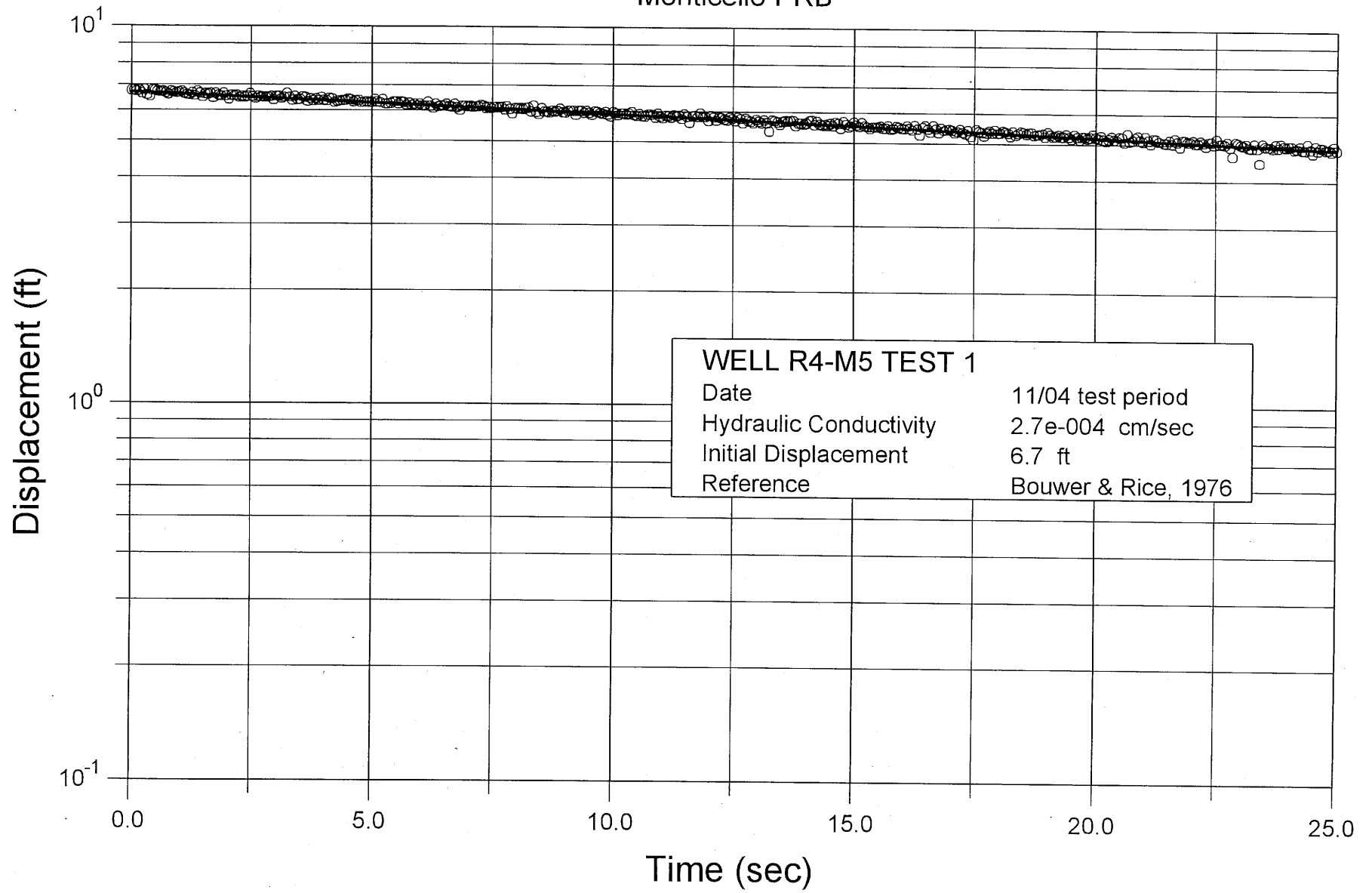
Monticello PRB



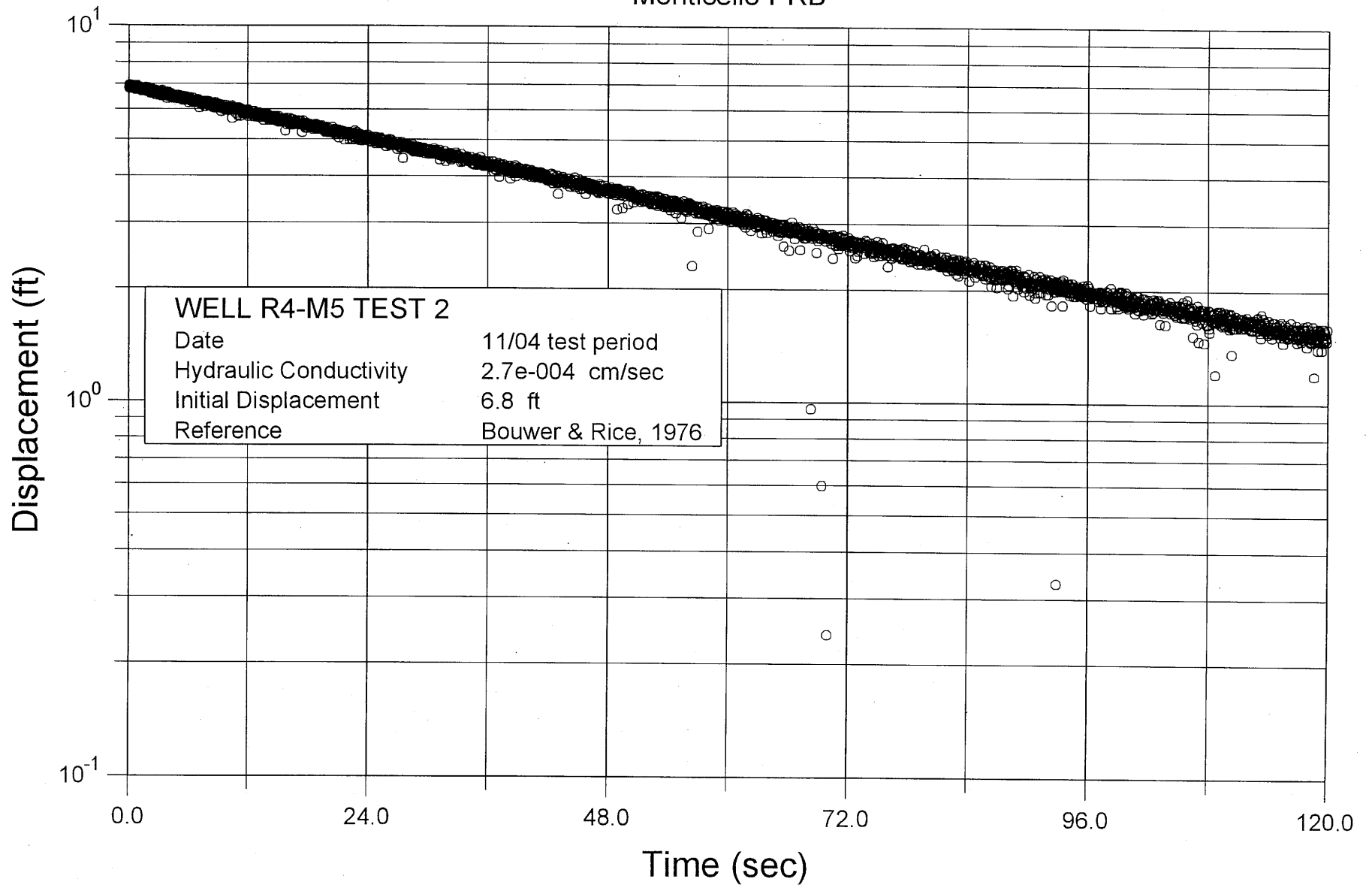
Monticello PRB



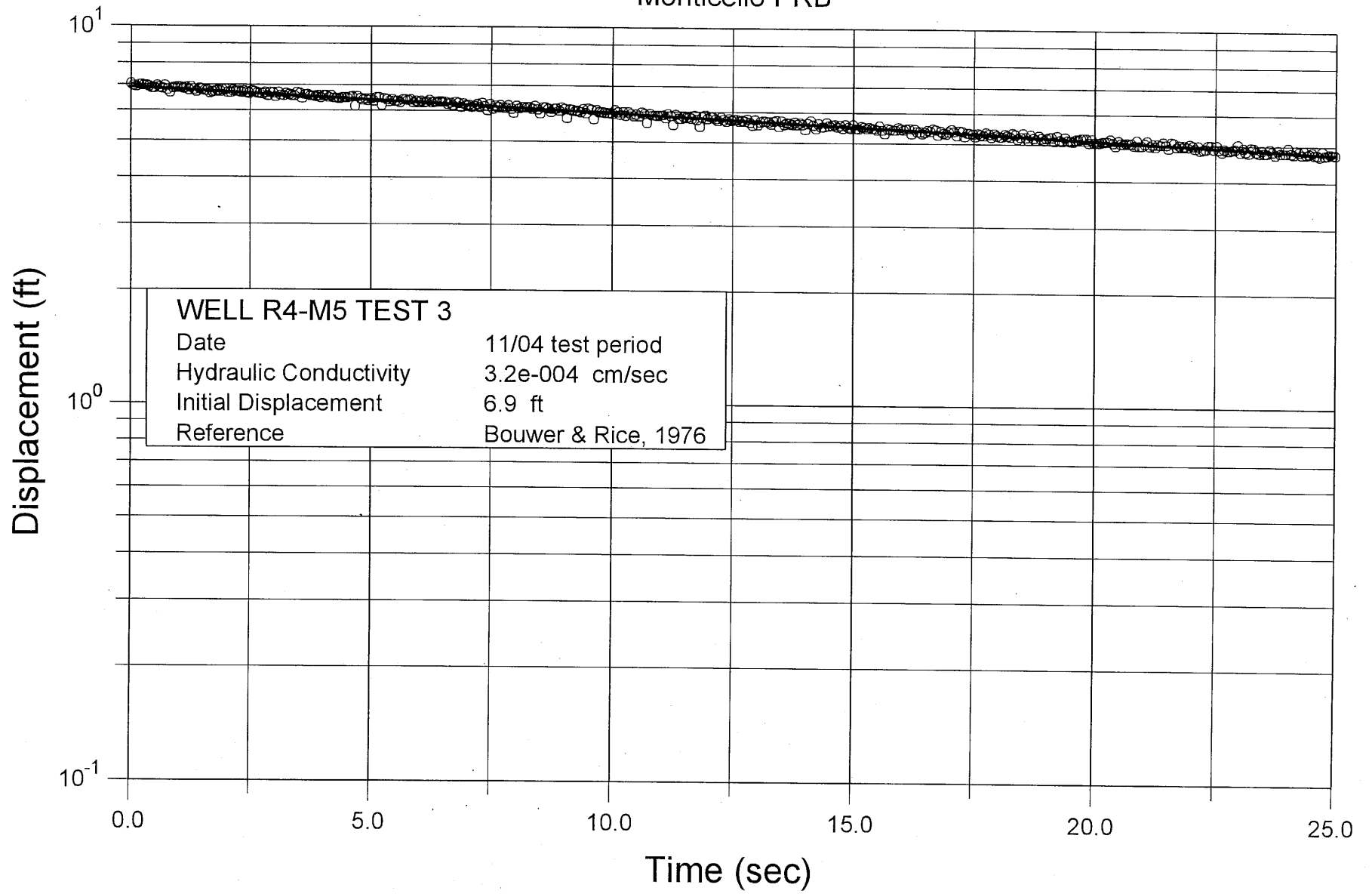
Monticello PRB



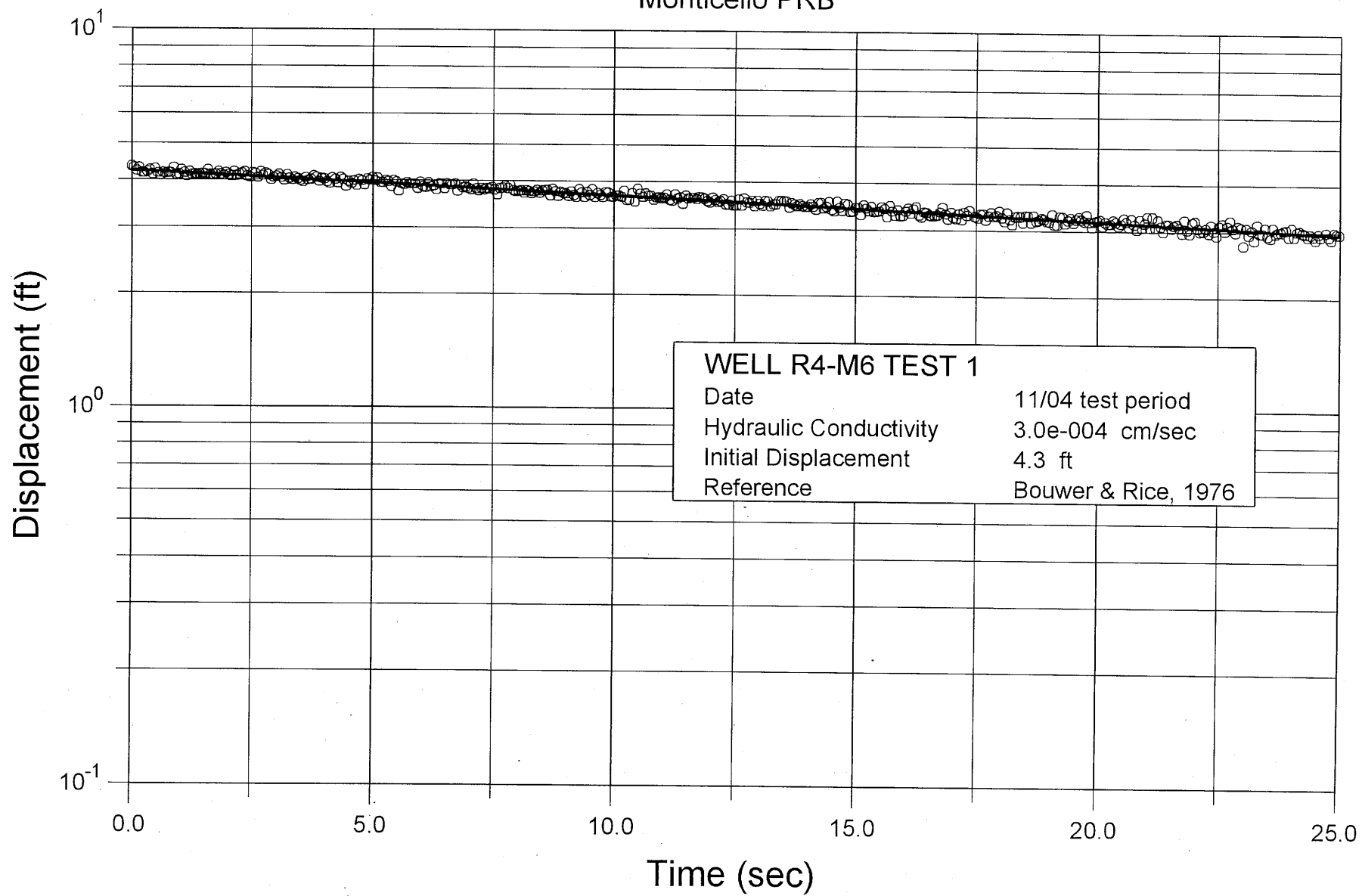
Monticello PRB



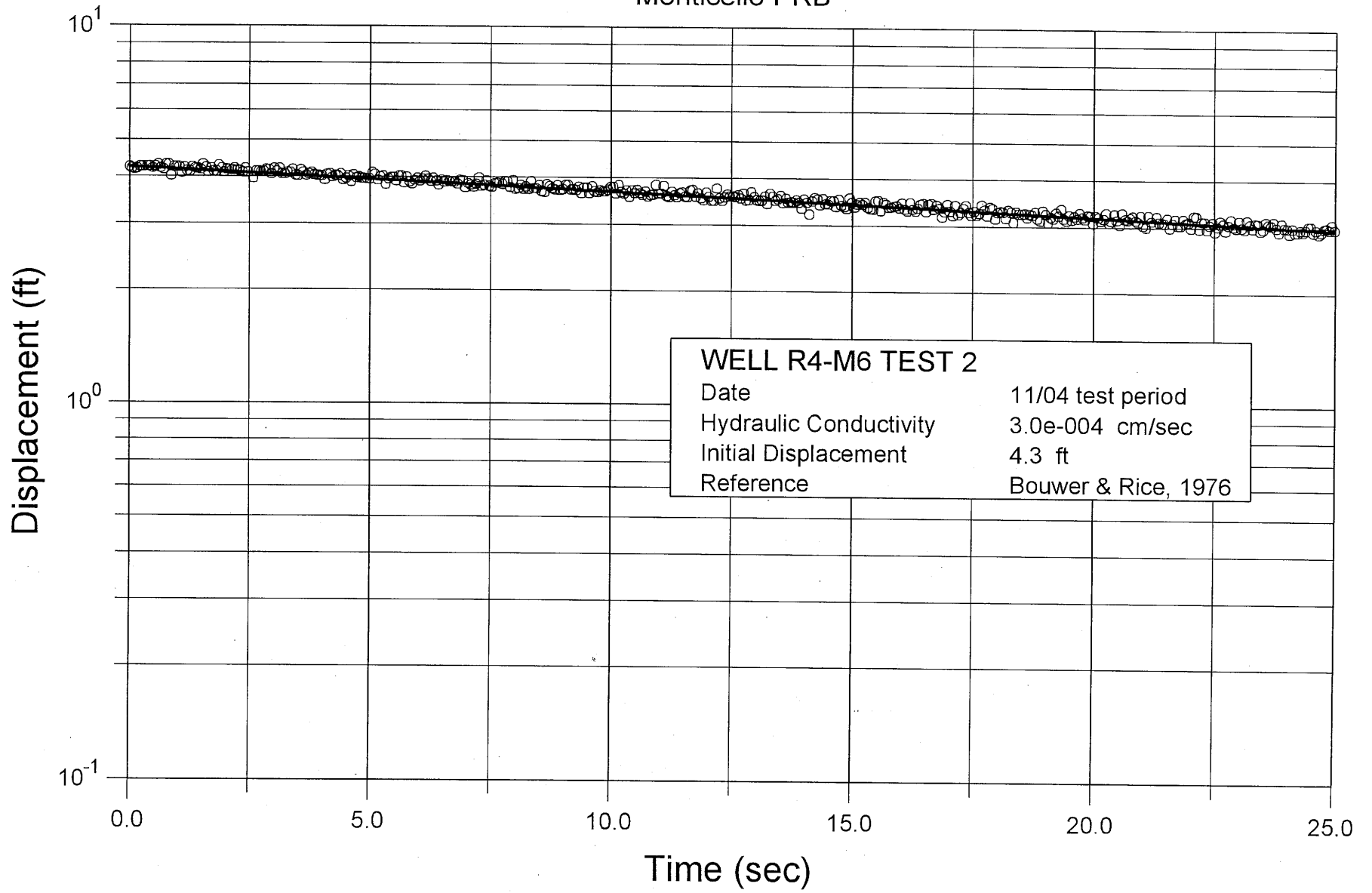
Monticello PRB



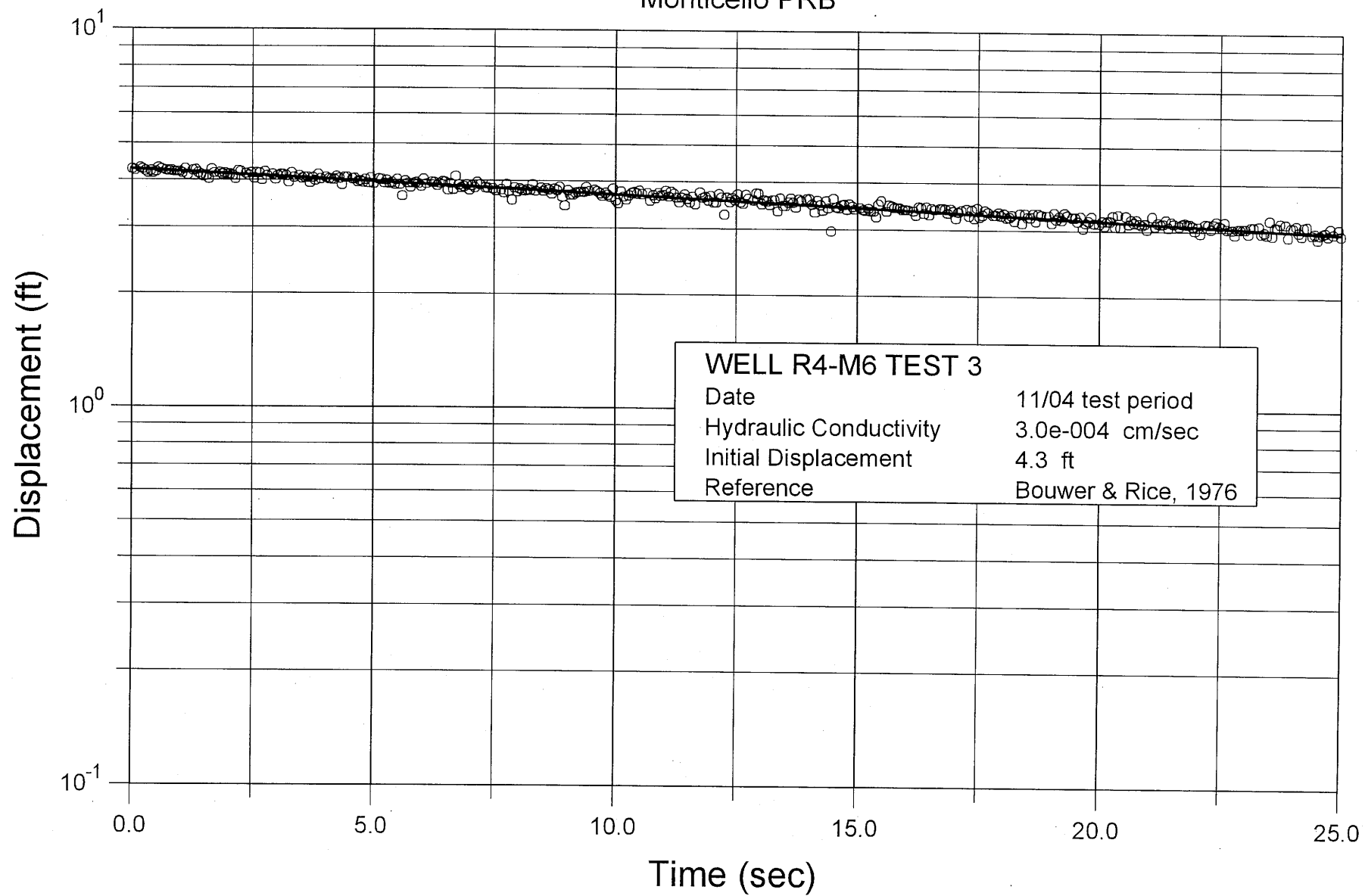
Monticello PRB



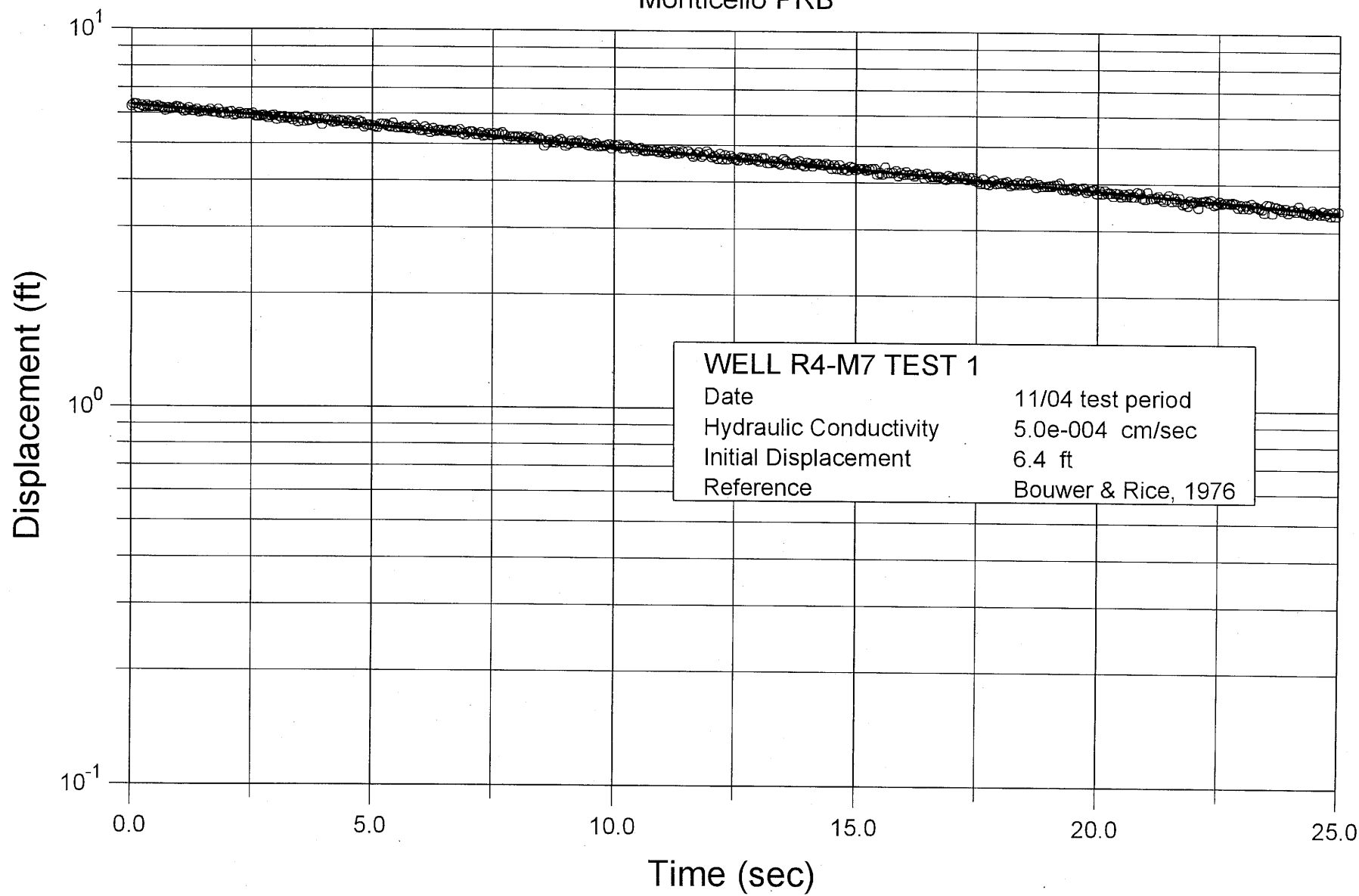
Monticello PRB



Monticello PRB



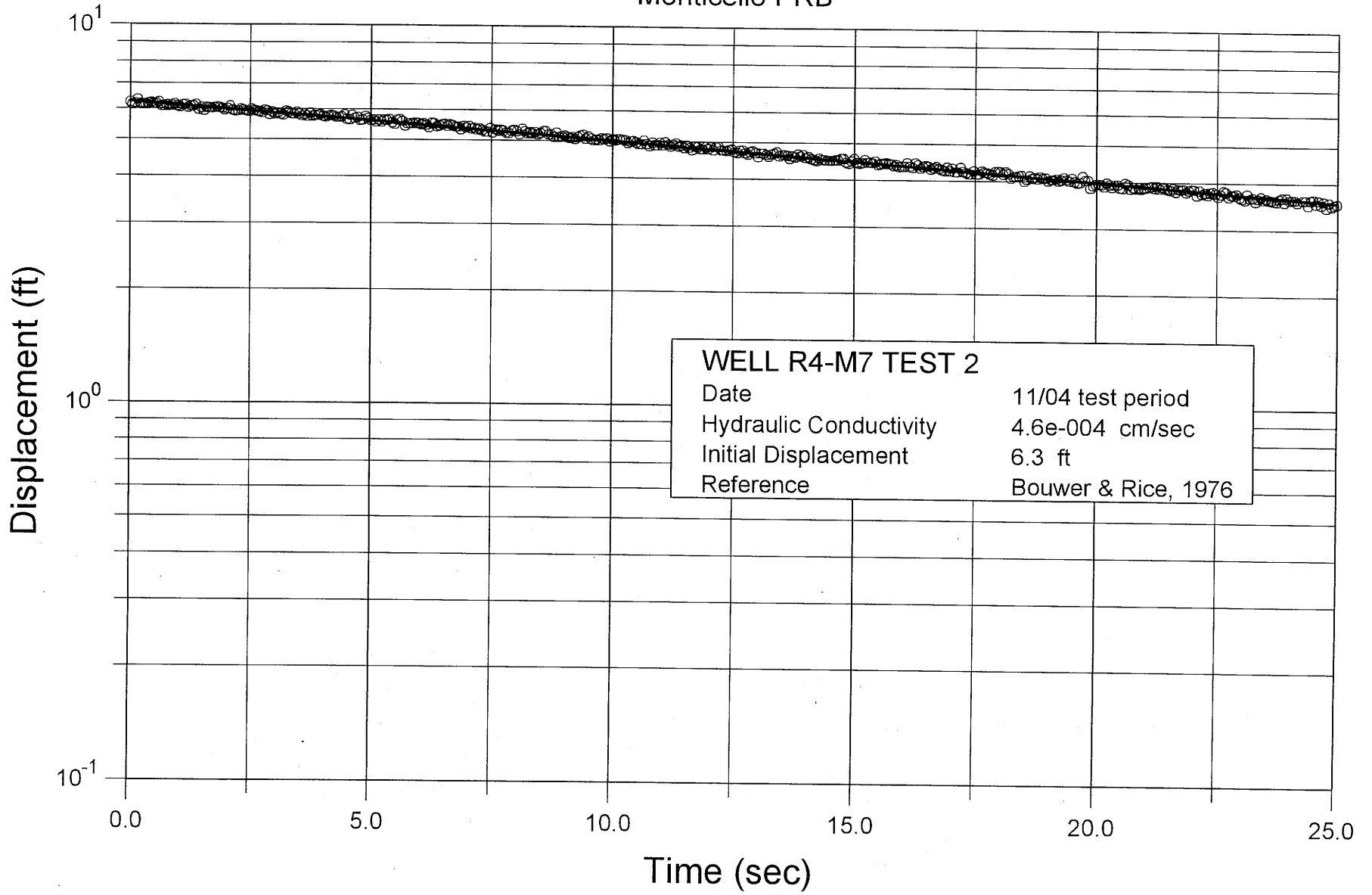
Monticello PRB



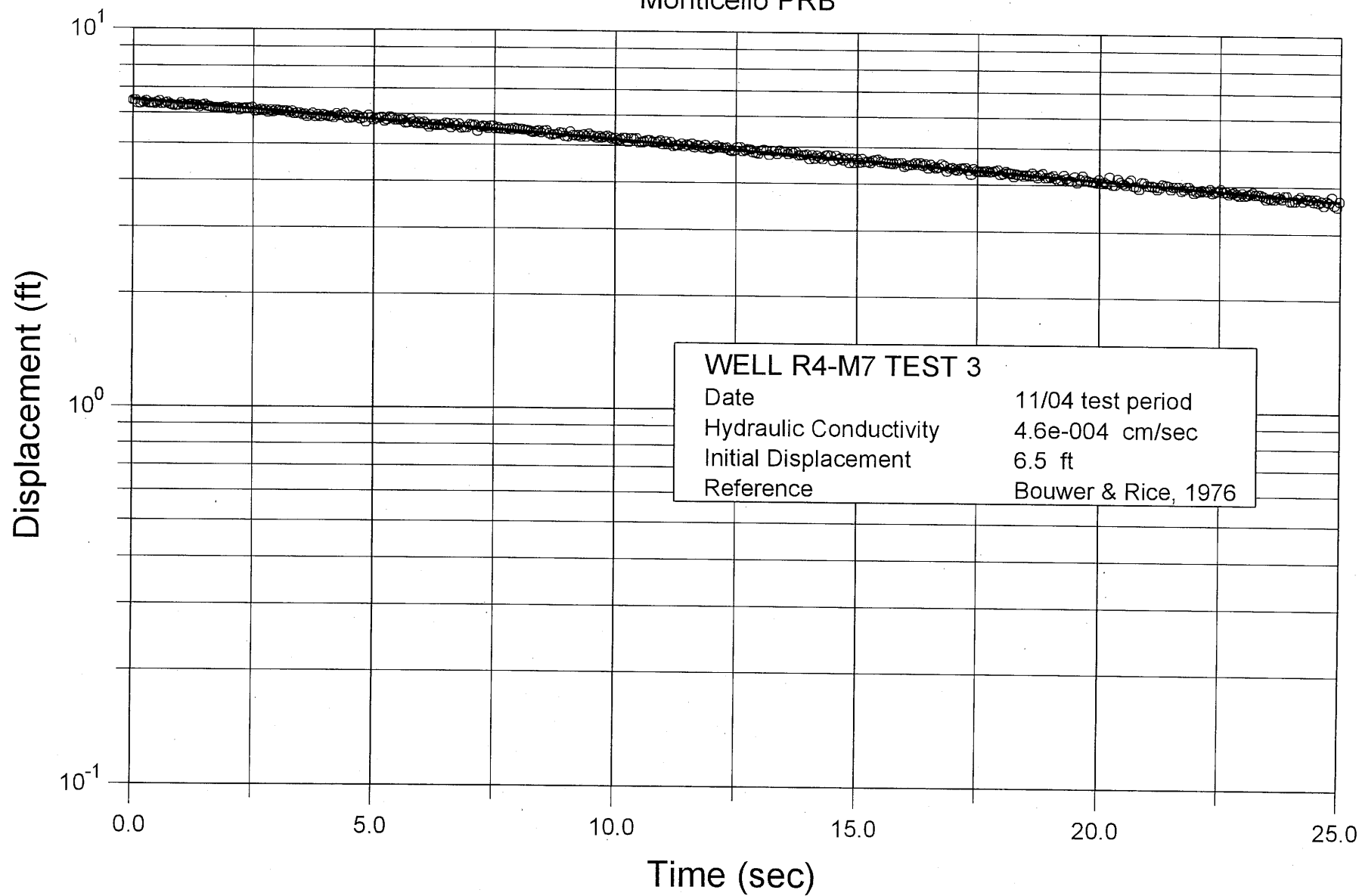
WELL R4-M7 TEST 1

Date	11/04 test period
Hydraulic Conductivity	5.0e-004 cm/sec
Initial Displacement	6.4 ft
Reference	Bouwer & Rice, 1976

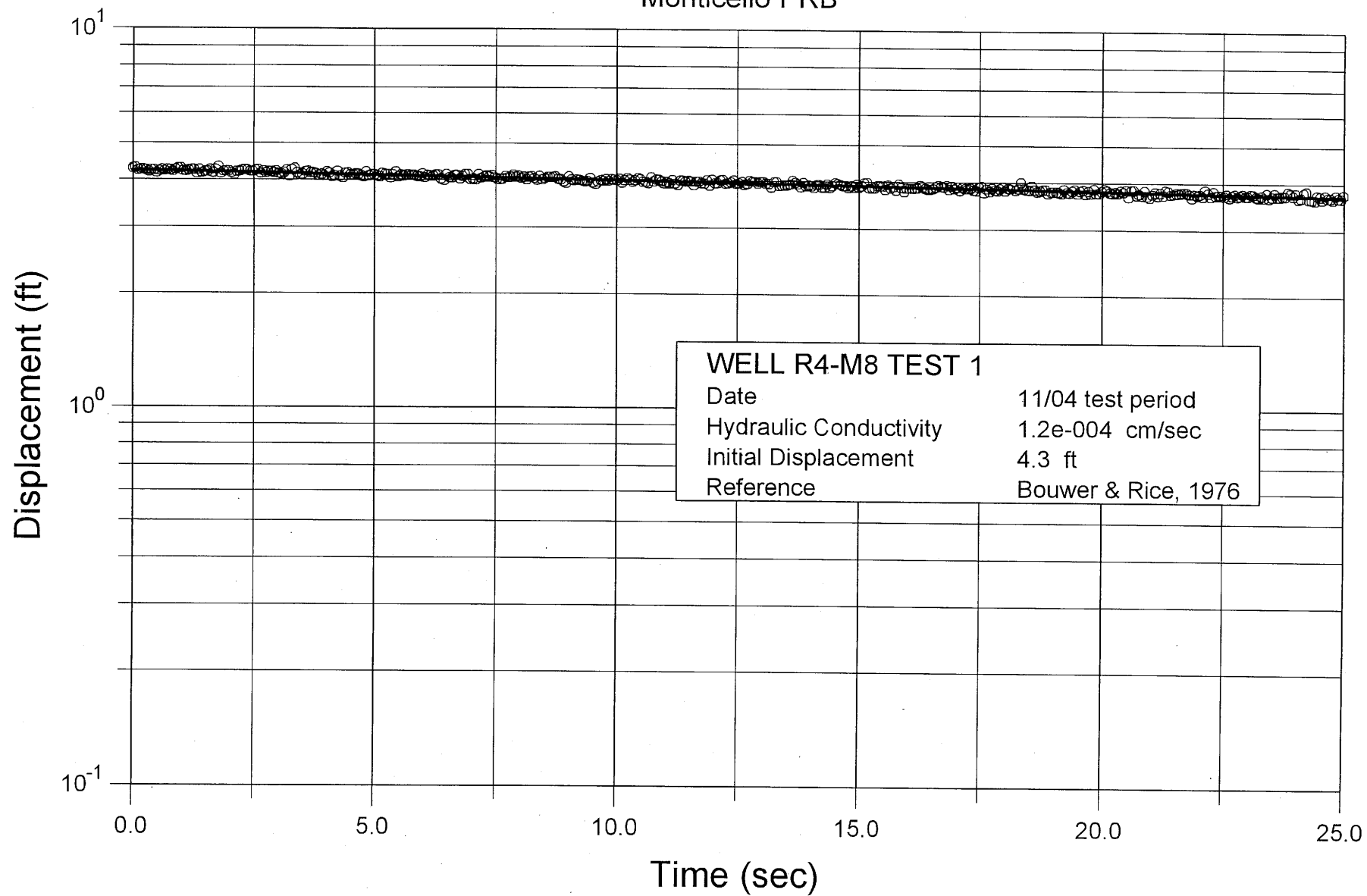
Monticello PRB



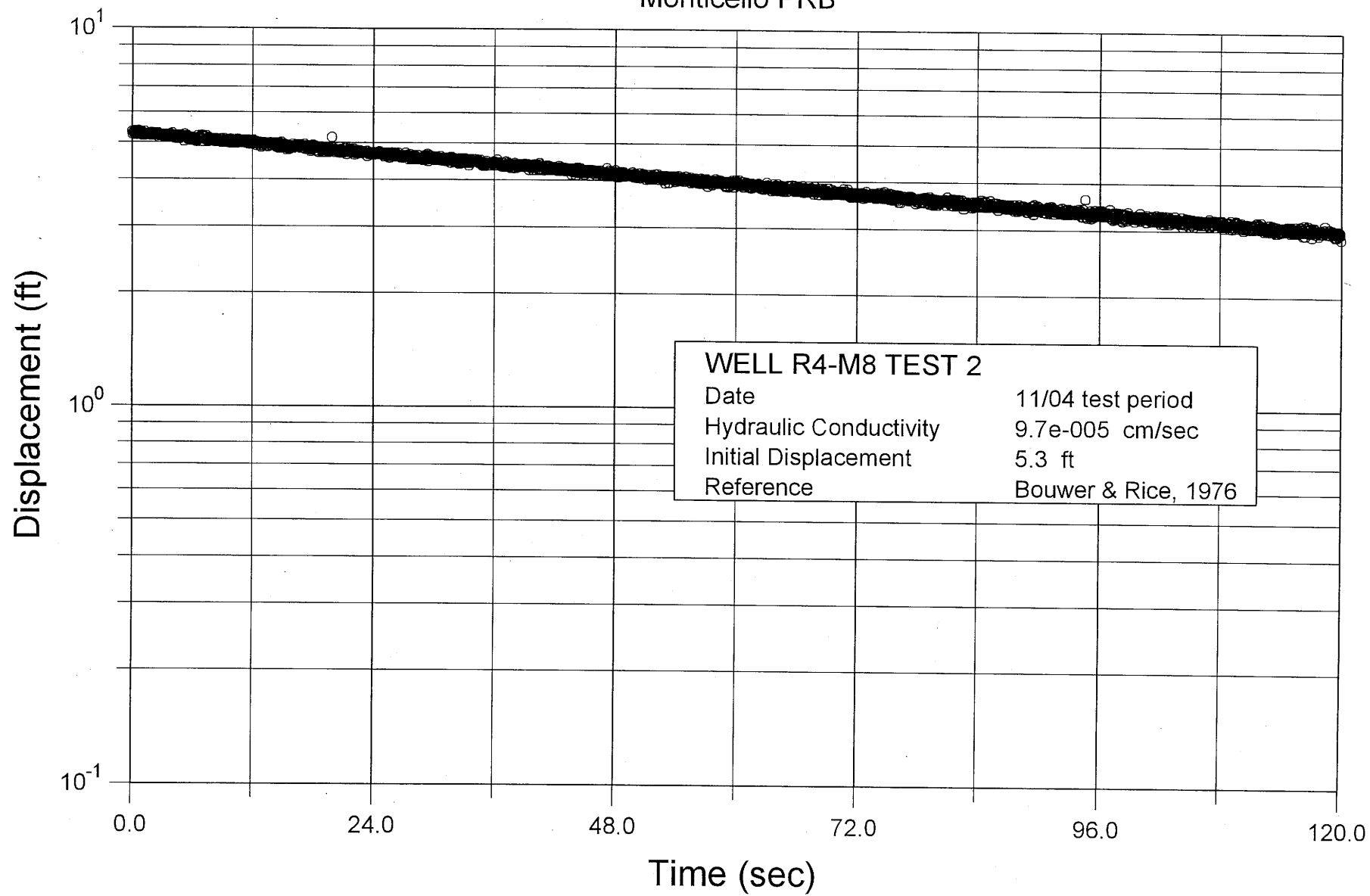
Monticello PRB



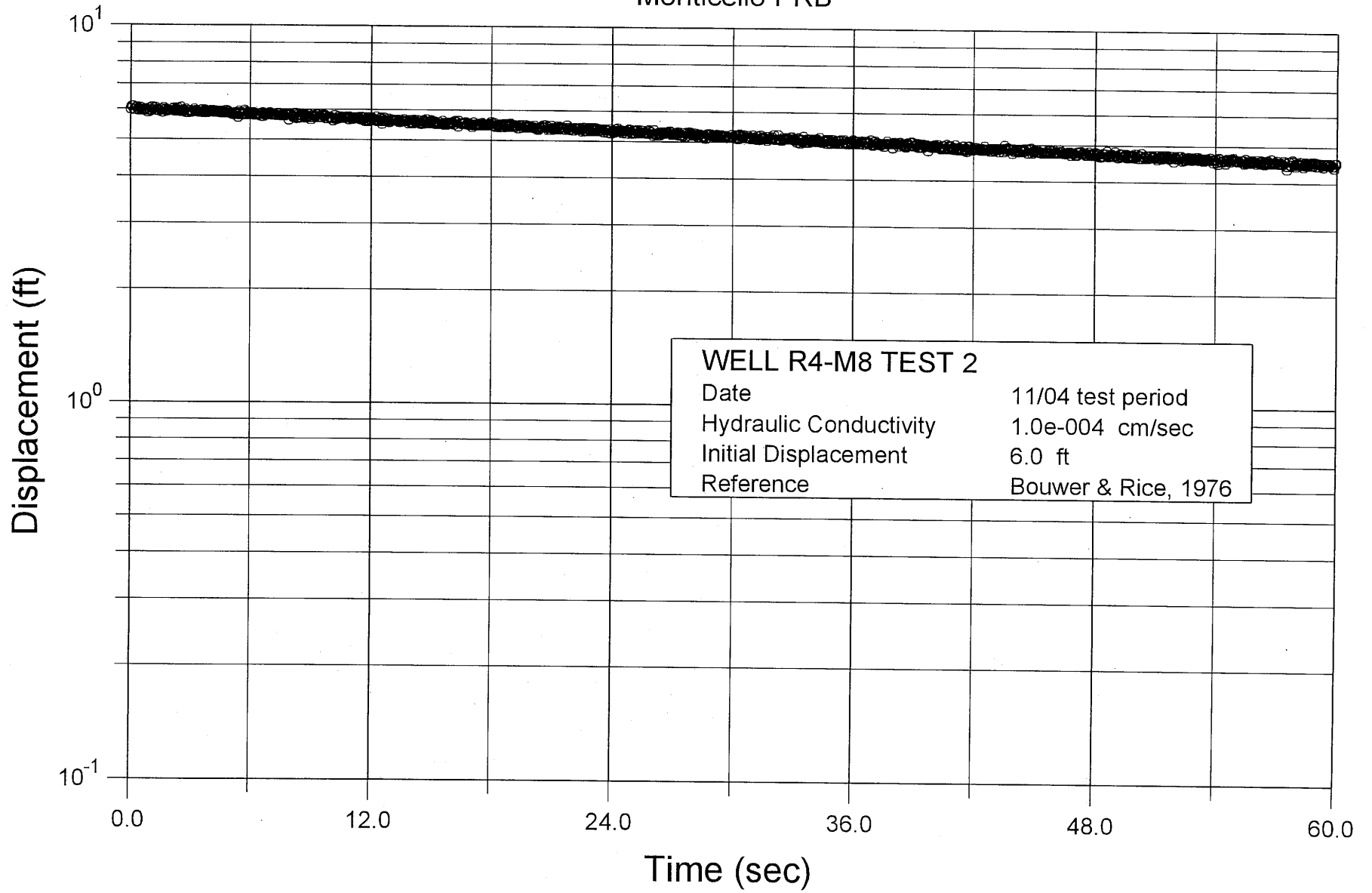
Monticello PRB



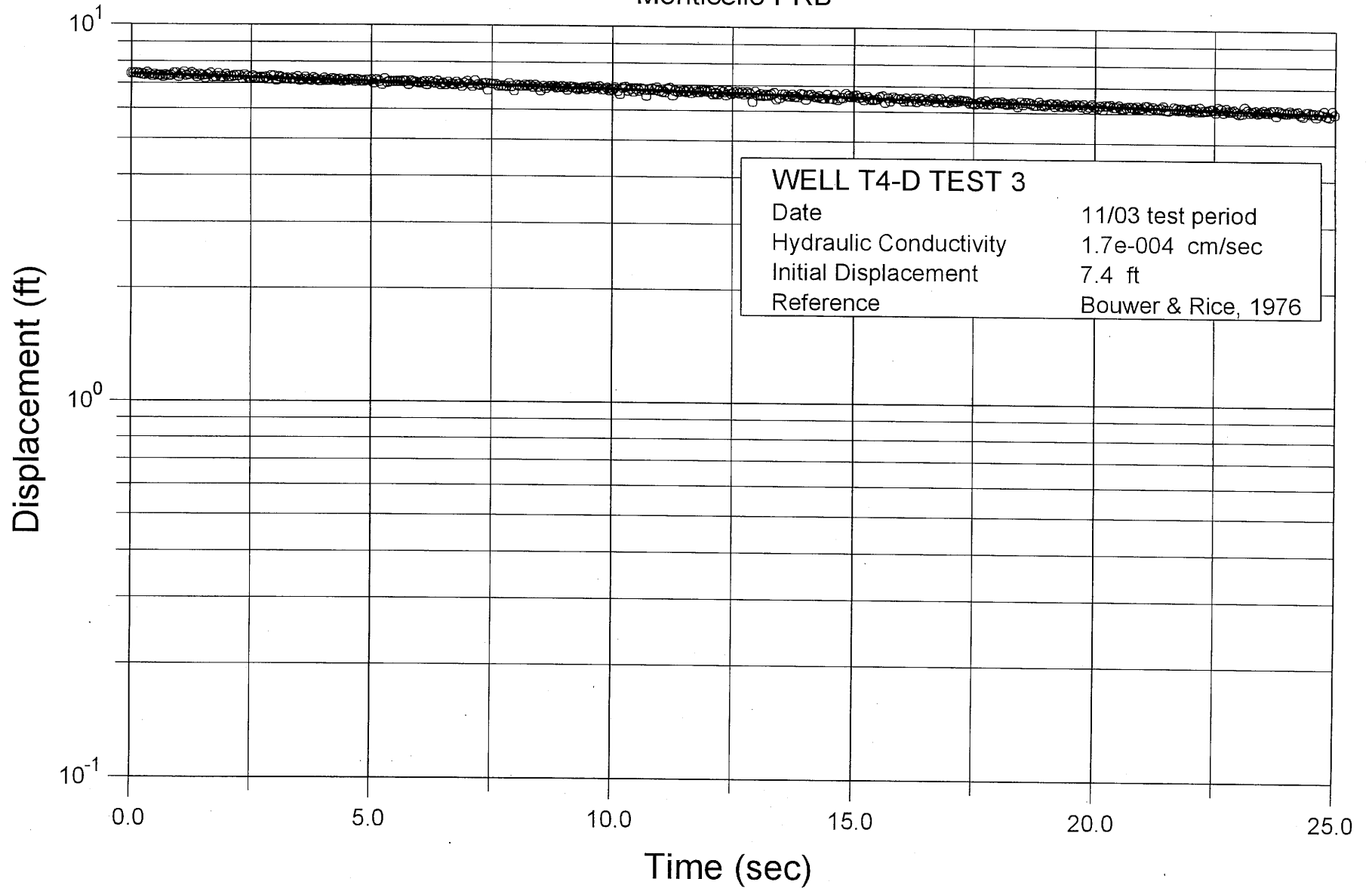
Monticello PRB



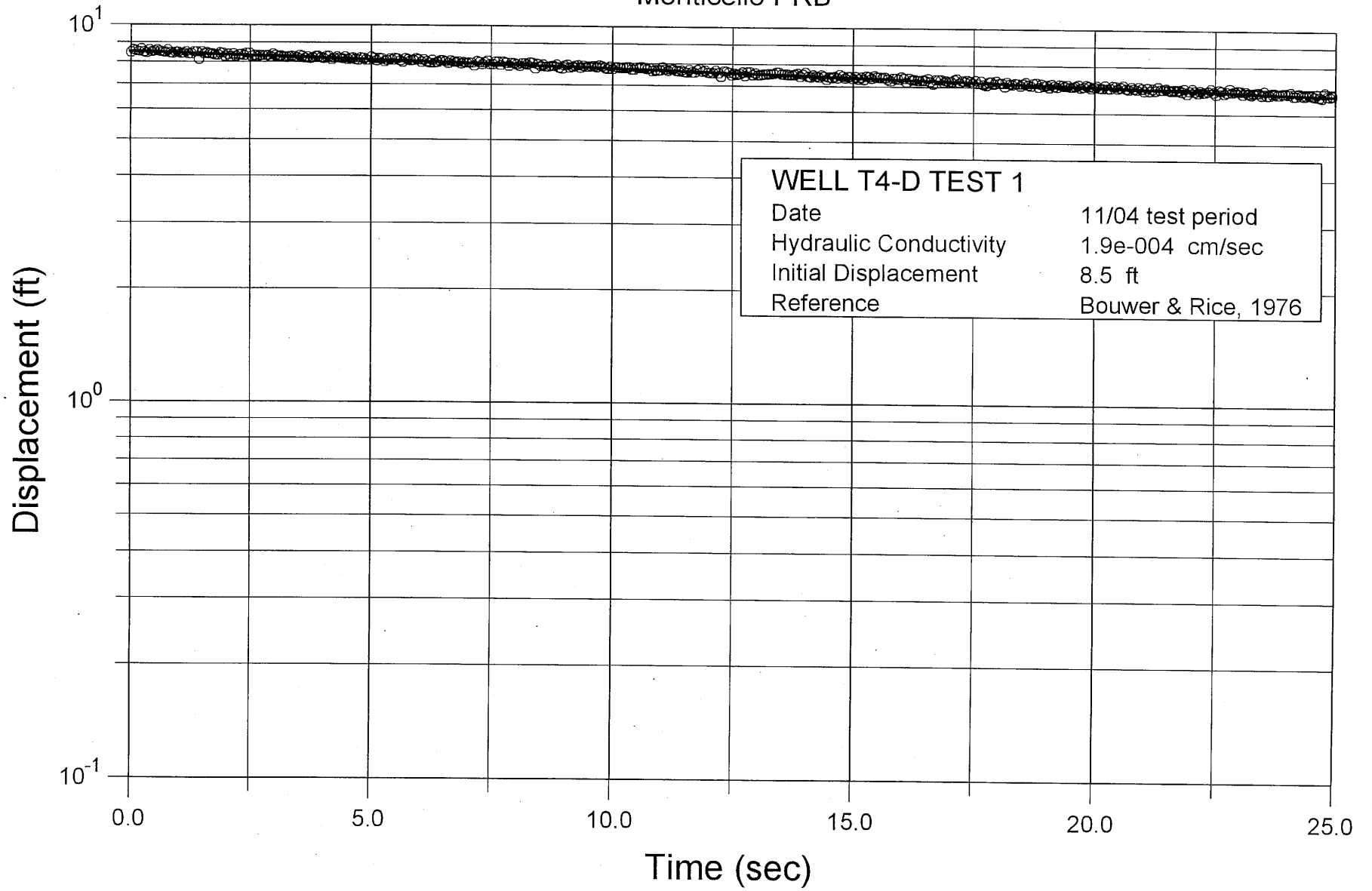
Monticello PRB



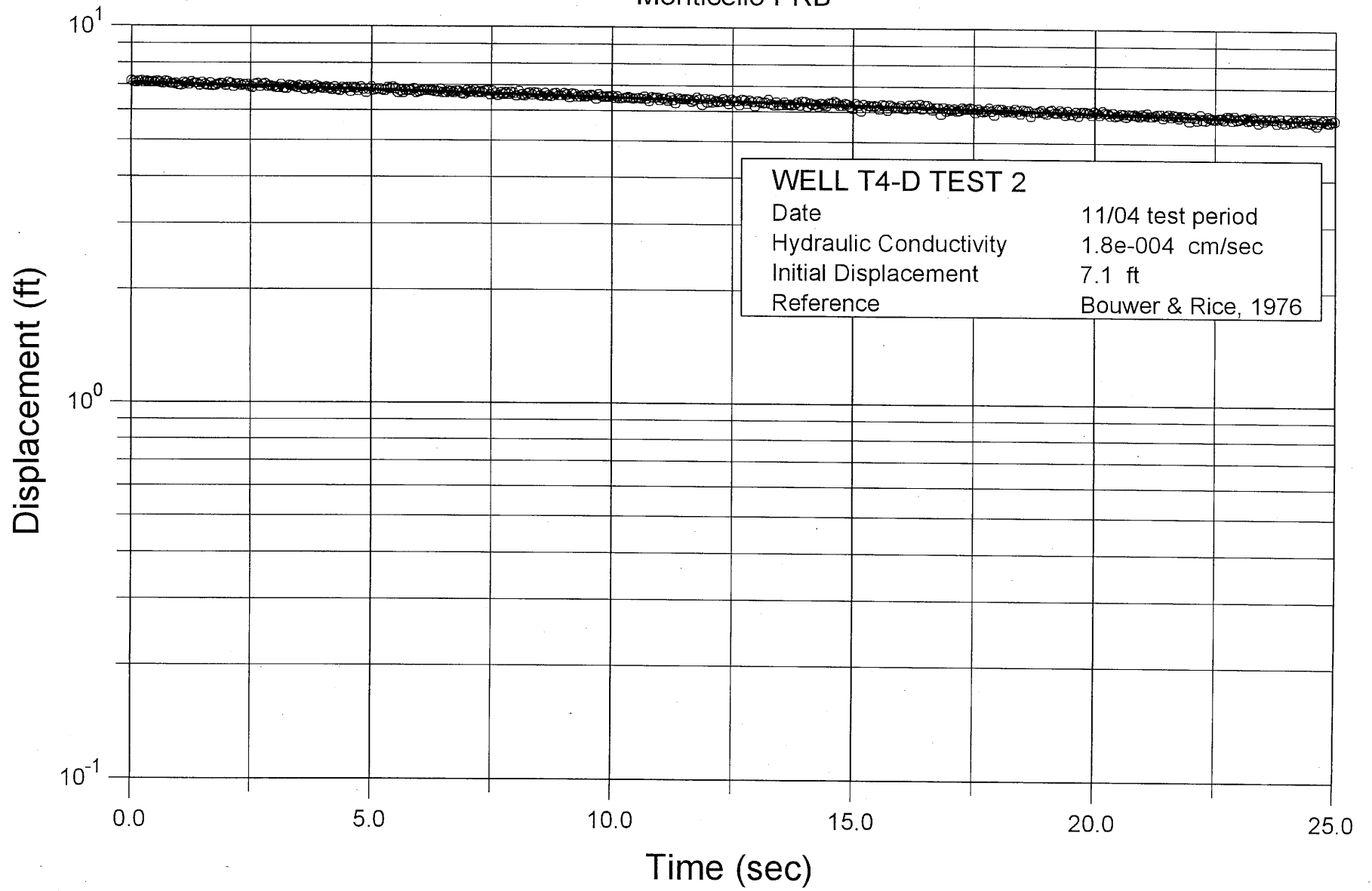
Monticello PRB



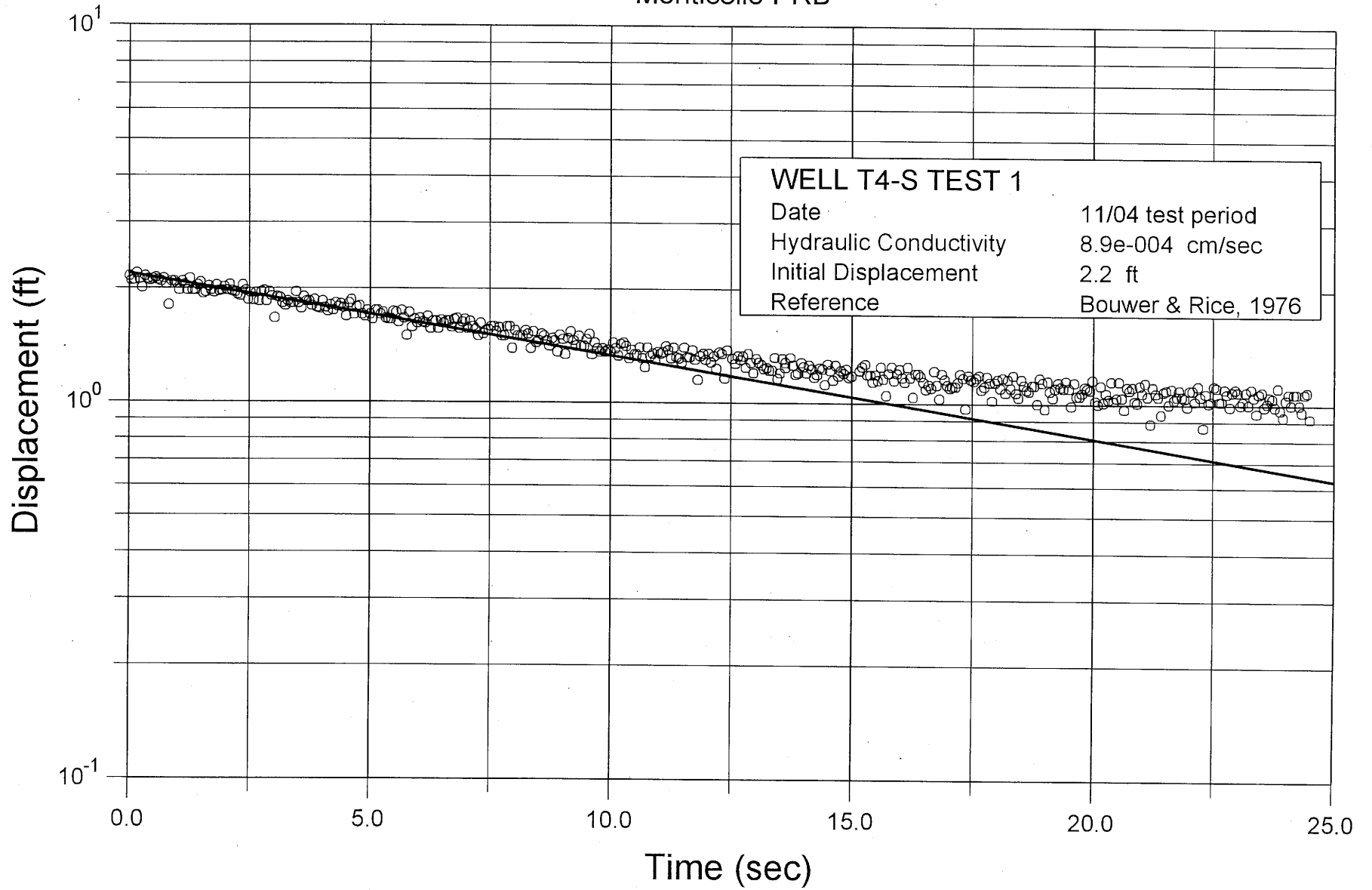
Monticello PRB



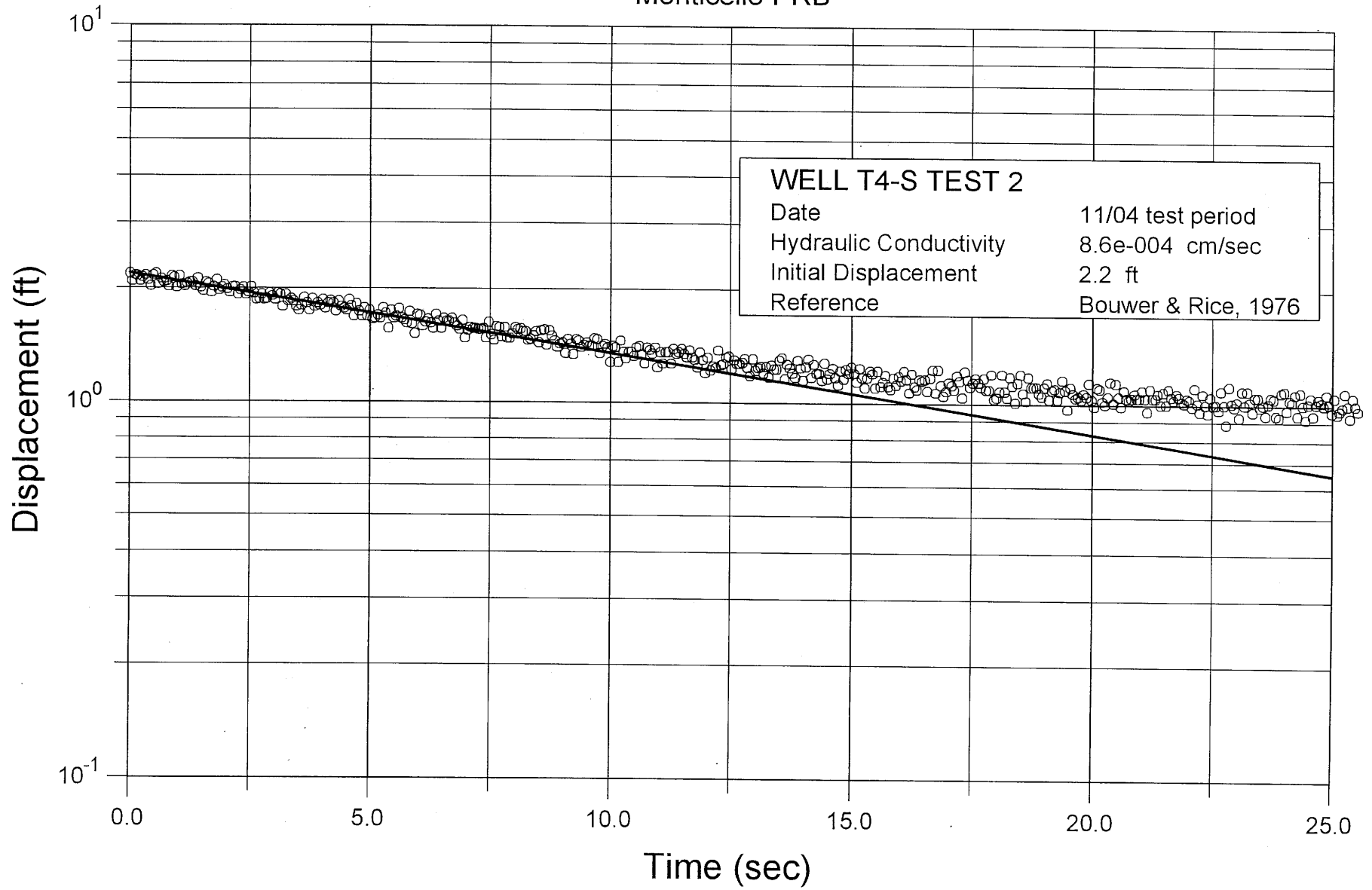
Monticello PRB



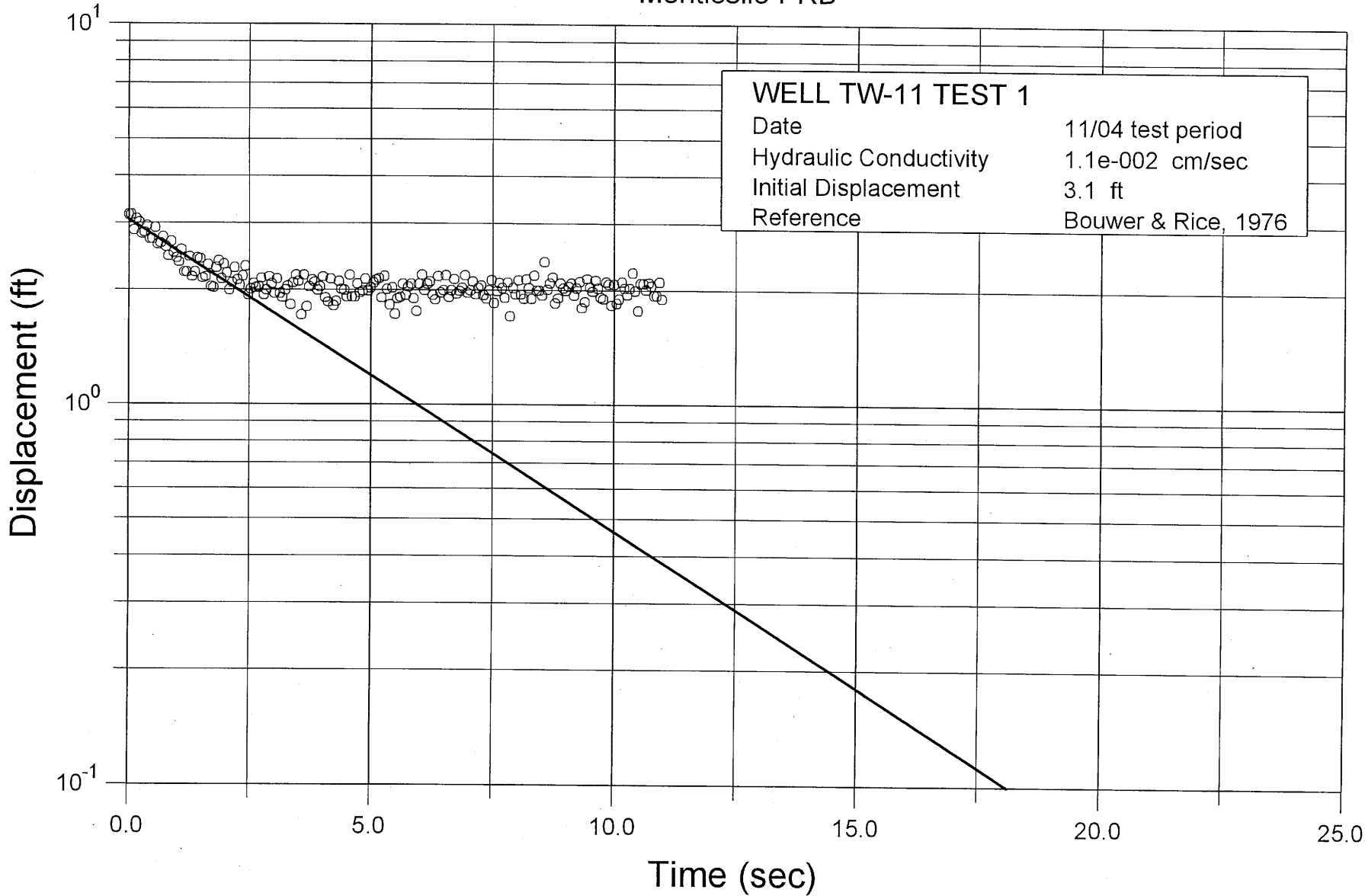
Monticello PRB



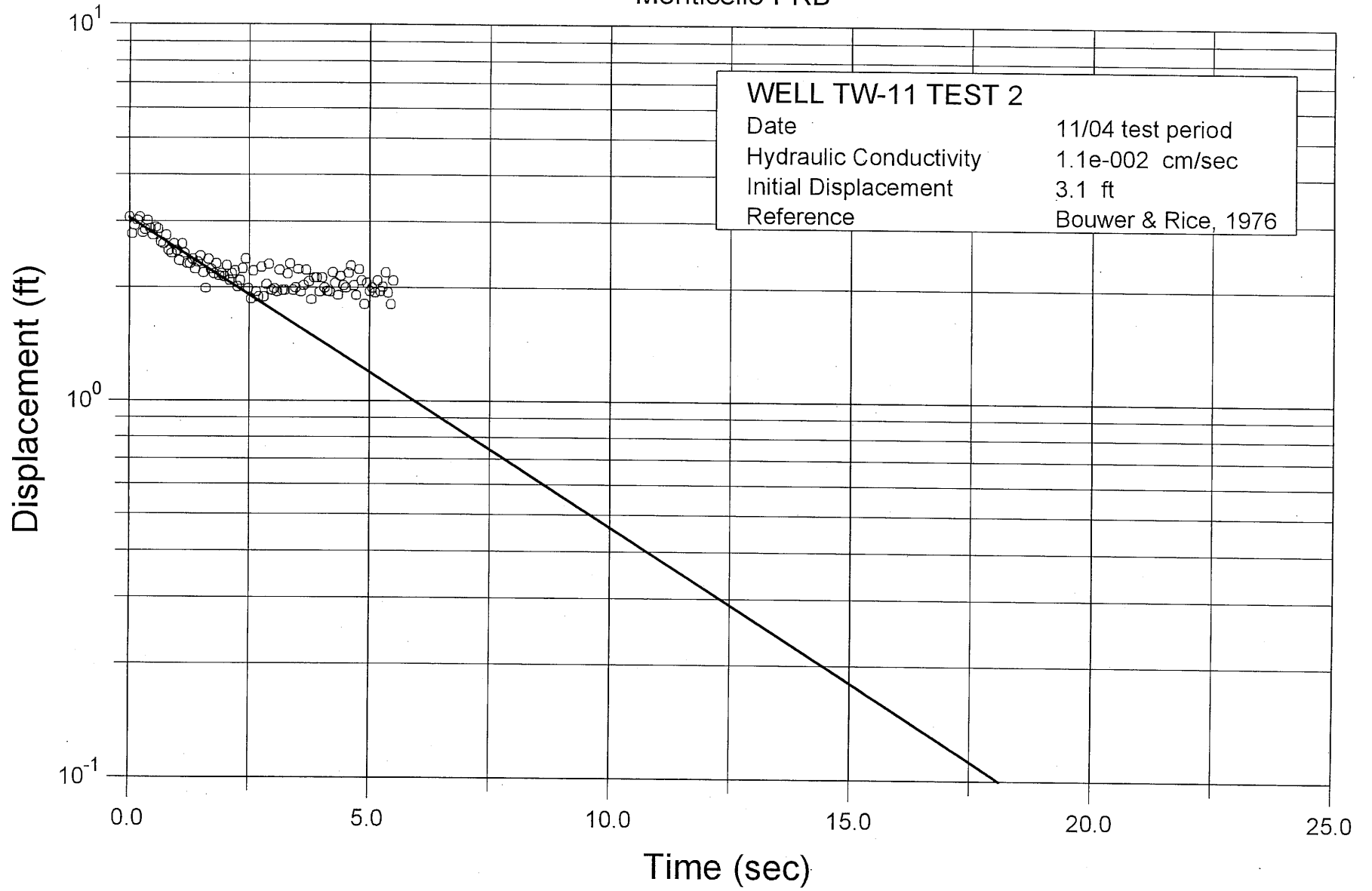
Monticello PRB



Monticello PRB



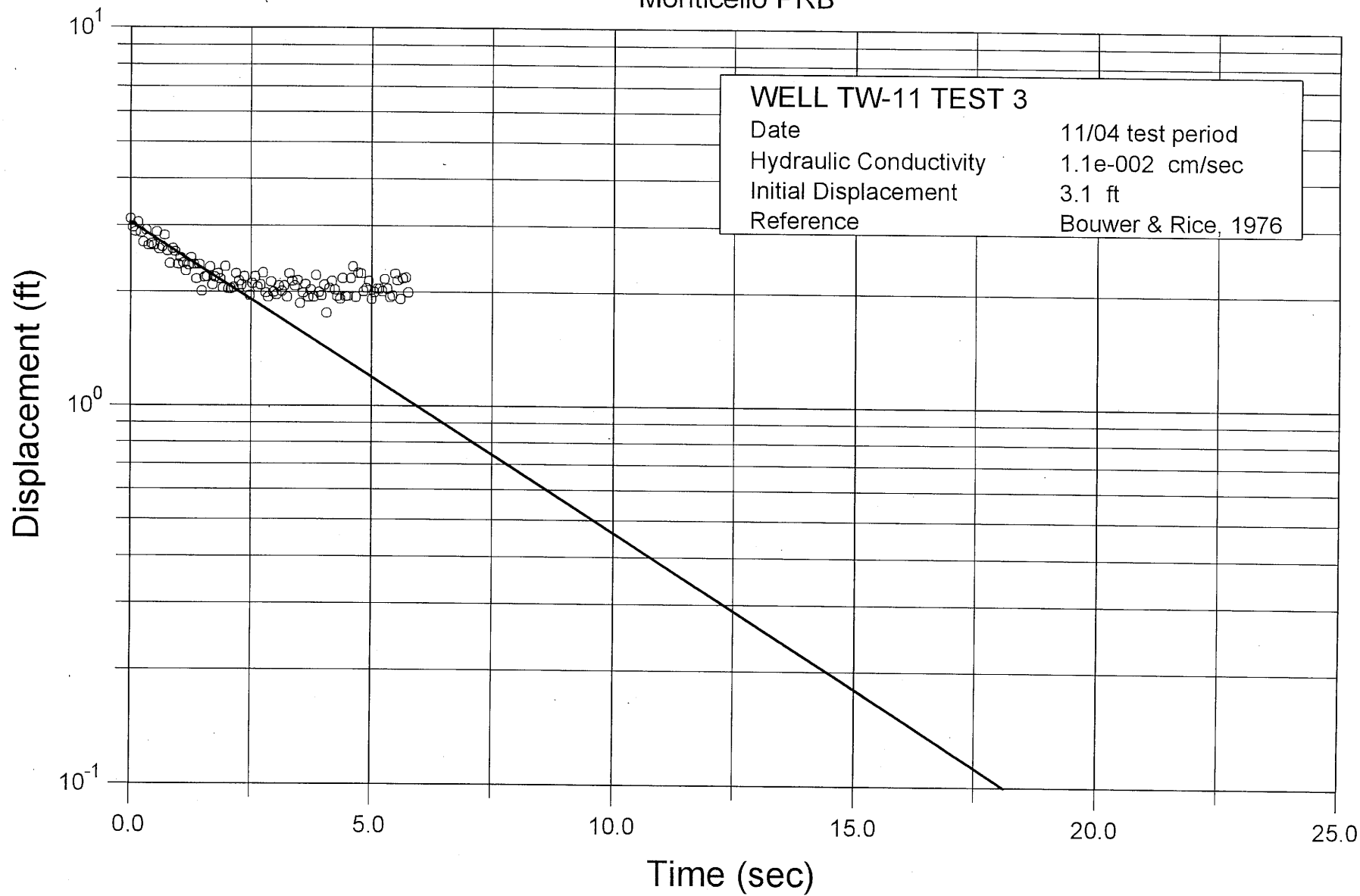
Monticello PRB



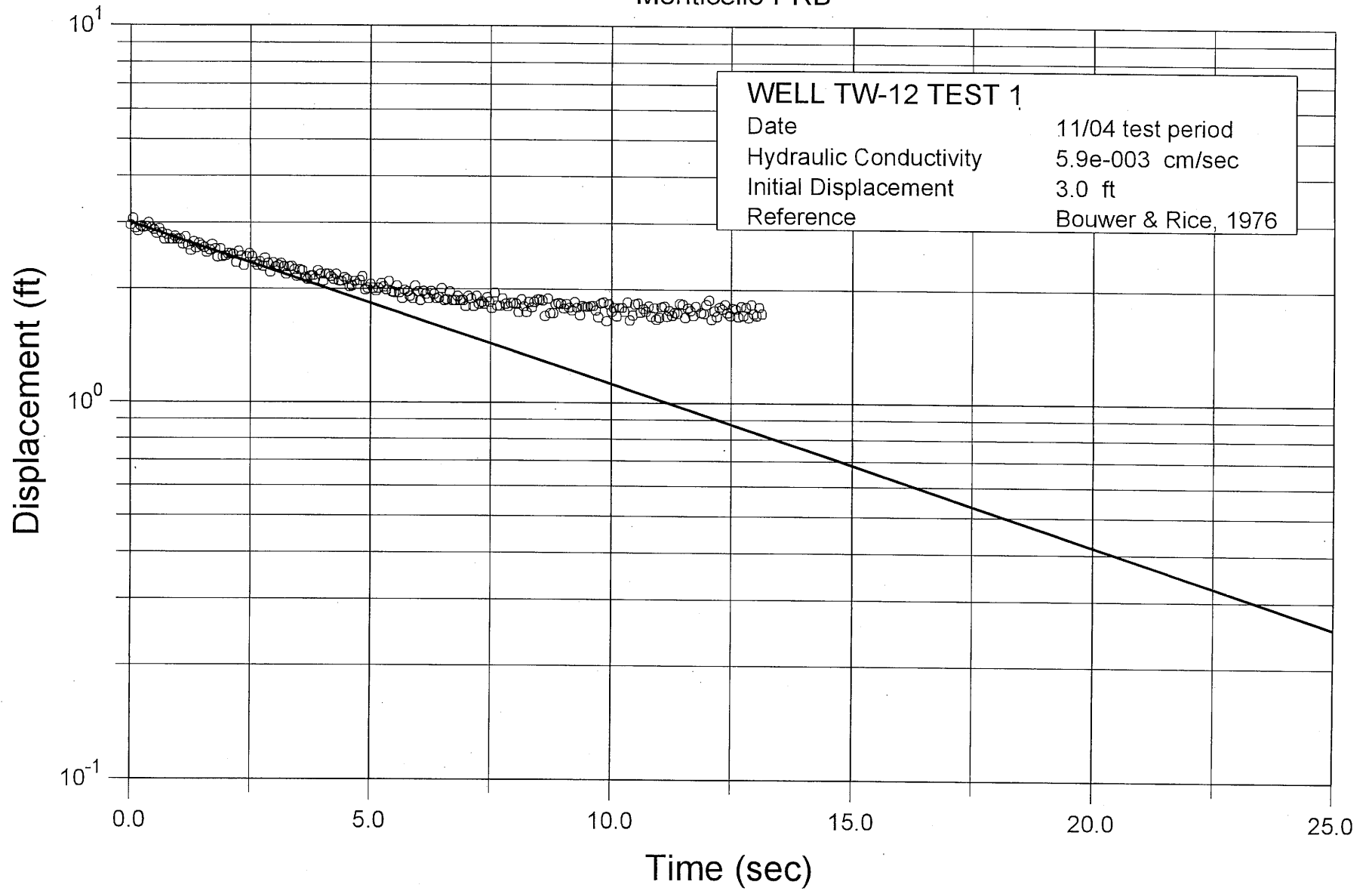
WELL TW-11 TEST 2

Date	11/04 test period
Hydraulic Conductivity	1.1e-002 cm/sec
Initial Displacement	3.1 ft
Reference	Bouwer & Rice, 1976

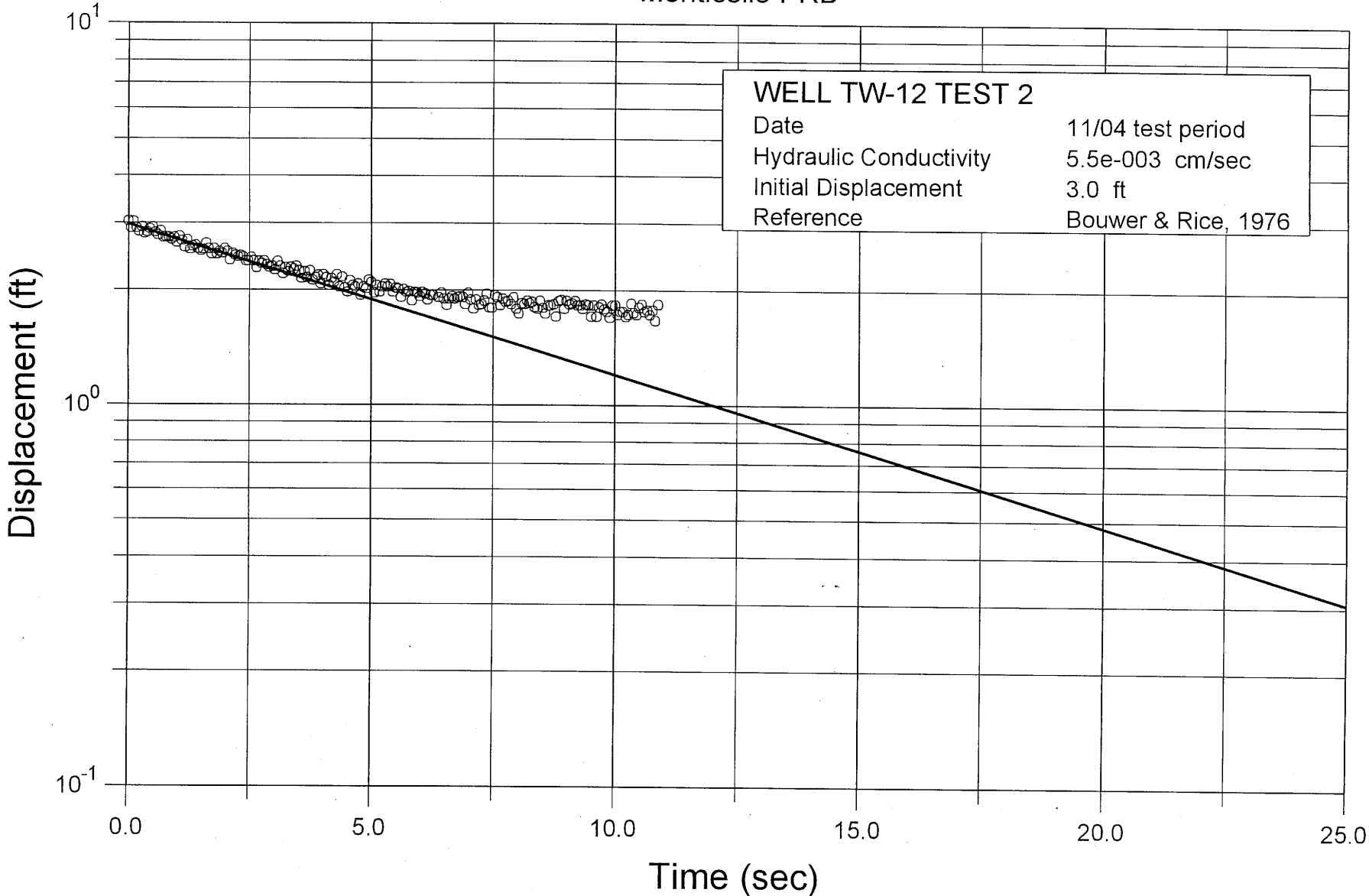
Monticello PRB



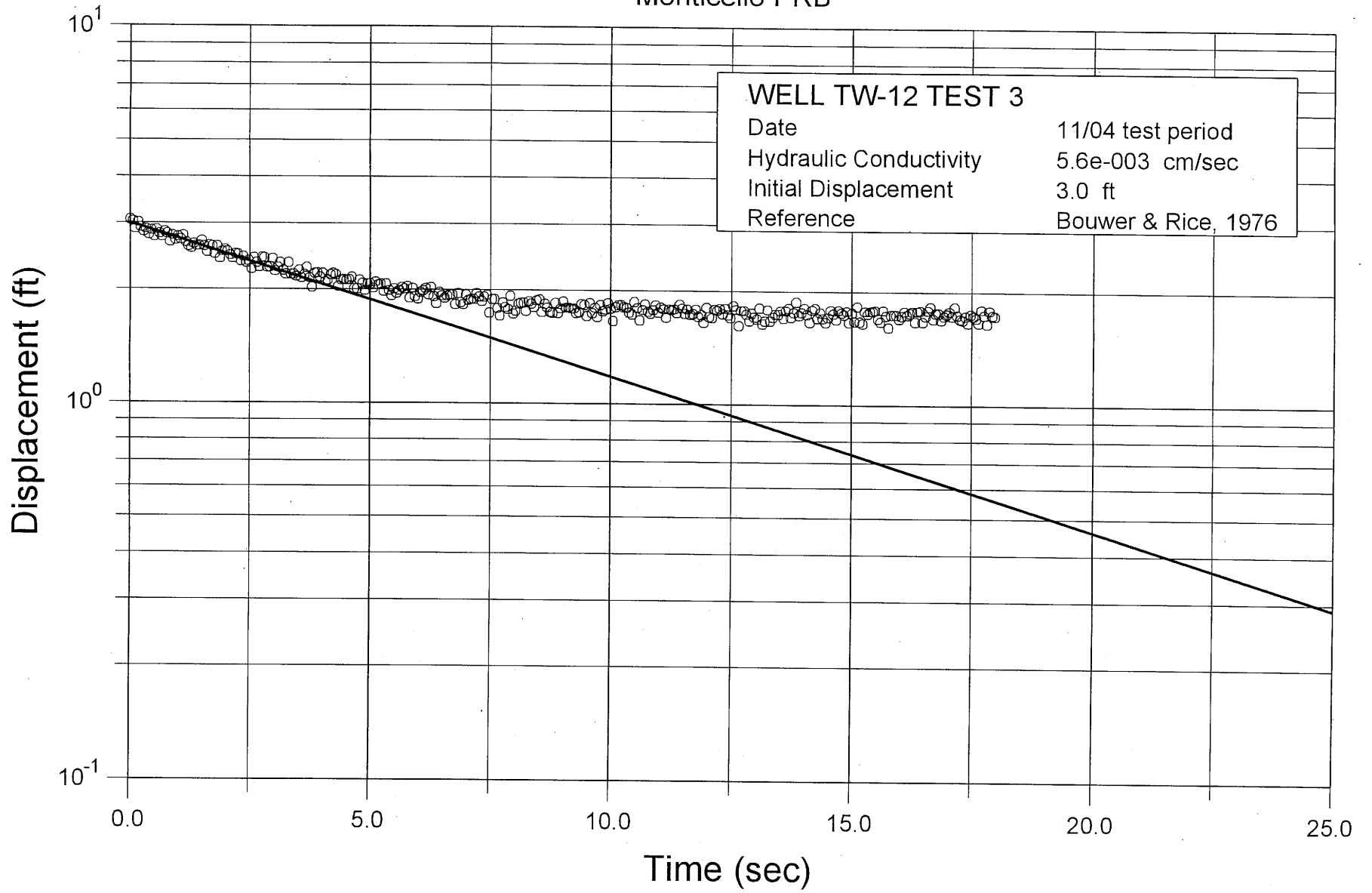
Monticello PRB



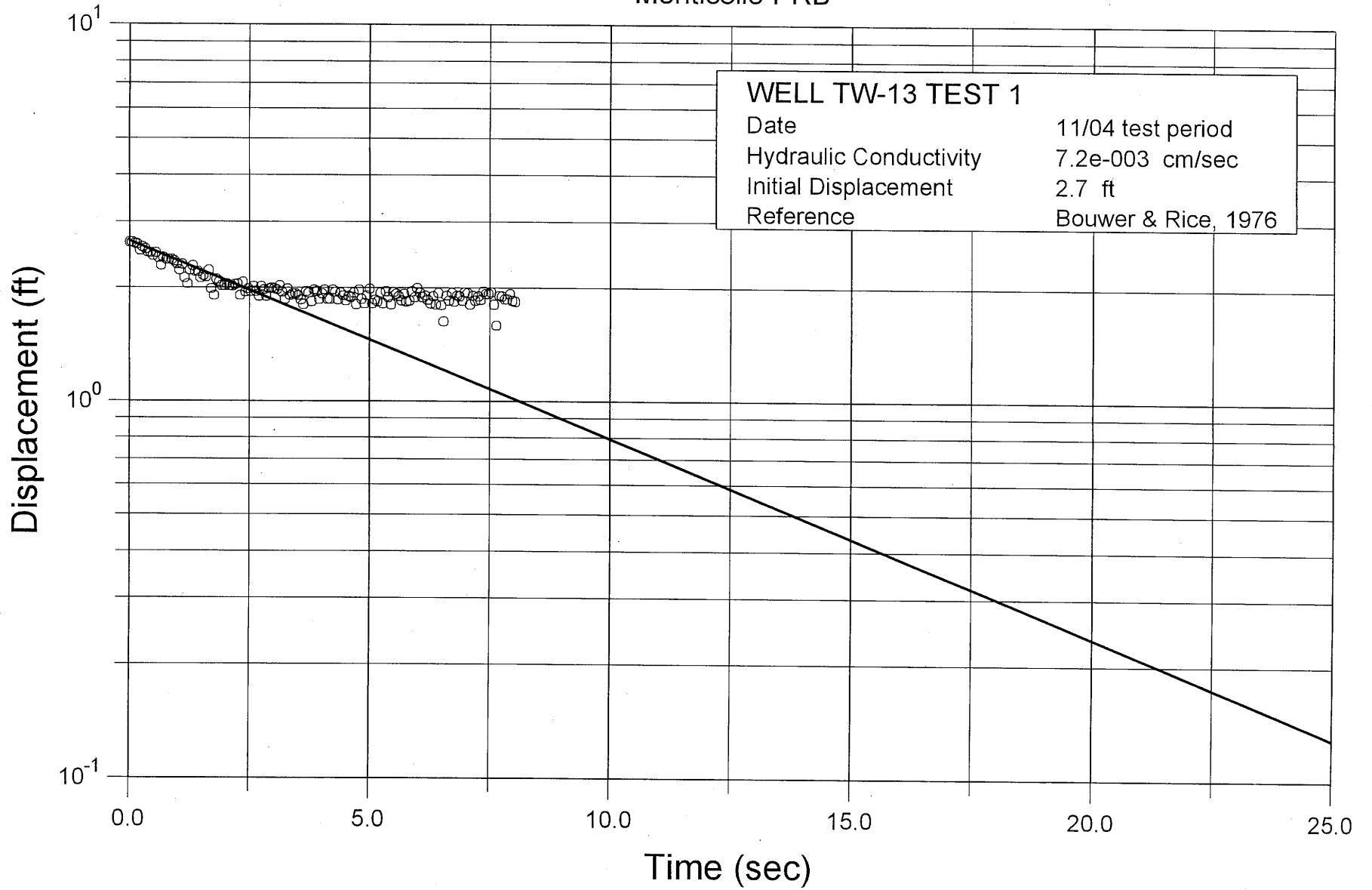
Monticello PRB



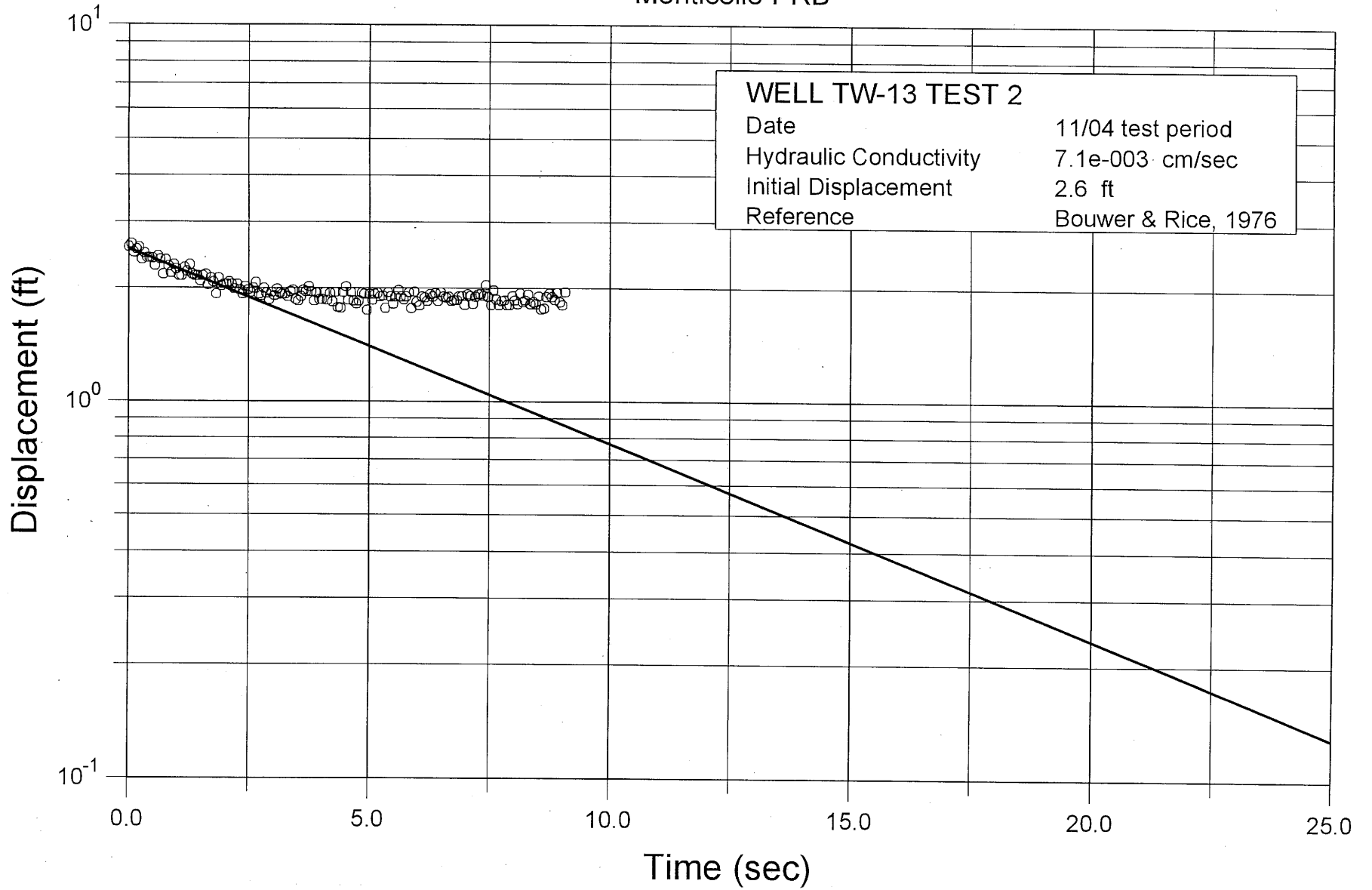
Monticello PRB



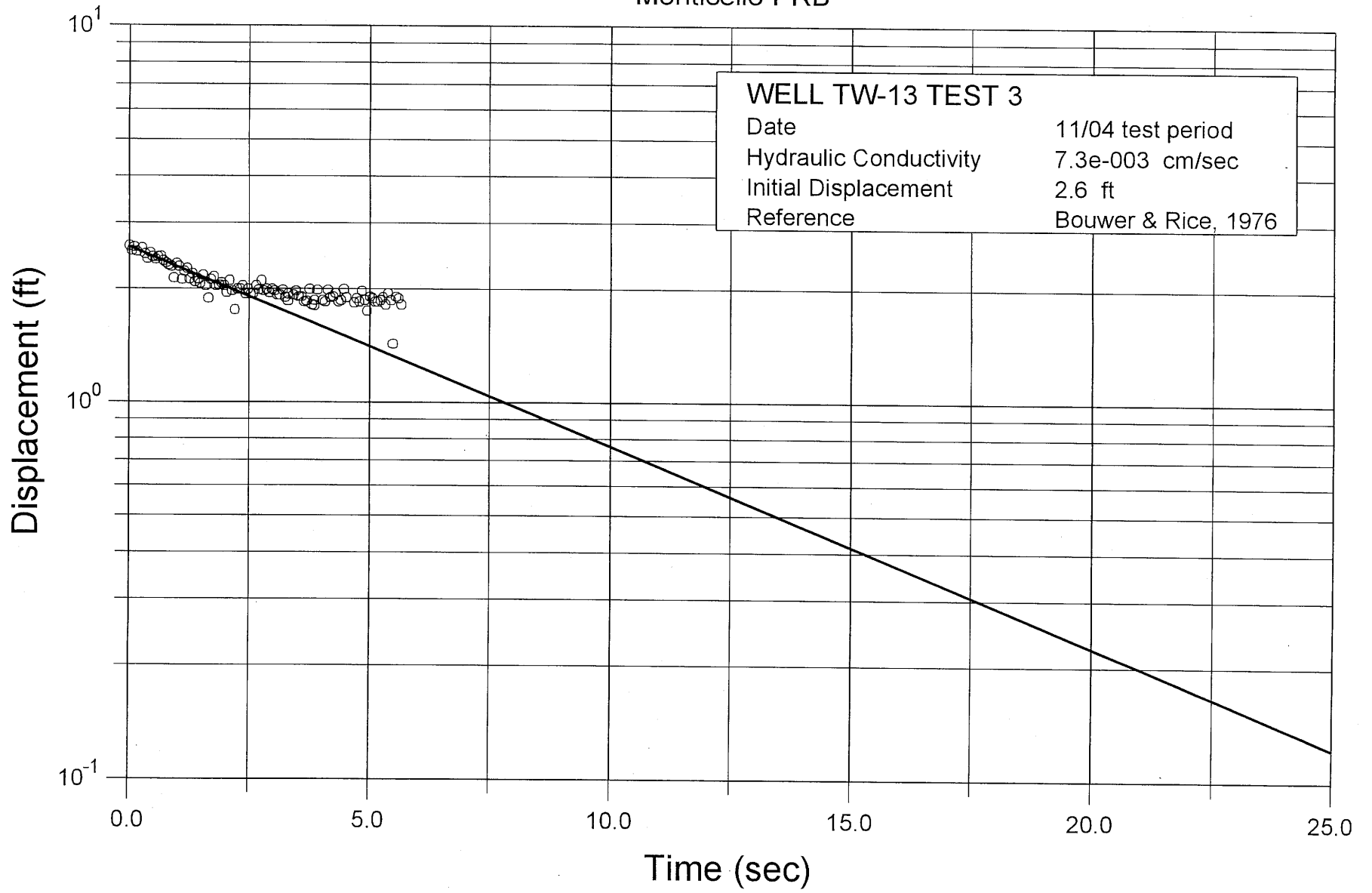
Monticello PRB



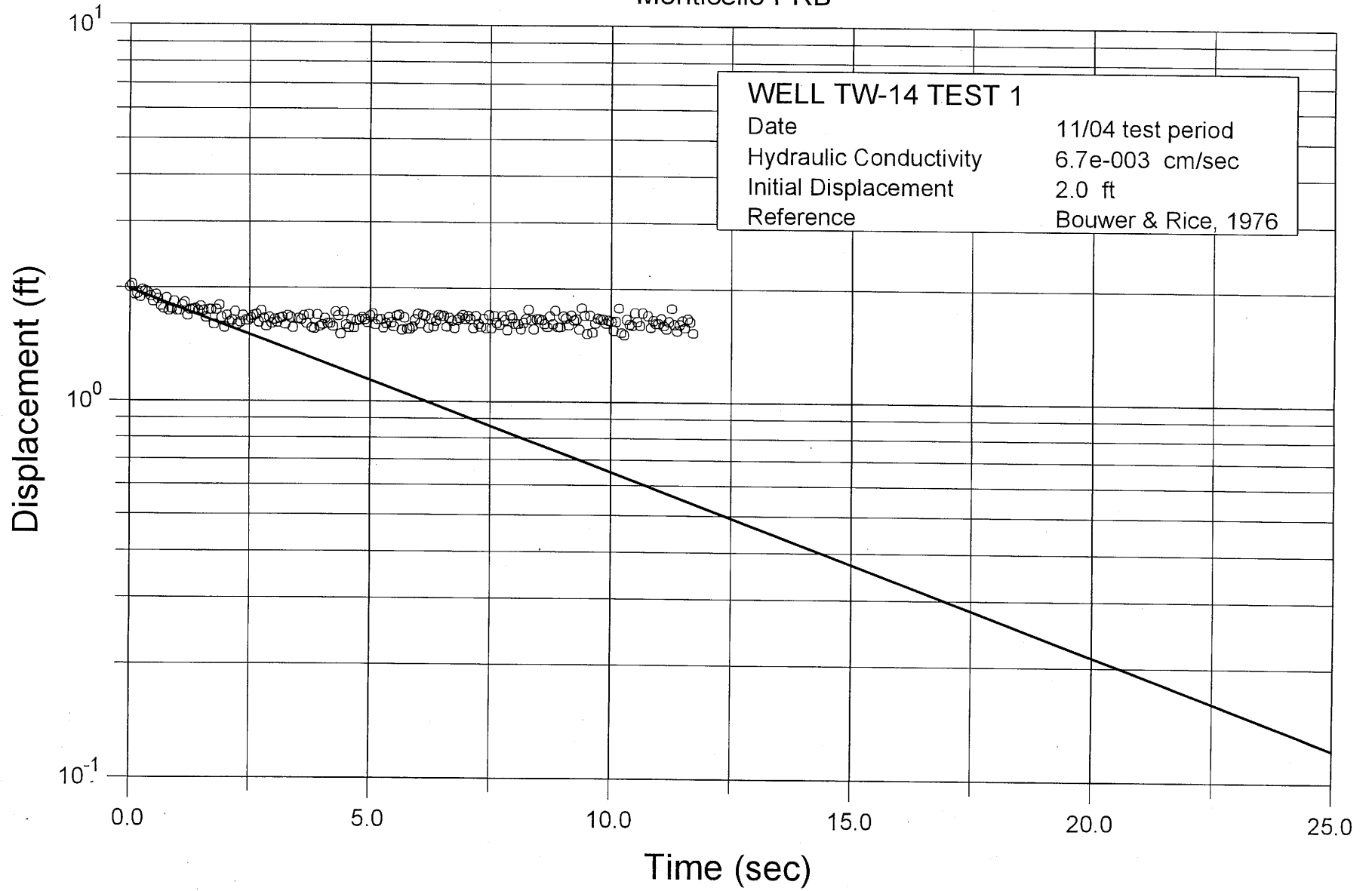
Monticello PRB



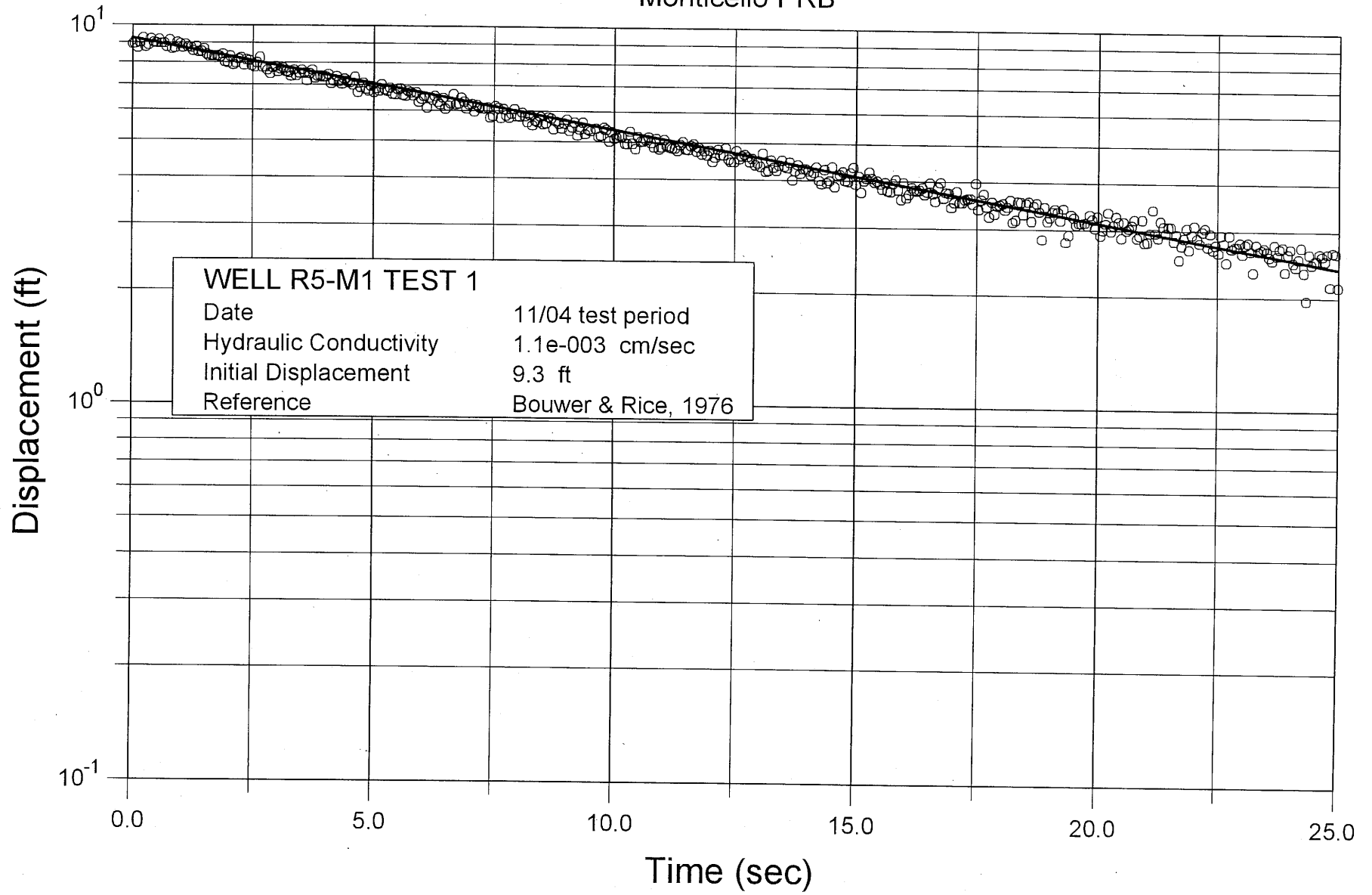
Monticello PRB



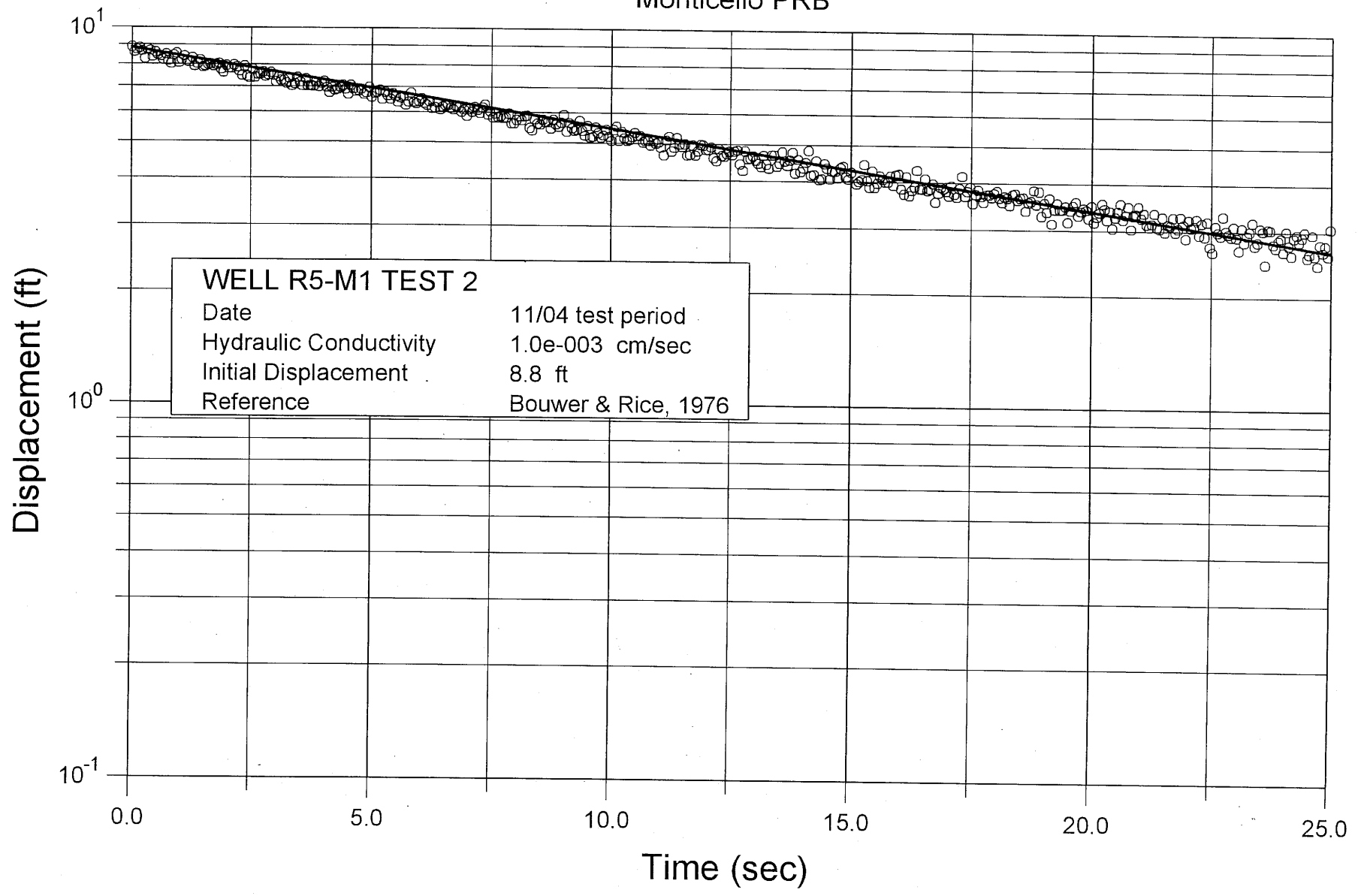
Monticello PRB



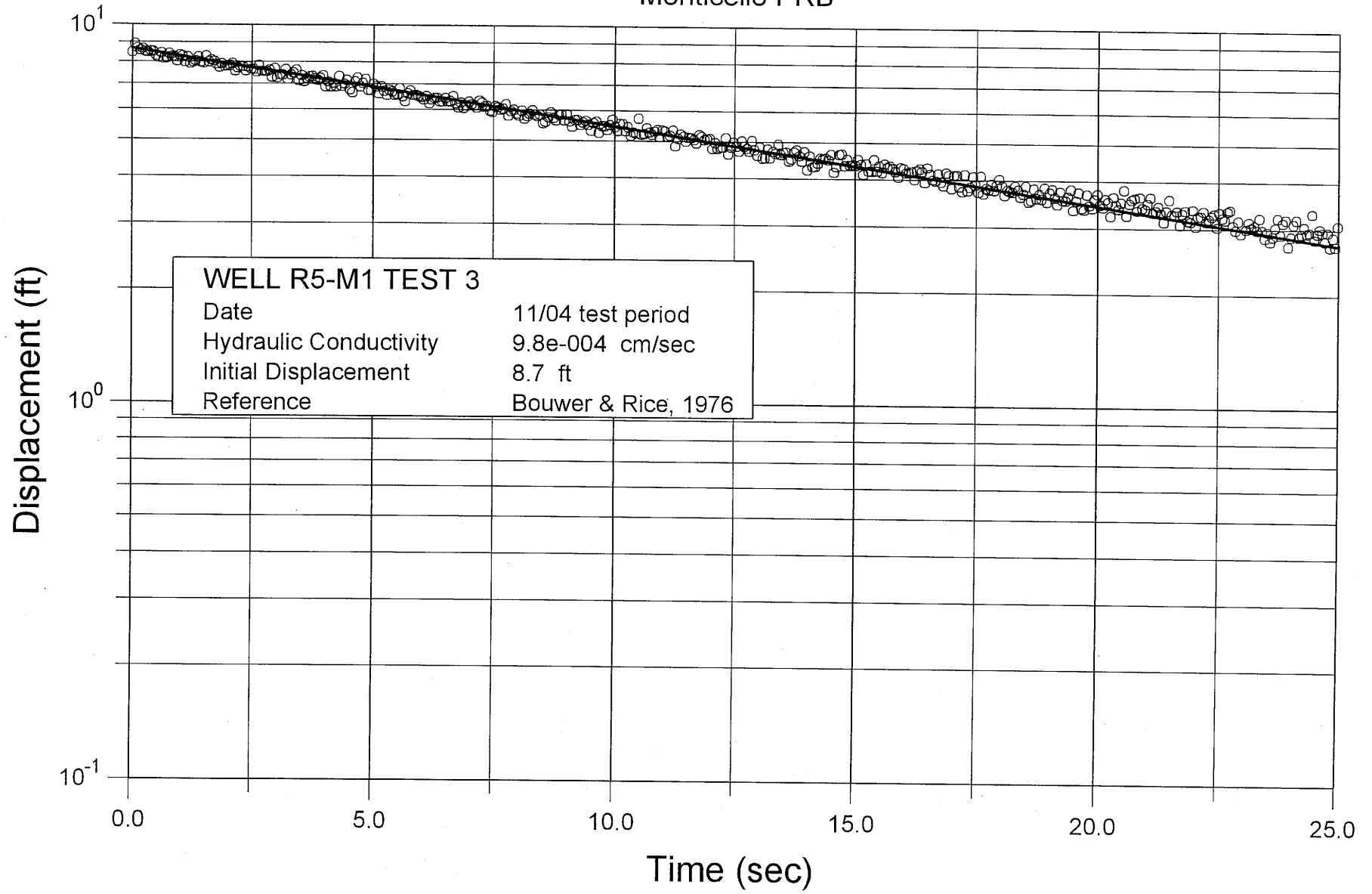
Monticello PRB



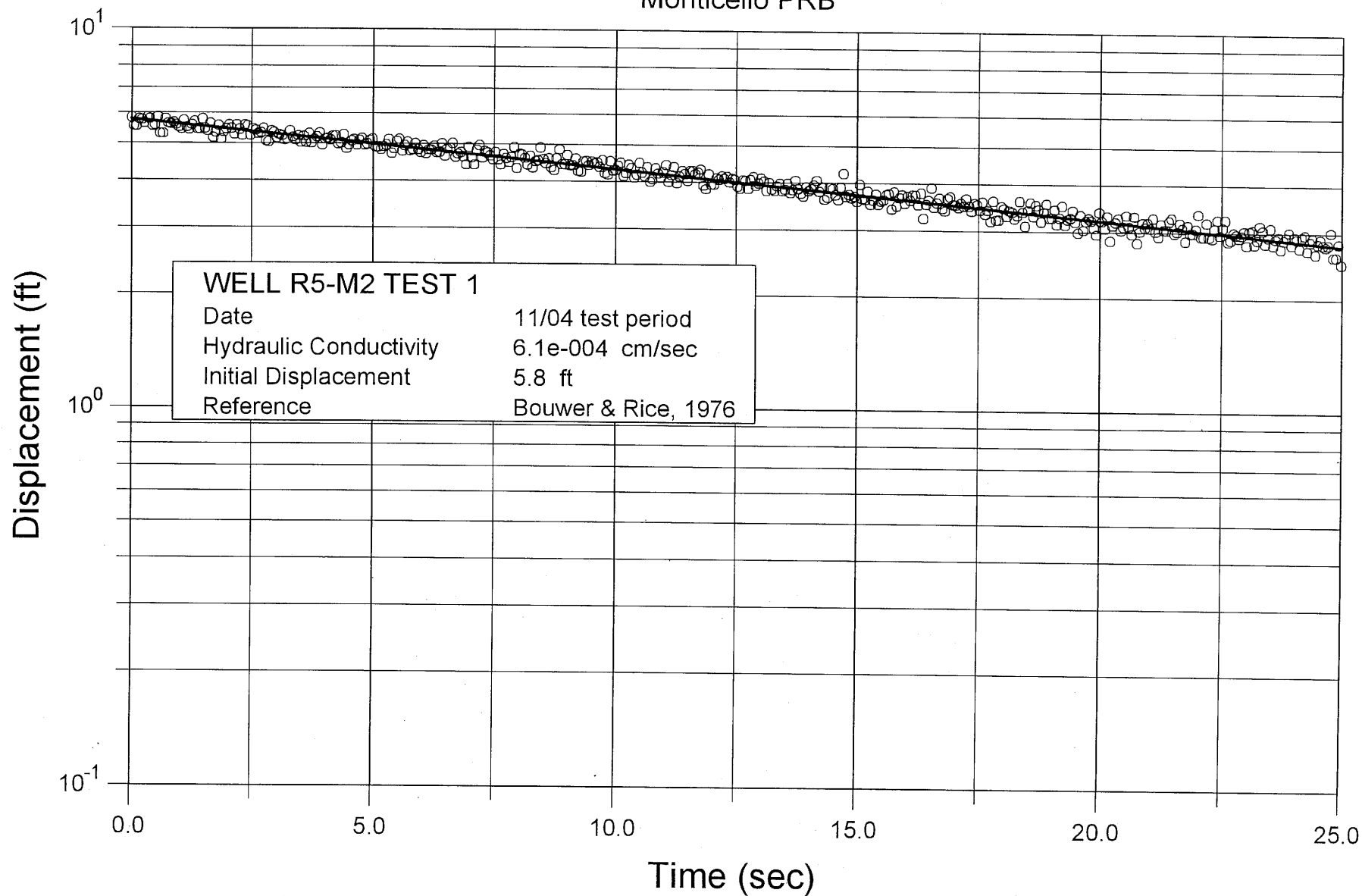
Monticello PRB



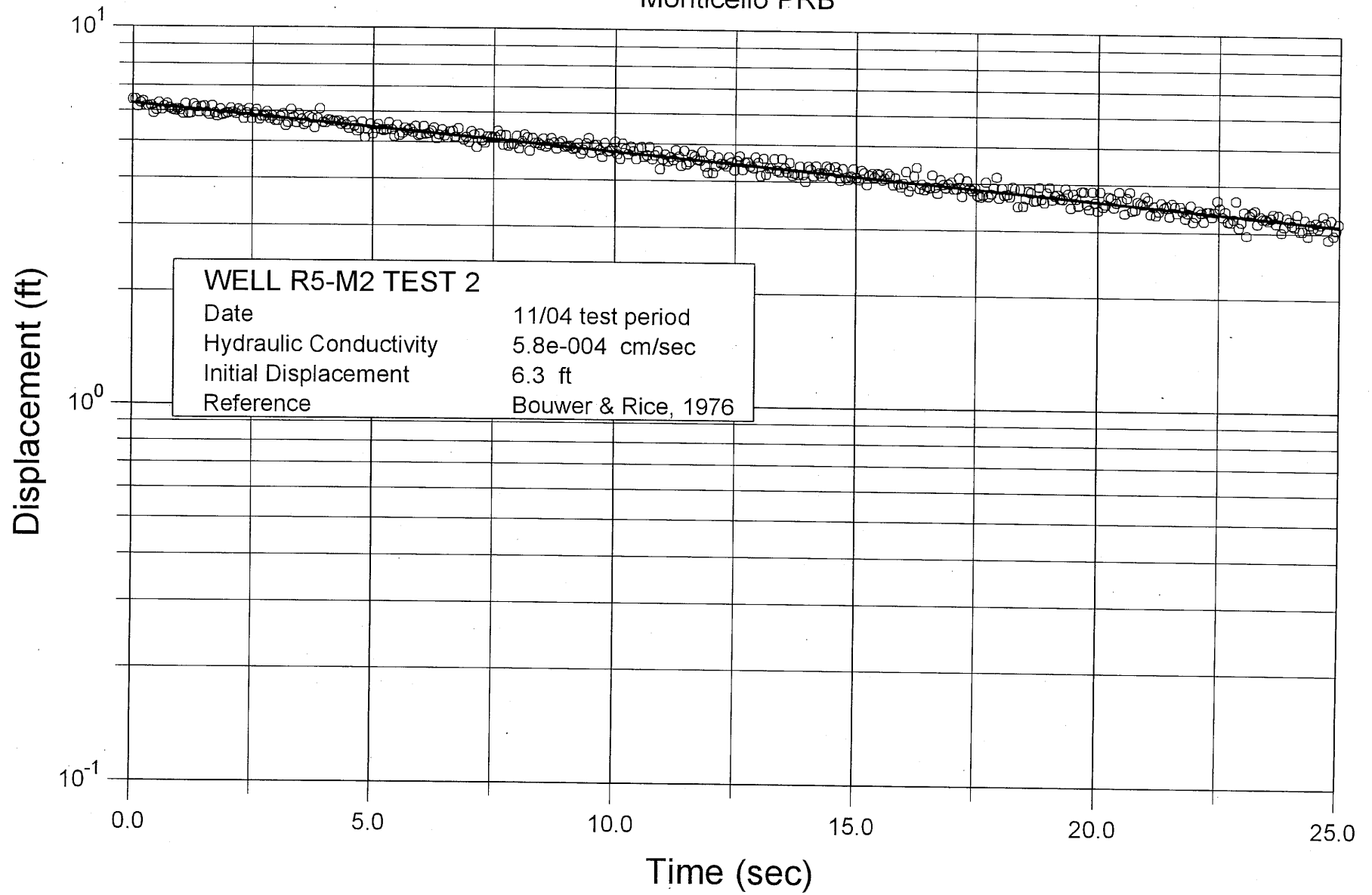
Monticello PRB



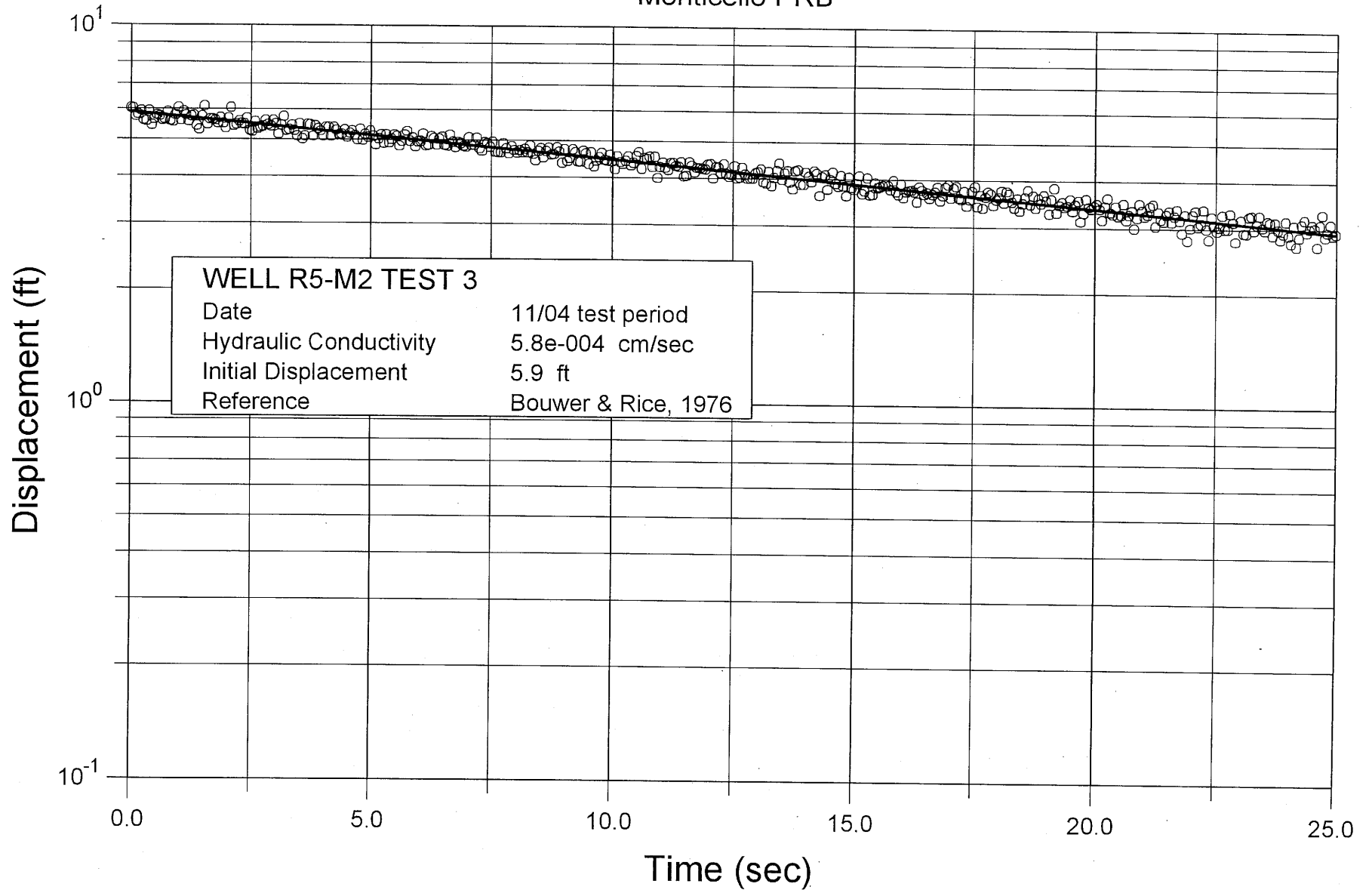
Monticello PRB



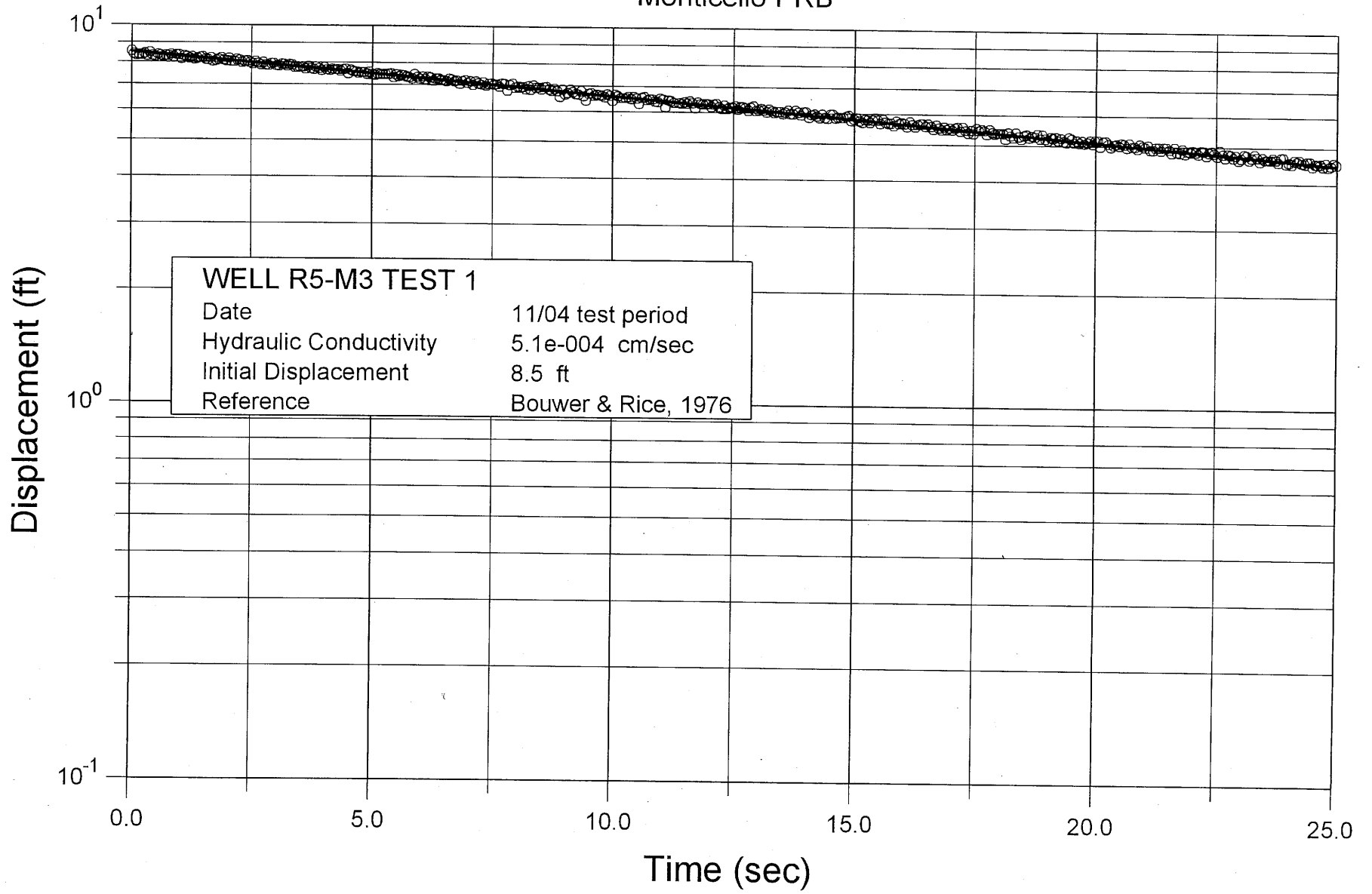
Monticello PRB



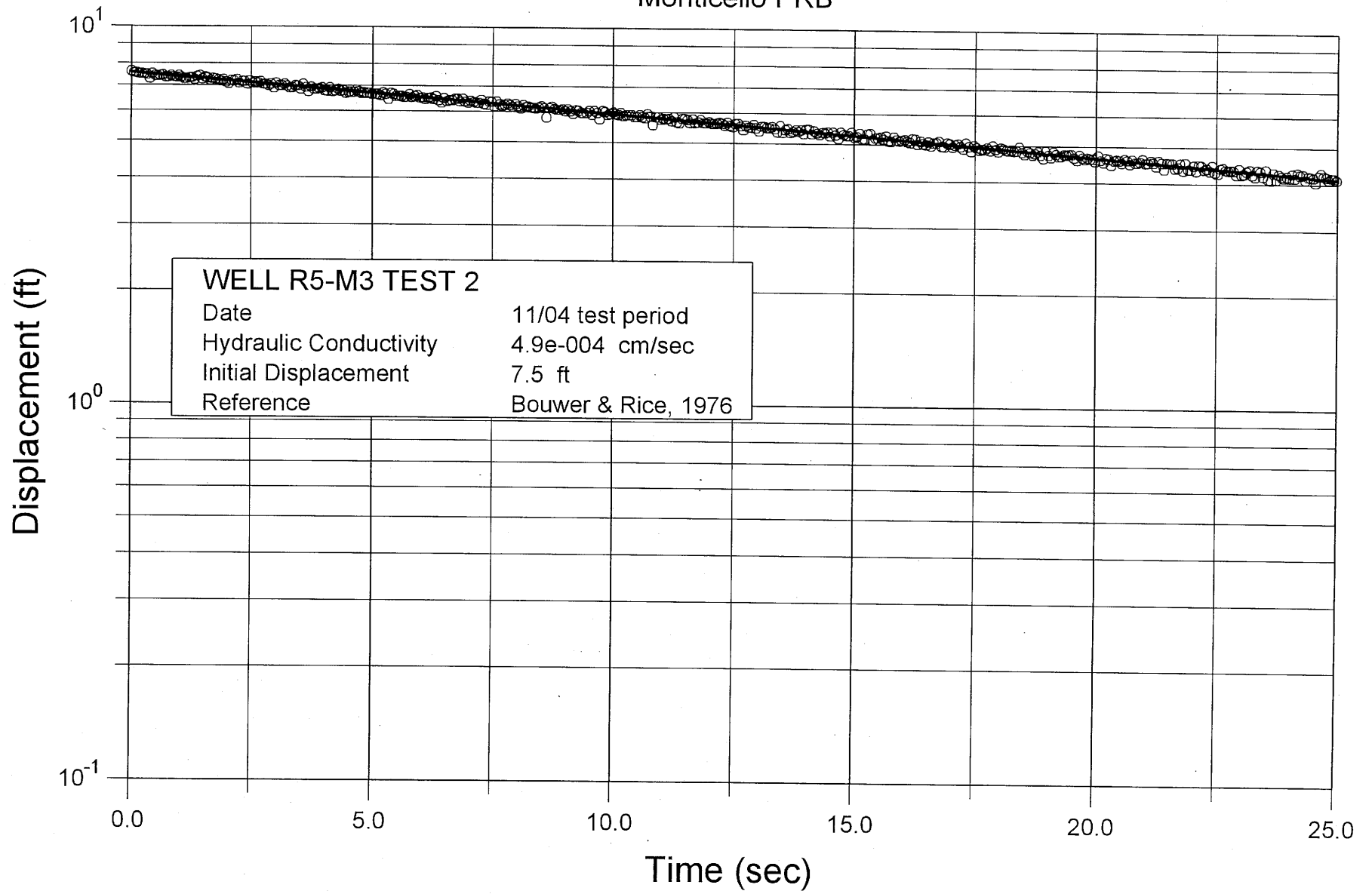
Monticello PRB



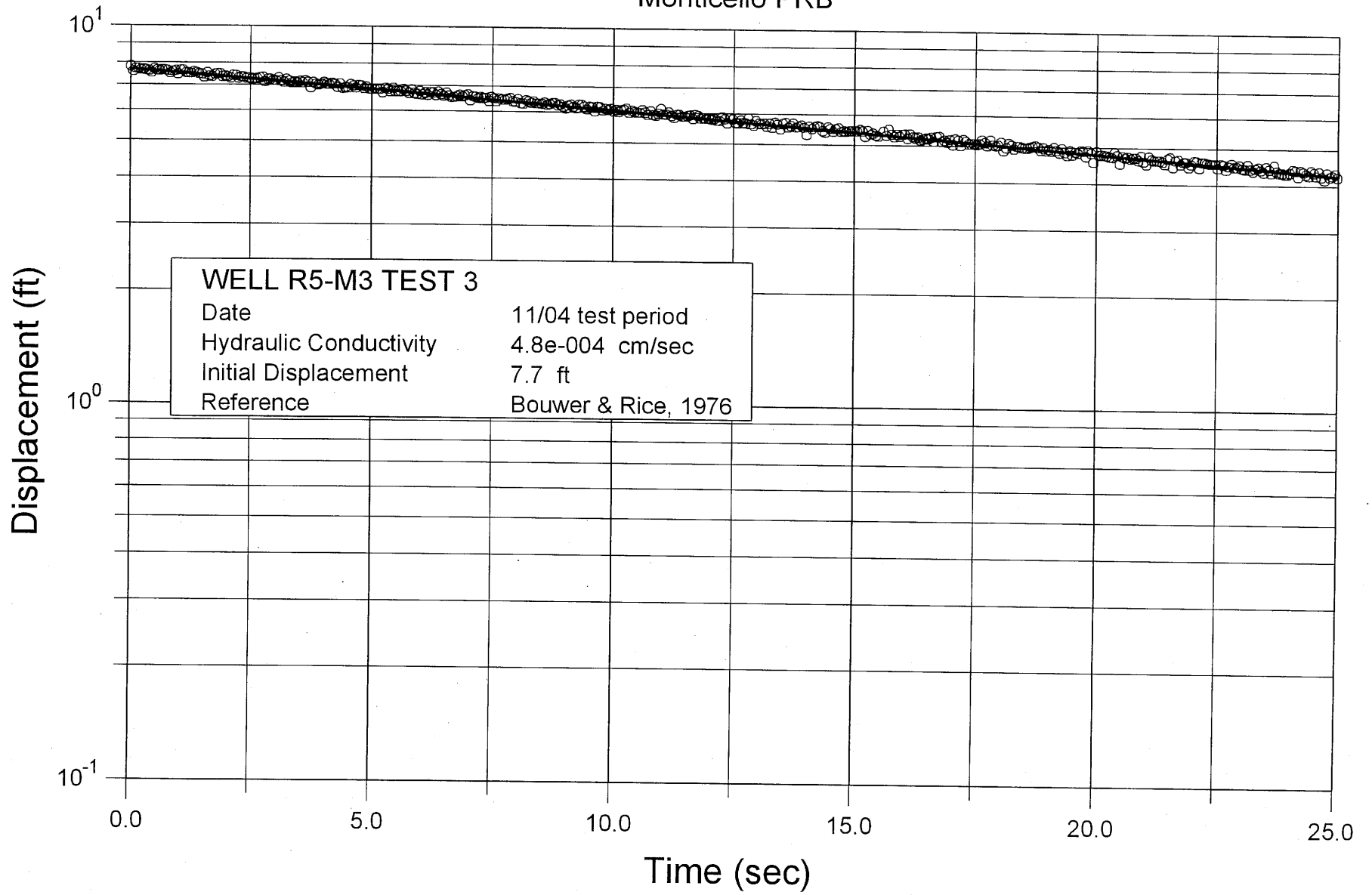
Monticello PRB



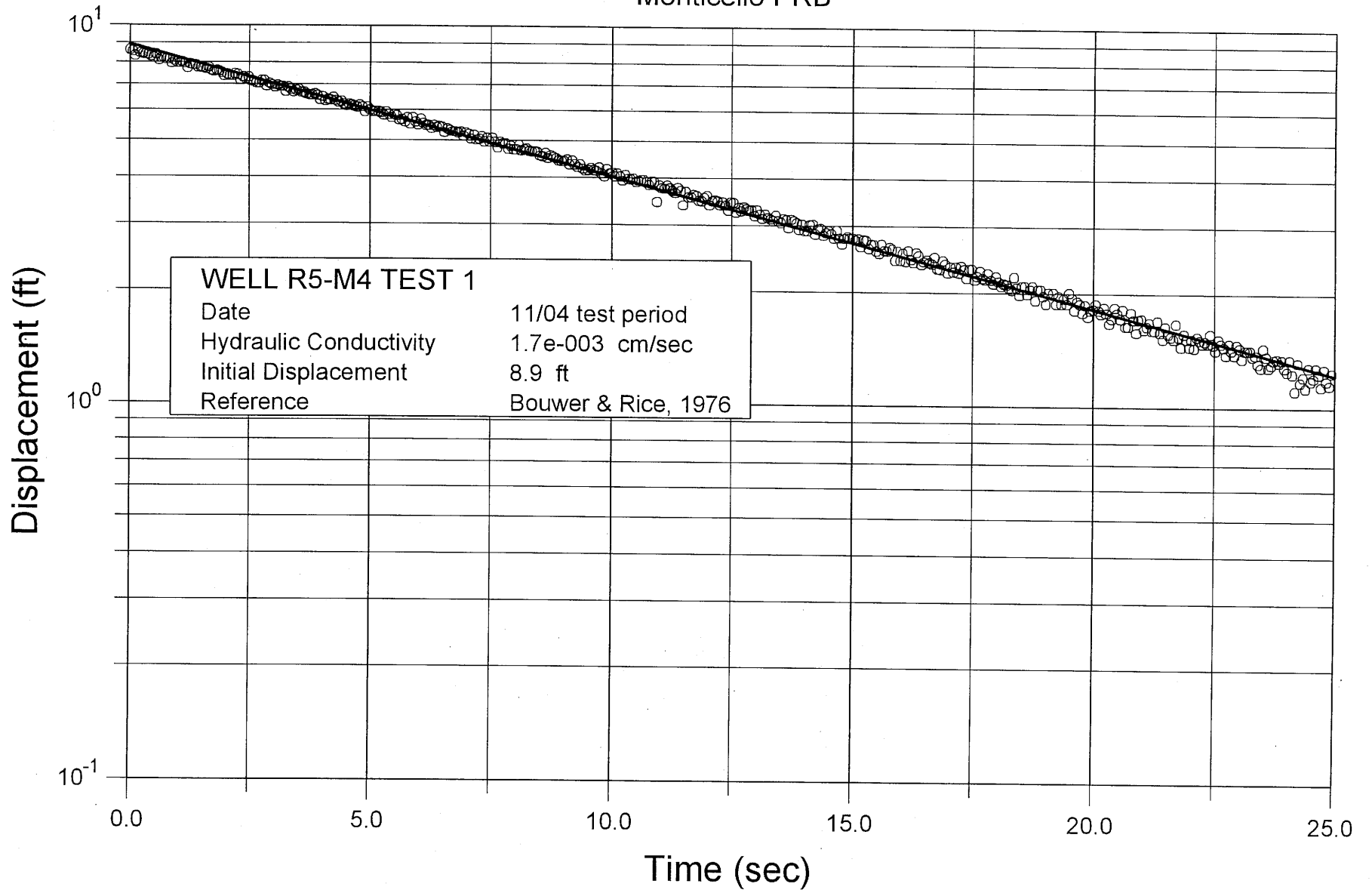
Monticello PRB



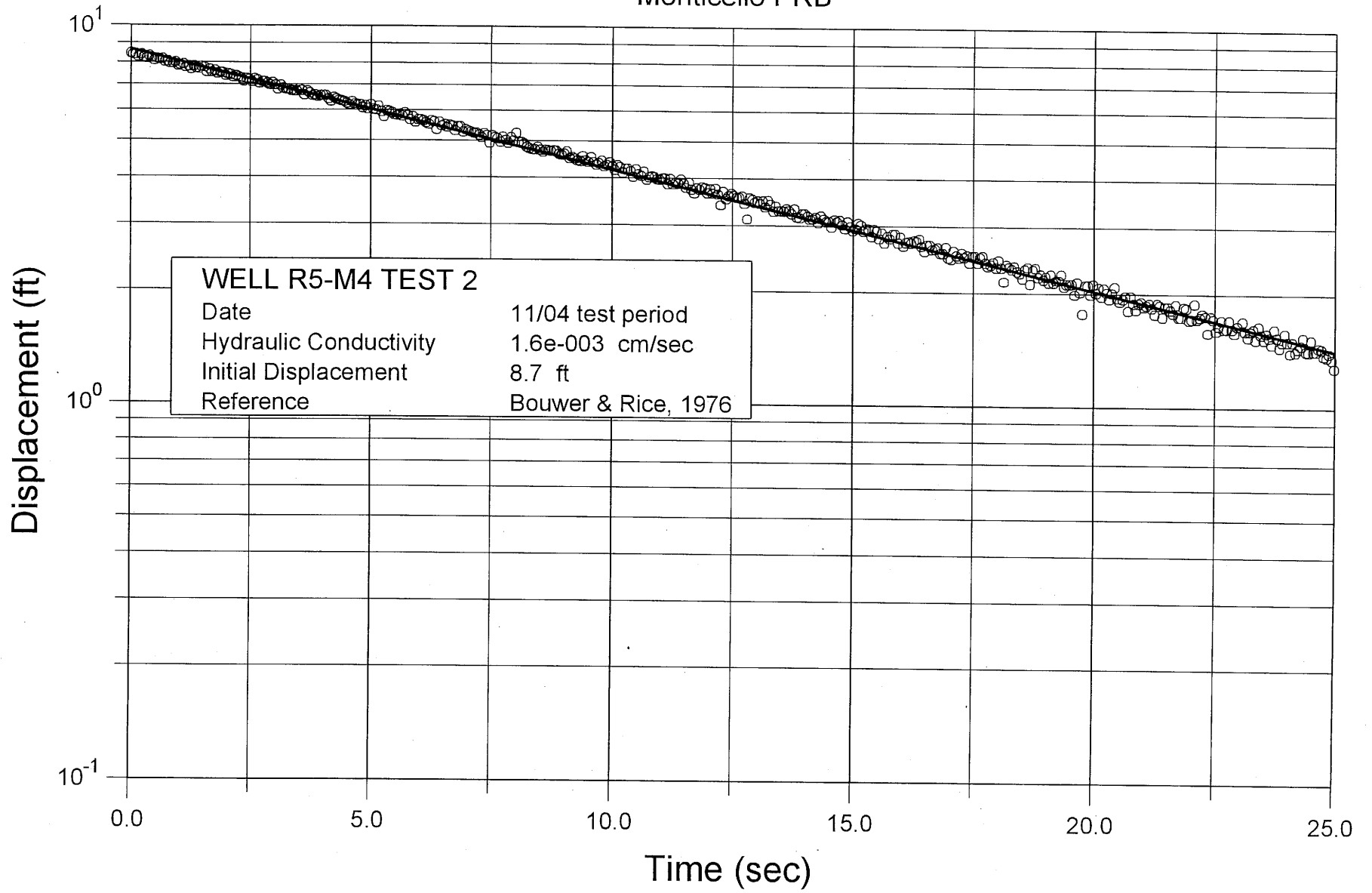
Monticello PRB



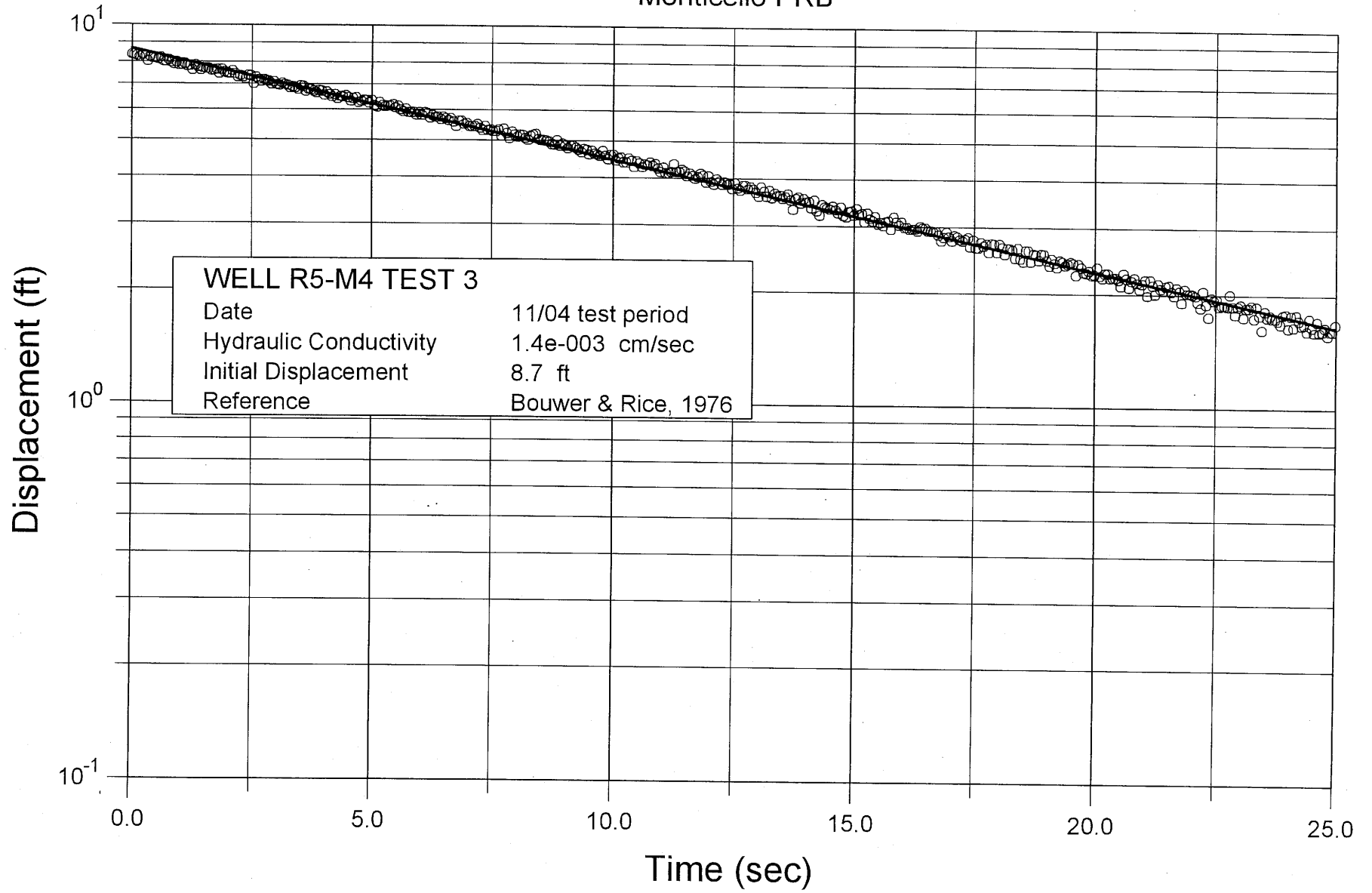
Monticello PRB



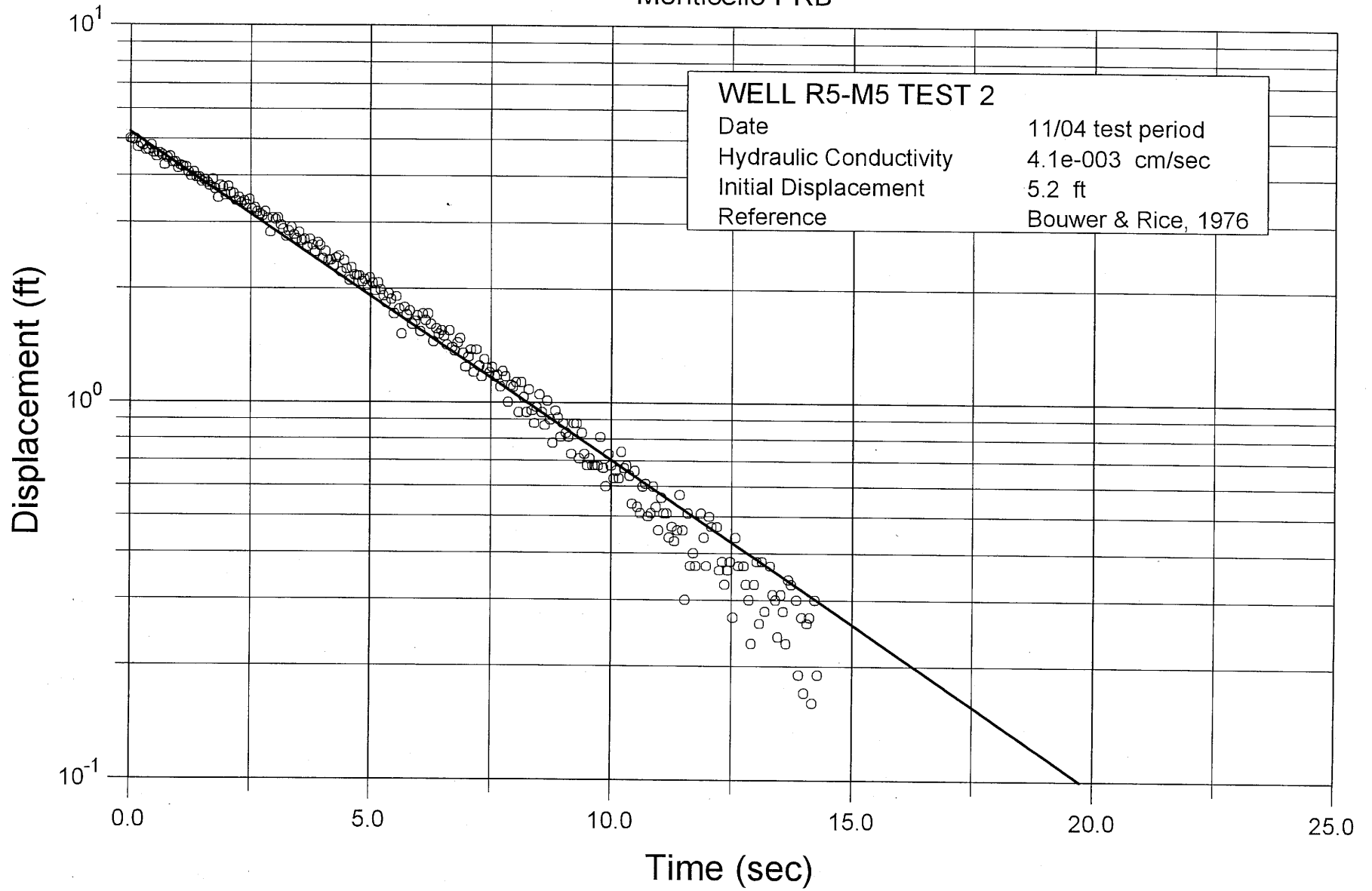
Monticello PRB



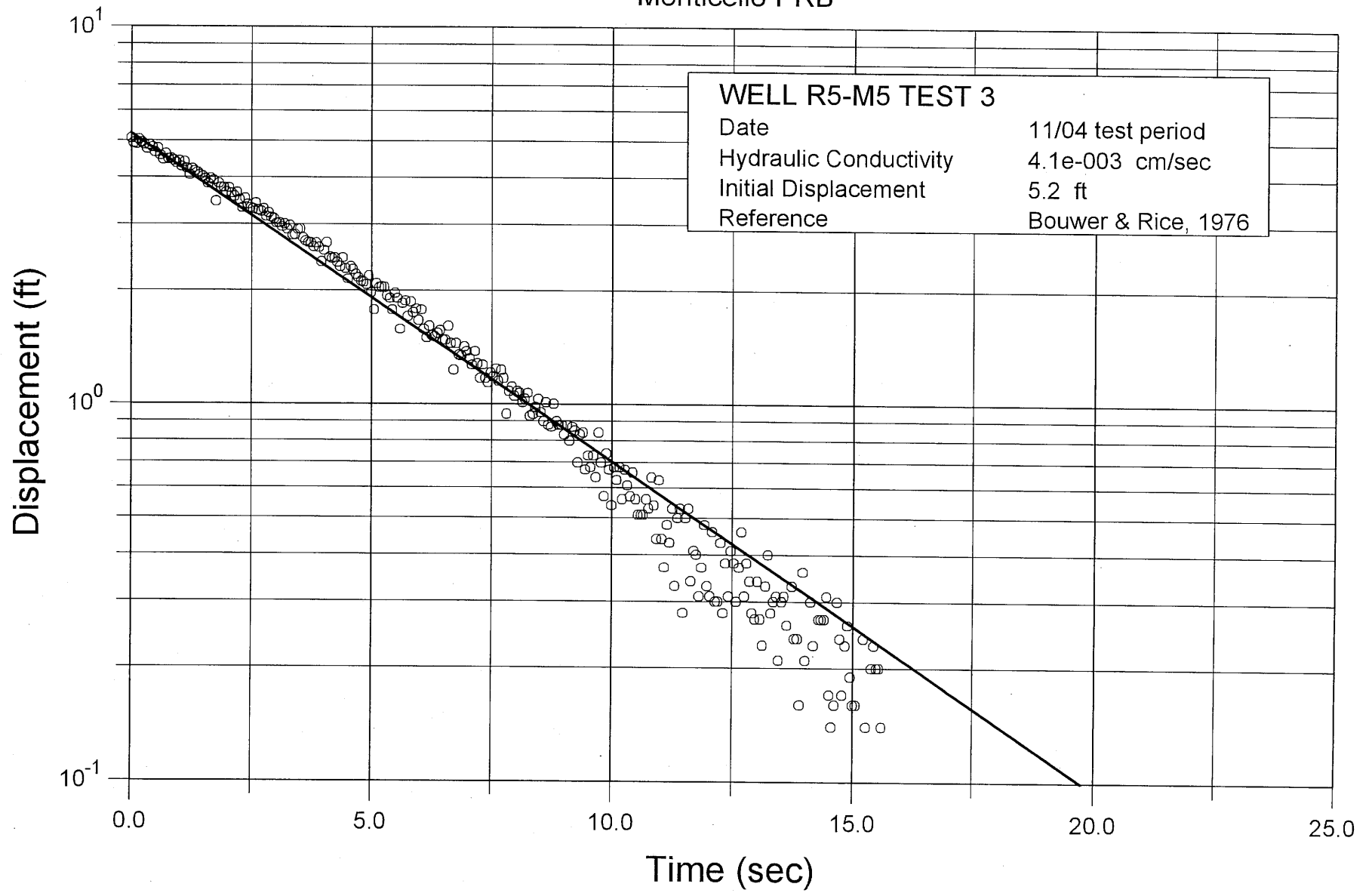
Monticello PRB



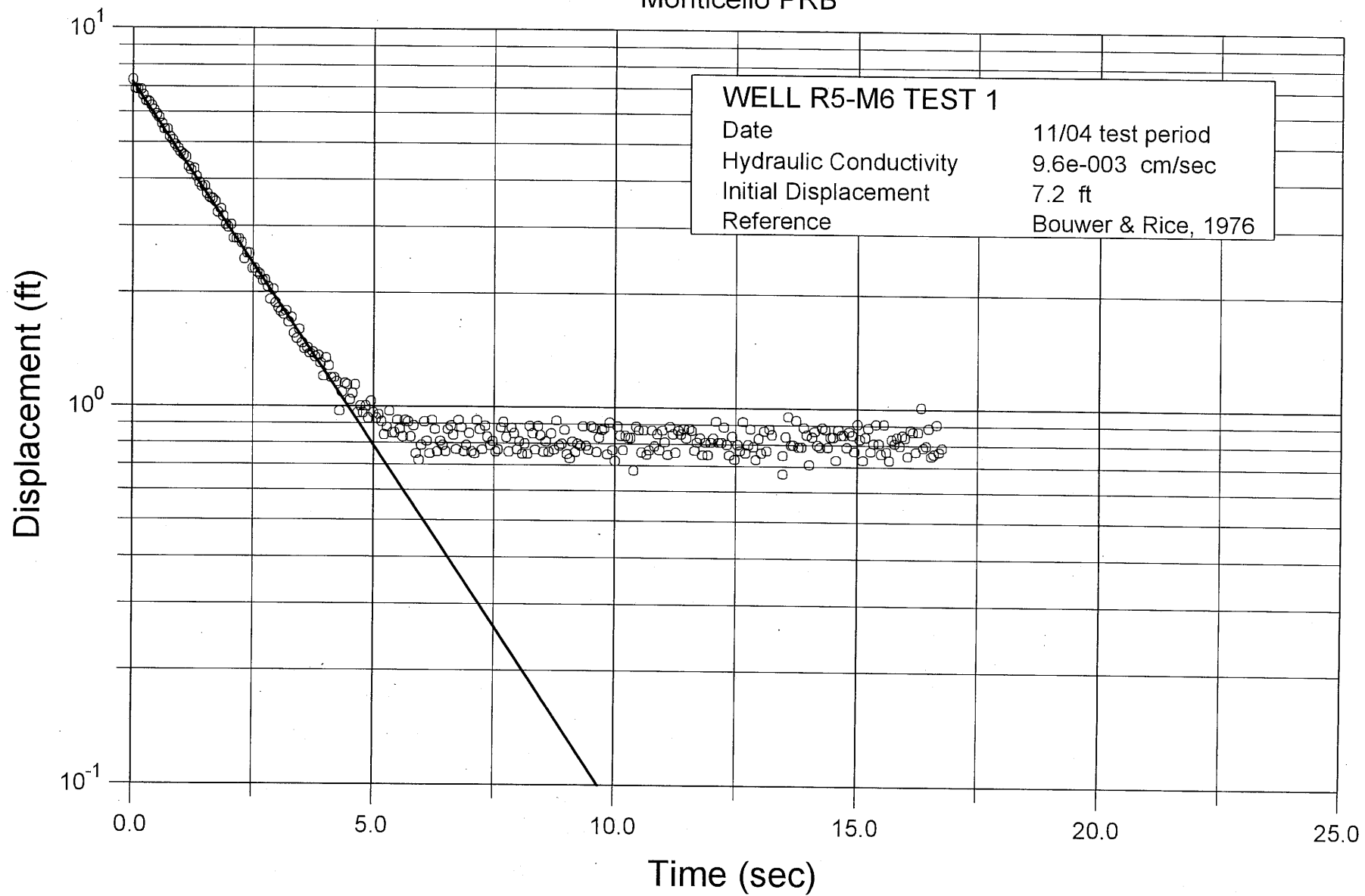
Monticello PRB



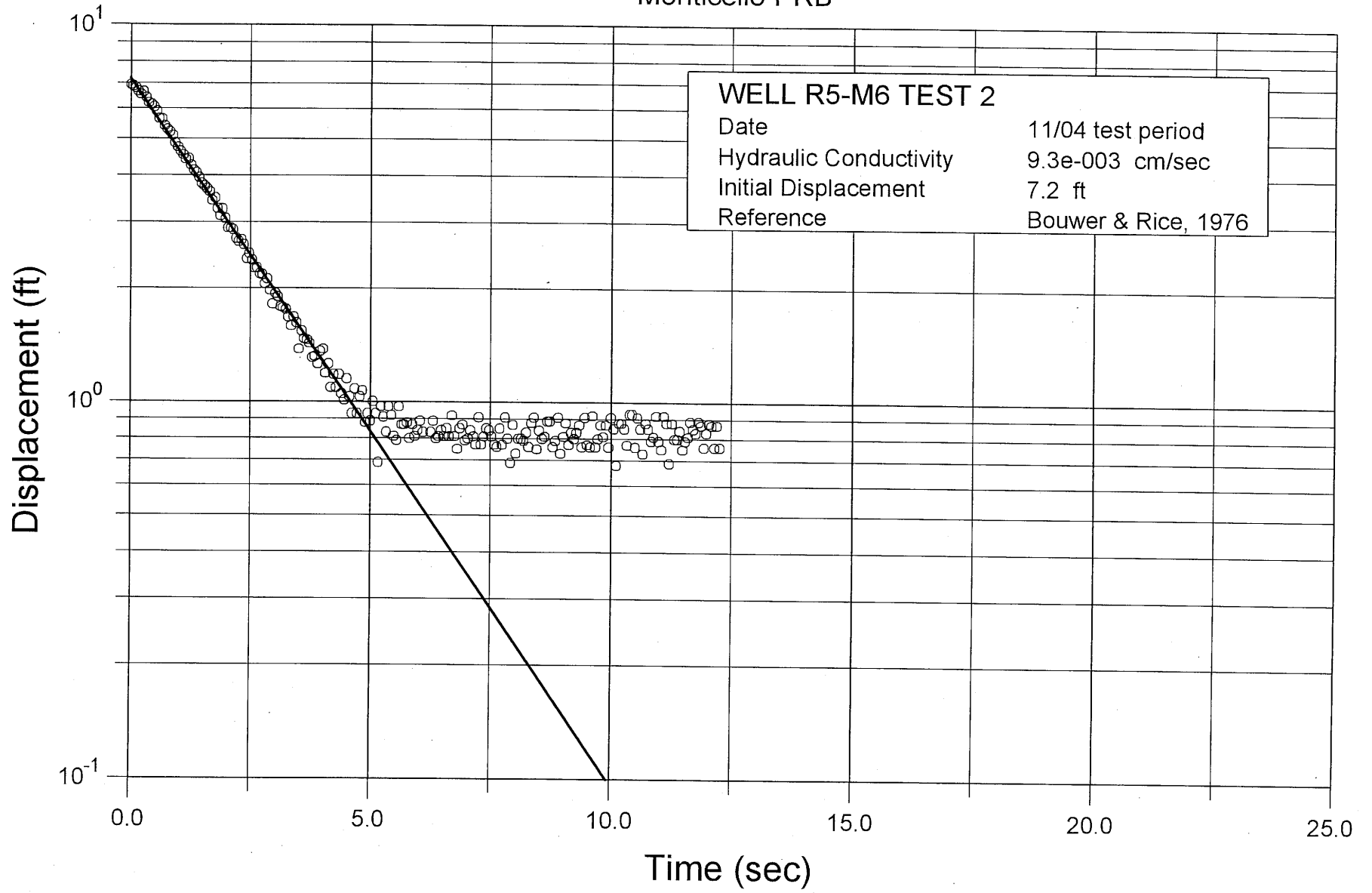
Monticello PRB



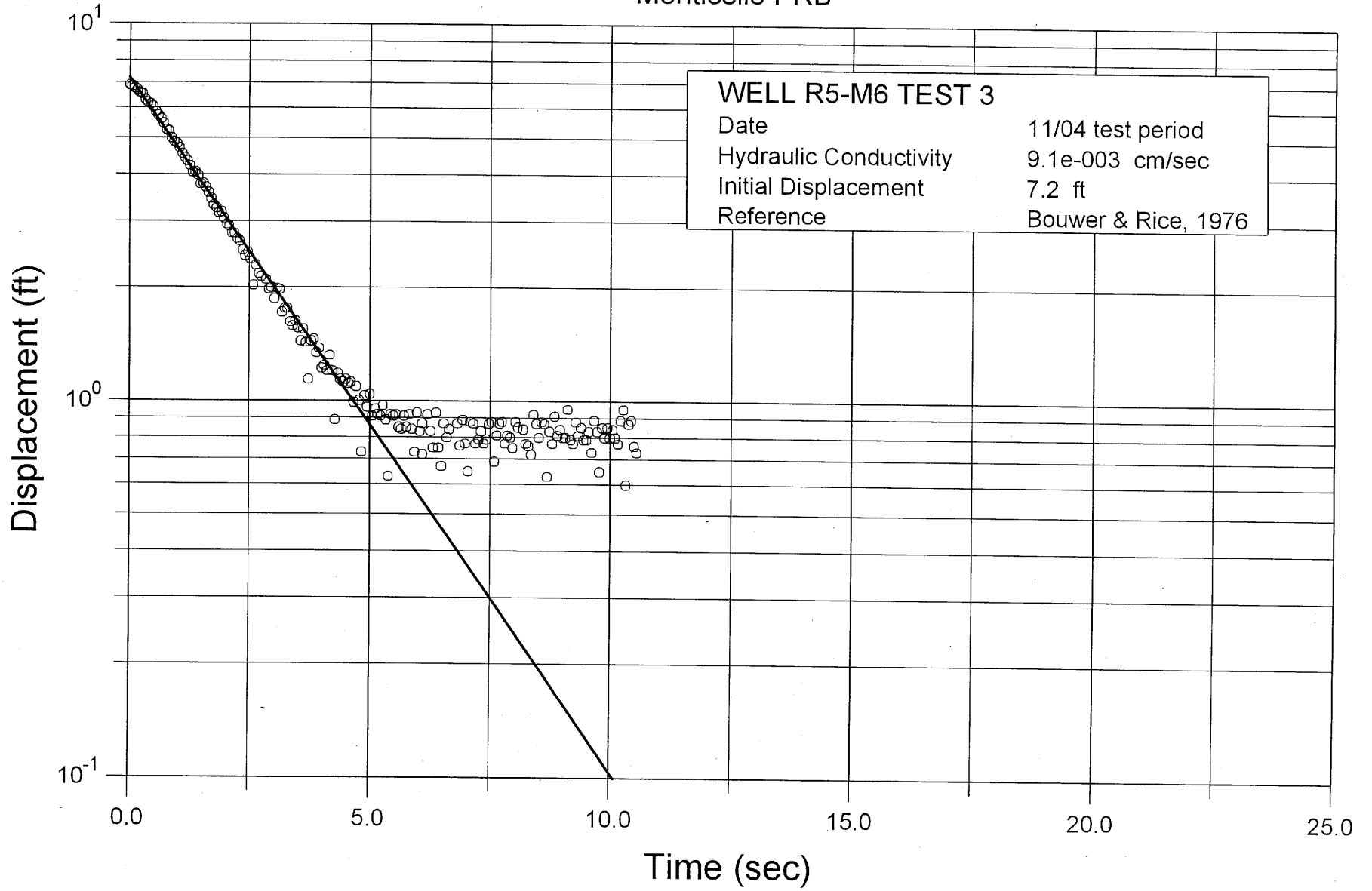
Monticello PRB



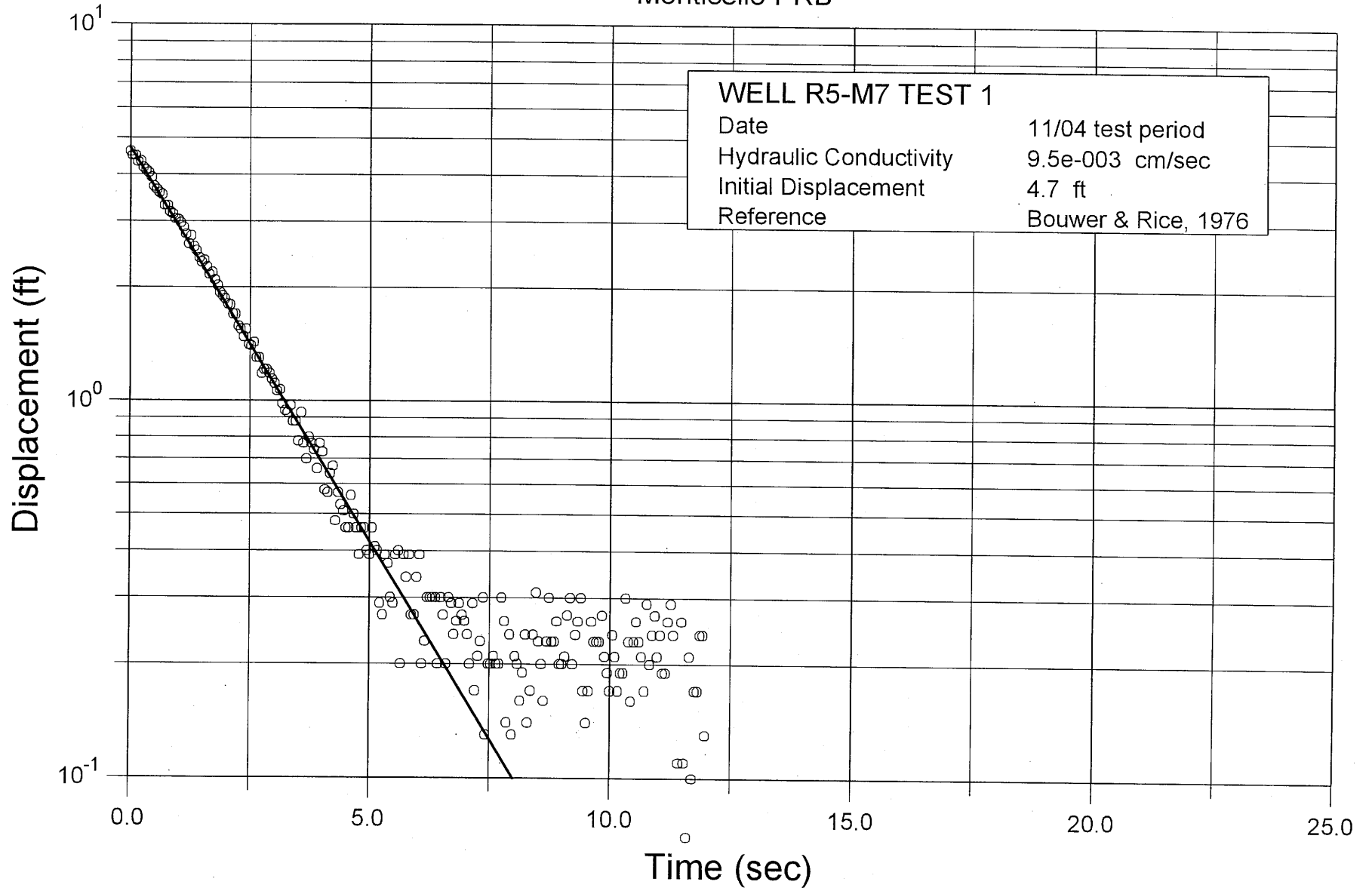
Monticello PRB



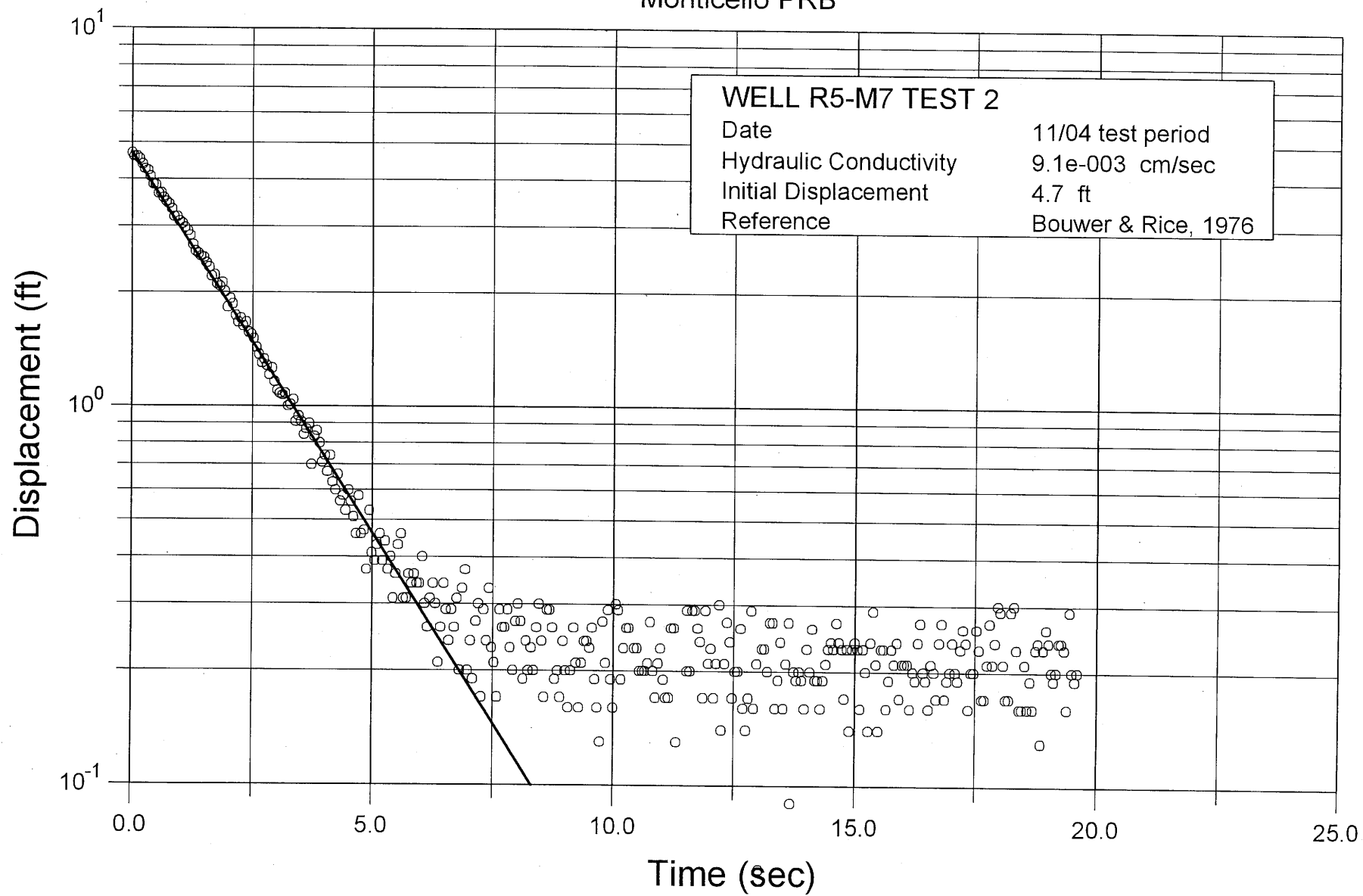
Monticello PRB



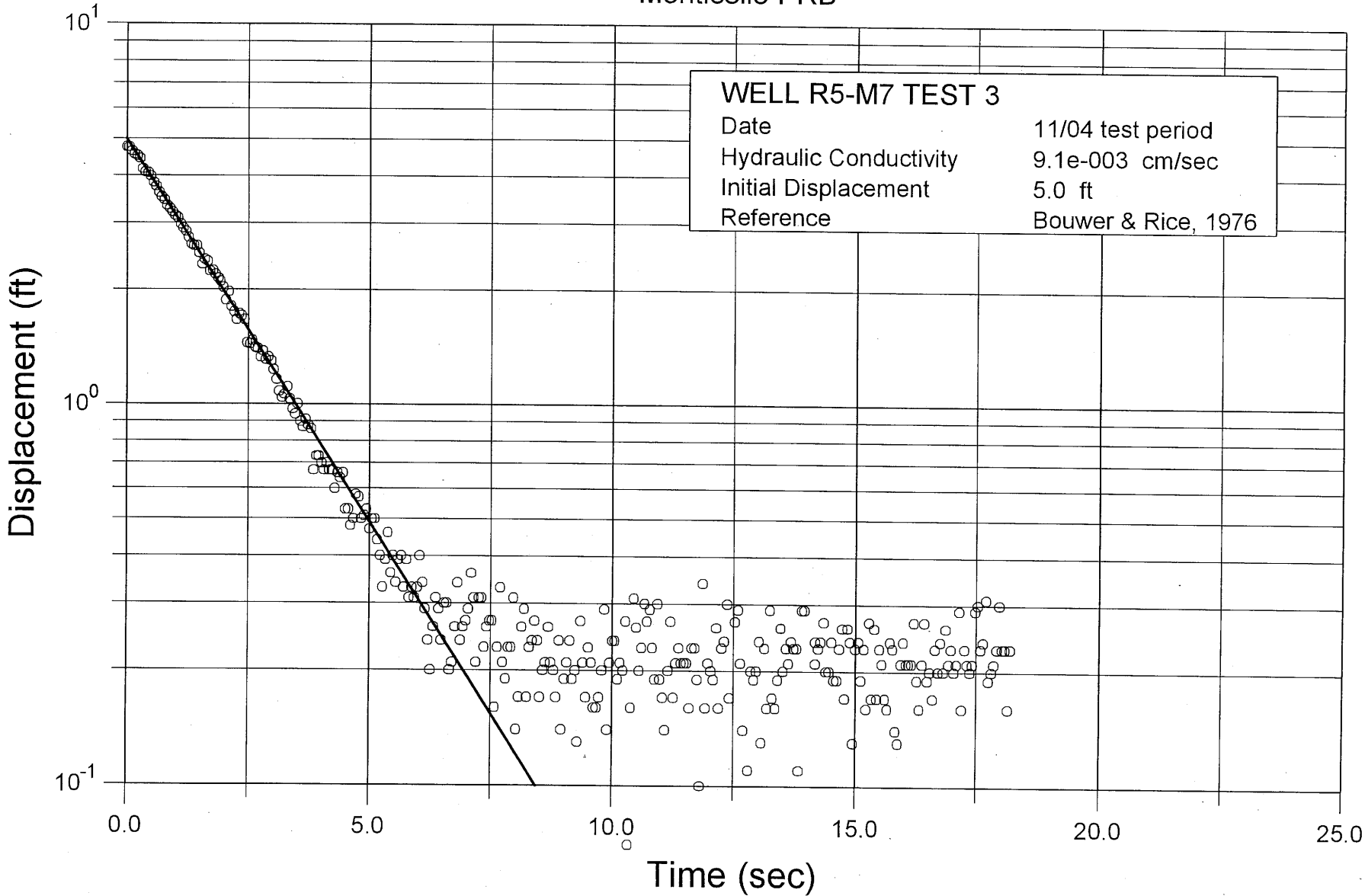
Monticello PRB



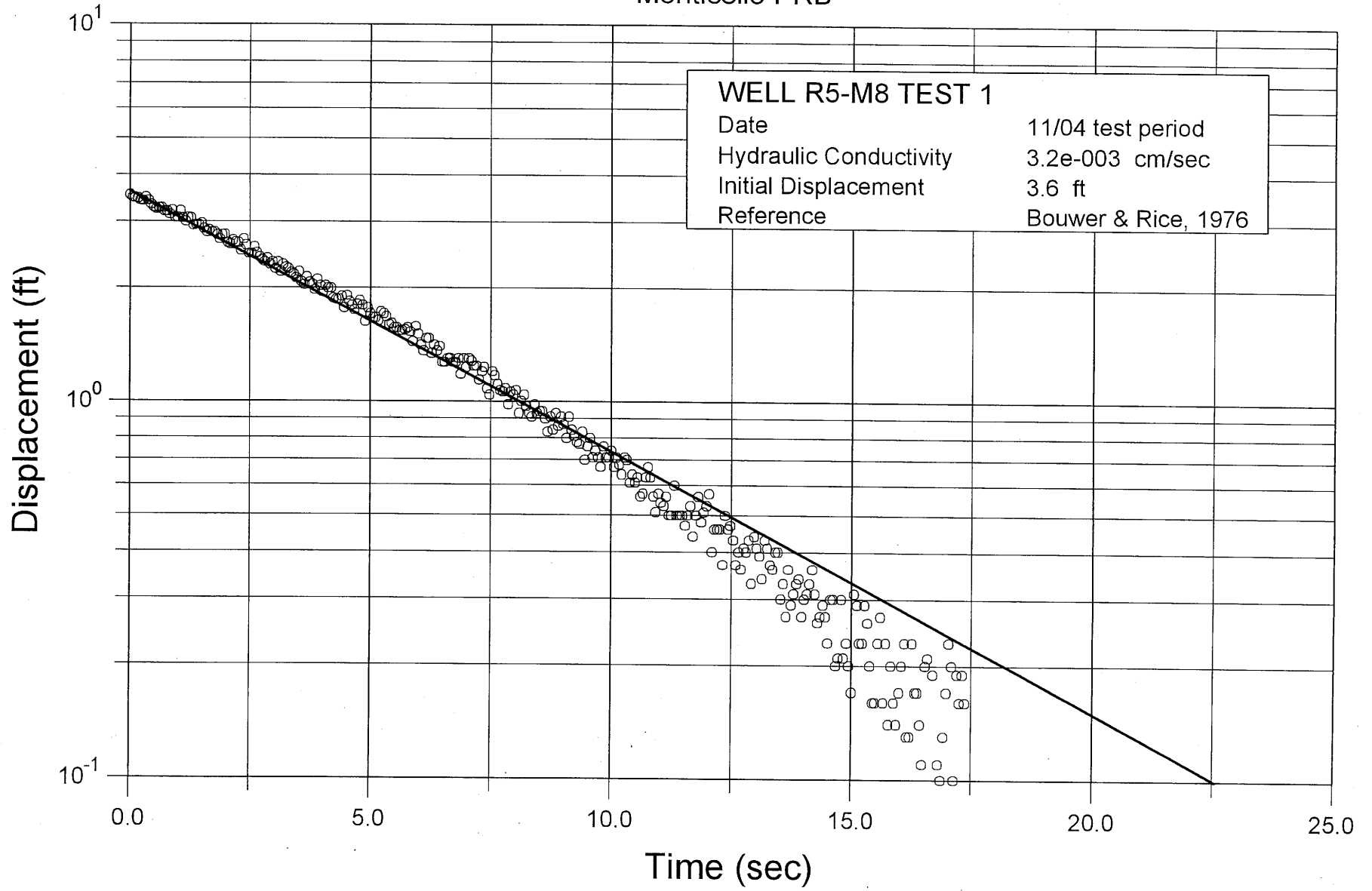
Monticello PRB



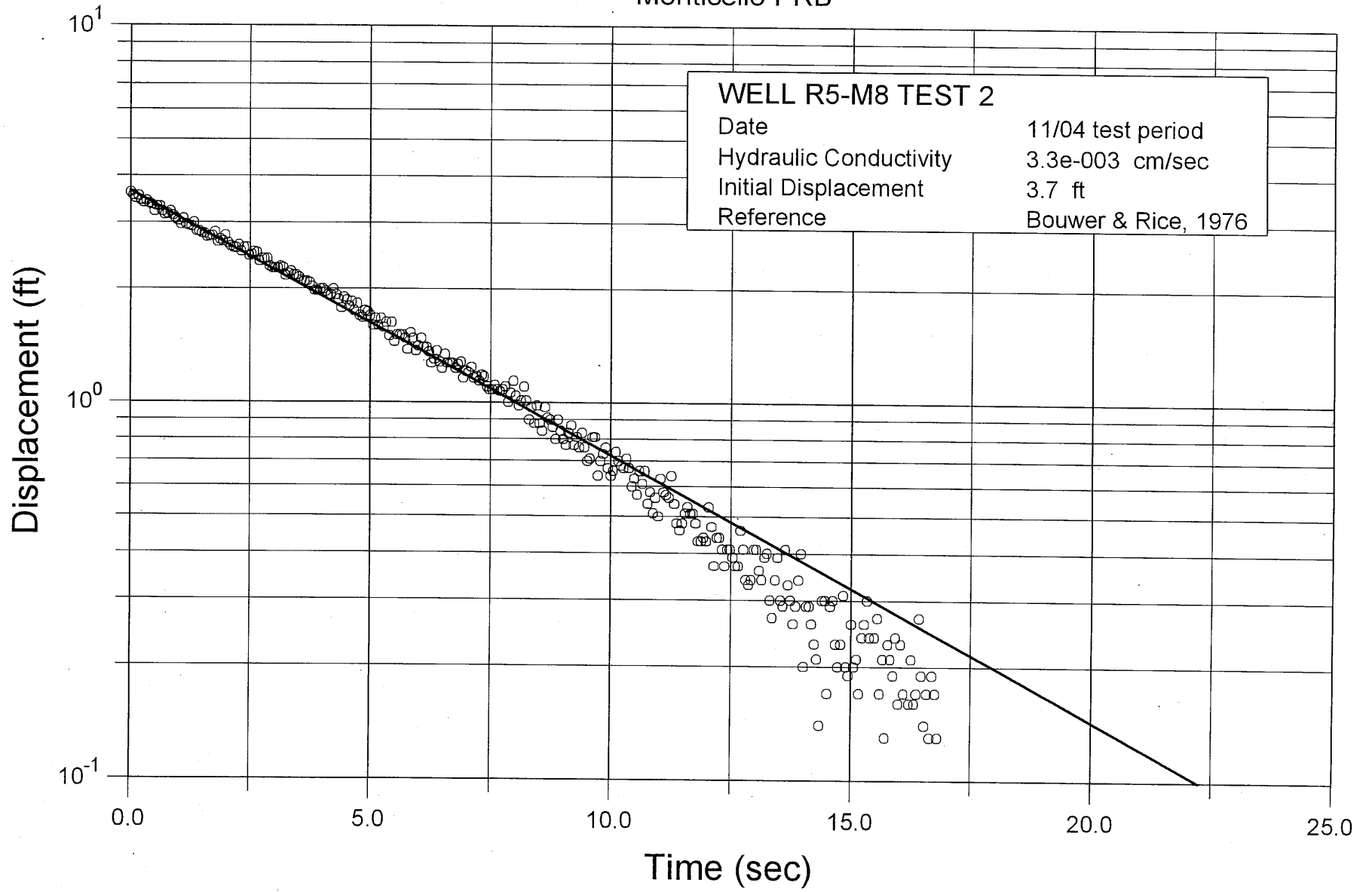
Monticello PRB



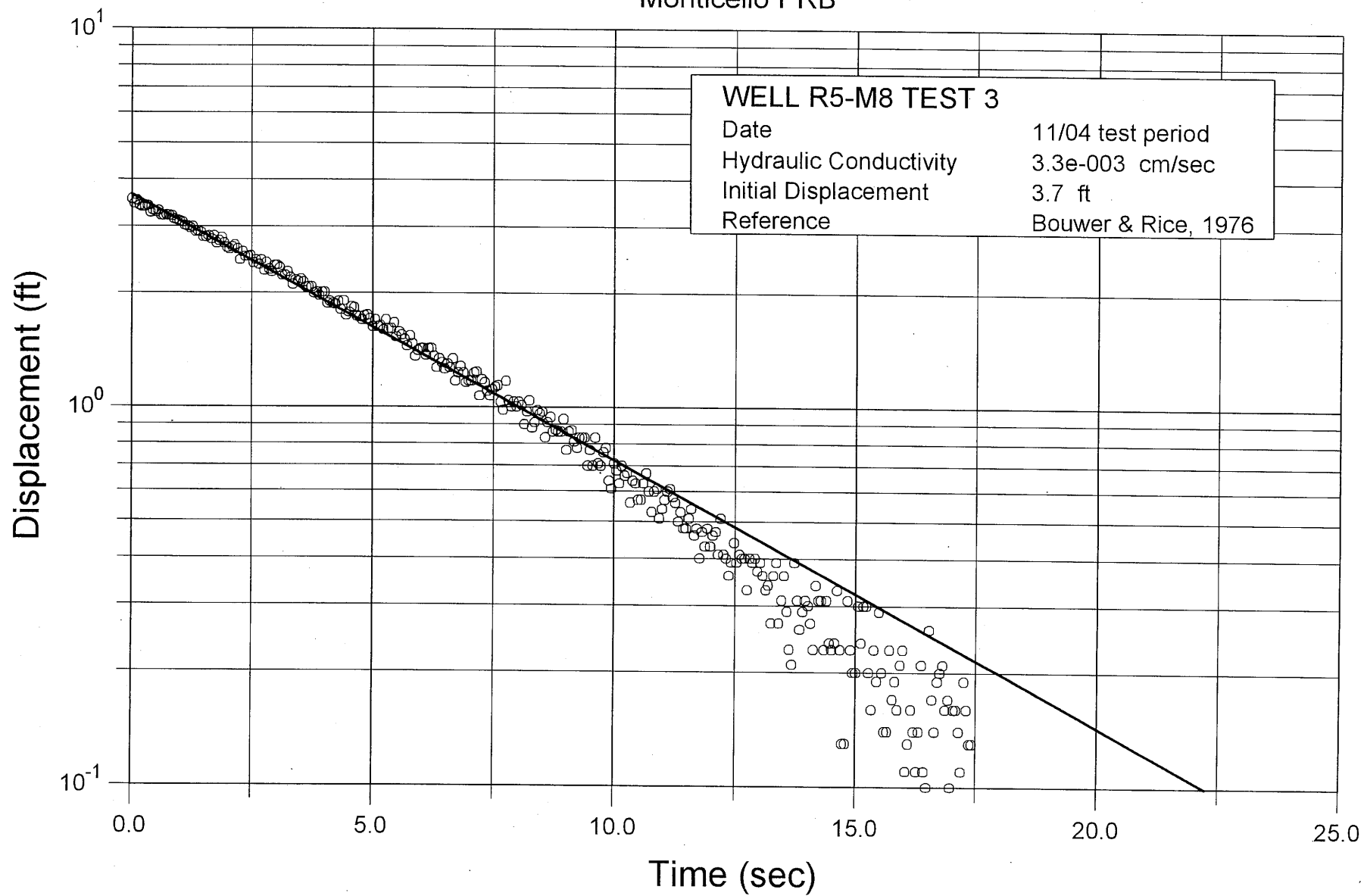
Monticello PRB



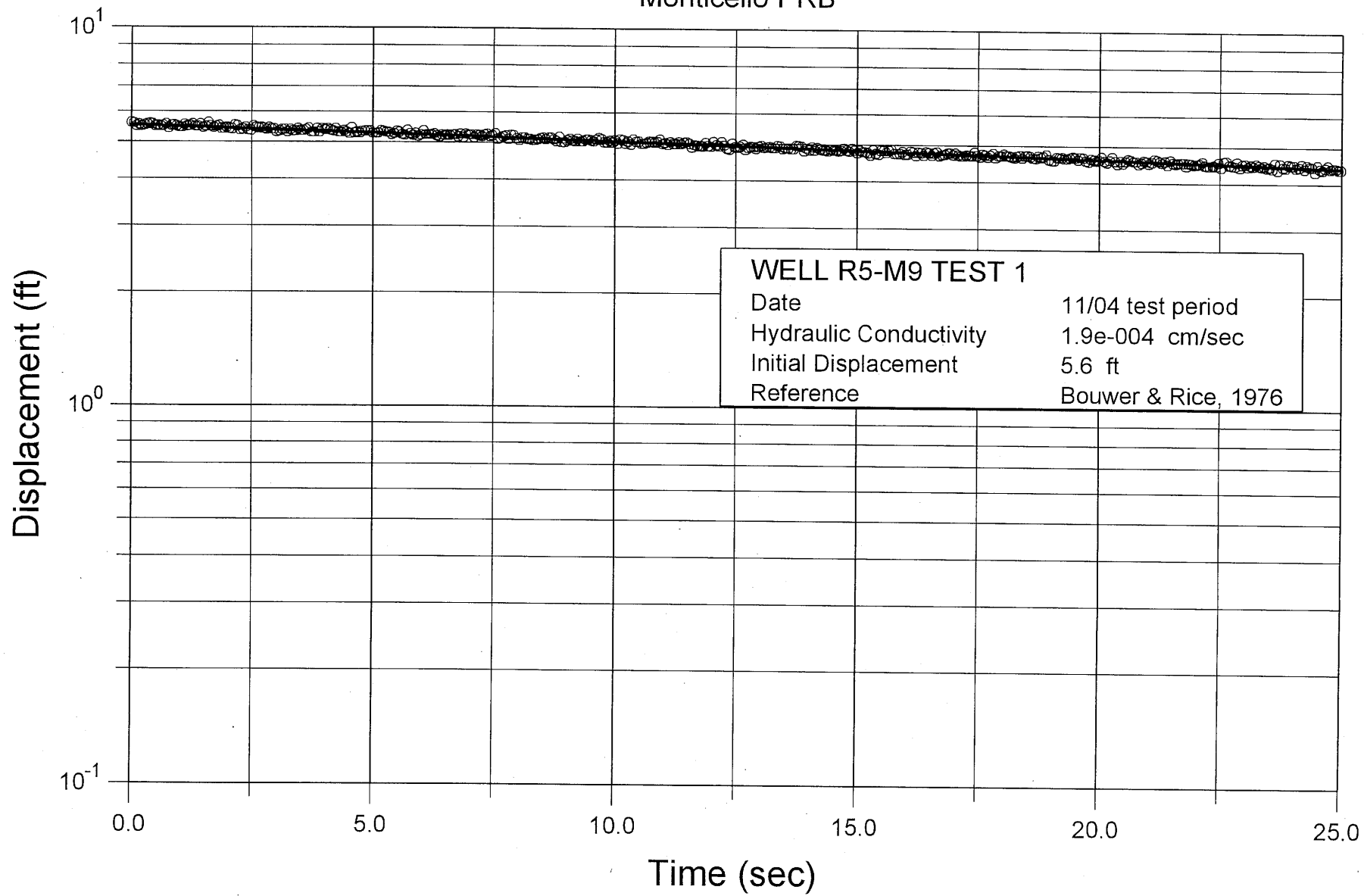
Monticello PRB



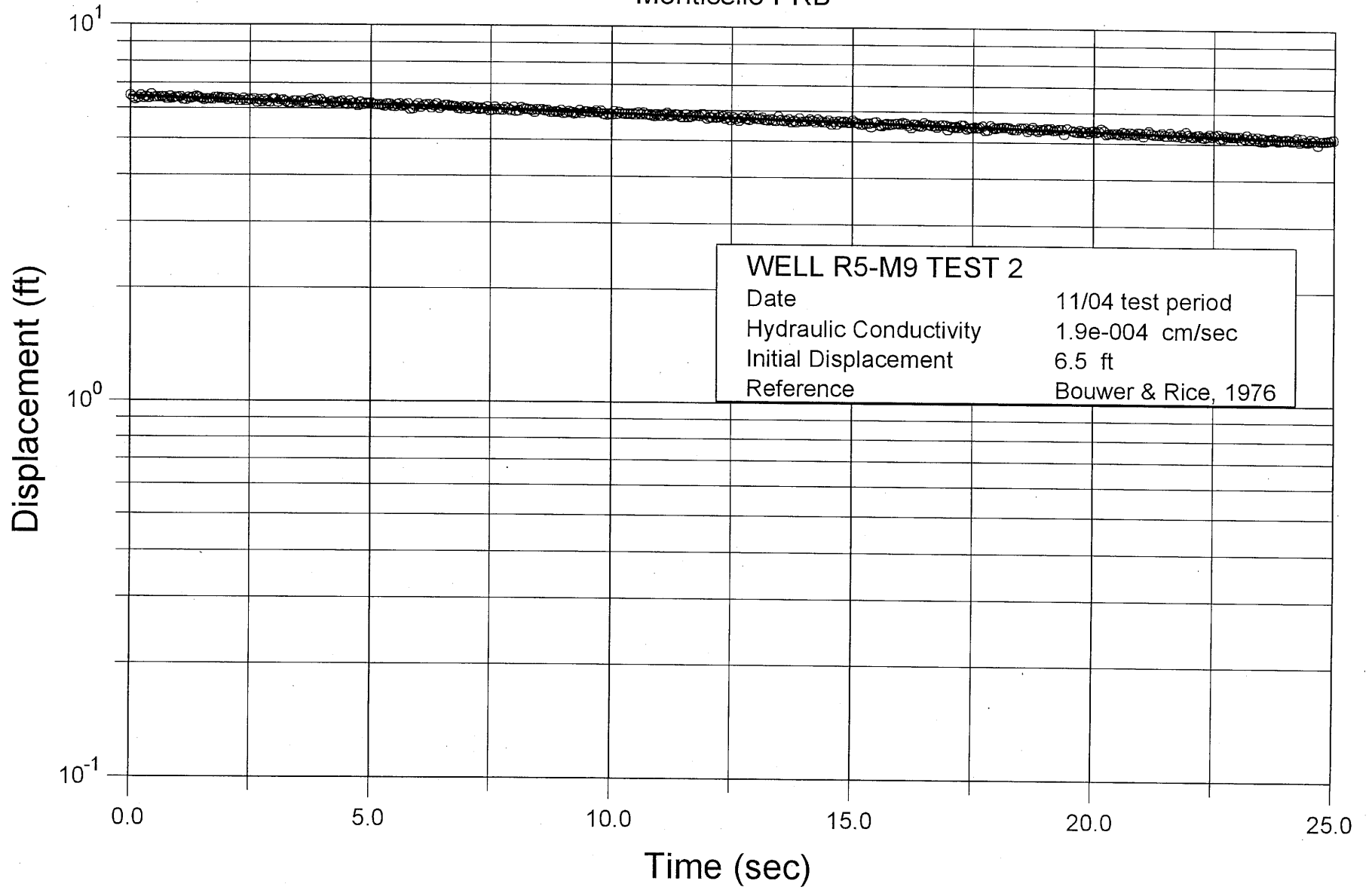
Monticello PRB



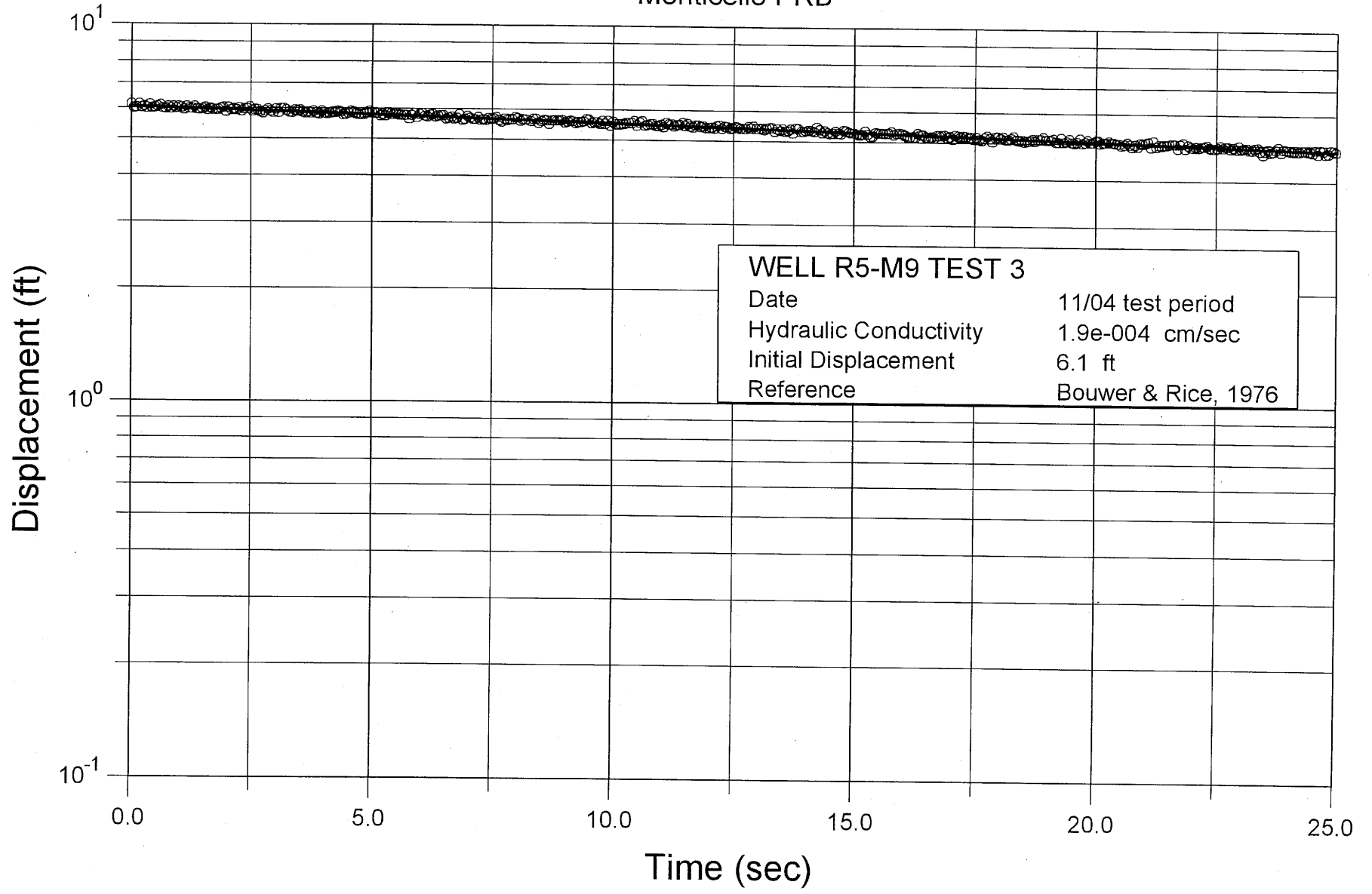
Monticello PRB



Monticello PRB

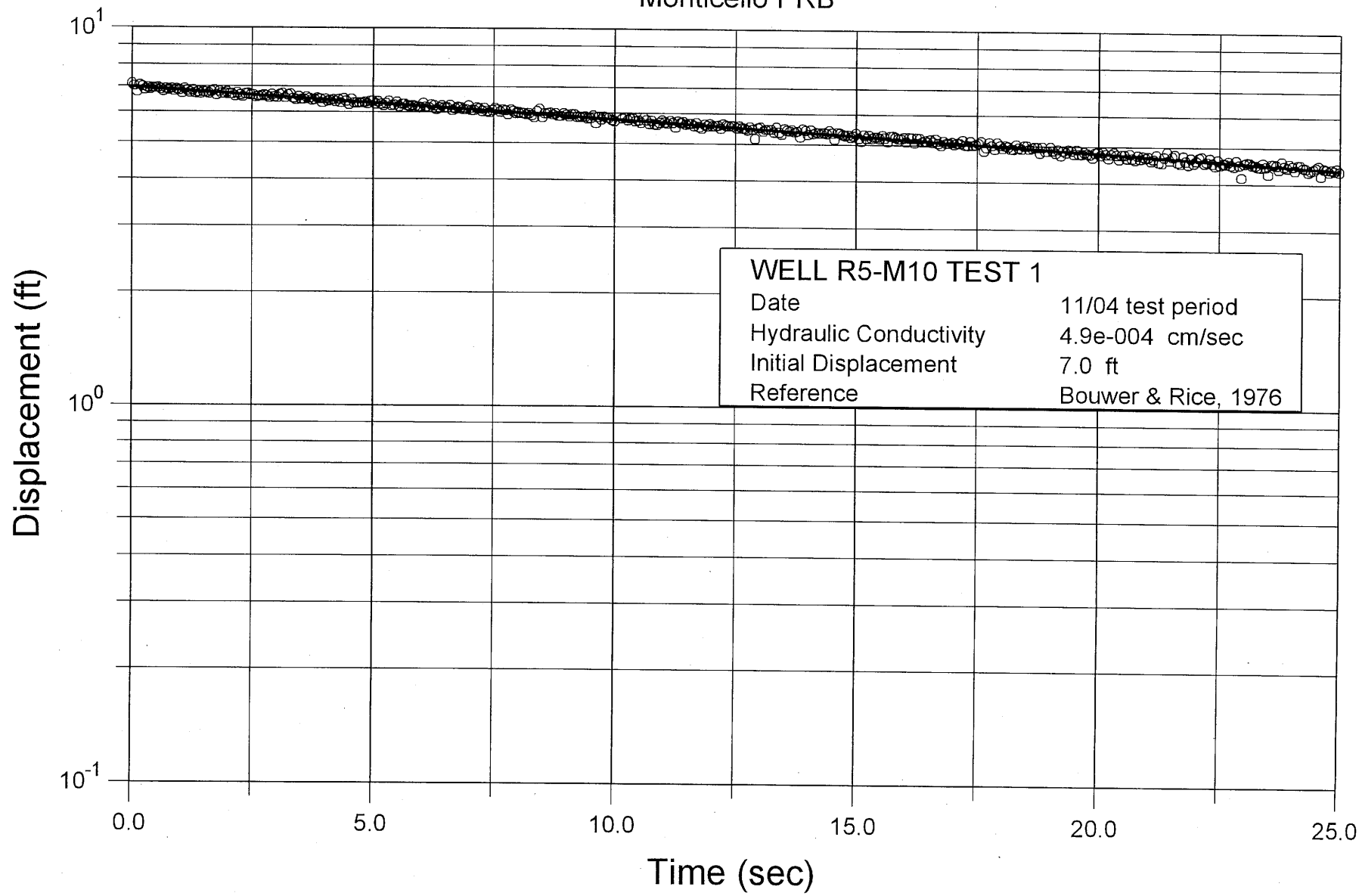


Monticello PRB

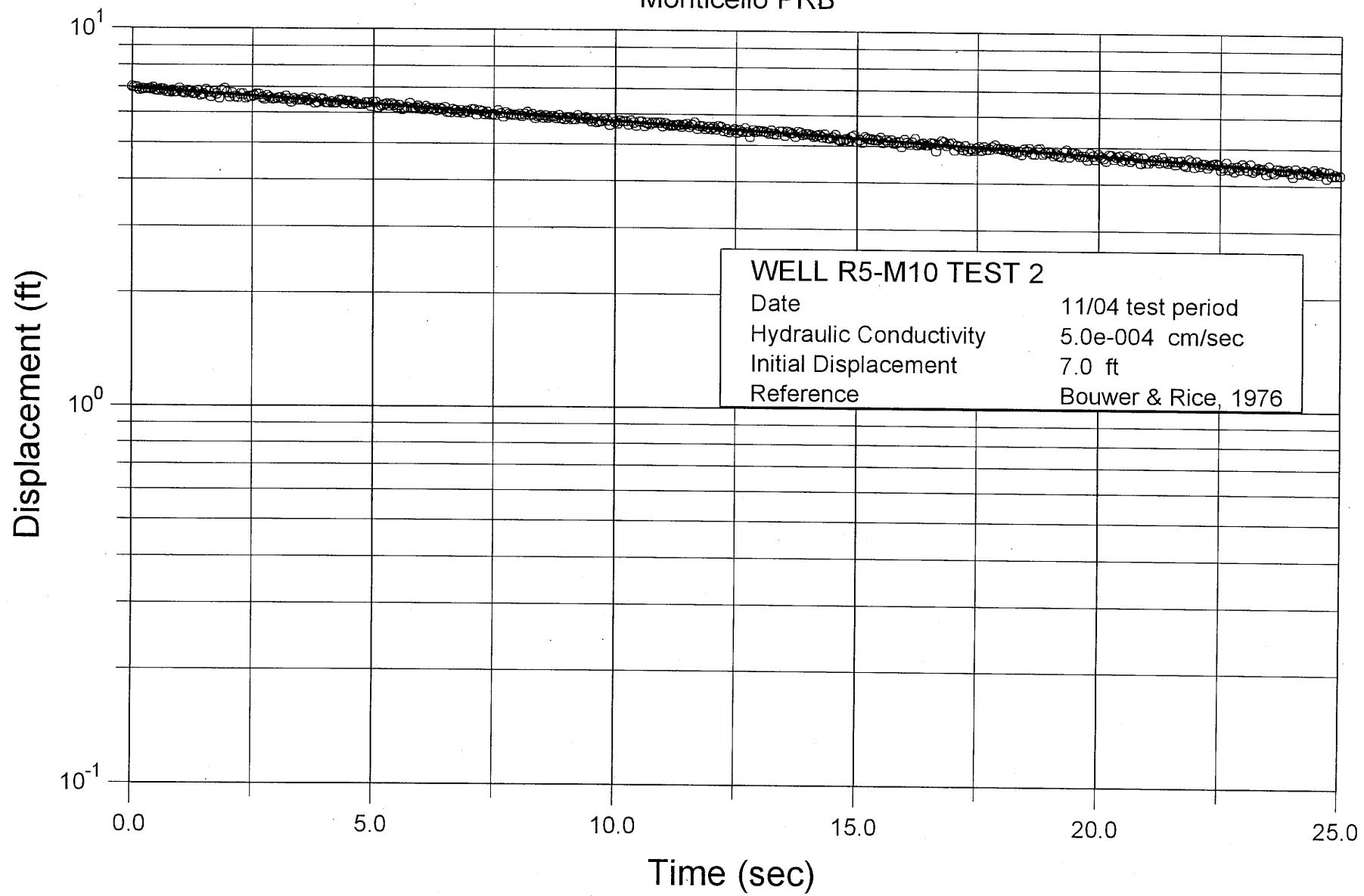


WELL R5-M9 TEST 3	
Date	11/04 test period
Hydraulic Conductivity	1.9e-004 cm/sec
Initial Displacement	6.1 ft
Reference	Bouwer & Rice, 1976

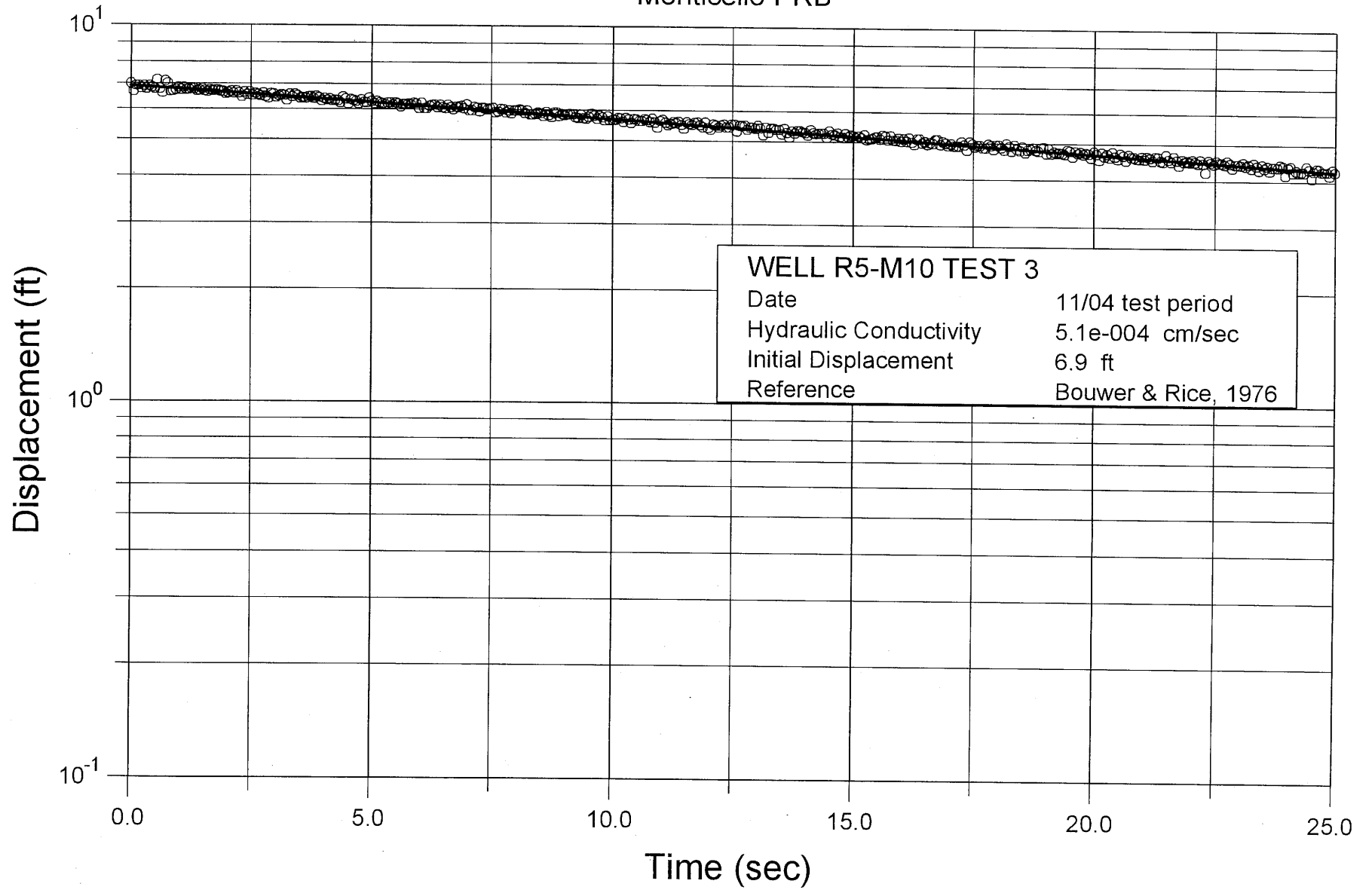
Monticello PRB



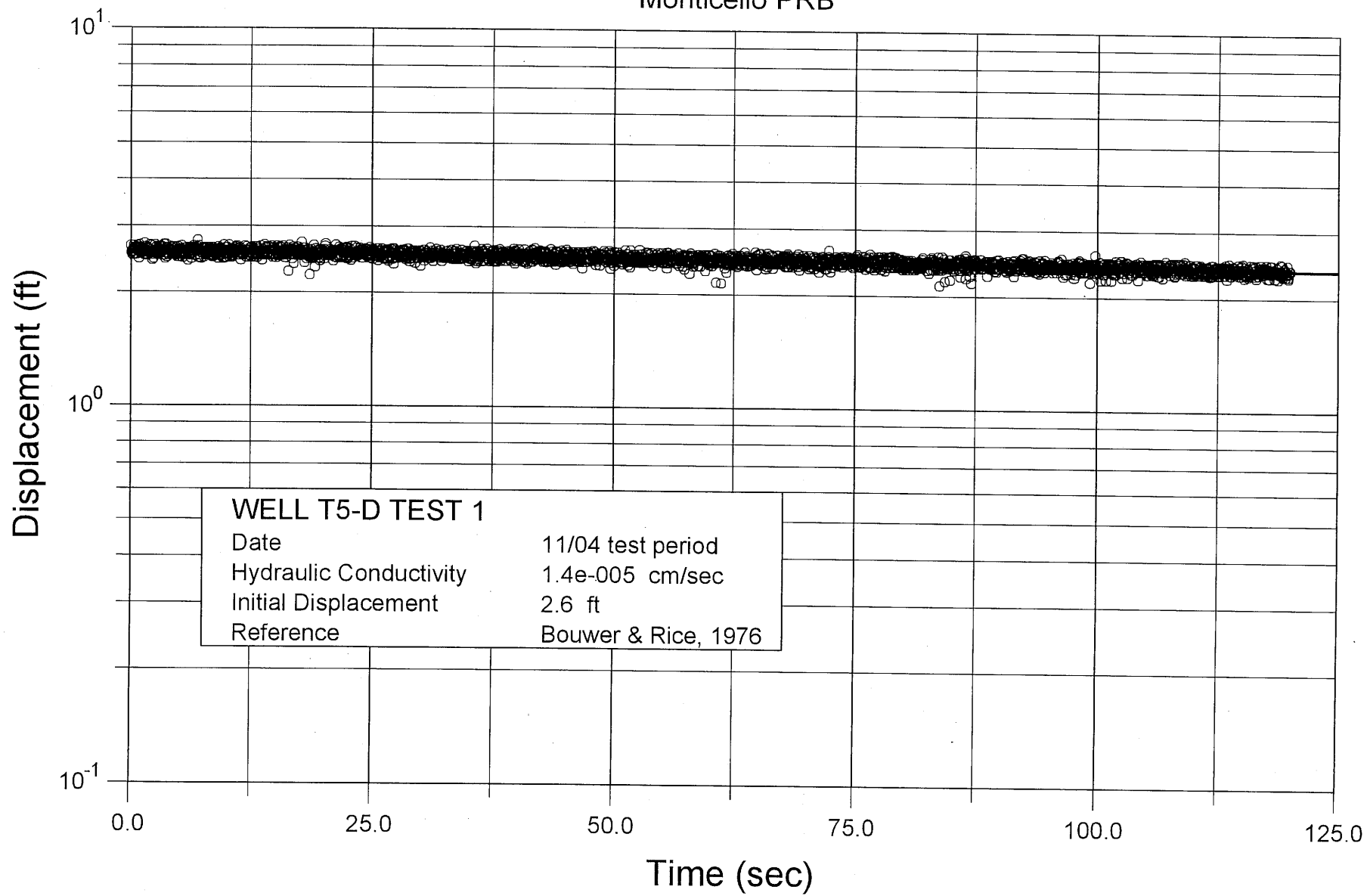
Monticello PRB



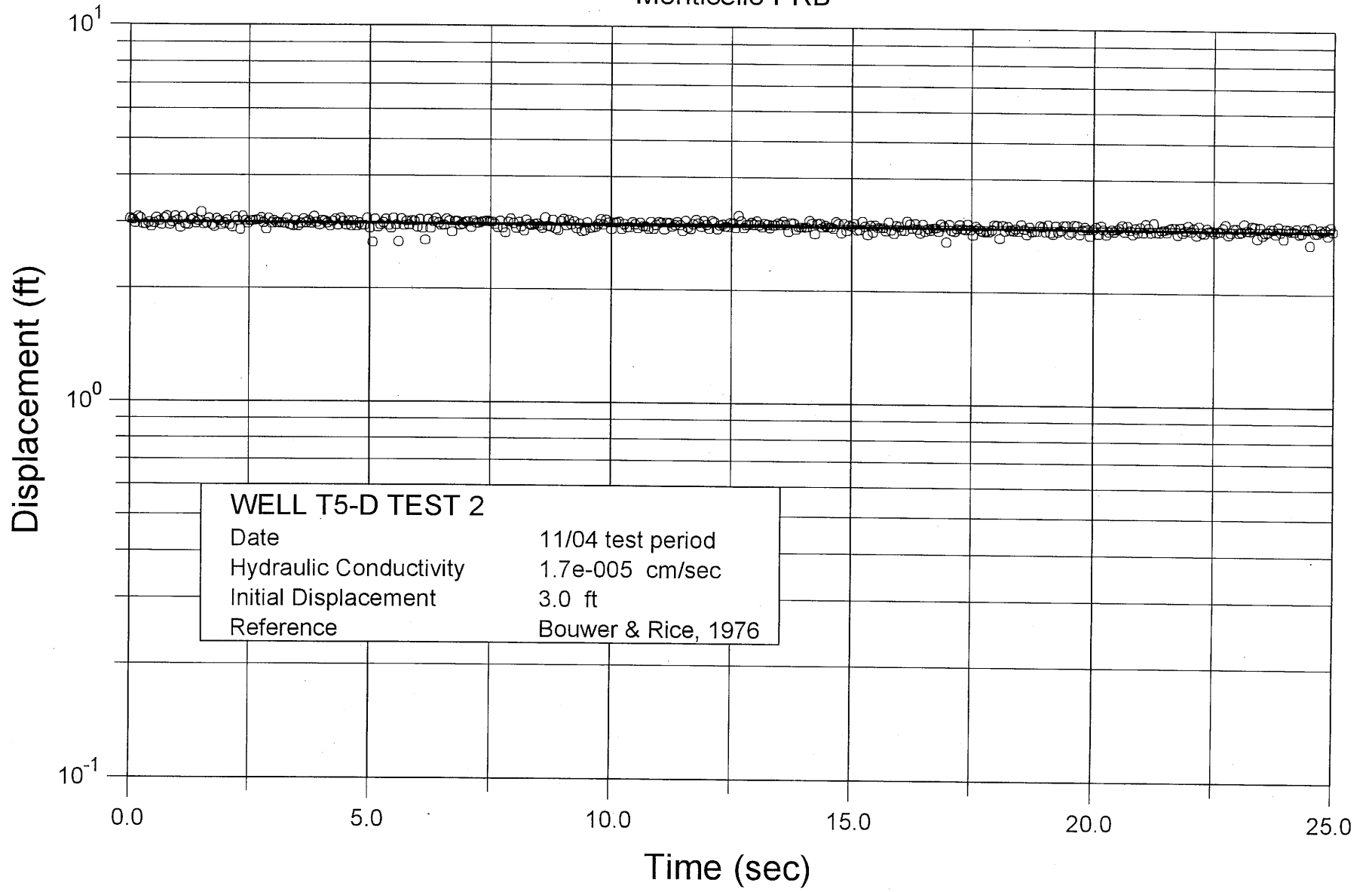
Monticello PRB



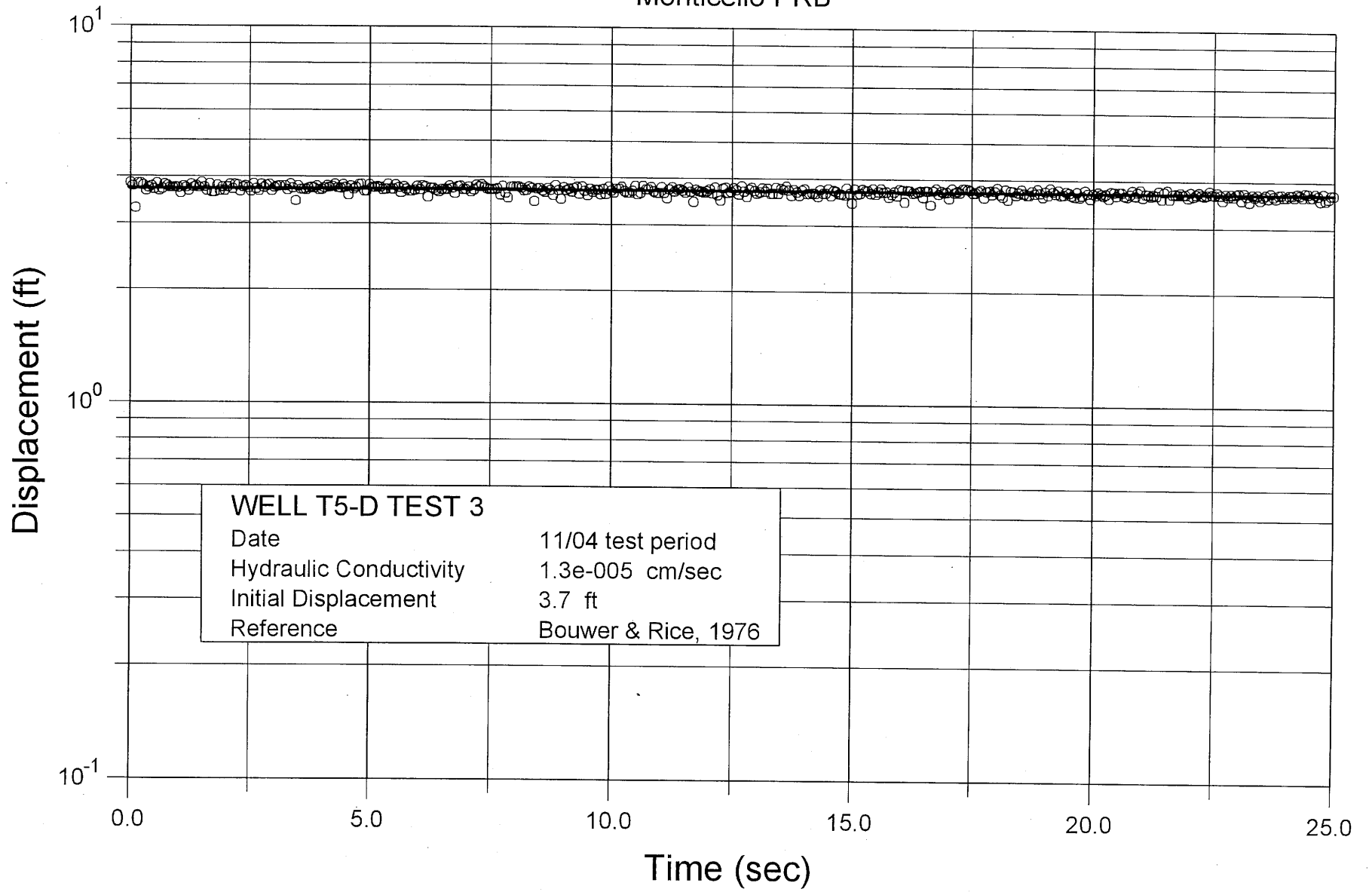
Monticello PRB



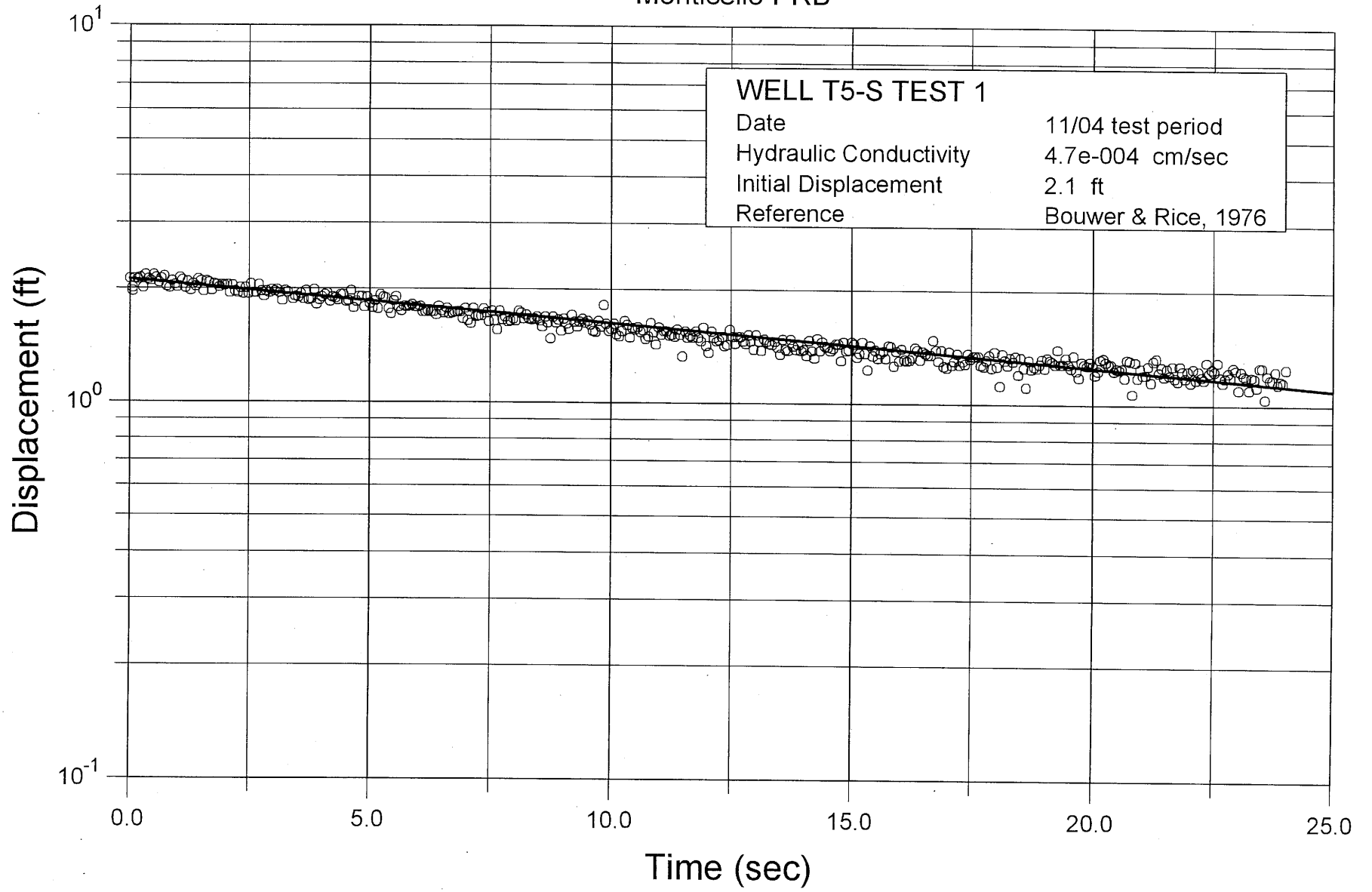
Monticello PRB



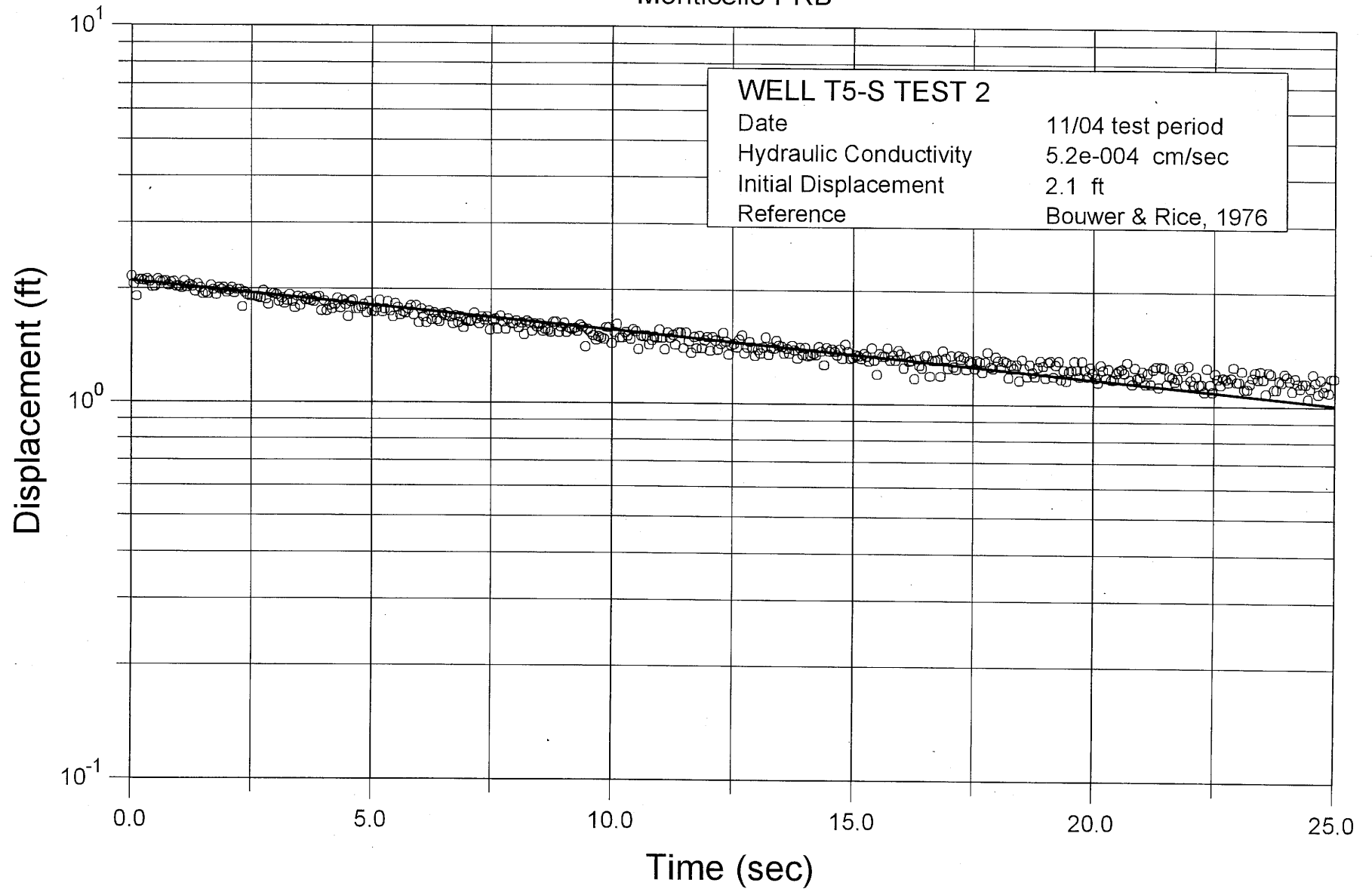
Monticello PRB



Monticello PRB



Monticello PRB



Monticello PRB

