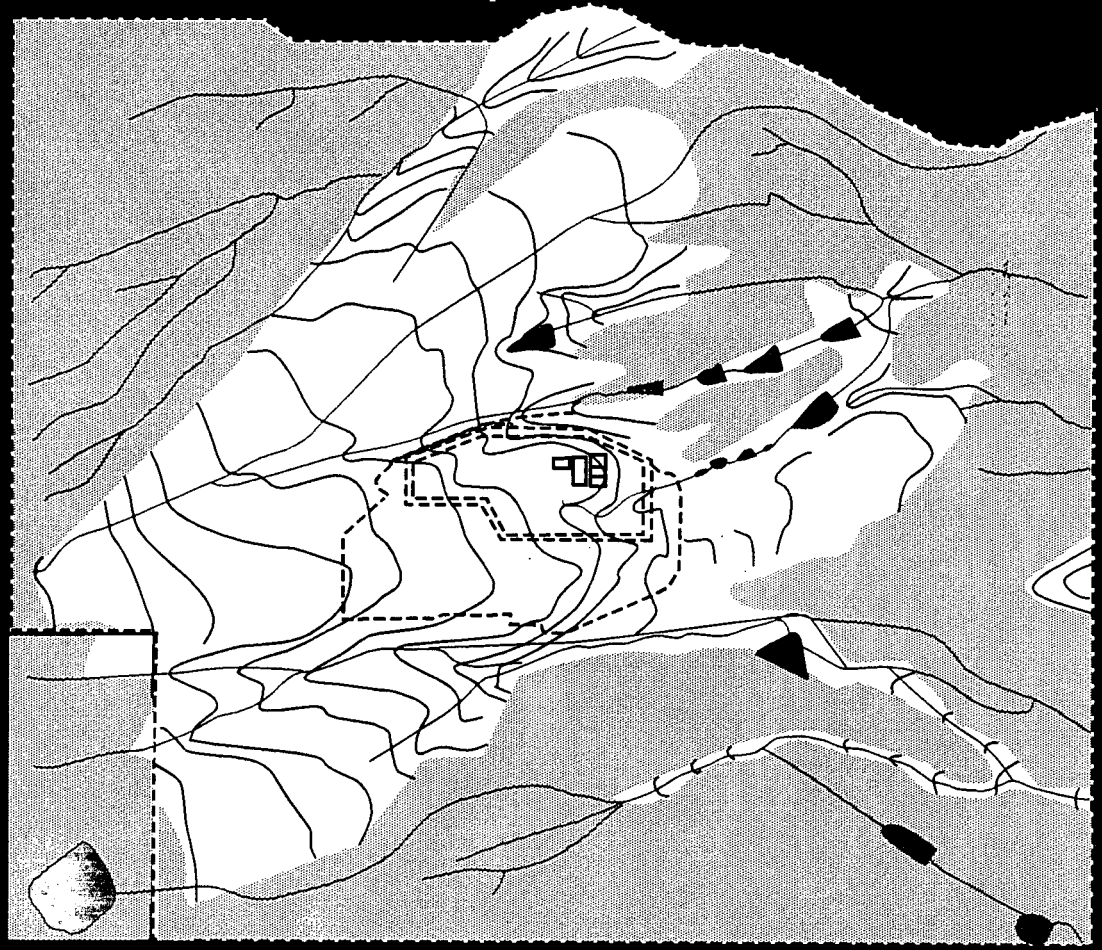
Hydrogeologic Characterization Report for the Rocky Flats Environmental Technology Site

Volume II of the Sitewide Geoscience Characterization Study

Appendices

Final Report
April 1995



EG&G ROCKY FLATS

Rocky Flats Environmental Technology Site
Golden, Colorado

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List of Appendices

Appendix A	Review of Previous Hydrogeological Studies: Abstracts
Appendix B	Well Construction Specifications
Appendix C	Single-Well Hydrographs
Appendix D	Well-Cluster Hydrographs
Appendix E	Dam Piezometer Hydrographs
Appendix F	Stream Gage/Alluvial-Well Hydrographs
Appendix G	Hydraulic Data
	Regression Analysis of Hydraulic Test Data
	Average Linear Groundwater Flow Velocities
	Advective and Diffusive Contaminant Transport
Appendix H	Analysis of Aquifer Test Data
	1994 Review of Bailer-Recovery Tests and Pumping-Recovery Tests
	Reanalysis of Bailer-Recovery Tests and Pumping-Recovery Tests, 1994
	1994 Review and Reanalysis of Slug Tests
	Packer Test Plots

List of Tables–Appendices

Table B-1	Well Construction Specifications
Table C-1	Investigated Spurious Water Levels and Corrections
Table D-1	Well Cluster and Gradient Data
Table G-1	Hydraulic Data
Table G-2	Summary Statistics of Hydraulic Data
Table G-3	Rocky Flats Site Laboratory Permeameter Data
Table G-4	Summary of Well Yield and Related Data for the Rocky Flats Site
Table G-5	Regression Output—Aquifer Test Data
Table G-6	Regression Output—Laboratory Permeameter Data
Table G-7	Average Linear Groundwater Flow Velocities
Table G-8	Calculation of Average Linear Groundwater Velocities for P_e=6.0 and P_e=0.02

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2

List of Figures–Appendices

Figure D-1	Locations of Well Clusters
Figure E-1	Dam Piezometer Location Map
Figure G-1	Unconsolidated Surficial Deposits Saturated Hydraulic Conductivity (K) Values: Pump Test vs. Slug Test Regression Analysis
Figure G-2	Unconsolidated Surficial Deposits Saturated Hydraulic Conductivity (K) Values: Pump Test vs. Bailer Recovery Test Regression Analysis
Figure G-3	Bedrock Saturated Hydraulic Conductivity (K) Values: Pump Test vs. Slug Test Regression Analysis
Figure G-4	Permeameter Tested Saturated Hydraulic Conductivity (K) Values: Horizontal K vs. Vertical K Regression Analysis
Figure G-5	Approximate Location of Flow Paths Used to Calculate Hydraulic Gradients for Qrf, Qc, and Qvf
Figure G-6	Potentiometric Surface and Flow Path of Weathered Bedrock at Solar Ponds Area, April 1993
Figure G-7	Potentiometric Surface and Flow Path of Weathered Bedrock at Present Landfill Area, March 1993
Figure G-8	LHSU Flow Paths Used to Calculate Hydraulic Gradients
Figure G-9	Comparison of Average Linear Groundwater Flow Velocities by Geologic Unit
Figure G-10	Contaminant Transport Zones
Figure G-11	Type of Contaminant Transport in Surficial Deposits
Figure G-12	Type of Contaminant Transport in Weathered Bedrock
Figure G-13	Type of Contaminant Transport in Unweathered Bedrock Box-and-Whisker Plots

3

Advanced Sciences, Inc. 1991. Draft Non-Tributary Groundwater Study, Task 29 of the Zero-Offsite Water-Discharge Study. Prepared for EG&G Rocky Flats, Inc. May 7.

This study was conducted to determine the physical and economic feasibility of pumping non-tributary groundwater from under the Rocky Flats Plant to replace water used at the facility and correct injured water rights for the assessment of the zero-discharge plan. The volume of water that must be replaced and/or augmented has been estimated at 1,140 acre-foot/year. The report describes physical aquifer characteristics at the Rocky Flats site, including thickness, facies, area, average saturated thickness, porosity, water in storage, hydraulic conductivity, and transmissivity. The calculated volume of water that can be withdrawn from the Laramie-Fox Hills aquifer would satisfy the needed volume of replacement water for the zero-discharge plan. In order to assess the feasibility of withdrawing water from the Laramie-Fox Hills aquifer, an analysis of a hypothetical wellfield at Rocky Flats was undertaken. Drawdowns in individual wells and at selected locations between wells were calculated using the Theis equation and superposition. Calculations made incorporating the hydraulic characteristics of the aquifer indicate that the proposed pumping rate would create a drawdown in excess of 700 feet; therefore, the actual withdrawl of the water is not feasible. The study concluded that it is more economically and physically feasible to purchase water from other sources to replace water used at the facility and correct water rights. Graphs, charts, figures, and calculations support conclusions.

Advanced Sciences, Inc. 1991. Project Management Plan Feasibility of Groundwater Cutoff/Diversion Study, Task 26 of the Zero-Offsite Water-Discharge Study. Prepared for EG&G Rocky Flats, Inc. January 10.

In accordance with the Agreement in Principle between the Colorado Department of Health and the U.S. Department of Energy, the Cutoff/Diversion Study of the Zero-Offsite Water-Discharge Study for the Rocky Flats Plant was developed. The main objective of the study is to assess the feasibility of groundwater cutoff/diversion in the area of the plant. A literature search on the geology and hydrogeology of the Rocky Flats site was conducted, and an annotated bibliography was compiled. Specific information on aquifer thickness and hydraulic properties is presented in tables. The feasibility study addressed four groundwater cutoff/diversion scenarios, including (1) a linear cutoff wall placed west (upgradient) of the Controlled Area; (2) a horseshoe-shaped cutoff wall placed around the west, south, and north sides of the Controlled Area; (3) a line of pumping wells at the east (downgradient) end of the Controlled Area; and (4) pumping wells on the downgradient edges of individual contaminant plumes. Flow net and streamline maps were

developed to assess the effectiveness of the alternatives. The computer programs DREAM and SURFER were used to analyze the flow systems and contour the stream lines. The cost effectiveness of each alternative was also evaluated. This feasibility study concluded that installing wells at individual contaminant sites is the recommended alternative for eliminating Rocky Flats contaminant discharges to the environment.

Advanced Sciences, Inc. 1991. Solar Pond Interceptor Trench System Groundwater Management Study, Rocky Flats Site, Task 7 of the Zero-Offsite Water-Discharge Study. Prepared for EG&G Rocky Flats, Inc. January 8.

The study provides an analysis of existing data regarding the quantity and quality of contaminated groundwater and surface water that is transferred from the Solar Ponds interceptor trench system to the Rocky Flats Solar Evaporation Ponds. This information was needed to provide for the long-term management of the transferred water as the use of the solar ponds is phased out. The annual average volume of groundwater transferred to the solar ponds by the interceptor trench system was estimated as approximately 5.9 gpm (3,100,000 gallons per year). Flow rates were formed to vary throughout the year and water quality characteristics were identified. The conceptual design of a treatment system was anticipated to include the existing interceptor trench system to collect the leachate flows, a surge tank for containment of anticipated surge flows, and a treatment system sized to handle the existing average annual flows.

Advanced Sciences, Inc. 1991. Surface Water and Groundwater Rights Study in the Vicinity of Rocky Flats Plant, Task 14 of the Zero-Offsite Water-Discharge Study. Prepared for EG&G Rocky Flats, Inc. May 21.

This study was performed to analyze potential impacts to both surface water and groundwater rights downstream of the Rocky Flats site to various alternatives related to zero-offsite discharge from Rocky Flats as well as alternatives to zero discharge from the facility. Rocky Flats purchases trans-mountain and trans-basin water from the Denver Water Board. Disagreement exists over whether this water must be replaced to the South Platte River Basin to legally satisfy downstream water rights. Non-tributary groundwater beneath Rocky Flats may be one alternative, of several, used to provide replacement water for downstream water rights. Hydrogeologic characteristics including formation thickness, saturation thickness, porosity, and water storage have been estimated from previously collected data from the alluvial, Arapahoe, and Laramie Fox-Hills aquifers to determine the quantity of groundwater available for downstream water rights augmentation. It is estimated that a total of 270,400 acre-feet of

5

groundwater is stored in the three aquifers of concern of which 127,000 acre-feet are legally, if not economically or feasibly, recoverable. The extent of the bedrock aquifers in the vicinity of the site is presented on a figure. A table of wells registered with the state in the vicinity of the Rocky Flats site is also included.

Aikin, A.R., and K.A. Turner. 1987. *Geochemical Assessment of Aquifer Effects in the Southwest Denver Basin.* Colorado Water Resource Institute Completion Report No. 146. September.

Recharge of the Denver groundwater basin by injection has been proposed as a result of increasing depletion of the water supply. However, injection recharge can cause physical and chemical changes in the geologic materials of the recharged aquifer, depending on the chemistry of the host and injected waters and the rock matrix mineralogy of the aquifers. The Denver groundwater basin contains four principal bedrock aquifers, of which the Arapahoe aquifer is considered to be the best in terms of water availability and quality. Field tests have been undertaken to study the effects of recharge injection. The tests demonstrated that permeability decreased after a few hours, but the cause was not known. It is possible that water that meets drinking water standards contains constituents that will react during injection into the aquifer, resulting in aquifer damage. Aquifer water and municipal drinking water were evaluated by a geochemical equilibrium computer model (PAREEQE) to determine the potential for reaction. Results of the tests conclude that the Arapahoe aquifer is a good candidate for injection recharge.

Author Unknown. 1952 through 1971. Site Survey Locations and Analysis, Rocky Flats, Golden, Colorado. Monthly reports from 1952–1971.

Author Unknown. 1952 through 1971. Site Survey Results, Rocky Flats, Golden, Colorado. Annual reports from 1952–1971.

A collection of handwritten and typed notes, tables, and graphs reflects environmental monitoring data that was collected from 1952 through 1971. It includes monitoring locations for air, pond, and well sample points as well as results from laboratory analyses. Results are illustrated in a hand-drawn graphical format but no interpretations are offered.

Banta, E.R. 1989. *Hydrologic Effects of Pumpage from the Denver Basin Bedrock Aquifers of Northern El Paso County, Colorado.* U.S. Geological Survey Water Resources Investigations Report 88-4033. October.

The Denver groundwater basin underlies a 6,700-square-mile area in eastern Colorado. To assess current conditions of the four bedrock aquifers in the basin, water levels, streamflow gain and loss, and other data were collected. Current aquifer conditions in the southern part of the basin and probable response to various 100-year pumping scenarios were analyzed using a digital finite-difference model. Simulated pre-development flow through the bedrock aquifers was about 59 cubic feet/second. Water-level changes between 1978 and 1985, ranged from rises of more than 40 feet to declines of as much as 80 feet. These were likely caused by variations in precipitation and by lowering of the water table, through pumping, in the overlying Black Squirrel Creek alluvial aquifer. Simulations presented, delineate relative percentage of contributions from various resources including groundwater in storage, induced recharge and recharge from precipitation. A baseline 100-year simulation, beginning in 1985, indicated minimal drawdowns for constant pumping at 1985 rates in the southern part of the basin. Other simulations indicated that the pumpage required to supply the needs of the projected population would be accompanied by drawdowns of as much as 1,300 feet and by large decreases in the amount of groundwater in storage. Pumpage from a hypothetical well field, located where the aquifers are thickest, and from the aquifers underlying Colorado Springs also was simulated.

Barrett, J.K., and R.H. Pearl. 1976. Hydrogeological Data of Thermal Springs and Wells in Colorado. Colorado State Geological Survey Information Series 6.

This report lists the locations and field measurements of pH, temperature, specific conductivity, chemical analyses, radioactivity, and discharge for all the thermal springs and wells of Colorado. Two wells in the study are located in Boulder and Jefferson counties in the Eldorado Springs area.

Belitz, K. 1986. Quantitative Analysis of Regional Flow in the Denver Basin. Presented at the Geological Society of America, 99th Annual Meeting. San Antonio, Texas. November 10–13.

A simulation model was used to investigate the groundwater flow system in the Denver Basin and the adjacent mid-continent. An area of over 200,000 square miles of Phanerozoic sedimentary strata was modeled. The strata was subdivided into six separate hydrostratigraphic

7

units. The model suggests that the regional flow system can be divided into basin and platform flow. Lateral flow rates were estimated for the regional aquifers and range from 0.03 feet per year in the basin to 3 feet per year over the platform. The model also suggests that in some deep strata the residence time of fluids is at least on the order of 10 million years and may exceed 100 million years if appropriate conditions exist. The calculated flow through the entire system is calculated to be 66 cubic feet per second. The results of the investigation suggest that circulation rates in large basins can be small and flow decreases markedly with depth.

Belitz, K., and J.D. Bredehoeft. 1988. "Hydrodynamics of Denver, Basin: Explanation of Subnormal Fluid Pressures." *American Association of Petroleum Geologists Bulletin* November, Vol. 72, No. 11.

Anomalously low fluid potential (and hence subnormal fluid pressure) is found in Mesozoic and Paleozoic rocks of the Denver Basin. The potentiometric surface for the Dakota and basal Cretaceous sandstones is 2,000 to 3,000 feet (600 to 900 meters) beneath the land surface in parts of the Denver Basin in Colorado and Nebraska. The potentiometric surface for pre-Pennsylvanian carbonate rocks is 1,500 feet (450 meters) lower than the potentiometric surface for the Dakota Sandstone in southeastern Colorado and western Kansas. The low fluid potential seems especially anomalous considering the high elevation of the outcrops along the Laramie and Front Ranges and the Black Hills. A quasi-three-dimensional numerical flow model is used to investigate the regional flow system in the Denver Basin and adjacent mid-continent. The model simulates flow through the entire Phanerozoic sedimentary column and indicates that subnormal pressures are a consequence of hydraulic insulation of the strata within the basin from their recharge zones as compared to their discharge zones. The Dakota Sandstone and underlying hydrostratigraphic units are insulated from the overlying water table by low-permeability shales of Cretaceous age and from their own high-elevation outcrops by a zone of low permeability coincident with the basin depth. Subnormal pressures in the area of Denver, Colorado, and southward are further enhanced by faulting along the Front Range that isolates the strata within the basin from their outcrops. The results of this study show that (1) subnormal fluid pressures can be explained as a consequence of steady-state regional groundwater flow, (2) shale is an important factor in the regional flow system, and (3) depth is an important control on the distribution of hydraulic conductivity.

8

Blume, J.A., & Associates, Engineers, Inc. 1972. Seismic and Geologic Investigations and Design Criteria for Rocky Flats Plutonium Recovery and Waste Treatment Facility. Prepared for C.F. Braun & Company Engineers. September. EMF-ICN # 12825.

An investigation of the seismological and geological characteristics was performed to determine the seismic design and siting criteria for the plutonium recovery and waste treatment facility. The site is located on the Colorado Piedmont with the Rocky Mountain Front Range to the west and the High Plains to the east. Tectonically it is situated on the edge of the Denver Basin. A detailed regional geology section includes the tectonic framework, geologic history, site geology, geologic structure, and area faulting, The proposed location for the plutonium facility is located on a surface that is underlain by the Rocky Flats Alluvium. The site has been free of faulting for the past 1 million years. Seismological records illustrate that only one major earthquake has occurred in the area since 1870. Evaluations of the geological, seismological, and geophysical data were made to determine the potential earthquake exposure of the site. Recommendations are made for the facility design specifications in the event of the determined maximum earthquake prospects.

Boetcher, A.J., and T.J. Major. 1969. *Water-Level Changes 1964-1968, Northern High Plains of Colorado.* U.S. Geological Survey Un-Numbered Open-File Report. April.

Groundwater withdrawals for irrigation nearly quadrupled between 1960 and 1968 in the northern high plains of Colorado. Groundwater use increased from 82,000 to 308,000 acre-feet per year because of the rapidly growing number of irrigation wells (from 480 wells in 1960 to 1,810 in 1968). Utilization of the resource at this rate has caused significant water-level decline in areas where wells are concentrated and has alerted water managers to the need for an intensive study of the water resources of the area. Such a study was begun in 1968 to provide information for wise administration and management of the resource. Water levels and water-level changes are mapped, based on measurements in 400 wells in the Ogallala aquifer. (KNAPP-USGS)

Boss, M.R. 1973. Well Sampling at Rocky Flats: Including a Summary of Data Collected During 1972, Rocky Flats, Golden, Colorado. July 11.

Water samples collected monthly from 15 monitoring wells at Rocky Flats were evaluated to detect the possible movement of various chemicals and radioactive constituents, originating from site operations, into the water strata underlying the site. The wells sampled included three deep (approximately 150 feet) wells drilled in 1966 (to serve as background), six shallow

9

(approximately 20 feet) wells drilled in 1960 (to check the leakage from the solar evaporation ponds), and six shallow (approximately 30 feet) wells drilled in 1971(to monitor water below the asphalt pad). The water was analyzed for chemical constituents and radioactive contaminants. Figures and tables indicate well locations and analytical results. The data collected from monthly monitoring indicated no significant leakage of radioactivity occurring through the solar evaporation holding ponds. High concentrations of nitrate ion were found in the water from the wells surrounding the solar evaporation ponds. The nitrate ion concentration appeared to be increasing with time. The report recommended that the sampling frequency be reduced to bi-annual sampling events due to the lack of new information obtained during monthly monitoring.

Britton, L.J., and N.G. Gaggian. 1989. *Northern Great Plains and Rocky Mountain Provinces, Denver and Raton Mesa Regions.* U.S. Geological Survey and U.S. Bureau of Land Management Professional Paper 1464.

During the decade 1974–1984, the U.S. Geological Survey and the U.S. Bureau of Land Management cooperated on investigations to collect information to study hydrologic processes related to development and mining of federally owned coal. In the Denver and Raton Mesa regions, active coal mining has decreased to a great extent compared to previous decades. In 1985, there was one active coal mine in the Denver region and seven in the Raton Mesa region. In the Denver region, groundwater is available in alluvial aquifers, sedimentary bedrock, and in fractured systems of metamorphic and granite rocks of the Front Range. The Laramie-Fox Hills and Arapahoe aquifers are the lowest of the four major regional bedrock aquifers. Groundwater south of the South Platte River flows from the main recharge areas on the west and south to the main discharge areas on the north and east. Groundwater north of the South Platte River flows to the southeast. The Denver and Dawson aquifers are the uppermost bedrock aquifers in the region. They serve as a primary water source for parts of the Denver metropolitan area. The Dawson aquifer has better water quality and availability than the Denver aquifer. Groundwater flow in these aquifers is generally to the northeast. Well yields range from 15 gallons per minute to 2,000 gallons per minute. In the Raton Mesa region, nearly every formation stores and transmits water. Well yields in this region range from .5 gallons per minute to 500 gallons per minute. Groundwater is transmitted through the sandstones and basalts in this region and retarded by shales and coal. Depth to water varies depending on topographical features. Water quality is generally good, but may be contaminated by natural minerals and gases in localized areas. Coal mining operations in the area have had some effect on groundwater in these regions. Noted changes include increased dissolved solids concentrations in groundwater; possible

10

increase of pH, iron, and manganese; and extensive possibly unreversible water-level drawdowns.

Campbell, I.A. 1966. Stream Profiles and Pediments Near Boulder, Colorado. Mountain Geologist, volume 3, no. 4, pp. 171–179.

A graphical analysis of stream profiles in the Front Range between Boulder and Golden was developed to determine if it was possible to correlate stream nick points with pediments. The Rocky Flats surface pediment falls within the study area.

ChemRisk. 1992. Health Studies of the Rocky Flats — Phases 1 & 2, Briefing Book 10 – December 1992 Project Task 6 Exposure Pathway Identification and Transport Modeling — Preliminary Draft Report, Rocky Flats Plant, Golden, Colorado. November.

Groundwater has been identified as a possible exposure pathway because groundwater contamination has been documented at Rocky Flats. Groundwater can become contaminated through percolation of liquid effluent discharged to soil or holding ponds and leaching of buried waste. However, a complete assessment of the available groundwater information suggests that it is not a significant transport mechanism of the materials of concern at Rocky Flats with regard to historical exposures. Exposure pathways associated with groundwater are incomplete at this time. A compilation of information resulting from a sitewide risk assessment study, ultimately identifying possible exposure pathways and modeling transport mechanisms for select contaminants of concern, is included within this document.

Colorado Department of Health. 1973. USAEC Rocky Flats Plant Surveillance. July. EMF-ICN 7073.

This report presents numerical summary of data accumulated during July 1973, pertaining to environmental surveillance activities of the Colorado Department of Health. Sample concentrations for plutonium, uranium, tritium, and total alpha for air and surface water are reported.

Colorado Department of Health. 1986. Comments on DOE Rocky Flats Plant Part B Application Section E. (Ground-Water Protection). May 16. EMF-ICN # 25077.

Section E of the RCRA Part B application gives a description of the groundwater system in the vicinity of the solar ponds and reviews chemical data from monitoring wells in that area. The

11

section is seriously inadequate in regard to site-specific hydrogeologic information and needs to be more detailed in reporting the actions which have been taken to protect the groundwater sitewide. Contaminant plume information is deficient in documenting migration rates and contaminant constituents and concentrations within the plume. New monitoring points are needed. A post-closure plan, in compliance with all requirements, must be developed to address groundwater monitoring and corrective actions.

Crifasi, R.R. "Alluvial Architecture of Laramide Orogenic Sediments: Denver Basin, Colorado." *The Mountain Geologist 1992*, Vol. 29, No. 1: 19-27.

Understanding the Denver Basin evolution and sedimentary structure may lead to an efficient development of the groundwater resources. The basin-wide Arapahoe, Denver, and Dawson aquifers existing in the non-equivalent Arapahoe, Denver, and Dawson Formations of the Denver Basin are defined by nuances of the sand/shale ratio in the sediments detected by electric logging techniques. Isopach maps of aquifer units covering a 2,700-square-mile area of the Denver Basin have been compiled from 730 electric logs included in a database file at the Colorado Division of Water Resources. Comparison of the presented isopach maps to the sandstone/siltstone isolith maps shows a correspondence of thicker aquifer areas to thicker areas of sandstone and siltstone. The trend of greater aquifer thickness may be related to the general flow direction of the streams that deposited the sediment. Because these trends tend to channel the groundwater, the drawdowns of wells drilled into the same trend may adversely interfere with one another by causing the depletion of available water in the channel.

Davis, T.L. 1976. Rocky Flats Seismic Project. April. EMF-ICN#7879.

Seismic surveys were conducted to investigate the possible existence of faults in the vicinity of the Rocky Flats Plant (now the Rocky Flats Environmental Technology Site). Two distinct, but associated, fault zones were identified in the area. Rocky Flats is located on the stable, upthrown horst block showing no evidence of growth faults. No faults were identified in the immediate area of Rocky Flats. A seismic line location map, supporting geologic maps, and seismic data for each line are included.

12

DOE. 1989. Groundwater Assessment Plan, Rocky Flats Plant, Golden, Colorado. U.S. Department of Energy. September.

This plan outlines the current (1989) interim status groundwater monitoring program at RFP to ensure long-term quality and consistency and that the plan is in accordance with the Colorado Code of Regulations. Major components in the program include methods to be implemented in determining background groundwater quality, groundwater contamination, groundwater migration rates, and concentrations of contaminants in groundwater. An extensive review of the hydrologic setting has been completed as part of the program. The hydrologic review states that groundwater at the RFP occurs in the surficial units (Rocky Flats Alluvium, valley-fill alluvium, and colluvium) and in sandstones in the Arapahoe and Laramie-Fox Hills Formations. Aquifer characteristics, including recharge and discharge, are discussed in the plan. The areas included in the program are the Solar Evaporation Ponds, Present Landfill, and West Spray Field. Tables, lists, and maps detail the monitoring well network and the required analytical parameters.

DOE. 1989. Interim Remedial Action Plan for 881 Hillside Area, Rocky Flats Plant, Golden, Colorado. U.S. Department of Energy. August.

This document was prepared to identify, screen, and evaluate appropriate remedial action alternatives and select the preferred remedial action for the 881 Hillside area. Site characterization information from the remedial investigation report includes a review of groundwater in surficial materials and in Arapahoe sandstones and claystones at the site. Unconfined groundwater flow in surficial materials is mainly through colluvial gravels toward contact seeps and terrace edges. The report estimated that a conservative solute would travel 10,000 feet in the alluvium (from the Hillside to the property boundary) in about 20 years. Bedrock groundwater flow occurs through Arapahoe Formation sandstones. Water is supplied to bedrock from alluvial groundwater infiltration. The maximum rate at which groundwater flows through bedrock sandstone was estimated as 36 ft/yr. This assumes interconnectedness of sandstones with adjacent units or a laterally continuous sandstone unit. (Lateral continuity of the sandstone units appear to be rare in occurrence.) Groundwater in the Arapahoe Formation supplies usable water for irrigation, livestock watering, and domestic purposes east of Rocky Flats. Groundwater contamination data are presented and data tables are included to support findings. Three remedial action alternatives were proposed. Each alternative involves contingencies that could affect groundwater flow in the 881 Hillside area. Alternatives most affecting groundwater flow include the cut-off of groundwater flow and the need to replace groundwater to ensure complete aquifer recharge. An alternative based on the most effective

13

remediation of groundwater contamination was the chosen action as a result of this study. An interceptor trench system (French Drain) was the chosen alternative.

DOE. 1990. Environmental Assessment for 881 Hillside (High Priority Sites) Interim Remedial Action, Rocky Flats Plant, Golden, Colorado. U.S. Department of Energy. January.

Although discontinued in 1972, portions of the 881 Hillside were used for waste disposal and storage. These sites included oil sludge pits, chemical burial, solvent-drum storage sites, and liquid disposal sites. These practices resulted in impacts to soil and alluvial groundwater including above background occurrences of volatile organic compounds, metals, major ions, and uranium. To prevent the release and migration of impacted alluvial groundwater from this area and to reduce existing contamination to within acceptable levels within the groundwater, the U.S. Department of Energy proposed to collect impacted groundwater from identified sources, install a French drain, treat groundwater using ultraviolet (UV)/peroxidation and ion exchange techniques, and discharge the treated effluent at the surface. An environmental assessment was prepared to assess the environmental impacts of the proposed action and the alternative actions. In addition to evaluating the potentially affected environment, the environmental impacts (i.e., water quality impacts) of the proposed and alternative actions and risks to exposed populations were studied. Information evaluated included risk assessment criteria. Conclusions indicate that the proposed action of treating groundwater with UV/peroxidation and ion exchange was preferable over the other alternatives in containing, removing, and destroying the contaminants of concern.

DOE. 1991. Draft Background Pumping Test analysis, Rocky Flats Plant, Golden, Colorado. U.S. Department of Energy. December.

In 1989, five pumping tests were performed at the Rocky Flats Plant in areas identified as upgradient or sidegradient of potential contaminant sources. These tests, as part of the Background Hydrogeochemical Characterization Program, were designed to provide comparison criteria to subsequent tests in contaminant areas. The goals of these tests were to characterize the alluvium materials, test for interconnected sandstones, and test for vertical connection between bedrock and overlying strata. The results were originally presented in a 1990 EG&G report, but it was later found that incorrect assumptions were used in the calculations. The currrent (1991) document presents all the original data, recalculations of the aquifer characteristics and revised conclusions. The original data includes barometric pressures, analyses, well construction diagrams, generated curves (drawdown vs. discharge, etc.) and raw field data. Calculated values

14

include transmissivity, storativity and hydraulic conductivity. The stratigraphic units subjected to pump tests include the Rocky Flats Alluvium in the southwest buffer zone, colluvium in the north buffer zone, and the bedrock sandstone in the southeast buffer zone and Woman Creek area south of the plant. The report concluded that the alluvium and colluvium are not homogeneous and isotropic across the site, sandstones tested were hydraulically connected and tests did not indicate a hydraulic connection between the Rocky Flats Alluvium and the sandstone bedrock. Pump tests completed subsequent to this report, in areas of potential contamination, support these general conclusions.

DOE. 1991. Final Historical Information Summary and Preliminary Health Risk Assessment, Operable Unit No. 3 - IHSS 200-202, Rocky Flats Plant. U.S. Department of Energy. June.

Sediments in the Great Western Reservoir, Standley Lake, and Mower Reservoir (Individual Hazardous Substance Sites [IHSSs] 200, 201, and 202, respectively) contain low levels of plutonium as a result of past activities at Rocky Flats. In accordance with the Interagency Agreement for Rocky Flats, possible groundwater sources were identified as potentially impacting these IHSSs. The primary objectives of this report were to present all available data involving contamination within the reservoirs and tributaries of the reservoirs, including groundwater, and to provide a human health risk assessment associated with a no action remediation alternative. A summary of the hydrogeologic conditions near Great Western Reservoir is included, and it is expected that similar conditions exist in the vicinity of the other reservoirs. Specific hydrogeological data for the Great Western Reservoir were limited to drilling records from privately owned wells. Surficial deposits were described as clay, sandy clay, or clay with gravel and boulders capped with topsoil and range from 15-feet to 50-feet thick. The underlying bedrock is generally described as alternating layers of shale and sandstone, assumed to be of the Arapahoe Formation. Wells in the area range from 35-feet to 275-feet in depth, and water levels average between 10-feet to 50-feet higher than the screened interval, indicating moderate pressure heads in the sandstones. The study concluded that plutonium adsorbed to clay-rich reservoir sediments was effectively immobilized and water quality was not measurably impacted by plutonium in the sediments. The most significant exposure pathway for the reservoir was believed to be reentrainment of exposed sediments; however, downwind air monitoring stations report levels well below the standard set by the U.S. Department of Energy.

15

DOE. 1991. Final Past Remedy Report, Operable Unit No. 3 - IHSS 199, Rocky Flats Plant, Golden, Colorado. U.S. Department of Energy. May.

The remediation of plutonium at Individual Hazardous Substance Site (IHSS) 199 was evaluated to determine the effectiveness of the remedy, and a human health risk assessment associated with IHSS 199 was conducted. The general local hydrogeologic system was reviewed, and groundwater was identified as a possible secondary source of further plutonium contamination. Quantified results from soil and water investigations indicated that plutonium would not readily migrate horizontally or vertically in groundwater. The study determined that further investigations may be warranted to study the transport of plutonium bound to colloidal particles in groundwater. Groundwater was not identified as a likely pathway for plutonium migration at the site.

DOE. 1991. Final Phase II RFI/RI Work Plan (Alluvial): Revision 1, Rocky Flats Plant, 903 Pad, Mound, and East Trenches Area (Operable Unit No. 2). U.S. Department of Energy. February 28.

The work plan presents site-specific plans for further field work to characterize contaminant sources and the extent of soils, surface water, and groundwater contamination at the 903 Pad, Mound, and East Trenches areas at Rocky Flats. The primary objective of the investigation is to collect the necessary data to determine the nature, distribution, and migration pathways of contaminants. A review of Phase I RI activity site characterization results is presented. It includes a detailed discussion of the groundwater hydrology, including hydrostratigraphic unit designations, recharge/discharge conditions, flow directions, and flow rates. The document also outlines the work plan data quality objectives, study tasks, field sampling plan, environmental evaluation work plan, ARARs, and work schedule.

DOE. 1991. Final Phase II RFI/RI Work Plan (Alluvial) TM NO. 1, Rocky Flats Plant, 903 Pad, Mound, and East Trenches Areas, Operable Unit No. 2. U.S. Department of Energy. August 19.

This technical memorandum presents added fieldwork to characterize contaminant sources and the extent of soils, surface water, and groundwater contamination at the 903 Pad, Mound, and East Trenches areas. Because the scope of work for the investigation was expanded, this document serves as a continuation of the earlier Final Phase II RFI/RI Work Plan to describe further field studies. A review of groundwater hydrogeology is included.

16

DOE. 1991. Final Phase II RFI/RI Work Plan (Bedrock), Rocky Flats Plant, Golden, Colorado, Colorado. U.S. Department of Energy. May. (Survey dates: August 1990, October–November 1990, November–December 1990, June.)

This work plan includes a field sampling plan that establishes the scope of field investigations and criteria used to redirect and expand the sampling efforts necessary to accomplish stated goals. The work plan addresses characterization and the nature and extent of contamination in the bedrock and hydrostratigraphic units beneath the upper hydrostratigraphic unit. The work plan emphasizes the development of a conceptual model to describe the bedrock hydrogeology, nature and extent of contamination in the bedrock, release mechanisms, exposure pathways, and receptors. The predominant component of the groundwater hydraulic gradient in the lower hydrostratigraphic unit appears to be downward. However, the low hydraulic conductivity of the unweathered claystone impedes the downward flow of groundwater. There is geologic evidence that the majority of groundwater flow that occurs may be laterally to the east. In general, the lower hydrostratigraphic unit is incompletely modeled. The objectives of the bedrock component of the Phase II RFI/RI are to characterize the bedrock hydrogeology and to sufficiently characterize the nature and extent of bedrock contamination to support the feasibility study , baseline risk assessment, and remedial design.

DOE. 1992. Draft Final Phase III RFI/RI Report for Operable Unit No. 1 (881 Hillside Area). Rocky Flats Plant, Golden, Colorado. U.S. Department of Energy. October.

This report presents the results for the Phase III remedial investigation characterizing the 881 Hillside (OU 1), the site physical features, the nature and extent of contamination and the assessment of risks. The report, including appendices, is an 18 volume set.

The site geology and hydrogeology is presented in the document in the site physical features sections. Cross-sections, maps, aquifer test data (slug, pump, packer, tracer), core logs, geophysical logs and geotechnical test data (Atterberg limits) are provided to support the interpretations and conclusions of the report. The characteristics of surficial deposits, including Rocky Flats Alluvium, colluvium and fill and valley-fill alluvium, overlaying the Laramie Formation claystone, siltstone and sandstone are discussed. Groundwater in the shallow surficial units at OU 1 is sparse and seasonally much of the upper hydrostratigraphic unit is dry. The bedrock is characterized as dense and has low hydraulic conductivity values. These characteristics further constrain the groundwater flow in the UHSU. Flow down the 881 Hillside toward Woman Creek is limited by these hydrogeologic conditions and by a French drain system

17

extending 1,800 feet along the hillside. Alluvial groundwater at IHSS 119 is contaminated by VOCs. The migration of this contamination is extremely limited because it is constrained by geologic conditions and the seasonally dicontinuous flow of groundwater. The report concludes that the OU 1 site presents no present risks and no predictable future risks to ecological or human receptors from existing contamination. This draft final document has been revised into a final document dated November 1993, and a subsequent final document dated June 1994.

DOE. 1992. Final No Further Action Justification Document, Rocky Flats Plant, Low Priority Sites (Operable Unit 16), Golden, Colorado. U.S. Department of Energy. July.

This document for Operable Unit No. 16 (OU 16) was prepared as part of the site characterization, remedial investigation, feasibility studies, and remedial/corrective actions in progress at the Rocky Flats site. OU 16 contains seven individual hazardous substance sites (IHSSs 185, 192, 193, 194, 195, 196, and 197) that either have undergone previous response actions or are associated with natural environmental processes eliminating the need for further action. Each IHSS was evaluated for risks to human health and the environment using a site conceptual model to evaluate the exposure pathways, including groundwater as a transport medium or pathway, by which potential receptors may be exposed to contaminants. A summary of the hydrogeology of OU 16 is presented and is accompanied by a potentiometric surface map. Groundwater quality data are presented as an appendix. This study concluded that further action is not justified at six of the seven IHSSs due to mitigation by past response actions and/or natural attenuation processes eliminating the source or exposure pathways. Further action is warranted only at IHSS 196, which is the Water Treatment Plant Backwash Pond.

DOE. 1992. Final Phase II RFI/RI Aquifer Test Work Plan (Alluvial) RFP Operable Unit No. 2, TM No. 3, Rocky Flats Plant, Golden, Colorado. U.S. Department of Energy.

To help understand the hydraulic characteristics of selected hydrostratigraphic units within OU 2 at Rocky Flats, an aquifer test plan was developed. The goals of this evaluation were to determine hydraulic parameters and to evaluate the degree of hydraulic connectedness within alluvium and bedrock aquifers. Three distinct hydrostratigraphic situations were analyzed to provide hydrologic information, maximize the use of existing wells, minimize additional well installation, and minimize time consumed by hydrologic testing. Test sites were chosen based on anticipated subsurface geological features. For instance, it is believed that groundwater in the Arapahoe Formation sandstone may flow through meandering paleochannels; therefore, two of the three test sites were selected such that tested wells would penetrate the uppermost sandstone

18

of the Arapahoe Formation. Geologic and hydrologic characteristics of the aquifer test sites were taken into consideration during design of the aquifer test, and data are included on tables. Maps and schematic figures help illustrate the test design.

DOE. 1992. Phase I RFI/RI Work Plan, Rocky Flats Plant, Solar Evaporation Ponds (Operable Unit No. 4), Golden, Colorado. U.S. Department of Energy. January.

The broad goals of the Phase I investigations at the Solar Evaporation Ponds (SEPs) include characterization of the physical features of the sources at the site and definition of the contaminant sources within Operable Unit No. 4 (OU 4). Site-specific objectives and data needs were identified and a field sampling plan was designed. The Phase I investigation at the SEPs included limited hydrogeologic studies, and the work plan provides review of sitewide hydrogeology. The main focus of the report is on source materials and soils. Groundwater was considered a potential contaminant pathway to the biotic environments especially around seeps. Groundwater investigations during the OU 4 Phase I RFI/RI were limited to piezometer installation to provide information on the water table configuration of the trench on the OU 4 boundary.

DOE. 1992. Phase I RFI/RI Work Plan for Operable Unit 6—Walnut Creek Priority Drainage, Manual No. 21100-WP-OU6.01, Rocky Flats, Golden, Colorado. U.S. Department of Energy. June.

This work plan presents the activities to be carried out to complete the Phase I investigation. It also includes introductory information of the general characteristics of the region and plant site, regional geology and hydrology at Rocky Flats, descriptions of the site physical characteristics, histories and previous investigations, available information concerning the nature and extent of contamination, and conceptual models for the IHSSs. Available historical and background data for each IHSS were collected and reviewed through a literature search and a review of the Rocky Flats Environmental Database System (RFEDS). Past investigations include sediment sampling in the A- and B-series ponds; ongoing surface water, groundwater, and sediment sampling programs along Walnut Creek; and the plantwide Ambient Air Monitoring Program. The main objectives for the Phase I RFI/RI were identified as: characterize the physical and hydrogeologic setting of the IHSSs; assess the presence or absence of contamination at the sites; characterize the nature and extent of contamination at the sites, if present; and support the Phase I Baseline Risk Assessment and Environmental Evaluation. Within these broad objectives, site-specific data needs were identified based on preliminary identification of contaminants potentially present at

each IHSS and the data needs for the Phase I Baseline Risk Assessment and Environmental Evaluation. The FSP for each IHSS required a combination of screening activities; sampling of soils, sediment and surface water; and installation and sampling of wells.

DOE. 1992. Phase I RFI/RI Work Plan—Woman Creek Priority Drainage Operable Unit No. 5, Rocky Flats Plant, Golden, Colorado. U.S. Department of Energy. February.

This work plan includes introductory information of the general characteristics of the region and plant site, regional geology and hydrology at Rocky Flats, descriptions of the site physical characteristics, histories and previous investigations, available information concerning the nature and extent of contamination, and conceptual models for the IHSSs. Available historical and background data for each IHSS were collected and reviewed through a literature search and a review of the Rocky Flats Environmental Database System (RFEDS). Past investigations include a germanium gamma radiation survey at the Original Landfill (IHSS 115); sediment sampling in Woman Creek; ongoing surface water, groundwater, and sediment sampling programs along Woman Creek and the South Interceptor Ditch (SID); and the plantwide Ambient Air Monitoring Program. The main objectives of the Phase I RFI/RI were identified as: characterize the physical and hydrogeologic setting of the IHSSs; assess the presence or absence of contamination at the sites; characterize the nature and extent of contamination at the sites, if present; and support the Phase I Baseline Risk Assessment and Environmental Evaluation. Within these broad objectives, site-specific data needs were identified based on preliminary identification of contaminants potentially present at each IHSS and the data needs for the Phase I Baseline Risk Assessment and Environmental Evaluation. The FSP for each IHSS required a combination of screening activities; sampling of soils, sediment, and surface water; and installation and sampling of wells.

DOE. 1992. Phase II RFI/RI Aquifer Test Report, Volume I, Rocky Flats Plant, Golden, Colorado. U.S. Department of Energy. November.

Unable to locate; no summary available.

DOE. 1992. Phase III RFI/RI Report - Rocky Flats Plant 881 Hillside Area (Operable Unit No. 1), Rocky Flats Plant, Golden, Colorado. U.S. Department of Energy. October.

The Phase III RFI/RI had several objectives: to characterize surficial and subsurface physical features at the operable unit, to characterize contaminant sources and the nature and extent of contamination at the site, and to provide a baseline risk assessment that considers contaminant

20

fate and transport and assesses the threat to public health and the environment from a no-action remedial alternative. Additionally the Phase III RFI/RI provided and developed data needed for feasibility studies of remedial alternatives as appropriate. Geologic units present at 881 Hillside include Rocky Flats Alluvium at the top of the hillside, colluvium and fill along central portions of the hillside, and Woman Creek valley-fill alluvium at the base of the hillside. These thin surficial units are underlain by thick Cretaceous claystone, siltstone, and sandstone of the Laramie Formation. Groundwater within these shallow surficial units is sparse and varies in elevation due to seasonal variation in precipitation and depression-focused recharge. Often, large portions of this upper hydrostratigraphic unit (UHSU) are dry within OU1 boundaries. When and where UHSU groundwater exists, flow is constrained laterally and vertically by the denser, low hydraulic conductivity bedrock surface. This configuration of the hydrologic system results in few continuous lateral groundwater flow pathways that permit groundwater flow from the rim of the valley to Woman Creek at the base of the hillside. Likewise, the installation of a French drain along the central portion of 881 Hillside further reduced potential groundwater flow paths toward Woman Creek. Contaminants have been identified in subsurface-surface soils and alluvial UHSU groundwater at the site and their migration pathways have been examined and evaluated.

DOE. 1993. Final Groundwater Assessment Plan, Rocky Flats Plant, Golden, Colorado. U.S. Department of Energy. February.

In accordance with governing agencies, a groundwater assessment plan was developed describing procedures for conducting RCRA interim groundwater monitoring and data evaluation for three RCRA-regulated units at Rocky Flats. These units include the Present Landfill, West Spray Field, and Solar Evaporation Ponds. Site-specific data, including tables and figures, for each of the regulated units provide information on historical uses; geology; hydrogeologic conditions; and past, present, and proposed groundwater monitoring activities. The 1990 groundwater monitoring data indicate that contaminants detected above background in the West Spray Field groundwater include metals, anions (fluoride, nitrate/nitrite, phosphate, silica, sulfate, and total suspended solids), methylene chloride, and radionuclides. Analytes present at elevated concentrations in groundwater underlying the Present Landfill include inorganics (nitrate/nitrite, bicarbonate, chloride, sulfate, total dissolved solids, calcium, magnesium, and sodium), metals, radionuclides, and volatile organic compounds (VOCs). Contaminants detected above site background concentrations in groundwater beneath the SEPs include total dissolved solids, metals, VOCs, radionuclides, and nitrate/nitrite. General assessment plan information includes procedures for monitoring groundwater at the site, evaluating data at points of compliance, and

21

assessing groundwater flow and the extent of the contamination. A summary of background groundwater quality data and a description of the statistical methodologies used in evaluating groundwater results is also included.

DOE. 1993. Final Revised Phase II RFI/RI Work Plan (Bedrock) for Operable Unit No. 2. Technical Memorandum No. 8. Rocky Flats Plant, Golden, Colorado. U.S. Department of Energy. May.

Unable to locate; no summary available.

Doty, Benjamin P. 1988. Travel Time in Ground Water. April. EMF-ICN#12000.

This report uses introductory hydrologic concepts as a basis for calculating contaminant travel times in groundwater. Groundwater transport of dissolved chemical species is controlled by advection, dispersion, and physical/chemical reactions. Advective transport through the valley-fill alluvium occurs in response to infiltration events. Using Darcy's law and assuming a six-month saturation period, the travel time from the source to the plant boundary is calculated to be 80 years. Advective transport through the Arapahoe claystone and sub-cropping permeable sandstone is most influenced by an assumption that the units are hydraulically interconnected. Using this assumption and Darcy's law, the travel time from the source to the plant boundary is 800 years.

Doty, B.P. 1989. Memorandum to T. C. Greengard. EPA Ground-Water Protection Strategy Classification. EMF-ICN # 26838.

The area under review consists of a 2-mile radius of the facility and includes the upstream edge of the Great Western Reservoir and almost includes the domestic wells immediately to the west of Standley Lake. There are two groundwater flow systems: unconfined flow in the Rocky Flats Alluvium and confined flow in sandstones within the Arapahoe Formation. The systems are mostly separated by a boundary condition. Studying wells, water supply reservoirs, ecology, and demography of the area helps determine the EPA classification of the groundwater conditions. It is concluded that both groundwater systems should be classified as IIA because they do not support threatened species, they are not highly vulnerable to contamination, and they are not used by a substantial population, but they do supply few households with a drinking water source and discharge to drinking water supply reservoirs.

22

Driver, N.E., and R.S. Williams. 1986. *Hydrogeology of and Potential Mining Impacts on Strippable Lignite Areas in the Denver Aquifer, East-Central Colorado.* U.S. Geological Survey Water Resources Investigation Report 84-4366.

Strippable lignite coal seams, 20 to 60 feet thick, are present in the Denver Formation. The Denver aquifer, the saturated part of the Denver Formation, is likely to be affected locally by surface mining of lignite. Transmissivity of that aquifer in the study area is estimated. Distance-drawdown curves show the extent of water-level drawdown near a dewatered surface mine. After reclamation of the lignite mine pit, flow through the lignite spoil pile may increase dissolved solids concentrations in the Denver aquifer. This increase could occur because, as water from rain and overland flow percolates through the newly exposed rock surfaces in the spoil material, minerals from the overburden can be dissolved in the water, which then joins with water from the aquifer. This increase could locally change streams, springs, and alluvial and bedrock aquifers.

EG&G Rocky Flats, Inc. 1989. Rocky Flats Plant Site Environmental Report, January through December 1989. Prepared for the U.S. Department of Energy. February.

This report provides information to the public about the impact of the Rocky Flats site on the environment and public health. The hydrogeology of the site is among several topics addressed. A brief hydrogeologic introduction describes the two groundwater flow systems that exist at the site. The two systems consist of a shallow unconfined aquifer in the Rocky Flats Alluvium and shallow paleochannels in the surface of the bedrock and a confined aquifer in the deeper sandstone units of the Arapahoe and Laramie Formations. Groundwater flow is generally from west to east beneath the site. The present groundwater monitoring system is designed to identify the magnitude and extent of contamination within these groundwater flow systems.

EG&G Rocky Flats, Inc. 1990. 1988 Annual RCRA Groundwater Monitoring Report for Regulated Units at Rocky Flats Plant — Addendum. March 1.

Information previously unavailable during preparation of the 1988 Annual RCRA Groundwater Monitoring Report (1988 Report) includes geochemical data for the three RCRA-regulated units at Rocky Flats: Solar Evaporation Ponds (SEPs), the West Spray Field, and the Present Landfill. Data not available include 1988 fourth-quarter metals data and third- and fourth-quarter radionuclide data. Updated tables originally presented in the 1988 Report summarize concentrations of metals and radionuclides detected above background levels. The additional

23

metals data support earlier interpretations of the nature and extent of metals contamination at these units. Above-background concentrations of radionuclides of uranium were observed in groundwater from the West Spray Field and Present Landfill, although uranium was not previously detected above background at these locations.

EG&G Rocky Flats, Inc. 1990. Background Geochemical Characterization Report for 1989. Rocky Flats Plant, Golden, Colorado. Prepared for the U.S. Department of Energy. December 21.

Groundwater, surface water, sediment, and soil samples were collected from areas undisturbed by plant operations. Samples were analyzed to describe the geochemical characteristics of media collected from background locations and will be used to evaluate the nature and extent of environmental contamination in areas affected by plant operations. Groundwater samples collected within the buffer zone west, north, and south of the plant were analyzed for radionuclides, metals, major ions, and water quality indicator parameters. Summary statistics and tolerance intervals are computed to describe separate groundwater units classified by geographic location and lithology (Rocky Flats Alluvium, valley-fill alluvium, and weathered and unweathered bedrock). Various tables, plates, and figures (histograms, trilinear diagrams, etc.) summarize the analytical results and statistical analyses. Groundwater chemistry does not vary geographically, with the exception of chloride. Ongoing hydrogeological investigations indicate that groundwater beneath the Rocky Flats site consists of an upper and a lower flow system. Based on geochemistry, the upper flow system, which is characterized by bicarbonate to calcium carbonate waters, is comprised of the Rocky Flats Alluvium, valley fill, and weathered bedrock. The lower flow system includes unweathered bedrock and is characterized by water with relatively higher concentrations of sodium, potassium, chloride, and sulfate. Background groundwater chemistry fluctuates seasonally. The tolerance levels presented here may be used to compare non-background data to help identify potential areas of chemical impact for the Rocky Flats Plant. Data from chemical and statistical analyses are presented to support tolerance limit calculations.

EG&G Rocky Flats, Inc. 1990. Final Phase III RFI/RI Work Plan: Rocky Flats Plant 881 Hillside Area (Operable Unit No. 1), Rocky Flats Plant, Golden, Colorado. Prepared for the U.S. Department of Energy. October.

This work plan summarizes the data needs, tasks, and fieldwork that will occur in connection with a Phase III investigation. A portion of this review consists of the Phase I and Phase II

characterization results including site geology and hydrology as well as the nature and extent of contamination in soils, groundwater, surface water, and sediments. Groundwater occurs in the surficial materials under unconfined conditions whereas confined groundwater flow occurs in deeper sandstone units. Recharge in this area is due to infiltrating precipitation, seepage from ditches and creeks, and leakage from detention ponds. Groundwater in surficial materials generally flows from the 881 Hillside southeast toward Woman Creek and may eventually flow down-valley to the east or be consumed by evapotranspiration. The hydraulic conductivities of surficial materials range from $9x10^{-4}$ cm/s to $7x10^{-5}$ cm/s depending on the type of surficial material. Groundwater from the alluvial material supplies water to the underlying sandstone units of the Arapahoe Formation as does leakage from overlying claystone units. The flow in the sandstones is assumed to be from west to east; however, the flow pattern in the sandstones is not yet fully understood. Hydraulic conductivity values for sandstones estimated from drawdown recovery tests, slug tests, and packer tests performed between 1986 and 1987 are in the range of 3×10^{-4} cm/s to 2×10^{-7} cm/s. The variability of these results is expected because of variable silt contents. Details of groundwater chemistry are presented in tables and discussed. Concentration maps and various water-elevation maps supplement the report.

EG&G Rocky Flats, Inc. 1990. Ground-Water Assessment Plan Addendum, Rocky Flats Plant, Golden, Colorado. Prepared for U.S. Department of Energy. May.

A description of site characteristics, contaminant migration, and groundwater monitoring is presented as an addendum to the Rocky Flats Groundwater Assessment Plan in response to comments from CDH. The monitoring program involves three RCRA-regulated units including the West Spray Field, the Present Landfill, and the Solar Evaporation Ponds. An overview of geology, hydrogeological characteristics, types of contaminants, potential pathways and transport mechanisms, and monitoring activities is presented separately for each unit. No conclusions are drawn.

EG&G Rocky Flats, Inc. 1990. High Resolution Seismic Reflection Application in Ground Water Monitoring Design, Rocky Flats Plant, Golden, Colorado. Prepared for the U.S. Department of Energy.

The bedrock underlying the Rocky Flats Plant is comprised of claystone, siltstone, and sandstone units that were deposited by a complex fluvial system. Because of the heterogeneities inherent in such a complex stratigraphic system, the inherent costs of investigation prompted an evaluation of alternative methods to characterize the subsurface geology. Shallow, high resolution seismic

25

reflection was modeled and field tested in light of remedial investigation objectives to assess groundwater contamination. In addition, paleochannel morphologies, facies changes, and other stratigraphic and structural features not evident from borehole correlations were indicated. The current stratigraphic and depositional models are being re-evaluated to incorporate this preliminary seismic information. A conceptual three-dimensional geologic model, in addition to previously collected contaminant data, is being used to develop the monitoring networks at Rocky Flats.

EG&G Rocky Flats, Inc. 1991. 1990 Annual RCRA Groundwater Monitoring Report for Regulated Units at Rocky Flats Plant. Prepared by EG&G Environmental Management Department. March 1.

The report includes a conceptual model of the groundwater flow system within each of the regulated units (Solar Evaporation Ponds [SEP], West Spray Field, and Present Landfill. The uppermost aquifer within each unit consists of surficial materials (alluvium, colluvium, and valley fill) and weathered bedrock. The unconfined (surficial) groundwater system is locally influenced by topography and the configuration of the top of bedrock. Unweathered bedrock is not considered part of the uppermost aquifer because of the low hydraulic conductivities calculated for these units. Calculated vertical gradients reveal downward saturated flow between surficial materials and weathered bedrock at the Solar Evaporation Ponds. Average linear groundwater flow velocities within surficial and weathered bedrock materials at the SEP unit were estimated to be 0.7 ft/yr and 0.3 ft/yr, respectively.

Monitoring wells completed within weathered bedrock in the Present Landfill area indicate local areas of hydraulic connection as well as areas that are hydraulically separated (disconnected) between the weathered bedrock and the saturated surficial materials. Groundwater elevations in surficial materials are characterized by seasonal variations of up to approximately 8 feet at the Present Landfill and 3 feet or less at the West Spray Field.

EG&G Rocky Flats, Inc. 1991. Final Groundwater Protection and Monitoring Program Plan of Rocky Flats Plant. Prepared for the U.S. Department of Energy. November 27.

The groundwater protection and monitoring activities at Rocky Flats were evaluated and a formal Groundwater Protection and Monitoring Program was developed in accordance with DOE Order 5400.1. The program includes 371 wells, of which 259 are sampled. Specific objectives of the program are to monitor concentrations of contaminants in groundwater, assess the rate of

26

groundwater movement, and determine the location and extent of contaminant plumes. This program will be reviewed and evaluated annually and updated every three years. An understanding of the various monitoring activities at Rocky Flats; site geology, hydrogeology, and groundwater geochemistry; and all applicable regulations, agreements, and orders is essential for evaluating the program. The program's status is highlighted by the presentation of monitoring well location maps, figures, and data tables. A general discussion of the sitewide hydrogeology includes the breakdown of the uppermost and lower hydrostratigraphic units, general flow direction, and hydraulic properties. This information is augmented by various hydrogeologic maps, schematics, and data tables. Future developments and interpretations are anticipated to affect the design and implementation of the Groundwater Protection and Monitoring Program.

EG&G. 1991. Final Phase II RFI/RI Work Plan (Alluvial) Revision I. 903 Pad, Mound, and East Trenches Areas (Operable Unit No. 2). February.

This Phase II RFI/RI Work Plan presents site-specific plans for further fieldwork to characterize contaminant sources and the extent of soils, surface-water, and groundwater contamination. The 903 Pad, Mound, and East Trenches Areas, located on the east side of the Rocky Flats site security area, were selected for investigation because of their suspected relationship to groundwater contamination. Results show contaminants existing in the upper hydrostratigraphic unit (UHSU) groundwater flow system in these areas. The UHSU includes the alluvium and hydraulically interconnected bedrock sandstone (uppermost sandstone). Contaminants detected above background include select volatile organic compounds, several trace elements, major cations and anions, total dissolved solids, and a number of radionuclides. Volatile organic and radionuclide contamination observed in seeps downgradient of the 903 Pad and in the upper reaches of South Walnut Creek at the Mound area may have been a result of surface-water and groundwater interaction and surface soil contamination in these areas. This plan calls for drilling and sampling of 46 boreholes and the installation of 63 "source" monitor wells. The plan indicated that 130 additional alluvial wells would be installed to characterize and monitor pumps and groundwater flow and quality in alluvial materials at the 903 Pad, Mound, and East Trenches Areas. An unspecified number of additional bedrock monitoring wells would be installed, developed, and sampled as the first step of the investigation. Source characterization activities would be performed subsequently. This "step-approach" would facilitate early evaluation of the need for interim remedial action to mitigate contaminant migration in groundwater of the UHSU.

27

EG&G Rocky Flats, Inc. 1991. Geologic Characterization Report. Prepared for the U.S. Department of Energy. July 31.

The hydrogeology of the Rocky Flats site has been characterized in an effort to aid the evaluation of groundwater flow parameters and contaminant migration pathways. The Rocky Flats site generally lies within a regional groundwater recharge area with localized areas of discharge along seeps and in streams. The uppermost hydrostratigraphic unit consists of unconsolidated alluvial material, including Rocky Flats Alluvium, and valley-fill alluvium, and subcropping sandstones of the Arapahoe Formation beneath the alluvium. The lower hydrostratigraphic unit consists of unweathered bedrock of the Arapahoe and Laramie Formations composed primarily of sandstones and claystones. Hydrologic data on the claystones of the Arapahoe Formation indicate that they exhibit low hydraulic conductivities and serve to confine much of the groundwater flowing within the lower hydrostratigraphic unit. Hydraulic properties for various geologic formations present beneath the Rocky Flats site indicate that the upper hydrostratigraphic unit exhibits low conductivities. Hydraulic conductivities for all lithologic units are presented in the report. Water-level maps of the uppermost hydrostratigraphic unit illustrate the hydraulic connection between the alluvial units and the subcropping Arapahoe sandstone. Information on depths to water indicate that groundwater flow is from west to east at the site. The hydrogeologic characterization is intended to provide input for hydrogeologic modeling, design of groundwater monitoring programs, and future remediation efforts.

EG&G Rocky Flats, Inc. 1991. Geophysical Applications for RCRA/CERCLA Investigations, Task 5, Plume Delineation of Landfill Drainage, Rocky Flats Plant, Golden, Colorado. May.

This report documents an electromagnetic (EM) survey conducted at the Present Landfill and the Solar Evaporation Ponds to determine the effectiveness of this geophysical method for subsurface mapping of TDS plumes, and to determine the source of the TDS plume near these sites. The report presents a brief, general summary of geology and hydrogeology at the Landfill and Solar Ponds, the EM methodology, surveys, data analysis, conductivity tables, pseudosections of the EM data, and conclusions. It was concluded that it is possible to define a relationship between the TDS concentration and the pore water conductivity and utilize this relationship to define specific areas which may represent elevated TDS content. The limiting factor is accurate characterization of the physical properties of the rock materials because conductive clays can be indistinguishable from the TDS signatures.

28

EG&G Rocky Flats, Inc. 1991. Present Landfill Area Groundwater/Surface Water Collection Study, Task 8 of the Zero-Offsite Water Discharge Study. Prepared for Rocky Flats Plant, Golden, Colorado. January 15.

The report addresses issues related to the surface and groundwater management at the Present Landfill in the development of a Zero-Offsite Water-Discharge Plan. The study presents a review of analytical data associated with the groundwater/leachate and an analysis of the expected quantities of water to be managed. The landfill pond collects approximately 1,700,000 gallons per year of leachate flow (from the surficial aquifer) in the leachate collection system. Three water management alternatives are presented.

EG&G Rocky Flats, Inc. 1991. Rocky Flats Plant Site Environmental Report, January through December 1990. Prepared for the U.S. Department of Energy.

This report provides information to the public about the impact of the Rocky Flats Plant on the environment and public health. The hydrogeology of the site is among several topics addressed. A brief hydrogeologic introduction describes the two groundwater flow systems that exist at the site. The two systems consist of a shallow unconfined aquifer in the Rocky Flats Alluvium and shallow paleochannels in the surface of the bedrock and a confined aquifer in the deeper sandstone units of the Arapahoe and Laramie Formations. Groundwater flow is generally from west to east beneath the site. The present groundwater monitoring system is designed to identify the magnitude and extent of contamination within these groundwater flow systems.

EG&G Rocky Flats, Inc. 1991. Task 3 Shallow, High Resolution Seismic Reflection Profiling in Operable Unit No. 2 (903 Pad, East Trenches, and Mound) at the Rocky Flats Plant — Final Report. Prepared by EBASCO Services, Inc. February.

A shallow, high-resolution seismic reflection program uncovered three identifiable major channel zones. Two of these channel zones contain greater volumes of highly permeable sandstones than the more prominent, surrounding low-permeability claystones and siltstones. These channel zones could provide potential bedrock contaminant pathways via groundwater flow.

29

EG&G. 1992. 1989 Surface-Water and Sediment Geochemical Characterization Report: Final. April 1.

This report documents the overall program goals and specific monitoring objectives of the sitewide surface-water and sediment monitoring program for Rocky Flats. It presents the data collection, validation, and management protocols used for 1989, the methodology for the results of quantitative analysis of all 1989 monitoring data, and an evaluation of the effectiveness of the 1989 program as well as recommendations for future monitoring. The report describes the 1989 monitoring program from initial network design through field sampling procedures and equipment, laboratory, and analytical requirements; data validation; data management; statistical and quantitative data analysis; and conclusions regarding surface-water and sediment contamination at the site.

EG&G Rocky Flats, Inc. 1992. 1990 Annual RCRA Groundwater Monitoring Report for Regulated Units at Rocky Flats Plant - Addendum. Prepared by EG&G Environmental Management Department. March 1.

This addendum presents data that was unavailable during the preparation of the 1990 Annual RCRA Groundwater Monitoring Report. Geochemical data for the three RCRA-regulated units are presented. No new groundwater flow interpretations are made in this addendum.

EG&G Rocky Flats, Inc. 1992. 1991 Annual RCRA Groundwater Monitoring Report for the Regulated Units at Rocky Flats Plant. Prepared by EG&G Environmental Management Department. March.

For the purpose of determining the impact of waste-management activities at the three RCRA-regulated units at Rocky Flats (the Solar Evaporation Ponds [SEPs], West Spray Field, and Present Landfill), 1991 groundwater data for each unit are statistically evaluated with respect to the site background data. Upon evaluating the results, the current groundwater monitoring program is assessed for effectiveness, and recommendations are made for future monitoring activities. Tables and various maps, including concentration contour maps, are used to present the data and make conclusions regarding the extent of impact at each site. Groundwater quality data is presented, and the nature of contaminants at each unit is determined. The uppermost aquifer and conceptual model of the groundwater flow system, including potentiometric surfaces and flow velocities, are described separately for each RCRA unit.

30

EG&G Rocky Flats, Inc. 1992. 1991 Annual RCRA Groundwater Monitoring Report for the Regulated Units at Rocky Flats Plant - Addendum. Prepared by EG&G Environmental Management Department. August.

This addendum presents data that was unavailable during the preparation of the 1991 Annual RCRA Groundwater Monitoring Report. Data presented includes geochemical data for the three RCRA-regulated units. No new interpretations are made in this investigation.

EG&G Rocky Flats, Inc. 1992. Background Geochemical Characterization Plan — Final, Rocky Flats Plant, Golden, Colorado. Prepared for the U.S. Department of Energy. February 28.

To monitor for possible environmental degradation which may have resulted from past work practices at the Rocky Flats site, a program to investigate the background geochemistry of geologic media, including groundwater was designed. A simplified review of the sitewide hydrogeology is one of several general topics of concern. Standard techniques will be used to sample geologic media to establish background levels. An oversimplified schematic of the hydrologic setting and well details are among the general data presented. Methods to collect and analyze chemical and statistical data are set forth. Recommendations for the geochemical and statistical evaluation of the data are made.

EG&G Rocky Flats, Inc. 1992. Background Geochemical Characterization Report, Rocky Flats Plant, Golden, Colorado. Prepared for the U.S. Department of Energy. September 30.

In order to evaluate potential contamination in soil and groundwater at the Rocky Flats site, analytical results are statistically compared with site background data collected from undisturbed non-impacted areas. Background geochemical data were collected from 1989 through 1992 in accordance with the Background Geochemical Characterization Program at Rocky Flats. Samples were collected quarterly from wells in north and south areas of the site and analyzed for radionuclides, metals, volatile organic compounds (VOCs), major ions, and several indicator parameters. Summary statistics and tolerance intervals were developed for each data set. Numerous plates, tables, and figures summarize site information, including analytical results and related statistical analyses. Groundwater at the Rocky Flats site consists of an upper flow system including the Rocky Flats Alluvium, valley-fill alluvium, colluvium, and weathered bedrock and a lower flow system consisting of unweathered Arapahoe/Laramie bedrock. Geochemical plots (Stiff diagrams) of groundwater major ion chemistry indicate that unweathered sandstone

groundwater is predominantly a sodium sulfate type, whereas the upper flow system is a calcium bicarbonate water. The mean concentrations of many metals, radionuclides, and water-quality parameters indicate significant differences between lithologic unit and geographical location. Several spatial trends in total dissolved solid concentrations are observed within the upper flow system. Similarly, uncharacteristic major ion geochemistry is observed downgradient and sidegradient of the Rocky Flats site. Operable Units 2 and 7 may be influencing groundwater chemistry immediately downgradient of these units. The majority of analytes exhibited more significant differences between lithologic units than between locations (north versus south of Rocky Flats). There were no VOCs detected in background groundwater. In addition, there were no systemic seasonal variations observed in background groundwater quality.

EG&G Rocky Flats, Inc. 1992. OU 2 Domestic Water Supply Simulations. Earth Resources Division, Rocky Flats Plant, Golden, Colorado.

Unable to locate; no summary available.

EG&G Rocky Flats, Inc. 1992. Phase I RFI/RI Work Plan for Operable Unit 6: Walnut Creek Priority Drainage Vol. 1, Text. June.

This document includes a field sampling plan that presents the investigation that will be conducted to evaluate the presence or absence of contamination at individual hazardous substance sites (IHSSs) within North and South Walnut Creek drainages. The regional hydrogeology is discussed as part of the general site characterization. The initial characterization forms the basis for establishing data needs, data-quality objectives, and developing a field sampling plan for each IHSS. The data collected will be used to better define site characteristics, source characteristics, and the nature and extent of contamination; to support the baseline risk assessment and environmental evaluation; and to evaluate potential remedial alternatives.

EG&G Rocky Flats, Inc. 1992. Rocky Flats Plant Environmental Monitoring Plan. March 1991.

This document describes the Rocky Flats monitoring programs for groundwater, surface water, air meteorology, soils, ecological and archaeological resources, gamma radiation, procedures for dose assessment, and quality assurance/quality control. The purpose of the Groundwater Monitoring Program is to determine background analyte values, measure the concentration of hazardous constituents, and determine the rate of movement and extent of any contaminant

32

plumes in the uppermost aquifer and other hydrostratigraphic units within Rocky Flats site boundaries. The document presents data from previous reports which reveal that the Rocky Flats Alluvium and the subcropping Arapahoe sandstones are in hydraulic connection. Together, the alluvium and weathered bedrock units represent the uppermost aquifer, which is an unconfined system. Confined groundwater exists within subsurface Arapahoe sandstone lenses which make-up the lower hydrostratigraphic unit. The hydraulic conductivity within the upper units is much greater than the hydraulic conductivity of the confining Arapahoe claystones.

EG&G Rocky Flats, Inc. 1992. Rocky Flats Plant Site Environmental Report, January through December 1991. Prepared for the U.S. Department of Energy

This report provides information to the public about the impact of the Rocky Flats Plant on the environment and public health. This report is published annually, incorporating the previous year's monitoring results. The hydrogeology of the site is among several topics presented. A brief hydrogeologic introduction describes the two groundwater flow systems that exist at the site. The two systems consist of a shallow unconfined aquifer in the Rocky Flats Alluvium and shallow paleochannels in the surface of the bedrock and a confined aquifer in the deeper sandstone units of the Arapahoe and Laramie Formations. Groundwater flow is generally from west to east beneath the site. The present groundwater monitoring system is designed to identify the magnitude and extent of contamination within these groundwater flow systems.

EG&G Rocky Flats, Inc. 1993. 1992 Annual RCRA Groundwater Monitoring Report for Regulated Units at the Rocky Flats Plant. Prepared by EG&G Environmental Management Department. March 1.

For the purpose of determining the impact of waste management activities at the three RCRA-regulated units (Solar Evaporation Ponds [SEPs], West Spray Field, and Present Landfill), 1992 groundwater data for each unit are statistically evaluated with respect to site background data. Upon evaluating the results, the current groundwater monitoring program is assessed for effectiveness, and recommendations are made for future monitoring. Tables, contour maps, analytical data, and calculations support conclusions drawn regarding the nature and extent of groundwater contamination, groundwater flow direction, chemistry, contaminant migration rate, and other hydrogeologic characteristics at each RCRA unit. The results indicate that groundwater has been affected by leakage of the SEPs. Major contamination from the SEPs includes nitrate/nitrite, some volatile organic compounds (VOCs), gross alpha, gross beta, and tritium. Contaminants affecting groundwater at the West Spray Field include uranium-233-234,

select dissolved metals, select inorganic analytes, and nitrate/nitrite. Contaminants derived from the Present Landfill operations include VOCs, radionuclides, dissolved metals, and major inorganic ions.

EG&G Rocky Flats, Inc. 1993. Background Geochemical Characterization Report for 1993, Rocky Flats Plant, Golden, Colorado. Prepared for the U.S. Department of Energy. September 30.

In order to evaluate potential contamination in soil and groundwater at the Rocky Flats site, analytical results are statistically compared with site-background data collected from undisturbed non-impacted areas. Background data were collected between 1989 and 1993 under the Background Geochemical Characterization Program at Rocky Flats. Samples were collected from stations located in the buffer zone areas, west, north, and south of the plant industrial areas and analyzed for radionuclides, metals, volatile organic compounds, major ions, and several indicator parameters. Summary statistics and tolerance limits were compiled for each set of chemical data within broken-down subgroups. Numerous plates, tables, and figures summarize site information, including analytical results and related statistical analyses. The hydrogeology of Rocky Flats consists of two flow systems, an upper flow system and a lower flow system. The upper flow system is unconfined and includes the alluvial material as well as sandstone units of the Arapahoe Formations that are in direct contact with the alluvium. Where weathered, the claystones may also act as unconfined water-bearing units, but will have much lower hydraulic conductivities than the alluvium and sandstones. In the lower flow system, groundwater is confined by the Arapahoe claystones and exists within the unweathered bedrock sandstones of the Arapahoe and upper Laramie Formations. The two systems are probably in hydraulic connection wherever bedrock sandstone subcrops upper surficial materials. Conclusions of this report determined that sufficient background data now exists for environmental media. In addition, seasonality in surface and groundwater has been shown to be unimportant. It is proposed that this be the final report of the program.

EG&G. 1993. Geotechnical Engineering Report for Geotechnical Analysis of Earthen Dams A-3, B-1, B-3, and Landfill Dam. EG&G Rocky Flats, Inc., Golden, CO. January.

This engineering report presents the results of geotechnical and hydraulic analyses of earthen dams A-3, B-1, B-3 and the Landfill Dam at the U.S. Department of Energy Rocky Flats site in Golden, Colorado. The study included visual reconnaissance, exploration and evaluation of subsurface conditions, analyses, and the development of conclusions and recommendations

regarding the condition of the dams and potential improvements. The field program included drilling 14 test holes and installing piezometers. This report summarizes field and laboratory data; describes the analyses conducted to evaluate the dams; and presents conclusions and recommendations based on the analysis results, previous observations and recommendations, and experience with similar dams. The report noted that the A-3, B-1, B-3, and Landfill Dams were in generally good condition. However, it suggested routine maintenance be improved. For example, excessive vegetation should be removed on a periodic basis, and rodent holes should be backfilled with low permeability material. Dam A-3 also required new riprap on the upstream slope. Dam B-1 required the repair of an area of headcutting and a seep at the toe of the dam. The spillway of Dam B-3 required regrading and lowering of its crest elevation. The outlet works gate of the Landfill Dam was in need of repair if it was to be relied upon. In general, the results of the hydraulic analyses indicated that all of the spillways are adequate to pass a 100-year occurrence precipitation event. The height of the B-1 spillway would cause overtopping of a portion of the dam. The amount of freeboard available for all four dams during this event is estimated to be approximately equal to or greater than the freeboard reported by the U.S. Army Corps of Engineers. There appeared to be no freeboard on Dam B-1 with a 100-year storm event.

EG&G Rocky Flats, Inc. 1993. Groundwater Protection and Monitoring Program Plan. Rocky Flats, Golden, Colorado. Prepared for the U.S. Department of Energy. October 15.

This document describes the programs at Rocky Flats that will ensure groundwater resources are properly managed and protected. A review of the currently accepted hydrogeological interpretation at the site is included to describe the site background characteristics. The hydrogeology, as it is understood to date, consists of an upper hydrostratigraphic unit and lower hydrostratigraphic unit. The upper hydrostratigraphic unit is considered to be an unconfined aquifer consisting of the unconsolidated alluvial materials and shallow bedrock sandstones and weathered claystones of the Arapahoe and Laramie Formations. The lower hydrostratigraphic unit is defined as comprising the deeper, confined sandstone aquifers and claystone aquitards of the Arapahoe and Laramie Formations. Additional hydrogeological properties reviewed in detail include groundwater occurrences and distribution, groundwater flow, hydraulic conductivities, and groundwater quantity. The remainder of the document supplies requirements, descriptions, evaluations, and improvements for the groundwater programs.

EG&G Rocky Flats, Inc. 1994. 1993 Annual RCRA Groundwater Monitoring Report for Regulated Units at the Rocky Flats Plant. February 23.

This report presents the results for the 1993 interim-status quarterly groundwater monitoring for the three RCRA-regulated units at the Rocky Flats site. The three regulated units are the Solar Evaporation Ponds, the West Spray Field, and the Present Landfill. For each one of the units, downgradient groundwater quality was statistically evaluated with respect to upgradient groundwater quality to determine the impact of waste management activities on groundwater quality within the uppermost aquifer. The same hydrostratigraphic unit comprises the uppermost aquifer at each of the RCRA-regulated units. The upper hydrostratigraphic unit consists of unconsolidated alluvium and colluvium and the underlying weathered portion of the bedrock. Water yields from the upper hydrostratigraphic unit at the Rocky Flats site are typically low, and broad areas of the UHSU may become dry during fall and early winter. Unweathered bedrock is interpreted to be an aquitard because of its consistently low hydraulic conductivity.

The groundwater monitoring activities at each of the regulated units were assessed, and recommendations for improved monitoring and characterization were made. Additional physical hydrogeologic characterization recommendations included examining further the bedrock paleotopographic surface to determine its effect on groundwater flow; determining the ranges of hydraulic conductivities and calculating the average hydraulic parameters for lithostratigraphic units to characterize the UHSU at Rocky Flats; and further characterizing vertical hydraulic gradients.

EG&G Rocky Flats, Inc. 1994. 1993 Well Evaluation Report — Final, Rocky Flats Plant, Golden, Colorado. Prepared for the U.S. Department of Energy. April 29.

The purpose of the 1993 well evaluation program was to determine whether the existing groundwater monitoring program at Rocky Flats meets regulatory monitoring requirements and sitewide programmatic goals. Sitewide assessments of geology, groundwater flow patterns, occurrence and distribution of contaminants in groundwater, and migration pathways provided a foundation for technical recommendations. A conceptual model for groundwater flow was developed using geologic cross sections, groundwater potentiometric surfaces, vertical hydraulic gradients, flow directions, hydraulic conductivities of aquifer materials, and known groundwater/surface water interations. Geologic characteristics at the Rocky Flats site that influence groundwater flow patterns include topography, paleotopography, lithology and permeability of surficial deposits and bedrock, and the distribution of sandstone. At Rocky Flats,

36

the upper hydrostratigraphic unit consists of several distinct lithostratographic units: Rocky Flats Alluvium, colluvium, valley-fill alluvium, landslide deposits, weathered Arapahoe and Laramie Formation bedrock, and all sandstone units within the Arapahoe and Laramie Formations that are in hydraulic connection with overlying unconsolidated surficial deposits or the ground surface. The lower hydrostratigraphic unit is comprised of unweathered bedrock of the Arapahoe and Laramie Formations. The spatial distribution of contaminant plumes in unconsolidated surficial deposits and shallow bedrock is similar, suggesting that these lithostratigraphic units are hydraulically connected, have similar permeability, and exhibit comparable hydraulic gradients. The report indicates that regulatory monitoring requirements and sitewide programmatic monitoring objectives are generally being met but suggests modifications that would improve sitewide monitoring at Rocky Flats.

EG&G Rocky Flats, Inc. 1994. Environmental Restoration Technical Support Document (ERTSD), NEPA Support Document for the Rocky Flats Plant, Golden, Colorado. Prepared for EG&G Rocky Flats, Inc. March. (Revised from Woodward-Clyde Consultants, June 1992)

The purpose of this document is to summarize environmental baseline data regarding the Rocky Flats site and operable units (OUs). Groundwater and hydrologic information is summarized from recent documents. The sitewide hydrologic system and individual OU hydrologic systems are detailed at length.

EG&G Rocky Flats, Inc. 1994. Technical Memorandum: Final Work Plan, Operable Unit No. 7—Present Landfill (IHSS 114) and Inactive Hazardous Waste Storage Area (IHSS 203). September 1994.

This work plan presents the findings of the Phase I Resource Conservation and Recovery Act (RCRA) facility investigation/remedial investigation (RFI/RI) at OU 7; and the field sampling plan developed for the collection of additional data. OU 7 comprises the Present Landfill (IHSS 114), the Inactive Hazardous Waste Storage Area (IHSS 203), and the East Landfill Pond and adjacent spray evaporation areas. Results of the Phase I RFI/RI were used to characterize the primary sources of contamination at OU 7, which include landfilled wastes and associated leachate and gas. In general, landfill-generated gases appear to be of precipitation and migration of groundwater through waste. Approximately 5,756,000 gallons of leachate are present in landfill debris within the intercept system above the unweathered bedrock, which is considered the underlying confining unit. Groundwater in the upper hydrostratigraphic unit (UHSU) at OU

37

7 contains metals, radionuclides, organic constituents, and nitrates at concentrations higher than background. PCOCs were identified in groundwater from the lower hydrostratigraphic unit (LHSU). However, in LHSU groundwater collected downgradient of the landfill, radionuclide and VOC concentrations were not significantly higher than concentrations in LHSU groundwater from background wells. Data collected during the Phase II investigation will be used to determine the contaminants in surface soils below the dam that present a risk to human health and the environment and the appropriate response action required to reduce those risks; describe the impacts to groundwater resulting from contaminant releases from the landfill and determine whether or not these impacts require a response action; support closure of the Present Landfill under CHWA and RCRA; design the landfill cap, leachate collection and treatment system, and gas control and treatment system; and address source area groundwater control.

EG&G Rocky Flats, Inc. Annual. SWD Field Reports Series, Golden, Colorado. 1992, 1993.

The annual SWD Field Reports Series is a collection of various reports focusing on surface-water processes and events taking place at the Rocky Flats site. These reports include information on ponds, piezometers, dam monitoring, year-end surface-water-related field event reports, raw water plant and wastewater treatment plant reports, and pesticide management reports. These reports explain changes in monitoring programs and monitoring results and detail events and new procedures for surface-water monitoring. They include analytical data tables, hydrographs, and statistical and correlation tables to illustrate program monitoring results.

Ellerbrock, J.A. Not dated. Rocky Flats Early Monitoring Data, Broomfield Municipal and Great Western Reservoir. EMF-ICN 28455.

Surveys on air, water, soil, and vegetation were made on surrounding creeks, reservoirs, and community tap water prior to the inception of plutonium operations in July of 1953. Monthly water samples were collected by Rocky Flats workers from outlying reservoirs beginning in 1952. In May of 1969 CDH also began collecting water samples from the reservoirs. The document reviews plutonium monitoring results from 1952 through 1972. It also cautions that increasing radioactive concentrations may be a result of higher technology and analysis methods rather than an actual increase of radioactive levels in the environment.

Emmons, S.F.W. Cross, and G. H. Eldridge. 1896. Geology of the Denver Basin in Colorado. USGS Monograph 27, 556 p.

This report discusses the regional geology, physiography, historical geology, structural geology, hydrography, paleontology, and coal regions of the area between Boulder and Golden.

Engineering Science, Inc. 1974. An Engineering Study for Water Control and Recycle. Prepared for the U.S. Atomic Energy Commission. July 21.

This study was conducted to provide a water management plan for the Rocky Flats Plant to ensure that water-borne releases from the plant do not adversely affect the environment. One of the four major tasks of this investigation was to evaluate the site hydrogeology, including locating existing and potential sources of groundwater contamination and the occurrence and flow of groundwater and reviewing monitoring activities. The principle source for groundwater contamination is through the process waste collection and transfer system. Most of the groundwater at the Rocky Flats site exists in the sediment gravel capping the bedrock and flows eastward. In general, the quantity of groundwater is small due to low recharge and thus groundwater flow rate is also low. Groundwater is intercepted by land surface and leaves the site through stream discharge. Very little water leaves the site through alluvial or bedrock materials. These conclusions on the site hydrogeology were drawn from observations; actual data used and presented includes water-level data from the existing 42 monitoring wells and the resultant water table surface elevation map.

Engineering Science, Inc. 1975. A Supplementary Report to an Engineering Study for Water Control and Recycle Concerning the Recovery of Nitrate Laden Groundwater, Rocky Flats Plant, Golden, Colorado. Prepared for the U.S. Atomic Energy Commission. January.

An investigation was conducted to evaluate the transportation of nitrate laden groundwater from the 207 Solar Evaporation Ponds to North Walnut Creek and to determine cost-effective solutions to the problem. Existing data were studied, borehole drilling and well installation were completed, and analyses of soils and water were obtained to evaluate the problem. The report indicates that groundwater is transported mainly through permeable lenses of sand and gravel extending from the pond to the creek. Recommendations are made to prevent further nitrate migration.

EPA. 1988. Groundwater Monitoring Evaluation: U.S. Department of Energy, Rocky Flats Plant, Golden, Colorado. U.S. Environmental Protection Agency Hazardous Waste Groundwater Task Force. August.

The plan and procedures for groundwater sample collection, handling, and analysis, monitoring well placement and construction, and data quality evaluation and assurance at Rocky Flats were critically reviewed and were found to be generally unsatisfactory and, at times, out of compliance. The groundwater monitoring program proposed for RCRA permitting was found to be inappropriate due to improper well placements, incorrect program type, and deficiencies in the monitoring parameters. The program evaluation included a review of prepared documents, facility inspection, laboratory evaluation, water level and well depth measurements, and sample collection and analysis. A substantial portion of the document details the hydrogeology at the site. General geologic characteristics of the Rocky Flats Alluvium, the Arapahoe Formation, and the Laramie and Fox Hills Formations are summarized. The Rocky Flats Alluvium has been identified as the uppermost aquifer and implies that the weathered sandstone of the Arapahoe Formation in contact with the overburden is also a part of the uppermost aquifer. Where hydraulically connected these sandstone units should be monitored as part of the uppermost aquifer. Groundwater flow direction in the alluvial aquifer generally follows topography flowing eastward toward drainages. Flow rates (both vertically and horizontally) in the alluvial aquifer have not been adequately defined. Groundwater in the bedrock sandstones flows east toward the Platte River at a rate in the range of 1×10^{-7} cm/sec to 2×10^{-6} cm/sec. Further investigations are necessary to more adequately characterize areas of interconnection, direction, and rates of groundwater flow and to determine the extent of effects of plant operations on groundwater quality. One investigation concludes that many deficiencies still exist in the Rocky Flats groundwater monitoring program. Maps, lists, data results, and diagrams support and aid findings.

ERDA. 1980. Final Environmental Impact Statement (DOE/EIS-0064 [ERDA 1545-D]), Rocky Flats Plant, Golden. Colorado.

An overview of the Rocky Flats Plant and its operations, a description of the area, and an assessment of the associated actual and potential environmental impacts that may affect the quality of the human environment are provided. The site hydrogeology is detailed as one of many major topics of interest. The Laramie-Fox Hills aquifer, Arapahoe Formation, and alluvial materials are identified as groundwater resources and discussed in detail. The Laramie-Fox Hills aquifer consists of approximately 300 feet of sandstone. Recharge occurs at outcrops west of the

40

site. This, combined with nearly 500 feet of clay which overlies the sandstone, make it unlikely that the plant will effect Laramie-Fox Hills aquifer water quality. The Arapahoe Formation receives water by leakage from surface water sources including creeks and reservoirs and from groundwater infiltration from the Rocky Flats Alluvium. Some of this water may discharge as seeps along the alluvial valleys, but most leaves the plant site as groundwater underflow. The Rocky Flats Alluvium receives water from infiltrating sources and leakage of surface water sources. The Rocky Flats Alluvium is not used as a source for water supply. However, groundwater discharge into the surface water system from the Rocky Flats Alluvium may affect other downstream water supply sources. Groundwater flow is generally to the east in each hydrostratigraphic unit.

Evans, A., and W.L. Raley. 1984. *Research in Action: Solving Colorado Water Problems, FY 1983 Annual Report.* Colorado Water Resources Research Institute Annual Report No. 28. September.

The Colorado Water Resources Research Institute conducted a single research project in fiscal year 1983 to integrate results of prior research on water management problems of the South Platte Basin. The principal objective of the project was to identify options for best development and management of the South Platte Basin's limited water supply. Emphasis was placed on potential for use of computer technologies. Team investigators considered urban and industrial water conservation, stream-aquifer modeling, water storage optimization, Denver Basin deep-bedrock groundwater, the quality of surface water and groundwater, economics of water allocation alternatives, legal-institutional aspects of water allocation, and current management practices.

Evans, N.A. 1987. *Fiscal Year 1986 Program Report: Colorado Water Resources Research Institute Annual Report No. 23.* U.S. Geological Survey Water Resources Division.

The institute's federal fiscal year 1986 program consisted of six research projects focused on the following Colorado problems: (1) conjunctive surface-groundwater management, (2) geochemical assessment of aquifer recharge effects in the southwest Denver Basin, (3) incentives for improving irrigation efficiency in the South Platte Basin, (4) specific yield of Denver Basin aquifer from nuclear magnetic resonance, (5) alternatives for meeting crane habitat requirements, and (6) reuse of treated wastewater by groundwater recharge.

41

Fedors, R.W., and J.W. Warner. 1993. *Characterization of Physical and Hydraulic Properties of Surficial Materials and Groundwater Surface Water Interaction Study at Rocky Flats Plant, Golden, Colorado.* Colorado State University Groundwater Technical Report #21. July.

The movement of water in the subsurface at the Rocky Flats site is the focus of this report. Field and laboratory measurements made to characterize the physical and hydraulic properties of surficial materials at Rocky Flats, including saturated and unsaturated hydraulic parameters and measurements of physical properties of soils, are reported for the Rocky Flats Alluvium, colluvium, and recent alluvium. These parameters include measurements of saturated and unsaturated hydraulic conductivity, bulk density, laboratory measurements of water retention curve, grain size distribution, and saturated water content. The resulting values will assist in any modeling efforts in the unconfined aquifer system at the Rocky Flats site. The investigation of surface water and groundwater interaction in the Woman Creek drainage quantifies the water flux between the creek and the unconfined system. A table illustrates the magnitudes of net gains to, or net losses from, Woman Creek depend on which stream section is being monitored as well as the month. In general, the data from Woman Creek appears to indicate that there is a net loss from the stream to groundwater in the summer and a net gain during the winter months, possibly due to snowmelt and groundwater interaction.

Fedors, R.W., J.W. Warner, B. Roberts, and A. Berzins. 1993. *Numerical Modeling of Variably Saturated Flow and Transport—881 Hillside, Rocky Flats Plant, Jefferson County, Colorado.* Colorado State University Groundwater Technical Report #20. June.

This study characterizes the unconfined groundwater flow and contaminant transport in colluvial and alluvial sediments on the 881 Hillside at the Rocky Flats site. Saturated and unsaturated hydraulic properties are estimated from laboratory measurements, field data, and literature values. A two-dimensional finite element code for variably saturated conditions is used to obtain steady state flow conditions from which water contents and Darcy velocities can be used for transient, contaminant transport modeling. The migration of trichloroethene and tetrachlorethene detected in monitoring wells associated with past barrel storage activities is modeled over a 40-year period using alternative scenarios for the source area. Cross-sections were prepared to illustrate subsurface conditions using pre-1990 borehole logs. Based on the results of the numeric modeling, the scenario involving a mixed, dense, non-aqueous phase liquid (DNAPL) pool at the bedrock contact best explains the contaminant levels detected in monitoring wells. Data presented as tables and figures support this conclusion.

42

Geraghty and Miller, Inc. Not dated. The Geology and Ground-Water Resources of Colorado. A Special Report. EMF-ICN # 26834.

Colorado is an area of mountains, high plateaus, and plains lying across the highest part of the Continental Divide. Precipitation is 20 to 30 inches in the mountainous areas but drops to 10 to 16 inches in the eastern and western portions of the state and to 6 inches in the San Luis Valley. The Rocky Mountain area forms the headwaters for such major rivers as the Platte, Arkansas, Rio Grande, and Colorado. Available flow in the major rivers (which is extremely seasonal) is some 14 billion gallons per day (bgd) or 16 million acre-feet; however, under existing compacts and decrees, about half of this water must be delivered to downstream states. Water of the South Platte, Arkansas, and Rio Grande rivers, about one quarter of the total supply, is already fully appropriated, while that of the Colorado River, about two-thirds of the total for the state, is expected to be fully utilized within 50 years. Only about one-third of the Colorado River flow of 11 million acre-feet per year can be used within Colorado. To supplement the Colorado water supply, bedrock aquifers are being tapped.

Greengard, T.C. 1988 Rockwell International. Surface and Ground Water Sampling and Analysis. Memorandum. January 26. EMF-ICN # 26168.

Changes were planned to the groundwater monitoring program in the first quarter of 1988. Changes that were planned for the program included sampling frequency, well sampling order, new well additions, old well deletions, standardized sampling reports, sample collection forms, sample parameter list, and duplicate sample collection protocol.

Greengard, T.C. 1989. Rockwell International. Ground Water Monitoring at Rocky Flats Plant. Governor's Scientific Panel on Monitoring Systems. August 7. EMF-ICN # 25465.

A summary of the monitoring at Rocky Flats includes the numbers and locations of monitoring wells installed per year from 1952 to 1989; actions taken, relating to groundwater monitoring, by the site operator per year from 1952 through 1989; a hydrogeologic model, groundwater hydraulics of the upper and lower hydrostratigraphic units; and groundwater quality at the west spray field; solar evaporation ponds; landfill; 881 hillside; 903 pad, mound, and east trenches; and boundary wells. The summary is presented in brief tabular format (overhead-format).

Gunning, R.R., and M.A. Thompson. 1974. Interim Report on Coring and Sampling the Rocky Flats Landfill, Rocky Flats, Golden, Colorado. January 17.

Tritium, americium-241, and strontium-90 were detected in drainage from the Rocky Flats sanitary landfill during sampling events on September 20, 1973 and October 5, 1973. Because these constituents were found, a dam was constructed at the east base of the landfill to contain the seepage, a daily sampling program was initialized, and a program was implemented to determine the concentrations within the landfill and to possibly locate their source. Twenty test holes (TH 1–TH 20) were drilled to a depth of 10 feet into natural soil. Plastic well screens were installed, and water was sampled and analyzed for tritium, strontium-90, plutonium, and a gamma scan. The landfill pond water was sampled at the dam daily for tritium, strontium-90, americium-241, plutonium-239,-240, a gamma scan, and total long-lived alpha. Tritium, strontium-90, and americium were detected in high concentrations or above background levels in specific test locations. Phenol and aluminum, calcium, iron, magnesium, sodium, and silicon were detected above background at all locations. Sampling results suggested that a localized tritium source, of unknown origin or nature, may exist in the landfill. High concentrations appeared to be localized in an area of the landfill used in 1970. The possibility that strontium and americium sources exist was determined. The strontium presence could not yet be explained. The americium presence was possibly explained by the past practice of burying sanitary sewage sludge containing small amounts of americium and plutonium in the landfill.

Hall, D.C., E.L. Boyd, and D. Cain. 1979. *Hydrologic Data for Wells, Springs, and Streams in Boulder County, Colorado.* U.S. Geological Survey Open-File Report 79-979. November.

Hydrologic data collected in 1975–1977 as part of a comprehensive water-resources investigation of Boulder County, Colorado, by the U.S. Geological Survey in cooperation with the Boulder County Health Department and the Colorado Geological Survey are presented in this report. The data, in tabular and graphic form, consist of water-quality analyses of selected constituents and geohydrologic-site, water-treatment, and sewage-treatment data for 609 wells and 48 springs; water-quality analyses for 102 of the wells and 9 of the springs; water-quality analyses of streamflow from 34 sites; and specific conductance and water-temperature measurements of streamflow from 3 sites.

Hall, D.C., D.C. Hillier, D.C. Cain, and E.L. Boyd. 1980. *Water Resources of Boulder County Colorado*. Colorado Geological Survey Bulletin 42.

This report summarizes the availability of water and its processes in Boulder County. Water resources are recharged by precipitation falling on the mountains and plains. The study involved collection of surface and groundwater for major ions, trace elements, bacteria, and radiochemicals and evaluated the suitability of the water as a drinking water supply. A study of the factors affecting the water quality was completed and long-term trends were evaluated. The data indicate that water quality has deteriorated in many areas, and there appear to be both localized and widespread water-quality problems. Maps, charts, graphs, and field and analytical test data are used extensively to supplement report findings.

Hall, D.C., and C.J. Johnson. 1979. *Drinking Water Quality and Variations in Water Levels in the Fractured Crystalline-Rock Aquifer, West-Central Jefferson County, Colorado.* U.S. Geological Survey Water Resources Investigations 79-94. September.

In parts of Jefferson County, Colorado, water for domestic use from the fractured crystalline-rock aquifer contained excessive concentrations of major ions, coliform bacteria, trace elements, or radiochemicals. Based on results of analyses from 26 wells, water from 21 of the wells contained excessive concentrations of one or more constituents. Drinking water standards were exceeded for fluoride in water from 2 wells, nitrate plus nitrite in 2 wells, dissolved solids in 1 well, iron in 6 wells, manganese in 8 wells, zinc in 2 wells, coliform bacteria in 4 wells, gross alpha radiation in at least 11 wells, and gross beta radiation in 1 well. Local variations in concentrations of 15 chemical constituents, specific conductance, and water temperature were statistically significant. Specific conductance increased significantly from 1973 to 1975 only in the vicinity of Indian Hills. Annual range in depths to water in 11 observation wells varied from 1 to 15 feet. The shallowest water levels were recorded in late winter, usually in February. The deepest water levels occurred during summer or fall, depending on the well and the year. Three-year trends in water-level changes in 6 of the 11 wells indicated decreasing water storage in the aquifer.

Hampton, E.R. 1975. *Map Showing Availability of Hydrologic Data Published by the U.S. Environmental Data Service, the U.S. Geological Survey, and Cooperating Agencies, Greater Denver Area, Front Range Urban Corridor, Colorado.* USGS Miscellaneous Geological Inv. Map I-856-C. (USGS)

45

This map shows hydrologic data of the Greater Denver area. Brief summaries are given for climatological, surface water, and groundwater data. Groundwater data on the map represent information from 218 wells monitored for water levels and 366 wells sampled for analysis of dissolved chemicals.

Hillier, D.E., R.E. Brogden, and P.A. Schneider, Jr. 1976. *Hydrology of the Arapahoe Aquifer in the Englewood-Castle Rock Area South of Denver Basin, Colorado.* U.S. Geological Survey Open-File Report 76-798.

Increased use of water from the artesian Arapahoe aquifer has caused the potentiometric surface to decline more than 200 feet in some areas between 1965 and 1975. Most artesian wells penetrating the aquifer that flowed prior to 1975 have ceased flowing. Only one flowing well was observed during the study. The Arapahoe aquifer is one of four bedrock aquifers underlying the Denver Basin. The Arapahoe aquifer is overlain by the Denver and Dawson aquifers and underlain by the Laramie-Fox Hills aquifer. Confining clay layers inhibit water movement, so that water in the aquifer is under artesian pressure in most localities. The Arapahoe formation consists of sand and conglomerate beds, interbedded by clays. Most beds, composing the aquifer, especially in the upper portion, are lenticular. In the lower portion of the aquifer, they are areally extensive. Horizontal and vertical interconnection of the beds composing the aquifer increases from the upper to the lower portions of the formation. The sand beds range in thickness from less than 100 feet to 560 feet. The depth to the base of the aquifer ranges from 500 feet to 2,500 feet. Prior to 1965, the principle groundwater flow was to the north and northwest. The altered groundwater flow is principally to the northwest. Recharge occurs to the Arapahoe aquifer by outcrop-subcrop water infiltration and from downward percolation through the Denver aquifer. Annual recharge is in the range of 0.28 to 0.38 inches. Discharge from the Arapahoe aquifer is through vertical upward and downward percolation. The overall potentiometric surface has been seriously altered by pumping.

Hillier, D.E., and P.A. Schneider, Jr. 1979. *Depth to Water-Table in the Boulder–Fort Collins–Greeley Area, Front Range Urban Corridor, Colorado.* United States Geological Survey Miscellaneous Investigation Series I-855-I.

Hillier, D.E., P.A. Schneider, Jr., and E.C. Hutchinson. 1979. *Hydrogeologic Data for Water-Table Aquifers in the Greater Denver Area, Front Range Urban Corridor.* USGS Open-File Report 79-214.

This report provides hydrologic data for water-table aquifers in the greater Denver Area collected and compiled during 1976 and 1977. Records for 325 wells and 11 springs and chemical analyses of the water for 272 of the wells and all of the springs are presented.

Hillier, D.E., and P.A. Schneider, Jr. 1979. *Well Yields and Chemical Quality of Water from Water-Table Aquifers in the Boulder–Fort Collins–Greeley Area, Front Range Urban Corridor, Colorado.* United States Geological Survey Miscellaneous Investigation Series I-855-J.

Hillier, D.E., and E.C. Hutchinson. 1980. *Depth to Water-Table in the Colorado Springs–Castle Rock Area, Front Range Urban Corridor, Colorado.* United States Geological Survey Miscellaneous Investigation Series I-857-H.

These maps show the water-level conditions for the water-table aquifer for each area. The hydrological conditions of the immediate area are briefly discussed and include water-table fluctuations and trends, cross-sections, and hydrographs.

Hillier, D.E., and E.C. Hutchinson. 1980. *Well Yields and Chemical Quality of Water from Water-Table Aquifers in the Colorado Springs–Castle Rock Area, Front Range Urban Corridor, Colorado.* United States Geological Survey Miscellaneous Investigation Series I-857-I.

Hillier, D.E., P.A. Schneider, Jr., and E.C. Hutchinson. 1983. *Depth to Water-Table in the Greater Denver Area, Front Range Urban Corridor, Colorado.* United States Geological Survey Miscellaneous Investigation Series I-856-K.

Hillier, D.E., P.A. Schneider, Jr., and E.C. Hutchinson. 1983. *Well Yields and Chemical Quality of Water form Water-Table Aquifers in the Greater Denver Area, Front Range Urban Corridor, Colorado*. United States Geological Survey Miscellaneous Investigation Series I-856-J.

Knowledge of the well yields and chemical quality of water from water-table aquifers is presented. Each of these map series contains two plates. For each location, one plate shows well yields for alluvial and water-table aquifers and the second plate shows well yields and chemical quality of the water for the water-table aquifers. The aquifer characteristics are discussed for each mapped area.

Hobbs, Farrel D. Not Dated (Pre 1985?). Elemental Content of Water in Drainages from the Rocky Flats Plant, Rocky Flats Plant, Golden, Colorado.

Samples from the three major drainages were collected and analyzed in order to determine the impact of the Rocky Flats Plant operations on water quality. The three major drainage pathways included North Walnut Creek, South Walnut Creek, and Woman Creek. North Walnut Creek receives seepage from holding ponds, while South Walnut Creek receives drainage from the sewage treatment plant. Woman Creek receives discharges from filter bed flushing at the water treatment plant. All receive discharge from cooling towers and footing drains from various buildings. Samples were taken from the ponds along each drainage on a daily basis. The samples were then composited weekly and monthly and analyzed for a number of different elements. Results indicated that five elements (chromium, copper, silver, strontium, and zinc) exceeded or equaled the allowable limits set by regulatory agencies in one or more of the drainages. Laboratory results are included in tabular format with the report.

Hoeger, R.L. 1968. "Hydrodynamic Study of the Western Denver Basin, Colorado." *Colorado School of Mines Quarterly*, January 1968, Vol. 63, No. 1.

The original hydrostatic pressure in the fracture system of Precambrian basement rocks in the Rocky Mountain Arsenal well was far below normal. In an effort to understand the reasons for the subnormal pressure, a study of hydrodynamic pressure gradients in overlying sedimentary rocks of the western Denver Basin was considered necessary. An analysis of all available data on the major deep aquifers is presented. A barrier trend, which may be caused by a fault system of regional extent, is present between the areas of high potential and the majority of the area studied, which is typically at much lower potential.

Hoffman, N.D. 1982. An Historical Evaluation of Radiological and Chemical Properties of Water From Hydrogeologic Test Wells at Rocky Flats, Golden, Colorado. April 15.

Fourty-two hydrologic test wells installed at Rocky Flats in the 1960s through 1971 were routinely sampled. Analyses were completed to determine if any movement of chemical or radioactive materials originating from the plant was occurring into water-bearing strata underlying the site. The wells varied in depth and were scattered throughout the plant area. The wells were sampled approximately three times a year. The document reported the hydrogeologic conditions existing at the site. Groundwater occurs in the Rocky Flats Alluvium, Arapahoe Formation, and Laramie-Fox Hills Aquifer. It is recharged by various precipitation events and percolation from surface waters and discharged through streams, baseflow, and subsurface flow. Soils tend to filter particulate materials and thus only soluble materials are likely to move substantial distances in the subsurface. Groundwater samples collected from 1975 through 1980 showed elevated levels of uranium, tritium, nitrate as nitrogen, chloride, sulfate, and calcium carbonate. No changes in the sampling program were suggested. Location maps and analytical data have been presented to support the conclusions.

Hoffman, N.D. 1984. Nonradioactive Groundwater Data Summary, 1975–1983. Prepared for Rockwell International.

The report summarizes selective nonradiological data and trend evaluation on the monitoring wells from 1975 through 1983. Approximately 50 non-radiological parameters were analyzed on groundwater samples each quarter. The report includes drinking water parameters, nitrate and selenium, groundwater quality parameters, groundwater contamination parameters, conclusions, and recommendations. Appendices include graphs on nitrate concentration in monitoring wells, total dissolved solids (TDS) concentrations in monitoring wells, and conductivity in monitoring wells. Figures in the report include locations of groundwater monitoring wells at Rocky Flats; ranges of nitrate, TDS, and conductivity concentrations in monitoring wells; nitrate, selenium, manganese, and iron concentrations above drinking water standard; and high TDS and conductivity wells. Tables include drinking water parameters data for monitoring well, nitrate, TDS, and conductivity data summary.

Hoffman, N.D./Rockwell International/Energy Systems Group. Undated Report. Groundwater Monitoring at the Rocky Flats Plant, Golden, Colorado.

Groundwater was monitored in 56 monitoring wells at the Rocky Flats Plant. Samples obtained were analyzed for select radionuclides, pH, nitrate, total dissolved solids, and approximately 43 other elements. Test results show that there is no significant groundwater contamination in most of the groundwater samples. Low concentrations of uranium, tritium, and nitrates above the background levels have been identified in the vicinity of the Solar Evaporation Ponds. The conclusion was that the ponds may have been used to store wastewater prior to treatment.

Hofstra, W.E., and D.C. Hall. 1975. *Basic Data 36 Hydrogeologic and Water-Quality Data in Western Jefferson County, Colorado.* Colorado Geological Survey Bulletin 36 MI 11, 51p. (USGS).

This document focuses on a 300-square-mile area in the mountainous parts of Jefferson County cornered by Clear Creek, Pike National Forest, the Front Range, and the western boundary of Jefferson County. Water availability and water-quality problems associated with sewage disposal are studied.

Hofstra, W.E., and D.C. Hall. 1975. *Geologic Control of Supply and Quality of Water in the Mountainous Part of Jefferson County, Colorado.* Colorado Geological Survey Bulletin 36, 51p. (USGS).

This study indicates that water-quality problems are related to geology and hydrology of the mountain environment and contains geologic and hydrologic descriptions for Jefferson County.

Hurr, R.T. Undated Report (between 1972 - 1976). Hydrology of the Rocky Flats Plant Site, A Progress Report. EMF-ICN # 24010.

Preliminary investigation activities began in May of 1972. Historical records and existing data have been reviewed to identify data gaps and to determine the quantity and quality of geologic and hydrogeologic data that already exist. To help develop a conceptual hydrogeologic model, map configurations of the water table and bedrock surface were constructed. Surface water, sediment, and precipitation sampling stations have been located to begin further data collection. A conceptual model of the hydrogeologic system has been developed for the site. Groundwater occurs in the pediment gravels and in bedrock formations at the site. Groundwater movement is

50

generally slow in both the gravels and bedrock formations. Contamination may move through both surface water and groundwater, although migration is more likely to be a problem through surface waters than through groundwater due to the velocity differences. Steps will be taken in the next phase of the investigation to eliminate data deficiencies.

Hurr, R.T. 1973. Status of Rocky Flats Hydrogeologic Investigations. October. EMF-ICN#24008.

This report indicates that the analysis of the relationship between precipitation and runoff in surface water is complicated by unmeasured inflows and leaks from diversion canals, unknown plant discharges, and sediment discharges. Surficial material mapping, seismic profiles, and gravel-base contour maps were used to try and locate subsurface drainage patterns which control direction of groundwater flow in the gravel. Bedrock was identified as the Arapahoe Formation rather than the previously reported Laramie Formation. Numerous faults were identified within the Rocky Flats area with displacement great enough to effect bedrock groundwater flow.

Hurr, R.T. 1976. *Hydrology of a Nuclear Processing Plant Site, Rocky Flats, Jefferson County, Colorado.* U.S. Geological Survey Open-File Report 76-268 (USGS).

The hydrologic setting of the Rocky Flats Plant site and vicinity is summarized. The presented precipitation, stream flow, stream sediment, water-level, borehole, and surface geophysical data and geological and hydrogeologic maps compiled during this study were incorporated with existing stratigraphic, structural, and hydrological data to evaluate the hydrologic system, recharge/discharge interactions, and erosional characteristics occurring at this site. A hypothetical model is used to demonstrate possible contaminant movement in the hydrologic system. The findings demonstrate that contaminants would move at different rates through different parts of the hydrologic system depending upon the magnitude of the release and the hydrological conditions at the time of the release.

Hydro-Search, Inc. 1985. Hydrogeologic Characterization of the Rocky Flats Plant, Golden, Colorado. Prepared for Rockwell International. December 9.

This report describes the groundwater hydrology and chemical conditions at Rocky Flats with recommendations for improvement. It provides data for 56 onsite wells, completion information for geologic logs and wells, and geochemical data for 1983 and 1984. Two field programs—a geophysical logging of nine existing wells to define sub-surface stratigraphy, and single hole

draw-down recovery tests in 10 wells—for developing onsite hydraulic conductivity values for the Rocky Flats Alluvium, the Arapahoe Formation, and the valley-fill materials are discussed. Appendices include geophysical logs, geochemical data, volatile organic data, and procedures for groundwater sampling, field water-quality testing, and water sample preservation.

Hydro-Search, Inc. 1986. Electromagnetic Survey, Rocky Flats Plant, Golden, Colorado.

This report discusses the electromagnetic survey that was conducted along the periphery of the security area, downgradient drainages, and the buffer zone at Rocky Flats. It was performed along relatively constant geologic material so that the only variable would be the conductivity of the groundwater. The survey found several areas of high ground conductance which appear to correlate with the areas of saturated surficial material based on the 1986 drilling program.

Hydro-Search, Inc. 1986. Geological and Hydrogeological Data Summary, Rocky Flats Plant, Golden, Colorado. Prepared for the U.S. Department of Energy.

The existing geologic, hydrologic, and water-quality data for the Rocky Flats Plant are summarized in the report. The information is compiled from previously collected data and reports. Figures, tables, and plates cover cross-sections, water table conditions, possible contaminant source areas, monitoring locations, details of aquifer tests, sampling program, and monitoring well details. An entire section is devoted to groundwater hydrology. There are two groundwater flow systems at the Rocky Flats site: a shallow system in the Rocky Flats Alluvium, colluvium, and valley-fill materials and a deeper flow system in the claystones and sandstones of the Arapahoe Formation. In the shallow system flow is to the east and is recharged by incident precipitation. The flow in the Arapahoe Formation is also to the east (toward the South Platte River) and occurs in sandstone horizons. Recharge to the sandstones occurs at subcrops and through downward leakage. References of all known hydrologic and soils reports is included.

Hydro-Search, Inc. 1988. Front Range Lightweight Aggregate Project. Prepared for L.C. Holdings, Inc.

This report was prepared in response to a proposal that was submitted to reopen an open-pit mine containing shale, sand, and gravel and a processing plant. The mine was located east of Colorado Highway 93 in the vicinity of Rocky Flats. This report discuss the surface water and groundwater hydrology of nearby channels (Coal Creek and South Boulder Diversion canal), the

52

impact of precipitation on the surficial materials, and the hydrology of the bedrock sandstone aquifers. It describes the water infiltration from the Rocky Flats gravels into Coal Creek drainage basins and provides hydrogeologic data and drainage design criteria.

Illsley, C.T. 1970. Geology of Rocky Flats Plantsite. EMF-ICN#3796.

The Rocky Flats site is located on a gently sloping outwash plain. The stratigraphic section comprises a 10 to 25 foot surficial deposit of Rocky Flats gravel, underlain by Laramie Formation, Fox Hills Sandstone, and Pierre Shale. The less than 5° east dip of the stratigraphic section would likely cause groundwater to appear at the surface a short distance from the recharge area. The impenetrable nature of the Laramie Formation precludes groundwater migration to a depth where it would surface east of Indiana Street. A geologic map and cross-section showing possible groundwater movement across the site are included.

Illsley, C.T. 1971. Potential Ground Water Contamination. January. Internal correspondence. EMF-ICN#23032.

This report indicates that water contamination by radioactive material from burial grounds is not at all probable. The combination of clay and caliche occurring in horizontal layers of the Rocky Flats "gravel" presents impermeable barriers to downward flow of water. Due to almost horizontal formations below alluvium, laterally moving water reappears as springs or creeks within a mile of the plant. In order for subsurface water to migrate east of Indiana Street, it would have to penetrate the bedrock formations more than 350 feet. Increased flow could occur through rock-fault cracks and connections, but faulting in the immediate area of Rocky Flats is not indicated on area geologic maps.

Illsley, C.T. 1976. Letter to Jerry Lackey of EG&G, Analyses of Waters From Deep Wells. January 9.

Water samples were collected from seven deep wells penetrating the Laramie-Fox Hills Aquifer to test for chemical and radiometric analyses. The wells were located northwest, south, and east of Rocky Flats. The results from testing indicated no chemical or radiometric difference in the downgradient water from that of upslope water. A map and laboratory analyses are included with the letter.

Jaunarajs, S.R. 1991. A Modeling Approach for Assessing the Feasibility of Groundwater Withdrawal from the Denver Basin During Periods of Drought. Masters Thesis, Colorado School of Mines.

The groundwater resources in the shallow bedrock aquifers of the Denver Basin may be used to supplement water supplies for the expanding Denver metropolitan area. Previous research suggests that large-scale pumping on a continuing basis may deplete the basin's groundwater resources. Short duration pumping, however, designed to meet water deficits during drought periods, may be a feasible method of utilizing the resource without causing long-term groundwater depletion. A pre-existing computer model of the Denver Basin is calibrated and used to predict the decline in aquifer heads and stream baseflows as a result of drought period pumping from a proposed well field. The four bedrock aquifers in the upper portion of the section, the Dawson, Denver, Arapahoe, and Laramie-Fox Hills are modeled as separate units along with the major streams and valley-fill alluvium in the basin. The MODFLOW computer code is used along with a modified river package, RIVINT, which permits simulation of variable river stage resulting from stream/aquifer interaction during transient simulations. Using known criteria, six drought periods with all but the last having a duration of two years, are identified during the 40-year interval 1948 through 1987, and then these historical cycles are imposed on the basin model for drought pumping simulations over the interval of 1990 to 2029. Annual water supply, use, reservoir storage, and change in reservoir storage for the City of Denver are examined for the years 1948 to 1987. Pumping rates are specified to eliminate deficits during droughts, such that no negative change in reservoir storage occurs during drought periods, assuming no growth in water use.

Jenkins, E.D. 1961. Records and Logs of Selected Wells and Test Holes and Chemical and Radiometric Analysis of Groundwater in the Boulder Area, Colorado. USGS and the Colorado Water Convention Board, Denver, Colorado. EMF-ICN # 26176.

This document summarizes well records that were collected from 1958 through 1961. Wells springs and test holes are located and described.

54

Klusman, R.W., and K.W. Edwards. 1976. Toxic Heavy Metals in Groundwater of a Portion of the Mineral Belt. June. Environmental Resources Center, Colorado State University, Fort Collins, Colorado. Completion Report. EMF-ICN # 28580.

A study of toxic trace metal distribution in groundwater of the Front Range Mineral Belt, Colorado, and adjacent areas was completed in order to determine the relationship of water quality to mineralization and the magnitude of potential health effects. A total of 149 samples were collected and analyzed for arsenic, cadmium, copper, iron, lead, manganese, mercury, silver, and zinc. Field determinations of pH, Eh, and specific conductance were also made. Ground waters in the mineral belt are estimated to exceed the U.S. Public Health limit in 14% of the samples for cadmium, 1% for copper, 51% for iron, 74% for manganese, 2% for mercury, and 9% for zinc. Outside the mineral belt, groundwater has a similar probability of exceeding the limit for mercury and lesser probabilities for all other elements.

Koffer, J.P. 1989. Investigation of the Surface and Groundwater Flow Mechanics of an Evaporation Spray Field at the Rocky Flats Nuclear Weapons Plant, Jefferson County, CO. Masters Thesis, Colorado School of Mines.

This report summarized an investigation of the hydrology of an evaporation spray field at the Rocky Flats Nuclear Weapons Plant (now the Rocky Flats Environmental Technology Site) in Jefferson County, Colorado. This study was part of an ongoing assessment of the effects of plant operations on the environment surrounding the plant. The spray field was originally intended to provide a means of using evapotranspiration for disposal of sanitary sewer treatment plant effluent. Evapotranspiration is only part of the hydrologic cycle of this site, and therefore, runoff and infiltration of the water occur. This investigation was undertaken to determine the actual destination of the water once it was sprayed onto the site. This was accomplished by determining the hydrologic system inflows and outflows and completing a water balance of the site. This was done for both 1988 and a 24-year average. The report concluded that a significant amount of water sprayed on the field went as recharge to the alluvial aquifer and the evapotranspiration rate was determined to be 39 inches, nearly twice the rate originally thought..

Lackey, J.G., E.B. Jones, and H.A. Wollenberg. 1976. Summary of EG&G Non-Nuclear Remote Sensing at the Rocky Flats Site and Status of Analysis of Geological and Hydrogeological Indicators, July 1975 – December 1975.

This report includes a description of the data acquisition and activities that produced all available imagery and data, the findings of the program to date relative to hydrological and geological indicators, the field investigations performed to verify the interpretations and results of the investigation, and interim recommendations for additional investigations necessary to resolve uncertainties identified to date.

Lackey, J.G., E. Bruce Jones, and H.A. Wollenberg. 1976. Technical Memorandum on Non-nuclear Remote Sensing at Rocky Flats Plant. March. EMF-ICN#7552.

During the interval of July through December 1975, progress continued on a program of non-nuclear remote sensing of the Rocky Flats site to aid in the interpretation of geological and hydrological features. Aerial photographs and thermal infrared imagery were used to identify features, and ground truth operations were used to support interpretations. A geologic element of primary interest was the possible existence of a fault or shear zone on or near the site. Seismic reflection surveys indicated little likelihood of appreciable vertical dislocation of beds at depth beneath the eastern portion of the Rocky Flats site. The hydrologic elements of interest were seeps, springs, and general water balance information. Seeps and springs were noted along the three drainages flowing through the site with some concentration in the vicinity of Rocky Flats. Water samples from selected springs, with one exception, did not exhibit the chemical or radiological characteristics of plant process waters. The exception was the area of seeps northeast of the solar evaporation ponds which contained elevated nitrate levels. The report indicated that the current U.S. Geological Survey analysis of water balance of the surrounding area did not contain the detail required by Rocky Flats personnel.

Leonard, R.B., D.C. Signor, D.G. Jorgensen, and J.O. Helgesen. *Geohydrology and Hydrochemistry of the Dakota Aquifer, Central United States.* Kansas State Geological Survey Water Resources Bulletin, December 1983, Vol. 19, No. 6.

The Dakota aquifer, composed of the Dakota Sandstone and stratigraphically equivalent sandstone units of Cretaceous age, is the upper-most regional aquifer underlying the extensively developed High Plains aquifer of the midwestern United States. The concentration of dissolved solids in groundwater of the Dakota aquifer ranges from less than 500 milligrams/liter in calcium

bicarbonate type water in the eastern outcrop area to more than 100,000 milligrams/liter in sodium chloride type oilfield brine in the Denver Basin to the west. Preliminary maps showing the distribution of dissolved solids confirm the complex nature of the Dakota aquifer as inferred from stratigraphic and hydraulic evidence. Extensive vertical leakage through confining layers, local recharge at the truncated eastern boundary, and a barrier to recharge along the western edge of the Denver Basin are consistent with the distribution of hydraulic head and dissolved solids.

Lewis, S.M. Not dated. Letter to O. Sutley. Contaminant characterizations of SEP seeps and surface water for the proposed treatability tests. EMF-ICN 26869.

Data from the areas north and east of the SEP represents the contaminants that will probably be present in the water collected for treatability testing. Data presented was compiled from the SEP closure plans.

Lord, R.V., & Associates, Inc. 1976. Subsurface Investigation and Groundwater Investigation 928 Building. Rocky Flats Plant, Golden, Colorado. Prepared for Rockwell International. December 1. EMF-ICN # 6879.

In order to determine the soil properties and the cause of the water table rise at Building 928, a subsurface soil and groundwater investigation was undertaken. Five test borings were made in the building area to characterize soils underlying foundation materials. Data from standard penetration tests, relative bearing tests, and disturbed and undisturbed soil samples, were collected to determine soil characteristics. Water was encountered in four of the five test holes from 2 to 5 feet. Water samples from one test hole, a nearby alluvial well, and from the building water storage tank were chemically analyzed, and historical reports, topographical maps, and hydraulic gradient determinations were studied to help determine the source of the shallow water table under Building 928. Based on the results of the investigation the shallow water table encountered in the test holes was the naturally occurring groundwater table that only appeared to be raised due to the lowering of ground surface for construction purposes.

Major, T.J., S.G. Robson, J.C. Romero, and S. Zawistowski. 1983. *Hydrogeologic Data from Parts of the Denver Basin, Colorado.* U.S. Geological Survey Open-File Report 83-274.

This report presents hydrogeologic data collected and compiled from 1956 to 1981 as part of a comprehensive hydrogeologic investigation of the Denver Basin, Colorado, by the U.S. Geological Survey in cooperation with the Colorado Department of Natural Resources, Division

57

of Water Resources, Office of the State Engineer. The data, in tabular and graphic form, consist of records for 870 wells, which include water-level data for 158 wells and water-quality analyses for 561 wells; geophysical logs from three wells, which include resistivity, self potential, and natural gamma logs; and gain-and-loss data of streamflow measured at 54 sites.

McCain, J.F., and W.R. Hotchkiss. 1975. Map showing Flood-Prone Areas in the Greater Denver Area, Front Range Urban Corridor, Colorado. USGS Miscellaneous Geologic Investigations Map I-856-D.

McConaghy, J.A., G.A. Chase, A.J. Boettcher, and T.J. Major (USGS). 1964. Hydrogeologic Data of the Denver Basin, Colorado. Colorado Water Conservation Board Basic Data Report 15. EMF-ICN # 26329.

Well information records were researched and the data (location, geology, hydrogeology, etc.) were complied to make the basic groundwater information available for planning purposes and to aid in water resource development studies. The entire report is presented in tabular format.

McConaghy, J.A., P.A. Schneider, Jr., and E.D. Jenkins. 1965. *Hydrology of the Denver Area, Colorado, Trip 11*. Guidebook for One-Day Field Conferences, Boulder Area, Colorado. Presented at the International Association of Quaternary Research, Seventh Congress, Lincoln, Nebraska.

Surface water is the main source of water supply in the Denver area, although in places only groundwater is available, obtained from both artesian and water-table aquifers. The Quaternary surface deposits, briefly described, are not very reliable where cut through by numerous valleys, except in pockets confined by underlying shale. The stratigraphy of the Denver Basin is summarized and viewed in Red Rocks Park area. Terrace and soil development, stream capture, and pollution of groundwater are among the topics discussed.

McCurdy, J. 1989. Nontributary Groundwater as a Municipal Supply in the Denver Metropolitan Area. Presented at AWRA Water: Laws and Management Conference, Tampa, Florida, September 17-22, 1989.

A case study was conducted in the Denver area to see how nontributary groundwater could be used as a primary water source for the city. The report included an environmental impact statement. Nontributary groundwater is defined as water that, when withdrawn from the ground, will not significantly deplete the surface water system within 100 years. The 6,700-square-mile

Denver, Colorado, groundwater basin is part of a larger structural Denver Basin that extends from central Colorado into western Nebraska, Kansas, and Wyoming. In 1985, the Colorado legislature established a law to regulate the use of nontributary groundwater. Although the right to appropriate groundwater in nontributary aquifers is tied to overlying land ownership, municipal entities are allowed to appropriate water underlying their boundaries by the implied consent of landowners.

McWhorter, D.B. 1984. Specific Yield by Geophysical Logging Potential for the Denver Basin. Technical Completion Report. Prepared for Colorado Water Resources Research Institute.

Management of the groundwater resources residing in the bedrock aquifers of the Denver Basin requires estimation of the volume of water ultimately recoverable from these formations. Management of the waters in the bedrock aquifers of the basin would be greatly expedited by a method that would permit objective estimation of specific yield on a routine basis. This report reviews the concept of specific yield, common methods for its estimation, and the potential for use of borehole geophysical measurements as an alternate method for estimating specific yield. The nuclear magnetic log emerged as the most promising borehole geophysical technique. This log measures the spin-lattice relaxation time of hydrogen nuclei after being subjected to a magnetic field.

Moran and Associates, Inc. Undated report. Environmental Constituents in the Rocky Flats Plant Area — Non-Facility Related Services Pertinent to Water Quality.

Background contaminant sources (originating from non-plant site facilities) have been studied in order to adequately evaluate data acquired during Rocky Flats investigations. These sources include geologic materials and human activity. Geologic materials in the Rocky Flats area are known to contain sedimentary and primary uranium deposits, coal/lignites, metalliferous shales, and alluvial deposits derived form locally mineralized precambrian metamorphic and igneous rocks. Human activity sources include industrial wastes, irrigation ditches, leach fields, agricultural run-off, and storage tanks. Results from groundwater sampling at upgradient locations implicate weathering of metal sulfides, clays, organic-rich sediments, and evaporate minerals as primary source pathways. Water and sediment sample results, taken from upgradient and sidegradient areas of Rocky Flats support these findings.

59

Mudge, M.R., and R.F. Brown. 1952. Geology and Groundwater of the Rocky Flats Area, Golden, Colorado. U.S. Geological Survey Special Report for the Atomic Energy Commission.

A cursory study of the general geology and groundwater in the Rocky Flats area was made for the proposed site of a pond that will be constructed in the SE ¼ NW ¼ sec 11, T28, R70W, Jefferson County, Colorado. The study included the Pierre Shale, Fox Hills Sandstone, Laramie Formation, and pediment gravels. The conclusion of the study was that the pediment gravels and the Laramie Formation, which are present at the site, are capable of transmitting groundwater downward a short distance, possibly 100 feet, and laterally for a distance of a few feet to a few miles.

Norris, J.M., S.G. Robson, and R.S. Parker. 1985. *Summary of Hydrologic Information for the Denver Coal Region, Colorado.* USGS Water Resources Investigation 84-4337. (USGS)

Available hydrologic data for the Denver coal region were summarized to provide a comprehensive review of the existing hydrologic information of the area. Groundwater occurs in alluvial and bedrock aquifers. Alluvial aquifers consisting of sand and gravel occur along principal stream channels. Alluvial aquifers are less than 200 feet thick, have a transmissivity between 1,300 and 67,000 square feet per day, and commonly have hard calcium bicarbonate type water. The four bedrock aquifers are the Dawson, Denver, Arapahoe, and Laramie-Fox Hills aquifers. Depth to water ranges from 0 to 1,000 feet. The aquifers are up to 1,000 feet thick with transmissivities of up to 1,200 square feet per day in the Dawson, 400 square feet per day in the Denver, 2,700 square feet per day in the Arapahoe, and 1,000 square feet per day in the Laramie-Fox Hills aquifers. The quality of the water is generally suitable for most uses; dissolved-solids concentrations range from 20 to 2,000 milligrams per liter. The water is a calcium bicarbonate type in the Dawson aquifer, becoming a mixed calcium bicarbonate to sodium bicarbonate or sodium sulfate type near the margins of the underlying aquifers.

Office of the State Engineer. 1985. Denver Basin Cross-Sections. Colorado Division of Water Resources 15 sections. (Map)

Office of the State Engineer. 1985. Location Map for Hydrogeological Cross-Sections, Colorado Division of Water Resources.

60

Office of the State Engineer. 1987. Aquifer Map of the Denver Basin, Colorado Division of Water Resources.

Office of the State Engineer. 1987. Designated Groundwater Basins and Management District Boundaries. Colorado Division of Water Resources. (Map)

Papadopulus, S.S., and Associates, Inc. 1987. Groundwater Modeling of Impacts of Proposed Spray Irrigation, Rocky Flats Plant, Golden, Colorado. Prepared for Rockwell International. December.

The purpose of this study was to estimate the impacts to the water table and to groundwater flow directions from spray irrigating 80 million gallons per year of tertiary treated sewage effluent. Two proposed locations were evaluated. The groundwater assessment included a groundwater flow model based on an analytical technique developed by M.S. Hantush that was used to make quantitative analyses for each site. The analytical solution evaluates the growth of a groundwater mound in an unconfined aquifer due to surface charge from a circular basin by evaluating the changes in hydraulic head over time. Field data collected in 1986 (depth to water, depth to bedrock) were entered into the model to evaluate alternative spray irrigation scenarios. A total of twelve and nine different scenarios was evaluated for the two proposed spray irrigation areas, respectively. A recharge rate of 45 million gallons per year was used. In all twelve scenarios, based on this recharge rate, the water table would intercept land surface, and overland flow will occur where recharge lasts longer than three years. The study also concluded that the maximum amount of water that could be recharged per area without the occurrence of overland flow is 15 to 20 million gallons per year. The study recommended that alternatives to spray irrigations be investigated, or that only a fraction of the proposed 80 million gallons of waste water be spray irrigated. Various figures of water-table rise generated by the computer model are presented, supporting the conclusions.

Pearl, R.H. 1974. Geology of Groundwater Resources in Colorado. Colorado Geological Survey SP 4. (CGS Library)

The report described the groundwater resources of Colorado in relation to water quantity, quality, and distribution for various geographic regions. A discussion of the geological and hydrological conditions of the following geographic regions was included: South Platte River Basin, southern High Plains, North Platte River Basin, Arkansas River Basin, northern High Plains, Rio Grande River Basin, and western Colorado.

61

Potter, G.L., and T.C. Greengard, 1985. Rockwell International, Internal Letter: RCRA Ground Water Monitoring Data to Daryl Hornbacher. February 7. EMF-ICN # 25396.

The solar evaporation ponds area at Rocky Flats has undergone groundwater monitoring in order to obtain water quality data in accordance with current regulations. A consulting firm was contracted to evaluate the groundwater monitoring program. The deficiencies and needed improvements include better monitoring well placement and updated sampling protocols. The current network of wells were placed for needs other than groundwater monitoring. For instance, the "background" wells are now located downgradient of the spray fields and may be impacted by spray irrigation, making the background samples biased. Also, many of the wells may have outdated construction standards, and thus may receive flow from surface water drainage. With the current sampling program common pumps or bailers may be used to collect samples, leaving the collected samples susceptible to cross-contamination. In many instances, improper bottle types were used to collect samples and samples have not been cooled to preserve field sample conditions. Many of the current wells may be contaminated with NaCl due to an error in adding rock salt to the monitoring wells, instead of Clorox, while attempting to sterilize the wells in early 1983.

Robson, S.G. 1983. *Hydraulic Characterization of the Principal Bedrock Aquifers in the Denver Basin, Colorado.* USGS Hydrological Inv. Atlas HA-659.

This map series includes 17 figures and 4 tables to illustrate the hydraulic properties of the four Denver Basin bedrock aquifers. The figures include a cross-section of the Denver Basin; mapped hydraulic conductivities of the four aquifers; graphs of the relation of specific capacity to transmissivity, porosity to hydraulic conductivity, and specific storage to head in the aquifer; maps of the transmissivity of each aquifer; and maps showing estimated storage coefficients of the Arapahoe aquifer and location of confined and unconfined conditions. Tables include information on strata permeability distribution of the four aquifers, specific yield, specific retention, porosity, effective porosity, gas permeability, hydraulic conductivity, and statistics of hydraulic properties. Each hydraulic property is briefly discussed for the Denver, Dawson, Arapahoe, and Laramie-Fox Hills aquifers.

Robson, S.G. 1987. *Bedrock Aquifers in the Denver Basin, Colorado — A Quantitative Water Resources Appraisal.* U.S. Geological Survey Professional Paper 1257 (also published in 1984 as U.S. Geological Survey Open-File Report 84-431).

Groundwater modeling techniques were used to simulate aquifer response to various pumpage estimates and groundwater development plans. It is estimated that 270 million acre-feet of recoverable groundwater is in storage in four bedrock aquifers. However, less than 0.1 percent of this volume of water is stored under confined conditions. The larger volume of water stored under unconfined conditions will be available for use only when the water levels in the confined aquifers decline below the top of the individual aquifer, allowing water table conditions to develop. Annual precipitation on the Denver Basin supplies water to the area at an average rate of 6,900 cubic feet per second; about 55 cubic feet per second of this water supply recharges the bedrock aquifers. Pumpage exceeds recharge in the metropolitan area and has caused water-level declines (1958 to 1978) in excess of 200 feet southeast of Denver.

A quasi-three-dimensional, finite-difference model of the aquifer system was constructed and calibrated under steady-state and transient-state conditions. Steady-state calibration indicated that lateral hydraulic conductivity within the aquifers is about 100,000 times larger than vertical hydraulic conductivity between the aquifers. Transient-state calibration indicated that between 1958 and 1978, 374,000 acre-feet of water was pumped from the aquifers, producing a 90,000-acre-foot net decrease in the volume of water in storage in the aquifers. During this time, pumpage also changed the rates of interaquifer flow, induced additional recharge, and caused capture of natural discharge. Three 1979 to 2050 pumpage estimates were made for use in simulating the effects of various groundwater development plans. Simulations, using each of these pumpage estimates, indicated that by the year 2050, large water-level declines could occur, particularly in the deeper aquifers. Maximum water-level declines of 410 feet, 1,700 feet, and 1,830 feet were produced, using the small, medium, and large pumping rates.

Robson, S.G. 1989. *Alluvial and Bedrock Aquifers of the Denver Basin: Eastern Colorado's Dual Groundwater Resource.* U.S. Geological Survey Water Supply Paper 2302.

In the semiarid Denver Basin of eastern Colorado, large volumes of groundwater are found in alluvial and bedrock aquifers. The alluvial aquifer is recharged from flash floods and snowmelt runoff and readily stores and transmits the water because it consists of relatively thin deposits of gravel, sand, and clay located in the valleys of principal streams. The bedrock aquifer is recharged less easily because of its greater thickness and prevalent layers of shale, which retard

the downward movement of water. Although the bedrock system contains more than 50 times as much water in storage as the alluvial aquifer, it does not store and transmit water as readily as the latter. Because of these and other factors, including legal and economic constraints and water-quality conditions, the alluvial aquifer is used primarily as a source of irrigation supply, which is the largest water use in the area.

Robson, S.G., and E.R. Banta. 1987. *Geology and Hydrology of Deep Bedrock Aquifers in Eastern Colorado.* U.S. Geological Survey Water Resources Investigations Report 85-4240.

Deep bedrock aquifers are present in rocks of Cretaceous through Pennsylvanian age in eastern Colorado. These aquifers are the Laramie-Fox Hills (the uppermost aquifer studied), Fort Hays-Codell, Dakota-Cheyenne, Entrada-Dockum, Lyons, and Fountain. Structural mapping indicates that the aquifers are 2,000 to 9,000 feet below land surface in most of eastern Colorado but outcrop in local areas in a narrow band along the Front Range of the Rocky Mountains. Recharge primarily occurs at outcrops and produces a northerly or easterly groundwater flow to discharge areas along the South Platte or Arkansas rivers. Deep aquifers also discharge by underflow to Kansas and Nebraska. Some strata in the Dakota-Cheyenne aquifer are not in hydraulic connection with the aquifer, and abnormal fluid pressures, trapped hydrocarbons, and high dissolved-solids concentrations are found in these strata. Temperature and dissolved-solids mapping indicate water temperatures of 100°F to 210°F in northeastern Colorado and a zone of relatively fresh water extending through a 7,000- square-mile area of the Dakota-Cheyenne aquifer in southeastern Colorado. Water levels in the Laramie-Fox Hills aquifer continue to decline as much as 12 feet per year in local areas near Denver.

Robson, S.G., and J.C. Romero. 1981. *Geologic Structure, Hydrology, and Water Quality of the Dawson Aquifer in the Denver Basin, Colorado.* U.S. Geological Survey Hydrologic Investigations Atlas HA-643. April.

Geologic structure, depth to the base, total-sandstone thickness, and potentiometric surfaces for 1958 and 1978 were mapped for the Dawson aquifer. A water-level change map from 1958 to 1978 indicated that water level declines locally more than 150 feet near the city of Denver. Water in the aquifer is generally a calcium bicarbonate type with dissolved-solids concentrations commonly ranging from 100 to 400 milligrams per liter and dissolved-iron concentrations as high as 85,000 micrograms per liter.

Robson, S.G., and J.C. Romero. 1981. *Geologic Structure, Hydrology, and Water Quality of the Denver Aquifer in the Denver Basin, Colorado.* U.S. Geological Survey Hydrologic Investigations Atlas HA-646. June.

Geologic structure, depth to base, total conglomerate, sandstone and siltstone thickness, and potentiometric surfaces for 1958 and 1978 were mapped for the Denver aquifer. Between 1958 and 1978, water-level declines exceeded 200 feet in some areas near the city of Denver. Groundwater is generally a calcium bicarbonate or sodium bicarbonate type with dissolved-solids concentrations commonly ranging from 100 to 500 milligrams per liter and dissolved-iron concentrations as high as 6,600 micrograms per liter in a few areas.

Robson, S.G., J.C. Romero, and S. Zawistowski. 1981. *Geologic Structure, Hydrology, and Water Quality of the Arapahoe Aquifer in the Denver Basin, Colorado.* U.S. Geological Survey Hydrologic Investigations Atlas HA-647. December.

Geologic structure, depth to base, total conglomerate, sandstone and siltstone thickness, and potentiometric surfaces of the Arapahoe aquifer for 1958 and 1978 were mapped. Between 1958 and 1978, water-level declines in the Arapahoe aquifer exceeded 200 feet in a 135-square-mile area southeast of Denver. The Arapahoe aquifer groundwater is generally of the sodium bicarbonate type with dissolved-solids concentrations commonly ranging from 200 to 1,000 milligrams per liter. Concentrations of dissolved sulfate in excess of 250 milligrams per liter occur in a 350-square-mile area along the northwest margin of the aquifer.

Robson, S.G., A. Wacinski, S. Zawistowski, and J.C. Romero. 1981. *Geologic Structure, Hydrology, and Water Quality of the Laramie-Fox Hills Aquifer in the Denver Basin, Colorado.* U.S. Geological Survey Hydrologic Investigations Atlas HA-650.

The Laramie-Fox Hills aquifer underlies an area of about 6,700 square miles in east-central Colorado and is an important water supply for many residents in the area. Population increases have produced increasing demands for groundwater and have led to significant water-level declines in parts of the aquifer. Results of this study, which was undertaken to better define the water-supply potential of the aquifer, indicate that the aquifer consists of interbedded sandstone, siltstone, and shale at depths of as much as 3,200 feet. The water-yielding sandstone and siltstone beds have a total thickness of more than 200 feet in some areas. The 1978 potentiometric-surface map indicates that groundwater moves from the south-central part of the aquifer toward the margins of the aquifer where most of the water discharges to streams and

65

alluvial aquifers. Some groundwater recharge occurs as downward movement of water from the overlying Arapahoe aquifer. Water-level declines between 1958 and 1978 exceeded 200 feet in an 80-square-mile area near Brighton, while only moderate changes have occurred in other parts of the aquifer. Water in the aquifer is generally a sodium bicarbonate type with dissolved-solids concentrations commonly ranging from 400 to 1,200 milligrams per liter.

Rockwell International. 1986. Draft Work Plan—Geological and Hydrogeological Site Characterization, Rocky Flats Plant, Golden, Colorado. Prepared for the U.S. Department of Energy.

This work plan describes the activities and tasks to be performed at the Rocky Flats Plant in order to characterize site geology, hydrology and water quality. Included is the initial site evaluation, its hydrogeologic setting, waste disposal activities, and prioritization of potential containment, and the nature and extent of contamination. The site characterization, topography, geology, groundwater hydrology, surface water hydrology, sediments, and laboratory materials testing are discussed. The work plan includes figures, tables, and plates of the Rocky Flats Plant, surficial geology, shallow and bedrock monitor well completion diagrams, surface water parameters, monitor well locations, and locations of surface water and sediment monitoring stations.

Rockwell International. 1986. Resource Conservation and Recovery Act Part B — Operating Permit Application for U.S. Department of Energy, Rocky Flats Plant, Hazardous and Radioactive Mixed Wastes (CO7890010526). November 28.

A portion of the application (Section E) is devoted to groundwater and is included in the Part B RCRA operating permit application report. Included were a detailed review of the hydrogeologic setting, results of Phase I investigations, and tables and figures presented historical groundwater data. An electromagnetic survey indicated areas of high conductivity potentially indicating groundwater contamination. Similarly, results of a soil gas survey provide insight on the potential for groundwater contamination. Hydraulic conductivities resulting from drawdown-recovery tests and packer tests were presented. The hydrogeologic setting review included formations, structure, recharge and discharge conditions, flow direction, and flow rates for the upper and lower flow systems. Closure plans for three RCRA-regulated units have been developed. These plans stipulate detection monitoring at specific points of compliance. Appendices presented data on groundwater monitoring including borehole logs, hydrologic test data, and chemical data.

66

Rockwell International. 1986. Sampling and Analyses Plan; U.S. DOE Rocky Flats Plant; Solar Pond 207-North, Interceptor Trench, Pump House and West Spray Field.

Unable to locate; no summary available.

Rockwell International. 1987. Remedial Investigation Report for High Priority Sites (881 Hillside Area), Rocky Flats Plant, Golden, Colorado. Prepared for the U.S. Department of Energy. July 1.

This report presents results of a remedial investigation undertaken to verify the existence and location of waste disposal sites in the general vicinity of the 881 Hillside area, characterize the site, evaluate the nature and extent of contamination, and develop data needed for feasibility studies of remedial alternatives. The Fountain, Upper Laramie, and Arapahoe Formations and the creeks of North and South Walnut, Woman, Coal, and Rock, and Leyden Gulch are discussed. Additional information reports on the geophysical investigation, the soil gas survey, and drilling activities. A separate section provides hydrogeologic data resulting from the investigation.

Rockwell International. 1987. Remedial Investigation Report, 903 Pad, Mound and East Trenches Areas, Rocky Flats Plant, Golden, Colorado. December 31.

This report characterizes the 903 Pad, Mound, and East Trenches areas; evaluates the nature and extent of contamination; and determines the data needed for feasibility studies of remedial alternatives. A summary of results from previous investigations, the nature and extent of the problem, and remedial investigation conclusions were included. The regional setting, site features, natural resources, climatology, physiography, regional hydrogeologic setting, and water resources were described. An entire volume was devoted to describing the site hydrogeology, including the surficial geology, bedrock geology, groundwater flow, chemistry, sediments, and flood potential. Public health and environmental concerns, potential receptors, public health impacts, and environmental impacts were also discussed. Hydrogeologic data collected, including groundwater, surface water, and sediment data, were presented.

67

Rockwell International. 1988. Environmental Assessment Report for High-Priority Sites (881 Hillside Area), Rocky Flats Plant, Golden, Colorado. December 23.

The document contains information that supports the proposed remedial action at the 881 Hillside area. Alluvial groundwater in this area is contaminated with volatile organic compounds. The proposed action includes installation of a pumping well, drain system, reinjection trench, and collection tanks. It also includes a treatment facility for the collection, treatment, and release of captured groundwater. If a remedial action is not implemented, additional impacts may result to surface water and groundwater from continued release of contaminants. This system would reduce contaminant concentrations in groundwater and prevent possible offsite contamination via groundwater in the future.

Rockwell International. 1988. Groundwater Monitoring at Regulated Units, Rocky Flats Plant, Golden, Colorado. March 31.

In accordance with regulations governing the interim status of the three RCRA-regulated units (Solar Evaporation Ponds [SEPs], West Spray Field, and Present Landfill) undergoing closure at RFP, groundwater monitoring programs were established for these sites. During 1986, a comprehensive program that included site characterization, remedial investigations and feasibility studies, and corrective action was implemented at RFP. Additional wells were installed in 1986 to characterize and delineate groundwater plume(s) at the SEP and to aid in site characterization at the West Spray Field and Present Landfill. At the Present Landfill, four wells were completed. The uppermost aquifer is comprised of alluvium, colluvium, and valley-fill alluvium. (This report did not include the weathered [bedrock] claystone in the surficial aquifer.) Figures presented illustrated a general easterly groundwater flow direction for these sites. Although not summarized, groundwater quality data sheets were provided for samples collected during 1986 and 1987. Groundwater elevations and flow directions within each unit were evaluated. The respective closure plans for these three units were referenced for in-depth discussions of the data.

Rockwell International. 1988. Remedial Investigation Report for High Priority Sites (881 Hillside Area). Prepared for the U.S. Department of Energy. March 1.

The 881 Hillside area, which consists of 12 solid waste management units (SWMUs), was identified during a 1986 characterization of the Rocky Flats site facility as a high-priority site and is considered a source of environmental contamination. A remedial investigation (RF) was

68

conducted at the 881 Hillside area to investigate the locations of alleged waste disposal sites, characterize the sites, and evaluate the nature and extent of contamination, including concentrations of volatile organic compounds (VOCs) in groundwater. In addition to various types of sampling and surveys conducted as part of the RI, monitoring wells were installed and groundwater samples were collected. Potentiometric surface and saturated thickness maps presented information on site hydrogeology. Borehole logs and monitoring well construction details also provided information on the site characteristics. Analytical data, presented in tables, indicated that low levels of VOCs were detected in the general vicinity of SWMUs 103, 106, and 107, and much higher levels were detected at SWMU 119.1. The extent of alluvial groundwater contamination was evaluated to be limited, possibly due to clayey soils of low hydraulic conductivity that contain discontinuous lenses of more permeable materials resulting in a small quantity of groundwater flow. Shallow groundwater beneath the 881 Hillside also contains detections of metals, radionuclides, and total dissolved solids (TDS). The only constituents found above background levels in groundwater downgradient of the 881 Hillside were TDS and strontium at very low concentrations. Bedrock groundwater quality is not presented as adversely impacted.

Rockwell International. 1988. Resource Conservation and Recovery Act Post-Closure Care Permit vol. I–VII. Rocky Flats Plant, Golden, Colorado. October 5.

This broad document covers a spectrum of plant facts and data and includes a section on regional and plant hydrogeologic information. Topics include groundwater recharge to upper and lower aquifers, hydraulic gradients, hydraulic conductivity, hydrogeologic systems, and groundwater and surface water discharge means. Cross sections, maps, hydrogeologic data, boring logs, and aquifer test data supplement the report.

Rockwell International. 1989. 1988 Annual RCRA Groundwater Monitoring Report for Regulated Units at Rocky Flats Plant.

This report presents 1988 groundwater monitoring data as required under the Colorado Hazardous Waste Act regulations for RCRA interim status units at Rocky Flats Plant. The units include the Solar Evaporation Ponds, Present Landfill, West Spray Field, and the Original Process Waste Line. Analytical groundwater quality data were presented and statistically evaluated in accordance with specific regulations. Physical aquifer characteristics are summarized for each of the regulated units. The uppermost aquifer in the area is comprised of saturated surficial materials, which include alluvium, colluvium, valley-fill alluvium, and the

69

sandstones and weathered claystones of the Arapahoe Formation, which subcrops beneath the waste management area. The uppermost aquifer in the West Spray Field is comprised of the saturated Rocky Flats Alluvium and does not include the Upper Laramie Formation (bedrock) because of the large hydraulic conductivity contacts between the two units. The uppermost aquifer in the Present Landfill area is comprised of the saturated surficial materials and the upper weathered claystones of the Arapahoe Formation. The weathered claystone is included in the uppermost aquifer, as it is in contact with the surficial material and is more permeable than unweathered claystone. Proposed well locations are discussed to better characterize the nature and extent of contamination within each regulated unit.

Rockwell International. 1989. Background Hydrogeochemical Characterization and Monitoring Plan, Rocky Flats Plant, Golden, Colorado. January.

This characterization and monitoring plan was developed to aid in evaluating potential groundwater contamination associated with the RCRA-regulated units at RFP and interpreting remedial investigation analytical results for the CERCLA sites. Background geochemistry of groundwater unimpacted by plant operations will be characterized. The background characterization can then provide comparison criteria to evaluate the extent of impact to the groundwater. Methodologies proposed for all phases of the investigation to characterize groundwater chemistry and detected potential impacts are presented.

Rockwell International. 1989. Groundwater Assessment Plan - Draft, Rocky Flats Plant, Golden, Colorado. Prepared for the U.S. Department of Energy. September.

An assessment plan was developed for conducting a groundwater monitoring and data evaluation program for the Rocky Flats site. The areas covered by this program consist of RCRA regulated units (Original Process Waste Lines, West Spray Field, Present Landfill, and Solar Evaporation Ponds) and CERCLA/SARA areas (881 Hillside; 903 Pad, Mound, and East Trenches; and Low Priority Sites). General area-specific information (historical uses, geology, hydrogeology, and known contaminants) is provided for each area. An entire section is devoted to regional and site hydrogeologic characteristics. Analytical data, hydrologic maps, figures, and tables provide information on site conditions and supplement past and planned groundwater monitoring activity program plans. General assessment plan information addresses groundwater monitoring regulations, contamination assessment and monitoring procedures, well construction, sample collection, quality control, parameter lists, and statistical tests to be implemented for the program.

70

Rockwell International. 1989. Rocky Flats Plant Site Environmental Report for 1988. Prepared for the U.S. Department of Energy.

The report summarizes the environmental surveillance program at RFP during 1988 and serves as a general public courtesy publication. As part of the program, 159 monitoring wells were sampled to analyze groundwater for volatile organic compounds (VOCs), metals, radionuclides, and other water quality indicator parameters. Groundwater has been impacted locally in areas of present and past plant operations. These areas include the Solar Evaporation Ponds; West Spray Field; 881 Hillside; 903 Pad, Mound, and East Trenches; and Present Landfill. Major contaminants include VOCs. Also present were elevated levels of nitrate, sulfate, bicarbonate, metals, and radionuclides.

Rockwell International. 1989. Seismic Reflection Profiling of the Arapahoe Formation at the Rocky Flats Plant - Draft Report. Prepared for the U.S. Department of Energy. August.

This report describes the shallow, high-resolution seismic reflection technique using seismic modeling. It also describes work to determine the feasibility of using this technique to answer detailed geologic questions, optimize groundwater monitoring well placement, and verify results. Field testing was done within the parameters set, and the results are presented in this report. Seismic data acquisition, data processing, interpretation of information, and recommendations are included.

Roeder, J.R. of EG&G. 1990. Memorandum to Jack Kersh EG&G. Surface Water and Groundwater Review. EMF-ICN 26868.

The DOE Rocky Flats Office has reviewed data from surface and groundwater monitoring stations at and adjacent to the solar evaporation ponds (second, third, and fourth quarters). The data show that there are numerous radionuclides of high concentrations in both the surface water and groundwater in the solar evaporation pond areas. Lab results accompany the memorandum.

Romero, J.C. 1976. Groundwater Resources of the Bedrock Aquifers of the Denver Basin, Colorado. Colorado Department of Natural Resources, Denver Division of Water Resources, Planning and Investigations.

The bedrock aquifers of the Denver Basin contain vast quantities of groundwater suitable, in most localities, for all beneficial purposes. The major problems that will confront both

71

administrators and users of this groundwater include those associated with declining water levels and deterioration of water quality. Areas in which current water-level declines are rapid enough to cause concern are the South Platte River corridor, the Strasburg-Byers-Deer Trail area, and parts of metropolitan Denver. Water-quality problems of the Denver Basin's bedrock aquifers are confined predominantly to the Laramie Formation and Laramie-Fox Hills aquifer. Water from these units is locally known to contain troublesome amounts of hydrogen sulfide, methane, iron, fluoride, and sodium. Many of these problems can probably be eliminated by avoiding multi-aquifer completions, particularly in the case of mixing Laramie-Fox Hill aquifer water with Dawson Group water. Successful management of the Denver Basin bedrock aquifers will require the collection and utilization of additional data. The importance of additional electric logs, geologic sample logs, and aquifer test data is emphasized. Also recommended are water-quality testing, an observation-well network, and accurate measurements of water withdrawn from the aquifer.

Romero, J.C., and E.R. Hampton. 1972. *Map Showing the Approximate Configuration and Depth to the Top of the Laramie-Fox Hills Aquifer, Denver Basin, Colorado.* USGS Miscellaneous Geologic Inv. Map I-791.

This map includes two contour maps of the Denver Basin showing the depth to the top of the Laramie-Fox Hills aquifer and the configuration of the top of the aquifer. A brief summary description of the Laramie-Fox Hills aquifer hydrologic characteristic is given.

Roy F. Weston, Inc. 1988. Present Landfill Hydrogeologic Characterization Report, Rocky Flats Plant. July. EMF-ICN#19255.

This report presents geologic and hydrogeologic characterization of the Present Landfill to aid in the creation of a closure plan. Hydrogeologic investigation results suggested that the landfill may not be completely isolated from groundwater exterior to the landfill by the groundwater intercept system. Water balance calculations indicated groundwater inflow around the landfill, perhaps at the intersection of the groundwater intercept system and the slurry walls. Groundwater quality impacts from the landfill were within the natural variations observed in the vicinity. The impermeable cap over the Present Landfill would aid in removing water currently present by reducing recharge to the landfill. Additional wells were proposed to gain a better understanding of lithology and hydraulic connection between alluvial groundwater inside and outside the landfill. Location, cross-section, and water-table elevation maps and analytical data are included.

Roy F. Weston, Inc. 1989. Remedial Investigation Plan - 903 Pad, Mound, and East Trenches Areas Phase II - Sampling Plan, Vol. 1, Draft. Rocky Flats Plant, Golden, Colorado. Prepared for Rockwell International. October.

This document describes the plan and scope of work for characterization of waste and surficial materials at the medium-priority sites at Rocky Flats. General conclusions have been drawn from several investigations conducted to provide information on the geologic and hydrologic site characterization as well as the nature and extent of contamination in soils, groundwater, and surface water. The sitewide hydrogeology is one of several general topics reviewed. A site-specific conceptual model developed from the Phase I investigation results describes the geology, hydrogeology, and hydrology. Unconfined groundwater flow occurs in surficial materials, subcropping sandstones, and potentially in weathered claystones. The flow in these units are interconnected. The flow in surficial materials is not fully saturated year-round. Flow in weathered claystones has not been sufficiently documented, and flow directions in subcropping sandstones are poorly defined due to complex stratigraphy. Confined groundwater flows in deeper sandstones. Groundwater recharge occurs as infiltration of incident precipitation and flow from ditches and surface water drainages. Discharge of groundwater is from the unconfined flow system and occurs as seeps and springs at the edge of the Rocky Flats terrace, to surface water in Woman Creek and South Walnut Creek, and leakage to bedrock sandstones. The objectives of this proposed work, relating with groundwater hydrology, include determining the relationship between surficial material and bedrock groundwater and to develop hydraulic conductivities and storativity values for these materials. The remainder of the document describes methods for implementation of this work.

R.V. Lord and Associates, Inc. 1976. Subsurface Soil and Groundwater Investigation for Existing Building 928, Rocky Flats Plant Site. Prepared for Rockwell International.

An investigation was initiated to clarify an earlier study that had showed lower water levels and to ascertain if the groundwater seepage was natural or if its origin was leakage from the tank. Field work consisted of test borings with which standard penetration tests were made to obtain an index of soil uniformity and relative bearing data. The subsurface soils and laboratory tests are described, and recommendations are made based on findings. The report includes a complete log of the borings, locations of identifiable soil changes, standard penetration test results, sample locations, and water measurements.

Schenk-Tarasuk, J.A. 1990. RIVINT; Computer Program for Surface Water/Groundwater Interactions and its Application to the Denver Basin, Colorado. Masters Thesis, Colorado School of Mines.

RIVINT (RIVer INTeractions) is a computer program that simulates surface water and groundwater interactions. RIVINT has been developed for use with the USGS three-dimensional finite difference groundwater flow code (MODFLOW) and is used in place of the original river package in the MODFLOW programs.

Users may model river reaches with or without alluvium. Seepage between a river and underlying aquifer is calculated and used in the MODFLOW code as part of the calculation of head in a grid cell. The form of the equation for seepage between a river and an aquifer is dependent on the nature of hydraulic conditions that exist between the river and the aquifer. The user has the option of including silt layer parameters to represent a silt layer in the riverbed. The form of the equation for seepage between alluvium and aquifer is dependent on the nature of hydraulic conditions that exist between the alluvium and underlying aquifer if alluvium is modeled explicitly using the river package. River discharge is calculated by summing flows in to and out of the river in a mass balance equation. Using Manning's equation for flow in an open channel, river depth and stage is calculated. If alluvium is explicitly modeled, net flow rate in the alluvial reach is calculated as the difference between inflows to and outflows from the reach. Change in head of the alluvium is equal to the net flow rate in to or out of the alluvium, multiplied by the time-step length, and divided by the specific yield and area of seepage. Output for reaches containing only rivers includes location of the reach in the groundwater grid, river discharge, river stage, and seepage rate between the river and grid cell. Output for reaches simulating river and alluvium includes reach location, head in the alluvium, seepage rate between alluvium and bedrock, river discharge, river stage, and seepage rate between the river and alluvium. RIVINT is used to model rivers and their alluvium in the Denver Basin of Colorado to assess how rivers are affected by pumping of groundwater in bedrock aquifers.

Schneider, P.A., Jr. 1980. *Water-Supply Assessment of the Laramie-Fox Hills Aquifer in Parts of Adams, Boulder, Jefferson, and Weld Counties, Colorado.* U.S. Geological Survey Open-File Report 80-327.

Groundwater in the Laramie-Fox Hills aquifer is a potential source of supplemental municipal water supplies for the communities of Erie, Lafayette, Louisville, and Superior in Colorado. The present water supplies for these communities are not always adequate to meet current demands.

74

The U.S. Geological Survey made this water-supply assessment of the Laramie-Fox Hills aquifer for the U.S. Bureau of Reclamation, which is investigating and evaluating alternative sources of water for the communities.

According to the assessment, recharge to the aquifer is mostly in the western and southwestern parts of the study area. Groundwater movement is generally from the southwest to northeast. Groundwater discharge in the study area is primarily by pumping wells. Since 1961, this pumping has caused water-level declines of about 250 to 300 feet from Broomfield to east of Erie, Colorado. Generally, water levels in other parts of the area have remained the same. The aggregate sand and aquifer thickness determined from well logs ranges from 42 to 360 feet and the mean thickness is 229 feet. The volume of groundwater in storage in the study area is about 5 million acre-feet. Reported yields from 93 wells ranged from 1 to 90 gallons per minute and averaged 22 gallons per minute. Well yields tended to be larger in the areas where aggregate sand thickness is the greatest. The water changes from a sodium calcium bicarbonate type to a sodium calcium sulfate type as it moves through the aquifer away from the recharge areas. The maximum limit established by the U.S. Environmental Protection Agency for nitrite plus nitrate in public water supplies was exceeded in water from three wells, the maximum limit for fluoride was exceeded in water from two wells, and the maximum limit for selenium was exceeded in water from three wells.

Snow, D.T. 1968. "Hydraulic Character of Fractured Metamorphic Rocks of the Front Range and Implications to the Rocky Mountain Arsenal Well." *Colorado School of Mines Quarterly*, January, Vol. 63, No. 1.

Hydraulic and geometrical properties of fractured metamorphic rocks of the Front Range of Colorado are determined from damsite pressure-injection tests and records of domestic water wells. Because the same rocks beneath the Denver Basin compose the reservoir into which fluid wastes have been injected at the Rocky Mountain Arsenal well, the Front Range properties are applicable to studies of the arsenal well-injection performance and the possible earthquake response. Fracture permeability may be of similar origin in both cases: faulting, weathering, and erosional stress release beneath a surface of erosion. At damsites in the Front Range metamorphic rocks fracture spacing is about 5 to 10 feet near the ground surface, increasing to about 15 to 35 feet at the 200-foot level. Water wells intercept even fewer significant fractures. Fracture openings close with depth starting with approximately 200 micron cracks going to 70 micron cracks between the near-surface and the 200-foot depth, porosities also decrease with depth from approximately 0.04 percent to 0.001 percent, and permeability decreases linearly with

the logarithm of depth. Test data suggest that the aquifer is bounded by vanishing permeability at about 200 feet, though open fault zones may extend to greater depths. The different lithologic units in the area have different transmissibilities. The calculated transmissiblities of the different lithologic units exceed the transmissibilities calculated for arsenal well flow. It has been deducted that the pre-Pennsylvanian soils and sediments resting on the gneiss at the arsenal site may effectively confine flow to the fractured basement.

The Austin Company. 1951. First Interim Report on Foundation Consulting Activities For Rocky Flats Project. Prepared for The United States Atomic Energy Commission. October. EMF-ICN # 7522 & 7523.

The preliminary foundation consulting activities report includes a review of the geological reconnaissance of the site, provides recommendations for the proposed drilling program, and presents the results and interpretations of the foundation material tests. In the general region the surface deposits consist of pediment gravels which overlie the Denver-Arapahoe Formation. The Denver Formation overlies the Laramie and Fox-Hills sandstones which contain numerous aquifers. These beds in turn overlie the Pierre Shale. The pediment gravels consist of a heterogeneous mixture of clay, silt, sand, gravel, cobbles, and boulders which were derived by fluvial deposition from the west. The Denver Formation is composed of clays of various degrees of compaction, poorly consolidated shales, and weakly cemented and poorly consolidated siltstones and sandstones. At the site, the pediment gravels are intermixed with alluvial gravels in major draws and the Denver Formation is most commonly represented by a soft to stiff variable-colored clay immediately overlying a blue to purple compact clay shale. The gravels may be an acceptable foundation material but detailed testing is advised. The soft clays of the Denver Formation show frequent weathering cycles and are generally classified as a poor foundation material. Tests on the compact shales have proven that it is an acceptable foundation material. However, deposits should be critically examined for sandstone stringers and indication of water table fluctuations as the occurrence of these may weaken the material. The surface water drainage would be from west to east toward the South Platte River, and it is expected that the groundwater would also have a west-east trend. At present there is no information on the groundwater table in the immediate area; however, the proposed foundation exploration program may present some information on the general water table. Wells in the area, used to irrigate and provide domestic water supply, obtain water primarily from the Fox-Hills and Laramie sandstones and some derive water from the Denver Formation. The water in the Denver Formation may be susceptible to contamination from surface water and groundwater. It is

16

doubtful that the Fox-Hills and Laramie sandstones obtain water percolating from the Denver Formation.

The Austin Company. 1951. Report on Findings Pertaining to Underground Waters at the Rocky Flats Plant Site. Prepared for the Atomic Energy Commission. October. EMF-ICN # 6944 & 6945.

The information in this report is based upon personnel observations, core borings to determine soil-bearing capacities, and conversations with local personnel of U.S. Geological Survey and the Bureau of Reclamation. Strata underlying the site dip to the east and outcrop approximately one half-mile west of the site. This indicates that groundwater generally flows from the west to the east across the site. The Rocky Flats Lake, located to the southwest of the site, is situated over the outcropping of several of the water-bearing strata. Water in this lake may feed these strata and may carry contamination collected in the lake from airborne particles to local water-supply wells. Water-supply wells are drilled in all strata to the east and southeast of the site down to a depth of more than 1,500 feet. The deepest well penetrates the Fox-Hills Sandstone, the lowest water-bearing formation in the area. Surface water penetrates the pediment gravels which vary from 1 to 25 feet in thickness and flows along the top of the Arapahoe Formation which is made-up of impervious clays. Faults occur in the Arapahoe Formation and, where they occur, surface water may seep to lower formations. The report concluded that in order to properly maintain a check on the groundwater, it would be necessary to drill test wells into each water-bearing formation. The placement of the wells should be on the upstream and downstream sides of the groundwater at the site. Initially two wells, presumably one located upstream and one located downstream of the site, should be drilled and electronically logged to the Fox-Hills Sandstone to determine the number and depth of each additional well required.

United States Atomic Energy Commission. 1972. Environmental Statement, Land Acquisition, Rocky Flats Plant Colorado. April. EMF-ICN#7593.

The purchase of approximately 4,600 acres to create a 1- to 1.5-mile buffer zone surrounding the Rocky Flats site is identified as a way to minimize problems between residential communities and industrial facilities and an additional safety margin in the event of a plant accident. Summary geological and hydrological information are part of the characterization of the existing environment. The area is underlain by 25 to 80 feet of bouldery, sandy, gravel with a clayey layer near the base. This gravel is underlain by approximately 500 feet of silty claystone bedrock. The impermeable strata at the base of the gravel and upper bedrock serve as horizontal

dams causing groundwater to move laterally creating seeps where the contact intersects the topographic surface. Acquisition of the land and planting shrubs and trees is not expected to significantly change current drainage or runoff patterns.

U.S. Energy Research and Development Administration. 1977. Draft Environmental Impact Statement (Volumes I & II), Rocky Flats Plant Site, Golden, Colorado. September.

This extensive document provides an overview of Rocky Flats Plant operations. A description of the area, assessment of the actual and potential environmental impacts associated with current (to June 1976) operations, and alternatives to current plant operations are included. A section in the report and an appendix are devoted to the hydrology of the Rocky Flats site. The hydrology reported within the EIS is a duplication of the U.S. Geological Survey report titled Hydrology of a Nuclear Processing Plant Site, written by R.T. Hurr.

Van Diest, P.H. 1891. Denver Artesian Basin. Colorado Science Society Proc., Vol. 4. Read at Meeting by R.C. Hills.

The first artesian wells penetrating the Arapahoe aquifer were installed in 1883. At that time the confining pressures were great enough to cause the water to rise more than 100 feet above the surface. With the addition of subsequent close proximity wells, the water resources were drained faster than they could be replenished. This caused wells to cease flowing, beginning with wells on the higher plains working toward the lower basin wells. The result was that wells had to be pumped to retrieve water. The conclusion drawn from the investigation was that the amount of water being drawn from the aquifer in 1891 was in excess of the water replenishing supply resources of the territory. The area of water collecting territory for the Arapahoe aquifer was estimated to be 28,512,000 square feet. Other calculations made included the value of water that the Arapahoe sandstone had supplied in six years (2,619,540,000 gallons), the amount of recharge that occurred per day (170,900 gallons), and the amount of water supplied each day (1,367,025 gallons). It was stated that water may be conservatively taken at 170,000 gallons per day. If all 202 wells drilled to date (1891) were plugged it would take approximately 40 years before the Arapahoe beds would be in the saturated condition existing at the drilling of the first well. The Laramie sandstone is considered as an untapped permanent source for water supply.

78

Van Slyke, G.J., J.C. Romero, and A. Wacinski. 1986. *Aquifer Data from Geophysical Logs, Denver Basin, Colorado.* U.S. Geological Survey Basic Data Report 1.

This report was generated to assist in the formulation of rules and regulations on the withdrawal of groundwater from the Denver Basin aquifers. The Denver Basin covers 6,700 square miles and contains four aquifers. The aquifers include the Dawson, Denver, Arapahoe, and Laramie-Fox Hills. Data have been interpreted for over 2,400 geophysical logs of oil, gas, and water wells in the Denver Basin. Log data include well location, surface elevation, elevation of the tops and bases of aquifers, and total thickness of sandstones and siltstones.

Van Slyke, G.J., J.C. Romero, and A. Wacinski. 1991. *Aquifer Data From Geophysical Logs, Denver Basin, Colorado.* U.S. Geological Survey Basic Data Report 2.

This report is an update to an earlier report that interpreted geophysical logs from exploration boreholes and wells throughout the Denver Basin. The report covers the four bedrock aquifers that exist in the Denver Basin: Dawson, Denver, Arapahoe, and Laramie-Fox Hills.

The Dawson aquifer covers an area of 1,400 square miles and ranges in thickness from 0 to 1,200 feet. It predominantly consists of coarse grained sandstones and has confining clay shale layers. Typical wells in the Dawson aquifer yield from a few to 400 gallons per minute.

The Denver aquifer underlies an area of 3,500 square miles and ranges in thickness from 0 to 1,000 feet. Sandstones are generally less than 40 feet thick, and most of the aquifer consists of clay, claystone, siltstone, and shale. The Denver aquifer is considered to be hydrologically connected throughout its entire vertical and horizontal extent with the exception of the continuous confining clays at the top and base of the aquifer. The Denver aquifer wells yield between 5 and 50 gallons per minute.

The Arapahoe aquifer consists of inter-bedded conglomerates, sandstones, siltstones, and clay shales and underlies an area of 4,700 square miles. The aquifer system changes from a single to a double aquifer system over a distance because of the layered strata. The Arapahoe aquifer wells yield between 5 and 150 gallons per minute.

The Laramie-Fox Hills aquifer underlies an area of 6,700 square miles. The Laramie portion of the aquifer consists of medium grained sandstone with interfingering siltstone beds. The Fox Hills portion of the aquifer consists of very fine silty sandstones and shaley siltstones. Wells in the Laramie-Fox Hills aquifer yield up to 100 gallons per minute.

Van Slyke, G., J. Romero, Morevec, and A. Wacinski. 1988. *Geologic Structure, Sandstone/Siltstone Isolith, and Location of Non-Tributary Groundwater for (the Dawson [DBA-1], Denver [DBA-2], Arapahoe [DBA-3], and Laramie-Fox Hills [DBA-4] Aquifers, Denver Basin, Colorado.* Colorado Division of Water Resources.

This map series showed various contours of the four Denver Basin aquifers including base and top of aquifers, geologic structures in different horizons of the aquifers, and contours of groundwater location within the aquifers. A summary description of the hydrogeologic characteristics is given for each aquifer.

Weston. 1988. Groundwater Monitoring at Regulated Units. Rocky Flats Plant, Golden, Colorado. March 31. EMF-ICN # 32795.

This report presents groundwater quality and elevation data from monitoring programs that were conducted at the West Spray Field, Present Landfill, and Solar Evaporation Ponds. The groundwater has been monitored for radionuclides since 1960. Fifty-six wells were installed between 1960 and 1985. Beginning in 1985 groundwater samples were analyzed for volatile organics, metals, and inorganics. A brief hydrogeological description, groundwater elevations, and migration rates were discussed for each area. The report describes the groundwater conditions at all sites as residing in an unconfined surficial aquifer and in a confined bedrock aquifer. It was found that the groundwater at all locations appears to move in a general trend from the west to the east, but a portion also moves to the north at the West Spray Field and to the northeast at the Solar Evaporation Ponds. Groundwater velocities were calculated to be a maximum of 84 feet per year in the Rocky Flats Alluvium sitewide and as a maximum of 9 feet per year in the valley-fill alluvium for Walnut Creek reaches. Numerous water-table maps and groundwater monitoring data accompany the report to illustrate findings.

Wheeler, W.W., & Associates, Inc. 1972. Report on Hydrologic Investigation - Rocky Flats. Prepared for C.F. Braun & Co. September.

In preparation for a new plutonium recovery facility to be constructed at RFP, an environmental study was undertaken to evaluate concerns relating to site hydrology and storm events. A brief summary of the site geology facilitates an understanding of the potential pathways taken by contaminated water infiltrating the ground surface. Precipitation will most likely infiltrate through the relatively permeable Rocky Flats Alluvium and remain perched atop the underlying Laramie Formation bedrock. A percentage of the infiltrated precipitation will then eventually

80

flow offsite to the Great Western Reservoir. A portion of the infiltrated water will percolate slowly through the upper portion of the bedrock and become incorporated into the existing water table. Eventually this water will intercept wells located to the east. Hydrographs and data on infiltration tests support the conclusions.

The document does not mention or acknowledge an upper hydrostratigraphic unit within the unconsolidated alluvial and colluvial materials. It is simply stated that perched groundwater exists atop the underlying bedrock following storm events and infiltration.

Wilson, W.W. 1965. Pumping Tests in Colorado, Colorado Water Conservation Board, Colorado Groundwater Circ. 11 (USGS).

This report examines and analyzes groundwater data and presents results in graphical form to show pumping rates, drawdown and recovery measurements, well depths, pretest water levels, saturated material thickness, specific capacities, and aquifer designations. Data for sections of basins containing the Arkansas River, Colorado River, Kansas River, Platte River, and the Rio Grande River are presented.

Woodward-Clevenger & Associates, Inc. 1974. Geotechnical Services Proposed and Existing Landfills. Rocky Flats Plant, near Golden, Colorado. Prepared for Dow Chemical Company, Rocky Flats Division. January 17. EMF-ICN #7846.

Test holes were drilled in the existing landfill and at three proposed landfill sites to investigate subsurface conditions of soil and groundwater. Information collected from these boring were used to evaluate the feasibility of developing a new landfill. Boreholes in the existing landfill, located in a natural "draw" north of the plant, showed a thin clayey surface fill underlain by sanitary landfill materials. The landfilled material is underlain by variable thicknesses of natural clayey sands and sandy clays and thence claystone bedrock. Free water was found in all the boreholes drilled into and through the sanitary landfill materials. The proposed landfill sites are located in terrace and ridge areas that form the high ground north of the Rocky Flats site. At site 1 the overburden consists of 56 to 67 feet of medium dense to dense clayey, gravely sands underlain by medium hard to hard claystone bedrock. Groundwater was encountered at a depth of 33 to 36 feet below ground surface. At sites 2 and 3 clayey sands and sandy clays overlie moderate depth bedrock (at a maximum of 10 feet at site 2 and 17 feet at site 3). Groundwater was encountered at or just below bedrock only on the western or high end of both sites. Site 1 would not be feasible for developing a landfill due to the difficulties associated with diverting

81

groundwater around the site presented by the groundwater encountered well above the top of bedrock. Sites 2 and 3 both have soil and groundwater conditions in which it would be feasible to develop a landfill. Maps, cross sections, gradation analyses, and bore logs supplement the report.

Woodward-Clyde Consultants. 1980. Geotechnical Services, Buildings 444, 447, 865, 881, 883, and Three Stacks, Rocky Flats Plant, Golden, Colorado. Prepared for Bernard Johnson, Inc.

Results of geotechnical studies to determine engineering characteristics of foundation materials, foundation alternatives, and criteria for foundation design for proposed building additions are presented in this report. Subsoils and groundwater are also discussed. The report includes locations and summary logs of test holes, graduation analysis, swell-consolidation test results, and laboratory test results.

Woodward-Clyde Consultants. 1987. Spray Irrigation Facility, Rocky Flats Plant, Golden, Colorado. Prepared for Merrick and Company.

Unable to locate; no summary available.

Woodward-Clyde Consultants. 1992. Site Assessment of the Wind Site, Rocky Flats Plant. Prepared for EG&G Rocky Flats, Inc. October 10.

This document presents the results of an environmental subsurface investigation of the Wind Site located in the north buffer zone of the Rocky Flats site. To evaluate the potential sources of contamination in potable water, the site was assessed with sonic drilling boreholes. The site hydrogeology is summarized, and two general groundwater flow systems are described. The uppermost hydrostratigraphic unit is an unconfined aquifer within the surficial unconsolidated alluvial deposits and the upper sandstone facies of the bedrock formations. A second hydrostratigraphic unit occurs under confined conditions in the deeper bedrock formations. Groundwater recharge/discharge, flow rates, and flow directions are discussed. Monitoring wells were installed and sampled to evaluate the source of contamination. Borehole logs, figures, and tables present data collected. Analytical data confirmed that metals and VOCs are present in groundwater beneath the Wind Site indicating the potential for multiple small sources west (upgradient) of the newly installed wells. Recommendations were made to continue monitoring groundwater to evaluate the extent of contamination over time.

Woodward-Thorfinnison and Associates, Inc. 1974. Investigation of Possible Groundwater Contamination, Atomic Energy Commission, Rocky Flats Plant, Rocky Flats, Colorado. Prepared for Swinerton and Walberg Company.

This report presents results of an investigation of five evaporation ponds (the Solar Evaporation Ponds) on the northeast corner of the main plant site where water moves to the north toward Walnut Creek. The document includes a vicinity map and location of the groundwater study area, a bedrock contour map, and summary logs of test holes.

Wright Water Engineers, Inc. 1991. Proposed Specified Area for Water Quality Control Commission Groundwater Classification and Standards Fearing, Rocky Flats Plant, Golden, Colorado. January 11. EMF-ICN 29554.

In order to protect the water quality of Standley Lake, The Great Western Reservoir, and groundwater in unconsolidated and bedrock materials, specific boundaries were proposed for groundwater rule-making activities. The area described comprises the drainage basin tributaries for Great Western Reservoir and Standley Lake; a reach of Coal Creek which encompassed Upper Church, Kinnear, Last Chance, and Smart ditches; and the recharge areas for the unconfined portions of the Arapahoe and Laramie Fox-Hills aquifers. The specified boundary was chosen based on hydraulic connection with the surface water and groundwater to be protected. The report included a brief discussion of the hydraulic characteristics of each area as well as reporting how natural and human activities in the Rocky Flats vicinity may impact these waters.

Zeff, Congorno, and Sealy, Inc. 1974. Report of Subsurface Studies for US Atomic Energy Commission Sanitary Landfill Renovations, Rocky Flats Plant, Golden, Colorado.

This report presents the results of field and laboratory investigations of subsoil conditions at the Sanitary Landfill to evaluate proposed renovations at the site. Soil samples collected from borings and test pits were visually described in the field and laboratory tested for physical and mechanical properties. A study of the geologic and hydrologic setting, seismicity, slope stability, and subsurface conditions was performed. Descriptions of the sampling structure and borrow areas and complete design considerations were included. Results indicated that the site is classified as a zone 1 seismic risk area. The groundwater flow occurs mainly above the bedrock surface with a secondary flow system through fractures in the claystone bedrock. Graphics of

83

site location maps, slope maps, cross-sections, and graphs of soil graduation analysis are included to support conclusions.

84

Table B-1
Well Construction Specifications

Well ID[1]	Well Type	GMP	Old Well Name(s)	True State Plane North	True State Plane East	Well Classification	Well Status	Completion Interval	Well Diameter	Surface Elevation (ft.)	Top of Casing (ft.)	TD Casing (ft.)	Top Scrn. (ft.)	Bot Scrn. (ft.)	Top of Bedrock (ft.)
CW001	CW	I		748015	2084773	NON-GMP	INSTALLED	ALLUVIUM	2 in	5926.2		21.0	6.0	15.6	14.6
WS01	MW	I		752538	2082511	NON-GMP	ABANDONED	ALLUVIUM?	12 in	5993.5	5994.55	24.6			
WS02	MW	I		752582	2084198	NON-GMP	ABANDONED	ALLUVIUM?	4 in	5966.0	5965.75	14.5			
WS03	MW	I		752081	2083698	NON-GMP	ABANDONED	ALLUVIUM?	NC	5976.9	NONE	NA			
WH-1	PZ	I		752141	2089607	NON-GMP	INSTALLED	ALLUVIUM	2 in						
WH-2	PZ	I		752053	2089666	NON-GMP	INSTALLED	ALLUVIUM	2 in						
WH-3	PZ	I		751989	2089710	NON-GMP	INSTALLED	ALLUVIUM/BEDROCK	2 in						
WH-4	PZ	I		752215	2089726	NON-GMP	INSTALLED	ALLUVIUM/BEDROCK	2 in						
DH-A1	PZ	I		753087	2089764	NON-GMP	INSTALLED	BEDROCK	2 in			63.0	61.0	63.0	
DH-A3	PZ	I		753144	2089908	NON-GMP	INSTALLED	BEDROCK	2 in			30.6	20.6	30.6	
DH-C1	PZ	I		747238	2089094	NON-GMP	INSTALLED	BEDROCK	2 in			52.5	50.5	52.5	
DH-C2	PZ	I		747348	2089274	NON-GMP	INSTALLED	BEDROCK	2 in			38.2	28.2	38.2	
TH046292	PZ	I		752563.9	2088417	NON-GMP	INSTALLED	ALLUVIUM	2 in	5799.1	5801.64	43.0	8.5	41.0	41.0
TH046492	PZ	I		752591.7	2088502	NON-GMP	INSTALLED	ALLUVIUM	2 in	5771.4	5773.88	16.0	6.5	14.0	14.0
TH046592	PZ	I		750595.7	2087164	NON-GMP	INSTALLED	ALLUVIUM	2 in	5885.5	5888.14	19.0	6.0	18.5	25.0
TH046792	PZ	I		750566.3	2087216	NON-GMP	INSTALLED	ALLUVIUM	2 in	5871.4	5873.96	16.0	6.5	14.0	14.0
TH046992	PZ	I		750817.3	2087890	NON-GMP	INSTALLED	ALLUVIUM	2 in	5856.6	5858.95	27.0	10.0	25.0	25.0
TH047092	PZ	I		750841.7	2087914	NON-GMP	INSTALLED	ALLUVIUM	2 in	5841.6	5844.17	13.0	6.0	11.0	11.0
TH047292	PZ	I		753063.8	2084643	NON-GMP	INSTALLED	ALLUVIUM	2 in	5926.7	5929.19	47.5	10.5	45.5	45.5
TH047492	PZ	I		753107.5	2084723	NON-GMP	INSTALLED	ALLUVIUM/BEDROCK	2 in	5891.8	5894.19	17.2	5.0	15.0	12.5
TR1	PZ	I		748858.1	2086844	NON-GMP	INSTALLED	ALLUVIUM	2 in	5917.0	5917.03	10.0		10.0	
TR2	PZ	I		748893.7	2086744	NON-GMP	INSTALLED	ALLUVIUM	2 in	5924.9	5924.91	15.0		15.0	
TR3	PZ	I		748905.1	2086691	NON-GMP	INSTALLED	ALLUVIUM	2 in	5930.0	5929.95	18.0		18.0	
TR4	PZ	I		748874	2086632	NON-GMP	INSTALLED	ALLUVIUM	2 in	5932.1	5932.12	18.0		18.0	
TR5	PZ	I		748914.3	2086562	NON-GMP	INSTALLED	ALLUVIUM	2 in	5944.9	5944.89	18.0		18.0	
308-P-1	PZ	I		751963.5	2084164	NON-GMP	INSTALLED	BEDROCK	2 in						
308-P-2	PZ	I		752051.7	2084576	NON-GMP	INSTALLED	BEDROCK	2 in						
0154	MW	I		750983	2084460	NON-GMP	INSTALLED	BEDROCK	12 in			13.7			
0254	MW	I		750051	2084740	NON-GMP	INSTALLED	BEDROCK	12 in			26.2			
0354	MW	I		750051	2084761	NON-GMP	INSTALLED	BEDROCK	12 in			27.8			
0160	MW	I	01-60	751514	2085432	NON-GMP	ABANDONED	BEDROCK?	6 in	5905.9	5908.11	25.6			
0260	MW	I	02-60	751181	2085023	NON-GMP	ABANDONED	BEDROCK?	6 in	5934.6	5935.06	22.6			
0360	MW	I	03-60	750889	2085491	NON-GMP	ABANDONED	BEDROCK?	6 in	5957.2	5957.37	20.2			
0460	MW	I	04-60	750574	2085531	NON-GMP	ABANDONED	BEDROCK?	6 in	5962.0	5962.10	17.7			
0560	MW	I	05-60	750308	2085404	NON-GMP	ABANDONED	BEDROCK?	6 in	5966.4	5966.71	19.4			
0660	MW	I	06-60	750124	2084921	NON-GMP	ABANDONED	BEDROCK?	6 in	5972.6	5972.63	28.8			
0166	MW	I	01-66	748964	2080548	NON-GMP	ABANDONED	BEDROCK?	6 in	6054.5	6056.11	151.6			
0266	MW	I	02-66	751062	2085681	NON-GMP	ABANDONED	BEDROCK?	6 in	5949.4	5951.16	139.7			
0366	MW	I	03-66	750813	2086264	NON-GMP	ABANDONED	BEDROCK?	6 in	5957.1	NONE	144.9			
0168	MW	I	01-68	749242	2085581	NON-GMP	ABANDONED	ALLUVIUM?	6 in	5977.2	5977.70	4.0			
0268	MW	I	02-68	748887	2085579	NON-GMP	ABANDONED	ALLUVIUM?	6 in	5979.6	NONE	4.0			
0368	MW	I	03-68	748887	2085957	NON-GMP	ABANDONED	ALLUVIUM?	6 in	5974.5	NONE	4.0			
0468	MW	I	04-68	749241	2085957	NON-GMP	ABANDONED	ALLUVIUM?	6 in	5973.3	NONE	4.0			
5070	MW	I	1-774-00	751026	2084206	NON-GMP	ABANDONED	BEDROCK	1.5 in			24.0			
5170	MW	I	1-776-00, 776-W	750652	2083843	NON-GMP	ABANDONED	ALLUVIUM	6 in	5986.6	5987.30	13.3			
5270	MW	I	2-776-00, 776-E	750643	2083827	NON-GMP	ABANDONED	ALLUVIUM	6 in	5986.3	5987.29	13.4			
5570	MW	I		749650	2084925	NON-GMP	ABANDONED	BEDROCK	1.5 in			39.5			
5670	MW	I	710-S	750713	2083670	NON-GMP	ABANDONED	BEDROCK	3 in	5985.7	5988.07	32.8			
0171	MW	I	01-71	748803	2086327	NON-GMP	ABANDONED	BEDROCK?	6.625 in OD	5950.0	5950.83	29.2			
0271	MW	I	02-71	748513	2085950	NON-GMP	ABANDONED	BEDROCK?	6.5 in	5936.2	5936.79	28.6			
0371	MW	I	03-71	752022	2087035	NON-GMP	ABANDONED	BEDROCK?	6 in	5819.1	NONE	30.7			

85

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Well ID[1]	Well Type	GMP	Old Well Name(s)	True State Plane North	True State Plane East	Well Classification	Well Status	Completion Interval	Well Diameter	Surface Elevation (ft.)	Top of Casing (ft.)	TD Casing (ft.)	Top Scrn. (ft.)	Bot Scrn. (ft.)	Top of Bedrock (ft.)
0471	MW	I	04-71	747861	2086138	NON-GMP	ABANDONED	BEDROCK?	6 in	5818.6	NONE	22.3			
0571	MW	I	05-71	751262	2088454	NON-GMP	ABANDONED	BEDROCK?	6 in	5830.3	NONE	27.5			
0671	MW	I	06-71	751515	2084747	NON-GMP	ABANDONED	BEDROCK?	4 in	5906.0	5908.79	63.7			
5071	MW	I	2-441-71, 441-2	749031	2081911	NON-GMP	ABANDONED	ALLUVIUM	4 in	6028.9	6030.50	17.1			
5171	MW	I	3-707-71, 707-3N	750132	2084021	NON-GMP	ABANDONED	ALLUVIUM/BEDROCK	4 in	5986.3	5986.30	9.0			
5271	MW	I	1-774-71, 774-2	751022	2084169	NON-GMP	ABANDONED	ALLUVIUM/BEDROCK	4 in	5965.8	5965.83	14.9			
5671	MW	I		749145	2081525	NON-GMP	ABANDONED	ALLUVIUM	2 in	6036.8	6037.3	11.0			
5771	MW	I	5-779-71, 779-5	750544	2084421	NON-GMP	ABANDONED	ALLUVIUM/BEDROCK	4 in	5977.8	5977.83	NA			
5871	MW	I	7-779-71, 779-1	750656	2084387	NON-GMP	ABANDONED	ALLUVIUM/BEDROCK	4 in	5978.4	5979.46	10.8			
5971	MW	I	1-865-71	749197	2084124	NON-GMP	ABANDONED	ALLUVIUM	4 in						
6071	MW	I	2-865-71	749031	2084070	NON-GMP	ABANDONED	ALLUVIUM	4 in			ND			
6271	MW	I	2-889-71, 889-1	749129	2083782	NON-GMP	ABANDONED	ALLUVIUM	3 in	6000.2	6000.35	9.3			
0174	MW	I	01-74	749626	2086195	NON-GMP	ABANDONED	BEDROCK?	6.25 in OD	5968.0	5968.83	24.2			
0374	MW	I	03-74	749931	2087000	NON-GMP	ABANDONED	BEDROCK?	6.25 in OD	5950.2	5951.36	24.0			
0474	MW	I	04-74	749918	2086893	NON-GMP	ABANDONED	BEDROCK?	6 in	5951.1	5951.26	6.1			
0574	MW	I	05-74	750005	2087329	NON-GMP	ABANDONED	BEDROCK?	6 in	5948.1	5949.16	19.0			
0674	MW	I	06-74	749981	2087228	NON-GMP	ABANDONED	BEDROCK?	6 in	5948.5	5948.99	7.4			
0774	MW	I	07-74	749411	2088198	NON-GMP	ABANDONED	BEDROCK?	6.25 in OD	5946.5	5947.00	49.7			
0874	MW	I	08-74	749413	2088090	NON-GMP	ABANDONED	ALLUVIUM?	6 in	5947.6	5947.87	39.4			
0974	MW	I	09-74	748028	2084783	NON-GMP	ABANDONED	BEDROCK?	6.25 in OD	5925.1	5926.39	19.0			
1074	MW	I	10-74	747988	2084705	NON-GMP	ABANDONED	ALLUVIUM?	6.375 in OD	5925.8	5926.00	9.9			
1374	MW	I	13-74	747113	2080171	NON-GMP	ABANDONED	BEDROCK?	6 in	5991.7	5993.01	19.2			
1474	MW	I	14-74	747123	2080091	NON-GMP	ABANDONED	ALLUVIUM?	6 in	5993.3	5994.51	4.6			
1574	MW	I	15-74	747672	2088363	NON-GMP	ABANDONED	BEDROCK?	6 in	5765.7	5766.41	19.3			
1674	MW	I	16-74	747721	2088282	NON-GMP	ABANDONED	ALLUVIUM?	6.25 in OD	5767.4	5768.48	4.3			
1774	MW	I	17-74	751170	2088515	NON-GMP	ABANDONED	BEDROCK?	6 in	5810.9	5811.99	14.3			
1874	MW	I	18-74	751130	2088503	NON-GMP	ABANDONED	BEDROCK?	6 in	5812.8	5813.75	6.4			
2174	MW	I	21-74	748290	2082636	NON-GMP	ABANDONED	BEDROCK?	3 in	6026.6	6026.75	258.0			
2274	MW	I	22-74	749525	2087126	NON-GMP	ABANDONED	BEDROCK?	3.5 in OD	5956.8	5957.50	199.0			
5074	MW	WL	3-SEP-74, TH-3	751066	2084732	NON-GMP	INSTALLED	BEDROCK	3 in	5956.3	5958.68	13.8			
5174	MW	WL	4-SEP-74, TH-4	751070	2084934	NON-GMP	INSTALLED	BEDROCK	3 in	5951.5	5950.91				
5274	MW	WL	5-SEP-74, TH-B2	751099	2085105	NON-GMP	INSTALLED	ALL/BEDROCK	2 in	5946.0	5946.91	7.1			
5374	MW	WL	13-SEP-74	750580	2086328	NON-GMP	INSTALLED	BEDROCK	3 in			20.5			
5474	MW	WL	14-SEP-74, TH-14	751073	2086321	NON-GMP	INSTALLED	BEDROCK	3 in	5933.6	5937.15	20.1			
5574	MW	WL	TH14-2E	751177	2087078	NON-GMP	INSTALLED	BEDROCK	3 in	5952.4	5954.08	33.0			
5674	MW	WL	TH14-1E	750989	2086416	NON-GMP	INSTALLED	BEDROCK	2 in	5955.4	5956.31	17.6			
5774	MW	WL	15-SEP-74, TH-15	750822	2086075	NON-GMP	INSTALLED	BEDROCK	3 in	5956.2	5959.14	15.7			
5874	MW	WL	20-SEP-74, TH-20	751567	2085830	NON-GMP	INSTALLED	BEDROCK	3 in	5881.0	5883.98	20.0			
5974	MW	WL	24-SEP-74, TH-24	751815	2085580	NON-GMP	INSTALLED	ALL/BEDROCK?	3 in	5856.7	5858.73	14.1			
6074	MW	WL	25-SEP-74, TH-25	752106	2085775	NON-GMP	INSTALLED	BEDROCK	3 in	5886.7	5888.75	18.3			
6174	MW	WL	26-SEP-74, TH-26	752079	2085309	NON-GMP	INSTALLED	BEDROCK	3 in	5914.7	5916.81	18.5			
6274	MW	WL	27-SEP-74, TH-28	751738	2085154	NON-GMP	INSTALLED	BEDROCK	3 in	5870.9	5874.22	20.1			
6374	MW	WL	31-SEP-74, TH-31	751806	2084589	NON-GMP	INSTALLED	BEDROCK	3 in	5907.4	5909.55	18.5			
6474	MW	I	3-3E	752234	2084694	NON-GMP	INSTALLED	BEDROCK	3 in	5961.1	5963.16	30.3			
6574	MW	I	3-2E	752247	2084274	NON-GMP	INSTALLED	BEDROCK	3 in	5967.6	5969.68	29.4			
6674	MW	I	3-1E	752089	2083792	NON-GMP	INSTALLED	BEDROCK	3 in	5975.0	5978.24	17.8			
6774	MW	I		750954	2080140	NON-GMP	INSTALLED	ALL/BEDROCK	3 in			58.8			
6874	MW	I		752120	2080170	NON-GMP	ABANDONED	ALLUVIUM	2 in	6034.8		43.0		43.0	68.0
0181	MW	I	01-81	753293	2090201	NON-GMP	ABANDONED	BEDROCK?	6 in	5718.9	5721.03				
0281	MW	I	02-81	753678	2089849	NON-GMP	ABANDONED	BEDROCK?	6 in	5722.9	5724.77	7.1			
0381	MW	I	03-81	751270	2088580	NON-GMP	ABANDONED	BEDROCK?	6 in	5808.4	5810.96	20.1			

86

Table B-1
Well Construction Specifications

Well ID[1]	Well Type	GMP	Old Well Name(s)	True State Plane North	True State Plane East	Well Classification	Well Status	Completion Interval	Well Diameter	Surface Elevation (ft.)	Top of Casing (ft.)	TD Casing (ft.)	Top Scrn. (ft.)	Bot Scrn. (ft.)	Top of Bedrock (ft.)
0481	MW	I	04-81	747570	2082078	NON-GMP	ABANDONED	ALLUVIUM?	6.625 in OD	5944.3	5945.42	20.1			
0581	MW	I	05-81	747573	2082159	NON-GMP	ABANDONED	BEDROCK?	6 in	5945.3	5947.06	33.0			
0681	MW	I	06-81	750859	2082503	NON-GMP	ABANDONED	BEDROCK?	6.625 in OD	6004.4	6005.75	17.6			
0781	MW	I	07-81	750860	2082539	NON-GMP	ABANDONED	BEDROCK?	6.625 in OD	6004.1	6006.06	15.7			
0881	MW	I	08-81	749972	2079681	NON-GMP	ABANDONED	BEDROCK?	6.625 in OD	6064.5	6065.92	20.0			
0981	MW	I	09-81	749969	2079740	NON-GMP	ABANDONED	ALLUVIUM?	6.625 in OD	6063.5	6065.16	14.1			
1081	MW	I	10-81	748871	2076105	NON-GMP	ABANDONED	ALLUVIUM?	6.625 in OD	6142.6	6144.67	18.3			
0182	MW	I	01-82	748039	2085117	NON-GMP	ABANDONED	BEDROCK?	6 in	5910.7	5912.79	18.5			
0282	MW	I	02-82	748017	2085073	NON-GMP	ABANDONED	BEDROCK?	6 in	5911.0	5913.32	20.1			
0382	MW	I	03-82	750009	2080554	NON-GMP	ABANDONED	ALLUVIUM?	6.625 in OD	6047.9	6049.56	18.5			
0482	MW	I	04-82	749973	2079048	NON-GMP	ABANDONED	ALLUVIUM?	6 in	6076.3	6077.69	30.3			
0582	MW	I	05-82	749472	2078145	NON-GMP	ABANDONED	ALLUVIUM?	6.625 in OD	6096.1	6097.68	29.4			
0682	MW	I	06-82	749420	2078147	NON-GMP	ABANDONED	ALLUVIUM?	6.625 in OD	6097.4	6098.58	17.8			
0782	MW	I	07-82	748821	2076117	NON-GMP	ABANDONED	ALLUVIUM?	6.625 in OD	6143.3	6145.84	58.8			
0186	MW	S	1-86	744906	2093973	BOUNDARY-AIP	INSTALLED	ALLUVIUM	2 in	5627.7	5629.32	10.2	3.2	10.2	9.3
0286	MW	I	2-86	748797	2093925	NON-GMP	ABANDONED	ALLUVIUM	2 in	5725.0	5726.10	9.0	3.2	9.0	7.8
0386	MW	S	3-86	750543	2093778	BOUNDARY-AIP	INSTALLED	BEDROCK	2 in	5676.2	5677.86	23.7	10.4	23.7	8.0
0486	MW	I	4-86	753482	2093851	NON-GMP	ABANDONED	ALLUVIUM	2 in	5643.9	5644.91	14.9	3.5	14.9	14.0
0586	MW	S	5-86	753703	2089776	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5724.4	5726.37	9.8	4.4	9.8	9.0
0686	MW	WL	6-86	753569	2086654	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5814.7	5816.72	8.9	3.3	8.9	10.5
0786	MW	S	7-86	752827	2083977	RCRA-C	INSTALLED	ALLUVIUM	2 in	5924.9	5926.54	5.7	3.0	5.7	5.0
0886	MW	S	8-86	752817	2084001	RCRA-C	INSTALLED	BEDROCK	2 in	5925.6	5926.90	63.8	59.1	63.8	1.0
0986	MW	S	9-86	752191	2082472	RCRA-S	INSTALLED	BEDROCK	2 in	5996.4	5998.23	135.4	122.6	135.4	30.3
1086	MW	S	10-86	752169	2082491	RCRA-S	INSTALLED	ALLUVIUM	2 in	5996.6	5998.19	23.8	3.3	23.8	23.0
1186	MW	I	11-86	753331	2090010	NON-GMP	ABANDONED	ALLUVIUM	2 in	5718.0	5720.09	10.3	3.9	10.3	9.5
1286	MW	I	12-86	752335	2087879	NON-GMP	ABANDONED	ALLUVIUM	2 in	5785.9	5788.03	11.3	2.0	11.3	11.0
1386	MW	S	13-86	751857	2086051	RCRA-C	INSTALLED	ALLUVIUM	2 in	5840.5	5842.59	9.5	3.1	9.5	9.0
1486	MW	S	14-86	751856	2085838	RCRA-C	INSTALLED	BEDROCK	2 in	5844.7	5846.71	55.4	39.4	55.4	11.0
1586	MW	S	15-86	751852	2085812	RCRA-C	INSTALLED	ALLUVIUM	2 in	5848.4	5850.63	14.4	4.1	14.4	12.5
1686	MW	S	16-86	751747	2085260	RCRA-C	INSTALLED	BEDROCK	2 in	5867.9	5869.55	45.1	39.1	45.1	7.0
1786	MW	S	17-86	751740	2085242	RCRA-C	INSTALLED	ALLUVIUM	2 in	5868.4	5869.57	14.0	3.7	14.0	12.5
1886	MW	WL	18-86	751522	2085831	RCRA-C	INSTALLED	ALLUVIUM	2 in	5885.8	5887.97	7.5	3.7	7.5	8.0
1986	MW	S	19-86	750894	2083296	CERCLA	INSTALLED	ALLUVIUM	2 in	5943.1	5943.86	12.3	3.0	12.3	11.5
2086	MW	I	20-86	751112	2084358	NON-GMP	ABANDONED	ALLUVIUM	2 in	5960.5	5962.12	10.6	4.2	10.6	12.5
2186	MW	S	21-86	750855	2082501	CERCLA	INSTALLED	BEDROCK	2 in	6004.8	6005.96	67.3	35.0	67.2	15.0
2286	MW	S	22-86	750718	2084411	RCRA-C	INSTALLED	ALLUVIUM	2 in	5978.8	5979.55	11.2	3.2	11.2	11.0
2386	MW	S	23-86	750338	2084259	RCRA-C	INSTALLED	BEDROCK	2 in	5982.5	5982.46	117.3	113.0	117.3	8.2
2486	MW	S	24-86	750338	2084277	RCRA-S	INSTALLED	ALLUVIUM	2 in	5982.5	5983.56	7.5	3.0	7.5	7.2
2586	MW	S	25-86	750412	2084831	RCRA-C	INSTALLED	BEDROCK	2 in	5975.2	5977.14	82.0	59.9	82.0	8.0
2686	MW	S	26-86	750411	2084841	RCRA-S	INSTALLED	ALLUVIUM	2 in	5975.4	5977.17	11.0	3.8	11.0	10.5
2786	MW	S	27-86	750781	2085238	RCRA-C	INSTALLED	BEDROCK	2 in	5962.9	5963.88	133.0	128.5	133.0	11.0
2886	MW	I	28-86	750803	2085240	NON-GMP	ABANDONED	ALLUVIUM	2 in	5962.4	5964.38	8.6	4.0	8.6	8.5
2986	MW	WL	29-86	750599	2085687	RCRA-C	INSTALLED	ALLUVIUM	2 in	5959.6	5960.68	8.8	2.8	8.8	8.5
3086	MW	S	30-86	751078	2084921	RCRA-S	INSTALLED	BEDROCK	2 in	5957.4	5958.39	14.9	2.5	14.9	2.5
3186	MW	WL	31-86	751051	2084764	RCRA-S	INSTALLED	BEDROCK	2 in	5965.0	5967.05	17.3	2.5	17.3	0.5
3286	MW	S	32-86	751050	2084743	RCRA-C	INSTALLED	BEDROCK	2 in	5966.1	5967.92	125.5	114.9	125.5	1.0
3386	MW	S	33-86	749950	2085003	RCRA-C	INSTALLED	ALLUVIUM	2 in	5951.4	5952.42	7.3	3.0	7.3	6.8
3486	MW	S	34-86	750162	2086193	RCRA-C	INSTALLED	BEDROCK	2 in	5912.0	5913.95	56.3	44.2	56.3	16.0
3586	MW	S	35-86	750167	2086219	RCRA-C	INSTALLED	ALLUVIUM	2 in	5910.8	5912.76	11.6	4.9	11.6	10.5
3686	MW	S	36-86	750387	2086820	RCRA-C	INSTALLED	ALLUVIUM	2 in	5883.7	5885.22	6.5	3.5	6.5	5.5
3786	MW	S	37-86	751561	2088854	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5796.6	5798.26	8.6	3.3	8.6	7.6

Table B-1
Well Construction Specifications

Well ID[1]	Well Type	GMP	Old Well Name(s)	True State Plane North	True State Plane East	Well Classification	Well Status	Completion Interval	Well Diameter	Surface Elevation (ft.)	Top of Casing (ft.)	TD Casing (ft.)	Top Scrn. (ft.)	Bot Scrn. (ft.)	Top of Bedrock (ft.)
3886	MW	S	38-86	752835	2090261	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5734.1	5736.08	8.5	2.9	8.5	6.0
3986	MW	S	39-86	751305	2090689	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5908.2	5909.41	31.5	5.0	31.5	30.5
4086	MW	S	40-86	749611	2088505	PLANT PROTECTION	INSTALLED	BEDROCK	2 in	5943.9	5944.89	111.5	88.0	111.5	45.0
4186	MW	WL	41-86	749609	2088543	NON-GMP	INSTALLED	ALLUVIUM	2 in	5942.6	5944.36	44.7	3.9	44.7	44.6
4286	MW	S	42-86	749559	2087114	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5956.3	5957.87	29.7	6.1	29.7	28.3
4386	MW	S	43-86	749404	2085869	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5972.9	5974.46	16.8	4.0	16.8	17.0
4486	MW	WL	44-86	749254	2082234	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	6019.9	6021.96	26.3	3.2	26.3	25.5
4586	MW	I	45-86	750316	2079470	NON-GMP	ABANDONED	ALLUVIUM	2 in	6050.0	6051.55	48.2	3.0	48.2	49.7
4686	MW	S	46-86	750854	2078283	RCRA-C	INSTALLED	BEDROCK	2 in	6082.0	6083.99	160.8	140.3	160.8	90.0
4786	MW	S	47-86	750825	2078289	RCRA-C	INSTALLED	ALLUVIUM	2 in	6081.9	6083.67	94.5	6.2	94.5	93.0
4886	MW	S	48-86	748989	2078287	RCRA-C	INSTALLED	BEDROCK	2 in	6097.1	6099.10	207.1	192.0	207.1	70.0
4986	MW	S	49-86	748965	2078288	RCRA-C	INSTALLED	ALLUVIUM	2 in	6097.4	6098.89	67.6	4.1	67.6	68.0
5086	MW	S	50-86	747783	2077299	RCRA-S	INSTALLED	ALLUVIUM	2 in	6121.0	6122.94	96.2	2.9	96.2	98.0
5186	MW	S	51-86	748575	2076136	RCRA-S	INSTALLED	ALLUVIUM	2 in	6142.4	6144.25	79.1	4.8	79.1	78.5
5286	MW	WL	52-86	748607	2076132	RCRA-C	INSTALLED	BEDROCK	2 in	6142.1	6144.44	125.7	92.0	125.8	72.0
5386	MW	S	53-86	745960	2078382	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	6065.8	6066.63	7.8	2.5	7.8	7.0
5486	MW	WL	54-86	745257	2078339	NON-GMP	INSTALLED	BEDROCK	2 in	6116.5	6117.62	85.3	75.4	85.2	36.0
5586	MW	WL	55-86, B405586	745223	2078340	NON-GMP	INSTALLED	ALLUVIUM	2 in	6116.6	6118.72	36.4	3.6	36.4	35.5
5686	MW	S	56-86	747042	2080220	RCRA-C	INSTALLED	ALLUVIUM	2 in	5987.5	5988.93	9.6	2.6	9.6	9.0
5786	MW	S	57-86	747559	2081572	NON-GMP	INSTALLED	ALLUVIUM	2 in	5951.5	5952.88	6.8	2.5	6.5	6.0
5886	MW	WL	58-86	747084	2083435	NON-GMP	INSTALLED	ALLUVIUM	2 in	5895.2	5897.65	3.5	1.5	3.5	3.0
5986	MW	I	59-86	747754	2084267	NON-GMP	ABANDONED	BEDROCK	2 in	5920.3	5921.90	28.0	19.0	28.0	7.5
5986R	MW	I	59-86R	747753	2084260	NON-GMP	ABANDONED	ALLUVIUM	2 in	5919.9	5921.54	28.6	20.1	27.3	29.5
6086	MW	I	60-86	747788	2084272	NON-GMP	INSTALLED	ALLUVIUM	2 in	5915.4	5921.68				9.0
6186	MW	S	61-86	749198	2083717	CERCLA	INSTALLED	ALLUVIUM	2 in	5999.5	6000.60	12.3	5.0	12.0	11.5
6286	MW	S	62-86	748143	2085725	PLANT PROTECTION	INSTALLED	BEDROCK	2 in	5902.0	5903.18	35.2	25.2	35.2	22.0
6386	MW	S	63-86	748145	2085753	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5901.1	5902.01	15.5	3.8	15.3	14.8
6486	MW	S	64-86	747672	2085610	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5839.1	5841.05	9.0	3.4	9.0	8.5
6586	MW	S	65-86	747881	2087501	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5786.7	5788.27	8.0	2.5	8.0	7.1
6686	MW	S	66-86	746646	2091267	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5692.6	5694.20	6.5	2.5	6.5	5.8
6786	MW	WL	67-86	748723	2090379	NON-GMP	INSTALLED	ALLUVIUM	2 in	5802.3	5803.97	14.8	2.5	14.8	14.0
6886	MW	S	68-86	747154	2083582	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5888.0	5890.49	3.5	1.5	3.5	2.8
6986	MW	I	69-86	747770	2084282	NON-GMP	ABANDONED	ALLUVIUM	2 in	5921.5	5922.52	14.0	3.0	14.0	14.5
7086	MW	S	70-86	747491	2082003	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5937.7	5939.39	7.9	2.4	7.9	7.0
0187	MW	S	01-87	748127	2083653	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5992.5	5994.08	12.1	3.4	11.8	11.8
0287	MW	I	02-87, BH3-87	747708	2083934	NON-GMP	ABANDONED	ALLUVIUM	2 in	5931.0	5932.53	9.3	3.2	9.1	7.2
0387	MW	I	0387BR, 03-87BR	747706	2083962	NON-GMP	ABANDONED	BEDROCK	2 in	5930.6	5932.44	108.0	102.8	107.8	20.8
0487	MW	S	04-87	747943	2084887	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5910.1	5911.58	19.7	3.5	19.5	19.7
0587	MW	I	0587BR, 05-87BR	748081	2084849	NON-GMP	ABANDONED	BEDROCK	2 in	5927.9	5929.99	51.5	42.0	51.3	11.0
0687	MW	I	06-87	748003	2085134	NON-GMP	ABANDONED	ALLUVIUM	2 in	5904.8	5906.32	7.1	3.6	6.9	6.5
0887	MW	I	0887BR, 08-87BR	747758	2084294	NON-GMP	ABANDONED	BEDROCK	2 in	5920.0	5921.55	89.3	84.0	89.0	8.7
0987	MW	S	09-87, BH29-87	749068	2085348	PLANT PROTECTION	INSTALLED	BEDROCK	2 in	5980.2	5981.70	32.4	14.5	32.2	12.5
1087	MW	S	10-87	748946	2085290	NON-GMP	INSTALLED	ALLUVIUM	2 in	5982.0	5983.52	12.0	3.5	12.0	11.3
1187	MW	S	11-87BR	748409	2086100	PLANT PROTECTION	INSTALLED	BEDROCK	2 in	5913.6	5915.12	20.5	15.2	20.3	5.2
1287	MW	S	12-87BR	748581	2086066	NON-GMP	INSTALLED	BEDROCK	2 in	5934.8	5936.30	10.3	4.9	10.0	3.5
1487	MW	S	1487BR, 14-87BR	748228	2086616	PLANT PROTECTION	INSTALLED	BEDROCK	2 in	5855.0	5856.56	24.3	19.0	24.1	5.2
1587	MW	S	15-87, BH30-87	749011	2086249	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5971.3	5972.79	22.5	5.8	22.1	21.9
1687	MW	S	1687BR, 6-87BR	749130	2086249	PLANT PROTECTION	INSTALLED	BEDROCK	2 in	5969.5	5970.79	125.2	100.0	125.0	22.2
1787	MW	I	17-87	749415	2086308	NON-GMP	ABANDONED	ALLUVIUM	2 in	5968.0	5969.56	25.8	3.5	25.5	25.0
1887	MW	S	1887BR, 18-87BR	749404	2086339	PLANT PROTECTION	INSTALLED	BEDROCK	2 in	5968.0	5969.49	133.7	127.0	133.5	25.2
1987	MW	S	19-87	749623	2086171	NON-GMP	INSTALLED	ALLUVIUM	2 in	5968.4	5969.91	11.9	3.5	11.7	10.8

Table B-1
Well Construction Specifications

Well ID[1]	Well Type	GMP	Old Well Name(s)	True State Plane North	True State Plane East	Well Classification	Well Status	Completion Interval	Well Diameter	Surface Elevation (ft.)	Top of Casing (ft.)	TD Casing (ft.)	Top Scrn. (ft.)	Bot Scrn. (ft.)	Top of Bedrock (ft.)
2087	MW	WL	2087BR, 20-87BR	749634	2086155	NON-GMP	INSTALLED	BEDROCK	2 in	5968.7	5970.14	116.4	107.3	116.1	11.8
2187	MW	S	21-87	749969	2085799	RCRA-C	INSTALLED	ALLUVIUM	2 in	5928.4	5929.69	10.6	3.3	10.4	8.0
2287	MW	S	2287BR, 22-87BR	749924	2085822	RCRA-C	INSTALLED	BEDROCK	2 in	5931.2	5932.80	88.7	81.4	88.5	12.8
2387	MW	WL	2387BR, 23-87BR	749404	2085910	NON-GMP	INSTALLED	BEDROCK	2 in	5972.8	5974.49	37.9	17.2	37.6	15.2
2487	MW	S	24-87	749751	2086746	NON-GMP	INSTALLED	ALLUVIUM	2 in	5958.3	5959.69	13.9	3.5	13.6	15.1
2587	MW	S	2587BR, 25-87BR	749719	2086748	PLANT PROTECTION	INSTALLED	BEDROCK	2 in	5959.5	5960.98	43.7	17.5	43.5	16.5
2687	MW	WL	26-87	749256	2087490	NON-GMP	INSTALLED	ALLUVIUM	2 in	5954.3	5955.90	13.7	4.0	13.5	14.5
2787	MW	WL	27-87	749438	2088051	NON-GMP	INSTALLED	ALLUVIUM	2 in	5947.8	5949.65	43.3	3.5	43.0	44.2
2887	MW	S	2887BR, 28-87BR	749438	2088090	NON-GMP	INSTALLED	BEDROCK	2 in	5947.6	5949.90	197.7	187.4	197.4	43.5
2987	MW	S	29-87	748089	2087362	NON-GMP	INSTALLED	ALLUVIUM	2 in	5812.6	5814.29	20.6	3.5	20.3	19.8
3087	MW	S	3087BR, 30-87BR	748090	2087424	NON-GMP	INSTALLED	BEDROCK	2 in	5810.1	5811.77	94.4	85.8	94.4	16.0
3187	MW	S	3187BR, 31-87BR	749500	2088309	NON-GMP	INSTALLED	BEDROCK	2 in	5945.3	5947.46	129.6	110.7	129.4	45.0
3287	MW	WL	32-87	749511	2088363	NON-GMP	INSTALLED	ALLUVIUM	2 in	5946.4	5947.97	46.8	36.0	46.6	46.0
3387	MW	S	3387, BH56-87	749855	2087921	NON-GMP	INSTALLED	ALLUVIUM	2 in	5945.8	5947.22	20.3	15.0	20.0	19.0
3487	MW	S	3487BR, 34-87BR	749836	2087931	PLANT PROTECTION	INSTALLED	BEDROCK	2 in	5945.6	5947.22	104.5	97.3	104.2	20.0
3587	MW	WL	35-87	749974	2087268	NON-GMP	INSTALLED	ALLUVIUM	2 in	5950.0	5951.39	9.6	3.5	9.4	9.1
3687	MW	S	3687BR, 36-87BR	749979	2087295	PLANT PROTECTION	INSTALLED	BEDROCK	2 in	5949.7	5951.11	63.6	19.8	63.4	7.4
3787	MW	I	37-87	750494	2085224	NON-GMP	ABANDONED	ALLUVIUM	2 in	5967.5	5968.99	9.0	3.5	8.8	8.0
3887	MW	S	38-87	750396	2085094	RCRA-S	INSTALLED	ALLUVIUM	2 in	5972.2	5973.90	9.5	3.5	9.3	7.8
3987	MW	S	SP08-87, 39-87BR	751081	2085268	RCRA-C	INSTALLED	BEDROCK	2 in	5947.0	5948.42	117.4	110.0	117.1	3.5
4087	MW	WL	40-87	753143	2084823	RCRA-S	INSTALLED	ALLUVIUM	2 in	5883.0	5884.61	6.7	3.5	6.5	5.8
4187	MW	S	4187BR, 41-87BR	753118	2084821	RCRA-S	INSTALLED	BEDROCK	2 in	5883.0	5884.49	94.0	81.2	93.8	3.5
4287	MW	S	42-87	753342	2085525	RCRA-C	INSTALLED	ALLUVIUM	2 in	5854.3	5855.87	6.6	3.0	6.4	6.1
4387	MW	WL	43-87, BH57-87	748030	2084788	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5925.1	5926.41	12.5	3.5	12.3	12.0
4487	MW	WL	44-87, BH58-87	748306	2085435	NON-GMP	INSTALLED	ALLUVIUM	2 in	5949.6	5951.10	3.7	1.5	3.5	3.2
4587	MW	S	4587BR, 45-87BR, BH59-87	748313	2085451	PLANT PROTECTION	INSTALLED	BEDROCK	2 in	5949.3	5950.91	101.3	89.5	97.1	4.0
4787	MW	WL	47-87	747779	2084903	NON-GMP	INSTALLED	ALLUVIUM	2 in	5882.8	5884.64	7.5	3.5	7.3	9.0
4887	MW	WL	48-87	747829	2084691	NON-GMP	INSTALLED	ALLUVIUM	2 in	5909.7	5911.41	10.3	3.5	10.1	10.0
4987	MW	WL	49-87	747991	2085004	NON-GMP	INSTALLED	ALLUVIUM	2 in	5912.7	5914.27	5.0	1.8	4.8	9.0
5087	MW	WL	50-87	748123	2085334	NON-GMP	INSTALLED	ALLUVIUM	2 in	5933.1	5934.78	13.7	3.5	13.5	12.5
5187	MW	S	51-87, BH62-87	748103	2083850	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5963.3	5965.22	14.0	3.6	13.8	12.5
5287	MW	S	52-87, BH63-87	748145	2084067	NON-GMP	INSTALLED	ALLUVIUM	2 in	5967.9	5969.57	20.5	3.5	20.3	20.0
5387	MW	WL	53-87	747985	2083912	NON-GMP	INSTALLED	ALLUVIUM	2 in	5960.0	5961.81	9.3	3.5	9.1	10.0
5487	MW	S	54-87	747985	2084032	NON-GMP	INSTALLED	ALLUVIUM	2 in	5955.9	5957.62	4.7	1.3	4.5	4.0
5587	MW	S	55-87	747619	2084919	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5858.4	5860.09	7.5	3.4	7.4	5.5
5687	MW	S	56-87, SP16-87	750638	2084423	RCRA-C	INSTALLED	ALLUVIUM	2 in	5978.4	5979.77	9.9	3.5	9.7	9.4
5887	MW	S	58-87	752234	2082531	RCRA-S	INSTALLED	ALLUVIUM	2 in	5995.5	5996.77	22.5	3.5	22.3	22.0
5987	MW	I	59-87	752313	2082563	NON-GMP	ABANDONED	ALLUVIUM	2 in	5992.9	5994.67	21.2	3.5	20.8	20.5
6087	MW	S	60-87	752930	2083035	RCRA-S	INSTALLED	ALLUVIUM	2 in	5984.4	5985.96	27.7	3.5	27.5	27.0
6187	MW	S	61-87	752860	2083072	RCRA-C	INSTALLED	ALLUVIUM	2 in	5984.4	5985.77	28.5	3.5	28.2	28.0
6287	MW	WL	62-87	752800	2083097	NON-GMP	INSTALLED	ALLUVIUM	2 in	5984.5	5986.37	26.8	3.5	26.6	26.3
6387	MW	I	63-87	752717	2083138	NON-GMP	ABANDONED	ALLUVIUM	2 in	5985.6	5987.01	25.5	3.5	25.4	25.0
6487	MW	S	64-87	752329	2083261	RCRA-C	INSTALLED	ALLUVIUM	2 in	5986.1	5987.34	23.8	13.0	23.3	22.0
6587	MW	S	65-87	752230	2083299	RCRA-C	INSTALLED	ALLUVIUM	2 in	5983.5	5984.99	24.2	10.7	24.0	21.0
6687	MW	S	66-87	752150	2083325	RCRA-C	INSTALLED	ALLUVIUM	2 in	5982.3	5983.67	18.2	3.4	18.0	15.3
6787	MW	I	67-87	753164	2083774	NON-GMP	ABANDONED	ALLUVIUM	2 in	5970.0	5971.76	16.8	11.7	16.5	16.4
6887	MW	S	68-87	753145	2083776	RCRA-C	INSTALLED	ALLUVIUM	2 in	5968.9	5970.32	16.0	11.2	15.8	15.5
7087	MW	S	70-87	752571	2084196	RCRA-C	INSTALLED	ALLUVIUM	2 in	5966.7	5968.38	16.5	3.5	16.3	12.0
7187	MW	S	71-87	753322	2084087	RCRA-C	INSTALLED	ALLUVIUM	2 in	5963.9	5965.49	13.9	3.5	13.5	14.0
7287	MW	S	72-87	752441	2083953	RCRA-C	INSTALLED	ALLUVIUM	2 in	5969.6	5971.25	7.0	3.5	6.8	8.0
0188	PZ	I	1-EU-88	750775	2083300	NON-GMP	ABANDONED	ALLUVIUM	1 in			ND			

89

Table B-1
Well Construction Specifications

Well ID[1]	Well Type	GMP	Old Well Name(s)	True State Plane North	True State Plane East	Well Classification	Well Status	Completion Interval	Well Diameter	Surface Elevation (ft.)	Top of Casing (ft.)	TD Casing (ft.)	Top Scrn. (ft.)	Bot Scrn. (ft.)	Top of Bedrock (ft.)
0288	PZ	I	2-EU-88	750500	2083025	NON-GMP	ABANDONED	ALLUVIUM	1 in			ND			
0388	PZ	I	3-EU-88	750120	2083655	NON-GMP	ABANDONED	ALLUVIUM	1 in			6.5			
0488	PZ	I	4-EU-88	749850	2083650	NON-GMP	ABANDONED	ALLUVIUM	1 in			5.0			
0588	PZ	I	5-EU-88	749600	2083950	NON-GMP	ABANDONED	ALLUVIUM	1 in			6.8			
0688	PZ	I	6-EU-88	749628	2084481	NON-GMP	ABANDONED	BEDROCK	1 in			10.5			
0788	PZ	I	7-EU-88	750247	2086025	NON-GMP	ABANDONED	ALLUVIUM	1 in			12.3			
0888	PZ	I	8-EU-88	748956	2082151	NON-GMP	ABANDONED	ALLUVIUM	1 in			8.2			
0988	PZ	I	9-EU-88	749050	2083050	NON-GMP	ABANDONED	ALLUVIUM	1 in			10.4			
1088	PZ	I	10-EU-88	749750	2084020	NON-GMP	ABANDONED	ALLUVIUM	1 in			10.5			
1188	PZ	I		748612.8046	2083682.9	NON-GMP	ABANDONED	ALLUVIUM	1 in	6004.1					
B400089	MW	WL	0189P	744565	2078309	PLANT PROTECTION	INSTALLED	ALLUVIUM	4 in	6121.8	6123.76	38.3	28.6	38.0	48.5
B400189	MW	WL	0189A, BH01	744565	2078309	NON-GMP	INSTALLED	ALLUVIUM	4 in	6122.2	6124.15	51.4	10.1	49.6	52.5
B400289	MW	WL	0289	744645	2079142	NON-GMP	INSTALLED	ALLUVIUM	4 in	6106.0	6107.71	51.3	20.5	50.0	NP
B400389	MW	WL	0389	743760	2078395	NON-GMP	INSTALLED	ALLUVIUM	4 in	6122.0	6124.00	50.3	9.5	49.0	48.5
B400489	MW	WL	0489, BH0489	743821	2079205	PLANT PROTECTION	INSTALLED	ALLUVIUM	4 in	6105.0	6107.07	55.7	9.9	54.5	54.0
B200589	MW	WL	0589	754837	2083536	PLANT PROTECTION	INSTALLED	ALLUVIUM	4 in	5968.4	5970.17	33.3	11.9	31.6	30.5
B200689	MW	WL	0689	755238	2084158	NON-GMP	INSTALLED	ALLUVIUM	4 in	5960.1	5961.94	32.8	11.6	31.1	30.5
B200789	MW	WL	0789	755765	2085008	NON-GMP	INSTALLED	ALLUVIUM	4 in	5946.1	5948.08	30.5	9.1	28.5	28.0
B200889	MW	WL	0889	756186	2085702	PLANT PROTECTION	INSTALLED	ALLUVIUM	4 in	5936.1	5938.08	24.7	8.6	23.1	22.7
B201089	MW	WL	0989	755267	2087257	NON-GMP	INSTALLED	ALLUVIUM	4 in	5883.1	5885.15	9.6	3.5	7.8	7.5
B201189	MW	WL	1089, BH1189	757645	2086852	PLANT PROTECTION	INSTALLED	ALLUVIUM	4 in	5806.5	5808.41	36.5	20.4	34.8	34.0
B201289	MW	WL	1189, BH1289	757596	2083582	NON-GMP	INSTALLED	ALLUVIUM	4 in	5826.1	5827.80	26.1	14.7	23.9	23.4
B201489	MW	I	1289	757078	2085337	NON-GMP	INSTALLED	ALLUVIUM	4 in	5859.4	5861.20	11.6	5.6	10.0	7.0
B201589	MW	WL	1389, BH1489	757328	2086648	NON-GMP	INSTALLED	ALLUVIUM	4 in	5846.0	5847.68	10.5	4.4	8.8	3.6
B201889	MW	I	B301889, 1489	747310	2085322	NON-GMP	ABANDONED	ALLUVIUM	4 in	5866.8	5868.83	24.5	13.2	22.6	22.3
B401989	MW	WL	1589	745849	2081635	NON-GMP	INSTALLED	ALLUVIUM	4 in	6025.6	6027.67	22.7	6.6	21.0	20.5
B302089	MW	WL	1689	746786	2083490	PLANT PROTECTION	INSTALLED	ALLUVIUM	4 in	5907.6	5909.55	15.0	3.9	13.3	13.5
B402189	MW	WL	1789BR, 1789	746339	2081476	PLANT PROTECTION	INSTALLED	BEDROCK	4 in	6024.5	6026.49	24.6	13.5	22.9	7.5
B102289	MW	WL	1889	753091	2079512	PLANT PROTECTION	INSTALLED	ALLUVIUM	4 in	5978.3	5980.06	14.2	3.0	12.5	12.5
B102389	MW	WL	1989	753834	2080256	NON-GMP	INSTALLED	ALLUVIUM	4 in	5939.5	5941.18	12.6	3.7	10.9	10.4
B202489	MW	WL	2089	757395	2083894	PLANT PROTECTION	INSTALLED	ALLUVIUM	4 in	5770.9	5772.83	14.7	3.4	12.9	12.4
B202589	MW	WL	2189	758112	2085712	PLANT PROTECTION	INSTALLED	ALLUVIUM	4 in	5723.6	5725.45	13.4	4.5	11.6	12.8
B402689	MW	WL	2289	747229	2078262	PLANT PROTECTION	INSTALLED	ALLUVIUM	4 in	6045.4	6047.07	5.9	2.6	3.3	2.8
B302789	MW	WL	2389	744707	2086227	PLANT PROTECTION	INSTALLED	ALLUVIUM	4 in	5832.3	5834.17	10.2	4.0	8.6	8.0
B302889	MW	WL	2489	745827	2089525	PLANT PROTECTION	INSTALLED	ALLUVIUM	4 in	5730.8	5733.16	12.1	5.9	10.5	12.2
B302989	MW	WL	2589	745356	2091266	NON-GMP	INSTALLED	ALLUVIUM	4.5 in	5686.2	5688.15	9.7	3.5	7.9	7.4
B303089	MW	WL	2689	742278	2093994	PLANT PROTECTION	INSTALLED	BEDROCK	4 in	5601.2	5602.93	8.9	4.6	7.0	4.6
B203189	MW	WL	2789BR, 2789	754848	2083557	PLANT PROTECTION	INSTALLED	BEDROCK	4 in	5968.0	5970.12	46.5	35.3	44.7	29.7
B203289	MW	WL	2889BR, 2889	755240	2084177	NON-GMP	INSTALLED	BEDROCK	4 in	5959.7	5961.59	46.0	35.0	44.5	30.1
B203489	MW	WL	2989BR, 2989	755791	2085052	NON-GMP	INSTALLED	BEDROCK	4 in	5945.7	5947.71	41.3	31.0	40.5	28.6
B203589	MW	WL	3089BR, 3089	756209	2085744	PLANT PROTECTION	INSTALLED	BEDROCK	4 in	5935.2	5937.07	40.9	29.7	39.2	31.1
B203689	MW	I	3189BR, 3189	756745	2086570	NON-GMP	ABANDONED	BEDROCK	4 in	5920.5	5922.45	37.3	27.1	36.6	21.3
B203789	MW	WL	3289BR, 3289	755777	2085031	NON-GMP	INSTALLED	BEDROCK	4 in	5946.2	5948.28	140.8	134.2	138.6	28.7
B203889	MW	WL	3389BR, 3389	756198	2085721	PLANT PROTECTION	INSTALLED	BEDROCK	4 in	5935.8	5937.69	113.9	107.0	111.4	28.5
B203989	MW	WL	3489BR, 3489	756730	2086552	NON-GMP	INSTALLED	BEDROCK	4 in	5920.9	5922.78	132.7	126.0	130.4	22.7
B204089	MW	WL	3589BR, 3589	754897	2087317	PLANT PROTECTION	INSTALLED	BEDROCK	4 in	5877.6	5879.29	115.2	106.5	112.9	1.2
B204189	MW	WL	3689BR, 3689	755340	2088469	NON-GMP	INSTALLED	BEDROCK	4 in	5826.9	5828.86	97.6	81.1	95.3	3.5
B304289	MW	I	3789BR, 3789	744679	2086215	NON-GMP	ABANDONED	BEDROCK	4 in	5833.0	5838.18	91.0	84.0	88.5	10.5
B304589	MW	I	3789P	744691	2086222	NON-GMP	INSTALLED	BEDROCK	4 in	5832.3	5834.25	9.5	5.0	9.4	10.8
B204689	MW	I	3889BR	754788	2086657	NON-GMP	ABANDONED	BEDROCK	4 in	5901.4	5902.82	112.2	105.5	110.0	1.3
B304789	MW	WL	3989BR, 3989	747309	2085299	NON-GMP	INSTALLED	BEDROCK	4 in	5867.8	5869.56	39.1	27.9	37.6	22.9

90

Table B-1
Well Construction Specifications

Well ID[1]	Well Type	GMP	Old Well Name(s)	True State Plane North	True State Plane East	Well Classification	Well Status	Completion Interval	Well Diameter	Surface Elevation (ft.)	Top of Casing (ft.)	TD Casing (ft.)	Top Scrn. (ft.)	Bot Scrn. (ft.)	Top of Bedrock (ft.)
B304889	MW	WL	4089BR, 4089	745817	2089570	PLANT PROTECTION	INSTALLED	BEDROCK	4 in	5730.6	5732.56	25.9	14.7	24.1	9.2
B304989	MW	WL	4189BR, 4189	745801	2089600	PLANT PROTECTION	INSTALLED	BEDROCK	4 in	5729.7	5731.85	86.3	75.5	83.9	8.4
B405189	MW	WL	4289BR, 4289	746782	2082448	NON-GMP	INSTALLED	BEDROCK	4 in	5968.1	5969.91	24.5	13.2	22.7	8.2
B405289	MW	WL	4389BR, 4389	746798	2082465	NON-GMP	INSTALLED	BEDROCK	4 in	5965.7	5967.31	48.0	41.2	45.7	8.6
B305389	MW	WL	4489BR, 4489, B405389	744718	2086232	PLANT PROTECTION	INSTALLED	BEDROCK	4 in	5831.9	5833.90	26.3	15.2	24.6	10.0
B405489	MW	WL	4589BR, 4589	745191	2078357	NON-GMP	INSTALLED	BEDROCK	4 in	6115.9	6117.67	50.1	39.1	48.6	34.0
B205589	MW	WL	4689, BH11-89	757654	2086855	PLANT PROTECTION	INSTALLED	ALLUVIUM	4 in	5806.4	5808.46	18.0	6.9	16.3	32.3
B405689	MW	WL	4789	743819	2079190	NON-GMP	INSTALLED	ALLUVIUM	4 in	6105.3	6107.25	23.8	3.0	22.5	NP
B405789	MW	WL	4889	743821	2079220	NON-GMP	INSTALLED	ALLUVIUM	4 in	6104.8	6106.70	53.7	43.0	52.5	52.0
B405889	MW	WL	4989BR, 4989	746332	2081476	PLANT PROTECTION	INSTALLED	BEDROCK	4 in	6024.9	6026.87	46.8	36.0	45.5	6.5
B405989	MW	WL	5089	746349	2081477	PLANT PROTECTION	INSTALLED	ALLUVIUM	4 in	6023.6	6026.06	8.5	2.8	6.7	6.1
B106089	MW	S	LF0189	752310	2082580	RCRA-C	INSTALLED	ALLUVIUM	4 in	5993.3	5995.35	24.5	3.7	23.2	22.5
B206189	MW	I	LF0289BR, LF0289	752332	2083301	NON-GMP	ABANDONED	ALLUVIUM/BEDROCK	4 in	5984.5	5986.57	36.6	25.9	35.4	20.9
B206289	MW	S	LF0389BR, LF0389	752253	2083564	RCRA-C	INSTALLED	BEDROCK	4 in	5977.6	5979.49	43.1	32.4	41.8	15.0
B206389	MW	I	LF0489BR, LF0489	752548	2083926	NON-GMP	ABANDONED	ALLUVIUM	4 in	5969.7	5971.56	14.7	4.0	13.5	13.3
B206489	MW	S	LF0589	752427	2083964	RCRA-C	INSTALLED	ALLUVIUM/BEDROCK	4 in	5969.1	5971.46	11.4	3.3	10.0	7.3
B206589	MW	S	LF0689BR, LF0689	752458	2084121	RCRA-C	INSTALLED	BEDROCK	4 in	5967.8	5969.72	36.2	23.5	35.1	7.6
B206689	MW	S	LF0889BR, LF0889	752588	2084361	RCRA-C	INSTALLED	BEDROCK	4 in	5959.3	5961.20	19.4	8.7	18.2	3.7
B206789	MW	S	LF0989BR, LF0989	752818	2084161	RCRA-C	INSTALLED	BEDROCK	4 in	5927.9	5930.19	20.5	9.8	19.3	4.8
B206889	MW	S	LF1089BR, LF1089	752823	2084781	RCRA-C	INSTALLED	BEDROCK	4 in	5917.1	5919.15	18.2	8.0	17.5	3.0
B206989	MW	S	LF1189BR, LF1189	753145	2084835	RCRA-S	INSTALLED	BEDROCK	4 in	5882.4	5884.32	22.5	11.8	21.3	6.0
B207089	MW	S	LF1289BR, LF1289	753103	2084837	RCRA-S	INSTALLED	BEDROCK	4 in	5883.1	5884.95	54.0	31.3	53.0	6.0
B207189	MW	I	LF1389BR, LF1389	753092	2084837	NON-GMP	ABANDONED	BEDROCK	4 in	5884.8	5886.72	77.8	71.0	75.4	5.5
B207289	MW	WL	LF1489BR, LF1489	753267	2084360	RCRA-C	INSTALLED	BEDROCK	4 in	5948.3	5950.49	15.9	5.2	14.7	0.2
P207389	MW	S	SEP0189BR, SEP0189	750195	2084468	RCRA-S	INSTALLED	BEDROCK	4 in	5981.0	5982.77	16.3	10.5	15.2	7.0
P207489	MW	I	SEP0289	750197	2084481	NON-GMP	ABANDONED	ALLUVIUM	4 in	5980.7	5982.64	8.2	2.4	7.0	6.5
P207589	MW	S	SEP0389	750395	2084843	RCRA-S	INSTALLED	BEDROCK	4 in	5974.1	5975.96	25.1	14.4	23.9	9.4
P207689	MW	S	SEP0489	750398	2085318	RCRA-S	INSTALLED	ALLUVIUM	4 in	5966.3	5967.88	14.4	3.6	13.1	12.6
P207789	MW	S	SEP0589	750392	2085343	RCRA-S	INSTALLED	BEDROCK	4 in	5965.9	5967.75	28.6	17.9	27.3	12.9
P207889	MW	S	SEP0689	750671	2085343	RCRA-S	INSTALLED	ALLUVIUM	4 in	5962.8	5964.90	9.0	3.3	7.7	8.5
P207989	MW	S	SEP0789BR, SEP0789	750671	2085330	RCRA-S	INSTALLED	BEDROCK	4 in	5963.1	5965.17	21.7	11.0	20.5	5.8
B208089	MW	S	SEP0889	751143	2085876	RCRA-C	INSTALLED	ALLUVIUM	4 in	5935.4	5937.07	14.2	3.4	12.9	12.2
B208189	MW	S	SEP0989BR, SEP0989	751138	2085885	RCRA-C	INSTALLED	BEDROCK	4 in	5935.4	5937.46	27.6	16.9	26.3	11.0
B208289	MW	S	SEP1089	751739	2086289	RCRA-C	INSTALLED	BEDROCK	4 in	5850.7	5852.95	16.2	6.0	15.4	0.2
B208389	MW	WL	SEP1189	751687	2085584	RCRA-C	INSTALLED	BEDROCK	4 in	5876.8	5878.66	9.1	3.4	7.8	0.2
B208489	MW	WL	SEP1289BR	751683	2085636	RCRA-C	INSTALLED	BEDROCK	4 in	5876.3	5878.34	30.5	19.8	29.2	15.5
B208589	MW	WL	SEP1389	751804	2085477	NON-GMP	INSTALLED	ALLUVIUM	4 in	5856.5	5858.35	5.1	3.2	4.0	3.6
B208689	MW	S	SEP1489BR, SEP1489	751728	2085250	RCRA-C	INSTALLED	BEDROCK	4 in	5867.6	5869.60	23.1	12.3	21.8	7.3
B208789	MW	WL	SEP1589	751755	2084450	NON-GMP	INSTALLED	ALLUVIUM	4 in	5907.1	5909.03	12.3	2.9	10.9	8.4
P208889	MW	S	SEP1689BR, SEP1689	751086	2085249	RCRA-C	INSTALLED	BEDROCK	4 in	5947.3	5949.25	99.2	87.8	96.9	5.5
P208989	MW	S	SEP1789BR, SEP1789	751044	2084839	RCRA-S	INSTALLED	BEDROCK	4 in	5962.5	5964.56	26.1	15.4	24.8	3.5
P209089	MW	S	SEP1889BR, SEP1889	750566	2084910	RCRA-C	INSTALLED	BEDROCK	4 in	5972.2	5974.25	27.2	16.5	26.0	11.5
P209189	MW	WL	SEP1989BR, SEP1989	750762	2084309	RCRA-S	INSTALLED	BEDROCK	4 in	5980.7	5982.21	36.1	13.3	35.0	10.3
P209289	MW	S	SEP2089	750863	2084139	RCRA-S	INSTALLED	ALLUVIUM	4 in	5981.6	5983.42	13.4	8.2	12.7	12.2
P209389	MW	S	SEP2189BR, SEP2189	750864	2084130	RCRA-S	INSTALLED	BEDROCK	4 in	5981.5	5983.39	30.1	16.8	28.8	13.8
P209489	MW	S	SEP2289BR, SEP2289	750991	2084634	RCRA-S	INSTALLED	BEDROCK	4 in	5978.0	5980.10	36.3	15.5	35.0	9.0
P209589	MW	S	SEP2389BR, SEP2389	751071	2085286	RCRA-S	INSTALLED	BEDROCK	4 in	5948.2	5950.04	19.8	9.1	18.5	4.1
P209689	MW	S	SEP2489BR, SEP2489	750533	2085514	RCRA-S	INSTALLED	BEDROCK	4 in	5962.6	5964.43	27.9	17.2	26.7	12.2
P209789	MW	S	SEP2589	750579	2085481	RCRA-S	INSTALLED	ALLUVIUM	4 in	5962.8	5964.94	13.8	3.0	12.5	12.0
P209889	MW	S	SEP2689BR, SEP2689	751194	2084984	RCRA-C	INSTALLED	BEDROCK	4 in	5940.3	5942.40	19.6	8.9	18.3	3.9
P209989	MW	I	SEP2889	751565	2084649	NON-GMP	ABANDONED	ALLUVIUM	4 in	5898.1	5900.40	9.6	3.8	8.2	7.7

Table B-1
Well Construction Specifications

Well ID[1]	Well Type	GMP	Old Well Name(s)	True State Plane North	True State Plane East	Well Classification	Well Status	Completion Interval	Well Diameter	Surface Elevation (ft.)	Top of Casing (ft.)	TD Casing (ft.)	Top Scrn. (ft.)	Bot Scrn. (ft.)	Top of Bedrock (ft.)
P210089	MW	S	SEP2989BR, SEP2989	751564	2084639	RCRA-C	INSTALLED	BEDROCK	4 in	5898.4	5900.40	22.9	12.2	21.5	7.2
P210189	MW	S	SEP3089BR, SEP3089	750752	2084411	RCRA-C	INSTALLED	BEDROCK	4 in	5980.8	5982.48	37.1	20.4	36.1	14.6
P210289	MW	I	SEP3189BR, SEP3189	750564	2085223	NON-GMP	ABANDONED	BEDROCK	4 in	5967.0	5969.19	22.3	11.6	21.0	6.6
B210389	MW	WL	SEP3289BR, SEP3289	751696	2085116	NON-GMP	INSTALLED	BEDROCK	4 in	5873.2	5875.32	24.4	13.6	23.1	8.6
B210489	MW	S	SEP3389	751802	2085513	RCRA-C	INSTALLED	ALLUVIUM	4 in	5856.4	5858.71	8.7	3.0	7.4	7.0
B410589	MW	S	SF0189	747771	2077811	RCRA-S	INSTALLED	ALLUVIUM	4 in	6111.8	6113.80	61.3	40.6	60.0	NP
B410689	MW	S	SF0289	748350	2078729	RCRA-S	INSTALLED	ALLUVIUM	4 in	6091.7	6093.71	51.3	30.5	50.1	NP
B410789	MW	S	SF0389	748791	2079141	RCRA-S	INSTALLED	ALLUVIUM	4 in	6082.1	6083.66	46.3	25.5	45.0	NP
B110889	MW	S	SF0489	749346	2079273	RCRA-S	INSTALLED	ALLUVIUM	4 in	6075.6	6077.77	65.8	45.3	64.8	65.0
B110989	MW	S	SF0589	749795	2078778	RCRA-S	INSTALLED	ALLUVIUM	4 in	6082.3	6084.36	66.9	46.1	65.6	71.0
B111189	MW	S	SF0689	749645	2077580	RCRA-S	INSTALLED	ALLUVIUM	4 in	6105.7	6107.52	73.8	53.1	72.6	NP
B411289	MW	S	SF0789	748718	2076943	RCRA-S	INSTALLED	ALLUVIUM	4 in	6125.4	6127.30	69.7	48.9	68.4	NP
B411389	MW	S	SF0889	748728	2077713	RCRA-C	INSTALLED	ALLUVIUM	4 in	6109.5	6111.06	64.8	44.0	63.5	NP
P313489	MW	S	PZ0589	748913	2083062	CERCLA	INSTALLED	ALLUVIUM	4 in	6011.7	6013.58	22.4	16.7	21.1	20.6
P313589	MW	S	PZ0789	748510	2083547	CERCLA	INSTALLED	ALLUVIUM	4 in	6008.5	6010.11	13.8	8.1	12.5	11.0
P213689	MW	S	PZ1089	749460	2083736	CERCLA	INSTALLED	ALLUVIUM	4 in	5994.3	5996.04	14.8	9.1	13.5	13.0
B213789	MW	S	PZ1389	750538	2086677	CERCLA	INSTALLED	ALLUVIUM	4 in	5917.8	5920.01	8.3	2.5	6.9	6.4
P213889	MW	WL	PZ1489	750466	2086109	CERCLA	INSTALLED	BEDROCK	4 in	5954.1	5955.94	22.0	11.3	20.8	8.0
P213989	MW	WL	PZ1489A	750468	2086102	CERCLA	INSTALLED	ALLUVIUM	4 in	5954.3	5956.38	7.2	3.3	6.9	6.7
P314089	MW	S	P214089, PZ2389	749461	2083653	CERCLA	INSTALLED	ALLUVIUM	4 in	5996.7	5998.49	11.1	5.4	9.8	9.3
P414189	MW	S	PZ2489	749059	2082986	CERCLA	INSTALLED	ALLUVIUM	4 in	6010.6	6012.18	19.8	14.1	18.5	18.0
P314289	MW	S	PZ3189	748216	2083280	CERCLA	INSTALLED	ALLUVIUM	4 in	6010.1	6011.77	14.8	9.1	13.5	13.0
P114389	MW	S	PZ3589	750990	2081739	CERCLA	INSTALLED	ALLUVIUM	4 in	5991.2	5993.17	15.8	10.1	14.5	14.0
P114489	MW	S	PZ3689	750337	2081246	CERCLA	INSTALLED	ALLUVIUM	4 in	6033.4	6035.43	50.1	44.4	48.8	48.3
P114589	MW	S	PZ3789	750396	2081731	CERCLA	INSTALLED	ALLUVIUM	4 in	6024.1	6025.90	37.6	32.5	36.5	27.5
P114689	MW	S	P214689, PZ4289	749943	2083044	CERCLA	INSTALLED	ALLUVIUM	4 in	6004.0	6005.76	23.5	17.8	22.2	22.0
P114789	MW	S	PZ4389	749940	2082610	CERCLA	INSTALLED	ALLUVIUM	4 in	6010.7	6012.40	27.7	21.8	26.2	26.0
P114889	MW	S	PZ4489	749926	2082127	CERCLA	INSTALLED	ALLUVIUM	4 in	6016.6	6018.26	15.6	9.9	14.3	13.8
P114989	MW	S	PZ4589	749959	2081661	CERCLA	INSTALLED	ALLUVIUM	4 in	6029.8	6031.84	39.3	33.6	38.0	37.5
P115089	MW	S	PZ4689	749930	2081258	CERCLA	INSTALLED	ALLUVIUM	4 in	6038.1	6040.10	42.0	36.3	40.7	40.2
P115189	MW	I	PZ4789	749641	2081236	NON-GMP	ABANDONED	ALLUVIUM	4 in	6034.0	Not surv.	37.0	31.3	35.7	38.3
B315289	MW	WL	5989BR	749225	2086766	NON-GMP	INSTALLED	BEDROCK	4 in	5963.2	5965.21	100.1	90.0	98.0	19.0
P115489	MW	S	PZ4989	749507	2082135	CERCLA	INSTALLED	ALLUVIUM	4 in	6023.4	6025.10	27.8	22.1	26.5	26.0
P115589	MW	S	PZ5089	749551	2082658	CERCLA	INSTALLED	ALLUVIUM	4 in	6014.1	6015.77	30.7	25.1	29.5	29.0
P115689	MW	S	PZ5189	749532	2083019	CERCLA	INSTALLED	ALLUVIUM	4 in	6006.9	6008.71	21.3	16.2	20.2	19.7
P215789	MW	S	PZ5289	749470	2083430	CERCLA	INSTALLED	ALLUVIUM	4 in	6002.0	6003.66	19.6	14.5	18.5	18.0
P415889	MW	S	PZ5389	749125	2080718	CERCLA	INSTALLED	ALLUVIUM	4 in	6050.4	6052.60	44.5	38.8	43.2	49.5
P415989	MW	S	PZ5489	749025	2081011	CERCLA	INSTALLED	ALLUVIUM	4 in	6044.9	6046.71	28.0	22.3	26.7	34.0
P416089	MW	S	PZ5589	748605	2080720	CERCLA	INSTALLED	ALLUVIUM	4 in	6051.7	6053.95	35.4	29.2	34.0	33.5
P416189	MW	S	PZ5689	748606	2081120	CERCLA	INSTALLED	ALLUVIUM	4 in	6045.6	6047.95	30.9	25.2	29.7	29.2
P416289	MW	S	PZ5789	748598	2081555	CERCLA	INSTALLED	ALLUVIUM	4 in	6038.6	6040.22	24.8	19.1	23.5	23.0
P416389	MW	S	PZ5889	748313	2080631	CERCLA	INSTALLED	ALLUVIUM	4 in	6055.4	6057.14	31.4	25.7	30.1	30.0
P416489	MW	S	PZ5989	748210	2081113	CERCLA	INSTALLED	ALLUVIUM	4 in	6048.5	6050.15	27.0	21.3	25.7	25.2
P416589	MW	S	PZ6089	748211	2081546	CERCLA	INSTALLED	ALLUVIUM	4 in	6041.2	6042.81	32.1	27.0	31.0	30.5
P416689	MW	S	PZ6189	748147	2081941	CERCLA	INSTALLED	ALLUVIUM	4 in	6035.0	6036.55	33.8	28.1	32.5	32.0
P416789	MW	S	PZ6289	748206	2082382	CERCLA	INSTALLED	ALLUVIUM	4 in	6027.8	6029.27	28.2	22.5	26.9	26.4
P416889	MW	S	PZ6389	748206	2082815	CERCLA	INSTALLED	ALLUVIUM	4 in	6017.4	6018.79	21.5	15.9	20.3	20.2
P416989	MW	S	5189BR	748780	2081034	CERCLA	INSTALLED	BEDROCK	4 in	6045.2	6047.55	158.0	151.2	155.6	30.0
B317189	MW	WL	5389BR	748807	2093921	NON-GMP	INSTALLED	BEDROCK	4 in	5725.0	5726.69	77.3	60.6	75.1	8.5
B217289	MW	S	5489BR	750563	2093776	PLANT PROTECTION	INSTALLED	BEDROCK	4 in	5677.6	5679.10	136.4	109.8	134.1	5.1
B217489	MW	WL	5689BR	749454	2086818	NON-GMP	INSTALLED	BEDROCK	4 in	5961.2	5963.23	148.7	142.0	146.4	25.2

92

Table B-1
Well Construction Specifications

Well ID[1]	Well Type	GMP	Old Well Name(s)	True State Plane North	True State Plane East	Well Classification	Well Status	Completion Interval	Well Diameter	Surface Elevation (ft.)	Top of Casing (ft.)	TD Casing (ft.)	Top Scrn. (ft.)	Bot Scrn. (ft.)	Top of Bedrock (ft.)
B217589	MW	WL	5789BR	749817	2087189	NON-GMP	INSTALLED	BEDROCK	4 in	5952.9	5954.89	92.9	85.2	90.7	17.3
B217689	MW	WL	5889BR	749629	2086745	NON-GMP	INSTALLED	BEDROCK	4 in	5960.5	5961.82	105.1	98.5	102.9	22.0
B217789	MW	WL	6089BR	749494	2087341	NON-GMP	INSTALLED	BEDROCK	4 in	5954.9	5956.85	86.0	72.0	83.8	23.6
P317989	MW	WL	OP0289	748891	2084272	PLANT PROTECTION	INSTALLED	ALLUVIUM	4 in	5990.9	5992.84	8.7	3.0	7.5	6.4
P218089	MW	WL	OP0389	749941	2084020	PLANT PROTECTION	INSTALLED	ALLUVIUM	4 in	5985.8	5987.55	8.7	3.0	7.4	6.0
P218289	MW	S	P118289, OP0189	748952	2082653	CERCLA	INSTALLED	ALLUVIUM	4 in	6016.9	6018.20	24.7	9.5	23.5	23.0
P218389	MW	S	PZ2789	750831	2085648	RCRA-C	INSTALLED	ALLUVIUM	4 in	5956.2	5958.45	13.8	8.1	12.5	12.0
B218789	MW	WL	P118789, 6489	749425	2086720	NON-GMP	INSTALLED	ALLUVIUM	4 in	5962.8	5964.52	29.8	9.1	28.5	28.0
P219089	MW	I	BH7740689	751127	2084117	PLANT PROTECTION	INSTALLED	ALLUVIUM	4 in	5949.1	5949.90	15.7	5.0	14.4	10.4
P219189	MW	S	PZ1889	751222	2084010	CERCLA	INSTALLED	ALLUVIUM	4 in	5941.2	5943.15	12.8	7.1	11.5	11.0
P119389	MW	S	PZ3889	750280	2081921	CERCLA	INSTALLED	ALLUVIUM	4 in	6011.7	6013.18	18.2	12.5	16.9	16.4
P219489	MW	I	PZ1589	750415	2085651	RCRA-C	INSTALLED	ALLUVIUM	4 in	5959.5	5961.15	24.2	18.5	22.9	22.5
P219589	MW	S	PZ1289	750268	2085536	RCRA-C	INSTALLED	BEDROCK	4 in	5963.8	5965.70	27.0	21.3	25.7	17.2
P419689	MW	S	PZ0489	748522	2082513	CERCLA	INSTALLED	ALLUVIUM	4 in	6022.4	6023.42	24.8	19.1	23.5	22.0
B319889	MW	I	6889	745835	2089522	NON-GMP	INSTALLED	ALLUVIUM	4 in	5734.6	5736.73	11.9	6.2	10.8	
P219989	MW	I	6989	749415	2087001	NON-GMP	INSTALLED	ALLUVIUM	4 in	5967.8	5968.63	25.7	20.0	24.5	
P320089	MW	S	P220089, 7089	748799	2083280	NON-GMP	INSTALLED	ALLUVIUM	4 in	6009.9	6011.87	20.1	14.4	18.8	18.8
B220189	MW	WL	7189	749938	2087001	NON-GMP	INSTALLED	ALLUVIUM	4 in	5949.3	5951.27	16.1	12.9	14.9	15.0
B220489	MW	I	7489	749555	2087096	NON-GMP	ABANDONED	ALLUVIUM	4 in	5958.2	5960.19	28.6	25.4	27.3	
B320589	MW	I	7589	747948	2084897	NON-GMP	ABANDONED	ALLUVIUM	4 in	5909.5	5911.40	20.8	17.6	19.5	
0190	MW	S	TH 10W	751087	2080307	NEW LANDFILL	INSTALLED	ALLUVIUM	2 in	6044.3	6045.88	49.5	29.5	44.5	62.5
0290	MW	S	TH 2W	752245	2079308	NEW LANDFILL	INSTALLED	ALLUVIUM	2 in	6048.3	6050.65	62.5	42.5	57.5	63.5
0390	MW	S	TH 1W	751328	2078292	NEW LANDFILL	INSTALLED	ALLUVIUM	2 in	6075.4	6079.13	70.0	50.0	65.0	92.0
0490	MW	I	TH 5W	751862	2079635	NON-GMP	ABANDONED	ALLUVIUM	2 in	6048.5	6050.92	60.0	40.0	55.0	69.5
0590	MW	WL	TH 21W	745484	2079248	NON-GMP	INSTALLED	ALLUVIUM	2 in	6096.8	6099.77	31.5	11.0	26.0	50.0
0690	MW	WL	TH 27W	745239	2080143	NON-GMP	INSTALLED	ALLUVIUM	2 in	6083.7	6086.91	27.3	7.0	22.0	41.3
0790	MW	WL	TH 24W	744708	2079640	NON-GMP	INSTALLED	ALLUVIUM	2 in	6095.9	6098.79	53.3	33.0	48.0	48.8
0990	MW	WL	TH 30W	744377	2080517	NON-GMP	INSTALLED	ALLUVIUM	2 in	6080.5	6083.48	40.3	20.0	35.0	35.0
1090	MW	I	TH 19W	754160	2082725	NON-GMP	INSTALLED	ALLUVIUM	2 in	5984.1	5986.86	35.0	15.0	30.0	33.8
1190	MW	I	TH 17W	753226	2082084	NON-GMP	INSTALLED	ALLUVIUM	2 in	5998.0	6001.08	34.8	14.3	29.3	40.0
1290	MW	I	TH 13W	752605	2081400	NON-GMP	INSTALLED	ALLUVIUM	2 in	6012.4	6014.87	40.0	20.0	35.0	44.0
1390	MW	I	TH 11W	752848	2080951	NON-GMP	INSTALLED	ALLUVIUM	2 in	6017.5	6020.62	44.3	24.0	39.0	47.5
1490	MW	S	TH 8AW	750839	2079028	NEW LANDFILL	INSTALLED	ALLUVIUM	2 in	6068.9	6071.28	64.5	44.5	59.5	66.0
3390	MW	I	B303390	748111	2085518	NON-GMP	INSTALLED	ALLUVIUM	2 in	5916.4	5918.41	9.3	6.1	8.0	8.0
3490	MW	I	B303490	748157	2085594	NON-GMP	INSTALLED	ALLUVIUM	2 in	5913.6	5915.55	8.1	5.6	7.5	7.5
3590	MW	I	B303590	748201	2085691	NON-GMP	INSTALLED	ALLUVIUM	2 in	5911.9	5913.89	10.7	7.7	9.7	9.7
3690	MW	I	B303690	748249	2085780	NON-GMP	INSTALLED	ALLUVIUM	2 in	5912.2	5914.19	20.3	12.1	16.5	17.2
00191	MW	S		749237	2086244	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5968.9	5970.44	27.0	15.0	25.0	24.2
00291	MW	S		749197	2086623	PLANT PROTECTION	INSTALLED	BEDROCK	2 in	5966.2	5967.57	56.0	44.0	54.0	16.0
00391	MW	S		748886	2086805	PLANT PROTECTION	INSTALLED	BEDROCK	2 in	5920.8	5922.40	23.8	16.8	21.8	16.9
00491	MW	S		748645	2086807	PLANT PROTECTION	INSTALLED	ALLUVIUM/BEDROCK	2 in	5903.5	5904.97	19.5	7.5	17.5	10.9
00691	MW	S		748322	2086379	NON-GMP	INSTALLED	ALLUVIUM	2 in	5894.5	5896.13	14.3	5.3	12.3	NP
00791	MW	WL		748303	2086023	NON-GMP	INSTALLED	ALLUVIUM	2 in	5907.1	5908.27	20.5	8.5	18.5	17.6
00891	MW	WL		748551	2087260	NON-GMP	INSTALLED	ALLUVIUM	2 in	5868.4	5869.95	19.9	7.9	17.9	18.2
00991	MW	WL		748082	2086190	NON-GMP	INSTALLED	BEDROCK	2 in	5867.0	5868.56	12.0	5.0	10.0	2.9
01291	MW	S		748335	2087062	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5851.2	5852.85	15.3	5.3	13.3	12.9
01391	MW	S		749402	2085226	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5973.7	5975.30	16.0	6.0	14.0	14.5
01491	MW	S		749430	2085474	PLANT PROTECTION	INSTALLED	BEDROCK	2 in	5970.4	5972.03	26.0	14.0	24.0	1.6
01791	MW	S		749504	2086018	PLANT PROTECTION	INSTALLED	BEDROCK	2 in	5965.8	5967.41	20.0	10.0	18.0	8.0
01891	MW	S		749438	2086023	PLANT PROTECTION	INSTALLED	BEDROCK	2 in	5971.8	5973.37	32.0	20.0	30.0	12.4
01991	MW	S		749476	2086734	NON-GMP	INSTALLED	BEDROCK	2 in	5962.2	5963.61	40.8	28.8	38.8	29.4

Table B-1
Well Construction Specifications

Well ID[1]	Well Type	GMP	Old Well Name(s)	True State Plane North	True State Plane East	Well Classification	Well Status	Completion Interval	Well Diameter	Surface Elevation (ft.)	Top of Casing (ft.)	TD Casing (ft.)	Top Scrn. (ft.)	Bot Scrn. (ft.)	Top of Bedrock (ft.)
02091	MW	S		749617	2086428	PLANT PROTECTION	INSTALLED	BEDROCK	2 in	5965.2	5966.65	32.6	15.6	30.6	16.1
02191	MW	WL		749708	2086166	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5965.8	5967.51	15.0	8.0	13.0	13.5
02291	MW	S		749880	2086139	PLANT PROTECTION	INSTALLED	BEDROCK	2 in	5936.7	5938.26	18.5	11.5	16.5	8.8
02391	MW	WL		749853	2086600	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5956.8	5958.43	8.0	3.0	6.0	6.9
02491	MW	S		749949	2086432	PLANT PROTECTION	INSTALLED	BEDROCK	2 in	5944.5	5946.21	18.8	11.8	16.8	8.5
02591	MW	S		750937	2089163	PLANT PROTECTION	INSTALLED	BEDROCK	2 in	5923.6	5925.34	51.1	42.1	49.1	39.8
02691	MW	S		750385	2086043	PLANT PROTECTION	INSTALLED	BEDROCK	2 in	5934.8	5936.38	18.0	6.0	16.0	1.1
02791	MW	WL		749854	2087029	NON-GMP	INSTALLED	ALLUVIUM	2 in	5954.3	5955.79	11.5	6.5	9.5	8.0
02891	MW	WL		749888	2087098	NON-GMP	INSTALLED	ALLUVIUM	2 in	5953.1	5954.61	11.0	6.0	9.0	9.1
02991	MW	S		749777	2086970	NON-GMP	INSTALLED	BEDROCK	2 in	5956.3	5957.90	54.0	42.0	52.0	15.8
03091	MW	S		749833	2087160	PLANT PROTECTION	INSTALLED	BEDROCK	2 in	5952.9	5954.23	52.0	35.0	50.0	17.3
03191	MW	WL		749882	2087441	NON-GMP	INSTALLED	ALLUVIUM	2 in	5950.4	5952.02	23.2	11.2	21.2	21.1
03391	MW	S		750047	2086994	PLANT PROTECTION	INSTALLED	BEDROCK	2 in	5944.5	5946.22	41.9	29.9	39.9	10.8
03591	MW	S		749999	2087691	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5949.0	5950.80	32.1	20.1	30.1	30.1
03691	MW	S		750199	2087072	PLANT PROTECTION	INSTALLED	BEDROCK	2 in	5932.6	5934.43	42.0	30.0	40.0	7.5
03791	MW	S		750206	2087183	PLANT PROTECTION	INSTALLED	BEDROCK	2 in	5936.8	5938.24	50.0	38.0	48.0	4.9
03891	MW	WL		750182	2087615	NON-GMP	INSTALLED	ALLUVIUM	2 in	5940.9	5942.95	9.0	4.0	7.0	7.4
03991	MW	S		750401	2088449	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5935.2	5936.87	39.4	27.4	37.4	36.0
04091	MW	S		750730	2088690	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5928.5	5930.14	38.0	28.0	36.0	36.0
04191	MW	S		749430	2087330	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5955.6	5956.99	19.1	7.1	17.1	17.1
04291	MW	S		749475	2087654	PLANT PROTECTION	INSTALLED	BEDROCK	2 in	5952.5	5953.90	25.1	18.1	23.1	17.0
04491	MW	S		749363	2087888	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5949.5	5951.15	29.0	17.0	27.0	27.0
04591	MW	S		749286	2088034	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5948.7	5950.25	46.1	34.1	44.1	44.2
04691	MW	S		749342	2088316	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5944.7	5946.43	45.9	33.9	43.9	43.9
04891	MW	WL		749439	2088680	NON-GMP	INSTALLED	ALLUVIUM	2 in	5939.2	5940.76	39.7	29.7	39.7	39.7
04991	MW	S		749551	2088844	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5936.9	5938.63	42.3	30.3	40.3	40.2
05091	MW	S		749894	2088825	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5937.6	5939.24	46.0	34.0	44.0	43.5
05191	MW	S		749957	2088672	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5938.4	5939.85	48.0	36.0	46.0	44.8
05291	MW	S		749958	2088377	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5941.2	5943.00	35.2	25.1	35.1	34.4
05391	MW	S		750153	2088298	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5940.2	5941.67	37.1	25.1	35.1	34.9
05691	MW	S		750053	2087621	NON-GMP	INSTALLED	ALLUVIUM	2 in	5947.6	5948.99	37.1	25.1	35.1	35.2
05991	MW	WL		748496	2086338	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5908.3	5909.91	24.0	12.1	22.1	22.1
06091	MW	S		750405	2088963	PLANT PROTECTION	INSTALLED	ALLUVIUM/BEDROCK	2 in	5930.1	5931.60	42.7	30.7	40.7	39.1
06191	MW	S		750865	2089985	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5919.2	5920.72	34.1	22.1	32.1	32.0
06291	MW	S		751639	2091094	NON-GMP	INSTALLED	BEDROCK	2 in	5897.9	5899.28	34.9	27.9	32.9	23.3
06391	MW	WL		751197	2091071	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5903.6	5905.17	24.6	17.6	22.6	21.2
06491	MW	S		751193	2093867	BOUNDARY-AIP	INSTALLED	BEDROCK	2 in	5671.5	5673.25	17.9	10.9	15.9	2.2
06591	MW	S		749064	2085535	PLANT PROTECTION	INSTALLED	BEDROCK	2 in	5978.3	5979.78	50.0	33.0	48.0	15.4
06691	MW	S		749068	2085714	NON-GMP	INSTALLED	ALLUVIUM	2 in	5978.3	5979.94	25.1	13.1	23.1	22.0
06791	MW	S		748855	2085646	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5978.9	5980.38	23.2	11.2	21.2	21.2
06891	MW	S		749258	2085883	NON-GMP	INSTALLED	ALLUVIUM	2 in	5974.1	5975.62	16.0	6.0	14.0	14.0
06991	MW	S		749168	2085990	NON-GMP	INSTALLED	ALLUVIUM	2 in	5972.9	5974.57	31.0	14.0	29.0	28.6
07191	MW	S		748850	2085908	NON-GMP	INSTALLED	ALLUVIUM	2 in	5974.8	5976.34	23.1	11.1	21.1	20.0
07291	MW	S		748748	2085766	NON-GMP	INSTALLED	ALLUVIUM	2 in	5977.3	5978.80	22.6	10.6	20.6	20.0
07391	MW	S		748547	2085827	NON-GMP	INSTALLED	ALLUVIUM/BEDROCK	2 in	5949.1	5950.61	13.4	5.4	11.4	8.1
07891	MW	S		749653	2087041	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5957.8	5959.45	30.0	18.0	28.0	27.5
07991	MW	S		749541	2087443	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5954.9	5956.78	28.1	16.1	26.1	26.0
08091	MW	S		749671	2087795	NON-GMP	INSTALLED	ALLUVIUM	2 in	5947.9	5949.51	18.3	11.3	16.3	16.1
08291	MW	WL		749586	2087832	NON-GMP	INSTALLED	ALLUVIUM	2 in	5950.2	5951.94	16.0	6.0	14.0	14.0
08391	MW	S		749607	2088034	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5947.2	5948.65	40.0	28.0	38.0	37.2
08491	MW	WL		749506	2087872	NON-GMP	INSTALLED	ALLUVIUM	2 in	5950.6	5952.16	18.0	6.0	16.0	16.0

Table B-1
Well Construction Specifications

Well ID[1]	Well Type	GMP	Old Well Name(s)	True State Plane North	True State Plane East	Well Classification	Well Status	Completion Interval	Well Diameter	Surface Elevation (ft.)	Top of Casing (ft.)	TD Casing (ft.)	Top Scrn. (ft.)	Bot Scrn. (ft.)	Top of Bedrock (ft.)
08591	MW	WL		749526	2088006	NON-GMP	INSTALLED	ALLUVIUM	2 in	5948.6	5950.12	44.0	32.0	42.0	40.7
08891	MW	S		749128	2085866	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5976.4	5978.06	27.3	15.3	25.3	23.0
09091	MW	S		748918	2085943	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5975.2	5976.79	26.7	14.7	24.7	24.0
09691	MW	S		748572	2086038	PLANT PROTECTION	INSTALLED	BEDROCK	2 in	5935.6	5937.05	16.0	6.0	14.0	3.1
10991	MW	S		749629	2088679	PLANT PROTECTION	INSTALLED	BEDROCK	2 in	5940.0	5941.64	53.0	46.0	51.0	45.2
11291	MW	WL		750391	2088968	NON-GMP	INSTALLED	ALLUVIUM	2 in	5930.6	5932.12	33.0	21.0	31.0	NP
11491	MW	WL		750035	2087628	NON-GMP	INSTALLED	ALLUVIUM	2 in	5948.2	5949.76	27.3	10.3	25.3	NP
11691	MW	S		750188	2087182	PLANT PROTECTION	INSTALLED	BEDROCK	2 in	5938.6	5939.91	35.5	18.5	33.5	9.5
11791	MW	S		748900	2086786	PLANT PROTECTION	INSTALLED	BEDROCK	2 in	5923.3	5925.03	15.7	8.7	13.7	6.9
11891	MW	S		750033	2086999	PLANT PROTECTION	INSTALLED	BEDROCK	2 in	5945.5	5947.44	30.0	13.0	28.0	12.0
12091	MW	S		749436	2086009	PLANT PROTECTION	INSTALLED	BEDROCK	2 in	5971.6	5973.27	24.0	14.0	22.0	13.2
12191	MW	S		749774	2086949	PLANT PROTECTION	INSTALLED	BEDROCK	2 in	5956.5	5958.19	35.0	18.0	33.0	15.7
12291	MW	S		749429	2085441	NON-GMP	INSTALLED	BEDROCK	2 in	5971.0	5972.73	16.1	7.1	14.1	2.0
12391	MW	S		750176	2088273	PLANT PROTECTION	INSTALLED	BEDROCK	2 in	5940.1	5941.70	70.4	58.4	68.4	36.5
12491	MW	S		750058	2087588	NON-GMP	INSTALLED	BEDROCK	2 in	5946.8	5948.35	62.0	45.0	60.0	30.0
12691	MW	S		749952	2087419	NON-GMP	INSTALLED	BEDROCK	2 in	5949.7	5951.08	65.1	48.1	63.1	20.0
12891	MW	WL		749696	2088032	NON-GMP	INSTALLED	ALLUVIUM	2 in	5946.8	5948.35	37.5	25.5	35.5	37.0
12991	MW	S		749209	2086625	PLANT PROTECTION	INSTALLED	BEDROCK	2 in	5965.7	5967.22	36.5	19.5	34.5	16.1
13091	MW	S		748960	2085992	NON-GMP	INSTALLED	ALLUVIUM	2 in	5973.7	5975.20	23.3	11.3	21.3	19.5
13191	MW	S	6591	749071	2085530	PLANT PROTECTION	INSTALLED	BEDROCK	2 in	5978.3	5979.90	27.7	15.7	25.7	15.4
13291	MW	S		749060	2085523	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5978.5	5979.97	17.7	5.7	15.7	15.4
13391	MW	S		750922	2089164	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5923.8	5925.35	41.0	29.0	39.0	38.6
13491	MW	S		749489	2086732	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5961.9	5963.42	29.5	19.0	29.0	29.4
13591	MW	WL		749204	2086612	NON-GMP	INSTALLED	ALLUVIUM	2 in	5965.9	5967.55	18.0	6.0	16.0	16.0
20091	MW	I		750056	2087603	NON-GMP	ABANDONED	ALLUVIUM/BEDROCK	2 in	5947.0	5948.52	57.2	17.0	57.0	31.7
20191	MW	I		750061	2087610	NON-GMP	INSTALLED	BEDROCK	2 in	5946.9	5948.49	59.0	37.0	57.0	33.1
20291	MW	I		750052	2087612	NON-GMP	INSTALLED	ALLUVIUM	2 in	5947.2	5948.58	33.3	18.0	33.0	33.1
20491	MW	I		750051	2087601	NON-GMP	INSTALLED	ALLUVIUM	2 in	5947.2	5948.71	32.9	16.6	31.6	NP
20591	MW	WL		749405	2086316	NON-GMP	INSTALLED	ALLUVIUM	2 in	5968.0	5969.61	24.6	4.1	24.1	24.5
20691	MW	WL		749411	2086317	NON-GMP	INSTALLED	ALLUVIUM	2 in	5968.1	5969.63	25.0	4.5	24.5	24.5
20791	MW	WL		749416	2086318	NON-GMP	INSTALLED	BEDROCK	2 in	5967.9	5969.49	36.5	29.5	34.5	24.5
20891	MW	I		749977	2087285	NON-GMP	INSTALLED	BEDROCK	2 in	5949.4	5952.02	64.0	21.7	63.7	19.4
20991	MW	I		749971	2087287	NON-GMP	INSTALLED	BEDROCK	2 in	5949.8	5951.39	65.0	21.0	63.0	19.4
21091	MW	I		749997	2087282	NON-GMP	INSTALLED	BEDROCK	2 in	5948.6	5950.12	65.0	19.0	63.0	15.0
21191	MW	I		750060	2087599	NON-GMP	INSTALLED	ALLUVIUM	2 in	5946.9	5948.52	58.0	35.8	57.8	31.7
30991	MW	S		747745	2085295	PLANT PROTECTION	INSTALLED	ALLUVIUM/BEDROCK	2 in	5849.8	5851.82	12.3	5.1	9.9	9.0
31491	MW	WL		747749	2084649	NON-GMP	INSTALLED	ALLUVIUM/BEDROCK	2 in	5902.6	5905.03	21.3	13.9	18.9	16.5
31791	MW	S		747425	2084276	NON-GMP	INSTALLED	ALLUVIUM/BEDROCK	2 in	5877.1	5879.80	14.2	6.8	11.8	8.8
31891	MW	S		747661	2084142	NON-GMP	INSTALLED	BEDROCK	2 in	5916.9	5919.52	21.0	16.6	18.6	17.2
32591	MW	S		747976	2084852	NON-GMP	INSTALLED	ALLUVIUM	2 in	5914.9	5917.41	18.9	11.5	16.5	16.0
33491	MW	S		748080	2084883	NON-GMP	INSTALLED	ALLUVIUM	2 in	5926.1	5928.59	11.1	6.7	8.7	8.0
33691	MW	WL		748112	2084994	NON-GMP	INSTALLED	ALLUVIUM/BEDROCK	2 in	5927.0	5929.24	10.6	6.2	8.1	7.8
33891	MW	S		747961	2084641	NON-GMP	INSTALLED	ALLUVIUM/BEDROCK	2 in	5927.5	5929.94	11.1	6.7	8.7	8.1
34591	MW	WL		748462	2085621	NON-GMP	INSTALLED	ALLUVIUM	2 in	5952.2	5954.63	11.3	6.9	8.9	8.2
34791	MW	S		748377	2085521	PLANT PROTECTION	INSTALLED	BEDROCK	2 in	5951.4	5953.91	10.4	6.0	8.0	8.0
35391	MW	S		748011	2083907	NON-GMP	INSTALLED	ALLUVIUM	2 in	5960.7	5963.03	10.5	6.1	8.1	6.0
35691	MW	S		747797	2084005	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5938.8	5941.36	29.0	15.6	26.6	25.2
35991	MW	WL		748057	2083756	NON-GMP	INSTALLED	ALLUVIUM	2 in	5973.3	5976.45	16.1	8.7	13.7	12.2
36191	MW	S		748091	2084198	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5962.9	5965.17	17.0	9.5	14.6	14.0
36391	MW	S		748042	2084294	NON-GMP	INSTALLED	ALLUVIUM	2 in	5964.6	5967.01	29.8	17.4	27.4	26.4
36691	MW	S		748027	2084421	NON-GMP	INSTALLED	ALLUVIUM/BEDROCK	2 in	5949.8	5951.52	27.8	15.8	25.8	25.0

95

Table B-1
Well Construction Specifications

Well ID[1]	Well Type	GMP	Old Well Name(s)	True State Plane North	True State Plane East	Well Classification	Well Status	Completion Interval	Well Diameter	Surface Elevation (ft.)	Top of Casing (ft.)	TD Casing (ft.)	Top Scrn. (ft.)	Bot Scrn. (ft.)	Top of Bedrock (ft.)
36991	MW	WL		748180	2084177	NON-GMP	INSTALLED	ALLUVIUM	2 in	5969.5	5972.31	10.6	6.6	8.6	8.0
37191	MW	S		748036	2084533	NON-GMP	INSTALLED	ALLUVIUM	2 in	5945.9	5948.29	23.1	11.1	21.1	20.5
37591	MW	S		748580	2084610	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5991.4	5993.45	14.6	7.6	12.6	12.0
37691	MW	S		748692	2085217	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5984.5	5985.24	18.5	6.5	16.5	16.2
37791	MW	S		748592	2083753	PLANT PROTECTION	INSTALLED	BEDROCK	2 in	6002.2	6004.18	22.6	10.6	20.6	20.0
37891	MW	S		748075	2084915	PLANT PROTECTION	INSTALLED	BEDROCK	2 in	5925.2	5926.29	55.2	43.2	53.2	4.7
37991	MW	S		748063	2084731	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5931.5	5933.55	57.2	45.2	55.2	6.9
38191	MW	WL		748014	2084765	NON-GMP	INSTALLED	ALLUVIUM	2 in	5924.5	5926.40	17.0	10.0	15.0	14.7
38291	MW	S		748032	2084801	NON-GMP	INSTALLED	ALLUVIUM	2 in	5924.5	5926.71	10.7	6.7	8.7	8.4
38591	MW	S		747408	2084659	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5864.7	5866.62	9.7	5.7	7.7	7.3
38891	MW	S		747830	2085051	NON-GMP	INSTALLED	BEDROCK	2 in	5891.3	5893.24	11.3	7.3	9.3	9.0
38991	MW	S		747820	2085024	NON-GMP	INSTALLED	BEDROCK	2 in	5893.1	5895.45	38.8	26.8	36.8	19.5
39191	MW	S		748009	2084921	NON-GMP	INSTALLED	BEDROCK	2 in	5918.2	5918.32	44.8	32.8	42.8	7.1
39291	MW	WL		747949	2084974	NON-GMP	INSTALLED	BEDROCK	2 in	5908.4	5910.24	46.0	34.0	44.0	10.8
39691	MW	S		748357	2083634	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	6006.3	6008.37	11.0	7.0	9.0	6.8
39991	MW	I	MW-1-92, MW01	747689	2083972	NON-GMP	ABANDONED	ALLUVIUM	2 in	5929.9	5932.36	20.7	13.3	18.2	NL
40491	MW	WL		750545	2093763	BOUNDARY-AIP	INSTALLED	ALLUVIUM	2 in	5677.3	5678.66	12.3	8.3	10.0	10.2
40791	MW	WL		746283	2093525	BOUNDARY-AIP	INSTALLED	ALLUVIUM/BEDROCK	2 in	5688.5	5690.24	9.3	5.3	7.0	7.0
40991	MW	WL		752163	2087538	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5801.2	5802.67	9.7	5.9	7.4	7.4
41091	MW	S		753241	2089994	PLANT PROTECTION	INSTALLED	ALLUVIUM/BEDROCK	2 in	5719.6	5721.85	12.3	7.8	10.0	10.0
41491	MW	S		744916	2093975	BOUNDARY-AIP	INSTALLED	ALLUVIUM	2 in	5627.4	5630.21	12.0	6.8	9.7	9.4
41591	MW	S		748800	2093914	BOUNDARY-AIP	INSTALLED	ALLUVIUM	2 in	5725.5	5727.27	13.5	6.3	11.0	11.0
41691	MW	S		753470	2093851	BOUNDARY-AIP	INSTALLED	ALLUVIUM	2 in	5644.0	5645.88	17.1	5.1	14.7	14.7
45091	MW	I		757431	2076976	NON-GMP	ABANDONED	ALLUVIUM	4 in	6036.4	6038.40	42.3	24.8	39.8	38.4
45191	MW	I		757407	2076503	NON-GMP	ABANDONED	ALLUVIUM	4 in	6044.0	6045.98	49.4	23.9	38.9	42.8
45291	MW	I		757760	2076728	NON-GMP	ABANDONED	ALLUVIUM	4 in	6038.6	6040.51	41.8	24.3	39.3	41.8
45391	MW	S	MW-2-92, MW02	747791	2084847	CERCLA	INSTALLED	ALLUVIUM	2 in	5891.2	5894.24	20.2	12.7	17.7	NL
03092	MW	S	MW-92-1	750834	2079651	NL	INSTALLED	ALLUVIUM	2 in	6058.2	6060.90	30.3	20.0	30.0	NL
03192	MW	S	MW-92-2	751084	2079054	NL	INSTALLED	ALLUVIUM	2 in	6066.0	6068.58	30.3	20.0	30.0	NL
10092	MW	S	FD01A	747942	2085296	CERCLA	INSTALLED	ALLUVIUM	2 in	5898.4	5900.47	20.6	5.2	18.8	18.6
10192	MW	S	FD02A	747687	2084096	CERCLA	INSTALLED	BEDROCK	2 in	5922.7	5924.30	18.7	4.9	16.8	16.4
10292	MW	S	FD02B	747692	2084106	CERCLA	INSTALLED	ALLUVIUM	2 in	5923.8	5925.46	24.3	18.0	22.7	15.2
10392	MW	S	FD03A	747677	2083820	CERCLA	INSTALLED	BEDROCK	2 in	5930.2	5932.05	26.8	5.5	25.2	24.8
10492	MW	S	FD03B	747678	2083812	CERCLA	INSTALLED	ALLUVIUM	2 in	5930.8	5932.81	31.9	25.9	30.3	22.6
10592	MW	S	FD04A	747716	2083725	CERCLA	INSTALLED	ALLUVIUM	2 in	5936.1	5937.93	25.8	4.7	24.0	23.5
10692	MW	S	FD05A	747745	2083638	CERCLA	INSTALLED	BEDROCK	2 in	5941.5	5943.60	21.3	5.0	19.4	18.9
10792	MW	S	FD06B	747723	2084363	CERCLA	INSTALLED	BEDROCK	2 in	5915.0	5917.10	24.0	17.7	22.4	16.2
10892	MW	S	FD07B	747671	2083928	CERCLA	INSTALLED	ALLUVIUM	2 in	5928.1	5929.20	25.0	18.5	23.4	15.5
10992	MW	S	FD08A	747775	2084780	CERCLA	INSTALLED	ALLUVIUM	2 in	5896.9	5898.56	31.3	4.9	29.4	29.2
11092	MW	S	FD09A	747842	2085079	CERCLA	INSTALLED	ALLUVIUM	2 in	5893.3	5895.31	20.5	5.0	19.0	18.6
43392	MW	S		748034	2081537	CERCLA	INSTALLED	ALLUVIUM/BEDROCK	2 in	6041.9	6043.44	32.8	25.6	30.3	31.4
43492	MW	S		743670	2087281	NON-GMP	INSTALLED	ALLUVIUM	2 in	5990.1	5991.09	43.5	36.1	41.1	39.4
46192	MW	S		748822	2076092	RCRA-S	INSTALLED	ALLUVIUM	2 in	6141.5	6143.37	80.0	57.2	77.2	77.0
46292	MW	S		749430	2078128	RCRA-C	INSTALLED	BEDROCK	2 in	6095.3	6097.24	93.3	45.5	90.5	90.5
46392	MW	S		749987	2079667	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	6063.2	6065.03	82.3	64.5	79.5	56.0
46492	MW	S		749747	2080245	PLANT PROTECTION	INSTALLED	BEDROCK	2 in	6054.7	6056.81	46.0	28.2	43.2	43.0
46692	MW	S		749554	2087077	PLANT PROTECTION	INSTALLED	BEDROCK	2 in	5956.2	5958.25	89.8	72.0	87.0	24.5
46792	MW	S		749538	2087080	PLANT PROTECTION	INSTALLED	BEDROCK	2 in	5956.3	5958.44	114.6	96.8	111.8	24.5
46892	MW	S		749524	2087087	PLANT PROTECTION	INSTALLED	BEDROCK	2 in	5956.7	5958.56	164.7	146.9	161.9	24.5
49192	MW	S		751221	2099197	CERCLA	INSTALLED	BEDROCK	2 in	5544.4	5546.12	39.0	24.0	34.0	10.8
49292	MW	S		741497	2109627	CERCLA	INSTALLED	BEDROCK	2 in	5399.7	5402.36	46.0	29.0	44.0	12.6

Table B-1
Well Construction Specifications

Well ID[1]	Well Type	GMP	Old Well Name(s)	True State Plane North	True State Plane East	Well Classification	Well Status	Completion Interval	Well Diameter	Surface Elevation (ft.)	Top of Casing (ft.)	TD Casing (ft.)	Top Scrn. (ft.)	Bot Scrn. (ft.)	Top of Bedrock (ft.)
50092	MW	S		747687	2086417	CERCLA	INSTALLED	ALLUVIUM	2 in	5822.3	5824.30	13.1	5.3	10.3	10.2
50192	MW	S		747533	2089222	CERCLA	INSTALLED	ALLUVIUM	2 in	5747.7	5748.65	12.9	5.0	10.0	9.8
50292	MW	S		747328	2089313	CERCLA	INSTALLED	ALLUVIUM	2 in	5744.5	5746.50	12.4	4.5	9.5	9.8
75092	MW	S		753228	2089870	CERCLA	INSTALLED	BEDROCK	2 in	5723.4	5725.40	16.7	7.2	14.7	6.3
75292	MW	S		752305	2089809	CERCLA	INSTALLED	ALLUVIUM	2 in	5754.9	5756.90	9.6	5.6	7.6	7.6
75892	MW	S		750915	2086558	CERCLA	INSTALLED	ALLUVIUM	2 in	5956.2	5959.20	9.3	4.3	7.3	7.6
75992	MW	S		750290	2086628	CERCLA	INSTALLED	ALLUVIUM	2 in	5897.1	5899.10	12.0	5.0	10.0	10.0
76192	MW	S		750660	2086122	CERCLA	INSTALLED	ALLUVIUM	2 in	5960.0	5963.00	8.0	4.0	6.0	6.0
76292	MW	S		750769	2085681	CERCLA	INSTALLED	BEDROCK	2 in	5957.0	5959.30	21.2	9.2	19.2	8.5
76792	MW	S		752546	2084618	CERCLA	INSTALLED	ALLUVIUM	2 in	5943.5	5945.50	7.8	3.5	5.5	6.3
76992	MW	S		752561	2084500	CERCLA	INSTALLED	ALLUVIUM	2 in	5955.0	5958.00	11.4	3.4	9.4	9.6
77192	MW	S		753646	2084381	CERCLA	INSTALLED	ALLUVIUM	2 in	5913.9	5915.90	7.9	2.9	5.9	NP
77392	MW	S		752243	2084299	CERCLA	INSTALLED	ALLUVIUM	2 in	5962.5	5965.50	8.9	3.9	6.9	7.0
77492	MW	S	60592	751246	2083508	CERCLA	INSTALLED	ALLUVIUM	2 in	5942.0	5944.50	24.1	12.1	22.1	22.5
00193	MW	S		747794	2088288	CERCLA	INSTALLED	BEDROCK	2 in	5765.7	5767.84	22.2	10.0	20.0	8.8
00293	MW	S		750313	2079458	CERCLA	INSTALLED	ALLUVIUM	2 in	6050.2	6052.44	50.0	38.0	48.0	48.2
00393	MW	S		753173	2083768	RCRA-C	INSTALLED	ALLUVIUM	2 in	5969.8	5971.67	16.0	4.0	14.0	13.2
00493	MW	S		752533	2083930	RCRA-C	INSTALLED	ALLUVIUM	2 in	5970.0	5972.03	10.9	5.9	8.9	8.9
05093	MW	S		750804	2085231	RCRA-S	INSTALLED	ALLUVIUM	2 in	5963.3	5965.54	12.5	3.5	10.5	9.7
05193	MW	S		750484	2085225	RCRA-S	INSTALLED	ALLUVIUM	2 in	5968.4	5970.58	13.4	4.4	11.4	12.1
05293	MW	S		750198	2084490	RCRA-S	INSTALLED	ALLUVIUM	2 in	5980.7	5983.11	9.7	2.7	7.7	6.6
05393	MW	S		750549	2085223	RCRA-S	INSTALLED	ALLUVIUM	2 in	5967.4	5969.69	24.1	12.1	22.1	6.2
22093	MW	S		748623	2085973	CERCLA	INSTALLED	BEDROCK	2 in	5945.0	5947.43	66.3	48.0	63.0	8.8
22193	PZ	S		749084	2086763	CERCLA	INSTALLED	BEDROCK	2 in	5960.9	5963.36	59.7	49.6	56.4	8.5
22293	PZ	S		748373	2086501	CERCLA	INSTALLED	BEDROCK	2 in	5881.5	5884.12	85.0	67.0	82.0	21.0
22393	PZ	S		749564	2086121	CERCLA	INSTALLED	BEDROCK	2 in	5969.3	5972.14	121.3	108.2	118.0	12.7
22593	MW	S		750008	2087315	CERCLA	INSTALLED	BEDROCK	2 in	5947.6	5950.20	98.0	85.0	95.0	ND
23193	PZ	S		749999	2087319	CERCLA	INSTALLED	BEDROCK	2 in	5948.2	5950.46	77.0	66.8	73.8	8.0
23293	MW	S		749823	2086846	CERCLA	INSTALLED	BEDROCK	2 in	5955.6	5958.02	91.0	77.9	87.7	15.5
24093	PZ	I		749808	2086918	NON-GMP	INSTALLED	ALLUVIUM	2 in	5956.0		18.0	6.0	15.5	13.4
24193	CW	I		749784	2086805	NON-GMP	INSTALLED	BEDROCK	2 in	5956.0		75.0	22.0	72.0	12.9
24293	PZ	I		749787	2086803	NON-GMP	INSTALLED	ALLUVIUM	2 in	5957.0		17.0	5.0	14.6	14.6
24393	IW	I		749789	2086907	NON-GMP	INSTALLED	BEDROCK	2 in	5957.0		75.0	22.2	72.0	17.1
24493	PZ	I		749807	2086895	NON-GMP	INSTALLED	ALLUVIUM	2 in	5956.0		15.2	8.1	11.1	13.0
24593	PZ	I		749781	2086904	NON-GMP	INSTALLED	ALLUVIUM	2 in	5956.0		14.2	8.3	11.3	13.3
24693	PZ	I		749787	2086918	NON-GMP	INSTALLED	ALLUVIUM	2 in	5956.0		16.4	9.0	12.0	13.7
24993	PZ	I		749809	2086910	NON-GMP	INSTALLED	BEDROCK	2 in	5956.0		76.0	23.4	67.6	14.3
25093	PZ	I		749787	2086912	NON-GMP	INSTALLED	BEDROCK	2 in	5957.0		71.0	23.0	68.0	15.1
40193	PZ	WL		751566.5	2085407	CERCLA	INSTALLED	ALLUVIUM	2 in	5902.7	5904.65	34.1	12.0	22.0	21.4
41193	PZ	WL		751044.2	2084874	CERCLA	INSTALLED	ALLUVIUM	2 in	5960.7	5962.52	10.0	3.0	8.0	7.8
41693	PZ	WL		750866.3	2084912	CERCLA	INSTALLED	ALLUVIUM/BEDROCK	2 in	5972.0	5975.25	18.0	6.0	16.0	14.1
41993	PZ	WL		750873.5	2084283	CERCLA	INSTALLED	ALLUVIUM/BEDROCK	2 in	5978.7	5978.34	16.5	4.5	14.5	7.6
42393	PZ	WL		750804.1	2084286	CERCLA	INSTALLED	ALLUVIUM/BEDROCK	2 in	5980.2	5981.96	15.0	3.0	13.0	8.1
42993	PZ	WL		750748	2084552	CERCLA	INSTALLED	ALLUVIUM/BEDROCK	2 in	5978.8	5980.75	18.0	6.0	16.0	12.9
43293	PZ	WL		750825.7	2085753	CERCLA	INSTALLED	ALLUVIUM/BEDROCK	2 in	5955.5	5958.14	16.0	9.0	14.0	10.0
43593	PZ	WL		750611.9	2084456	CERCLA	INSTALLED	BEDROCK	2 in	5978.0	5979.94	13.0	6.0	11.0	7.0
43893	PZ	WL		750452.9	2084655	CERCLA	INSTALLED	ALLUVIUM	2 in	5977.5	5980.09	16.0	9.0	14.0	14.4
43993	PZ	WL		750486.4	2084909	CERCLA	INSTALLED	ALLUVIUM/BEDROCK	2 in	5972.9	5976.39	18.0	6.0	16.0	13.0
44893	PZ	WL		751341.2	2085490	CERCLA	INSTALLED	ALLUVIUM	2 in	5925.8	5927.83	16.0	4.0	14.0	16.2
44993	PZ	WL		751331.9	2085514	CERCLA	INSTALLED	ALLUVIUM	2 in	5926.7	5928.68	14.5	7.5	12.5	12.5
45093	PZ	WL		751315.2	2085546	CERCLA	INSTALLED	ALLUVIUM	2 in	5928.0	5929.86	13.7	6.7	11.7	12.0

97

Table B-1
Well Construction Specifications

Well ID[1]	Well Type	GMP	Old Well Name(s)	True State Plane North	True State Plane East	Well Classification	Well Status	Completion Interval	Well Diameter	Surface Elevation (ft.)	Top of Casing (ft.)	TD Casing (ft.)	Top Scrn. (ft.)	Bot Scrn. (ft.)	Top of Bedrock (ft.)
45293	PZ	WL		751351.1	2085468	CERCLA	INSTALLED	ALLUVIUM	2 in	5925.1	5926.98	14.8	7.8	12.8	12.8
45393	PZ	WL		751367.8	2085437	CERCLA	INSTALLED	ALLUVIUM	2 in	5923.7	5925.66	18.7	6.7	16.7	16.7
45593	WP	WL		751248.8	2084516	CERCLA	INSTALLED	BEDROCK?	2 in	5933.5	5935.64	5.5	3.0	5.5	ND
45693	PZ	WL		751221.5	2084514	CERCLA	INSTALLED	BEDROCK	2 in	5936.8	5938.81	8.0	1.5	5.5	1.0
45793	PZ	WL		751139	2084528	CERCLA	INSTALLED	ALLUVIUM	2 in	5950.4	5953.12	6.0	2.0	4.0	4.0
45893	PZ	WL		751112.8	2084467	CERCLA	INSTALLED	ALLUVIUM/BEDROCK	2 in	5960.4	5962.50	20.0	8.0	18.0	9.0
45993	PZ	WL		751138.2	2084512	CERCLA	INSTALLED	ALLUVIUM/BEDROCK	2 in	5950.2	5952.81	7.0	2.5	5.0	4.3
46093	WP	WL		751247	2084888	CERCLA	INSTALLED	ALLUVIUM/BEDROCK?	2 in	5932.6	5933.91	7.0	4.0	7.0	ND
46193	PZ	WL		751219.4	2084858	CERCLA	INSTALLED	BEDROCK	2 in	5935.7	5938.70	9.0	2.0	7.0	2.2
46293	PZ	WL		751179.8	2084859	CERCLA	INSTALLED	ALLUVIUM	2 in	5939.6	5941.59	10.0	3.0	8.0	8.0
46393	PZ	WL		751573	2085418	CERCLA	INSTALLED	ALLUVIUM	2 in	5900.4	5902.74	24.5	12.5	22.5	22.0
46493	PZ	WL		751557.8	2085394	CERCLA	INSTALLED	ALLUVIUM	2 in	5903.3	5905.57	18.0	6.0	16.0	15.6
51193	MW	S		747775	2086379	CERCLA	INSTALLED	ALLUVIUM	2 in	5817.0	5819.00	10.0	5.2	7.7	7.1
51293	WP	I		747247	2078315	CERCLA	INSTALLED	ALLUVIUM	2 in	6043.7		7.0	2.0	7.0	NP
51393	WP	I		747314	2079057	CERCLA	INSTALLED	ALLUVIUM	2 in	6023.9		7.0	2.0	7.0	NP
51493	WP	I		747283	2079717	CERCLA	INSTALLED	ALLUVIUM	2 in	6002.1		2.0	0.5	2.0	NP
51593	WP	I		747060	2080102	CERCLA	INSTALLED	ALLUVIUM	2 in	5990.1		4.5	1.0	4.5	NP
51693	WP	I		747147	2080102	CERCLA	INSTALLED	ALLUVIUM	2 in	5997.3		10.0	5.0	10.0	NP
51793	WP	I		747166	2080104	CERCLA	INSTALLED	ALLUVIUM	2 in	5999.4		11.0	5.0	11.0	NP
51893	WP	I		747185	2080105	CERCLA	INSTALLED	ALLUVIUM	2 in	6001.0		11.0	6.0	11.0	NP
51993	WP	I		747205	2080103	CERCLA	INSTALLED	ALLUVIUM	2 in	6003.5		12.0	7.0	12.0	NP
52093	WP	I		747225	2080103	CERCLA	INSTALLED	ALLUVIUM	2 in	6004.9		12.0	7.0	12.0	NP
52193	WP	I		747245	2080102	CERCLA	INSTALLED	ALLUVIUM	2 in	6006.5		11.2	6.2	11.2	NP
52293	WP	I		746946	2080088	CERCLA	INSTALLED	ALLUVIUM	2 in	5990.3		4.0	1.5	4.0	NP
52393	WP	I		746490	2079702	CERCLA	INSTALLED	ALLUVIUM	2 in	6016.0		12.0	7.0	12.0	NP
52493	WP	I		746213	2078977	CERCLA	INSTALLED	ALLUVIUM	2 in	6045.1		1.8	0.8	1.8	NP
52593	WP	I		747036	2080671	CERCLA	INSTALLED	ALLUVIUM	2 in	5972.7		4.0	1.0	4.0	NP
52693	WP	I		747544	2081505	CERCLA	INSTALLED	ALLUVIUM	2 in	5952.0		6.0	2.0	6.0	NP
52793	WP	I		747442	2082003	CERCLA	INSTALLED	ALLUVIUM	2 in	5937.9		4.0	2.0	4.0	NP
52893	WP	I		747518	2082002	CERCLA	INSTALLED	ALLUVIUM	2 in	5938.5		4.0	2.0	4.0	NP
52993	WP	I		747563	2082002	CERCLA	INSTALLED	ALLUVIUM	2 in	5940.0		9.0	5.0	9.0	NP
53093	WP	I		747594	2082005	CERCLA	INSTALLED	ALLUVIUM	2 in	5950.7		15.0	9.0	15.0	NP
53193	WP	I		747613	2082003	CERCLA	INSTALLED	ALLUVIUM	2 in	5953.5		15.0	8.0	15.0	NP
53293	WP	I		747657	2082004	CERCLA	INSTALLED	ALLUVIUM	2 in	5966.8		24.0	14.0	24.0	NP
53393	WP	I		747500	2082736	CERCLA	INSTALLED	ALLUVIUM	2 in	5917.7		3.0	1.0	3.0	NP
53493	WP	I		747196	2083174	CERCLA	INSTALLED	ALLUVIUM	2 in	5905.4		10.0	5.0	10.0	NP
53593	WP	I		747223	2083950	CERCLA	INSTALLED	ALLUVIUM	2 in	5877.4		3.0	1.0	3.0	NP
53693	WP	I		747120	2083987	CERCLA	INSTALLED	ALLUVIUM	2 in	5884.1		6.0	3.0	6.0	NP
53793	WP	I		746271	2082801	CERCLA	INSTALLED	ALLUVIUM	2 in	5949.7		5.0	2.0	5.0	NP
53893	WP	I		747387	2084559	CERCLA	INSTALLED	ALLUVIUM	2 in	5867.5		3.0	1.0	3.0	NP
53993	WP	I		747614	2085058	CERCLA	INSTALLED	ALLUVIUM	2 in	5852.6		8.0	4.0	8.0	NP
54093	WP	I		747642	2085052	CERCLA	INSTALLED	ALLUVIUM	2 in	5852.8		8.0	4.0	8.0	NP
54193	WP	I		747669	2085046	CERCLA	INSTALLED	ALLUVIUM	2 in	5859.0		2.0	1.0	2.0	NP
54293	WP	I		747689	2085040	CERCLA	INSTALLED	ALLUVIUM	2 in	5866.3		10.0	5.0	10.0	NP
54393	WP	I		747709	2085034	CERCLA	INSTALLED	ALLUVIUM	2 in	5873.0		14.0	6.0	14.0	NP
54493	WP	I		747742	2085025	CERCLA	INSTALLED	ALLUVIUM	2 in	5881.9		19.0	13.0	19.0	NP
54593	WP	I		747845	2086378	CERCLA	INSTALLED	ALLUVIUM	2 in	5819.8		7.0	3.0	7.0	NP
54693	WP	I		747937	2087123	CERCLA	INSTALLED	ALLUVIUM	2 in	5797.9		8.0	4.0	8.0	NP
54793	WP	I		747844	2087876	CERCLA	INSTALLED	ALLUVIUM	2 in	5774.9		4.0	1.0	4.0	NP
58793	MW	S		747512	2080605	CERCLA	INSTALLED	ALLUVIUM	2 in	6012.6	6014.96	27.3	14.8	24.8	24.6
59093	MW	S		747350	2079327	CERCLA	INSTALLED	ALLUVIUM	2 in	6024.7	6026.75	17.2	4.3	14.3	14.3

98

Table B-1
Well Construction Specifications

Well ID[1]	Well Type	GMP	Old Well Name(s)	True State Plane North	True State Plane East	Well Classification	Well Status	Completion Interval	Well Diameter	Surface Elevation (ft.)	Top of Casing (ft.)	TD Casing (ft.)	Top Scrn. (ft.)	Bot Scrn. (ft.)	Top of Bedrock (ft.)
59393	MW	S		747555	2081489	CERCLA	INSTALLED	ALLUVIUM	2 in	5954.7	5957.20	10.0	2.5	7.5	7.5
59493	MW	S		747824	2081536	CERCLA	INSTALLED	ALLUVIUM	2 in	5992.4	5994.50	15.8	7.9	12.9	14.1
59593	MW	S		747577	2081786	CERCLA	INSTALLED	ALLUVIUM	2 in	5953.0	5955.00	15.9	3.0	13.0	13.0
59793	MW	S		747553	2082128	CERCLA	INSTALLED	ALLUVIUM	2 in	5945.8	5947.10	16.6	8.7	13.7	13.3
59893	WP	I		747594	2082528	CERCLA	INSTALLED	ALLUVIUM	2 in	5946.4		14.6	9.6	14.6	NP
59993	WP	I		747550	2082132	CERCLA	INSTALLED	ALLUVIUM	2 in	5944.3		16.3	11.3	16.3	NP
60093	WP	I		747565	2082046	CERCLA	INSTALLED	ALLUVIUM	2 in	5945.4		9.8	4.8	9.8	NP
60193	WP	I		747594	2081950	CERCLA	INSTALLED	ALLUVIUM	2 in	5949.2		10.0	5.0	10.0	NP
60293	WP	I		747596	2081847	CERCLA	INSTALLED	ALLUVIUM	2 in	5949.5		12.0	7.0	12.0	NP
60393	WP	I		747619	2081539	CERCLA	INSTALLED	ALLUVIUM	2 in	5963.2		11.3	6.3	11.3	NP
60493	WP	I		747589	2081257	CERCLA	INSTALLED	ALLUVIUM	2 in	5984.7		14.0	9.0	14.0	NP
60593	WP	I		747676	2080973	CERCLA	INSTALLED	ALLUVIUM	2 in	6015.3		15.4	10.4	15.4	NP
60693	WP	I		747685	2080896	CERCLA	INSTALLED	ALLUVIUM	2 in	6023.7		17.8	12.8	17.8	NP
60793	WP	I		747696	2080822	CERCLA	INSTALLED	ALLUVIUM	2 in	6030.4		15.9	10.9	15.9	NP
60893	WP	I		747843	2081585	CERCLA	INSTALLED	ALLUVIUM	2 in	6000.0		23.2	18.2	23.2	NP
60993	MW	I		747817	2081948	CERCLA	INSTALLED	ALLUVIUM/BEDROCK	2 in	5986.9	5988.70	8.2	3.0	8.0	3.9
61093	MW	I		747764	2081952	CERCLA	INSTALLED	ALLUVIUM/BEDROCK	2 in	5973.6	5975.50	13.1	3.0	13.0	9.0
61293	MW	S		747523	2081148	CERCLA	INSTALLED	ALLUVIUM	2 in	5986.7	5988.70	10.9	3.0	8.0	7.0
61593	WP	I		746789	2084341	CERCLA	INSTALLED	ALLUVIUM	2 in	5931.4		8.1	3.1	8.1	NP
61693	WP	I		746405	2082887	CERCLA	INSTALLED	ALLUVIUM	2 in	5945.5		14.8	9.8	14.8	NP
61793	WP	I		747111	2082876	CERCLA	INSTALLED	ALLUVIUM	2 in	5918.7		5.9	0.9	5.9	NP
61893	WP	I		746983	2082625	CERCLA	INSTALLED	ALLUVIUM	2 in	5946.2		8.8	3.8	8.8	NP
61993	WP	I		747215	2082375	CERCLA	INSTALLED	ALLUVIUM	2 in	5935.5		6.0	1.0	6.0	NP
62093	WP	I		746620	2079975	CERCLA	INSTALLED	ALLUVIUM	2 in	6011.3		8.8	3.8	8.8	NP
62193	WP	I		746569	2079679	CERCLA	INSTALLED	ALLUVIUM	2 in	6018.4		5.9	0.9	5.9	NP
62293	WP	I		746457	2079817	CERCLA	INSTALLED	ALLUVIUM	2 in	6023.3		5.7	0.7	5.7	NP
62393	WP	I		746948	2078159	CERCLA	INSTALLED	ALLUVIUM	2 in	6064.1		5.7	0.7	5.7	NP
62493	WP	I		746976	2078853	CERCLA	INSTALLED	ALLUVIUM	2 in	6047.6		8.8	3.8	8.8	NP
62593	WP	I		747620	2079457	CERCLA	INSTALLED	ALLUVIUM	2 in	6047.8		8.4	3.4	8.4	NP
62693	WP	I		747627	2079926	CERCLA	INSTALLED	ALLUVIUM	2 in	6041.8		8.6	3.6	8.6	NP
62793	WP	I		747547	2082304	CERCLA	INSTALLED	ALLUVIUM	2 in	5939.5		11.8	6.8	11.8	NP
62893	WP	I		747964	2082700	CERCLA	INSTALLED	ALLUVIUM	2 in	5995.2		14.8	9.8	14.8	NP
63093	MW	S		747357	2079751	CERCLA	INSTALLED	ALLUVIUM/BEDROCK	2 in	6019.2	6021.70	24.8	7.0	22.0	19.6
63193	MW	I		747697	2082542	CERCLA	INSTALLED	ALLUVIUM/BEDROCK	2 in	5970.0	5971.80	21.1	11.1	21.1	15.5
63293	WP	I		747774	2086375	CERCLA	INSTALLED	ALLUVIUM	2 in	5815.7		7.6	5.0	7.6	NP
63393	WP	I		747784	2086381	CERCLA	INSTALLED	ALLUVIUM	2 in	5815.5		4.5	2.9	4.5	NP
63493	WP	I		747774	2086385	CERCLA	INSTALLED	ALLUVIUM	2 in	5815.7		9.9	4.9	9.9	NP
63593	WP	I		747514	2080603	CERCLA	INSTALLED	ALLUVIUM	2 in	6012.8		24.3	14.4	24.3	NP
63693	WP	I		747502	2080608	CERCLA	INSTALLED	ALLUVIUM	2 in	6012.2		21.8	14.8	21.8	NP
63793	WP	I		747515	2080611	CERCLA	INSTALLED	ALLUVIUM	2 in	6013.0		19.9	10.1	19.9	NP
63893	WP	I		747828	2081536	CERCLA	INSTALLED	ALLUVIUM	2 in	5991.7		12.9	8.0	12.9	NP
63993	WP	I		747822	2081530	CERCLA	INSTALLED	ALLUVIUM	2 in	5992.2		12.8	7.8	12.8	NP
64093	WP	I		747818	2081543	CERCLA	INSTALLED	ALLUVIUM	2 in	5991.5		13.0	8.0	13.0	NP
70093	MW	S		752675	2082657	CERCLA	INSTALLED	ALLUVIUM	2 in	5990.9	5992.90	24.0	7.0	22.0	22.2
70193	MW	S		752688	2082674	CERCLA	INSTALLED	BEDROCK	2 in	5990.0	5992.00	39.3	22.3	37.3	19.5
70293	MW	S		752681	2082665	CERCLA	INSTALLED	BEDROCK	2 in	5993.1	5995.10	69.1	52.1	67.1	21.5
70393	MW	S		752090	2082389	CERCLA	INSTALLED	ALLUVIUM	2 in	5997.9	6000.10	24.8	7.8	22.8	22.8
70493	MW	S		752111	2082390	CERCLA	INSTALLED	BEDROCK	2 in	5998.0	6000.00	46.0	24.0	44.0	21.3
70593	MW	S		752100	2082390	CERCLA	INSTALLED	BEDROCK	2 in	5998.0	6000.00	138.0	121.0	136.0	21.3
70693	MW	S		752070	2082799	CERCLA	INSTALLED	ALLUVIUM	2 in	5991.2	5992.70	30.5	8.4	28.4	28.5
70893	MW	S		752070	2082810	CERCLA	INSTALLED	BEDROCK	2 in	5991.2	5993.20	68.0	51.0	66.0	25.6

99

Table B-1
Well Construction Specifications

Well ID[1]	Well Type	GMP	Old Well Name(s)	True State Plane North	True State Plane East	Well Classification	Well Status	Completion Interval	Well Diameter	Surface Elevation (ft.)	Top of Casing (ft.)	TD Casing (ft.)	Top Scrn. (ft.)	Bot Scrn. (ft.)	Top of Bedrock (ft.)
71193	MW	S		752566	2082717	CERCLA	INSTALLED	ALLUVIUM	2 in	5989.3	5991.30	22.0	10.0	20.0	20.2
71493	MW	S		752517	2082741	CERCLA	INSTALLED	ALLUVIUM	2 in	5990.4	5992.40	24.8	18.8	22.8	24.0
71693	MW	S		752237	2082923	CERCLA	INSTALLED	ALLUVIUM	2 in	5988.3	5990.30	28.3	16.3	26.3	26.5
71893	MW	S		752174	2082951	CERCLA	INSTALLED	ALLUVIUM	2 in	5987.7	5989.70	28.0	10.7	25.7	26.0
72093	MW	S		752550	2083206	CERCLA	INSTALLED	ALLUVIUM	2 in	5986.0	5988.30	37.4	30.4	35.4	35.4
72293	MW	S		752774	2083808	CERCLA	INSTALLED	ALLUVIUM	2 in	5973.7	5976.10	34.6	27.6	32.6	32.7
72393	MW	S		752552	2083196	CERCLA	INSTALLED	ALLUVIUM	2 in	5985.2	5987.20	24.0	12.0	22.0	NP
72493	MW	S		752770	2083803	CERCLA	INSTALLED	ALLUVIUM	2 in	5973.7	5975.80	29.9	17.9	27.9	NP
10094	MW	I		743067.0355	2091932.2	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5663.7	5665.92	8.4	4.1	6.1	6.7
10194	MW	I		749121.3809	2088283.8	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5838.3	5940.38	43.0	30.8	40.8	40.7
10294	MW	I		742318.8907	2093691.2	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5623.8	5625.93	17.0	4.6	14.6	14.4
10394	MW	I		744946.9266	2093663.7	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5650.4	5653.13	10.5	3.2	8.2	8.0
10494	MW	I				PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in						
10594	MW	WL		752124.3077	2086746.5	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5818.0	5820.95	10.5	4.5	7.9	7.9
10694	MW	WL		752659.0465	2088757.1	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5757.3	5760.23	8.0	3.7	5.7	5.7
10794	MW	I		753735.3855	2090860	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5695.9	5698.51	6.8	2.5	4.5	4.5
10894	MW	I		753948.1745	2092348.3	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5666.8	5668.91	10.2	3.0	8.0	4.7
10994	MW	S		747431.1697	2083265.9	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5915.4	5917.48	19.7	12.2	17.2	18.0
11094	MW	WL		747259.9318	2082927.4	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5909.9	5912.37	9.8	2.4	6.8	6.5
11194	MW	I				PLANT PROTECTION	Proposed	ALLUVIUM	2 in						
11294	MW	I		749435.1554	2074305	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	6171.4	6173.50	78.5	61.2	76.2	75.8
11394	MW	WL		747847.4994	2076297	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	6147.0	6146.46	75.3	53.0	73.0	73.0
11494	MW	I		748147.5817	2074267	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	6184.6	6186.63	69.5	52.0	67.0	69.0
11594	MW	I		751604.4391	2075705.9	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	6113.6	6116.33	65.9	43.6	63.6	61.0
11694	MW	S		755770.4526	2085007.7	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5945.2	5947.66	7.5	7.5	27.5	27.3
11794	MW	S		755760.4279	2085006.7	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5923.1	5925.12	7.5	7.5	27.5	27.3
11894	MW	I		752859.9516	2095268.5	BOUNDARY-AIP	INSTALLED	ALLUVIUM	2 in	5613.1	5615.35	17.0	4.3	14.3	4.8
11994	MW	I		753276.2911	2094758.6	BOUNDARY-AIP	INSTALLED	ALLUVIUM	2 in	5625.3	5627.54	8.2	4.0	6.0	5.3
12094	MW	S		753879.8565	2088529.2	PLANT PROTECTION	INSTALLED	ALLUVIUM	2 in	5760.0	5763.07	12.0	5.6	10.0	NP
50194	MW	I		749310.4	2077234	CERCLA	INSTALLED	ALLUVIUM	2 in	6114.4	6116.29	97.0	74.7	94.7	NP
50294	MW	I		748704.9	2076128	CERCLA	INSTALLED	ALLUVIUM	2 in	6142.0	6143.91	18.2	5.9	15.9	NP
50394	MW	I		748529.1	2077216	CERCLA	INSTALLED	ALLUVIUM	2 in	6120.3	6122.21	66.8	49.5	64.5	NP
50494	MW	I		749648.8	2078240	CERCLA	INSTALLED	ALLUVIUM	2 in	6092.3	6094.34	24.0	11.7	21.7	NP
50594	MW	I				CERCLA	Proposed	ALLUVIUM	2 in						
50694	MW	I		749392.4	2078741.8	CERCLA	INSTALLED	ALLUVIUM	2 in	6085.5	6087.50	29.1	11.8	26.8	NP
50794	MW	I		747899.2	2076816	CERCLA	INSTALLED	ALLUVIUM	2 in	6132.8	6134.81	25.0	13.0	23.0	NP
50894	MW	I		748289.4	2077776.4	CERCLA	INSTALLED	ALLUVIUM	2 in	6111.4	6113.37	27.3	10.0	25.0	NP
50994	MW	I		749172.9	2077650	CERCLA	INSTALLED	ALLUVIUM	2 in	6107.6	6109.71	24.0	13.0	23.0	NP
51094	MW	I		748629.9	2078673.7	CERCLA	INSTALLED	ALLUVIUM	2 in	6091.2	6093.25	60.0	37.7	57.7	58.0
51194	MW	I		749883.5	2079328	CERCLA	INSTALLED	ALLUVIUM	2 in	6071.4	6073.31	52.0	35.0	50.0	NP
51294	MW	I		749278.4	2079847	CERCLA	INSTALLED	ALLUVIUM	2 in	6062.8	6064.68	37.3	20.0	35.0	NP
51394	MW	I				CERCLA	Proposed	ALLUVIUM	2 in						
51494	MW	I		748982.4	2078255.9	CERCLA	INSTALLED	ALLUVIUM	2 in	6097.4	6099.26	70.7	48.7	68.7	69.0
51594	MW	S		748972.1	2078255.7	CERCLA	INSTALLED	ALLUVIUM		6097.5	6099.49	20.0	10.0	20.0	NP
51694	MW	S		749638.7	2078238.5	CERCLA	INSTALLED	ALLUVIUM		6092.5	6094.61	5.0	45.0	60.0	27.3
51794	MW	S		747910.7	2076815	CERCLA	INSTALLED	ALLUVIUM		6132.8	6135.10	3.0	3.0	8.0	27.3
52894	MW	S		753221.5768	2085098.9	CERCLA	INSTALLED	ALLUVIUM		5870.2	5870.75	6.0	3.0	4.0	4.0
52994	MW	S		753196.2326	2085085.2	CERCLA	INSTALLED	ALLUVIUM		5872.9	5873.81	17.0	7.5	15.0	5.0
53094	MW	S		753197.8139	2085095.3	CERCLA	INSTALLED	BEDROCK		5872.9	5873.37	67.0	55.0	65.0	14.0
53194	MW	S		753434.3319	2086036.6	CERCLA	INSTALLED	ALLUVIUM		5838.8	5839.38	9.4	4.5	7.0	7.0
60194	WP	I		748852.7659	2086847.8	NON-GMP	INSTALLED	ALLUVIUM		5916.2	5917.52	9.9			

100

Table B-1
Well Construction Specifications

Well ID[1]	Well Type	GMP	Old Well Name(s)	True State Plane North	True State Plane East	Well Classification	Well Status	Completion Interval	Well Diameter	Surface Elevation (ft.)	Top of Casing (ft.)	TD Casing (ft.)	Top Scrn. (ft.)	Bot Scrn. (ft.)	Top of Bedrock (ft.)
60294	WP	I		748913.7678	2086858.8	NON-GMP	INSTALLED	ALLUVIUM		5920.8	5921.83	8.9			
60394	WP	I		748891.7777	2086746.4	NON-GMP	INSTALLED	BEDROCK		5924.2	5925.18	14.9			
60494	WP	I		748894.1174	2086747.8	NON-GMP	INSTALLED	ALLUVIUM		5924.5	5925.50	10.8			
60594	WP	I		748895.5292	2086748.7	NON-GMP	INSTALLED	BEDROCK		5924.5	5925.56	20.8			
60694	WP	I		748904.9611	2086678.9	NON-GMP	INSTALLED	BEDROCK		5930.6	5931.67	14.6			
60794	WP	I		748904.7675	2086677.4	NON-GMP	INSTALLED	BEDROCK		5930.8	5931.87	13.6			
60894	WP	I		748904.4113	2086676.2	NON-GMP	INSTALLED	ALLUVIUM		5930.9	5931.98	9.5			
60994	WP	I		748806.5994	2086570.4	NON-GMP	INSTALLED	ALLUVIUM		5931.1	5932.07	11.7			
61094	WP	I		748870.3996	2086634.1	NON-GMP	INSTALLED	BEDROCK		5931.4	5932.24	14.9			
61194	WP	I		748848.5481	2086555.3	NON-GMP	INSTALLED	ALLUVIUM		5936.2	5937.27	14.5			
61294	WP	I		748850.4542	2086555.7	NON-GMP	INSTALLED	BEDROCK		5936.5	5937.49	12.3			
61394	WP	I		748894.4453	2086506.6	NON-GMP	INSTALLED	BEDROCK		5944.3	5945.33	13.4			
61494	WP	I		748894.6844	2086504.7	NON-GMP	INSTALLED	BEDROCK		5944.5	5945.49	14.5			
61594	WP	I		748894.9306	2086503.1	NON-GMP	INSTALLED	BEDROCK		5932.5	5945.33	19.8			
68194	MW	I		749576.1843	2081909	NON-GMP	INSTALLED	ALLUVIUM		6027.1	6027.10	8.6	8.6	18.0	NP
68294	MW	I		749652.6838	2081943.6	NON-GMP	INSTALLED	ALLUVIUM		6024.2	6023.89	4.7	4.7	14.3	NP
68394	MW	I		749634.7885	2082005	NON-GMP	INSTALLED	ALLUVIUM		6023.3	6023.05	4.2	4.2	13.9	NP
68494	MW	I		749551.9862	2082026	NON-GMP	INSTALLED	ALLUVIUM		6024.5	6024.37	5.5	5.5	15.2	NP

[1] Recently installed wells or piezometers may be excluded from this table because of pending surveyed coordinate data

KEY

CW = Collection Well
PZ = Piezometer Well
MW = Monitoring Well
IW = Injection Well
WP = Well Point

GMP = Groundwater Monitoring Program
I = Inactive
WL = Water levels measured
S = Sampled + water levels measured

NC = Well not cased
OD = Outer diameter
NP = Not penetrated
NA = Not applicable
ND = Not determined
NL = Not logged

TD Casing = Total depth of casing, measured from ground surface
Top Scrn. = Depth to top of screen, measured from ground surface
Bot Scrn. = Depth to bottom of screen, measured from ground surface
CERCLA = Comprehensive Environmental Response, Compensation and Liability Act
RCRA = Resource Conservation and Recovery Act
RCRA-C = RCRA wells used to determine the rate and extent of contamination
RCRA-S = RCRA wells used for statistical comparisons
BOUNDARY-AIP = Agreement in Principle required wells used to monitor downgradient (of Rocky Flats site) groundwater
PLANT PROTECTION = Wells used for source characterization and plume geometry
NL = New Landfill wells
NON-GMP = Wells for engineering or other special purposes

101

Single-Well Hydrographs

Single-well hydrographs of 535 Rocky Flats site groundwater monitoring wells were constructed using water-level elevation data from as early as January 1986. Wells that lacked one or more of the following data were discarded: surface elevation, total depth of casing, depth to top of screen, depth to bottom of screen, or depth to top of bedrock. Hydrographs for wells with only one water-level data point were not generated. Screen tops and screen bottoms are plotted on each graph. The elevations of the land surface, top of bedrock, and bottom of casing are also provided.

Many well hydrographs exhibited spurious water levels which were investigated for potential data entry or transcription errors. This was accomplished by comparing each spurious observation to the original water-level measurement recorded on field log forms. Only spurious water levels that showed discrepancies between the water levels recorded on the original data sheets and the water levels in the RFEDS database were corrected. Other spurious water-level values were not changed as they could not be positively invalidated. Table C-1 summarizes the identified spurious water levels, reviewed field logs, and corrected water-level elevations.

Some hydrographs exhibit large fluctuations that are inconsistent with seasonal variations in precipitation. These hydrographs have patterns with sharp declines followed by slow water-level recoveries (e.g., well 10592). These wells appear to be affected by sampling procedures. The low transmissivity of aquifer materials associated with these wells results in long recovery times following sampling events. Recorded water-level elevations for these wells may not be indicative of actual potentiometric elevations in the aquifer. Many of these wells are in the LHSU.

102

Table C-1
Investigated Spurious Water Levels and Corrections

Well ID	SPURIOUS WATER LEVEL		RECORDED WATER LEVEL		Top of Casing Elevation (ft)	Difference Between Spurious and Recorded Water Levels (ft)	Water Level Corrected?	Corrected Water Level Elevation (ft)	EG&G RECORD		
	Measurement Date	Water Level Elevation (ft)	Measurement Date	Depth to Water (ft)					Reviewed Field Logs	Catalog No.	Page No.
0186	8/18/88	5617.22	ND	ND	ND[1]	ND	NO	ND	NA	NA	NA
0386	4/11/90	5665.51	4/11/90	12.35	5677.86	0.00	NO	5665.51	GWLM	128	21
0386	12/14/90	5673.31	12/14/90	4.55	5677.86	0.00	NO	5673.31	GWSCL	83	52
0386	2/4/92	5652.50	2/4/92	DRY	5677.86	0.07	YES	5652.57	GWLM	107	35A
0386	7/12/89	5652.50	7/12/89	15.89	5677.86[2]	9.47	YES	5661.97	WLDS/GWQSS	NC	NP
0486	2/4/92	5629.00	2/4/92	DRY	5644.91	-0.06	YES	5628.94	GWLM	107	35A
0586	3/23/90	5722.37	3/23/90	4.00	5726.37	0.00	NO	5722.37	WLDS	128	23
0586	4/11/90	5722.96	4/11/90	3.41	5726.37	0.00	NO	5722.96	WLDS	128	23
0586	3/17/92	5723.55	3/17/92	2.82	5726.37	0.00	NO	5723.55	GWSCL	103	46
0586	4/1/92	5723.04	4/1/92	3.33	5726.36	-0.01	YES	5723.03	GWLM	183	8
0686	4/10/90	5812.56	4/10/90	4.16	5816.72	0.00	NO	5812.56	GWLM	149	57
0686	4/2/92	5812.70	4/2/92	4.02	5816.72	0.00	NO	5812.7	GWLM	183	57
0686	10/13/86	5805.59	ND	ND	ND[1]	ND	NO	ND	NA	NA	NA
0686	11/26/86	5805.73	ND	ND	ND[1]	ND	NO	ND	NA	NA	NA
0686	1/6/88	5813.42	ND	ND	ND	ND	NO	ND	NA	NA	NA
0686	6/16/89	5805.52	ND	ND	ND[1]	ND	NO	ND	NA	NA	NA
0786	3/3/92	5893.54	ND	ND	5926.54	ND	NO	ND	NOT IN GWLM/GWSCL	ND	ND
0886	4/2/91	5870.87	4/2/91	56.03	5926.90	0.00	NO	5870.87	GWLM	70	59
0886	1/25/94	5865.26	ND	ND	5926.90	ND	NO	ND	NOT IN GWLM/GWSCL	ND	ND
0886	3/14/91	5901.75	ND	ND	5926.90	ND	NO	ND	NOT IN GWLM/GWSCL	ND	ND
0886	2/26/93	5869.00	2/26/93	59.70	5926.90	-1.80	YES	5867.2	GWLM	21394	8
0886	11/13/86	5875.09	ND	ND	ND	ND	NO	ND	NA	NA	NA
0886	7/8/87	5893.70	ND	ND	ND	ND	NO	ND	NA	NA	NA
0886	8/31/87	5888.50	ND	ND	ND	ND	NO	ND	NA	NA	NA
0886	2/4/88	5867.40	ND	ND	ND	ND	NO	ND	NA	NA	NA
0886	7/15/88	5866.50	ND	ND	ND	ND	NO	ND	NA	NA	NA
0986	1/2/91	5919.89	1/2/91	78.34	5998.23	0.00	NO	5919.89	GWLM	97	52
0986	4/2/91	5949.79	4/2/91	48.44	5998.23	0.00	NO	5949.79	GWLM	70	75
0986	10/1/92	5920.96	10/1/92	77.27	5998.23	0.00	NO	5920.96	GWLM	168	70
0986	2/26/93	5936.72	2/16/93	61.51	5998.23	0.00	NO	5936.72	GWLM	21394	70
0986	5/3/90	5877.66	5/3/90	33.01	5998.23	87.56	YES	5965.22	HWSD	127	27
0986	10/31/86	5869.99	ND	ND	ND	ND	NO	ND	NA	NA	NA
0986	9/15/88	5929.33	ND	ND	ND	ND	NO	ND	NA	NA	NA
1086	3/2/92	5872.48	3/2/92	13.77	5998.19	111.94	YES	5984.42	GWLM	107	8
1186	9/24/86	5713.92	ND	ND	ND	ND	NO	ND	NA	NA	NA
1186	4/1/87	5714.49	ND	ND	ND	ND	NO	ND	NA	NA	NA
1186	5/7/87	5715.21	ND	ND	ND	ND	NO	ND	NA	NA	NA

103

Table C-1
Investigated Spurious Water Levels and Corrections

Well ID	SPURIOUS WATER LEVEL		RECORDED WATER LEVEL		Top of Casing Elevation (ft)	Difference Between Spurious and Recorded Water Levels (ft)	Water Level Corrected?	Corrected Water Level Elevation (ft)	EG&G RECORD		
	Measurement Date	Water Level Elevation (ft)	Measurement Date	Depth to Water (ft)					Reviewed Field Logs	Catalog No.	Page No.
1286	2/4/88	5774.60	ND	ND	ND	ND	NO	ND	NA	NA	NA
1286	3/14/88	5774.60	ND	ND	ND	ND	NO	ND	NA	NA	NA
1386	11/4/91	5830.61	11/4/91	5.64	5842.59	6.34	YES	5836.95	GWLM	76	93
1486	5/4/90	5809.29	5/4/90	10.22	5846.71	27.20	YES	5836.49	HWSD	127	32
1486	6/15/88	5789.30	ND	ND	ND	ND	NO	ND	NA	NA	NA
1486	12/15/88	5828.71	ND	ND	ND	ND	NO	ND	NA	NA	NA
1686	10/2/90	5855.86	10/2/90	13.69	5869.55	0.00	NO	5855.86	GWLM	87	34
1686	8/18/88	5792.65	ND	ND	ND[1]	ND	NO	ND	NA	NA	NA
1686	12/15/88	5834.55	ND	ND	ND	ND	NO	ND	NA	NA	NA
1786	10/7/92	5861.03	10/7/92	8.54	5869.57	0.00	NO	5861.03	GWSCL	165	34
1786	12/6/90	5853.08	12/6/90	6.48	5869.57	10.01	YES	5863.09	GWLM	88	40
1886	4/11/90	5880.41	4/11/90	7.56	5887.97	0.00	NO	5880.41	WLDS	128	36
1886	2/1/93	5880.48	2/1/93	7.49	5887.97	0.00	NO	5880.48	GWLM	3426	30
1886	8/18/88	5878.17	ND	ND	ND[1]	ND	NO	ND	NA	NA	NA
1886	11/15/88	5878.17	ND	ND	ND[1]	ND	NO	ND	NA	NA	NA
1986	6/22/93	5942.12	6/22/93	1.74	5943.86	0.00	NO	5942.12	GWSCL	7247	121
1986	8/6/92	5930.80	8/7/92	3.02	5943.86	10.04	YES	5940.84	GWLM	141	48
2186	8/29/86	5937.50	ND	ND	ND	ND	NO	ND	NA	NA	NA
2186	11/19/86	5956.73	ND	ND	ND	ND	NO	ND	NA	NA	NA
2186	11/20/86	5960.46	ND	ND	ND	ND	NO	ND	NA	NA	NA
2186	11/21/86	5961.95	ND	ND	ND	ND	NO	ND	NA	NA	NA
2186	11/24/86	5967.17	ND	ND	ND	ND	NO	ND	NA	NA	NA
2186	11/25/86	5964.70	ND	ND	ND	ND	NO	ND	NA	NA	NA
2386	4/24/91	5919.90	4/24/91	62.56	5982.46	0.00	NO	5919.9	GWSCL	68	109
2386	7/1/92	5876.16	7/1/92	106.30	5982.46	0.00	NO	5876.16	GWLM	140	127
2386	11/15/88	5956.36	ND	ND	ND	ND	NO	ND	NA	NA	NA
2486	7/8/87	5974.91	ND	ND	ND[1]	ND	NO	ND	NA	NA	NA
2486	4/18/88	5974.86	ND	ND	ND[1]	ND	NO	ND	NA	NA	NA
2486	8/18/88	5974.86	ND	ND	ND[1]	ND	NO	ND	NA	NA	NA
2486	9/15/88	5974.86	ND	ND	ND[1]	ND	NO	ND	NA	NA	NA
2486	12/15/88	5974.86	ND	ND	ND[1]	ND	NO	ND	NA	NA	NA
2486	5/26/89	5974.86	ND	ND	ND[1]	ND	NO	ND	NA	NA	NA
2486	9/11/89	5974.98	ND	ND	ND[1]	ND	NO	ND	NA	NA	NA
2586	7/1/92	5919.22	7/1/92	57.92	5977.14	0.00	NO	5919.22	GWLM	140	123
2686	11/7/89	5964.40	ND	ND	ND	ND	NO	ND	NA	NA	NA
2786	7/3/91	5852.96	7/3/91	110.92	5963.88	0.00	NO	5852.96	GWLM	43	79
2786	7/2/92	5836.00	7/2/92	127.88	5963.88	0.00	NO	5836	GWLM	140	98

Table C-1
Investigated Spurious Water Levels and Corrections

Well ID	SPURIOUS WATER LEVEL		RECORDED WATER LEVEL		Top of Casing Elevation (ft)	Difference Between Spurious and Recorded Water Levels (ft)	Water Level Corrected?	Corrected Water Level Elevation (ft)	EG&G RECORD		
	Measurement Date	Water Level Elevation (ft)	Measurement Date	Depth to Water (ft)					Reviewed Field Logs	Catalog No.	Page No.
2786	7/21/92	5855.85	7/21/92	108.03	5963.88	0.00	NO	5855.85	GWSCL	137	57
2786	5/14/90	5837.38	5/14/90	71.58	5963.88	54.92	YES	5892.3	HWSD	127	45
2886	9/13/86	5953.71	ND	ND	ND[1]	ND	NO	ND	NA	NA	NA
2886	9/16/86	5953.60	ND	ND	ND[1]	ND	NO	ND	NA	NA	NA
2886	9/17/86	5953.58	ND	ND	ND[1]	ND	NO	ND	NA	NA	NA
2886	9/18/86	5953.75	ND	ND	ND[1]	ND	NO	ND	NA	NA	NA
2986	4/2/92	5953.25	4/2/92	7.43	5960.68	0.00	NO	5953.25	GWLM	183	79
2986	4/1/87	5951.83	ND	ND	ND	ND	NO	ND	NA	NA	NA
2986	5/1/88	5952.38	ND	ND	ND	ND	NO	ND	NA	NA	NA
2986	7/15/88	5950.48	ND	ND	ND[1]	ND	NO	ND	NA	NA	NA
2986	9/15/88	5950.48	ND	ND	ND[1]	ND	NO	ND	NA	NA	NA
2986	4/27/89	5950.48	ND	ND	ND[1]	ND	NO	ND	NA	NA	NA
2986	5/26/89	5950.58	ND	ND	ND[1]	ND	NO	ND	NA	NA	NA
2986	6/30/89	5950.68	ND	ND	ND[1]	ND	NO	ND	NA	NA	NA
3186	6/15/88	5950.15	ND	ND	ND	ND	NO	ND	NA	NA	NA
3186	5/26/89	5947.65	ND	ND	ND[1]	ND	NO	ND	NA	NA	NA
3286	7/10/90	5902.41	7/10/90	65.51	5967.92	0.00	NO	5902.41	GWLM	195	5
3286	11/6/86	5848.15	ND	ND	ND	ND	NO	ND	NA	NA	NA
3286	3/24/87	5857.92	ND	ND	ND	ND	NO	ND	NA	NA	NA
3286	7/8/87	5885.82	ND	ND	ND	ND	NO	ND	NA	NA	NA
3286	12/15/88	5893.42	ND	ND	ND	ND	NO	ND	NA	NA	NA
3386	6/11/91	5946.27	6/11,12,13/91	6.15	5952.42	0.00	NO	5946.27	GWSCL	68	139
3386	6/21/93	5947.07	6/21/93	5.35	5952.42	0.00	NO	5947.07	GWSCL	7247	203
3386	4/14/93	5846.84	4/14/93	5.58	5952.42	100.00	YES	5946.84	GWLM	7246	145
3386	7/15/88	5943.92	ND	ND	ND[1]	ND	NO	ND	NA	NA	NA
3586	4/11/90	5908.11	4/11/90	4.65	5912.76	0.00	NO	5908.11	WLDS	128	53
3586	9/3/93	5898.81	9/3/93	13.95	5912.76	0.00	NO	5898.81	GWLM	15291	142
3686	8/27/86	5875.94	ND	ND	ND[1]	ND	NO	ND	NA	NA	NA
3786	7/27/87	5788.00	ND	ND	ND	ND	NO	ND	NA	NA	NA
3786	2/24/88	5788.00	ND	ND	ND	ND	NO	ND	NA	NA	NA
3786	5/5/89	5796.16	ND	ND	ND	ND	NO	ND	NA	NA	NA
3886	10/13/86	5725.60	ND	ND	ND	ND	NO	ND	NA	NA	NA
3886	11/26/86	5725.60	ND	ND	ND	ND	NO	ND	NA	NA	NA
3986	1/1/87	5903.49	ND	ND	ND	ND	NO	ND	NA	NA	NA
4086	5/6/87	5859.26	ND	ND	5944.89	ND	NO	ND	NOT IN GWLM/GWSCL	ND	ND
4086	12/12/89	5857.72	ND	ND	5944.89	ND	NO	ND	NOT IN GWLM/GWSCL	ND	ND
4186	11/15/88	5921.56	ND	ND	5944.36	ND	NO	ND	NOT IN GWLM/GWSCL	ND	ND

105

Table C-1
Investigated Spurious Water Levels and Corrections

Well ID	SPURIOUS WATER LEVEL		RECORDED WATER LEVEL		Top of Casing Elevation (ft)	Difference Between Spurious and Recorded Water Levels (ft)	Water Level Corrected?	Corrected Water Level Elevation (ft)	EG&G RECORD		
	Measurement Date	Water Level Elevation (ft)	Measurement Date	Depth to Water (ft)					Reviewed Field Logs	Catalog No.	Page No.
4186	7/12/90	5897.90	ND	ND	5944.36	ND	NO	ND	NOT IN GWLM/GWSCL	ND	ND
4286	1/15/90	5949.38	ND	ND	5957.87	ND	NO	ND	NOT IN GWLM/GWSCL	ND	ND
4286	1/30/90	5936.09	1/30/90	8.49	5957.87	13.29	YES	5949.38	WLDS	128	60
4286	8/25/93	5924.30	ND	ND	5957.87	ND	NO	ND	NOT IN GWLM/GWSCL	ND	ND
4386	2/14/89	5956.06	ND	ND	ND[1]	ND	NO	ND	NA	NA	NA
4486	1/16/90	6008.99	ND	ND	6021.96	ND	NO	ND	NOT IN GWLM/GWSCL	ND	ND
4486	1/3/91	6007.53	1/3/91	14.43	6021.96	0.00	NO	6007.53	GWLM	97	23
4486	12/15/88	6007.46	12/15/88	8.21	6021.96	6.29	YES	6013.75	GWSCL	NC	NP
4586	9/28/87	6008.05	ND	ND	6051.55	ND	NO	ND	NOT IN GWLM/GWSCL	ND	ND
4586	2/4/92	6001.80	2/4/92	DRY	6051.55	-0.01	YES	6001.79	GWLM	107	50A
4686	6/19/90	5945.66	6/18/90	138.33	6083.99	0.00	NO	5945.66	HWSD/GWSCL	127/151	64/135
4686	10/19/92	5940.49	10/19/92	143.50	6083.99	0.00	NO	5940.49	GWSCL	165	98
4686	9/28/87	5925.49	ND	ND	ND	ND	NO	ND	NA	NA	NA
4686	5/12/88	5949.19	ND	ND	ND	ND	NO	ND	NA	NA	NA
4686	7/15/88	5941.29	ND	ND	ND	ND	NO	ND	NA	NA	NA
4686	8/18/88	6038.59	ND	ND	ND	ND	NO	ND	NA	NA	NA
4786	4/1/91	6002.99	4/1/91	80.68	6083.67	0.00	NO	6002.99	GWLM	70	38
4786	12/2/91	6019.90	12/2/91	63.77	6083.67	0.00	NO	6019.9	GWLM	76	148
4786	4/19/93	6019.35	4/19/93	64.32	6083.67	0.00	NO	6019.35	GWLM	7274	299
4786	12/1/93	5991.76	12/1/93	91.91	6083.67	0.00	NO	5991.76	GWLM	17550	747
4886	11/20/86	5944.43	ND	ND	6099.10	ND	NO	ND	NOT IN GWLM/GWSCL	ND	ND
4886	12/15/86	5965.06	ND	ND	6099.10	ND	NO	ND	NOT IN GWLM/GWSCL	ND	ND
4886	8/31/87	6001.30	ND	ND	6099.10	ND	NO	ND	NOT IN GWLM/GWSCL	ND	ND
4886	10/1/90	5891.67	10/1/90	207.43	6099.10	0.00	NO	5891.67	GWLM	87	29
4886	2/26/90	6007.92	ND	ND	6099.10	ND	NO	ND	NOT IN GWLM/GWSCL	ND	ND
4986	7/8/87	6057.49	ND	ND	6098.89	ND	NO	ND	NOT IN GWLM/GWSCL	ND	ND
4986	8/3/87	6044.89	ND	ND	6098.89	ND	NO	ND	NOT IN GWLM/GWSCL	ND	ND
5086	9/15/88	6056.24	ND	ND	6122.94	ND	NO	ND	NOT IN GWLM/GWSCL	ND	ND
5186	2/1/93	6056.70	2/1/93	87.55	6144.25	0.00	NO	6056.7	GWLM	3423	91
5186	3/7/94	6055.39	3/7/94	88.86	6144.25	0.00	NO	6055.39	GWLM	32111	212
5186	2/4/92	6063.30	2/4/92	DRY	6144.25	0.01	YES	6063.31	GWLM	107	49A
5286	6/15/88	6140.64	ND	ND	6144.44	ND	NO	ND	NOT IN GWLM/GWSCL	ND	ND
5386	4/2/92	6062.78	4/2/92	3.85	6066.63	0.00	NO	6062.78	GWLM	183	42
5386	5/8/87	6057.98	ND	ND	ND[1]	ND	NO	ND	NA	NA	NA
5386	7/15/88	6058.43	ND	ND	ND	ND	NO	ND	NA	NA	NA
5386	8/18/88	6063.13	ND	ND	ND	ND	NO	ND	NA	NA	NA
5386	11/15/88	6057.83	ND	ND	ND[1]	ND	NO	ND	NA	NA	NA

106

Table C-1
Investigated Spurious Water Levels and Corrections

Well ID	SPURIOUS WATER LEVEL		RECORDED WATER LEVEL		Top of Casing Elevation (ft)	Difference Between Spurious and Recorded Water Levels (ft)	Water Level Corrected?	Corrected Water Level Elevation (ft)	EG&G RECORD		
	Measurement Date	Water Level Elevation (ft)	Measurement Date	Depth to Water (ft)					Reviewed Field Logs	Catalog No.	Page No.
5386	12/15/88	6057.83	ND	ND	ND[1]	ND	NO	ND	NA	NA	NA
5386	1/15/89	6057.83	ND	ND	ND[1]	ND	NO	ND	NA	NA	NA
5386	3/24/89	6057.83	ND	ND	ND[1]	ND	NO	ND	NA	NA	NA
5486	9/4/91	6066.89	9/4/91	50.73	6117.62	0.00	NO	6066.89	GWLM	44	10
5486	6/2/92	6064.07	6/2/92	53.55	6117.62	0.00	NO	6064.07	GWLM	177	121
5486	12/6/90	6034.58	12/6/90	83.03	6117.62	0.01	YES	6034.59	GWLM	88	34
5486	7/15/88	6044.32	ND	ND	ND	ND	NO	ND	NA	NA	NA
5686	10/3/91	5979.15	10/3/91	9.78	5988.93	0.00	NO	5979.15	GWLM	74	40
5686	10/1/92	5978.72	10/1/92	10.22	5988.93	-0.01	YES	5978.71	GWLM	168	2
5686	10/1/92	5978.71	ND	ND	5988.93	ND	NO	ND	NOT IN GWLM/GWSCL	ND	ND
5686	7/15/88	5977.90	ND	ND	ND	ND	NO	ND	NA	NA	NA
5786	1/6/94	5952.43	1/6/94	0.45	5952.88	0.00	NO	5952.43	GWLM	32111	244
5786	10/6/87	5944.58	ND	ND	ND[1]	ND	NO	ND	NA	NA	NA
5786	11/9/87	5944.58	ND	ND	ND[1]	ND	NO	ND	NA	NA	NA
5786	10/22/88	5944.68	ND	ND	ND[1]	ND	NO	ND	NA	NA	NA
5886	2/24/88	5891.65	ND	ND	ND[1]	ND	NO	ND	NA	NA	NA
5886	5/2/88	5891.65	ND	ND	ND[1]	ND	NO	ND	NA	NA	NA
5986	1/9/88	5892.30	ND	ND	ND	ND	NO	ND	NA	NA	NA
6186	6/3/87	5987.20	ND	ND	ND	ND	NO	ND	NA	NA	NA
6386	4/16/90	5893.41	4/16/90	8.60	5902.01	0.00	NO	5893.41	WLDS	128	80
6386	6/13/90	5891.41	6/12/90	10.61	5902.01	-0.01	YES	5891.4	HWSD/GWSCL	127/151	80/175
6386	9/15/88	5885.21	ND	ND	ND[1]	ND	NO	ND	NA	NA	NA
6386	12/15/88	5885.21	ND	ND	ND[1]	ND	NO	ND	NA	NA	NA
6686	7/17/87	5686.10	ND	ND	ND	ND	NO	ND	NA	NA	NA
6686	1/8/88	5686.10	ND	ND	ND	ND	NO	ND	NA	NA	NA
6686	9/12/89	5685.34	ND	ND	ND[1]	ND	NO	ND	NA	NA	NA
6786	8/18/86	5788.66	ND	ND	ND	ND	NO	ND	NA	NA	NA
6886	10/1/92	5884.17	10/1/92	6.32	5890.49	0.00	NO	5884.17	GWLM	168	1
6886	7/8/93	5884.18	7/8/93	6.31	5890.49	0.00	NO	5884.18	GWLM	15291	288
6886	8/6/92	5884.50	8/6/92	DRY	5890.49	-0.03	YES	5884.47	GWSCL	137	142
6886	8/6/87	5884.50	ND	ND	ND	ND	NO	ND	NA	NA	NA
6886	1/9/88	5884.50	ND	ND	ND	ND	NO	ND	NA	NA	NA
6886	2/4/88	5884.50	ND	ND	ND	ND	NO	ND	NA	NA	NA
6886	2/24/88	5884.50	ND	ND	ND	ND	NO	ND	NA	NA	NA
6886	8/18/88	5884.50	ND	ND	ND	ND	NO	ND	NA	NA	NA
6886	1/15/89	5884.50	ND	ND	ND	ND	NO	ND	NA	NA	NA
6886	2/14/89	5884.50	ND	ND	ND	ND	NO	ND	NA	NA	NA

107

Table C-1
Investigated Spurious Water Levels and Corrections

Well ID	SPURIOUS WATER LEVEL		RECORDED WATER LEVEL		Top of Casing Elevation (ft)	Difference Between Spurious and Recorded Water Levels (ft)	Water Level Corrected?	Corrected Water Level Elevation (ft)	EG&G RECORD		
	Measurement Date	Water Level Elevation (ft)	Measurement Date	Depth to Water (ft)					Reviewed Field Logs	Catalog No.	Page No.
6886	7/28/89	5884.50	ND	ND	ND	ND	NO	ND	NA	NA	NA
6986	7/15/88	5908.52	ND	ND	ND	ND	NO	ND	NA	NA	NA
7086	7/7/87	5929.80	ND	ND	ND	ND	NO	ND	NA	NA	NA
7086	9/15/88	5926.09	ND	ND	ND[1]	ND	NO	ND	NA	NA	NA
0287	11/3/87	5931.83	ND	ND	ND	ND	NO	ND	NA	NA	NA
0287	12/16/87	5931.53	ND	ND	ND	ND	NO	ND	NA	NA	NA
0287	1/9/88	5931.03	ND	ND	ND	ND	NO	ND	NA	NA	NA
0287	2/24/88	5931.53	ND	ND	ND	ND	NO	ND	NA	NA	NA
0387	10/5/87	5842.24	ND	ND	ND	ND	NO	ND	NA	NA	NA
0387	2/24/88	5847.44	ND	ND	ND	ND	NO	ND	NA	NA	NA
0387	5/2/88	5860.64	ND	ND	ND	ND	NO	ND	NA	NA	NA
0387	8/25/89	5834.76	ND	ND	ND	ND	NO	ND	NA	NA	NA
0587	4/1/91	5913.49	4/1/91	16.50	5929.99	0.00	NO	5913.49	GWLM	70	13
0587	2/4/88	5898.83	ND	ND	ND	ND	NO	ND	NA	NA	NA
0887	4/1/91	5896.70	4/1/91	24.85	5921.55	0.00	NO	5896.7	GWLM	70	17
0887	10/2/91	5865.17	10/2/91	56.38	5921.55	0.00	NO	5865.17	GWLM	74	77
0887	2/5/92	5911.63	2/5/92	9.92	5921.55	0.00	NO	5911.63	GWLM	107	58A
0887	2/24/88	5849.65	ND	ND	ND	ND	NO	ND	NA	NA	NA
0887	5/2/88	5850.45	ND	ND	ND	ND	NO	ND	NA	NA	NA
0887	8/25/89	5831.00	ND	ND	ND	ND	NO	ND	NA	NA	NA
0987	4/7/92	5966.87	4/7/92	14.83	5981.70	0.00	NO	5966.87	GWLM	183	133
0987	4/13/90	5965.93	4/13/90	13.14	5981.70	2.63	YES	5968.56	WLDS	128	95
1087	6/11/91	5965.66	6/11/91	17.86	5983.52	0.00	NO	5965.66	GWLM	66	73
1087	6/17/93	5965.17	6/17/93	18.35	5983.52	0.00	NO	5965.17	GWLM	7246	47
1087	11/2/93	5974.46	11/2/93	9.06	5983.52	0.00	NO	5974.46	GWLM	17550	899
1087	8/4/92	5965.17	8/4/92	18.39	5983.52	-0.04	YES	5965.13	GWLM	141	37
1087	7/15/88	5969.92	ND	ND	ND[1]	ND	NO	ND	NA	NA	NA
1087	8/18/88	5969.92	ND	ND	ND[1]	ND	NO	ND	NA	NA	NA
1087	9/15/88	5969.92	ND	ND	ND[1]	ND	NO	ND	NA	NA	NA
1087	12/15/88	5969.92	ND	ND	ND[1]	ND	NO	ND	NA	NA	NA
1087	7/21/89	5969.97	ND	ND	ND[1]	ND	NO	ND	NA	NA	NA
1187	1/7/94	5893.70	1/7/94	21.42	5915.12	0.00	NO	5893.7	GWLM	32111	45
1287	4/16/90	5930.91	4/16/90	5.39	5936.30	0.00	NO	5930.91	WLDS	128	98
1287	4/3/92	5930.72	4/3/92	5.58	5936.30	0.00	NO	5930.72	GWLM	183	101
1487	1/10/94	5830.70	1/10/94	DRY	5856.56	0.23	YES	5830.93	GWLM	32111	54
1587	12/8/92	5943.49	12/8/92	29.30	5972.79	0.00	NO	5943.49	GWLM	169	129
1587	7/21/89	5964.49	ND	ND	ND	ND	NO	ND	NA	NA	NA

108

Table C-1
Investigated Spurious Water Levels and Corrections

Well ID	SPURIOUS WATER LEVEL Measurement Date	SPURIOUS WATER LEVEL Water Level Elevation (ft)	RECORDED WATER LEVEL Measurement Date	RECORDED WATER LEVEL Depth to Water (ft)	Top of Casing Elevation (ft)	Difference Between Spurious and Recorded Water Levels (ft)	Water Level Corrected?	Corrected Water Level Elevation (ft)	EG&G RECORD Reviewed Field Logs	EG&G RECORD Catalog No.	EG&G RECORD Page No.
1687	7/12/90	5869.45	7/12/90	101.34	5970.79	0.00	NO	5869.45	GWLM	195	25
1687	10/3/90	5868.65	10/2/90	102.14	5970.79	0.00	NO	5868.65	GWLM	87	56
1687	10/2/92	5880.26	10/2/92	90.53	5970.79	0.00	NO	5880.26	GWLM	168	120
1687	10/7/93	5880.35	10/7/93	90.44	5970.79	0.00	NO	5880.35	GWLM	17550	880
1887	4/2/91	5836.83	4/2/91	132.66	5969.49	0.00	NO	5836.83	GWLM	70	56
1887	3/4/93	5850.11	3/4/93	119.38	5969.49	0.00	NO	5850.11	GWSCL	3428	156
1887	9/16/93	5850.37	9/16/93	119.12	5969.49	0.00	NO	5850.37	GWSCL	15290	70
1887	3/18/91	5852.72	ND	ND	5969.49	ND	NO	ND	NOT IN GWLM/GWSCL	ND	ND
1887	12/1/87	5939.17	ND	ND	ND	ND	NO	ND	NA	NA	NA
1887	1/11/88	5929.69	ND	ND	ND	ND	NO	ND	NA	NA	NA
1887	2/29/88	5916.89	ND	ND	ND	ND	NO	ND	NA	NA	NA
1987	4/6/92	5962.97	4/6/92	6.94	5969.91	0.00	NO	5962.97	GWLM	183	122
1987	5/11/92	5959.53	5/11/91	10.38	5969.91	0.00	NO	5959.53	GWSCL	179	229
1987	11/9/87	5962.11	ND	ND	ND	ND	NO	ND	NA	NA	NA
1987	12/21/87	5962.41	ND	ND	ND	ND	NO	ND	NA	NA	NA
1987	11/15/88	5956.31	ND	ND	ND[1]	ND	NO	ND	NA	NA	NA
2187	12/1/87	5917.80	ND	ND	ND	ND	NO	ND	NA	NA	NA
2287	11/12/87	5882.10	ND	ND	ND	ND	NO	ND	NA	NA	NA
2287	12/1/87	5852.35	ND	ND	ND	ND	NO	ND	NA	NA	NA
2287	12/22/87	5882.30	ND	ND	ND	ND	NO	ND	NA	NA	NA
2287	1/27/88	5852.30	ND	ND	ND	ND	NO	ND	NA	NA	NA
2387	8/13/90	5940.81	8/13/90	33.68	5974.49	0.00	NO	5940.81	GWSCL	192	237
2487	4/3/92	5950.24	4/3/92	9.45	5959.69	0.00	NO	5950.24	GWLM	183	96
2487	11/9/87	5951.19	ND	ND	ND	ND	NO	ND	NA	NA	NA
2487	12/1/87	5944.70	ND	ND	ND	ND	NO	ND	NA	NA	NA
2487	12/8/87	5951.79	ND	ND	ND	ND	NO	ND	NA	NA	NA
2487	11/15/88	5944.19	ND	ND	ND[1]	ND	NO	ND	NA	NA	NA
2587	3/3/92	5934.06	3/3/92	26.92	5960.98	0.00	NO	5934.06	GWSCL	103	246
2587	4/3/92	5947.41	4/3/92	13.57	5960.98	0.00	NO	5947.41	GWLM	183	96
2887	10/2/92	5930.53	10/2/92	191.37	5949.90	-172.00	YES	5758.53	GWLM	168	111
2887	12/1/87	5909.85	ND	ND	ND	ND	NO	ND	NA	NA	NA
2887	12/14/87	5906.10	ND	ND	ND	ND	NO	ND	NA	NA	NA
2887	1/8/88	5886.50	ND	ND	ND	ND	NO	ND	NA	NA	NA
2887	2/5/88	5889.00	ND	ND	ND	ND	NO	ND	NA	NA	NA
2887	3/7/88	5870.10	ND	ND	ND	ND	NO	ND	NA	NA	NA
3087	7/1/92	5749.75	7/1/92	62.02	5811.77	0.00	NO	5749.75	GWLM	140	69
3187	1/8/88	5871.26	ND	ND	5947.46	ND	NO	ND	NOT IN GWLM/GWSCL	ND	ND

109

Table C-1
Investigated Spurious Water Levels and Corrections

Well ID	SPURIOUS WATER LEVEL		RECORDED WATER LEVEL		Top of Casing Elevation (ft)	Difference Between Spurious and Recorded Water Levels (ft)	Water Level Corrected?	Corrected Water Level Elevation (ft)	EG&G RECORD		
	Measurement Date	Water Level Elevation (ft)	Measurement Date	Depth to Water (ft)					Reviewed Field Logs	Catalog No.	Page No.
3187	8/9/90	5909.40	8/9/90	38.06	5947.46	0.00	NO	5909.4	GWLM	194	17
3187	12/2/93	5819.71	12/2/93	127.75	5947.46	0.00	NO	5819.71	GWLM	17550	819
3387	6/15/88	5928.82	ND	ND	5947.22	ND	NO	ND	NOT IN GWLM/GWSCL	ND	ND
3387	1/15/90	5929.92	1/15/90	17.30	5947.22	0.00	NO	5929.92	WLDS	128	118
3387	2/21/90	5925.50	2/21/90	DRY	5947.22	0.28	YES	5925.78	WLDS	128	118
3387	12/14/87	5925.12	ND	ND	ND[1]	ND	NO	ND	NA	NA	NA
3487	11/15/88	5848.52	ND	ND	5947.22	ND	NO	ND	NOT IN GWLM/GWSCL	ND	ND
3487	6/26/90	5851.93	6/25/90	95.29	5947.22	0.00	NO	5851.93	HWSD/GWSCL	127/151	119/295
3587	9/4/91	5917.27	9/4/91	34.12	5951.39	0.00	NO	5917.27	GWLM	44	8
3587	11/9/87	5944.29	ND	ND	ND	ND	NO	ND	NA	NA	NA
3587	12/1/87	5940.24	ND	ND	ND[1]	ND	NO	ND	NA	NA	NA
3587	12/14/87	5944.79	ND	ND	ND	ND	NO	ND	NA	NA	NA
3687	2/13/89	5924.21	ND	ND	ND	ND	NO	ND	NA	NA	NA
3687	9/4/91	5886.10	9/4/91	DRY	5951.11	0.22	YES	5886.32	GWLM	44	8
3687	12/3/91	5925.89	12/3/91	25.22	5951.11	0.00	NO	5925.89	GWLM	76	127
4187	7/10/90	5809.79	7/10/90	74.70	5884.49	0.00	NO	5809.79	GWLM	195	7
4187	4/2/91	5809.56	4/2/91	74.93	5884.49	0.00	NO	5809.56	GWLM	70	71
4187	3/22/93	5814.36	3/22/93	70.13	5884.49	0.00	NO	5814.36	GWLM	21395	14
4187	9/28/87	5797.89	ND	ND	ND	ND	NO	ND	NA	NA	NA
4187	2/4/88	5795.69	ND	ND	ND	ND	NO	ND	NA	NA	NA
4187	6/15/88	5798.39	ND	ND	ND	ND	NO	ND	NA	NA	NA
4387	9/12/90	5915.78	9/12/90	10.63	5926.41	0.00	NO	5915.78	GWLM	194	51
4387	8/6/93	5915.34	8/6/93	11.07	5926.41	0.00	NO	5915.34	GWLM	15291	186
4387	12/2/93	5915.09	12/2/93	11.32	5926.41	0.00	NO	5915.09	GWLM	17550	761
4487	7/2/92	5860.30	7/2/92	90.80	5951.10	0.00	NO	5860.3	GWLM	140	83
4487	2/4/88	5945.77	ND	ND	ND[1]	ND	NO	ND	NA	NA	NA
4487	12/15/88	5945.70	ND	ND	ND[1]	ND	NO	ND	NA	NA	NA
4587	7/2/92	5945.26	7/2/92	5.65	5950.91	0.00	NO	5945.26	GWLM	140	83
4887	2/13/89	5899.41	ND	ND	ND[1]	ND	NO	ND	NA	NA	NA
4987	4/12/90	5911.57	4/12/90	2.70	5914.27	0.00	NO	5911.57	WLDS	128	133
4987	5/3/90	5910.17	5/2/90	4.10	5914.27	0.00	NO	5910.17	GWSCL	151	327
4987	4/9/93	5910.15	4/9/93	4.12	5914.27	0.00	NO	5910.15	GWLM	7246	228
4987	5/3/90	5910.17	5/2/90	4.1	5914.27	0.00	NO	5910.17	GWLM	151	327
4987	5/3/90	5910.17	5/2/90	4.10	5914.27	0.00	NO	5910.17	GWSCL	151	327
5087	11/10/87	5923.28	ND	ND	ND	ND	NO	ND	NA	NA	NA
5087	12/16/87	5923.68	ND	ND	ND	ND	NO	ND	NA	NA	NA
5187	10/2/91	5951.73	10/2/91	13.49	5965.22	0.00	NO	5951.73	GWLM	74	73

110

Table C-1
Investigated Spurious Water Levels and Corrections

Well ID	SPURIOUS WATER LEVEL		RECORDED WATER LEVEL		Top of Casing Elevation (ft)	Difference Between Spurious and Recorded Water Levels (ft)	Water Level Corrected?	Corrected Water Level Elevation (ft)	EG&G RECORD		
	Measurement Date	Water Level Elevation (ft)	Measurement Date	Depth to Water (ft)					Reviewed Field Logs	Catalog No.	Page No.
5187	10/17/91	5952.86	10/17/91	12.36	5965.22	0.00	NO	5952.86	GWSCL	72	301
5187	2/4/88	5948.77	ND	ND	ND[1]	ND	NO	ND	NA	NA	NA
5187	8/25/89	5955.39	ND	ND	ND	ND	NO	ND	NA	NA	NA
5287	01/15/86[3]	5953.97	ND	ND	ND	ND	NO	ND	NA	NA	NA
5387	5/2/88	5956.41	ND	ND	ND	ND	NO	ND	NA	NA	NA
5387	4/12/90	5958.57	4/12/90	3.24	5961.81	0.00	NO	5958.57	GWLM	128	137
5587	1/15/89	5850.89	ND	ND	ND[1]	ND	NO	ND	NA	NA	NA
5587	2/14/89	5850.89	ND	ND	ND[1]	ND	NO	ND	NA	NA	NA
5587	4/27/89	5850.79	ND	ND	ND[1]	ND	NO	ND	NA	NA	NA
5587	6/1/89	5850.79	6/1/89	9.30	5860.45[2]	0.36	YES	5851.15	WLDS	NC	NP
5587	7/10/89	5850.74	7/10/89	9.35	5860.45[2]	0.36	YES	5851.10	WLDS	NC	NP
5887	4/2/91	5973.00	4/2/91	DRY	5996.77	0.20	YES	5973.2	GWSCL	70	75
6087	4/10/90	5980.11	4/10/90	5.85	5985.96	0.00	NO	5980.11	WLDS	128	142
6087	4/1/92	5981.10	4/1/92	4.86	5985.96	0.00	NO	5981.1	GWLM	183	7
6287	5/12/88	5984.37	ND	ND	ND	ND	NO	ND	NA	NA	NA
6387	1/26/93	5960.10	ND	ND	5987.01	ND	NO	ND	NOT IN GWLM/GWSCL	ND	ND
6387	2/26/93	5960.10	ND	ND	5987.01	ND	NO	ND	ABANDONED/DESTROYED	ND	ND
6387	3/22/93	5960.10	ND	ND	5987.01	ND	NO	ND	ABANDONED/DESTROYED	ND	ND
6387	1/6/88	5960.10	ND	ND	ND	ND	NO	ND	NA	NA	NA
6487	12/16/87	5978.34	ND	ND	ND	ND	NO	ND	NA	NA	NA
6487	1/9/88	5979.84	ND	ND	ND	ND	NO	ND	NA	NA	NA
6487	2/24/88	5980.44	ND	ND	ND	ND	NO	ND	NA	NA	NA
6487	3/7/88	5980.54	ND	ND	ND	ND	NO	ND	NA	NA	NA
6487	4/4/88	5980.64	ND	ND	ND	ND	NO	ND	NA	NA	NA
6487	5/2/88	5980.44	ND	ND	ND	ND	NO	ND	NA	NA	NA
6587	8/16/91	5978.14	ND	ND	5984.99	ND	NO	ND	NOT IN GWLM/GWSCL	ND	ND
6587	4/1/92	5977.77	4/1/92	7.22	5984.99	0.00	NO	5977.77	GWLM	183	3
6687	4/1/92	5978.23	4/1/92	5.44	5983.67	0.00	NO	5978.23	GWLM	183	5
6787	4/10/90	5964.50	4/10/90	7.26	5971.76	0.00	NO	5964.5	WLDS	128	149
6787	7/6/93	5953.20	ND	ND	5971.76	ND	NO	ND	NOT IN GWLM/GWSCL	ND	ND
6787	1/6/88	5967.46	ND	ND	ND	ND	NO	ND	NA	NA	NA
7087	1/6/88	5950.20	ND	ND	ND	ND	NO	ND	NA	NA	NA
7087	2/4/88	5950.20	ND	ND	ND	ND	NO	ND	NA	NA	NA
7087	3/21/88	5950.20	ND	ND	ND	ND	NO	ND	NA	NA	NA
7287	5/12/88	5914.25	ND	ND	ND[1]	ND	NO	ND	NA	NA	NA
B102289	11/1/92	5976.54	11/1/92	3.52	5980.06	0.00	NO	5976.54	GWLM	169	24
B106089	8/9/90	5969.29	8/9/90	26.06	5995.35	0.00	NO	5969.29	GWLM	194	18

Table C-1
Investigated Spurious Water Levels and Corrections

Well ID	SPURIOUS WATER LEVEL		RECORDED WATER LEVEL		Top of Casing Elevation (ft)	Difference Between Spurious and Recorded Water Levels (ft)	Water Level Corrected?	Corrected Water Level Elevation (ft)	EG&G RECORD		
	Measurement Date	Water Level Elevation (ft)	Measurement Date	Depth to Water (ft)					Reviewed Field Logs	Catalog No.	Page No.
B106089	5/2/91	5970.59	5/2/91	24.76	5995.35	0.00	NO	5970.59	GWLM	66	14
B106089	11/5/91	5971.09	11/5/91	24.26	5995.35	0.00	NO	5971.09	GWLM	76	83
B106089	2/1/93	5970.92	2/1/93	24.43	5995.35	0.00	NO	5970.92	GWLM	3423	230
B110889	11/12/91	6050.83	11/12/91	26.94	6077.77	0.00	NO	6050.83	GWLM	76	571
B110889	6/11/90	6034.47	6/11/90	46.67	6077.77	-3.37	YES	6031.1	GWSCL	151	649
B110989	8/15/90	6042.09	8/15/90	42.27	6084.36	0.00	NO	6042.09	GWLM	194	32
B110989	12/1/93	6015.40	12/1/93	DRY	6084.36	2.29	YES	6017.69	GWLM	17548	124
B111189	8/23/93	6057.50	8/23/93	50.02	6107.52	0.00	NO	6057.5	GWLM	15300	635
B200589	12/1/93	5935.10	12/1/93	DRY	5970.17	11.73	YES	5946.83	GWLM	17548	118
B200589	8/7/91	5935.10	8/7/91	DRY	5970.17	11.73	YES	5946.83	GWLM	44	35
B201089	6/6/91	5881.38	6/6/91	3.77	5885.15	0.00	NO	5881.38	GWLM	66	46
B201189	6/5/90	5790.05	6/5/90	18.36	5808.41	0.00	NO	5790.05	GWSCL	151	431
B201189	1/3/92	5792.45	1/3/92	15.96	5808.41	0.00	NO	5792.45	GWLM	106	31
B201189	4/4/91	5792.45	4/4-5/91	16.41	5808.41	-0.45	YES	5792	GWSCL	68	412
B201289	4/12/90	5823.44	4/12/90	4.36	5827.80	0.00	NO	5823.44	WLDS	128	164
B201289	6/15/90	5815.20	6/14/90	12.60	5827.80	0.00	NO	5815.2	HWSD/GWSCL	127/151	164/435
B201589	4/2/92	5842.35	4/2/92	5.33	5847.68	0.00	NO	5842.35	GWLM	183	48
B202489	9/14/90	5756.96	9/14/90	15.87	5772.83	0.00	NO	5756.96	GWLM	194	56
B202489	12/1/93	5756.20	12/1/93	DRY	5772.83	1.79	YES	5757.99	GWLM	17548	102
B202489	9/14/89	5756.58	9/14/89	16.25	5772.83	0.00	NO	5756.58	WLDS	NC	NP
B202489	10/12/89	5762.31	10/12/89	10.52	5772.83	0.00	NO	5762.31	WLDS	NC	NP
B203189	9/5/91	5956.25	9/5/91	13.87	5970.12	0.00	NO	5956.25	GWLM	44	16
B203189	7/1/91	5947.15	7/1/91	22.79	5970.12	0.18	YES	5947.33	GWLM	43	29
B203189	12/1/93	5921.50	12/1/93	DRY	5970.12	1.80	YES	5923.3	GWLM	17548	98
B203289	10/1/91	5920.53	10/1/91	41.06	5961.59	0.00	NO	5920.53	GWLM	74	34
B203289	4/1/93	5919.94	4/1/93	41.65	5961.59	0.00	NO	5919.94	GWLM	7243	677
B203289	4/4/94	5937.07	ND	ND	5961.59	ND	NO	ND	NOT IN GWLM/GWSCL	ND	ND
B203289	8/16/89	5913.70	8/16/89	43.15	5961.59	4.74	YES	5918.44	WLDS	NC	NP
B203489	4/5/94	5918.02	ND	ND	5947.71	ND	NO	ND	NOT IN GWLM/GWSCL	ND	ND
B203789	6/22/90	5816.13	6/21/90	132.15	5948.28	0.00	NO	5816.13	HWSD/GWSCL	127/151	184\481
B203789	10/2/91	5838.76	10/2/91	109.52	5948.28	0.00	NO	5838.76	GWLM	74	62
B203789	4/1/93	5822.47	4/1/93	125.81	5948.28	0.00	NO	5822.47	GWLM	7243	680
B203789	7/1/93	5810.66	7/1/93	137.62	5948.28	0.00	NO	5810.66	GWLM	15300	663
B203889	10/2/91	5830.65	10/2/91	107.04	5937.69	0.00	NO	5830.65	GWLM	74	65
B203889	1/3/94	5908.11	1/3/94	29.58	5937.69	0.00	NO	5908.11	GWLM	32111	716
B203889	12/1/93	5821.90	12/1/93	DRY	5937.69	2.47	YES	5824.37	GWLM	17548	91
B203989	6/18/90	5798.81	6/18/90	123.97	5922.78	0.00	NO	5798.81	HWSD/GWSCL	127/151	186/485

112

Table C-1
Investigated Spurious Water Levels and Corrections

Well ID	SPURIOUS WATER LEVEL		RECORDED WATER LEVEL		Top of Casing Elevation (ft)	Difference Between Spurious and Recorded Water Levels (ft)	Water Level Corrected?	Corrected Water Level Elevation (ft)	EG&G RECORD		
	Measurement Date	Water Level Elevation (ft)	Measurement Date	Depth to Water (ft)					Reviewed Field Logs	Catalog No.	Page No.
B203989	9/11/91	5837.72	9/11/91	85.06	5922.78	0.00	NO	5837.72	GWSCL	41	429
B204089	4/11/90	5868.61	4/11/90	10.68	5879.29	0.00	NO	5868.61	WLDS	128	187
B204189	10/1/93	5740.21	10/1/93	88.65	5828.86	0.00	NO	5740.21	GWLM	17548	88
B204189	1/20/94	5768.12	ND	ND	5828.86	ND	NO	ND	NOT IN GWLM/GWSCL	ND	ND
B204189	12/11/91	5718.93	12/11,12,13/91	69.93	5828.86	40.00	YES	5758.93	GWLM	76	434
B204189	6/27/89	5736.16	ND	ND	ND	ND	NO	ND	NA	NA	NA
B205589	10/3/91	5792.40	10/3/91	16.06	5808.46	0.00	NO	5792.4	GWLM	74	42
B205589	1/3/92	5800.62	1/3/92	7.84	5808.46	0.00	NO	5800.62	GWLM	106	31
B206189	4/10/90	5951.11	4/10/90	35.46	5986.57	0.00	NO	5951.11	WLDS	128	205
B206189	4/2/91	5953.93	4/2/91	32.64	5986.57	0.00	NO	5953.93	GWLM	70	76
B206289	4/10/90	5947.39	4/10/90	32.10	5979.49	0.00	NO	5947.39	WLDS	128	206
B206289	4/2/91	5944.92	4/2/91	34.57	5979.49	0.00	NO	5944.92	GWLM	70	76
B206289	2/26/93	5945.39	2/26/93	34.10	5979.49	0.00	NO	5945.39	GWLM	21394	5
B206289	1/3/91	5848.13	1/3/91	31.36	5979.49	100.00	YES	5948.13	GWLM	97	32
B206689	6/12/90	5949.55	6/12/90	11.65	5961.20	0.00	NO	5949.55	HWSD/GWSCL	127/151	210/535
B206689	1/3/91	5941.09	1/3/91	20.11	5961.20	0.00	NO	5941.09	GWLM	97	31
B206689	4/2/91	5949.00	4/2/91	12.20	5961.20	0.00	NO	5949	GWLM	70	69
B206789	10/1/90	5913.00	10/1/90	17.19	5930.19	0.00	NO	5913	GWLM	87	4
B206789	4/2/91	5912.95	4/2/91	17.24	5930.19	0.00	NO	5912.95	GWLM	70	59
B206789	2/26/93	5913.17	2/26/93	17.02	5930.19	0.00	NO	5913.17	GWLM	21394	6
B207089	4/29/91	5847.60	4/29/91	37.35	5884.95	0.00	NO	5847.6	NOT IN GWLM/GWSCL	ND	ND
B207089	9/11/89	5841.02	ND	ND	ND	ND	NO	ND	NA	NA	NA
B207189	7/10/90	5850.56	7/10/90	36.16	5886.72	0.00	NO	5850.56	GWLM	195	7
B207189	4/2/91	5849.02	4/2/91	37.70	5886.72	0.00	NO	5849.02	GWLM	70	71
B207189	9/15/89	5811.97	ND	ND	ND	ND	NO	ND	NA	NA	NA
B207289	2/4/92	5881.16	ND	ND	5950.49	ND	NO	ND	NOT IN GWLM/GWSCL	ND	ND
B208189	4/2/92	5933.44	4/2/92	4.02	5937.46	0.00	NO	5933.44	GWLM	183	55
B208189	4/9/92	5932.43	4/9/92	5.03	5937.46	0.00	NO	5932.43	GWSCL	179	560
B208189	9/12/89	5909.00	ND	ND	ND	ND	NO	ND	NA	NA	NA
B208389	6/23/93	5869.72	6/23/94	8.94	5878.66	0.00	NO	5869.72	GWSCL	7248	941
B208689	1/17/90	5859.60	1/17/90	10.00	5869.60	0.00	NO	5859.6	WLDS	128	241
B208689	3/15/90	5860.23	3/15/90	9.37	5869.60	0.00	NO	5860.23	WLDS	128	241
B208689	4/11/90	5848.63	4/11/90	20.97	5869.60	0.00	NO	5848.63	HWSD	127	230
B208689	2/20/92	5849.56	2/20/92	20.04	5869.60	0.00	NO	5849.56	GWSCL	103	549
B210389	9/13/89	5848.80	ND	ND	ND	ND	NO	ND	NA	NA	NA
B210489	10/8/92	5850.48	10/8/92	8.23	5858.71	0.00	NO	5850.48	GWSCL	165	520
B213789	4/2/92	5913.44	4/2/92	6.58	5920.01	-0.01	YES	5913.43	GWLM	183	38

113

Table C-1
Investigated Spurious Water Levels and Corrections

Well ID	SPURIOUS WATER LEVEL		RECORDED WATER LEVEL		Top of Casing Elevation (ft)	Difference Between Spurious and Recorded Water Levels (ft)	Water Level Corrected?	Corrected Water Level Elevation (ft)	EG&G RECORD		
	Measurement Date	Water Level Elevation (ft)	Measurement Date	Depth to Water (ft)					Reviewed Field Logs	Catalog No.	Page No.
B217289	10/5/90	5598.08	10/5/90	81.02	5679.10	0.00	NO	5598.08	GWLM	87	87
B217289	8/6/91	5589.85	8/6/91	89.25	5679.10	0.00	NO	5589.85	GWLM	44	61
B217289	6/1/92	5620.02	6/1/92	59.08	5679.10	0.00	NO	5620.02	GWLM	177	100
B217289	9/10/92	5541.20	ND	ND	5679.10	ND	NO	ND	NOT IN GWLM/GWSCL	ND	ND
B217489	10/22/92	5901.07	10/22/92	62.16	5963.23	0.00	NO	5901.07	GWLM	169	15
B217589	10/22/92	5915.83	10/22/92	39.06	5954.89	0.00	NO	5915.83	GWLM	169	15
B217589	12/15/92	5874.65	12/15/92	80.24	5954.89	0.00	NO	5874.65	GWSCL	165	429
B217689	6/22/93	5893.03	6/22/93	68.79	5961.82	0.00	NO	5893.03	GWSCL	7248	959
B218789	4/16/90	5951.19	4/16/90	13.33	5964.52	0.00	NO	5951.19	WLDS	128	202
B218789	4/3/92	5953.27	4/3/92	11.25	5964.52	0.00	NO	5953.27	GWLM	183	100
B302989	11/1/93	5676.50	11/1/93	DRY	5688.15	1.80	YES	5678.3	GWLM	17548	41
B303089	7/11/89	5592.30	7/11/89	10.63	5602.93	0.00	NO	5592.30	WLDS	NC	NP
B304289	6/20/90	5754.14	6/20/90	84.04	5838.18	0.00	NO	5754.14	GWSCL	151	491
B304289	6/20/90	5754.14	6/20/90	9.25	5838.18	74.79	YES	5828.93	HWSD	127	189
B304989	6/1/90	5658.35	6/1/90	73.50	5838.18	106.33	YES	5764.68	GWSCL	151	497
B304989	6/23/89	5690.59	ND	ND	ND	ND	NO	ND	NA	NA	NA
B305389	5/25/90	5820.72	ND	ND	5833.90	ND	NO	ND	NOT IN GWLM/GWSCL	ND	ND
B402689	7/14/89	6039.50	7/14/89	7.57	6047.07	0.00	NO	6039.50	WLDS	NC	NP
B402689	9/11/89	6040.00	9/11/89	7.57	6047.07	0.00	NO	6039.50	WLDS	NC	NP
B402689	10/19/89	6039.50	10/19/89	7.57	6047.07	0.00	NO	6039.50	WLDS	NC	NP
B405289	1/3/92	5923.47	1/3/92	43.84	5967.31	0.00	NO	5923.47	GWLM	106	27
B405289	4/3/92	5922.09	4/3/92	45.22	5967.31	0.00	NO	5922.09	GWLM	183	91
B405289	6/23/89	5917.70	ND	ND	ND	ND	NO	ND	NA	NA	NA
B405489	5/22/90	6080.54	5/22/90	37.13	6117.67	0.00	NO	6080.54	HWSD	127	196
B405489	5/22/90	6080.54	ND	ND	6117.67	ND	NO	ND	NOT IN GWLM/GWSCL	ND	ND
B405789	5/30/90	6065.69	5/30/90	10.35	6106.70	30.66	YES	6096.35	HWSD	127	199
B410689	3/7/94	6046.21	3/7/94	47.50	6093.71	0.00	NO	6046.21	GWLM	32111	799
B410789	12/1/93	6035.80	12/1/93	DRY	6083.66	1.27	YES	6037.07	GWLM	17548	5
P114389	12/2/91	5975.40	12/2/91	DRY	5993.17	1.30	YES	5976.7	GWLM	76	138
P114589	9/10/90	6009.92	9/19/90	15.98	6025.90	0.00	NO	6009.92	GWLM	194	38
P114589	12/1/93	5987.69	12/1/93	38.21	6025.90	0.00	NO	5987.69	GWLM	17548	264
P114589	3/1/94	5987.31	3/1/94	38.59	6025.90	0.00	NO	5987.31	GWLM	32111	815
P114589	4/26/94	6021.38	ND	ND	6025.90	ND	NO	ND	NOT IN GWLM/GWSCL	ND	ND
P114589	9/15/89	5987.60	9/15/89	38.30	6025.90	0.00	NO	5987.60	WLDS	NC	NP
P114689	4/25/90	5980.50	4/25/90	DRY	6005.76	1.26	YES	5981.76	WLDS	128	276
P114789	9/3/92	5995.22	9/3/92	17.18	6012.40	0.00	NO	5995.22	GWLM	141	69
P114889	11/21/93	6011.64	11/21/93	6.62	6018.26	0.00	NO	6011.64	GWSCL	16424	793

114

Table C-1
Investigated Spurious Water Levels and Corrections

Well ID	SPURIOUS WATER LEVEL		RECORDED WATER LEVEL		Top of Casing Elevation (ft)	Difference Between Spurious and Recorded Water Levels (ft)	Water Level Corrected?	Corrected Water Level Elevation (ft)	EG&G RECORD		
	Measurement Date	Water Level Elevation (ft)	Measurement Date	Depth to Water (ft)					Reviewed Field Logs	Catalog No.	Page No.
P114889	12/1/93	6002.26	12/1/93	16.00	6018.26	0.00	NO	6002.26	GWLM	17548	255
P114889	2/7/94	6004.50	ND	ND	6018.26	ND	NO	ND	NOT IN GWLM/GWSCL	ND	ND
P114989	12/1/93	6016.04	12/1/93	15.80	6031.84	0.00	NO	6016.04	GWLM	17548	252
P115089	11/21/93	6033.18	11/21/93	6.72	6040.10	0.20	YES	6033.38	GWSCL	16424	785
P115189[4]	7/24/89	~6029.90	ND	ND	ND[1]	ND	NO	ND	NA	NA	NA
P115489	12/2/92	6017.89	12/2/92	7.21	6025.10	0.00	NO	6017.89	GWLM	169	75
P119389	11/17/93	6005.60	11/17/93	7.58	6013.18	0.00	NO	6005.6	GWSCL	16424	793
P119389	12/3/93	5996.20	12/3/93	16.98	6013.18	0.00	NO	5996.2	GWLM	17548	237
P119389	2/7/94	6004.12	ND	ND	6013.18	ND	NO	ND	NOT IN GWLM/GWSCL	ND	ND
P207489	10/23/91	5973.91	10/23/91	8.73	5982.64	0.00	NO	5973.91	GWSCL	72	486
P208889	2/8/93	5870.00	2/8/93	79.25	5949.25	0.00	NO	5870	GWSCL	3428	448
P209489	6/9/92	5973.28	6/9/92	6.82	5980.10	0.00	NO	5973.28	GWLM	177	138
P210089	1/3/92	5894.48	1/3/92	5.92	5900.40	0.00	NO	5894.48	GWSCL	103	585
P210089	9/12/89	5876.61	ND	ND	ND	ND	NO	ND	NA	NA	NA
P210289	1/4/91	5946.83	1/4/91	22.36	5969.19	0.00	NO	5946.83	GWLM	97	1
P210289	12/11/90	5955.84	ND	ND	5969.19	ND	NO	ND	NOT IN GWLM/GWSCL	ND	ND
P218389	4/24/90	5948.95	4/24/90	9.50	5958.45	0.00	NO	5948.95	WLDS	128	270
P218389	4/2/92	5949.62	4/2/92	8.83	5958.45	0.00	NO	5949.62	GWLM	183	79
P313489	7/5/91	5989.30	7/5/91	DRY	6013.58	1.40	YES	5990.7	GWLM	43	95
P313589	5/11/93	5998.14	5/11/93	11.97	6010.11	0.00	NO	5998.14	GWLM	7243	858
P313589	7/5/91	5994.70	7/5/91	DRY	6010.11	1.30	YES	5996	GWLM	43	95
P414189	12/1/93	5996.79	12/1/93	15.39	6012.18	0.00	NO	5996.79	GWLM	17548	173
P414189	3/1/94	5998.14	3/1/94	14.04	6012.18	0.00	NO	5998.14	GWLM	32111	909
P415889	9/10/92	6005.90	9/10/92	DRY	6052.60	1.30	YES	6007.2	GWLM	141	102
P416489	5/2/91	6021.50	5/2/91	DRY	6050.15	1.30	YES	6022.8	GWLM	66	21
P416589	5/2/91	6009.10	5/2/91	DRY	6042.81	1.10	YES	6010.2	GWLM	66	21
P416589	9/3/91	6030.54	9/3/91	26.53	6042.81	-14.26	YES	6016.28	GWLM	44	28
P416689	5/5/92	6027.50	5/5/92	9.05	6036.55	0.00	NO	6027.5	GWLM	177	83
P416689	12/1/93	6004.56	12/1/93	31.99	6036.55	0.00	NO	6004.56	GWLM	17548	145
P416689	3/1/94	6003.17	3/1/94	33.38	6036.55	0.00	NO	6003.17	GWLM	32111	935
P416689	9/3/92	6010.16	9/3/92	29.31	6036.55	-2.92	YES	6007.24	GWLM	141	72
P416689	4/2/93	6009.11	4/2/93	16.24	6036.55	11.20	YES	6020.31	GWLM	7243	889
P416789	6/11/91	6005.92	6/11/91	23.35	6029.27	0.00	NO	6005.92	GWLM	66	70
P416789	4/1/92	6006.42	4/1/92	22.85	6029.27	0.00	NO	6006.42	GWLM	183	35
P416789	9/3/92	5999.96	9/3/92	26.39	6029.27	2.92	YES	6002.88	GWLM	141	72
P416889	6/7/91	6004.33	6/7/91	14.46	6018.79	0.00	NO	6004.33	GWLM	66	49
P416889	4/1/92	6004.76	4/1/92	14.03	6018.79	0.00	NO	6004.76	GWLM	183	35

115

Table C-1
Investigated Spurious Water Levels and Corrections

Well ID	SPURIOUS WATER LEVEL		RECORDED WATER LEVEL		Top of Casing Elevation (ft)	Difference Between Spurious and Recorded Water Levels (ft)	Water Level Corrected?	Corrected Water Level Elevation (ft)	EG&G RECORD		
	Measurement Date	Water Level Elevation (ft)	Measurement Date	Depth to Water (ft)					Reviewed Field Logs	Catalog No.	Page No.
02091	3/3/92	5944.39	3/3/92	22.26	5966.65	0.00	NO	5944.39	GWLM	107	39
02091	4/8/92	5958.44	4/8/92	8.21	5966.65	0.00	NO	5958.44	GWLM	183	146
02491	3/3/92	5928.75	3/3/92	17.46	5946.21	0.00	NO	5928.75	GWLM	107	39
02591	10/2/92	5879.12	10/2/92	46.22	5925.34	0.00	NO	5879.12	GWLM	168	127
03091	4/3/92	5925.96	4/3/92	28.27	5954.23	0.00	NO	5925.96	GWLM	183	95
03591	4/3/92	5927.48	4/3/92	23.32	5950.80	0.00	NO	5927.48	GWLM	183	95
03591	5/4/92	5927.94	5/4/92	22.86	5950.80	0.00	NO	5927.94	GWLM	177	25
03991	4/8/92	5905.86	4/8/92	31.01	5936.87	0.00	NO	5905.86	GWLM	183	134
03991	5/4/92	5895.40	5/4/92	41.47	5936.87	0.00	NO	5895.4	GWLM	177	22
04491	12/2/93	5937.91	12/2/93	31.24	5951.15	-18.00	YES	5919.91	GWSCL	16423	220
05091	11/10/93	5891.60	11/10/93	DRY	5939.24	2.03	YES	5893.63	GWSCL	16423	250
05391	4/3/92	5913.50	4/3/92	28.62	5941.67	-0.45	YES	5913.05	GWLM	183	95
05391	5/4/93	5907.44	5/4/93	34.26	5941.67	-0.03	YES	5907.41	GWSCL	7247	343
06391	10/5/93	5878.84	10/5/93	26.33	5905.17	0.00	NO	5878.84	GWLM	17550	677
06391	4/4/94	5864.99	ND	ND	5905.17	ND	NO	ND	NOT IN GWLM/GWSCL	ND	ND
06391	3/3/92	5879.00	3/3/92	DRY	5905.17	2.03	YES	5881.03	GWLM	107	56
06391	4/6/93	5878.80	4/6/93	26.35	5905.17	0.02	YES	5878.82	GWLM	7246	290
06991	4/6/92	5965.66	4/6/92	8.91	5974.57	0.00	NO	5965.66	GWLM	183	124
07191	4/6/92	5961.77	4/6/92	14.57	5976.34	0.00	NO	5961.77	GWLM	183	126
07891	4/13/92	5944.40	4/13/92	15.05	5959.45	0.00	NO	5944.4	GWLM	183	150
07991	4/2/92	5937.67	4/2/92	19.11	5956.78	0.00	NO	5937.67	GWLM	183	75
07991	5/4/92	5937.48	5/13/92	19.30	5956.78	0.00	NO	5937.48	GWLM	177	9
08091	5/4/92	5934.82	5/4/92	14.69	5949.51	0.00	NO	5934.82	GWLM	177	9
08091	5/18/92	5934.26	5/18/93	15.25	5949.51	0.00	NO	5934.26	GWSCL	179	753
11791	1/12/94	5907.60	1/12/94	DRY	5925.03	1.99	YES	5909.59	GWLM	32111	448
11891	4/3/92	5928.23	4/3/92	19.21	5947.44	0.00	NO	5928.23	GWLM	183	98
12091	4/8/92	5963.50	4/8/92	9.77	5973.27	0.00	NO	5963.5	GWLM	183	142
12091	2/26/92	5951.24	ND	ND	5973.27	ND	NO	ND	NOT IN GWLM/GWSCL	ND	ND
12191	4/3/92	5944.55	4/3/92	13.64	5958.19	0.00	NO	5944.55	GWLM	183	99
12991	4/2/92	5955.20	4/2/92	12.02	5967.22	0.00	NO	5955.2	GWLM	183	73
13291	4/6/92	5970.76	4/6/92	9.21	5979.97	0.00	NO	5970.76	GWLM	183	125
13491	5/4/92	5949.21	5/4/92	14.21	5963.42	0.00	NO	5949.21	GWLM	177	71
13491	5/4/93	5943.68	5/4/93	19.74	5963.42	0.00	NO	5943.68	GWSCL	7248	573
20791	10/7/93	5937.14	10/7/93	32.35	5969.49	0.00	NO	5937.14	GWLM	17549	481
31491	4/6/92	5888.98	4/6/92	16.05	5905.03	0.00	NO	5888.98	GWLM	183	131
36191	12/3/91	5945.90	ND	ND	5965.17	ND	NO	ND	NOT IN GWLM/GWSCL	ND	ND
36991	6/9/93	5958.90	6/9/93	10.35	5972.31	3.06	YES	5961.96	GWSCL	7248	625

116

Table C-1
Investigated Spurious Water Levels and Corrections

Well ID	SPURIOUS WATER LEVEL		RECORDED WATER LEVEL		Top of Casing Elevation (ft)	Difference Between Spurious and Recorded Water Levels (ft)	Water Level Corrected?	Corrected Water Level Elevation (ft)	EG&G RECORD		
	Measurement Date	Water Level Elevation (ft)	Measurement Date	Depth to Water (ft)					Reviewed Field Logs	Catalog No.	Page No.
38191	12/2/93	5907.50	12/2/93	DRY	5926.40	2.87	YES	5910.37	GWLM	17549	444
38291	12/2/93	5914.81	12/2/93	11.90	5926.71	0.00	NO	5914.81	GWLM	15549	441
38291	4/6/94	5915.19	ND	ND	5926.71	ND	NO	ND	NOT IN GWLM/GWSCL	ND	ND
38591	10/8/93	5855.56	10/8/93	11.06	5866.62	0.00	NO	5855.56	GWLM	168	62
39691	10/1/92	5995.49	10/1/92	12.88	6008.37	0.00	NO	5995.49	GWLM	168	62
39691	4/11/94	5995.30	ND	ND	6008.37	ND	NO	ND	NOT IN GWLM/GWSCL	ND	ND
39691	10/1/93	5995.30	10/1/93	DRY	6008.37	1.96	YES	5997.26	GWLM	17549	429
39691	1/12/94	5995.30	1/12/94	DRY	6008.37	1.96	YES	5997.26	GWLM	32111	516
39991	10/29/92	5909.19	10/29/92	23.17	5932.36	0.00	NO	5909.19	GWSCL	165	789
39991	11/19/92	5908.05	11/19/92	24.31	5932.36	0.00	NO	5908.05	GWLM	169	71
39991	12/16/92	5907.90	12/16/92	24.46	5932.36	0.00	NO	5907.9	GWSCL	165	140
39991	1/20/93	5909.19	1/20/93	23.17	5932.36	0.00	NO	5909.19	GWLM	3426	659
40991	4/8/92	5795.09	4/8/92	7.58	5802.67	0.00	NO	5795.09	GWLM	183	143
40991	7/2/92	5791.50	7/2/92	9.39	5802.67	1.78	YES	5793.28	GWLM	140	95
45391	10/29/92	5881.41	10/29/92	12.83	5894.24	0.00	NO	5881.41	GWLM	165	815
45391	12/4/92	5883.35	12/4/92	10.89	5894.24	0.00	NO	5883.35	GWSCL	169	107
45391	12/29/92	5883.33	12/29/92	10.91	5894.24	0.00	NO	5883.33	GWLM	168	161
45391	1/28/93	5883.49	1/28/93	10.75	5894.24	0.00	NO	5883.49	GWLM	3426	678
10692	10/26/92	5935.90	10/26/92	7.70	5943.60	0.00	NO	5935.9	GWLM	168	162
10692	12/29/92	5939.60	12/29/92	4.00	5943.60	0.00	NO	5939.6	GWLM	168	162
10692	3/12/93	5935.83	3/12/93	5.28	5943.60	2.49	YES	5938.32	GWSCL	3428	815
46292	7/19/93	6052.60	7/19/93	44.64	6097.24	0.00	NO	6052.6	GWSCL	15290	488
46492	9/17/92	6021.91	9/17/92	34.90	6056.81	0.00	NO	6021.91	GWSCL	137	800
46692	12/17/92	5877.42	12/17/92	80.83	5958.25	0.00	NO	5877.42	GWLM	168	881
46692	7/14/93	5926.34	7/14/93	31.91	5958.25	0.00	NO	5926.34	GWSCL	15290	488
46692	10/5/93	5909.36	10/5/93	48.89	5958.25	0.00	NO	5909.36	GWLM	17549	320
46692	3/2/94	5894.46	3/2/94	63.79	5958.25	0.00	NO	5894.46	GWLM	32111	626
46892	10/5/93	5820.24	10/5/93	138.32	5958.56	0.00	NO	5820.24	GWLM	17548	314
46892	3/2/94	5801.32	3/2/94	157.24	5958.56	0.00	NO	5801.32	GWLM	32111	632
49192	5/20/93	5525.46	5/20/93	20.66	5546.12	0.00	NO	5525.46	GWSCL	7248	713
50092	12/7/92	5809.20	12/7/92	DRY	5824.30	2.80	YES	5812	GWLM	169	122
75092	6/7/93	5709.09	6/7/93	16.31	5725.40	0.00	NO	5709.09	GWSCL	7248	857
75292	9/21/93	5745.30	9/21/93	11.68	5756.90	-0.08	YES	5745.22	GWSCL	15290	578
75292	10/5/93	5745.46	10/5/93	11.44	5756.90	0.00	NO	5745.46	GWLM	17548	282
75992	4/1/93	5892.81	4/1/93	6.29	5899.10	0.00	NO	5892.81	GWLM	7243	634
76292	4/28/94	5945.42	ND	ND	5959.30	ND	NO	ND	NOT IN GWLM/GWSCL	ND	ND
22593	11/8/93	5890.02	11/8/93	60.18	5950.20	0.00	NO	5890.02	GWSCL	16424	531

117

Table C-1
Investigated Spurious Water Levels and Corrections

Well ID	SPURIOUS WATER LEVEL		RECORDED WATER LEVEL		Top of Casing Elevation (ft)	Difference Between Spurious and Recorded Water Levels (ft)	Water Level Corrected?	Corrected Water Level Elevation (ft)	EG&G RECORD		
	Measurement Date	Water Level Elevation (ft)	Measurement Date	Depth to Water (ft)					Reviewed Field Logs	Catalog No.	Page No.
22593	3/16/94	5905.93	ND	ND	5959.20	ND	NO	ND	NOT IN GWLM/GWSCL	ND	ND
22093	7/8/93	5892.75	7/8/93	54.68	5947.43	0.00	NO	5892.75	GWLM	15291	481
22393	6/9/93	5848.46	6/9/93	123.68	5972.14	0.00	NO	5848.46	GWSCL	7248	589
22393	10/1/93	5873.02	10/1/93	99.12	5972.14	0.00	NO	5873.02	GWLM	17549	473
22393	3/21/94	5873.77	ND	ND	5972.14	ND	NO	ND	NOT IN GWLM/GWSCL	ND	ND
22393	4/6/94	5854.94	ND	ND	5972.14	ND	NO	ND	NOT IN GWLM/GWSCL	ND	ND
23193	7/14/93	5926.12	7/14/93	24.34	5950.46	0.00	NO	5926.12	GWLM	15291	485
23293	6/9/93	5863.42	6/9/93	94.60	5958.02	0.00	NO	5863.42	GWSCL	7248	595
23293	10/5/93	5880.91	10/5/93	77.11	5958.02	0.00	NO	5880.91	GWLM	17549	470
40193	12/1/93	5859.79	12/1/93	44.86	5904.65	0.00	NO	5859.79	GWLM	17549	426
43893	2/1/94	5961.50	2/1/94	DRY	5980.09	2.00	YES	5963.5	GWLM	32111	557
45293	2/2/94	5916.89	2/4/94	10.09	5926.98	0.00	NO	5916.89	GWLM	32111	572
45993	2/1/94	5943.20	2/1/94	DRY	5952.81	2.00	YES	5945.2	GWLM	32111	603
61293	4/4/94	5985.28	ND	ND	5988.70	ND	NO	ND	NOT IN GWLM/GWSCL	ND	ND
70293	3/22/93	5944.10	3/22/93	51.00	5995.10	0.00	NO	5944.1	GWLM	21395	16
70293	4/2/93	5953.70	4/2/93	41.40	5995.10	0.00	NO	5953.7	GWLM	7243	618
70393	4/22/93	5992.62	4/22/93	7.48	6000.10	0.00	NO	5992.62	GWLM	7248	773
70493	3/22/93	5965.68	3/22/93	34.32	6000.00	0.00	NO	5965.68	GWLM	21395	17
70593	3/22/93	5897.04	3/22/93	102.96	6000.00	0.00	NO	5897.04	GWLM	21395	17
70593	4/7/93	5872.03	4/7/93	127.97	6000.00	0.00	NO	5872.03	GWLM	7243	621
72293	2/26/93	5939.10	2/26/93	ND	5976.10	ND	NO	ND	STILL BEING DEVELOPED	21394	13

[1] Reported water level elevation is below bottom of casing. Several factors may be responsible for such a measurement:

- Measurement is erroneous
- PVC stickup has been shortened, as documented in several cases
- Transcription or other errors have occurred and have been incorporated in database

[2] This elevation reflects length of stickup reported in referenced log, which is often different from length of stickup reported in current (as of 12/94) well data tables.

[3] Field logbooks document borehole sampling at this location in 9/87 and installation of this well thereafter. Groundwater sampling date of 1/86 must be erroneous, and this data point was removed from the hydrograph.

[4] Because top of casing at this well has not been surveyed, water level elevation is approximate. Depth to water = 6.10', ground surface elevation = 6034.0'.

Key

ND = No data found for the indicated date.

NA = Not applicable: no data were located that would confirm or contradict reported data.

NC = Not cataloged. Pre-1990 data are sparse, incomplete, and not organized into catalogs.

NP = Not paginated. Pre-1990 data are sparse, incomplete, and not paginated.

Field Logs

GWLM = Groundwater Level Measurement Log

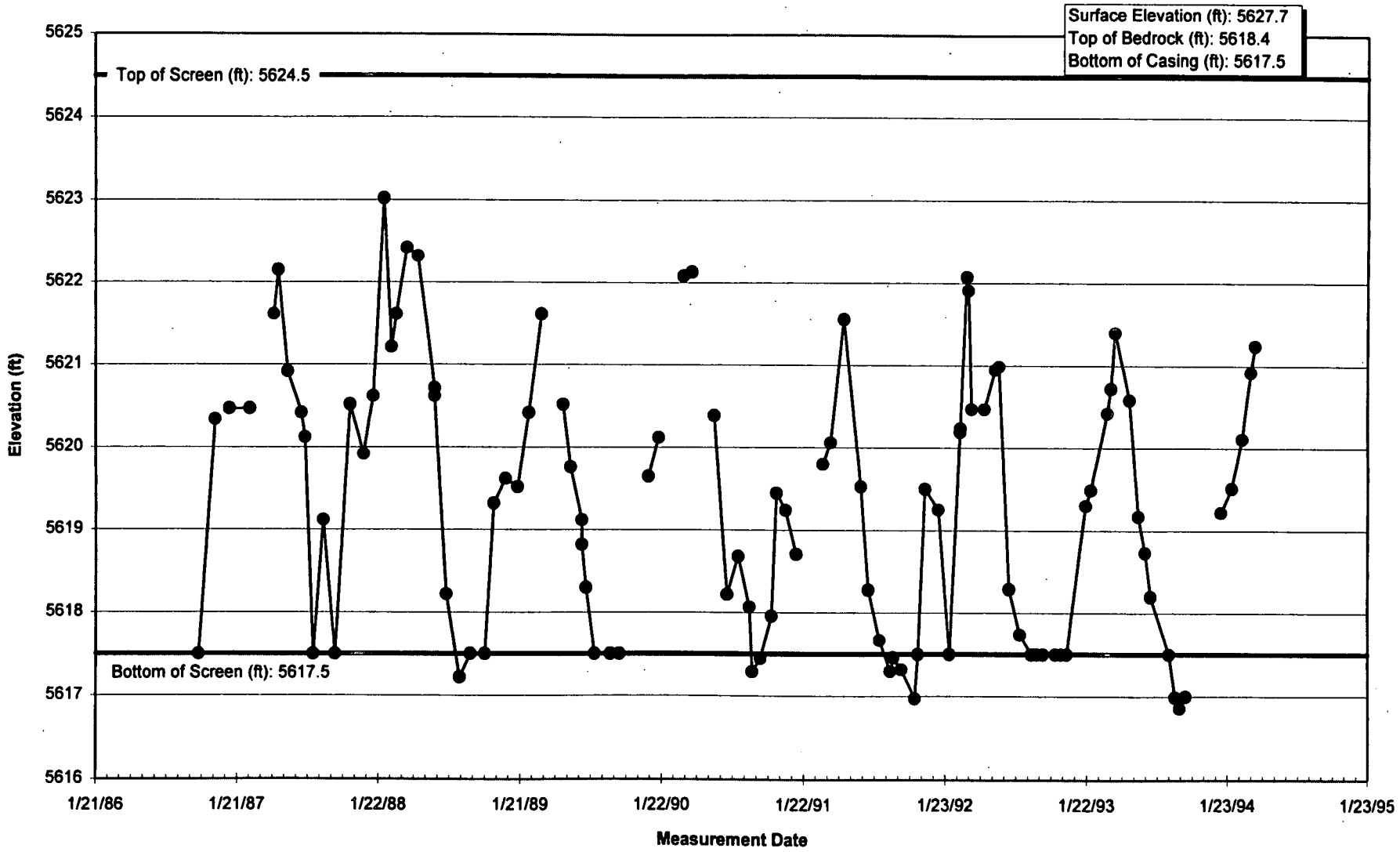
GWSCL = Groundwater Sampling Collection Log

WLDS = Water Level Data Sheet

HWSD = Historical Well Status Document

118

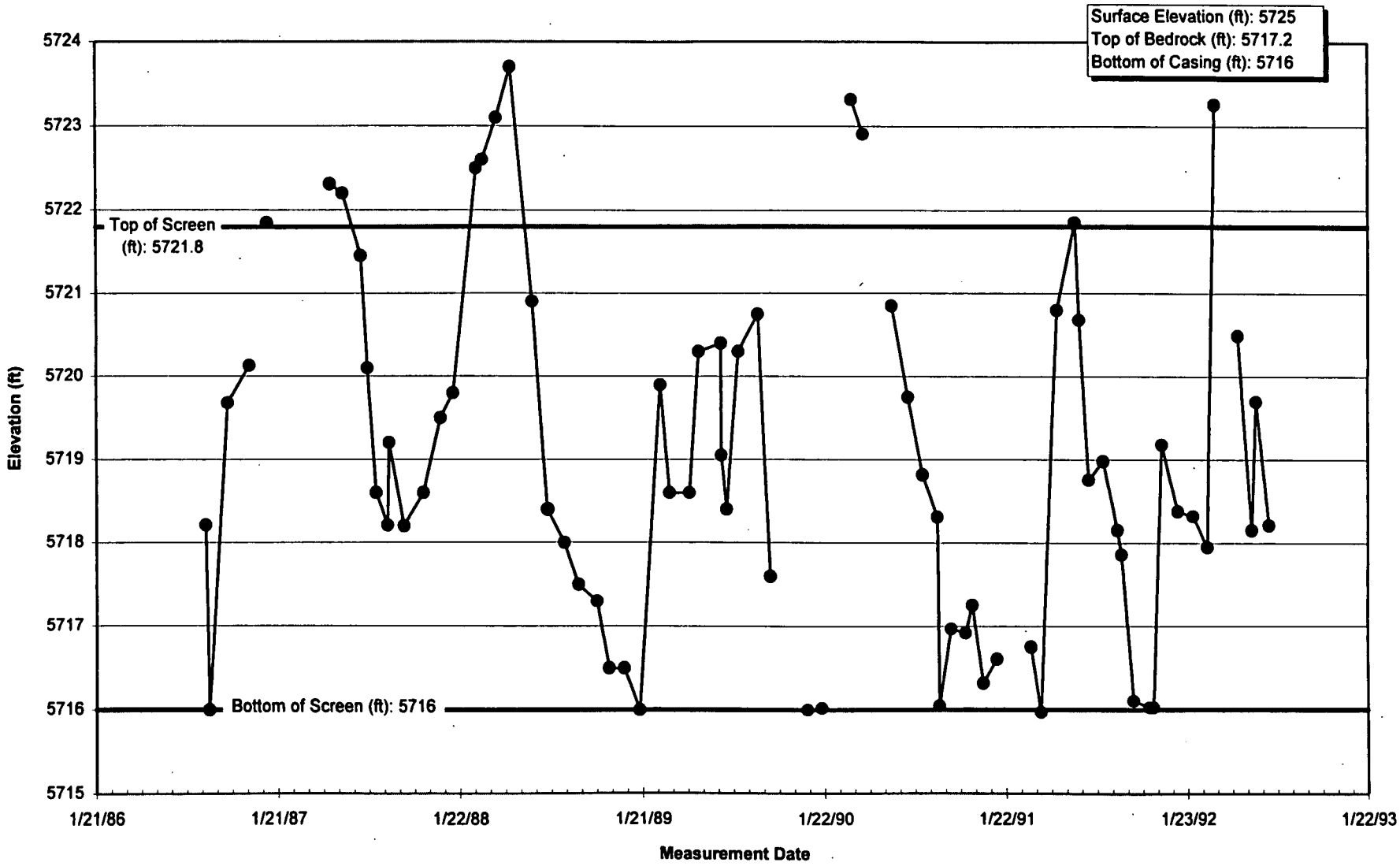
Hydrograph 0186



119

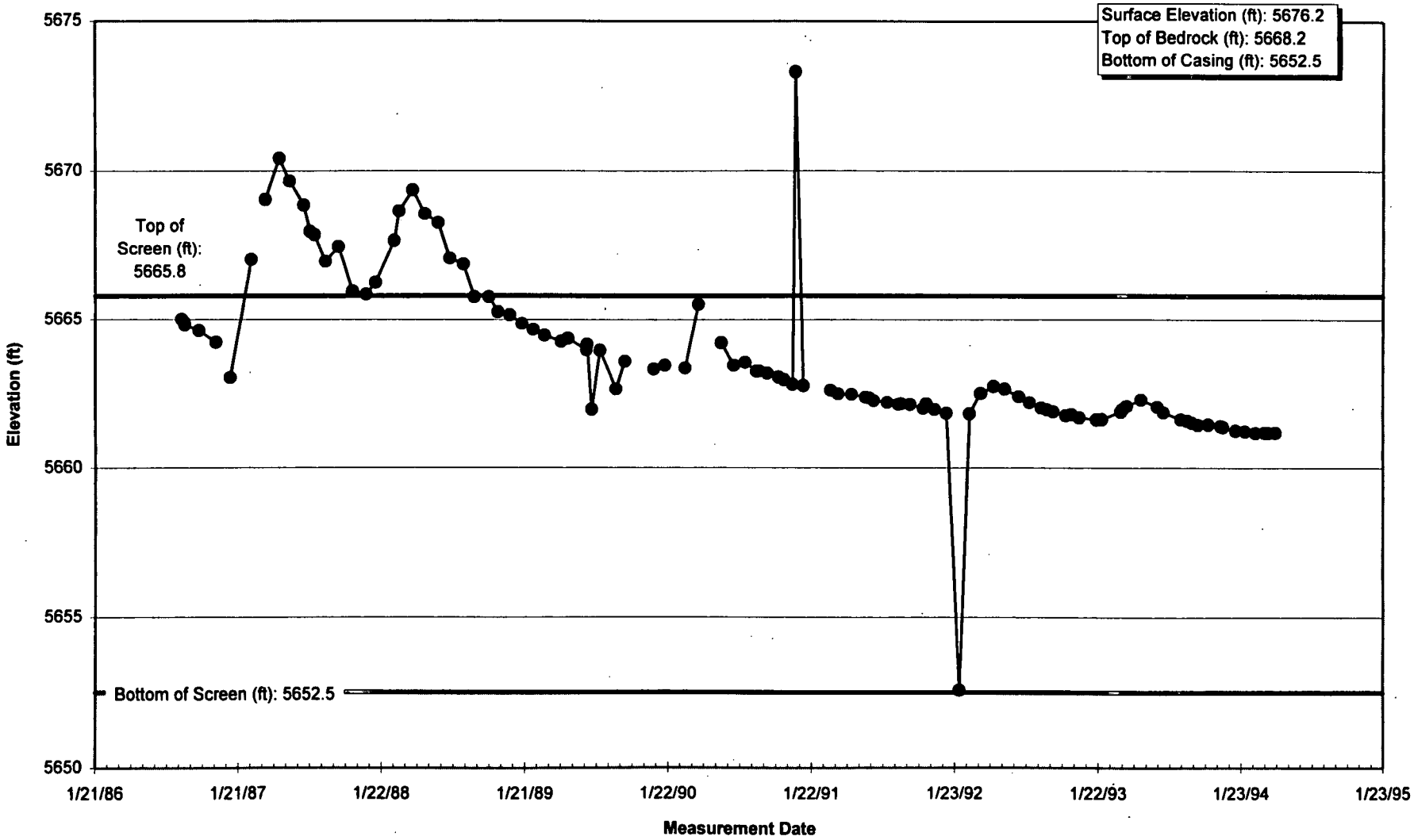
S1.XLS 0186 3/31/95

Hydrograph 0286



120

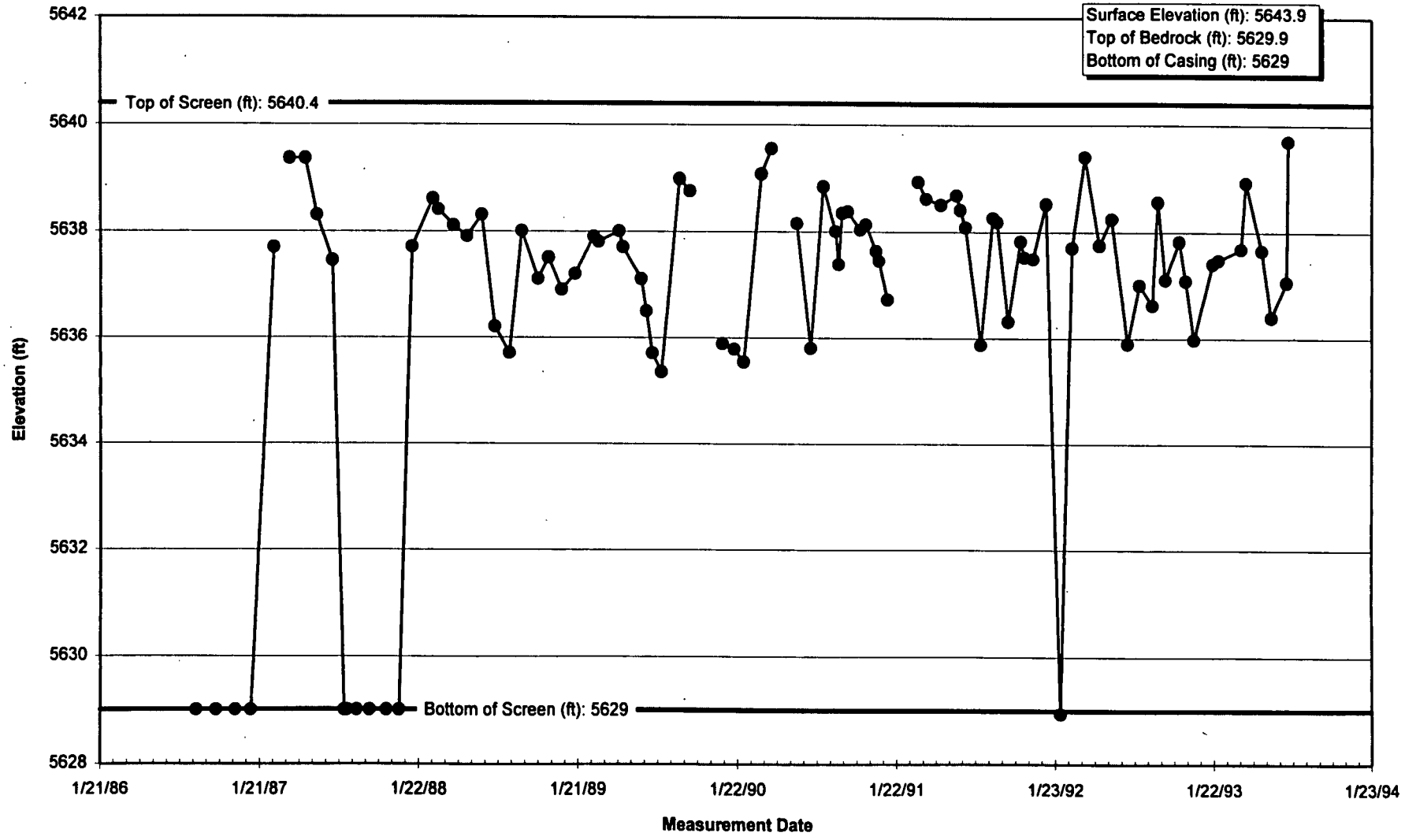
Hydrograph 0386



121

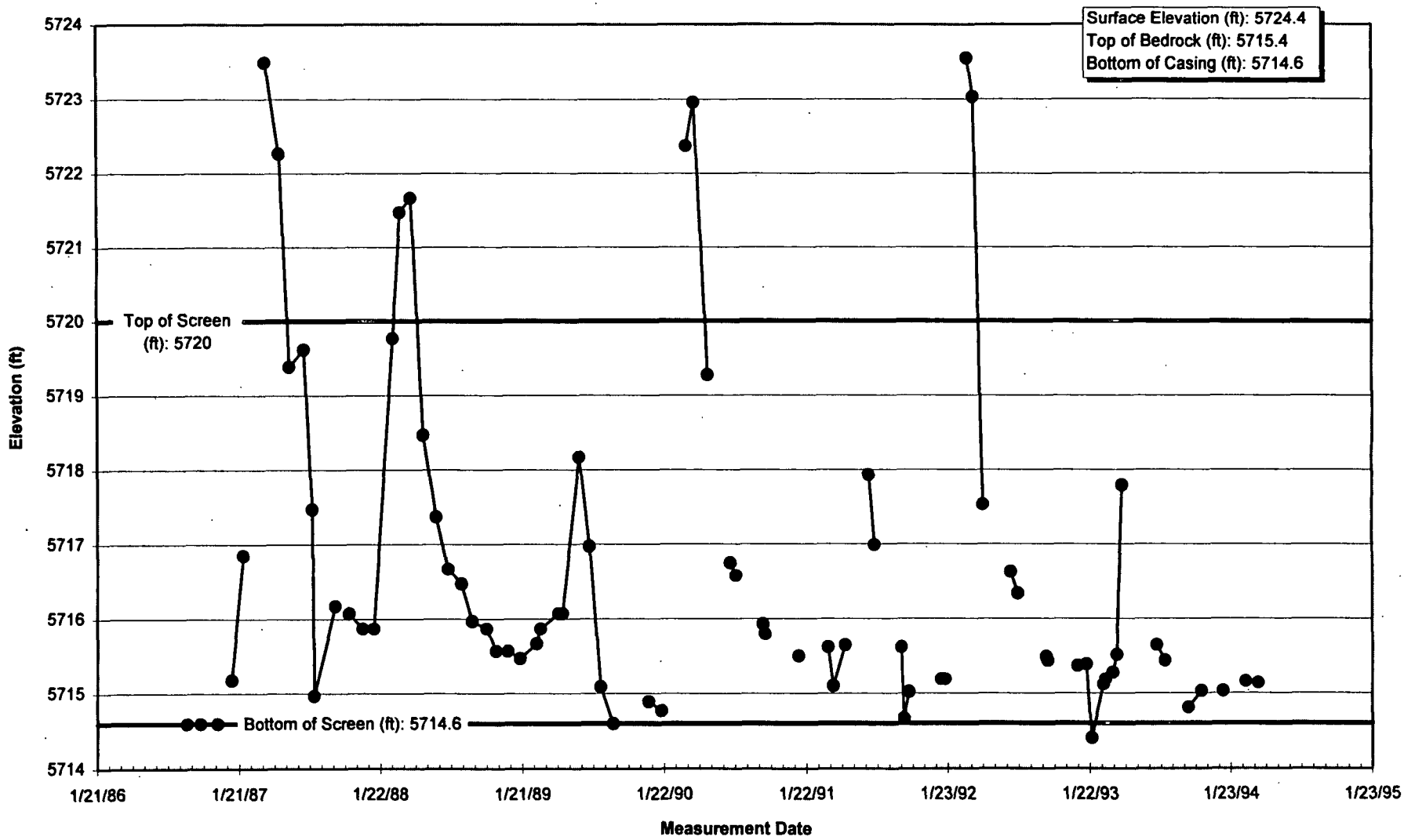
S2.XLS 0386 3/31/95

Hydrograph 0486



122 S3.XLS 0486 3/31/95

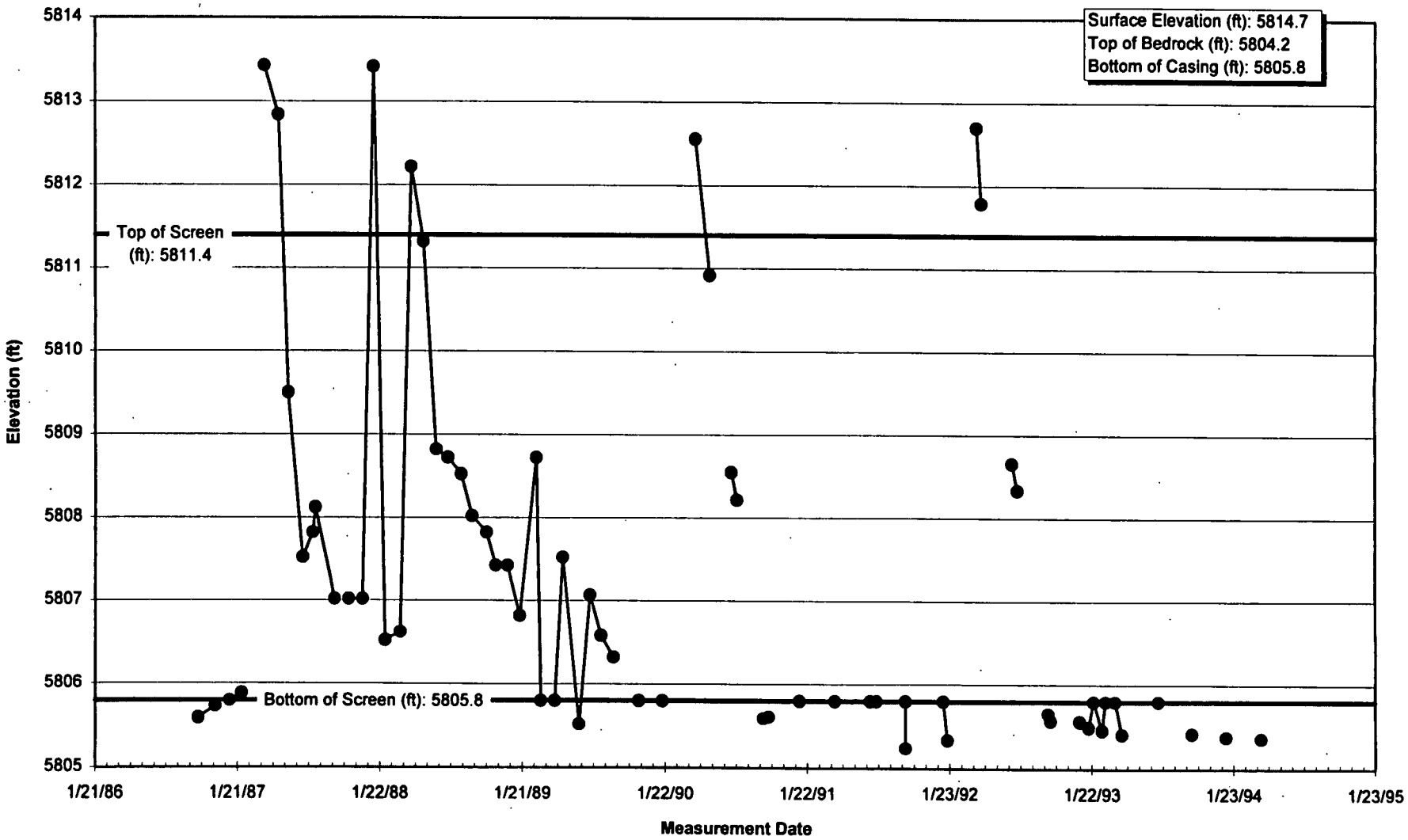
Hydrograph 0586



S3.XLS 0586 3/31/95

123

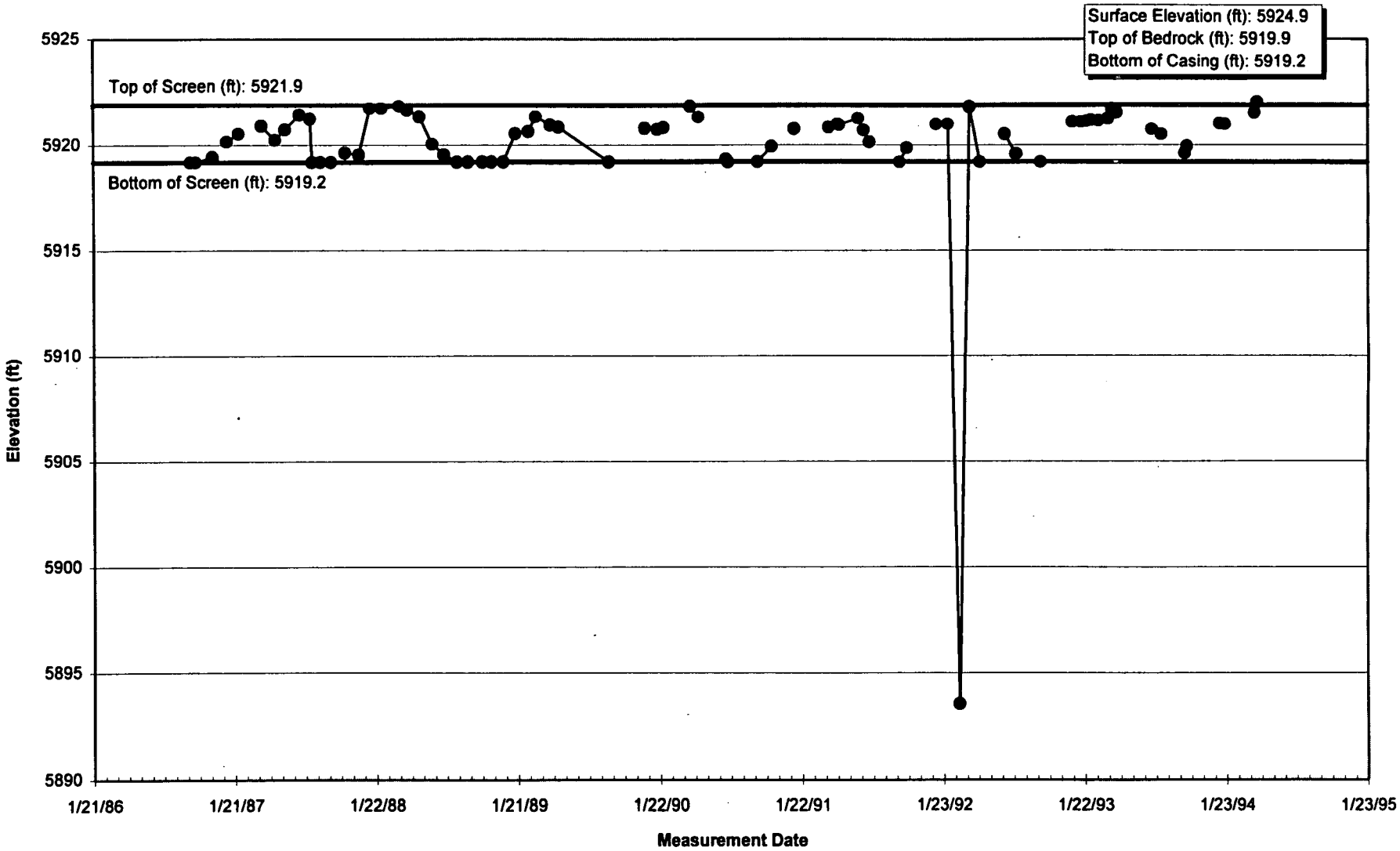
Hydrograph 0686



124

S4.XLS 0686 3/31/95

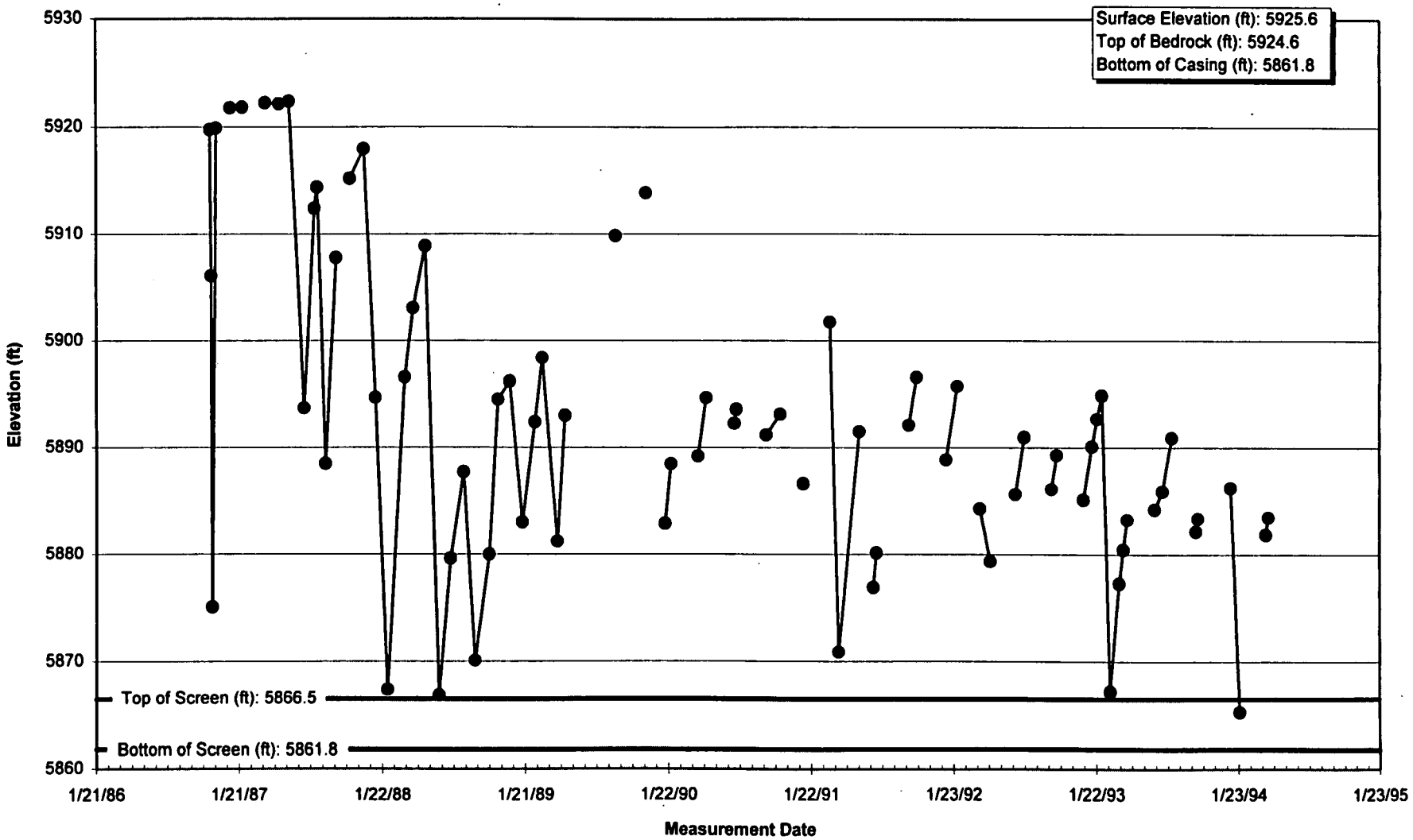
Hydrograph 0786



125

S4.XLS 0786 3/31/95

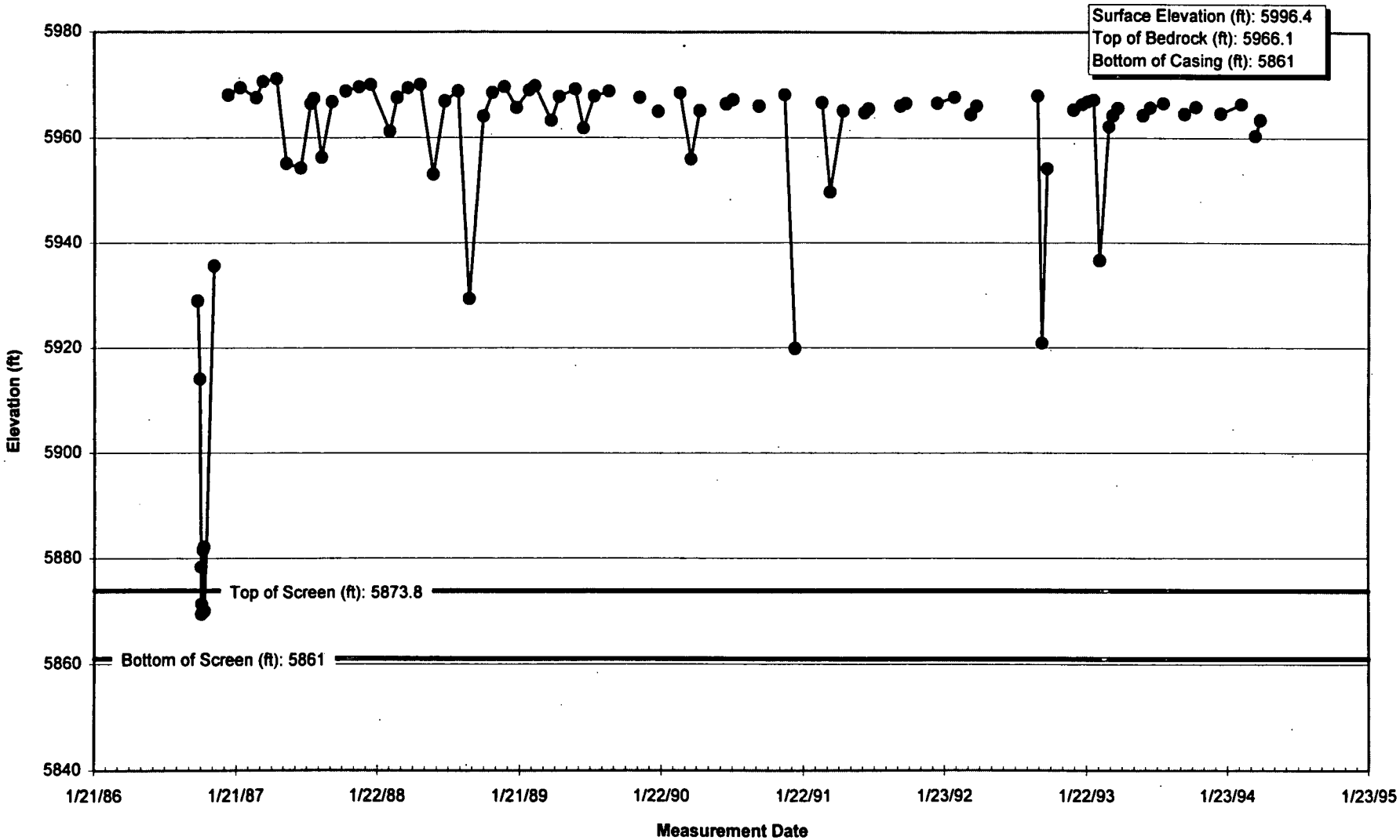
Hydrograph 0886



126

S4.XLS 0886 4/3/95

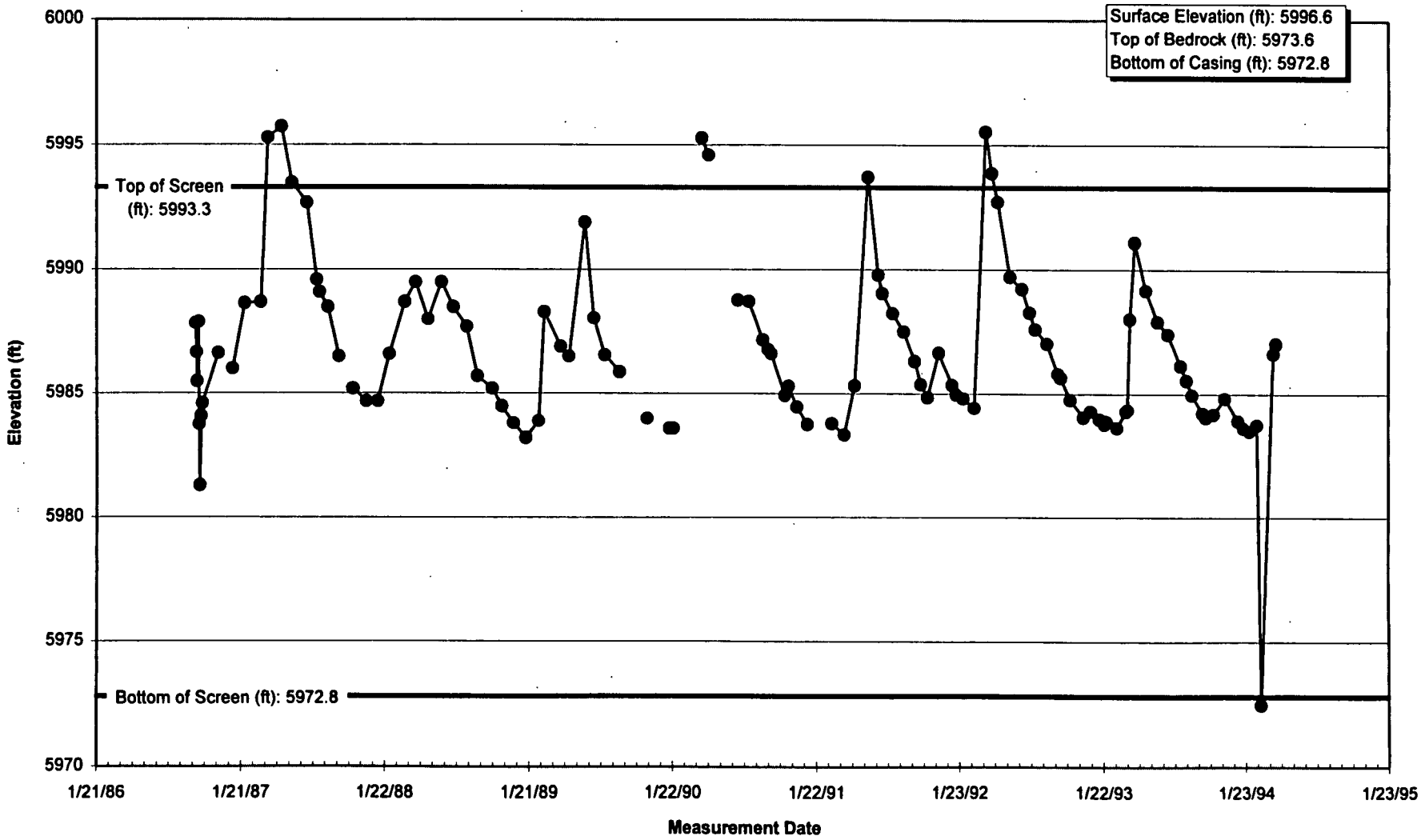
Hydrograph 0986



127

S5.XLS 0986 4/3/95

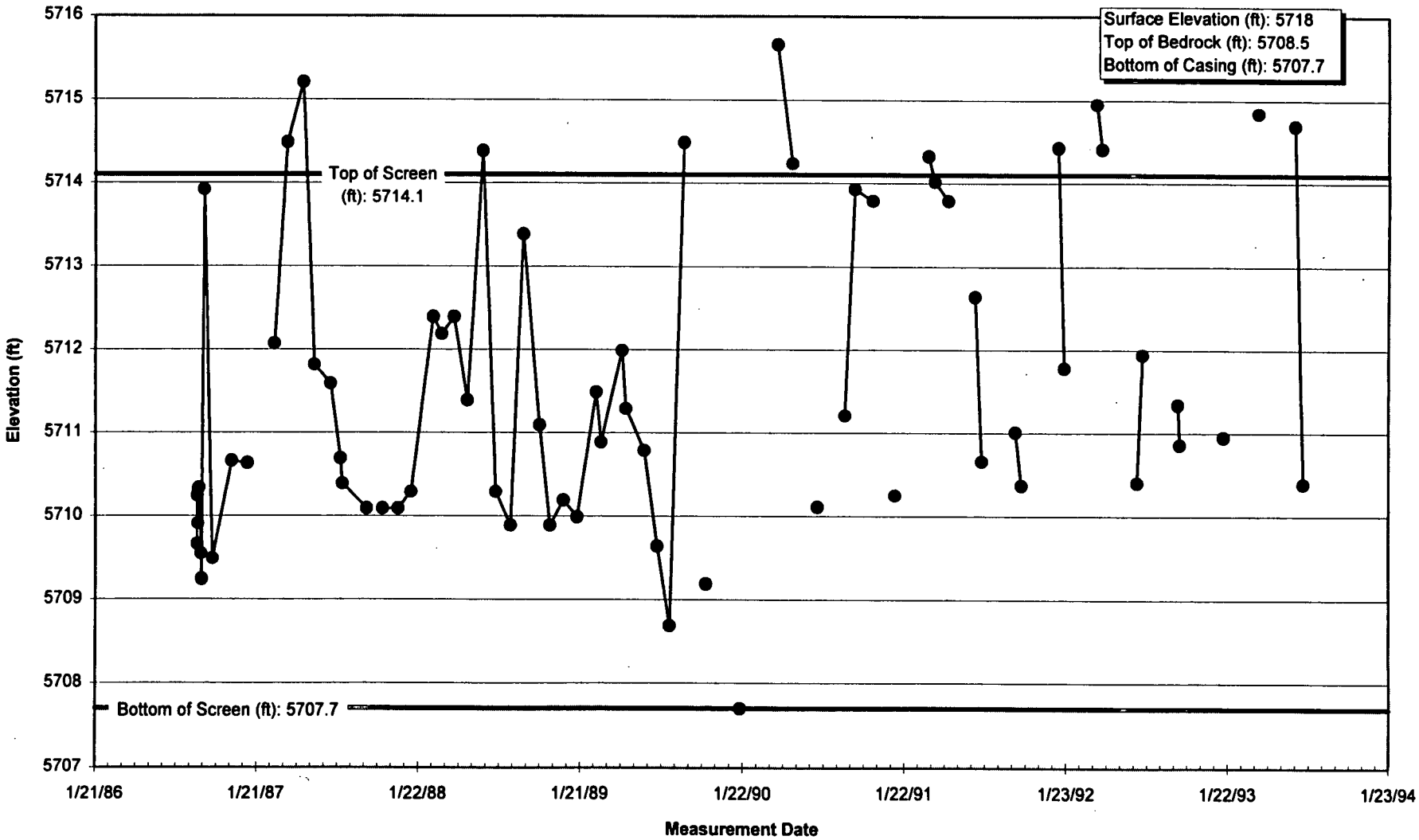
Hydrograph 1086



128

S5.XLS 1086 4/3/95

Hydrograph 1186



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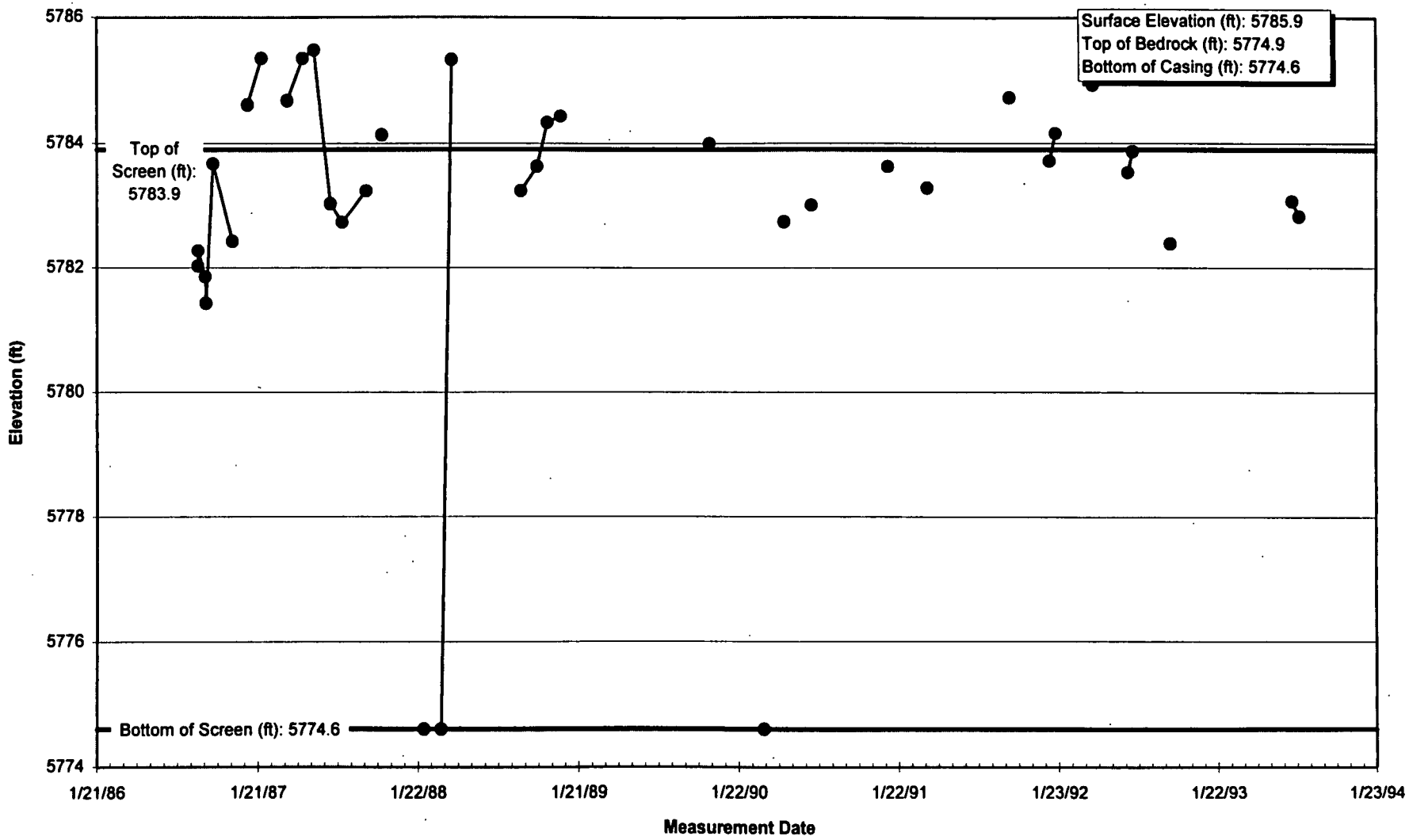
S5.XLS 1186 4/3/95

Hydrograph 1286



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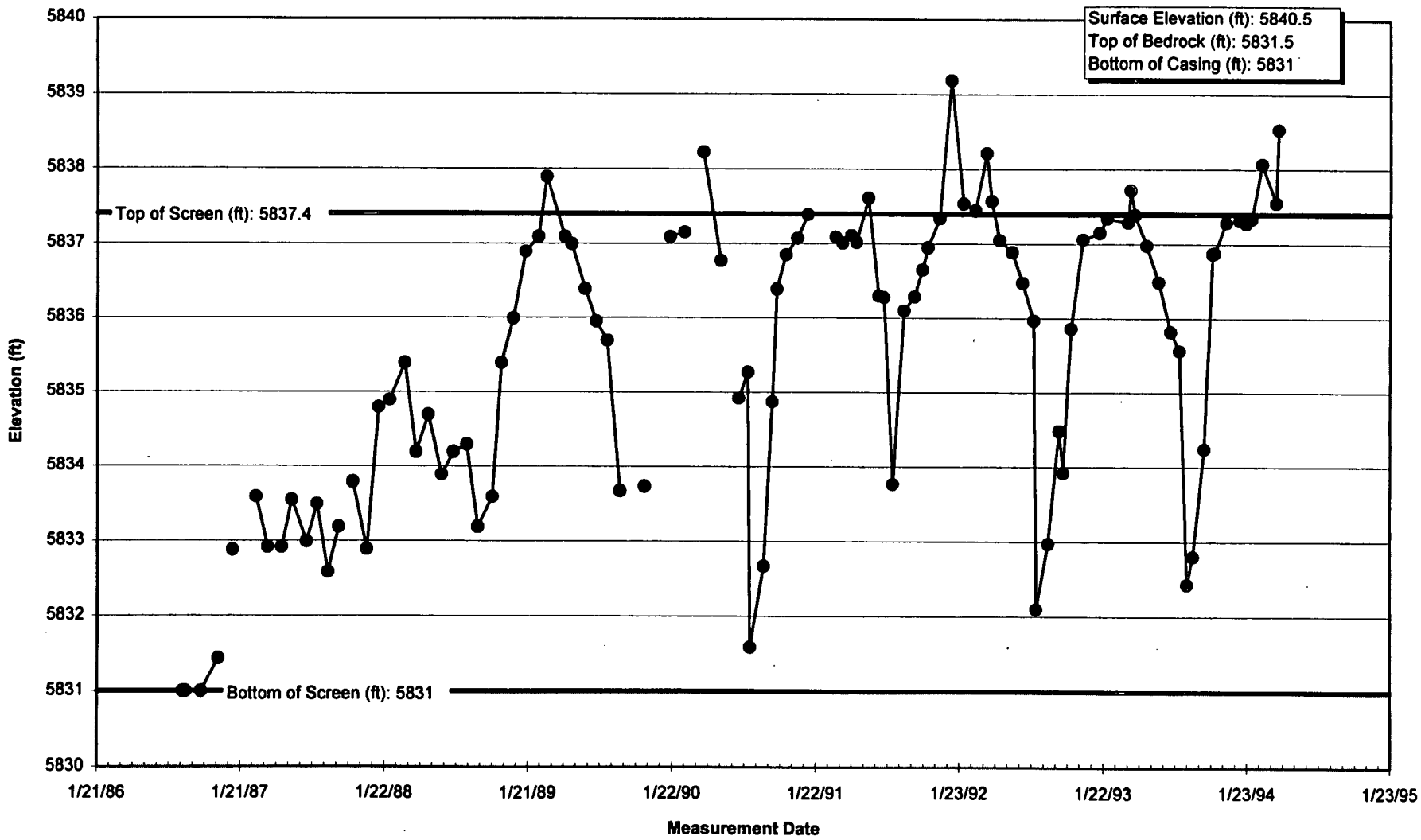
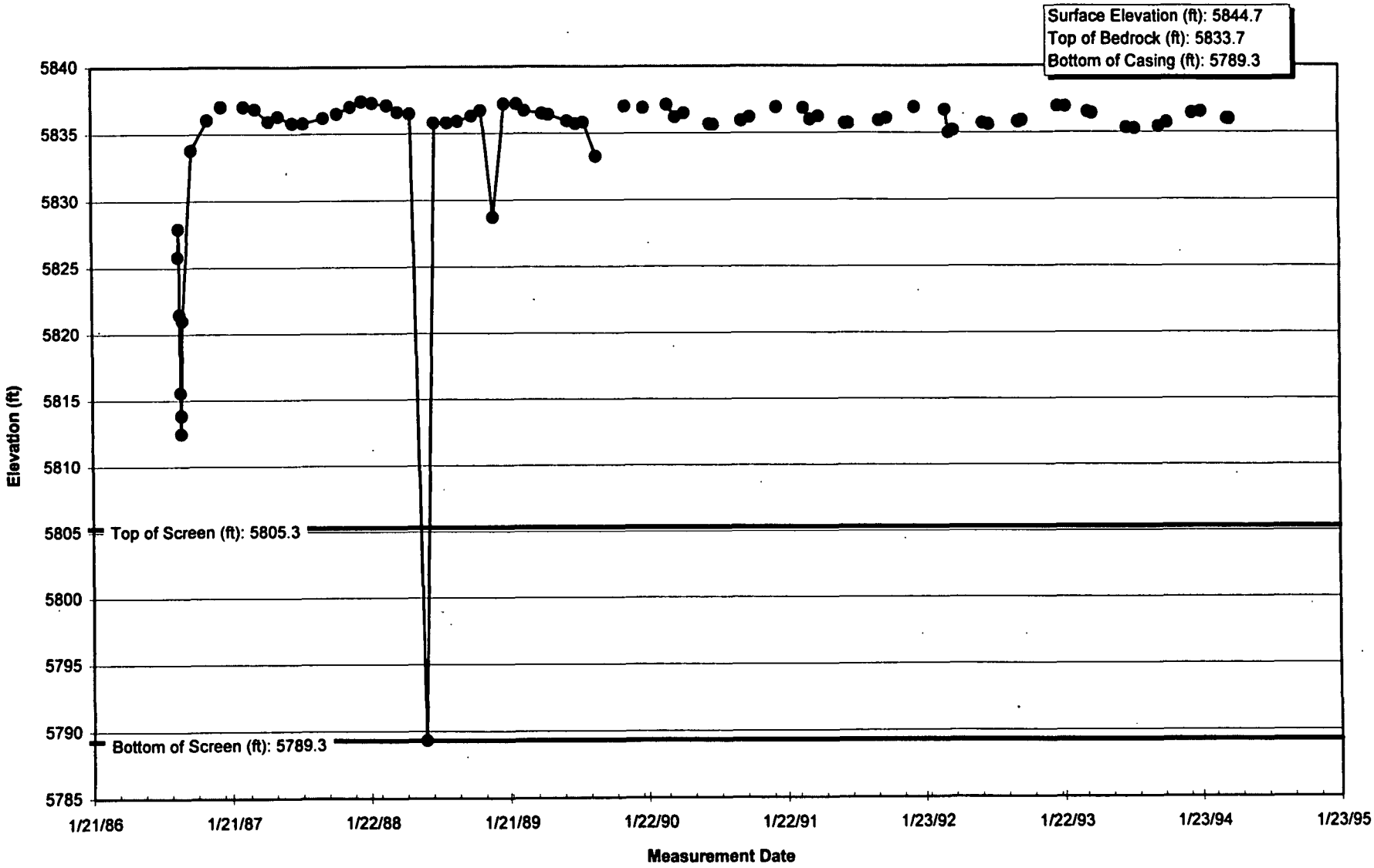
Hydrograph 1386



131

S6.XLS 1386 4/3/95

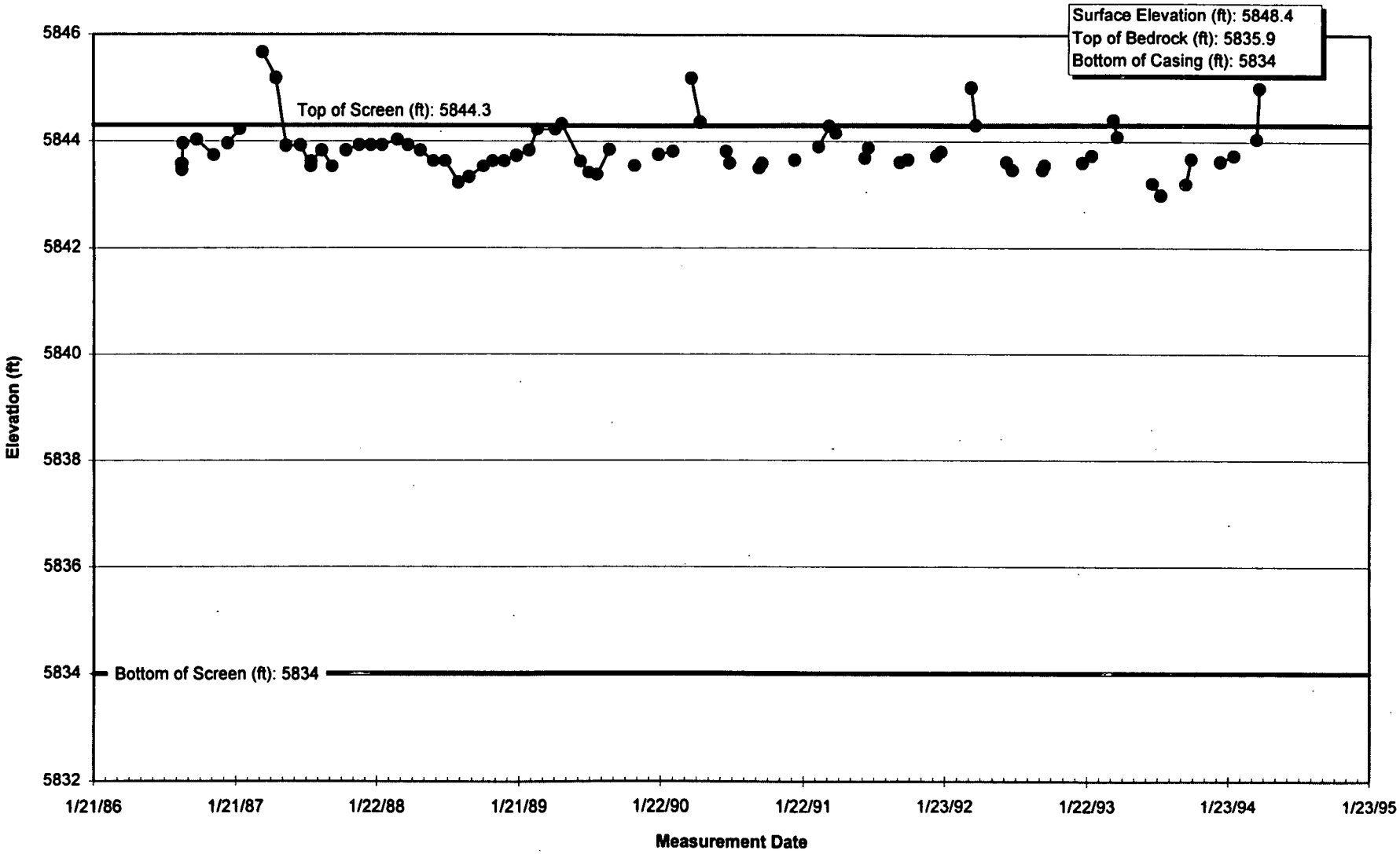
Hydrograph 1486



132

S6.XLS 4/3/95

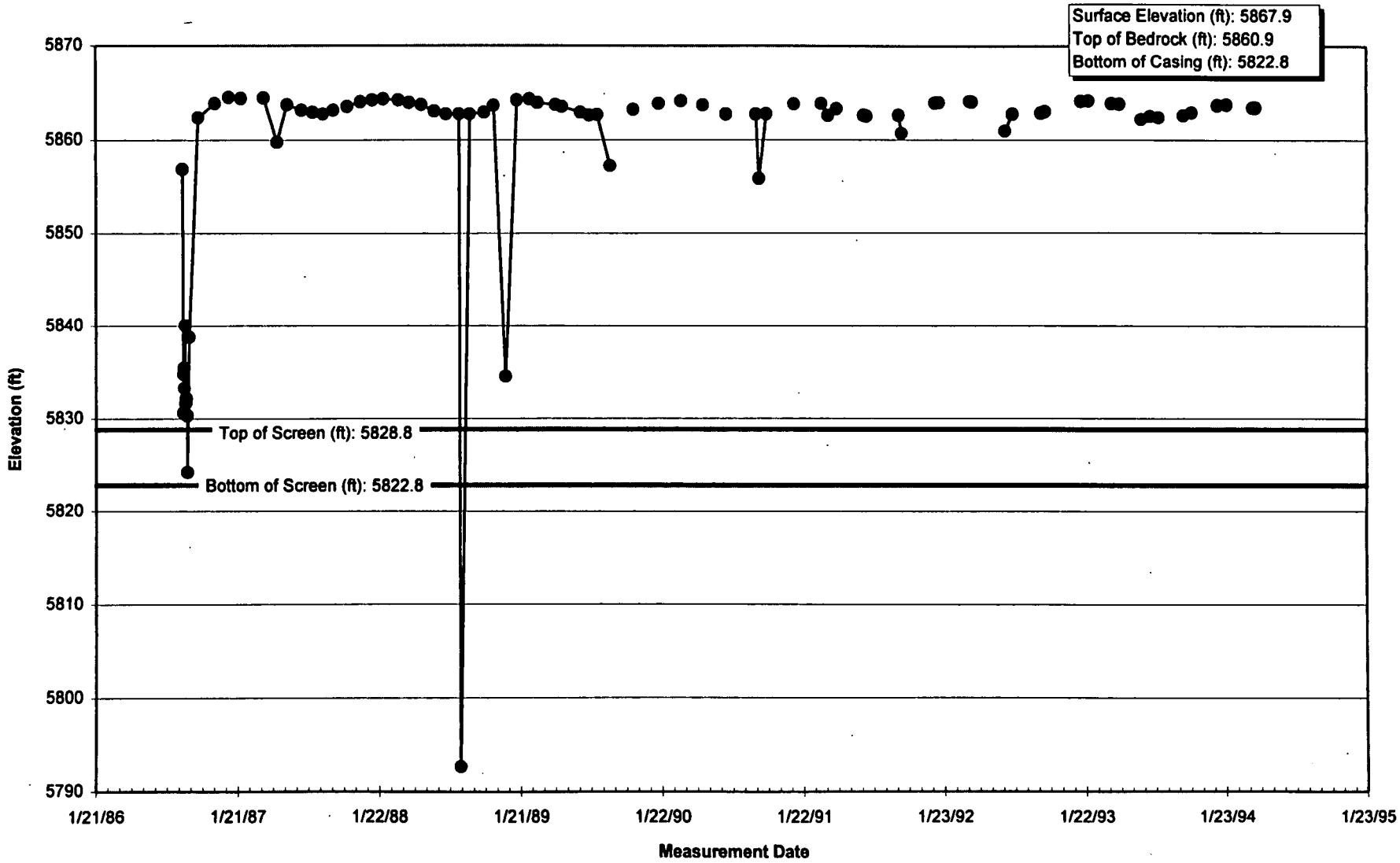
Hydrograph 1586



133

S6.XLS 1586 4/3/95

Hydrograph 1686



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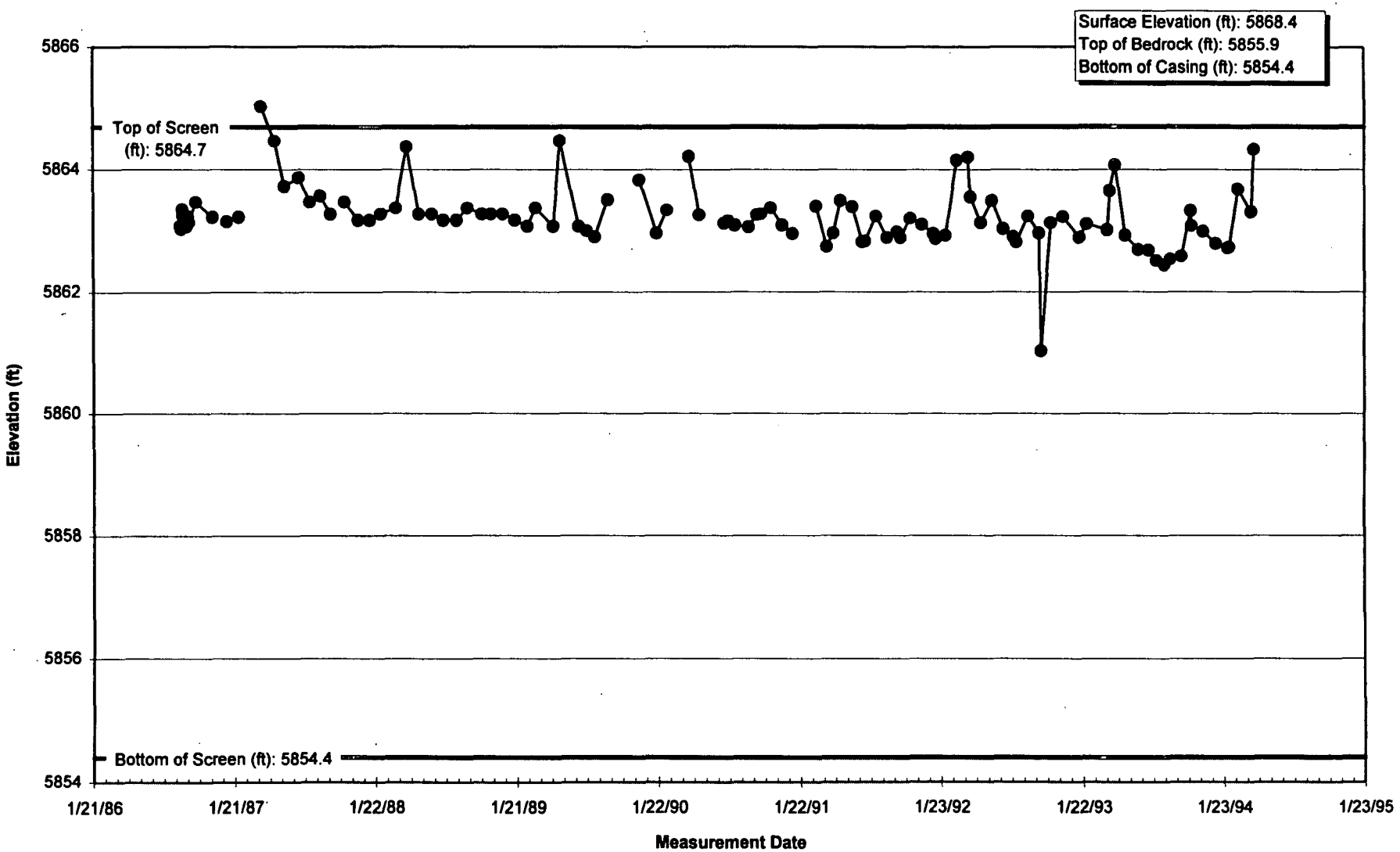
S6.XLS 1686 4/3/95

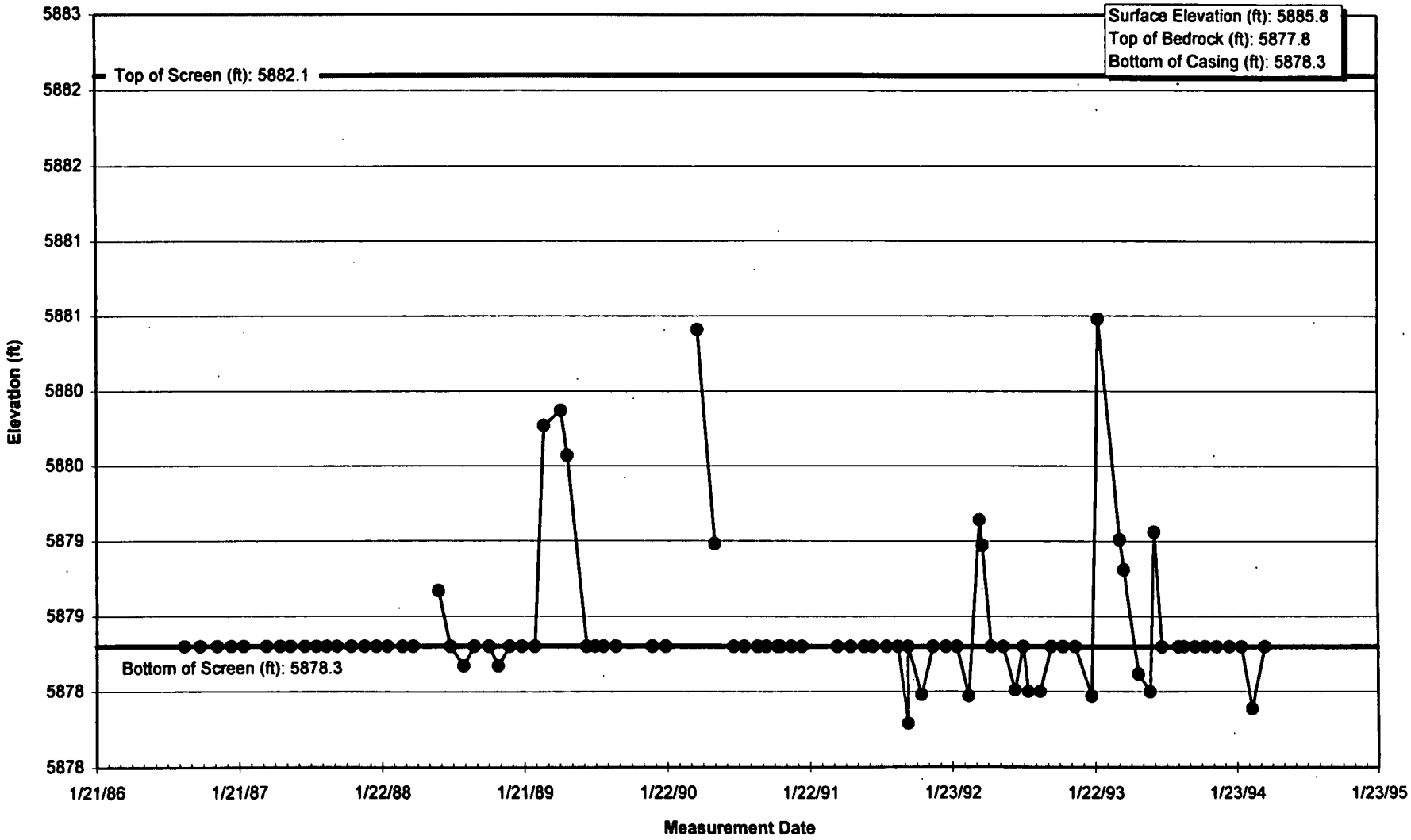
Hydrograph 1786



135

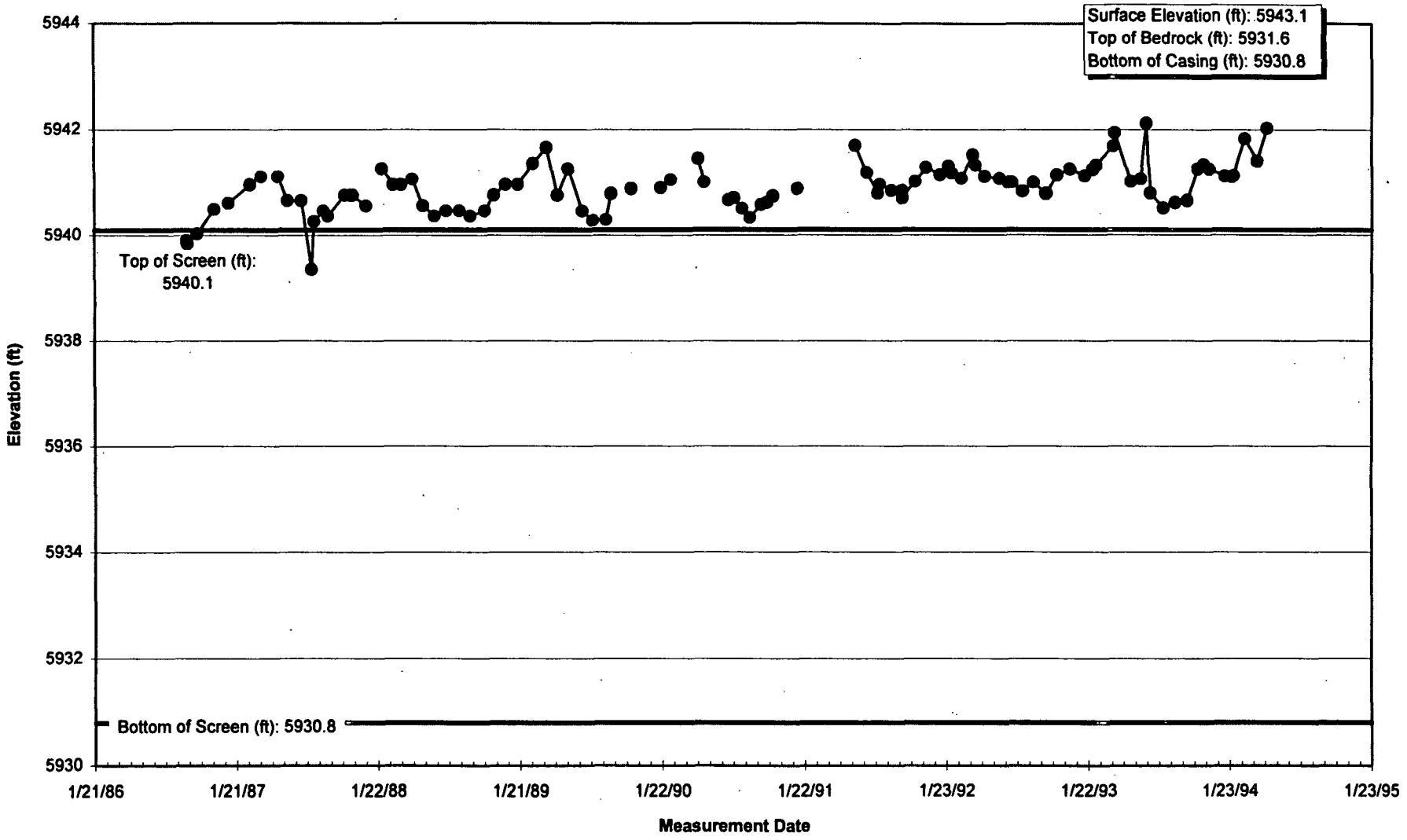
S6.XLS 1786 4/3/95

Hydrograph 1886



136

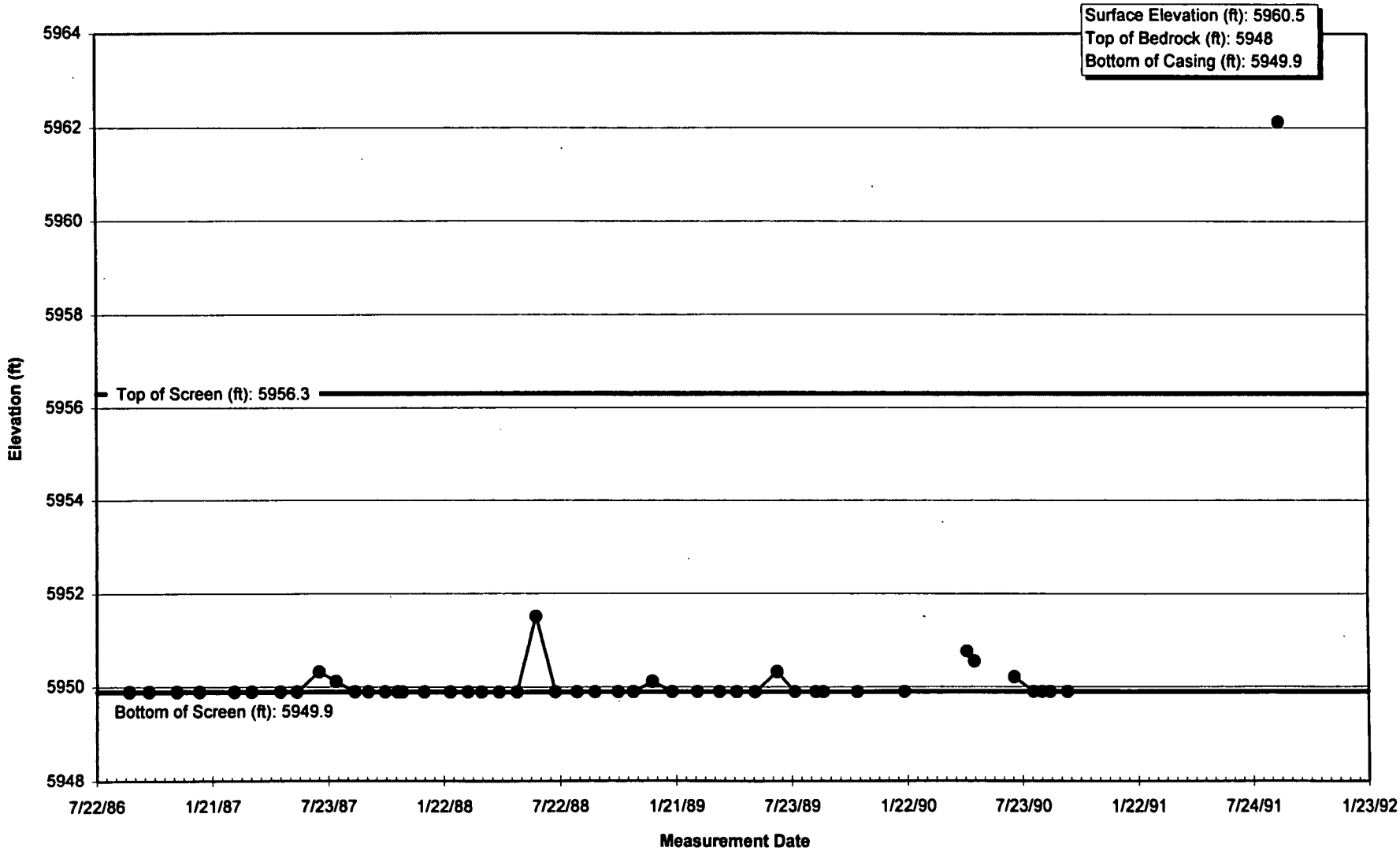
Hydrograph 1986



137

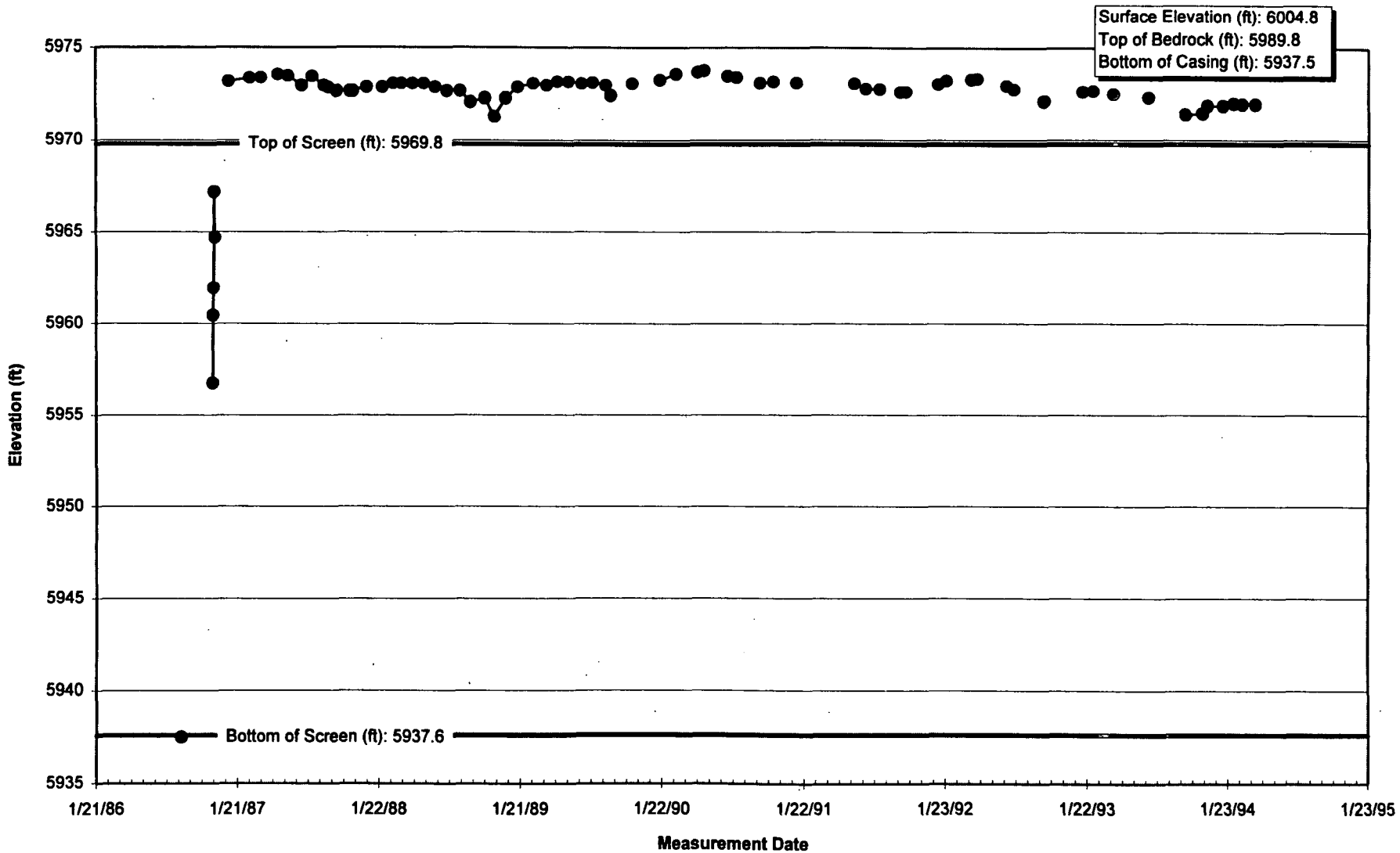
S7.XLS 1986 4/3/95

Hydrograph 2086



138 S7.XLS 2 1/3/95

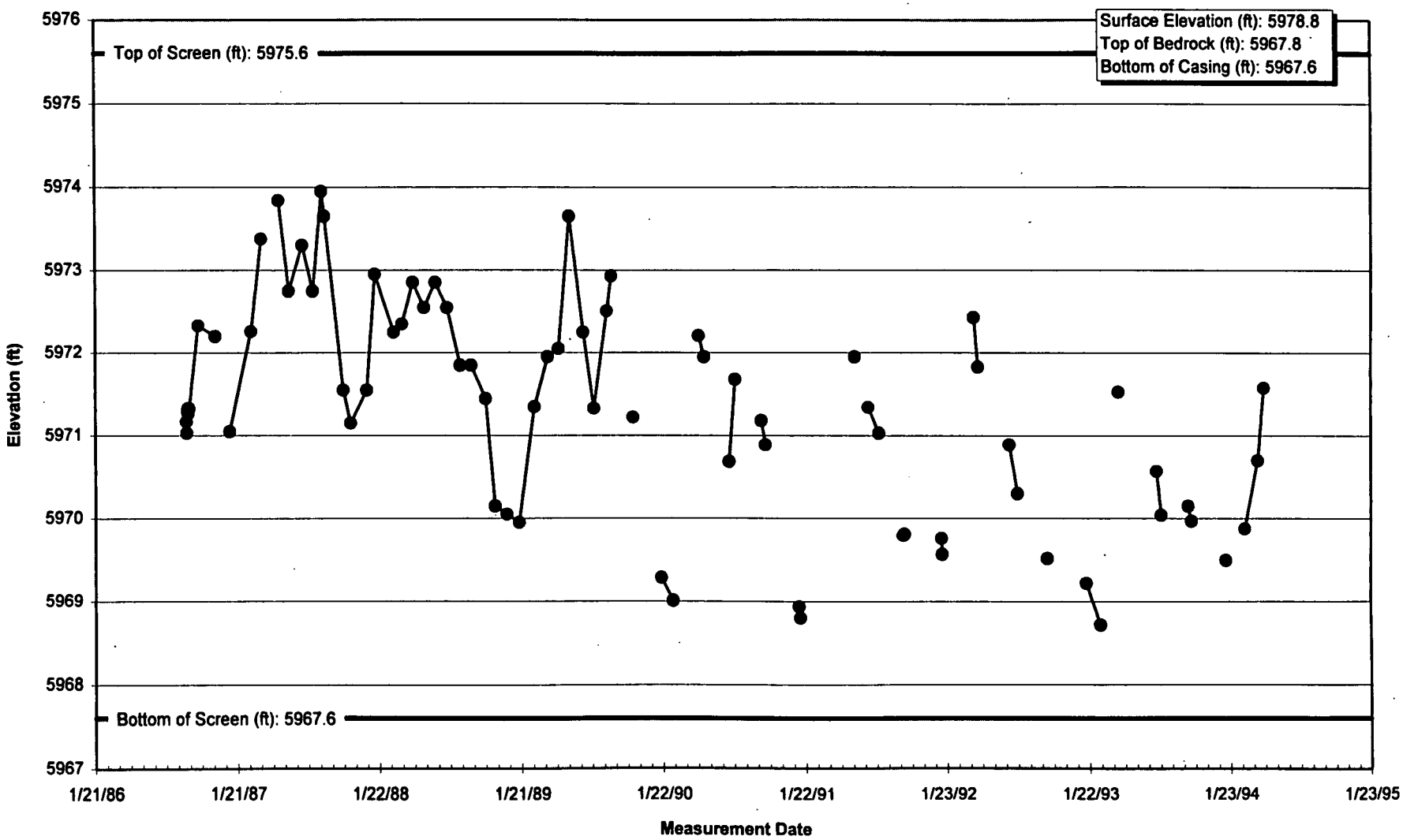
Hydrograph 2186



S7.XLS 2186 4/3/95

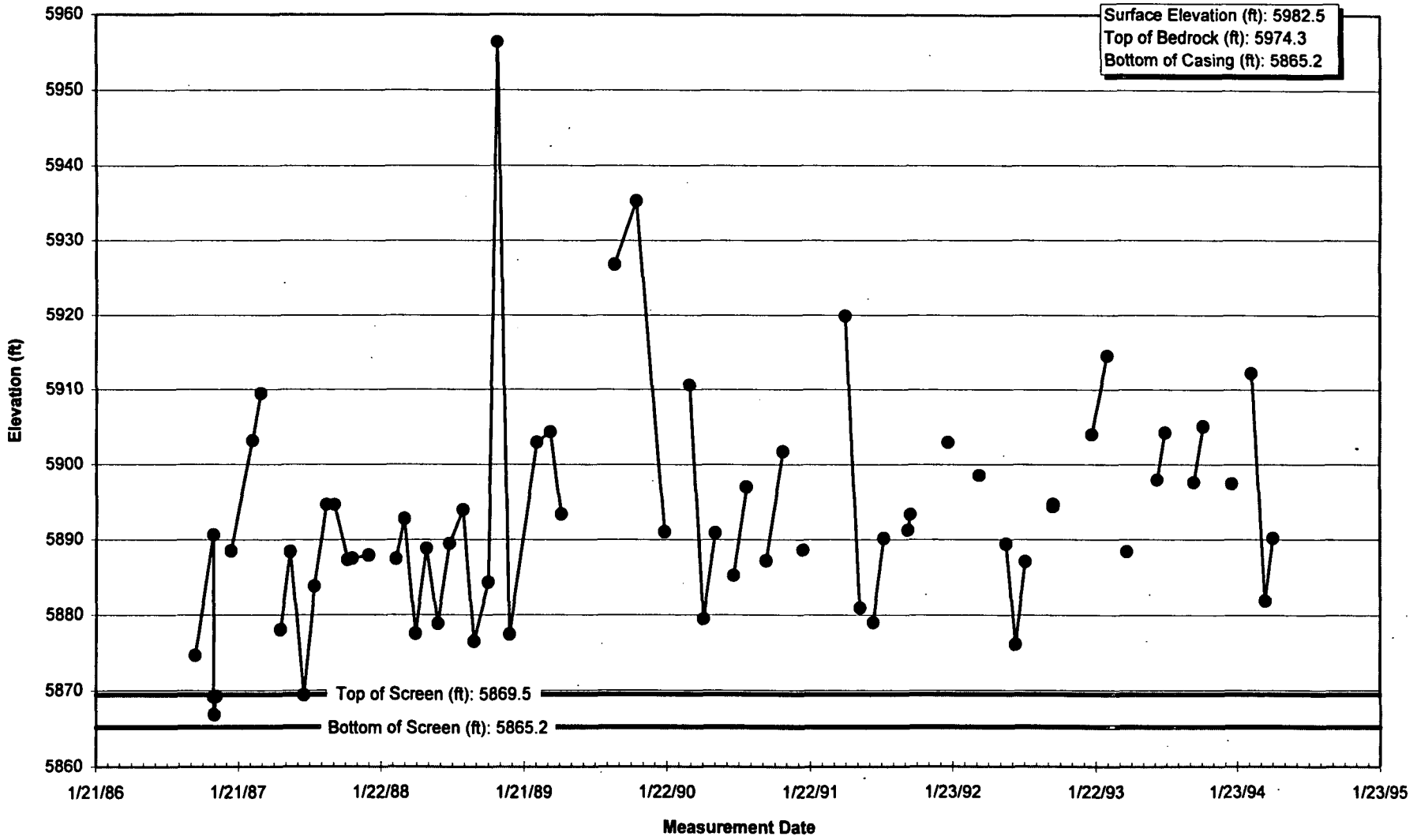
139

Hydrograph 2286



140

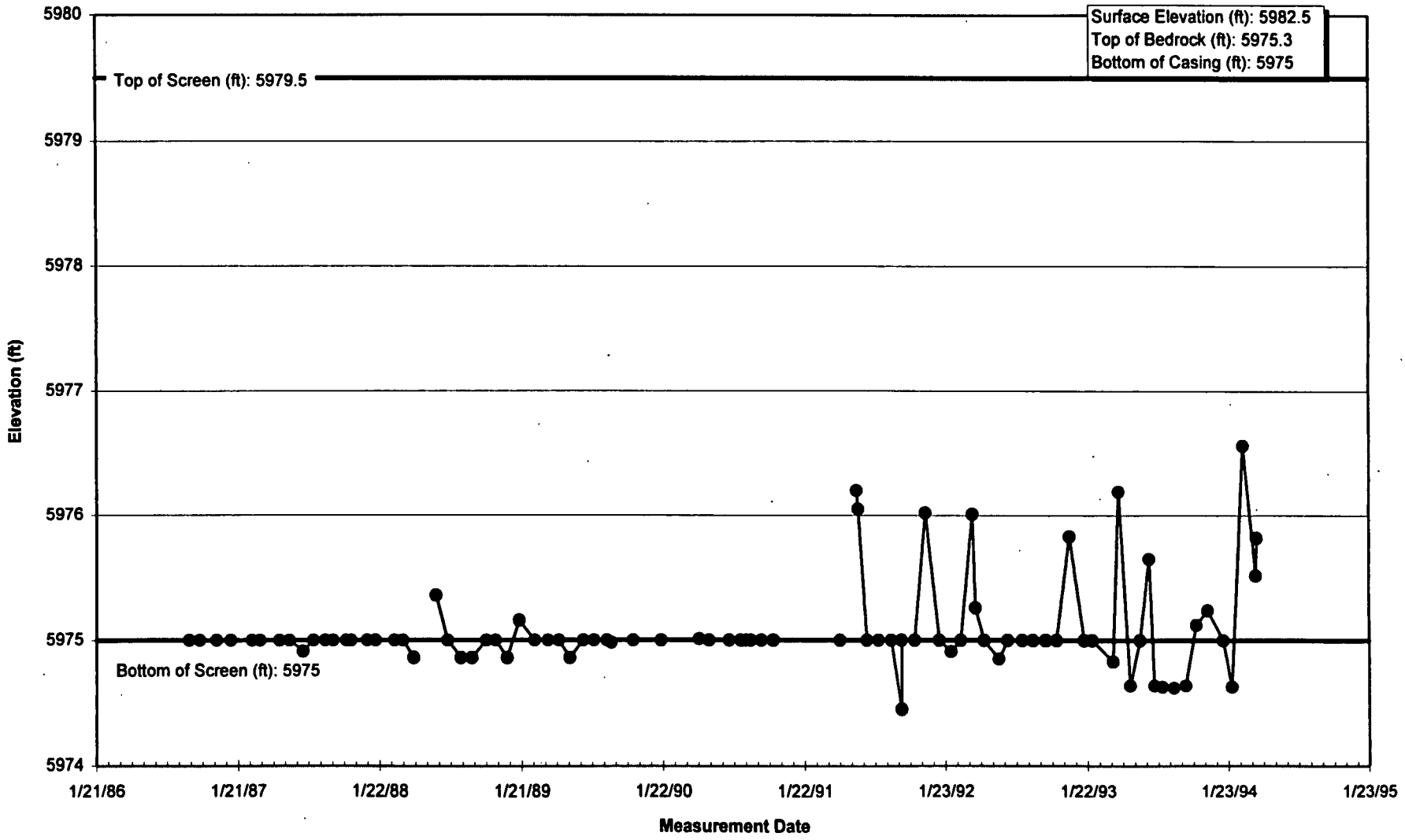
Hydrograph 2386



S8.XLS 2386 4/4/95

141

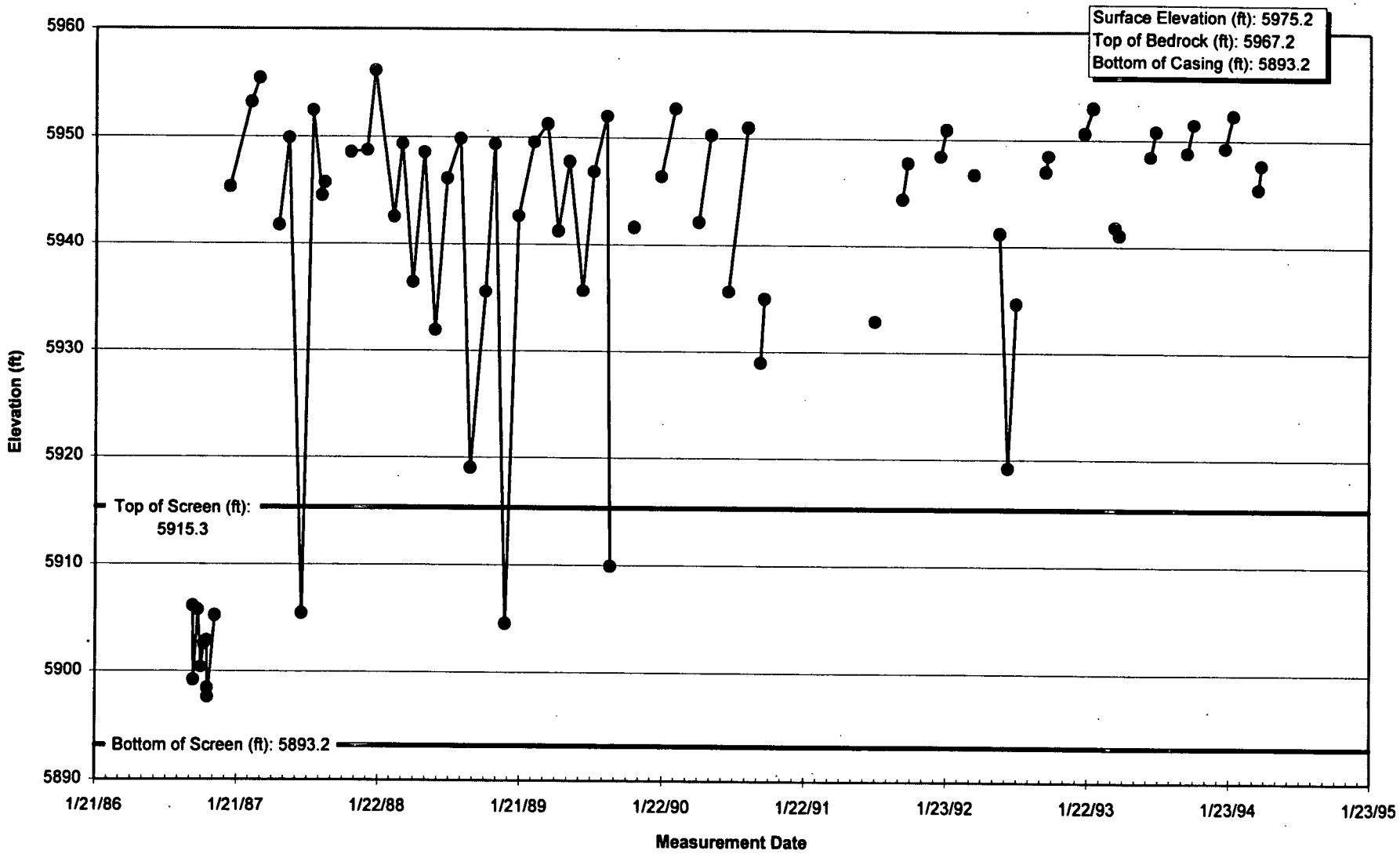
Hydrograph 2486



142

S8.XLS 4/4/95

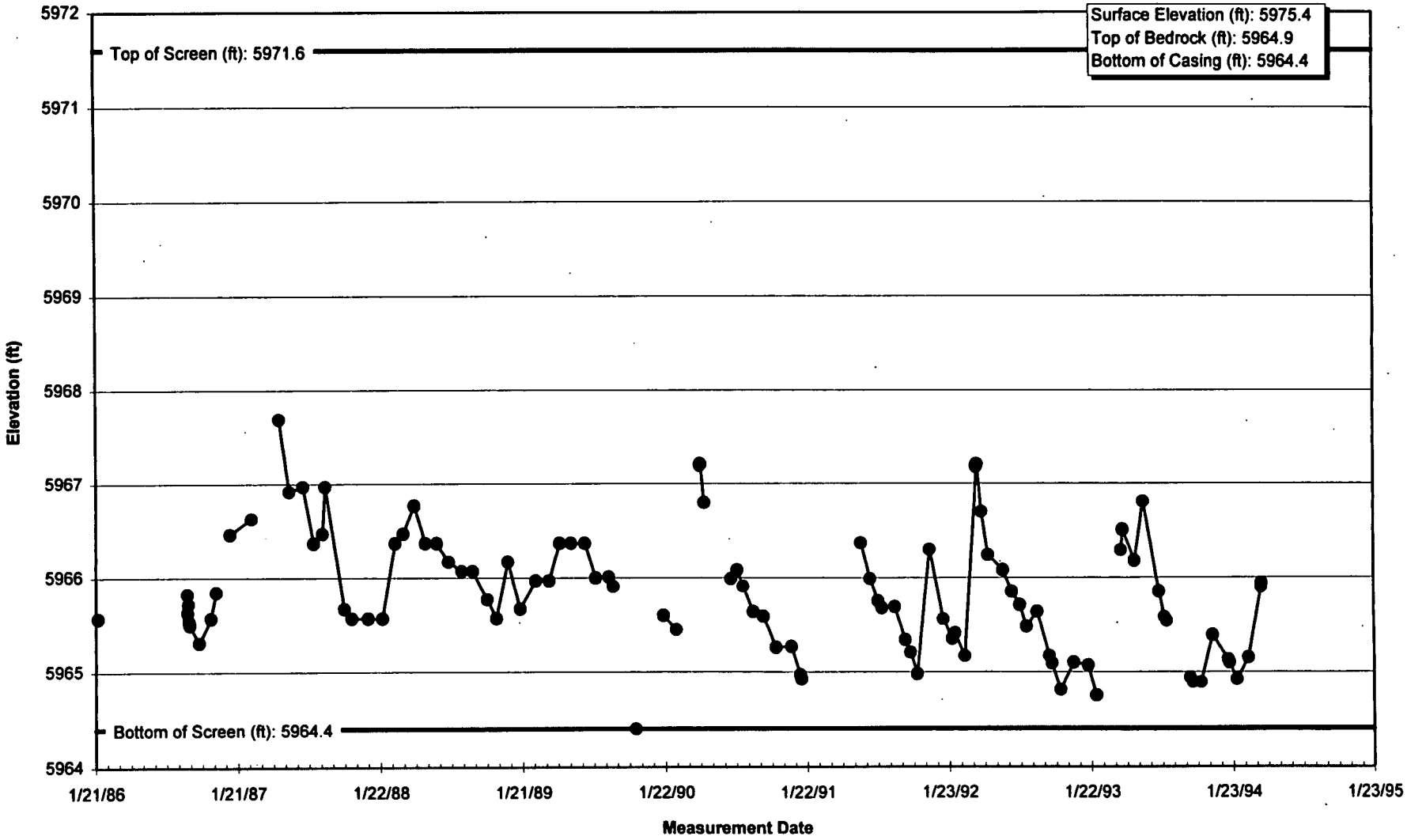
Hydrograph 2586



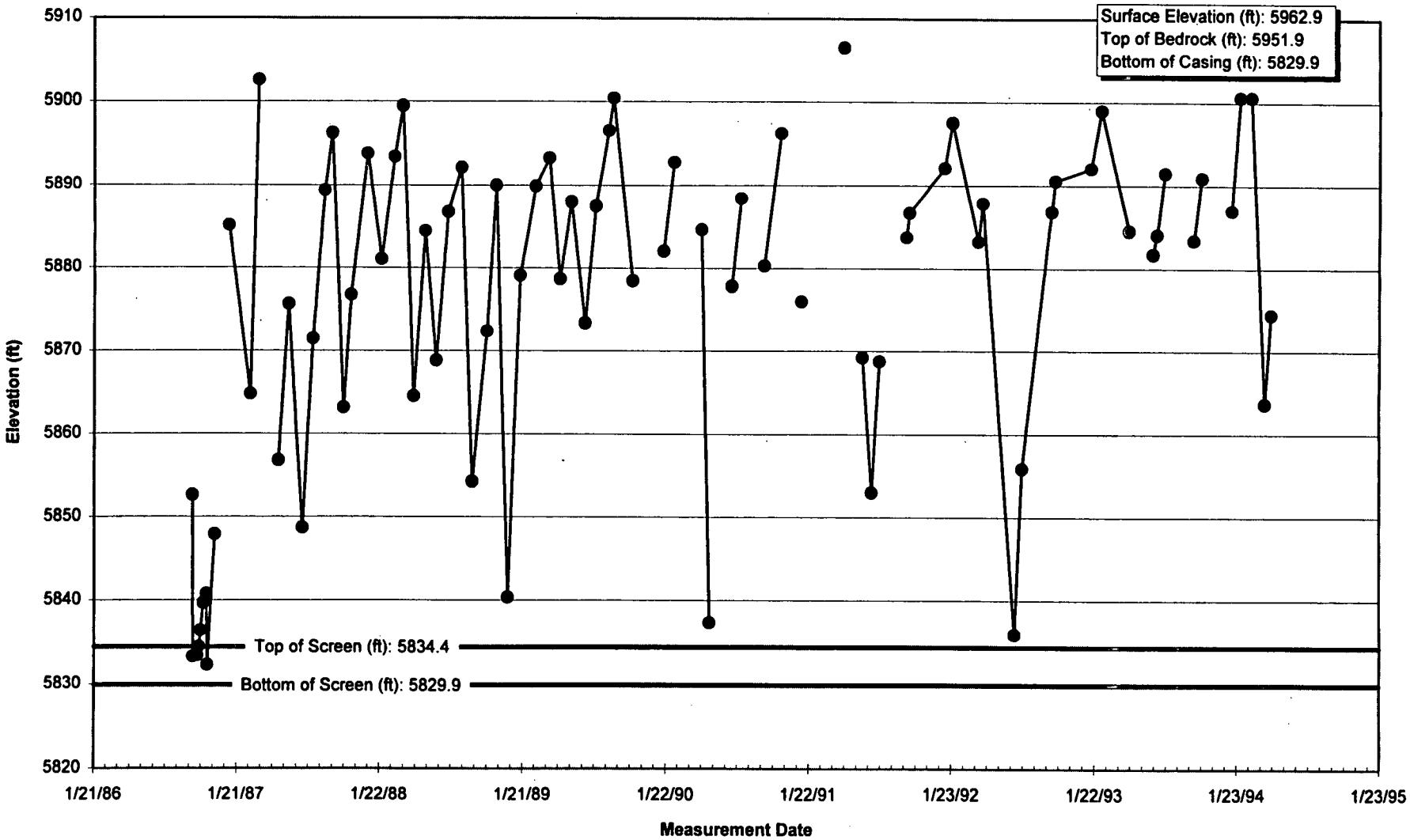
S8.XLS 2586 4/4/95

143

Hydrograph 2686



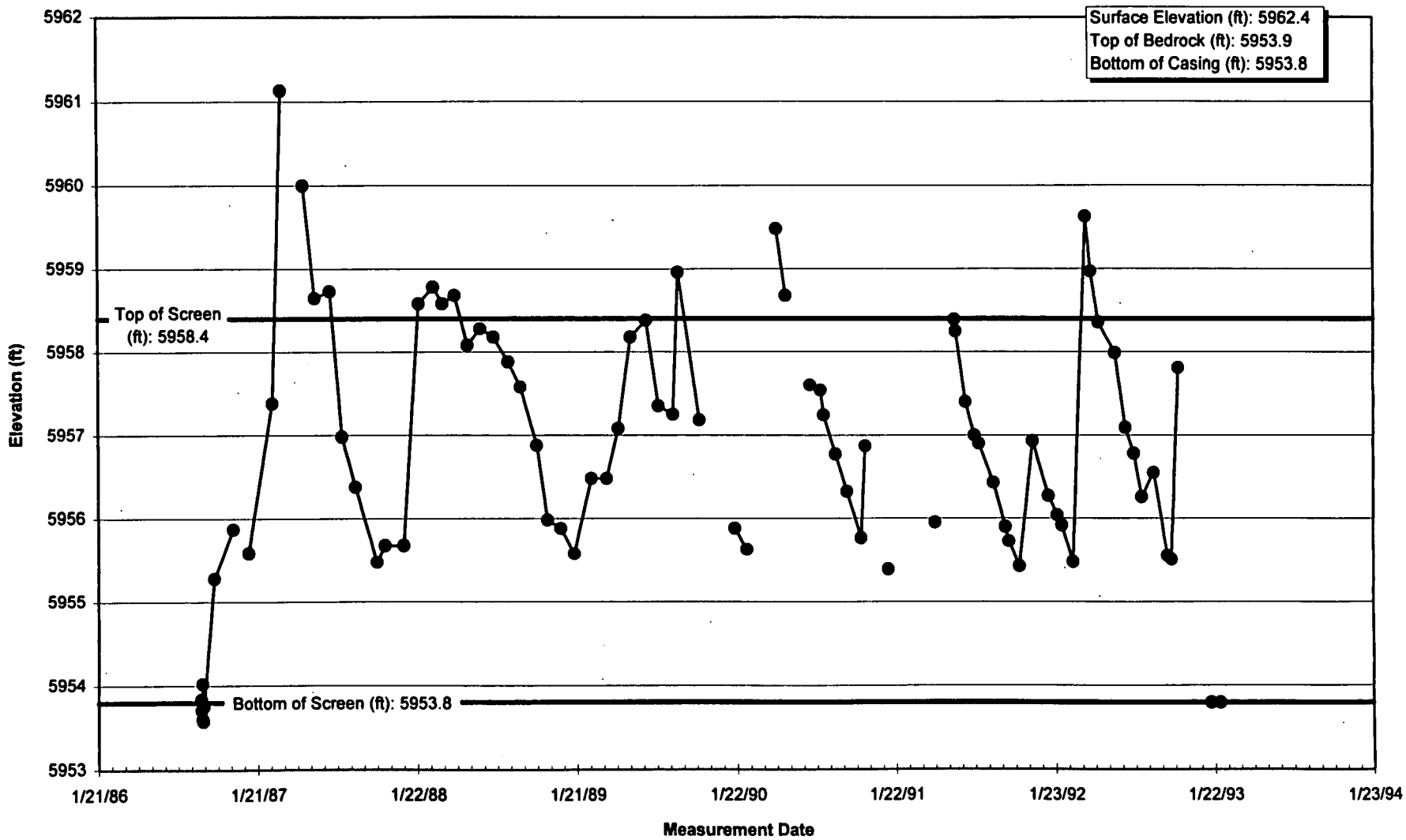
Hydrograph 2786



145

S8.XLS 2786 4/4/95

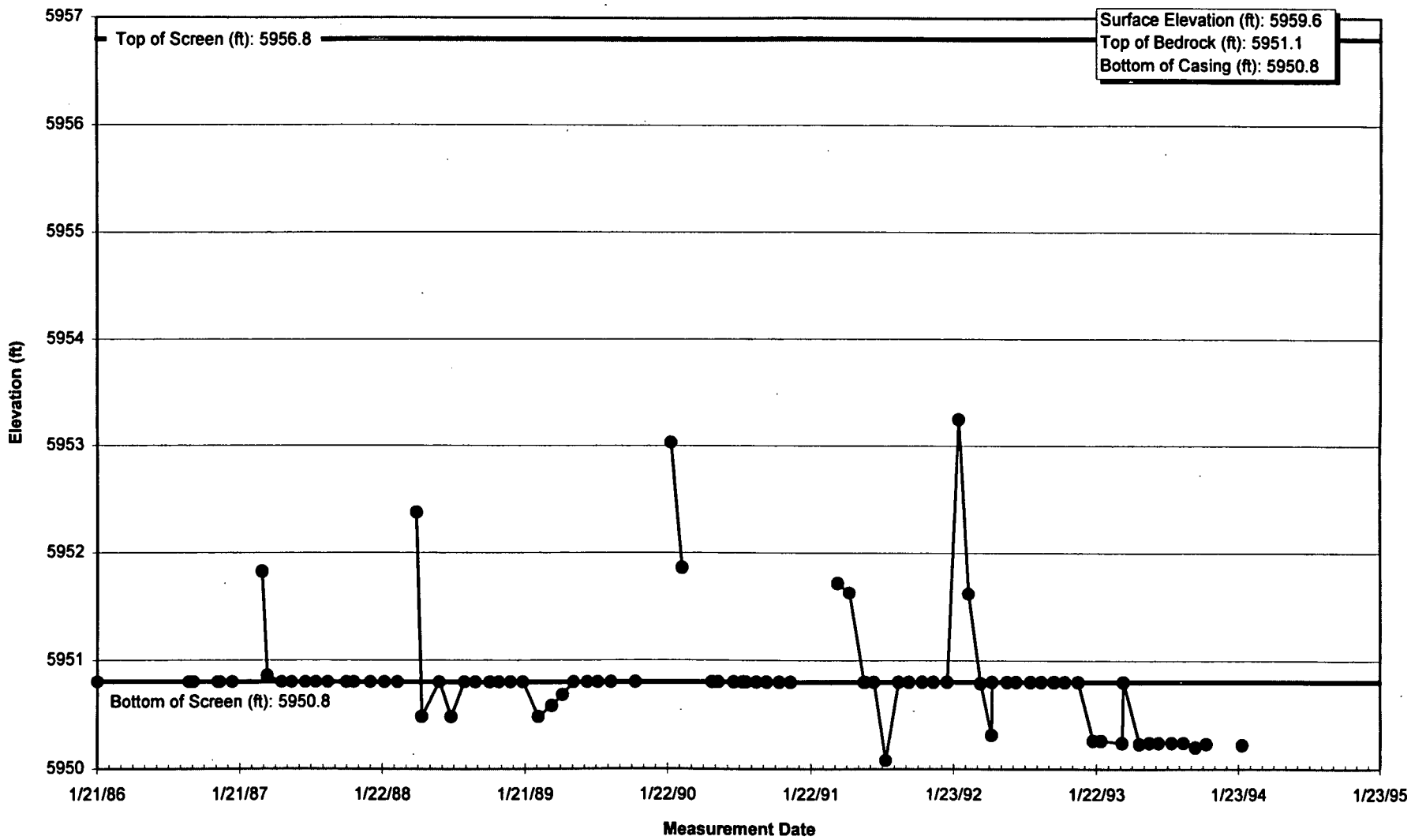
Hydrograph 2886



146

S8.XLS 2886 4/4/95

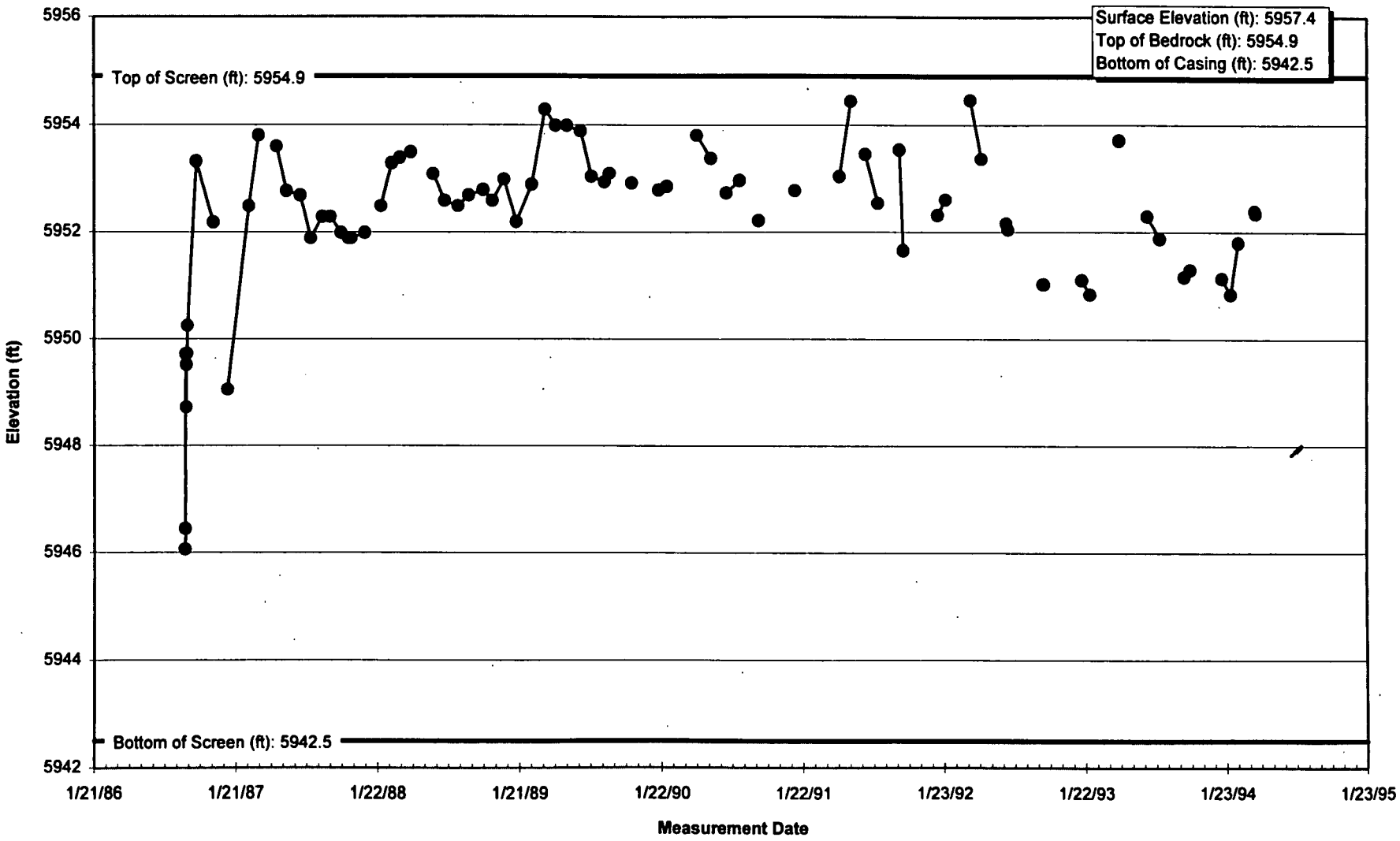
Hydrograph 2986



147

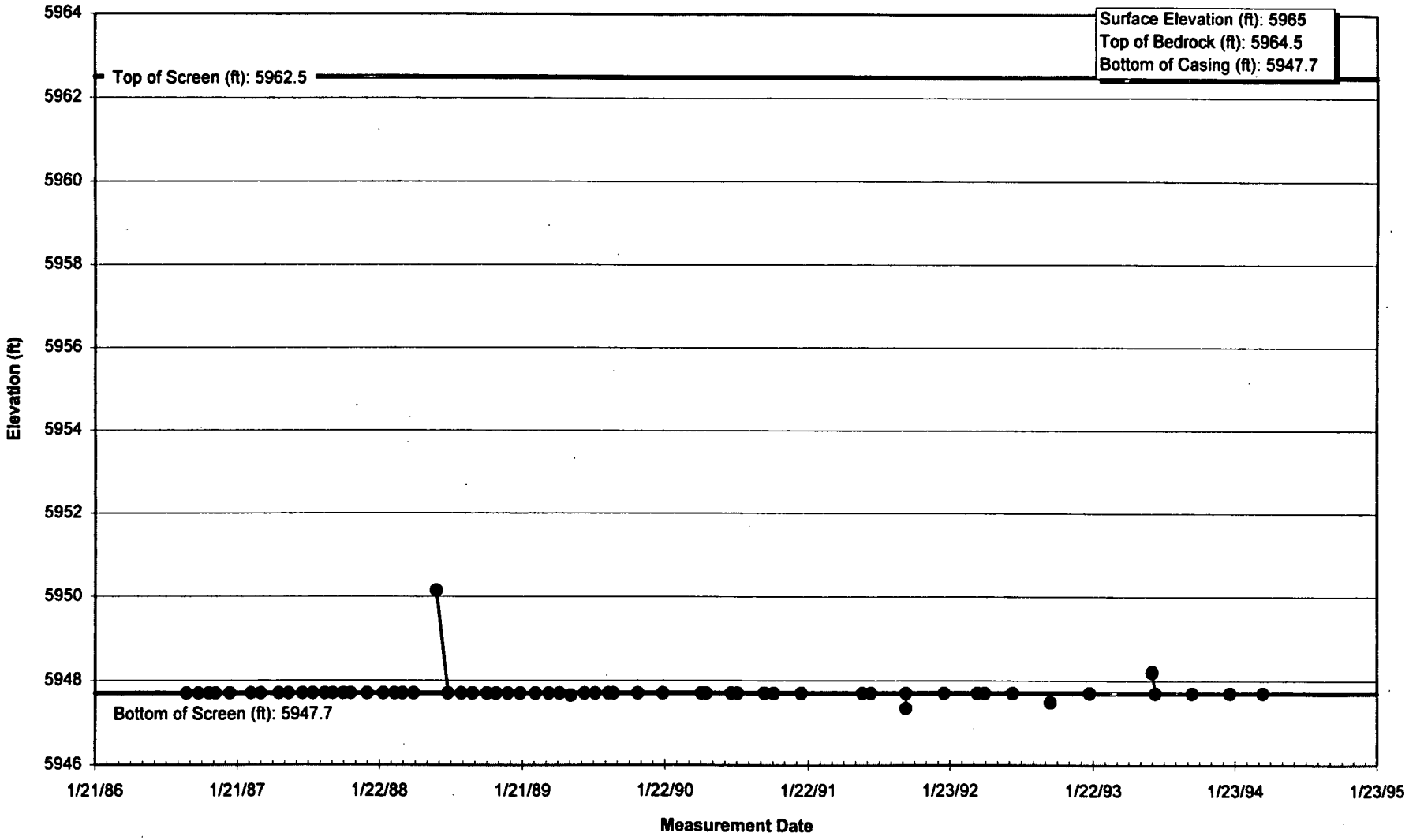
S8.XLS 2986 4/4/95

Hydrograph 3086



148 S8.XLS 3086 4/4/95

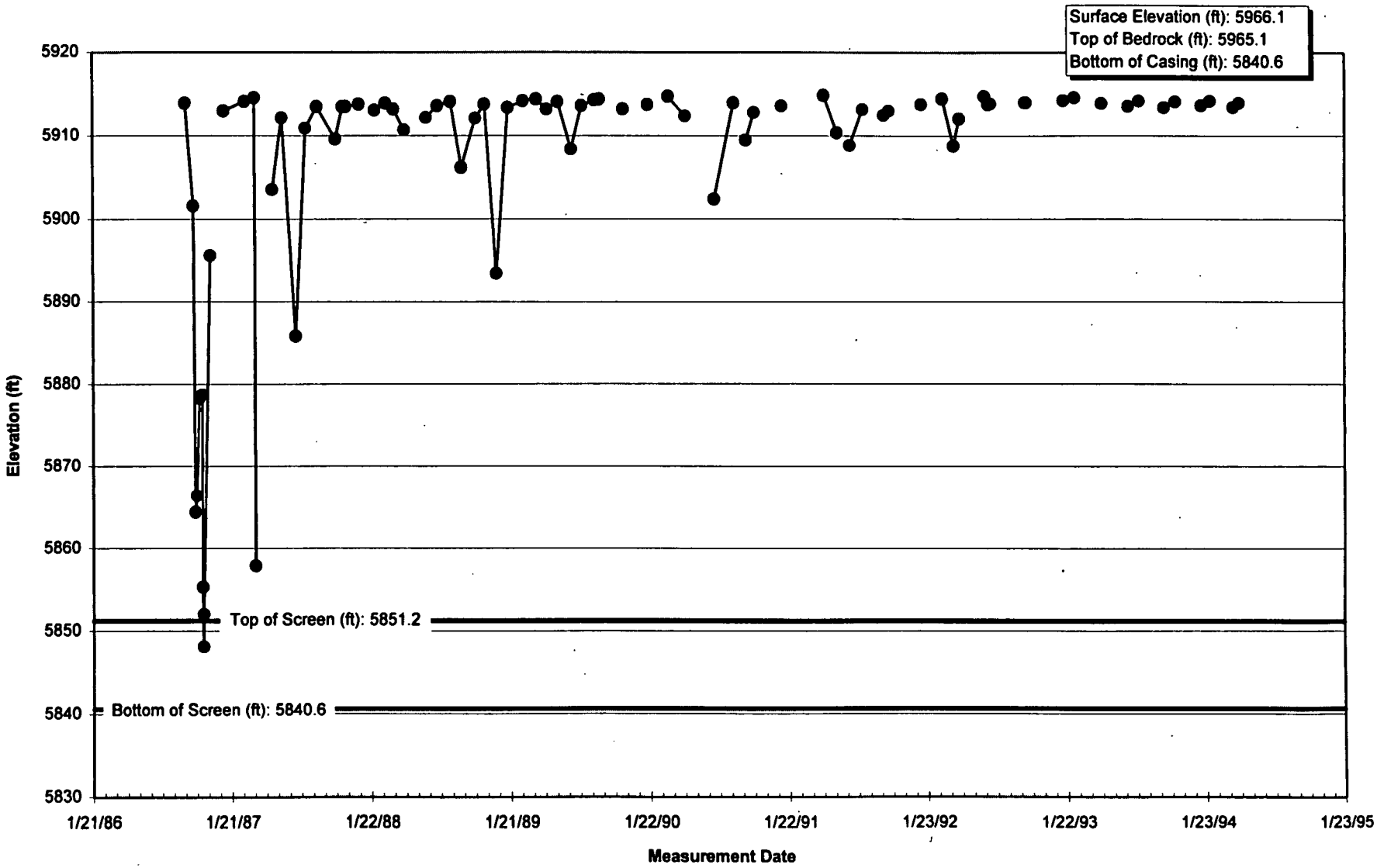
Hydrograph 3186



S8.XLS 3186 4/4/95

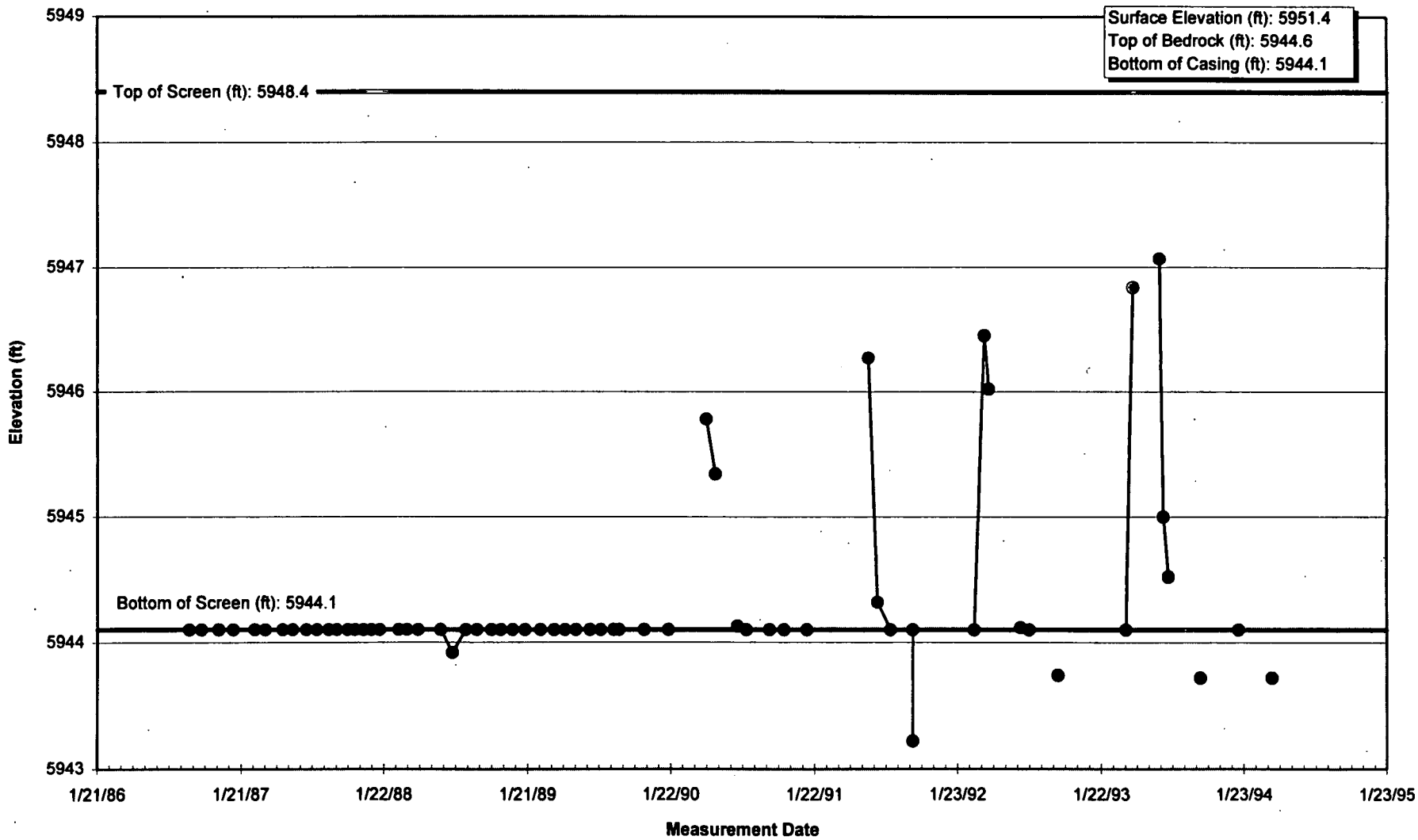
149

Hydrograph 3286



150

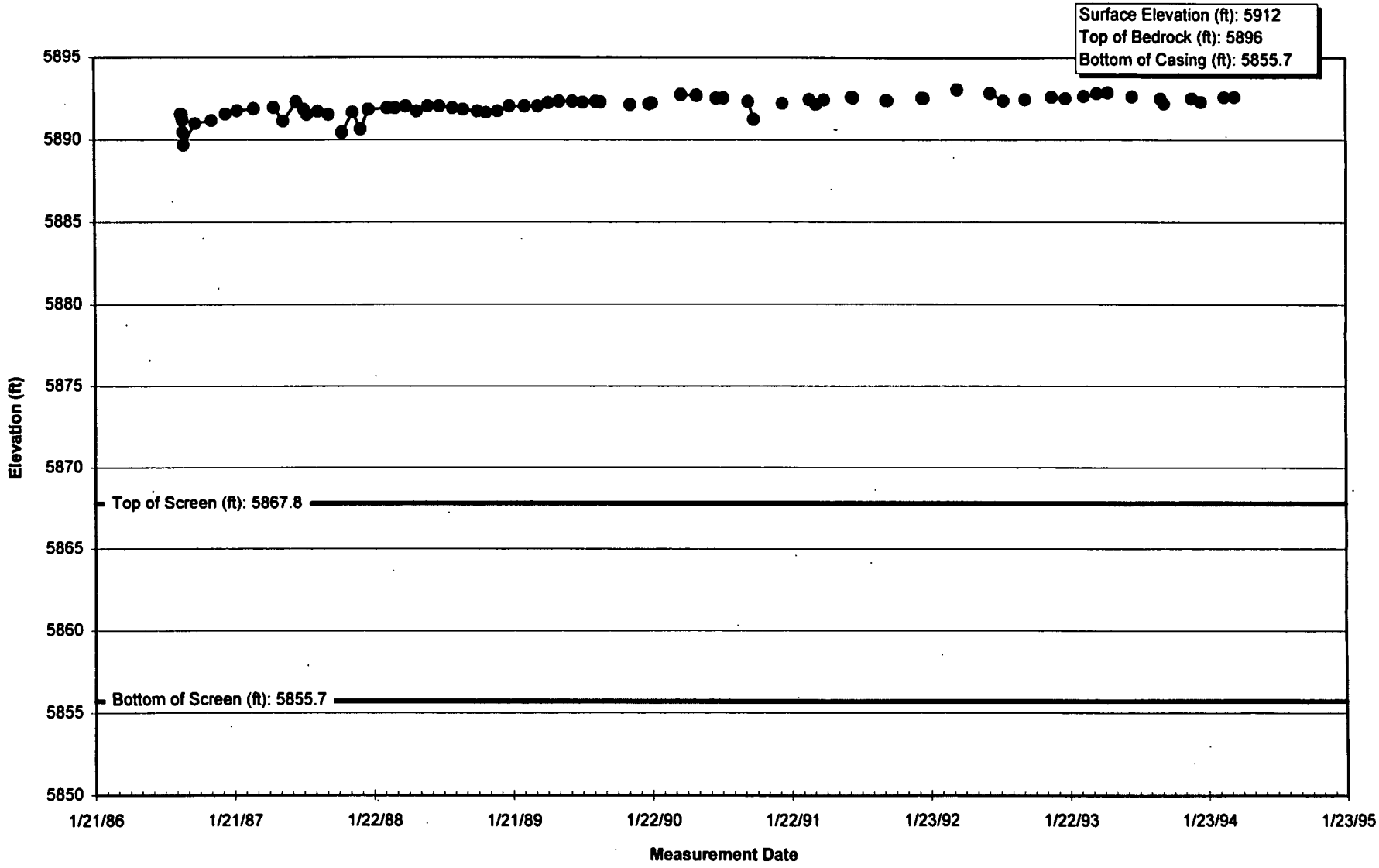
Hydrograph 3386



151

S9.XLS 3386 4/4/95

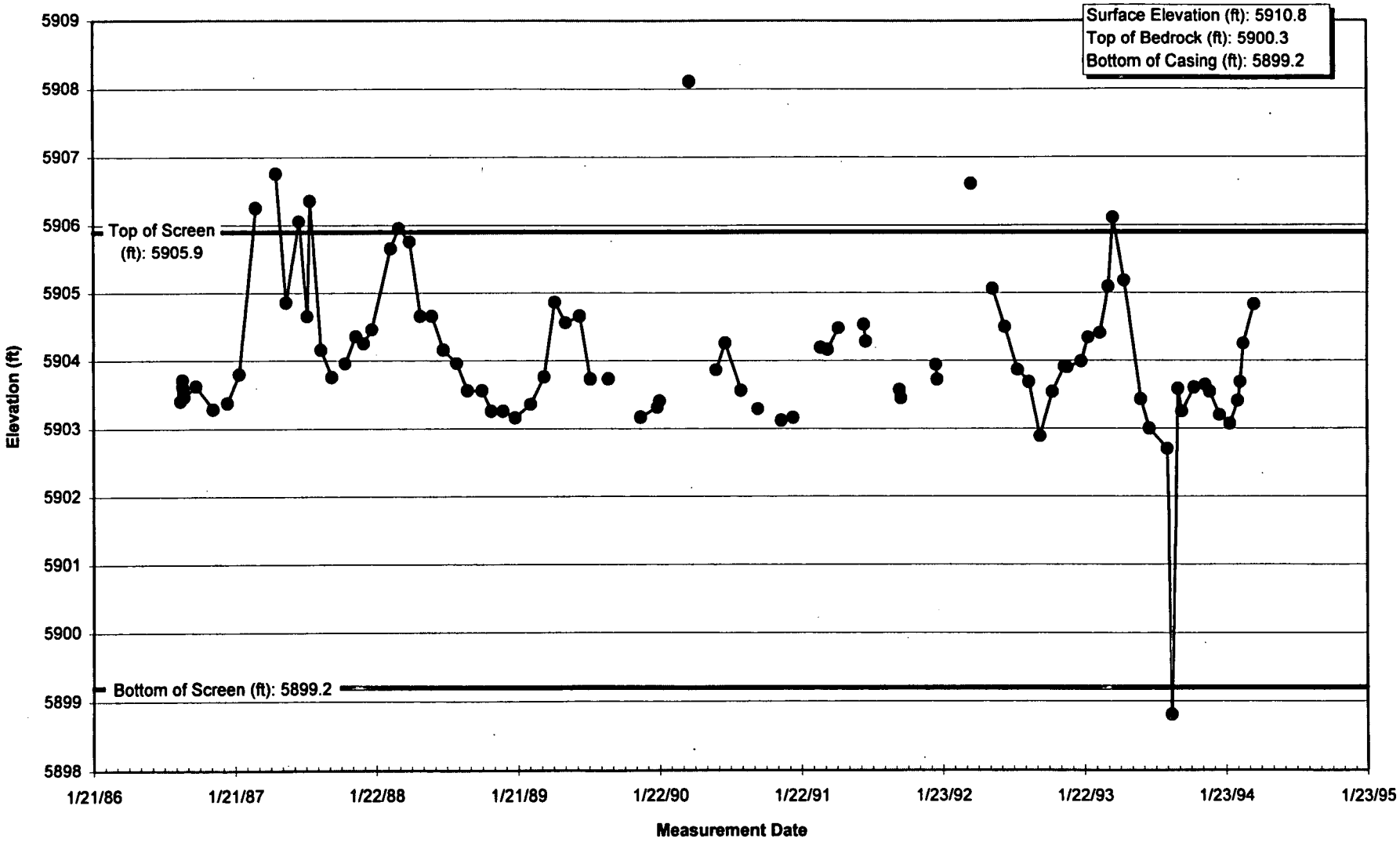
Hydrograph 3486



152

S9.XLS 3 4/4/95

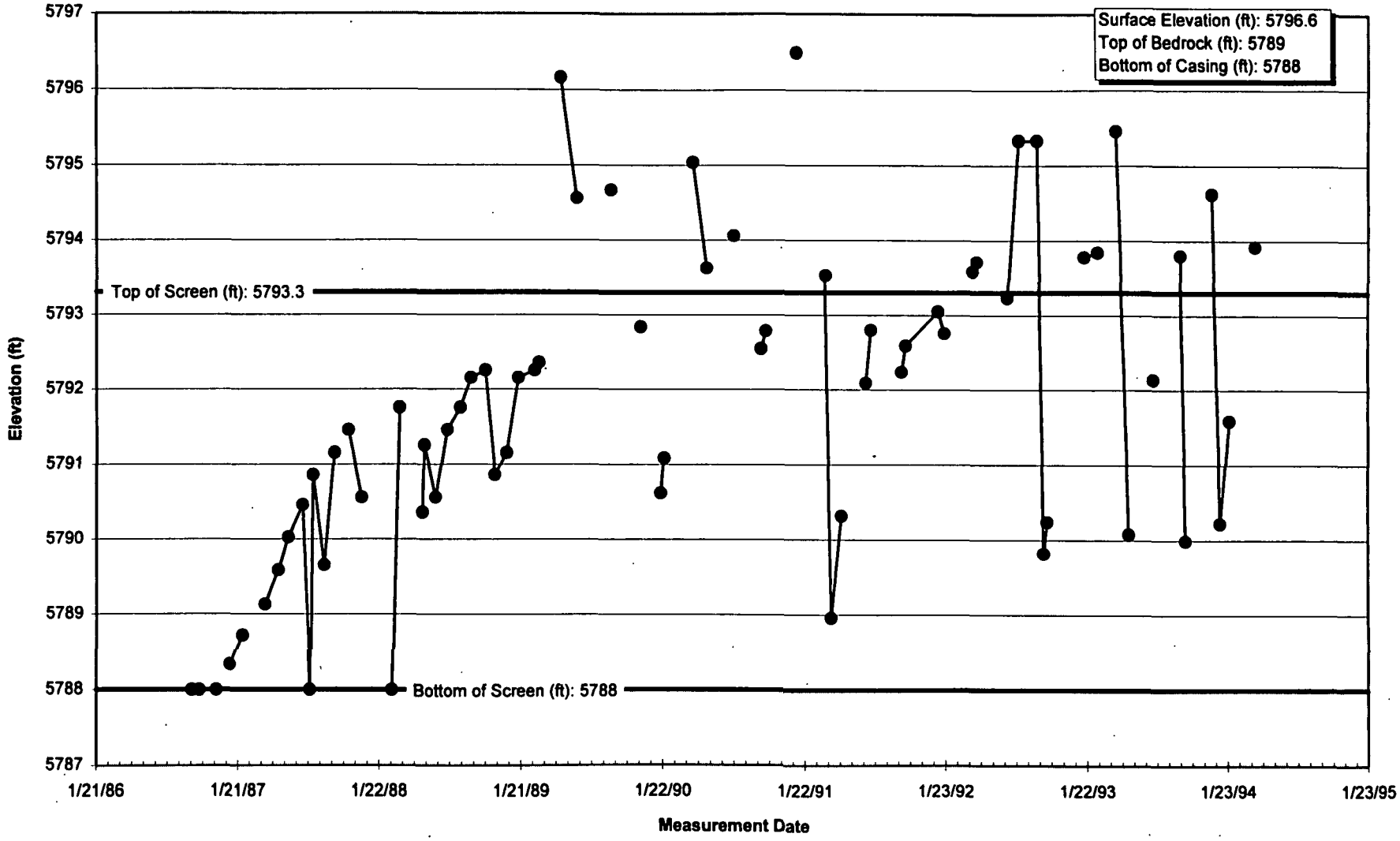
Hydrograph 3586



153

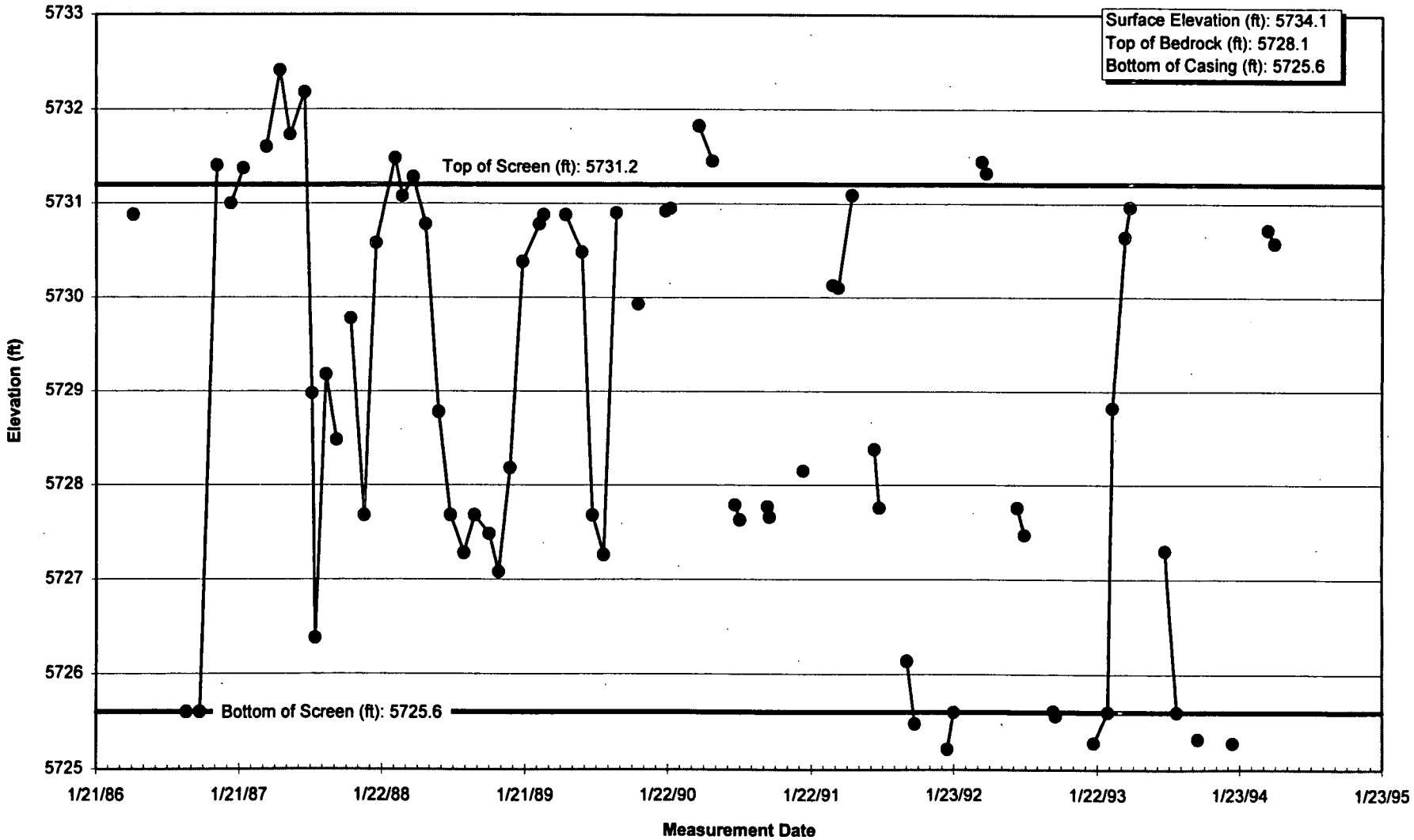
S9.XLS 3586 4/4/95

Hydrograph 3786



154

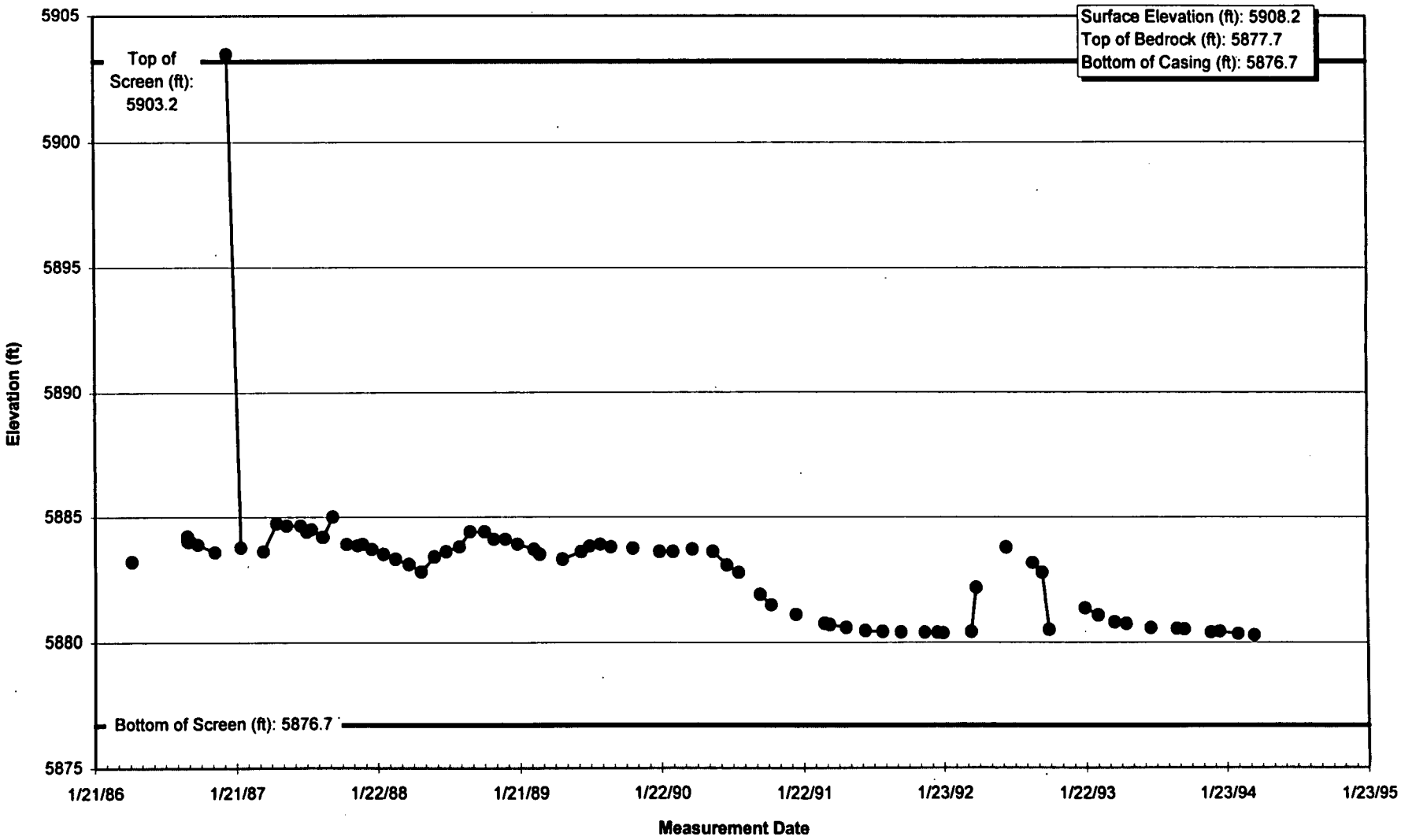
Hydrograph 3886



S10.XLS 3886 4/4/95

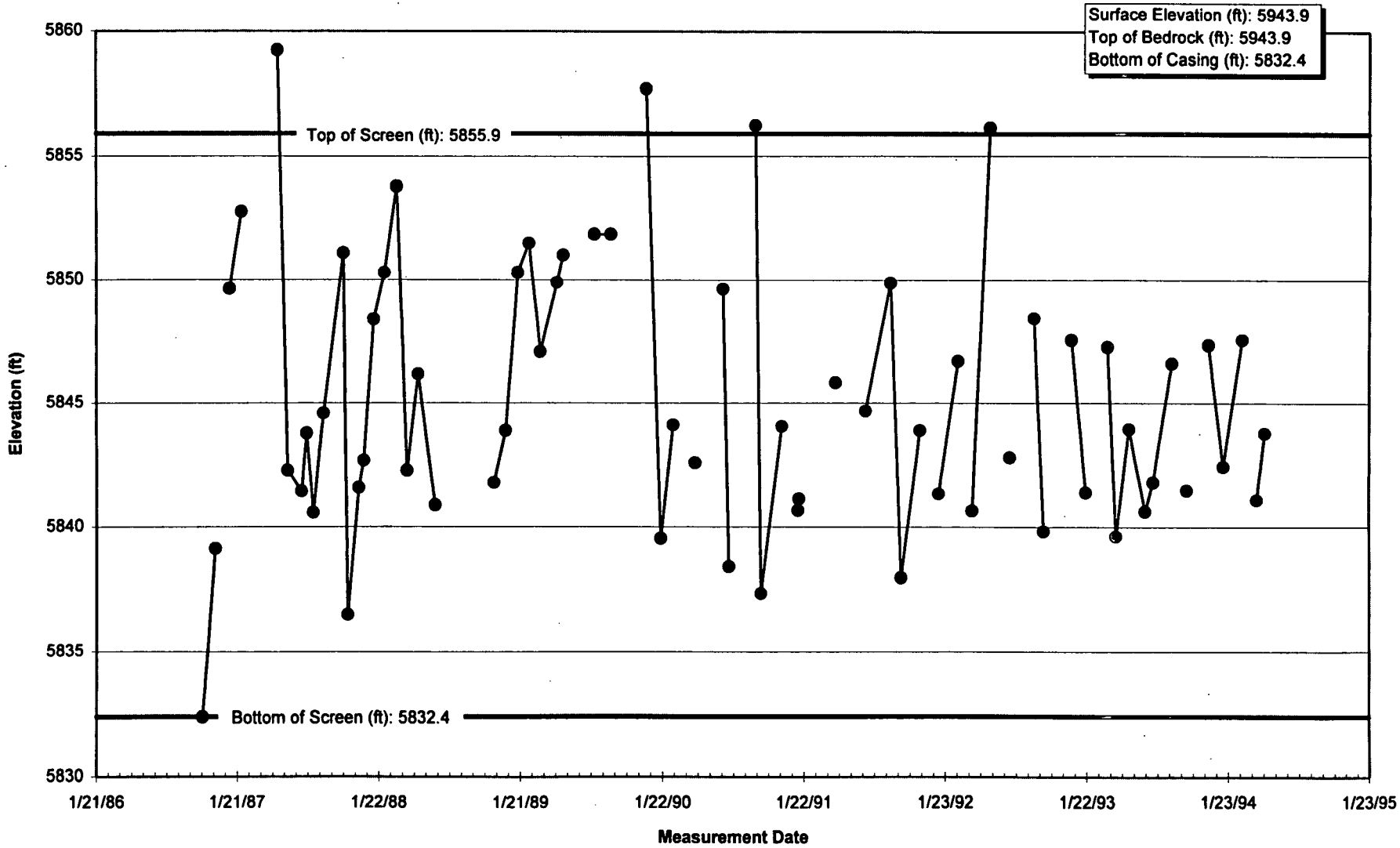
155

Hydrograph 3986



156

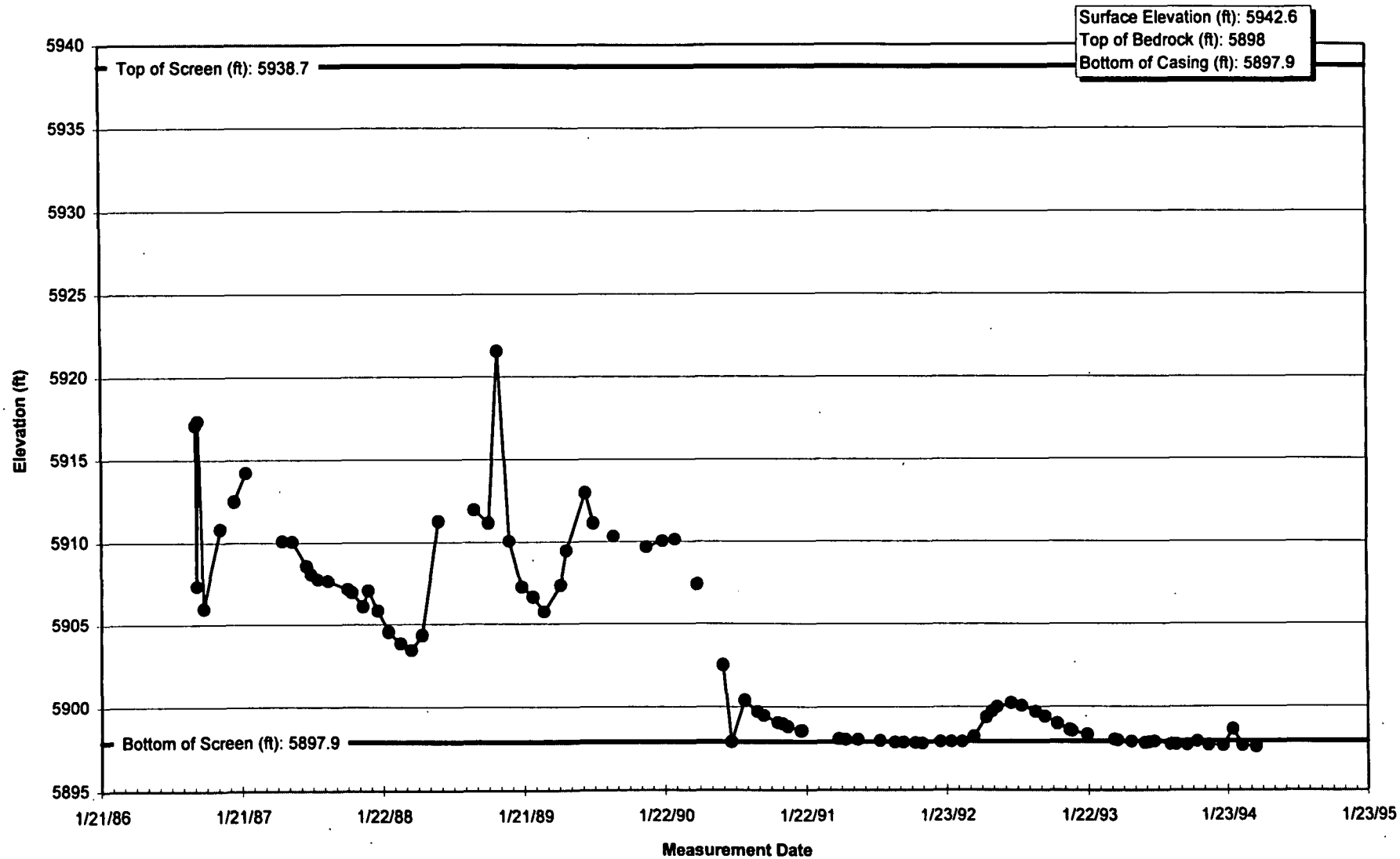
Hydrograph 4086



8689GRPH.XLS 4086

157

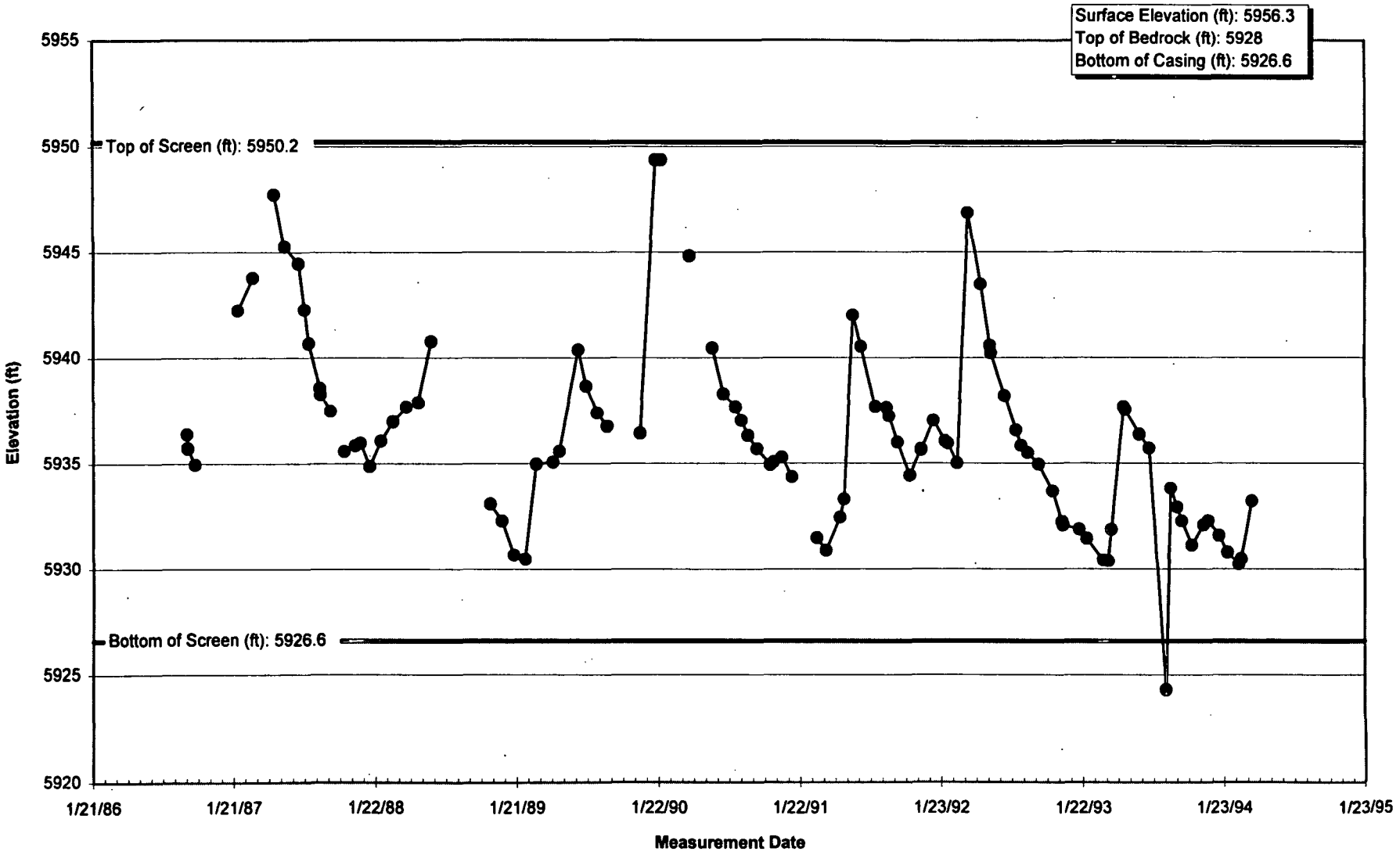
Hydrograph 4186



158

8689GRPH.XLS 4186

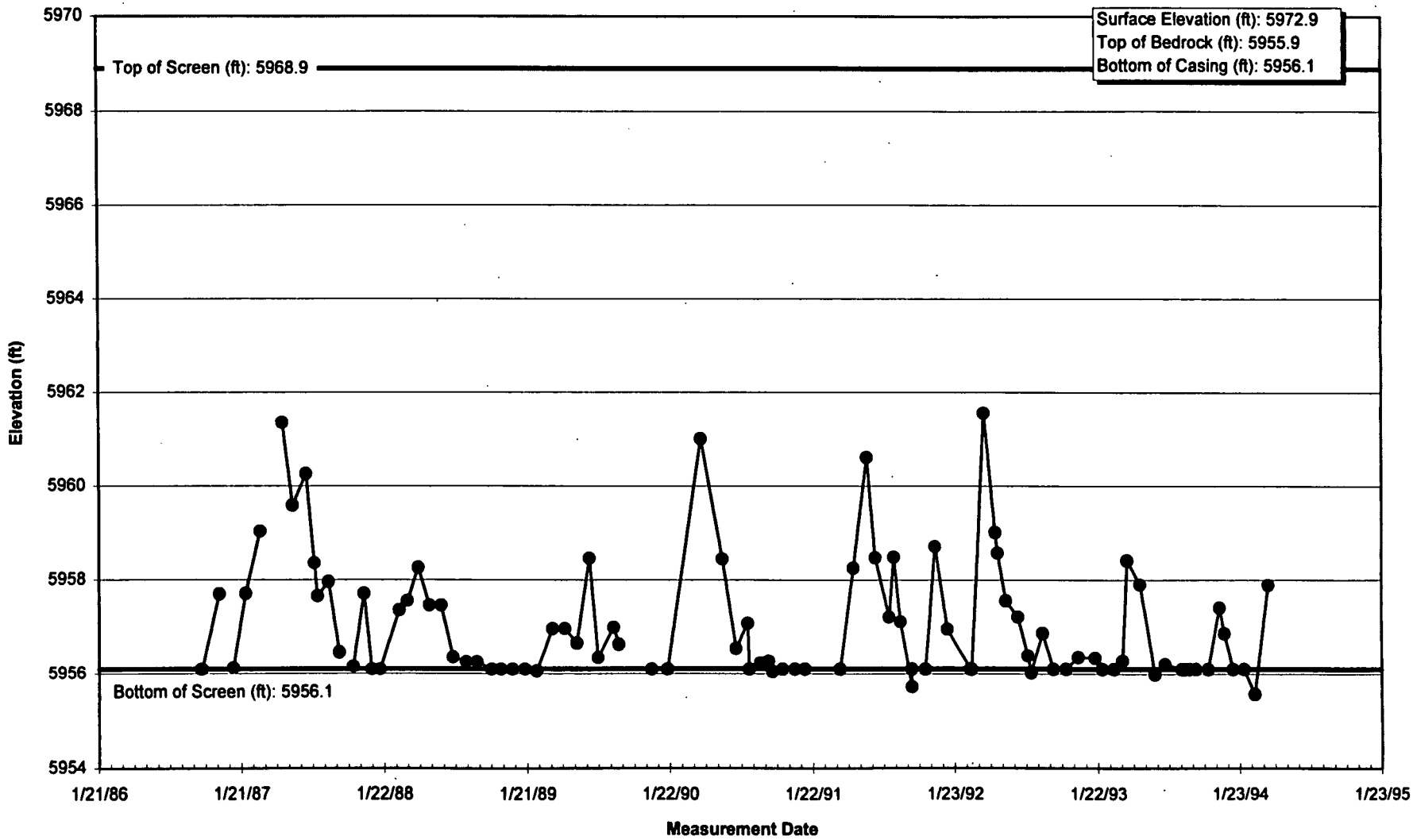
Hydrograph 4286



8689GRPH.XLS 4286

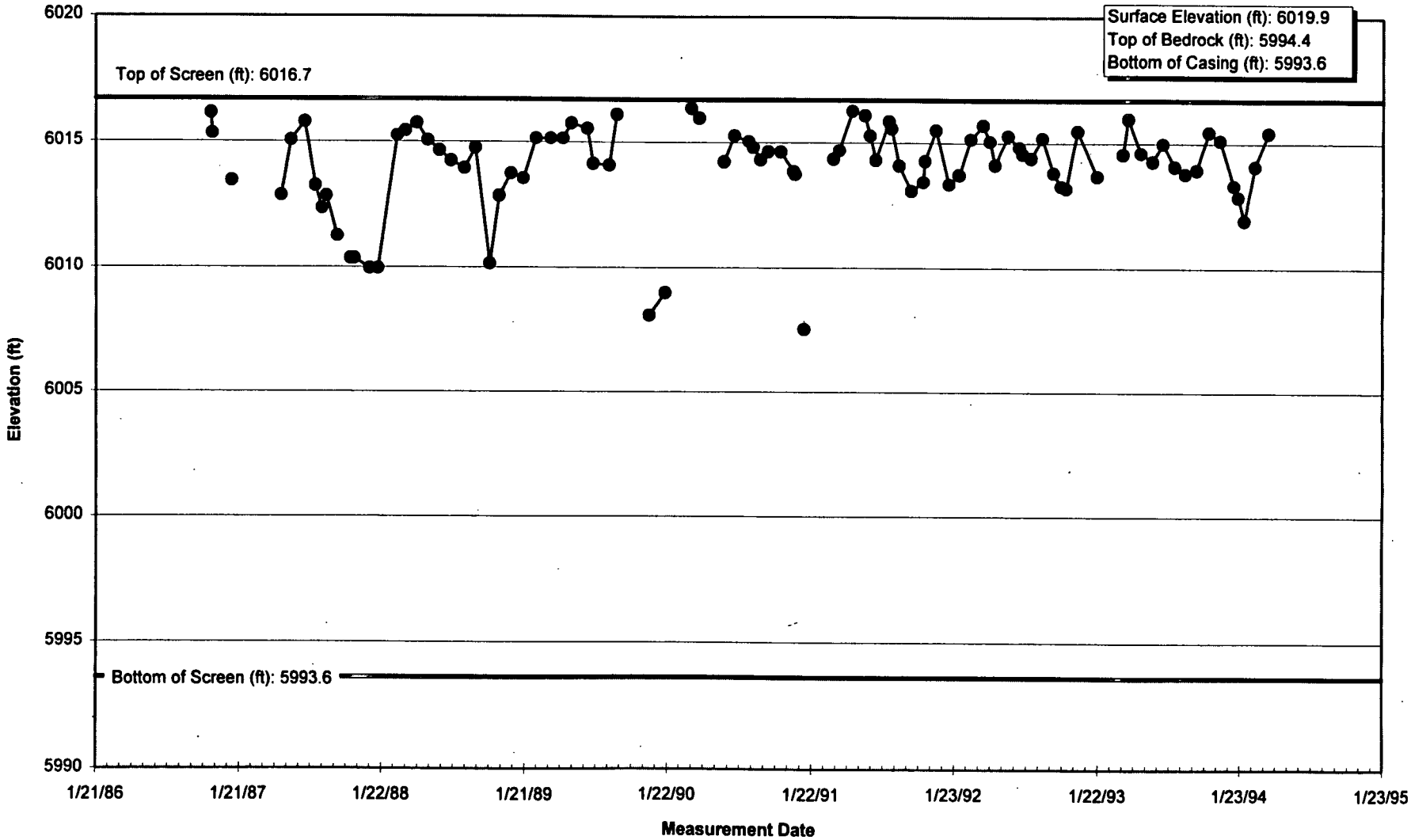
159

Hydrograph 4386



160

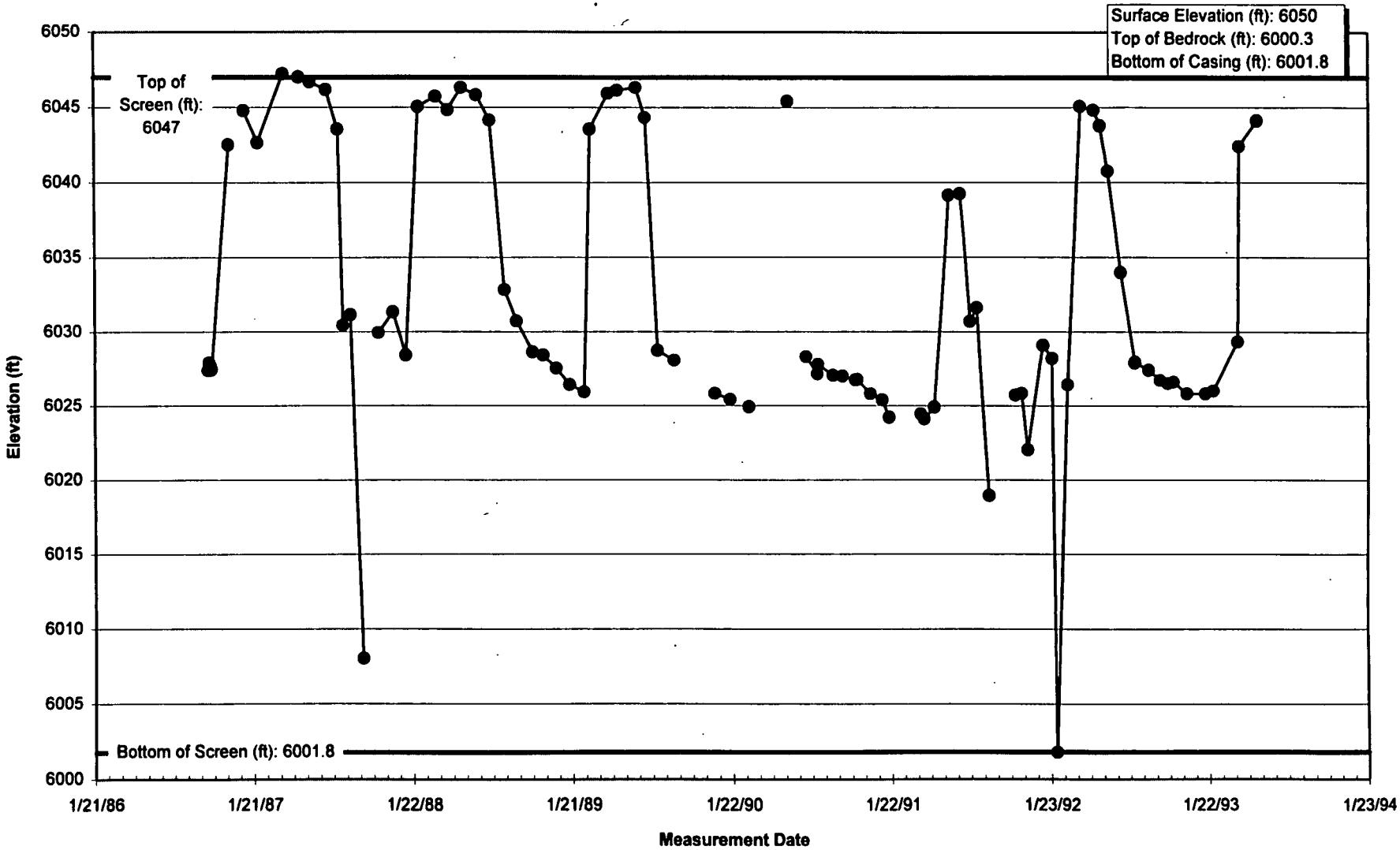
Hydrograph 4486



S11.XLS 4486 4/5/95

161

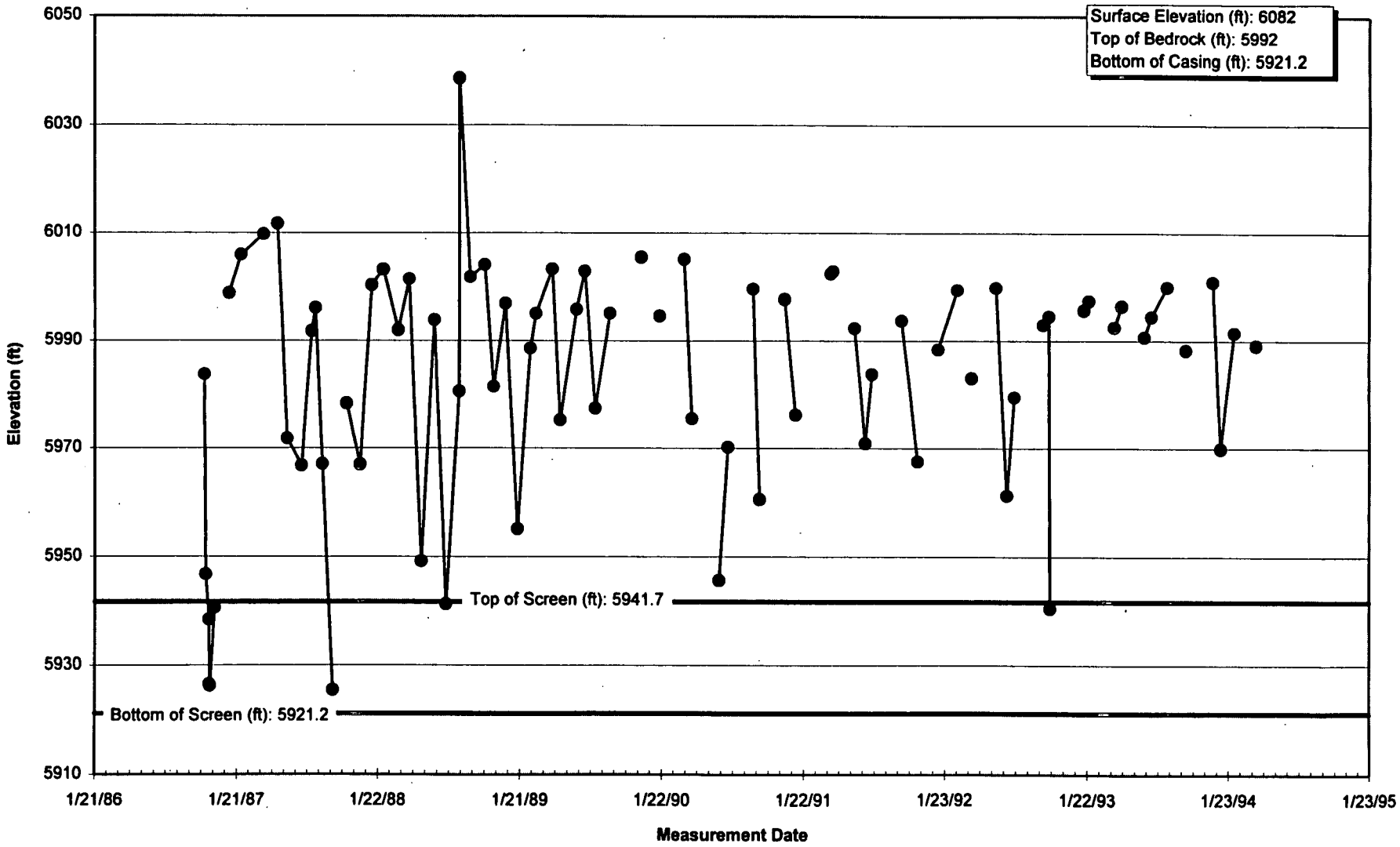
Hydrograph 4586



162

8689GR[illegible] 4586

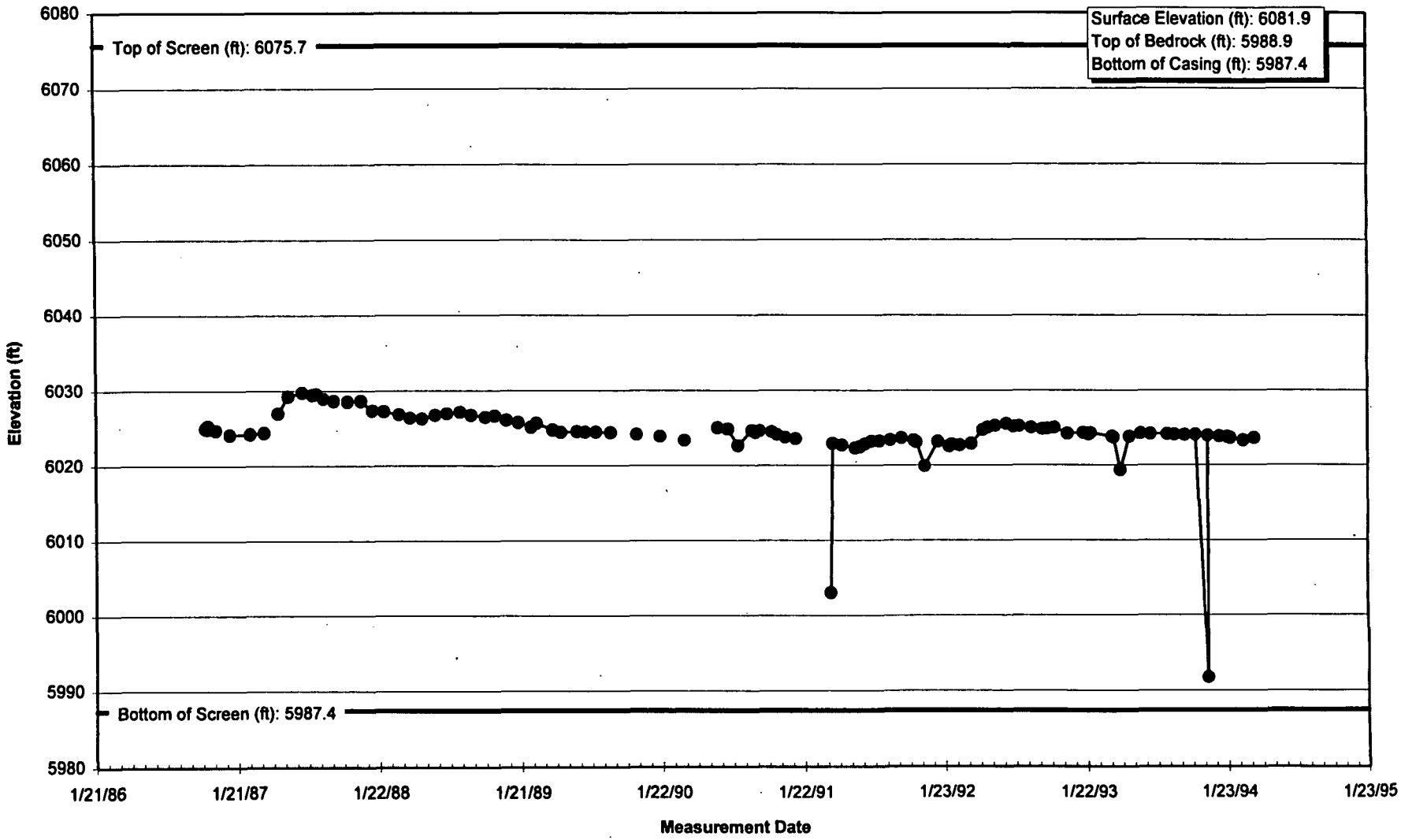
Hydrograph 4686



163

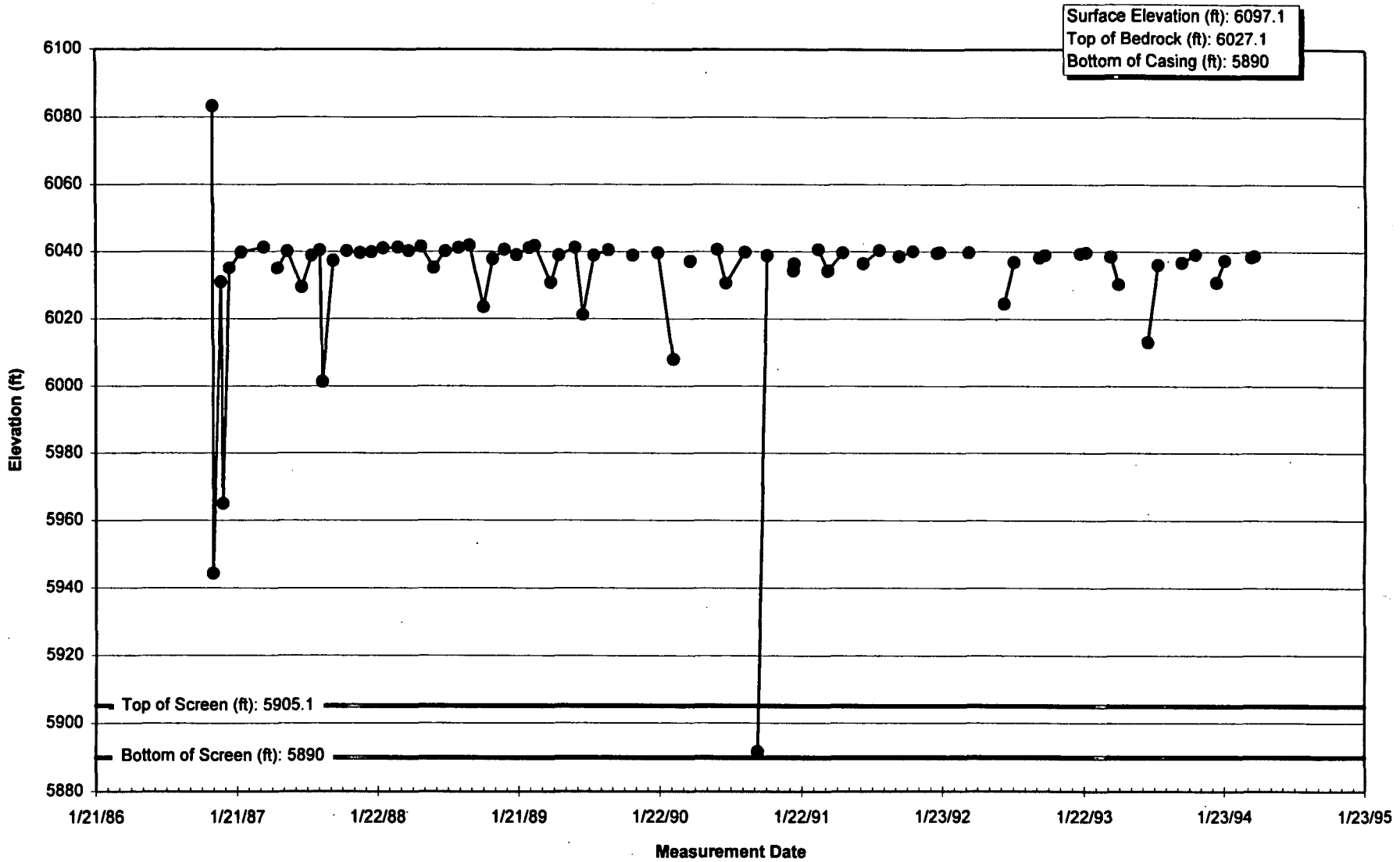
S12.XLS 4686 4/5/95

Hydrograph 4786



164

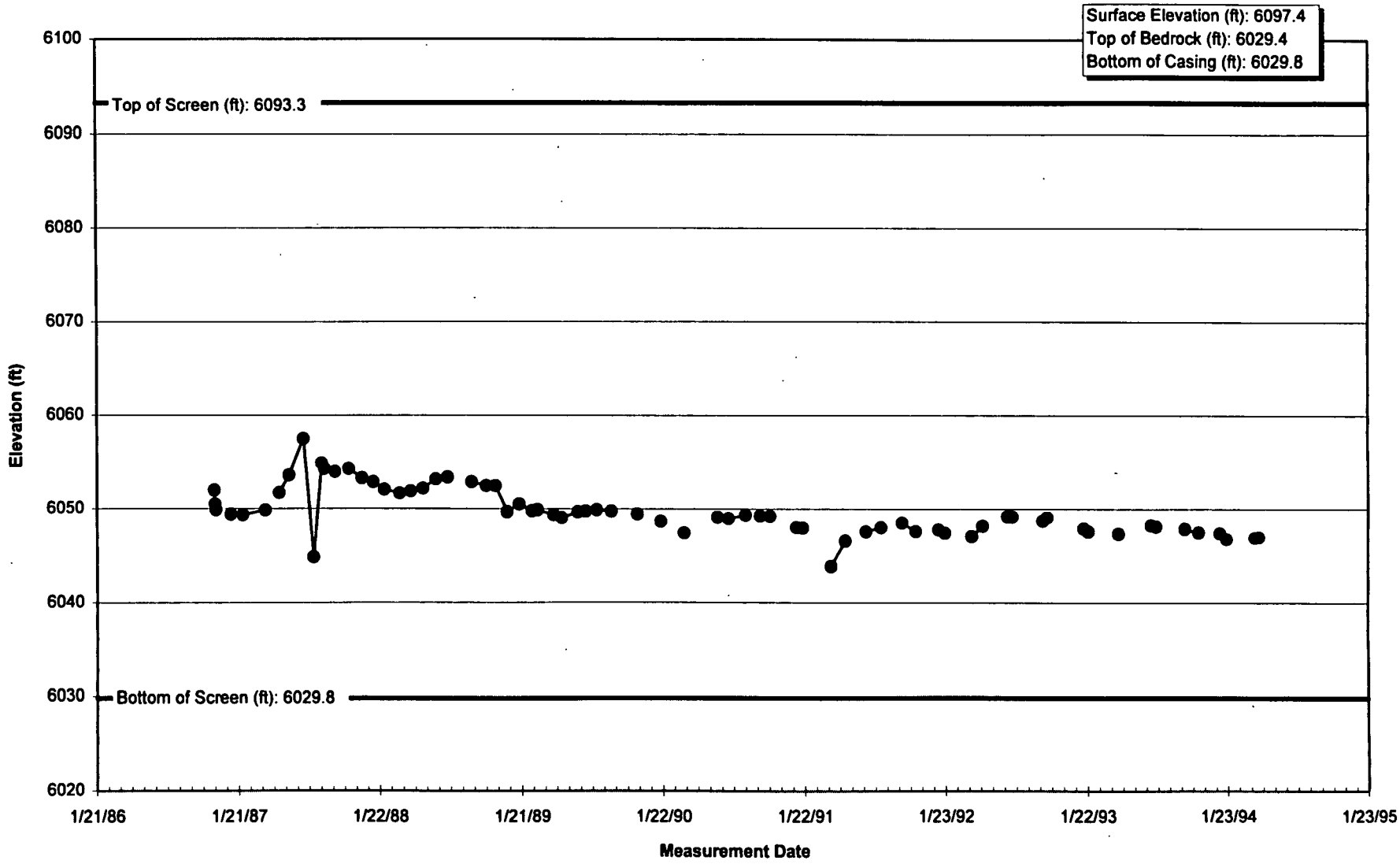
Hydrograph 4886



8689GRPH.XLS 4886

165

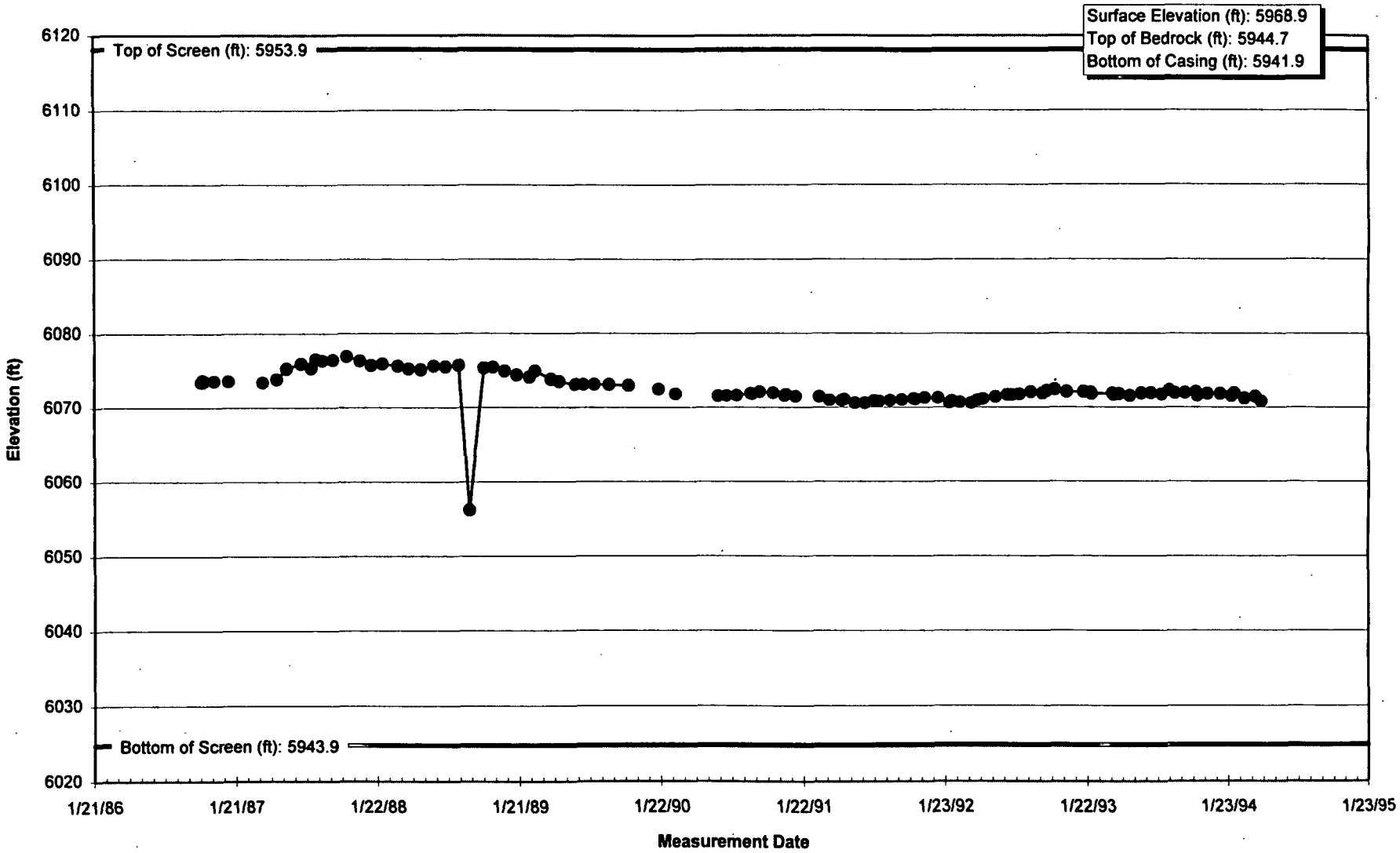
Hydrograph 4986



166

8689GR[redacted]S 4986

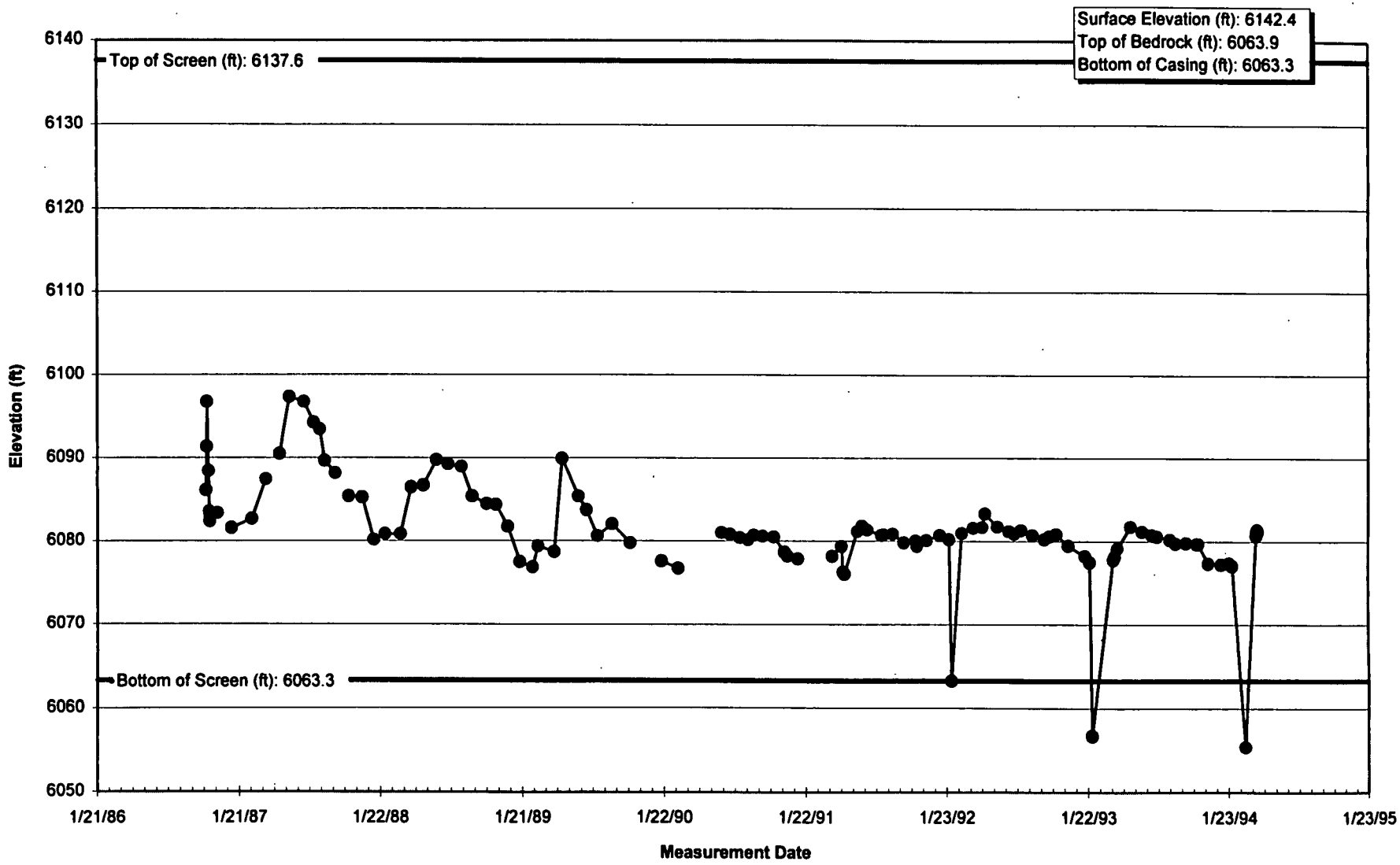
Hydrograph 5086



8689GRPH.XLS 5086

167

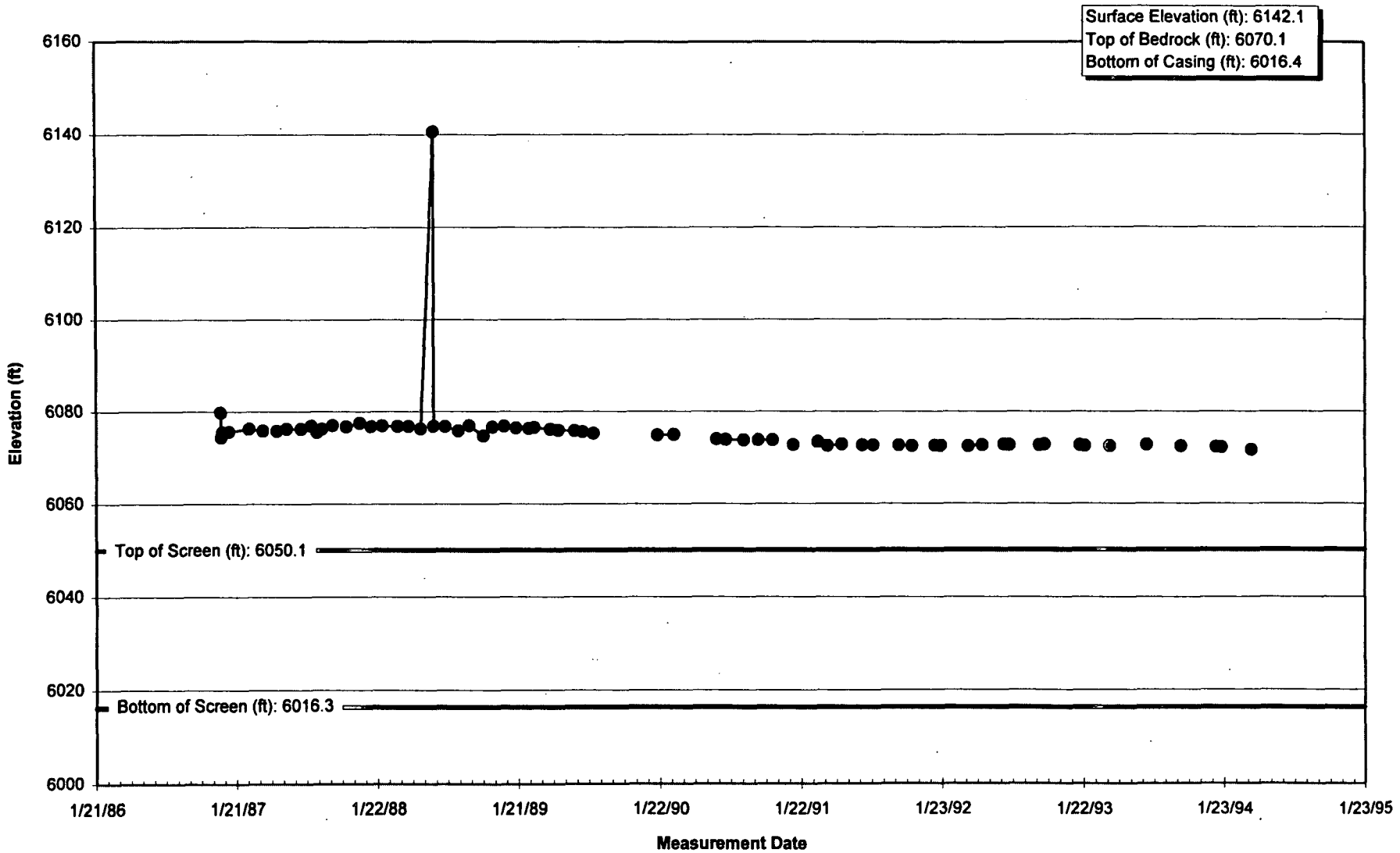
Hydrograph 5186



168

8689GRPH.XLS 5186

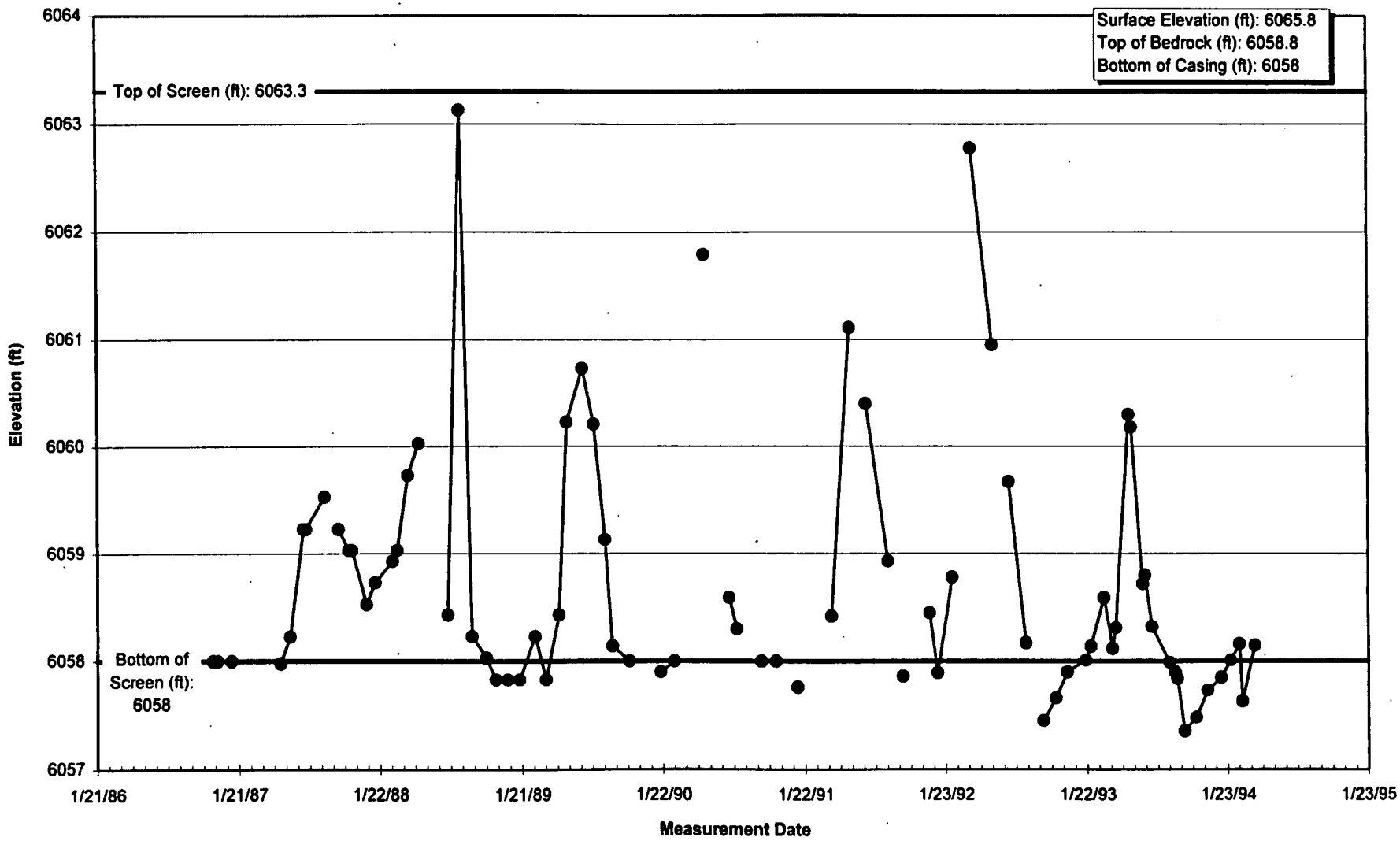
Hydrograph 5286



8689GRPH.XLS 5286

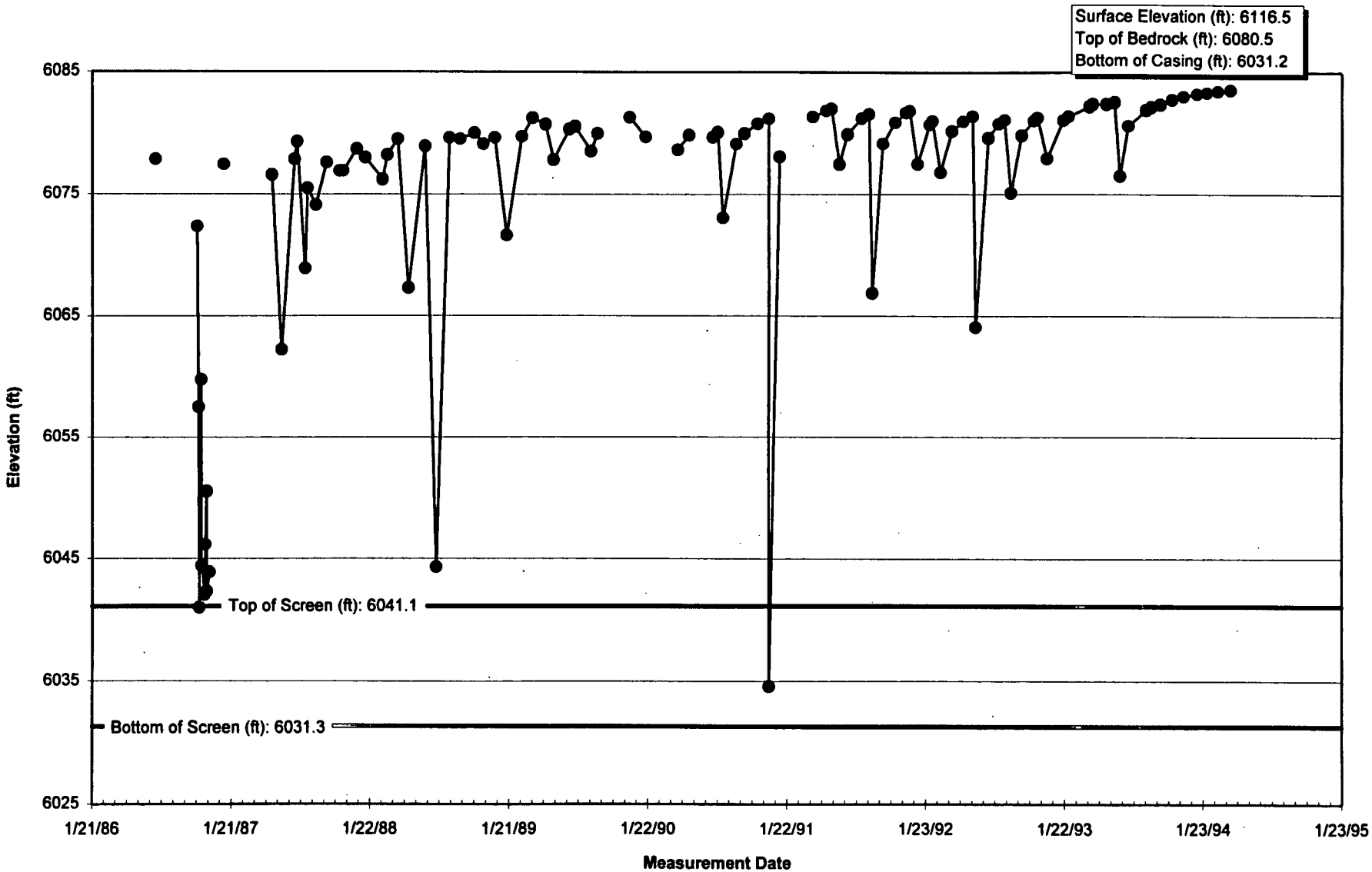
169

Hydrograph 5386



170

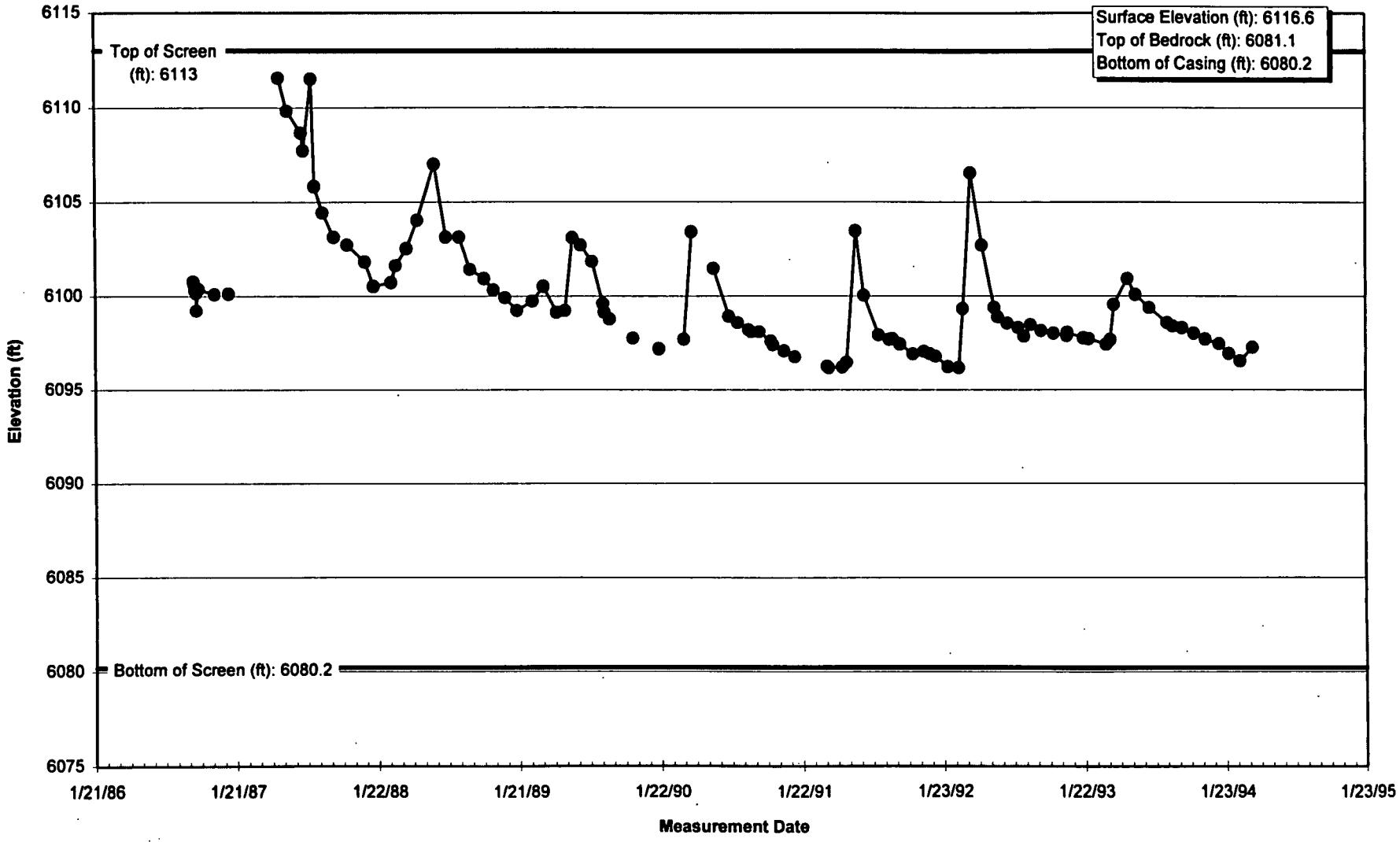
Hydrograph 5486



S13.XLS 5486 4/5/95

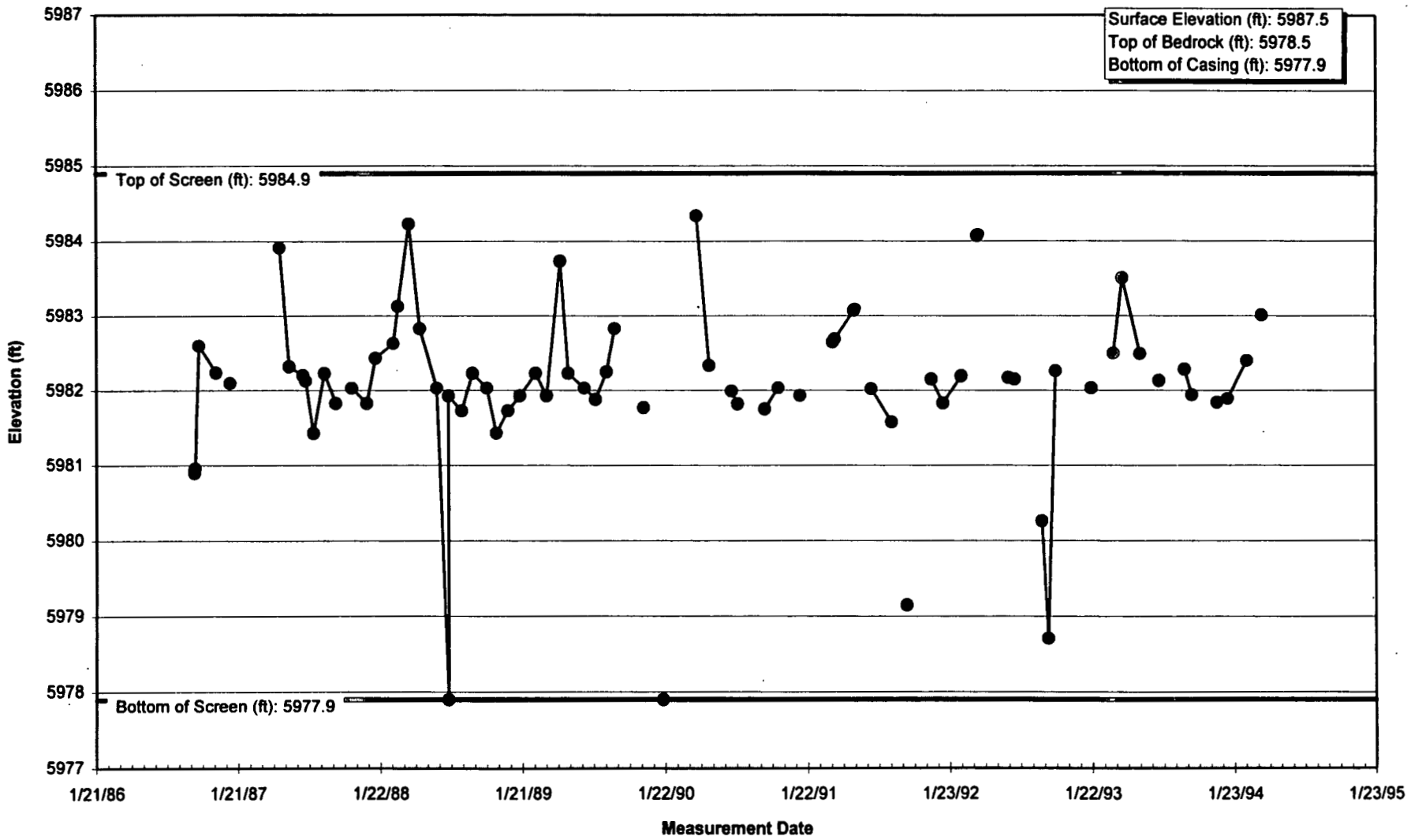
171

Hydrograph 5586



172

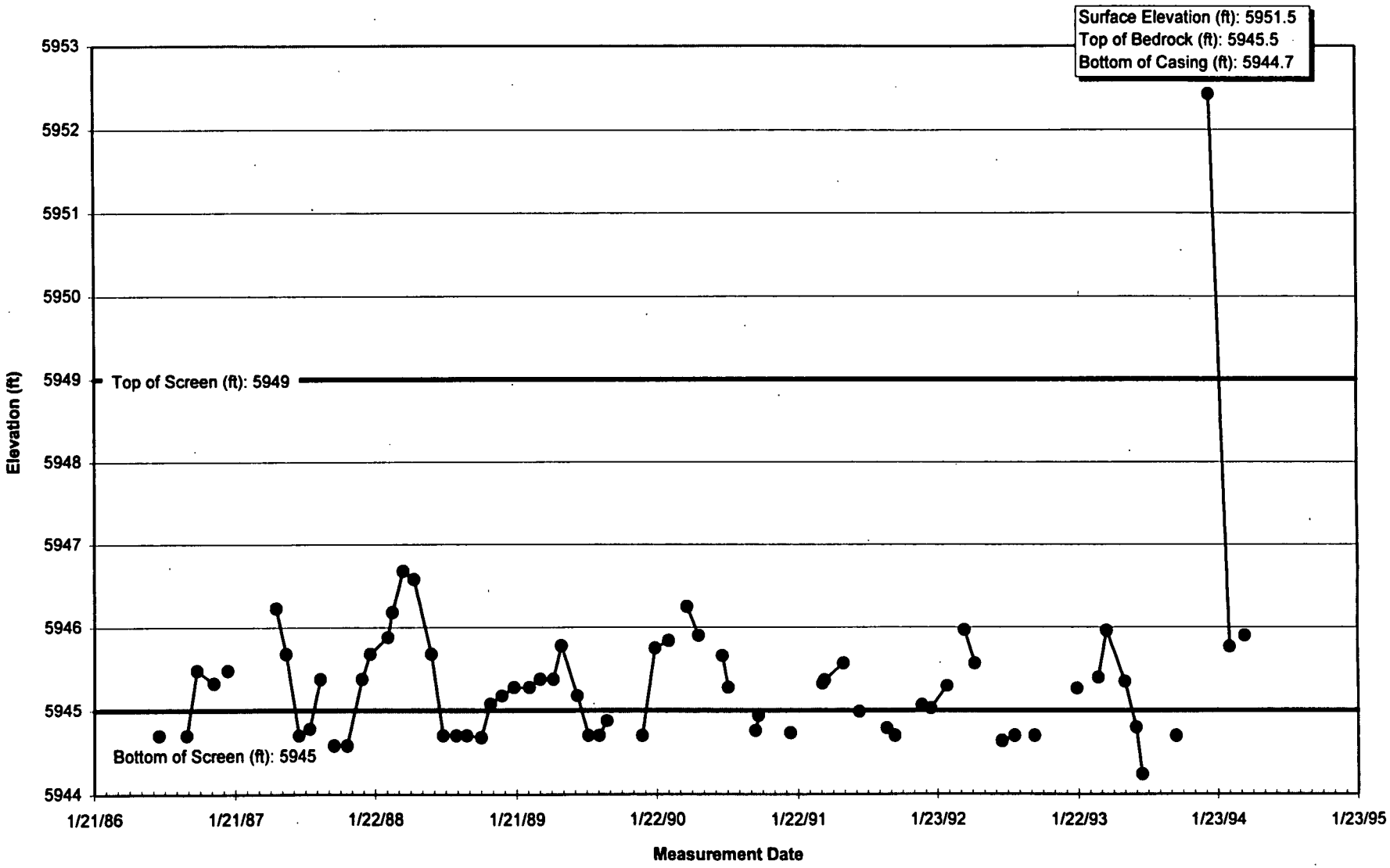
Hydrograph 5686



S13.XLS 5686 4/5/95

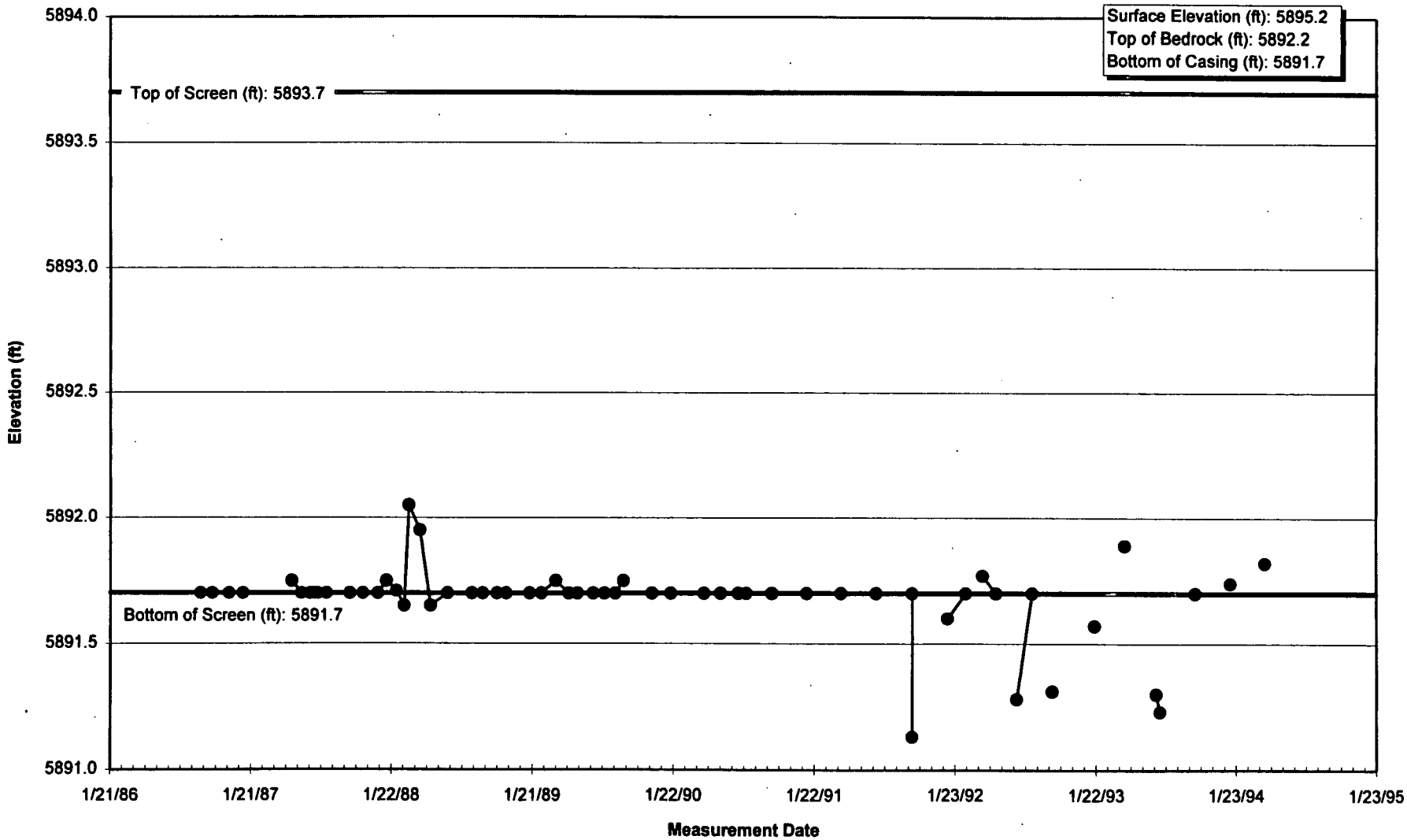
173

Hydrograph 5786



174

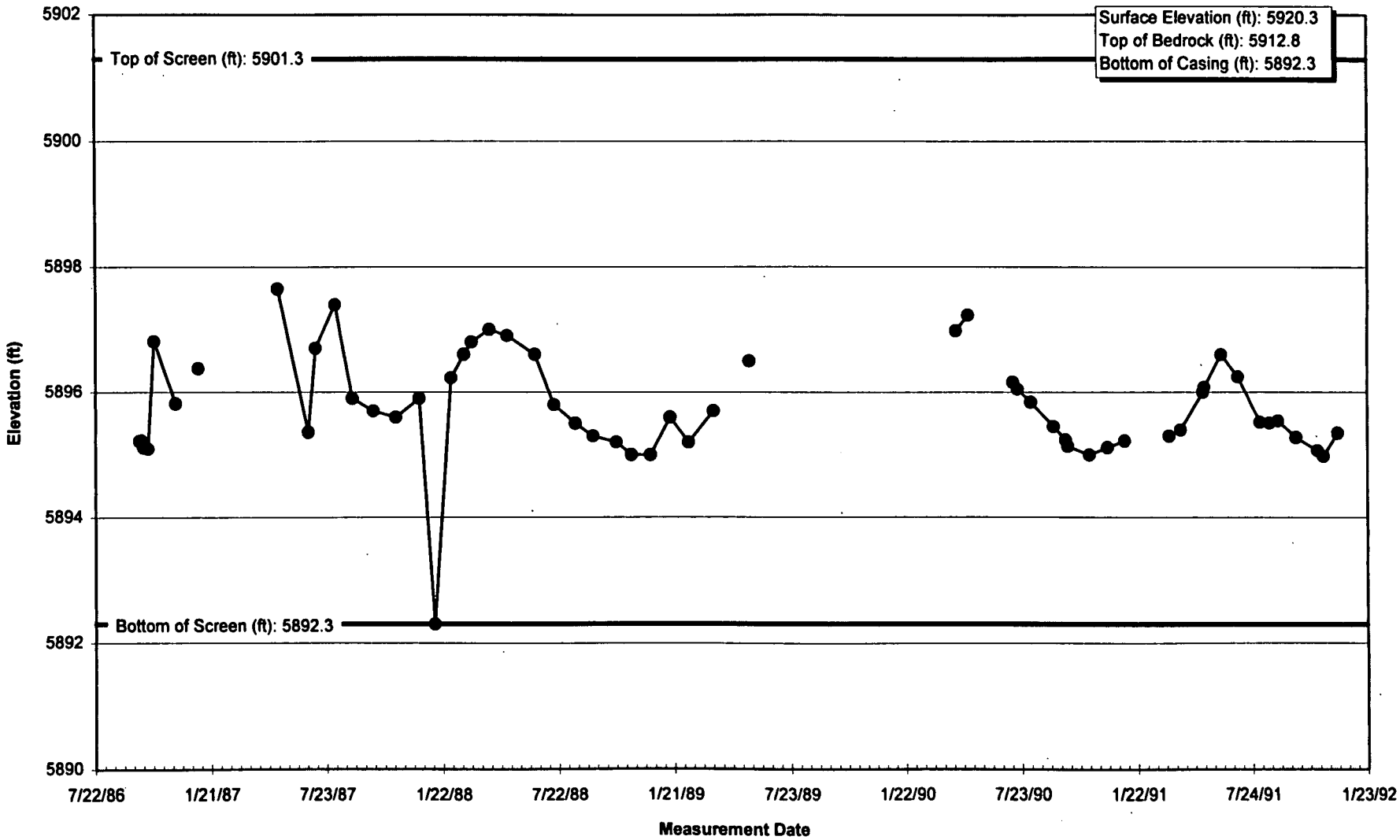
Hydrograph 5886



S14.XLS 5886 4/5/95

175

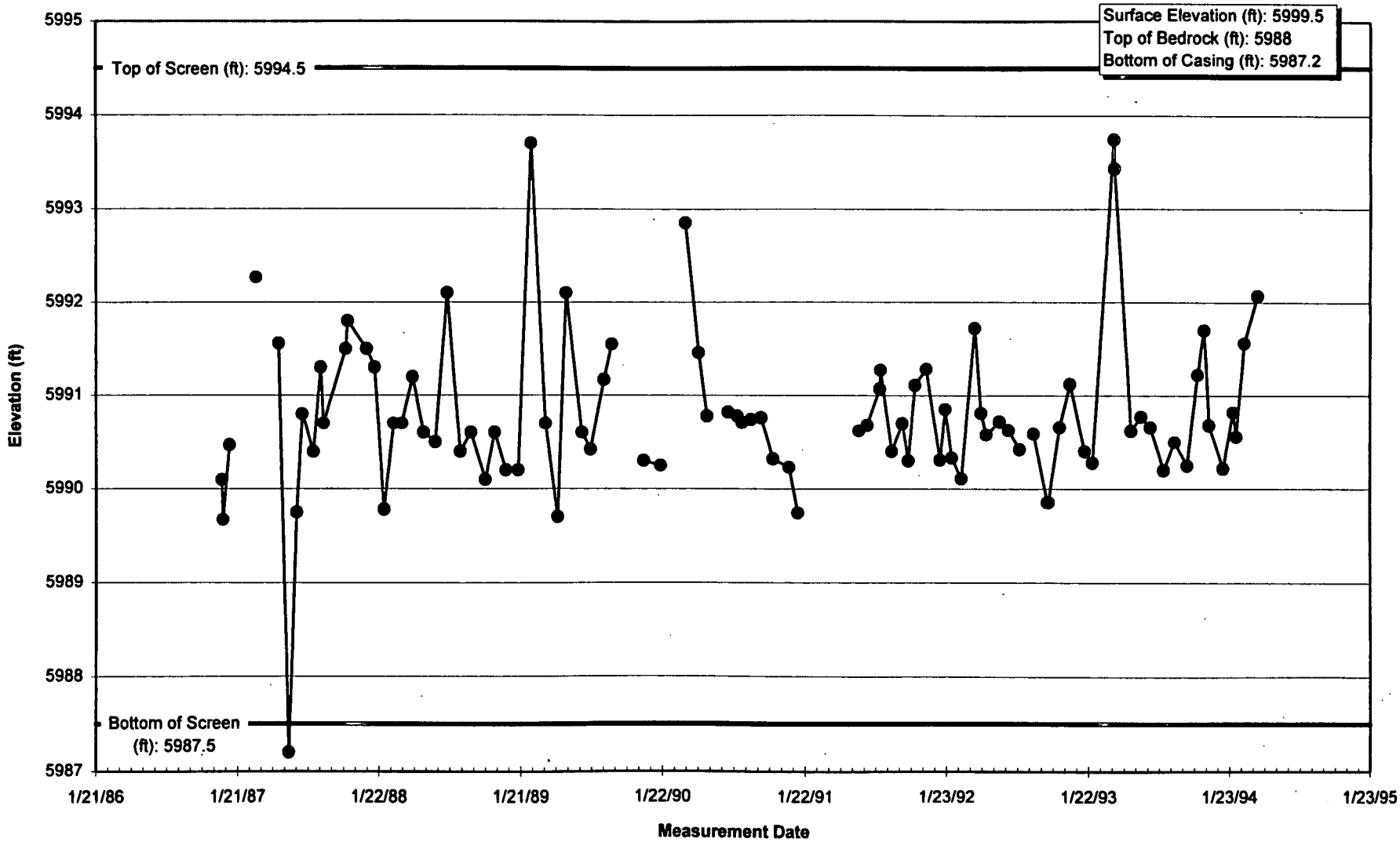
Hydrograph 5986



S14.XLS 5986 4/5/95

176

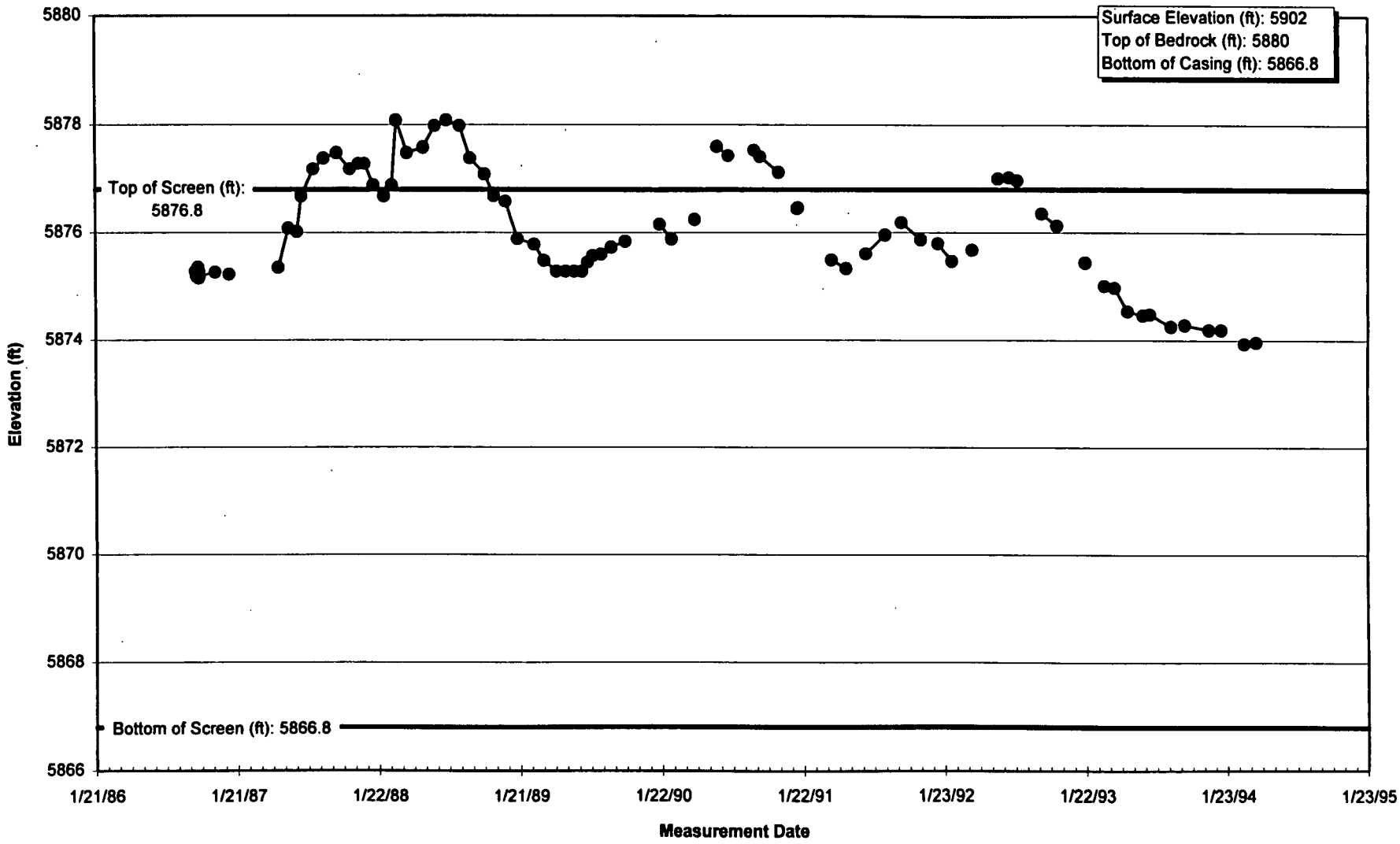
Hydrograph 6186



S14.XLS 6186 4/5/95

177

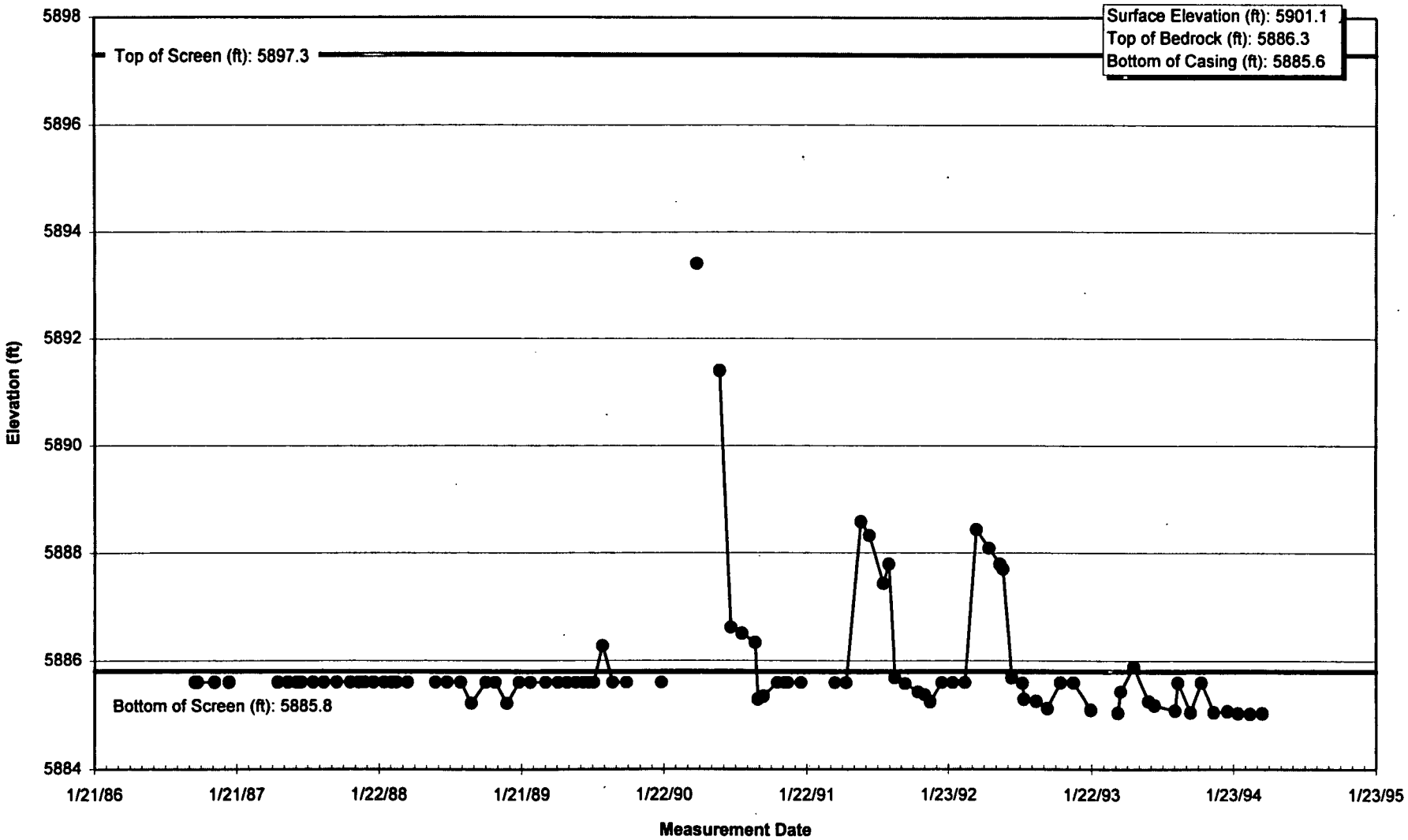
Hydrograph 6286



178

S14.XLS 6286 4/5/95

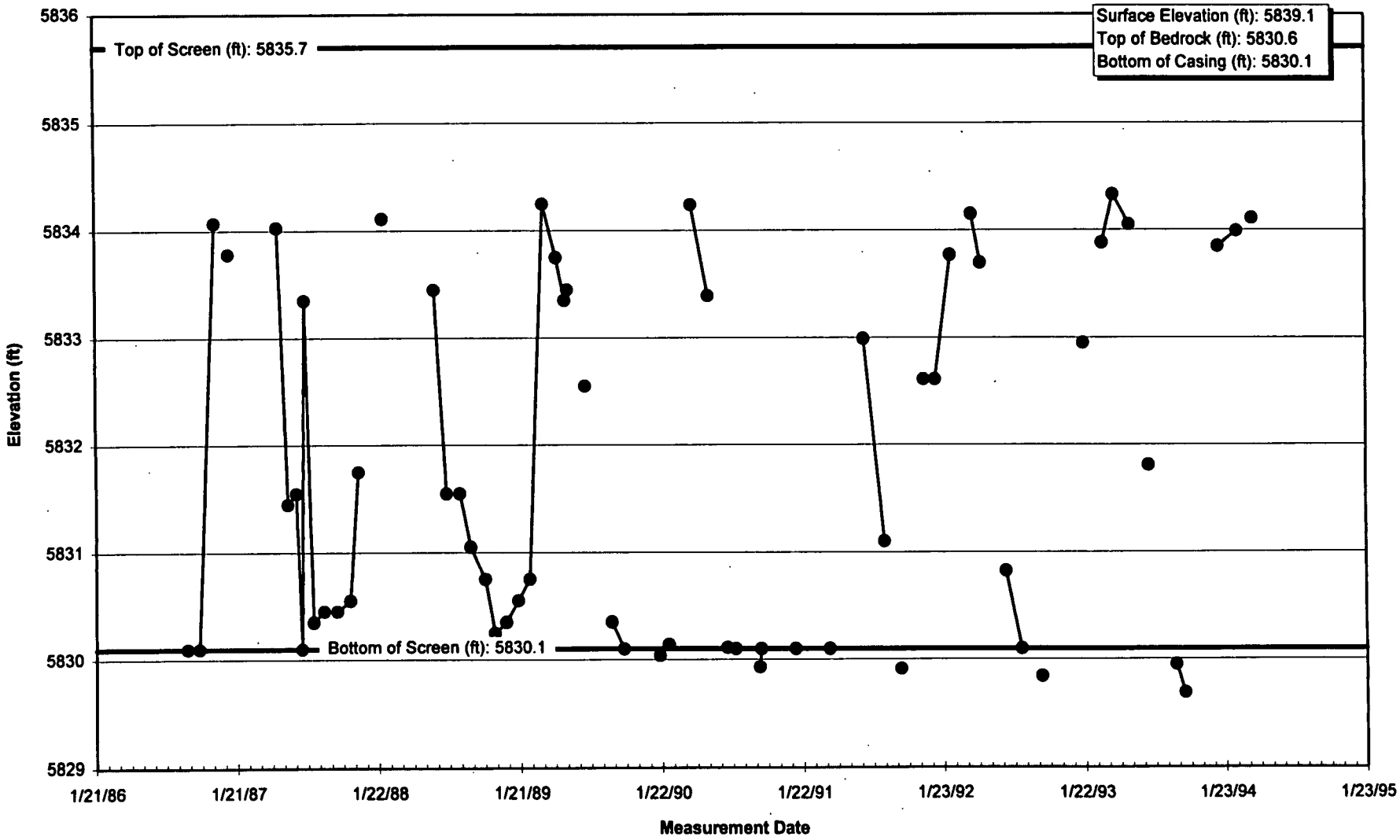
Hydrograph 6386



S14.XLS 6386 4/5/95

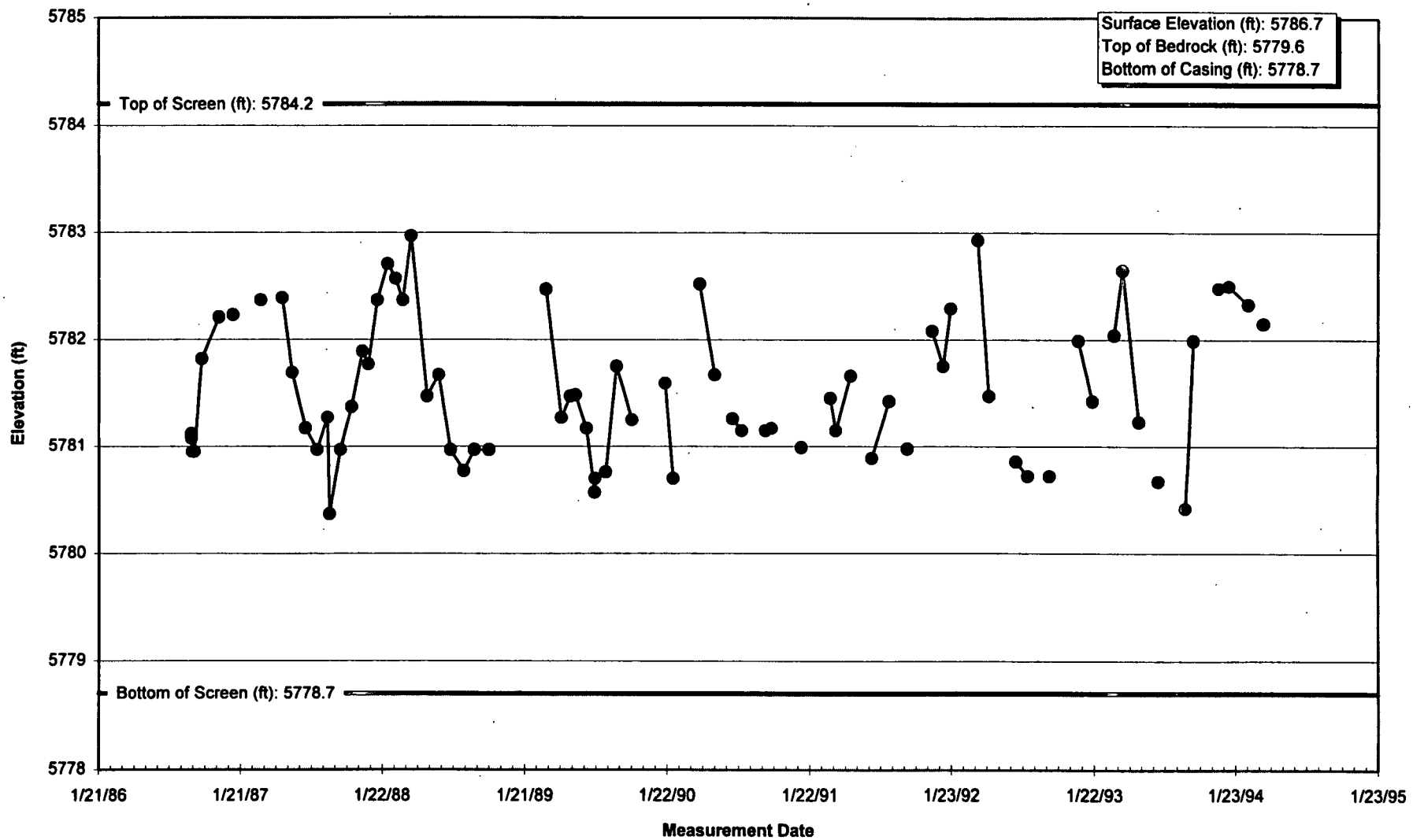
179

Hydrograph 6486



180

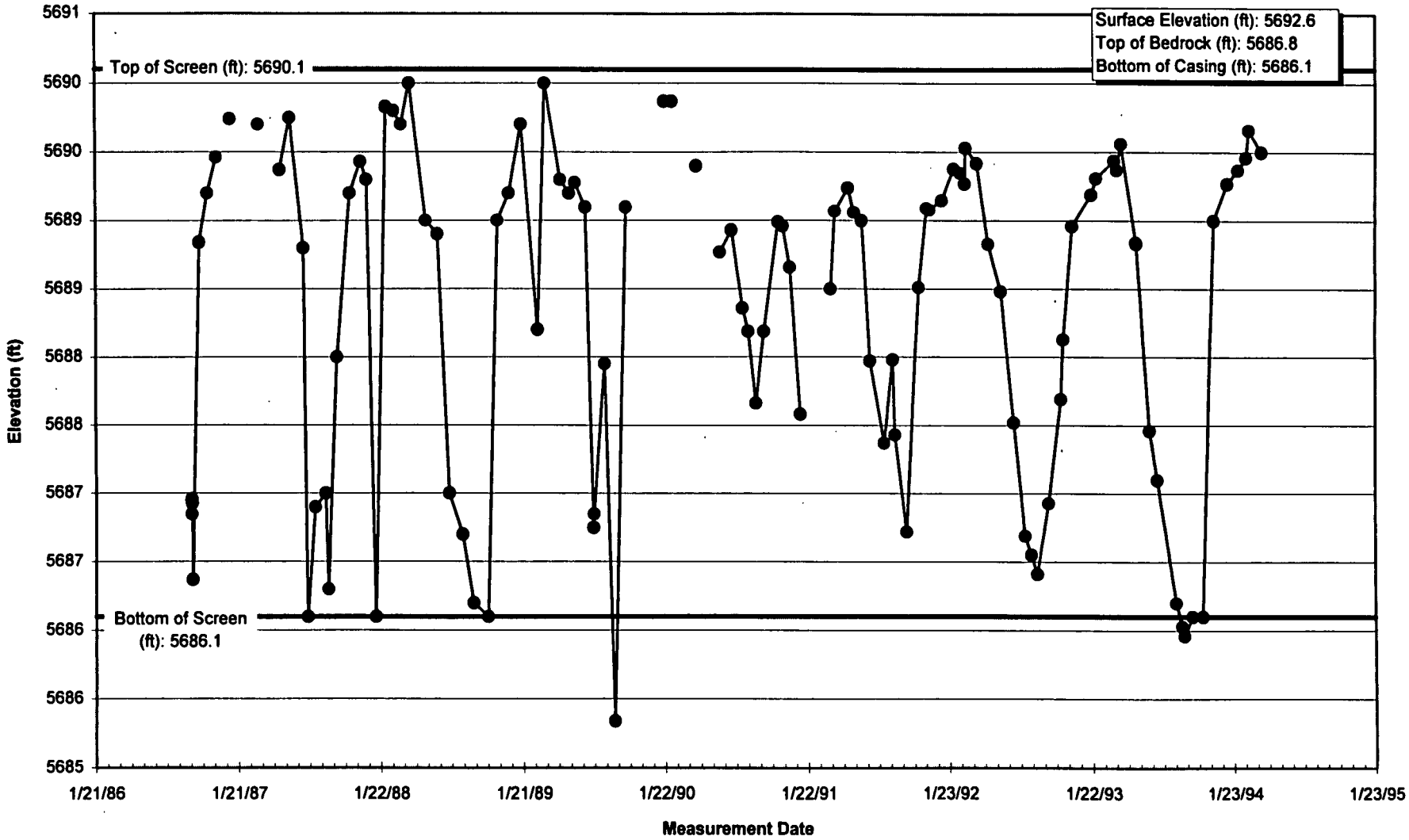
Hydrograph 6586



S14.XLS 6586 4/6/95

181

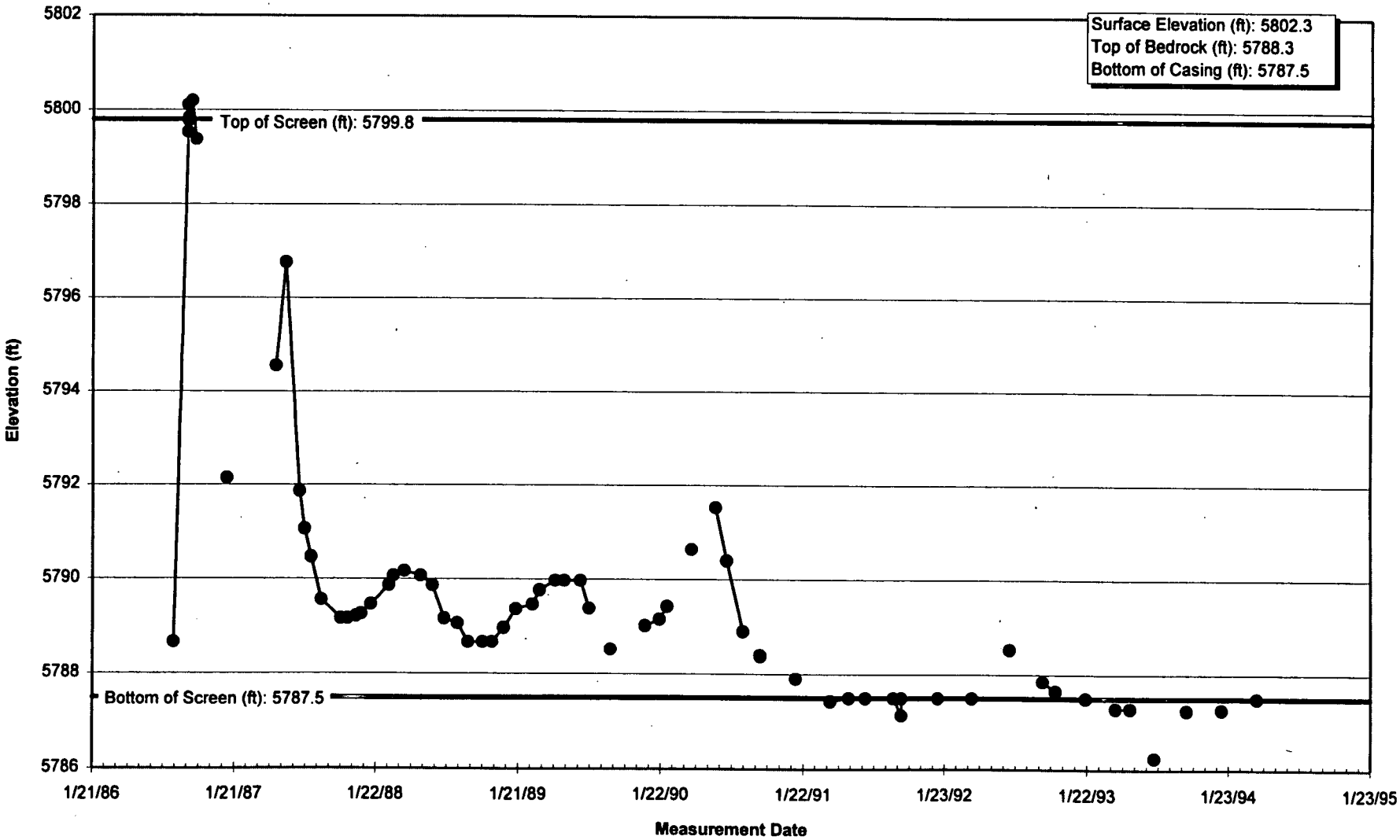
Hydrograph 6686



182

S15.XLS 4/6/95

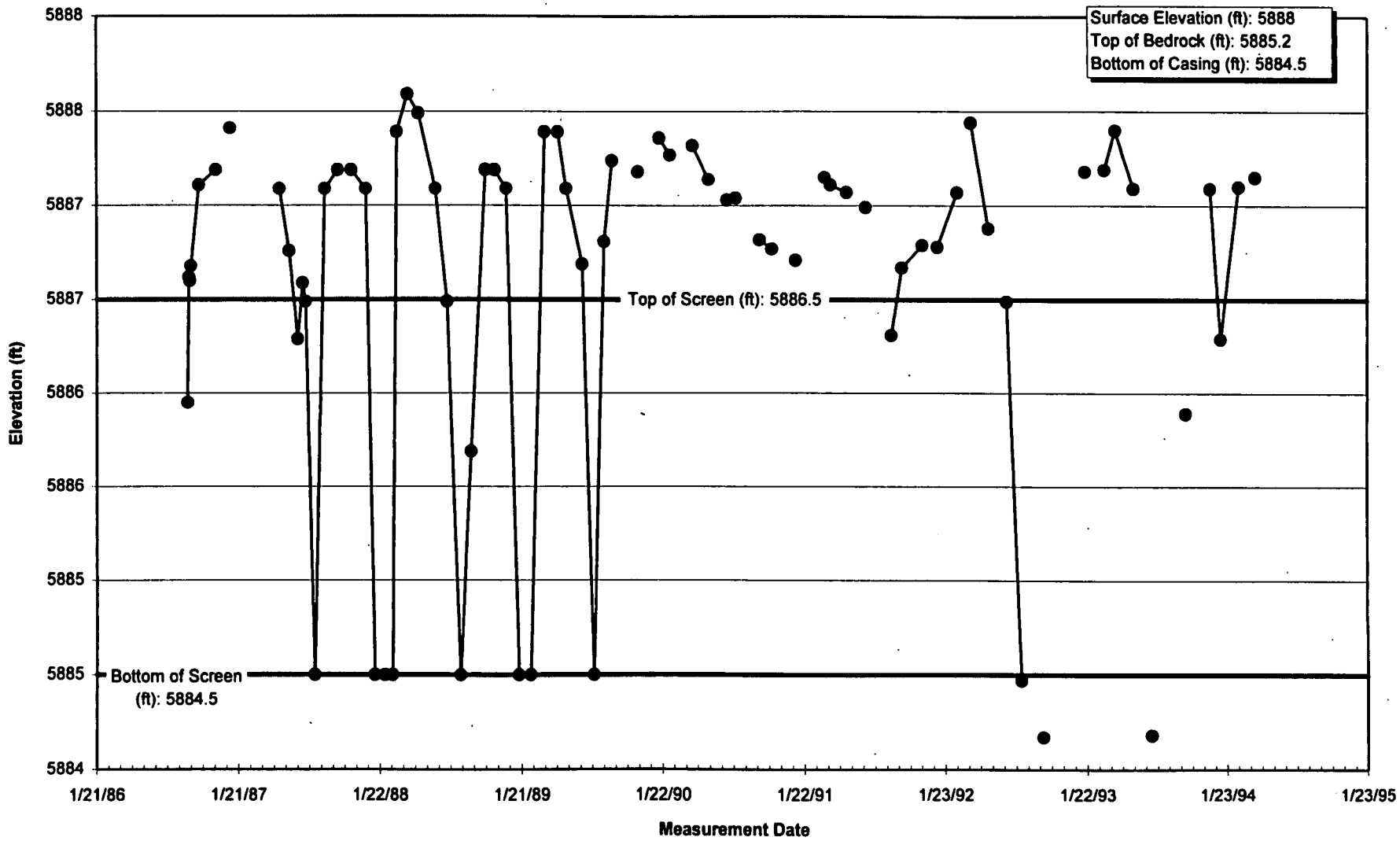
Hydrograph 6786



S15.XLS 6786 4/6/95

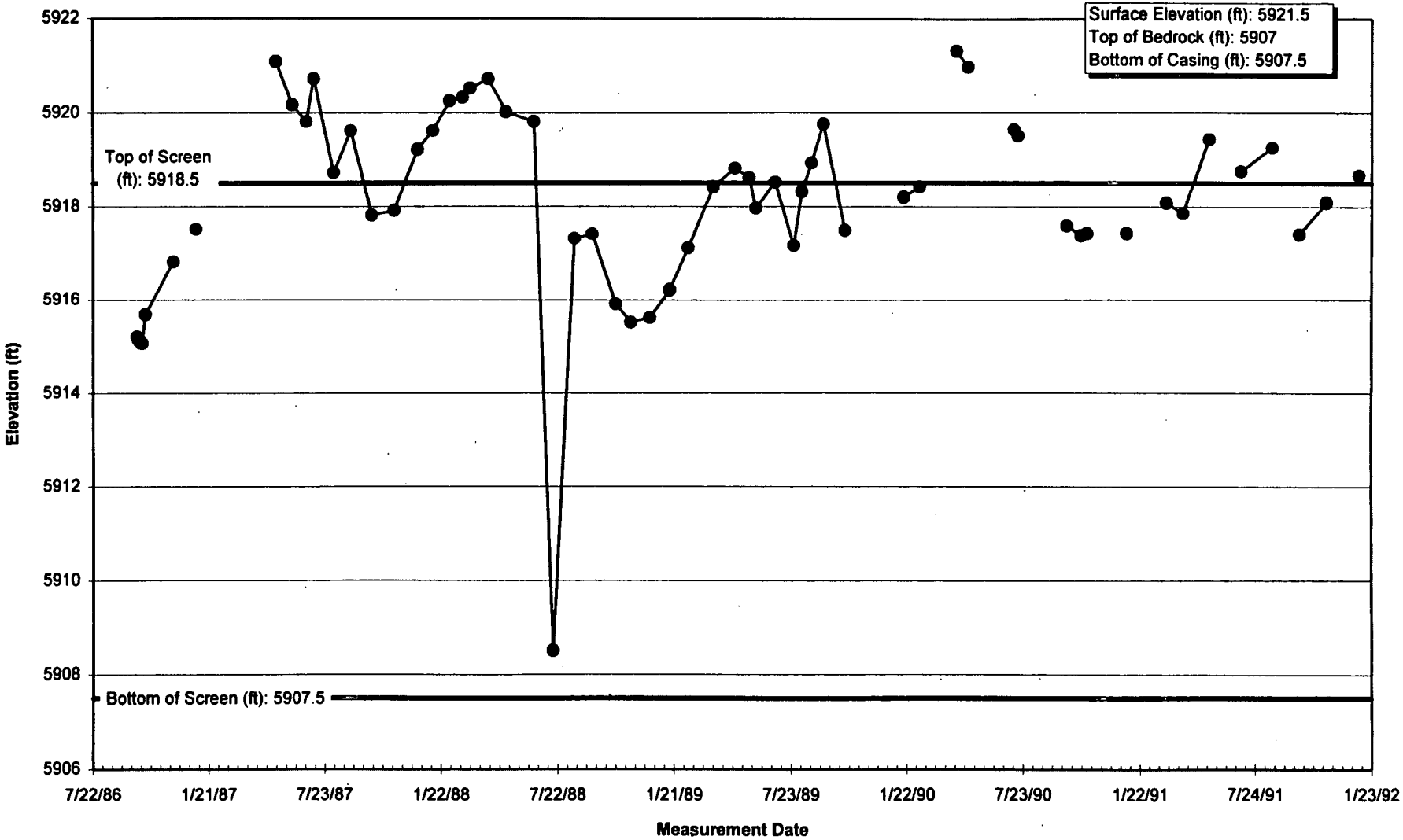
183

Hydrograph 6886



184

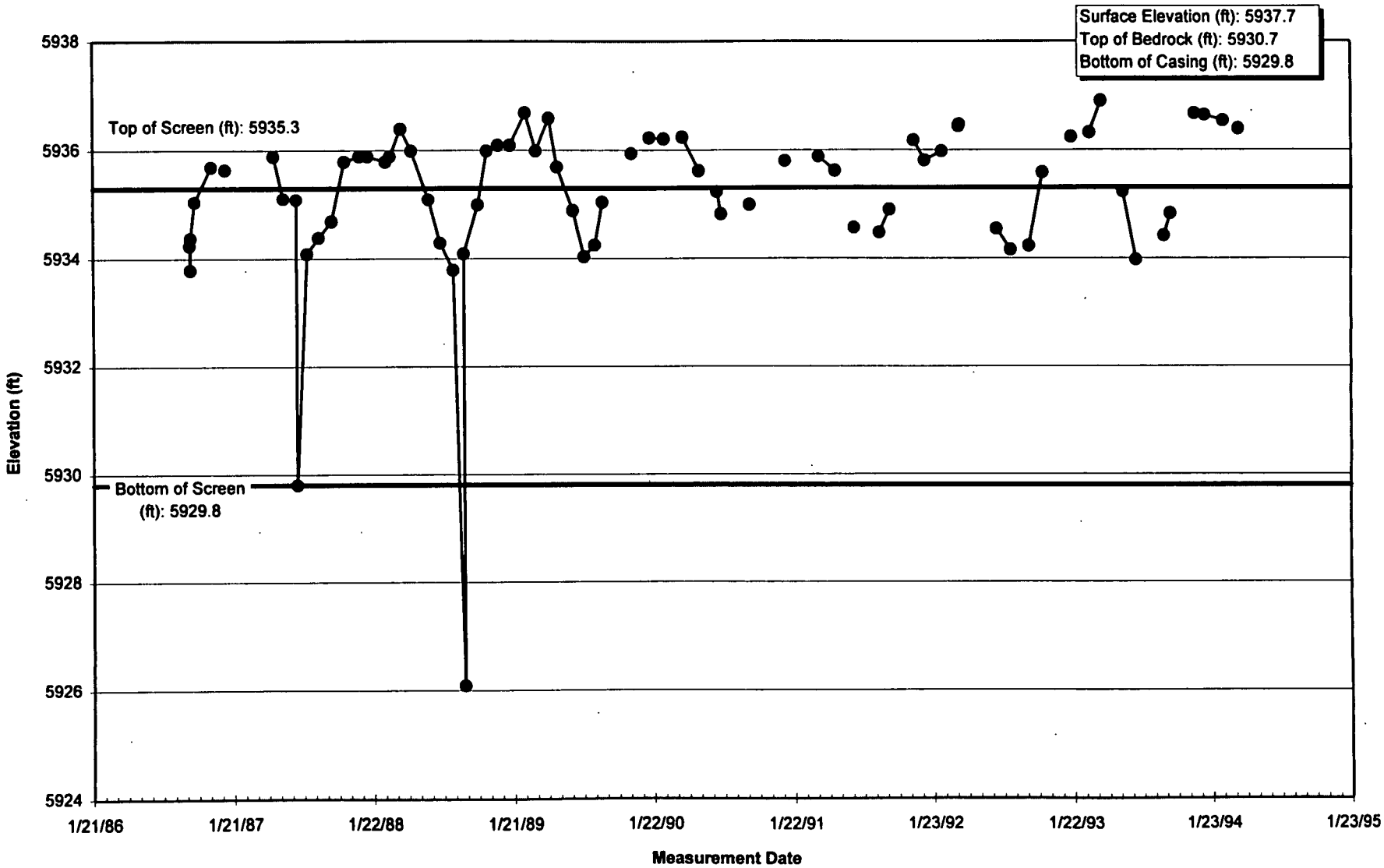
Hydrograph 6986



185

S15.XLS 6986 4/6/95

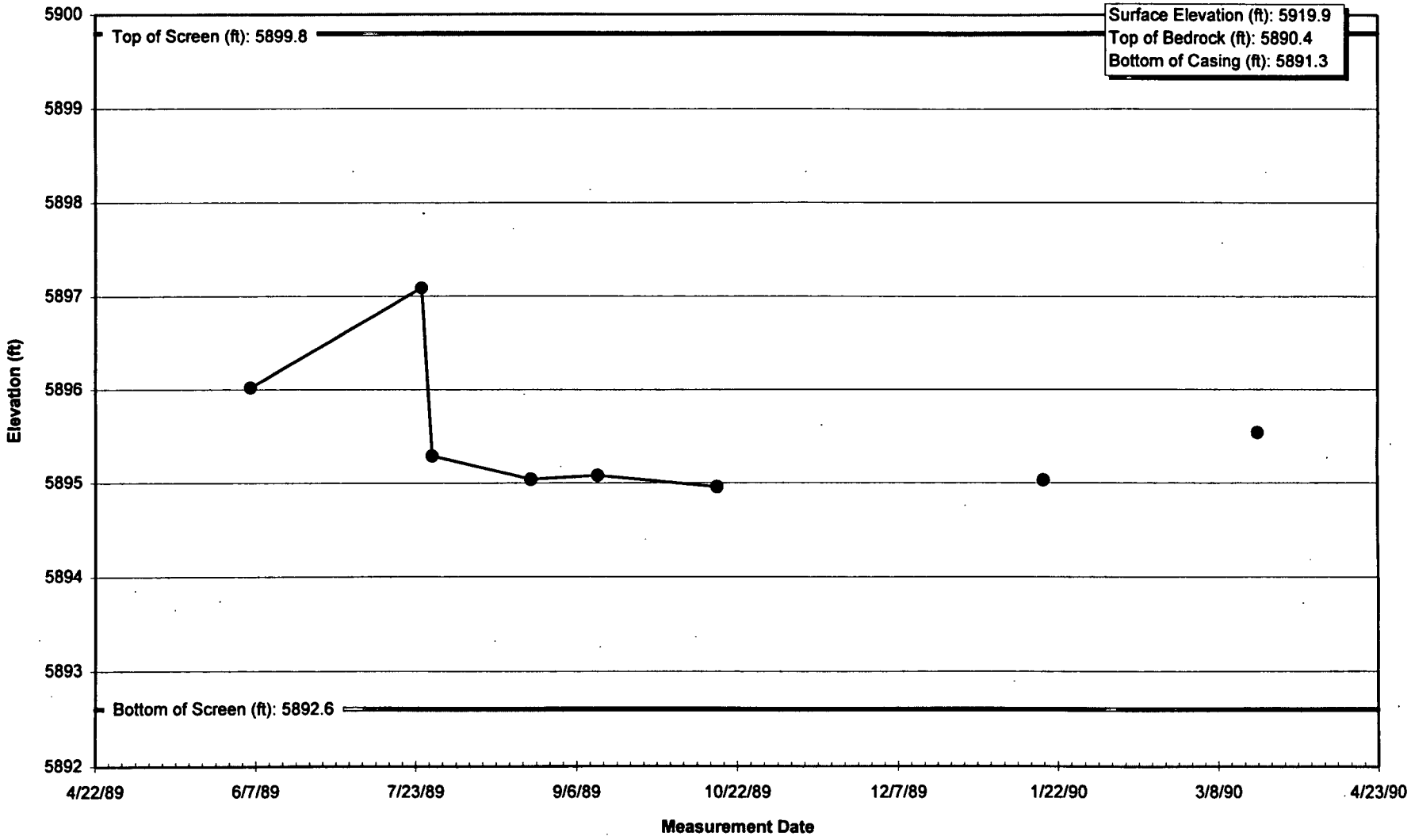
Hydrograph 7086



186

S15.XLS 4/6/95

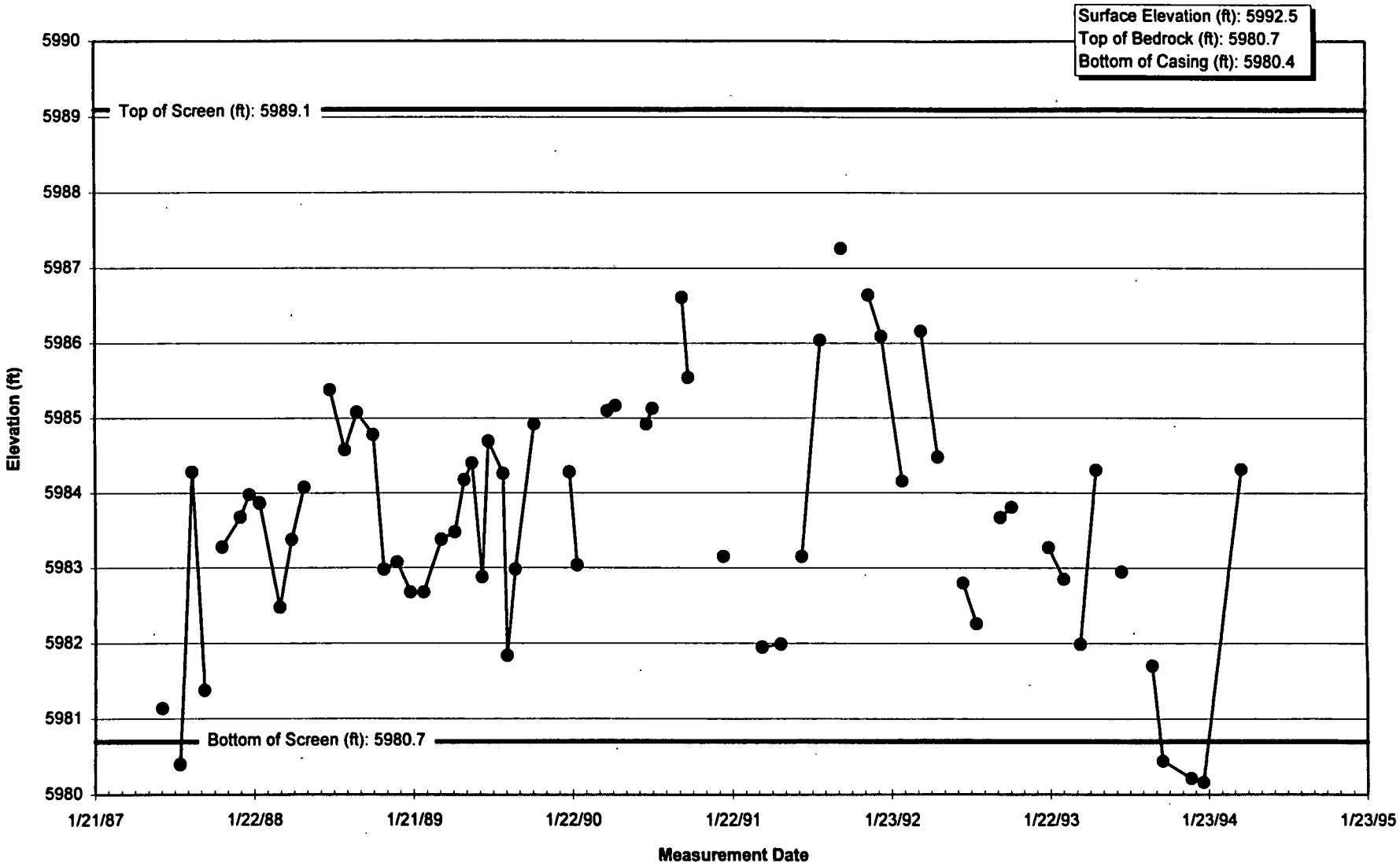
Hydrograph 5986R



S14.XLS 5986R 4/5/95

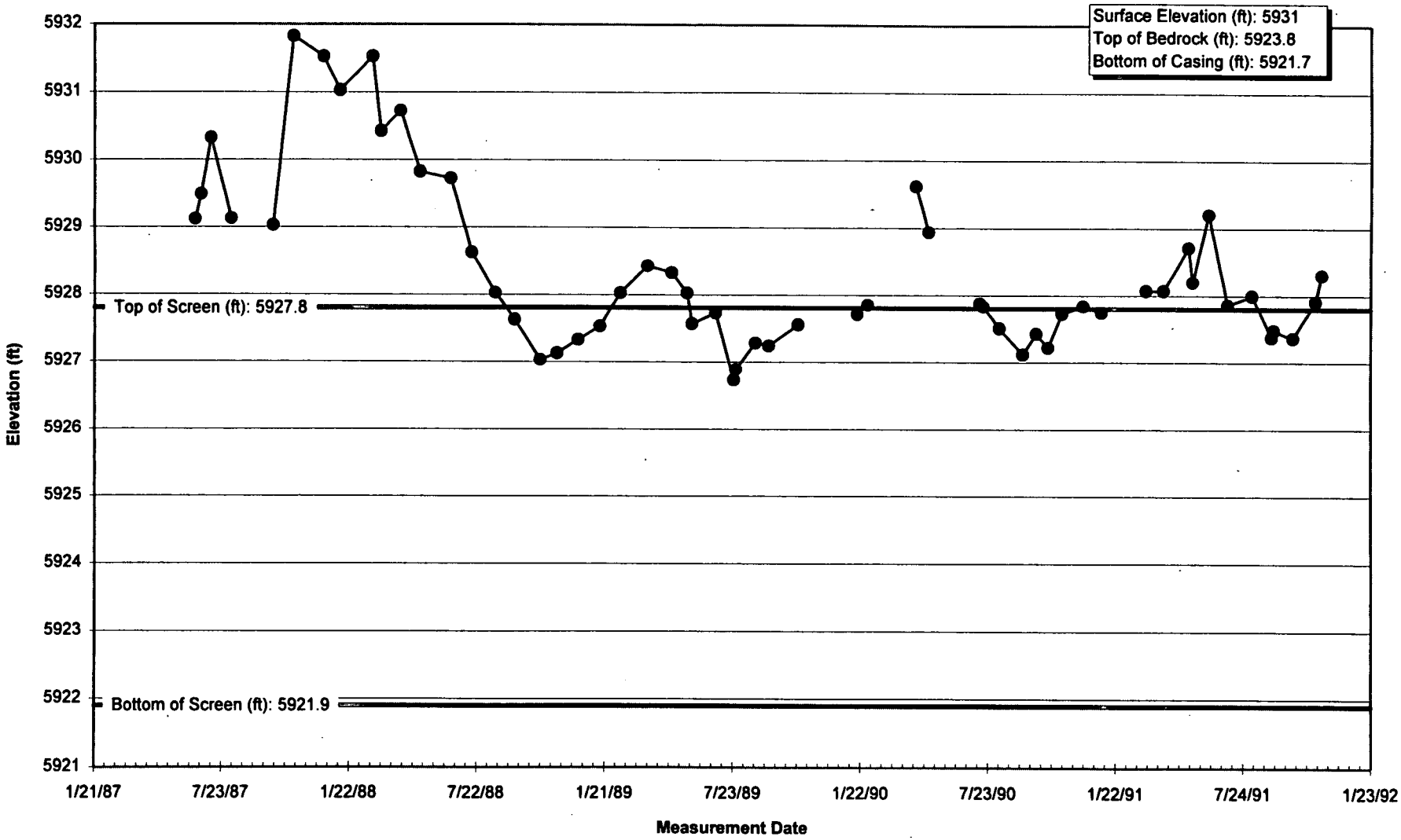
187

Hydrograph 0187



188

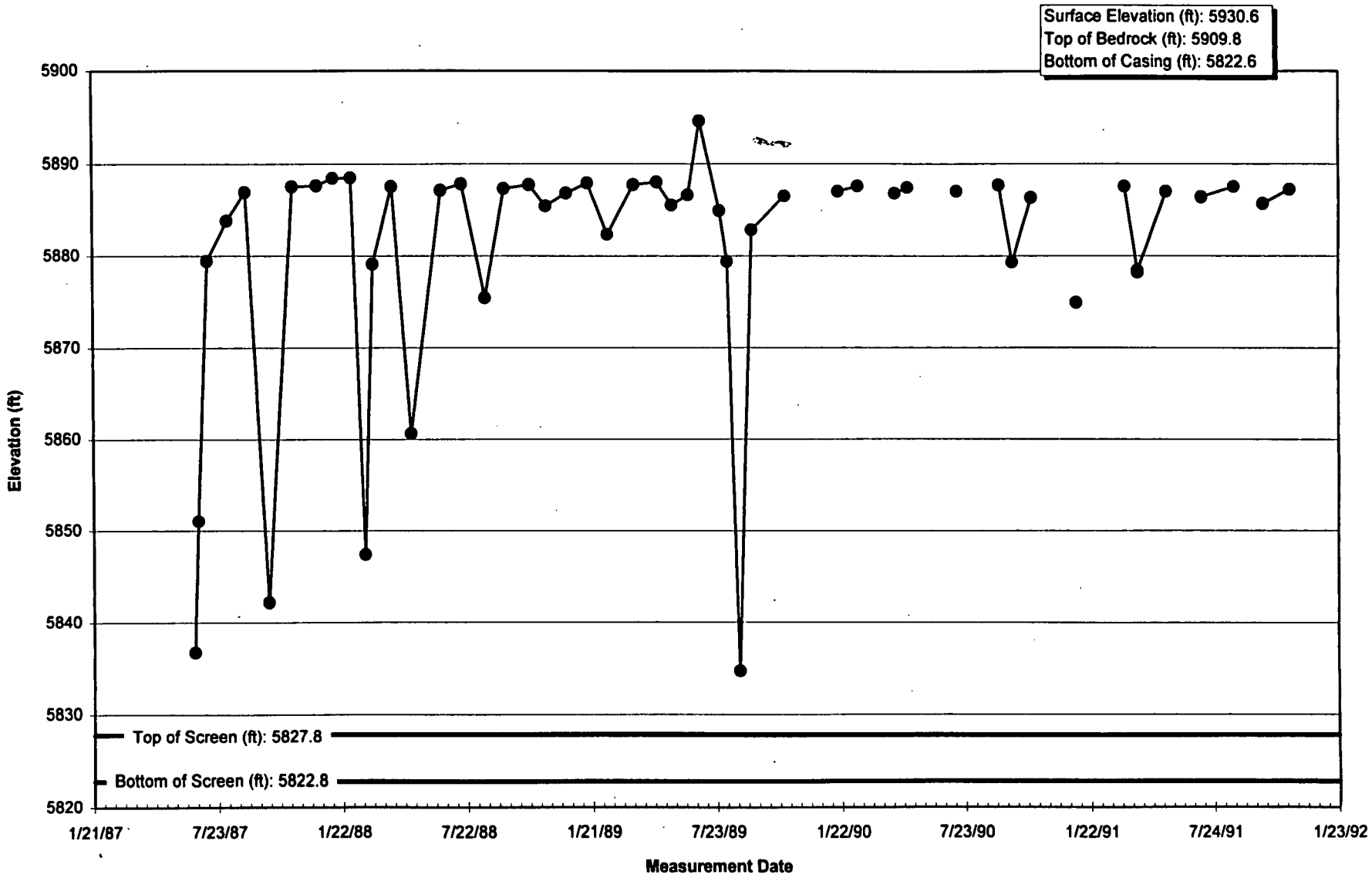
Hydrograph 0287



189

S2.XLS 0287 3/31/95

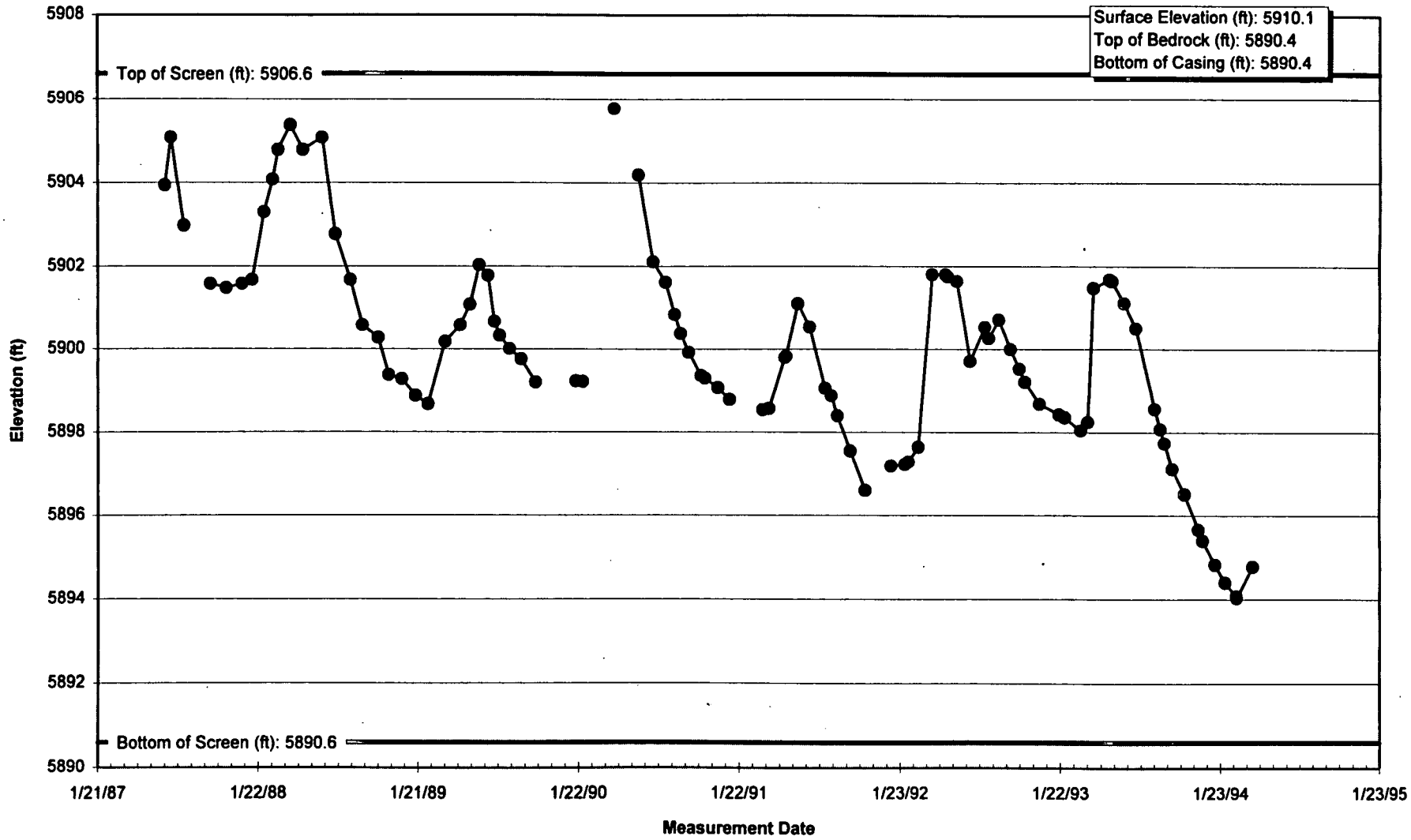
Hydrograph 0387



190

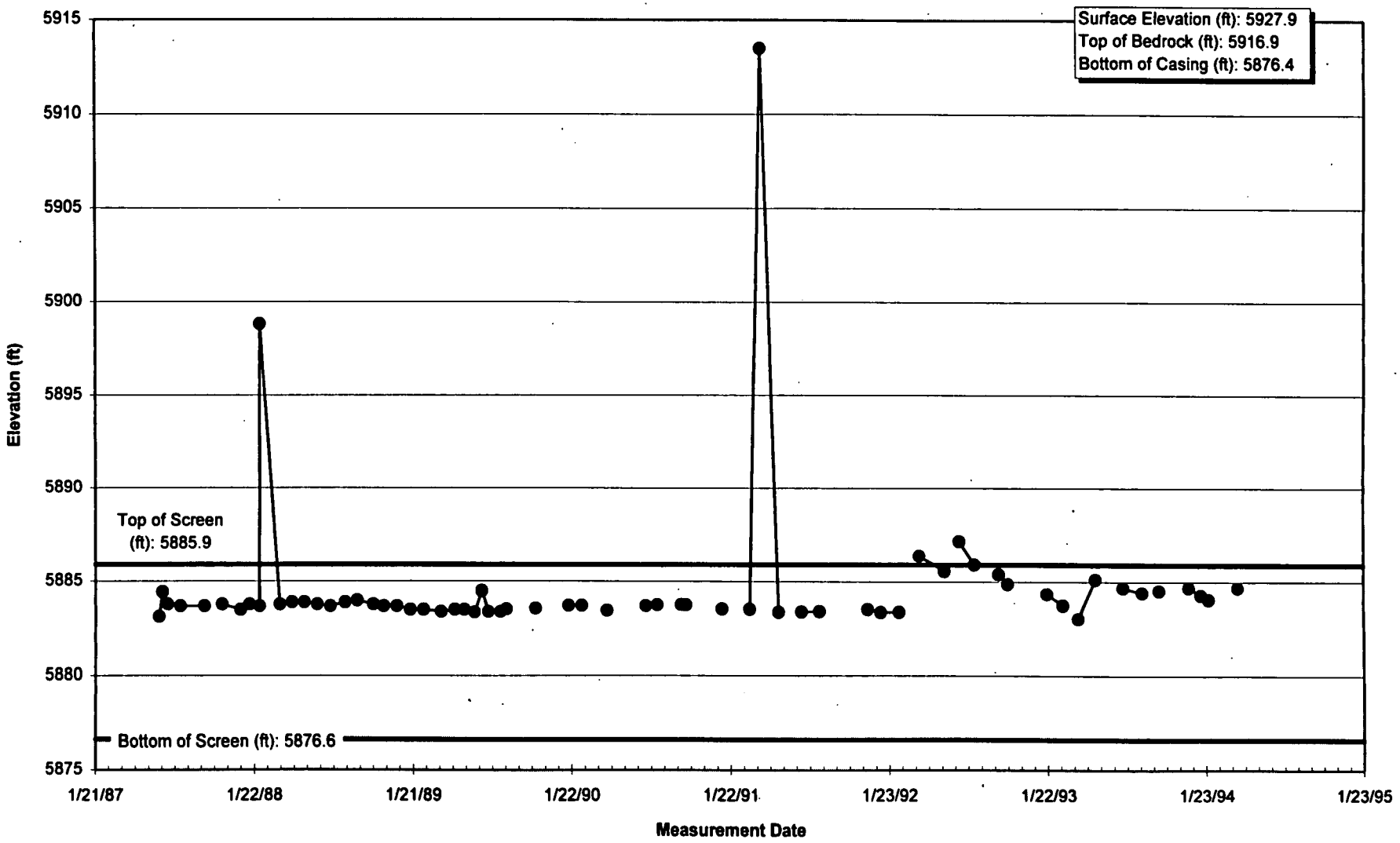
S2.XLS 0387 3/31/95

Hydrograph 0487



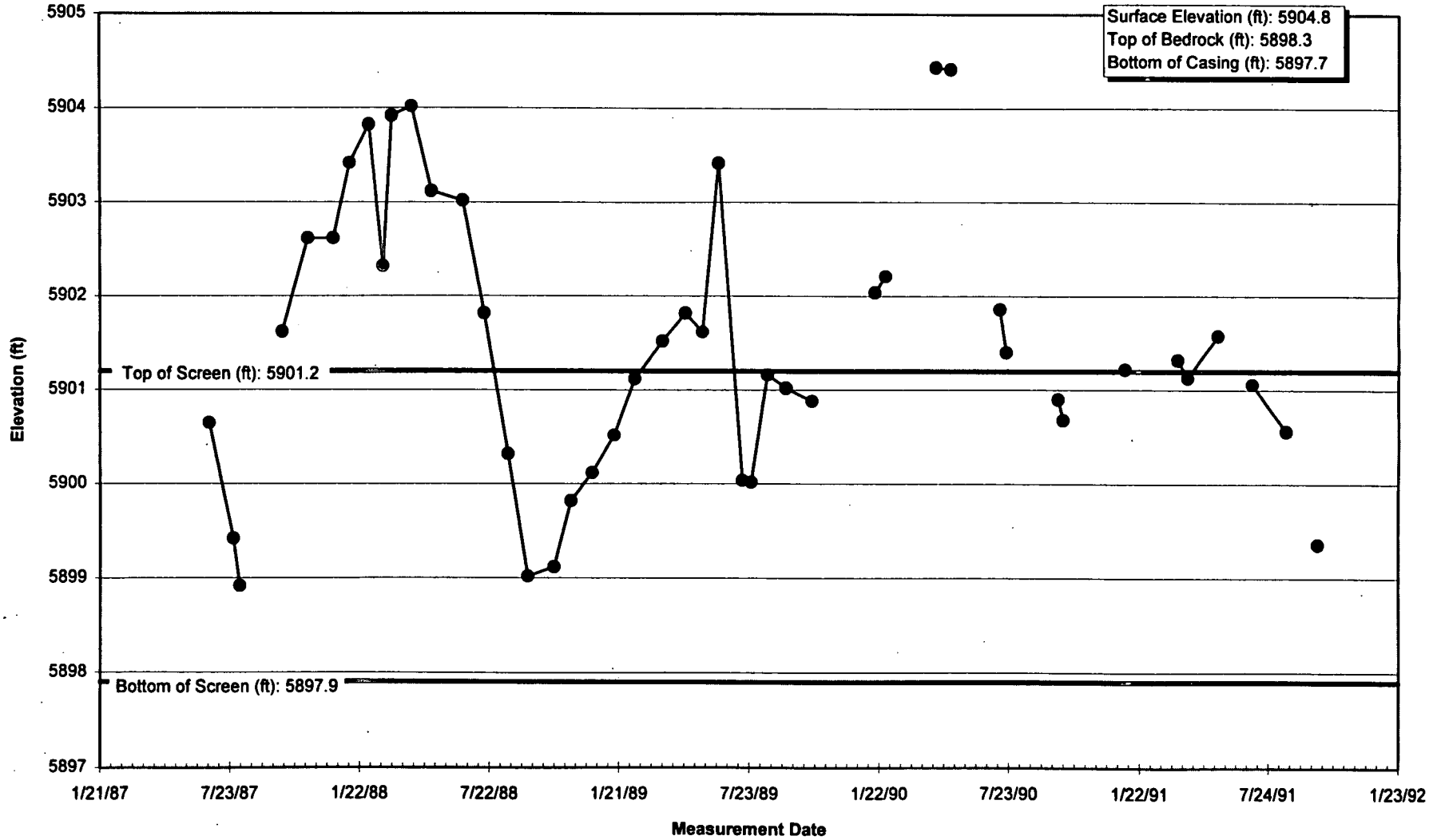
S3.XLS 0487 3/31/95

Hydrograph 0587



192

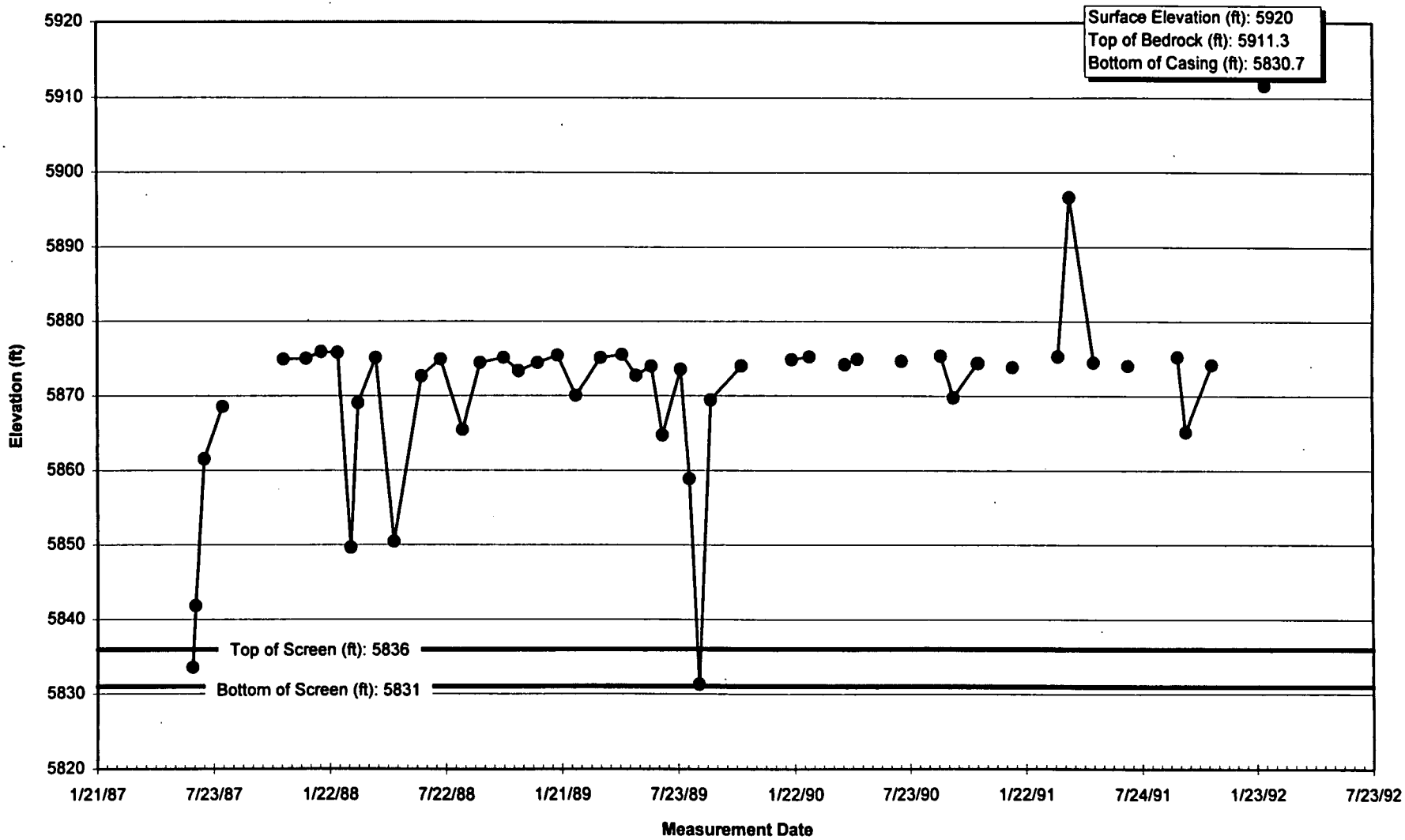
Hydrograph 0687



193

S4.XLS 0687 3/31/95

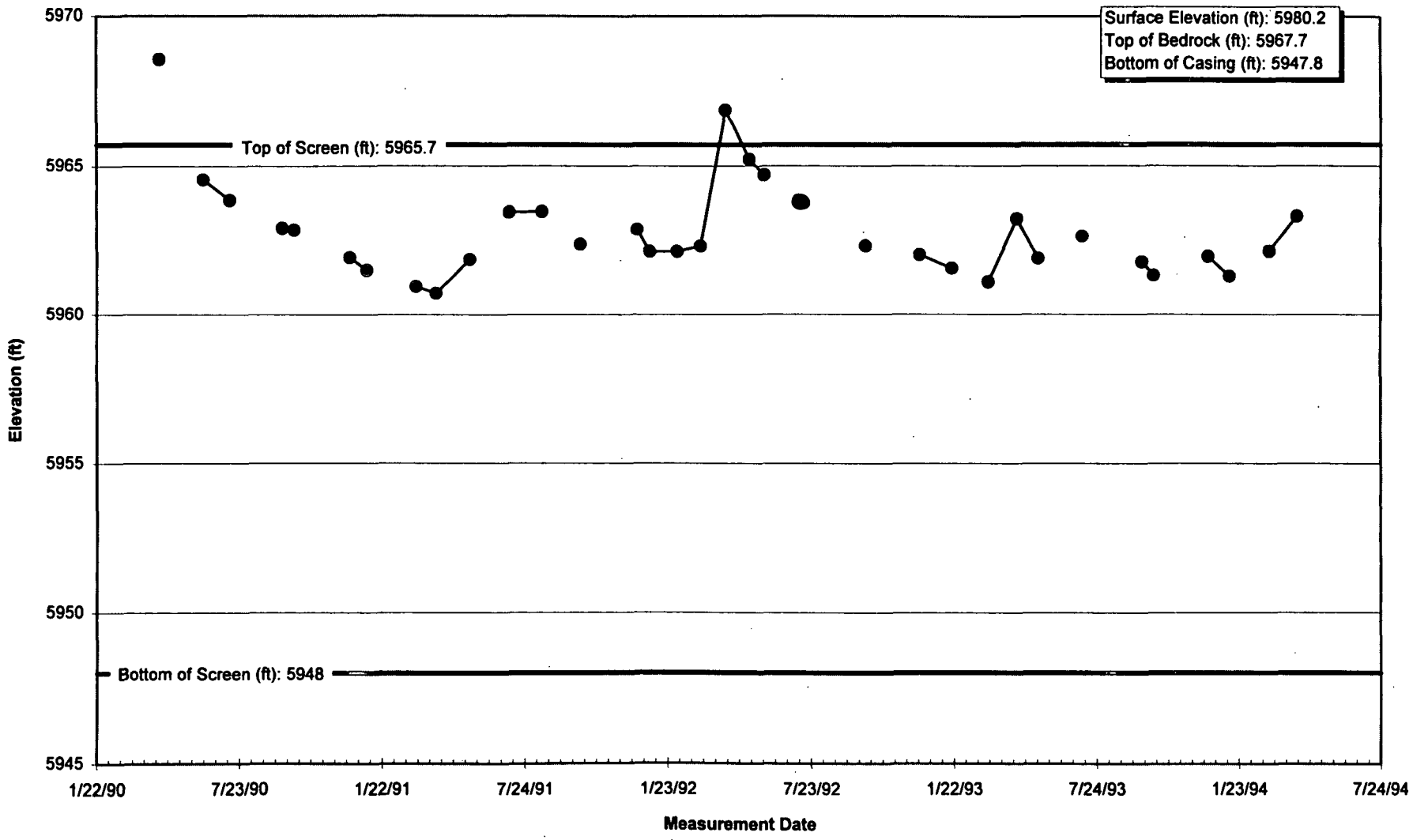
Hydrograph 0887



S4.XLS 0887 4/3/95

194

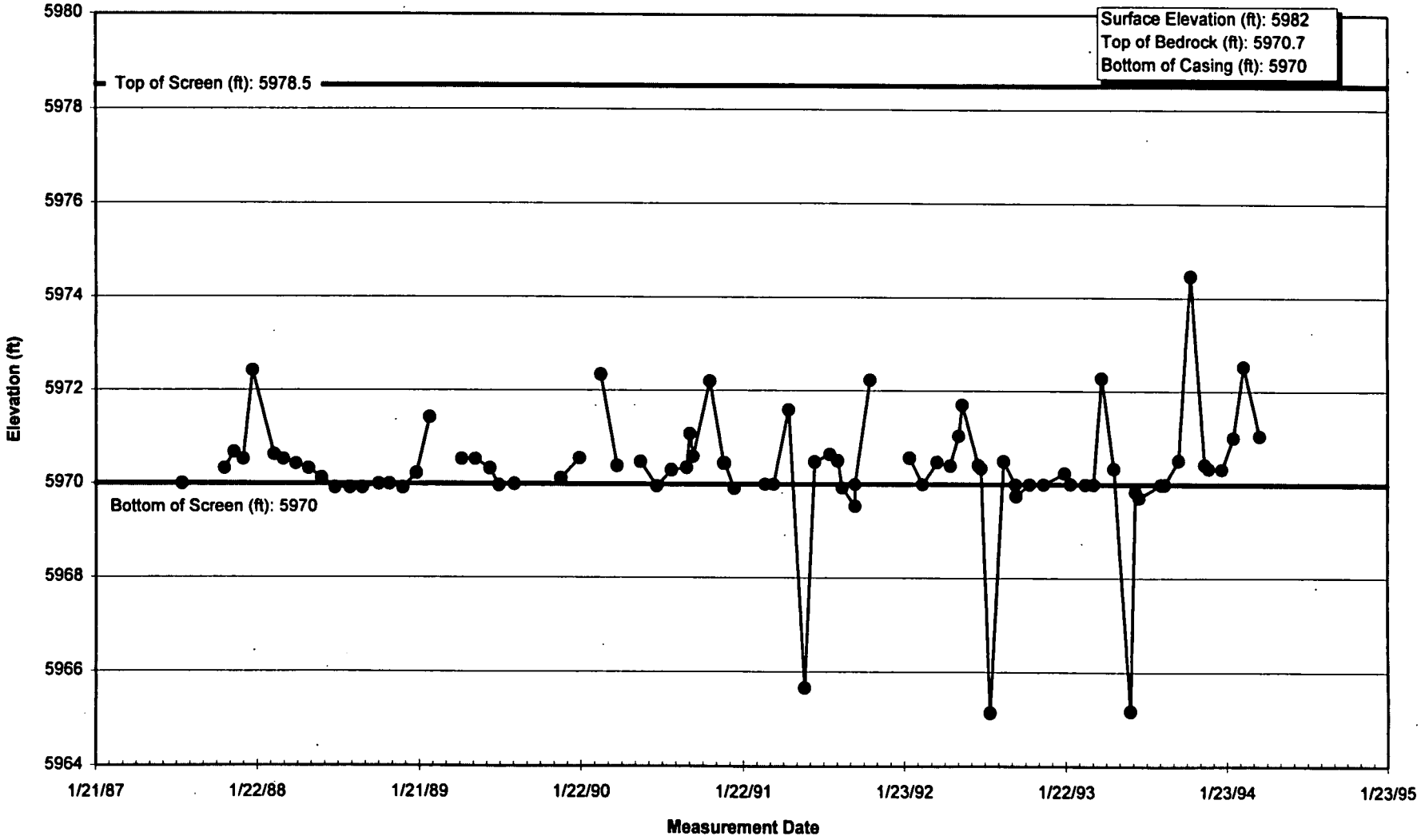
Hydrograph 0987



195

S5.XLS 0987 4/3/95

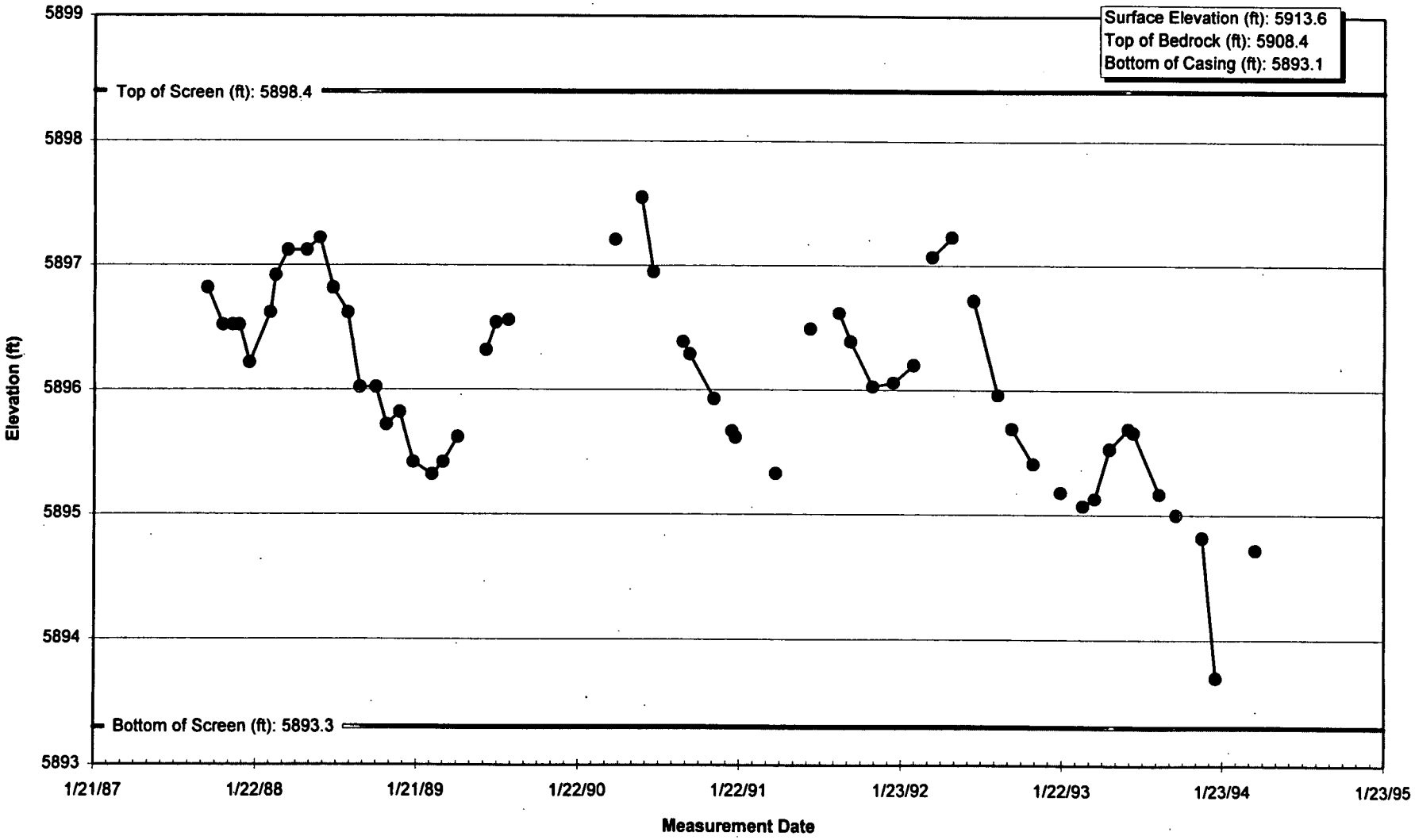
Hydrograph 1087



196

S5.XLS 1087 4/3/95

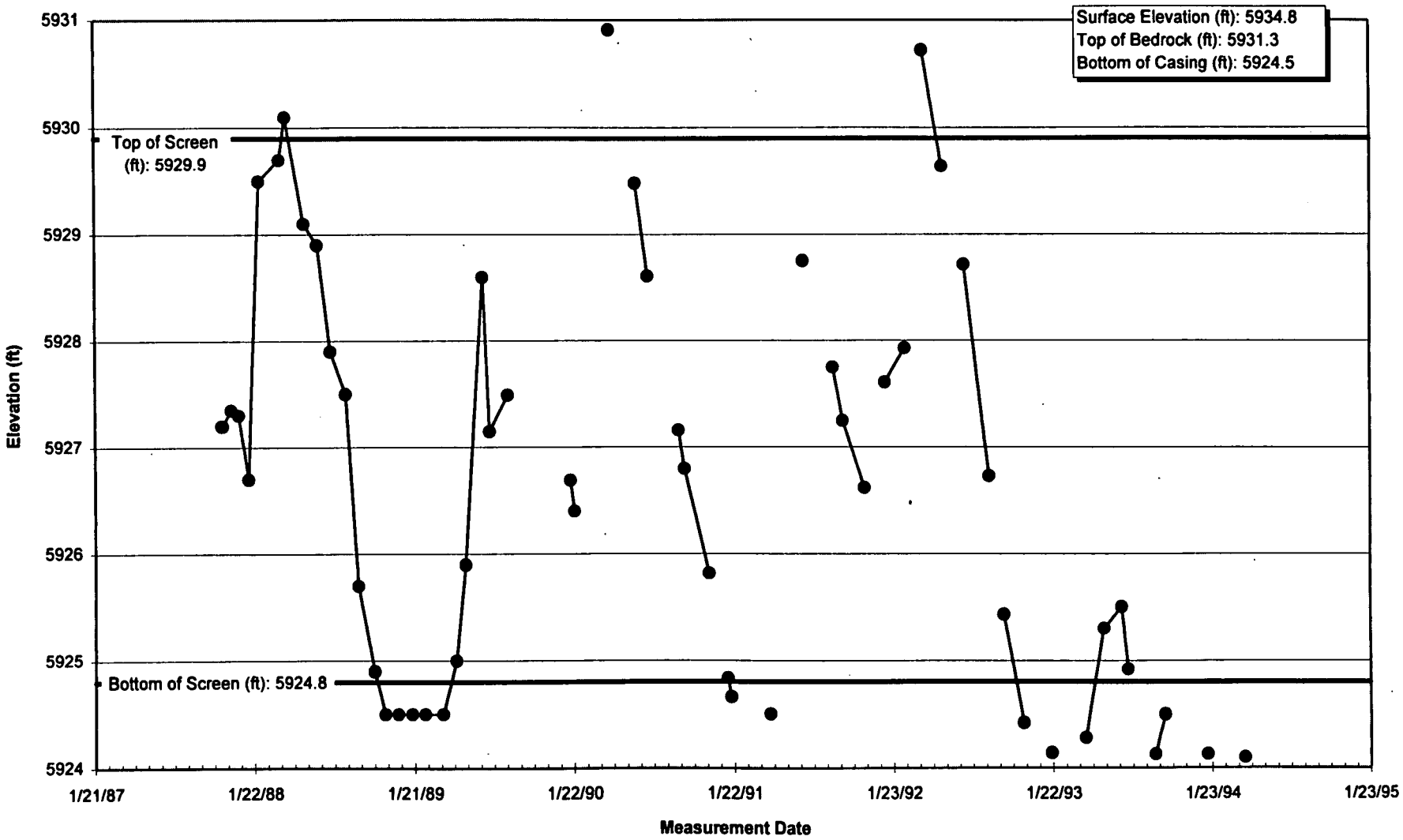
Hydrograph 1187



S5.XLS 1187 4/3/95

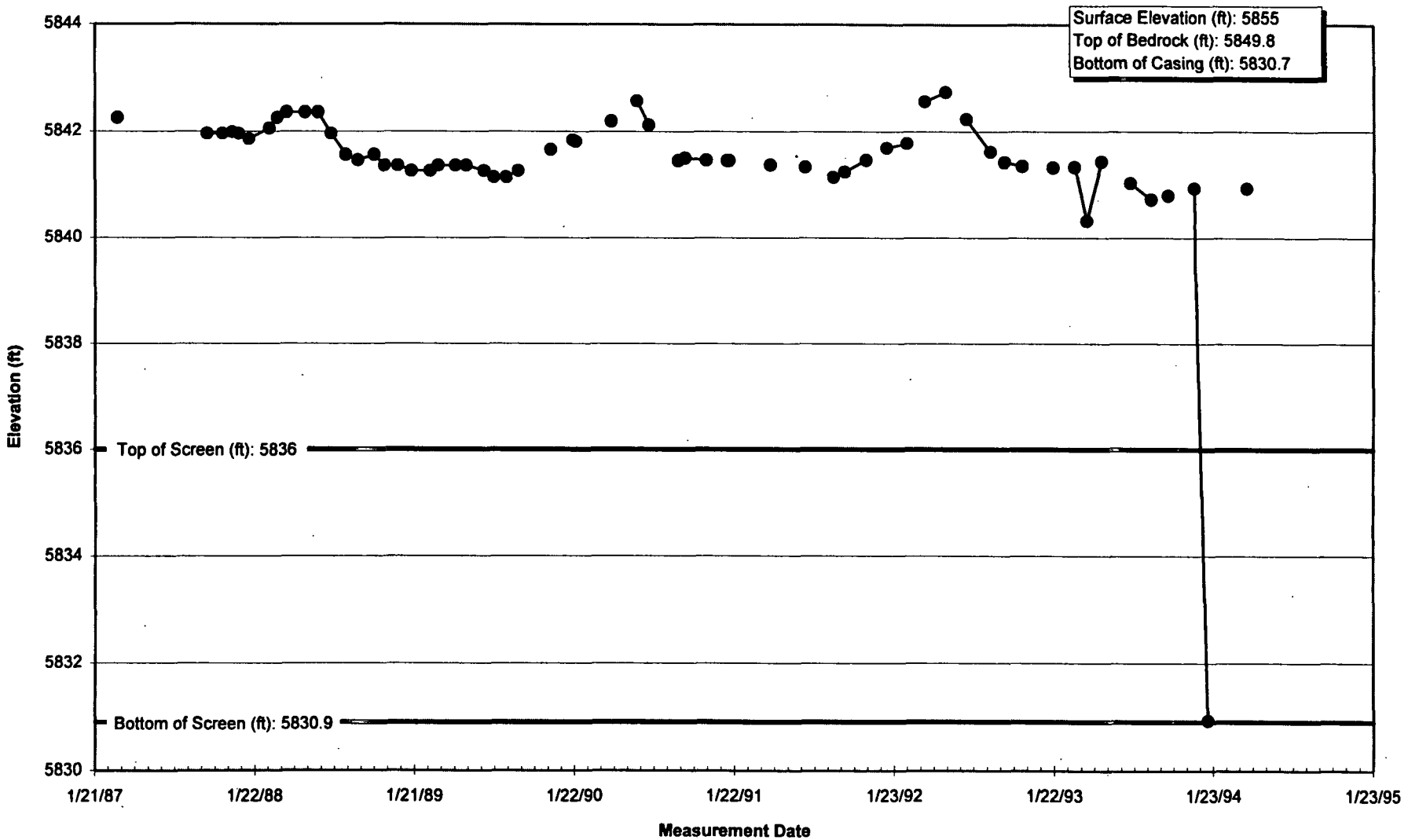
197

Hydrograph 1287



198

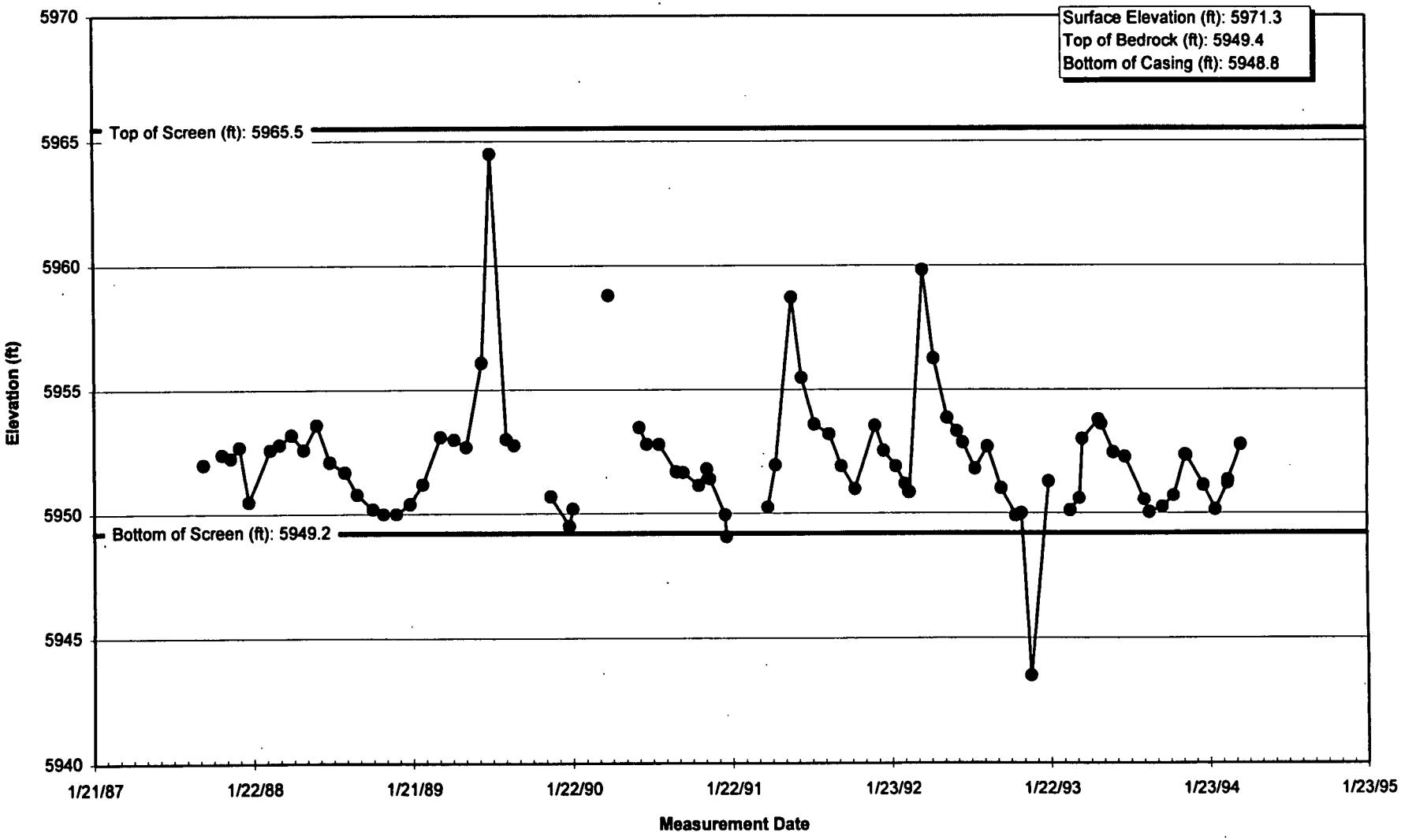
Hydrograph 1487



S6.XLS 1487 4/3/95

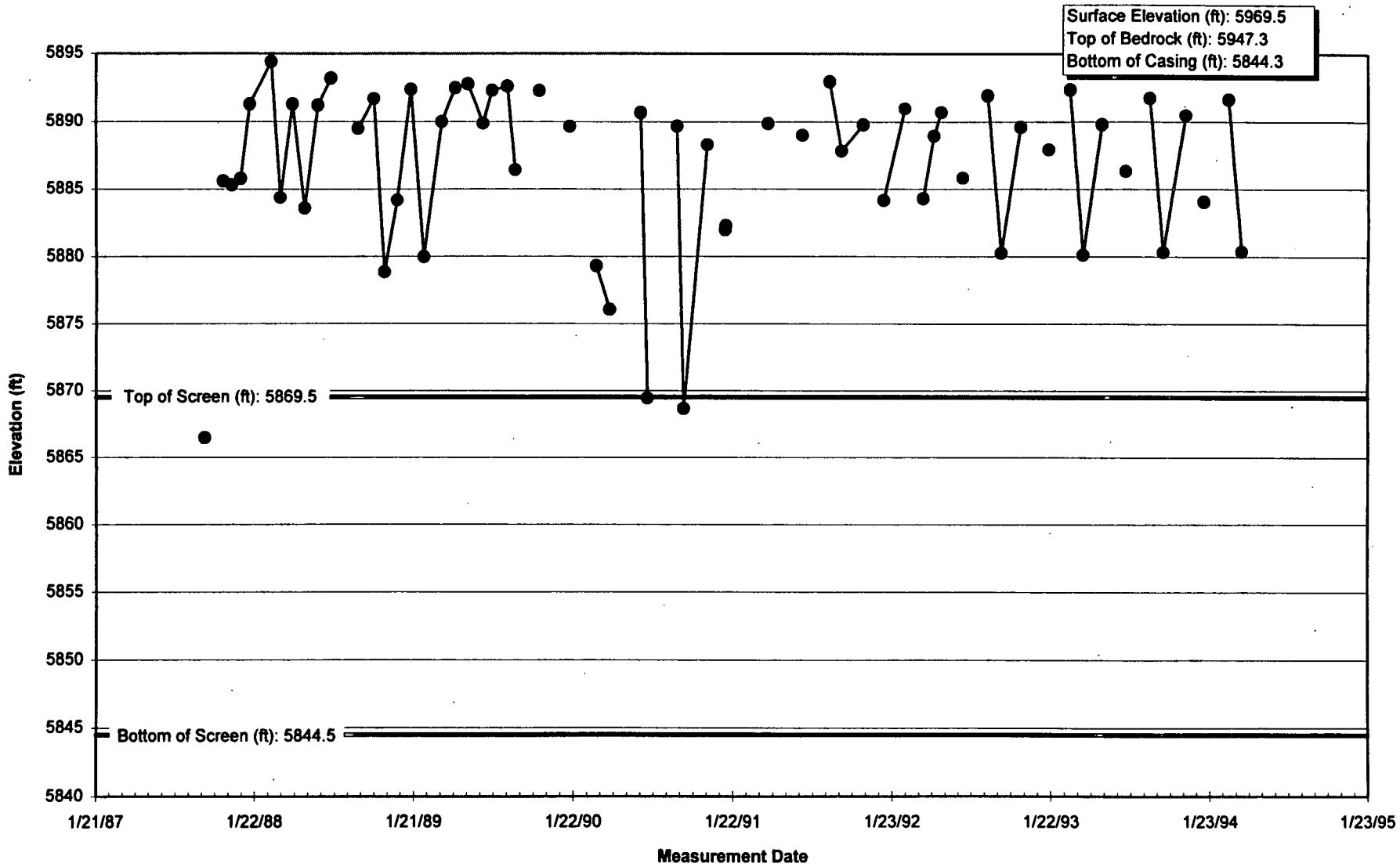
199

Hydrograph 1587



200

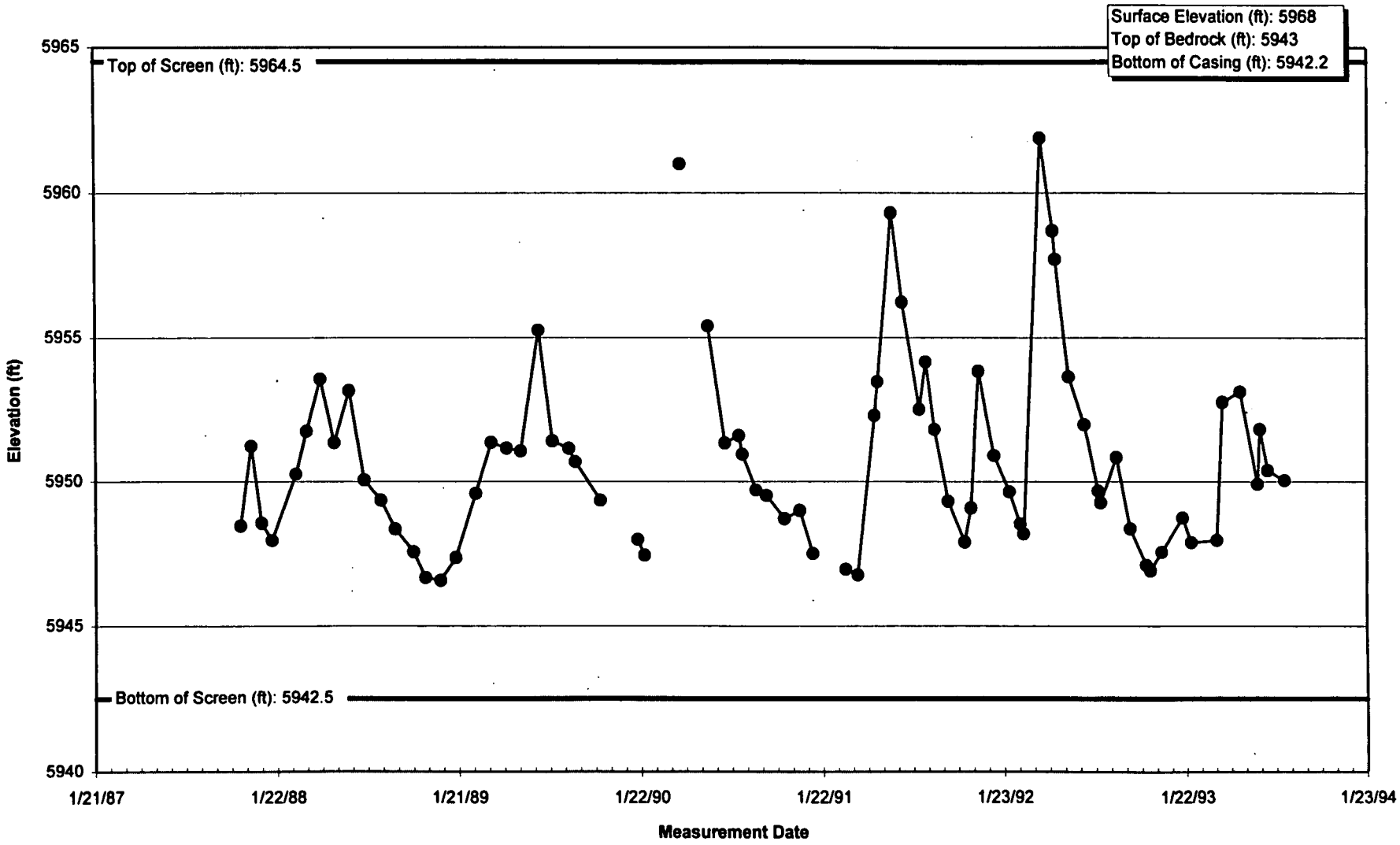
Hydrograph 1687



S6.XLS 1687 4/3/95

201

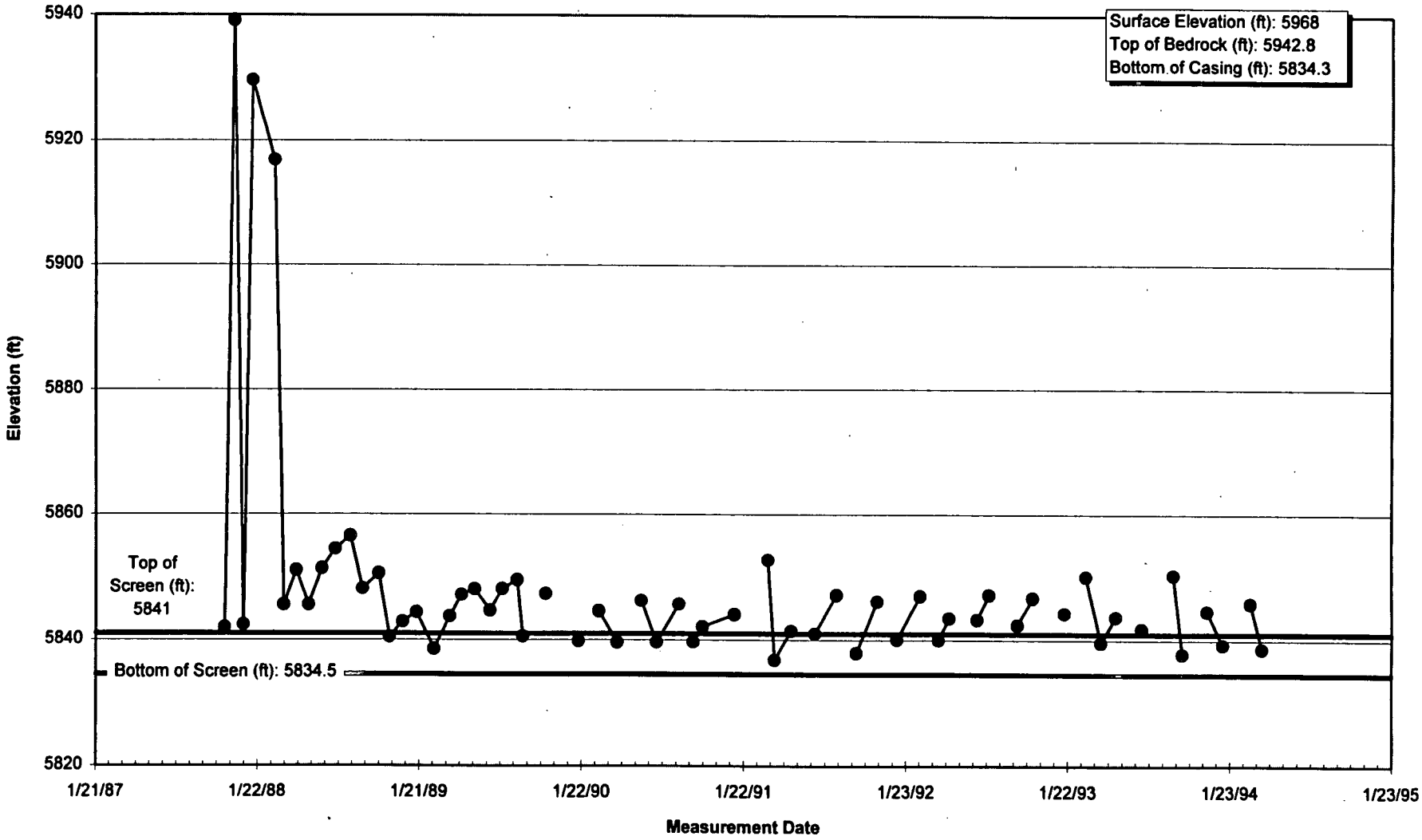
Hydrograph 1787



202

8689GRPHWLS 1787

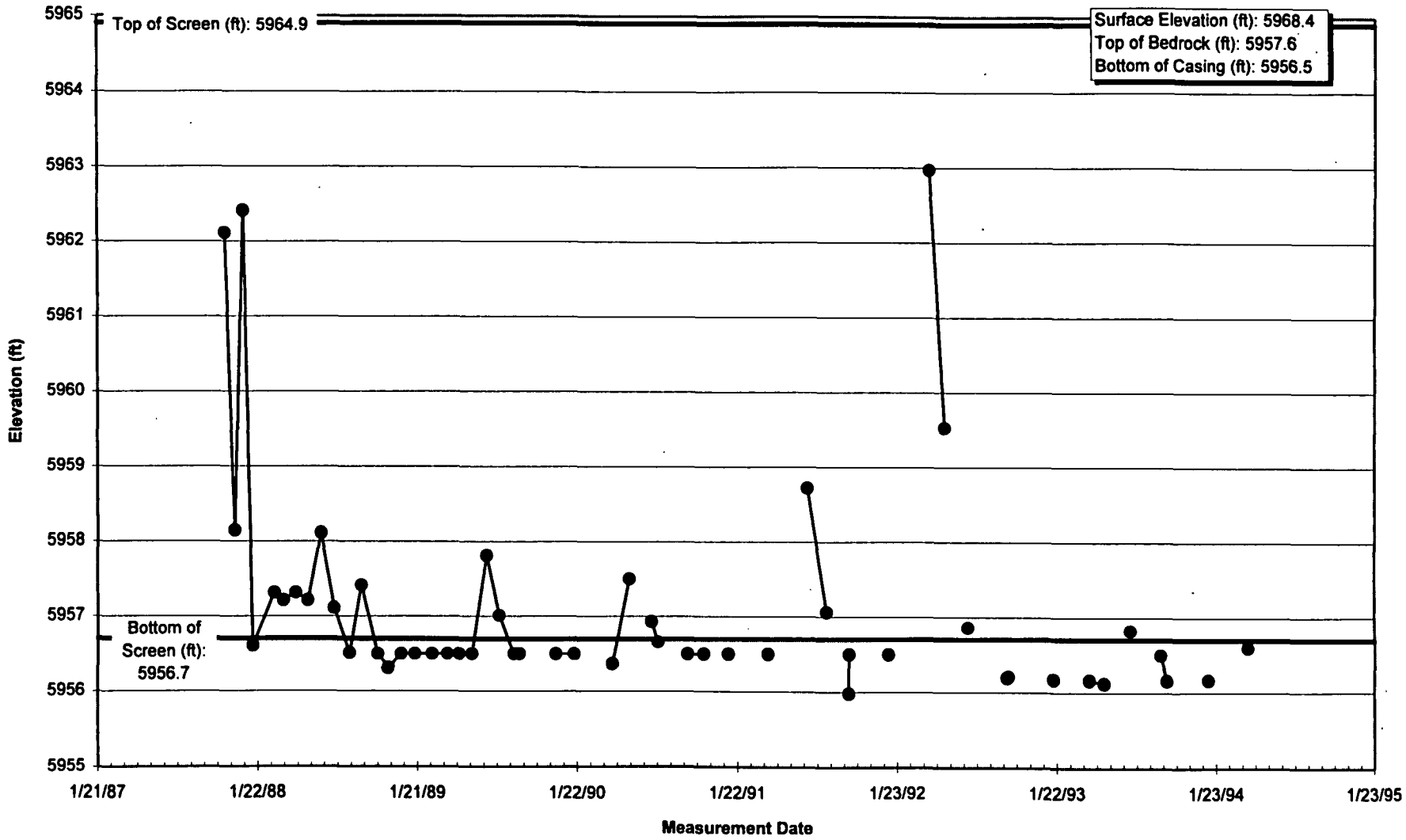
Hydrograph 1887



S7.XLS 1887 4/3/95

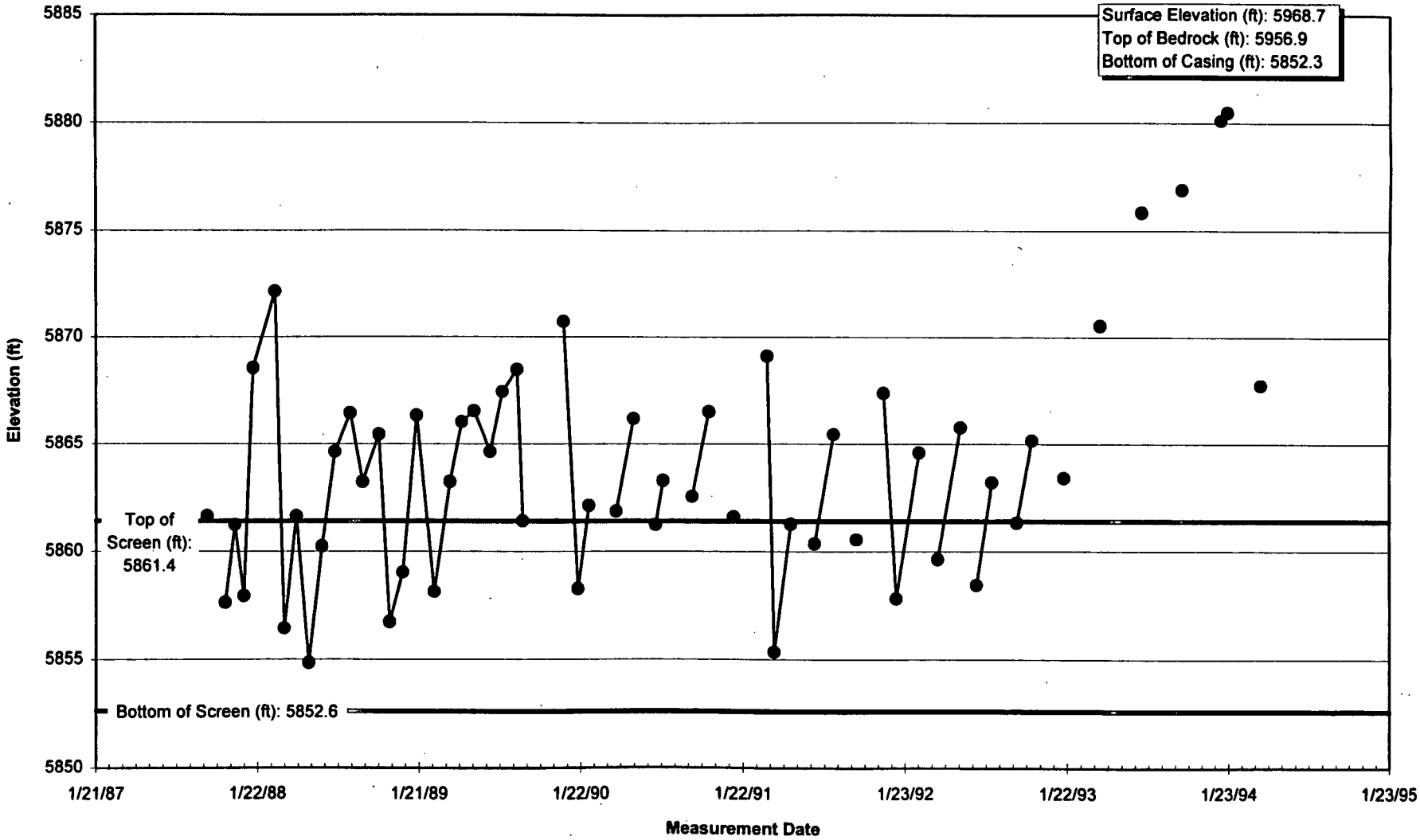
203

Hydrograph 1987



204

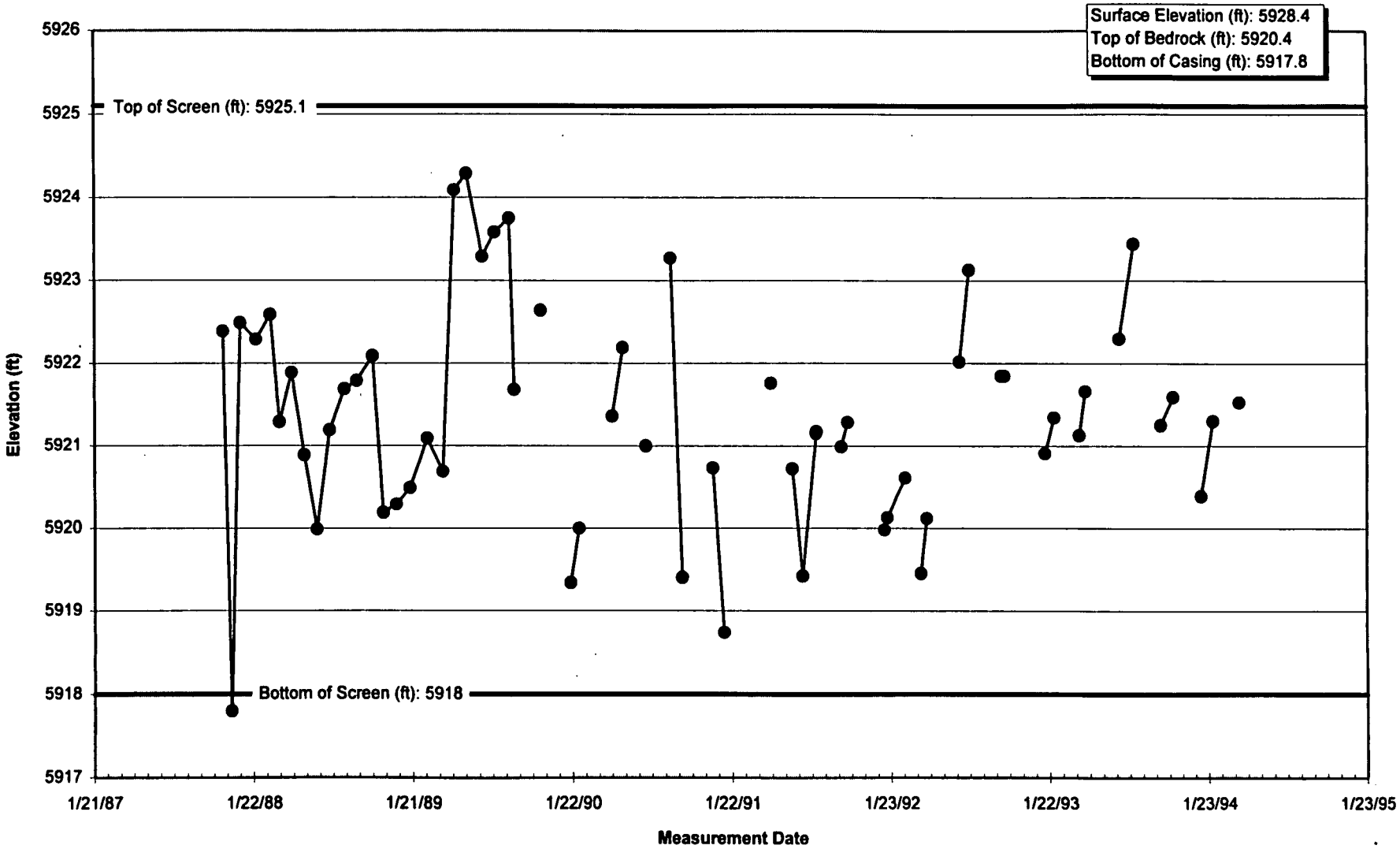
Hydrograph 2087



205

S7.XLS 2087 4/3/95

Hydrograph 2187



206

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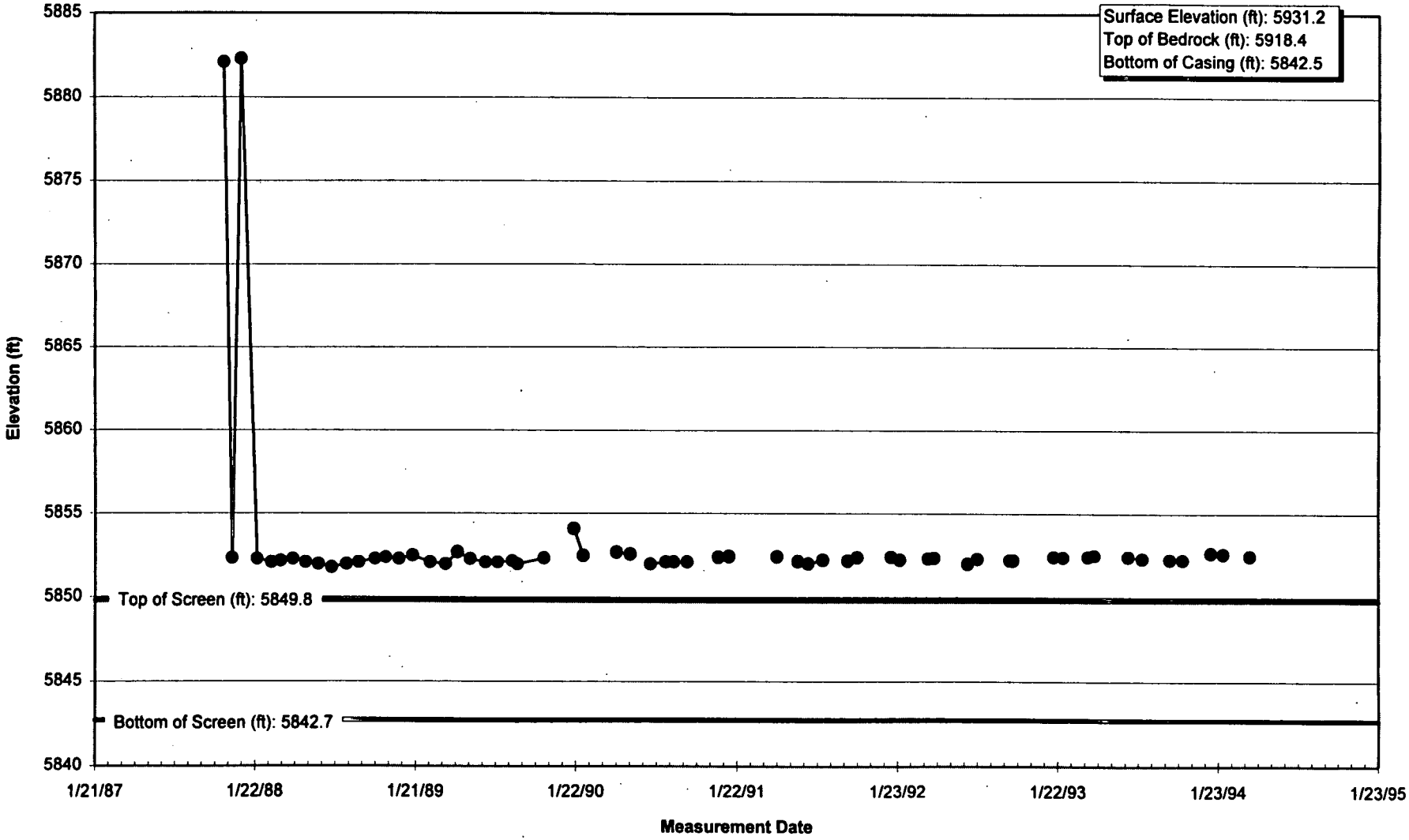
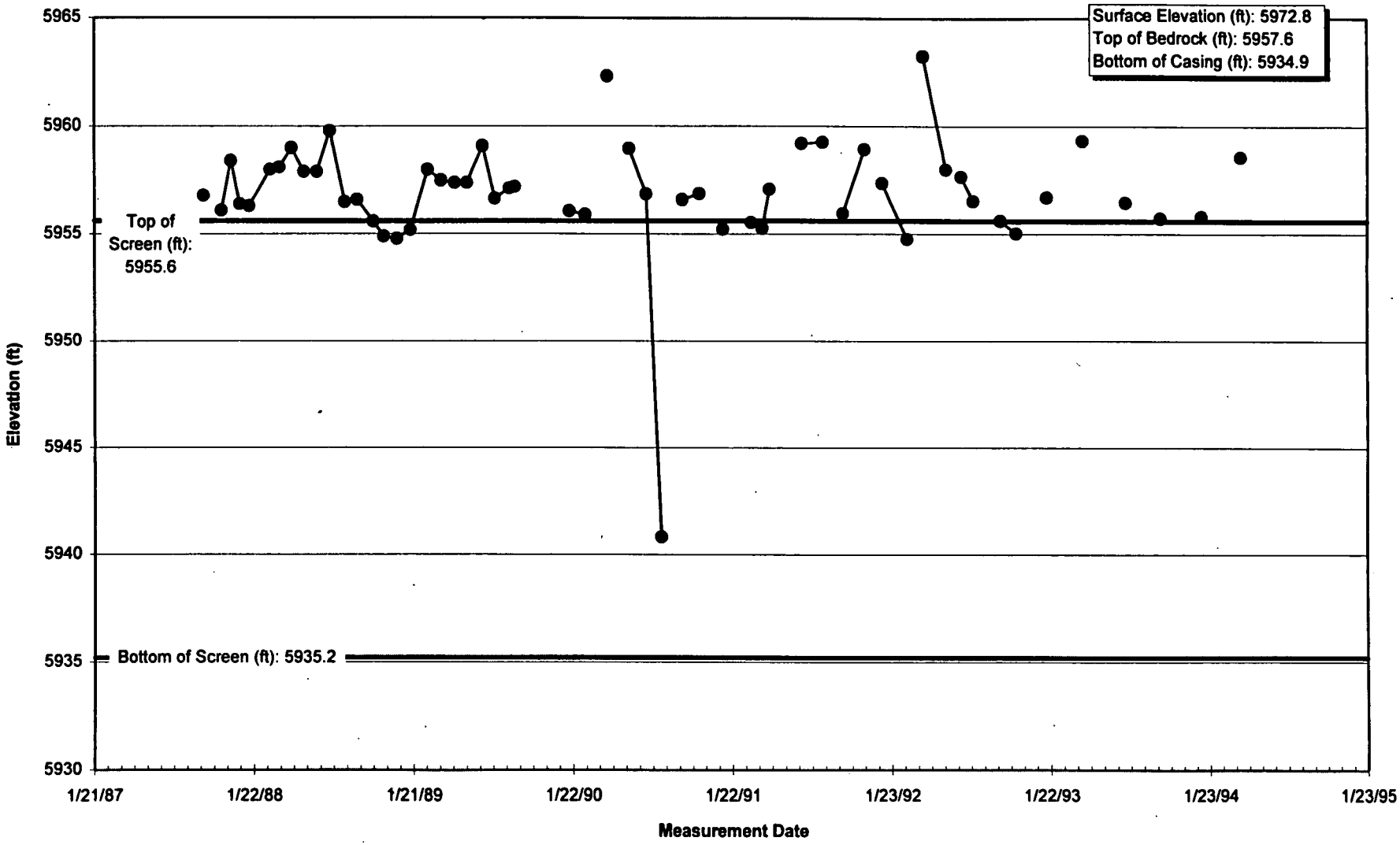


S8.XLS 2287 4/4/95

207

Hydrograph 2387



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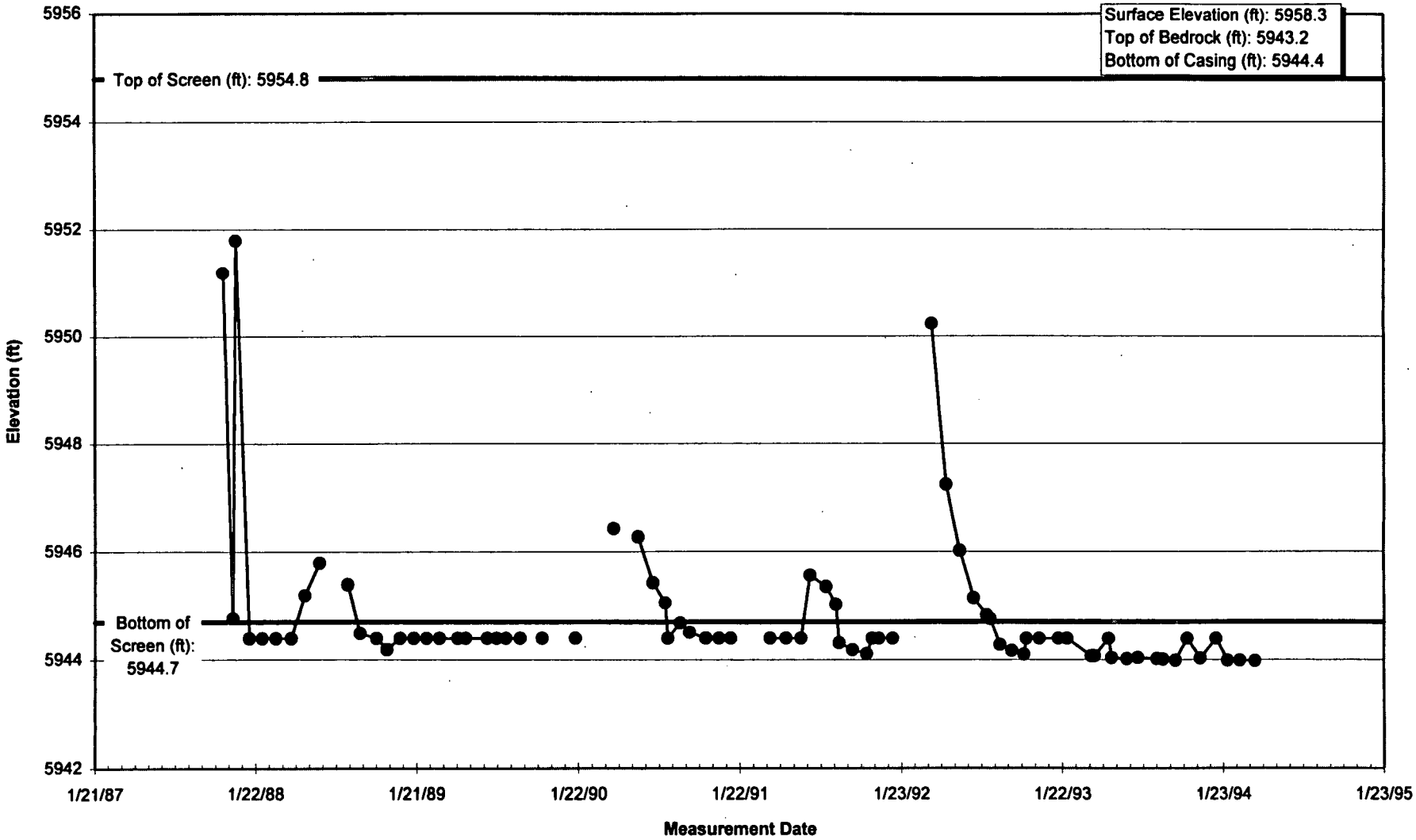
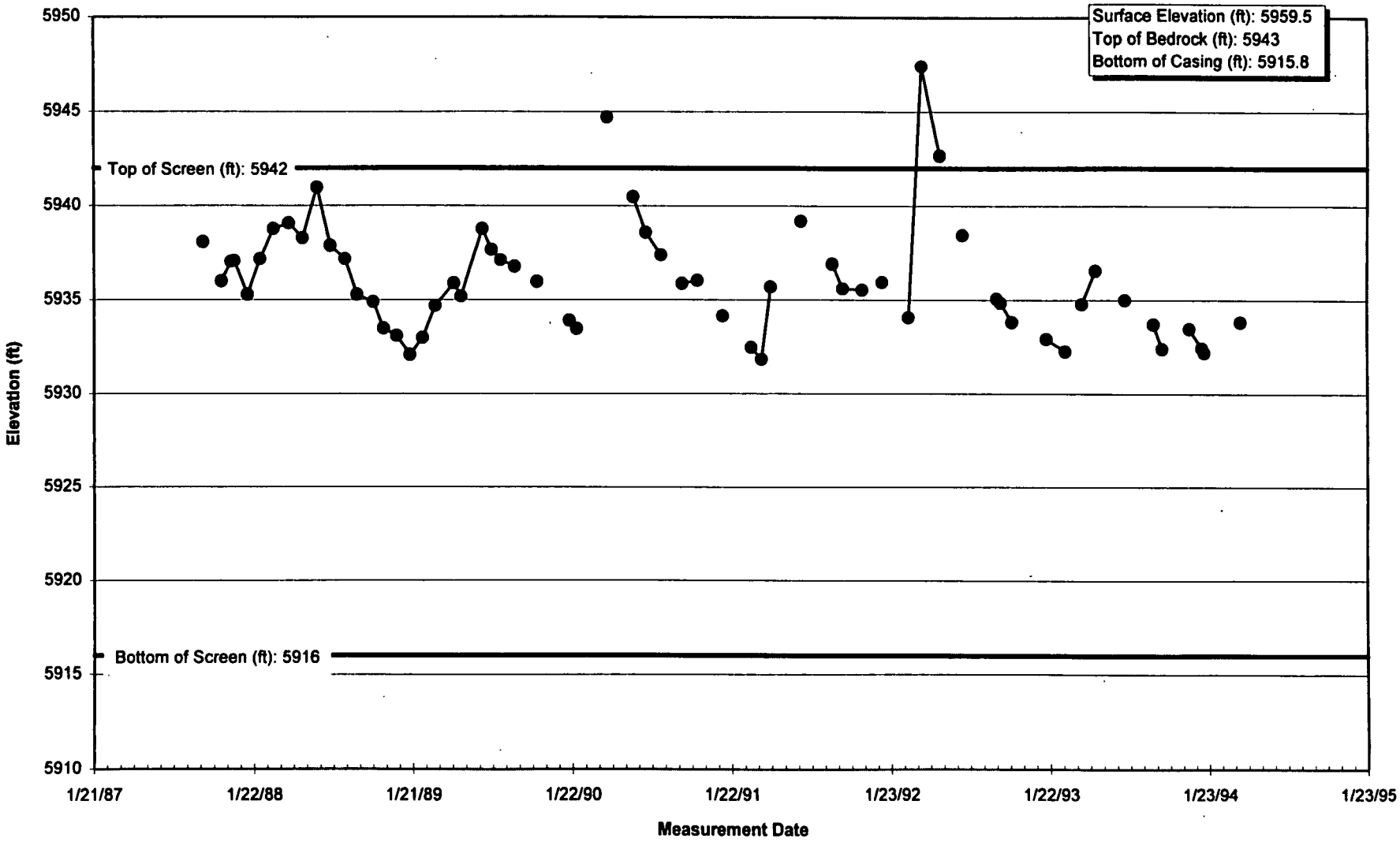
Hydrograph 2487



S8.XLS 2487 4/4/95

209

Hydrograph 2587



210

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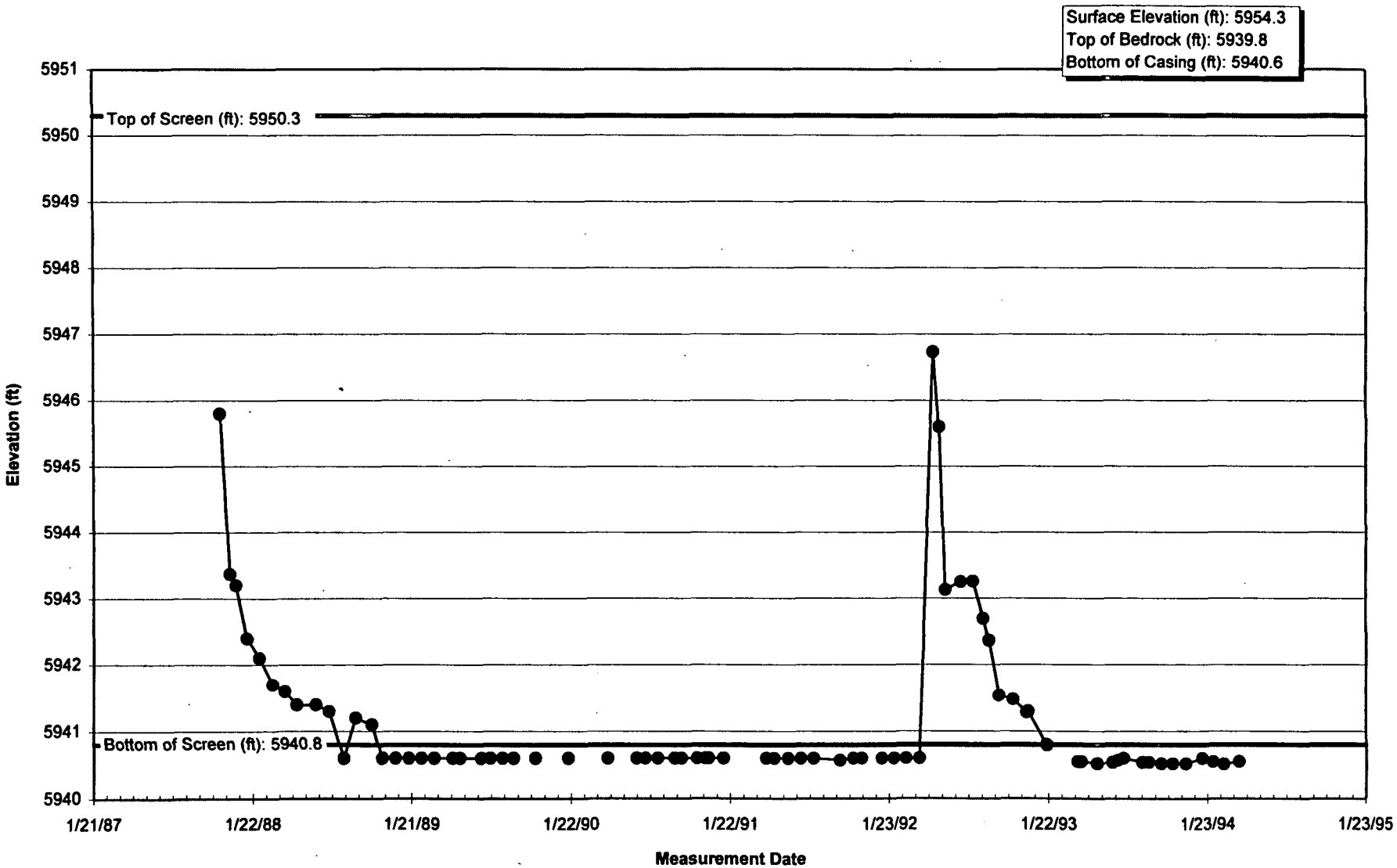

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211

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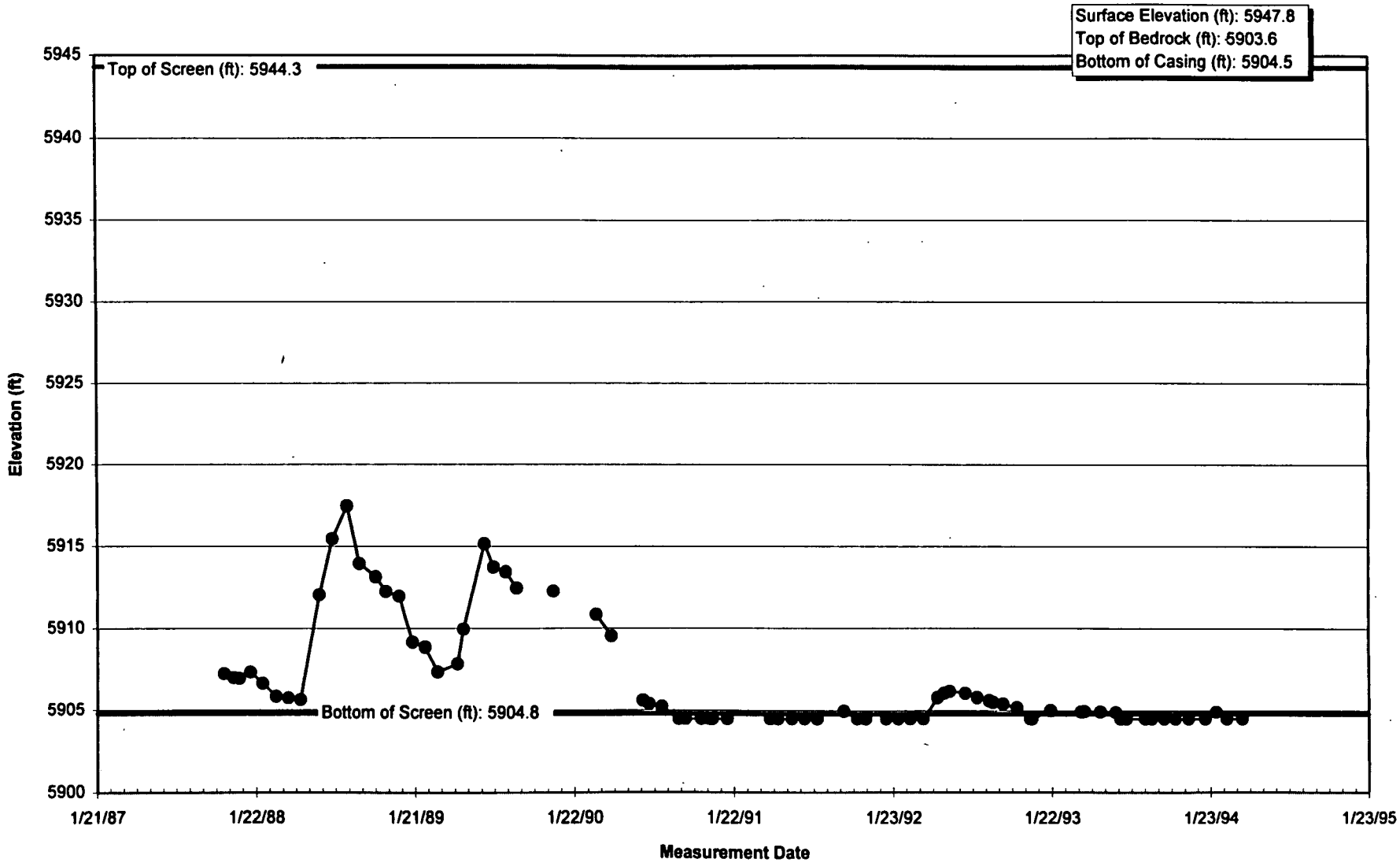

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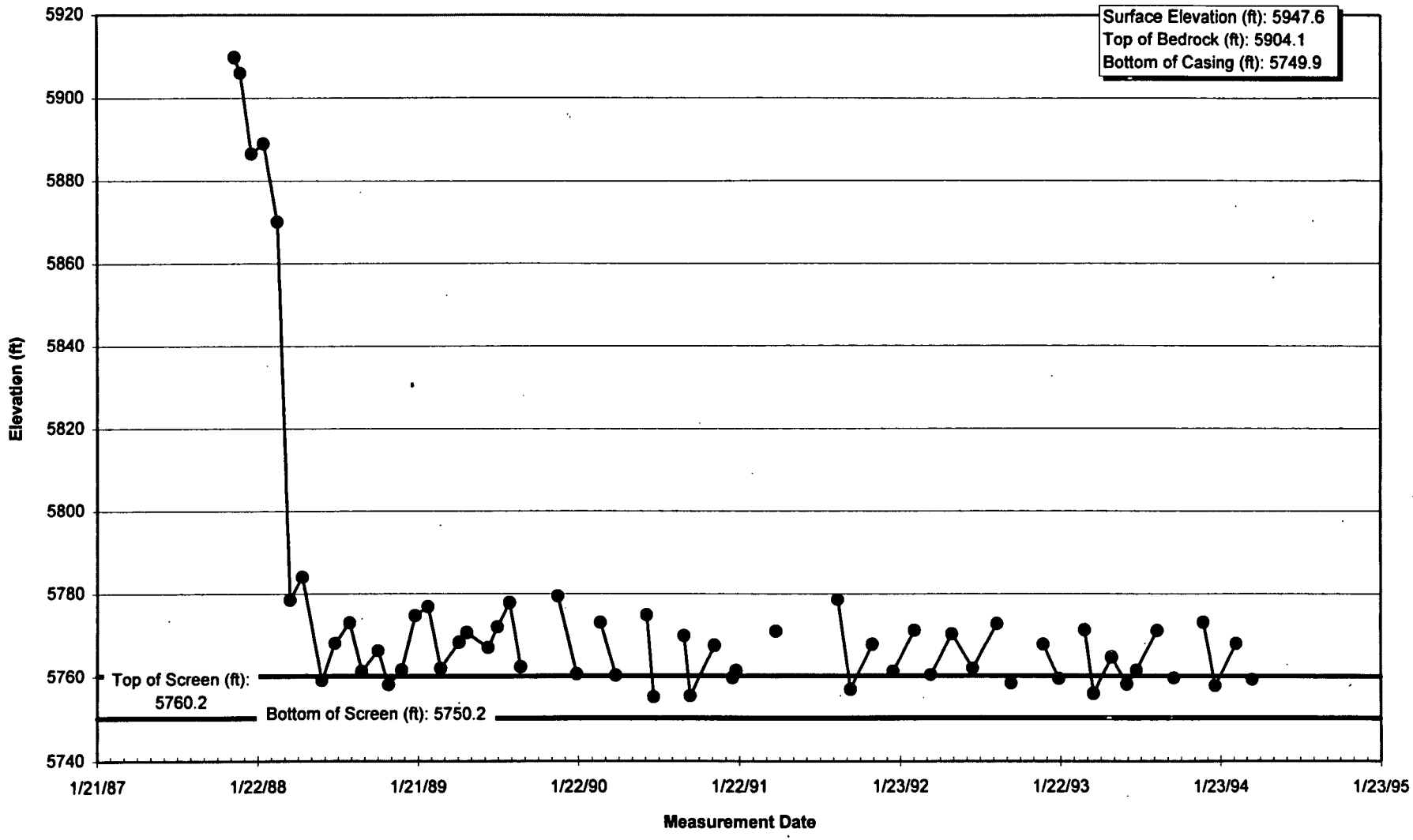
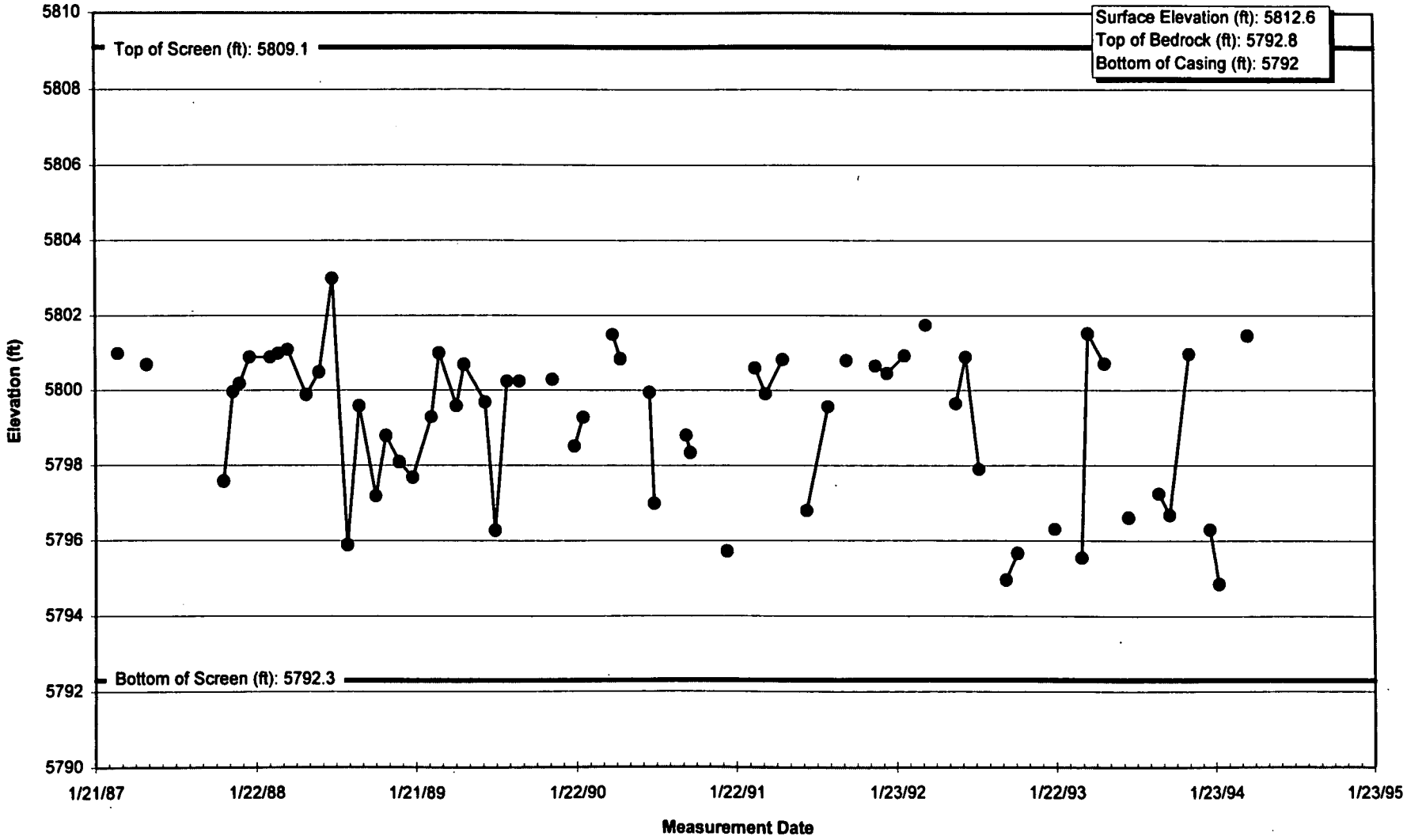
Hydrograph 2887



S8.XLS 2887 4/4/95

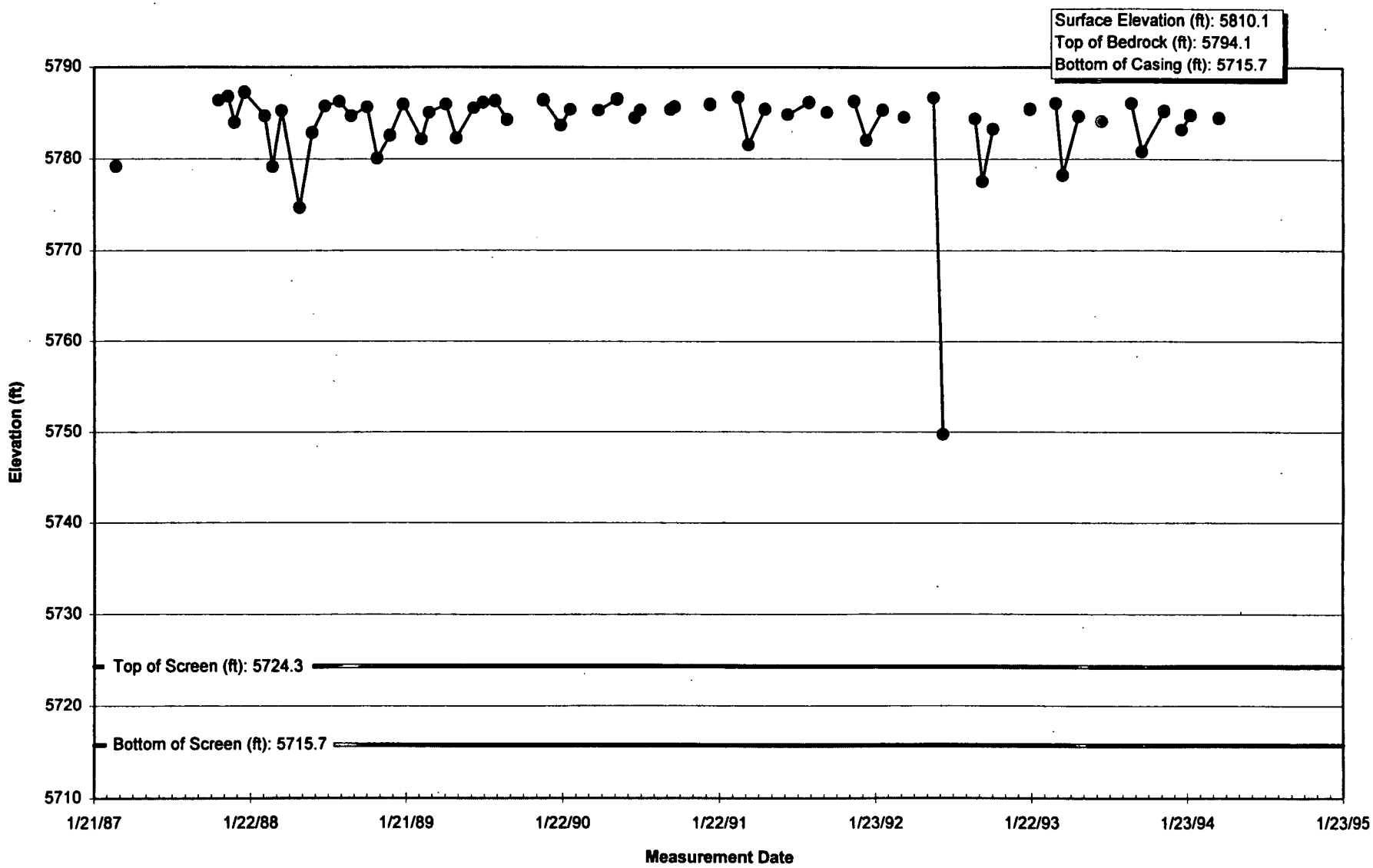
2/3

Hydrograph 2987



214

Hydrograph 3087



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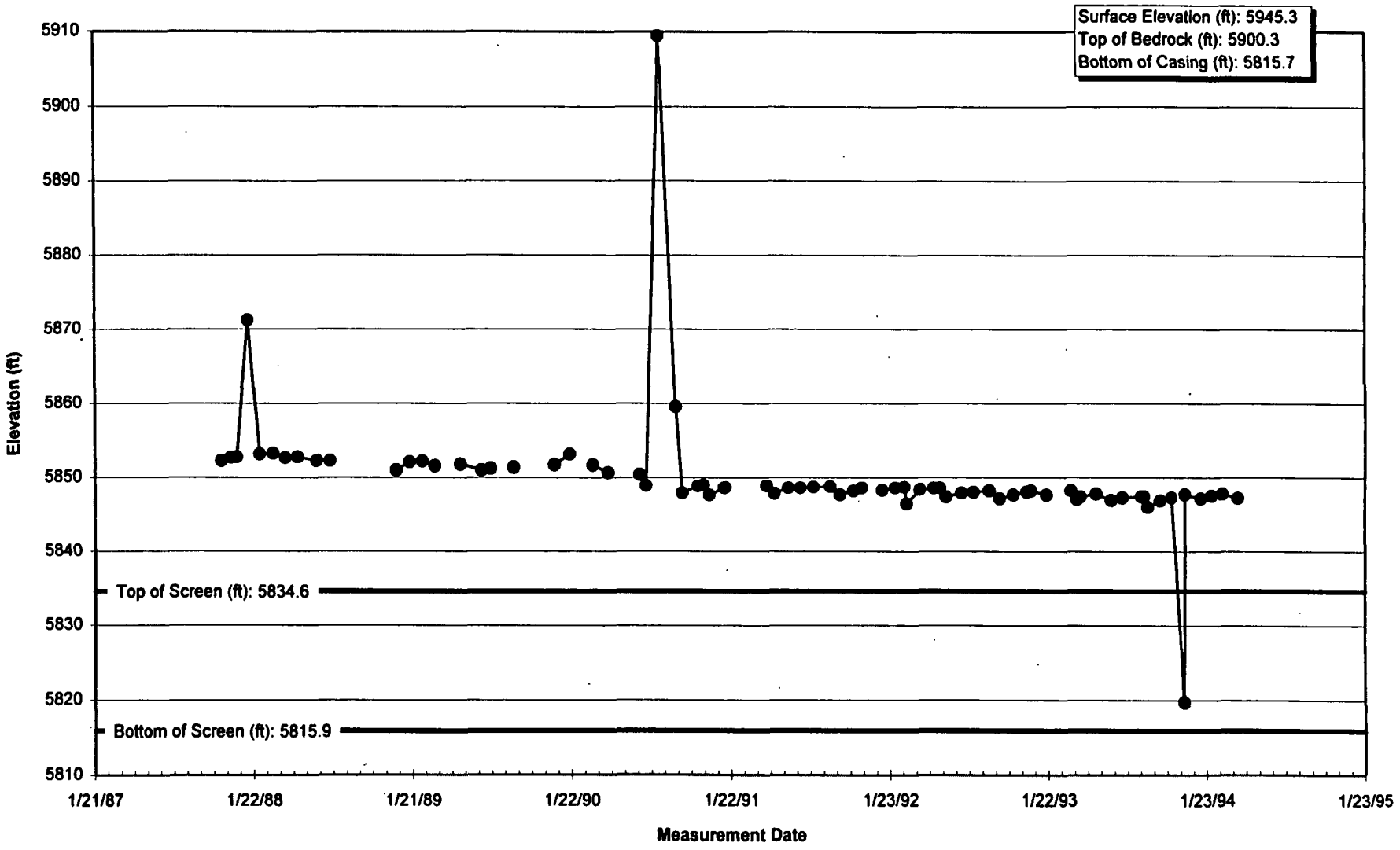
S8.XLS 3087 4/4/95

Hydrograph 3187



216

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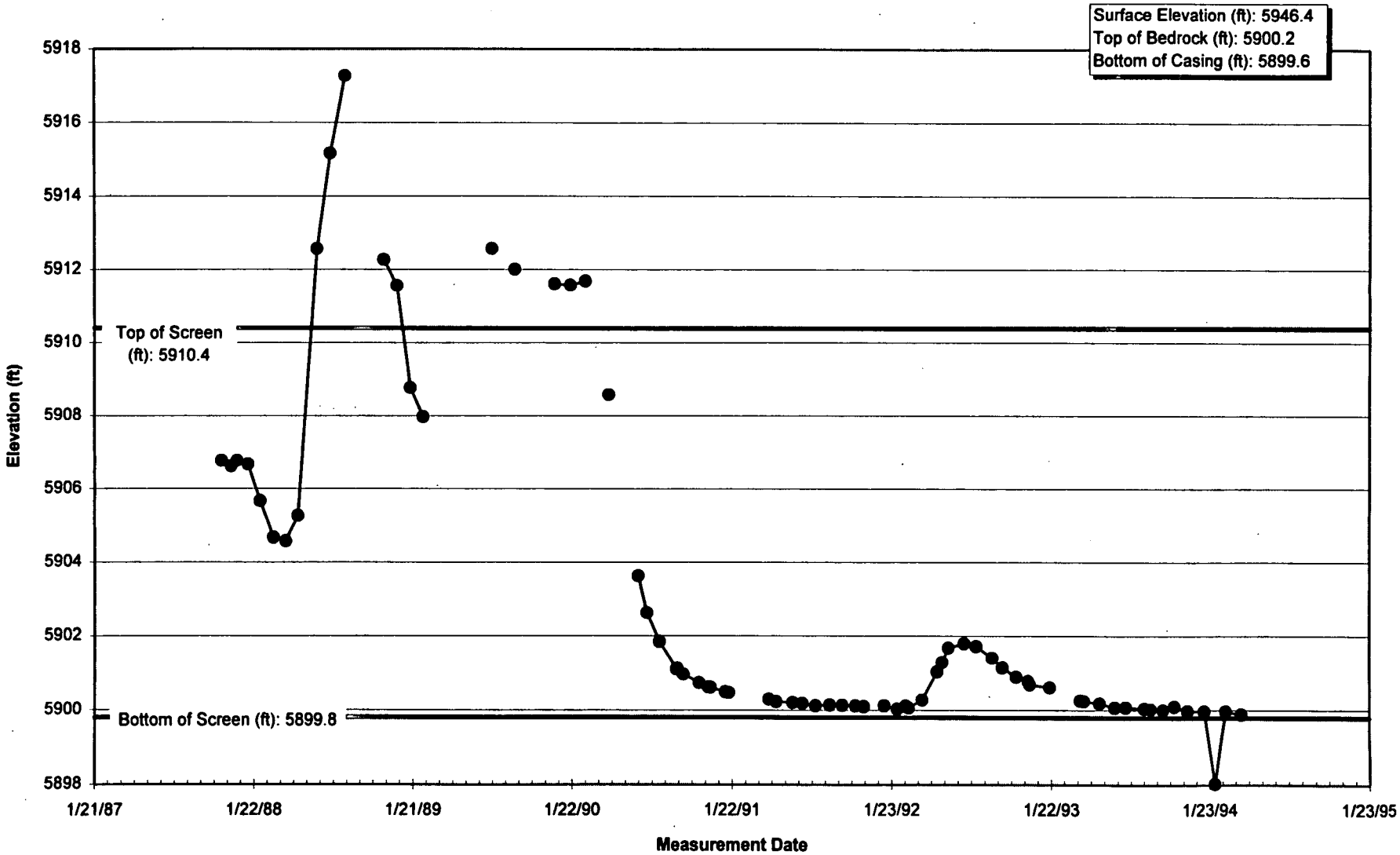
Hydrograph 3287



217

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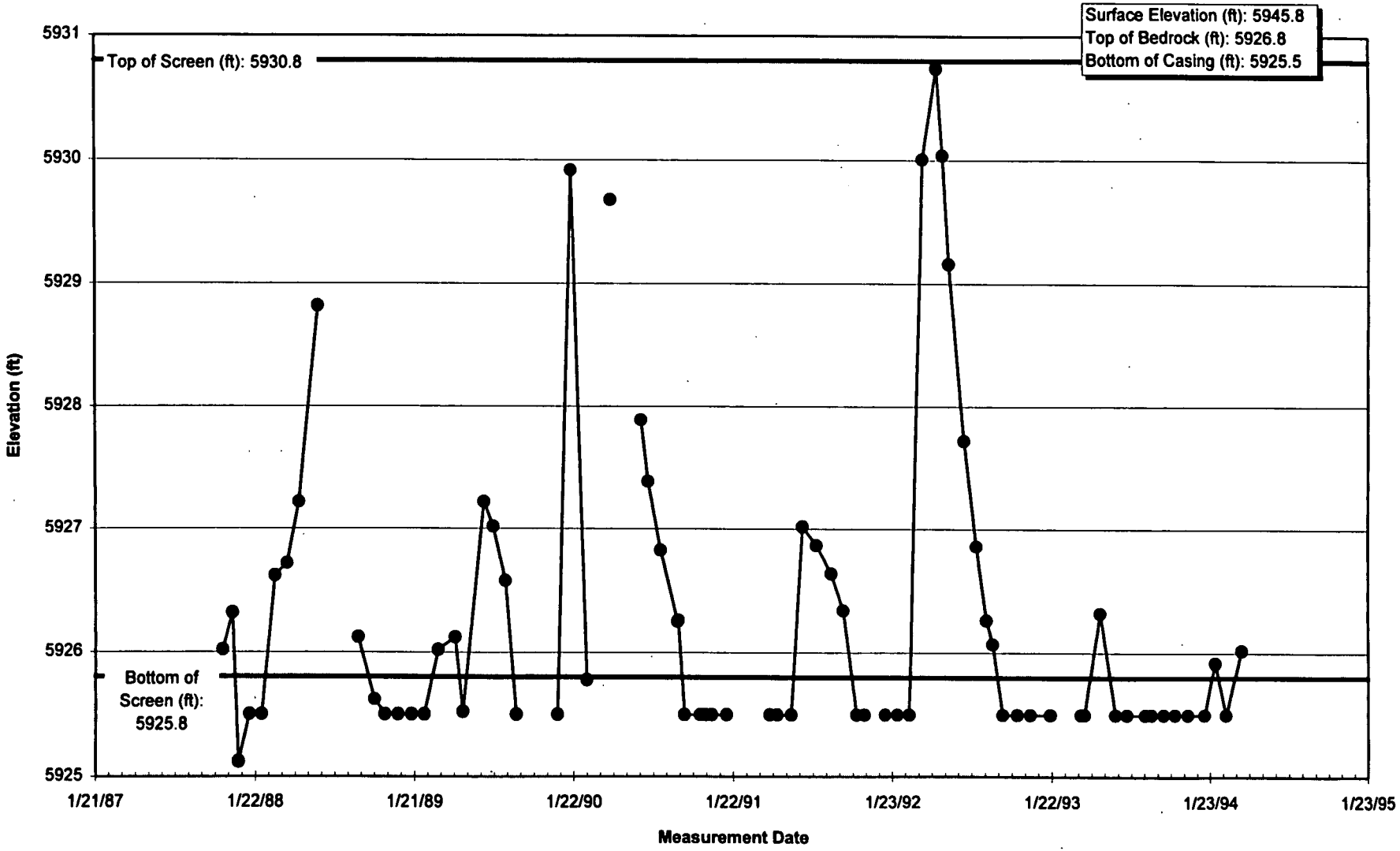
Hydrograph 3387



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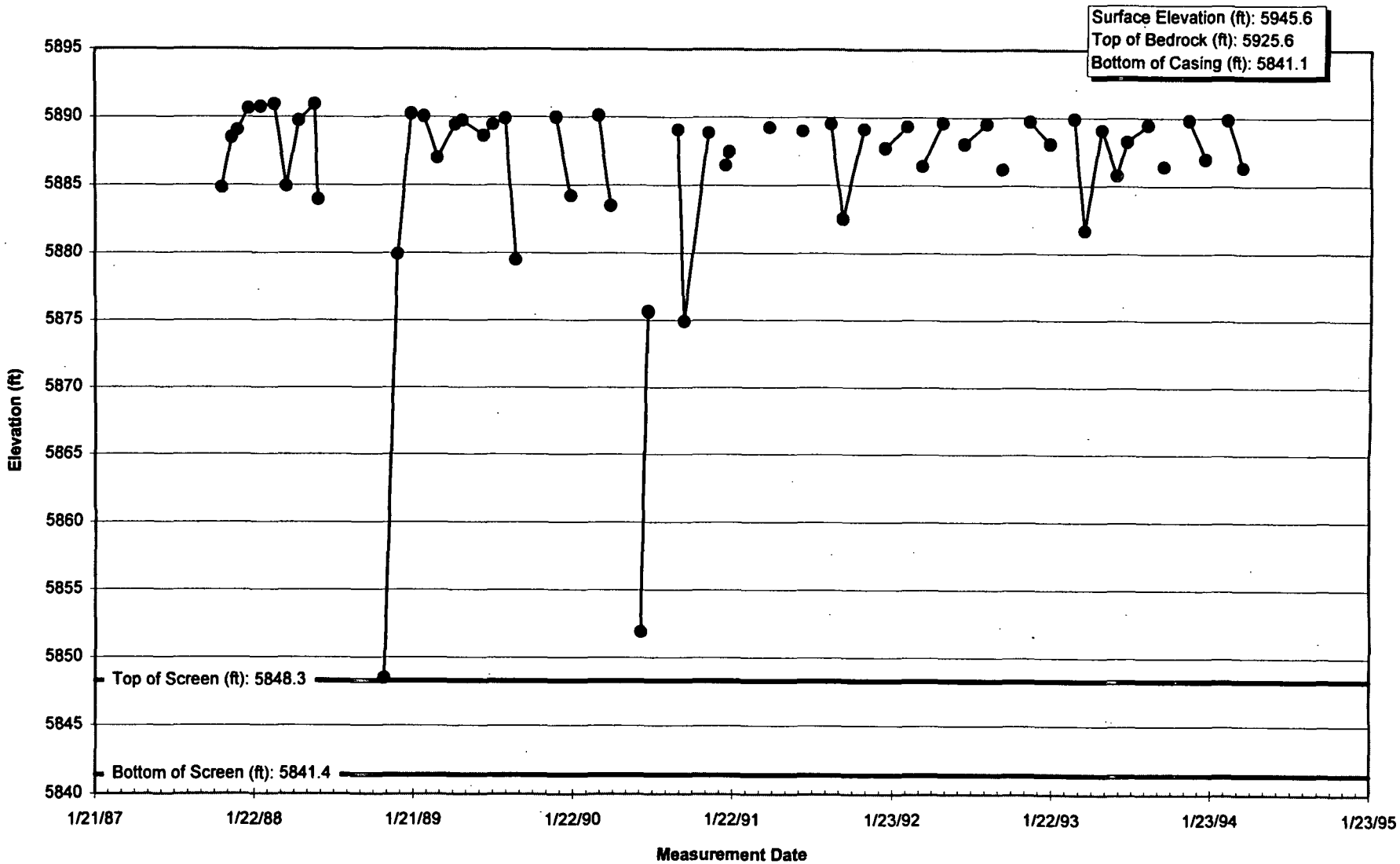
218

Hydrograph 3487



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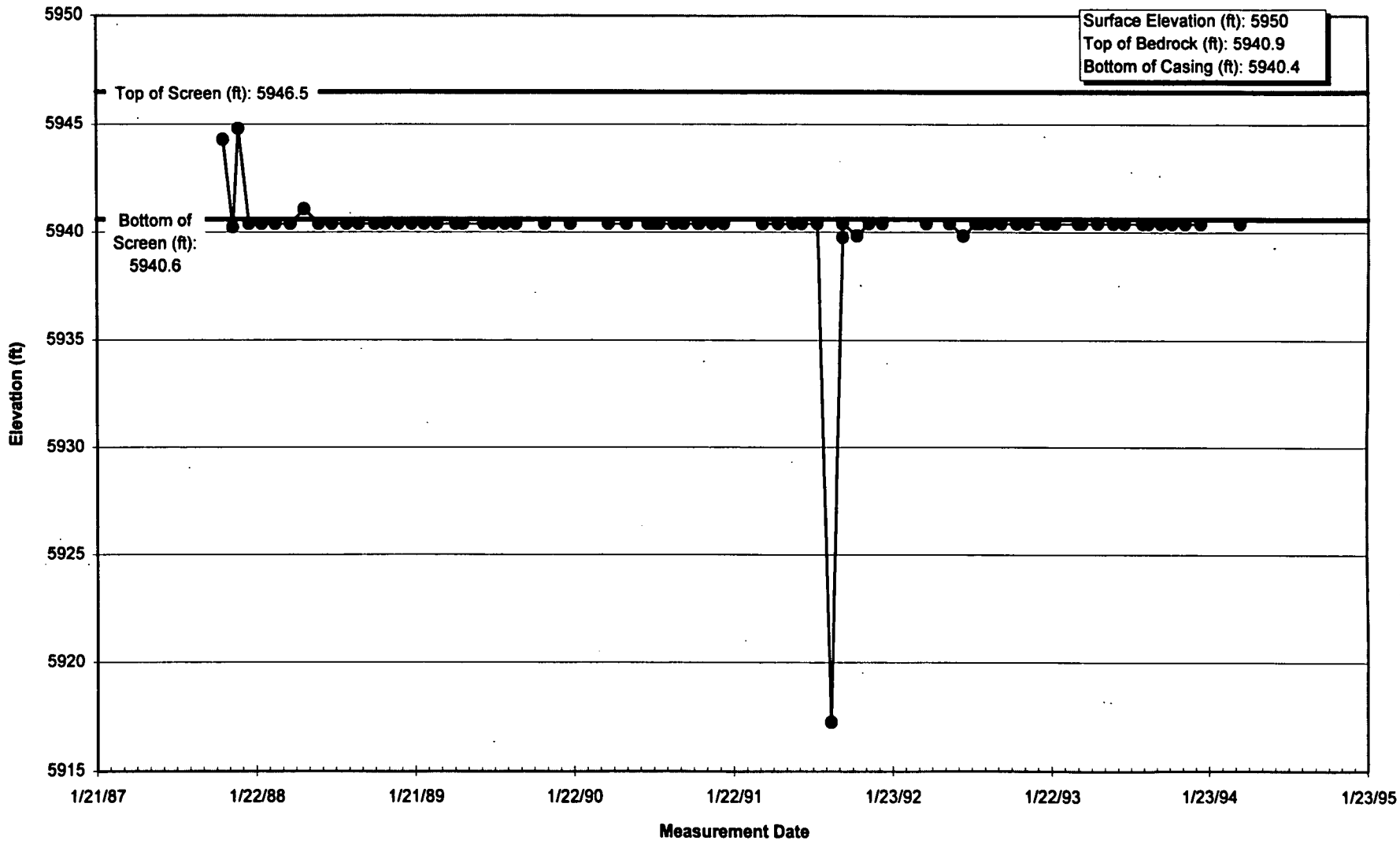
Hydrograph 3587



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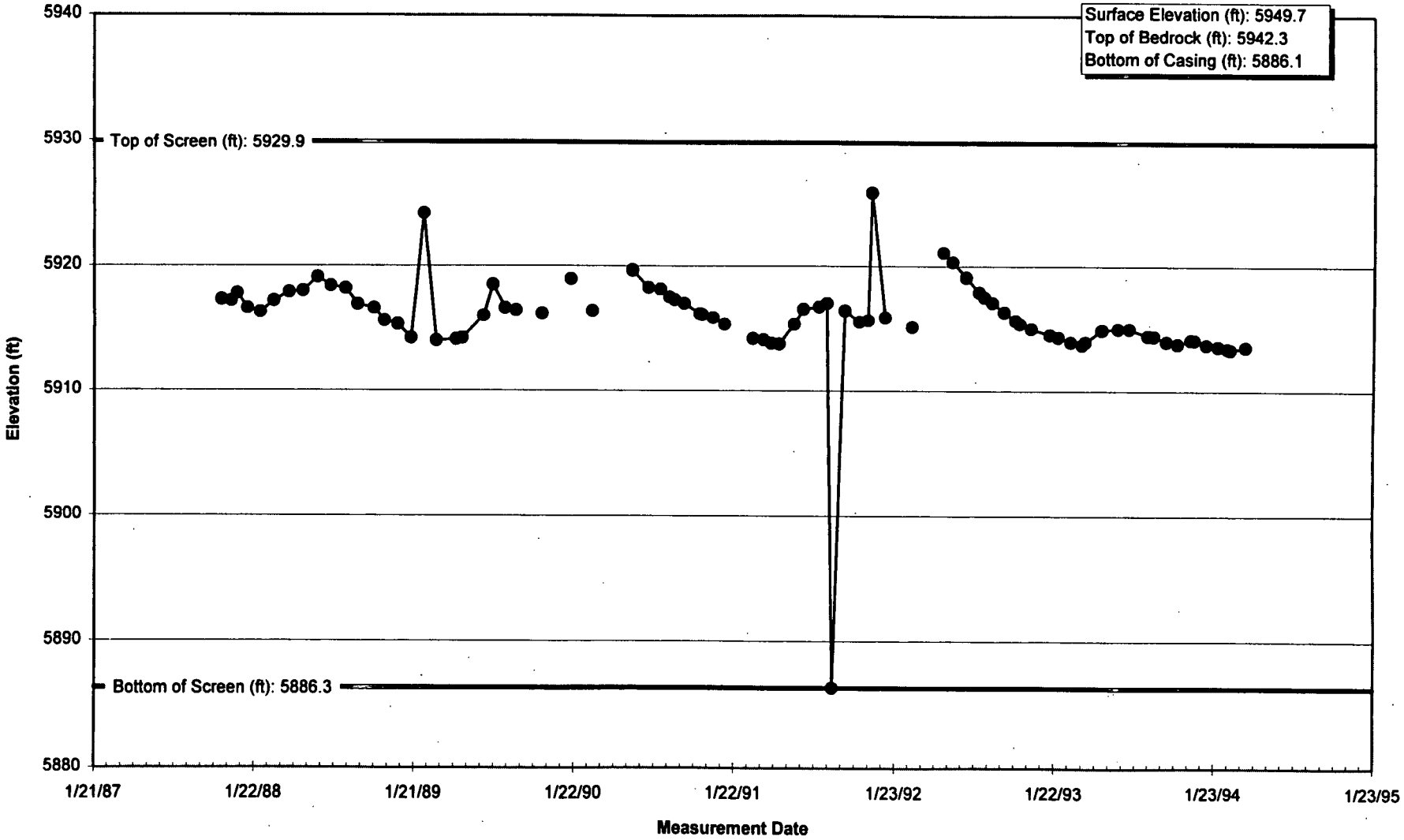
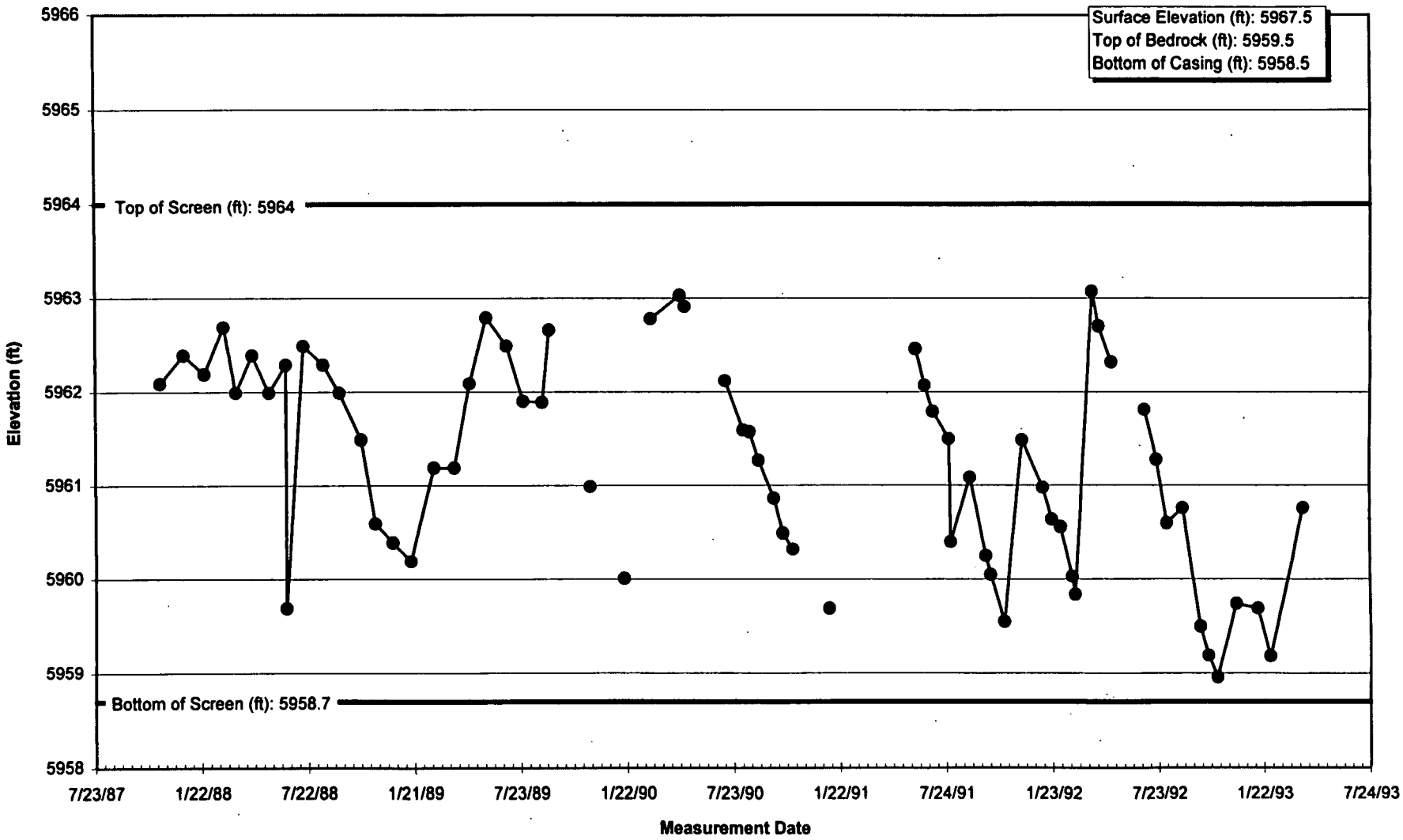
Hydrograph 3687



S9.XLS 3687 4/4/95

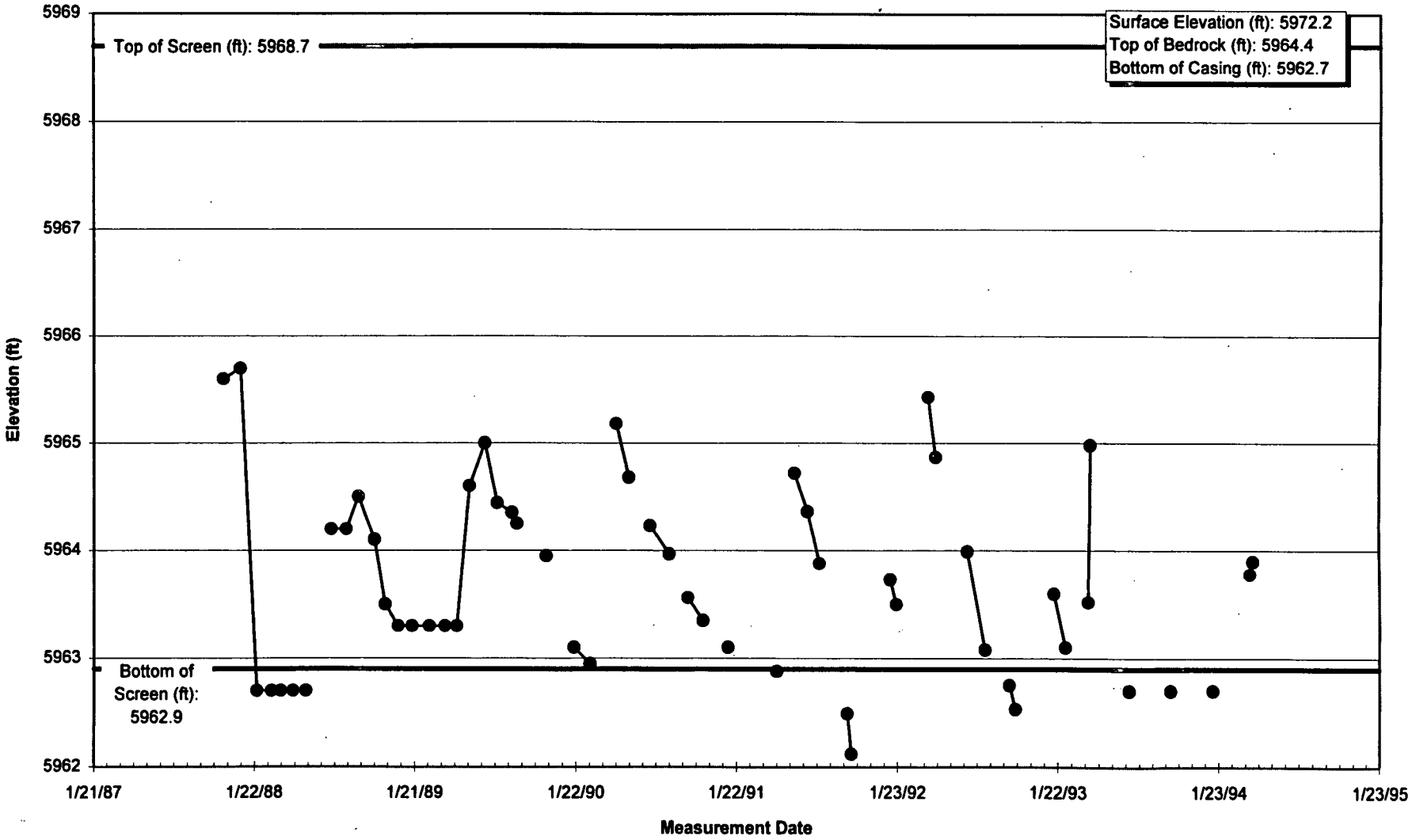
221

Hydrograph 3787



222

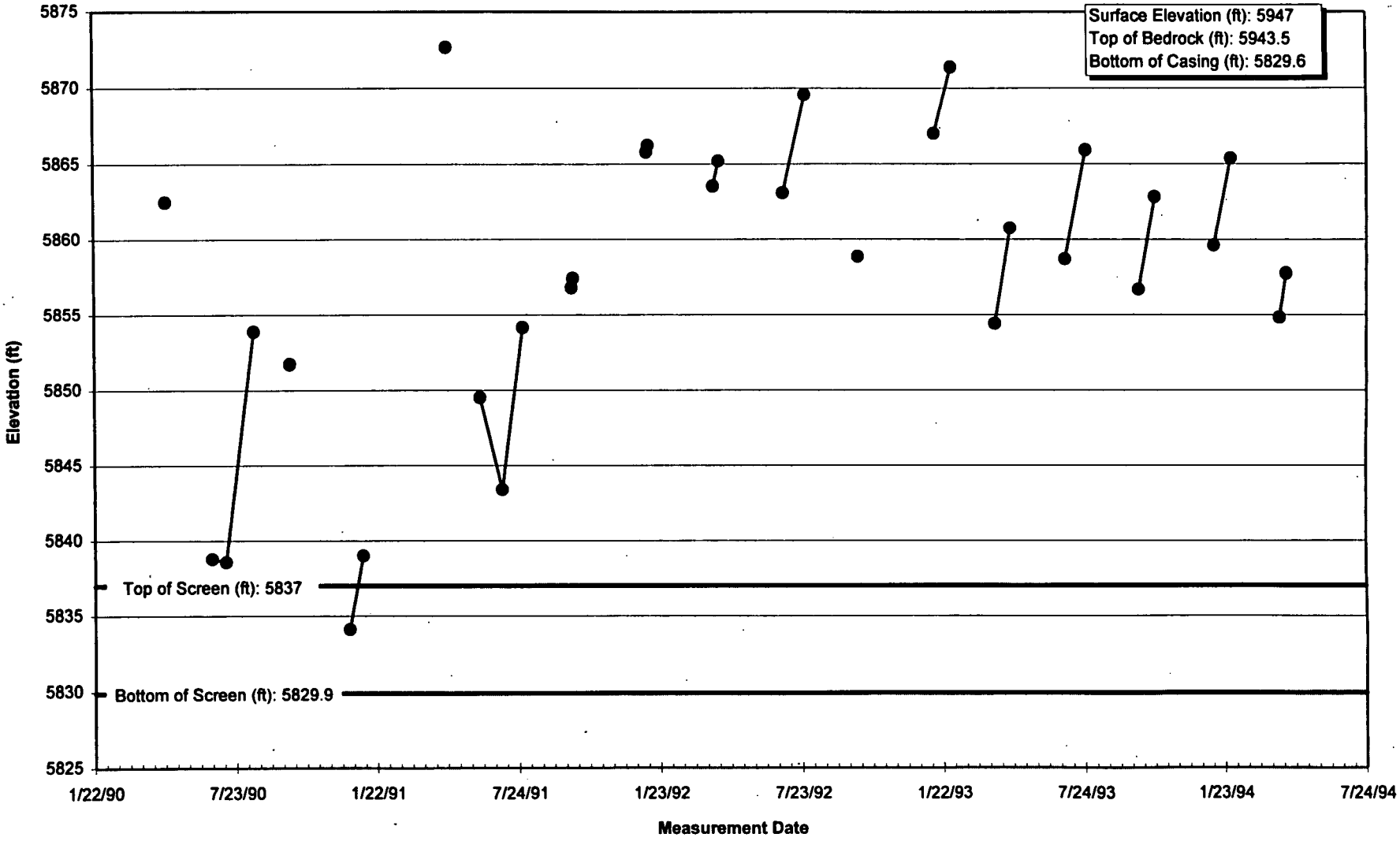
Hydrograph 3887



223

S10.XLS 3887 4/4/95

Hydrograph 3987



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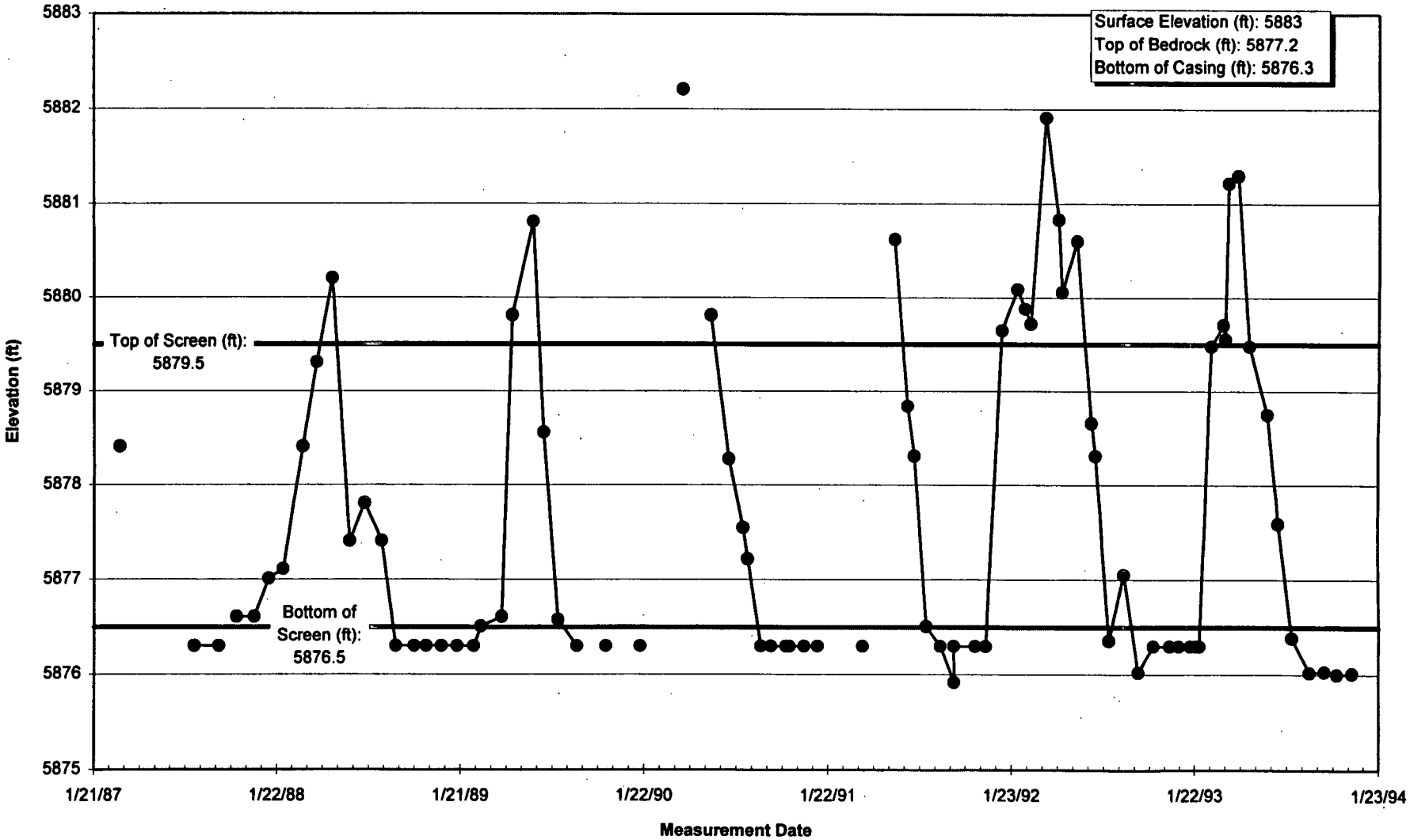
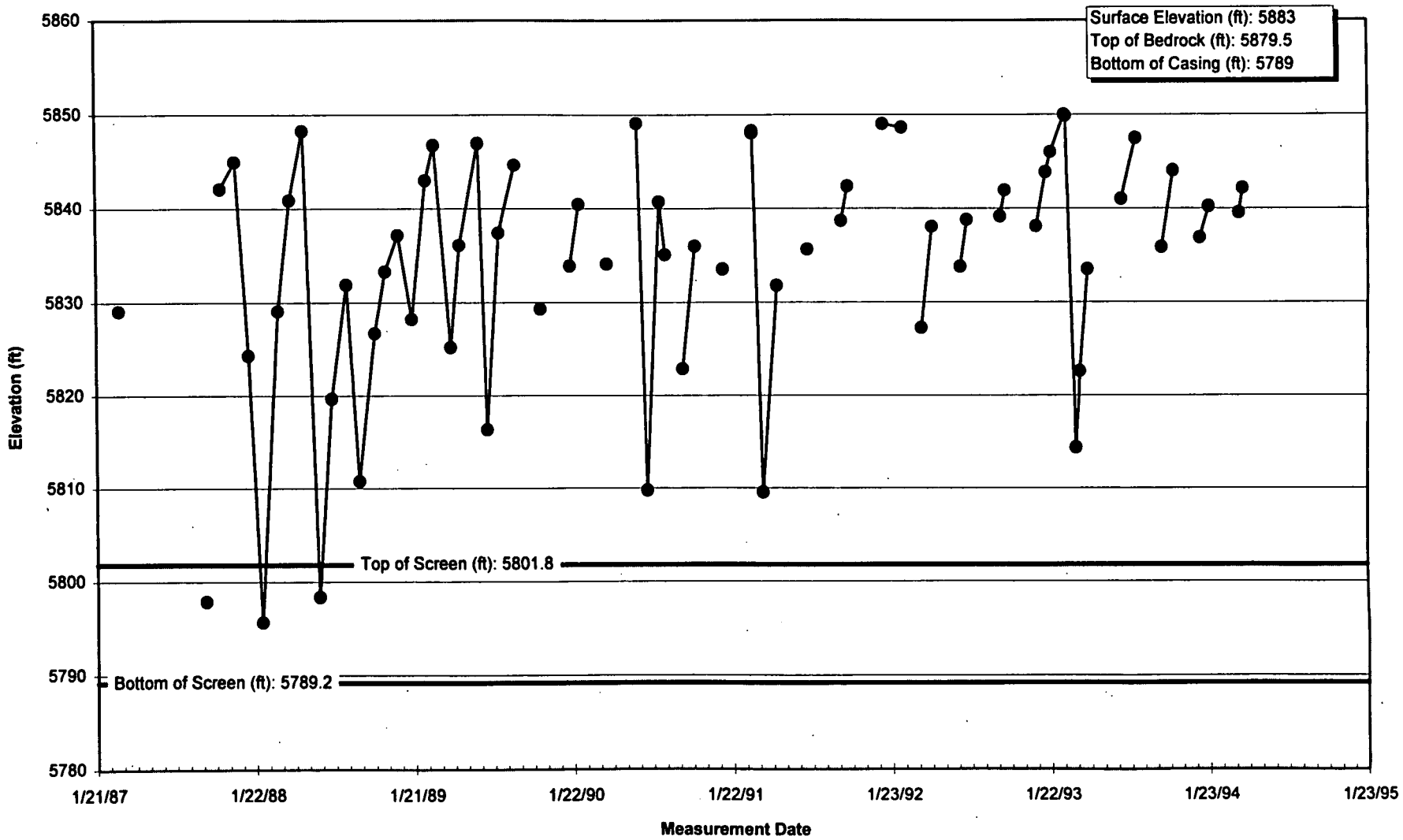
Hydrograph 4087



S10.XLS 4087 4/4/95

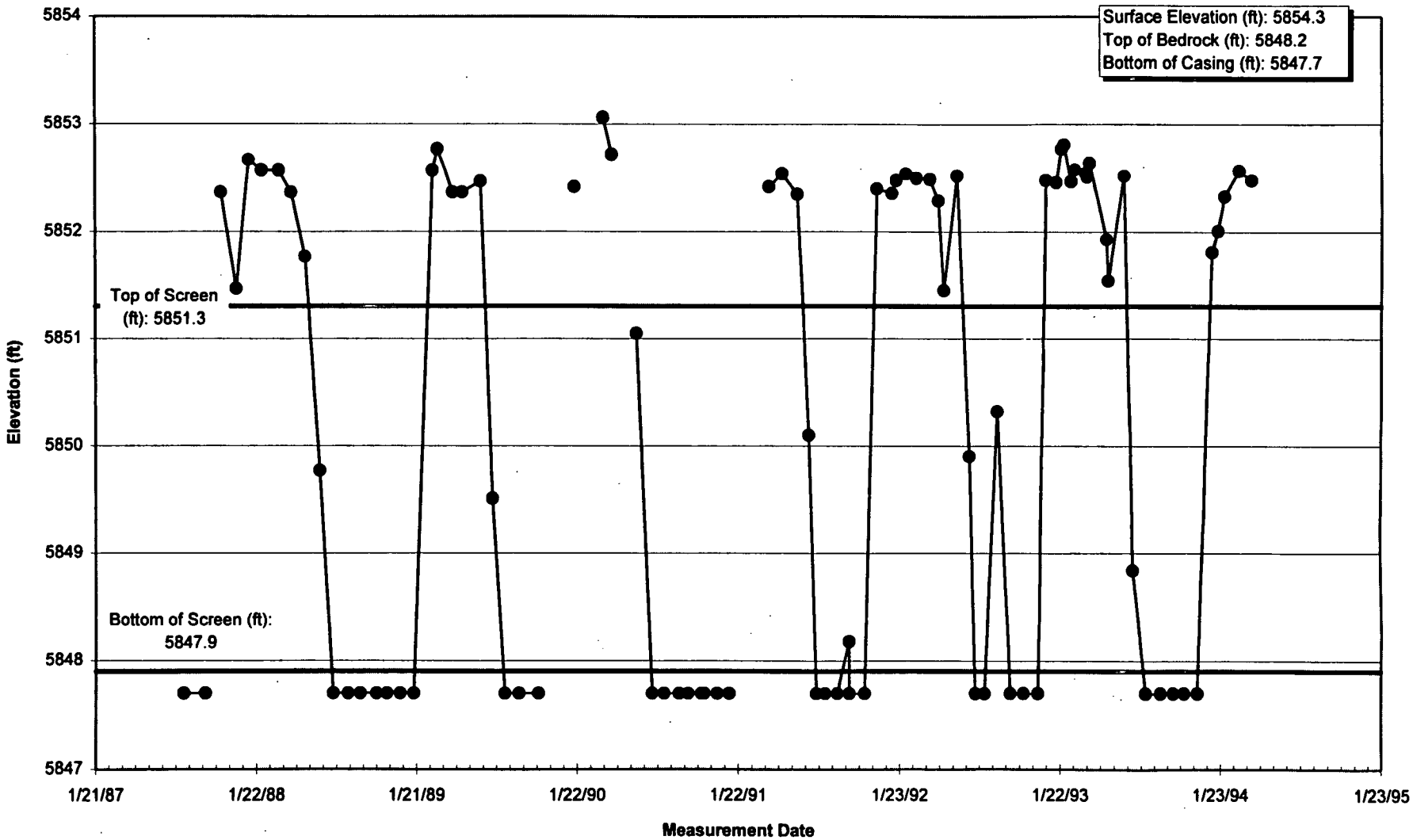
225

Hydrograph 4187



226

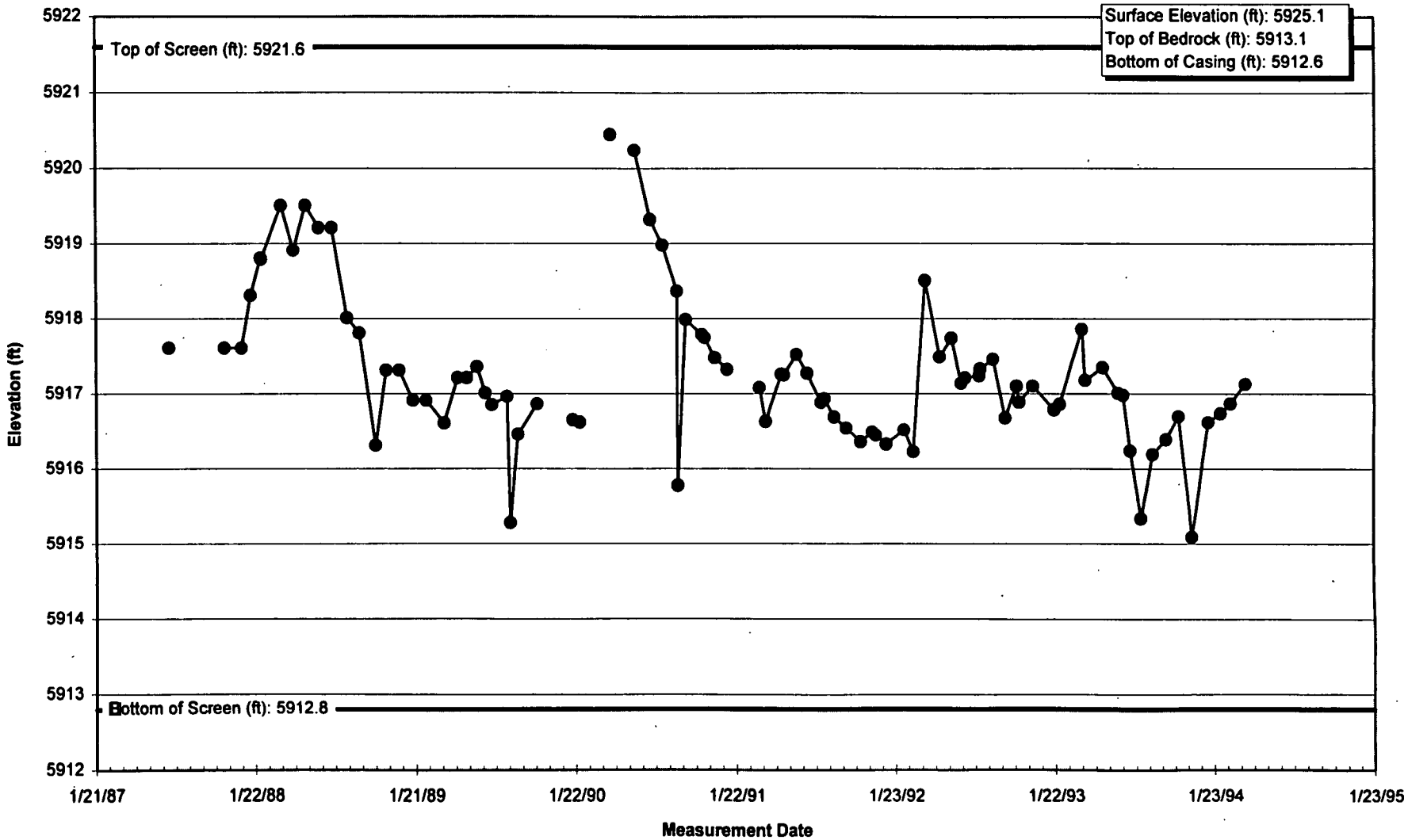
Hydrograph 4287



227

S11.XLS 4287 4/5/95

Hydrograph 4387



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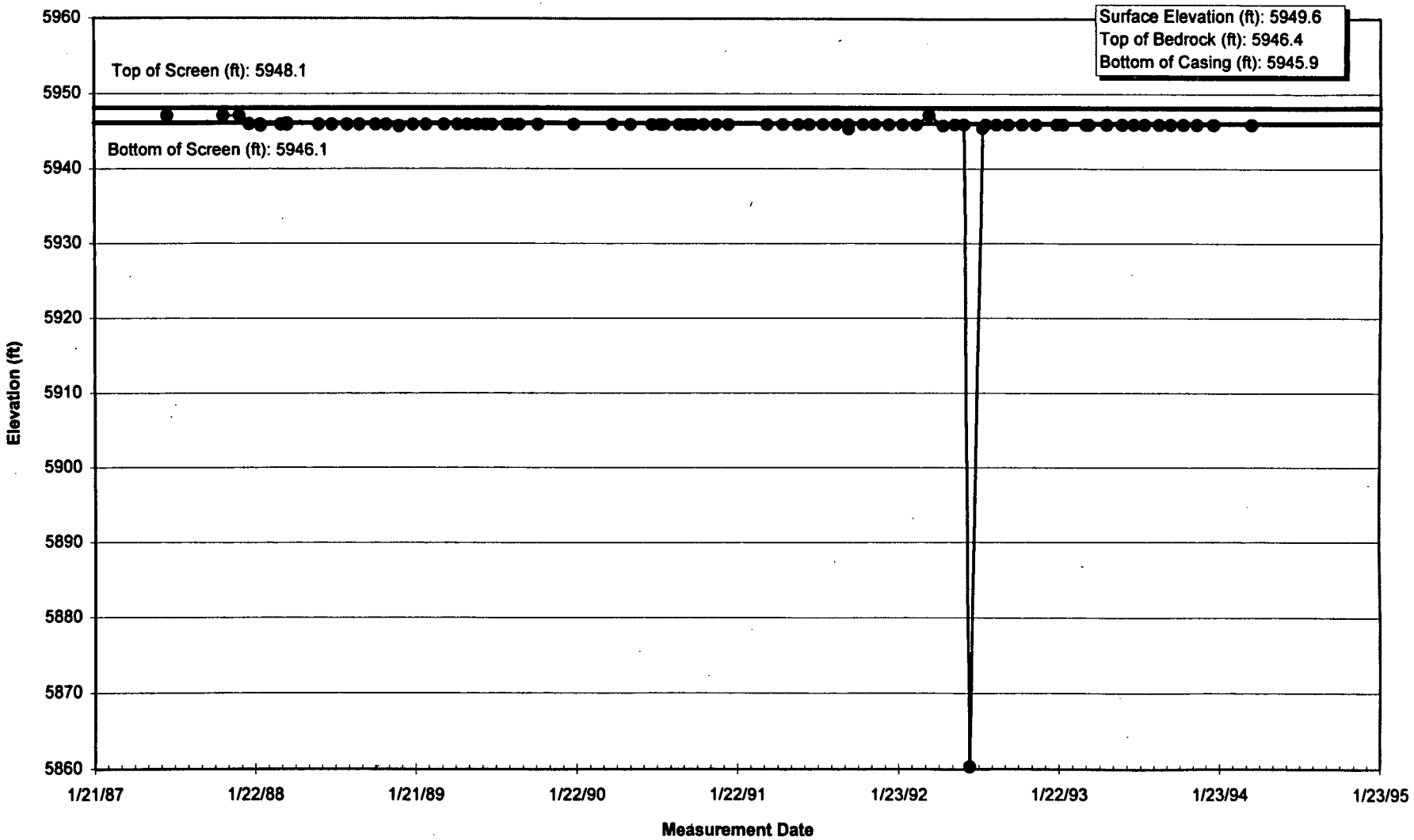
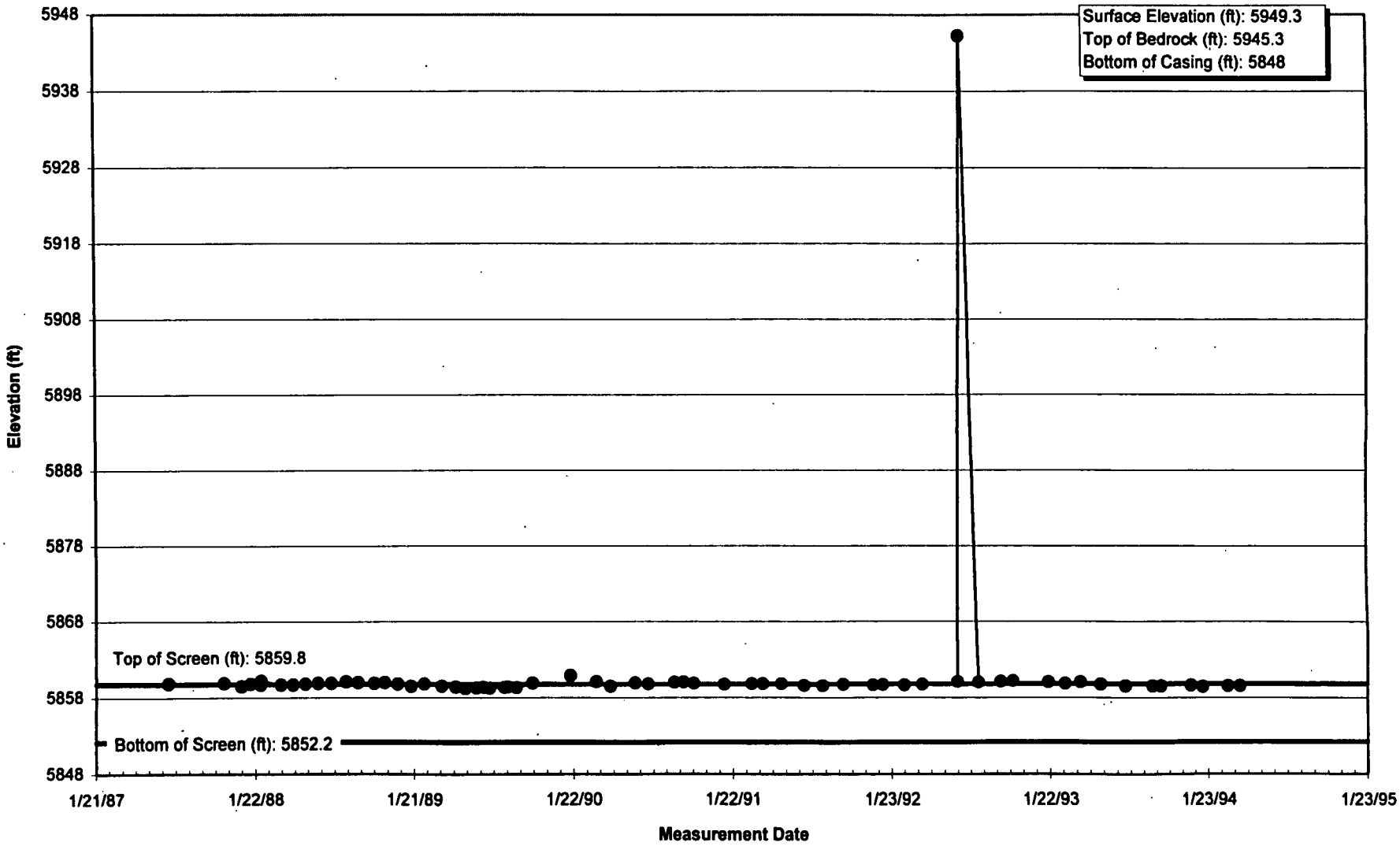
Hydrograph 4487



229

S11.XLS 4487 4/5/95

Hydrograph 4587



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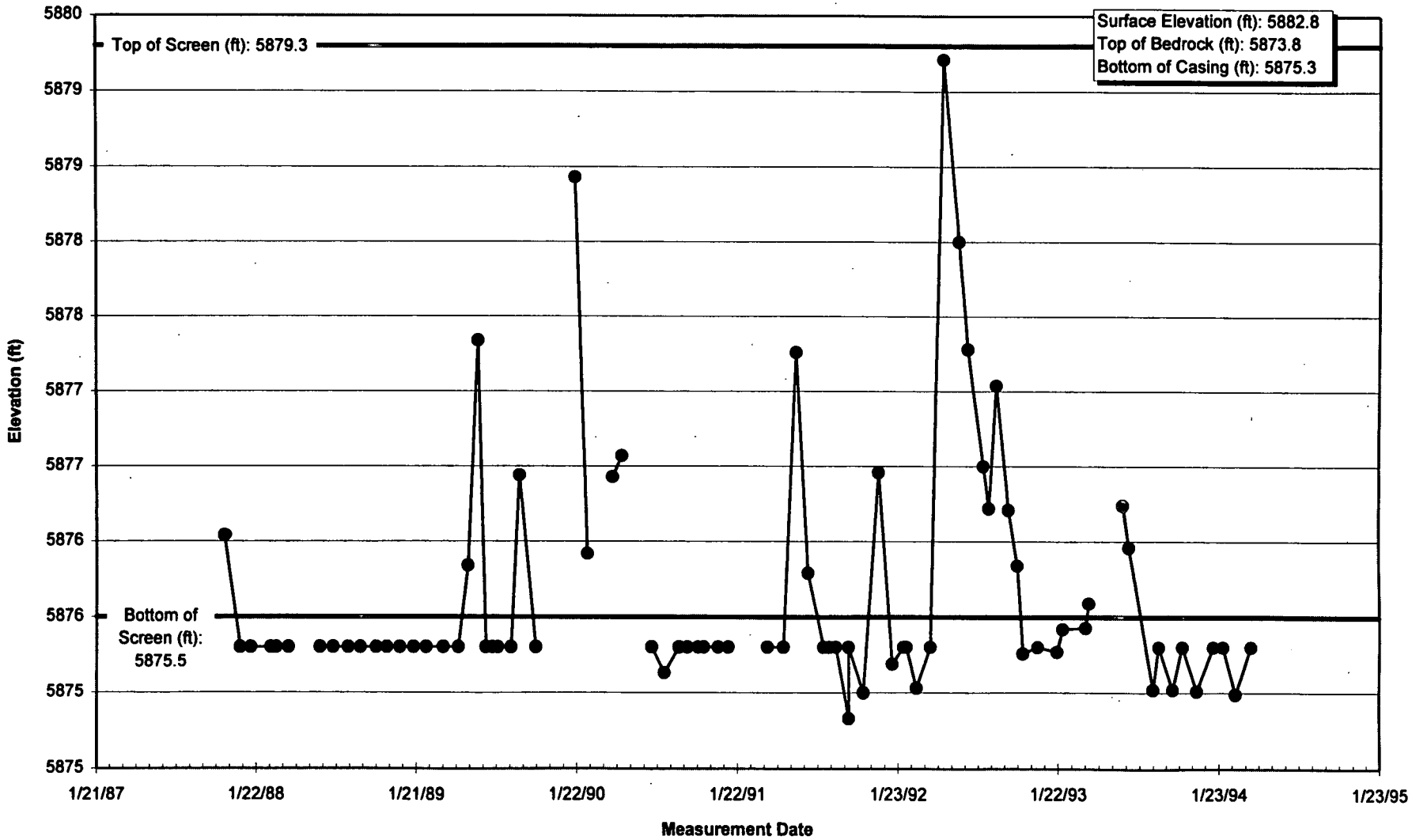
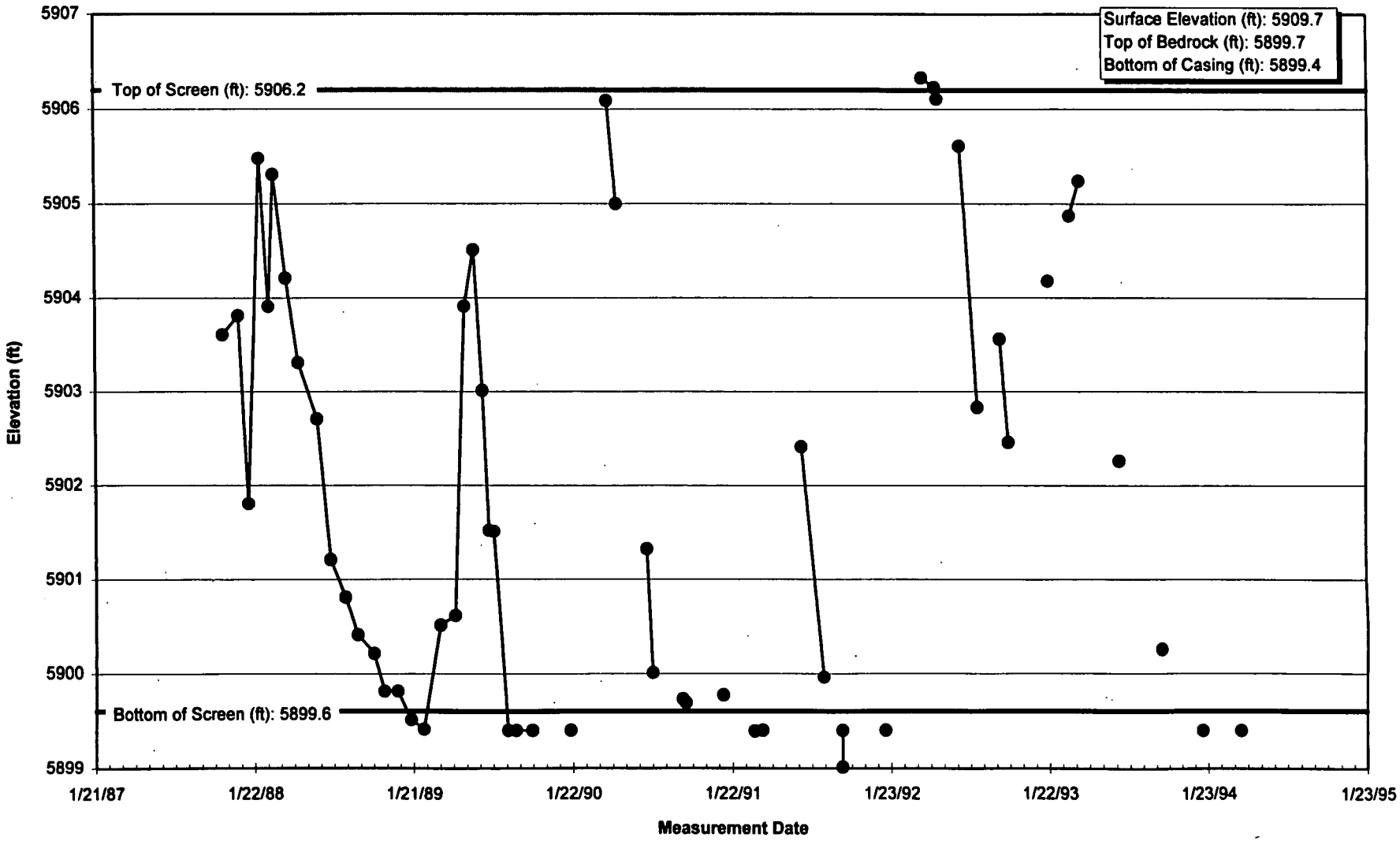


S13.XLS 4787 4/5/95

c 231

Hydrograph 4887



232

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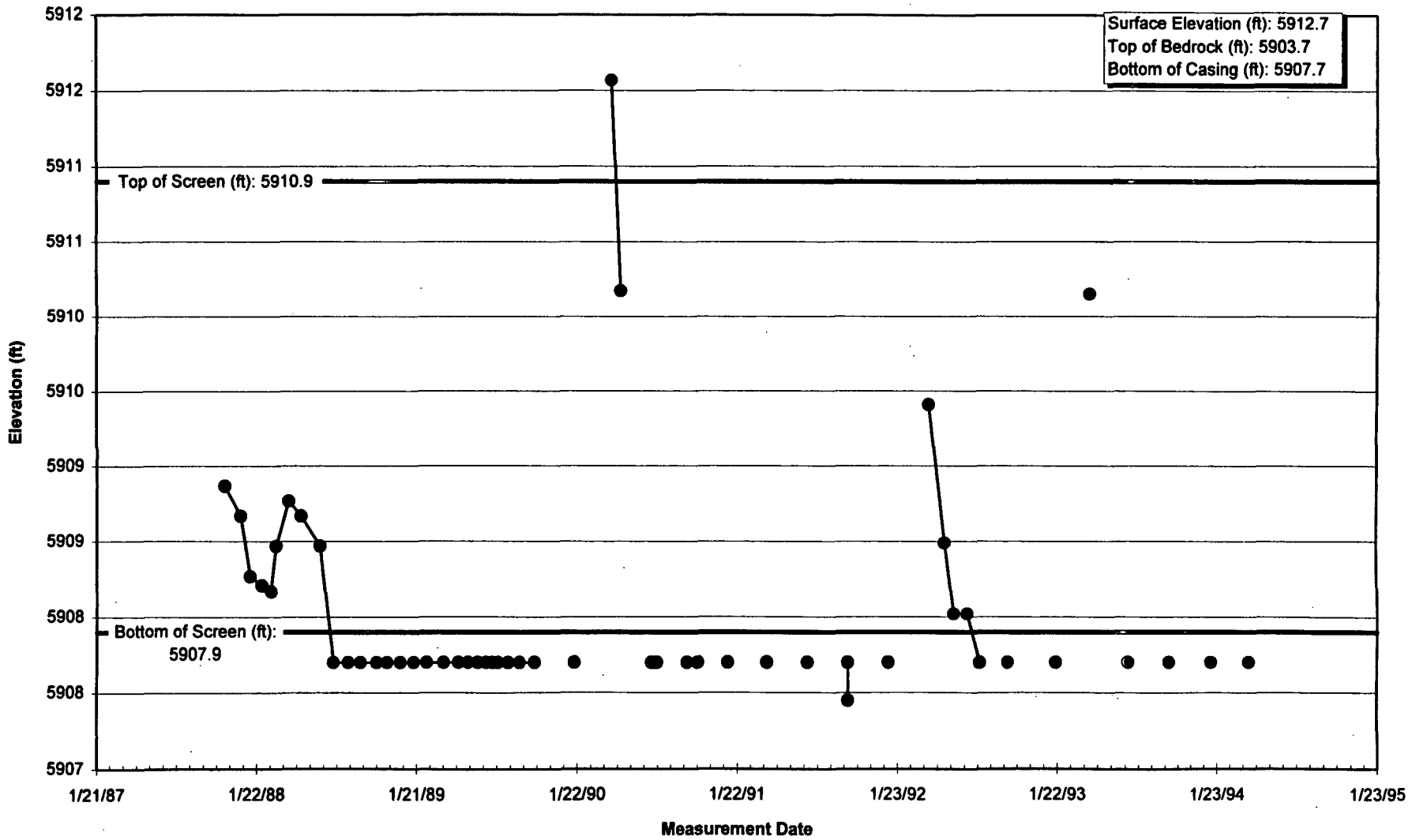

S13.XLS 4987 4/5/95

233

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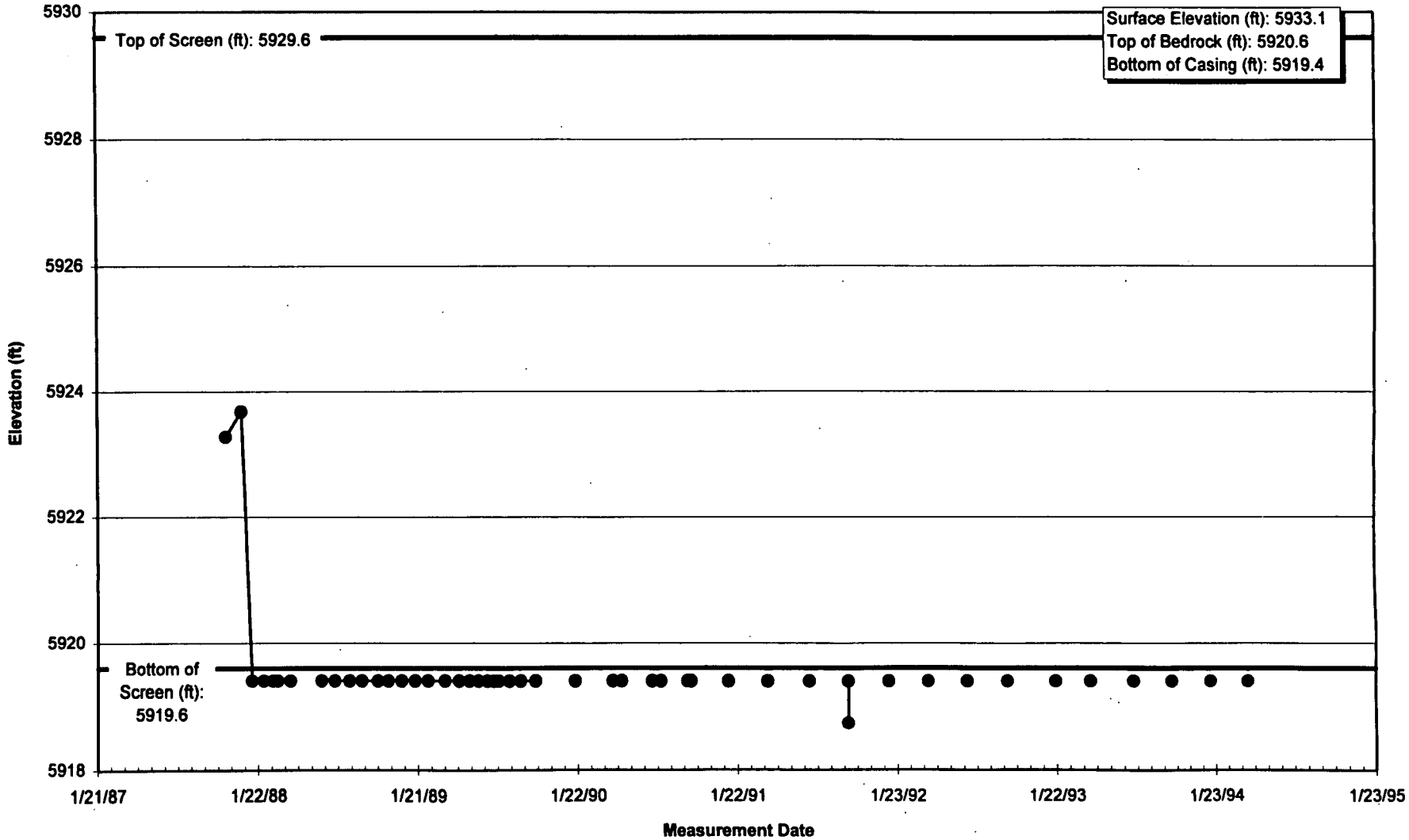
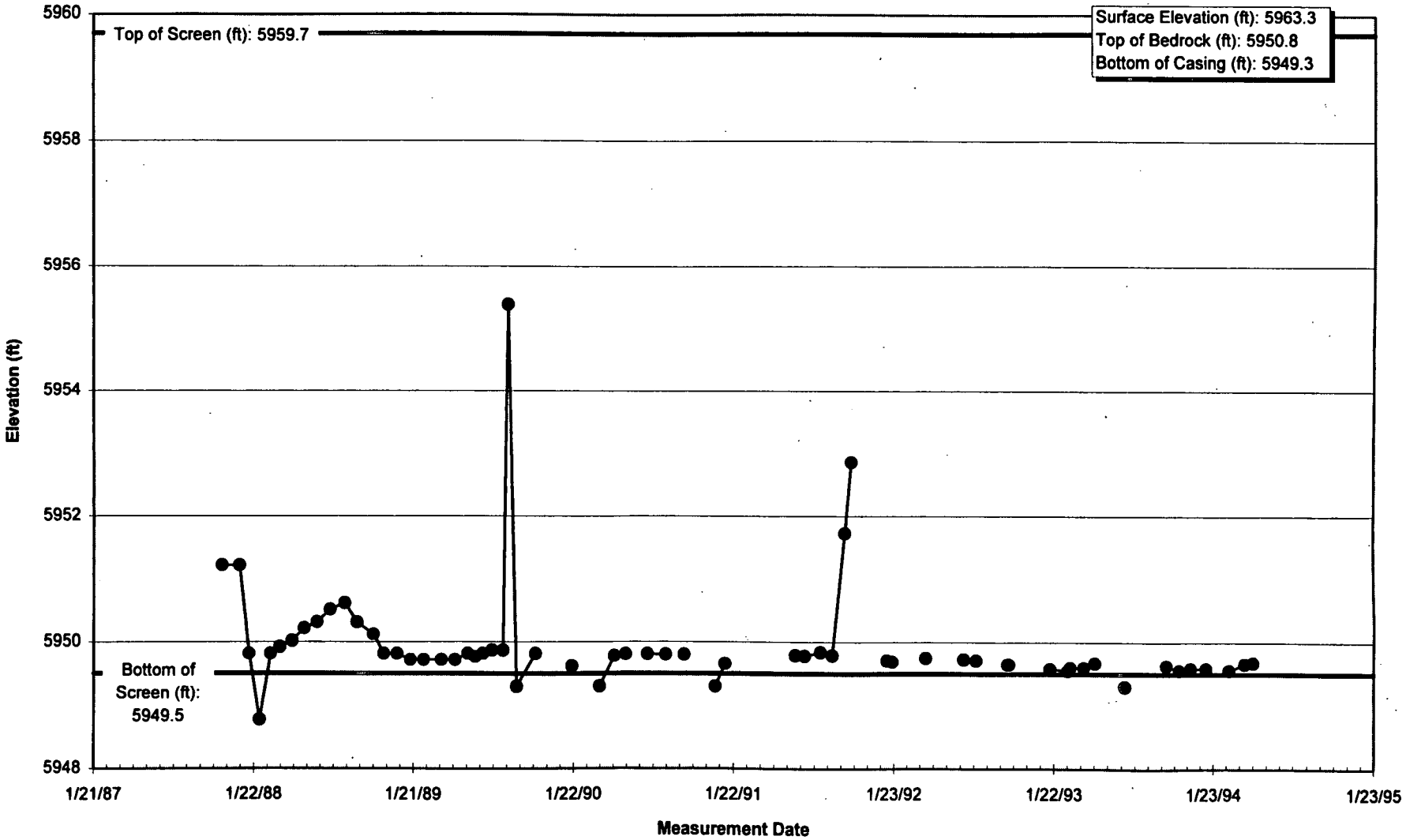


234 S13.XLS 4/5/95

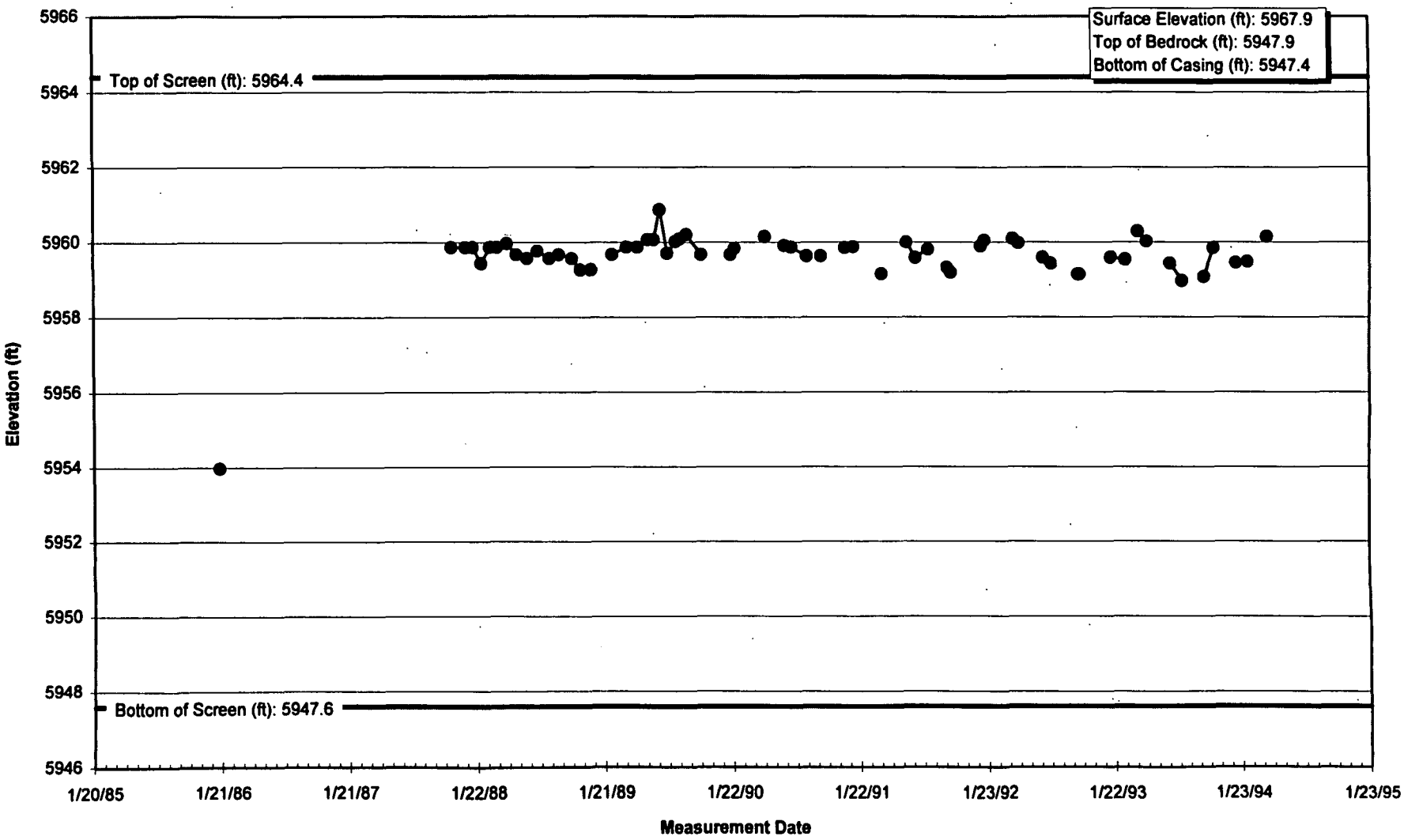
Hydrograph 5187



235

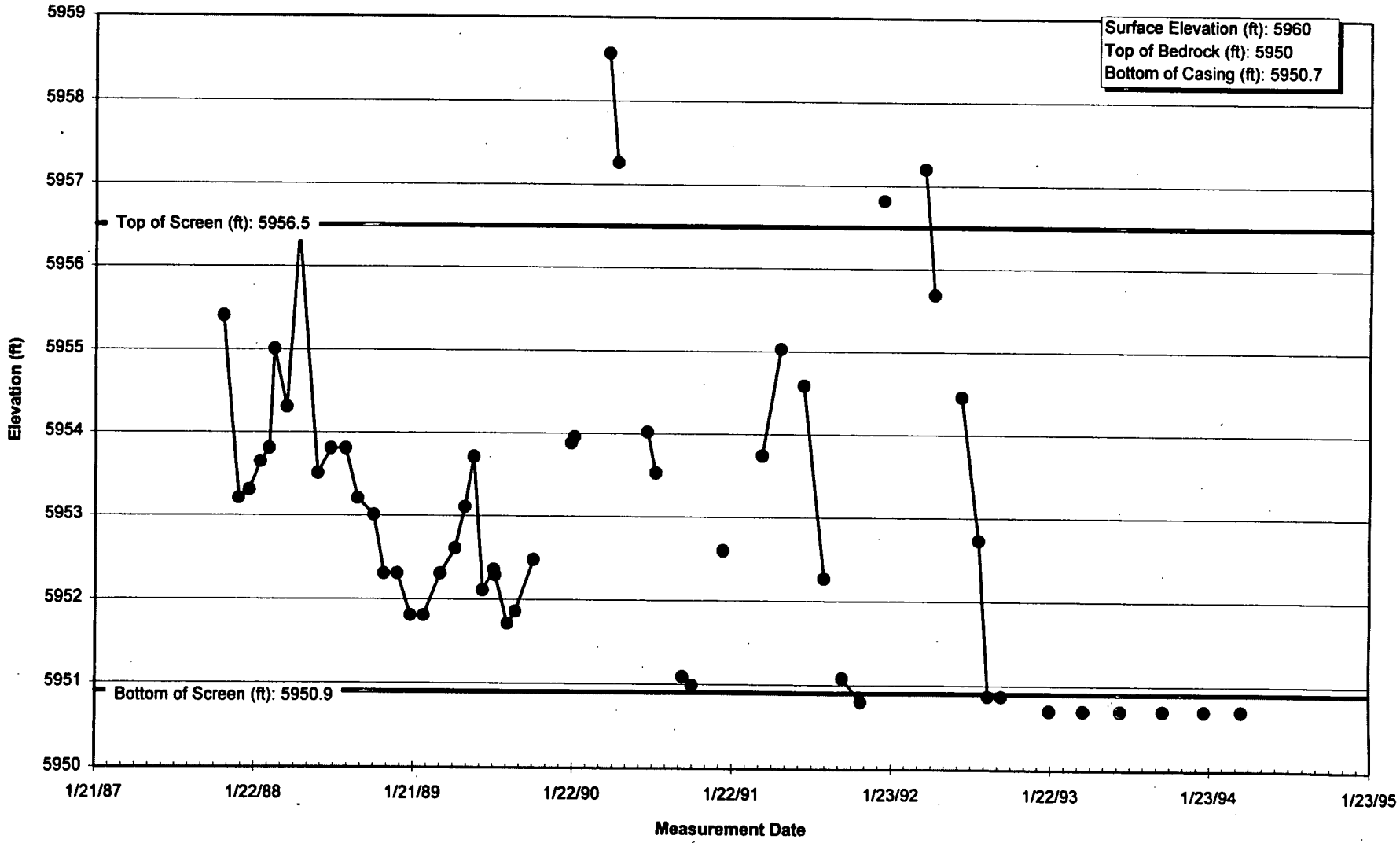
S13.XLS 5187 4/5/95

Hydrograph 5287



236

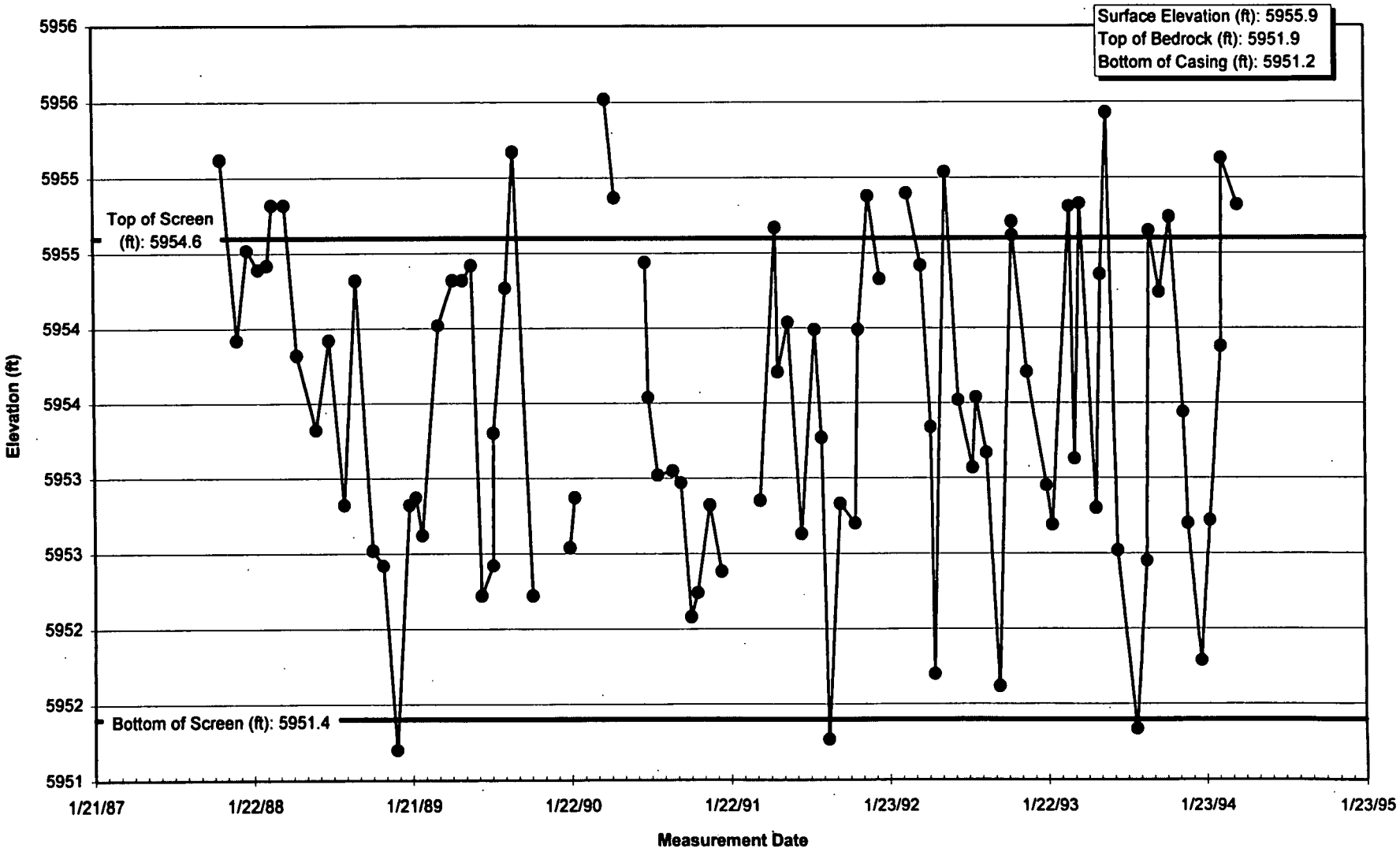
Hydrograph 5387



S13.XLS 5387 4/5/95

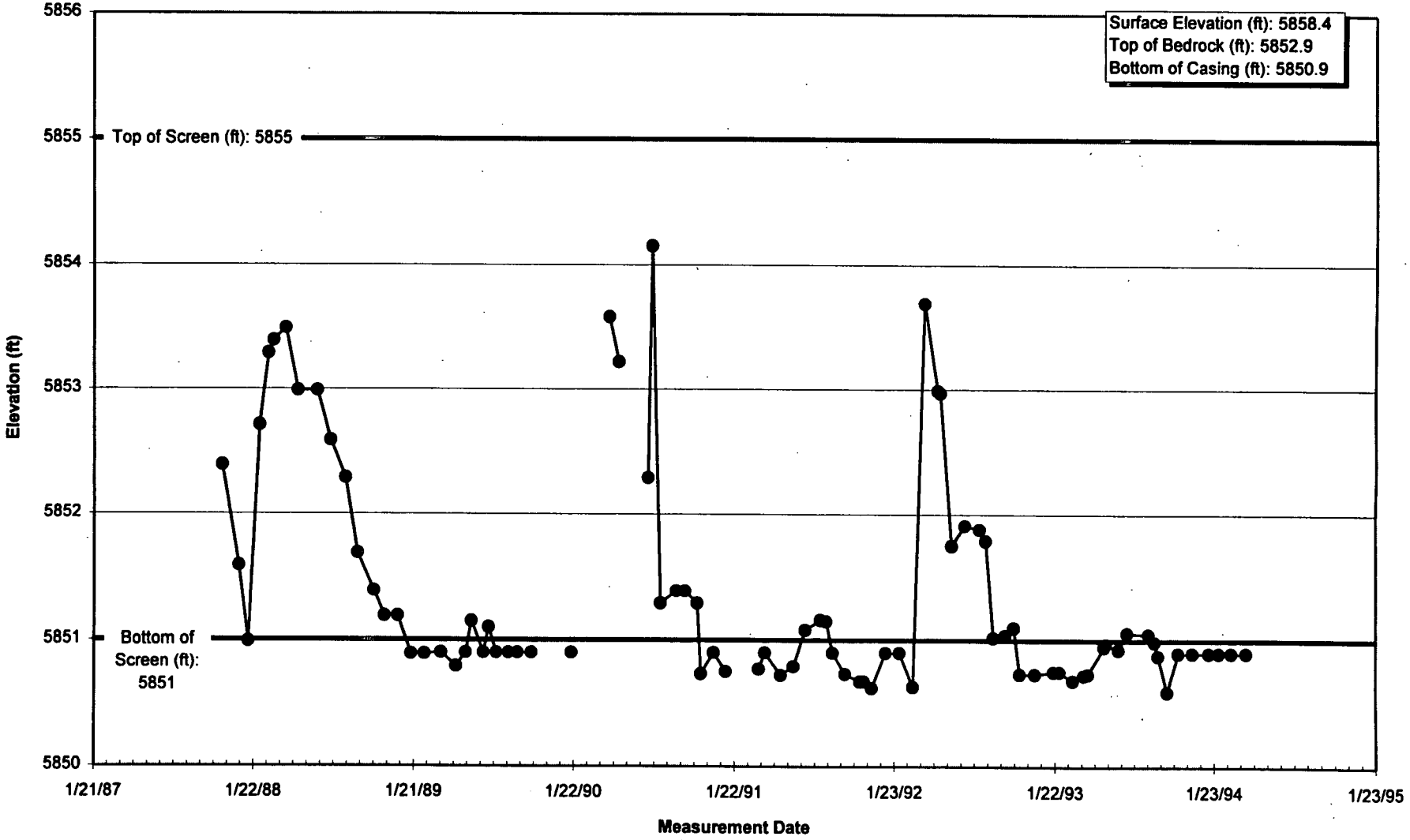
237

Hydrograph 5487



238 S13.XL[redacted] 4/5/95

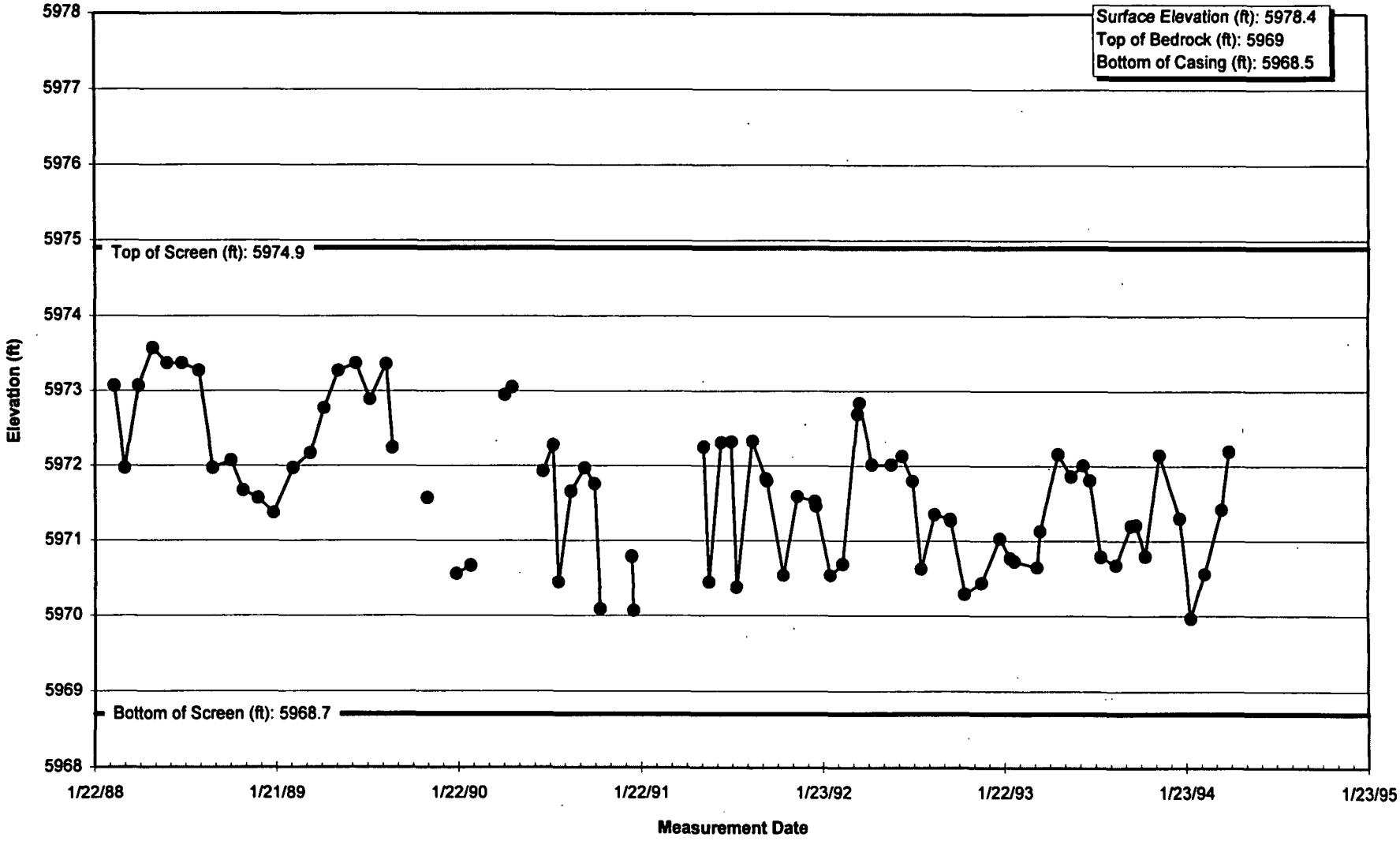
Hydrograph 5587



S13.XLS 5587 4/5/95

239

Hydrograph 5687



240

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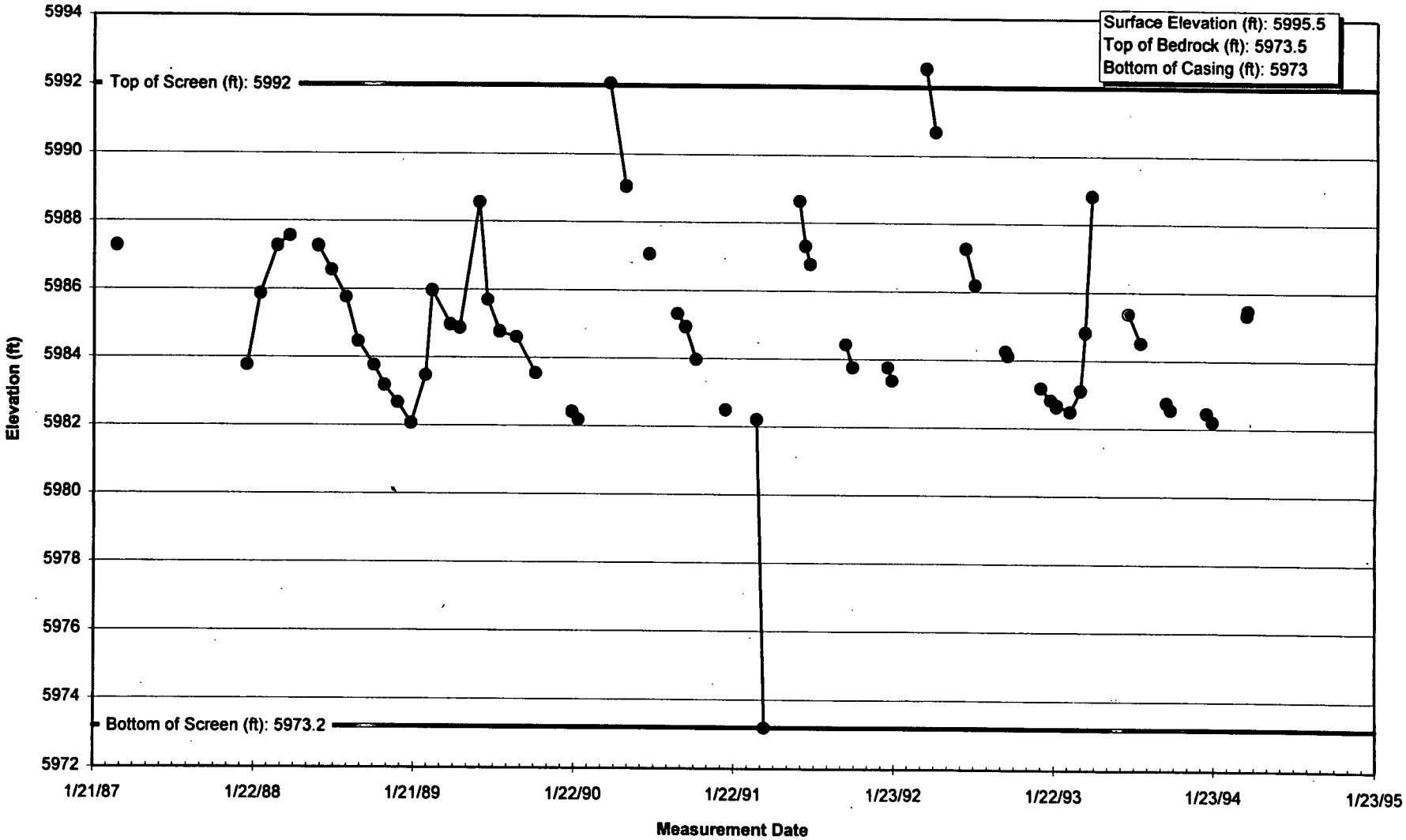

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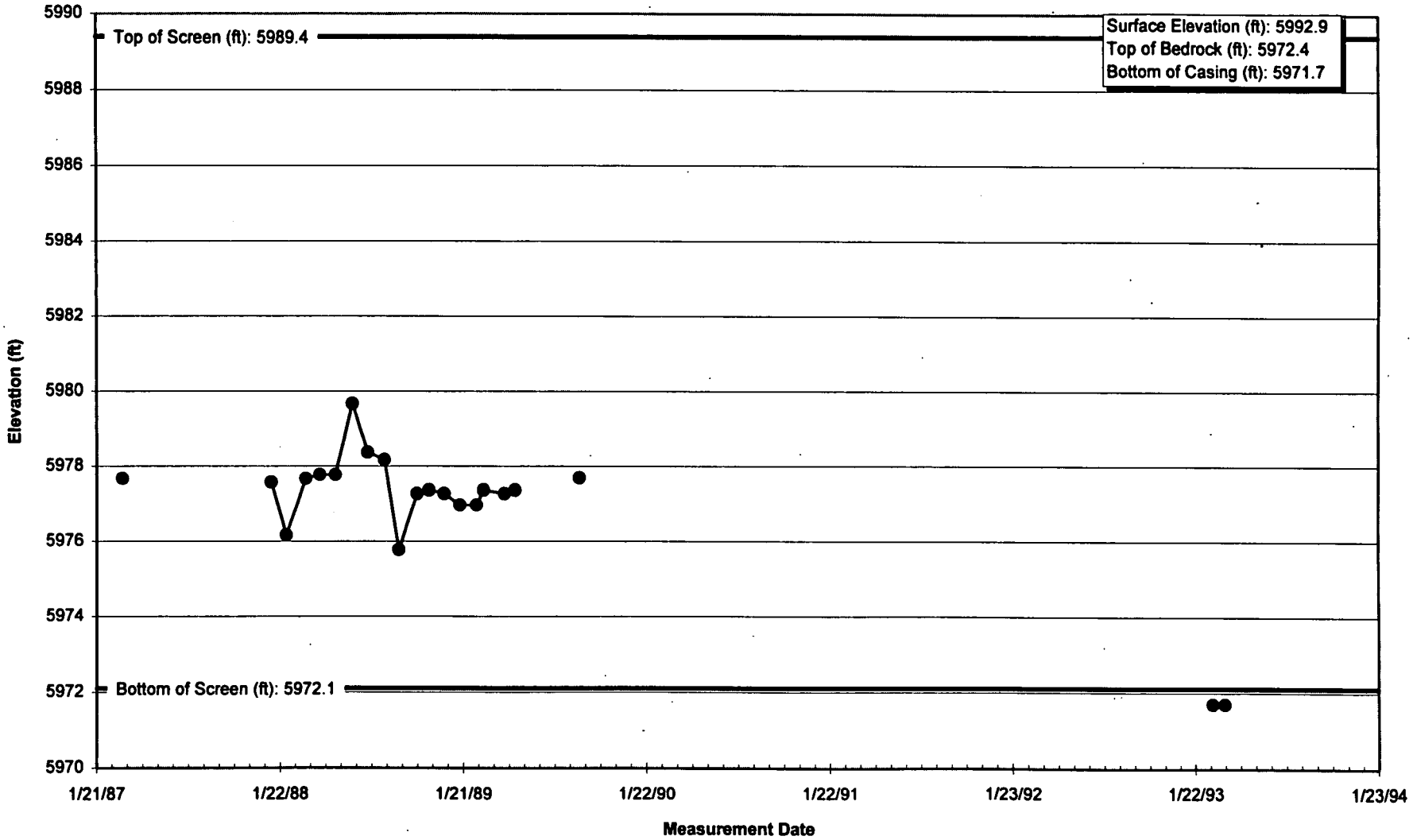
3441

Hydrograph 5987



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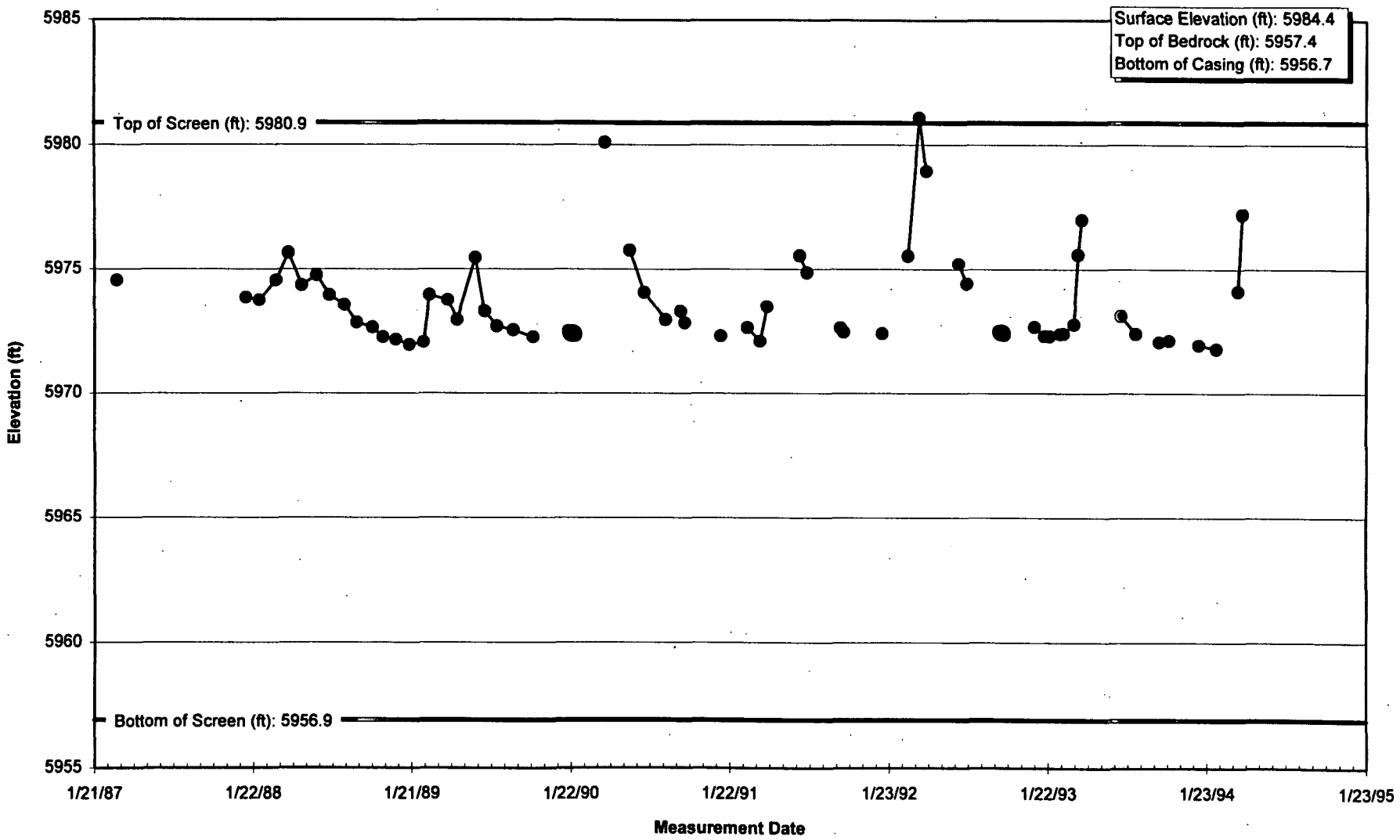
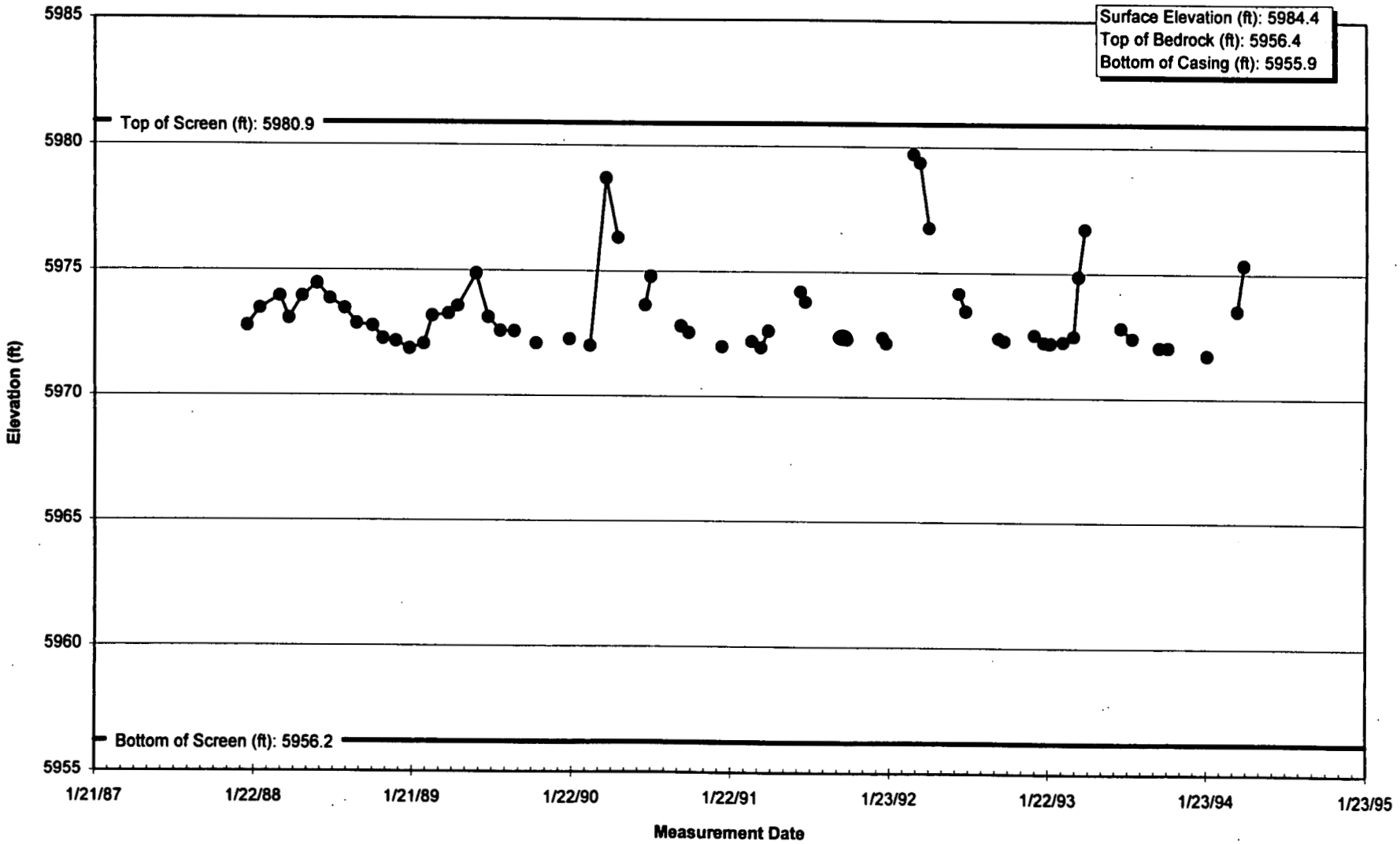


S14.XLS 6087 4/5/95

243

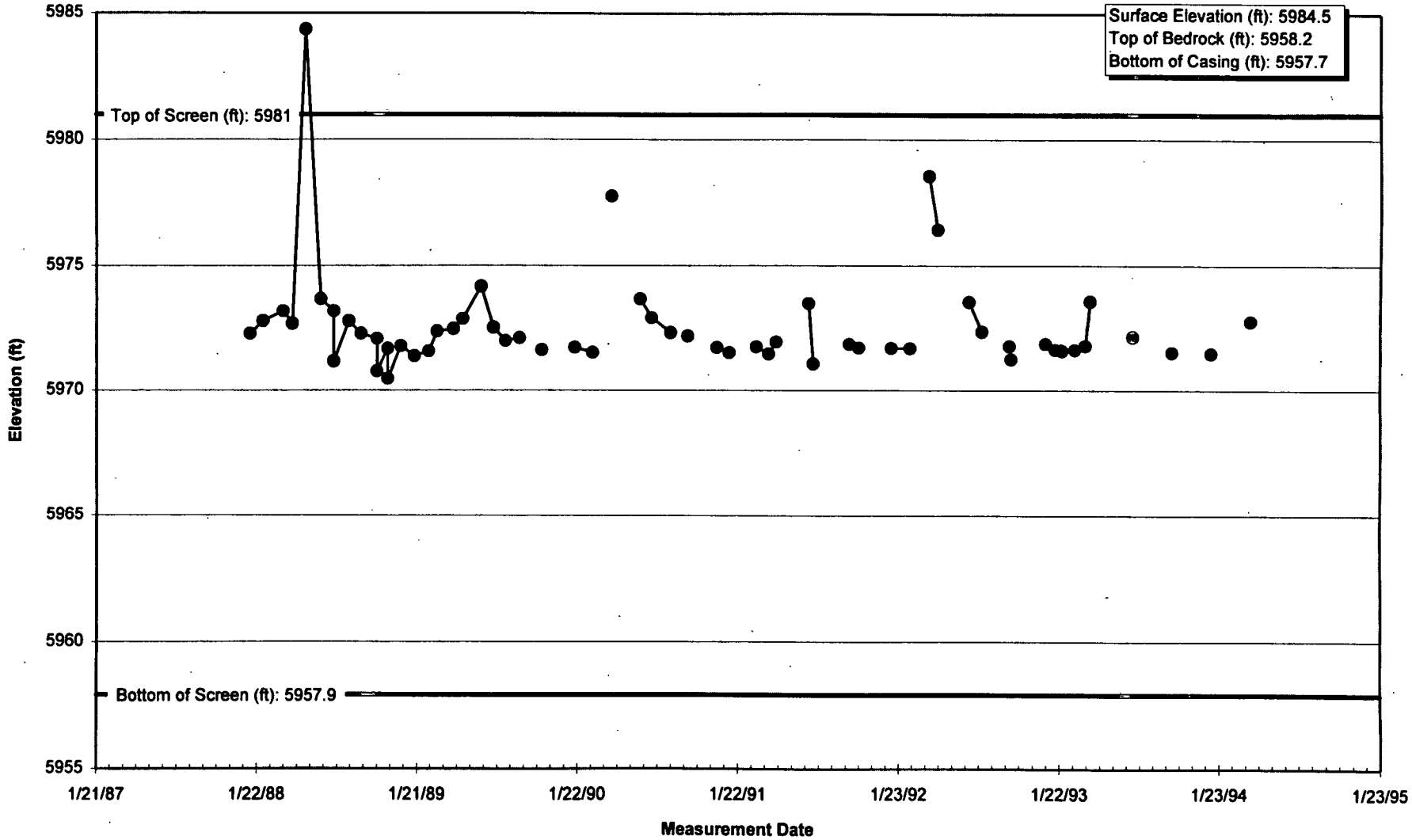
Hydrograph 6187



244

S14.XLS 6187 4/5/95

Hydrograph 6287



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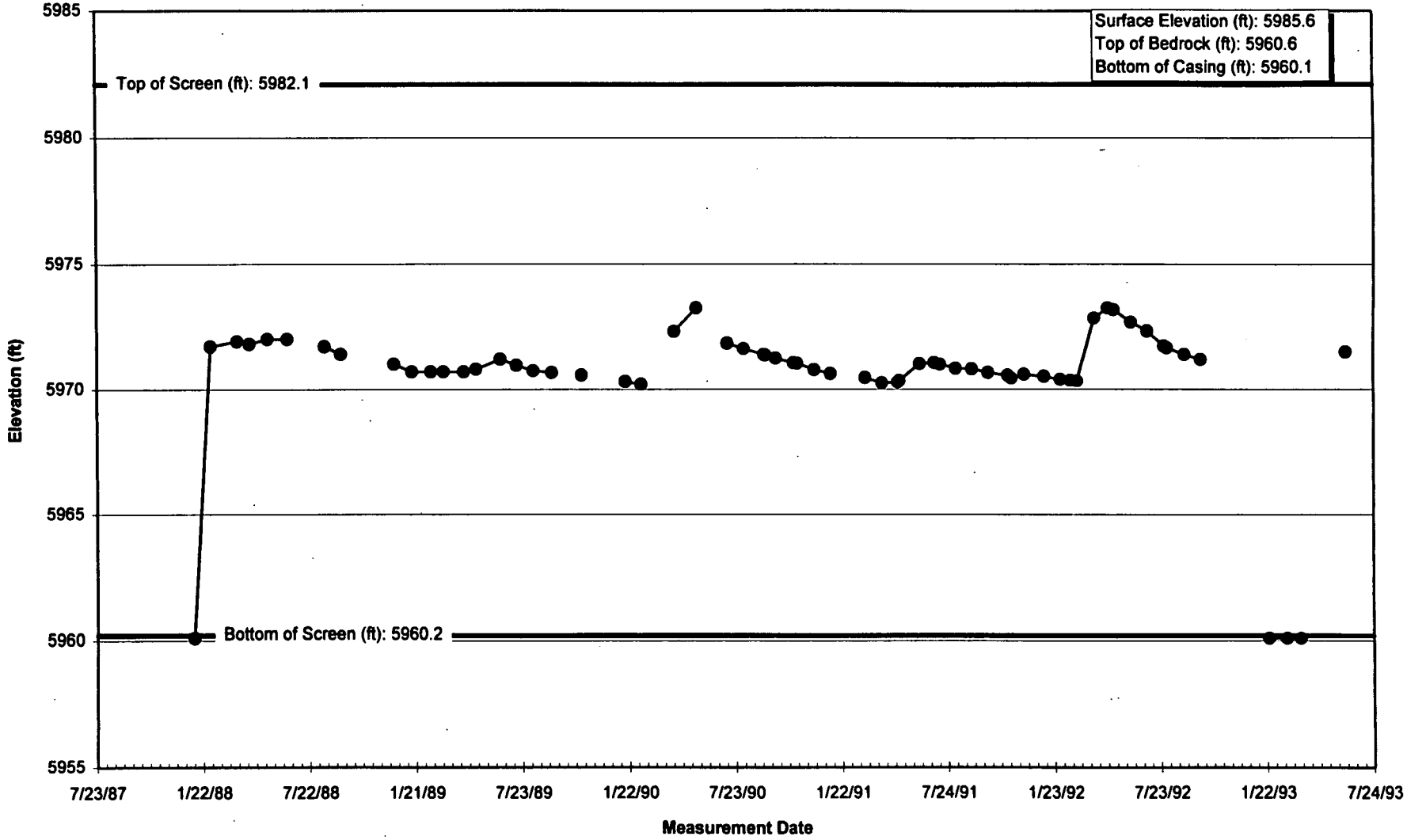
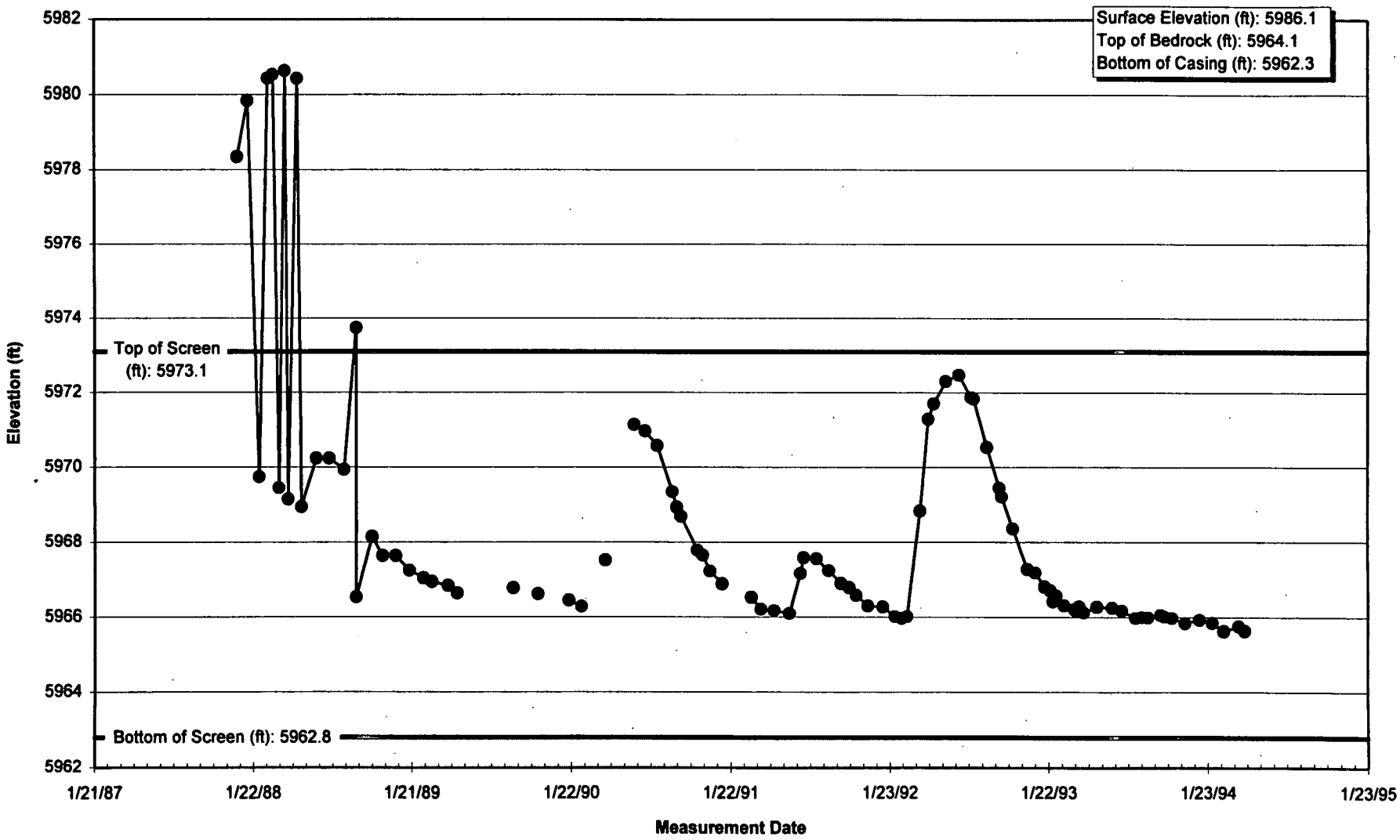
S14.XLS 6287 4/5/95

Hydrograph 6387



346

Hydrograph 6487



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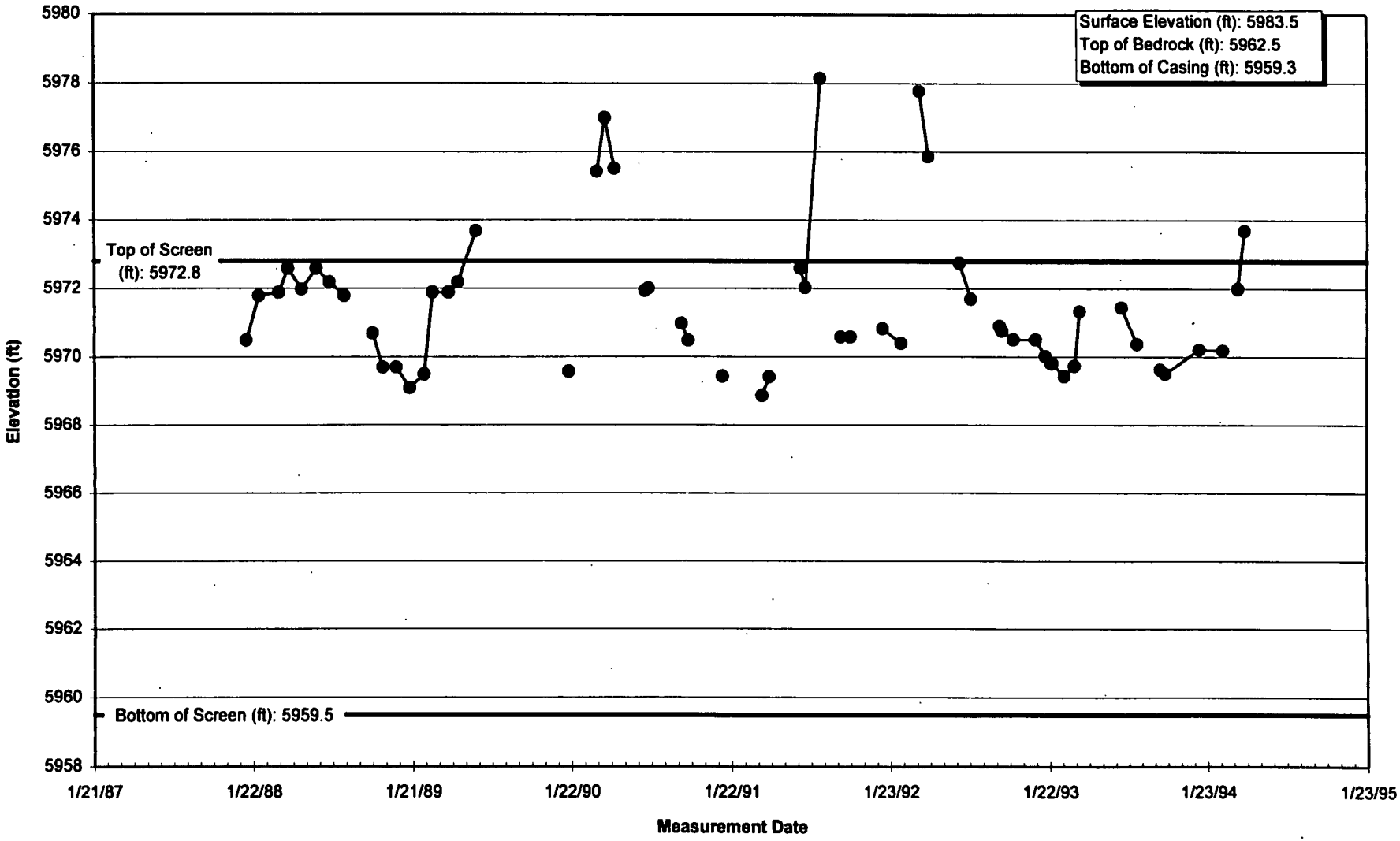
S14.XLS 6487 4/6/95

Hydrograph 6587



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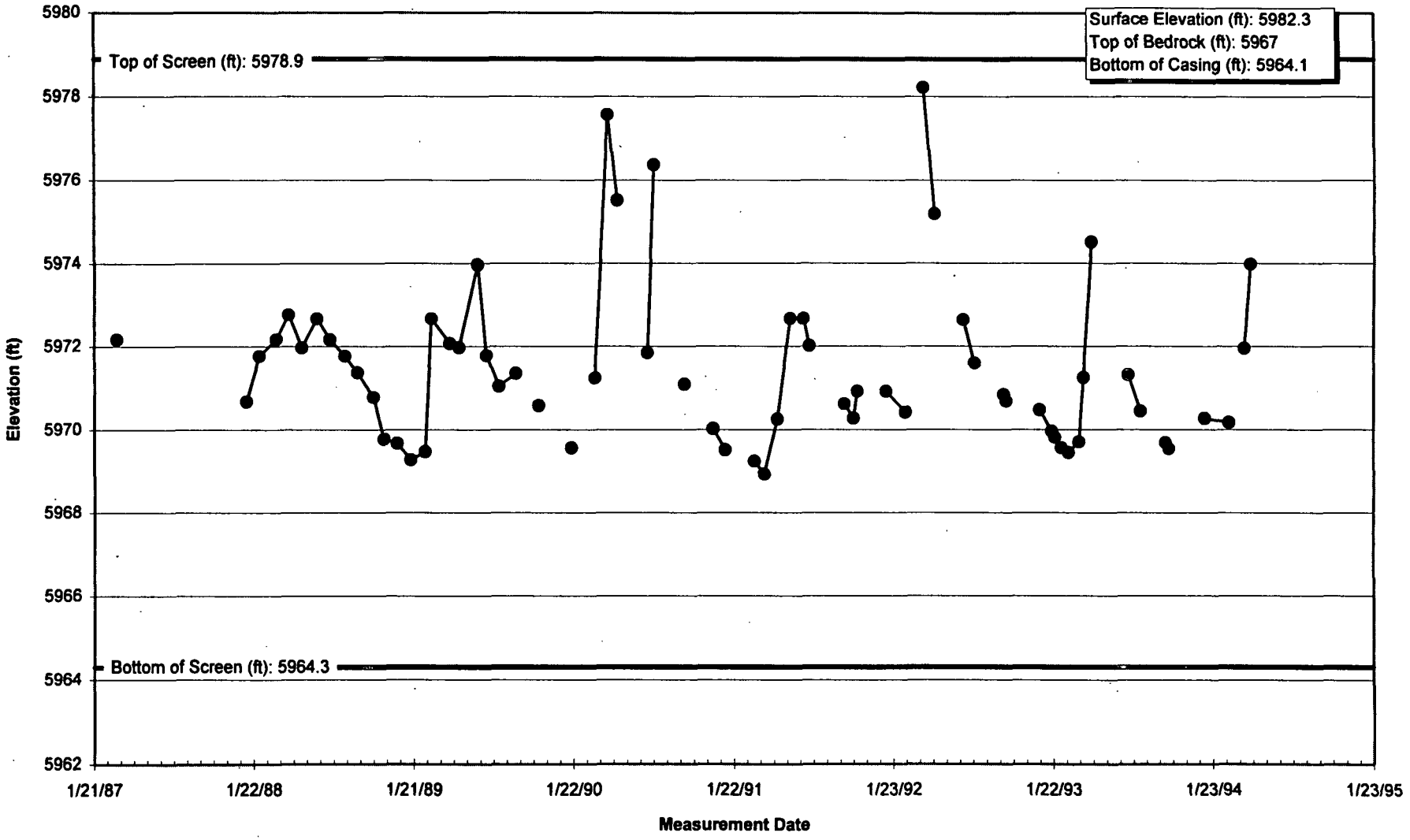
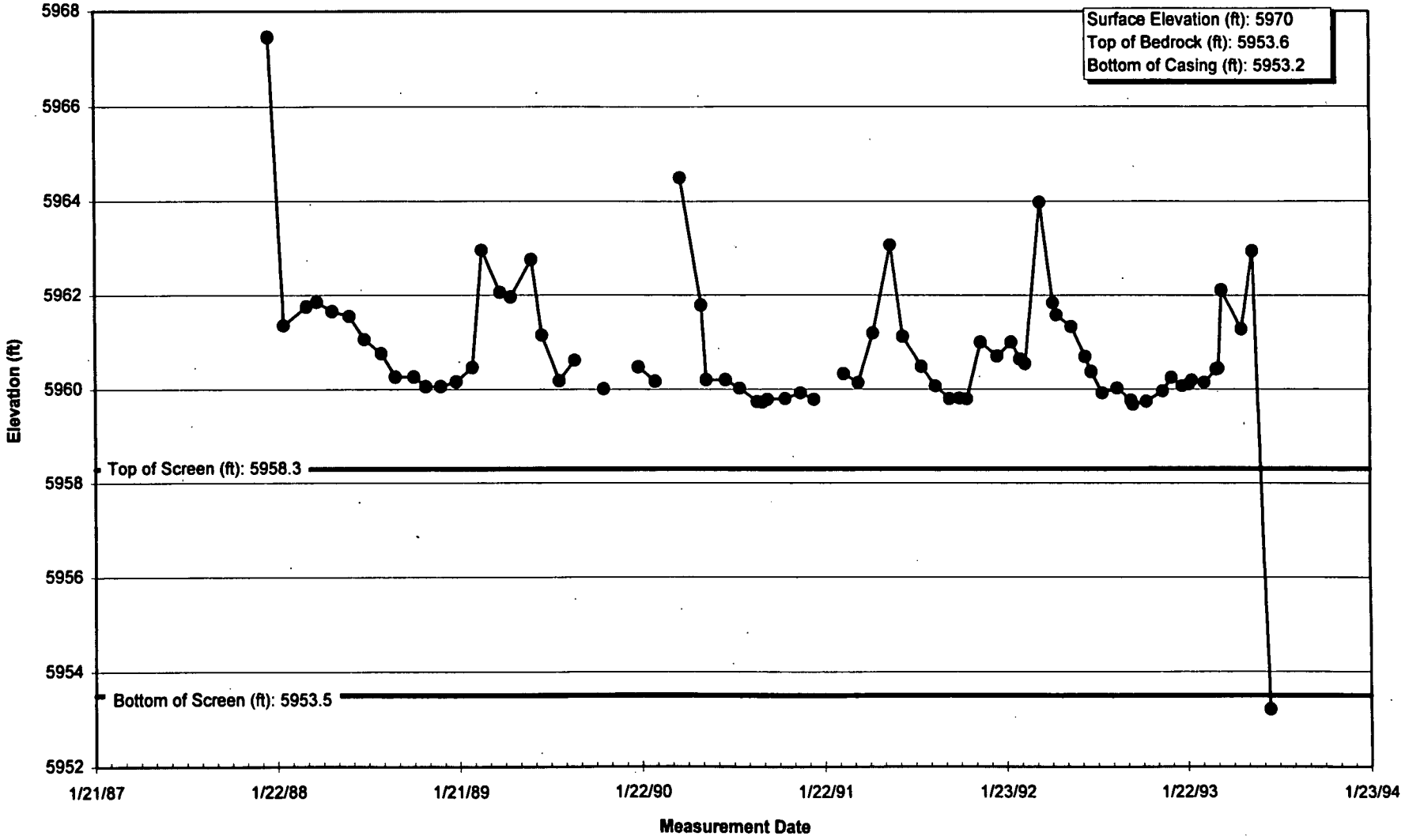
Hydrograph 6687



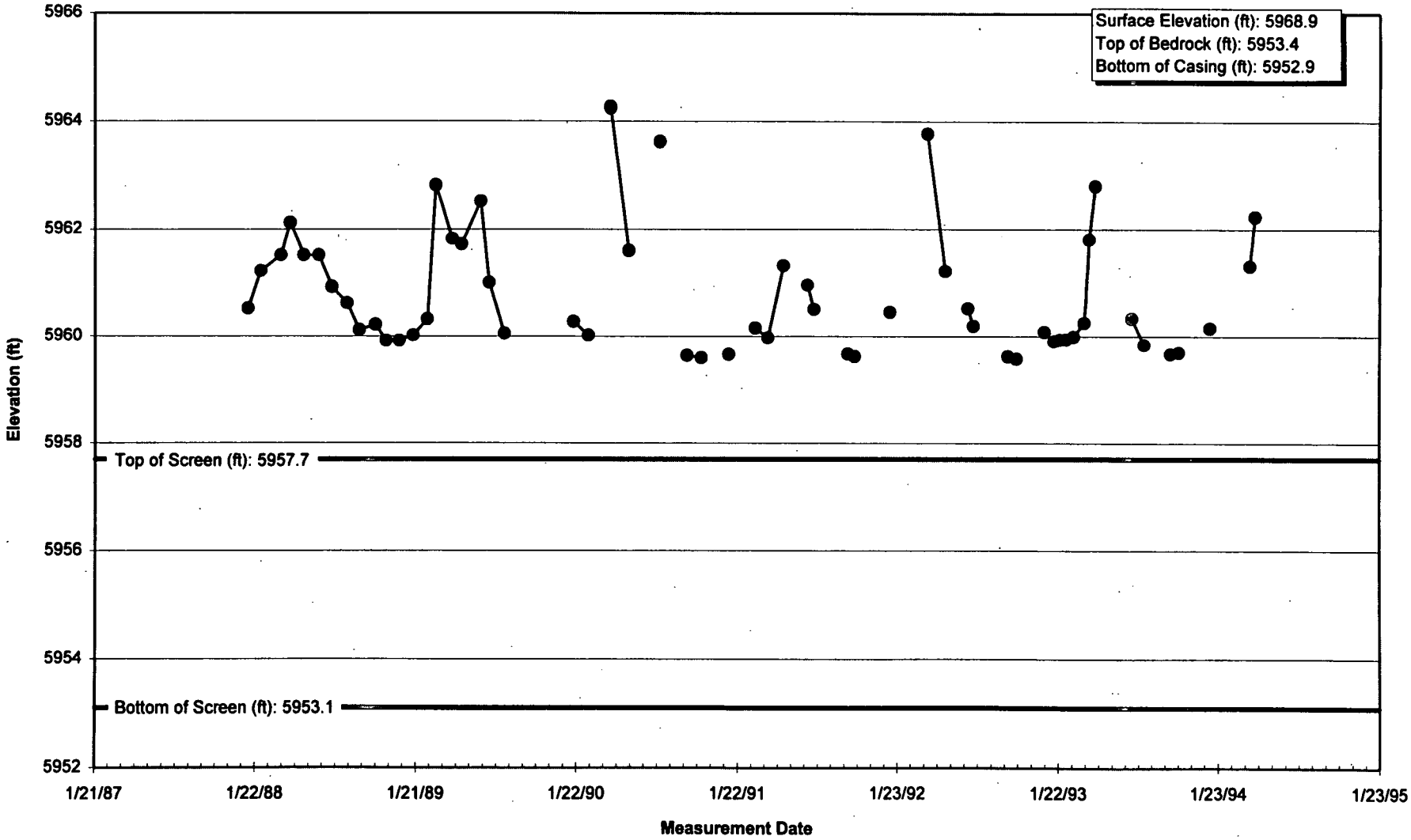
249 S15.XLS 6687 4/6/95

Hydrograph 6787



250

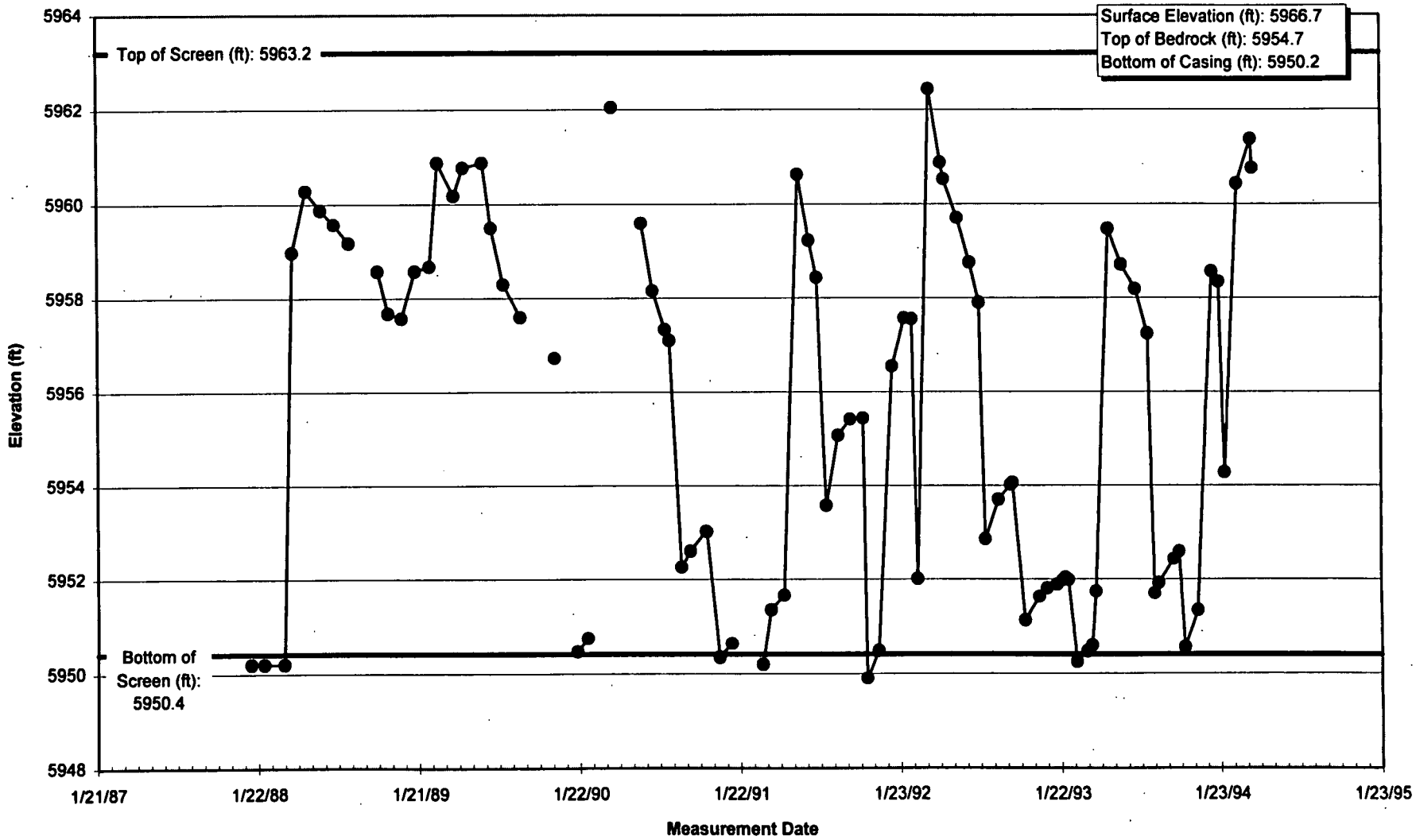
Hydrograph 6887



251

S15.XLS 6887 4/6/95

Hydrograph 7087



257

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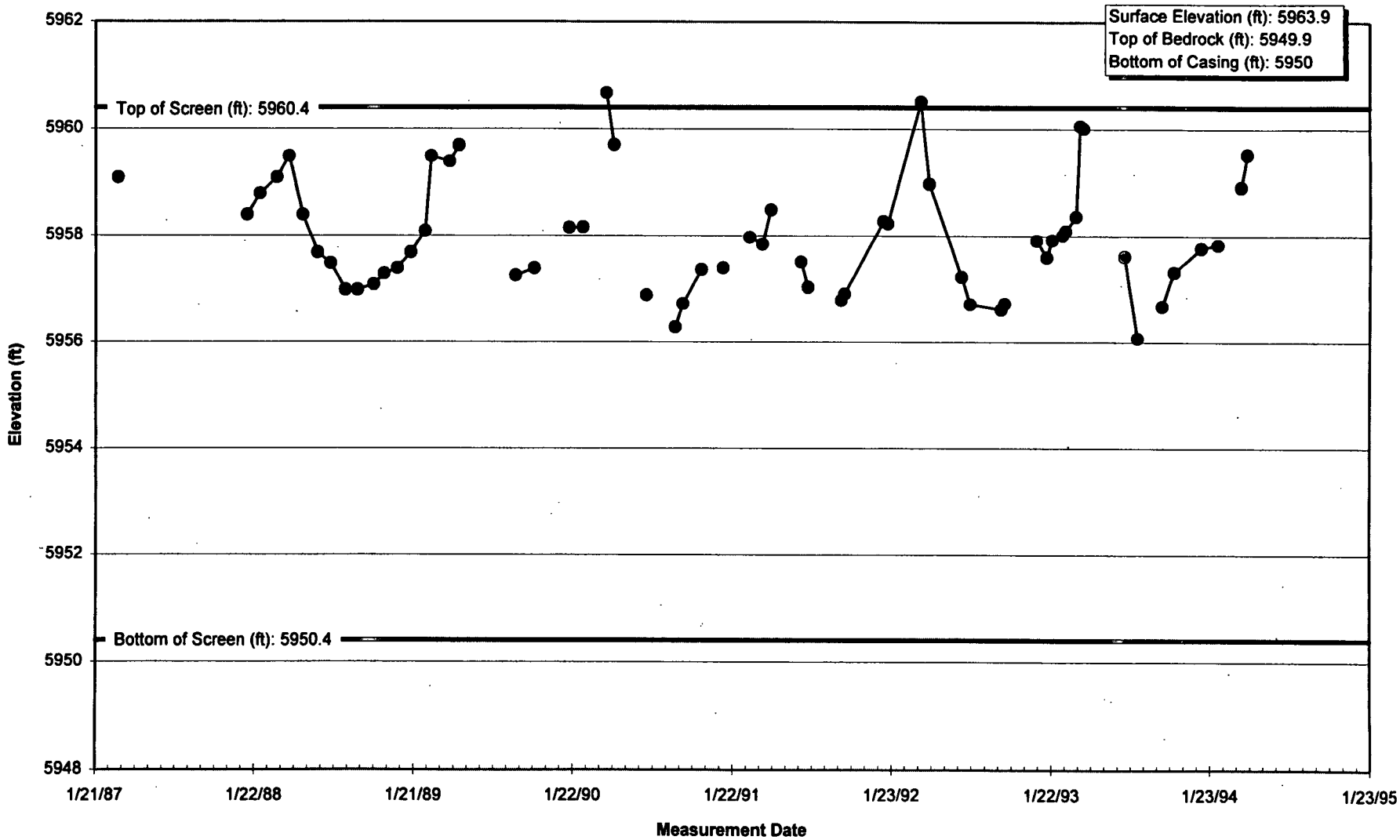
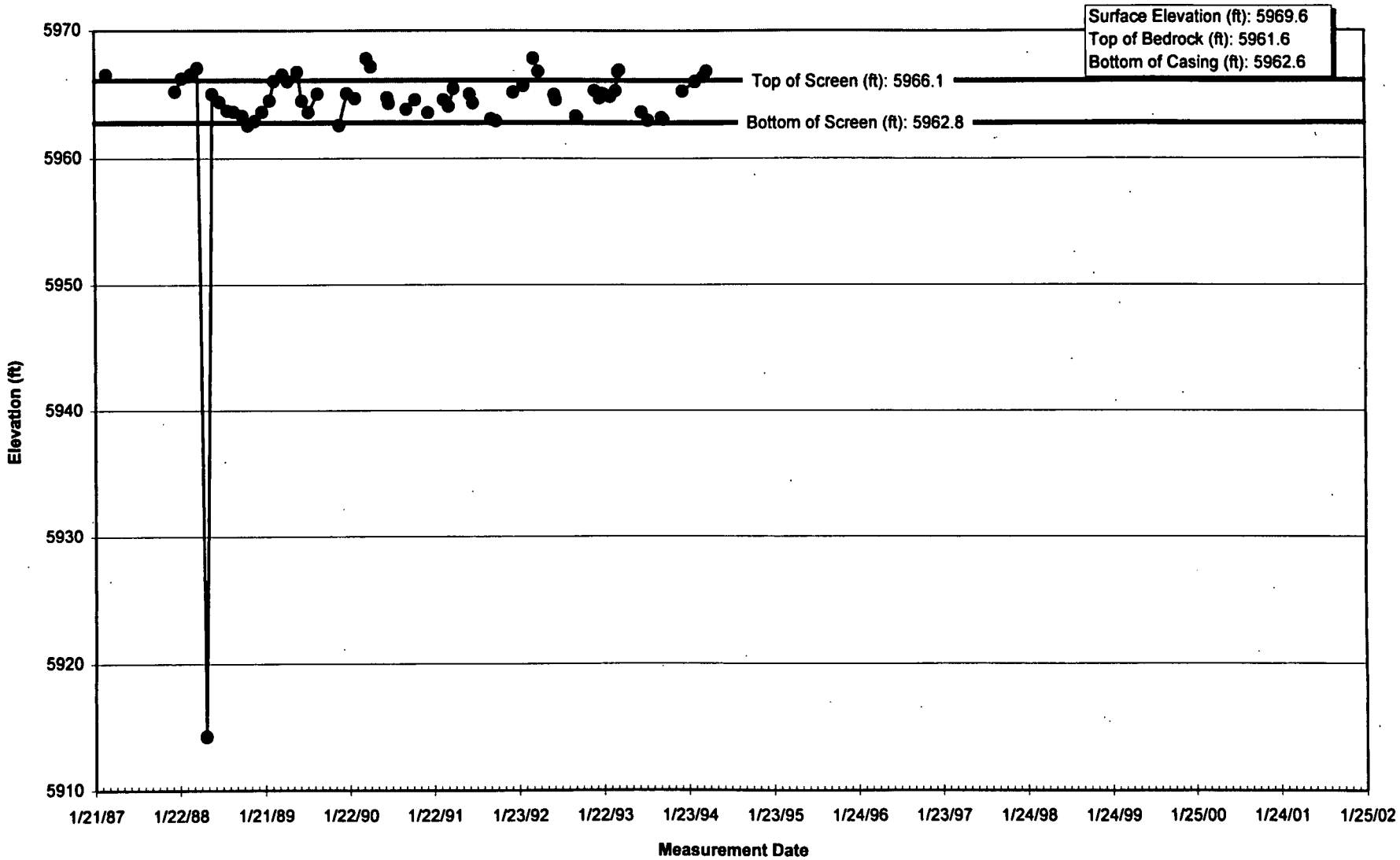


253

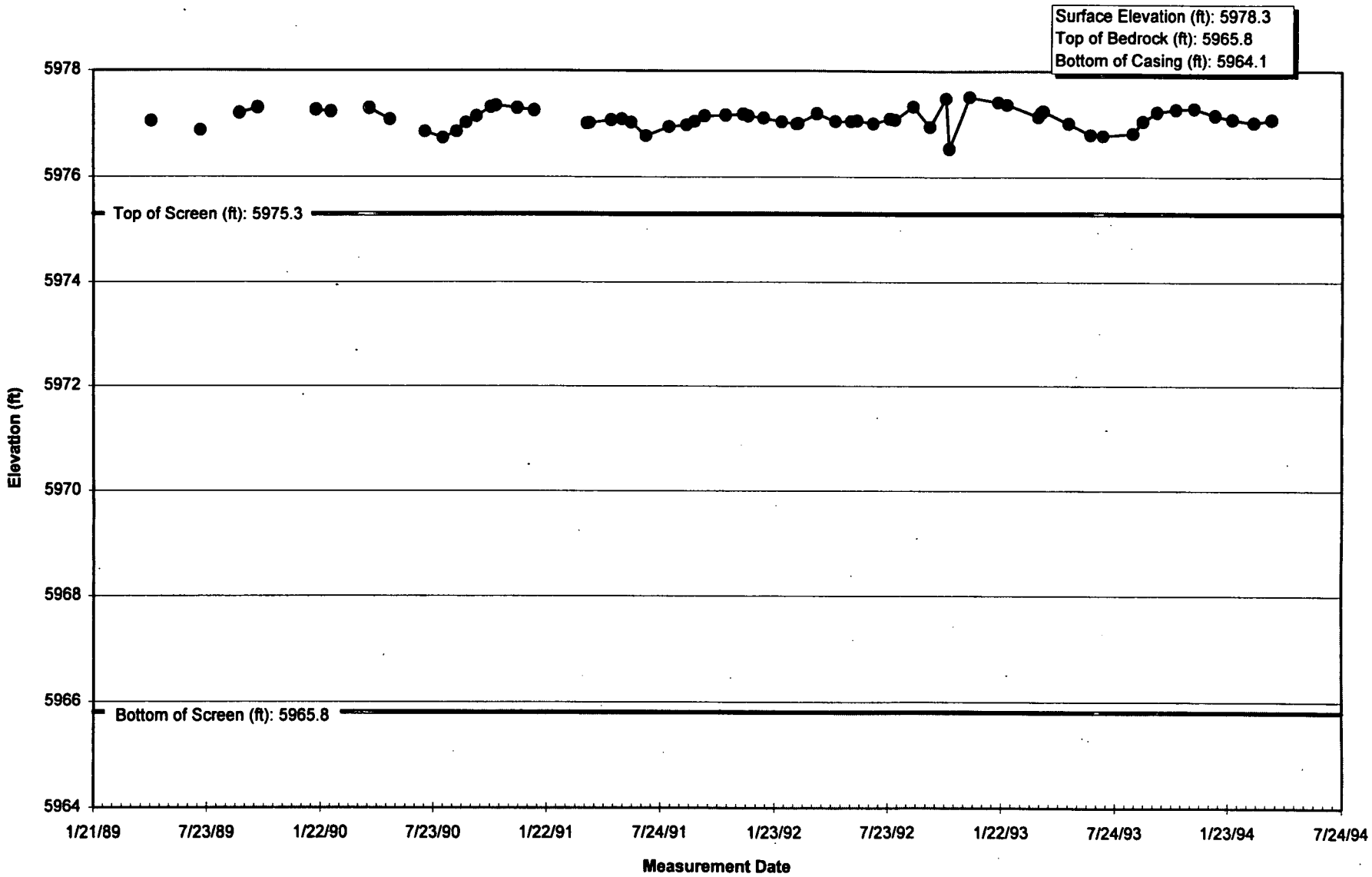
S15.XLS 7187 4/6/95

Hydrograph 7287



254

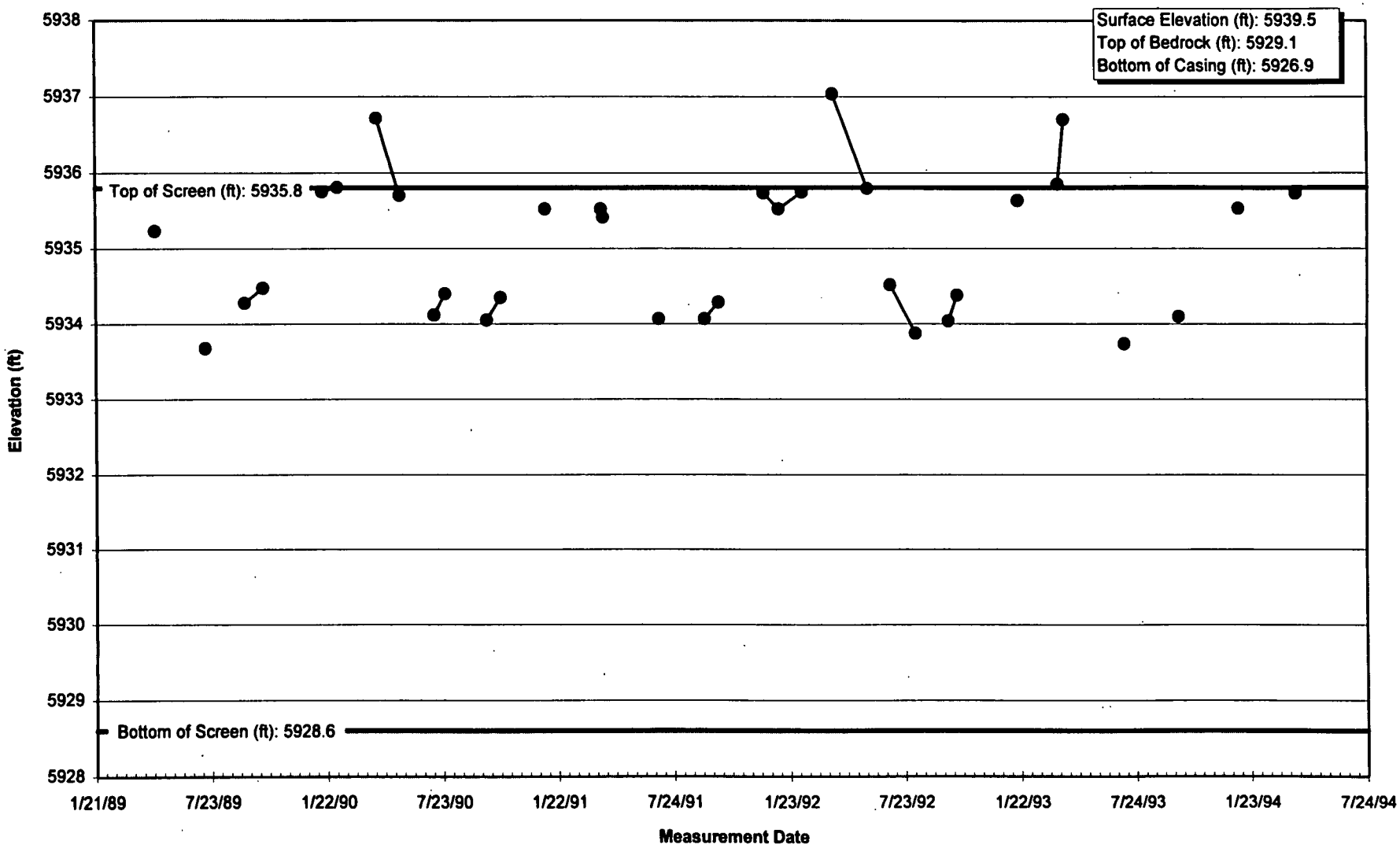
Hydrograph B102289



255

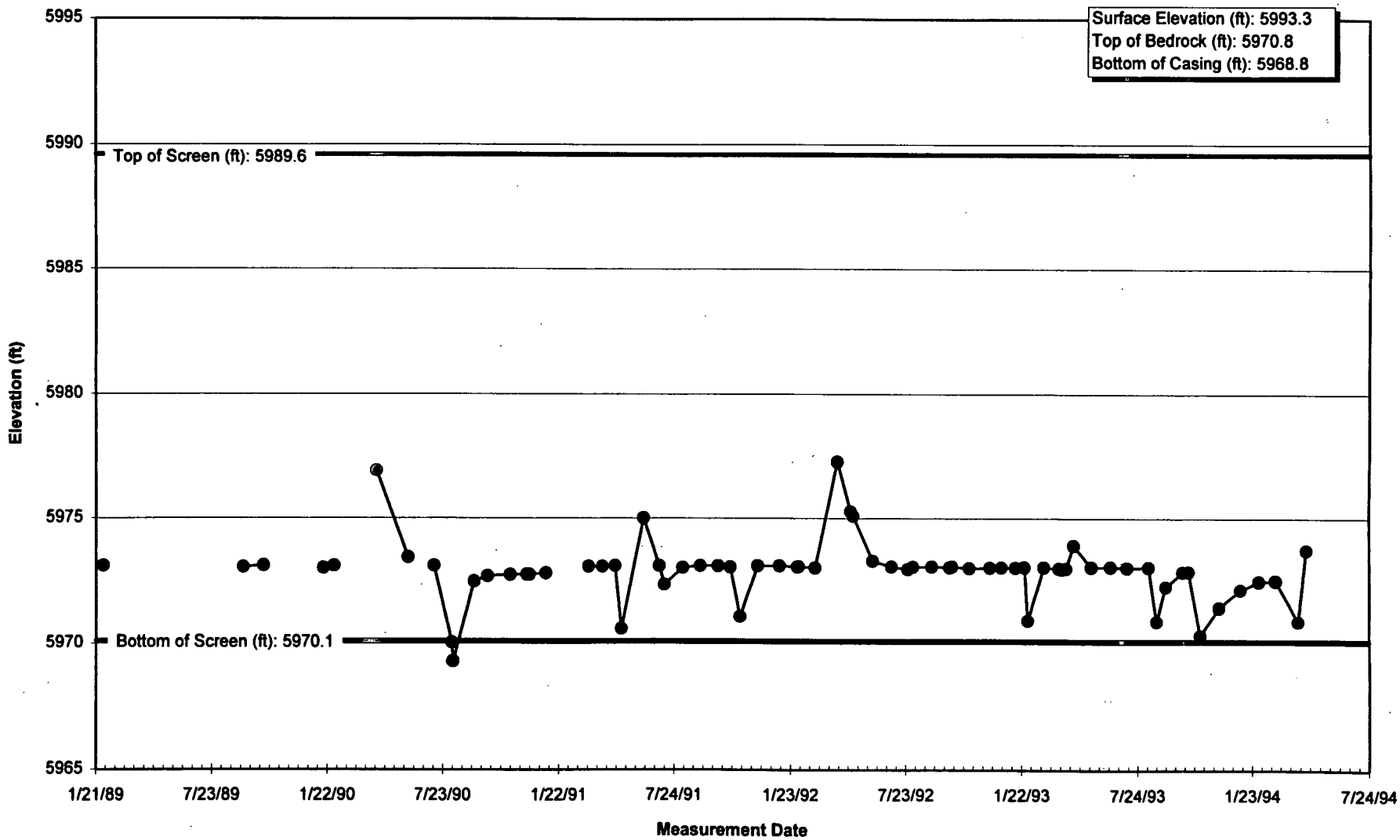
S16.XLS B102289 4/6/95

Hydrograph B102389



256

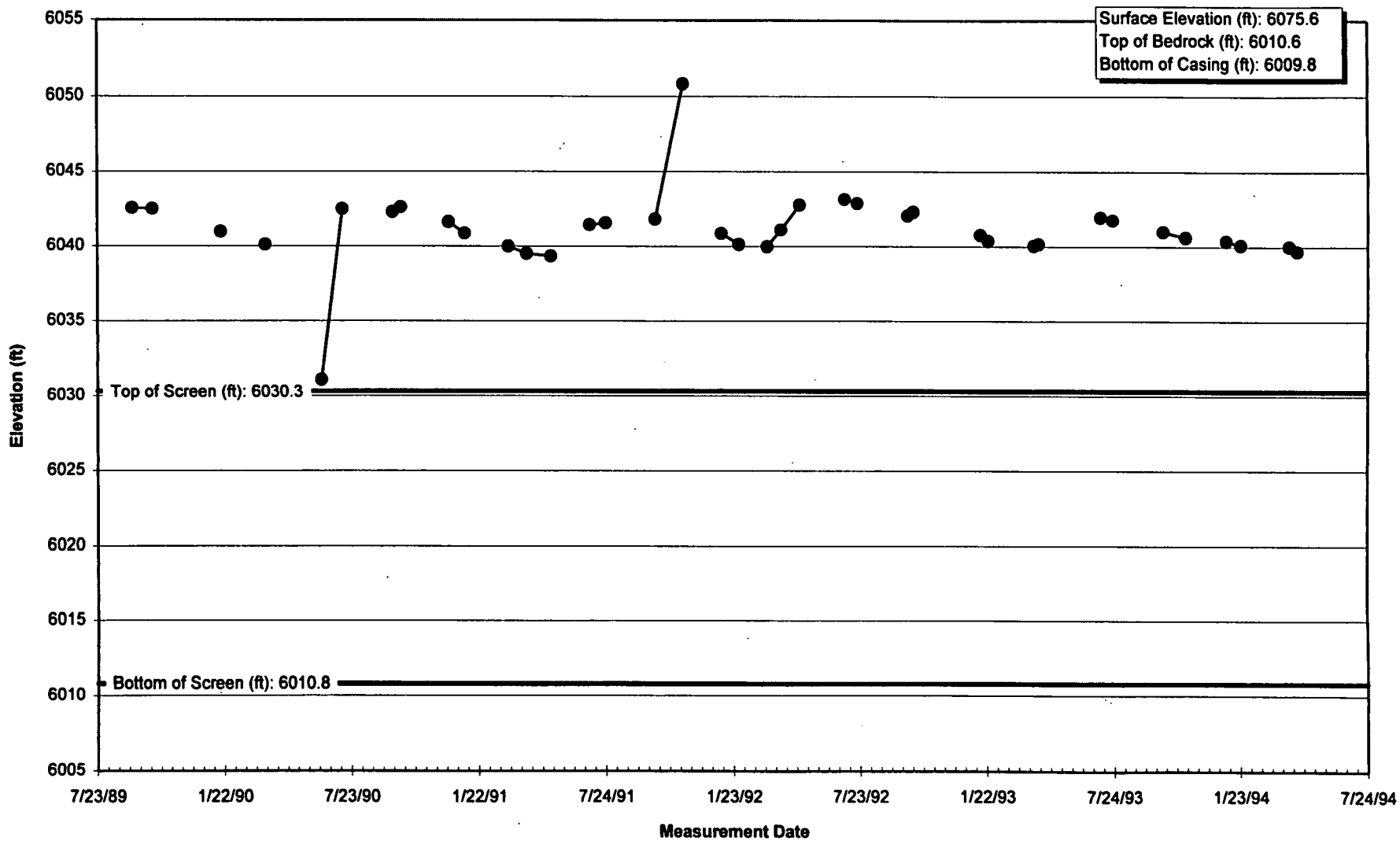
Hydrograph B106089



257

S16.XLS B106089 4/6/95

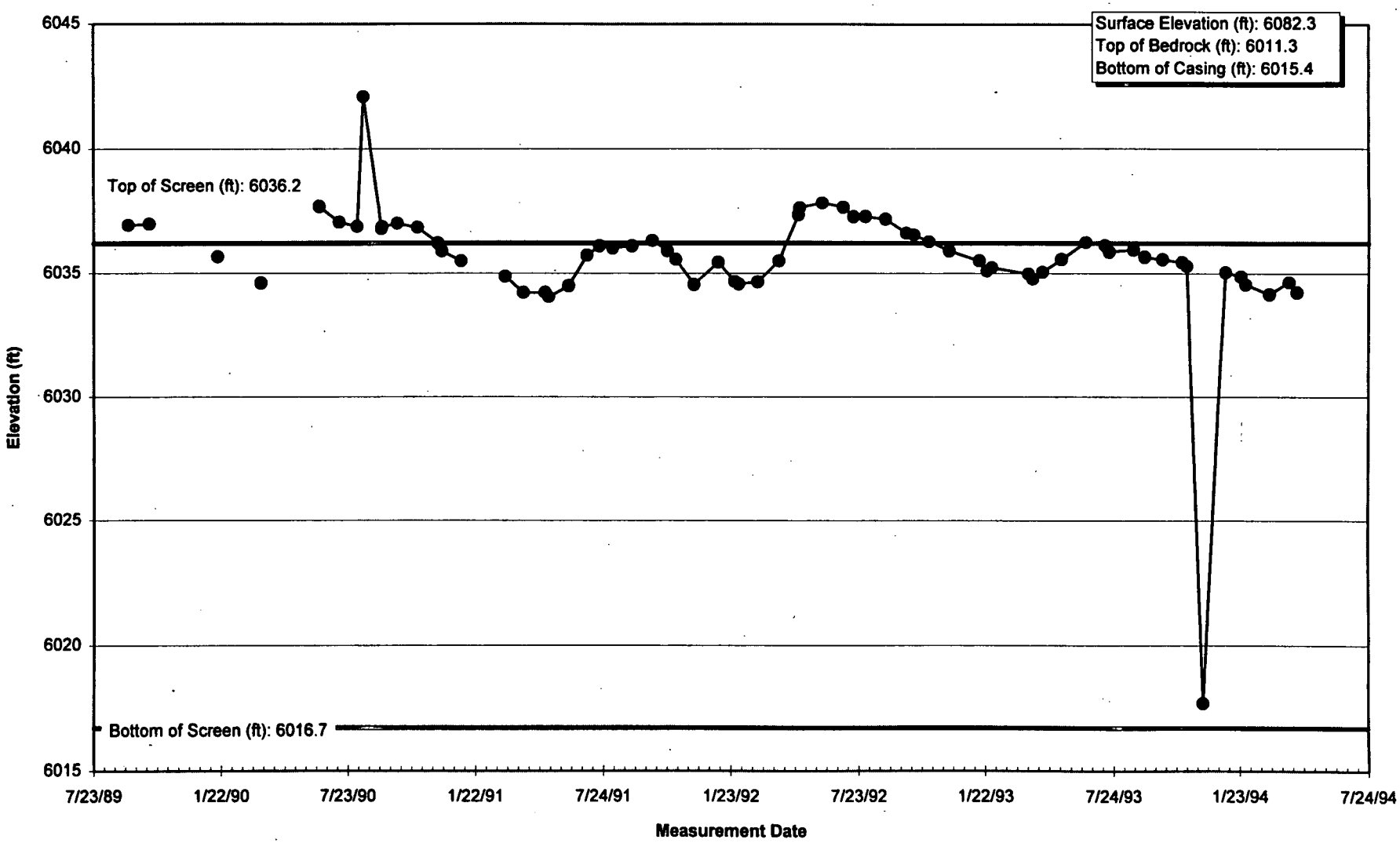
Hydrograph B110889



258

S16.XLS 389 4/6/95

Hydrograph B110989



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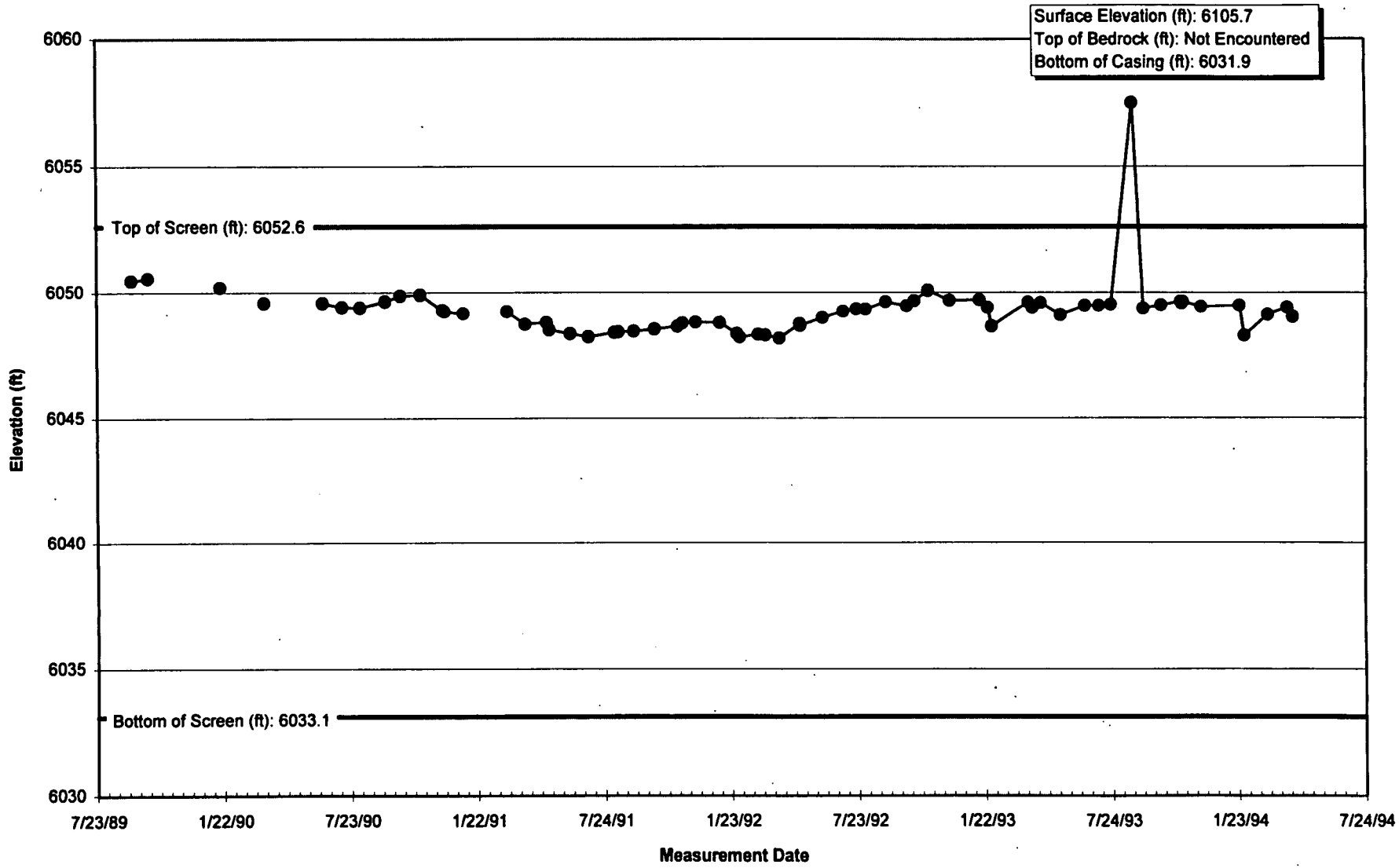
S16.XLS B110989 4/6/95

Hydrograph B111189



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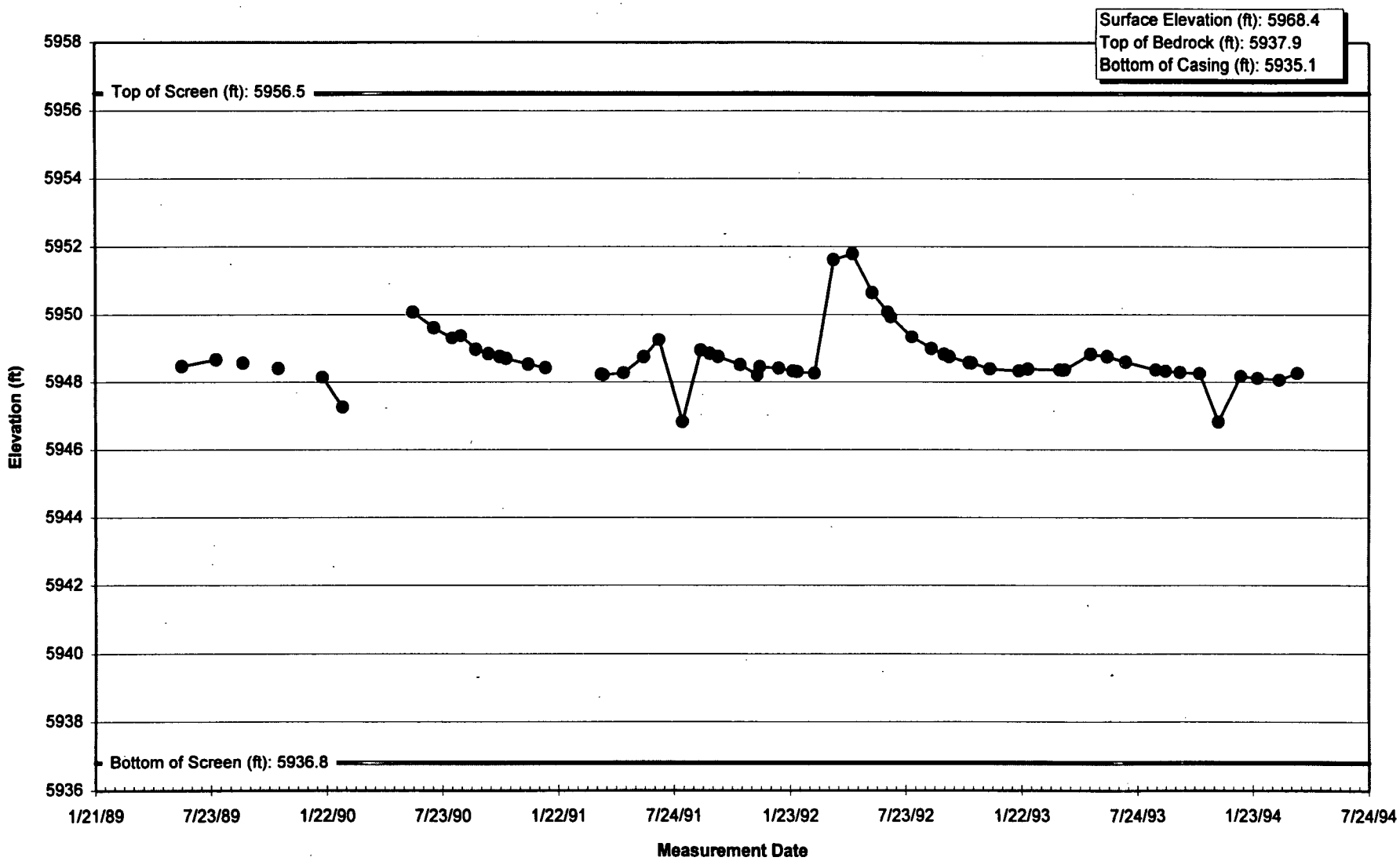
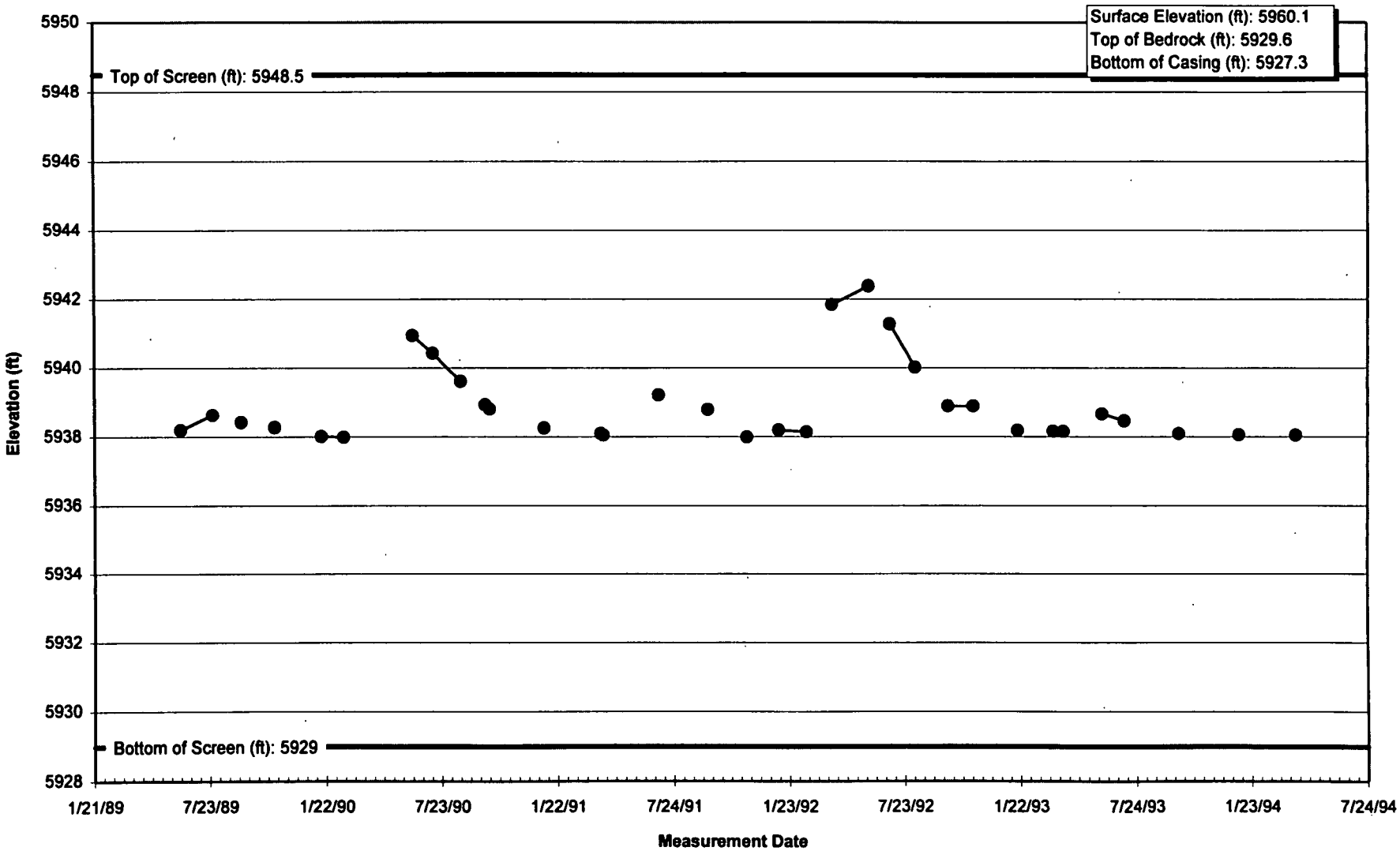
Hydrograph B200589



S16.XLS B200589 4/6/95

261

Hydrograph B200689



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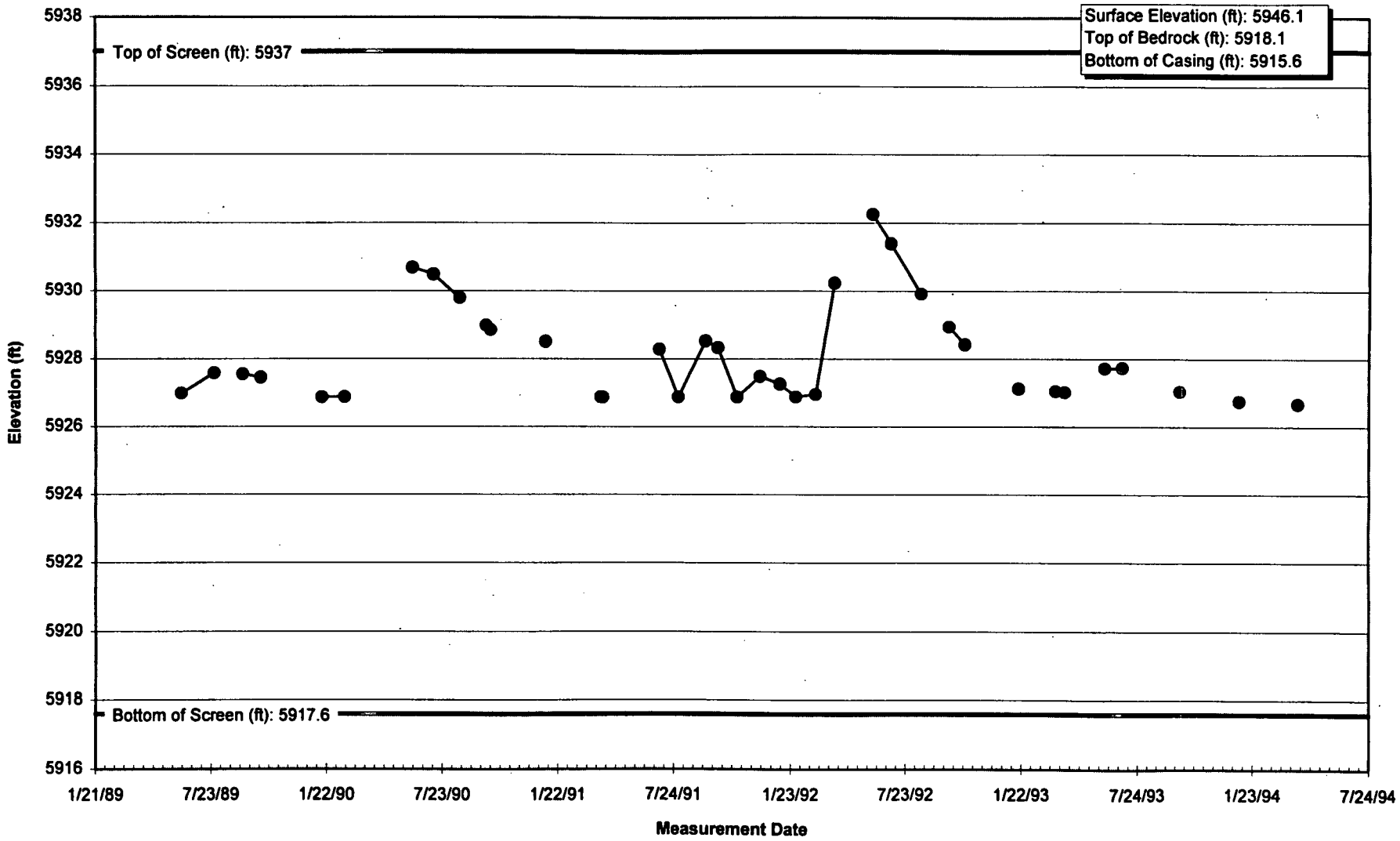
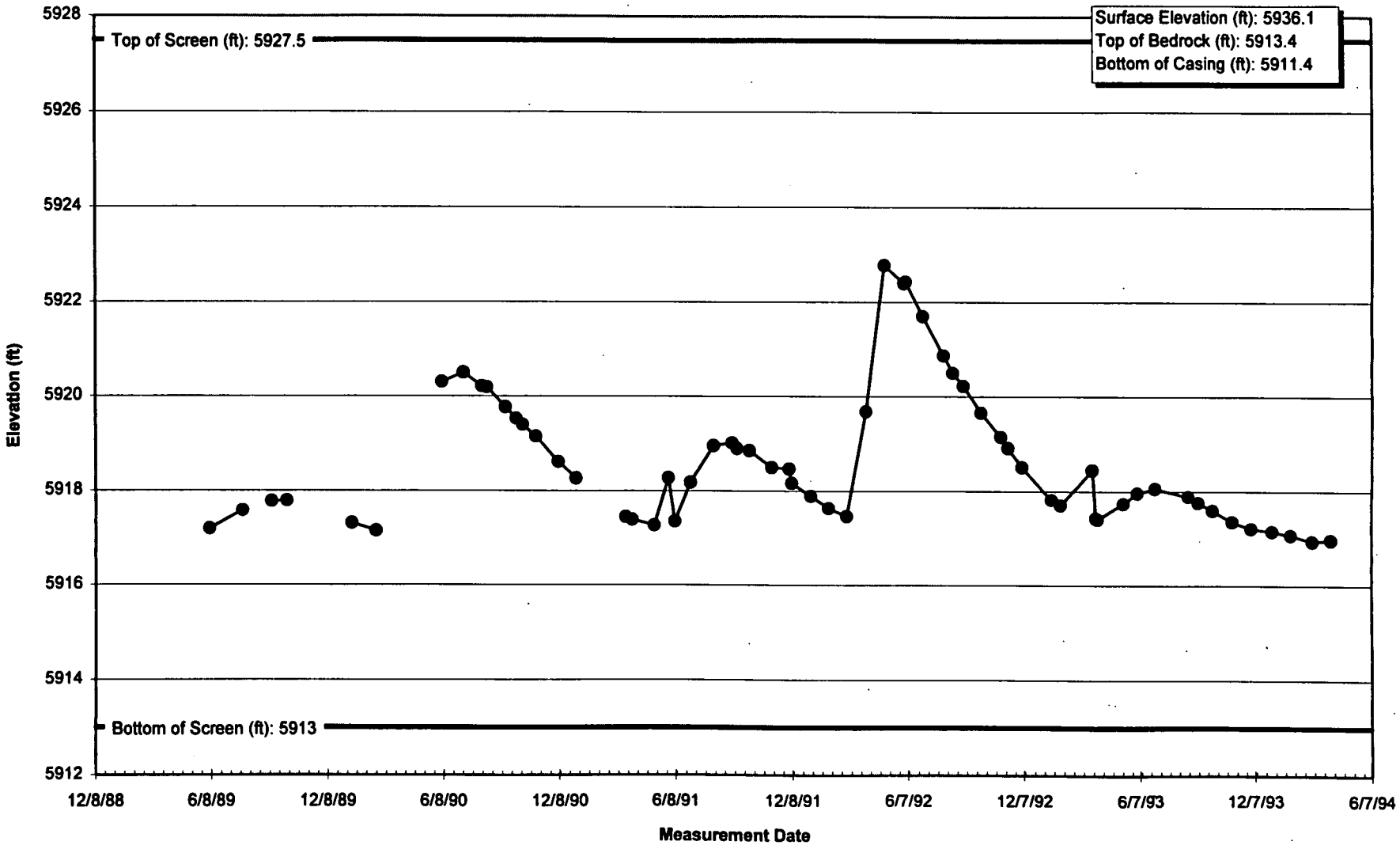


S16.XLS B200789 4/6/95

263

Hydrograph B200889



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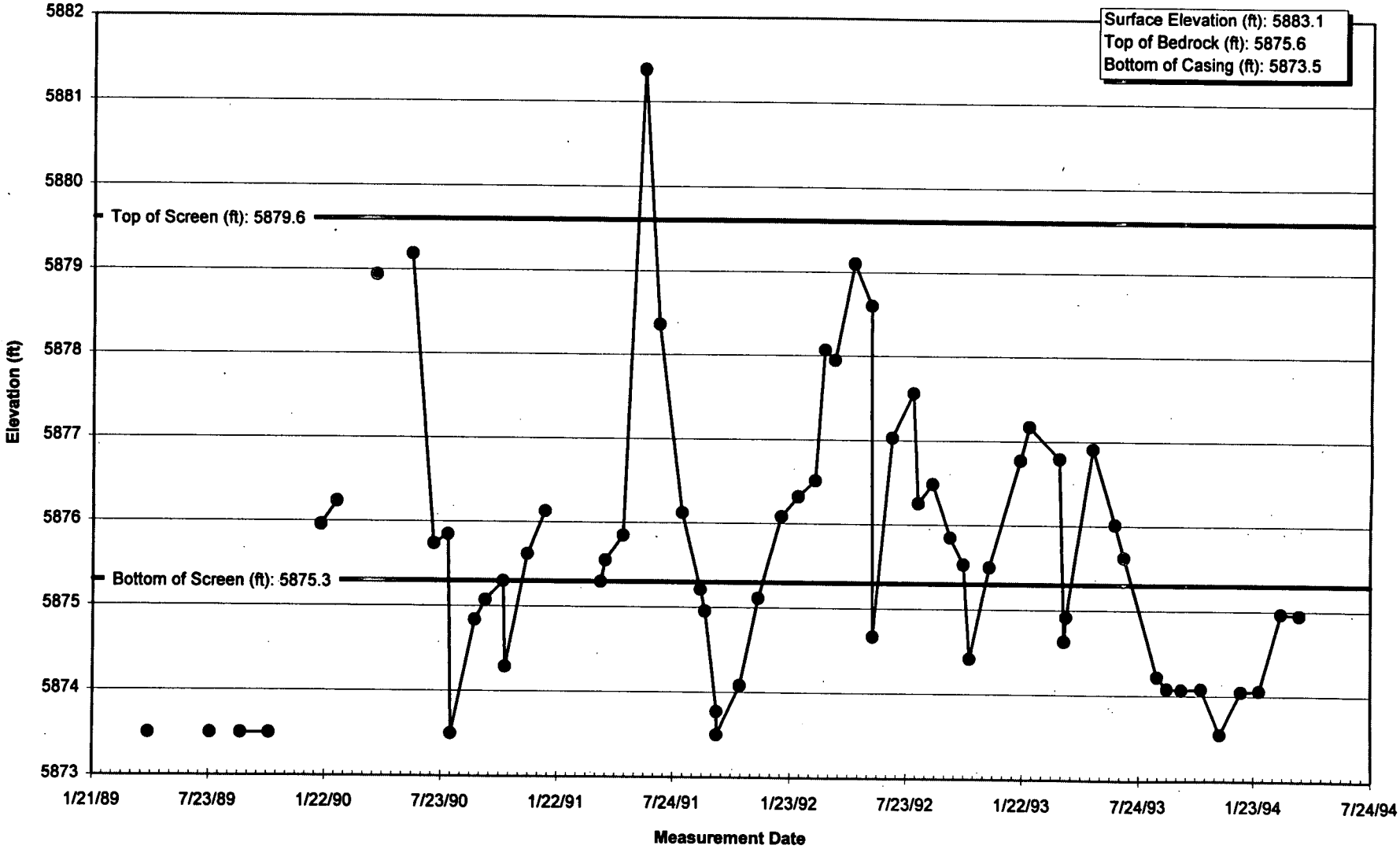
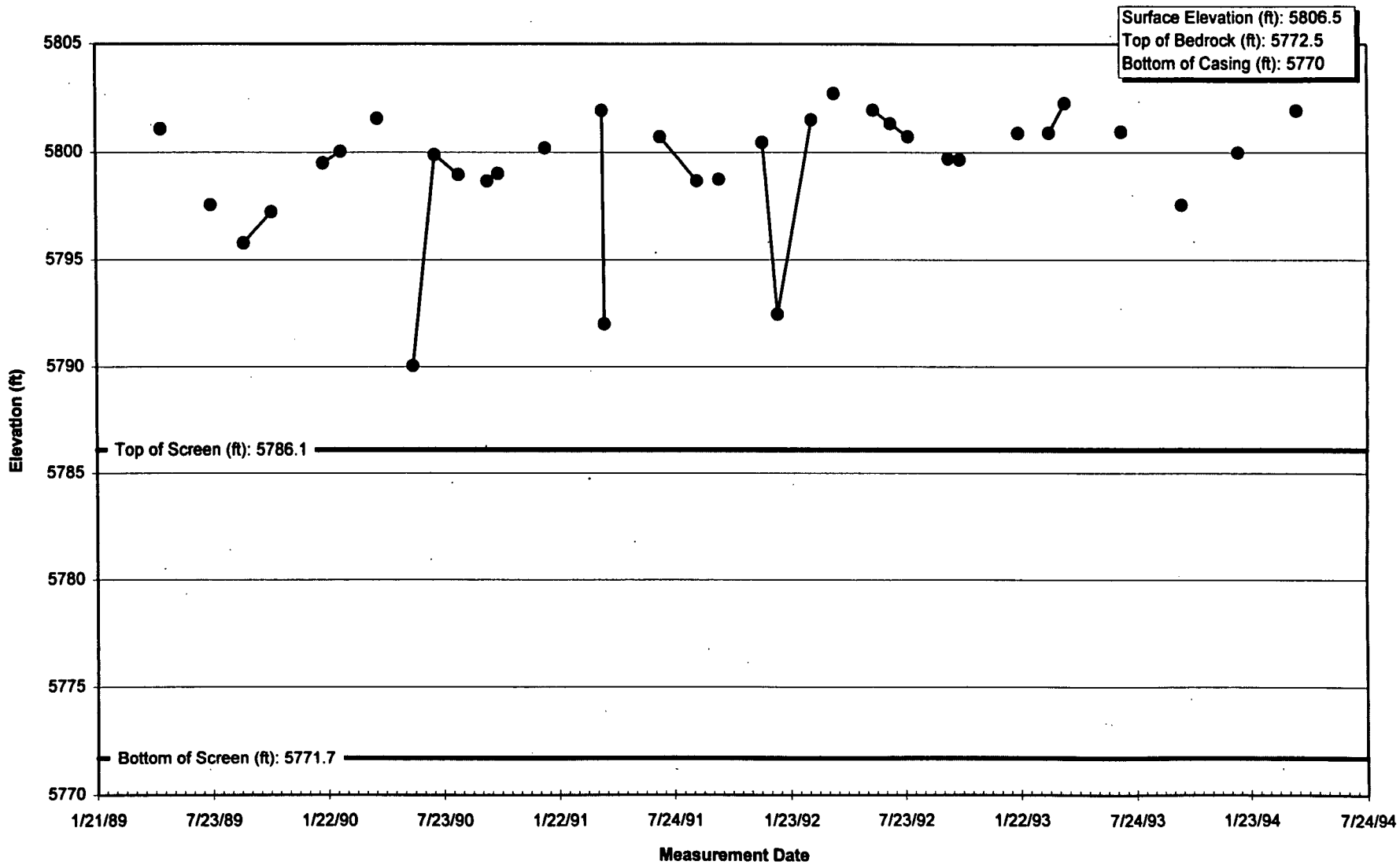


S16.XLS B201089 4/6/95

265

Hydrograph B201189



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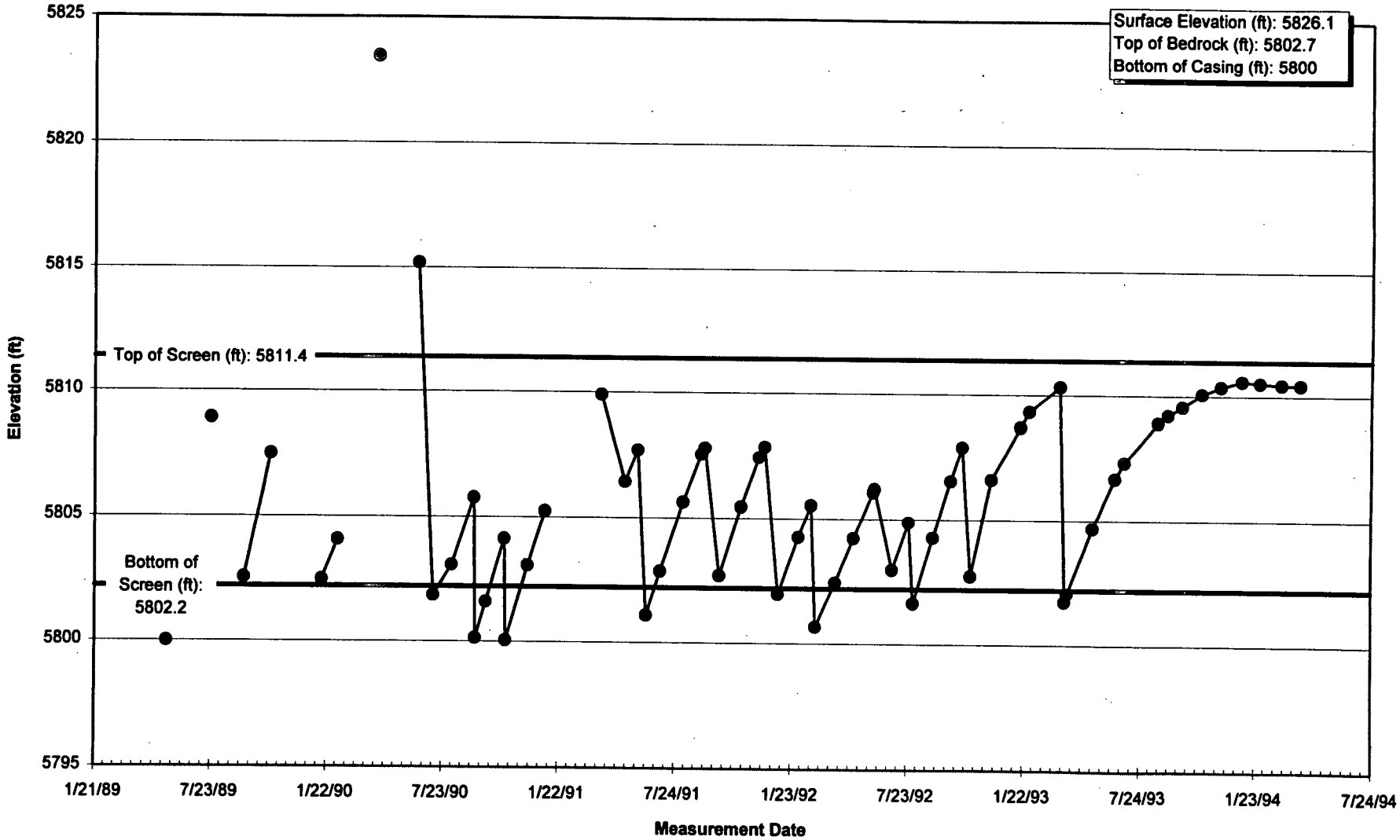
S17.XLS 189 4/9/95

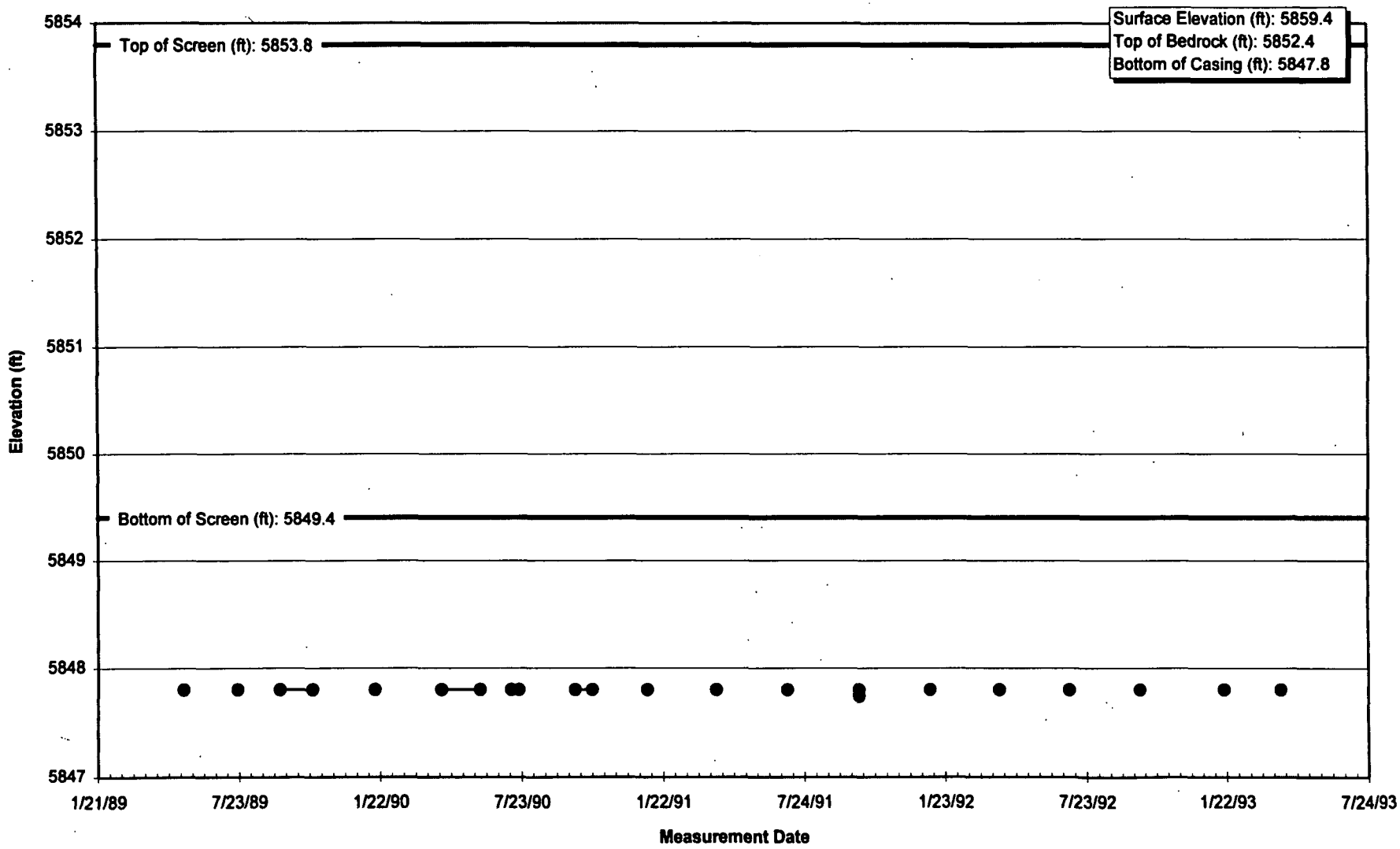
Hydrograph B201289



S17.XLS B201289 4/9/95

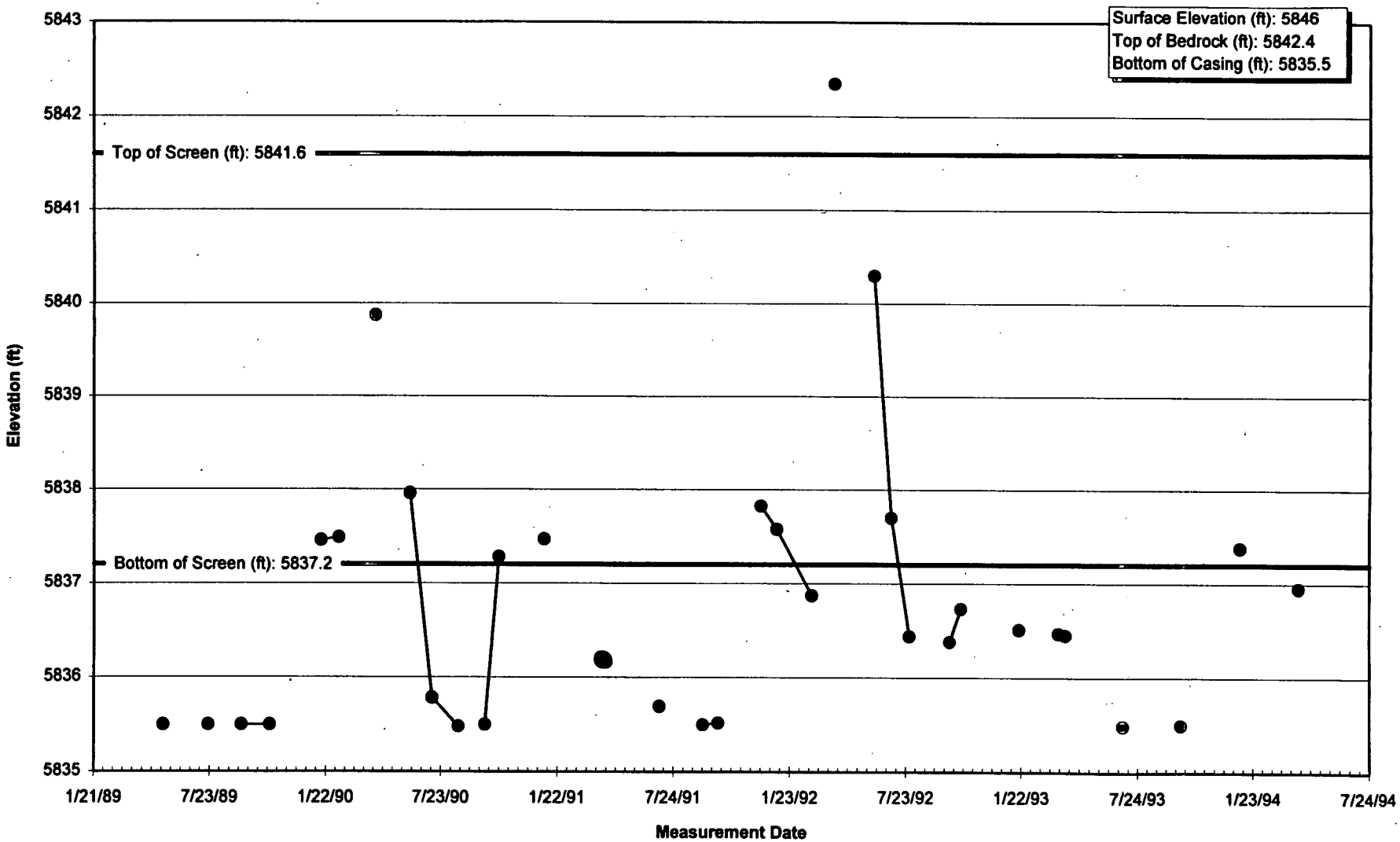
267

Hydrograph B201489



268 S17.XLS 89 4/9/95

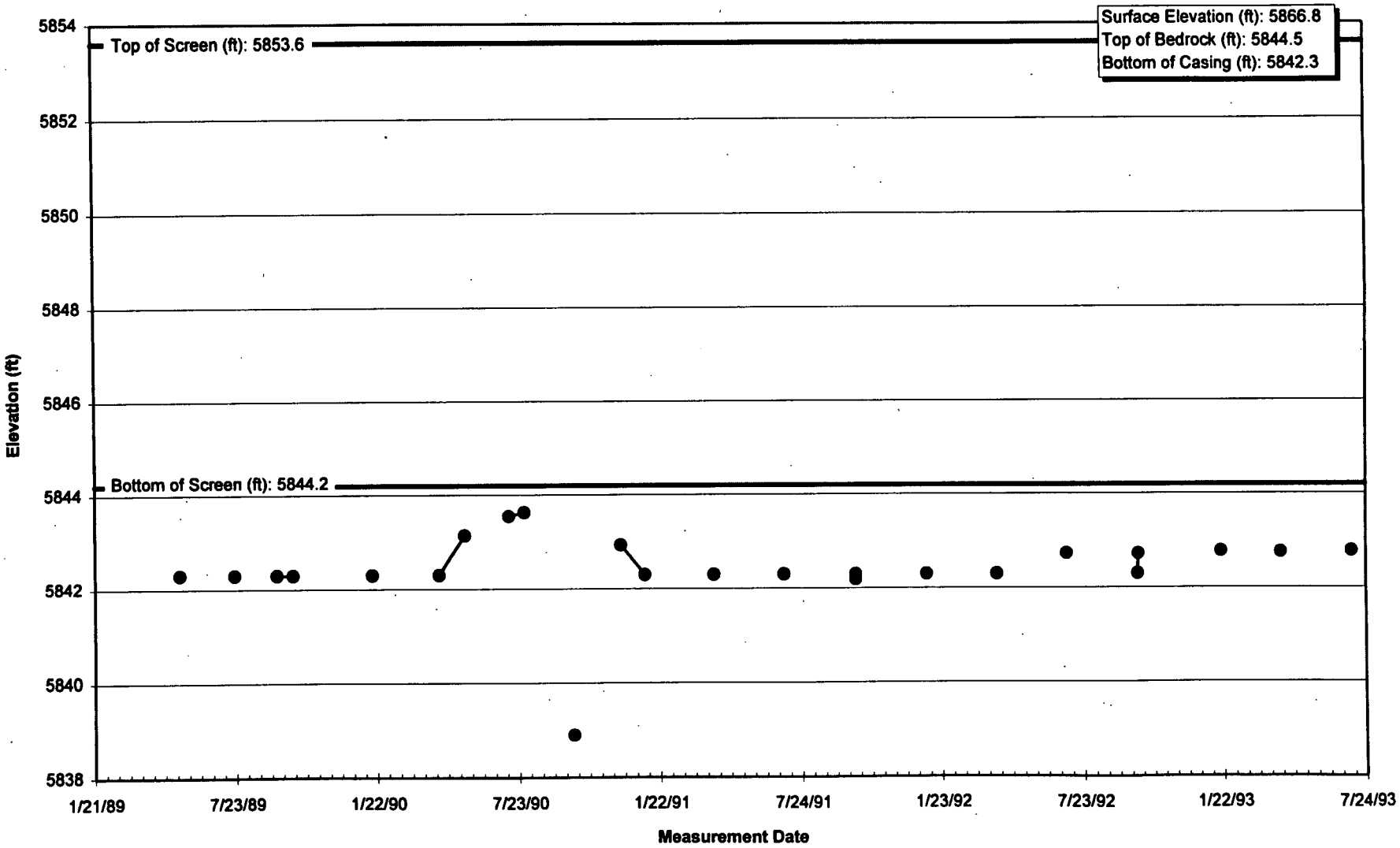
Hydrograph B201589



S17.XLS B201589 4/9/95

269

Hydrograph B201889



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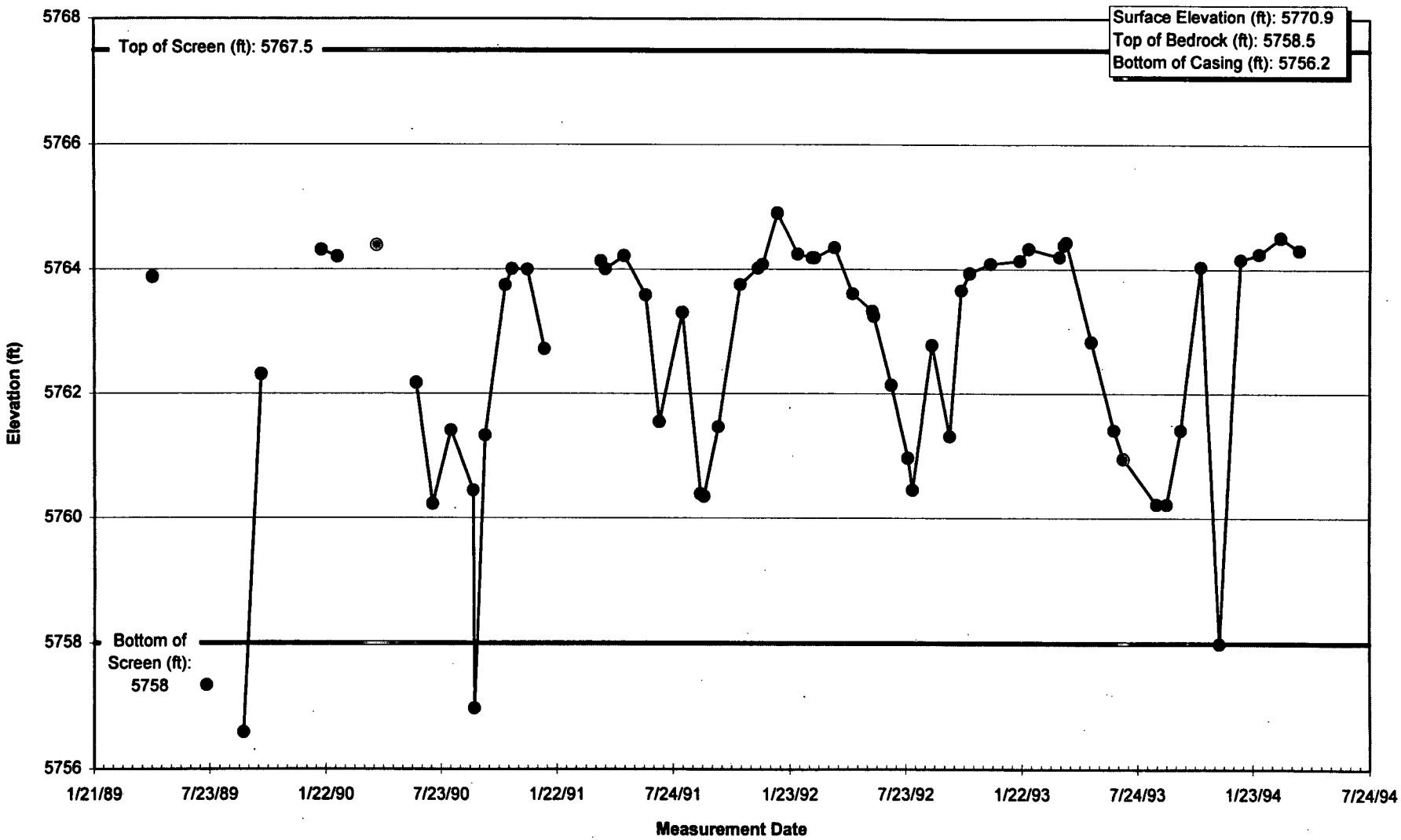
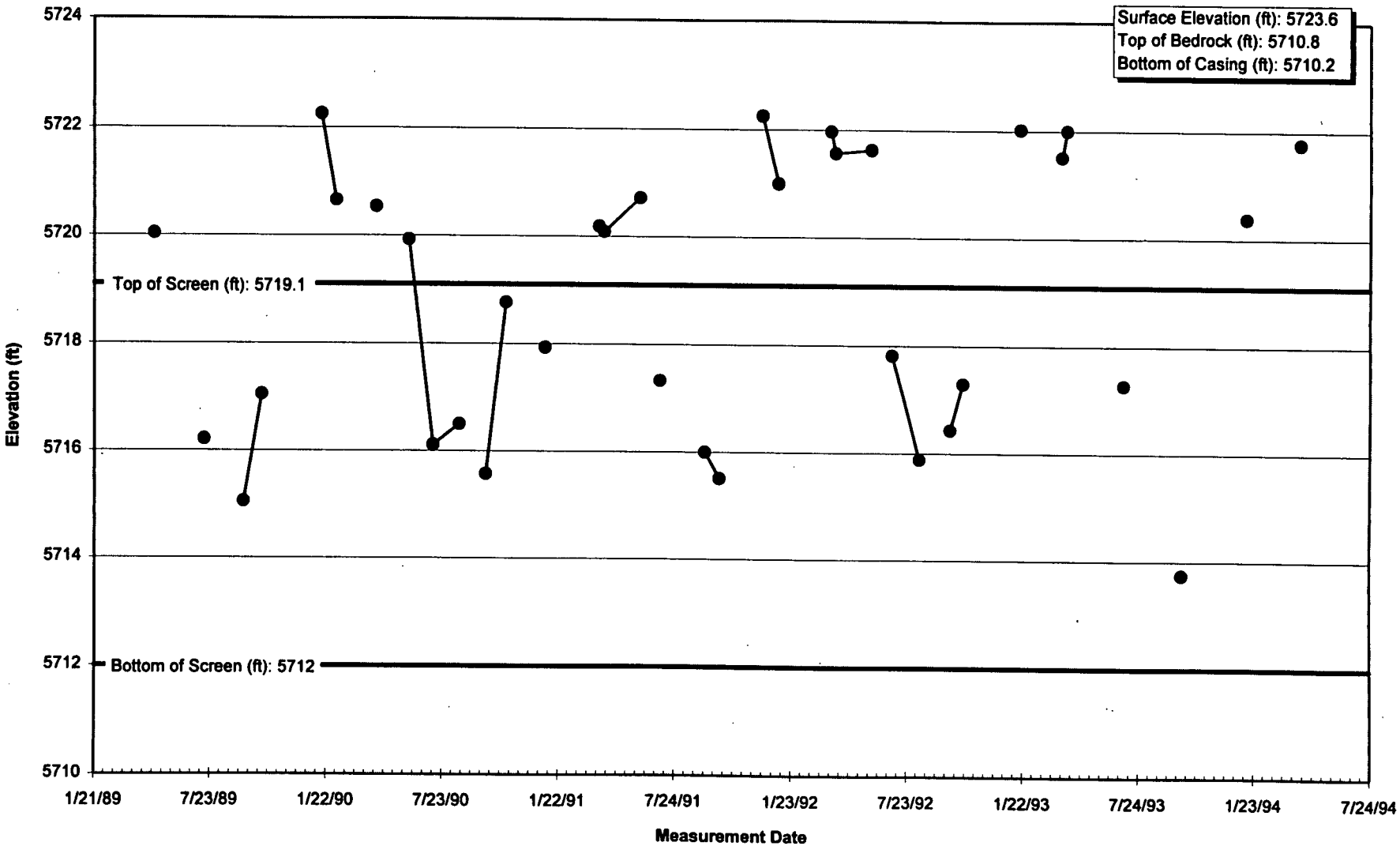
Hydrograph B202489



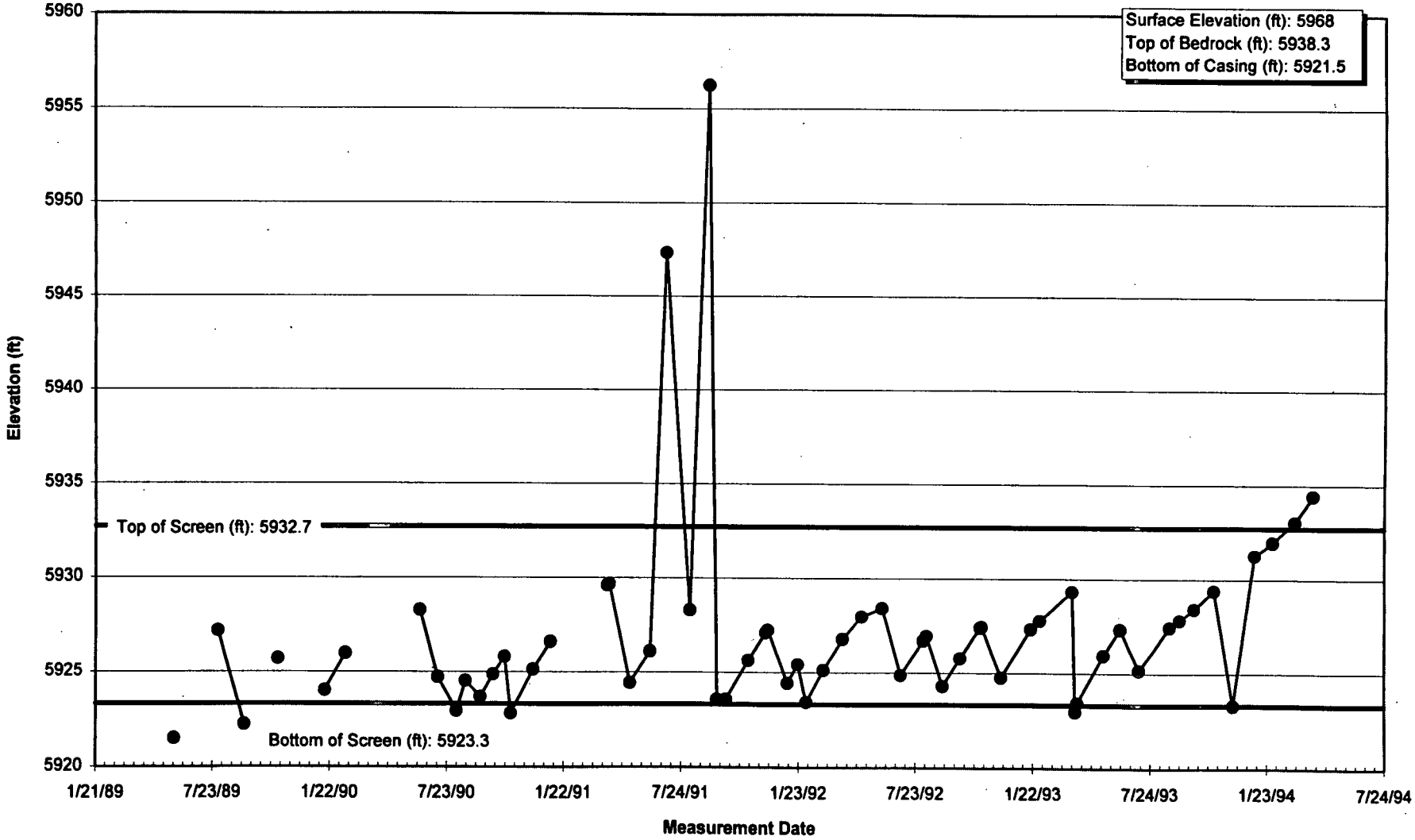
S17.XLS B202489 4/9/95

271

Hydrograph B202589



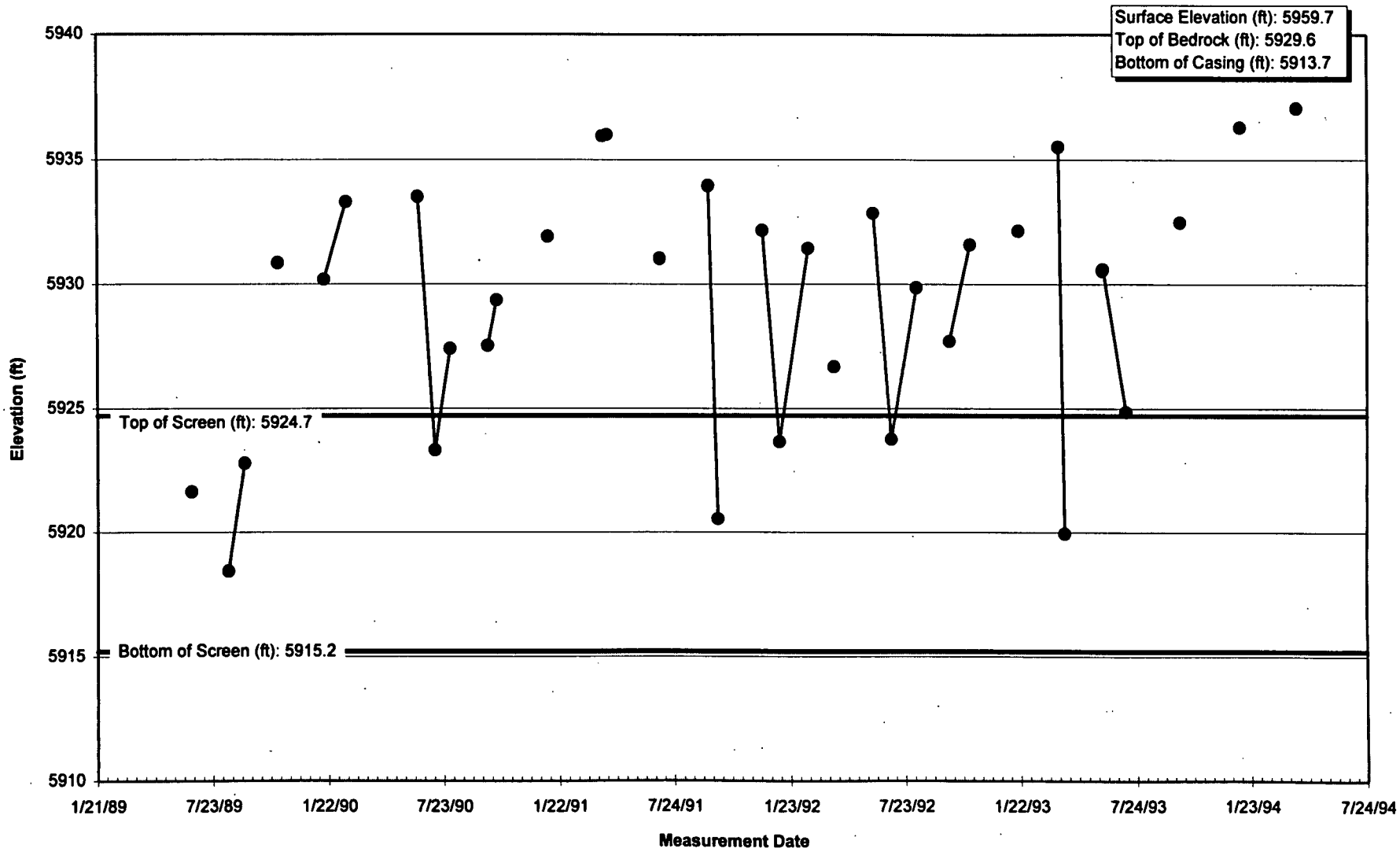
Hydrograph B203189



S17.XLS B203189 4/9/95

273

Hydrograph B203289



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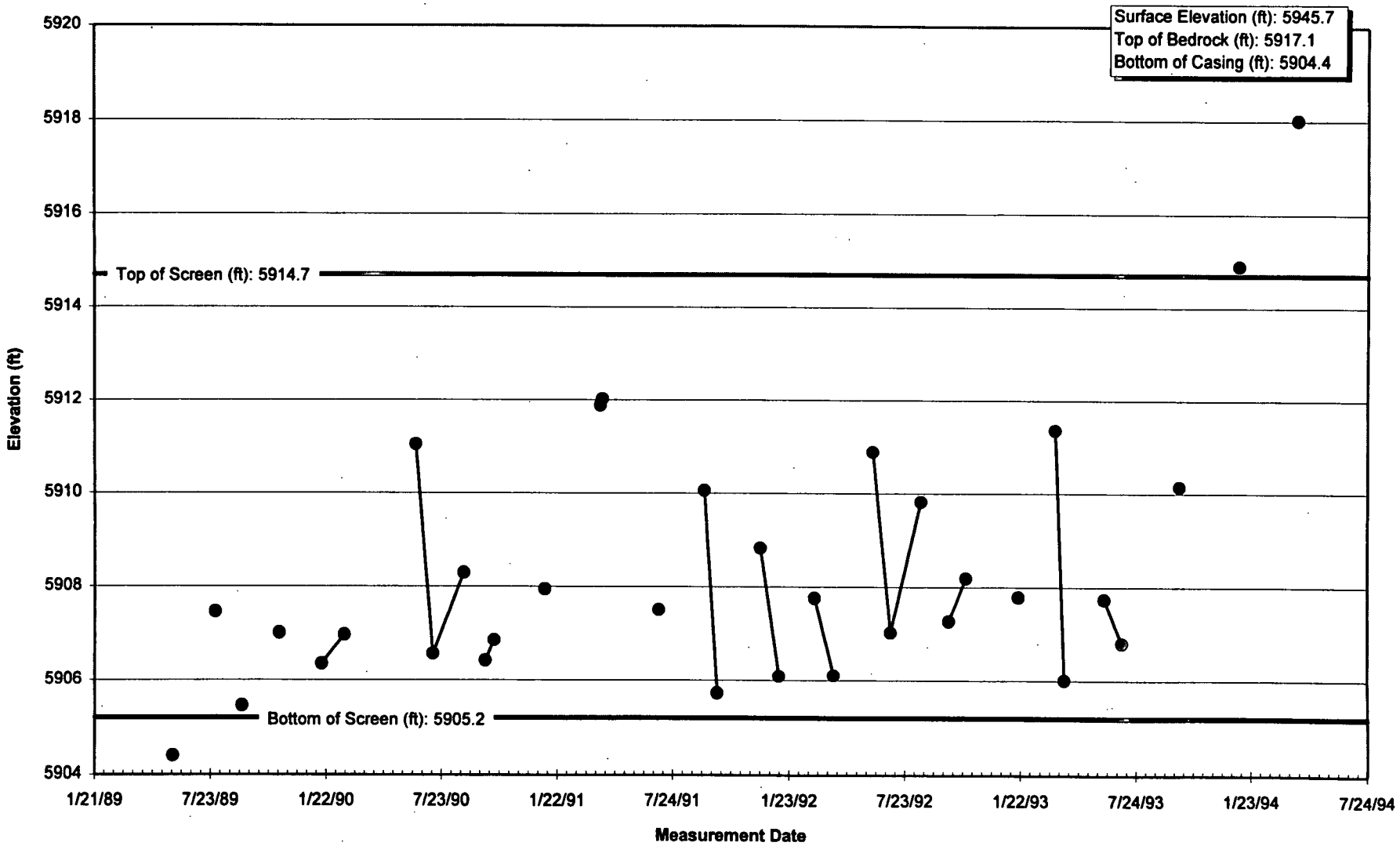

S17.XLS B203489 4/9/95

275

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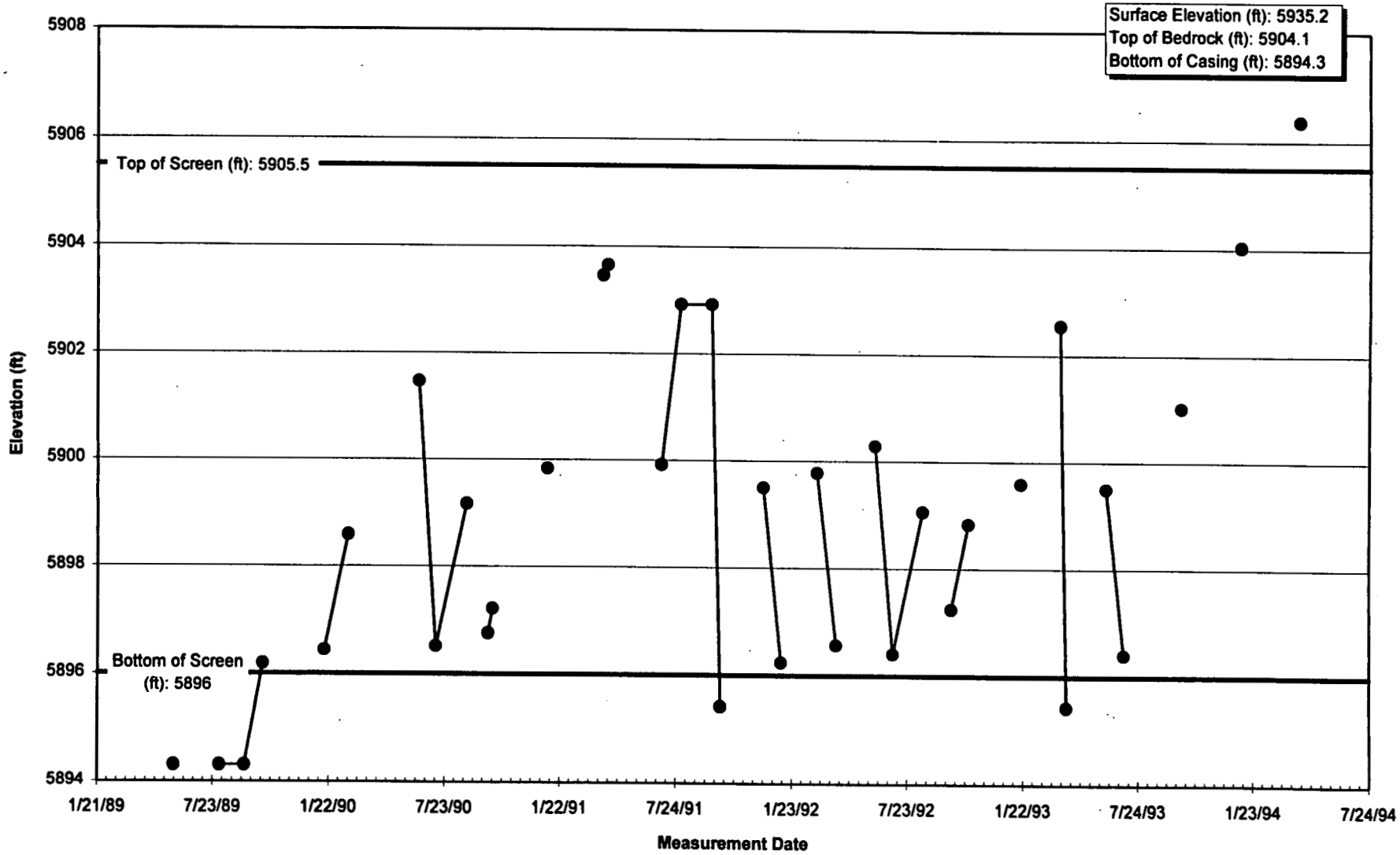

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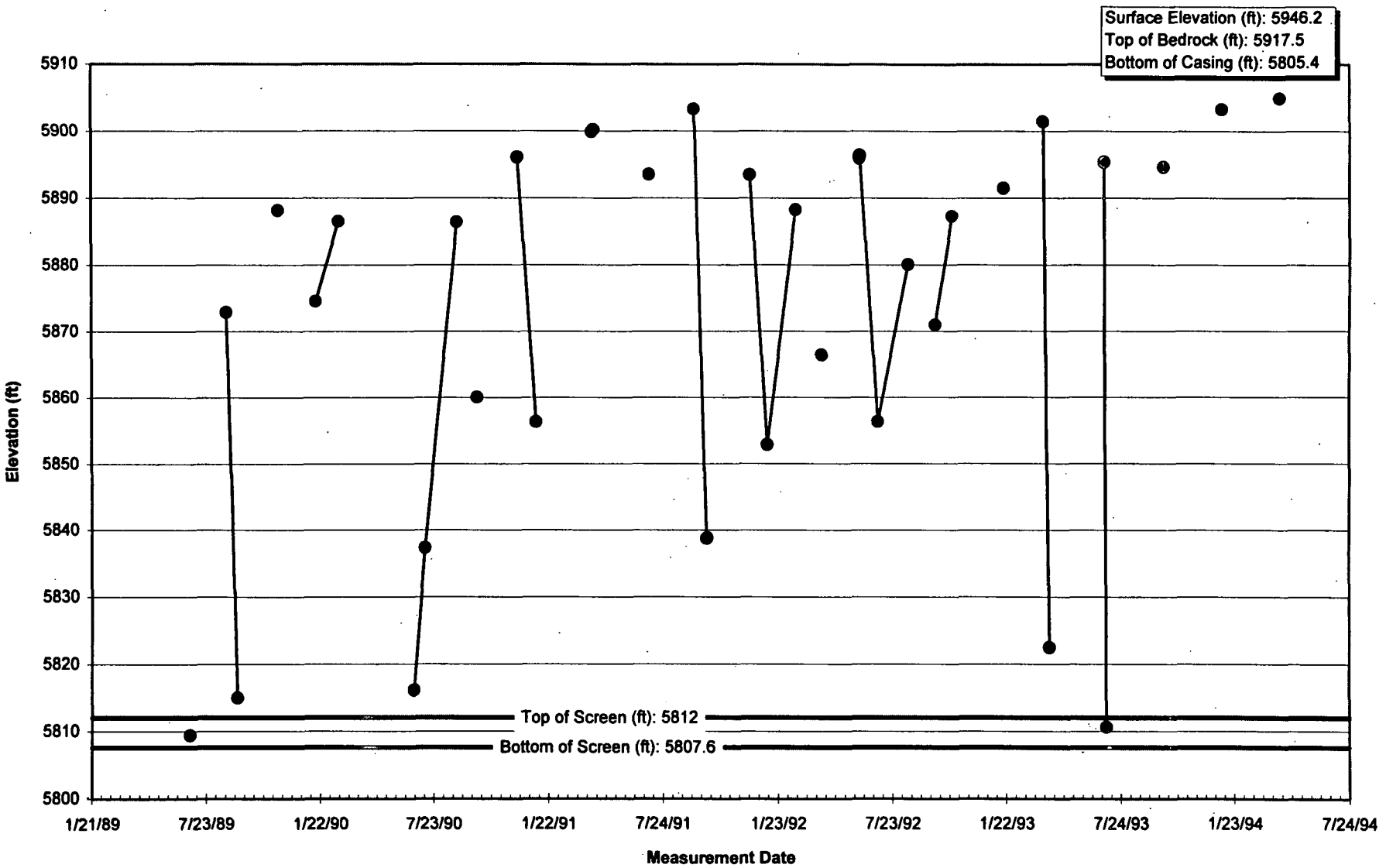

S17.XLS B203789 4/9/95

277

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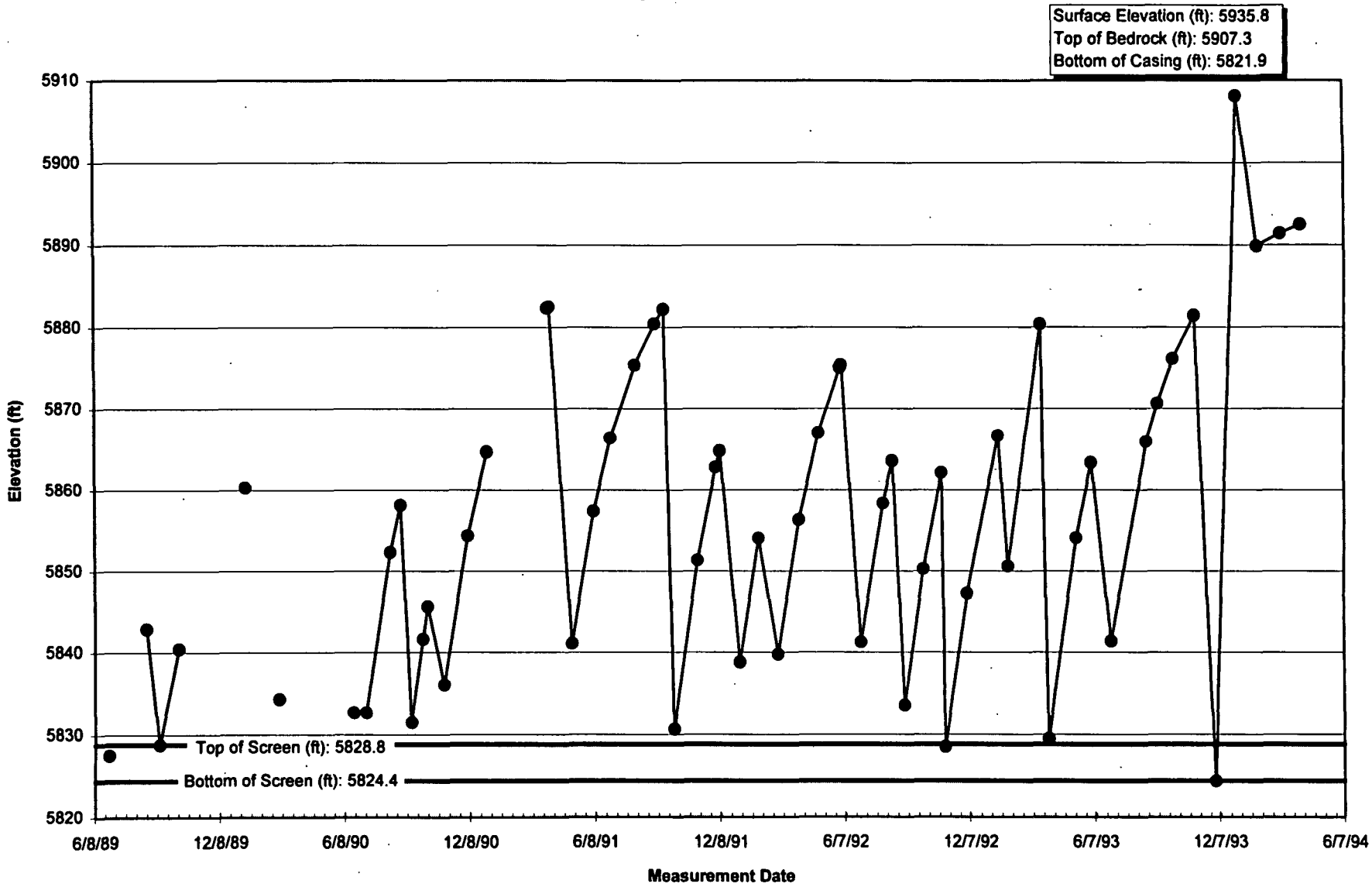
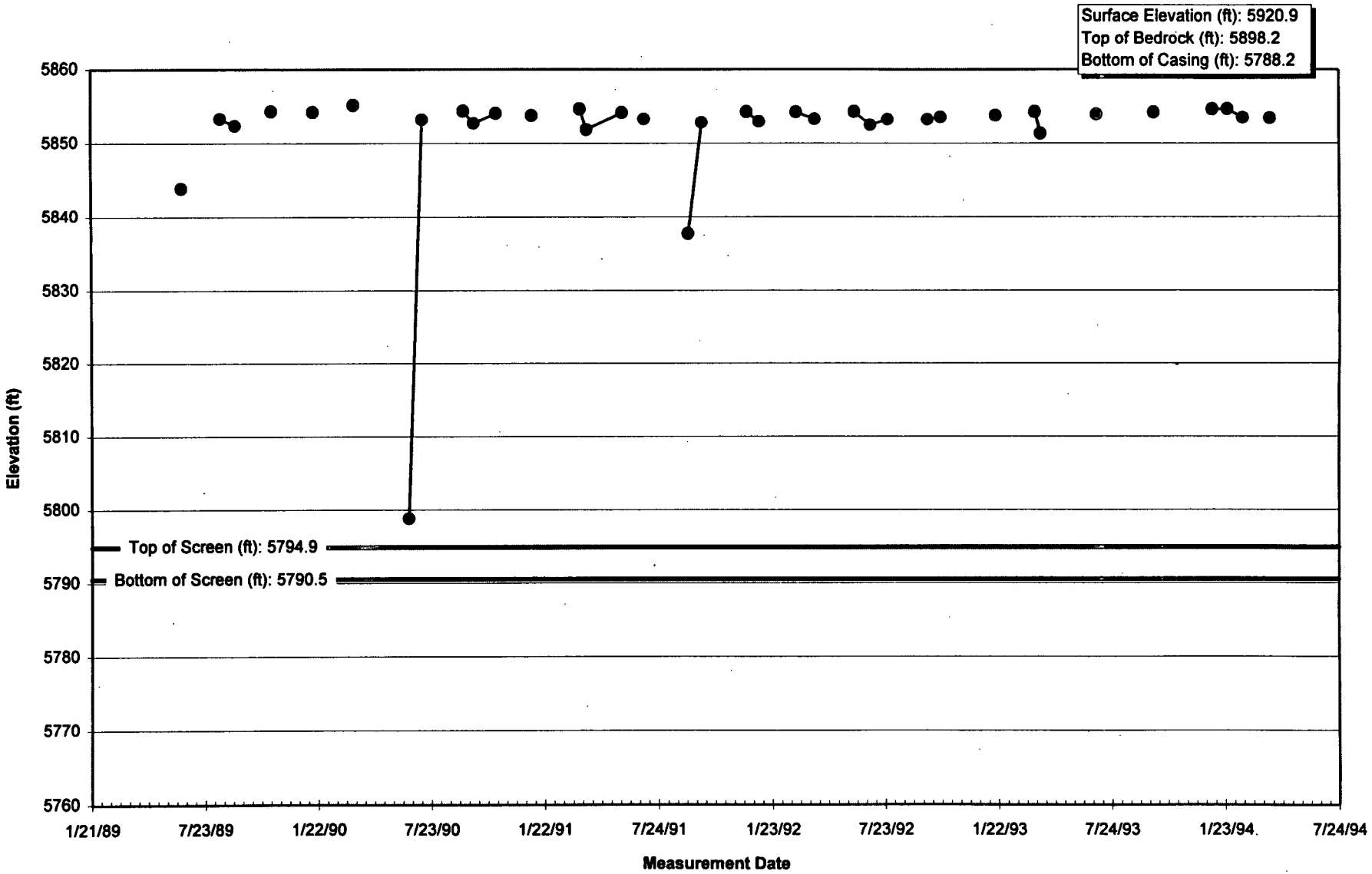


278 S17.XLS 889 4/9/95

Hydrograph B203989



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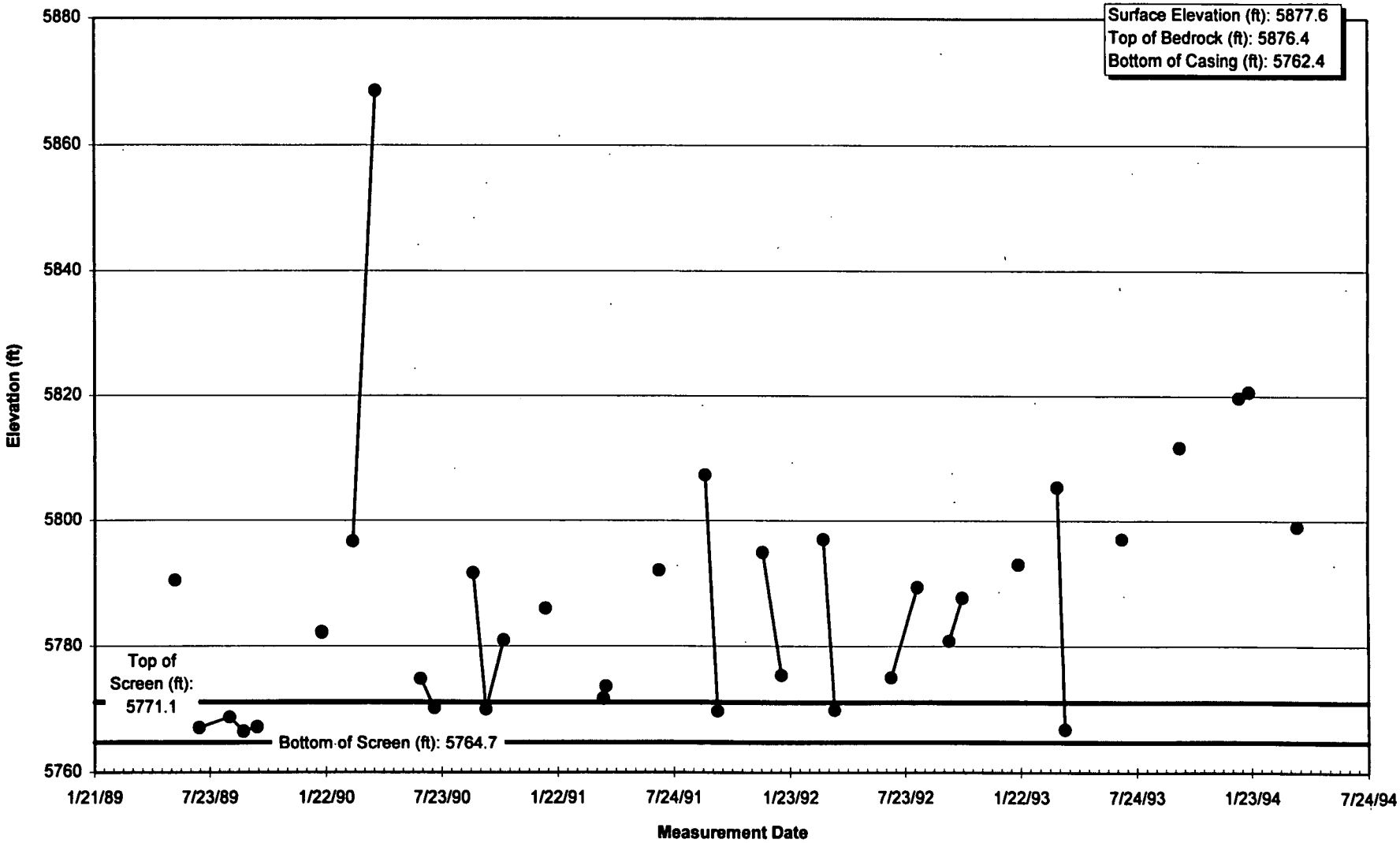
S17.XLS B203989 4/9/95

Hydrograph B204089



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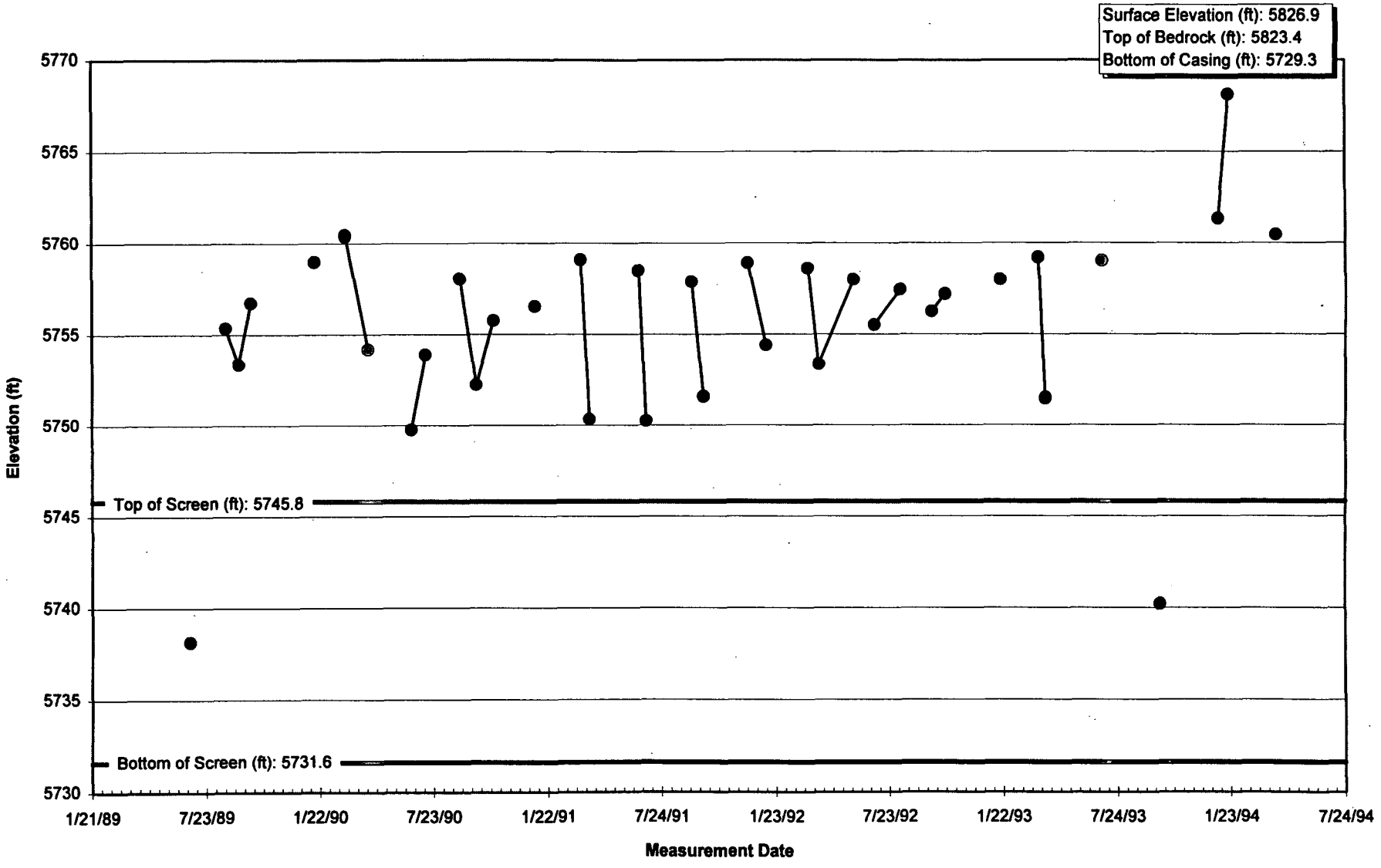

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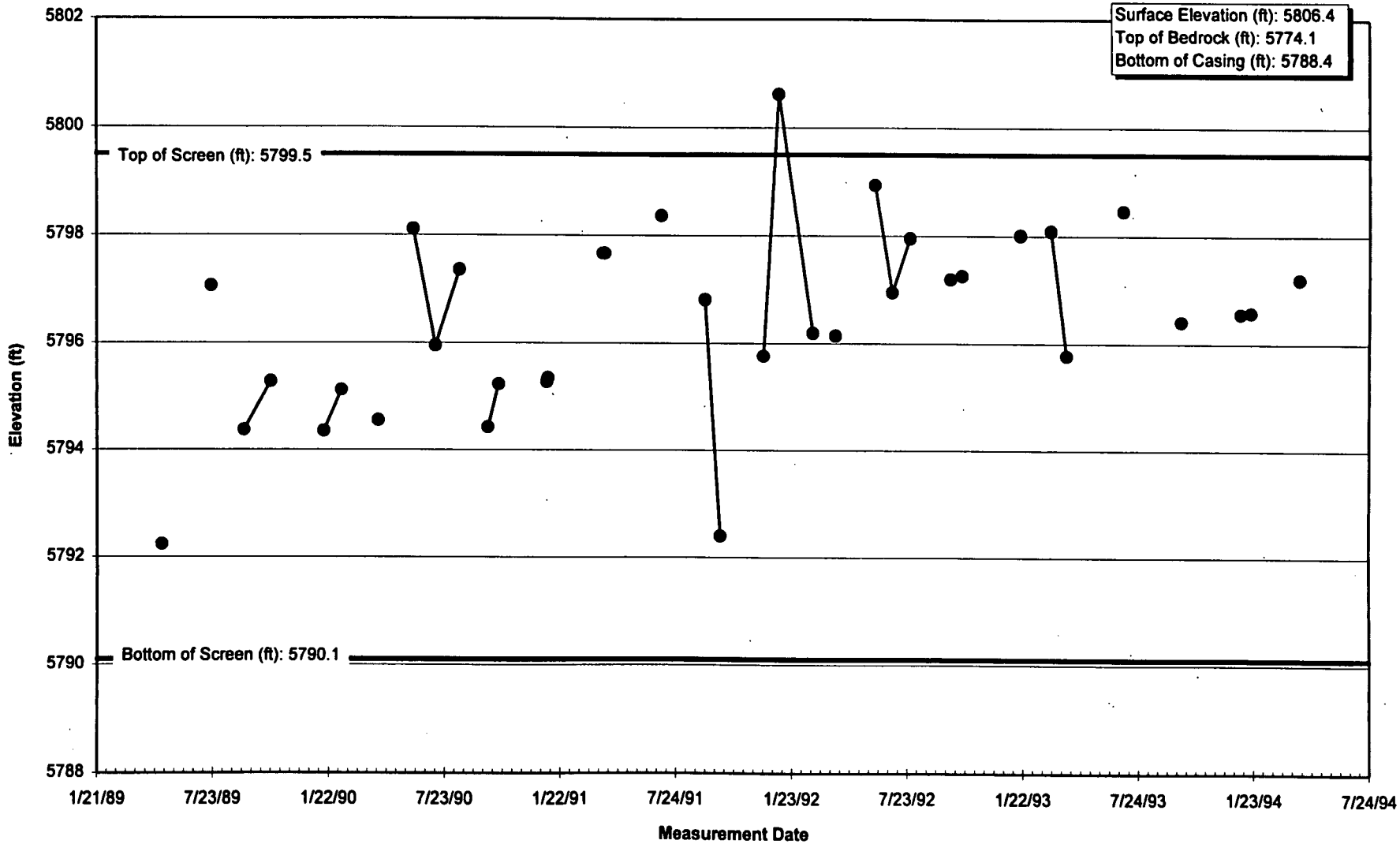
S17.XLS B204189 4/9/95

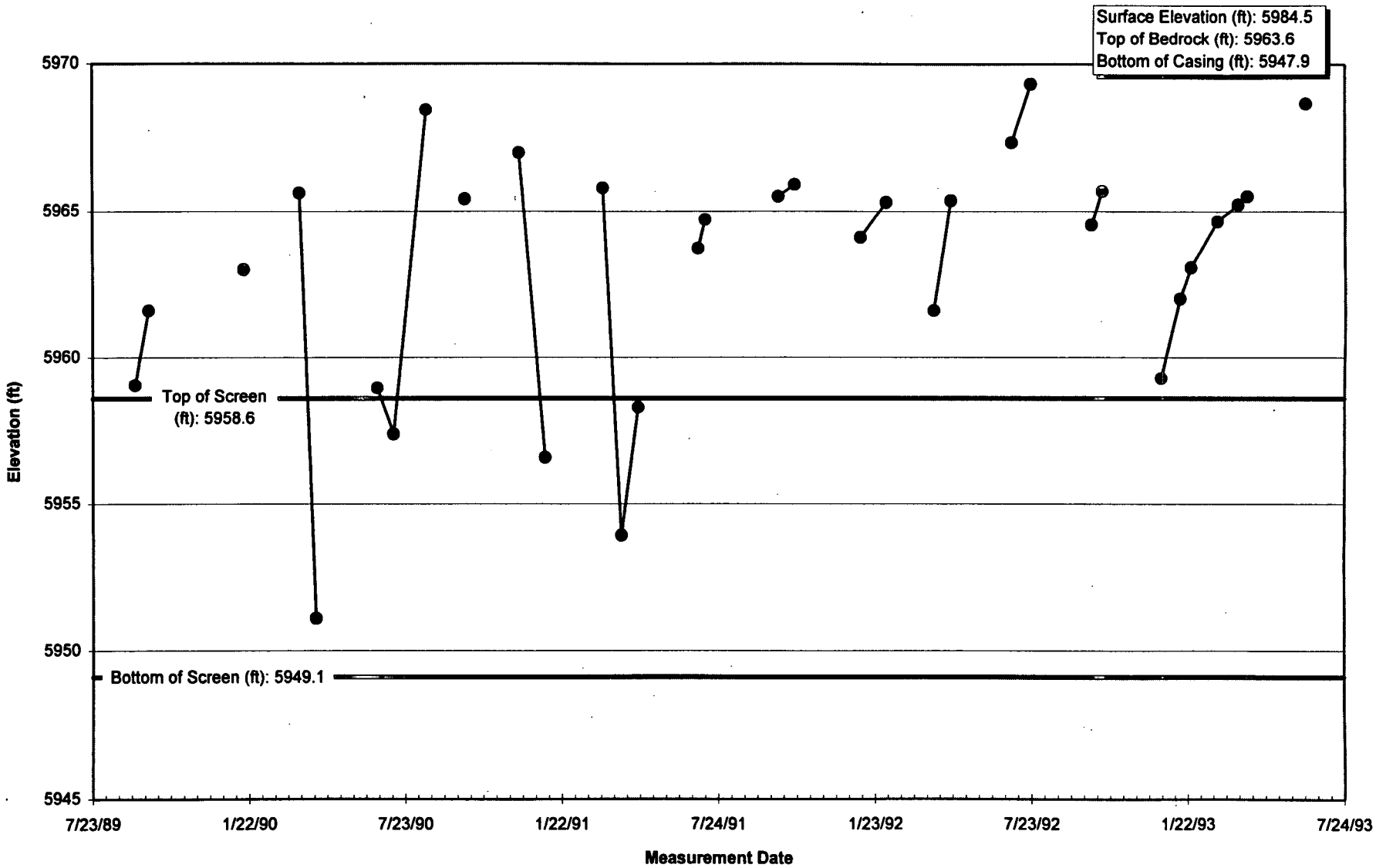
Hydrograph B205589



282

S17.XLS B[illegible]689 4/9/95

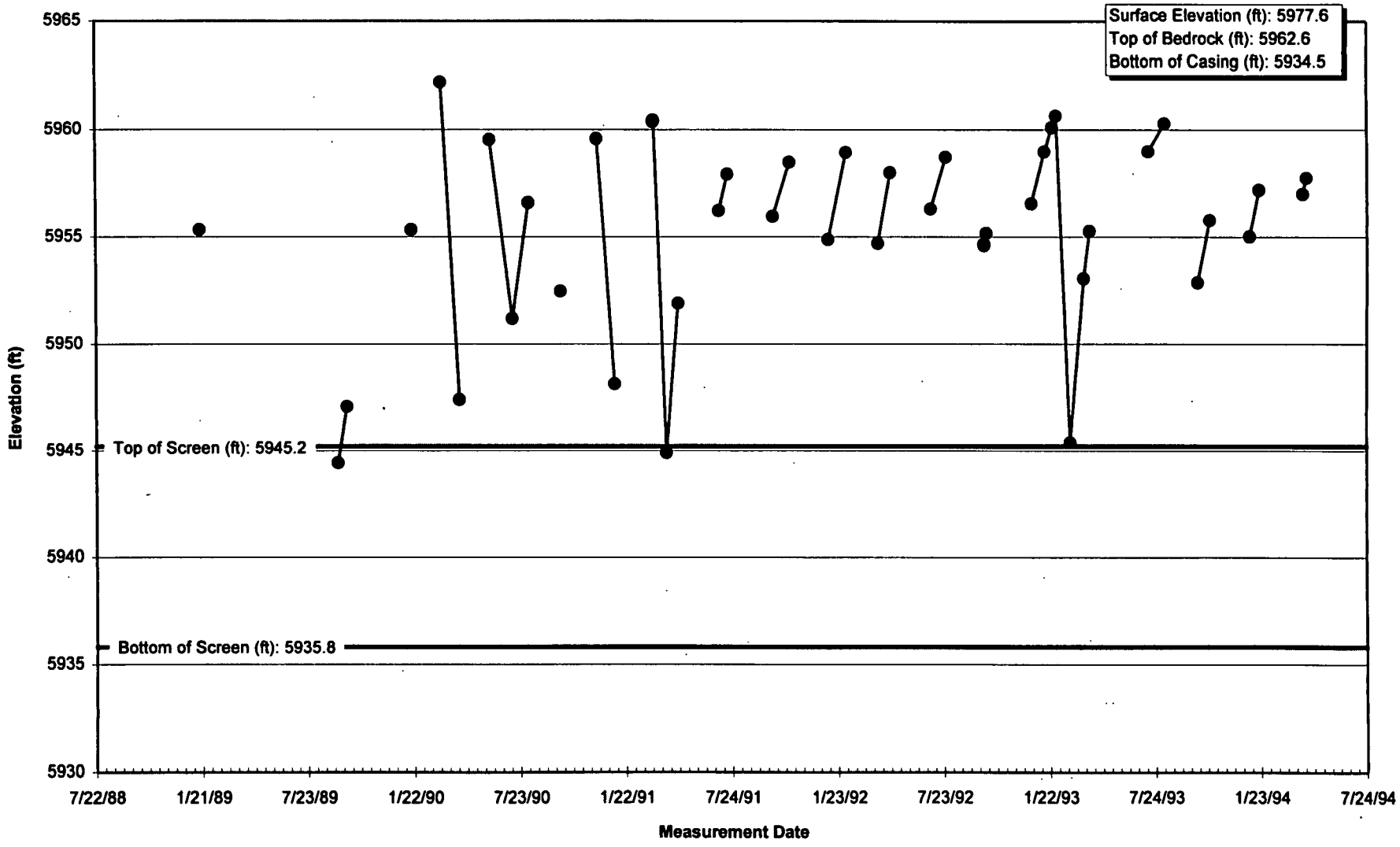
Hydrograph B206189



1283

S17.XLS B206189 4/9/95

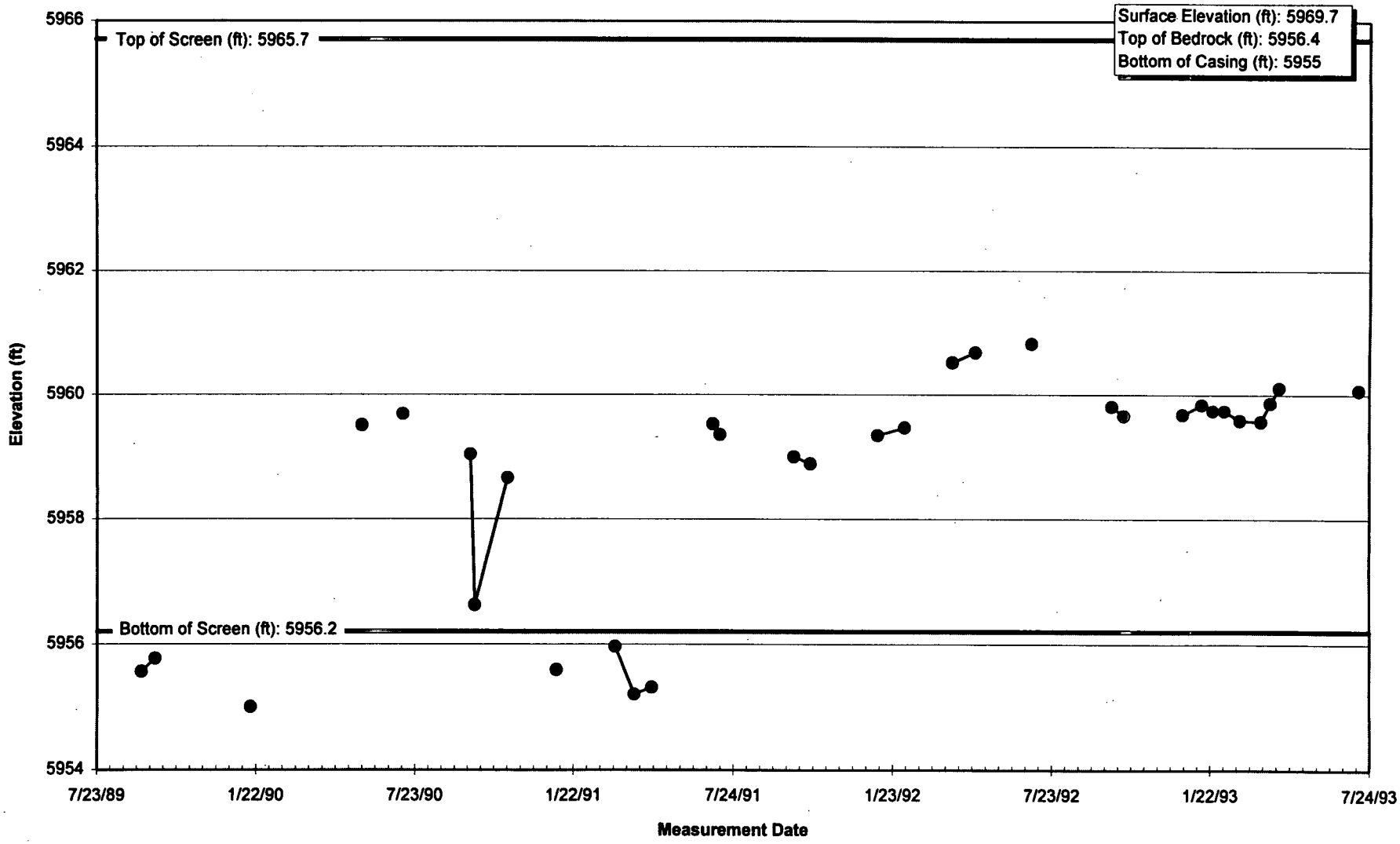
Hydrograph B206289



284

S17.XLS B206289 4/9/95

Hydrograph B206389



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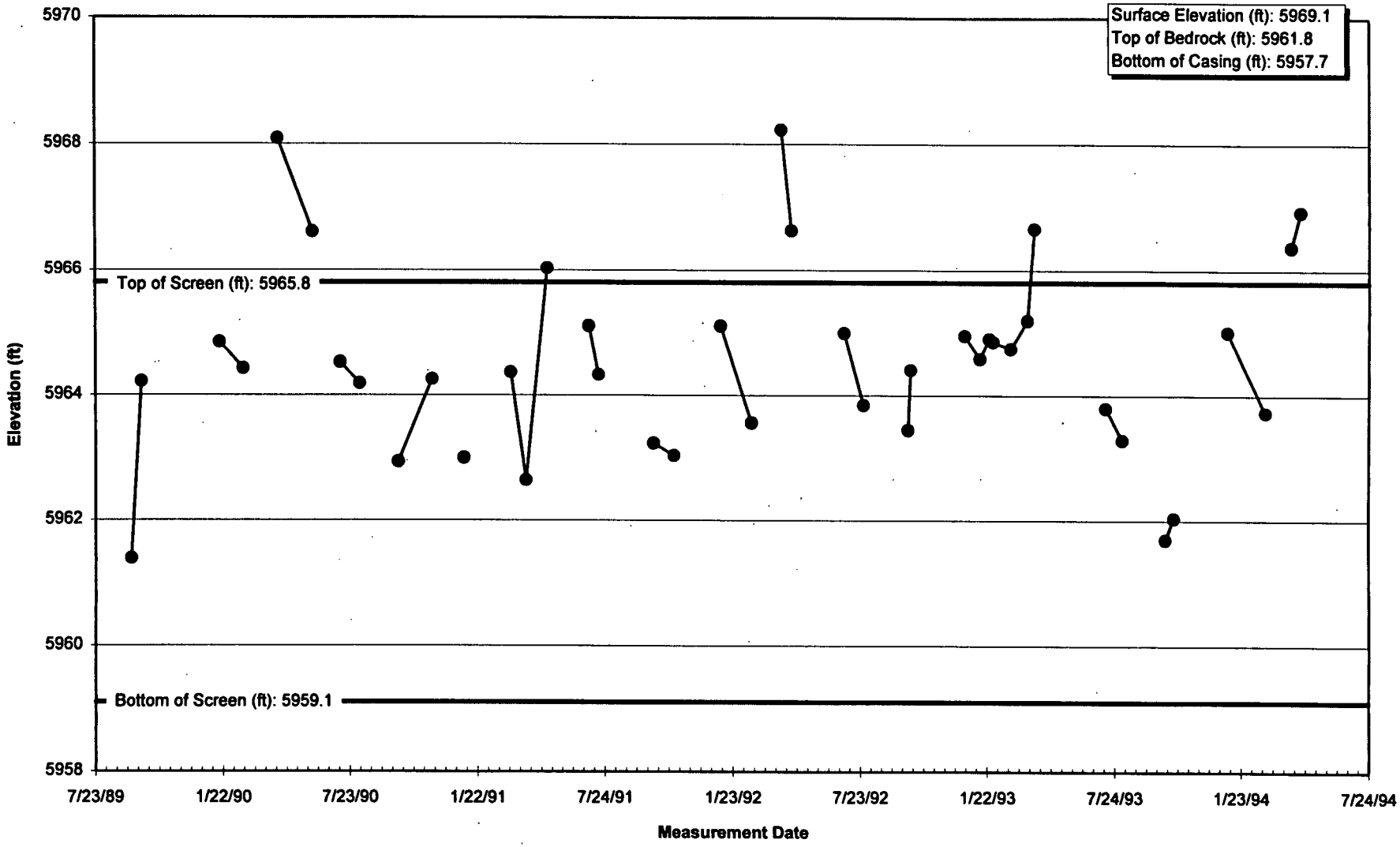
S17.XLS B206389 4/9/95

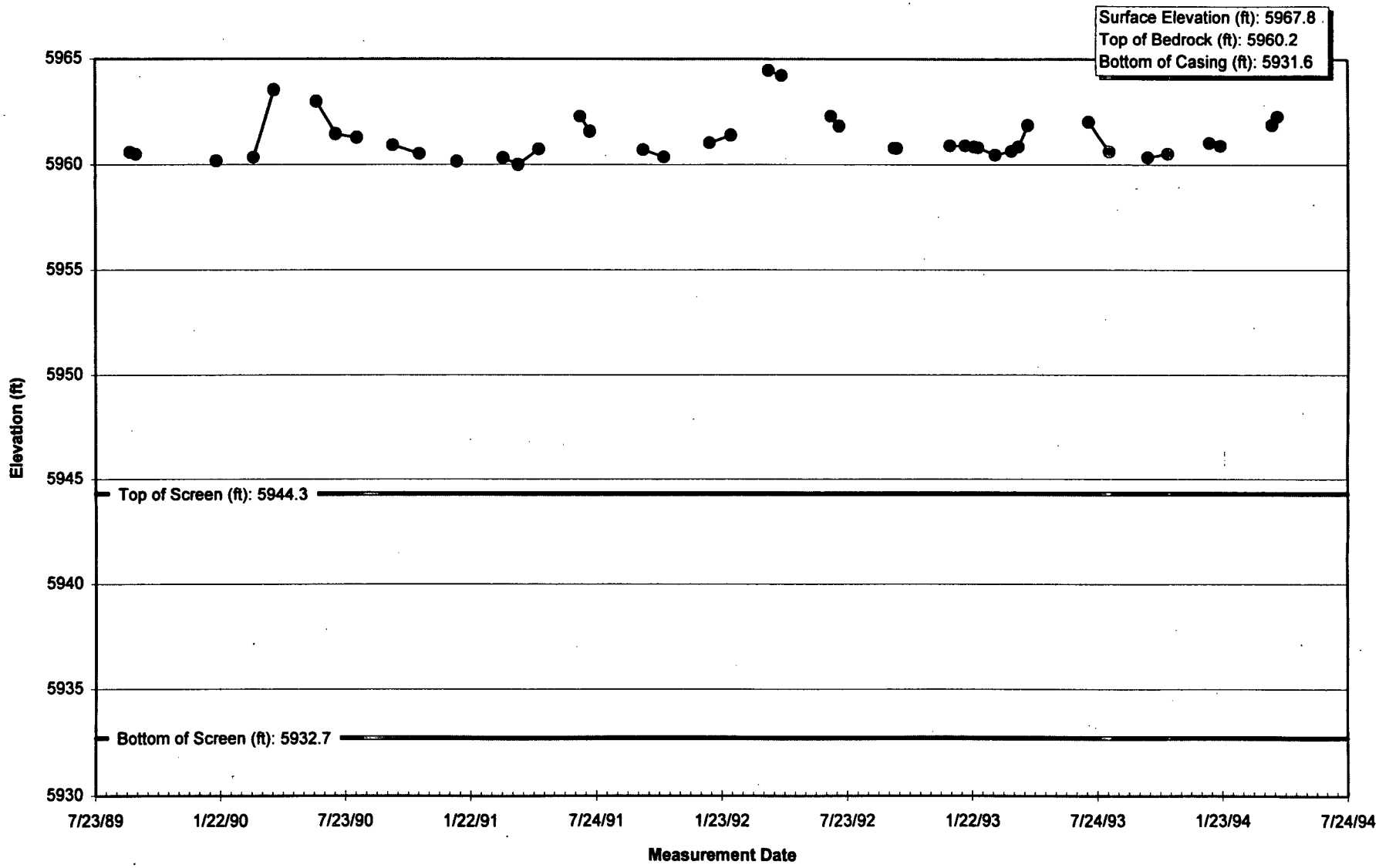
Hydrograph B206489



286

S17.XLS B206489 4/9/95

Hydrograph B206589



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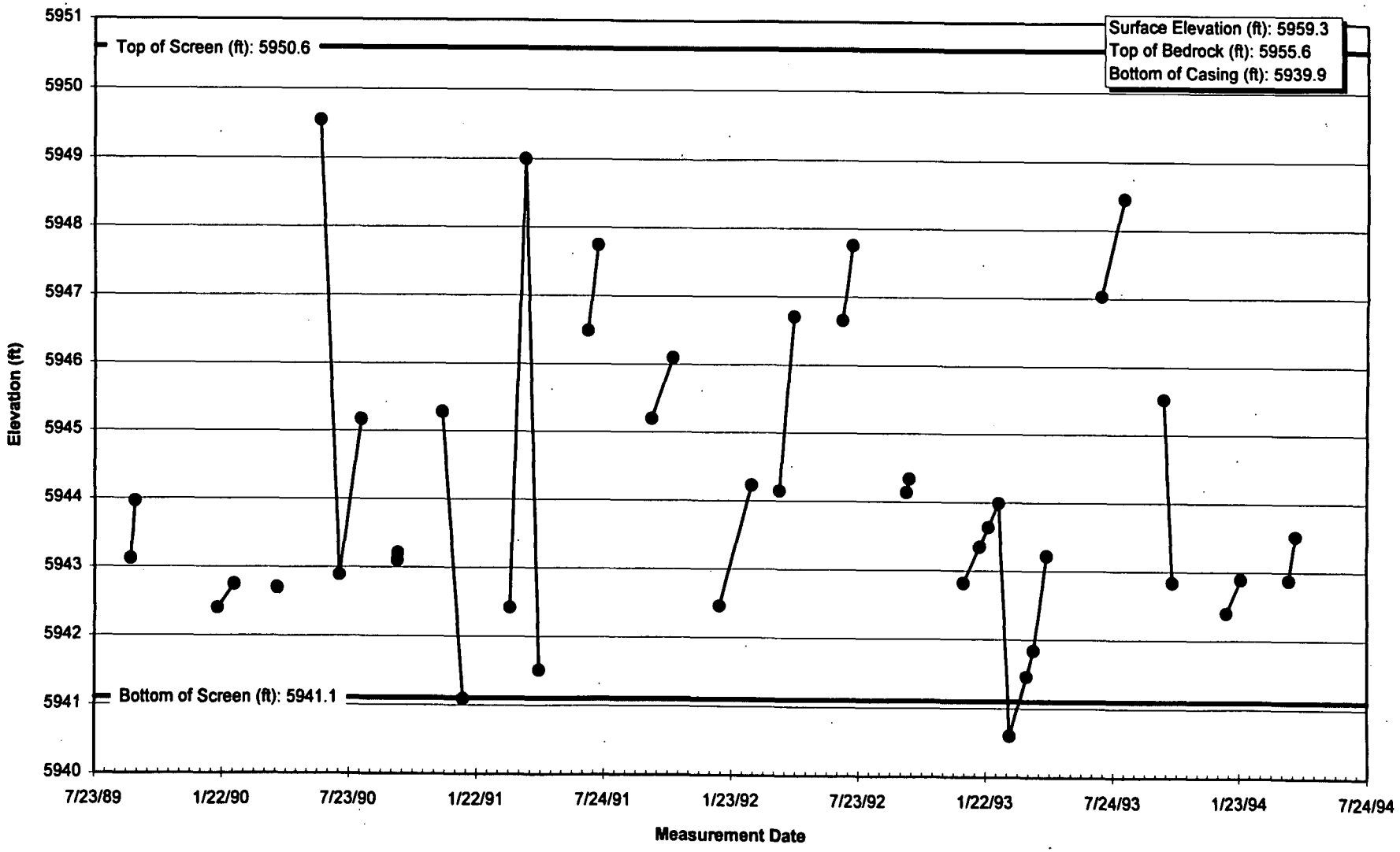
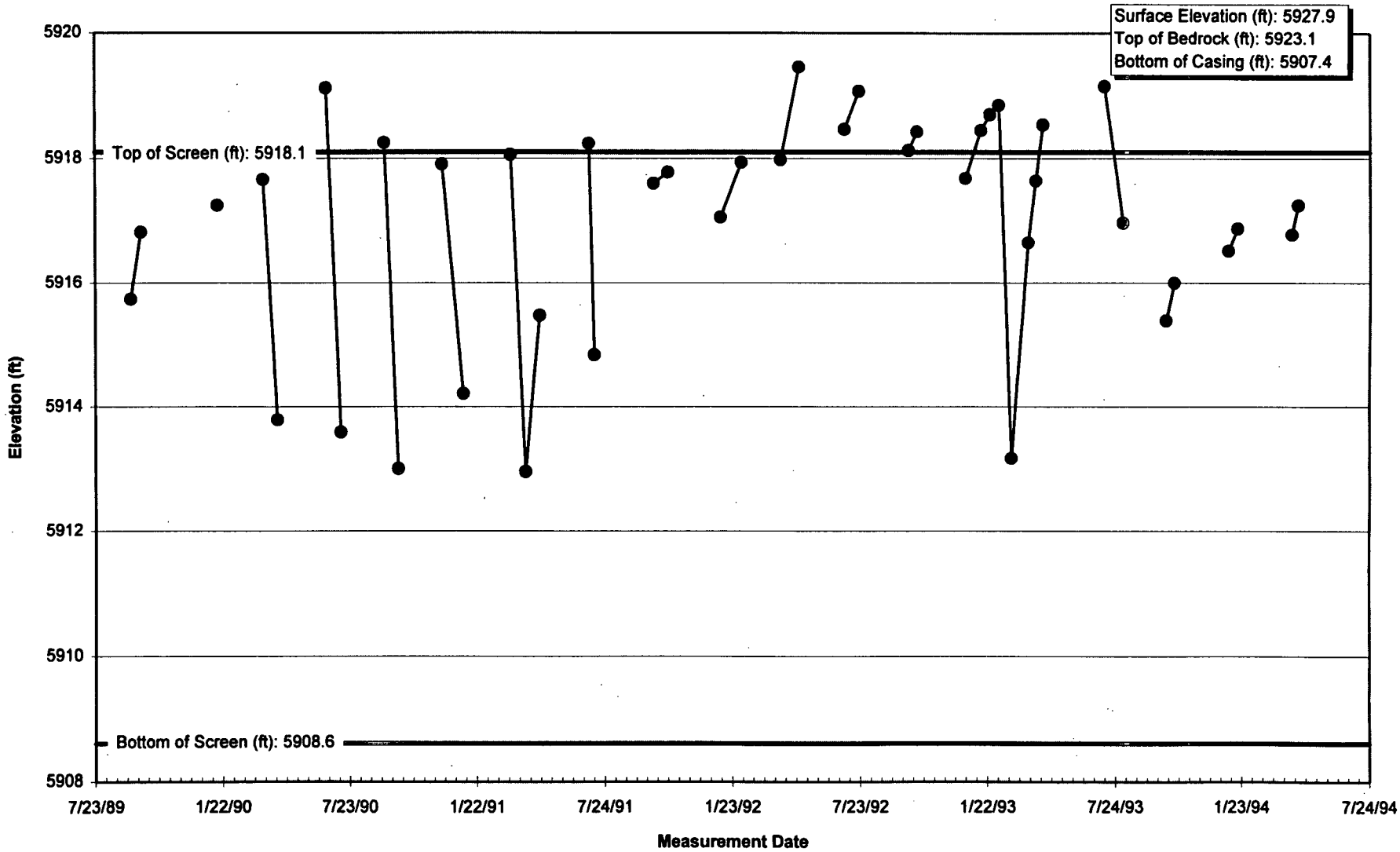
S17.XLS B206589 4/9/95

Hydrograph B206689



288 S17.XLS B206689 4/9/95

Hydrograph B206789



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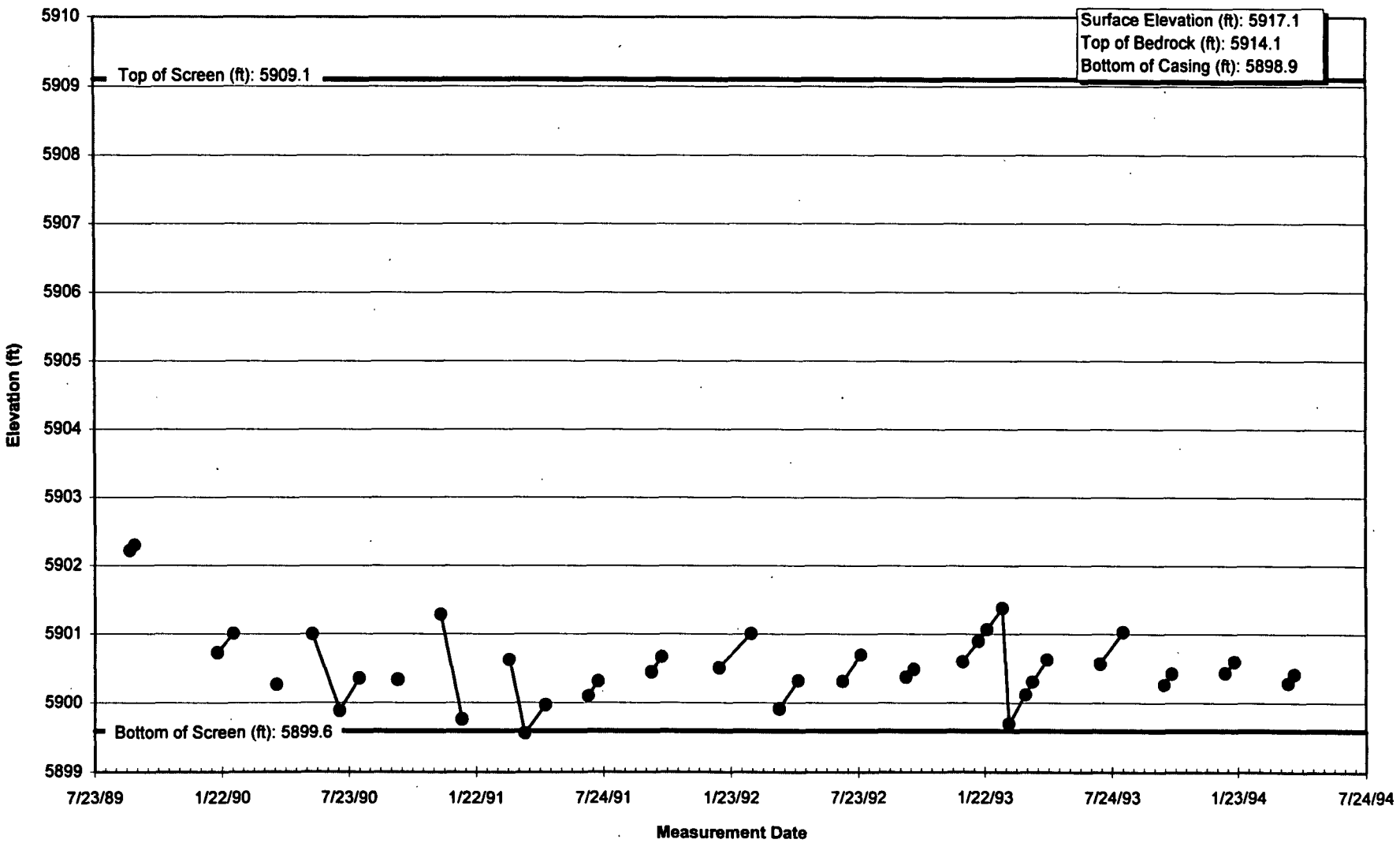
S17.XLS B206789 4/9/95

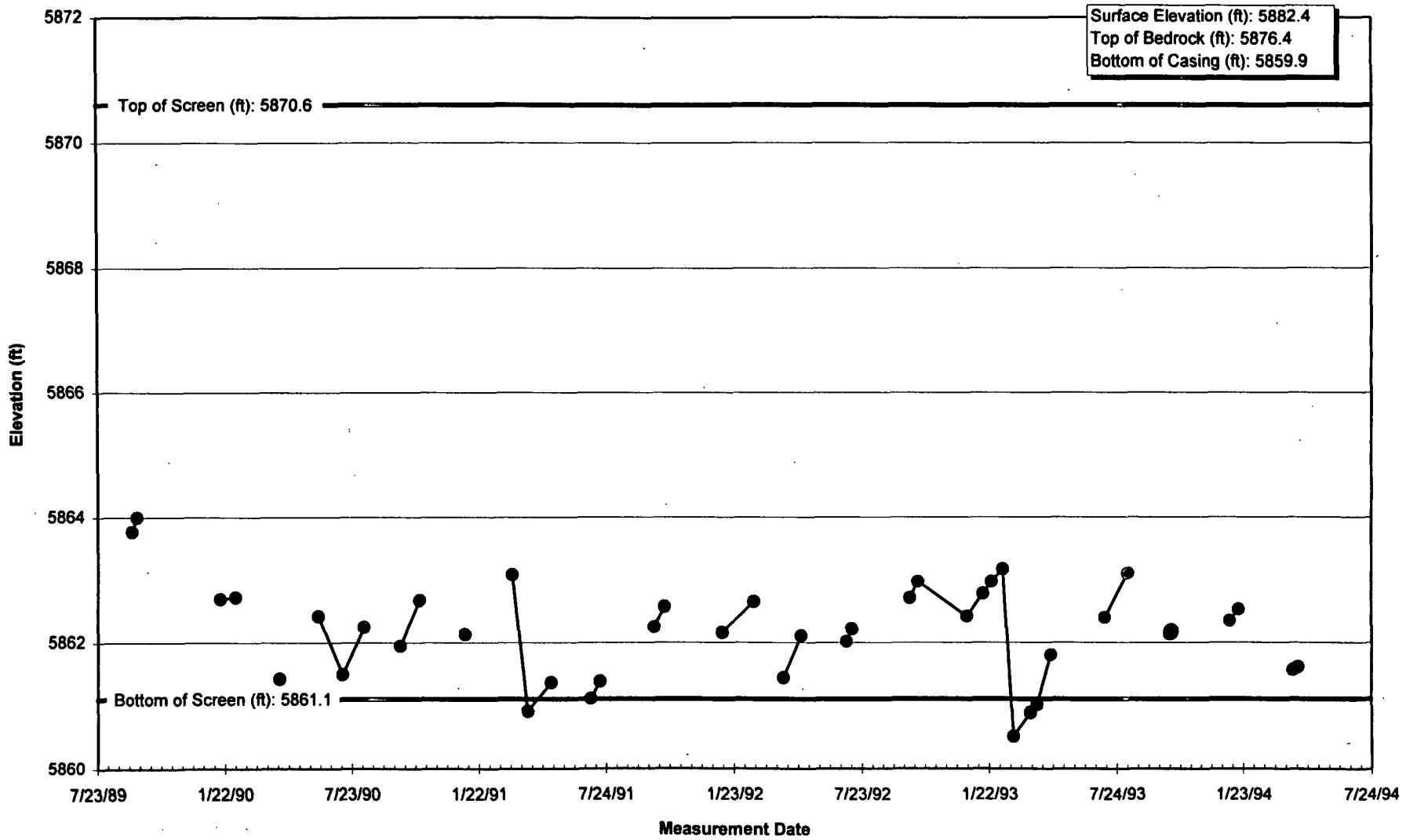
Hydrograph B206889



290

S18.XLS [illegible]89 4/9/95

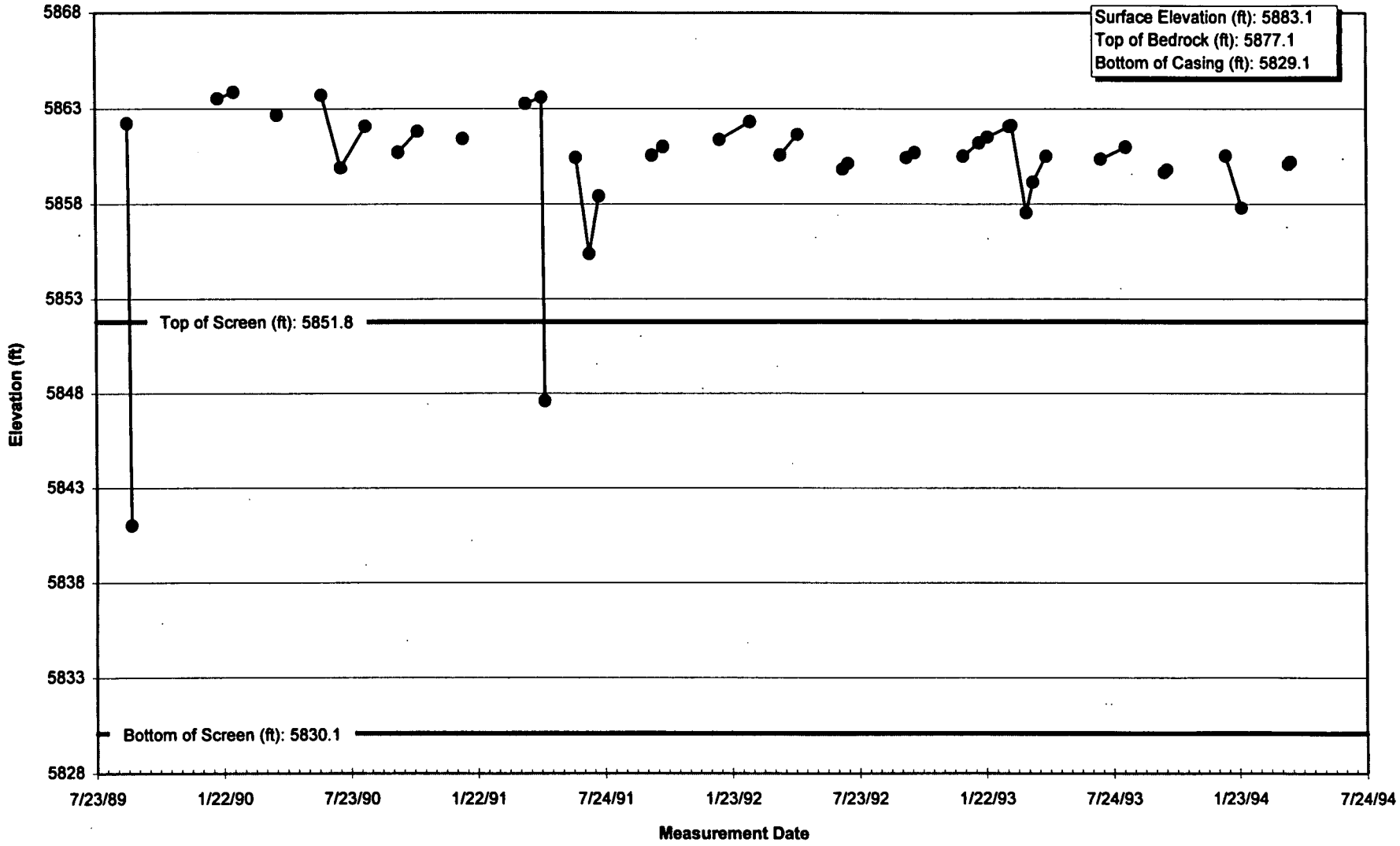
Hydrograph B206989



S18.XLS B206989 4/9/95

241

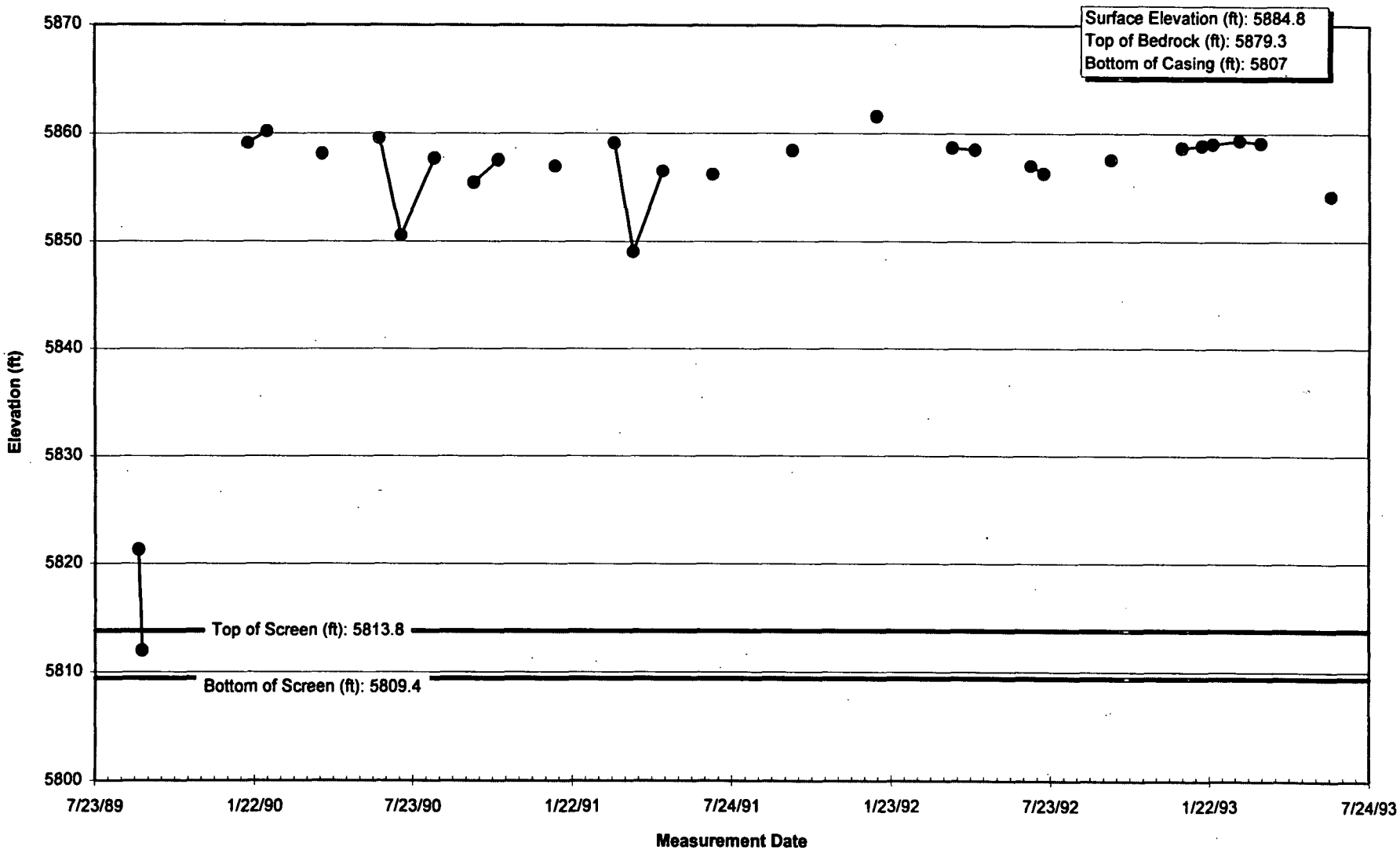
Hydrograph B207089



S18.XLS [illegible]089 4/9/95

292

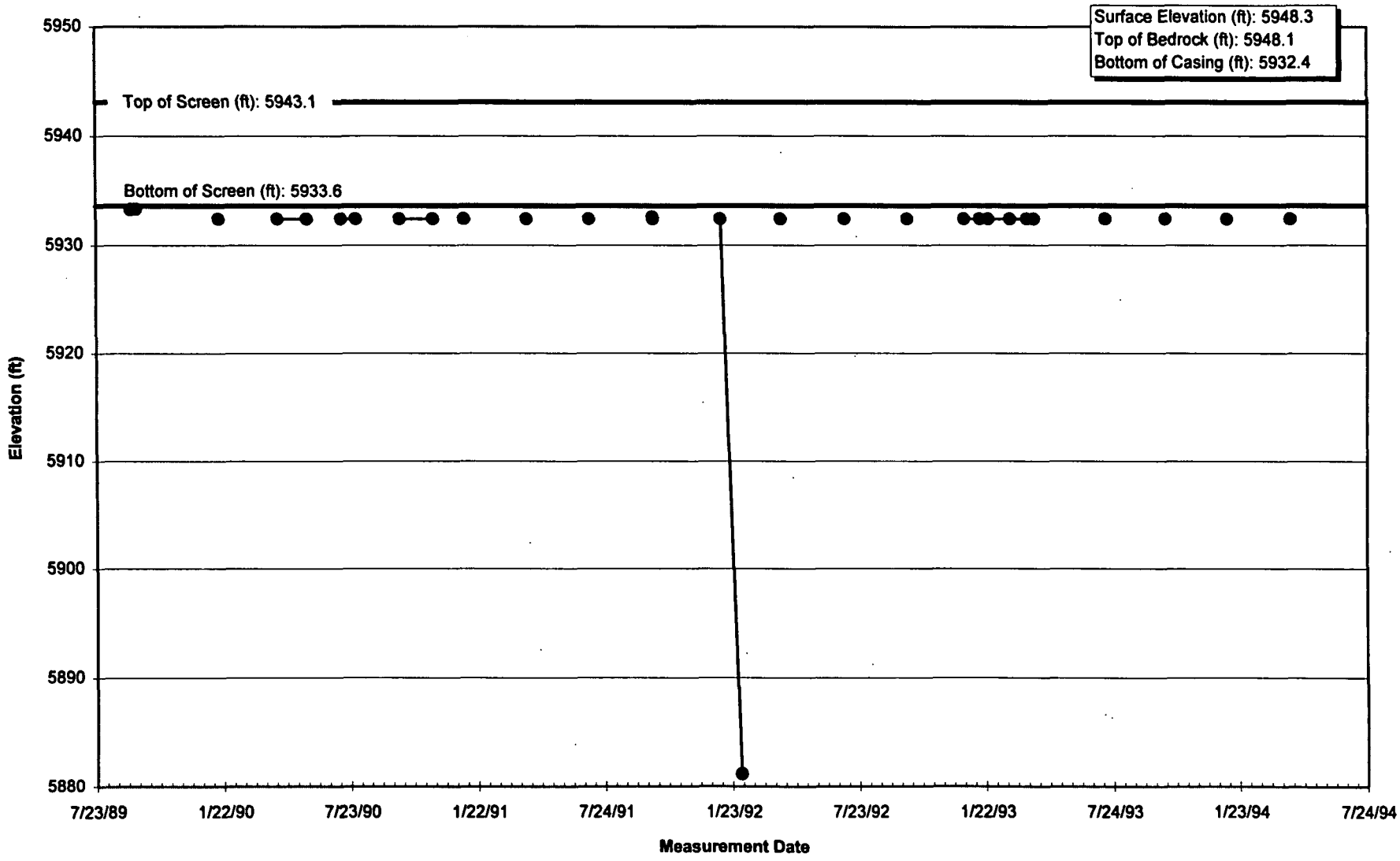
Hydrograph B207189



S18.XLS B207189 4/9/95

293

Hydrograph B207289



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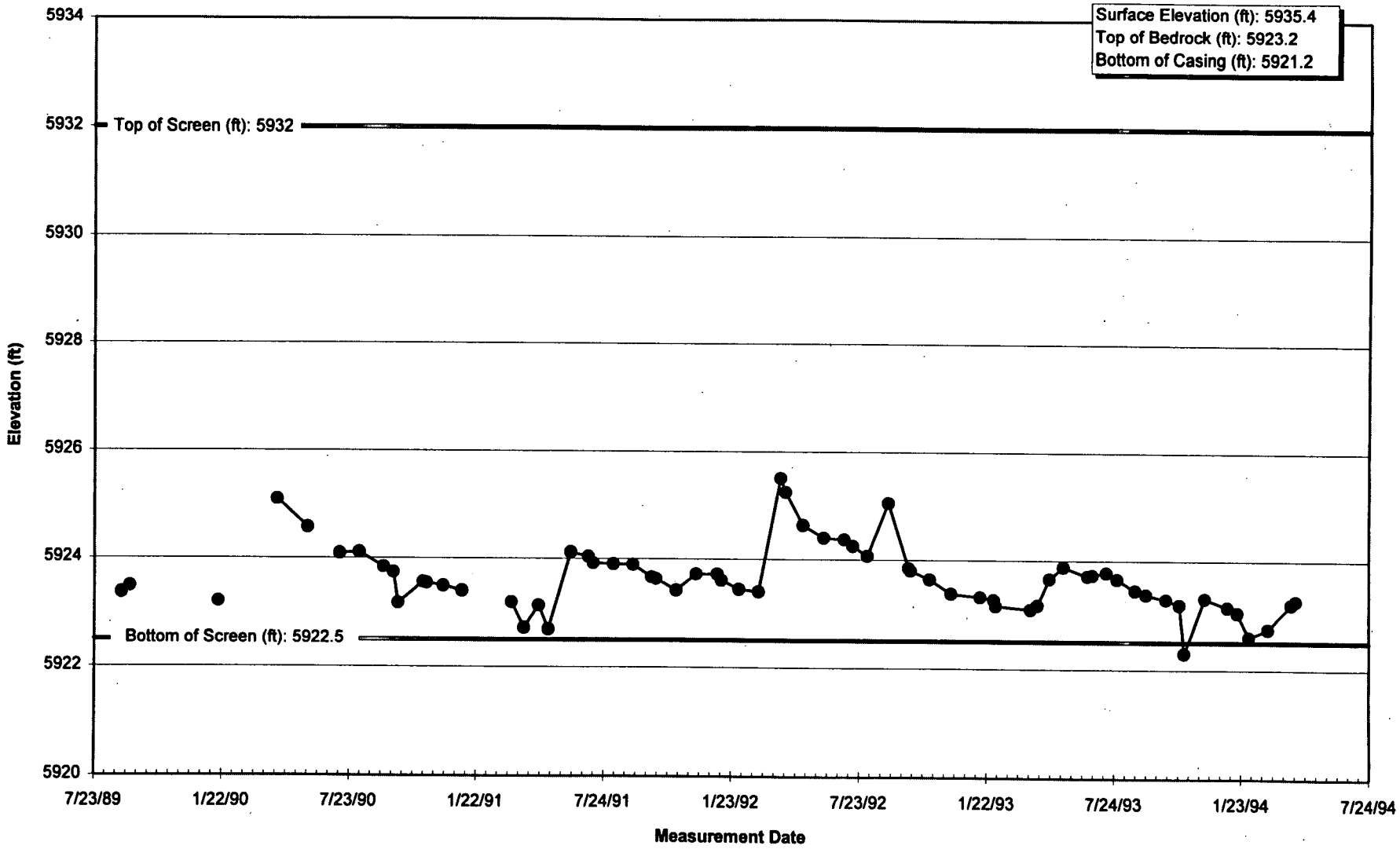
S18.XLS [illegible]89 4/9/95

Hydrograph B208089



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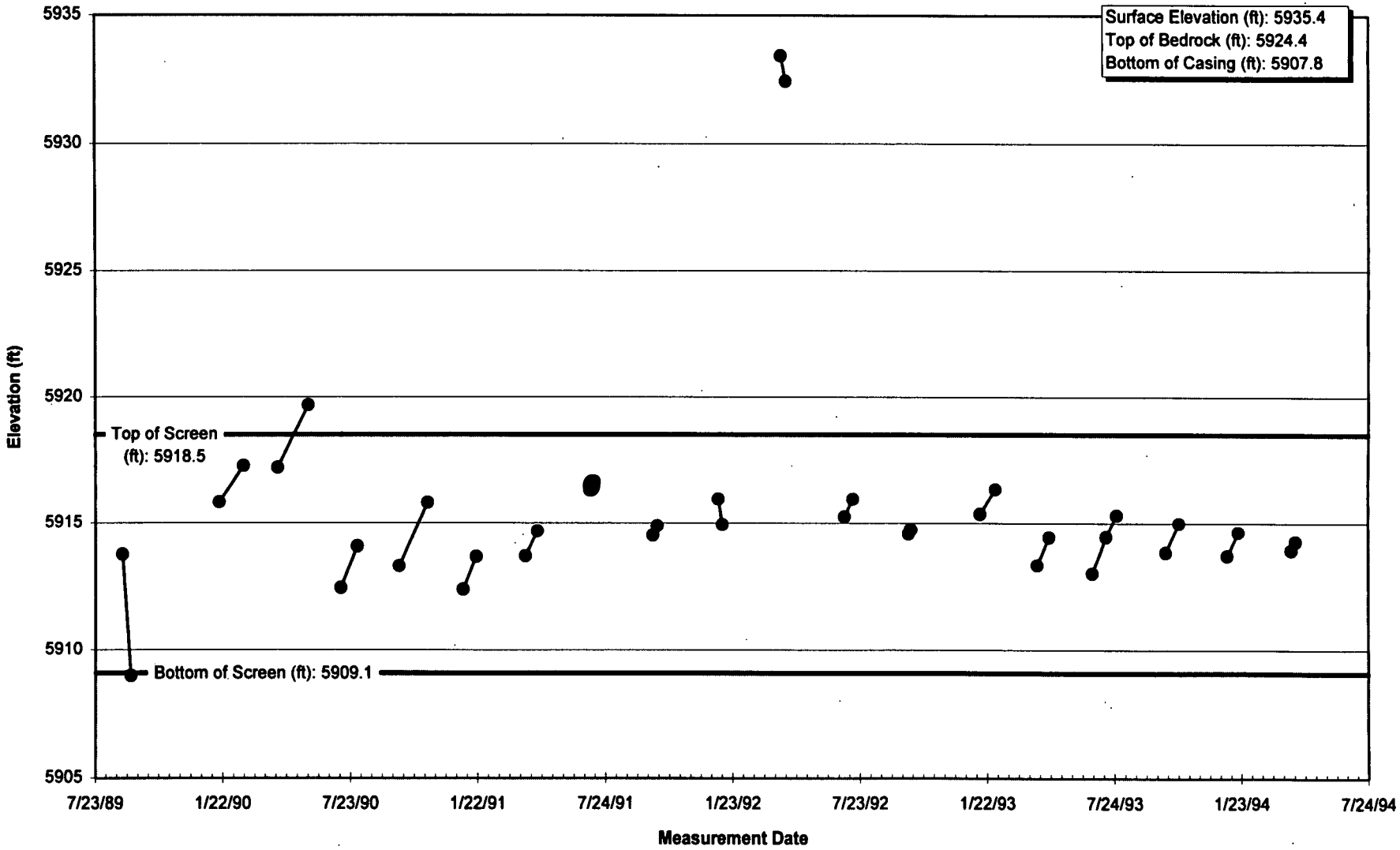
S18.XLS B208089 4/9/95

Hydrograph B208189



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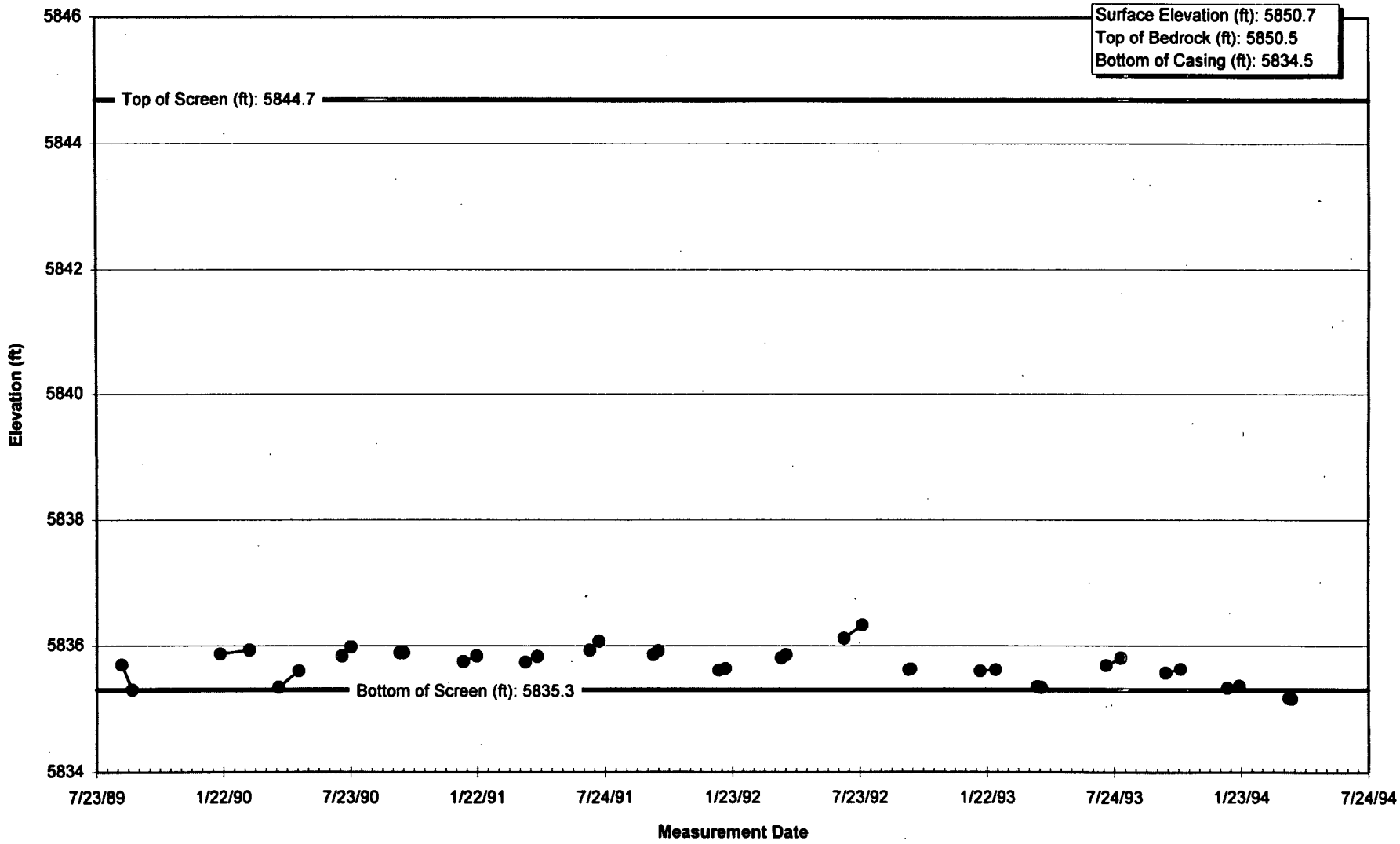

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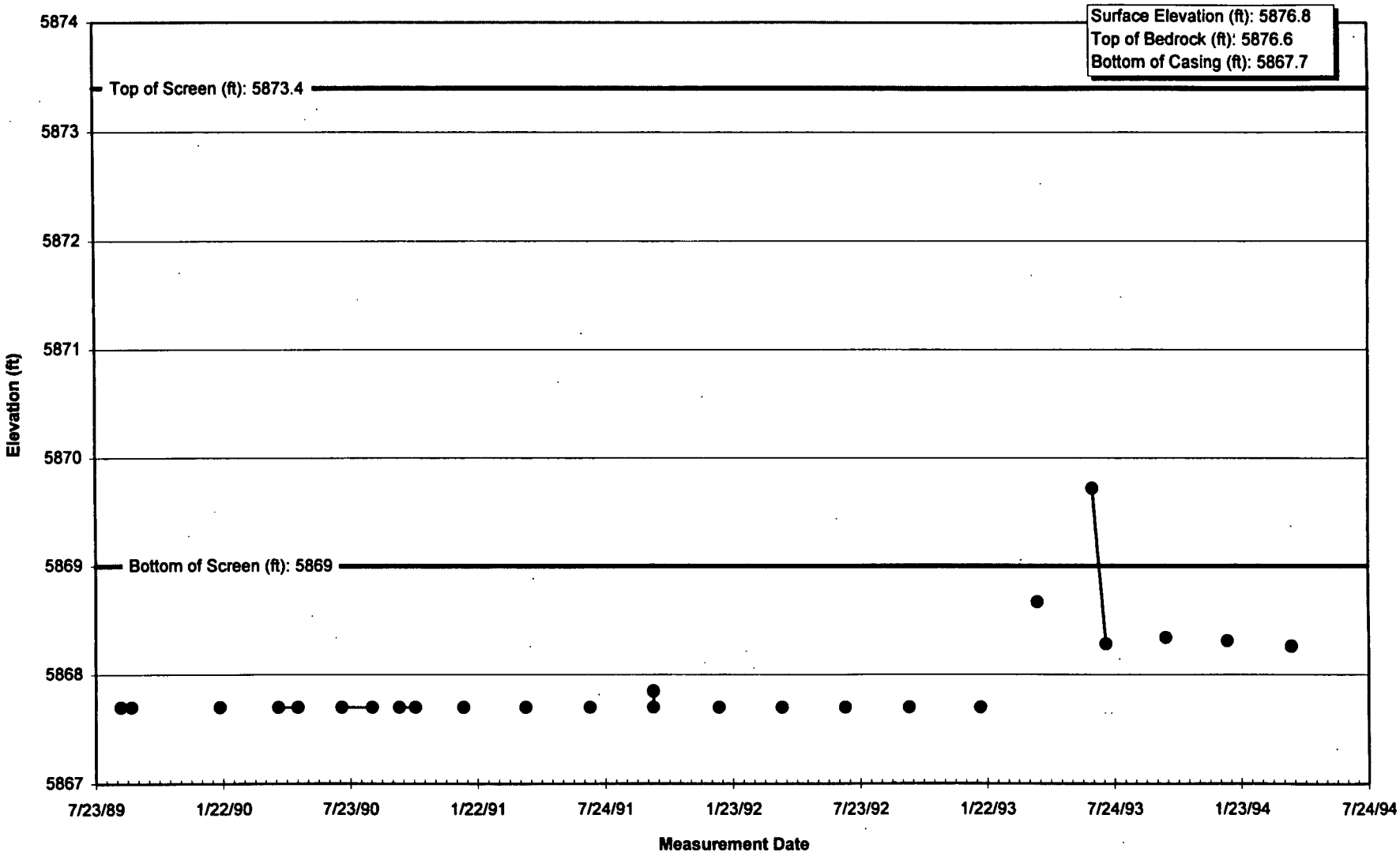
S18.XLS B208289 4/9/95

Hydrograph B208389



248

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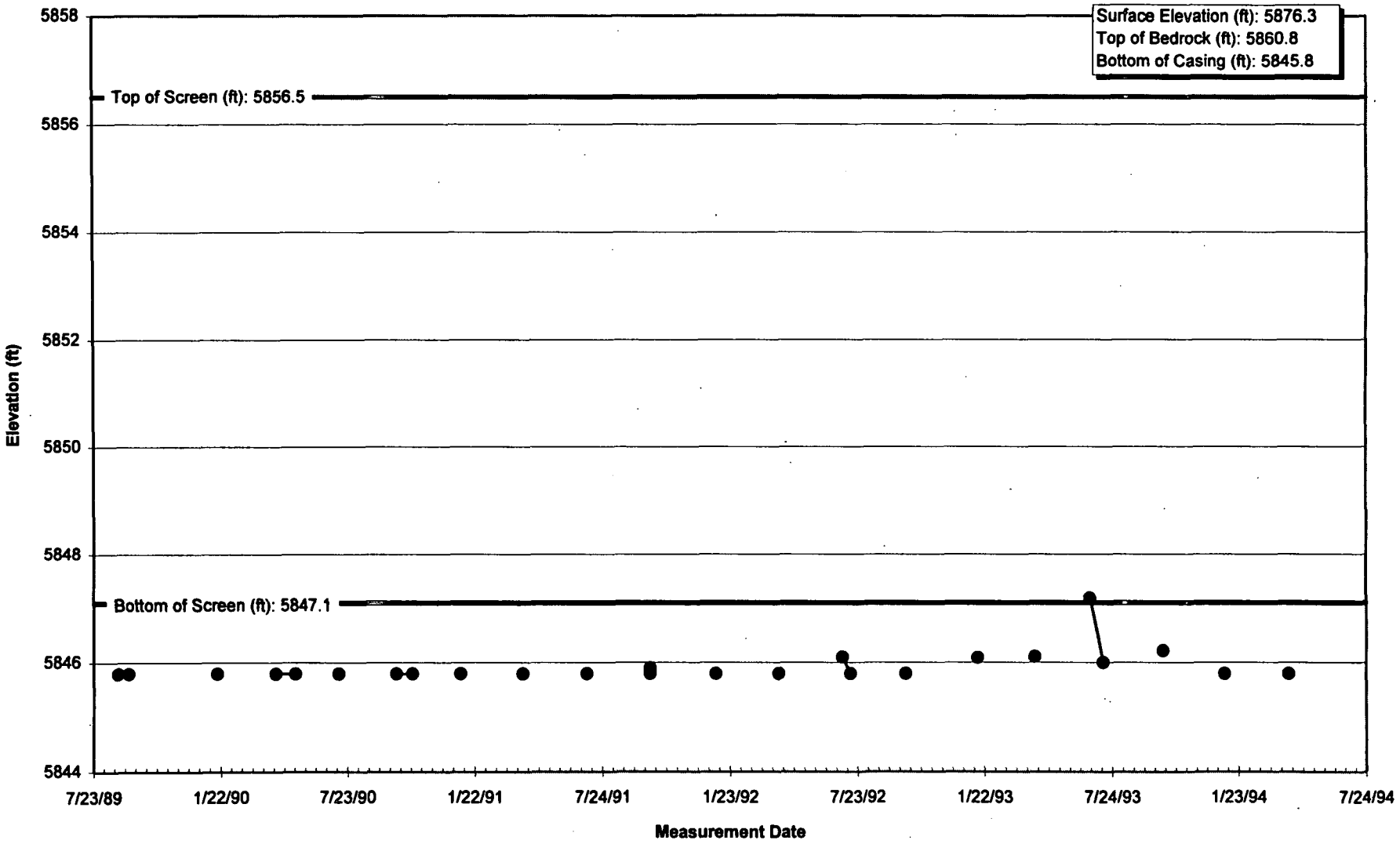

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S18.XLS B208489 4/9/95

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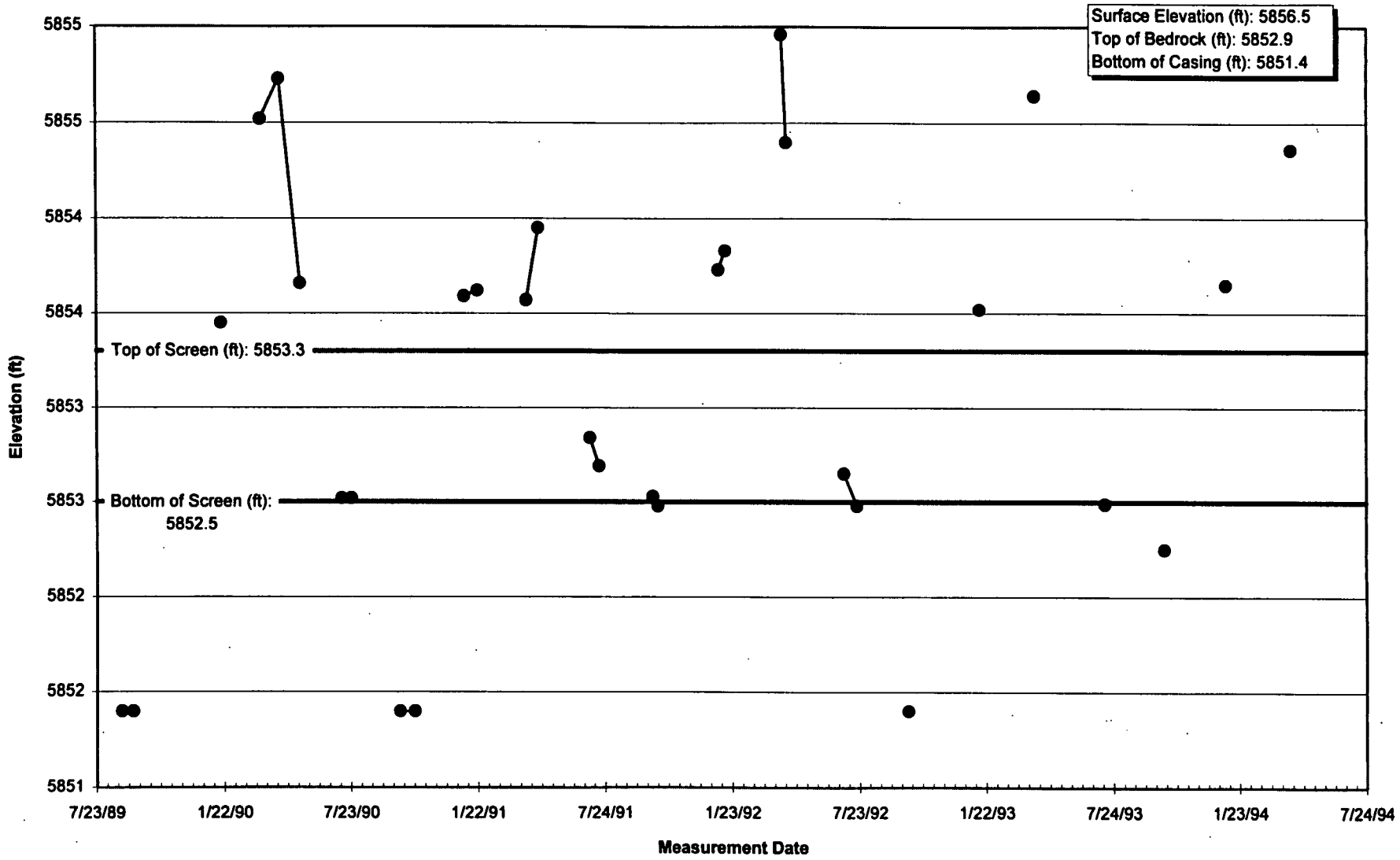

300

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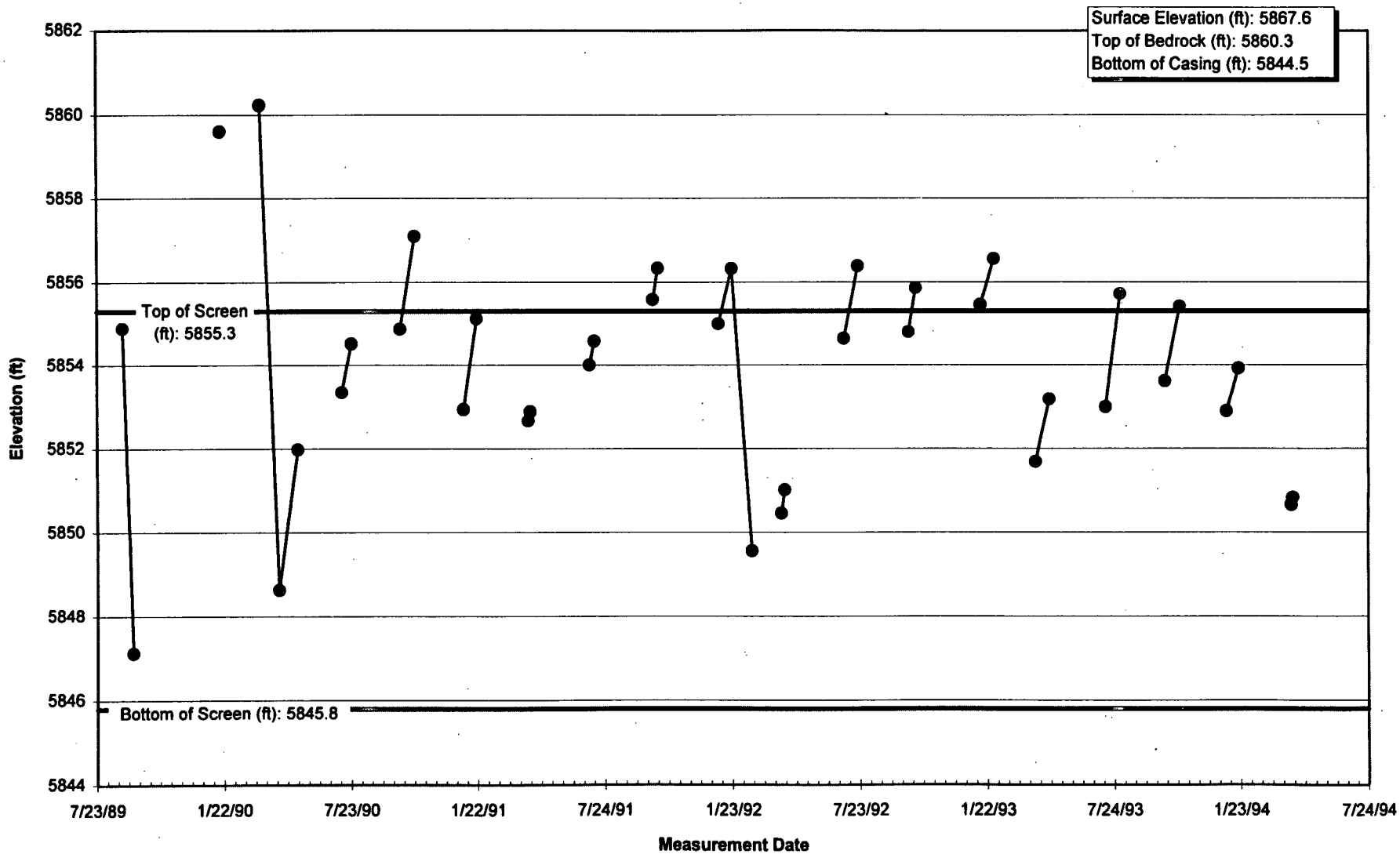

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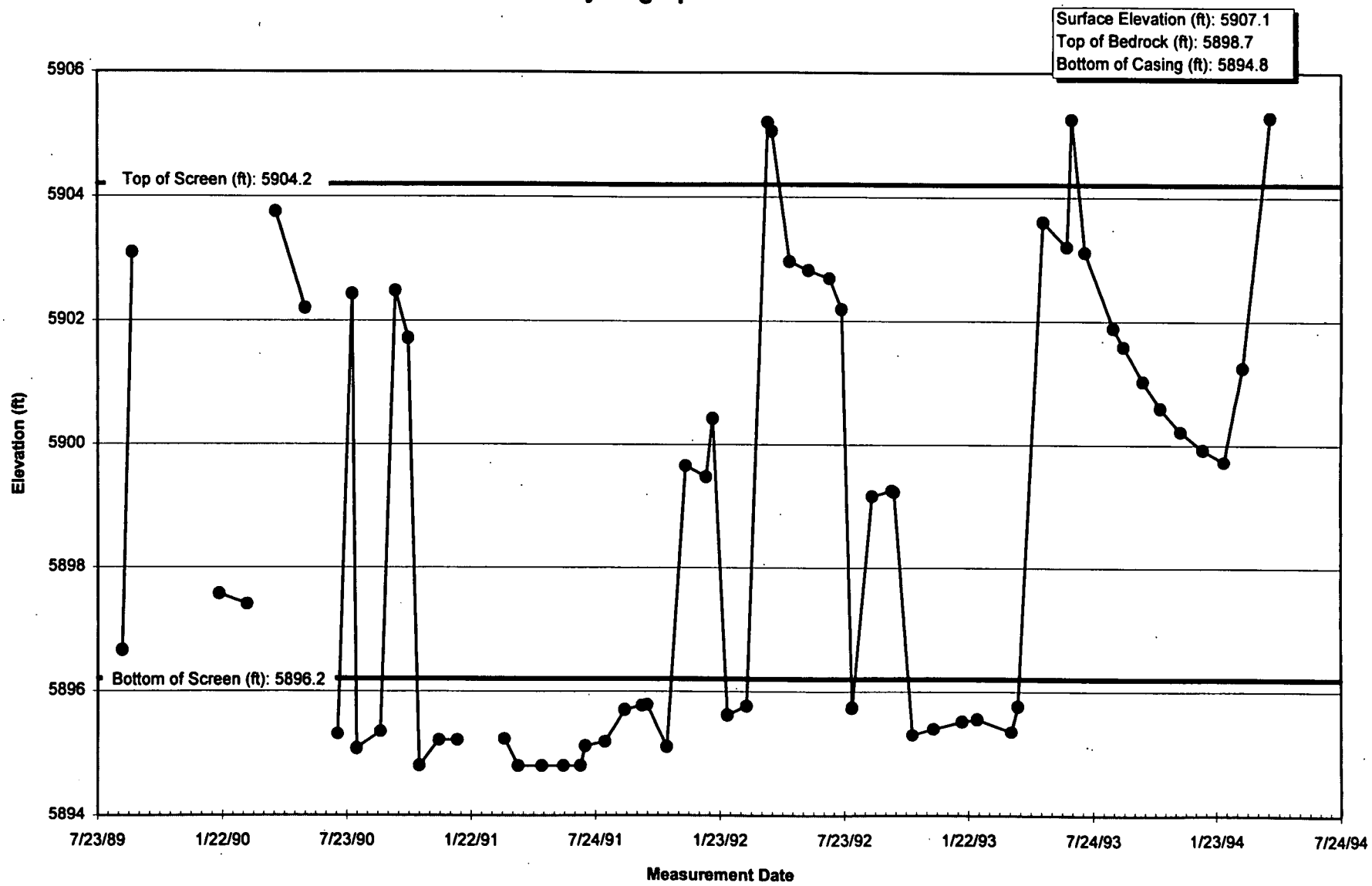
S18.XLS B208689 4/9/95

Hydrograph B208789



302

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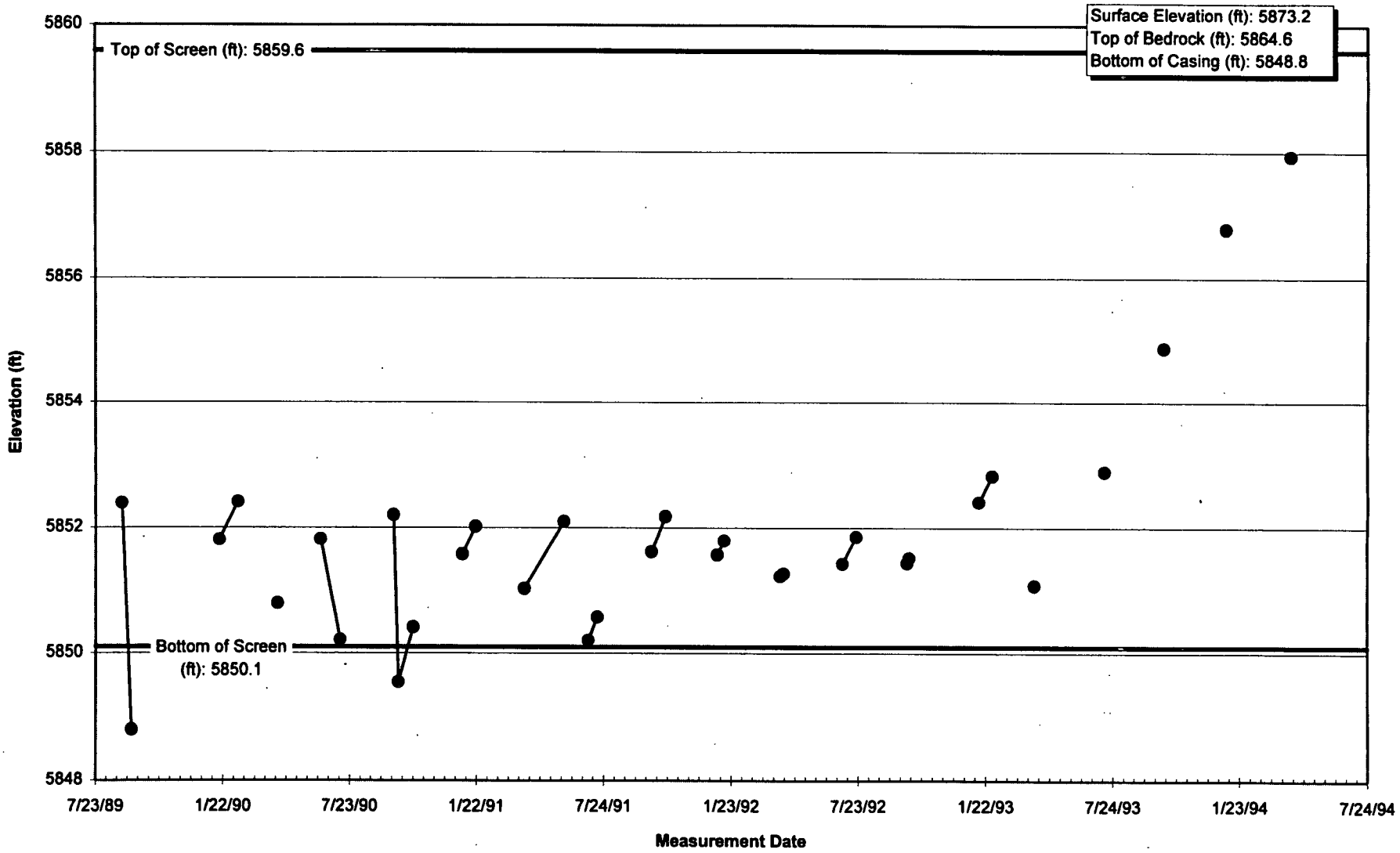

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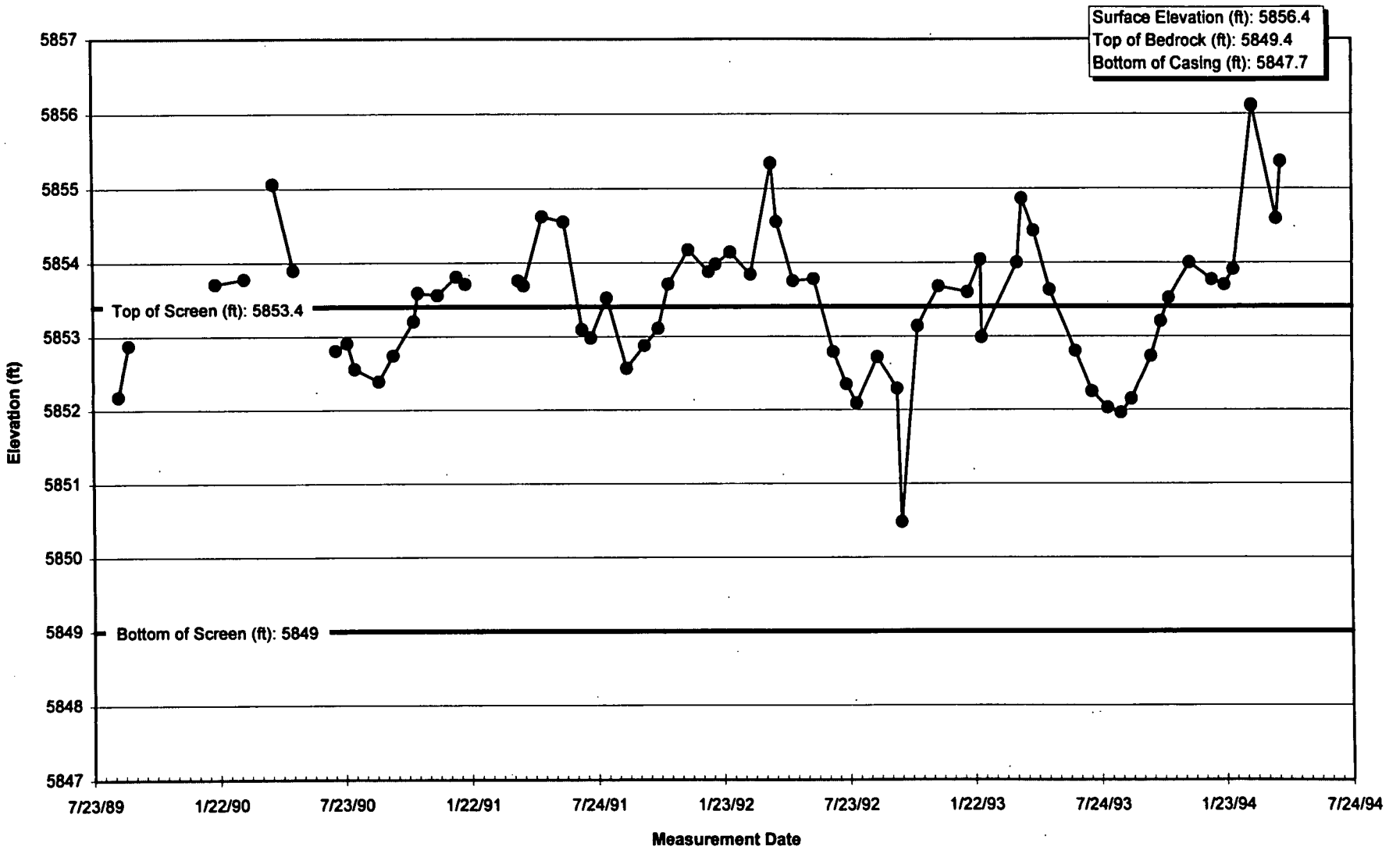

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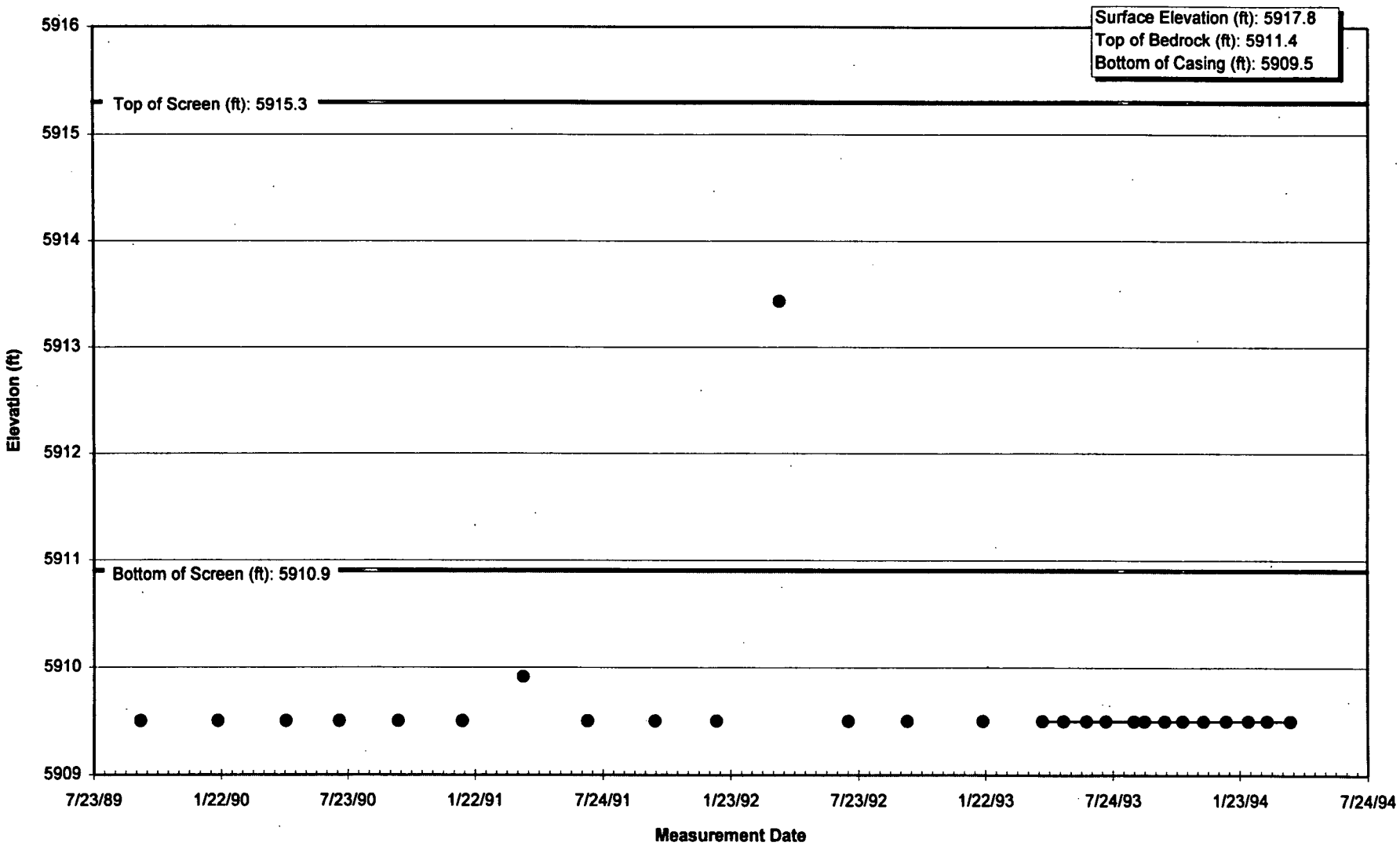
S18.XLS 0489 4/9/95

Hydrograph B213789



305

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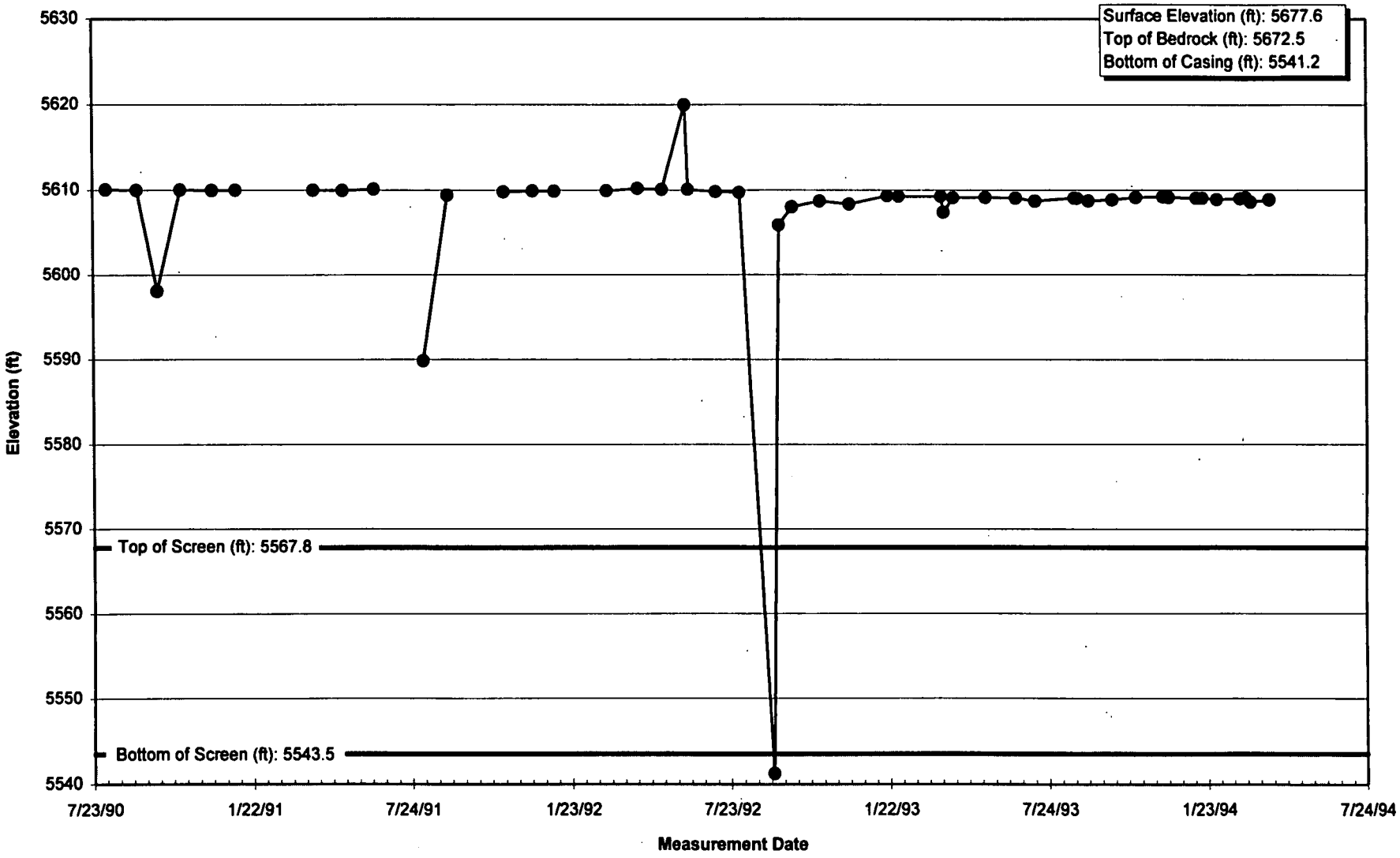
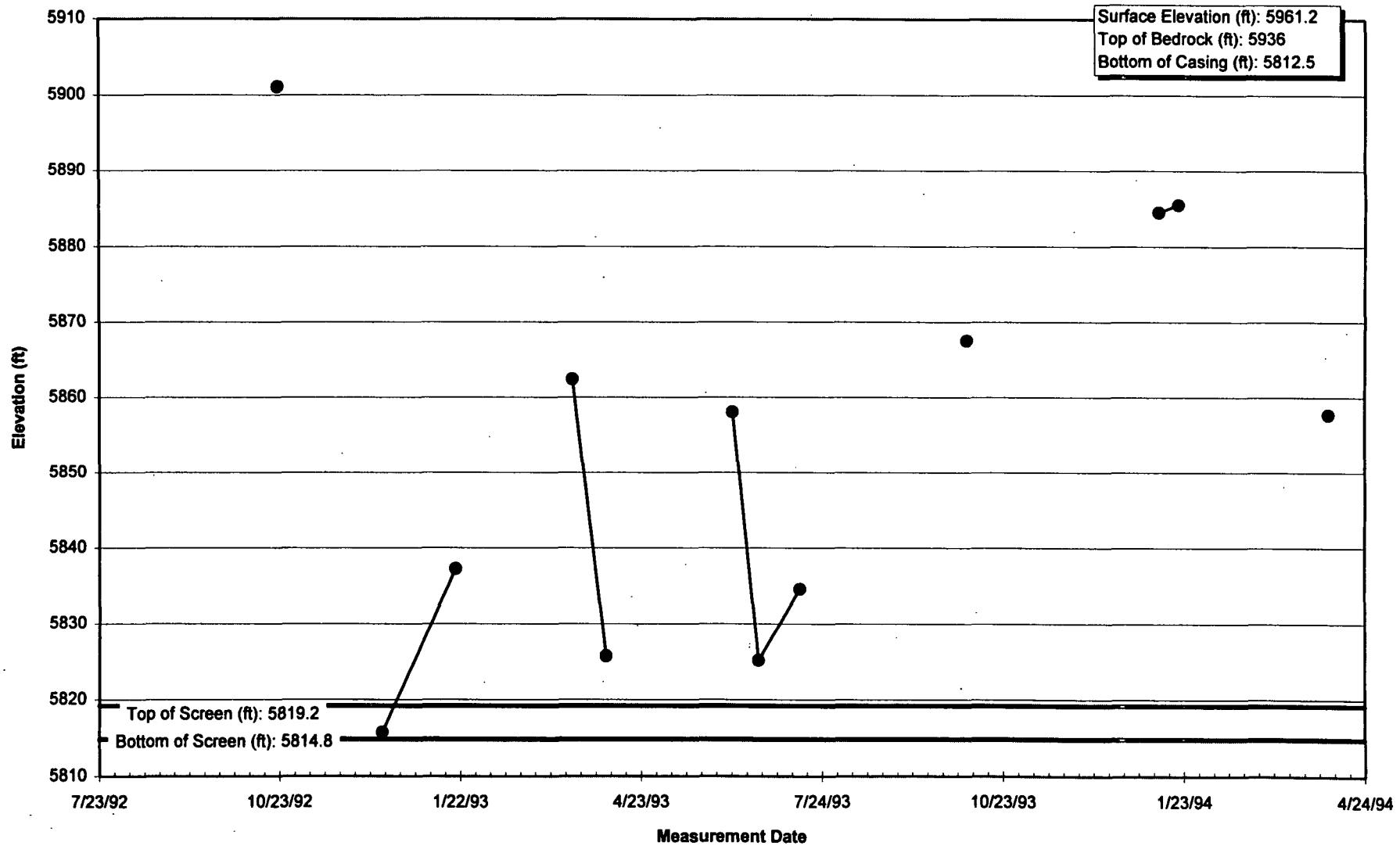
Hydrograph B217289



306

S18.XLS 289 4/9/95

Hydrograph B217489



S18.XLS B217489 4/9/95

307

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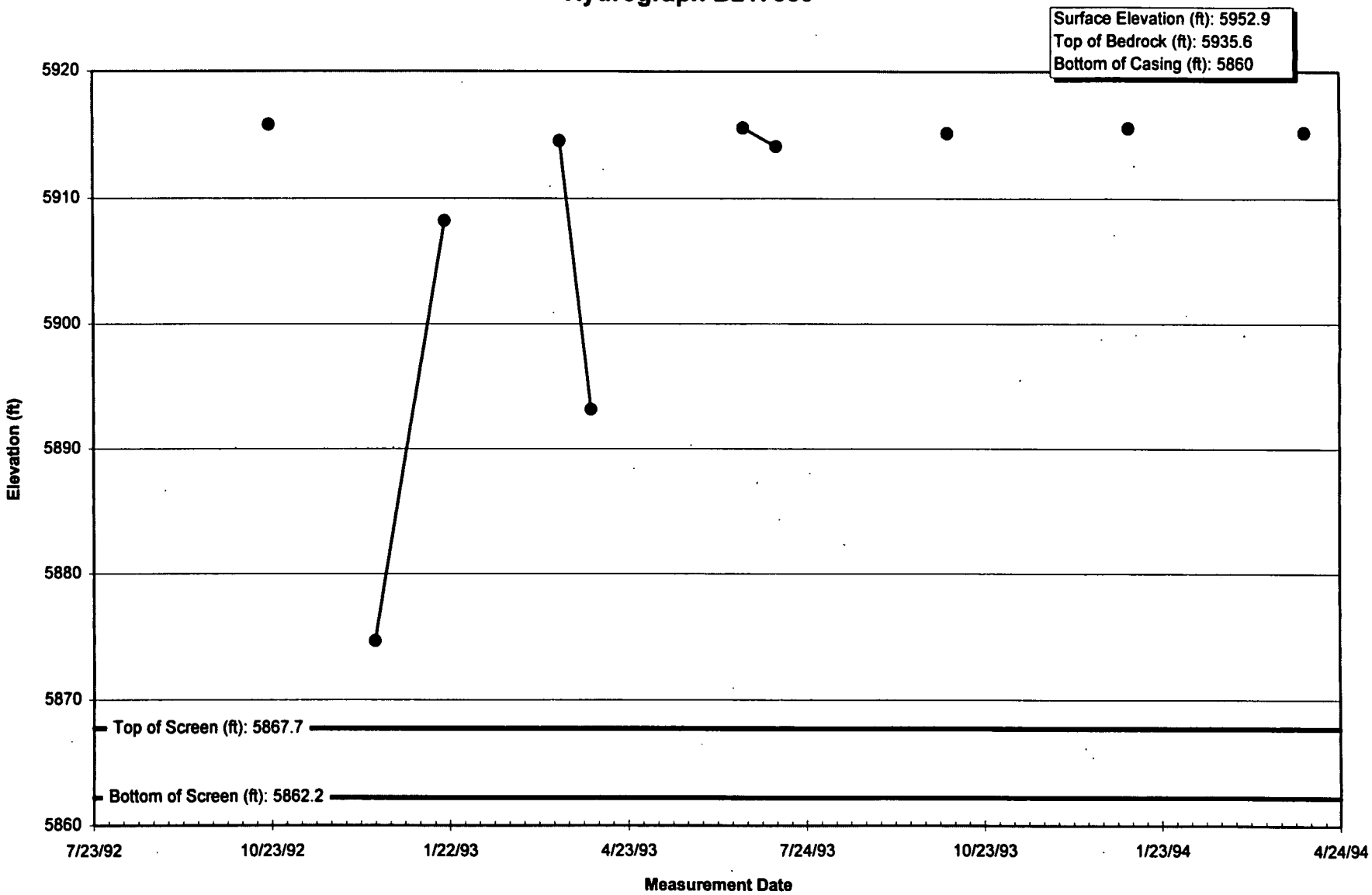

308 S18.XLS 89 4/9/95

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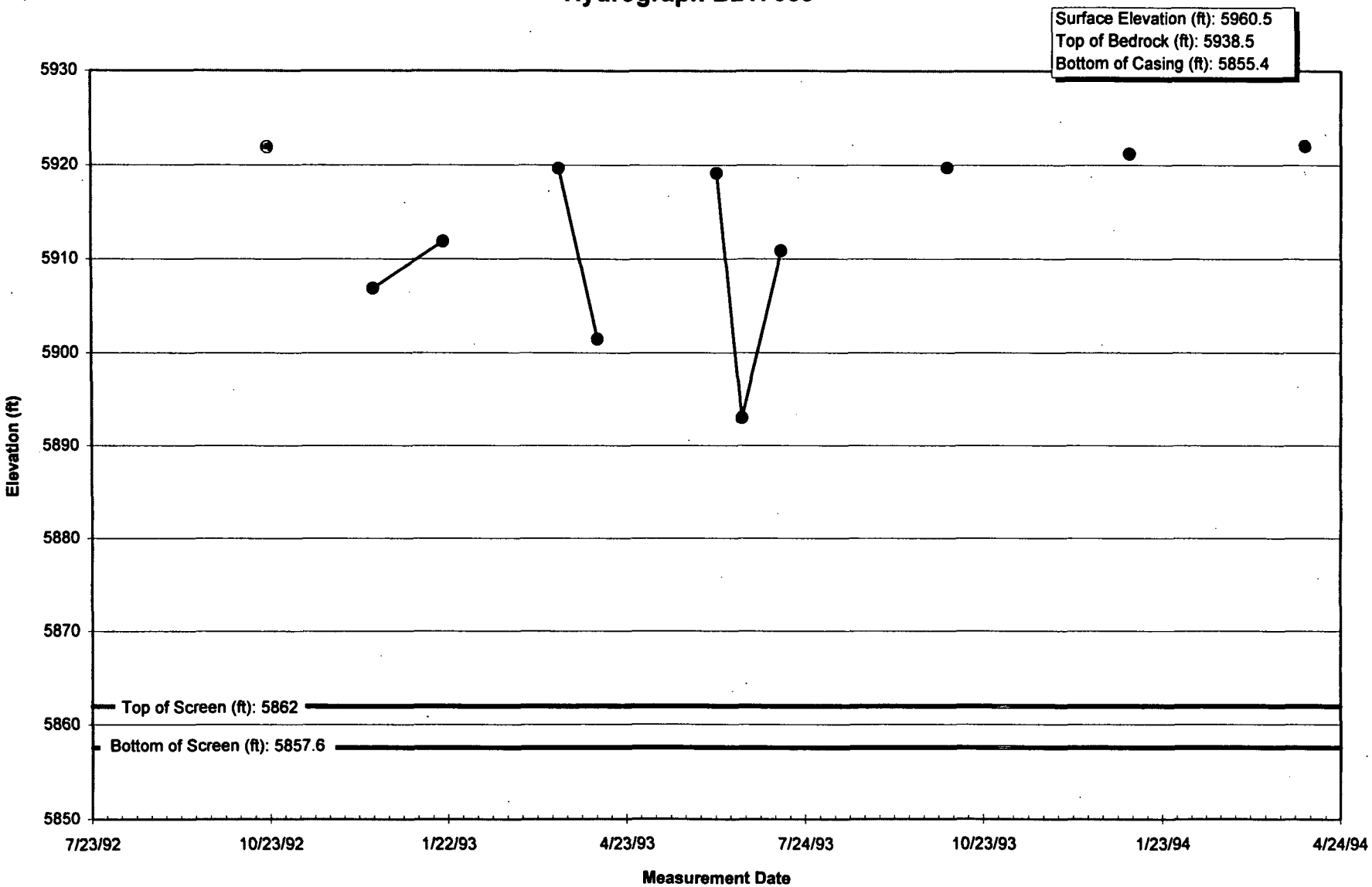

309

S18.XLS B217689 4/9/95

DIE

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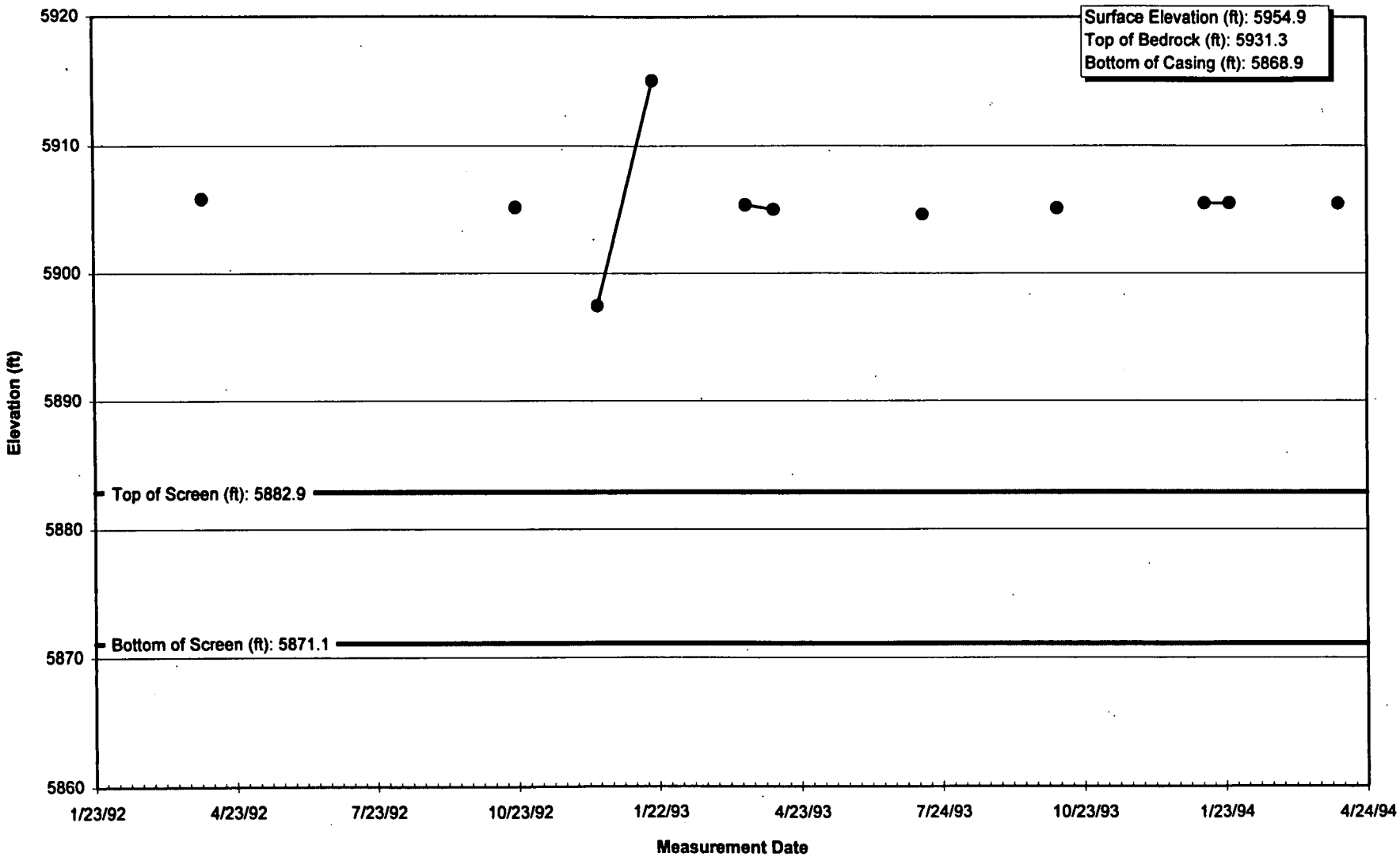

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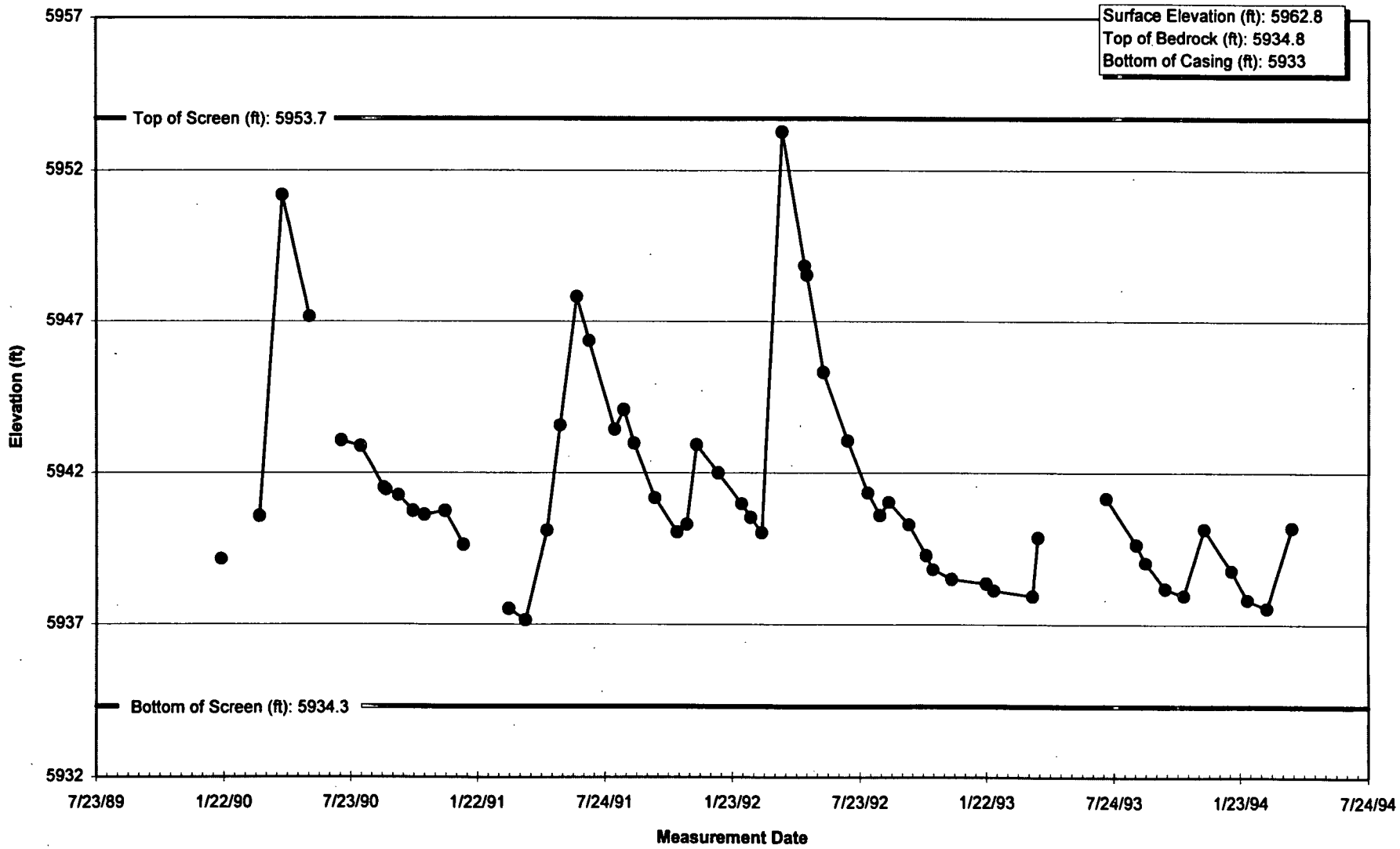

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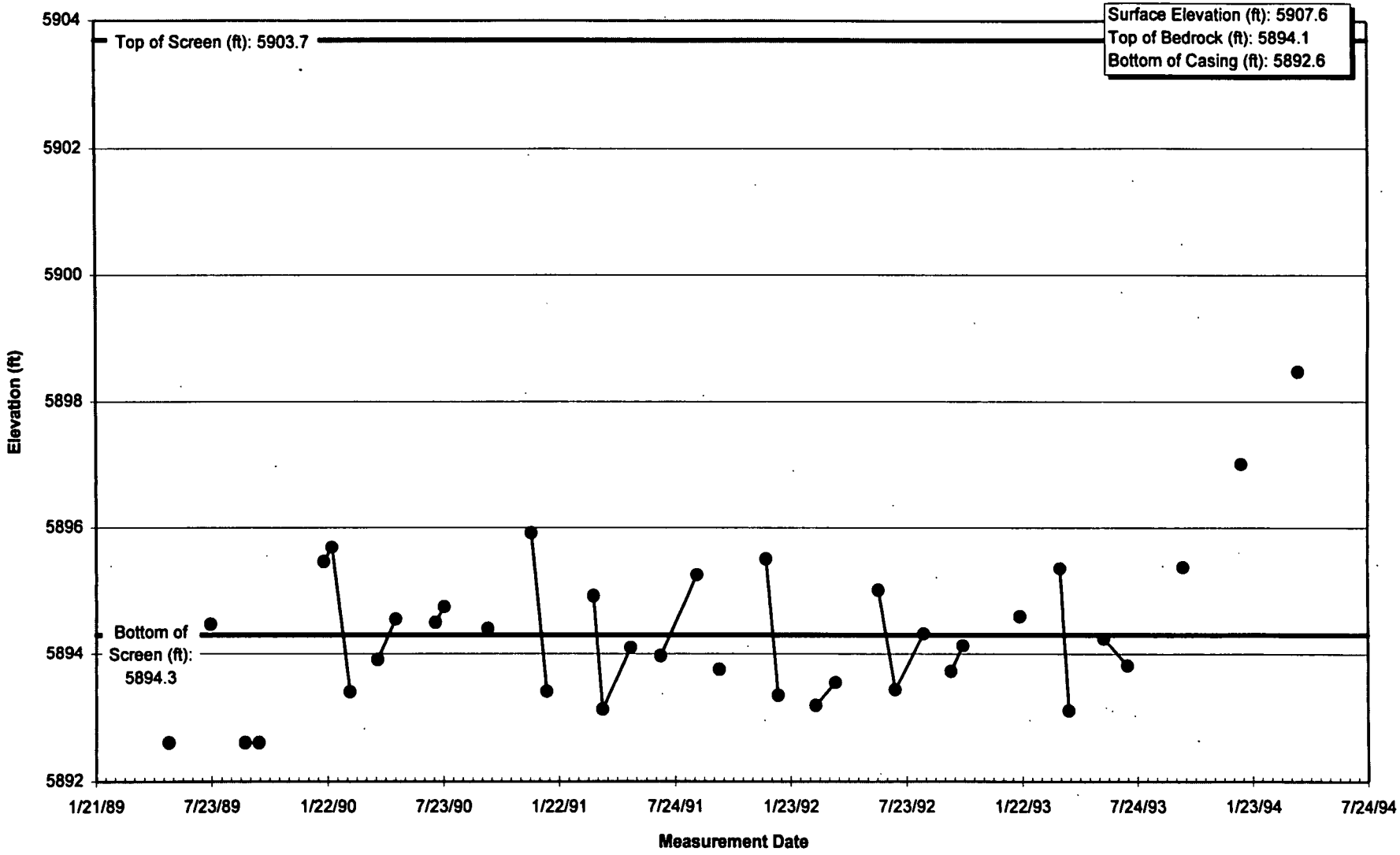
S18.XLS B218789 4/9/95

Hydrograph B302089



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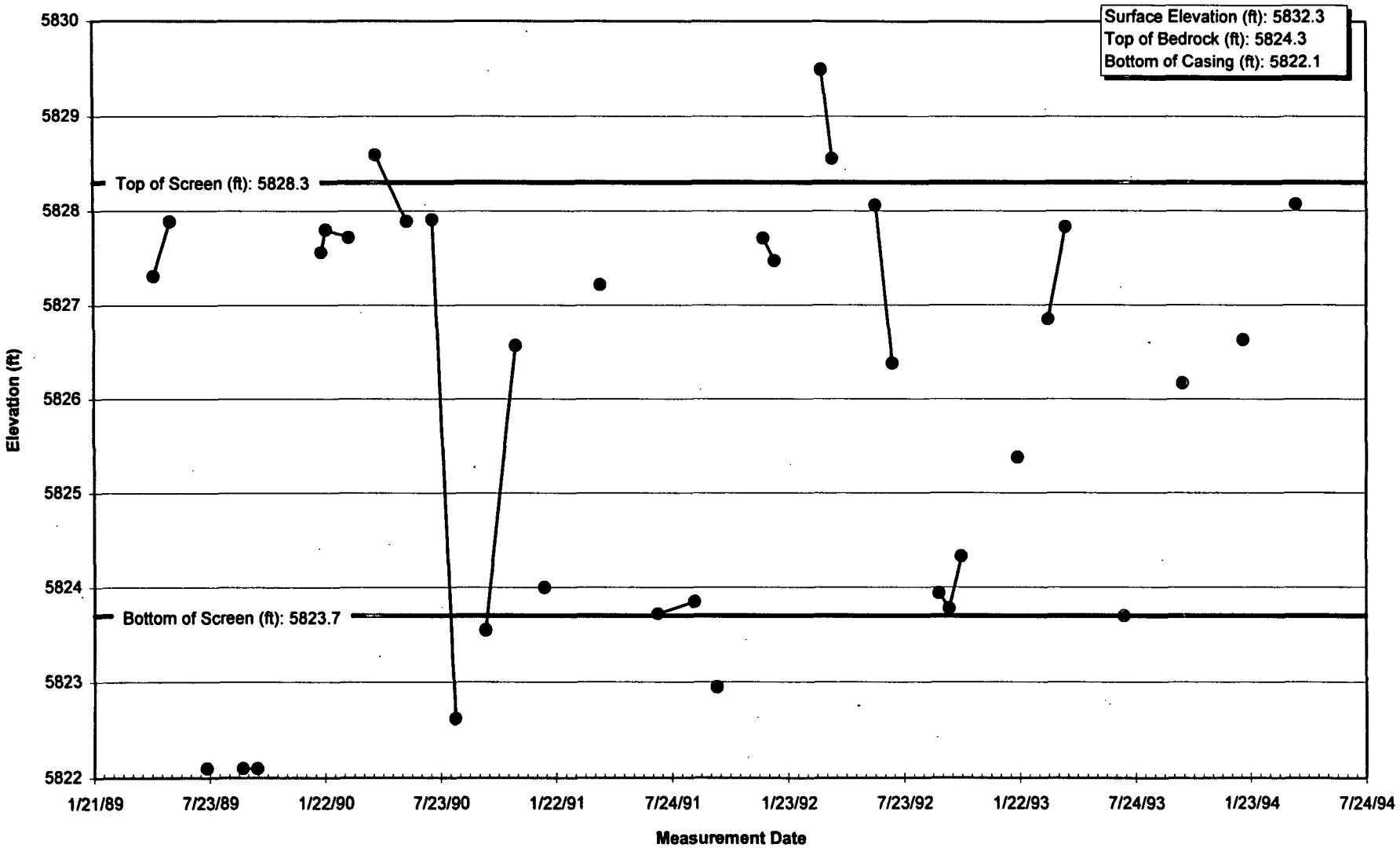
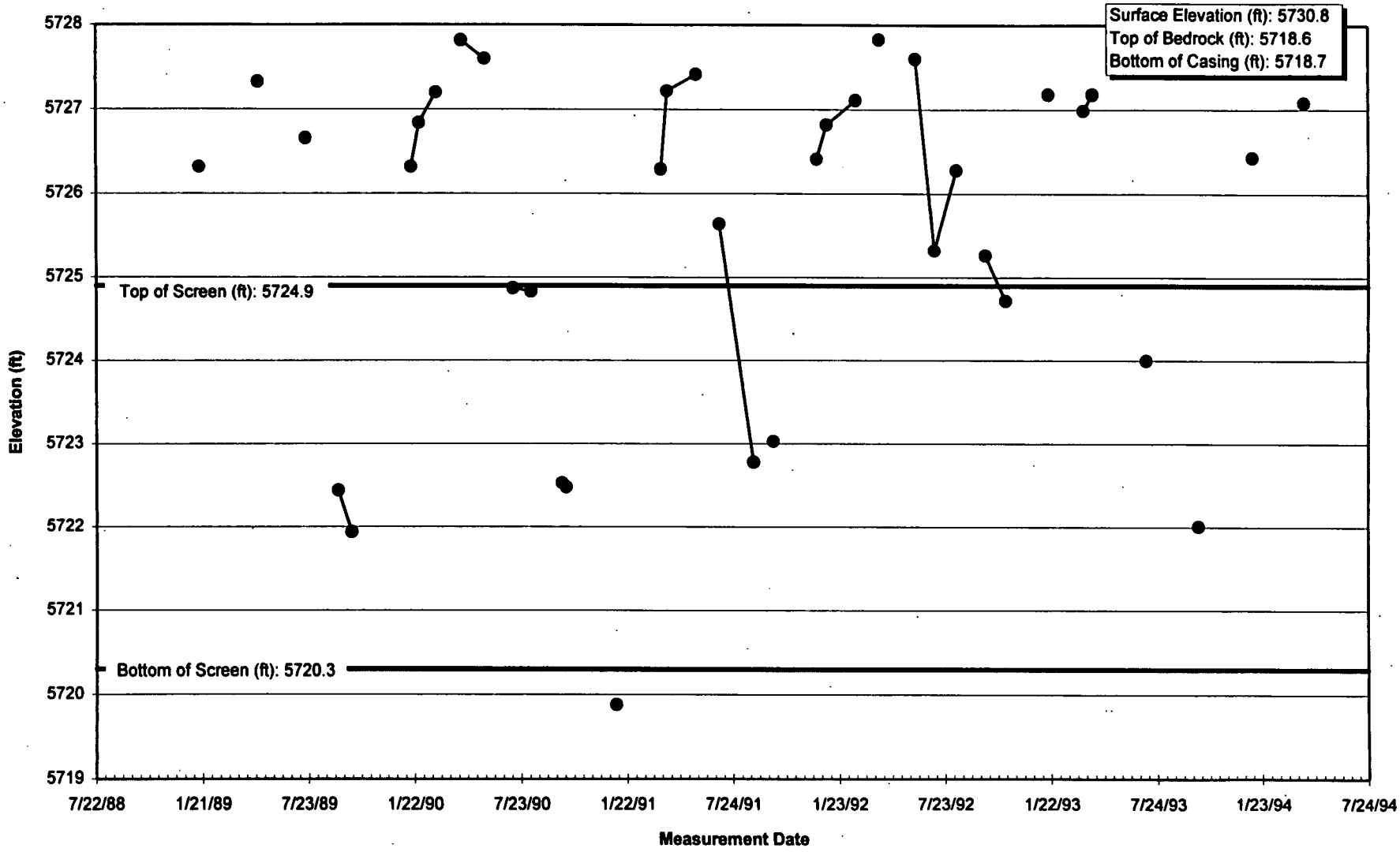


S18.XLS B302789 4/9/95

3/3

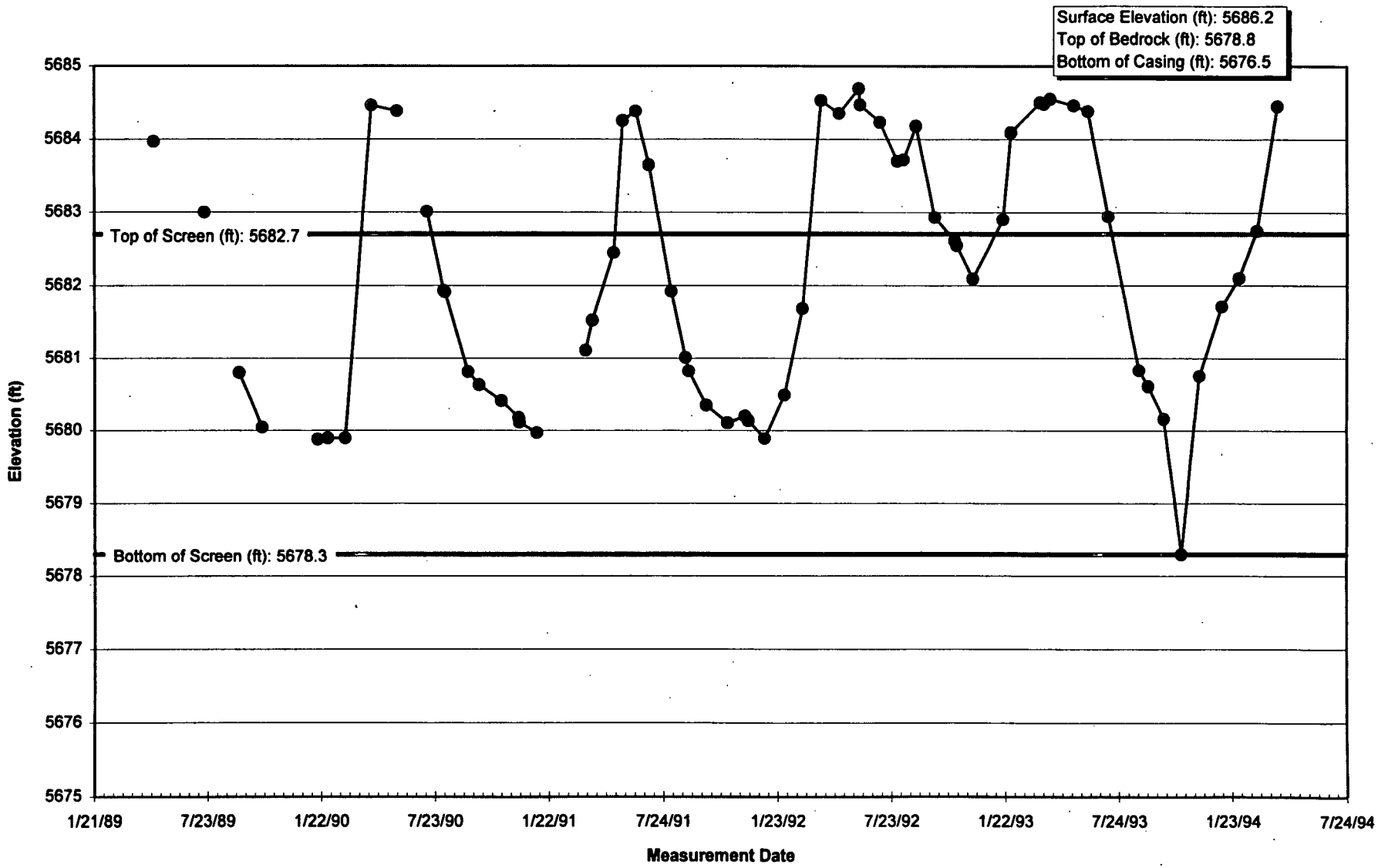
Hydrograph B302889



314

S19.XLS B3[illegible]89 4/9/95

Hydrograph B302989



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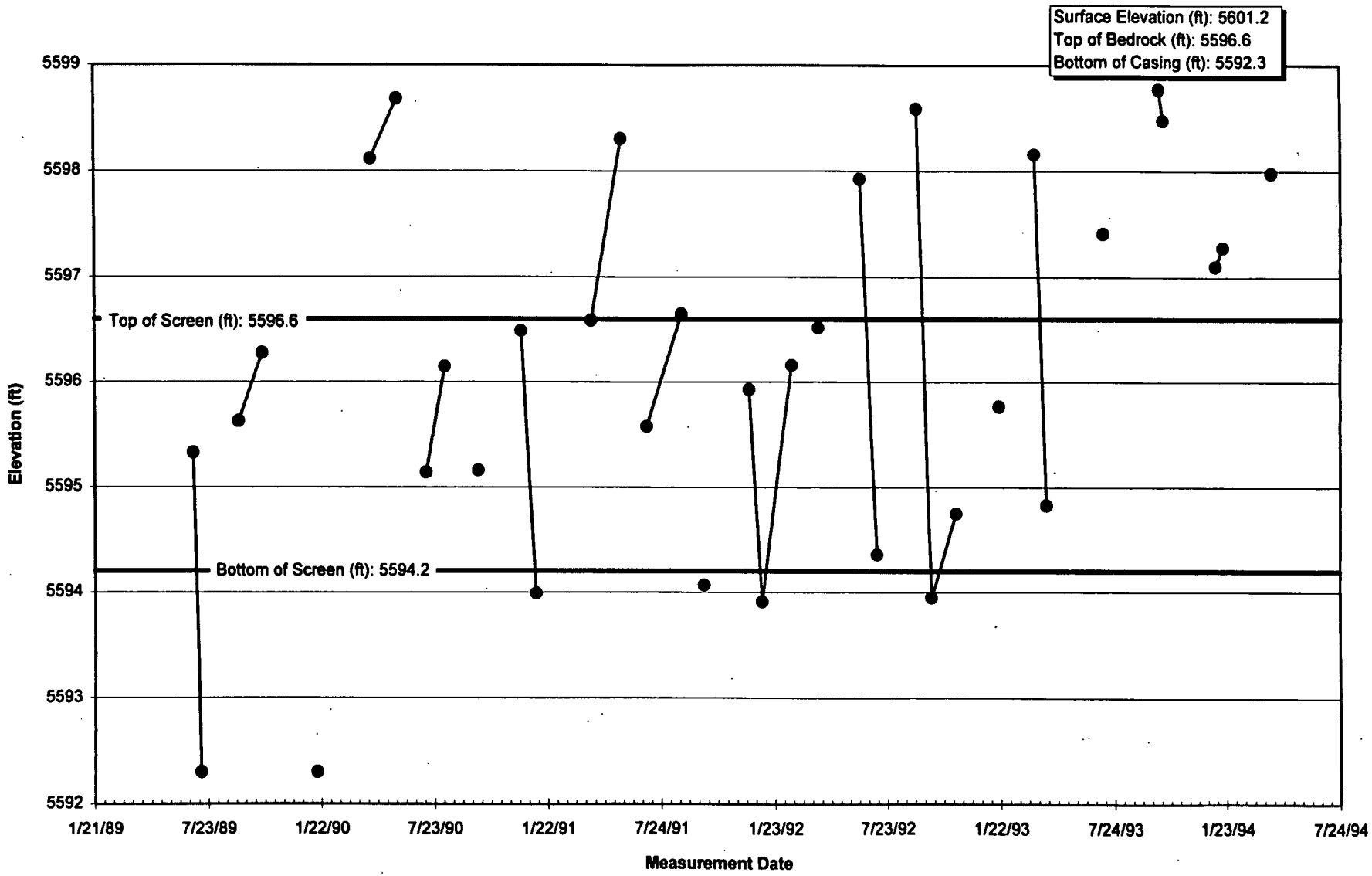
S19.XLS B302989 4/9/95

Hydrograph B303089



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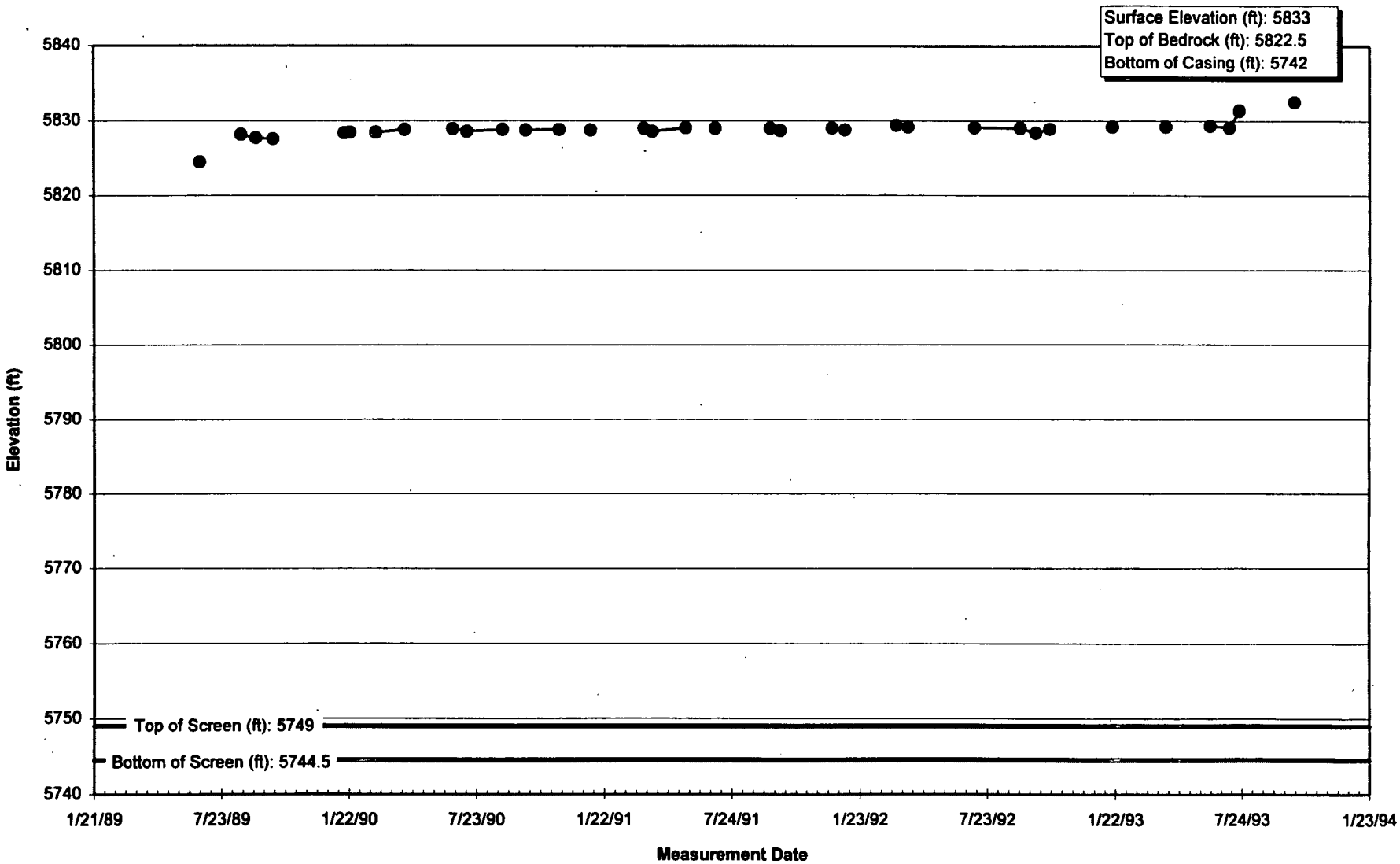
S19.XLS 303089 4/9/95

Hydrograph B304289



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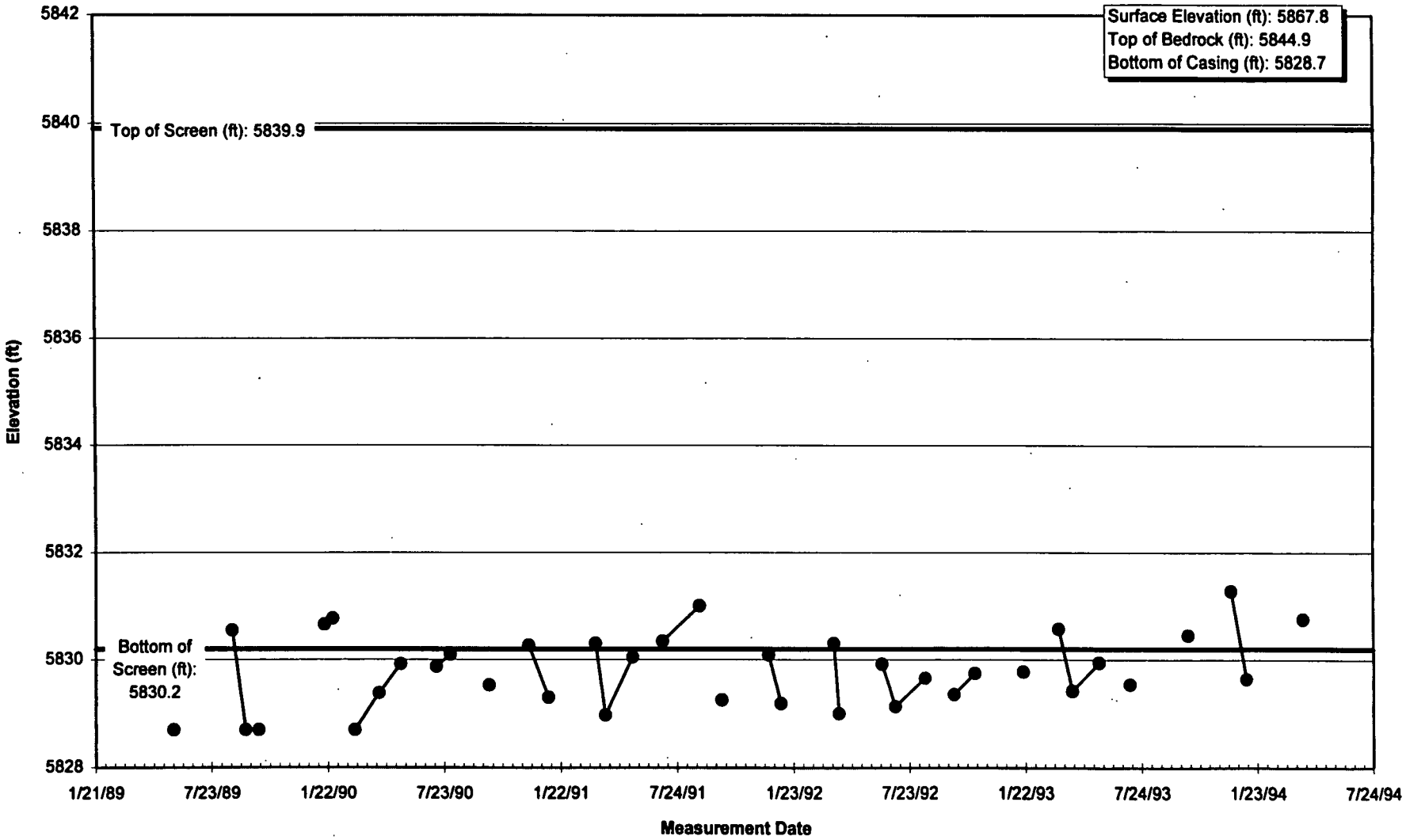
Hydrograph B304789



318

S19.XLS [illegible]789 4/9/95

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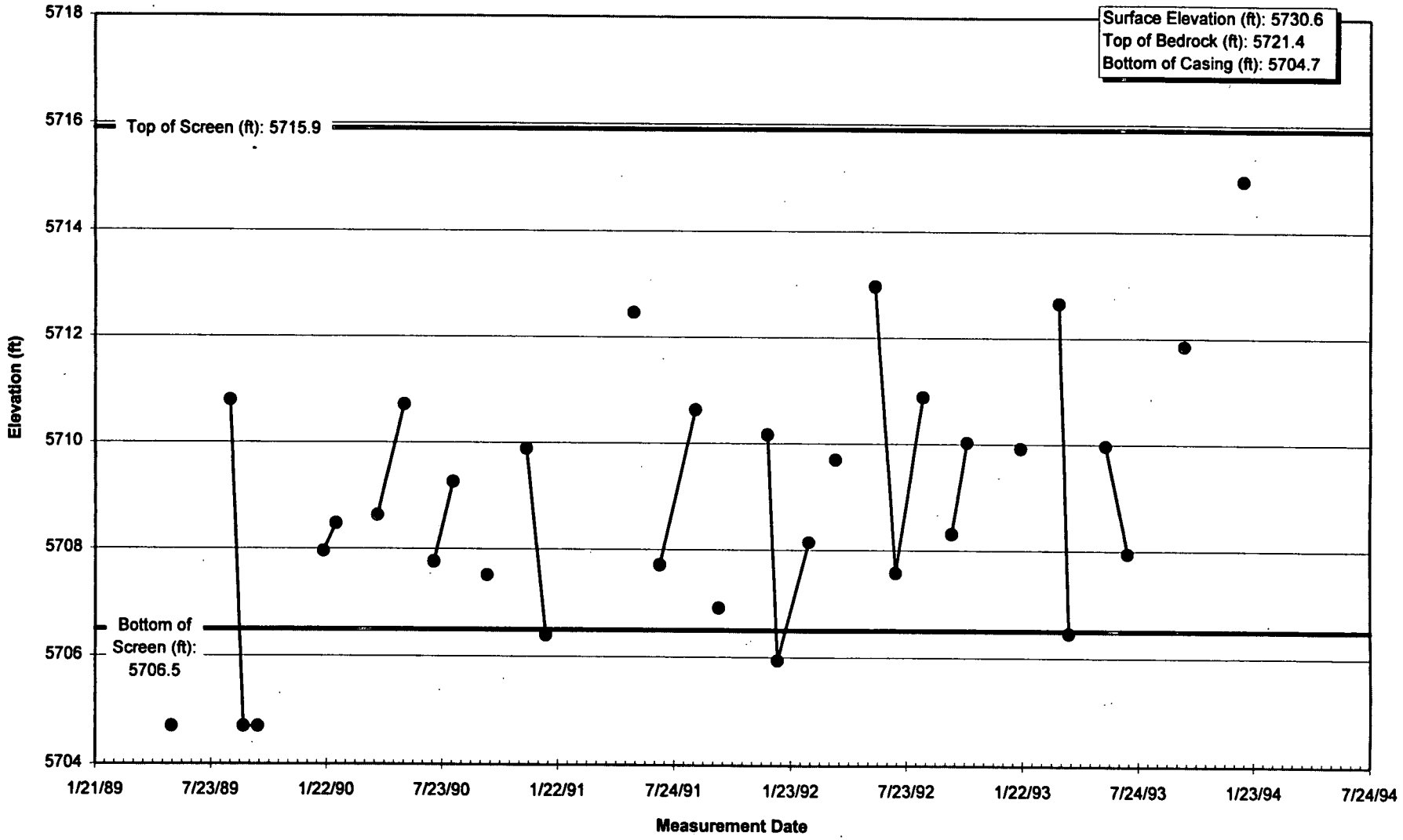

S19.XLS B304889 4/9/95

319

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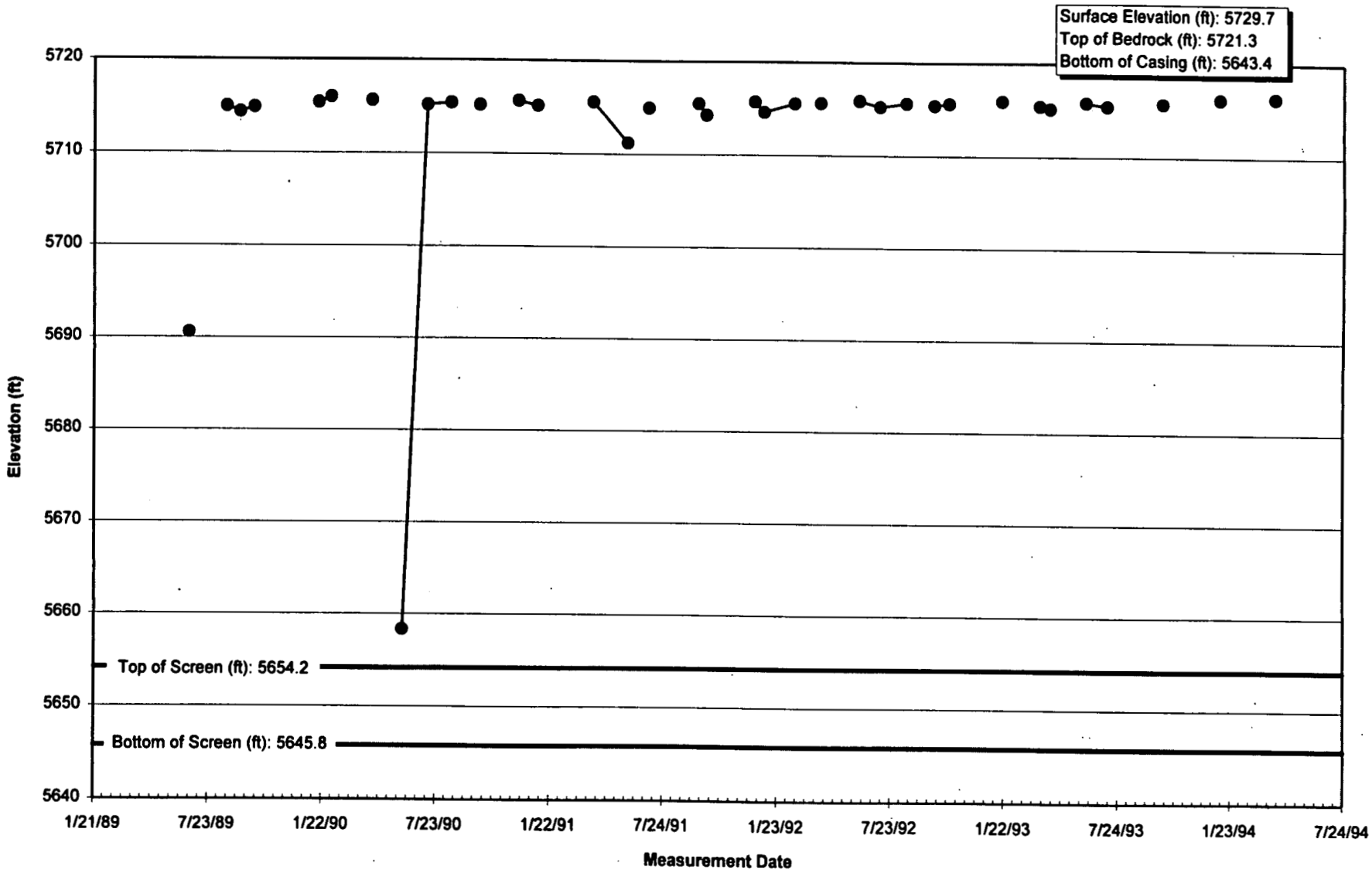

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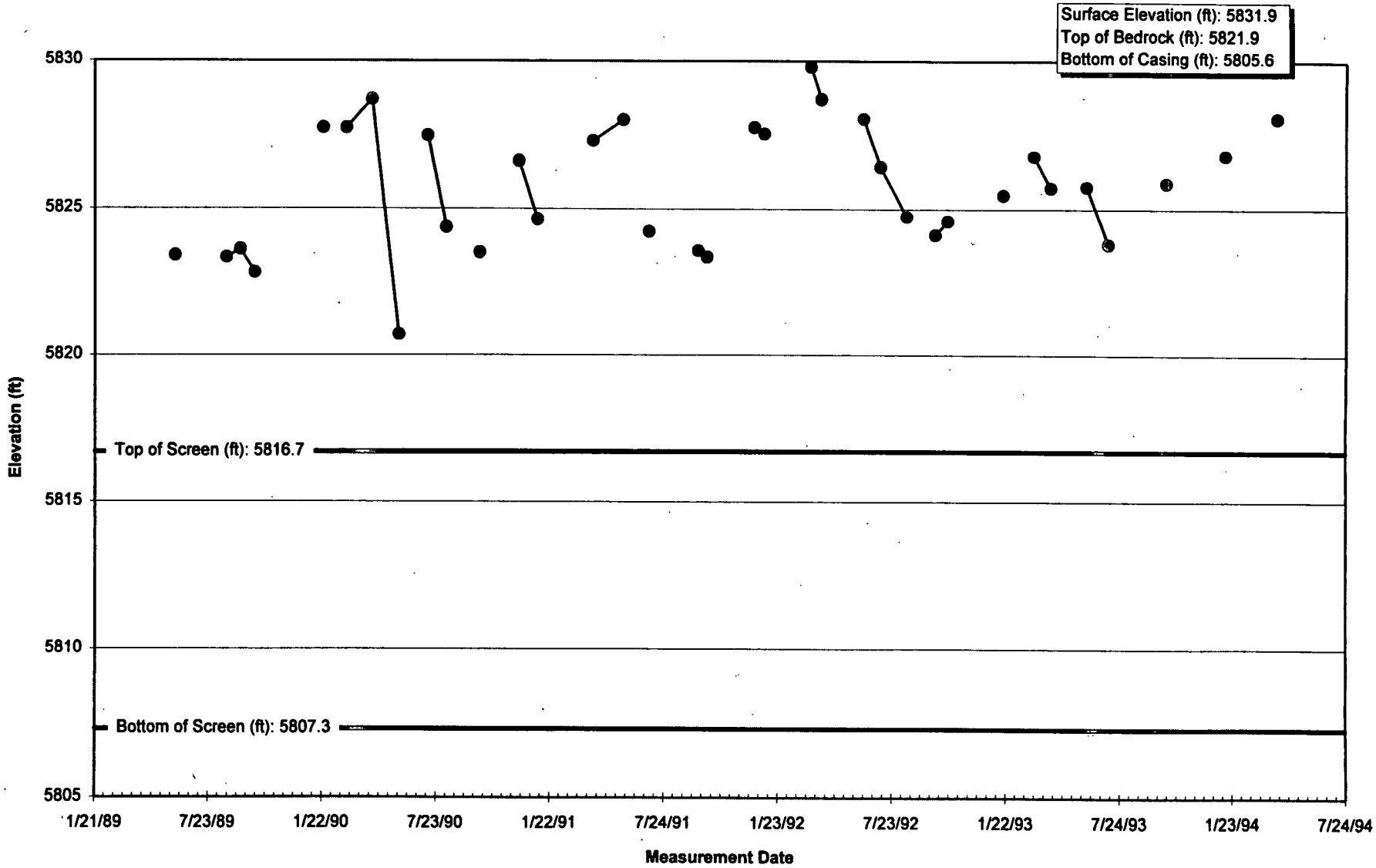
S19.XLS B304989 4/9/95

Hydrograph B305389



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321

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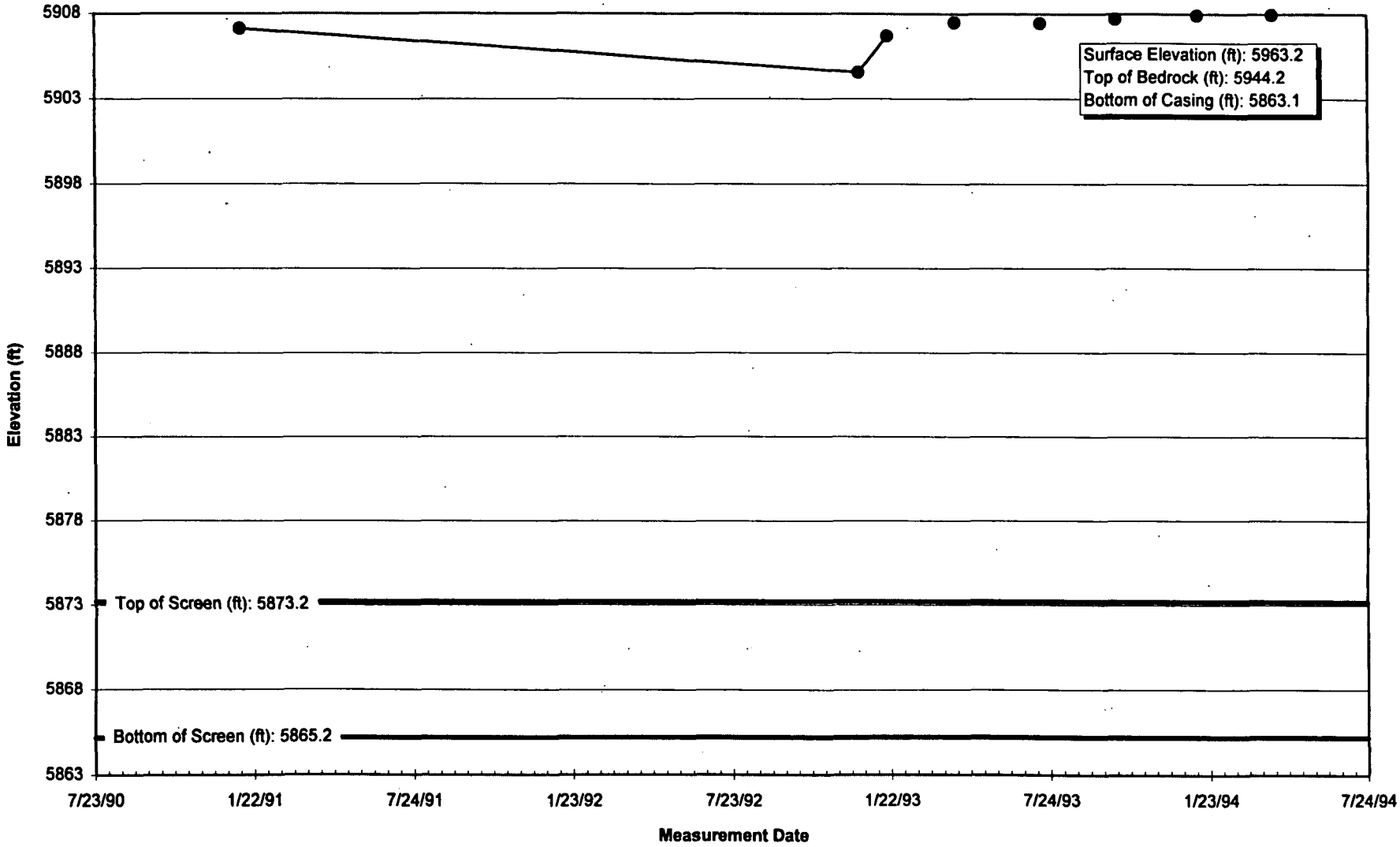
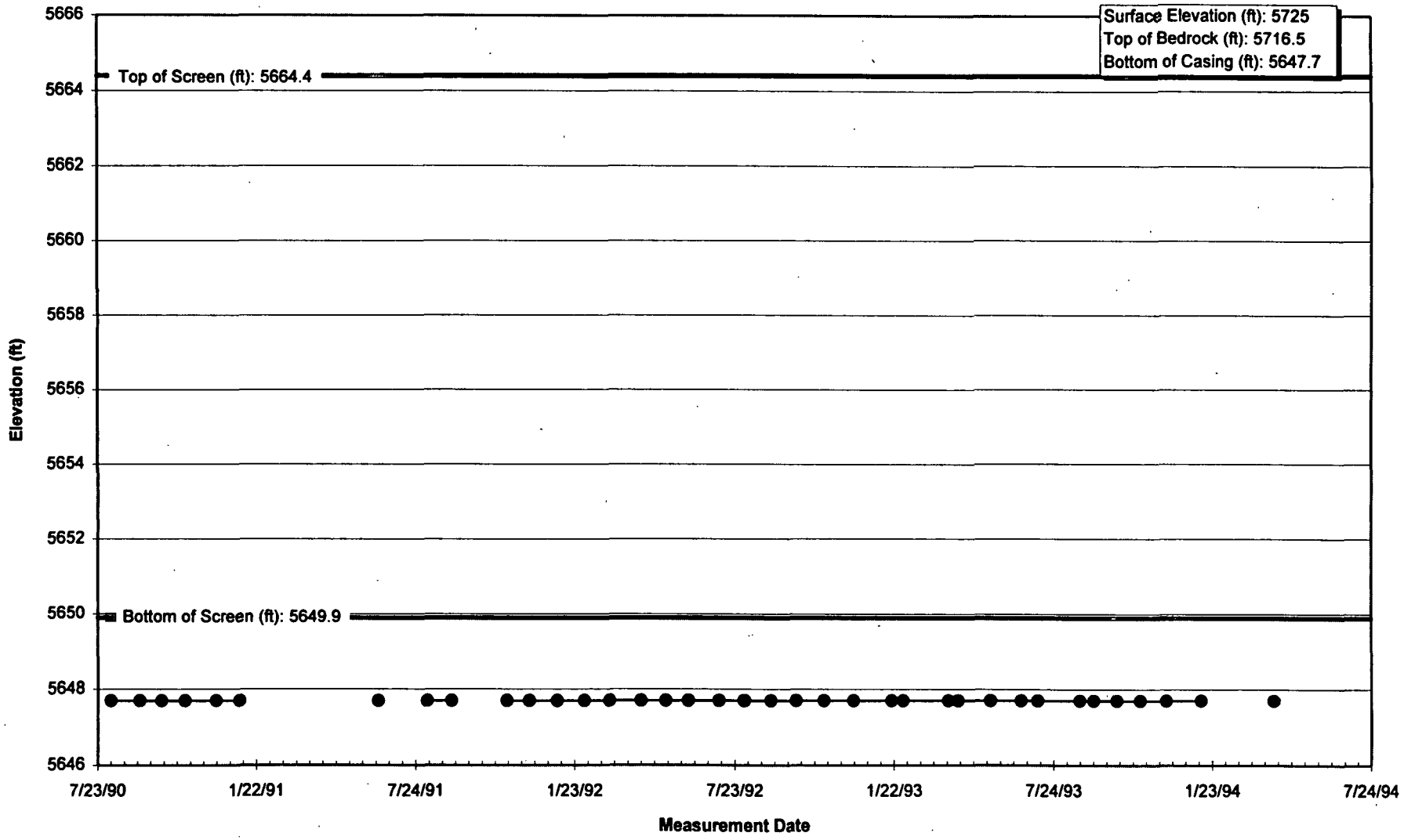


S19.XLS B315289 4/9/95

322

Hydrograph B317189



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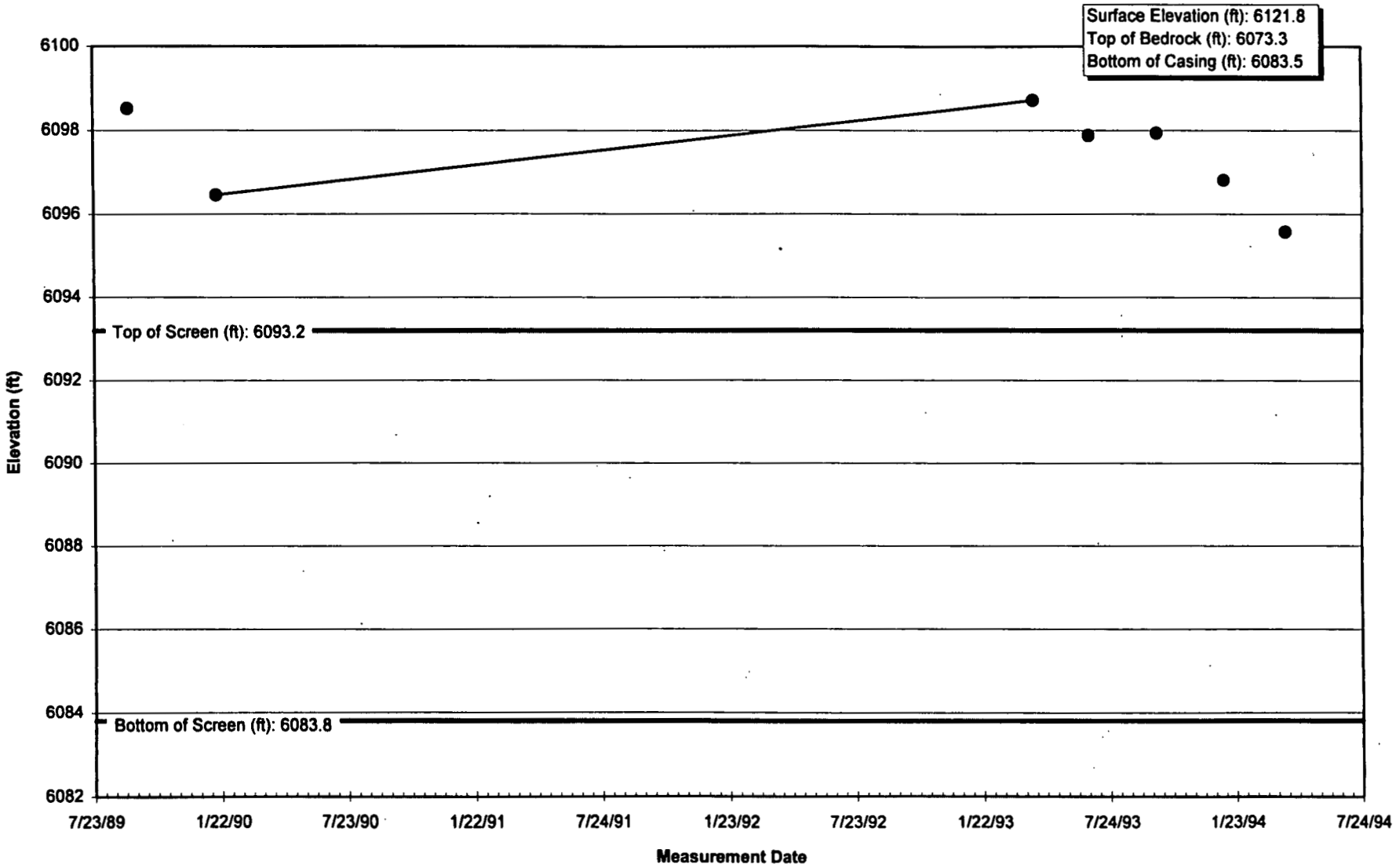
323

Hydrograph B400089



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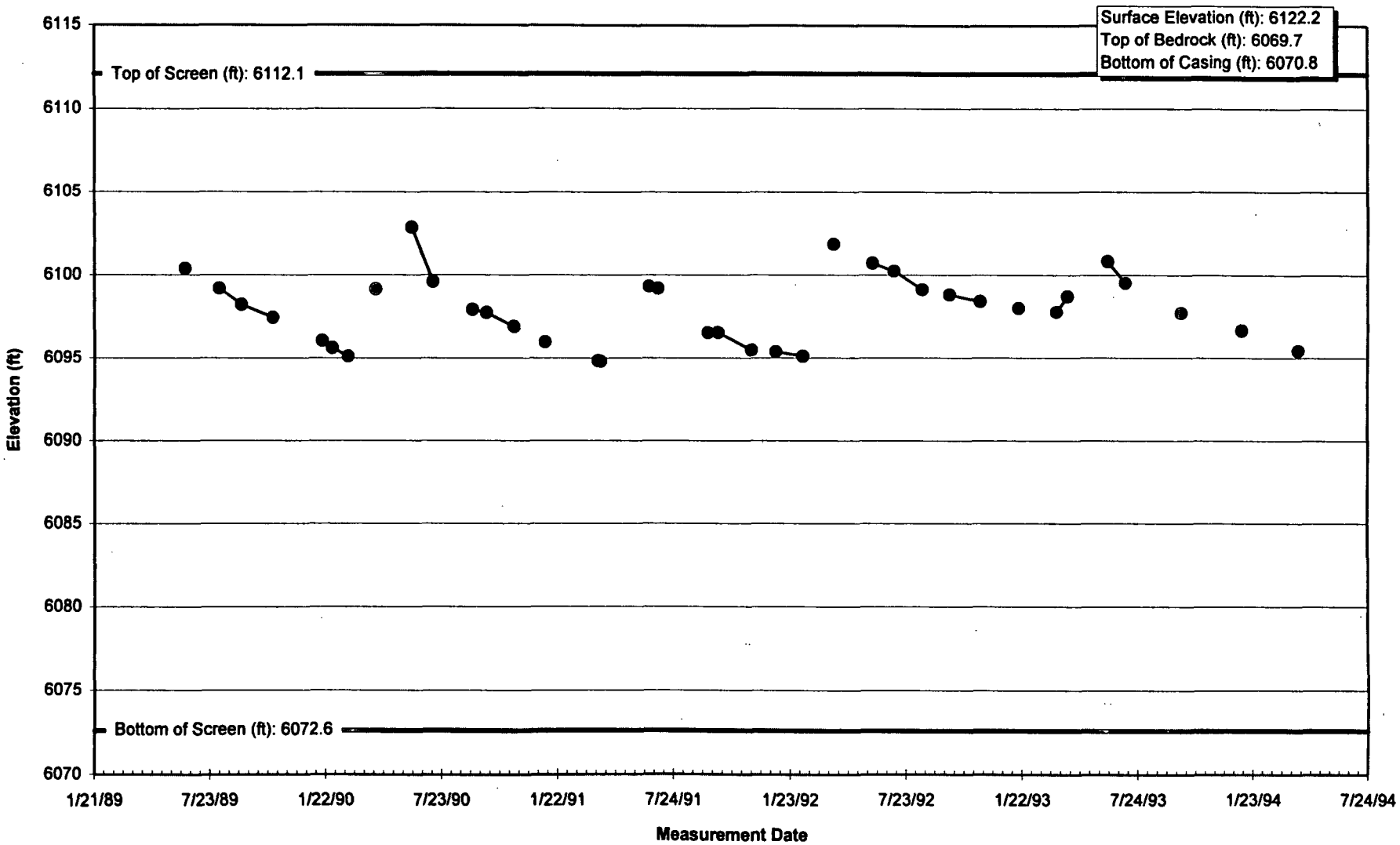

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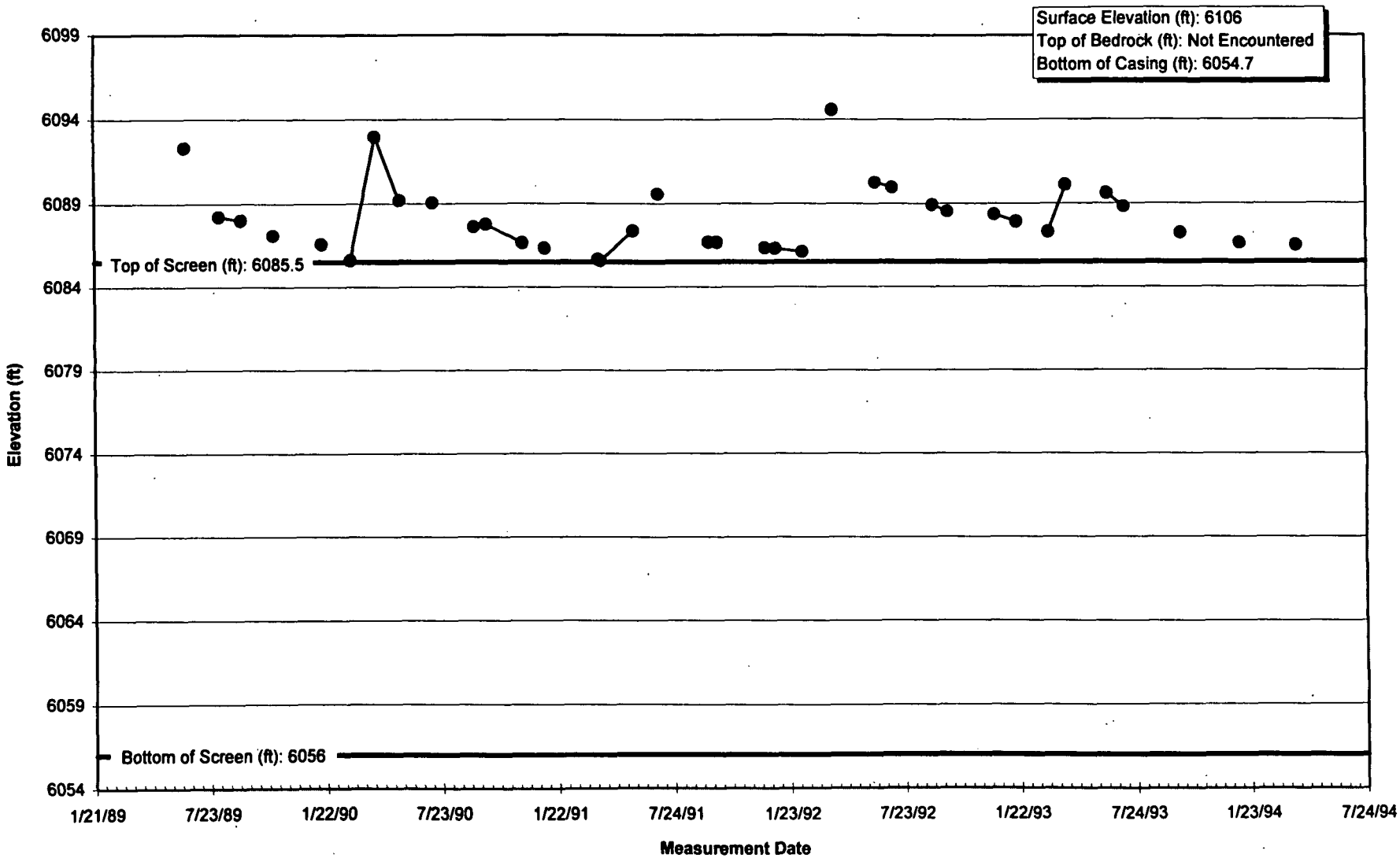
Hydrograph B400289



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326

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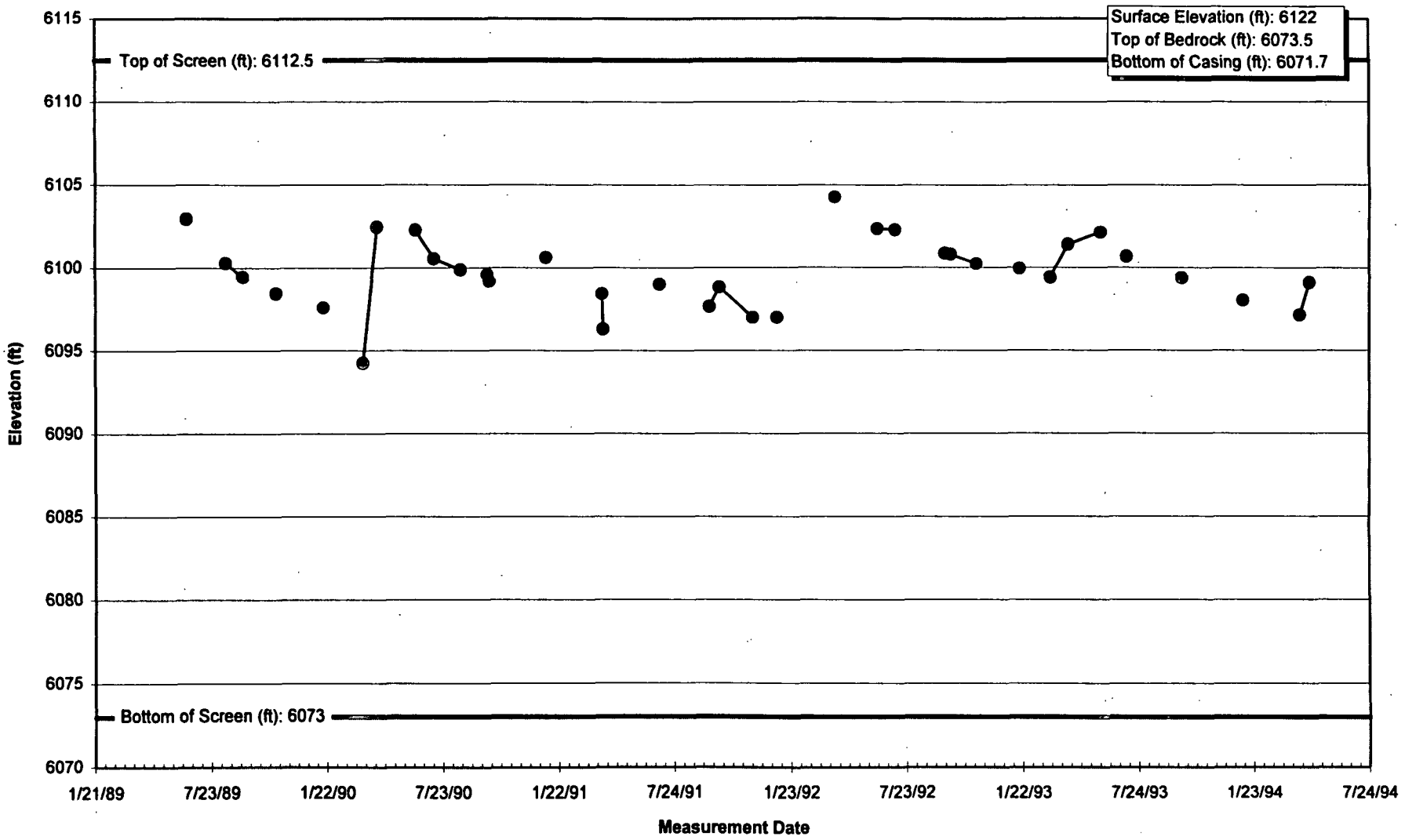
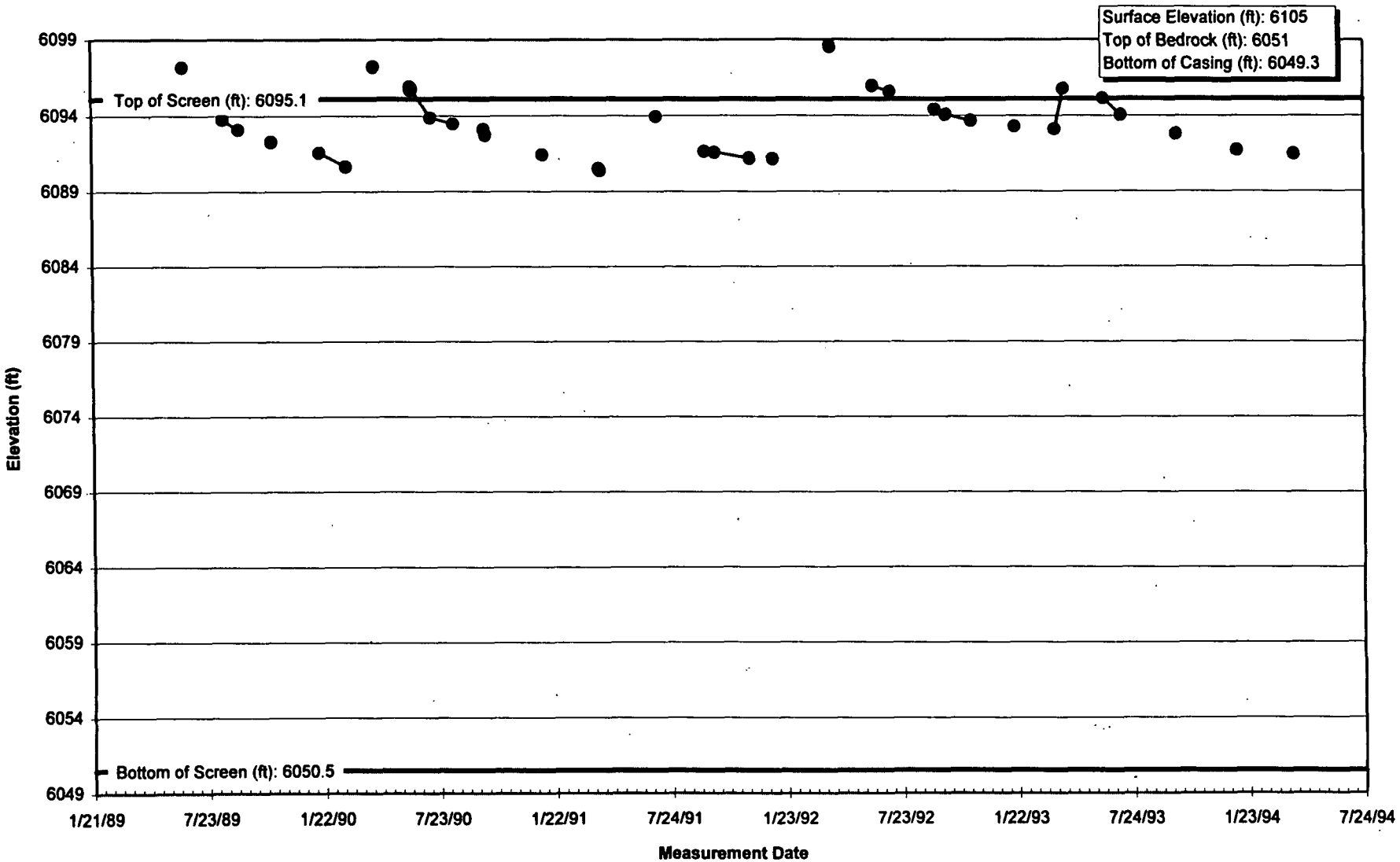


S19.XLS B400389 4/9/95

327

Hydrograph B400489



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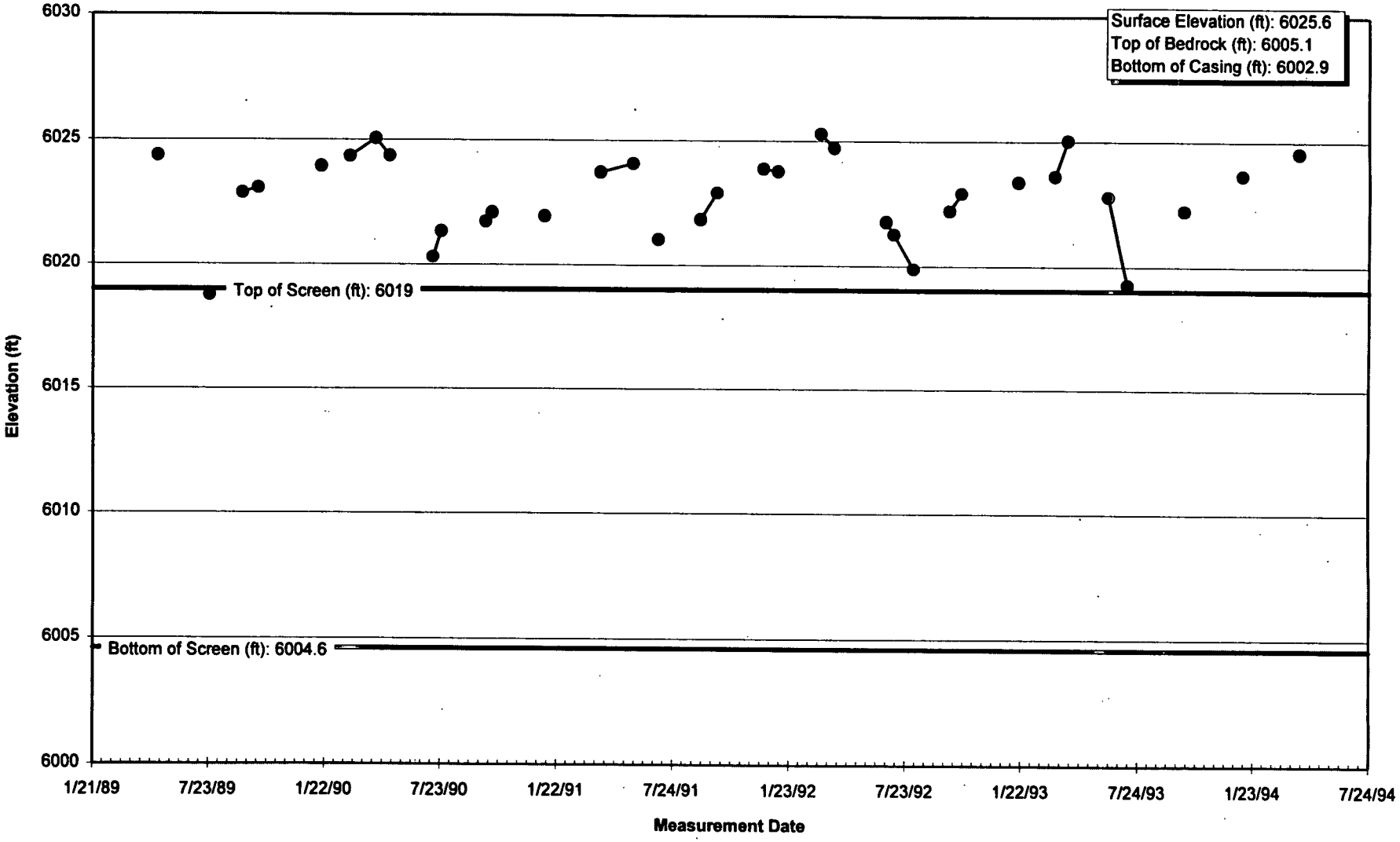
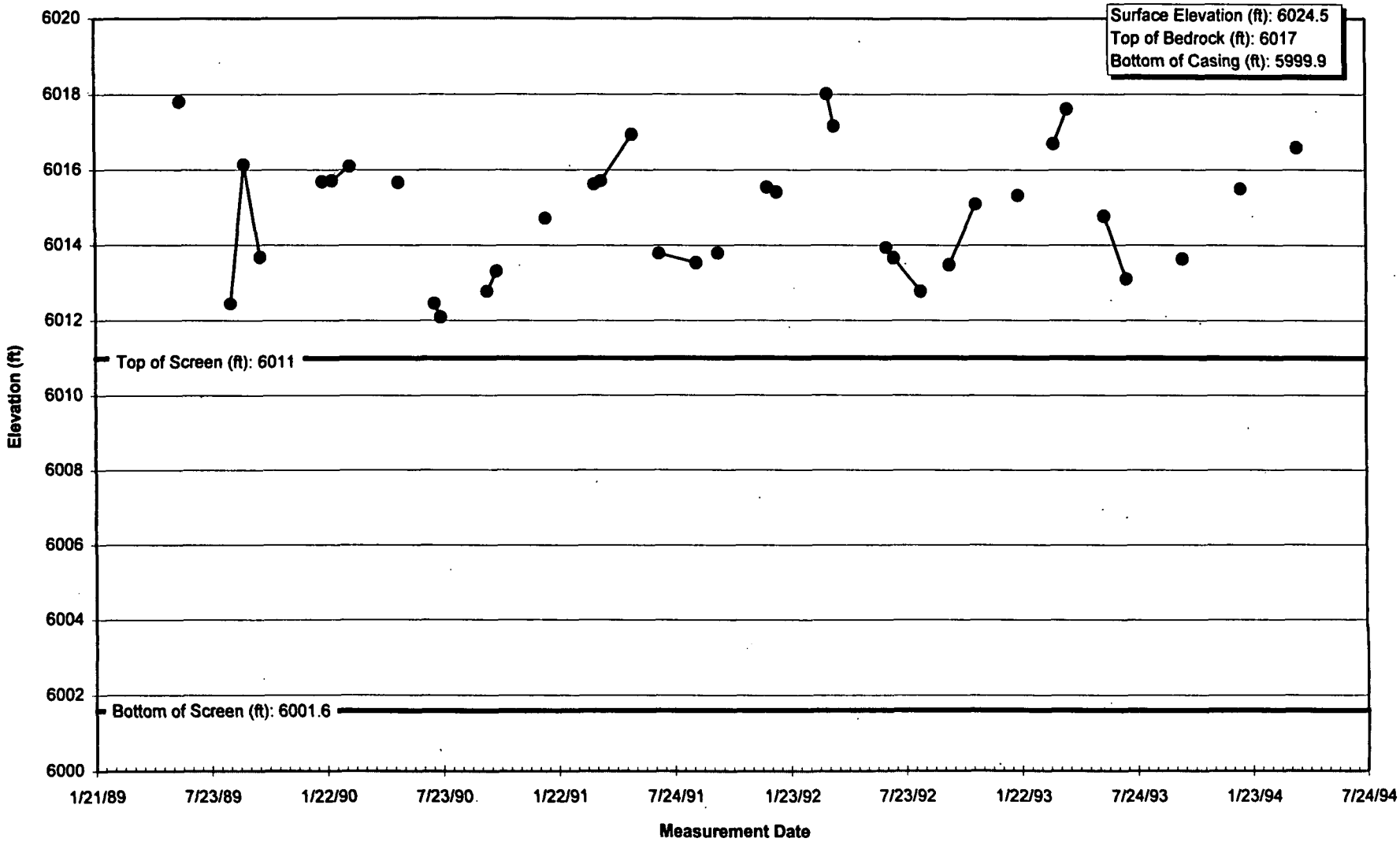
328

Hydrograph B401989



329 S19.XLS B401989 4/9/95

Hydrograph B402189



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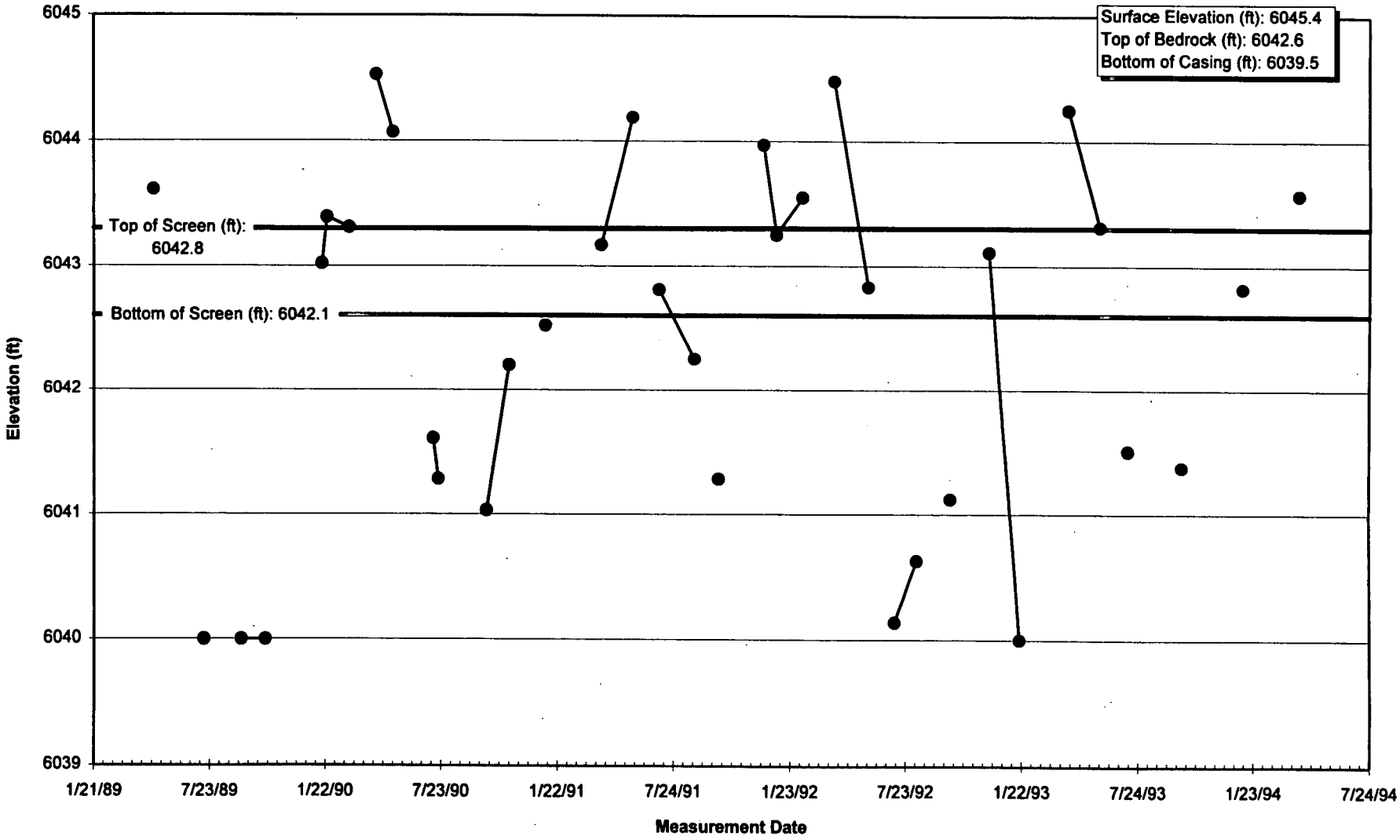
Hydrograph B402689



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331

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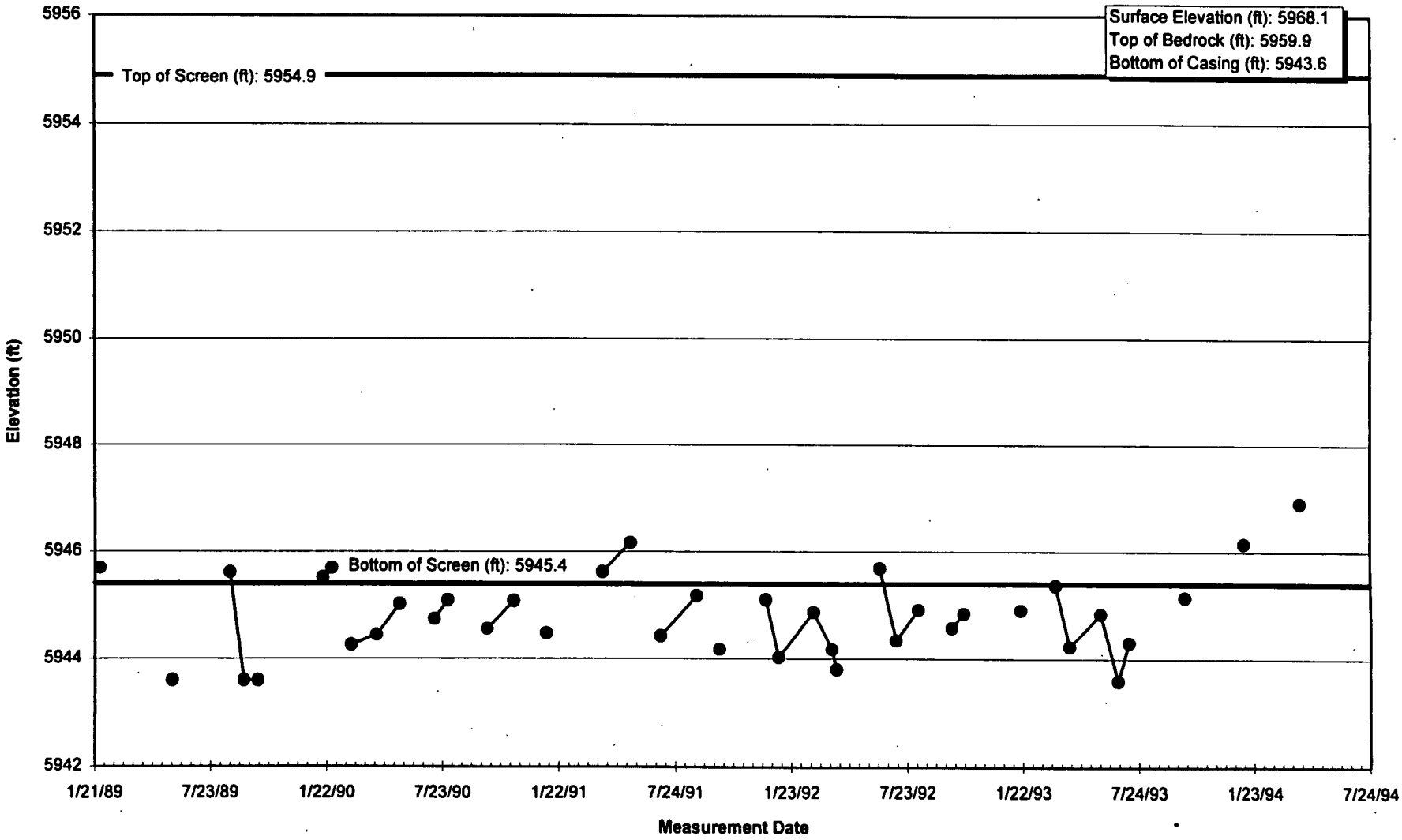

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332

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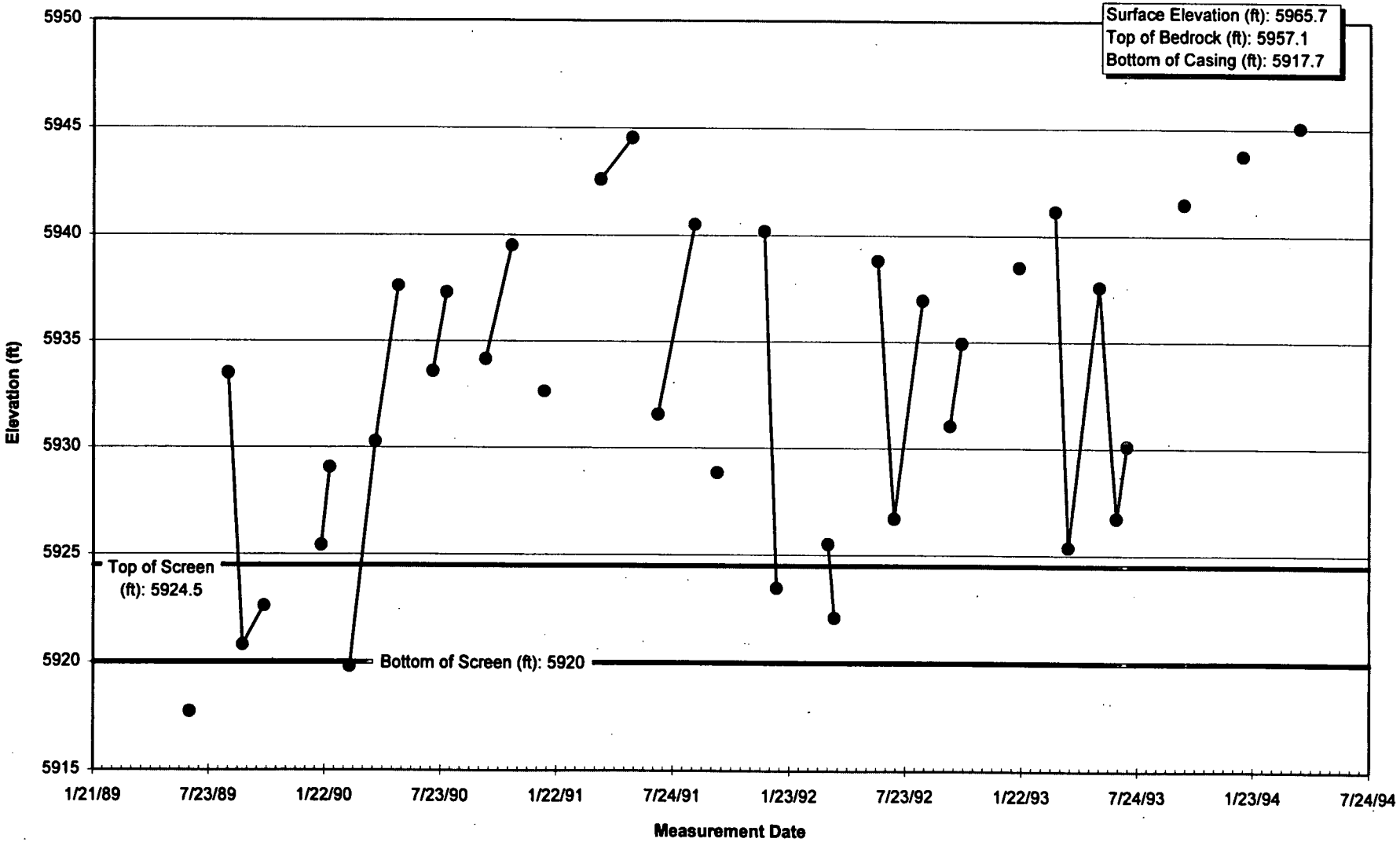

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333

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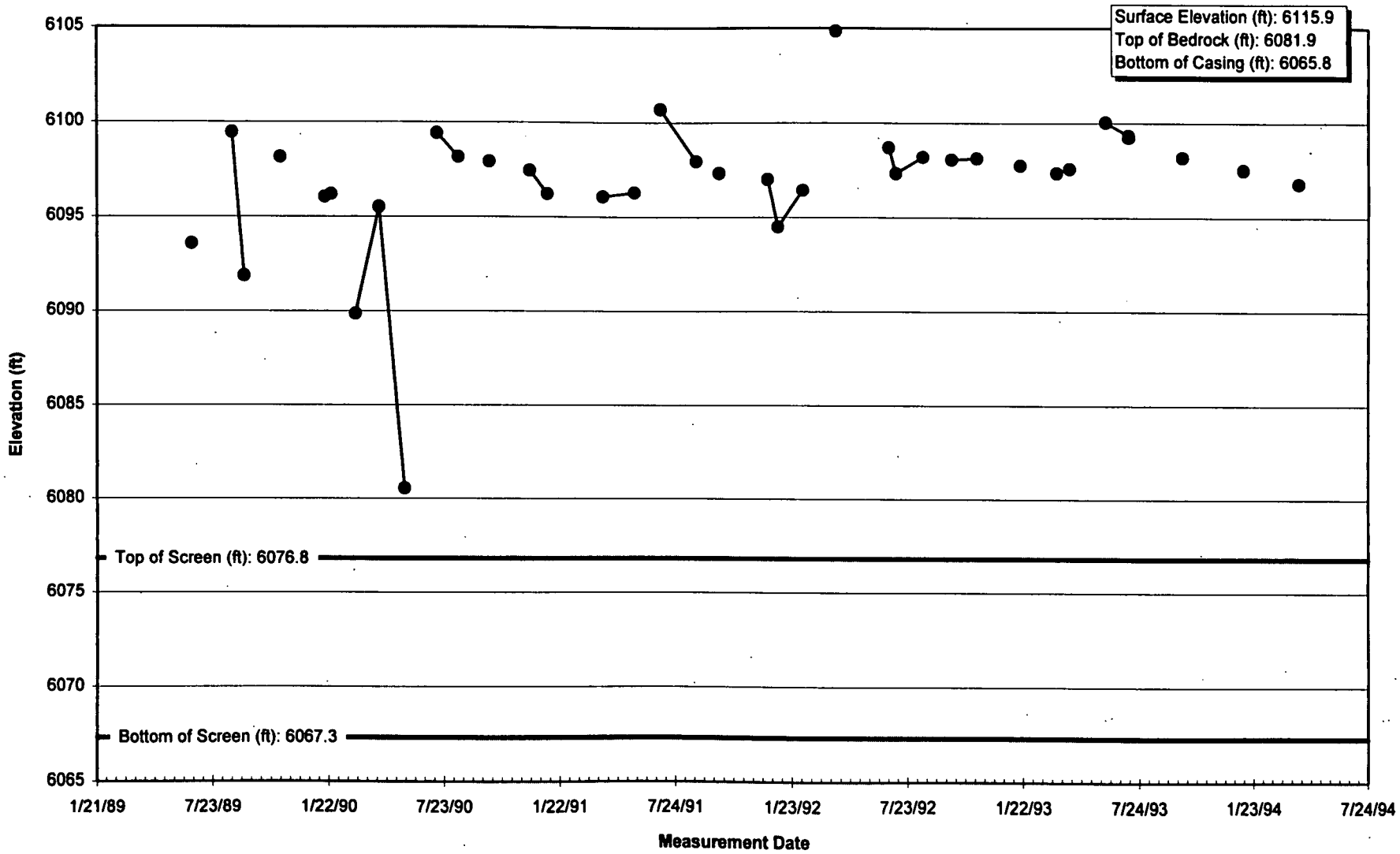

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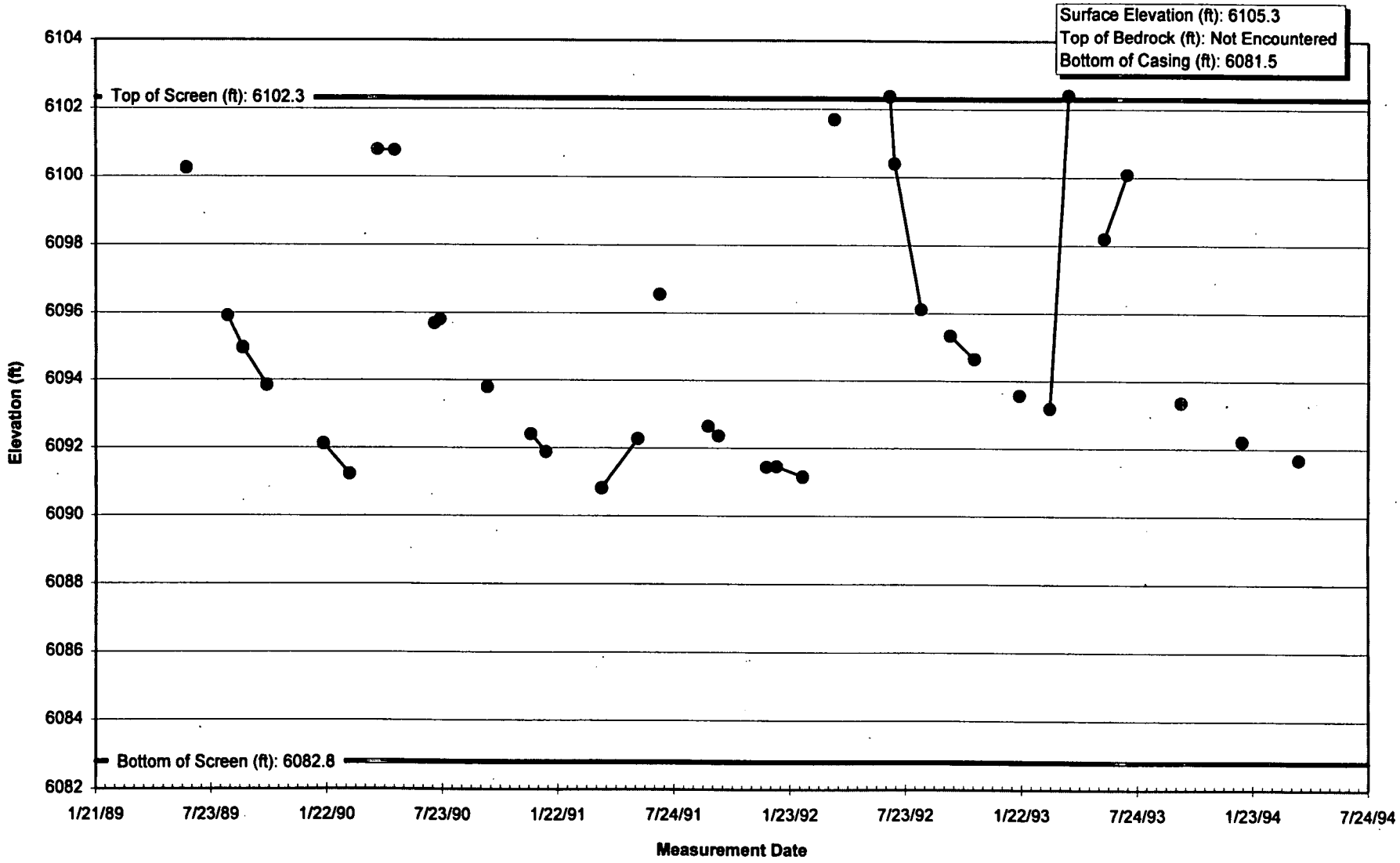
334

Hydrograph B405689



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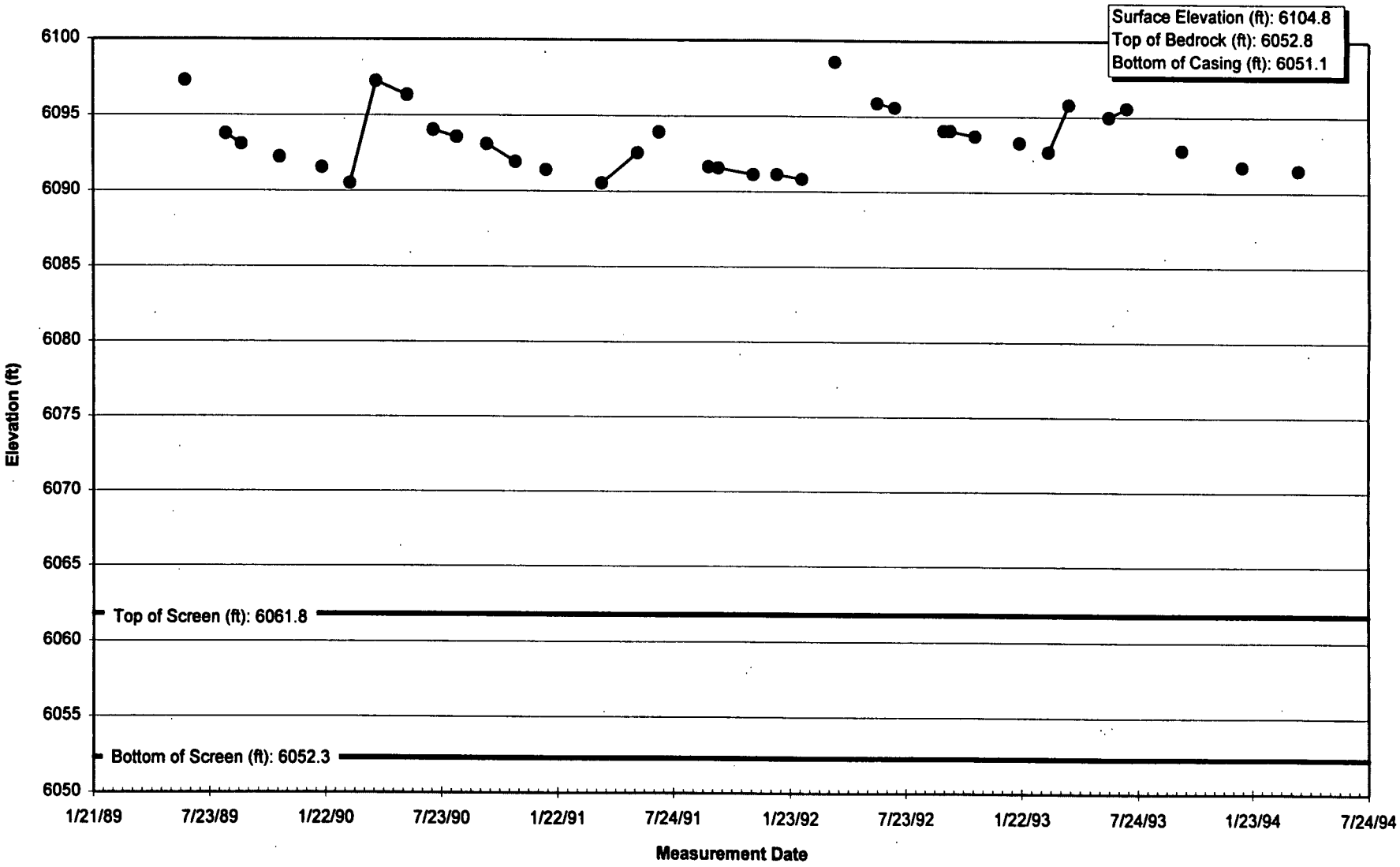
335

Hydrograph B405789



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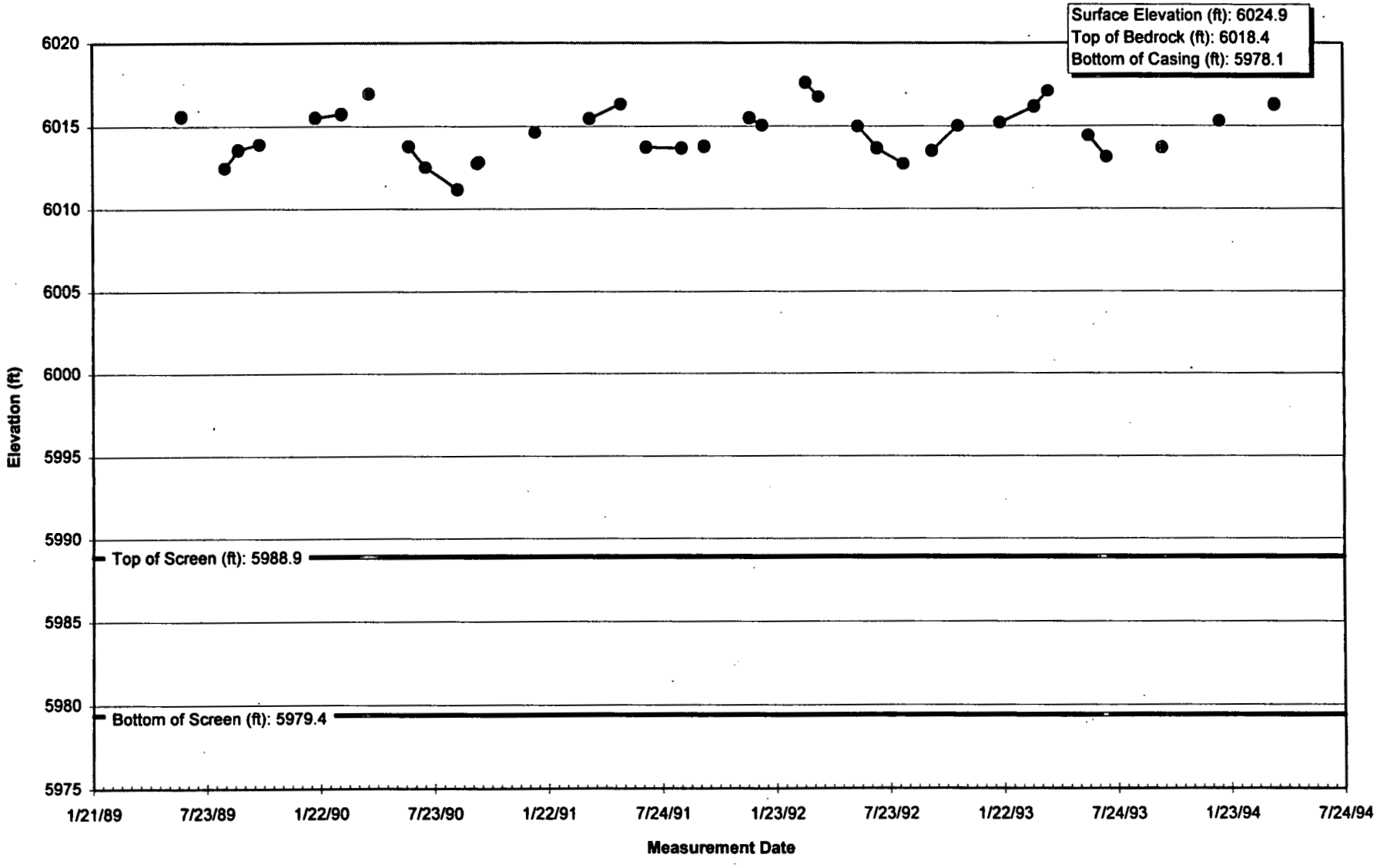
336

Hydrograph B405889



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337

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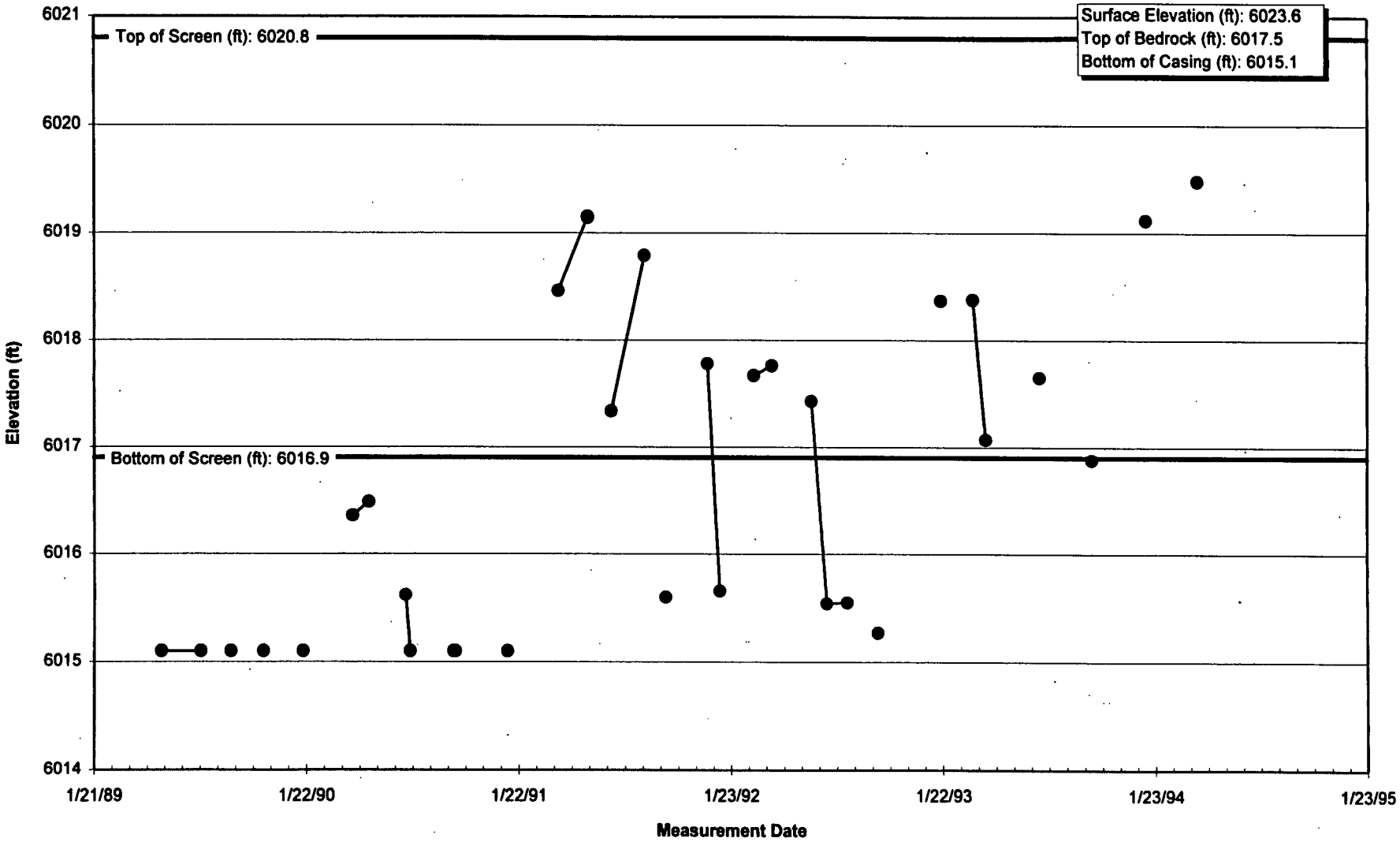

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338

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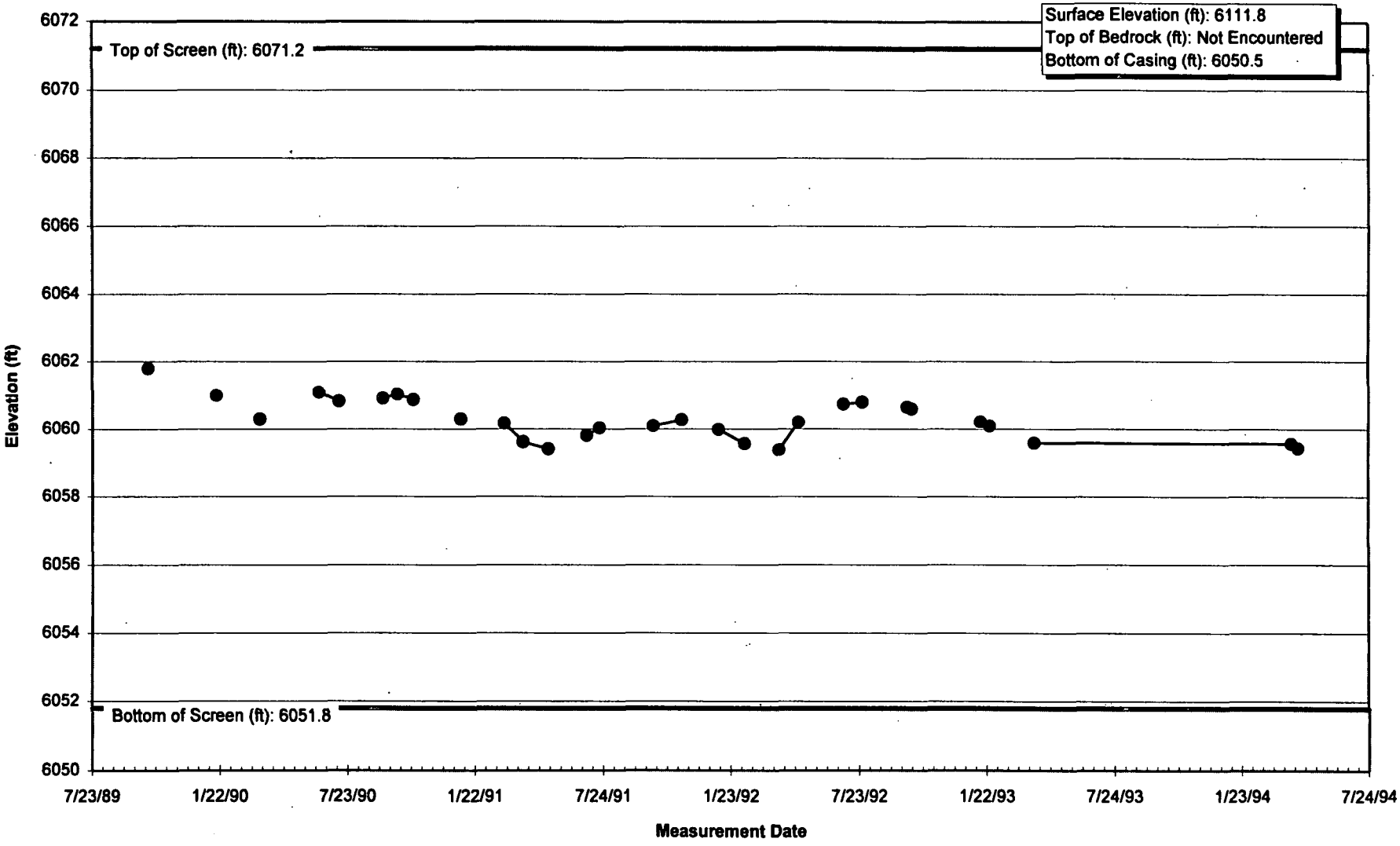

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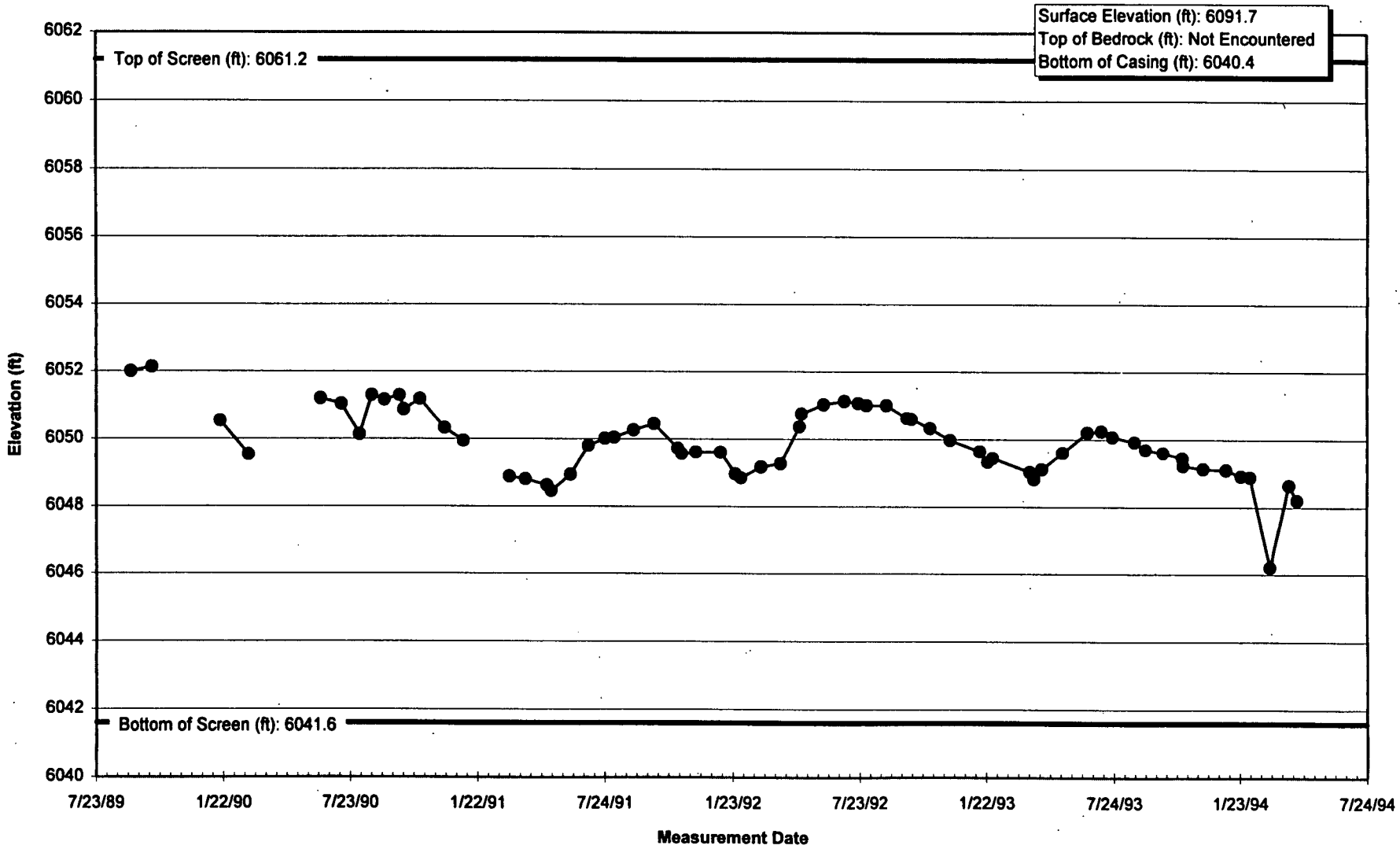
339

Hydrograph B410689



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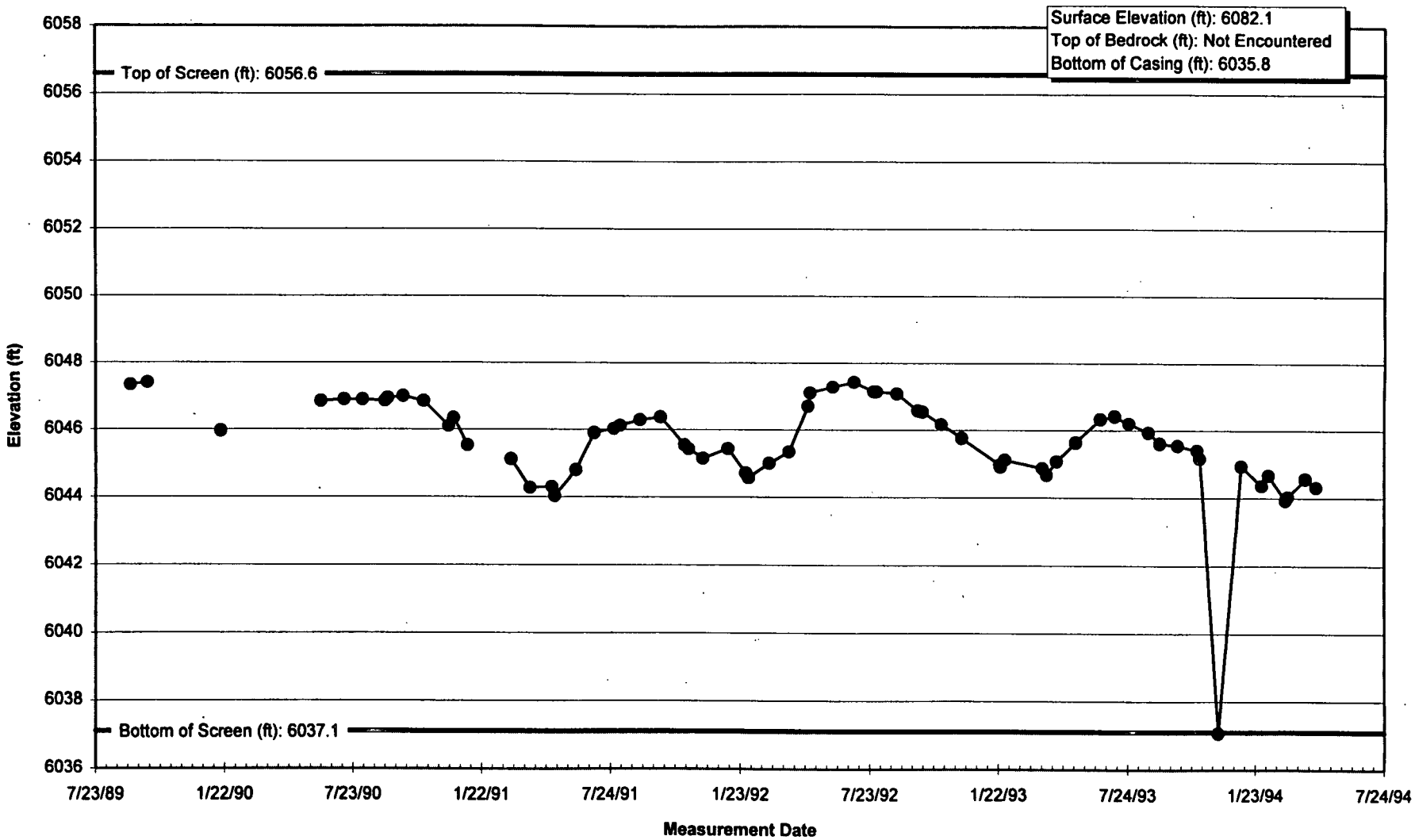
340

Hydrograph B410789



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341

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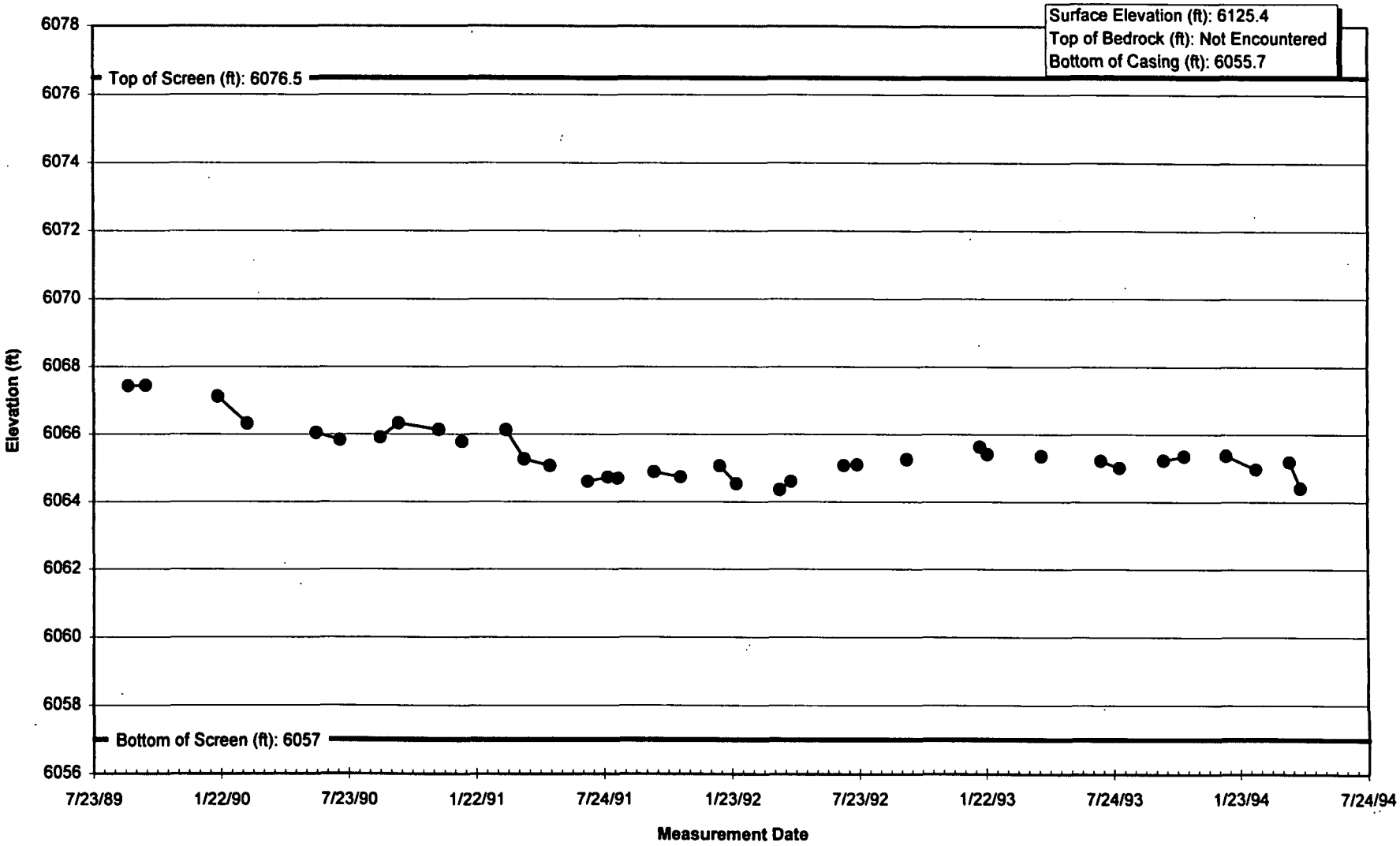

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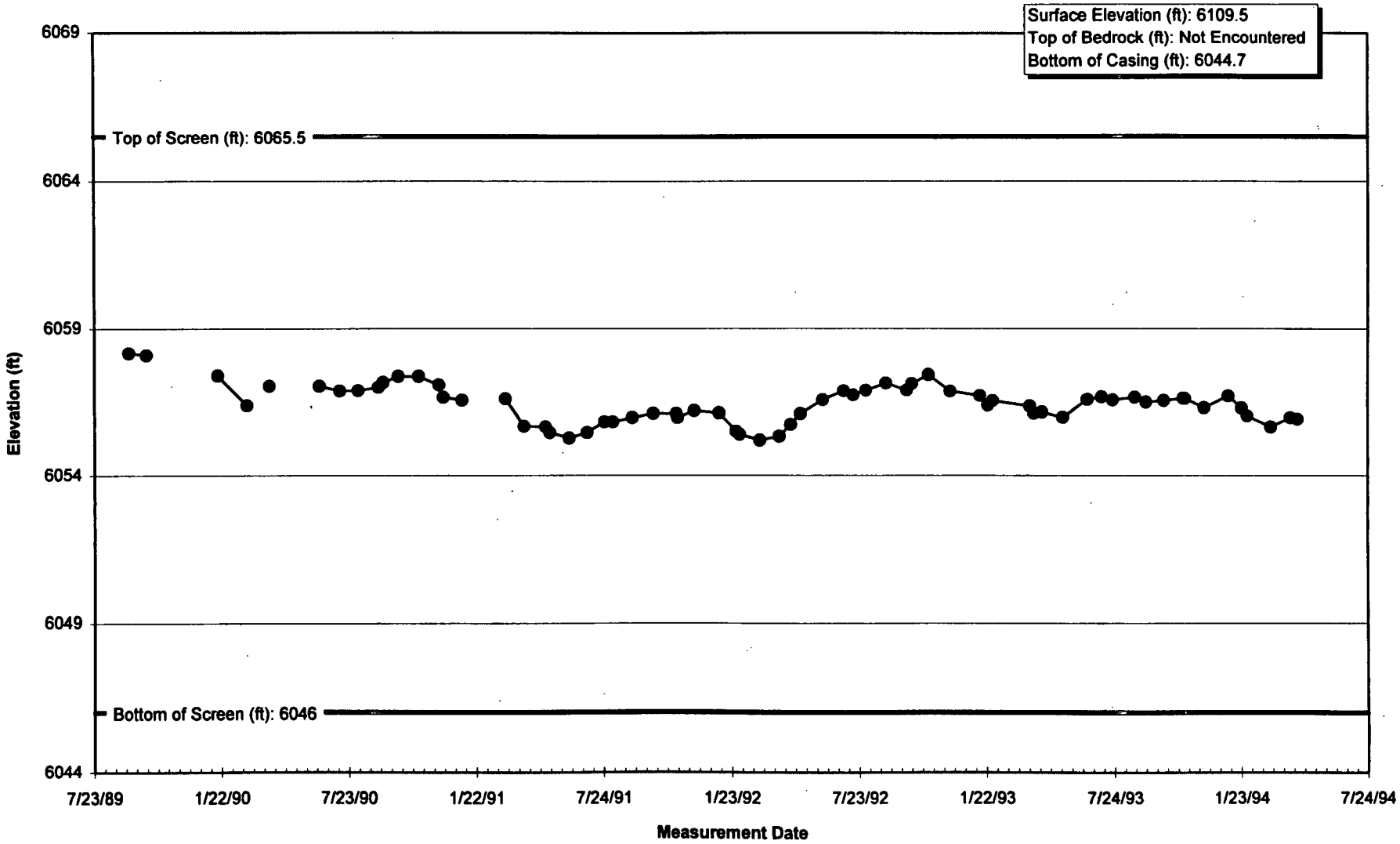

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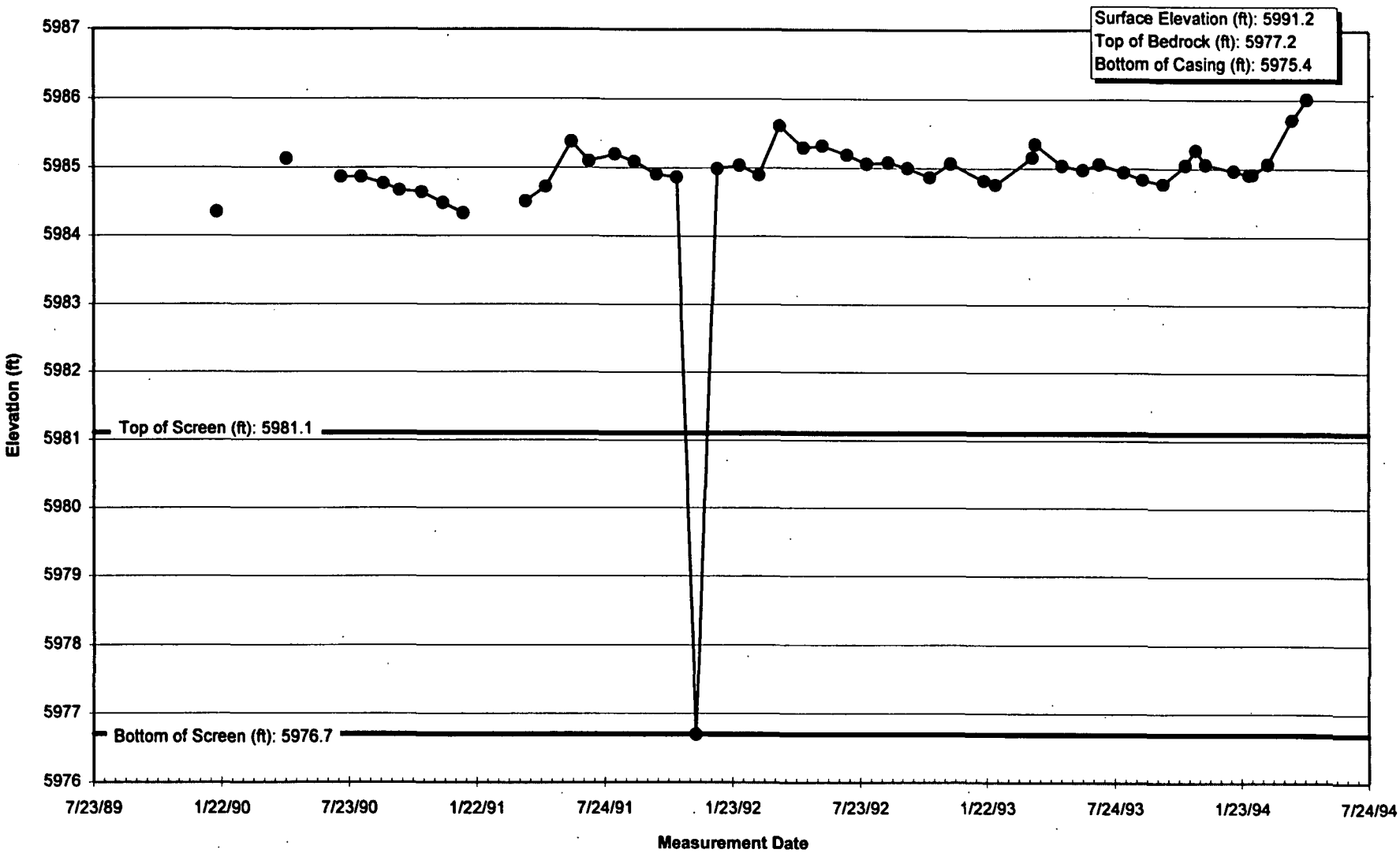
343

Hydrograph P114389



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344

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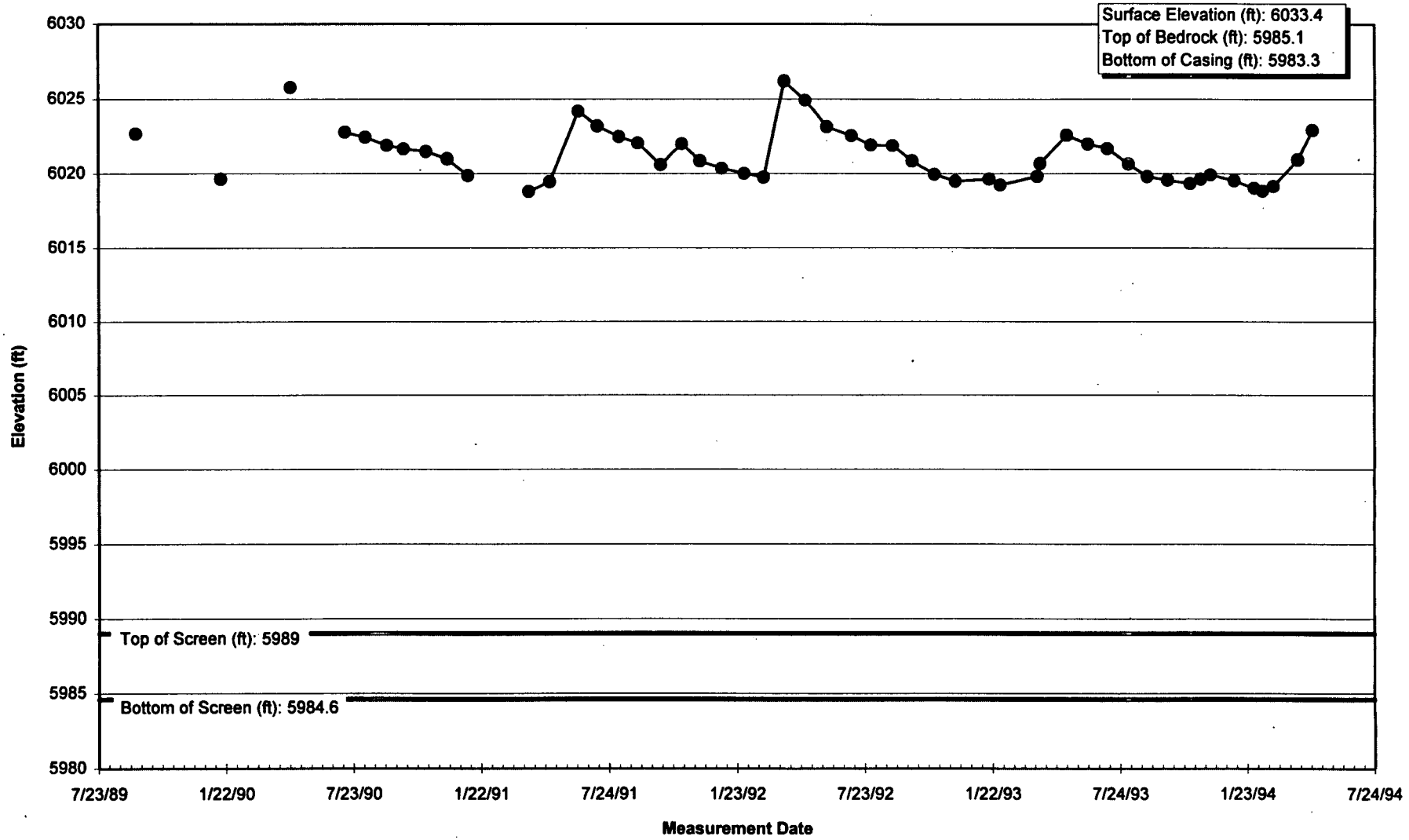

345

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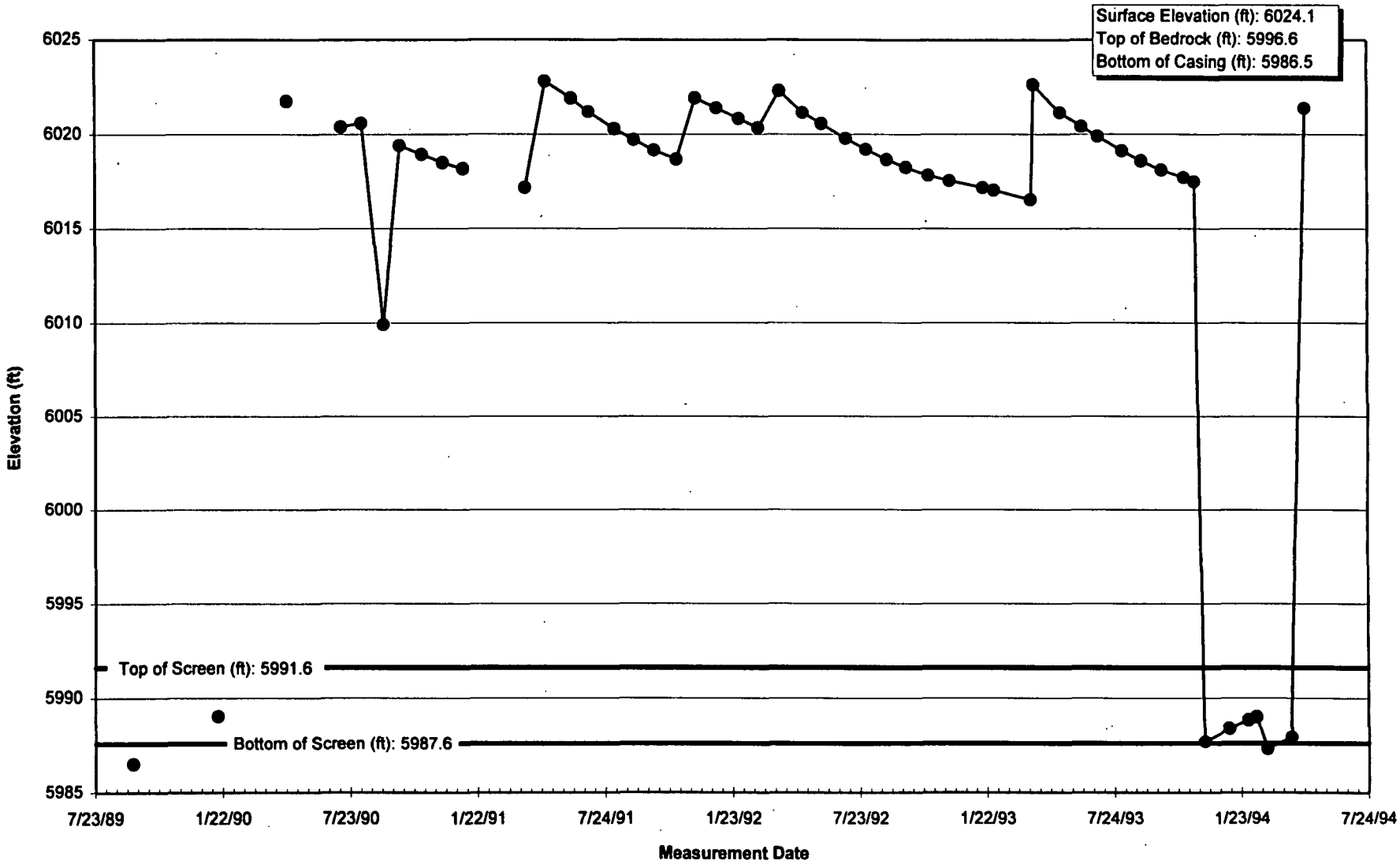

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346

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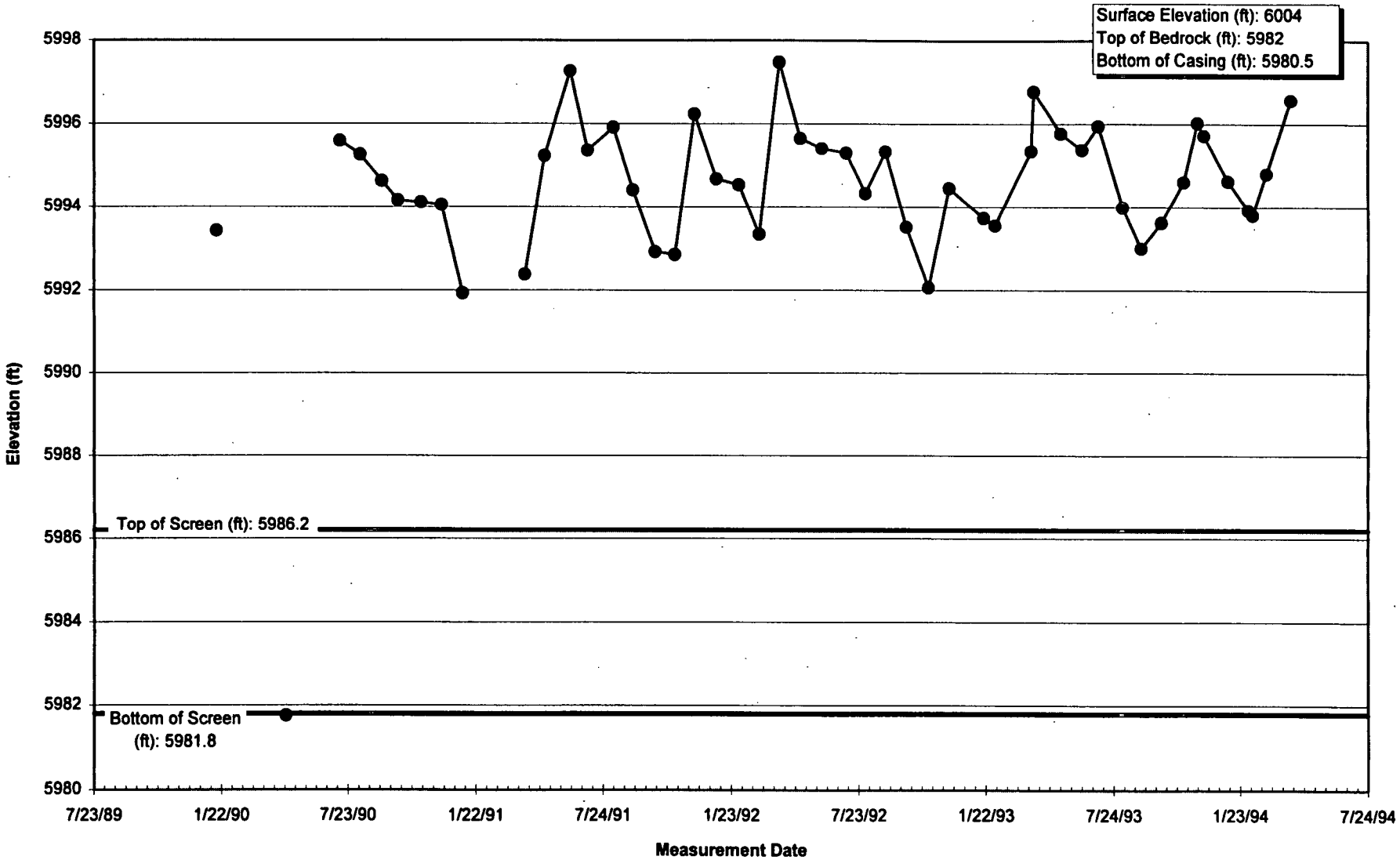

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347

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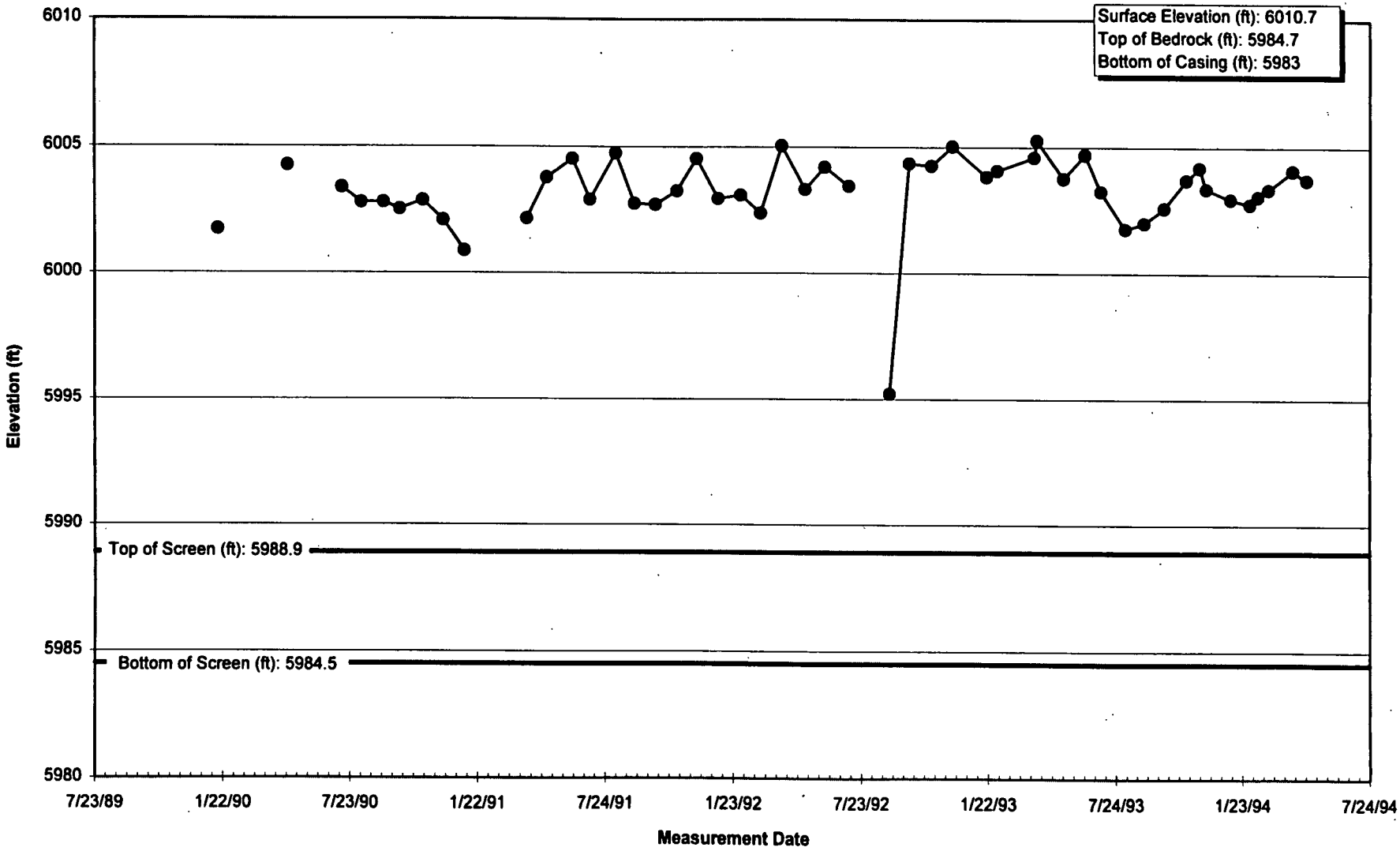

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348

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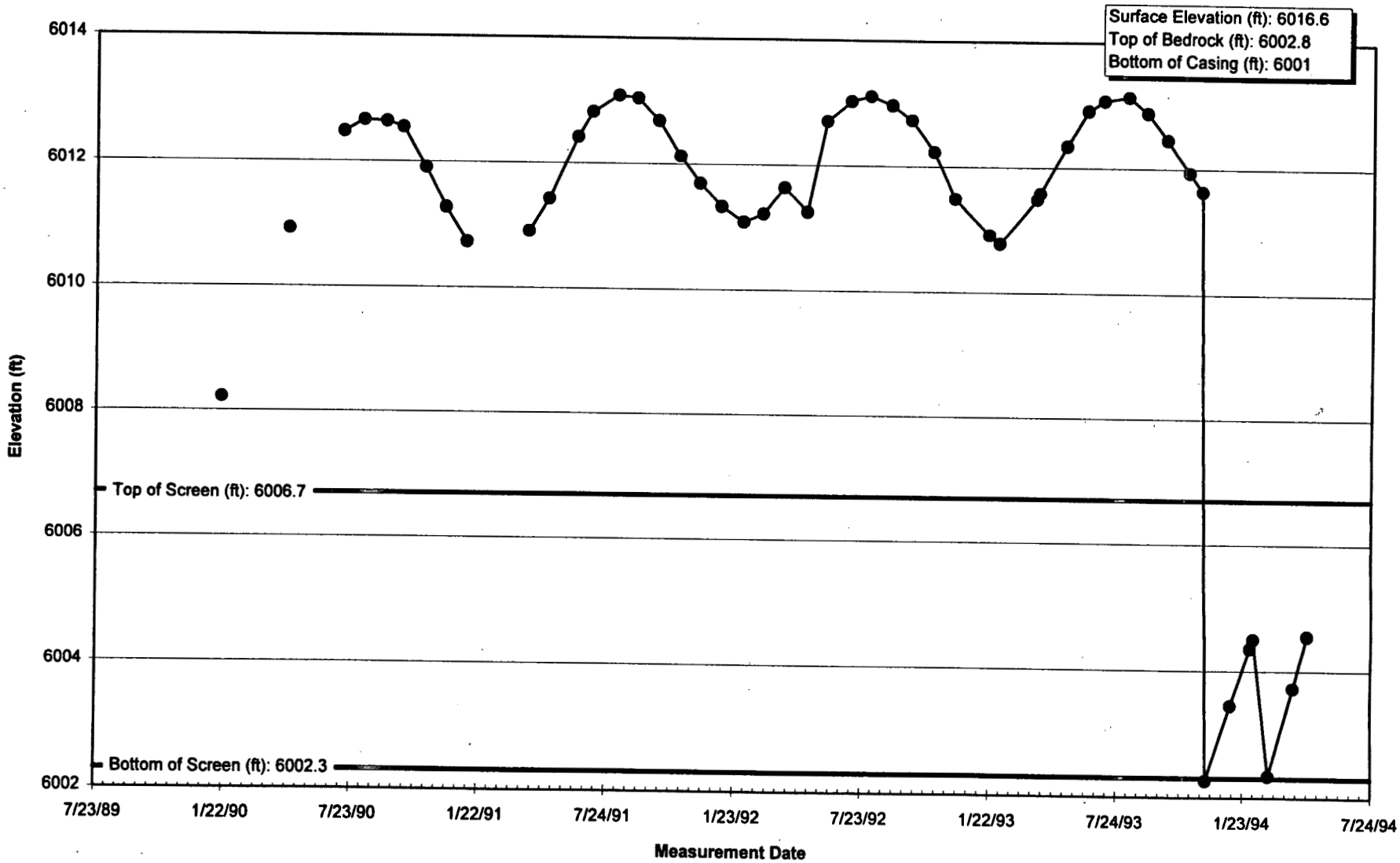
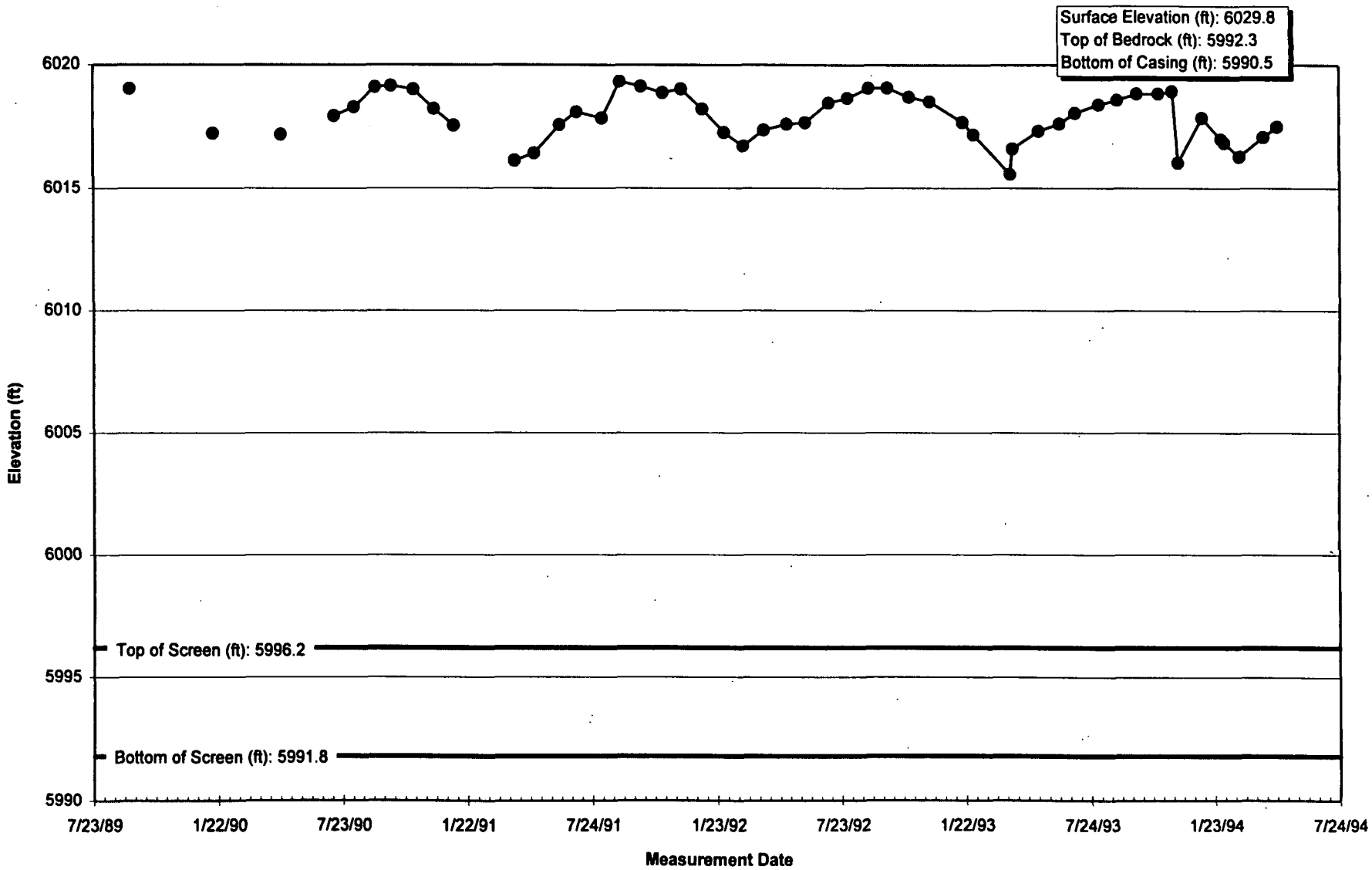


349

S20.XLS P114889 4/9/95

Hydrograph P114989



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350

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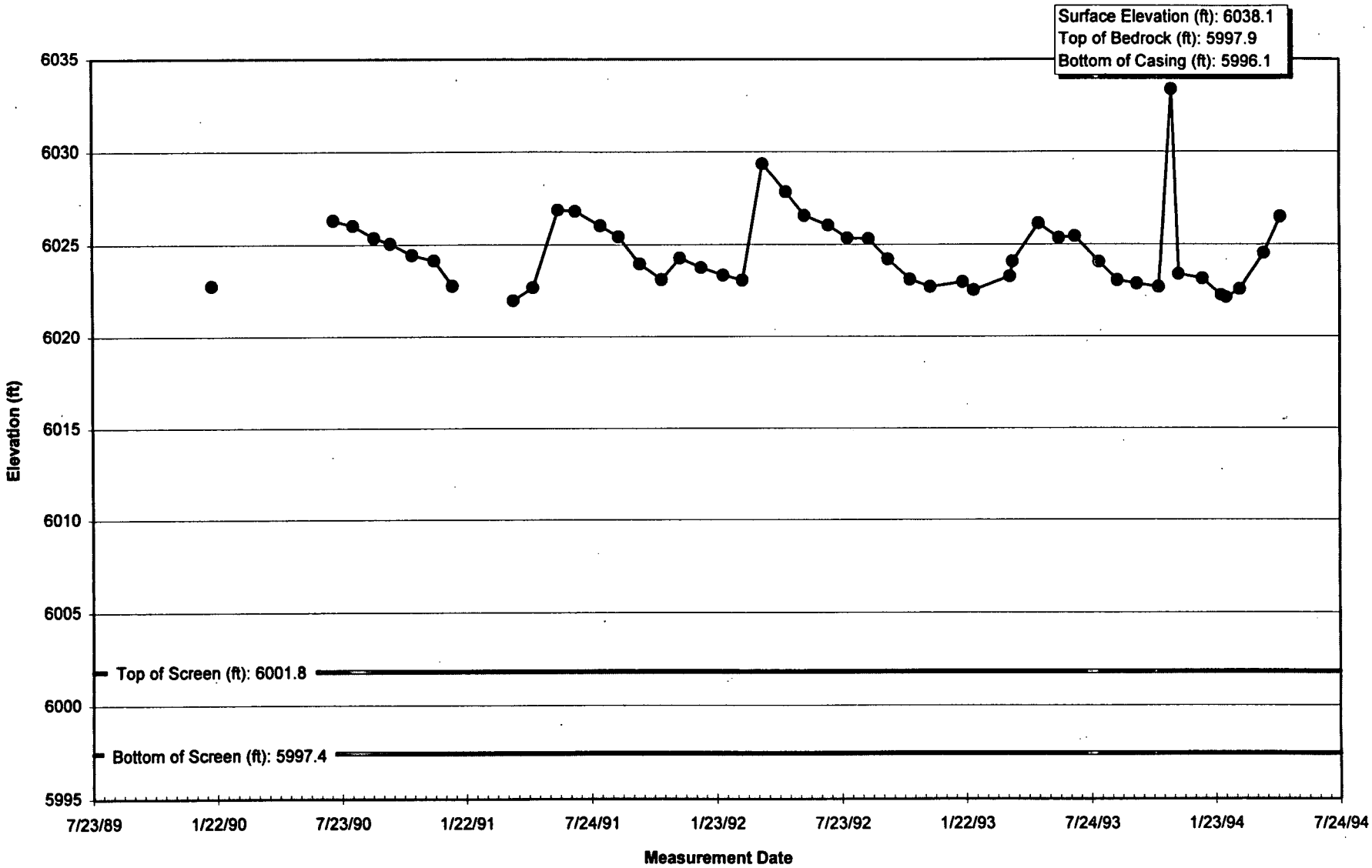

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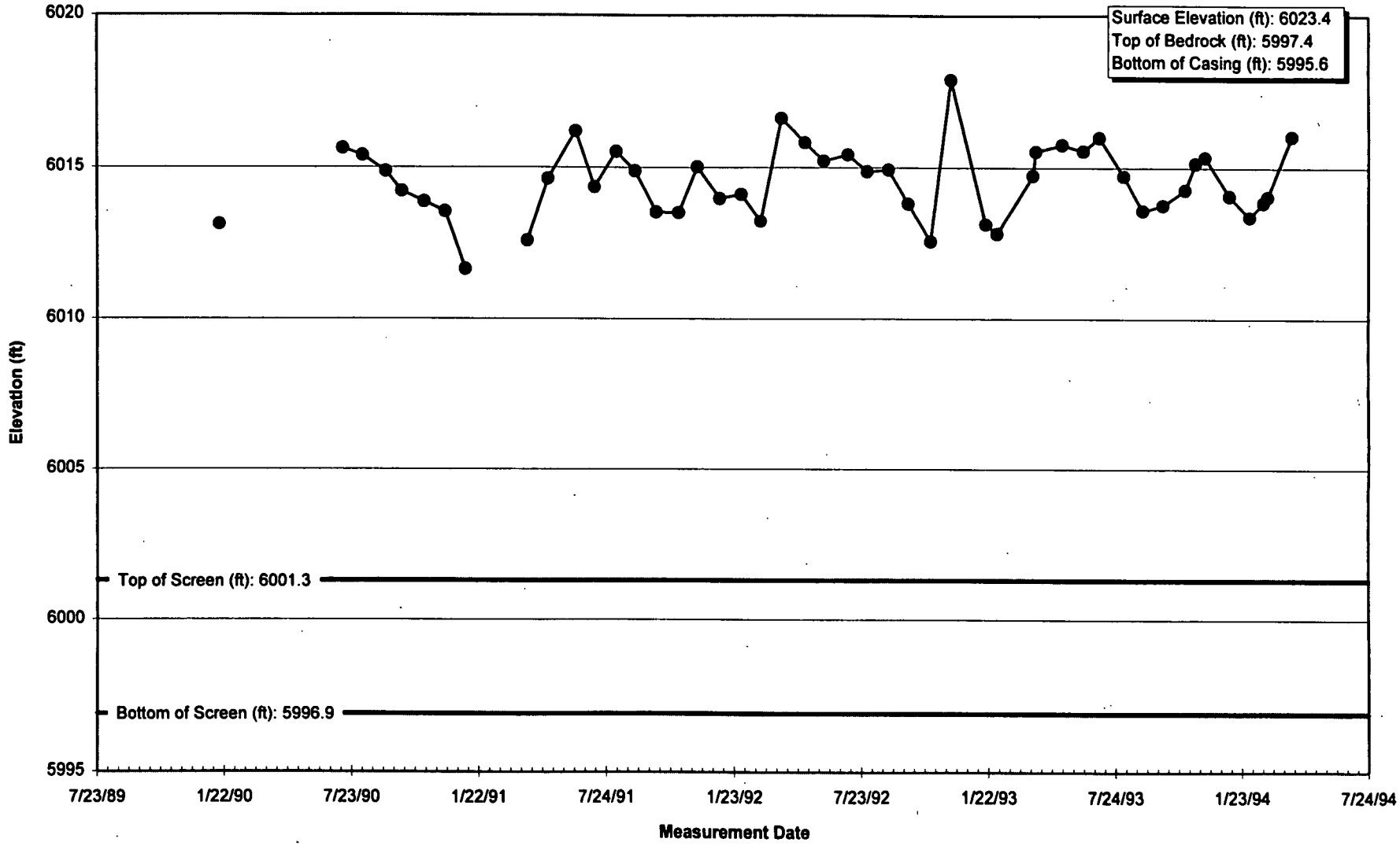
351

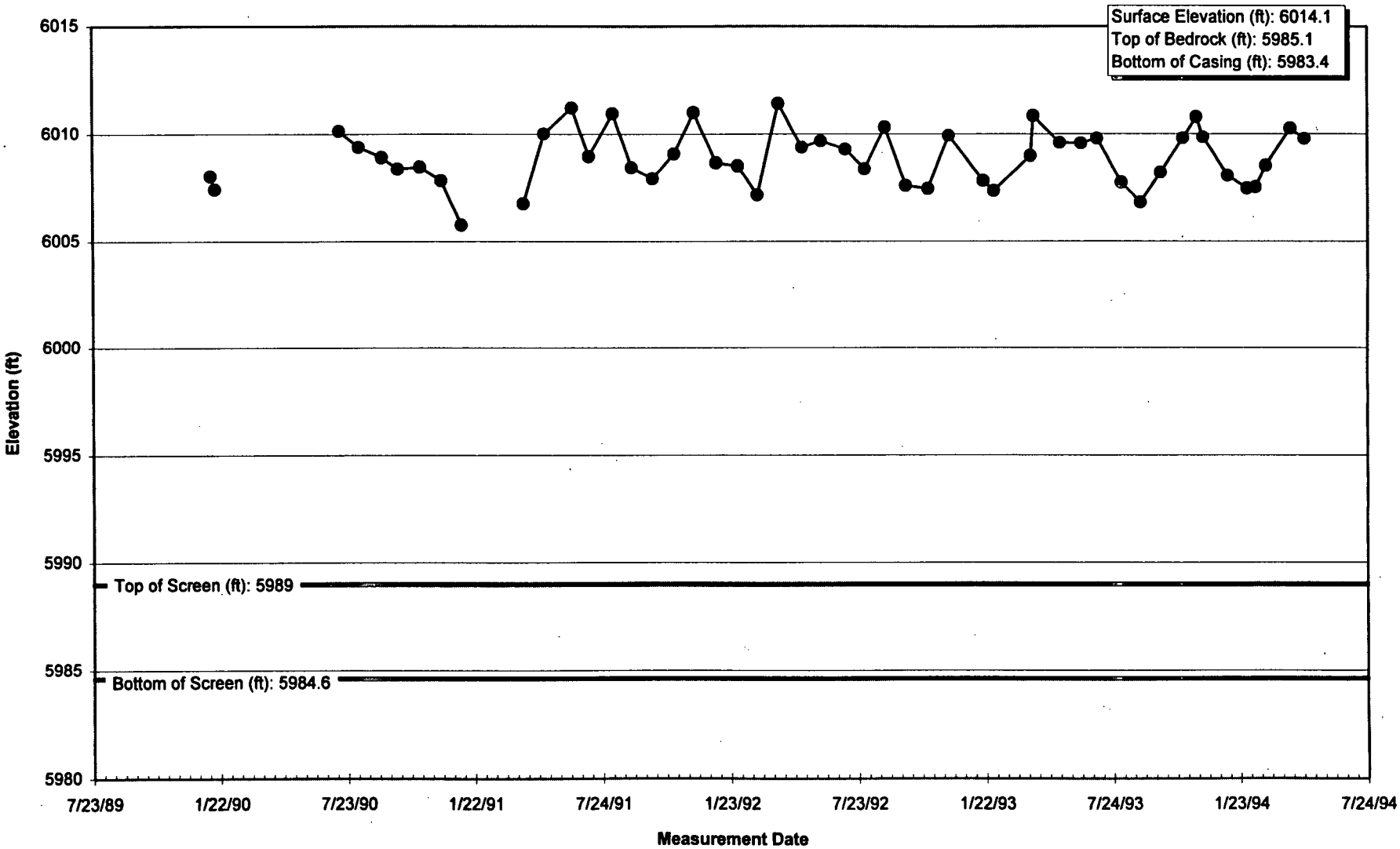
Hydrograph P115489



352

S20.XLS P115489 4/9/95

Hydrograph P115589



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358

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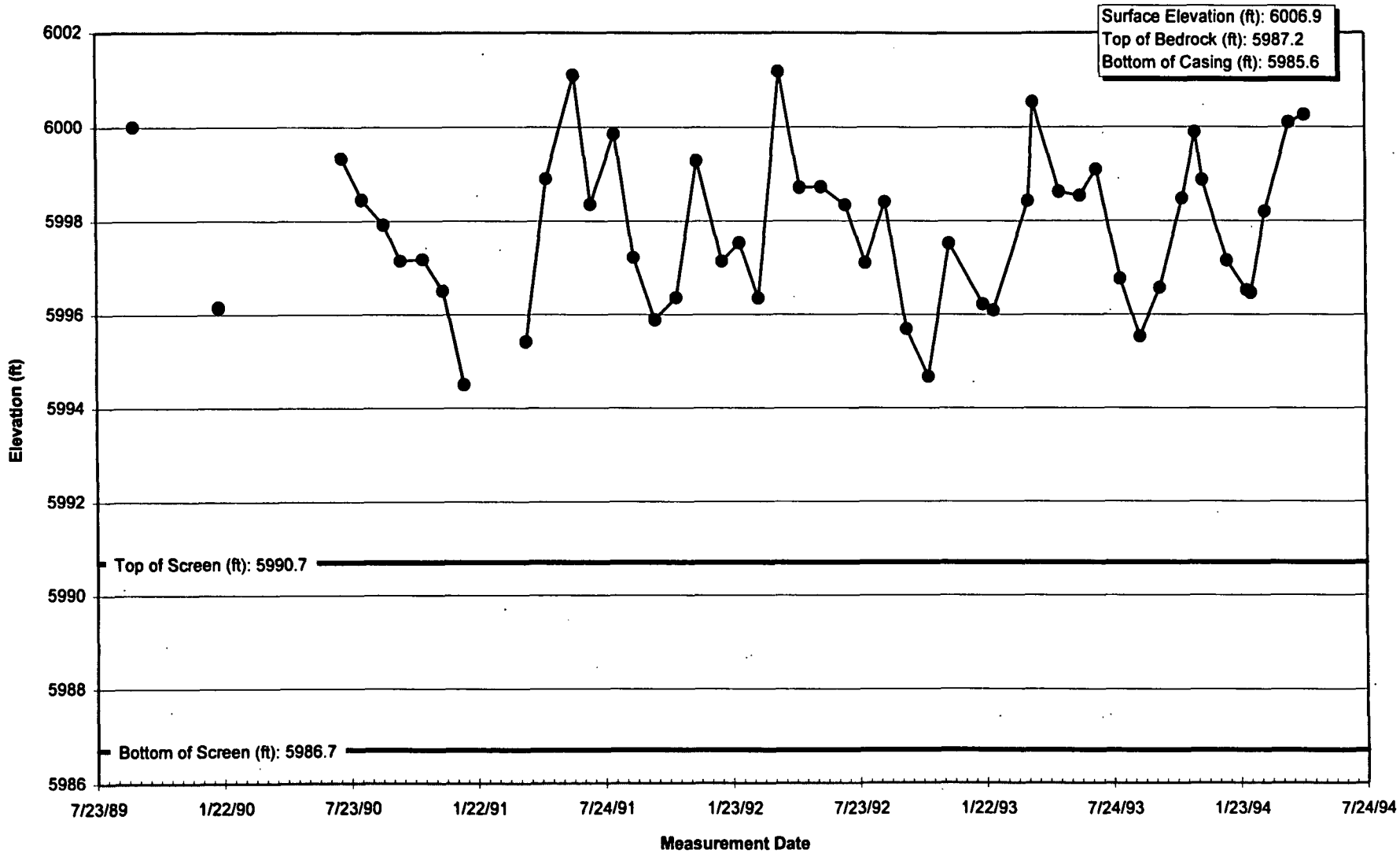

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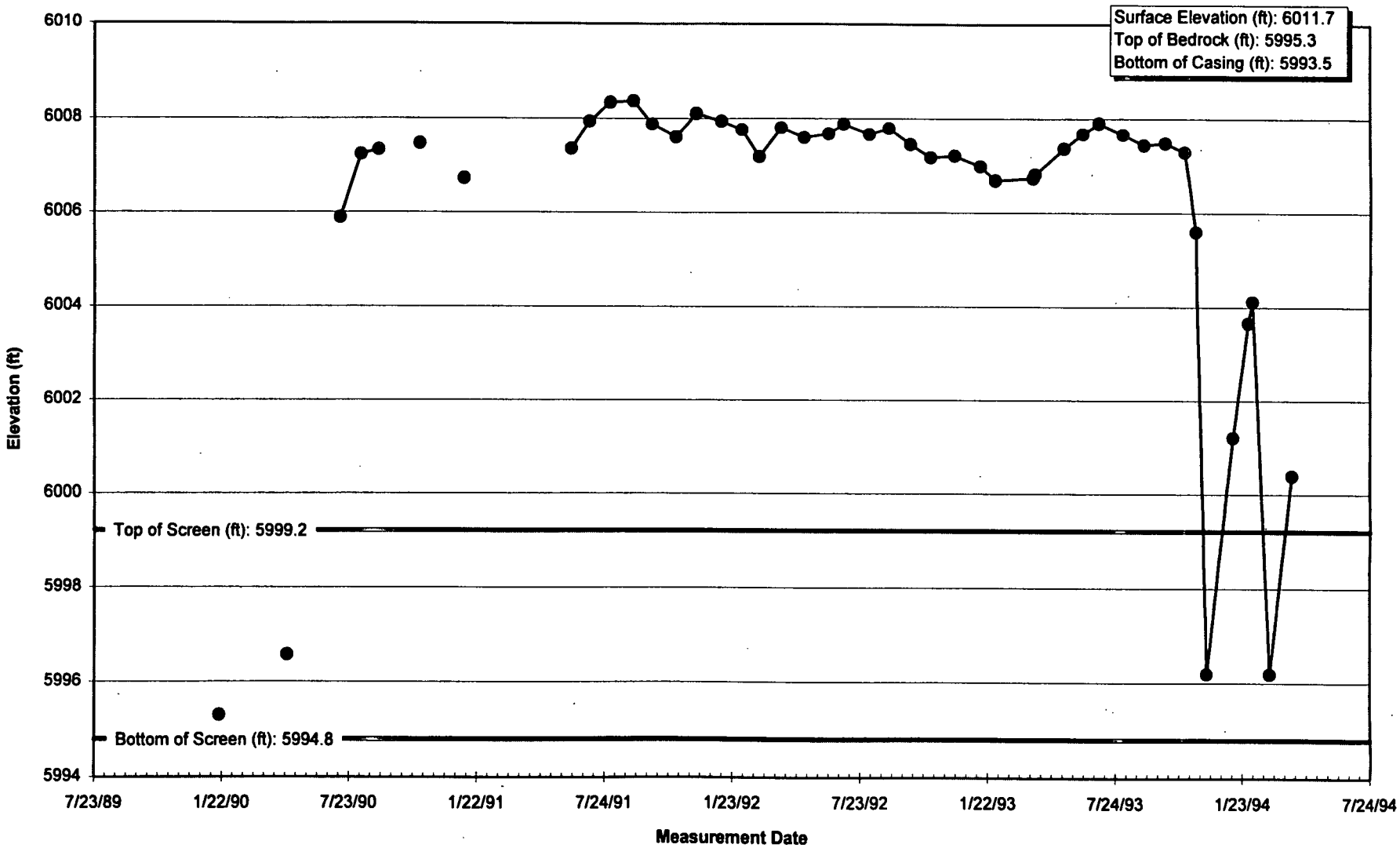
354

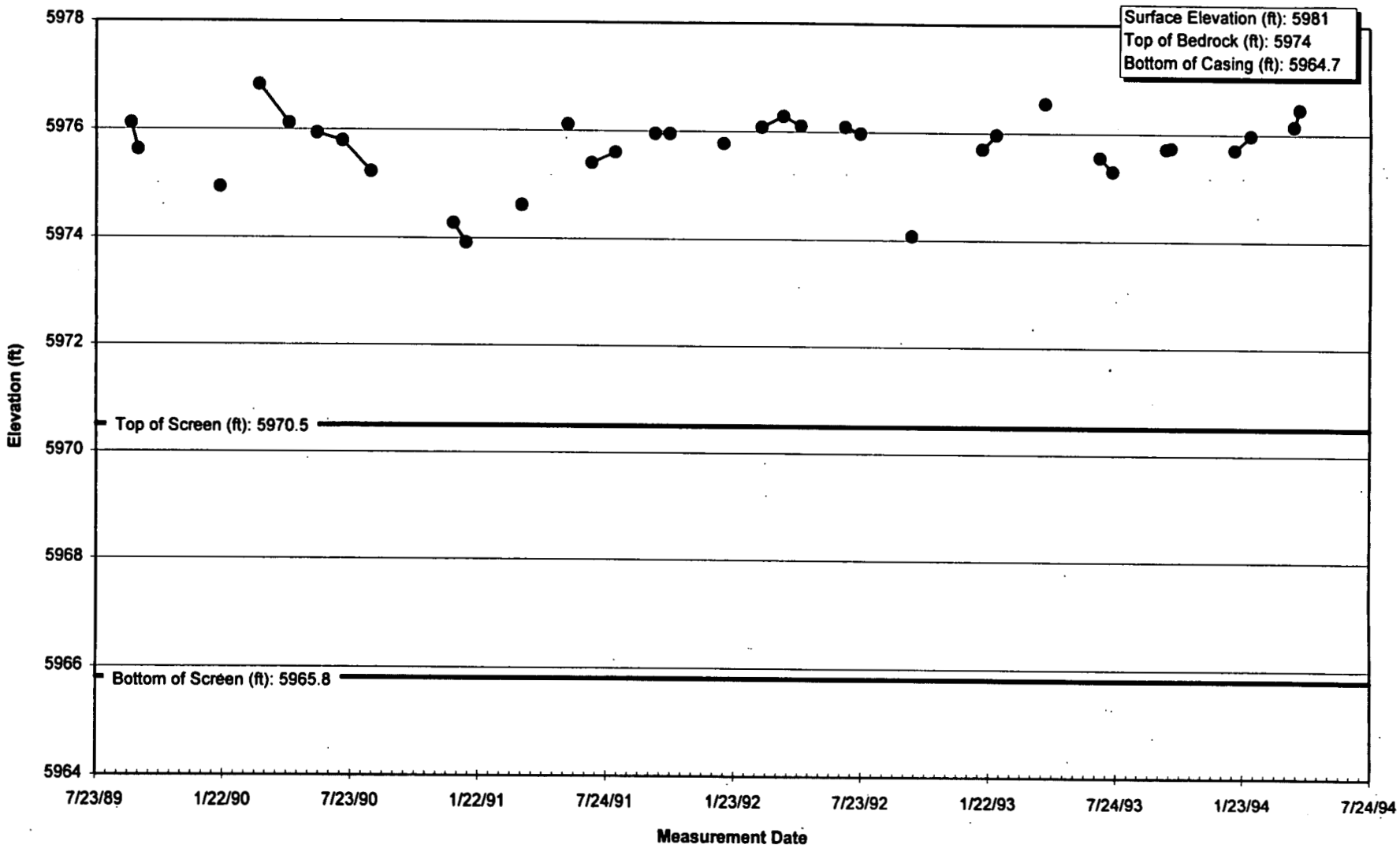
Hydrograph P119389



S20.XLS P119389 4/9/95

355

Hydrograph P207389



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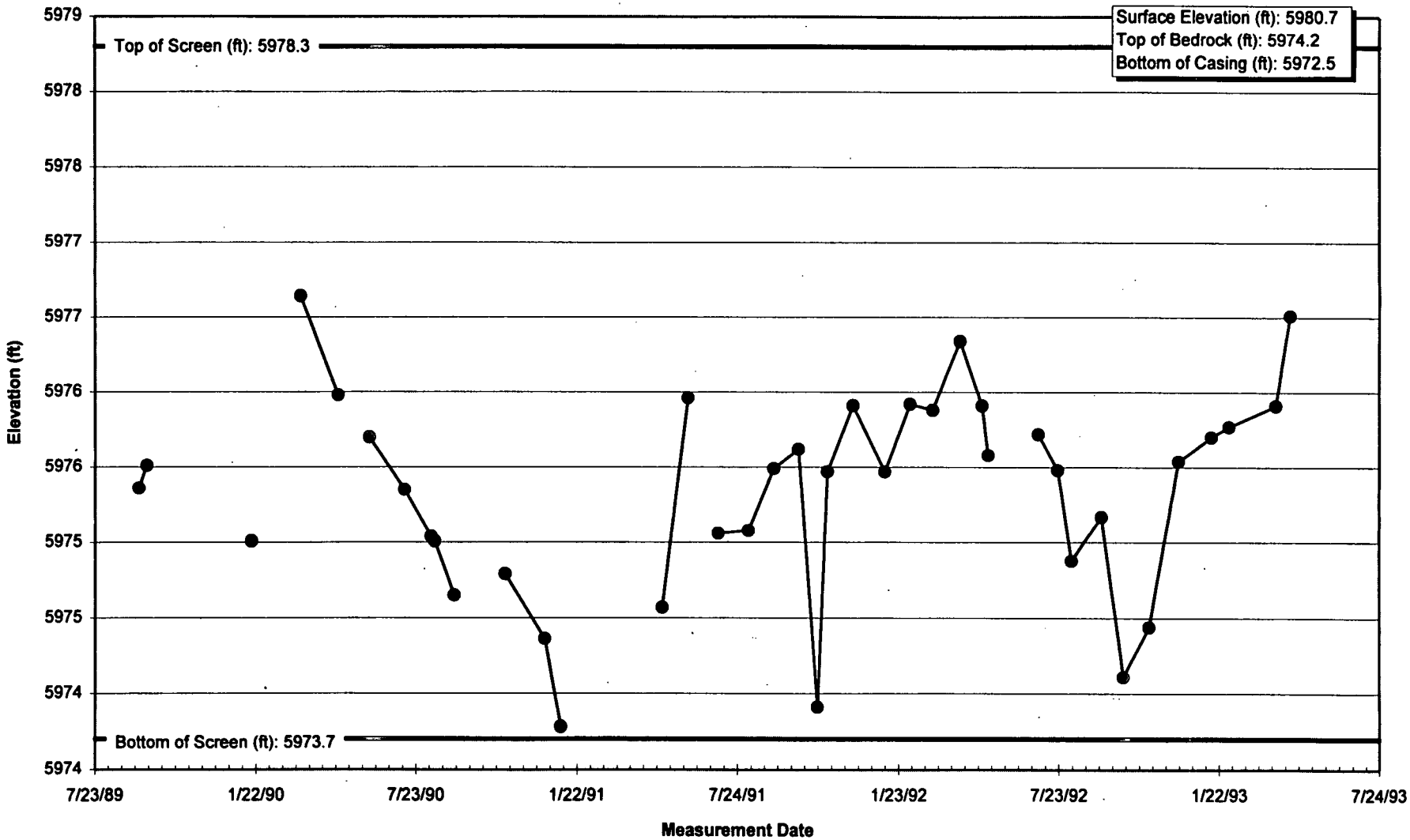
356

Hydrograph P207489



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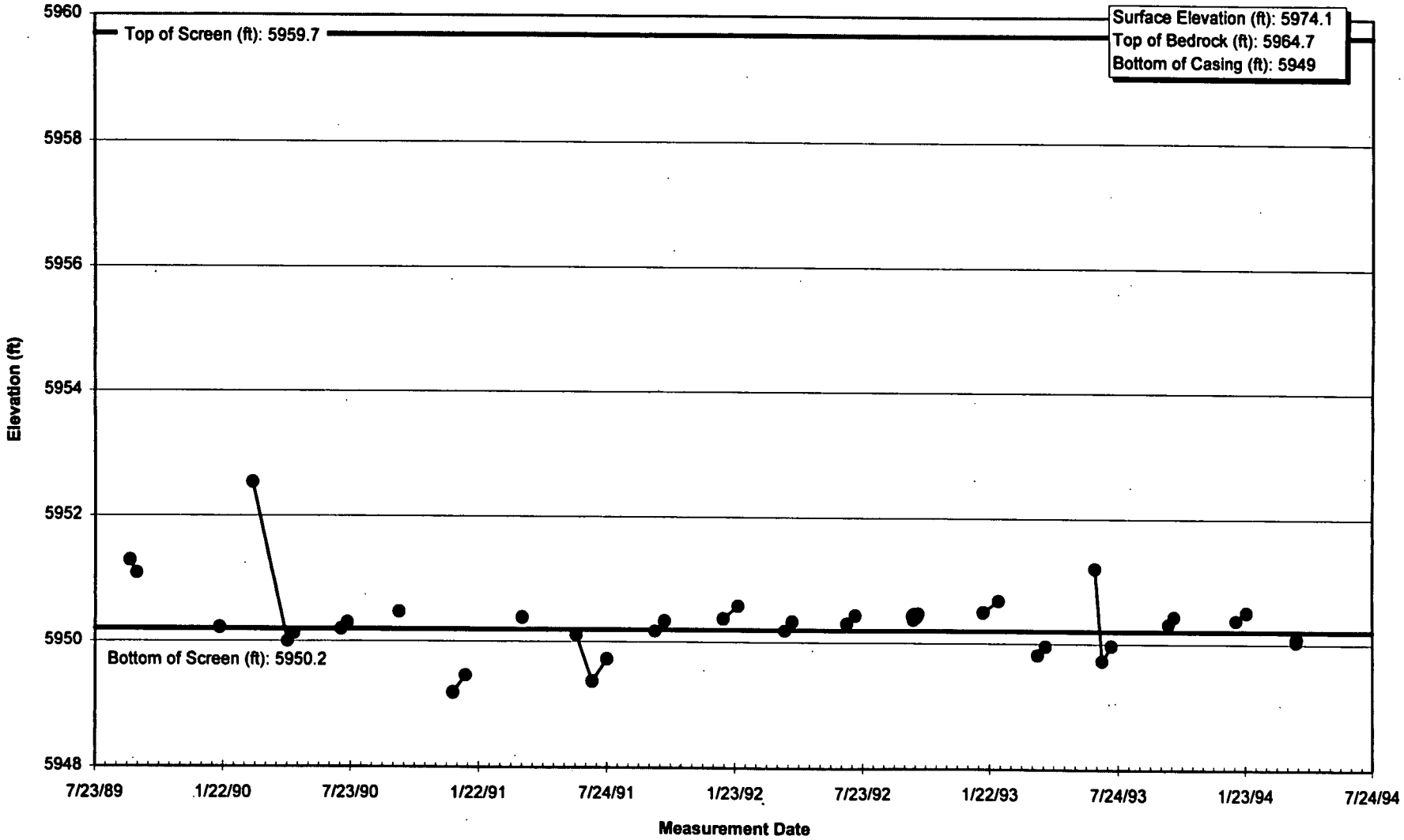
357

Hydrograph P207589



358

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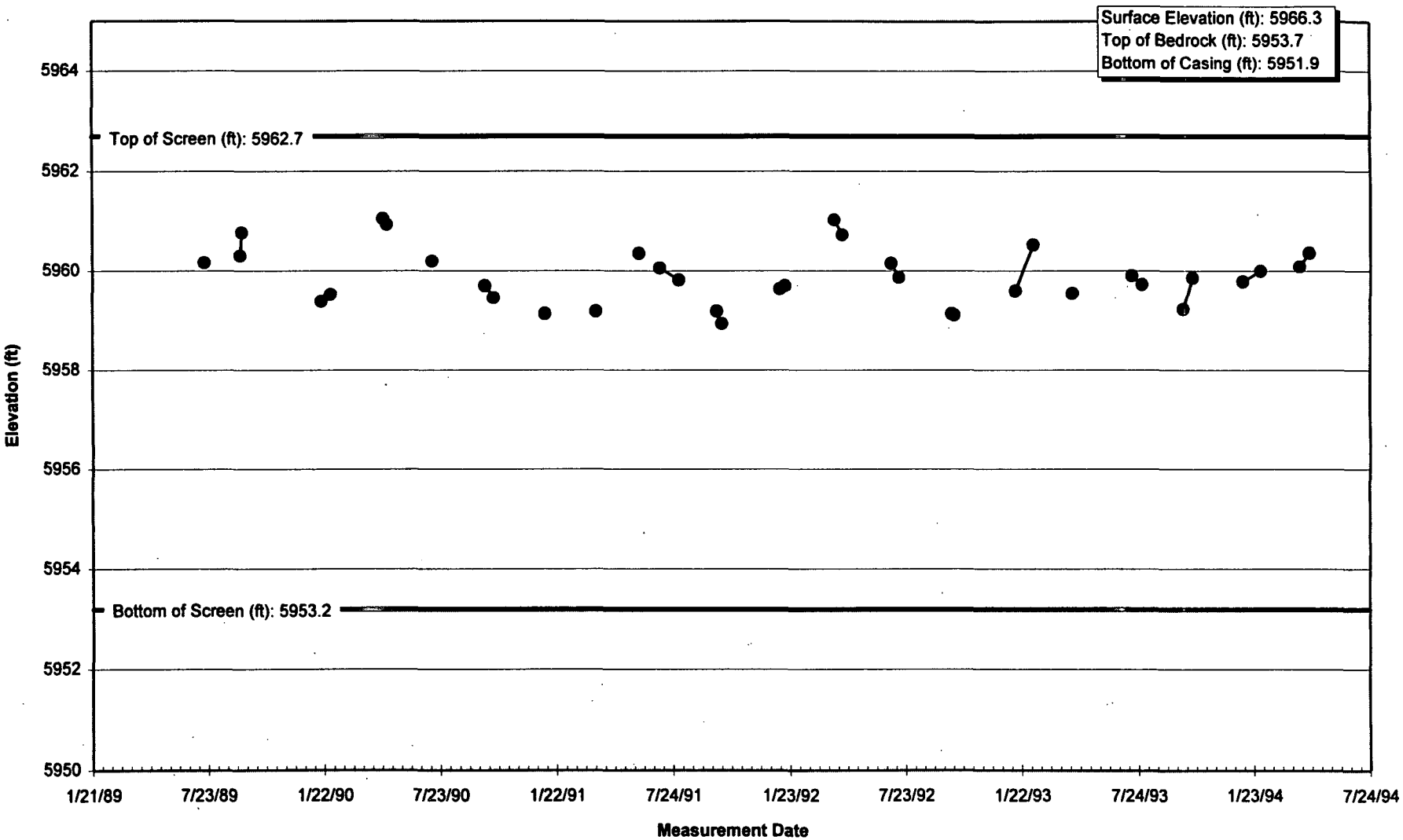

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359

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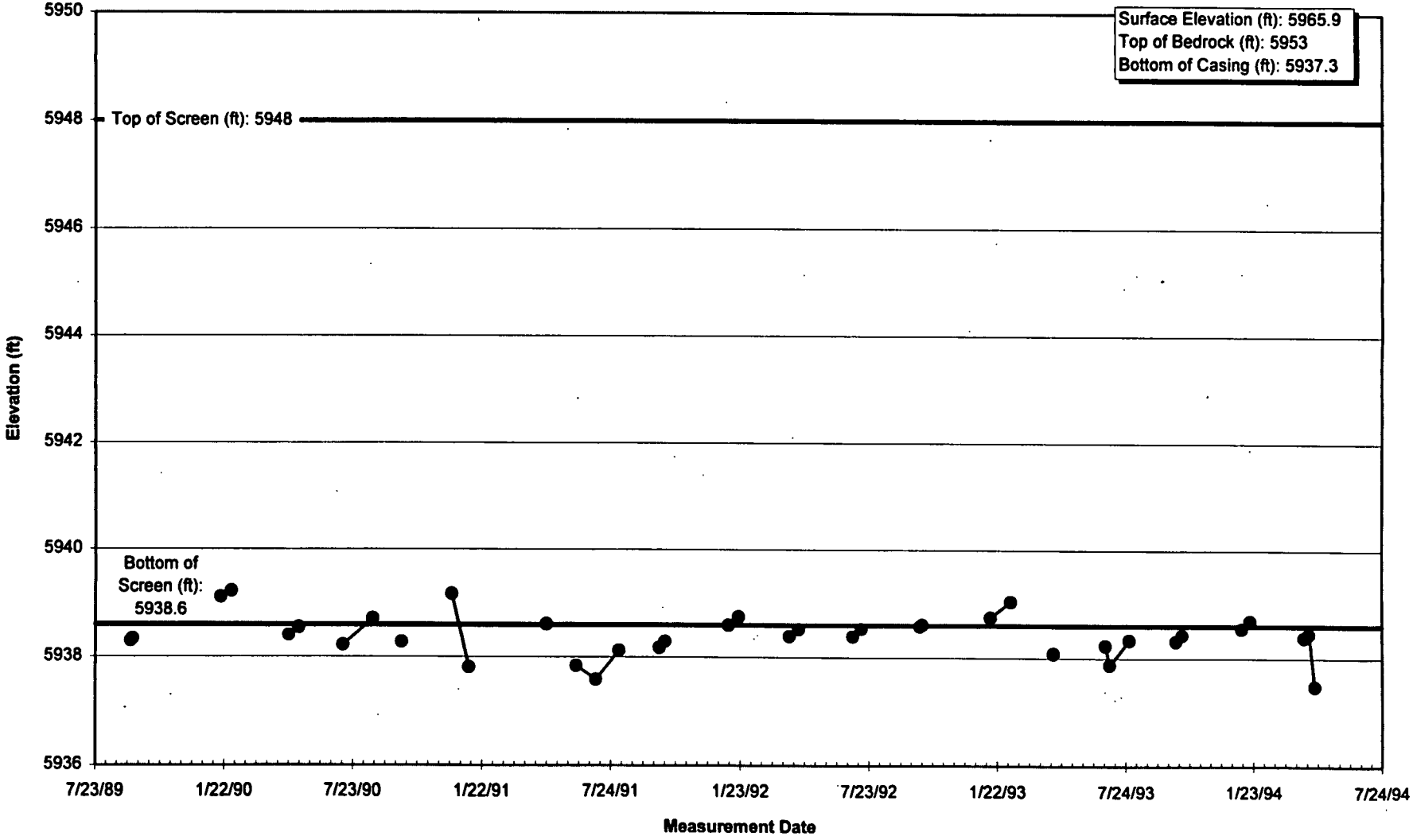

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360

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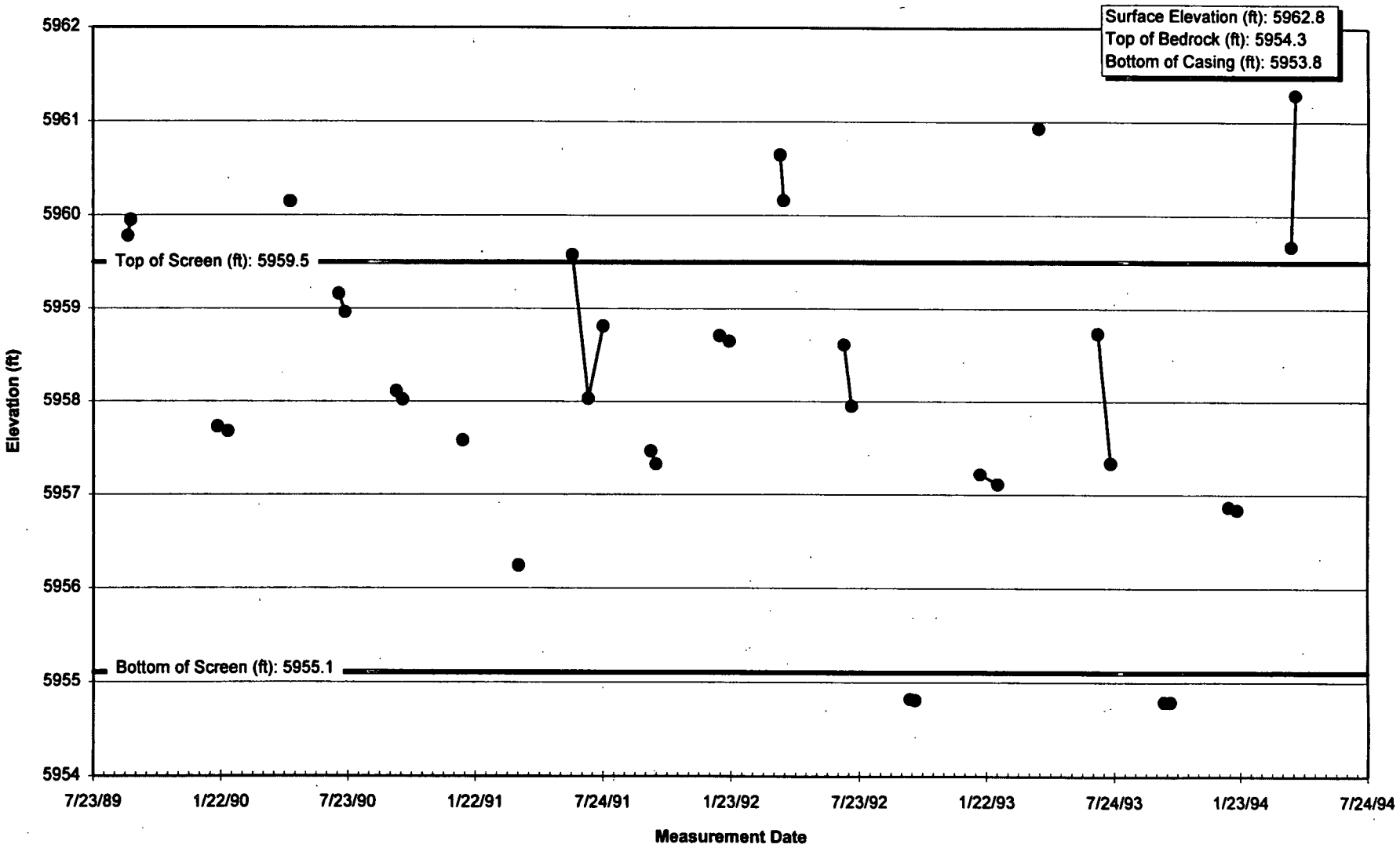

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361

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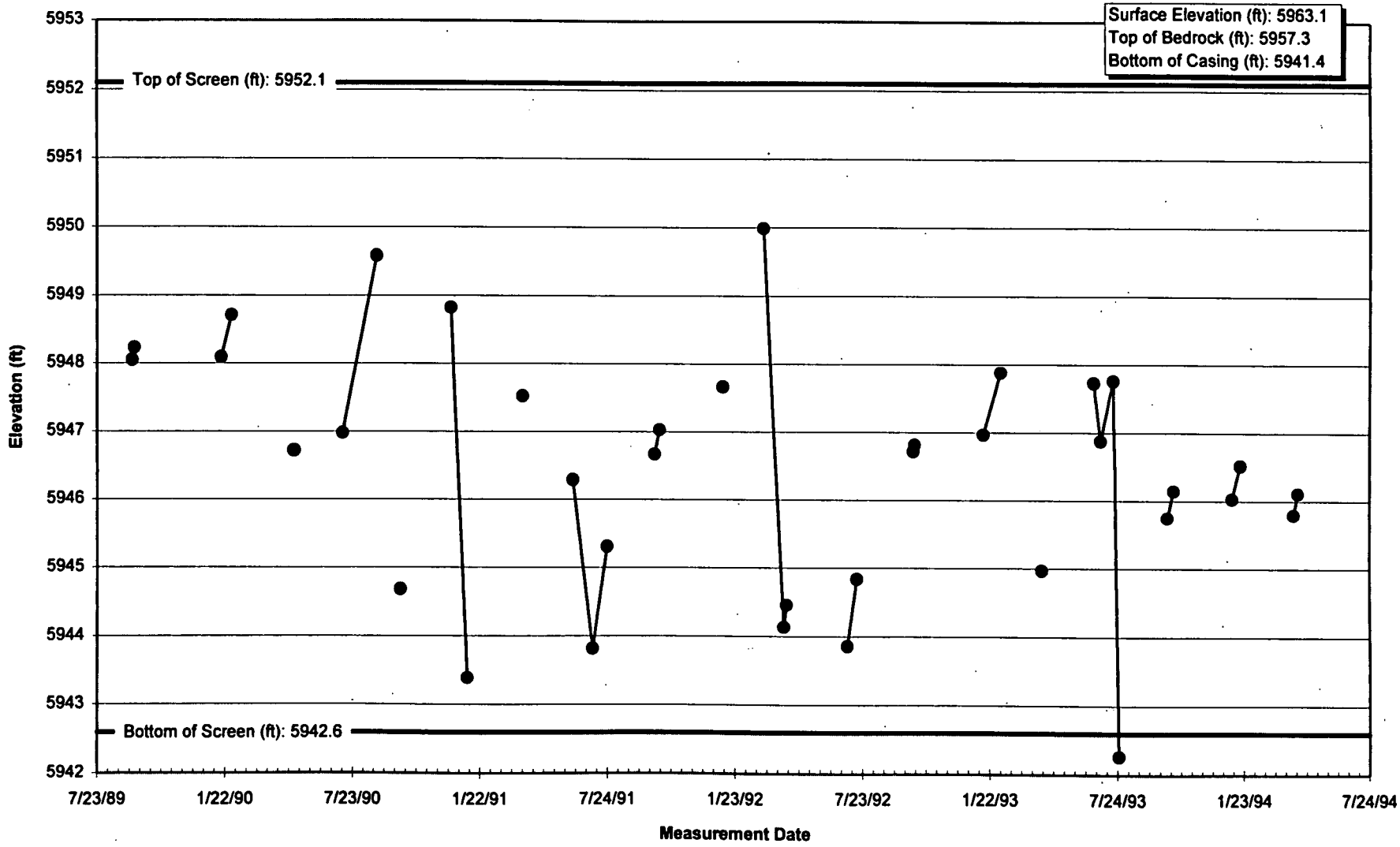
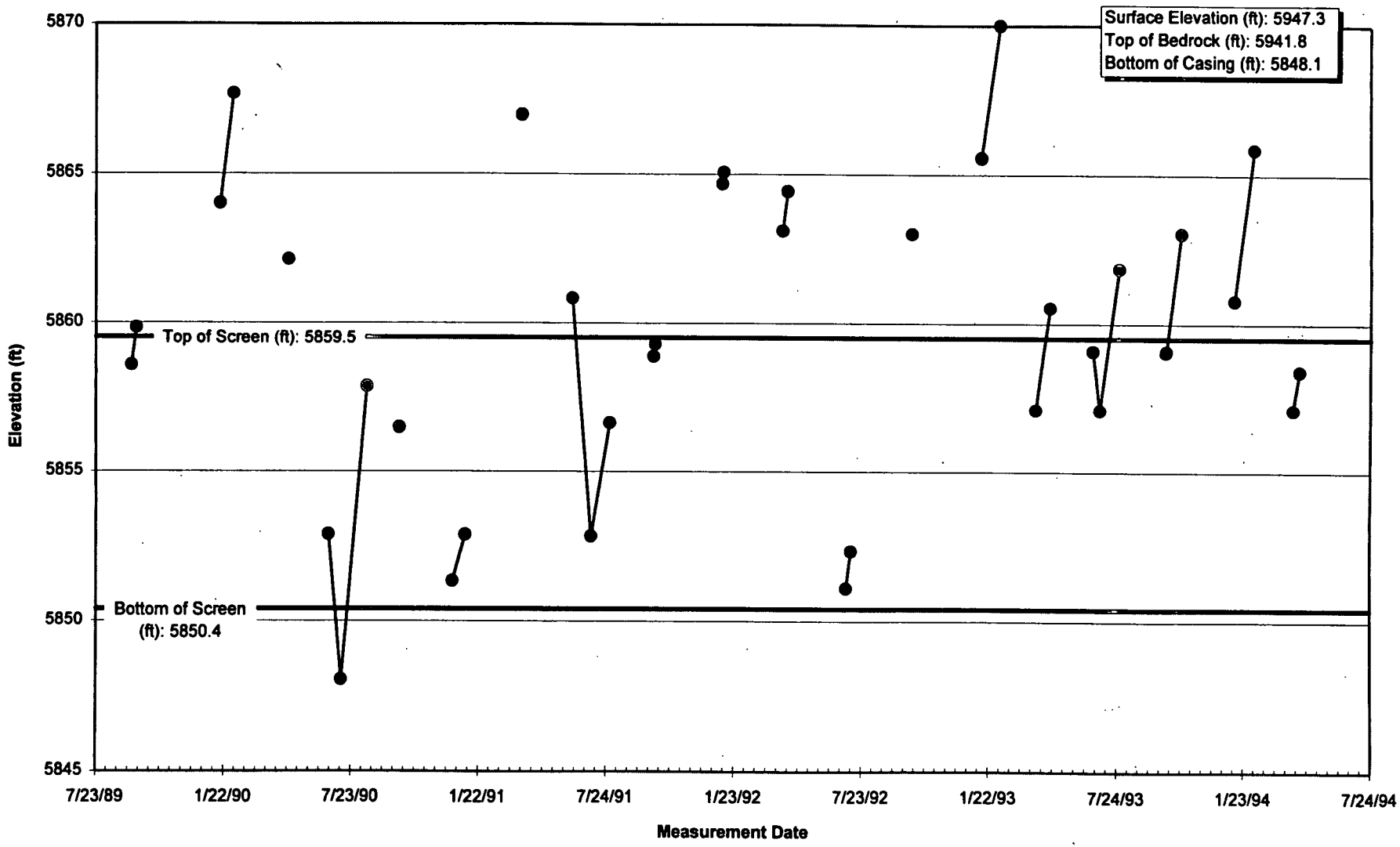


S21.XLS P207989 4/9/95

362

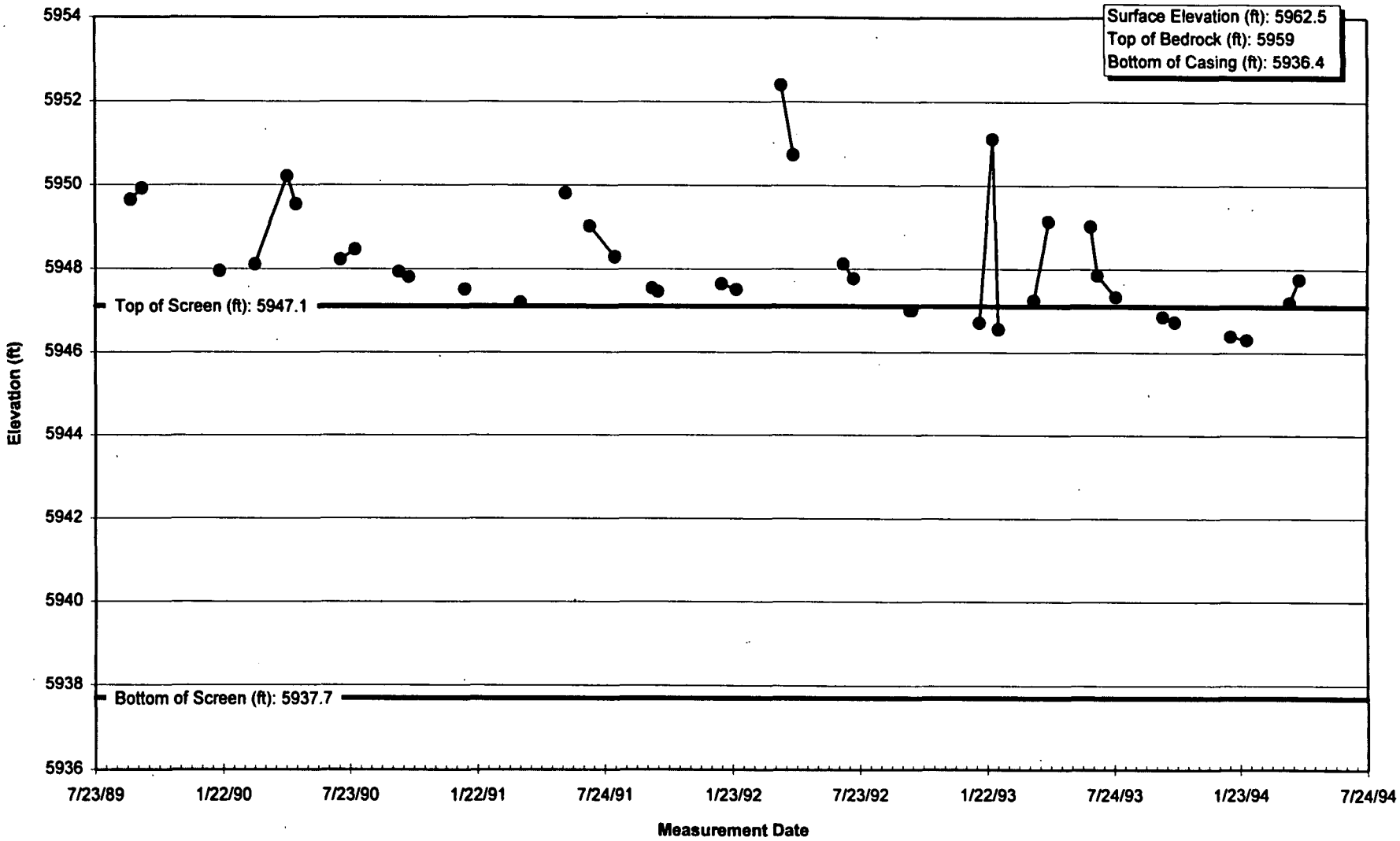
Hydrograph P208889



S21.XLS P208889 4/9/95

363

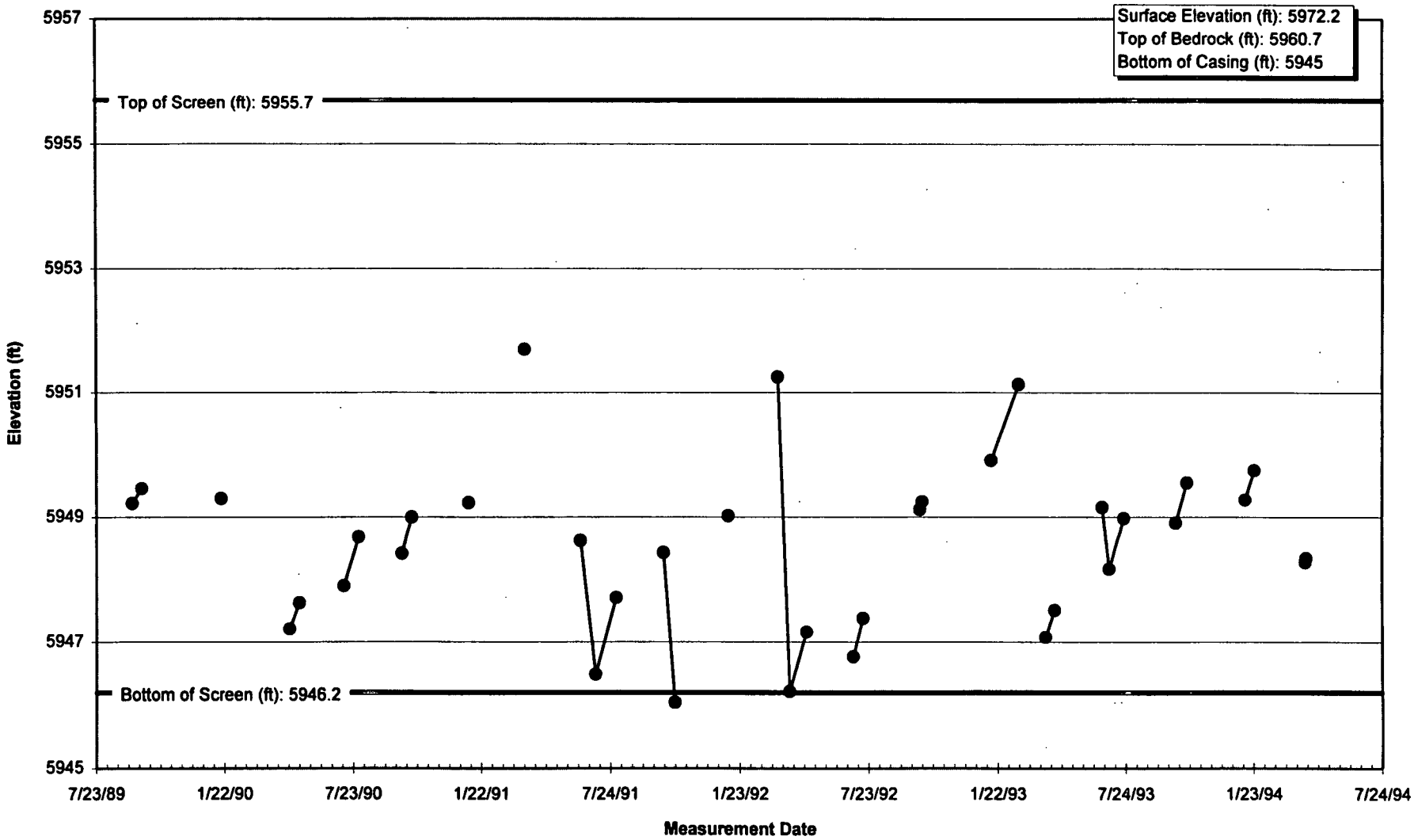
Hydrograph P208989



S21.XLS P208989 4/9/95

364

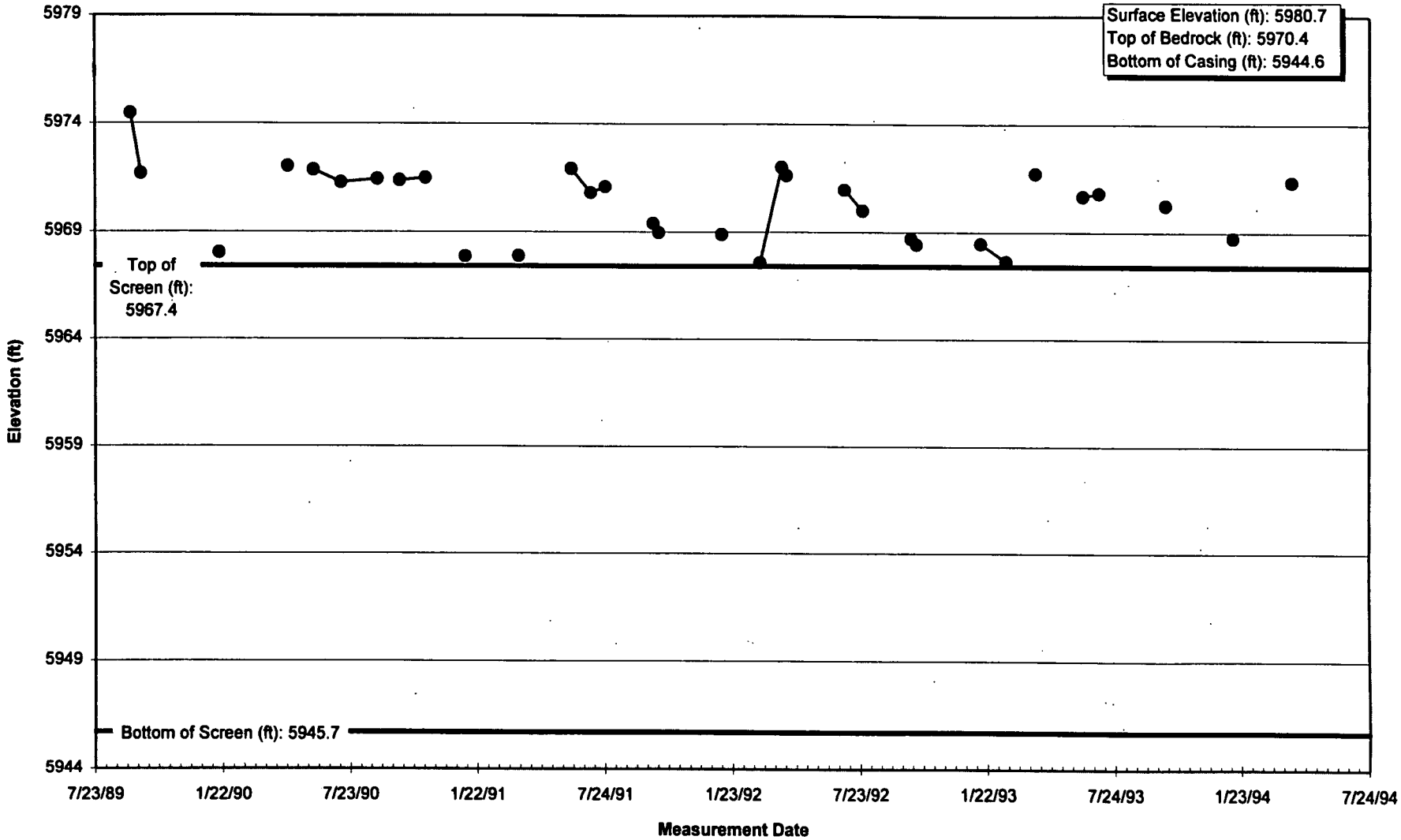
Hydrograph P209089



S21.XLS P209089 4/9/95

365

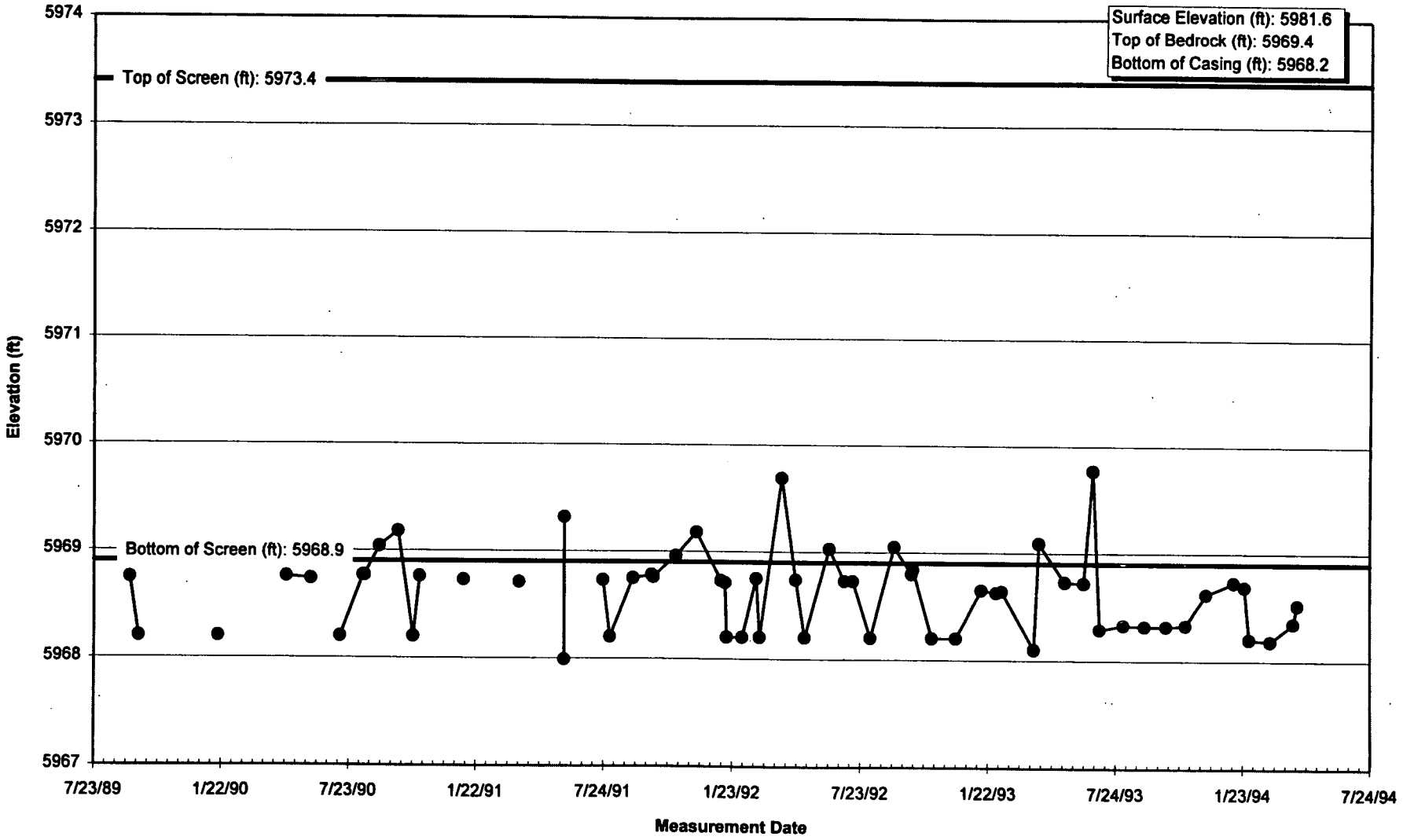
Hydrograph P209189



S21.XLS P209189 4/9/95

366

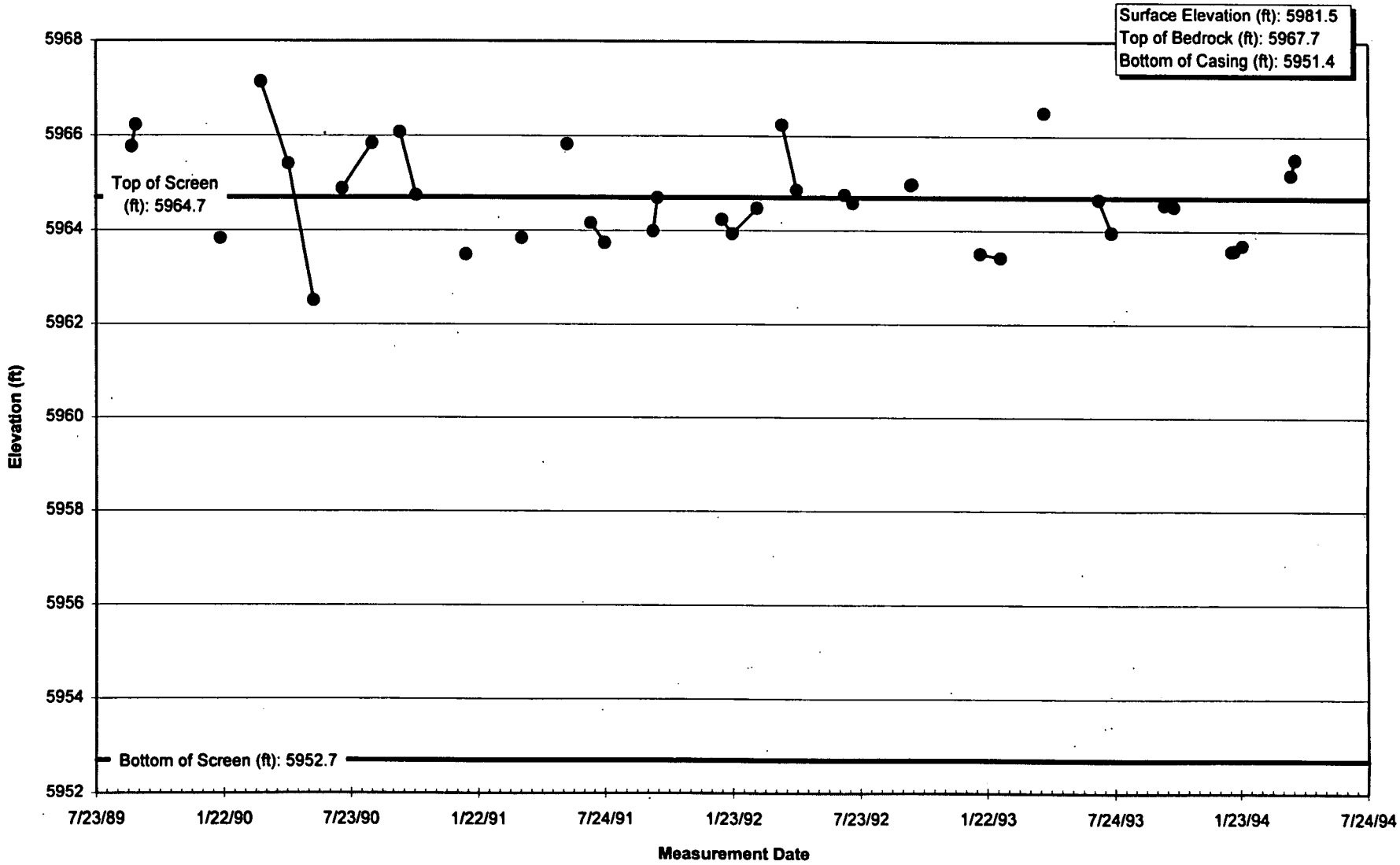
Hydrograph P209289



S21.XLS P209289 4/9/95

367

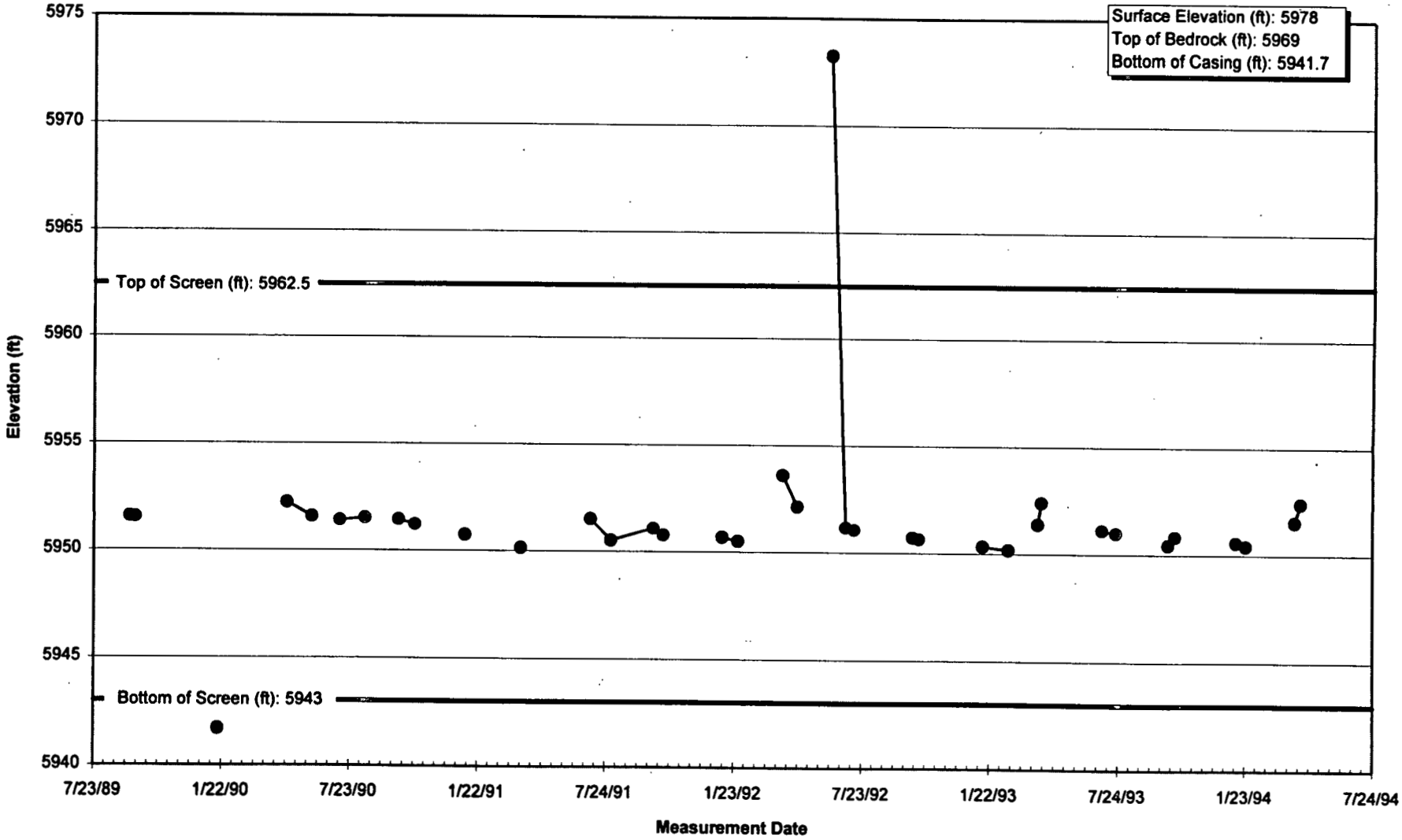
Hydrograph P209389



S21.XLS P209389 4/9/95

368

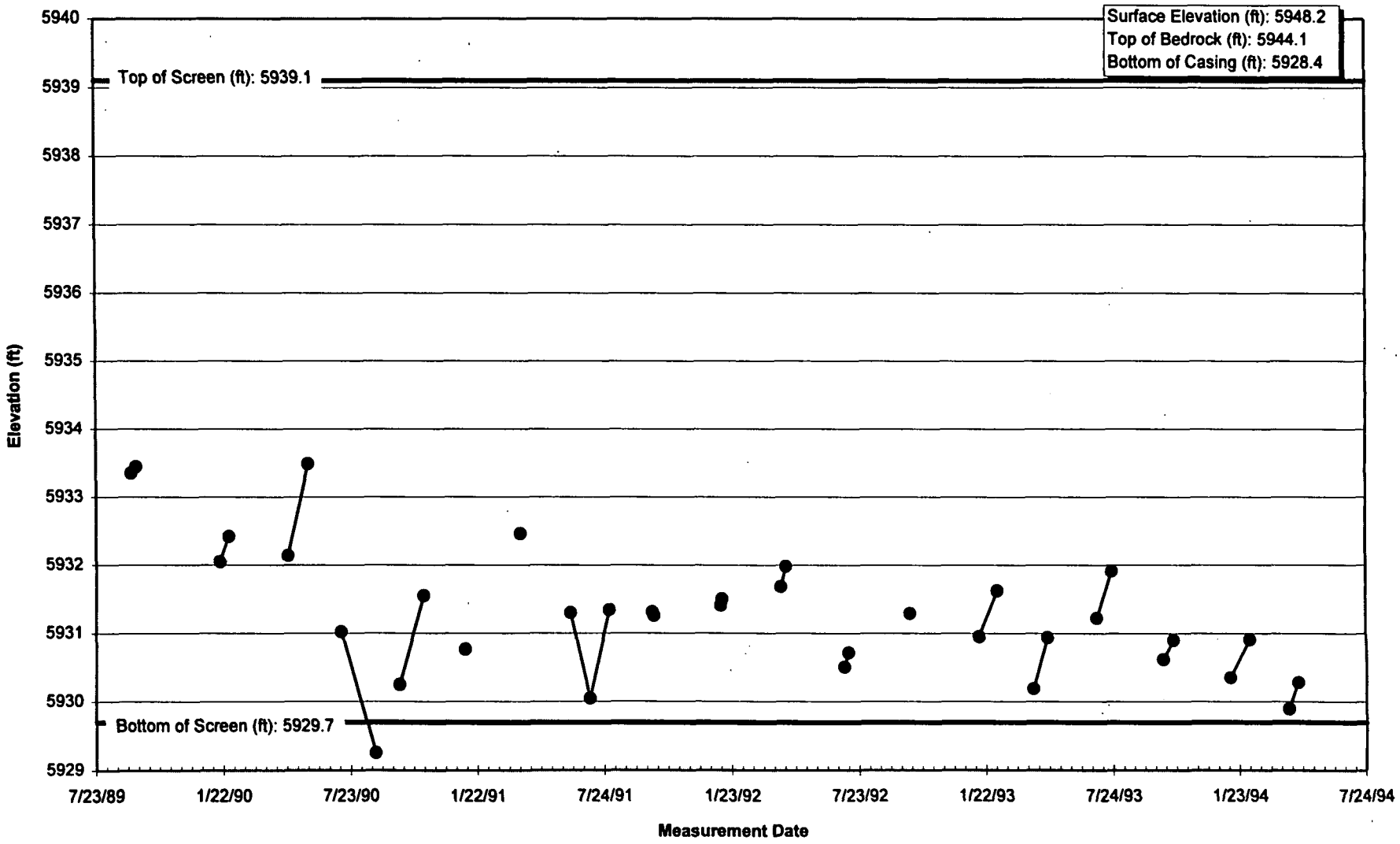
Hydrograph P209489



S21.XLS P209489 4/9/95

369

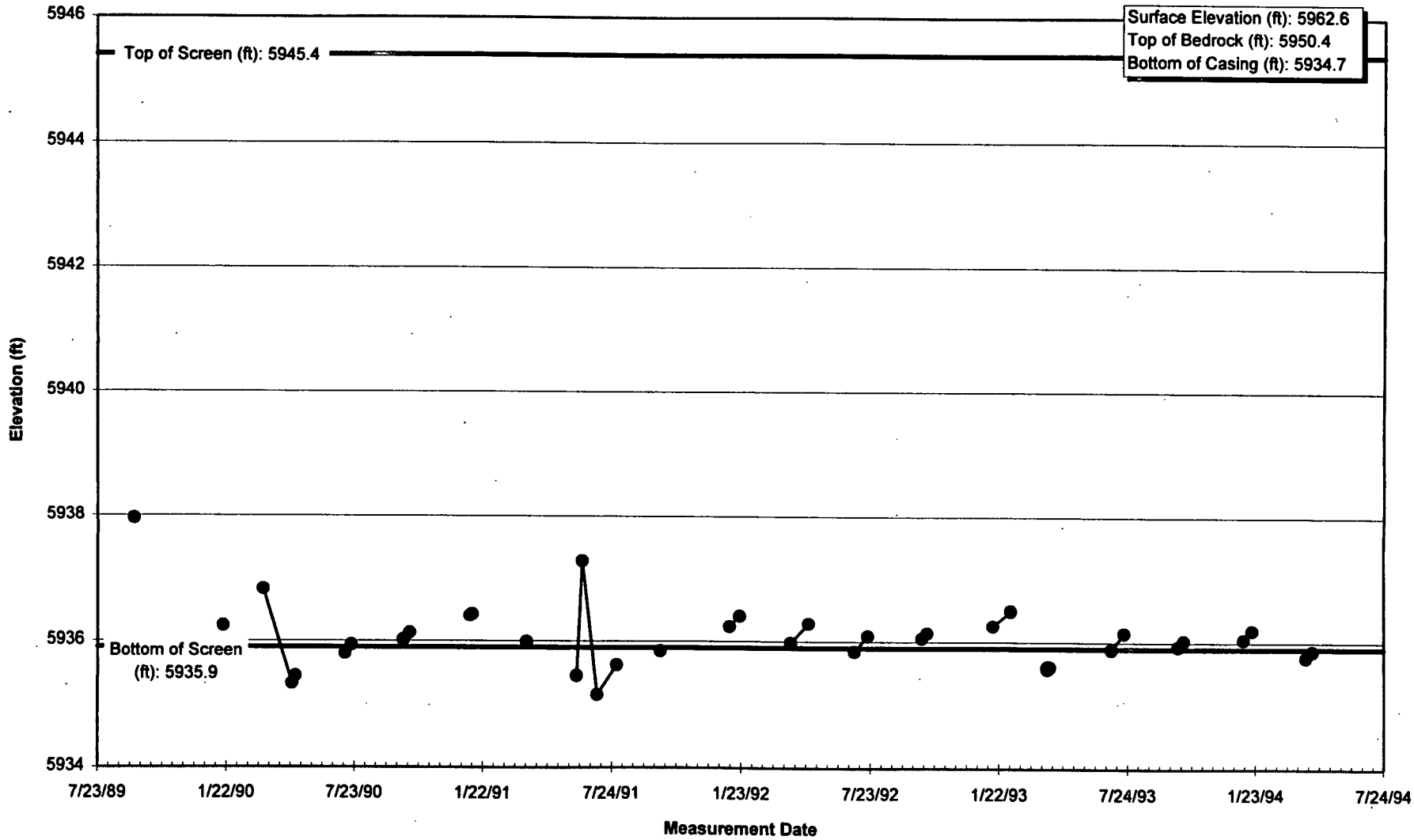
Hydrograph P209589



S21.XLS P209589 4/9/95

370

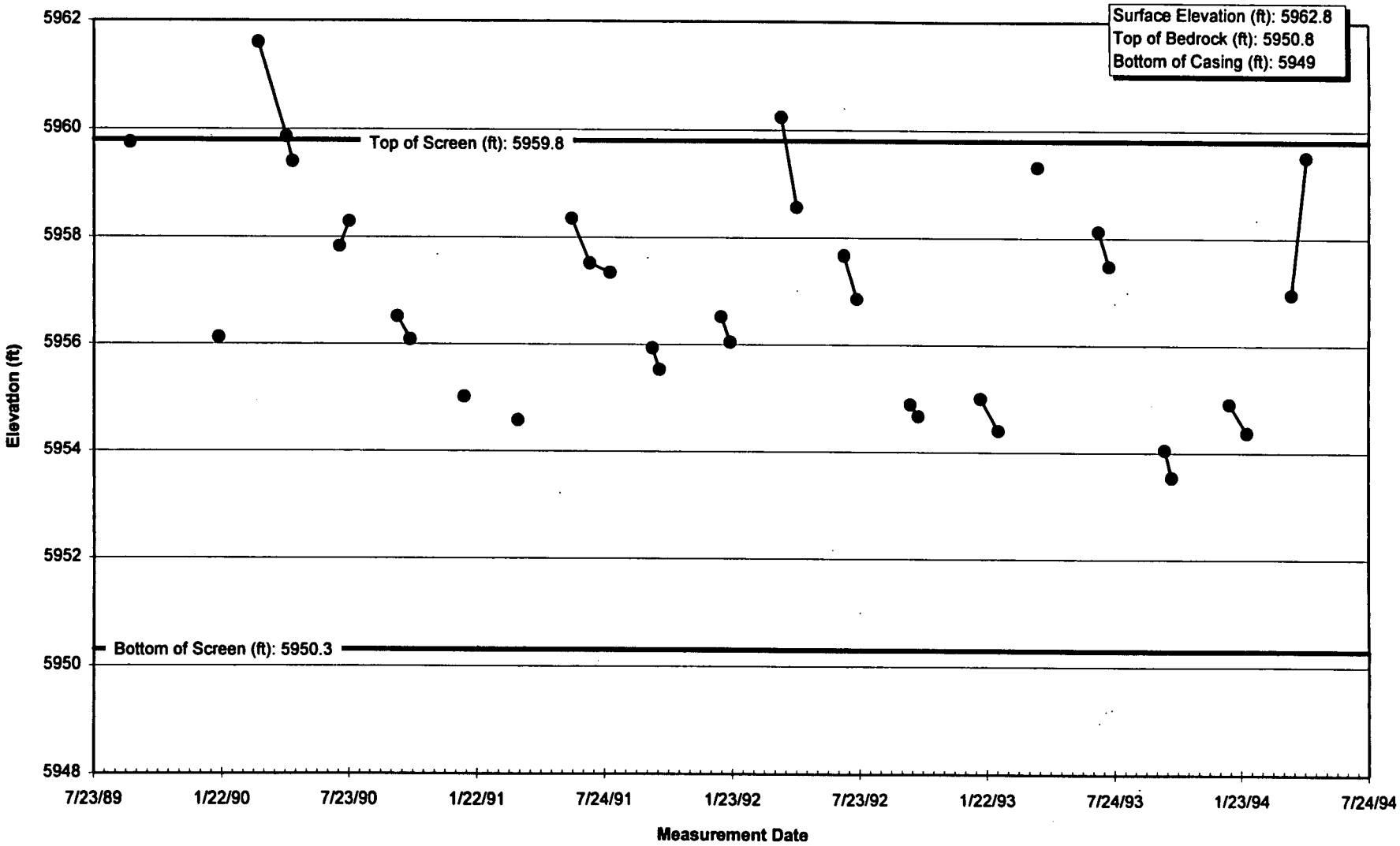
Hydrograph P209689



S21.XLS P209689 4/9/95

371

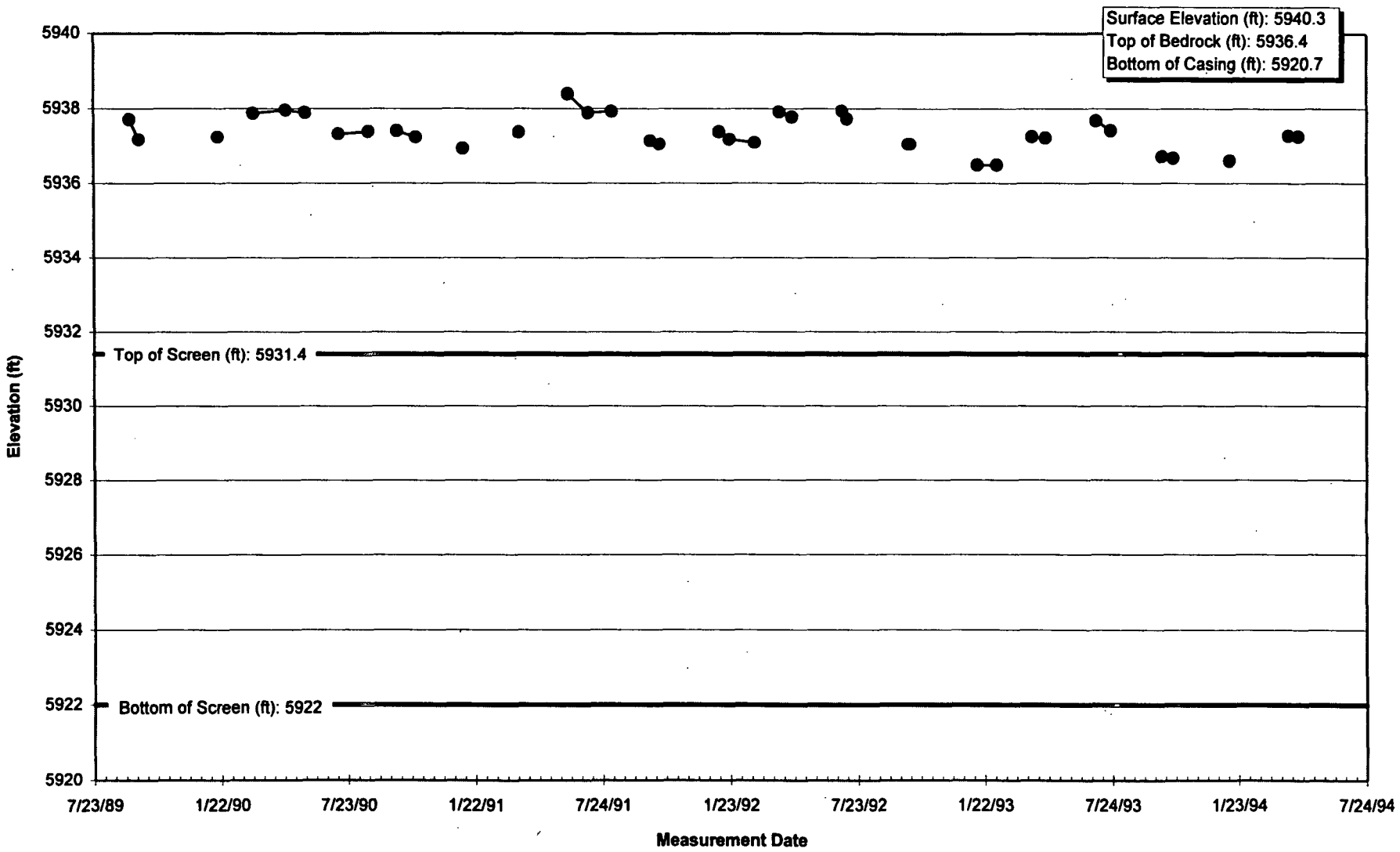
Hydrograph P209789



S21.XLS P209789 4/9/95

372

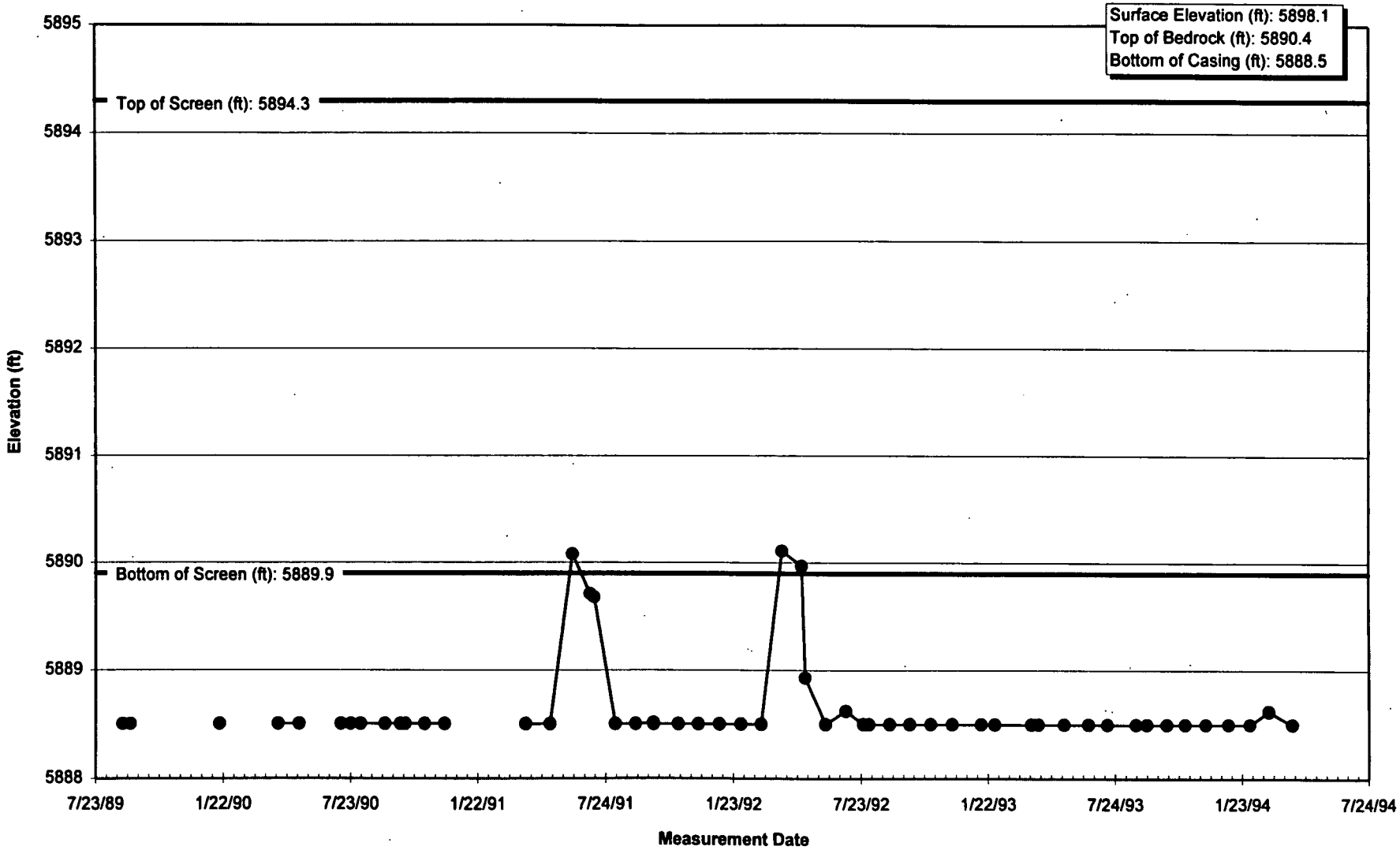
Hydrograph P209889



S21.XLS P209889 4/9/95

373

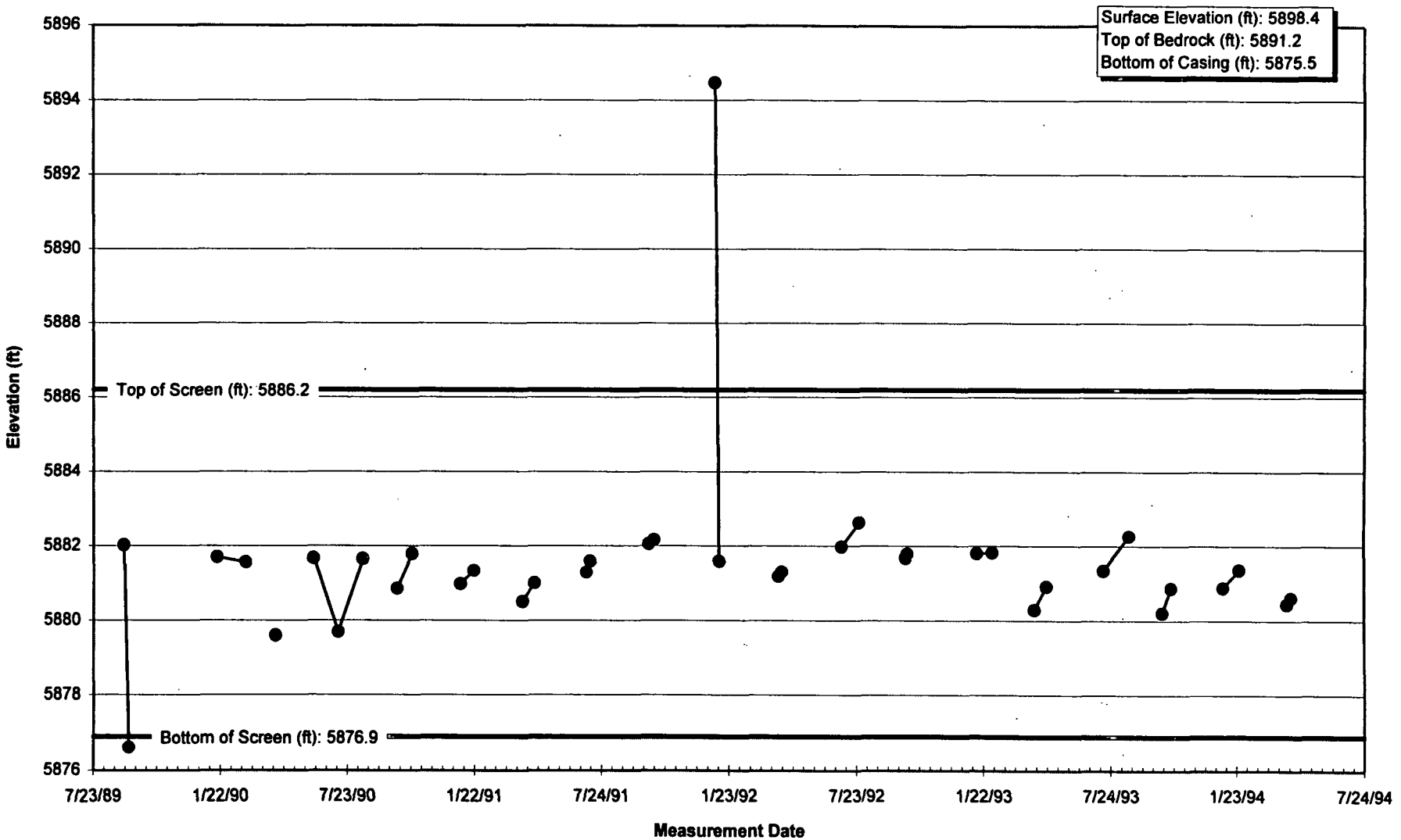
Hydrograph P209989



S21.XLS P209989 4/9/95

374

Hydrograph P210089



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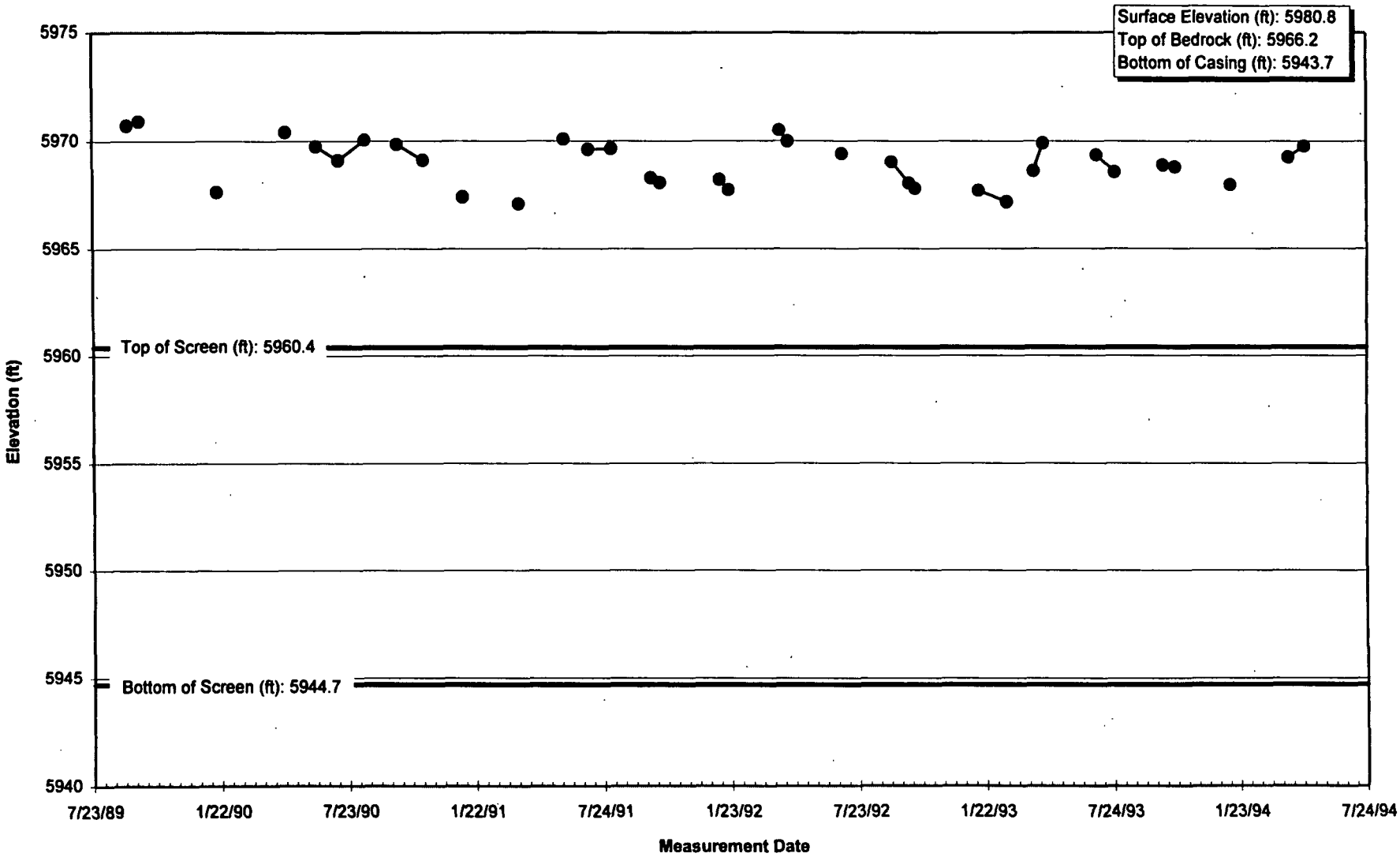
375

Hydrograph P210189



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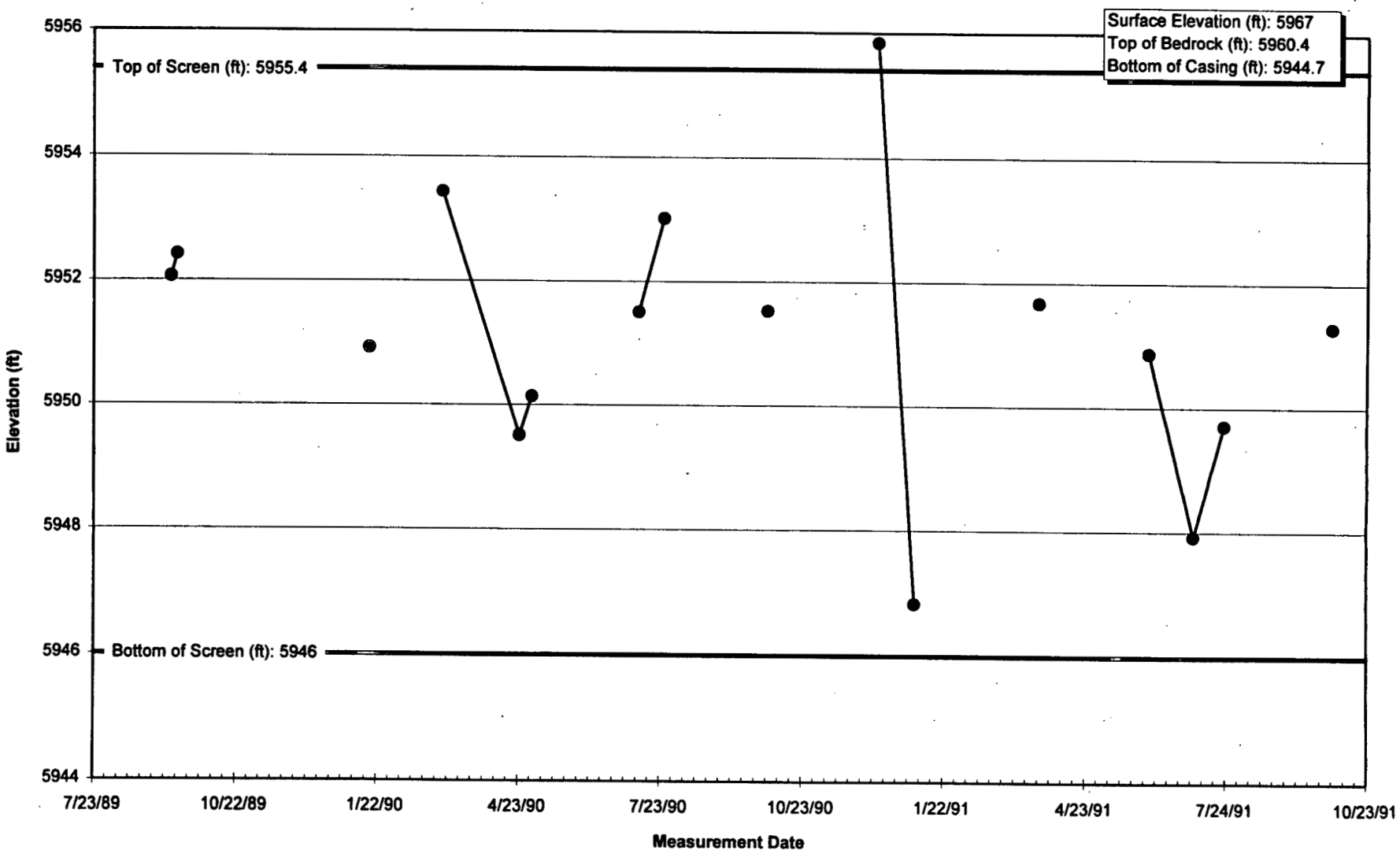
376

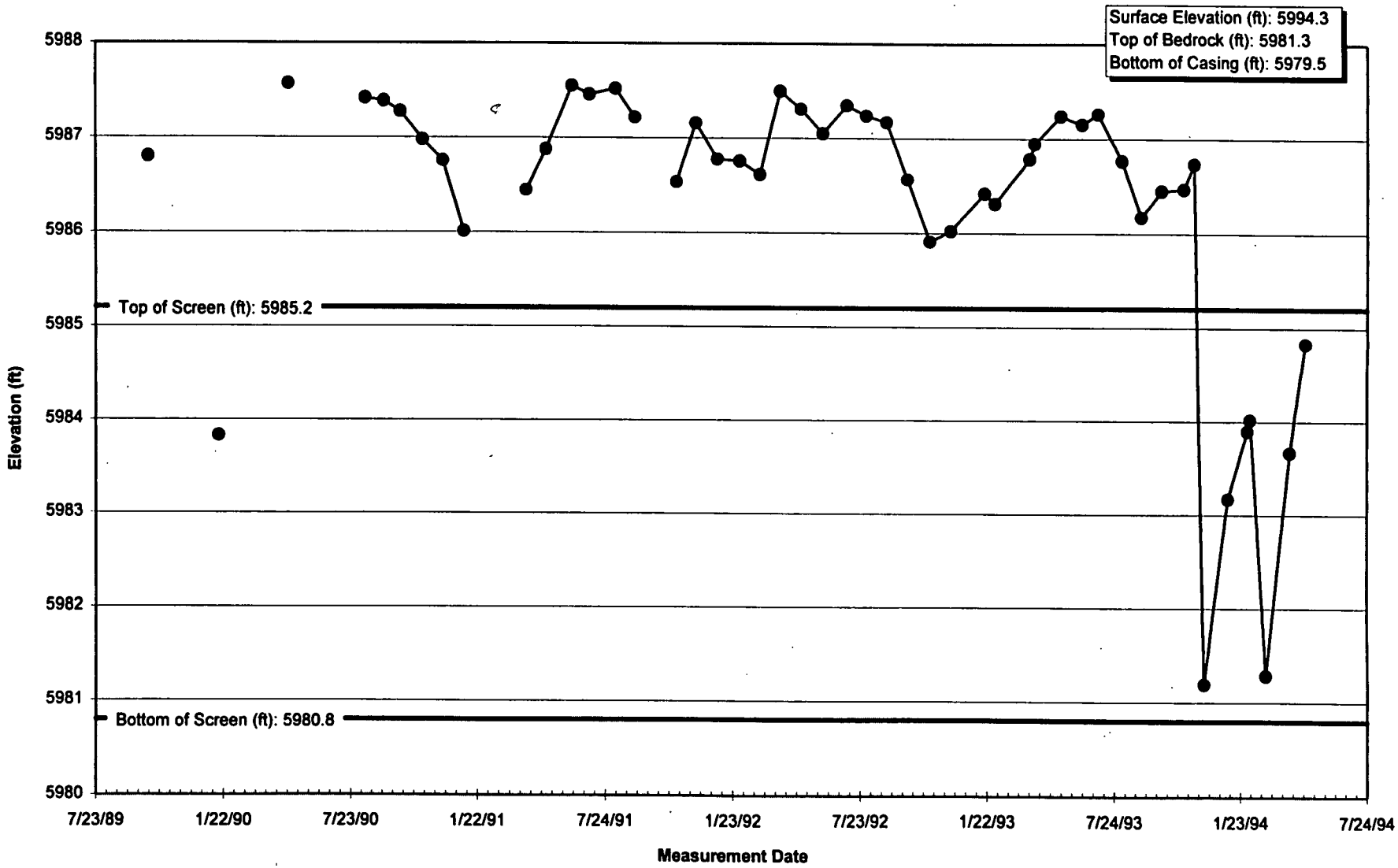
Hydrograph P210289



S21.XLS P210289 4/9/95

377

Hydrograph P213689



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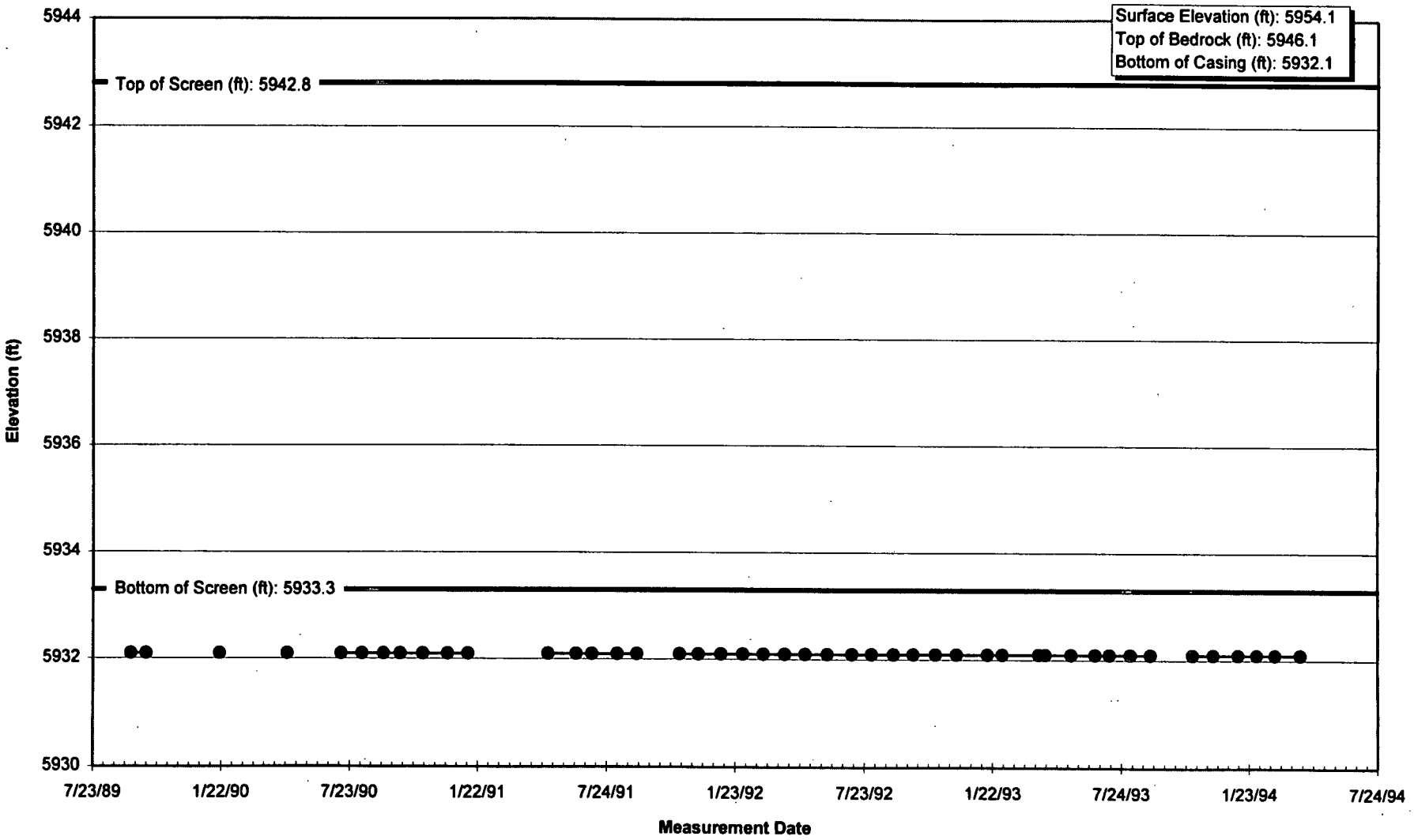
378

Hydrograph P213889



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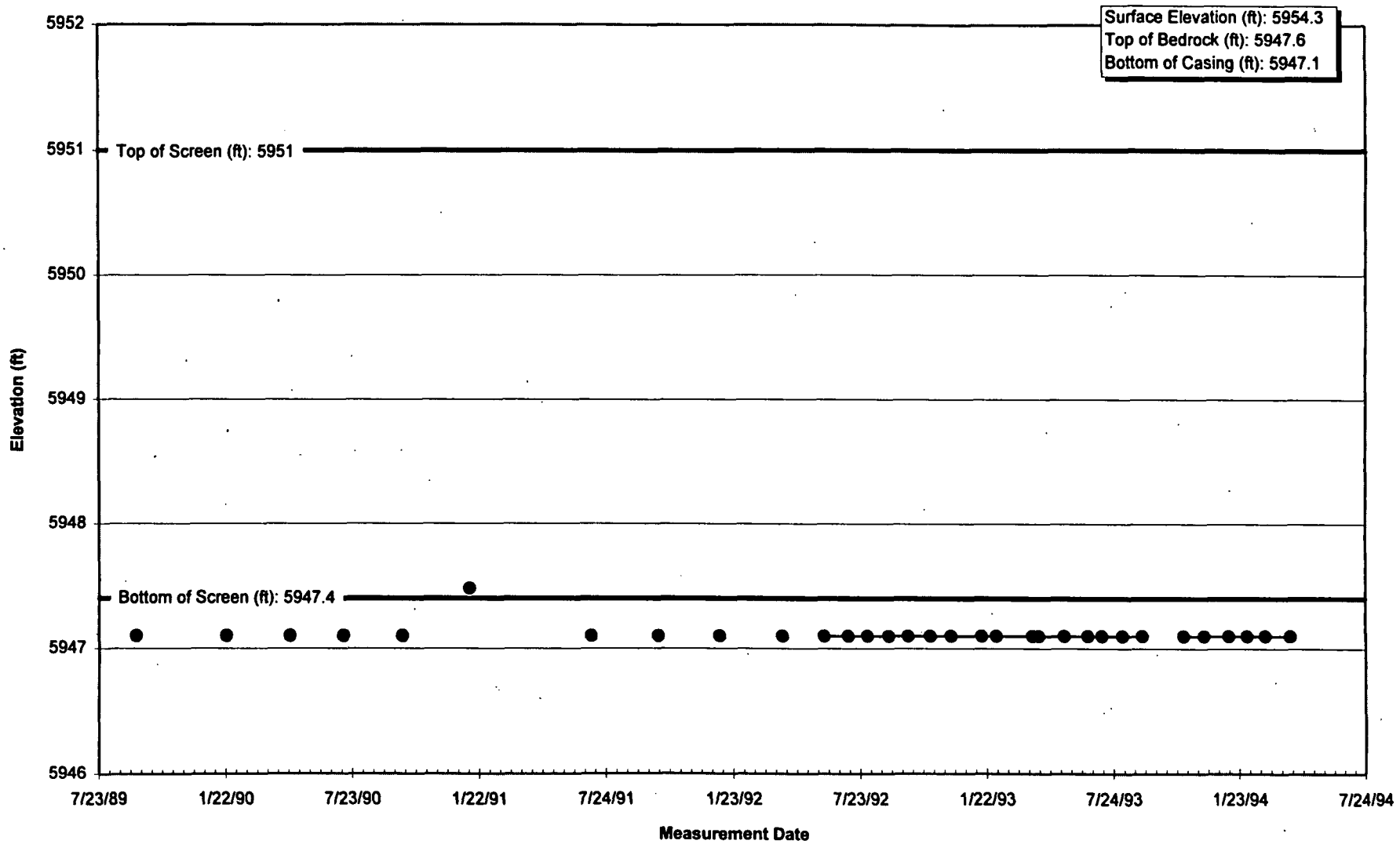
379

Hydrograph P213989



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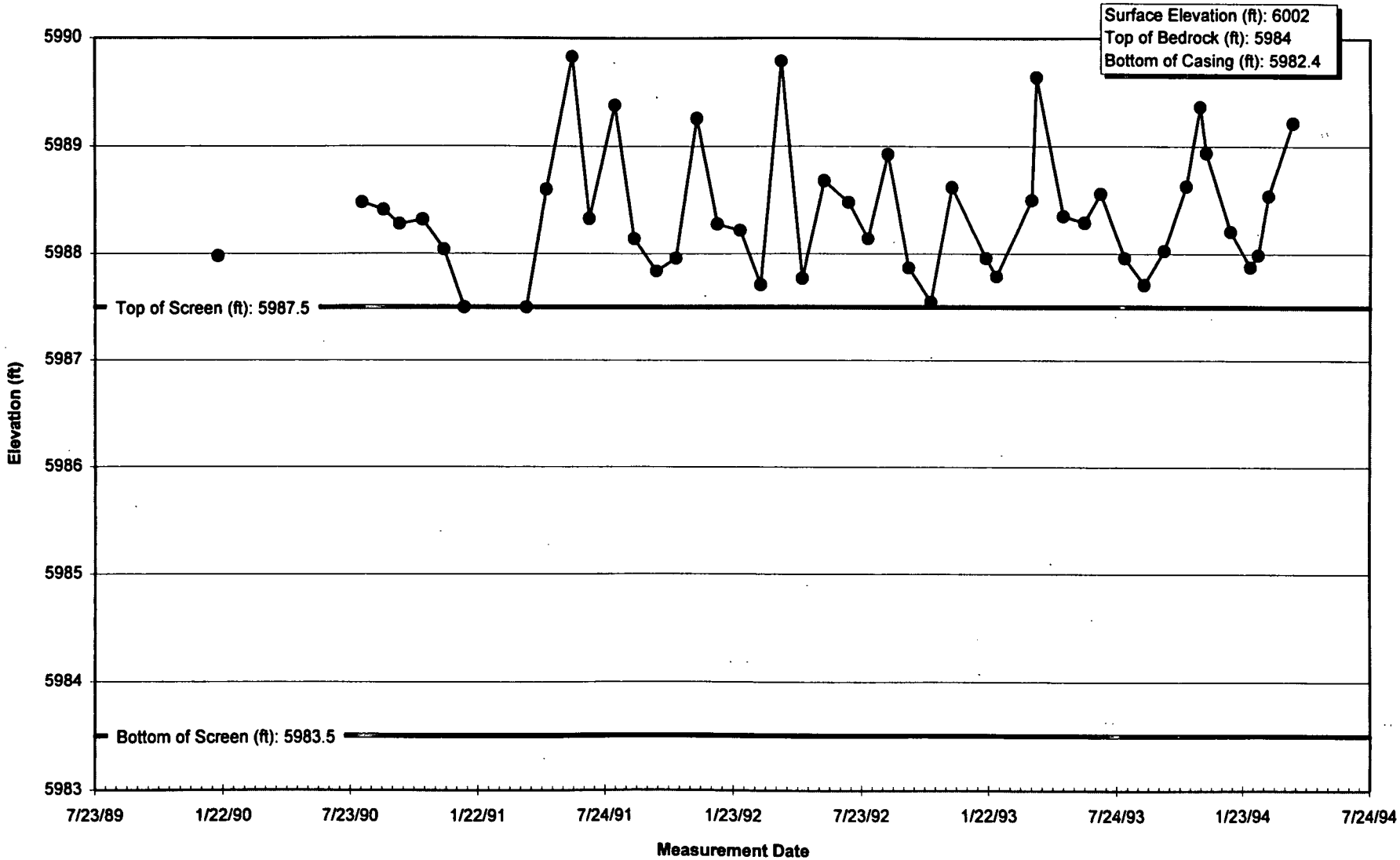
380

Hydrograph P215789



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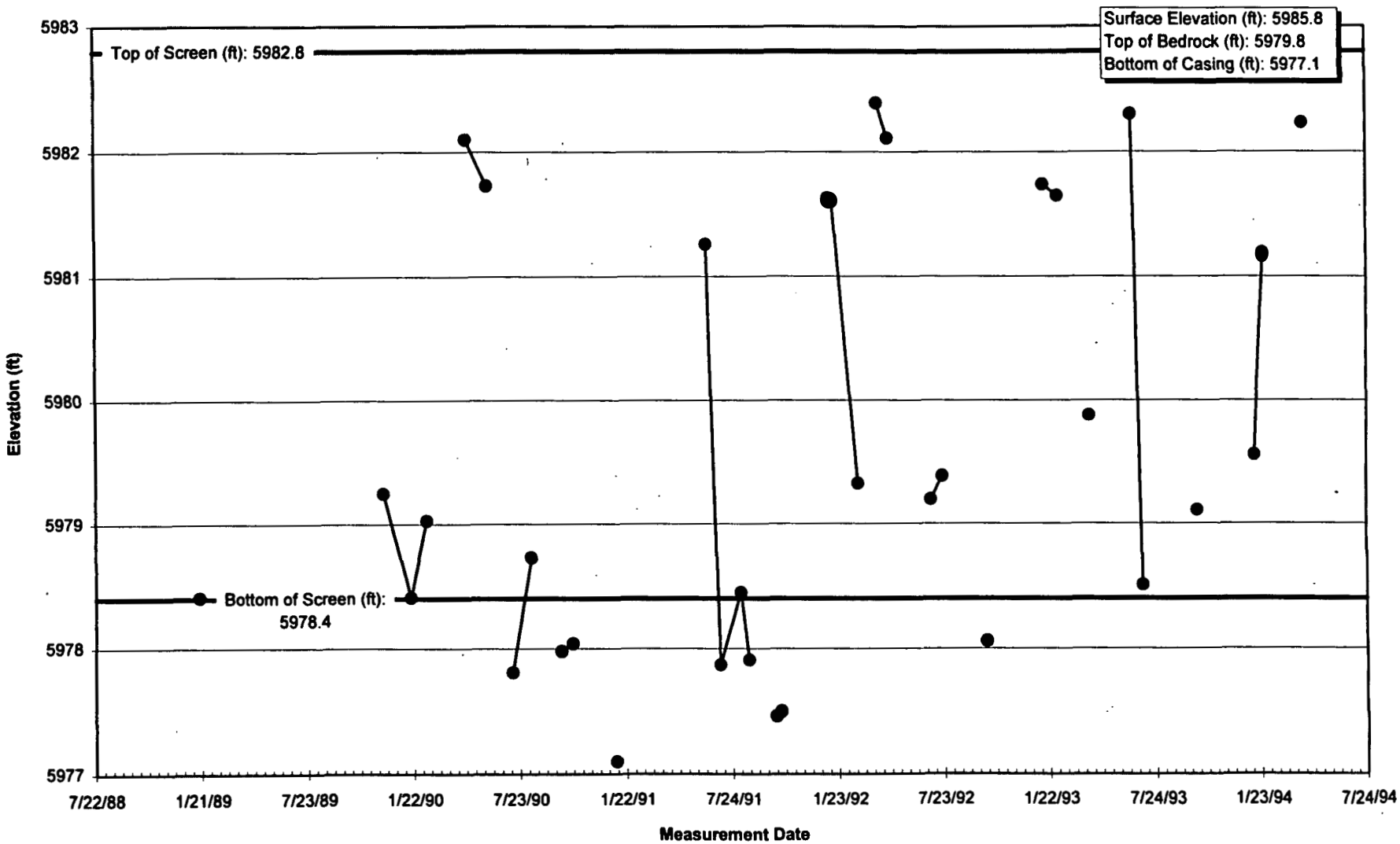
381

Hydrograph P218089



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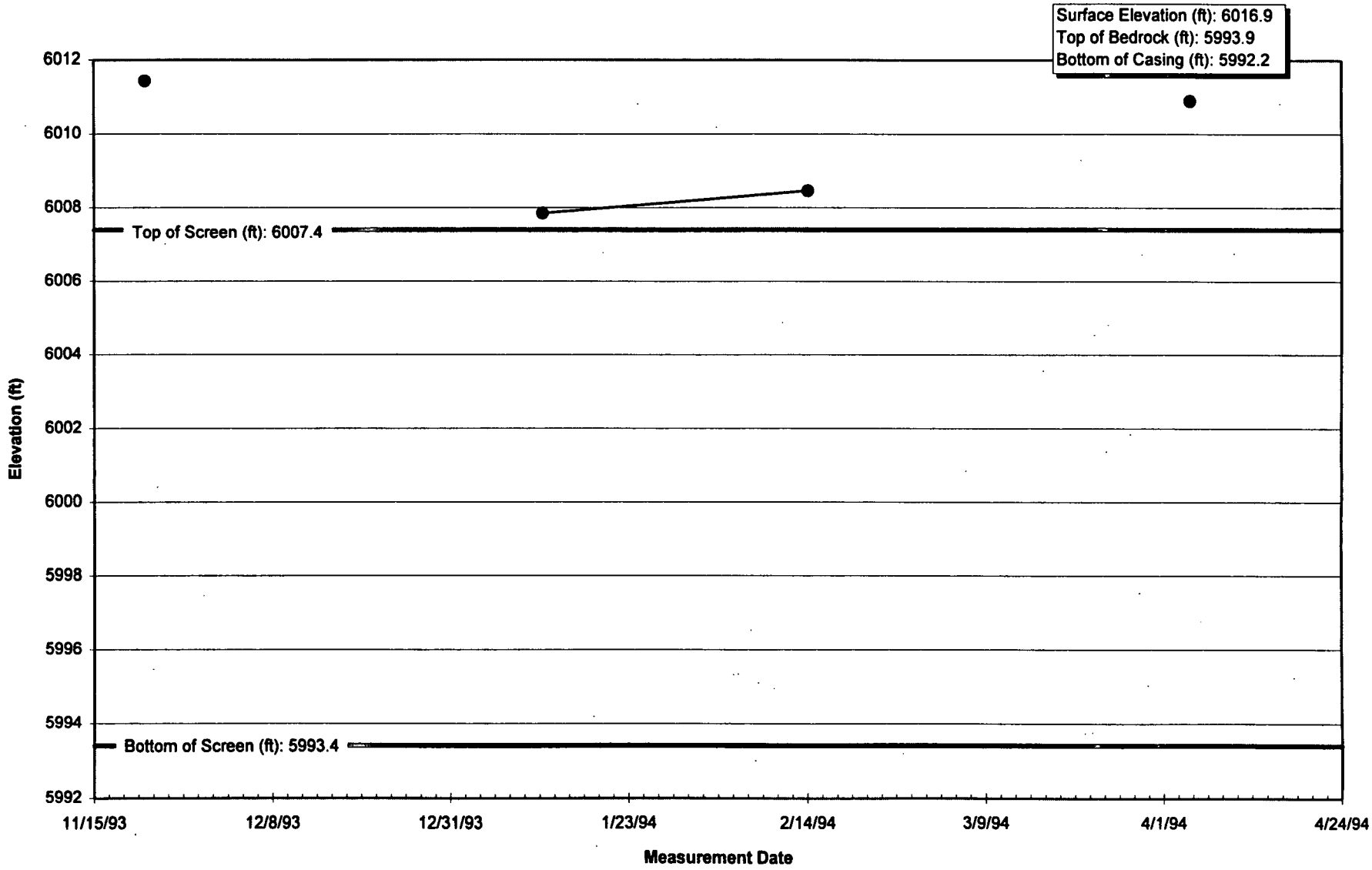
382

Hydrograph P218289



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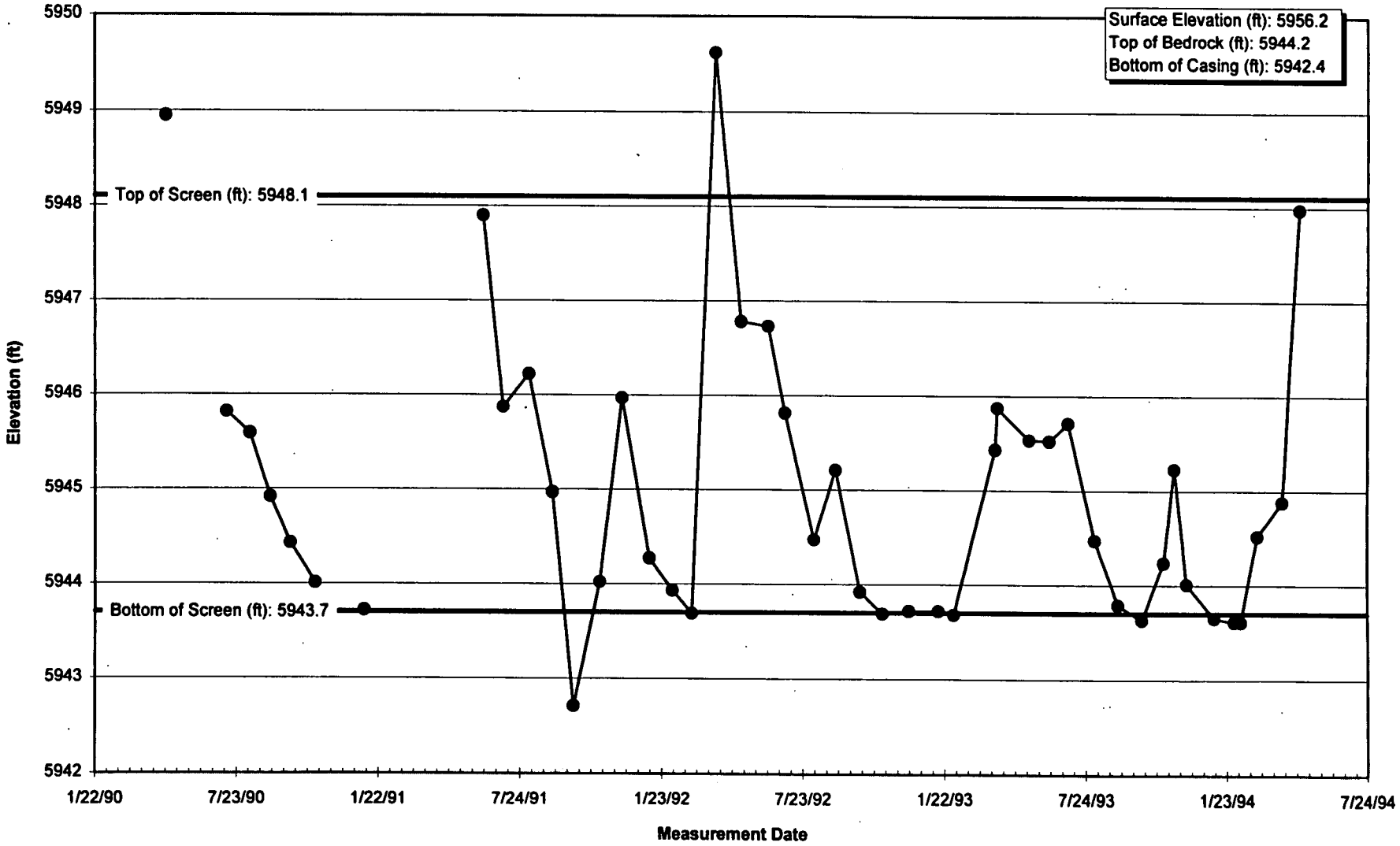
383

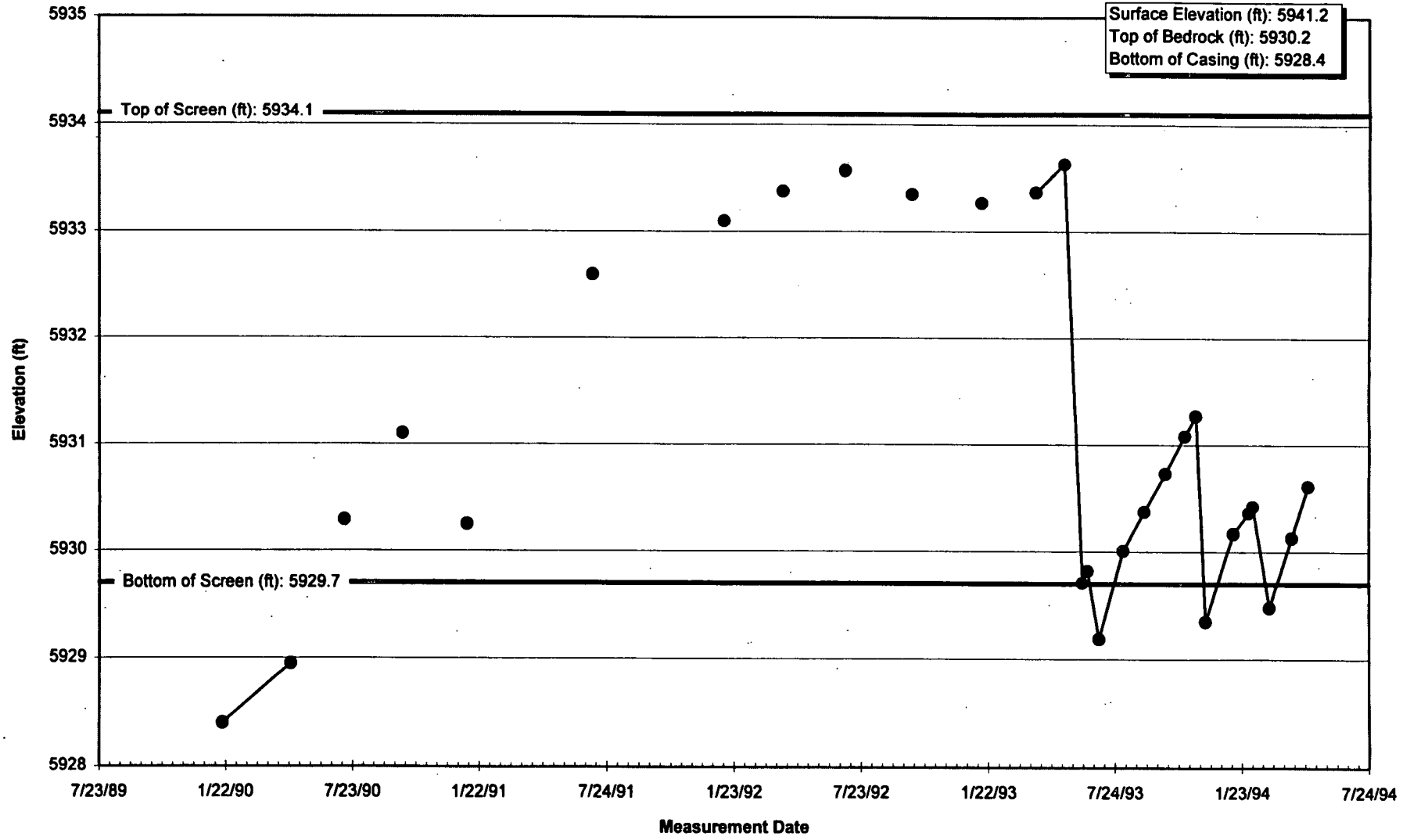
Hydrograph P218389



S21.XLS P218389 4/9/95

384

Hydrograph P219189



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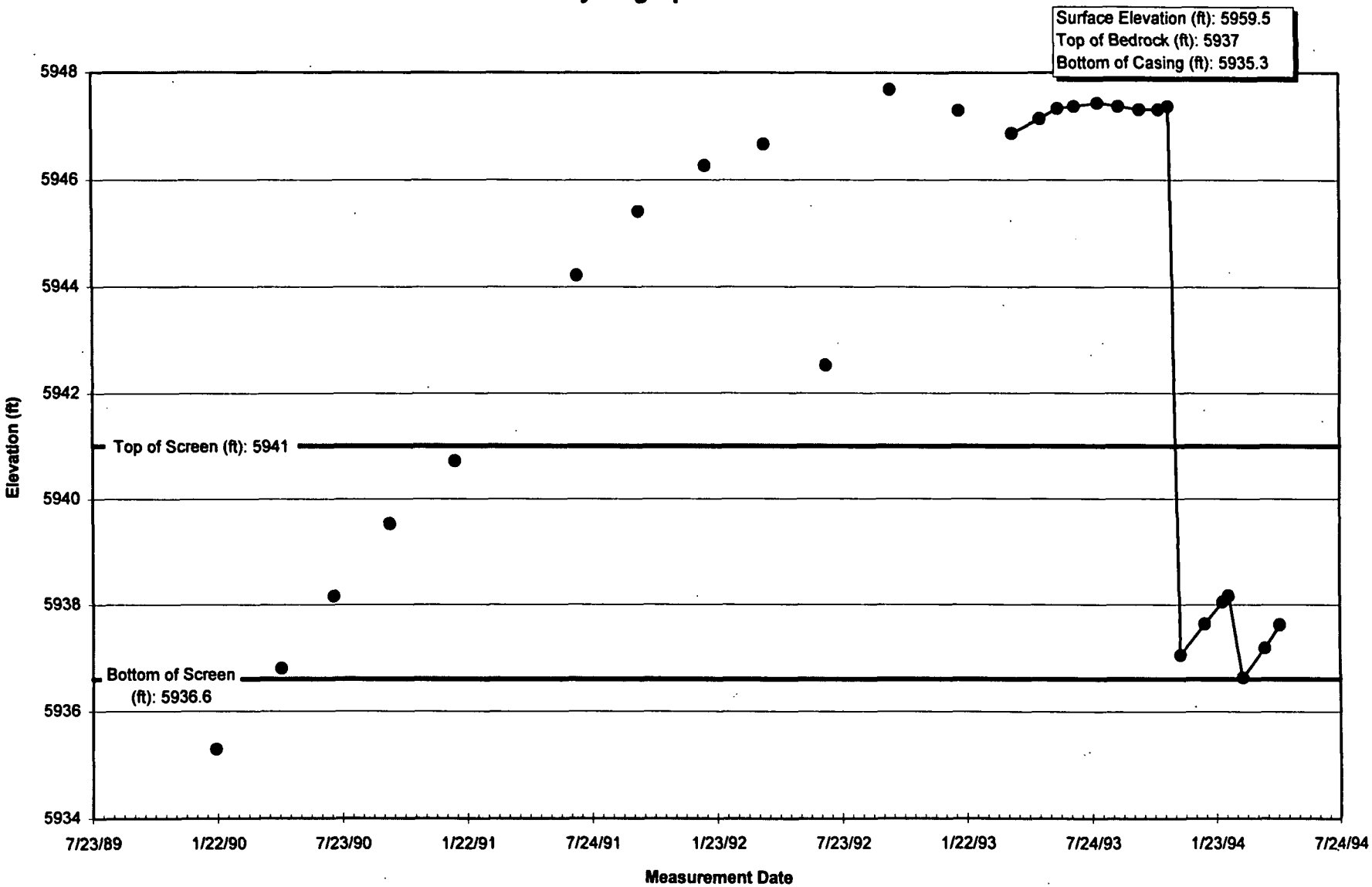
385

Hydrograph P219489



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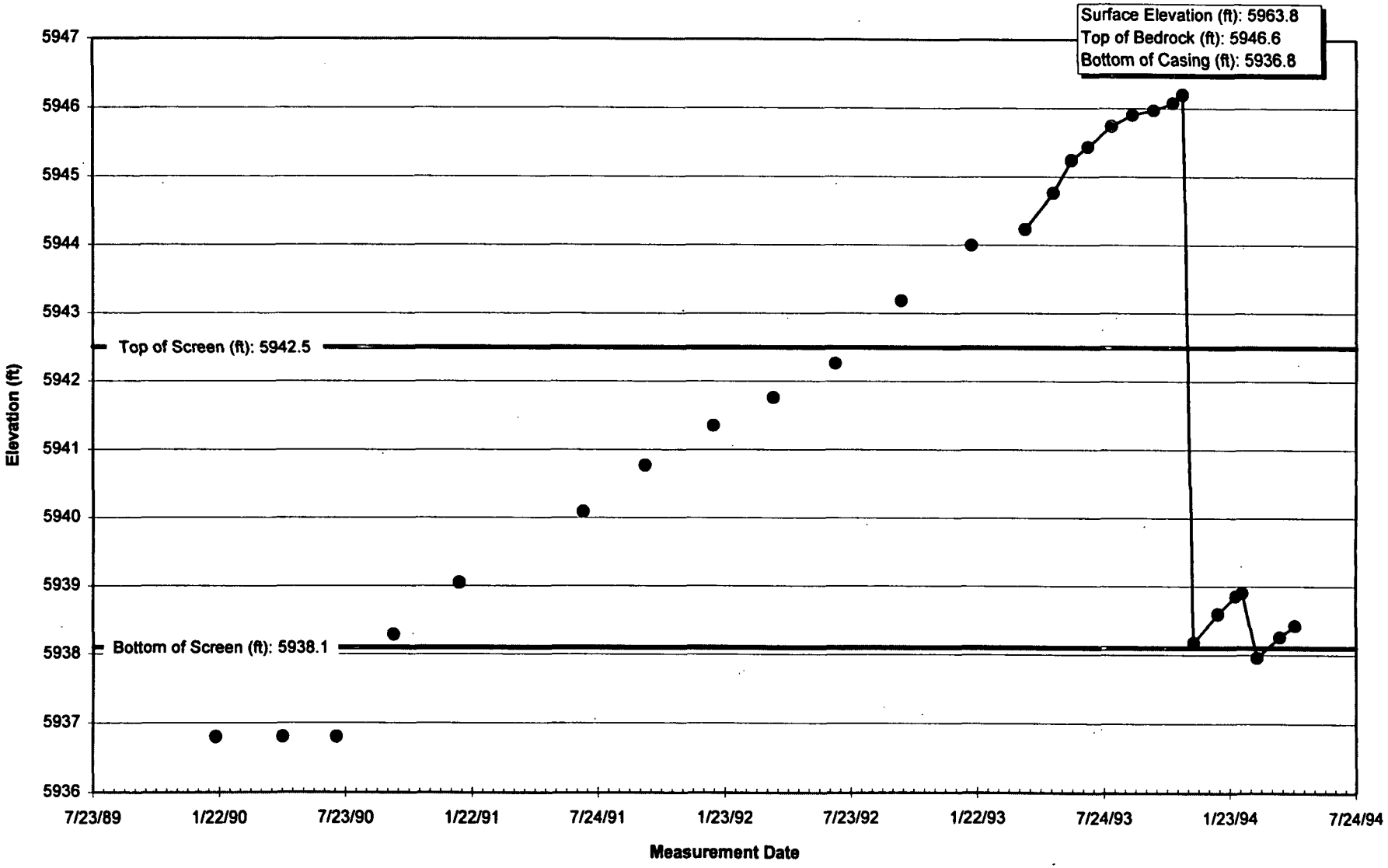
386

Hydrograph P219589



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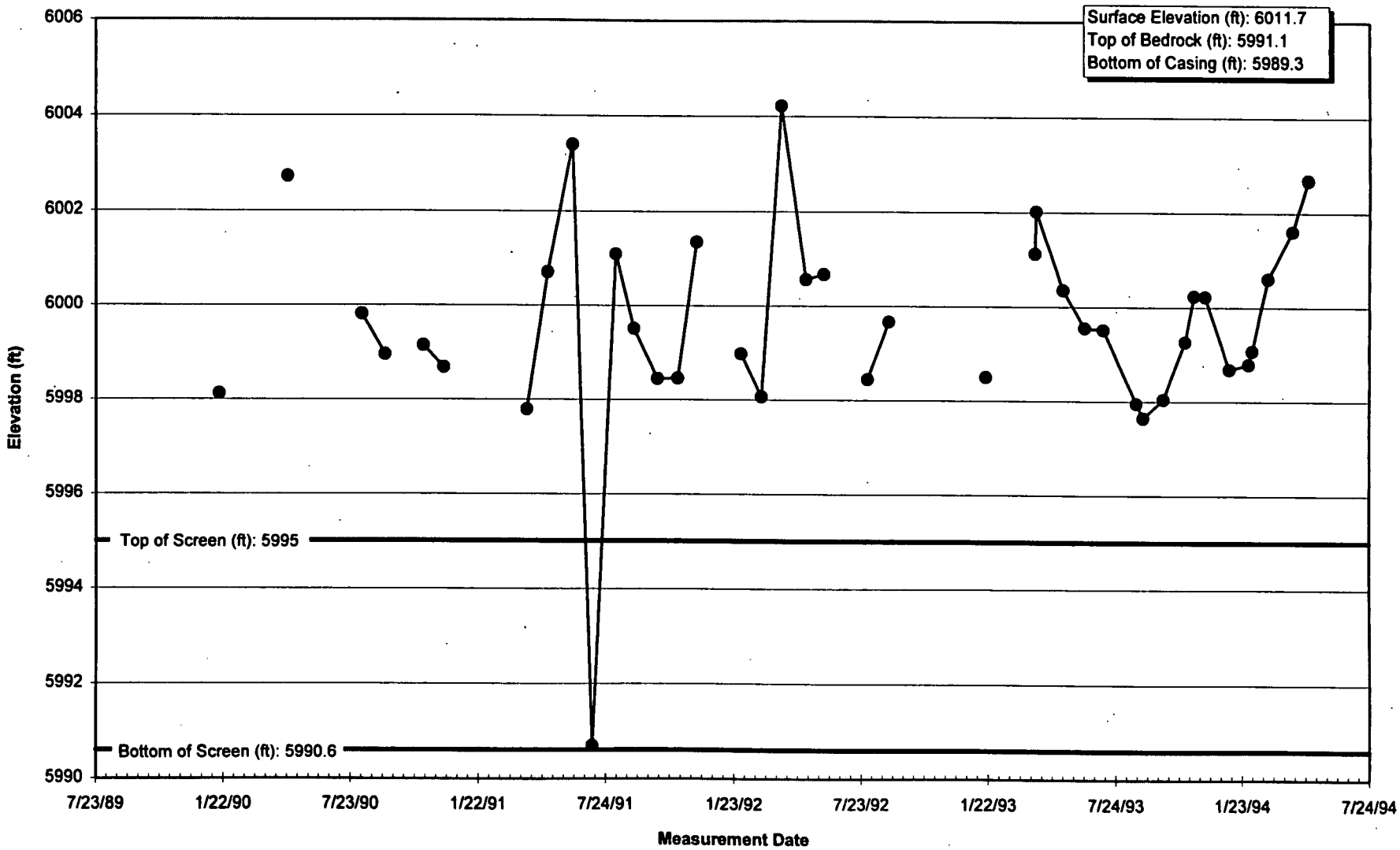
387

Hydrograph P313489



388

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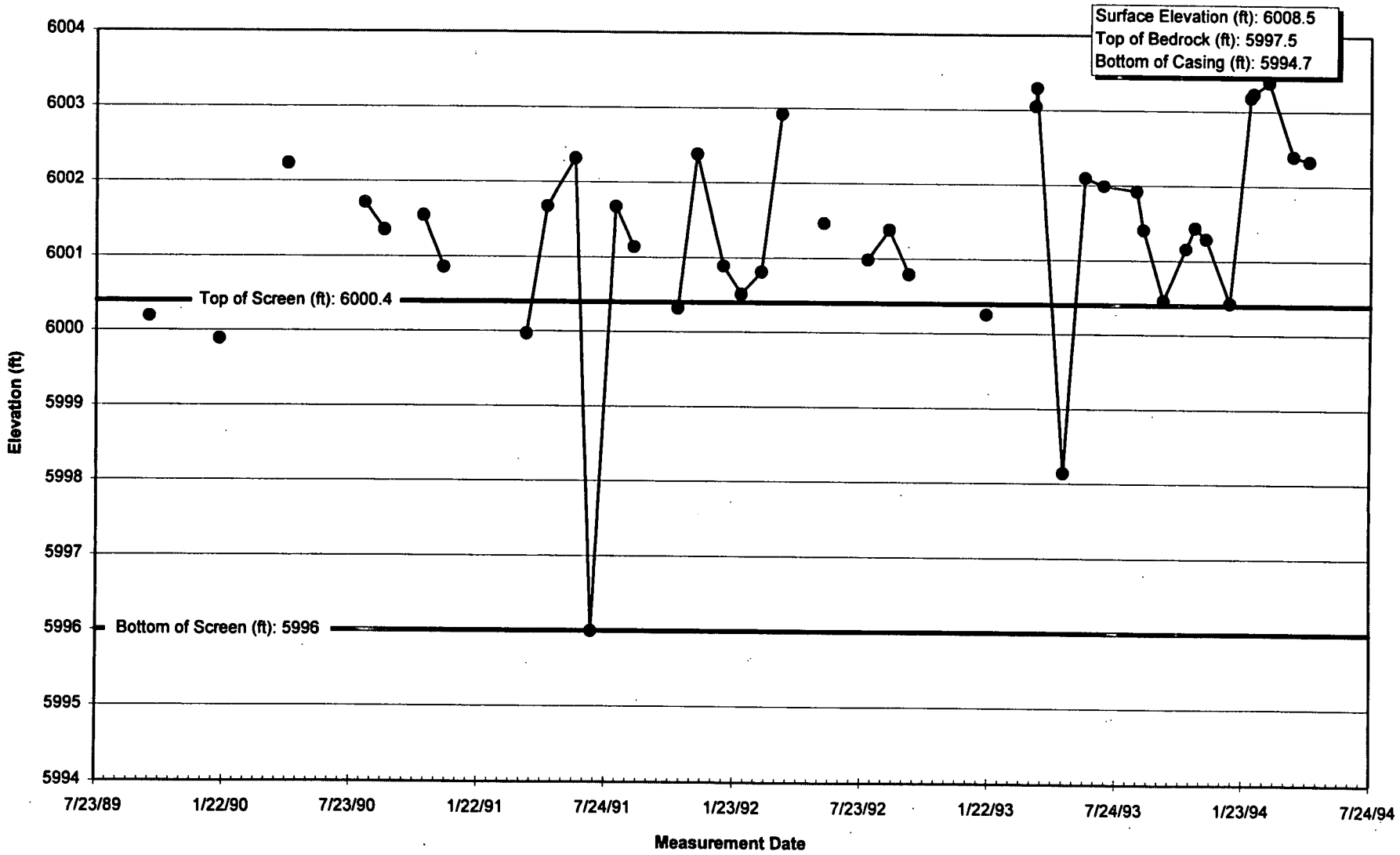
Hydrograph P313589



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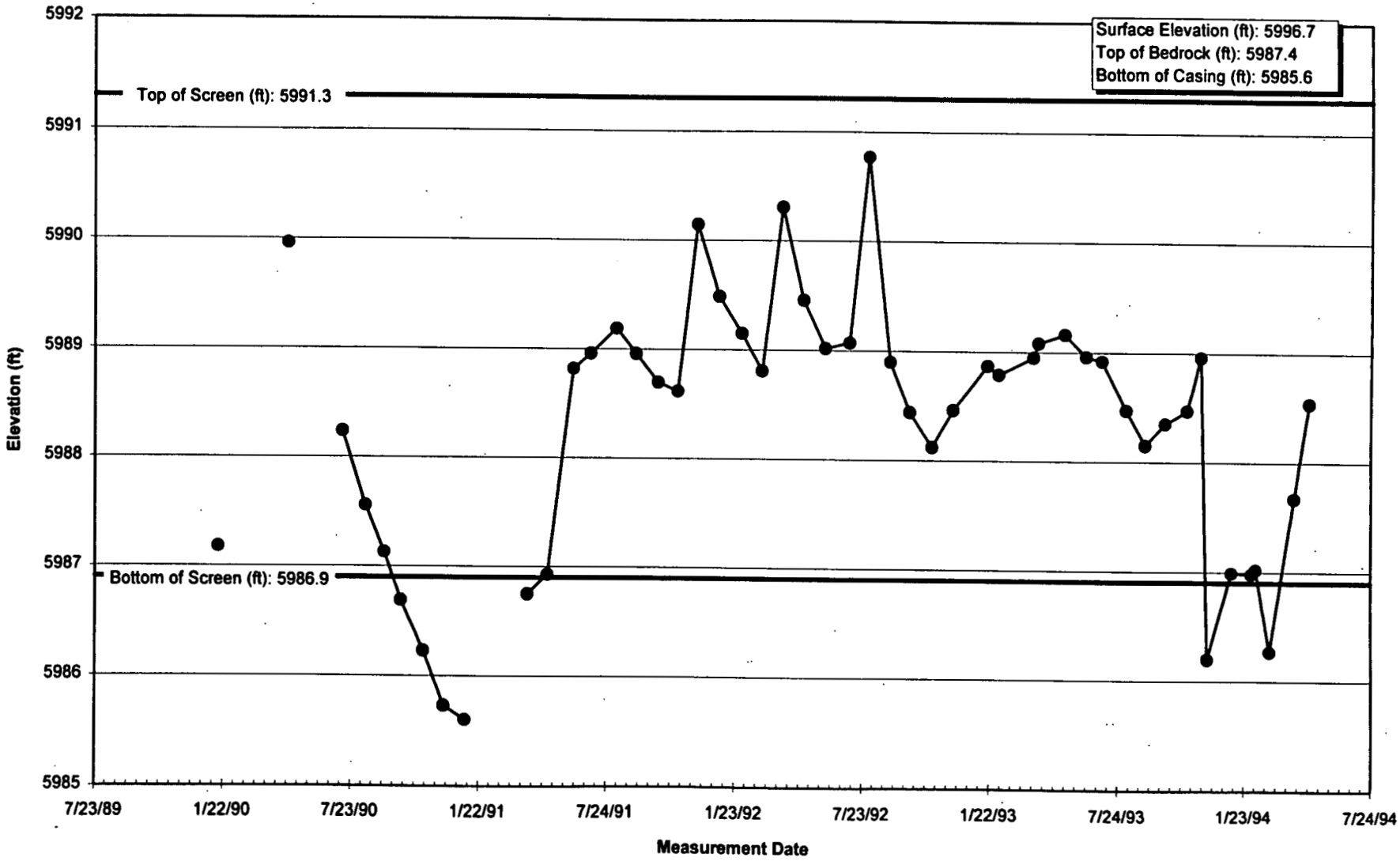
389

Hydrograph P314089



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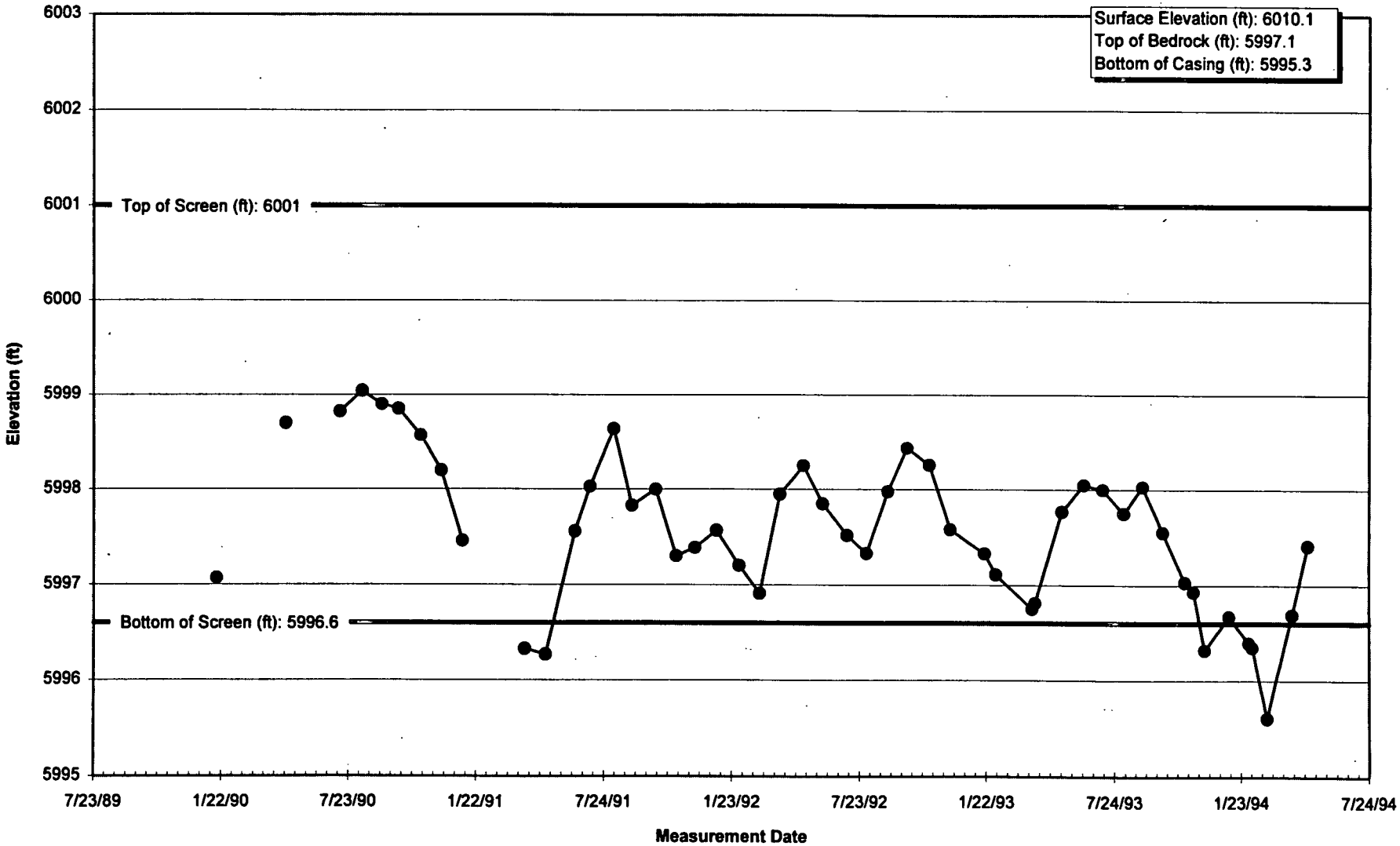
390

Hydrograph P314289



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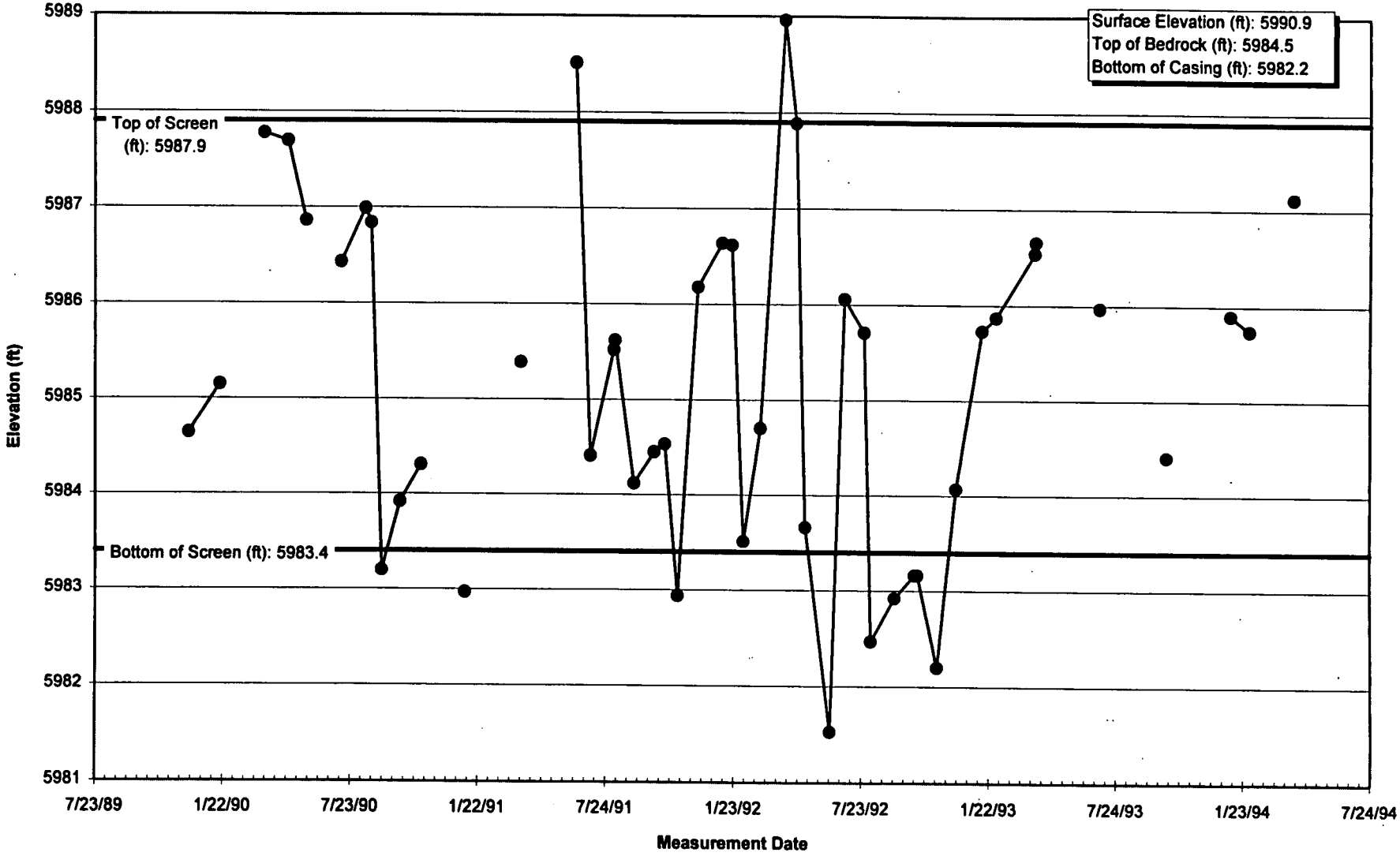
391

Hydrograph P317989



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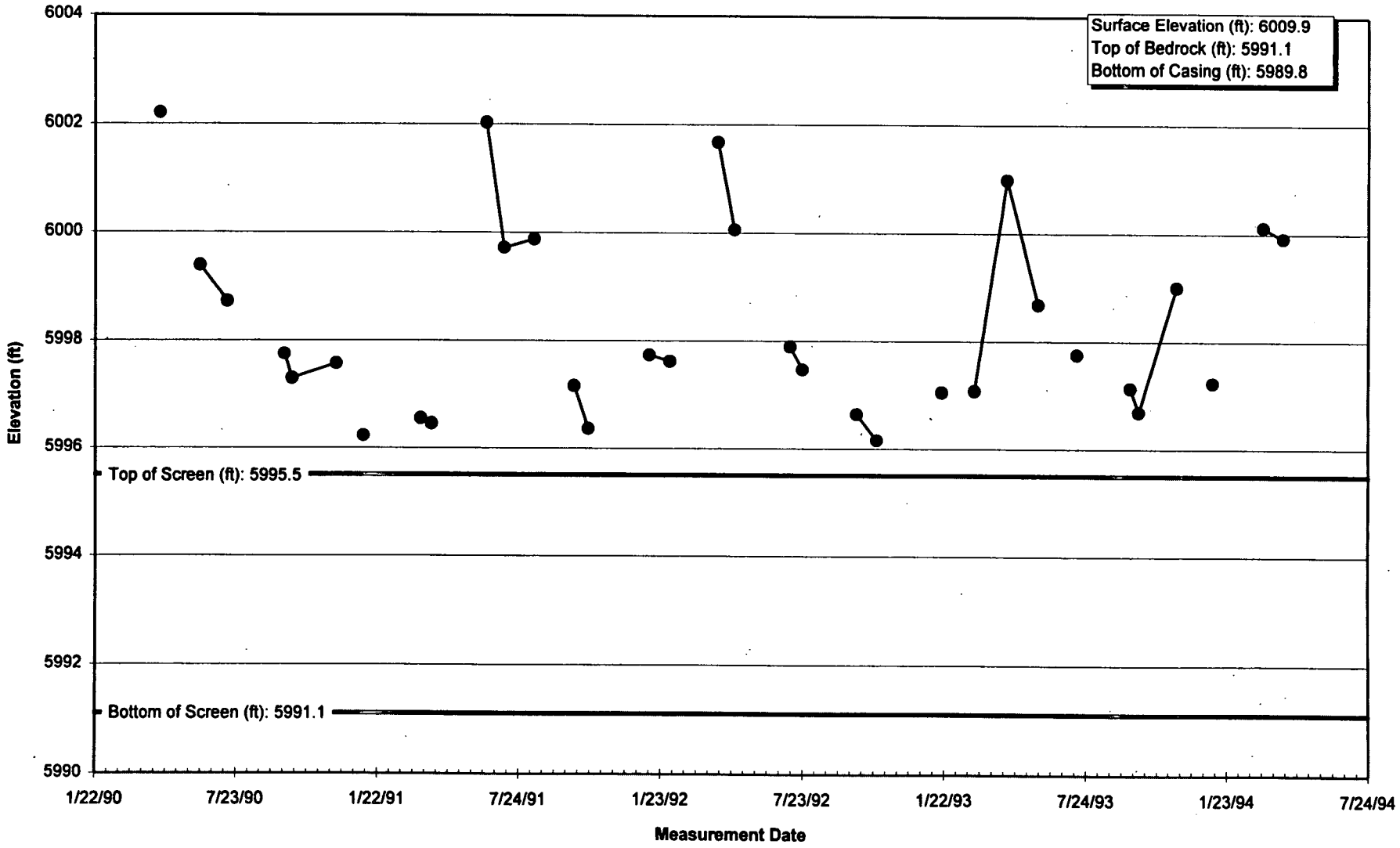
392

Hydrograph P320089



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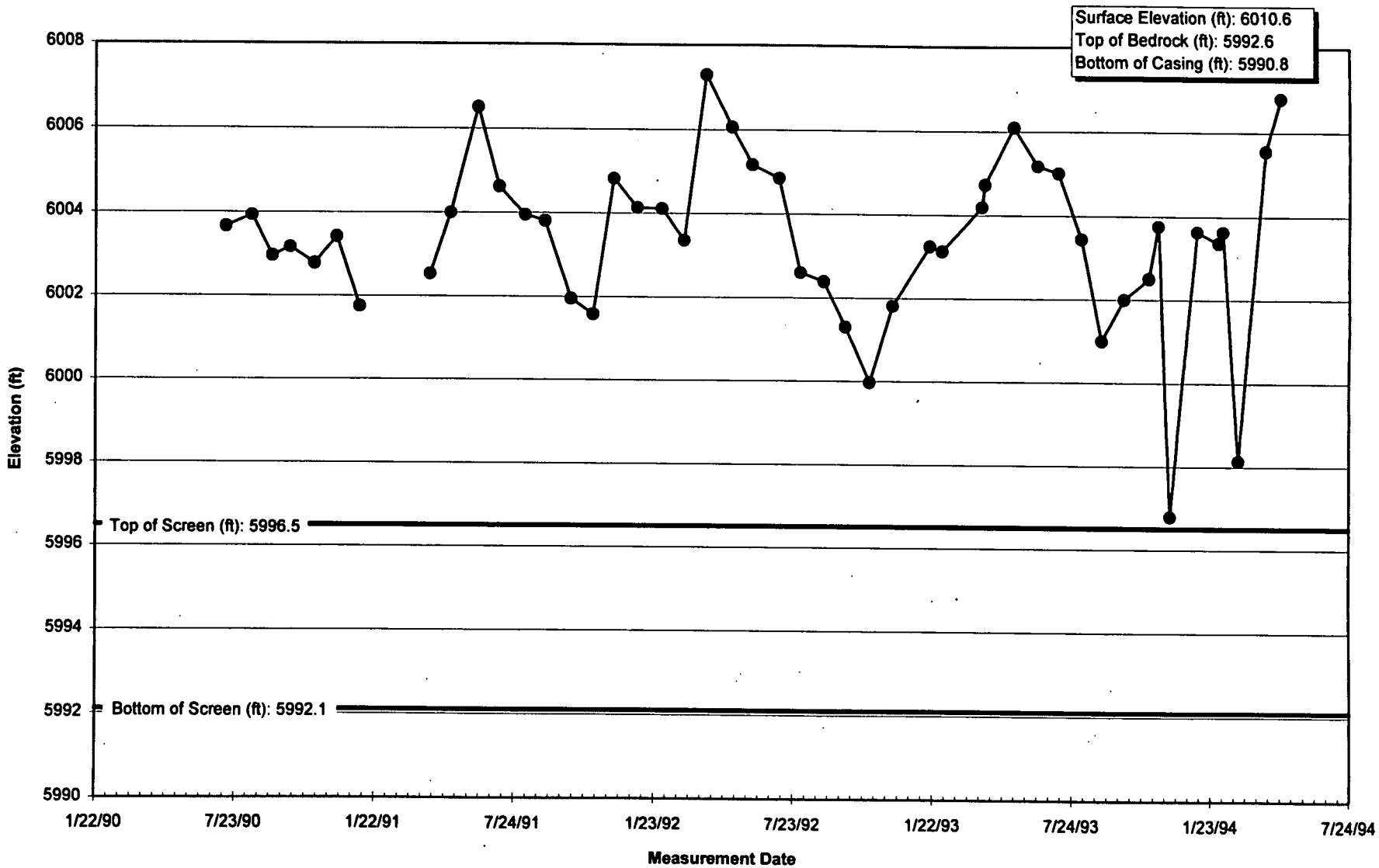
393

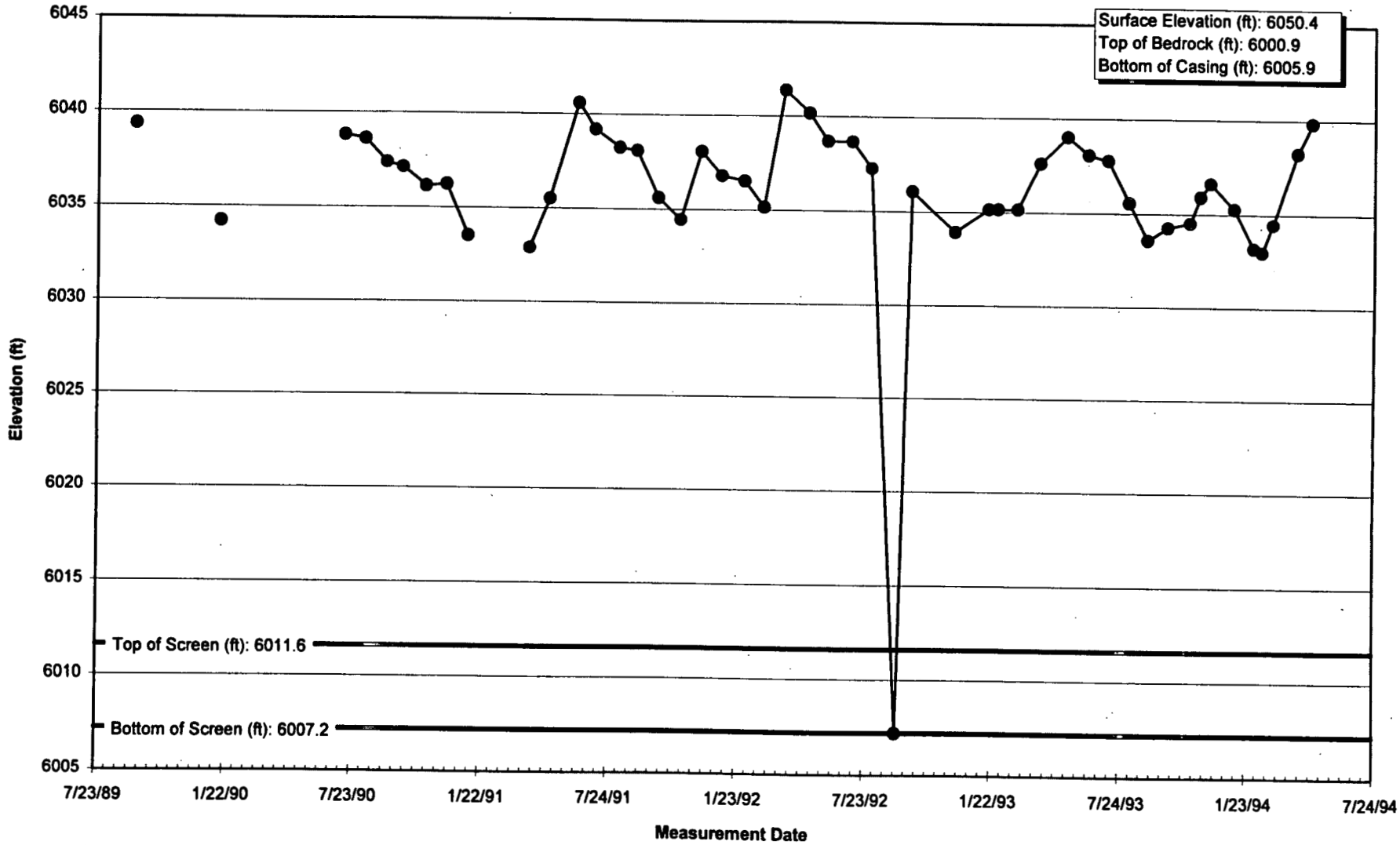
Hydrograph P414189



S22.XLS P414189

394

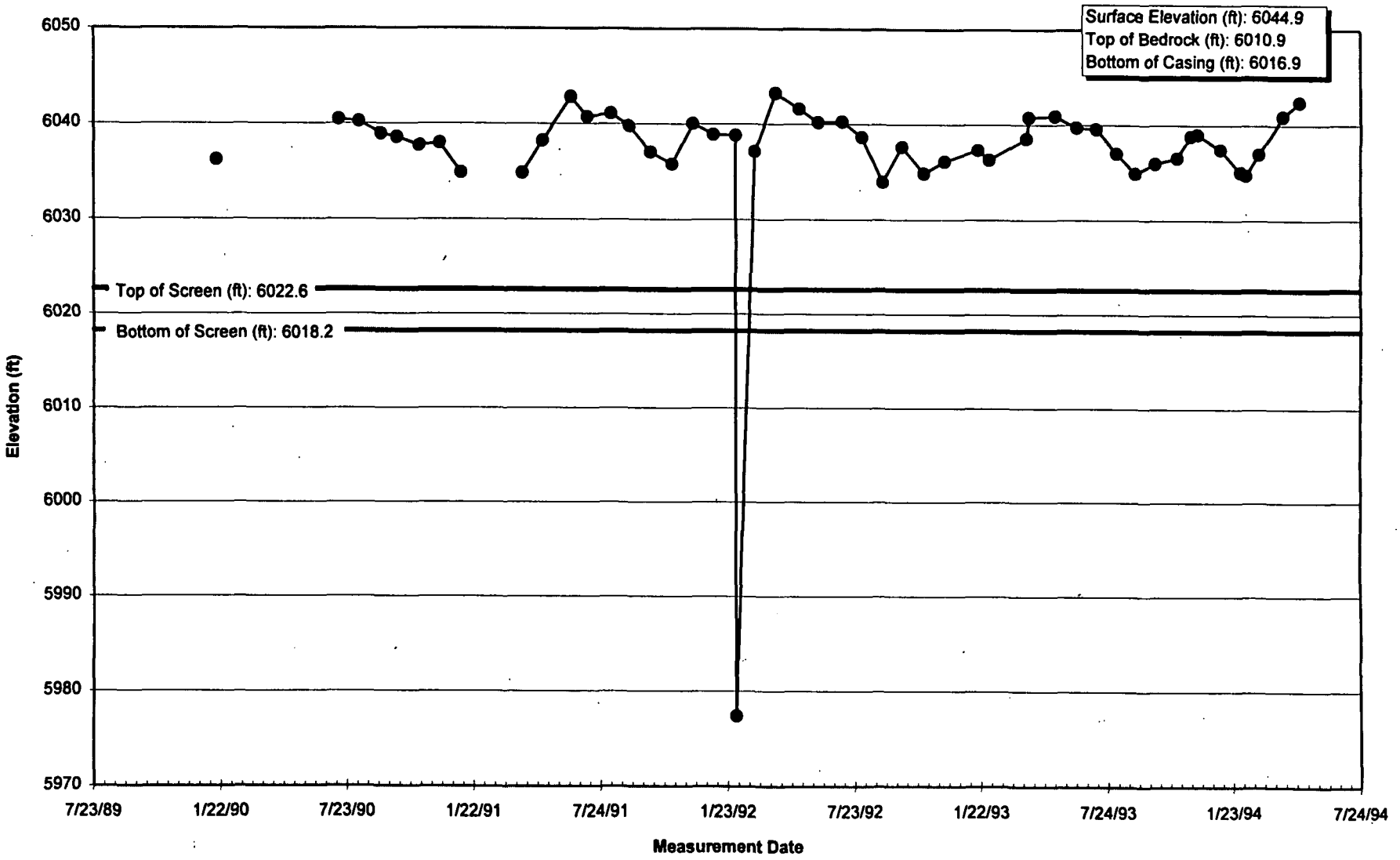
Hydrograph P415889



S22.XLS P415889

395

Hydrograph P415989



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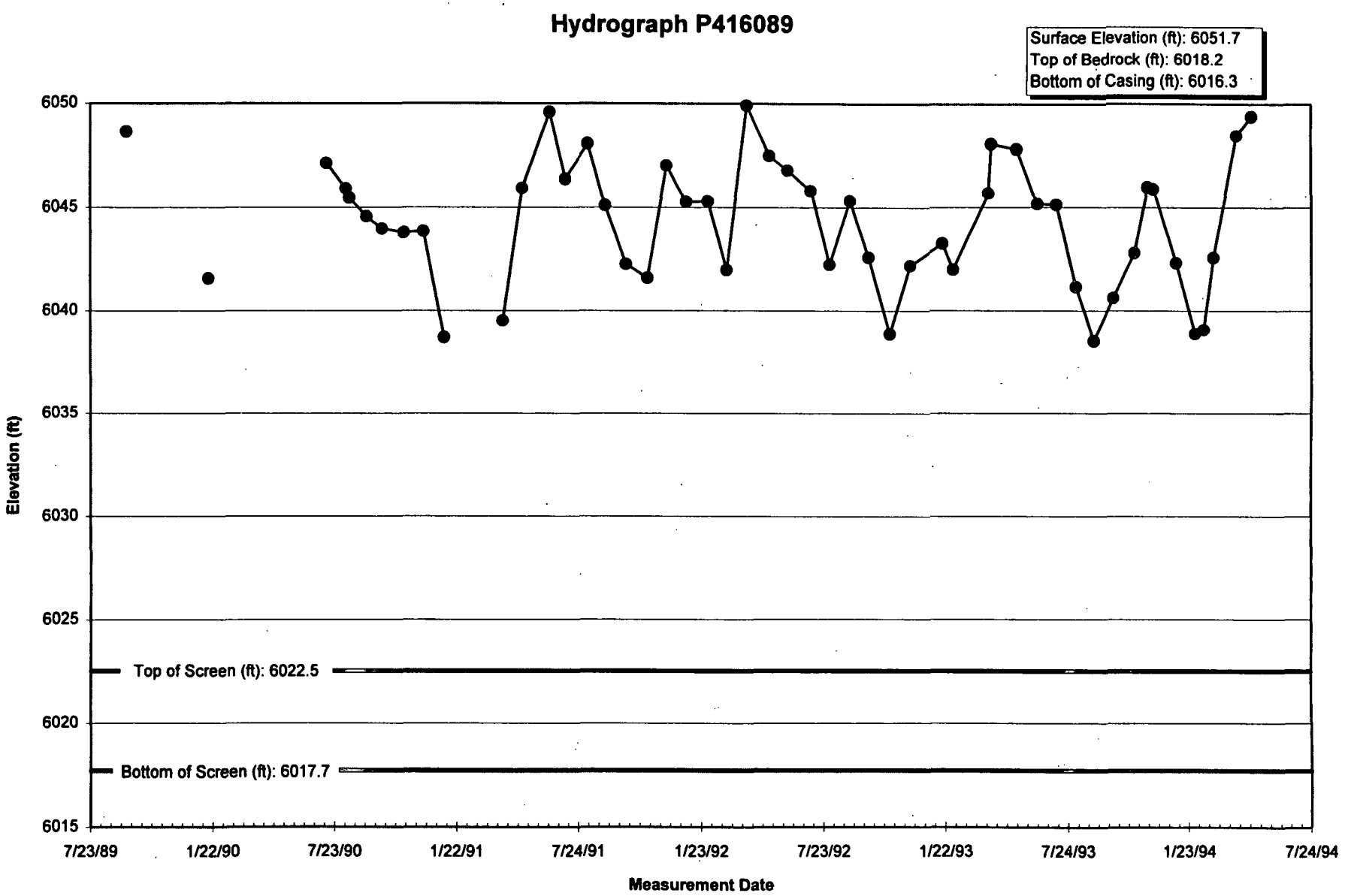

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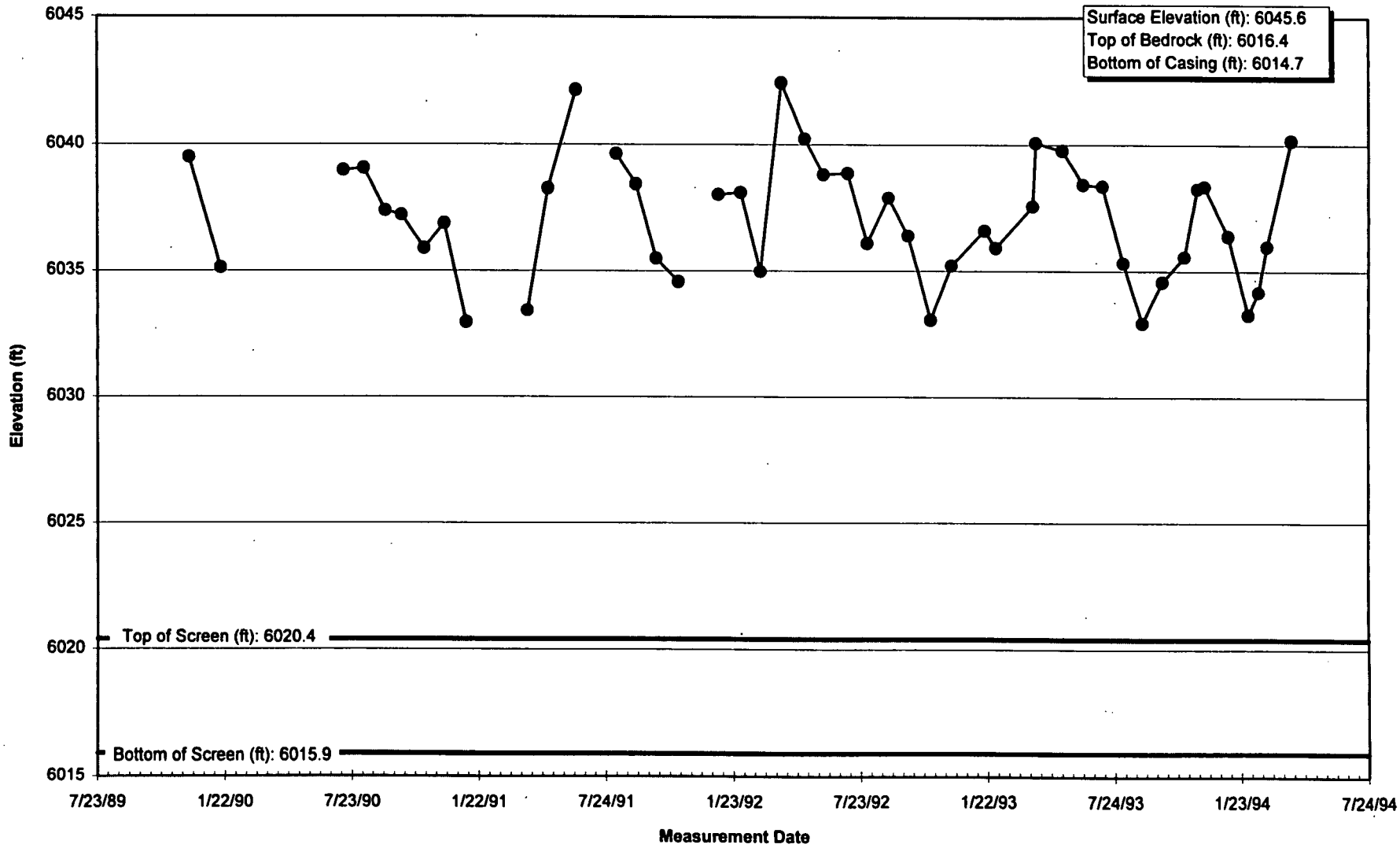
397

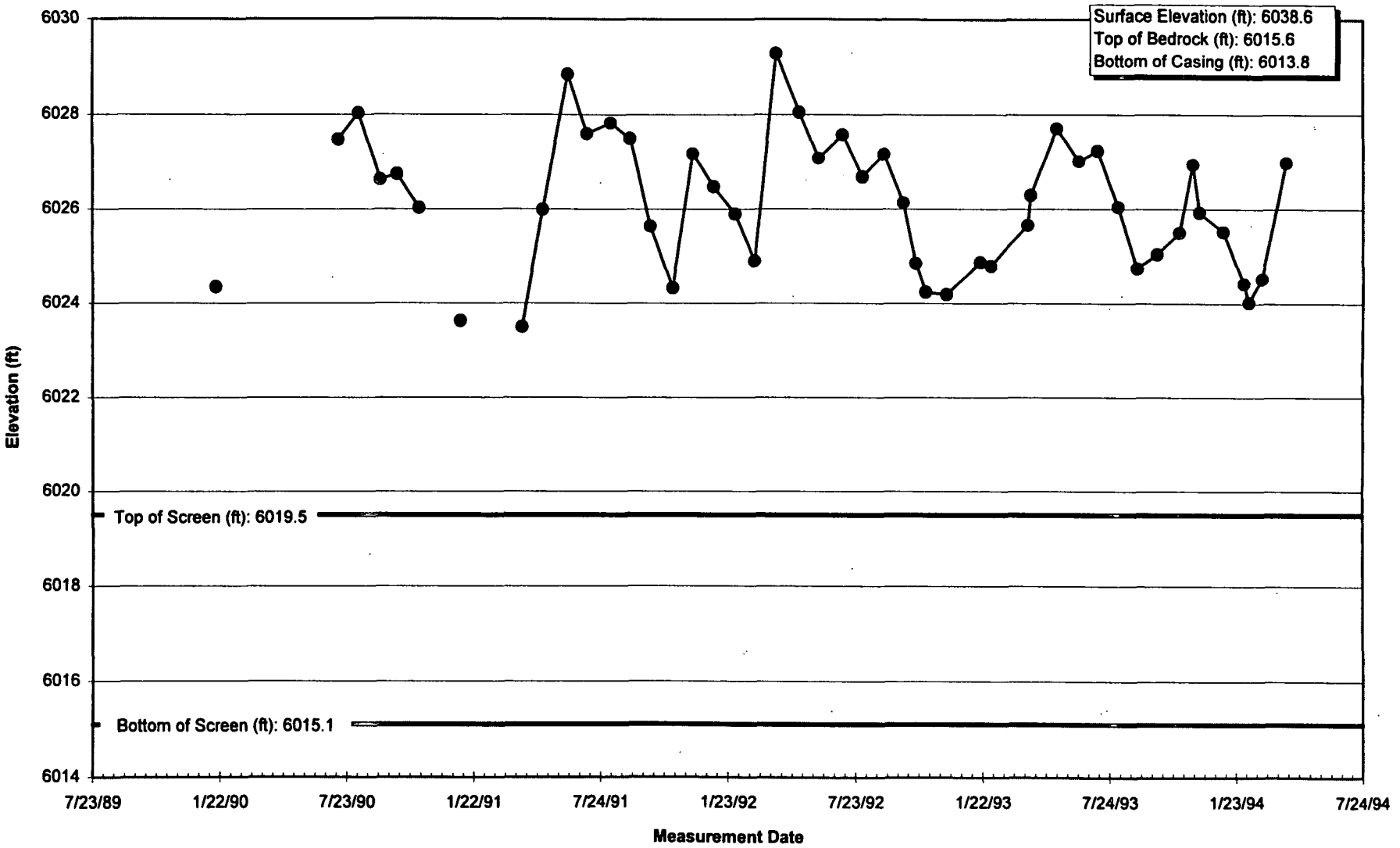
Hydrograph P416189



398

S22.XLS P416189 4/6/95

Hydrograph P416289



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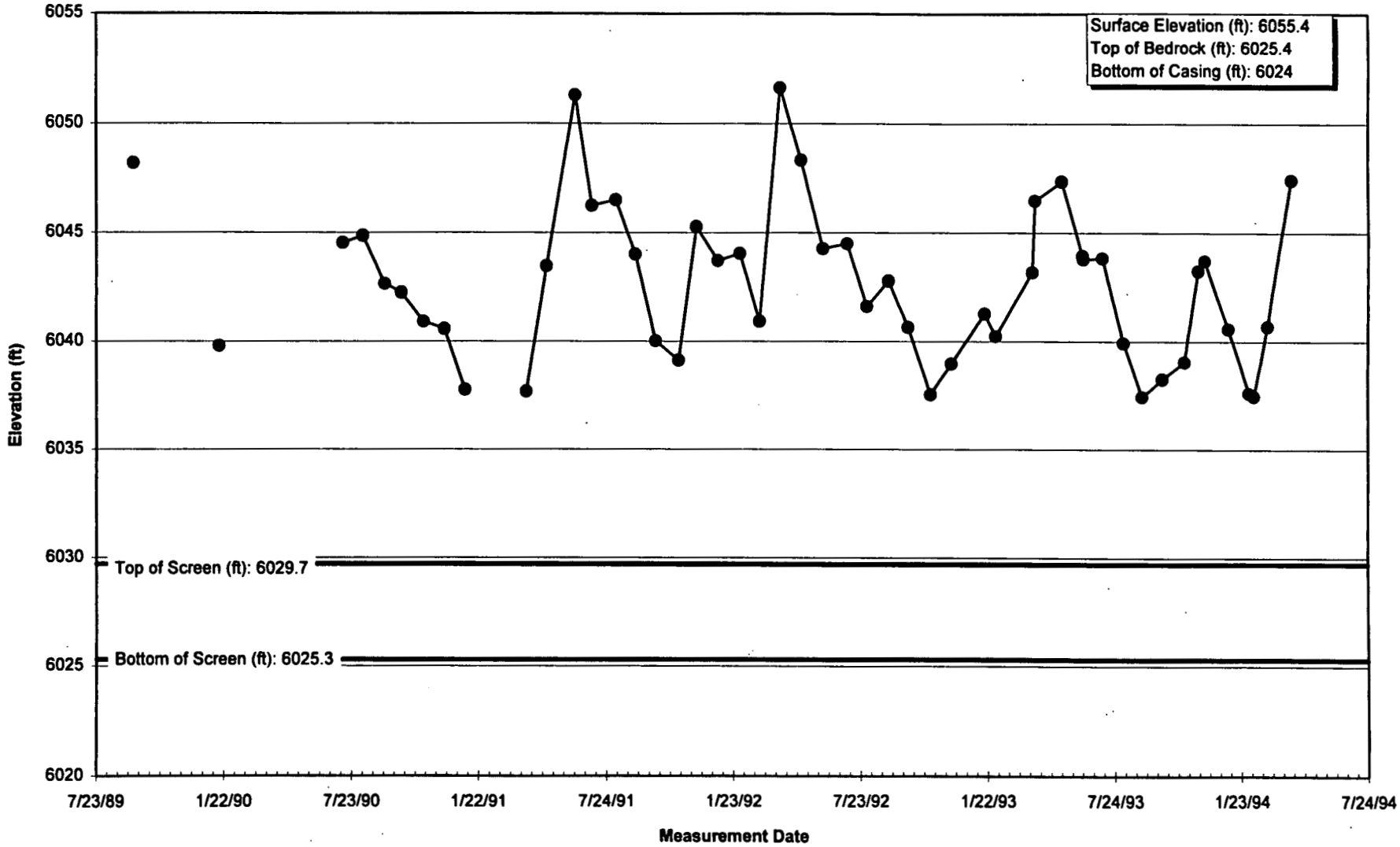
399

Hydrograph P416389



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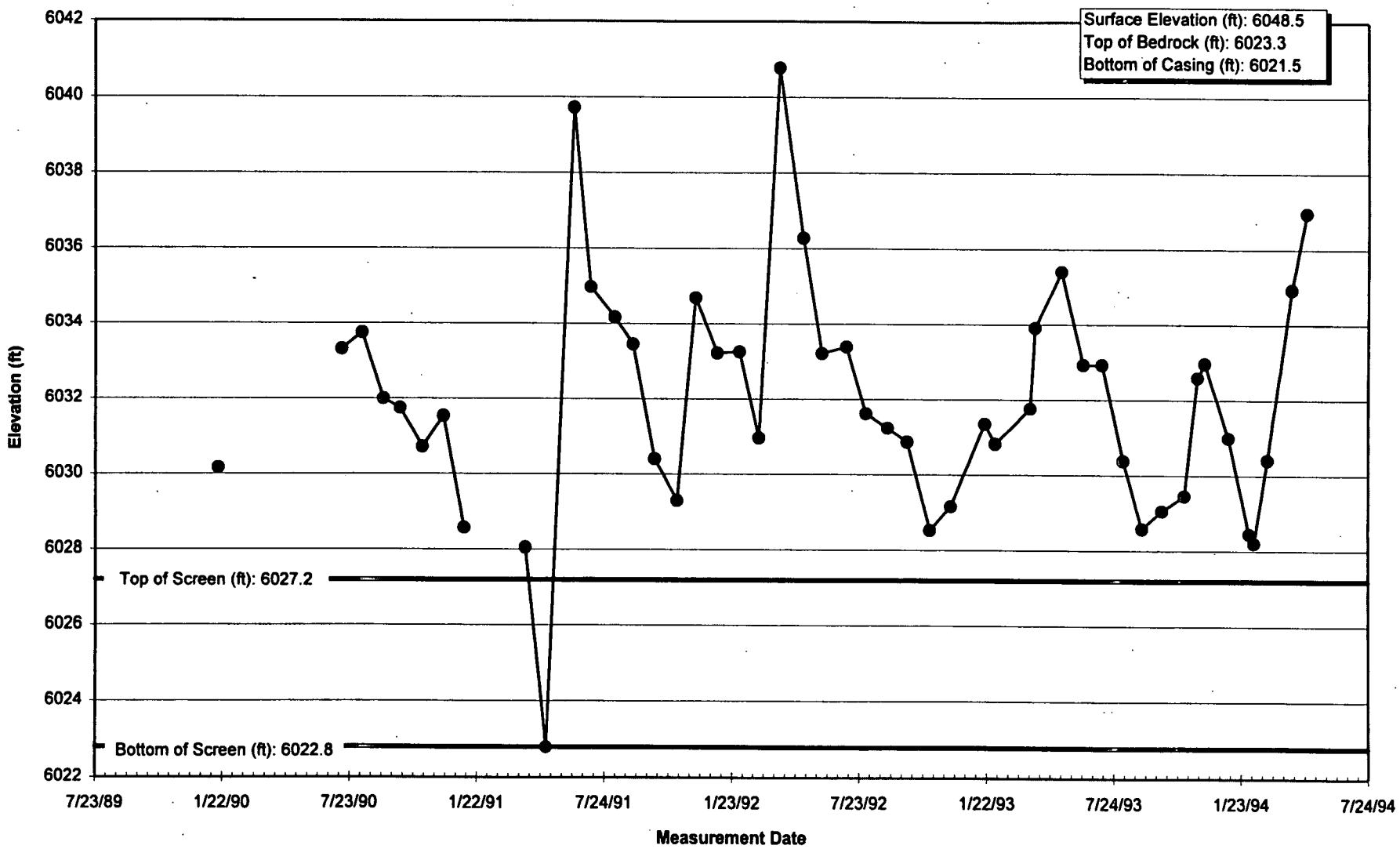
400

Hydrograph P416489



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401

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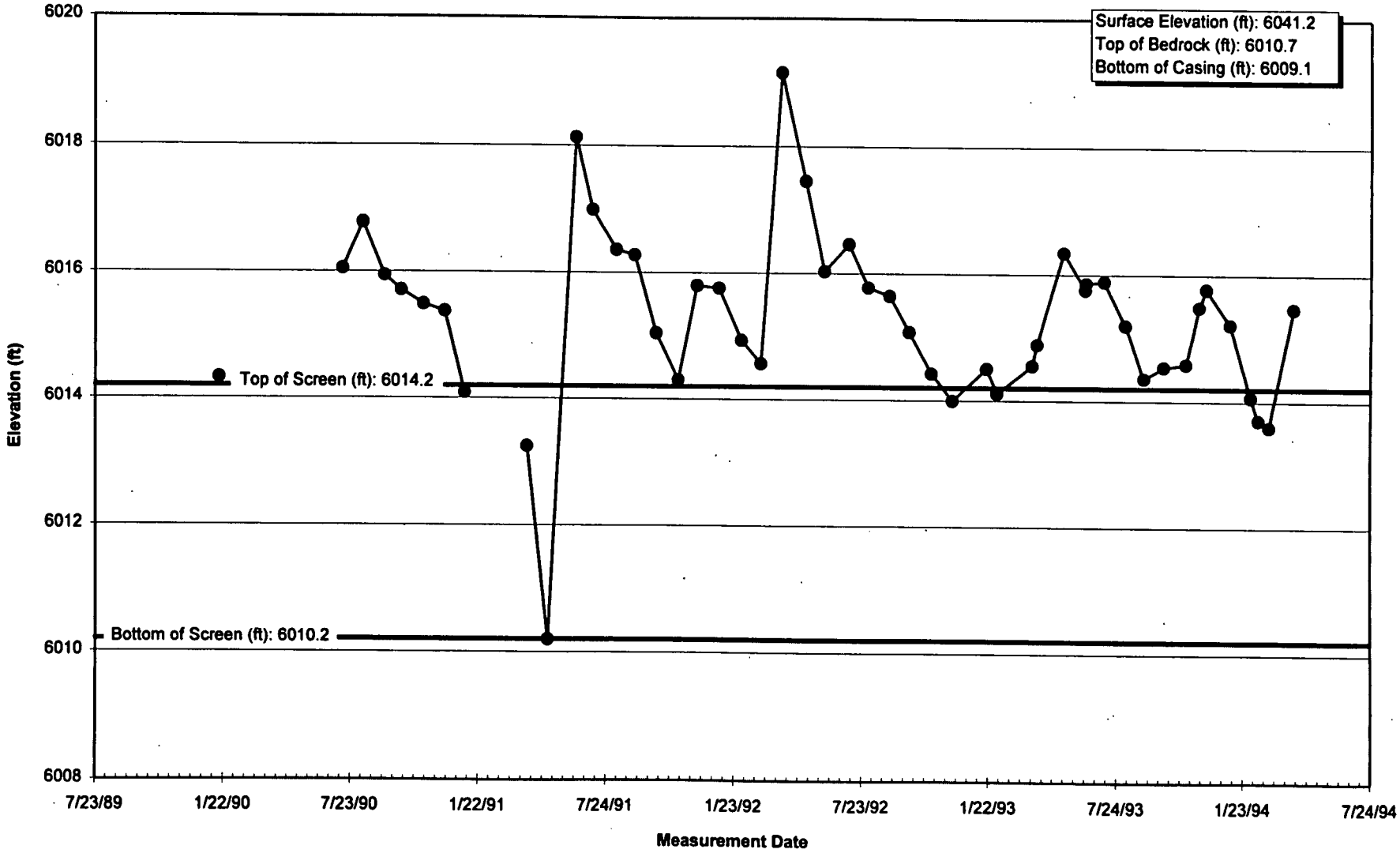

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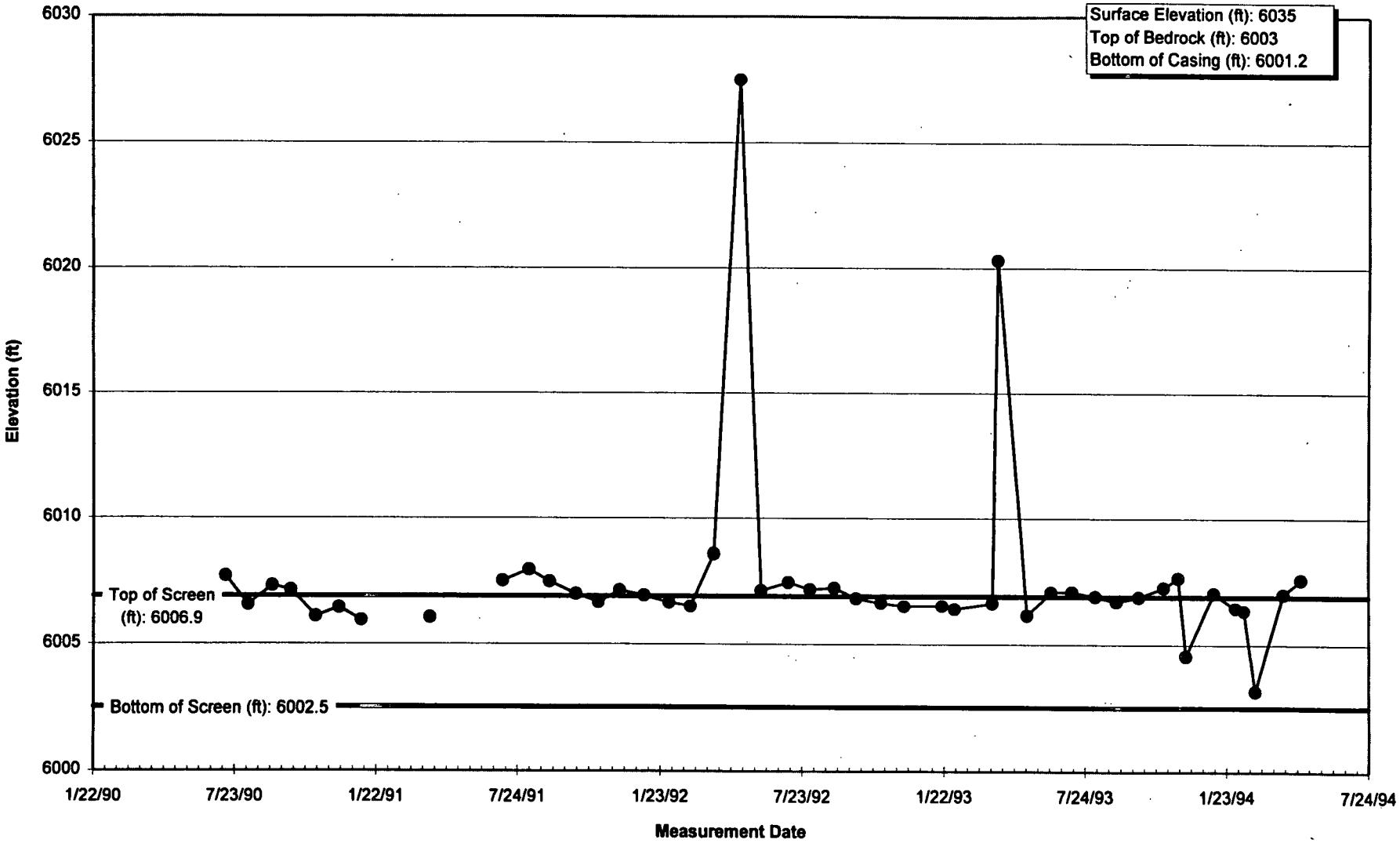
402

Hydrograph P416689



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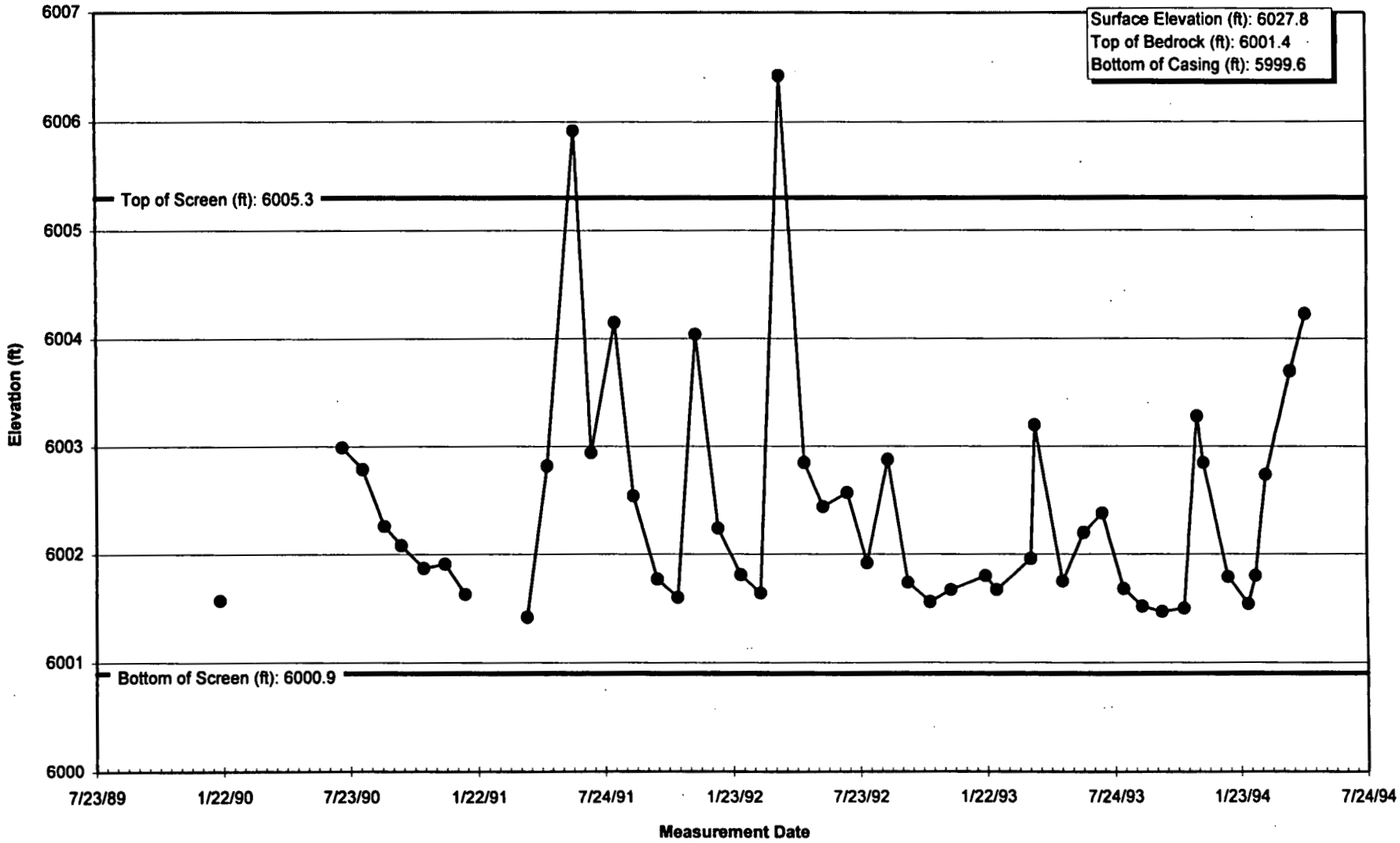
403

Hydrograph P416789



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404

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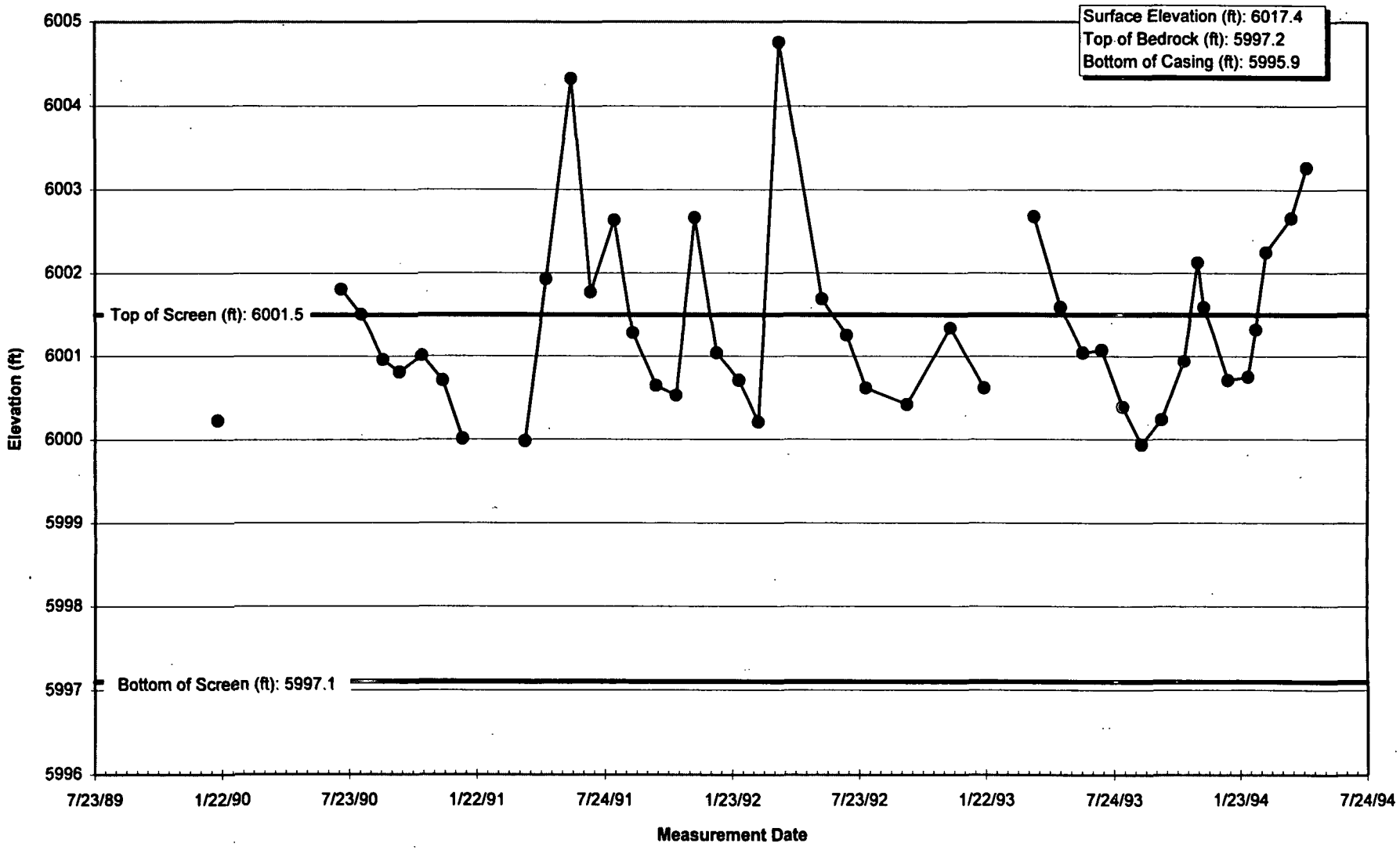

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405

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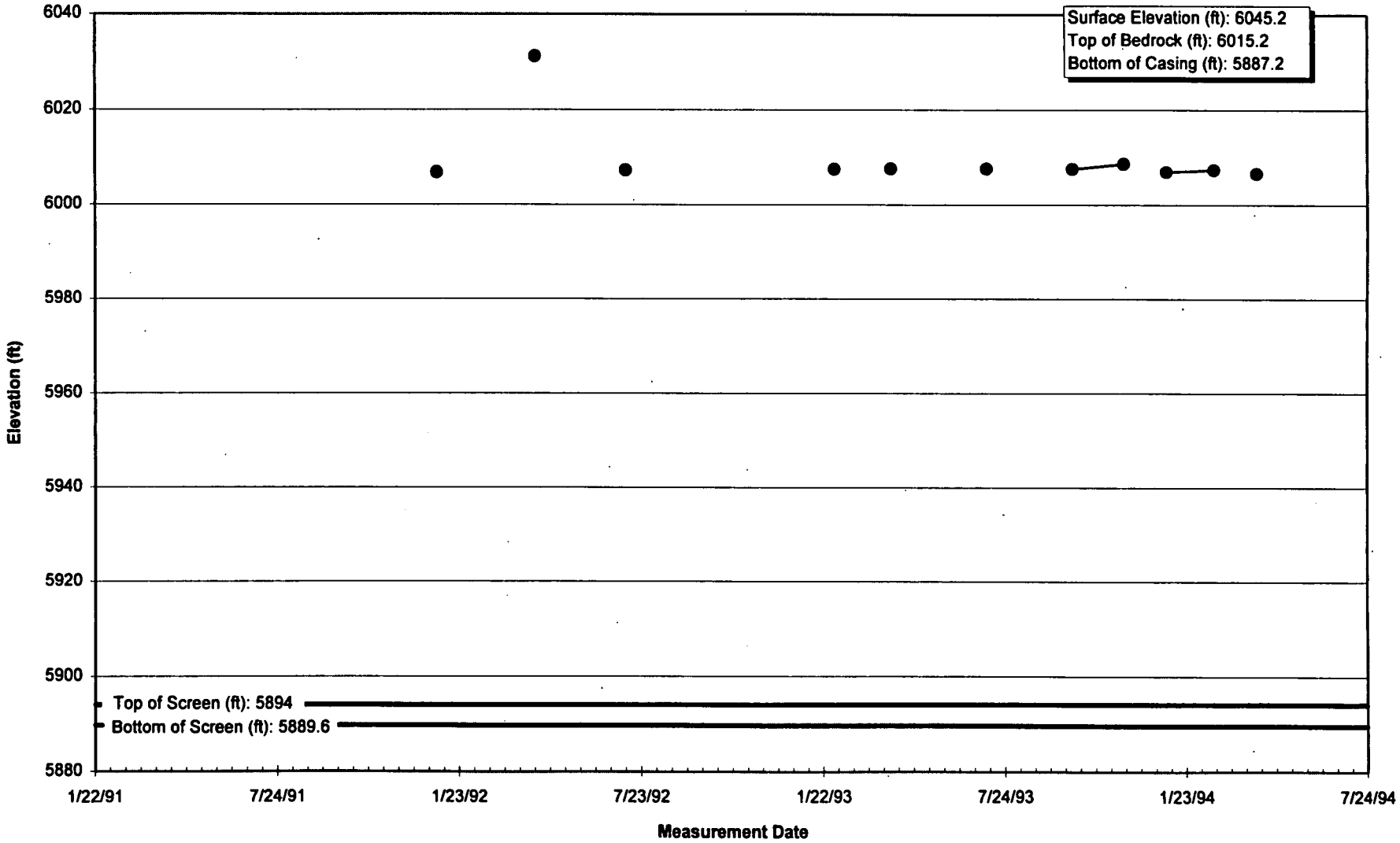

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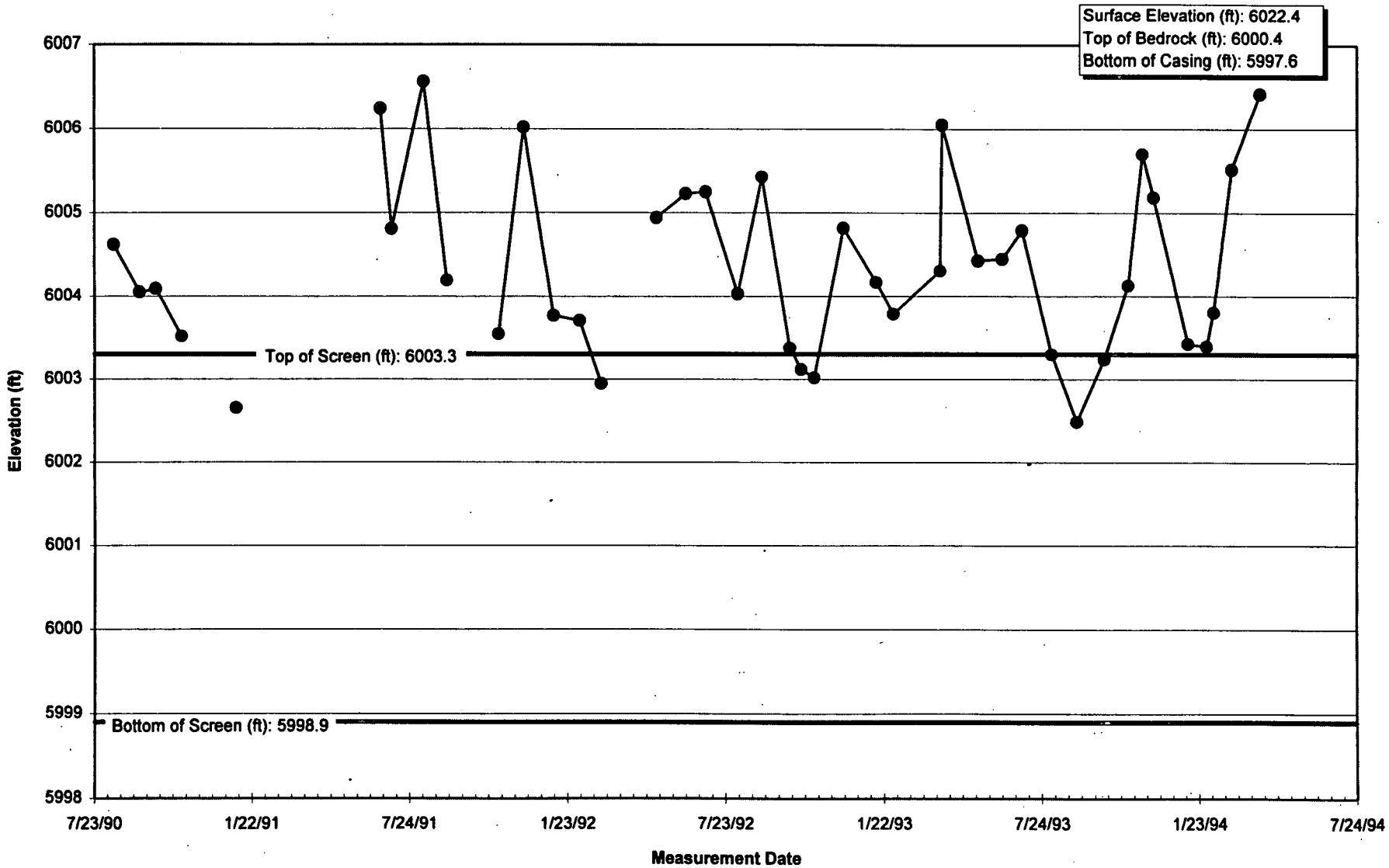
406

Hydrograph P419689



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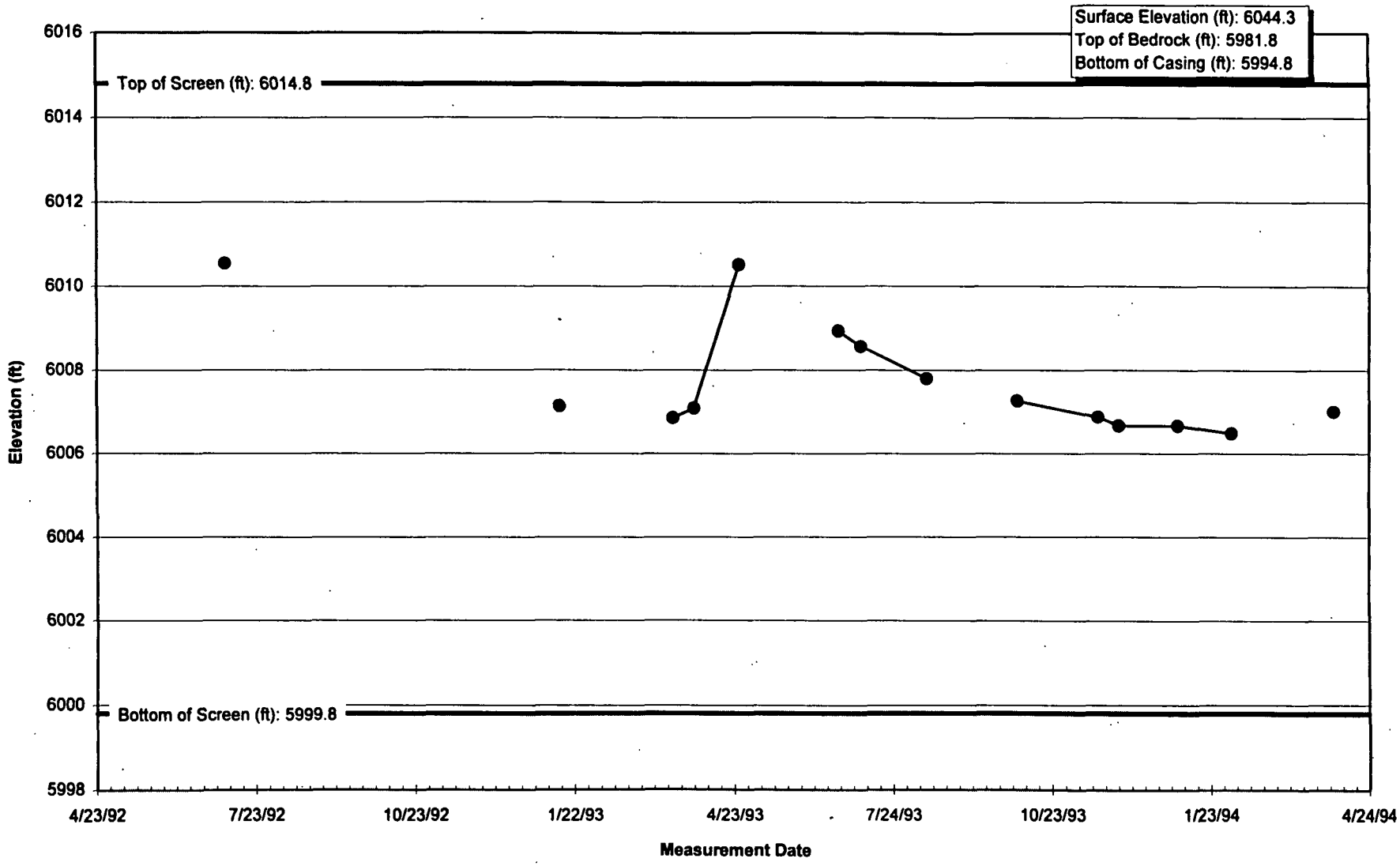
407

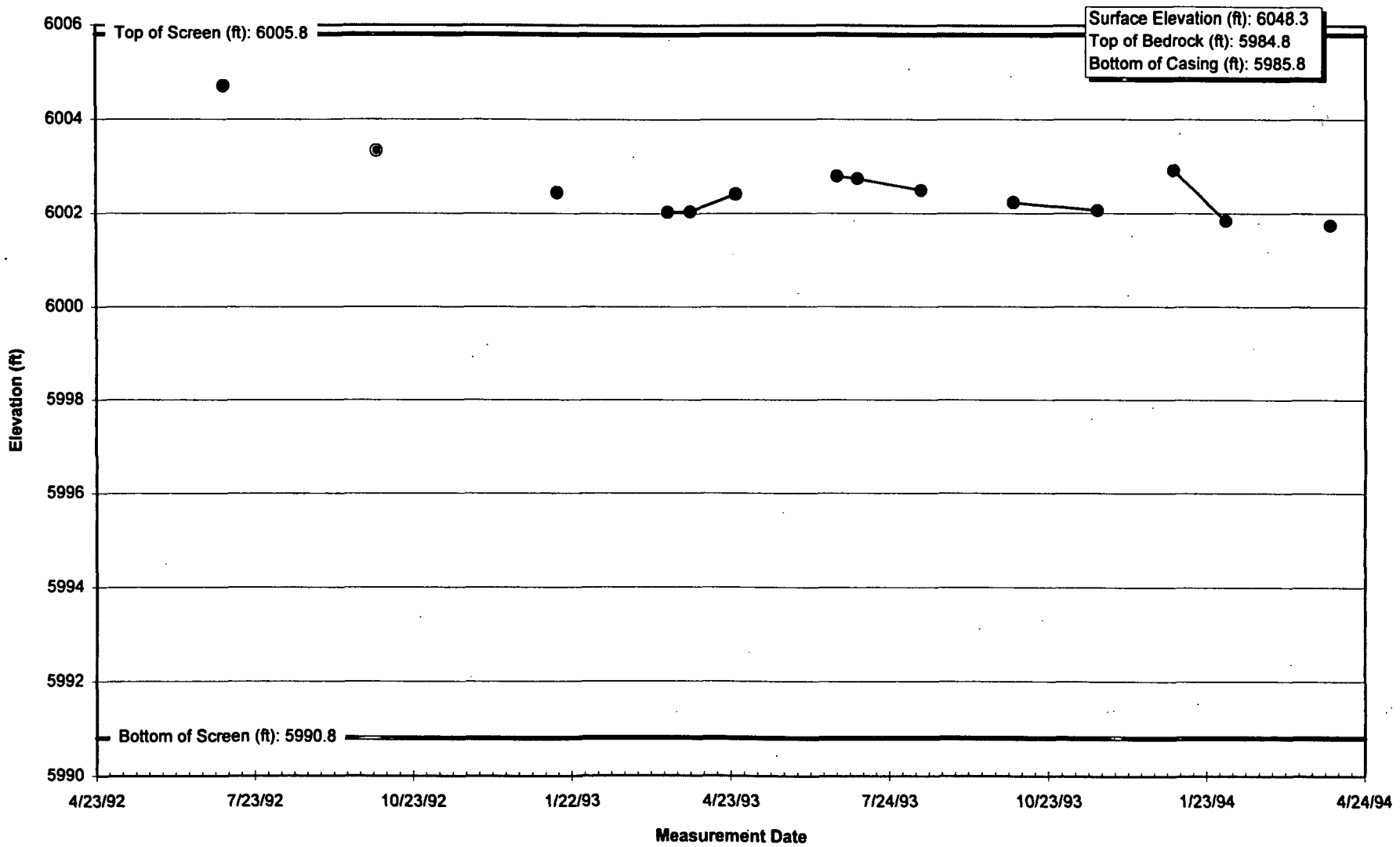
Hydrograph 0190



408

S1.XLS 0190 3/31/95

Hydrograph 0290



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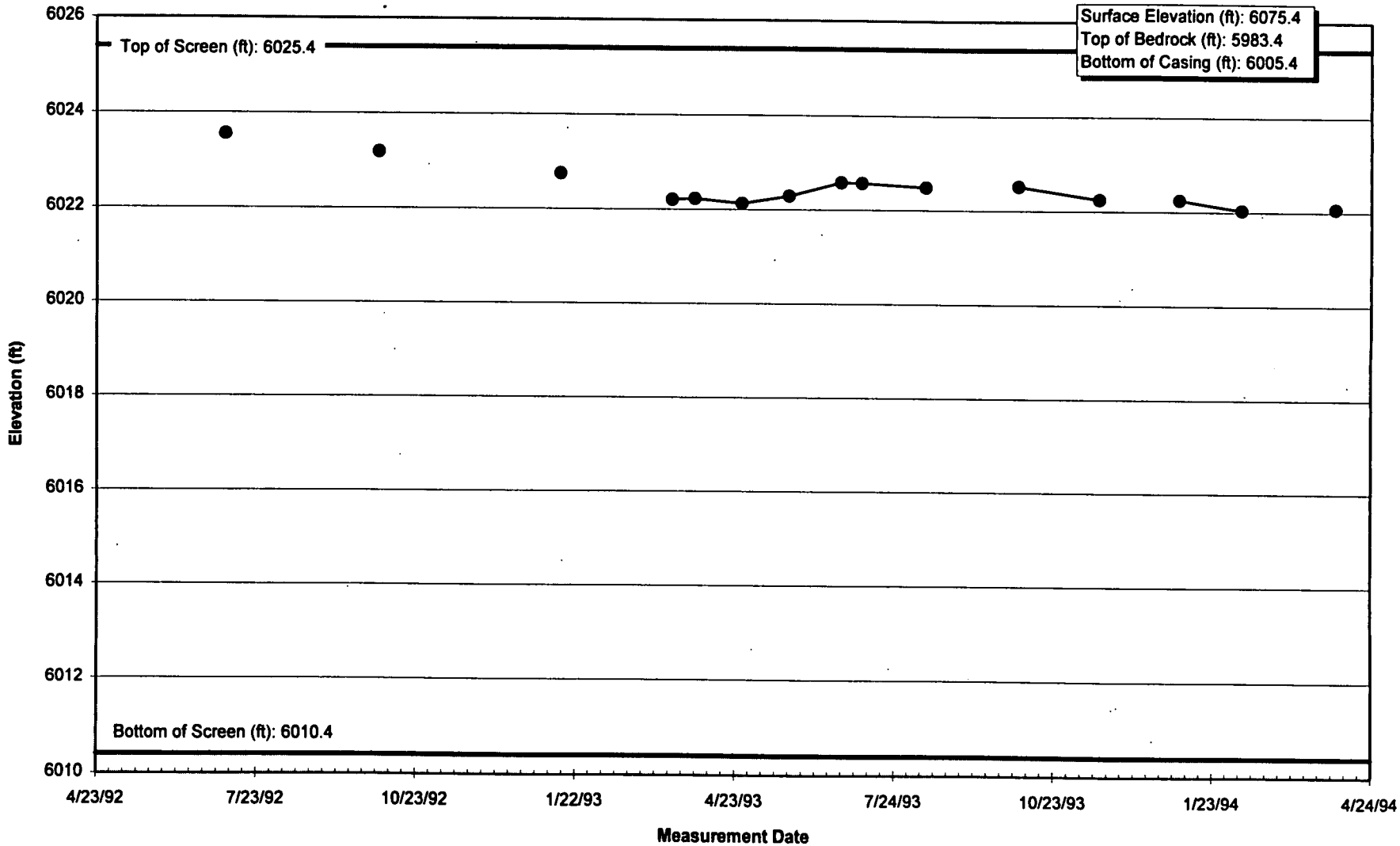
409

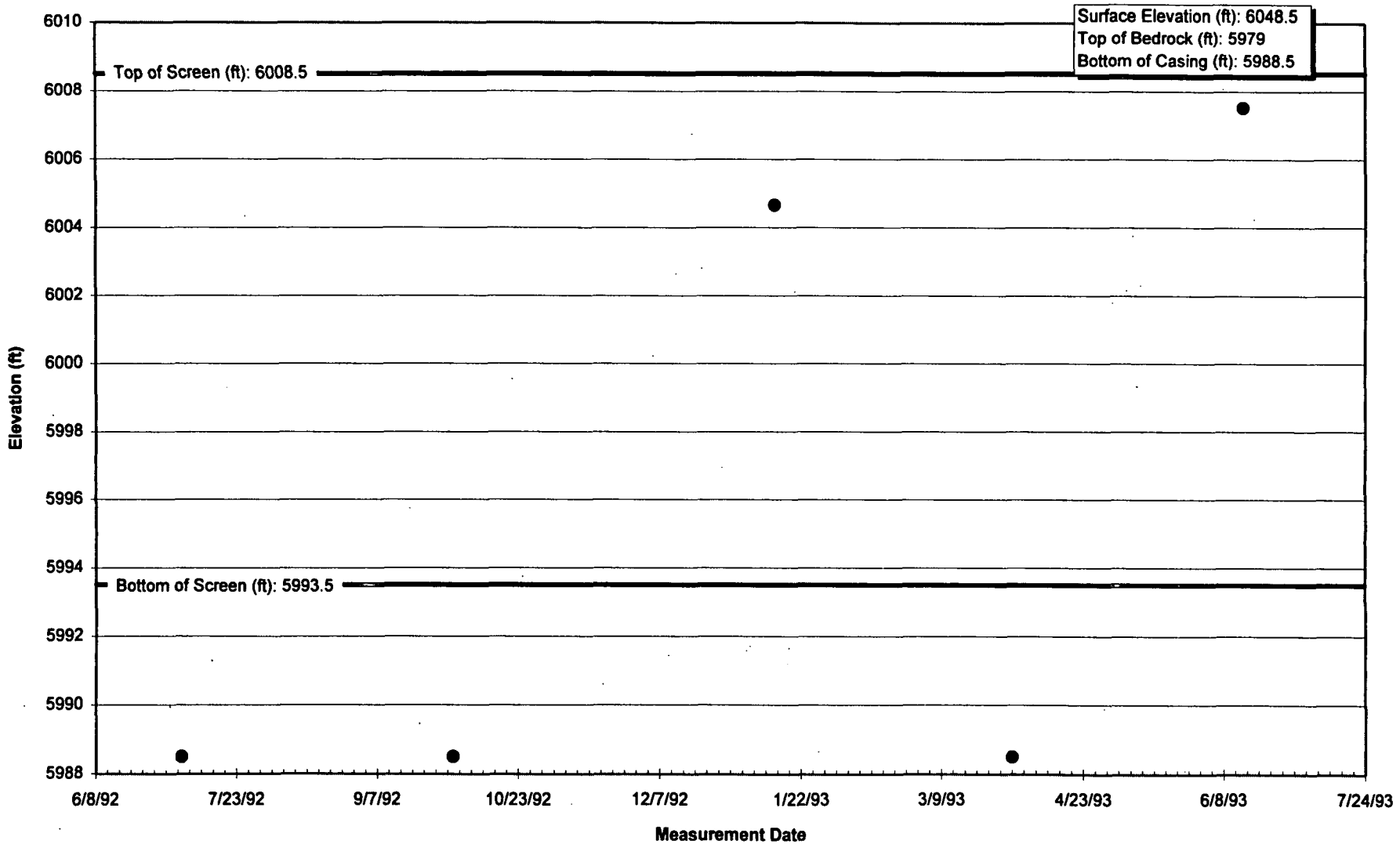
Hydrograph 0390



S2.XLS 0390 3/31/95

410

Hydrograph 0490



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411

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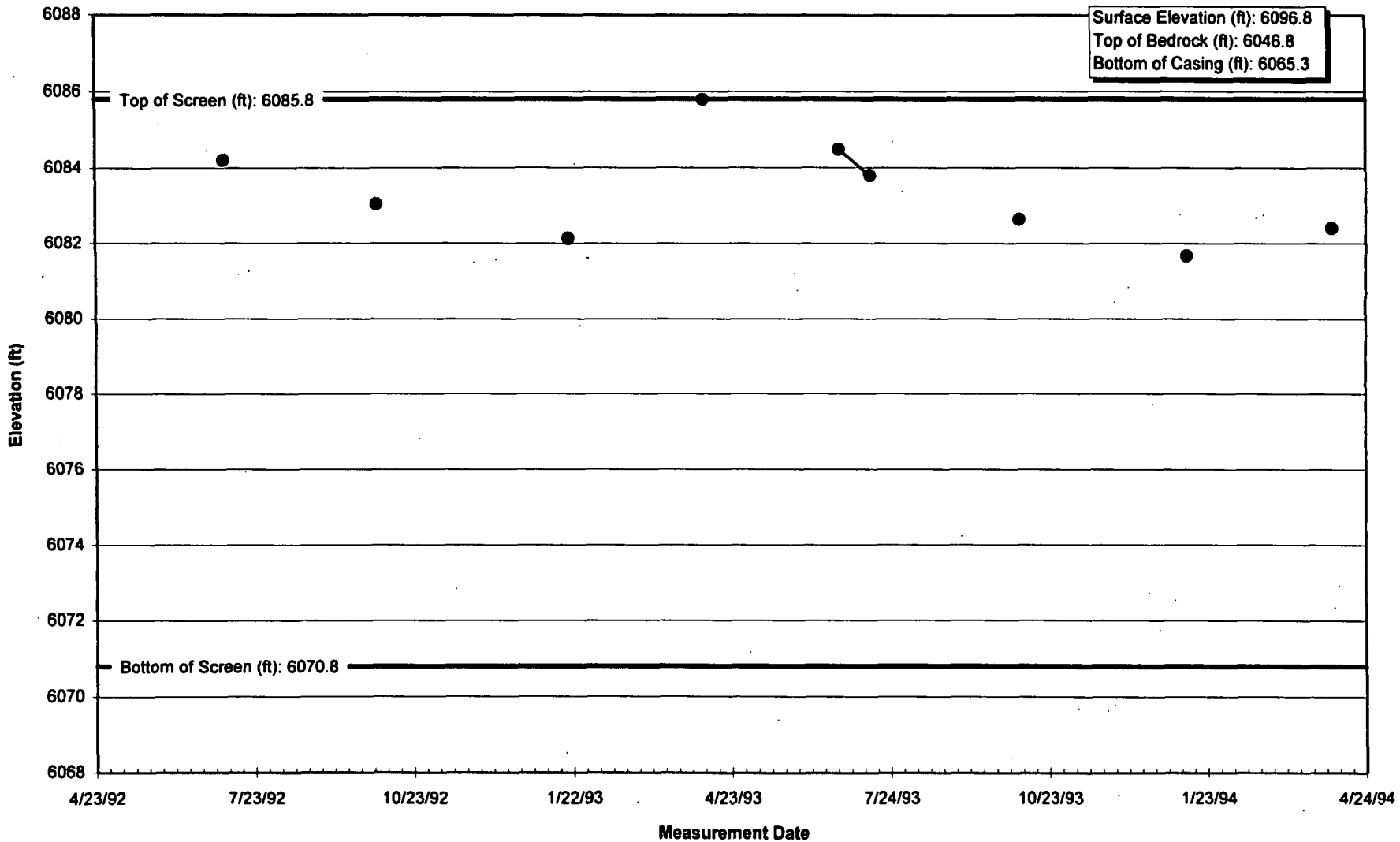

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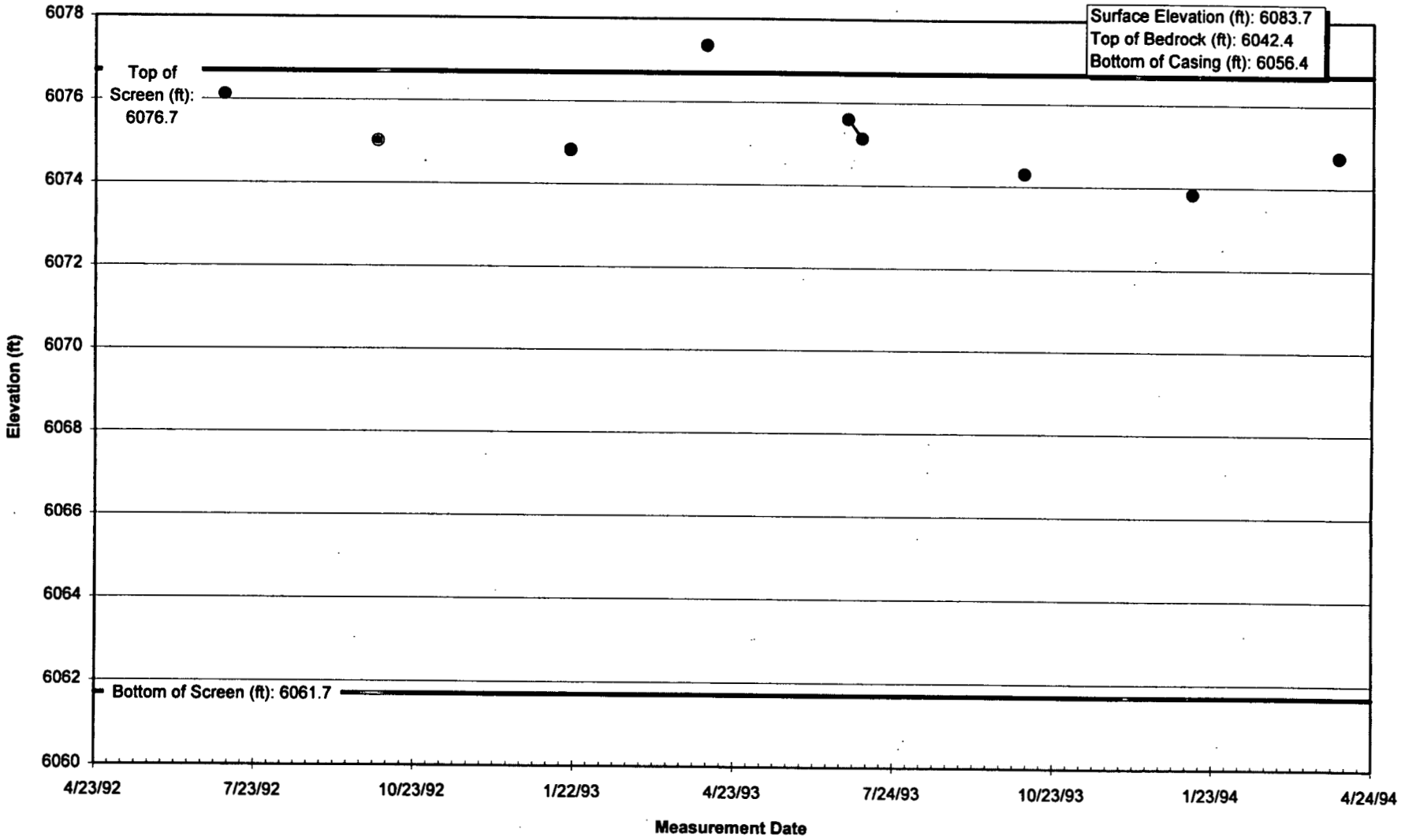
4/2

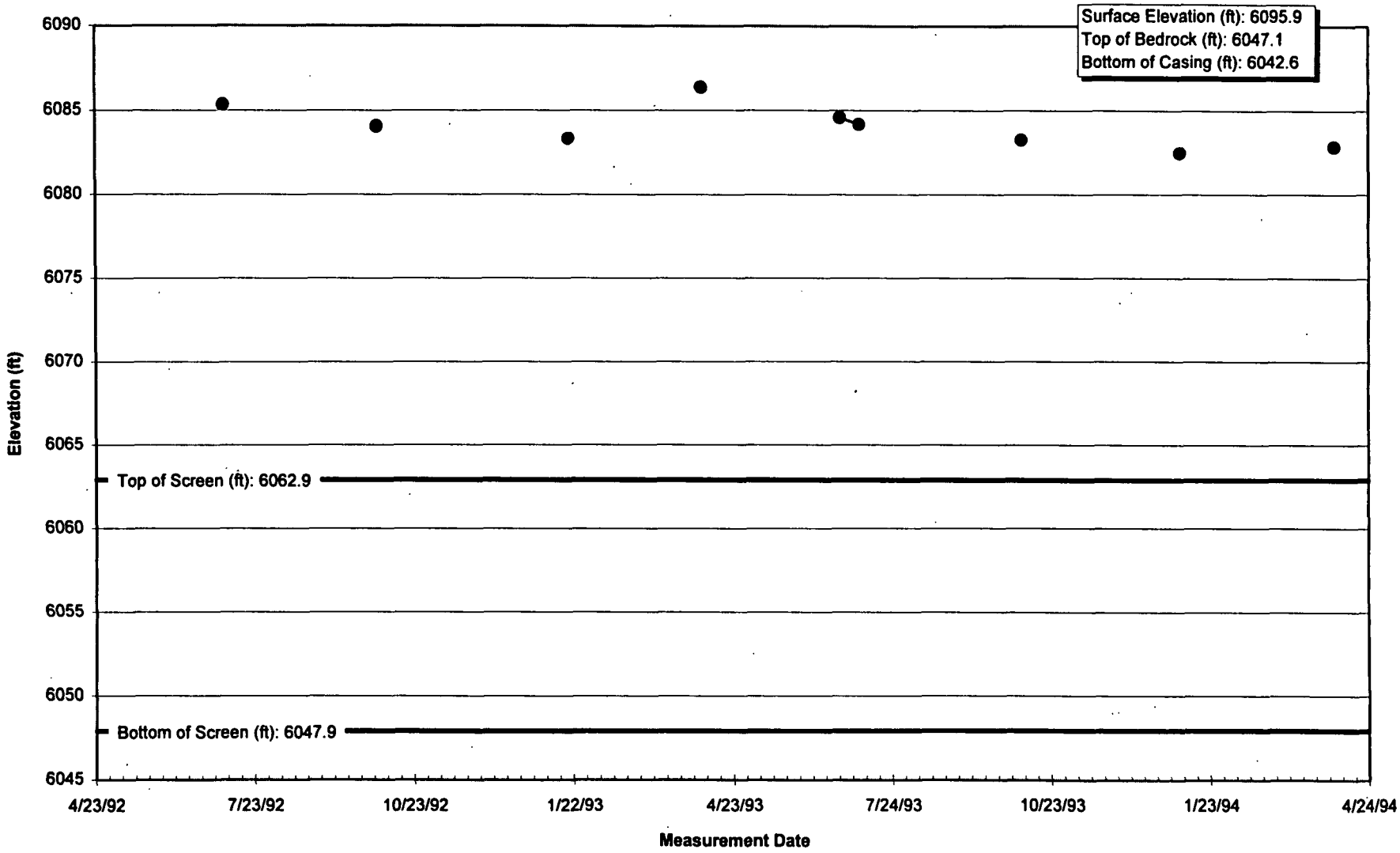
Hydrograph 0690



S4.XLS 0690 3/31/95

413

Hydrograph 0790



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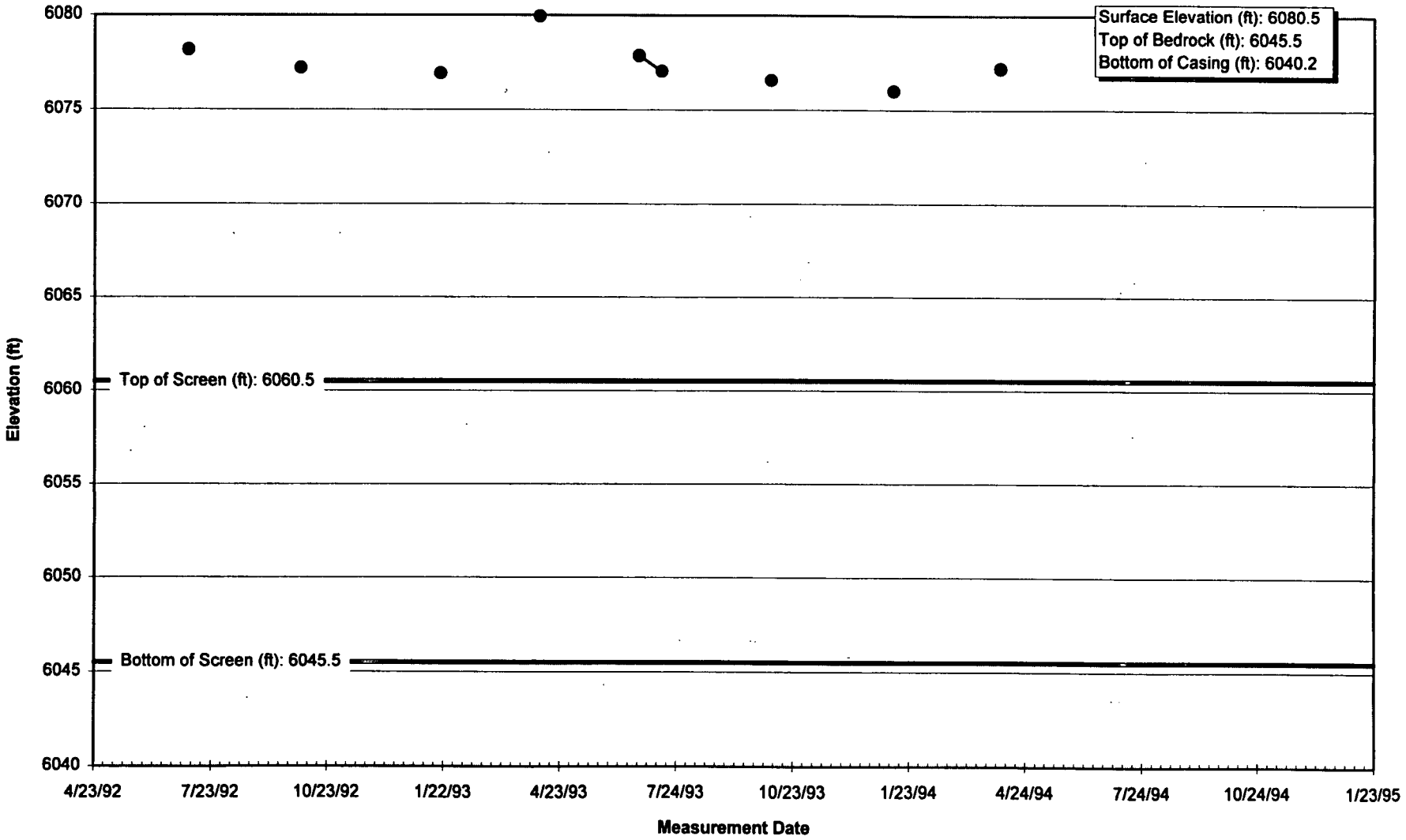
414

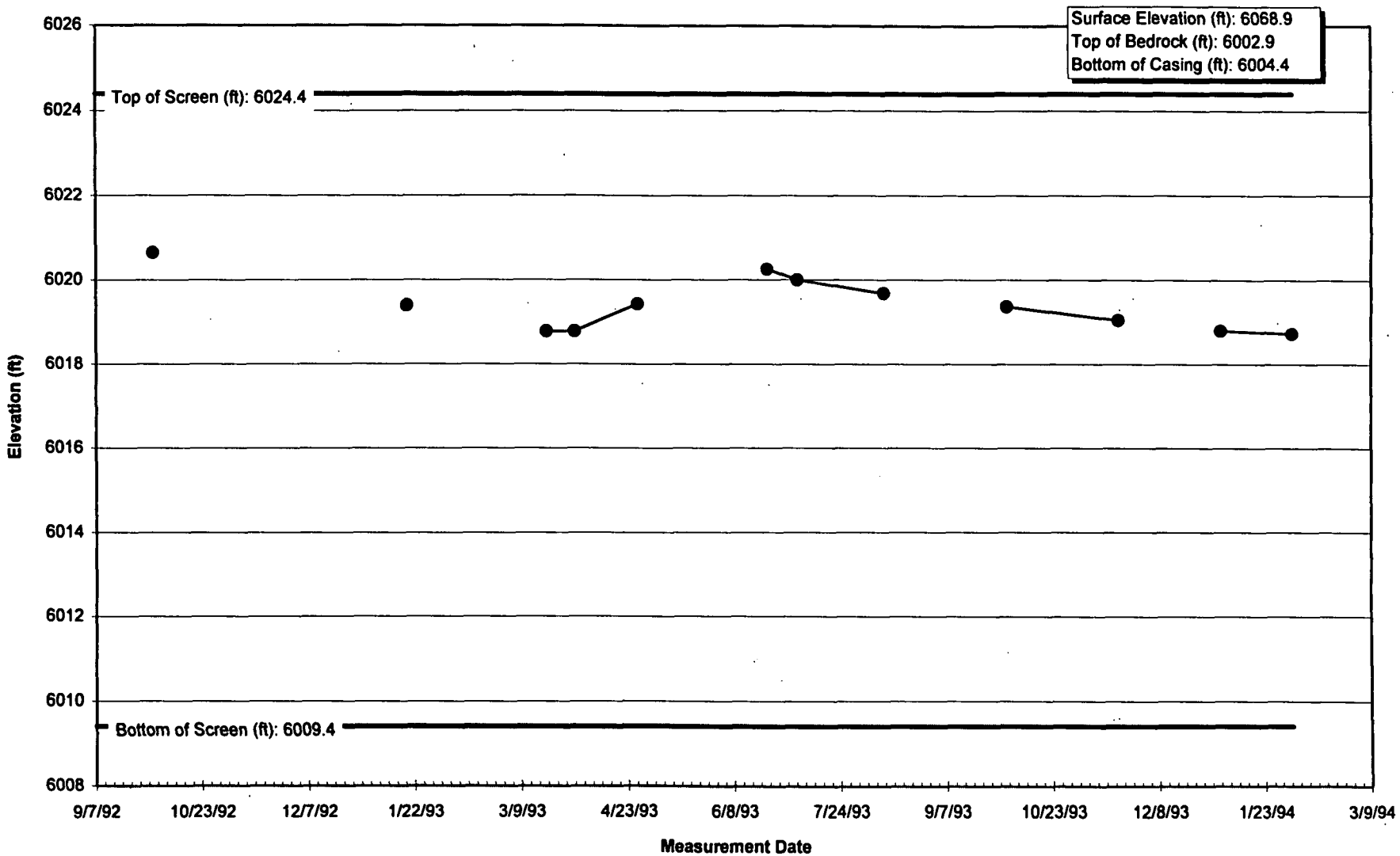
Hydrograph 0990



415

S5.XLS 0990 4/3/95

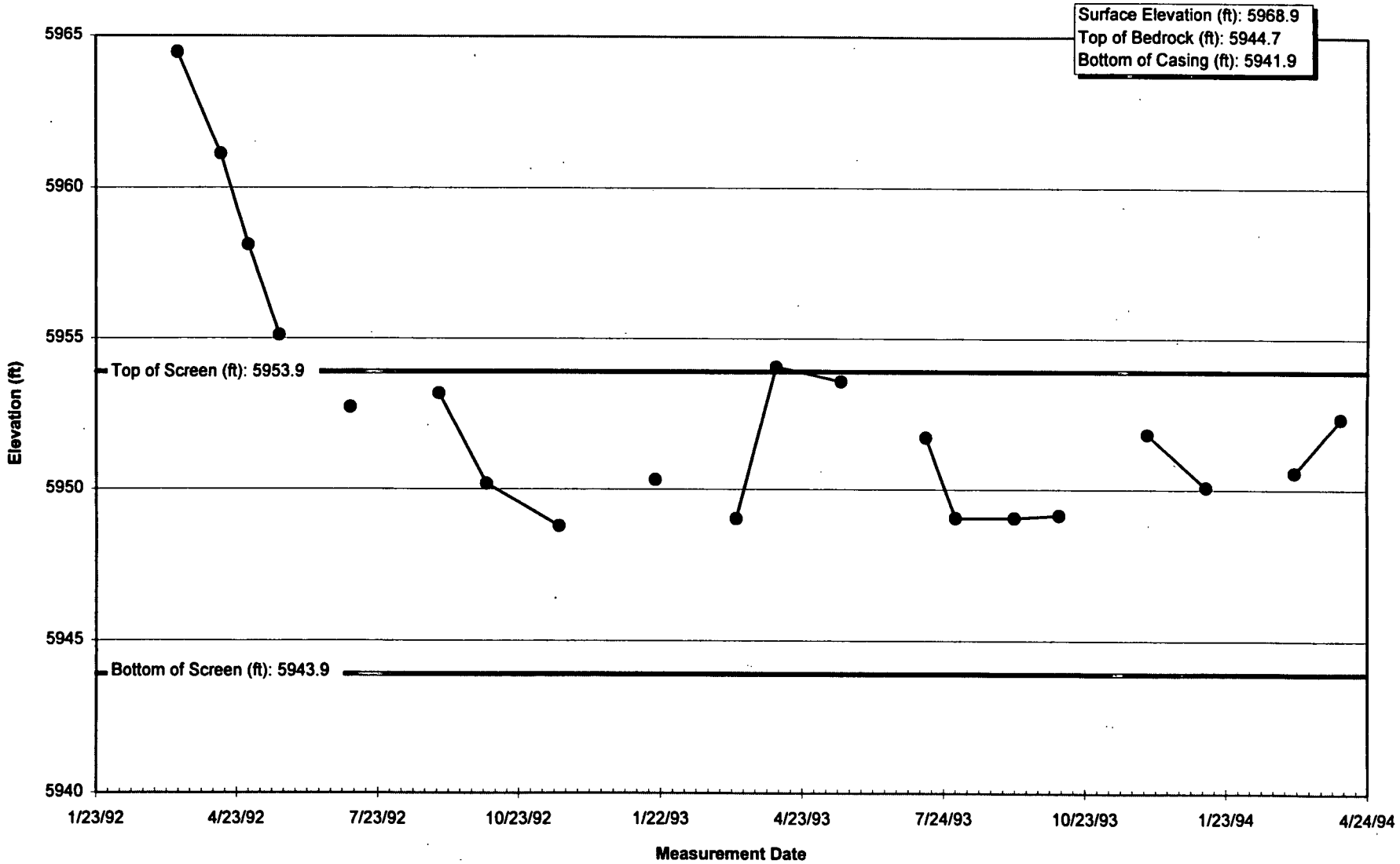
Hydrograph 1490



S6.XLS 1490 4/3/95

416

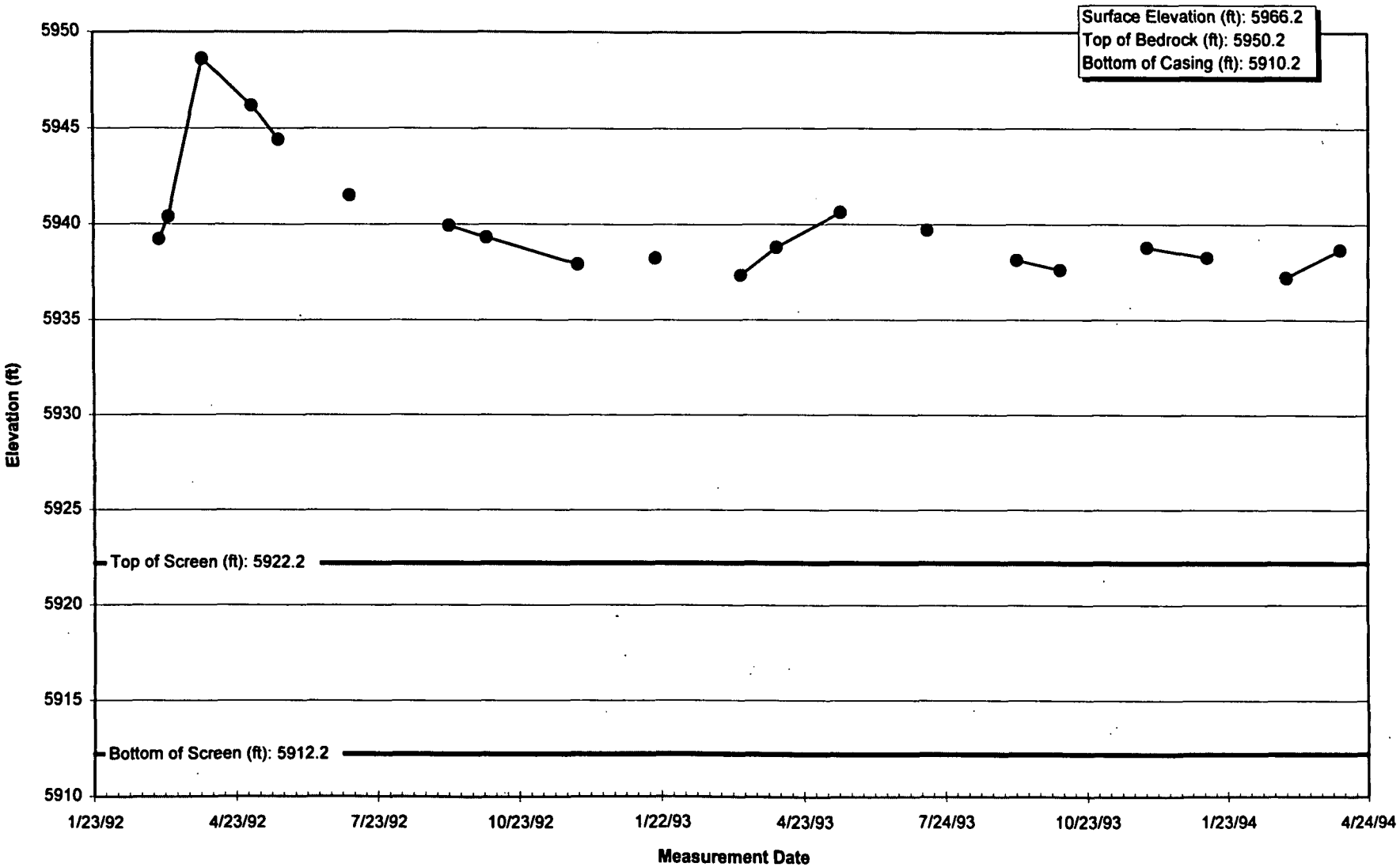
Hydrograph 00191



417

S1.XLS 00191 3/31/95

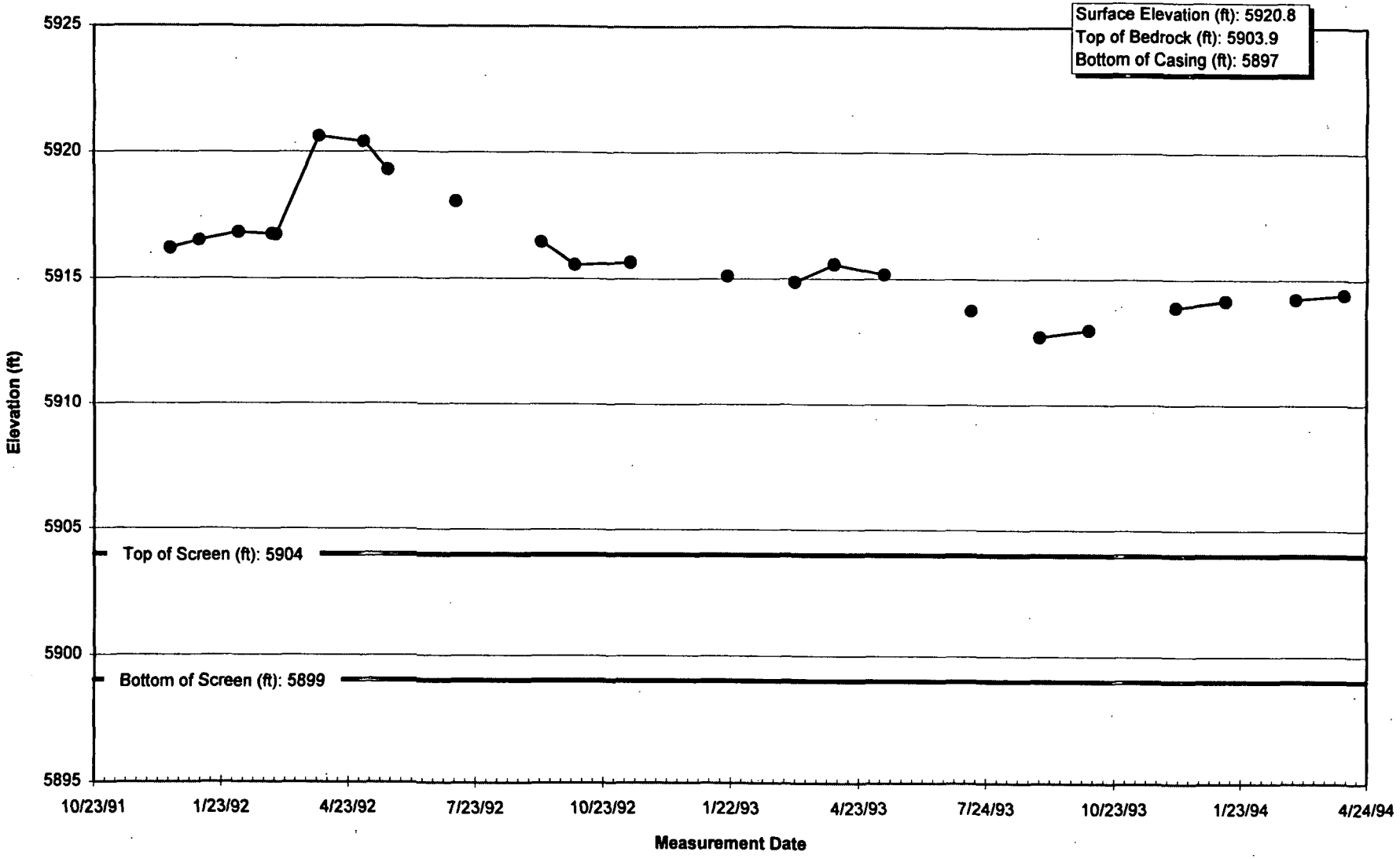
Hydrograph 00291



S1.XLS 00291 3/31/95

418

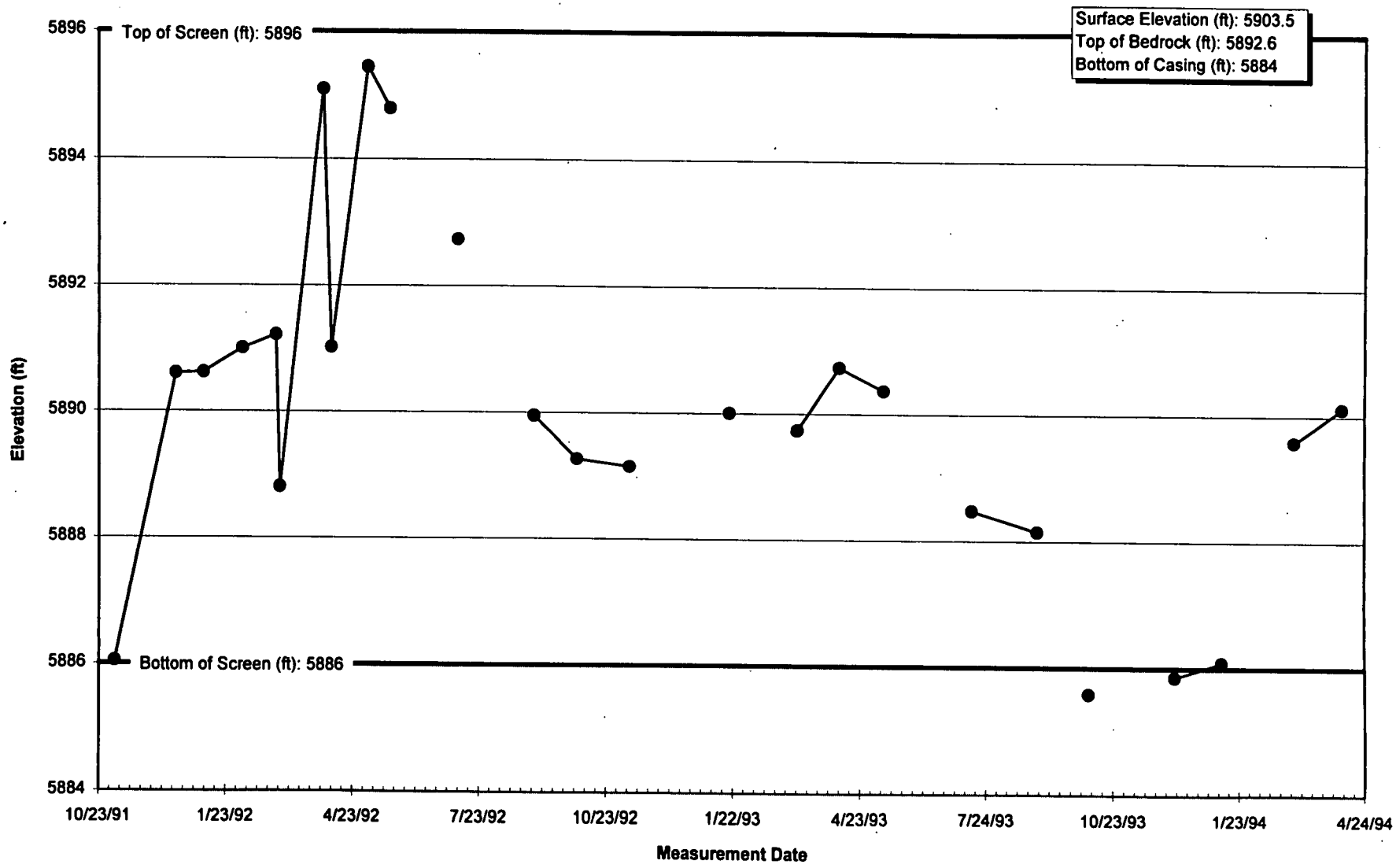
Hydrograph 00391



S1.XLS 00391 3/31/95

419

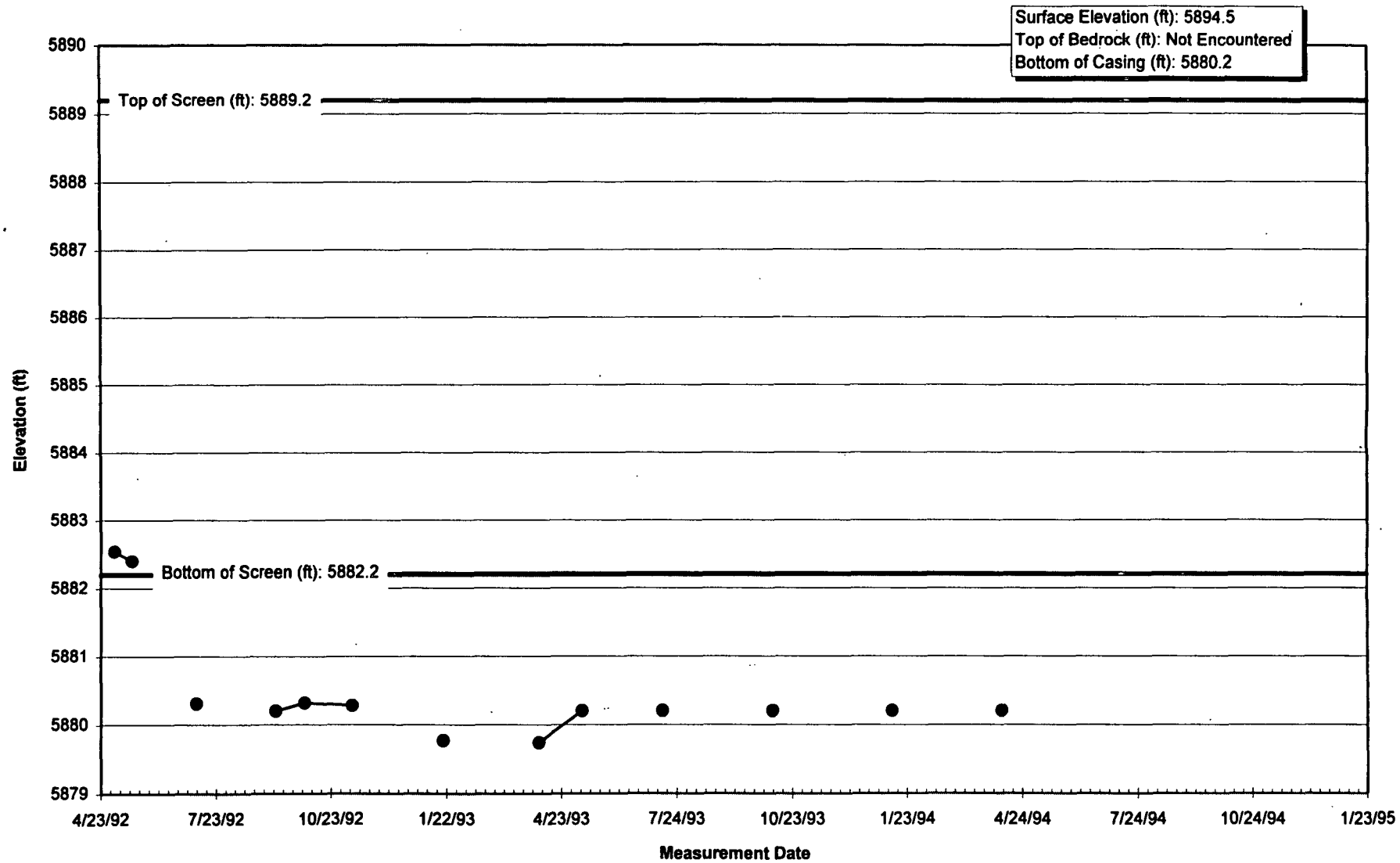
Hydrograph 00491



S1.XLS 00491 3/31/95

420

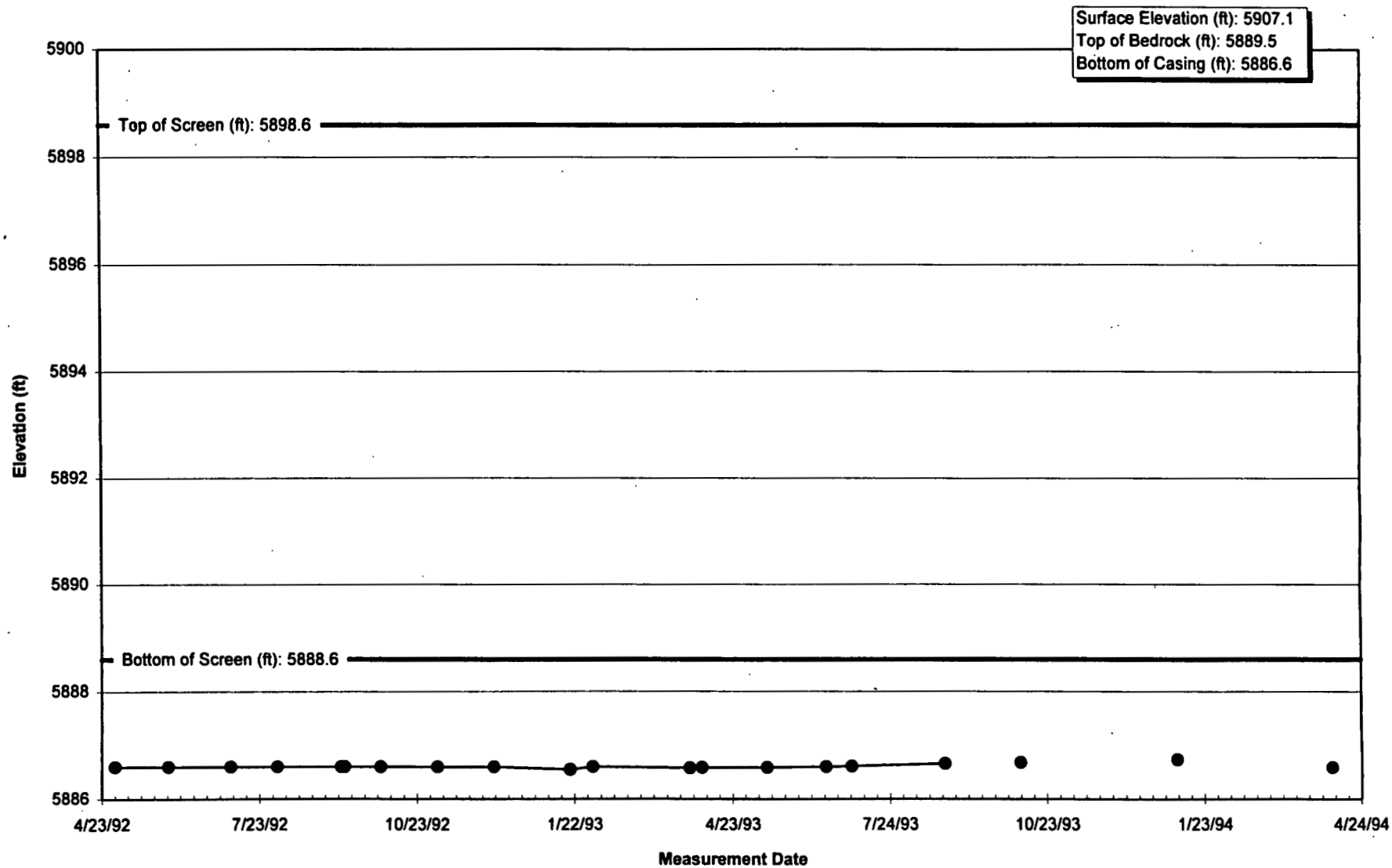
Hydrograph 00691



S1.XLS 00691 3/31/95

421

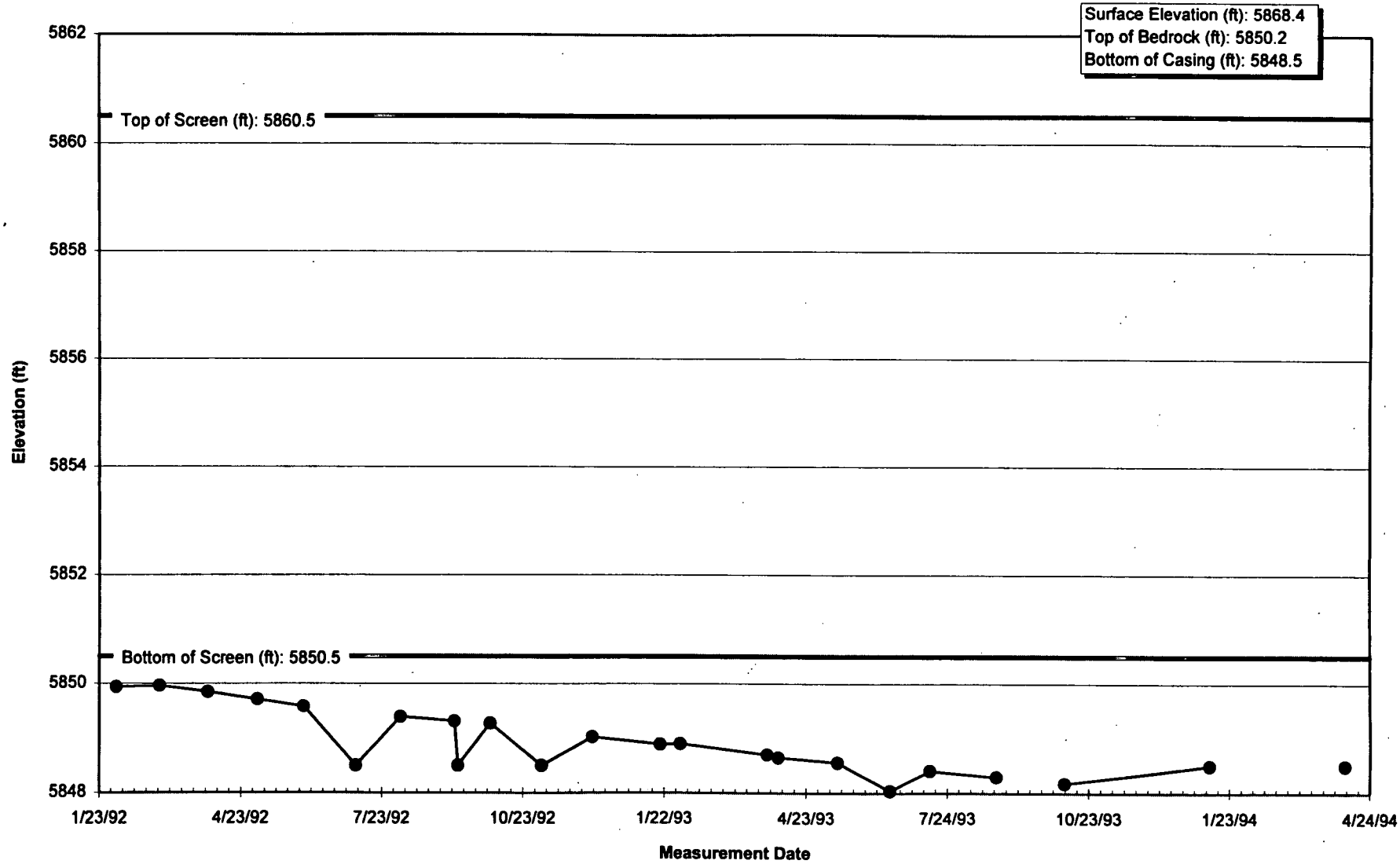
Hydrograph 00791



S1.XLS 00791 3/31/95

422

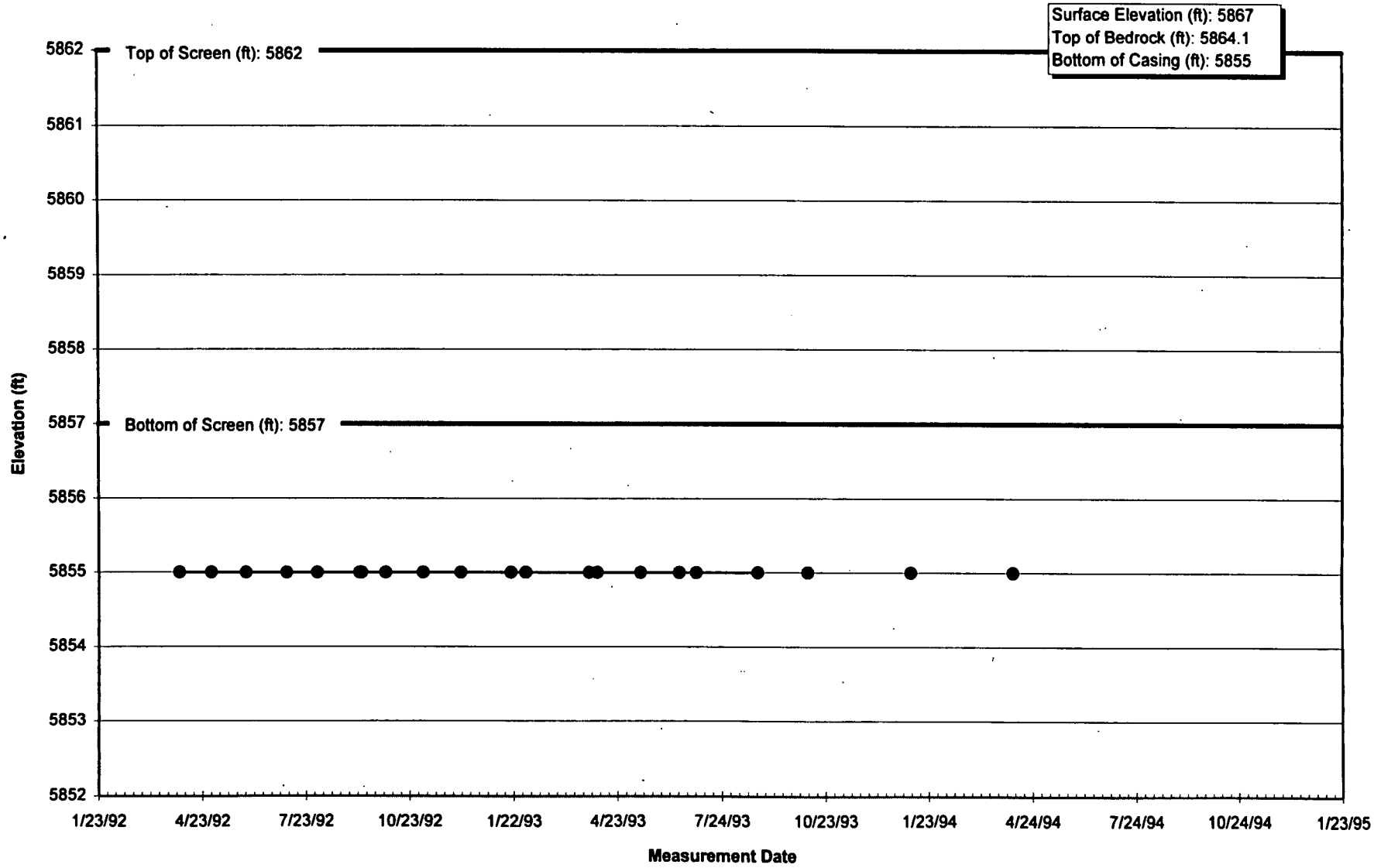
Hydrograph 00891



S1.XLS 00891 3/31/95

423

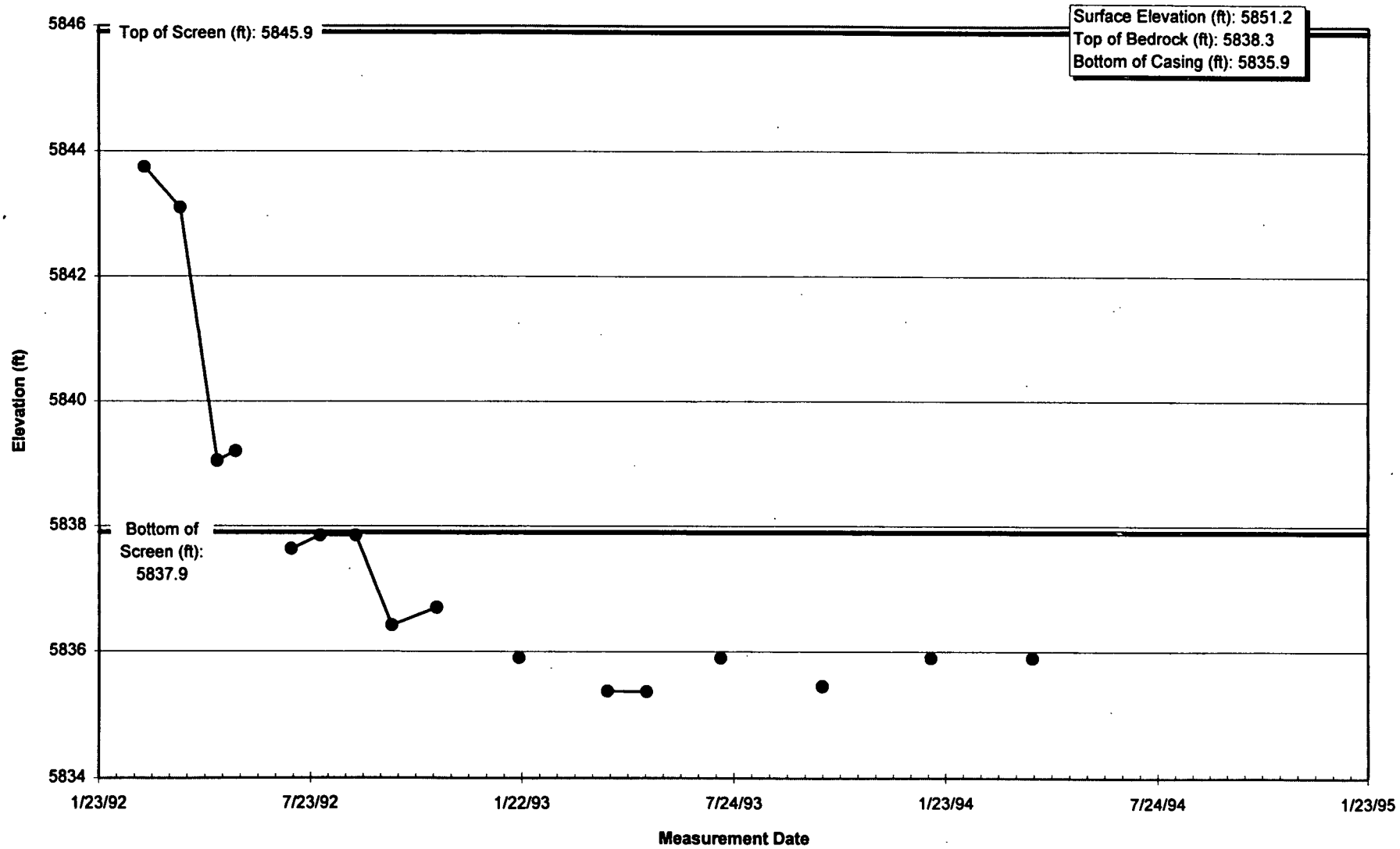
Hydrograph 00991



S1.XLS 00991 3/31/95

424

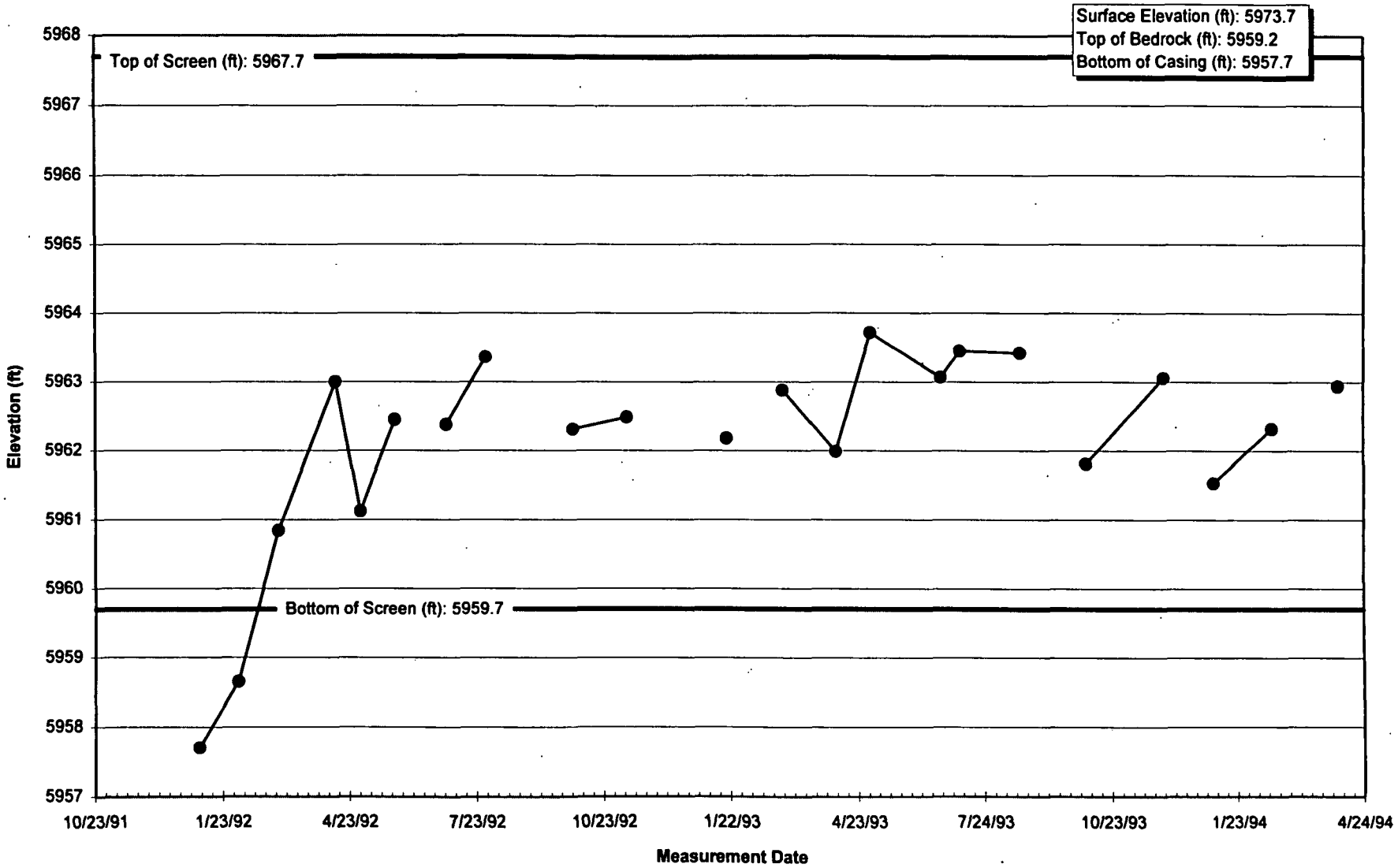
Hydrograph 01291



S1.XLS 01291 3/31/95

425

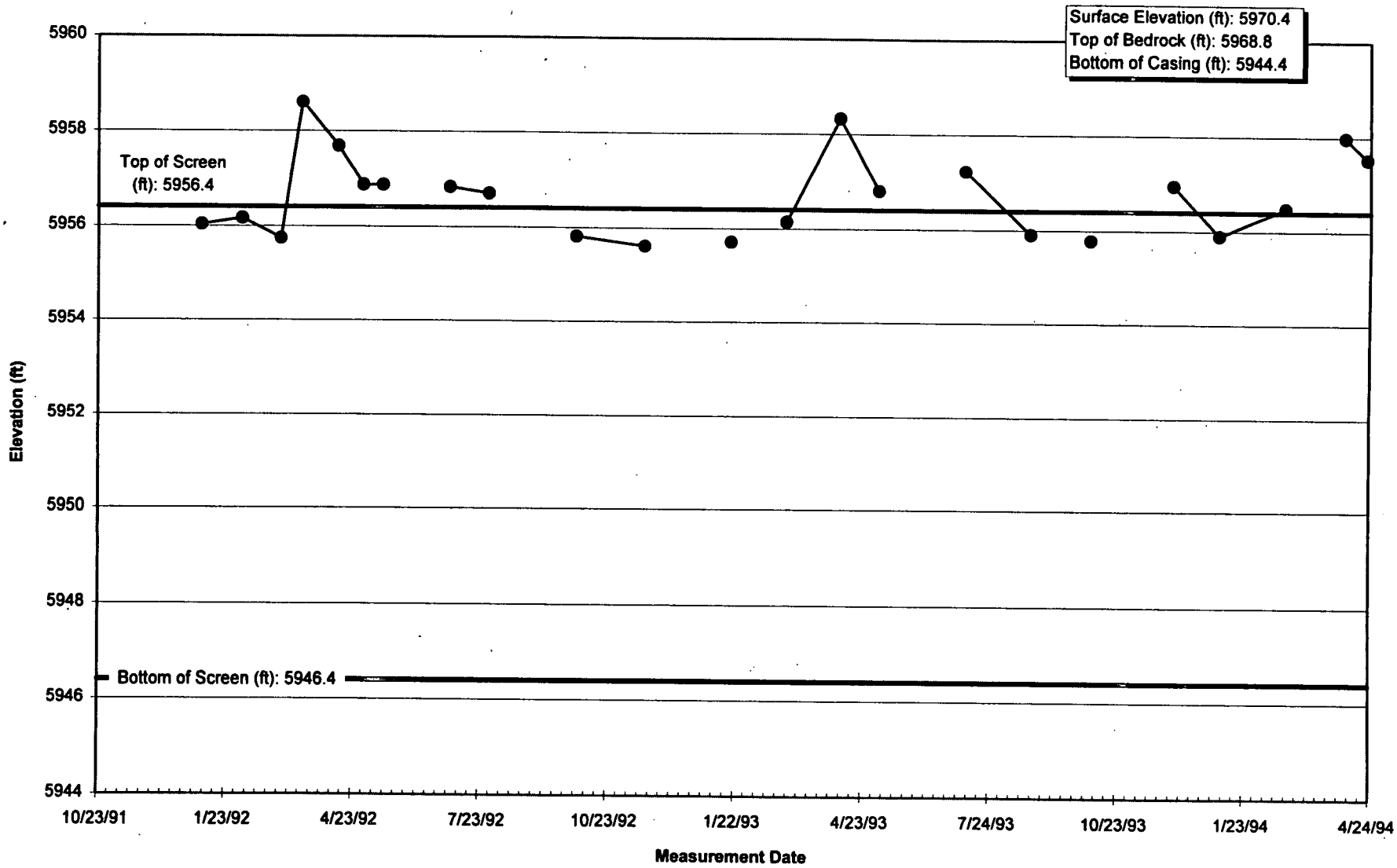
Hydrograph 01391



S1.XLS 01391 3/31/95

426

Hydrograph 01491



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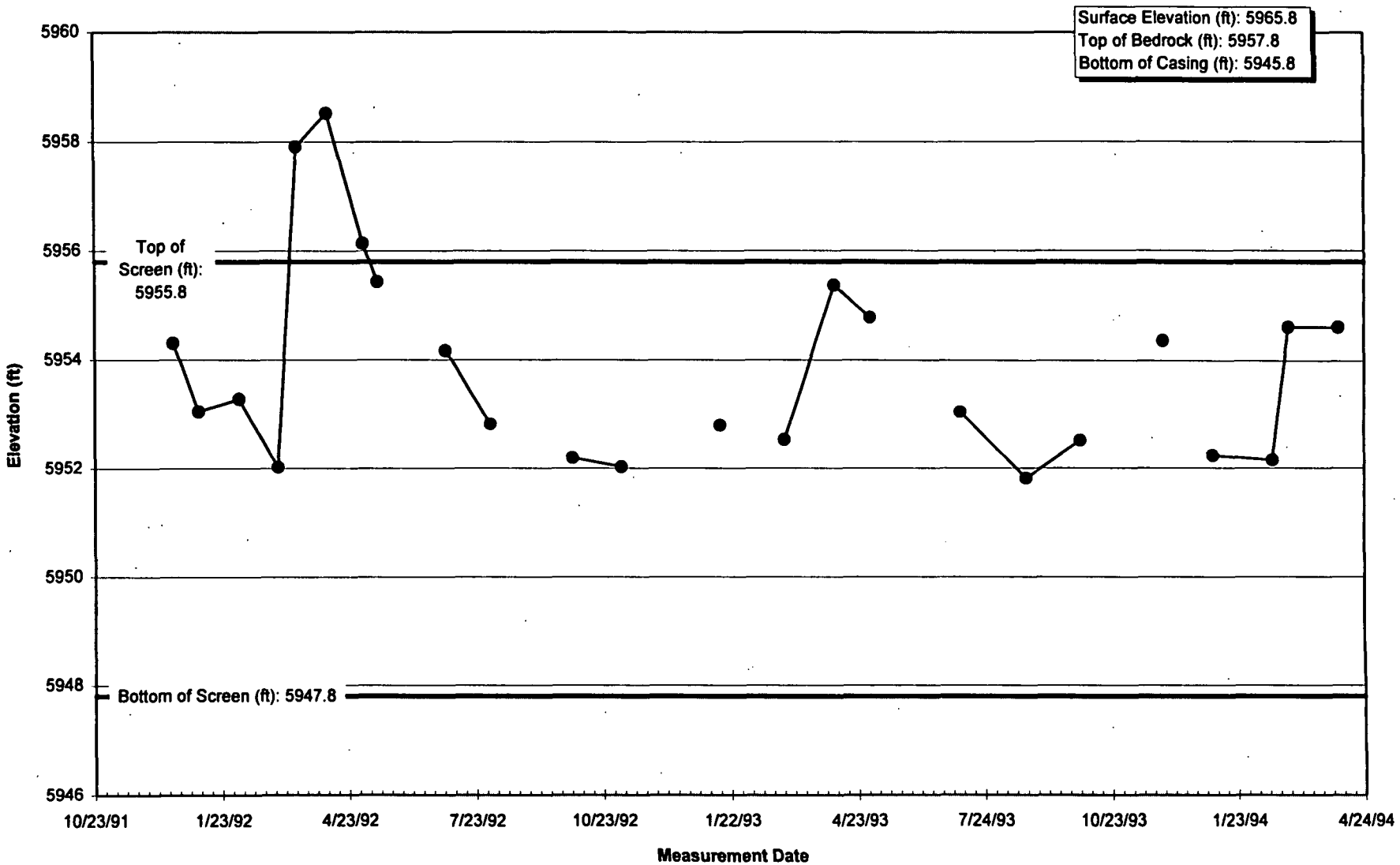
427

Hydrograph 01791



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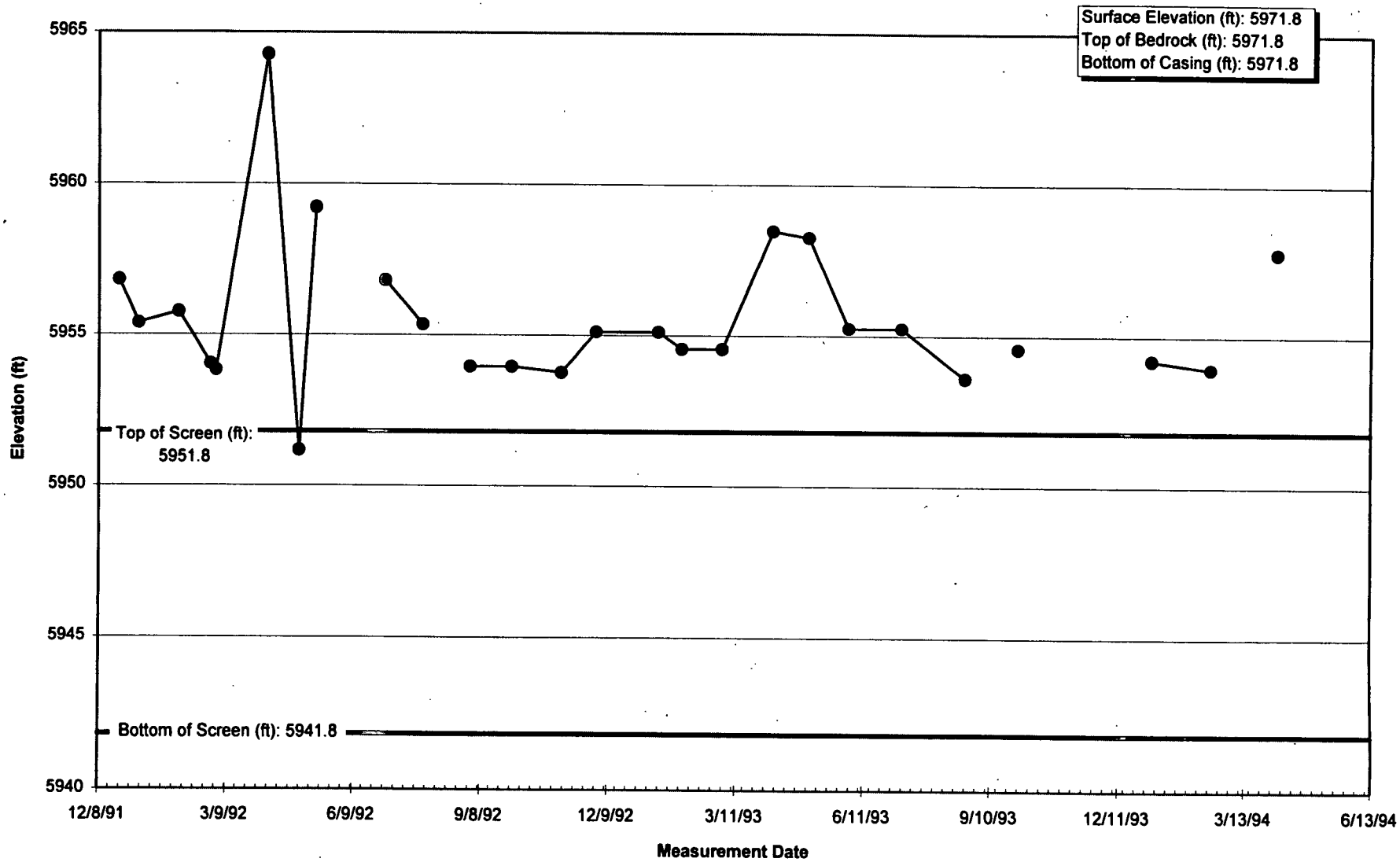
428

Hydrograph 01891



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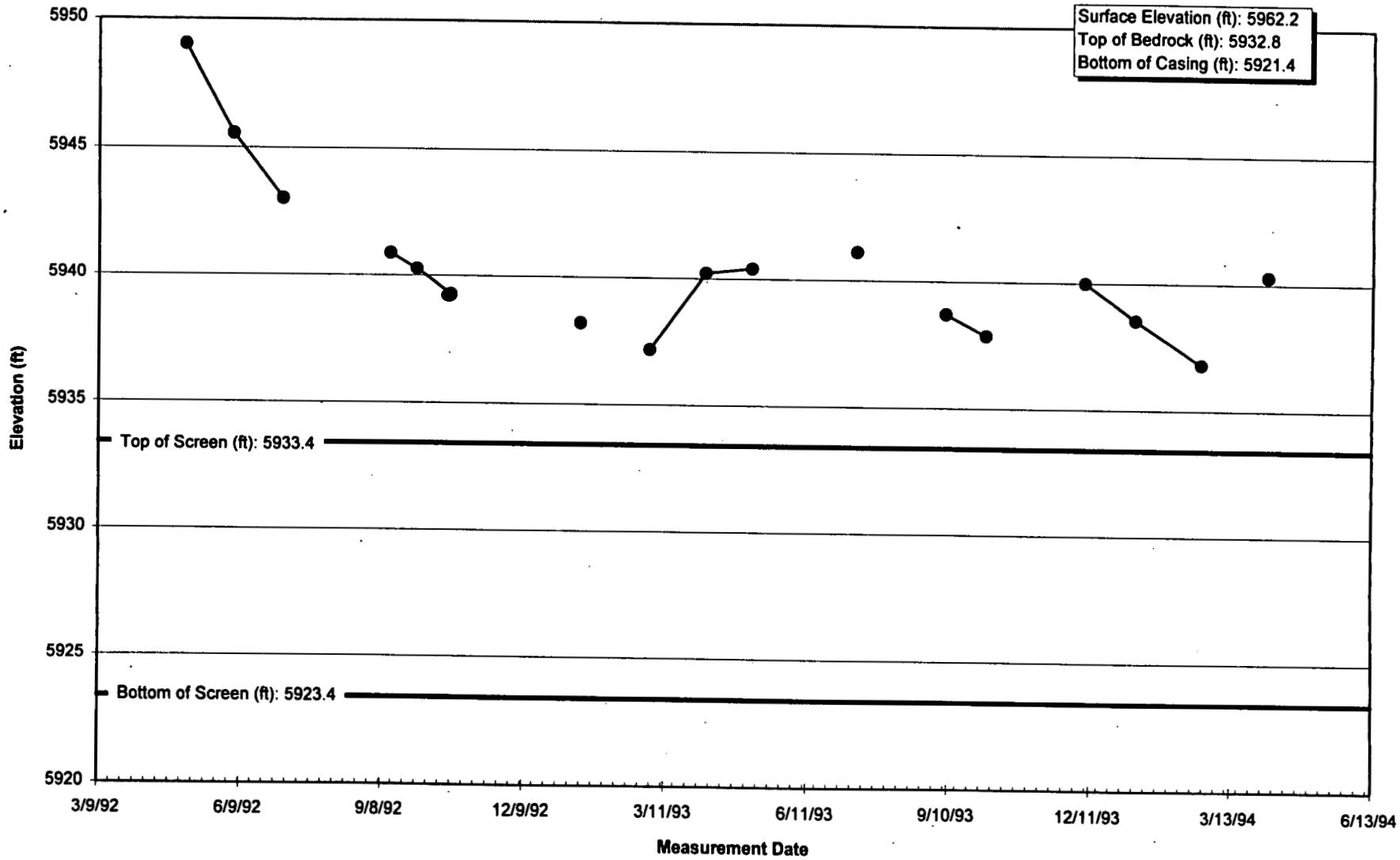
429

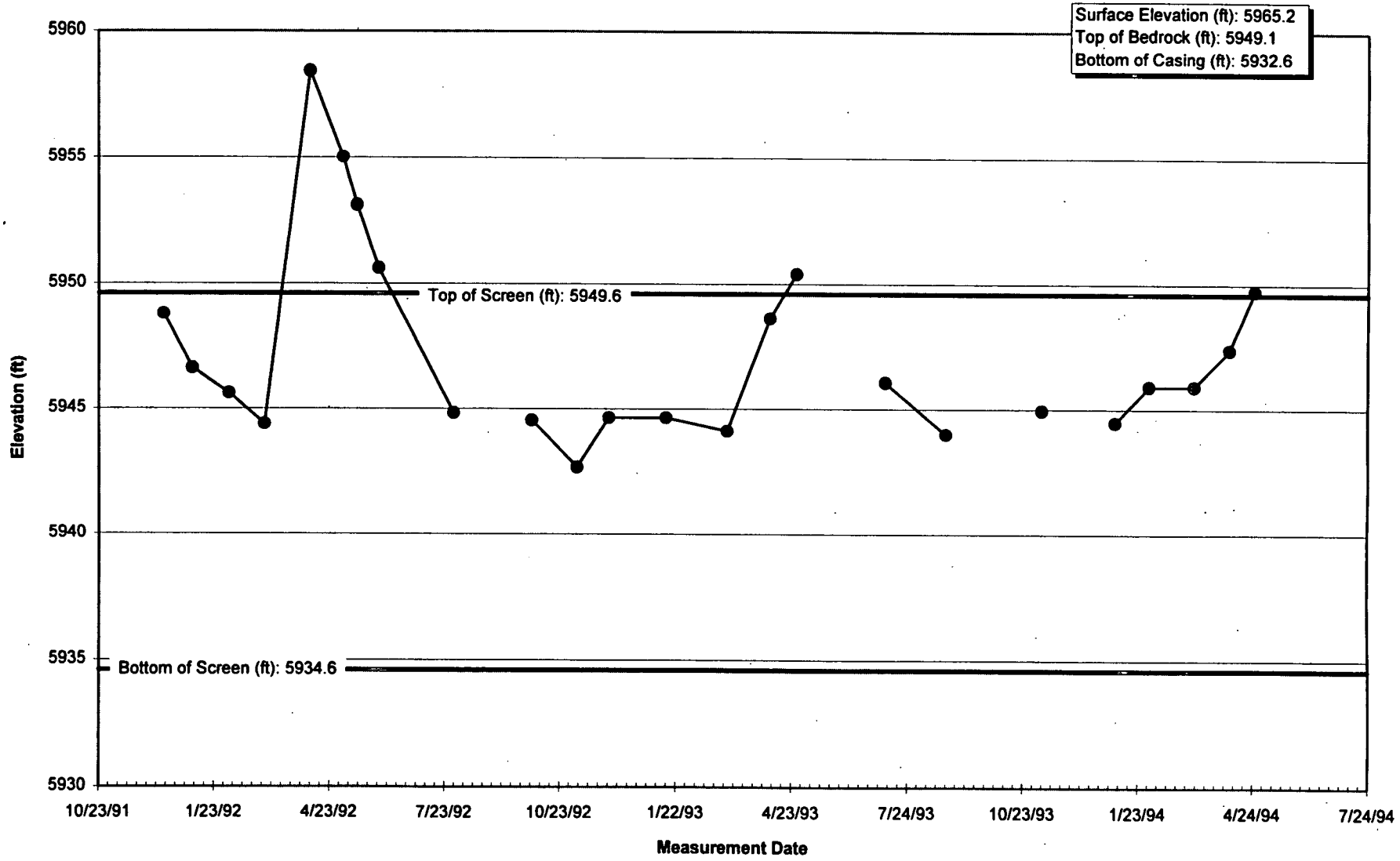
Hydrograph 01991



S1.XLS 01991 3/31/95

430

Hydrograph 02091



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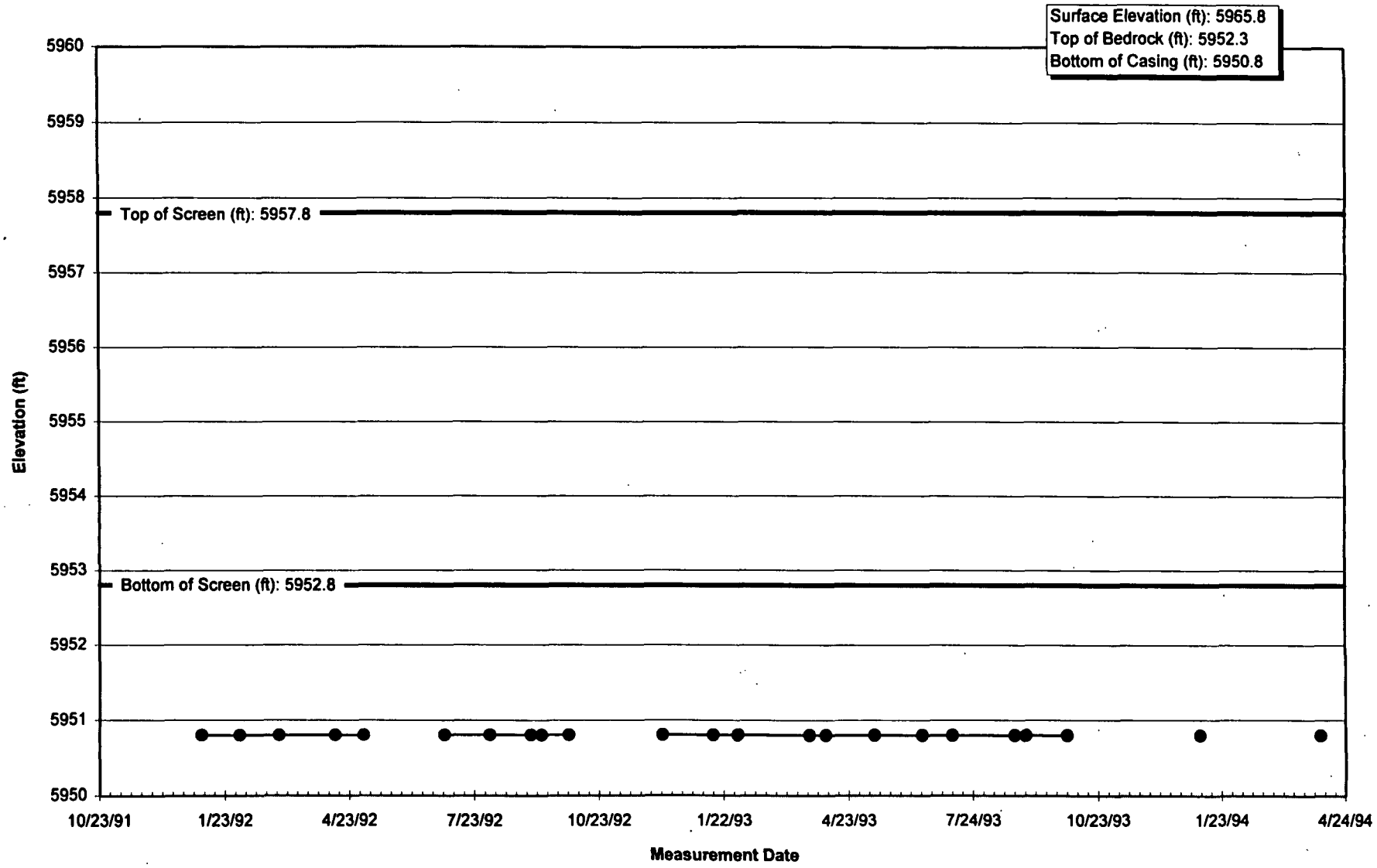
431

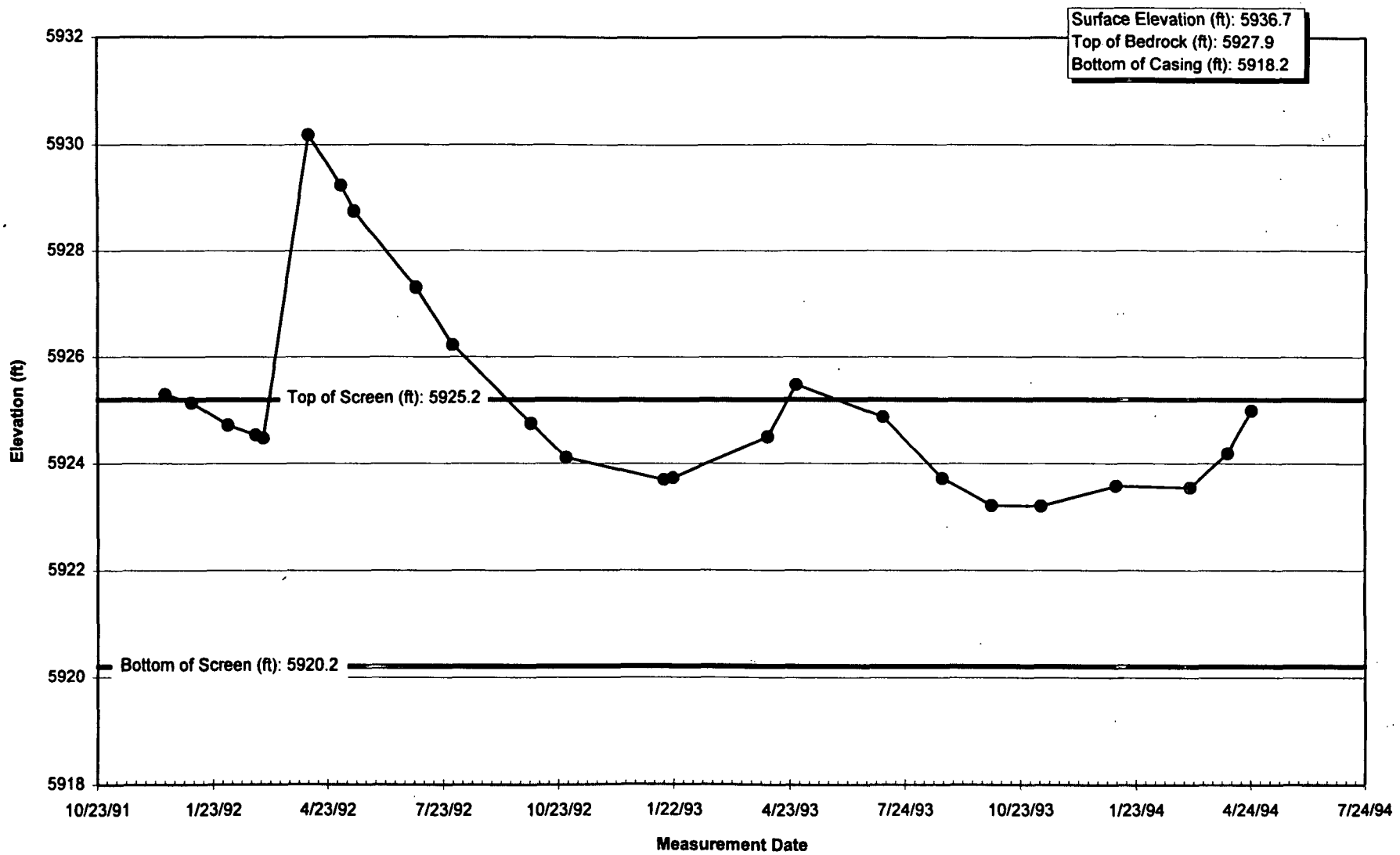
Hydrograph 02191



S1.XLS 02191 3/31/95

432

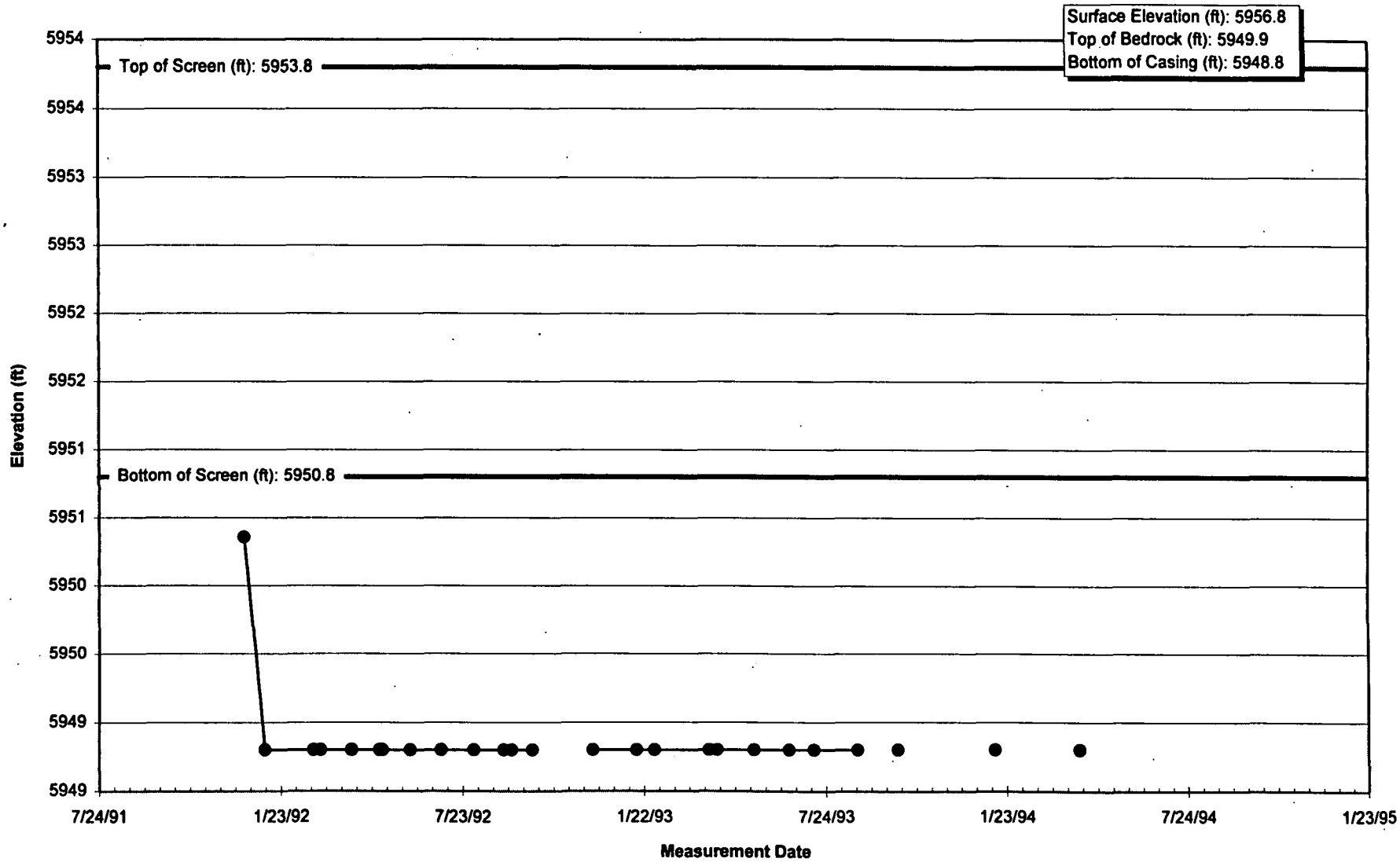
Hydrograph 02291



S1.XLS 02291 3/31/95

433

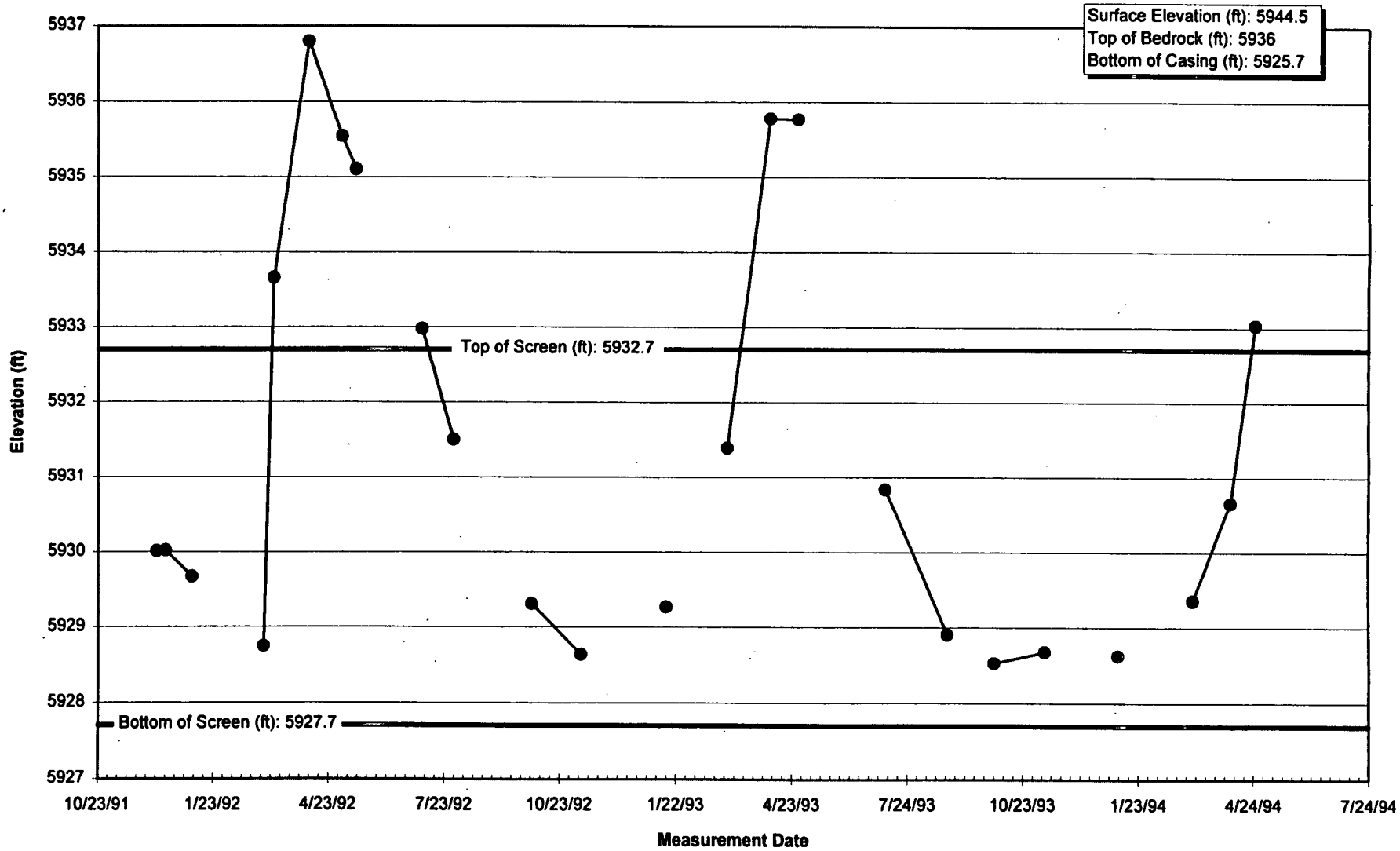
Hydrograph 02391



S1.XLS 02391 3/31/95

434

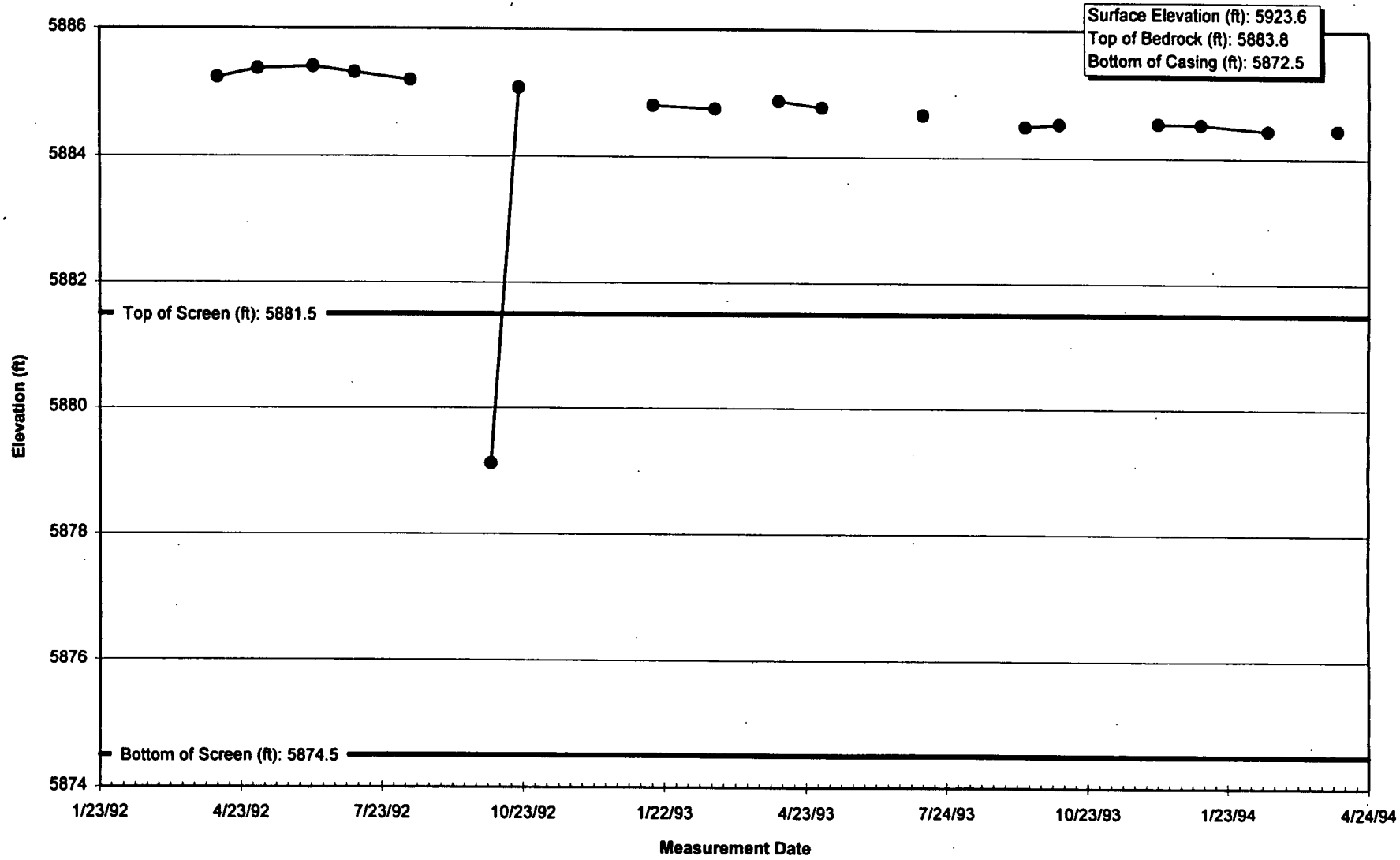
Hydrograph 02491



S2.XLS 02491 3/31/95

435

Hydrograph 02591



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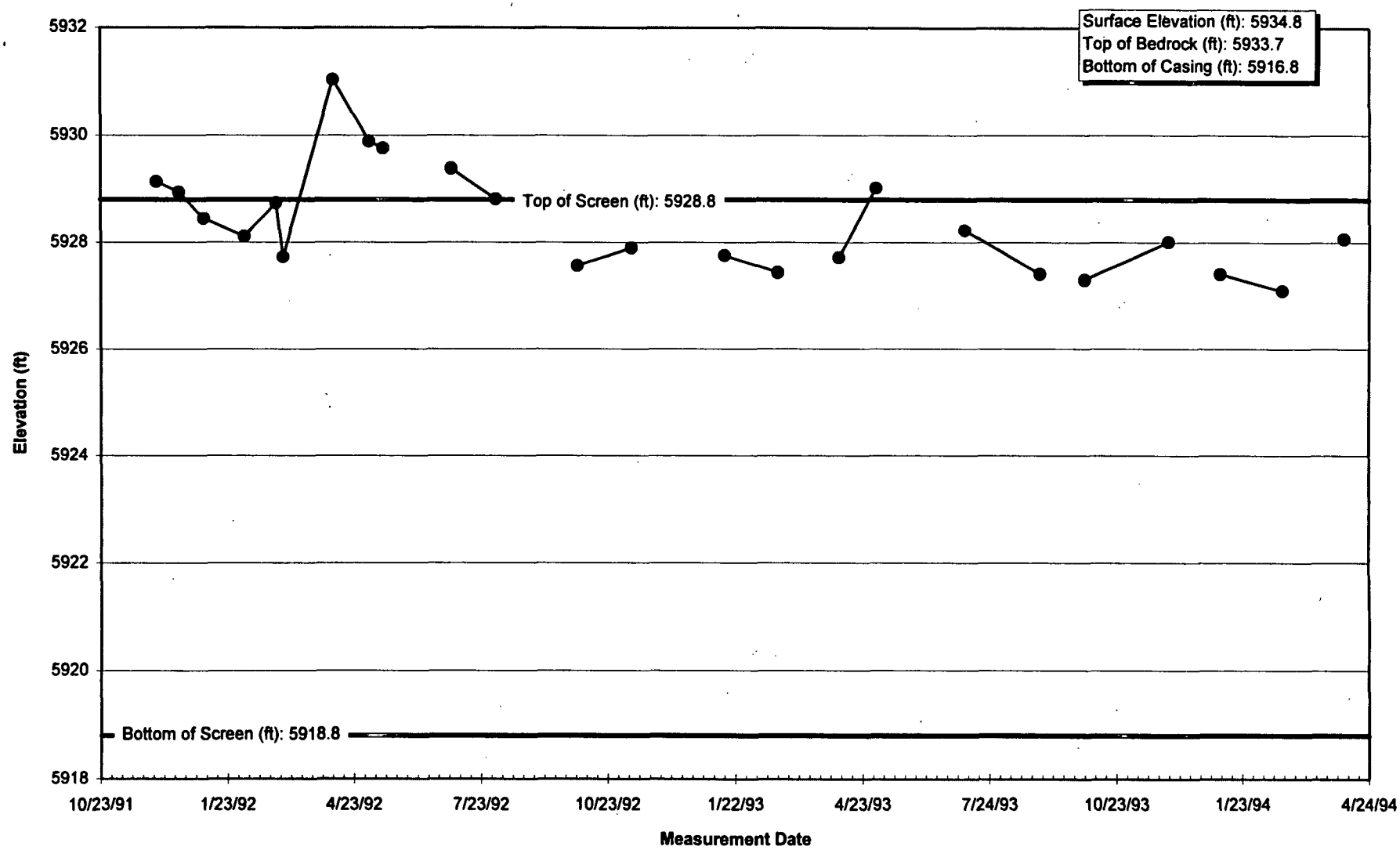
436

Hydrograph 02691



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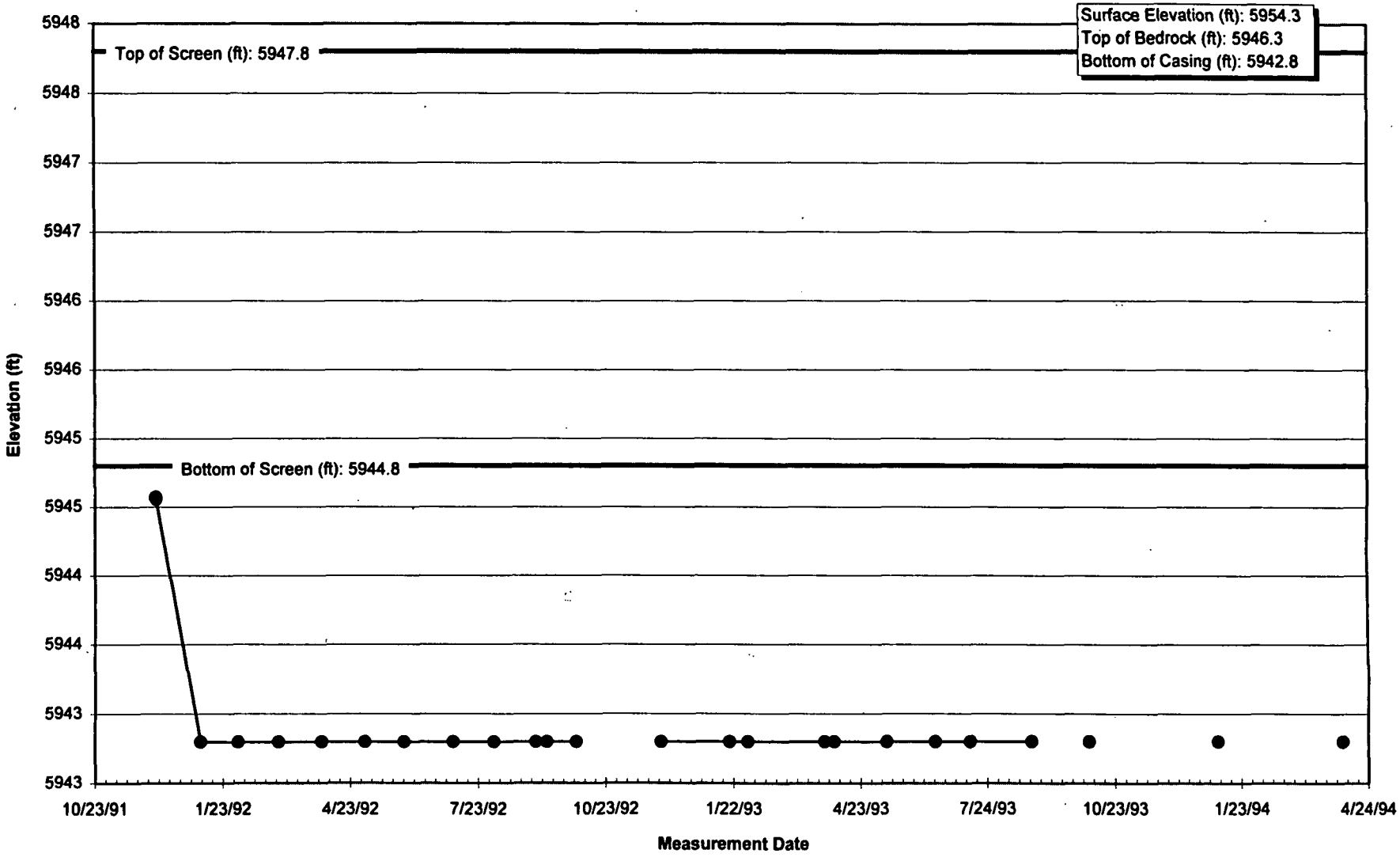
437

Hydrograph 02791



438

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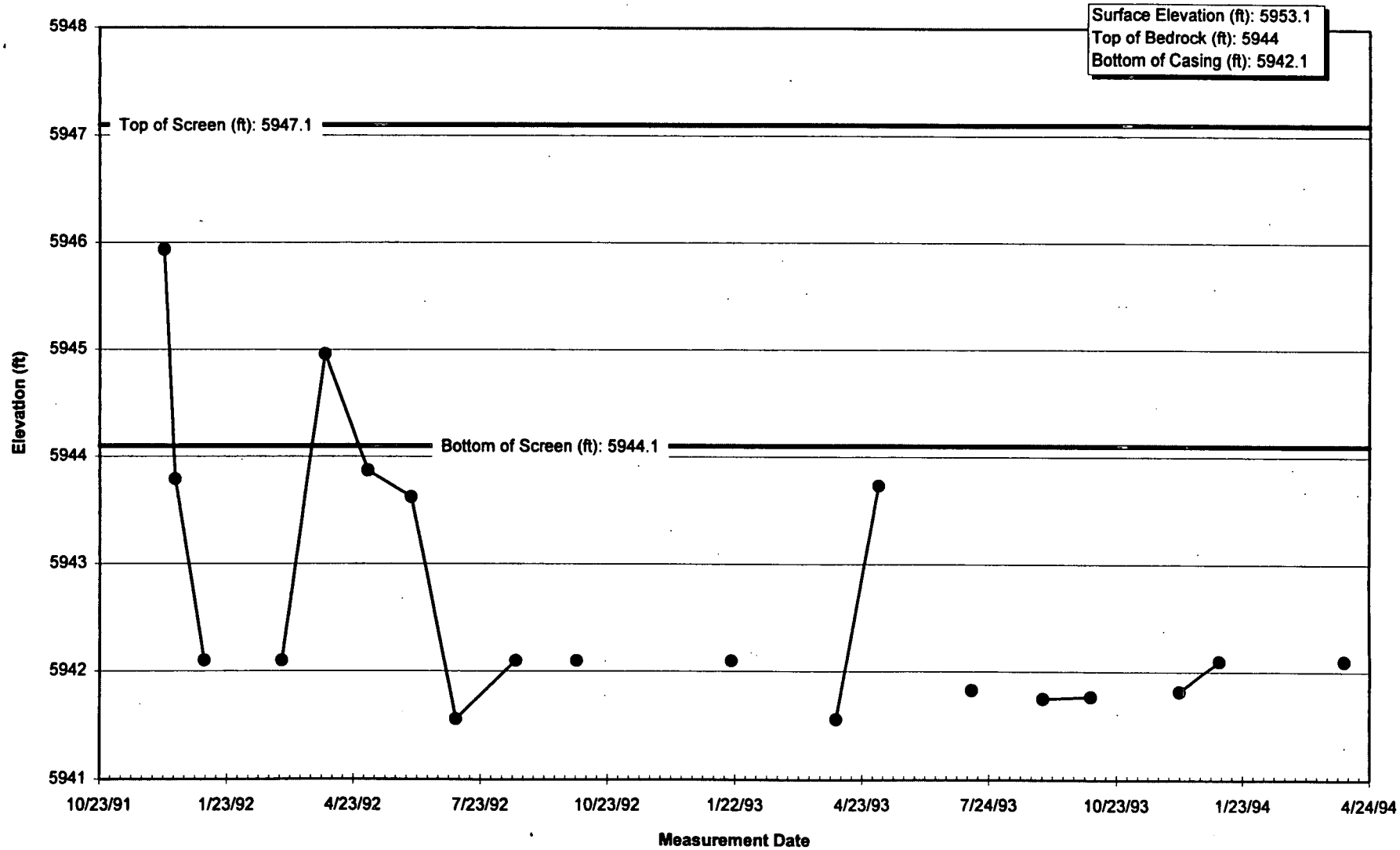
Hydrograph 02891



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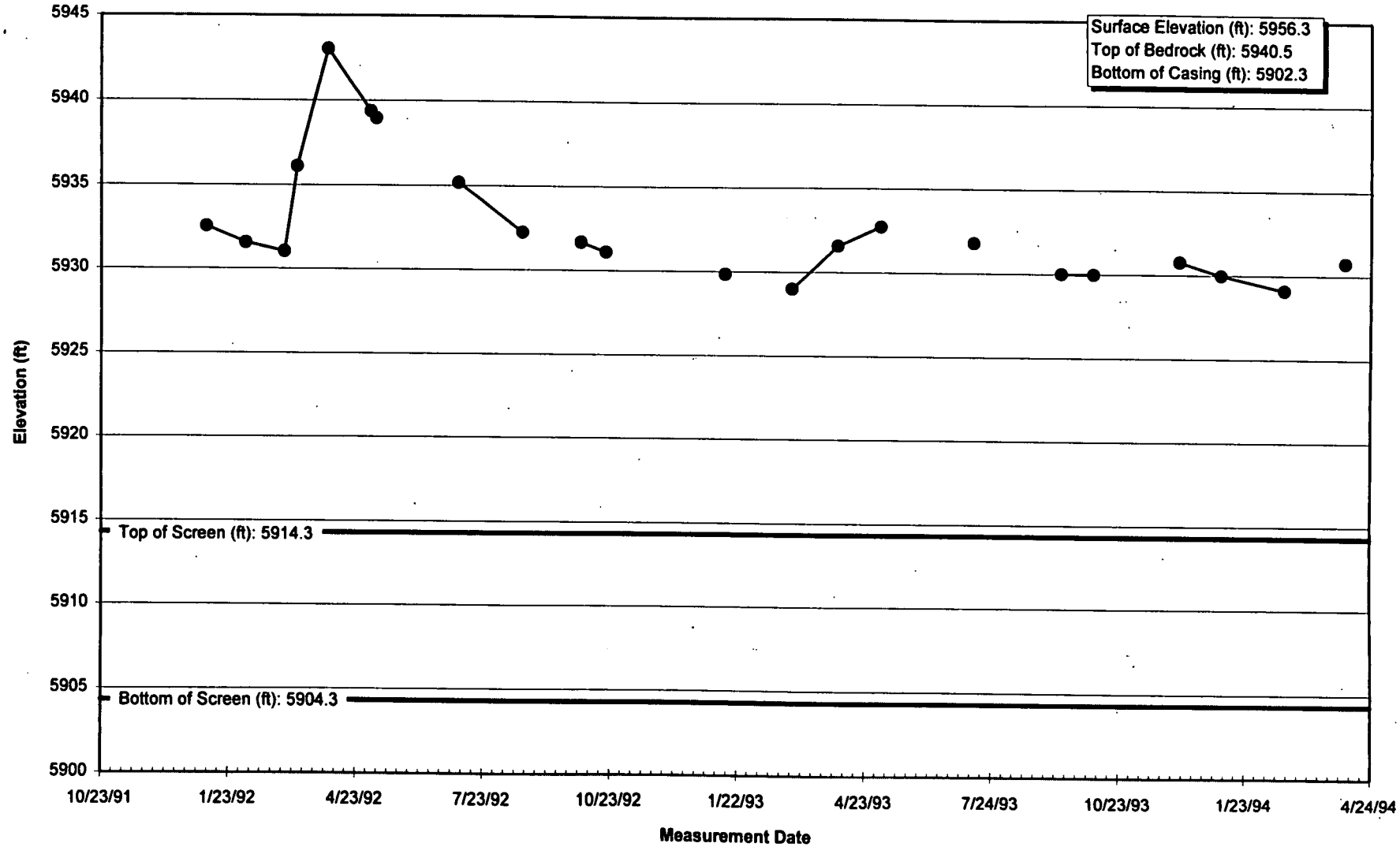
430

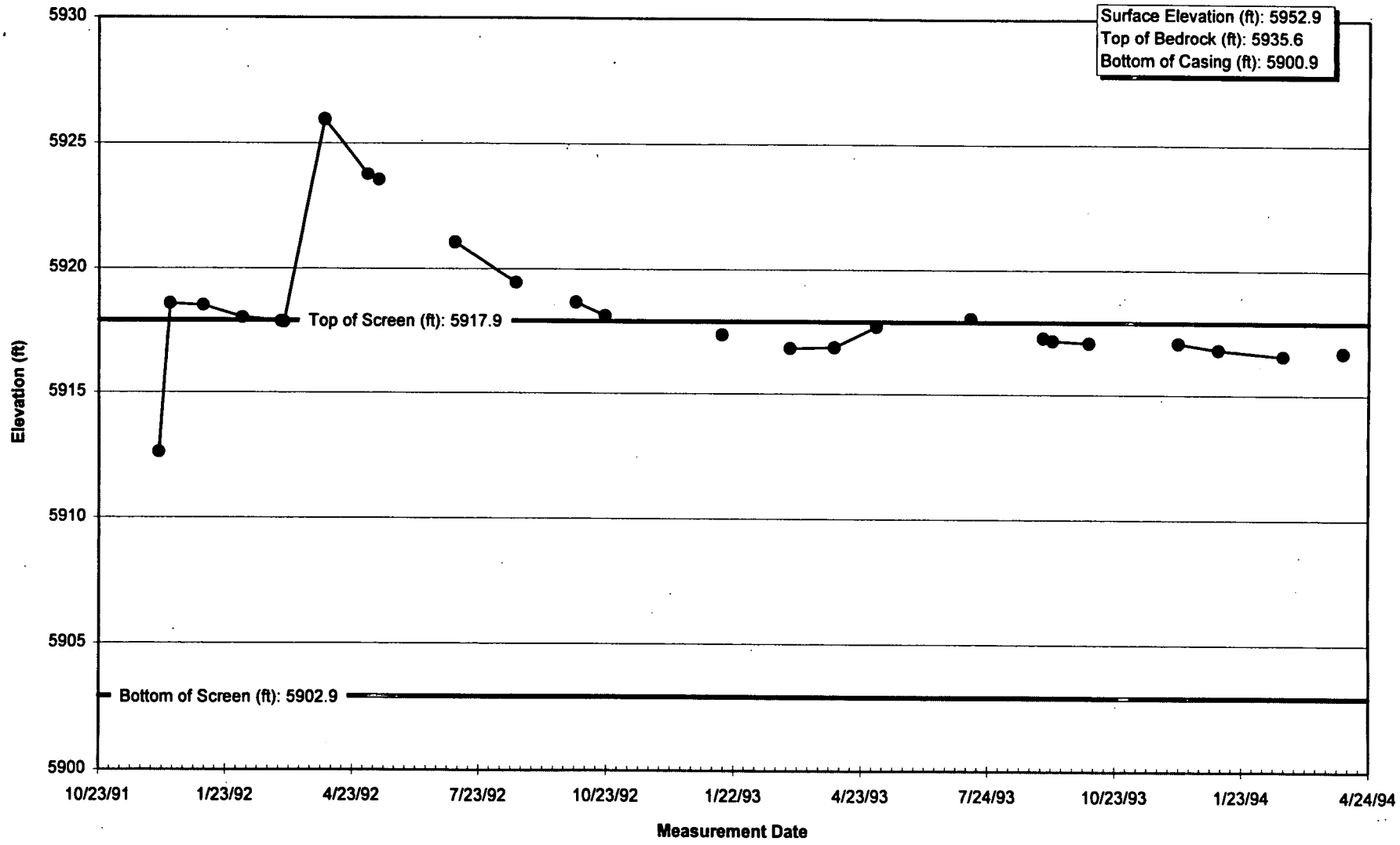
Hydrograph 02991



440

S2.XLS 02991 3/31/95

Hydrograph 03091



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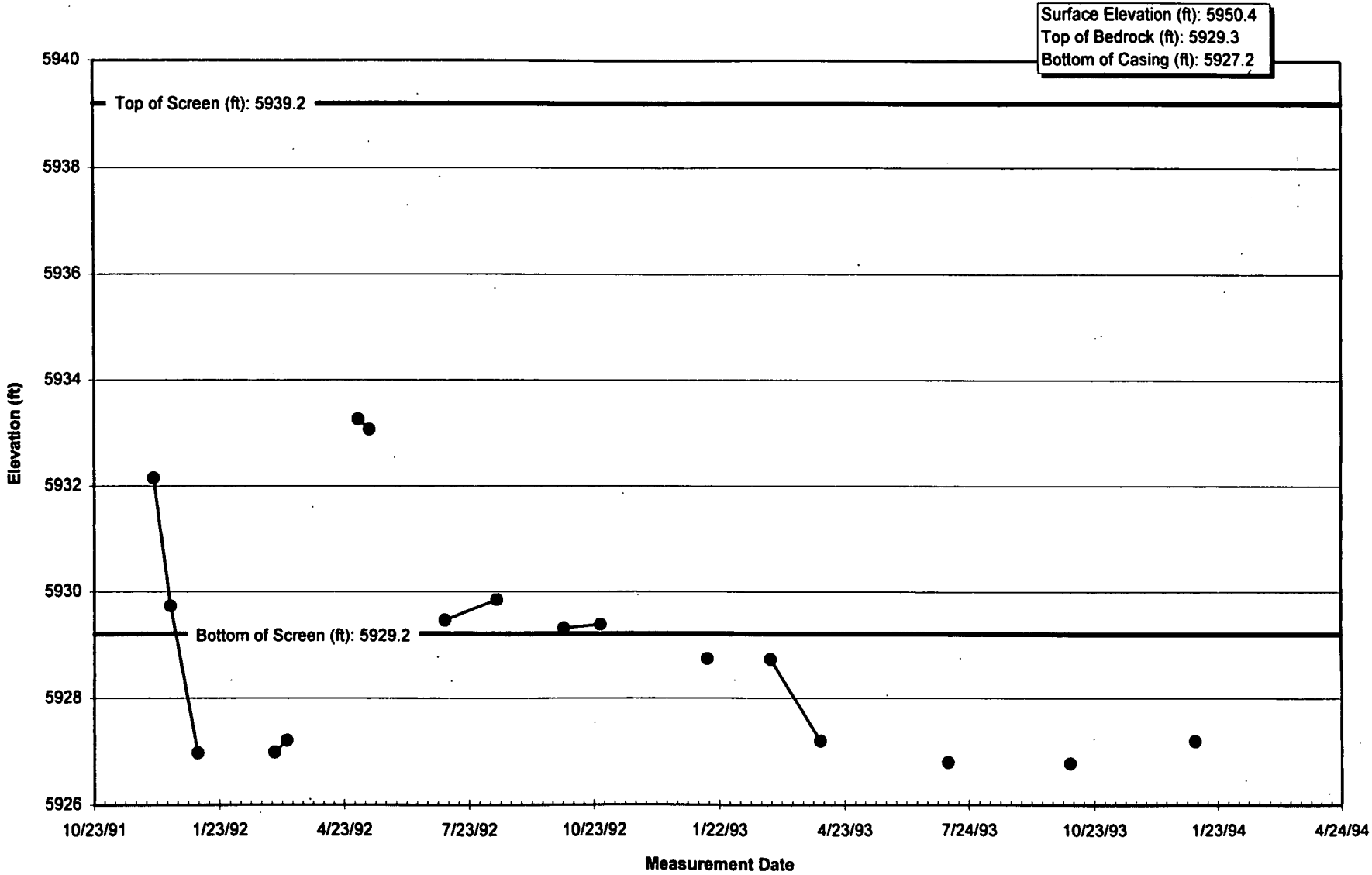
441

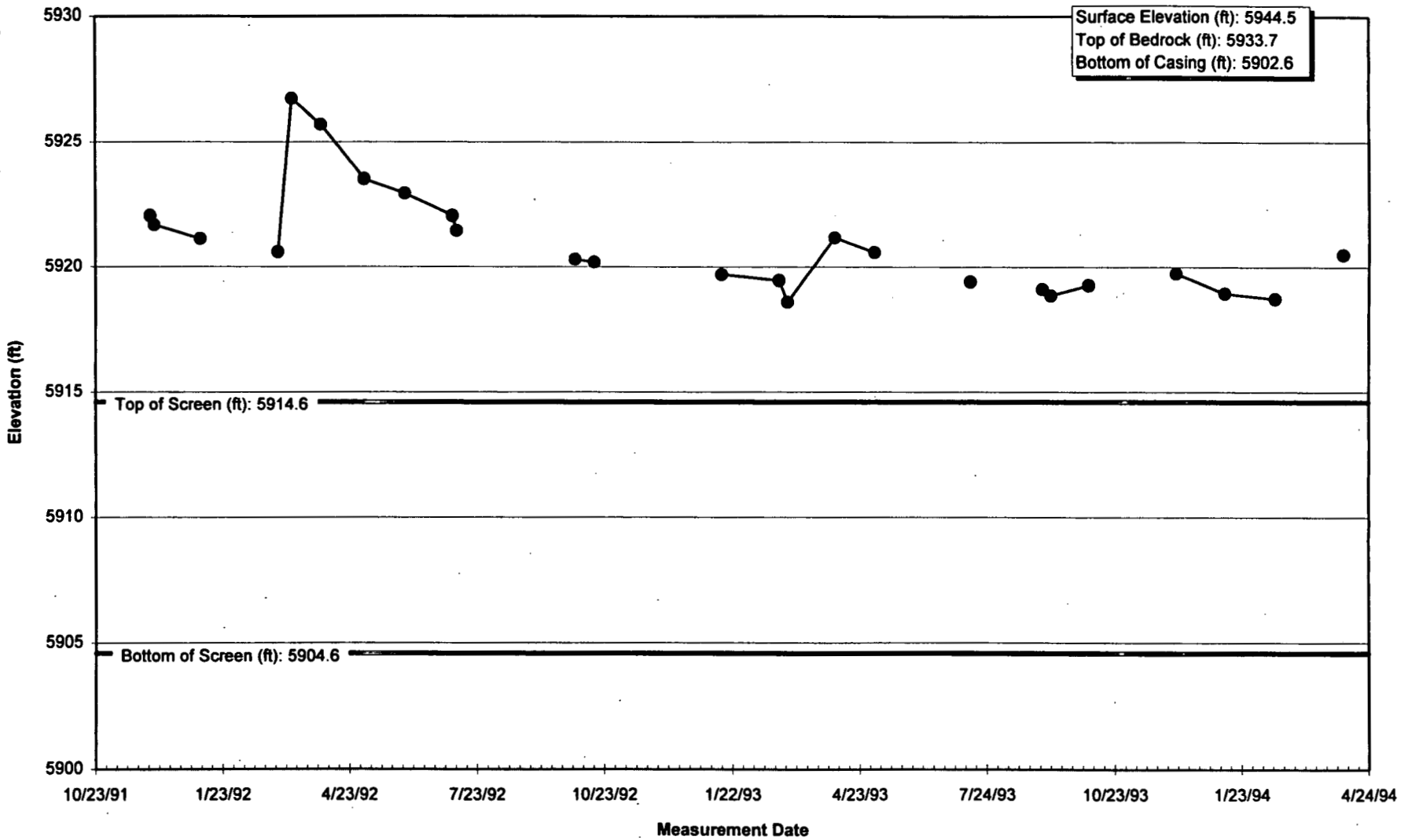
Hydrograph 03191



S2.XLS 03191 3/31/95

442

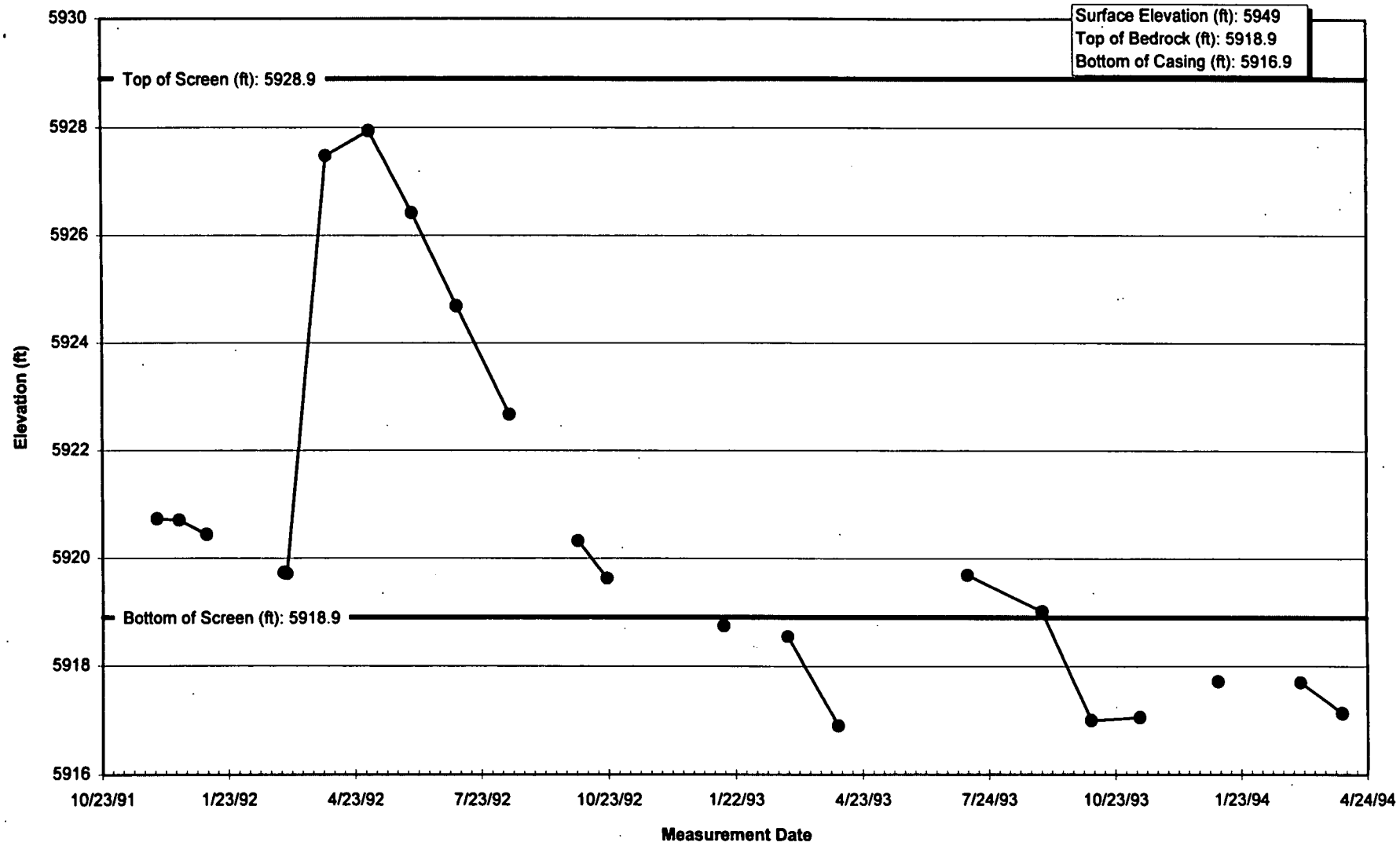
Hydrograph 03391



S2.XLS 03391 3/31/95

443

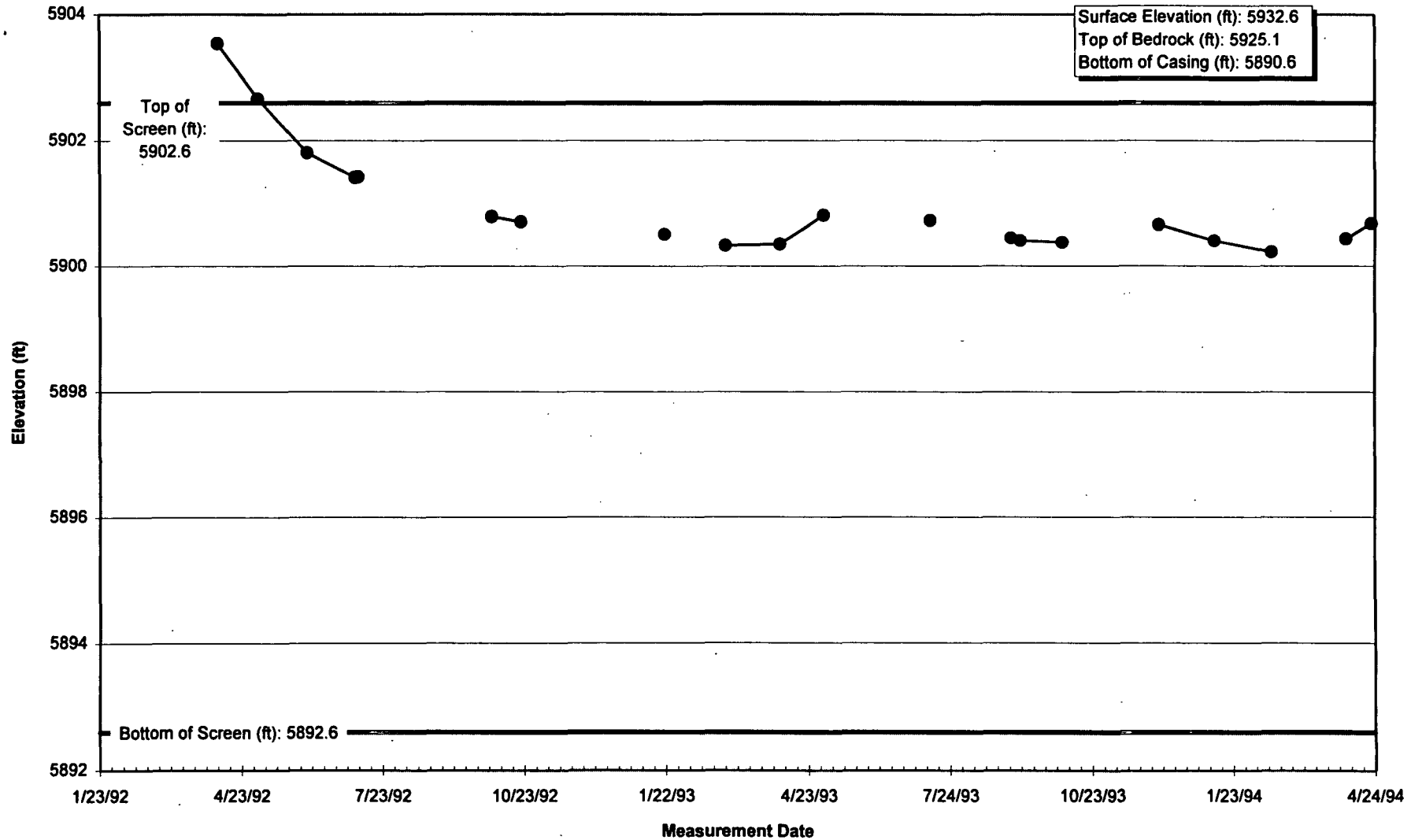
Hydrograph 03591



444

S2.XLS 03591 3/31/95

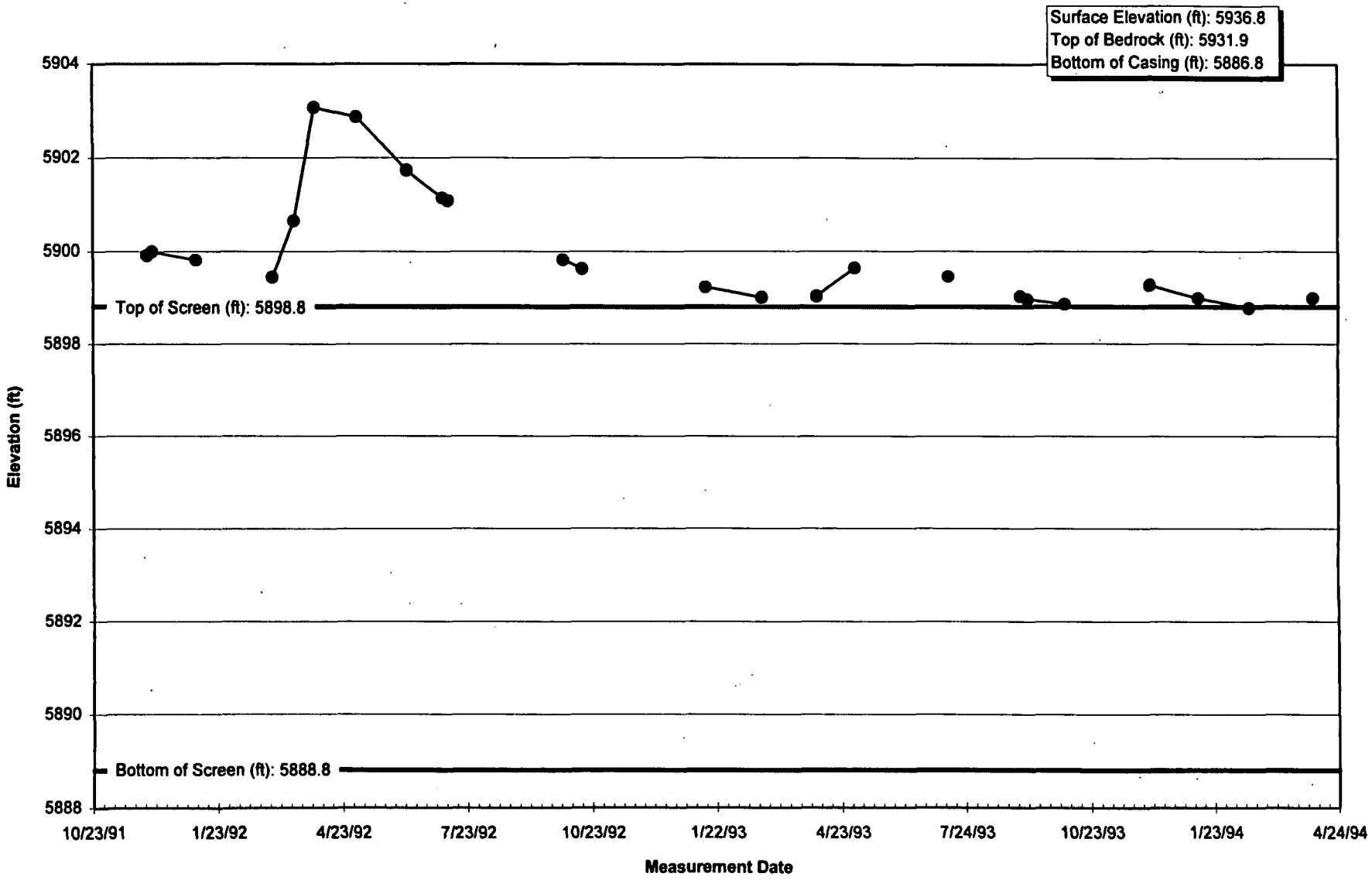
Hydrograph 03691



S2.XLS 03691 3/31/95

445

Hydrograph 03791



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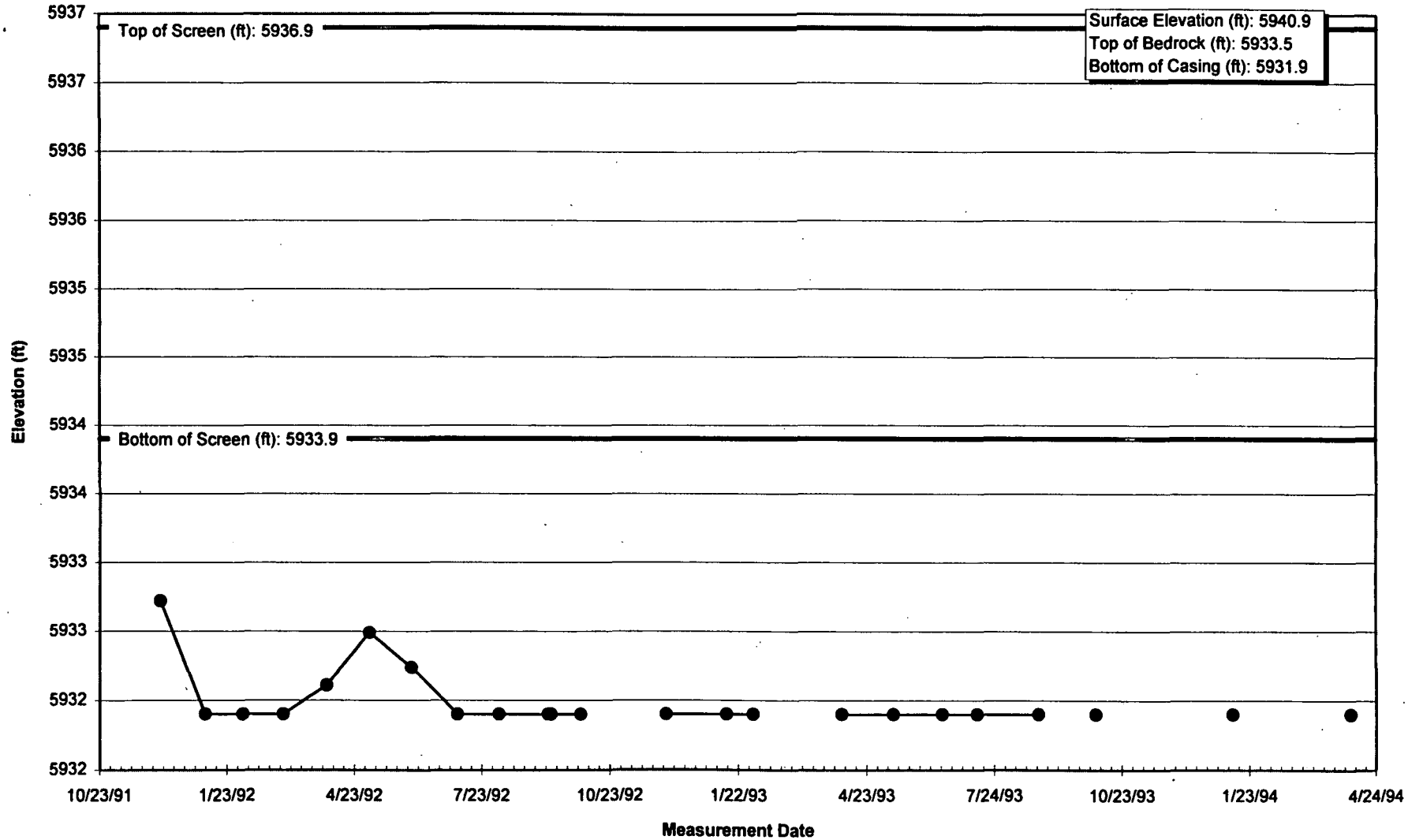
446

Hydrograph 03891



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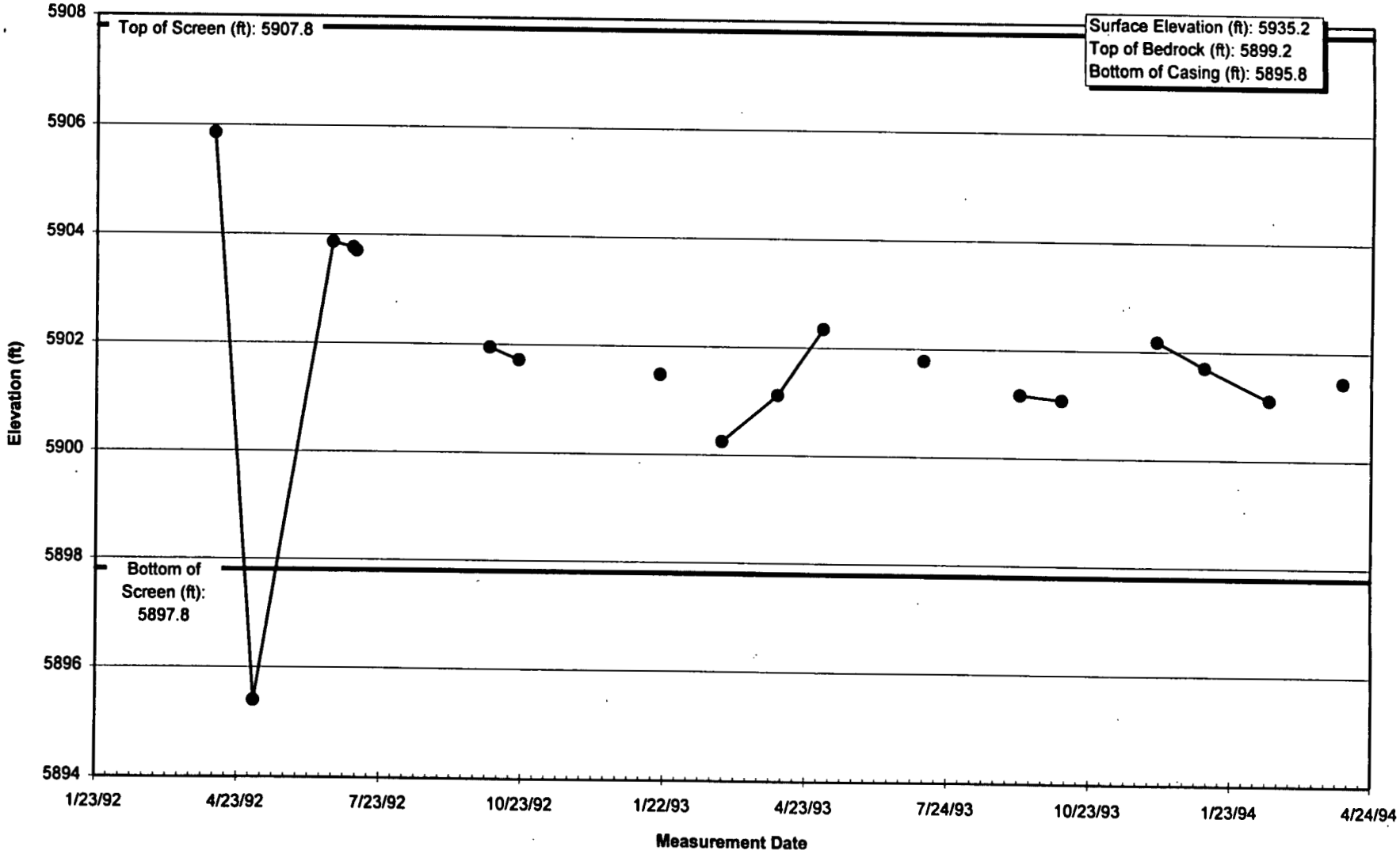
447

Hydrograph 03991



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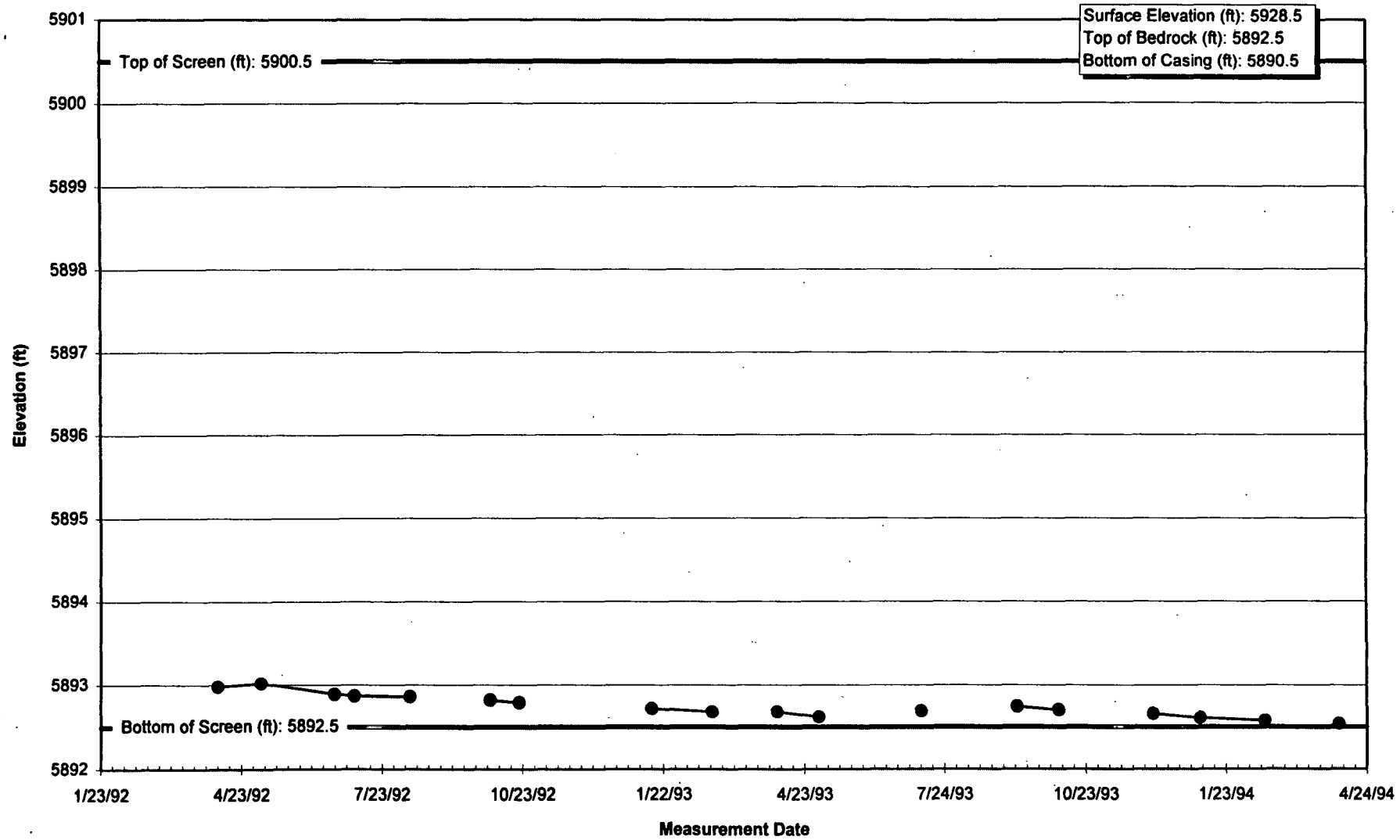
448

Hydrograph 04091



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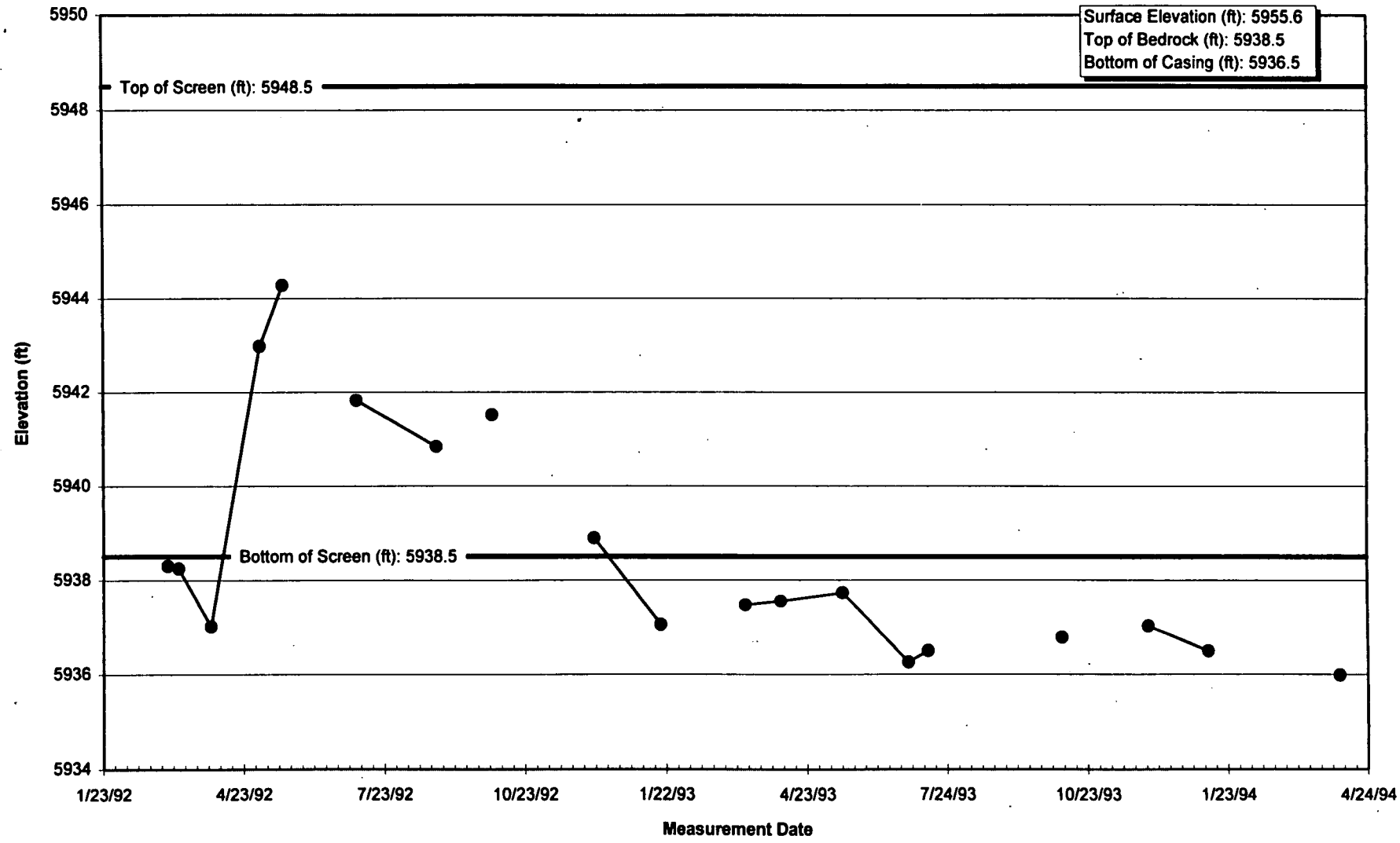
449

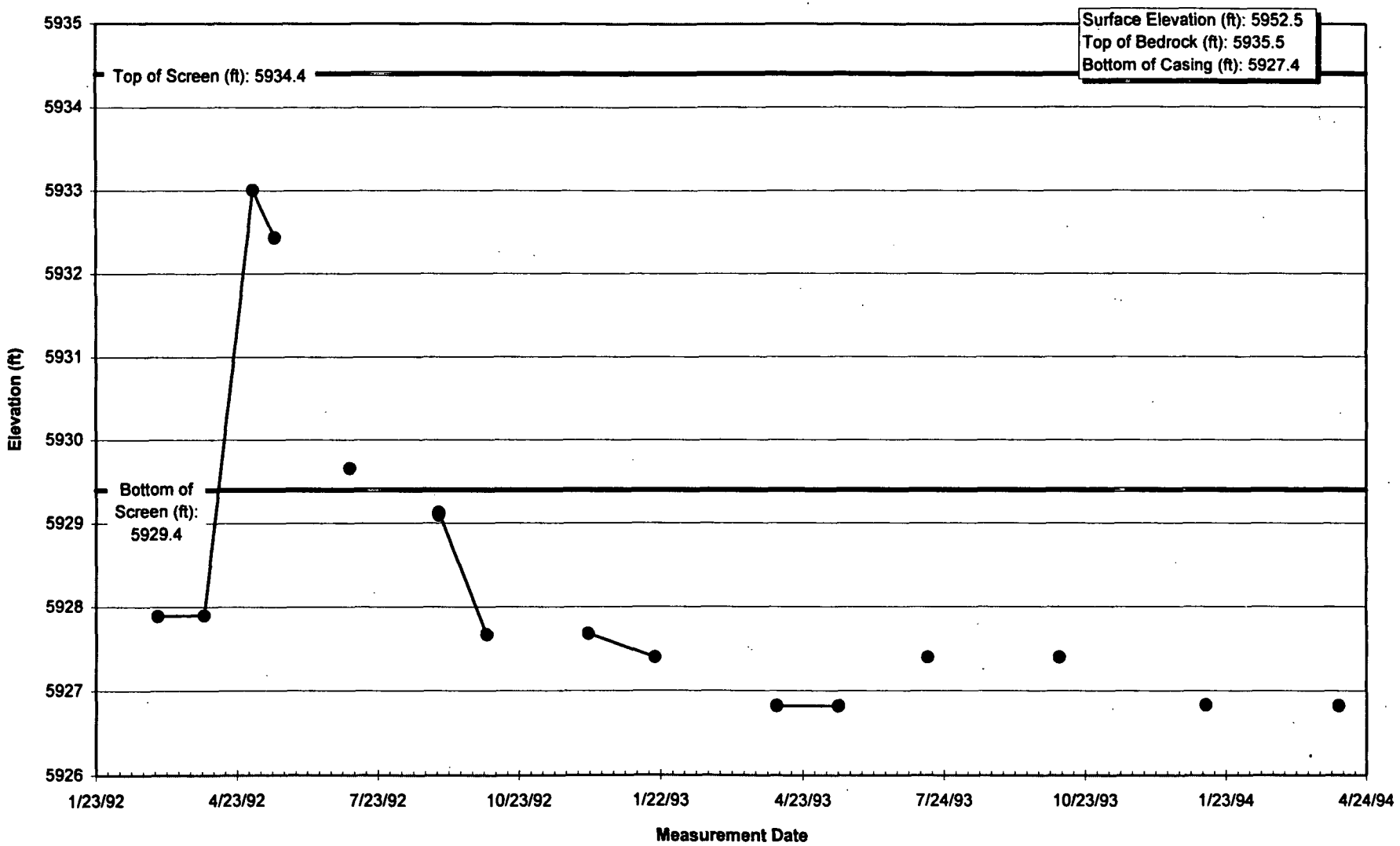
Hydrograph 04191



S2.XLS 04191 3/31/95

450

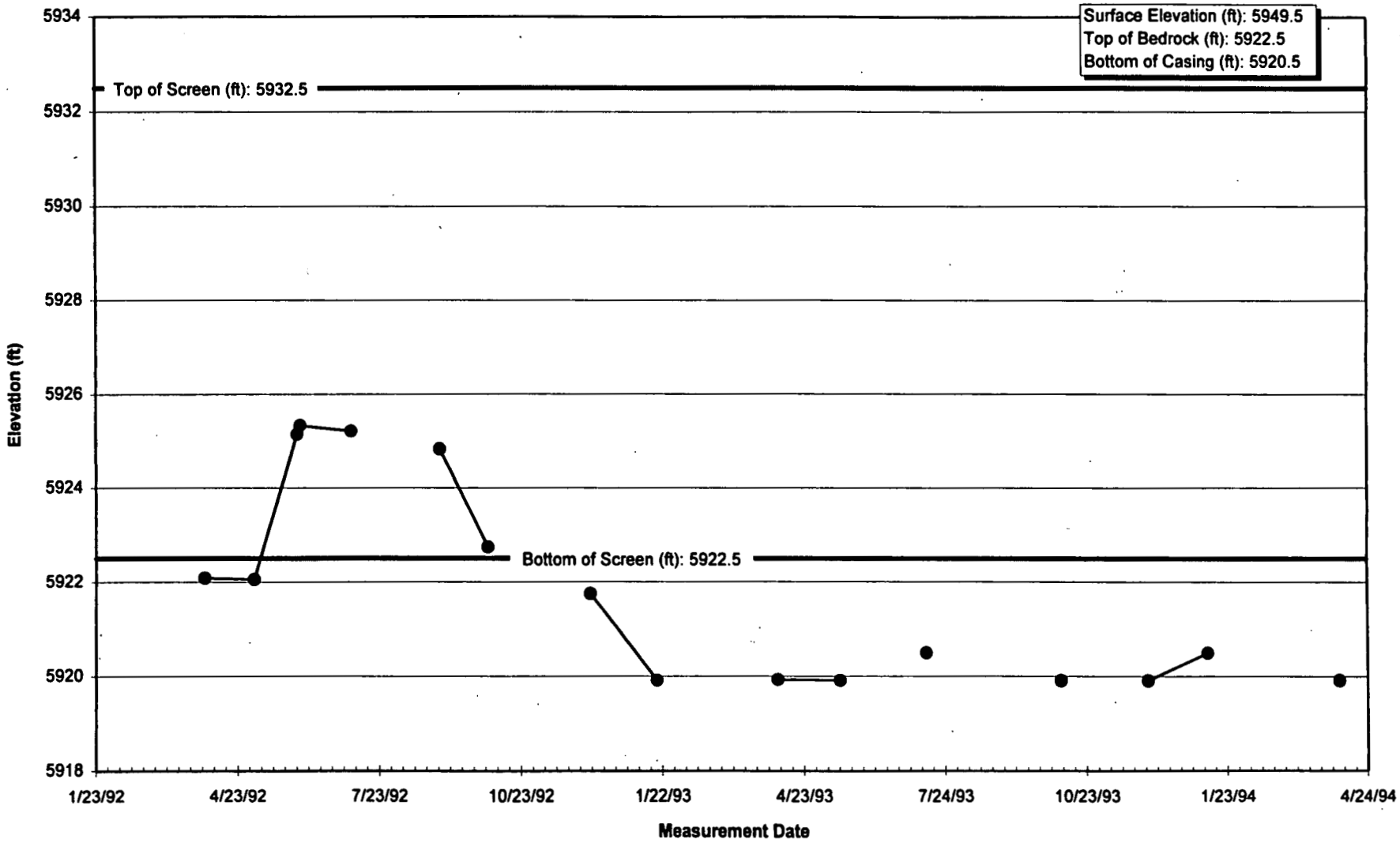
Hydrograph 04291



S2.XLS 04291 3/31/95

451

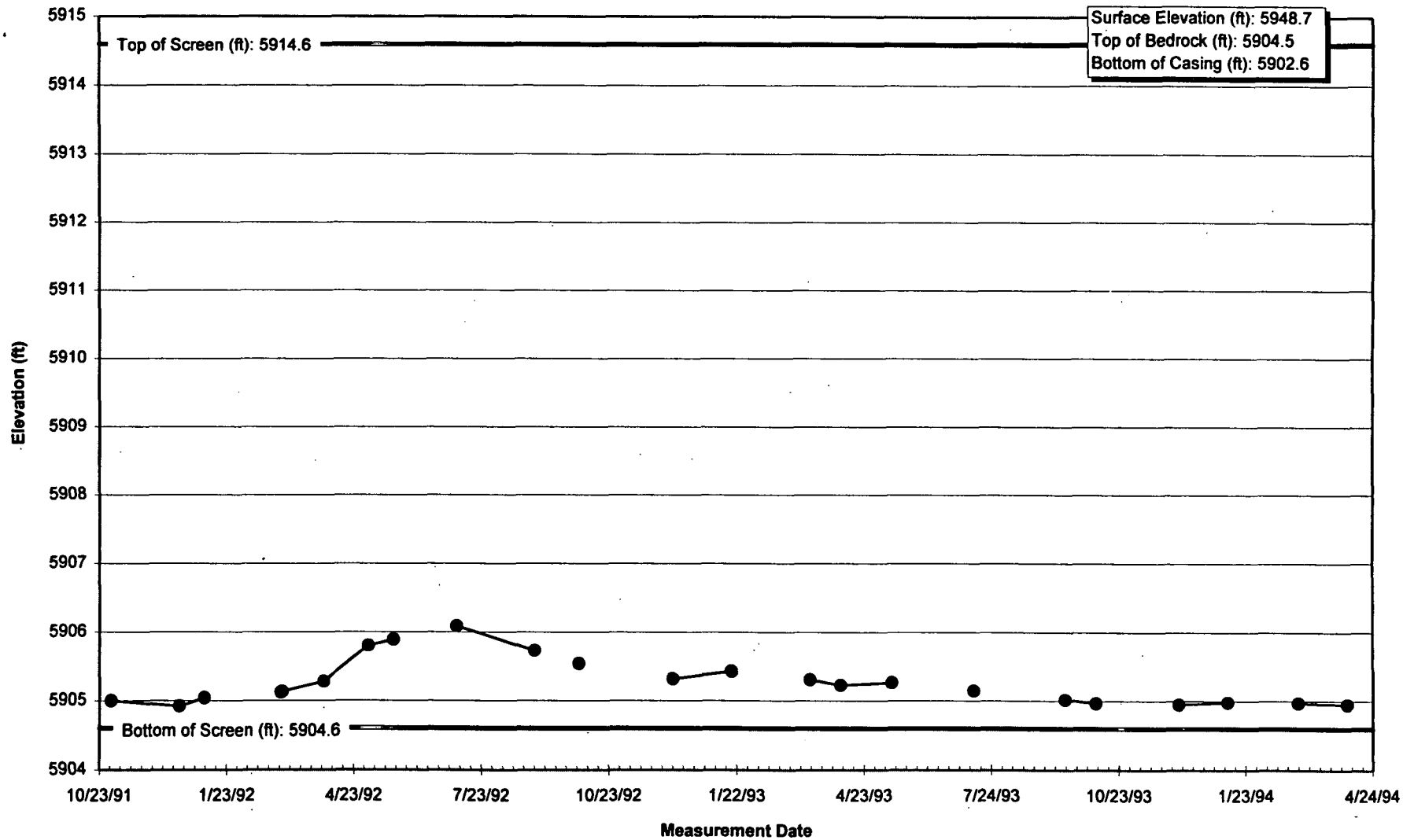
Hydrograph 04491



452

S3.XLS 04491 3/31/95

Hydrograph 04591



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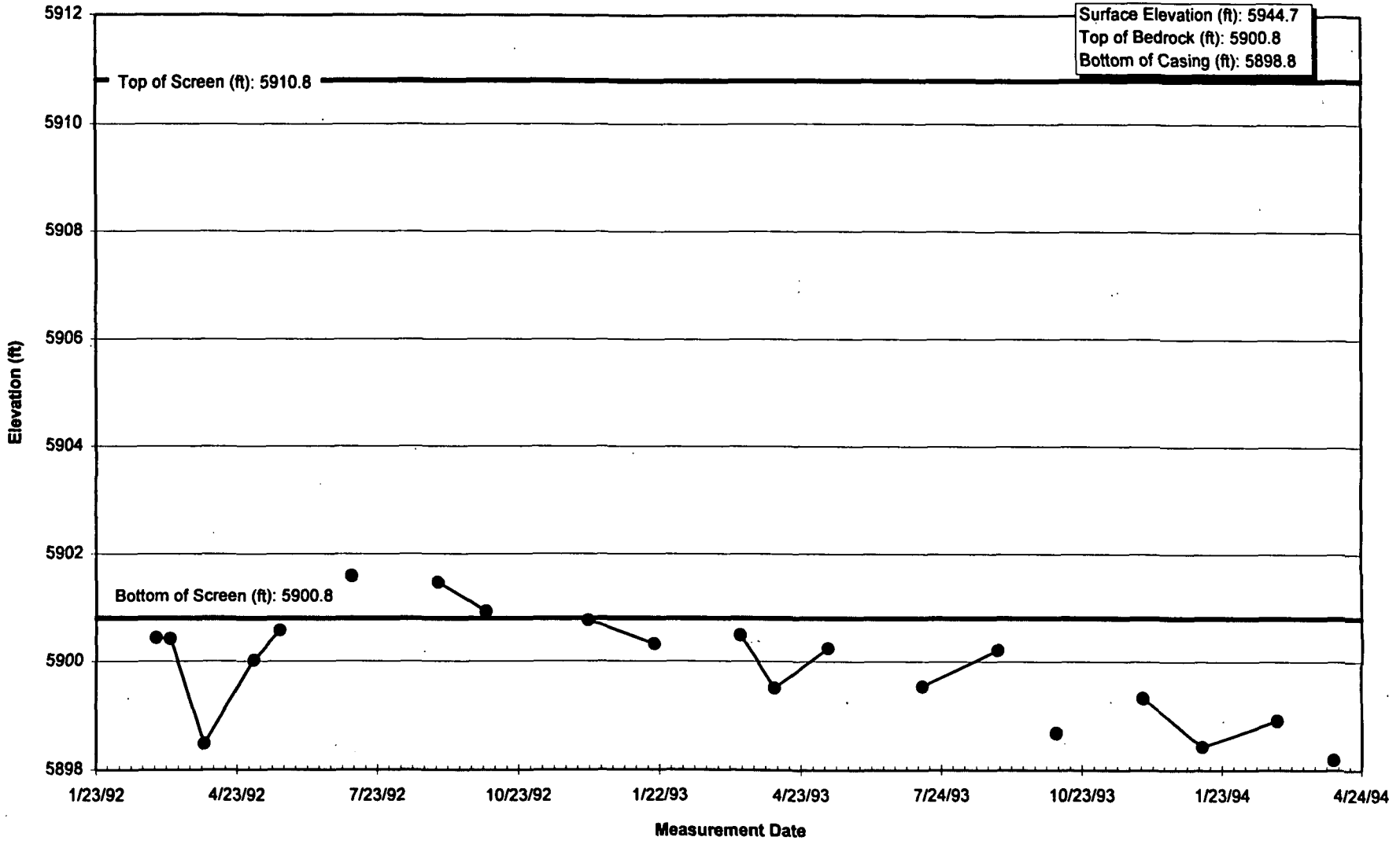
453

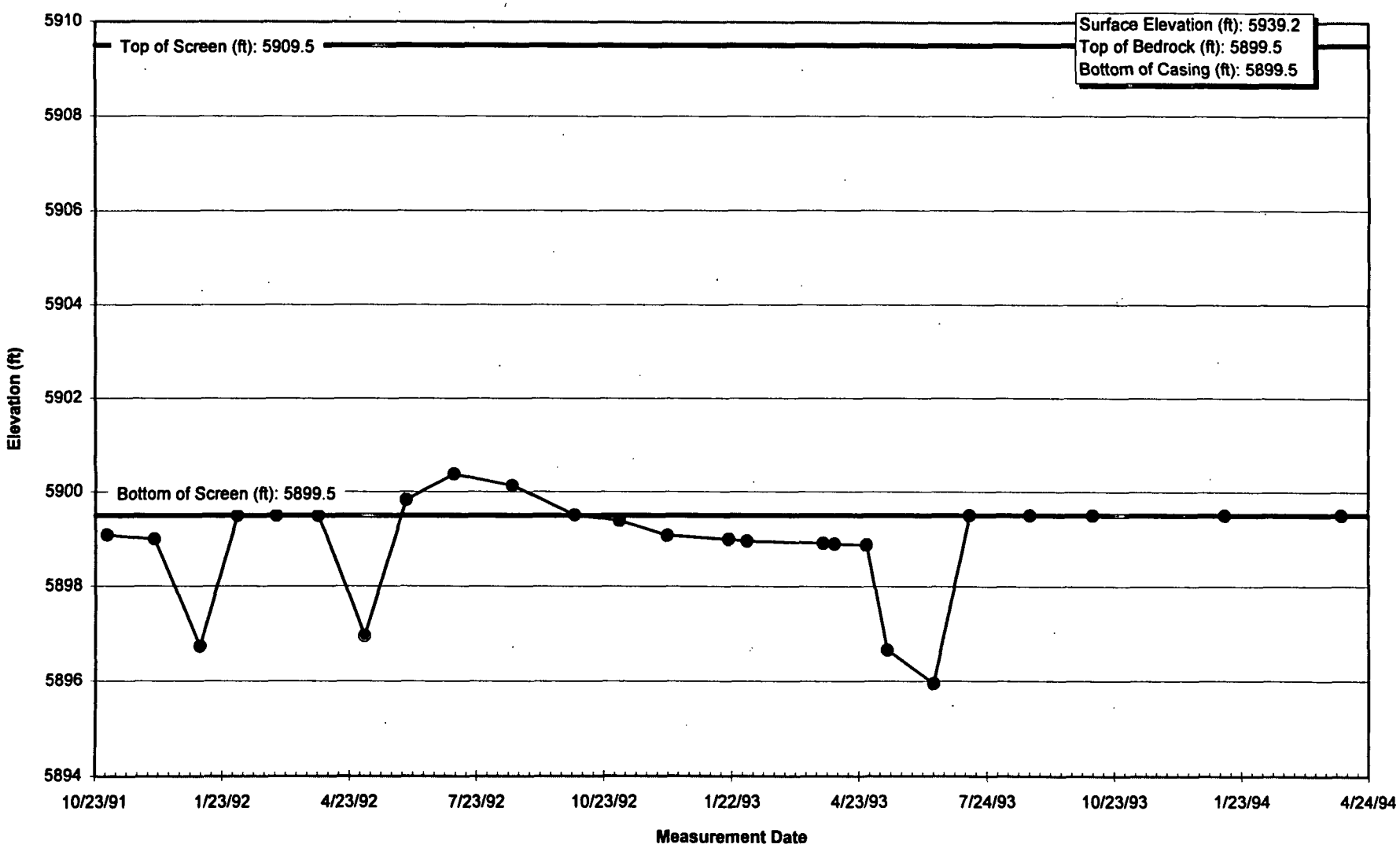
Hydrograph 04691



S3.XLS 04691 3/31/95

454

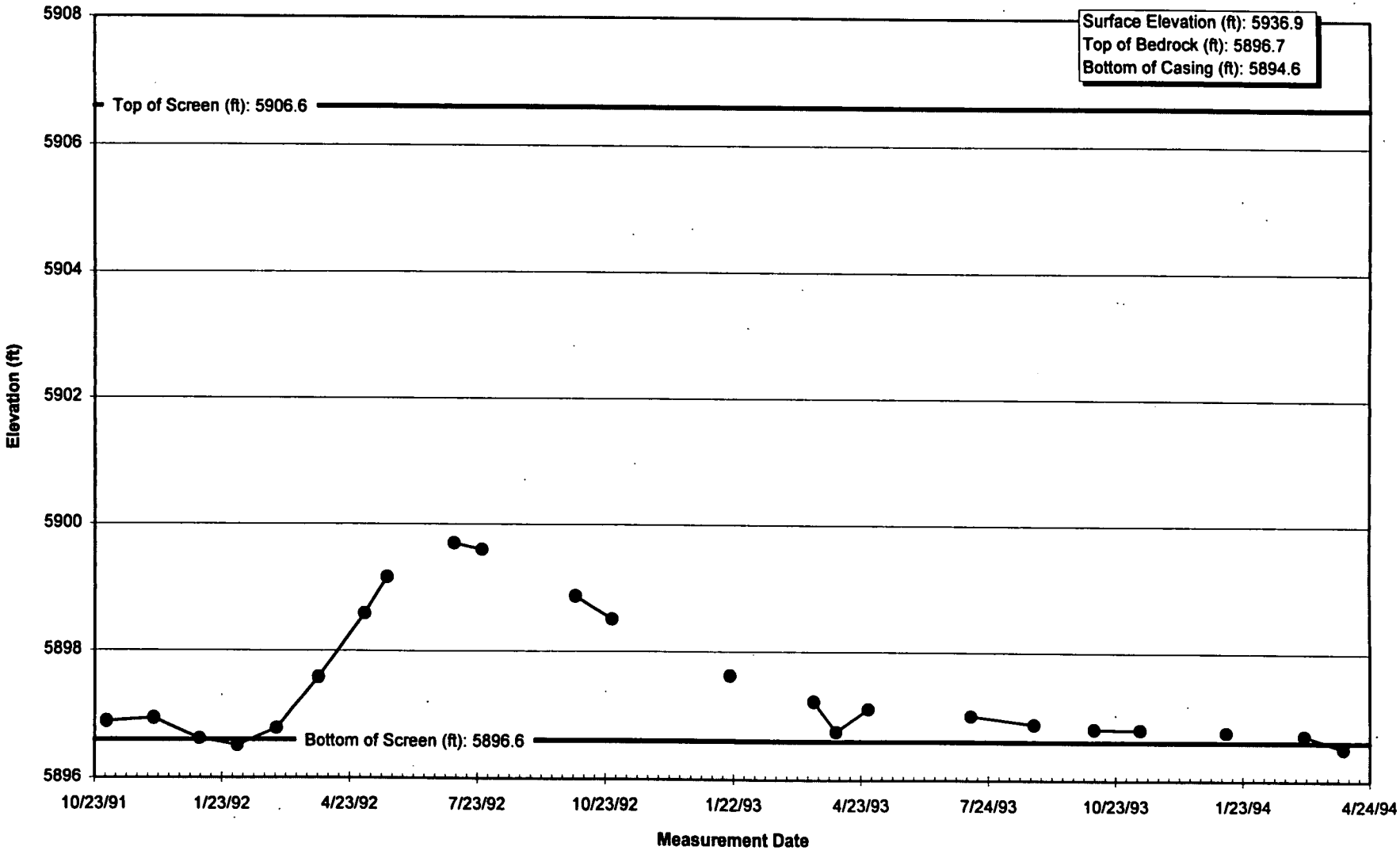
Hydrograph 04891



S3.XLS 04891 3/31/95

455

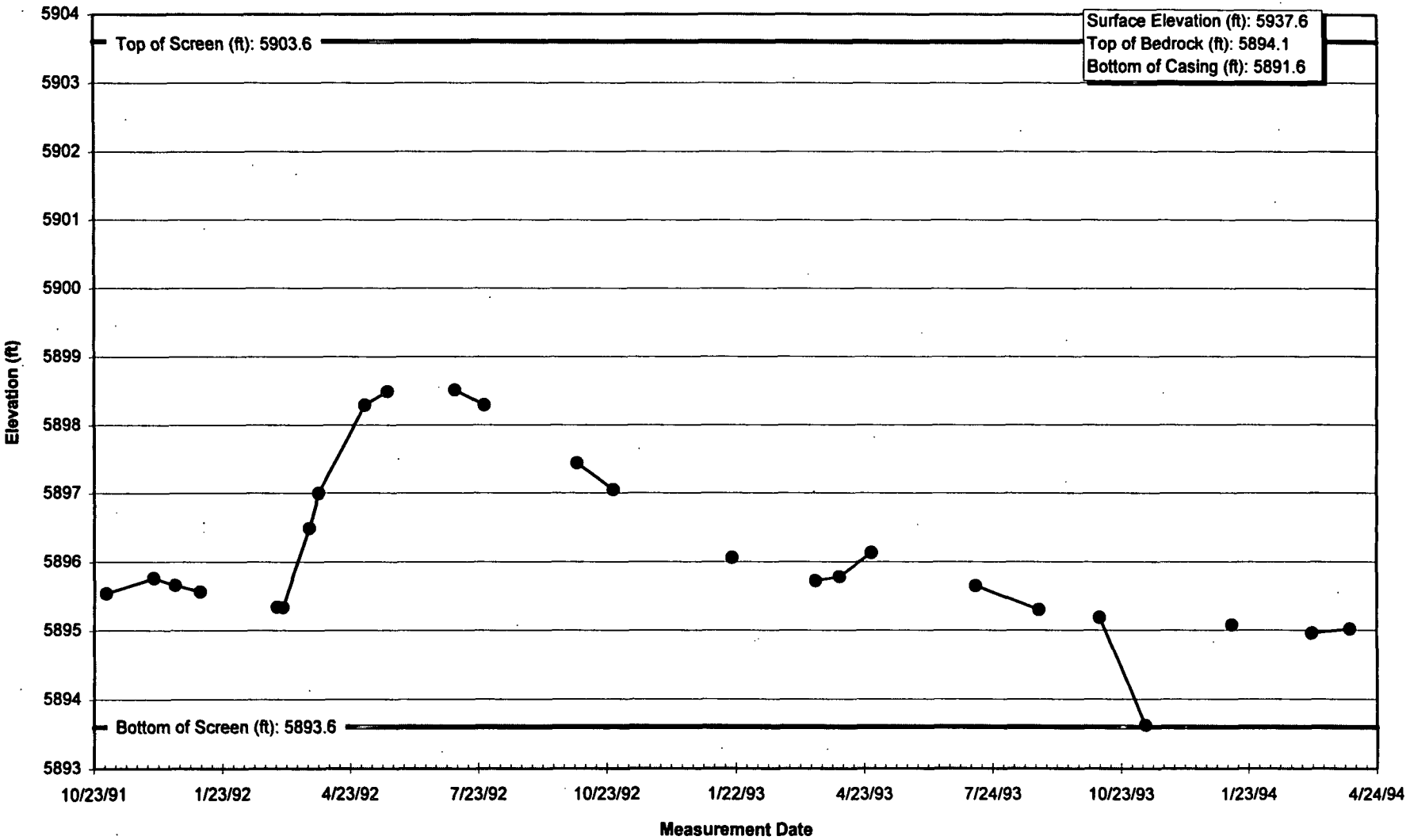
Hydrograph 04991



S3.XLS 04991 3/31/95

456

Hydrograph 05091



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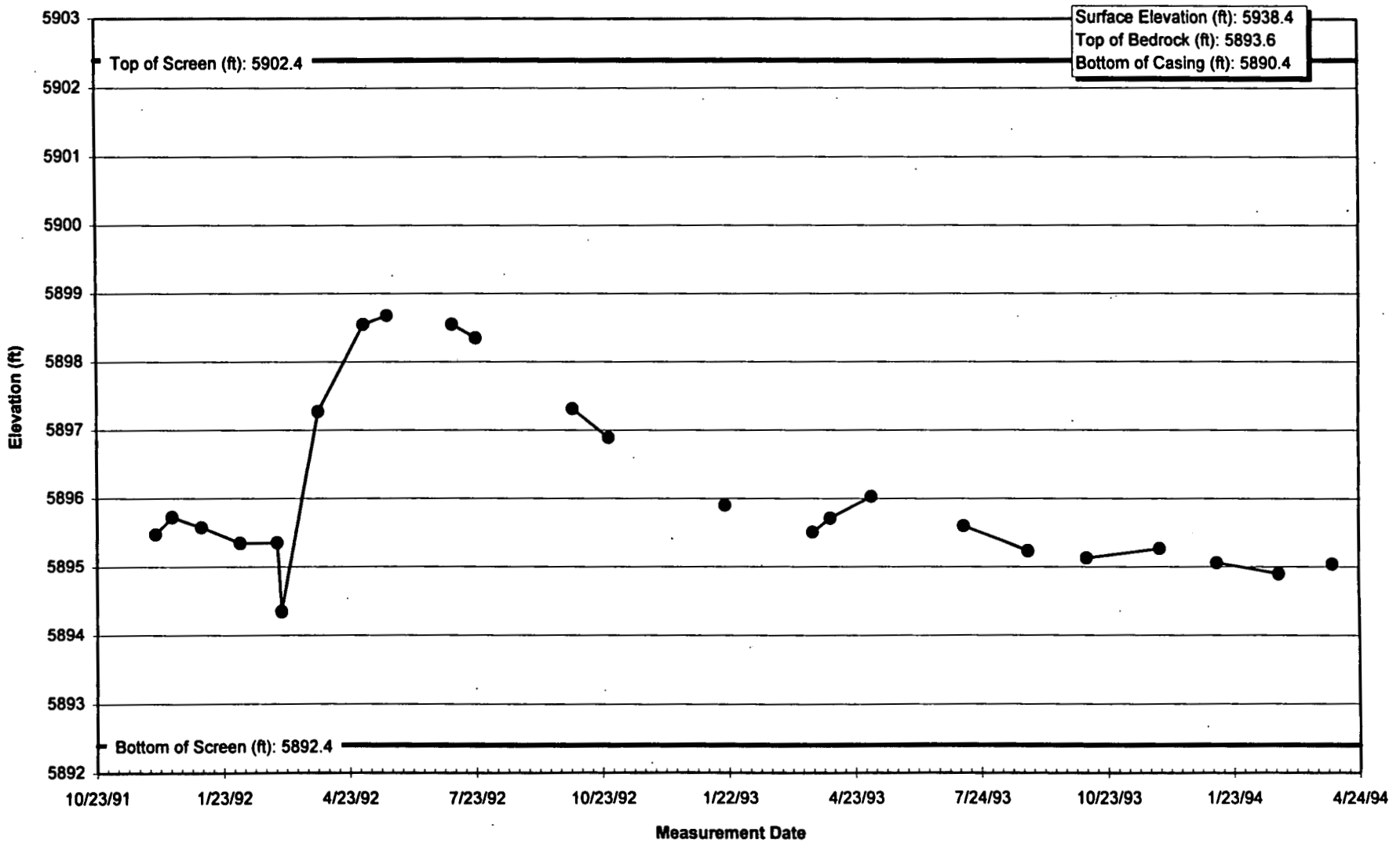
457

Hydrograph 05191



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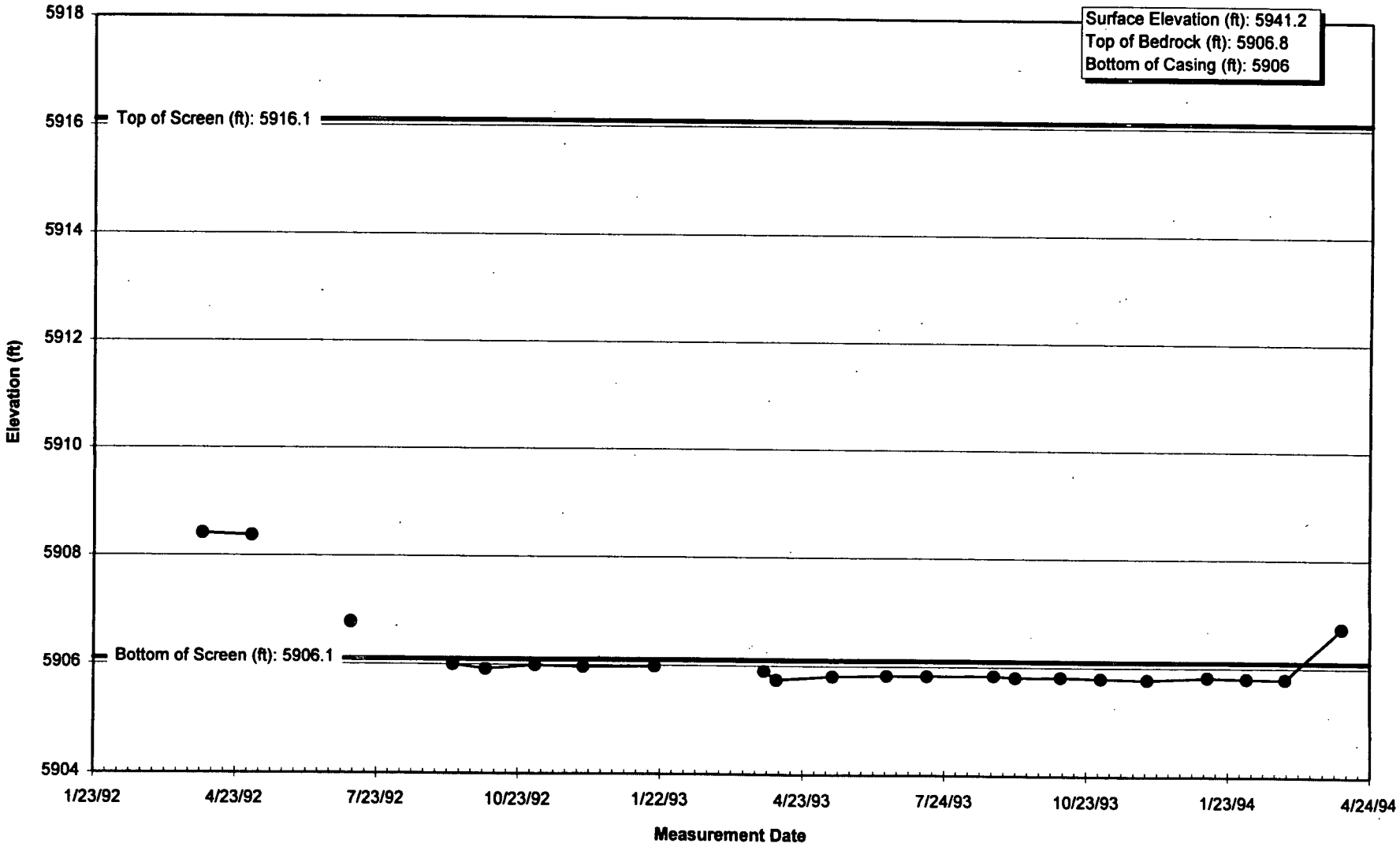
458

Hydrograph 05291



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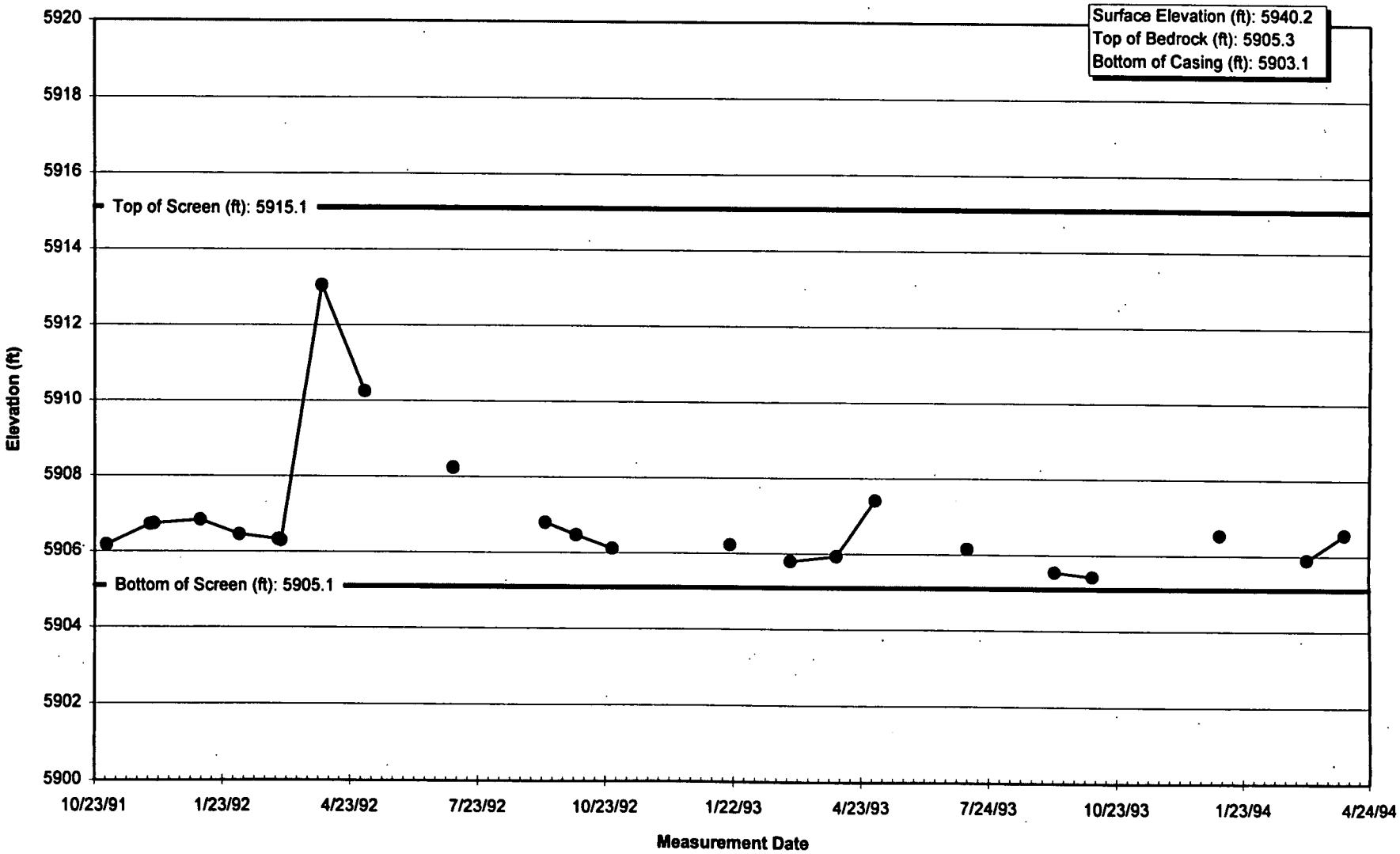
459

Hydrograph 05391



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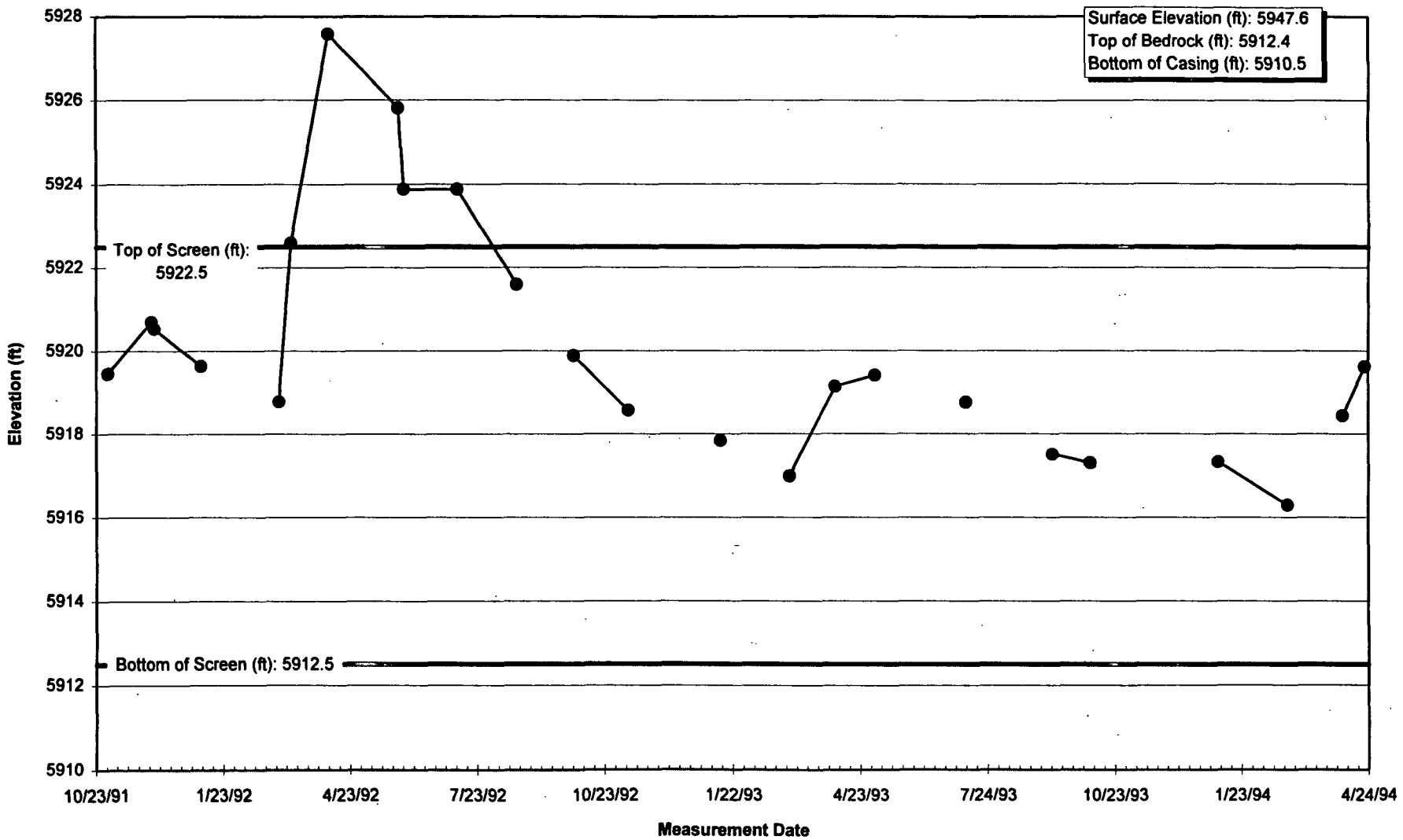
460

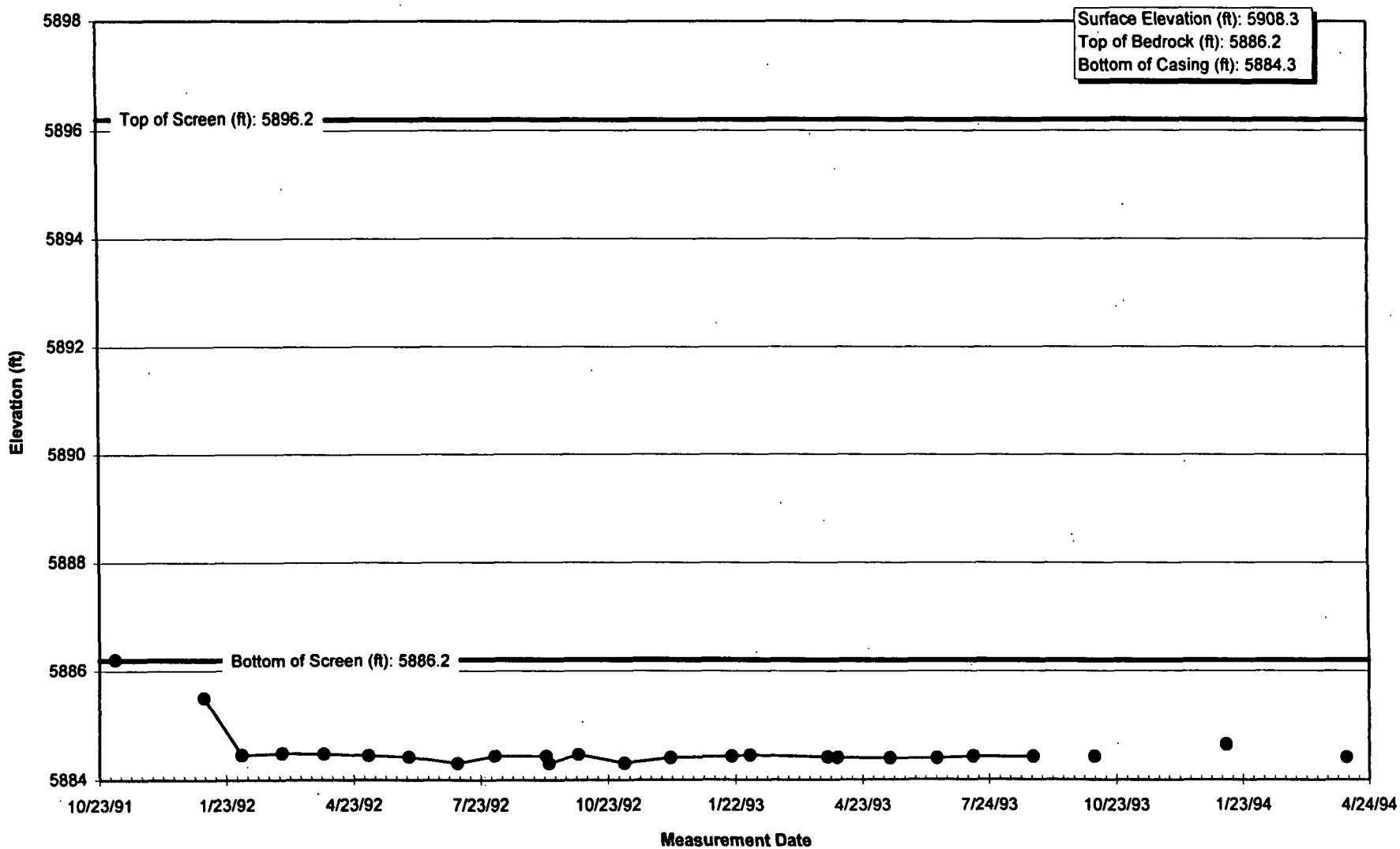
Hydrograph 05691



S3.XLS 05691 3/31/95

461

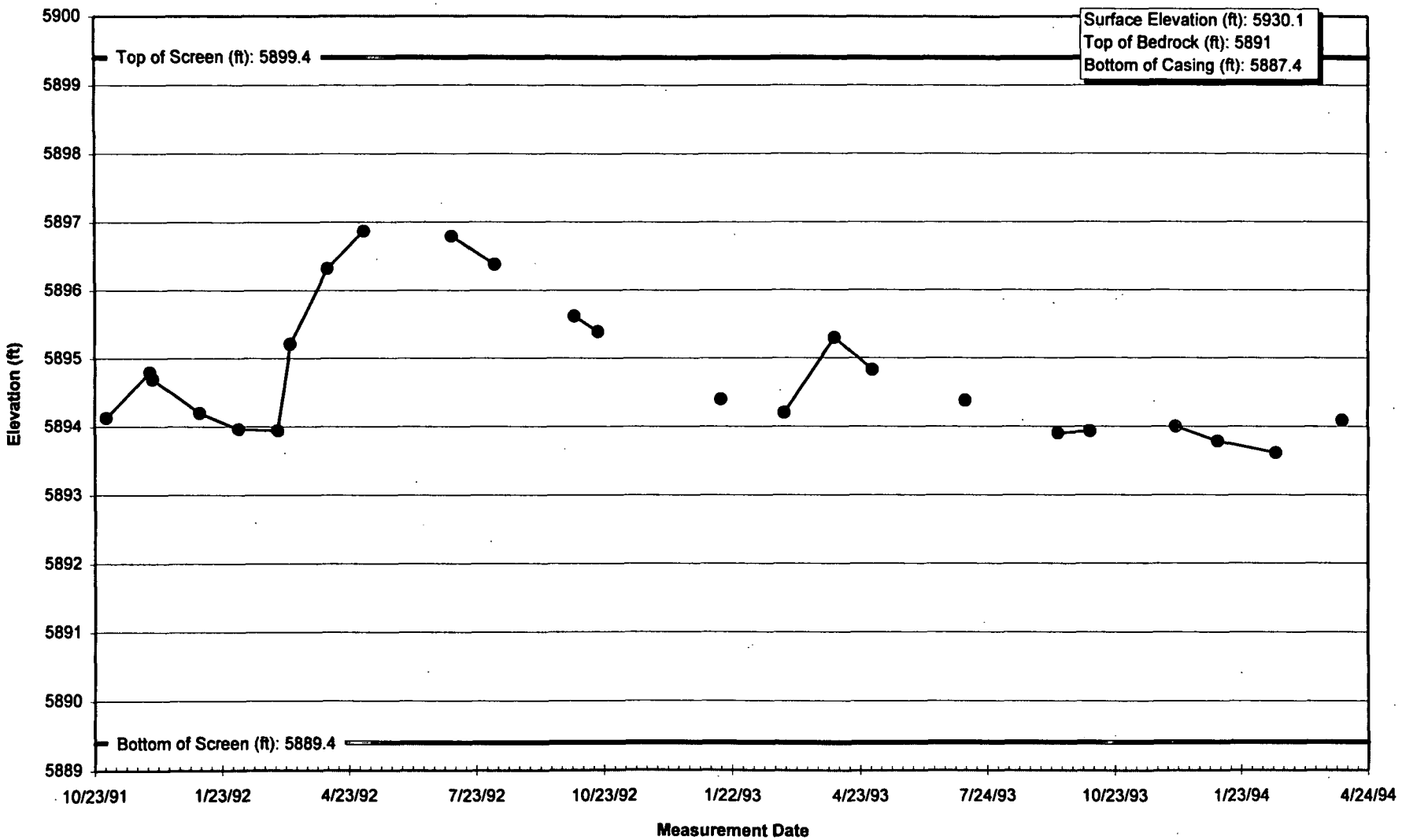
Hydrograph 05991



S3.XLS 05991 3/31/95

462

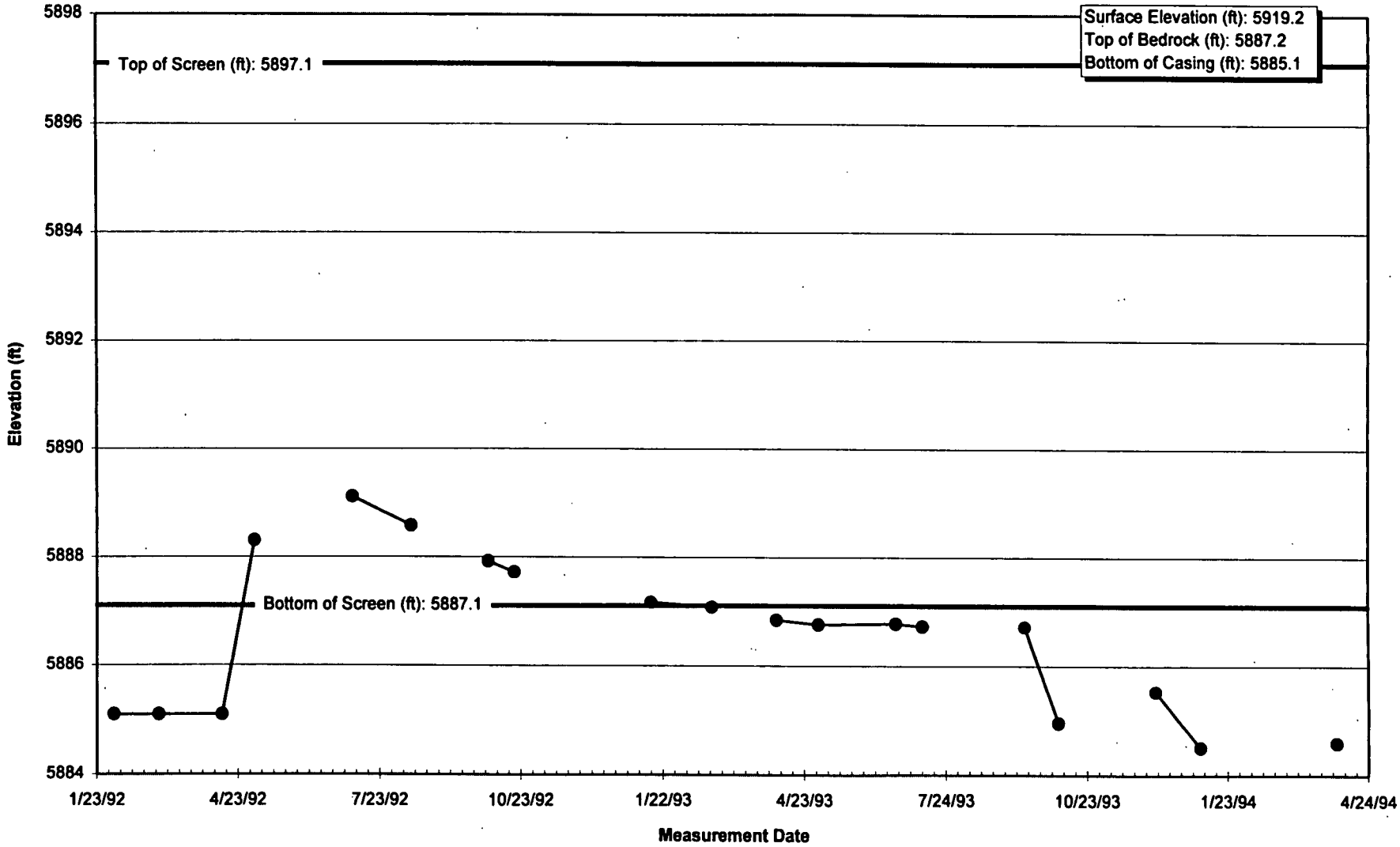
Hydrograph 06091



S3.XLS 06091 3/31/95

463

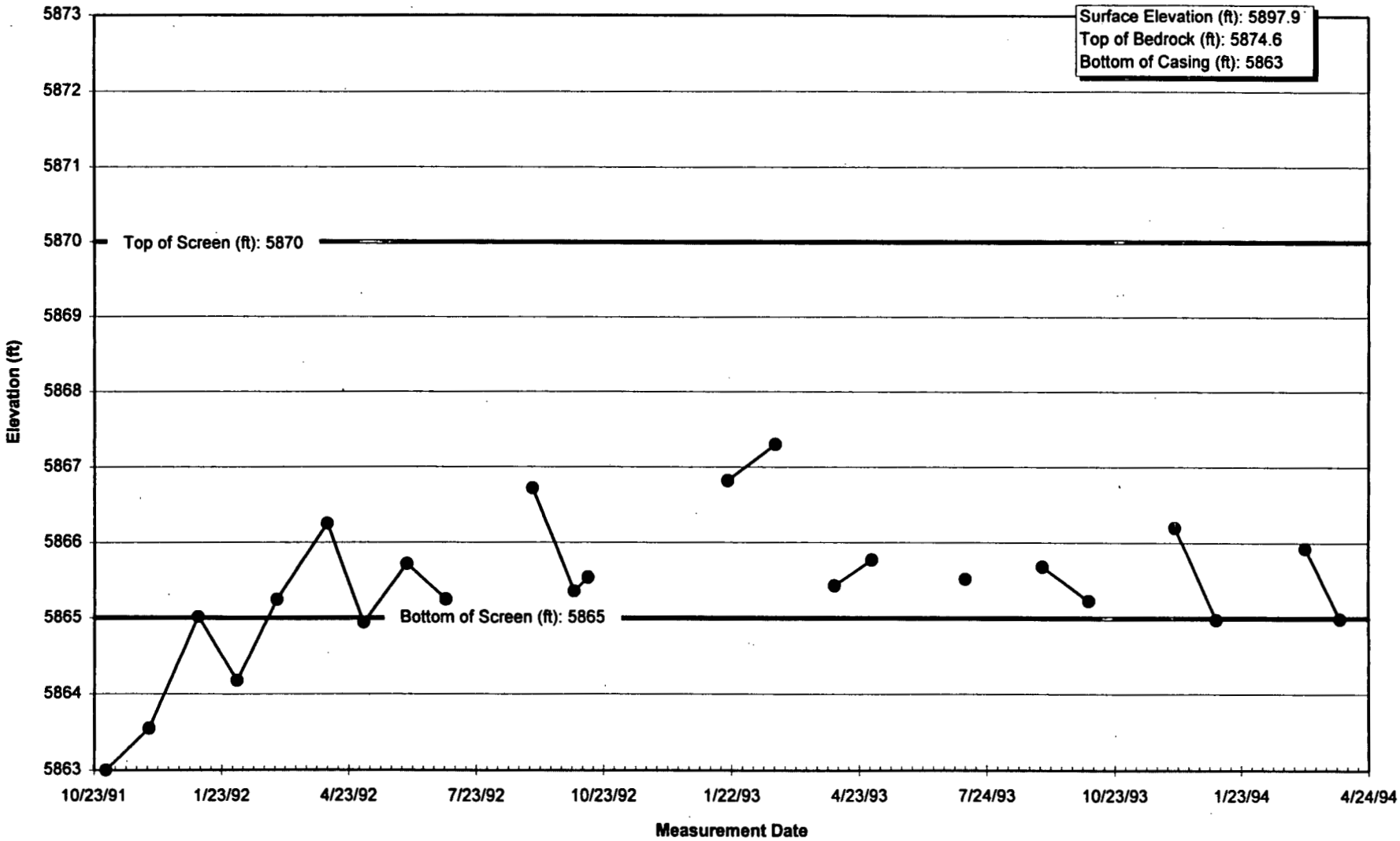
Hydrograph 06191



S3.XLS 06191 3/31/95

464

Hydrograph 06291



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465

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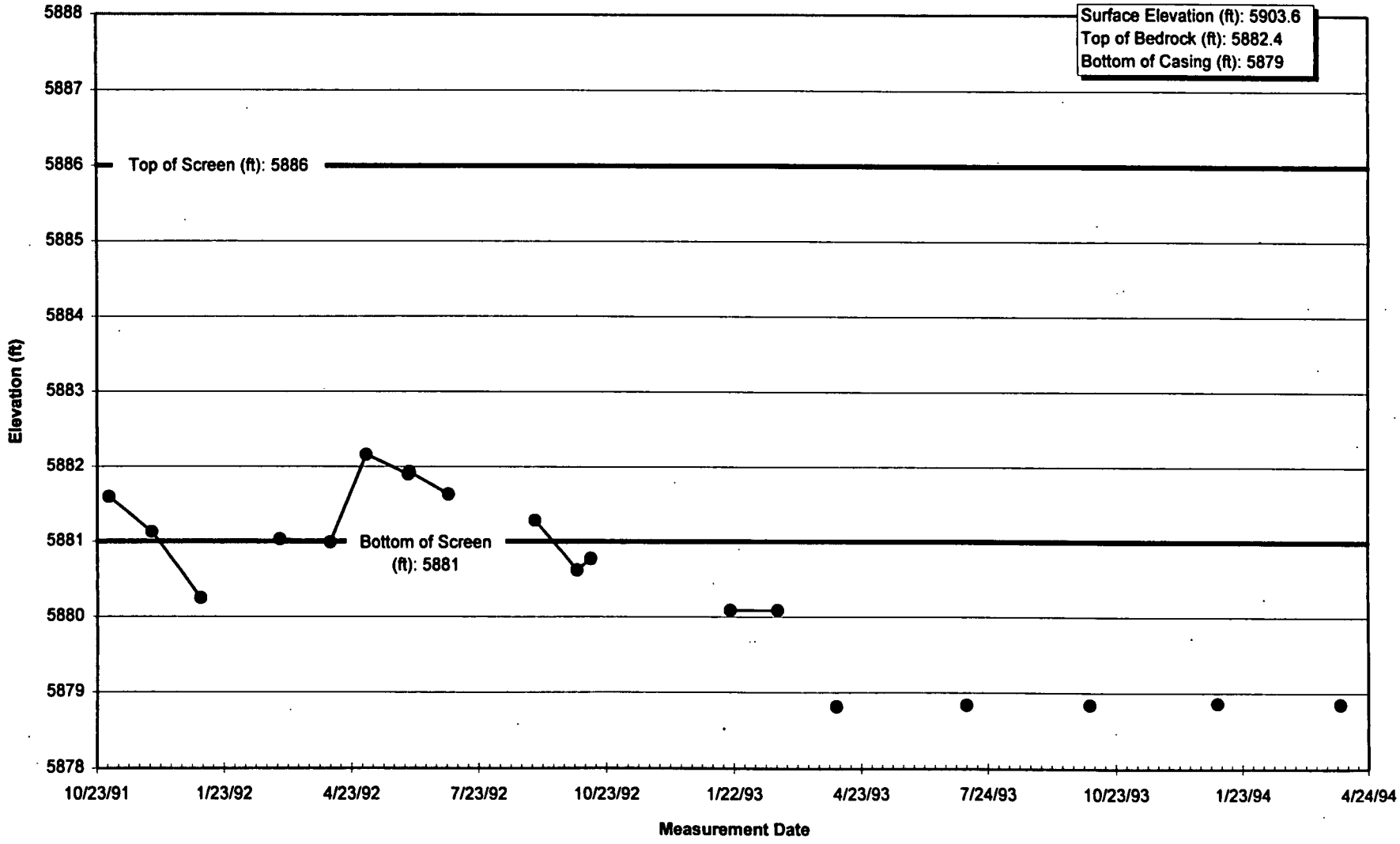
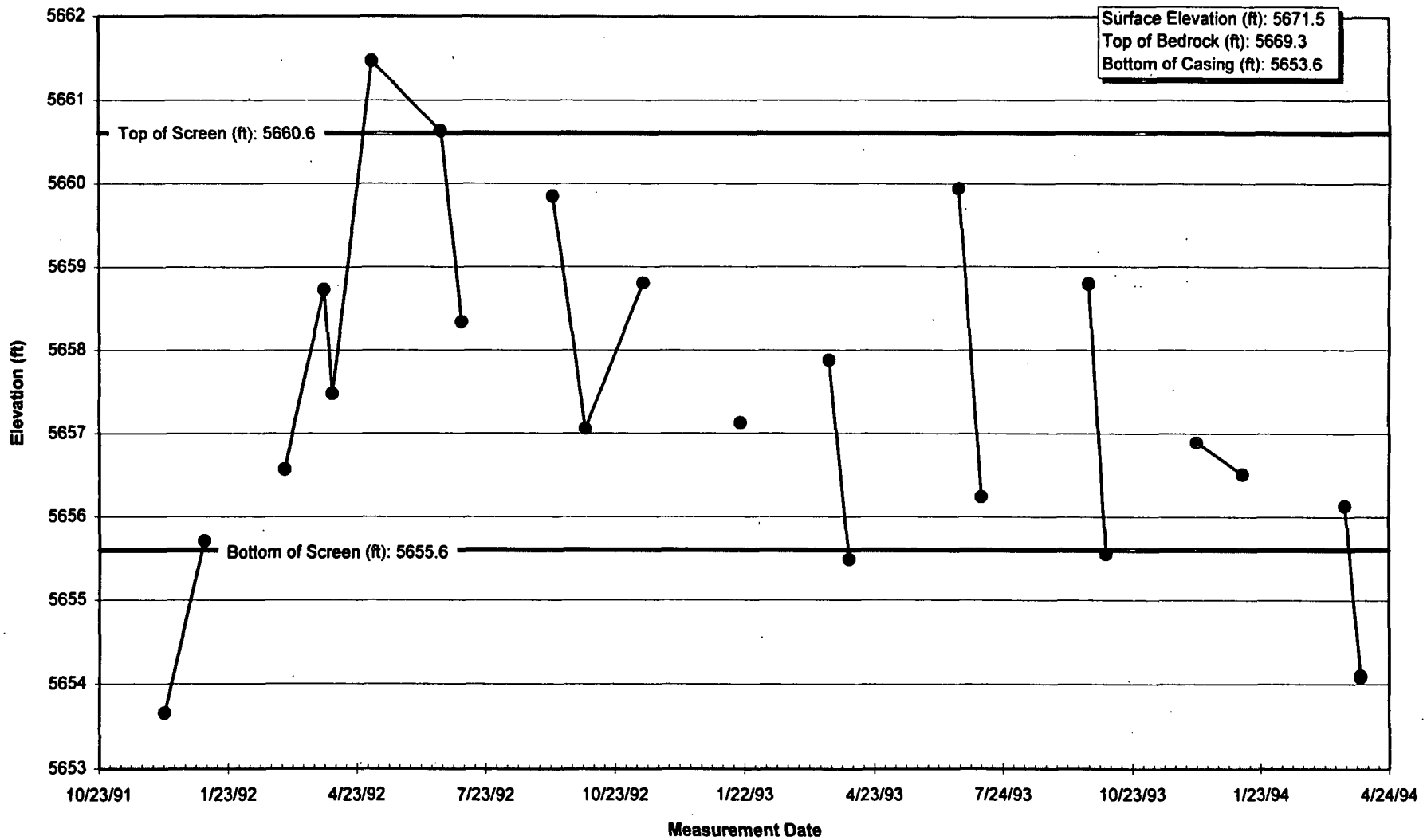


S3.XLS 06391 3/31/95

466

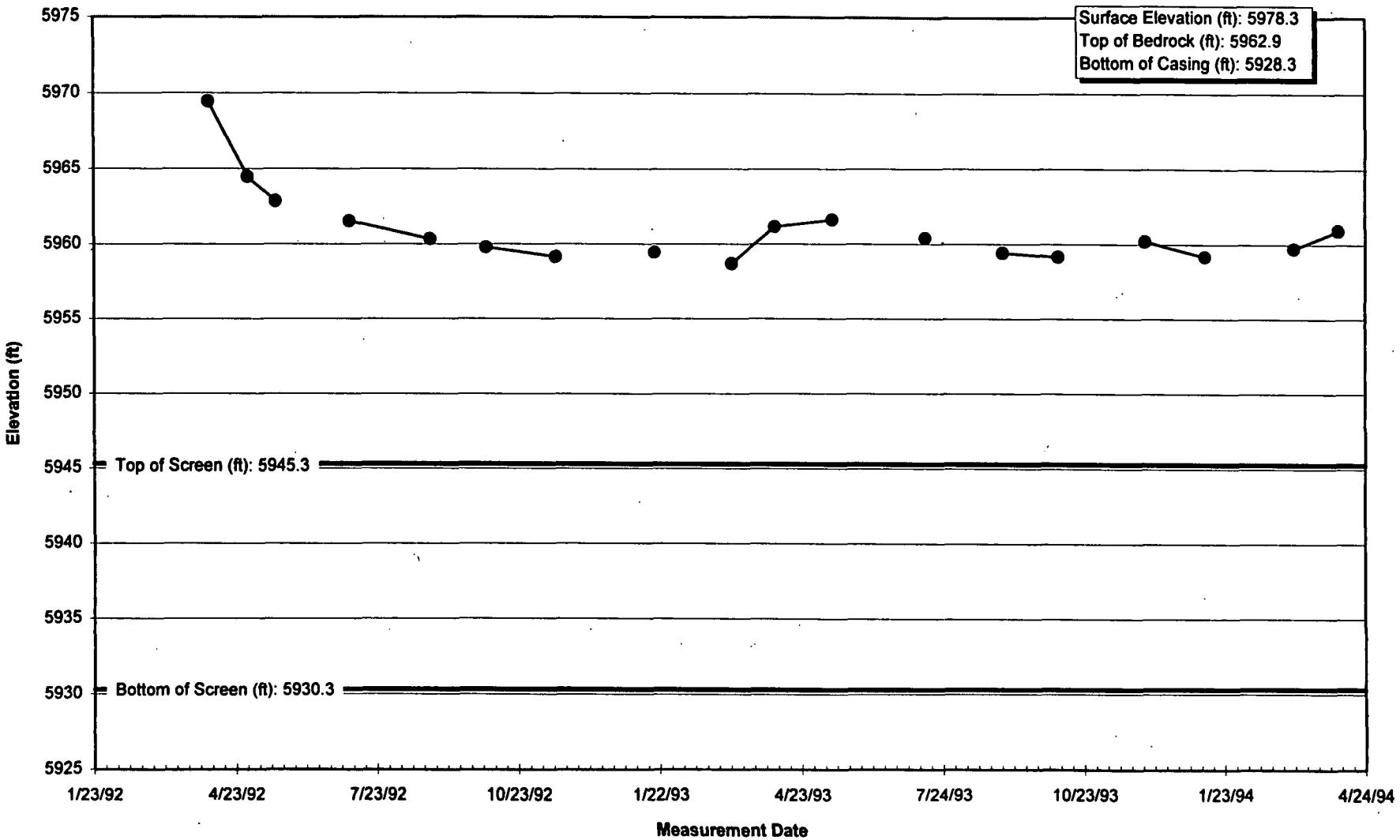
Hydrograph 06491



467

S4.XLS 06491 3/31/95

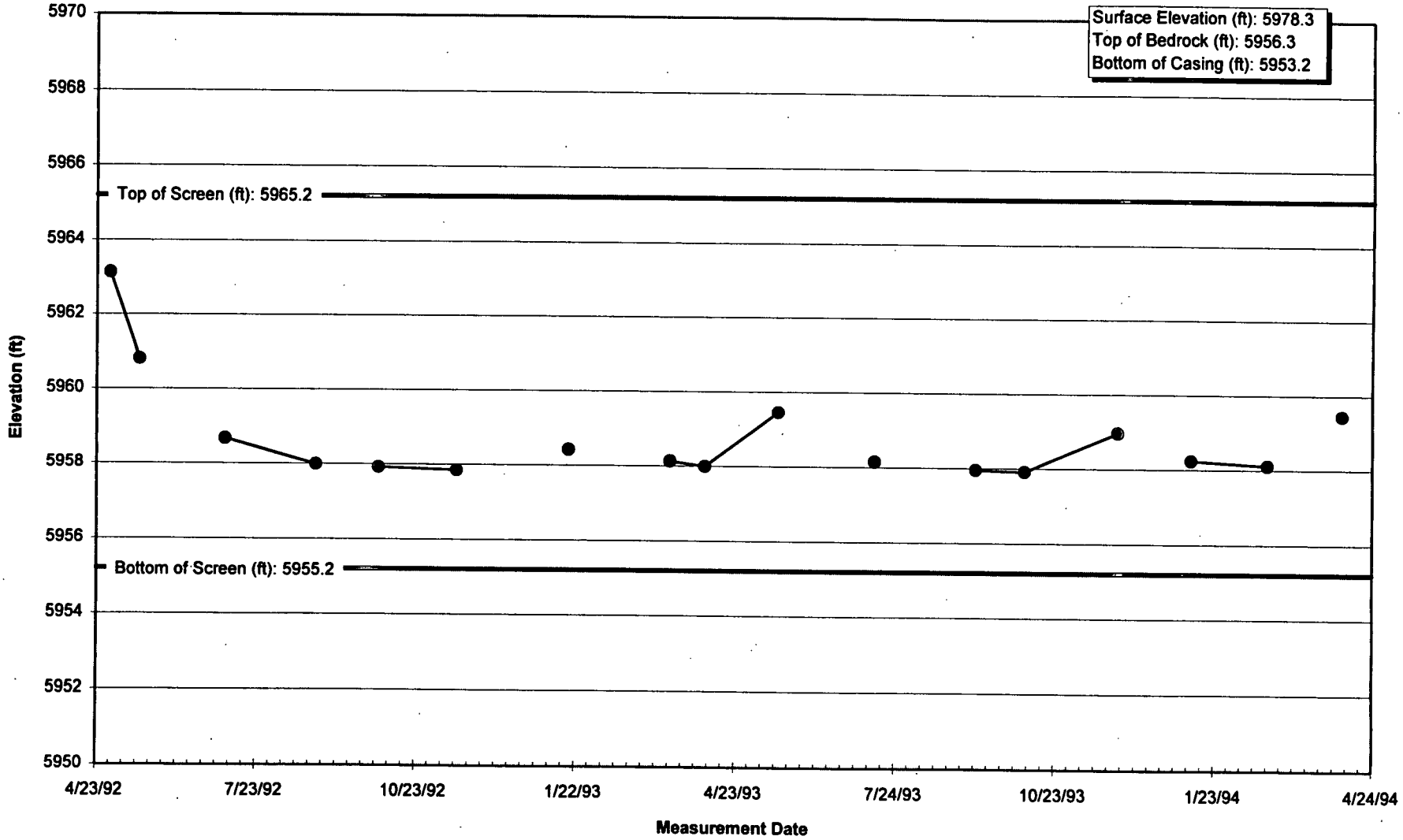
Hydrograph 06591



S4.XLS 06591 3/31/95

468

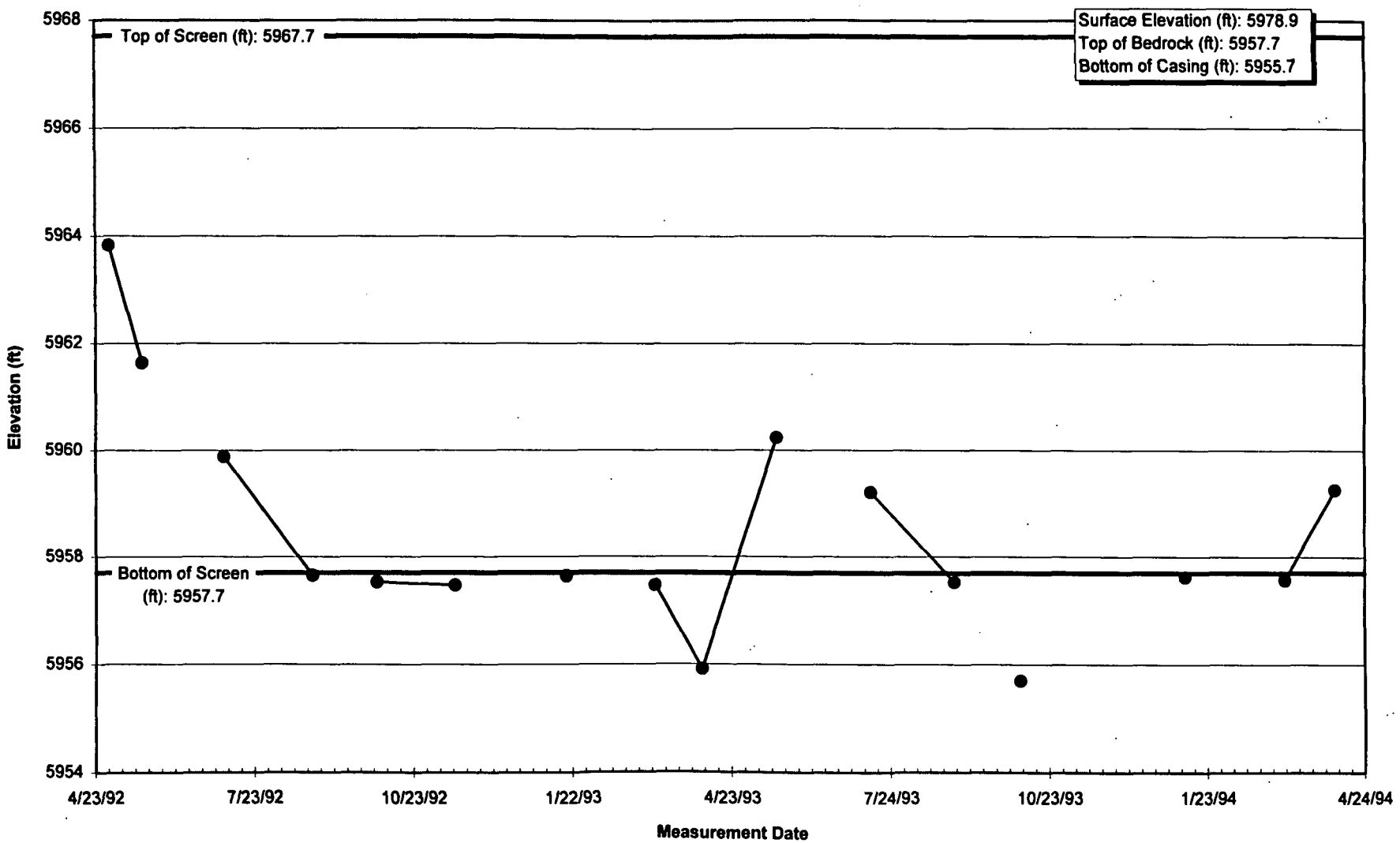
Hydrograph 06691



S4.XLS 06691 3/31/95

469

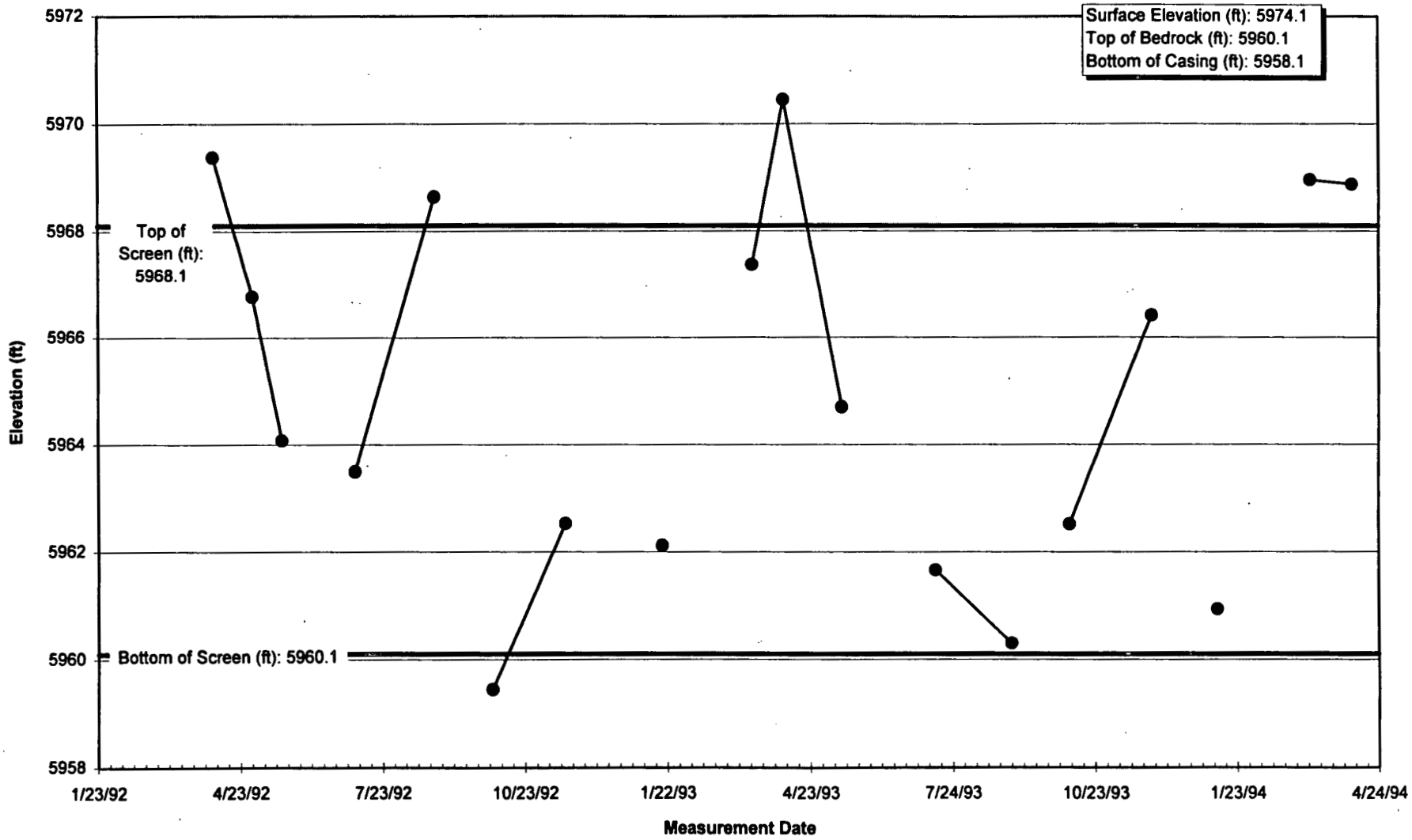
Hydrograph 06791



S4.XLS 06791 3/31/95

470

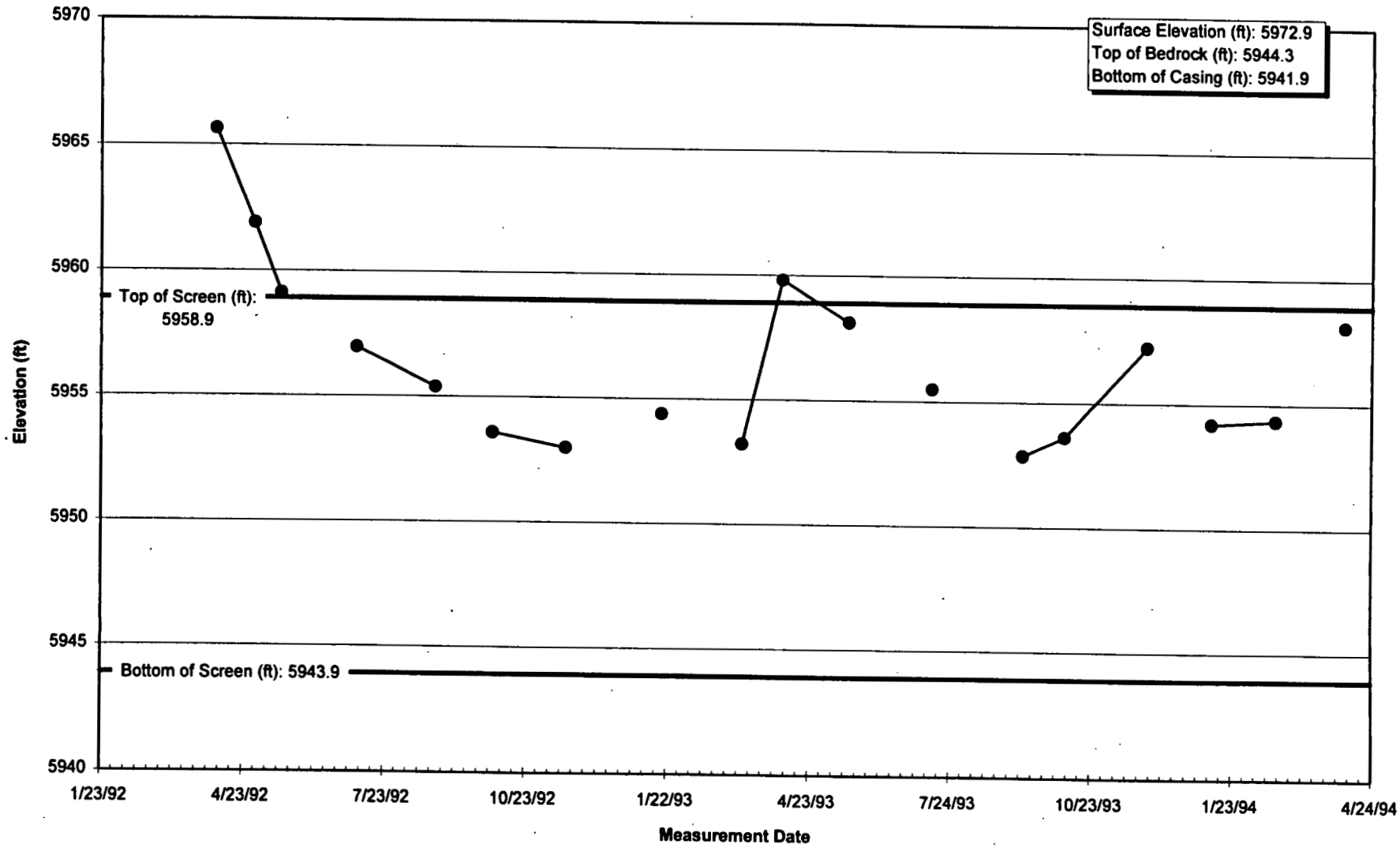
Hydrograph 06891



S4.XLS 06891 3/31/95

471

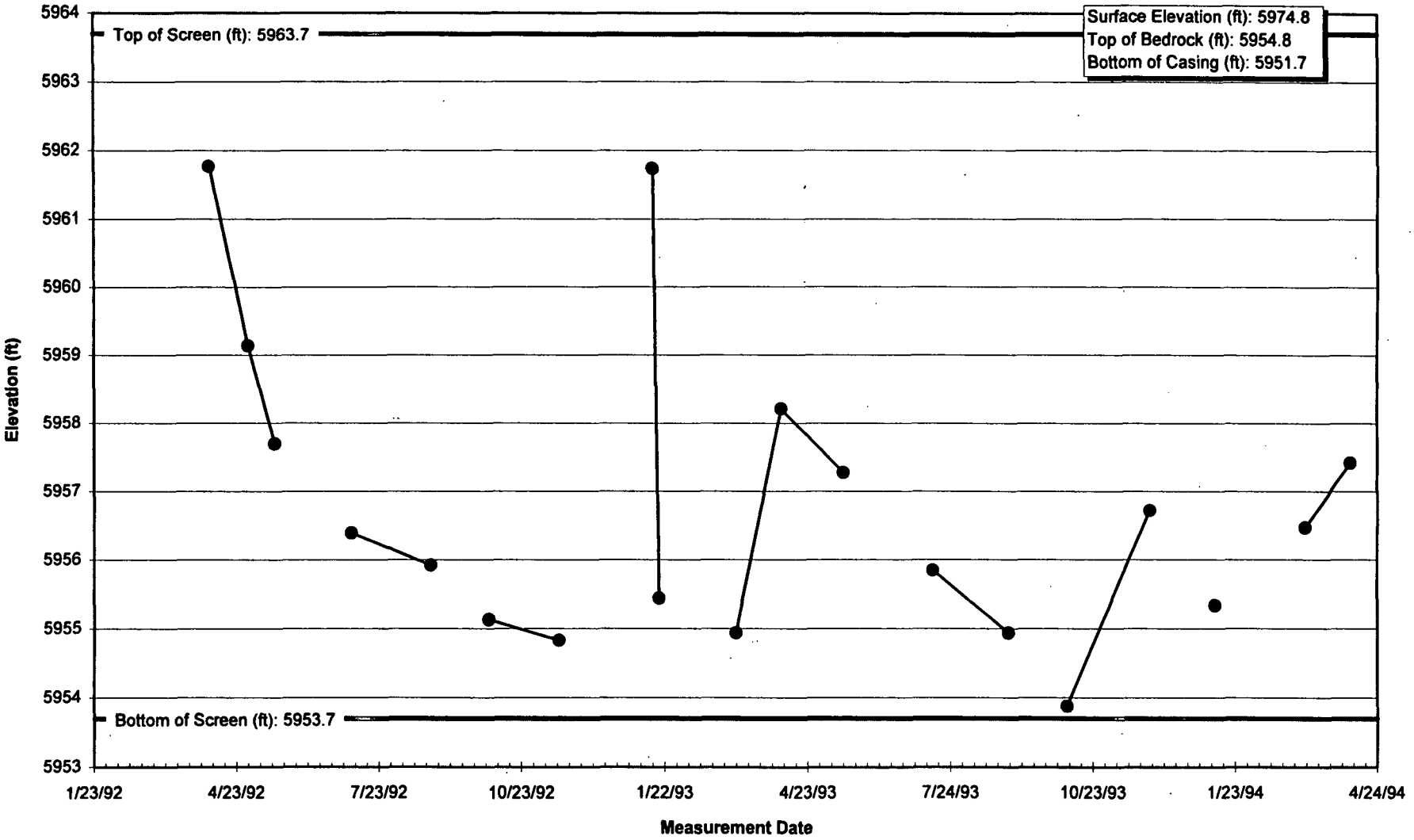
Hydrograph 06991



42

S4.XLS 06991 3/31/95

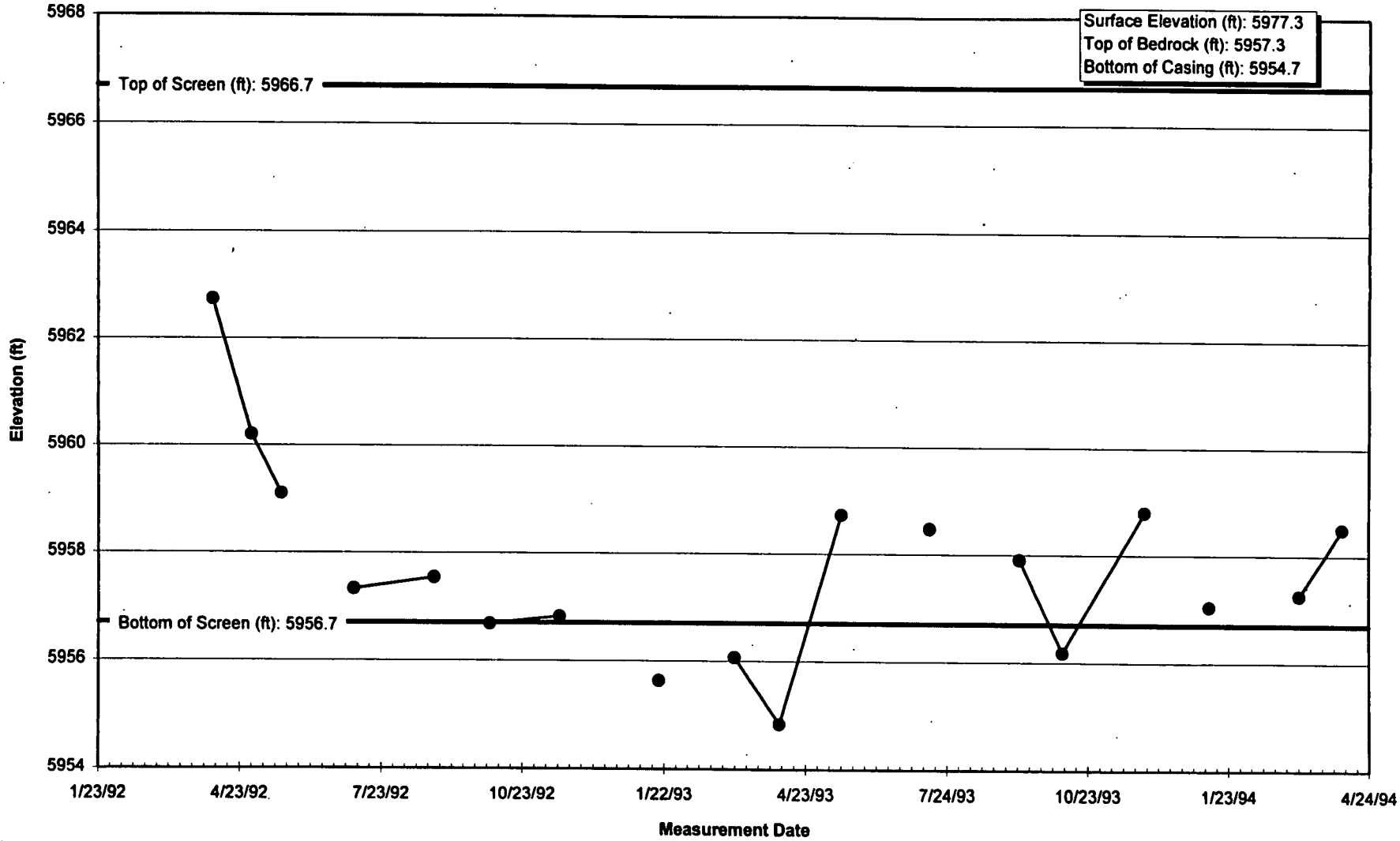
Hydrograph 07191



S4.XLS 07191 3/31/95

473

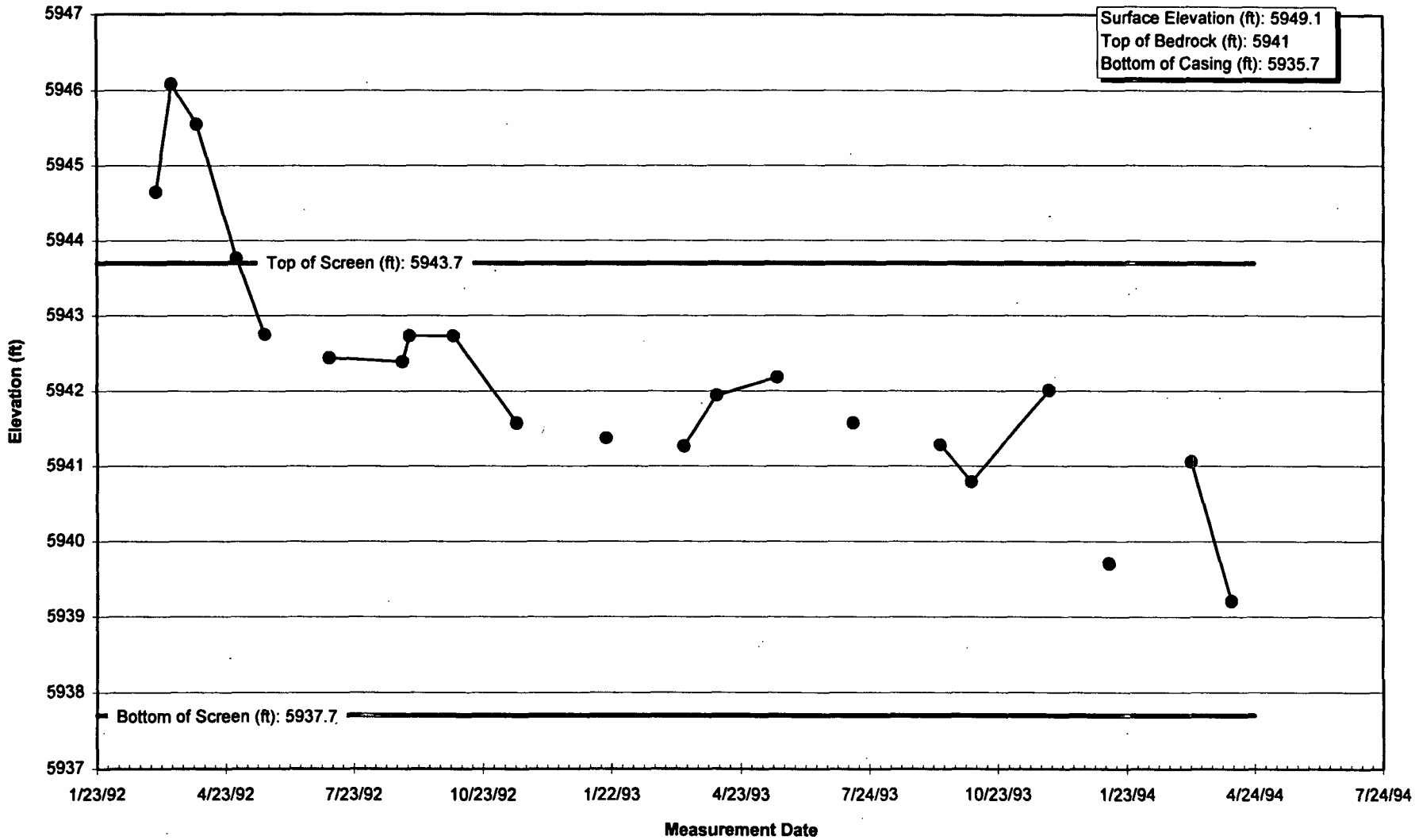
Hydrograph 07291



S4.XLS 07291 3/31/95

474

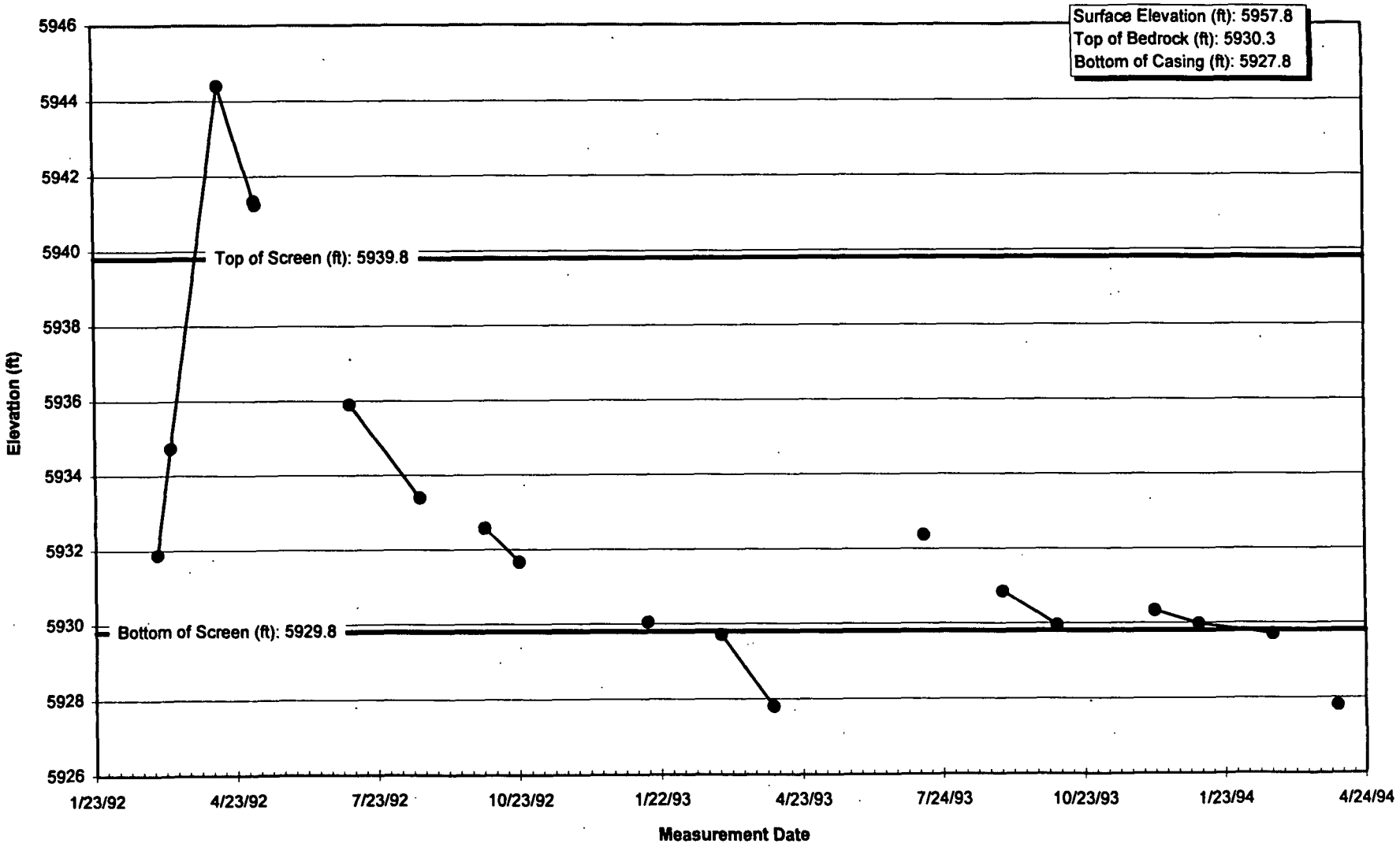
Hydrograph 07391



S4.XLS 07391 3/31/95

475

Hydrograph 07891



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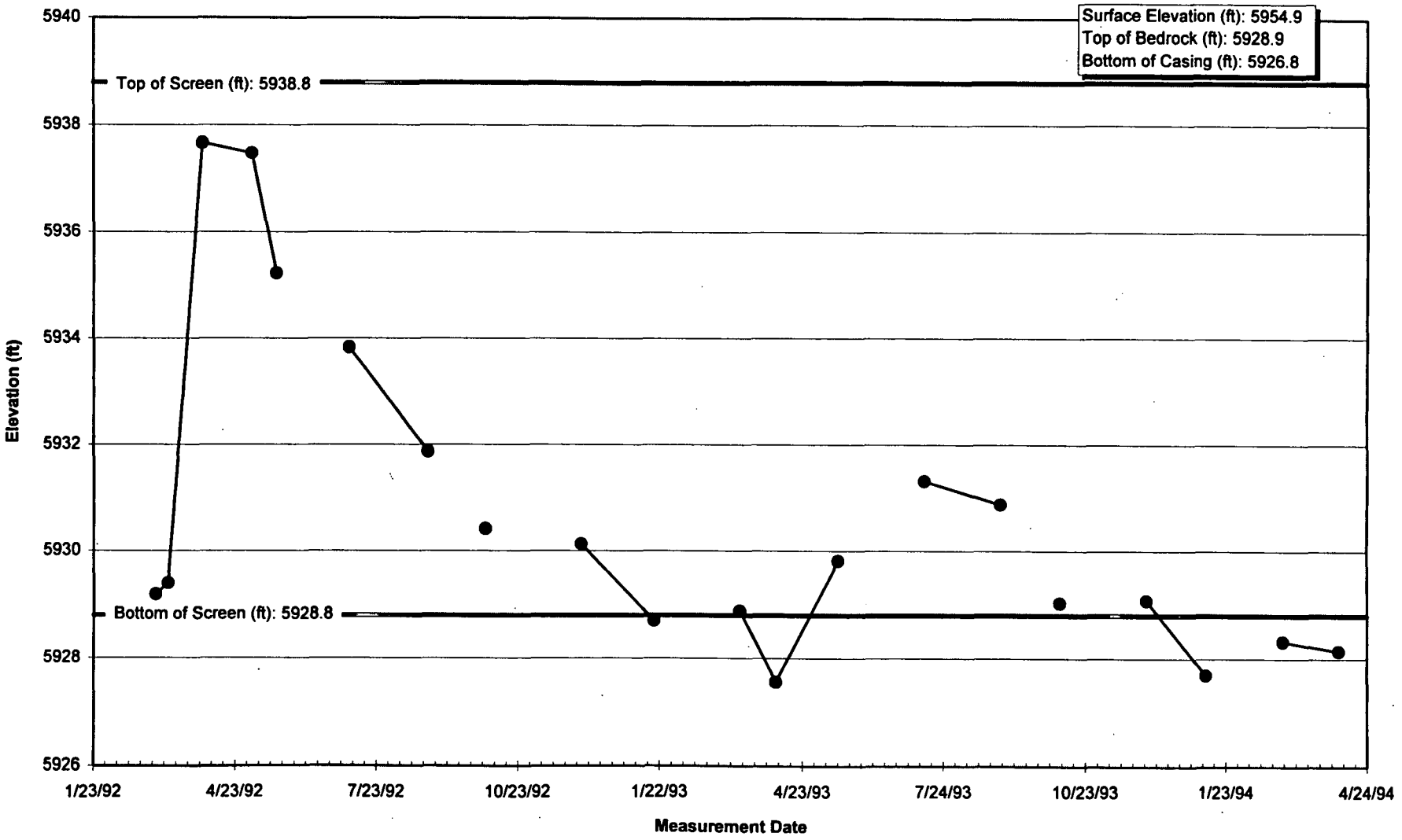
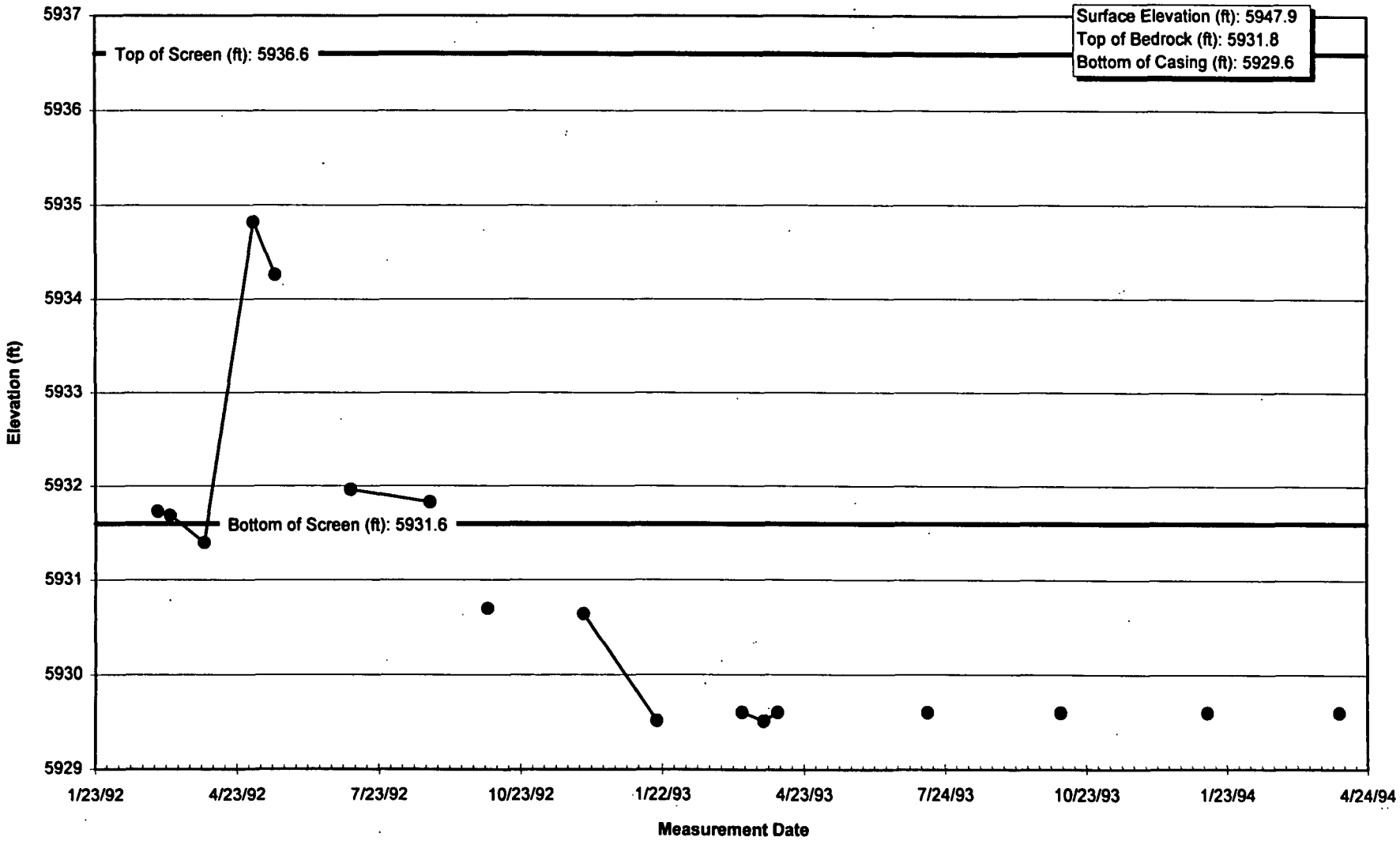
Hydrograph 07991



S4.XLS 07991 3/31/95

477

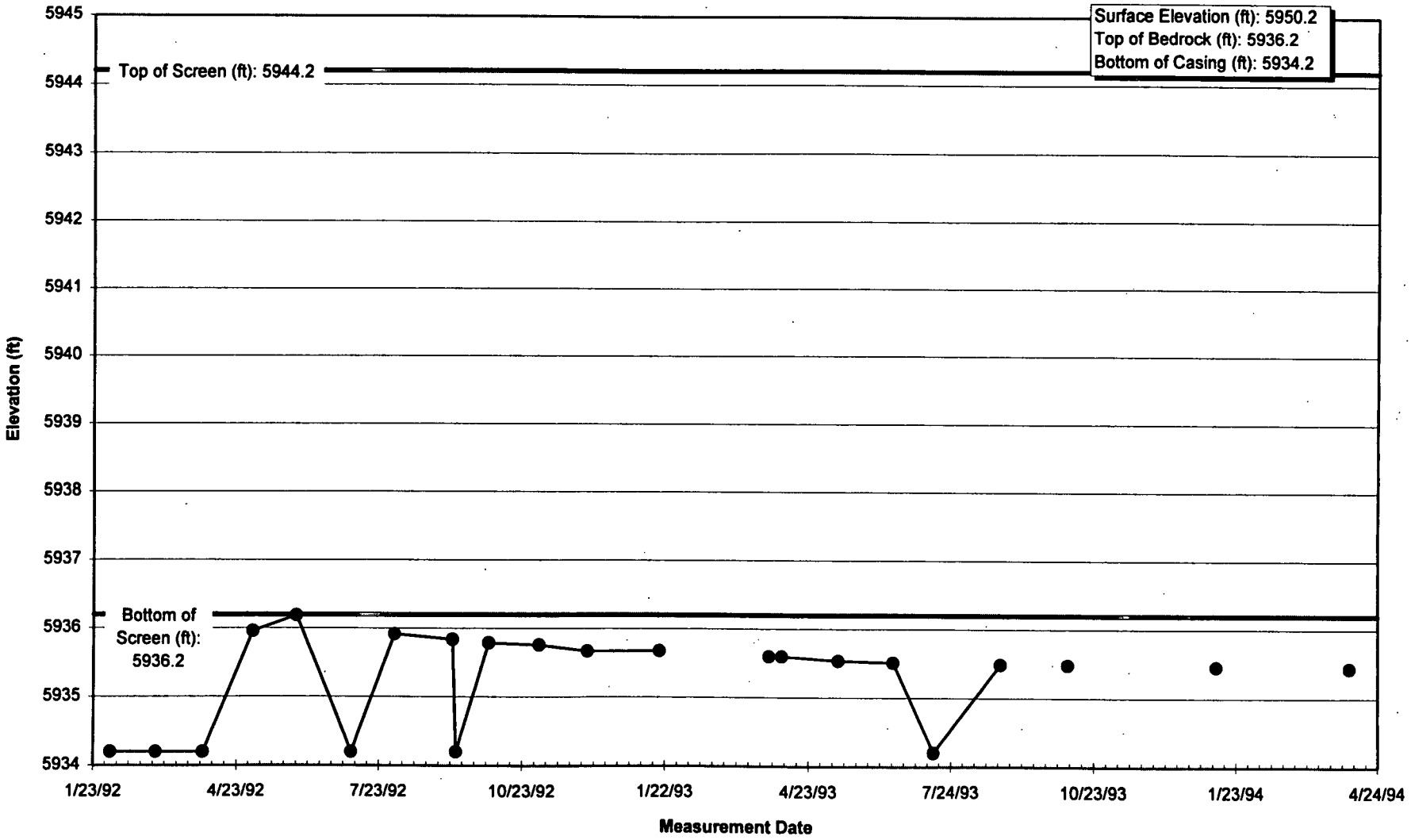
Hydrograph 08091



S4.XLS 08091 3/31/95

478

Hydrograph 08291



S4.XLS 08291 3/31/95

479

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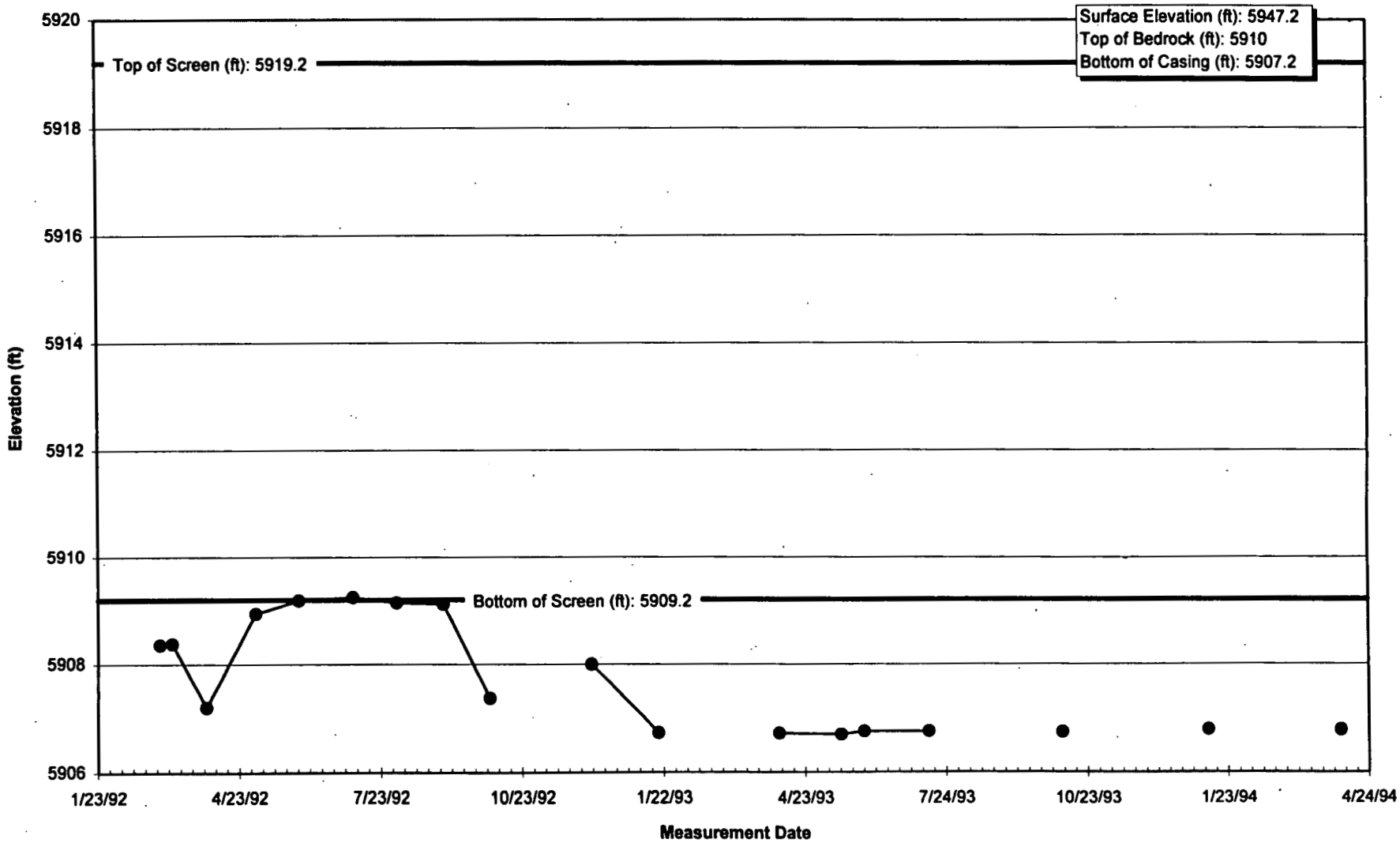
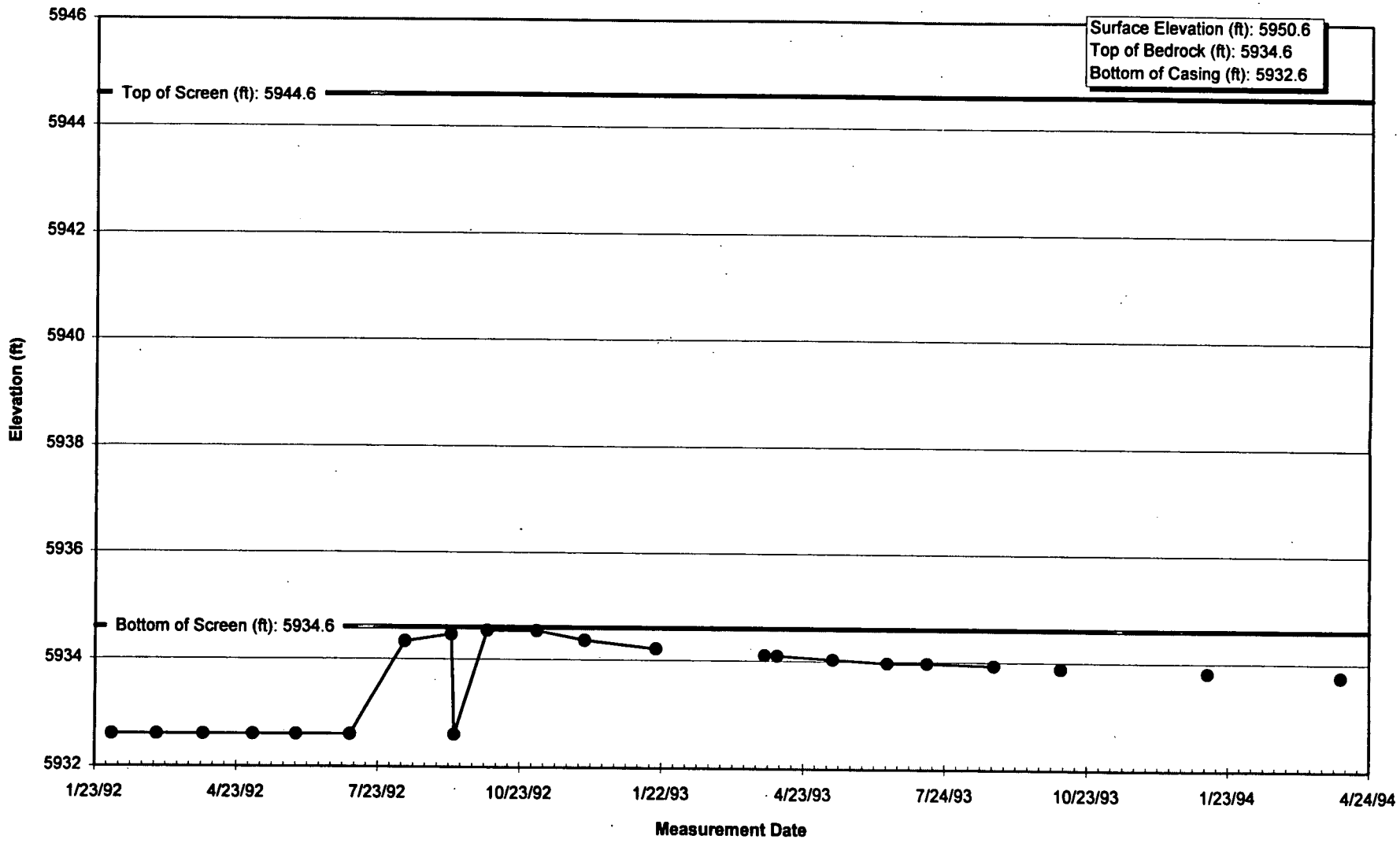


S4.XLS 08391 4/3/95

480

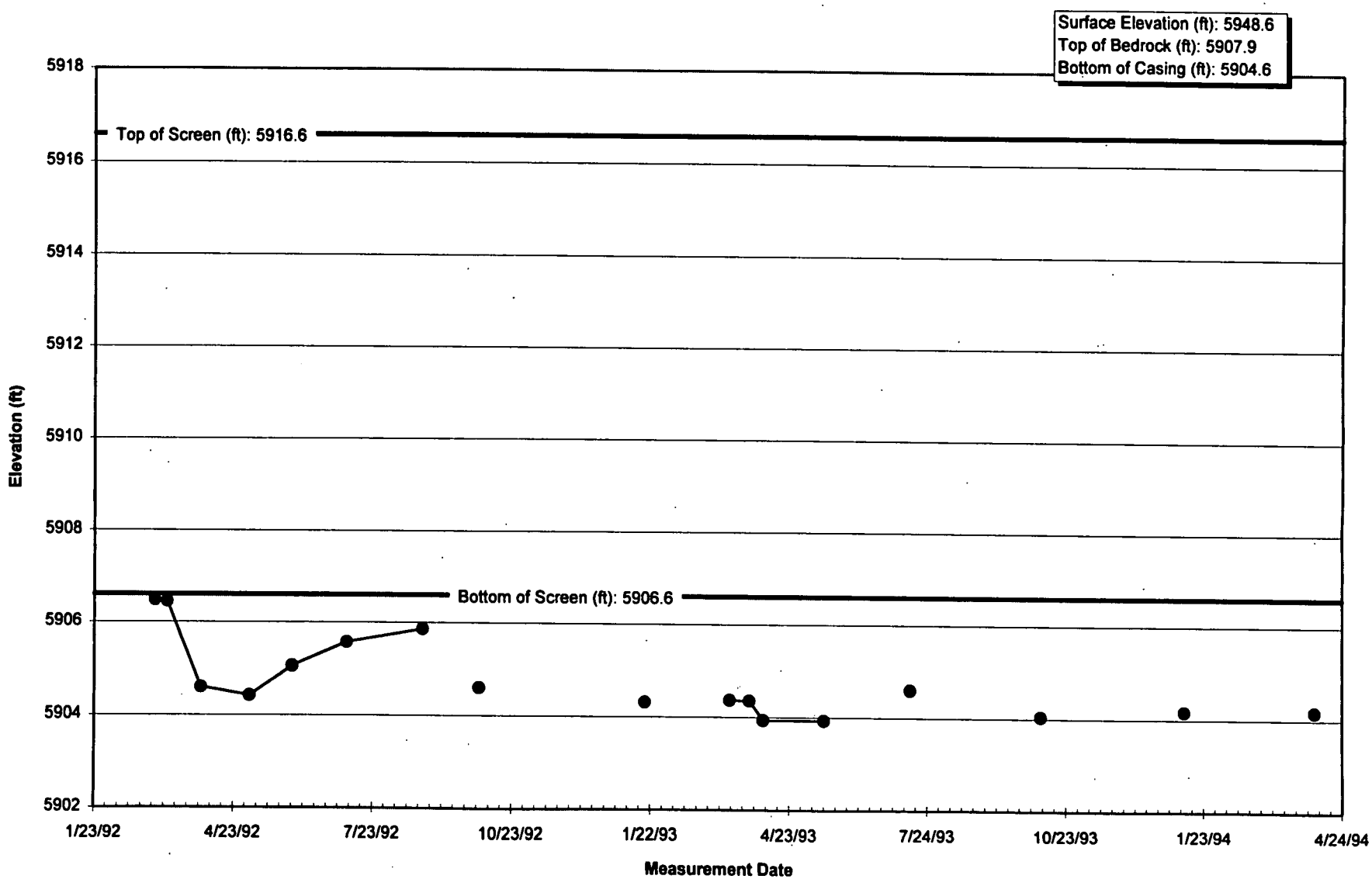
Hydrograph 08491



S4.XLS 08491 4/3/95

481

Hydrograph 08591



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482

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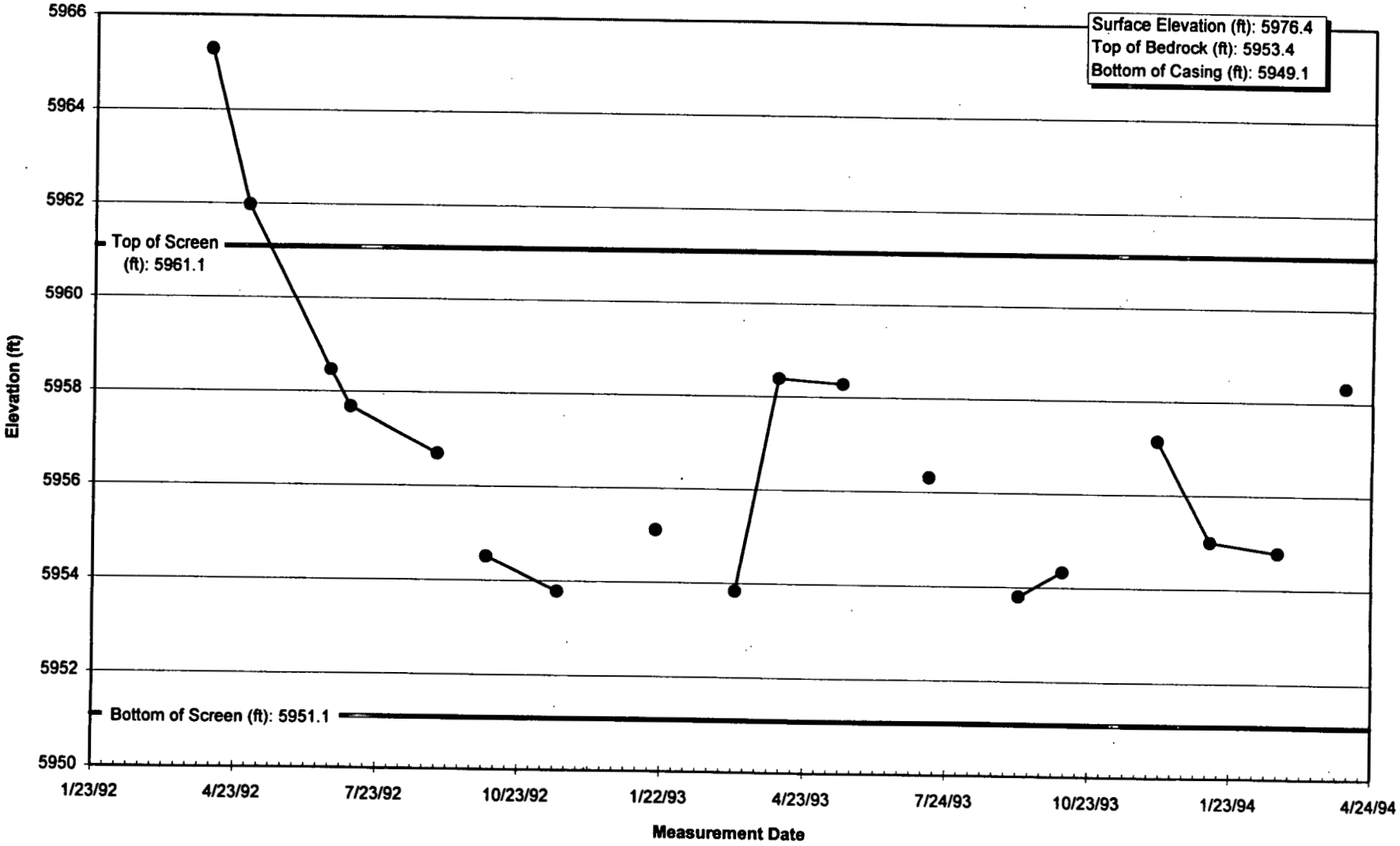
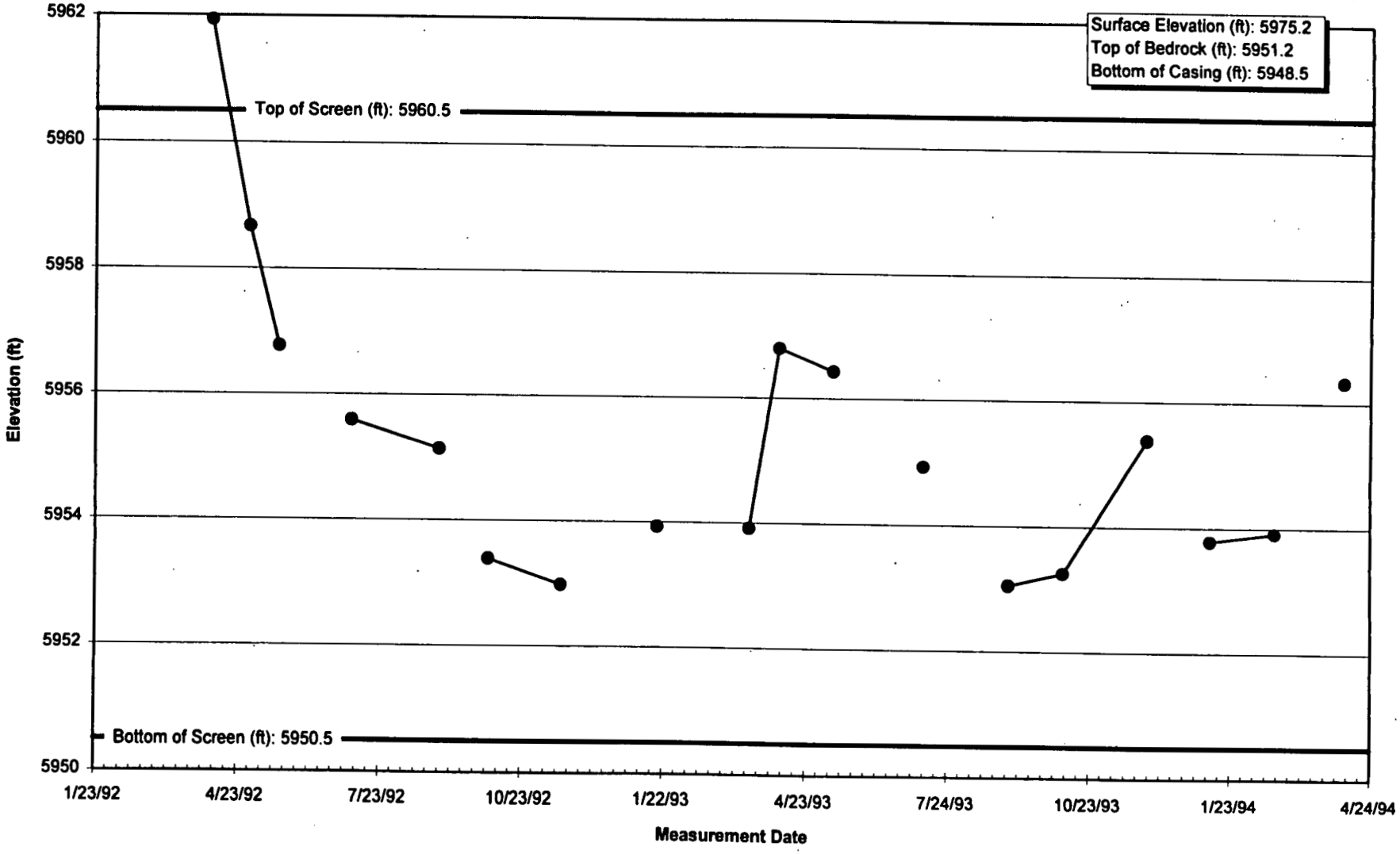


S4.XLS 08891 4/3/95

483

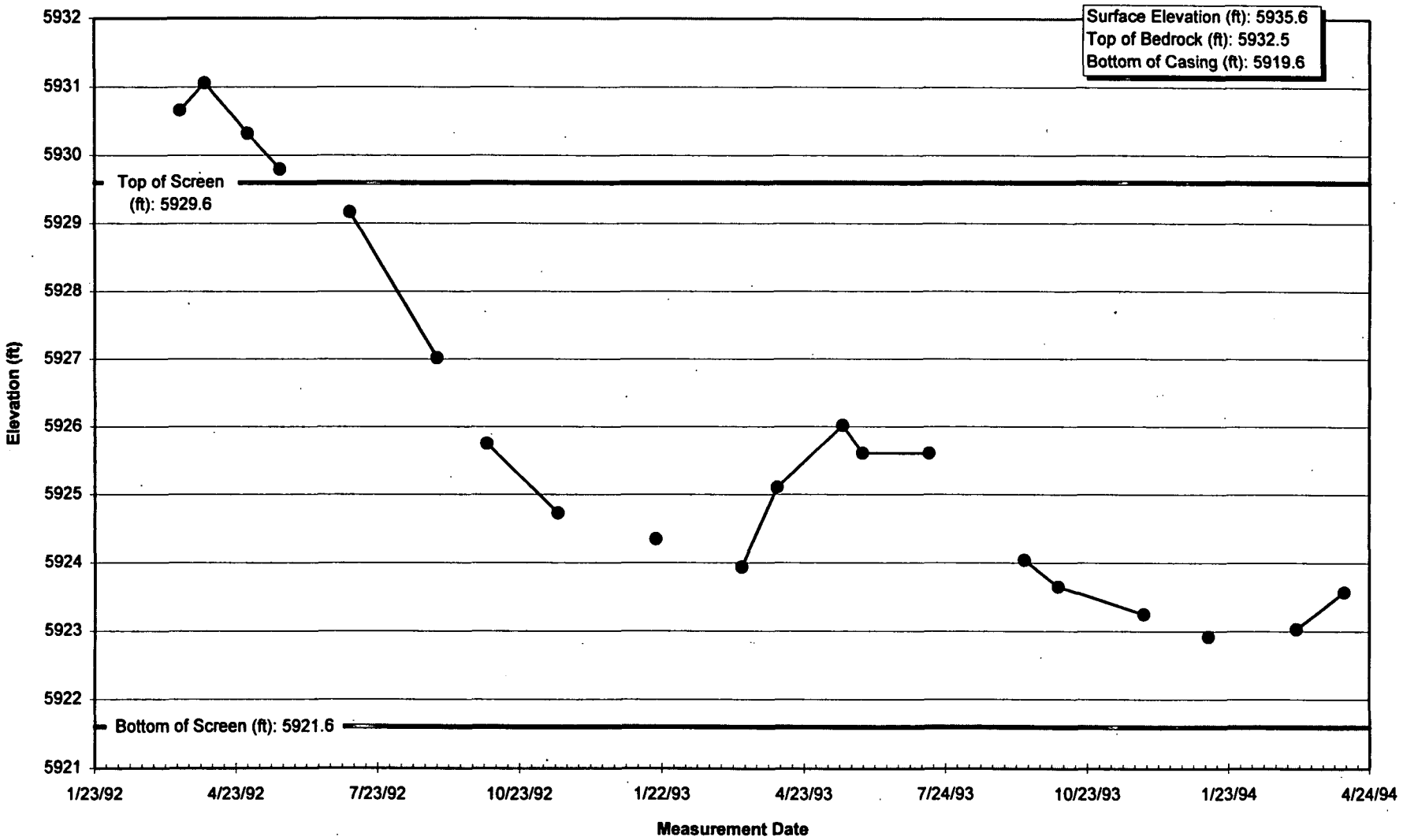
Hydrograph 09091



S4.XLS 09091 4/3/95

484

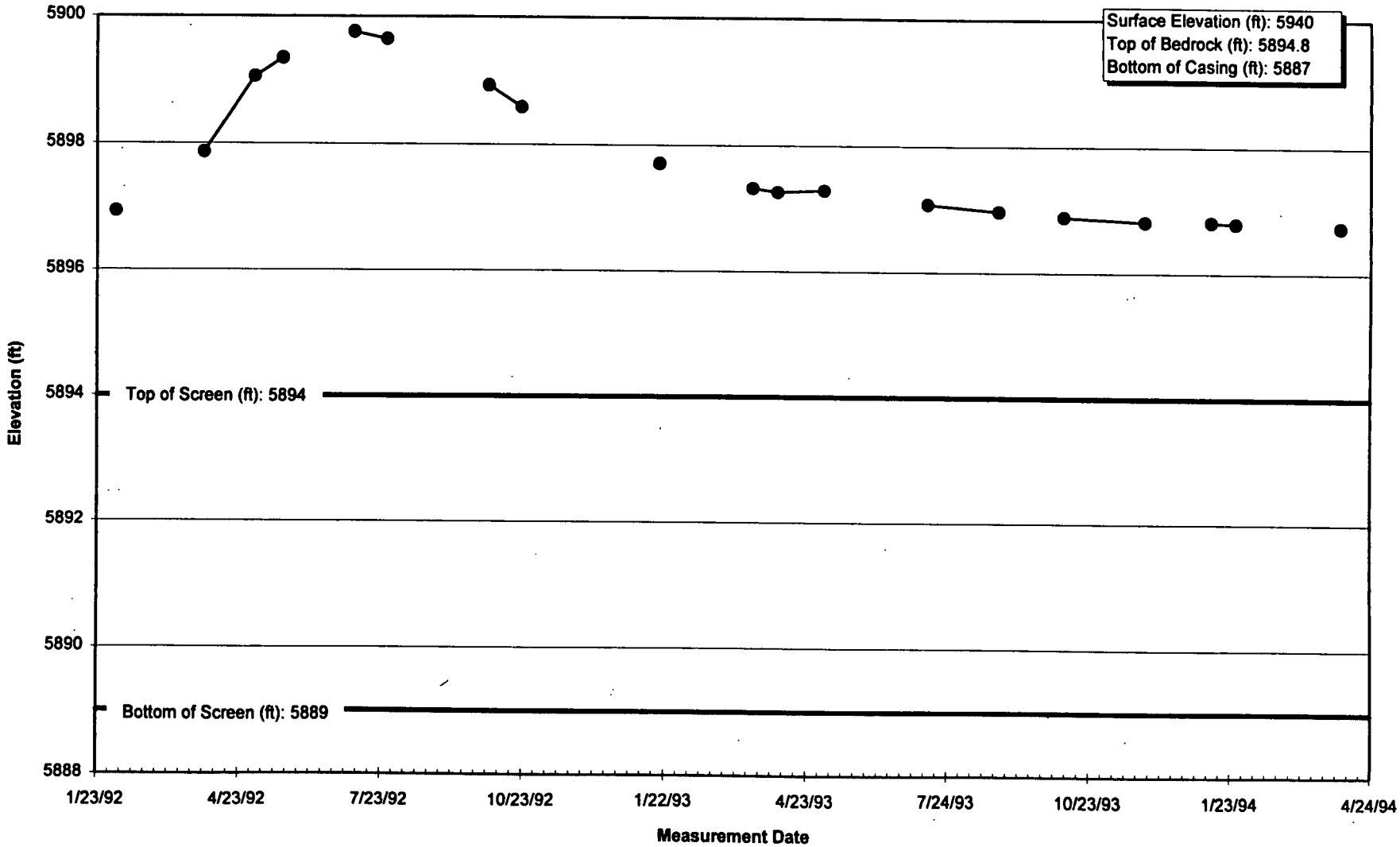
Hydrograph 09691



S5.XLS 09691 4/3/95

485

Hydrograph 10991



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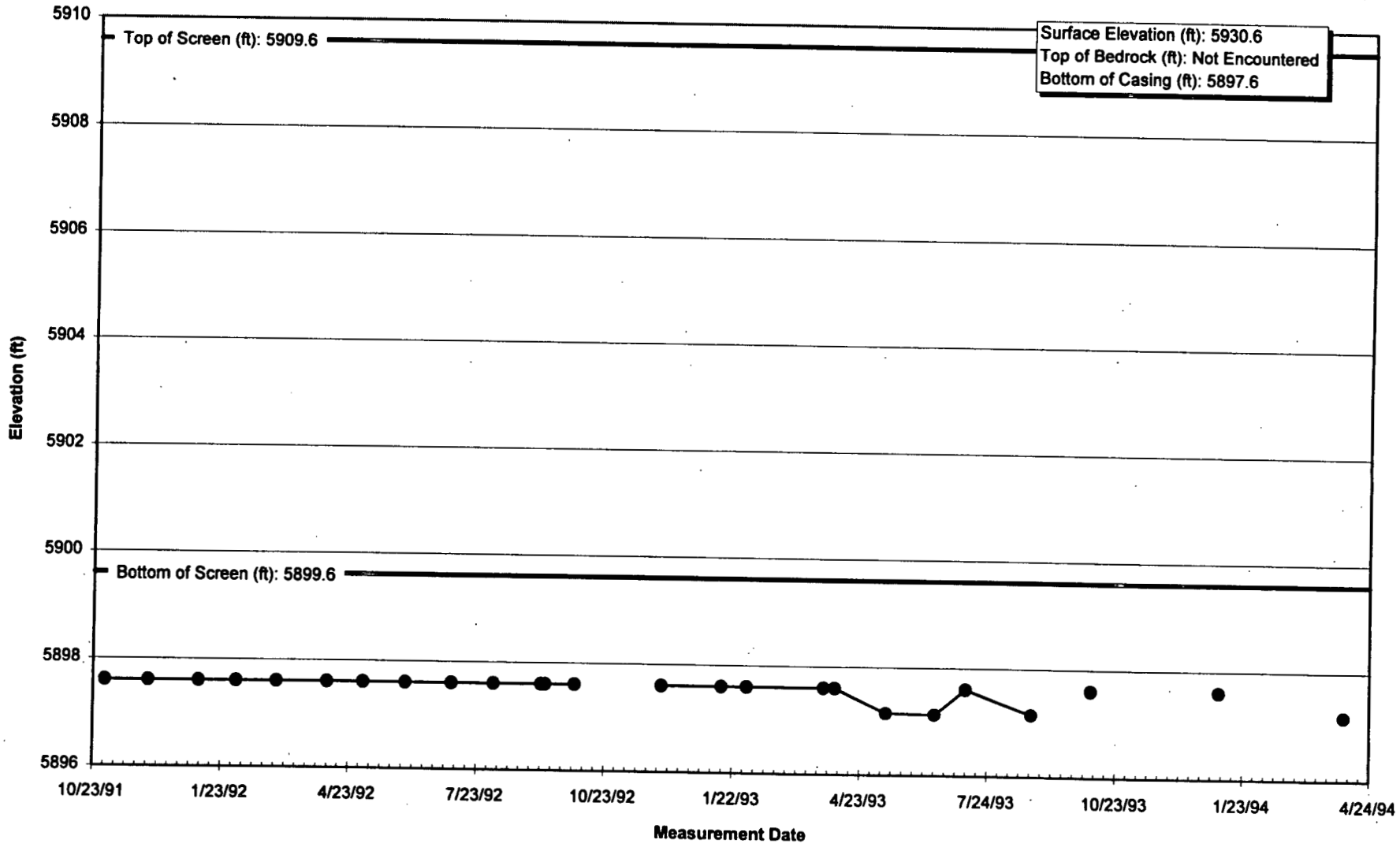
486

Hydrograph 11291



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487

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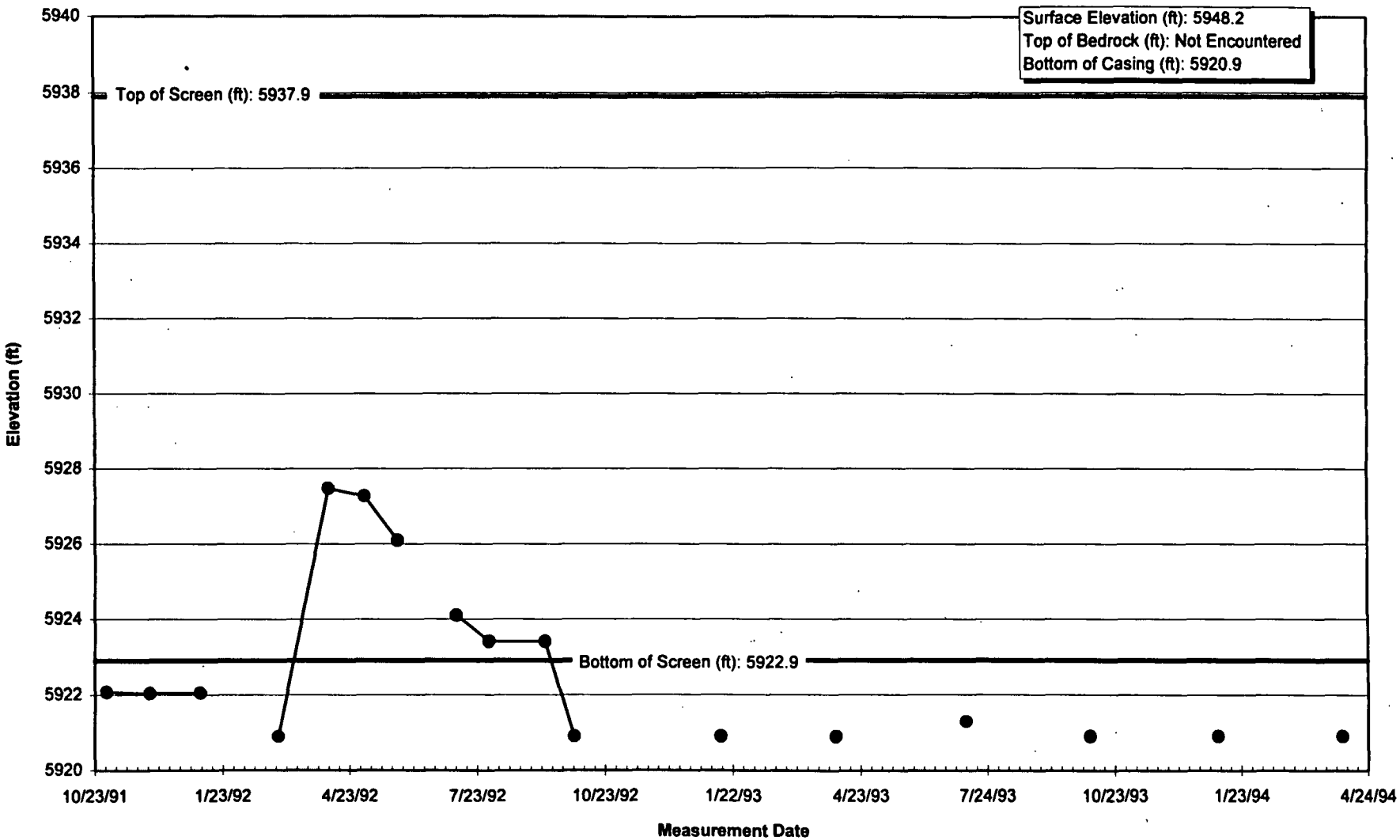

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488

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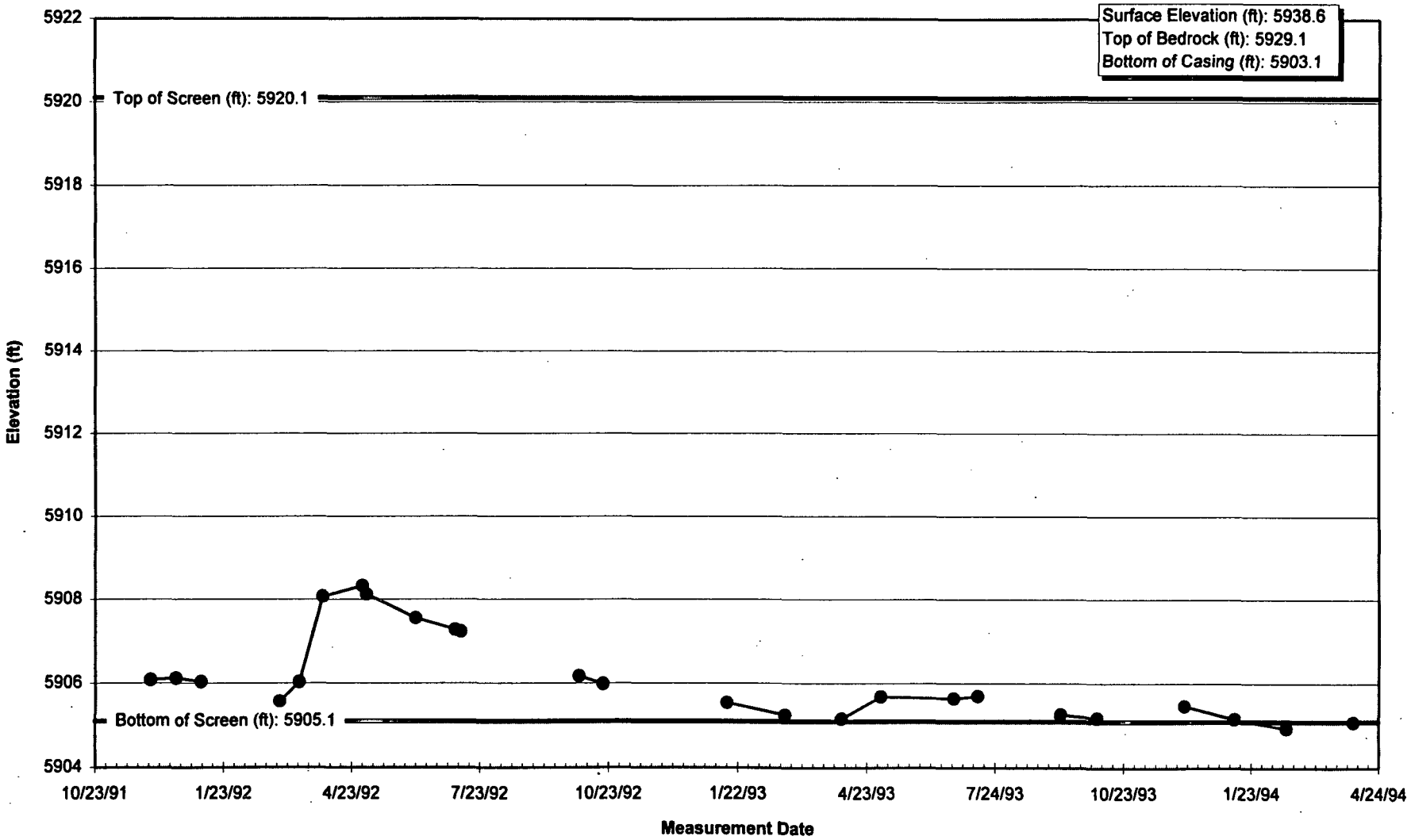

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489

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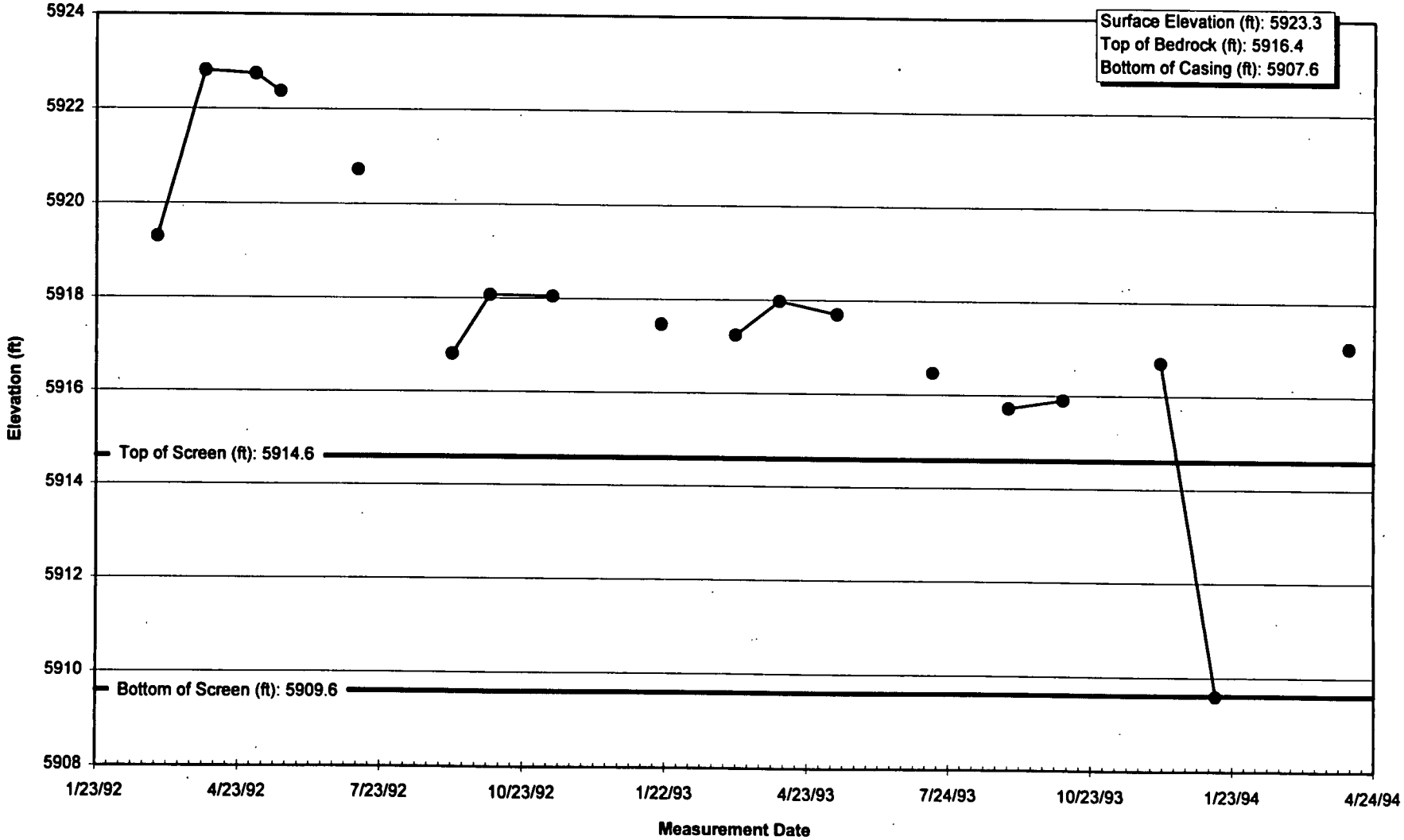

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490

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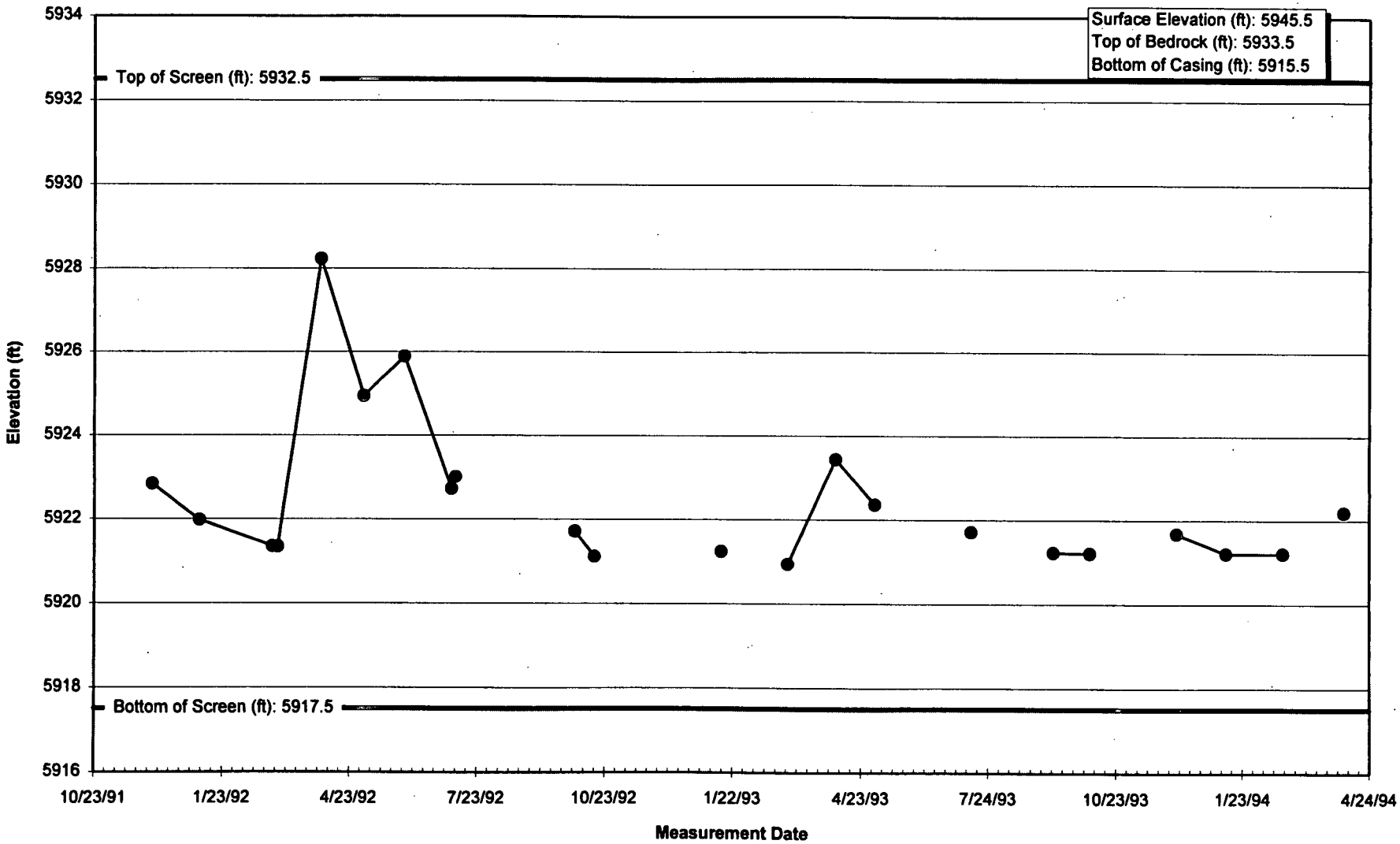

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491

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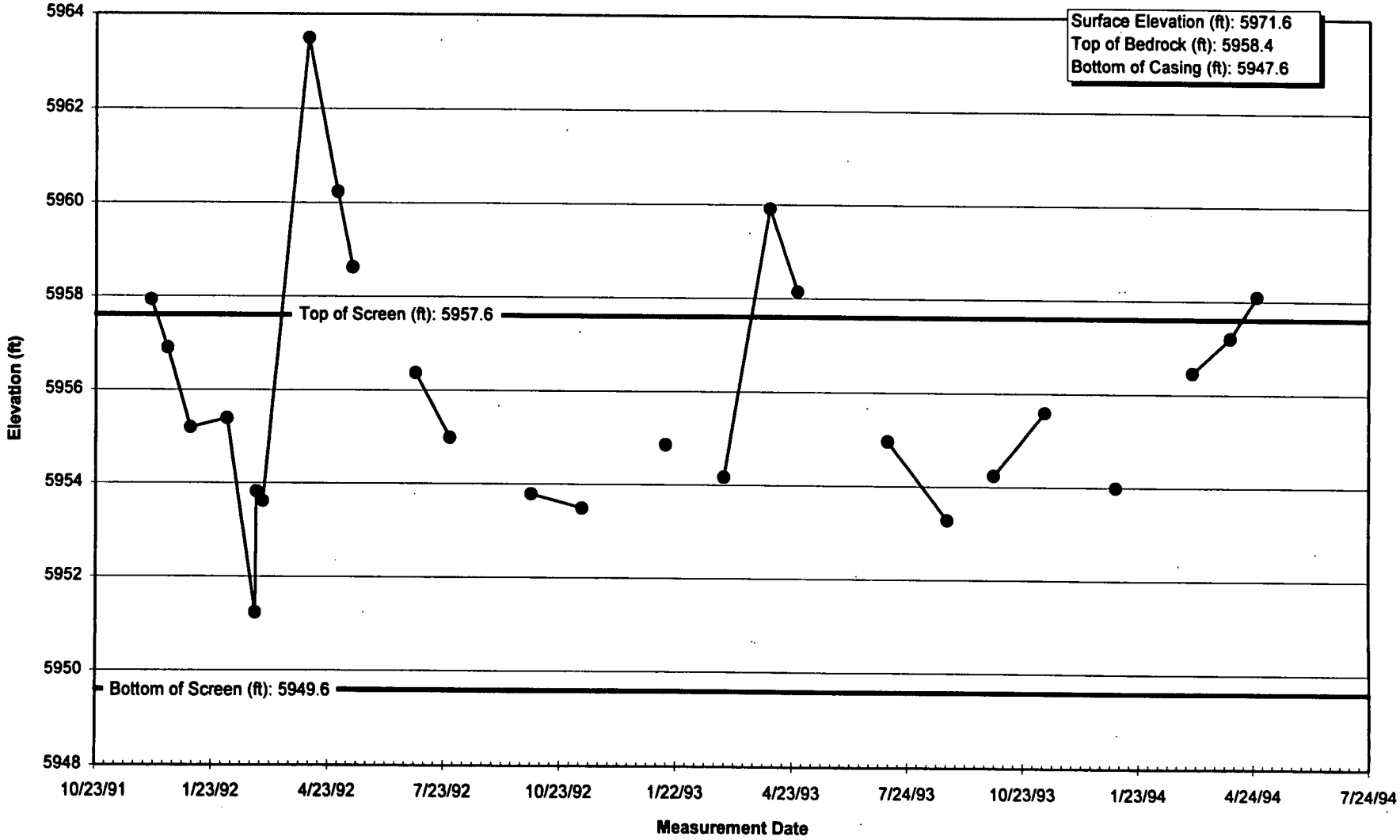
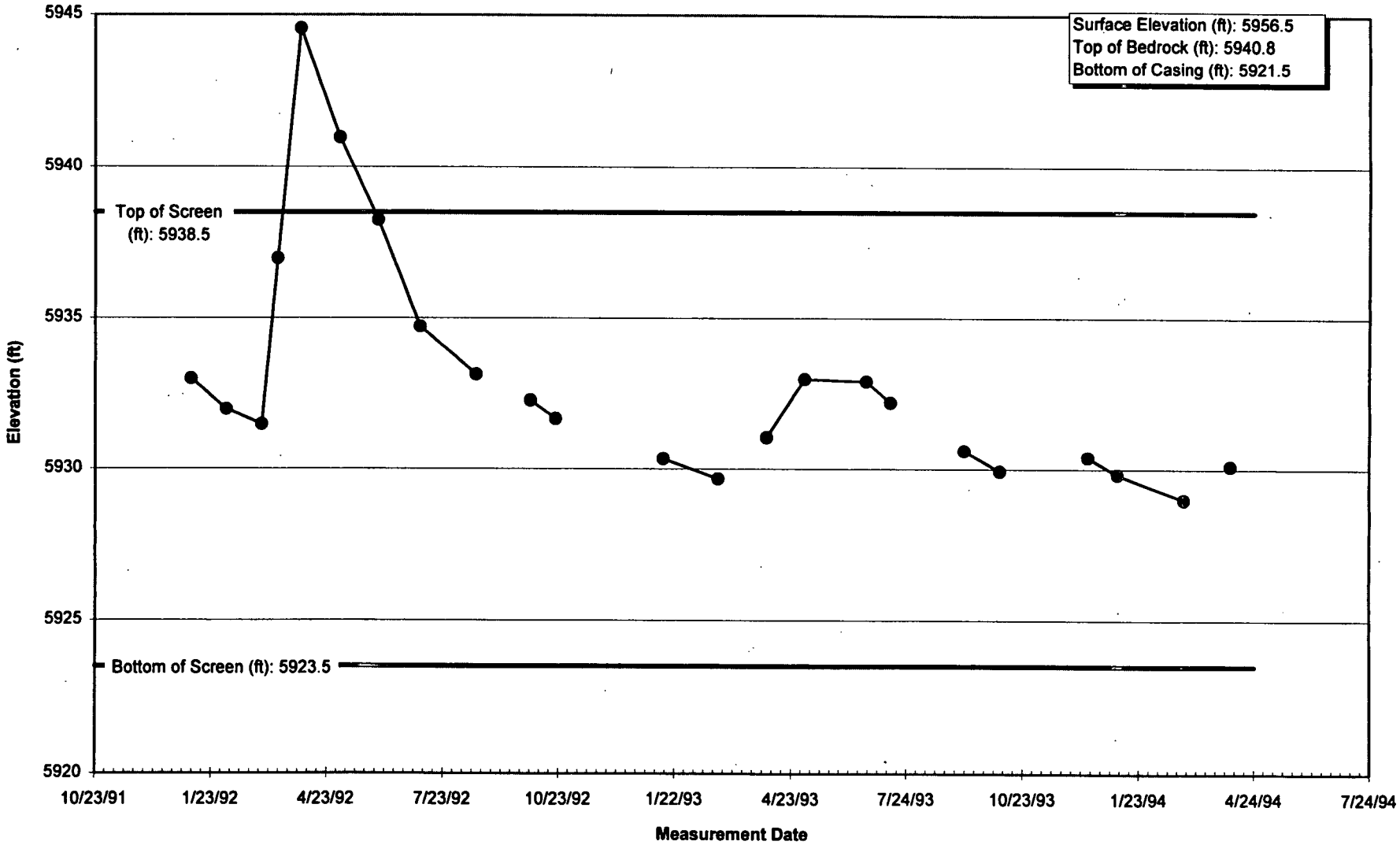


S6.XLS 12091 4/3/95

492

Hydrograph 12191



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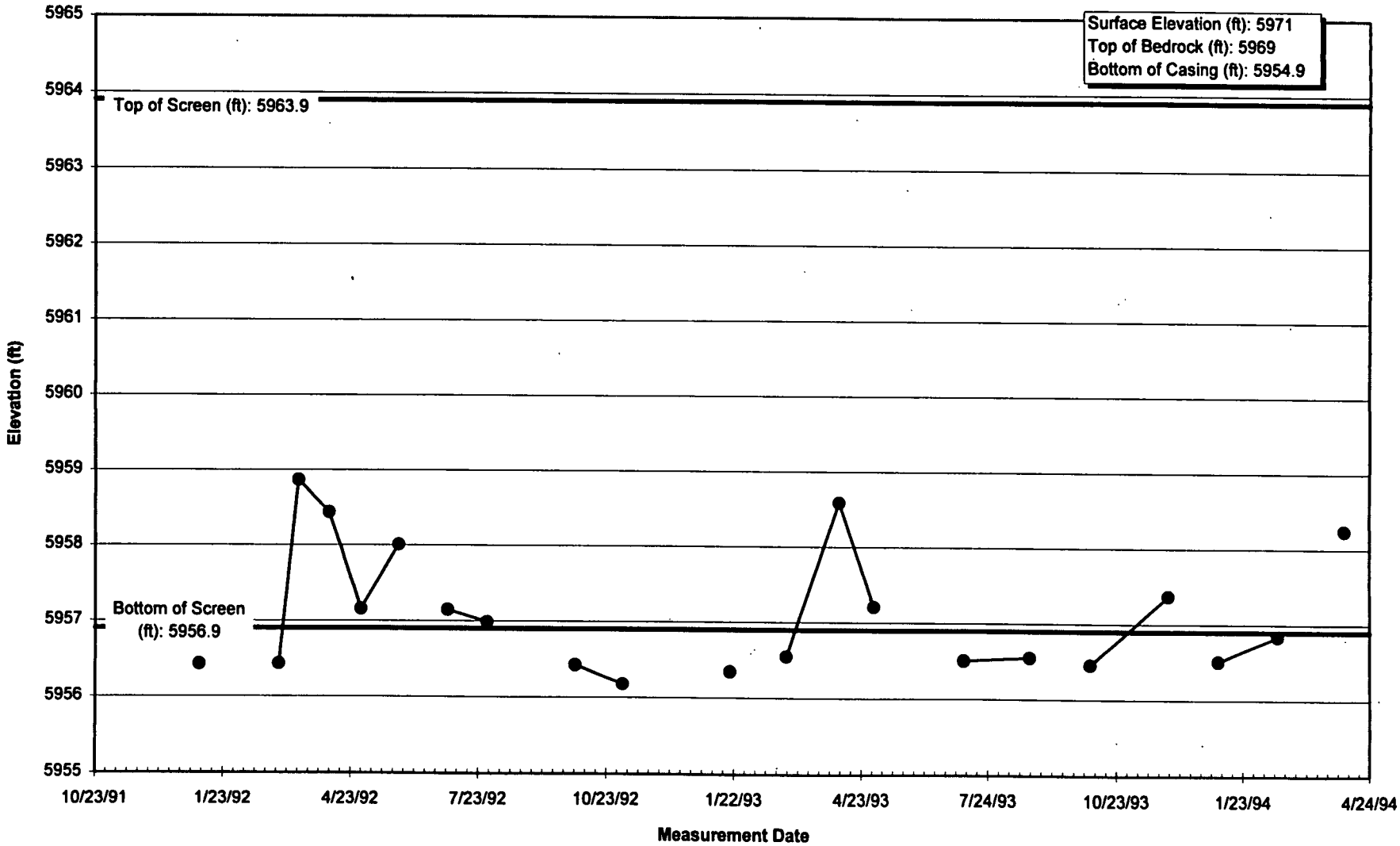
4/93

Hydrograph 12291



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494

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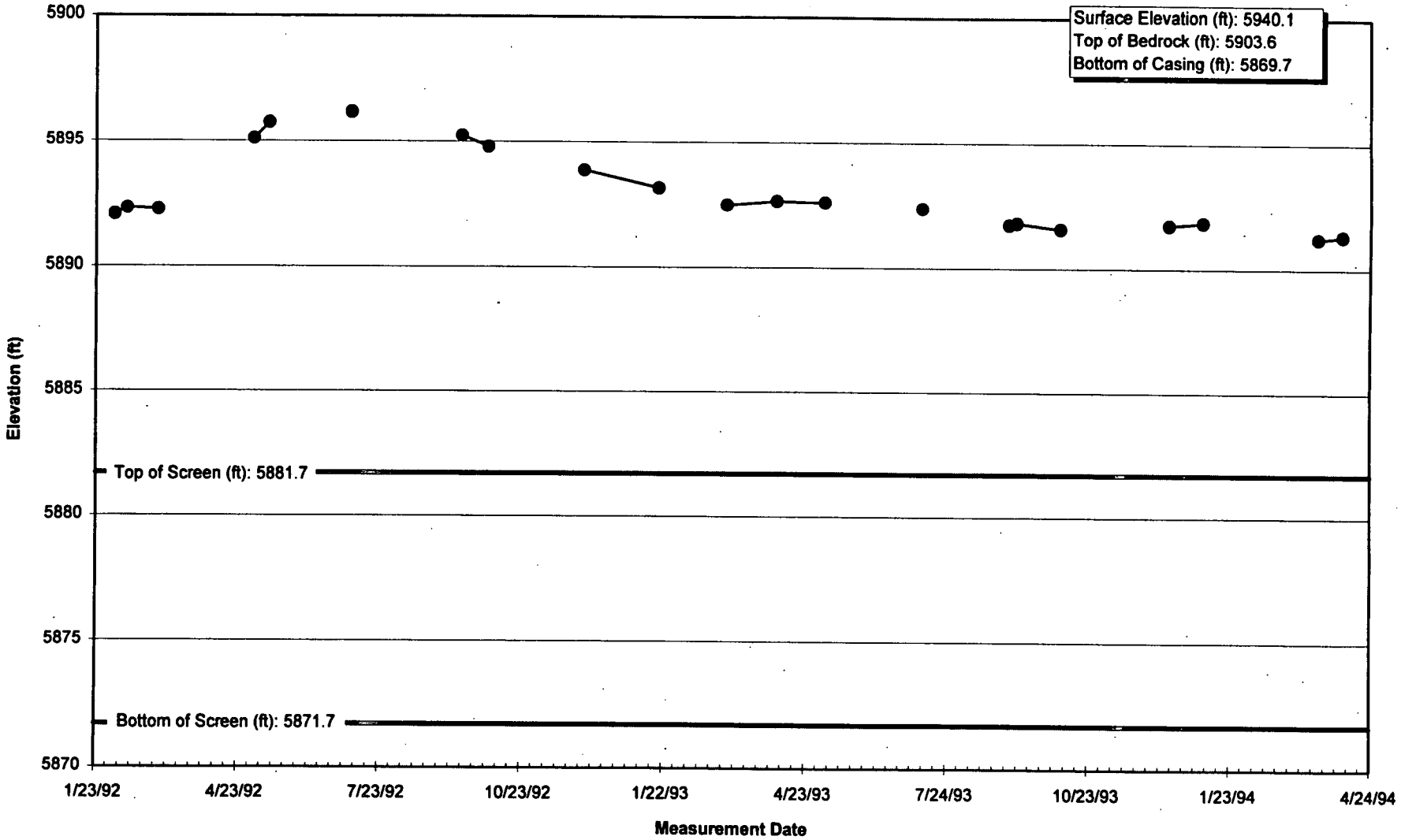

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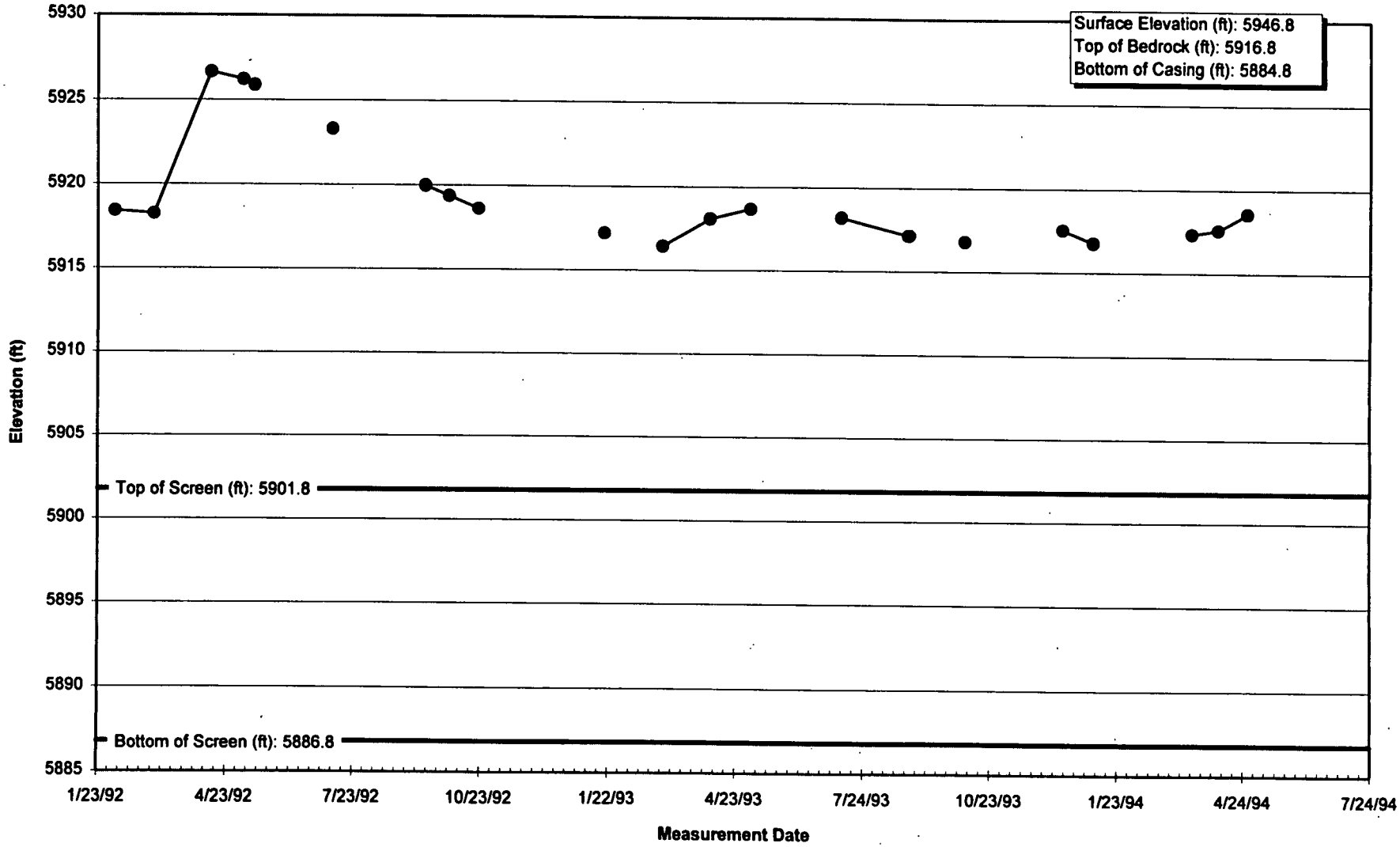
4/95

Hydrograph 12491



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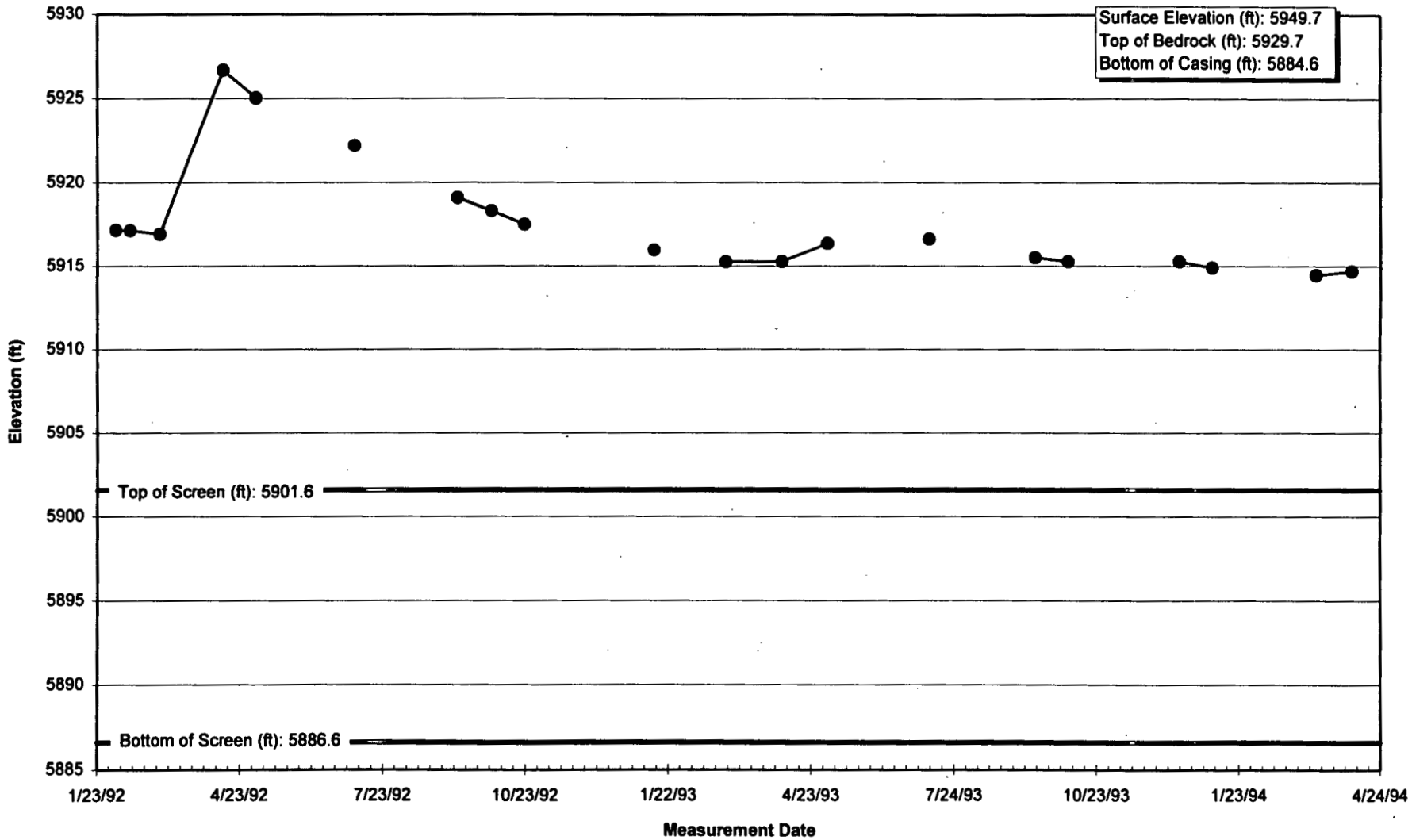
Hydrograph 12691



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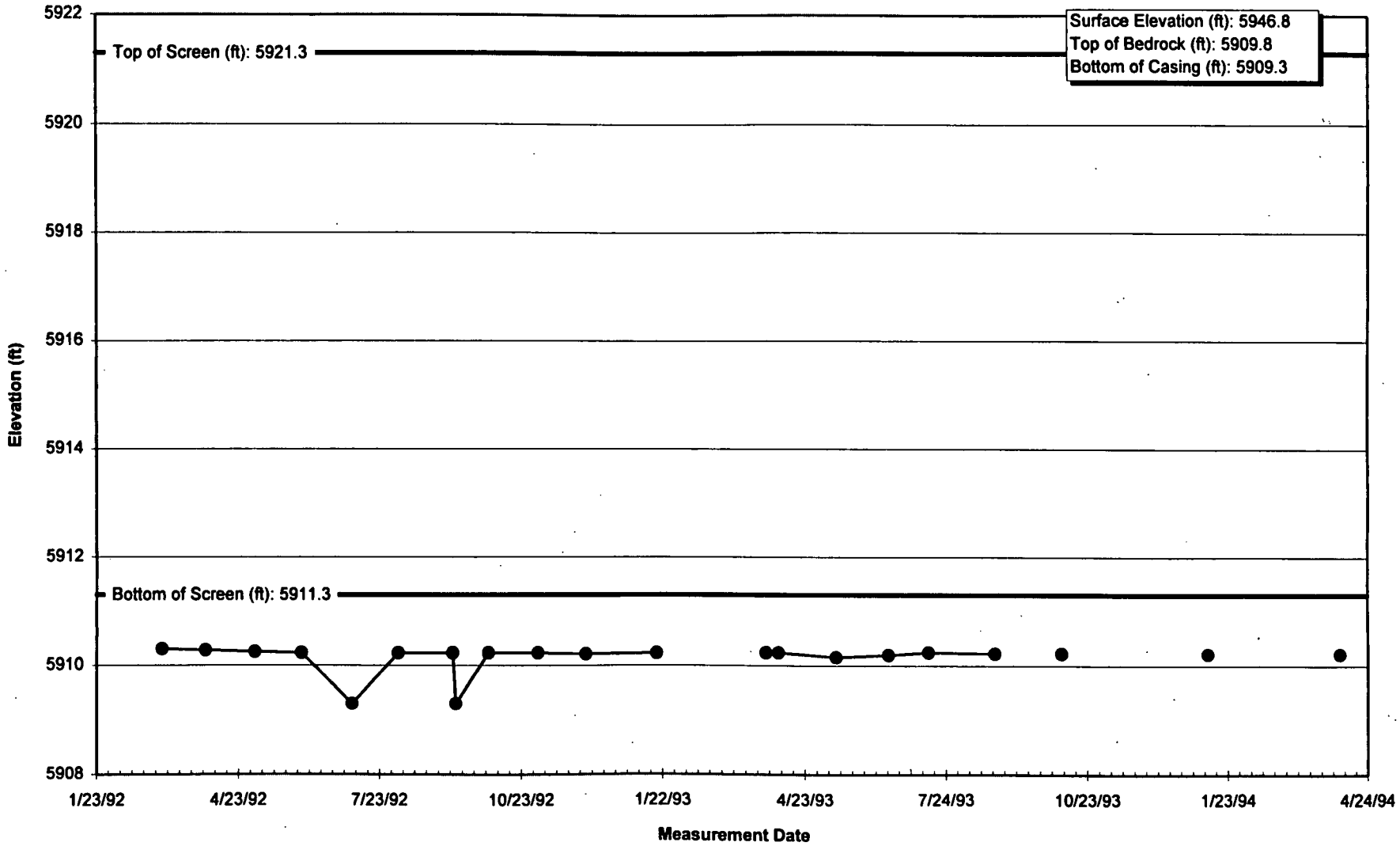
497

Hydrograph 12891



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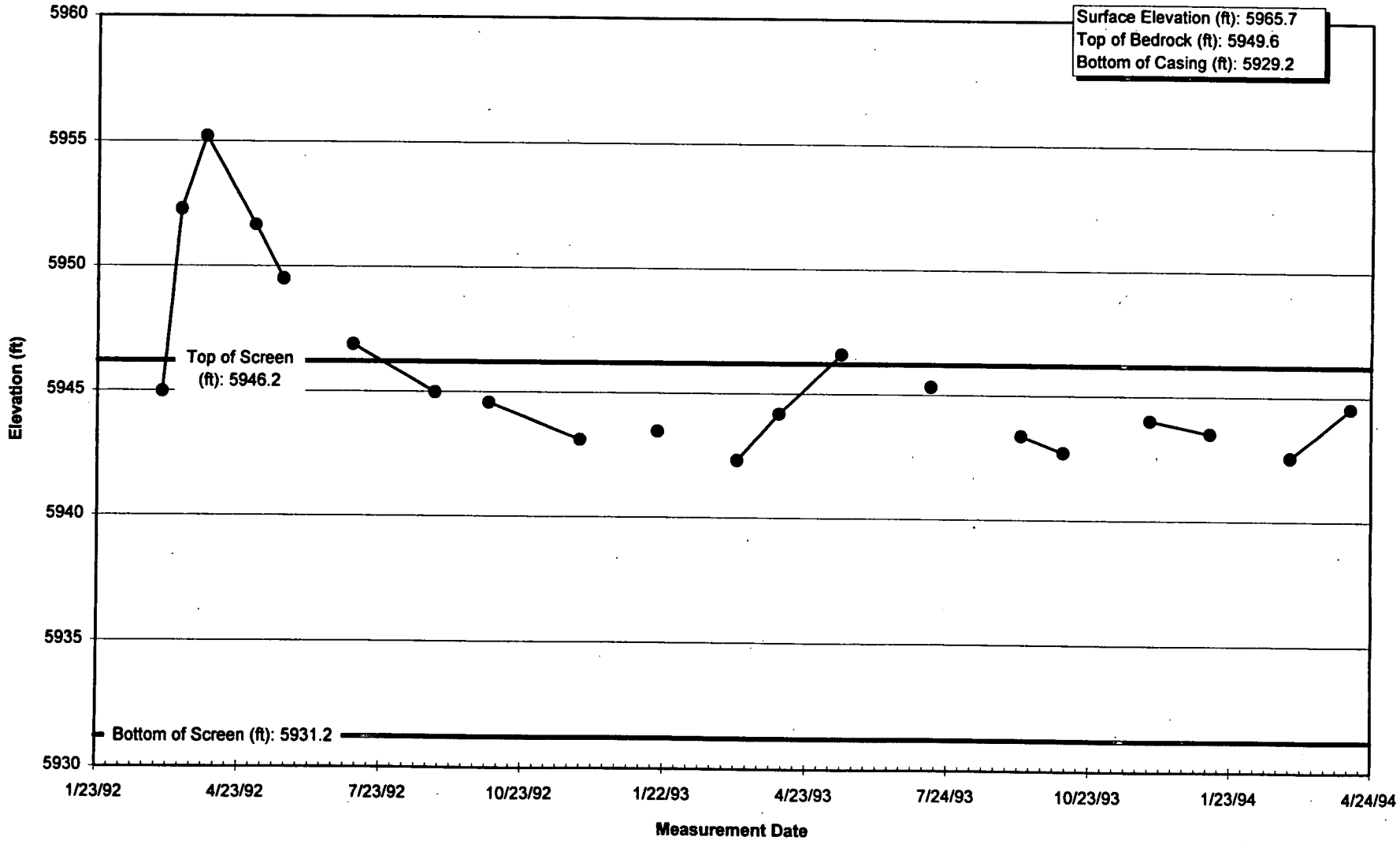

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499

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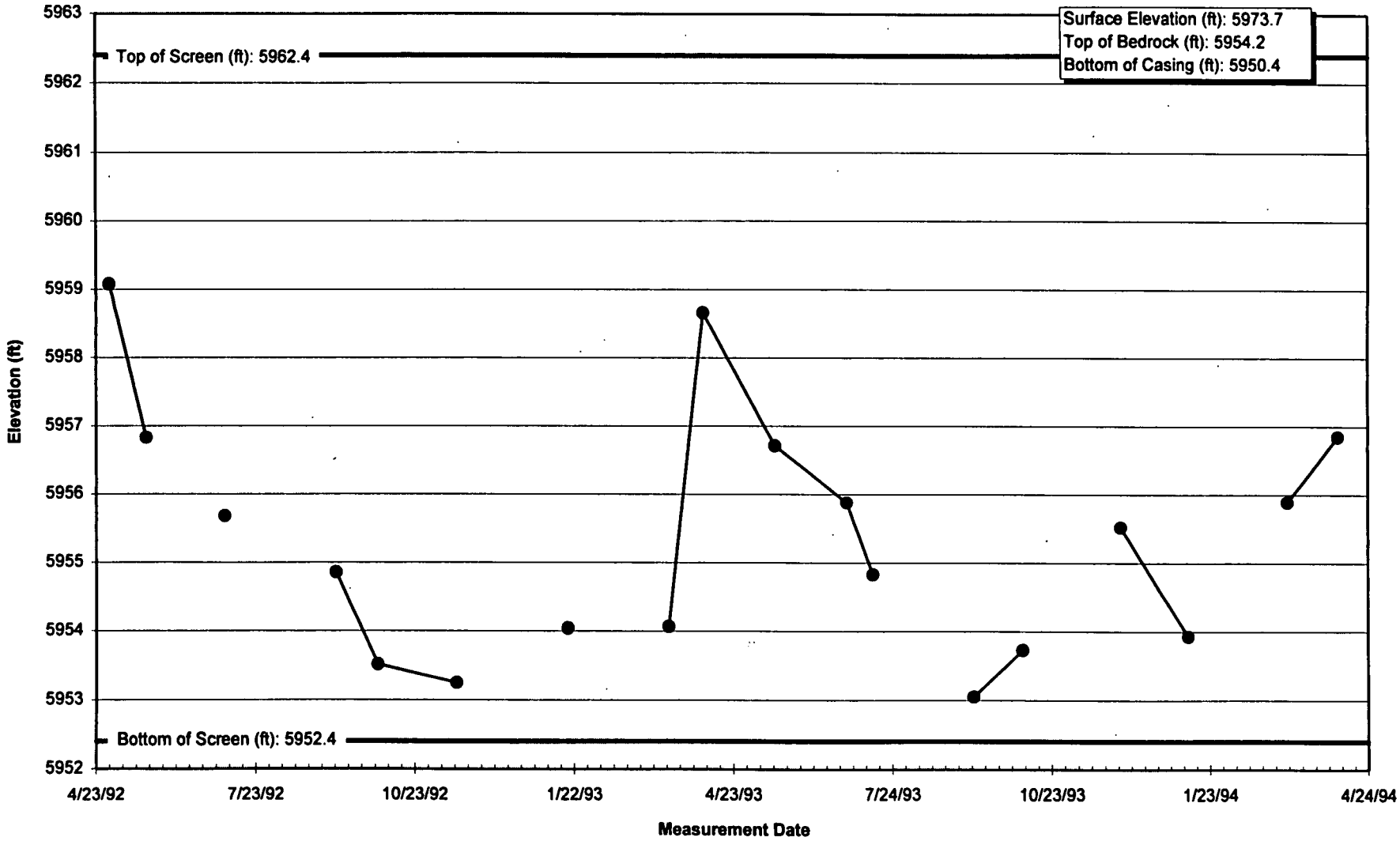

500 S6.XLS 13091 4/3/95

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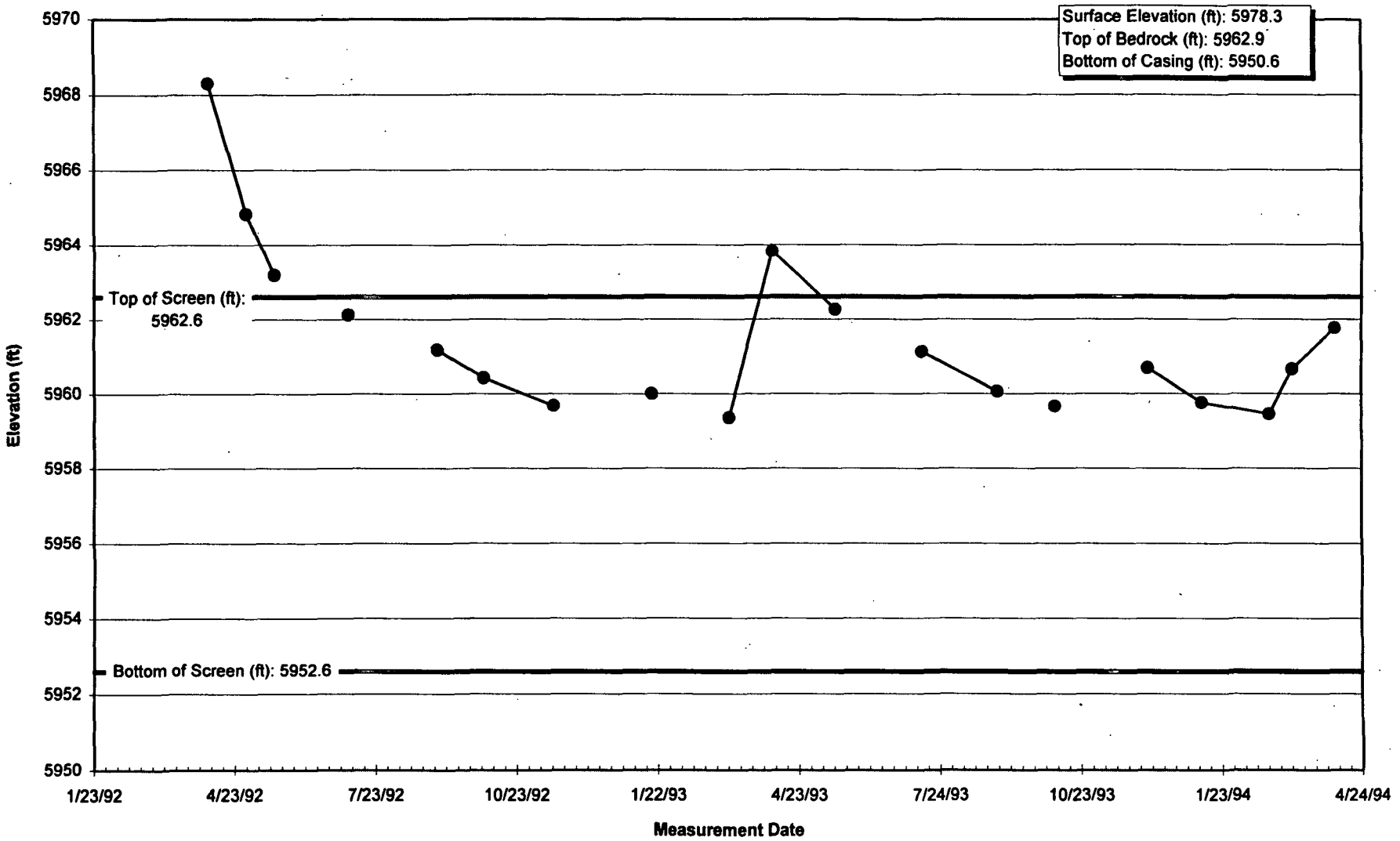

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501

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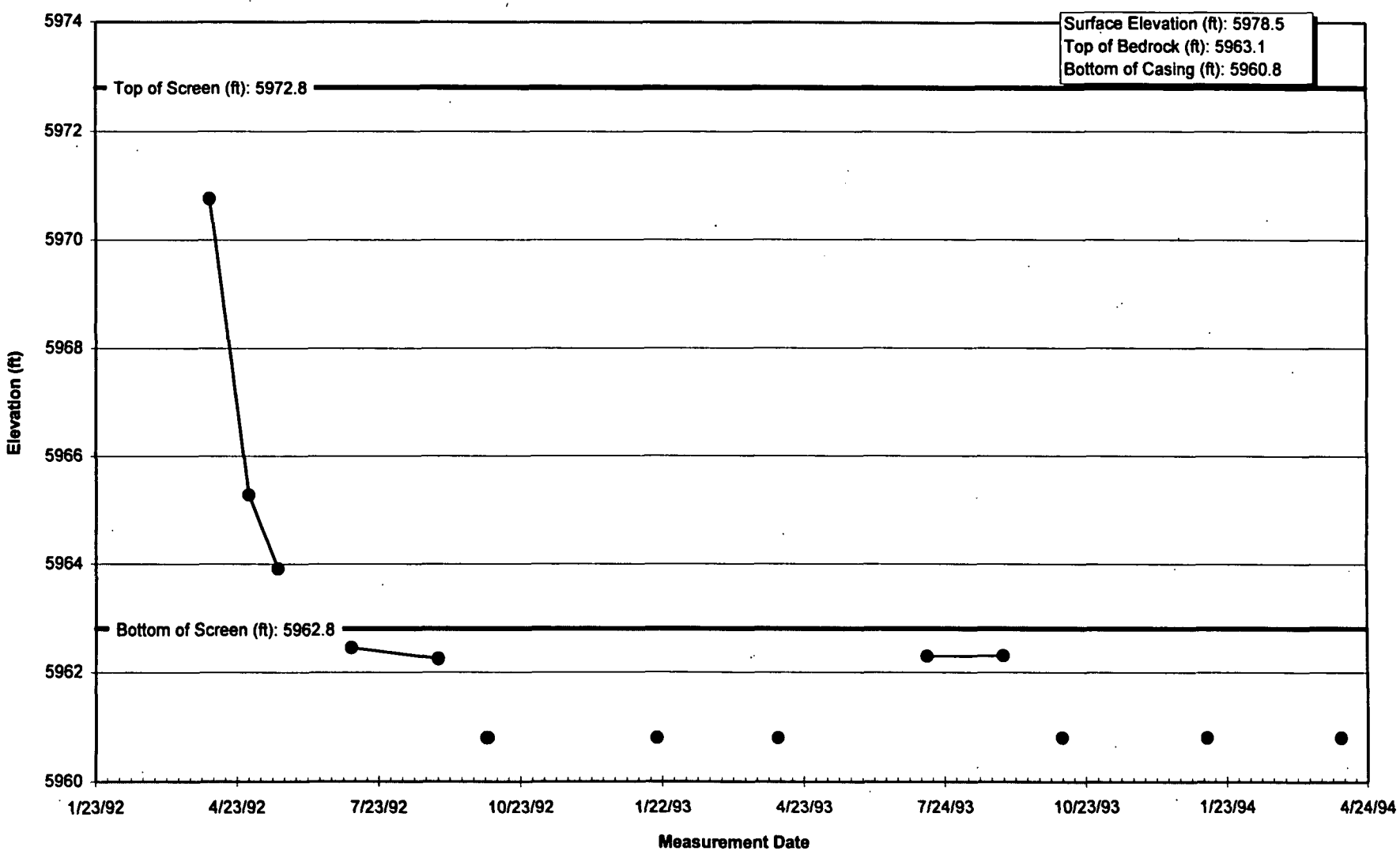

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502

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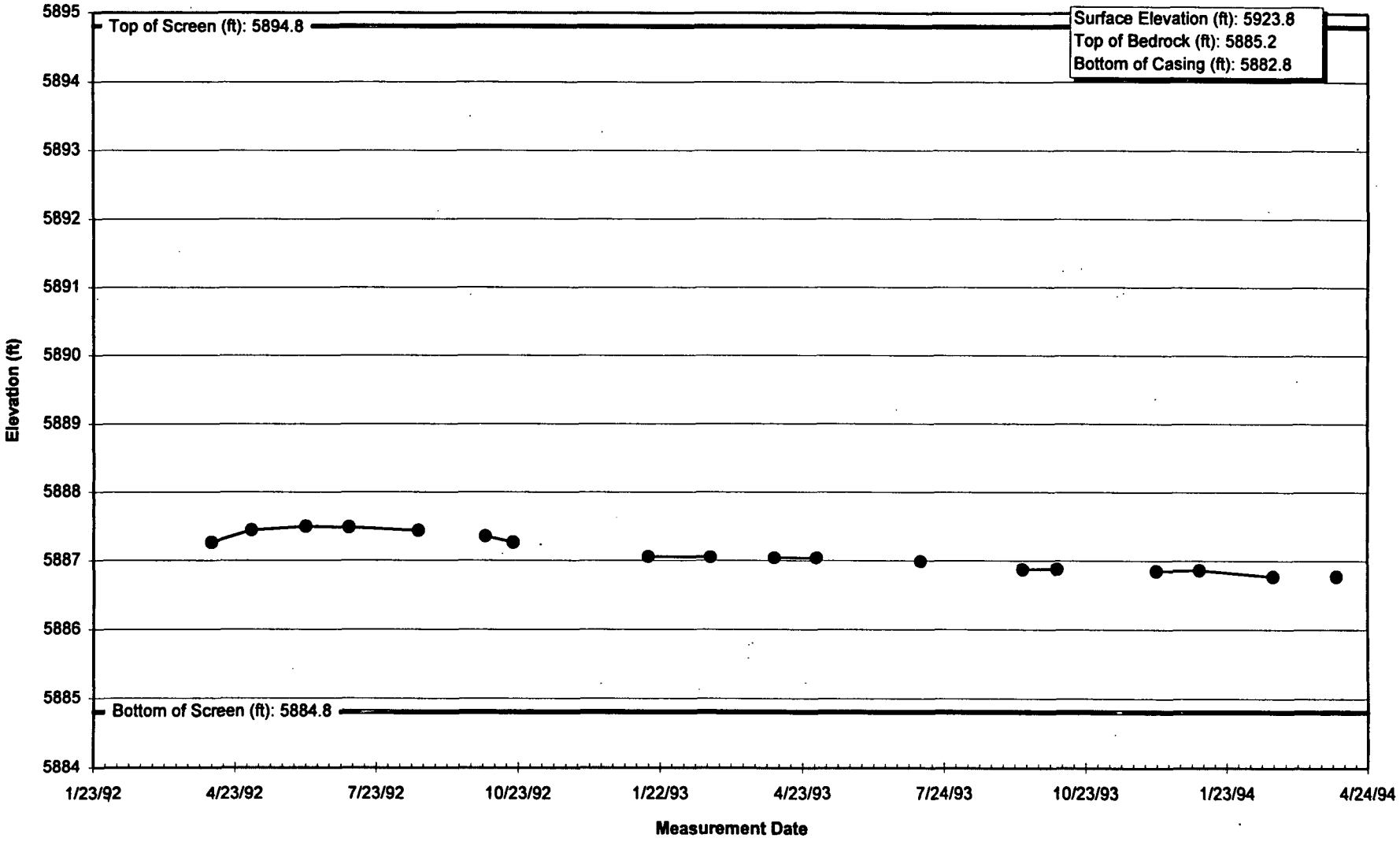

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503

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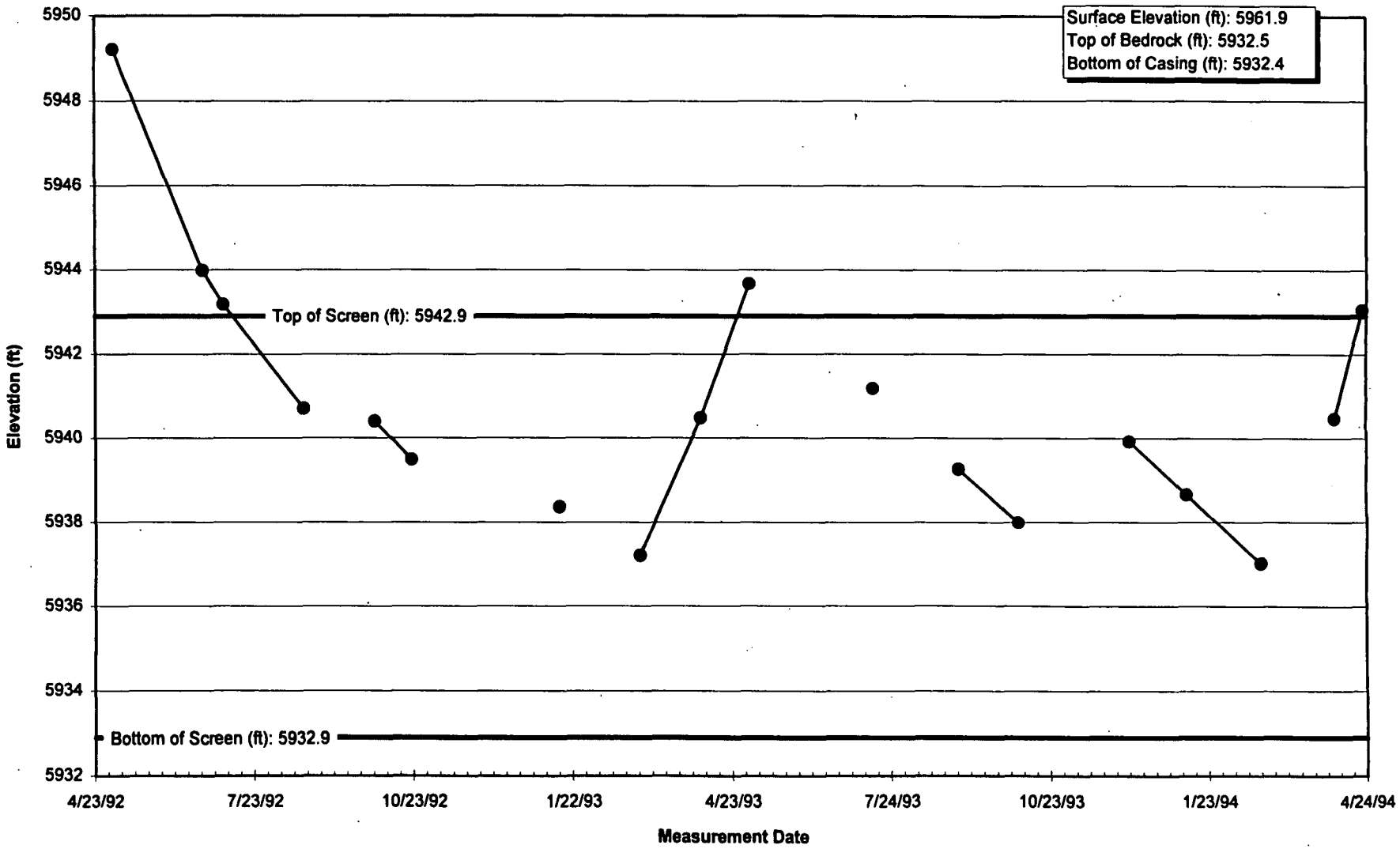

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504

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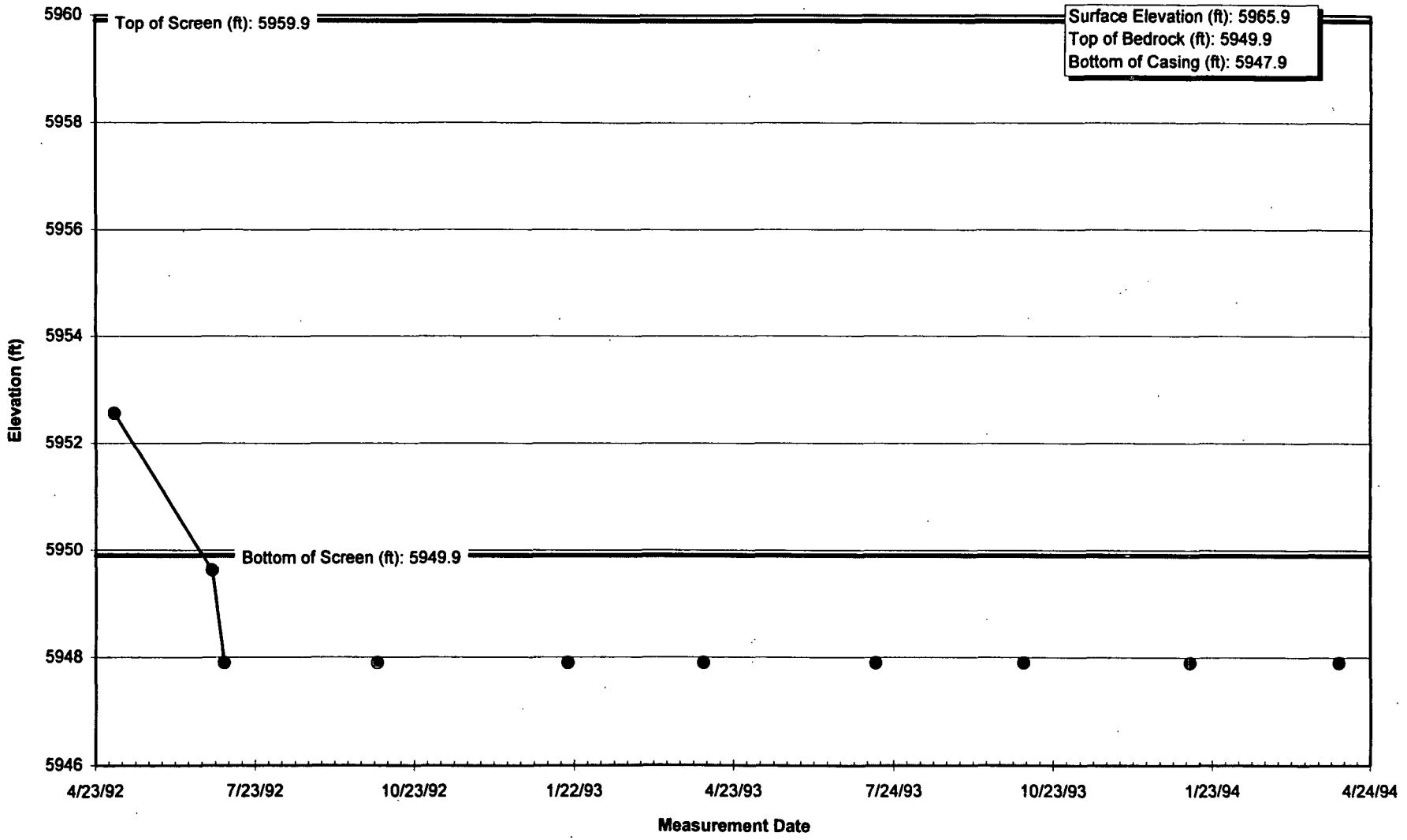

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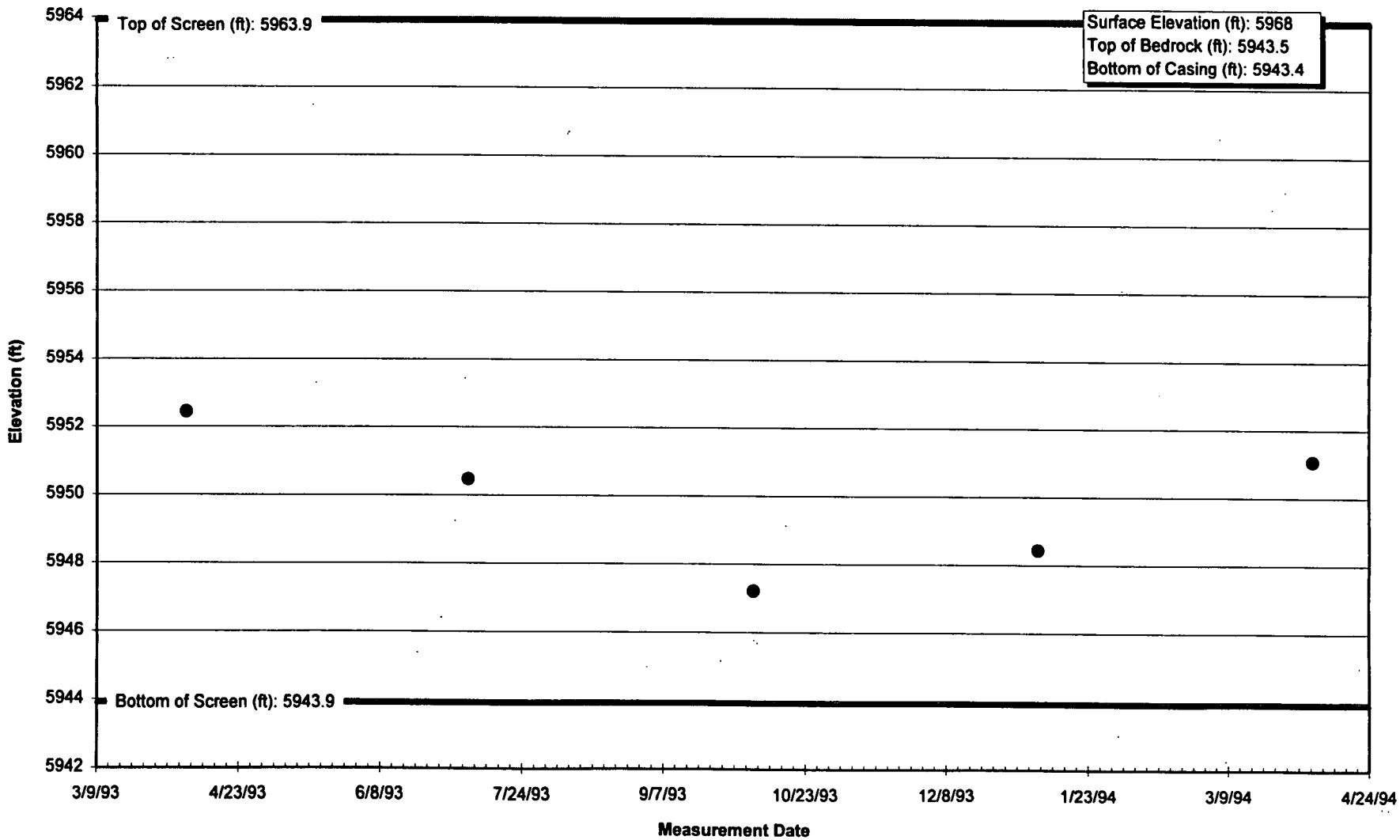
505

Hydrograph 20591



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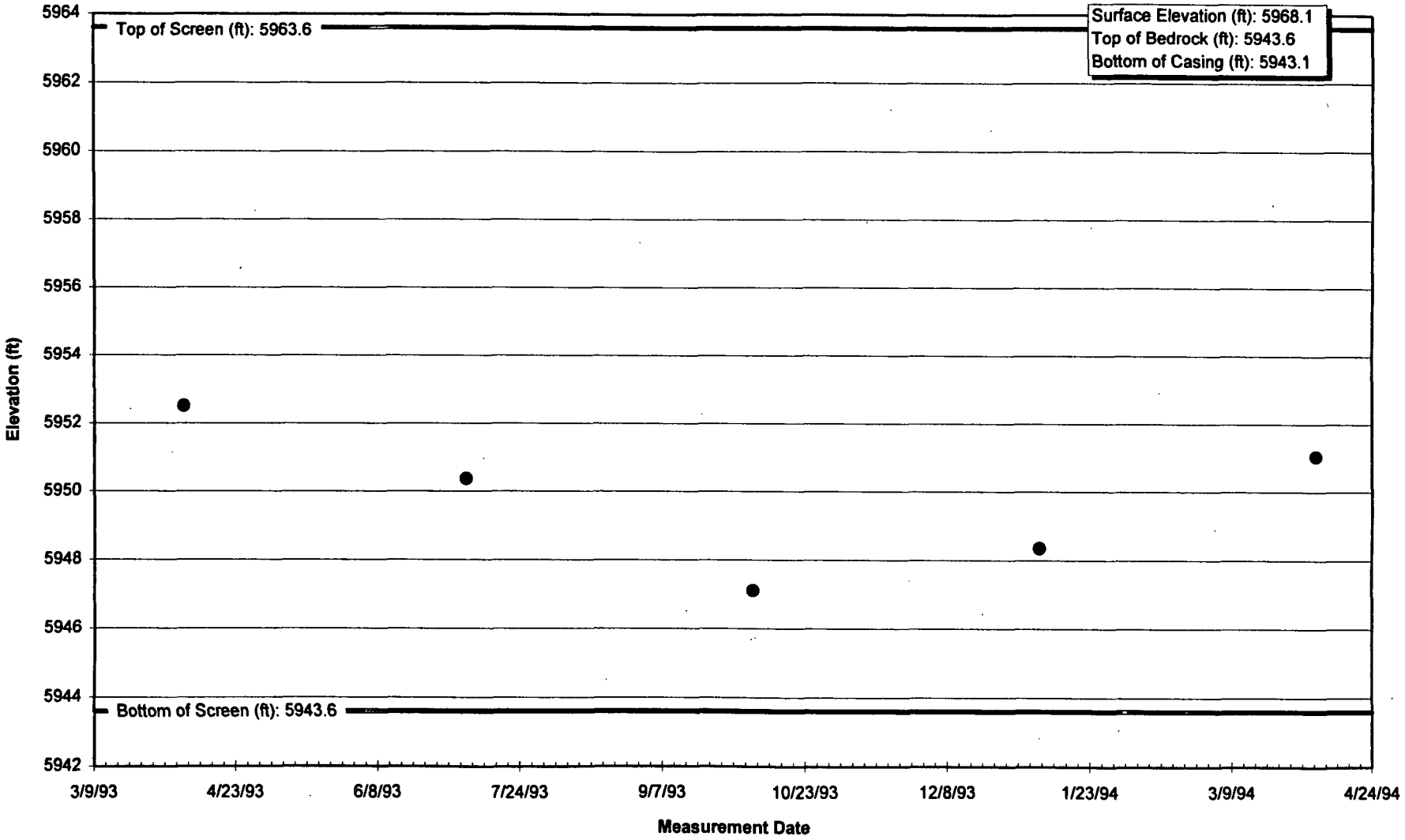
506

Hydrograph 20691



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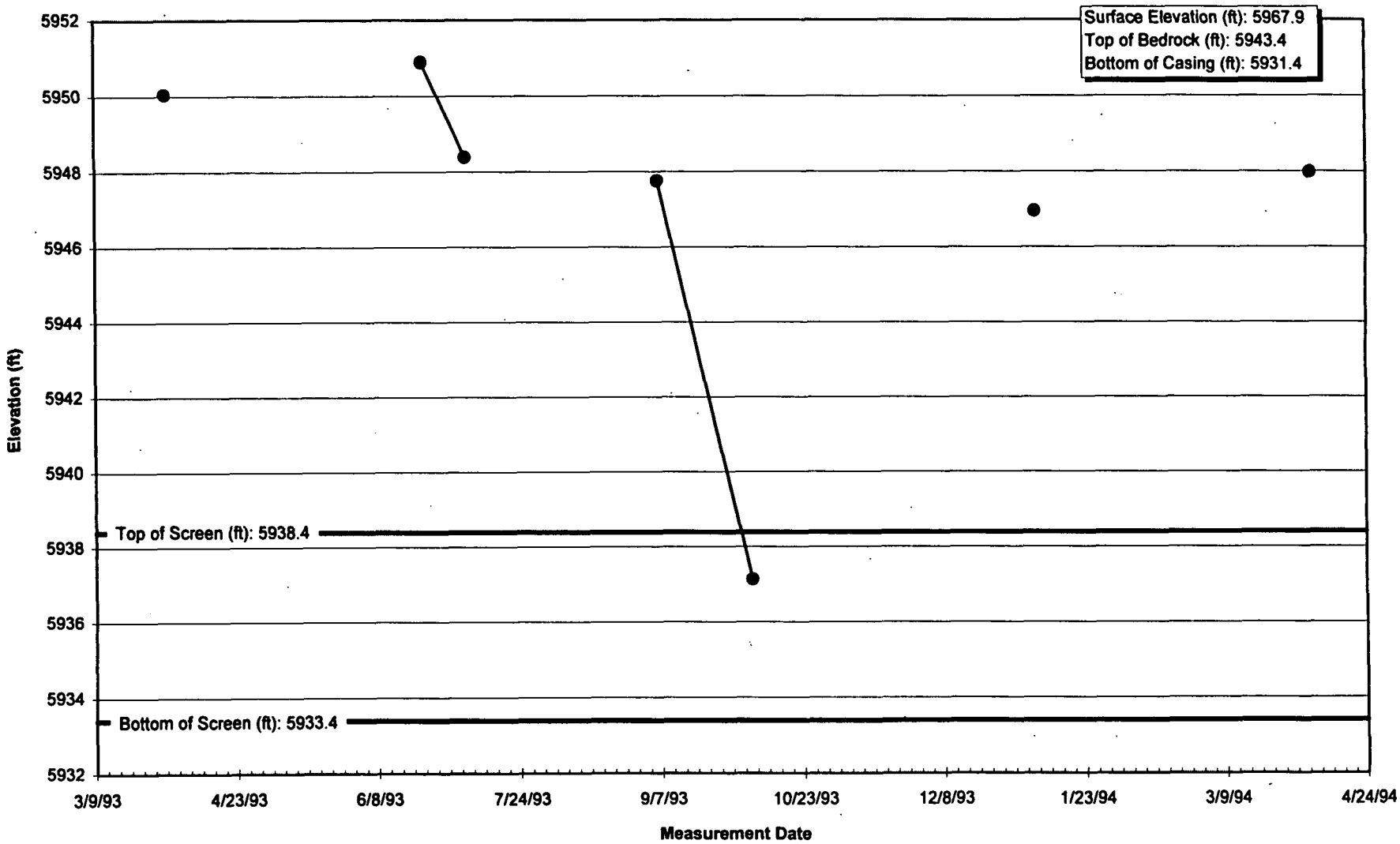
517

Hydrograph 20791



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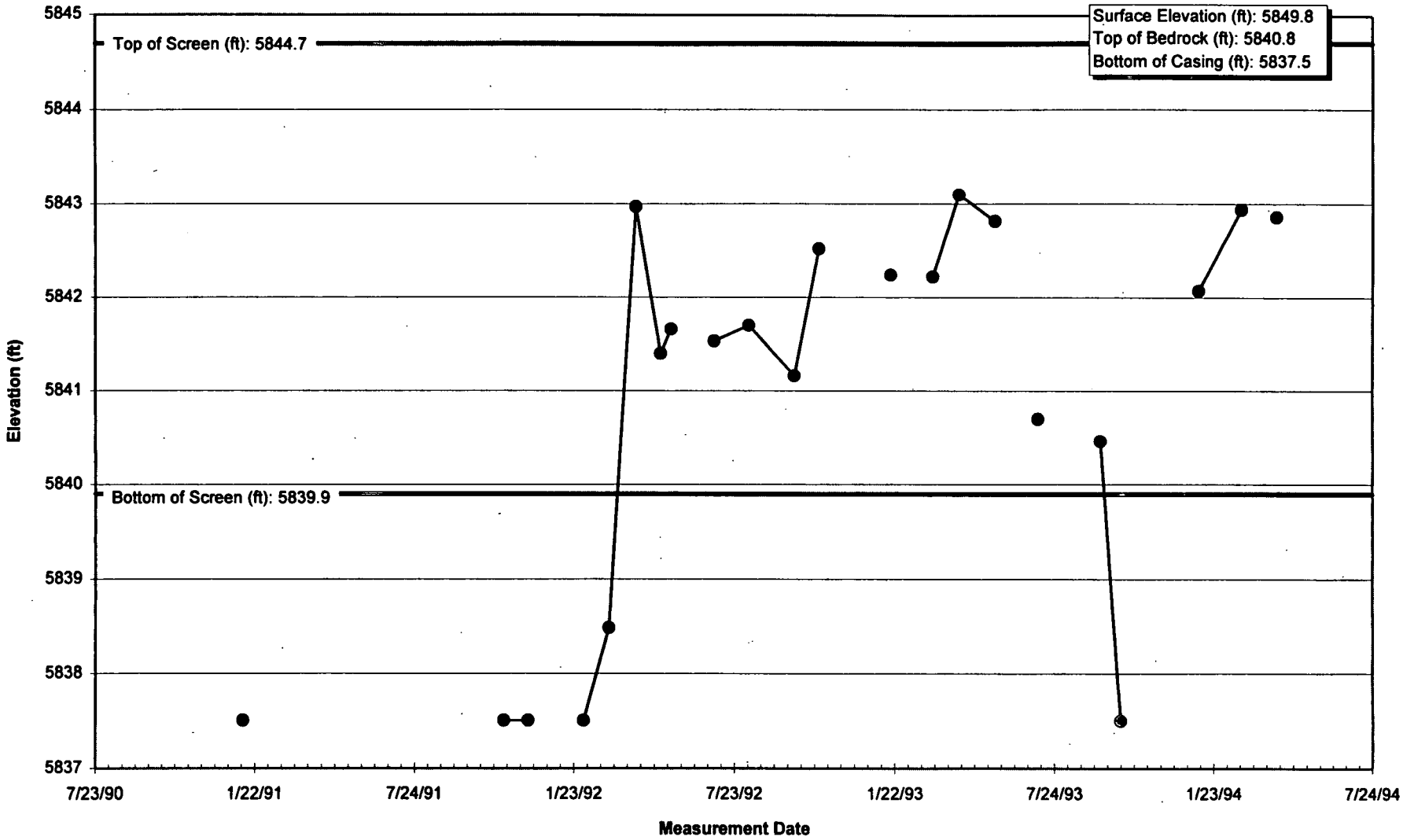
Hydrograph 30991



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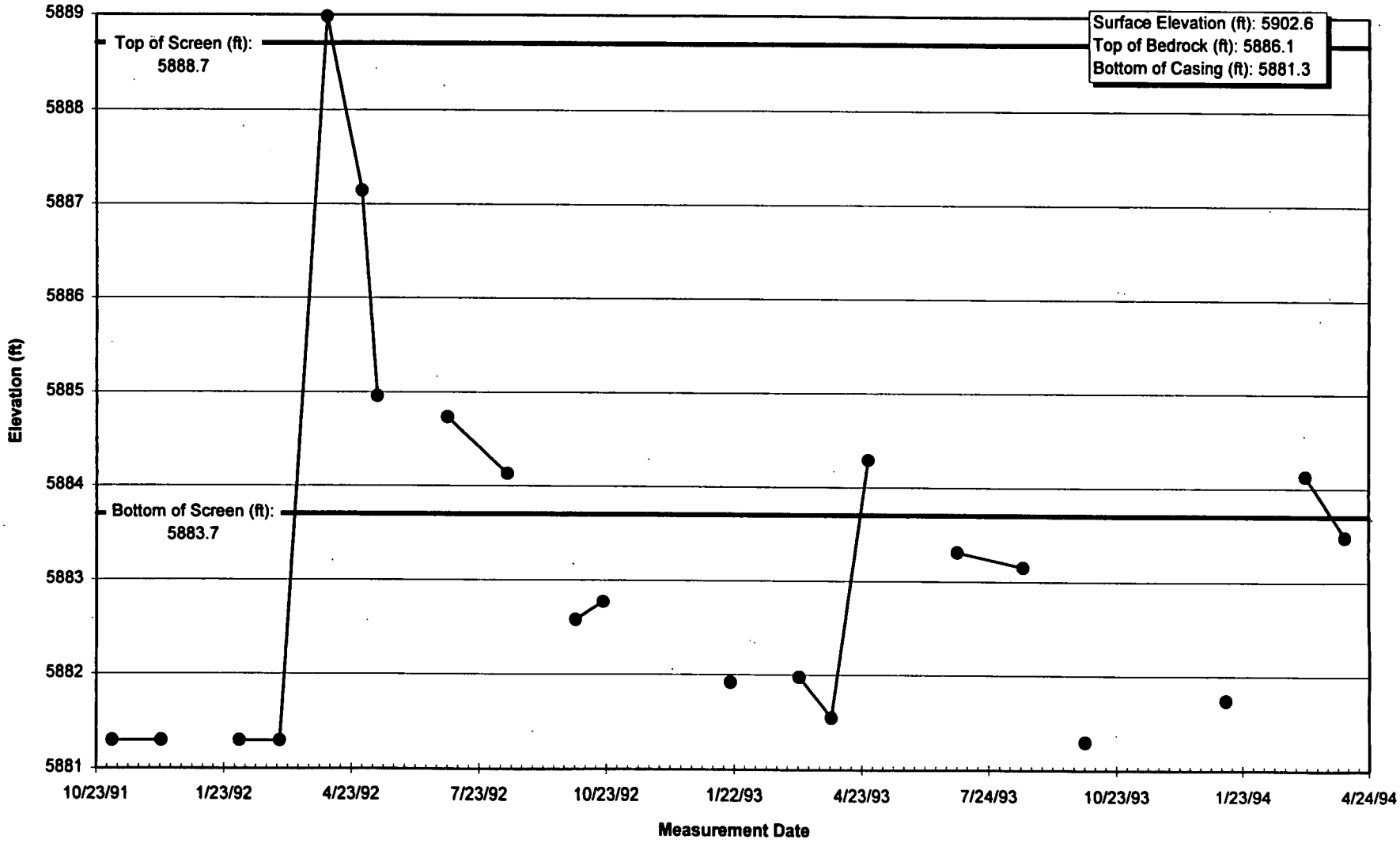
509

Hydrograph 31491



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510

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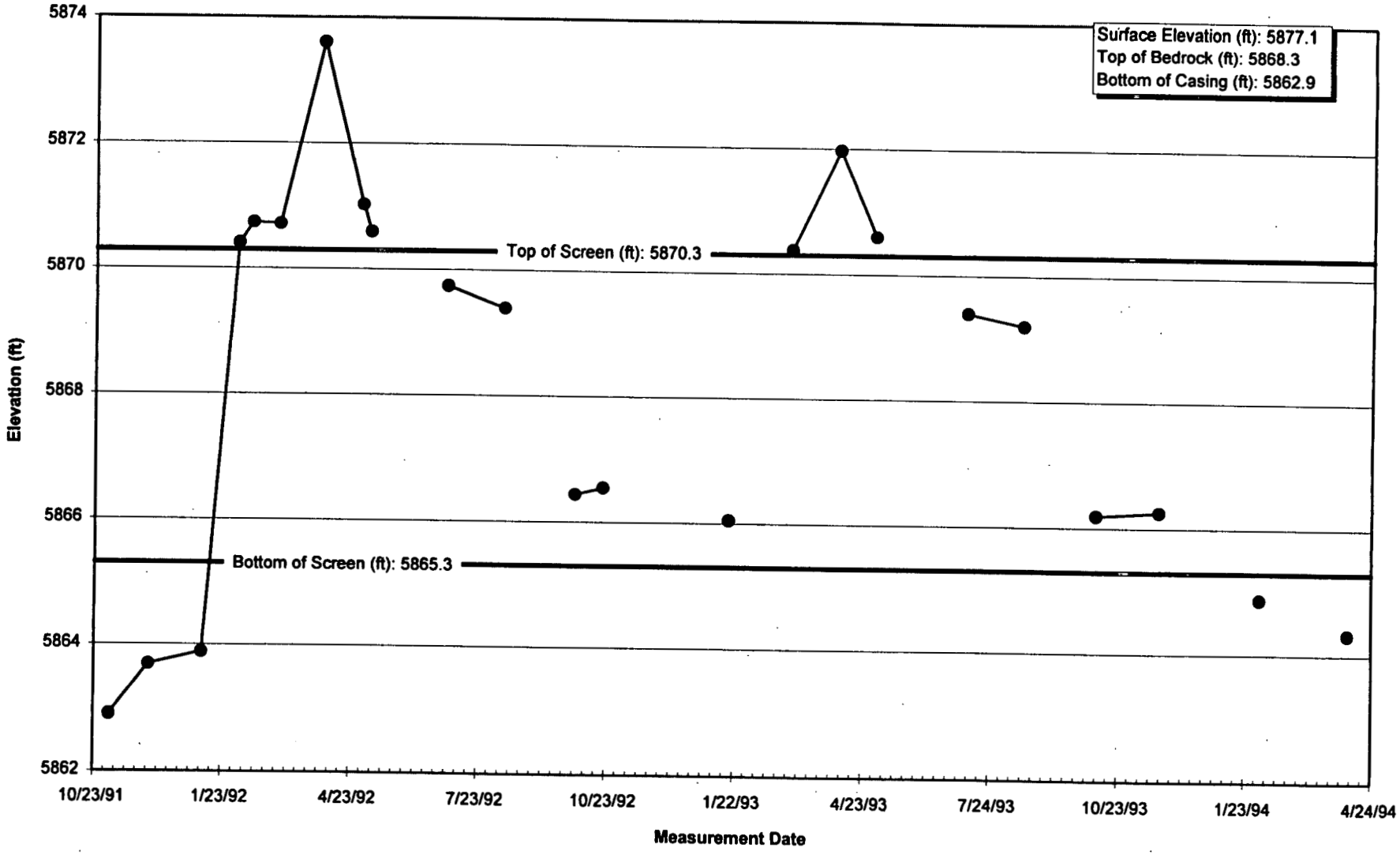

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511

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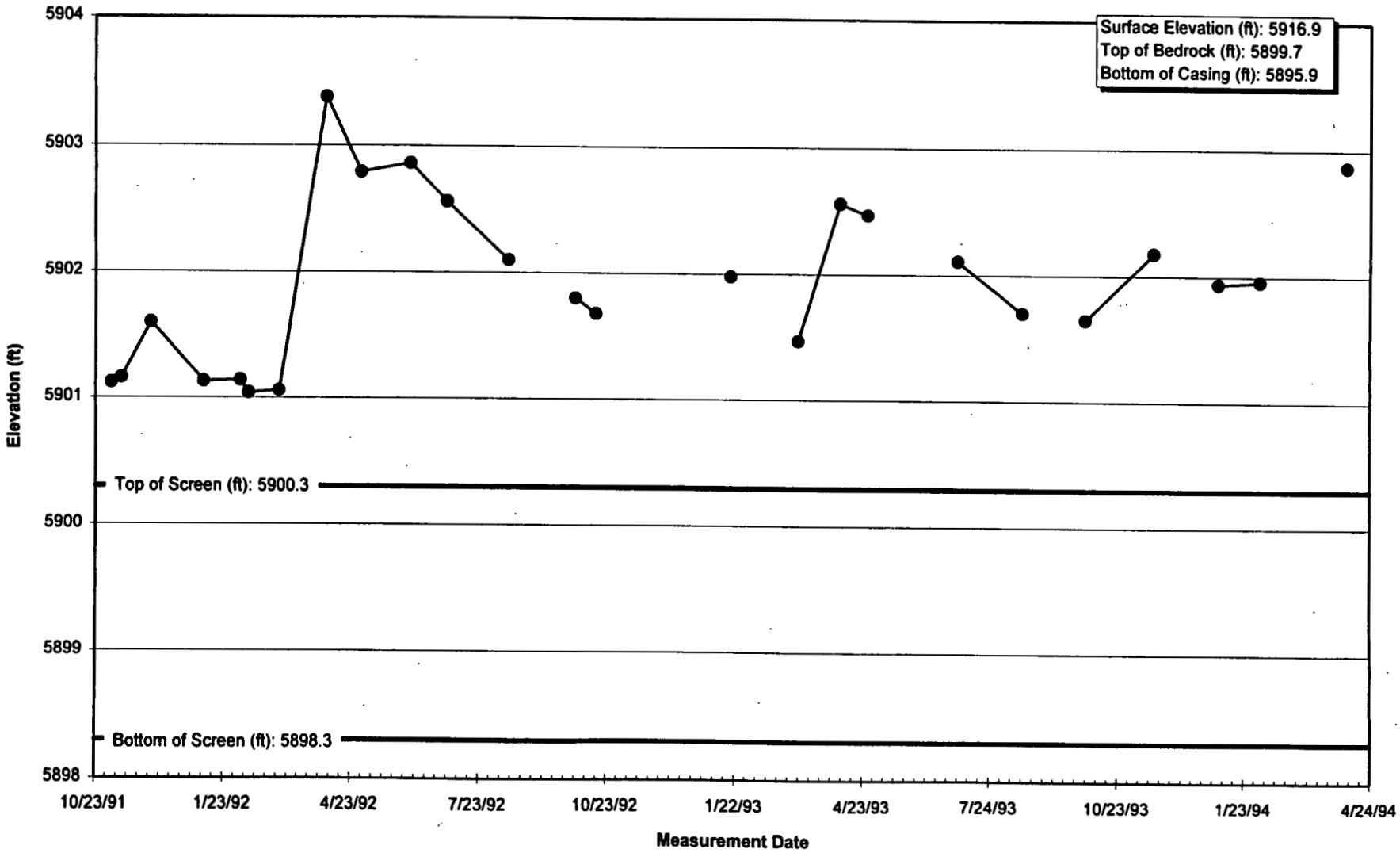

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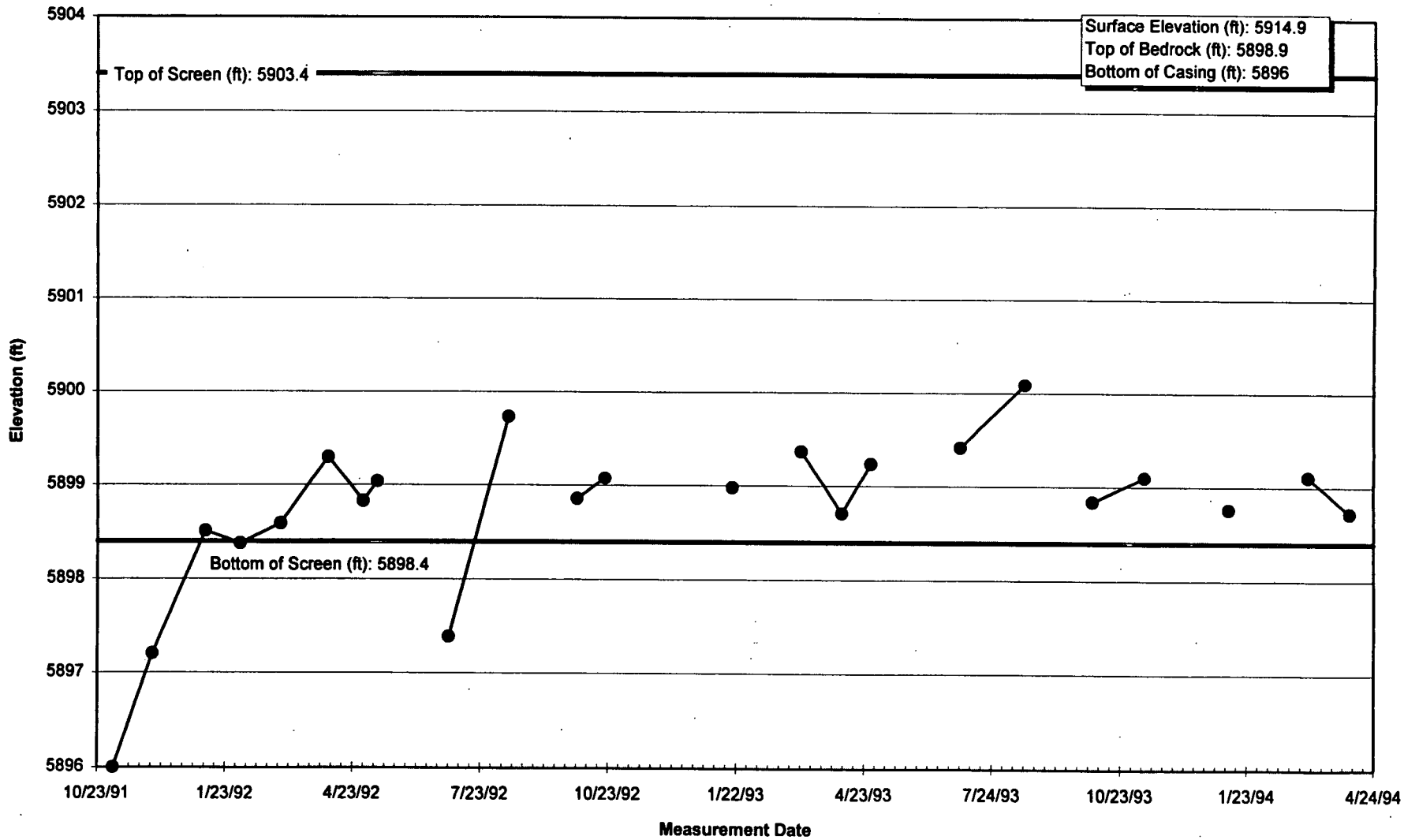
512

Hydrograph 32591



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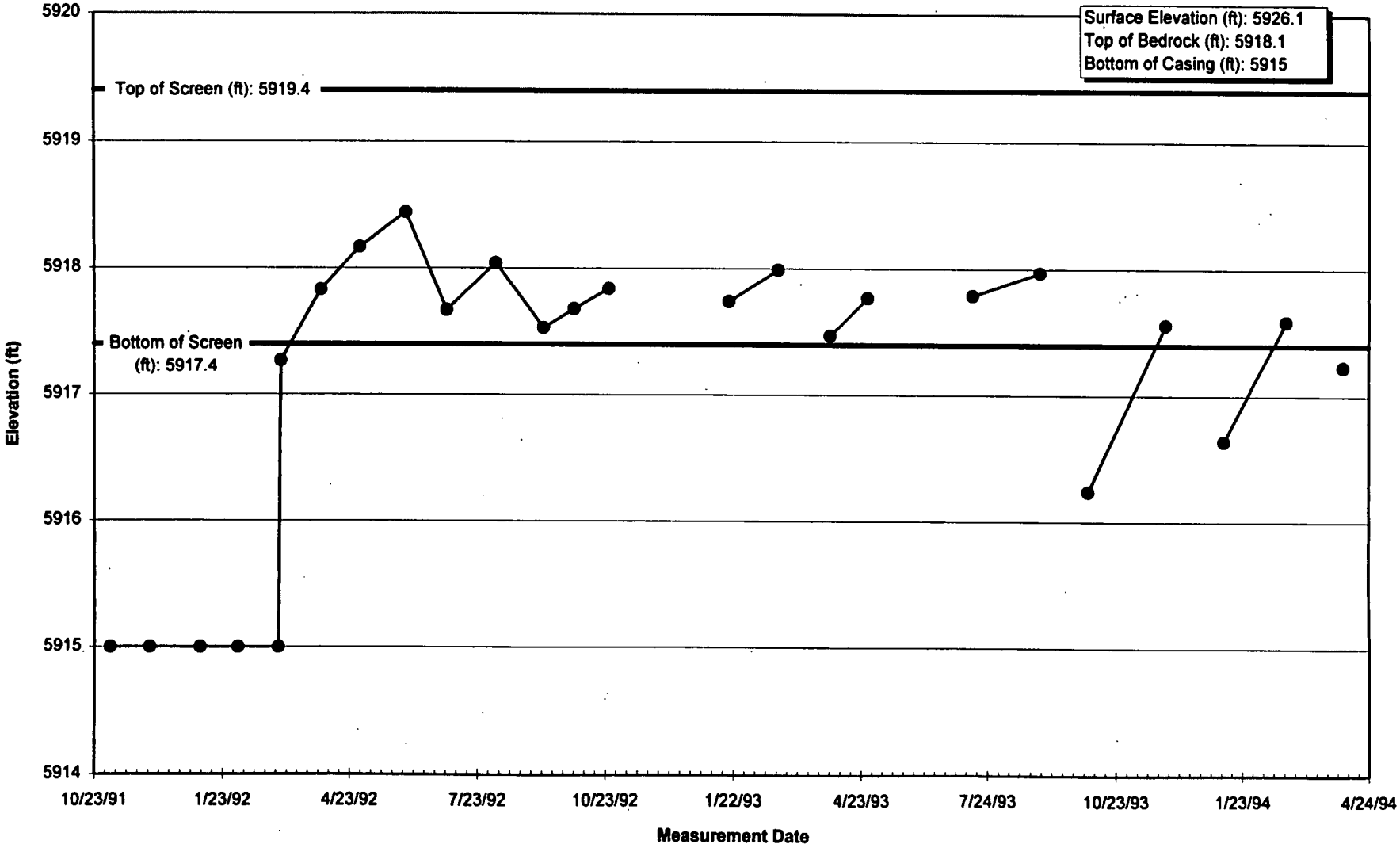
513

Hydrograph 33491



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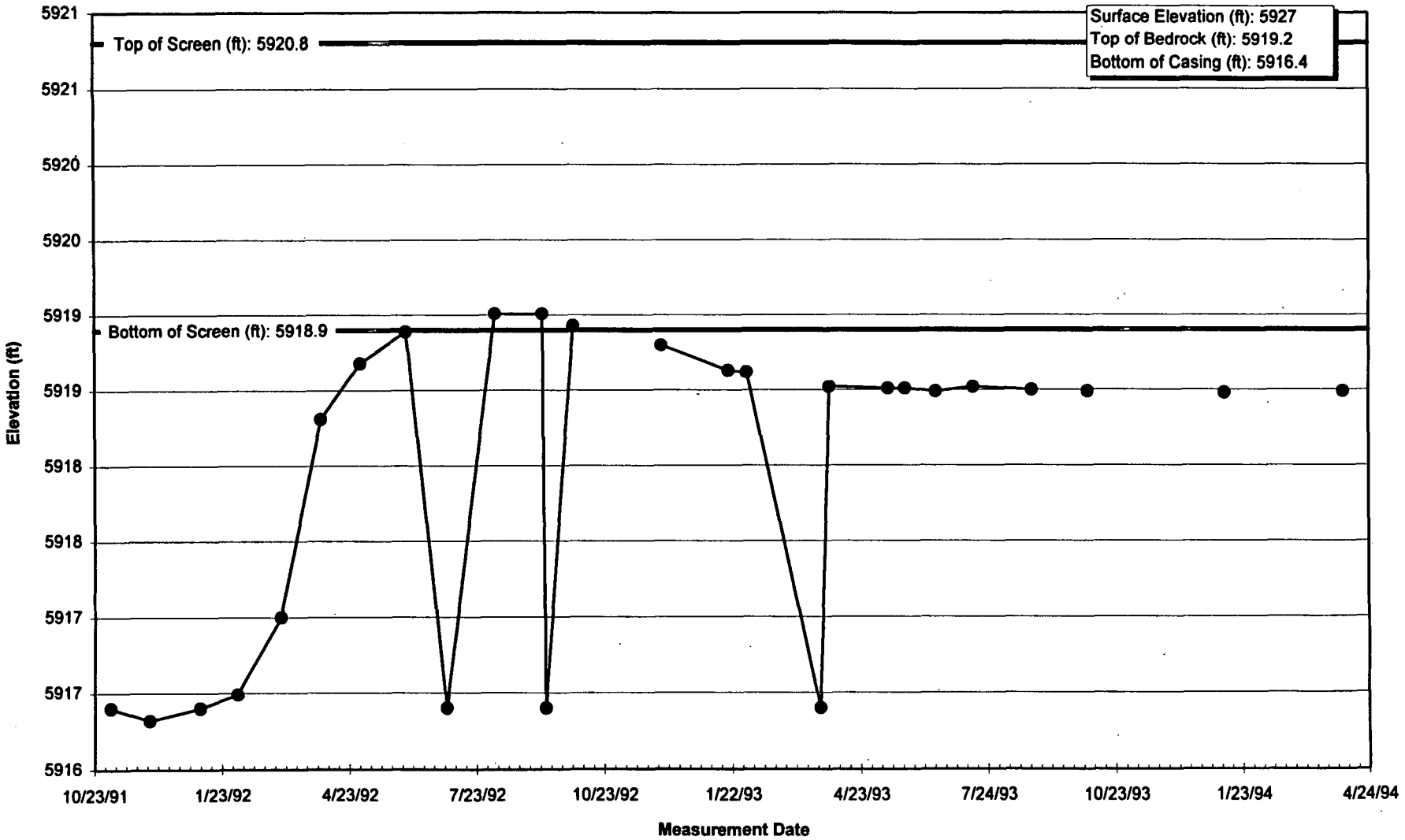

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515

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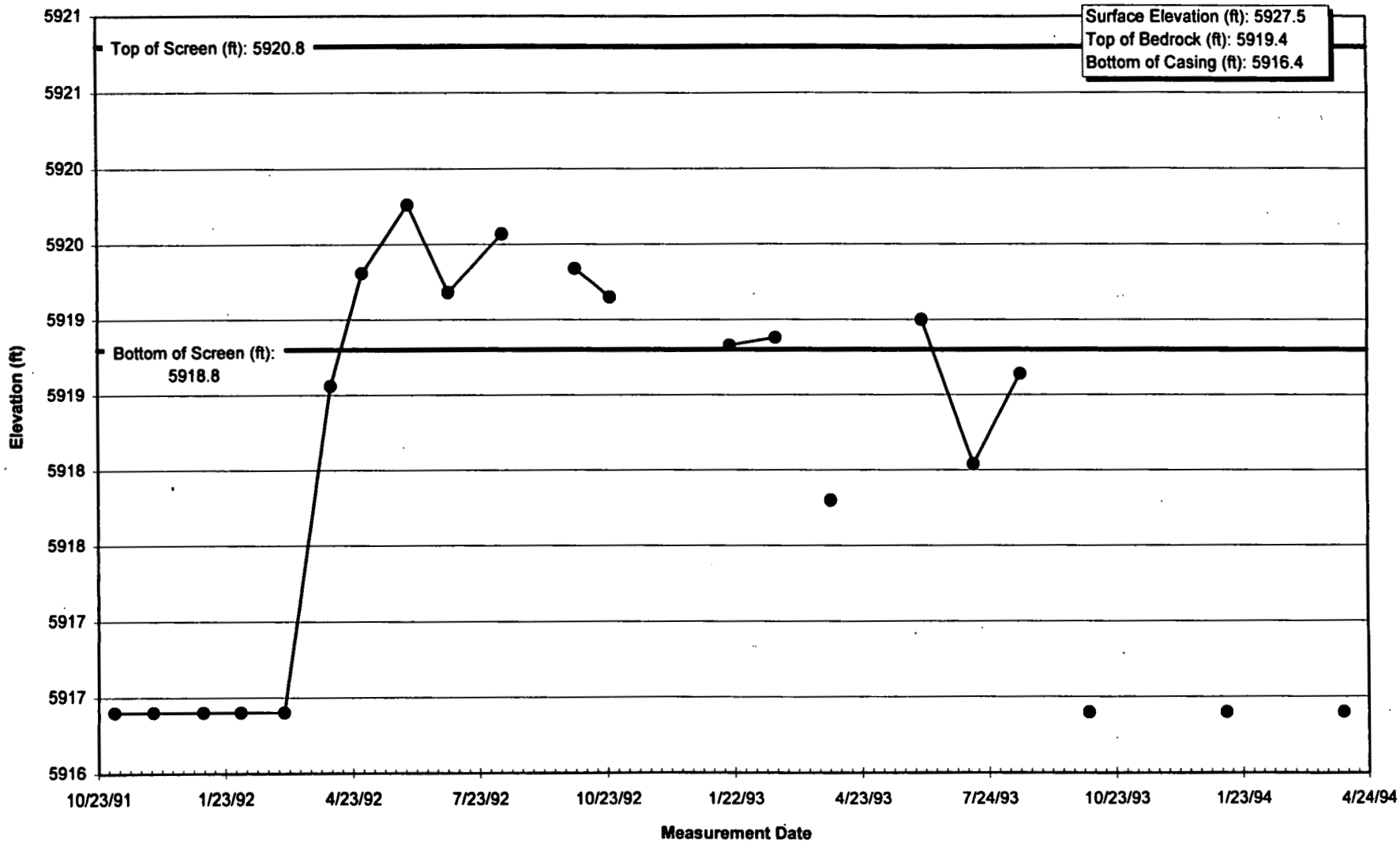

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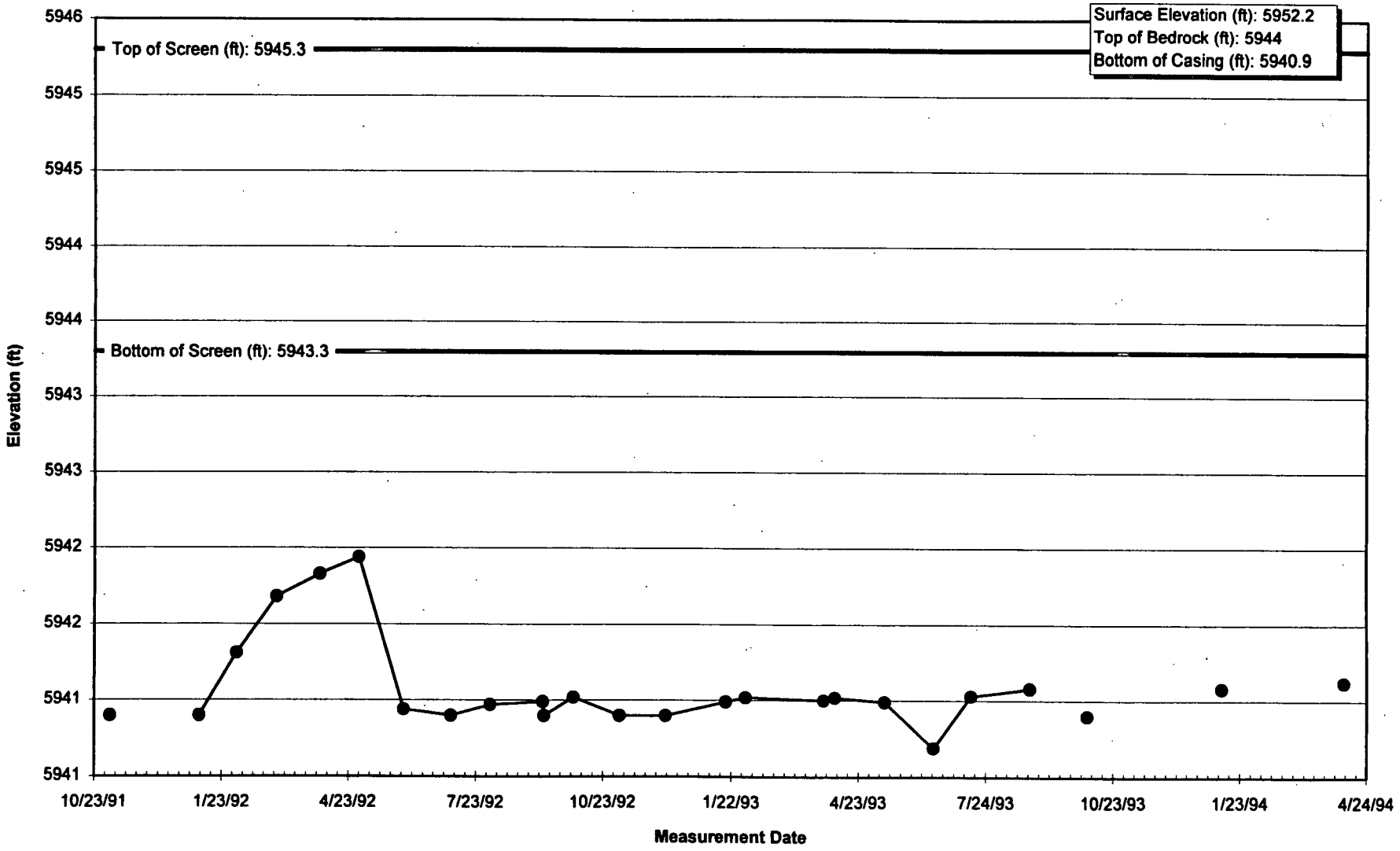

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5/7

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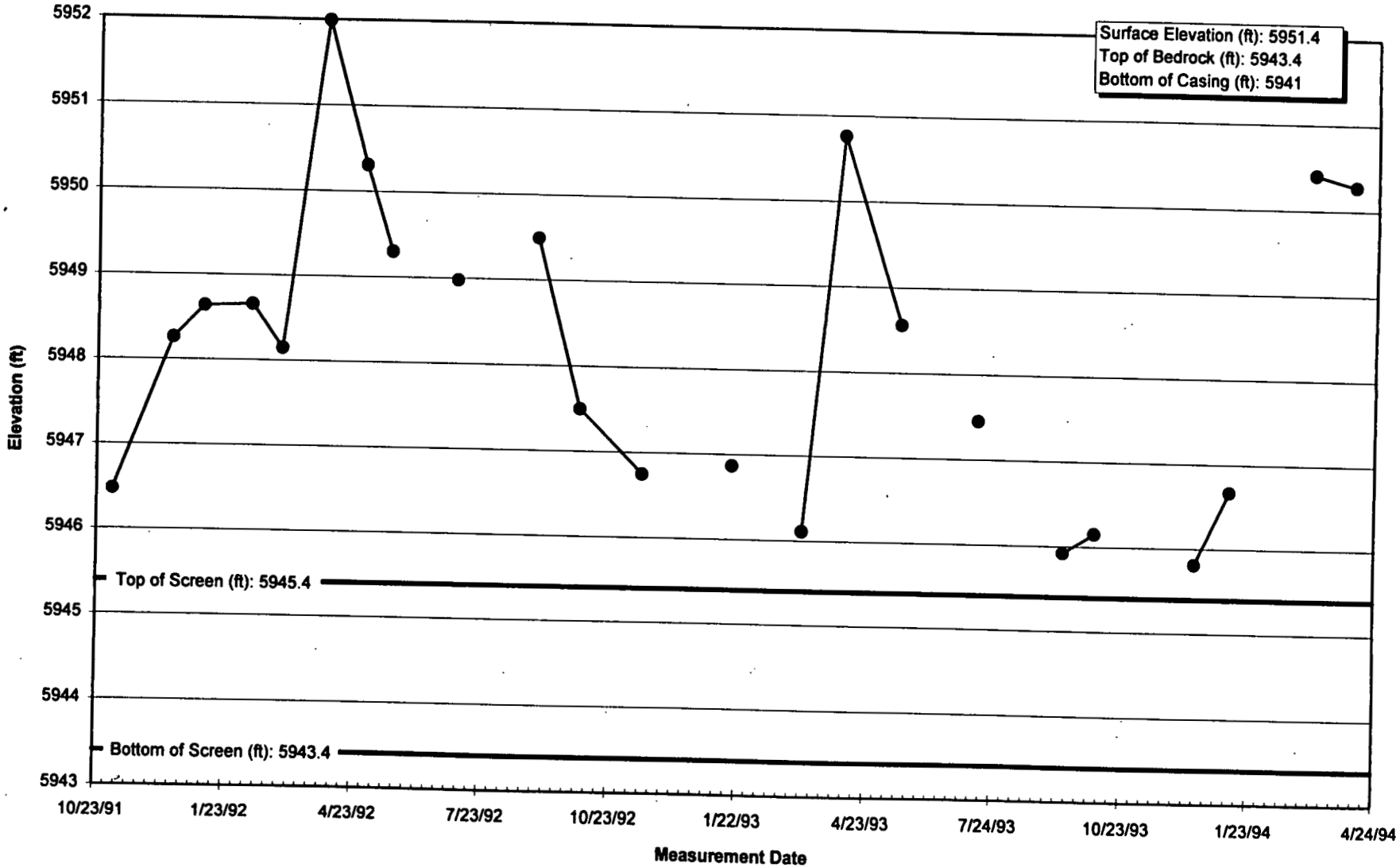

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518

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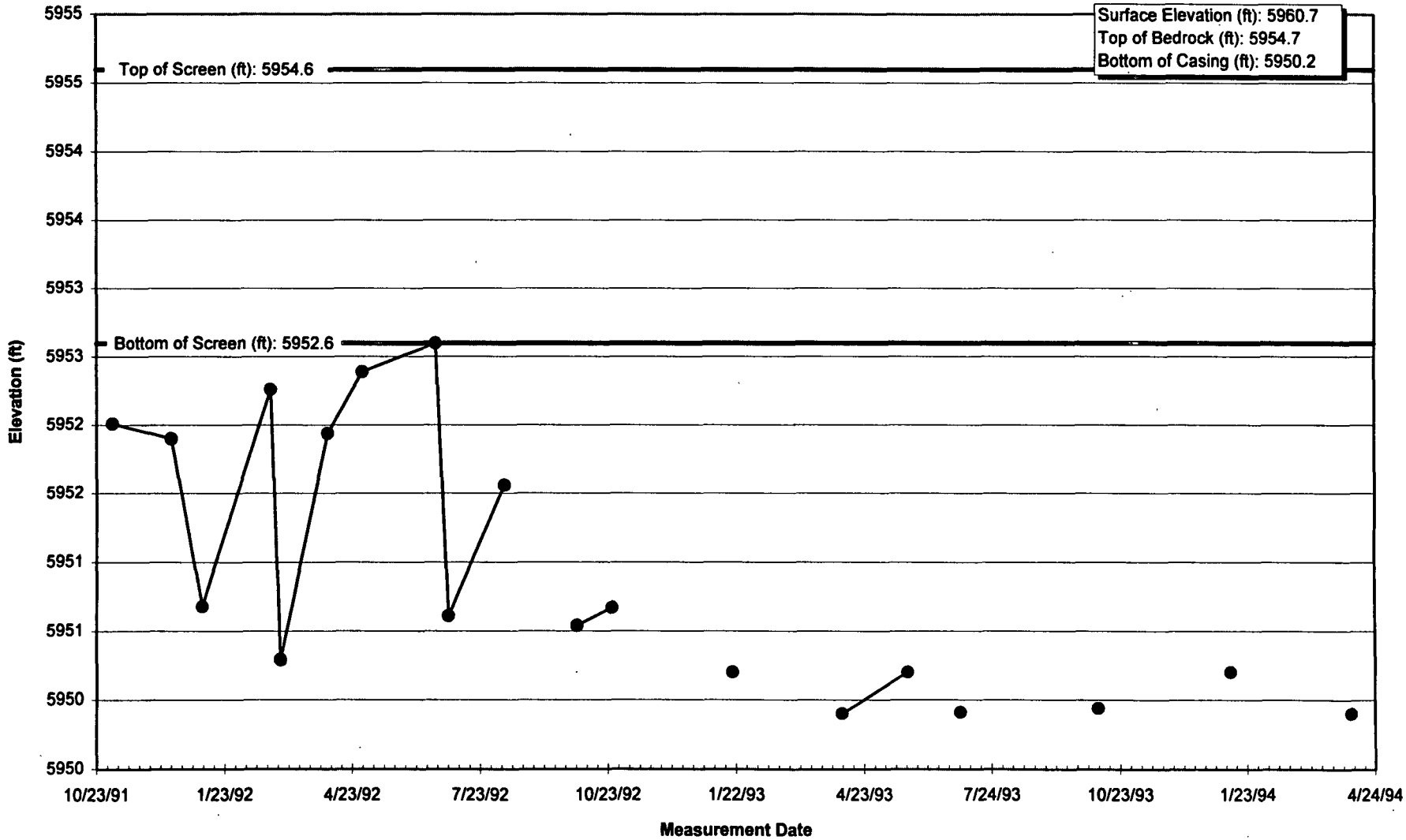

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519

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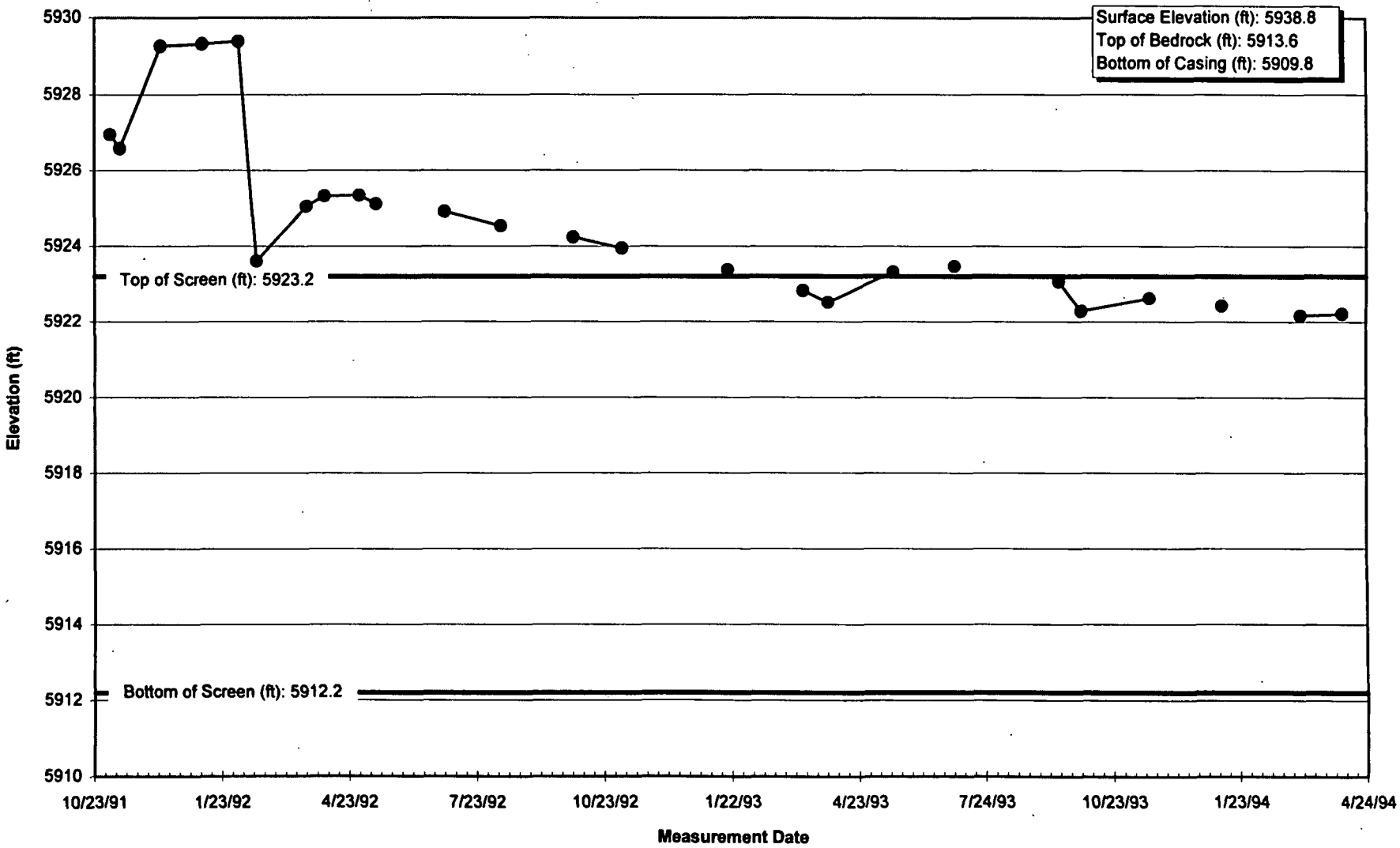

S9.XLS 35691 4/4/95

520

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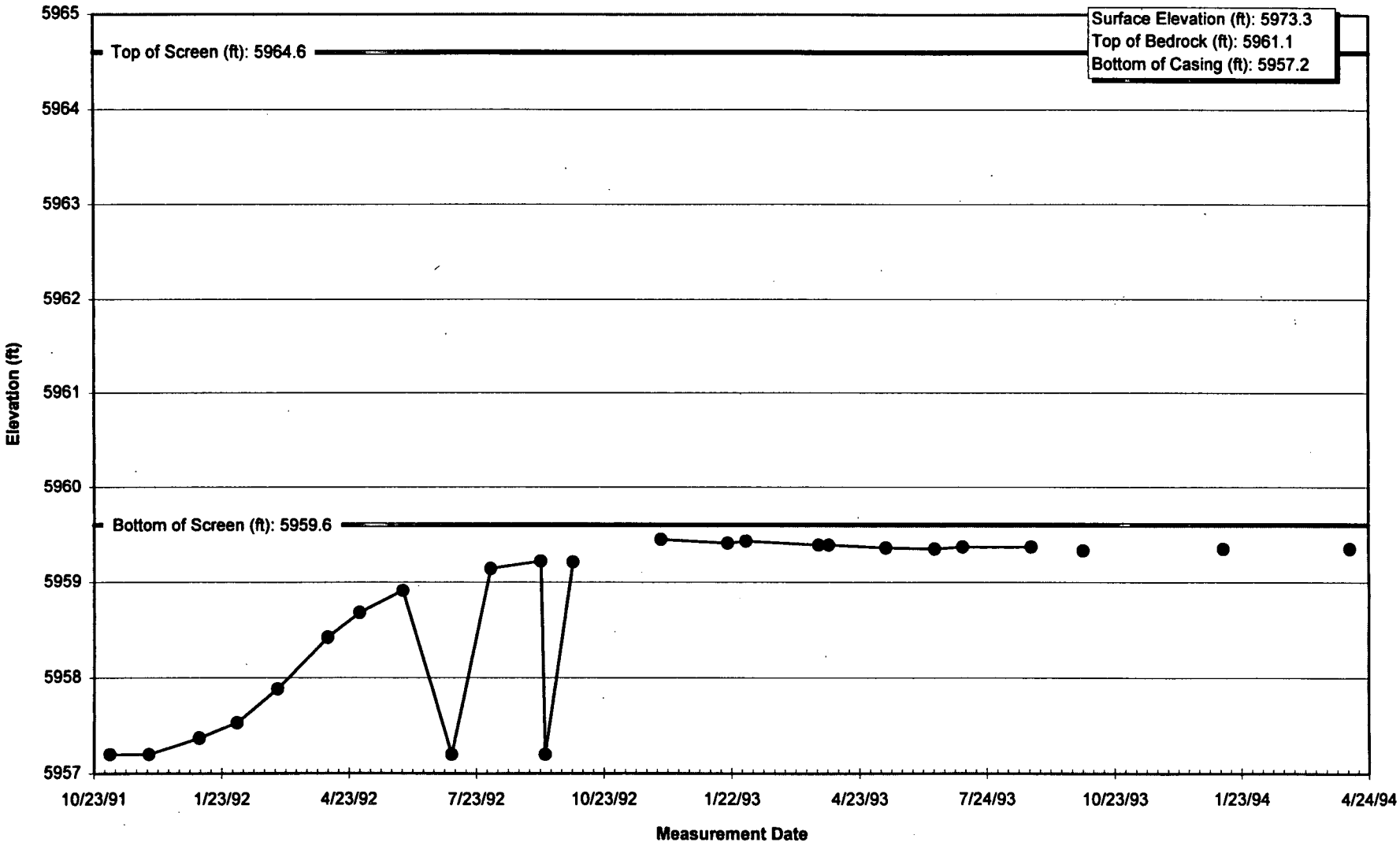
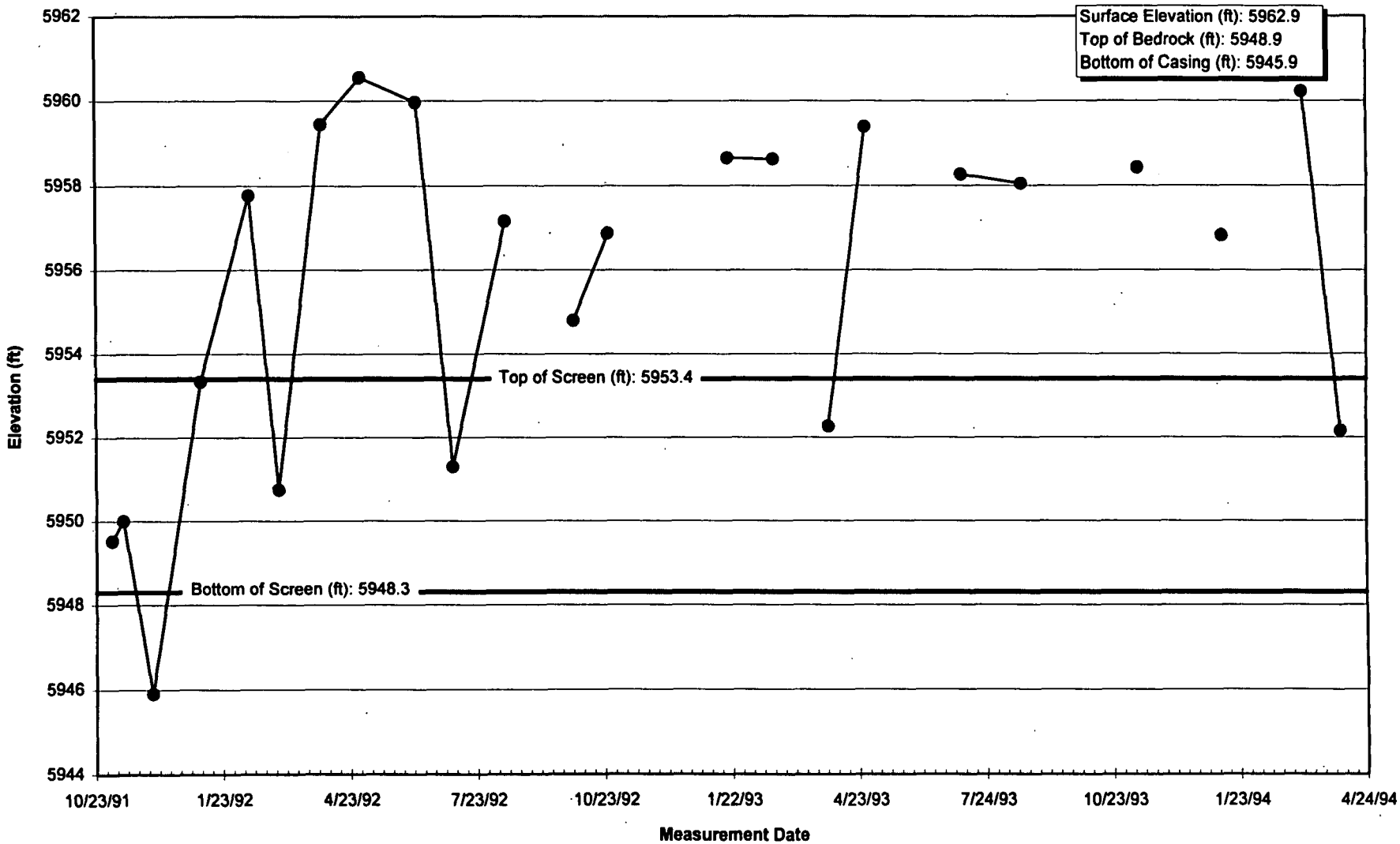


S9.XLS 35991 4/4/95

521

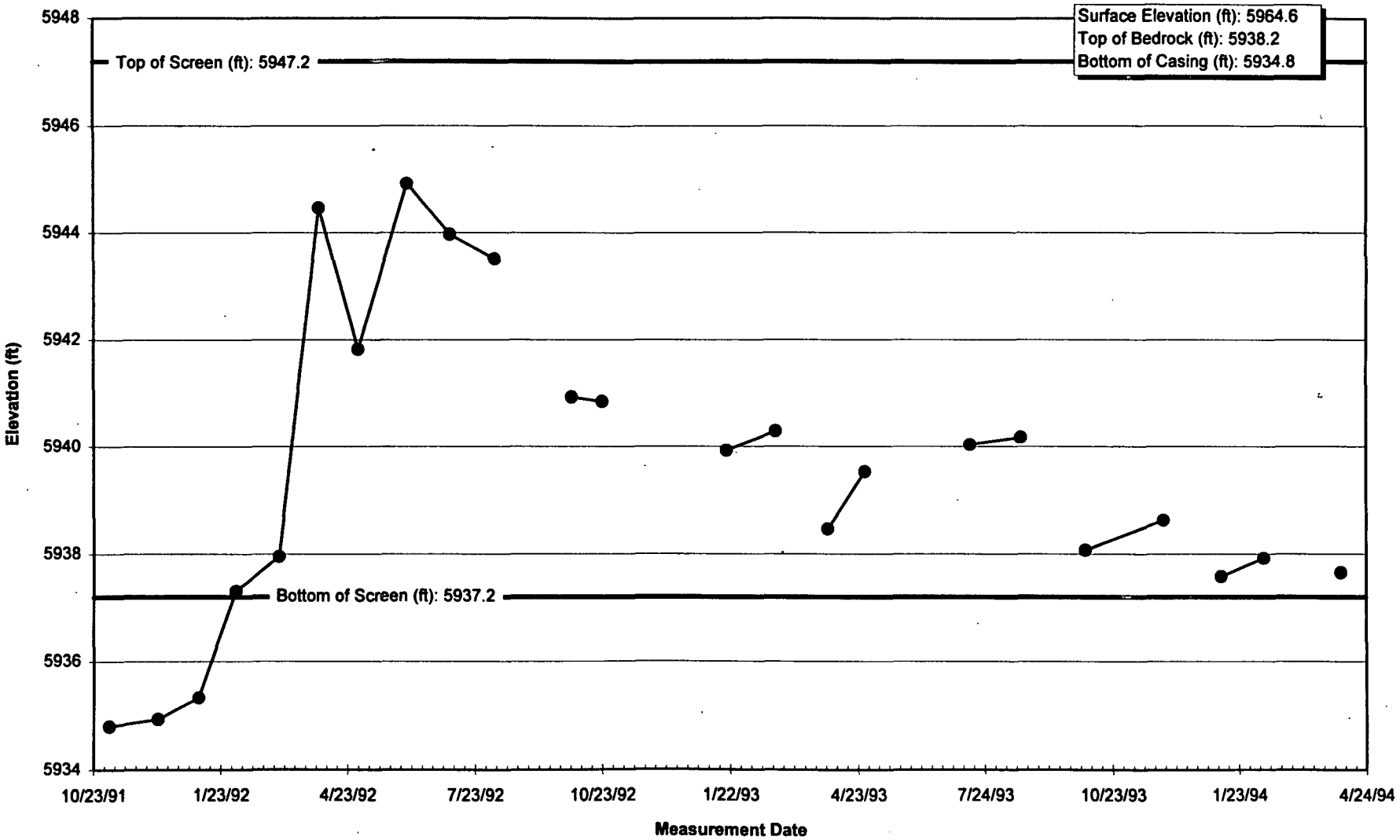
Hydrograph 36191



S9.XLS 36191 4/4/95

522

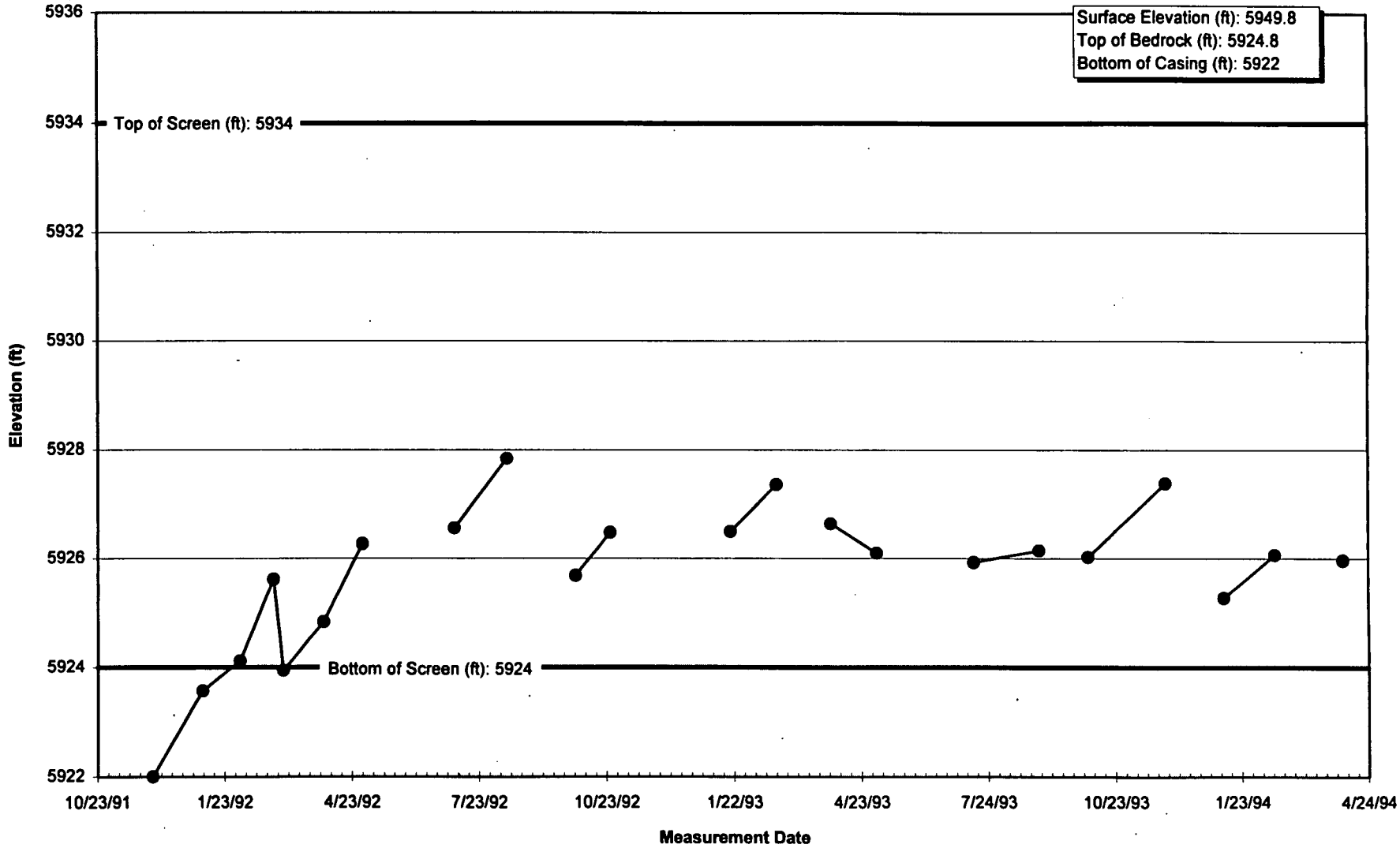
Hydrograph 36391



S9.XLS 36391 4/4/95

523

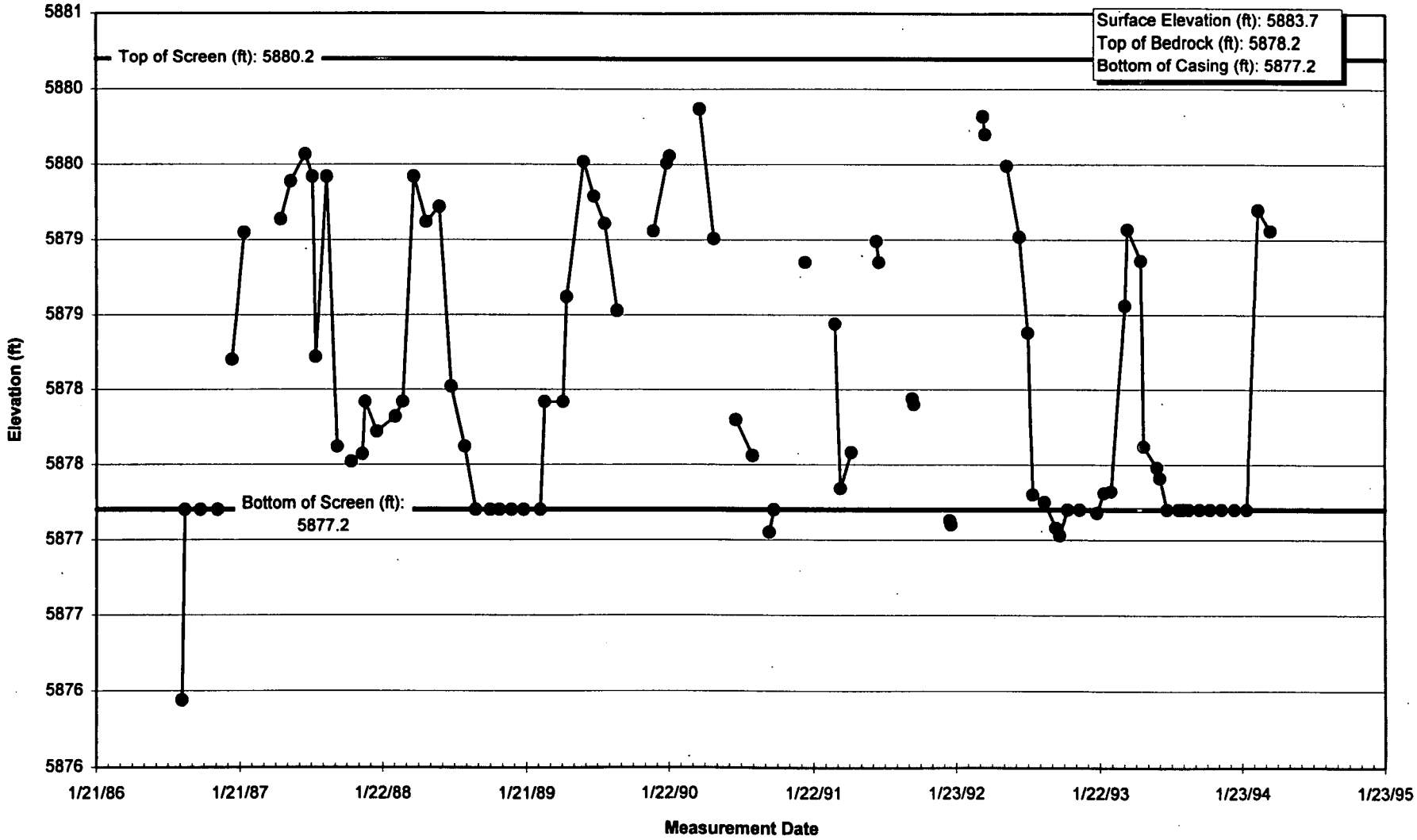
Hydrograph 36691



S9.XLS 36691 4/4/95

524

Hydrograph 3686



S9.XLS 3686 4/4/95

525

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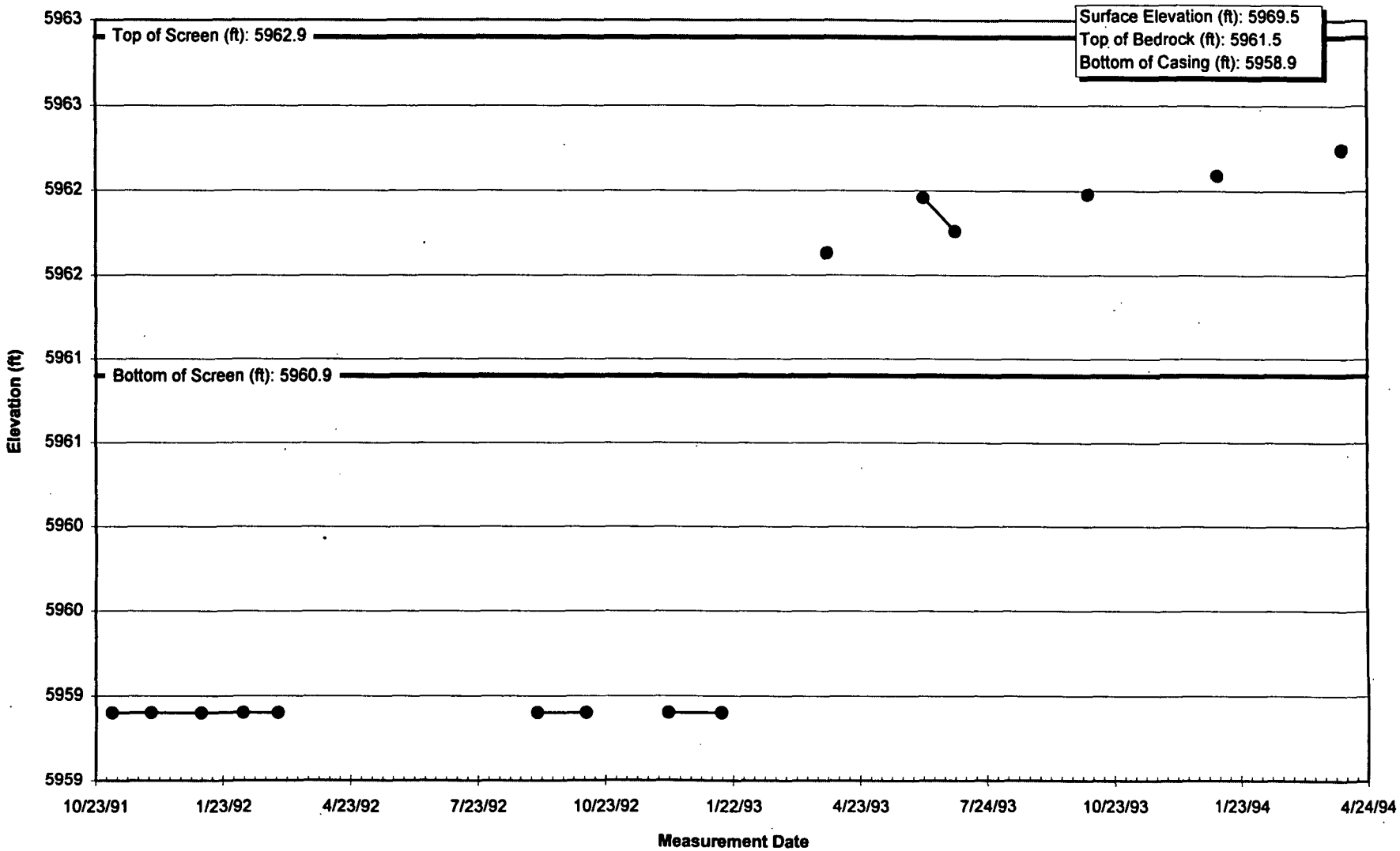

S9.XLS 36991 4/4/95

526

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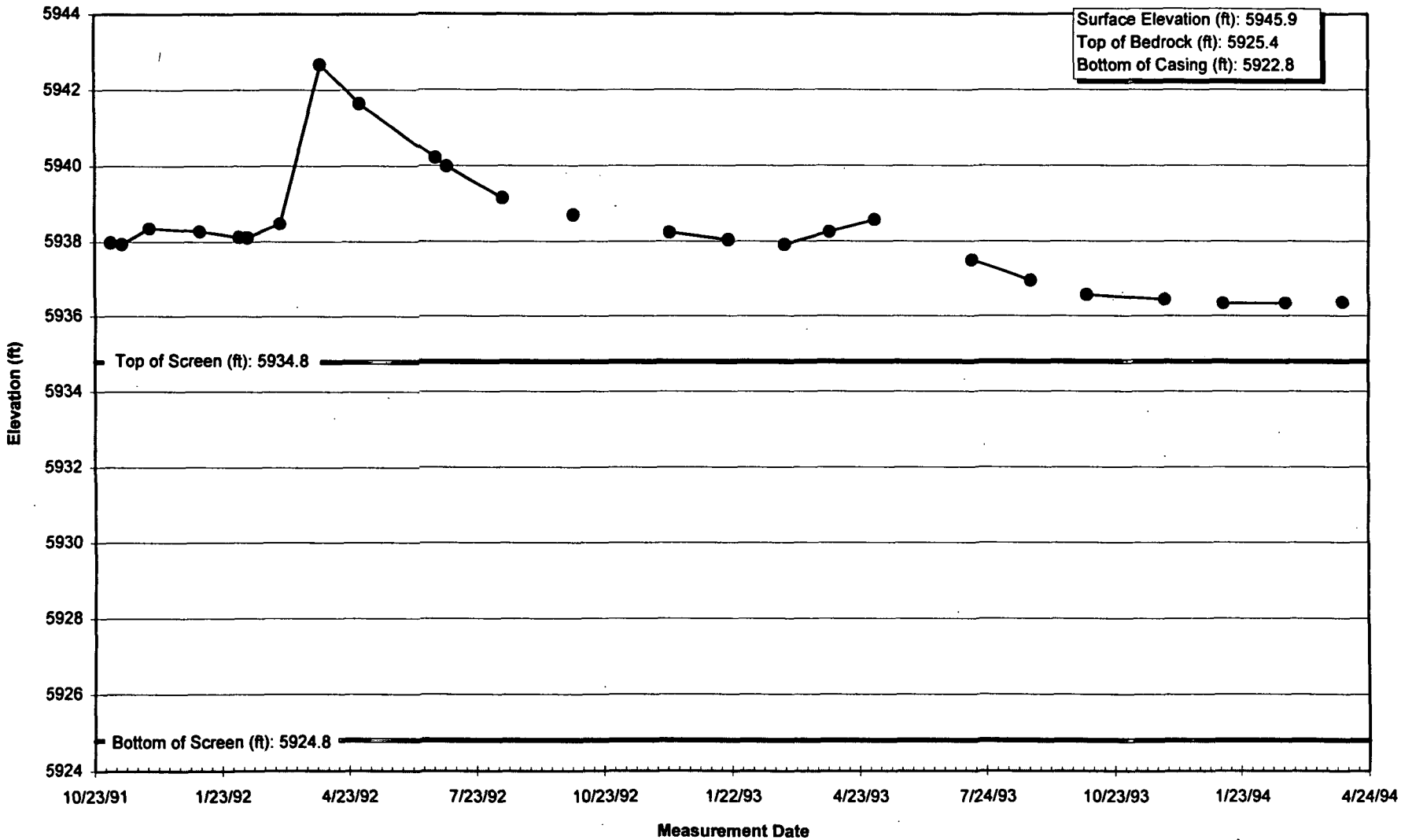

S9.XLS 37191 4/4/95

527

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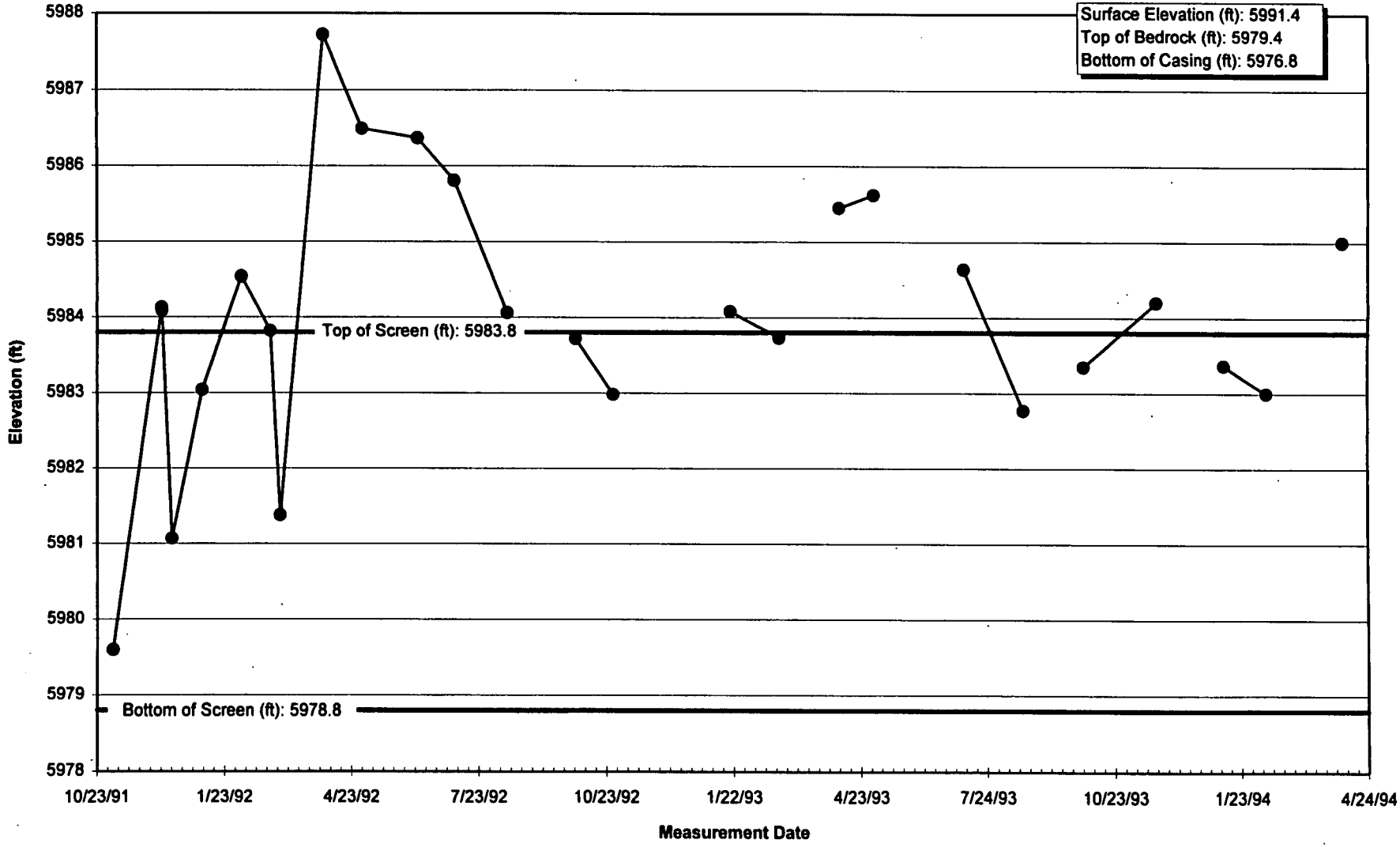

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528

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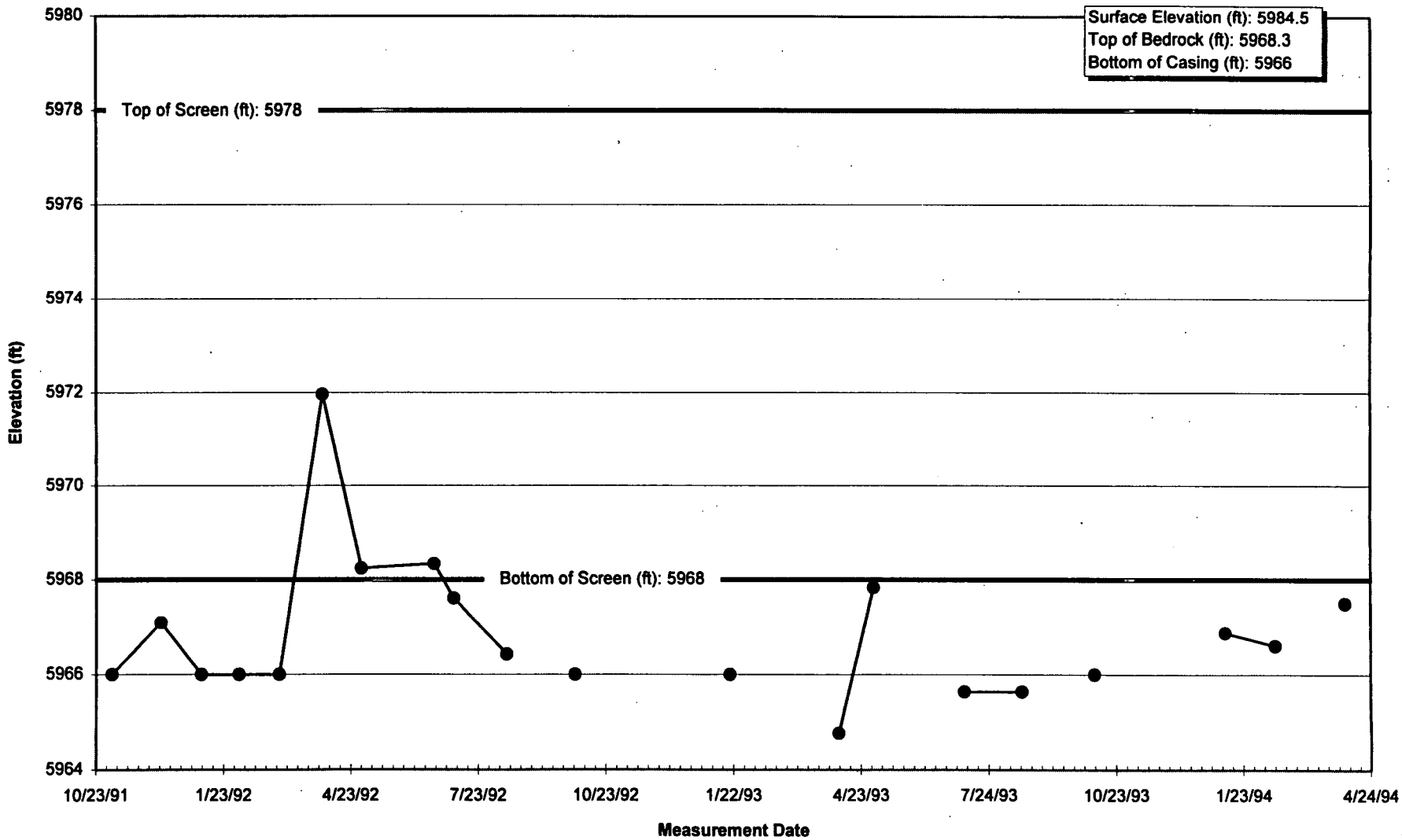

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529

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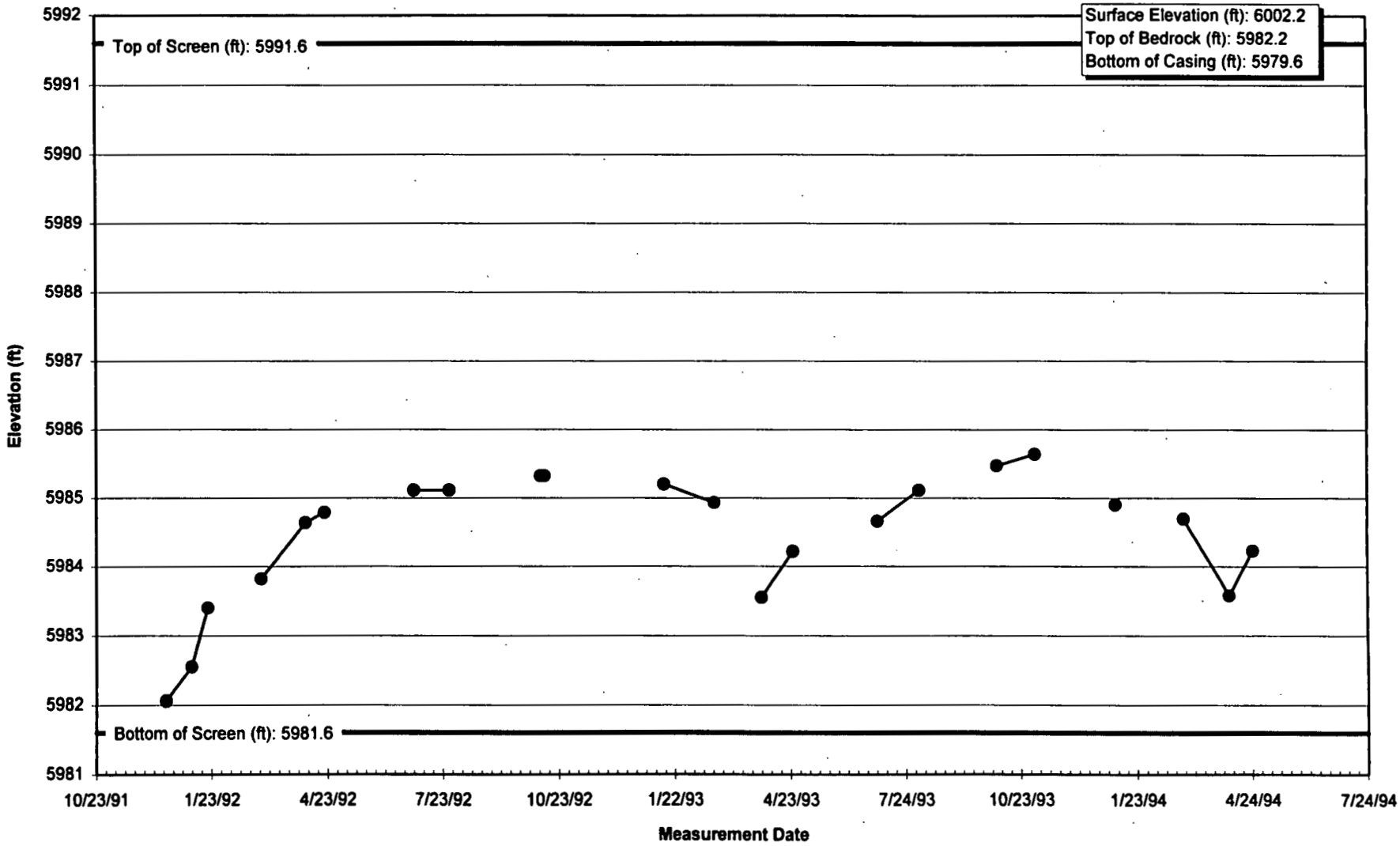

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530

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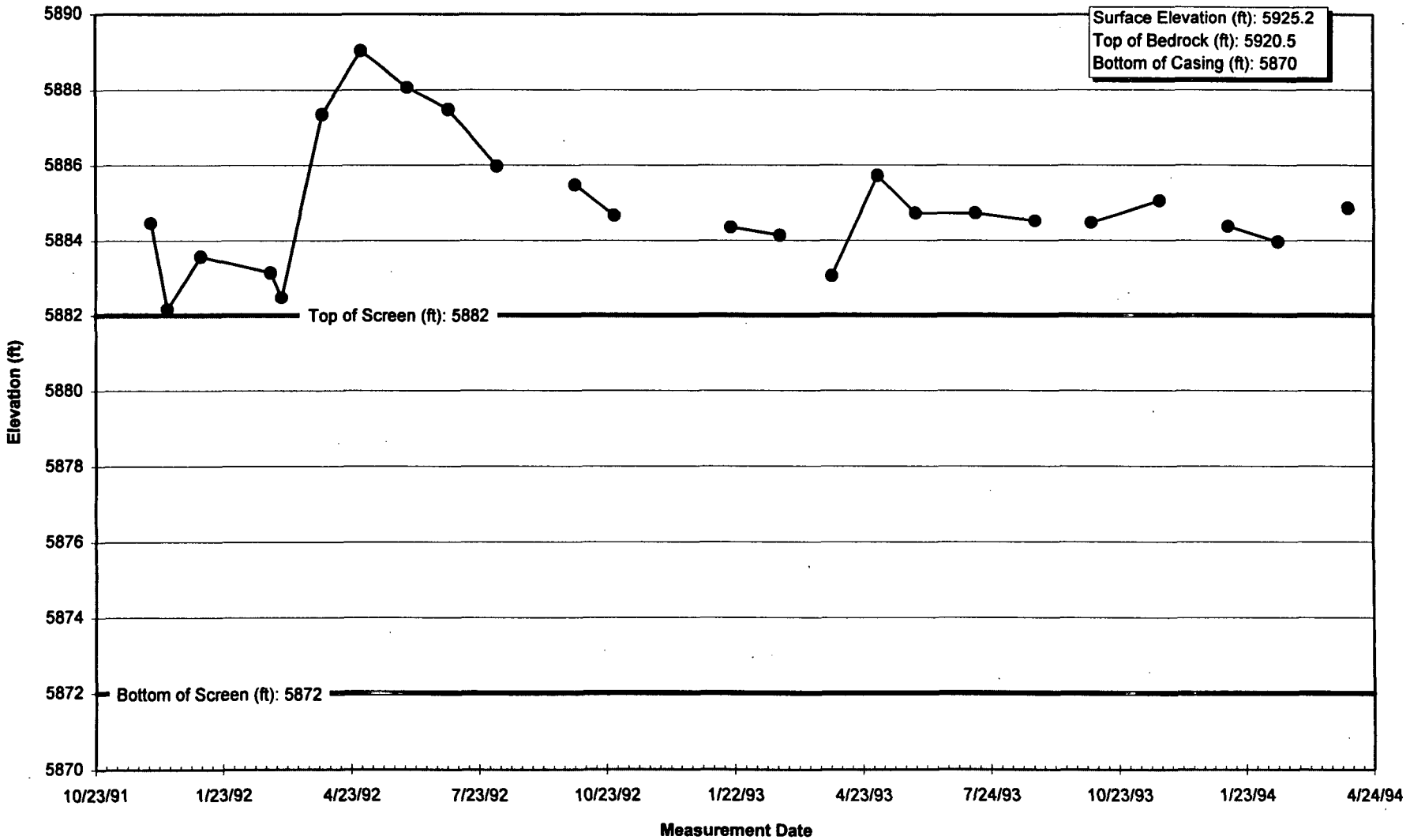

S10.XLS 37891 4/4/95

531

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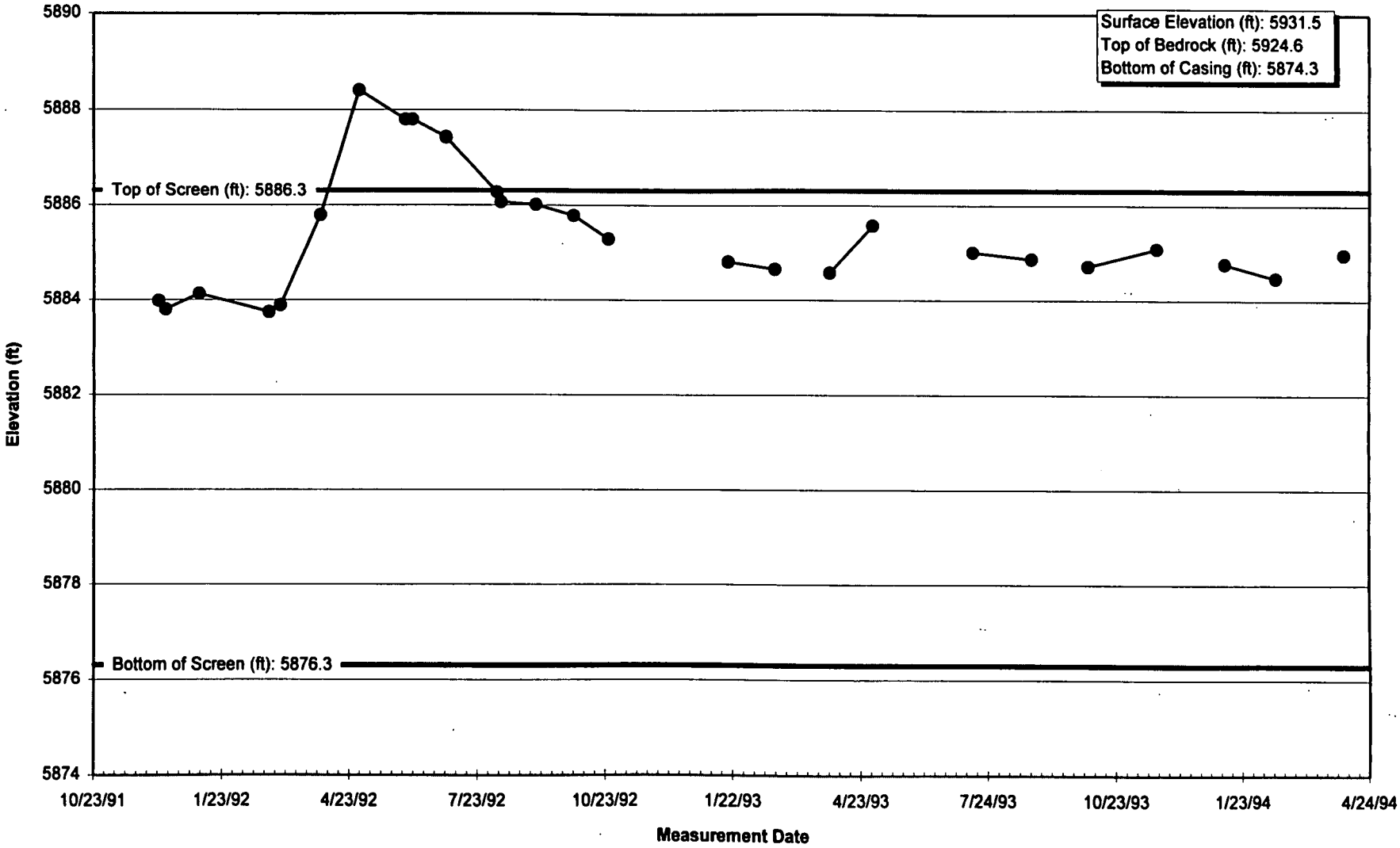

S10.XLS 37991 4/4/95

532

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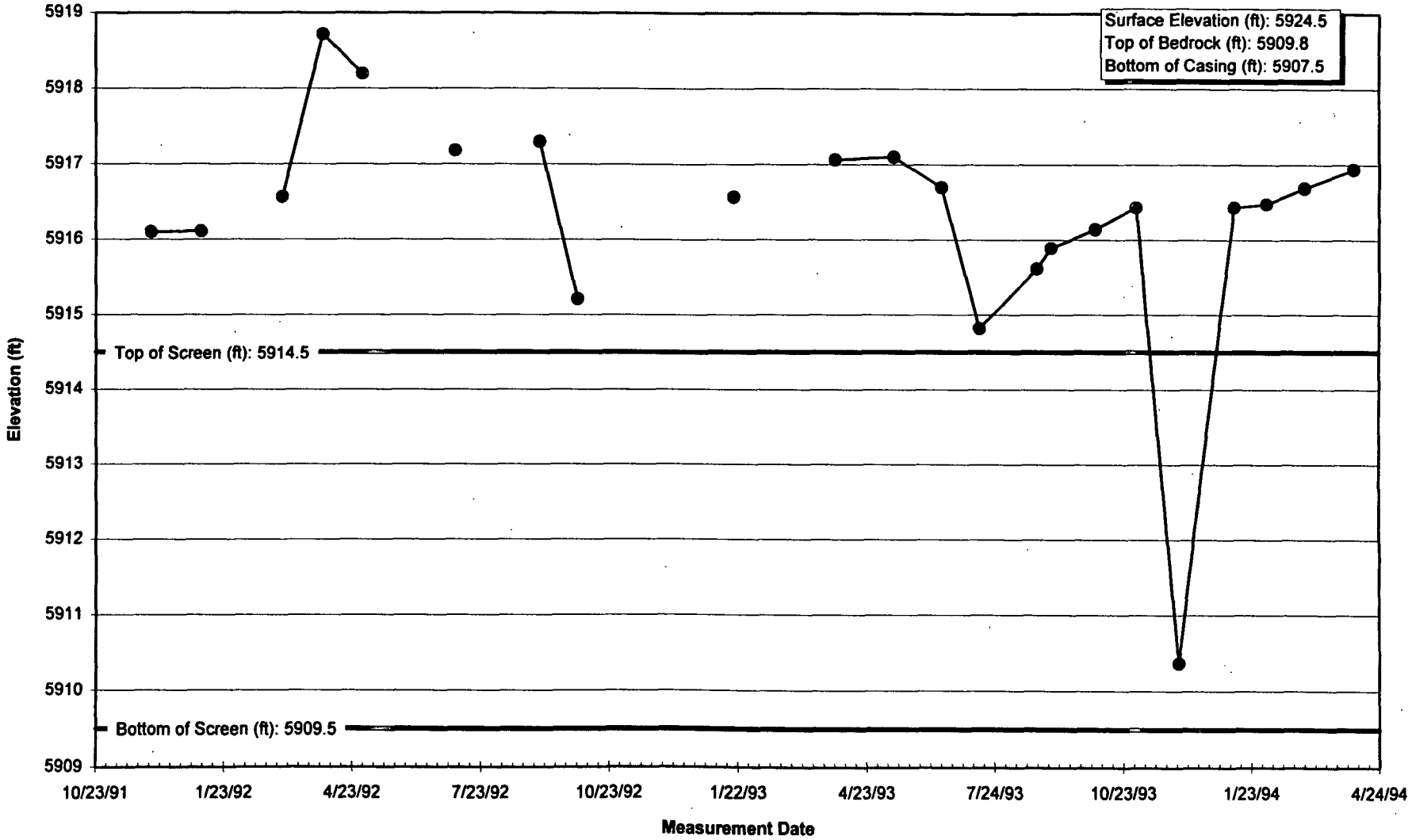

S10.XLS 38191 4/4/95

533

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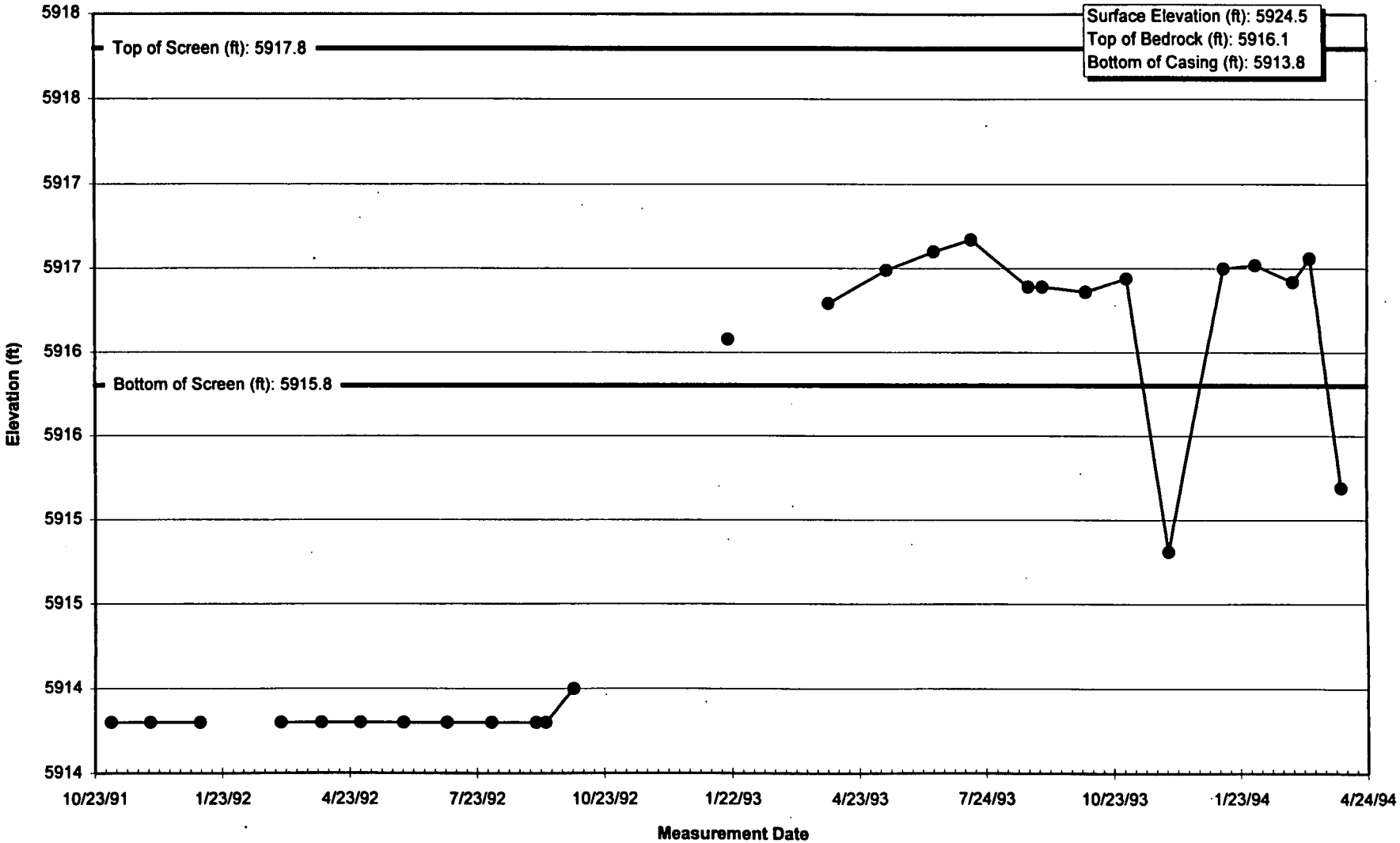

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S10.XLS 38291 4/4/95

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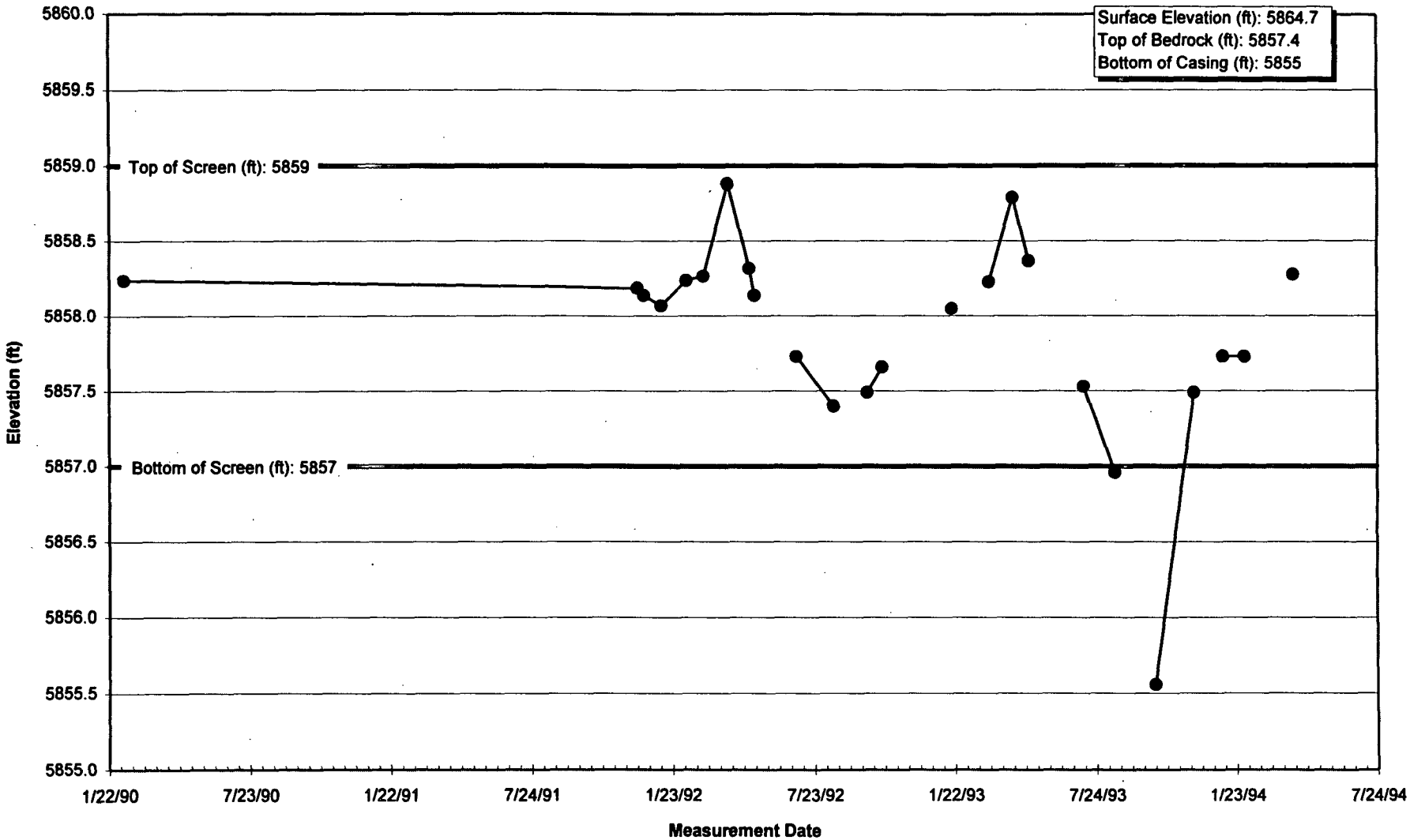

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535

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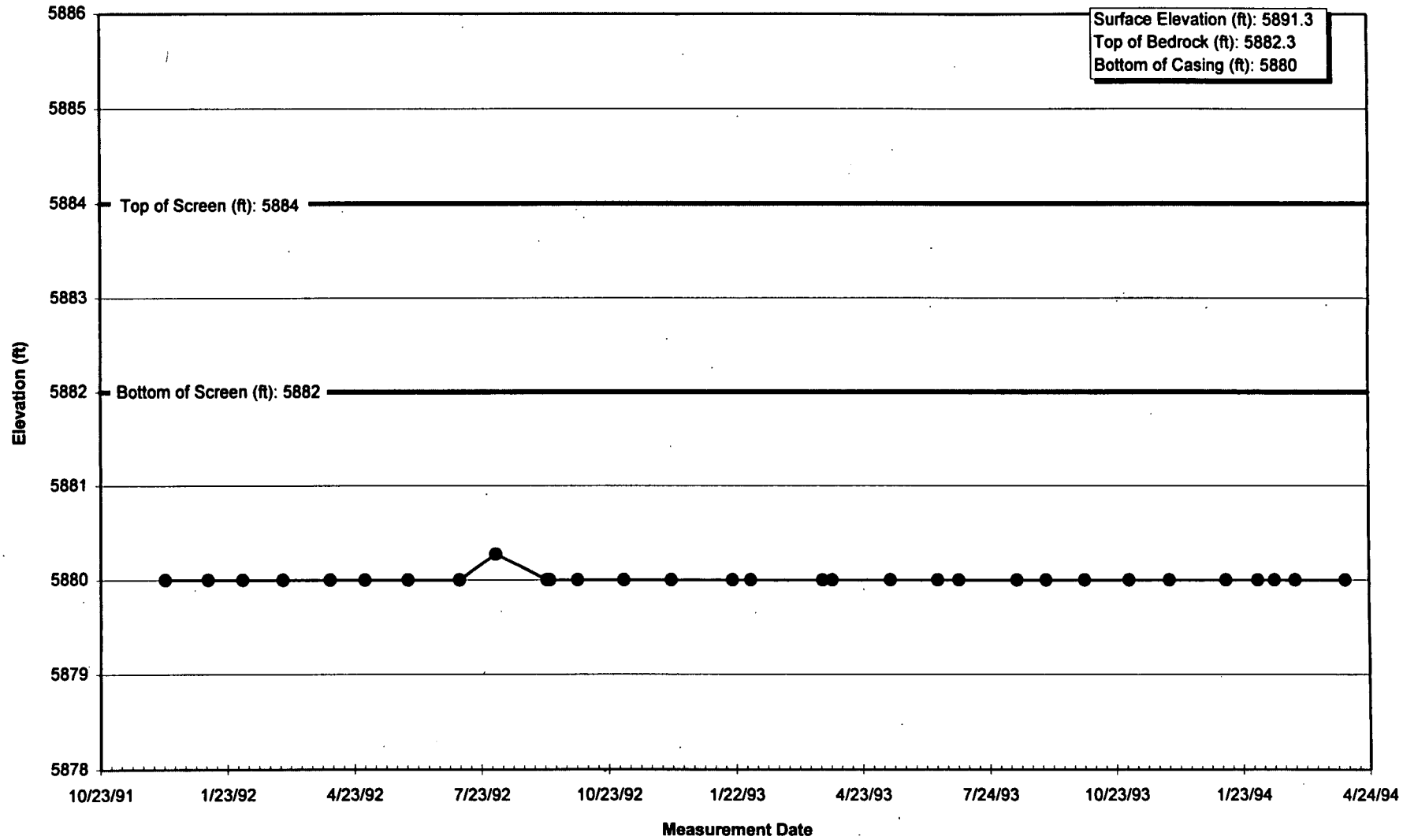

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536

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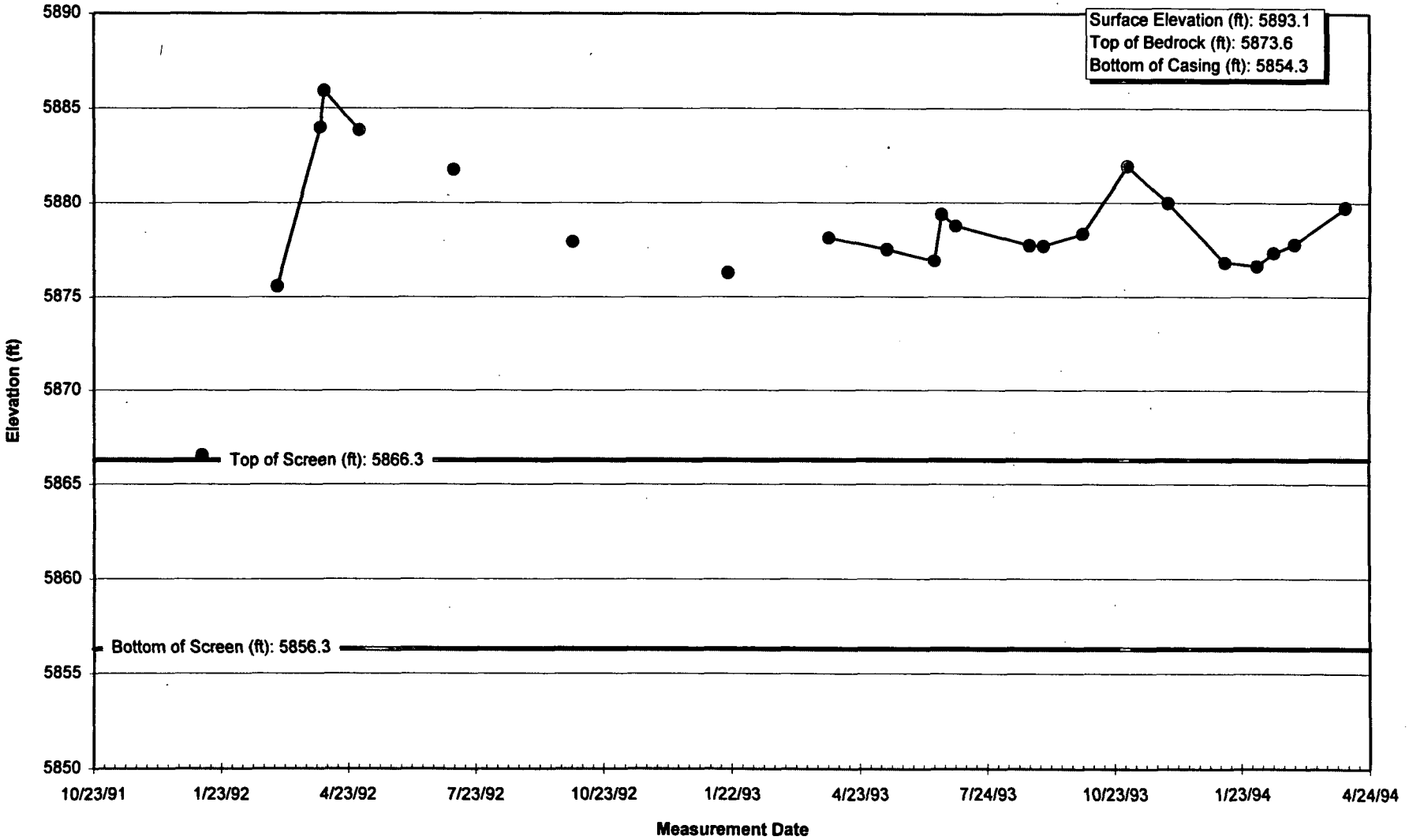

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537

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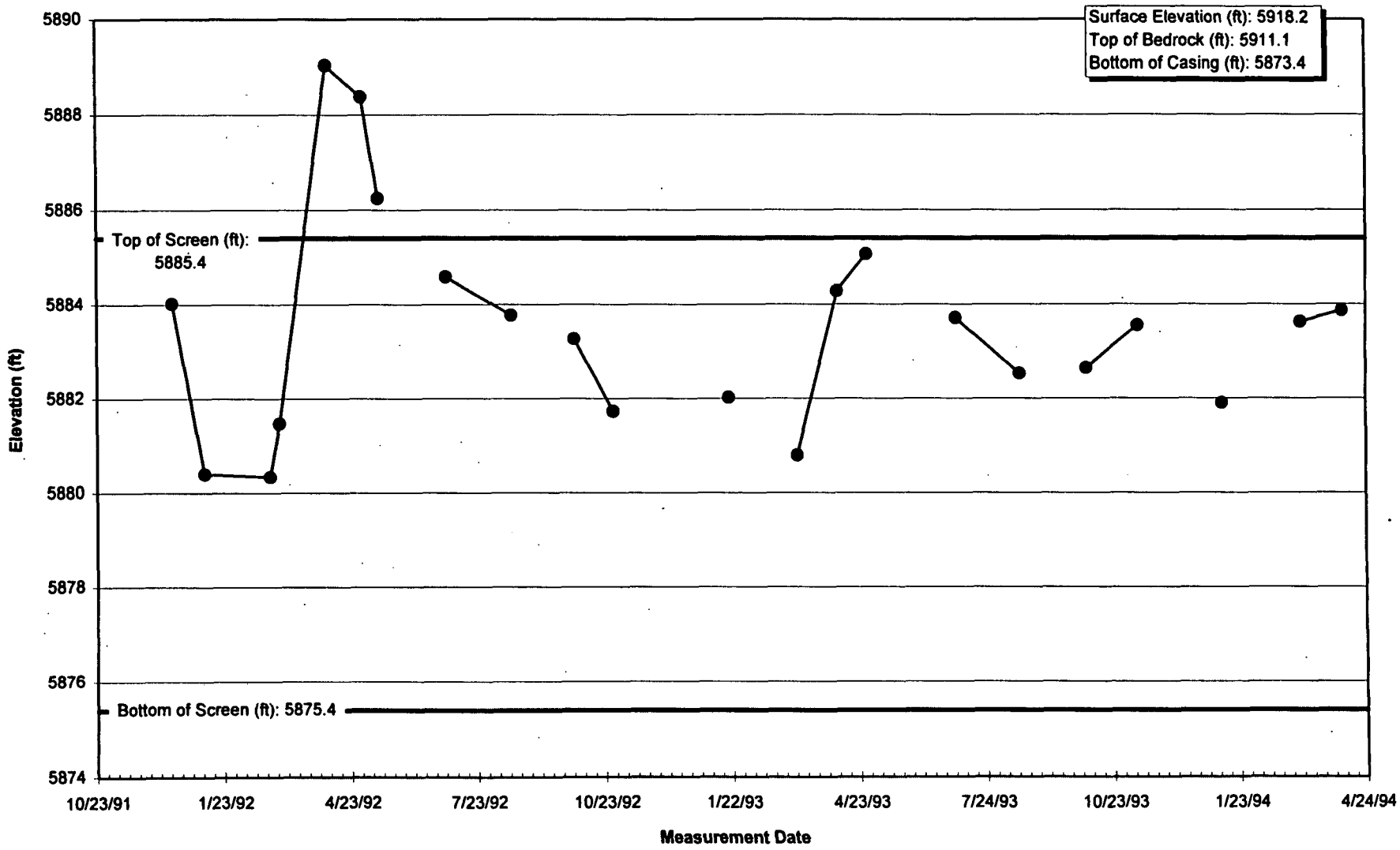

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538

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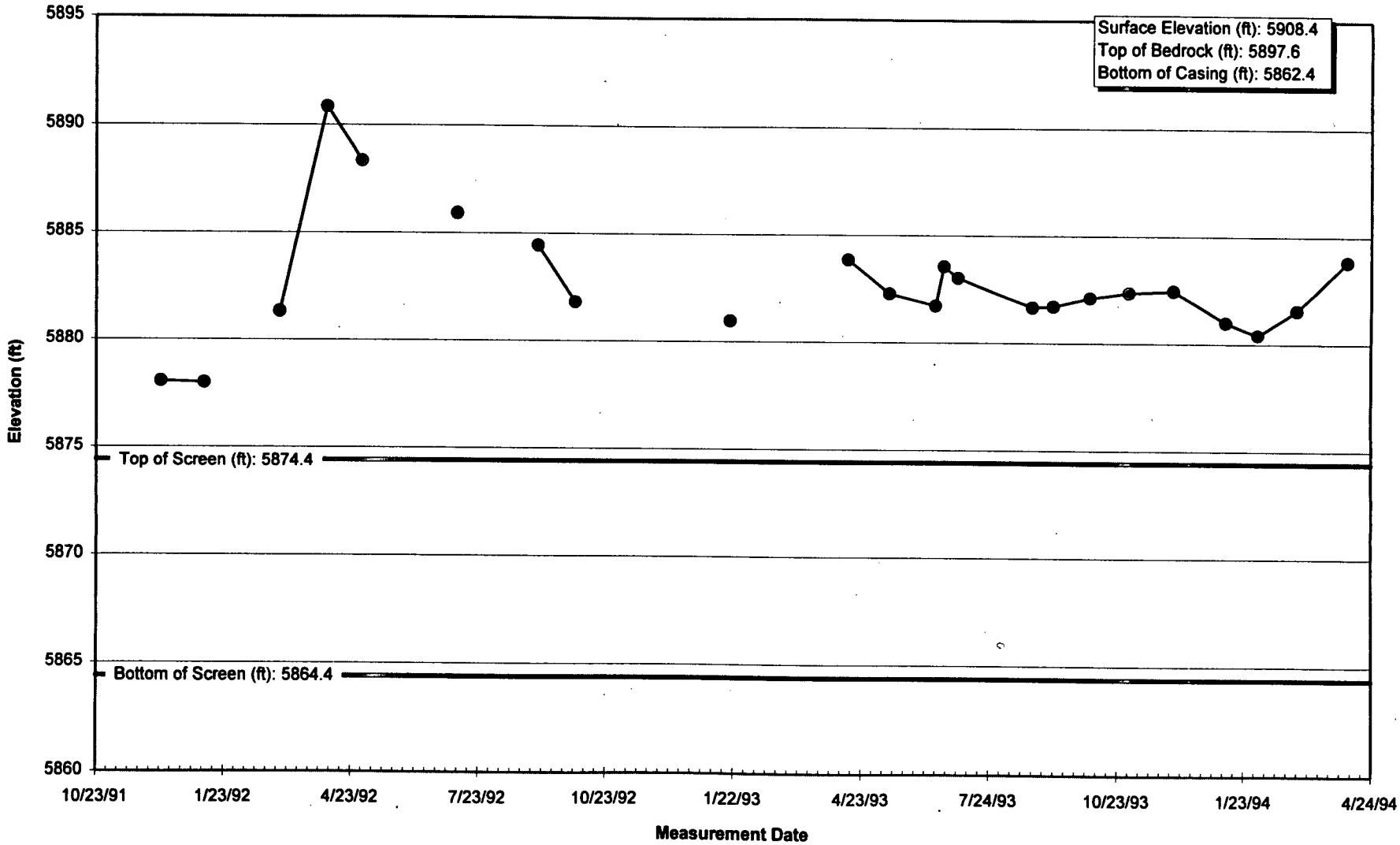

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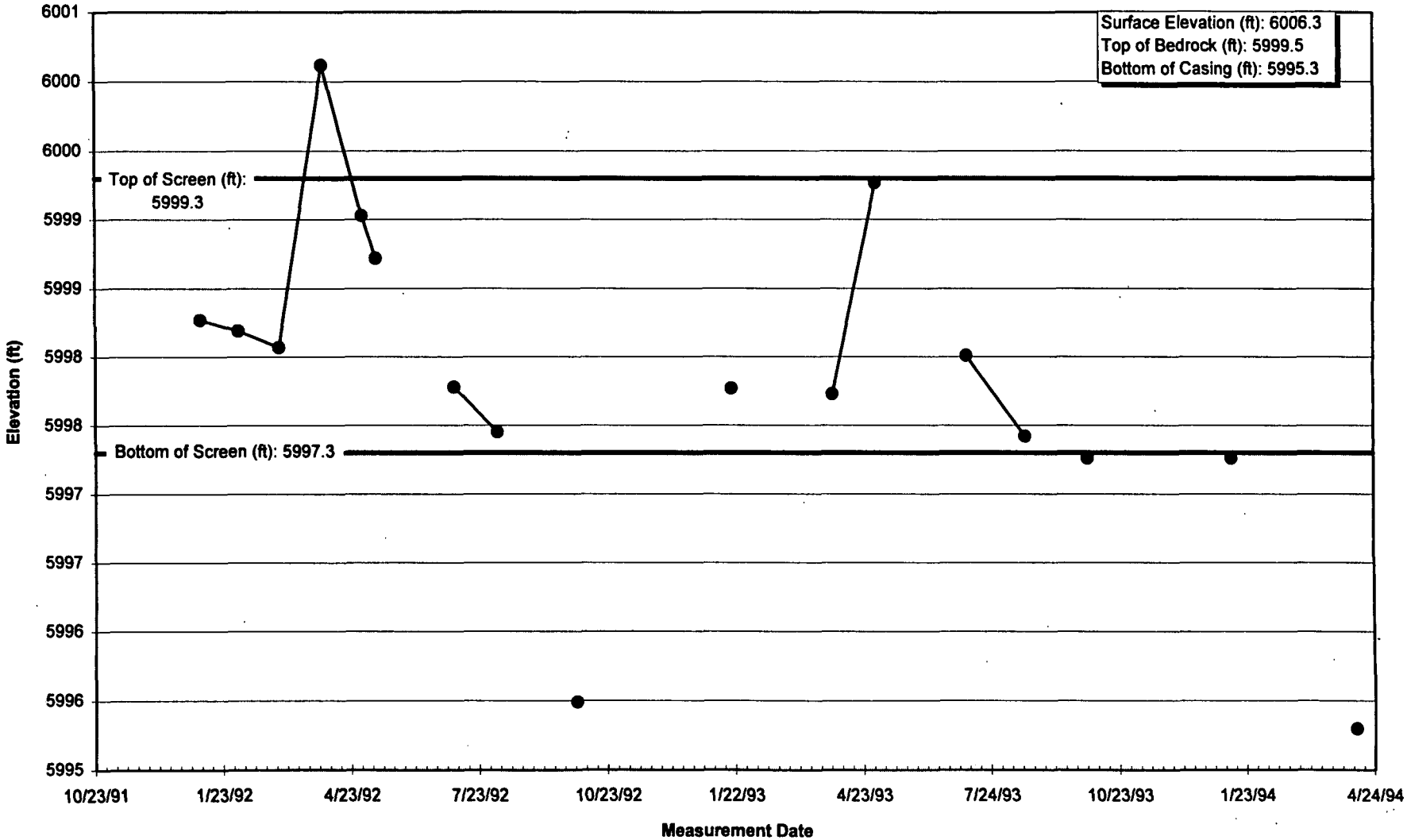
539

Hydrograph 39691



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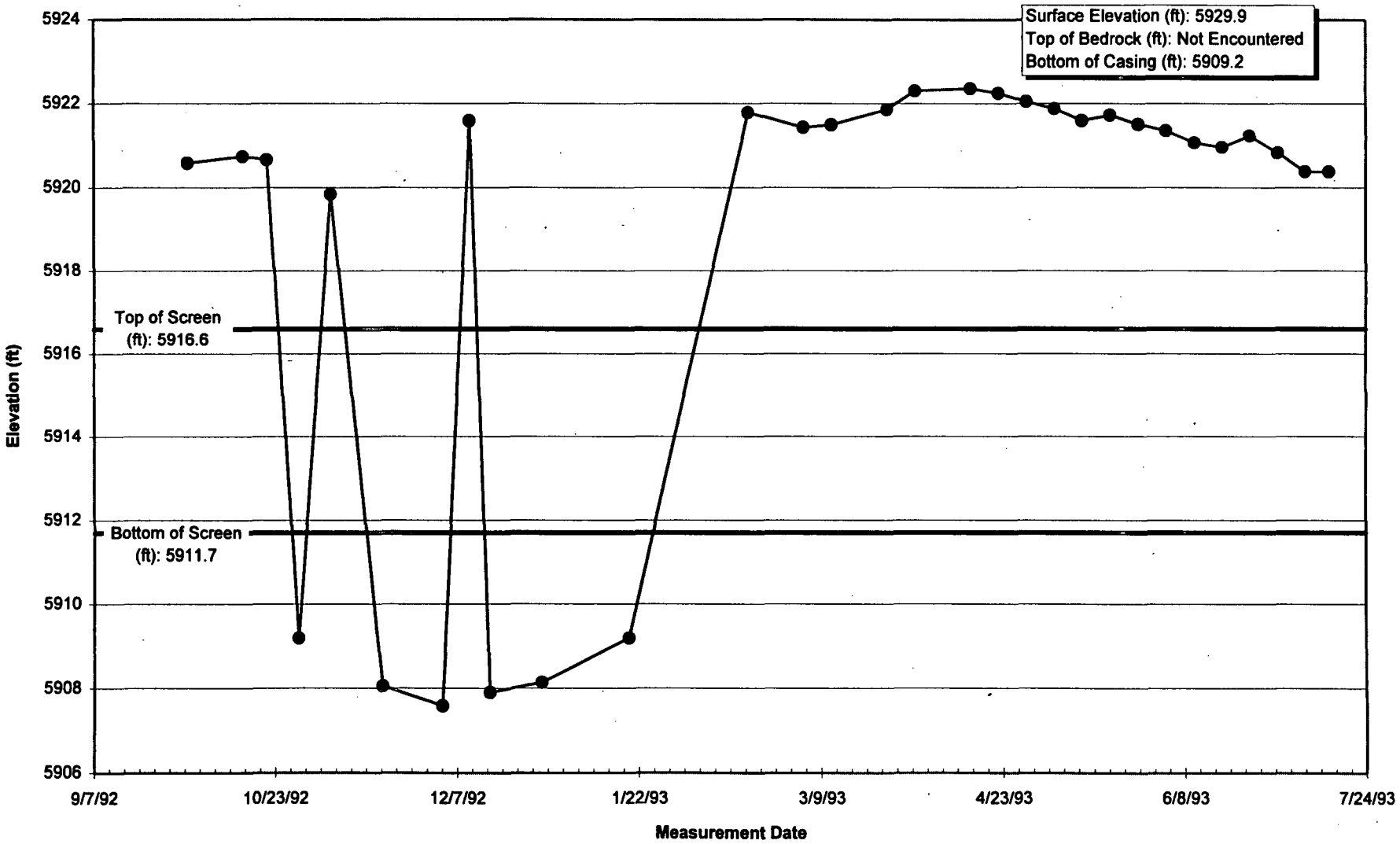
Hydrograph 39991



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541

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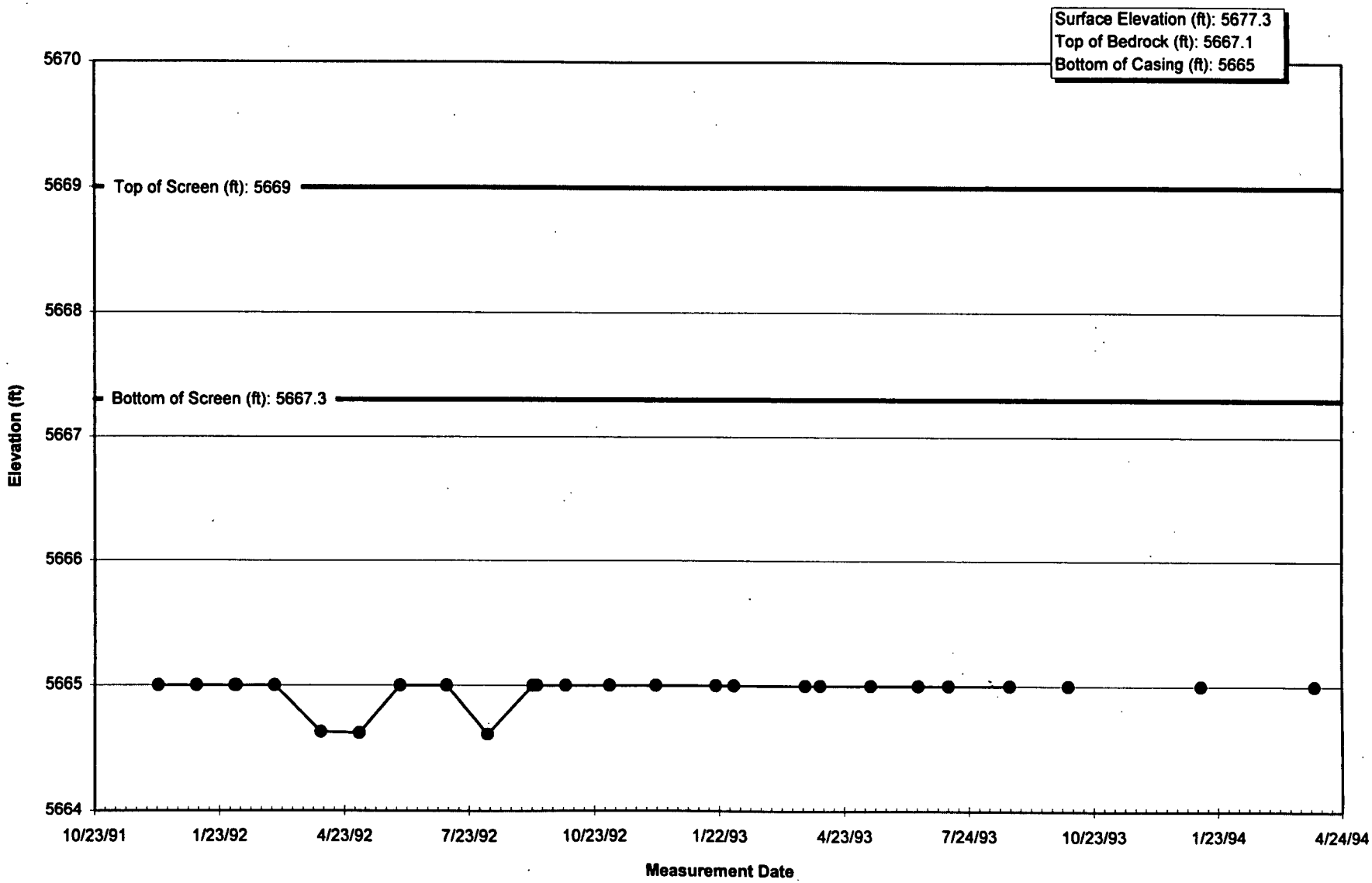

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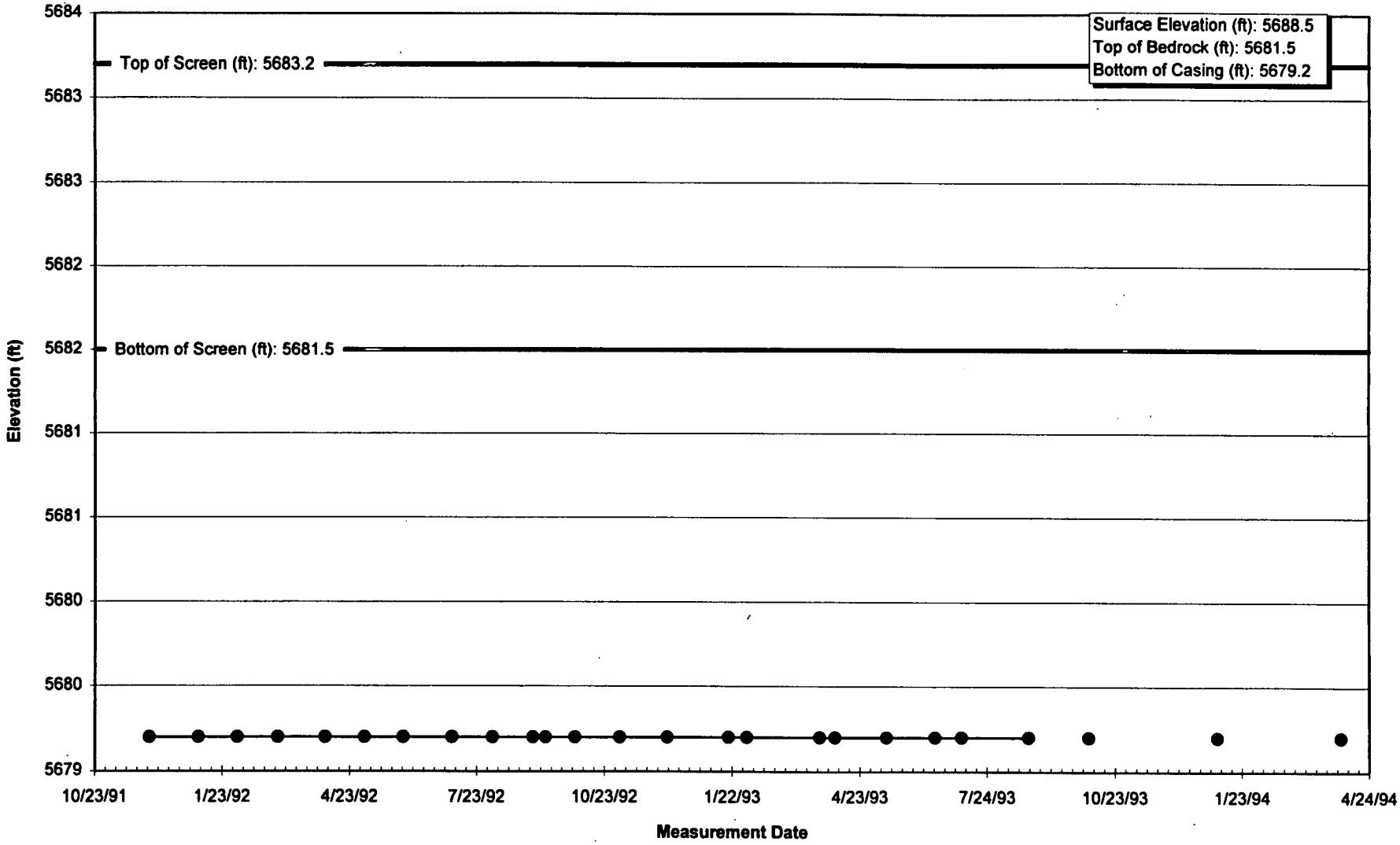
542

Hydrograph 40791



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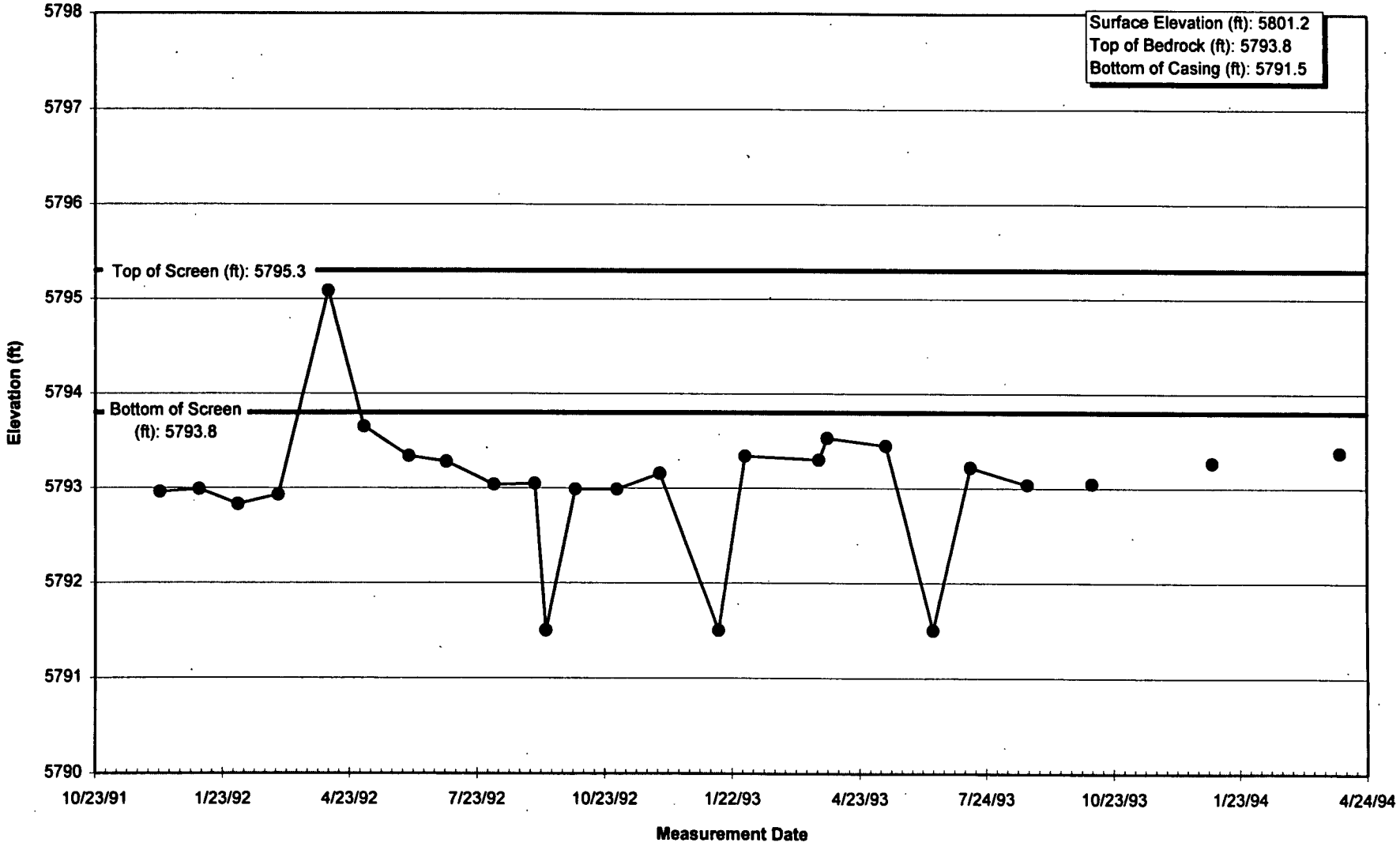
543

Hydrograph 40991



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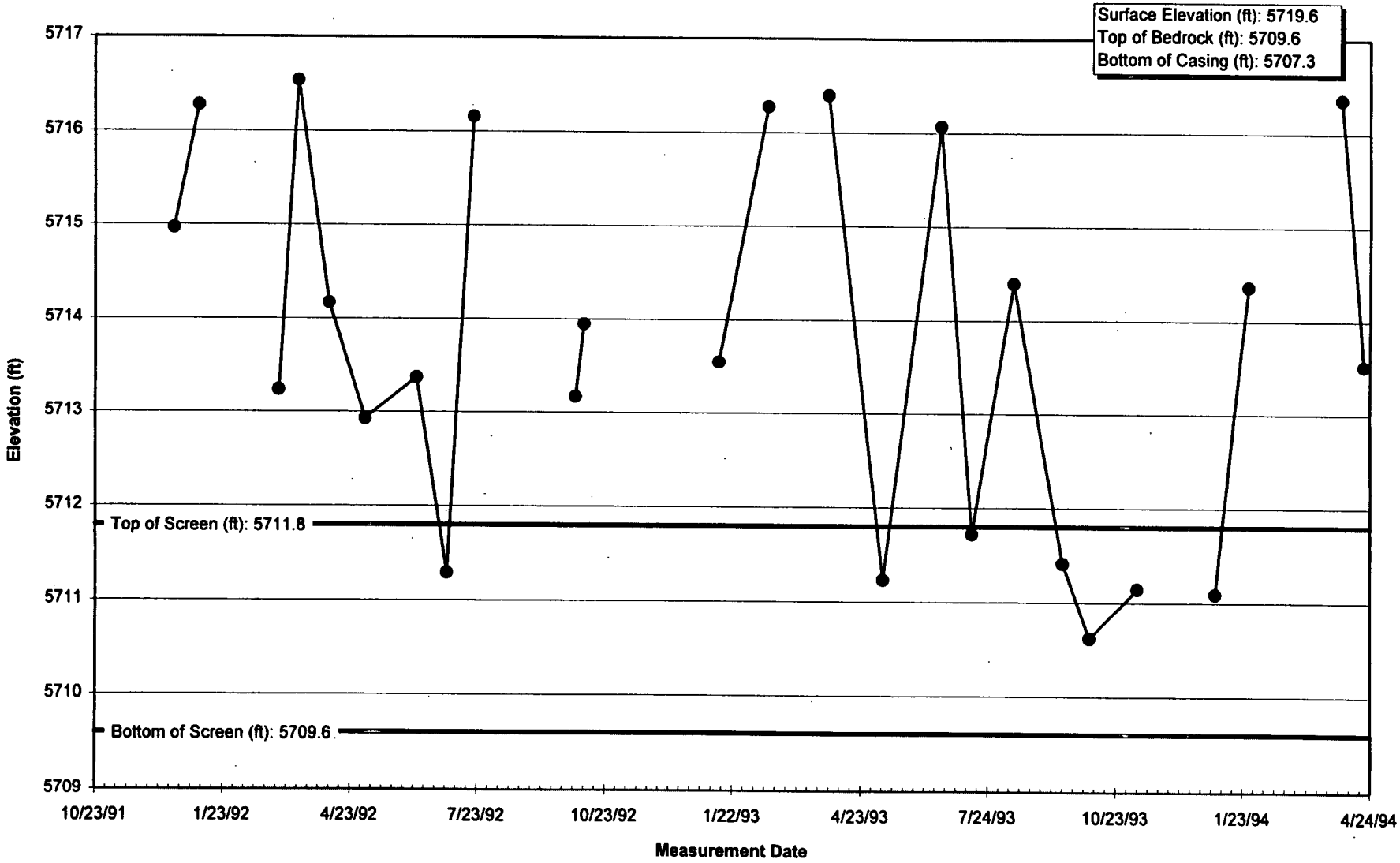
54

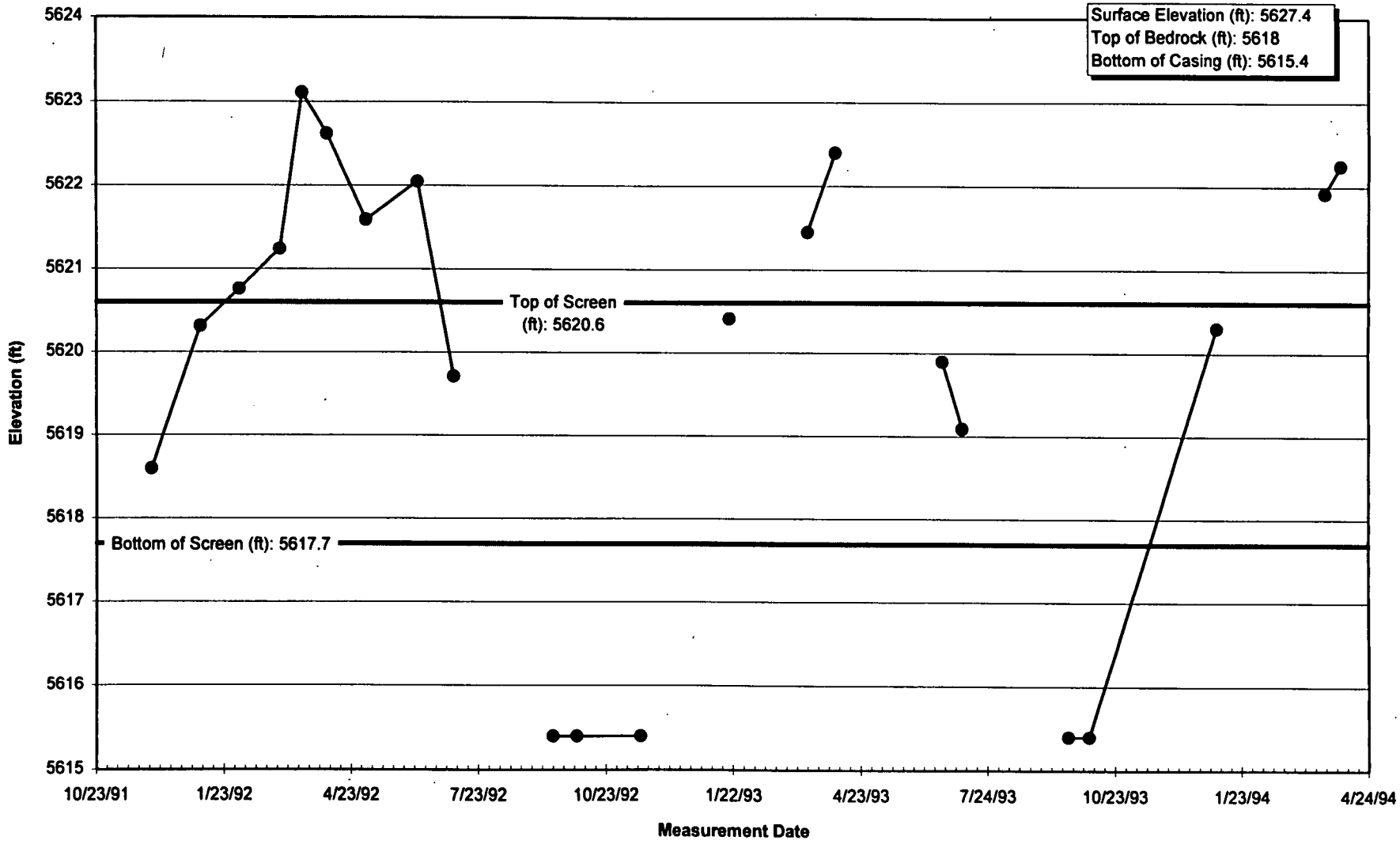
Hydrograph 41091



S11.XLS 41091 4/5/95

545

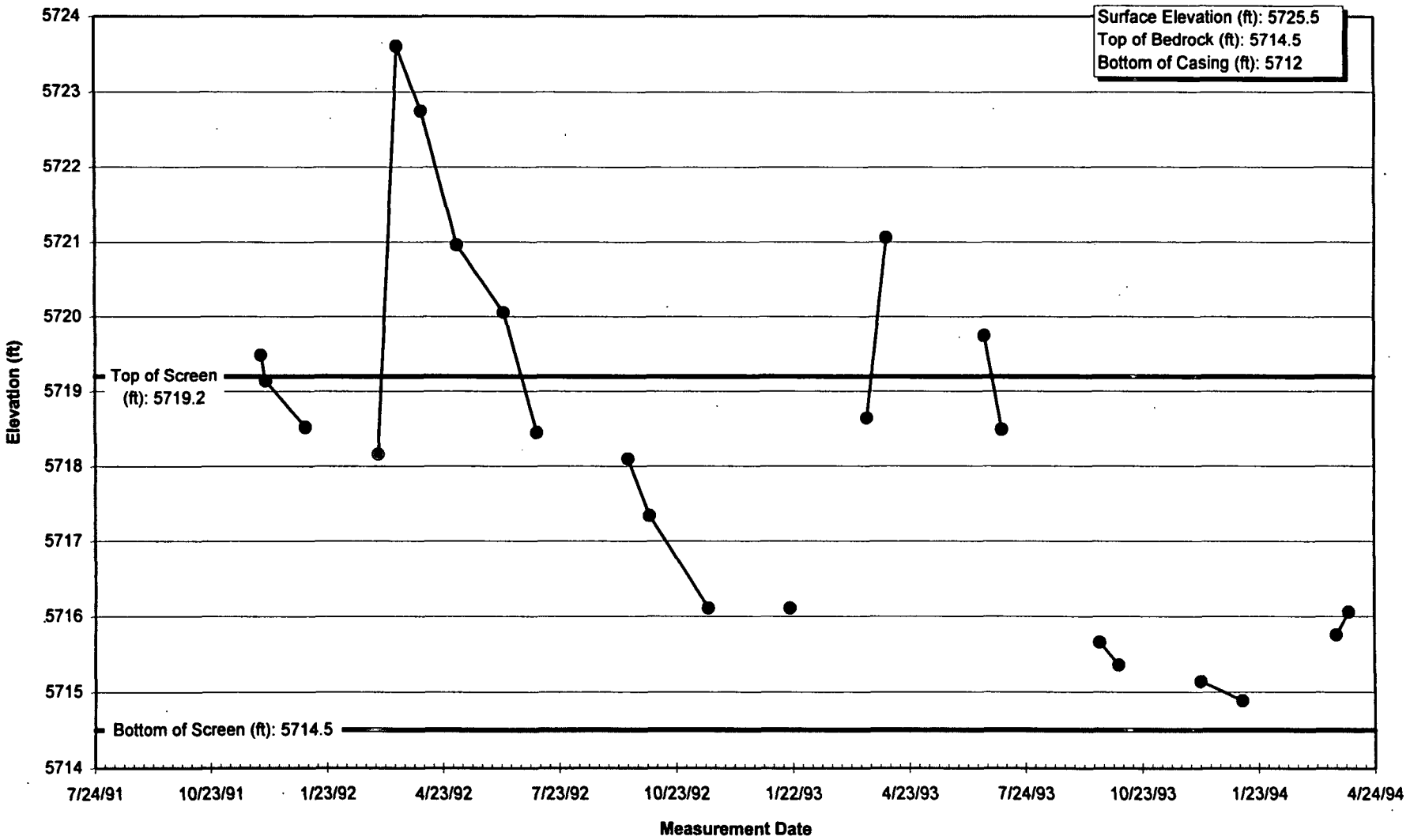
Hydrograph 41491



S11.XLS 41491 4/6/95

546

Hydrograph 41591



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547

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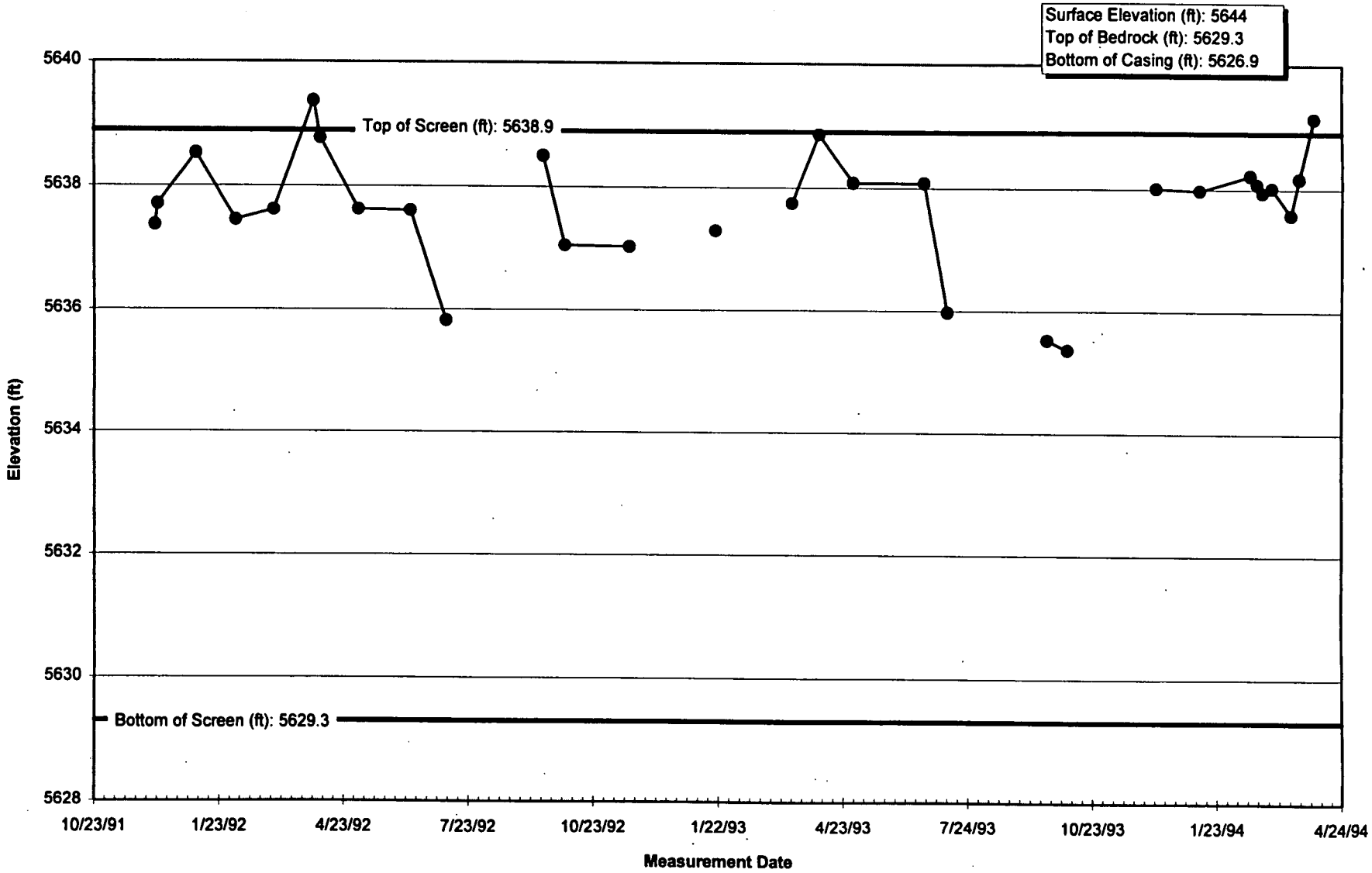

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548

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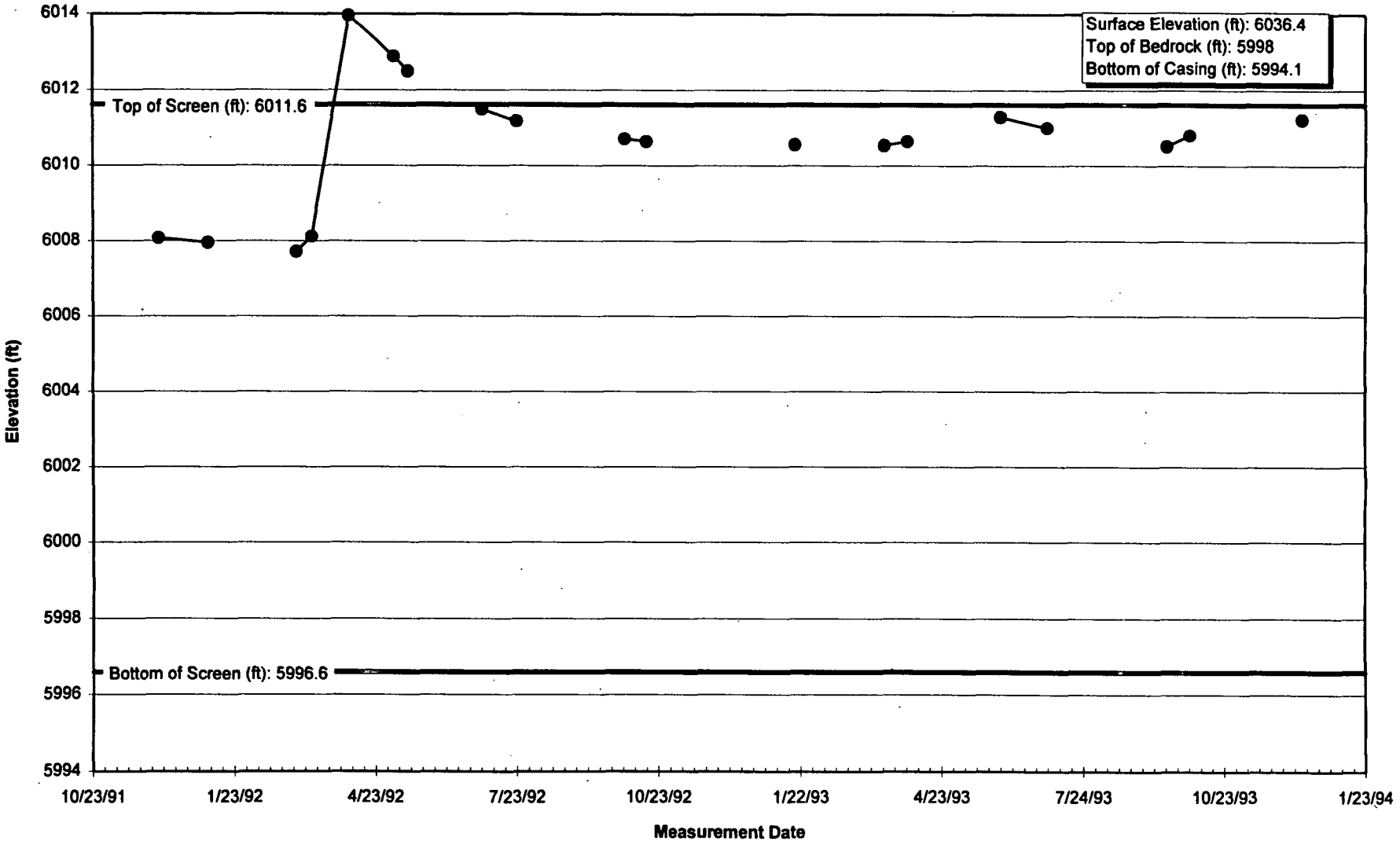

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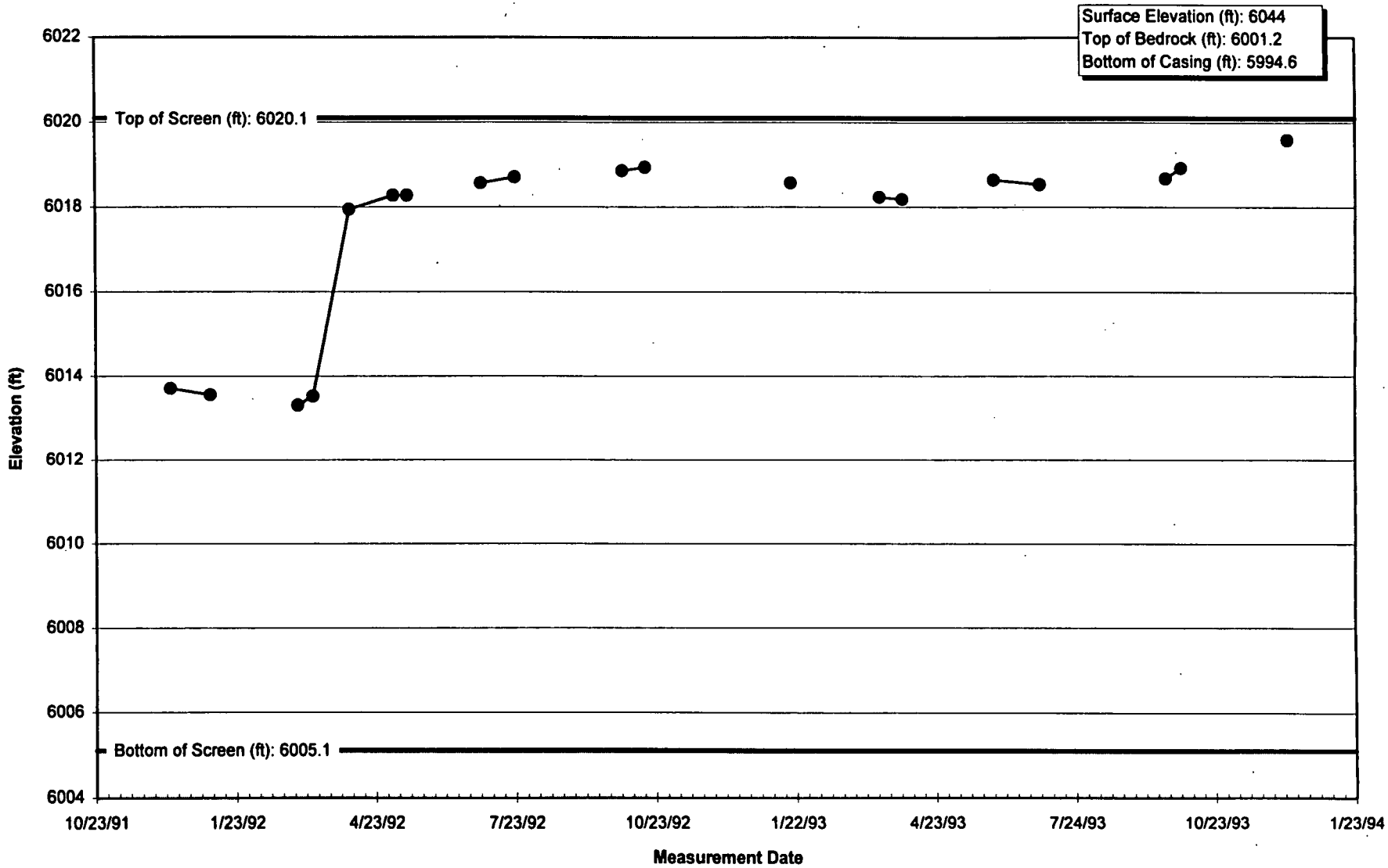
Hydrograph 45191



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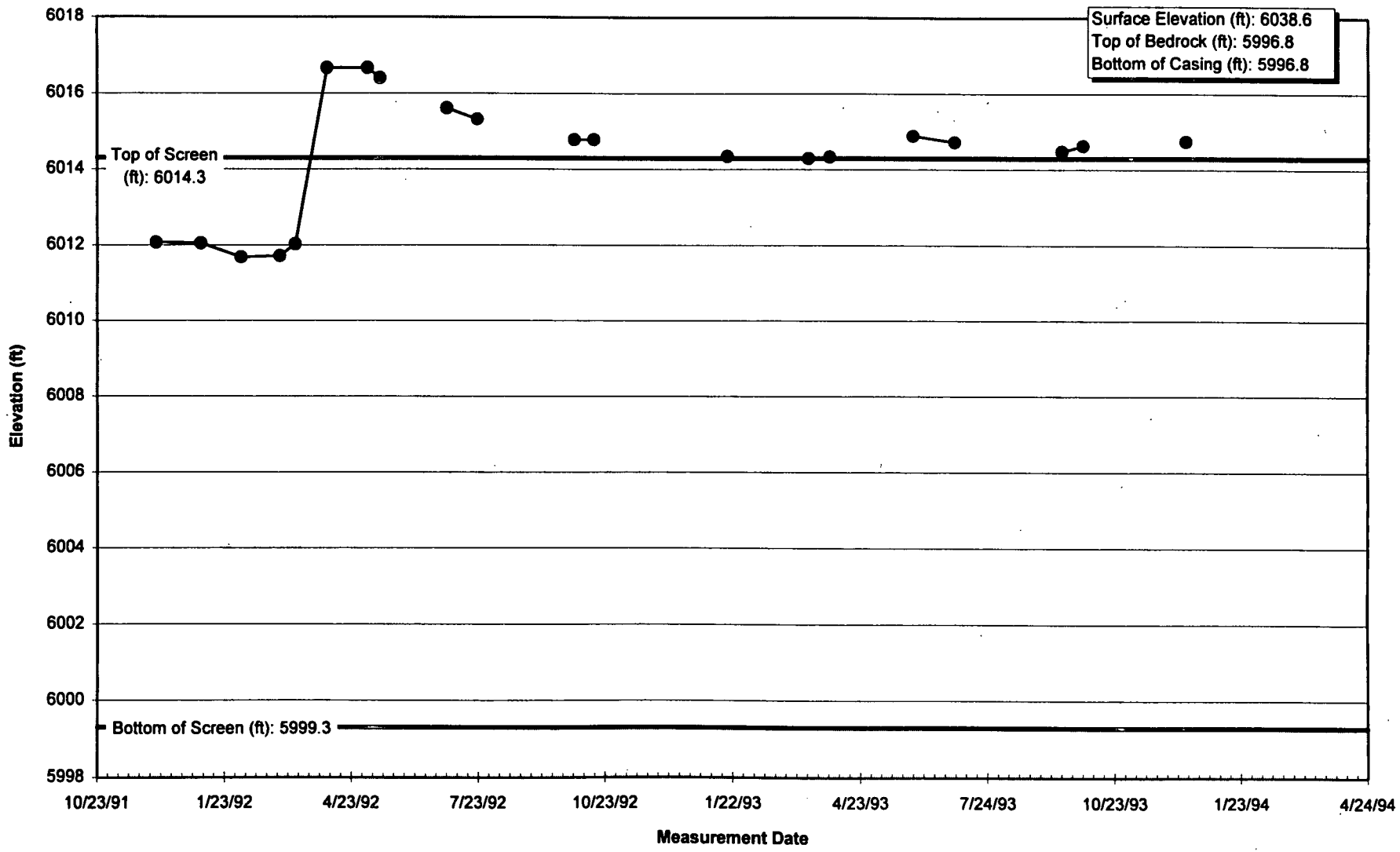
550

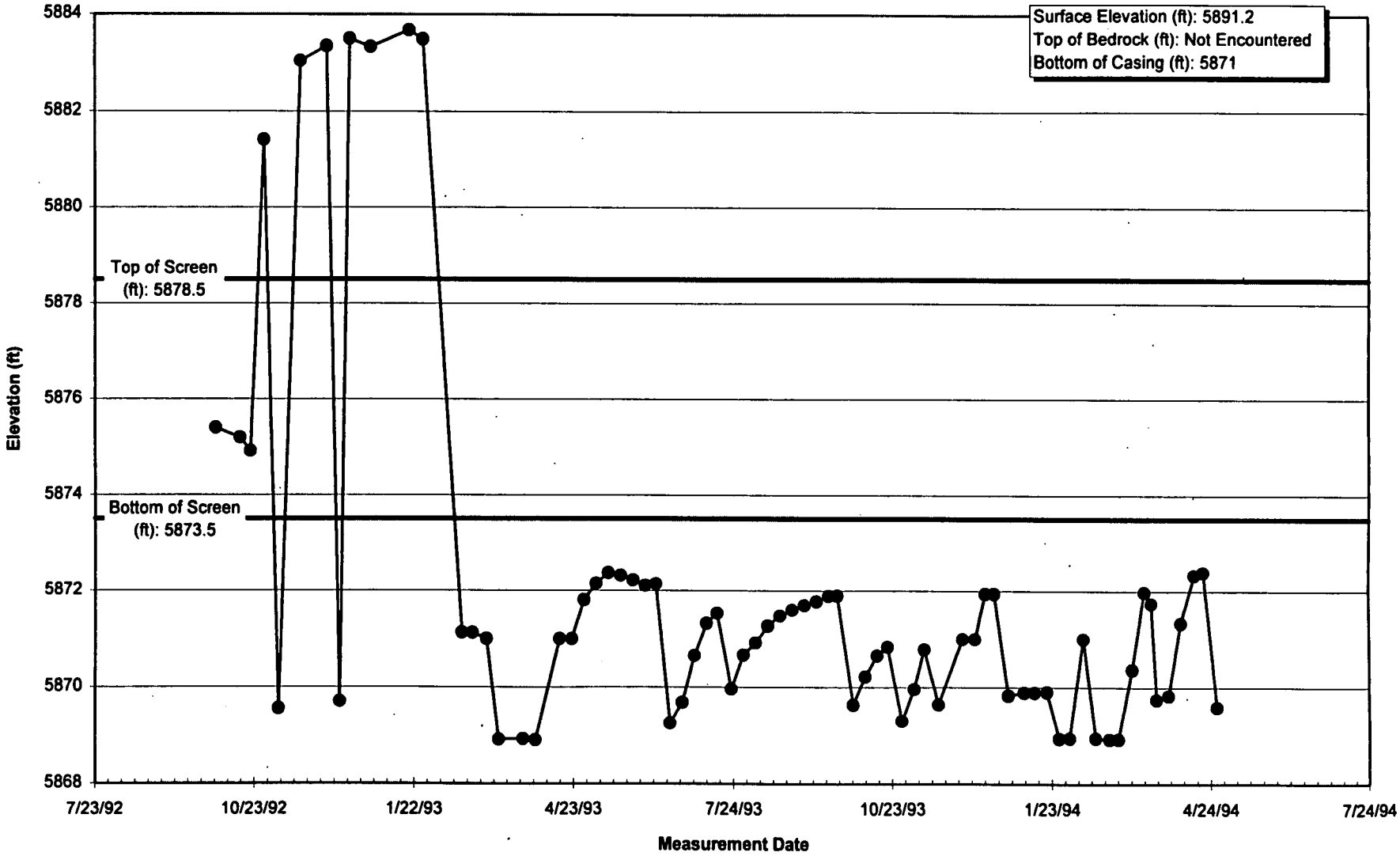
Hydrograph 45291



S12.XLS 45291 4/5/95

551

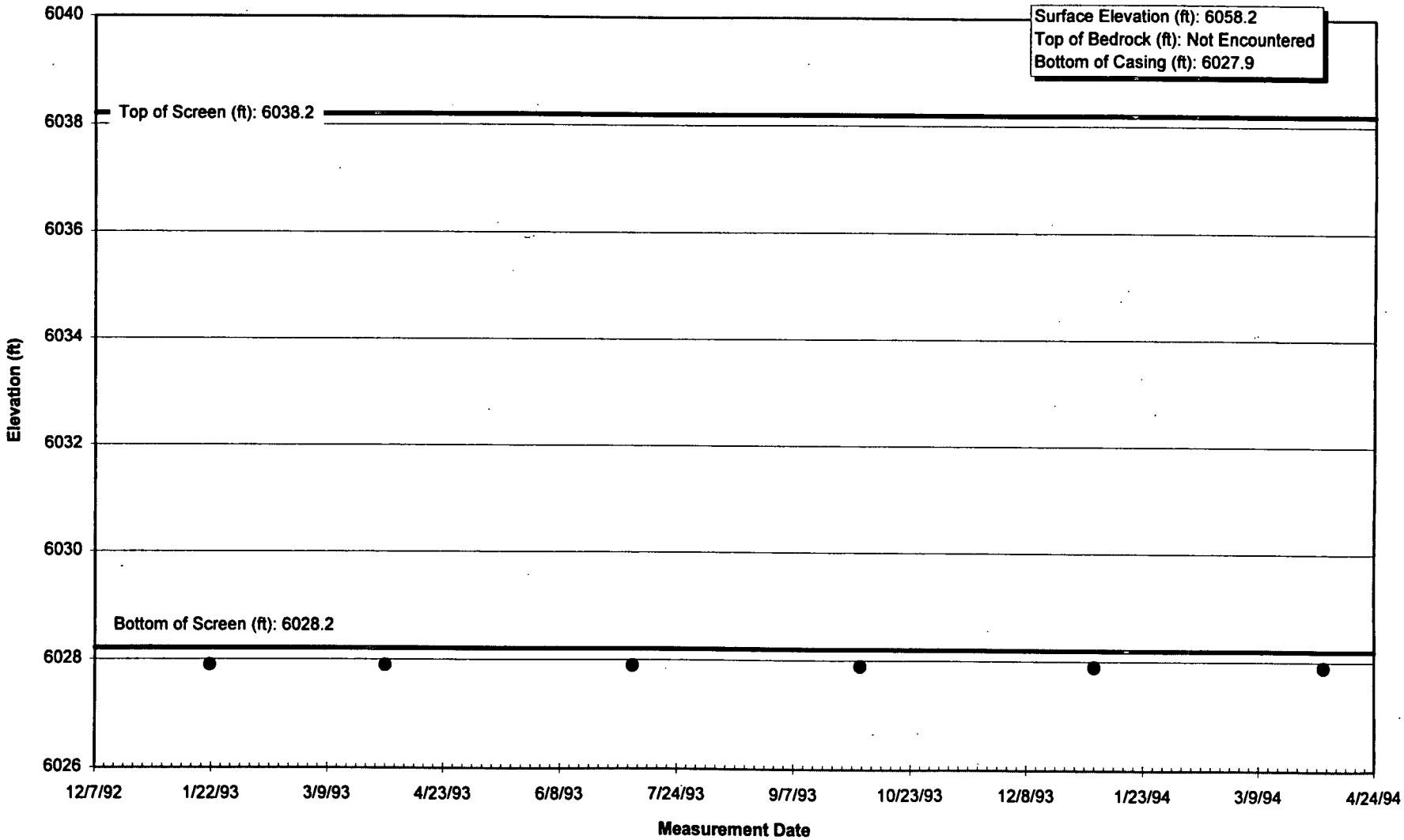
Hydrograph 45391



S12.XLS 45391 4/5/95

552

Hydrograph 03092



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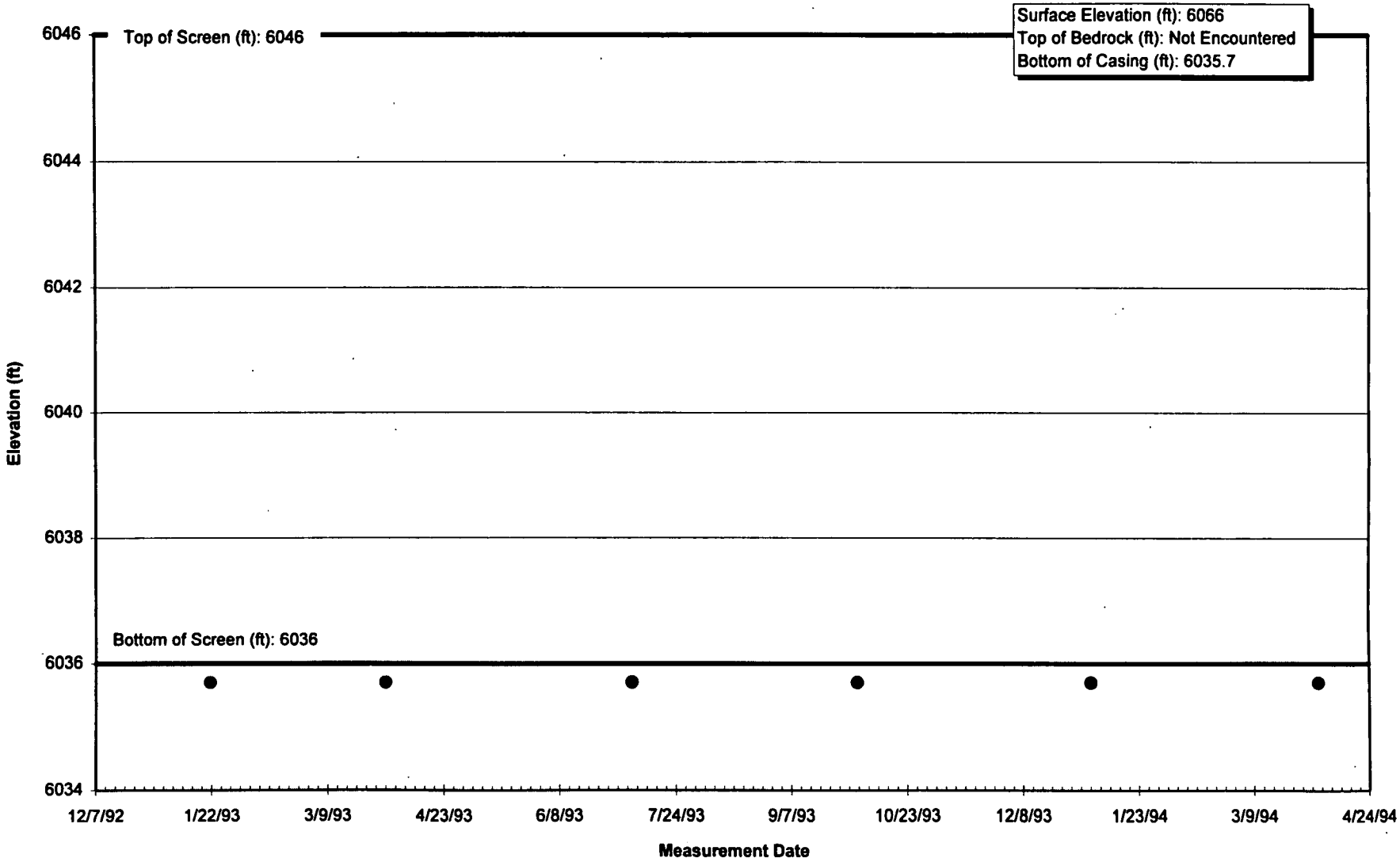
553

Hydrograph 03192



554

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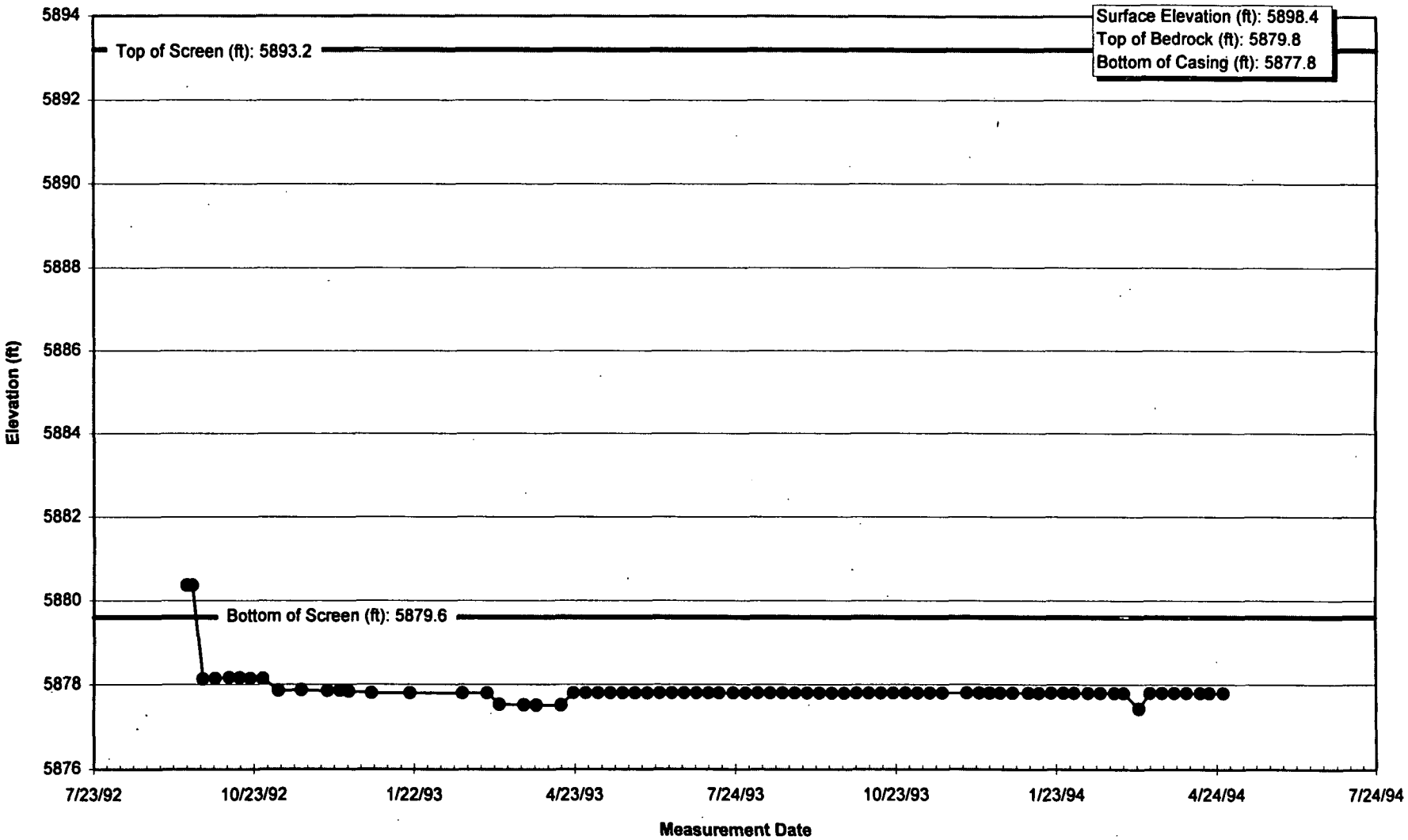

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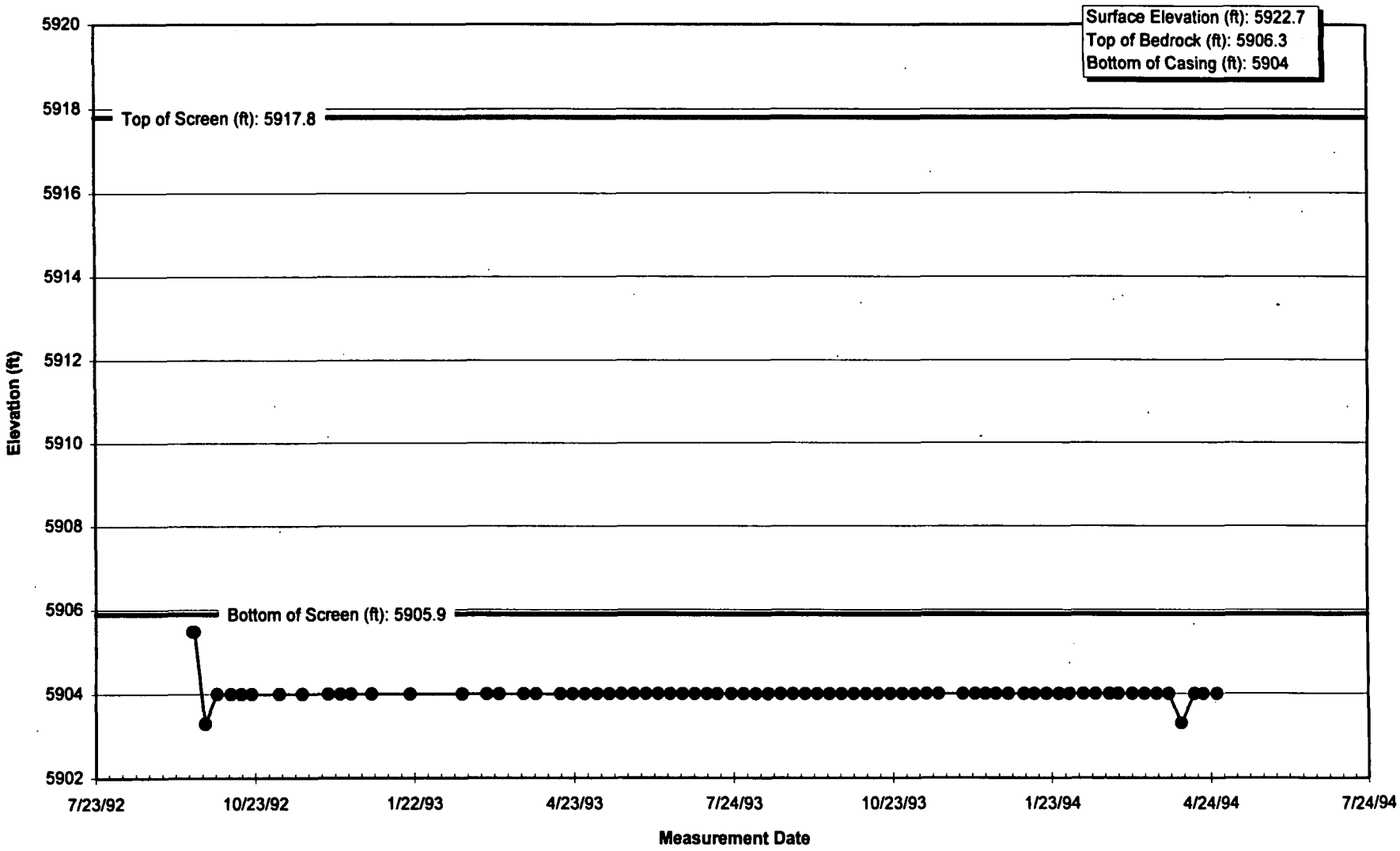
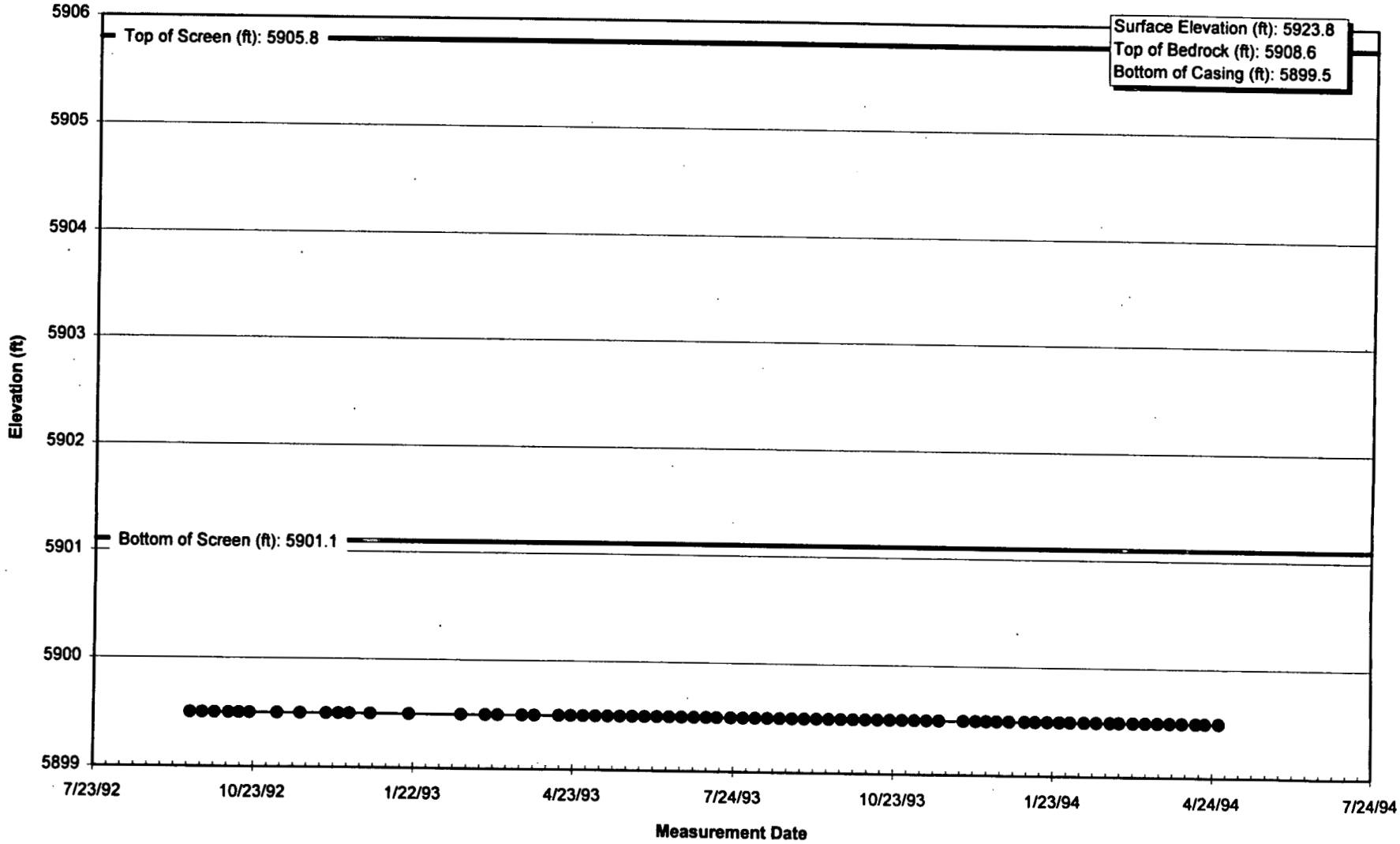
555

Hydrograph 10192



556

Hydrograph 10292



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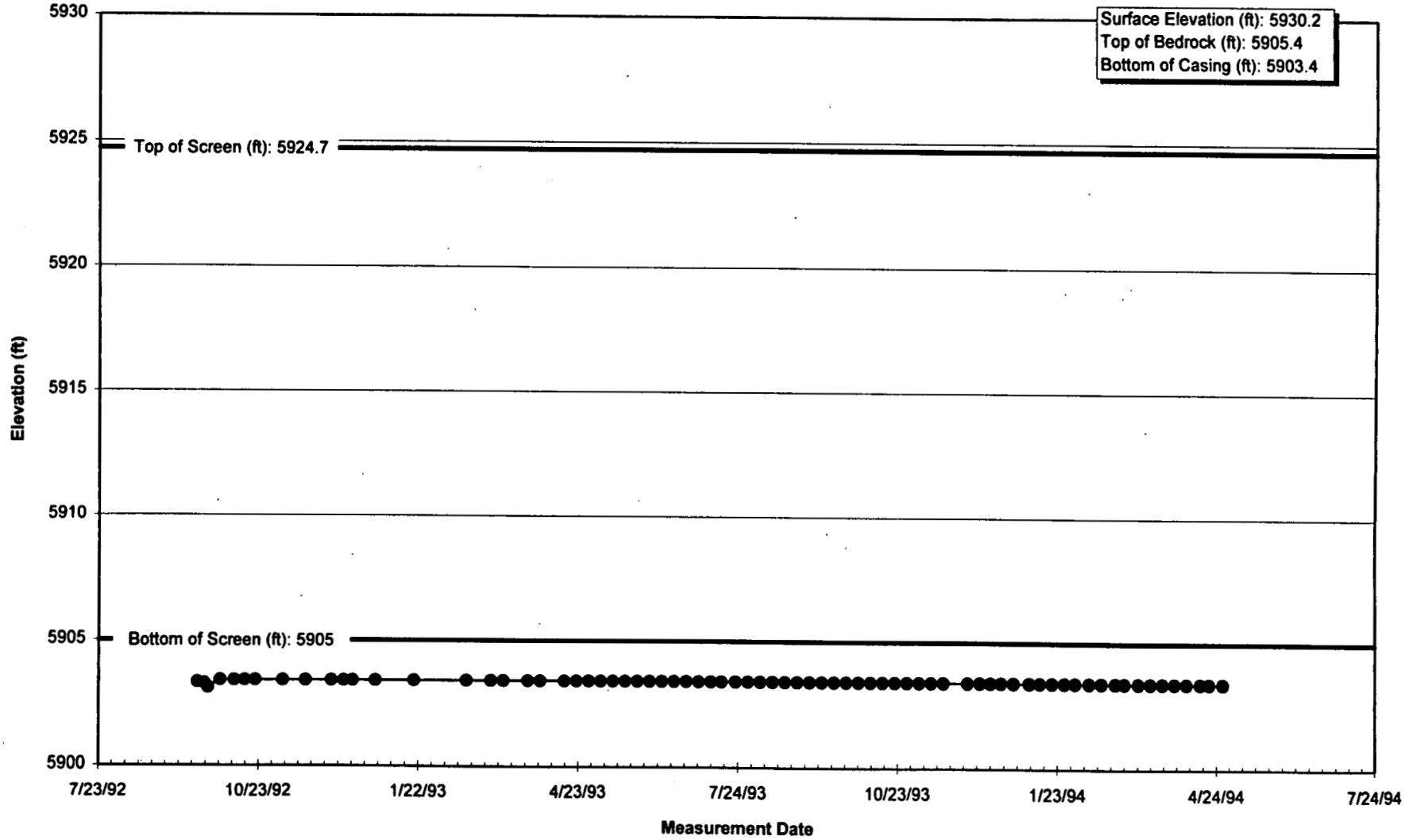
557

Hydrograph 10392



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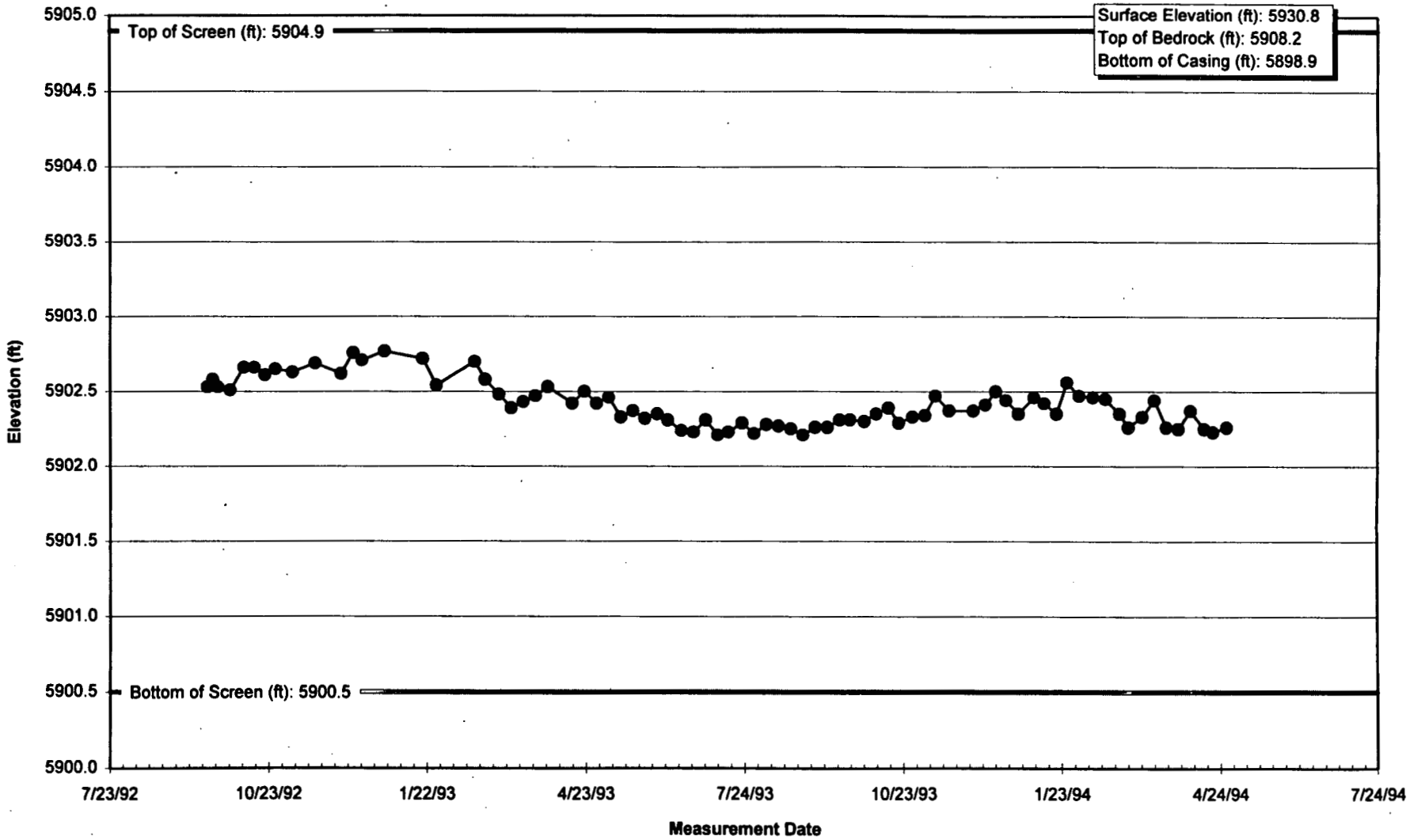
558

Hydrograph 10492



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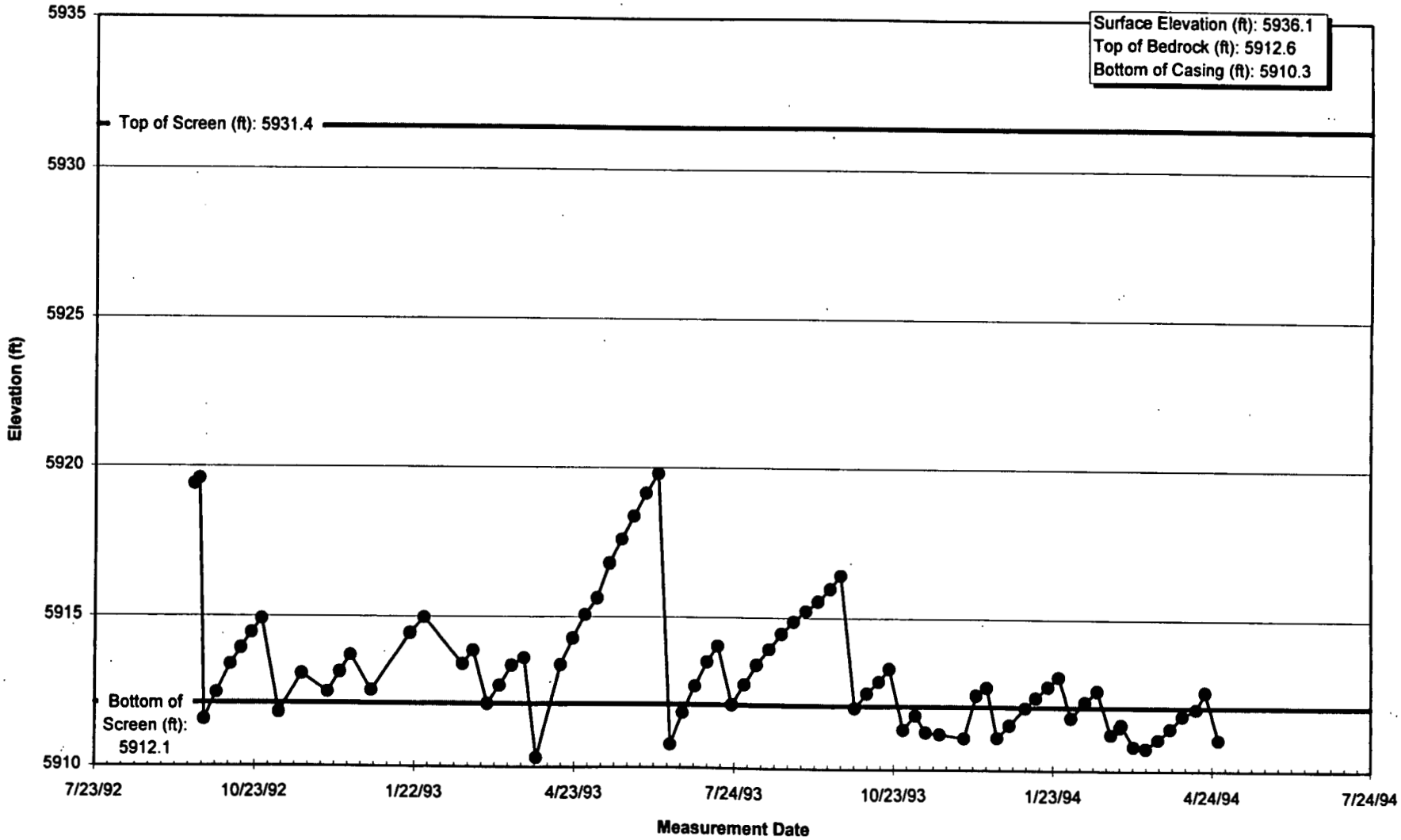
559

Hydrograph 10592



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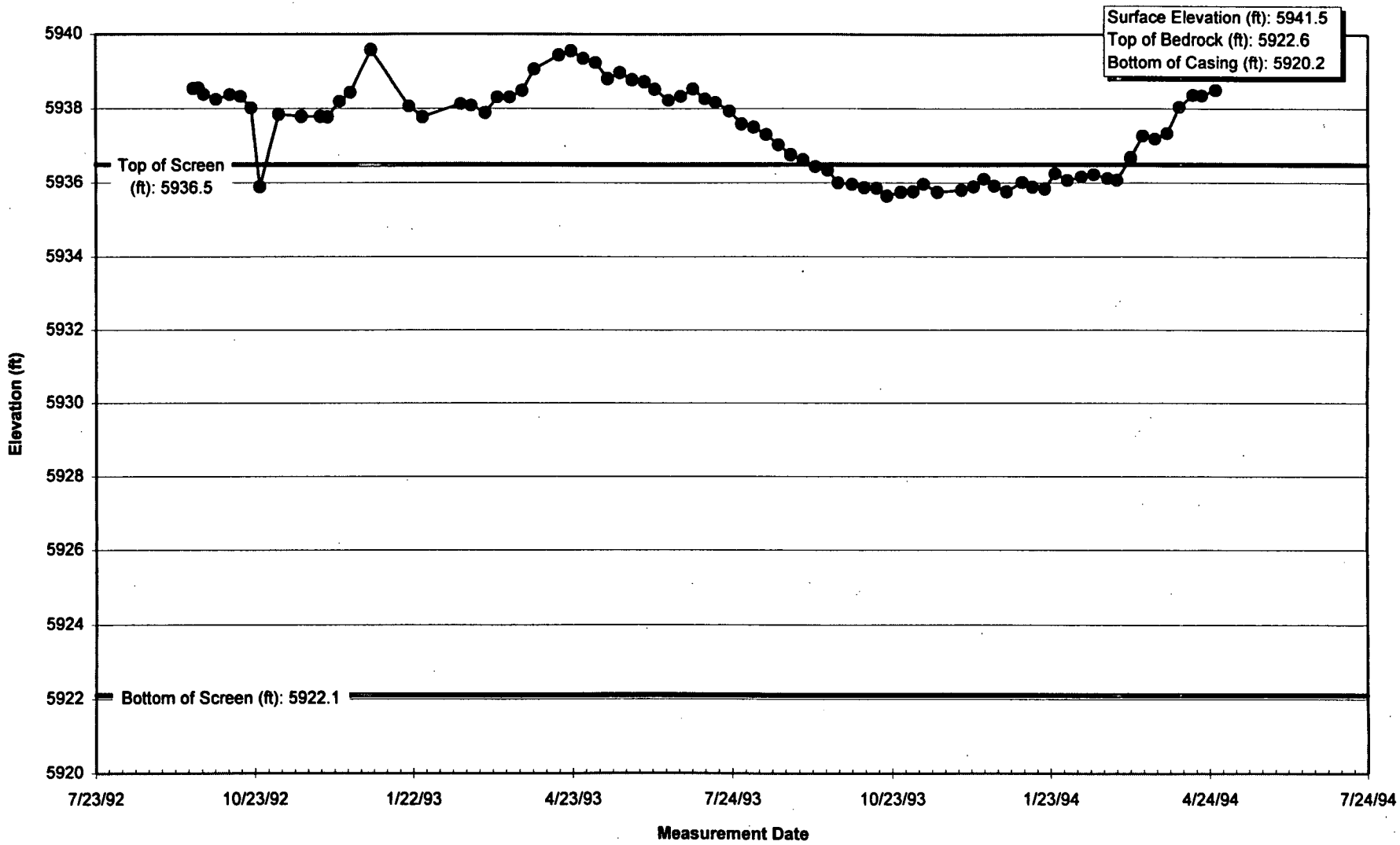
560

Hydrograph 10692



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561

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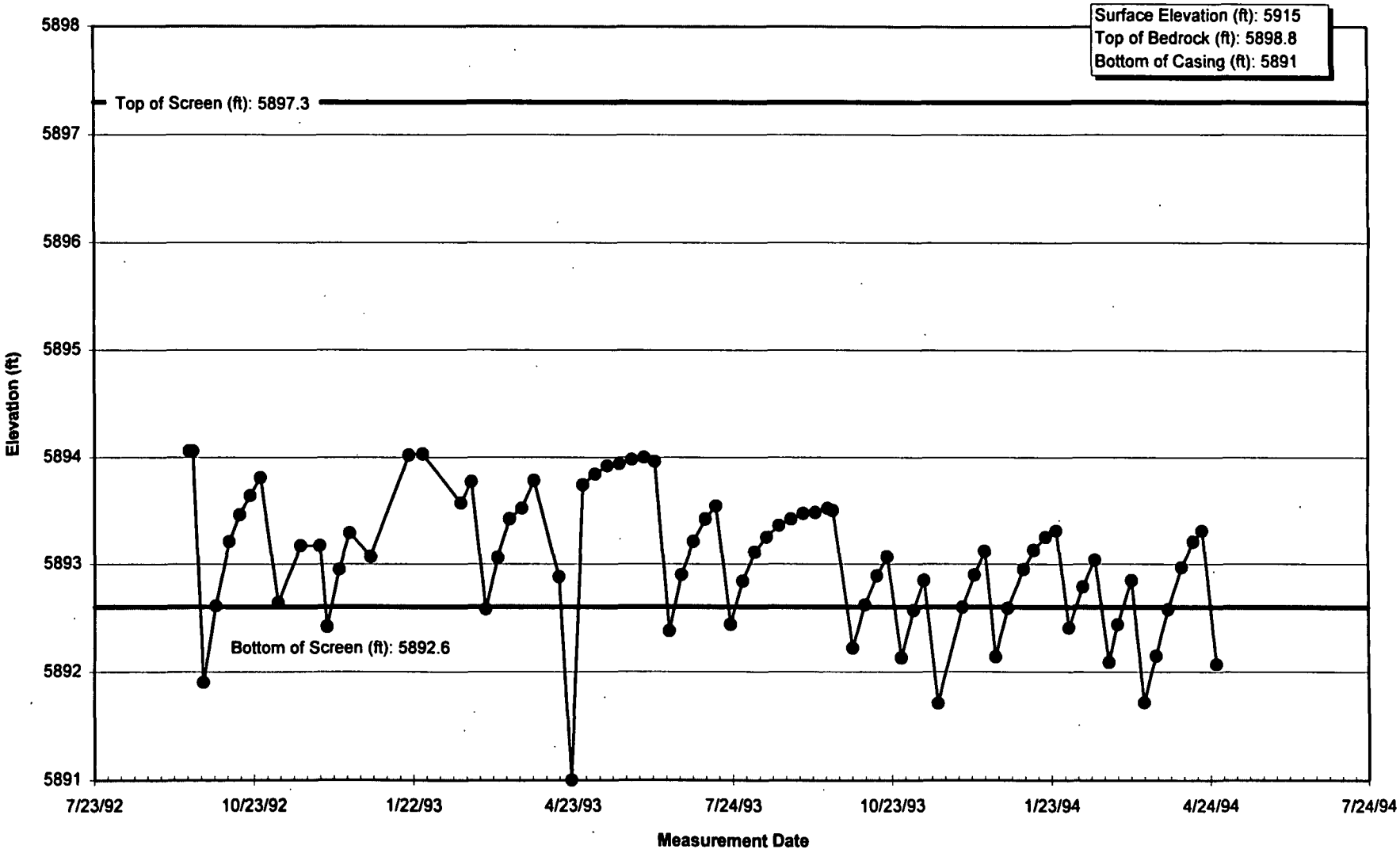

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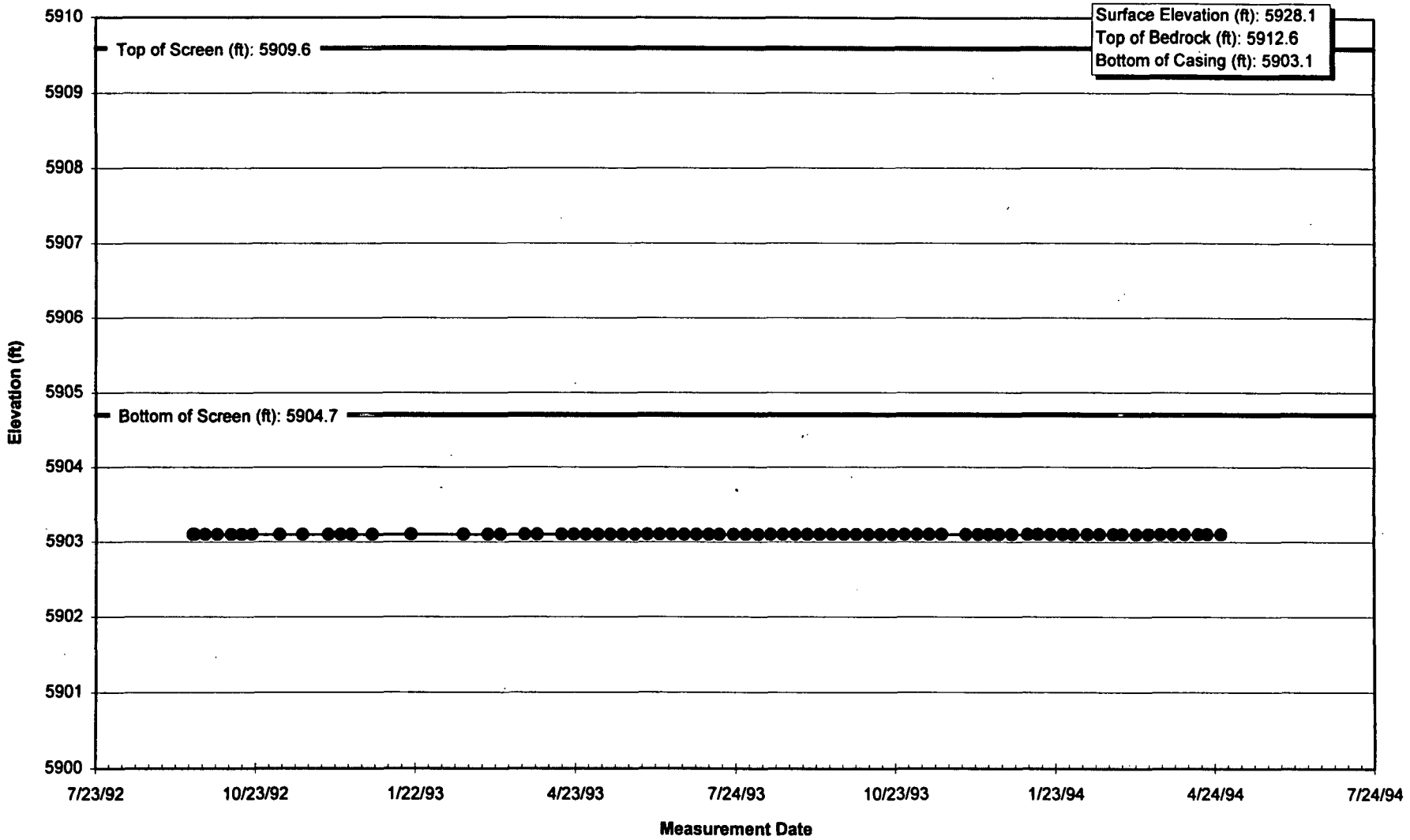
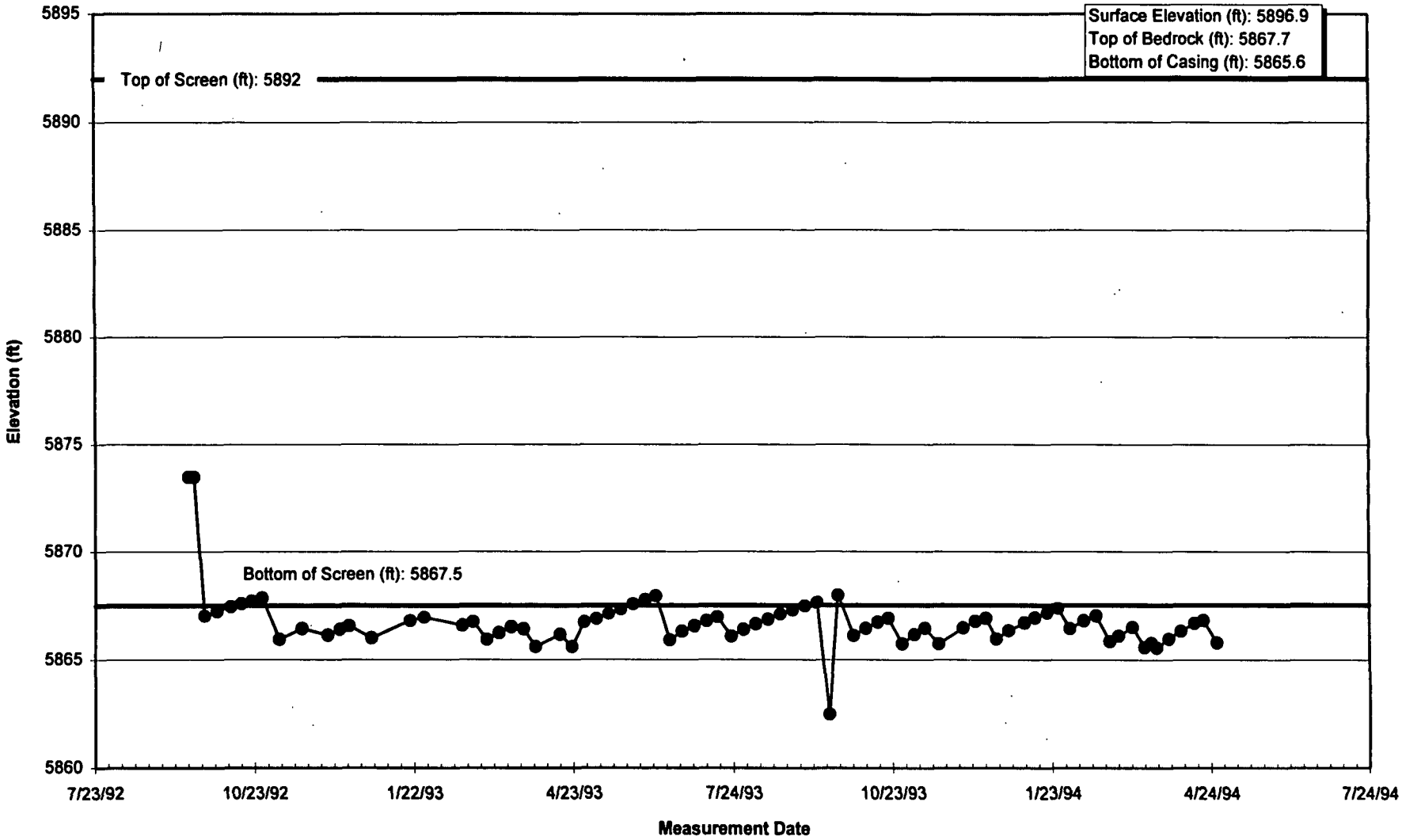


563 S5.XLS 10892 4/3/95

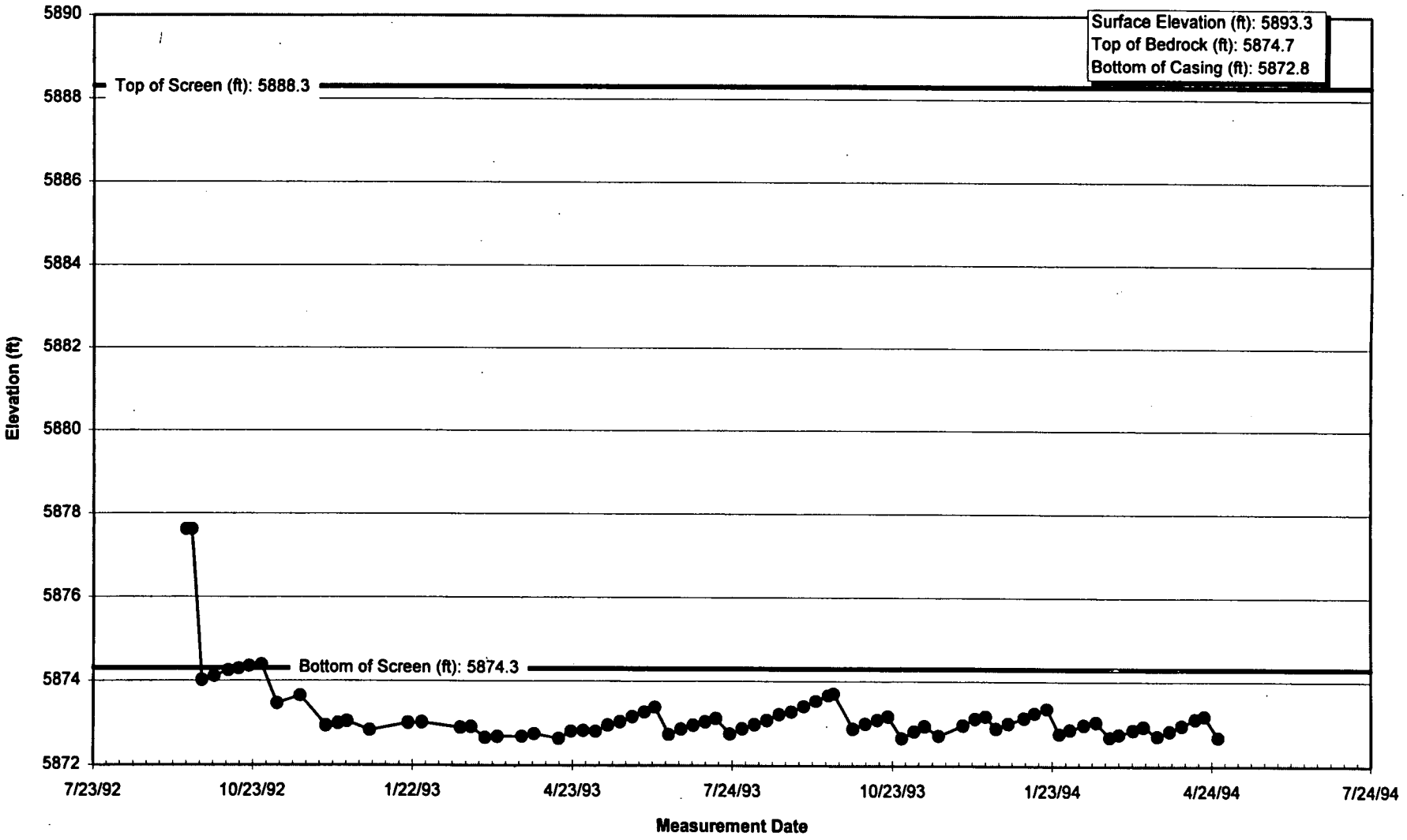
Hydrograph 10992



S64

S5.XLS 10992 4/3/95

Hydrograph 11092



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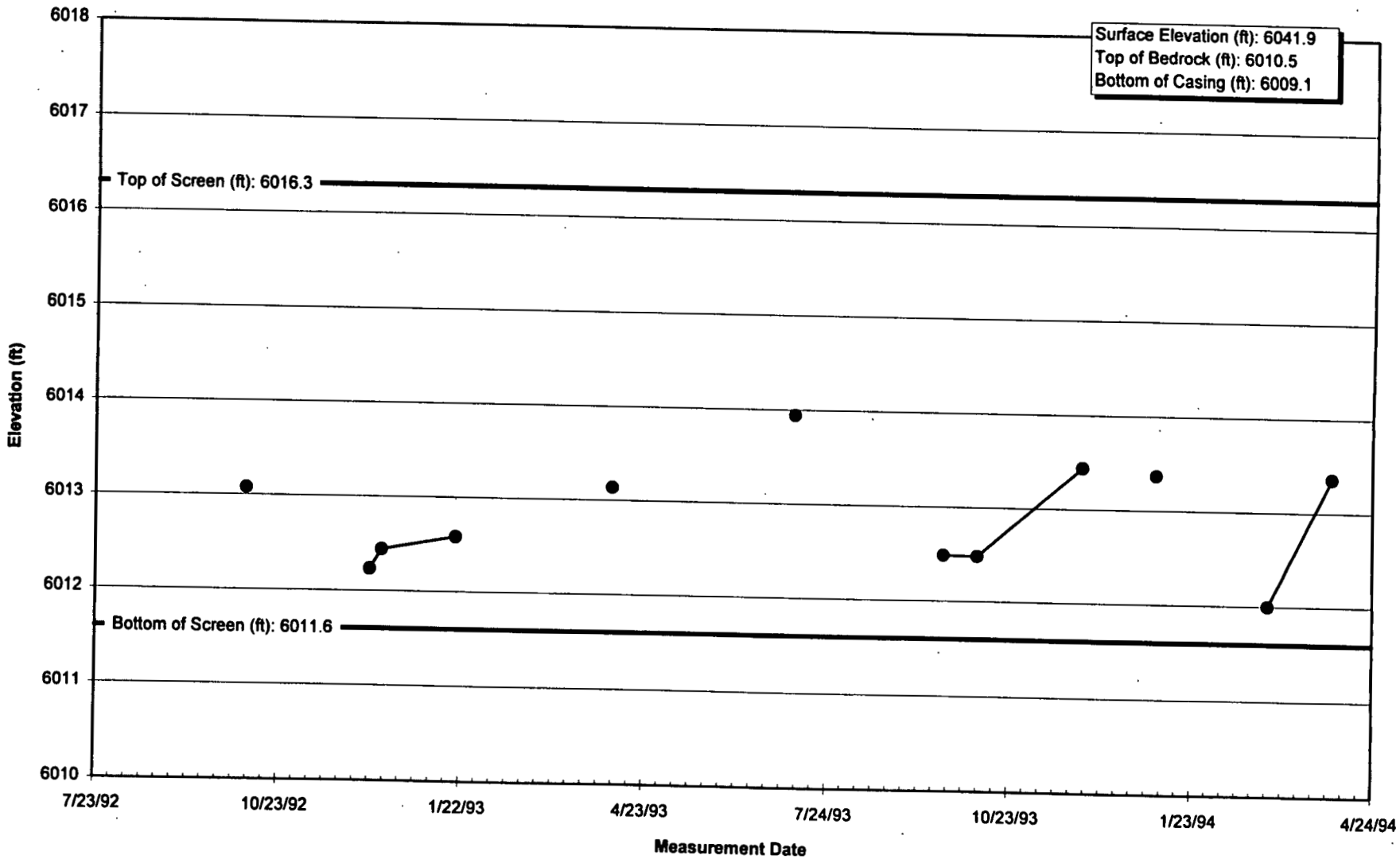
565

Hydrograph 43392



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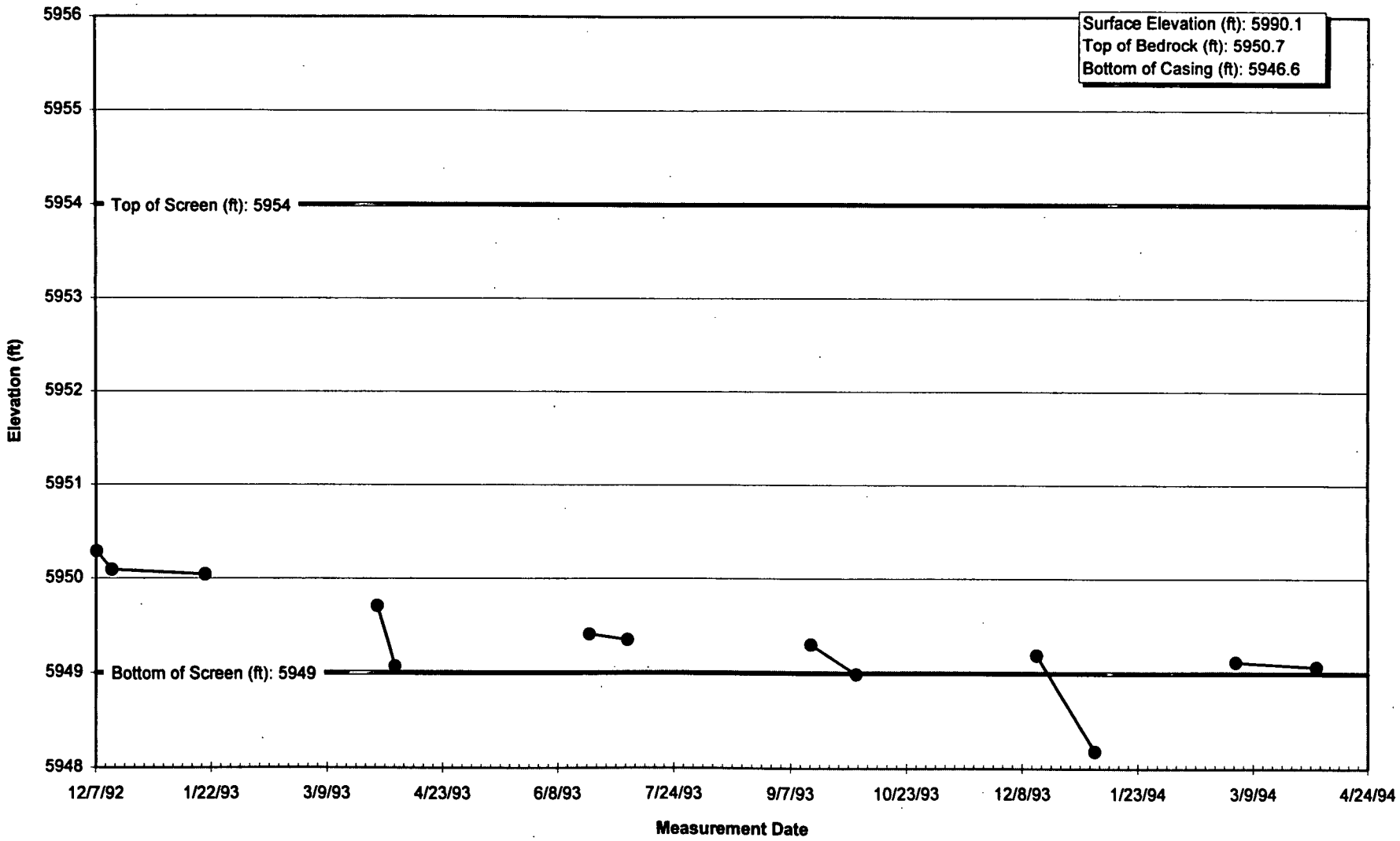
Hydrograph 43492



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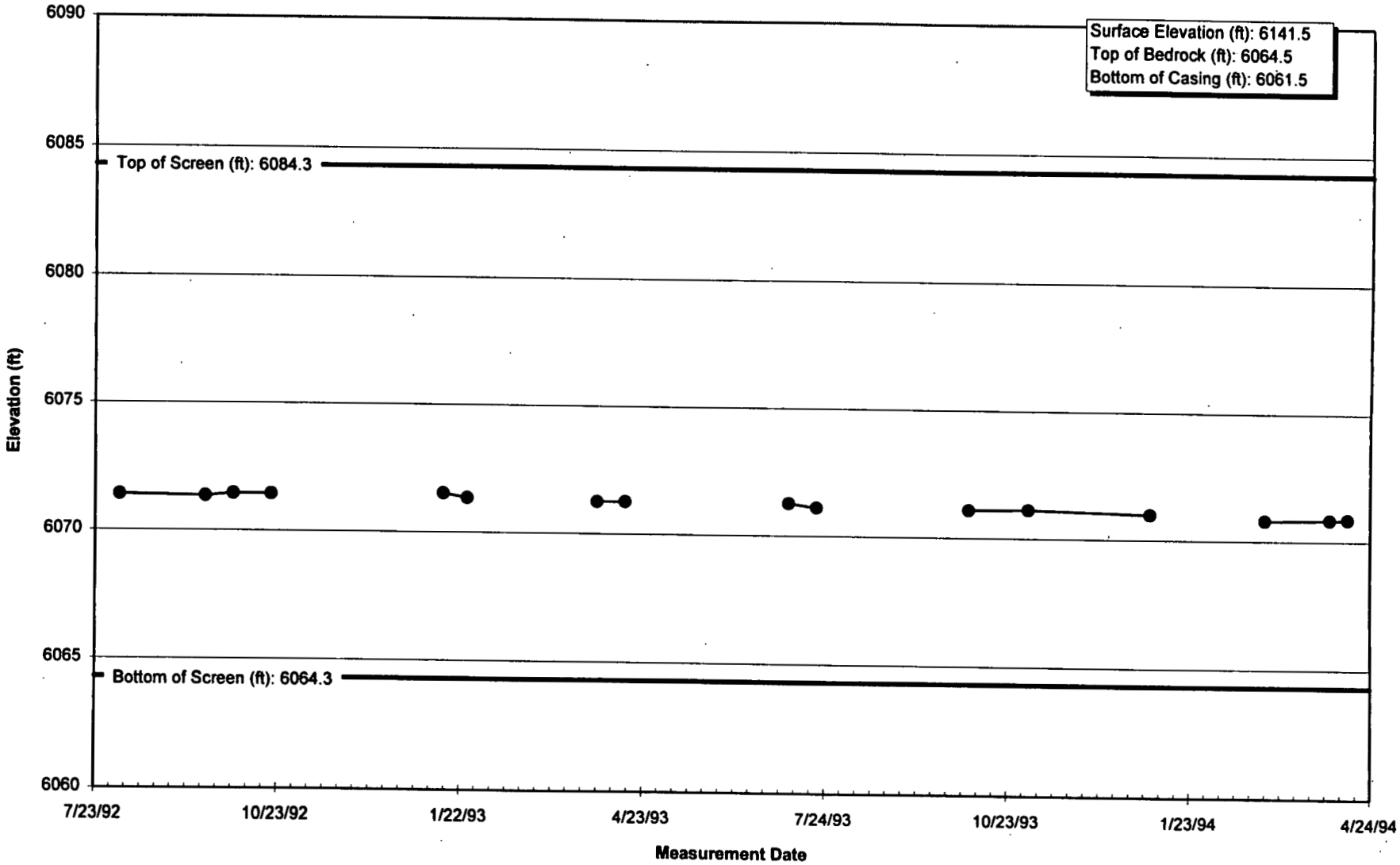

568

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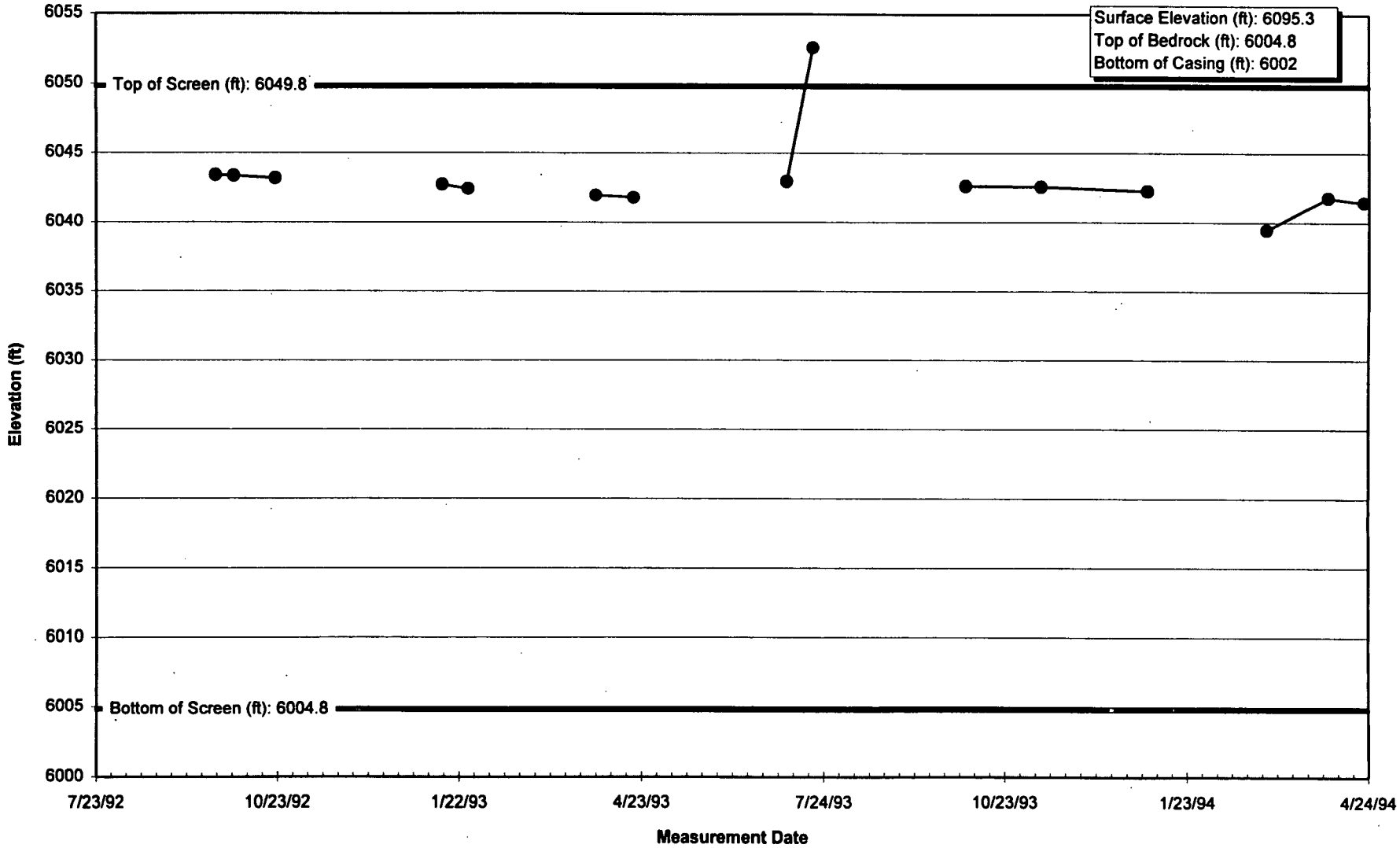
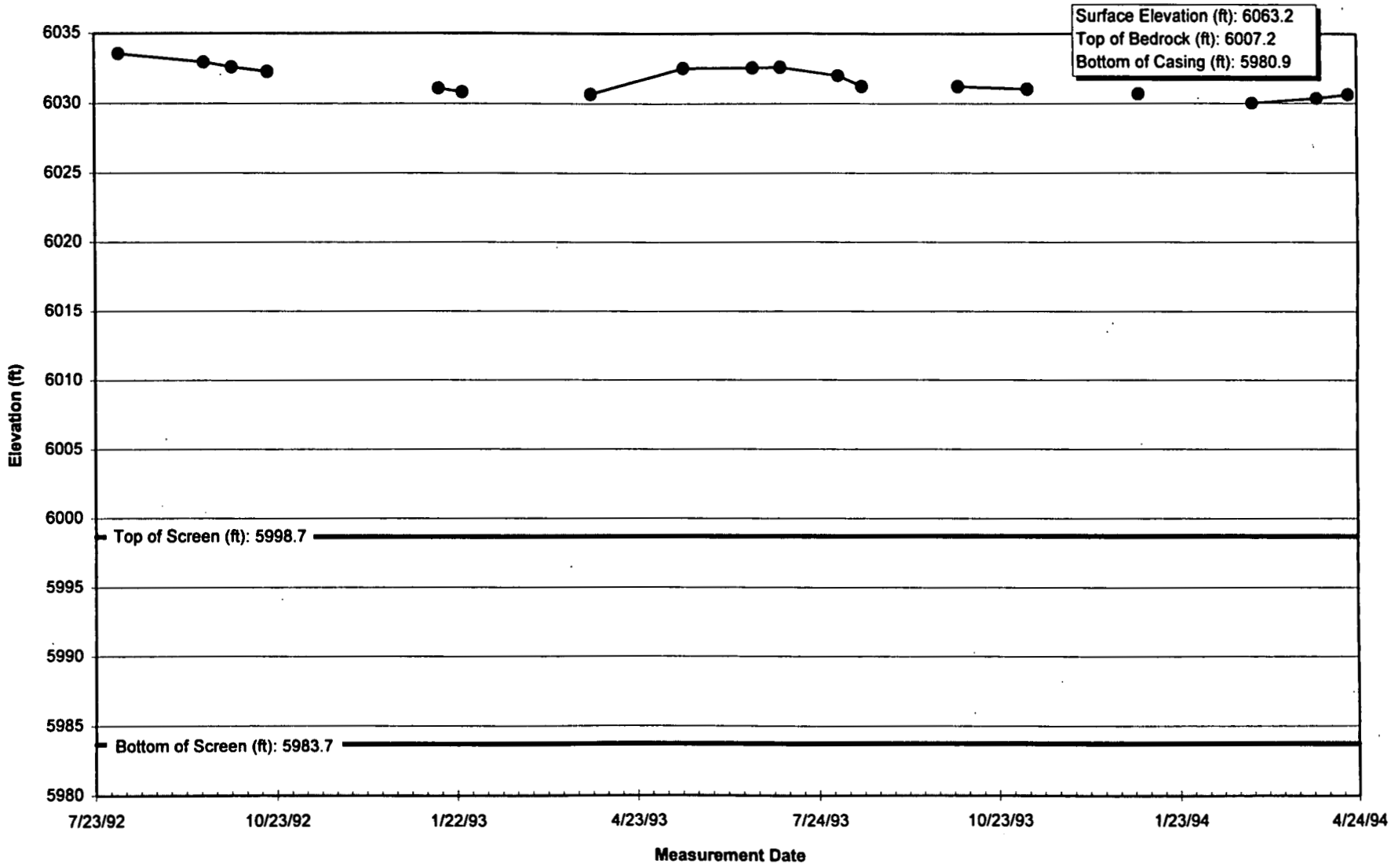
Hydrograph 46292



S12.XLS 46292 4/5/95

569

Hydrograph 46392



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570

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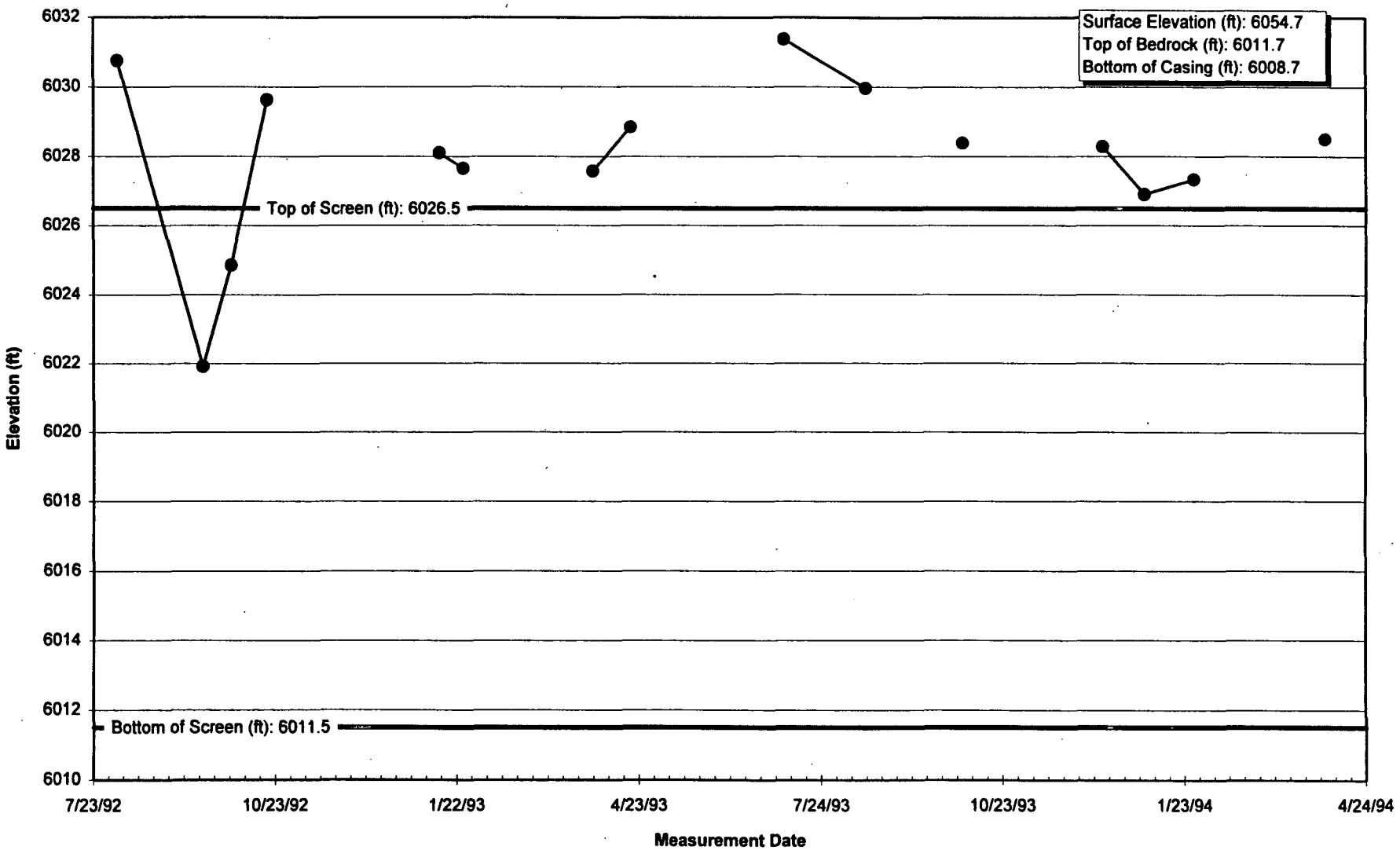

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571

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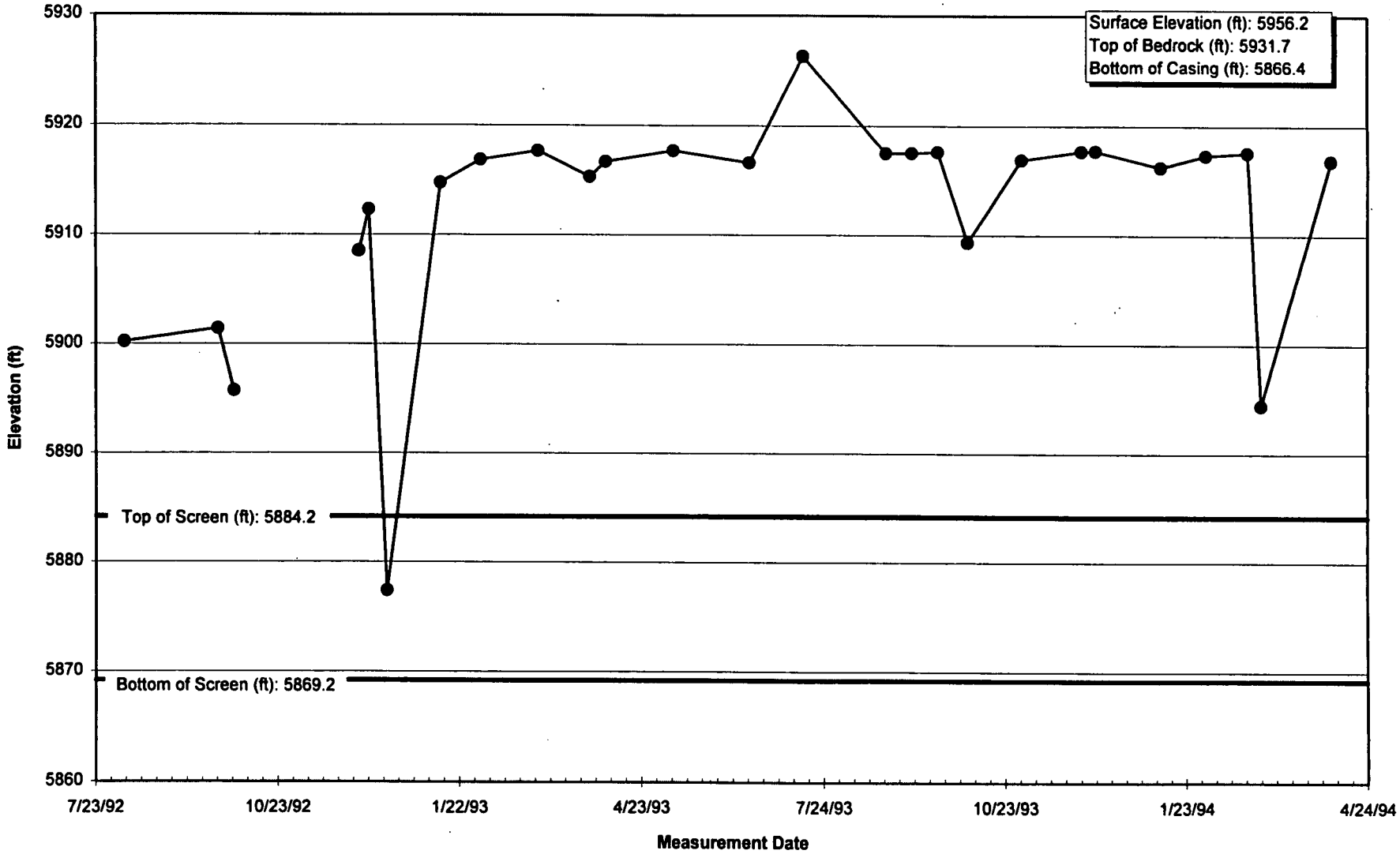

572

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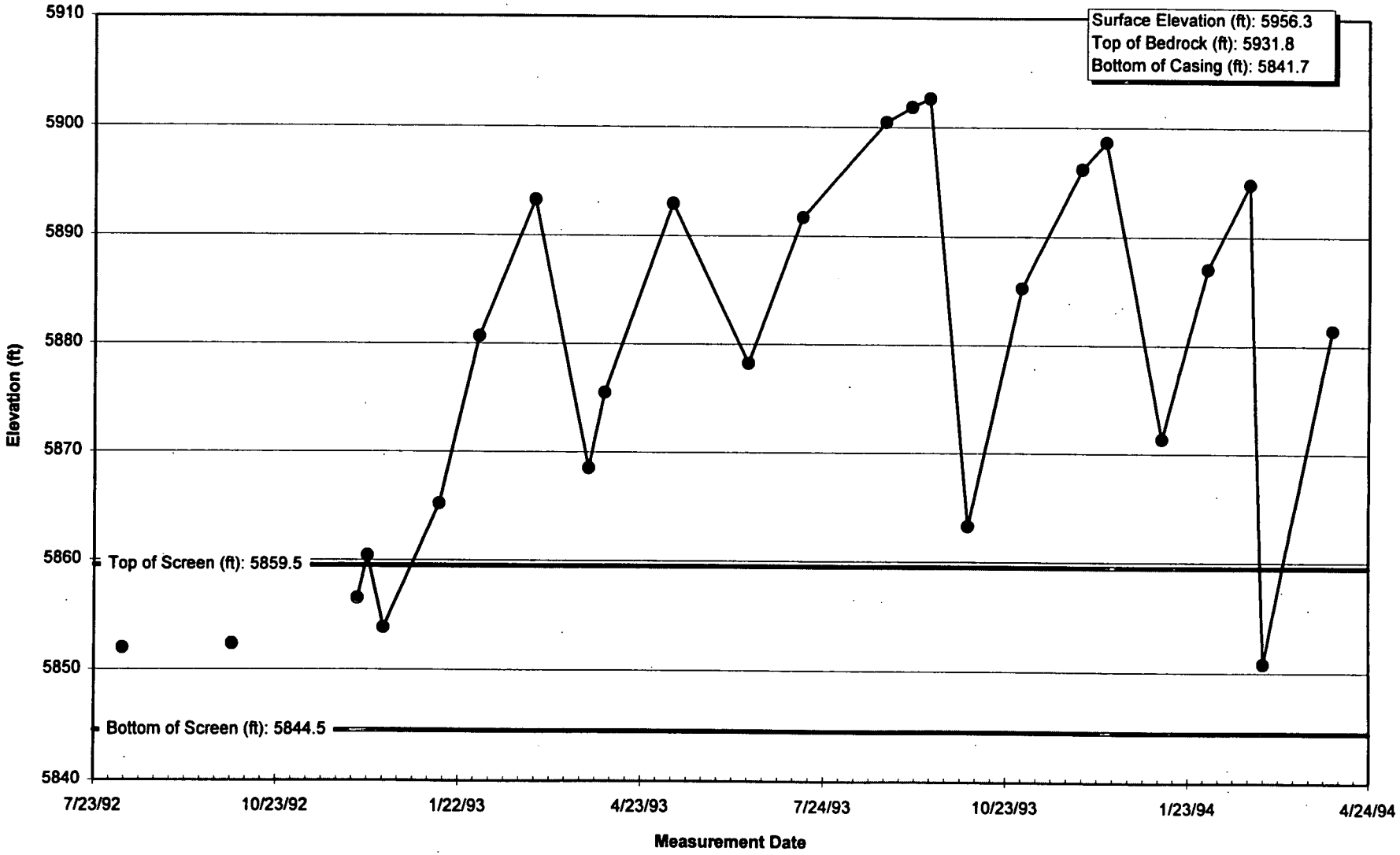

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573

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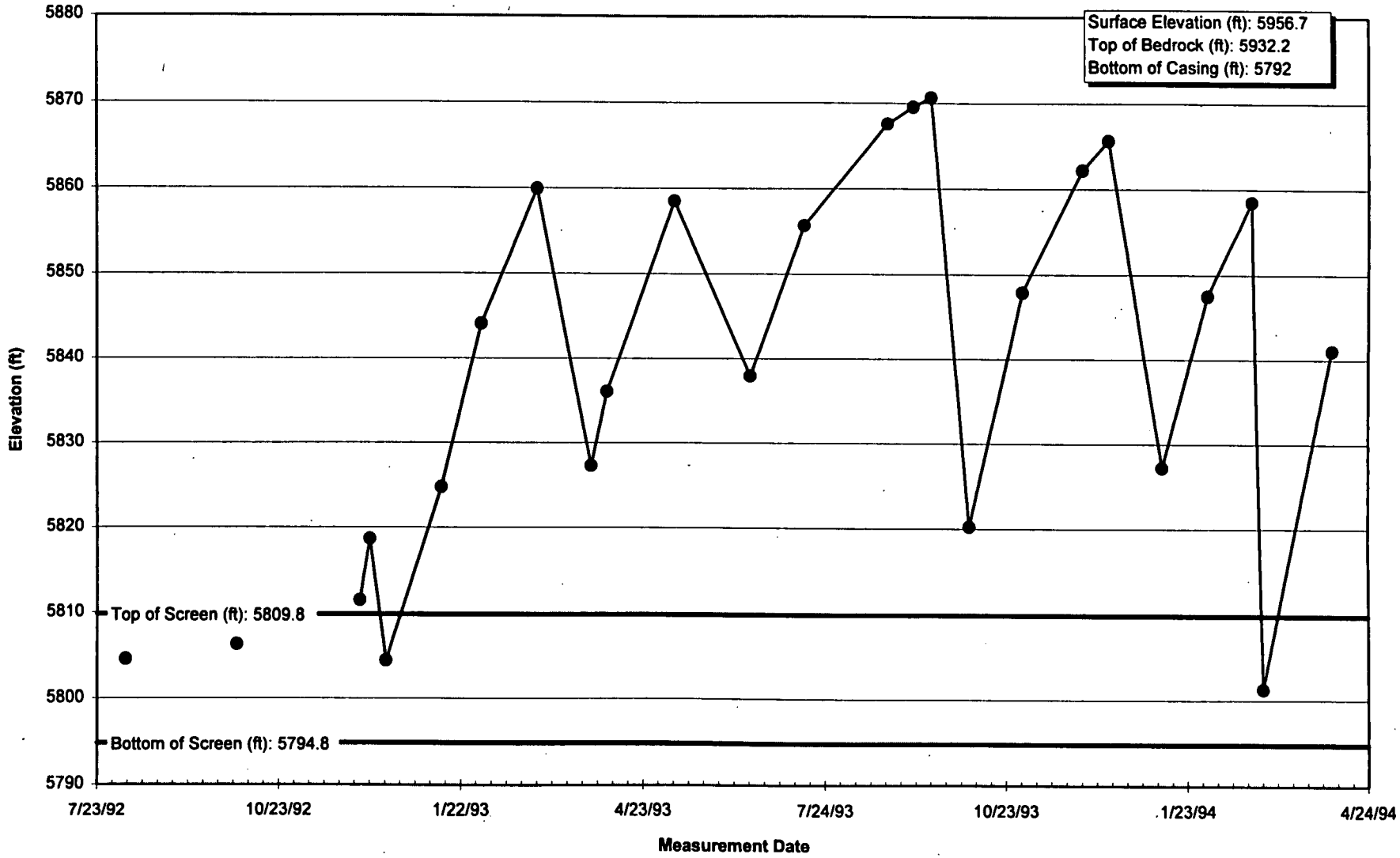

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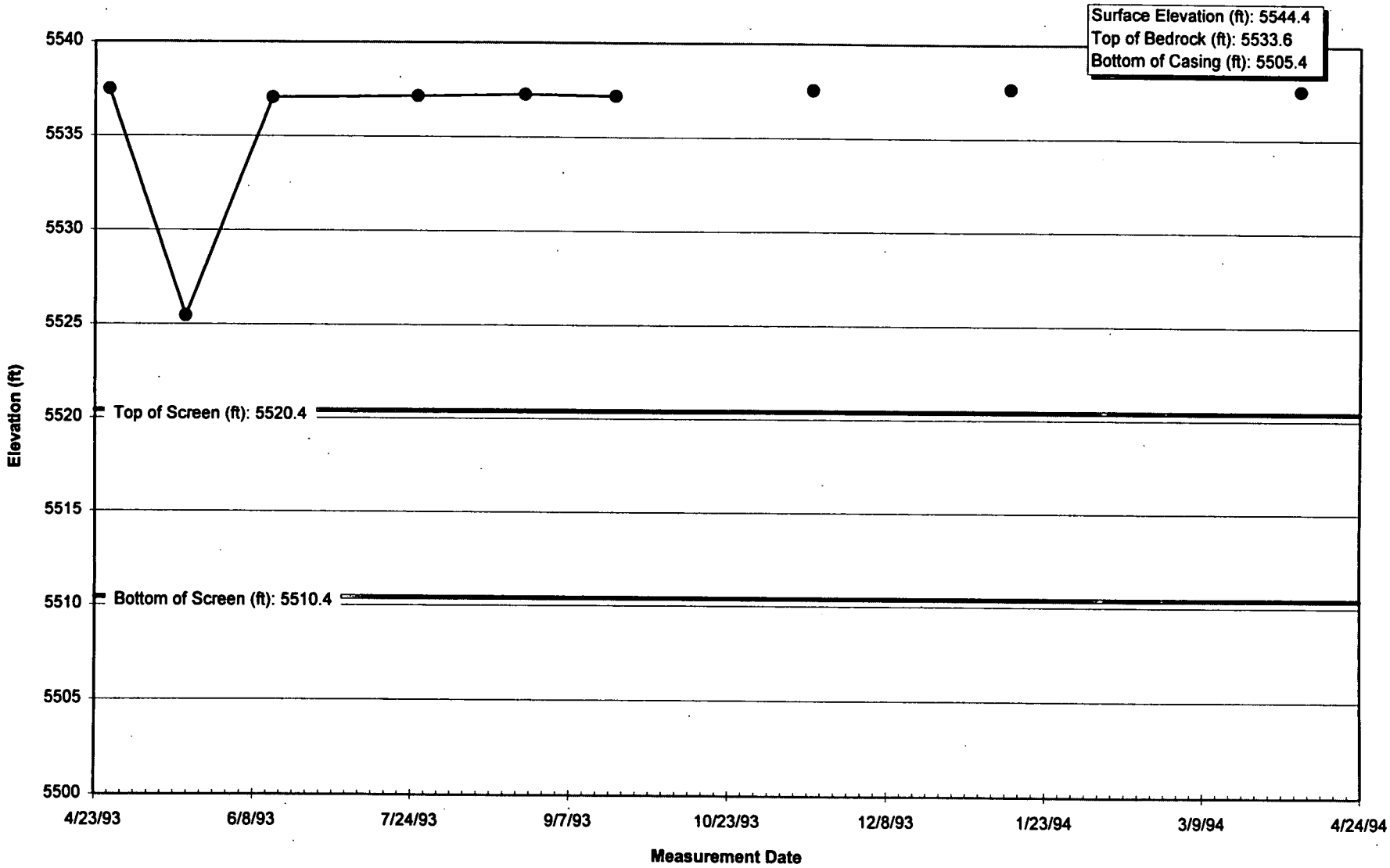
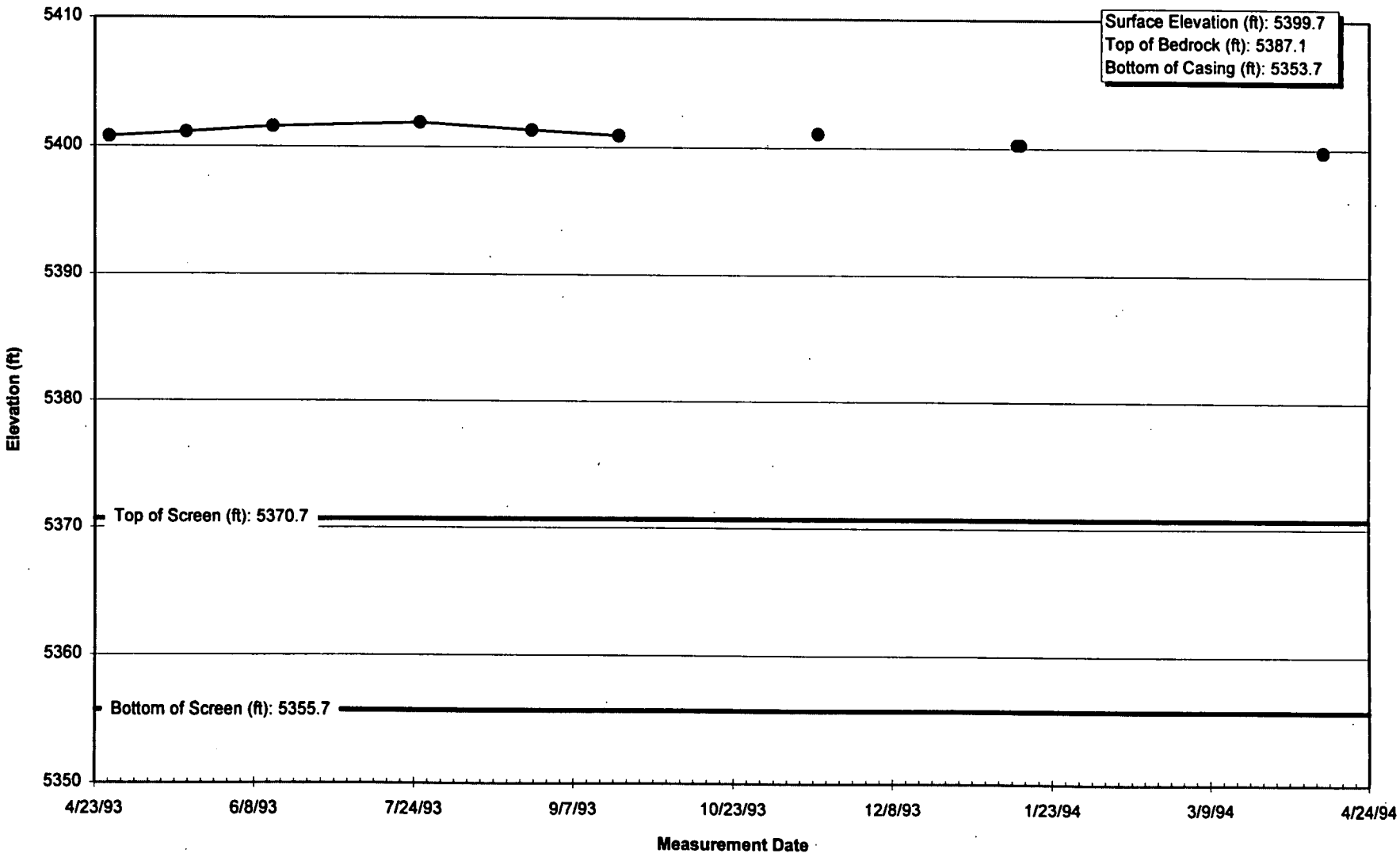
S12.XLS 46892 4/5/95

Hydrograph 49192



515 S13.XLS 49192 4/5/95

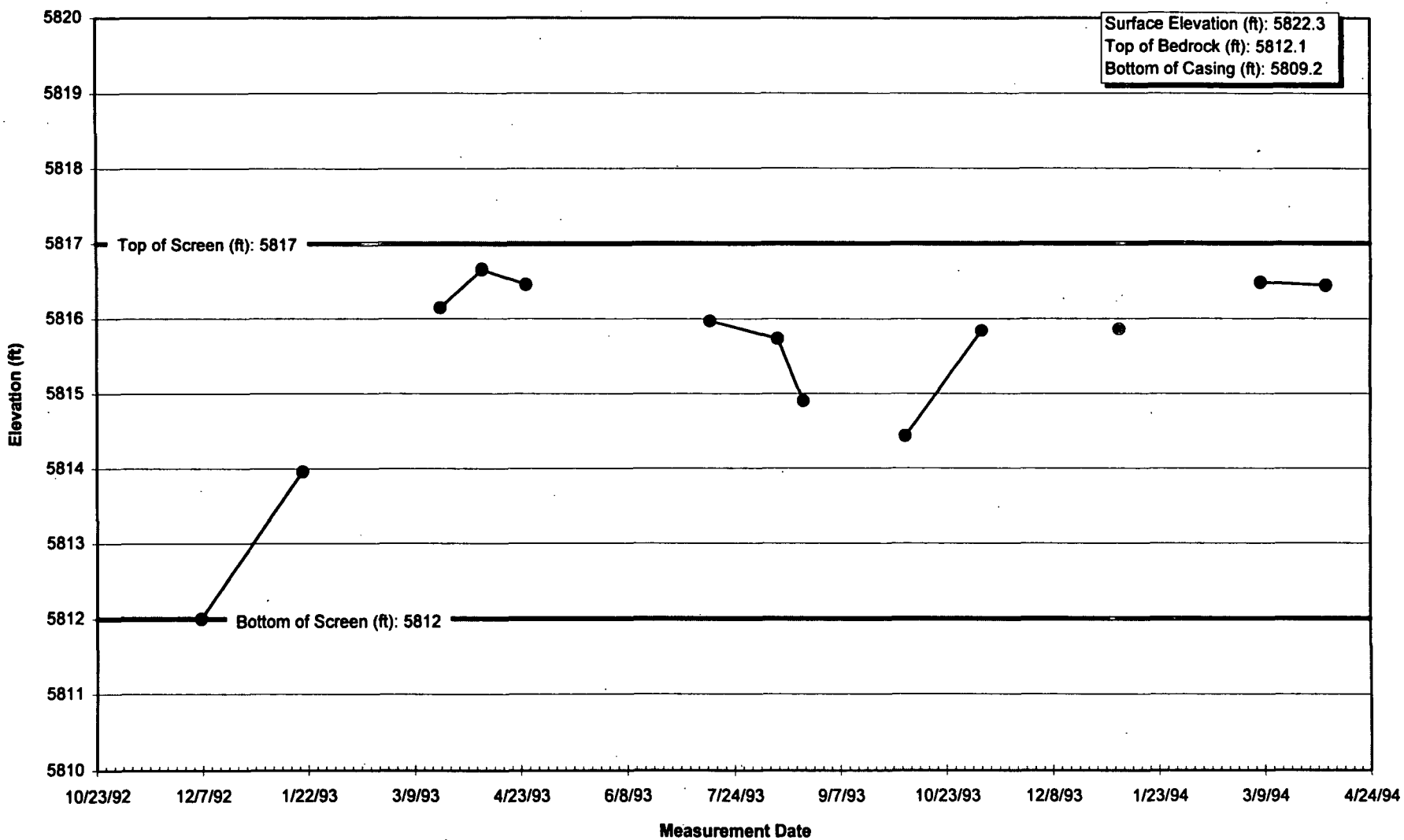
Hydrograph 49292



S13.XLS 49292 4/5/95

516

Hydrograph 50092



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S13.XLS 50092 4/5/95

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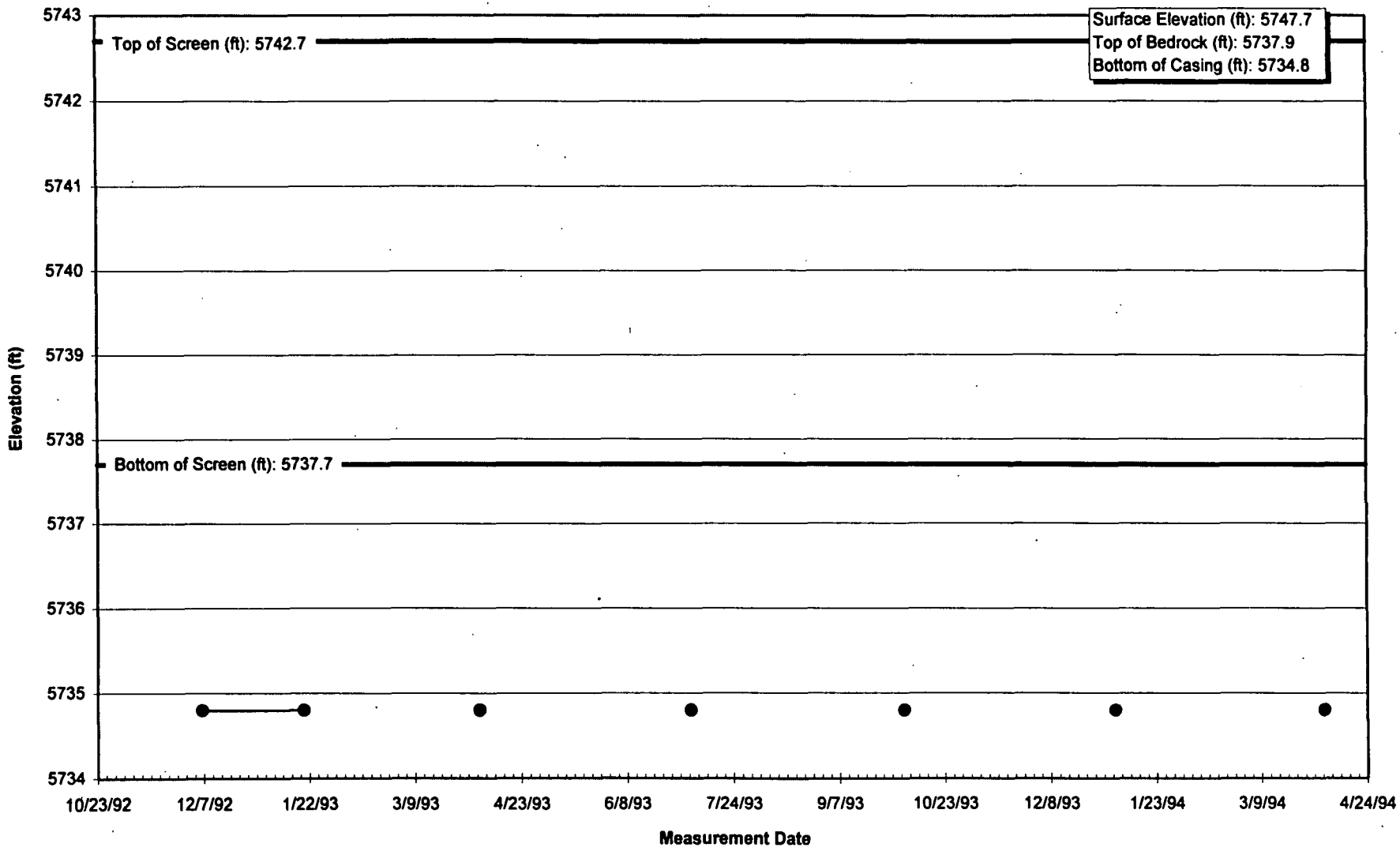

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518

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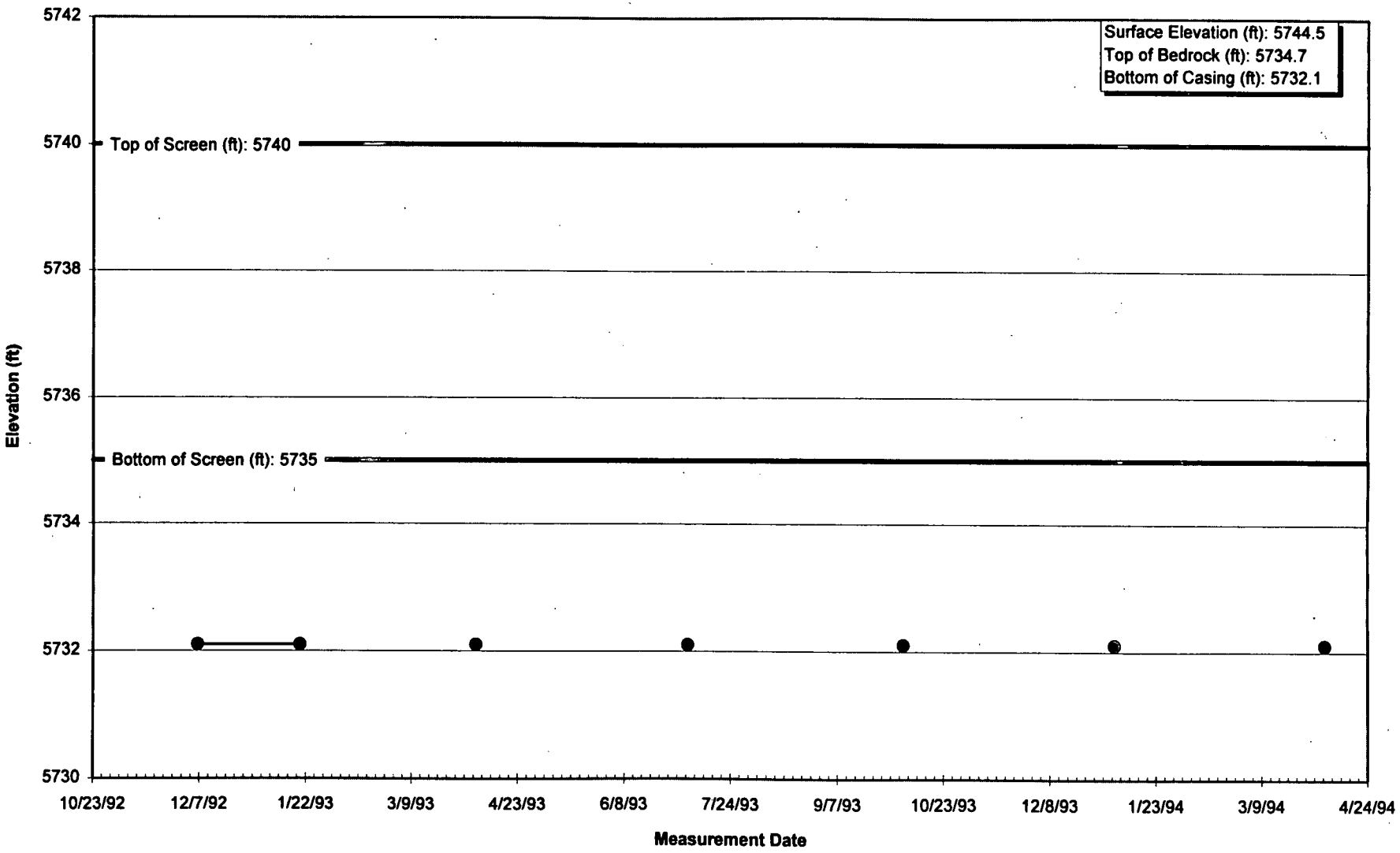

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519

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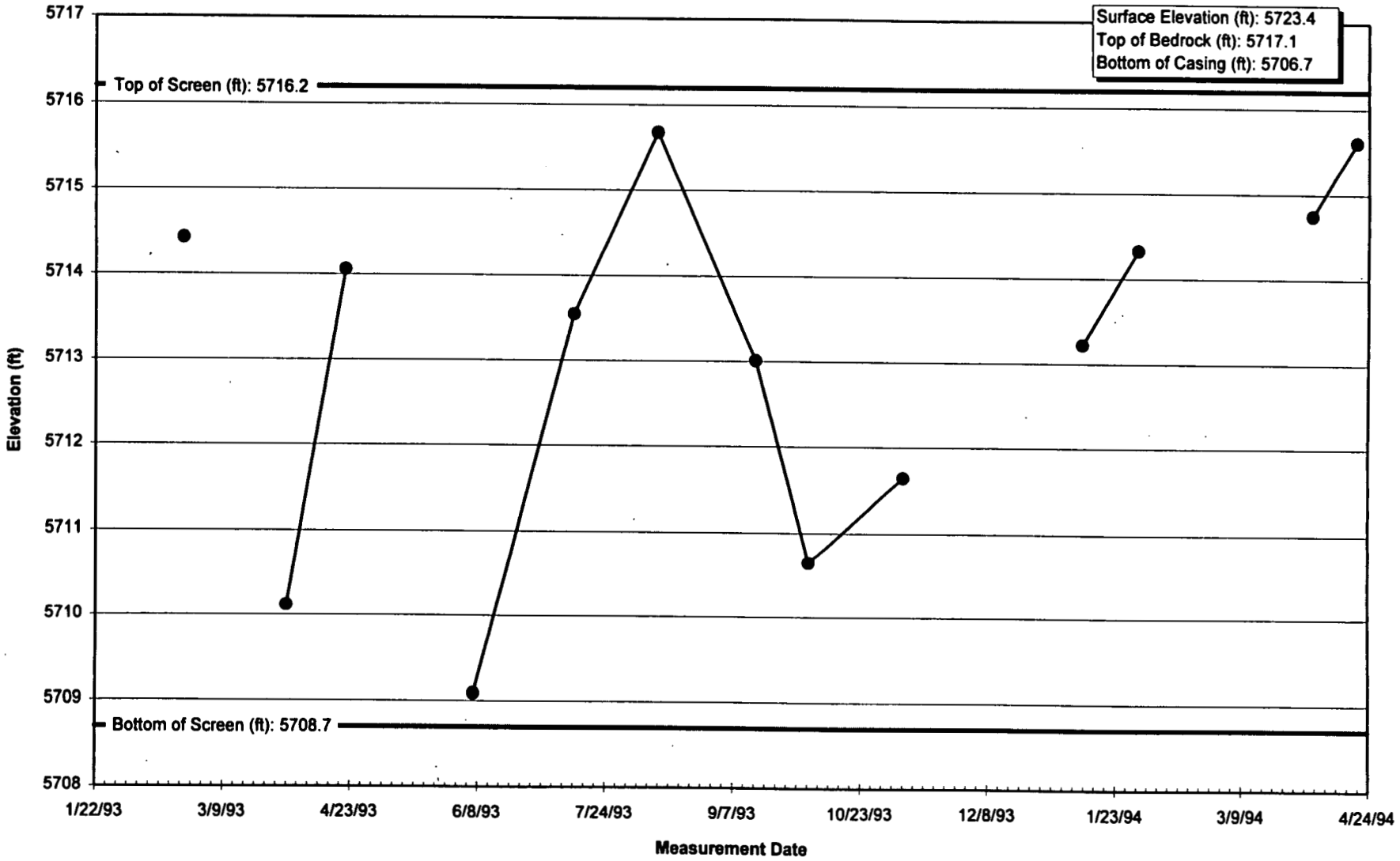

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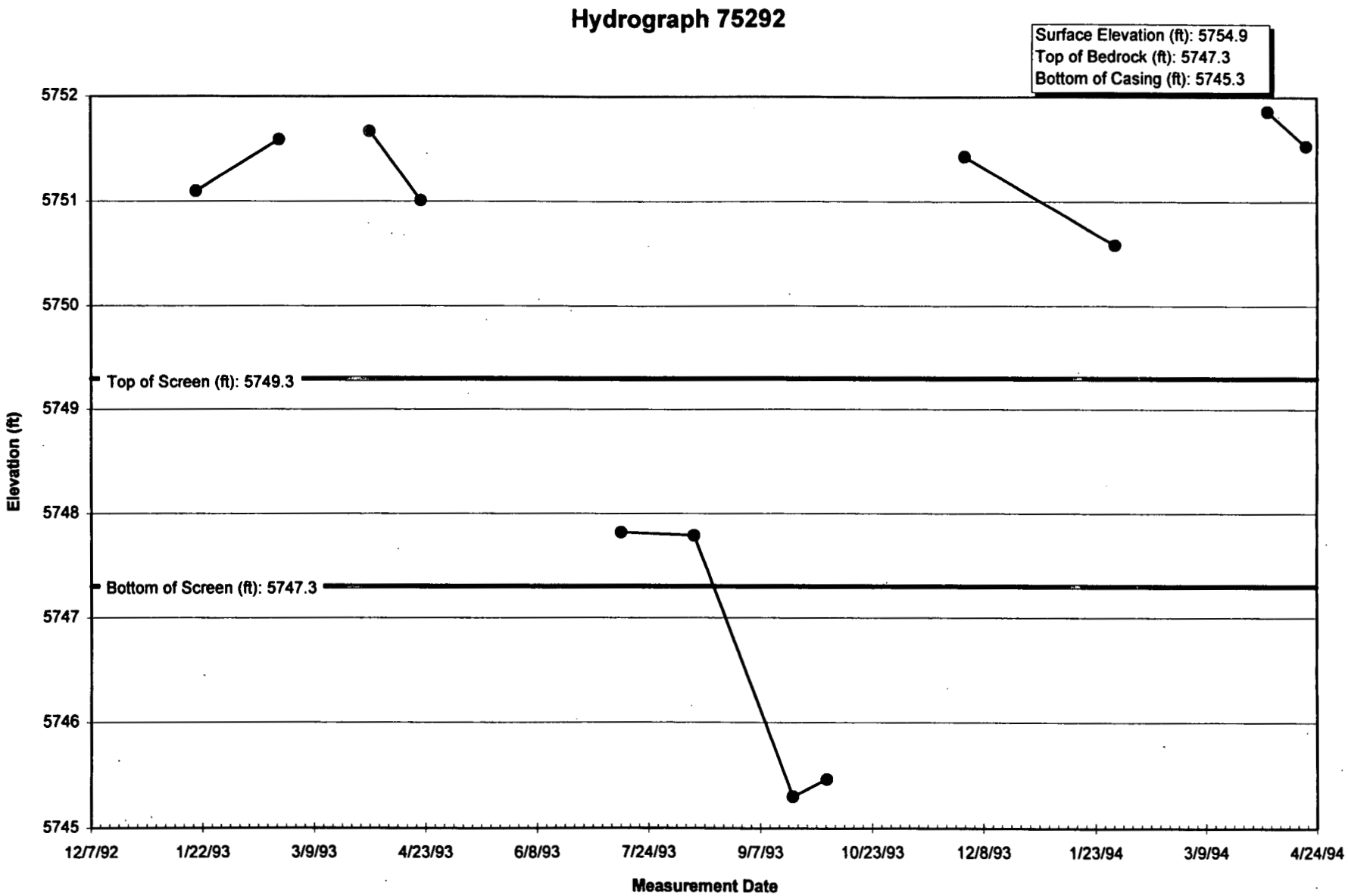
580



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581

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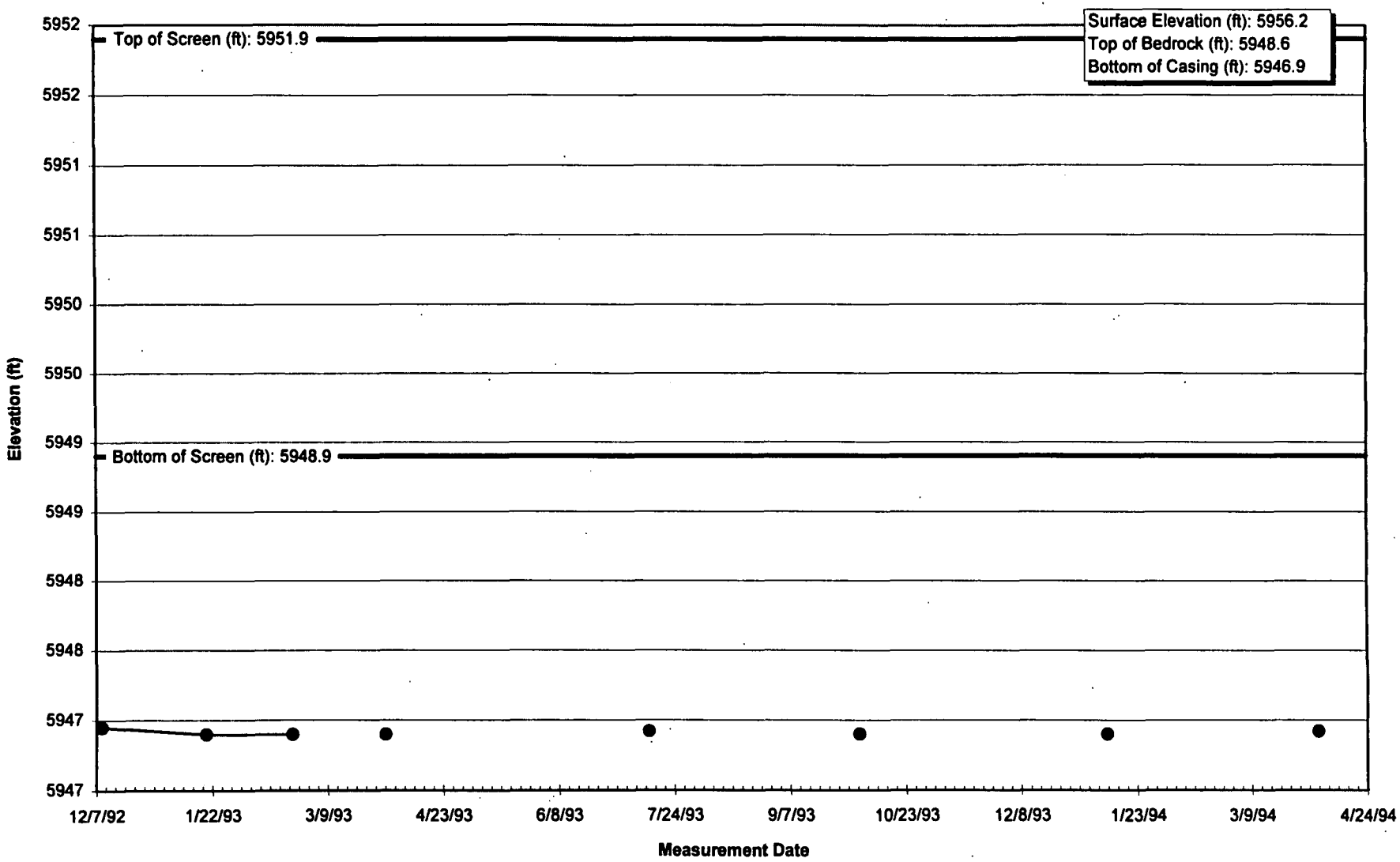

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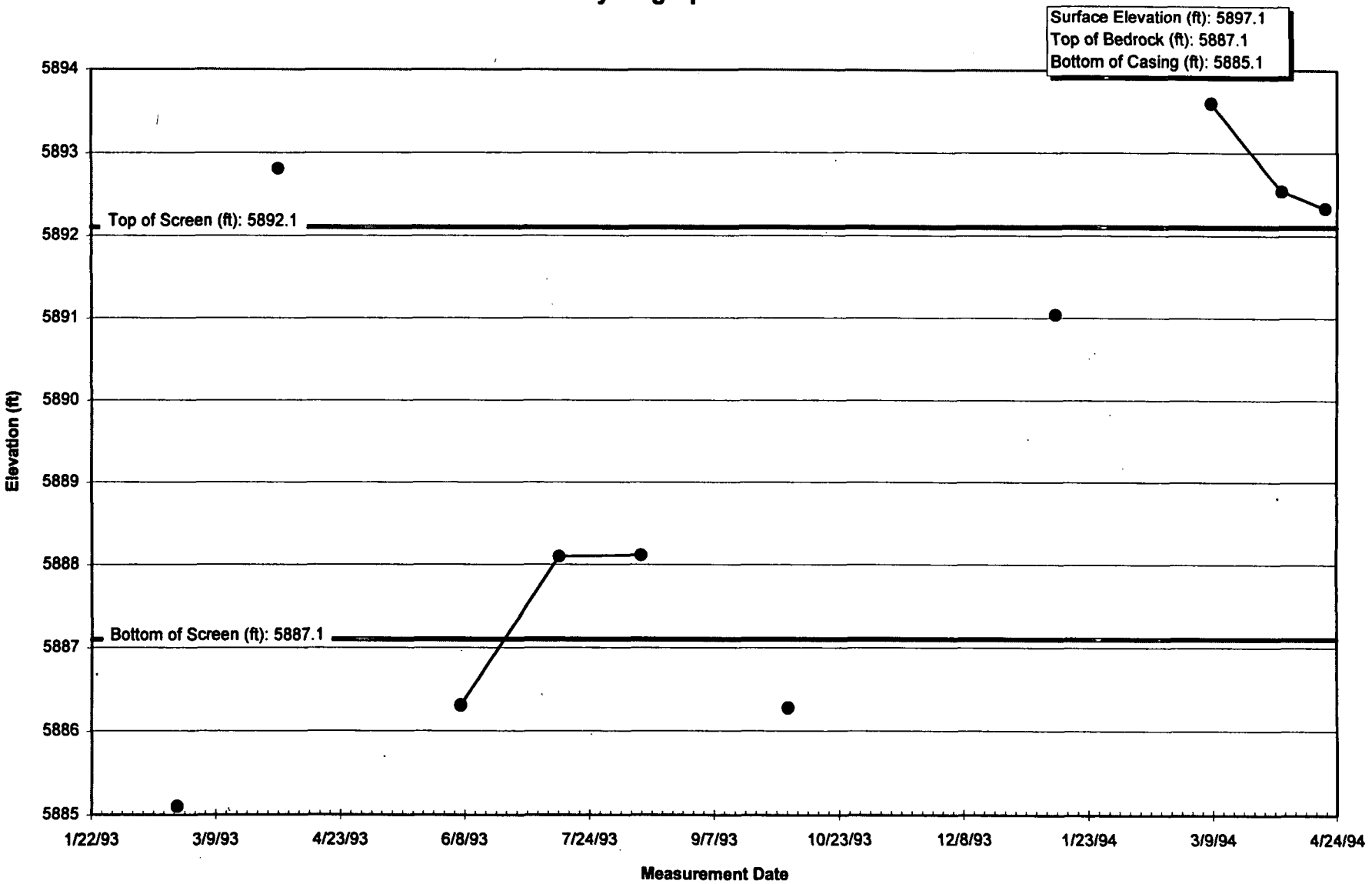

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583

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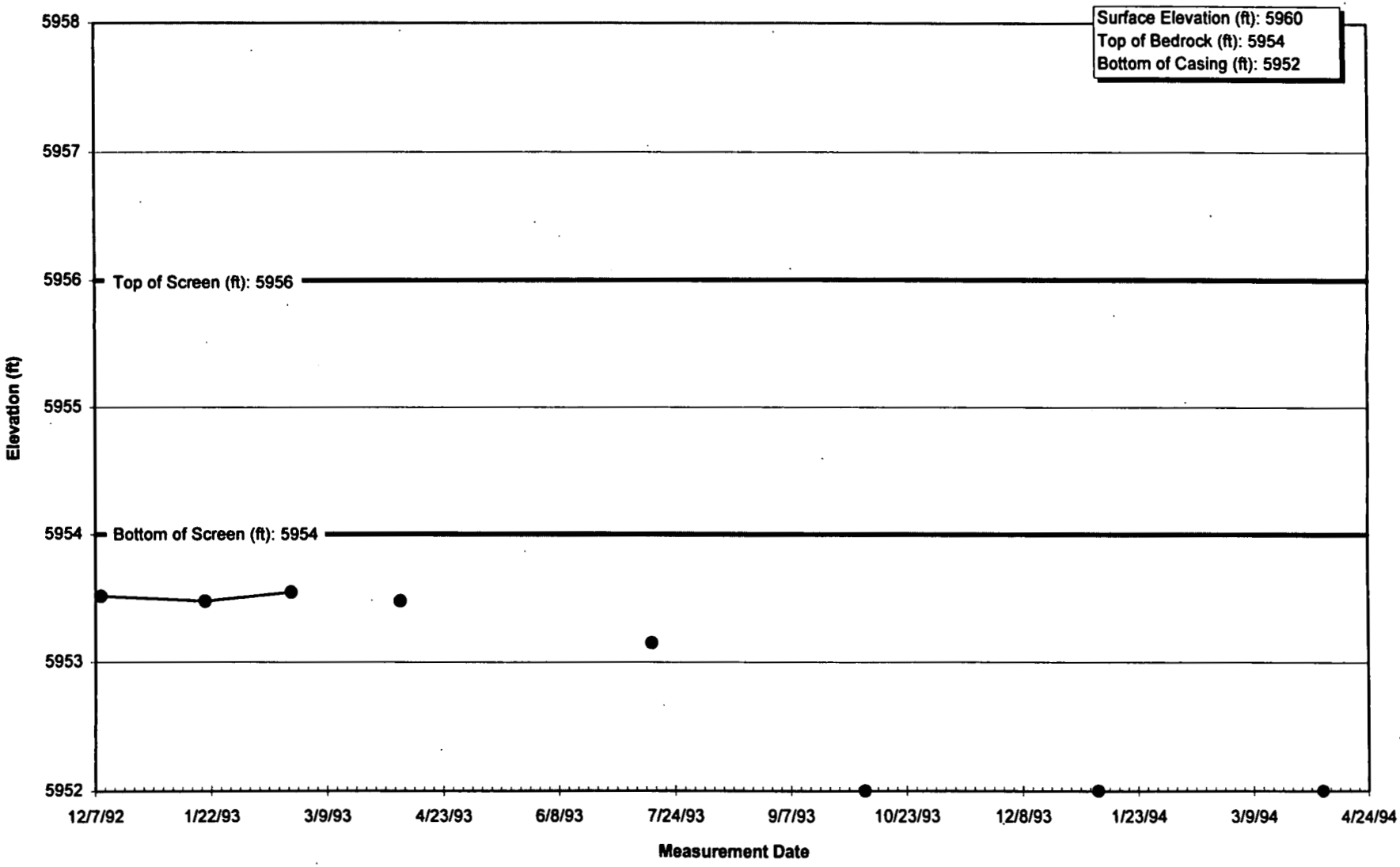

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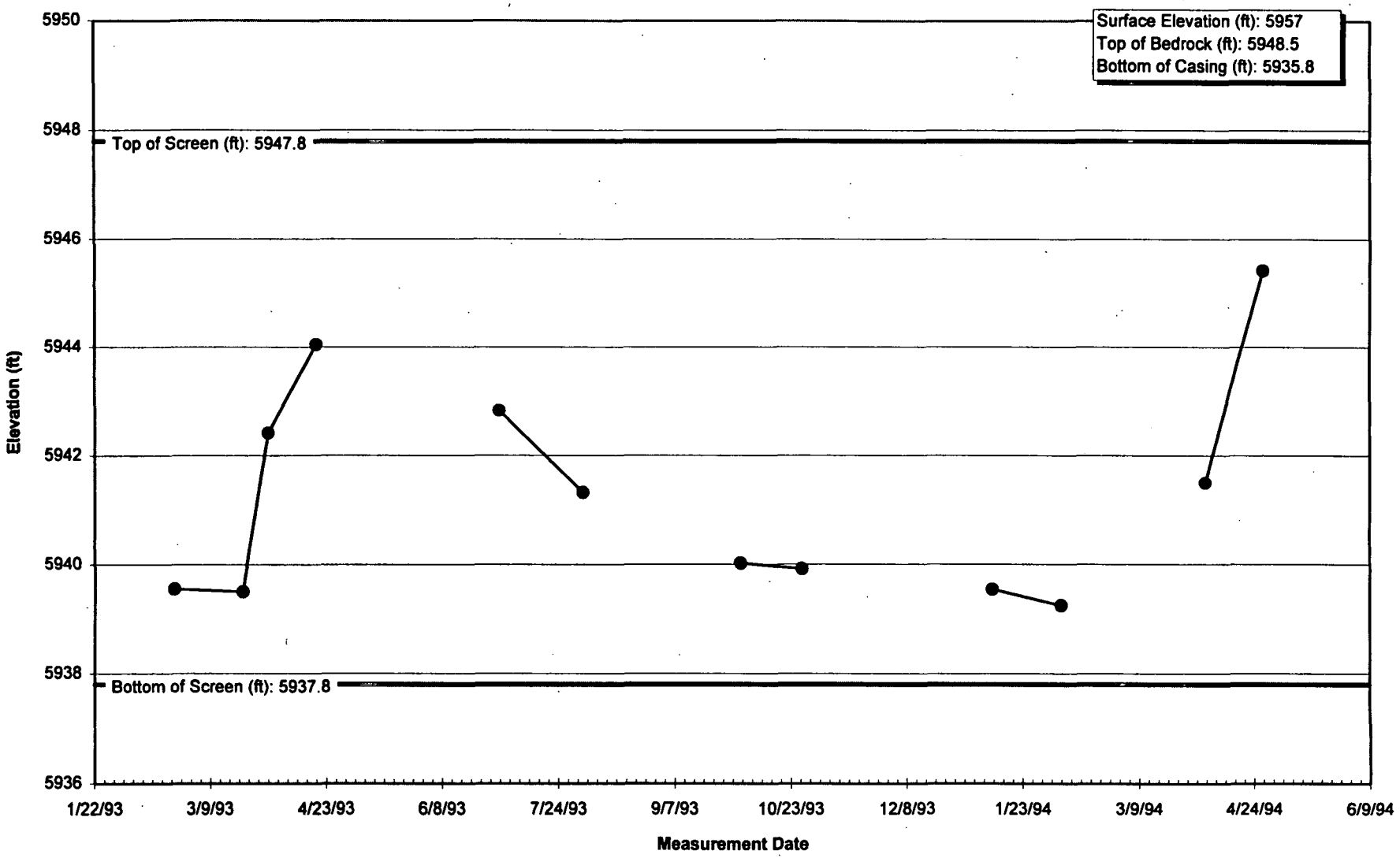

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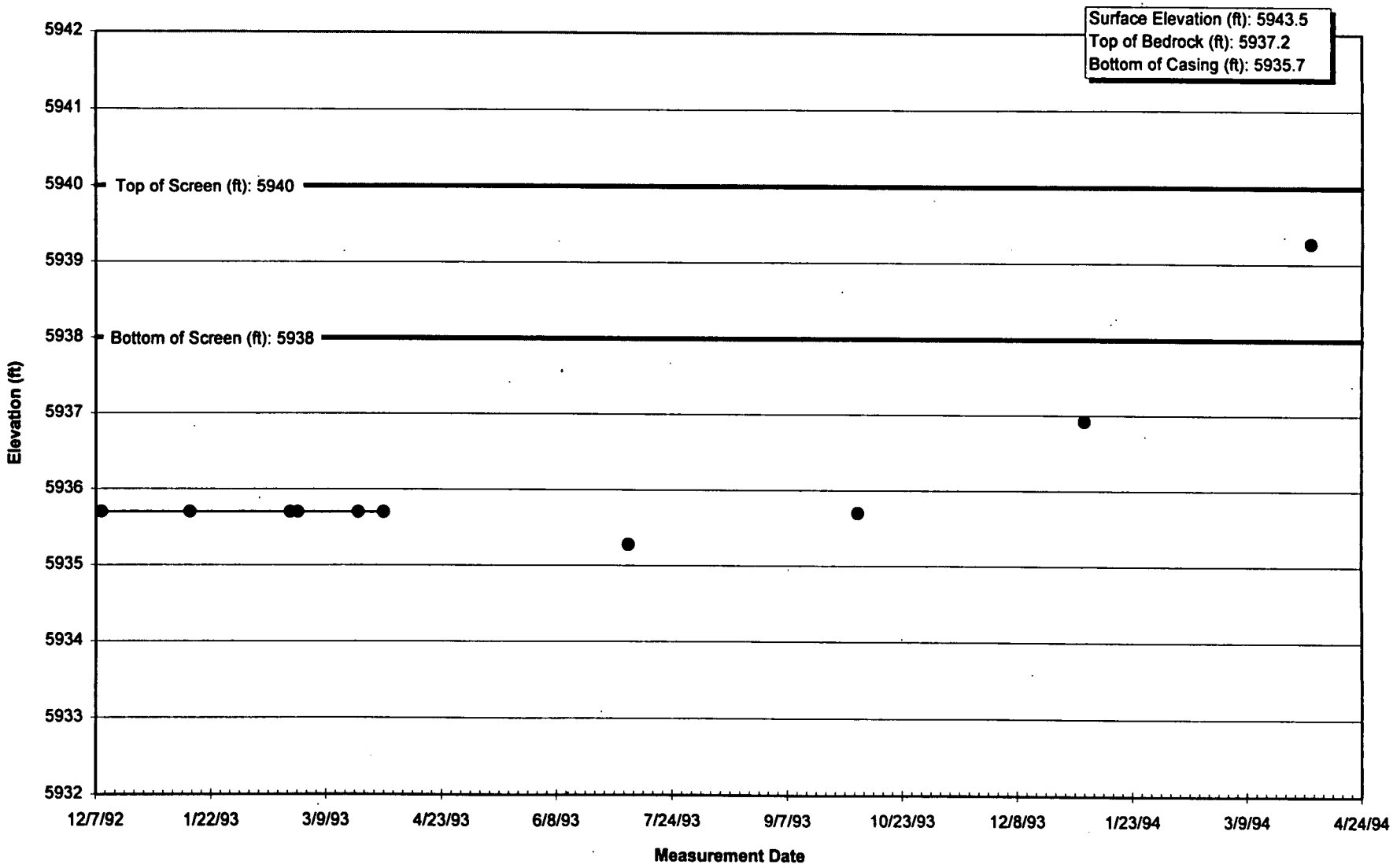
585

Hydrograph 76792



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586

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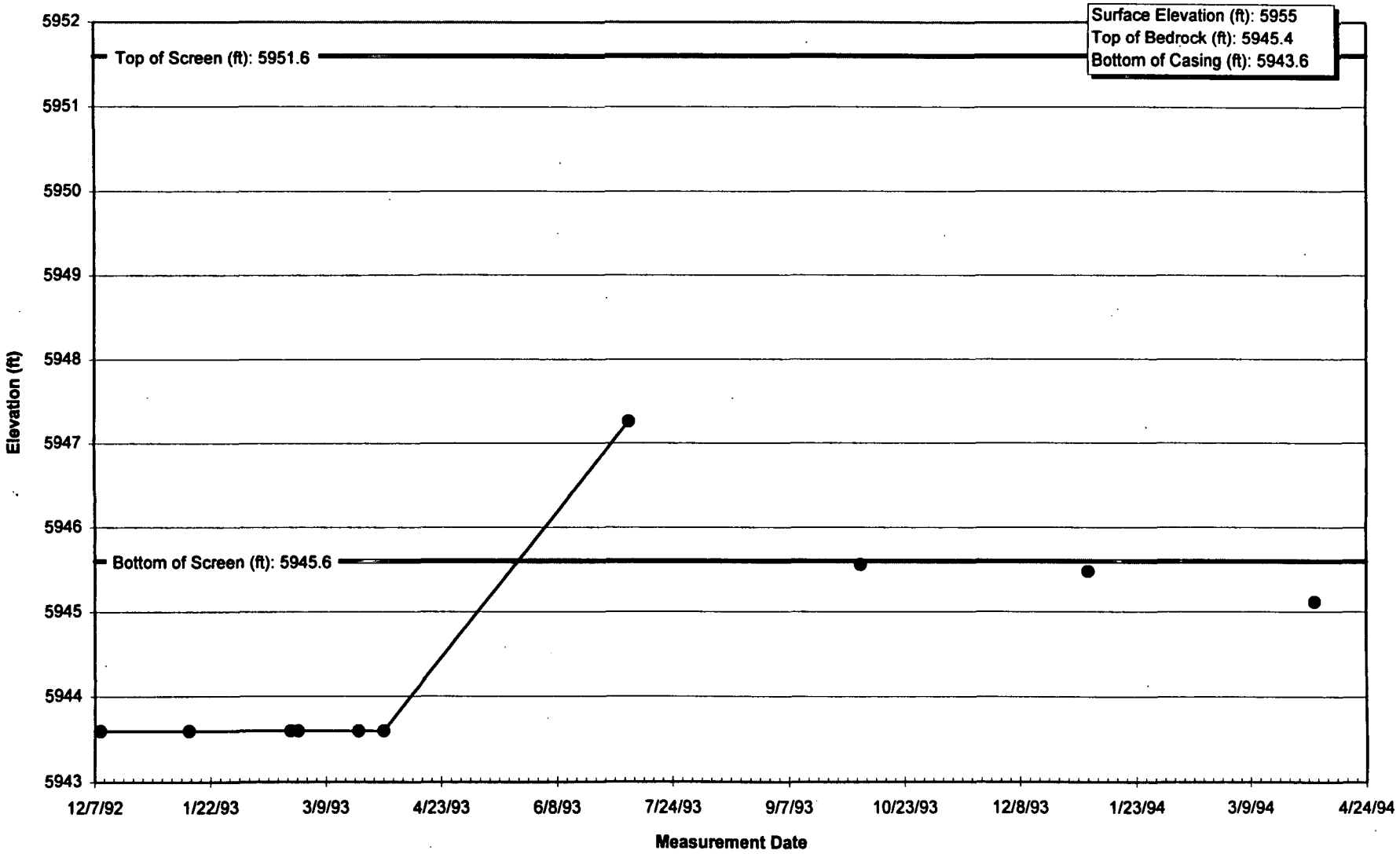

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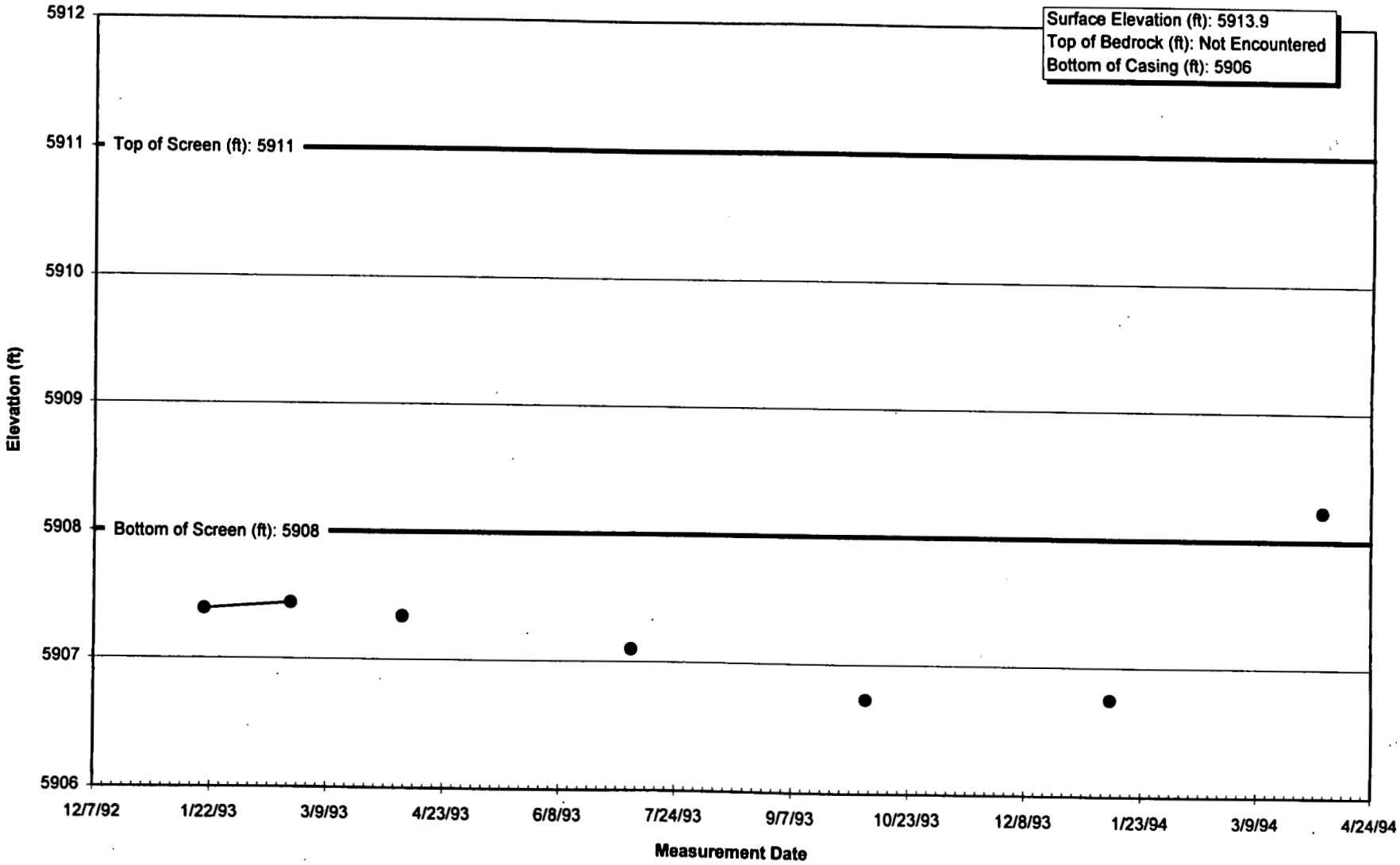

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588

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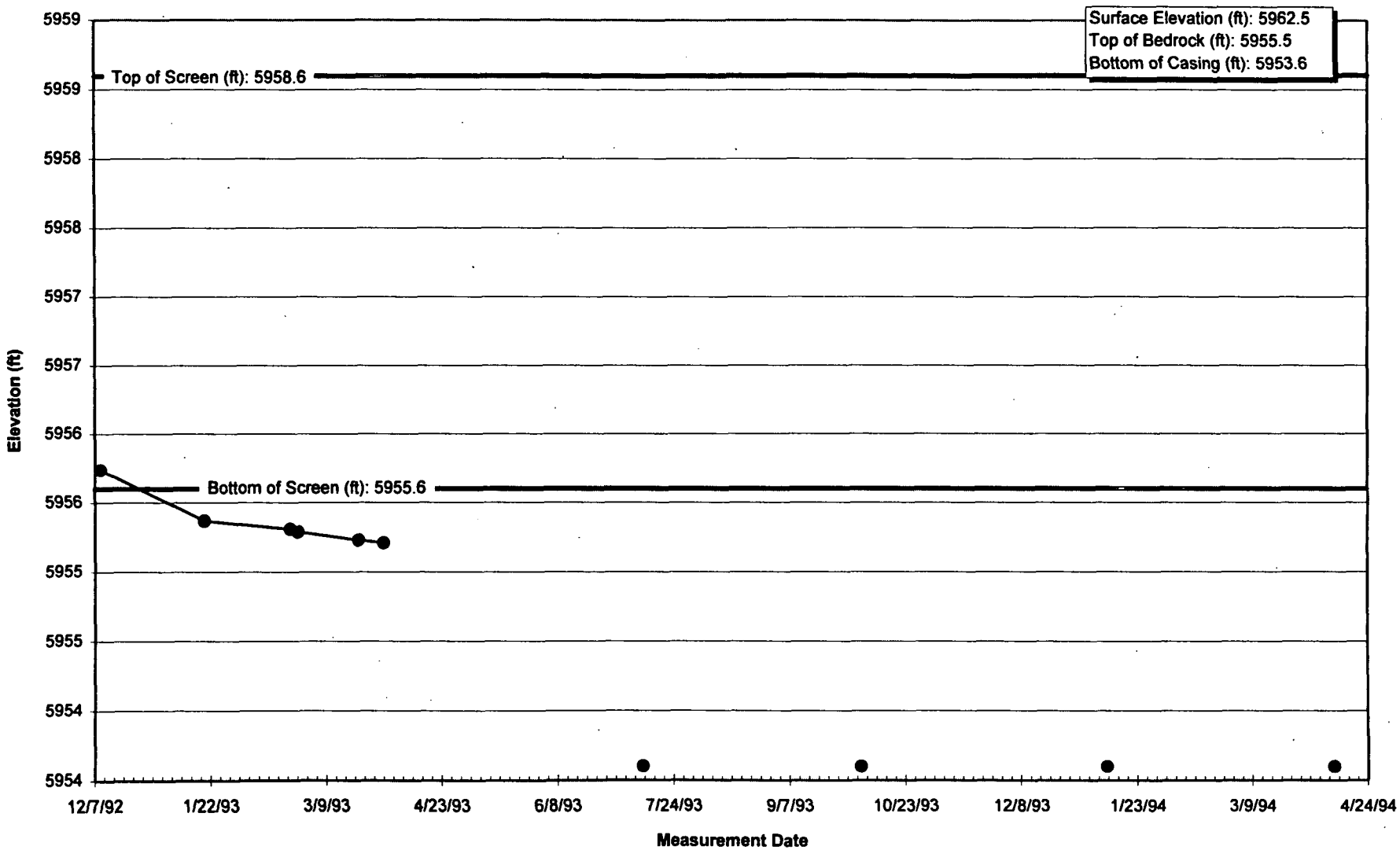

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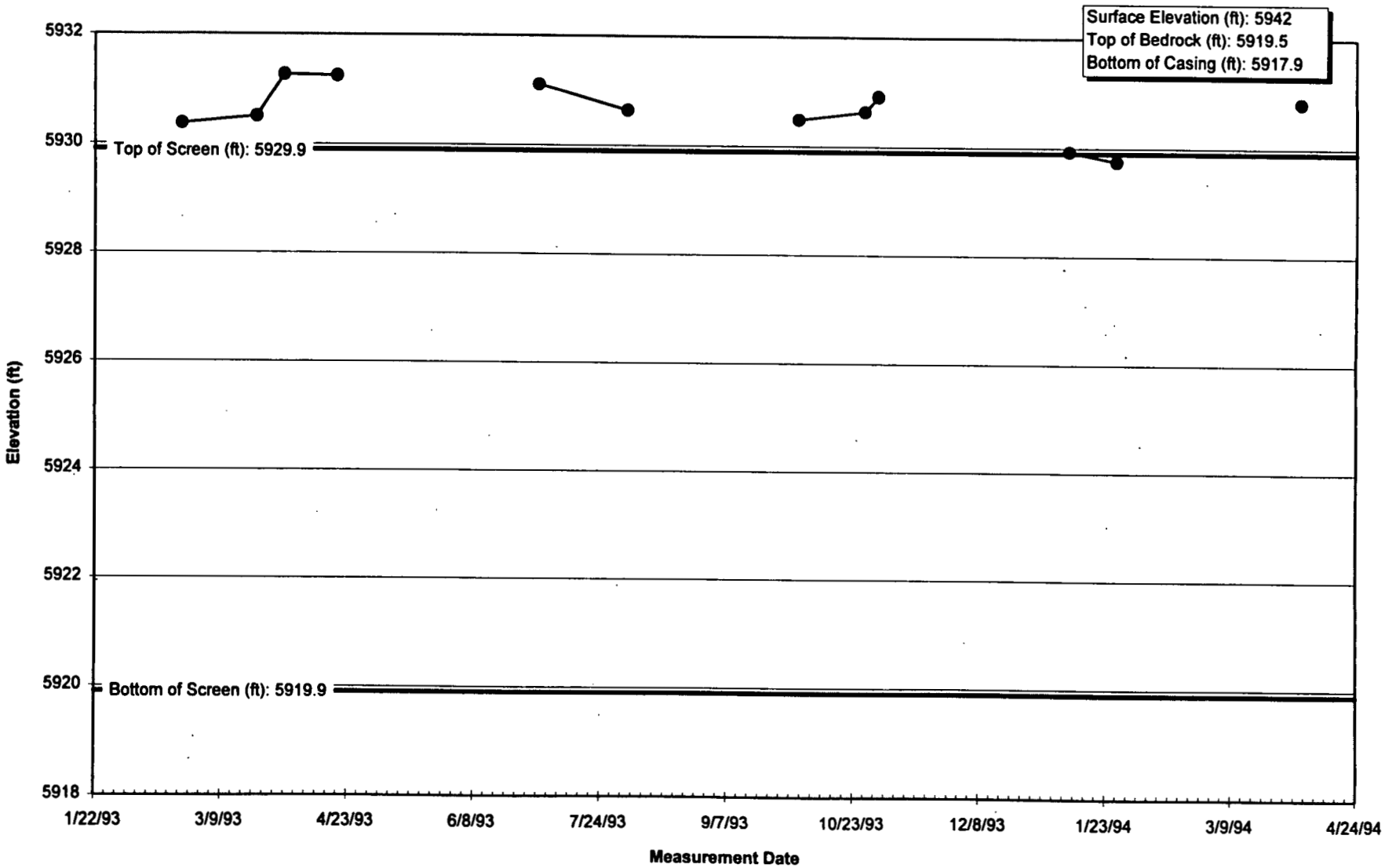
589

Hydrograph 77492



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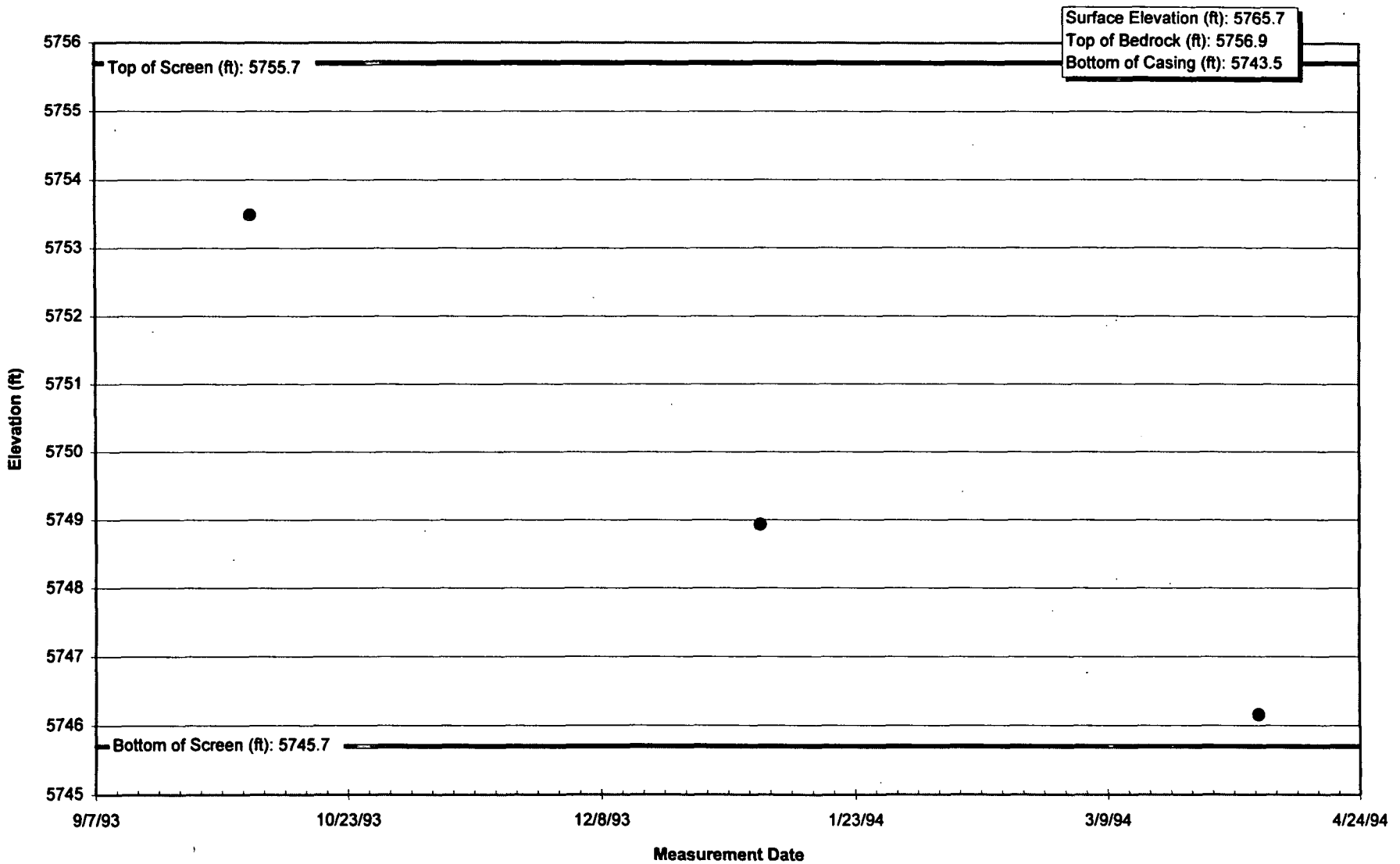

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541

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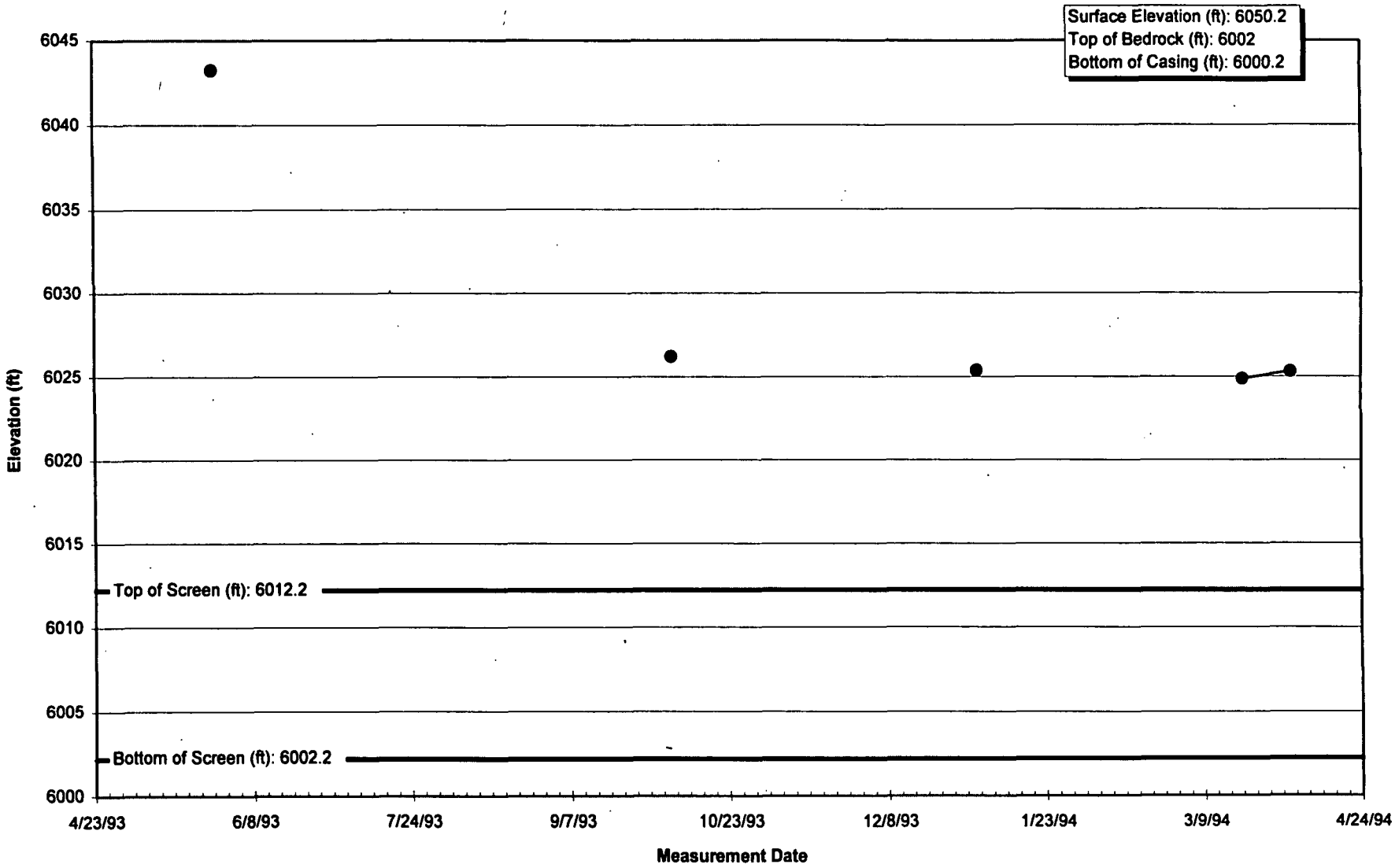

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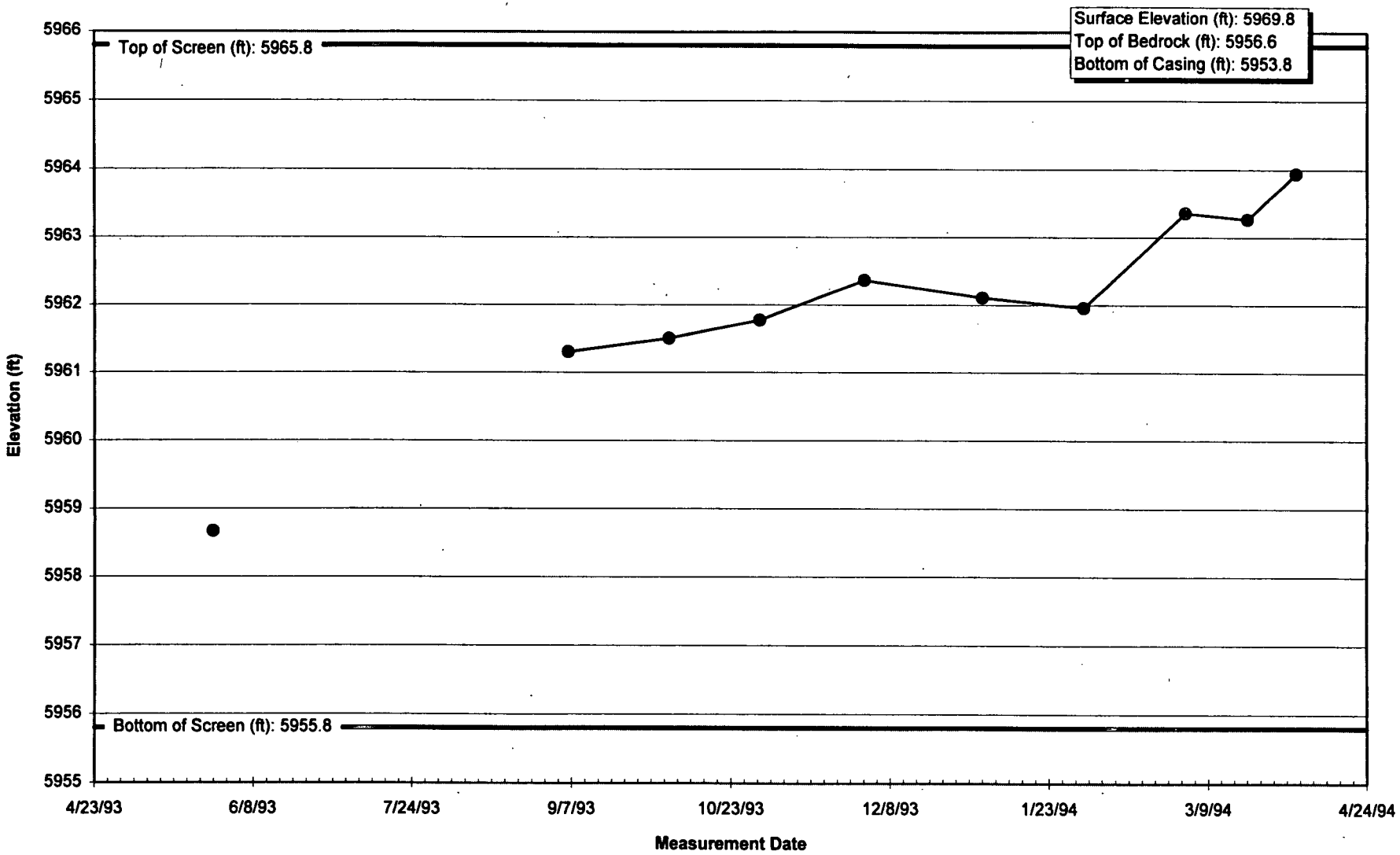

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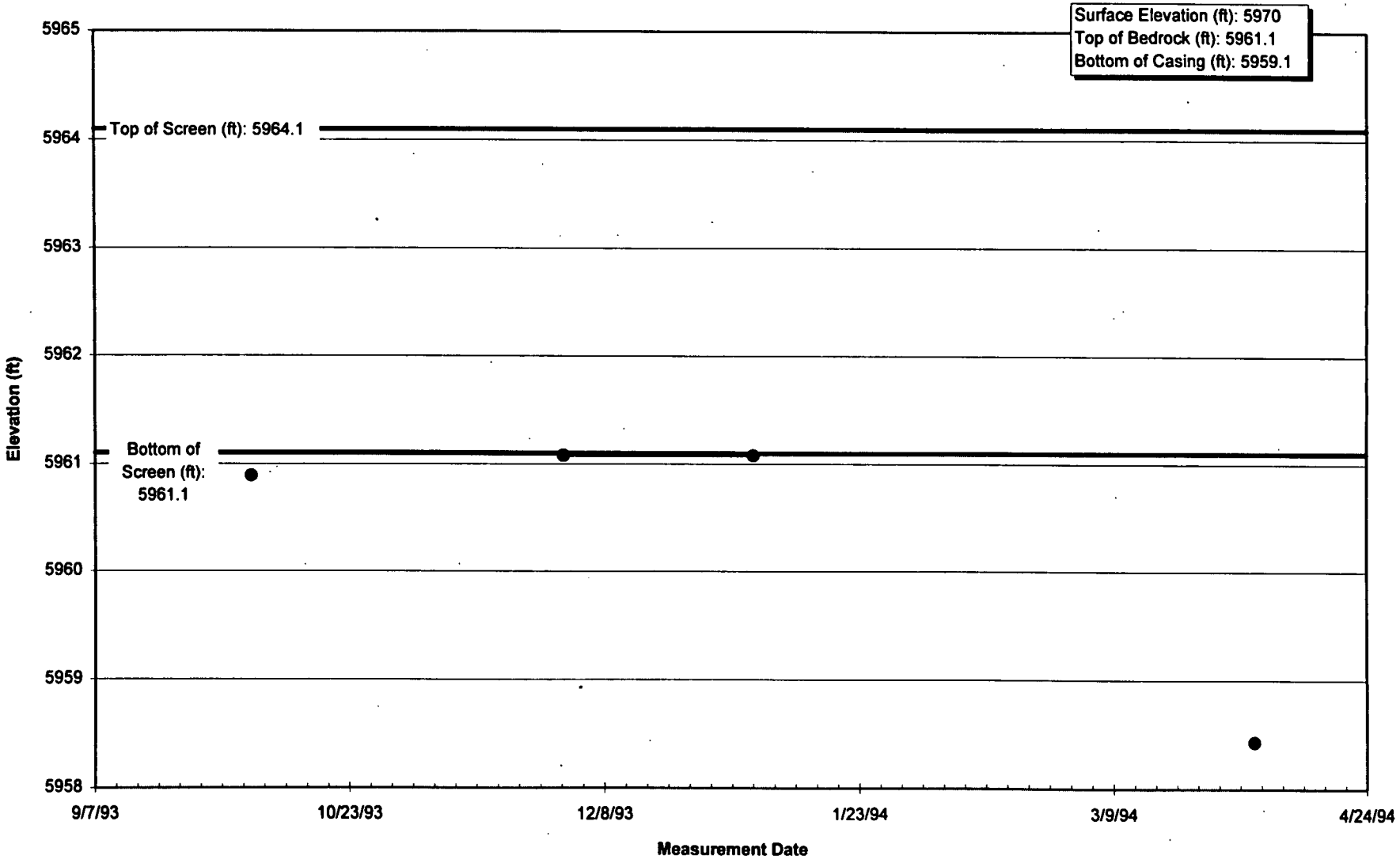
Hydrograph 00493



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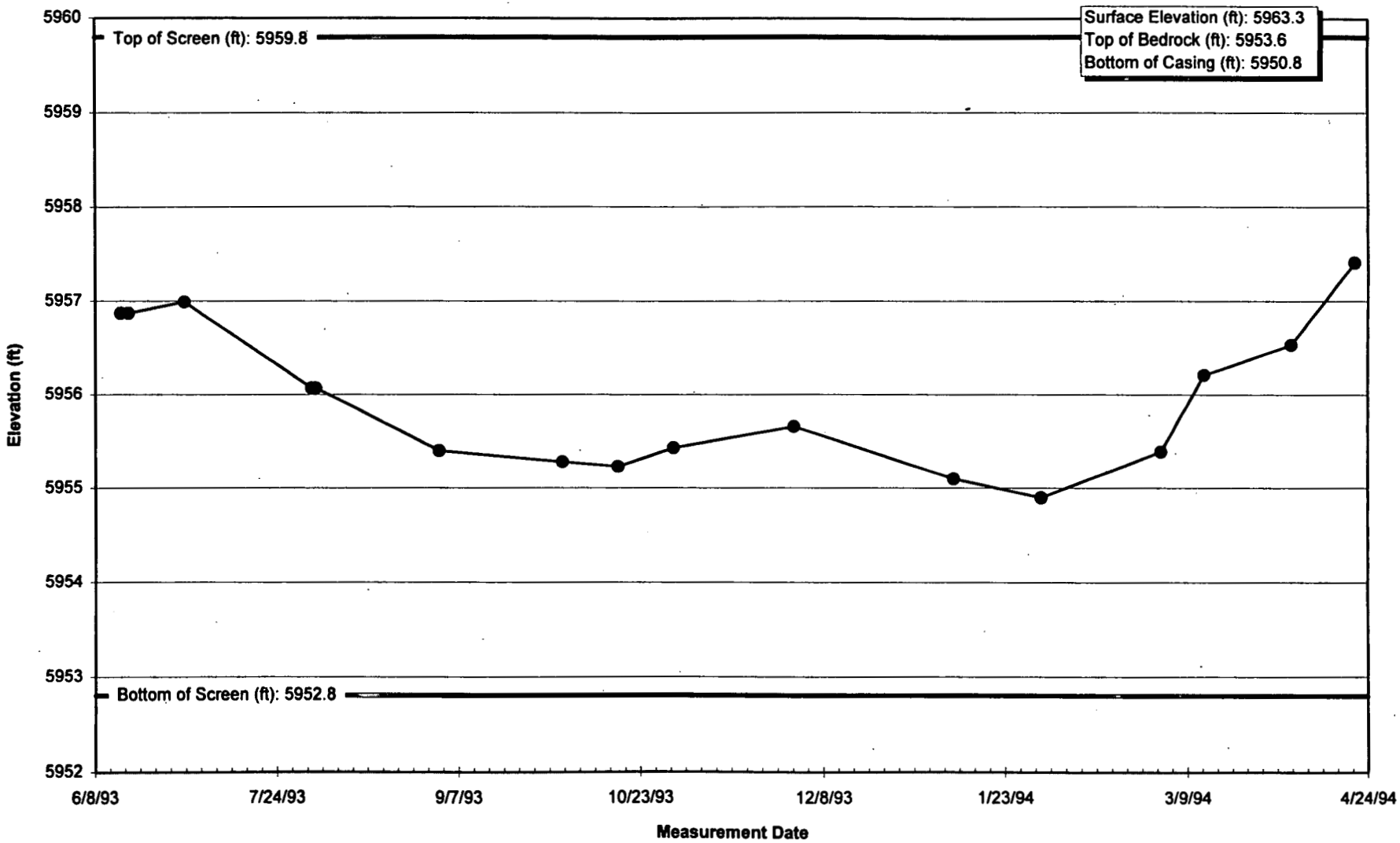
Hydrograph 05093



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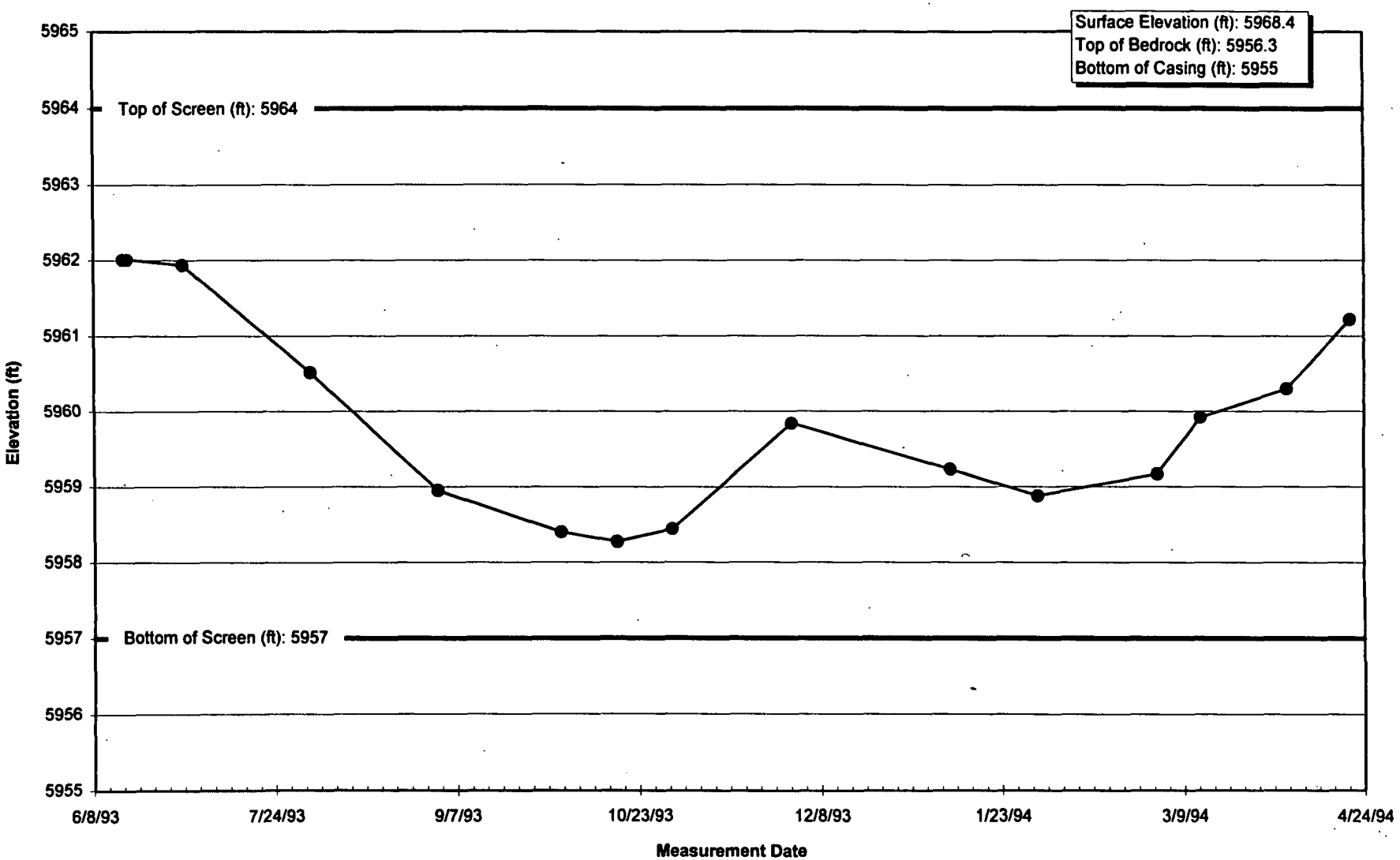
595

Hydrograph 05193



596 S3.XLS 05193 3/31/95

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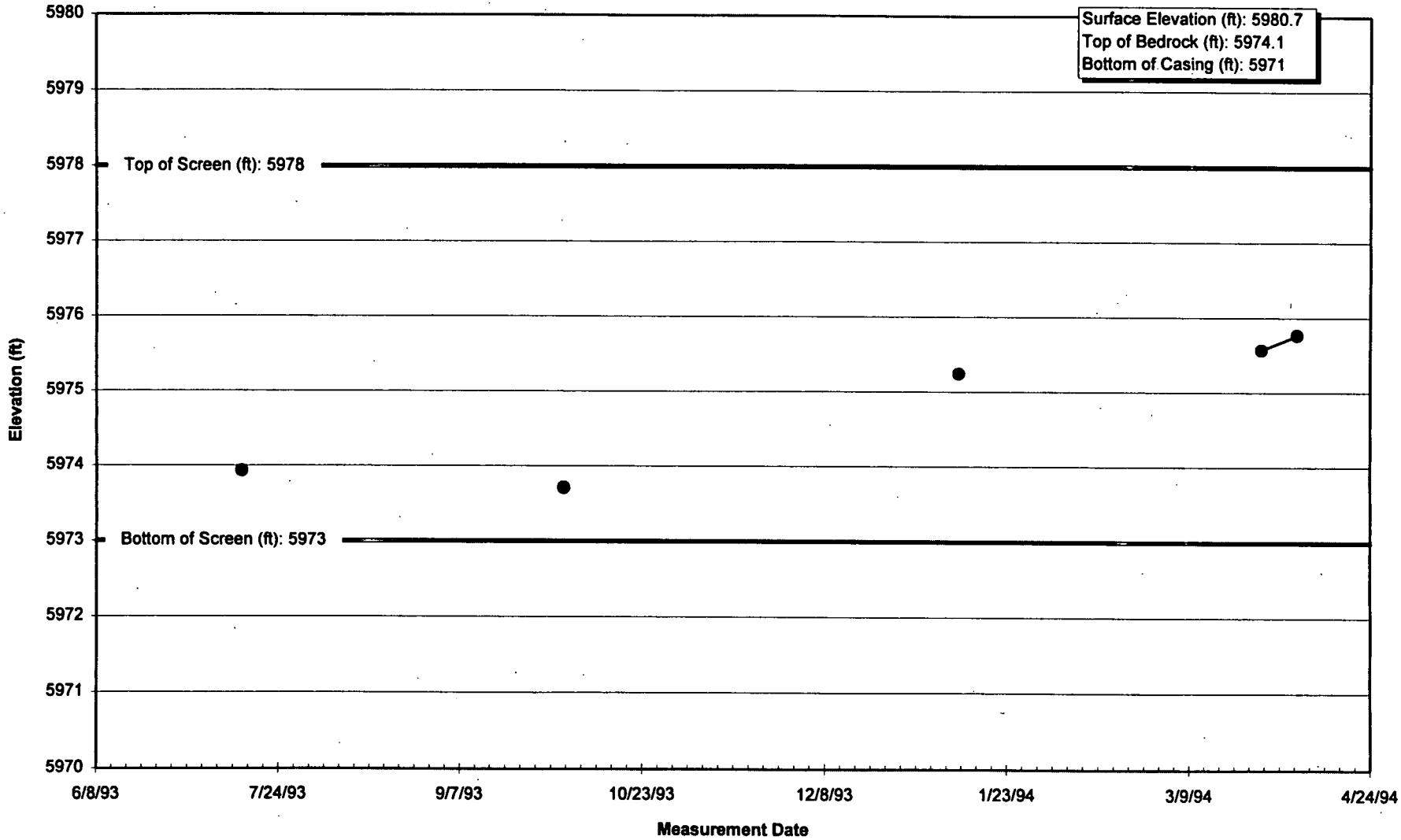

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597

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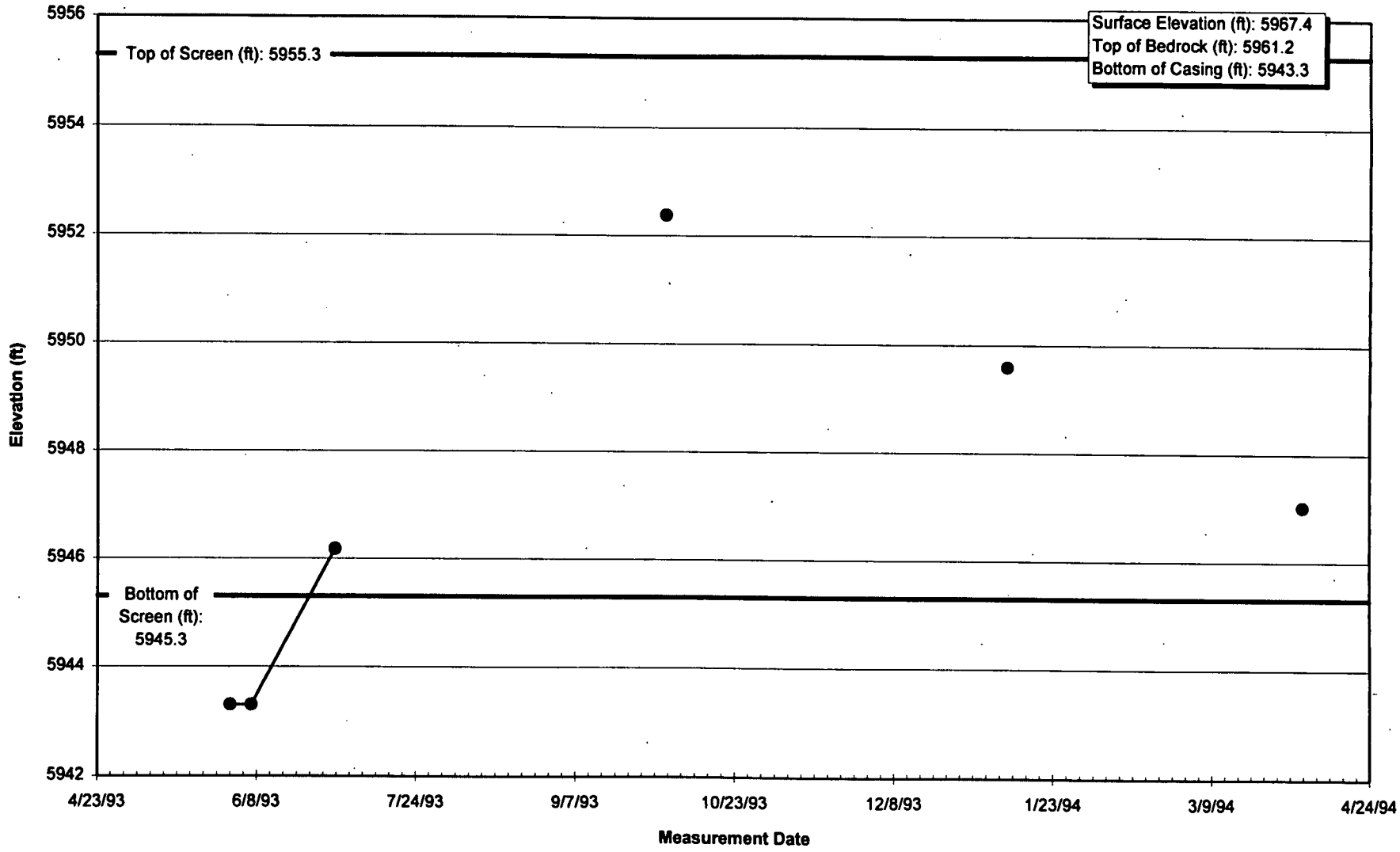

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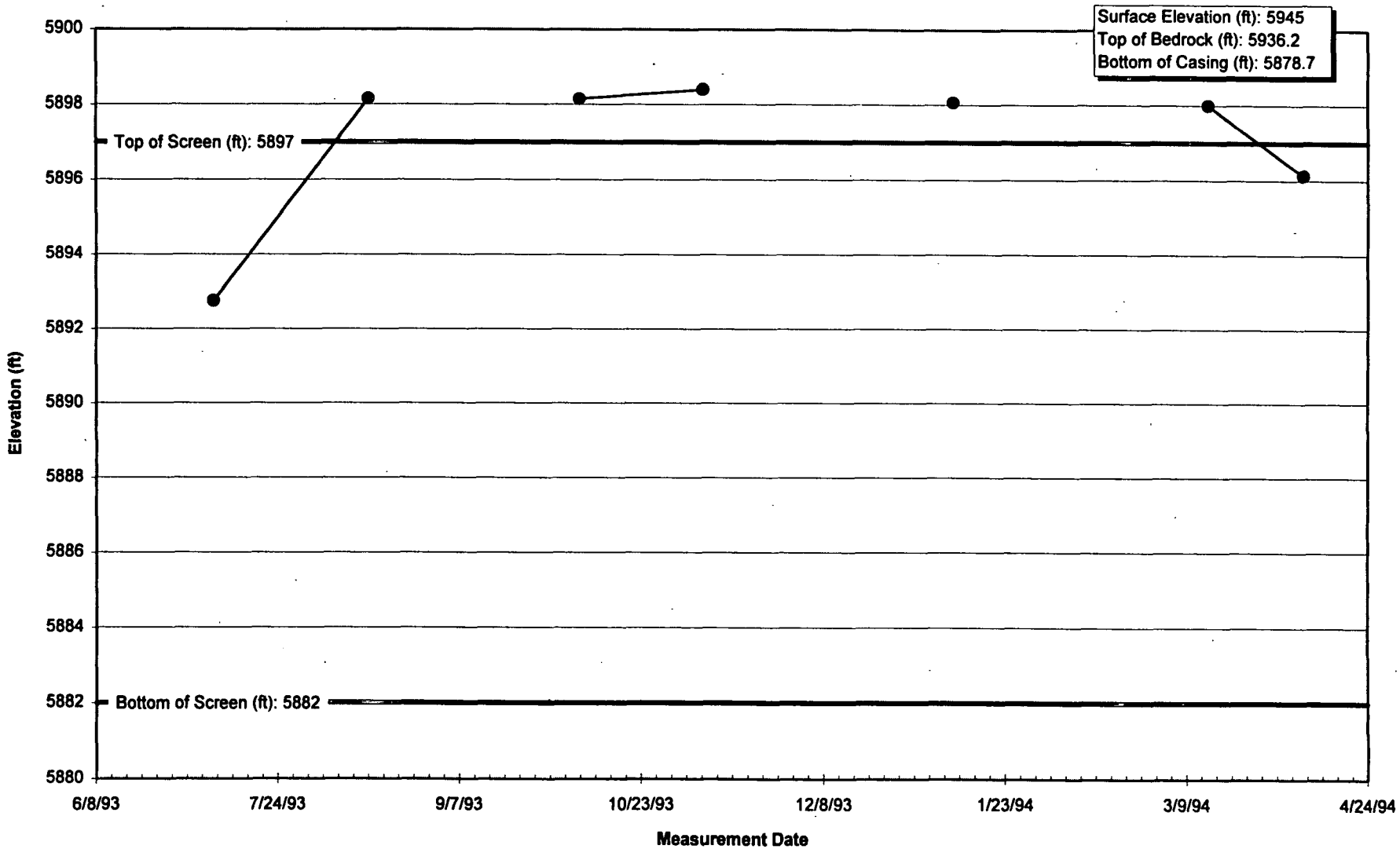
Hydrograph 22093



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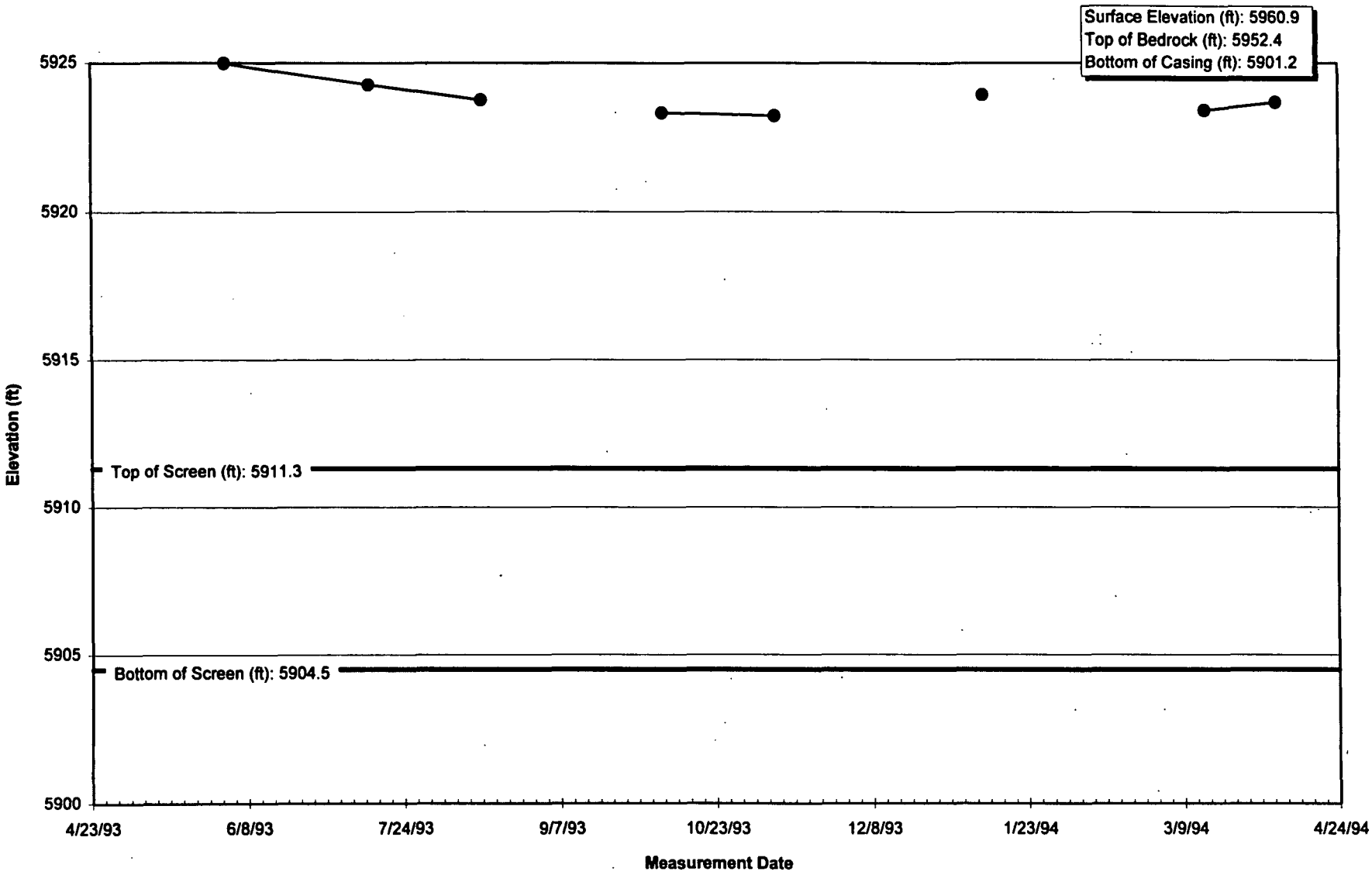
599

Hydrograph 22193



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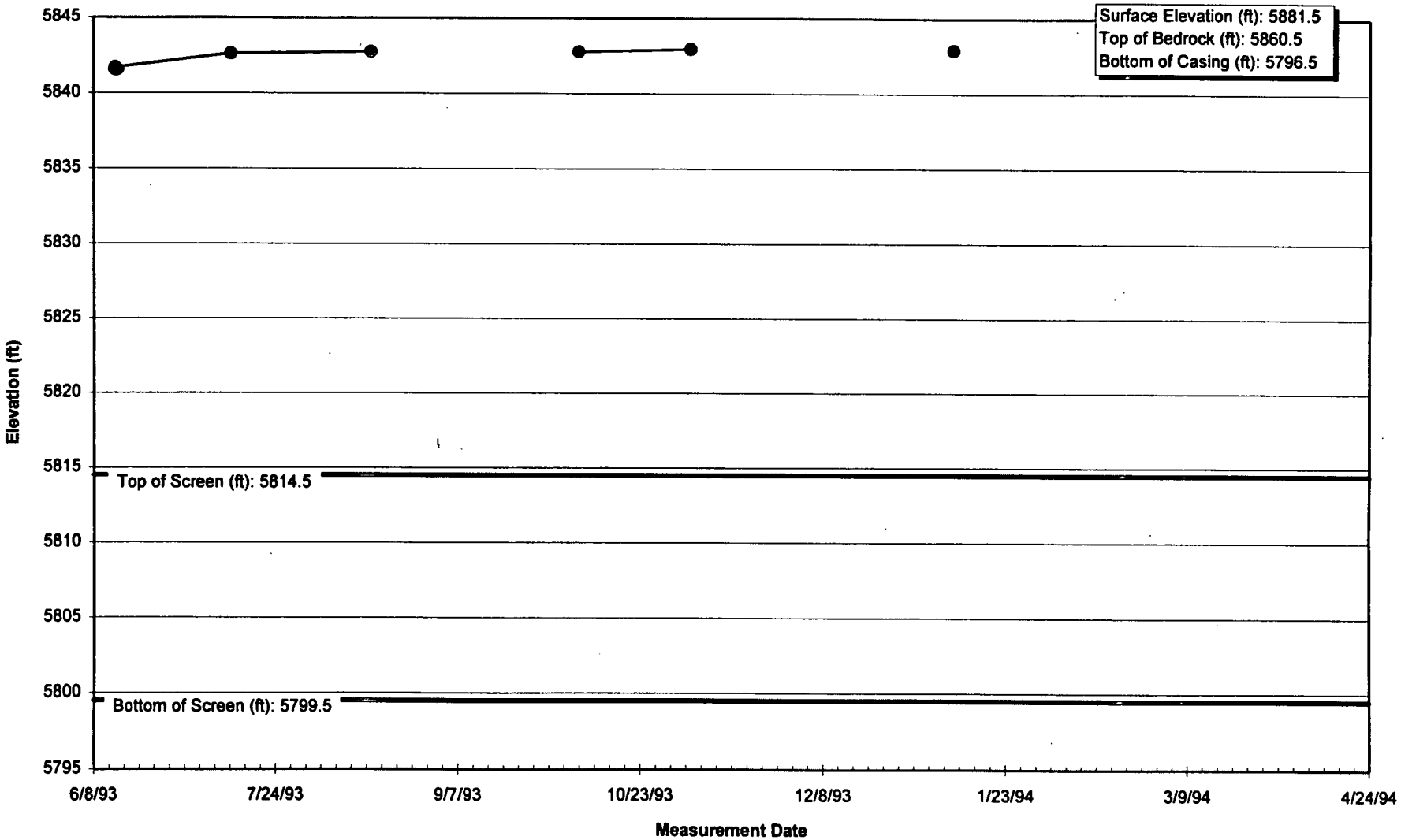
600

Hydrograph 22293



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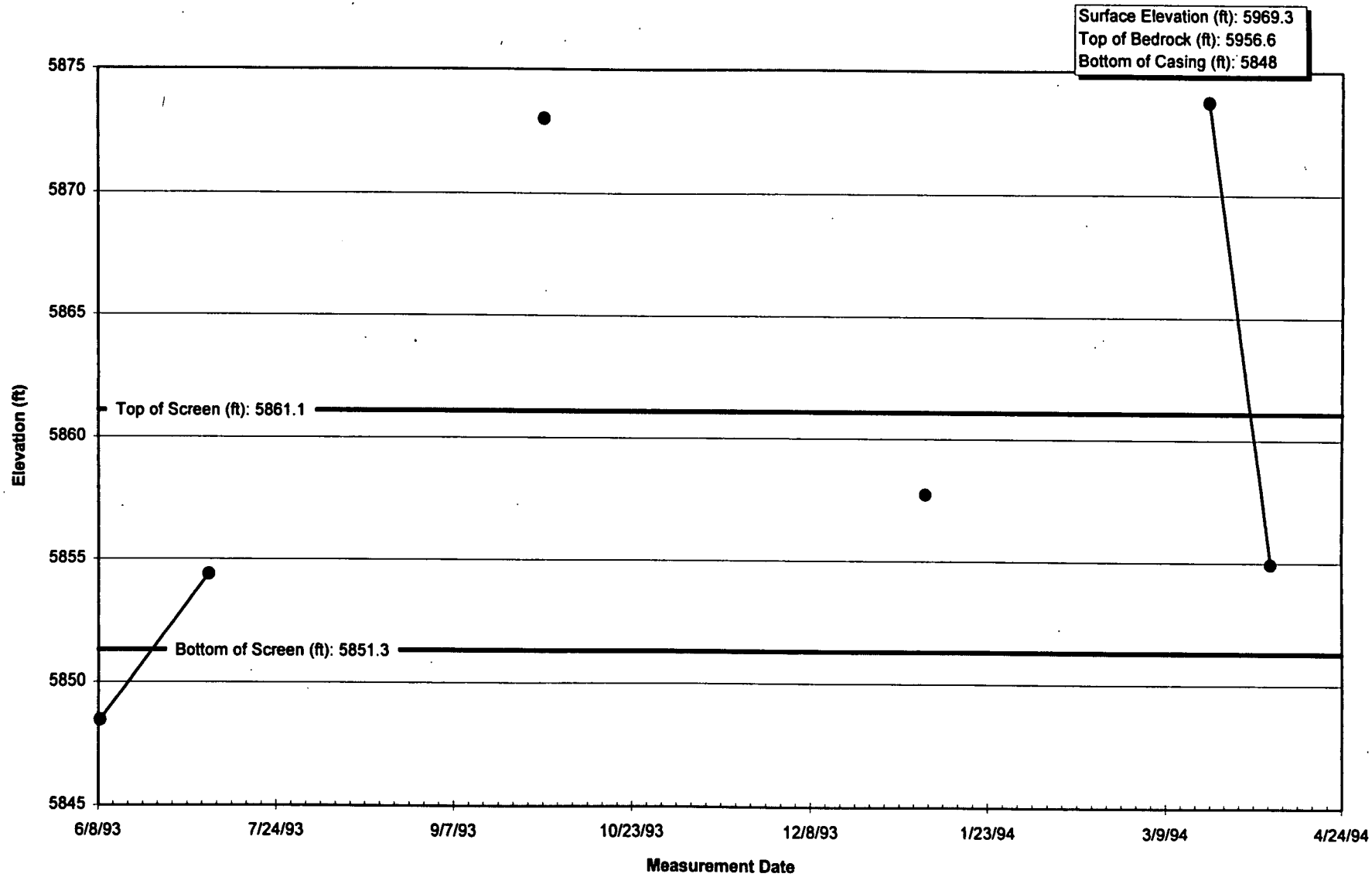
401

Hydrograph 22393



602 S7.XLS 22393 4/3/95

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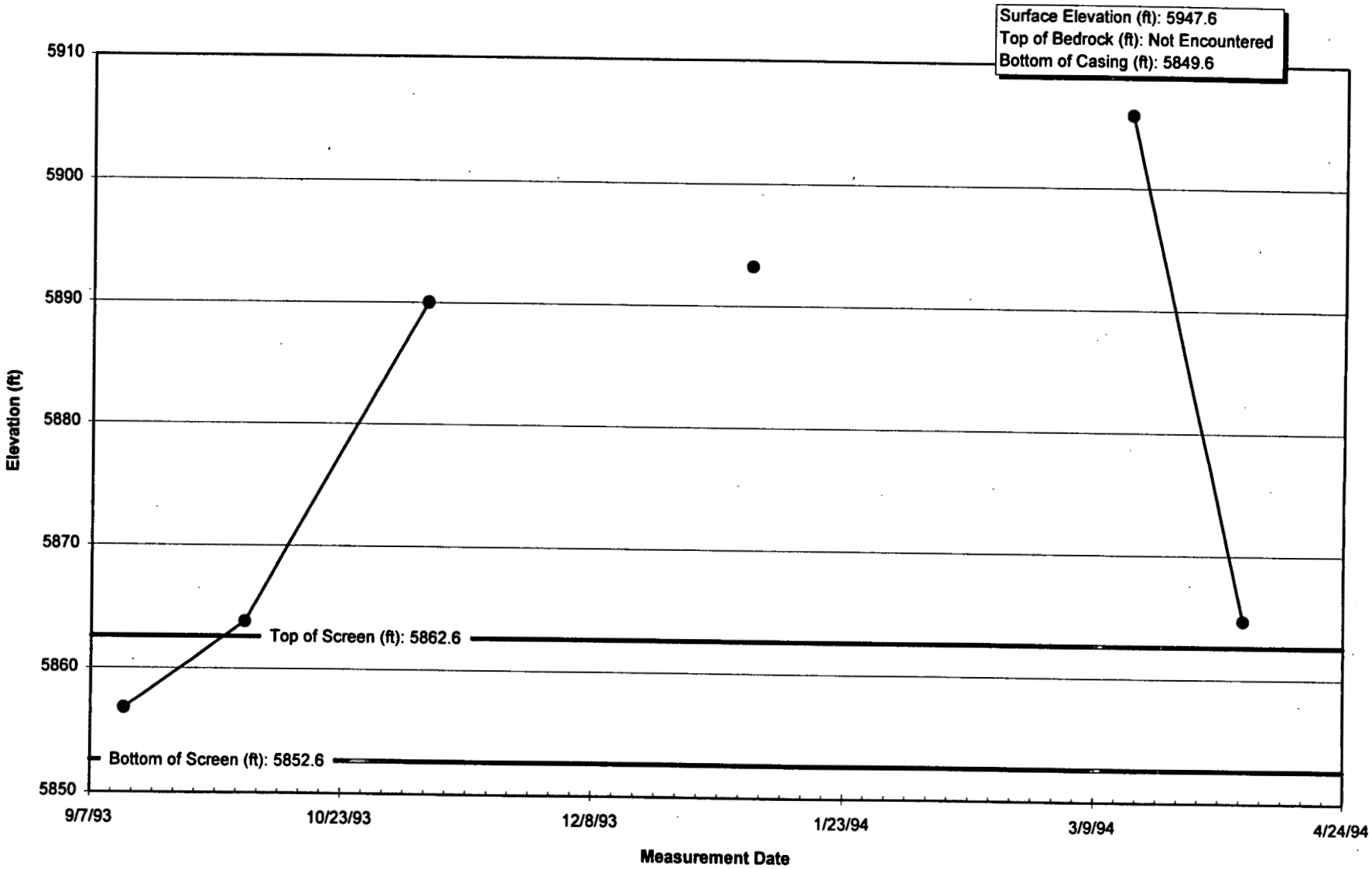

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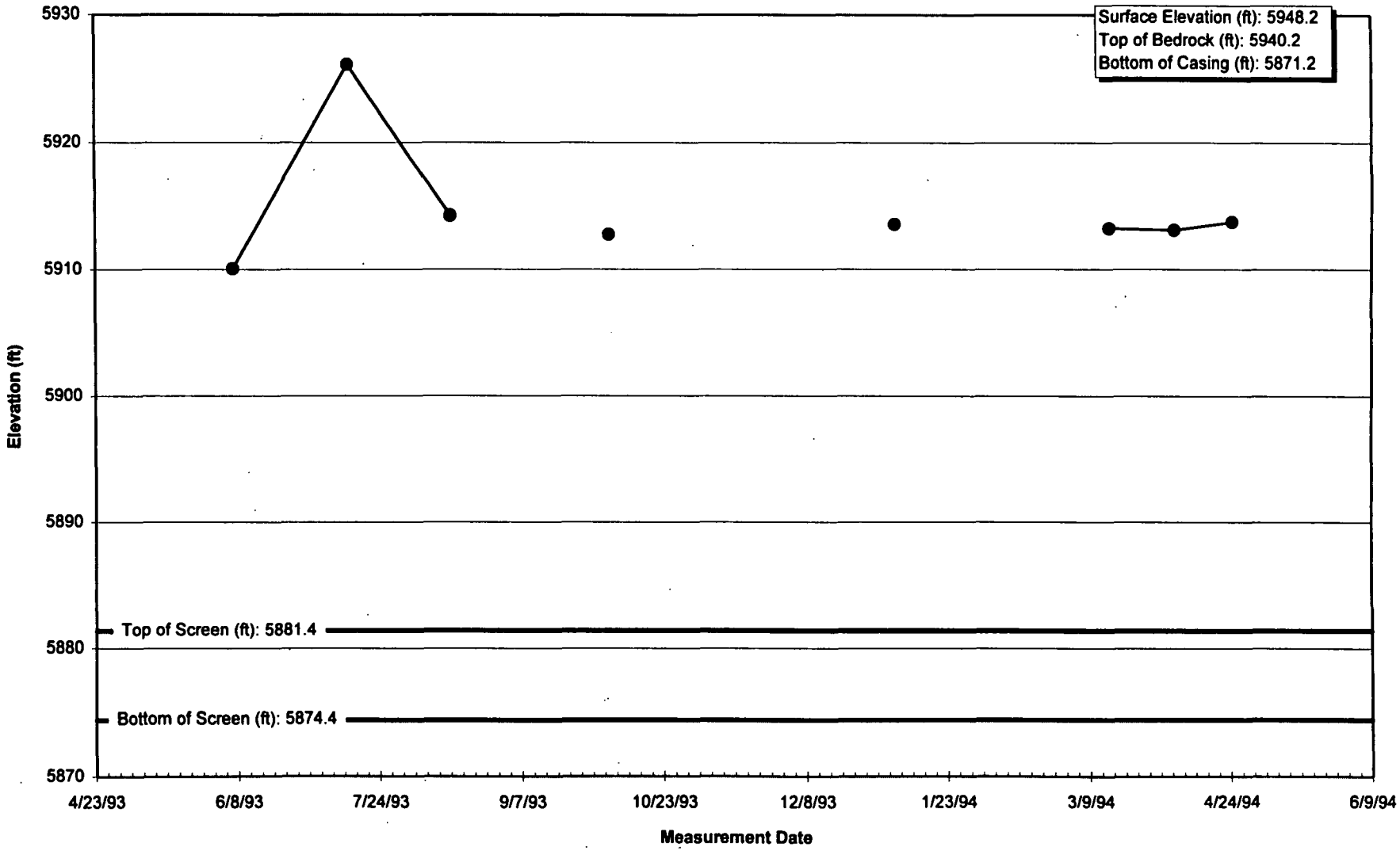
603

Hydrograph 23193



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604

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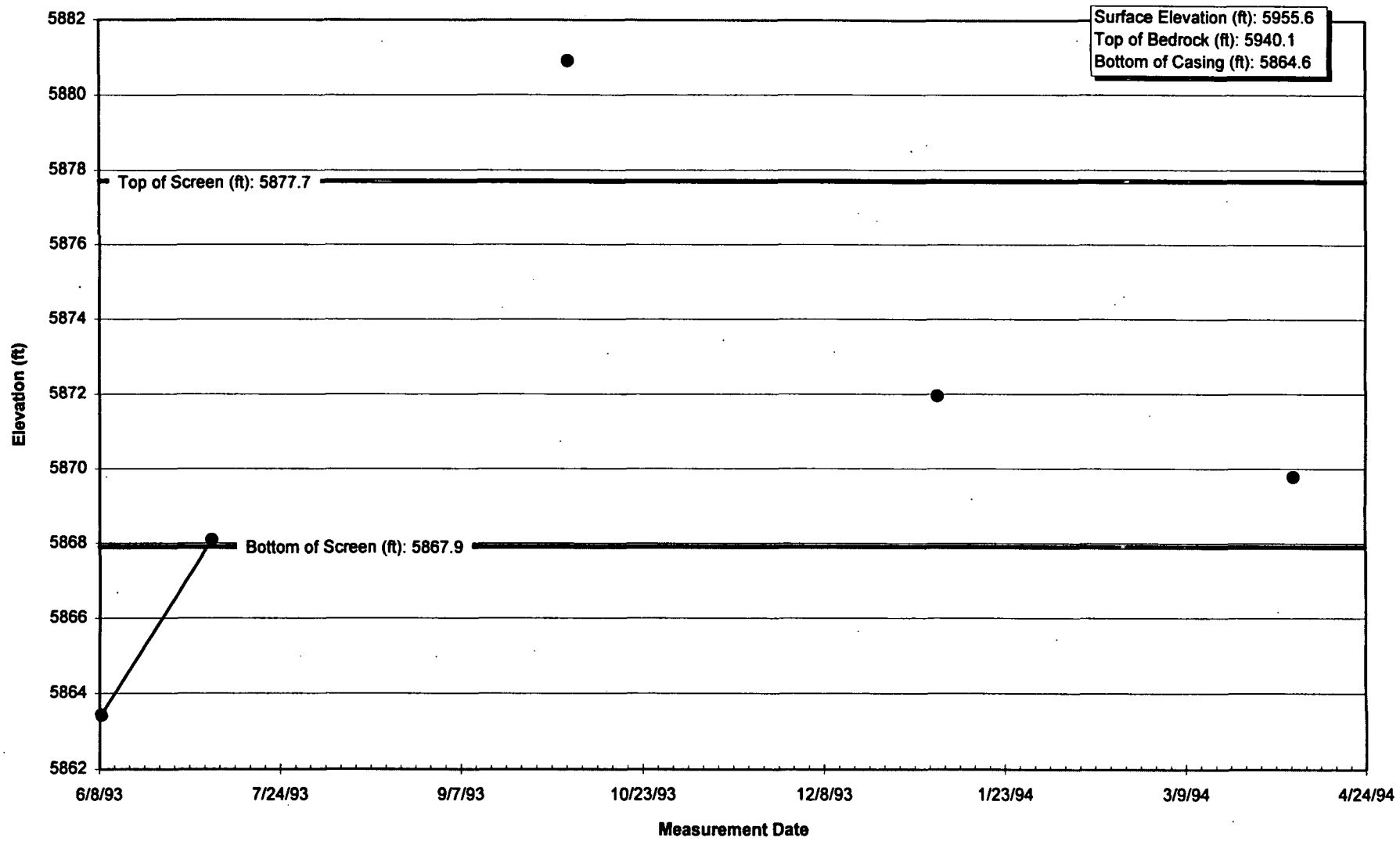

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605

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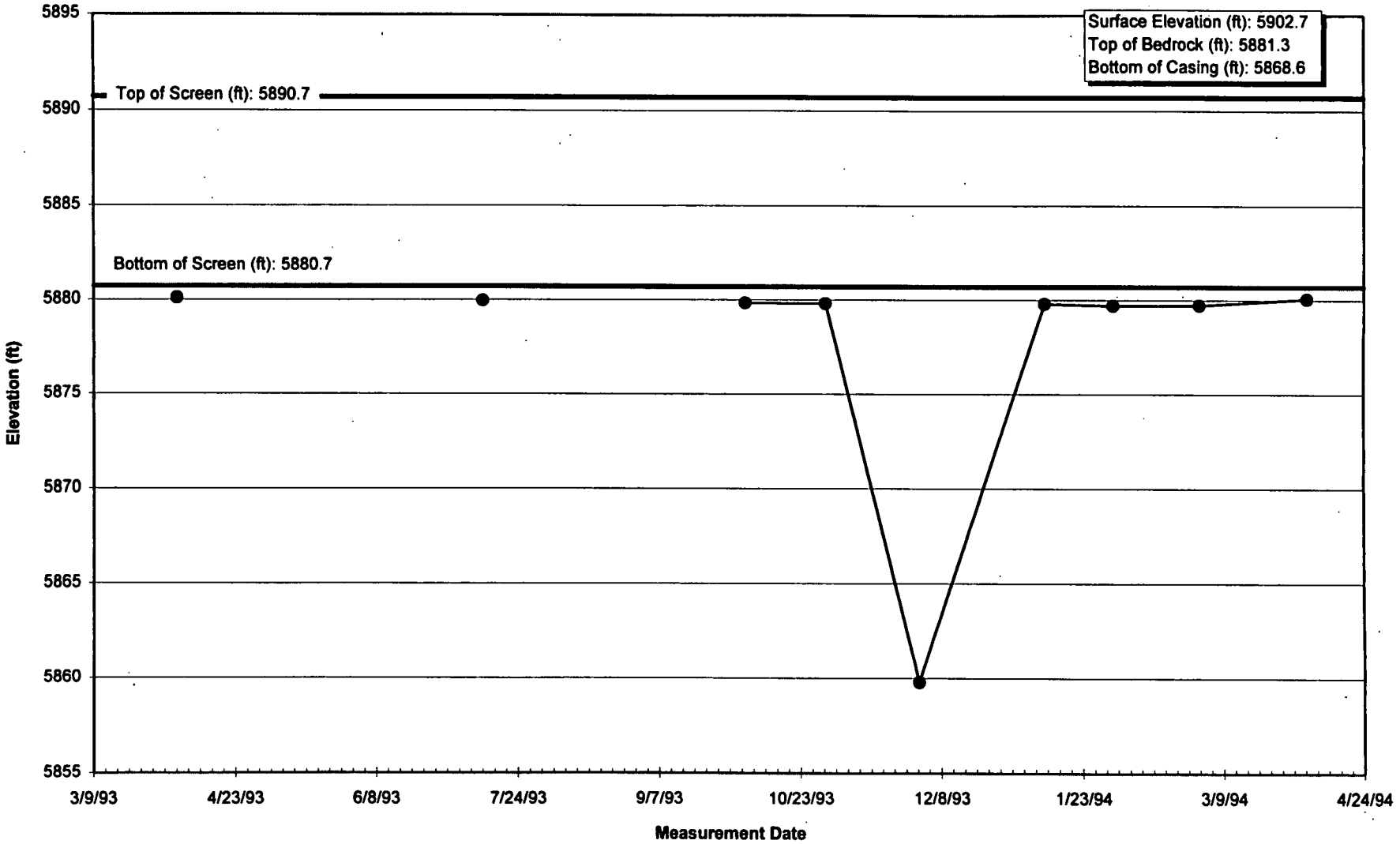

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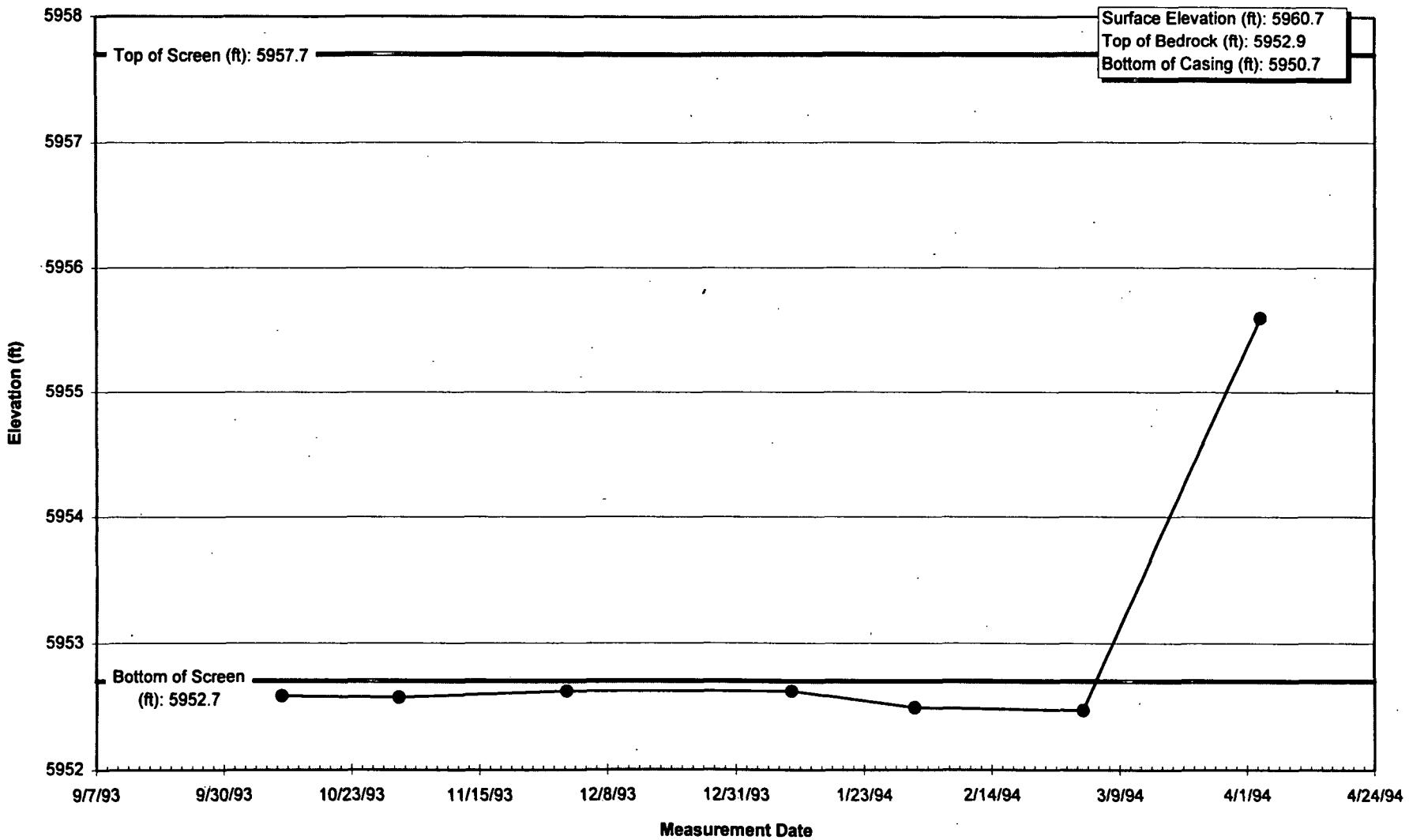
Hydrograph 41193



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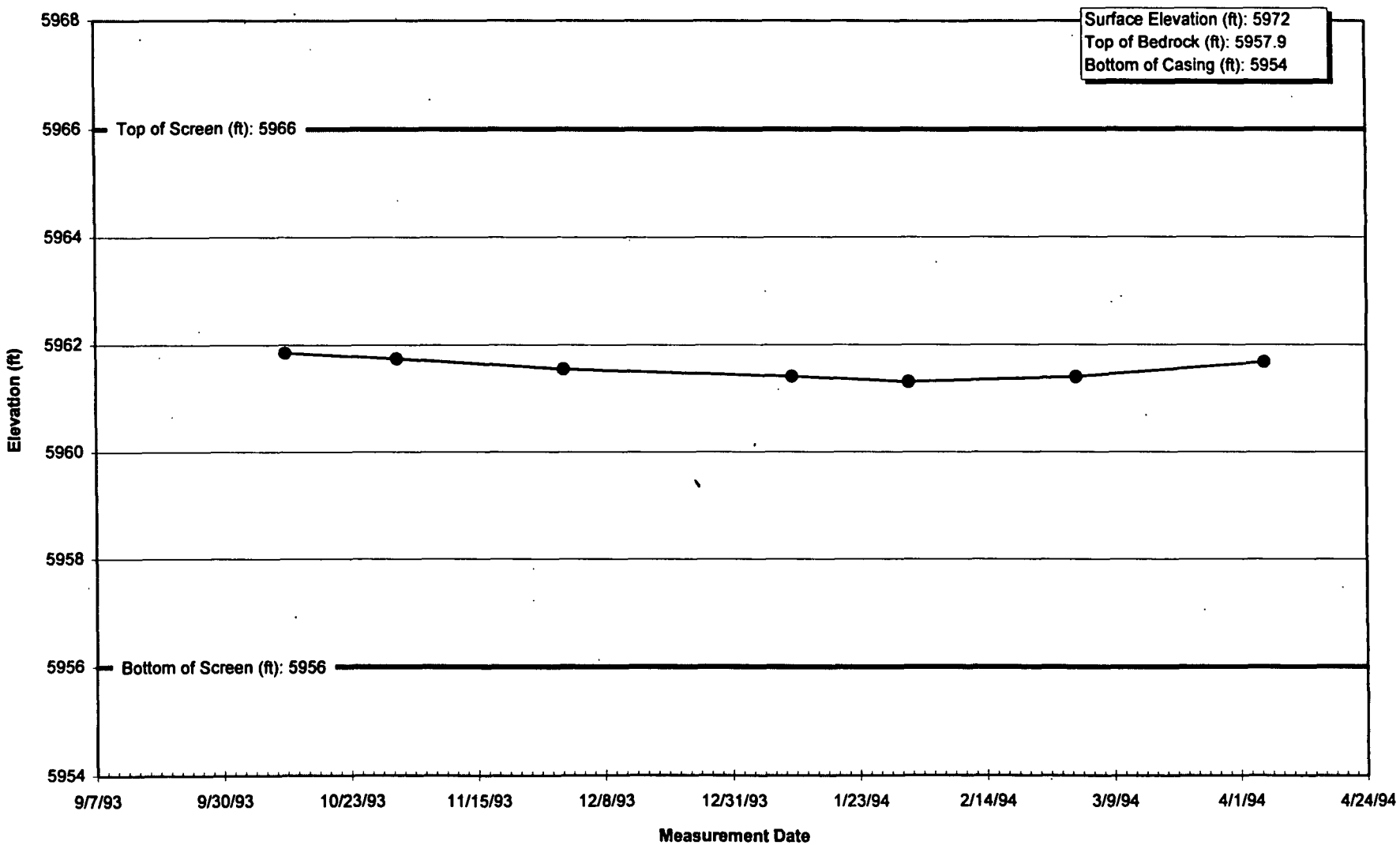
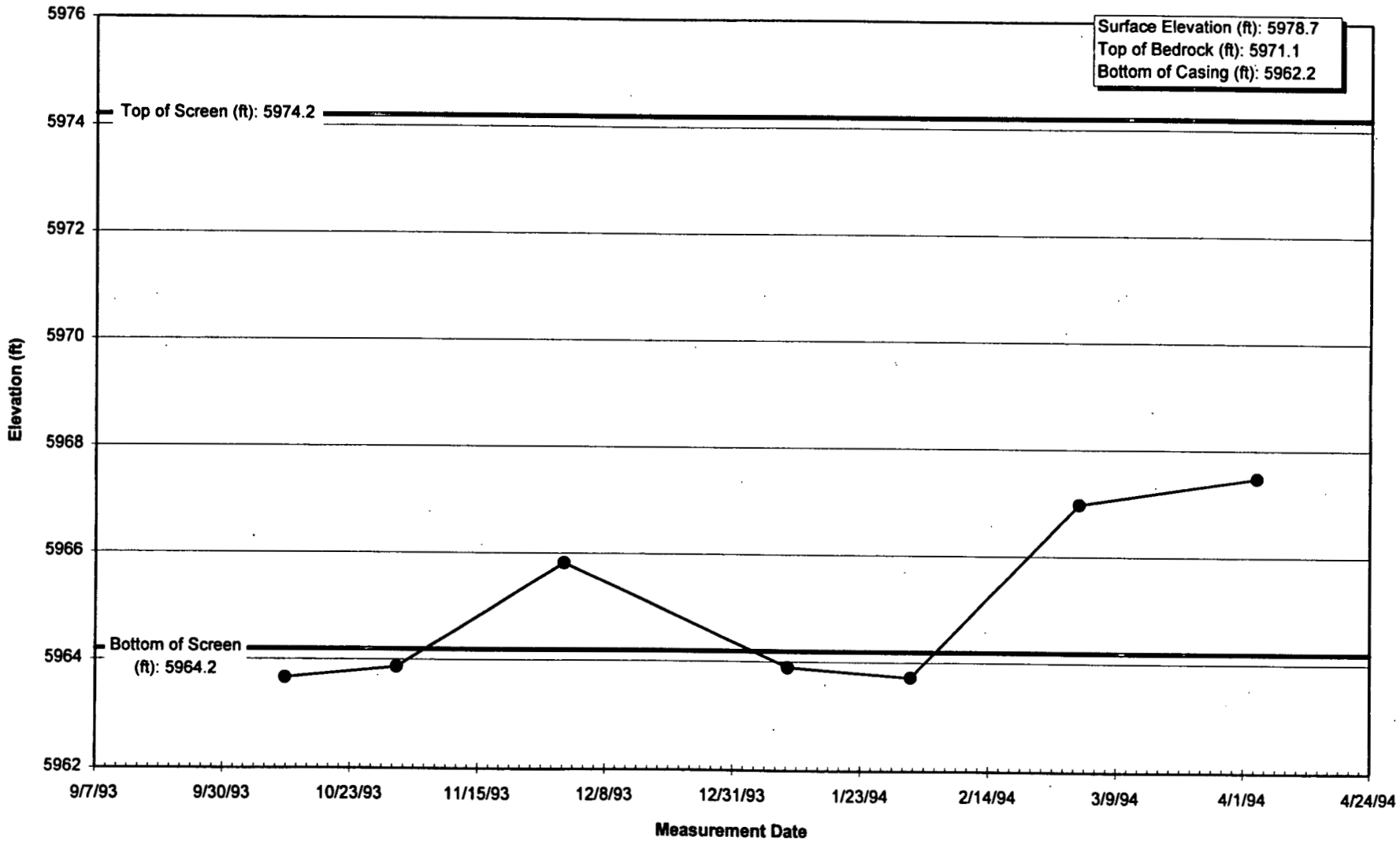
S11.XLS 41193 4/5/95

Hydrograph 41693



608 S11.XLS 41693 4/5/95

Hydrograph 41993



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609

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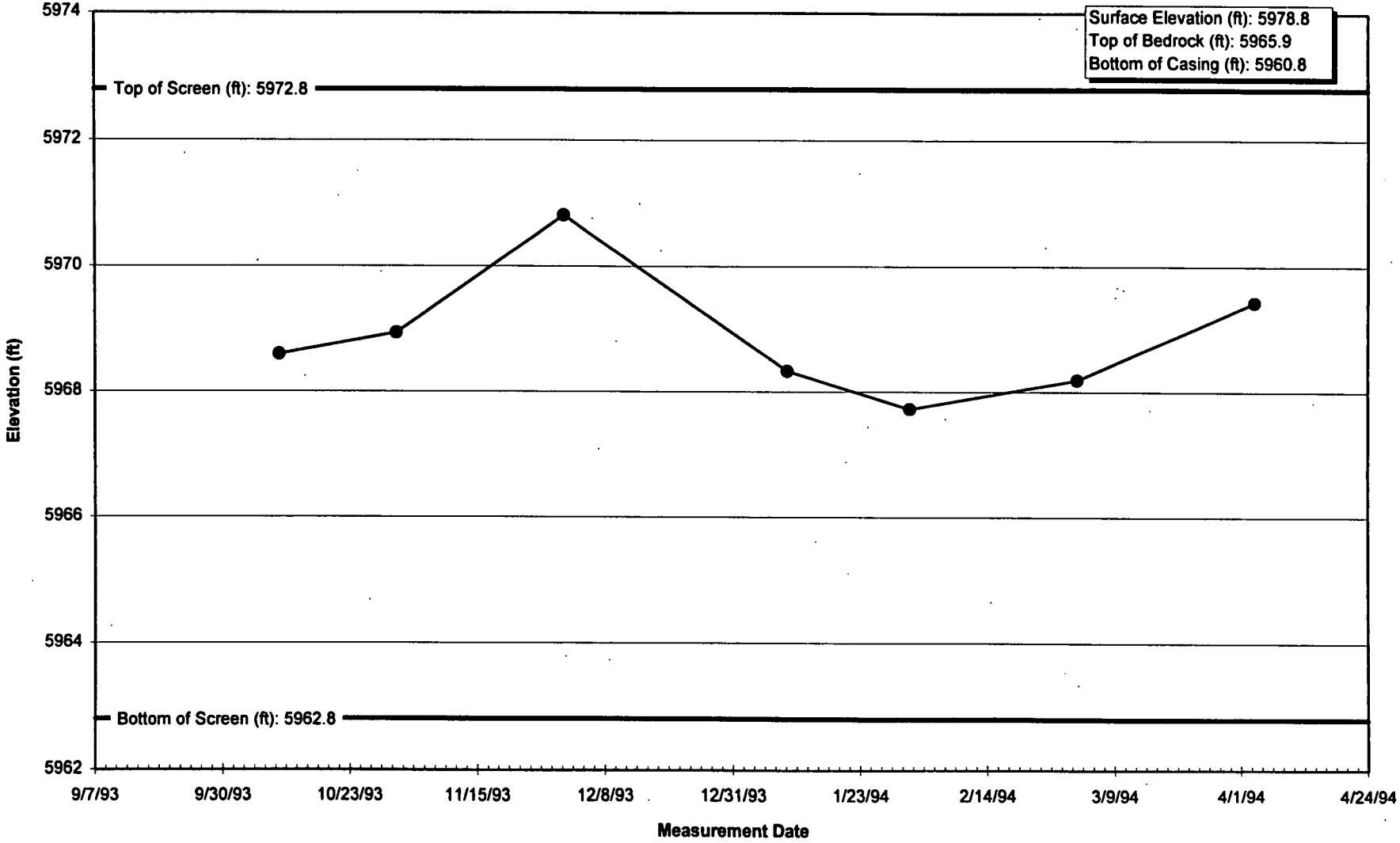

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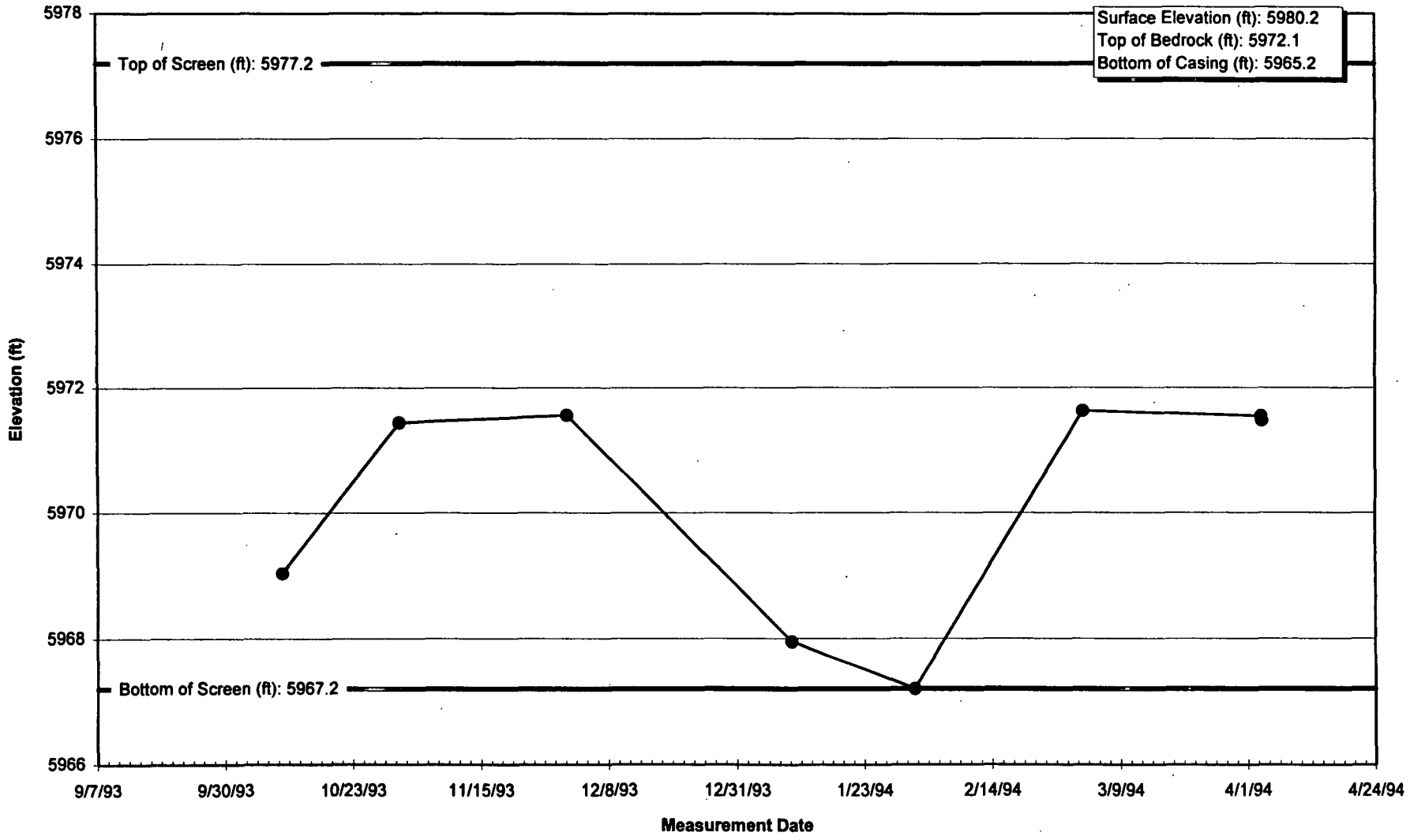

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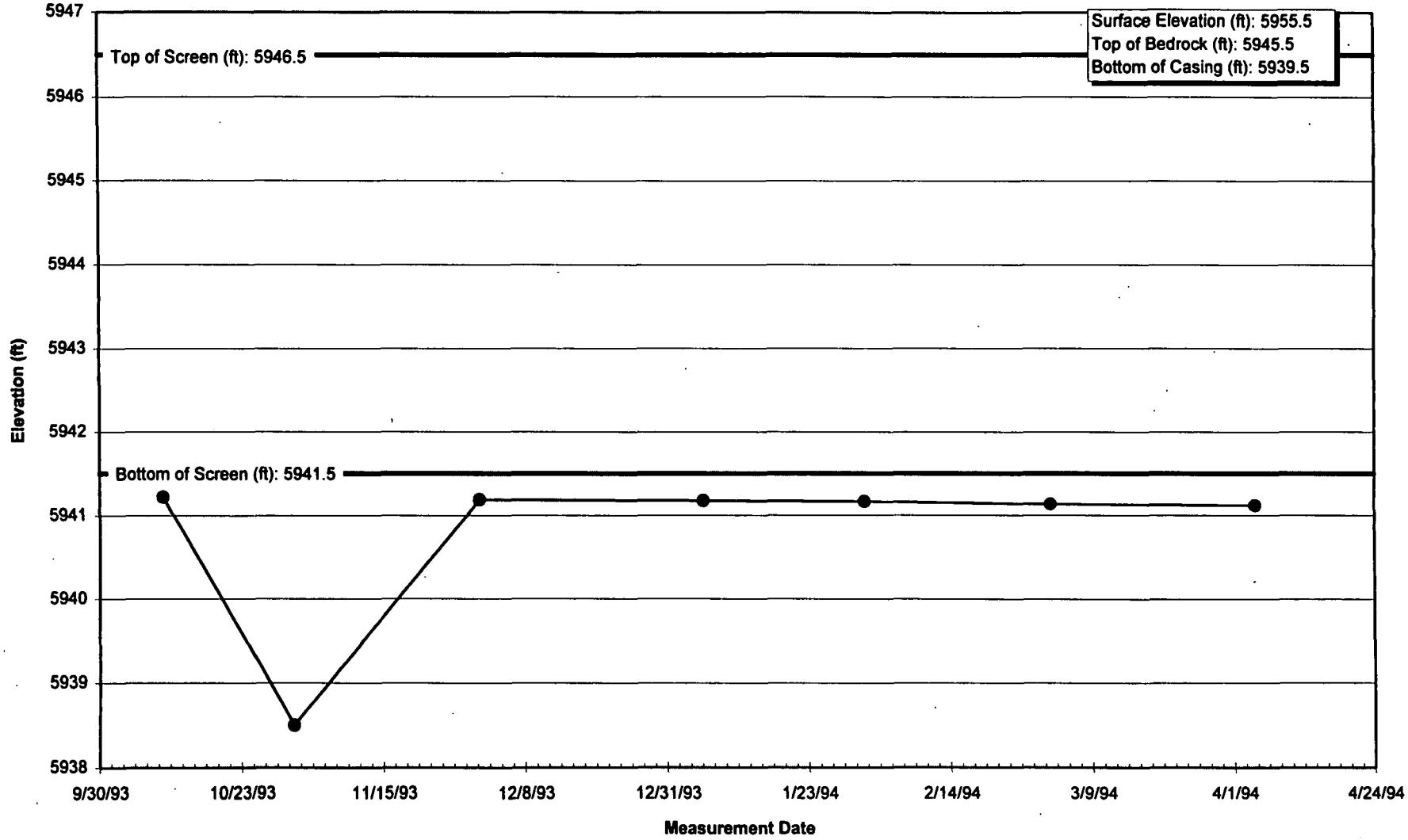

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612

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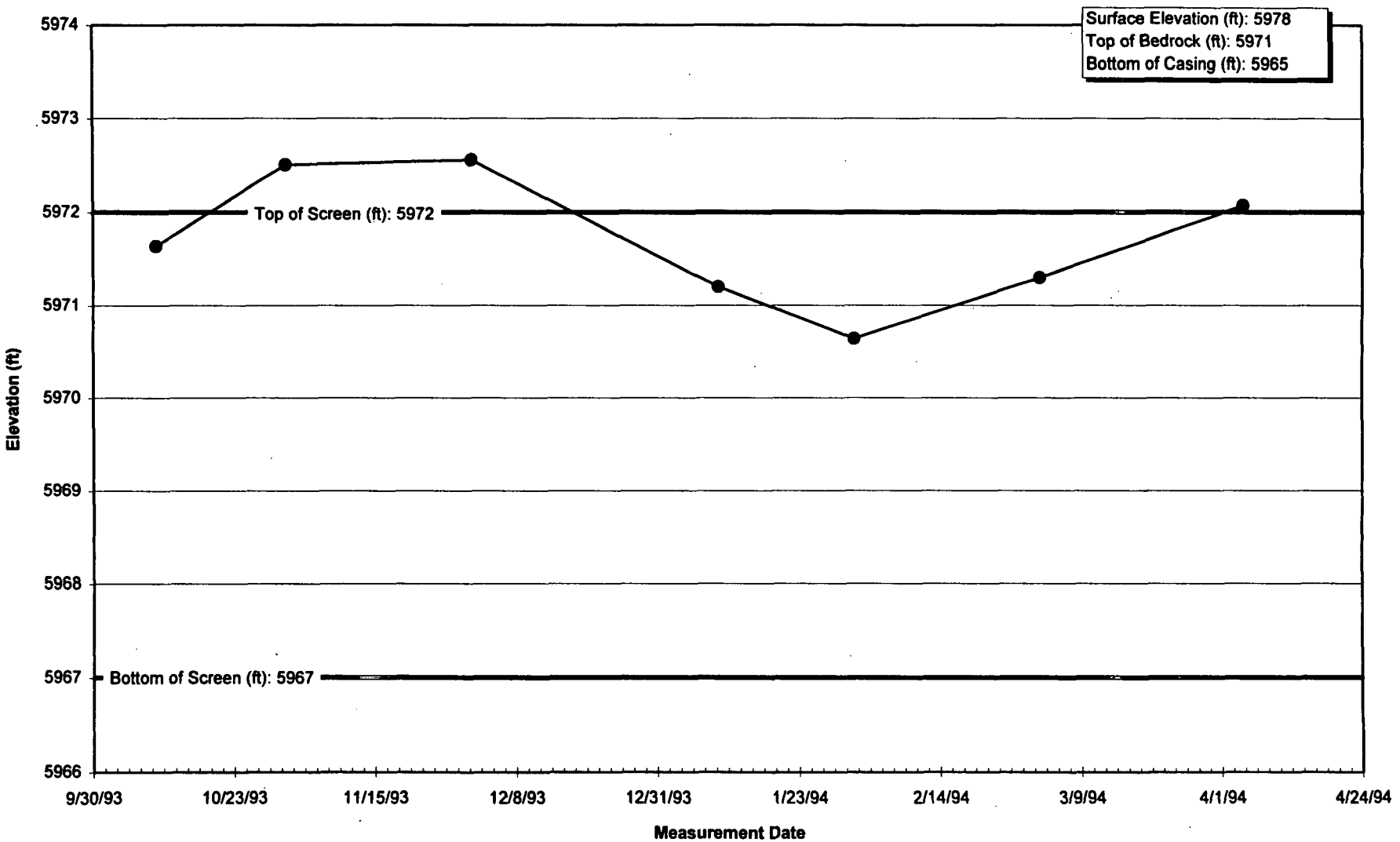

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613

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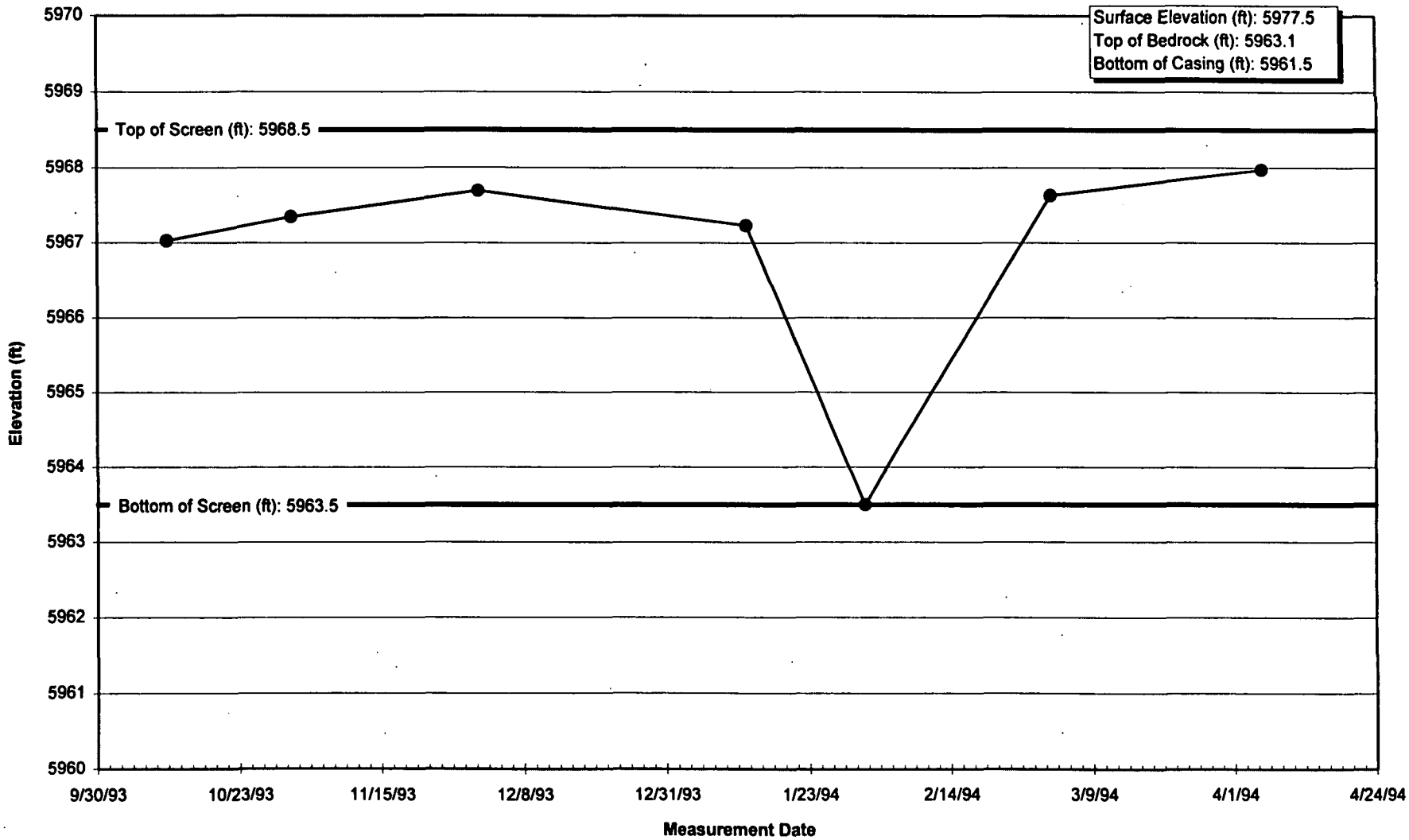

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614

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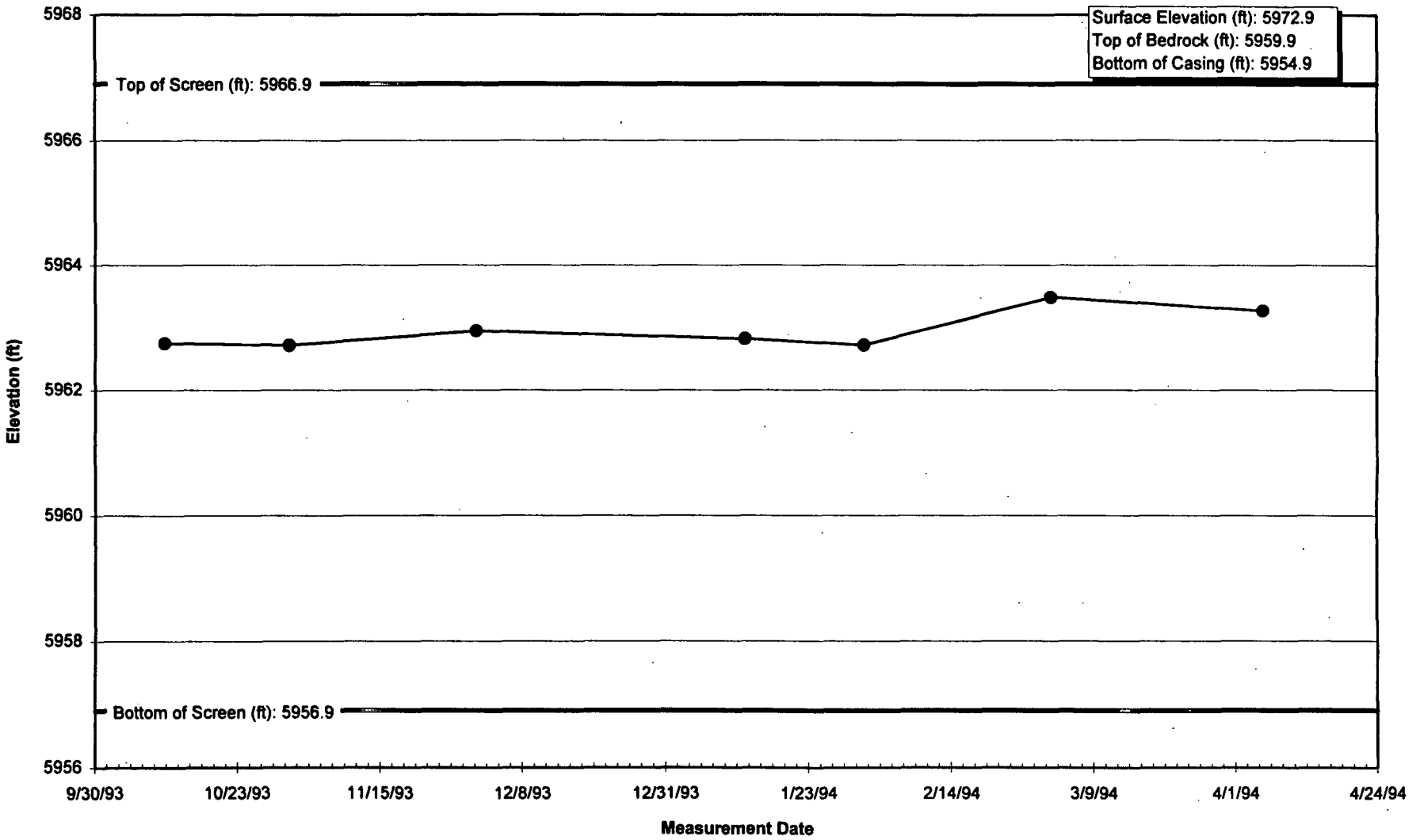

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615

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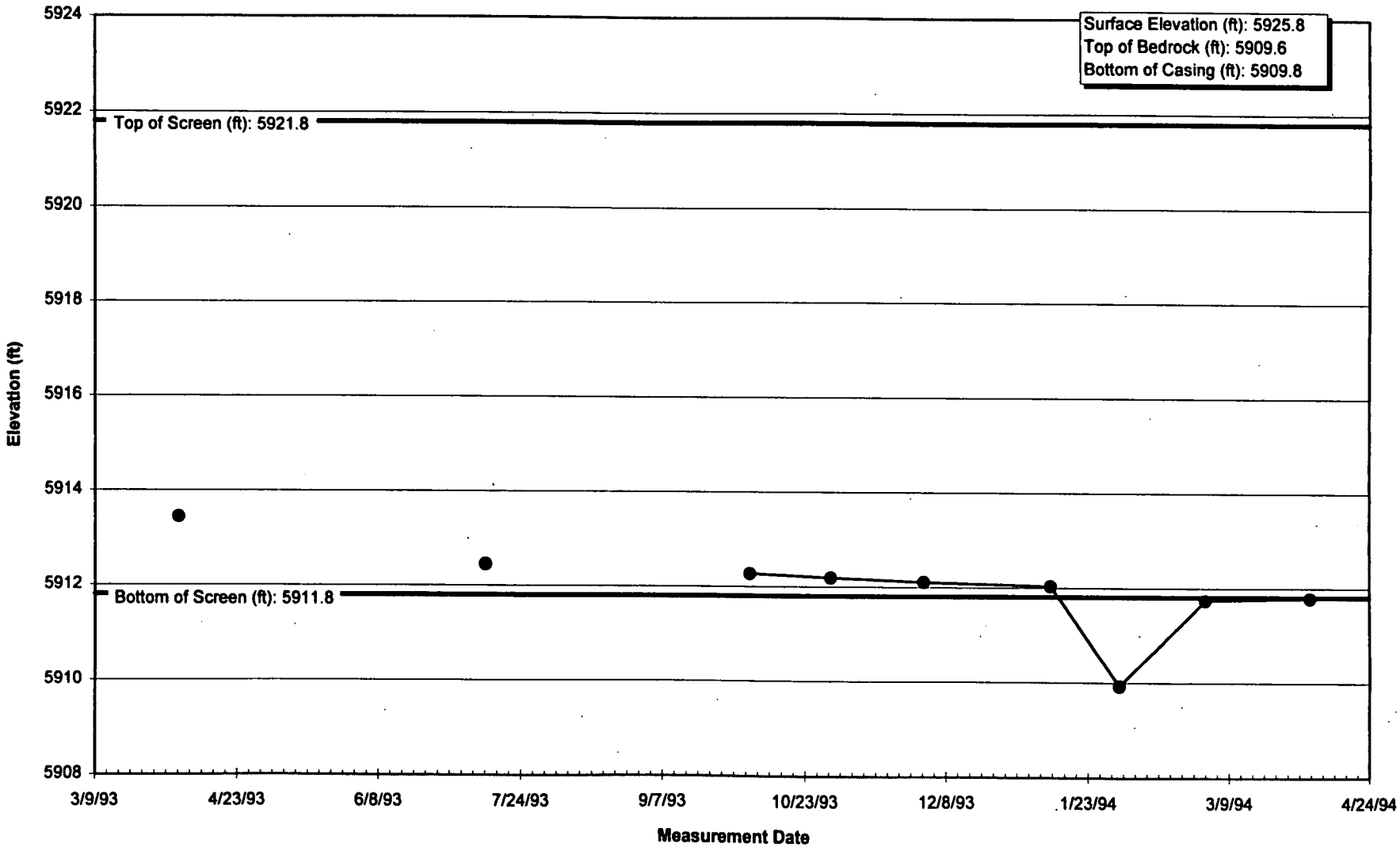

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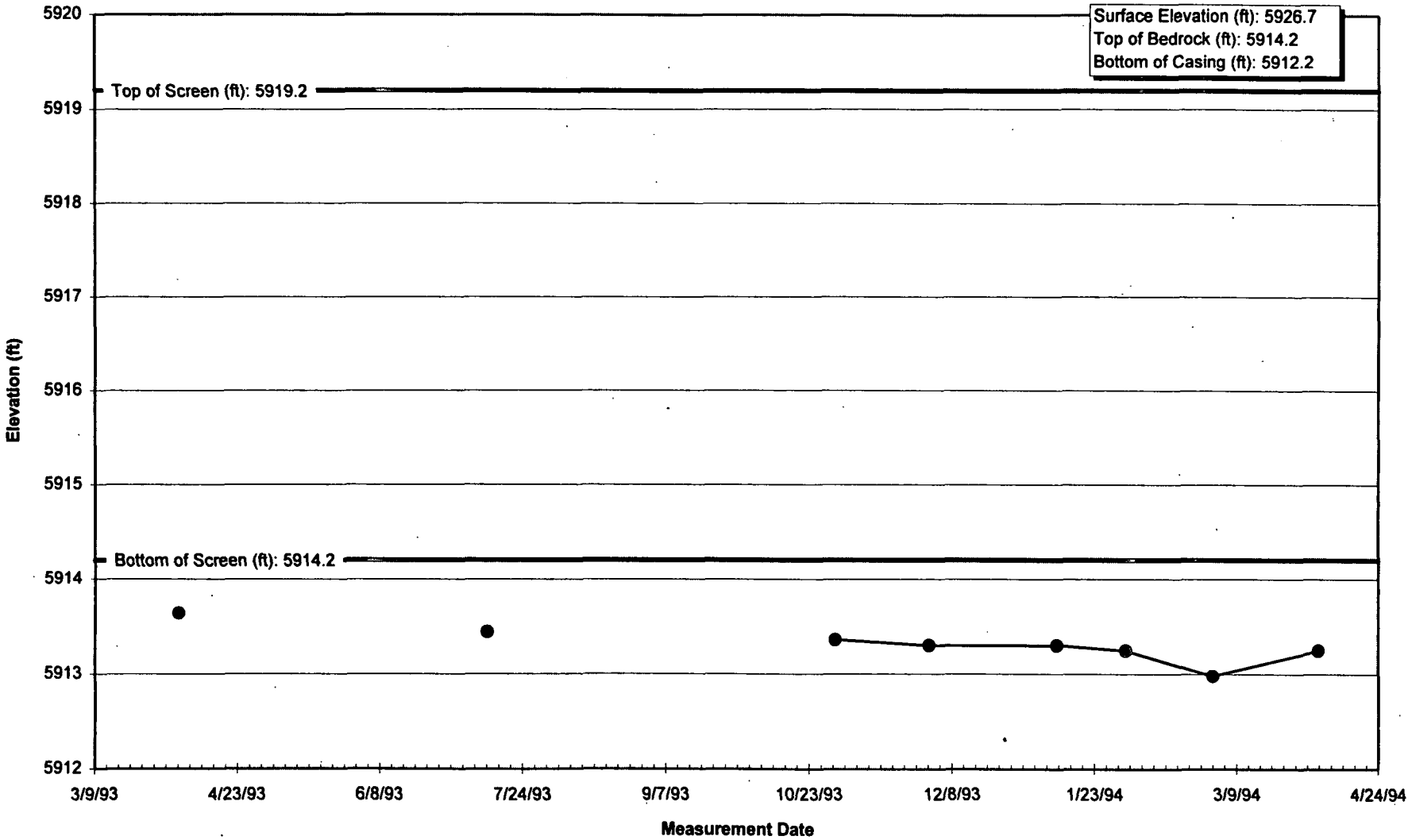

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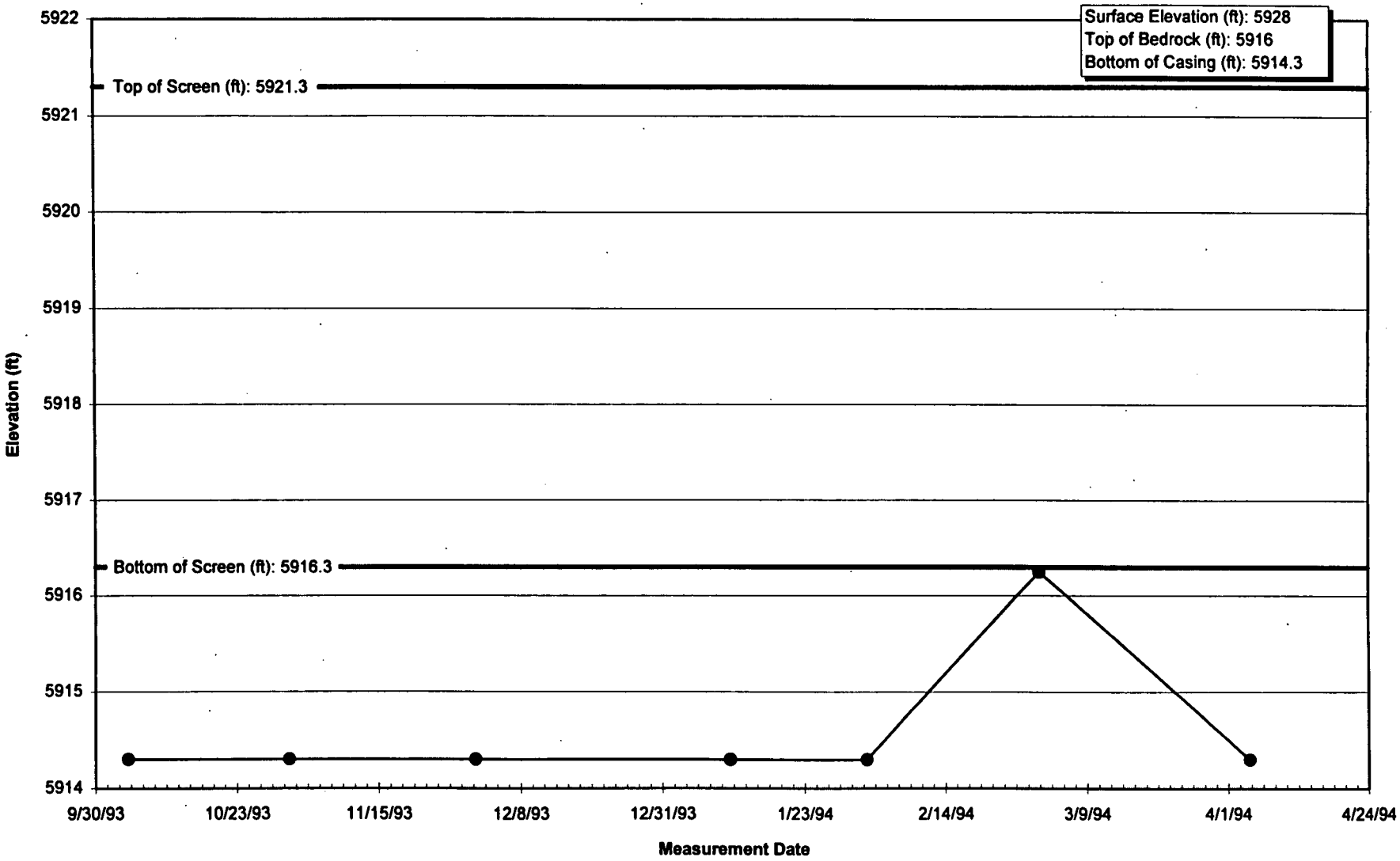

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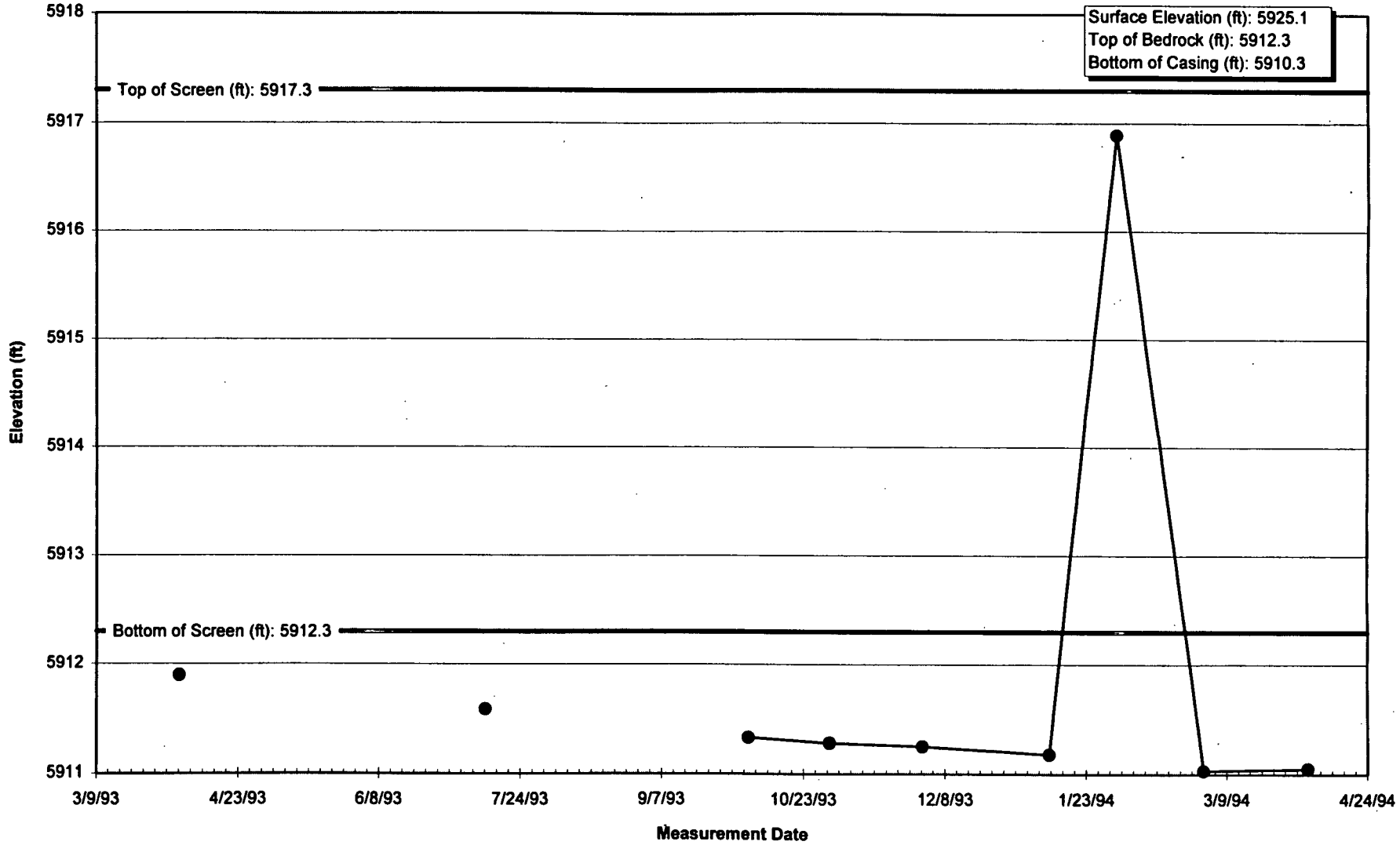
Hydrograph 45293



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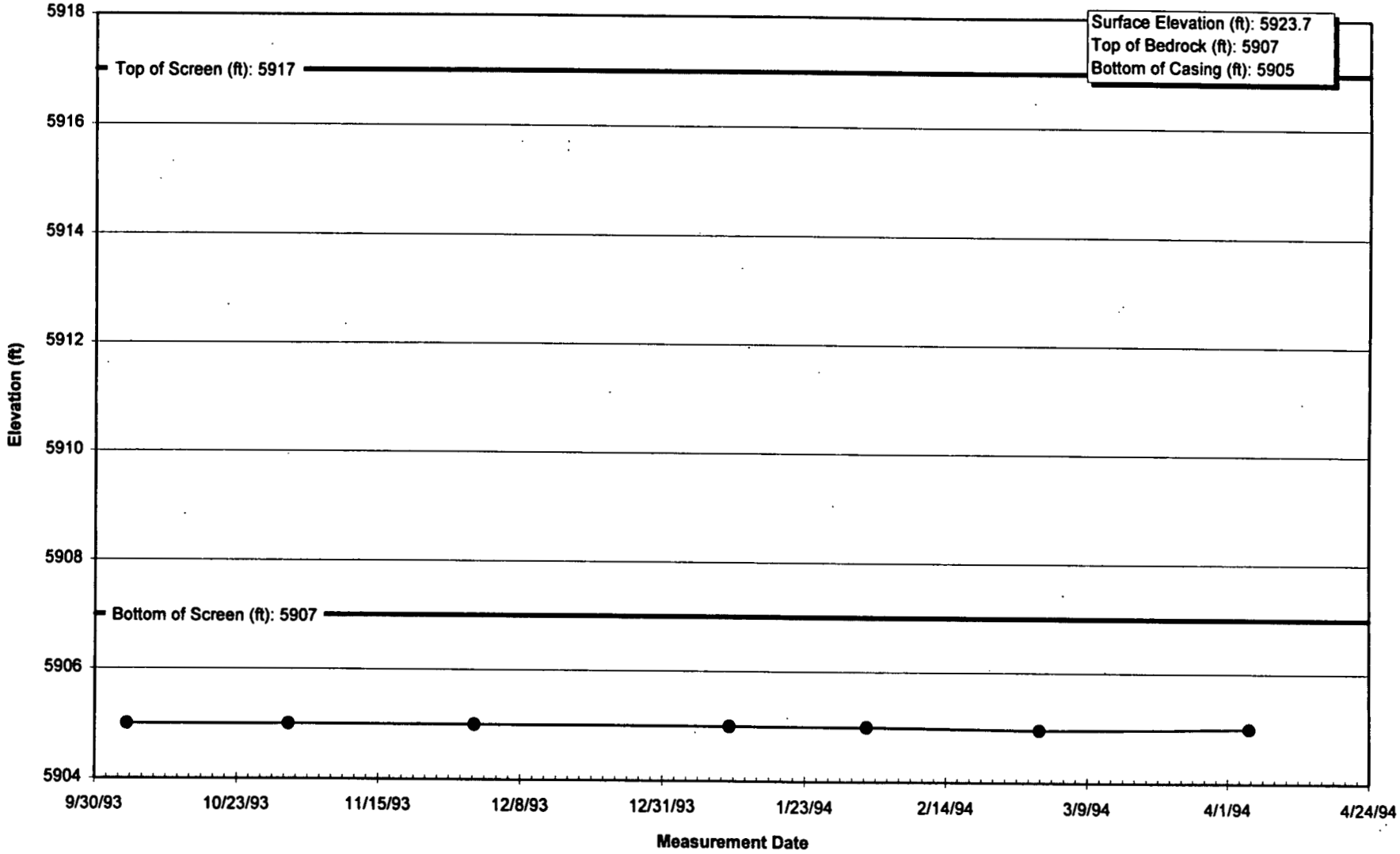
Hydrograph 45393



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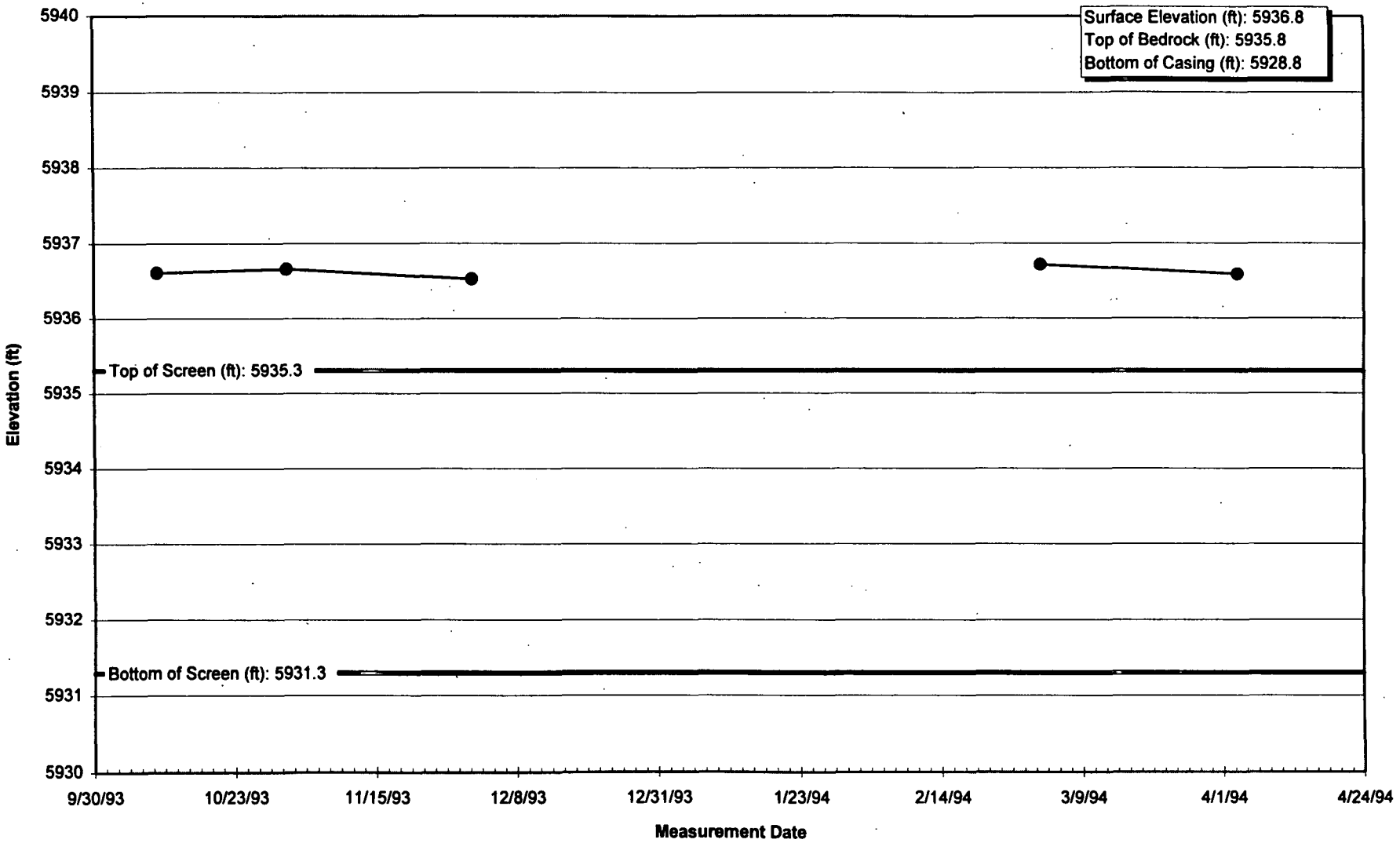
Hydrograph 45693



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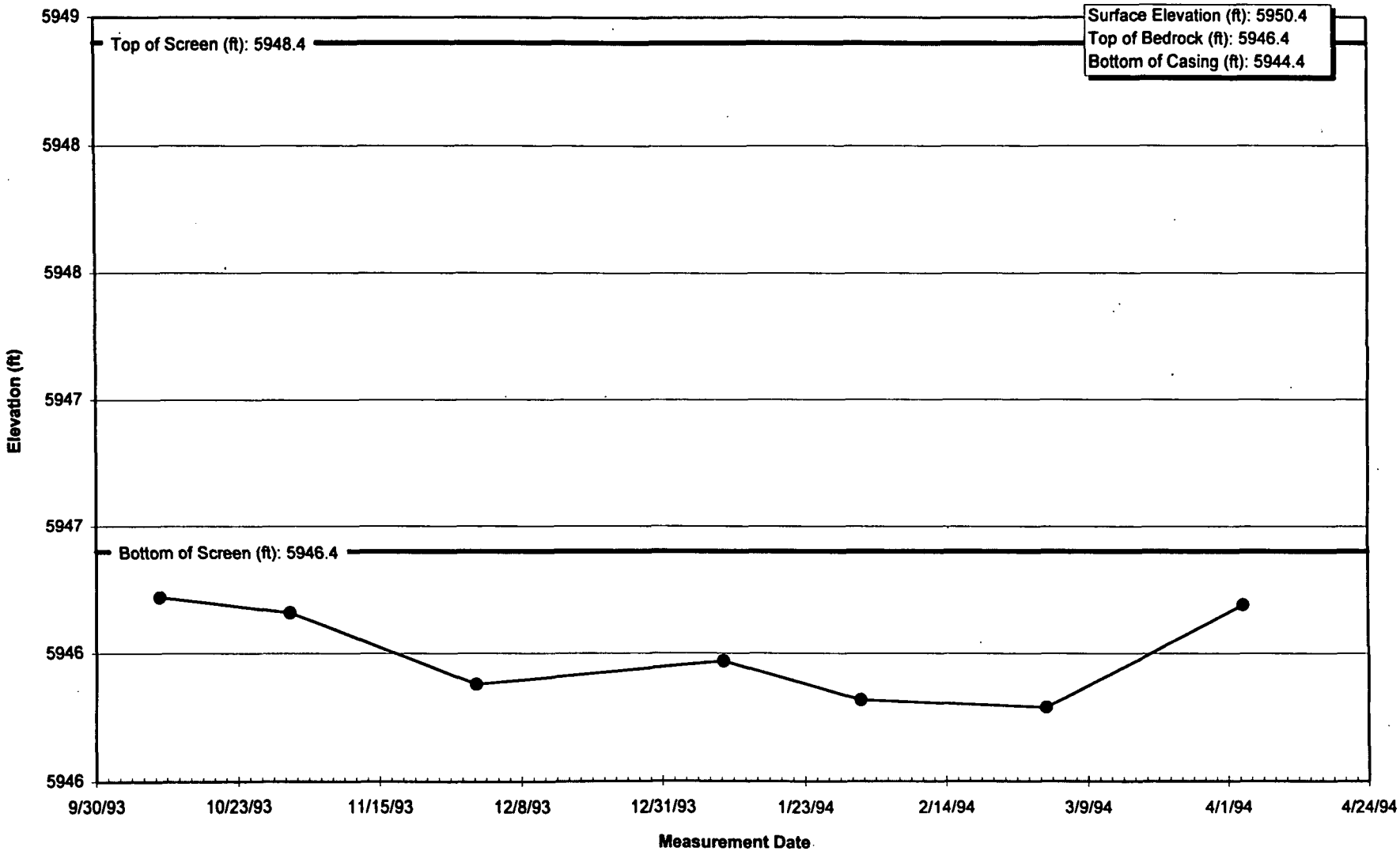

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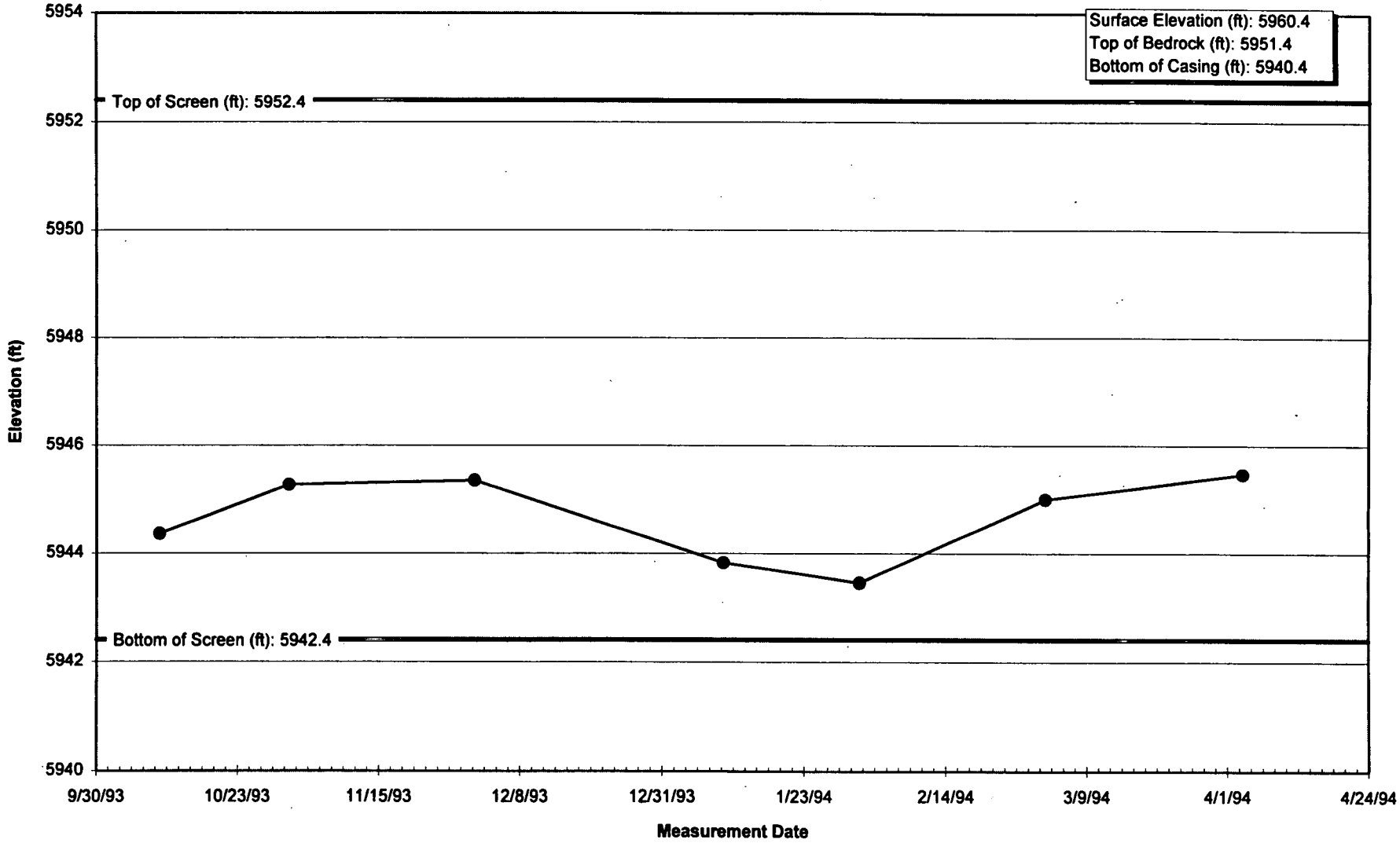

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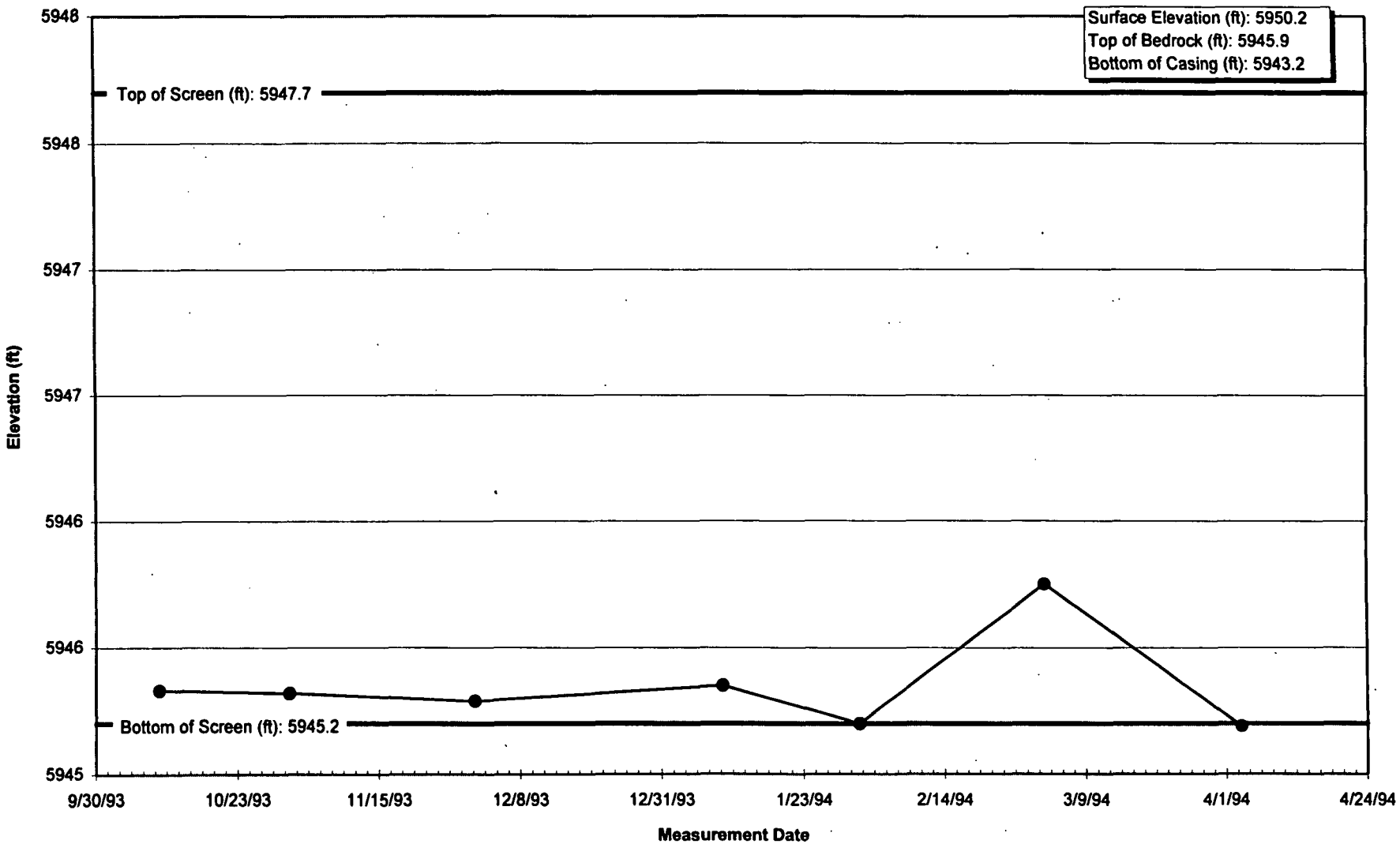
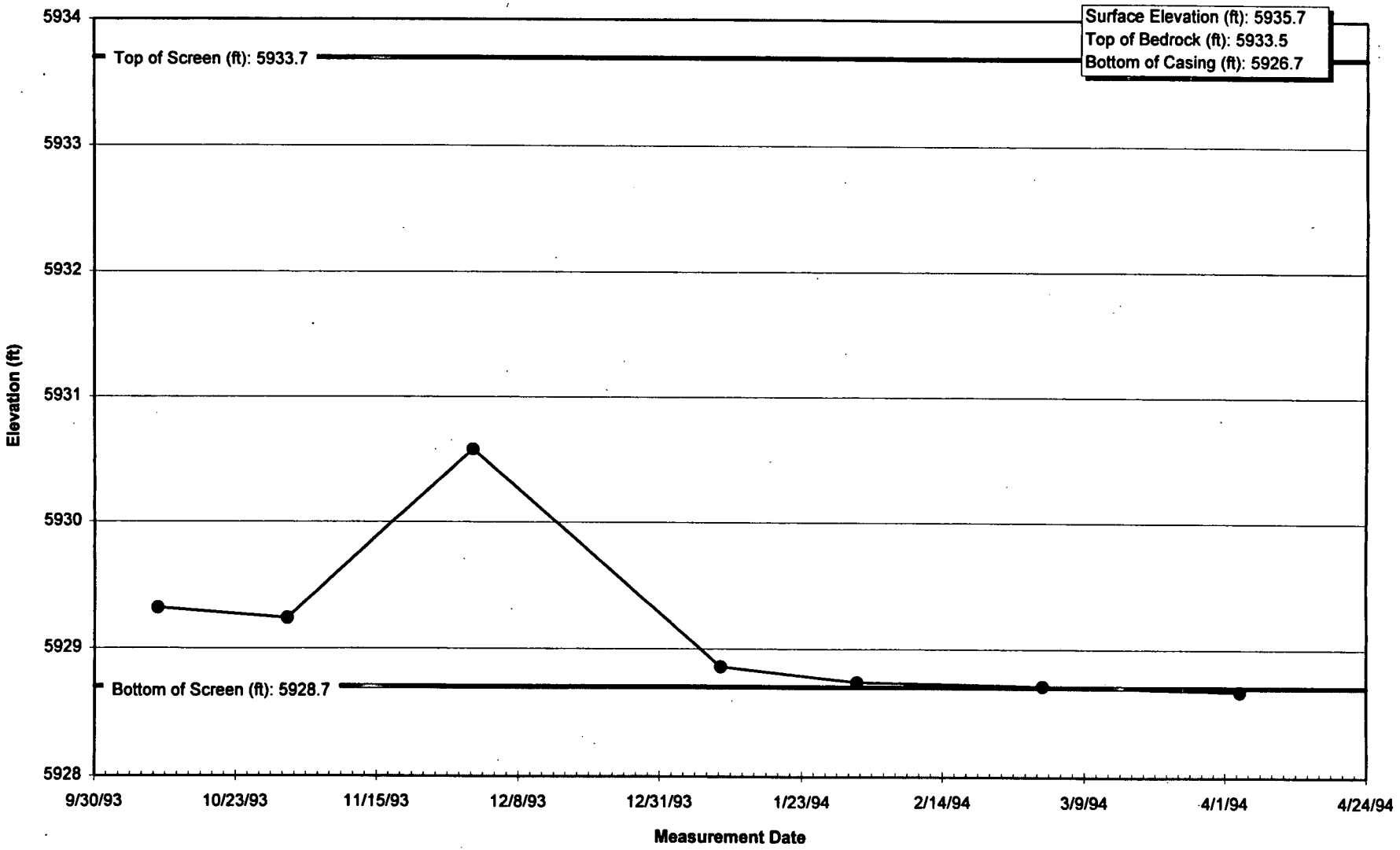


624 S12.XLS 45993 4/5/95

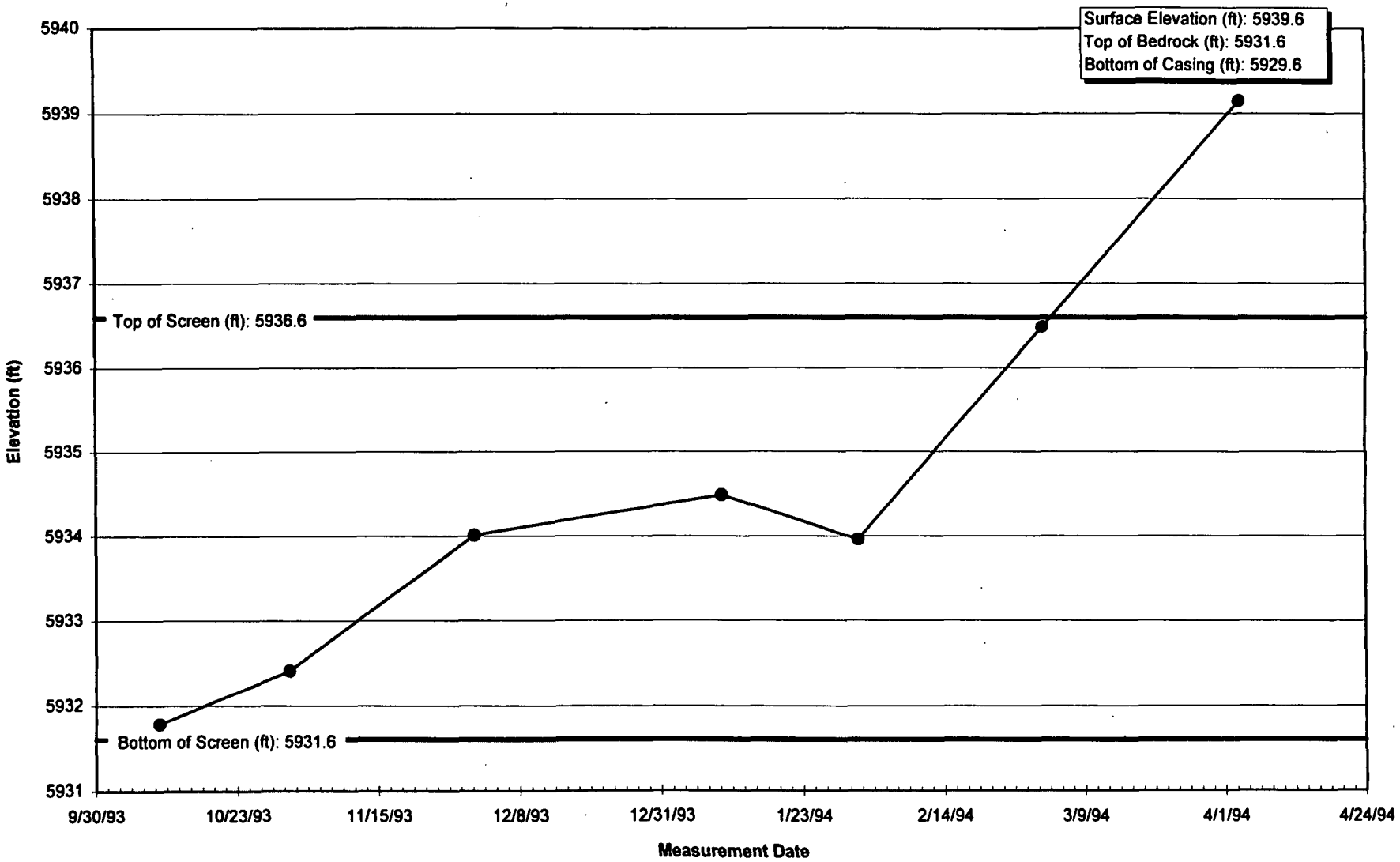
Hydrograph 46193



S12.XLS 46193 4/5/95

625

Hydrograph 46293



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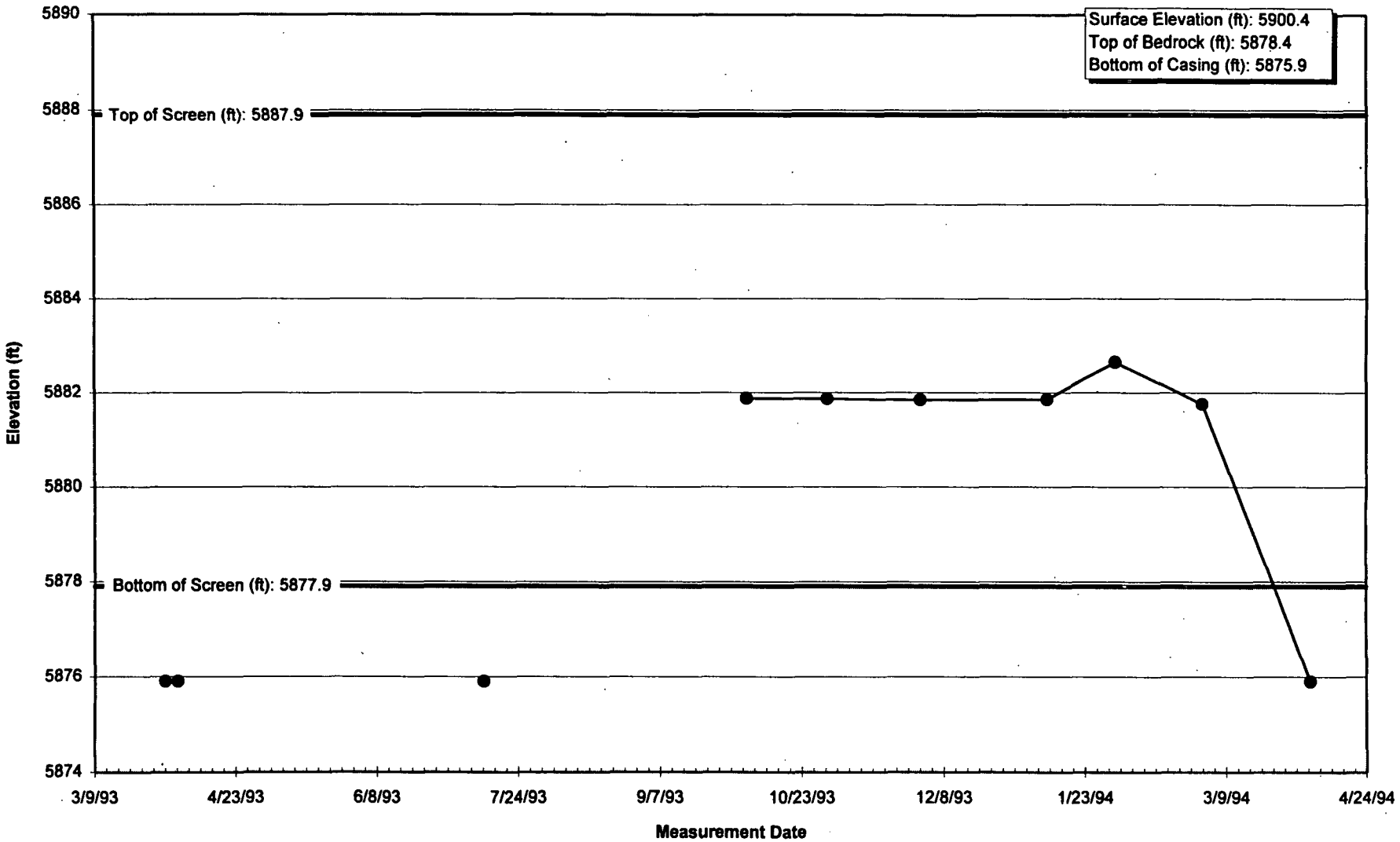
S12.XLS 46293 4/5/95

Hydrograph 46393



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627

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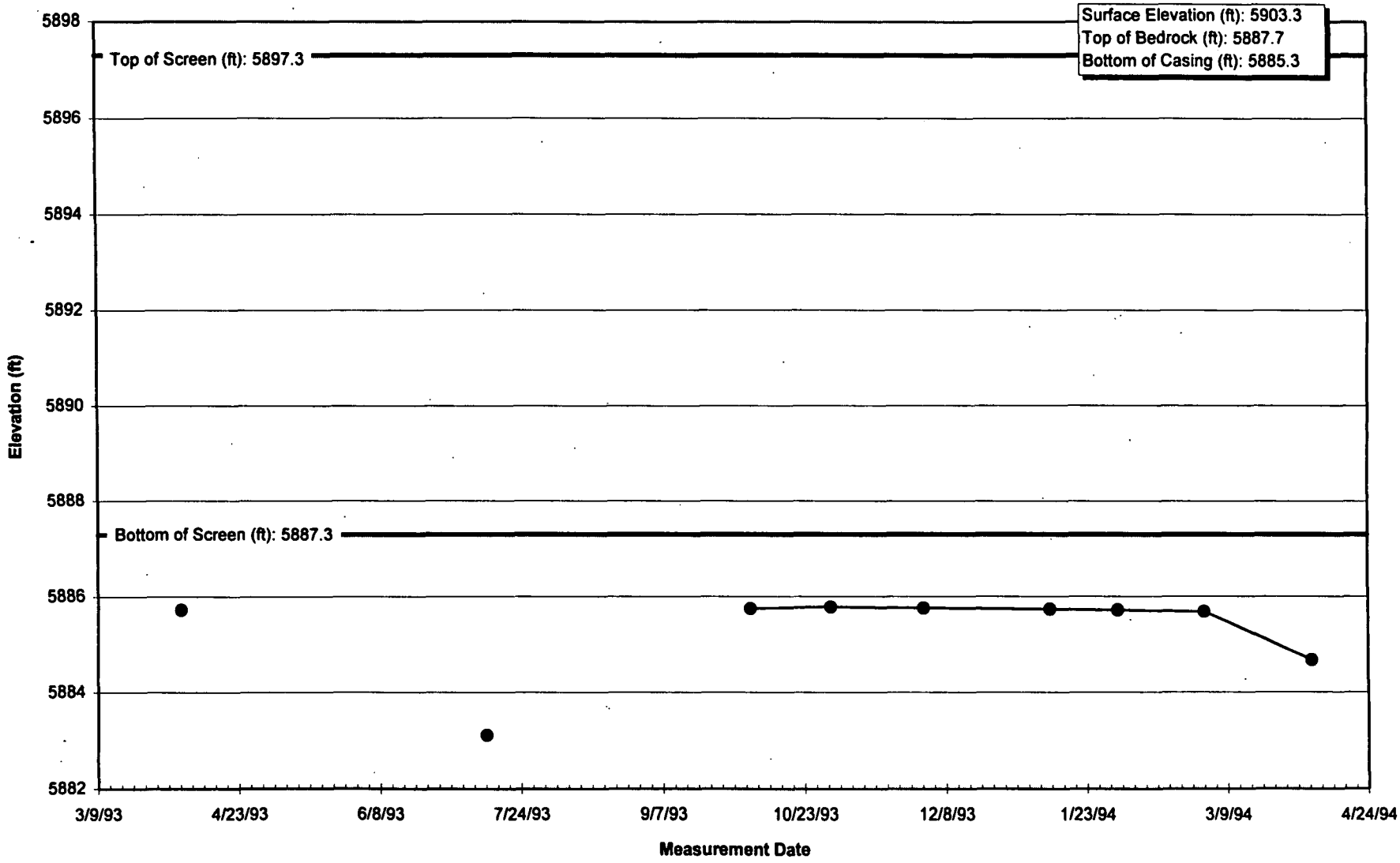

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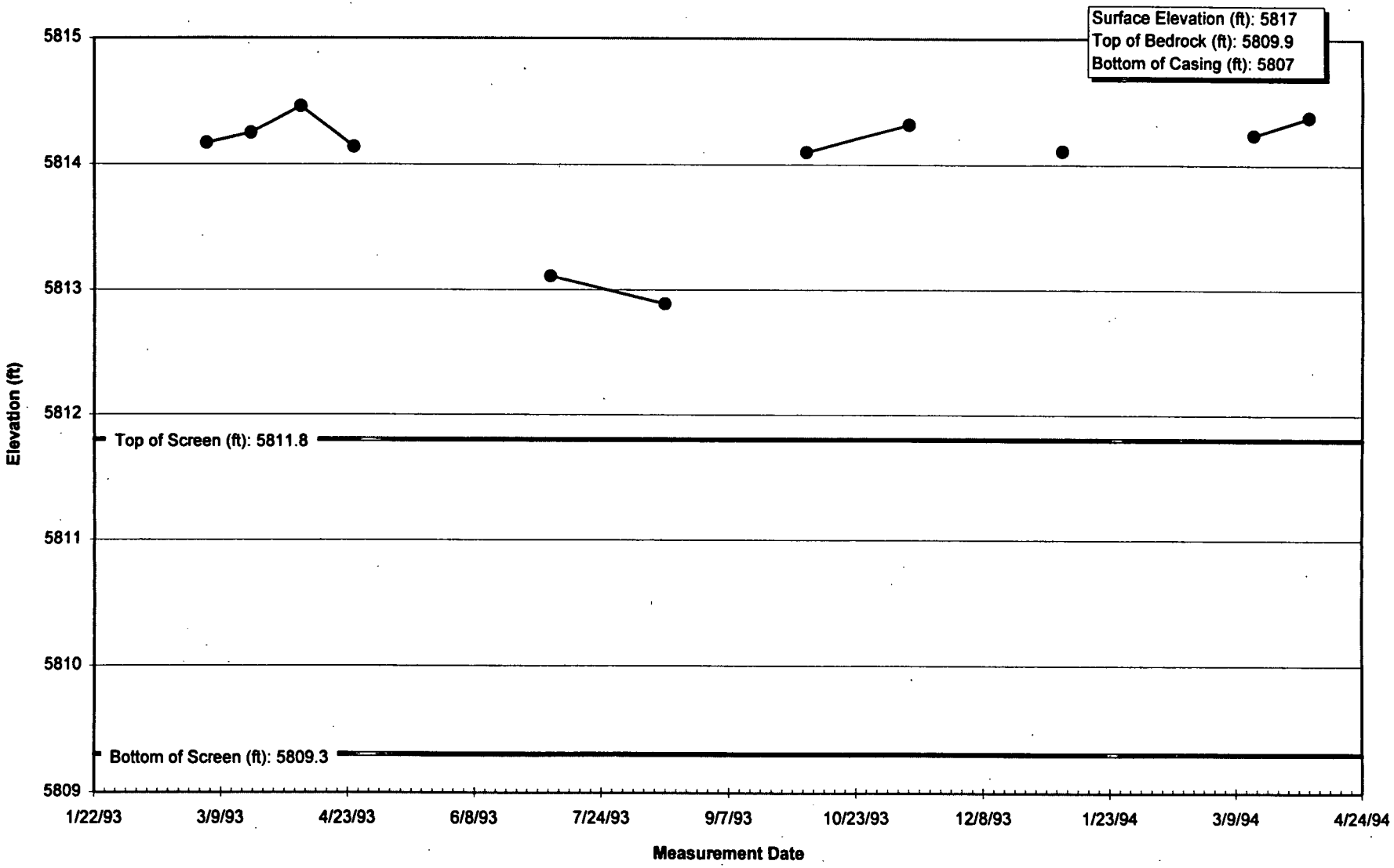
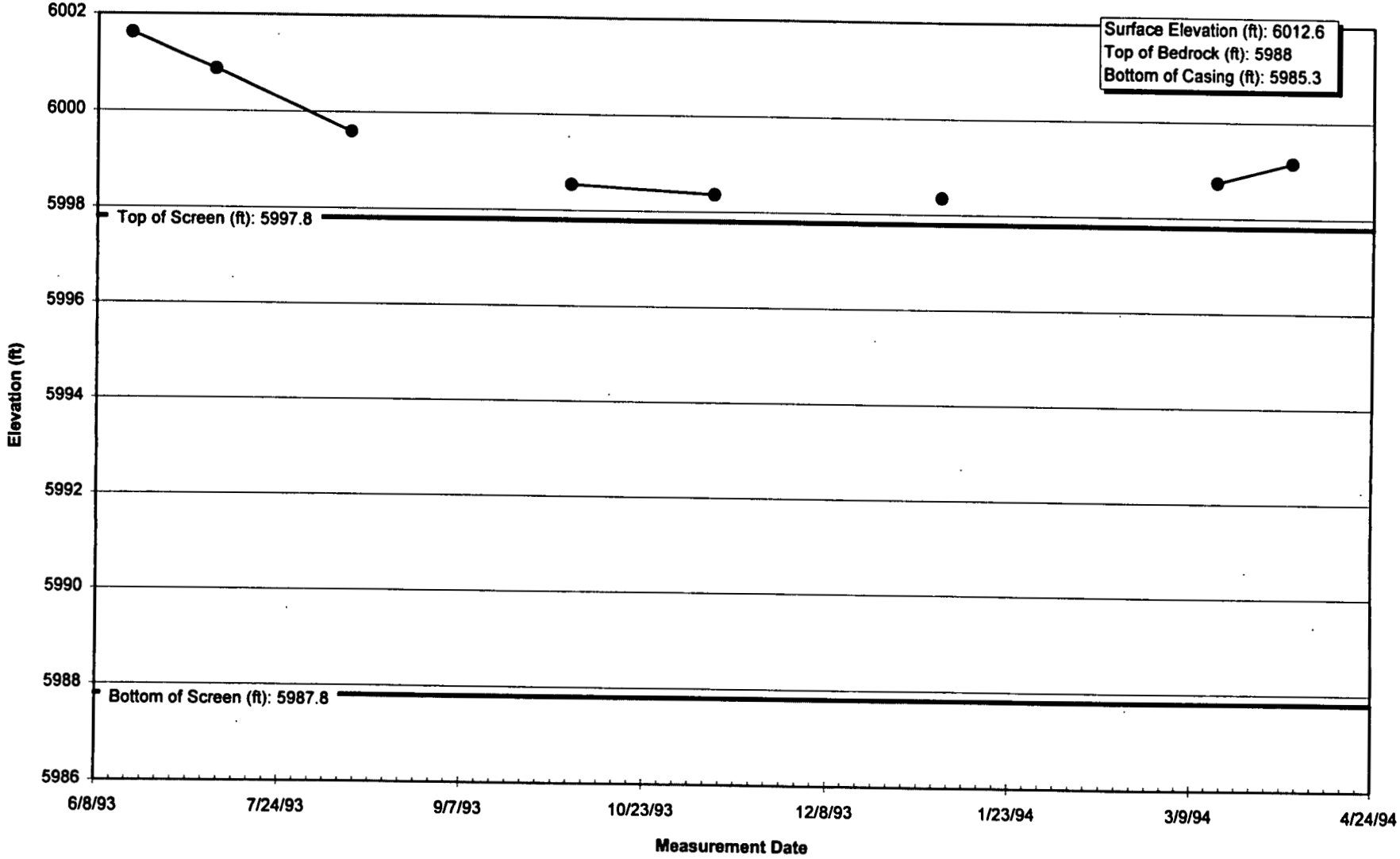
Hydrograph 51193



S13.XLS 51193 4/5/95

629

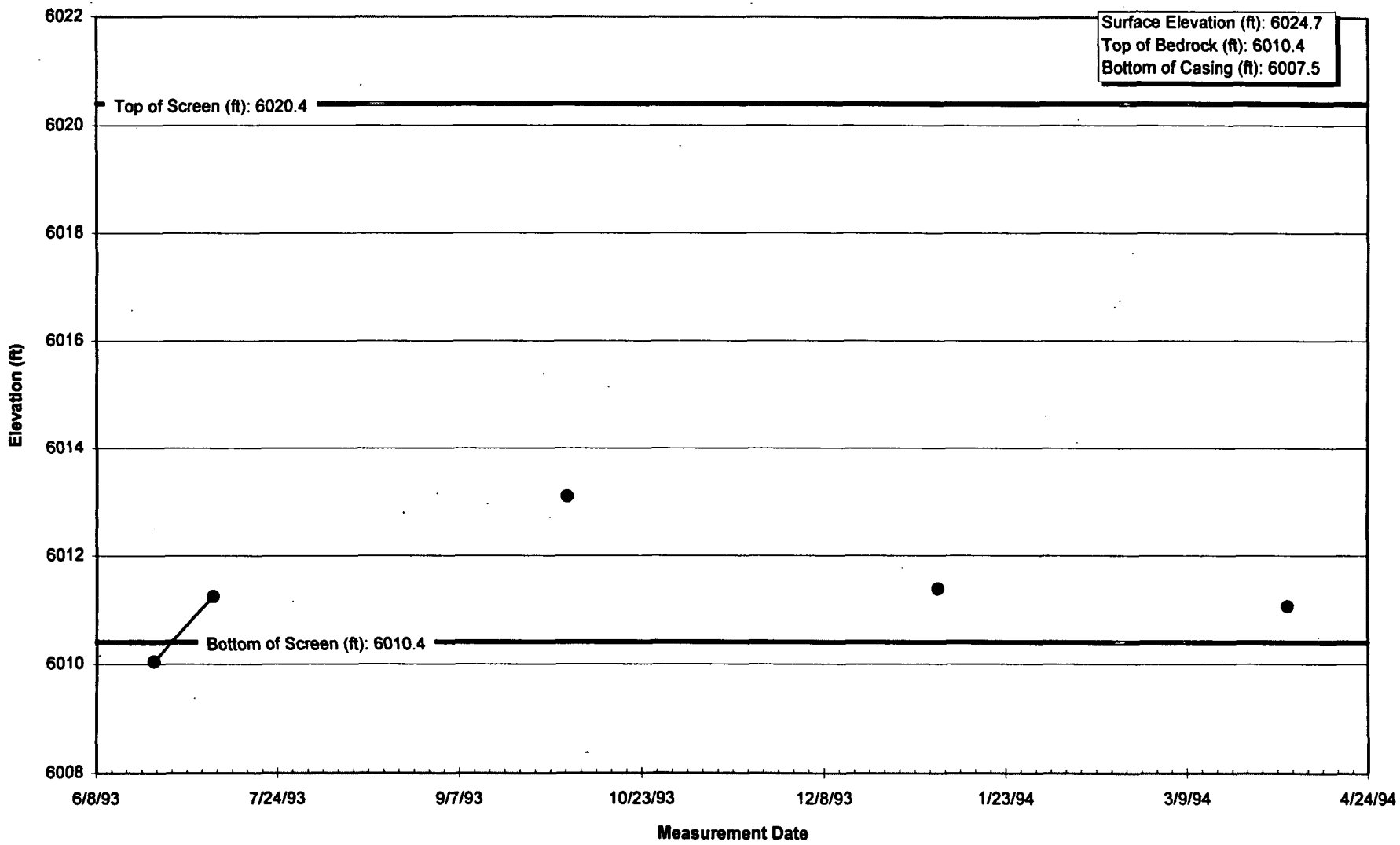
Hydrograph 58793



630

S14.XLS 58793 4/5/95

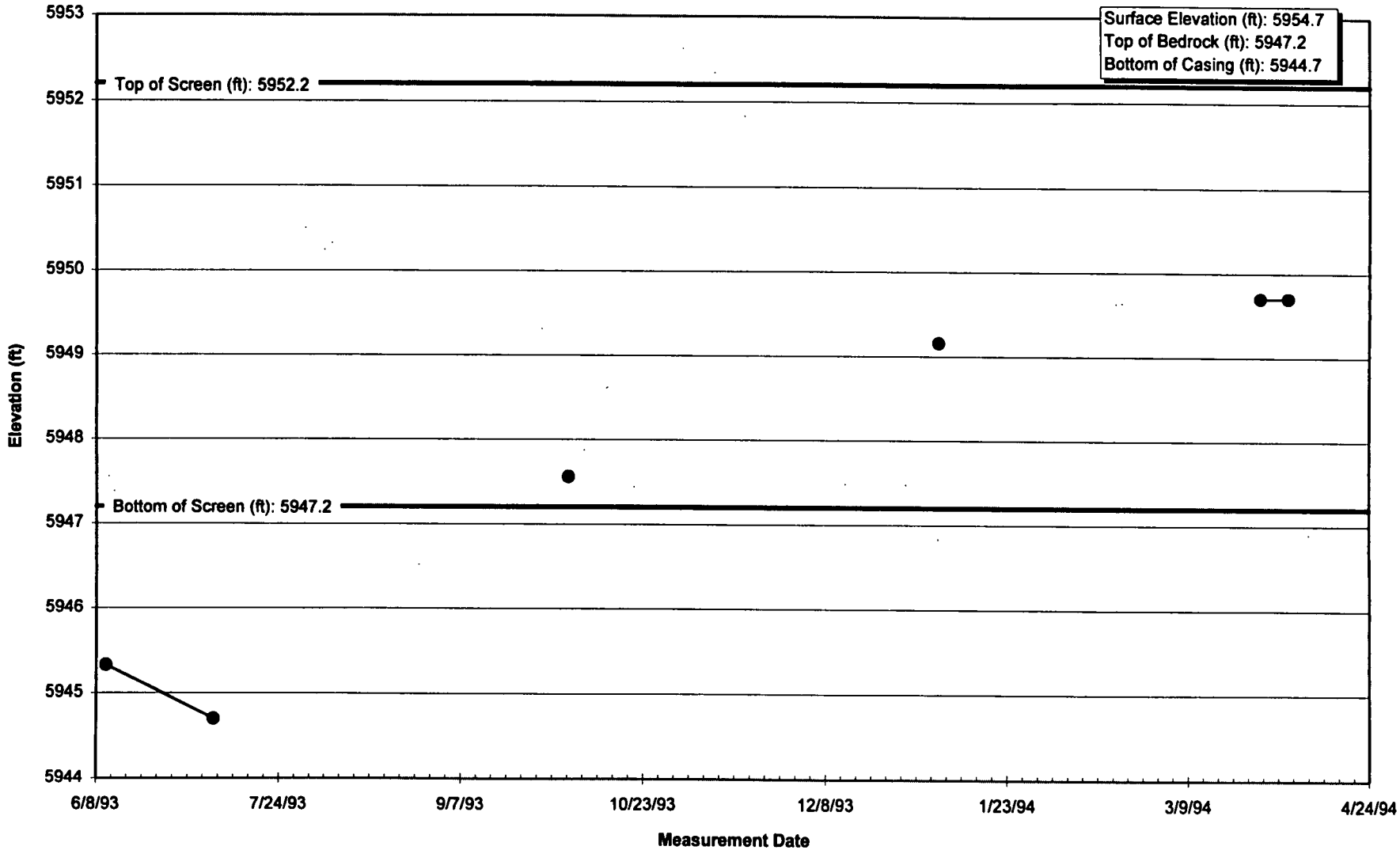
Hydrograph 59093



S14.XLS 59093 4/5/95

631

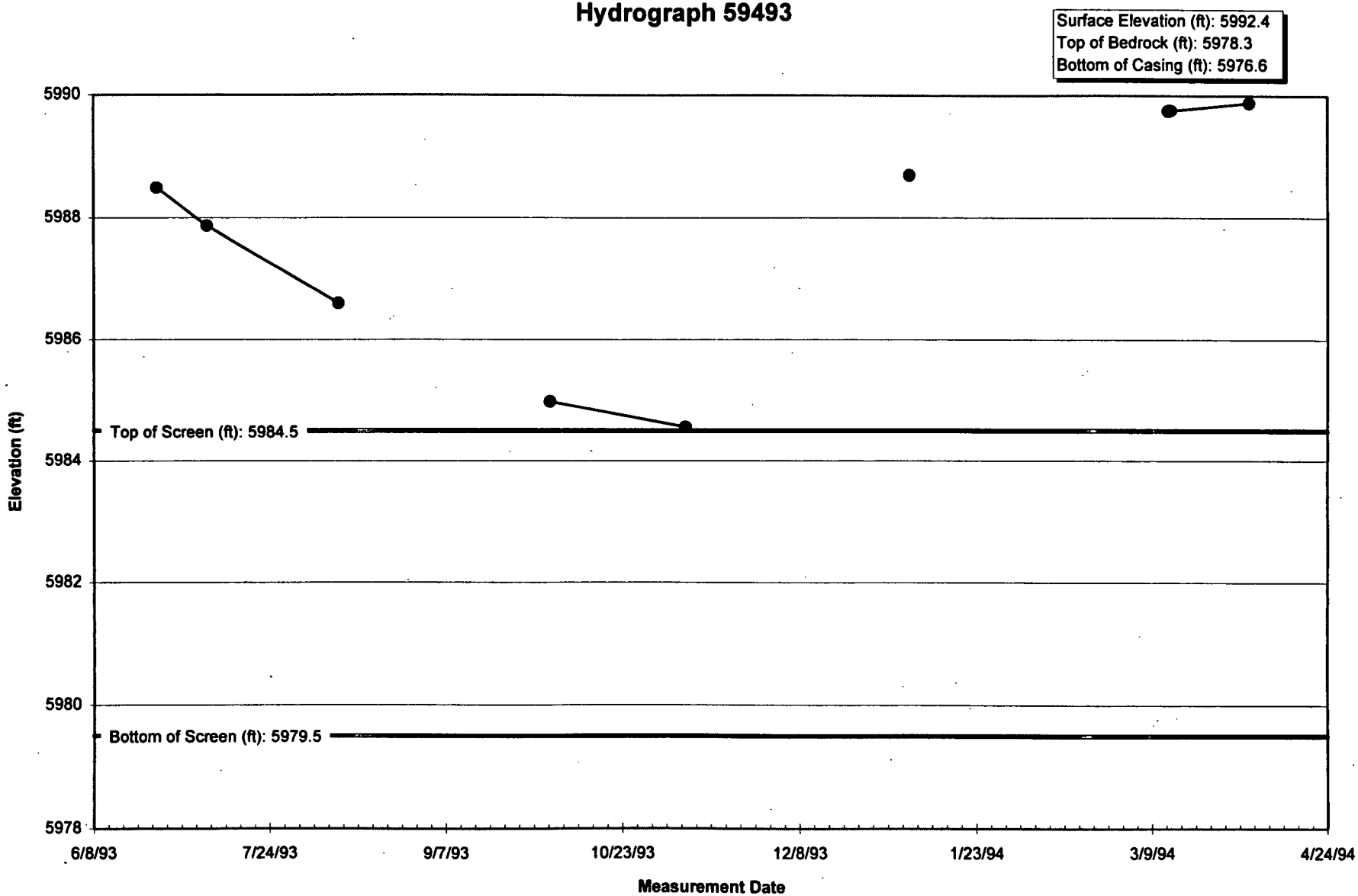
Hydrograph 59393



S14.XLS 59393 4/5/95

632

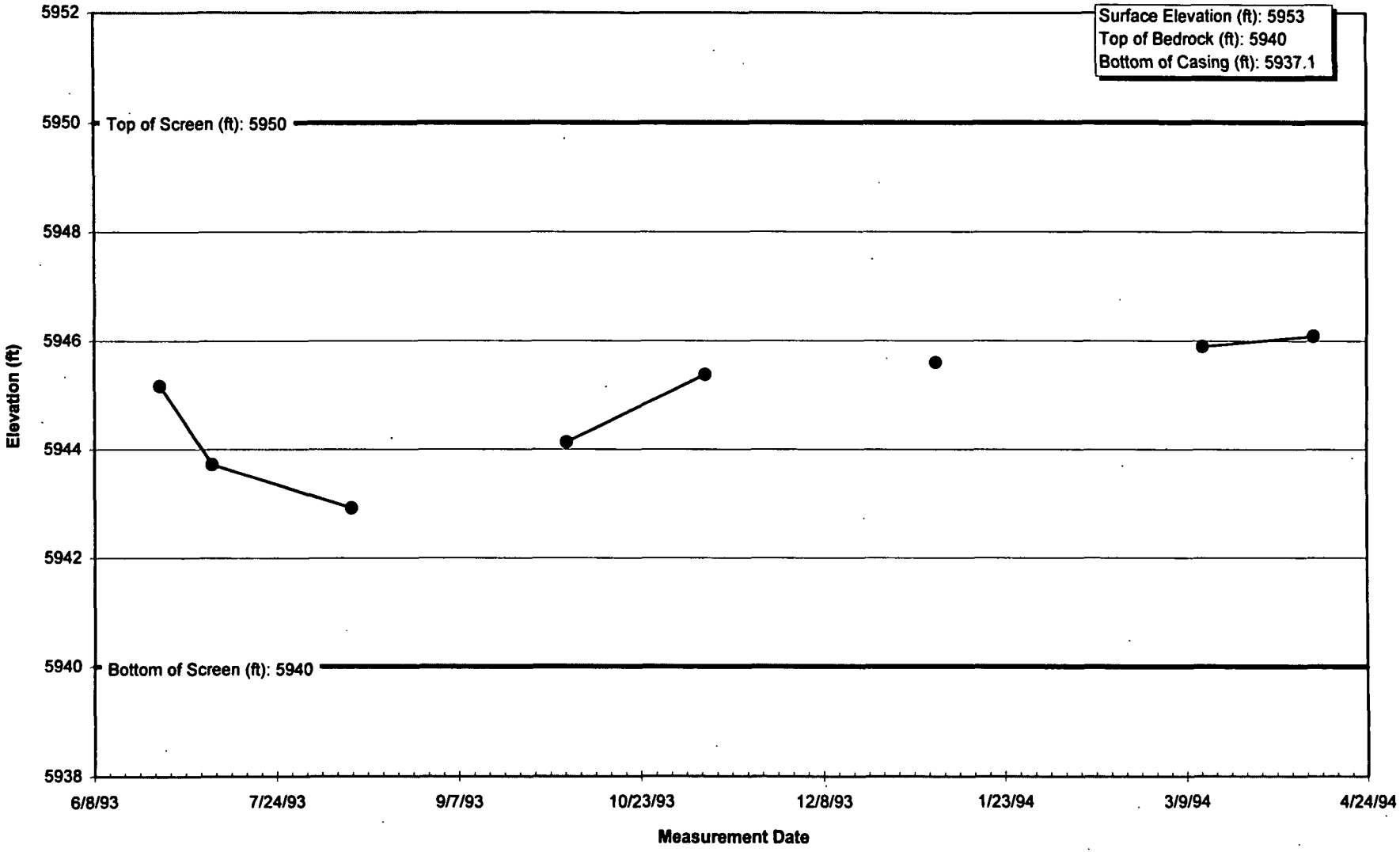
Hydrograph 59493



S14.XLS 59493 4/5/95

633

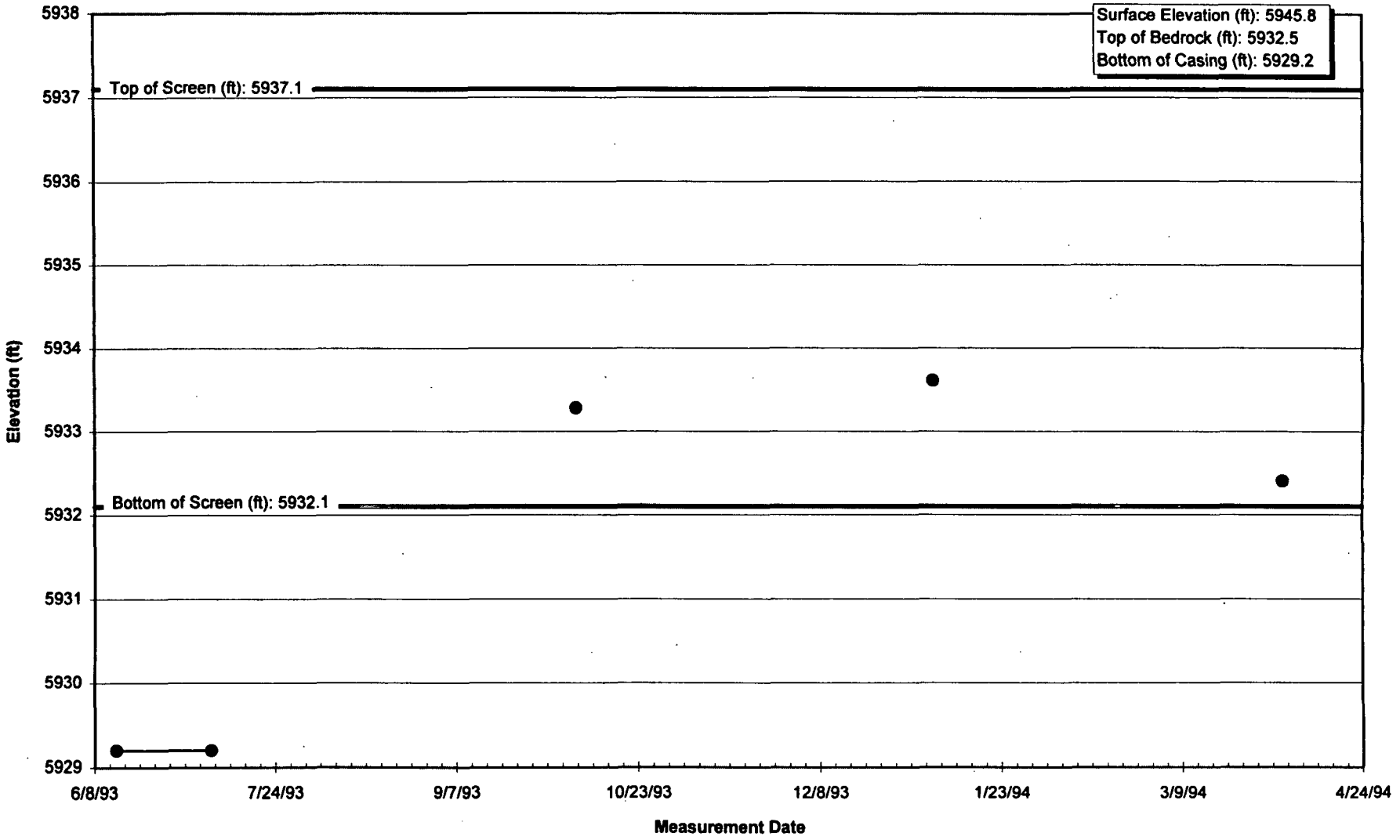
Hydrograph 59593



634

S14.XLS 59593 4/5/95

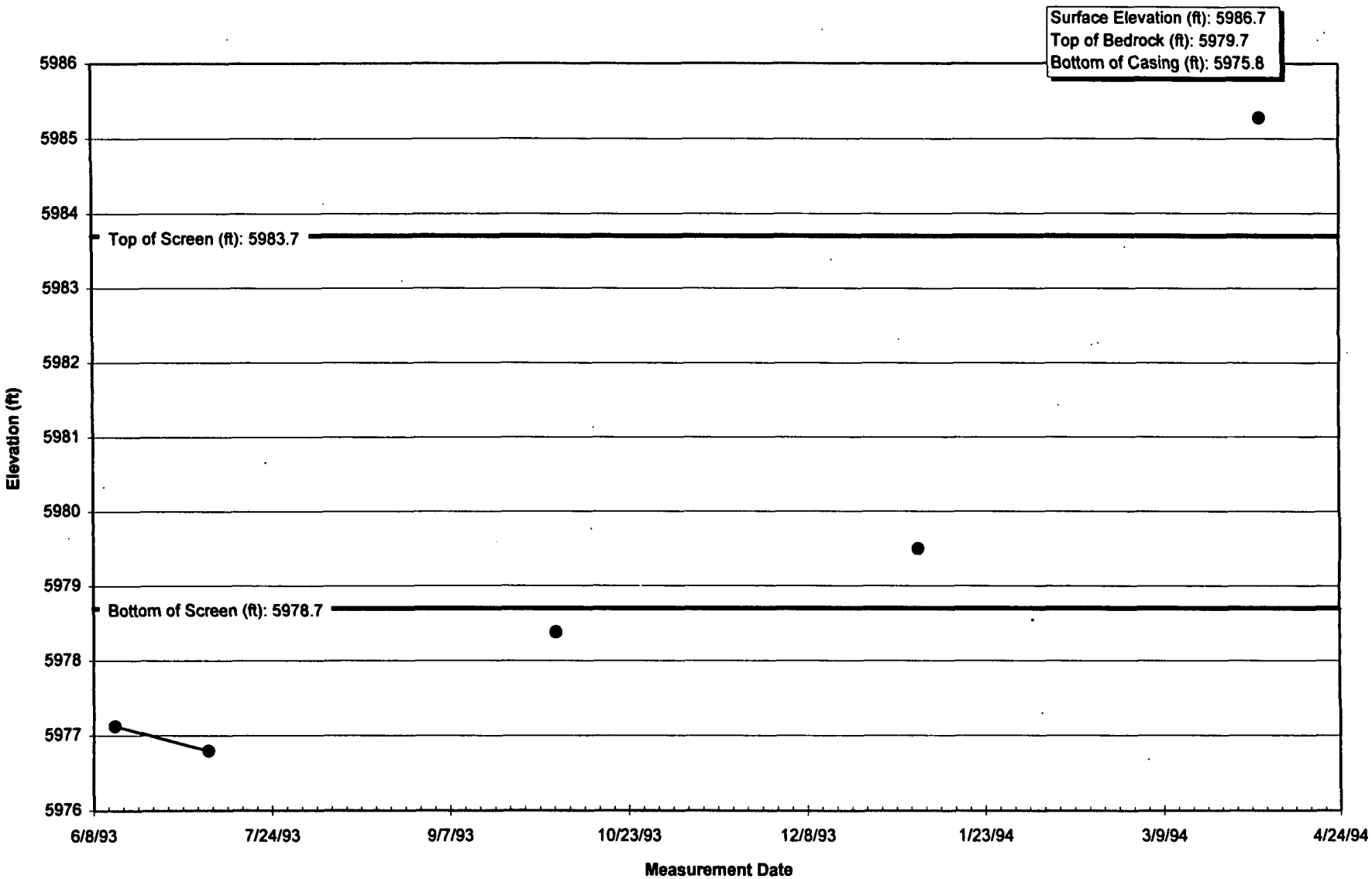
Hydrograph 59793



S14.XLS 59793 4/5/95

635

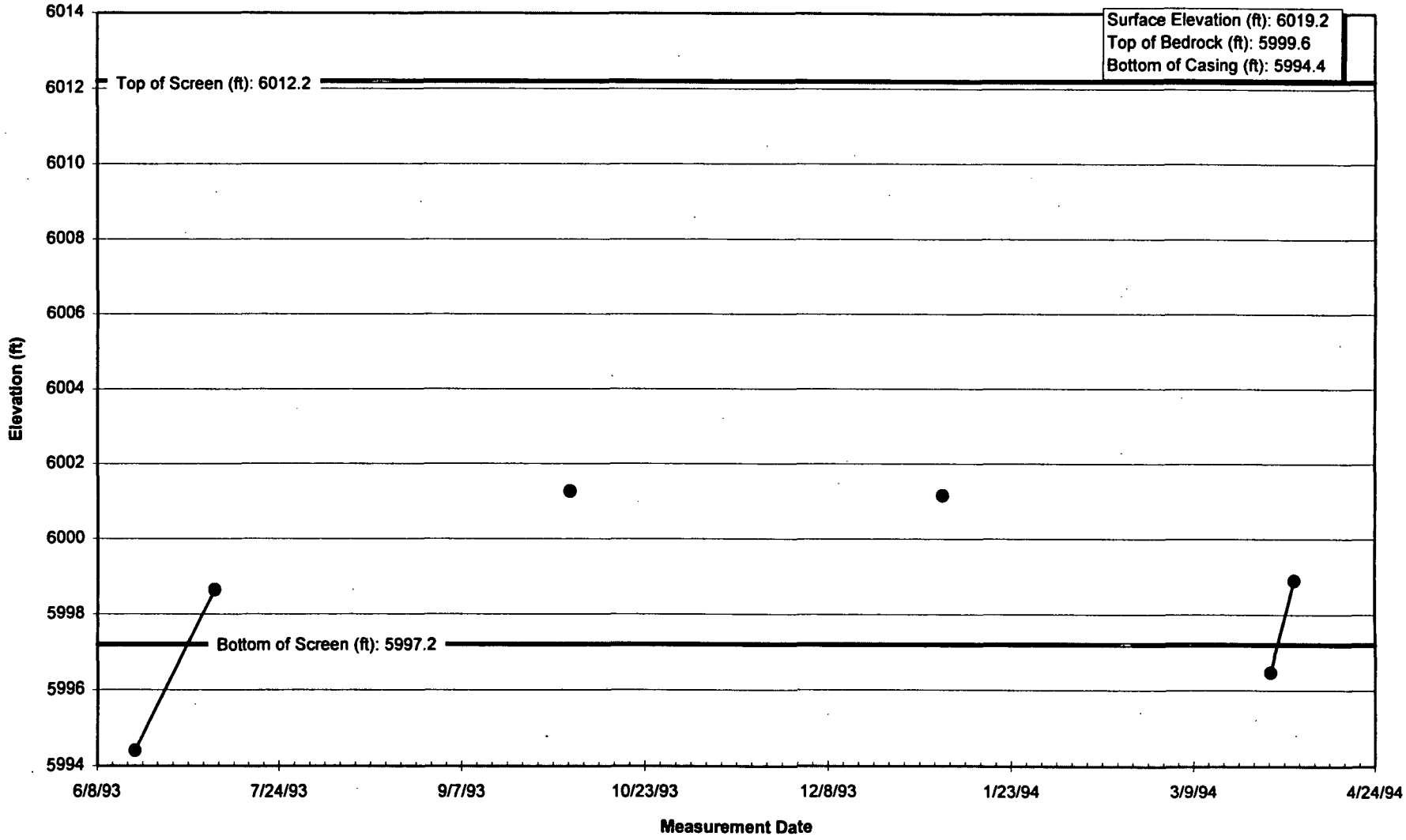
Hydrograph 61293



636

S14.XLS 61293 4/5/95

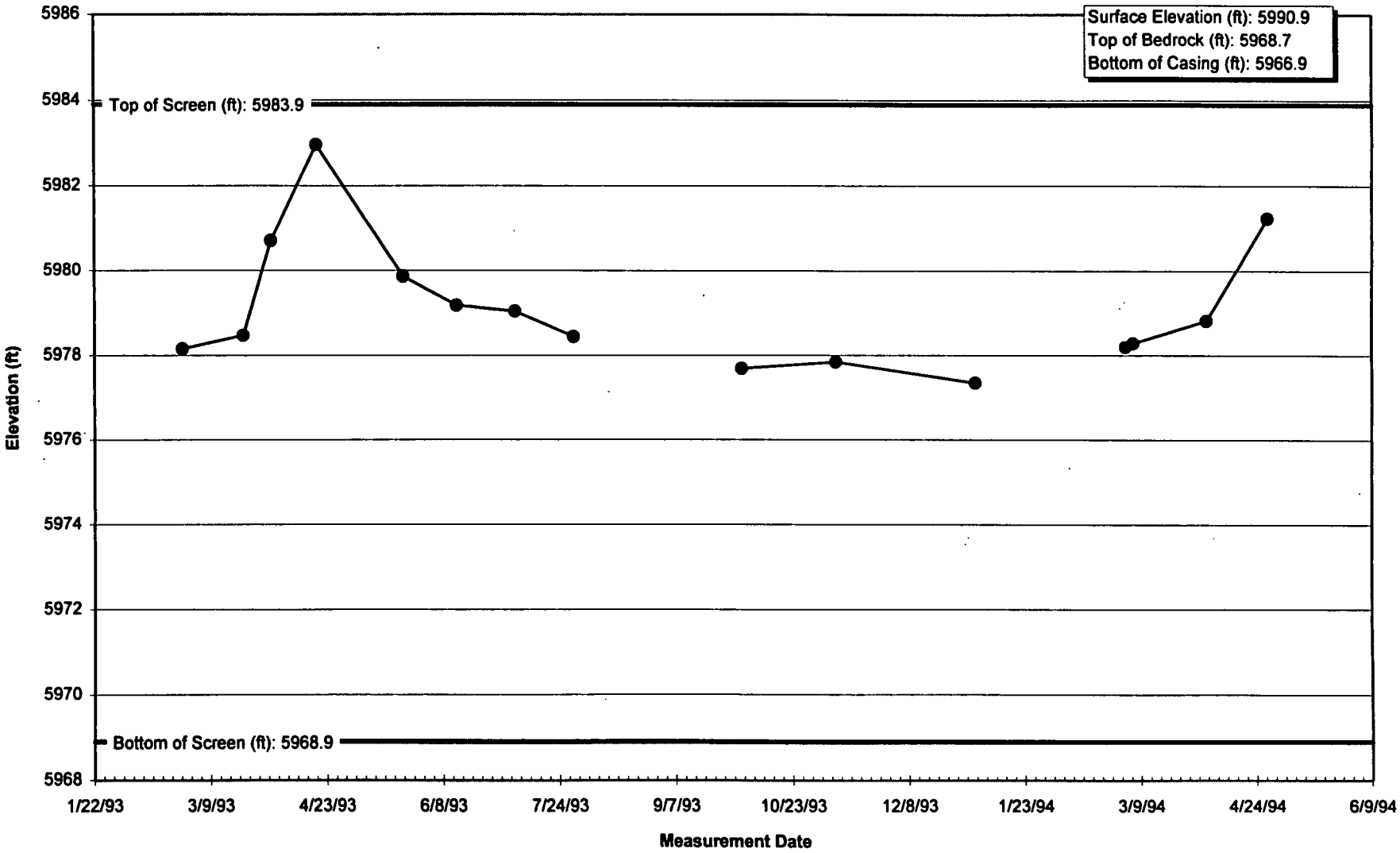
Hydrograph 63093



S14.XLS 63093 4/5/95

637

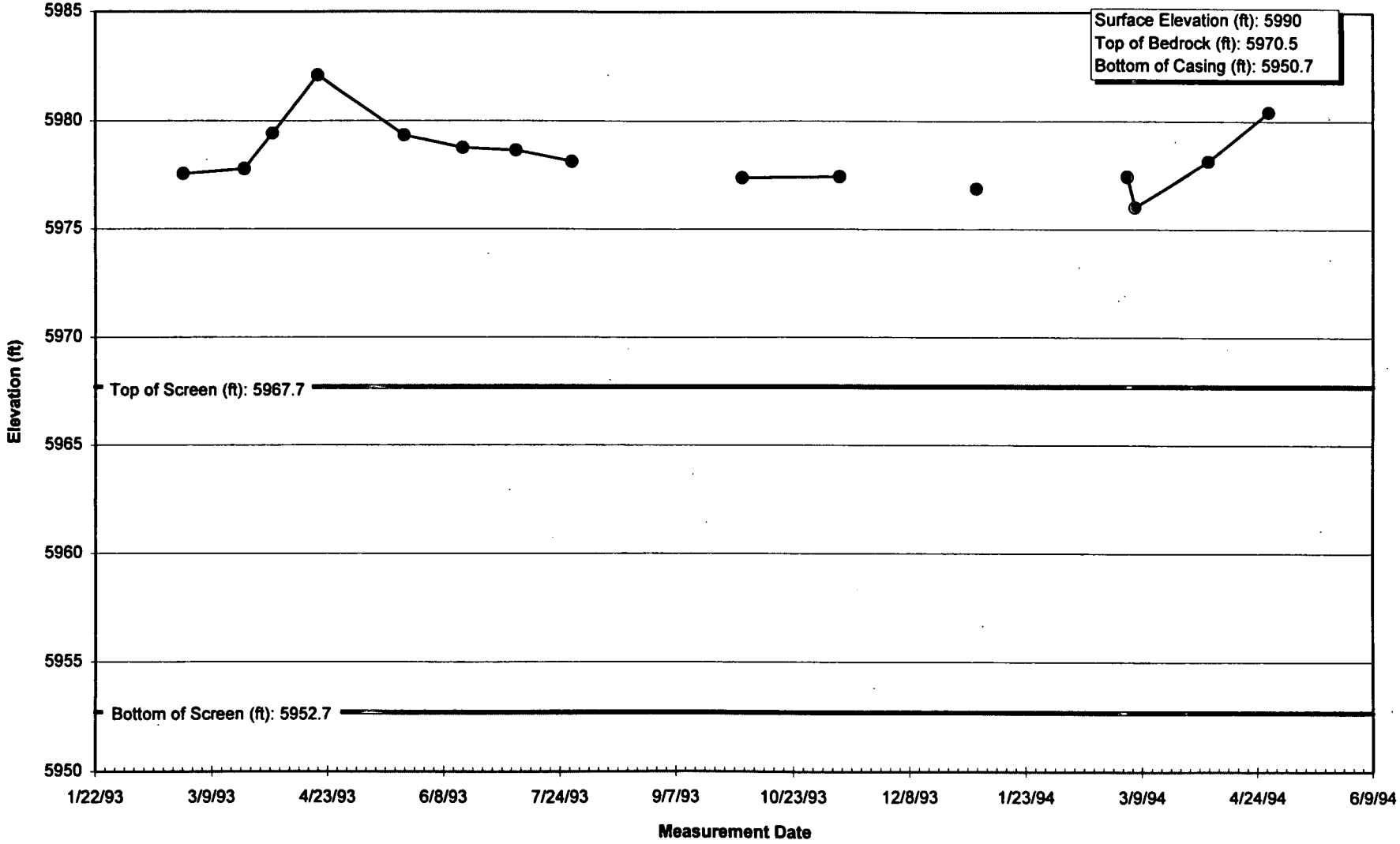
Hydrograph 70093



638

S15.XLS 70093 4/6/95

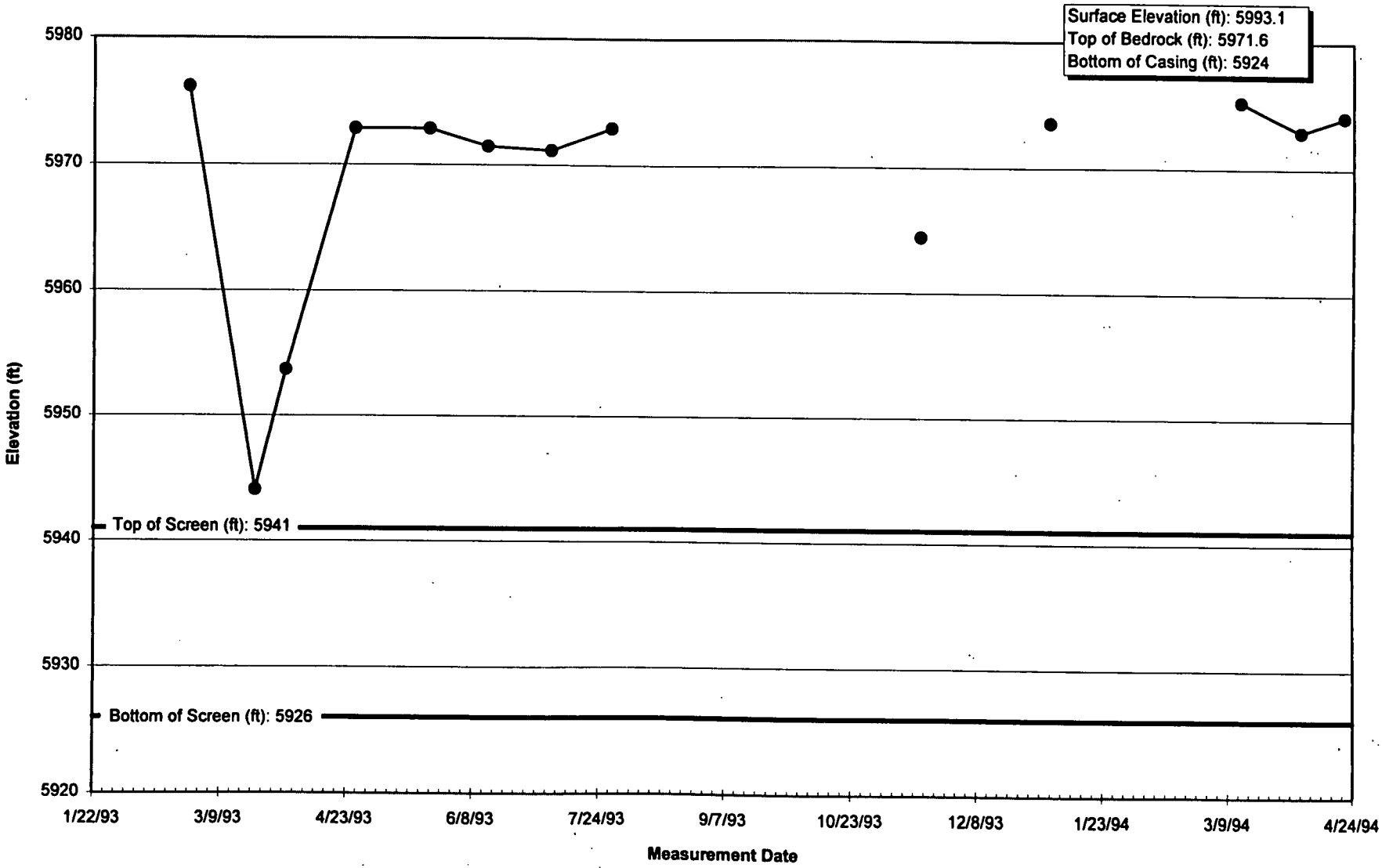
Hydrograph 70193



639

S15.XLS 70193 4/6/95

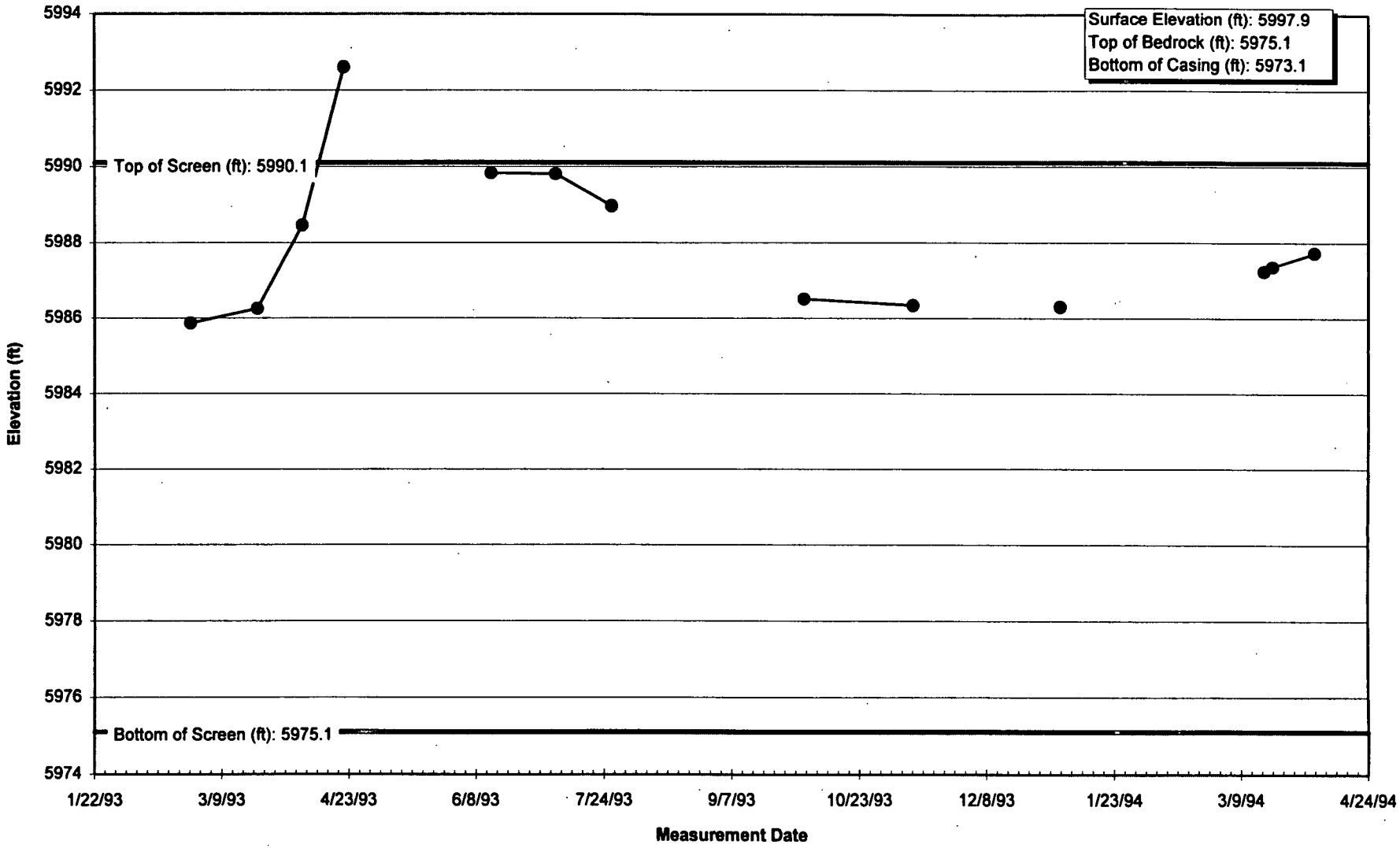
Hydrograph 70293



640

S15.XLS 70293 4/6/95

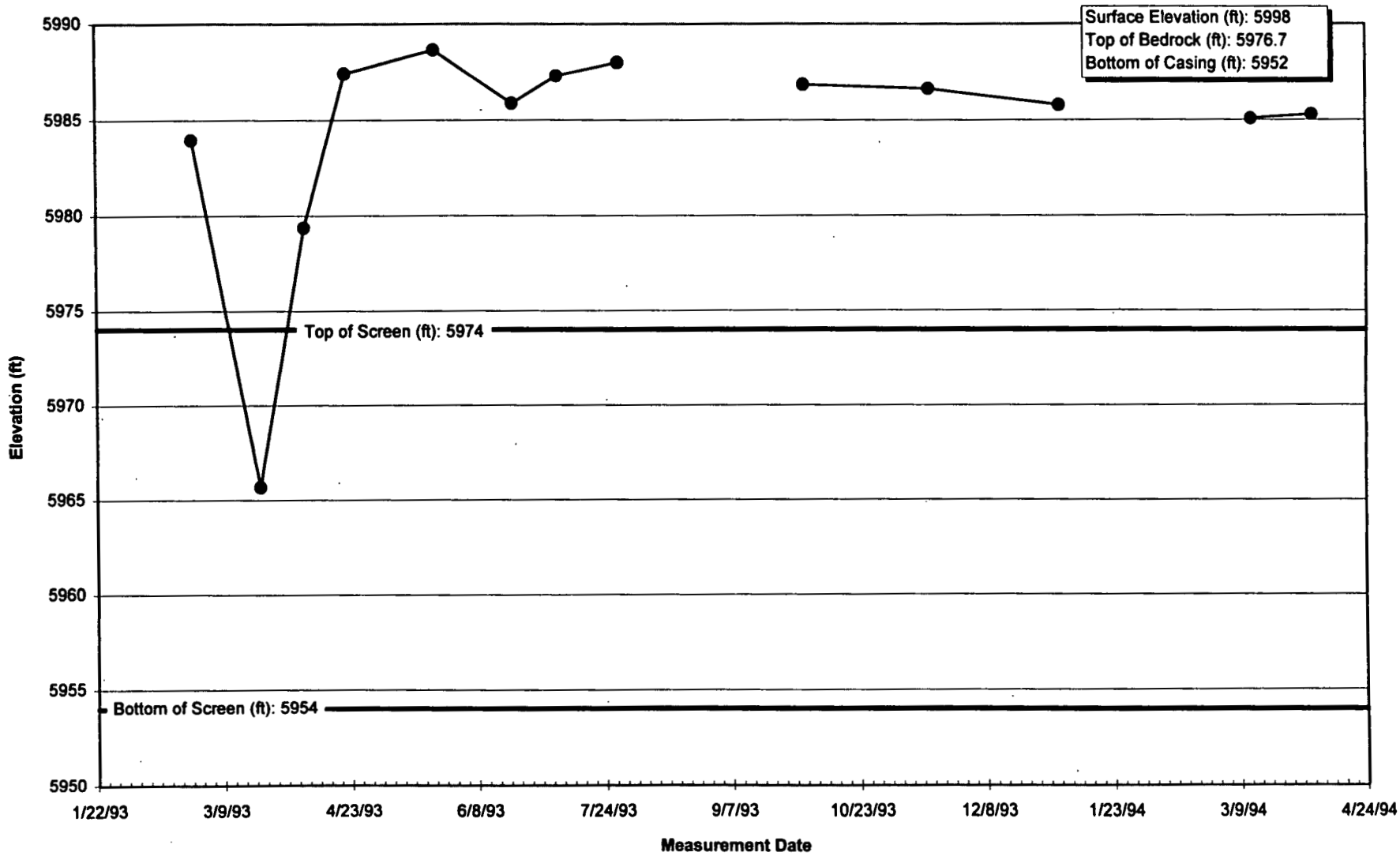
Hydrograph 70393



S15.XLS 70393 4/6/95

641

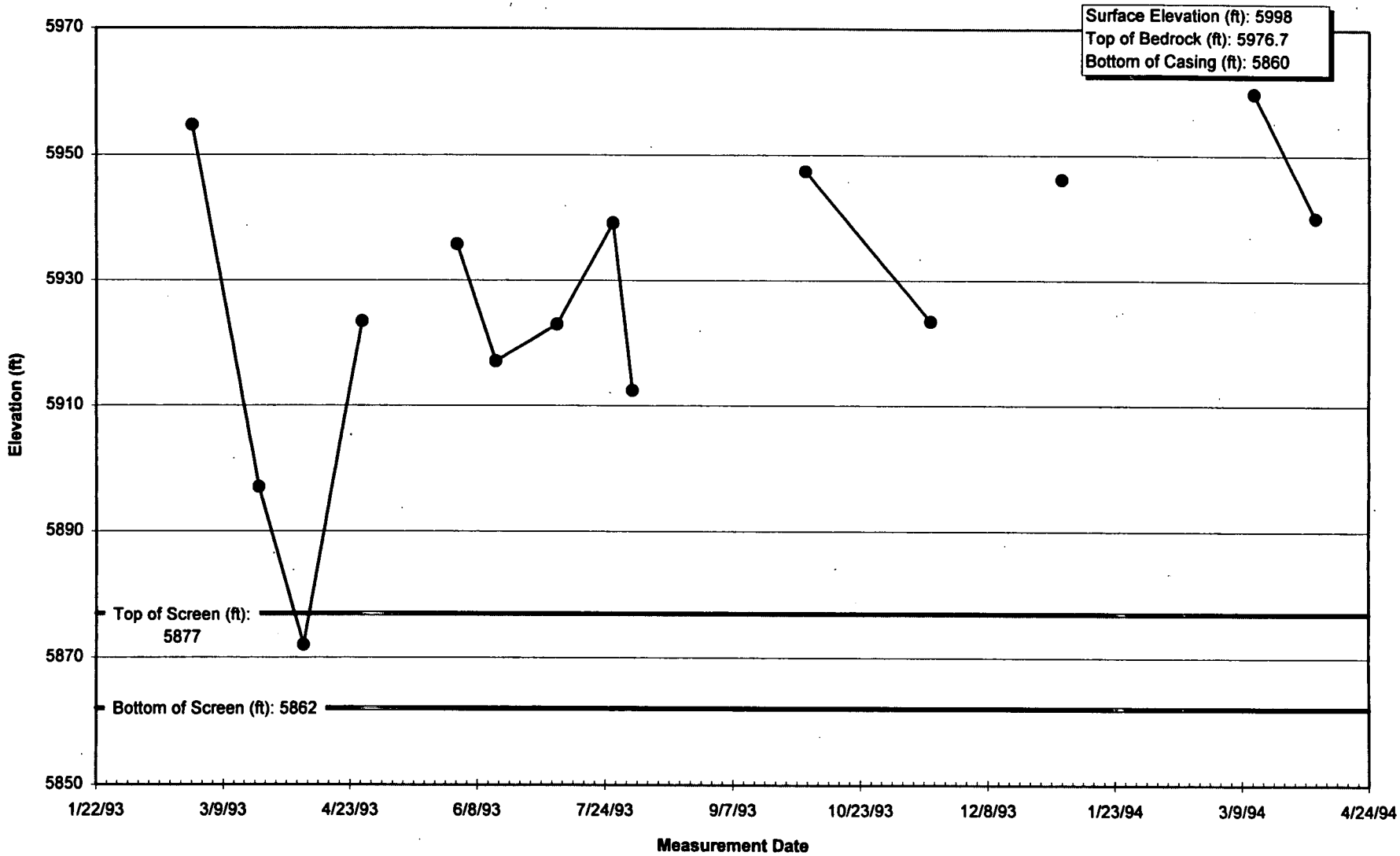
Hydrograph 70493



642

S15.XLS 70493 4/6/95

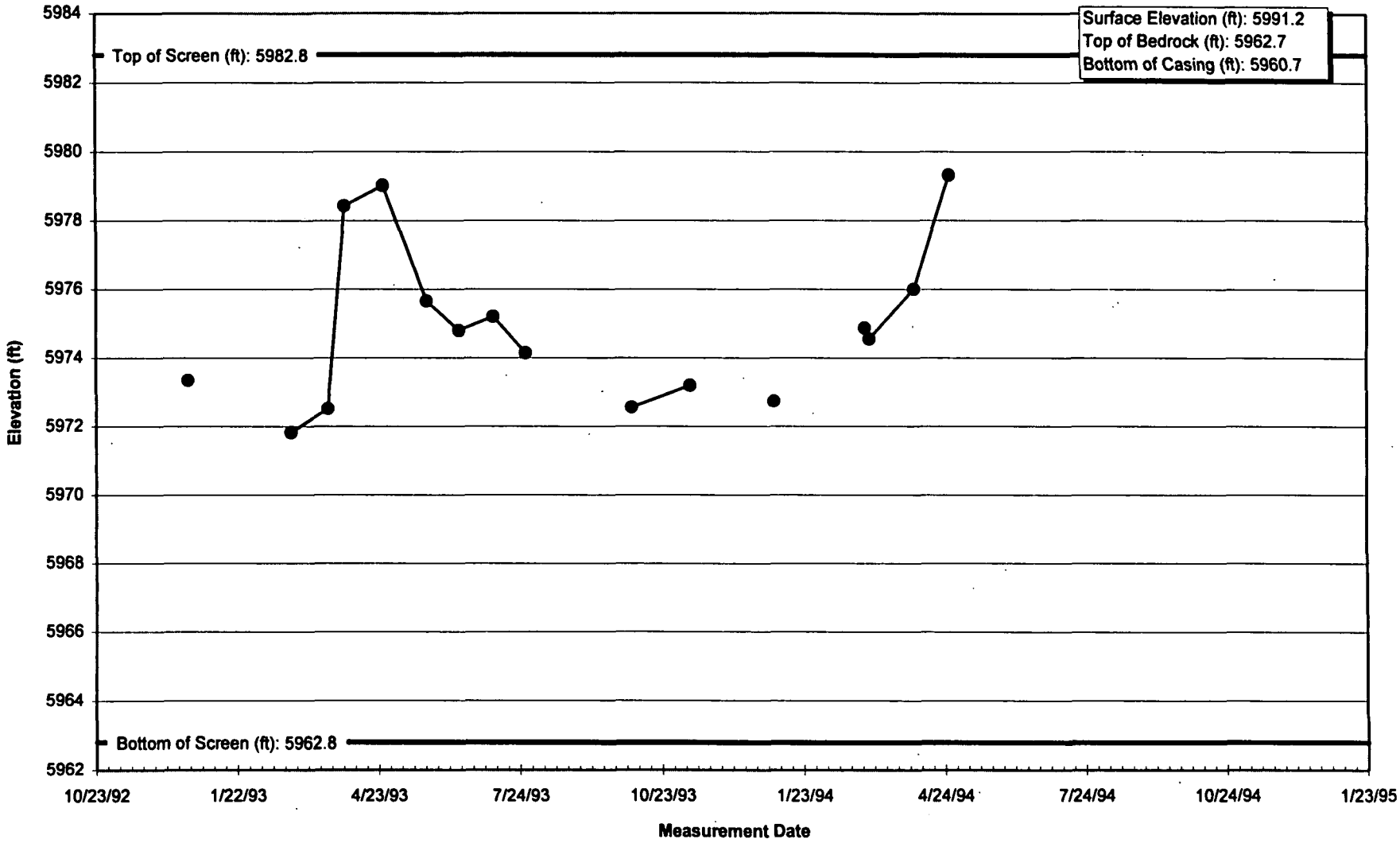
Hydrograph 70593



S15:XLS 70593 4/6/95

643

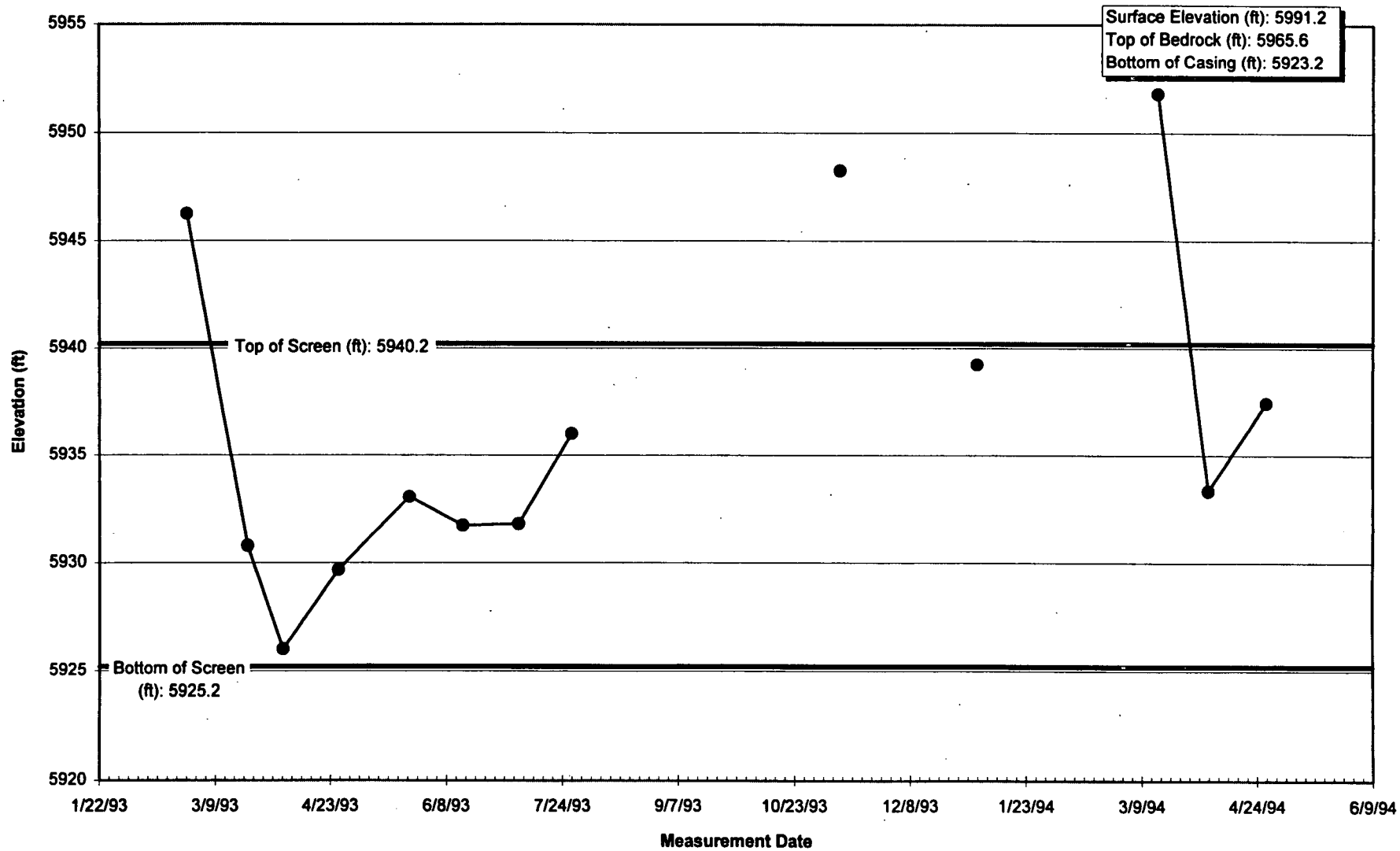
Hydrograph 70693



644

S15.XLS 70693 4/6/95

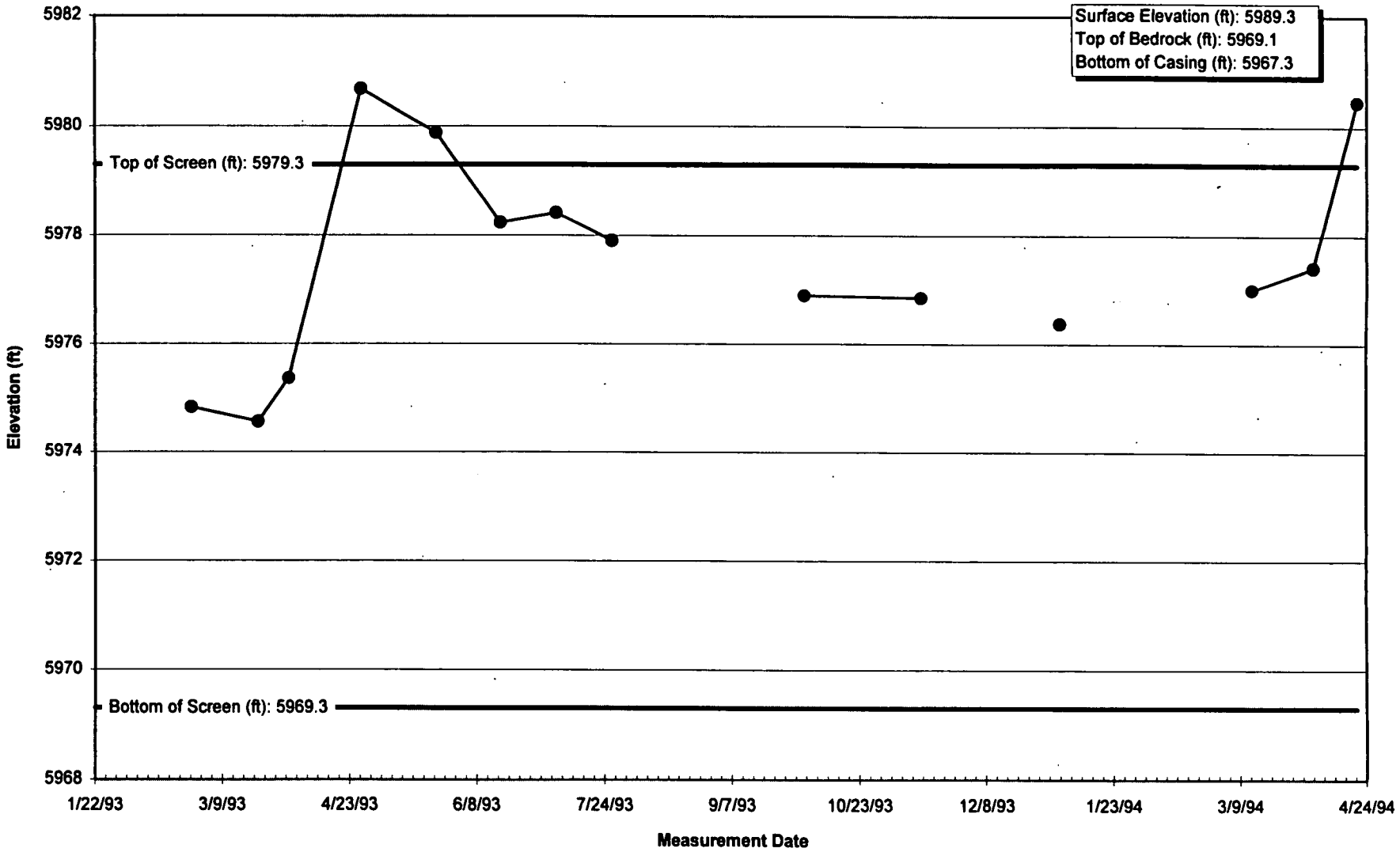
Hydrograph 70893



S15.XLS 70893 4/6/95

645

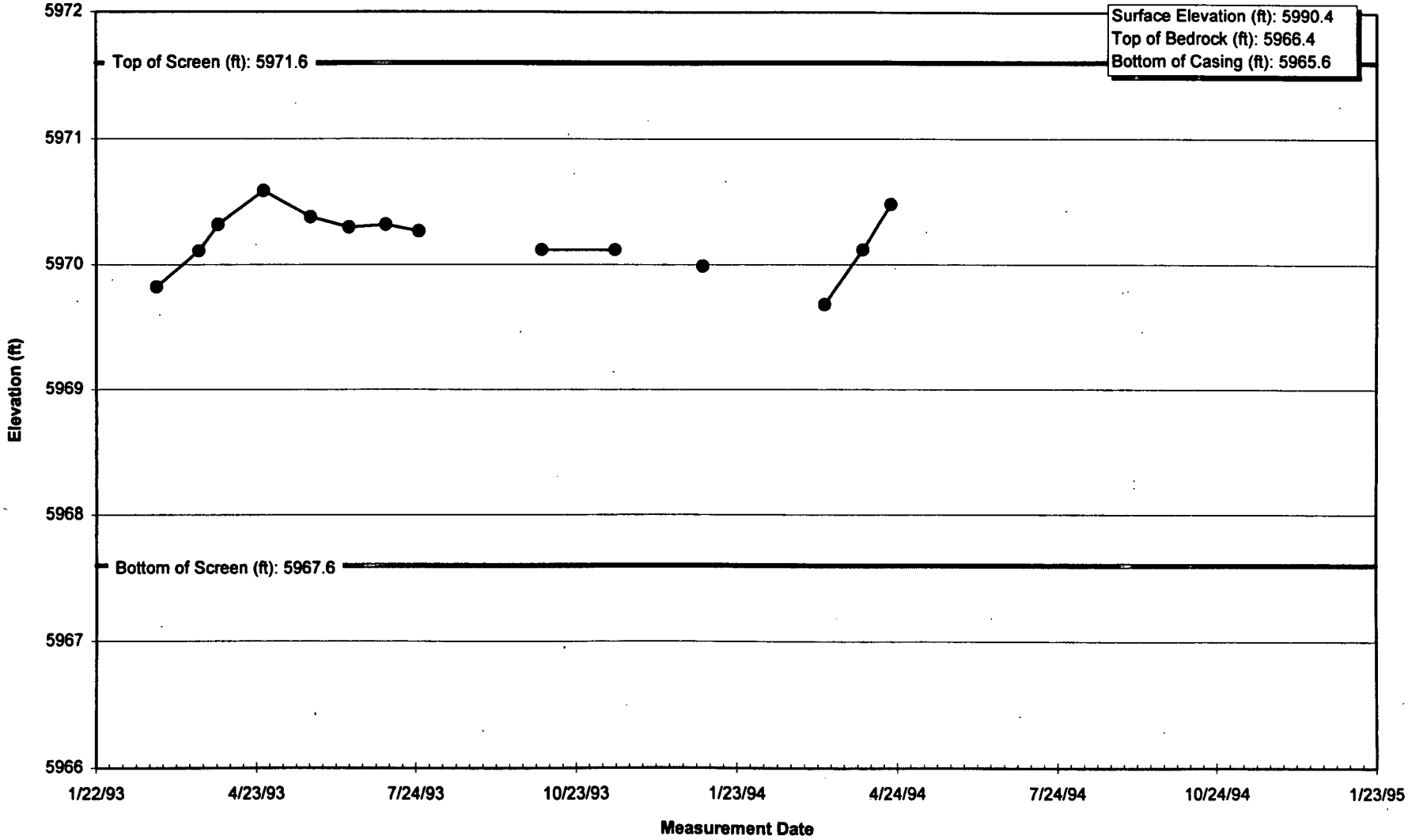
Hydrograph 71193



646

S15.XLS 71193 4/6/95

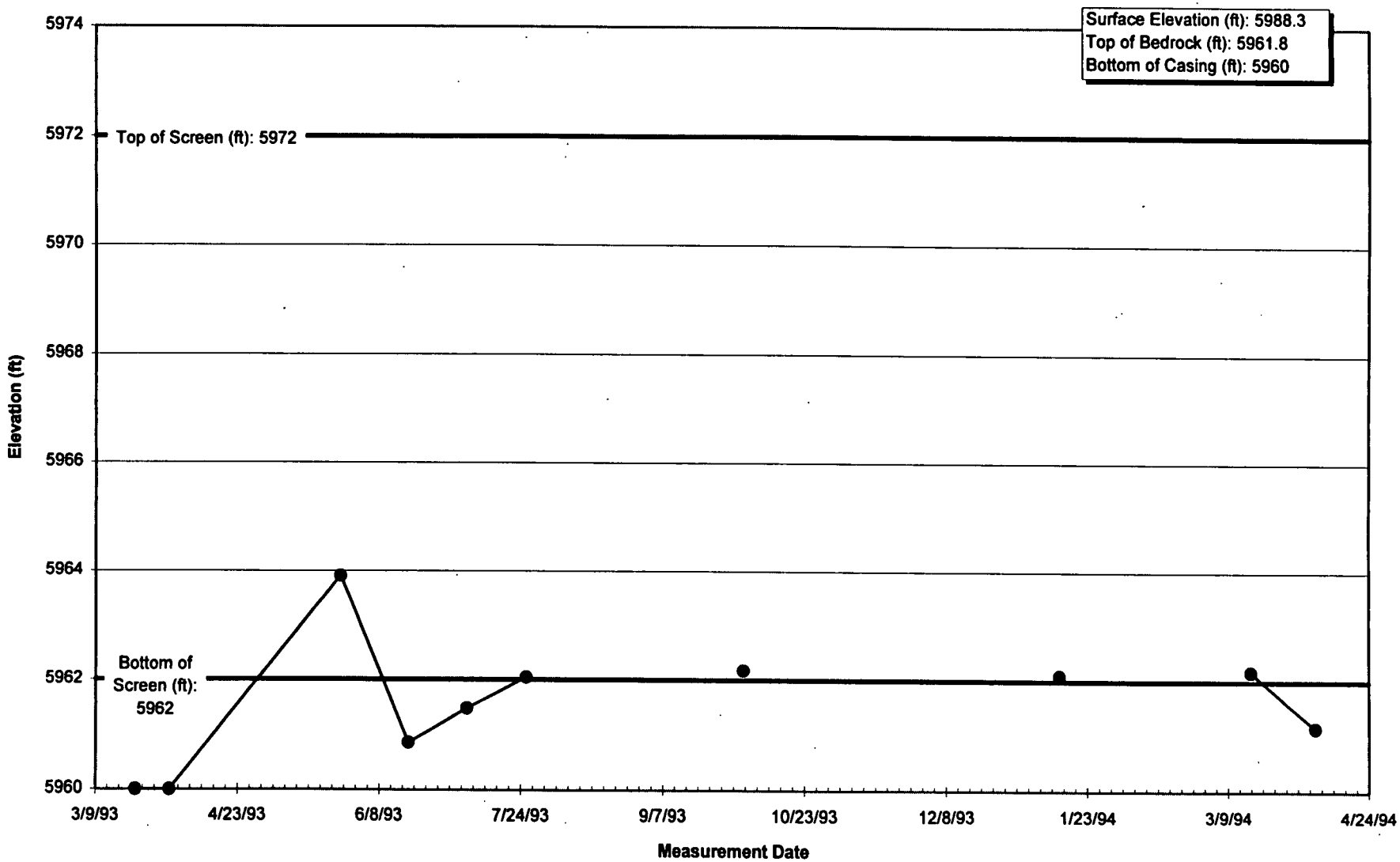
Hydrograph 71493



S16.XLS 71493 4/6/95

647

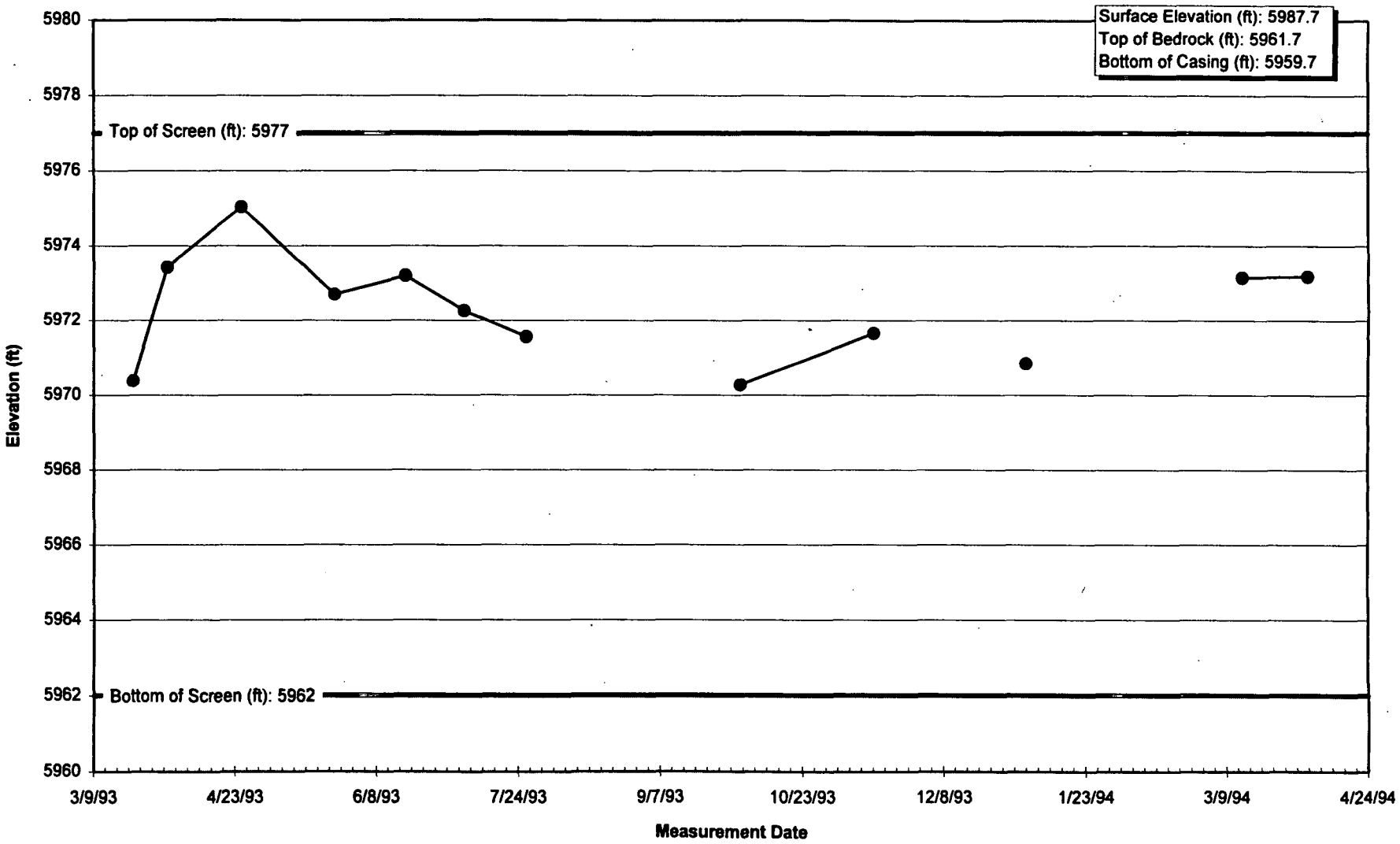
Hydrograph 71693



648

S15.XLS 71693 4/6/95

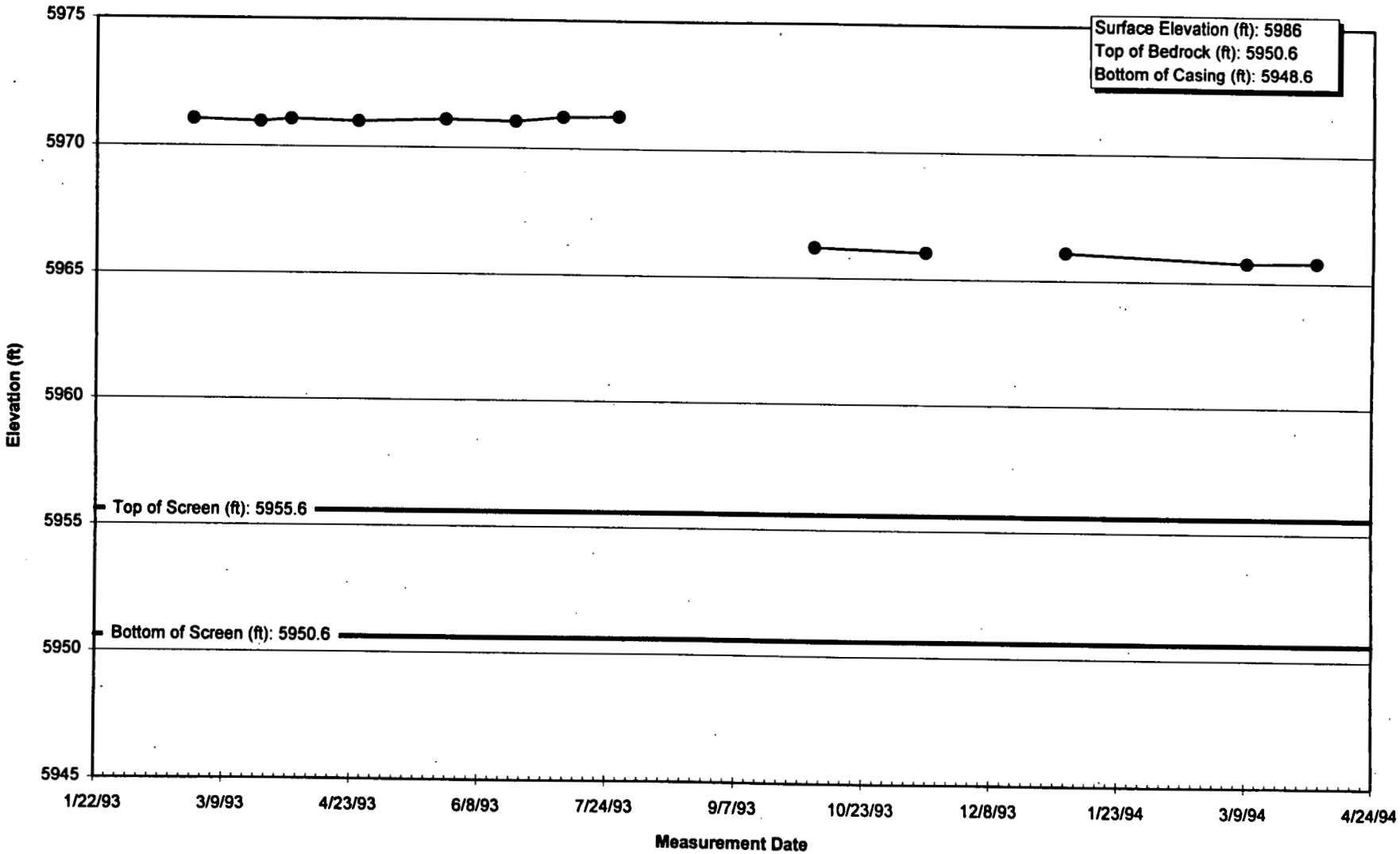
Hydrograph 71893



S15.XLS 71893 4/6/95

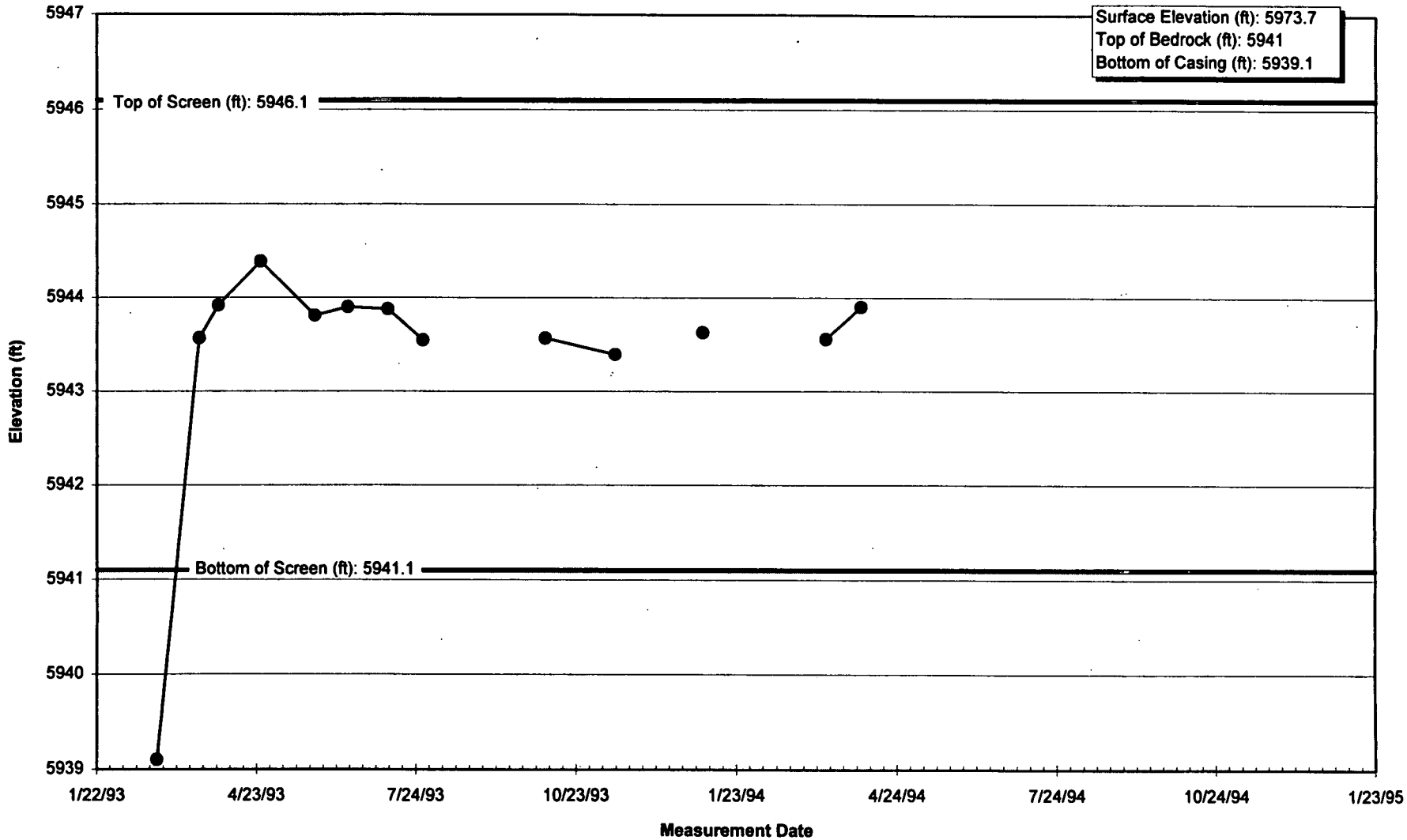
649

Hydrograph 72093



650 S15.XLS 72093 4/6/95

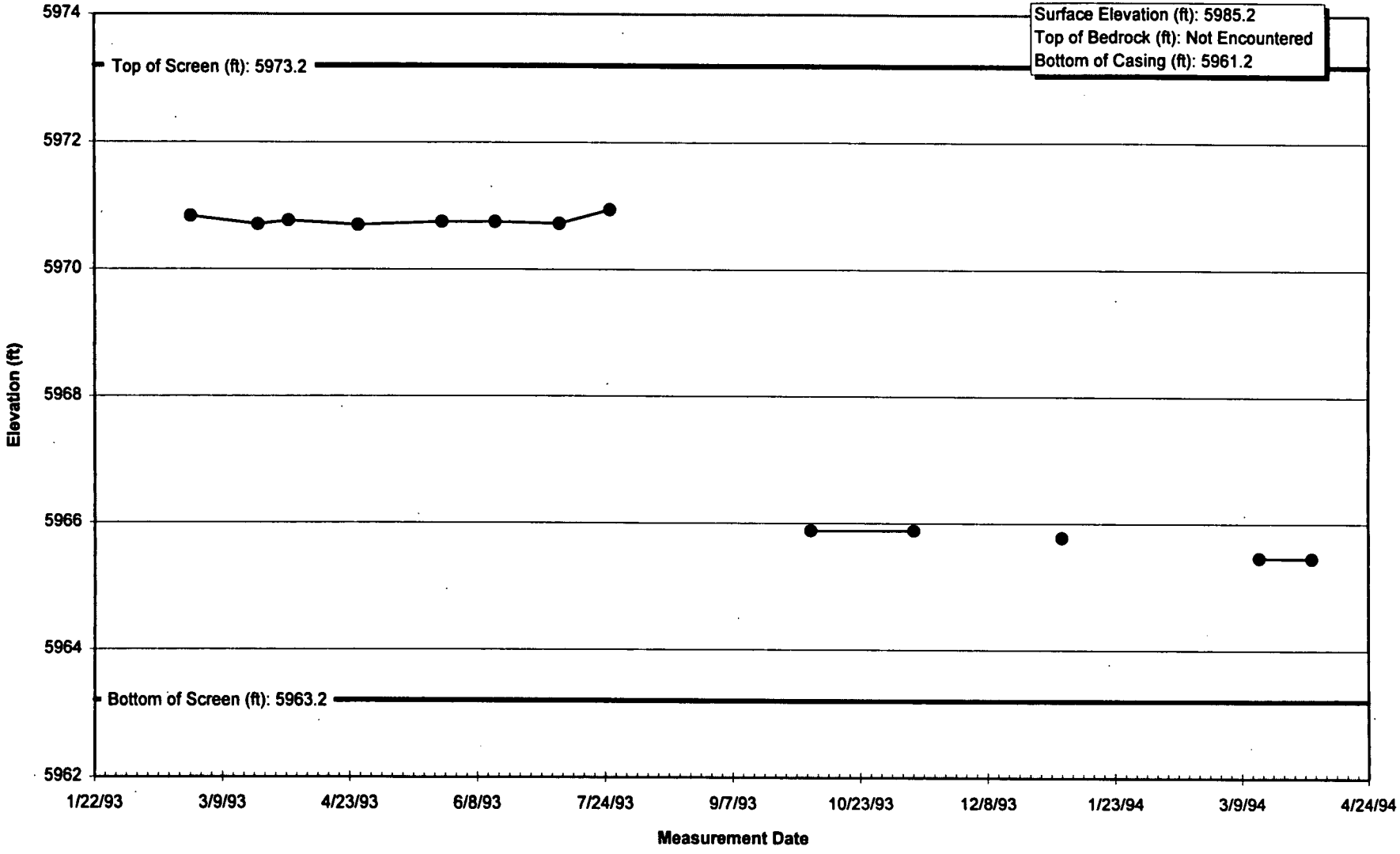
Hydrograph 72293



S15.XLS 72293 4/6/95

651

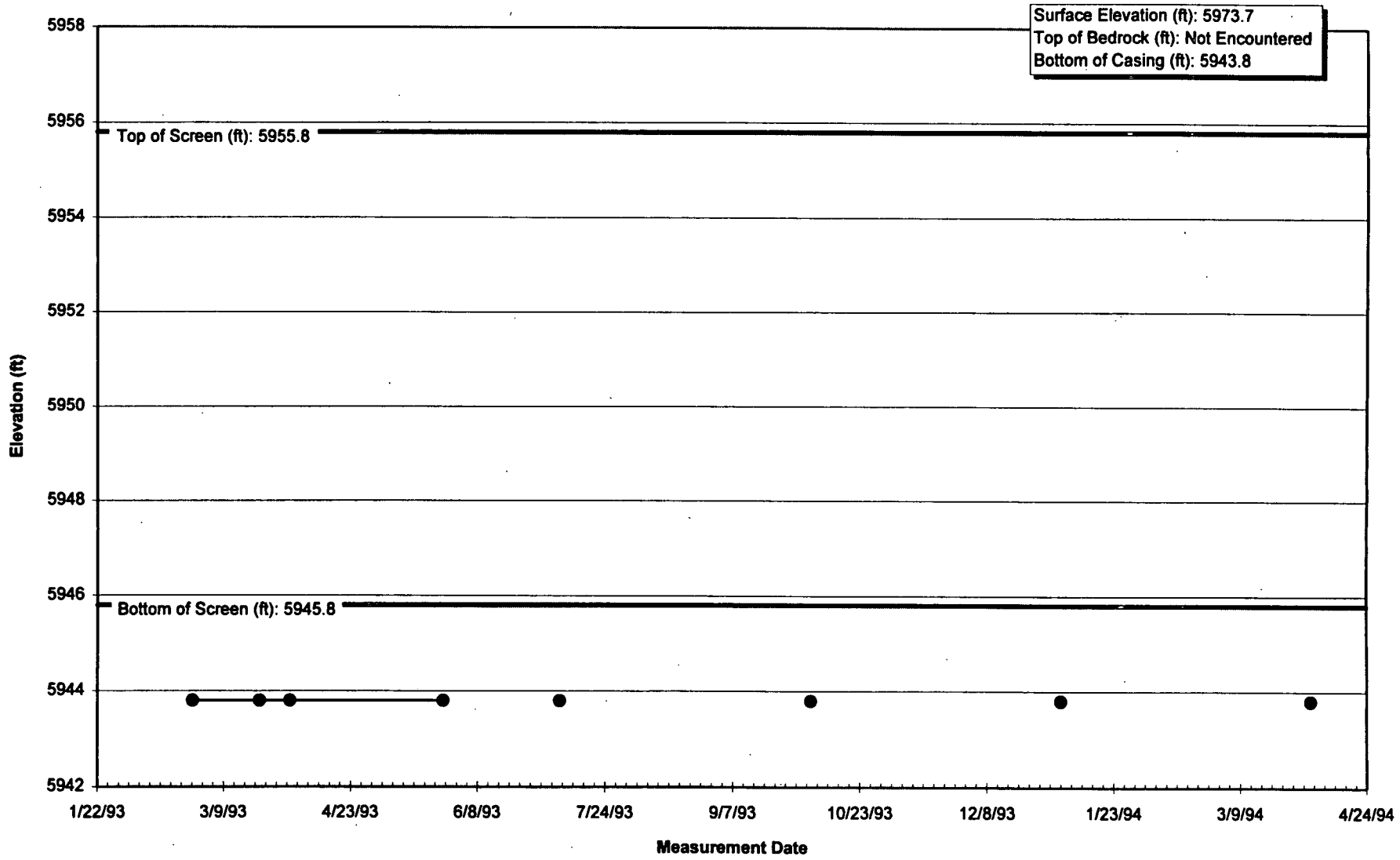
Hydrograph 72393



652

S16.XLS 72393 4/6/95

Hydrograph 72493



S16.XLS 72493 4/6/95

653

Well-Cluster Hydrographs

Well-cluster hydrographs were constructed to examine hydraulic interactions between hydrostratigraphic units and within the lithostratigraphic units that comprise each hydrostratigraphic unit. Alluvial wells represented on the hydrographs are screened across unconsolidated surficial deposits. Weathered bedrock wells are screened entirely across weathered bedrock strata. Weathered bedrock wells screened across more than 2 feet of unweathered bedrock were excluded from well clusters. The unweathered wells represented on the hydrographs are screened entirely across unweathered bedrock strata. Well completion intervals, lithostratigraphic contacts, and groundwater elevations were obtained from RFEDS.

Well clusters comprise a minimum of two wells which are no more than 25 feet apart. All wells within 25 feet of a cluster were considered for inclusion in the cluster. Wells were not used in the cluster if screened intervals overlapped or if the data were incomplete. To simplify the presentation of well-cluster hydrographs, the average top of bedrock elevation and the average land surface elevation at each of the wells are shown. Screened intervals are plotted directly on the graph where possible, otherwise the elevation of the top and bottom of the screen are given.

Methodology for Calculating Vertical Hydraulic Gradients

Vertical hydraulic gradients were calculated using potentiometric data presented on the well-cluster hydrographs. The results of these calculations should be regarded as general estimates only. To accurately calculate vertical hydraulic gradients, point measurements of head and a thorough understanding of the aquifer/confining layer geometries are needed. At the Rocky Flats site, screens that span a significant portion of the aquifer are used to measure water levels, and aquifer/confining layer geometries are not well defined at most locations. In calculating gradients, the screen midpoint is used as the measuring point where the screen length is fully penetrating, and the midpoint of the saturated thickness is used when the screen length is partially penetrating. This selection of the measuring point is consistent with the methods used by Abriola and Pinder (1982). Because of this simplification in calculating the vertical hydraulic gradient, the resulting estimates should be used as indicators of potential vertical groundwater movement and not exact values.

Gradients were calculated only for wells screened in the same hydrostratigraphic (sub)unit or adjacent (sub)units. Thus, vertical hydraulic gradients were not calculated between wells screened in surficial deposits and unweathered bedrock because groundwater between these two units is not in direct hydraulic connection. In addition,

654

wells that were consistently dry were not used to calculate vertical hydraulic gradients to avoid incorrectly assigning a gradient to an area that is consistently unsaturated.

Vertical hydraulic gradients were calculated using the following method:

1. The water-level measurements for each well were evaluated on an individual basis. The hydraulic head measurement for a well was assigned as either a representative value or as the geometric mean of the water-level measurements according to the following criteria:

   - Water-level measurements influenced by sampling events were evaluated by visually examining the well-cluster hydrographs. If a water-level measurement appeared to be affected by sampling, an estimated value representative of static conditions was used as the hydraulic head measurement (h) for the well.

   - If water-level measurements were not affected by sampling, the geometric mean of all water- level data for the well was used as the hydraulic head measurement (h) for the well. Use of the geometric mean is justified because even the hydrographs that do not appear to be sample influenced contain anomalous data. The influence of the few outlying data points is lessened by using the geometric mean.

2. The respective head measurements were used for h_1 (upper unit) and h_2 (lower unit).

3. If the head (geometric mean) >= top of screen elevation, then the screen midpoint was used as the measuring point (l).

4. If the head (geometric mean) < top of screen elevation, then midpoint of saturated thickness was used as measuring point (l).

   - Saturated thickness of surficial deposits is defined as head measurement minus top-of-bedrock elevation.

   - Saturated thickness of bedrock (weathered or unweathered) is defined as head measurement minus bottom-of-screen elevation.

5. Based on these definitions the vertical hydraulic gradient will then be:

$$\frac{(h_1 - h_2)}{(l_1 - l_2)}$$

655

where

h_1 = groundwater elevation in well screened across upper unit

h_2 = groundwater elevation in well screened across lower unit

and

l_1 and l_2 = vertical distance between the measuring points of the upper and lower unit wells, respectively, as described above.

656

Table D-1
Well Cluster and Gradient Data

Cluster Number	Well 1	Well 2	Well 3	Well 4	Cluster Type	Vertical Gradient[a] ALLV - KaKI (w)	KaKI(w) - KaKI (u)	KaKI (w)- KaKI (w)	KaKI (u)- KaKI (u)	ALLV - ALLV	Comments
1	5586	B405489	5486[b]		ALLV-KaKI(w)-KaKI(u)	0.08	0.42	X	X	X	
2	05691	12491			ALLV-KaKI(w)	0.03	X	X	X	X	
3	13291	13191	06591		ALLV-KaKI(w)	0.03	X	0.03	X	X	Two KaKI(w) wells, ALLV well is dry most of the time
4	P207689	P207789			ALLV-KaKI(w)	X	X	X	X	X	KaKI is dry
5	4487	4587			ALLV-KaKI(w)	X	X	X	X	X	ALLV is dry
6	1586	1486			ALLV-KaKI(u)	X	X	X	X	X	
7	2686[b]	2586[b]	P207589[b]		ALLV-KaKI(w)-KaKI(u)	1.01[c]	-0.02	X	X	X	KaKI(u) appears sample influenced, similar levels in KaKI(w) & KaKI(u)
8	B302789	B304289[b]	B305389		ALLV-KaKI(w)-KaKI(u)	0.04	-0.05	X	X	X	KaKI(w) and ALLV in excellent connection, KaKI(u) has higher head than ALLV
9	1786	1686[b]	B208689[b]		ALLV-KaKI(w)-KaKI(u)	0.64	-0.24	X	X	X	KaKI(u) head similar to ALLV but different peak times
10	B302889	B304989[b]	B304889[b]		ALLV-KaKI(w)-KaKI(u)	1.02[c]	-0.07	X	X	X	KaKI(u) head higher than KaKI(w)
11	40491	0386	B217289		ALLV-KaKI(w)-KaKI(u)	X	0.53	X	X	X	ALLV is dry
12	3387	3487			ALLV-KaKI(u)	X	X	X	X	X	ALLV is dry most of the time
13	2787	2887			ALLV-KaKI(u)	X	X	X	X	X	ALLV is dry after ~5/90
14	4186	4086			ALLV-KaKI(u)	X	X	X	X	X	ALLV is dry after~5/90
15	B200789	B203489[b]	B203789[b]		ALLV-KaKI(w)-KaKI(u)	1.11[c]	0.14	X	X	X	
16	2886	2786			ALLV-KaKI(u)	X	X	X	X	X	
17	1987	2087			ALLV-KaKI(u)	X	X	X	X	X	ALLV is dry most of the time
18	2486	2386			ALLV-KaKI(u)	X	X	X	X	X	ALLV is dry most of the time
19	2286	P210189			ALLV-KaKI(w)	0.15	X	X	X	X	Variations in water levels are similar but KaKI(w) has lower head values
20	B208089	B208189			ALLV-KaKI(w)	X	X	X	X	X	ALLV is dry some of the time
21	3586	3486			ALLV-KaKI(u)	X	X	X	X	X	
22	13391	02591			ALLV-KaKI(w)	0.32	X	X	X	X	Heads are similar but KaKI(w) has lower values
23	05391	12391			ALLV-KaKI(w)	0.81[c]	X	X	X	X	
24	4087	B207089	B207189	4187	ALLV-KaKI(u)	X	X	X	0.07	X	ALLV is dry most of the time, three KaKI(w) wells (gradient between B207089 and B207189)
24						X	X	X	0.68	X	(Gradient between B207189 and 4187)
25	2987	3087			ALLV-KaKI(u)	X	X	X	X	X	
26	4087	B206989			ALLV-KaKI(w)	0.98[c]	X	X	X	X	

657

Table D-1
Well Cluster and Gradient Data

Cluster Number	Well 1	Well 2	Well 3	Well 4	Cluster Type	Vertical Gradient[a] ALLV - KaKI (w)	KaKI(w) - KaKI (u)	KaKI (w)- KaKI (w)	KaKI (u)- KaKI (u)	ALLV - ALLV	Comments
27	70093	70193	70293[b]		ALLV-KaKI(w)-KaKI(u)	0.05	0.13	X	X	X	ALLV & KaKI(w) water levels are similar with ~same head values
28	70393	70493	70593[b]		ALLV-KaKI(w)-KaKI(u)	0.22	0.36	X	X	X	ALLV & KaKI(w) water levels are similar with ~same head values
29	10392	10492			ALLV-KaKI(w)	X	X	X	X	X	ALLV is dry, KaKI(w) is not dry
30	10192	10292			ALLV-KaKI(w)	X	X	X	X	X	Both wells dry
31	P209989	P210089			ALLV-KaKI(w)	X	X	X	X	X	ALLV is dry, KaKI(w) is not dry
32	1086	0986			ALLV-KaKI(u)	X	X	X	X	X	KaKI(u) head over 90 feet above top of KaKI(u) screen
33	0287	0387			ALLV-KaKI(u)	X	X	X	X	X	
34	6986	0887			ALLV-KaKI(u)	X	X	X	X	X	
35	70693	70893			ALLV-KaKI(u)	X	X	X	X	X	KaKI(u) heads falls to within screened interval
36	0786	0886			ALLV-KaKI(u)	X	X	X	X	X	KaKI(u) possibly sample influenced
37	P209289	P209389			ALLV-KaKI(w)	X	X	X	X	X	
38	P207489	P207389			ALLV-KaKI(w)	-0.05	X	X	X	X	ALLV & KaKI(w) have similar head values
39	P207889	P207989			ALLV-KaKI(w)	1.01[c]	X	X	X	X	
40	P213989	P213889			ALLV-KaKI(w)	X	X	X	X	X	Both ALLV and KaKI(w) wells are dry
41	13491	01991			ALLV-KaKI(w)	0.04	X	X	X	X	ALLV & KaKI(w) have similar head values
42	1787	20691	20791	1887	ALLV-KaKI(w)-KaKI(u)	0.34	1.0[c]	X	X	X	
43	13591	12991	00291		ALLV-KaKI(w)	X	X	0.27	X	X	ALLV is dry, 2 KaKI(w) exhibit similar variations with different head values
44	B201889	B304789			ALLV-KaKI(w)	X	X	X	X	X	ALLV is dry, KaKI(w) varies between dry and minimal water
45	5186[b]	5286[b]			ALLV-KaKI(w)	0.23	X	X	X	X	
46	B200589	B203189[b]			ALLV-KaKI(w)	1.12	X	X	X	X	KaKI(w) appears sample influenced, KaKI(w) increasing heads after 3/94
47	B200689	B203289[b]			ALLV-KaKI(w)	0.13	X	X	X	X	KaKI(w) appears sample influenced, KaKI(w) approaches ALLV level.
48	B200889	B203589[b]	B203889[b]		ALLV-KaKI(w)-KaKI(u)	0.91[c]	0.15	X	X	X	KaKI(u) appears sample influenced
49	4786	4686			ALLV-KaKI(u)	X	X	X	X	X	
50	4986	4886			ALLV-KaKI(u)	X	X	X	X	X	
51	B405689	B400489	B405789		ALLV-ALLV	X	X	X	X	0.16	3 ALLV wells, different heads, similar variations
52	0286	41591	B317189		ALLV-KaKI(u)	X	X	X	X	X	KaKI(u) is dry
53	4286	46692[b]	46792	46892[b]	ALLV-KaKI(u)	X	X	X	0.63	X	3 KaKI(u) wells with different head values

658

Table D-1
Well Cluster and Gradient Data

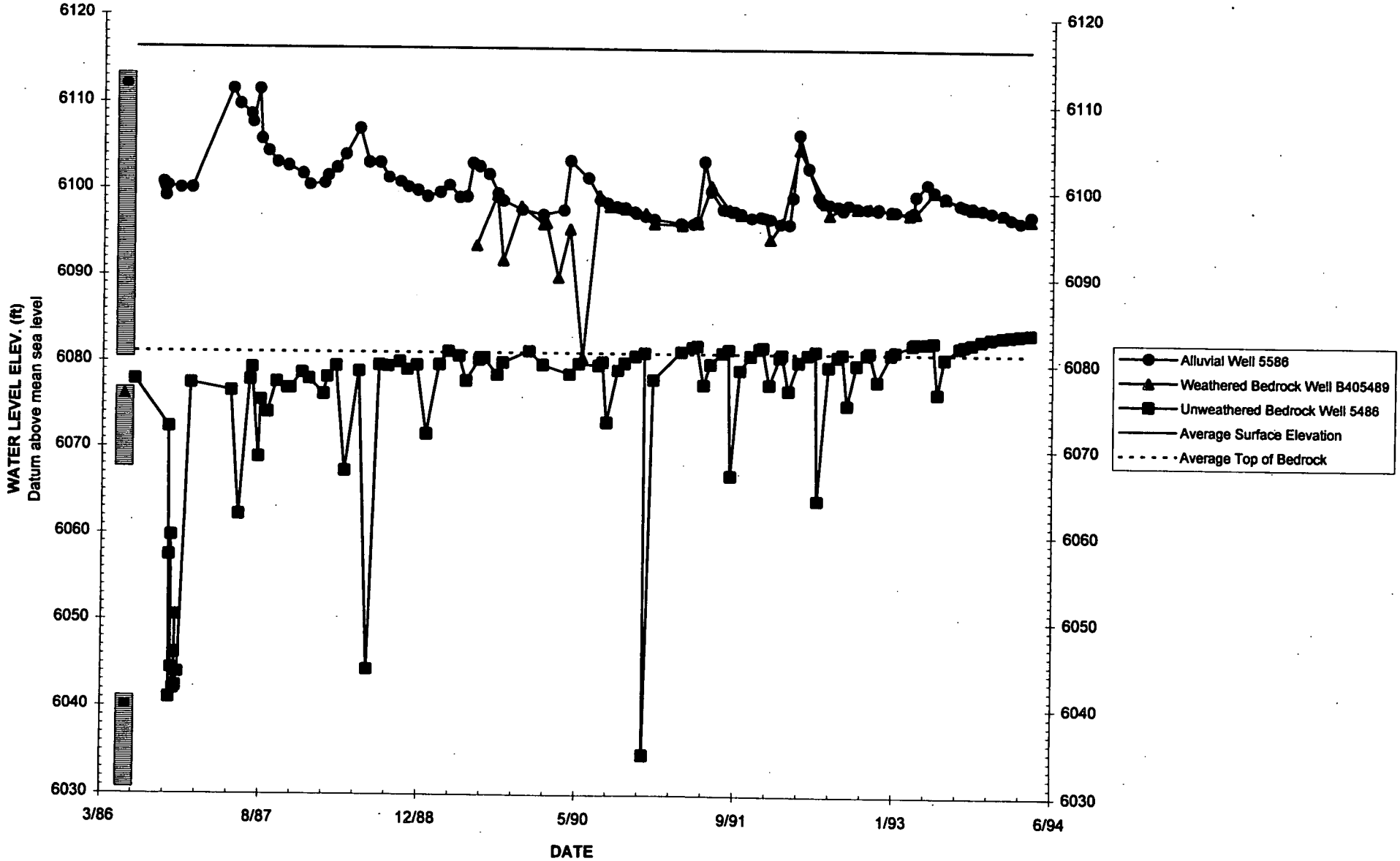
Cluster Number	Well 1	Well 2	Well 3	Well 4	Cluster Type	Vertical Gradient[a]					Comments
						ALLV - KaKl (w)	KaKl(w) - KaKl (u)	KaKl (w)- KaKl (w)	KaKl (u)- KaKl (u)	ALLV - ALLV	
54	4387	38291	37991		ALLV-KaKl(u)	X	X	X	X	X	
55	P209589	P208889	3987		KaKl(w)-KaKl(u)	X	0.90/0.73[d]	X	0.10	X	2 KaKl(u) wells with similar head values

[a] Negative numbers indicate upward gradient
[b] For gradient calculations, water level estimated from hydrographs and not from geometric mean of water level measurement
[c] Hydraulic gradient has been calculated but hydrographs indicate unsaturated zone at top of weathered bedrock
[d] Hydraulic gradient between weathered bedrock well and both unweathered bedrock wells

KEY
ALLV = Wells completed in surficial deposits
KaKl(u) = Undifferentiated Araphoe/Laramie unweathered bedrock wells
KaKl(w) = Undifferentiated Araphoe/Laramie weathered bedrock wells
X = Gradient not calculated

659

Well-Cluster Hydrograph 1



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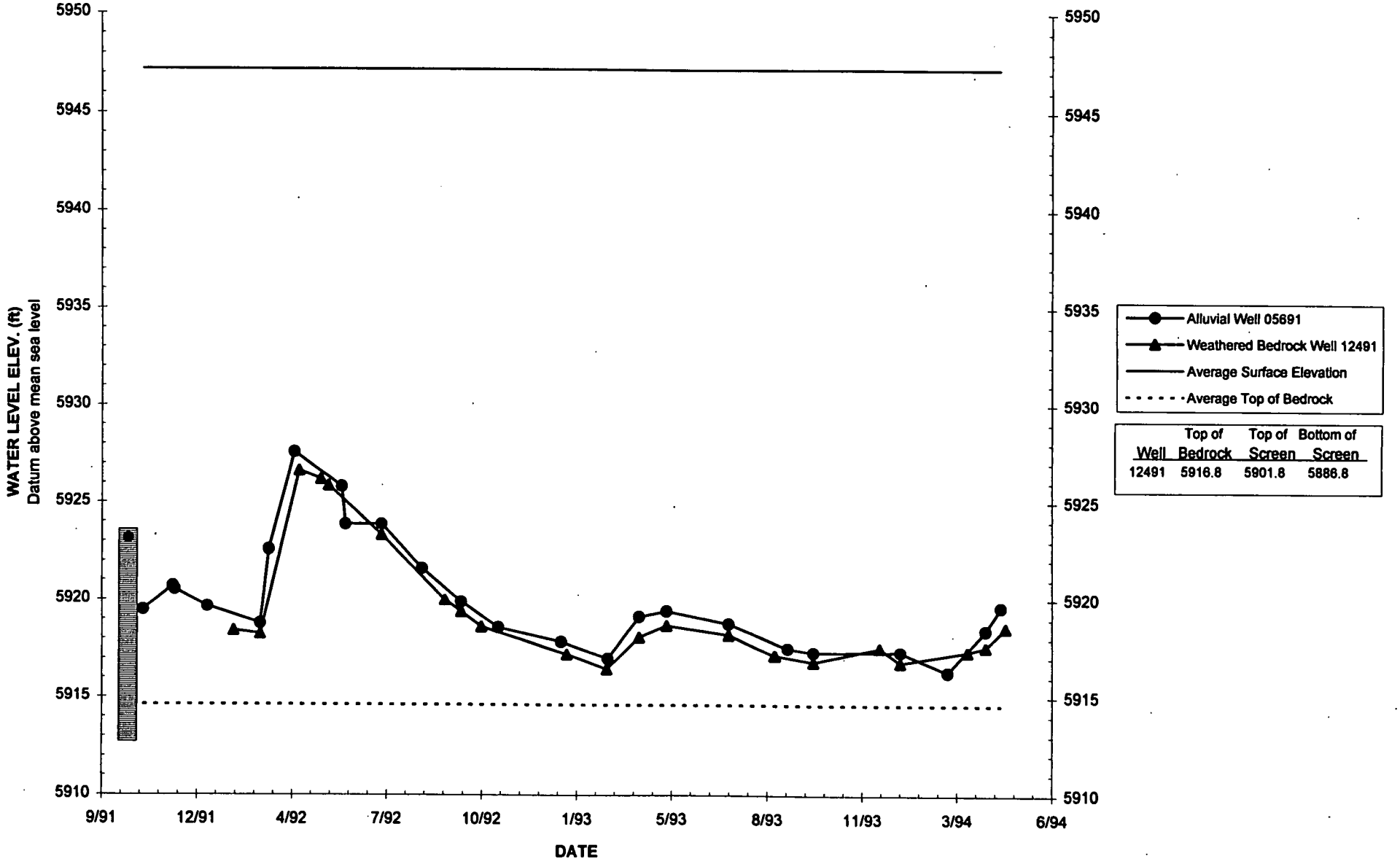
661

Well-Cluster Hydrograph 2

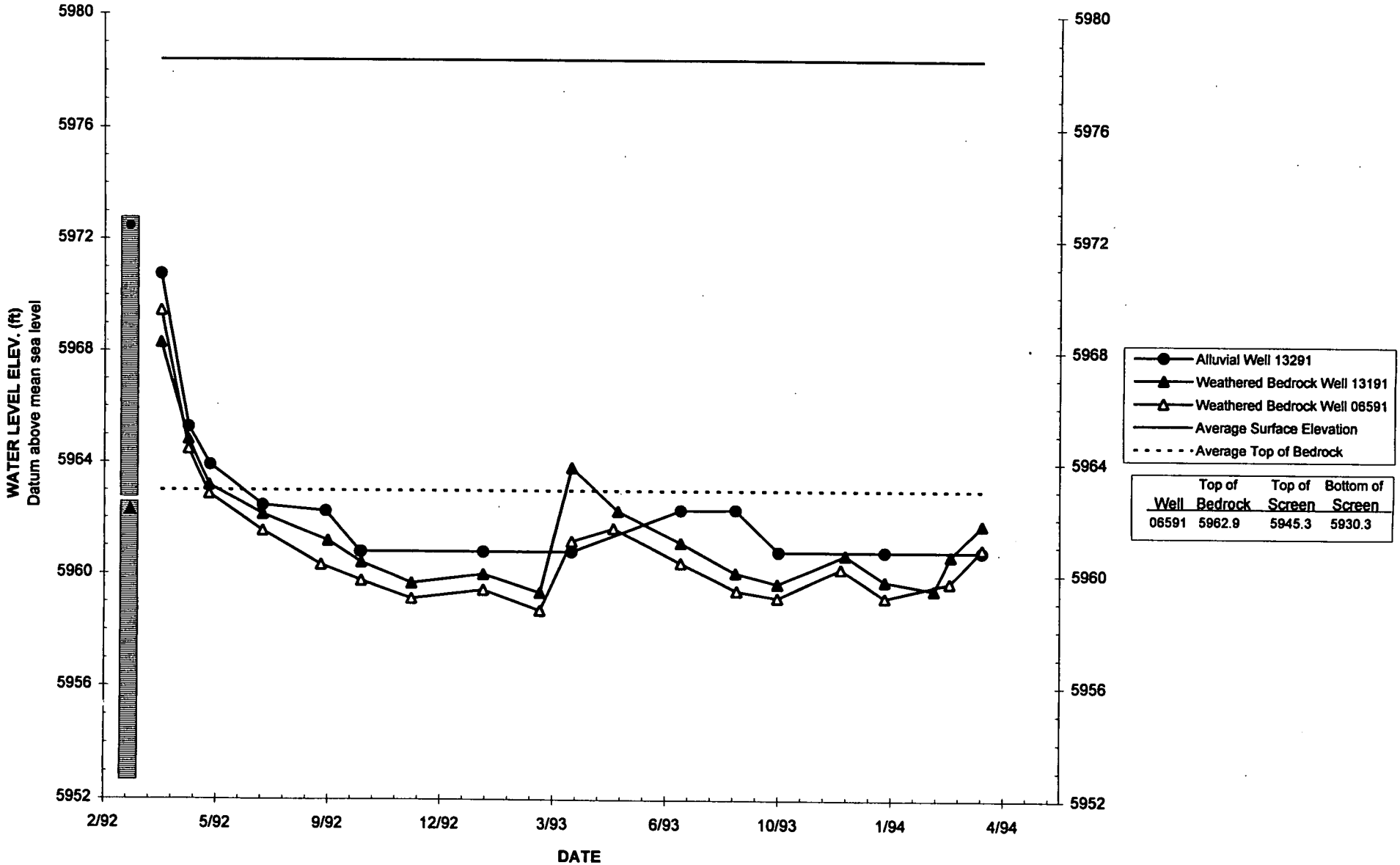


Well	Top of Bedrock	Top of Screen	Bottom of Screen
12491	5916.8	5901.8	5886.8

662

IWLEVALR[illegible]S GRAPH 2 1/8/95

Well-Cluster Hydrograph 3

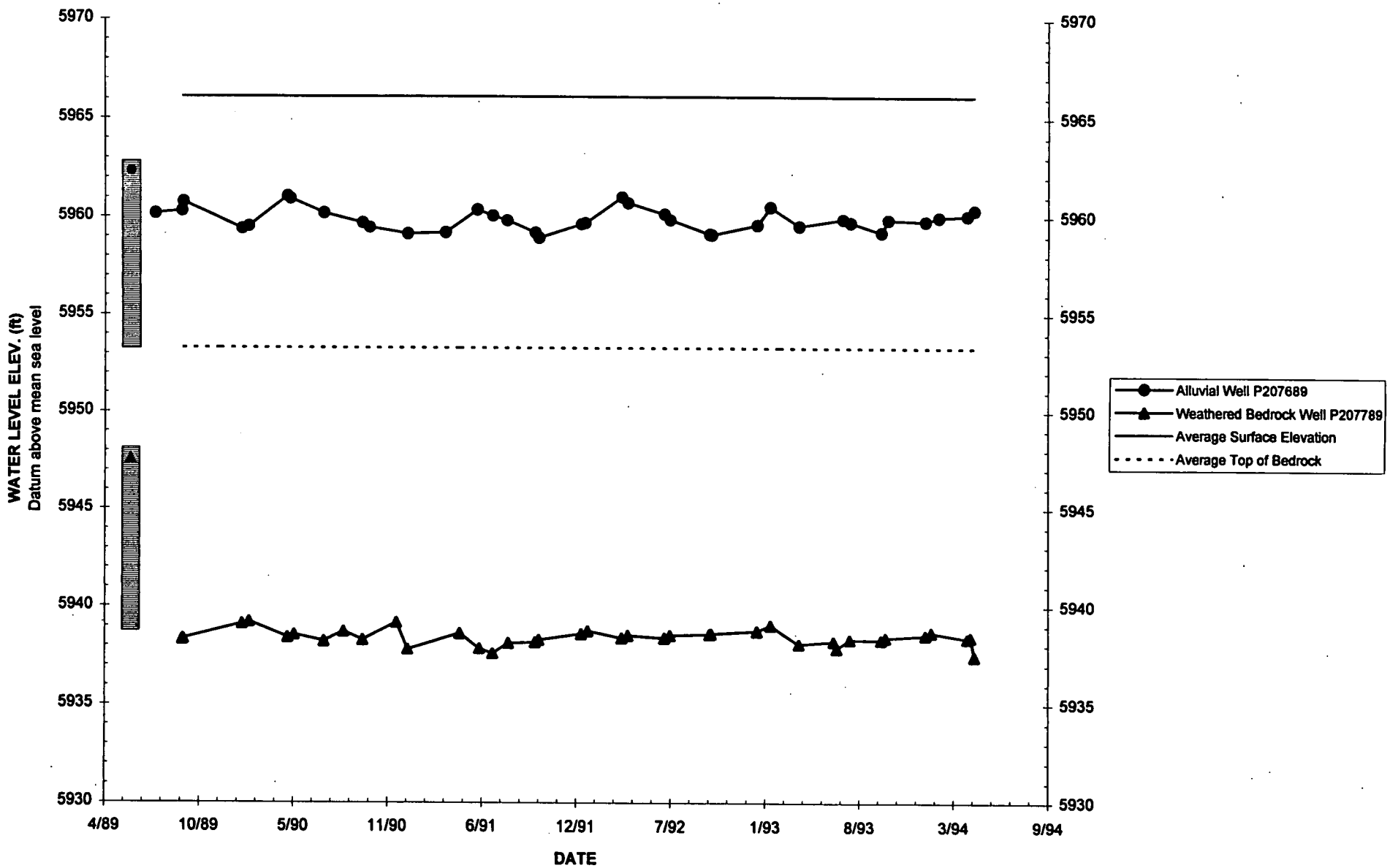


Well	Top of Bedrock	Top of Screen	Bottom of Screen
06591	5962.9	5945.3	5930.3

\WLEVALPR.XLS GRAPH 3 1/5/95

663

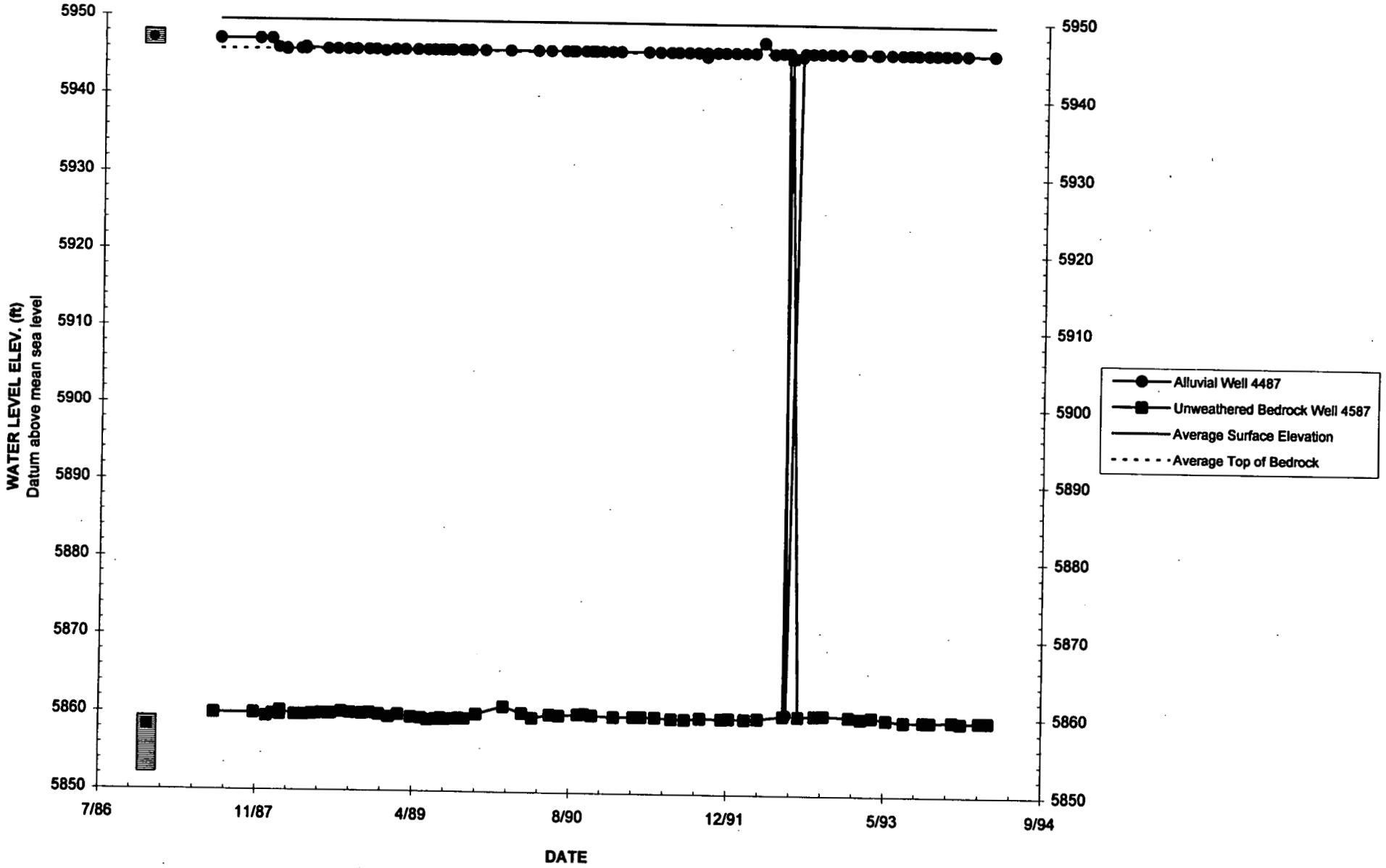
Well-Cluster Hydrograph 4



\WLEVALR[illegible]S GRAPH 4 1/10/95

664

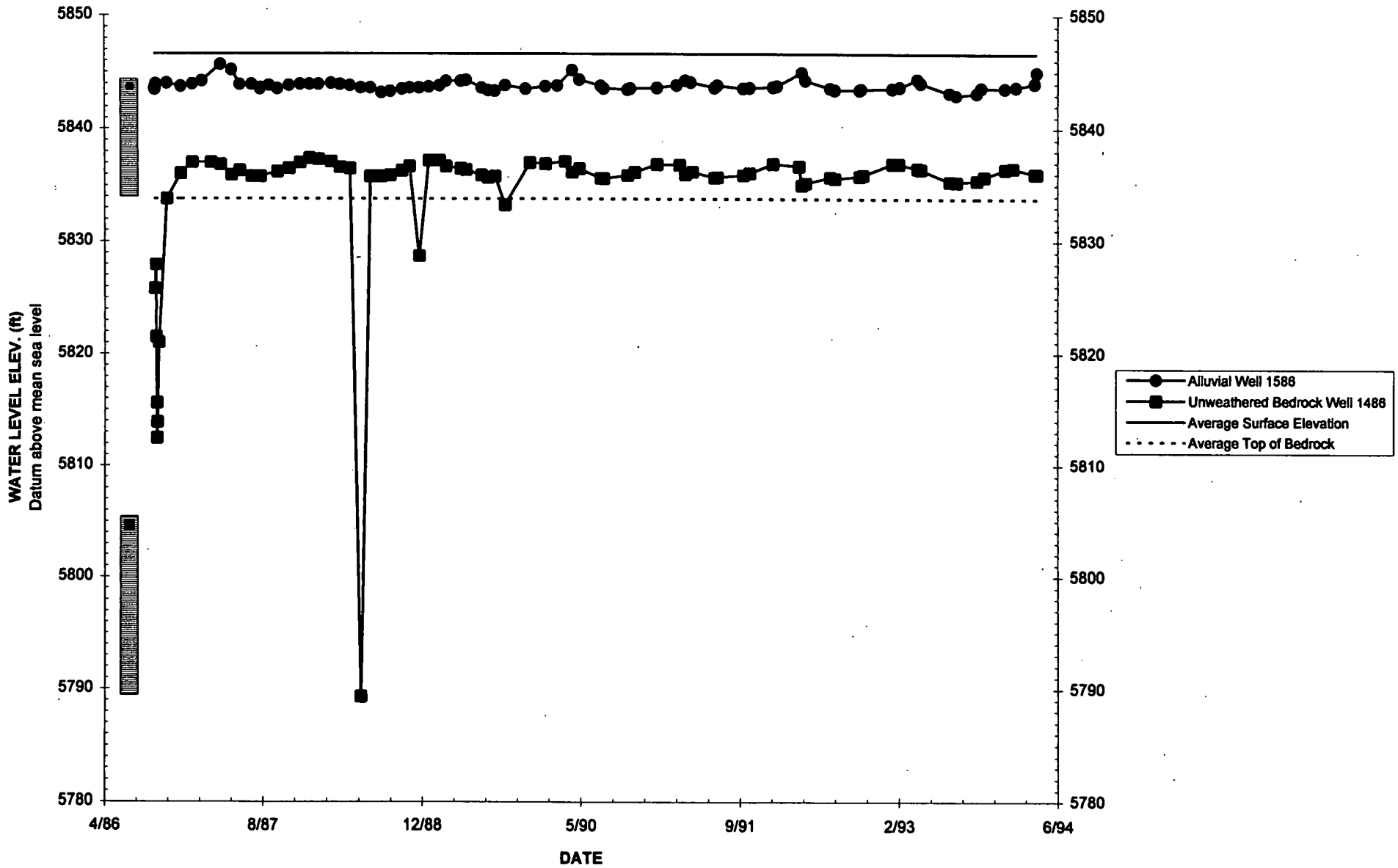
Well-Cluster Hydrograph 5



\WLEVALPR.XLS GRAPH 5 1/10/95

665

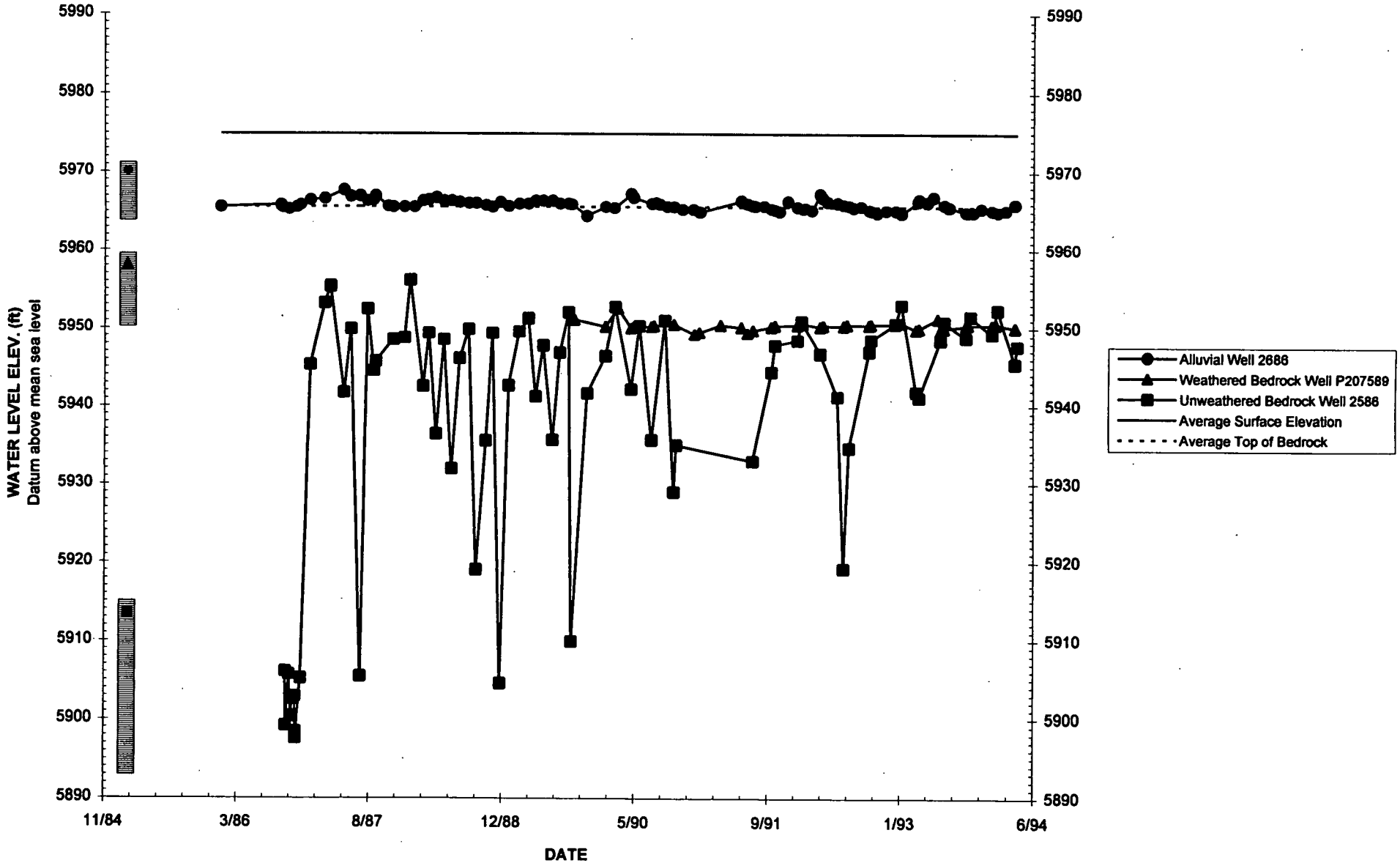
Well-Cluster Hydrograph 6



\WLEVALP[illegible]S GRAPH 6 1/8/95

666

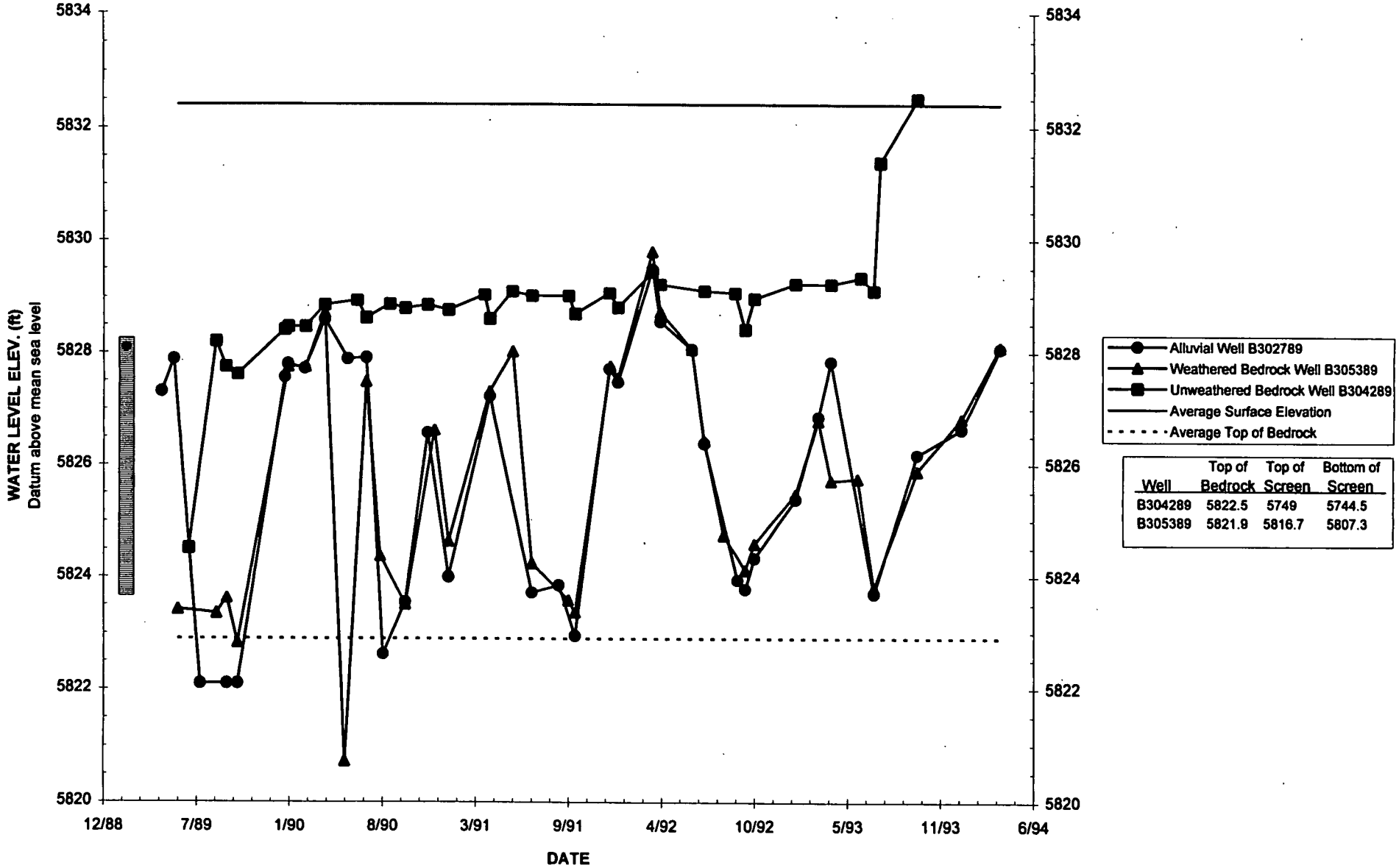
Well-Cluster Hydrograph 7



\WLEVALPR.XLS GRAPH 7 1/8/95

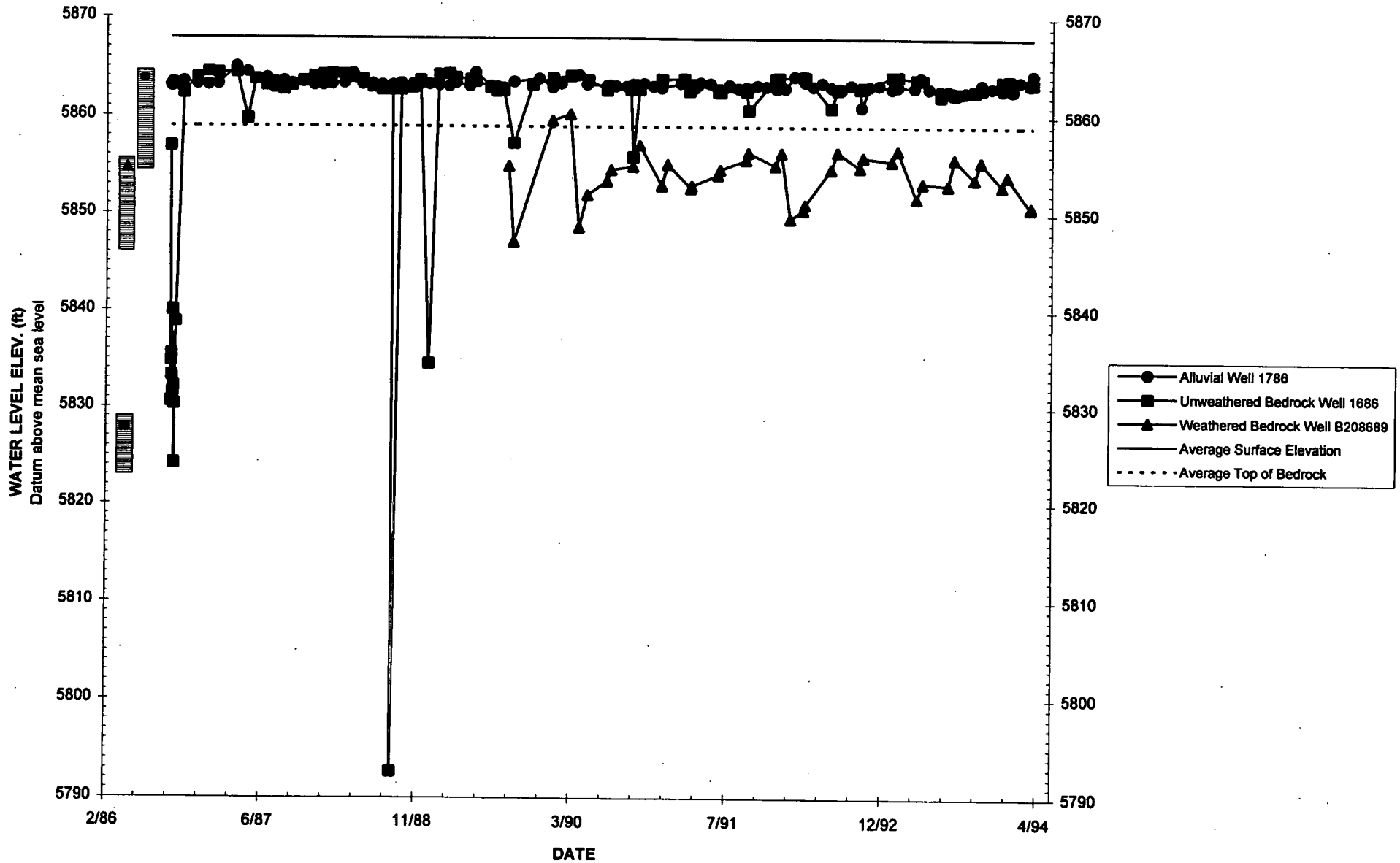
667

Well-Cluster Hydrograph 8



Well	Top of Bedrock	Top of Screen	Bottom of Screen
B304289	5822.5	5749	5744.5
B305389	5821.9	5816.7	5807.3

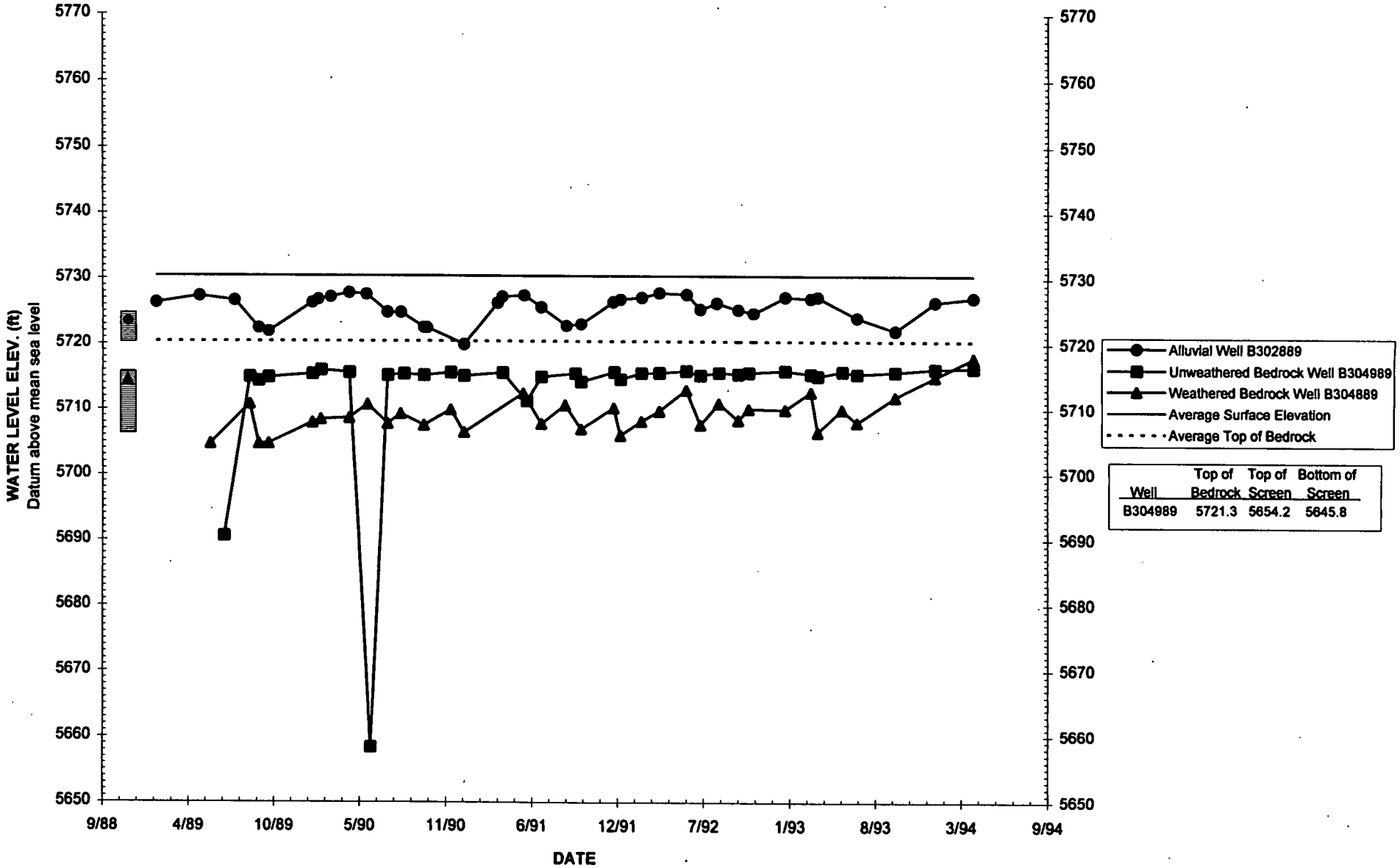
Well-Cluster Hydrograph 9



\WLEVALPR.XLS GRAPH 9 1/8/95

669

Well-Cluster Hydrograph 10

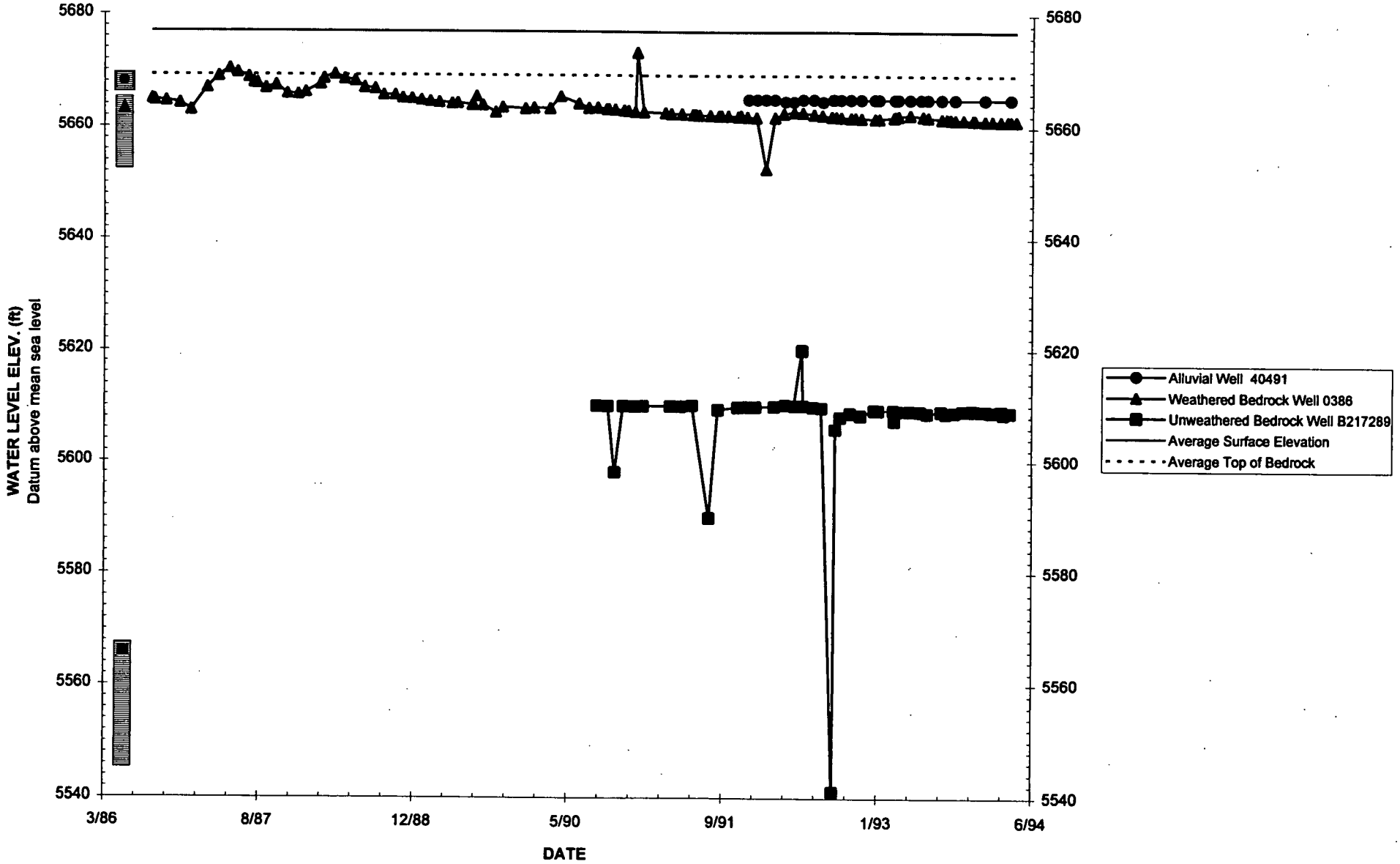


Well	Top of Bedrock	Top of Screen	Bottom of Screen
B304989	5721.3	5654.2	5645.8

\WLEVALPR\WLS GRAPH 10 1/10/95

670

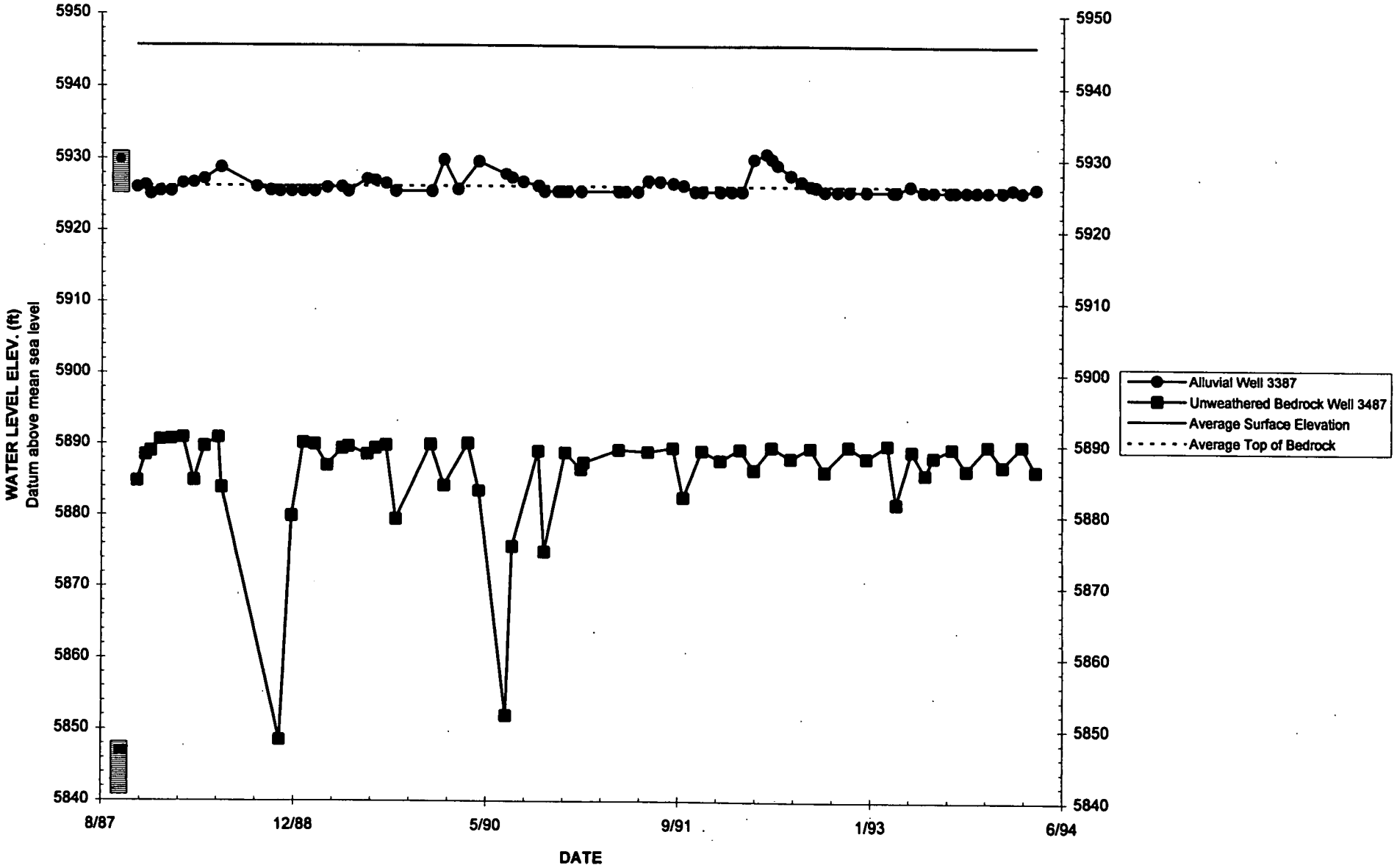
Well-Cluster Hydrograph 11



\WLEVALPR.XLS GRAPH 11 1/5/95

671

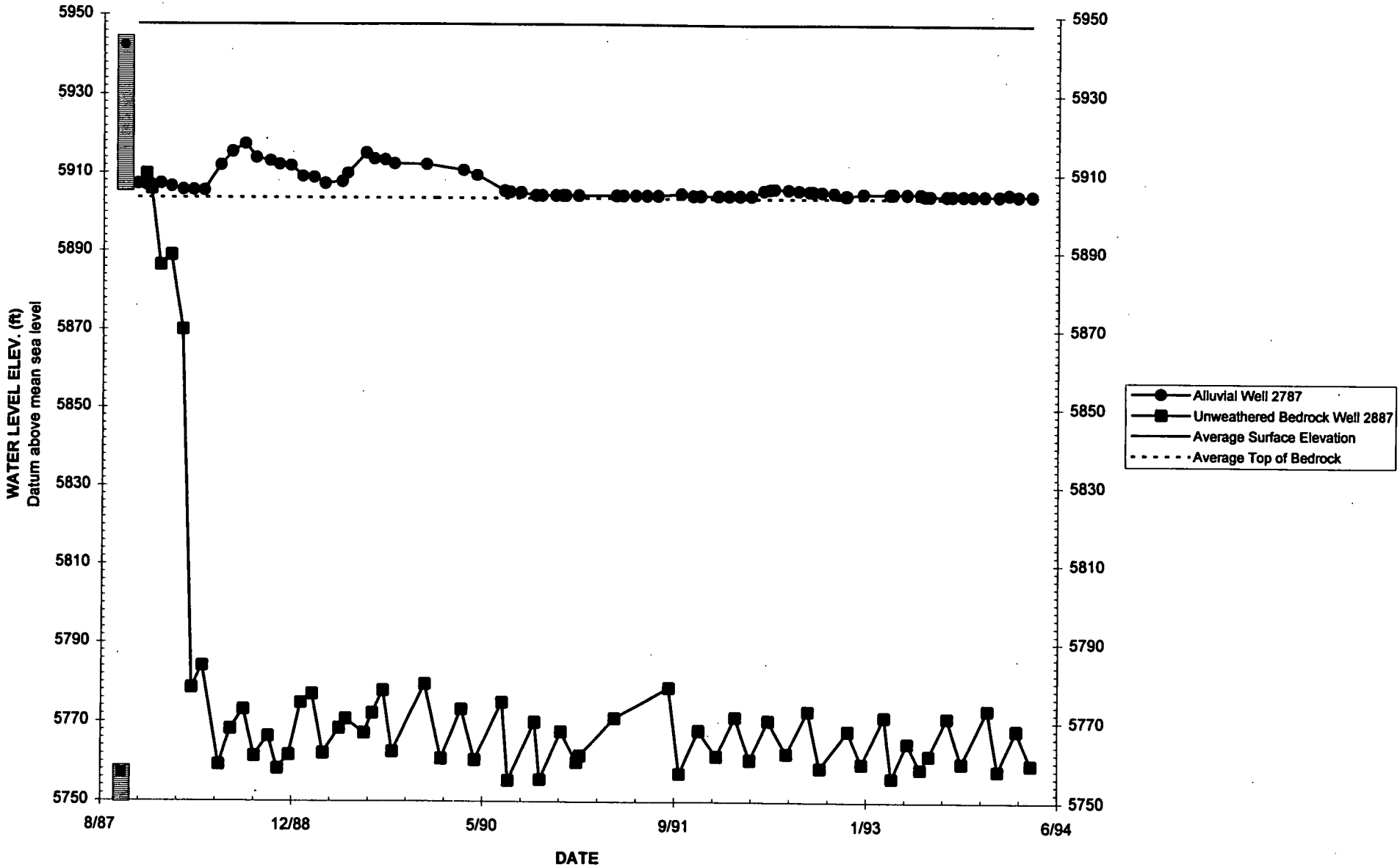
Well-Cluster Hydrograph 12



\WLEVALP[illegible]S GRAPH 12 1/8/95

672

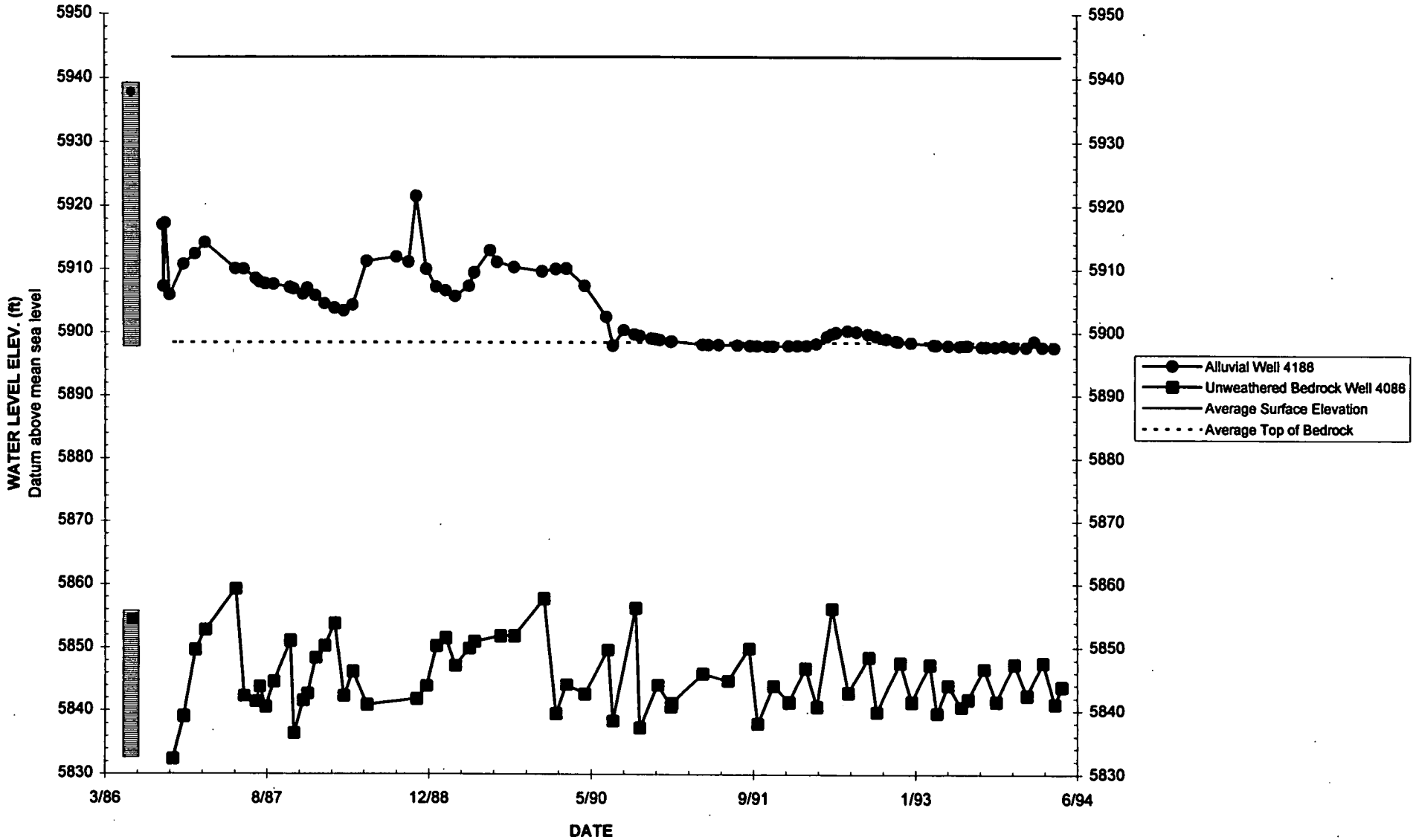
Well-Cluster Hydrograph 13



\WLEVALPR.XLS GRAPH 13 1/8/95

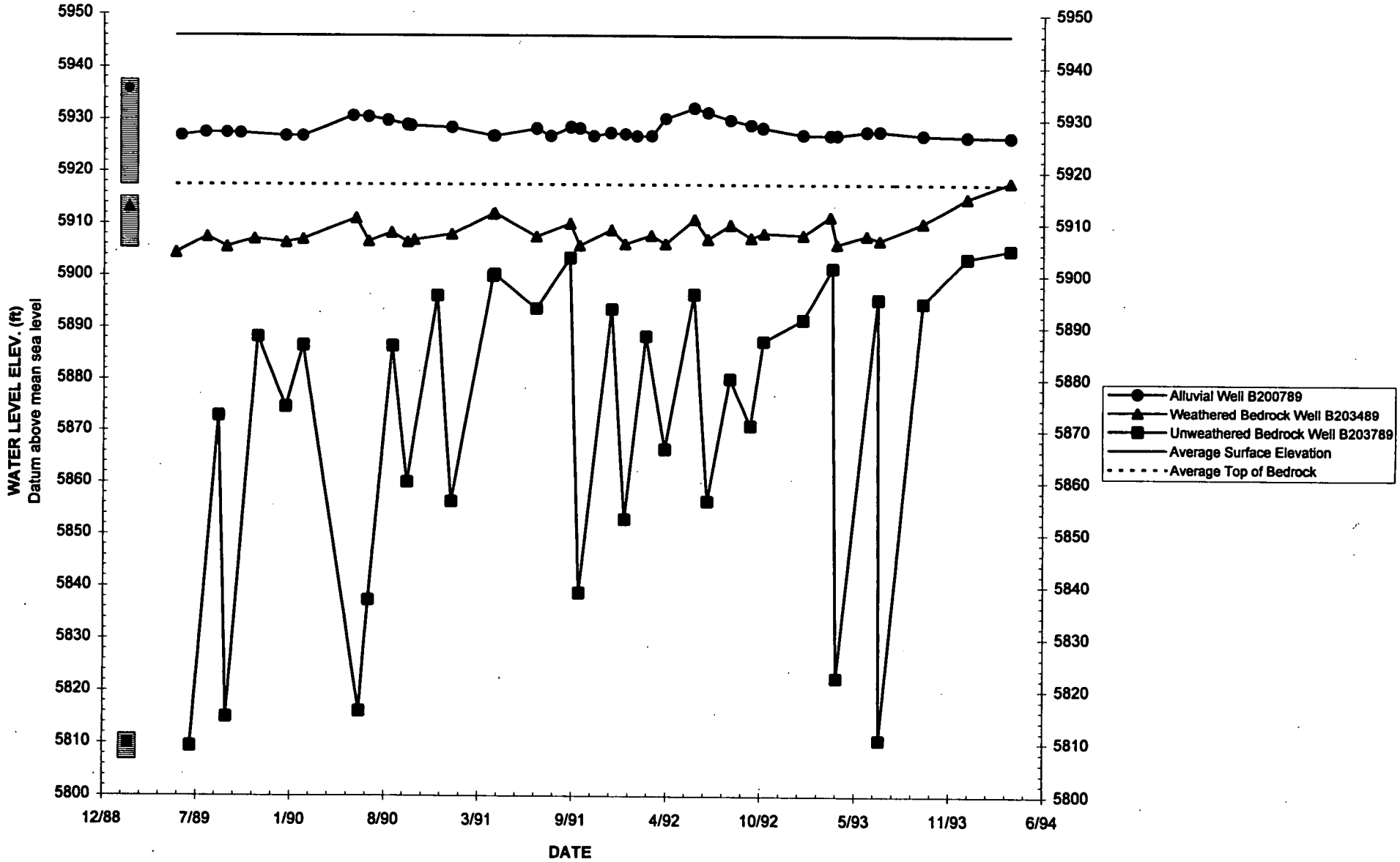
673

Well-Cluster Hydrograph 14



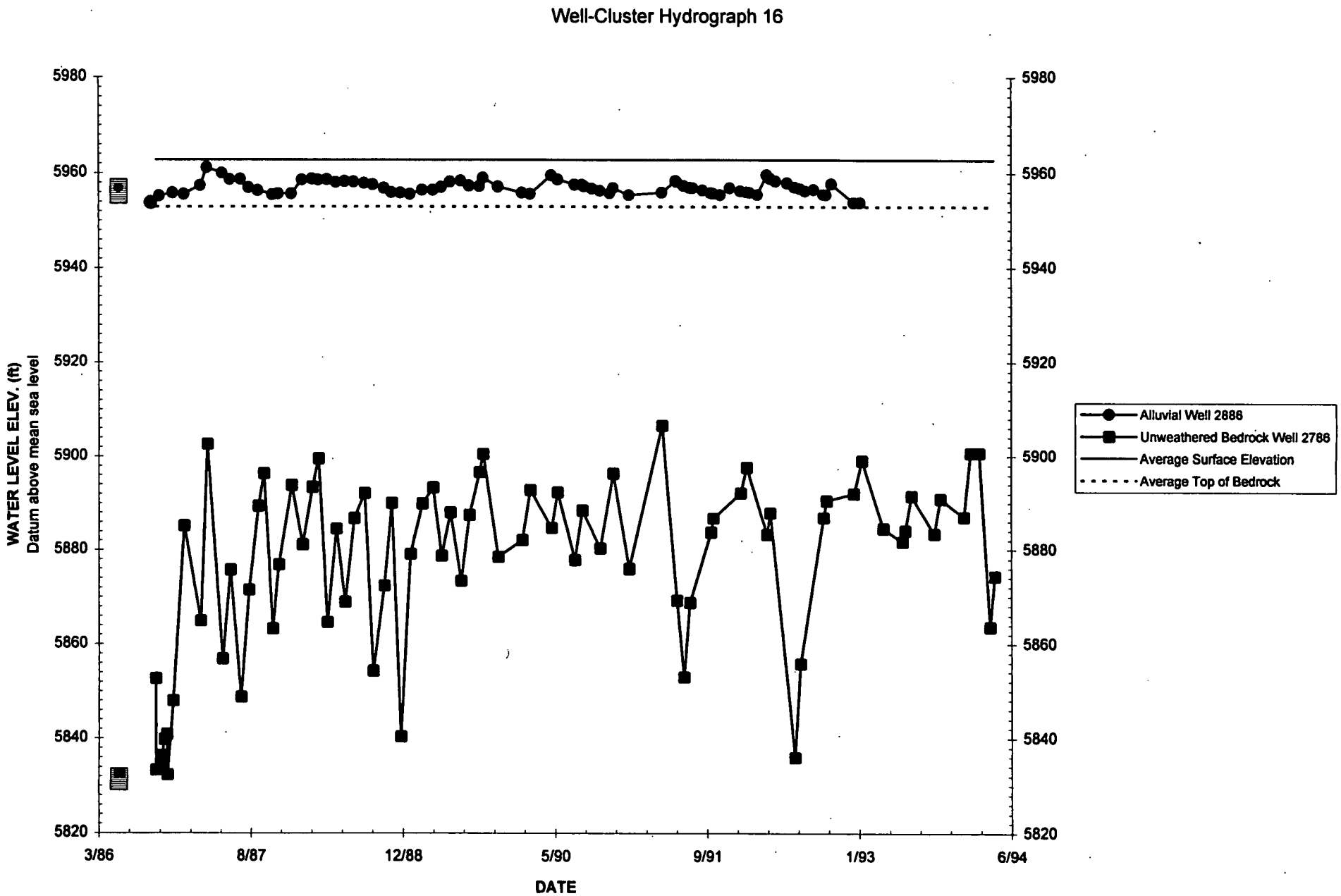
674

Well-Cluster Hydrograph 15



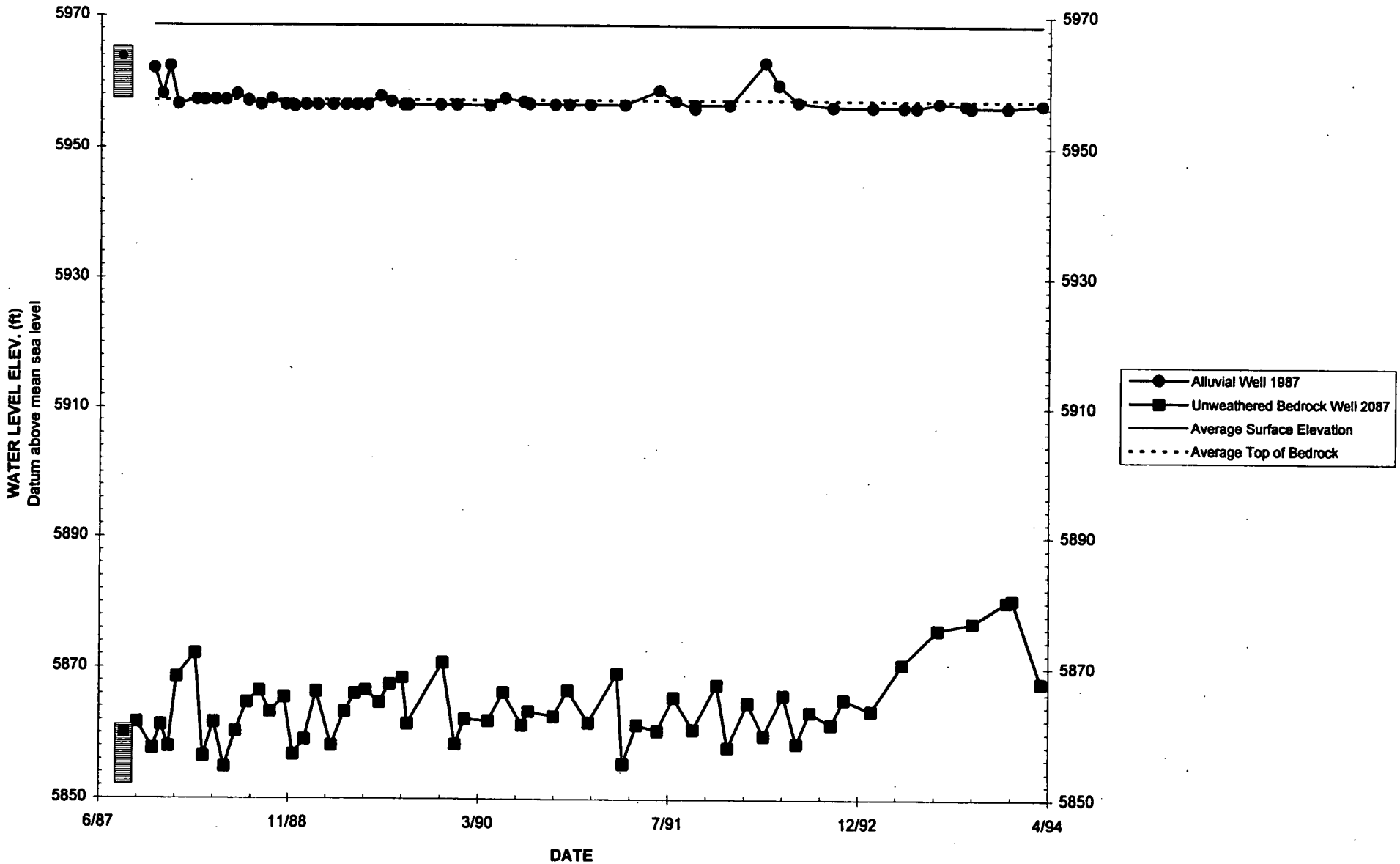
675

\WLEVALPR.XLS GRAPH 15 1/8/95

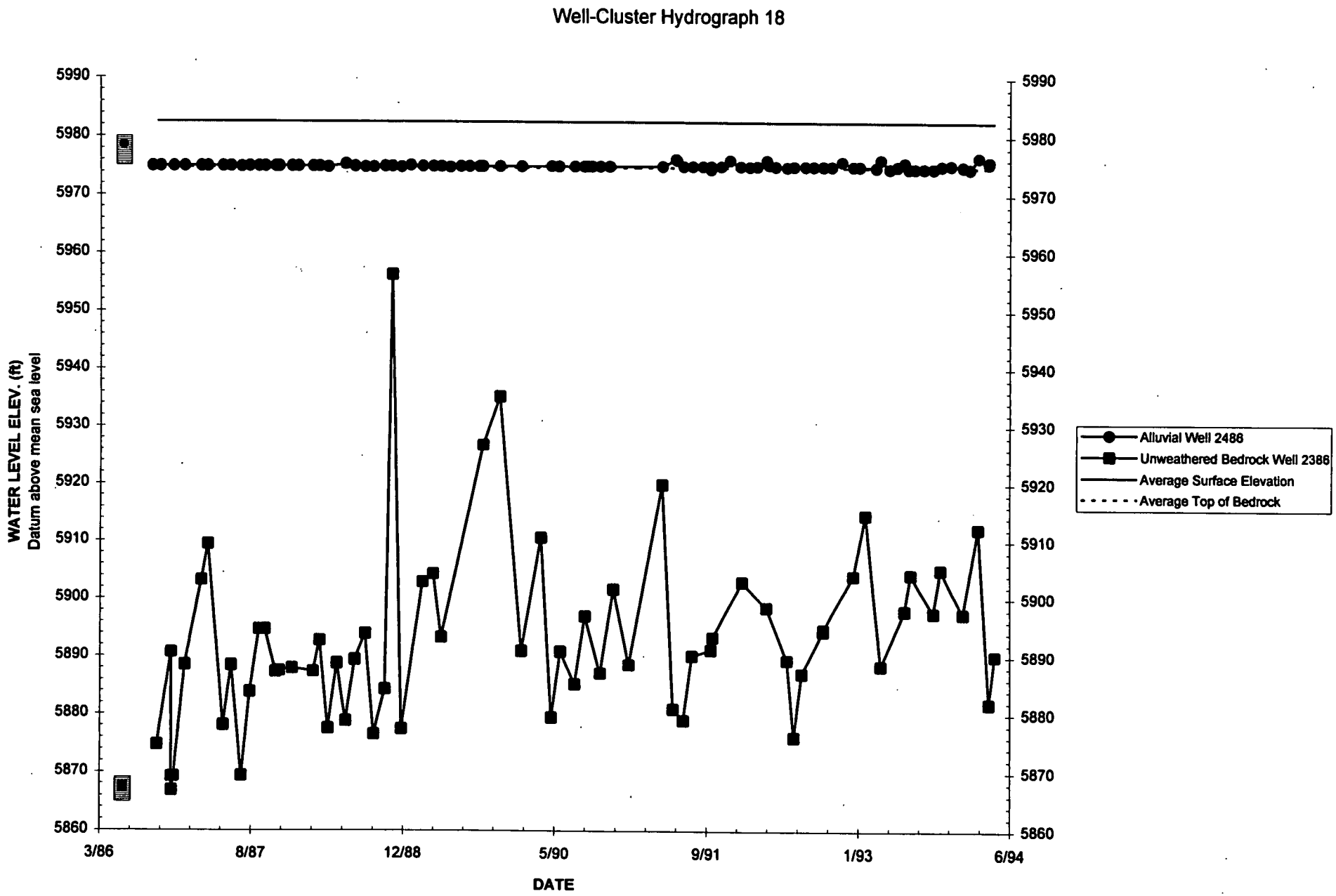

Well-Cluster Hydrograph 16
WATER LEVEL ELEV. (ft)
Datum above mean sea level
5980
5960
5940
5920
5900
5880
5860
5840
5820
3/86
8/87
12/88
5/90
9/91
1/93
6/94
DATE
Alluvial Well 2886
Unweathered Bedrock Well 2786
Average Surface Elevation
Average Top of Bedrock

676

Well-Cluster Hydrograph 17



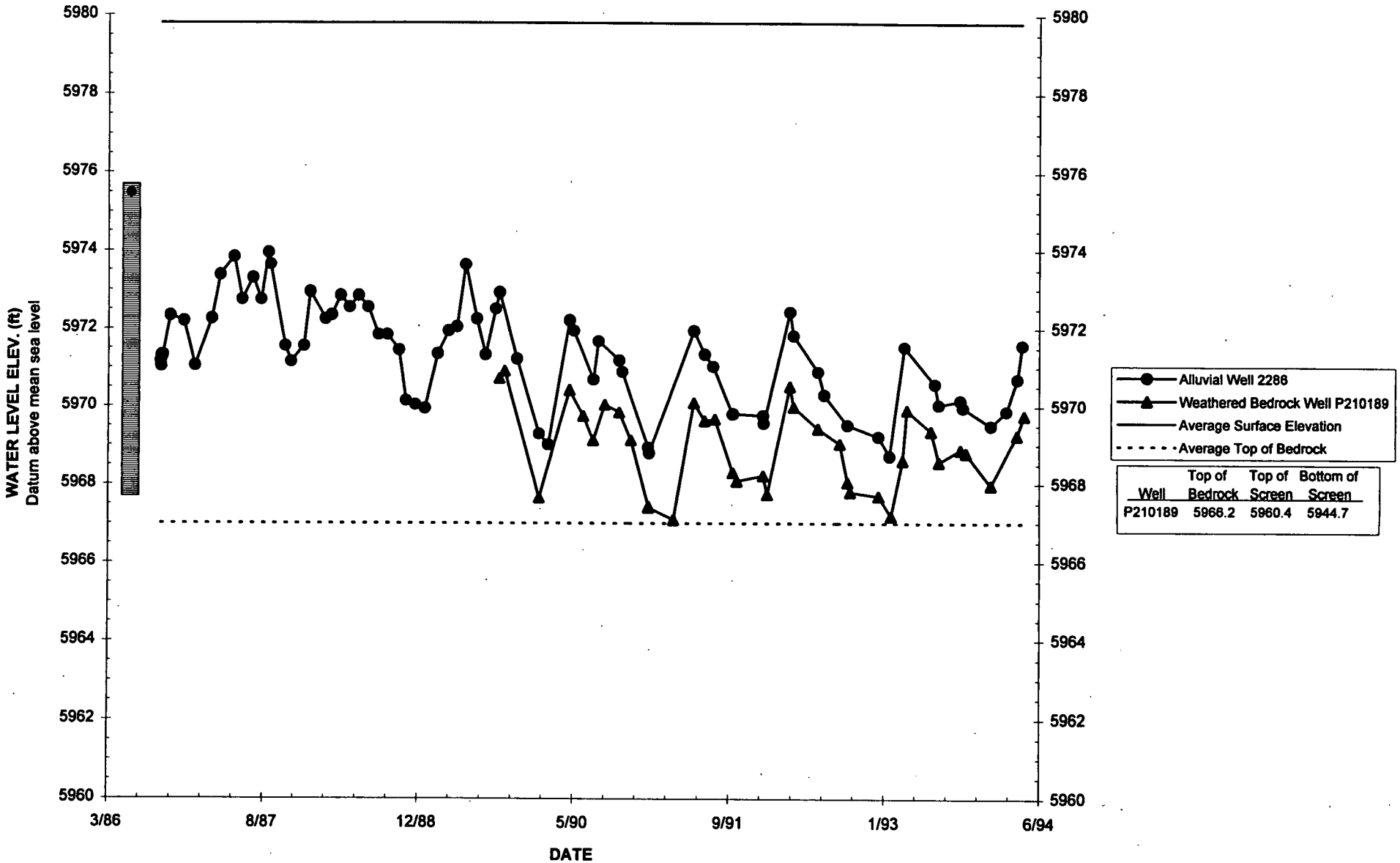
677 \WLEVALPR.XLS GRAPH 17 1/8/95



\WLEVALD\ALS GRAPH 18 1/8/95

678

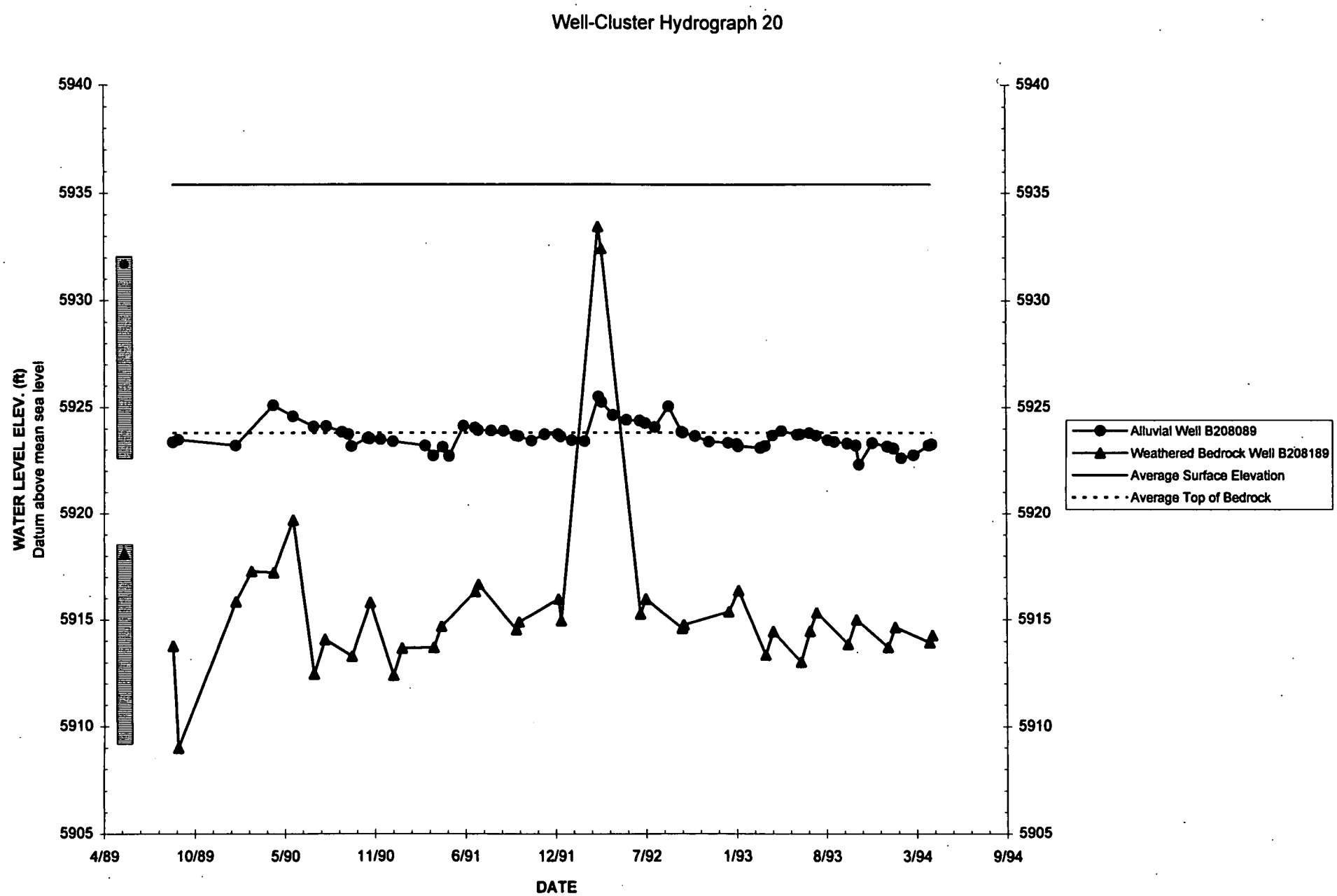
Well-Cluster Hydrograph 19



Well	Top of Bedrock	Top of Screen	Bottom of Screen
P210189	5966.2	5960.4	5944.7

\WLEVALPR.XLS GRAPH 19 1/8/95

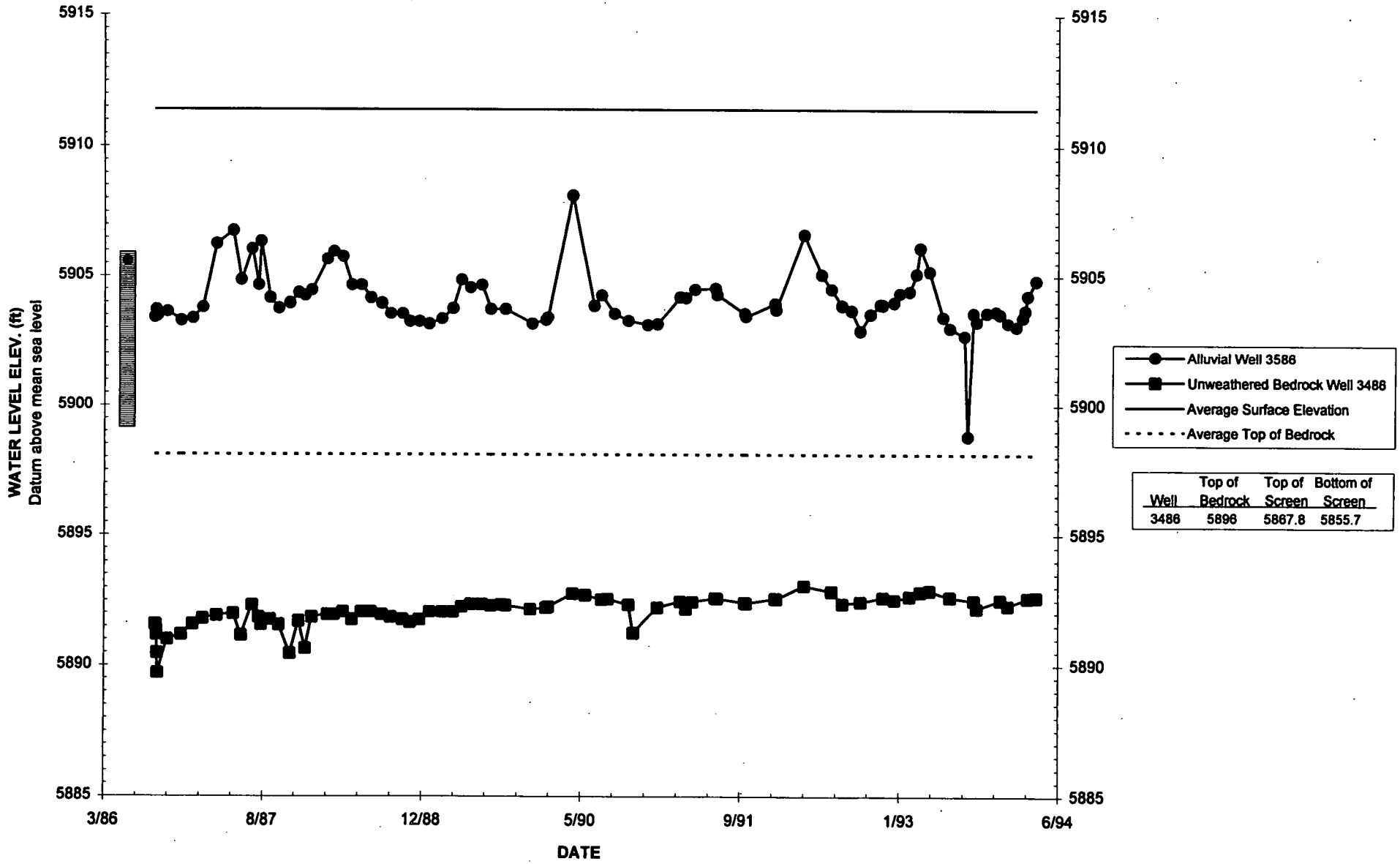
679



680

IWLEVAL S GRAPH 20 1/8/95

Well-Cluster Hydrograph 21

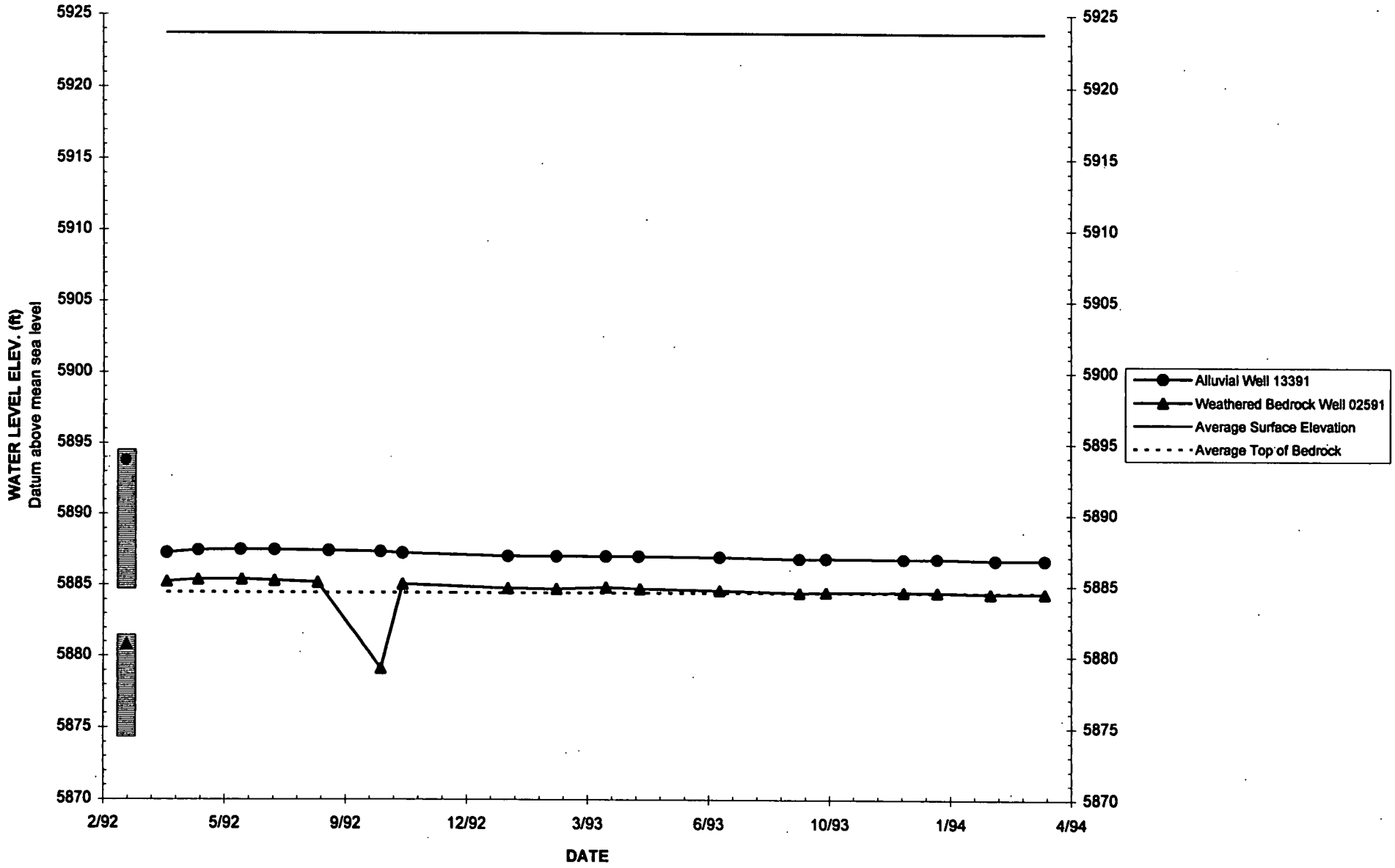


Well	Top of Bedrock	Top of Screen	Bottom of Screen
3486	5896	5867.8	5855.7

\WLEVALPR.XLS GRAPH 21 1/8/95

681

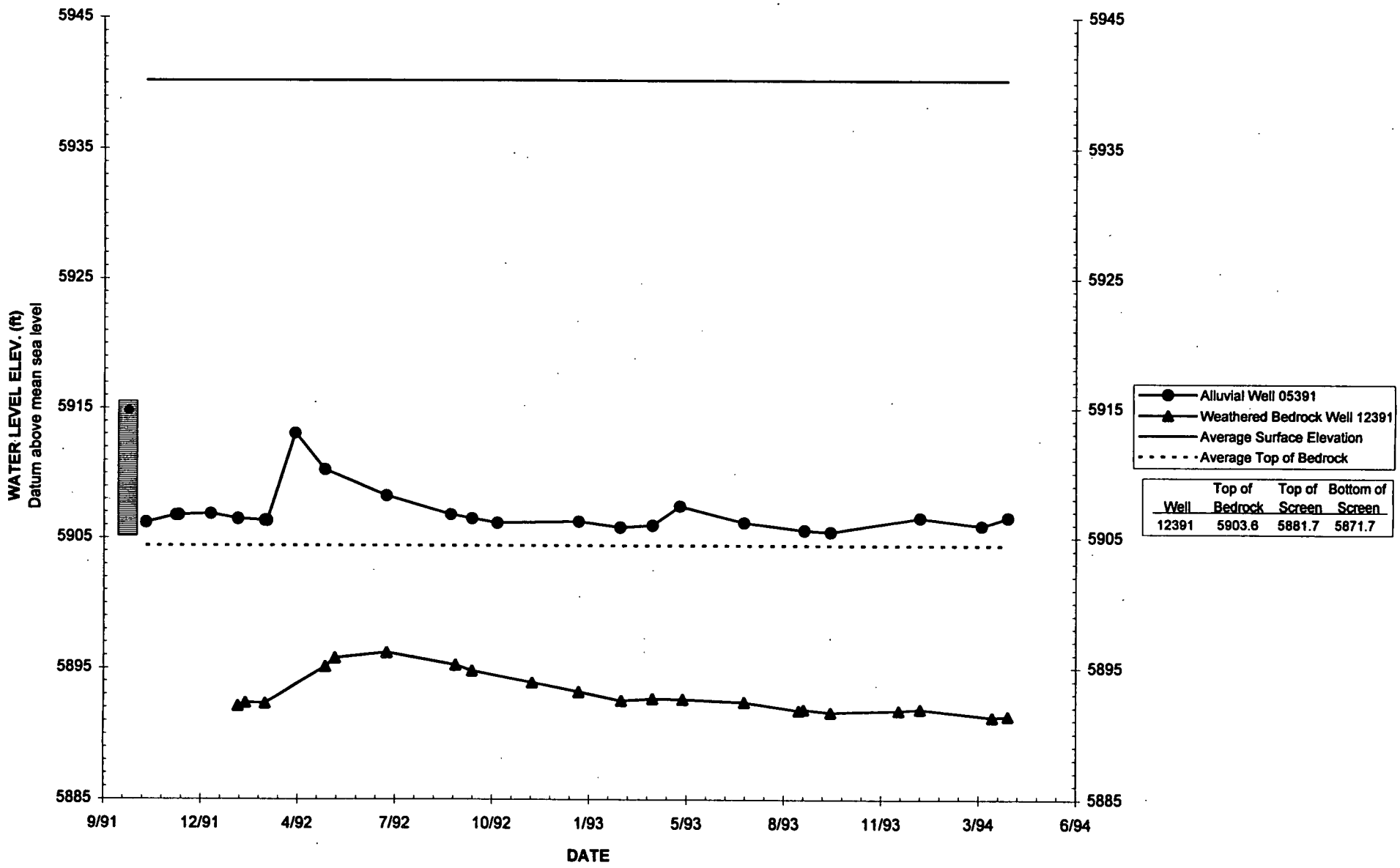
Well-Cluster Hydrograph 22



\WLEVALD[illegible]LS GRAPH 22 1/8/95

682

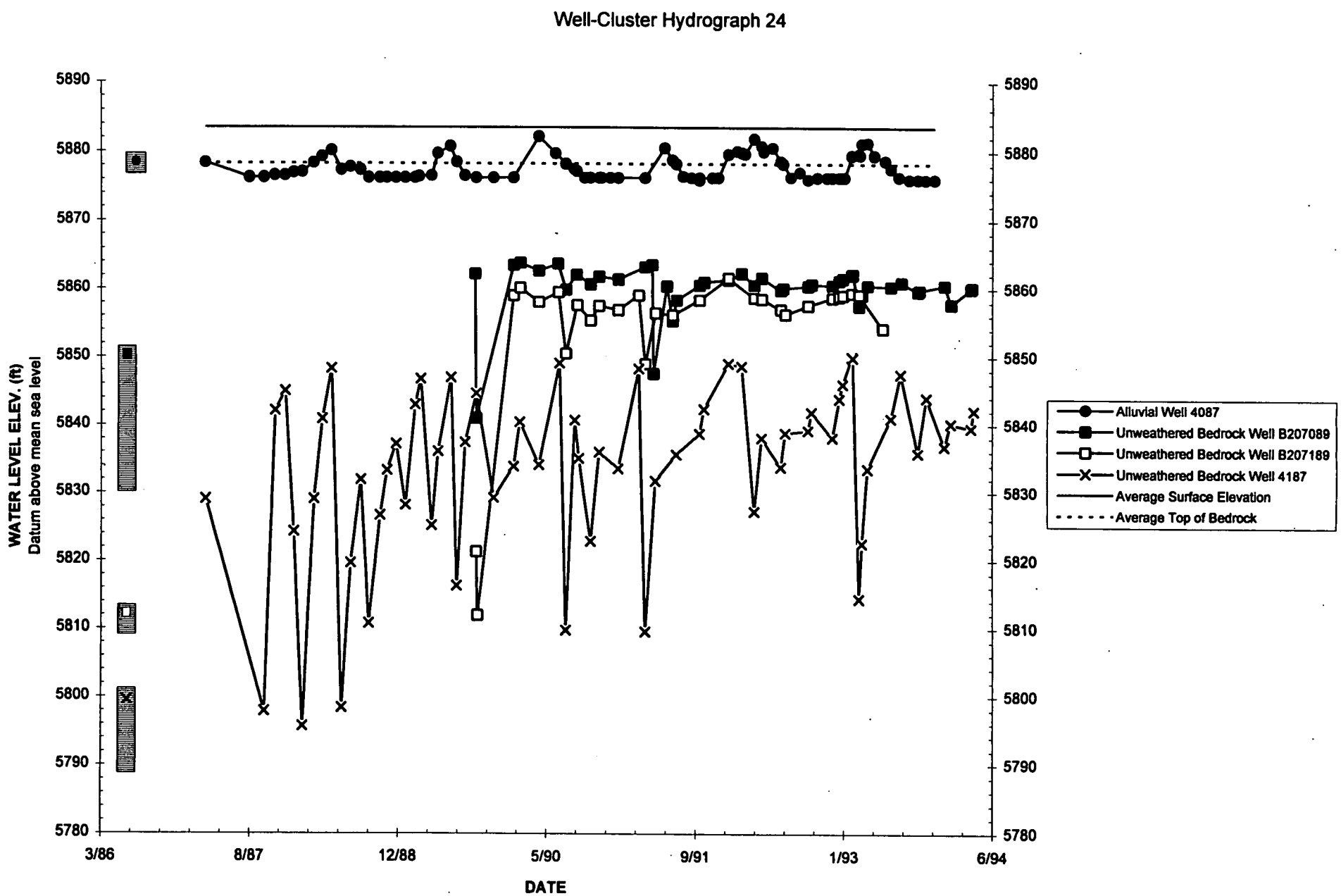
Well-Cluster Hydrograph 23



Well	Top of Bedrock	Top of Screen	Bottom of Screen
12391	5903.6	5881.7	5871.7

\WLEVALPR.XLS GRAPH 23 1/8/95

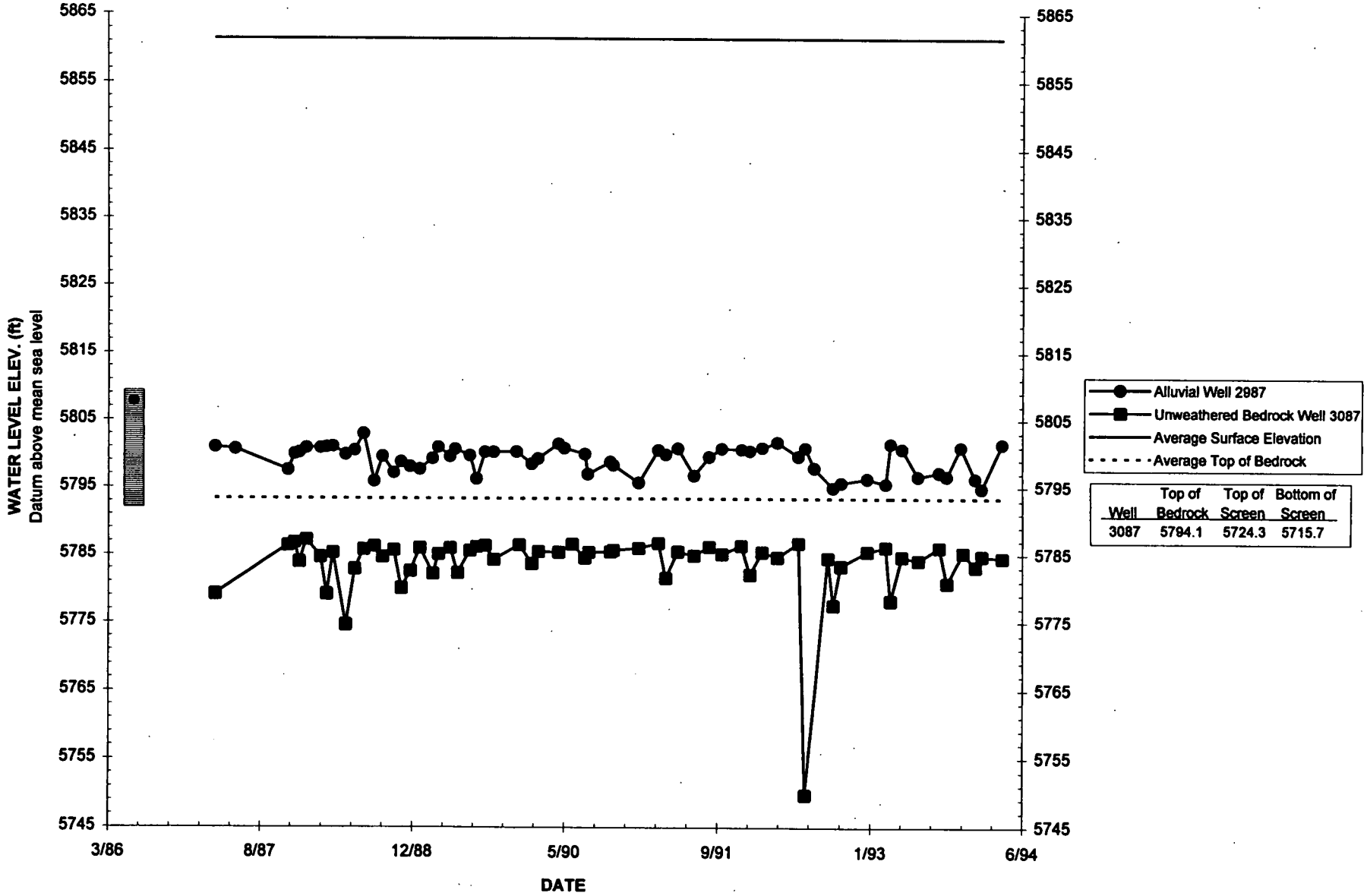
683



684

WLEVALPR.XLS GRAPH 24 1/8/95

Well-Cluster Hydrograph 25

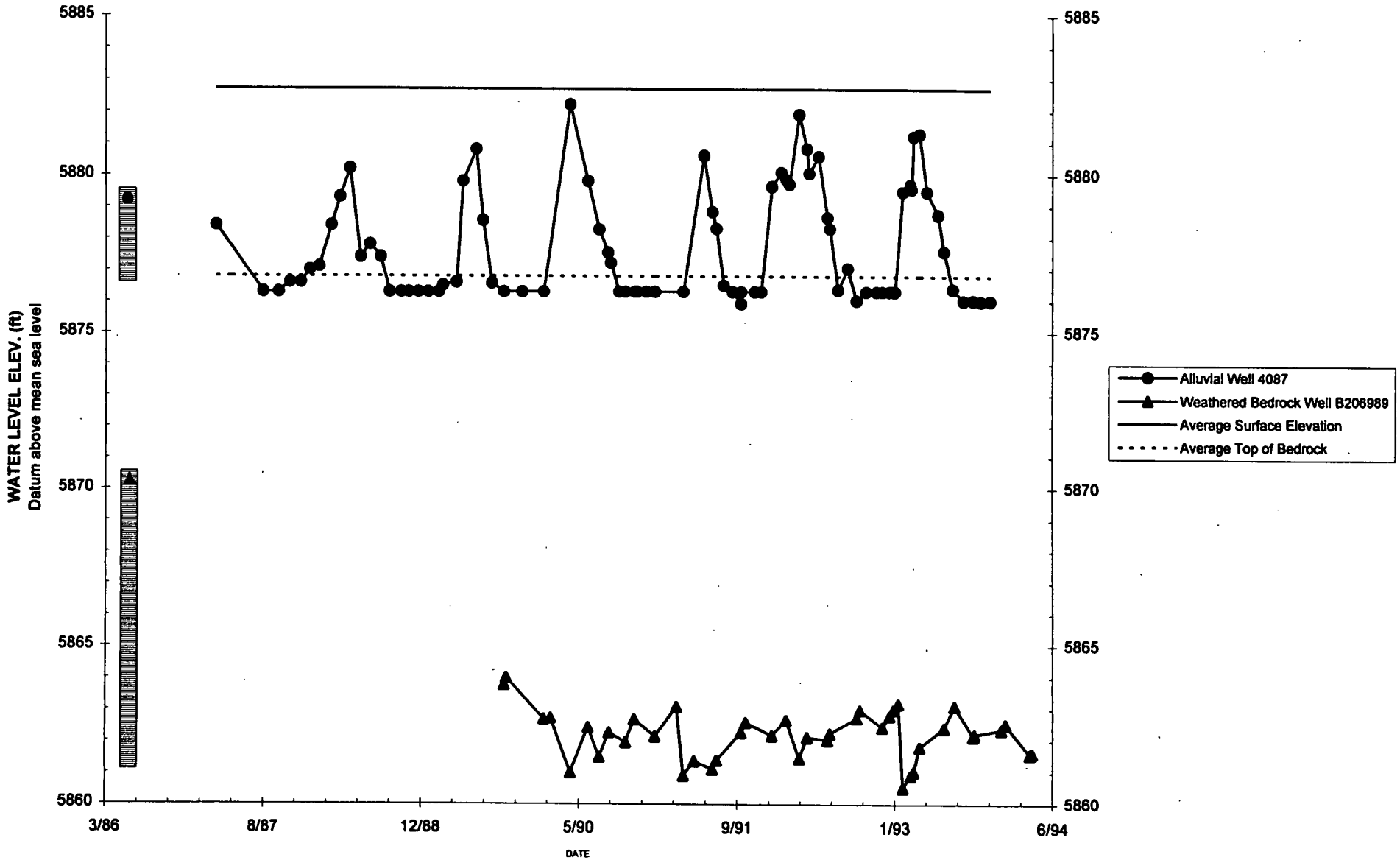


Well	Top of Bedrock	Top of Screen	Bottom of Screen
3087	5794.1	5724.3	5715.7

\WLEVALPR.XLS GRAPH 25 1/10/95

685

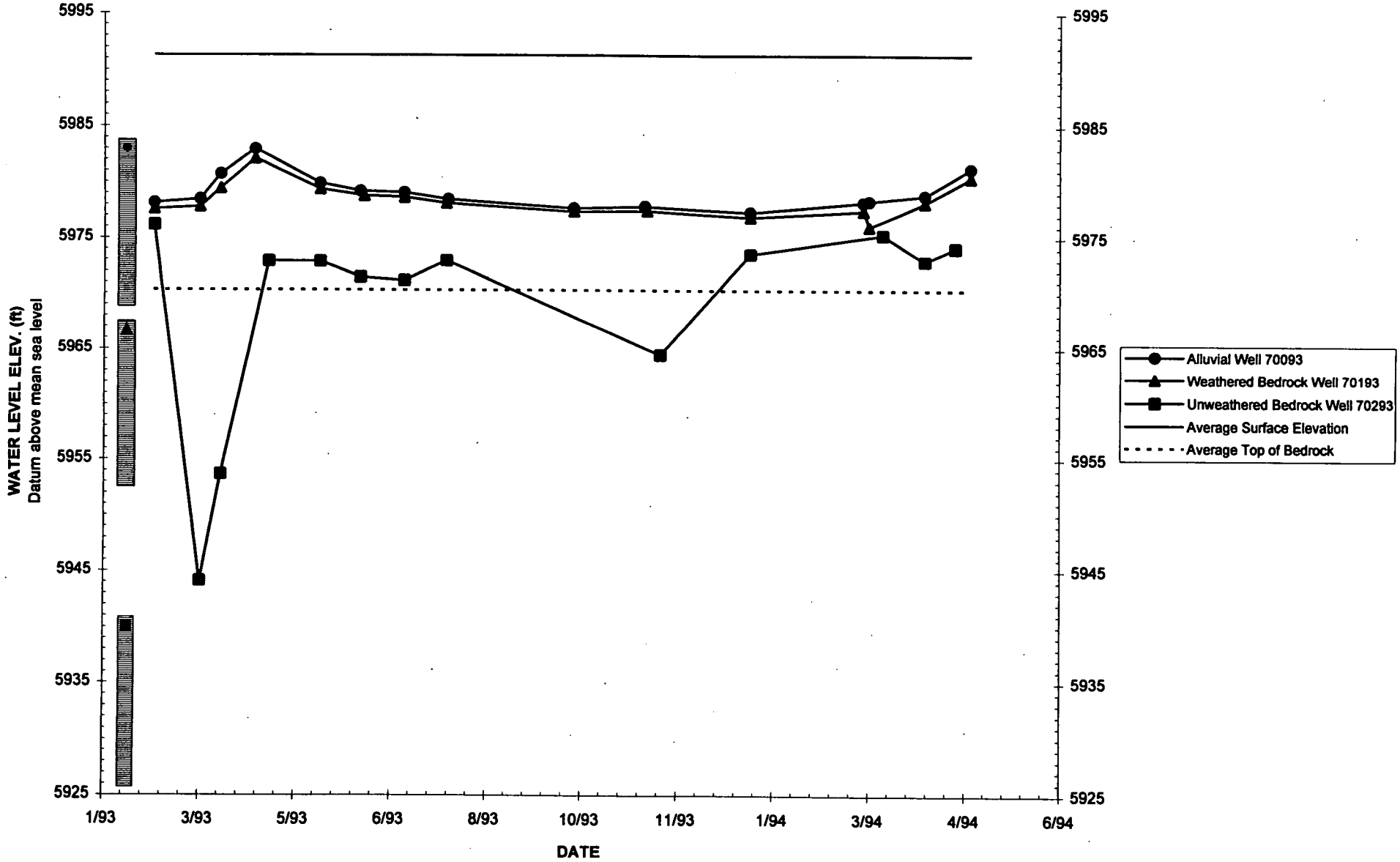
Well-Cluster Hydrograph 26



\STREAM[illegible]S GRAPH 26 1/10/95

686

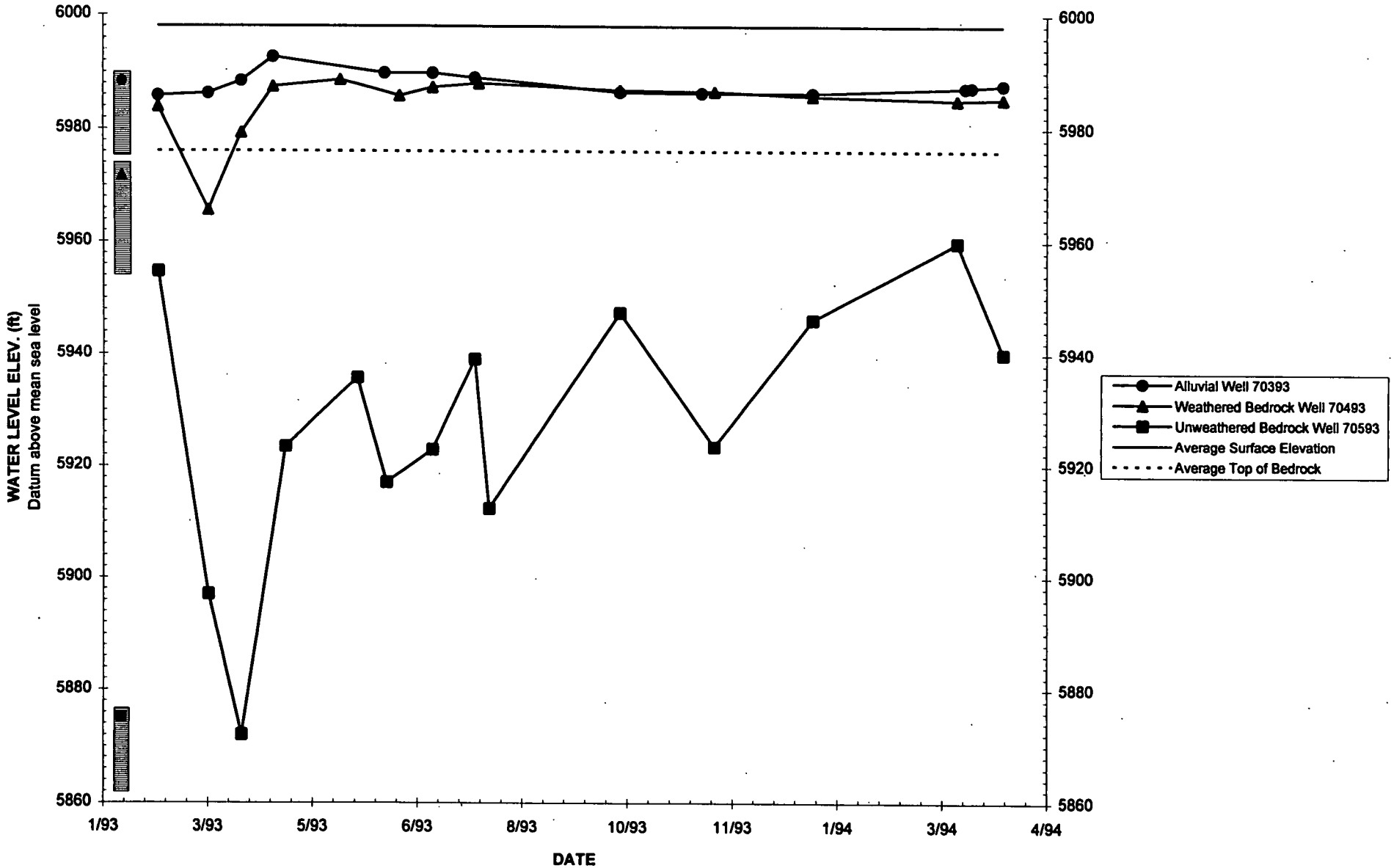
Well-Cluster Hydrograph 27



\STREAMPR.XLS GRAPH 27 1/8/95

687

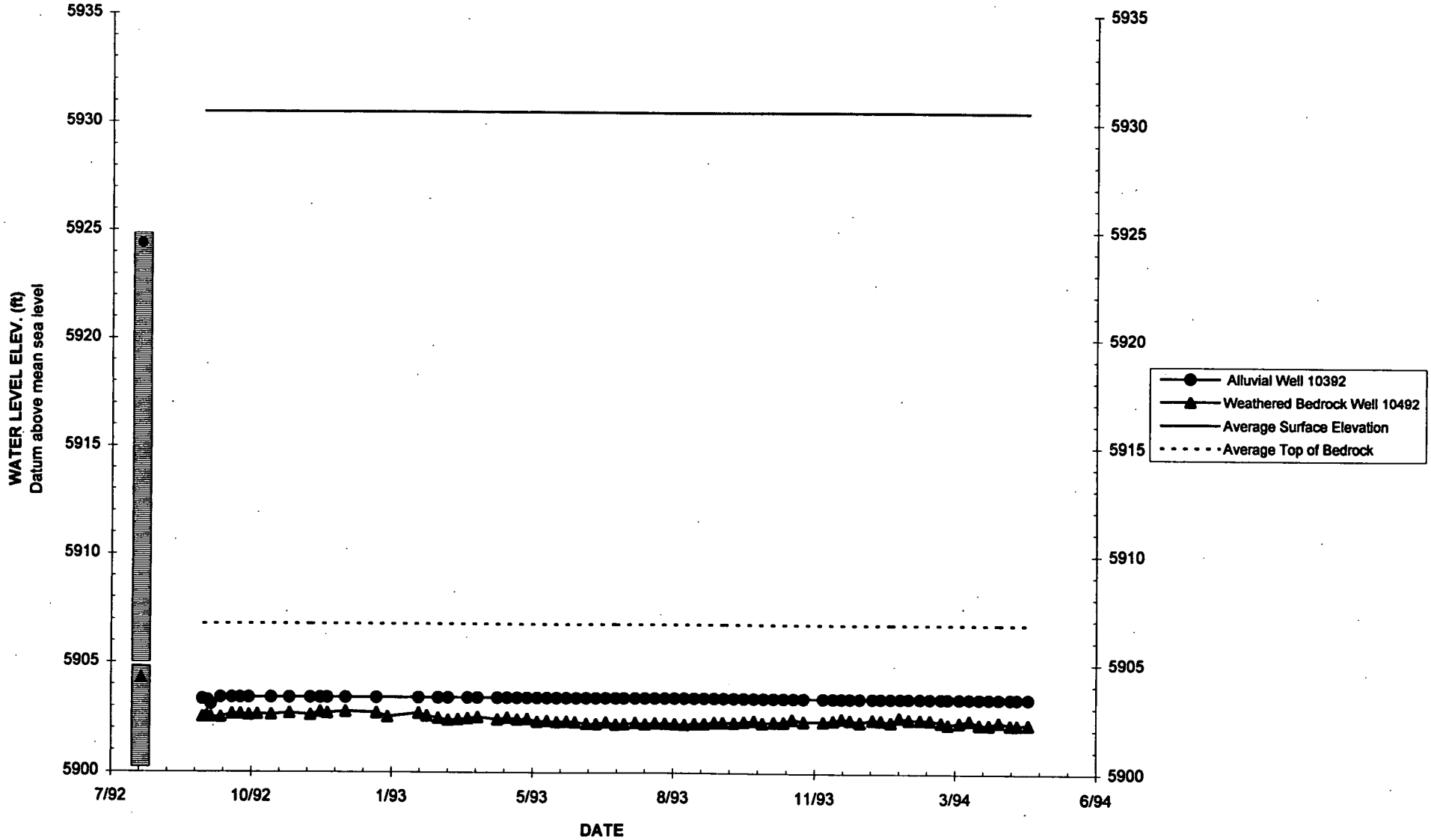
Well-Cluster Hydrograph 28



\STREAMPR.XLS GRAPH 28 1/10/95

688

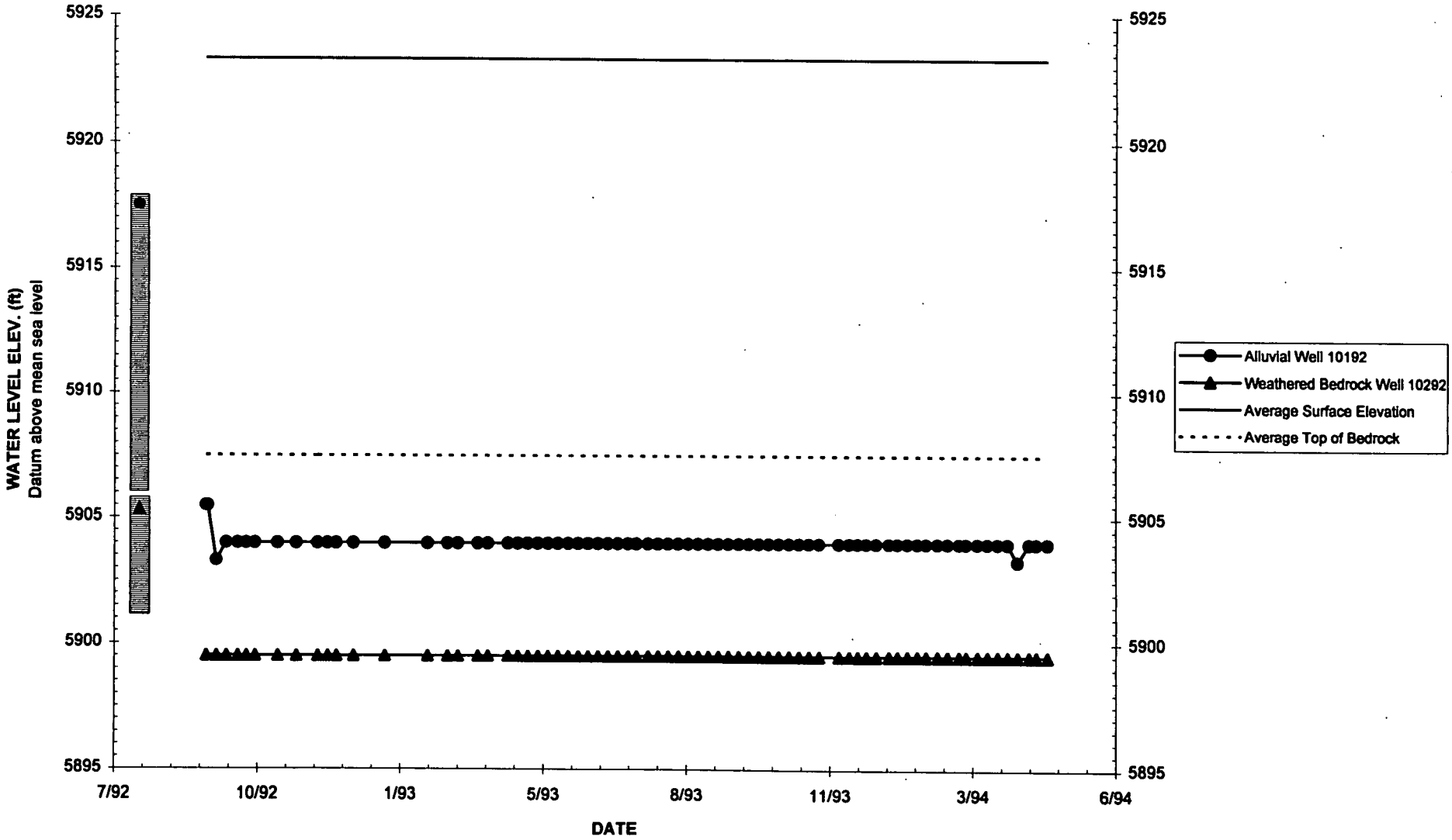
Well-Cluster Hydrograph 29



\STREAMPR.XLS GRAPH 29 1/10/95

689

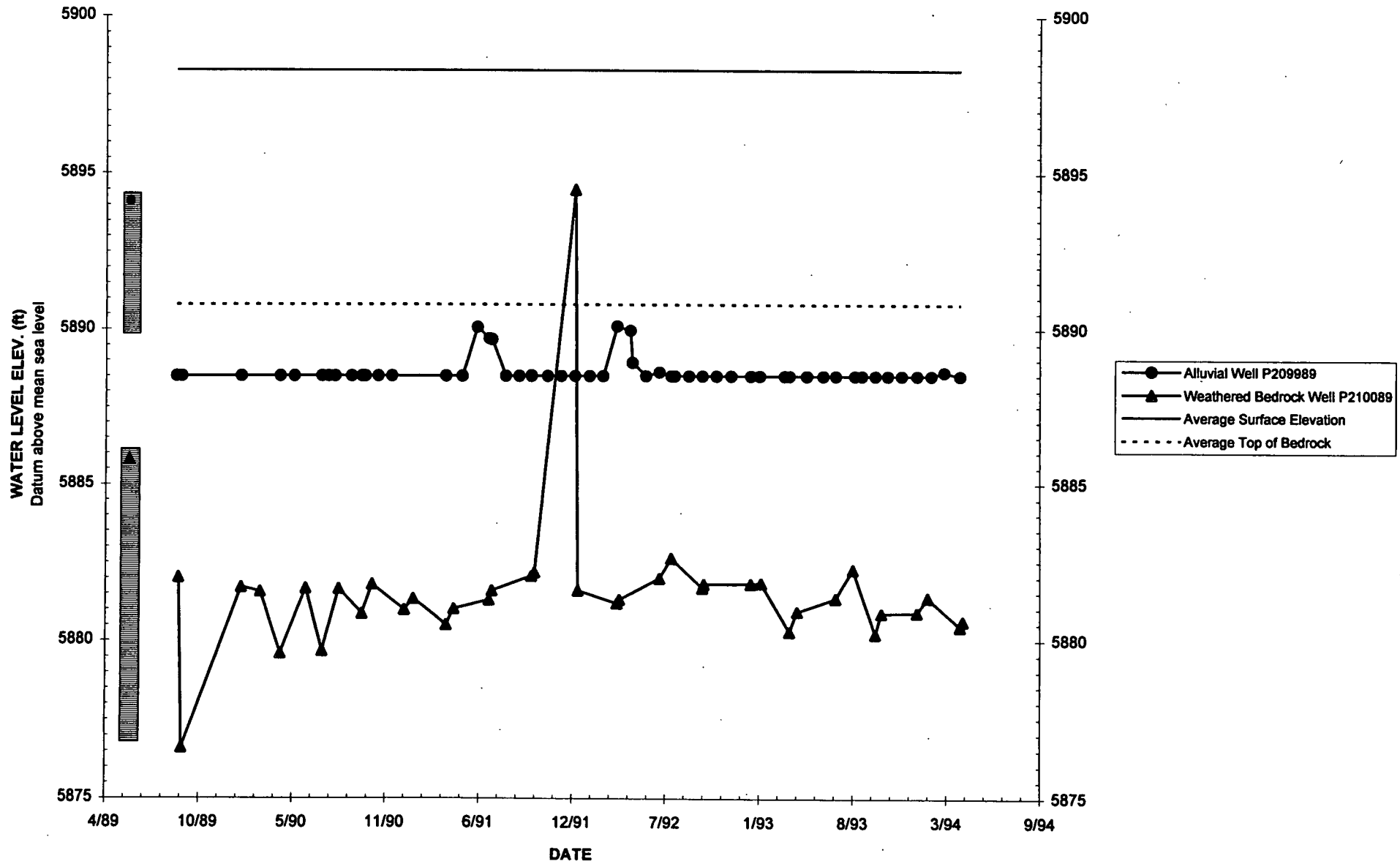
Well-Cluster Hydrograph 30



\STREAMPR.XLS GRAPH 30 1/10/95

690

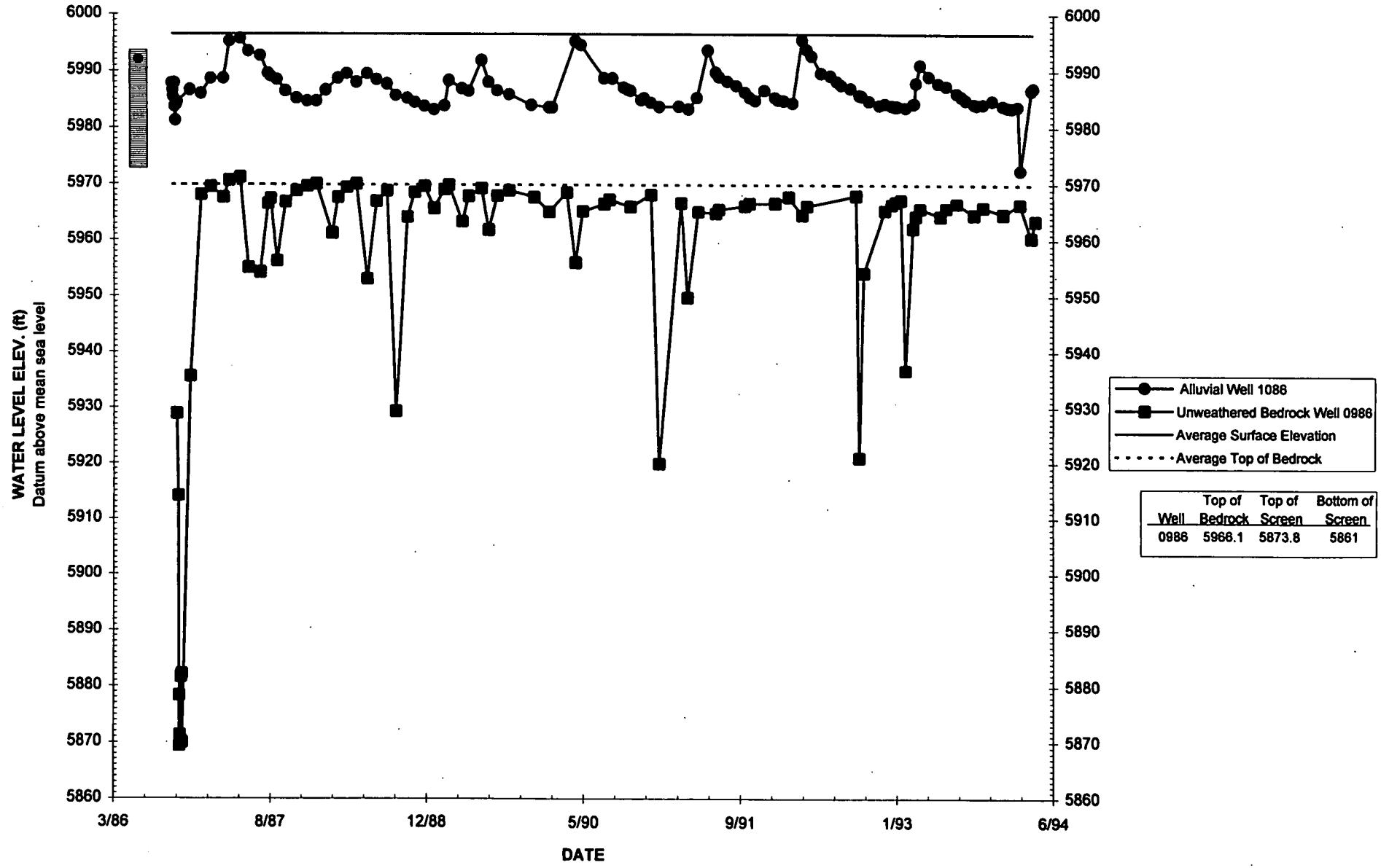
Well-Cluster Hydrograph 31



\STREAMPR.XLS GRAPH 31 1/8/95

691

Well-Cluster Hydrograph 32

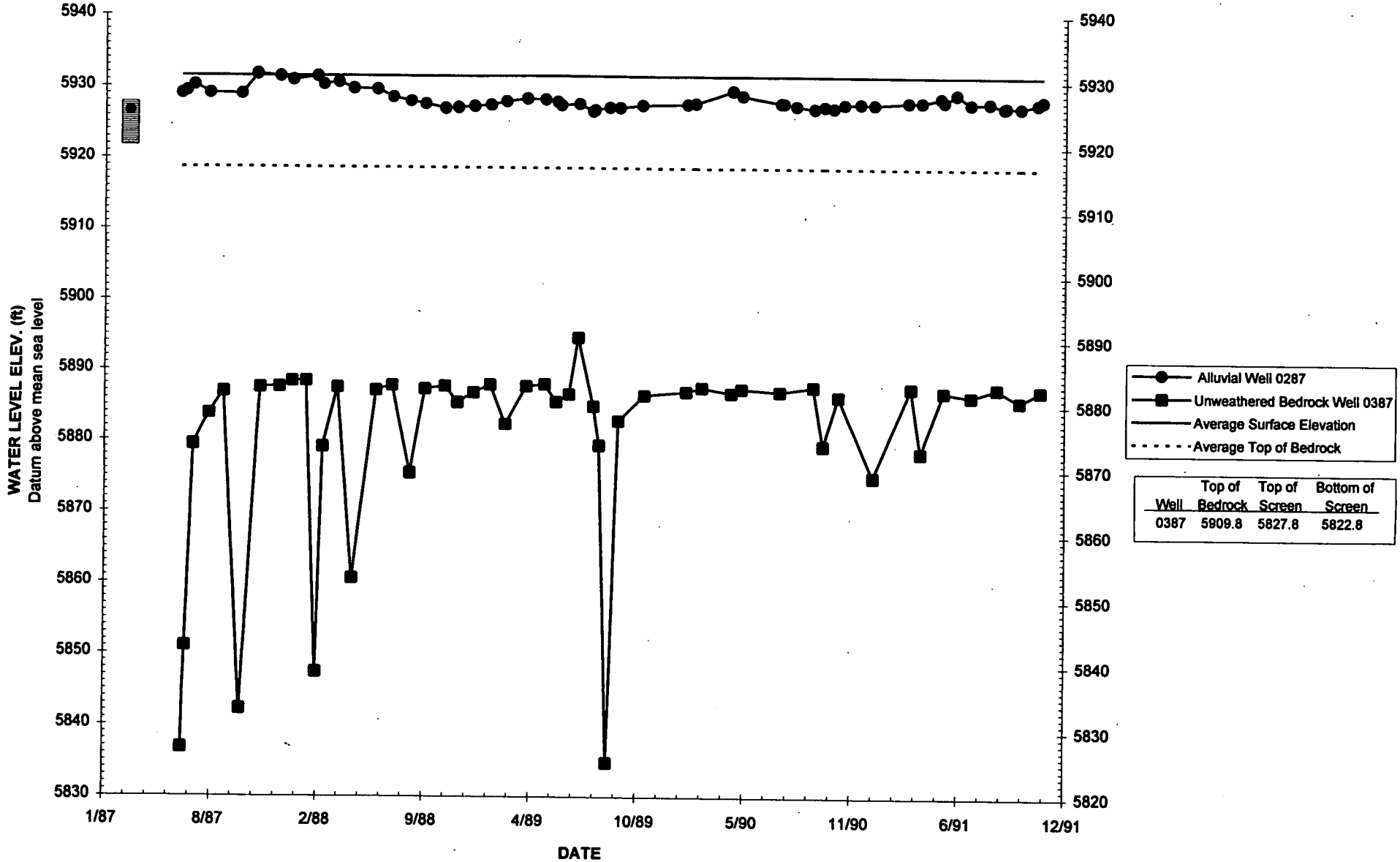


Well	Top of Bedrock	Top of Screen	Bottom of Screen
0986	5966.1	5873.8	5861

\STREAM[illegible]S GRAPH 32 1/10/95

692

Well-Cluster Hydrograph 33

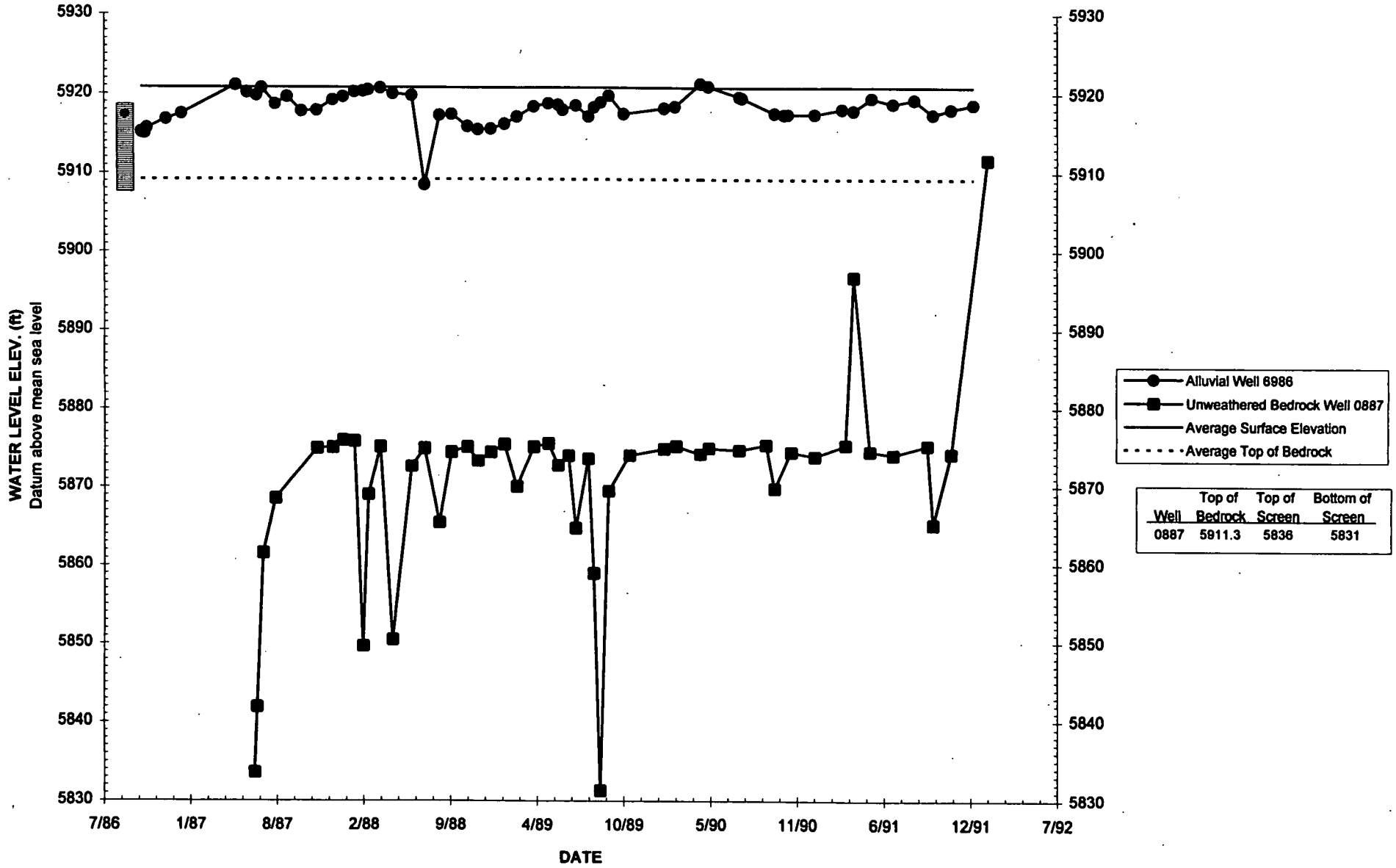


Well	Top of Bedrock	Top of Screen	Bottom of Screen
0387	5909.8	5827.8	5822.8

\STREAMPR.XLSGRAPH 331/10/95

493

Well-Cluster Hydrograph 34

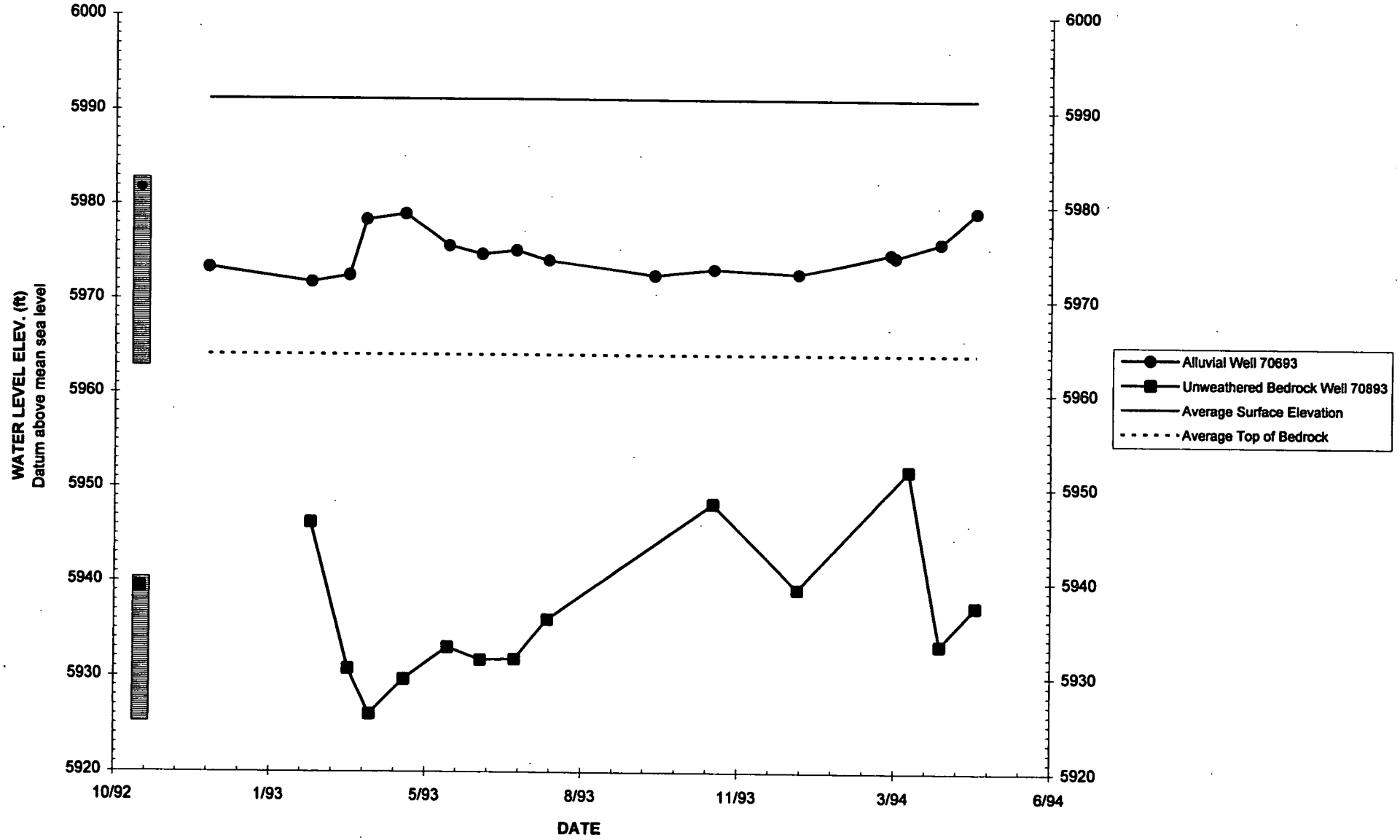


Well	Top of Bedrock	Top of Screen	Bottom of Screen
0887	5911.3	5836	5831

\STREAMPR.XLS GRAPH 34 1/10/95

694

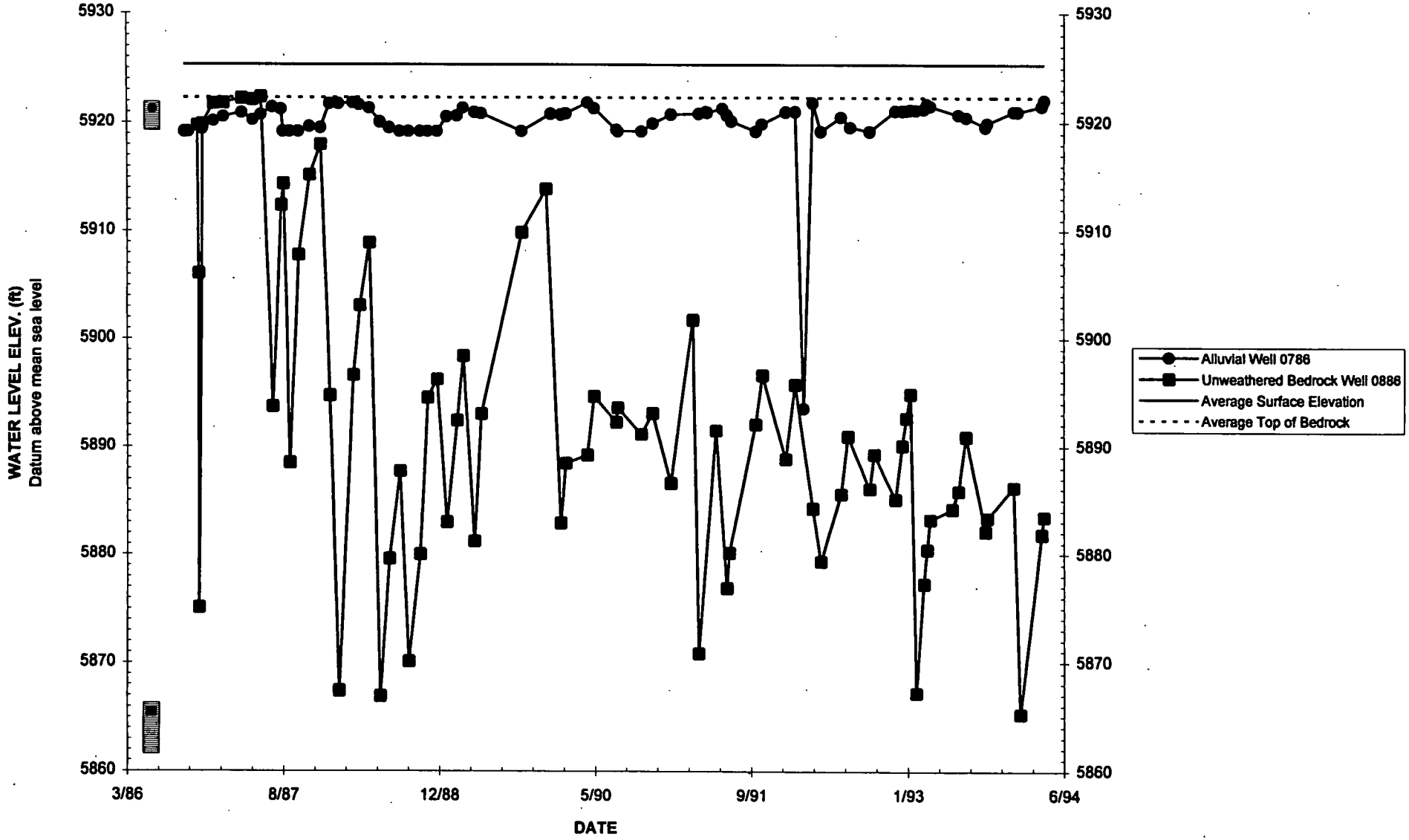
Well-Cluster Hydrograph 35



\STREAMPR.XLS GRAPH 35 1/9/95

695

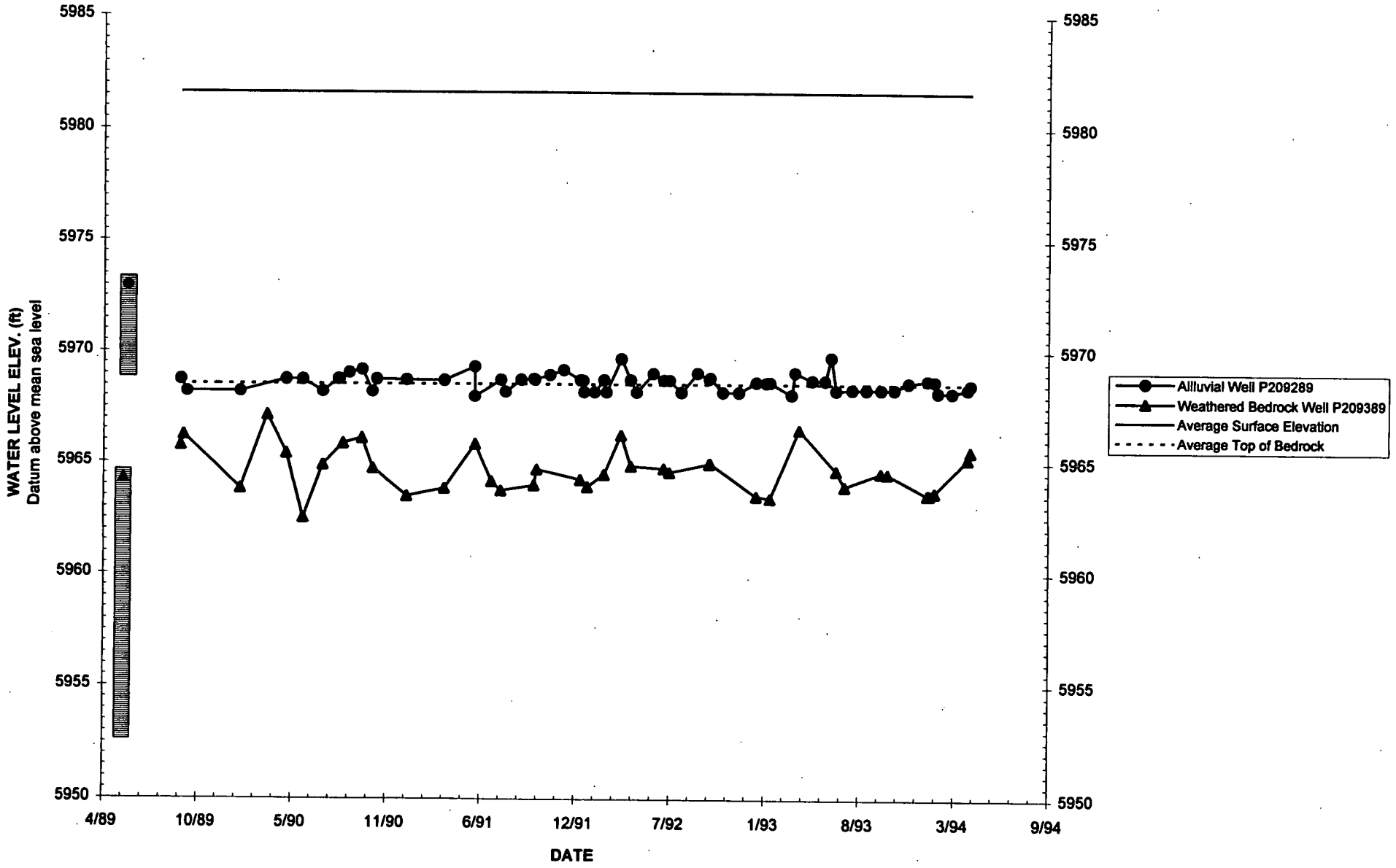
Well-Cluster Hydrograph 36



\STREAM[illegible]LS GRAPH 36 1/9/95

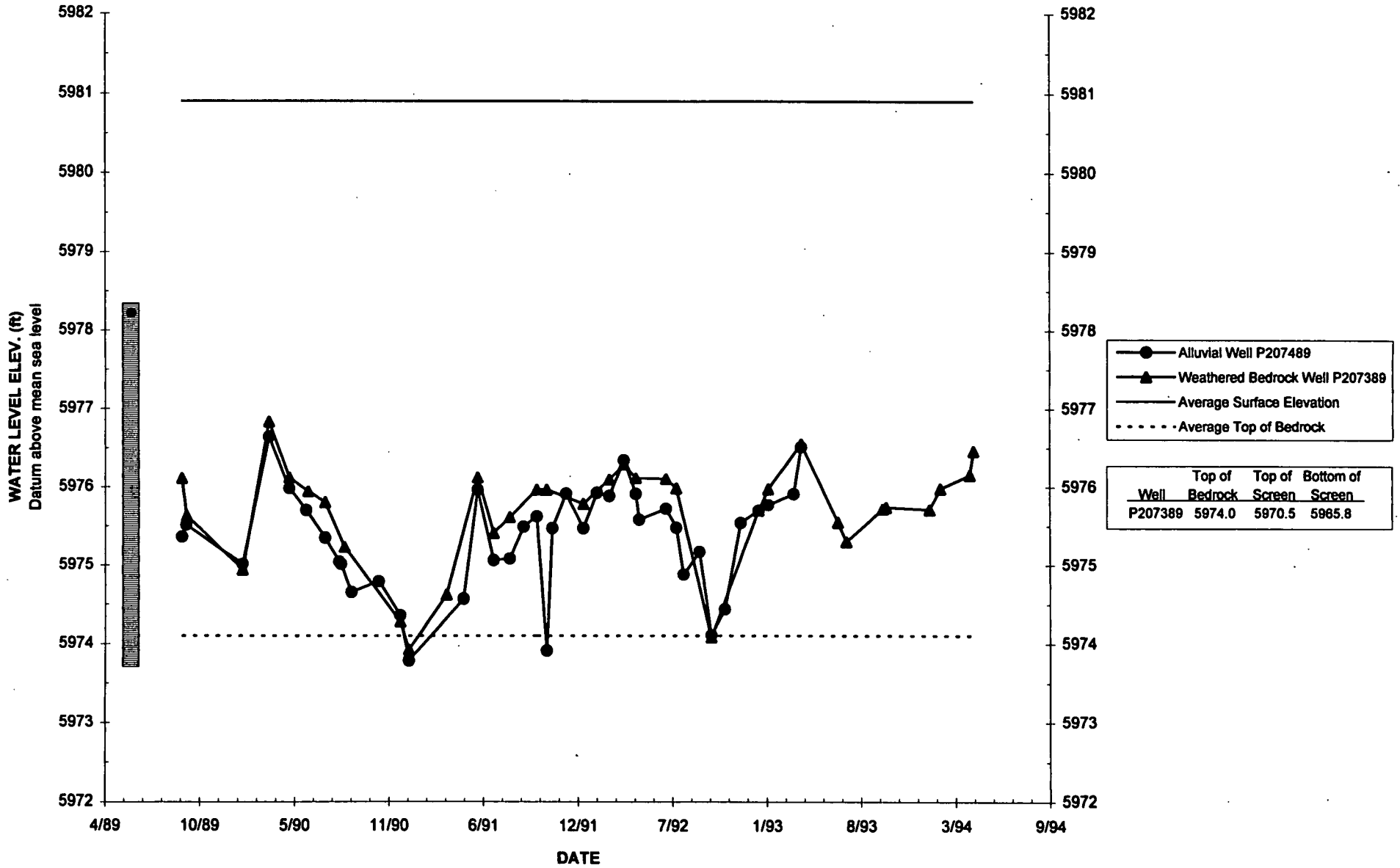
696

Well-Cluster Hydrograph 37



697 \SITEWDPR.XLS GRAPH 37 1/9/95

Well-Cluster Hydrograph 38

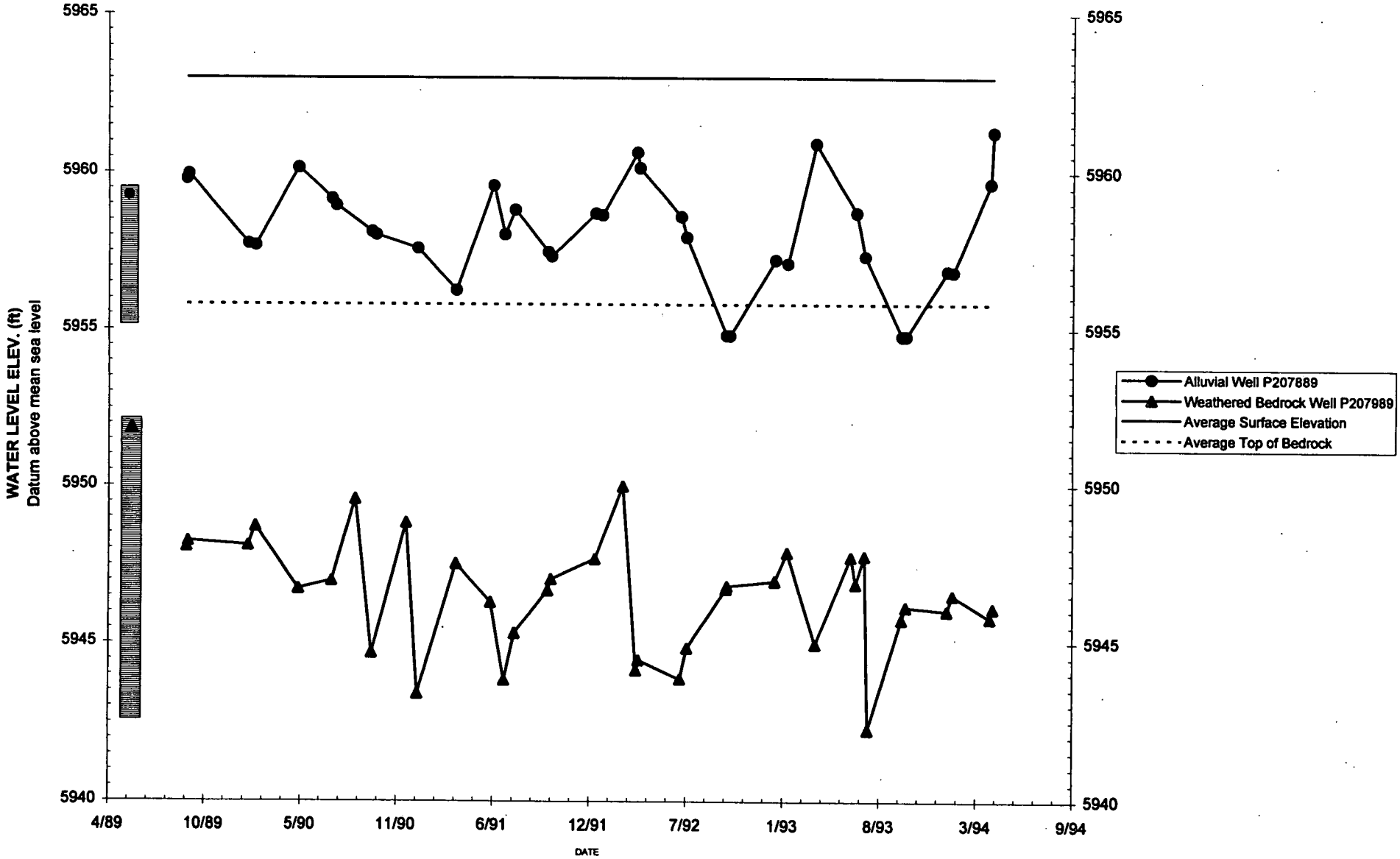


Well	Top of Bedrock	Top of Screen	Bottom of Screen
P207389	5974.0	5970.5	5965.8

698

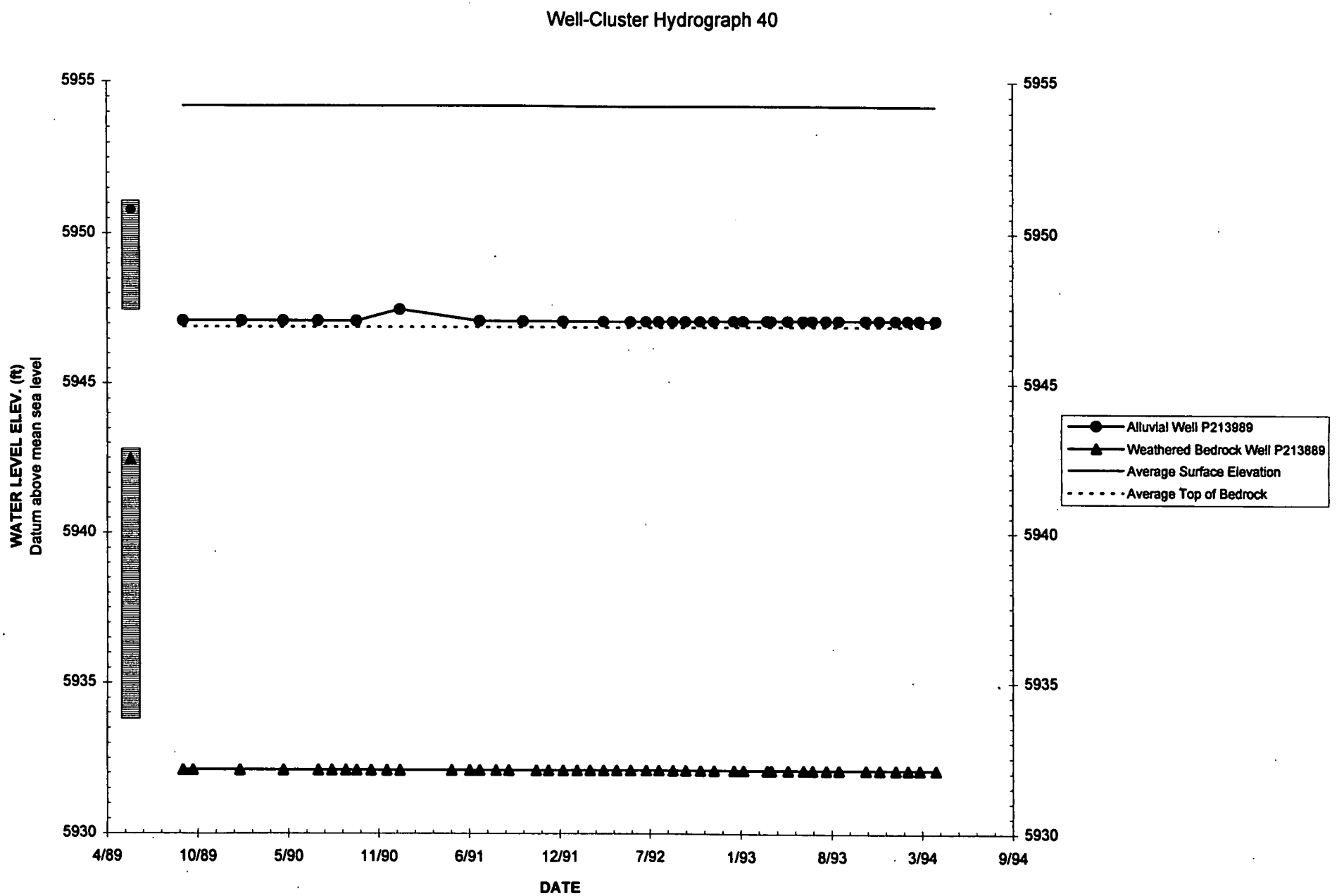
\SITEWD[illegible] GRAPH 38 1/10/95

Well-Cluster Hydrograph 39



\SITEWDPR.XLS GRAPH 39 1/10/95

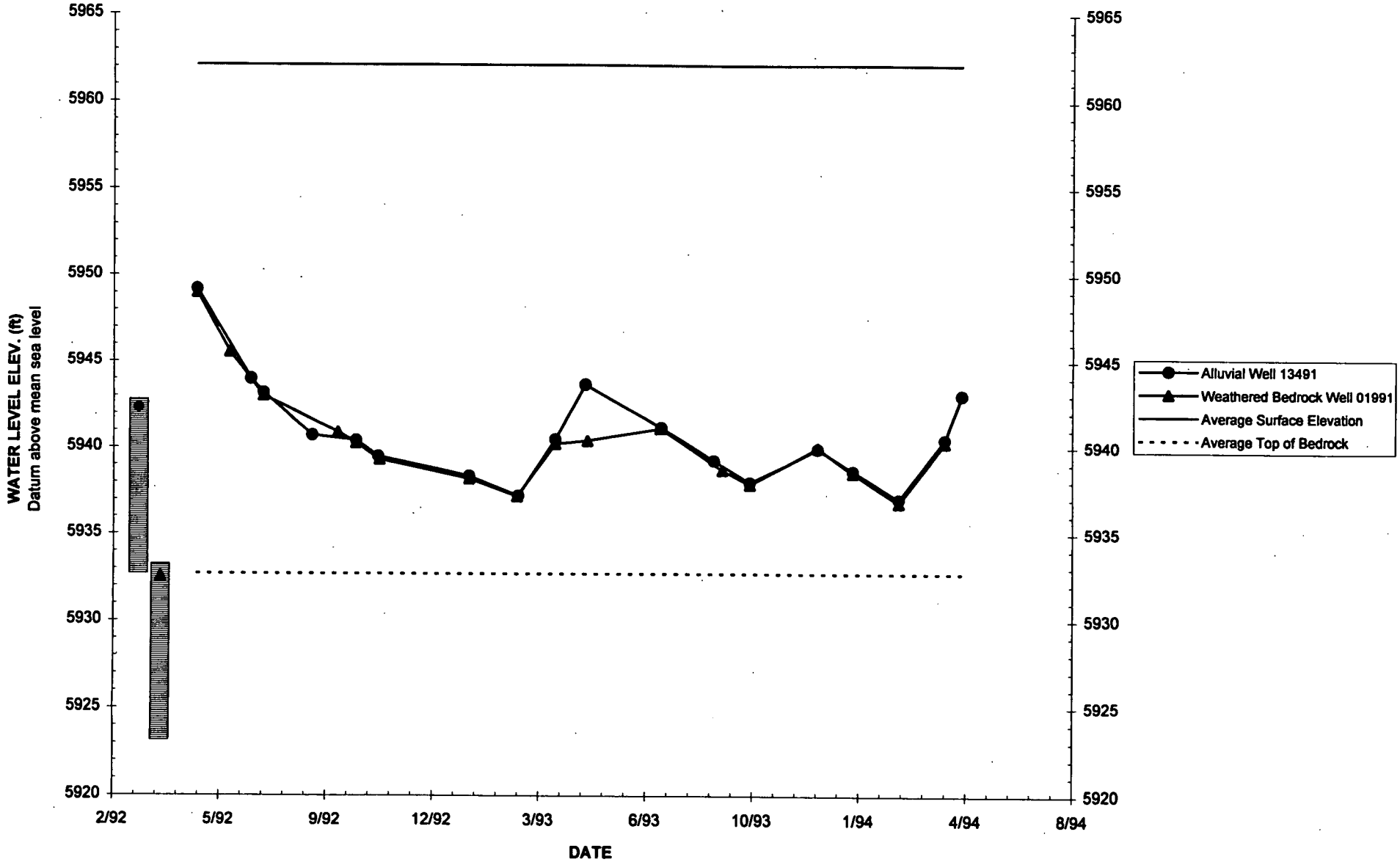
699



\SITEWDPE XLS GRAPH 40 1/9/95

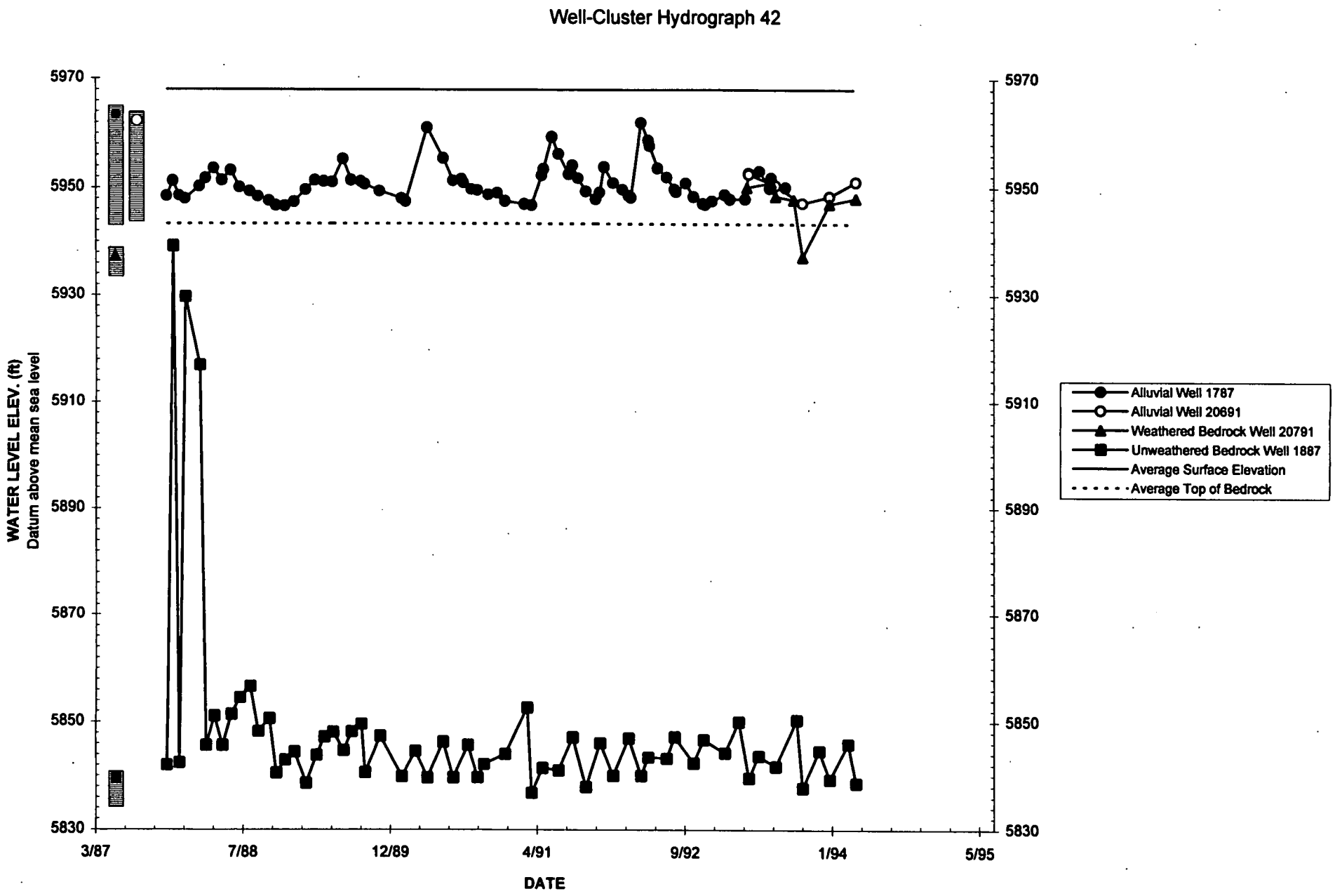
700

Well-Cluster Hydrograph 41



\SITEWDPR.XLS GRAPH 41 1/9/95

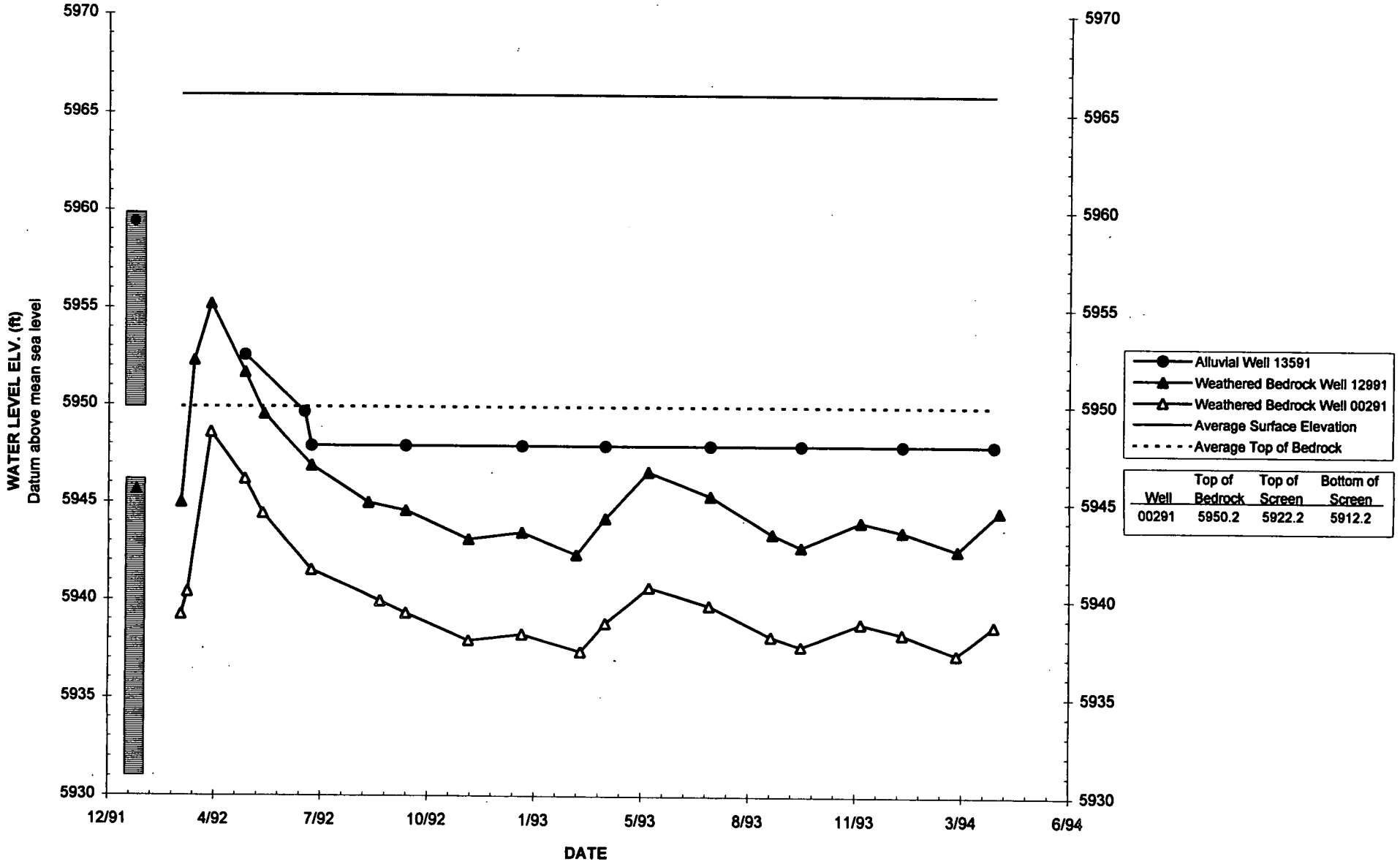
70



\SITEWDPR.XLS GRAPH 42 1/10/95

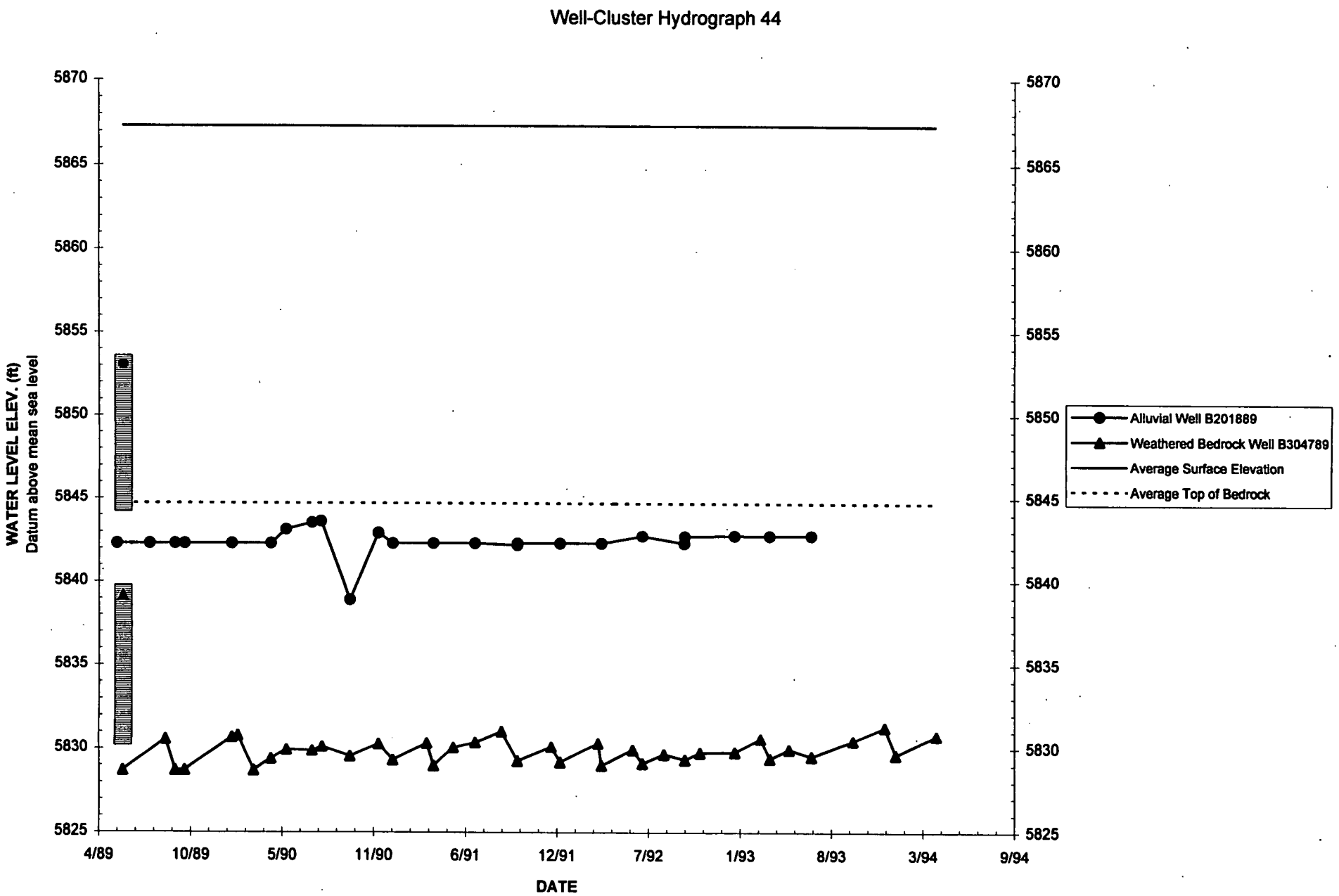
702

Well-Cluster Hydrograph 43



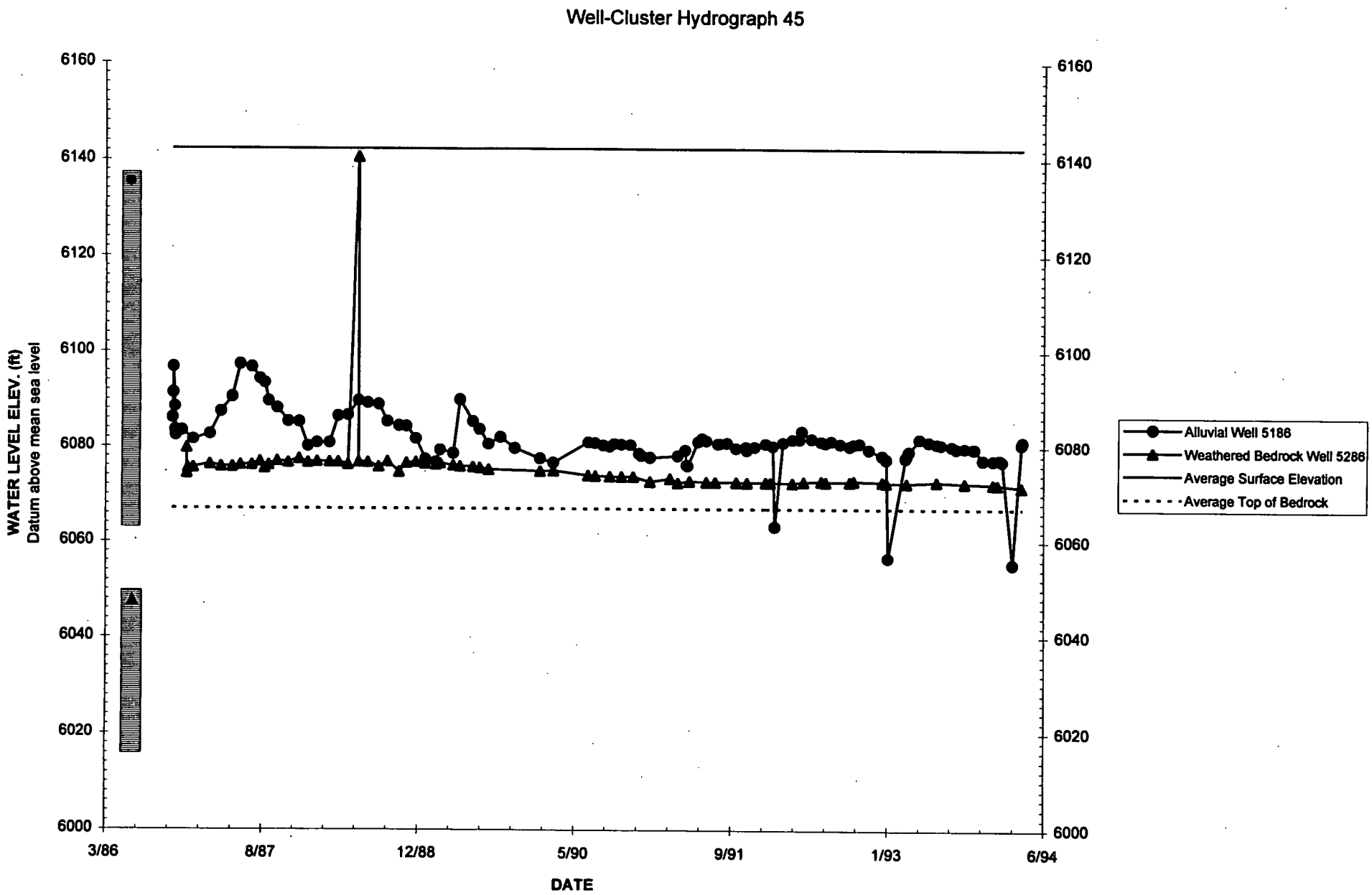
Well	Top of Bedrock	Top of Screen	Bottom of Screen
00291	5950.2	5922.2	5912.2

\SITEWDPR.XLS GRAPH 43 1/5/95



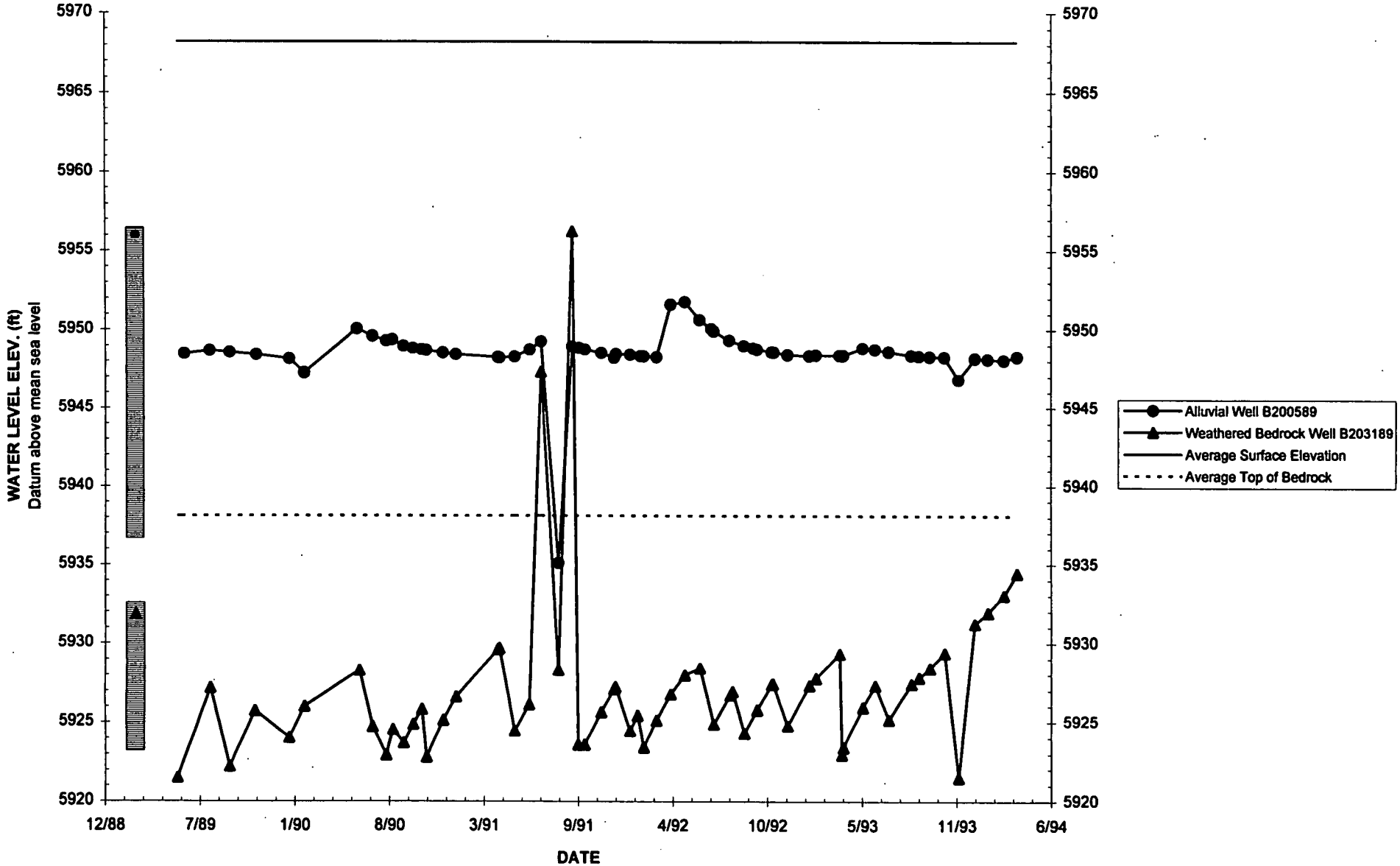
\SITEWDPR.XLS GRAPH 44 1/5/95

704



\SITEWDPR.XLS GRAPH 45 1/9/95

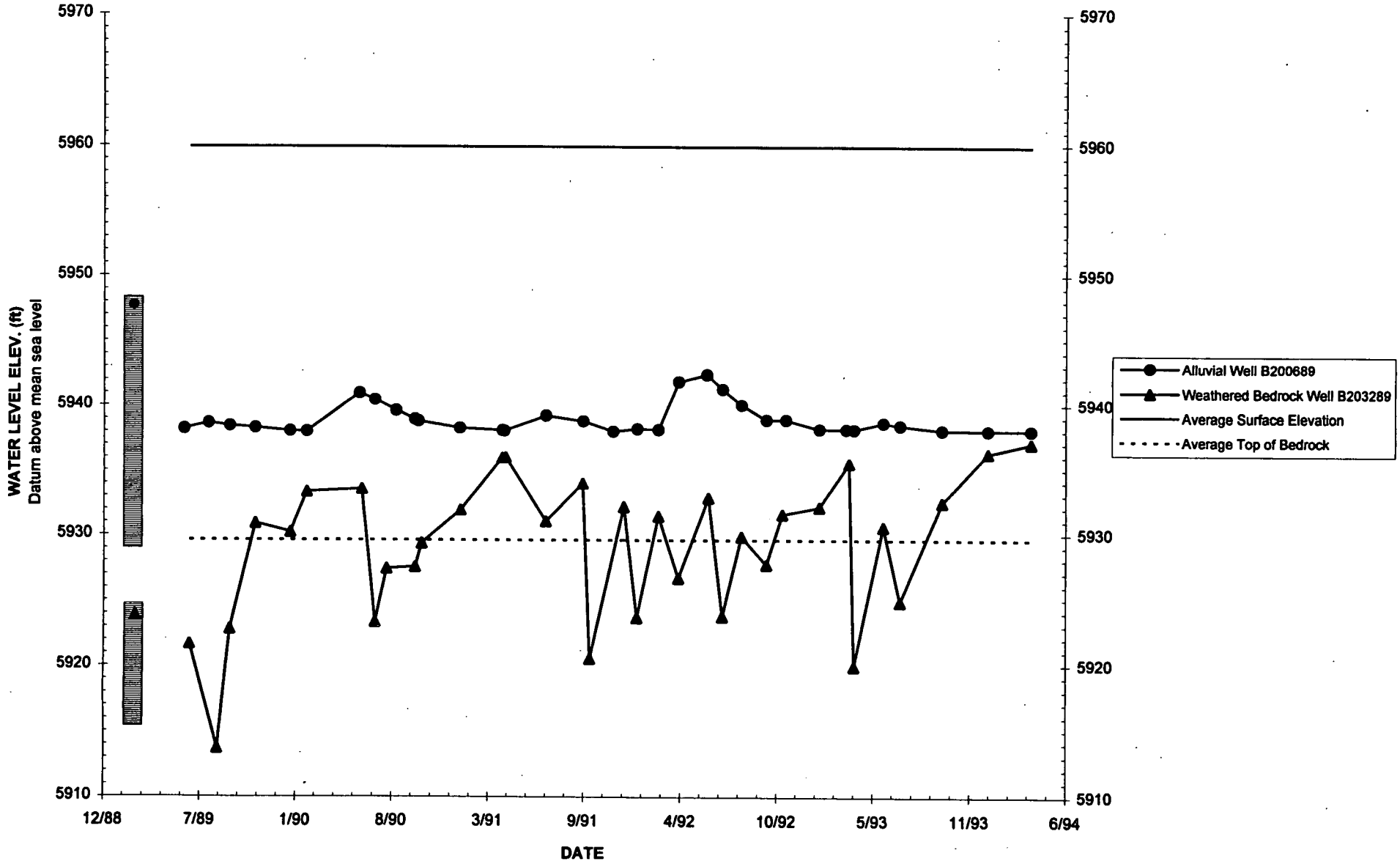
Well-Cluster Hydrograph 46



\SITEWDP2.XLS GRAPH 46 1/5/95

706

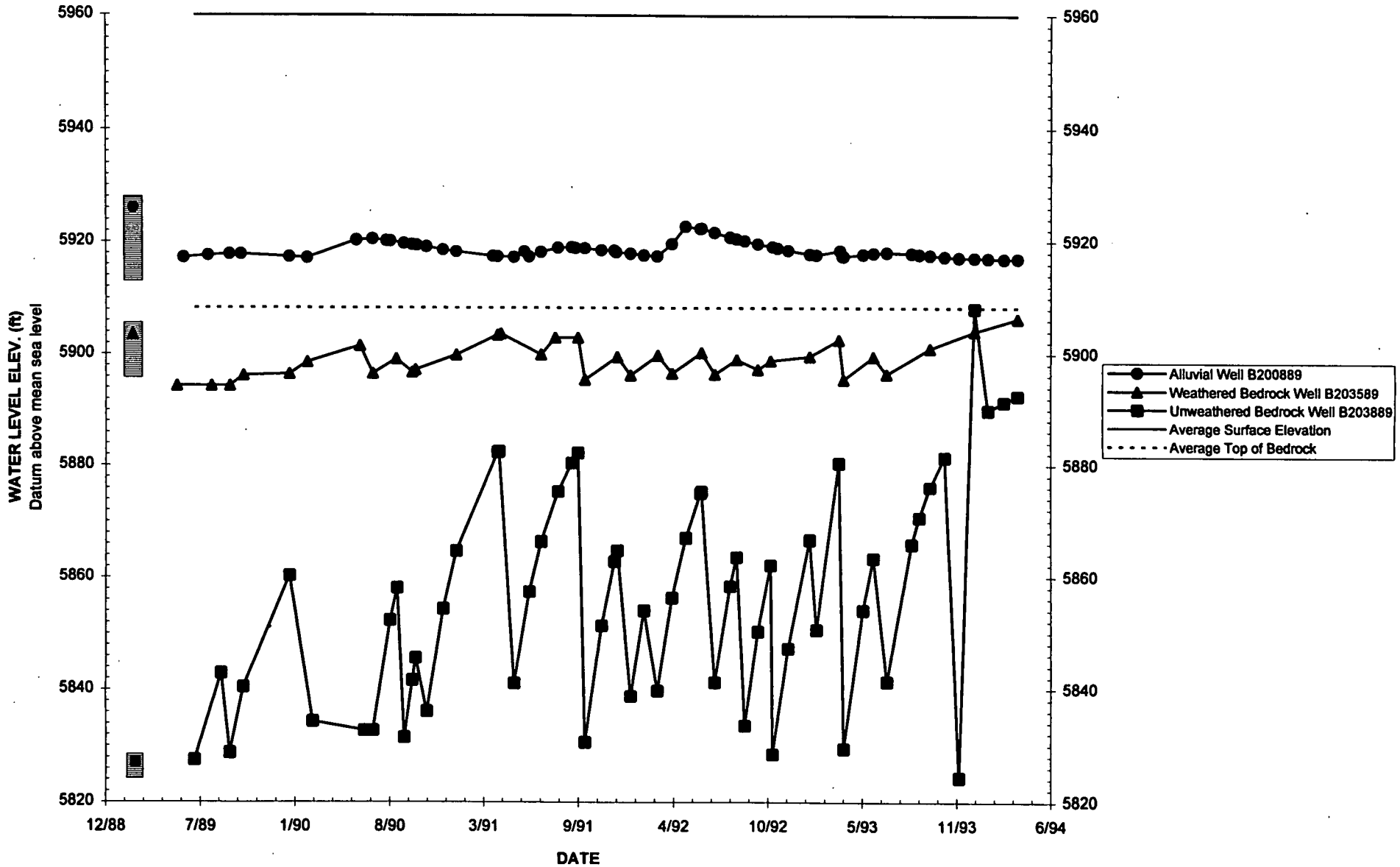
Well-Cluster Hydrograph 47



\SITEWDPR.XLS GRAPH 47 1/10/95

707

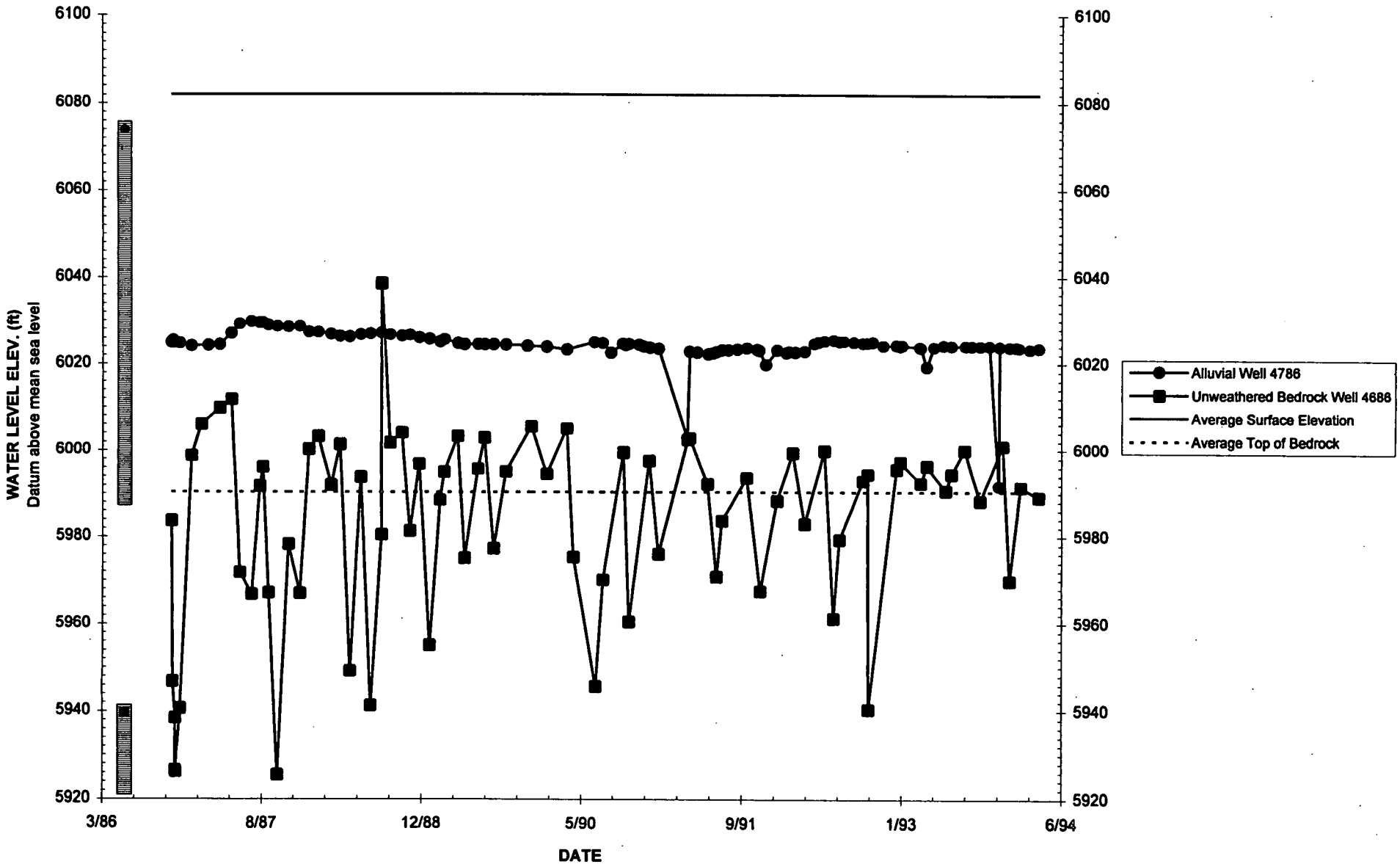
Well-Cluster Hydrograph 48



\SITEWDPR XLS GRAPH 48 1/5/95

708

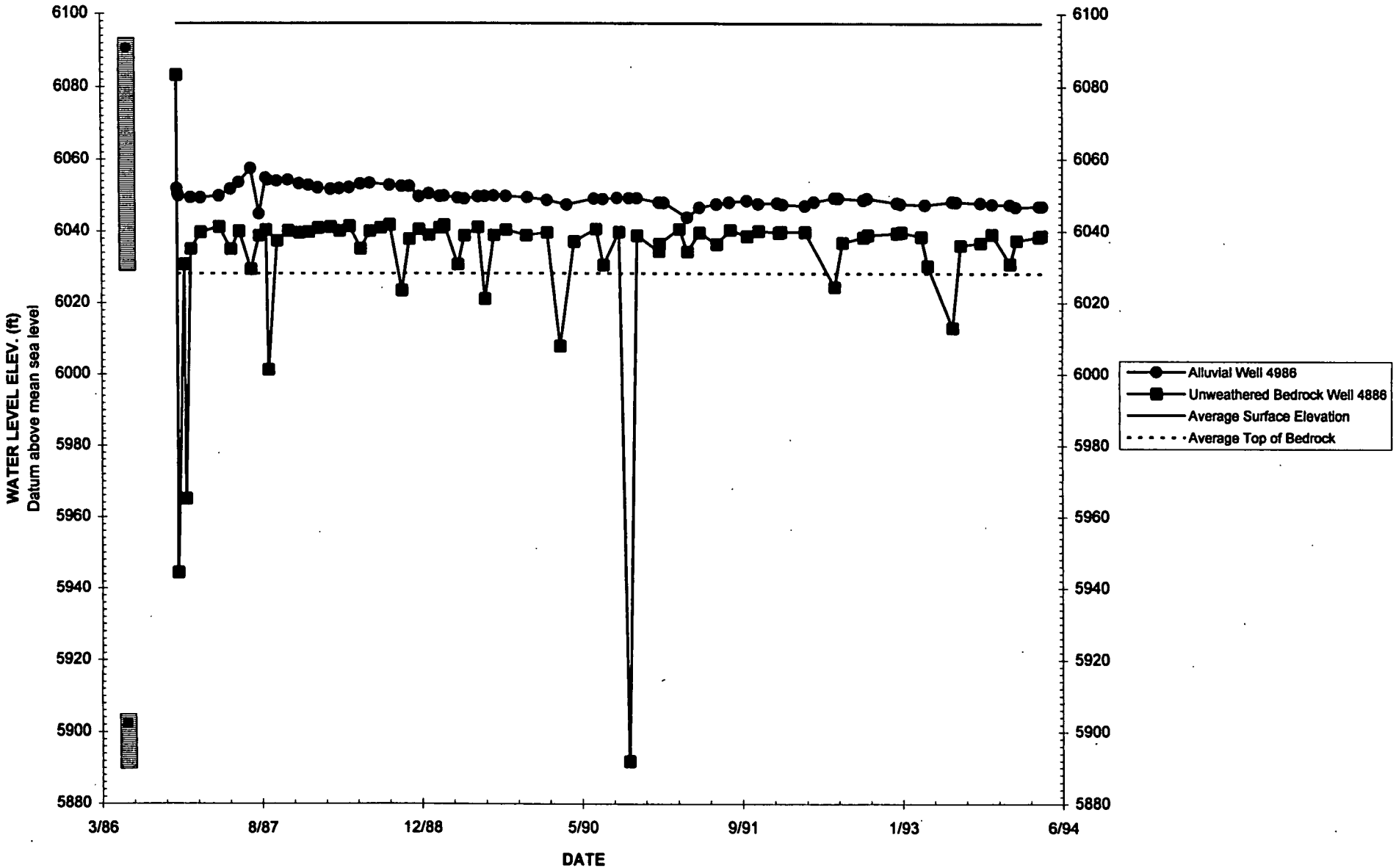
Well-Cluster Hydrograph 49



\SITEWDPR.XLS GRAPH 49 1/9/95

109

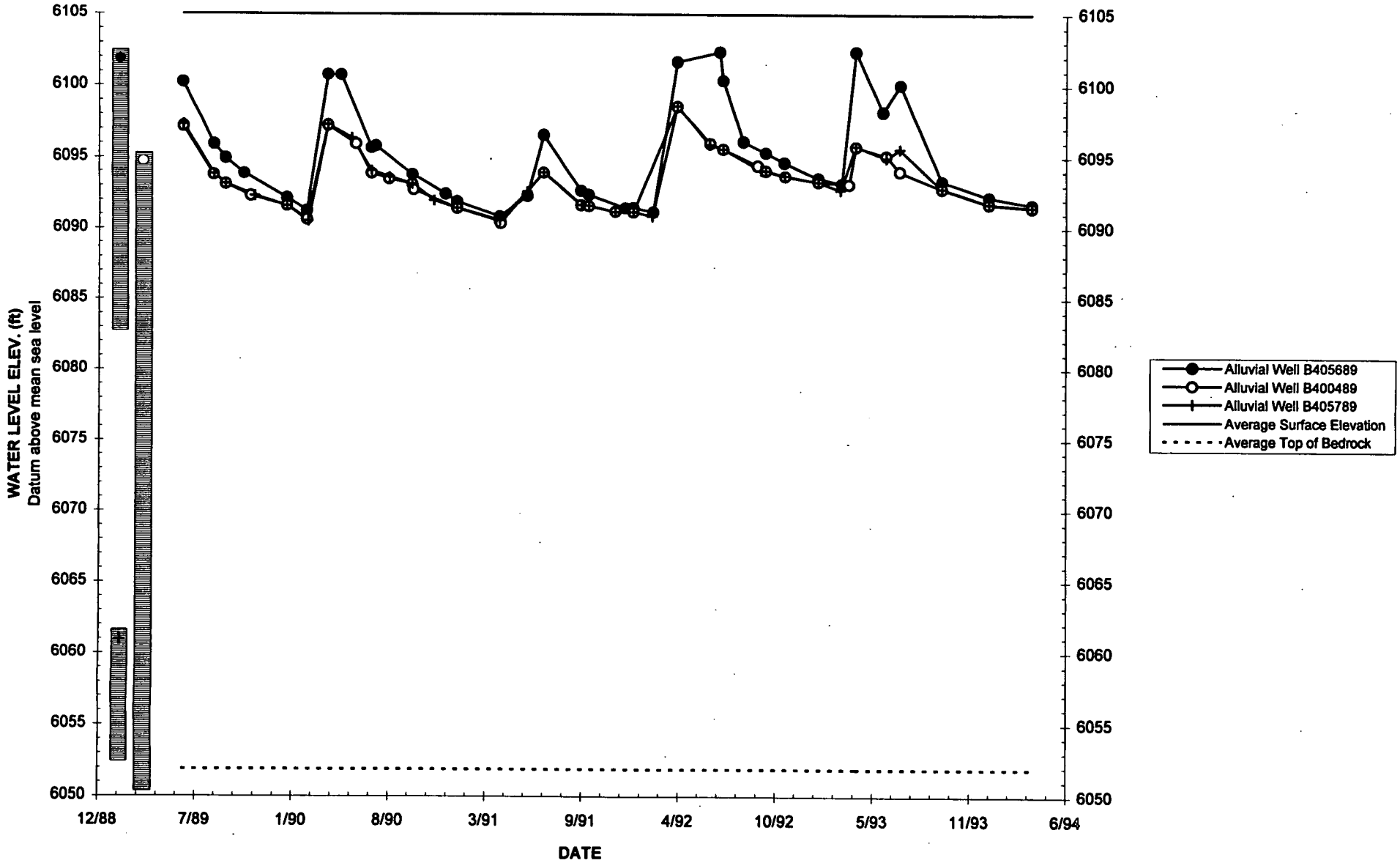
Well-Cluster Hydrograph 50



\SITEWDPR.XLS GRAPH 50 1/9/95

710

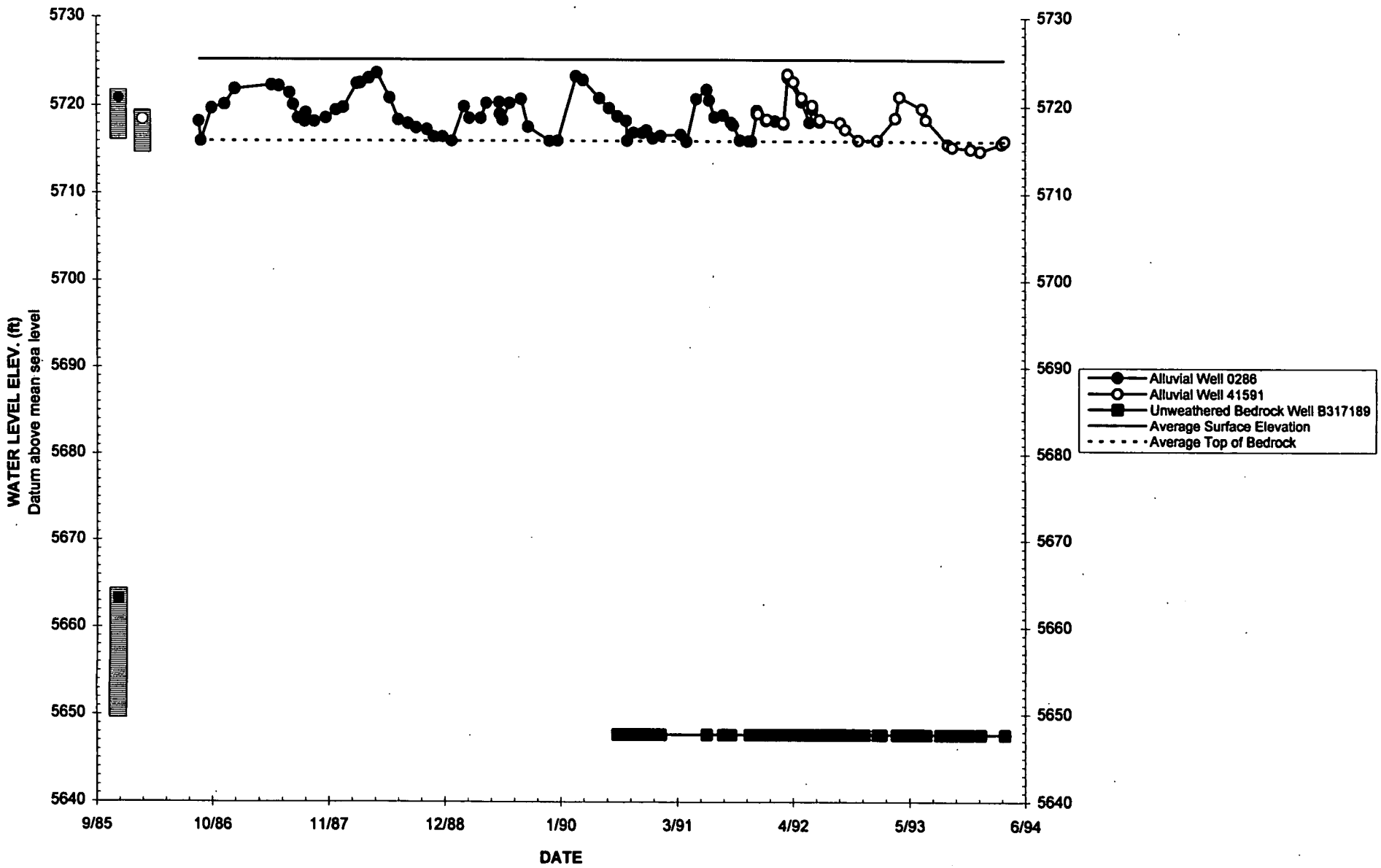
Well-Cluster Hydrograph 51



\SITEWDPR.XLS GRAPH 51 1/9/95

711

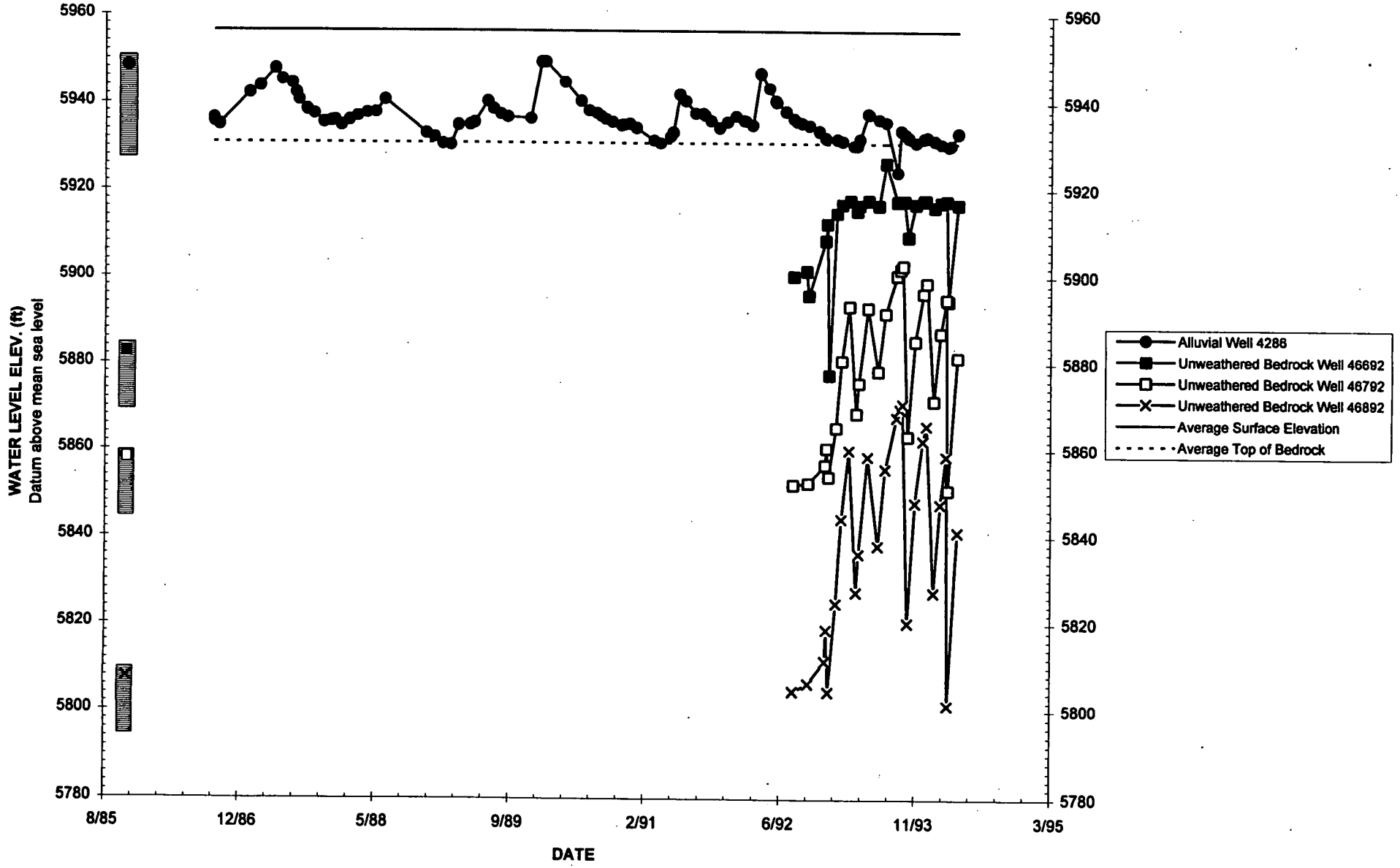
Well-Cluster Hydrograph 52



\SITEWDPR.XLS GRAPH 52 1/9/95

712

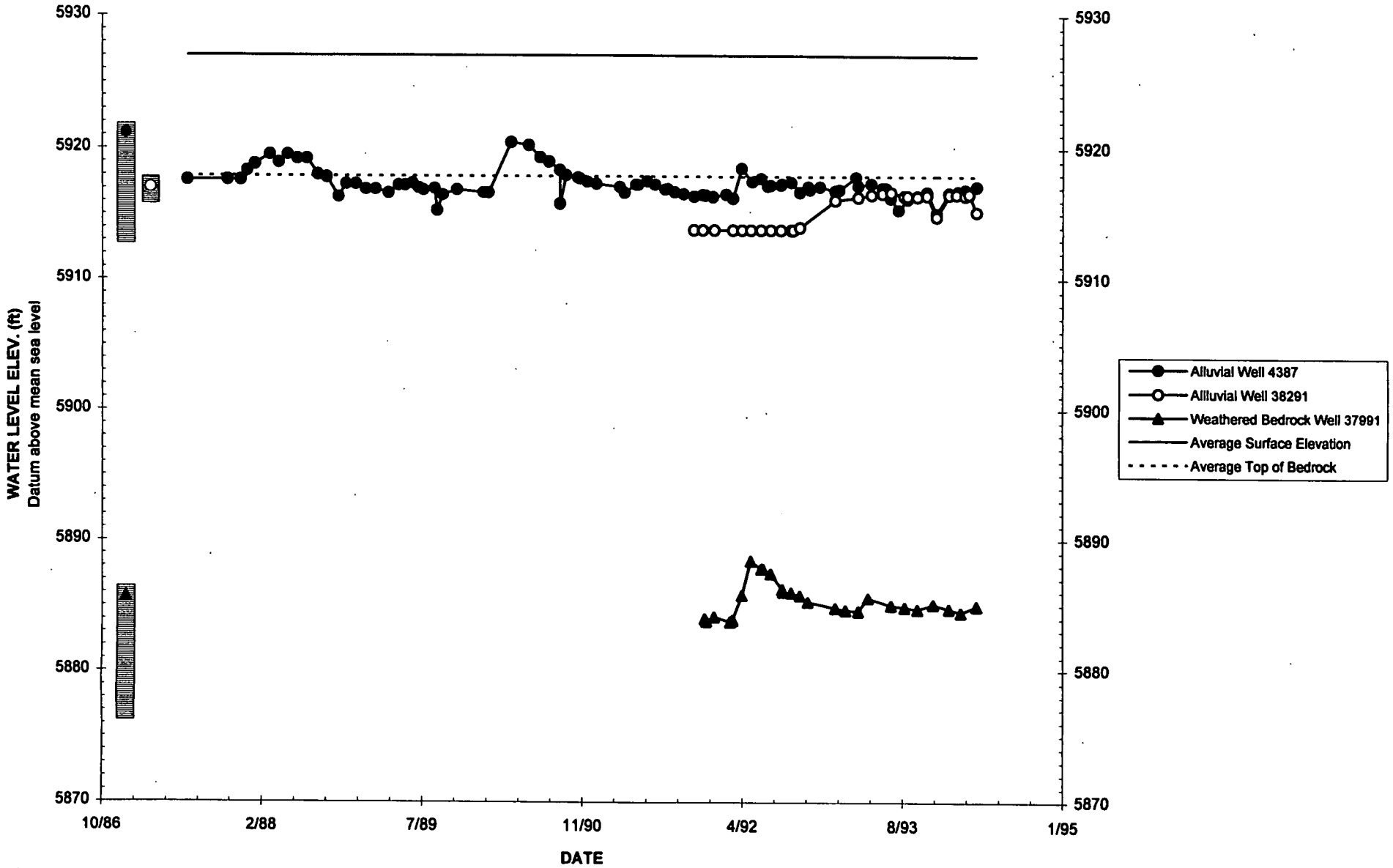
Well-Cluster Hydrograph 53



\SITEWDPR.XLS GRAPH 53 1/9/95

7B

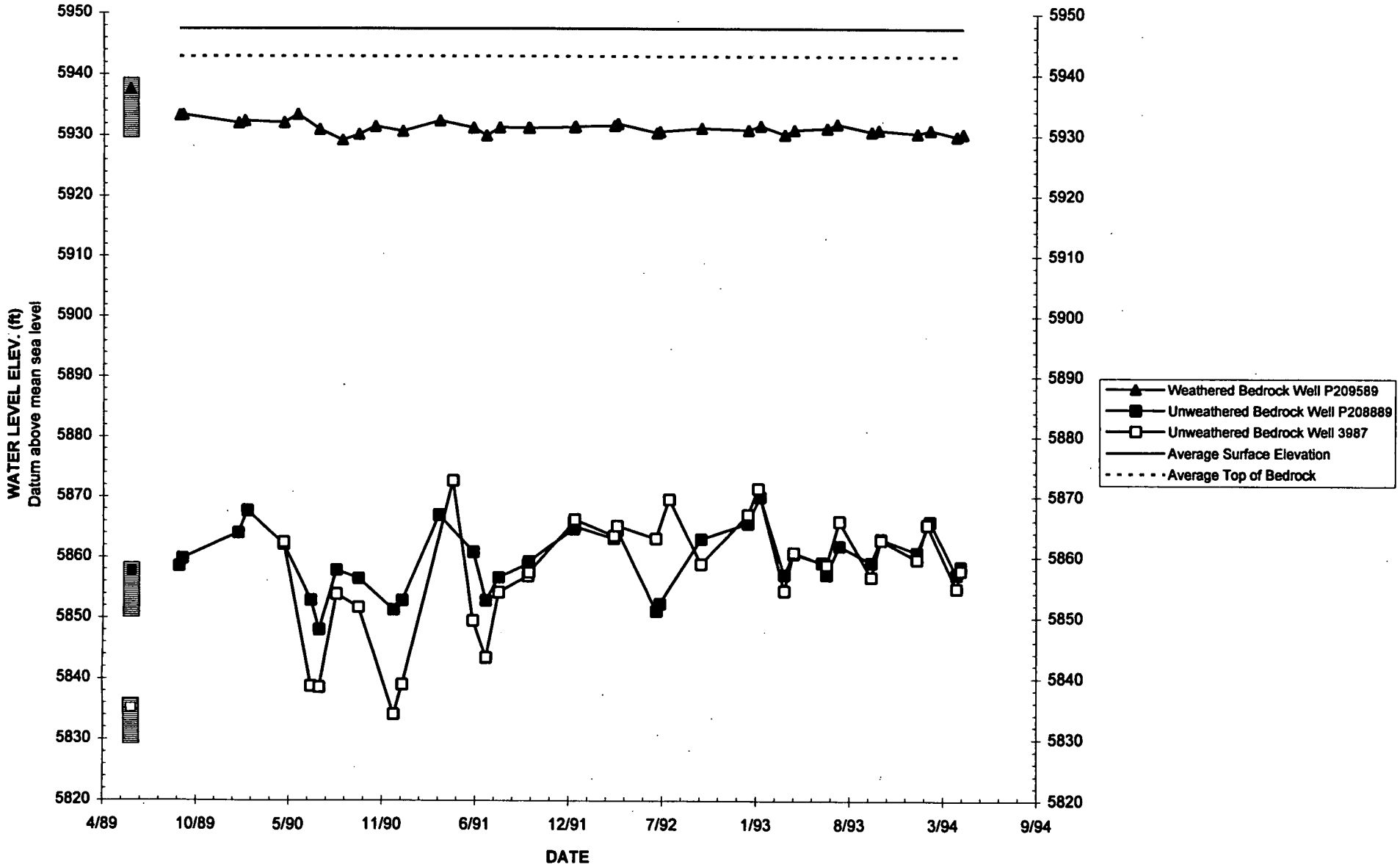
Well-Cluster Hydrograph 54



714

\SITEWDPB.XLS GRAPH 54 1/5/95

Well-Cluster Hydrograph 55



\SITEWDPR.XLS GRAPH 55 1/9/95

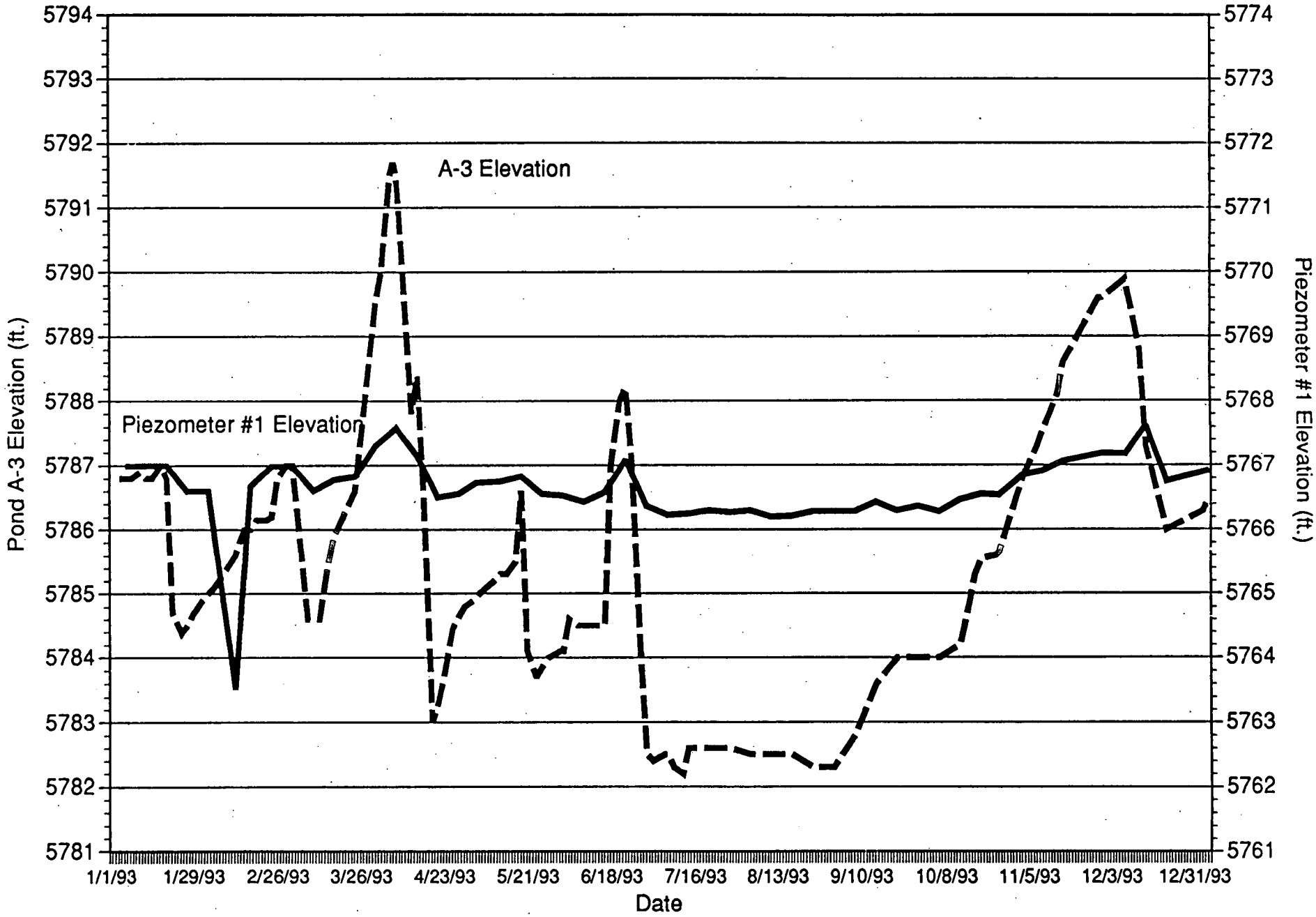
715

Dam Piezometer Hydrographs

The dam piezometer and pond elevation hydrographs were obtained from the 1993 Surface Water Division Field Report Series (EG&G, 1993i). Well construction information for the piezometers is provided in Table B-1. (Note: well construction information for Piezometers #1 and #2 was not available at time of publication.)

7/16

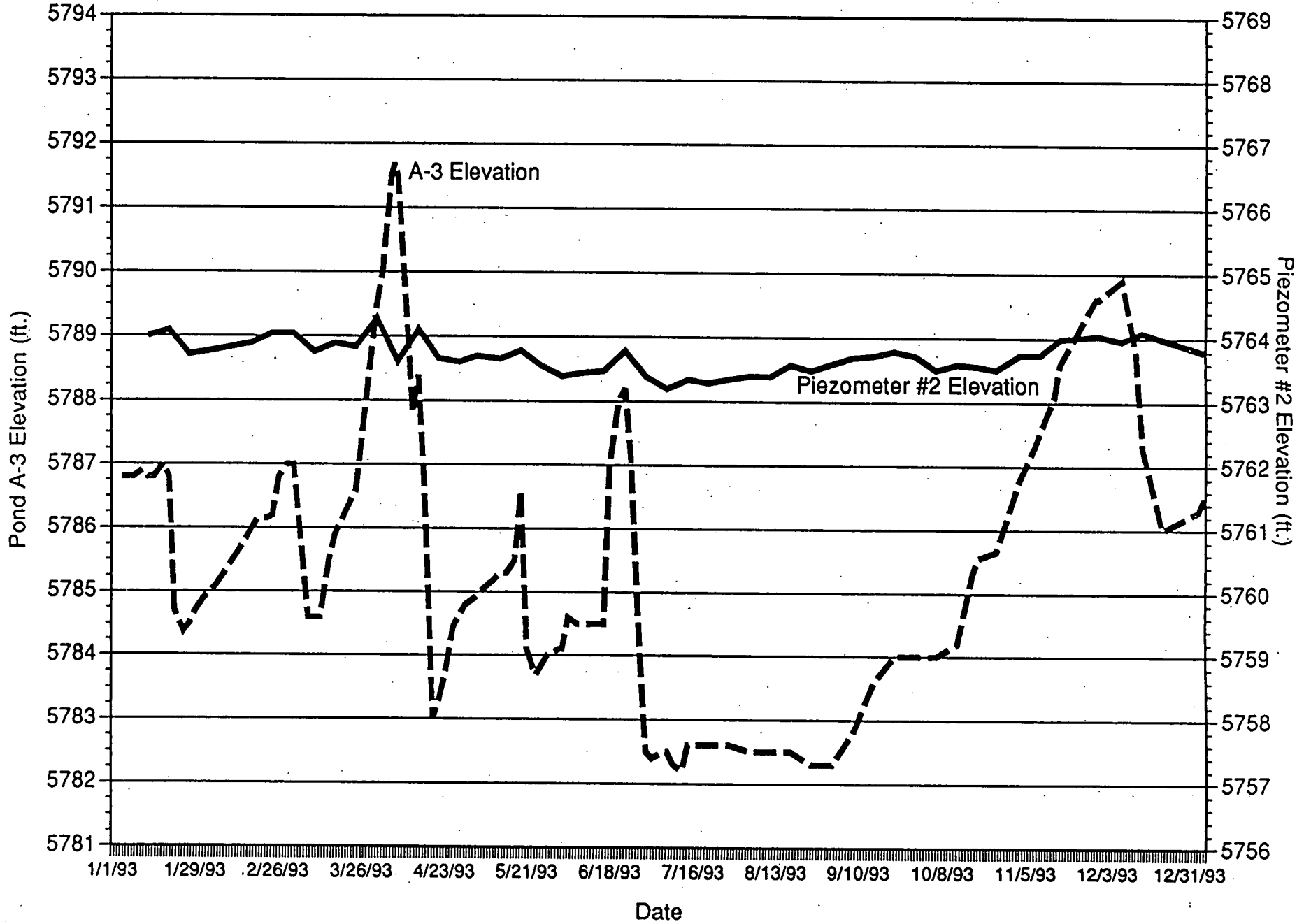
Pond A-3 Elevation vs. Piezometer #1 - 1993



SWD

718

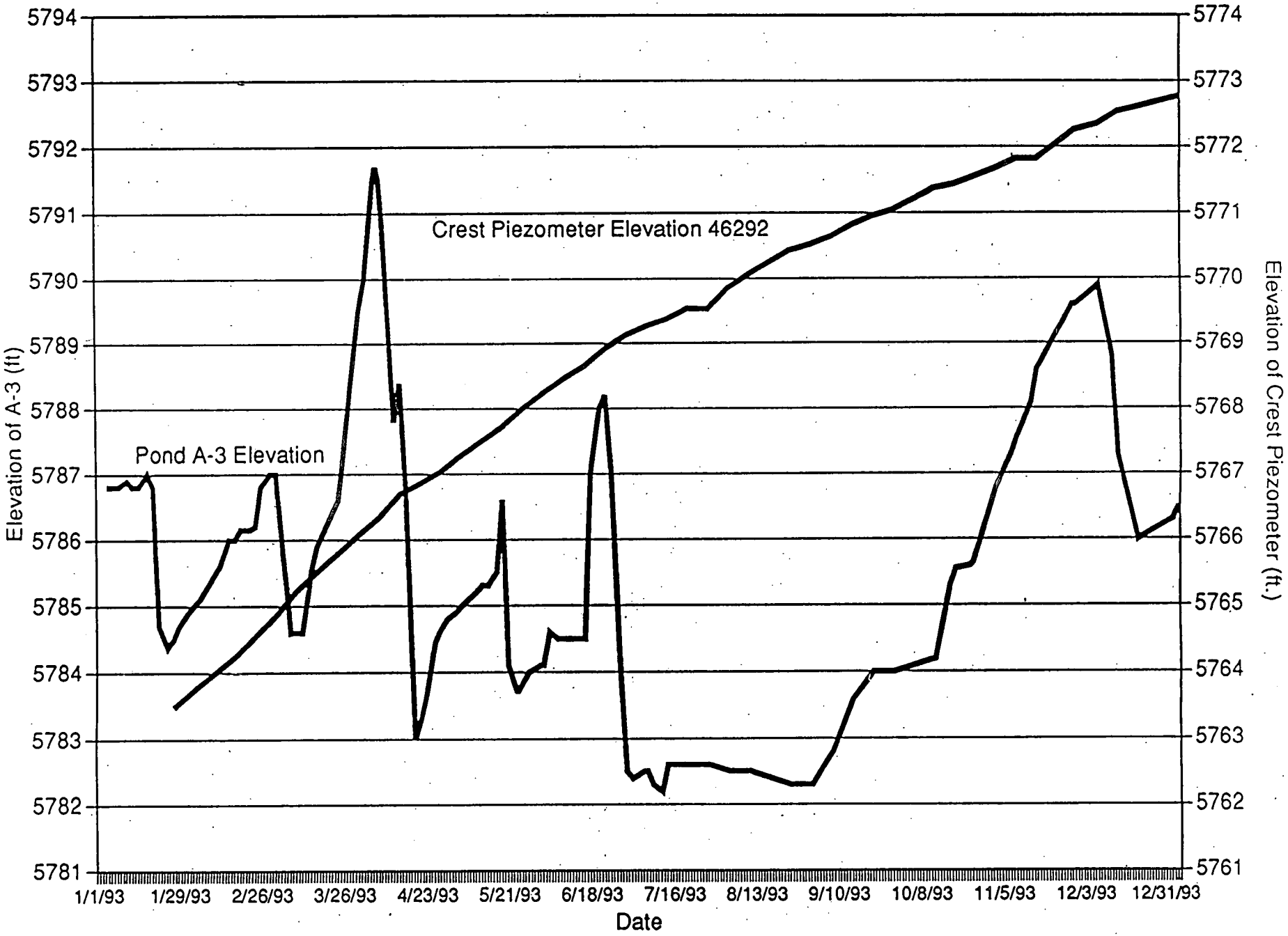
Pond A-3 Elevation vs. Piezometer #2 - 1993



719

SWD

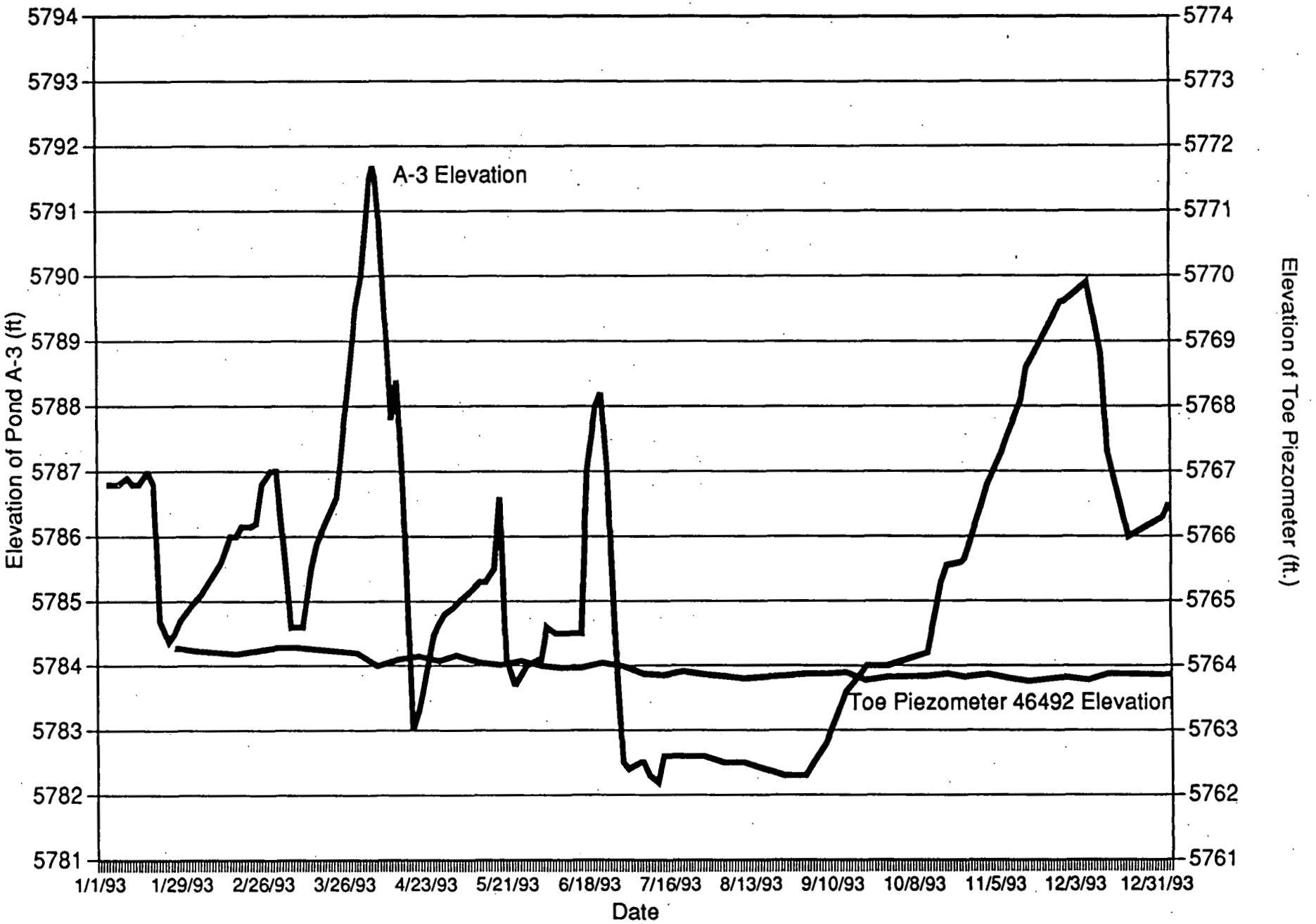
Pond A-3 vs. Crest Piezometer 46292 Elevation - 1993



SWD

720

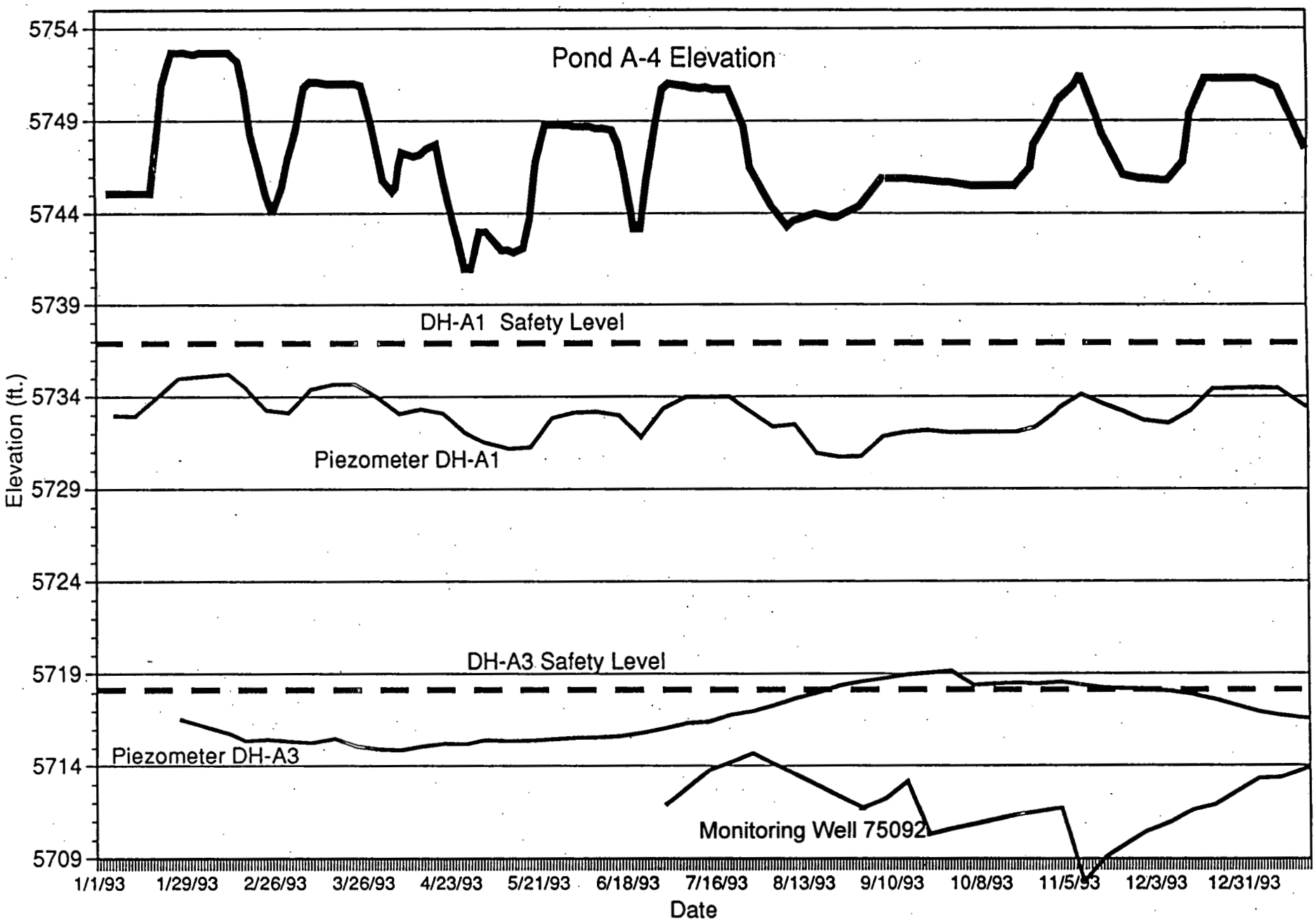
Pond A-3 vs. Toe Piezometer 46492 Elevation - 1993



SWD

721

1993 Elevation of Pond A-4 and Piezometers

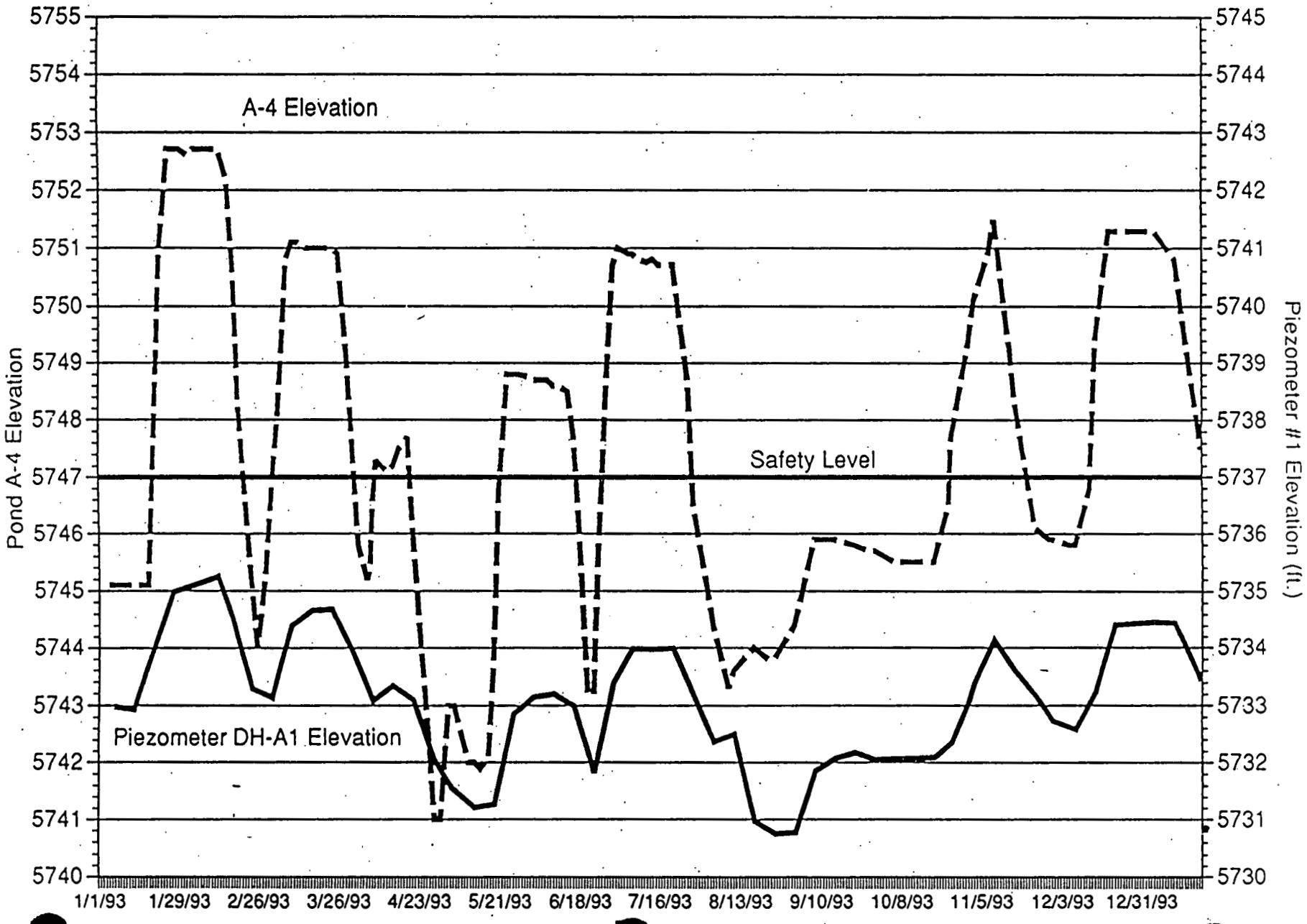


Piezometer DH-A1 is on the crest of the dam, and Piezometer DH-A3 is on the toe of the dam. Both are centrally located. The Groundwater station is on the toe of the dam, approximately 100 yards north of the dam's center.

SWD

722

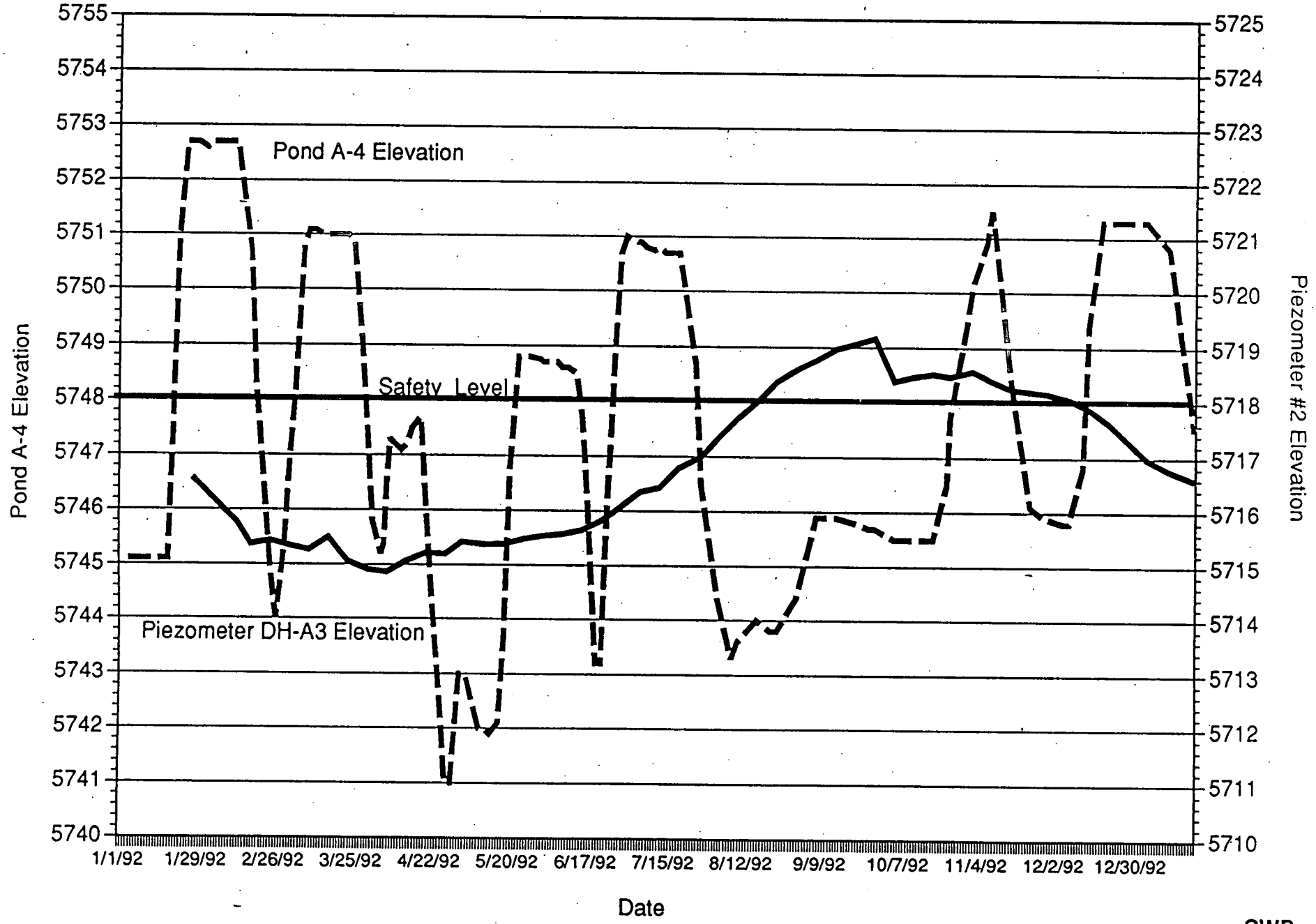
Pond A-4 vs. Piezometer DH-A1 Elevation - 1993



723

SWD

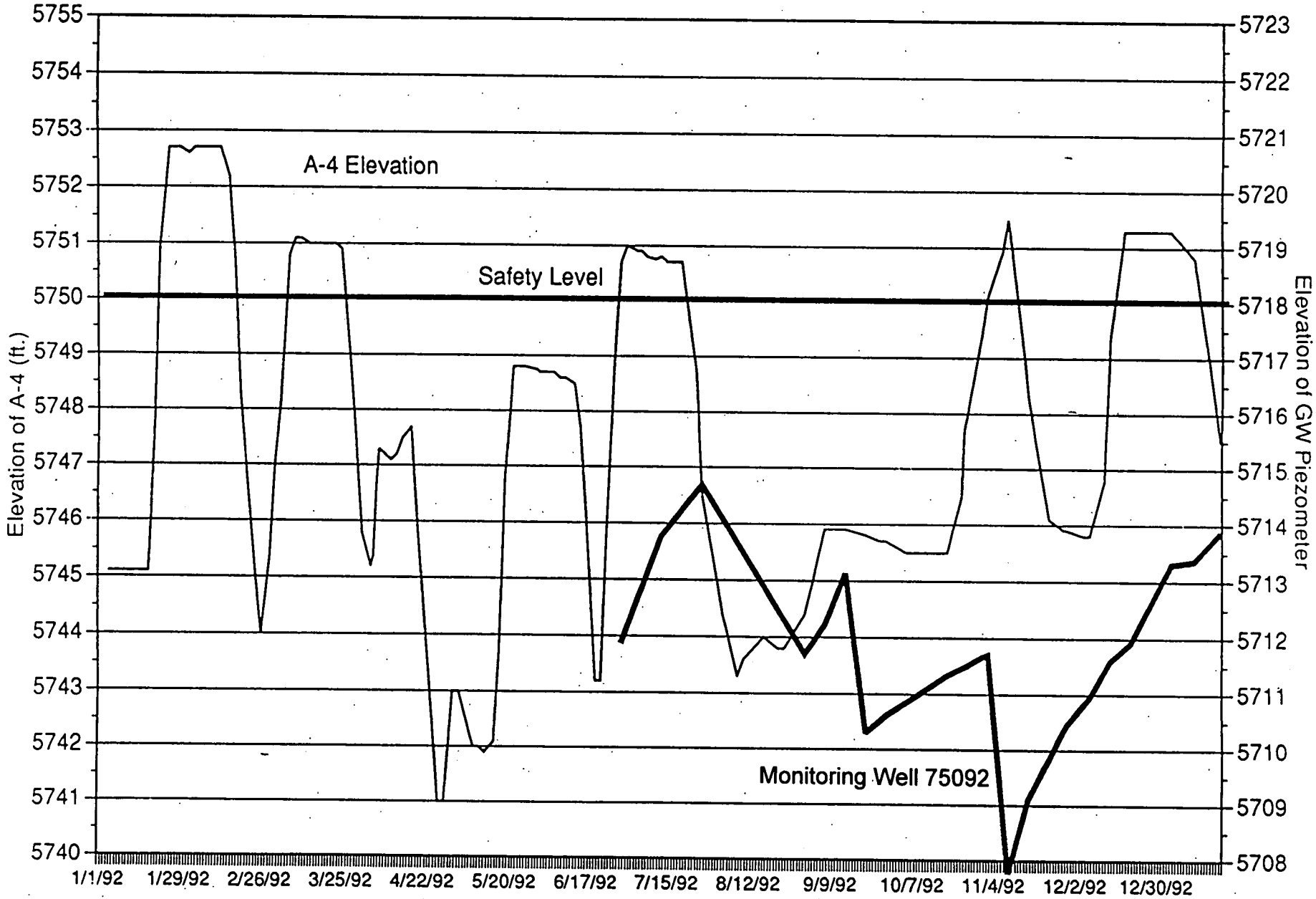
Pond A-4 vs.Piezometer DH-A3 Elevation - 1993



724

SWD

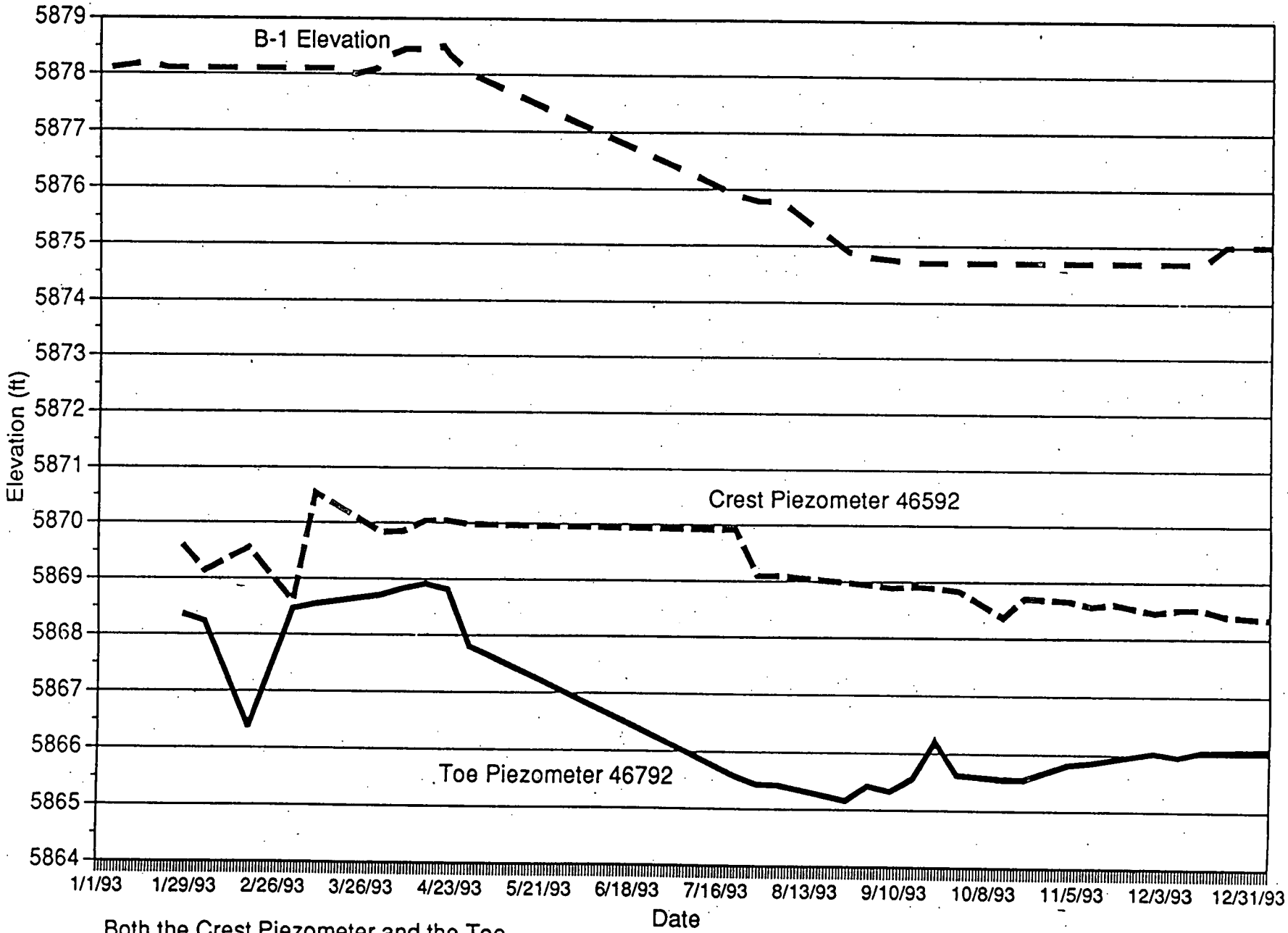
Pond A-4 vs. Groundwater Station Elevation - 1993



725

SWD

Pond B-1 and Piezometer Elevations - 1993

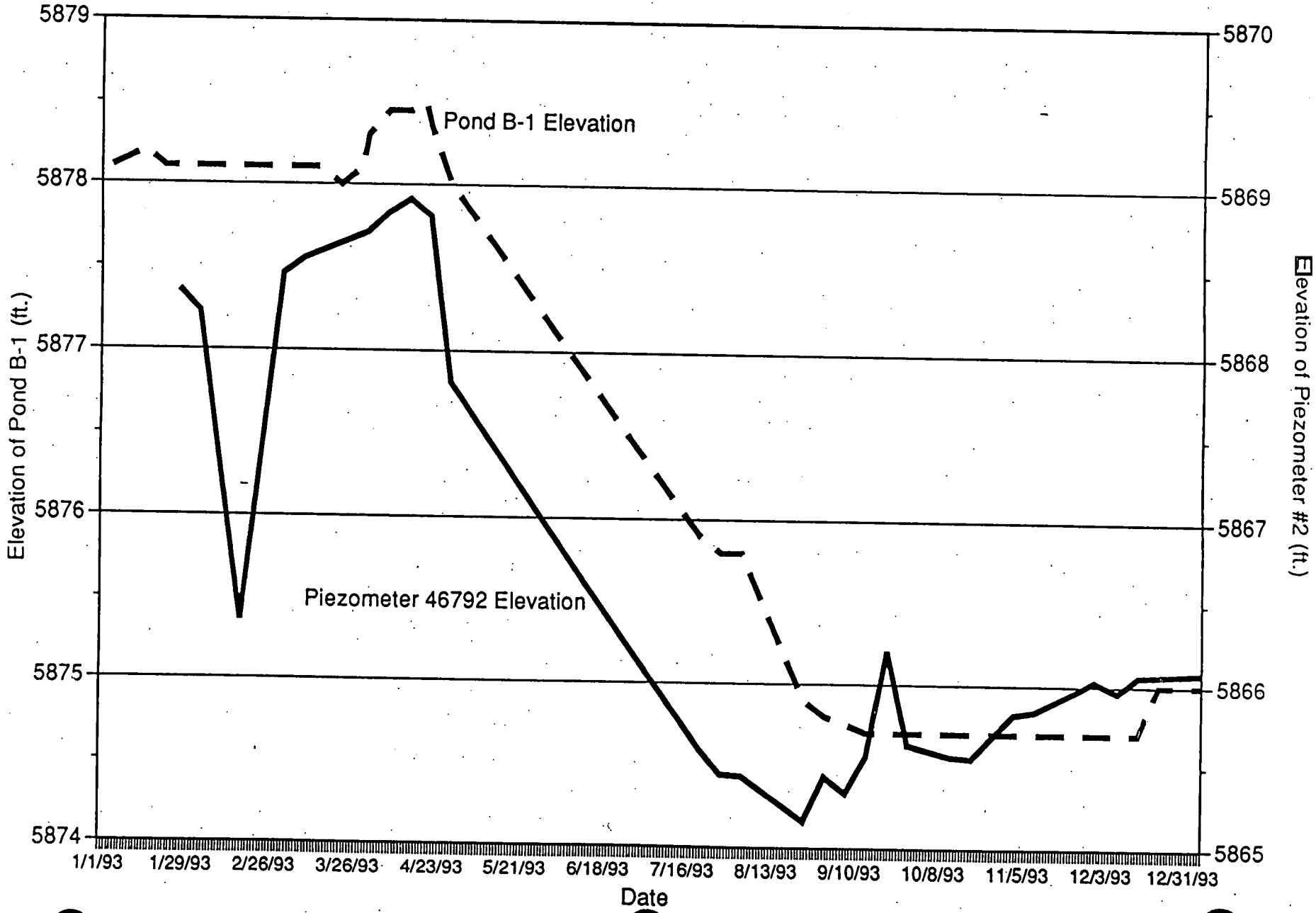


Both the Crest Piezometer and the Toe Piezometer are centrally located on the dam.

726

SWD

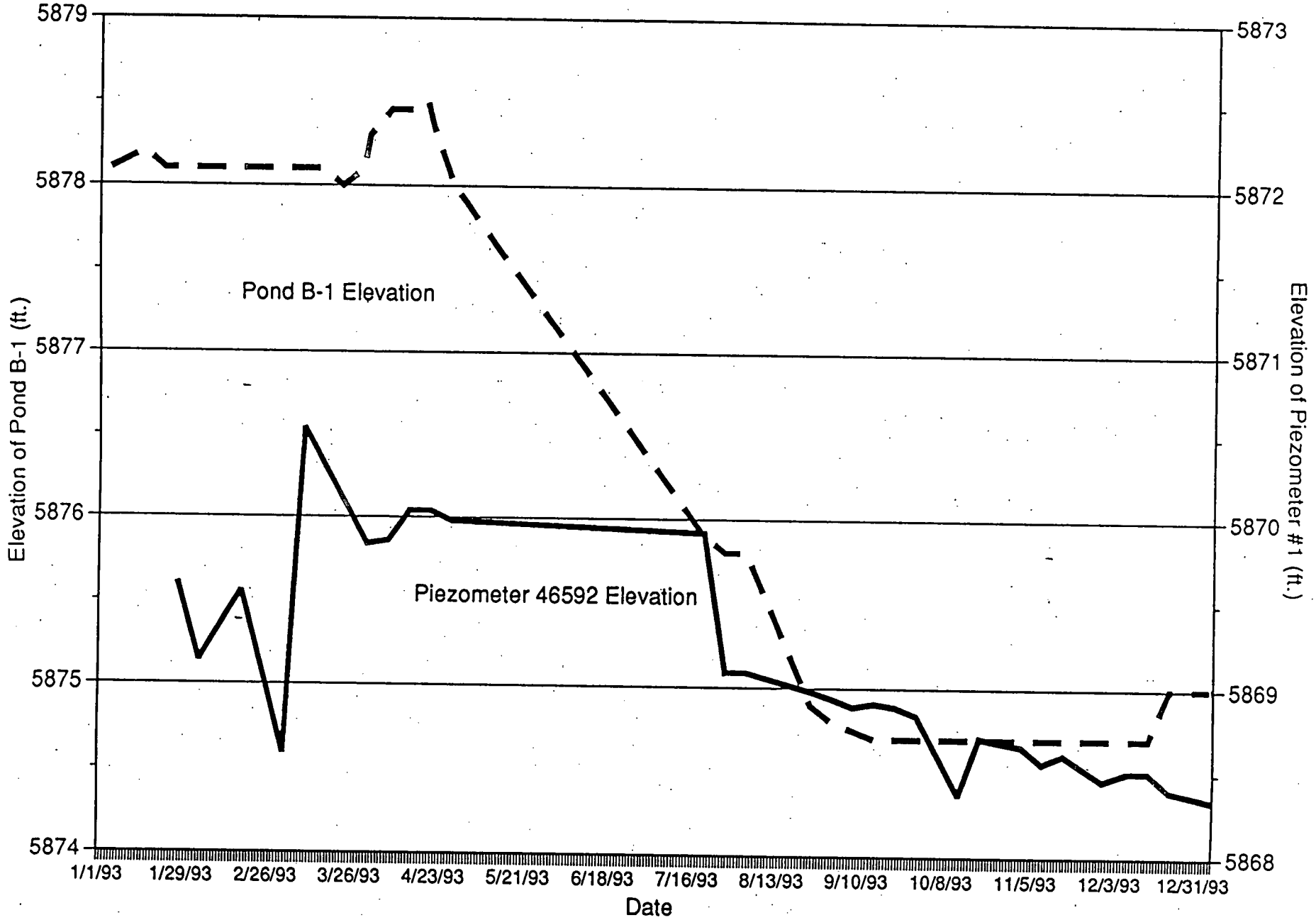
Pond B-1 Elevation vs. Toe Piezometer 46792 - 1993



727

SWD

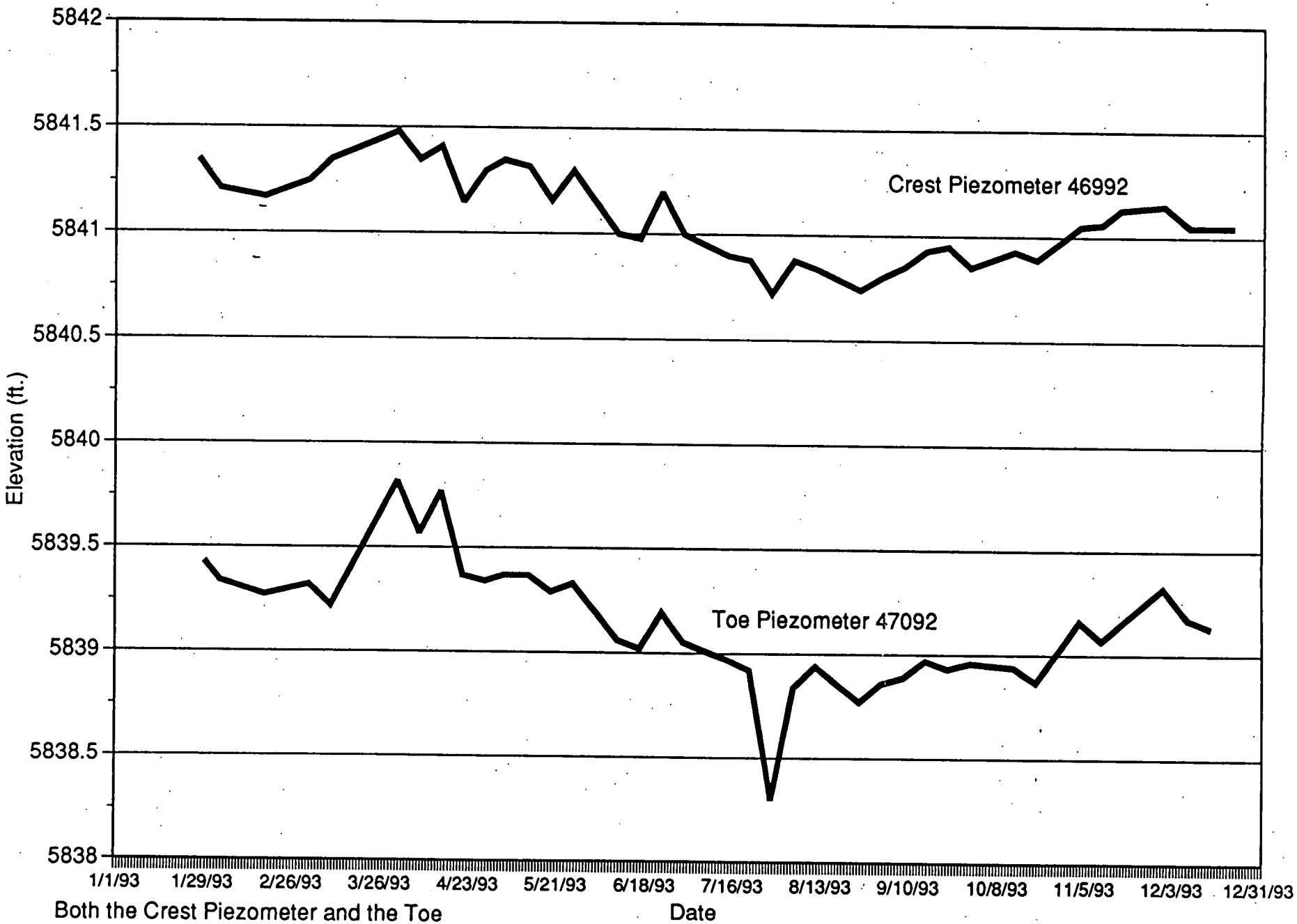
Pond B-1 Elevation vs. Crest Piezometer 46592 - 1993



728

SWD

Pond B-3 Piezometer Elevations - 1993

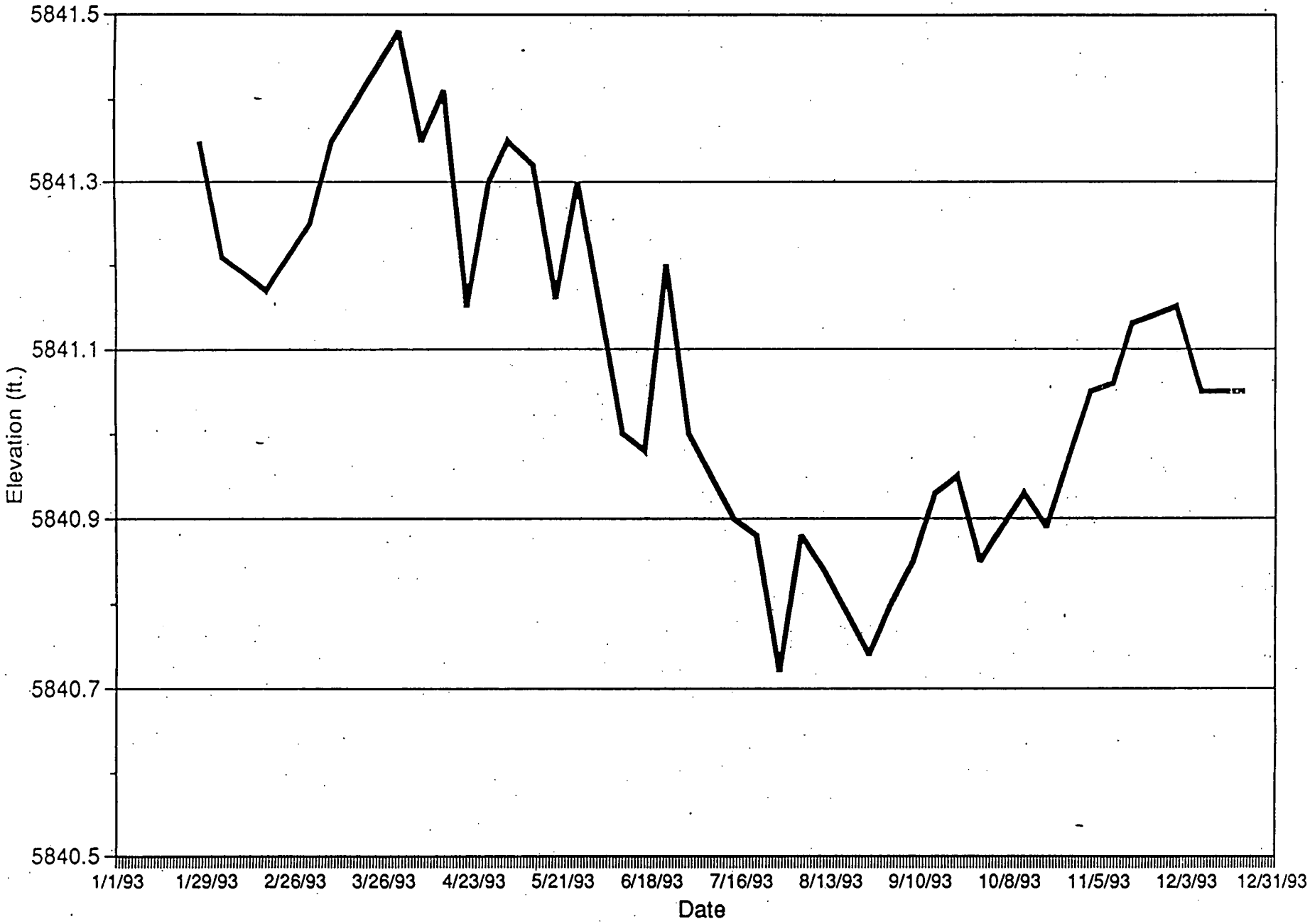


Both the Crest Piezometer and the Toe Piezometer are centrally located on the dam.

SWD

729

Elevation of Crest Piezometer 46992 - 1993



SWD

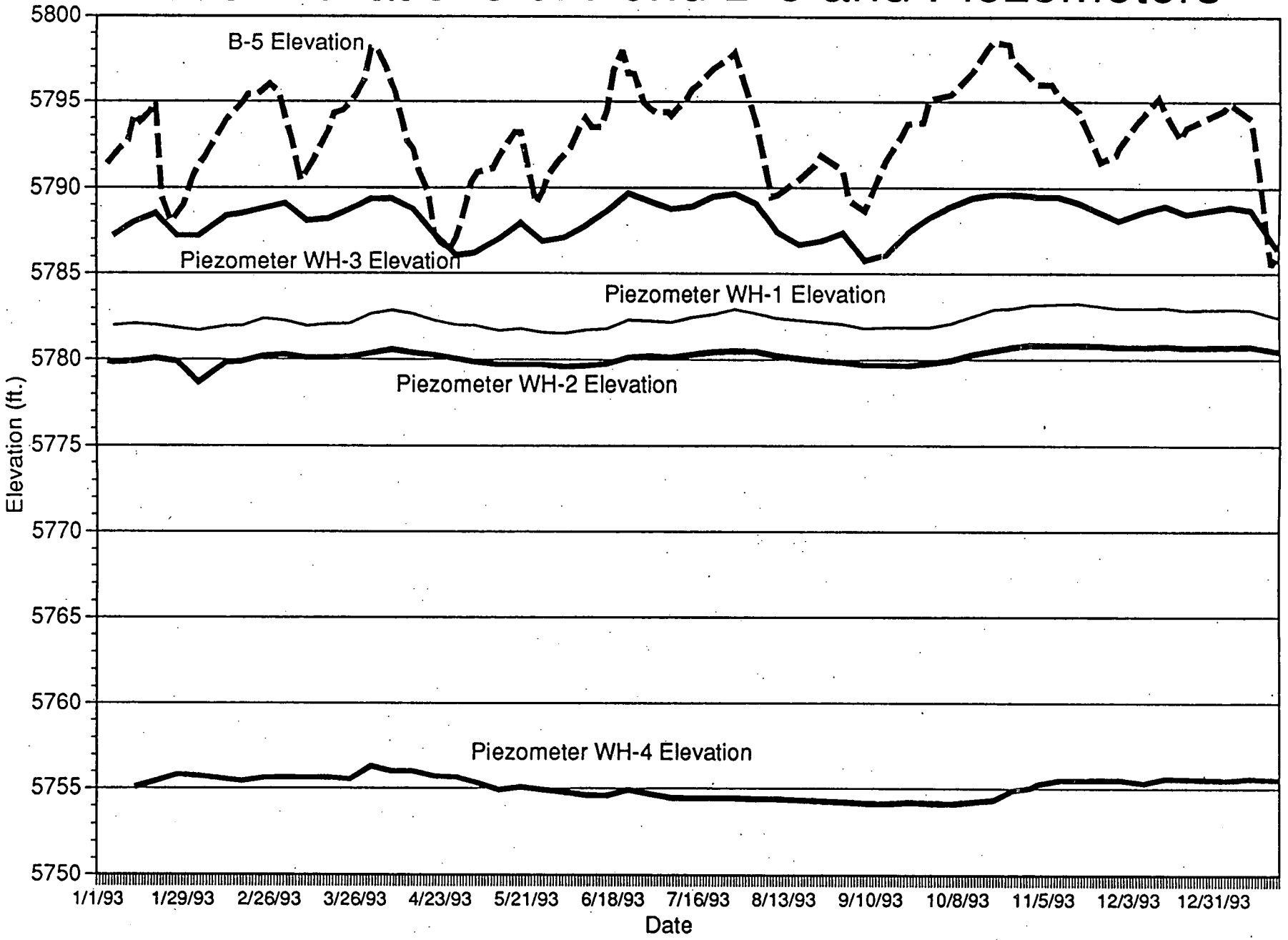
130

Elevation of Toe Piezometer 47092 - 1993

731

SWD

1993 Elevations of Pond B-5 and Piezometers

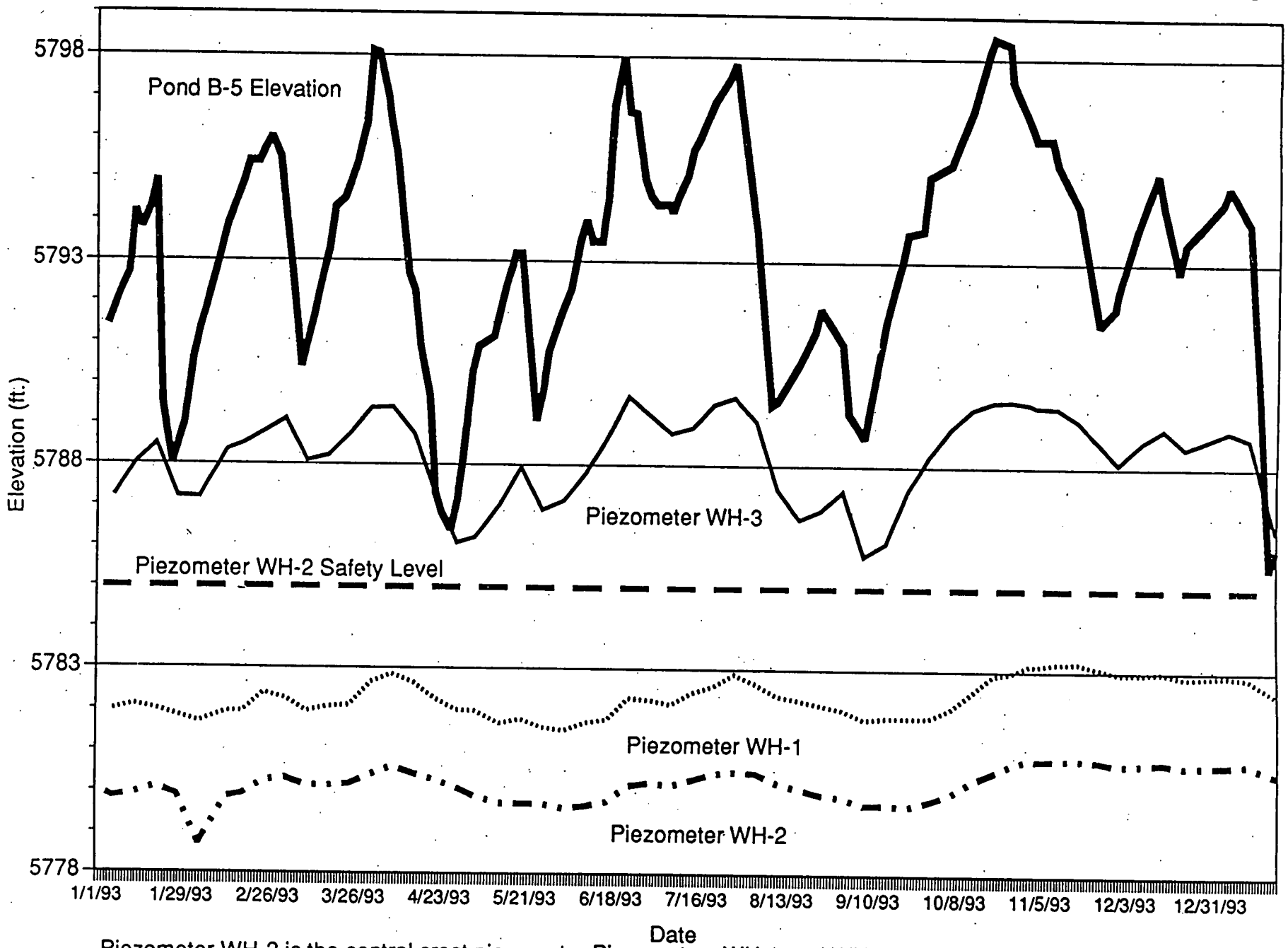


Piezometer WH-2 is the central crest piezometer.Piezometers WH-1 andWH- 3 are located noth and south of Piezometer WH-2, respectively. Piezometer WH-4 is located on the toe, near the center of the dam.

SWD

732

1993 Elevations of Pond B-5 and Crest Piezometers

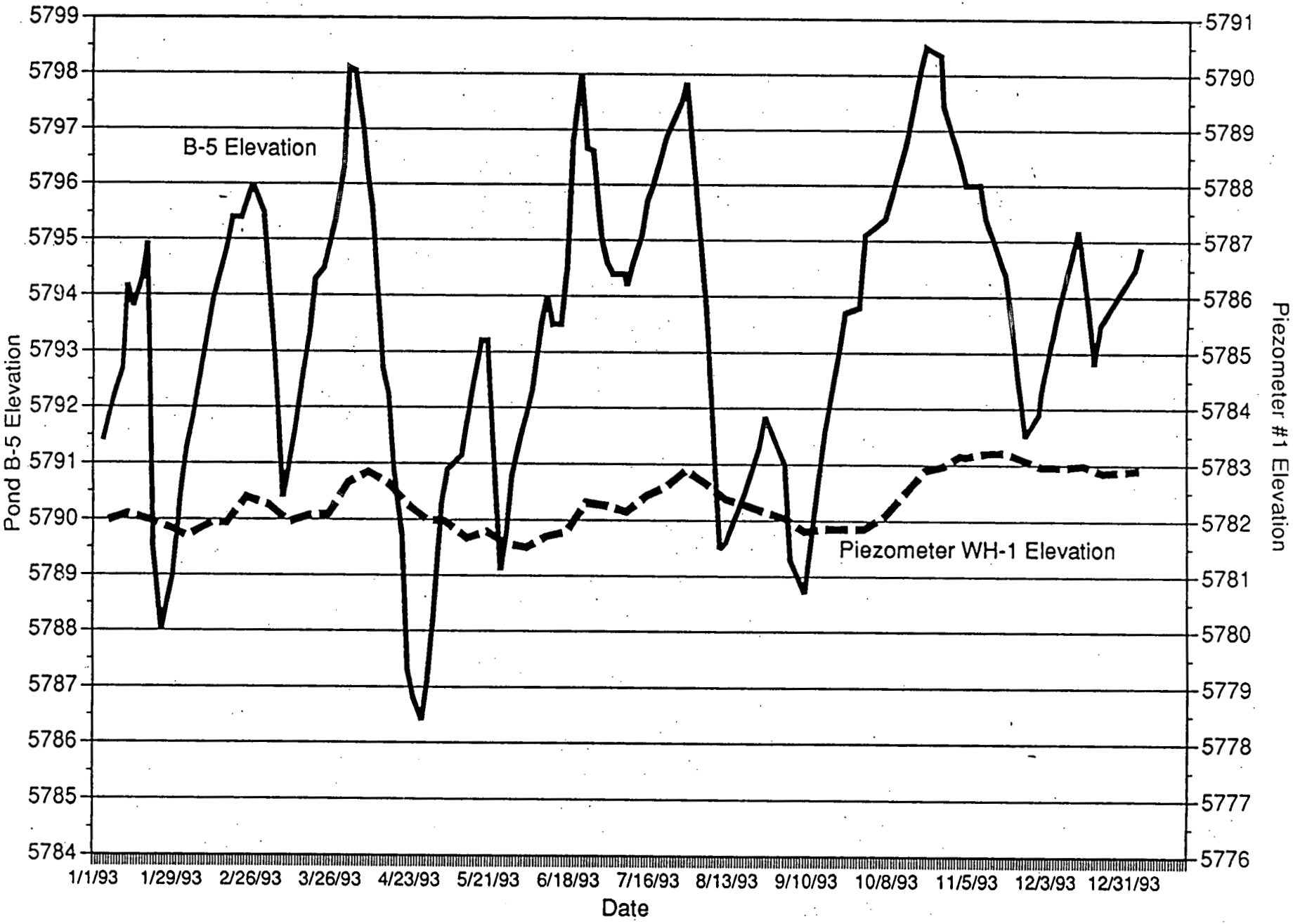


Piezometer WH-2 is the central crest piezometer.Piezometers WH-1 and WH-3 are located noth and south of Piezometer WH-2, respectively.

133

SWD

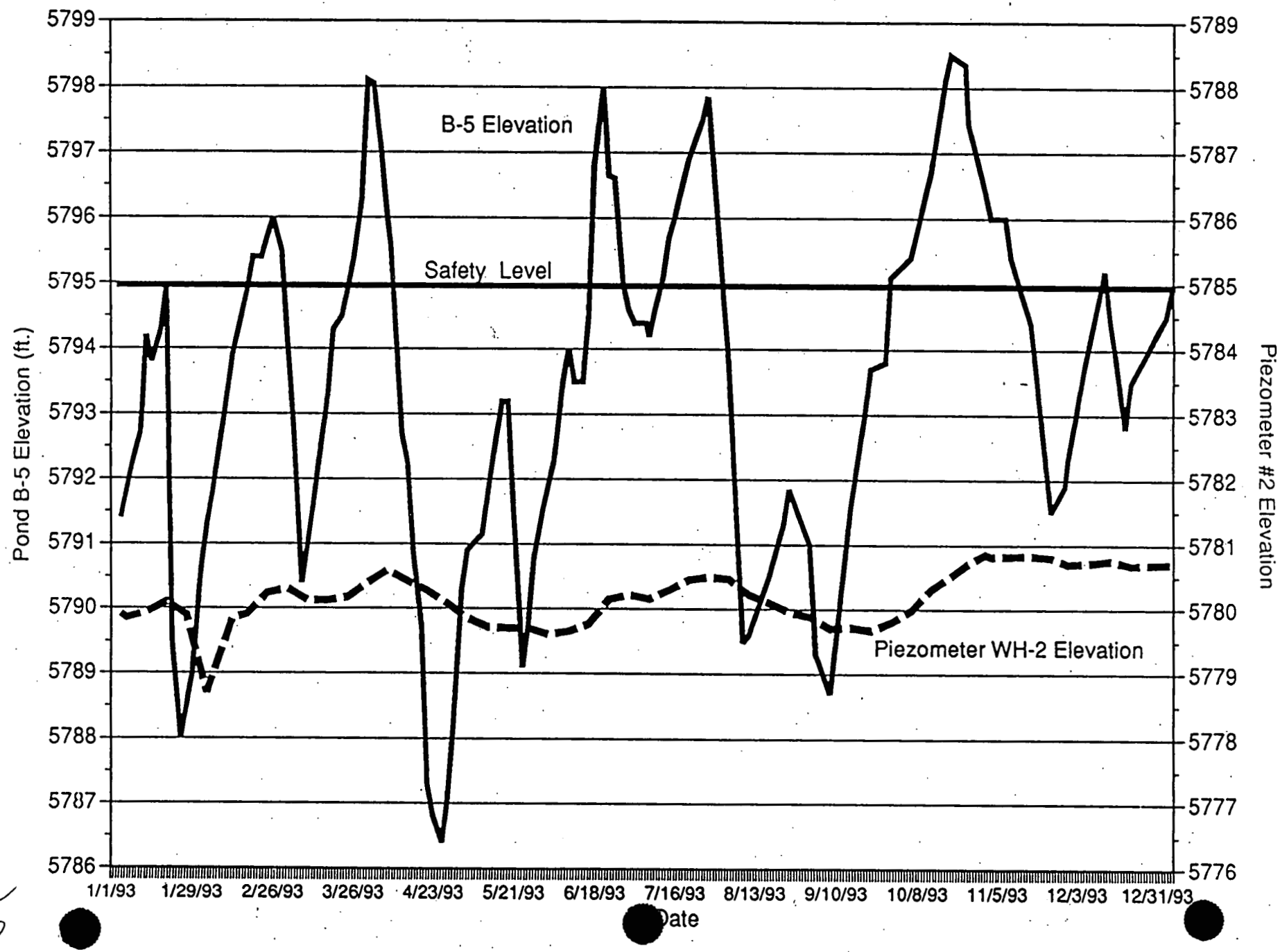
Pond B-5 vs. Piezometer WH-1 Elevation - 1993



734

SWD

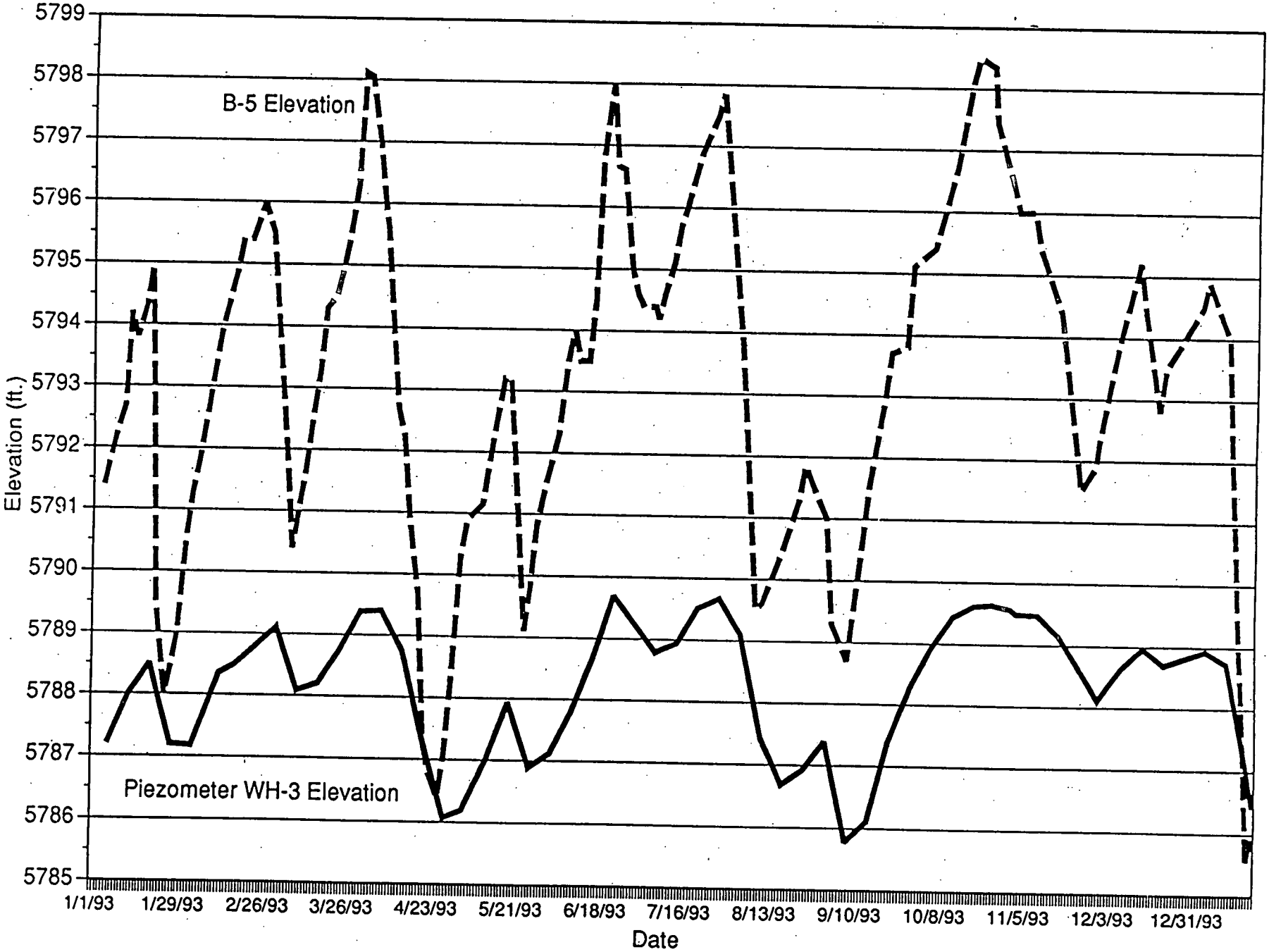
Pond B-5 vs. Piezometer WH-2 Elevation - 1993



735

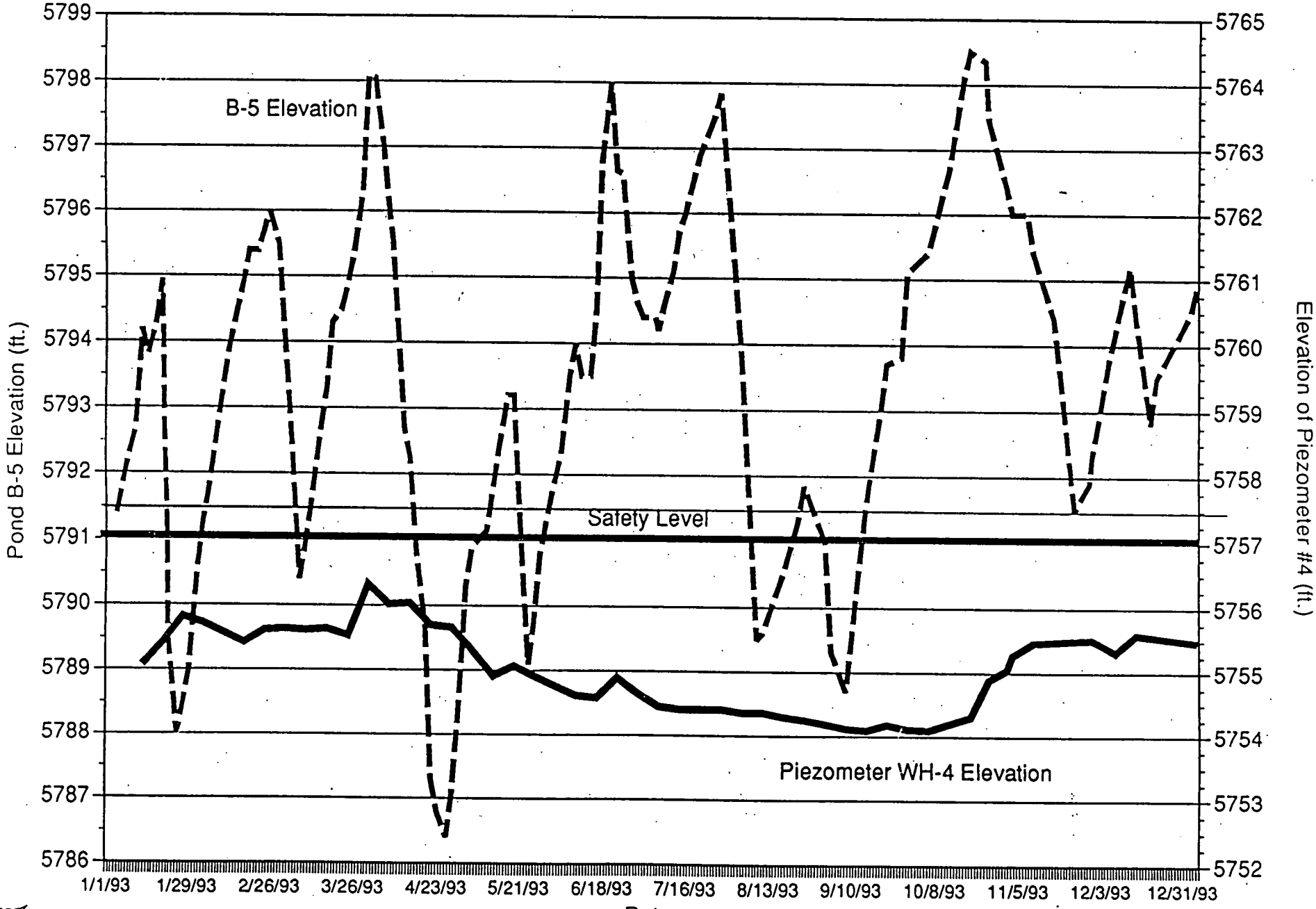
SWD

Pond B-5 vs. Piezometer WH-3 Elevation - 1993



73L

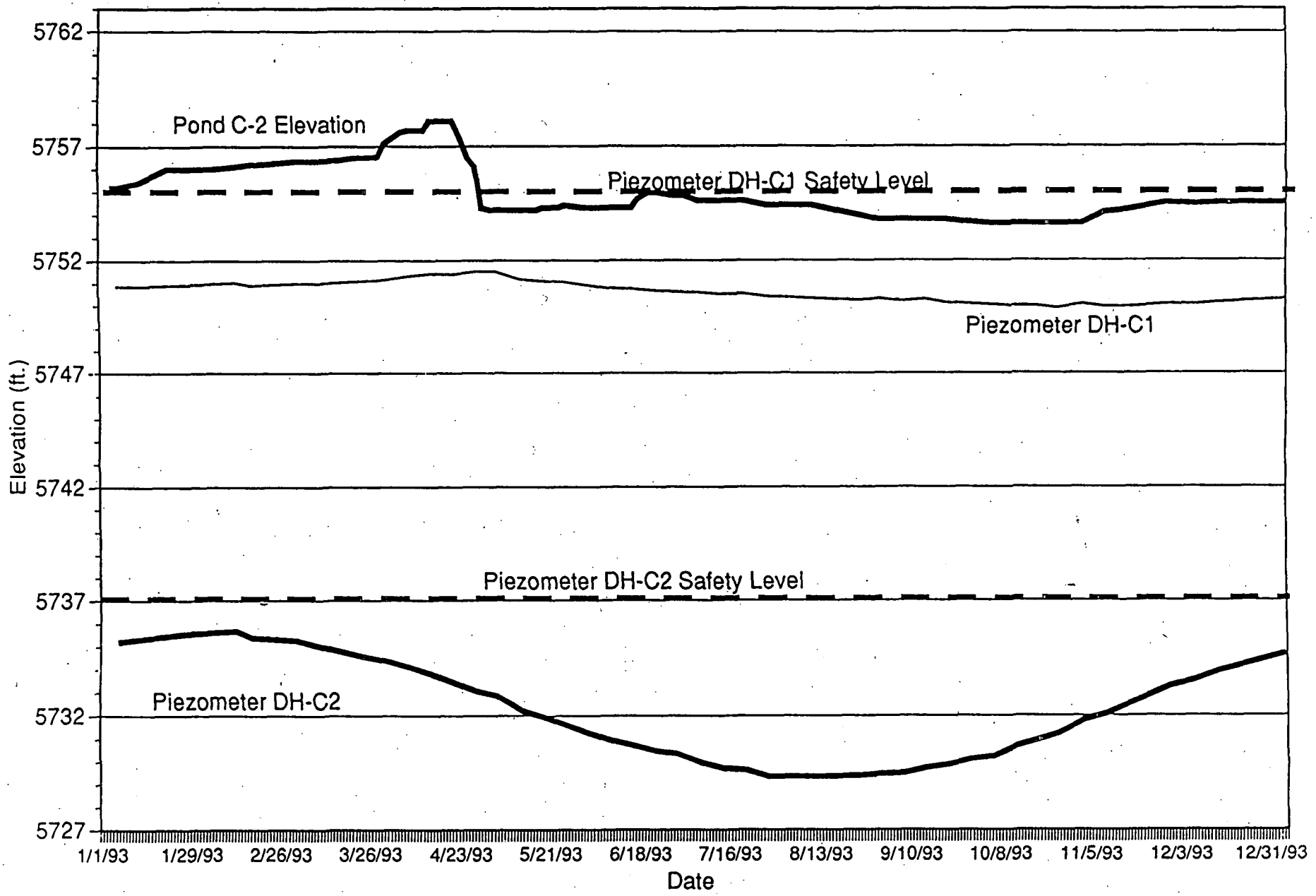
Pond B-5 vs. Piezometer WH-4 Elevation - 1993



737

SWD

1993 Elevations of Pond C-2 and Piezometers

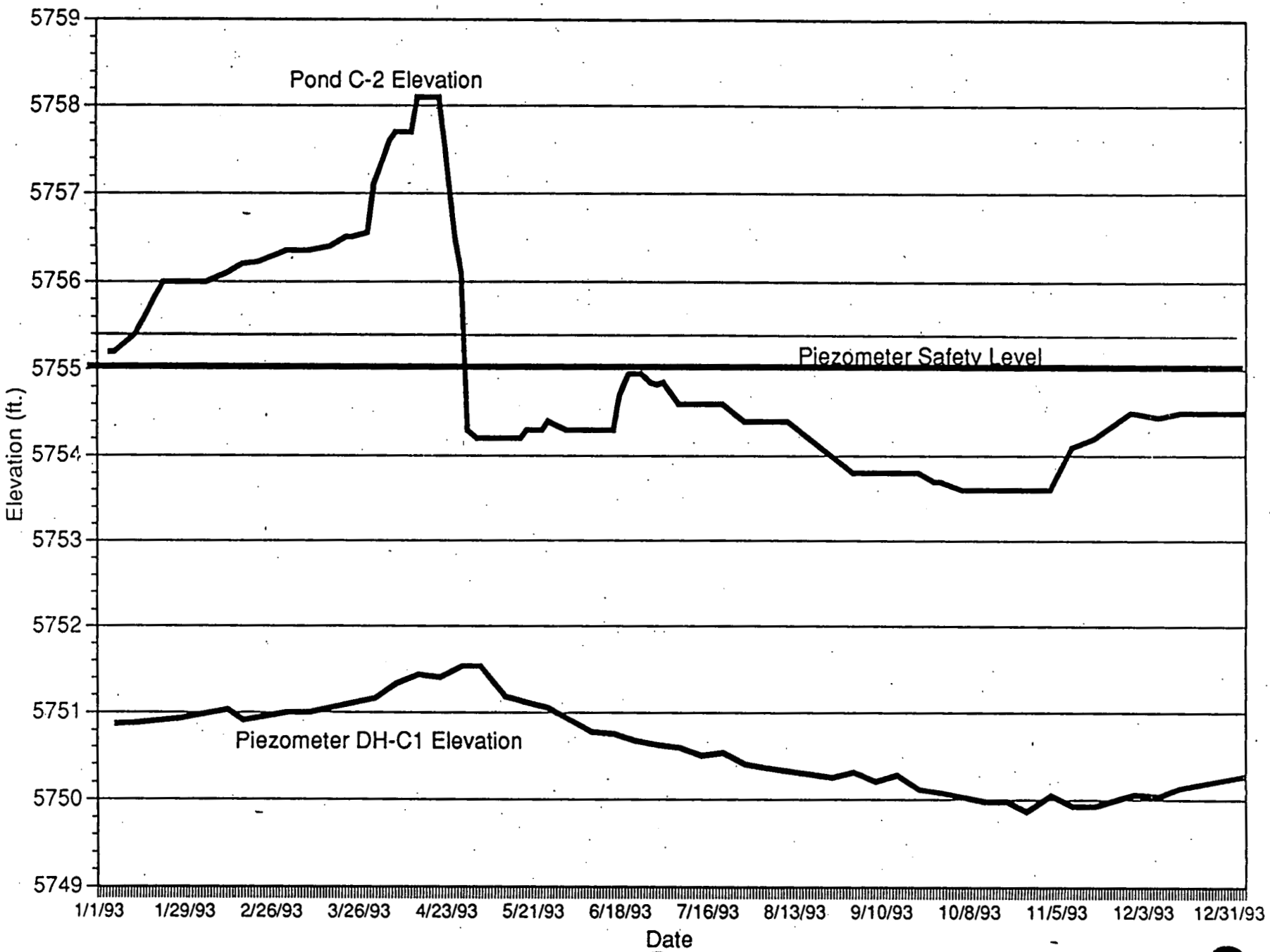


Piezometer DH-C1 is on the crest of the dam, and Piezometer DH-C2 is on the toe of the dam. Both are centrally located.

SWD

738

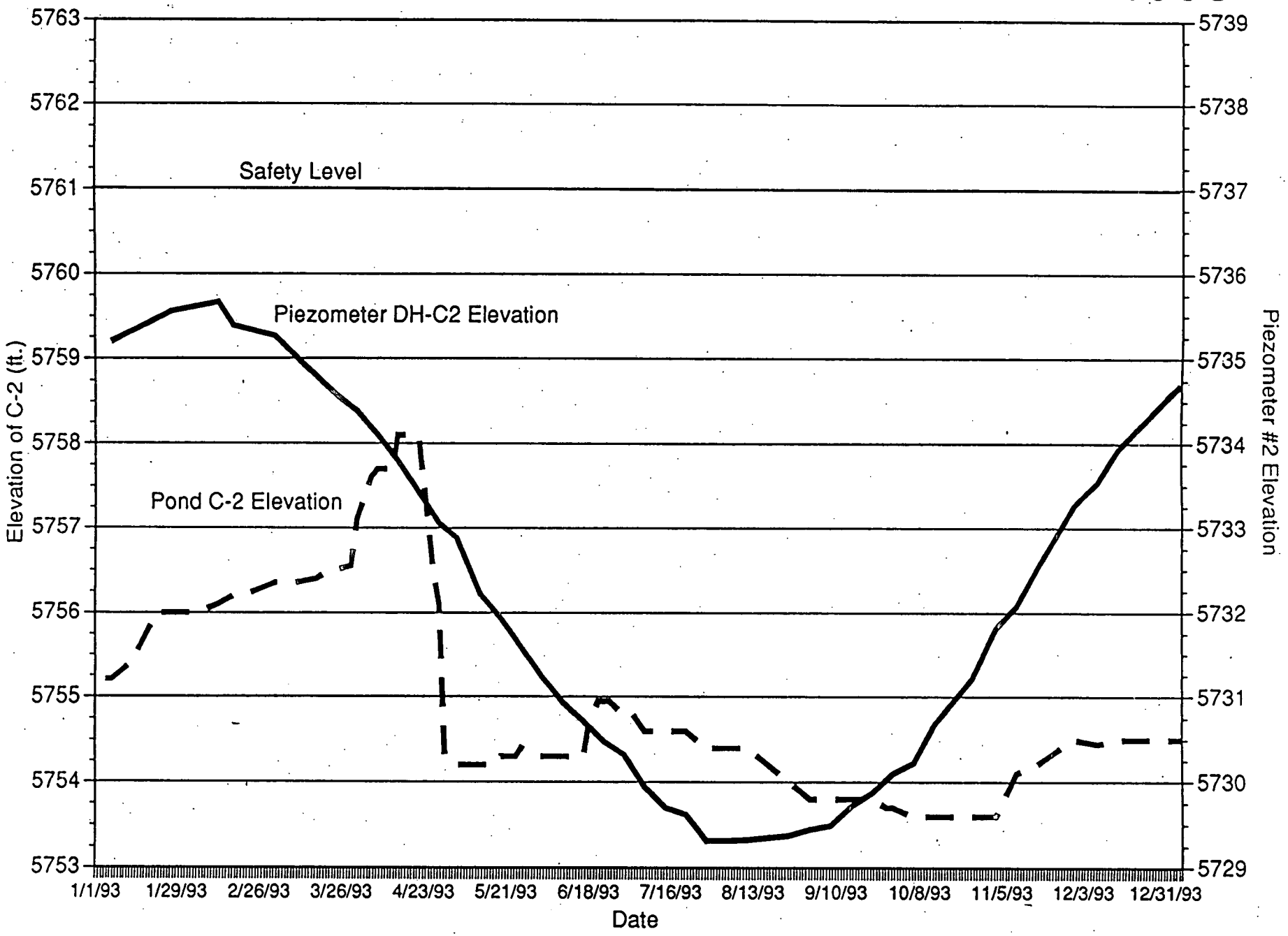
Pond C-2 vs. Piezometer DH-C1 Elevation - 1993



739

SWD

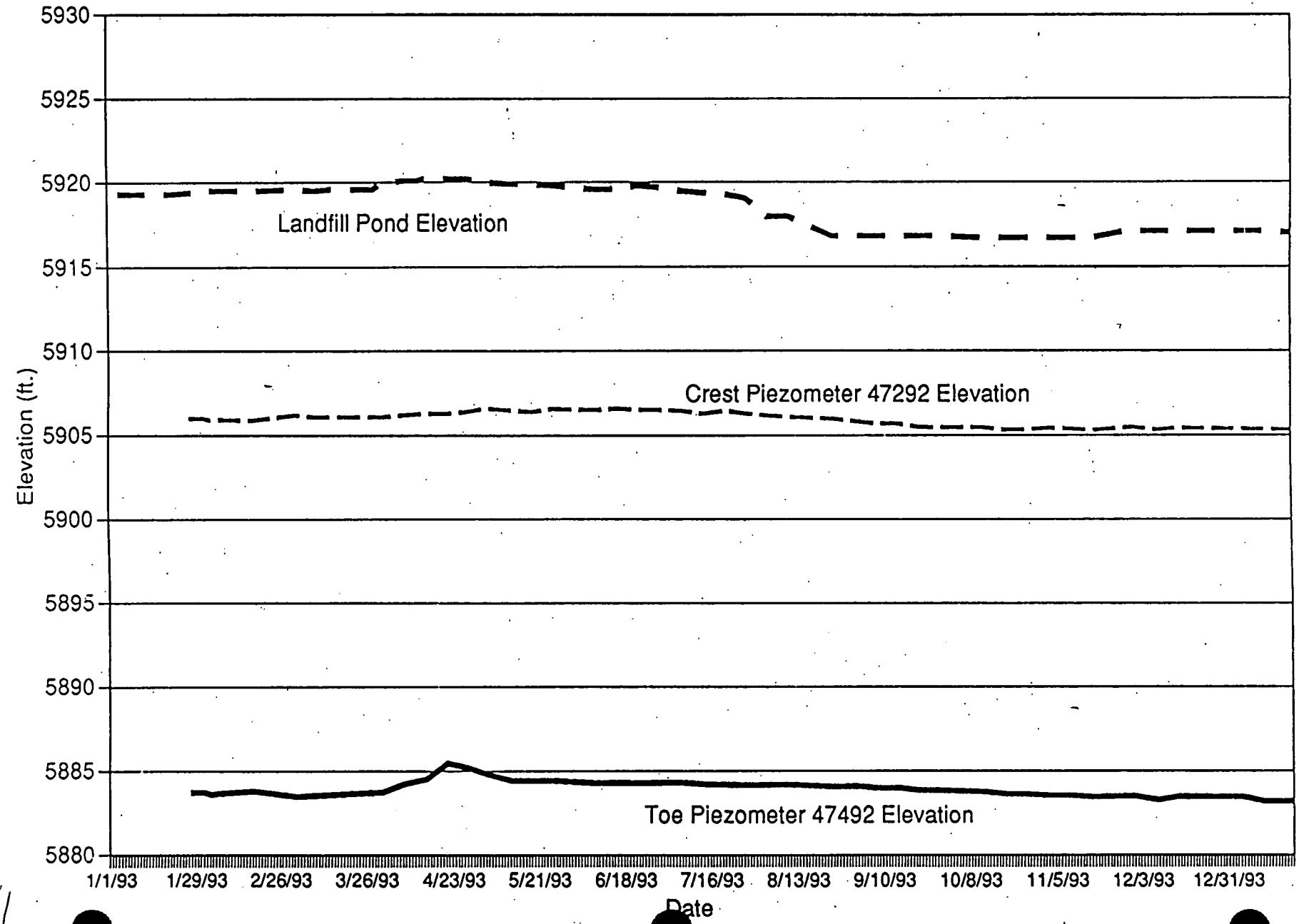
Pond C-2 vs. Piezometer DH-C2 Elevation - 1993



740

SWD

Landfill Pond and Piezometer Elevations - 1993

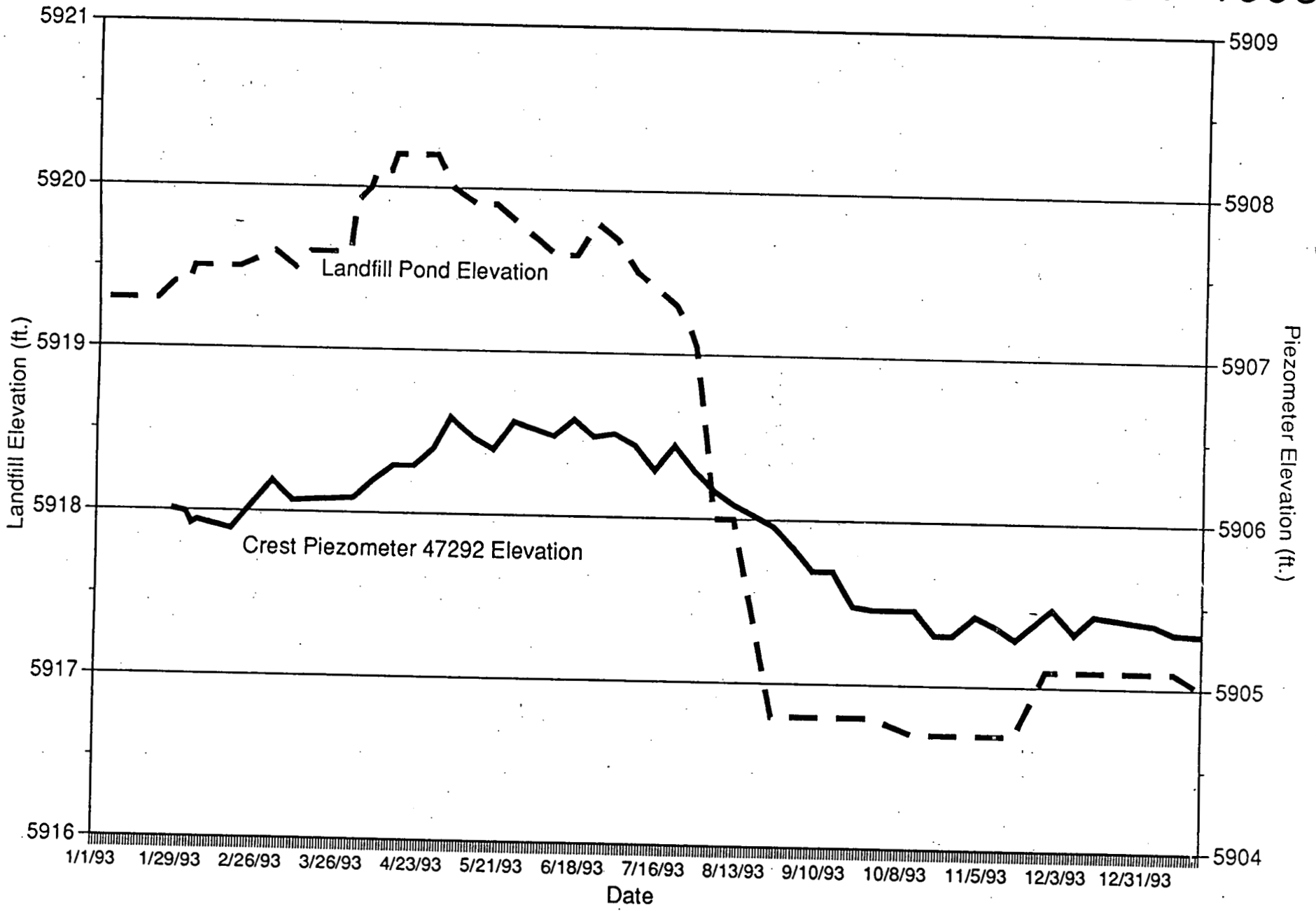


741

th the Crest Piezometer and the Toe
Piezometer are centrally located on the dam

SWD

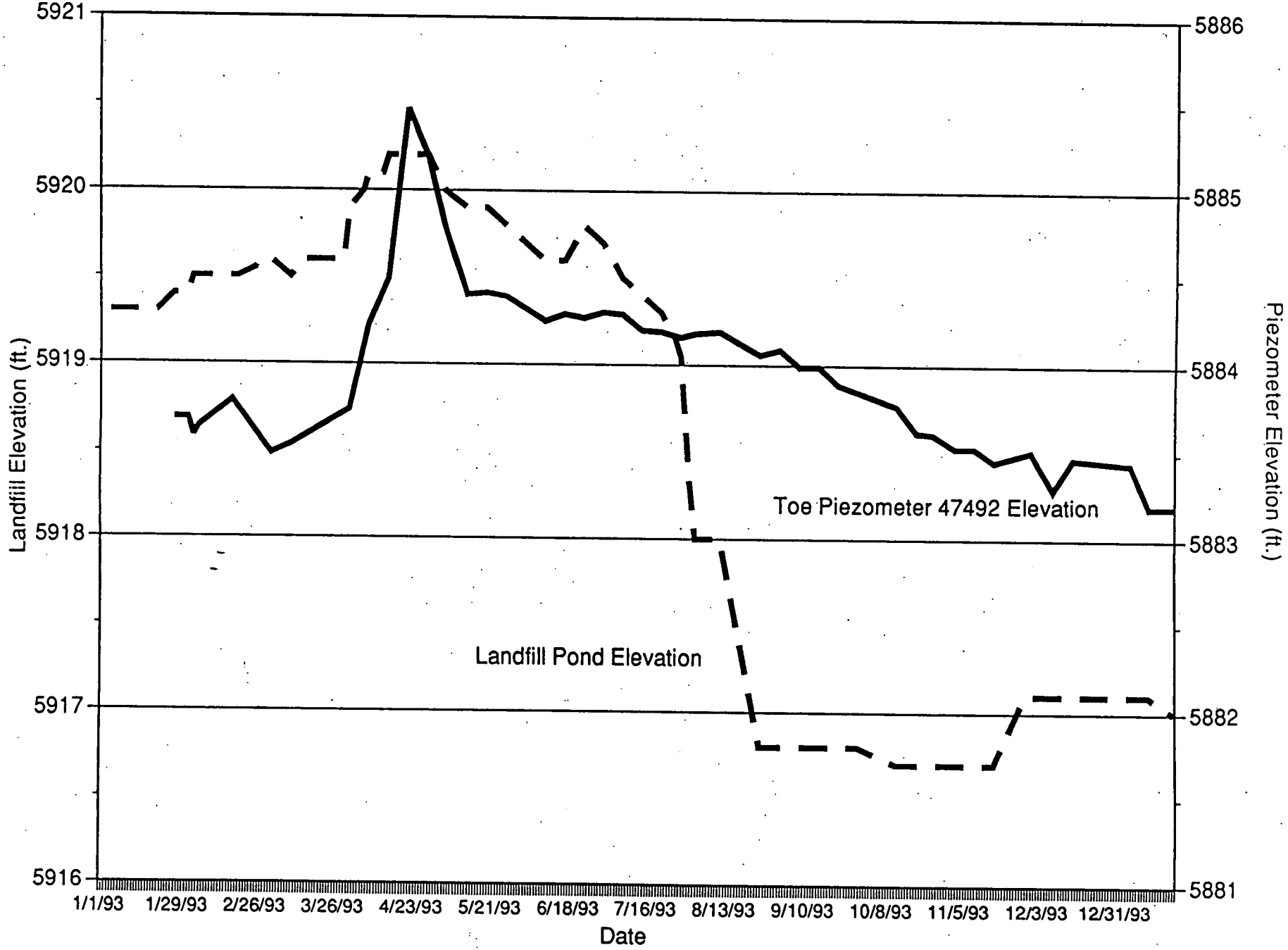
Landfill Pond vs. Crest Piezometer 47292 Elevation -1993



142

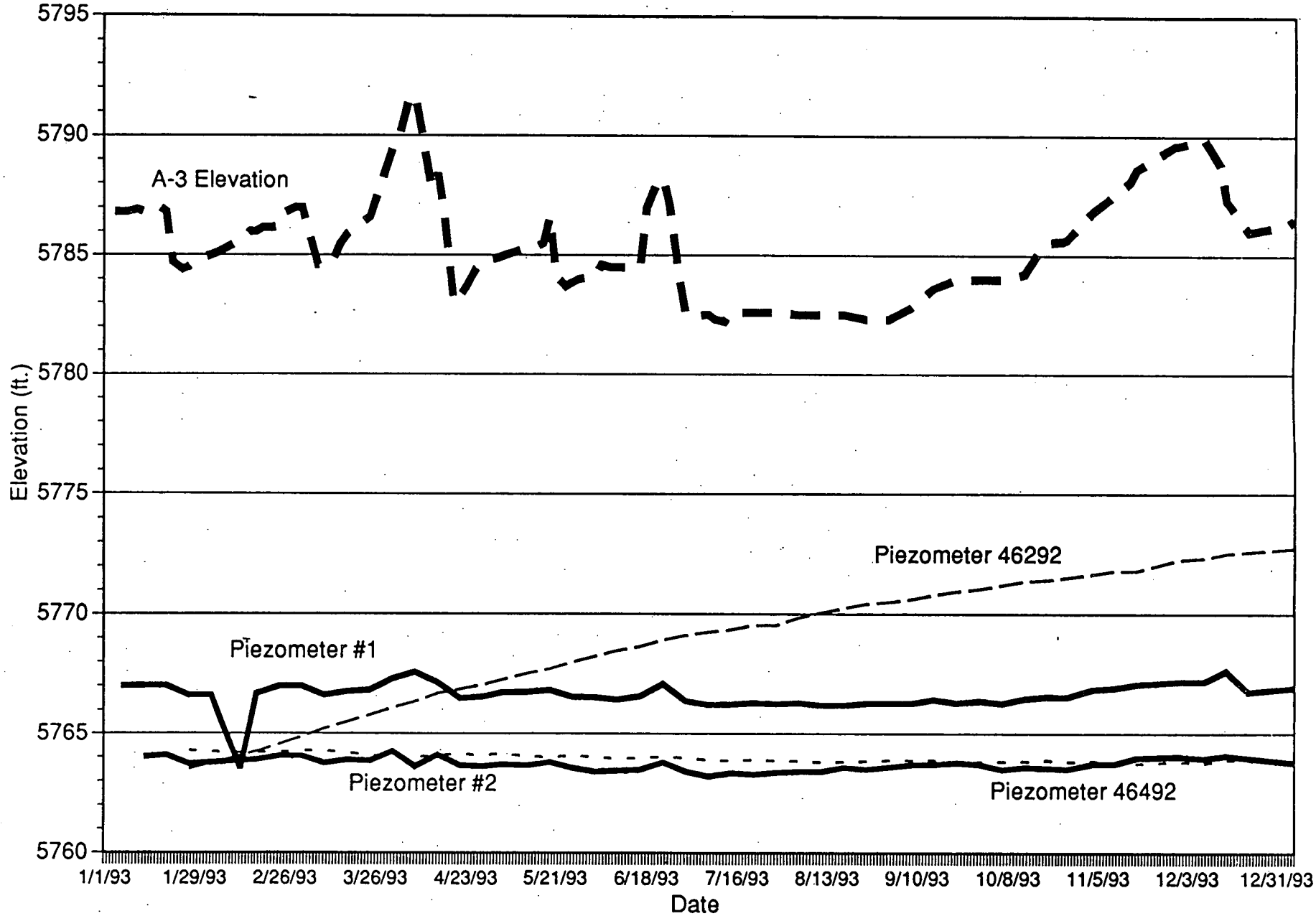
SWD

Landfill Pond vs. Toe Piezometer 47492 Elevation - 1993



743

Pond A-3 vs. Piezometer Elevations - 1993



Piexometer #1 is on the crest of the dam, Piezometer #2 is at the toe, and Piezometers 46292 and 46492 are on the crest and toe of the dam, respectively. All are centrally located.

SWD

744

Stream Gage/Alluvial-Well Hydrographs

Stream gage/alluvial-well hydrographs presented in Appendix F were generated to visually compare stream discharge to alluvial groundwater levels in associated drainages. Mean daily discharge for water years 1991, 1992, and 1993 was collected at 13 primary stream gaging stations (GS01 through GS13) at Rocky Flats. The stream gaging data is included on disks provided with the annual event-related surface water monitoring reports (EG&G, 1993b). Stream discharge data from these disks were plotted on hydrographs in cubic feet per second (cfs).

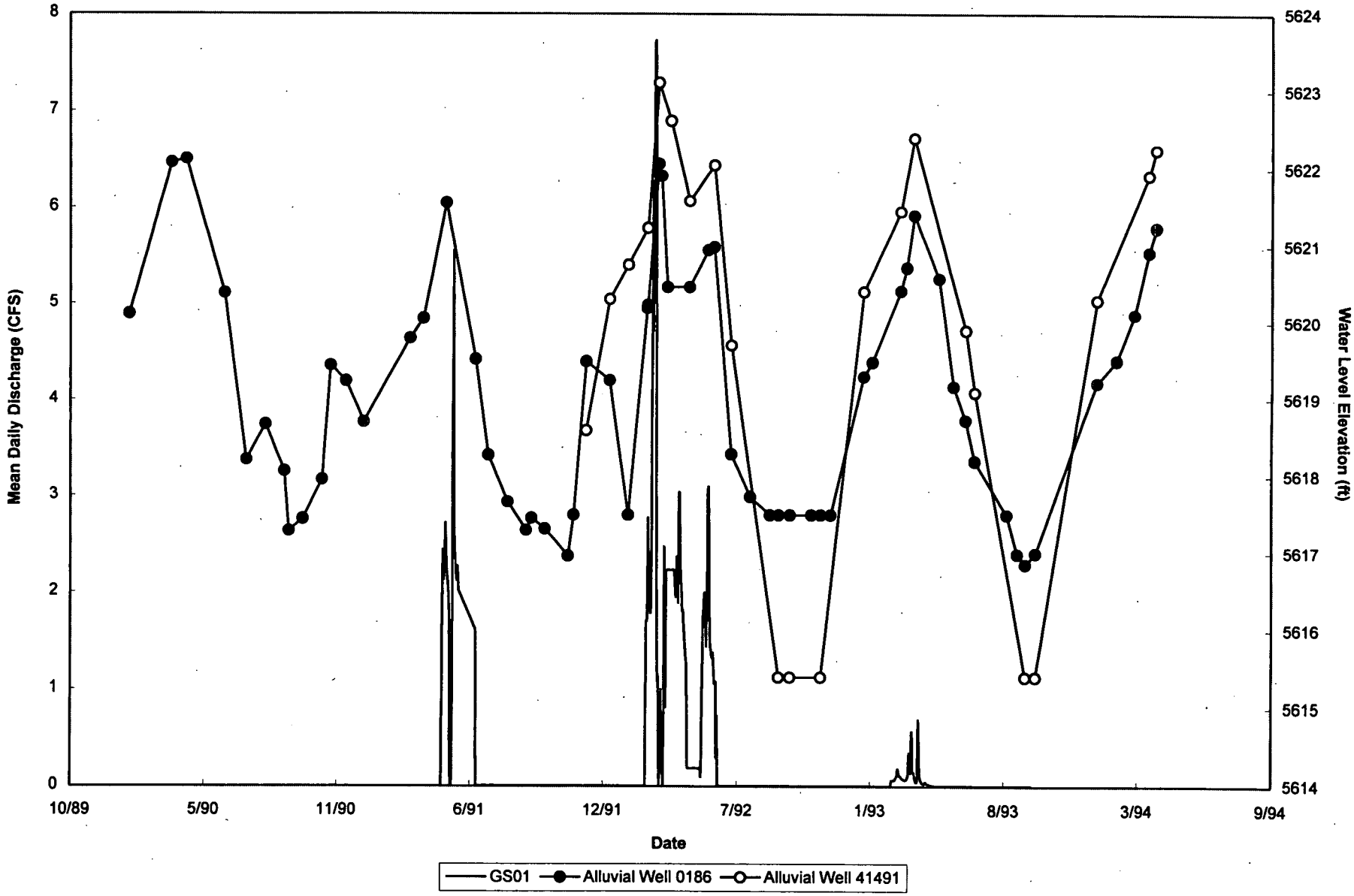
The closest alluvial well(s) to each of the stream gaging stations was(were) selected to represent alluvial groundwater levels near the gaging stations. Stream gaging stations and associated alluvial wells are listed below.

Stream Gaging Station	Alluvial Well Location(s)
GS01	41491 and 0186
GS02	40791
GS03	41691 and 0486
GS04	B202589
GS05	B402689
GS06	5386
GS07	51193
GS08	75292
GS09	-no wells-
GS10	75992
GS11	41091
GS12	-no wells-
GS13	1386

Groundwater-elevation data for corresponding alluvial wells were plotted on the stream gaging station hydrographs. The alluvial-well hydrographs were generated from data files created for the single-well hydrographs presented in Appendix C. Stream gaging station hydrographs and their corresponding alluvial-well hydrographs were plotted on the same time scale for direct comparison. Stream gaging data could not be converted into absolute elevation (stage) due to the lack of elevation data at these locations.

745

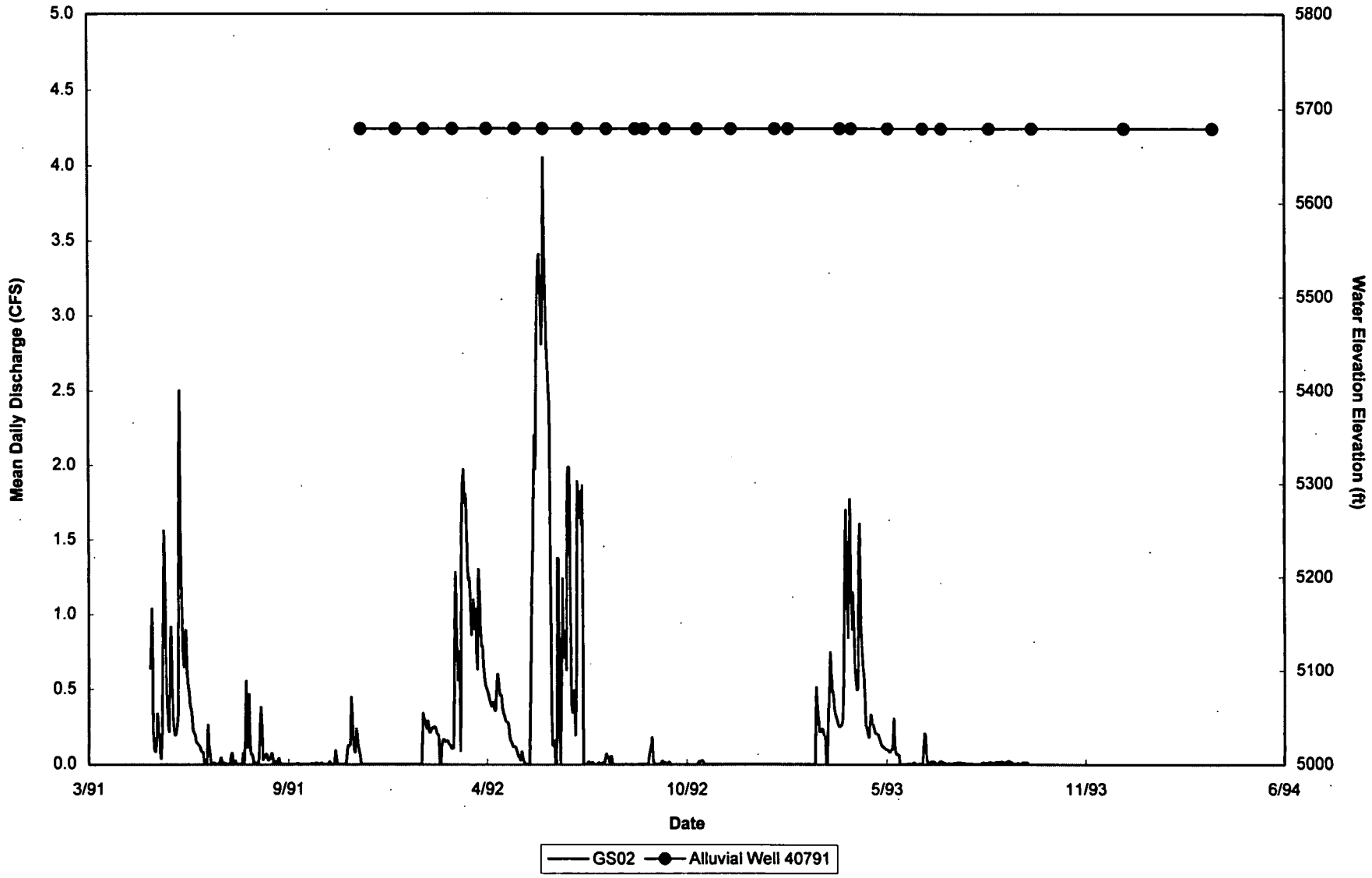
Stream Gage/Alluvial-Well Hydrograph



746

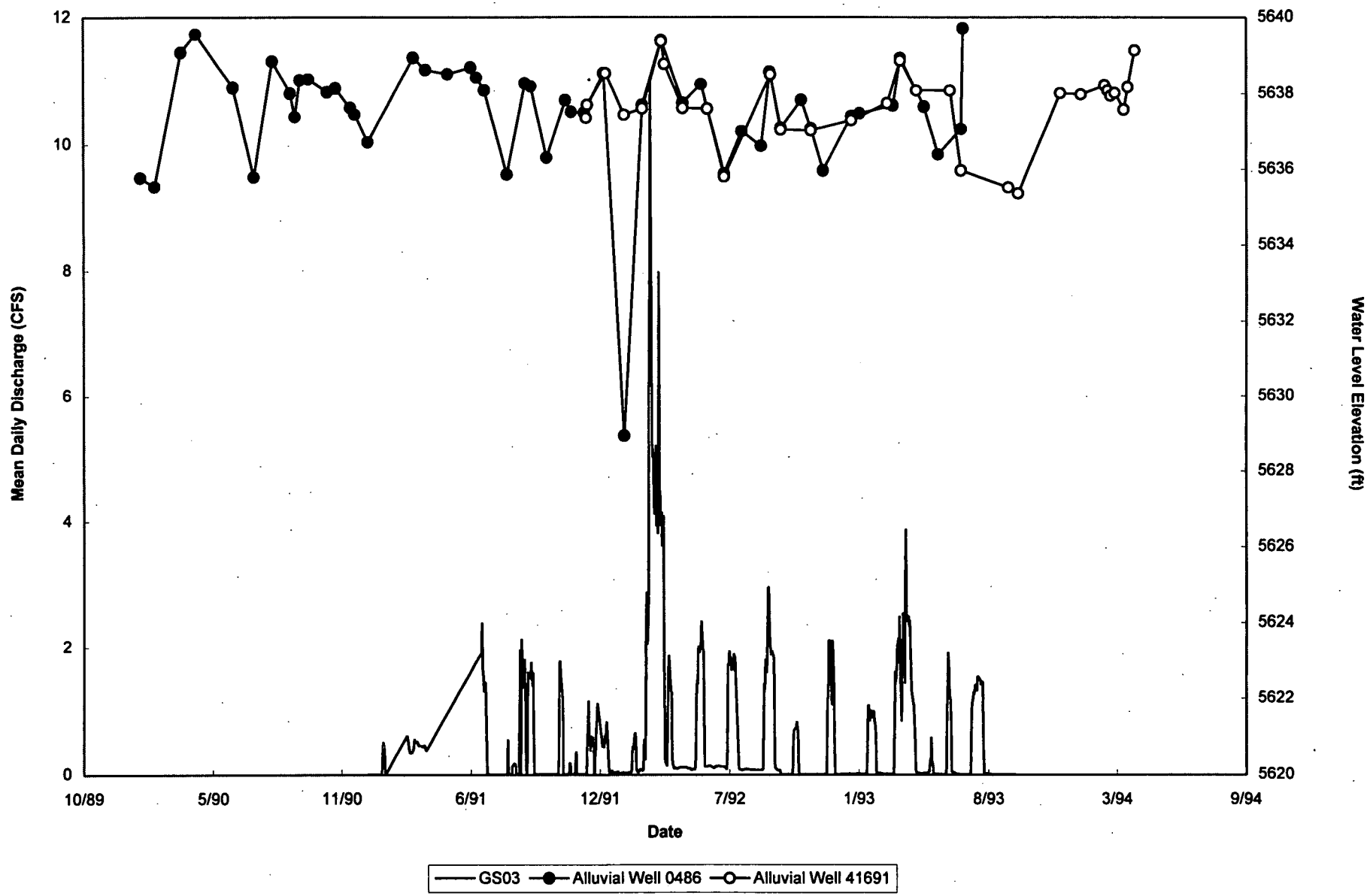
MEP D:\..\SGHYDROS.XLS GS01 1/10/95

Stream Gage/Alluvial-Well Hydrograph



747

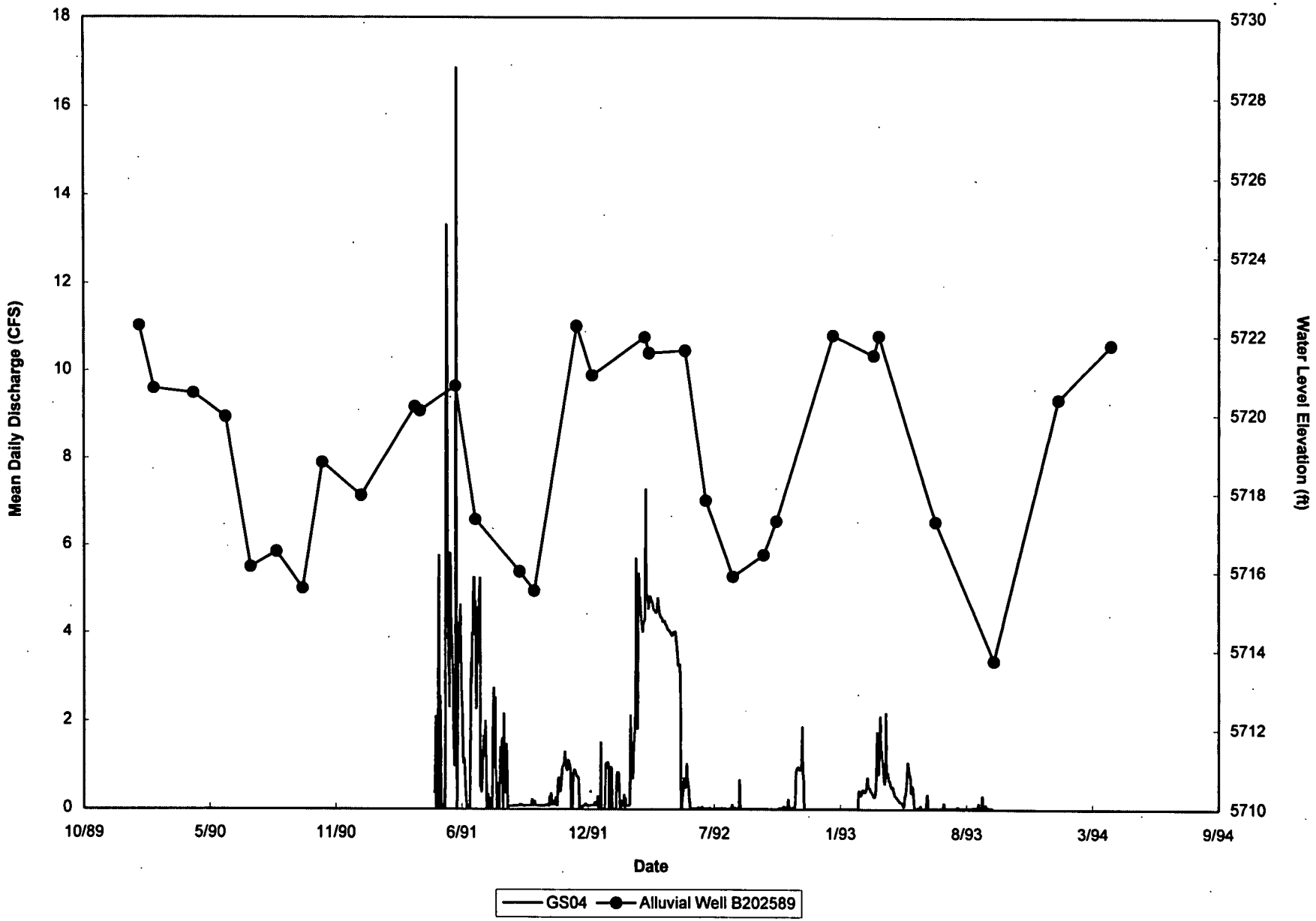
Stream Gage/Alluvial-Well Hydrograph



748

MEP D:\..\SGHYDROS.XLS GS03 1/10/95

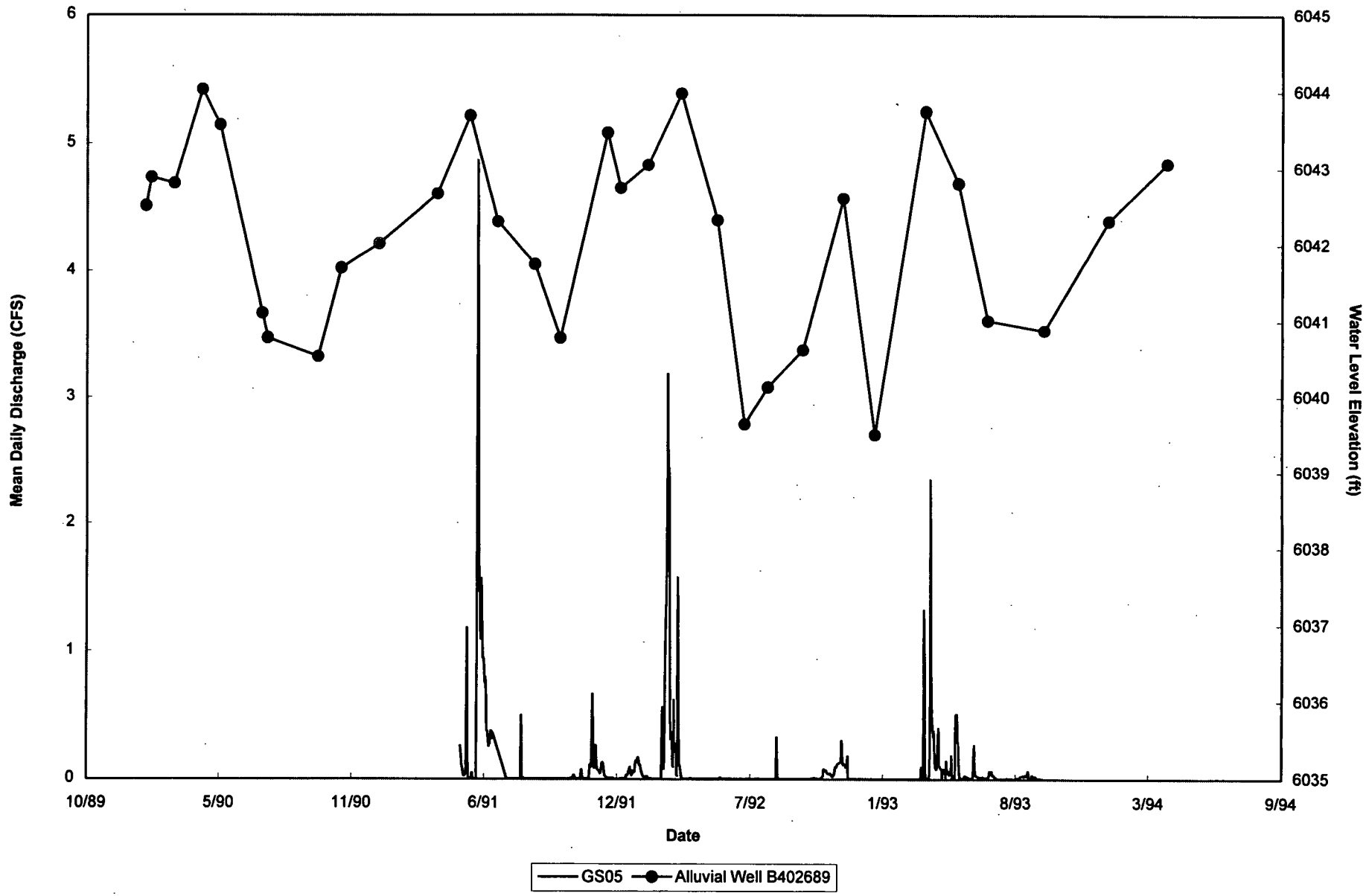
Stream Gage/Alluvial-Well Hydrograph



749

MEP D:\..\S[redacted]S.XLS GS04 1/10/95

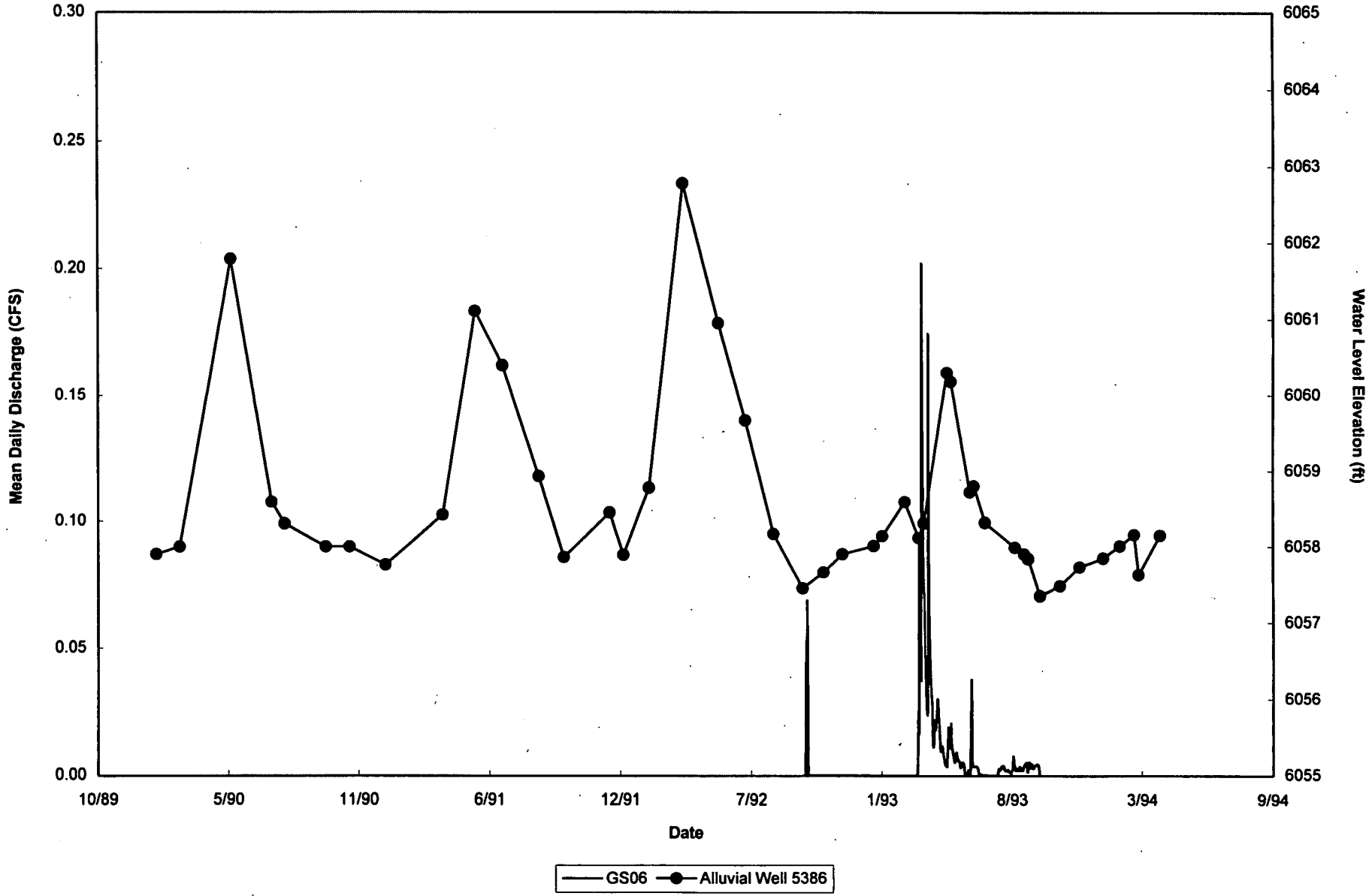
Stream Gage/Alluvial-Well Hydrograph



451

MEP D:\L.\SGHYDROS.XLS GS05 1/10/95

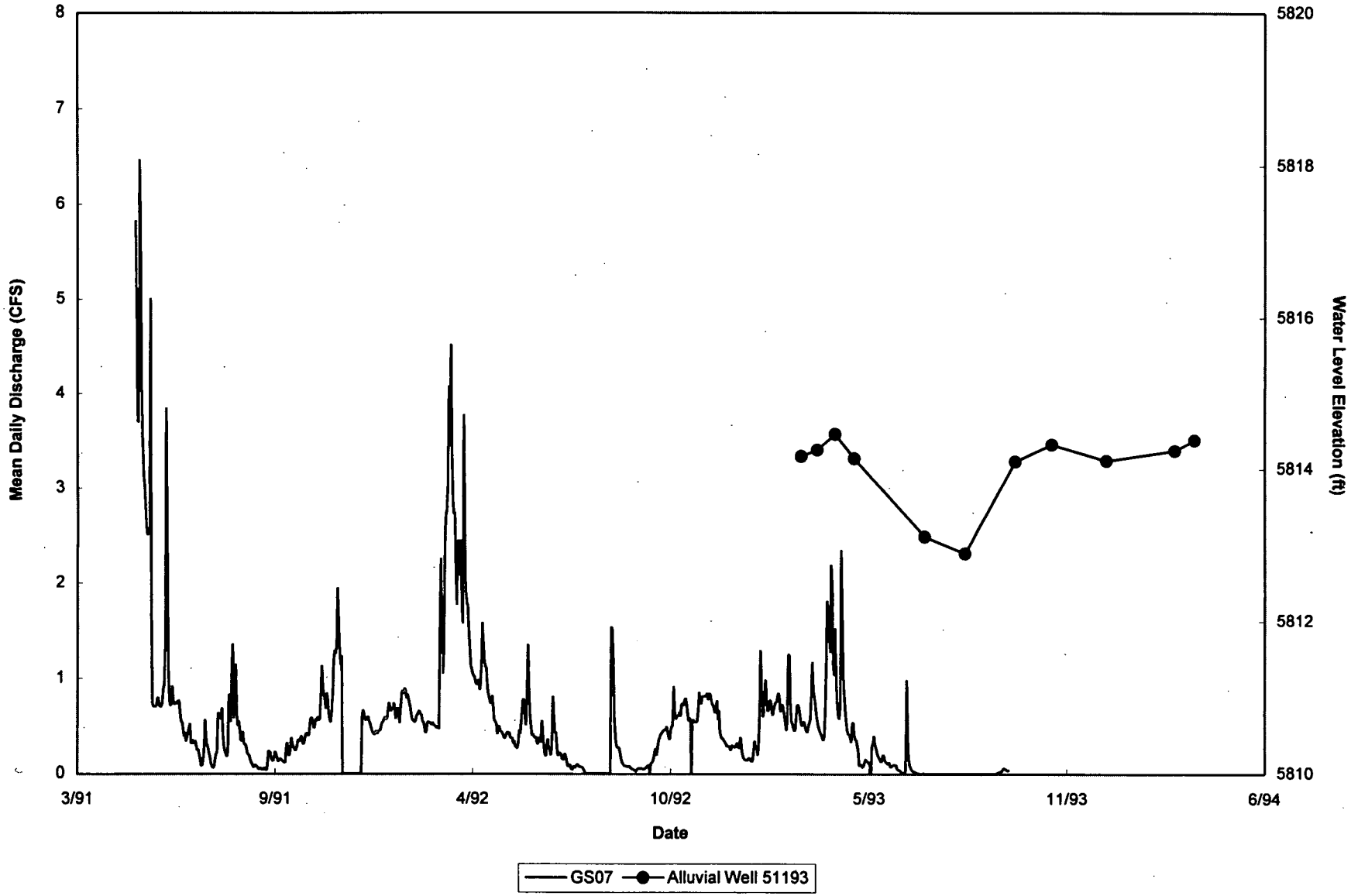
Stream Gage/Alluvial-Well Hydrograph



751

MEP D:\.\ OS.XLS GS06 1/10/95

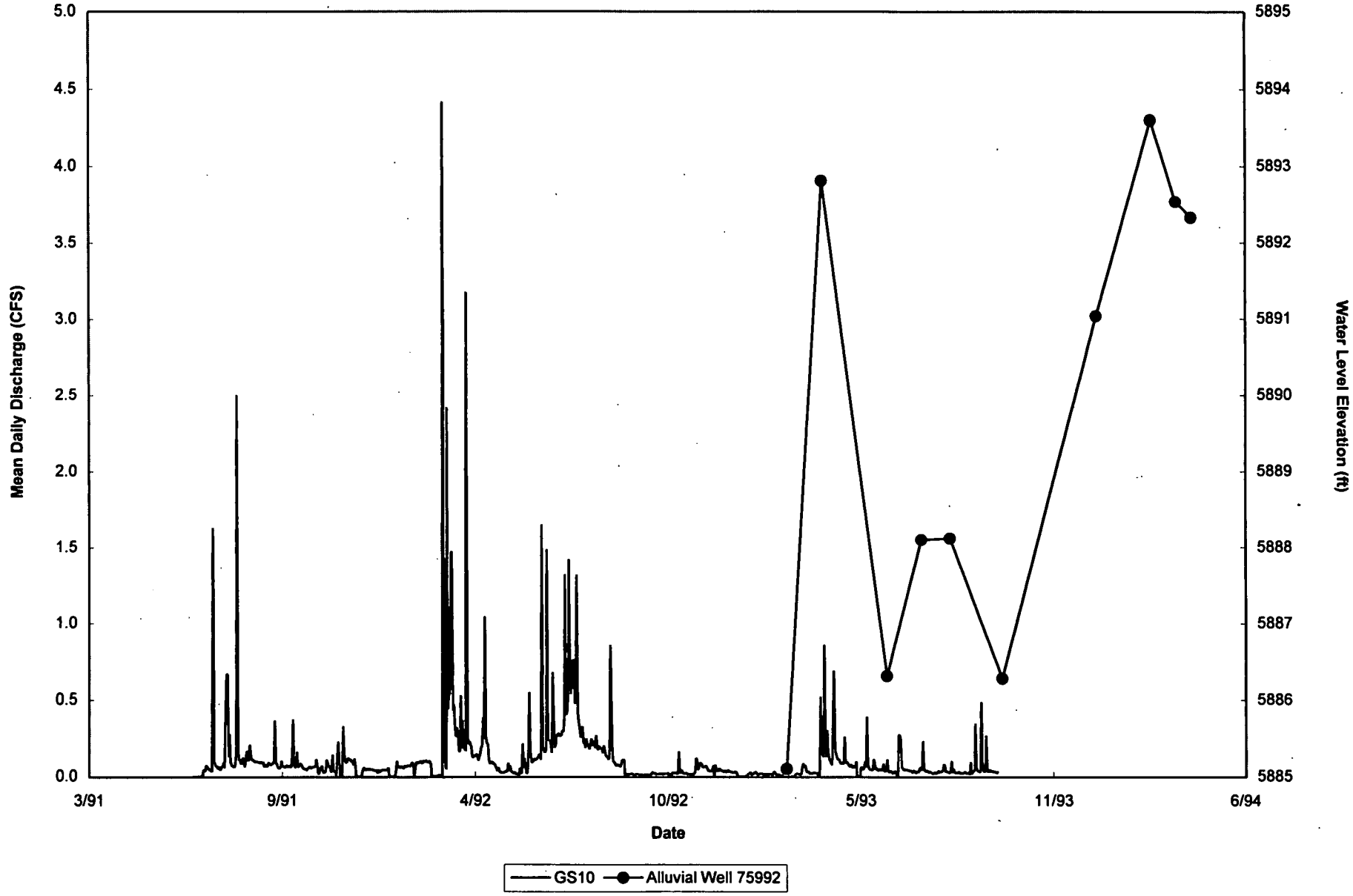
Stream Gage/Alluvial-Well Hydrograph



152

MEP D:\L.\SGHYDROS.XLS GS07 1/10/95

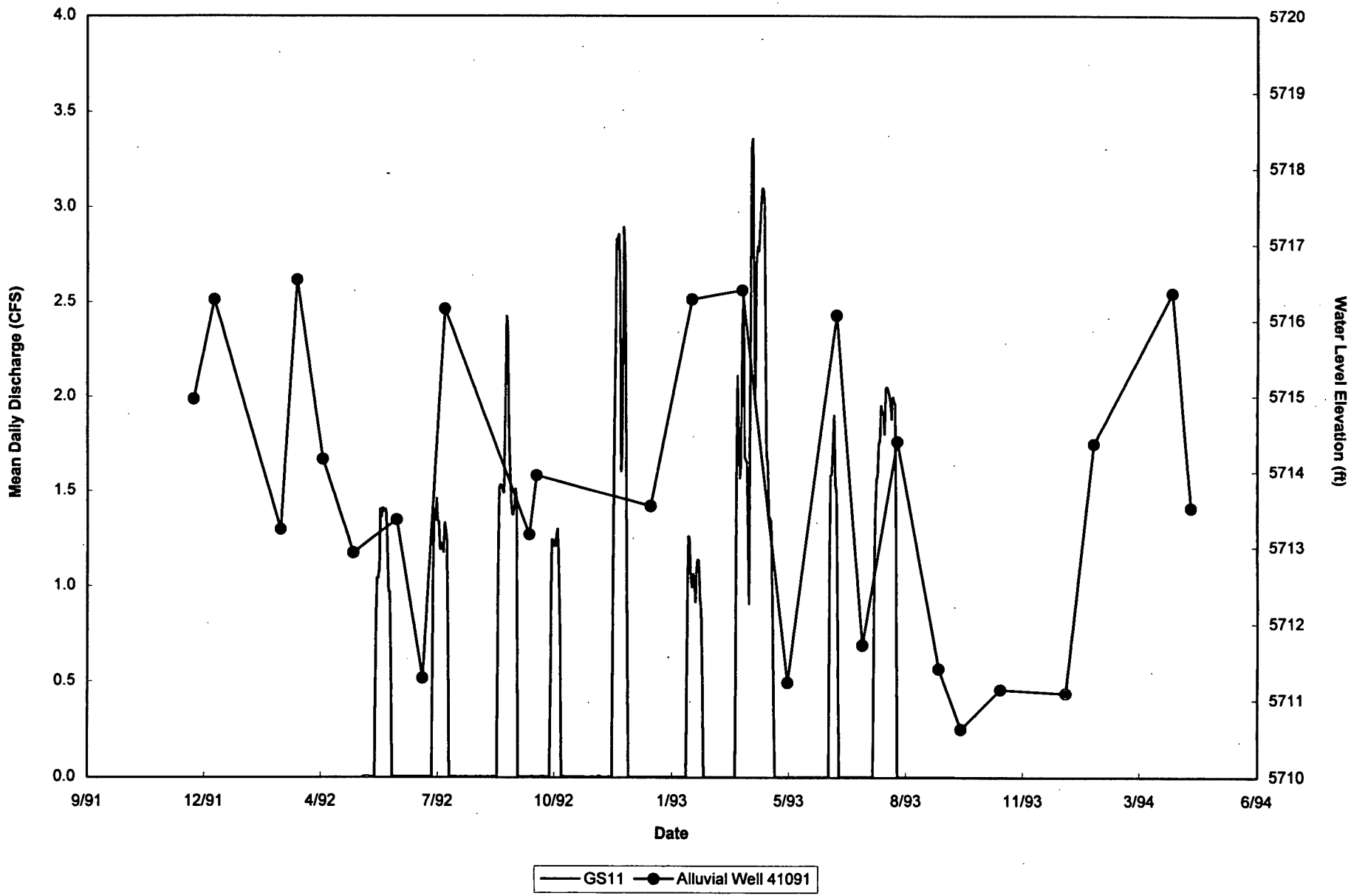
Stream Gage/Alluvial-Well Hydrograph



753

MEP D:\..\SC S.XLS GS10 1/10/95

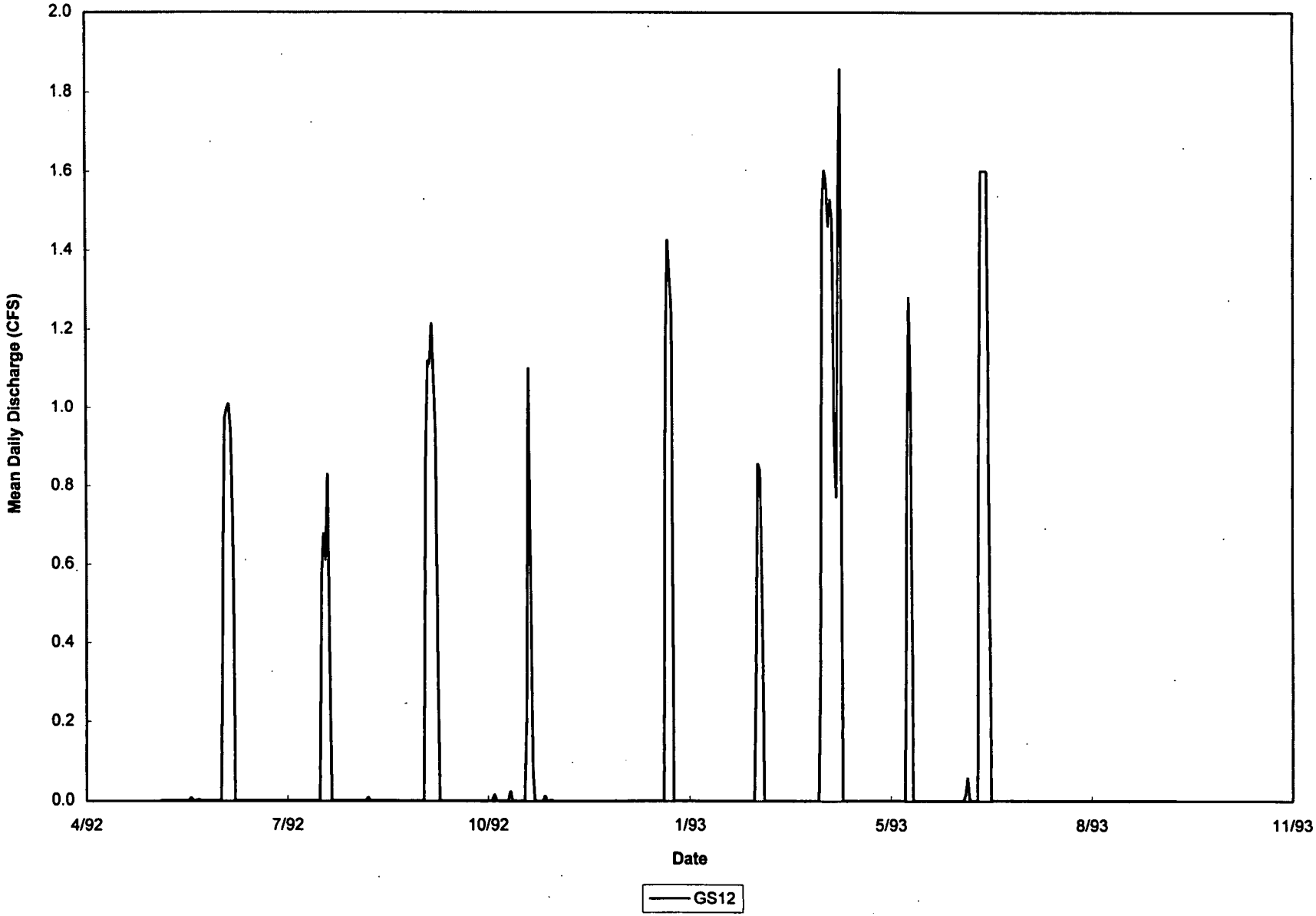
Stream Gage/Alluvial-Well Hydrograph



154

MEP D:\.\SGHYDROS.XLS GS11 1/10/95

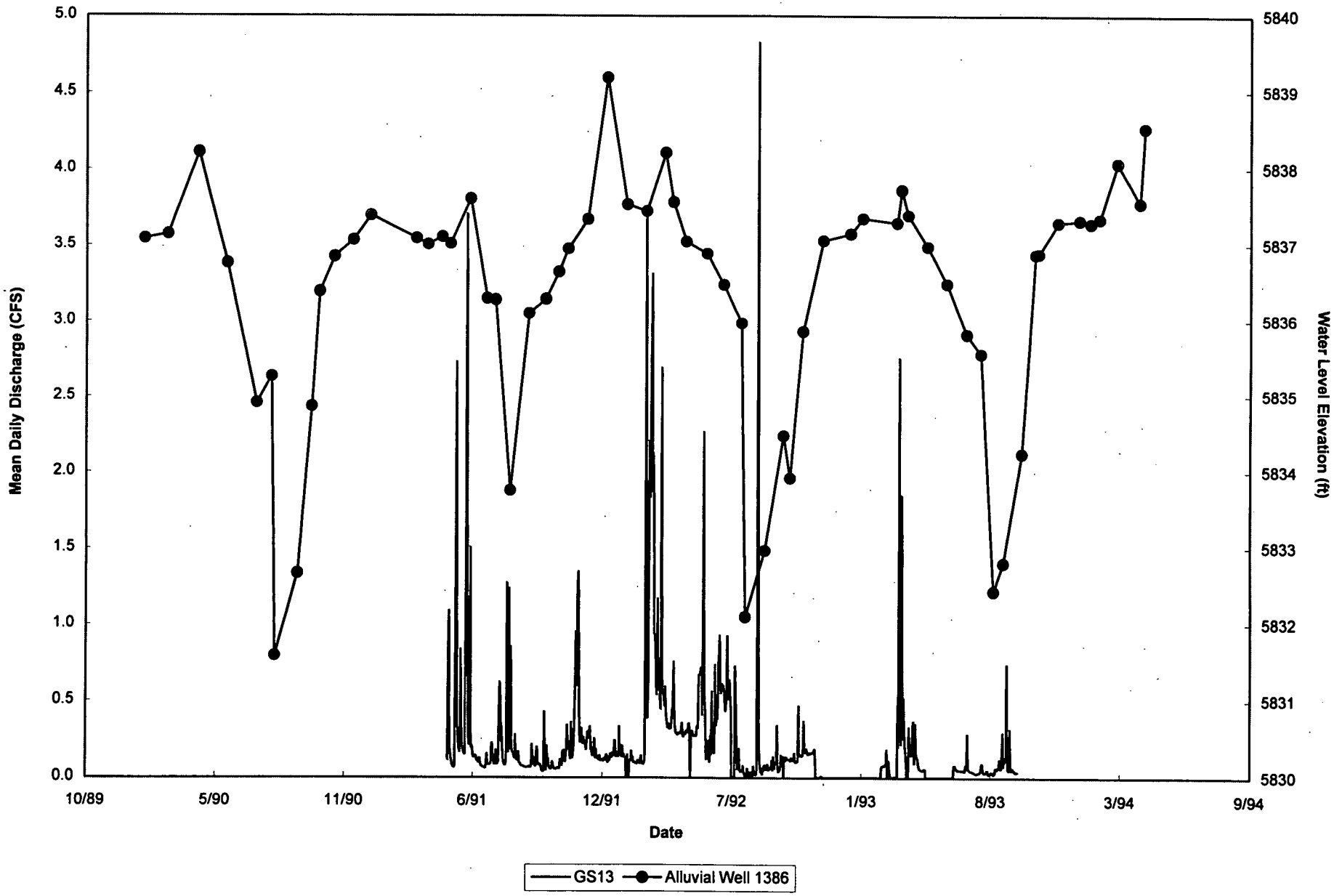
Stream Gage/Alluvial-Well Hydrograph



755

MEP D:\.\S DS.XLS GS12 1/10/95

Stream Gage/Alluvial-Well Hydrograph



156

MEP D:\.\SGHYDROS.XLS GS13 1/10/95

Hydraulic Data

The methodology used to assign lithologic units to the hydraulic conductivity values listed in Table G-1 is explained below. Only those wells with usable hydraulic conductivity values were assigned completion lithologies.

Well completion lithologies assigned by RFEDS are surficial deposits, weathered bedrock, and unweathered bedrock. Wells screened in surficial deposits were further classified as Rocky Flats Alluvium, Quaternary Colluvium, or Quaternary Valley Fill using boring logs and the surficial deposits map (Plate 4-1, EG&G, 1995a). Bedrock wells were subdivided into weathered or unweathered bedrock wells based on RFEDS criteria, and Arapahoe sandstone completion intervals were identified based on information from the Geologic Characterization Report (EG&G, 1995a).

All completion intervals were assigned the primary lithologies listed in RFEDS (i.e., weathered, sandy claystones and weathered, silty claystones were both classified as weathered claystones). The unweathered bedrock wells were also assigned primary lithologies (i.e., unweathered, silty sandstones and unweathered, clayey sandstones were both classified as unweathered sandstones).

Several weathered and unweathered bedrock wells were completed across multiple lithologies. For these wells, the well was classified as the coarsest lithology within the screened interval. Lithologies for individual packer test intervals were obtained from core logs.

757

Table G-1
Hydraulic Data

Well ID	Date Tested	Analysis Method	Test Duration (min.)	Interval Tested (ft.)	Aquifer Conditions	Initial Saturated Thickness (ft.)	Depth to Water (ft.)	Maximum Drawdown (ft.)	Average Discharge (gpm)	Hydraulic Conductivity (cm/sec)	Hydraulic Conductivity (ft/d)	Lithologic Unit Tested	Type of Test	Data Usable?	Comments	Source
I-1	12/18/91	Jacob	477.33	2.32-6.0	unconfined	3.68	NA	0.307	1.56	1.90E-02	5.39E+01	Qvf	pumping	yes	late match	(14)
I-1	12/18/91	Theis	890	2.32-6.0	unconfined	3.68	NA	0.307	1.56	3.70E-02	1.05E+02	Qvf	recovery	yes	late match	(14)
I-1	12/18/91	Boulton	477.33	2.32-6.0	unconfined	3.68	NA	0.307	1.56	3.70E-02	1.05E+02	Qvf	pumping	yes	early match	(14)
I-1	12/18/91	Boulton	477.33	2.32-6.0	unconfined	3.68	NA	0.307	1.56	1.40E-02	3.97E+01	Qvf	pumping	no	late match	(14)
I-2	12/18/91	Boulton	477.33	2.53-6.0	unconfined	3.47	NA	0.307	1.56	1.60E-02	4.54E+01	Qvf	pumping	yes	early match	(14)
I-2	12/18/91	Boulton	477.33	2.53-6.0	unconfined	3.47	NA	0.307	1.56	1.10E-02	3.12E+01	Qvf	pumping	no	late match	(14)
O-1	12/18/91	Jacob	477.33	2.28-6.0	unconfined	3.72	NA	0.321	1.56	1.90E-02	5.39E+01	Qvf	pumping	yes	late match	(14)
O-1	12/18/91	Theis	890	2.28-6.0	unconfined	3.72	NA	0.321	1.56	2.80E-02	7.94E+01	Qvf	recovery	yes	late match	(14)
O-1	12/18/91	Boulton	477.33	2.28-6.0	unconfined	3.72	NA	0.321	1.56	2.80E-02	7.94E+01	Qvf	pumping	yes	early match	(14)
O-1	12/18/91	Boulton	477.33	2.28-6.0	unconfined	3.72	NA	0.321	1.56	7.80E-03	2.21E+01	Qvf	pumping	no	late match	(14)
O-2	12/18/91	Jacob	477.33	2.35-6.0	unconfined	3.65	NA	0.325	1.56	1.80E-02	5.10E+01	Qvf	pumping	yes	late match	(14)
O-2	12/18/91	Theis	890	2.35-6.0	unconfined	3.65	NA	0.325	1.56	3.00E-02	8.50E+01	Qvf	recovery	yes	late match	(14)
O-2	12/18/91	Boulton	477.33	2.35-6.0	unconfined	3.65	NA	0.325	1.56	3.10E-02	8.79E+01	Qvf	pumping	yes	early match	(14)
O-2	12/18/91	Boulton	477.33	2.35-6.0	unconfined	3.65	NA	0.325	1.56	1.60E-02	4.54E+01	Qvf	pumping	no	late match	(14)
O-3	12/18/91	Jacob	477.33	2.63-6.0	unconfined	3.37	NA	0.601	1.56	1.70E-02	4.82E+01	Qvf	pumping	yes	late match	(14)
O-3	12/18/91	Theis	890	2.63-6.0	unconfined	3.37	NA	0.601	1.56	3.00E-02	8.50E+01	Qvf	recovery	yes	late match	(14)
O-3	12/18/91	Boulton	477.33	2.63-6.0	unconfined	3.37	NA	0.601	1.56	5.90E-03	1.67E+01	Qvf	pumping	no	early match	(14)
O-3	12/18/91	Boulton	477.33	2.63-6.0	unconfined	3.37	NA	0.601	1.56	5.90E-03	1.67E+01	Qvf	pumping	no	late match	(14)
0166		Thiem	39			22				6.70E-05	1.90E-01	Qrf/Ka?	recovery	no		(1)
0366		Thiem	50			118.5				3.70E-07	1.05E-03	Ka?	recovery	no		(1)
0174	12/85	Thiem	81.5	unknown		9.3		7.69	2.53	4.00E-05	1.13E-01	Ka?	recovery	no		(1)
2174		Thiem	70			238.4				2.00E-07	5.67E-04	Ka?	recovery	no		(1)
2274	12/85	Thiem	1466	unknown		175.5		9.48	0.71	2.70E-07	7.65E-04	Ka?	recovery	no		(1)
0181		Thiem	44			10				8.60E-05	2.44E-01	Qvf?	recovery	no		(1)
0881		Theis	62.5			151.5				3.20E-06	9.07E-03	Ka?	recovery	no		(1)
0981		Thiem	39.5			27.6				2.90E-05	8.22E-02	Qrf?	recovery	no		(1)
1081		Thiem	117			13		7.37	7.82	2.90E-03	8.22E+00	Qrf?	recovery	no		(1)
0386		Thiem	35	10.36-23.67	unconfined	12.6	11.07	8.93		8.00E-05	2.27E-01	KaKlss(w)	recovery	yes		WWE
0886		Theis	5685	59.08-63.79		4.71		46.49	0.146	7.00E-08	1.98E-04	KaKlslt(u)	bailer/recovery	yes	RF Weston	(10)
0886		?								5.00E-07	1.42E-03			ND		(10)
0886		?								5.00E-06	1.42E-02			ND		(10)
0886		Thiem		33.50-43.53		10.03	5.14		0.0365	6.90E-06	1.96E-02	Ka	packer	ND	1st P1/3 test	(10)
0886		Thiem		33.50-43.53		10.03	5.14		0.0295	5.10E-06	1.45E-02	Ka	packer	ND	P2/3 test	(10)
0886		Thiem		33.50-43.53		10.03	5.14		0.0156	3.10E-06	8.79E-03	Ka	packer	ND	2nd P1/3 test	(10)
0886		Thiem		43.50-53.53		10.03	5.14		0.0014	2.10E-07	5.95E-04	Ka	packer	ND	P2/3 test	(10)
0886		Thiem		53.50-63.53		10.03	5.14		0.0063	1.10E-06	3.12E-03	Ka	packer	ND	1st P1/3 test	
0886		Thiem		53.50-63.53		10.03	5.14		0.00027	3.00E-08	8.50E-05	Ka	packer	ND	P2/3 test	
0986		Theis	5989	122.57-135.35	confined	12.78	64.3	58.76	0.109	4.00E-08	1.13E-04	KaKlss(u)	bailer/recovery	yes	RF Weston	(10)
0986		Thiem		87.64-97.67	confined	10.03	67.42		0	<1E-08	0.00E+00	Ka	packer	ND	1st P1/3 test	(10)
0986		Thiem		87.64-97.67	confined	10.03	67.42		0.00061	1.00E-08	2.83E-05	Ka	packer	ND	P2/3 test	(10)
0986		Thiem		87.64-97.67	confined	10.03	67.42		0	<1E-08	0.00E+00	Ka	packer	ND	2nd P1/3 test	(10)
0986		Thiem		97.67-107.70	confined	10.03	67.42		0.0022	6.00E-08	1.70E-04	Ka	packer	ND	1st P1/3 test	(10)
0986		Thiem		97.67-107.70	confined	10.03	67.42		0.0012	3.00E-08	8.50E-05	Ka	packer	ND	P2/3 test	(10)
0986		Thiem		107.70-117.93	confined	10.23	67.42		0.0001	<1E-08	0.00E+00	Ka	packer	ND	1st P1/3 test	(10)
0986		Thiem		107.70-117.93	confined	10.23	67.42		0.00061	1.00E-08	2.83E-05	Ka	packer	ND	P2/3 test	(10)

Table G-1
Hydraulic Data

Well ID	Date Tested	Analysis Method	Test Duration (min.)	Interval Tested (ft.)	Aquifer Conditions	Initial Saturated Thickness (ft.)	Depth to Water (ft.)	Maximum Drawdown (ft.)	Average Discharge (gpm)	Hydraulic Conductivity (cm/sec)	Hydraulic Conductivity (ft/d)	Lithologic Unit Tested	Type of Test	Data Usable?	Comments	Source
0986		Thiem		107.70-117.93	confined	10.23	67.42		0	<1E-08	0.00E+00	Ka	packer	ND	2nd P1/3 test	(10)
0986		Thiem		121.00-131.03	confined	10.03	67.42		0.0041	9.00E-08	2.55E-04	Ka	packer	ND	1st P1/3 test	(10)
0986		Thiem		121.00-131.03	confined	10.03	67.42		0.002	4.00E-08	1.13E-04	Ka	packer	ND	P2/3 test	(10)
0986		Thiem		121.00-131.03	confined	10.03	67.42		0	<1E-08	0.00E+00	Ka	packer	ND	2nd P1/3 test	(10)
0986		Thiem		135.00-145.03	confined	10.03	67.42		0.0056	1.20E-07	3.40E-04	Ka	packer	ND	1st P1/3 test	(10)
0986		Thiem		135.00-145.03	confined	10.03	67.42		0.00061	1.00E-08	2.83E-05	Ka	packer	ND	P2/3 test	(10)
0986		Thiem		135.00-145.03	confined	10.03	67.42		0.00061	1.00E-08	2.83E-05	Ka	packer	ND	2nd P1/3 test	(10)
1086		Theis		11.05-23.78	unconfined	12.73	11.05	12.49	0.429	1.40E-06	3.97E-03	Qrf	bailer/recovery	yes	Reanalysis of Hydrosearch data	(8)(10)(19)
1286	9/26/86	Thiem	18.8	4.08-11.3	unconfined	7.22	4.08	5.88		2.00E-04	5.67E-01	Qvf	bailer/recovery	no		(8)
1486	9/26/86	Theis	4775	39.42-55.36	confined	15.94	14.8	39.99	0.277	1.90E-07	5.39E-04	KaKlss(u)	bailer/recovery	yes	Reanalysis of Hydrosearch data	(8)(19)
1486	9/2/86	Thiem		32.46-43.64	confined	11.18	10.86		0.0034	7.80E-07	2.21E-03	KaKlclst(u)	packer	yes	1st P1/3 test	(8)
1486	9/2/86	Thiem		32.46-43.64	confined	11.18	10.86		0.0321	3.50E-06	9.92E-03	KaKlclst(u)	packer	yes	P2/3 test	(8)
1486	9/2/86	Thiem		32.46-43.64	confined	11.18	10.86		0.0039	8.80E-07	2.49E-03	KaKlclst(u)	packer	yes	2nd P1/3 test	(8)
1486	9/2/86	Thiem		43.26-54.44	confined	11.18	10.86		0.0091	2.10E-06	5.95E-03	KaKlss(u)	packer	yes	1st P1/3 test	(8)
1486	9/2/86	Thiem		43.26-54.44	confined	11.18	10.86		0.0596	7.30E-06	2.07E-02	KaKlss(u)	packer	yes	P2/3 test	(8)
1486	9/2/86	Thiem		43.26-54.44	confined	11.18	10.86		0.0028	6.50E-07	1.84E-03	KaKlss(u)	packer	yes	2nd P1/3 test	(8)
1486	9/2/86	Thiem		53.91-65.09	confined	11.18	10.86		0.001	2.50E-07	7.09E-04	KaKlclst(u)	packer	yes	1st P1/3 test	(8)
1486	9/2/86	Thiem		53.91-65.09	confined	11.18	10.86		0.0343	2.40E-06	6.80E-03	KaKlclst(u)	packer	yes	P2/3 test	(8)
1486	9/2/86	Thiem		53.91-65.09	confined	11.18	10.86		0.001	2.40E-07	6.80E-04	KaKlclst(u)	packer	yes	2nd P1/3 test	(8)
1586	9/26/86	Theis	199	4.33-14.69	unconfined	10.36	4.33	6.61	0.872	4.30E-05	1.22E-01	Qvf	recovery	yes	Reanalysis of Hydrosearch data	(8)(19)
1586		Theis								4.30E-05	1.22E-01	Qvf	recovery	yes	Correction for saturated thickness	
1686	9/26/86	Theis	9999	39.06-45.06	confined	6	10.18	34.88	0.5	6.00E-08	1.70E-04	KaKlss(u)	bailer/recovery	yes	Reanalysis of Hydrosearch data	(8)(19)
1686	8/27/86	Thiem		28.68-38.68	confined	10	5.09		0.011	3.90E-06	1.11E-02	Ka	packer	no	1st P1/3 test	(8)
1686	8/27/86	Thiem		28.68-38.68	confined	10	5.09		0.0248	7.10E-06	2.01E-02	Ka	packer	no	P2/3 test	(8)
1686	8/27/86	Thiem		34.43-44.42	confined	9.99	5.09		0.0043	1.50E-06	4.25E-03	KaKlclst(u)	packer	yes	1st P1/3 test	(8)
1686	8/27/86	Thiem		34.43-44.42	confined	9.99	5.09		0.0067	1.20E-06	3.40E-03	KaKlclst(u)	packer	yes	P2/3 test	(8)
1686	8/27/86	Thiem		34.43-44.42	confined	9.99	5.09		0.007	2.60E-06	7.37E-03	KaKlclst(u)	packer	yes	2nd P1/3 test	(8)
1686	8/27/86	Thiem		42.59-52.59	confined	10	5.09		0.00015	4.00E-08	1.13E-04	KaKlss(u)	packer	yes	1st P1/3 test	(8)
1686	8/27/86	Thiem		42.59-52.59	confined	10	5.09		0.0086	1.30E-06	3.68E-03	KaKlss(u)	packer	yes	P2/3 test	(8)
1686	8/27/86	Thiem		42.59-52.59	confined	10	5.09		0.002	7.20E-07	2.04E-03	KaKlss(u)	packer	yes	2nd P1/3 test	(8)
1686	8/27/86	Thiem		52.43-62.43	confined	10	5.09		0.00069	2.00E-07	5.67E-04	KaKlclst(u)	packer	yes	1st P1/3 test	(8)
1686	8/27/86	Thiem		52.43-62.43	confined	10	5.09		0.0173	1.90E-06	5.39E-03	KaKlclst(u)	packer	yes	P2/3 test	(8)
1686	8/27/86	Thiem		52.43-62.43	confined	10	5.09		0.0011	3.00E-07	8.50E-04	KaKlclst(u)	packer	yes	2nd P1/3 test	(8)
1786	11/19/86	Bouwer/Rice	83	4.63-13.98	unconfined	9.35	4.63	1.17		4.80E-06	1.36E-02	Qvf	airlift/slug	no	selected value	(8)
1786	11/19/86	Hvorslev	83	4.63-13.98	unconfined	9.35	4.63	1.17		6.50E-06	1.84E-02	Qvf	airlift/slug	no	see above	(8)
1786	11/19/86	Cooper et al	83	4.63-13.98	unconfined	9.35	4.63	1.17		7.00E-06	1.98E-02	Qvf	airlift/slug	no	see above	(8)
1786	11/19/86	Ferris/Knowles	83	4.63-13.98	unconfined	9.35	4.63	1.17		2.10E-06	5.95E-03	Qvf	airlift/slug	no	see above	(8)
1986	10/21/86	?	12							?			bailer/recovery	no		(2)
2186	2/2/88	Bouwer/Rice	18.9	35.00-67.20	confined	34	7.27	0.99	NA	5.58E-07	1.58E-03	Qrf	slug	no		(2)
2286	9/26/86	Bouwer/Rice	136	7.27-11.2	unconfined	3.93	7.27	3.93	NA	8.70E-06	2.47E-02	Qrf	bailer/slug	no	selected value	(8)
2286	9/26/86	Hvorslev	136	7.27-11.2	unconfined	3.93	7.27	3.93		4.80E-05	1.36E-01	Qrf	bailer/slug	no	see above	(8)
2286	9/26/86	Cooper et al	136	7.27-11.2	unconfined	3.93	7.27	3.93		1.20E-04	3.40E-01	Qrf	bailer/slug	no	see above	(8)
2286	9/26/86	Ferris/Knowles	136	7.27-11.2	unconfined	3.93	7.27	3.93		3.10E-05	8.79E-02	Qrf	bailer/slug	no	see above	(8)
2386	2/2/88	Bouwer/Rice	22.36	113.00-117.25	confined	5.5	105.55	1.22		2.17E-07	6.15E-04	Ka	slug	no		(2)(8)
2386	9/26/86	Thiem		37.25-48.43	unsaturated	11.18			0.0042	2.00E-07	5.67E-04	Ka	packer	no	1st P1/3 test	(8)
2386	9/26/86	Thiem		41.14-52.35	unsaturated	11.21			0.0078	3.30E-07	9.35E-04	KaKlclst(w)	packer	yes	1st P1/3 test	(8)

759

Table G-1
Hydraulic Data

Well ID	Date Tested	Analysis Method	Test Duration (min.)	Interval Tested (ft.)	Aquifer Conditions	Initial Saturated Thickness (ft.)	Depth to Water (ft.)	Maximum Drawdown (ft.)	Average Discharge (gpm)	Hydraulic Conductivity (cm/sec)	Hydraulic Conductivity (ft/d)	Lithologic Unit Tested	Type of Test	Data Usable?	Comments	Source
2386	9/26/86	Thiem		41.14-52.35	unsaturated	11.21			0.0304	1.10E-06	3.12E-03	KaKlclst(w)	packer	yes	P2/3 test	(8)
2386	9/26/86	Thiem		41.14-52.35	unsaturated	11.21			0.00071	3.00E-08	8.50E-05	KaKlclst(w)	packer	yes	2nd P1/3 test	(8)
2386	9/26/86	Thiem		44.68-52.35	unsaturated	7.67			0.0078	4.30E-07	1.22E-03	KaKlclst(w)	packer	yes	1st P1/3 test (see above)	(8)
2386	9/26/86	Thiem		44.68-52.35	unsaturated	7.67			0.0304	1.40E-06	3.97E-03	KaKlclst(w)	packer	yes	P2/3 test (see above)	(8)
2386	9/26/86	Thiem		44.68-52.35	unsaturated	7.67			0.00071	4.00E-08	1.13E-04	KaKlclst(w)	packer	yes	2nd P1/3 test (see above)	(8)
2386	9/26/86	Thiem		52.35-63.55	unsaturated	11.2			0.001	4.00E-08	1.13E-04	Ka	packer	no	1st P1/3 test	(8)
2386	9/26/86	Thiem		52.35-63.55	unsaturated	11.2			0.0191	9.30E-07	2.64E-03	Ka	packer	no	P2/3 test	(8)
2386	9/26/86	Thiem		52.35-63.55	unsaturated	11.2			0.0017	6.00E-08	1.70E-04	Ka	packer	no	2nd P1/3 test	(8)
2386	9/26/86	Thiem		66.10-77.30	unsaturated	11.2			0.0025	7.00E-08	1.98E-04	KaKlslt(u)	packer	yes	1st P1/3 test	(8)
2386	9/26/86	Thiem		66.10-77.30	unsaturated	11.2			0.0148	3.60E-07	1.02E-03	KaKlslt(u)	packer	yes	P2/3 test	(8)
2386	9/26/86	Thiem		66.10-77.30	unsaturated	11.2			0.0003	1.00E-08	2.83E-05	KaKlslt(u)	packer	yes	2nd P1/3 test	(8)
2386	9/26/86	Thiem		67.80-79.00	unsaturated	11.2			0.0222	6.30E-07	1.79E-03	Ka	packer	no	1st P1/3 test	(8)
2386	9/26/86	Thiem		71.80-83.00	unsaturated	11.2			0.0091	4.80E-07	1.36E-03	Ka	packer	no	1st P1/3 test	(8)
2386	9/26/86	Thiem		78.00-79.00	unsaturated	1			0.0222	3.10E-06	8.79E-03	Ka	packer	no	1st P1/3 test (see above)	(8)
2386	9/26/86	Thiem		82.72-93.92	unsaturated	11.2			0.0122	2.90E-07	8.22E-04	Ka	packer	no	1st P1/3 test	(8)
2386	9/26/86	Thiem		84.05-95.25	unsaturated	11.2			0.0156	3.60E-07	1.02E-03	Ka	packer	no	1st P1/3 test	(8)
2386	9/26/86	Thiem		104.21-115.40	unsaturated	11.19			0.0032	6.00E-08	1.70E-04	KaKlslt(u)	packer	yes	1st P1/3 test	(8)
2386	9/26/86	Thiem		104.21-115.40	unsaturated	11.19			0.0077	1.40E-07	3.97E-04	KaKlslt(u)	packer	yes	2nd P1/3 test	(8)
2586	11/12/86	Theis	3031	74.04-82.00	unconfined ?	7.96	74.04	8.71	0.0593	7.00E-08	1.98E-04	Ka	bailer/recovery	no	need correction for b=7.96'	(8)
2586	11/12/86	Theis	3031	74.04-82.00	unconfined ?	7.96	74.04	8.71	0.0593	1.87E-05	5.30E-02	KaKlclst(u)	bailer/recovery	yes	Late-time Theis recovery reanalysis	(19)
2586	9/6/86	Thiem		35.88-47.06	unsaturated	11.18			0.0096	7.80E-07	2.21E-03	KaKlclst(w)	packer	yes	1st P1/3 test	(8)
2586	9/6/86	Thiem		35.88-47.06	unsaturated	11.18			0.0305	2.10E-06	5.95E-03	KaKlclst(w)	packer	yes	P2/3 test	(8)
2586	9/6/86	Thiem		35.88-47.06	unsaturated	11.18			0.0037	3.20E-07	9.07E-04	KaKlclst(w)	packer	yes	2nd P1/3 test	(8)
2586	9/6/86	Thiem		48.05-59.23	unsaturated	11.18			0.00013	1.00E-08	2.83E-05	Ka	packer	no	1st P1/3 test	(8)
2586	9/6/86	Thiem		48.05-59.23	unsaturated	11.18			0.00043	2.00E-08	5.67E-05	Ka	packer	no	P2/3 test	(8)
2586	9/6/86	Thiem		58.86-70.04	unsaturated	11.18			0.00043	2.00E-08	5.67E-05	KaKlclst(u)	packer	yes	1st P1/3 test	(8)
2586	9/6/86	Thiem		58.86-70.04	unsaturated	11.18			0.014	5.90E-07	1.67E-03	KaKlclst(u)	packer	yes	P2/3 test	(8)
2586	9/6/86	Thiem		58.86-70.04	unsaturated	11.18			0.0059	3.30E-07	9.35E-04	KaKlclst(u)	packer	yes	2nd P1/3 test	(8)
2586	9/6/86	Thiem		69.36-80.54	unconfined ?	11.18	69.92		0.00046	2.00E-08	5.67E-05	KaKlclst(u)	packer	yes	1st P1/3 test	(8)
2586	9/6/86	Thiem		69.36-80.54	unconfined ?	11.18	69.92		0.0743	2.70E-06	7.65E-03	KaKlclst(u)	packer	yes	P2/3 test	(8)
2586	9/6/86	Thiem		69.36-80.54	unconfined ?	11.18	69.92		0.0159	7.70E-07	2.18E-03	KaKlclst(u)	packer	yes	2nd P1/3 test	(8)
2586	9/6/86	Thiem		83.29-94.47	unconfined ?	11.18	69.92		0.0028	1.40E-07	3.97E-04	Ka	packer	no	1st P1/3 test	(8)
2586	9/6/86	Thiem		83.29-94.47	unconfined ?	11.18	69.92		0.0586	2.00E-06	5.67E-03	Ka	packer	no	P2/3 test	(8)
2586	9/6/86	Thiem		83.29-94.47	unconfined ?	11.18	69.92		0.0607	3.10E-06	8.79E-03	Ka	packer	no	2nd P1/3 test	(8)
2686	11/12/86	Bouwer/Rice	8792	3.95-11.00	unconfined	7.05	3.95	6.85	NA	4.00E-08	1.13E-04	Fill ?	bailer/slug	no	Preferred value	(8)
2686	11/12/86	Hvorslev	8792	3.95-11.00	unconfined	7.05	3.95	6.85	NA	2.90E-08	8.22E-05	Fill?	bailer/slug	no	see above	(8)
2686	11/12/86	Cooper et al	8792	3.95-11.00	unconfined	7.05	3.95	6.85	NA	3.30E-07	9.35E-04	Fill?	bailer/slug	no	see above	(8)
2686	11/12/86	Ferris/Knowles	8792	3.95-11.00	unconfined	7.05	3.95	6.85	NA	2.10E-05	5.95E-02	Fill?	bailer/slug	no	see above	(8)
2686	11/12/86	Theis	8792	3.95-11.00	unconfined	7.05	3.95	6.85	NA	1.98E-05	5.61E-02	Qrf	slug	yes	Late-time Theis recovery reanalysis	(19)
2786	11/11/86	Theis	4465	128.50-133.00	confined?	4.5	126.65	4.98	0.0833	1.90E-07	5.39E-04	KaKlslt(u)	bailer/recovery	yes		(8)
2786	9/15/86	Thiem		24.65-35.84	unsaturated	11.19	129.14		0.0197	2.00E-06	5.67E-03	Ka	packer	no	1st P1/3 test	(8)
2786	9/15/86	Thiem		24.65-35.84	unsaturated	11.19	129.14		0.0147	1.40E-06	3.97E-03	Ka	packer	no	P2/3 test	(8)
2786	9/15/86	Thiem		35.84-47.03	unsaturated	11.19	129.14		0.0059	4.70E-07	1.33E-03	KaKlclst(w)	packer	yes	1st P1/3 test	(8)
2786	9/15/86	Thiem		35.84-47.03	unsaturated	11.19	129.14		0.0093	6.50E-07	1.84E-03	KaKlclst(w)	packer	yes	P2/3 test	(8)
2786	9/15/86	Thiem		35.84-47.03	unsaturated	11.19	129.14		0.00051	4.00E-08	1.13E-04	KaKlclst(w)	packer	yes	2nd P1/3 test	(8)
2786	9/15/86	Thiem		42.58-53.77	unsaturated	11.19	129.14		0.0001	1.00E-08	2.83E-05	Ka	packer	no	1st P1/3 test	(8)

760

Table G-1
Hydraulic Data

Well ID	Date Tested	Analysis Method	Test Duration (min.)	Interval Tested (ft.)	Aquifer Conditions	Initial Saturated Thickness (ft.)	Depth to Water (ft.)	Maximum Drawdown (ft.)	Average Discharge (gpm)	Hydraulic Conductivity (cm/sec)	Hydraulic Conductivity (ft/d)	Lithologic Unit Tested	Type of Test	Data Usable?	Comments	Source
2786	9/15/86	Thiem		42.58-53.77	unsaturated	11.19	129.14		0.0001	1.00E-08	2.83E-05	Ka	packer	no	P2/3 test	(8)
2786	9/15/86	Thiem		42.58-53.77	unsaturated	11.19	129.14		0	<1E-08	0.00E+00	Ka	packer	no	2nd P1/3 test	(8)
2786	9/15/86	Thiem		70.96-82.15	unsaturated	11.19	129.14		0.0215	1.00E-06	2.83E-03	KaKlclst(u)	packer	yes	1st P1/3 test	(8)
2786	9/15/86	Thiem		70.96-82.15	unsaturated	11.19	129.14		0.0831	3.00E-06	8.50E-03	KaKlclst(u)	packer	yes	P2/3 test	(8)
2786	9/15/86	Thiem		70.96-82.15	unsaturated	11.19	129.14		0.0356	1.70E-06	4.82E-03	KaKlclst(u)	packer	yes	2nd P1/3 test	(8)
2786	9/15/86	Thiem		82.15-93.34	unsaturated	11.19	129.14		0.0041	1.70E-07	4.82E-04	KaKlclst(u)	packer	yes	1st P1/3 test	(8)
2786	9/15/86	Thiem		82.15-93.34	unsaturated	11.19	129.14		0.1234	3.80E-06	1.08E-02	KaKlclst(u)	packer	yes	P2/3 test	(8)
2786	9/15/86	Thiem		82.15-93.34	unsaturated	11.19	129.14		0.0089	3.80E-07	1.08E-03	KaKlclst(u)	packer	yes	2nd P1/3 test	(8)
2786	9/15/86	Thiem		96.43-107.62	unsaturated	11.19	129.14		0.0085	3.10E-07	8.79E-04	KaKlclst(u)	packer	yes	1st P1/3 test	(8)
2786	9/15/86	Thiem		96.43-107.62	unsaturated	11.19	129.14		0.0078	2.10E-07	5.95E-04	KaKlclst(u)	packer	yes	P2/3 test	(8)
2786	9/15/86	Thiem		96.43-107.62	unsaturated	11.19	129.14		0.001	4.00E-08	1.13E-04	KaKlclst(u)	packer	yes	2nd P1/3 test	(8)
2786	9/15/86	Thiem		107.62-118.81	unsaturated	11.19	129.14		0.0004	1.00E-08	2.83E-05	KaKlclst(u)	packer	yes	1st P1/3 test	(8)
2786	9/15/86	Thiem		107.62-118.81	unsaturated	11.19	129.14		0.0036	9.00E-08	2.55E-04	KaKlclst(u)	packer	yes	P2/3 test	(8)
2786	9/15/86	Thiem		107.62-118.81	unsaturated	11.19	129.14		0.0002	1.00E-08	2.83E-05	KaKlclst(u)	packer	yes	2nd P1/3 test	(8)
2786	9/15/86	Thiem		118.81-130.00	unsaturated	11.19	129.14		0.0004	1.00E-08	2.83E-05	KaKlclst(u)	packer	yes	1st P1/3 test	(8)
2786	9/15/86	Thiem		118.81-130.00	unsaturated	11.19	129.14		0.0051	1.10E-07	3.12E-04	KaKlclst(u)	packer	yes	P2/3 test	(8)
2786	9/15/86	Thiem		118.81-130.00	unsaturated	11.19	129.14		0.00061	2.00E-08	5.67E-05	KaKlclst(u)	packer	yes	2nd P1/3 test	(8)
2786	9/15/86	Thiem		130.00-141.19	unconfined?	11.19	129.14		0.0003	1.00E-08	2.83E-05	KaKlclst(u)	packer	yes	1st P1/3 test	(8)
2786	9/15/86	Thiem		130.00-141.19	unconfined?	11.19	129.14		0.0276	5.80E-07	1.64E-03	KaKlclst(u)	packer	yes	P2/3 test	(8)
2786	9/15/86	Thiem		130.00-141.19	unconfined?	11.19	129.14		0.0026	8.00E-08	2.27E-04	KaKlclst(u)	packer	yes	2nd P1/3 test	(8)
2786	9/15/86	Thiem		138.37-149.56	unconfined?	11.19	129.14		0.00051	1.00E-08	2.83E-05	KaKlclst(u)	packer	yes	1st P1/3 test	(8)
2786	9/15/86	Thiem		138.37-149.56	unconfined?	11.19	129.14		0.0027	6.00E-08	1.70E-04	KaKlclst(u)	packer	yes	P2/3 test	(8)
2786	9/15/86	Thiem		138.37-149.56	unconfined?	11.19	129.14		0	<1E-08	0.00E+00	KaKlclst(u)	packer	yes	2nd P1/3 test	(8)
2886	11/11/86	Theis	10592	6.19-9.96	unconfined	3.77	6.19	2.61	0.069	5.10E-07	1.45E-03	Qrf	bailer/recovery	no	check b; u>0.01	(8)
2886	11/11/86	Theis	10592	6.19-9.96	unconfined	3.77	6.19	2.61	0.06	6.81E-07	1.93E-03	Qrf	bailer/recovery	yes	Reanalysis for saturated thickness and Q	(19)
3086	11/13/86	Theis	6134	4.11-14.93	unconfined	10.82	4.11	10.23	0.22	8.60E-07	2.44E-03	KaKlclst(w)	bailer/recovery	yes		(8)
3086	1994	Hvorslev	8400	3.19-16.09	unconfined	8.95	7.14	10.4	NA	7.62E-06	2.16E-02	KaKlclst(w)	slug	ND		(17)
3086	1994	Bouwer/Rice	8400	3.19-16.09	unconfined	8.95	7.14	10.4	NA	2.39E-05	6.77E-02	KaKlclst(w)	slug	ND		(17)
3086	1994									2.39E-05	6.77E-02	KaKlclst(w)	slug	yes		(17), Recommended Value
3286	11/10/86	Theis	3134	114.90-125.50	confined	10.6	108.05	18.08	0.0581	9.00E-08	2.55E-04	KaKlss(u)	bailer/recovery	yes		(8)
3286	9/26/86	Thiem		35.20-45.20	unsaturated	10	63.88		0	<1E-08	0.00E+00	Ka	packer	no	1st P1/3 test	(8)
3286	9/26/86	Thiem		35.20-45.20	unsaturated	10	63.88		0.001	8.00E-08	2.27E-04	Ka	packer	no	P2/3 test	(8)
3286	9/26/86	Thiem		35.20-45.20	unsaturated	10	63.88		0	<1E-08	0.00E+00	Ka	packer	no	2nd P1/3 test	(8)
3286	9/26/86	Thiem		45.20-55.20	unsaturated	10	63.88		0.008	5.60E-07	1.59E-03	KaKlclst(u)	packer	yes	1st P1/3 test	(8)
3286	9/26/86	Thiem		45.20-55.20	unsaturated	10	63.88		0.0135	8.10E-07	2.30E-03	KaKlclst(u)	packer	yes	P2/3 test	(8)
3286	9/26/86	Thiem		45.20-55.20	unsaturated	10	63.88		0.002	1.40E-07	3.97E-04	KaKlclst(u)	packer	yes	2nd P1/3 test	(8)
3286	9/26/86	Thiem		55.20-65.20	unsaturated	10	63.88		0.0047	2.80E-07	7.94E-04	Ka	packer	no	1st P1/3 test	(8)
3286	9/26/86	Thiem		55.20-65.20	unsaturated	10	63.88		0.0012	6.00E-08	1.70E-04	Ka	packer	no	P2/3 test	(8)
3286	9/26/86	Thiem		65.20-75.20	confined	10	63.88		0.0078	4.60E-07	1.30E-03	KaKlclst(u)	packer	yes	1st P1/3 test	(8)
3286	9/26/86	Thiem		65.20-75.20	confined	10	63.88		0.0141	6.40E-07	1.81E-03	KaKlclst(u)	packer	yes	P2/3 test	(8)
3286	9/26/86	Thiem		65.20-75.20	confined	10	63.88		0.0031	1.90E-07	5.39E-04	KaKlclst(u)	packer	yes	2nd P1/3 test	(8)
3286	9/26/86	Thiem		75.20-85.20	confined	10	63.88		0.0014	8.00E-08	2.27E-04	KaKlclst(u)	packer	yes	1st P1/3 test	(8)
3286	9/26/86	Thiem		75.20-85.20	confined	10	63.88		0.0086	3.70E-07	1.05E-03	KaKlclst(u)	packer	yes	P2/3 test	(8)
3286	9/26/86	Thiem		75.20-85.20	confined	10	63.88		0.001	6.00E-08	1.70E-04	KaKlclst(u)	packer	yes	2nd P1/3 test	(8)
3286	9/26/86	Thiem		85.20-95.20	confined	10	63.88		0.0026	1.50E-07	4.25E-04	KaKlclst(u)	packer	yes	1st P1/3 test	(8)
3286	9/26/86	Thiem		85.20-95.20	confined	10	63.88		0.0018	7.00E-08	1.98E-04	KaKlclst(u)	packer	yes	P2/3 test	(8)
3286	9/26/86	Thiem		85.20-95.20	confined	10	63.88		0.001	6.00E-08	1.70E-04	KaKlclst(u)	packer	yes	2nd P1/3 test	(8)

761

Table G-1
Hydraulic Data

Well ID	Date Tested	Analysis Method	Test Duration (min.)	Interval Tested (ft.)	Aquifer Conditions	Initial Saturated Thickness (ft.)	Depth to Water (ft.)	Maximum Drawdown (ft.)	Average Discharge (gpm)	Hydraulic Conductivity (cm/sec)	Hydraulic Conductivity (ft/d)	Lithologic Unit Tested	Type of Test	Data Usable?	Comments	Source
3286	9/26/86	Thiem		95.20-105.20	confined	10	63.88		0.0064	3.70E-07	1.05E-03	KaKlclst(u)	packer	yes	1st P1/3 test	(8)
3286	9/26/86	Thiem		95.20-105.20	confined	10	63.88		0.0105	4.10E-07	1.16E-03	KaKlclst(u)	packer	yes	P2/3 test	(8)
3286	9/26/86	Thiem		95.20-105.20	confined	10	63.88		0.0011	7.00E-08	1.98E-04	KaKlclst(u)	packer	yes	2nd P1/3 test	(8)
3286	9/26/86	Thiem		95.20-105.92	confined	10.72	63.88		0.0064	3.50E-07	9.92E-04	KaKlclst(u)	packer	yes	1st P1/3 test (see above)	(8)
3286	9/26/86	Thiem		95.20-105.92	confined	10.72	63.88		0.0105	3.90E-07	1.11E-03	KaKlclst(u)	packer	yes	P2/3 test (see above)	(8)
3286	9/26/86	Thiem		95.20-105.92	confined	10.72	63.88		0.0011	6.00E-08	1.70E-04	KaKlclst(u)	packer	yes	2nd P1/3 test (see above)	(8)
3286	9/26/86	Thiem		105.20-115.20	confined	10	63.88		0.001	6.00E-08	1.70E-04	KaKlclst(u)	packer	yes	1st P1/3 test	(8)
3286	9/26/86	Thiem		105.20-115.20	confined	10	63.88		0.0123	4.60E-07	1.30E-03	KaKlclst(u)	packer	yes	P2/3 test	(8)
3286	9/26/86	Thiem		105.20-115.20	confined	10	63.88		0.0022	1.30E-07	3.68E-04	KaKlclst(u)	packer	yes	2nd P1/3 test	(8)
3286	9/26/86	Thiem		116.08-126.08	confined	10	63.88		0.0065	3.80E-07	1.08E-03	KaKlss(u)	packer	yes	1st P1/3 test	(8)
3286	9/26/86	Thiem		116.08-126.08	confined	10	63.88		0.0131	4.70E-07	1.33E-03	KaKlss(u)	packer	yes	P2/3 test	(8)
3286	9/26/86	Thiem		116.08-126.08	confined	10	63.88		0.0037	2.20E-07	6.24E-04	KaKlss(u)	packer	yes	2nd P1/3 test	(8)
3486	9/26/86	Theis	140	44.24-56.25	confined	12.01	20.8	33.59	0.409	3.10E-06	8.79E-03	KaKlslt(u)	bailer/recovery	yes		(8)(9)
3486	10/14/87	Cooper et al	30.33	44.24-56.25	confined	10.6	20.82	1.26	NA	3.50E-06	9.92E-03	Ka	slug	no		(4a)
3486	10/14/87	Bouwer/Rice	30.33	44.24-56.25	confined	10.6	20.82	1.26	NA	1.10E-05	3.12E-02	KaKlslt(u)	slug	yes		(4a)
3486	10/22/87	Bouwer/Rice	42.33	44.24-56.25	confined	100	20.82	8.65	NA	1.01E-06	2.86E-03	Ka	slug	no	superseded by (4a)	(4b)
3486	10/14/87	Cooper	30.33	44.24-56.25	confined	10.6		1.26		1.33E-05	3.77E-02	KaKlslt(u)	slug	yes	Reanalysis of 10/14/87 data	(19)
3486	8/29/86	Thiem		46.10-56.00	confined	9.99	20.46		0.0124	1.70E-06	4.82E-03	Ka	packer	no	1st P1/3 test	(8)(9)
3486	8/29/86	Thiem		46.10-56.00	confined	9.99	20.46		0	<1E-08	0.00E+00	Ka	packer	no	P2/3 test	(8)(9)
3486	8/29/86	Thiem		46.10-56.00	confined	9.99	20.46		0.045	6.30E-06	1.79E-02	Ka	packer	no	2nd P1/3 test	(8)(9)
3486	8/29/86	Thiem		55.01-65.00	confined	9.99	20.46		0.0285	4.10E-06	1.16E-02	KaKlss(u)	packer	yes	1st P1/3 test	(8)(9)
3486	8/29/86	Thiem		55.01-65.00	confined	9.99	20.46		0.0675	5.70E-06	1.62E-02	KaKlss(u)	packer	yes	P2/3 test	(8)(9)
3486	8/29/86	Thiem		55.01-65.00	confined	9.99	20.46		0.0107	1.60E-06	4.54E-03	KaKlss(u)	packer	yes	2nd P1/3 test	(8)(9)
3486	8/29/86	Thiem		76.71-86.70	confined	9.99	20.46		0.0058	4.70E-07	1.33E-03	Ka	packer	no	1st P1/3 test	(8)(9)
3486	8/29/86	Thiem		85.10-95.09	confined	9.99	20.46		0.0041	5.60E-07	1.59E-03	KaKlss(u)	packer	yes	1st P1/3 test	(8)(9)
3486	8/29/86	Thiem		85.10-95.09	confined	9.99	20.46		0.0643	4.30E-06	1.22E-02	KaKlss(u)	packer	yes	P2/3 test	(8)(9)
3486	8/29/86	Thiem		85.10-95.09	confined	9.99	20.46		0	<1E-08	0.00E+00	KaKlss(u)	packer	yes	2nd P1/3 test	(8)(9)
3586	9/25/86	Theis		6.94-11.60	unconfined	4.66	6.94	4.23	0.25	2.60E-05	7.37E-02	Qvf	bailer/recovery	no	check b	(8)(9)
3586		Theis								3.13E-05	8.87E-02	Qvf	bailer/recovery	yes	Correction for saturated thickness	
3586	10/14/87	Bouwer/Rice	58.42	7.04-11.60	unconfined	4.59	7.04	0.64	NA	1.40E-04	3.97E-01	Qvf	slug	yes		(4a)
3586	10/22/87	Bouwer/Rice	58.42	7.04-11.60	unconfined	100	7.04	4.35	NA	8.77E-06	2.49E-02	Qvf	slug	no	superseded by (4a)	(4b)
3886	1994	Hvorslev	5800	8.50-10.73	unconfined	2.23	8.5	9.66	NA	1.98E-06	5.62E-03	Qvf	slug	ND		(17)
3886	1994	Bouwer/Rice	5800	8.50-10.73	unconfined	2.23	8.5	9.66	NA	3.25E-06	9.22E-03	Qvf	slug	ND		(17)
3886	1994									3.25E-06	9.22E-03	Qvf	slug	yes		(17), Recommended Value
3986	9/25/86			23.85-31.50	unconfined	7.65	23.85	2.97		3.70E-04	1.05E+00	Qrf	pumping	no		(9)
3986		Theis								1.72E-03	4.88E+00	Qrf	pumping	yes	Theis recovery reanalysis	(19)
4086	1/26/88	Bouwer/Rice	12.68	95.14-111.50	unconfined	16.36	95.14	1.12		1.20E-05	3.40E-02	Ka	slug	no		(2)
4086	1/26/88	Cooper et al	12.68	95.14-111.50	unconfined	16.36	95.14	1.14		2.40E-06	6.80E-03	KaKlclst(u)	slug	yes		(2)
4086	10/7/86	Thiem		63.00-73.03	unsaturated	10.03	91		0.0023	1.30E-07	3.35E-02	KaKlclst(u)	packer	yes	1st P1/3 test	(9)
4086	10/7/86	Thiem		63.00-73.03	unsaturated	10.03	91		0.0131	5.70E-07	1.62E-03	KaKlclst(u)	packer	yes	P2/3 test	(9)
4086	10/7/86	Thiem		63.00-73.03	unsaturated	10.03	91		0.0035	1.90E-07	5.39E-04	KaKlclst(u)	packer	yes	2nd P1/3 test	(9)
4086	10/7/86	Thiem		92.00-102.03	unconfined	10.03	91		0.0027	1.20E-07	3.40E-04	KaKlclst(u)	packer	yes	1st P1/3 test	(9)
4086	10/7/86	Thiem		92.00-102.03	unconfined	10.03	91		0.0091	2.80E-07	7.94E-04	KaKlclst(u)	packer	yes	P2/3 test	(9)
4086	10/7/86	Thiem		92.00-102.03	unconfined	10.03	91		0.0012	5.00E-08	1.42E-04	KaKlclst(u)	packer	yes	2nd P1/3 test	(9)
4086	10/7/86	Thiem		102.00-112.03	unconfined	10.03	91		0.0021	9.00E-08	2.55E-04	KaKlclst(u)	packer	yes	1st P1/3 test	(9)
4086	10/7/86	Thiem		102.00-112.03	unconfined	10.03	91		0.0087	2.90E-07	8.22E-04	KaKlclst(u)	packer	yes	P2/3 test	(9)
4086	10/7/86	Thiem		102.00-112.03	unconfined	10.03	91		0.003	1.30E-07	3.68E-04	KaKlclst(u)	packer	yes	2nd P1/3 test	(9)

762

Table G-1
Hydraulic Data

Well ID	Date Tested	Analysis Method	Test Duration (min.)	Interval Tested (ft.)	Aquifer Conditions	Initial Saturated Thickness (ft.)	Depth to Water (ft.)	Maximum Drawdown (ft.)	Average Discharge (gpm)	Hydraulic Conductivity (cm/sec)	Hydraulic Conductivity (ft/d)	Lithologic Unit Tested	Type of Test	Data Usable?	Comments	Source
4086	10/7/86	Thiem		113.00-123.03	unconfined	10.03	91		0.0093	4.00E-07	1.13E-03	KaKlclst(u)	packer	yes	1st P1/3 test	(9)
4086	10/7/86	Thiem		113.00-123.03	unconfined	10.03	91		0.1127	3.30E-06	9.35E-03	KaKlclst(u)	packer	yes	P2/3 test	(9)
4086	10/7/86	Thiem		113.00-123.03	unconfined	10.03	91		0.009	3.80E-07	1.08E-03	KaKlclst(u)	packer	yes	2nd P1/3 test	(9)
4086	1994	Hvorslev	8400	102.88-112.69	unconfined	9.81	102.88	105.24	NA	4.47E-07	1.27E-03	KaKlclst(u)	slug	ND		(17)
4086	1994	Bouwer/Rice	8400	102.88-112.69	unconfined	9.81	102.88	105.24	NA	2.69E-07	7.63E-04	KaKlclst(u)	slug	ND		(17)
4086	1994									4.47E-07	1.27E-03	KaKlclst(u)	slug	yes		(17), Recommended Value
4186				24.91-44.70	unconfined	19.79	24.91	19.07				Qrf	bailer/recovery	no		(9)
4186		Theis								1.67E-04	4.73E-01	Qrf	bailer/recovery	yes	Late-time Theis recovery reanalysis	(19)
4286	10/14/87	Bouwer/Rice	0.25	19.96-29.70	unconfined	9.74	19.96	1	NA	5.00E-02	1.42E+02	Qrf	slug	yes		(9)(4a)
4286	10/23/87	Bouwer/Rice	1.27	19.96-29.70	unconfined	9.74	19.96	9.29	NA	1.29E-04	3.66E-01	Qrf	slug	no	superseded by (4a)	(4b)
4486	1994	Hvorslev	2600	7.92-30.36	unconfined	22.44	7.92	5.7	NA	3.56E-05	1.01E-01	Qrf	falling head	ND		(17)
4486	1994	Bouwer/Rice	2600	7.92-30.36	unconfined	22.44	7.92	5.7	NA	8.64E-05	2.45E-01	Qrf	falling head	ND		(17)
4486	1994									8.64E-05	2.45E-01	Qrf	slug	yes		(17), Recommended Value
4586	10/22/86	Bouwer/Rice	15	22.01-48.20	unconfined	26.19	22.01	9.36		2.10E-05	5.95E-02	Qrf	airlift/slug	no	preferred method	(10)
4586										2.10E-05	5.95E-02			no	2nd analysis	
4586	10/22/86	Cooper et al	15	22.01-48.20	unconfined	26.19	22.01	9.36		8.20E-05	2.32E-01	Qrf	airlift/slug	no	see above	(10)
4586										3.90E-05	1.11E-01			no	2nd analysis	
4586	10/22/86	Hvorslev	15	22.01-48.20	unconfined	26.19	22.01	9.36		5.60E-05	1.59E-01	Qrf	airlift/slug	no	see above	(10)
4586										2.80E-05	7.94E-02			no	2nd analysis	
4586	10/22/86	Ferris/Knowles	15	22.01-48.20	unconfined	26.19	22.01	9.36		1.80E-05	5.10E-02	Qrf	airlift/slug	no	see above	(10)
4586										4.60E-06	1.30E-02			no	2nd analysis	
4586	10/22/86	Theis	15	22.01-48.20	unconfined	26.19	22.01	9.36		1.47E-05	4.17E-02	Qrf	slug	yes	Theis recovery reanalysis	(19)
4686		Theis	4348	149.21-160.79	unconfined	20.46	149.21	13.42	0.0583	5.20E-08	1.47E-04	Ka	bailer/recovery	no	check b	(9)
4686	10/17/86	Thiem		107.27-117.30	unsaturated	10.03	132.63		0.00069	3.00E-08	8.50E-05	Ka	packer	no	1st P1/3 test	(9)
4686	10/17/86	Thiem		130.22-140.25	unsaturated	10.03	132.63		0.00028	1.00E-08	2.83E-05	KaKlclst(u)	packer	yes	1st P1/3 test	(9)
4686	10/17/86	Thiem		130.22-140.25	unsaturated	10.03	132.63		0.0078	1.70E-07	4.82E-04	KaKlclst(u)	packer	yes	P2/3 test	(9)
4686	10/17/86	Thiem		130.22-140.25	unsaturated	10.03	132.63		0.002	6.00E-08	1.70E-04	KaKlclst(u)	packer	yes	2nd P1/3 test	(9)
4686	10/17/86	Thiem		140.64-150.67	unconfined	10.03	132.63		0.00027	1.00E-08	2.83E-05	KaKlslt(u)	packer	yes	1st P1/3 test	(9)
4686	10/17/86	Thiem		140.64-150.67	unconfined	10.03	132.63		0.0239	5.10E-07	1.45E-03	KaKlslt(u)	packer	yes	P2/3 test	(9)
4686	10/17/86	Thiem		140.64-150.67	unconfined	10.03	132.63		0.0035	1.10E-07	3.12E-04	KaKlslt(u)	packer	yes	2nd P1/3 test	(9)
4686	10/17/86	Thiem		151.00-161.03	unconfined	10.03	132.63		0.0004	1.00E-08	2.83E-05	KaKlslt(u)	packer	yes	1st P1/3 test	(9)
4686	10/17/86	Thiem		151.00-161.03	unconfined	10.03	132.63		0.0036	7.00E-08	1.98E-04	KaKlslt(u)	packer	yes	P2/3 test	(9)
4686	10/17/86	Thiem		151.00-161.03	unconfined	10.03	132.63		0.00048	1.00E-08	2.83E-05	KaKlslt(u)	packer	yes	2nd P1/3 test	(9)
4686	1994	Hvorslev	8400	106.05-164.99	unconfined	58.94	106.05	133.7	NA	3.35E-08	9.50E-05	KaKlslt(u)	slug	ND		(17)
4686	1994	Bouwer/Rice	8400	106.05-164.99	unconfined	58.94	106.05	133.7	NA	2.43E-08	6.90E-05	KaKlslt(u)	slug	ND		(17)
4686	1994	Ramey	8400	106.05-164.99	unconfined	58.94	106.05	133.7	NA	6.70E-09	1.90E-05	KaKlslt(u)	slug	ND		(17)
4686	1994										9.50E-05	KaKlslt(u)	slug	yes		(17), Recommended Value
4786	11/18/86	Theis	75	56.80-94.49	unconfined	37.69	58.87	5.08	0.238	2.60E-05	7.37E-02	Qrf	bailer/recovery	yes		(11)
4886	1/22/88	Bouwer/Rice	27.26	191.99-207.07	confined	9.73	61.75	1.29	NA	1.06E-06	3.01E-03	Ka	slug	no		(2)(11)
4886	1/22/88	Cooper et al	27.26	191.99-207.07	confined	9.73	61.75	1.29	NA	5.40E-07	1.53E-03	Ka	slug	no		(2)(11)
4886	11/3/86	Thiem		101.23-110.88	confined	9.65	54.91		0.00032	2.00E-08	5.67E-05	Ka	packer	no	1st P1/3 test	(11)
4886	11/3/86	Thiem		113.80-123.53	confined	9.73	54.91		0.0025	1.60E-07	4.54E-04	KaKlslt(u)	packer	yes	1st P1/3 test	(11)
4886	11/3/86	Thiem		113.80-123.53	confined	9.73	54.91		0.0013	6.00E-08	1.70E-04	KaKlslt(u)	packer	yes	P2/3 test	(11)
4886	11/3/86	Thiem		113.80-123.53	confined	9.73	54.91		0.00011	1.00E-08	2.83E-05	KaKlslt(u)	packer	yes	2nd P1/3 test	(11)
4886	11/3/86	Thiem		124.69-134.34	confined	9.65	54.91		0.0036	2.30E-07	6.52E-04	KaKlclst(u)	packer	yes	1st P1/3 test	(11)
4886	11/3/86	Thiem		124.69-134.34	confined	9.65	54.91		0.0159	7.00E-07	1.98E-03	KaKlclst(u)	packer	yes	P2/3 test	(11)
4886	11/3/86	Thiem		124.69-134.34	confined	9.65	54.91		0.0015	1.00E-07	2.83E-04	KaKlclst(u)	packer	yes	2nd P1/3 test	(11)

Table G-1
Hydraulic Data

Well ID	Date Tested	Analysis Method	Test Duration (min.)	Interval Tested (ft.)	Aquifer Conditions	Initial Saturated Thickness (ft.)	Depth to Water (ft.)	Maximum Drawdown (ft.)	Average Discharge (gpm)	Hydraulic Conductivity (cm/sec)	Hydraulic Conductivity (ft/d)	Lithologic Unit Tested	Type of Test	Data Usable?	Comments	Source
4886	11/3/86	Thiem		128.05-137.70	confined	9.65	54.91		0.0059	3.80E-07	1.08E-03	Ka	packer	no	1st P1/3 test	(11)
4886	11/3/86	Thiem		130.05-139.70	confined	9.65	54.91		0.0085	5.50E-07	1.56E-03	Ka	packer	no	1st P1/3 test	(11)
4886	11/3/86	Thiem		141.03-150.39	confined	9.36	54.91		0.0014	9.00E-08	2.55E-04	KaKlslt(u)	packer	yes	1st P1/3 test	(11)
4886									0.0051	3.40E-07	9.64E-04	KaKlslt(u)	packer	yes	1st P1/3 test (duplicate?)	(11)
4886	11/3/86	Thiem		141.03-150.39	confined	9.36	54.91		0.0168	6.50E-07	1.84E-03	KaKlslt(u)	packer	yes	P2/3 test	(11)
4886	11/3/86	Thiem		141.03-150.39	confined	9.36	54.91		0.00043	3.00E-08	8.50E-05	KaKlslt(u)	packer	yes	2nd P1/3 test	(11)
4886	11/3/86	Thiem		144.00-153.65	confined	9.65	54.91		0.039	2.50E-07	7.09E-04	Ka	packer	no	1st P1/3 test	(11)
4886	11/3/86	Thiem		145.94-155.59	confined	9.65	54.91		0.0029	1.90E-07	5.39E-04	Ka	packer	no	1st P1/3 test	(11)
4886	11/3/86	Thiem		160.00-169.65	confined	9.65	54.91		0.0067	4.30E-07	1.22E-03	Ka	packer	no	1st P1/3 test	(11)
4886	11/3/86	Thiem		161.88-171.53	confined	9.65	54.91		0.0021	1.30E-07	3.68E-04	Ka	packer	no	1st P1/3 test	(11)
4886	11/3/86	Thiem		165.20-174.80	confined	9.6	54.91		0.0015	1.00E-07	2.83E-04	Ka	packer	no	1st P1/3 test	(11)
4886	11/3/86	Thiem		167.10-176.74	confined	9.64	54.91		0.0047	3.10E-07	8.79E-04	Ka	packer	no	1st P1/3 test	(11)
4886	11/3/86	Thiem		175.85-185.50	confined	9.65	54.91		0.0036	2.20E-07	6.24E-04	Ka	packer	no	1st P1/3 test	(11)
4886	11/3/86	Thiem		177.75-187.40	confined	9.65	54.91		0.0001	1.00E-08	2.83E-05	Ka	packer	no	1st P1/3 test	(11)
4886	11/3/86	Thiem		181.21-190.86	confined	9.65	54.91		0.0024	1.50E-07	4.25E-04	Ka	packer	no	1st P1/3 test	(11)
4886	11/3/86	Thiem		183.11-192.76	confined	9.65	54.91		0.00065	4.00E-08	1.13E-04	Ka	packer	no	1st P1/3 test	(11)
4886	11/3/86	Thiem		192.00-201.65	confined	9.65	54.91		0.00011	1.00E-08	2.83E-05	Ka	packer	no	1st P1/3 test	(11)
4886	11/3/86	Thiem		194.00-230.60	confined	9.6	54.91		0.0047	3.00E-07	8.50E-04	Ka	packer	no	1st P1/3 test	(11)
4886	11/3/86	Thiem		196.15-206.80	confined	10.65	54.91		0.0184	1.10E-07	3.12E-04	Ka	packer	no	1st P1/3 test	(11)
4886	11/3/86	Thiem		198.76-208.41	confined	9.65	54.91		0.00043	3.00E-08	8.50E-05	Ka	packer	no	1st P1/3 test	(11)
4886	1994	Hvorslev	11000	190.50-211.00	confined	139	61.59	65.6	NA	1.02E-07	2.88E-04	Ka	slug	ND		(17)
4886	1994	Ramey	11000	190.50-211.00	confined	139	61.59	65.6	NA	8.13E-08	2.30E-04	Ka	slug	ND		(17)
4886	1994									1.02E-07	2.88E-04	KaKlslt(u)	slug	yes		(17), Recommended Value
4986	1/22/88	Bouwer/Rice	18.73	23.64-67.60	unconfined	23.64	43.96	0.17	NA	9.67E-05	2.74E-01	Qrf	slug	no		(2)
5086	1/28/88	Bouwer/Rice	1.68	46.72-96.15	unconfined	49.43	46.72	0.22	NA	5.30E-04	1.51E+00	Qrf	slug	no		(2)
5186	11/14/86	NA	125	61.68-79.06	unconfined	17.38	61.68	78.88	unknown			Qrf	bailer/recovery	no		
5286	1/28/88	Bouwer/Rice	23.43	92.00-125.80	confined	38.8	70.45	1.15	NA	7.09E-06	2.01E-02	Ka	slug	no		(2)
5286	1/28/88	Cooper et al	23.43	92.00-125.80	confined	38.8	70.45	1.15	NA	1.90E-05	5.39E-02	Ka	slug	no		(2)
5286	1/28/88	Cooper	23.43	92.00-125.80	confined	38.8	70.45	1.15	NA	6.90E-06	1.96E-02	Ka	slug	no	Reanalysis of 1/28/88 data	(19)
5486	2/4/88	Bouwer/Rice	47.88	75.43-85.24	confined	11.55	37.21	1.25	NA	1.80E-07	5.10E-04	Ka	slug	no		(2)
5486	2/4/88	Cooper et al	47.88	75.43-85.24	confined	11.55	37.21	1.25	NA	3.70E-07	1.05E-03	Ka	slug	no		(2)
5486	10/10/86	Thiem		55.00-65.03	confined	10.03	32		0.002	2.00E-07	1.36E-03	KaKlclst(w)	packer	yes	1st P1/3 test	(9)
5486	10/10/86	Thiem		55.00-65.03	confined	10.03	32		0.0232	1.70E-06	4.82E-03	KaKlclst(w)	packer	yes	P2/3 test	(9)
5486	10/10/86	Thiem		55.00-65.03	confined	10.03	32		0.0034	3.40E-07	9.64E-04	KaKlclst(w)	packer	yes	2nd P1/3 test	(9)
5486	10/10/86	Thiem		65.00-75.03	confined	10.03	32		0.00081	8.00E-08	2.27E-04	KaKlclst(u)	packer	yes	1st P1/3 test	(9)
5486	10/10/86	Thiem		65.00-75.03	confined	10.03	32		0.0059	3.90E-07	1.11E-03	KaKlclst(u)	packer	yes	P2/3 test	(9)
5486	10/10/86	Thiem		65.00-75.03	confined	10.03	32		0.00061	6.00E-08	1.70E-04	KaKlclst(u)	packer	yes	2nd P1/3 test	(9)
5486	10/10/86	Thiem		73.00-83.03	confined	10.03	32		0.0111	1.10E-06	3.12E-03	KaKlclst(u)	packer	yes	1st P1/3 test	(9)
5486	10/10/86	Thiem		73.00-83.03	confined	10.03	32		0.0311	1.90E-06	5.39E-03	KaKlclst(u)	packer	yes	P2/3 test	(9)
5486	10/10/86	Thiem		73.00-83.03	confined	10.03	32		0.005	4.90E-07	1.39E-03	KaKlclst(u)	packer	yes	2nd P1/3 test	(9)
5586	10/21/86			15.96-36.39	unconfined	20.43	15.96					Ka	bailer/recovery	no		(9)
5586		Theis								5.43E-06	1.54E-02	Qrf	bailer/recovery	yes	Late-time Theis recovery reanalysis	(19)
5686	10/1/86	Theis	33	6.16-9.6	unconfined	3.44	6.16	2.98	0.0492	5.90E-06	1.67E-02	Qrf	bailer/recovery	no		(11)
5686		Thiem	33	6.16-9.6	unconfined	3.44	6.16	2.83	NA	3.90E-04	1.11E+00	Qrf	bailer/recovery	no		(12)
5686		Theis	33	6.16-9.6	unconfined	3.44	6.16	3.31	0.23	3.20E-04	9.07E-01	Qvf	bailer/recovery	yes		(12)
5686		Theis	33	6.16-9.6	unconfined	3.44	6.16	3.31		3.20E-04	9.07E-01	Qvf	bailer/recovery	yes	curve match	(12)

764

Table G-1
Hydraulic Data

Well ID	Date Tested	Analysis Method	Test Duration (min.)	Interval Tested (ft.)	Aquifer Conditions	Initial Saturated Thickness (ft.)	Depth to Water (ft.)	Maximum Drawdown (ft.)	Average Discharge (gpm)	Hydraulic Conductivity (cm/sec)	Hydraulic Conductivity (ft/d)	Lithologic Unit Tested	Type of Test	Data Usable?	Comments	Source
5686		Bouwer/Rice	27	6.16-9.6	unconfined	3.44	6.16	3.31		5.00E-05	1.42E-01	Qrf	slug	no		(11)
5686		Cooper et al	27	6.16-9.6	unconfined	3.44	6.16	3.31		3.80E-04	1.08E+00	Qrf	slug	no	see above	(11)
5686		Hvorslev	27	6.16-9.6	unconfined	3.44	6.16	3.31		1.50E-04	4.25E-01	Qrf	slug	no	see above	(11)
5686		Ferris/Knowles	27	6.16-9.6	unconfined	3.44	6.16	3.31		1.00E-04	2.83E-01	Qrf	slug	no	see above	(11)
5986										4.30E-04	1.22E+00			ND	source ?	(12)
5986		Bouwer/Rice	1.66	21.86-29.06	unconfined	3.53				1.40E-02	3.97E+01		Slug in	ND	source ?	(6)
5986	10/23/86	Theis	20.8	25.09-28.00	unconfined	2.91	25.09	2.37	0.07	1.90E-04	5.39E-01	KaKlss(w)	bailer/recovery	yes		(12)
5986		Thiem	20.8	25.09-28.00	unconfined	3.01	25.09	2.37		4.30E-04	1.22E+00	Ka	bailer/recovery	no		(12)
5986		Theis	20.8	25.09-28.00	unconfined	2.91	25.09	2.37	0.07	2.10E-04	5.95E-01	KaKlss(w)	bailer/recovery	yes	curve match	(12)
5986R										1.40E-02	3.97E+01		Slug out	no		
5986R		Bouwer/Rice	100 s	25.53-29.06	unconfined	3.53				1.50E-02	4.25E+01		Slug in	no		(6)
6186	1994	Hvorslev	7200	10.00-13.60	unconfined	3.6	10	11.1	NA	4.12E-05	1.17E-01	Qrf	slug	ND		(17)
6186	1994	Bouwer/Rice	7200	10.00-13.60	unconfined	3.6	10	11.1	NA	2.39E-05	6.77E-02	Qrf	slug	ND		(17)
6186	1994									4.12E-05	1.17E-01	Qrf	slug	yes		(17), Recommended Value
6286	9/15/86	Theis	395	25.12-35.19	unconfined	10.07	25.12	9.3	0.25	1.50E-05	4.25E-02	KaKlss(w)	bailer/recovery	yes	late match value	(12)
6286		Thiem	395	25.12-35.19	unconfined	9.08	25.12	9.3		1.40E-05	3.97E-02	Ka	bailer/recovery	no		(12)
6286		Theis	395	25.12-35.19	unconfined	10.07	25.12	9.3	0.25	1.30E-05	3.68E-02	KaKlss(w)	bailer/recovery	yes	curve match	(12)
6286	10/15/87	Bouwer/Rice	42.37	24.27-35.19	unconfined	10.23	24.27	0.81	NA	5.70E-06	1.62E-02	KaKlss(w)	slug	yes		(4a)
6286	10/15/87	Bouwer/Rice	42.37	24.27-35.19	unconfined	100	24.27	8.76	NA	2.10E-06	5.95E-03	Ka	slug	no	superseded by (4a)	(4b)
6586	9/30/86	Theis	12	5.30-8.00	unconfined	2.7	5.3	1.59	0.33	2.10E-03	5.95E+00	Qvf	bailer/recovery	yes	late match value	(12)
6586		Thiem	12	5.30-8.00	unconfined	1.7	5.3	1.59		3.50E-03	9.92E+00	Qvf	bailer/recovery	no		(12)
6586		Theis	12	5.30-8.00	unconfined	2.7	5.3	1.59	0.33	2.10E-03	5.95E+00	Qvf	slug	yes	curve match	(12)
6686	1994	Bouwer/Rice	10	7.15-8.40	unconfined	1.25	7.15	7.77	NA	3.20E-03	9.07E+00	Qvf	slug	ND		(17)
6686	1994		10	7.15-8.40	unconfined	1.25	7.15	7.77	NA	3.20E-03	9.07E+00	Qvf	slug	yes		(17), Recommended Value
6886	9/29/86	Theis	8	0.92-3.50	unconfined	2.58	0.92	2.21	0.38	5.50E-04	1.56E+00	Qvf	bailer/recovery	yes		(12)
6886		Thiem	8	0.92-3.50	unconfined	1.88	0.92	2.21		4.40E-03	1.25E+01	Qvf	bailer/recovery	no		(12)
6886		Theis	8	0.92-3.50	unconfined	2.58	0.92	2.21	0.38	9.80E-04	2.78E+00	Qvf	bailer/recovery	yes	curve match	(12)
6986	10/6/86	Theis	27	5.70-14.00	unconfined	8.3	5.7	6.8	0.5	1.40E-04	3.97E-01	Qc	bailer/recovery	yes		(12)
6986		Thiem	27	5.70-14.00	unconfined	2.3	5.7	6.8		6.80E-04	1.93E+00	Qc	bailer/recovery	no		(12)
6986		Theis	27	5.70-14.00	unconfined	8.3	5.7	6.8	0.5	2.40E-04	6.80E-01	Qc	bailer/recovery	yes	curve match	(12)
6986	10/26/87	Bouwer/Rice	28.36	6.68-14.00	unconfined	7.32	6.68	0.31	NA	1.74E-04	4.93E-01	Qc	slug	yes		(4a)
6986	10/26/87	Bouwer/Rice	28.36	6.68-14.00	unconfined	7.32	6.68	0.31	NA	4.38E-06	1.24E-02	Qc	slug	no	superseded by (4a)	(4b)
7086	10/23/86	Theis	10	1.74-7.90	unconfined	6.16	1.74	5.06	0.55	1.50E-04	4.25E-01	Qvf	bailer/recovery	yes		(19)
7086		Thiem	10	1.74-7.90	unconfined	4	1.74	5.06	0.55	6.80E-04	1.93E+00	Qvf	bailer/recovery	no		(19)
7086		Theis	10	1.74-7.90	unconfined	6.16	1.74	5.06	0.55	2.10E-04	5.95E-01	Qvf	bailer/recovery	yes	curve match	(19)
0287	6/15/87	Jacob	133	3.41-11.08	unconfined	7.67	3.41	11.61	0.07	3.40E-05	9.64E-02	Qc/Fill?	pumping	no		(12)
0287		Theis	200	3.41-11.08	unconfined	7.67	3.41	11.61	0.07	3.60E-05	1.02E-01	Qc/Fill?	recovery	no		(12)
0287		Thiem	200	3.41-11.08	unconfined	6.25	3.41	11.61		3.60E-05	1.02E-01	Qc/Fill?	recovery	no		(12)
0287		Theis	200	3.41-11.08	unconfined	7.67	3.41	11.61	0.07	3.30E-05	9.35E-02	Qc	recovery	yes	curve match	(12)
0387	6/18/87	Theis	1040	102.80-107.75	confined	4.4	95.67	14.15	0.11	2.00E-04	5.67E-01	Ka	bailer/recovery	no	early data match	(12)
0387		Thiem	1040	102.80-107.75	confined	4.4	95.67	14.15		3.30E-06	9.35E-03	Ka	bailer/recovery	no	check value	(12)
0387		Cooper et al	1040	102.80-107.75	confined	4.4	95.67	14.15		8.30E-07	2.35E-03	Ka	slug	no	used bailer/recovery data	(12)
0387	6/4/87	Thiem		62.90-72.55	unsaturated	9.65	79.35		0.00011	1.00E-08	2.83E-05	KaKlclst(u)	packer	yes	1st P1/3 test	(12)
0387	6/4/87	Thiem		62.90-72.55	unsaturated	9.65	79.35		0.0087	3.30E-07	9.35E-04	KaKlclst(u)	packer	yes	P2/3 test	(12)
0387	6/4/87	Thiem		62.90-72.55	unsaturated	9.65	79.35		0.00032	2.00E-08	5.67E-05	KaKlclst(u)	packer	yes	2nd P1/3 test	(12)
0387	6/4/87	Thiem		74.55-84.20	unsaturated	9.65	79.35		0.000011	<1E-08	0.00E+00	KaKlclst(u)	packer	yes	1st P1/3 test	(12)

765

Table G-1
Hydraulic Data

Well ID	Date Tested	Analysis Method	Test Duration (min.)	Interval Tested (ft.)	Aquifer Conditions	Initial Saturated Thickness (ft.)	Depth to Water (ft.)	Maximum Drawdown (ft.)	Average Discharge (gpm)	Hydraulic Conductivity (cm/sec)	Hydraulic Conductivity (ft/d)	Lithologic Unit Tested	Type of Test	Data Usable?	Comments	Source
0387	6/4/87	Thiem		74.55-84.20	unsaturated	9.65	79.35		0.0016	5.00E-08	1.42E-04	KaKlclst(u)	packer	yes	P2/3 test	(12)
0387	6/4/87	Thiem		74.55-84.20	unsaturated	9.65	79.35		0.00081	4.00E-08	1.13E-04	KaKlclst(u)	packer	yes	2nd P1/3 test	(12)
0387	6/4/87	Thiem		88.20-97.85	confined?	9.65	79.35		0.00011	<1E-08	0.00E+00	KaKlclst(u)	packer	yes	1st P1/3 test	(12)
0387	6/4/87	Thiem		88.20-97.85	confined?	9.65	79.35		0.0149	4.50E-07	1.28E-03	KaKlclst(u)	packer	yes	P2/3 test	(12)
0387	6/4/87	Thiem		88.20-97.85	confined?	9.65	79.35		0.000011	<1E-08	0.00E+00	KaKlclst(u)	packer	yes	2nd P1/3 test	(12)
0387	6/4/87	Thiem		97.85-107.50	confined?	9.65	79.35		0.0017	8.00E-08	2.27E-04	KaKlclst(u)	packer	yes	1st P1/3 test	(12)
0387	6/4/87	Thiem		97.85-107.50	confined?	9.65	79.35		0.0152	4.40E-07	1.25E-03	KaKlclst(u)	packer	yes	P2/3 test	(12)
0387	6/4/87	Thiem		97.85-107.50	confined?	9.65	79.35		0.0011	5.00E-08	1.42E-04	KaKlclst(u)	packer	yes	2nd P1/3 test	(12)
0387	6/4/87	Thiem		101.26-110.91	confined?	9.65	79.35		0.000011	<1E-08	0.00E+00	Ka	packer	no	1st P1/3 test	(12)
0387	6/4/87	Thiem		101.26-110.91	confined?	9.65	79.35		0.000011	<1E-08	0.00E+00	Ka	packer	no	2nd P1/3 test	(12)
0487	6/8/87	Jacob	30	7.99-19.47	unconfined	11.48	7.99	12.64	0.13	6.60E-05	1.87E-01	Qc	pumping	no		(12)
0487		Theis	40	7.99-19.47	unconfined	11.48	7.99	12.64	0.13	8.00E-05	2.27E-01	Qc	recovery	no		(12)
0487		Thiem											recovery	no	suspect data in Table 2	(12)
0487		Theis								6.60E-05	1.87E-01		pumping	no	value rejected; b=11.48	(12)
0487		Theis				6.25				6.70E-06	1.90E-02		recovery	no	curve match value	(12)
0587	6/16/87	Theis	60	46.87-53.25	confined	5.6	46.87	6.65	2.2	6.30E-05	1.79E-01	Ka	bailer/recovery	no		(12)
0587		Thiem	55	46.87-53.25	confined	5.6	46.87	6.65		9.70E-05	2.75E-01	Ka	bailer/recovery	no		(12)
0587	10/23/87	Cooper et al	47.33	44.95-51.25	confined	6.3	45	0.61	NA	9.10E-05	2.58E-01	Ka	slug	no	Ho affected by filter pack	(4a)
0587	10/23/87	Bouwer/Rice	47.33	44.95-51.25	confined	6.3	45	0.61	NA	6.57E-05	1.86E-01	KaKlss(w)	slug	yes		(4a)
0587	10/23/87	Bouwer/Rice	47.33	44.95-51.25	confined	100	45	7.51	NA	1.29E-06	3.66E-03	Ka	slug	no	superseded by (4a)	(4b)
0587	5/28/87	Thiem		26.40-36.05	unsaturated	9.65	44.56		0.0198	1.90E-06	5.39E-03	Ka	packer	no	1st P1/3 test	(12)
0587	5/28/87	Thiem		26.40-36.05	unsaturated	9.65	44.56		0.000011	<1E-08	0.00E+00	Ka	packer	no	2nd P1/3 test	(12)
0587	5/28/87	Thiem		36.05-45.70	unsaturated	9.65	44.56		0.0152	1.20E-06	3.40E-03	Ka	packer	no	1st P1/3 test	(12)
0587	5/28/87	Thiem		36.05-45.70	unsaturated	9.65	44.56		0.0026	2.00E-07	5.67E-04	Ka	packer	no	2nd P1/3 test	(12)
0587	5/28/87	Thiem		45.70-55.35	confined?	9.65	44.56		0.0107	7.80E-07	2.21E-03	Ka	packer	no	1st P1/3 test	(12)
0587	5/28/87	Thiem		45.70-55.35	confined?	9.65	44.56		0.0029	2.00E-07	5.67E-04	Ka	packer	no	2nd P1/3 test	(12)
0887	6/19/87	Theis	318	87.97-91.02	unconfined?	3.05	87.97	3.33	0.14	5.80E-04	1.64E+00	Ka	bailer/recovery	no	late data match	(12)
0887	6/19/87	Theis	318	87.97-91.02	unconfined?	3.05	87.97	3.33	0.14	7.52E-06	2.13E-02	KaKlclst(u)	bailer/recovery	yes	Late-time Theis recovery reanalysis	(19)
0887		Thiem	285	87.97-91.02	unconfined?	2.03	87.97	3.33		2.50E-05	7.09E-02	Ka	bailer/recovery	no		(12)
0887		Cooper et al	318	87.97-91.02	unconfined?	2.03	87.97	3.33		2.10E-06	5.95E-03	Ka	slug	no	used bailer/recovery data	(12)
0887	5/20/87	Thiem		62.61-72.26	unsaturated	9.65	77.69		0	<1E-08 ?	0.00E+00	Ka	packer	no	1st P1/3 test	(12)
0887	5/20/87	Thiem		62.61-72.26	unsaturated	9.65	77.69		0.0187	7.00E-07	1.98E-03	Ka	packer	no	2nd P1/3 test	(12)
0887	5/20/87	Thiem		83.43-93.08	unconfined ?	9.65	77.69		0.0019	9.00E-08	2.55E-04	Ka	packer	no	1st P1/3 test	(12)
0887	5/20/87	Thiem		83.43-93.08	unconfined ?	9.65	77.69		0.00018	1.00E-08	2.83E-05	Ka	packer	no	2nd P1/3 test	(12)
0987	10/9/87	Bouwer/Rice	2.93	16.60-32.15	unconfined	14.9	16.6	0.75	NA	3.10E-03	8.79E+00	KaNo.1ss(w)	slug	yes		(4a)WWE
0987	10/9/87	Bouwer/Rice								4.49E-05	1.27E-01	Ka	slug	no	unable to match to (4a) data	(2)
0987	10/9/87	Bouwer/Rice	1.5	16.60-32.15	unconfined	14.9	16.6	0.89		4.20E-03	1.19E+01	KaNo.1ss(w)	slug	yes	duplicate	(4a)WWE
0987	10/9/87	Bouwer/Rice								4.50E-05	1.28E-01	Ka	slug	no	unable to match to (4a) data	(2)
0987	10/9/87	Bouwer/Rice	4.16	16.60-32.15	unconfined	14.9	16.6	0.54		1.80E-03	5.10E+00	KaNo.1ss(w)	slug	yes	duplicate	(4a)WWE
0987	10/9/87	Bouwer/Rice								3.93E-05	1.11E-01	Ka	slug	no	unable to match to (4a) data	(2)
1187										5.00E-04	1.42E+00			ND	need source	(9)
1287										5.00E-04	1.42E+00			ND	need source	WWE
1487	10/15/87	Bouwer/Rice	58.85	19.00-24.05	unconfined	11.3	12.75	1.16	NA	2.26E-05	6.41E-02	KaKlss(w)	slug	yes		(4a)(9)
1487	10/15/87	Bouwer/Rice	58.85	19.00-24.05	unconfined	100	12.75			1.55E-06	4.39E-03	Ka	slug	no	superseded by (4a)	(2)
1587										1.00E-03	2.83E+00			ND	need source	WWE
1687	10/14/87	Cooper et al	18.18	100.00-125.00	confined	34.44	90.56	1.26	NA	1.90E-06	5.39E-03	Ka	slug	no		(4a)(9)

166

Table G-1
Hydraulic Data

Well ID	Date Tested	Analysis Method	Test Duration (min.)	Interval Tested (ft.)	Aquifer Conditions	Initial Saturated Thickness (ft.)	Depth to Water (ft.)	Maximum Drawdown (ft.)	Average Discharge (gpm)	Hydraulic Conductivity (cm/sec)	Hydraulic Conductivity (ft/d)	Lithologic Unit Tested	Type of Test	Data Usable?	Comments	Source
1687	10/14/87	Bouwer/Rice	18.18	100.00-125.00	confined	34.44	90.56	1.26	NA	2.90E-07	8.22E-04	Ka	slug	no		(4a)(9)
1687	10/14/87	Bouwer/Rice	18.18	100.00-125.00	confined	100	90.56	1.26	NA	1.18E-09	3.34E-06	Ka	slug	no	superseded by (4a)	(2)
1687	7/14/87	Thiem		48.41-58.06	unsaturated	9.65	103.08		0.00043	3.00E-08	8.50E-05	Ka	packer	no	1st P1/3 test	(9)
1687	7/14/87	Thiem		55.90-65.55	unsaturated	9.65	103.08		0.00054	4.00E-08	1.13E-04	Ka	packer	no	1st P1/3 test	(9)
1687	7/14/87	Thiem		55.90-65.55	unsaturated	9.65	103.08		0.0057	2.80E-07	7.94E-04	Ka	packer	no	P2/3 test	(9)
1687	7/14/87	Thiem		57.90-67.55	unsaturated	9.65	103.08		0.00011	1.00E-08	2.83E-05	Ka	packer	no	1st P1/3 test	(9)
1687	7/14/87	Thiem		67.55-77.20	unsaturated	9.65	103.08		0.0011	6.00E-08	1.70E-04	KaKlclst(u)	packer	yes	1st P1/3 test	(9)
1687	7/14/87	Thiem		67.55-77.20	unsaturated	9.65	103.08		0.0116	4.80E-07	1.36E-03	KaKlclst(u)	packer	yes	P2/3 test	(9)
1687	7/14/87	Thiem		67.55-77.20	unsaturated	9.65	103.08		0.0023	1.30E-07	3.68E-04	KaKlclst(u)	packer	yes	2nd P1/3 test	(9)
1687	7/14/87	Thiem		69.55-79.20	unsaturated	9.65	103.08		0.0073	4.00E-07	1.13E-03	Ka	packer	no	1st P1/3 test	(9)
1687	7/14/87	Thiem		79.05-88.70	unsaturated	9.65	103.08		0.0142	7.10E-07	2.01E-03	KaKlclst(u)	packer	yes	1st P1/3 test	(9)
1687	7/14/87	Thiem		79.05-88.70	unsaturated	9.65	103.08		0.0478	1.70E-06	4.82E-03	KaKlclst(u)	packer	yes	P2/3 test	(9)
1687	7/14/87	Thiem		79.05-88.70	unsaturated	9.65	103.08		0.0075	3.70E-07	1.05E-03	KaKlclst(u)	packer	yes	2nd P1/3 test	(9)
1687	7/14/87	Thiem		88.70-98.35	unsaturated	9.65	103.08		0	<1E-08 ?	0.00E+00	KaKlclst(u)	packer	yes	1st P1/3 test	(9)
1687	7/14/87	Thiem		88.70-98.35	unsaturated	9.65	103.08		0.0437	1.40E-06	3.97E-03	KaKlclst(u)	packer	yes	P2/3 test	(9)
1687	7/14/87	Thiem		88.70-98.35	unsaturated	9.65	103.08		0.00043	2.00E-08	5.67E-05	KaKlclst(u)	packer	yes	2nd P1/3 test	(9)
1687	7/14/87	Thiem		90.70-100.35	unsaturated	9.65	103.08		0.0328	1.40E-06	3.97E-03	Ka	packer	no	1st P1/3 test	(9)
1687	7/14/87	Thiem		100.50-110.15	unsaturated	9.65	103.08		0.0036	1.30E-07	3.68E-04	KaKlslt(u)	packer	yes	1st P1/3 test	(9)
1687	7/14/87	Thiem		100.50-110.15	unsaturated	9.65	103.08		0.046	1.30E-06	3.68E-03	KaKlslt(u)	packer	yes	P2/3 test	(9)
1687	7/14/87	Thiem		100.50-110.15	unsaturated	9.65	103.08		0.0036	1.30E-07	3.68E-04	KaKlslt(u)	packer	yes	2nd P1/3 test	(9)
1687	7/14/87	Thiem		109.72-119.37	confined?	9.65	103.08		0.0033	1.40E-07	3.97E-04	KaKlslt(u)	packer	yes	1st P1/3 test	(9)
1687	7/14/87	Thiem		109.72-119.37	confined?	9.65	103.08		0.0897	2.50E-06	7.09E-03	KaKlslt(u)	packer	yes	P2/3 test	(9)
1687	7/14/87	Thiem		109.72-119.37	confined?	9.65	103.08		0.0051	2.10E-07	5.95E-04	KaKlslt(u)	packer	yes	2nd P1/3 test	(9)
1687	7/14/87	Thiem		119.37-129.02	confined?	9.65	103.08		0.0035	1.40E-07	3.97E-04	KaKlslt(u)	packer	yes	1st P1/3 test	(9)
1687	7/14/87	Thiem		119.37-129.02	confined?	9.65	103.08		0.147	4.00E-06	1.13E-02	KaKlslt(u)	packer	yes	P2/3 test	(9)
1687	7/14/87	Thiem		119.37-129.02	confined?	9.65	103.08		0.0035	1.40E-07	3.97E-04	KaKlslt(u)	packer	yes	2nd P1/3 test	(9)
1687	7/14/87	Thiem		129.02-138.67	confined?	9.65	103.08		0.0074	3.00E-07	8.50E-04	KaKlclst(u)	packer	yes	1st P1/3 test	(9)
1687	7/14/87	Thiem		129.02-138.67	confined?	9.65	103.08		0.0368	9.60E-07	2.72E-03	KaKlclst(u)	packer	yes	P2/3 test	(9)
1687	7/14/87	Thiem		129.02-138.67	confined?	9.65	103.08		0.0059	2.40E-07	6.80E-04	KaKlclst(u)	packer	yes	2nd P1/3 test	(9)
1687	7/14/87	Thiem		131.02-140.67	confined?	9.65	103.08		0.00006	2.00E-09	5.67E-06	Ka	packer	no	1st P1/3 test	(9)
1687	7/14/87	Thiem		134.94-144.59	confined?	9.65	103.08		0.000006	2.50E-10	7.09E-07	Ka	packer	no	1st P1/3 test	(9)
1687	7/14/87	Thiem		144.71-154.36	confined?	9.65	103.08		0.0041	1.70E-07	4.82E-04	Ka	packer	no	1st P1/3 test	(9)
1687	7/14/87	Thiem		146.71-156.36	confined?	9.65	103.08		0.0079	3.20E-07	9.07E-04	Ka	packer	no	1st P1/3 test	(9)
1687	7/14/87	Thiem		151.35-161.00	confined?	9.65	103.08		0.0007	2.80E-08	7.94E-05	Ka	packer	no	1st P1/3 test	(9)
1687	7/14/87	Thiem		153.35-163.00	confined?	9.65	103.08		0.00064	2.60E-08	7.37E-05	Ka	packer	no	1st P1/3 test	(9)
1687	1994	Hvorslev	38	101.42-127.42	unconfined	48.39	79.03	83	NA	2.12E-08	6.00E-05	KaKlslt(u)	slug	ND		(17)
1687	1994	Bouwer/Rice	38	101.42-127.42	unconfined	48.39	79.03	83	NA	3.88E-08	1.10E-04	KaKlslt(u)	slug	ND		(17)
1687	1994	Ramey	38	101.42-127.42	unconfined	48.39	79.03	83	NA	1.38E-08	3.90E-05	KaKlslt(u)	slug	ND		(17)
1687	1994									5.08E-08	1.44E-04	KaKlslt(u)	slug	yes		(17), Recommended Value
1787	10/14/87	Bouwer/Rice	36.75	18.35-25.50	unconfined	7.15	18.35	0.56	NA	6.00E-05	1.70E-01	Qrf	slug	yes		(4a)(9)
1787	10/14/87	Bouwer/Rice	36.75	18.35-25.50	unconfined	13.7	18.35			5.89E-06	1.67E-02	Qrf	slug	no	superseded by (4a)	(2)
1787	1992	Coooper/Jacob								1.78E-04	5.05E-01	Qrf	pump	yes		(20)
1787	1992	Theis Analysis								1.61E-04	4.57E-01	Qrf	pump	yes		(20)
1787	1992	Theis Recovery								9.18E-04	2.60E+00	Qrf	pump	yes		(20)
1887	8/21/87												packer	no	data lacks w.l. for K calc.	
1887	1994	Hvorslev	20080	130.72-135.54	unconfined	4.82	130.72	133.46	NA	1.73E-07	4.90E-04	KaKlslt(u)	rising head	ND		(17)
1887	1994	Bouwer/Rice	20080	130.72-135.54	unconfined	4.82	130.72	133.46	NA	1.13E-07	3.20E-04	KaKlslt(u)	rising head	ND		(17)

767

Table G-1
Hydraulic Data

Well ID	Date Tested	Analysis Method	Test Duration (min.)	Interval Tested (ft.)	Aquifer Conditions	Initial Saturated Thickness (ft.)	Depth to Water (ft.)	Maximum Drawdown (ft.)	Average Discharge (gpm)	Hydraulic Conductivity (cm/sec)	Hydraulic Conductivity (ft/d)	Lithologic Unit Tested	Type of Test	Data Usable?	Comments	Source
1887	1994										4.90E-04	KaKlslt(u)	slug	yes		(17), Recommended Value
2087	8/11/87	Thiem		53.90-63.55	unsaturated	9.65	106.91		0.0017	1.20E-07	3.40E-04	Ka	packer	no	1st P1/3 test	(8)(9)
2087	8/11/87	Thiem		53.90-63.55	unsaturated	9.65	106.91		0.00097	4.60E-08	1.30E-04	Ka	packer	no	P2/3 test	(8)(9)
2087	8/11/87	Thiem		65.55-75.20	unsaturated	9.65	106.91		0.00076	3.00E-08	8.50E-05	Ka	packer	no	P2/3 test	(8)(9)
2087	8/11/87	Thiem		75.20-84.85	unsaturated	9.65	106.91		0.0011	3.80E-08	1.08E-04	Ka	packer	no	P2/3 test	(8)(9)
2087	8/11/87	Thiem		86.85-96.50	unsaturated	9.65	106.91		0.003	9.40E-08	2.66E-04	Ka	packer	no	P2/3 test	(8)(9)
2087	8/11/87	Thiem		96.50-106.15	unsaturated	9.65	106.91		0.0037	1.00E-07	2.83E-04	Ka	packer	no	P2/3 test	(8)(9)
2087	8/11/87	Thiem		107.20-116.85	unconfined?	9.65	106.91		0.00011	4.00E-09	1.13E-05	Ka	packer	no	1st P1/3 test	(8)(9)
2087	8/11/87	Thiem		107.20-116.85	unconfined?	9.65	106.91		0.0038	1.00E-07	2.83E-04	Ka	packer	no	P2/3 test	(8)(9)
2087	8/11/87	Thiem		106.15-115.80	unconfined?	9.65	106.91		0.0038	1.00E-07	2.83E-04	Ka	packer	no	P2/3 test	(8)(9)
2087	8/11/87	Thiem		114.42-124.07	unconfined?	9.65	106.91		0.0285	1.10E-06	3.12E-03	Ka	packer	no	1st P1/3 test	(8)(9)
2087	8/11/87	Thiem		114.42-124.07	unconfined?	9.65	106.91		0.0018	4.70E-08	1.33E-04	Ka	packer	no	P2/3 test	(8)(9)
2087	1994	Hvorslev	21520	107.36-117.96	unconfined	13.72	104.24	108	NA	3.53E-08	1.00E-04	KaKlclst(u)	slug	ND		(17)
2087	1994	Bouwer/Rice	21520	107.36-117.96	unconfined	13.72	104.24	108	NA	2.40E-08	6.80E-05	KaKlclst(u)	slug	ND		(17)
2087	1994	Ramey	21520	107.36-117.96	unconfined	13.72	104.24	108	NA	2.33E-08	6.60E-05	KaKlclst(u)	slug	ND		(17)
2087	1994									3.56E-08	1.01E-04	KaKlclst(u)	slug	yes		(17), Recommended Value
2287	10/12/87	Thiem		45.60-52.55	unsaturated	6.95	78.66		0.00065	6.30E-08	1.79E-04	Ka	packer	no	1st P1/3 test	(8)(9)
2287	10/12/87	Thiem		45.60-52.55	unsaturated	6.95	78.66		0.0016	1.30E-07	3.68E-04	Ka	packer	no	P2/3 test	(8)(9)
2287	10/12/87	Thiem		52.55-62.20	unsaturated	9.65	78.66		0.00054	3.50E-08	9.92E-05	Ka	packer	no	1st P1/3 test	(8)(9)
2287	10/12/87	Thiem		52.55-62.20	unsaturated	9.65	78.66		0.0013	6.90E-08	1.96E-04	Ka	packer	no	P2/3 test	(8)(9)
2287	10/12/87	Thiem		62.20-71.85	unsaturated	9.65	78.66		0.00011	6.00E-09	1.70E-05	Ka	packer	no	1st P1/3 test	(8)(9)
2287	10/12/87	Thiem		71.85-81.50	unsaturated	9.65	78.66		0.00032	1.70E-08	4.82E-05	Ka	packer	no	1st P1/3 test	(8)(9)
2287	10/12/87	Thiem		71.85-81.50	unsaturated	9.65	78.66		0.0016	6.40E-08	1.81E-04	KaKlclst(u)	packer	yes	P2/3 test	(8)(9)
2287	10/12/87	Thiem		81.50-91.15	unconfined?	9.65	78.66		0.0289	1.50E-06	4.25E-03	KaKlclst(u)	packer	yes	1st P1/3 test	(8)(9)
2287	10/12/87	Thiem		81.50-91.15	unconfined?	9.65	78.66		0.048	1.80E-06	5.10E-03	KaKlclst(u)	packer	yes	P2/3 test	(8)(9)
2287	10/12/87	Thiem		81.50-91.15	unconfined?	9.65	78.66		0.0206	1.10E-06	3.12E-03	KaKlclst(u)	packer	yes	2nd P1/3 test	(8)(9)
2287	10/12/87	Thiem		82.70-92.35	unconfined?	9.65	78.66		0.0317	1.60E-06	4.54E-03	KaKlclst(u)	packer	yes	1st P1/3 test	(8)(9)
2287	10/12/87	Thiem		82.70-92.35	unconfined?	9.65	78.66		0.042	1.50E-06	4.25E-03	KaKlclst(u)	packer	yes	P2/3 test	(8)(9)
2287	10/12/87	Thiem		82.70-92.35	unconfined?	9.65	78.66		0.0277	1.40E-06	3.97E-03	KaKlclst(u)	packer	yes	2nd P1/3 test	(8)(9)
2287	10/12/87	Thiem		92.35-102.00	unconfined?	9.65	78.66		0.0095	4.80E-07	1.36E-03	KaKlclst(u)	packer	yes	1st P1/3 test	(8)(9)
2287	10/12/87	Thiem		92.35-102.00	unconfined?	9.65	78.66		0.018	6.30E-07	1.79E-03	KaKlclst(u)	packer	yes	P2/3 test	(8)(9)
2287	10/12/87	Thiem		92.35-102.00	unconfined?	9.65	78.66		0.0064	3.30E-07	9.35E-04	KaKlclst(u)	packer	yes	2nd P1/3 test	(8)(9)
2287	1994	Hvorslev	8500	81.97-90.60	unconfined	10.24	80.36	77.7	NA	4.24E-06	1.20E-02	KaKlclst(u)	rising head	ND		(17)
2287	1994	Bouwer/Rice	8500	81.97-90.60	unconfined	10.24	80.36	77.7	NA	3.14E-06	8.90E-03	KaKlclst(u)	rising head	ND		(17)
2287	1994									4.27E-06	1.21E-02	KaKlclst(u)	slug	yes		(17), Recommended Value
2387	10/14/87	Bouwer/Rice	26.28	21.09-37.61	unconfined	16.52	21.09	1.13	NA	1.76E-04	4.99E-01	Ka	slug	no		(4a)(9)
2387	10/14/87	Bouwer/Rice	26.28	21.09-37.61	unconfined	100	21.09			9.72E-06	2.76E-02	Ka	slug	no	superseded by (4a)	(2)
2387	10/14/87	Bouwer/Rice	26.28	21.09-37.61	unconfined	16.52	21.09	1.13	NA	3.96E-05	1.12E-01	KaNo.1ss(w)	slug	yes	reanalysis of 10/14/87 data	(4a)(9)(19)
2387	1994	Hvorslev	70	18.40-40.00	confined	22.65	15.72	13.6	NA	3.81E-05	1.08E-01	KaNo.1ss(w)	rising head	ND		(17)
2387	1994	Ramey	70	18.40-40.00	confined	22.65	15.72	13.6	NA	4.17E-05	1.18E-01	KaNo.1ss(w)	rising head	ND		(17)
2387	1994	Hvorslev	70	18.40-40.00	confined	22.65	15.72	13.6	NA	3.81E-05	1.08E-01	KaNo.1ss(w)	falling head	ND		(17)
2387	1994									7.12E-05	2.02E-01	KaNo.1ss(w)	slug	yes		(17), Recommended Value
2587	10/14/87	Bouwer/Rice	6.38	22.90-43.45	unconfined	20.55	22.9	0.84	NA	1.53E-03	4.34E+00	Ka	slug	no		(4a)(9)
2587	10/14/87	Bouwer/Rice	6.38	22.90-43.45	unconfined	100	22.9			7.30E-06	2.07E-02	Ka	slug	no	superseded by (4a)	(2)
2587	10/14/87	Bouwer/Rice	6.38	22.90-43.45	unconfined	20.55	22.9	0.84	NA	4.52E-04	1.28E+00	KaNo.1ss(w)	slug	yes	reanalysis of 10/14/87 data	(4a)(9)(19)
2587	1994	Hvorslev	5.5	23.13-45.38	unconfined	22.25	23.13	25.5	NA	1.93E-03	5.47E+00	KaNo.1ss(w)	rising head	ND		(17)

168

Table G-1
Hydraulic Data

Well ID	Date Tested	Analysis Method	Test Duration (min.)	Interval Tested (ft.)	Aquifer Conditions	Initial Saturated Thickness (ft.)	Depth to Water (ft.)	Maximum Drawdown (ft.)	Average Discharge (gpm)	Hydraulic Conductivity (cm/sec)	Hydraulic Conductivity (ft/d)	Lithologic Unit Tested	Type of Test	Data Usable?	Comments	Source
2587	1994	Bouwer/Rice	5.5	23.13-45.38	unconfined	22.25	23.13	25.5	NA	1.98E-03	5.62E+00	KaNo.1ss(w)	rising head	ND		(17)
2587	1994	Hvorslev	7.5	23.13-45.38	unconfined	22.25	23.13	21.7	NA	1.93E-03	5.47E+00	KaNo.1ss(w)	falling head	ND		(17)
2587	1994	Bouwer/Rice	7.5	23.13-45.38	unconfined	22.25	23.13	21.7	NA	3.00E-03	8.50E+00	KaNo.1ss(w)	falling head	ND		(17)
2587	1994									2.29E-03	6.48E+00	KaNo.1ss(w)	slug	yes		(17), Recommended Value
2887	9/17/87	Thiem		57.35-67.00	unsaturated	9.65	193.23		0.0289	1.80E-06	5.10E-03	KaKlclst(u)	packer	yes	1st P1/3 test	(9)
2887	9/17/87	Thiem		57.35-67.00	unsaturated	9.65	193.23		0.0075	3.60E-07	1.02E-03	KaKlclst(u)	packer	yes	P2/3 test	(9)
2887	9/17/87	Thiem		57.35-67.00	unsaturated	9.65	193.23		0.0014	8.50E-08	2.41E-04	KaKlclst(u)	packer	yes	2nd P1/3 test	(9)
2887	9/17/87	Thiem		62.68-72.33	unsaturated	9.65	193.23		0.0061	2.70E-07	7.65E-04	Ka	packer	no	P2/3 test	(9)
2887	9/17/87	Thiem	15	78.70-88.35	unsaturated	9.65	193.23		0.0032	1.10E-07	3.12E-04	Ka	packer	no	P2/3 test	(9)
2887	9/17/87	Thiem	15	78.70-88.35	unsaturated	9.65	193.23		0.001	4.90E-08	1.39E-04	Ka	packer	no	2nd P1/3 test	(9)
2887	9/17/87	Thiem	15	88.35-98.00	unsaturated	9.65	193.23		0.0144	4.60E-07	1.30E-03	Ka	packer	no	P2/3 test	(9)
2887	9/17/87	Thiem	15	88.35-98.00	unsaturated	9.65	193.23		0.00047	2.10E-08	5.95E-05	Ka	packer	no	2nd P1/3 test	(9)
2887	9/17/87	Thiem	15	98.00-107.65	unsaturated	9.65	193.23		0.0029	8.60E-08	2.44E-04	Ka	packer	no	P2/3 test	(9)
2887	9/17/87	Thiem	15	100.35-110.00	unsaturated	9.65	193.23		0.00038	1.50E-08	4.25E-05	Ka	packer	no	2nd P1/3 test	(9)
2887	9/17/87	Thiem	15	183.39-193.04	unsaturated	9.65	193.23		0.0006	1.40E-08	3.97E-05	Ka	packer	no	1st P1/3 test	(9)
2887	9/17/87	Thiem	14	183.37-193.02	unsaturated	9.65	193.23		0.000081	2.00E-09	5.67E-06	Ka	packer	no	1st P1/3 test	(9)
2887	9/17/87	Thiem	15	185.39-195.04	unsaturated	9.65	193.23		0.000022	1.00E-09	2.83E-06	Ka	packer	no	1st P1/3 test	(9)
2887	9/17/87	Thiem	15	187.54-197.19	unsaturated	9.65	193.23		0.00043	1.00E-08	2.83E-05	Ka	packer	no	1st P1/3 test	(9)
2887	9/17/87	Thiem	14	187.55-197.20	unsaturated	9.65	193.23		0.0026	5.90E-08	1.67E-04	Ka	packer	no	1st P1/3 test	(9)
2887	1994	Hvorslev	8500	190.02-200.26	unconfined	10.24	190.02	193.1	NA	2.05E-07	5.80E-04	KaKlclst(u)	slug	ND		(17)
2887	1994	Bouwer/Rice	8500	190.02-200.26	unconfined	10.24	190.02	193.1	NA	1.41E-07	4.00E-04	KaKlclst(u)	slug	ND		(17)
2887	1994									2.03E-07	5.76E-04	KaKlclst(u)	slug	yes		(17), Recommended Value
3087	9/17/87	Thiem											packer	no	lacks W.L. data for K calc.	(9)
3187										1.00E-05	2.83E-02			ND		(9)
3187	10/26/87	Cooper et al	38.45	110.64-129.41	confined	36.51	92.49	0.93	NA	1.10E-06	3.12E-03	Ka	slug	no		(4a)
3187	10/26/87	Bouwer/Rice	38.45	110.64-129.41	confined	36.51	92.49	0.93	NA	5.51E-07	1.56E-03	Ka	slug	no		(4a)
3187	10/26/87	Bouwer/Rice	38.45	110.64-129.41	confined	100	92.49			4.80E-08	1.36E-04	Ka	slug	no	superseded by (4a)	(2)
3187	9/30/87	Thiem	15	62.45-72.10	unsaturated	9.65	92.21		0.0049	2.90E-07	8.22E-04	KaKlclst(u)	packer	yes	1st P1/3 test	(9)
3187	9/30/87	Thiem	15	62.45-72.10	unsaturated	9.65	92.21		0.011	4.90E-07	1.39E-03	KaKlclst(u)	packer	yes	P2/3 test	(9)
3187	9/30/87	Thiem	15	62.45-72.10	unsaturated	9.65	92.21		0.0014	8.20E-08	2.32E-04	KaKlclst(u)	packer	yes	2nd P1/3 test	(9)
3187	9/30/87	Thiem	15	81.75-91.40	unsaturated	9.65	92.21		0.0017	6.10E-08	1.73E-04	Ka	packer	no	P2/3 test	(9)
3187	9/30/87	Thiem	15	91.40-101.05	unsaturated	9.65	92.21		0.0214	9.30E-07	2.64E-03	KaKlclst(u)	packer	yes	1st P1/3 test	(9)
3187	9/30/87	Thiem	15	91.40-101.05	unsaturated	9.65	92.21		0.0478	1.50E-06	4.25E-03	KaKlclst(u)	packer	yes	P2/3 test	(9)
3187	9/30/87	Thiem	15	91.40-101.05	unsaturated	9.65	92.21		0.0132	5.80E-07	1.64E-03	KaKlclst(u)	packer	yes	2nd P1/3 test	(9)
3187	9/30/87	Thiem	15	101.05-110.70	confined?	9.65	92.21		0.0011	4.90E-08	1.39E-04	Ka	packer	no	1st P1/3 test	(9)
3187	9/30/87	Thiem	15	101.05-110.70	confined?	9.65	92.21		0.0116	3.60E-07	1.02E-03	Ka	packer	no	P2/3 test	(9)
3187	9/30/87	Thiem	15	110.70-120.35	confined?	9.65	92.21		0.0114	5.10E-07	1.45E-03	KaKlclst(u)	packer	yes	1st P1/3 test	(9)
3187	9/30/87	Thiem	15	110.70-120.35	confined?	9.65	92.21		0.029	8.60E-07	2.44E-03	KaKlclst(u)	packer	yes	P2/3 test	(9)
3187	9/30/87	Thiem	15	110.70-120.35	confined?	9.65	92.21		0.0076	3.40E-07	9.64E-04	KaKlclst(u)	packer	yes	2nd P1/3 test	(9)
3187	9/30/87	Thiem	15	119.55-129.20	confined?	9.65	92.21		0.0129	5.80E-07	1.64E-03	KaKlss(u)	packer	yes	1st P1/3 test	(9)
3187	9/30/87	Thiem	15	119.55-129.20	confined?	9.65	92.21		0.0385	1.10E-06	3.12E-03	KaKlss(u)	packer	yes	P2/3 test	(9)
3187	9/30/87	Thiem	15	119.55-129.20	confined?	9.65	92.21		0.013	5.80E-07	1.64E-03	KaKlss(u)	packer	yes	2nd P1/3 test	(9)
3187	1994	Hvorslev	8500	111.76-132.06	unconfined	32.22	99.84	103.6	NA	8.47E-07	2.40E-03	KaKlss(u)	bailer/recovery	ND		(17)
3187	1994	Bouwer/Rice	8500	111.76-132.06	unconfined	32.22	99.84	103.6	NA	6.71E-07	1.90E-03	KaKlss(u)	bailer/recovery	ND		(17)
3187	1994	Ramey	8500	111.76-132.06	unconfined	32.22	99.84	103.6	NA	6.71E-07	1.90E-03	KaKlss(u)	bailer/recovery	ND		(17)
3187	1994									8.64E-07	2.45E-03	KaKlss(u)	slug	yes		(17), Recommended Value
3287	10/23/87	Bouwer/Rice	13.43	38.85-46.58	unconfined	7.73	38.85	1.11	NA	1.20E-03	3.40E+00	Qrf	slug	no		(4a)(9)

769

Table G-1
Hydraulic Data

Well ID	Date Tested	Analysis Method	Test Duration (min.)	Interval Tested (ft.)	Aquifer Conditions	Initial Saturated Thickness (ft.)	Depth to Water (ft.)	Maximum Drawdown (ft.)	Average Discharge (gpm)	Hydraulic Conductivity (cm/sec)	Hydraulic Conductivity (ft/d)	Lithologic Unit Tested	Type of Test	Data Usable?	Comments	Source
3287	10/23/87	Bouwer/Rice	13.43	38.85-46.58	unconfined	12.88	38.85			4.90E-05	1.39E-01	Qrf	slug	no	superseded by (4a)	(2)
3287	10/23/87	Bouwer/Rice	13.43	38.85-46.58	unconfined	7.73	38.85	1.11	NA	2.88E-04	8.16E-01	Qrf	slug	yes	reanalysis of 10/23/87 data	(4a)(9)(19)
3487										1.00E-05	2.83E-02			ND	need source	(9)
3487	10/26/87	Cooper et al	5.93	97.29-104.24	confined	31.15	72.49	1.27	NA	2.50E-06	7.09E-03	Ka	slug	no		(4a)
3487	10/26/87	Bouwer/Rice	5.93	97.29-104.24	confined	31.15	72.49	1.27	NA	2.04E-06	5.78E-03	Ka	slug	no		(4a)
3487	10/26/87	Bouwer/Rice	5.93	97.29-104.24	confined	100	72.49			2.27E-07	6.43E-04	Ka	slug	no	superseded by (4a)	(2)
3487	9/2/87	Thiem	15	65.40-75.05	unsaturated	9.65	72.85		0.0164	9.60E-07	2.72E-03	KaKlclst(u)	packer	yes	1st P1/3 test	(9)
3487	9/2/87	Thiem	15	65.40-75.05	unsaturated	9.65	72.85		0.0108	4.30E-07	1.22E-03	KaKlclst(u)	packer	yes	P2/3 test	(9)
3487	9/2/87	Thiem	15	65.40-75.05	unsaturated	9.65	72.85		0.0025	1.40E-07	3.97E-04	KaKlclst(u)	packer	yes	2nd P1/3 test	(9)
3487	9/2/87	Thiem	15	75.05-84.70	confined?	9.65	72.85		0.00043	1.60E-08	4.54E-05	Ka	packer	no	P2/3 test	(9)
3487	9/2/87	Thiem	15	84.70-94.35	confined?	9.65	72.85		0.00087	3.10E-08	8.79E-05	Ka	packer	no	P2/3 test	(9)
3487	9/2/87	Thiem	15	94.35-104.00	confined?	9.65	72.85		0.00011	6.00E-09	1.70E-05	Ka	packer	no	1st P1/3 test	(9)
3487	9/2/87	Thiem	15	94.35-104.00	confined?	9.65	72.85		0.0031	1.10E-07	3.12E-04	Ka	packer	no	P2/3 test	(9)
3487	9/2/87	Thiem	15	104.00-113.65	confined?	9.65	72.85		0.00087	2.90E-08	8.22E-05	Ka	packer	no	P2/3 test	(9)
3487	1994	Hvorslev	8300	97.92-106.52	unconfined	45.24	61.28	65	NA	1.38E-07	3.90E-04	KaKlclst(u)	slug	ND		(17)
3487	1994	Bouwer/Rice	8300	97.92-106.52	unconfined	45.24	61.28	65	NA	1.13E-07	3.20E-04	KaKlclst(u)	slug	ND		(17)
3487	1994	Ramey	8300	97.92-106.52	unconfined	45.24	61.28	65	NA	1.98E-07	5.60E-04	KaKlclst(u)	slug	ND		(17)
3487	1994									1.98E-07	5.62E-04	KaKlclst(u)	slug	yes		(17), Recommended Value
3687	10/14/87	Bouwer/Rice	12.9	31.52-63.35	unconfined	31.83	31.52	1.2	NA	1.00E-03	2.83E+00	Ka	slug	no		(4a)(9)
3687	10/14/87	Bouwer/Rice	12.9	31.52-63.35	unconfined	100	31.52			1.47E-05	4.17E-02	Ka	slug	no	superseded by (4a)	(2)
3687	10/14/87	Bouwer/Rice	12.9	31.52-63.35	unconfined	31.83	31.52	1.2	NA	2.73E-04	7.74E-01	KaNo.1ss(w)	slug	yes	reanalysis of 10/14/87 data	(4a)(9)(19)
3687	1994	Hvorslev	22	35.48-65.10	unconfined	29.62	35.48	35.74	NA	8.13E-05	2.30E-01	KaNo.1ss(w)	rising head	ND		(17)
3687	1994	Bouwer/Rice	22	35.48-65.10	unconfined	29.62	35.48	35.74	NA	5.08E-05	1.44E-01	KaNo.1ss(w)	rising head	ND		(17)
3687	1994	Hvorslev	28	35.48-65.10	unconfined	29.62	35.48	35.26	NA	5.08E-05	1.44E-01	KaNo.1ss(w)	falling head	ND		(17)
3687	1994	Bouwer/Rice	28	35.48-65.10	unconfined	29.62	35.48	35.26	NA	3.51E-05	9.94E-02	KaNo.1ss(w)	falling head	ND		(17)
3687	1994									6.61E-05	1.87E-01	KaNo.1ss(w)	slug	yes		(17), Recommended Value
3687	1992	Theis recovery								4.18E-04	1.19E+00	KaNo.1ss(w)	pump	yes		(20)
3687	1992	CooperJacob								4.02E-03	1.14E+01	KaNo.1ss(w)	pump	yes		(20)
3687	1992	Theis Analysis								4.37E-04	1.24E+00	KaNo.1ss(w)	pump	yes		(20)
3987	11/12/87	Thiem	15	50.10-59.75	unsaturated	9.65	83.98		0.00054	2.50E-08	7.09E-05	Ka	packer	no	P2/3 test	(8)
3987	11/12/87	Thiem	15	59.75-69.40	unsaturated	9.65	83.98		0.0014	6.10E-08	1.73E-04	Ka	packer	no	P2/3 test	(8)
3987	11/12/87	Thiem	15	69.40-79.05	unsaturated	9.65	83.98		0.0011	4.10E-08	1.16E-04	Ka	packer	no	P2/3 test	(8)
3987	11/12/87	Thiem	15	79.05-88.70	unsaturated	9.65	83.98		0.00022	1.00E-08	2.83E-05	Ka	packer	no	1st P1/3 test	(8)
3987	11/12/87	Thiem	15	79.05-88.70	unsaturated	9.65	83.98		0.00087	3.00E-08	8.50E-05	Ka	packer	no	P2/3 test	(8)
3987	11/12/87	Thiem	15	88.70-98.35	confined	9.65	83.98		0.00076	2.50E-08	7.09E-05	Ka	packer	no	P2/3 test	(8)
3987	11/12/87	Thiem	15	98.35-108.00	confined	9.65	83.98		0.0012	3.60E-08	1.02E-04	Ka	packer	no	P2/3 test	(8)
3987	11/12/87	Thiem	15	108.00-117.65	confined	9.65	83.98		0.0019	6.10E-08	1.73E-04	Ka	packer	no	P2/3 test	(8)
3987	11/12/87	Thiem	15	115.65-125.30	confined	9.65	83.98		0.0131	3.90E-07	1.11E-03	Ka	packer	no	P2/3 test	(8)
3987	11/12/87	Thiem	15	122.68-132.33	confined	9.65	83.98		0.00032	1.50E-08	4.25E-05	Ka	packer	no	1st P1/3 test	(8)
3987	11/12/87	Thiem	15	122.68-132.33	confined	9.65	83.98		0.0013	3.60E-08	1.02E-04	Ka	packer	no	P2/3 test	(8)
4187	1/26/88	Bouwer/Rice	44.88	41.68-93.79	confined	100	41.68	1.25	NA	2.34E-07	6.63E-04	Ka	slug	no		(3)
4187	1/26/88	Bouwer/Rice	44.88	41.68-93.79	confined	9.73	41.68	1.25	NA	5.04E-07	1.43E-03	Ka	slug	no	superseded by (3)	(2)
4187	1/26/88	Cooper et al	44.88	41.68-93.79	confined	100	41.68	1.25	NA	2.80E-08	7.94E-05	Ka	slug	no		(3)
4187	1/26/88	Cooper et al	44.88	41.68-93.79	confined	9.73	41.68	1.25	NA	3.70E-07	1.05E-03	Ka	slug	no	superseded by (3)	(2)
4187	7/31/87	Thiem	15	20.85-30.50	unsaturated	9.65	41.83		0.0041	5.70E-07	1.62E-03	KaKlclst(w)	packer	yes	1st P1/3 test	(10)
4187	7/31/87	Thiem	15	20.85-30.50	unsaturated	9.65	41.83		0.0141	1.70E-06	4.82E-03	KaKlclst(w)	packer	yes	P2/3 test	(10)

770

Table G-1
Hydraulic Data

Well ID	Date Tested	Analysis Method	Test Duration (min.)	Interval Tested (ft.)	Aquifer Conditions	Initial Saturated Thickness (ft.)	Depth to Water (ft.)	Maximum Drawdown (ft.)	Average Discharge (gpm)	Hydraulic Conductivity (cm/sec)	Hydraulic Conductivity (ft/d)	Lithologic Unit Tested	Type of Test	Data Usable?	Comments	Source
4187	7/31/87	Thiem	15	20.85-30.50	unsaturated	9.65	41.83		0.0074	9.90E-07	2.81E-03	KaKlclst(w)	packer	yes	2nd P1/3 test	(10)
4187	7/31/87	Thiem	15	32.50-42.15	unsaturated	9.65	41.83		0.0037	3.50E-07	9.92E-04	KaKlclst(u)	packer	yes	1st P1/3 test	(10)
4187	7/31/87	Thiem	15	32.50-42.15	unsaturated	9.65	41.83		0.0011	1.00E-07	2.83E-04	KaKlclst(u)	packer	yes	P2/3 test	(10)
4187	7/31/87	Thiem	15	32.50-42.15	unsaturated	9.65	41.83		0.00011	1.00E-08	2.83E-05	KaKlclst(u)	packer	yes	2nd P1/3 test	(10)
4187	7/31/87	Thiem	15	41.55-51.20	unsaturated	9.65	41.83		0.0116	9.00E-07	2.55E-03	KaKlclst(u)	packer	yes	1st P1/3 test	(10)
4187	7/31/87	Thiem	15	41.55-51.20	unsaturated	9.65	41.83		0.0367	2.50E-06	7.09E-03	KaKlclst(u)	packer	yes	P2/3 test	(10)
4187	7/31/87	Thiem	15	41.55-51.20	unsaturated	9.65	41.83		0.0212	1.80E-06	5.10E-03	KaKlclst(u)	packer	yes	2nd P1/3 test	(10)
4187	7/31/87	Thiem	15	53.05-62.70		9.65	41.83		0.0023	2.00E-07	5.67E-04	KaKlclst(u)	packer	yes	1st P1/3 test	(10)
4187	7/31/87	Thiem	15	53.05-62.70		9.65	41.83		0.0058	3.90E-07	1.11E-03	KaKlclst(u)	packer	yes	P2/3 test	(10)
4187	7/31/87	Thiem	15	53.05-62.70		9.65	41.83		0.0011	1.00E-07	2.83E-04	KaKlclst(u)	packer	yes	2nd P1/3 test	(10)
4187	7/31/87	Thiem	15	62.70-72.35		9.65	41.83		0.0049	4.20E-07	1.19E-03	KaKlss(u)	packer	yes	1st P1/3 test	(10)
4187	7/31/87	Thiem	15	62.70-72.35		9.65	41.83		0.0109	6.60E-07	1.87E-03	KaKlss(u)	packer	yes	P2/3 test	(10)
4187	7/31/87	Thiem	15	62.70-72.35		9.65	41.83		0.0019	1.70E-07	4.82E-04	KaKlss(u)	packer	yes	2nd P1/3 test	(10)
4187	7/31/87	Thiem	15	72.35-82.00		9.65	41.83		0.0106	9.10E-07	2.58E-03	Ka	packer	no	1st P1/3 test	(10)
4187	7/31/87	Thiem	15	72.35-82.00		9.65	41.83		0.0455	2.60E-06	7.37E-03	Ka	packer	no	P2/3 test	(10)
4187	7/31/87	Thiem	15	82.00-91.65		9.65	41.83		0.0065	5.70E-07	1.62E-03	Ka	packer	no	1st P1/3 test	(10)
4187	7/31/87	Thiem	15	82.00-91.65		9.65	41.83		0.00087	4.60E-08	1.30E-04	Ka	packer	no	P2/3 test	(10)
4587		Bouwer/Rice	10.3	98.48-101.30	unconfined	10.82	90.48	0.61	NA	1.33E-04	3.77E-01	KaKlss(u)	slug	no		(2)
4587		Bouwer/Rice	10.3	98.48-101.30	unconfined	10.82	90.48	0.61	NA	6.81E-05	1.93E-01	KaKlss(u)	slug	yes	reanalysis of data	(2)(19)
5287	2/4/88	Bouwer/Rice	9.68	3.5-20.3	unconfined	13.76	6.54	0.82	NA	2.08E-04	7.94E-01	Qc	slug	no		(2)
5287	2/4/88	Bouwer/Rice	9.68	3.5-20.3	unconfined	13.76	6.54	0.82	NA	6.24E-05	1.77E-01	Qc	slug	yes	reanalysis of data	(2)(19)
5887	1/28/88	Bouwer/Rice	23.45	13.80-22.26	unconfined	8.46	13.8	0.88	NA	1.56E-05	4.42E-02	Qrf	slug	no		(3)(10)
5887	1/28/88	Bouwer/Rice	23.45	13.80-22.26	unconfined	38.8	?	0.88	NA	5.50E-06	1.56E-02	Qrf	slug	no	discrepent input parameters superseded by (3)	(2)
6087	1/26/88	Bouwer/Rice	3	11.32-27.47	unconfined	16.15	11.32	1.25	NA	1.29E-03	3.66E+00	Qrf	slug	no		(3)(10)
6087	1/26/88	Bouwer/Rice	3	11.32-27.47	unconfined	11.55	?	1.26	NA	5.41E-04	1.53E+00	Qrf	slug	no	discrepent input parameters superseded by (3)	(2)
6087	1/26/88	Bouwer/Rice	3	11.32-27.47	unconfined	16.15	11.32	1.25	NA	2.01E-04	5.70E-01	Qrf	slug	yes	reanalysis of 1/26/88 data	(3)(10)(19)
6187	1/27/88	Bouwer/Rice	4.52	12.46-28.24	unconfined	15.78	12.46	0.71	NA	9.87E-04	2.80E+00	Qrf	slug	no		(4)(10)
6187	1/27/88	Bouwer/Rice	4.52	12.46-28.24	unconfined	15.78	12.46	0.71	NA	9.87E-04	2.80E+00	Qrf	slug	no	same as (4)	(3a)
6187	1/27/88	Bouwer/Rice	4.52	12.46-28.24	unconfined	38.8	?	0.71	NA	1.35E-04	3.83E-01	Qrf	slug	no	Superseded by (4)	(2)
6287	1/27/88	Bouwer/Rice	7.72	12.66-26.56	unconfined	13.9	12.66	1.01	NA	6.21E-04	1.76E+00	Qrf	slug	no		(4)(10)
6287	1/27/88	Bouwer/Rice	7.72	12.66-26.56	unconfined	13.9	12.66	1.01	NA	6.21E-04	1.76E+00	Qrf	slug	no	same as (4)	(3a)
6287	1/27/88	Bouwer/Rice	7.72	12.66-26.56	unconfined	38.8	?	1.01	NA	7.67E-05	2.17E-01	Qrf	slug	no	superseded by (4)	(2)
6387	1/27/88	Bouwer/Rice	10.13	14.56-25.40	unconfined	10.84	14.56	0.73	NA	6.68E-04	1.89E+00	Qrf	slug	no		(4)(10)
6387	1/27/88	Bouwer/Rice	10.13	14.56-25.40	unconfined	10.84	14.56	0.73	NA	6.68E-04	1.89E+00	Qrf	slug	no	same as (4)	(3a)
6387	1/27/88	Bouwer/Rice	10.13	14.56-25.40	unconfined	38.8	?	0.73	NA	7.00E-05	1.98E-01	Qrf	slug	no	superseded by (4)	(2)
6587	1/28/88	Bouwer/Rice	12.28	12.82-23.96	unconfined	11.14	12.82	0.77	NA	4.63E-04	4.37E-01	Qrf	slug	no		(4)(10)
6587	1/28/88	Bouwer/Rice	12.28	12.82-23.96	unconfined	11.14	12.82	0.77	NA	4.63E-04	1.31E+00	Qrf	slug	no	same as (4)	(3a)
6587	1/28/88	Bouwer/Rice	12.28	12.82-23.96	unconfined	38.8	?	0.77	NA	4.98E-05	1.41E-01	Qrf	slug	no	superseded by (4)	(2)
6687	1/27/88	Bouwer/Rice	10.08	11.37-17.96	unconfined	6.59	11.37	1.27	NA	1.79E-04	5.07E-01	Qrf	slug	no		(3)(10)
6687	1/27/88	Bouwer/Rice	10.08	11.37-17.96	unconfined	38.8	?	1.27	NA	1.24E-05	3.51E-02	Qrf	slug	no	superseded by (3)	(2)
6787	1/27/88	Bouwer/Rice	19.45	8.74-16.46	unconfined	5.08	8.74	1.14	NA	6.42E-05	1.82E-01	Qrf	slug	no		(3)(10)
6787	1/27/88	Bouwer/Rice	19.45	8.74-16.46	unconfined	38.8	?	1.17	NA	1.65E-05	4.68E-02	Qrf	slug	no	superseded by (3)	(2)
7078										3.00E-04	8.50E-01			ND	did not have data in ref.	(12)
7187	1/26/88	Bouwer/Rice	5.65	5.67-13.50	unconfined	7.83	5.67	1.2	NA	6.60E-04	1.87E+00	Qrf	slug	yes		(3)(10)
7187	1/26/88	Bouwer/Rice	5.65	5.67-13.50	unconfined	11.55	?	1.2	NA	1.63E-04	4.62E-01	Qrf	slug	no	superseded by (3)	(2)

Table G-1
Hydraulic Data

Well ID	Date Tested	Analysis Method	Test Duration (min.)	Interval Tested (ft.)	Aquifer Conditions	Initial Saturated Thickness (ft.)	Depth to Water (ft.)	Maximum Drawdown (ft.)	Average Discharge (gpm)	Hydraulic Conductivity (cm/sec)	Hydraulic Conductivity (ft/d)	Lithologic Unit Tested	Type of Test	Data Usable?	Comments	Source
7187	NA	NA	NA	5.67-13.50	unconfined	NA	NA	NA	NA	6.60E-04	1.87E+00	Qrf	slug	ND	insufficient background information	(5)
B102289	1989	Bouwer/Rice	34.6	4.76-14.23	unconfined	11.23	3	2.3	NA	2.30E-04	6.24E-01	Qvf	Slug in	yes		(5)
B102289	1989	Bouwer/Rice	32.5	4.76-14.23	unconfined	11.23	3	3.1	NA	2.20E-04	6.24E-01	Qvf	Slug out	yes		(5)
B102389	1989	Bouwer/Rice	51.7	5.74-12.58	unconfined	6.34	5.74	2.2	NA	1.40E-04	4.54E-01	Qvf	Slug in	no	recalculate Rc	(5)
B102389	1989	Bouwer/Rice	58.3	5.74-12.58	unconfined	6.34	5.74	1.6	NA	9.40E-05	2.66E-01	Qvf	Slug out	no	recalculate Rc	(5)
B102389	1989	Bouwer/Rice	51.7	5.74-12.58	unconfined	6.34	5.74	2.2	NA	2.34E-04	6.63E-01	Qc	Slug in	yes	reanalysis using adjusted Rc	(5)(19)
B102389	1989	Bouwer/Rice	58.3	5.74-12.58	unconfined	6.34	5.74	1.6	NA	1.52E-04	4.31E-01	Qc	Slug out	yes	reanalysis using adjusted Rc	(5)(19)
B110889	1989	Bouwer/Rice	2	47.47-66.95	unconfined	31.55	35.4	2.33	NA	3.30E-03	9.35E+00	Qrf	Slug out	yes		
B110889	1989	Bouwer/Rice	2	47.47-66.95	unconfined	31.55	35.4	2.1	NA	3.00E-03	8.50E+00	Qrf	Slug in	yes		
B110989	1989	Bouwer/Rice	8.5	48.19-67.67	unconfined	20.05	47.62	2	NA	7.40E-04	2.10E+00	Qrf	Slug in	yes		(6)
B110989	1989	Bouwer/Rice	8.5	48.19-67.67	unconfined	20.05	47.62	1.9	NA	7.60E-04	2.15E+00	Qrf	Slug out	yes		(6)
B111189	1989	Bouwer/Rice	32.5	56.97-74.4	unconfined	17.43	56.97	1.4	NA	3.00E-04	8.51E-01	Qrf	Slug out	yes		(6)
B111189	1989	Bouwer/Rice	44.2	56.97-74.4	unconfined	17.43	56.97	1	NA	1.00E-04	2.83E-01	Qrf	Slug in	yes		(6)
B200589	1989	Bouwer/Rice	8.5	21.26-33.34	unconfined	10.51	21.26	1.1	NA	2.90E-03	9.64E+00	Qrf	Slug in	no	recalculate Rc	(5)
B200589	1989	Bouwer/Rice	7	21.26-33.34	unconfined	10.51	21.26	1.6	NA	1.20E-03	3.40E+00	Qrf	Slug out	no	recalculate Rc	(5)
B200589	1989	Bouwer/Rice	8.5	21.26-33.34	unconfined	10.51	21.26	1.1	NA	8.30E-03	2.35E+01	Qrf	Slug in	yes	reanalysis using adjusted Rc	(5)(19)
B200589	1989	Bouwer/Rice	7	21.26-33.34	unconfined	10.51	21.26	1.6	NA	3.40E-03	9.64E+00	Qrf	Slug out	yes	reanalysis using adjusted Rc	(5)(19)
B200689	1989	Bouwer/Rice	30	23.33-32.89	unconfined	9.11	23.33	2.4	NA	4.30E-04	2.10E+00	Qrf	Slug out	no	recalculate Rc	(5)
B200689	1989	Bouwer/Rice	26.3	23.33-32.89	unconfined	9.11	23.33	2	NA	3.70E-04	1.81E+00	Qrf	Slug in	no	recalculate Rc	(5)
B200689	1989	Bouwer/Rice	30	23.33-32.89	unconfined	9.11	23.33	2.4	NA	7.40E-04	2.10E+00	Qrf	Slug out	yes	reanalysis using adjusted Rc	(5)(19)
B200689	1989	Bouwer/Rice	26.3	23.33-32.89	unconfined	9.11	23.33	2	NA	6.40E-04	1.81E+00	Qrf	Slug in	yes	reanalysis using adjusted Rc	(5)(19)
B200689	1989	Bouwer/Rice	30	23.33-32.89	unconfined	9.11	23.33	2.2	NA	3.70E-04	1.05E+00	Qrf	Slug out	no	recalculate Rc	(5)
B200689	1989	Bouwer/Rice	30	23.33-32.89	unconfined	9.11	23.33	2.1	NA	3.70E-04	1.05E+00	Qrf	Slug in	no	recalculate Rc	(5)
B200689	1989	Bouwer/Rice	30	23.33-32.89	unconfined	9.11	23.33	2.2	NA	6.40E-04	1.81E+00	Qrf	Slug out	yes	reanalysis using adjusted Rc	(5)(19)
B200689	1989	Bouwer/Rice	30	23.33-32.89	unconfined	9.11	23.33	2.1	NA	6.00E-04	1.70E+00	Qrf	Slug in	yes	reanalysis using adjusted Rc	(5)(19)
B200789	1989	Bouwer/Rice	12	21.0-30.48	unconfined	8.98	21	2	NA	8.20E-04	4.25E+00	Qrf	Slug in	no	recalculate Rc	(5)
B200789	1989	Bouwer/Rice	10	21.0-30.48	unconfined	8.98	21	2	NA	8.50E-04	2.41E+00	Qrf	Slug out	no	recalculate Rc	(5)
B200789	1989	Bouwer/Rice	12	21.0-30.48	unconfined	8.98	21	2	NA	1.40E-03	3.97E+00	Qrf	Slug in	yes	reanalysis using adjusted Rc	(5)(19)
B200789	1989	Bouwer/Rice	10	21.0-30.48	unconfined	8.98	21	2	NA	1.40E-03	3.97E+00	Qrf	Slug out	yes	reanalysis using adjusted Rc	(5)(19)
B200889	1989	Bouwer/Rice	27.5	20.84-25.10	unconfined	3.94	20.84	7.4	NA	5.20E-04	1.98E+00	Qrf	Slug in	no	recalculate Rc	(5)
B200889	1989	Bouwer/Rice	27.5	20.84-25.10	unconfined	3.94	20.84	6.1	NA	4.00E-04	2.41E+00	Qrf	Slug out	no	recalculate Rc	(5)
B200889	1989	Bouwer/Rice	27.5	20.84-25.10	unconfined	3.94	20.84	7.4	NA	8.80E-04	2.49E+00	Qrf	Slug in	yes	reanalysis using adjusted Rc	(5)(19)
B200889	1989	Bouwer/Rice	27.5	20.84-25.10	unconfined	3.94	20.84	6.1	NA	7.10E-04	2.01E+00	Qrf	Slug out	yes	reanalysis using adjusted Rc	(5)(19)
B200889	1989	Bouwer/Rice	31.3	20.84-25.10	unconfined	3.94	20.84	7.4	NA	5.20E-04	1.47E+00	Qrf	Slug in	no	recalculate Rc	(5)
B200889	1989	Bouwer/Rice	31.3	20.84-25.10	unconfined	3.94	20.84	7.8	NA	4.90E-04	1.39E+00	Qrf	Slug out	no	recalculate Rc	(5)
B200889	1989	Bouwer/Rice	31.3	20.84-25.10	unconfined	3.94	20.84	7.4	NA	5.83E-04	1.65E+00	Qrf	Slug in	yes	reanalysis using adjusted Rc	(5)(19)
B200889	1989	Bouwer/Rice	31.3	20.84-25.10	unconfined	3.94	20.84	7.8	NA	8.53E-04	2.42E+00	Qrf	Slug out	yes	reanalysis using adjusted Rc	(5)(19)
B201189	8/18/89	Bouwer/Rice	237.5	22.27-36.71	unconfined	28.52	7.39	4.1	NA	9.10E-06	2.69E-02	Qc	Slug in	yes		(5)
B201189	8/18/89	Bouwer/Rice	238.3	22.27-36.71	unconfined	28.52	7.39	2.95	NA	9.40E-06	3.97E+01	Qc	Slug out	yes		(5)
B201189	8/18/89	Theis	410	22.27-36.71	unconfined	26.44	11.97	17.5	0.73	4.90E-04	6.24E-02	Qc	pumping	yes		(13)
B201189	8/18/89	Theis	3590	22.27-36.71	unconfined	26.44?	11.97	17.5	0.73	2.00E-04	5.67E-01	Qc	recovery	yes		(13)
B201189	8/18/89	Theis	400	22.27-36.71	unconfined	26.4	11.97	17.5	0.73	9.29E-04	2.63E+00	Qc	recovery	yes	Theis recovery reanalysis	(19)
B201189	8/18/89	Papadopulus/Cooper	400	22.27-36.71	unconfined	26.4	11.97	17.5	0.73	2.86E-05	8.11E-02	Qc	recovery	yes	Papadopulus-Cooper wellbore storage reanalysis	(19)
B202489	1989	Bouwer/Rice	1.7	9.09-14.83	unconfined	5.24	9.09	1.3	NA	7.60E-03	4.82E+01	Qvf	Slug in	no	recalculate Rc	(5)
B202489	1989	Bouwer/Rice	1.7	9.09-14.83	unconfined	5.24	9.09	2.2	NA	1.00E-02	2.83E+01	Qvf	Slug out	no	recalculate Rc	(5)

Table G-1
Hydraulic Data

Well ID	Date Tested	Analysis Method	Test Duration (min.)	Interval Tested (ft.)	Aquifer Conditions	Initial Saturated Thickness (ft.)	Depth to Water (ft.)	Maximum Drawdown (ft.)	Average Discharge (gpm)	Hydraulic Conductivity (cm/sec)	Hydraulic Conductivity (ft/d)	Lithologic Unit Tested	Type of Test	Data Usable?	Comments	Source
B202489	1989	Bouwer/Rice	1.7	9.09-14.83	unconfined	5.24	9.09	1.3	NA	1.32E-02	3.74E+01	Qvf	Slug in	yes	reanalysis using adjusted Rc	(5)(19)
B202489	1989	Bouwer/Rice	1.7	9.09-14.83	unconfined	5.24	9.09	2.2	NA	1.70E-02	4.82E+01	Qvf	Slug out	yes	reanalysis using adjusted Rc	(5)(19)
B202489	1989	Bouwer/Rice	1.7	9.09-14.83	unconfined	5.24	9.09	1.3	NA	7.30E-03	2.07E+01	Qvf	Slug in	no	recalculate Rc	(5)
B202489	1989	Bouwer/Rice	1.7	9.09-14.83	unconfined	5.24	9.09	2	NA	9.70E-03	2.75E+01	Qvf	Slug out	no	recalculate Rc	(5)
B202489	1989	Bouwer/Rice	1.7	9.09-14.83	unconfined	5.24	9.09	1.3	NA	1.27E-02	3.60E+01	Qvf	Slug in	yes	reanalysis using adjusted Rc	(5)(19)
B202489	1989	Bouwer/Rice	1.7	9.09-14.83	unconfined	5.24	9.09	2	NA	1.65E-02	4.68E+01	Qvf	Slug out	yes	reanalysis using adjusted Rc	(5)(19)
B202589	1989	Bouwer/Rice	0.58	6.38-13.45	unconfined	8.97	4.08	4	NA	2.20E-02	5.39E+00	Qvf	Slug in	yes		(5)
B202589	1989	Bouwer/Rice	0.67	6.38-13.45	unconfined	8.97	4.08	3.8	NA	2.00E-02	5.67E+01	Qvf	Slug in	yes		(5)
B202589	1989	Bouwer/Rice	0.67	6.38-13.45	unconfined	8.97	4.08	4	NA	1.90E-02	5.39E+01	Qvf	Slug out	yes		(5)
B203189	1994	Hvorslev	37000	35.99-48.20	unconfined	15.47	32.73	35.38	NA	4.59E-08	1.30E-04	KaKlclst(w)	bailer/recovery	ND		(17)
B203189	1994	Bouwer/Rice	37000	35.99-48.20	unconfined	15.47	32.73	35.38	NA	2.86E-08	8.10E-05	KaKlclst(w)	bailer/recovery	ND		(17)
B203189	1994	Ramey	37000	35.99-48.20	unconfined	15.47	32.73	35.38	NA	5.65E-08	1.60E-04	KaKlclst(w)	bailer/recovery	ND		(17)
B203189	1994									5.59E-08	1.58E-04	KaKlclst(w)	slug	yes		(17), Recommended Value
B203289	1994	Hvorslev	26000	35.99-46.49	unconfined	14.5	25.24	28.59	NA	3.88E-08	1.10E-04	KaKlclst(w)	bailer/recovery	ND		(17)
B203289	1994	Ramey	26000	35.99-46.49	unconfined	14.5	25.24	28.59	NA	1.59E-07	4.50E-04	KaKlclst(w)	bailer/recovery	ND		(17)
B203289	1994									1.52E-07	4.32E-04	KaKlclst(w)	slug	yes		(17), Recommended Value
B203489	1994	Hvorslev	21500	32.01-43.26	confined	12.66	28.38	31.79	NA	3.53E-08	1.00E-04	KaKlclst(w)	bailer/recovery	ND		(17)
B203489	1994	Ramey	21500	32.01-43.26	confined	12.66	28.38	31.79	NA	3.53E-08	1.00E-04	KaKlclst(w)	bailer/recovery	ND		(17)
B203489	1994									3.81E-08	1.08E-04	KaKlclst(w)	slug	yes		(17), Recommended Value
B203589	1994	Hvorslev	1000	30.57-41.81	confined	8.91	29.67	33.1	NA	2.44E-08	6.90E-05	KaKlclst(w)	rising head	ND		(17)
B203589	1994	Ramey	1000	30.57-41.81	confined	8.91	29.67	33.1	NA	3.00E-08	8.50E-05	KaKlclst(w)	rising head	ND		(17)
B203589	1994									3.00E-08	8.50E-05	KaKlclst(w)	slug	yes		(17), Recommended Value
B203789	1994	Hvorslev	20000	135.08-143.33	unconfined	100.04	43.29	48.29	NA	2.86E-08	8.10E-05	KaKlclst(w)	bailer/recovery	ND		(17)
B203789	1994	Bouwer/Rice	20000	135.08-143.33	unconfined	100.04	43.29	48.29	NA	2.54E-08	7.20E-05	KaKlclst(w)	bailer/recovery	ND		(17)
B203789	1994	Ramey	20000	135.08-143.33	unconfined	100.04	43.29	48.29	NA	2.44E-08	6.90E-05	KaKlclst(w)	bailer/recovery	ND		(17)
B203789	1994									2.85E-08	8.06E-05	KaKlclst(u)	slug	yes		(17), Recommended Value
B203889	1994	Hvorslev	20080	107.69-115.99	unconfined	72.26	43.73	47.96	NA	2.08E-08	5.90E-05	KaKlclst(u)	bailer/recovery	ND		(17)
B203889	1994	Bouwer/Rice	20080	107.69-115.99	unconfined	72.26	43.73	47.96	NA	1.59E-08	4.50E-05	KaKlclst(u)	bailer/recovery	ND		(17)
B203889	1994	Ramey	20080	107.69-115.99	unconfined	72.26	43.73	47.96	NA	1.87E-08	5.30E-05	KaKlclst(u)	bailer/recovery	ND		(17)
B203889	1994									2.08E-08	5.90E-05	KaKlclst(u)	slug	yes		(17), Recommended Value
B203989	1994	Hvorslev	8800	125.88-134.88	unconfined	65.15	69.73	73.4	NA	1.02E-05	2.88E-02	KaKlclst(u)	rising head	ND		(17)
B203989	1994	Bouwer/Rice	8800	125.88-134.88	unconfined	65.15	69.73	73.4	NA	7.62E-06	2.16E-02	KaKlclst(u)	rising head	ND		(17)
B203989	1994	Ramey	8800	125.88-134.88	unconfined	65.15	69.73	73.4	NA	1.57E-05	4.46E-02	KaKlclst(u)	rising head	ND		(17)
B203989	1994	Hvorslev	2800	125.88-134.88	unconfined	65.15	69.73	65.56	NA	5.58E-06	1.58E-02	KaKlclst(u)	falling head	ND		(17)
B203989	1994	Bouwer/Rice	2800	125.88-134.88	unconfined	65.15	69.73	65.56	NA	3.81E-06	1.08E-02	KaKlclst(u)	falling head	ND		(17)
B203989	1994	Ramey	2800	125.88-134.88	unconfined	65.15	69.73	65.56	NA	2.54E-05	7.20E-02	KaKlclst(u)	falling head	ND		(17)
B203989	1994									2.08E-05	5.90E-02	KaKlclst(u)	slug	yes		(17), Recommended Value
B204089	1994	Hvorslev	20000	107.19-116.92	unconfined	50.47	66.45	69.18	NA	6.71E-08	1.90E-04	KaKlclst(u)	bailer/recovery	ND		(17)
B204089	1994	Bouwer/Rice	20000	107.19-116.92	unconfined	50.47	66.45	69.18	NA	5.65E-08	1.60E-04	KaKlclst(u)	bailer/recovery	ND		(17)
B204089	1994	Ramey	20000	107.19-116.92	unconfined	50.47	66.45	69.18	NA	4.24E-08	1.20E-04	KaKlclst(u)	bailer/recovery	ND		(17)
B204089	1994									6.61E-08	1.87E-04	KaKlss(u)	slug	yes		(17), Recommended Value
B204189	1989	Cooper et al	5833	83.06-97.29	confined	14.1	NA	NA	NA	8.20E-08	4.25E-04	KaKlss(u)	Slug in	yes		(5)
B204189	1989	Cooper et al	8333	83.06-97.29	confined	14.1	NA	NA	NA	1.50E-07	4.25E-04	KaKlss(u)	Slug out	yes		(5)
B204189	1994	Hvorslev	21520	81.96-99.58	unconfined	32.07	67.51	71.18	NA	7.06E-08	2.00E-04	KaKlss(u)	bailer/recovery	ND		(17)
B204189	1994	Bouwer/Rice	21520	81.96-99.58	unconfined	32.07	67.51	71.18	NA	4.24E-08	1.20E-04	KaKlss(u)	bailer/recovery	ND		(17)
B204189	1994	Ramey	21520	81.96-99.58	unconfined	32.07	67.51	71.18	NA	1.31E-07	3.70E-04	KaKlss(u)	bailer/recovery	ND		(17)
B204189	1994									1.32E-07	3.74E-04	KaKlss(u)	slug	yes		(17), Recommended Value
B205589	1989	Bouwer/Rice	1.7	13.98-18.36	unconfined	4.38	13.98	5.6	NA	1.70E-03	3.12E+01	Qc	Slug in	no	well bore storage	(5)

713

Table G-1
Hydraulic Data

Well ID	Date Tested	Analysis Method	Test Duration (min.)	Interval Tested (ft.)	Aquifer Conditions	Initial Saturated Thickness (ft.)	Depth to Water (ft.)	Maximum Drawdown (ft.)	Average Discharge (gpm)	Hydraulic Conductivity (cm/sec)	Hydraulic Conductivity (ft/d)	Lithologic Unit Tested	Type of Test	Data Usable?	Comments	Source
B205589	1989	Bouwer/Rice	1.7	13.98-18.36	unconfined	4.38	13.98	6.8	NA	2.50E-03	7.09E+00	Qc	Slug out	no	well bore storage	(5)
B205589	8/18/89	Theis	410	13.98-18.36	unconfined	4	15.34	0.03	0.73	ND	ND	Qc	pumping	no	No response to pumping 10-89	(13)
B206589	1989	Bouwer/Rice	1105	25.42-37.06	confined	27.09	9.33	1	NA	5.80E-06	1.64E-03	KaKlclst(w)	Slug in	yes		(6)
B206589	1989	Bouwer/Rice	433.3	25.42-37.06	confined	27.09	9.33	2.65	BA	5.80E-06	1.64E-02	KaKlclst(w)	Slug out	yes		(6)
B206589	1994	Hvorslev	18640	24.42-38.96	confined	29.54	7.55	11	NA	5.65E-07	1.60E-03	KaKlclst(w)	slug	ND		(17)
B206589	1994	Bouwer/Rice	18640	24.42-38.96	confined	29.54	7.55	11	NA	2.89E-06	8.20E-03	KaKlclst(w)	slug	ND		(17)
B206589	1994	Ramey	18640	24.42-38.96	confined	29.54	7.55	11	NA	1.62E-06	4.60E-03	KaKlclst(w)	slug	ND		(17)
B206589	1994	Bouwer/Rice	18640	24.42-38.96	confined	29.54	7.55	11	NA	2.90E-06	8.21E-03	KaKlclst(w)	slug out	yes		(17), Recommended Value
B206789	1990	Bouwer/Rice	NA	12.09-31.57	unconfined	14.17	NA	NA	NA	ND	ND	Ka	Slug in	no	Data Unanalyzable	(6)
B206789	1994	Hvorslev	8800	16.36-23.59	unconfined	7.23	16.36	19.5	NA	4.59E-07	1.30E-03	KaKlclst(w)	slug	ND		(17)
B206789	1994	Bouwer/Rice	8800	16.36-23.59	unconfined	7.23	16.36	19.5	NA	2.65E-07	7.50E-04	KaKlclst(w)	slug	ND		(17)
B206789	1994									4.47E-07	1.27E-03	KaKlclst(w)	slug	yes		(17), Recommended Value
B207089	1990	Bouwer/Rice	866.7	33.2-54.88	confined	30.89	23.49	1.7	NA	2.30E-07	6.52E-04	KaKlclst(u)	Slug in	yes		(6)
B207189	1990	Bouwer/Rice	1000	72.9-77.35	confined	44.67	32.68	4.3	NA	1.50E-07	4.25E-04	KaKlclst(u)	Slug out	yes		(6)
B207189	1990	Bouwer/Rice	733.3	72.9-77.35	confined	44.67	32.68	4.3	NA	1.40E-07	3.97E-04	KaKlclst(u)	Slug in	yes		(6)
B207189	1990	Bouwer/Rice	2	47.47-66.95	unconfined	31.55				3.20E-03	9.36E+00	KaKlclst(u)	Slug in	yes		
B217489	1994	Hvorslev	25840	134.60-151.52	unconfined	63.41	88.11	91.93	NA	9.53E-08	2.70E-04	KaKlss(u)	slug	ND		(17)
B217489	1994	Bouwer/Rice	25840	134.60-151.52	unconfined	63.41	88.11	91.93	NA	4.94E-08	1.40E-04	KaKlss(u)	slug	ND		(17)
B217489	1994	Ramey	25840	134.60-151.52	unconfined	63.41	88.11	91.93	NA	4.59E-08	1.30E-04	KaKlss(u)	slug	ND		(17)
B217489	1994									9.66E-08	2.74E-04	KaKlss(u)	slug	yes		(17), Recommended Value
B217589	1994	Hvorslev	20080	85.22-97.67	unconfined	57.75	39.92	43.81	NA	6.00E-08	1.70E-04	KaKlss(u)	slug	ND		(17)
B217589	1994	Bouwer/Rice	20080	85.22-97.67	unconfined	57.75	39.92	43.81	NA	4.24E-08	1.20E-04	KaKlss(u)	slug	ND		(17)
B217589	1994	Ramey	20080	85.22-97.67	unconfined	57.75	39.92	43.81	NA	8.12E-08	2.30E-04	KaKlss(u)	slug	ND		(17)
B217589	1994									8.13E-08	2.30E-04	KaKlss(u)	slug	yes		(17), Recommended Value
B217689	1994	Hvorslev	18640	97.83-109.28	unconfined	69.25	40.03	43.69	NA	6.00E-08	1.70E-04	KaKlss(u)	slug	ND		(17)
B217689	1994	Bouwer/Rice	18640	97.83-109.28	unconfined	69.25	40.03	43.69	NA	4.24E-08	1.20E-04	KaKlss(u)	slug	ND		(17)
B217689	1994	Ramey	18640	97.83-109.28	unconfined	69.25	40.03	43.69	NA	1.59E-07	4.50E-04	KaKlss(u)	slug	ND		(17)
B217689	1994									1.58E-07	4.46E-04	KaKlss(u)	slug	yes		(17), Recommended Value
B217789	1994	Hvorslev	8300	71.87-89.27	unconfined	37.64	51.63	52.25	NA	2.33E-07	6.60E-04	KaKlclst(u)	slug	ND		(17)
B217789	1994	Bouwer/Rice	8300	71.87-89.27	unconfined	37.64	51.63	52.25	NA	1.48E-07	4.20E-04	KaKlclst(u)	slug	ND		(17)
B217789	1994	Ramey	8300	71.87-89.27	unconfined	37.64	51.63	52.25	NA	2.86E-07	8.10E-04	KaKlclst(u)	slug	ND		(17)
B217789	1994									2.85E-07	8.06E-04	KaKlclst(u)	slug	yes		(17), Recommended Value
B302889	1989	Bouwer/Rice	8.5	8.25-12.85	unconfined	6.57	5.96	2.3	NA	2.80E-03	6.24E+00	Qvf	Slug in	yes		(5)
B302889	1989	Bouwer/Rice	8	8.25-12.85	unconfined	6.57	5.96	2.2	NA	2.20E-03	6.24E+00	Qvf	Slug out	yes		(5)
B302989	1989	Bouwer/Rice	14	5.39-9.83	unconfined	5.52	3.81	2.4	NA	1.20E-03	4.25E+00	Qvf	Slug in	yes		(5)
B302989	1989	Bouwer/Rice	12.2	5.39-9.83	unconfined	5.52	3.81	2.4	NA	1.50E-03	4.25E+00	Qvf	Slug out	yes		(5)
B304289	1989	Cooper et al	1000	86.22-90.67	confined	4	11.91	NA	NA	9.80E-06	3.12E-02	KaKlss(u)	Slug in	yes		(5)
B304289	1989	Cooper et al	500	86.22-90.67	confined	4	11.91	NA	NA	3.50E-05	9.92E-02	KaKlss(u)	Slug out	yes		(5)
B304289		?								2.20E-04	6.24E-01			ND	need reference	(5)
B304289	9/13/89	NA	63	84.0-88.5	confined	NA	11.11	73.44	0.21	ND	ND	Ka	pumping	no	well bore storage, unreliable data	(13)
B304589	9/13/89	NA	63	NA	unconfined	NA	11.27	0	0.21	ND	ND	Qrf	pumping	no	No response to pumping 37-89BR	(13)
B304889	1994	Hvorslev	40000	15.66-27.96	unconfined	15.43	12.53	8.11	NA	2.51E-07	7.10E-04	KaKlclst(w)	falling head	ND		(17)
B304889	1994	Bouwer/Rice	40000	15.66-27.96	unconfined	15.43	12.53	8.11	NA	1.73E-07	4.90E-04	KaKlclst(w)	falling head	ND		(17)
B304889	1994	Ramey	40000	15.66-27.96	unconfined	15.43	12.53	8.11	NA	6.11E-07	1.73E-03	KaKlclst(w)	falling head	ND		(17)
B304889	1994									2.49E-07	7.06E-04	KaKlclst(w)	slug	yes		(17), Recommended Value
B304989	1994	Hvorslev	4200	76.62-88.40	unconfined	72.8	15.6	11.4	NA	3.88E-07	1.10E-03	KaKlss(u)	falling head	ND		(17)
B304989	1994	Bouwer/Rice	4200	76.62-88.40	unconfined	72.8	15.6	11.4	NA	3.53E-07	1.00E-03	KaKlss(u)	falling head	ND		(17)

774

Table G-1
Hydraulic Data

Well ID	Date Tested	Analysis Method	Test Duration (min.)	Interval Tested (ft.)	Aquifer Conditions	Initial Saturated Thickness (ft.)	Depth to Water (ft.)	Maximum Drawdown (ft.)	Average Discharge (gpm)	Hydraulic Conductivity (cm/sec)	Hydraulic Conductivity (ft/d)	Lithologic Unit Tested	Type of Test	Data Usable?	Comments	Source
B304989	1994	Ramey	4200	76.62-88.40	unconfined	72.8	15.6	11.4	NA	1.24E-06	3.50E-03	KaKlss(u)	falling head	ND		(17)
B304989	1994									1.22E-06	3.46E-03	KaKlss(u)	slug	yes		(17), Recommended Value
B305389	1989	Cooper et al	350	17.08-26.48	confined	6	8.41	NA	NA	3.40E-05	5.10E-01	KaKlslt(w)	Slug in	yes		(5)
B305389	1989	Cooper et al	3000	17.08-26.48	confined	6	8.41	NA	NA	3.00E-05	8.50E-02	KaKlslt(w)	Slug out	yes		(5)
B305389	1994	Hvorslev	7200	15.80-27.80	confined	16.7	5.94	9.85	NA	1.06E-05	3.00E-02	KaKlslt(w)	slug	ND		(17)
B305389	1994	Ramey	7200	15.80-27.80	confined	16.7	5.94	9.85	NA	2.34E-05	6.62E-02	KaKlslt(w)	slug	ND		(17)
B305389	1994									2.34E-05	6.62E-02	KaKlslt(w)	slug	yes		(17), Recommended Value
B315289	1994	Hvorslev	8400	90.0-101.00	unconfined	43.5	57.5	60.45	NA	8.64E-07	2.45E-03	KaKlclst(u)	slug	ND		(17)
B315289	1994	Bouwer/Rice	8400	90.0-101.00	unconfined	43.5	57.5	60.45	NA	4.57E-07	1.30E-03	KaKlclst(u)	slug	ND		(17)
B315289	1994	Ramey	8400	90.0-101.00	unconfined	43.5	57.5	60.45	NA	8.64E-07	2.45E-03	KaKlclst(u)	slug	ND		(17)
B315289	1994									8.64E-07	2.45E-03	KaKlclst(u)	slug	yes		(17), Recommended Value
B400089										5.50E-04	1.56E+00			ND	need reference	
B400089	7/20/89	Theis	265		unconfined	14.83	23.43	2.21	0.68	5.00E-05	1.42E-01	Qrf	pumping	yes		(13)
B400189	1989	Bouwer/Rice	68.3	22.55-51.64	unconfined	29.09	22.55	1.7	NA	5.80E-05	1.64E-01	Qrf	Slug in	no	recalculate Rc	(5)
B400189	1989	Bouwer/Rice	64.2	22.55-51.64	unconfined	29.09	22.55	2.2	NA	7.00E-05	1.99E-01	Qrf	Slug out	no	recalculate Rc	(5)
B400189	1989	Bouwer/Rice	68.3	22.55-51.64	unconfined	29.09	22.55	1.7	NA	3.20E-06	9.07E-03	Qrf	Slug in	yes	reanalysis using adjusted Rc	(5)(19)
B400189	1989	Bouwer/Rice	64.2	22.55-51.64	unconfined	29.09	22.55	2.2	NA	4.00E-06	1.13E-02	Qrf	Slug out	yes	reanalysis using adjusted Rc	(5)(19)
B400189	7/20/89	Theis	265	24.1-49.6	unconfined	27.53	24.1	21.01	0.68	1.56E-04	4.42E-01	Qrf	pumping	yes		(13)
B400189	7/20/89	Theis	1055	24.1-49.6	unconfined	27.53	24.1	21.01	0.68	2.00E-04	5.67E-01	Qrf	recovery	yes		(13)
B400289	1989	Bouwer/Rice	9.6	22.32-51.8	unconfined	29.08	16.12	4.1	NA	7.60E-04	2.13E+00	Qrf	Slug in	yes		(5)
B400289	1989	Bouwer/Rice	7.6	22.32-51.8	unconfined	29.08	16.12	4	NA	7.60E-04	2.13E+00	Qrf	Slug out	yes		(5)
B400389	1989	Bouwer/Rice	46.3	21.42-51.00	unconfined	29.08	21.42	2.2	NA	1.30E-04	3.80E-01	Qrf	Slug in	no	recalculate Rc	(5)
B400389	1989	Bouwer/Rice	30	21.42-51.00	unconfined	29.08	21.42	2.7	NA	1.80E-04	5.18E-01	Qrf	Slug out	no	recalculate Rc	(5)
B400389	1989	Bouwer/Rice	46.3	21.42-51.00	unconfined	29.08	21.42	2.2	NA	2.90E-04	8.22E-01	Qrf	Slug in	yes	reanalysis using adjusted Rc	(5)(19)
B400389	1989	Bouwer/Rice	30	21.42-51.00	unconfined	29.08	21.42	2.7	NA	3.90E-04	1.11E+00	Qrf	Slug out	yes	reanalysis using adjusted Rc	(5)(19)
B400489	1989	Bouwer/Rice	30	12.02-56.60	unconfined	45.73	10.42	2.8	NA	5.80E-03	1.67E+01	Qrf	Slug out	yes		(5)
B400489	1989	Bouwer/Rice	30	12.02-56.60	unconfined	45.73	10.42	4.1	NA	7.00E-03	1.98E+01	Qrf	Slug in	yes		(5)
B400489	7/28/89	Theis	360	12.92-54.5	unconfined	31.66	12.92	1.72	12.06	2.00E-02	3.69E+00	Qrf	pumping	yes		(13)
B400489	7/28/89	Theis	5440	12.92-54.5	unconfined	31.66	12.92	1.72	12.06	3.00E-02	8.50E+01	Qrf	Recovery	yes		(13)
B400489		Theis								1.50E-02	4.25E+01	Qrf	Recovery	yes	Correction for saturated thickness and equation error	
B400489		Theis								2.00E-02	5.67E+01	Qrf	Recovery	yes	Correction for saturated thickness and equation error	
B401989	1989	Bouwer/Rice	12	8.68-23.13	unconfined	17.97	4.66	1.9	NA	2.90E-04	8.51E-01	Qc	Slug in	yes		(5)
B401989	1989	Bouwer/Rice	18	8.68-23.13	unconfined	17.97	4.66	1.8	NA	3.00E-04	8.50E-01	Qc	Slug out	yes		(5)
B402189	1989	Bouwer/Rice	26	15.65-25.05	confined	13.49	11.56	2.9	NA	2.30E-04	6.52E-01	KaNo.1ss(w)	Slug in	yes		(5)
B402189	1989	Bouwer/Rice	39.2	15.65-25.05	confined	13.49	11.56	2.9	NA	2.20E-04	6.24E-01	KaNo.1ss(w)	Slug out	yes		(5)
B402189	1989	Cooper et al	41.7	15.65-25.05	confined	13.49	11.56	NA	NA	6.10E-04	1.73E+00	KaNo.1ss(w)	Slug in	yes		(5)
B402189	1989	Cooper et al	66.7	15.65-25.05	confined	13.49	11.56	NA	NA	6.10E-04	1.73E+00	KaNo.1ss(w)	Slug out	yes		(5)
B402189	8/8/89	Theis	480	15.65-25.05	confined	12	14.22	0.76	6.14	8.00E-03	1.47E+01	Ka	pumping	no	Pumped well 49-89BR	(13)
B402189										1.20E-02	3.40E+01			ND	need reference	
B402189										7.30E-03	2.07E+01			ND	need reference	
B405289	1994	Hvorslev	56000	41.92-49.72	unconfined	27.85	21.85	24.98	NA	2.13E-08	6.05E-05	KaKlclst(u)	slug	ND		(17)
B405289	1994	Bouwer/Rice	56000	41.92-49.72	unconfined	27.85	21.85	24.98	NA	2.08E-08	5.90E-05	KaKlclst(u)	slug	ND		(17)
B405289	1994	Ramey	56000	41.92-49.72	unconfined	27.85	21.85	24.98	NA	3.05E-08	8.64E-05	KaKlclst(u)	slug	ND		(17)
B405289	1994									3.05E-08	8.64E-05	KaKlclst(u)	slug	yes		(17), Recommended Value
B405689		Bouwer/Rice	1100	6.95-24.55	unconfined	17.6	6.95	2.1	NA	2.20E-07	5.10E-03	Qrf	Slug in	yes		(5)

715

Table G-1
Hydraulic Data

Well ID	Date Tested	Analysis Method	Test Duration (min.)	Interval Tested (ft.)	Aquifer Conditions	Initial Saturated Thickness (ft.)	Depth to Water (ft.)	Maximum Drawdown (ft.)	Average Discharge (gpm)	Hydraulic Conductivity (cm/sec)	Hydraulic Conductivity (ft/d)	Lithologic Unit Tested	Type of Test	Data Usable?	Comments	Source
B405689		Bouwer/Rice	1100	6.95-24.55	unconfined	17.6	6.95	1.1	NA	1.20E-07	3.40E-04	Qrf	Slug out	yes		(5)
B405689	7/28/89	Theis	360	10.7-22.5	unconfined	13.85	10.7	0.05	12.06	1.80E-06	5.04E-03	Qrf	pumping	no	No response to pumping of 4-89	(13)
B405689	1994	Hvorslev	1400	13.26-25.80	unconfined	12.54	13.26	16.12	NA	6.61E-05	1.87E-01	Qrf	slug	ND		(17)
B405689	1994	Bouwer/Rice	1400	13.26-25.80	unconfined	12.54	13.26	16.12	NA	2.54E-05	7.20E-02	Qrf	slug	ND		(17)
B405689	1994									6.10E-06	1.73E-02	Qrf	slug	yes		(17), Recommended Value
B405789	1989	Bouwer/Rice	1	44.91-54.38	unconfined	43.88	10.02	5	NA	3.00E-02	3.97E+01	Qrf	Slug in	yes		(5)
B405789	1989	Bouwer/Rice	1.1	44.91-54.38	unconfined	43.88	10.02	2	NA	1.40E-02	3.97E+01	Qrf	Slug out	yes		(5)
B405789	7/28/89	Theis	360	44.91-54.38	unconfined	41.9	12.48	1.07	12.06	2.00E-02	5.67E+00	Qrf	pumping	yes	Pumping well 4-89	(13)
B405789	7/28/89	Theis	5080	44.91-54.38	unconfined	41.9	12.48	1.07	12.06	3.00E-02	8.50E+01	Qrf	recovery	yes	Pumping well 4-89	(13)
B405789	1994	Hvorslev	10	43.29-55.90	unconfined	41.86	14.04	17.6	NA	4.42E-05	1.25E-01	Qrf	rising head	ND		(17)
B405789	1994	Bouwer/Rice	10	43.29-55.90	unconfined	41.86	14.04	17.6	NA	4.37E-03	1.24E+01	Qrf	rising head	ND		(17)
B405789	1994	Ramey	10	43.29-55.90	unconfined	41.86	14.04	17.6	NA	2.64E-01	7.49E+02	Qrf	rising head	ND		(17)
B405789	1994	Hvorslev	10	43.29-55.90	unconfined	41.86	14.04	uncertain	NA	6.10E-03	1.73E+01	Qrf	falling head	ND		(17)
B405789	1994	Bouwer/Rice	10	43.29-55.90	unconfined	41.86	14.04	uncertain	NA	4.22E-03	1.20E+01	Qrf	falling head	ND		(17)
B405789	1994	Ramey	10	43.29-55.90	unconfined	41.86	14.04	uncertain	NA	2.54E-01	7.20E+02	Qrf	falling head	ND		(17)
B405789	1994									3.66E-02	1.04E+02	Qrf	slug	yes		(17), Recommended Value
B405889	1989	Cooper et al	18.3	38.01-47.47	confined	12	12.35	NA	NA	2.40E-03	6.52E+00	KaNo.1ss(w)	Slug in	yes		(5)
B405889	1989	Cooper et al	18.3	38.01-47.47	confined	12	12.35	NA	NA	2.30E-03	6.52E+00	KaNo.1ss(w)	Slug out	yes		(5)
B405889	8/8/89	Theis	2380	38.01-47.47	confined	11.5	14.57	14.55	6.14	2.00E-03	8.79E-01	KaNo.1ss(w)	recovery	yes	Observation well 17-89BR	(13)
B405889										9.50E-04	2.69E+00			ND	need reference	(5)
B405889										1.10E-03	3.12E+00			ND	need reference	(5)
B405889		Theis								9.25E-03	2.62E+01	KaNo.1ss(w)	recovery	yes	Late-time recovery reanalysis of pumped well	(19)
B405889		Theis								7.81E-03	2.21E+01	KaNo.1ss(w)	recovery	yes	Late-time Theis recovery reanalysis of observation well 17-89BR	(19)
B405889		Theis								8.00E-03	2.27E+01	KaNo.1ss(w)	recovery	yes	Theis reanalysis of observation well 17-89BR during pumping	(19)
B411289	1989	Bouwer/Rice	86.7	59.74-70.29	unconfined	10.55	59.74	1.4	NA	1.60E-05	4.54E-02	Qrf	slug out	yes		(6)
B411289	1989	Bouwer/Rice	100	59.74-70.29	unconfined	10.55	59.74	1.3	NA	1.90E-05	5.39E-02	Qrf	Slug in	yes		(6)
B411389	1989	Bouwer/Rice	89.2	53.00-65.08	unconfined	12.08	53	1	NA	8.50E-05	2.35E-01	Qrf	Slug out	yes		(6)
B411389	1989	Bouwer/Rice	78.8	53.00-65.08	unconfined	12.08	53	0.94	NA	7.00E-05	1.98E-01	Qrf	Slug in	yes		(6)
P114389	1994	Hvorslev	5700	11.07-17.97	unconfined	10.01	7.96	11.2	NA	2.19E-06	6.19E-03	Qrf	rising head	ND		(17)
P114389	1994	Bouwer/Rice	5700	11.07-17.97	unconfined	10.01	7.96	11.2	NA	1.47E-06	4.18E-03	Qrf	rising head	ND		(17)
P114389	1994	Hvorslev	3900	11.07-17.97	unconfined	10.01	7.96	4.9	NA	6.61E-06	1.87E-02	Qrf	falling head	ND		(17)
P114389	1994	Bouwer/Rice	3900	11.07-17.97	unconfined	10.01	7.96	4.9	NA	4.47E-06	1.27E-02	Qrf	falling head	ND		(17)
P114389	1994	Ramey	3900	11.07-17.97	unconfined	10.01	7.96	4.9	NA	1.37E-05	3.89E-02	Qrf	falling head	ND		(17)
P114389	1994		3900	11.07-17.97	unconfined	10.01	7.96	4.9	NA	1.37E-05	3.89E-02	Qrf	slug	yes		(17), Recommended Value
P114489	1994	Hvorslev	38	34.10-52.00	unconfined	39.61	12.39	15.75	NA	4.02E-05	1.14E-01	Qrf	rising head	ND		(17)
P114489	1994	Bouwer/Rice	38	34.10-52.00	unconfined	39.61	12.39	15.75	NA	3.66E-05	1.04E-01	Qrf	rising head	ND		(17)
P114489	1994	Ramey	38	34.10-52.00	unconfined	39.61	12.39	15.75	NA	1.93E-04	5.47E-01	Qrf	rising head	ND		(17)
P114489	1994	Hvorslev	1600	34.10-52.00	unconfined	39.61	12.39	9.3	NA	2.39E-05	6.77E-02	Qrf	falling head	ND		(17)
P114489	1994	Bouwer/Rice	1600	34.10-52.00	unconfined	39.61	12.39	9.3	NA	2.19E-05	6.19E-02	Qrf	falling head	ND		(17)
P114489	1994	Ramey	1600	34.10-52.00	unconfined	39.61	12.39	9.3	NA	4.93E-05	1.40E-01	Qrf	falling head	ND		(17)
P114489	1994									9.66E-05	2.74E-01	Qrf	slug	yes		(17), Recommended Value
P114689	1994	Hvorslev	24	18.31-25.61	unconfined	15.99	9.62	12.7	NA	2.69E-04	7.63E-01	Qrf	rising head	ND		(17)
P114689	1994	Bouwer/Rice	24	18.31-25.61	unconfined	15.99	9.62	12.7	NA	2.08E-04	5.90E-01	Qrf	rising head	ND		(17)
P114689	1994	Ramey	24	18.31-25.61	unconfined	15.99	9.62	12.7	NA	1.07E-03	3.02E+00	Qrf	rising head	ND		(17)
P114689	1994	Hvorslev	18	18.31-25.61	unconfined	15.99	9.62	6.7	NA	3.05E-04	8.64E-01	Qrf	falling head	ND		(17)

Table G-1
Hydraulic Data

Well ID	Date Tested	Analysis Method	Test Duration (min.)	Interval Tested (ft.)	Aquifer Conditions	Initial Saturated Thickness (ft.)	Depth to Water (ft.)	Maximum Drawdown (ft.)	Average Discharge (gpm)	Hydraulic Conductivity (cm/sec)	Hydraulic Conductivity (ft/d)	Lithologic Unit Tested	Type of Test	Data Usable?	Comments	Source
P114689	1994	Bouwer/Rice	18	18.31-25.61	unconfined	15.99	9.62	6.7	NA	2.74E-04	7.78E-01	Qrf	falling head	ND		(17)
P114689	1994	Ramey	18	18.31-25.61	unconfined	15.99	9.62	6.7	NA	1.47E-03	4.18E+00	Qrf	falling head	ND		(17)
P114689	1994									1.27E-03	3.60E+00	Qrf	slug	yes		(17), Recommended Value
P114789	1994	Hvorslev	10000	22.80-29.40	unconfined	20.32	9.08	12.3	NA	7.62E-05	2.16E-01	Qrf	rising head	ND		(17)
P114789	1994	Bouwer/Rice	10000	22.80-29.40	unconfined	20.32	9.08	12.3	NA	6.10E-05	1.73E-01	Qrf	rising head	ND		(17)
P114789	1994	Ramey	10000	22.80-29.40	unconfined	20.32	9.08	12.3	NA	2.85E-04	8.06E-01	Qrf	rising head	ND		(17)
P114789	1994	Hvorslev	4000	22.80-29.40	unconfined	20.32	9.08	6	NA	7.62E-05	2.16E-01	Qrf	falling head	ND		(17)
P114789	1994	Bouwer/Rice	4000	22.80-29.40	unconfined	20.32	9.08	6	NA	5.59E-05	1.58E-01	Qrf	falling head	ND		(17)
P114789	1994	Ramey	4000	22.80-29.40	unconfined	20.32	9.08	6	NA	2.54E-04	7.20E-01	Qrf	falling head	ND		(17)
P114789	1994									2.69E-04	7.63E-01	Qrf	slug	yes		(17), Recommended Value
P114889	1994	Hvorslev	4000	15.21-17.21	unconfined	2	15.21	16.16	NA	3.46E-06	9.79E-03	Qrf	bailer/recovery	ND		(17)
P114889	1994	Bouwer/Rice	4000	15.21-17.21	unconfined	2	15.21	16.16	NA	1.68E-06	4.75E-03	Qrf	bailer/recovery	ND		(17)
P114889	1994									3.46E-06	9.79E-03	Qrf	slug	yes		(17), Recommended Value
P114989	1994	Hvorslev	12880	34.64-41.84	unconfined	27.58	14.26	16.75	NA	9.15E-07	2.59E-03	Qrf	rising head	ND		(17)
P114989	1994	Bouwer/Rice	12880	34.64-41.84	unconfined	27.58	14.26	16.75	NA	7.62E-07	2.16E-03	Qrf	rising head	ND		(17)
P114989	1994	Ramey	12880	34.64-41.84	unconfined	27.58	14.26	16.75	NA	7.12E-07	2.02E-03	Qrf	rising head	ND		(17)
P114989	1994	Hvorslev	20080	34.64-41.84	unconfined	27.58	14.26	11.4	NA	2.29E-07	6.48E-04	Qrf	falling head	ND		(17)
P114989	1994	Bouwer/Rice	20080	34.64-41.84	unconfined	27.58	14.26	11.4	NA	1.93E-07	5.47E-04	Qrf	falling head	ND		(17)
P114989	1994	Ramey	20080	34.64-41.84	unconfined	27.58	14.26	11.4	NA	2.80E-06	7.92E-03	Qrf	falling head	ND		(17)
P114989	1994									1.73E-06	4.90E-03	Qrf	slug	yes		(17), Recommended Value
P115089	1994	Hvorslev	12	26.51-44.01	unconfined	30.79	13.22	15.83	NA	9.15E-04	2.59E+00	Qrf	rising head	ND		(17)
P115089	1994	Bouwer/Rice	12	26.51-44.01	unconfined	30.79	13.22	15.83	NA	8.13E-04	2.30E+00	Qrf	rising head	ND		(17)
P115089	1994	Ramey	12	26.51-44.01	unconfined	30.79	13.22	15.83	NA	2.39E-03	6.77E+00	Qrf	rising head	ND		(17)
P115089	1994	Hvorslev	16	26.51-44.01	unconfined	30.79	13.22	10.7	NA	4.57E-04	1.30E+00	Qrf	falling head	ND		(17)
P115089	1994	Bouwer/Rice	16	26.51-44.01	unconfined	30.79	13.22	10.7	NA	5.59E-04	1.58E+00	Qrf	falling head	ND		(17)
P115089	1994	Ramey	16	26.51-44.01	unconfined	30.79	13.22	10.7	NA	6.61E-03	1.87E+01	Qrf	falling head	ND		(17)
P115089	1994									4.42E-03	1.25E+01	Qrf	slug	yes		(17), Recommended Value
P115489	1994	Hvorslev	140	22.40-29.45	unconfined	20.75	8.7	12	NA	1.07E-04	3.02E-01	Qrf	rising head	ND		(17)
P115489	1994	Bouwer/Rice	140	22.40-29.45	unconfined	20.75	8.7	12	NA	9.15E-05	2.59E-01	Qrf	rising head	ND		(17)
P115489	1994	Ramey	140	22.40-29.45	unconfined	20.75	8.7	12	NA	1.68E-04	4.75E-01	Qrf	rising head	ND		(17)
P115489	1994	Hvorslev	1000	22.40-29.45	unconfined	20.75	8.7	5.65	NA	1.07E-04	3.02E-01	Qrf	falling head	ND		(17)
P115489	1994	Bouwer/Rice	1000	22.40-29.45	unconfined	20.75	8.7	5.65	NA	7.62E-05	2.16E-01	Qrf	falling head	ND		(17)
P115489	1994	Ramey	1000	22.40-29.45	unconfined	20.75	8.7	5.65	NA	3.30E-04	9.36E-01	Qrf	falling head	ND		(17)
P115489	1994									2.49E-04	7.06E-01	Qrf	slug	yes		(17), Recommended Value
P115589	1994	Hvorslev	9600	25.72-32.57	unconfined	26.51	6.06	9.8	NA	3.00E-07	8.50E-04	Qrf	rising head	ND		(17)
P115589	1994	Bouwer/Rice	9600	25.72-32.57	unconfined	26.51	6.06	9.8	NA	3.10E-07	8.78E-04	Qrf	rising head	ND		(17)
P115589	1994	Ramey	9600	25.72-32.57	unconfined	26.51	6.06	9.8	NA	1.47E-06	4.18E-03	Qrf	rising head	ND		(17)
P115589	1994	Hvorslev	4300	25.72-32.57	unconfined	26.51	6.06	2.8	NA	6.10E-07	1.73E-03	Qrf	falling head	ND		(17)
P115589	1994	Bouwer/Rice	4300	25.72-32.57	unconfined	26.51	6.06	2.8	NA	5.08E-07	1.44E-03	Qrf	falling head	ND		(17)
P115589	1994	Ramey	4300	25.72-32.57	unconfined	26.51	6.06	2.8	NA	1.02E-06	2.88E-03	Qrf	falling head	ND		(17)
P115589	1994									1.02E-06	2.88E-03	Qrf	slug	yes		(17), Recommended Value
P115689	1994	Hvorslev	1200	16.71-23.12	unconfined	13.1	10.02	13.4	NA	5.59E-05	1.58E-01	Qrf	rising head	ND		(17)
P115689	1994	Bouwer/Rice	1200	16.71-23.12	unconfined	13.1	10.02	13.4	NA	4.22E-05	1.20E-01	Qrf	rising head	ND		(17)
P115689	1994	Ramey	1200	16.71-23.12	unconfined	13.1	10.02	13.4	NA	1.17E-04	3.31E-01	Qrf	rising head	ND		(17)
P115689	1994	Hvorslev	100	16.71-23.12	unconfined	13.1	10.02	6.8	NA	3.66E-05	1.04E-01	Qrf	falling head	ND		(17)
P115689	1994	Bouwer/Rice	100	16.71-23.12	unconfined	13.1	10.02	6.8	NA	4.57E-05	1.30E-01	Qrf	falling head	ND		(17)
P115689	1994	Ramey	100	16.71-23.12	unconfined	13.1	10.02	6.8	NA	8.64E-05	2.45E-01	Qrf	falling head	ND		(17)
P115689	1994									1.02E-04	2.88E-01	Qrf	slug	yes		(17), Recommended Value

Table G-1
Hydraulic Data

Well ID	Date Tested	Analysis Method	Test Duration (min.)	Interval Tested (ft.)	Aquifer Conditions	Initial Saturated Thickness (ft.)	Depth to Water (ft.)	Maximum Drawdown (ft.)	Average Discharge (gpm)	Hydraulic Conductivity (cm/sec)	Hydraulic Conductivity (ft/d)	Lithologic Unit Tested	Type of Test	Data Usable?	Comments	Source
P119389	1994	Hvorslev	8200	13.75-19.98	unconfined	6.23	13.75	15.9	NA	3.05E-07	8.64E-04	Qrf	slug	ND		(17)
P119389	1994	Bouwer/Rice	8200	13.75-19.98	unconfined	6.23	13.75	15.9	NA	2.13E-07	6.05E-04	Qrf	slug	ND		(17)
P119389	1994									3.05E-07	8.64E-04	Qrf	slug	yes		(17), Recommended Value
P207989	1994	Hvorslev	8400	19.01-23.80	unconfined	4.79	19.01	20.83	NA	4.17E-07	1.18E-03	KaKlclst(w)	slug	ND		(17)
P207989	1994	Bouwer/Rice	8400	19.01-23.80	unconfined	4.79	19.01	20.83	NA	2.34E-07	6.62E-04	KaKlclst(w)	slug	ND		(17)
P207989	1994									4.17E-07	1.18E-03	KaKlclst(w)	slug	yes		(17), Recommended Value
P213689	1994	Hvorslev	8200	11.77-16.54	unconfined	4.77	11.77	14.35	NA	4.07E-07	1.15E-03	Qrf	slug	ND		(17)
P213689	1994	Bouwer/Rice	8200	11.77-16.54	unconfined	4.77	11.77	14.35	NA	2.69E-07	7.63E-04	Qrf	slug	ND		(17)
P213689	1994									4.07E-07	1.15E-03	Qrf	slug	yes		(17), Recommended Value
P215789	1994	Hvorslev	10	15.30-21.35	unconfined	6.05	15.3	18.1	NA	7.62E-03	2.16E+01	Qrf	rising head	ND		(17)
P215789	1994	Bouwer/Rice	10	15.30-21.35	unconfined	6.05	15.3	18.1	NA	9.66E-03	2.74E+01	Qrf	rising head	ND		(17)
P215789	1994									0.00E+00	NONE	Qrf	slug	yes		(17), Recommended Value
P218089	1994	Hvorslev	8400	5.92-10.70	unconfined	4.78	5.92	7.64	NA	7.12E-08	2.02E-04	Qrf	slug	ND		(17)
P218089	1994	Bouwer/Rice	8400	5.92-10.70	unconfined	4.78	5.92	7.64	NA	3.35E-08	9.50E-05	Qrf	slug	ND		(17)
P218089	1994									7.12E-08	2.02E-04	Qrf	slug	yes		(17), Recommended Value
P313489	1994	Hvorslev	10000	16.88-24.25	unconfined	10.89	13.36	16.7	NA	3.41E-05	9.65E-02	Qrf	rising head	ND		(17)
P313489	1994	Bouwer/Rice	10000	16.88-24.25	unconfined	10.89	13.36	16.7	NA	2.49E-05	7.06E-02	Qrf	rising head	ND		(17)
P313489	1994	Ramey	10000	16.88-24.25	unconfined	10.89	13.36	16.7	NA	9.15E-05	2.59E-01	Qrf	rising head	ND		(17)
P313489	1994	Hvorslev	4000	16.88-24.25	unconfined	10.89	13.36	10.8	NA	6.61E-05	1.87E-01	Qrf	falling head	ND		(17)
P313489	1994	Bouwer/Rice	4000	16.88-24.25	unconfined	10.89	13.36	10.8	NA	4.27E-05	1.21E-01	Qrf	falling head	ND		(17)
P313489	1994	Ramey	4000	16.88-24.25	unconfined	10.89	13.36	10.8	NA	2.13E-04	6.05E-01	Qrf	falling head	ND		(17)
P313489	1994									1.52E-04	4.32E-01	Qrf	slug	yes		(17), Recommended Value
P313589	1994	Hvorslev	1600	9.00-16.20	unconfined	7.99	8.21	11.34	NA	1.93E-06	5.47E-03	Qrf	rising head	ND		(17)
P313589	1994	Bouwer/Rice	1600	9.00-16.20	unconfined	7.99	8.21	11.34	NA	2.59E-06	7.34E-03	Qrf	rising head	ND		(17)
P313589	1994	Hvorslev	1200	9.00-16.20	unconfined	7.99	8.21	5.4	NA	4.47E-06	1.27E-02	Qrf	falling head	ND		(17)
P313589	1994	Bouwer/Rice	1200	9.00-16.20	unconfined	7.99	8.21	5.4	NA	2.44E-06	6.91E-03	Qrf	falling head	ND		(17)
P313589	1994									4.47E-06	1.27E-02	Qrf	slug	yes		(17), Recommended Value
P314089	1994	Hvorslev	1000	10.76-13.34	unconfined	2.58	10.76	11.47	NA	1.22E-06	3.46E-03	Qrf	slug	ND		(17)
P314089	1994	Bouwer/Rice	1000	10.76-13.34	unconfined	2.58	10.76	11.47	NA	4.37E-07	1.24E-03	Qrf	slug	ND		(17)
P314089	1994									1.22E-06	3.46E-03	Qrf	slug	yes		(17), Recommended Value
P317989	1994	Hvorslev	7000	6.35-10.50	unconfined	4.15	6.35	8.38	NA	1.78E-07	5.04E-04	Qrf	slug	ND		(17)
P317989	1994	Bouwer/Rice	7000	6.35-10.50	unconfined	4.15	6.35	8.38	NA	6.10E-08	1.73E-04	Qrf	slug	ND		(17)
P317989	1994									1.78E-07	5.04E-04	Qrf	slug	yes		(17), Recommended Value
P320089	1994	Hvorslev	12	14.97-22.05	unconfined	9.88	12.17	14.3	NA	2.13E-03	6.05E+00	Qrf	rising head	ND		(17)
P320089	1994	Bouwer/Rice	12	14.97-22.05	unconfined	9.88	12.17	14.3	NA	1.58E-03	4.46E+00	Qrf	rising head	ND		(17)
P320089	1994	Hvorslev	12	14.97-22.05	unconfined	9.88	12.17	10.3	NA	2.69E-03	7.63E+00	Qrf	falling head	ND		(17)
P320089	1994	Bouwer/Rice	12	14.97-22.05	unconfined	9.88	12.17	10.3	NA	2.03E-03	5.76E+00	Qrf	falling head	ND		(17)
P320089	1994									2.69E-03	7.63E+00	Qrf	slug	yes		(17), Recommended Value
P414189	1994	Hvorslev	42500	15.00-22.00	unconfined	14.09	7.91	11.25	NA	3.00E-08	8.50E-05	Qrf	rising head	ND		(17)
P414189	1994	Bouwer/Rice	42500	15.00-22.00	unconfined	14.09	7.91	11.25	NA	2.34E-08	6.62E-05	Qrf	rising head	ND		(17)
P414189	1994	Ramey	42500	15.00-22.00	unconfined	14.09	7.91	11.25	NA	6.10E-08	1.73E-04	Qrf	rising head	ND		(17)
P414189	1994	Hvorslev	25500	15.00-22.00	unconfined	14.09	7.91	4.76	NA	1.02E-07	2.88E-04	Qrf	falling head	ND		(17)
P414189	1994	Bouwer/Rice	25500	15.00-22.00	unconfined	14.09	7.91	4.76	NA	8.13E-08	2.30E-04	Qrf	falling head	ND		(17)
P414189	1994	Ramey	25500	15.00-22.00	unconfined	14.09	7.91	4.76	NA	1.93E-07	5.47E-04	Qrf	falling head	ND		(17)
P414189	1994									1.93E-07	5.47E-04	Qrf	slug	yes		(17), Recommended Value
P415889	1994	Hvorslev	10	39.75-47.00	unconfined	33.84	13.16	16.6	NA	9.15E-04	2.59E+00	Qrf	rising head	ND		(17)
P415889	1994	Bouwer/Rice	10	39.75-47.00	unconfined	33.84	13.16	16.6	NA	7.12E-04	2.02E+00	Qrf	rising head	ND		(17)
P415889	1994	Ramey	10	39.75-47.00	unconfined	33.84	13.16	16.6	NA	2.13E-03	6.05E+00	Qrf	rising head	ND		(17)

778

Table G-1
Hydraulic Data

Well ID	Date Tested	Analysis Method	Test Duration (min.)	Interval Tested (ft.)	Aquifer Conditions	Initial Saturated Thickness (ft.)	Depth to Water (ft.)	Maximum Drawdown (ft.)	Average Discharge (gpm)	Hydraulic Conductivity (cm/sec)	Hydraulic Conductivity (ft/d)	Lithologic Unit Tested	Type of Test	Data Usable?	Comments	Source
P415889	1994	Hvorslev	12	39.75-46.50	unconfined	33.84	13.16	11.4	NA	4.52E-04	1.28E+00	Qrf	falling head	ND		(17)
P415889	1994	Bouwer/Rice	12	39.75-46.50	unconfined	33.84	13.16	11.4	NA	4.02E-04	1.14E+00	Qrf	falling head	ND		(17)
P415889	1994	Ramey	12	39.75-46.50	unconfined	33.84	13.16	11.4	NA	1.27E-02	3.60E+01	Qrf	falling head	ND		(17)
P415889	1994									2.13E-03	6.05E+00	Qrf	slug	yes		(17), Recommended Value
P415989	1994	Hvorslev	18	23.11-29.81	unconfined	24.02	5.79	9.1	NA	6.61E-04	1.87E+00	Qrf	rising head	ND		(17)
P415989	1994	Bouwer/Rice	18	23.11-29.81	unconfined	24.02	5.79	9.1	NA	5.59E-04	1.58E+00	Qrf	rising head	ND		(17)
P415989	1994	Ramey	18	23.11-29.81	unconfined	24.02	5.79	9.1	NA	1.83E-03	5.18E+00	Qrf	rising head	ND		(17)
P415989	1994	Hvorslev	22	23.11-29.81	unconfined	24.02	5.79	2.6	NA	4.88E-04	1.38E+00	Qrf	falling head	ND		(17)
P415989	1994	Bouwer/Rice	22	23.11-29.81	unconfined	24.02	5.79	2.6	NA	4.32E-04	1.22E+00	Qrf	falling head	ND		(17)
P415989	1994	Ramey	22	23.11-29.81	unconfined	24.02	5.79	2.6	NA	2.85E-03	8.06E+00	Qrf	falling head	ND		(17)
P415989	1994									2.85E-03	8.06E+00	Qrf	slug	yes		(17), Recommended Value
P416089	1994	Hvorslev	280	30.50-38.65	unconfined	30.32	8.33	11.5	NA	6.61E-05	1.87E-01	Qrf	rising head	ND		(17)
P416089	1994	Bouwer/Rice	280	30.50-38.65	unconfined	30.32	8.33	11.5	NA	5.59E-05	1.58E-01	Qrf	rising head	ND		(17)
P416089	1994	Ramey	280	30.50-38.65	unconfined	30.32	8.33	11.5	NA	2.24E-04	6.34E-01	Qrf	rising head	ND		(17)
P416089	1994	Hvorslev	50	30.50-38.65	unconfined	30.32	8.33	4.9	NA	7.12E-05	2.02E-01	Qrf	falling head	ND		(17)
P416089	1994	Bouwer/Rice	50	30.50-38.65	unconfined	30.32	8.33	4.9	NA	5.59E-05	1.58E-01	Qrf	falling head	ND		(17)
P416089	1994	Ramey	50	30.50-38.65	unconfined	30.32	8.33	4.9	NA	2.54E-04	7.20E-01	Qrf	falling head	ND		(17)
P416089	1994									2.39E-04	6.77E-01	Qrf	slug	yes		(17), Recommended Value
P416189	1994	Hvorslev	14	25.29-32.19	unconfined	23.82	8.37	11.7	NA	9.15E-04	2.59E+00	Qrf	rising head	ND		(17)
P416189	1994	Bouwer/Rice	14	25.29-32.19	unconfined	23.82	8.37	11.7	NA	8.64E-04	2.45E+00	Qrf	rising head	ND		(17)
P416189	1994	Ramey	14	25.29-32.19	unconfined	23.82	8.37	11.7	NA	7.62E-03	2.16E+01	Qrf	rising head	ND		(17)
P416189	1994	Hvorslev	12	25.29-32.19	unconfined	23.82	8.37	4.8	NA	6.10E-04	1.73E+00	Qrf	falling head	ND		(17)
P416189	1994	Bouwer/Rice	12	25.29-32.19	unconfined	23.82	8.37	4.8	NA	8.64E-04	2.45E+00	Qrf	falling head	ND		(17)
P416189	1994	Ramey	12	25.29-32.19	unconfined	23.82	8.37	4.8	NA	3.51E-03	9.94E+00	Qrf	falling head	ND		(17)
P416189	1994									5.59E-03	1.58E+01	Qrf	slug	yes		(17), Recommended Value
P416289	1994	Hvorslev	11440	19.69-26.72	unconfined	13.83	12.89	15.7	NA	1.37E-07	3.89E-04	Qrf	rising head	ND		(17)
P416289	1994	Bouwer/Rice	11440	19.69-26.72	unconfined	13.83	12.89	15.7	NA	1.02E-07	2.88E-04	Qrf	rising head	ND		(17)
P416289	1994	Hvorslev	6800	19.69-26.72	unconfined	13.83	12.89	9.7	NA	2.54E-07	7.20E-04	Qrf	falling head	ND		(17)
P416289	1994	Bouwer/Rice	6800	19.69-26.72	unconfined	13.83	12.89	9.7	NA	4.63E-07	1.31E-03	Qrf	falling head	ND		(17)
P416289	1994	Ramey	6800	19.69-26.72	unconfined	13.83	12.89	9.7	NA	7.62E-07	2.16E-03	Qrf	falling head	ND		(17)
P416289	1994									7.62E-07	2.16E-03	Qrf	slug	yes		(17), Recommended Value
P416389	1994	Hvorslev	26	26.43-33.14	unconfined	19.6	13.54	16.85	NA	2.13E-04	6.05E-01	Qrf	rising head	ND		(17)
P416389	1994	Bouwer/Rice	26	26.43-33.14	unconfined	19.6	13.54	16.85	NA	1.78E-04	5.04E-01	Qrf	rising head	ND		(17)
P416389	1994	Ramey	26	26.43-33.14	unconfined	19.6	13.54	16.85	NA	4.47E-04	1.27E+00	Qrf	rising head	ND		(17)
P416389	1994	Hvorslev	30	26.43-33.14	unconfined	19.6	13.54	10.35	NA	2.13E-04	6.05E-01	Qrf	falling head	ND		(17)
P416389	1994	Bouwer/Rice	30	26.43-33.14	unconfined	19.6	13.54	10.35	NA	1.73E-04	4.90E-01	Qrf	falling head	ND		(17)
P416389	1994	Ramey	30	26.43-33.14	unconfined	19.6	13.54	10.35	NA	4.88E-04	1.38E+00	Qrf	falling head	ND		(17)
P416389	1994									4.47E-04	1.27E+00	Qrf	slug	yes		(17), Recommended Value
P416489	1994	Hvorslev	2400	21.65-28.75	unconfined	11.52	17.23	20.45	NA	1.27E-06	3.60E-03	Qrf	rising head	ND		(17)
P416489	1994	Bouwer/Rice	2400	21.65-28.75	unconfined	11.52	17.23	20.45	NA	1.12E-06	3.17E-03	Qrf	rising head	ND		(17)
P416489	1994	Ramey	2400	21.65-28.75	unconfined	11.52	17.23	20.45	NA	6.10E-06	1.73E-02	Qrf	rising head	ND		(17)
P416489	1994	Hvorslev	5600	21.65-28.75	unconfined	11.52	17.23	14	NA	2.44E-06	6.91E-03	Qrf	falling head	ND		(17)
P416489	1994	Bouwer/Rice	5600	21.65-28.75	unconfined	11.52	17.23	14	NA	1.58E-06	4.46E-03	Qrf	falling head	ND		(17)
P416489	1994	Ramey	5600	21.65-28.75	unconfined	11.52	17.23	14	NA	4.93E-06	1.40E-02	Qrf	falling head	ND		(17)
P416489	1994									6.10E-06	1.73E-02	Qrf	slug	yes		(17), Recommended Value
P416589	1994	Hvorslev	64	27.66-34.21	unconfined	7.95	26.26	28.8	NA	1.42E-04	4.03E-01	Qrf	rising head	ND		(17)
P416589	1994	Bouwer/Rice	64	27.66-34.21	unconfined	7.95	26.26	28.8	NA	1.02E-04	2.88E-01	Qrf	rising head	ND		(17)
P416589	1994	Hvorslev	44	27.66-34.21	unconfined	7.95	26.26	23.78	NA	8.64E-05	2.45E-01	Qrf	falling head	ND		(17)

Table G-1
Hydraulic Data

Well ID	Date Tested	Analysis Method	Test Duration (min.)	Interval Tested (ft.)	Aquifer Conditions	Initial Saturated Thickness (ft.)	Depth to Water (ft.)	Maximum Drawdown (ft.)	Average Discharge (gpm)	Hydraulic Conductivity (cm/sec)	Hydraulic Conductivity (ft/d)	Lithologic Unit Tested	Type of Test	Data Usable?	Comments	Source
P416589	1994	Bouwer/Rice	44	27.66-34.21	unconfined	7.95	26.26	23.78	NA	6.10E-05	1.73E-01	Qrf	falling head	ND		(17)
P416589	1994									1.42E-04	4.03E-01	Qrf	slug	yes		(17), Recommended Value
P416689	1994	Hvorslev	15000	29.17-35.31	unconfined	6.14	29.17	31.55	NA	1.78E-06	5.04E-03	Fill	slug	ND		(17)
P416689	1994	Bouwer/Rice	15000	29.17-35.31	unconfined	6.14	29.17	31.55	NA	1.02E-06	2.88E-03	Fill	slug	ND		(17)
P416689	1994									1.78E-06	5.04E-03	Fill	slug	yes		(17), Recommended Value
P416789	1994	Hvorslev	2800	26.61-30.17	unconfined	3.56	26.61	27.72	NA	4.02E-04	1.14E+00	Qrf	slug	ND		(17)
P416789	1994	Bouwer/Rice	2800	26.61-30.17	unconfined	3.56	26.61	27.72	NA	2.13E-04	6.05E-01	Qrf	slug	ND		(17)
P416789	1994									4.02E-04	1.14E+00	Qrf	slug	yes		(17), Recommended Value
P416889	1994	Hvorslev	5600	17.51-22.91	unconfined	5.4	17.51	21	NA	2.13E-04	6.05E-01	Qrf	slug	ND		(17)
P416889	1994	Bouwer/Rice	5600	17.51-22.91	unconfined	5.4	17.51	21	NA	1.32E-05	3.74E-02	Qrf	slug	ND		(17)
P416889	1994									2.13E-05	6.05E-02	Qrf	slug	yes		(17), Recommended Value
P416989	1994	Hvorslev	4600	151.0-160.0	unconfined	118.77	41.23	45.05	NA	1.88E-06	5.33E-03	KaKlslt(u)	rising head	ND		(17)
P416989	1994	Bouwer/Rice	4600	151.0-160.0	unconfined	118.77	41.23	45.05	NA	1.58E-06	4.46E-03	KaKlslt(u)	rising head	ND		(17)
P416989	1994	Ramey	4600	151.0-160.0	unconfined	118.77	41.23	45.05	NA	2.49E-06	7.06E-03	KaKlslt(u)	rising head	ND		(17)
P416989	1994	Hvorslev	5800	151.0-160.0	unconfined	118.77	41.23	37.25	NA	1.52E-06	4.32E-03	KaKlslt(u)	falling head	ND		(17)
P416989	1994	Bouwer/Rice	5800	151.0-160.0	unconfined	118.77	41.23	37.25	NA	1.22E-06	3.46E-03	KaKlslt(u)	falling head	ND		(17)
P416989	1994	Ramey	5800	151.0-160.0	unconfined	118.77	41.23	37.25	NA	6.61E-06	1.87E-02	KaKlslt(u)	falling head	ND		(17)
P416989	1994									6.61E-06	1.87E-02	KaKlslt(u)	slug	yes		(17), Recommended Value
P419689	1994	Hvorslev	34	19.18-26.02	unconfined	6.84	19.18	21.99	NA	8.13E-04	2.30E+00	Qrf	slug	ND		(17)
P419689	1994	Bouwer/Rice	34	19.18-26.02	unconfined	6.84	19.18	21.99	NA	5.59E-04	1.58E+00	Qrf	slug	ND		(17)
P419689	1994									8.13E-04	2.30E+00	Qrf	slug	yes		(17), Recommended Value
0590	1994	Hvorslev	20	16.63-34.47	unconfined	17.84	16.63	19.8	NA	9.15E-05	2.59E-01	Qrf	rising head	ND		(17)
0590	1994	Bouwer/Rice	20	16.63-34.47	unconfined	17.84	16.63	19.8	NA	6.10E-05	1.73E-01	Qrf	rising head	ND		(17)
0590	1994	Hvorslev	1600	16.63-34.47	unconfined	17.84	16.63	15.8	NA	8.13E-06	2.30E-02	Qrf	falling head	ND		(17)
0590	1994	Bouwer/Rice	1600	16.63-34.47	unconfined	17.84	16.63	15.8	NA	5.08E-06	1.44E-02	Qrf	falling head	ND		(17)
0590	1994									8.13E-06	2.30E-02	Qrf	slug	yes		(17), Recommended Value
0690	1994	Hvorslev	10	12.52-30.51	unconfined	17.99	12.52	14	NA	1.63E-03	4.61E+00	Qrf	rising head	ND		(17)
0690	1994	Bouwer/Rice	10	12.52-30.51	unconfined	17.99	12.52	14	NA	9.66E-04	2.74E+00	Qrf	rising head	ND		(17)
0690	1994	Hvorslev	2800	12.52-30.51	unconfined	17.99	12.52	12.2	NA	2.54E-06	7.20E-03	Qrf	falling head	ND		(17)
0690	1994	Bouwer/Rice	2800	12.52-30.51	unconfined	17.99	12.52	12.2	NA	1.42E-07	4.03E-04	Qrf	falling head	ND		(17)
0690	1994									2.54E-02	7.20E+01	Qrf	slug	yes		(17), Recommended Value
0790	1994	Hvorslev	10	30.30-56.19	unconfined	40.61	15.58	16.5	NA	7.62E-03	2.16E+01	Qrf	rising head	ND		(17)
0790	1994	Bouwer/Rice	10	30.30-56.19	unconfined	40.61	15.58	16.5	NA	6.10E-03	1.73E+01	Qrf	rising head	ND		(17)
0790	1994	Hvorslev	10	30.30-56.19	unconfined	40.61	15.58	15	NA	2.80E-03	7.92E+00	Qrf	falling head	ND		(17)
0790	1994	Bouwer/Rice	10	30.30-56.19	unconfined	40.61	15.58	15	NA	1.73E-03	4.90E+00	Qrf	falling head	ND		(17)
0790	1994									7.62E-03	2.16E+01	Qrf	slug	yes		(17), Recommended Value
0990	1994	Hvorslev	10	18.28-43.28	unconfined	36.22	7.06	8.9	NA	6.10E-04	1.73E+00	Qrf	rising head	ND		(17)
0990	1994	Bouwer/Rice	10	18.28-43.28	unconfined	36.22	7.06	8.9	NA	4.17E-04	1.18E+00	Qrf	rising head	ND		(17)
0990	1994	Hvorslev	10	18.28-43.28	unconfined	36.22	7.06	5.3	NA	5.59E-04	1.58E+00	Qrf	falling head	ND		(17)
0990	1994	Bouwer/Rice	10	18.28-43.28	unconfined	36.22	7.06	5.3	NA	3.56E-04	1.01E+00	Qrf	falling head	ND		(17)
0990	1994									1.58E-03	4.46E+00	Qrf	slug	yes		(17), Recommended Value
B300190		USBR		18.82-25.08		6.26				<1.5E-06		Ka	packer	no		(7)
B300290		USBR		14.95-21.25		6.26				2.20E-03	6.24E+00	Ka	packer	no		(7)
B300290		USBR		18.09-24.35		6.26				2.30E-03	6.52E+00	Ka	packer	no		(7)
B300590		USBR		9.71-14.98		5.27				<2.8E-06		Ka	packer	no		(7)
B300590		USBR		14.76-20.03		5.27				<3.7E-06		Ka	packer	no		(7)
B300590		USBR		17.13-22.40		5.27				<4.5E-06		KaKlclst(w)	packer	yes		(7)

780

Table G-1
Hydraulic Data

Well ID	Date Tested	Analysis Method	Test Duration (min.)	Interval Tested (ft.)	Aquifer Conditions	Initial Saturated Thickness (ft.)	Depth to Water (ft.)	Maximum Drawdown (ft.)	Average Discharge (gpm)	Hydraulic Conductivity (cm/sec)	Hydraulic Conductivity (ft/d)	Lithologic Unit Tested	Type of Test	Data Usable?	Comments	Source
B300690		USBR		10.10-15.37		5.27				<3.3E-06		Ka	packer	no		(7)
B300690		USBR		14.98-20.25		5.27				<3.7E-06		Wxbr	packer	yes		(7)
B300690		USBR		20.10-25.37		5.27				8.40E-07	2.38E-03	Ka	packer	no		(7)
B300790		USBR		10.12-13.00		2.88				<5E-06		Ka	packer	no		(7)
B300790		USBR		13.0-17.00		4				<8.4E-06		Ka	packer	no		(7)
B300790		USBR		17.00-23.00		6				<4.8E-06		Ka	packer	no		(7)
B300890		USBR		16.26-19.50		3.24				<5.9E-06		Ka	packer	no		(7)
B300890		USBR		19.50-25.00		5.5				<3.4E-06		Ka	packer	no		(7)
B300890		USBR		24.50-29.50		5				2.00E-05	5.67E-02	Wxbr	packer	yes		(7)
B300990		USBR		14.30-19.30		5				<2.6E-06		Ka	packer	no		(7)
B300990		USBR		19.30-24.30		5				<1.3E-06		Ka	packer	no		(7)
B300990		USBR		24.30-29.30		5				<2E-06		Ka	packer	no		(7)
B301090		USBR		22.07-27.34		5.27				6.40E-05	1.81E-01	Ka	packer	no		(7)
B301190		USBR		23.00-28.00		5				<6.6E-06		Ka	packer	no		(7)
B301190		USBR		28.00-33.00		5				<5.3E-06		Ka	packer	no		(7)
B301190		USBR		34.00-39.00		5				<3.5E-06		Ka	packer	no		(7)
B301290		USBR		9.50-14.50		5				<1.5E-06		Ka	packer	no		(7)
B301290		USBR		14.50-19.50		5				<1E-06		Ka	packer	no		(7)
B301290		USBR		19.50-24.50		5				1.10E-04	3.12E-01	Ka	packer	no		(7)
B301390		USBR		14.80-18.80		4				3.50E-06	9.92E-03	Wxbr	packer	yes		(7)
B301390		USBR		18.80-23.80		5				1.70E-06	4.82E-03	KaKlclst(w)	packer	yes		(7)
B301390		USBR		24.80-28.80		4				3.50E-06	9.92E-03	Ka	packer	no		(7)
B301390		USBR		28.80-33.80		5				<5E-07		KaKlclst(w)	packer	yes		(7)
B301490		USBR		18.00-23.27		5.27				<4.9E-06		Ka	packer	no		(7)
B301490		USBR		22.70-27.97		5.27				<6E-06		Ka	packer	no		(7)
B301490		USBR		27.50-32.77		5.27				<2.3E-06		Ka	packer	no		(7)
B301590		USBR		16.50-20.30		3.8				8.50E-04	2.41E+00	Wxbr	packer	yes		(7)
B301590		USBR		20.30-25.30		5				4.20E-05		KaKlclst(w)	packer	yes		(7)
B301590		USBR		25.30-30.30		5				2.30E-06		KaKlclst(w)	packer	yes		(7)
B301590		USBR		26.30-30.30		4				8.00E-06	2.27E-02	KaKlclst(w)	packer	yes		(7)
B301690		USBR		22.80-27.60		4.8				<6.6E-07		KaKlclst(w)	packer	yes		(7)
B301690		USBR		24.75-32.90		8.15				<4.3E-07		KaKlclst(w)	packer	yes		(7)
B301690		USBR		32.90-37.80		4.9				4.40E-07	1.25E-03	KaKlclst(w)	packer	yes		(7)
B301790		USBR		22.76-24.60		1.84				<1.3E-06		KaKlclst(w)	packer	yes		(7)
B301790		USBR		24.60-29.60		5				<5.8E-07		KaKlclst(w)	packer	yes		(7)
B301790		USBR		29.60-34.60		5				<4.8E-07		KaKlclst(w)	packer	yes		(7)
B301790		USBR		34.60-39.60		5				<4.1E-07		KaKlclst(w)	packer	yes		(7)
B301890		USBR		23.50-26.90		3.4				<8.3E-07		KaKlclst(w)	packer	yes		(7)
B301890		USBR		26.90-31.90		5				3.90E-06	1.11E-02	KaKlclst(w)	packer	yes		(7)
B301890		USBR		31.90-36.90		5				<4.5E-07		KaKlclst(w)	packer	yes		(7)
B301890		USBR		37.90-41.90		4				<4.5E-07		KaKlclst(w)	packer	yes		(7)
B301990		USBR		22.60-26.60		4				<7.4E-07		Ka	packer	no		(7)
B301990		USBR		26.60-31.60		5				<5.4E-07		Ka	packer	no		(7)
B301990		USBR		31.60-36.60		5				<5.6E-07		Ka	packer	no		(7)
B301990		USBR		38.60-41.60		3				<5.3E-07		Ka	packer	no		(7)
B302090		USBR		29.00-32.00		3				<7.2E-07		Ka	packer	no		(7)

781

Table G-1
Hydraulic Data

Well ID	Date Tested	Analysis Method	Test Duration (min.)	Interval Tested (ft.)	Aquifer Conditions	Initial Saturated Thickness (ft.)	Depth to Water (ft.)	Maximum Drawdown (ft.)	Average Discharge (gpm)	Hydraulic Conductivity (cm/sec)	Hydraulic Conductivity (ft/d)	Lithologic Unit Tested	Type of Test	Data Usable?	Comments	Source
B302090		USBR		32.00-37.00		5				<5.5E-07		Ka	packer	no		(7)
B302090		USBR		33.00-37.00		4				<5.2E-07		Ka	packer	no		(7)
B302090		USBR		38.00-42.00		4				<4.5E-07		Ka	packer	no		(7)
B302190		USBR		32.00-35.20		3.2				<6.2E-07		Ka	packer	no		(7)
B302190		USBR		35.20-40.00		4.8				<4.2E-07		Ka	packer	no		(7)
B302190		USBR		40.00-45.00		5				<3.6E-07		Ka	packer	no		(7)
B302290		USBR		23.00-27.00		4				<7.4E-07		Ka	packer	no		(7)
B302290		USBR		27.00-32.00		5				<5.4E-07		Ka	packer	no		(7)
B302290		USBR		32.00-37.00		5				<4.5E-07		Ka	packer	no		(7)
B303790		USBR		17.00-22.00		5				<8.2E-07		Ka	packer	no		(7)
B303790		USBR		22.00-27.00		5				<6.6E-07		Ka	packer	no		(7)
B303790		USBR		27.00-32.00		5				<5.4E-07		Ka	packer	no		(7)
B303890		USBR		14.00-18.00		4				<1.2E-06		Ka	packer	no		(7)
B303890		USBR		20.00-23.00		3				<1E-06		Ka	packer	no		(7)
B303890		USBR		23.00-28.00		5				<6.2E-07		Ka	packer	no		(7)
00491	1994	Hvorslev	3000	15.15-19.00	unconfined	3.85	15.15	17.6	NA	1.63E-06	4.61E-03	Qc	rising head	ND		(17)
00491	1994	Bouwer/Rice	3000	15.15-19.00	unconfined	3.85	15.15	17.6	NA	1.32E-06	3.74E-03	Qc	rising head	ND		(17)
00491	1994	Hvorslev	2400	15.15-19.00	unconfined	3.85	15.15	14.6	NA	3.96E-06	1.12E-02	Qc	falling head	ND		(17)
00491	1994	Bouwer/Rice	2400	15.15-19.00	unconfined	3.85	15.15	14.6	NA	3.35E-06	9.50E-03	Qc	falling head	ND		(17)
00491	1994									3.96E-06	1.12E-02	Qc	slug	yes		(17), Recommended Value
01991	1994	Hvorslev	92	28.21-40.71	confined	9.9	19.35	22.3	NA	1.02E-04	2.88E-01	KaKlclst(w)	rising head	ND		(17)
01991	1994	Ramey	92	28.21-40.71	confined	9.9	19.35	22.3	NA	5.59E-04	1.58E+00	KaKlclst(w)	rising head	ND		(17)
01991	1994	Hvorslev	38	28.21-40.71	confined	9.9	19.35	16.3	NA	9.66E-05	2.74E-01	KaKlclst(w)	falling head	ND		(17)
01991	1994	Ramey	38	28.21-40.71	confined	9.9	19.35	16.3	NA	5.59E-04	1.58E+00	KaKlclst(w)	falling head	ND		(17)
01991	1994									5.59E-04	1.58E+00	KaKlclst(w)	slug	yes		(17), Recommended Value
03391	1994	Hvorslev	8300	28.62-41.62	unconfined	16.15	25.47	23.1	NA	2.24E-05	6.34E-02	KaNo.1ss(w)	falling head	ND		(17)
03391	1994	Bouwer/Rice	8300	28.62-41.62	unconfined	16.15	25.47	23.1	NA	2.69E-05	7.63E-02	KaNo.1ss(w)	falling head	ND		(17)
03391	1994	Ramey	8300	28.62-41.62	unconfined	16.15	25.47	23.1	NA	2.24E-04	6.34E-01	KaNo.1ss(w)	falling head	ND		(17)
03391	1994									2.24E-04	6.34E-01	KaNo.1ss(w)	slug	yes		(17), Recommended Value
11491	1992	Cooper/Jacob								1.81E-03	5.14E+00	Qrf	pump	yes		(20)
11491	1992	Theis Analysis								1.61E-03	4.54E+00	Qrf	pump	yes		(20)
11791	1994	Hvorslev	8500	9.53-15.43	confined	6.8	7.88	5.1	NA	1.27E-06	3.60E-03	KaKlclst(w)	falling head	ND		(17)
11791	1994	Ramey	8500	9.53-15.43	confined	6.8	7.88	5.1	NA	9.15E-06	2.59E-02	KaKlclst(w)	falling head	ND		(17)
11791	1994									9.15E-06	2.59E-02	KaKlclst(w)	slug	yes		(17), Recommended Value
11891	1994	Hvorslev	84	25.06-29.96	confined	4.9	25.06	26.52	NA	4.63E-04	1.31E+00	KaNo.1ss(w)	rising head	ND		(17)
11891	1994	Bouwer/Rice	84	25.06-29.96	confined	4.9	25.06	26.52	NA	3.86E-04	1.09E+00	KaNo.1ss(w)	rising head	ND		(17)
11891	1994	Hvorslev	82	25.06-29.96	confined	4.9	25.06	24.68	NA	1.63E-04	4.61E-01	KaNo.1ss(w)	falling head	ND		(17)
11891	1994	Bouwer/Rice	82	25.06-29.96	confined	4.9	25.06	24.68	NA	1.52E-04	4.32E-01	KaNo.1ss(w)	falling head	ND		(17)
11891	1994									4.63E-04	1.31E+00	KaNo.1ss(w)	slug	yes		(17), Recommended Value
13491	1994	Hvorslev	920	18.94-31.02	unconfined	12.08	18.94	21.3	NA	1.58E-03	4.46E+00	Qrf	rising head	ND		(17)
13491	1994	Bouwer/Rice	920	18.94-31.02	unconfined	12.08	18.94	21.3	NA	1.27E-03	3.60E+00	Qrf	rising head	ND		(17)
13491	1994	Hvorslev	26	18.94-31.02	unconfined	12.08	18.94	16.8	NA	2.13E-03	6.05E+00	Qrf	falling head	ND		(17)
13491	1994	Bouwer/Rice	26	18.94-31.02	unconfined	12.08	18.94	16.8	NA	1.52E-03	4.32E+00	Qrf	falling head	ND		(17)
13491	1994									1.88E-03	5.33E+00	Qrf	slug	yes		(17), Recommended Value
20291	1994	Hvorslev	18	29.04-34.68	unconfined	5.64	29.04	30.9	NA	1.42E-03	4.03E+00	Qrf	rising head	ND		(17)
20291	1994	Bouwer/Rice	18	29.04-34.68	unconfined	5.64	29.04	30.9	NA	9.66E-04	2.74E+00	Qrf	rising head	ND		(17)
20291	1994	Hvorslev	18	29.04-34.68	unconfined	5.64	29.04	28.3	NA	1.17E-03	3.31E+00	Qrf	falling head	ND		(17)

782

Table G-1
Hydraulic Data

Well ID	Date Tested	Analysis Method	Test Duration (min.)	Interval Tested (ft.)	Aquifer Conditions	Initial Saturated Thickness (ft.)	Depth to Water (ft.)	Maximum Drawdown (ft.)	Average Discharge (gpm)	Hydraulic Conductivity (cm/sec)	Hydraulic Conductivity (ft/d)	Lithologic Unit Tested	Type of Test	Data Usable?	Comments	Source
20291	1994	Bouwer/Rice	18	29.04-34.68	unconfined	5.64	29.04	28.3	NA	9.66E-04	2.74E+00	Qrf	falling head	ND		(17)
20291	1994									1.32E-03	3.74E+00	Qrf	slug	yes		(17), Recommended Value
20291	1992	Cooper/Jacob								8.79E-04	2.49E+00	Qrf	pump	yes		(20)
20291	1992	Theis Analysis								8.13E-04	2.31E+00	Qrf	pump	yes		(20)
20491	1994	Hvorslev	10	29.16-33.61	unconfined	4.45	29.16	30.6	NA	2.74E-03	7.78E+00	Qrf	rising head	ND		(17)
20491	1994	Bouwer/Rice	10	29.16-33.61	unconfined	4.45	29.16	30.6	NA	4.83E-03	1.37E+01	Qrf	rising head	ND		(17)
20491	1994	Hvorslev	16	29.16-33.61	unconfined	4.45	29.16	28.6	NA	2.74E-03	7.78E+00	Qrf	falling head	ND		(17)
20491	1994	Bouwer/Rice	16	29.16-33.61	unconfined	4.45	29.16	28.6	NA	1.02E-03	2.88E+00	Qrf	falling head	ND		(17)
20491	1992	Cooper/Jacob								3.58E-03	1.02E+01	Qrf	pump	yes		(20)
20491	1992	Theis Analysis								3.10E-03	8.79E+00	Qrf	Pump	yes		(20)
20491	1994									2.90E-03	8.21E+00	Qrf	slug	yes		(17), Recommended Value
20591	1994	Hvorslev	1200	16.81-26.21	unconfined	9.4	16.81	19.5	NA	1.63E-04	4.61E-01	Qrf	rising head	ND		(17)
20591	1994	Bouwer/Rice	1200	16.81-26.21	unconfined	9.4	16.81	19.5	NA	1.17E-04	3.31E-01	Qrf	rising head	ND		(17)
20591	1994	Hvorslev	20	16.81-26.21	unconfined	9.4	16.81	14.7	NA	4.17E-04	1.18E+00	Qrf	falling head	ND		(17)
20591	1994	Bouwer/Rice	20	16.81-26.21	unconfined	9.4	16.81	14.7	NA	2.69E-04	7.63E-01	Qrf	falling head	ND		(17)
20591	1994									2.90E-04	8.21E-01	Qrf	slug	yes		(17), Recommended Value
20591	1992	Cooper/Jacob								1.61E-04	4.55E-01	Qrf	pump	yes		(20)
20591	1992	Theis Analysis								1.42E-04	4.03E-01	Qrf	pump	yes		(20)
20591	1992	Theis Recovery								8.61E-04	2.44E+00	Qrf	pump	yes		(20)
20691	1994	Hvorslev	1200	21.30-27.00	unconfined	5.7	21.3	25	NA	2.13E-04	6.05E-01	Qrf	rising head	ND		(17)
20691	1994	Bouwer/Rice	1200	21.30-27.00	unconfined	5.7	21.3	25	NA	2.59E-04	7.34E-01	Qrf	rising head	ND		(17)
20691	1994									3.86E-04	1.09E+00	Qrf	slug	yes		(17), Recommended Value
20691	1992	Cooper/Jacob								1.30E-04	3.70E-01	Qrf	pump	yes		(20)
20691	1992	Theis Analysis								1.21E-04	3.43E-01	Qrf	pump	yes		(20)
20691	1992	Theis Recovery								4.44E-04	1.26E-01	Qrf	pump	yes		(20)
20791	1994	Hvorslev	30160	30.7-36.5	confined	10	18.82	21.54	NA	3.00E-05	8.50E-02	KaKlclst(u)	rising head	ND		(17)
20791	1994	Ramey	30160	30.7-36.5	confined	10	18.82	21.54	NA	7.12E-04	2.02E+00	KaKlclst(u)	rising head	ND		(17)
20791	1994	Hvorslev	41680	30.7-36.5	confined	10	18.82	15.6	NA	2.59E-08	7.34E-05	KaKlclst(u)	falling head	ND		(17)
20791	1994	Ramey	41680	30.7-36.5	confined	10	18.82	15.6	NA	1.58E-08	4.46E-05	KaKlclst(u)	falling head	ND		(17)
20791	1994									2.59E-08	7.34E-05	KaKlclst(u)	slug	yes		(17), Recommended Value
20891	1994	Hvorslev	12	35.43-68.62	unconfined	33.19	35.43	36.18	NA	1.93E-05	5.47E-02	KaNo.1ss(w)	slug	ND		(17)
20891	1994	Bouwer/Rice	12	35.43-68.62	unconfined	33.19	35.43	36.18	NA	5.59E-05	1.58E-01	KaNo.1ss(w)	slug	ND		(17)
20891	1994									5.59E-05	1.58E-01	KaNo.1ss(w)	slug	yes		(17), Recommended Value
20891	1992	Cooper/Jacob								3.56E-03	1.01E+01	KaNo.1ss(w)	pump	yes		(20)
20891	1992	Theis Analysis								4.17E-04	1.18E+00	KaNo.1ss(w)	pump	yes		(20)
20991	1994	Hvorslev	12	35.60-65.00	unconfined	29.4	35.6	38	NA	8.13E-04	2.30E+00	KaNo.1ss(w)	rising head	ND		(17)
20991	1994	Bouwer/Rice	12	35.60-65.00	unconfined	29.4	35.6	38	NA	6.10E-04	1.73E+00	KaNo.1ss(w)	rising head	ND		(17)
20991	1994	Hvorslev	16	35.60-65.00	unconfined	29.4	35.6	34.5	NA	1.63E-04	4.61E-01	KaNo.1ss(w)	falling head	ND		(17)
20991	1994	Bouwer/Rice	16	35.60-65.00	unconfined	29.4	35.6	34.5	NA	1.42E-04	4.03E-01	KaNo.1ss(w)	falling head	ND		(17)
20991	1994									8.13E-04	2.30E+00	KaNo.1ss(w)	slug	yes		(17), Recommended Value
20991	1992	Theis Recovery								3.68E-04	1.04E+00	KaNo.1ss(w)	pump	yes		(20)
20991	1992	Theis Analysis								3.68E-04	1.16E+00	KaNo.1ss(w)	pump	yes		(20)
20991	1992	Cooper/Jacobs								4.33E-03	1.23E+01	KaNo.1ss(w)	pump	yes		(20)
21091	1992	Theis Recovery								4.13E-04	1.17E+00	KaNo.1ss(w)	pump	yes		(20)
21091	1992	Theis Analysis								4.13E-04	1.29E+00	KaNo.1ss(w)	Pump	yes		(20)
21091	1992	Cooper/Jacobs								4.08E-03	1.16E+01	KaNo.1ss(w)	pump	yes		(20)
31891				16.80-18.40						2.00E-04	5.67E-01		slug injection	ND		(15)
31891										2.00E-04	5.67E-01		slug withdrawal	ND		(15)

783

Table G-1
Hydraulic Data

Well ID	Date Tested	Analysis Method	Test Duration (min.)	Interval Tested (ft.)	Aquifer Conditions	Initial Saturated Thickness (ft.)	Depth to Water (ft.)	Maximum Drawdown (ft.)	Average Discharge (gpm)	Hydraulic Conductivity (cm/sec)	Hydraulic Conductivity (ft/d)	Lithologic Unit Tested	Type of Test	Data Usable?	Comments	Source
34791				6.20-7.70						1.00E-05	2.84E-02		slug injection	ND		(15)
34791										6.00E-06	1.70E-02		slug withdrawal	ND		(15)
35691				15.80-26.40						1.00E-06	2.83E-03		slug injection	ND		(15)
35691										9.00E-07	2.55E-03		slug withdrawal	ND		(15)
36191				9.70-14.40						1.00E-06	2.83E-03		bailer/recovery	ND		(15)
37191	12/7/91	Bouwer/Rice	26	11.30-20.90	unconfined	13.74	9.88			1.00E-04	2.83E-01	Qc	slug injection	ND		(15)
37191	12/7/91	Bouwer/Rice	64	11.30-20.90	unconfined	13.74	9.88	1.92		4.00E-05	1.13E-01	Qc	slug withdrawal	ND		(15)
37391				2.55-2.80						8.10E-09	2.30E-05			ND		(15)
37391				2.20-2.55										ND		(15)
37391				11.00-11.75										ND		(15)
37391				11.75-12.00						2.50E-09	7.09E-06			ND		(15)
37491				2.70-3.00						1.70E-08	4.82E-05			ND		(15)
37491				3.00-3.25										ND		(15)
37591				3.00-3.25										ND		(15)
37591				3.25-3.50						5.90E-06	1.67E-02			ND		(15)
37591				6.95-7.45										ND		(15)
37591				7.45-7.70						1.30E-05	3.68E-02			ND		(15)
37591	12/21/91	Bouwer/Rice	2650	7.80-12.40	unconfined	1.21	13.29	1.43		7.00E-06	1.98E-02	Qrf	bailer/recovery	ND		(15)
37691				13.50-13.80						3.70E-08	1.05E-04			ND		(15)
37691				13.80-14.00										ND		(15)
37891				0.08-1.10								Qc		ND		(15)
37891				1.10-1.35						1.80E-07	5.10E-04	Qc		ND		(15)
37891				7.50-7.75						3.80E-08	1.08E-04	KaKlclst(w)		ND		(15)
37891				10.20-10.45						4.70E-08	1.33E-04	KaKlclst(w)		ND		(15)
37891				46.15-46.40						5.00E-08	1.42E-04	KaKlclst(w)		ND		(15)
37891	12/18/91	Bouwer/Rice	2680	43.40-53.00	unconfined	13.3	43.7			5.00E-07	1.42E-03	KaKlclst(w)/slt	slug injection	ND		(15)
37891	12/21/91	Bouwer/Rice	1490	43.40-53.00	unconfined	13.3	43.7	1.25		1.00E-06	2.83E-03	KaKlclst(w)/slt	slug withdrawal	ND		(15)
37991				3.00-3.50						1.30E-08	3.68E-05	Qc		ND		(15)
37991				3.50-3.75						1.30E-08	3.60E-05	Qc		ND		(15)
37991				11.40-11.65						5.50E-09	1.56E-05	KaKlclst(w)		ND		(15)
37991				46.70-48.00						7.80E-05	2.21E-01	KaKlclst(w)		ND		(15)
37991	12/18/91	Bouwer/Rice	1370	45.40-55.00	unconfined	8.5	50.89	5.5		7.00E-06	1.98E-02	KaKlclst(w)/slt	bailer/recovery	ND		(15)
38191		Bouwer/Rice		10.10-14.90						2.00E-06	5.67E-03	Qc	slug withdrawal	ND		(15)
38191		Bouwer/Rice		10.10-14.90						4.00E-04	1.13E+00	Qc	slug injection	ND		(15)
38591				4.80-5.05						1.70E-05	4.82E-02			ND		(15)
38591				5.05-5.30						5.10E-08	1.45E-04			ND		(15)
38591				5.90-7.50						4.20E-09	1.19E-05		bailer/recovery	ND		(15)
38991				1.50-1.75						1.00E-06	2.83E-03	Qc		ND		(15)
38991				1.75-2.00						1.70E-05	4.82E-02	Qc		ND		(15)
38991				11.50-11.75								Qc		ND		(15)
38991				11.75-12.00						5.10E-08	1.45E-04	Qc		ND		(15)
38991				21.15-21.40						4.20E-09	1.19E-05	KaKlclst(w)		ND		(15)
38991				27.00-36.60						1.00E-06	2.83E-03	KaKlclst(w)/slt	bailer/recovery	ND		(15)
39091				0.50-0.90										ND		(15)
39091				0.90-1.15						1.20E-03	3.40E+00			ND		(15)
39191				3.0-3.25								Qc		ND		(15)
39191				3.25-3.50						2.10E-08	5.95E-05	Qc		ND		(15)
39191				11.75-12.00						9.50E-08	2.69E-04	KaKlclst(w)		ND		(15)

784

Table G-1
Hydraulic Data

Well ID	Date Tested	Analysis Method	Test Duration (min.)	Interval Tested (ft.)	Aquifer Conditions	Initial Saturated Thickness (ft.)	Depth to Water (ft.)	Maximum Drawdown (ft.)	Average Discharge (gpm)	Hydraulic Conductivity (cm/sec)	Hydraulic Conductivity (ft/d)	Lithologic Unit Tested	Type of Test	Data Usable?	Comments	Source
39191				17.60-26.80						1.70E-06	4.82E-03	KaKlclst(w)	packer	ND		(15)
39191				21.15-21.40						4.20E-09	1.19E-05	KaKlclst(w)		ND		(15)
39191		Bouwer/Rice		33.00-42.60						2.00E-05	5.67E-02	KaKlclst(w)/slt	bailer/recovery	ND		(15)
39191				42.25-42.50						1.60E-06	4.54E-03	KaKlclst(w)		ND		(15)
39291		Bouwer/Rice		34.20-43.80						3.00E-05	8.50E-02	KaKlclst(w)/slt	slug injection	ND		(15)
39291		Bouwer/Rice		34.20-43.80						3.00E-05	8.50E-02	KaKlclst(w)/slt	slug withdrawal	ND		(15)
39691				5.00-5.25										ND		(15)
39691				5.25-5.50						7.60E-07	2.15E-03			ND		(15)
41191	1/14/91	USDI	195.72	125.00-130.20	confined	5.2	64	NA	0.000226	2.10E-07	5.95E-04	KaKlclst(u)	packer	ND		(16)
41391	2/4/92	Jacob and Lohman	265	145.00-150.20	confined	5.2	1.5	NA	0.013	3.80E-06	1.08E-02	KaKlclst(u)	packer	ND		(16)
41391	2/4/92	USDI	265	145.00-150.20	confined	5.2	1.5	NA	0.013	4.50E-06	1.28E-02	KaKlclst(u)	packer	ND		(16)
41791	2/4/92	NA	NA	53.00-58.20	unconfined	NA	45.94	NA	NA	NA		KaKlclst(u)	NA	ND	No estimate obtained due to inadequate seal of test interval	(16)
41791	2/4/92	NA	NA	59.05-64.25	unconfined	NA	45.94	NA	NA	NA		KaKlclst(u)	NA	ND	No estimate obtained due to inadequate seal of test interval	(16)
5691	1992	Cooper/Jacob								1.78E-03	5.04E+00		pump	yes		(20)
5691	1992	Theis analysis								1.83E-03	5.04E+00		pump	yes		(20)
41292	7/8/92	USDI	138.18	109.00-112.50	confined	3.5	18.3	NA	0.00214	1.20E-07	3.40E-04	KaKlclst(u)	packer	ND		(16)
41292	7/8/92	Jacob	138.18	112.50-114.25	confined	1.75	18.3	NA	0.00214	1.50E-07	4.25E-04	KaKlclst(u)	packer	ND		(16)
41292	7/7/92	USDI	246	131.00-136.25	confined	5.25	18.3	NA	0.00014	2.40E-08	6.80E-05	KaKlclst(u)	constant head/packe	ND		(16)
41892	4/3/92	USDI	218	70.00-75.75	confined	5.75	48.6	NA	0.000263	4.10E-08	1.16E-04	KaKlclst(u)	packer	ND		(16)
41992	3/24/92	USDI	229	58.00-69.13	confined	11.13	25.8	NA	0.0034	3.20E-07	9.07E-04	KaKlclst(u)	constant head	ND		(16)
41992	3/24/92	Bouwer/Rice	229	58.00-69.13	confined	11.13	25.8	NA	0.0034	2.00E-07	5.67E-04	KaKlclst(u)	falling head	ND		(16)
41992	4/25/92	Jacob	230.33	78.00-85.83	confined	7.83	25.8	NA	0.00614	1.40E-07	3.97E-04	KaKlclst(u)	packer	ND		(16)
41992	4/25/92	USDI	230.33	85.83-89.13	confined	3.3	25.8	NA	0.00614	4.70E-07	1.33E-03	KaKlclst(u)	packer	ND		(16)
42092	2/25/92	USDI	247	70.00-75.50			49.1	NA	0.000211	2.40E-08	6.80E-05		packer	ND		(16)
46392	1994	Hvorslev	1600	65.40-84.20	confined	26.4	31.84	35.5	NA	1.78E-06	5.04E-03	KaKlclst(w)	rising head	ND		(17)
46392	1994	Hvorslev	3800	65.40-84.20	confined	26.4	31.84	28.8	NA	2.39E-06	6.77E-03	KaKlclst(w)	falling head	ND		(17)
46392	1994	Ramey	3800	65.40-84.20	confined	26.4	31.84	28.8	NA	1.17E-06	3.31E-03	KaKlclst(w)	falling head	ND		(17)
46392	1994										5.90E-03	KaKlclst(w)	slug	yes		(17), Recommended Value
46492	1994	Hvorslev	4200	27.11-51.11	unconfined	26.96	24.15	26.4	NA	1.52E-07	4.32E-04	Qrf	rising head	ND		(17)
46492	1994	Bouwer/Rice	4200	27.11-51.11	unconfined	26.96	24.15	26.4	NA	8.64E-08	2.45E-04	Qrf	rising head	ND		(17)
46492	1994	Hvorslev	1000	27.11-51.11	unconfined	26.96	24.15	21.6	NA	8.13E-07	2.30E-03	Qrf	falling head	ND		(17)
46492	1994	Bouwer/Rice	1000	27.11-51.11	unconfined	26.96	24.15	21.6	NA	5.59E-07	1.58E-03	Qrf	falling head	ND		(17)
46492	1994										1.34E-03	Qrf	slug	yes		(17), Recommended Value
46692	1994	Hvorslev	14320	72.05-91.35	unconfined	46.67	44.68	47.75	NA	1.37E-07	3.89E-04	KaKlss(u)	rising head	ND		(17)
46692	1994	Bouwer/Rice	14320	72.05-91.35	unconfined	46.67	44.68	47.75	NA	1.17E-07	3.31E-04	KaKlss(u)	rising head	ND		(17)
46692	1994	Ramey	14320	72.05-91.35	unconfined	46.67	44.68	47.75	NA	7.62E-08	2.16E-04	KaKlss(u)	rising head	ND		(17)
46692	1994										3.89E-04	KaKlss(u)	slug	yes		(17), Recommended Value
46792	1994	Hvorslev	21520	96.84-116.74	unconfined	57.58	59.16	65.2	NA	3.56E-08	1.01E-04	KaKlslt(u)	slug	ND		(17)
46792	1994	Bouwer/Rice	21520	96.84-116.74	unconfined	57.58	59.16	65.2	NA	2.74E-08	7.78E-05	KaKlslt(u)	slug	ND		(17)
46792	1994	Ramey	21520	96.84-116.74	unconfined	57.58	59.16	65.2	NA	1.68E-08	4.75E-05	KaKlslt(u)	slug	ND		(17)
46792	1994										1.01E-04	KaKlslt(u)	slug	yes		(17), Recommended Value
46892	1994	Hvorslev	1200	149.41-166.56	unconfined	17.15	144.41	152.35	NA	1.22E-06	3.46E-03	KaKlss(u)	slug	ND		(17)
46892	1994	Bouwer/Rice	1200	149.41-166.56	unconfined	17.15	144.41	152.35	NA	7.62E-07	2.16E-03	KaKlss(u)	slug	ND		(17)
46892	1994										3.46E-03	KaKlss(u)	slug	yes		(17), Recommended Value
00293	1994	Hvorslev	18	38.05-52.35	unconfined	27.15	25.2	28.5	NA	7.12E-04	2.02E+00	Qvf	rising head	ND		(17)
00293	1994	Bouwer/Rice	18	38.05-52.35	unconfined	27.15	25.2	28.5	NA	5.59E-04	1.58E+00	Qvf	rising head	ND		(17)

785

Table G-1
Hydraulic Data

Well ID	Date Tested	Analysis Method	Test Duration (min.)	Interval Tested (ft.)	Aquifer Conditions	Initial Saturated Thickness (ft.)	Depth to Water (ft.)	Maximum Drawdown (ft.)	Average Discharge (gpm)	Hydraulic Conductivity (cm/sec)	Hydraulic Conductivity (ft/d)	Lithologic Unit Tested	Type of Test	Data Usable?	Comments	Source
00293	1994	Ramey	18	38.05-52.35	unconfined	27.15	25.2	28.5	NA	1.32E-03	3.74E+00	Qvf	rising head	ND		(17)
00293	1994	Hvorslev	24	38.05-52.35	unconfined	27.15	25.2	22.9	NA	8.13E-04	2.30E+00	Qvf	falling head	ND		(17)
00293	1994	Bouwer/Rice	24	38.05-52.35	unconfined	27.15	25.2	22.9	NA	4.12E-04	1.17E+00	Qvf	falling head	ND		(17)
00293	1994	Ramey	24	38.05-52.35	unconfined	27.15	25.2	22.9	NA	2.85E-03	8.06E+00	Qvf	falling head	ND		(17)
00293	1994									2.08E-03	5.90E+00	Qvf	slug	yes		(17), Recommended Value
23193	1994	Hvorslev	38	68.90-79.40	unconfined	43.97	35.43	39	NA	9.66E-07	2.74E-03	KaKlss(u)	rising head	ND		(17)
23193	1994	Bouwer/Rice	38	68.90-79.40	unconfined	43.97	35.43	39	NA	7.12E-07	2.02E-03	KaKlss(u)	rising head	ND		(17)
23193	1994	Ramey	38	68.90-79.40	unconfined	43.97	35.43	39	NA	1.17E-06	3.31E-03	KaKlss(u)	rising head	ND		(17)
23193	1994	Hvorslev	38	68.90-79.40	unconfined	43.97	35.43	31.5	NA	6.10E-07	1.73E-03	KaKlss(u)	falling head	ND		(17)
23193	1994	Bouwer/Rice	38	68.90-79.40	unconfined	43.97	35.43	31.5	NA	1.47E-06	4.18E-03	KaKlss(u)	falling head	ND		(17)
23193	1994	Ramey	38	68.90-79.40	unconfined	43.97	35.43	31.5	NA	1.52E-06	4.32E-03	KaKlss(u)	falling head	ND		(17)
23193	1994									1.52E-06	4.32E-03	KaKlss(u)	slug	yes		(17), Recommended Value
70593	1994	Hvorslev	12880	122.35-135.20	unconfined	93.36	45.84	55.36	NA	3.05E-08	8.64E-05	KaKlslt(u)	slug	yes		(17), Recommended Value
70593	1994	Bouwer/Rice	12880	122.35-135.20	unconfined	93.36	45.84	55.36	NA	2.54E-08	7.20E-05	KaKlslt(u)	slug	ND		(17)
70593	1994	Ramey	12880	122.35-135.20	unconfined	93.36	45.84	55.36	NA	3.36E-09	9.50E-06	KaKlslt(u)	slug	ND		(17)

Key

gpm = gallons per minute
cm/sec = centimeters per second
ft/d = feet per day
NA = Not available
ND = No data
Qvf = Quarternary valley-fill alluvium
Qrf = Quarternary Rocky Flats Alluvium
Qc = Quarternary colluvium
KaKlclst(u) = Undifferentiated Arapahoe/Laramie unweathered bedrock claystones
KaKlslt(u) = Undifferentiated Arapahoe/Laramie unweathered bedrock siltstones
KaKlss(u) = Undifferentiated Arapahoe/Laramie unweathered bedrock sandstones
KaKlclst(w) = Undifferentiated Arapahoe/Laramie weathered bedrock claystones
KaKlslt(w) = Undifferentiated Arapahoe/Laramie weathered bedrock siltstones
KaNo.1ss(w) =Weathered bedrock Arapahoe No. 1 sandstones
KaKlss(w) = Undifferentiated Arapahoe/Laramie weathered bedrock sandstones other than Arapahoe No. 1 sandstones
Ka = Undifferentiated Arapahoe Sandstone
Wxbr = Undifferentiated weathered bedrock
Fill = Artificial Fill
ND = Not determined
Slug test or falling head/rising head test = Conducted by instantaneously injecting or removing a known volume of water into or from a well and measuring the subsequent recovery rate to static conditions
Bailer-recovery test = Conducted by removing a volume of water from a well with a bailer and measuring the subsequent recovery rate to static conditions. A bailer-recovery test is differentiated from a slug test by the time of bailing
Constant-rate test or pump(ing) test = Conducted by discharging or injecting water from or into a well at a constant rate. Changes in hydraulic head are measured in the pumping or injection well and nearby observation wells
Packer test = Conducted by inducing hydraulic pressures on isolated zones. Injection rates and hydraulic head responses are recorded for the duration of time it takes the test interval to reach steady state conditions

Source

(1) HydroSearch (1986), Geological and Hydrological Data Summary, July 21, 1986
(2) Chen and Associates (1988), Transmittal Of Slug Test Data, March 31, 1988
(3) Chen and Associates (1988), Transmittal of Slug Test Data, May 20, 1988
(4) Chen and Associates (1988), Transmittal of Slug Test Data, September 20, 1988
(4a) Chen and Associates (1987), Revised Slug Test Results, December 22, 1987.
(4b) Chen and Associates (1987), Hydraulic Conductivity Results, November 11, 1987.
(5) R. F. Weston (1990), Draft Background Field Program Report, May, 1990
(6) R. F. Weston (1990), Draft Summary of Field Activities Report, August 3, 1990
(7) French Drain Geotechnical Investigation Report, October 5, 1990
(8) Solar Evaporation Pond Closure Plan, July 1988
(9) 903 RI Report, December, 1987
(10) Present Landfill Closure Plan, July, 1988
(11) West Spray Field RI/FS Work Plan
(12) 881 Hillside Response to EPA Comments, February, 1989
(13) R. F. Weston (1991), Revised Background Pumping Tests, November, 1991
(14) Doty and Associates (1992), Evaluation of O-3 Pumping Test, Woman Creek Alluvium, January, 1992
(15) OU1 Phase III RFI/RI
(16) Phase II Geologic Characterization Data Acquisition, October 1992
(17) Golder and Associates, Analyses of Aquifer Tests
(18) Phase II RF/RI Aquifer Test Report of OU2
(19) Hydrogeologic Characterization Report, 1994.
(20) Phase II RFI/RI aquifer test report of OU2

186

Table G-2
Summary Statistics of Hydraulic Data

	Qvf	KaNo.1ss(w)	Qrf	Qc	KaKlss(w)	KaKlslt(w)	KaKlclst(w)	KaKlss(u)	KaKlclst(u)	KaKlslt(u)
Mean	1.13E-02	1.94E-03	3.37E-03	2.06E-04	7.53E-05	2.91E-05	1.41E-05	4.21E-06	2.07E-05	1.18E-06
Standard Error	1.92E-03	4.22E-04	7.61E-04	5.88E-05	2.88E-05	3.10E-06	1.14E-05	1.88E-06	2.00E-05	4.66E-07
Median	3.00E-03	5.36E-04	3.90E-04	1.63E-04	4.42E-05	3.00E-05	6.50E-07	5.80E-07	3.00E-07	1.30E-07
Standard Deviation	1.22E-02	2.46E-03	8.23E-03	2.35E-04	8.16E-05	5.36E-06	7.98E-05	1.20E-05	2.53E-04	2.91E-06
Sample Variance	1.48E-04	6.07E-06	6.77E-05	5.53E-08	6.65E-09	2.88E-11	6.36E-09	1.45E-10	6.40E-08	8.47E-12
Kurtosis	-8.94E-01	2.26E+00	1.27E+01	5.63E+00	-5.41E-01	NED	4.82E+01	2.11E+01	1.60E+02	1.04E+01
Skewness	6.75E-01	1.68E+00	3.46E+00	2.14E+00	1.06E+00	-7.13E-01	6.92E+00	4.40E+00	1.26E+01	3.24E+00
Range	3.70E-02	9.21E-03	5.00E-02	9.25E-04	2.04E-04	1.06E-05	5.59E-04	6.81E-05	3.20E-03	1.33E-05
Minimum	3.25E-06	3.96E-05	7.12E-08	3.96E-06	5.70E-06	2.34E-05	3.00E-08	1.00E-08	1.00E-08	1.00E-08
Maximum	3.70E-02	9.25E-03	5.00E-02	9.29E-04	2.10E-04	3.40E-05	5.59E-04	6.81E-05	3.20E-03	1.33E-05
Count	40	34	117	16	8	3	49	41	160	39
Upper Confidence Level (95.000%)	3.77E-03	8.28E-04	1.49E-03	1.15E-04	5.65E-05	6.07E-06	2.23E-05	3.69E-06	3.92E-05	9.13E-07
Geometric Mean	2.54E-03	7.88E-04	2.10E-04	9.33E-05	3.89E-05	2.88E-05	8.82E-07	5.77E-07	2.48E-07	1.59E-07

Notes

1. Hydraulic conductivity values are posted in cm/sec
2. Summary statistics were performed on "useable" hydraulic conductivity data identified in Table G-1

Key

KaKlss(w) = Undifferentiated Araphoe/Laramie weathered bedrock sandstones other than Araphoe No. 1 sandstones
KaKlslt(w) = Undifferentiated Arapahoe/Laramie weathered bedrock siltstones
KaKlclst(w) = Undifferentiated Arapahoe/Laramie weathered bedrock claystones
KaNo.1ss(w) = Weathered bedrock Arapahoe No. 1 sandstone
Qvf = Quaternary valley-fill alluvium
Qrf = Quaternary Rocky Flats Alluvium
Qc = Quaternary colluvium
KaKlss(u) = Undifferentiated Arapahoe/Laramie unweathered bedrock sandstones
KaKlslt(u) = Undifferentiated Arapahoe/Laramie unweathered bedrock siltstones
KaKlclst(u) = Undifferentiated Arapahoe/Laramie unweathered bedrock claystones

NED = Not enough data to compute statistic

Table G-3
Rocky Flats Site Laboratory Permeameter Data
UNCONSOLIDATED SURFICIAL DEPOSITS

Well/Borehole	Interval (ft)	Lithology	Saturated Conductivity (cm/sec)	Direction	Method	Source
5986	8.3-8.7	Clay Loam	5.40E-07	Vertical	Trout, et. al. (1982)	5
6286	3.3-4.0	Clay Loam	4.40E-07	Vertical	Trout, et. al. (1982)	5
587	7.0-7.5	Clay Loam	8.20E-07	Vertical	Trout, et. al. (1982)	5
5587	4.7-5.0	Sandy Clay Loam	5.60E-07	Vertical	Trout, et. al. (1982)	5
5191	30.5-30.72	Clayey Sand w/ Silt	1.90E-08	Vertical	ASTM D-2434	3
10891	25.8-26.03	Clayey Sand	1.20E-08	Vertical	ASTM D-2434	3
20091	28.1-28.33	Sandy Gravel w/ Clay	1.30E-07	Vertical	ASTM D-2434	3
20791	15.3-15.45	Gravelly Sand w/ Clay	2.20E-08	Vertical	ASTM D-2434	3
52294	6.0-7.0	Silty Sand w/ Clay+	8.80E-08	Vertical	ASTM D5084	4
CSU Soil Sample #1	unknown	Rocky Flats Alluvium (Qrf)	2.10E-05	Vertical	Trout, et. al. (1982)	5
CSU Soil Sample #3	unknown	Sandy Clay Loam (Qal)	6.30E-06	Vertical	Trout, et. al. (1982)	5
CSU Soil Sample #5	unknown	Loam (Qal)	4.50E-05	Vertical	Trout, et. al. (1982)	5
CSU Soil Sample #7	unknown	Sandy Clay Loam (Qc)	1.90E-06	Vertical	Trout, et. al. (1982)	5
CSU Soil Sample #11	unknown	Clay Loam (Qc)	6.90E-07	Vertical	Trout, et. al. (1982)	5
CSU Soil Sample #18	unknown	Clay (Qc)	6.40E-06	Vertical	Trout, et. al. (1982)	5
CSU Soil Sample #19	unknown	Clay (Qc)	3.60E-06	Vertical	Trout, et. al. (1982)	5
CSU Soil Sample #21	unknown	Sandy Clay Loam (Qal)	4.90E-06	Vertical	Trout, et. al. (1982)	5
CSU Soil Sample #23	unknown	Rocky Flats Alluvium (Qrf)	2.70E-04	Vertical	Trout, et. al. (1982)	5
CSU Soil Sample #55	unknown	Rocky Flats Alluvium (Qrf)	2.10E-04	Vertical	Trout, et. al. (1982)	5
CSU Soil Sample #56	unknown	Rocky Flats Alluvium (Qrf)	1.10E-03	Vertical	Trout, et. al. (1982)	5
CSU Soil Sample #58	unknown	Rocky Flats Alluvium (Qrf)	3.60E-03	Vertical	Trout, et. al. (1982)	5
CSU Soil Sample #65	unknown	Rocky Flats Alluvium (Qrf)	3.20E-04	Vertical	Trout, et. al. (1982)	5
CSU Soil Sample #68	unknown	Clay Loam (Qal)	2.40E-06	Vertical	Trout, et. al. (1982)	5
CSU Soil Sample #69	unknown	Clay Loam (Qc)	9.80E-06	Vertical	Trout, et. al. (1982)	5
CSU Soil Sample #71	unknown	Clay Loam (Qc)	2.40E-06	Vertical	Trout, et. al. (1982)	5
		Geometric Mean	**2.24E-04**			
		Minimum	**1.20E-08**			
		Maximum	**3.60E-03**			

788

Table G-3
Rocky Flats Site Laboratory Permeameter Data
WEATHERED BEDROCK

Well/Borehole	Interval (ft)	Lithology	Saturated Conductivity (cm/sec)	Direction	Method	Source
	47.2-47.5	Sandy Siltst. (W)	2.10E-05	Vertical	Trout, et. al. (1982)	5
1087	16.7-17	Sandy Siltst. (W)	1.60E-08	Vertical	ASTM D-2434	1
B315289 (5989BR)	34.8-35	Siltst. (W)	3.30E-08	Vertical	ASTM D-2434	1
B315289 (5989BR)	64.25-64.45	Sandst. (W)	4.70E-09	Vertical	ASTM D-2434	1
B217589 (5789BR)	29.5-29.85	Silty Clst. (W)	3.40E-09	Vertical	ASTM D-2434	1
B217689 (5887BR)	35-35.25	Clayey Siltst. (W)	1.00E-08	Vertical	ASTM D-2434	1
B300690	18.5-19.0	Weathered Bedrock (W)	1.60E-07	Vertical	EPA Method 9100	2
B300790	18.6-18.8	Weathered Bedrock (W)	6.00E-09	Vertical	EPA Method 9100	2
B301090	25.5-26.0	Weathered Bedrock (W)	3.10E-08	Vertical	EPA Method 9100	2
B301190	23.6-24.0	Sandy Siltst. (W)	2.40E-08	Vertical	EPA Method 9100	2
	35.0-35.5	Sandy Clayey Siltst. (W)	1.10E-08	Vertical	EPA Method 9100	2
B301390	28.8-29.4	Weathered Bedrock (W)	1.90E-07	Vertical	EPA Method 9100	2
B301490	28.3-28.6	Weathered Bedrock (W)	3.10E-08	Vertical	EPA Method 9100	2
B301590	26.75-27.10	Silty SS (W)	1.50E-06	Vertical	EPA Method 9100	2
B301690	29.6-30.0	Clayey Siltst. (W)	2.40E-08	Vertical	EPA Method 9100	2
	32.4-32.7	Sandy Siltst. (W)	7.10E-08	Vertical	EPA Method 9100	2
B301990	29.6-30.3	Sandy Clayey Siltst. (W)	7.00E-08	Vertical	EPA Method 9100	2
B303790	30.8-31.5	Clayey Siltst. (W)	4.00E-08	Vertical	EPA Method 9100	2
291	38.4-38.6	Clayey SS (W)	2.50E-05	Horizontal	ASTM D-2434	3
3091	43.7-43.93	Silty SS (W)	3.10E-09	Vertical	ASTM D-2434	3
3591	37.5-37.73	Clayst. (W)	1.70E-08	Vertical	ASTM D-2434	3
10291	37.8-38.05	Sandst. (W)	3.70E-08	Vertical	ASTM D-2434	3
	43.8-44.05	Sandst. (W)	1.10E-08	Vertical	ASTM D-2434	3
	51.8-52.05	Clayey SS (W)	5.00E-09	Vertical	ASTM D-2434	3
10391	35.8-36.05	Sandst. (W)	1.10E-04	Vertical	ASTM D-2434	3
	40.7-40.95	Clayey SS (W)	5.40E-08	Vertical	ASTM D-2434	3
	49.6-49.85	Clayey SS (W)	1.50E-07	Vertical	ASTM D-2434	3
20791	15.3-15.45	Gravelly Sand w/ Clay	2.20E-08	Vertical	ASTM D-2434	3
20991	42.8-43.05	Sandst. (W)	1.10E-06	Vertical	ASTM D-2434	3
	56.8-57.05	Silty SS (W)	6.80E-08	Vertical	ASTM D-2434	3

789

Table G-3
Rocky Flats Site Laboratory Permeameter Data

WEATHERED BEDROCK
(continued)

Well/Borehole	Interval (ft)	Lithology	Saturated Conductivity (cm/sec)	Direction	Method	Source
21193	65.8-66.5	Silty Clst.(W)	8.40E-08	Vertical	ASTM D5084-90	3
	69.0-70.6	Siltst. (W)	1.40E-09	Vertical	ASTM D5084-90	3
			2.30E-07	Horizontal	ASTM D5084-90	3
21493	60.0-61.6	Clayst. (W)	5.40E-09	Vertical	ASTM D5084-90	3
21593	40.9-42.2	Silty Clst. (W)	2.70E-09	Vertical	ASTM D5084-90	2
			3.20E-08	Horizontal	ASTM D5084-90	2
52194	6.5-7.5	Clayst. (W)	4.70E-08	Vertical	ASTM D5084	4
52394	7.0-8.0	Clayst. (W)	2.30E-08	Vertical	ASTM D5084	4
		Geometric Mean	**4.21E-06**			
		Minimum	**1.40E-09**			
		Maximum	**1.10E-04**			

Table G-3
Rocky Flats Site Laboratory Permeameter Data
UNWEATHERED BEDROCK

Well/Borehole	Interval (ft)	Lithology	Saturated Conductivity (cm/sec)	Direction	Method	Source
1390 (TH-11)	40	Claystone (UNW)	4.00E-06	Vertical	Triaxial	6
1390 (TH-11)	50	Claystone (UNW)	7.00E-10	Vertical	Triaxial	6
	61.8-62.05	Sandy Clst. (UNW)	7.30E-08	Vertical	ASTM D-2434	3
41391	144.2-144.6	Silty SS (UNW)	3.20E-08	Horizontal	ASTM D-2434	1
	144.2-144.6	Silty SS (UNW)	4.10E-10	Vertical	ASTM D-2434	1
41791	53.1-53.6	Clayey SS (UNW)	1.00E-06	Vertical	ASTM D-2434	1
	53.1-53.6	Clayey SS (UNW)	6.60E-06	Horizontal	ASTM D-2434	1
	78.3-79.4	Clayst. (UNW)	1.80E-08	Vertical	ASTM D5084-90	3
			1.30E-07	Horizontal	ASTM D5084-90	3
	89.3-93.8	Sandy Siltst. (UNW)	7.10E-08	Vertical	ASTM D5084-90	3
			3.40E-06	Horizontal	ASTM D5084-90	3
	107.4-107.8	Silty Clst. (UNW)	1.40E-07	Vertical	ASTM D5084-90	3
	125.1-125.8	Silty Clst. (UNW)	3.30E-08	Horizontal	ASTM D5084-90	3
21293	58.4-63	Silty SS/Silty Clayst. (UNW)	2.00E-08	Vertical	ASTM D5084-90	3
			6.80E-07	Horizontal	ASTM D5084-90	3
	89.5-94.9	Silty Clst. (UNW)	1.40E-07	Vertical	ASTM D5084-90	3
			9.80E-08	Horizontal	ASTM D5084-90	3
	111.7-115.4	Silty SS (UNW)	9.90E-08	Vertical	ASTM D5084-90	3
			5.10E-08	Horizontal	ASTM D5084-90	3
	138.2-141.1	Clayey SS (UNW)	1.60E-07	Horizontal	ASTM D5084-90	3
	141.6-143.8	Sandst. (UNW)	8.80E-06	Vertical	ASTM D5084-90	3
21393	49.0-50.3	Silty Clst. (UNW)	1.30E-08	Vertical	ASTM D5084-90	3
			1.80E-08	Horizontal	ASTM D5084-90	3
	51.5-52.8	Sandy Siltst. (UNW)	3.80E-08	Vertical	ASTM D5084-90	3
	58.4-62.2	Silty Clst. (UNW)	2.10E-08	Vertical	ASTM D5084-90	3
	69.2-70.0	Clayey Siltst. (UNW)	1.40E-07	Vertical	ASTM D5084-90	3
			6.00E-07	Horizontal	ASTM D5084-90	3
	84.5-86.0	Silty Clst. (UNW)	3.00E-08	Vertical	ASTM D5084-90	3
	93.0-93.6	Silty Clst. (UNW)	5.00E-09	Horizontal	ASTM D5084-90	3

791

Table G-3
Rocky Flats Site Laboratory Permeameter Data
UNWEATHERED BEDROCK
(continued)

Well/Borehole	Interval (ft)	Lithology	Saturated Conductivity (cm/sec)	Direction	Method	Source
	94.3-95.9	Clayey Siltst. (UNW)	2.50E-07	Vertical	ASTM D5084-90	3
	97.4-97.8	Clayey Siltst. (UNW)	7.30E-08	Horizontal	ASTM D5084-90	3
	124.0-125.9	Clst (UNW)	4.20E-08	Vertical	ASTM D5084-90	3
	130.3-130.7	Clst (UNW)	3.60E-08	Horizontal	ASTM D5084-90	3
	145.1-157.4	Clayey SS (UNW)	4.20E-08	Vertical	ASTM D5084-90	3
			1.20E-08	Horizontal	ASTM D5084-90	3
	73.0-76.6	Clayey SS/Silty SS (UNW)	1.30E-08	Vertical	ASTM D5084-90	3
			7.50E-09	Horizontal	ASTM D5084-90	3
	105.2-106.7	Clst (UNW)	1.30E-07	Vertical	ASTM D5084-90	3
			2.00E-08	Horizontal	ASTM D5084-90	3
	120.3-121.8	Sandy Clst./Silty SS (UNW)	4.70E-08	Vertical	ASTM D5084-90	3
			2.90E-07	Horizontal	ASTM D5084-90	3
	124.5-127.7	Clst (UNW)	1.30E-07	Vertical	ASTM D5084-90	3
			4.70E-08	Horizontal	ASTM D5084-90	3
	74.8-76.2	Clst (UNW)	9.10E-08	Vertical	ASTM D5084-90	2
	109.8-113.0	Silty Clst (UNW)	5.30E-08	Vertical	ASTM D5084-90	2
			1.40E-08	Horizontal	ASTM D5084-90	2
	128.9-129.9	Clst (UNW)	2.70E-09	Vertical	ASTM D5084-90	2
			4.70E-07	Horizontal	ASTM D5084-90	2
	146.6-147.5	Clayey SS/Sandy Clst (UNW)	9.10E-08	Vertical	ASTM D5084-90	2
			3.10E-07	Horizontal	ASTM D5084-90	2
	159.0-163.8	Clst (UNW)	7.70E-08	Vertical	ASTM D5084-90	2
			3.00E-07	Horizontal	ASTM D5084-90	2
21693	63.4-68.7	Silty SS/Sandy Clst. (UNW)	7.60E-08	Vertical	ASTM D5084-90	2
			2.60E-08	Horizontal	ASTM D5084-90	2

Table G-3
Rocky Flats Site Laboratory Permeameter Data
UNWEATHERED BEDROCK
(continued)

Well/Borehole	Interval (ft)	Lithology	Saturated Conductivity (cm/sec)	Direction	Method	Source
	83.6-84.9	Silty Clst/Clayey SS (UNW)	3.20E-07	Vertical	ASTM D5084-90	2
	94.0-101.8	Clst (UNW)	2.00E-08	Vertical	ASTM D5084-90	2
	106.3-108.0	Silty Clst (UNW)	4.30E-08	Vertical	ASTM D5084-90	2
			3.20E-08	Horizontal	ASTM D5084-90	2
	119.9-143.7	Clst (UNW)	1.90E-08	Vertical	ASTM D5084-90	2
			1.00E-07	Horizontal	ASTM D5084-90	2
	151.8-154.7	Silty Clst (UNW)	2.40E-07	Vertical	ASTM D5084-90	2
			2.10E-07	Horizontal	ASTM D5084-90	2
		Geometric Mean	**4.85E-07**			
		Minimum	**4.10E-10**			
		Maximum	**8.80E-06**			

Source

1 - Advanced Terra Testing (Unpublished data)

2 - French Drain Geotechnical Investigation, October 5, 1990

3 - OU2 Phase RFI/RI Report

4 - Huntingdon Engineering and Environmental, Geotechnical Engineering Study, Sewer Line Installation (Job No. 1 527 94), August 19, 1994

5 - Fedors, R. and J. W. Warner, 1993, Characterization of Physical and Hydraulic Properties of Surficial Materials and Groundwater/Surface Water Interaction Study, Colorado State University Groundwater Technical Report No.21

6 - Merrick and Company, 1991, Preliminary Conceptual Design Document for Sanitary Landfill, BA 58071 HS, April 1991

Table G-4
Summary of Well Yield and Related Data for the Rocky Flats Site

Well No.	Date	Test Duration (hours)	Test Type	Initial Saturated Thickness (ft)	Maximum Drawdown (ft)	Percent Drawdown	Estimated Well Yield (gpm)	Specific Capacity (gpm/ft)	Lithology	Source
6286	5/22/92	2.22	constant head	10.44	8.19	78.45	0.026	3.2E-3	KaKlss(w)	1
287	6/15/87	2.20	constant rate	7.67	11.61	151.37	0.07	6.0E-3	Qc (?)	2
487	5/21/92	1.66	constant head	12.00	9.92	82.67	0.044	4.4E-3	Qc	1
B400189	7/20/89	4.40	constant rate	27.53	21.01	76.32	0.68	32.4E-3	Qrf	3
B400489	7/28/89	6.00	constant rate	31.66	1.72	5.43	12.06	7.0E+0	Qrf	3
B201189	8/18/89	6.80	constant rate	26.44	17.50	66.19	0.73	41.7E-3	Qc	3
B402189	8/8/89	8.00	constant rate	12.00	0.78	6.50	6.14	7.9E+0	KaNo.1ss(w)	3
B304289	9/13/89	1.00	constant rate		73.44		0.21		KaKlss(u)	3
20291	6/23/92	32.80	constant rate	10.87	4.58	42.13	0.35	76.4E-3	Qrf	4
20691	5/20/92	137.80	constant rate	12.04	2.72	22.59	0.056	20.6E-3	Qrf	4
20891	4/28/92	143.90	constant rate	36.87	7.00	18.99	1.62	231.4E-3	KaNo.1ss(w)	4
37191	5/21/92	1.98	constant head	17.25	14.53	84.23	0.055	3.8E-3	Qc	1
24193		24.00	constant rate	23.00	7.80	33.91	3	384.6E-3	KaNo.1ss(w)	5
O-3	12/18/91	14.80	constant rate	3.37	0.60	17.80	1.56	2.6E+0	Qvf	6

Source
1 - EG&G, 1992, 881 Hillside Well Production Test Results (unpublished data)
2 - 881 Hillside Response to EPA Comments, February, 1989
3 - R. F. Weston (1991), Revised Background Pumping Tests, November, 1991
4 - EG&G, 1992, Phase II RFI/RI Aquifer Test Report, November 19, 1992
5 - Reference not included in the original report
6 - Doty and Associates, 1992, Evaluation of O-3 Pumping Test, Woman Creek Alluvium, January 1992

Key
KaKlss(w) = Undifferentiated Arapahoe/Laramie weathered bedrock sandstones other than Arapahoe No. 1 sandstones
KaNo.1ss(w) = Weathered bedrock Arapahoe No. 1 standstones
KaKlss(u) = Undifferentiated Arapahoe/Laramie unweathered bedrock sandstones
Qvf = Quaternary valley-fill alluvium
Qrf = Quaternary Rocky Flats Alluvium
Qc = Quaternary colluvium

79

Methodology

Saturated hydraulic conductivity values at the Rocky Flats site have been measured using a number of different hydraulic test methods, including pumping well tests, slug tests, recovery tests, and laboratory permeameter tests. Regression analyses were conducted to determine the linear relationships between hydraulic conductivity values measured by different test methods. Regression analysis was also conducted to determine the correlation between horizontal and vertical saturated hydraulic conductivity values measured using laboratory permeameter tests. The following procedures were used to conduct the regression analyses:

- Only useable saturated hydraulic conductivity values from wells with multiple test results (i.e., pumping, slug, and/or recovery) were used for the regression analysis (Tables G-5 through G-6).
- If more than one useable value for a single test at any given well existed, the values were averaged.
- For aquifer tests, slug test and recovery test data were plotted as a function of pumping well test data.
- Hydraulic conductivity data were divided into unconsolidated surficial deposits (Qrf, Qc, and Qvf) and bedrock (weathered and unweathered) geologic units. For unconsolidated surficial deposits, pumping test data were compared to slug and recovery test data. Due to the absence of bedrock recovery data, the regression analysis for bedrock aquifer tests was limited to a pumping test and slug test data caparison.
- When comparing laboratory permeameter hydraulic conductivity data, only horizontal and vertical test values from the same sample were used for the regression analysis (Table G-6). Only bedrock values met this criteria and, therefore, were used for this analysis.

Regression Analysis Results

Unconsolidated Surficial Deposits Aquifer Tests – Figure G-1 displays a linear relationship (r^2=0.72) between the pump test and slug test data. The regression equation appears to be a good fit only at the lower values (< 5 X 10^{-3} cm/sec), with the greatest amount of error occurring at the higher values. Conversely, Figure G-2 displays a significantly higher degree of correlation (r^2=0.92) between pump test data and bailer\recovery test data, indicating a stronger linear relationship between these variables.

195

Bedrock Aquifer Tests – Figure G-3 displays poor correlation (r^2=0.001) between pump test and slug test data measured in bedrock lithologies. No linear relationship is indicated between these data.

Permeameter Test Data – Figure G-4 displays some degree of linear correlation (r^2=0.72) between horizontal and vertical saturated hydraulic conductivity values.

Regression outputs are presented in Tables G-5 and G-6 for the aquifer test and laboratory permeameter test regressions, respectively.

196

Table G-5
Regression Output—Aquifer Test Data

Unconsolidated Surficial Deposits

Well Location	Pump Test Values (cm/sec)	Slug Test Values (cm/sec)	Predicted Test Values (cm/sec)
3586	3.13E-05	1.40E-05	1.11E-04
6986	1.40E-04	1.74E-04	1.88E-04
B400189	1.56E-04	3.60E-06	1.99E-04
20691	2.32E-04	3.86E-04	2.52E-04
20591	3.88E-04	2.90E-04	3.63E-04
1787	4.19E-04	6.00E-05	3.85E-04
B201189	4.90E-04	9.25E-06	4.35E-04
20291	8.46E-04	1.32E-03	6.87E-04
20491	3.34E-03	2.90E-03	2.45E-03
B405789	2.00E-02	2.20E-02	1.42E-02
B400489	2.00E-02	6.40E-03	1.42E-02

Regression Statistics	
R Squared	0.71676739
Standard Error	0.00369145
Observations	11

	Coefficients	*Standard Error*
Intercept	8.85564E-05	0.001274363
Slope	0.707625533	0.148273913

Predicted y = x*0.707+8.9E-05

Well Location	Pump Test Values (cm/sec)	Bailer/Recovery Test Values (cm/sec)	Predicted Test Values (cm/sec)
B400189	1.56E-04	2.00E-04	1.05E-03
B201189	4.90E-04	3.86E-04	1.48E-03
O-3	1.70E-02	3.00E-02	2.25E-02
B405789	2.00E-02	3.00E-02	2.64E-02
B400489	2.00E-02	2.17E-02	2.64E-02
O-1	2.35E-02	2.80E-02	3.08E-02
O-2	2.45E-02	3.00E-02	3.21E-02
I-1	2.80E-02	3.70E-02	3.66E-02

Regression Statistics	
R Squared	0.924384733
Standard Error	0.004193406
Observations	8

	Coefficients	*Standard Error*
Intercept	0.000852424	0.002895832
Slope	1.275258087	0.148902101

Predicted y = x*1.28+0.00085

Table G-5
Regression Output—Aquifer Test Data

Bedrock

Well Location	Pump Test Values (cm/sec)	Slug Test Values (cm/sec)	Predicted Test Values (cm/sec)
3086	8.60E-07	2.39E-05	4.03E-04
3486	3.10E-06	1.10E-05	4.03E-04
6286	1.40E-05	5.70E-06	4.04E-04
3687	1.70E-04	1.62E-03	4.08E-04
20991	1.69E-03	8.13E-04	4.53E-04
20891	1.99E-03	5.59E-05	4.62E-04

Regression Statistics	
Multiple R	0.041031581
R Squared	0.001683591
Adjusted R Square	-0.24789551
Standard Error	0.000746335
Observations	6

	Coefficients	*Standard Error*
Intercept	0.000403306	0.000382119
Slope	0.029414149	0.358131187

Predicted y = x*0.029+4E-04

798

Table G-6
Regression Output—Laboratory Permeameter Data

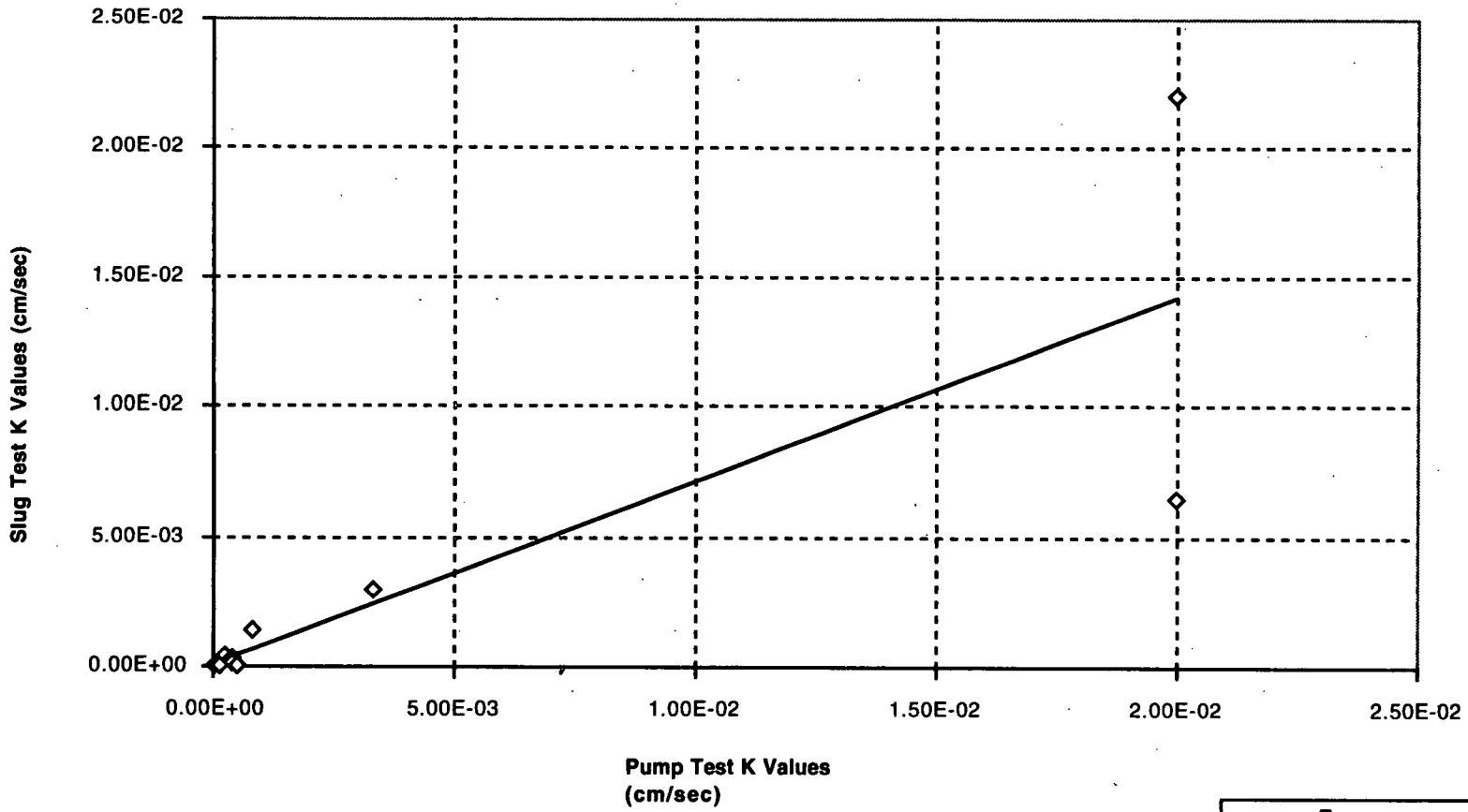
Well/Borehole Location	Interval (ft)	Horizontal K Values (cm/sec)	Vertical K Values (cm/sec)	Predicted Test Values (cm/sec)
21393	73.0-76.6	7.50E-09	1.30E-08	3.72E-08
21393	145.1-157.4	1.20E-08	4.20E-08	3.77E-08
21393	109.8-113.0	1.40E-08	5.30E-08	3.79E-08
21393	49.0-50.3	1.80E-08	1.30E-08	3.84E-08
21393	105.2-106.7	2.00E-08	1.30E-07	3.86E-08
21693	63.4-68.7	2.60E-08	7.60E-08	3.93E-08
21593	40.9-42.2	3.20E-08	2.70E-09	4.00E-08
41391	144.2-144.6	3.20E-08	4.10E-10	4.00E-08
21693	106.3-108.0	3.20E-08	4.30E-08	4.00E-08
21393	124.5-127.7	4.70E-08	1.30E-07	4.18E-08
21293	111.7-115.4	5.10E-08	9.90E-08	4.22E-08
21293	89.5-94.9	9.80E-08	1.40E-07	4.77E-08
21693	119.9-143.7	1.00E-07	1.90E-08	4.80E-08
41791	78.3-79.4	1.30E-07	1.80E-08	5.15E-08
21693	151.8-154.7	2.10E-07	2.40E-07	6.08E-08
21193	69.0-70.6	2.30E-07	1.40E-09	6.31E-08
21393	120.3-121.8	2.90E-07	4.70E-08	7.01E-08
21393	159.0-163.8	3.00E-07	7.70E-08	7.13E-08
21393	146.6-147.5	3.10E-07	9.10E-08	7.24E-08
21393	128.9-129.9	4.70E-07	2.70E-09	9.11E-08
21393	69.2-70.0	6.00E-07	1.40E-07	1.06E-07
21293	58.4-63	6.80E-07	2.00E-08	1.16E-07
41791	89.3-93.8	3.40E-06	7.10E-08	4.33E-07
41791	53.1-53.6	6.60E-06	1.00E-06	8.06E-07

Regression Statistics	
R Squared	0.71882511
Standard Error	1.08521E-07
Observations	24

	Coefficients	*Standard Error*
Intercept	3.62963E-08	2.3865E-08
Slope	0.116568792	0.015543456

Predicted y = x*0.117+3.63E-08

Key
K = Saturated Hydraulic Conductivity
Regression performed on bedrock samples



Slug Test Value

Predicted Value

EG&G ROCKY FLATS

Rocky Flats Site, Golden, Colorado

Unconsolidated Surficial Deposits Saturated Hydraulic Conductivity (K) Values
Pump Test vs. Slug Test Regression Analysis
R Squared = 0.72

Hydrogeologic Characterization Report

April 1995

Figure G-1

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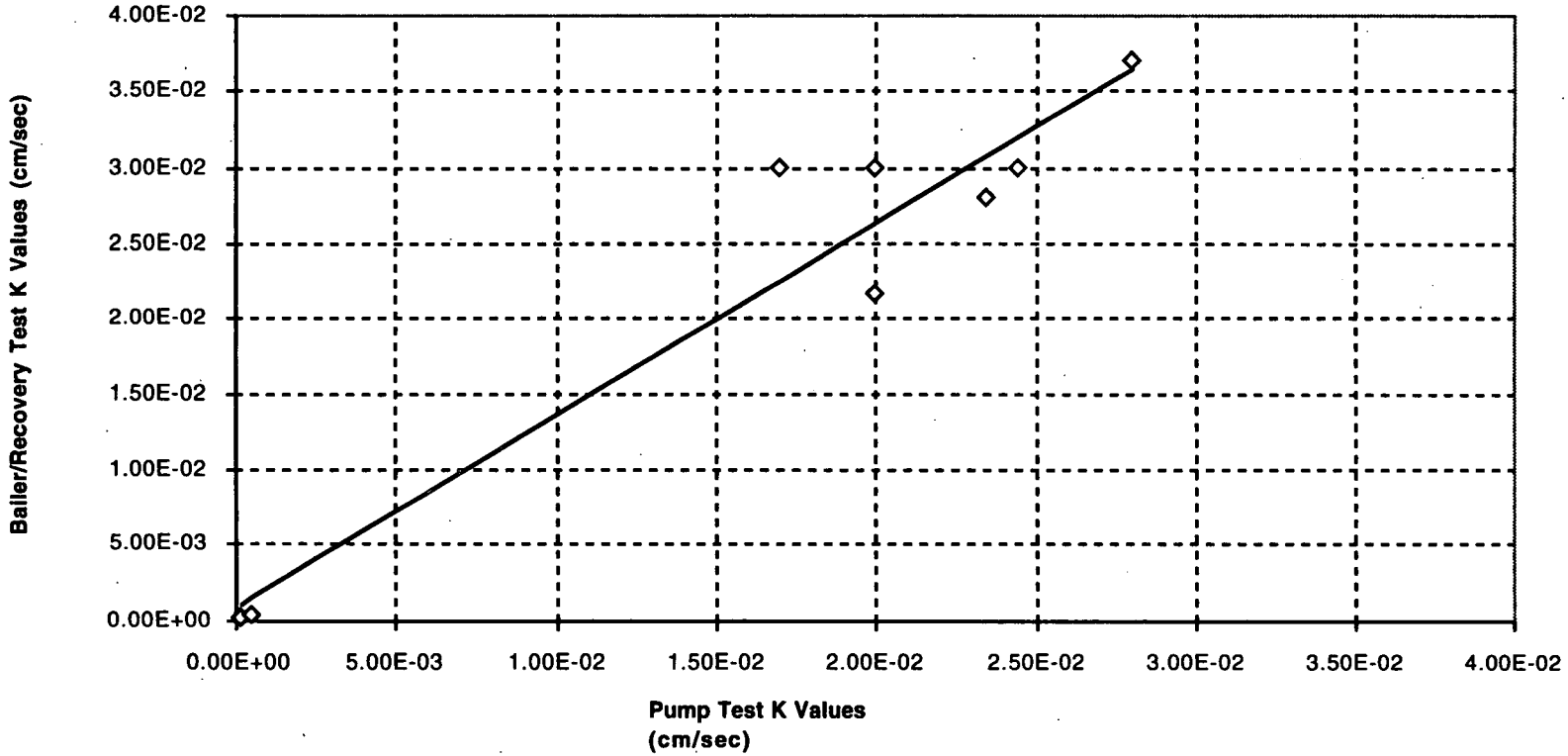

◇ Bailer/Recovery Test

—— Predicted Value

EG&G ROCKY FLATS

Rocky Flats Site, Golden, Colorado

Unconsolidated Surficial Deposits Saturated Hydraulic Conductivity (K) Values Pump Test vs. Bailer Recovery Test Regression Analysis R Squared = 0.092

Hydrogeologic Characterization Report

April 1995	Figure G-2

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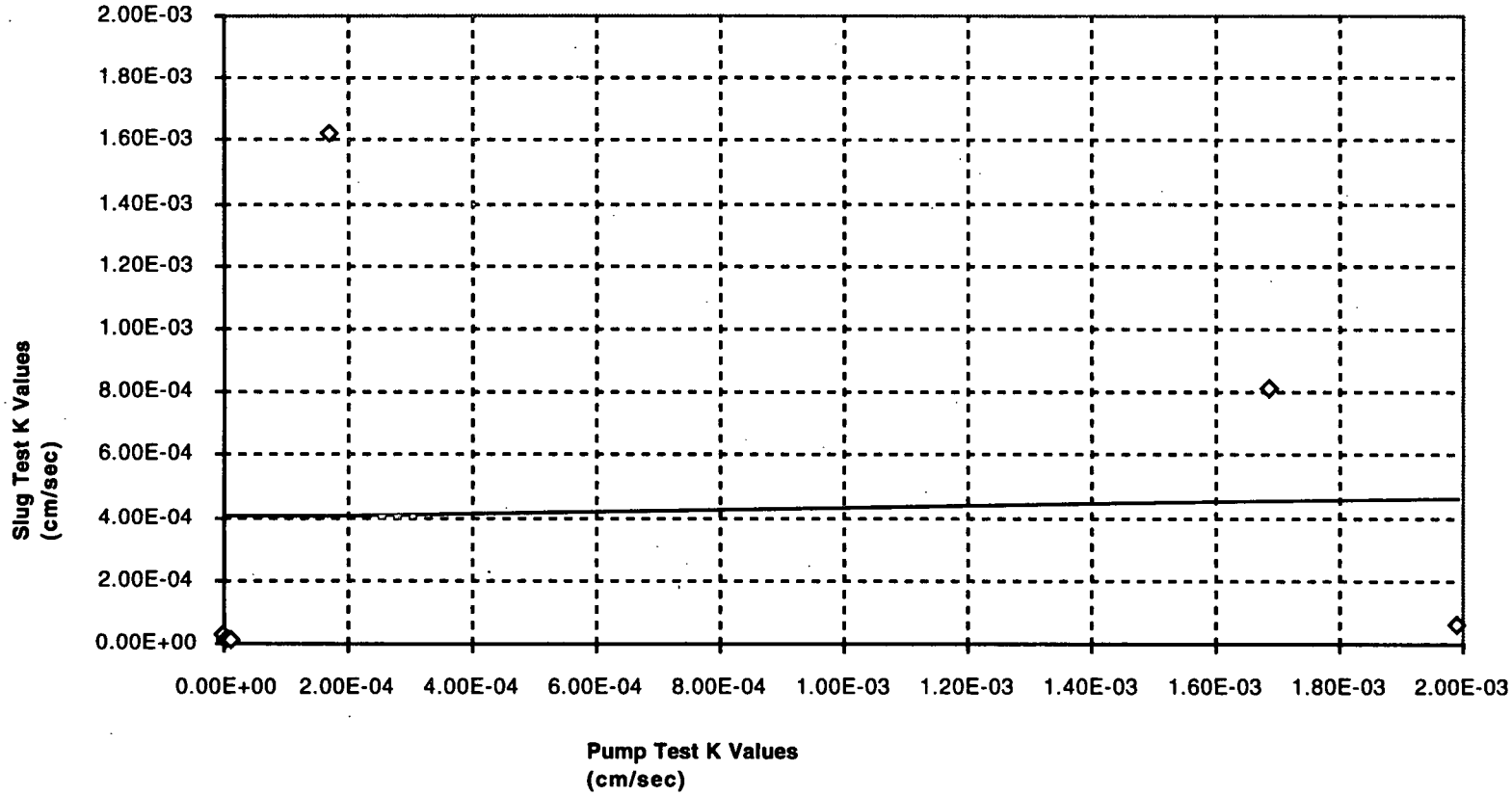
801



◇ Slug Test Value

—— Predicted Value

EG&G ROCKY FLATS

Rocky Flats Site, Golden, Colorado

Bedrock Saturated Hydraulic Conductivity (K) Values
Pump Test vs. Slug Test Regression Analysis
R Squared = 0.001

Hydrogeologic Characterization Report

April 1995	Figure G-3

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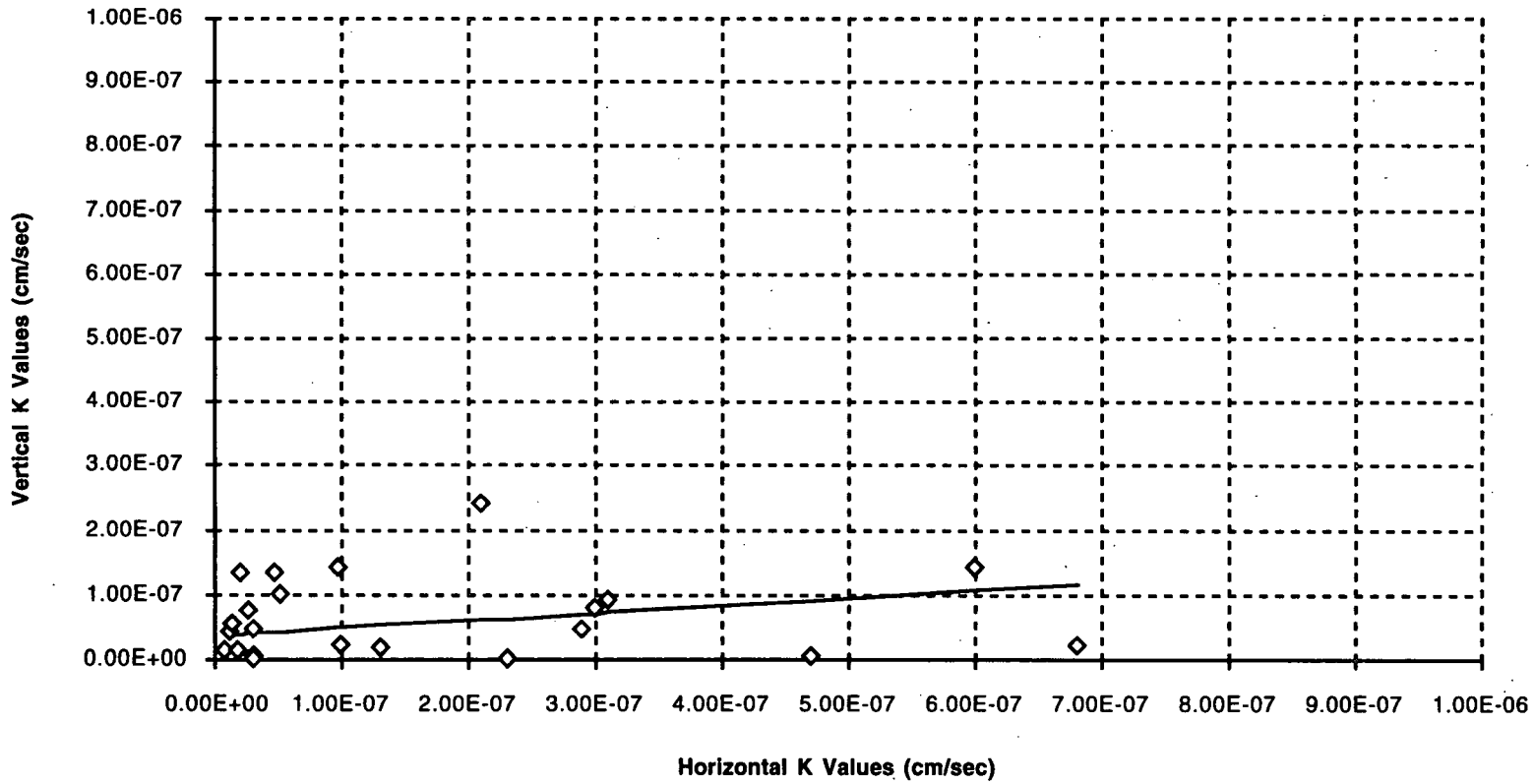
802



◇ Vertical K

—— Predicted Value

EG&G ROCKY FLATS

Rocky Flats Site, Golden, Colorado

Permeameter Tested Saturated Hydraulic Conductivity (K) Values Horizontal K vs. Vertical K Regression Analysis R Squared = 0.72

Hydrogeologic Characterization Report

April 1995	Figure G-4

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803

Methodology

Average linear groundwater flow (seepage) velocities represent advective transport rates for dissolved constituents. Seepage velocities for unconsolidated surficial deposits (Qrf, Qc, and Qvf), weathered bedrock (KaKlclst [w], KaKlslt [w], KaKlss [w], and Ka No.1ss), and unweathered (KaKlclst [u], KaKlslt [u], and KaKlss [u]) bedrock units were calculated along several flowpaths at the Rocky Flats site (Figures G-5 through G-8). Downward (vertical) seepage velocities were also estimated for the LHSU. Input parameters used for the seepage velocity (v) calculations include saturated hydraulic conductivity (K), effective porosity (ϕ), and the hydraulic gradient (dh/dl). Seepage velocities were calculated assuming steady-state, one-dimensional flow and full saturation. Hydraulic conductivity was assumed to be homogeneous and isotropic. The following expression was used to calculate seepage velocities:

Darcy flux (q) = K dh/dl

$v = q/\phi$

Geometric mean saturated hydraulic conductivity values (Table G-2) were used to calculate seepage velocities for each lithographic unit. Quantitative measurements of effective porosity for the Rocky Flats site were not available. However, Hurr (1976) reports estimated effective porosity values of 0.1 for the Rocky Flats Alluvium and 0.1 to 0.5 for the Arapahoe formation. For a conservative estimate, an effective porosity value of 0.1 was used to calculate seepage velocities. Lateral hydraulic gradients were determined by calculating the change in (hydraulic) head (dh) along the flowpath distance (dl) between two points. The lateral hydraulic gradients for the unconsolidated surficial deposits were based on the 2nd Quarter Potentiometric Surface Maps (Plates 2 and 4). The flowpaths chosen to calculate these hydraulic gradients are presented in Figure G-5. Hydraulic gradients for weathered bedrock were calculated along the flowpaths presented in Figures G-6 and G-7. Although no potentiometric surface maps for unweathered bedrock are available, hydraulic gradients were calculated from well pairs completed in unweathered bedrock by assuming a west to east component of flow in the LHSU. These flow paths do not correspond to those identified in the Groundwater Geochemistry Report (EG&G, 1995b) which were used to delineate variations in groundwater geochemistry. Average static head values at each LHSU well location were estimated using the single-well hydrographs (Appendix C). The respective head differences were calculated along each of the flowpaths presented in Figure G-8.

Downward seepage velocities were also calculated for the LHSU. Vertical hydraulic gradients between LHSU wells were calculated using the methods described in

804

Appendix D. Due to anisotropy in the LHSU, the geometric mean (5.83E-08 cm/sec) for vertical saturated hydraulic conductivity tests (Table G-3) was used for calculating downward seepage velocities.

Table G-7 summarizes seepage velocity calculations. Figure G-9 compares the mean and range of seepage velocities calculated for each geologic unit.

805

Table G-7
Average Linear Groundwater Flow Velocity

Area/Geologic Unit	Flow Path	Hydraulic Gradient (ft/ft)	Hydraulic Conductivity (cm/sec)	Effective Porosity[4]	v cm/sec	v ft/yr
Qvf						
Unnamed Tributary	A - A'[1]	0.03	2.54E-03	0.1	7.62E-04	785
Upper Rock Creek	B - B'	0.05	2.54E-03	0.1	1.27E-03	1308
Lower Rock Creek	C - C'	0.02	2.54E-03	0.1	5.08E-04	523
North Walnut Creek	D - D'	0.03	2.54E-03	0.1	7.62E-04	785
Upper South Walnut Creek	E - E'	0.05	2.54E-03	0.1	1.27E-03	1308
Lower South Walnut Creek	F - F'	0.03	2.54E-03	0.1	7.62E-04	785
Lower Walnut Creek	G - G'	0.02	2.54E-03	0.1	5.08E-04	523
North Woman Creek	H - H'	0.03	2.54E-03	0.1	7.62E-04	785
South Woman Creek	I - I'	0.03	2.54E-03	0.1	7.62E-04	785
Woman Creek (OU5)	J - J'	0.06	2.54E-03	0.1	1.52E-03	1570
Upper Smart Ditch	K - K'	0.04	2.54E-03	0.1	1.02E-03	1046
Lower Smart Ditch	L - L'	0.02	2.54E-03	0.1	5.08E-04	523
Lower Woman Creek	M - M'	0.02	2.54E-03	0.1	5.08E-04	523
					Range[5]	**523 to 1570**
					Mean[5]	**865**
Qc						
OU2 (Woman Creek Drainage)	N - N'[1]	0.14	9.33E-05	0.1	1.31E-04	135
OU2 (North Walnut Creek Drainage)	O - O'	0.23	9.33E-05	0.1	2.15E-04	221
Unnamed Tribuary	P - P'	0.18	9.33E-05	0.1	1.68E-04	173
OU1 (881 Hillside)	Q - Q'	0.13	9.33E-05	0.1	1.21E-04	125
Upper Rock Creek	R - R'	0.18	9.33E-05	0.1	1.68E-04	173
Lower Rock Creek	S - S'	0.23	9.33E-05	0.1	2.15E-04	221
					Range[5]	**125 to 221**
					Mean[5]	**175**

806

Table G-7
Average Linear Groundwater Flow Velocity

Area/Geologic Unit	Flow Path	Hydraulic Gradient (ft/ft)	Hydraulic Conductivity (cm/sec)	Effective Porosity[4]	v cm/sec	v ft/yr
Qrf						
NW Corner RFS	T - T'[1]	0.015	2.10E-04	0.1	3.15E-05	32
North of West Spray Field	U - U'	0.014	2.10E-04	0.1	2.94E-05	30
North Of OU7	V - V'	0.012	2.10E-04	0.1	2.52E-05	26
West Spray Field	W - W'	0.008	2.10E-04	0.1	1.68E-05	17
Industrial Area	X - X'	0.017	2.10E-04	0.1	3.57E-05	37
Medial Paleoscour (OU2)	Y - Y'	0.015	2.10E-04	0.1	3.15E-05	32
Ugradient of Antelope Springs	Z - Z'	0.012	2.10E-04	0.1	2.52E-05	26
					Range[5]	**17 to 37**
					Mean[5]	**29**
KaKlclst(w)						
OU4 North Walnut Creek Drainage	AA - AA'[2]	0.18	8.82E-07	0.1	1.59E-06	1.64
OU4-On Pediment near Solar Ponds	BB - BB'	0.02	8.82E-07	0.1	1.76E-07	0.18
OU7-East Landfill Pond Drainage	CC - CC'	0.16	8.82E-07	0.1	1.41E-06	1.45
OU7-East Landfill Pond Embankment	DD - DD'	0.25	8.82E-07	0.1	2.21E-06	2.27
OU7 Landfill	EE - EE'	0.02	8.82E-07	0.1	1.76E-07	0.18
					Range[5]	**0.18 to 2.27**
					Mean[5]	**1.14**
KaKlslt(w)						
OU4 North Walnut Creek Drainage	AA - AA'[2]	0.18	2.88E-05	0.1	5.18E-05	53
OU4-On Pediment near Solar Ponds	BB - BB'	0.02	2.88E-05	0.1	5.76E-06	6
OU7-East Landfill Pond Drainage	CC - CC'	0.16	2.88E-05	0.1	4.61E-05	47
OU7-East Landfill Pond Embankment	DD - DD'	0.25	2.88E-05	0.1	7.20E-05	74
OU7 Landfill	EE - EE'	0.02	2.88E-05	0.1	5.76E-06	6
					Range[5]	**6 to 74**
					Mean[5]	**37**

807

Table G-7
Average Linear Groundwater Flow Velocity

Area/Geologic Unit	Flow Path	Hydraulic Gradient (ft/ft)	Hydraulic Conductivity (cm/sec)	Effective Porosity[4]	v cm/sec	v ft/yr
KaKlss(w)						
OU4 North Walnut Creek Drainage	AA - AA'[2]	0.18	3.89E-05	0.1	7.00E-05	72
OU4-On Pediment near Solar Ponds	BB - BB'	0.02	3.89E-05	0.1	7.78E-06	8
OU7-East Landfill Pond Drainage	CC - CC'	0.16	3.89E-05	0.1	6.22E-05	64
OU7-East Landfill Pond Embankment	DD - DD'	0.25	3.89E-05	0.1	9.73E-05	100
OU7 Landfill	EE - EE'	0.02	3.89E-05	0.1	7.78E-06	8
					Range[5]	**8 to 100**
					Mean[5]	**50**
KaNo.1ss(w)						
OU4 North Walnut Creek Drainage	AA - AA'[2]	0.18	7.88E-04	0.1	1.42E-03	1461
OU4-On Pediment near Solar Ponds	BB - BB'	0.02	7.88E-04	0.1	1.58E-04	162
OU7-East Landfill Pond Drainage	CC - CC'	0.16	7.88E-04	0.1	1.26E-03	1299
OU7-East Landfill Pond Embankment	DD - DD'	0.25	7.88E-04	0.1	1.97E-03	2029
OU7 Landfill	EE - EE'	0.02	7.88E-04	0.1	1.58E-04	162
					Range[5]	**162 to 2029**
					Mean[5]	**1023**
KaKlclst(u)						
Southwest Buffer Zone	5486/B304289[3]	0.03	2.48E-07	0.1	7.44E-08	0.077
South Buffer Zone	B304289/B304989	0.03	2.48E-07	0.1	7.44E-08	0.077
Southeast Buffer Zone	5486/B304989	0.03	2.48E-07	0.1	7.44E-08	0.077
East-Central Buffer Zone	1887/B217289	0.03	2.48E-07	0.1	7.44E-08	0.077
					Range[5]	**NA**
					Mean[5]	**0.077**
KaKlslt(u)						
Southwest Buffer Zone	5486/B304289[3]	0.03	1.59E-07	0.1	4.77E-08	0.049
South Buffer Zone	B304289/B304989	0.03	1.59E-07	0.1	4.77E-08	0.049
Southeast Buffer Zone	5486/B304989	0.03	1.59E-07	0.1	4.77E-08	0.049
East-Central Buffer Zone	1887/B217289	0.03	1.59E-07	0.1	4.77E-08	0.049
					Range[5]	**NA**
					Mean[5]	**0.049**

808

Table G-7
Average Linear Groundwater Flow Velocity

Area/Geologic Unit	Flow Path	Hydraulic Gradient (ft/ft)	Hydraulic Conductivity (cm/sec)	Effective Porosity[4]	v cm/sec	v ft/yr
KaKlss(u)						
Southwest Buffer Zone	5486/B304289[3]	0.03	5.77E-07	0.1	1.73E-07	0.178
South Buffer Zone	B304289/B304989	0.03	5.77E-07	0.1	1.73E-07	0.178
Southeast Buffer Zone	5486/B304989	0.03	5.77E-07	0.1	1.73E-07	0.178
East-Central Buffer Zone	1887/B217289	0.03	5.77E-07	0.1	1.73E-07	0.178
					Range[5]	**NA**
					Mean[5]	**0.178**
LHSU: Vertical v						
Well Cluster 24	B207089/B207189[6]	0.07	5.83E-08	0.1	4.08E-08	0.042
Well Cluster 24	B207189/4187	0.56	5.83E-08	0.1	3.26E-07	0.336
Well Cluster 24	B207089/4187	0.24	5.83E-08	0.1	1.40E-07	0.144
Well Cluster 53	46692/46792	0.65	5.83E-08	0.1	3.79E-07	0.390
Well Cluster 53	46792/46892	0.64	5.83E-08	0.1	3.73E-07	0.384
Well Cluster 53	46692/46892	0.65	5.83E-08	0.1	3.79E-07	0.390
Well Cluster 55	P208889/3987	0.05	5.83E-08	0.1	2.92E-08	0.030
					Range[5]	**0.03 to 0.39**
					Mean[5]	**0.299**

Notes

[1] Hydraulic gradients for Qrf, Qc, and Qvf were based on the 2nd Quarter Potentiometric Surface Map of Unconsolidated Surficial Deposits (Plate 2). Refer to Figure G-5 for approximate locations of flow paths.

[2] Hydraulic gradients for weathered bedrock units were based on potentiometric surface maps of weathered bedrock. Refer to Figures G-6 and G-7 for approximate locations of flow paths.

[3] Hydraulic gradients for unweathered bedrock units were based on potentiometric data from LHSU well pairs. Refer to Figure G-8 for aprroximate locations of flow paths.

[4] Effective porosity value reported by Hurr (1976).

[5] Range and mean v values reported in ft/yr.

[6] Vertical Hydraulic gradients were based on potentiometric data and well completion details presented in Well-Cluster Hydrographs 24, 53, and 55.

Key

v = Average Linear Groundwater Flow Velocity

Na = Not Applicable

Qvf = Quaternary valley-fill alluvium

Qrf = Quaternary Rocky Flats Alluvium

Qc = Quaterary colluvium

KaKlss(w) = Undifferentiated Araphoe/Laramie weathered bedrock sandstones other than Araphoe No. 1 sandstones

KaKlslt(w) = Undifferentiated Arapahoe/Laramie weathered bedrock siltstones

KaKlclst(w) = Undifferentiated Arapahoe/Laramie weathered bedrock claystones

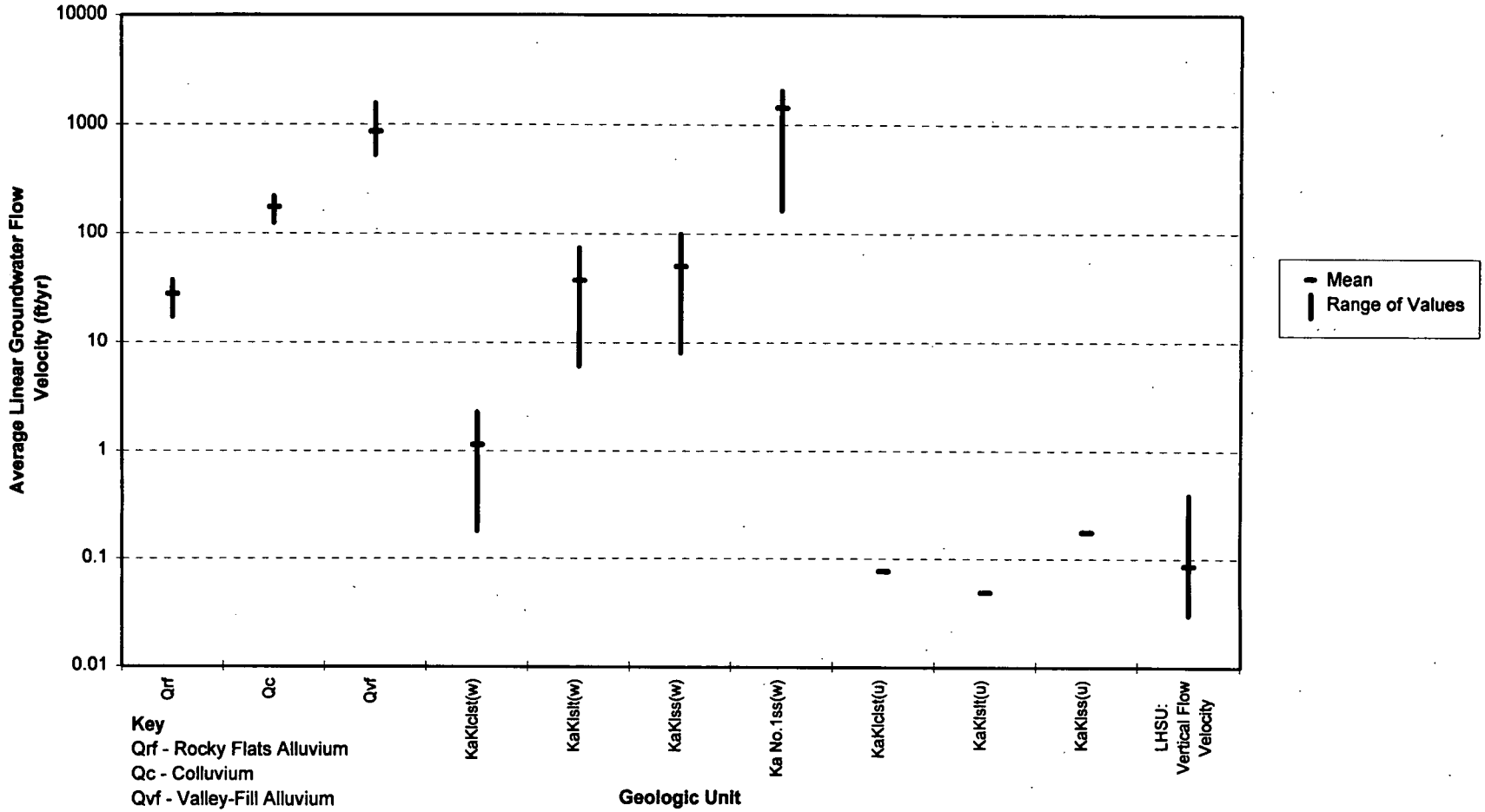
KaNo.1ss(w) = Weathered bedrock Arapahoe No.1 sandstone

KaKlss(u) = Undifferentiated Arapahoe/Laramie unweathered bedrock sandstones

KaKlslt(u) = Undifferentiated Arapahoe/Laramie unweathered bedrock siltstones

KaKlclst(u) = Undifferentiated Arapahoe/Laramie unweathered bedrock claystones

809



Key
Qrf - Rocky Flats Alluvium
Qc - Colluvium
Qvf - Valley-Fill Alluvium
KaKlclst(w) - Weathered Claystone
KaKlslt(w) - Weathered Siltstone
KaKlss(w) - Weathered Sandstone
KaNo.1ss(w) - Weathered Arapahoe No. 1 Sandstone
KaKlclst(u) - Unweathered Claystone
KaKlslt(u) - Unweathered Siltstone
KaKlss(u) - Unweathered Sandstone
LHSU - Lower Hydrostratigraphic Unit

EG&G ROCKY FLATS
Rocky Flats Site, Golden, Colorado

Comparison of Average Linear Groundwater Flow Velocities by Geologic Unit

Hydrogeologic Characterization Report

April 1995 | Figure G-9

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814

Methodology

The following discussion presents an assessment of the relative importance of diffusion and advection in the transport of contaminants in different lithologic units at the Rocky Flats site. The methodology used to make the assessment is presented with a brief summary of the importance of diffusive and advective transport in different lithologic units at Rocky Flats. For this discussion advective transport is considered to be the sum of advection and mechanical dispersion.

The importance of diffusion and advection in contaminant transport can be assessed based on the average linear groundwater velocity, grain size, and diffusion coefficient of the chemical constituent. Fetter (1993) calculates Peclet numbers to determine if advective or diffusive processes control the movement of contamination. The Peclet number is given as

$$P_e = V_x d / D_d$$

where

V_x= average linear velocity

d = median grain size

D_d= diffusion coefficient

For Peclet numbers less than 0.02, diffusion processes control the movement of contaminants; for Peclet numbers greater than 6, advective transport controls contaminant migration (Fetter, 1993). Freeze and Cherry (1979) use 1E-06 cm^2/s as a typical value for the diffusion coefficient (D_d) for most analytes. By using a single value for the diffusion coefficient, the process that controls contaminant transport becomes a function of grain size and the average linear velocity of groundwater. Figure G-10 shows a graph of average linear velocity versus grain size for P_e=0.2 and P_e=6.0. Groundwater contaminant transport in the area above the line P_e=6.0 is controlled by advective processes. Diffusion controls the rate of contaminant migration (in the area below the line P_e=0.2). Contaminant migration is influenced by both advection and diffusion in the area between these lines. The values used to calculate the lines representing P_e=0.2 and P_e=6.0 are shown in Table G-8.

The relative importance of diffusion and advection in contaminant transport can be determined by comparing the estimated average linear groundwater velocities and grain sizes for the different units at Rocky Flats using this type of figure. Figure G-10 shows the ranges of grain size and average linear groundwater velocities for the unconsolidated units at Rocky Flats.

815

Average linear groundwater velocities (Table G-7) were used to evaluate the importance of advection and diffusion in different lithologic units. In the Rocky Flats Alluvium, both advective and diffusive processes influence contaminant transport, with advection having the greatest influence in coarse-grained deposits and diffusion becoming more important in fine-grained deposits. Valley-fill alluvium is relatively coarse grained, and average linear groundwater velocities in the unit are generally higher. As a result, contaminant transport is largely controlled by advection in Valley-fill alluvium (Figure G-11). Colluvium is generally more fine grained than Rocky Flats Alluvium or valley-fill alluvium and contaminant transport is influenced by diffusion and advection in the colluvial deposits (Figure G-11).

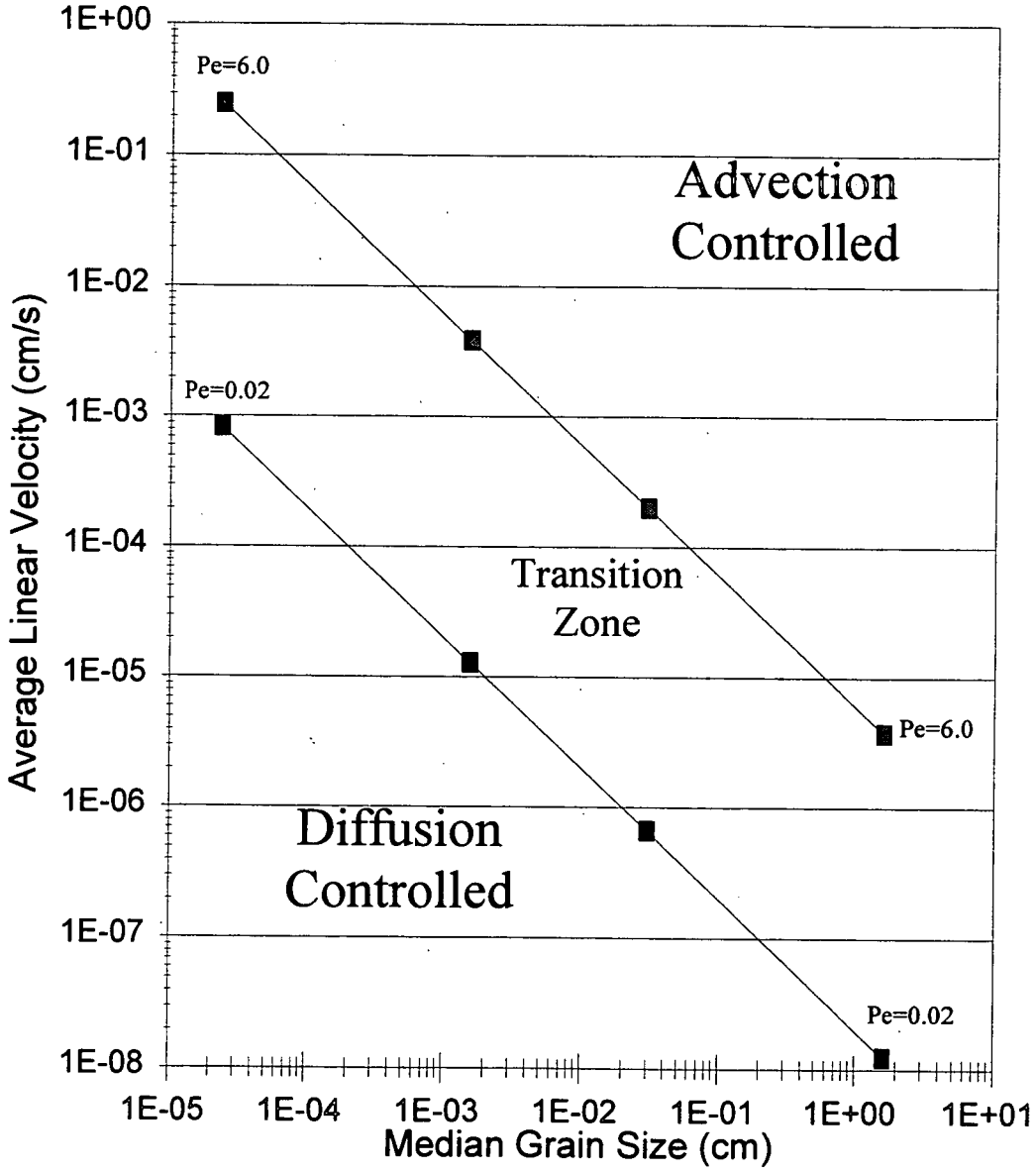
Contaminant transport in the weathered bedrock is controlled by diffusion in claystones, by a combination of diffusion and advection in siltstones and non-Arapahoe sandstones, and predominately by advection in Arapahoe sandstones (Figure G-12). The higher hydraulic conductivities associated with the Arapahoe sandstone result in higher average linear groundwater velocities within the unit which increases the relative importance of advective transport within the unit.

In the unweathered bedrock, the low average linear groundwater velocities result in diffusion-controlled contaminant transport for claystone, siltstone, and sandstone (Figure G-13). Vertical average linear groundwater velocities were also calculated for the unweathered bedrock. Figure G-13 shows that the downward migration of contaminants in the unweathered bedrock is also controlled by diffusion.

816

Table G-8
Calculation of Average Linear Groundwater Velocities
for P_e=6.0 and P_e=0.02

Sediment	Grain Size (cm)	Diffusion Coefficient (cm^2/sec)	Average Linear Velocity (cm/s) for P_e = 0.02	Average Linear Velocity (cm/s) for P_e = 6.0
med. gravel	1.6	1.0E-06	1.25E-08	3.75E-06
med. sand	3.0E-02	1.0E-06	6.67E-07	2.00E-04
med. silt	1.6E-03	1.0E-06	1.28E-05	3.85E-03
clay	2.4E-05	1.0E-06	8.33E-04	2.50E-01



EG&G ROCKY FLATS
Rocky Flats Site, Golden, Colorado

Contaminant Transport Zones

Hydrogeologic Characterization Report

April 1995	Figure G-10

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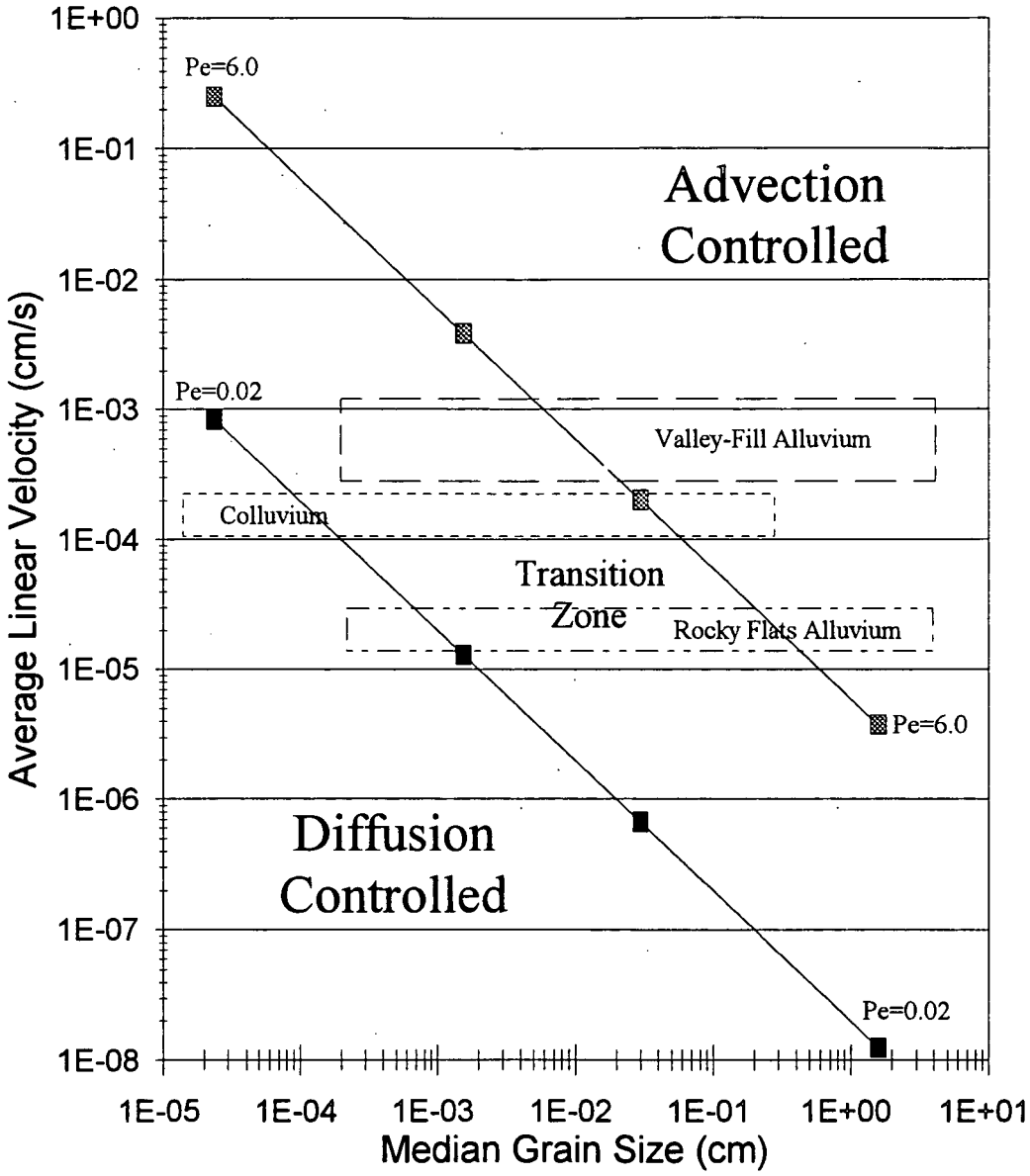
818



EG&G ROCKY FLATS
Rocky Flats Site, Golden, Colorado

Type of Contaminant Transport in Surficial Deposits

Hydrogeologic Characterization Report

April 1995	Figure G-11

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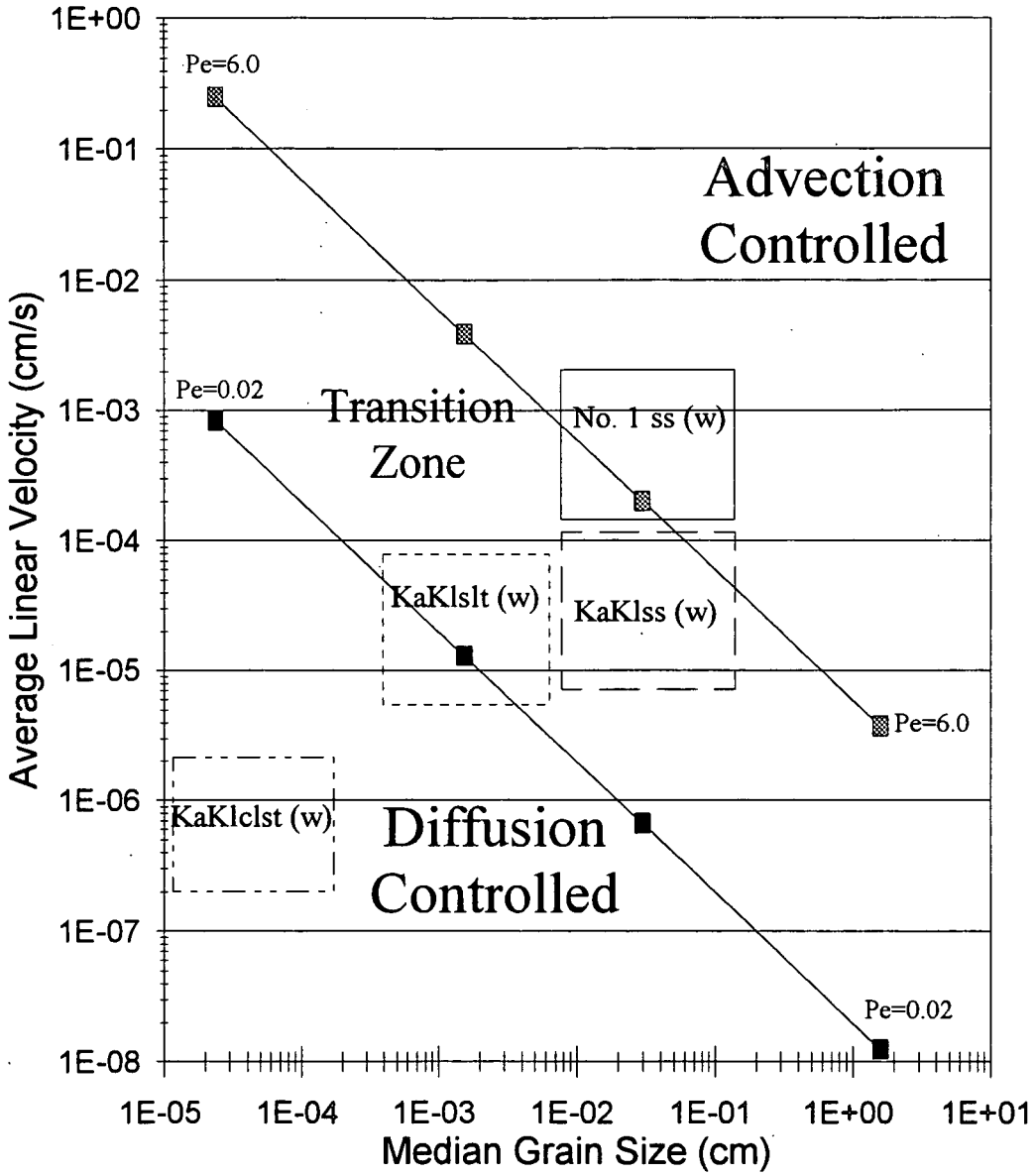

EG&G ROCKY FLATS
Rocky Flats Site, Golden, Colorado

Type of Contaminant Transport in Weathered Bedrock

Hydrogeologic Characterization Report

April 1995	Figure G-12

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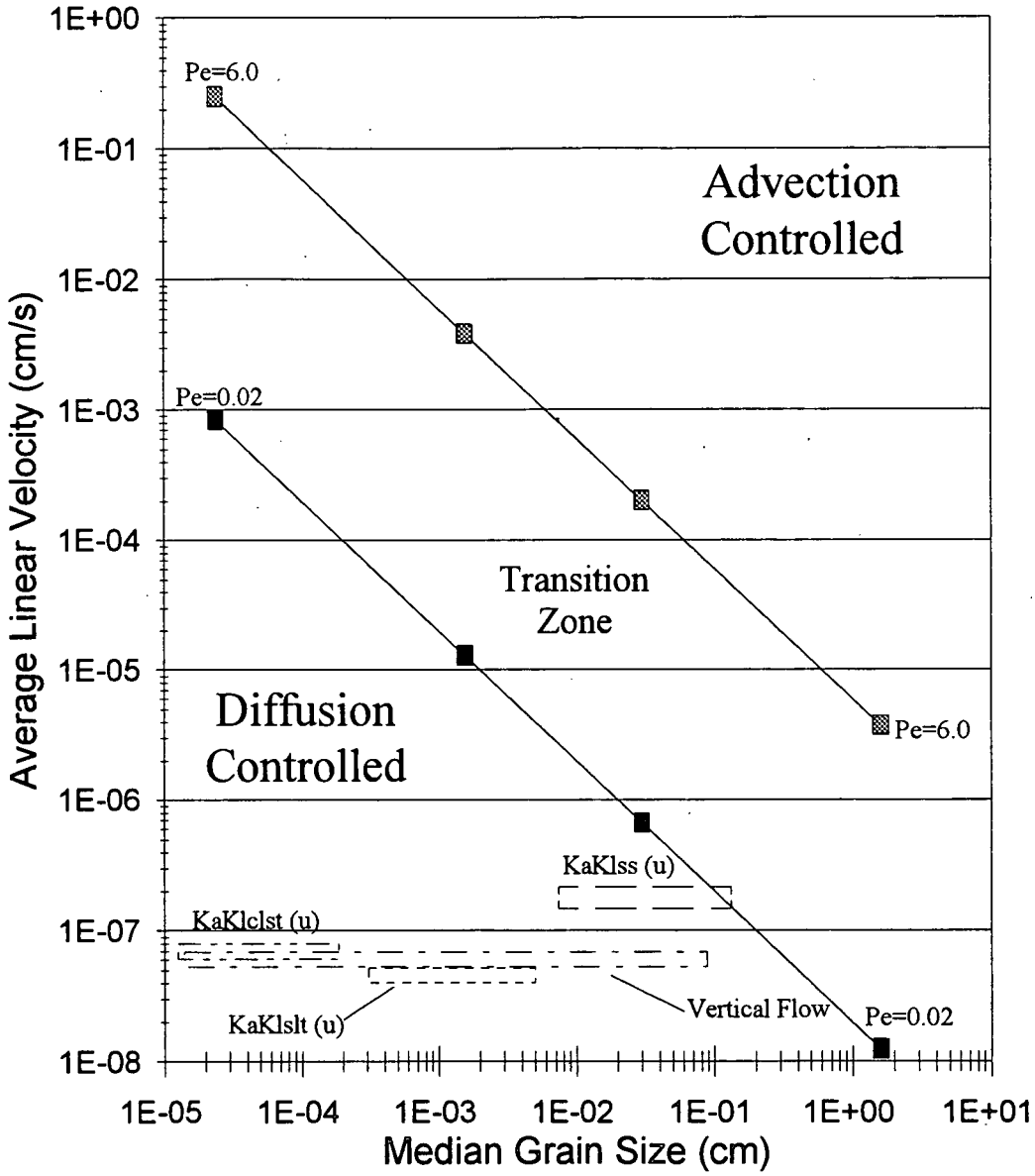
820



EG&G ROCKY FLATS
Rocky Flats Site, Golden, Colorado

Type of Contaminant Transport in Unweathered Bedrock

Hydrogeologic Characterization Report

April 1995	Figure G-13

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821

Methodology

Box-and-whisker plots were generated to compare saturated hydraulic conductivity values from different geologic units occurring at the Rocky Flats site. Box-and-whisker plots divide the data into four equal quartiles. The enclosed box designates the middle 50-percent quartile with a straight line representing the median value. Whiskers extend to the data points within 1.5 interquartile ranges from the lower and upper quartiles, respectively. Observations plotted beyond the whiskers but within 3 interquartile ranges of the upper and lower quartiles are designated as suspected outliers and represented as solid squares. Extreme outliers occurring beyond 3 interquartile ranges of the upper and lower quartiles are represented as a square with a '+' symbol.

Saturated hydraulic conductivity values of different geologic units were compared by aggregating the data into unconsolidated surficial deposits, weathered bedrock, and unweathered bedrock. The data were further subdivided within each data group as described below:

- Unconsolidated surficial deposits were divided into Rocky Flats Alluvium (Qrf), Colluvium (Qc), and Valley-Fill Alluvium (Qvf) subgroups.
- Weathered bedrock was divided into weathered claystone (KaKlclst[w]), weathered siltstone (KaKlslt[w]), weathered sandstone (KaKlss[w]), and the Arapahoe Sandstone (Ka No.1ss) subgroups.
- Unweathered bedrock was divided into unweathered claystone (KaKlclst[u]), unweathered siltstone (KaKlslt[u]), and unweathered sandstone (KaKlss[u]).

In addition, saturated hydraulic conductivity values from unconsolidated surficial deposits and the Arapahoe sandstone values were compared. Due to the wide range of values for the different geologic units, two box-and-whisker graphs (expanded and reduced scales) were plotted for each data group.

Explanation for Box-and-Whisker Plots:

Qrf	Rocky Flats Alluvium
Qc	Colluvium
Qvf	Valley-Fill Alluvium
KaKlclst	Undifferentiated Arapahoe/Laramie Claystone
KaKlslt	Undifferentiated Arapahoe/Laramie Siltstone
KaKlss	Undifferentiated Arapahoe/Laramie Sandstone
Ka No.1ss	No. 1 Arapahoe Sandstone

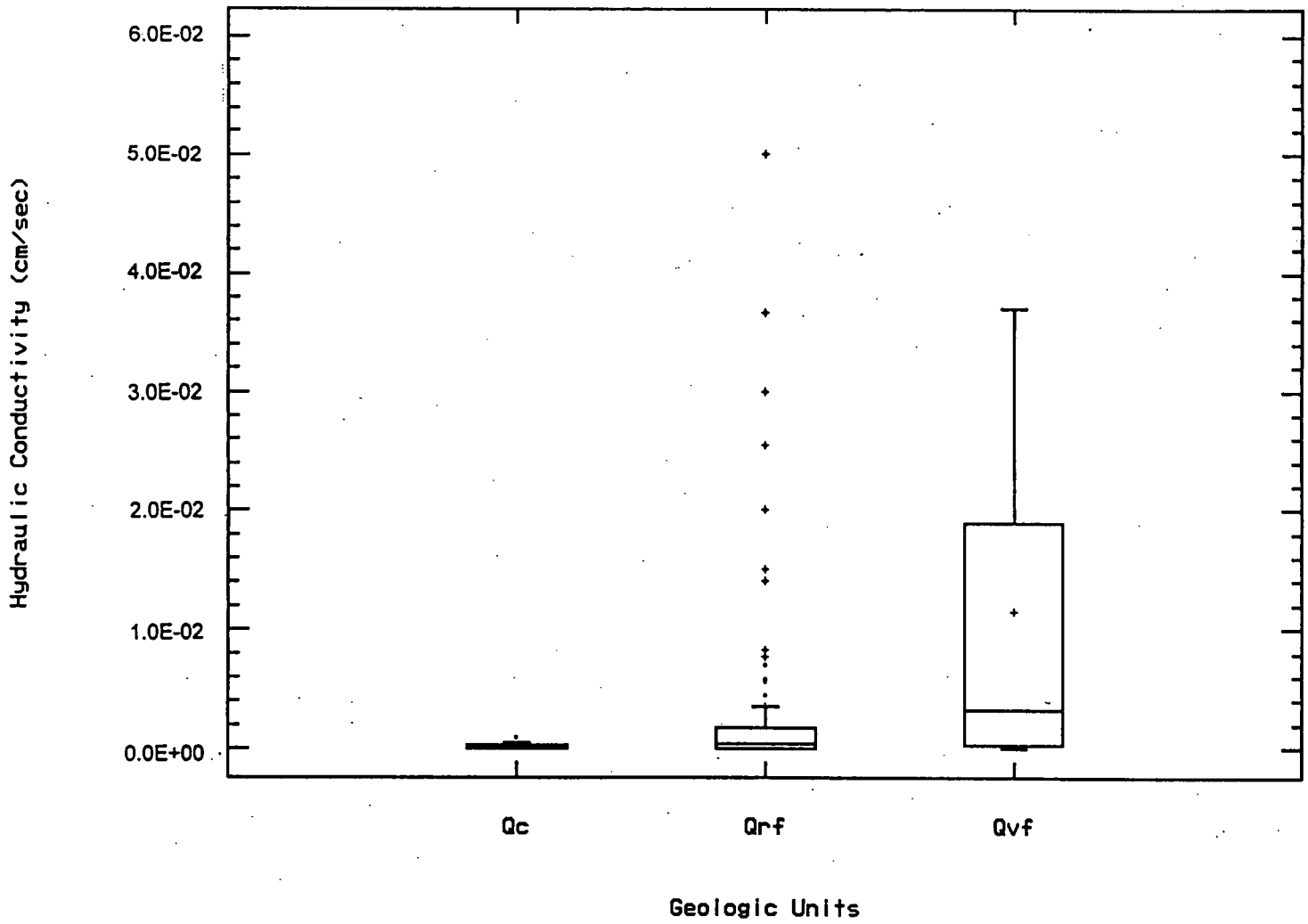
822

cm/sec	centimeters per second
■	Outlier Within 3 Interquartile Ranges of the Upper and Lower Quartiles.
✦	Outlier Beyond 3 Interquartile Ranges of the Upper and Lower Quartiles.
+	Mean

823

Hydraulic Conductivity Comparisons

Unconsolidated Surficial Deposits

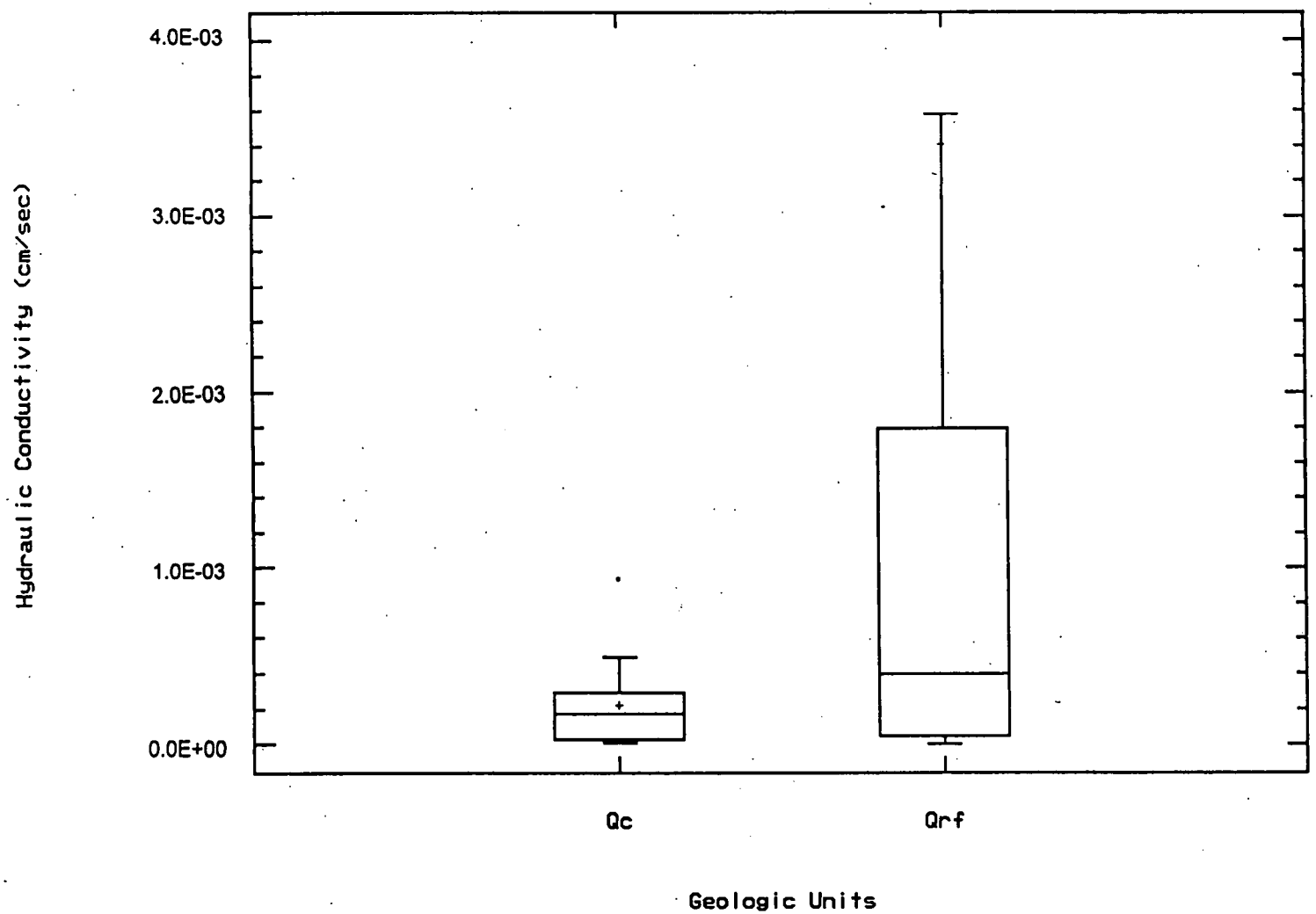


Expanded Scale Showing Outliers

824

Hydraulic Conductivity Comparisons

Unconsolidated Surficial Deposits

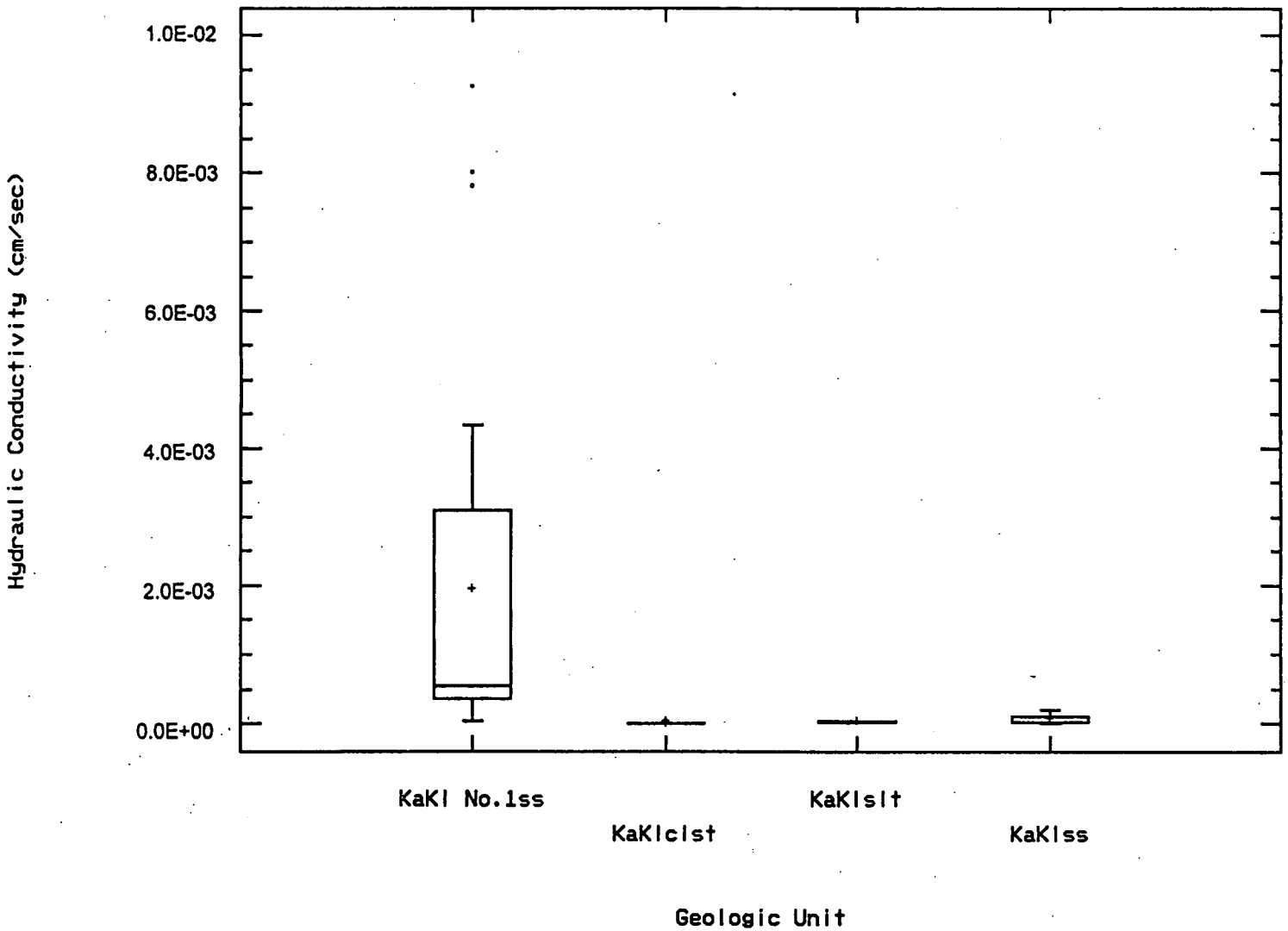


Reduced S[illegible]: Extreme Outliers and Qvf Excluded From Graph

825

Hydraulic Conductivity Comparisons

Weathered Bedrock

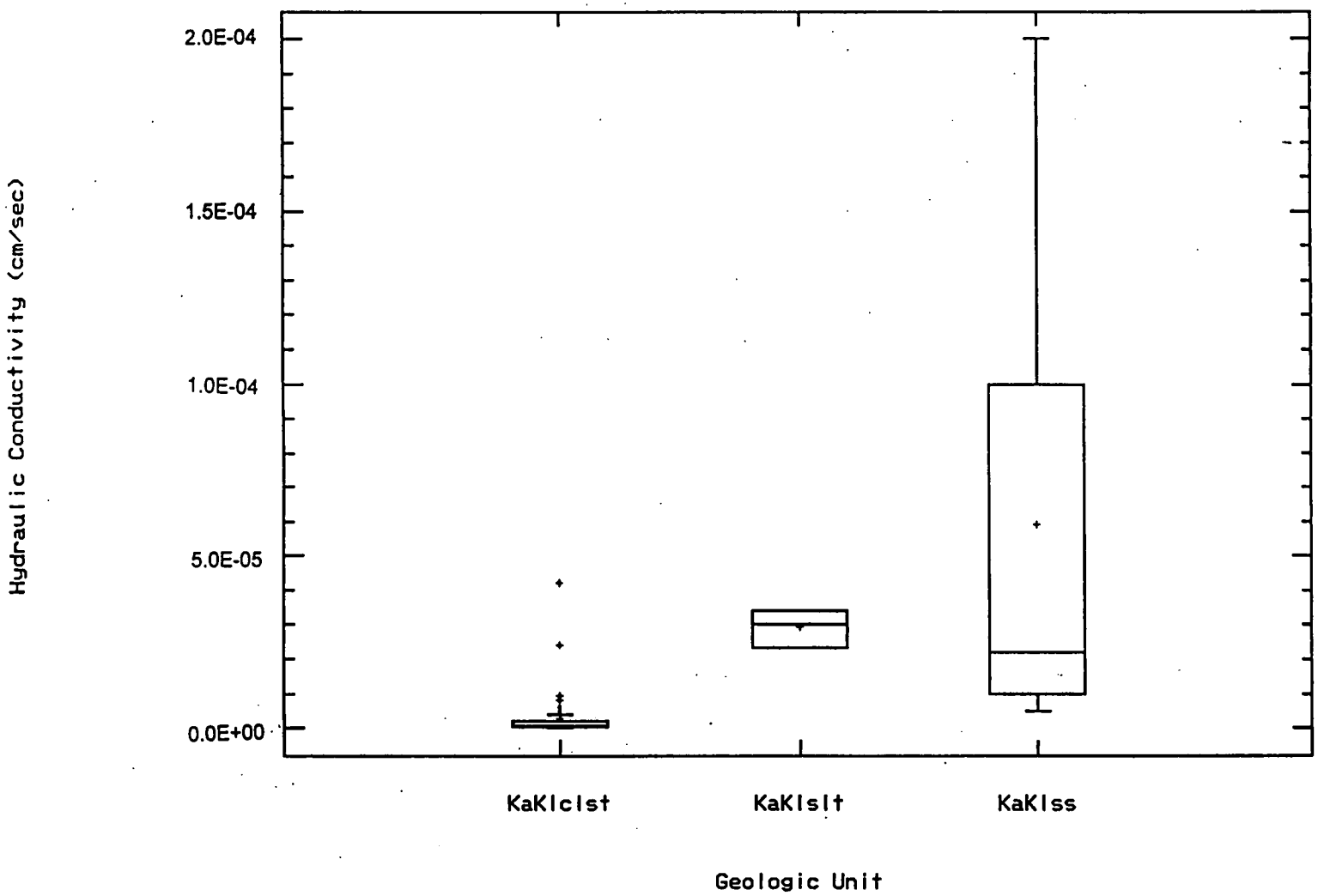


Expanded Scale Showing Outliers

826

Hydraulic Conductivity Comparisons

Weathered Bedrock

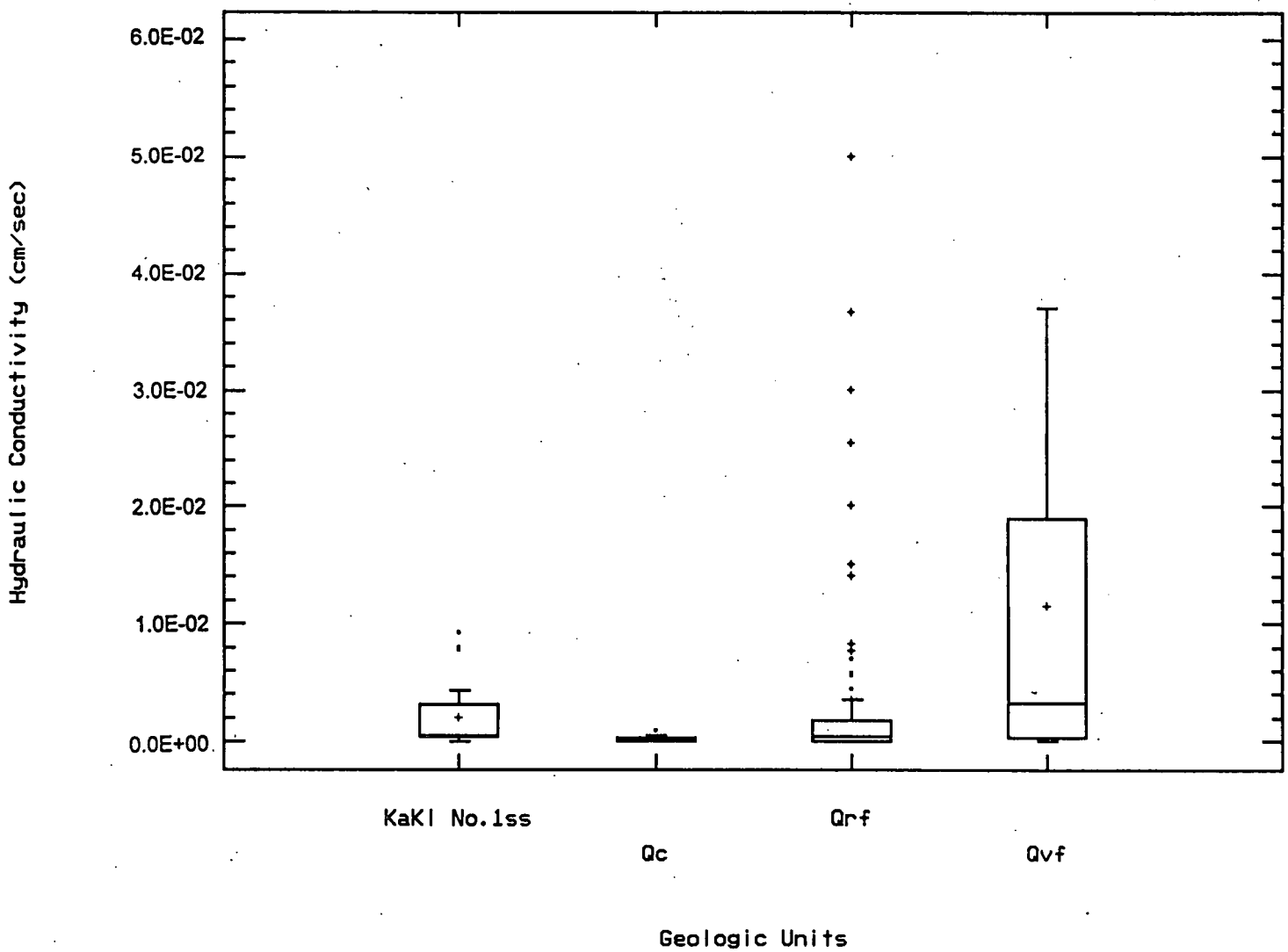


Ka No.1s[illegible]cluded From Graph

827

Hydraulic Conductivity Comparisons

Arapahoe No.1 Sandstone & Unconsolidated Surficial Deposits

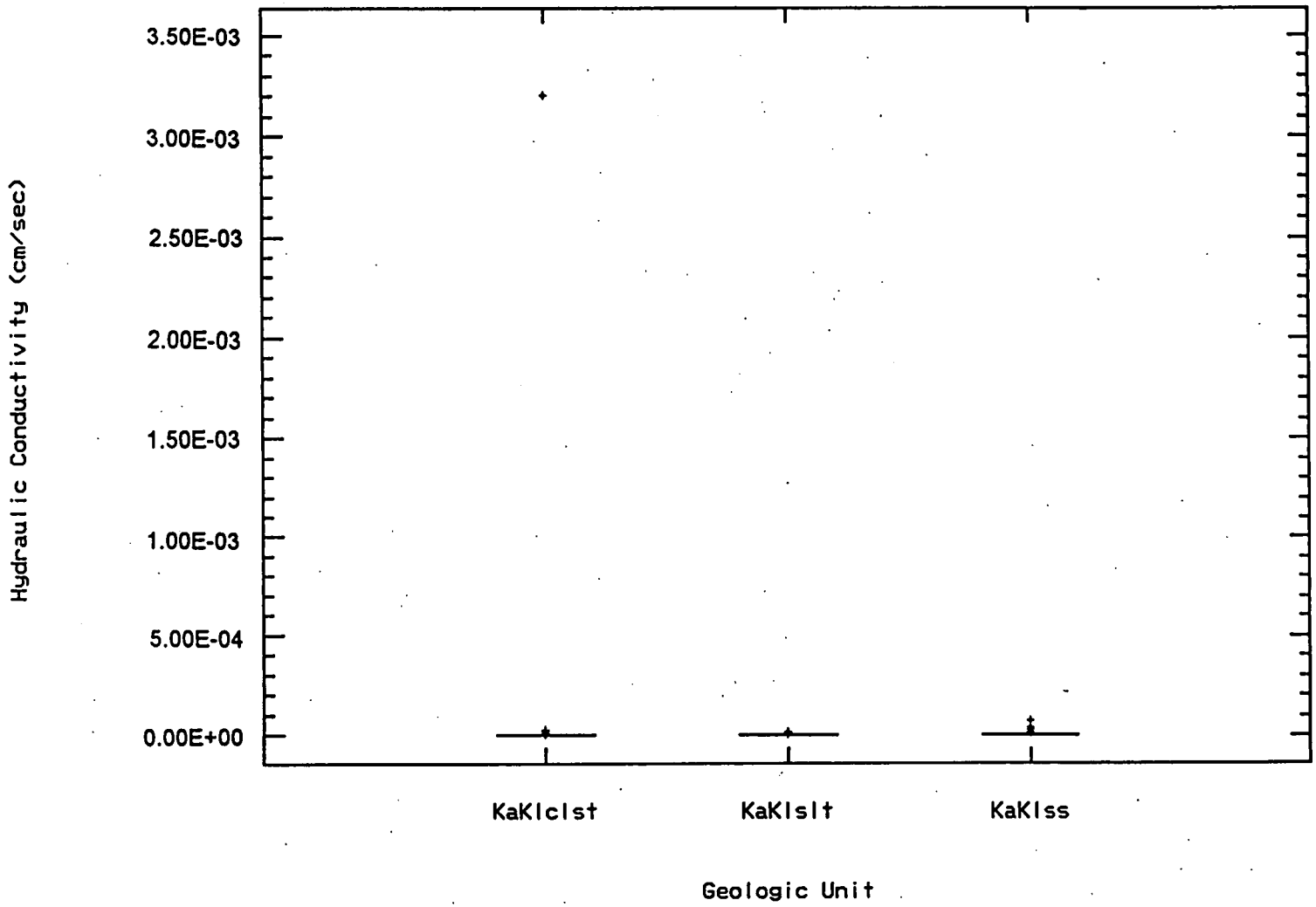


Expanded Scale Showing Outliers

828

Hydraulic Conductivity Comparisons

Unweathered Bedrock

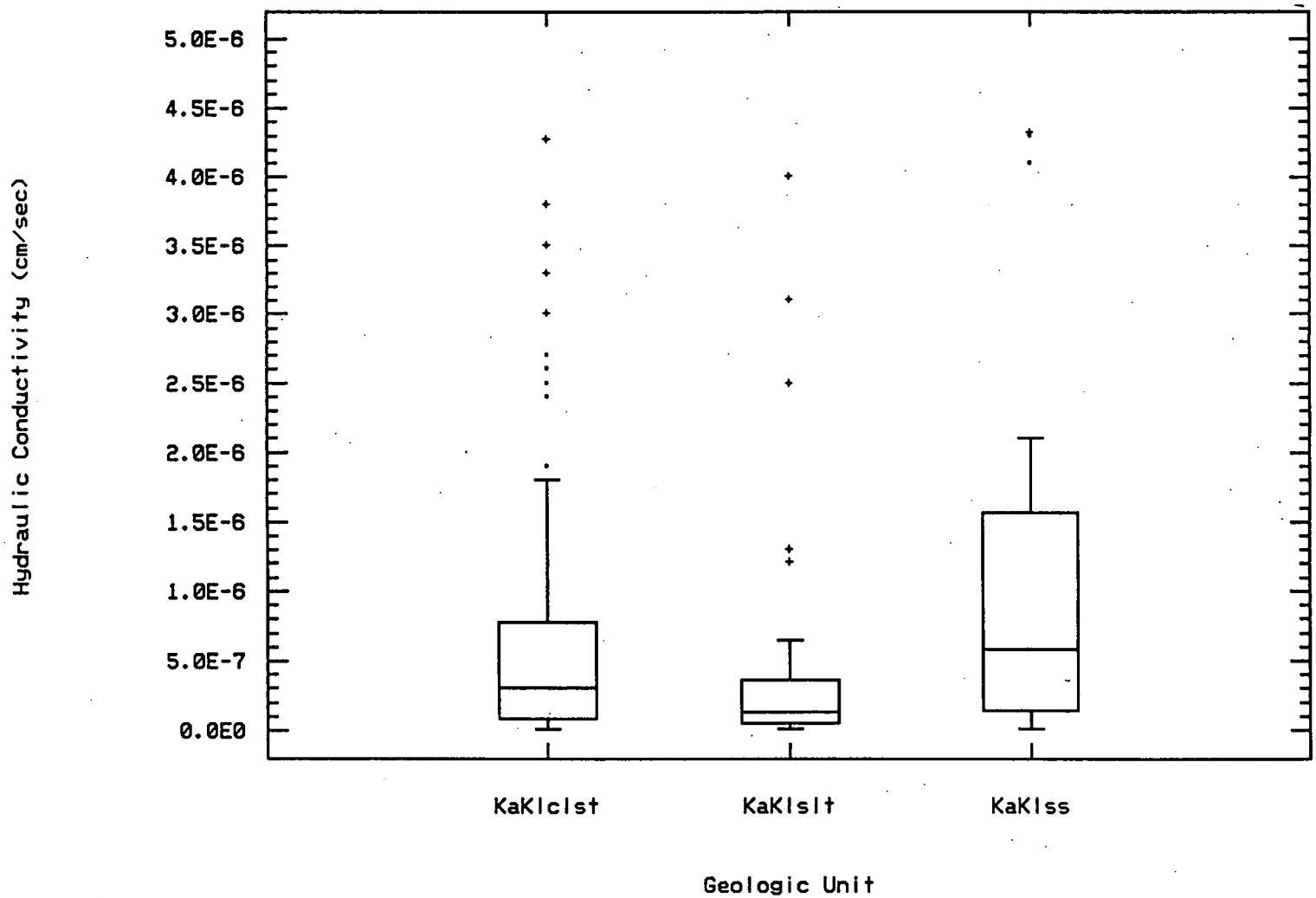


Expanded Scale Showing Outliers

829

Hydraulic Conductivity Comparisons

Unweathered Bedrock



Reduced Scale: Extreme Outliers Excluded

830

Aquifer Testing Program

An extensive program of single-well tests has been conducted to characterize the hydraulic conductivity of hydrostratigraphic units at Rocky Flats. Single-well tests have included constant-head packer tests, slug tests, bailing or pumping recovery tests, and constant rate pumping tests. By comparison, relatively few multiple-well tests have been conducted. Procedures for conducting each type of well test have evolved as site investigators have learned about the hydrogeology of Rocky Flats and testing equipment has improved. For example, pumping rates have been decreased in recent years to better characterize hydraulic properties of sediments with low permeability. The use of downhole pressure transducers to measure water-level change has improved the quality and completeness of early-time data.

During preparation of the current Hydrogeologic Characterization Report, the available database of aquifer tests was reviewed and each test was judged acceptable or unacceptable for use in site characterization (EG&G, 1994d). In cases where test data were judged acceptable but the analysis for hydraulic conductivity was inappropriate or incorrect, test data were reanalyzed. Results of the test review and reanalysis effort are summarized in Table G-1. The table represents the best available database of hydraulic-conductivity estimates for site characterization. Significant results of the review and reanalysis effort are presented in the subsequent sections. Descriptions of individual tests considered acceptable for use are provided in Appendix G.

Review of each aquifer test consisted of the following five steps: (1) well construction and history was reviewed to ensure that the resulting aquifer parameters are representative of the hydrogeologic unit tested; (2) equipment calibration and installation records for the test were reviewed, including any packers, transducers, and meters, to ensure that test data were properly recorded and that test conditions did not adversely impact the reliability of estimated aquifer properties; (3) the hydrogeologic setting of the test was reviewed to ensure that an appropriate analytical method was used to estimate aquifer properties; (4) pressure or water-level change data and type-curve matches were reviewed to ensure that the analytical method was applied in a technically justifiable manner; and (5) analytical equations for estimating aquifer properties were reviewed to ensure that the analytical equations were proper and arithmetically correct.

If review of a well test indicated that test data were useable but errors in test analysis had been made, the test was reanalyzed. Simple arithmetic errors and some other errors, such as incorrectly noting the saturated thickness of an aquifer, were corrected without resorting to complex reanalysis. Reanalysis of an aquifer test involving more complex errors was conducted using the computer software package AQTESOLV

831

version 1.1 (Duffield and Rumbaugh, 1991). Reanalysis consisted of (1) reconciling any existing data problems and correcting any data errors resulting from improper calibration or installation of test equipment, (2) preparing appropriate AQTESOLV analyses, including estimation of aquifer parameters, and evaluating parameter sensitivity, and (3) preparing data and type-curve plots, as well as computer files of AQTESOLV output.

Pumping and Recovery Tests

The relatively low permeability of hydrostratigraphic units at Rocky Flats has directly effected the type and quality of pumping and recovery tests. Wells dewater rapidly unless rates of withdrawal are low. If dewatering occurs rapidly, the resulting radius of influence for a test may not be significantly greater than for a slug test. Several testing procedures have been used at Rocky Flats to account for the low permeability.

Prior to 1989, most tests were conducted by bailing or pumping to essentially dewater a well and recording water-level recovery with various types of electrical tapes. Dewatering typically took a few minutes to an hour. Water-level changes were recorded during dewatering but efforts to analyze these data generally have not been worthwhile. The primary purpose in conducting these tests was to measure recovery data. When properly operated and recorded, data from electrical tapes appear to be reasonable. However, rapid collection of data during the early part of the recovery period rarely was possible with electric tapes. As a result, early-time data were lost if recovery was rapid. Since 1989, use of pressure transducers during well testing at Rocky Flats has improved the ability to obtain early-time data. Data transcription errors, which occurred occasionally when using electrical tapes, also became less frequent.

The traditional approach to analyzing recovery data at a pumped or bailed well is known as the Theis recovery method. Although originally developed for application in a confined aquifer, modified recovery methods are available for application to water-table aquifers where drawdown is less than 20 percent of the initial saturated thickness. The basic Theis assumption of radial flow toward the well remains unchanged. In the case of a nearly dewatered well, drawdown exceeds 20 percent of the initial saturated thickness and flow toward the well is spherical or hemispherical rather than radial.

Early-time recovery data obtained in many bailing or pumping tests conducted at Rocky Flats do not conform to the assumptions of the analytical method and cannot be used reliably to estimate hydraulic conductivity. Late-time recovery data more closely conform to the assumptions of the method and can be used reliably. The type-curve matches considered acceptable for use in site characterization at Rocky Flats emphasize late-time data. In cases where adequate data were available but the existing analysis

832

did not emphasize late-time data or where mathematical errors were made in an analysis of late-time data, a reanalysis of the test was conducted.

Since 1989, emphasis in testing has shifted toward conducting longer term constant-rate pumping and recovery tests. Digital instrumentation, including pressure transducers and data loggers, has been used extensively. Consequently, the quality of the tests and applicability of test results to site characterization has improved. Occasionally, mathematical errors have occurred when applying a given analytical method. These errors have been corrected during reanlaysis.

Multiple-well pumping and recovery tests provide a means of estimating aquifer properties effective over a radius of influence greater than observed in single well tests. To successfully conduct a multiple-well test, drawdown and recovery should be recorded in one or more observation wells located at various distances from the pumping well. At Rocky Flats, the relatively low permeability and correspondingly low well yields make it difficult to conduct multiple-well tests. Low pumping rates sustained over many hours are required to obtain optimum data sets for analysis.

Relatively few multiple-well tests have been conducted at Rocky Flats. The most comprehensive multiple-well test was conducted at the 881 Hillside and resulted from a pumping period of approximately eight hours. The test was conducted under water-table conditions and graphs of drawdown data show partial development of a delayed yield. Full development of delayed yield, a characteristic of water-table conditions, would have required a longer pumping period. However, sustained pumping of a low-yield well may not have been practical.

Slug Tests

Approximately 208 slug tests were completed at Rocky Flats from 1986 through 1994. Well construction information for these tests was reviewed to determine screen length, well depth, length of filter pack, casing diameter, and well bore diameter. Lithologic information from well bore logs were reviewed to determine the type of geologic material where wells were screened. This information was compared to the input parameters that were used in the hydraulic conductivity calculation. If any input parameter values were incorrect, the hydraulic conductivity value was rejected. The criteria used for slug test analyses are listed below:

1. Review well construction for completeness.
2. Review lithologic log for comparison to input parameters.
3. Check input parameters used for estimation of hydraulic conductivity.
4. Re-check calculations where hydraulic conductivity was calculated by hand.
5. Check position of best fit plots to determine if fit was appropriate.
6. Reanalyze, using correct input parameters where applicable.

833

Slug tests were reanalyzed when improper analytical methods were employed for a particular test. For example, it was considered inappropriate to apply the Cooper method to an unconfined aquifer. Tests were also selected at random for reanalysis to verify original hydraulic conductivity values. Data were entered into AQTESOLV, plotted, and the best-fit line was drawn through the data. The aquifer parameters were generated and compared to the geologic material and the hydrogeologic conditions to determine if they were accurate, reasonable, and reproducible using several methods. Plots and statistical output were generated for reanalyzed tests.

Packer Tests

Qualitative and semiquantitative methods were used to determine the validity of hydraulic conductivity values for packer tests. Lithologic descriptions were compared to the calculated hydraulic conductivities for individual packer tests. Hydraulic conductivities were then compared to published values to determine if they were within the representative ranges. Published hydraulic conductivity values are presented in Freeze and Cherry (1979) and McWhorter and Sunada (1977). The majority of hydraulic conductivities were within one order of magnitude of the acceptable range for their respective lithology.

To determine bad hole conditions, equipment malfunctions, or other difficulties, plots of the available data were made. Data from tests were plotted if hydraulic conductivity values varied one order of magnitude between the same tests for individual intervals. The packer test SOP specifies that at least three tests should be completed for each interval: one-third the overburden pressure, two-thirds the overburden pressure, and again at one-third the overburden pressure. The average discharge rates for intervals tested were also compared. For tests where the average discharge was approximately greater than one order of magnitude between equal applied pressures, plots of the average discharge versus the applied pressure were created.

834

1994 REVIEW OF
BAILER-RECOVERY TESTS AND PUMPING-RECOVERY TESTS

Aquifer Tests Recommended for No Use

Aquifer tests conducted during 1986 and 1987 at the following wells are not considered adequate for analysis:

Wells 1286, 1786, 2286, 2386, 5186, 0387, 0487.

Aquifer Test Descriptions

Recovery Tests Prior to 1986
Wells 0166, 0366, 0174, 2174, 2274, 0181, 0881, 0981, 1081

Recovery tests were conducted on the preceding wells. Each test consisted of pumping water for approximately 30 minutes and recording recovery with a pressure transducer for another 30 minutes. Recovery data were analyzed using the Theim equation for steady-state flow to a well. The radius of influence during the test was not known. Therefore it was assumed that the logarithm of the ratio of radii (radius of influence / radius of the well) was equal to 2 pi. This assumption is similar to the assumption made in the packer tests conducted at Rocky Flats. However the SOP for packer tests includes efforts to conduct the tests at several values of pressure. With this information it is possible to evaluate the validity of the Theim assumption. No similar efforts were undertaken for the recovery tests at the preceding wells. Therefore the validity of applying the Theim method to these tests can not be evaluated. The uncertainty of the resulting estimates of hydraulic conductivity is large.

Recommendation -- The estimates of hydraulic conductivity should not be used.

Well 0386 Recovery Test

Date - unknown

Detailed documentation of this test has not been located. From tabulated information, the test was conducted and analyzed in a manner consistent with other acceptable 1986 tests.

Recommendation -- The estimate of hydraulic conductivity can be used with caution.

Well 0886 Bailer-Recovery Test

Date - unknown

Detailed documentation of this test has not been located. From tabulated information, the test was conducted and analyzed in a manner consistent with other acceptable 1986 tests.

Recommendation -- The estimate of hydraulic conductivity can be used with caution.

Well 0986 Bailer-Recovery Test

Date - unknown
Detailed documentation of this test has not been located. From tabulated information, the test was conducted and analyzed in a manner consistent with other acceptable 1986 tests.

Recommendation -- The estimate of hydraulic conductivity can be used with caution.

Well 1086 Bailer-Recovery Test

Date - unknown

Detailed documentation of this test has not been located. From tabulated information, the test was conducted and analyzed in a manner consistent with other acceptable 1986 tests.

Recommendation -- The estimate of hydraulic conductivity can be used with caution.

Well 1286 Bailer-Recovery Test

Date - 9/26/86

The well is completed in alluvial clay and sand. Saturated thickness at the start of the test was approximately 7 ft. The underlying unit consists of claystone of the Arapahoe Formation. No test data sheet was available. A computer printout of test data indicates that the well was bailed for 30 min. However, the quantity of water bailed was not recorded. The water level recovered in approximately 15 min. Hydraulic conductivity was estimated by the Theim method. The Theim method is applicable to steady-state conditions where steady-state drawdown is noted in several wells at different distances from the pumping well. The Theim method is not appropriate for application to the transient conditions recorded in this test.

Recommendation -- The estimate of hydraulic conductivity should not be used. Without bailer discharge information, the test data can not be analyzed.

836

Well 1486 Bailer-Recovery Test

Date - 9/26/86

Well is screened from 39.4 to 55.4 ft in silty sandstone and claystone of the Arapahoe Formation. Saturated thickness of the sandstone is estimated to be 15.9 ft. The static water level is above the top of the sandstone. Based on the original test data sheet, water was discharged by a bailer for 30 min and yielded 0.277 gal/min. Drawdown at the end of bailing essentially dewatered the well. However, recovery was fairly rapid and sufficient late-time data were collected to conduct reliable test analyses. Methods of discharge measurement (bucket) may have introduced some error. Hydraulic conductivity was estimated from recovery data by the Theis recovery method (straight line). This method is based on the assumption of a confined aquifer. With well dewatering, the assumption may not be true. However, when applied to late-time data, the assumption is reasonable.

Recommendation -- The present estimate of hydraulic conductivity should be used.

Well 1586 Bailer-Recovery Test

Date - 9/26/86

Well is screened from 4.1 to 14.7 ft in interbedded clayey gravel and clay of the valley-fill alluvium. The lower 2 ft of the screened interval is claystone of the Arapahoe Formation. Water level at the start of testing was approximately 4.3 ft. Therefore the effective saturated thickness is assumed to be approximately 9.4 ft. Based on the original test data sheet, water was discharged by a bailer for 23.5 min to yield 20.5 gal. Drawdown at the end of bailing essentially dewatered the well. However, recovery was fairly rapid and sufficient late-time data were collected to conduct reliable test analyses. Methods of discharge measurement (bucket) may have introduced some error. Hydraulic conductivity was estimated from recovery data by the Theis recovery method (straight line). This method is based on the assumption of a confined aquifer. With well dewatering, the assumption may not be true. However, when applied to late-time data, the assumption is reasonable. A saturated thickness of approximately 10.4 ft was used in the analysis. Therefore the resulting estimate of 4.3E-05 cm/sec (8.5E-05 ft/min) may be underestimated by 10 percent.

Recommendation -- The present estimate of hydraulic conductivity should not be used. Correcting for saturated thickness, the value of hydraulic conductivity can be revised to 4.8E-05 cm/sec (9.4E-05 ft/min).

Well 1686 Bailer-Recovery Test

Date - 9/26/86

Well is screened from 39 to 45 ft in silty sandstone and siltstone of the Arapahoe Formation. Thickness of the sandstone is 2 ft. The static water level is above the top of the sandstone. Based on the original test data sheet, water was discharged by a bailer for 12 min and yielded 6 gal. Drawdown at the end of bailing essentially dewatered the well. However, recovery was fairly rapid and sufficient late-time data were collected to conduct reliable test analyses. Methods of discharge measurement (bucket) may have introduced some error. Hydraulic conductivity was estimated from recovery data by the Theis recovery method (straight line). This method is based on the assumption of a confined aquifer. With well dewatering, the assumption may not be true. However, when applied to late-time data, the assumption is reasonable. Saturated thickness was assumed to equal the screened interval.

Recommendation -- The present estimate of hydraulic conductivity (6E-08cm/sec) should be used.

Well 1786 Airlift-Recovery Test

Date - 11/19/86

Well is screened from 3.7 to 14 ft in poorly sorted gravel, sand, silt and clay of the valley-fill alluvium. The lower 1 ft of the screened interval is claystone of the Arapahoe Formation. Water level at the start of testing was approximately 4.3 ft. Therefore the effective saturated thickness is assumed to be approximately 9.4 ft. No test data sheet was available to review. Water apparently was discharged by an airlift pump but the quantity of pumpage was not recorded. Pumping appears to have occurred for 42 min. Recovery data were recorded for 82 min. Hydraulic conductivity was estimated from recovery data by several slug-test methods. These methods are based on an assumption that the water level is instantaneously raised or lowered in the well. Instantaneous implies that the water level change occurred over a time scale that minimized water flow between the aquifer and the well. Recovery data show that this assumption is not true for the test at Well 1786. Therefore the slug-test methods are not appropriate for analysis of test results.

Recommendation -- The present estimates of hydraulic conductivity should not be used.

Well 2286 Bailer-Recovery Test

Date - 9/26/86

Well is screened from 3.2 to 11.2 ft in Rocky Flats Alluvium. Sandstone of the Arapahoe Formation forms the underlying unit. Saturated thickness has ranged from 3 to 6 ft. Development records indicate that the water was turbid and the well may not have been fully developed at the time of the test. Water was discharged by a bailer. Methods of discharge measurement (bucket) and water-level measurement (electric tape) may have introduced some error. The original aquifer test data sheet did not indicate the rate or total volume of water removed. There also is some confusion over the time of bailing. However, most subsequent test analyses assumed a bailing time of 8.5 min. The well was bailed essentially dry. Water-level recovery data indicate that a water level change of 1.5 ft (approximately 50 percent of saturated thickness at the time of the test. Based on this observation, it is not reasonable to assume that bailing resulted in an essentially instantaneous head change at the start of the test. The data are not considered sufficiently reliable for interpretation. Hydraulic conductivity was estimated from recovery data by the Bouwer-Rice method for slug tests and provided a value of 1.4E-05 ft/min. Other slug test analysis methods also have been applied to the test data but are not considered as applicable as Bouwer-Rice. For reasons stated above, no slug test analysis is considered appropriate. The Bouwer-Rice method is applicable to water level recovery following an instantaneous change in head. The Theis recovery method or a Neuman recovery method would be more appropriate. Hydraulic conductivity estimated by Bouwer-Rice method may be in error by several orders of magnitude. However, the total water bailed was not recorded. It would not be sufficiently reliable to estimate this total from well construction information.

Recommendation -- The present estimates of hydraulic conductivity should not be used. Data from this test can not be confidently interpreted because the volume of water removed is not recorded.

Well 2386 Bailer-Recovery Test

Date - 9/26/86

Well is screened from 3.2 to 11.2 ft in Rocky Flats Alluvium. Sandstone of the Arapahoe Formation forms the underlying unit. Saturated thickness has ranged from 3 to 6 ft. Development records indicate that the water was turbid and the well may not have been fully developed at the time of the test. Water was discharged by a bailer. Methods of discharge measurement (bucket) and water-level measurement (electric tape) may have introduced some error. The original aquifer test data sheet did not indicate the rate or total volume of water removed. There also is some confusion over the time of bailing. However, most subsequent test analyses assumed a bailing time of 8.5 min. The well was bailed essentially dry. Water-level recovery data indicate that a water level change of 1.5 ft (approximately 50 percent of saturated thickness at the time of the test. Based on this observation, it is not reasonable to assume that bailing resulted in an essentially instantaneous head change at the start of the test. The data are not considered sufficiently reliable for interpretation. Hydraulic conductivity was estimated from recovery data by the Bouwer-Rice method for slug tests and provided a value of 1.4E-05 ft/min. Other slug test methods also have been applied to the test data. For reasons stated above, no slug test analysis is considered appropriate. The Bouwer-Rice method is applicable to water level recovery following an instantaneous change in head. The Theis recovery method or a Neuman recovery method would be more appropriate. Hydraulic conductivity estimated by Bouwer-Rice method may be in error by several orders of magnitude. However, the total water bailed was not recorded. It would not be sufficiently reliable to estimate this total from well construction information.

Recommendation -- The present estimates of hydraulic conductivity should not be used. Data from this test can not be confidently interpreted because the volume of water removed is not recorded. No reanalysis is recommended.

Well 2586 Bailer-Recovery Test

Date - 11/12/86

Well is screened from 60 to 82 ft in the Arapahoe Formation. Saturated thickness is estimated to be 8 ft. The log of the hole indicates that the screened interval consists of 11.7 ft of claystone, 2.4 ft of missing core and 8 ft of sandstone. Based on the original test data sheet, water was discharged by a bailer for 6 min and yielded 1.75 gal. Drawdown at the end of bailing essentially dewatered the well. Methods of discharge measurement (bucket) may have introduced some error. Hydraulic conductivity was estimated from recovery data by the Theis recovery method. Two errors were made in the Theis recovery analysis; total time of bailing was assumed to 29.5 min and saturated thickness was assumed to be equal to the screen interval of 22.1 ft.

Recommendation -- The present estimates of hydraulic conductivity should not be used. The Theis recovery method should be correctly applied to late-time data to estimate hydraulic conductivity. The Theis method applies to confined aquifers. With Jacob's corrected drawdown, it can be used with reasonable confidence in unconfined aquifers if the drawdown is a small portion of the initial saturated thickness (20 percent). Because the aquifer was essentially dewatered at the well bore, vertical components of flow may have been significant and the Dupuit assumption used in the Theis method would not be valid except for late-time data.

Well 2686 Bailer-Recovery Test

Date - 11/12/86

Well is screened from 3.75 to 11 ft in the alluvium and Arapahoe Formation. The log of the hole indicates that the screened interval consists of three lithologic units; 0.75 ft of gravel, 5 ft of sand and 1.5 ft of claystone. The water table general is located in the claystone. Occasionally, the lower portion of the sand becomes saturated. The original test data sheet indicates that 0.75 gal was removed from the well by bailing for 14 minutes. Drawdown at the end of bailing essentially dewatered the well. Methods of discharge measurement (bucket) may have introduced some error. The static water level recorded on the data sheet is incorrect. A more correct value can be inferred from the recovery water-level data and is noted in red on copies of the original data sheet. This value would imply that 0.75 ft of the sand unit was saturated at the start of the test. Hydraulic conductivity was estimated from by Bouwer-Rice and several other slug test methods providing an estimate of 7.9 ft/min from the Bouwer-Rice analysis. However, the analysis was done without fully recognizing the error in the recorded initial water level. Consequently the saturated thickness and recovery data used in the analysis were incorrect.

Recommendation -- The present estimates of hydraulic conductivity should not be used. The test could be reanalyzed using Theis recovery method, and corrected data.

Well 2786 Bailer-Recovery Test

Date - 11/11/86

Well is screened from 128.5 to 133 ft in silty sandstone of the Arapahoe Formation. Saturated thickness of the sandstone is estimated to be 4.9 ft. The static water level is at or slightly above the top of the sandstone. Since the test, the water level has been substantially higher than the sandstone unit. Based on the original test data sheet, water was discharged by a bailer for 18 min and yielded 1.5 gal. Drawdown at the end of bailing essentially dewatered the well. However, recovery was fairly rapid and sufficient late-time data were collected to conduct reliable test analyses. Methods of discharge measurement (bucket) may have introduced some error. Hydraulic conductivity was estimated from recovery data by the Theis recovery method to be 3.7E-07 ft/min. This method is based on the assumption of a confined aquifer. With well dewatering, the assumption may not be true. However, when applied to late-time data, the assumption is reasonable.

Recommendation -- The present estimates of hydraulic conductivity should be used.

Well 2886 Bailer-Recovery Test

Date - 11/11/86

The well is screened from 4 to 9.96 ft in alluvium. The static water level at the time of the test was 6.19 ft. Based on the original test data sheet, water was discharged by a bailer for 16.5 min and yielded 1 gal. Drawdown at the end of bailing essentially dewatered the well. Methods of discharge measurement (bucket) and water-level measurement (electric tape) may have introduced some error. Hydraulic conductivity was estimated from recovery data by the Theis recovery method to be 1E-06 ft/min. This method is based on the assumptions of a confined aquifer and Dupuit flow conditions. With well dewatering, the assumptions may not be true. If applied to late-time data, the assumption is reasonable. Two important errors were made in conducting the Theis recovery analysis. Incorrect values for saturated thickness and discharge rate were used.

Recommendation -- The present estimates of hydraulic conductivity should not be used. Using a Theis recovery analysis and adjusting the available estimate of hydraulic conductivity for a saturated thickness of 3.8 ft and a discharge rate of 0.06060 gal/min, a value of 6.8E-07 cm/sec or 1.34E-06 ft/min is obtained.

Well 3086 Bailer-Recovery Test

Date - 11/13/86

The well is screened from 2.5 to 15 ft in claystone of the Arapahoe. The static water level at the time of the test was 4.11 ft; giving a saturated thickness of approximately 11 ft. Based on the original test data sheet, water was discharged by a bailer for 12.5 min and yielded 2.75 gal. Drawdown at the end of bailing essentially dewatered the well. Methods of discharge measurement (bucket) and water-level measurement (electric tape) may have introduced some error. Hydraulic conductivity was estimated from recovery data by the Theis recovery method to be 1.7E-06 ft/min. This method is based on the assumptions of a confined aquifer and Dupuit flow conditions. With well dewatering, the assumptions may not be true. If applied to late-time data, the assumption is reasonable.

Recommendation -- The present estimate of hydraulic conductivity should be used.

Well 3286 Bailer-Recovery Test

Date - 11/10/86

Well is screened from 114.9 to 125.5 ft in the Arapahoe Formation. The log of the screened interval indicates a series of silty sand and claystone units. The static water level at the time of the test was at or above the top of the sand unit. Subsequent measurements have shown water in the sand units to be confined. Based on the original test data sheet, water was discharged by a bailer for 64.5 min and yielded 3.75 gal. Drawdown at the end of bailing essentially dewatered the well. However, recovery was fairly rapid and sufficient late-time data were collected to conduct reliable test analyses. Methods of discharge measurement (bucket) and water-level measurement (electric tape) may have introduced some error. Hydraulic conductivity was estimated from recovery data by the Theis recovery method to be 1.8E-07 ft/min. This method is based on the assumptions of a confined aquifer and Dupuit flow conditions. With well dewatering, the assumptions may not be true. If applied to late-time data, the assumption is reasonable.

Recommendation -- The present estimate of hydraulic conductivity by the Theis recovery method should be used.

Well 3486 Bailer-Recovery Test

Date - 9/26/86

Well is screened from 44.2 to 56.2 ft in the a silty sandstone of the Arapahoe Formation. The static water level at the time of the test was at or above the top of the sand unit. Subsequent measurements have shown water in the sand units to be confined. Based on the original test data sheet, water was discharged by a bailer for 22 min and yielded 9 gal. Drawdown at the end of bailing essentially dewatered the well. However, recovery was fairly rapid and sufficient late-time data were collected to conduct reliable test analyses. Methods of discharge measurement (bucket) and water-level measurement (electric tape) may have introduced some error. Hydraulic conductivity was estimated from recovery data by the Theis recovery method to be 6.1E-06 ft/min. This method is based on the assumptions of a confined aquifer and Dupuit flow conditions. With well dewatering, the assumptions may not be true. If applied to late-time data, the assumption is reasonable.

Recommendation -- The present estimate of hydraulic conductivity by the Theis recovery method should be used.

Well 3586 Bailer-Recovery Test

Date - 9/25/86

Well is screened from 5 to 11.6 ft in clayey alluvium. Clay continued to a depth of 12.5 ft where claystone of the Arapahoe was encountered. The water level at the time of the test was 6.94 ft giving a saturated thickness of approximately 5.6 ft. Based on the original test data sheet, water was discharged by a bailer for 6 min and yielded 1.5 gal. Drawdown at the end of bailing essentially dewatered the well. Methods of discharge measurement (bucket) and water-level measurement (electric tape) may have introduced some error. Hydraulic conductivity was estimated from recovery data by the Theis recovery method to be 5.1E-05 ft/min. However, an erroneous value of 6.74 ft was used for saturated thickness. The Theis recovery method is based on the assumptions of a confined aquifer and Dupuit flow conditions. With well dewatering, the assumptions may not be true. If applied to late-time data, the assumption is reasonable.

Recommendation -- The present estimate of hydraulic conductivity should not be used. Adjusting for the actual saturated thickness, the estimate of hydraulic conductivity obtained by the Theis recovery method is 3.13E-05 cm/sec or 6.2E-05 ft/min. This estimate would be more appropriate.

Well 3986 Constant Discharge-Recovery Test

Date - 9/25/86

The well is screened from 5 to 31.5 ft in Rocky Flats Alluvium. Claystone of the Arapahoe Formation forms the underlying unit. Saturated thickness has averaged 10.5 ft. One log of the hole indicates that the saturated unit is clay. A second log indicates a sandy gravel unit. An original geologist's log completed at the time of drilling is not available. Well development data indicate a reasonably productive aquifer. The test was conducted after the well was developed. Water was discharged by an airlift pump. Methods of discharge measurement (bucket) and water-level measurement (electric tape) may have introduced some error. This is particularly apparent in the recovery data for time equals 13 minutes. However, the data are considered sufficiently reliable for interpretation. Hydraulic conductivity was estimated from recovery data by the Bouwer-Rice method for slug tests and provided a value of 7.46E-05 ft/min. Transmissivity was estimated from drawdown data by the Theis method and gave a value of 0.0399 ft^2/min; with saturated thickness of 10.5 ft hydraulic conductivity would be 0.00380 ft/min. However, the data match to the type curve was very poor. Neither analysis is considered appropriate. The Bouwer-Rice method is applicable to water level recovery following an instantaneous change in head. The Theis recovery method would be more appropriate. Hydraulic conductivity estimated by Bouwer-Rice method may be in error by several orders of magnitude. The drawdown data during most of the pumping period plot on log-log scales as a straight line of unit slope. This is the classic characteristic of drawdown influenced by wellbore storage. The last two water level measurements made during the pumping period reflect aquifer characteristics. However, this is not sufficient information for analysis.

Recommendation -- The present estimates of hydraulic conductivity should not be used. The recovery data should be reanalyzed using the Theis recovery method. Data from the pumping period should not be used to estimate aquifer properties.

Well 4186 Bailer-Recovery Test

Date - unknown

Well is screened to 44.7 ft in Rocky Flats Alluvium. Claystone of the Arapahoe Formation forms the underlying unit. Saturated thickness has averaged 10.3 ft. The saturated unit consists of sand and gravel. Water was discharged by bailing 2 gal in 15.2 min (0.132 gal/min). This nearly dewatered the well. Methods of discharge measurement (bucket) and water-level measurement (electric tape) may have introduced some error. This is particularly apparent in the pretest water level data which were in error by 10 ft. Correcting the recovery data for this apparent discrepancy, the test is considered sufficiently reliable for interpretation. However, no value of hydraulic conductivity has been tabulated.

Recommendation -- The recovery data should be analyzed using the Theis recovery method.

Well 4586 Constant Discharge-Recovery Test (airlift-slug)

Date - 10/22/86

Well is screened from 3 to 48.2 ft in Rocky Flats Alluvium. The Laramie Formation forms the underlying unit. Saturated thickness has averaged 22 ft. The log of the hole indicates that the saturated unit is sandy gravel. From development data it is known that the well is a good producer. The test was conducted after the well was developed. Water was discharged by an airlift pump for 5.5 min. Total pumpage was 1.53 gal. Methods of discharge measurement (bucket) and water-level measurement (electric tape) may have introduced some error. Hydraulic conductivity was estimated from recovery data by several slug test methods. The Bouwer-Rice method provided an estimate of 4.1E-05 ft/min and was identified as the preferred method.

Recommendation -- The present estimates of hydraulic conductivity should not be used. The recovery data should be reanalyzed using the Theis recovery method.

Well 4686 Bailer-Recovery Test

Date - unknown

Well is screened from 140.3 to 160.8 ft in siltstone of the Laramie Formation. Water was encountered in the surficial gravel deposits. However, the water level in the well during the test was within the screened interval. According to a copy of the original test data sheet, water was discharged by a bailer for 60 min and yielded 3.5 gal. Drawdown at the end of bailing essentially dewatered the well and recovery was fairly slow. Data were collected for 4 days. The late-time data show considerable noise. Methods of discharge measurement (bucket) and water-level measurement (electric tape) may have introduced some error. Hydraulic conductivity was estimated from recovery data by the Theis recovery method to be 5.2E-08 cm/sec (1.0E-07 ft/min). The late-time match was based on only a few data points and is not considered reliable. Never-the-less, the slow recovery indicates that hydraulic conductivity is small.

Recommendation -- The present estimate of hydraulic conductivity by the Theis recovery method should not be used.

Well 4786 Constant Discharge-Recovery Test

Date - 11/18/86

The well is screened from 6.2 to 48.2 ft in Rocky Flats Alluvium. Saturated thickness has averaged 37.8 ft. The log of the hole indicates that the saturated unit is sandy gravel. From development data it is known that the well is a good producer. The test was conducted after the well was developed. Water was discharged by a pump for 65 min. Total pumpage was 15.5 gal with approximately 5 ft of drawdown. Methods of discharge measurement (bucket) and water-level measurement (electric tape) may have introduced some error. Ninety percent recovery occurred in 75 minutes. Hydraulic conductivity was estimated from recovery data by the Theis recovery method to be 2.57E-05 cm/sec (5.05E-05 ft/min). The late-time match was based on many few data points and is considered reliable.

Recommendation -- The present estimate of hydraulic conductivity can be used with caution.

Well 5186 Bailer-Recovery Test

Date - 11/14/86

The well is screened from 4.9 to 79 ft in Rocky Flats Alluvium. The Laramie Formation was encountered at 78 ft. Saturated thickness has averaged 23 ft. The log of the hole indicates that the saturated unit is gravel with abundant thick lenses of sand, silt and clay. From development data it is believed that the well is a good producer. The test was conducted after the well was developed. Water was discharged by a bailer for 65 min. Total pumpage was not recorded. Methods of discharge measurement (bucket) and water-level measurement (electric tape) may have introduced some error. No estimate of hydraulic conductivity has been tabulated.

Recommendation -- The recovery data can not be interpreted unless a rate of bailing can be determined.

Well 5586 Bailer-Recovery Test

Date - 10/21/86

Well is screened from 3.6 to 36.5 ft in unconsolidated alluvium. The Laramie Formation was encountered at 35.5 ft. Saturated thickness has averaged 17 ft. The log of the hole indicates that the saturated unit is sand and gravel with abundant thick lenses of sand, silt and clay. The test was conducted after the well was developed. Five gal of water were discharged by bailing for 4 min. Methods of discharge measurement (bucket) and water-level measurement (electric tape) may have introduced some error. No estimate of hydraulic conductivity has been tabulated.

Recommendation -- The recovery data should be analyzed using the Theis recovery method.

Well 5686 Bailer-Recovery Test

Date - 10/1/86

The well is screened from 2.6 to 9.6 ft in alluvium. The Laramie Formation was encountered at 9 ft. Saturated thickness has averaged 3.5 ft. The log of the hole indicates that the saturated unit is gravel. Water was discharged by a bailer for 13 min. Total pumpage was 3 gal. Drawdown at the end of bailing nearly dewatered the well. Methods of discharge measurement (bucket) and water-level measurement (electric tape) may have introduced some error. Hydraulic conductivity was estimated from recovery data by the Theis recovery method and a modified Theim method. The Theim method is applicable to steady-state conditions and is not appropriate for this test. The Theis method is based on assumptions of confined aquifers and the Dupuit conditions. With well dewatering, these assumptions would be true only for late-time data.

Recommendation -- The present estimate of hydraulic conductivity by the Theis method can be used with caution. The estimate by the Theim method should not be used.

Well 5986 Bailer-Recovery Test

Date - 10/23/86

The well is screened from 19 to 28 ft in the first sandstone of the Arapahoe Formation. Saturated thickness has averaged 2.5 ft. The water level indicates that unconfined conditions occur in the first sandstone. Water was discharged by a bailer for 20 min. Total pumpage was 1.5 gal. Drawdown at the end of bailing nearly dewatered the well. Methods of discharge measurement (bucket) and water-level measurement (electric tape) may have introduced some error. Hydraulic conductivity was estimated from recovery data by the Theis recovery method and the Theim method. The Theim method is applicable to steady-state conditions and is not appropriate for this test. The Theis method is based on assumptions of confined aquifers and the Dupuit conditions. With well dewatering, these assumptions would be true only for late-time data.

Recommendation -- The present estimate of hydraulic conductivity by the Theis method can be used with caution. The estimate by the Theim method should not be used.

Well 6286 Bailer-Recovery Test

Date - 10/23/86

The well is screened from 25 to 35 ft in the first sandstone of the Arapahoe Formation. Saturated thickness has averaged 9 ft. The water level indicates that unconfined conditions occur in the first sandstone. Substantial amounts of clay are present in the sandstone. Water was discharged by pumping for 10 min. Total pumpage was 2.5 gal. Drawdown at the end of pumping nearly dewatered the well. Methods of discharge measurement (bucket) and water-level measurement (electric tape) may have introduced some error. Hydraulic conductivity was estimated from recovery data by the Theis recovery method and the Theim method. The Theis method is based on assumptions of confined aquifers and the Dupuit conditions. With well dewatering, these assumptions would be true only for late time data. The Theim method is applicable to steady-state conditions and is not appropriate for this test.

Recommendation -- The present estimate of hydraulic conductivity by the Theis method can be used with caution. The estimate by the Theim method should not be used.

Well 6586 Bailer-Recovery Test

Date - 9/30/86

The well is screened from 2.5 to 8.0 ft in clayey gravel of the alluvium. Claystone of the Arapahoe Formation was encountered at 7 ft. Saturated thickness has averaged 1.7 ft. Well development data indicate that the aquifer can produce significant amounts of water. Water was discharged by a bailing for 3 min. Total pumpage was 1.0 gal. Drawdown at the end of pumping essentially dewatered the alluvium. Methods of discharge measurement (bucket) and water-level measurement (electric tape) may have introduced some error. This is apparent in plots of water-level recovery data. Hydraulic conductivity was estimated from recovery data by the Theis recovery method and Theim method. The Theis method is based on assumptions of confined aquifers and the Dupuit conditions. With well dewatering, these assumptions would be true only for late-time data. The Theim method is applicable to steady-state conditions and is not appropriate for this test.

Recommendation -- The present estimate of hydraulic conductivity by the Theis method can be used with caution. The estimate by the Theim method should not be used.

Well 6886 Bailer-Recovery Test

Date - 9/29/86

The well is screened from 1.5 to 3.7 ft in gravelly silty sand of the alluvium near Woman Creek. Claystone of the Arapahoe Formation was encountered at 2.8 ft. Saturated thickness has averaged 2.2 ft. Well development data indicate that the aquifer can produce significant amounts of water. Water was discharged by bailing for 2 min. Total volume discharged was 0.75 gal. Drawdown at the end of bailing essentially dewatered the alluvium. Methods of discharge measurement (bucket) and water-level measurement (electric tape) may have introduced some error. This is apparent in plots of water-level recovery data. Hydraulic conductivity was estimated from recovery data by the Theis recovery method and Theim method. The Theis method is based on assumptions of confined aquifers and the Dupuit conditions. With well dewatering, these assumptions would be true only for late-time data. The Theim method is applicable to steady-state conditions and is not appropriate for this test.

Recommendation -- The present estimate of hydraulic conductivity by the Theis method can be used with caution. The estimate by the Theim method should not be used.

Well 6986 Bailer-Recovery Test

Date - 10/6/86

The well is screened from 3 to 14 ft in alluvium. The geologists log shows the alluvium to consist of 11 ft of clay and 3 ft of clayey gravel. Claystone of the Arapahoe Formation was encountered at 14 ft. Saturated thickness has averaged 9.2 ft. Well development data indicate that the aquifer can produce significant amounts of water. Water was discharged by bailing for 15 min. Total volume discharged was 7.5 gal. Drawdown at the end of bailing essentially dewatered the alluvium. Methods of discharge measurement (bucket) and water-level measurement (electric tape) may have introduced some error. This is apparent in plots of water-level recovery data. Hydraulic conductivity was estimated from recovery data by the Theis recovery method and Theim method. The Theis method is based on assumptions of confined aquifers and the Dupuit conditions. With well dewatering, these assumptions would be true only for late-time data. The Theim method is applicable to steady-state conditions and is not appropriate for this test.

Recommendation -- The present estimate of hydraulic conductivity by the Theis method can be used with caution. The estimate by the Theim method should not be used.

851

Well 7086 Bailer-Recovery Test

Date - 10/23/86

The well is screened from 2.4 to 7.9 ft in alluvium. The geologists log shows the alluvium to consist of sandy clay, and clayey sand and gravel. Claystone of the Arapahoe Formation was encountered at 14 ft. Saturated thickness has averaged 6.2 ft. Well development data indicate that the aquifer can produce significant amounts of water. Water was discharged by bailing for 5 min. Total volume discharged was 2.75 gal. Drawdown at the end of bailing essentially dewatered the alluvium. Methods of discharge measurement (bucket) and water-level measurement (electric tape) may have introduced some error. This is apparent in plots of water-level recovery data. Hydraulic conductivity was estimated from recovery data by the Theis recovery method and Theim method. The Theis method is based on assumptions of confined aquifers and the Dupuit conditions. With well dewatering, these assumptions would be true only for late-time data. The Theim method is applicable to steady-state conditions and is not appropriate for this test.

Recommendation -- The present estimate of hydraulic conductivity by the Theis method can be used with caution. The estimate by the Theim method should not be used.

Well 0287 Pumping-Recovery Test

Date - 6/15/87

The well is completed in colluvium. The geologists log shows the colluvium to consist of sandy clay. Saturated thickness was 7.67 ft. Water was discharged by pumping approximately 0.07 gal/min for 2 hrs. Drawdown at the end of pumping essentially dewatered the well. Methods of discharge measurement (bucket) and water-level measurement (electric tape) may have introduced some error. Hydraulic conductivity was estimated from drawdown data by the Jacob method. Recovery data were analyzed by three methods. The final analysis of recovery data by the Theis method is considered the most reliable. However, all methods provided consistent estimates of 6.5E-05 to 7.1E-05 ft/min. The analyses all were based on assumptions of confined aquifers and the Dupuit conditions. With well dewatering, these assumptions would be true only for late-time data.

Recommendation -- The present estimates of hydraulic conductivity can be used with caution.

852

Well 0387BR Bailer-Recovery Test

Date - 6/18/87

The well is completed in the Arapahoe Formation. The geologist log shows that the well is completed in interbedded sandstone and claystone. Saturated thickness was 4.4 ft. Groundwater at this site is confined. Water was discharged by bailing approximately 2.32 gal in 21 min. Methods of discharge measurement (bucket) and water-level measurement (electric tape) may have introduced some error. Insufficient late-time data were collected. Hydraulic conductivity was estimated from recovery data by the Theis method (early time), a Theim method modified for wellbore storage, and the slug test method of Cooper and others. None of these methods is appropriate. The early-time match to the Theis curve was very poor, possibly because wellbore storage was not considered. The modification of the Theim method is inappropriate because the Theim method is applicable to steady-state conditions. The slug test method is not appropriate because the aquifer stress occurred over 21 minutes and can not be considered instantaneous.

Recommendation -- The present estimates of hydraulic conductivity should not be used. Because late-time data are not sufficient, reanalysis is not recommended.

Well 0487 Pumping-Recovery Test

Date - 6/15/87

The well is completed in colluvium. The geologists log shows the colluvium to consist of clay, sand and gravel, and sandy clay. The saturated thickness was 11.5 ft. Water was discharged by pumping approximately 0.13 gal/min for 30 min. Drawdown at the end of pumping essentially dewatered the well. Methods of discharge measurement (bucket) and water-level measurement (electric tape) may have introduced some error. Hydraulic conductivity was estimated from drawdown data by the Jacob straight-line method and the Theis method. Recovery data were analyzed by a modified Theim method, the Theis method, and a Theis method with flow rate adjusted in an effort to account for wellbore storage. The Jacob method resulted in a very poor match to data. The Theim method is not appropriate for application to transient flow conditions. The Theis method with adjusted flow rate is an inappropriate method for evaluating wellbore storage effects. The Theis recovery method did not produce an acceptable match to data.

Recommendation -- The present estimates of hydraulic conductivity should not be used. The general shape of drawdown and recovery curves do not conform with other simple analytical models. It is suspected that without observation well data no model would be successfully matched to the data. Therefore it is recommended that the data not be reanalyzed.

Well 0587BR Bailer-Recovery Test

Date - 6/18/87

The well is completed in a 9.25 ft section of the Arapahoe Formation. The geologist log shows that the well is completed in interbedded fine sandstone and claystone. A vertical fracture was noted in the completion interval. Groundwater at this site is unconfined. Water was discharged by bailing approximately 2.2 gal in 10 min. Methods of discharge measurement (bucket) and water-level measurement (electric tape) may have introduced some error. Hydraulic conductivity was estimated from recovery data by the Theis method, and a Theim method modified for wellbore storage. The Theis recovery method provided an acceptable match to the recovery data. Early-time data may have been effected by wellbore storage or water-table conditions. The modified Theim method is inappropriate for application to transient flow conditions.

Recommendation -- The present estimates of hydraulic conductivity should be used with caution.

Well 0887BR Bailer-Recovery Test

Date - 6/18/87

The well is completed in a 5 ft section of the Arapahoe Formation. The geologist log shows that the well is completed in lignite. Groundwater at this site is unconfined. Water was discharged by bailing approximately 0.55 gal in 4 min. Methods of discharge measurement (bucket) and water-level measurement (electric tape) may have introduced some error. Hydraulic conductivity was estimated from recovery data by the Theis method, and a Theim method modified for wellbore storage. The Theis recovery method provided a poor match to the recovery data. This may have been due to the effects of wellbore storage or water-table conditions. The modified Theim method is inappropriate for application to transient flow conditions. Data also were analyzed by the slug test method of Cooper and others. This method is not appropriate given the durations of pumping.

Recommendation -- The present estimates of hydraulic conductivity should not be used. The test is recommended for reanalysis by the Theis method emphasizing late-time data to minimize wellbore and water table effects.

Well B400189 Pumping-Recovery Test
B400089 (observation well)

Date - 7/20/89

The well is completed in the Rocky Flats alluvium. Saturated thickness was 27.5 ft. Groundwater at this site is unconfined. Well B400089 was located 14.3 ft away and was used as an observation well during the test. Water was discharged by pumping approximately 0.68 gal/m for 270 min. Both pumping and observation well were instrumented with transducers. The aquifer testing SOP appears to have been followed. Analysis of this test is reported in the background aquifer testing report. Hydraulic conductivity was estimated from pumping-period data by the Theis method applied to both pumping and observation well. Recovery data from the pumping well were also used with the Theis recovery method to estimate hydraulic conductivity. The matches of data to type curve were not shown for any analysis. Because pumping dewatered a large portion of the aquifer, corrected drawdown was used in all analyses. This correction is appropriate only if dewatering is no more than approximately 20 percent of the initial saturated thickness. Early-time data for both wells are noisy. The drawdown curve for the pumping well shows the typical response of wellbore storage (slope of unity on log-log paper) from 1 to 10 minutes. However, the shape of the observation well curve appears to follow closely the type curve. Hydraulic conductivity estimates obtained in these analyses ranged from 9.9E-05 to 3.9E-04 ft/min. The storage coefficient estimates obtained where appropriate were approximately 2E-03. This value is unrealistic for an unconfined aquifer and casts doubt on the analysis. It is possible that a more realistic value of storage coefficient would have been obtained if the pumping had occurred for an extended time (1 to 3 days and drawdown data were obtained indicating delayed yield.

Recommendation -- The present estimates of hydraulic conductivity can be used with caution.

855

Well B400489 Pumping-Recovery Test
B400589 (observation well)

Date - 7/28/89

The well is completed in the Rocky Flats alluvium. Saturated thickness was 31.7 ft. Groundwater at this site is unconfined. The observation well was located 14.9 ft away. Water was discharged by pumping approximately 12.06 gal/m. Both pumping and observation well were instrumented with transducers. The aquifer testing SOP appears to have been followed. Analysis of this test is reported in the background aquifer testing report. Hydraulic conductivity was estimated from pumping-period and recovery data by the Theis method applied to both pumping and observation well. The matches of data to type curves were not shown. However, the shape of the curves appears to deviate from the Theis type curve in a manner consistent with drawdown in a water-table aquifer. Corrected drawdown was used in all analyses. Given the magnitude of drawdown, this may not have been needed. Hydraulic conductivity estimates obtained in these analyses ranged from 0.04 to 0.06 ft/min. The storage coefficient estimate obtained was unrealistic for an unconfined aquifer and casts doubt on the analysis. It is possible that a more realistic value of storage coefficient would have been obtained if a water-table method such as the Neuman method was used. Inconsistent estimates of saturated thickness were used for estimating hydraulic conductivity from the pumping and observation wells. This introduced an error of approximately 25 percent. The estimates obtained from recovery data are in error by a factor of 2 due to an error in the equation used.

Recommendation -- The present estimates of hydraulic conductivity, after correction for errors in saturated thickness and equation, can be used with caution.

856

Well B201189 Pumping-Recovery Test
(with observation well)

Date - 8/18/89

The well is completed in a gravel zone of Quaternary colluvium. Saturated thickness was 26.4 ft. Groundwater at this site is unconfined. A nearby observation well was completed in clay. Water was discharged by pumping approximately 0.73 gal/m for 400 min. Both pumping and observation well were instrumented with transducers. However, the observation well showed no response to the pumping well. The aquifer testing SOP appears to have been followed. Analysis of this test is reported in the background aquifer testing report. Hydraulic conductivity was estimated from pumping-period and recovery data by the Theis method applied to the pumping well. The matches of data to type curves were not shown. However, the shape of the curves do not appear to follow the type curve. Because pumping dewatered a large portion of the aquifer, corrected drawdown was used in all analyses. This correction is appropriate only if dewatering is no more than approximately 20 percent of the initial saturated thickness. Hydraulic conductivity estimates obtained in these analyses were 3.9E-04 to 9.6E-04 ft/min. The estimates obtained from recovery data are in error by a factor of 2 due to an error in the equation used. The saturated thickness used in the recovery analysis was 4 ft. In previous analyses a thickness of 26.4 ft was used.

Recommendation -- The present estimates of hydraulic conductivity should not be used. The several computational errors need to be corrected.

857

Well B405889 Pumping-Recovery Test
B402189 (observation well)

Date - 8/8/89

Wells B405889 and B4020189 are completed in sandstones of the Arapahoe Formation. The wells are separated horizontally by 6.85 ft. Elevations of the two screened intervals differ by approximately 20 ft. The test was conducted to determine if the sandstones in the two wells were hydraulically connected. Water was discharged from Well B405889 by pumping approximately 6.14 gal/m. Both pumping and observation well were instrumented with transducers. The aquifer testing SOP appears to have been followed. Analysis of this test is reported in the background aquifer testing report. Hydraulic conductivity was estimated from pumping-period data obtained at the observation well by the Theis method. The matches of data to type curves were not shown. However, the shape of the curves appears to follow closely the type curve. The hydraulic conductivity estimate obtained in this analysis was 1.0E-02 ft/min. A value of storage coefficient calculated from the test data was in excess of one and is physically meaningless. Because the wells are separated vertically by a distance greater than the horizontal separation, the assumptions of the Theis method are not meet. The hydraulically effective distance from pumping to observation well probably is greater than the 6.85 ft used in the analysis. However, the actual path of water flow is not known. Two other estimates of hydraulic conductivity (0.012 and 0.0073 cm/sec) are listed in the table. The source for these estimates is identified as the background report. However, the source could not be verified.

Recommendation -- The present estimates of hydraulic conductivity should not be used. The unrealistic estimate of storage coefficient casts a significant doubt on the validity of the test analysis. The suspected error in selecting the effective distance between wells is considered the major cause of uncertainty in the estimate of hydraulic conductivity as well as the unrealistic estimate of storage coefficient. The Theis analysis could be repeated for the observation well with various effective distances in an effort to identify a range of hydraulic conductivity estimates and effective distances that result in physically reasonable estimates of storage coefficient. It is likely that such an effort would result in hydraulic-conductivity estimates that differ from the reported value by 1 to 3 orders of magnitude.

Wells and Pumping Tests Where No Estimate of Hydraulic Conductivity Was Possible

B304289 9/13/89
Used as a pumping well; response dominated by wellbore storage. Data considered unreliable.

B304589 9/13/89
Used as an observation well for B304289; no response to pumping.

B200589 8/18/89
Used as an observation well for B201189; no response to pumping.

B405689 7/28/89
Used as an observation well for B400489; no response to pumping.

881 Hillside Multiple Well Pumping Test
Pumping Well -- O-3
Observation Wells -- O-1, O-2, I-1, I-2

The 8-hr pumping test was conducted on 12/18/91 in the Woman Creek alluvium and is documented in Doty and Associates (1992). Description of the geologic setting and test procedures are sketchy. The site was instrumented with transducers. The report provides relatively unprocessed data from In Situ data loggers. The graphical presentation of the data is not as clear as it could be and no matches to type curves are shown. In general it appears that drawdown curves follow the Theis curve during very early time and deviate at later time. During later parts of the test, less drawdown occurred than would be predicted by the Theis method.

Water-level data were analyzed by the Jacob straight-line method and the Theis recovery method. Doty and Associates (1992) hypothesized that deviations from drawdown predicted by the Theis method were the result of delayed yield from storage. Therefore the Boulton method was used to estimate hydraulic conductivity. In general the Boulton method has been superseded by the water-table method of Neuman (1972, 1975). However, no Neuman analysis was attempted. Hydraulic conductivity estimates using these various methods ranged from 0.0059 to 0.037 cm/sec (1.2E-02 to 7.3E-02 ft/min). The Boulton method did not provide estimates that were consistently higher or lower than the Jacob or Theis methods.

Recommendation -- The 8-hr test duration was not sufficient to develop the double-hump response that is characteristic of delayed yield. Consequently, the hypothesis of delayed yield from storage can neither be confirmed nor denied. Other hypotheses such as channeling along preferential flow paths also could cause deviations from the ideal Theis response. Without a longer-term stress it is unlikely that any single hypothesis will be proven. Given the lack of definition in the late-time pumping-period data, the late-time matches using the Boulton method are considered unreliable. The early-time match at the pumping well (O-3) using the Boulton method also is considered unreliable because of wellbore storage effects. With these adjustments, the range of hydraulic conductivity estimates for the test is 0.016 to 0.037 cm/sec. This range indicates that estimates are relatively consistent from well to well and from analytical method to method.

8/20

REANALYSIS OF
BAILER-RECOVERY TESTS AND PUMPING-RECOVERY TESTS
1994

Results of Reanalyses

Aquifer tests conducted at a number of wells have been incompletely or incorrectly interpreted. Data for these tests have been reanalyzed. Details of specific analyses are included in the well-by-well test descriptions that follow. Results of the reanalyses are summarized in the following table.

Well Number	Hydraulic Conductivity (cm/sec)	Comment
2586	1.87×10^{-5}	Late-time Theis recovery analysis
2686	1.98×10^{-5}	Late-time Theis recovery analysis
2886	6.81×10^{-7}	Correction for saturated thickness and discharge rate
3586	3.13×10^{-5}	Correction for saturated thickness
3986	1.72×10^{-3}	Theis recovery analysis
4186	1.67×10^{-4}	Late-time Theis recovery analysis
4586	1.47×10^{-5}	Theis recovery analysis
5586	5.43×10^{-6}	Late-time Theis recovery analysis
0887BR	7.52×10^{-6}	Late-time Theis recovery analysis
B400489	1.50×10^{-2}	Correction for saturated thickness and equation error
	2.00×10^{-2}	Correction for saturated thickness and equation error
B201189	9.29×10^{-4}	Theis recovery analysis
B405889	9.25×10^{-3}	Late-time recovery analysis of pumped well
	7.81x10-3	Late-time Theis recovery analysis of observation well B402189
	8.00×10^{-3}	Theis analysis of observation well B402189 during pumping

861

Well 2586 Bailer-Recovery Test

Date - Nov 12, 1986

The well is screened from 60 to 82 ft in the Arapahoe Formation. Saturated thickness is estimated to be 8 ft. The log of the hole indicates that the screened interval consists of 11.7 ft of claystone, 2.4 ft of missing core and 8 ft of sandstone. Based on the original test data sheet, water was discharged by a bailer for 6 min and yielded 1.75 gal. Drawdown at the end of bailing essentially dewatered the well. Methods of discharge measurement (bucket) may have introduced some error. Hydraulic conductivity was estimated from recovery data by the Theis recovery method. The Theis method applies to confined aquifers. However, using Jacob's corrected drawdown, it can be used with reasonable confidence in unconfined aquifers where the drawdown is a small portion of the initial saturated thickness (20 percent). Because the aquifer was essentially dewatered at the well bore, vertical components of flow may have been significant. The Dupuit assumption, used when applying the Theis method to water-table conditions, would not be valid except for late-time data.

The recovery data were analyzed by the Theis recovery method as implemented in the AQTESOLV version 1.1 software (Duffield and Rumbaugh, 1991). Input data, output data and plot files for the analysis are called W2586.DAT, W2586.OUT, and W2586.PLT. Listings of the data files and the type-curve match are provided.

862

Well 2586 Recovery Data, Nov 12, 1986
pwrate
0.03899
trecov
6
tsdata

7	8.71	1
8	7.74	1
9	7.73	1
10	7.59	1
11	7.57	1
12	7.57	1
13	7.57	1
14	7.56	1
15	7.53	1
17	7.33	1
19	7.26	1
21	7.24	1
23	7.21	1
25	7.18	1
27	7.09	1
29	7.06	1
31	6.99	1
33	6.93	1
35	6.88	1
40	6.78	1
45	6.64	1
50	6.57	1
55	6.52	1
60	6.45	1
65	6.4	1
70	6.35	1
75	6.31	1
80	6.27	1
85	6.22	1
95	6.18	1
105	6.1	1
115	6.05	1
125	5.98	1
135	5.97	1
145	5.93	1
155	5.9	1
165	5.88	1
175	5.85	1
185	5.82	1
200	5.76	1
215	5.72	1
230	5.68	1
245	5.64	1
260	5.62	1
275	5.58	1
1273	4.16	1
1572	3.85	1
3031	2.77	1

863

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A Q T E S O L V   R E S U L T S

Version 1.10

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TEST DESCRIPTION

Data set........... w2586.dat
Data set title..... Well 2586 Recovery Data, Nov 12, 1986

Knowns and Constants:
No. of data points.................. 48
Pumping rate........................ 0.03899
Total pumping time.................. 6

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ANALYTICAL METHOD

Theis Recovery (Confined Aquifer)

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RESULTS FROM STATISTICAL CURVE MATCHING

STATISTICAL MATCH PARAMETER ESTIMATES

	Estimate		Std. Error
T =	2.9776E-004	+/-	3.2147E-005
S' =	5.9495E-001	+/-	4.4794E-002

ANALYSIS OF MODEL RESIDUALS

residual = calculated - observed
weighted residual = residual * weight

Weighted Residual Statistics:
Number of residuals............... 48
Number of estimated parameters.... 2
Degrees of freedom................ 46
Residual mean..................... -0.6545
Residual standard deviation....... 1.25
Residual variance................. 1.564

Model Residuals:

Time	Observed	Calculated	Residual	Weight
7	8.71	11.864	-3.1537	1
8	7.74	11.244	-3.5043	1
9	7.73	10.736	-3.0058	1
10	7.59	10.31	-2.7204	1
11	7.57	9.9489	-2.3789	1
12	7.57	9.6378	-2.0678	1
13	7.57	9.367	-1.797	1
14	7.56	9.1293	-1.5693	1
15	7.53	8.9187	-1.3887	1
17	7.33	8.5624	-1.2324	1
19	7.26	8.2722	-1.0122	1
21	7.24	8.0312	-0.79119	1
23	7.21	7.8278	-0.61783	1
25	7.18	7.6539	-0.47388	1
27	7.09	7.5034	-0.41338	1
29	7.06	7.3719	-0.31187	1

864

31	6.99	7.256	-0.26596	1
33	6.93	7.153	-0.22302	1
35	6.88	7.061	-0.18099	1
40	6.78	6.8686	-0.08858	1
45	6.64	6.7164	-0.076429	1
50	6.57	6.5931	-0.02309	1
55	6.52	6.4911	0.028922	1
60	6.45	6.4053	0.044701	1
65	6.4	6.3322	0.067839	1
70	6.35	6.2691	0.08094	1
75	6.31	6.2141	0.095938	1
80	6.27	6.1657	0.1043	1
85	6.22	6.1228	0.09716	1
95	6.18	6.0503	0.12975	1
105	6.1	5.9911	0.10888	1
115	6.05	5.942	0.10798	1
125	5.98	5.9006	0.079408	1
135	5.97	5.8652	0.10483	1
145	5.93	5.8345	0.095458	1
155	5.9	5.8078	0.09221	1
165	5.88	5.7842	0.095776	1
175	5.85	5.7633	0.086693	1
185	5.82	5.7446	0.075385	1
200	5.76	5.72	0.039969	1
215	5.72	5.6988	0.021168	1
230	5.68	5.6804	-0.00036169	1
245	5.64	5.6641	-0.024126	1
260	5.62	5.6497	-0.029743	1
275	5.58	5.6369	-0.056913	1
1273	4.16	5.461	-1.301	1
1572	3.85	5.4517	-1.6017	1
3031	2.77	5.4326	-2.6626	1

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RESULTS FROM VISUAL CURVE MATCHING

VISUAL MATCH PARAMETER ESTIMATES

	Estimate
T =	2.9776E-004
S' =	5.9495E-001

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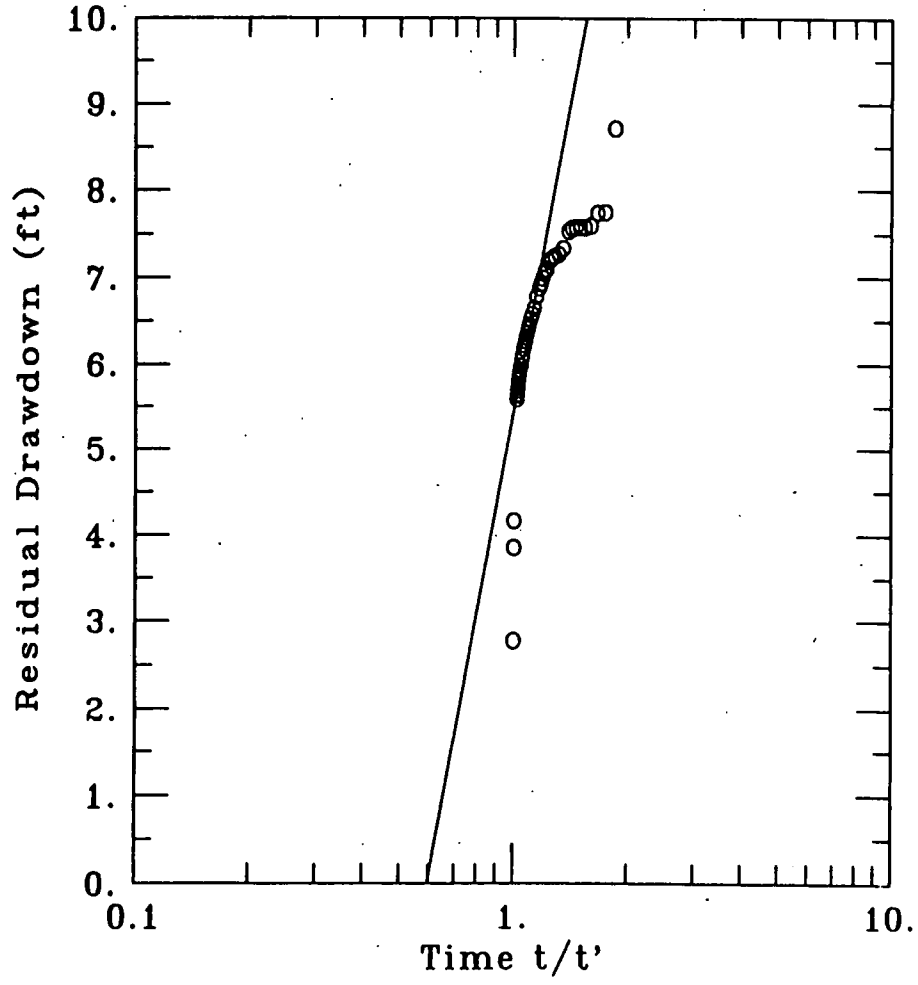
865

Well 2586 Recovery Data, Nov 12, 1986



DATA SET:
w2586.dat
09/12/94

AQUIFER TYPE:
Confined

SOLUTION METHOD:
Theis Recovery

ESTIMATED PARAMETERS:
T = 0.0002978 ft^2/min
S' = 0.595

TEST DATA:
Q = 0.03899 ft^3/min
t pumping = 6. min

Well 2686 Bailer-Recovery Test

Date - Nov 12, 1986

The well is screened from 3.75 to 11 ft in the alluvium and Arapahoe Formation. The log of the hole indicates that the screened interval consists of three lithologic units; 0.75 ft of gravel, 5 ft of sand and 1.5 ft of claystone. The water table general is located in the claystone. Occasionally, the lower portion of the sand becomes saturated. The original test data sheet indicates that 0.75 gal was removed from the well by bailing for 14 minutes. Drawdown at the end of bailing essentially dewatered the well. Methods of discharge measurement (bucket) may have introduced some error. The static water level recorded on the data sheet is incorrect. A more correct value can be inferred from the recovery water-level data and is noted in red on copies of the original data sheet. This value would imply that 0.75 ft of the sand unit was saturated at the start of the test.

An estimate of hydraulic conductivity has been obtained by applying the Theis recovery method, as implemented in the AQTESOLV version 1.1 software (Duffield and Rumbaugh, 1991), with corrected values of initial head. Input data, output data and plot files for the analysis are called W2686.DAT, W2686.OUT, W2686.PLT.

867

Well 2686 Recovery Data, Nov. 12, 1986
pwrate
0.00716196
trecov
14
tsdata

0.5	2.05	1
1	1.85	1
1.5	1.76	1
2	1.7	1
2.5	1.63	1
3	1.6	1
3.5	1.55	1
4	1.5	1
4.5	1.47	1
5	1.33	1
6	1.3	1
7	1.27	1
8	1.19	1
9	1.15	1
10	1.15	1
11	1.09	1
12	1.07	1
13	1.07	1
14	0.99	1
15	0.94	1
17	0.9	1
19	0.87	1
21	0.84	1
23	0.75	1
25	0.75	1
27	0.7	1
29	0.7	1
31	0.69	1
33	0.66	1
35	0.66	1
40	0.64	1
45	0.59	1
50	0.56	1
55	0.51	1
60	0.48	1
65	0.47	1
70	0.43	1
75	0.4	1
80	0.39	1
90	0.36	1
100	0.31	1
110	0.27	1
120	0.25	1
130	0.24	1
140	0.24	1
150	0.23	1
160	0.21	1
170	0.21	1

868

180	0.21	1
195	0.18	1
210	0.17	1

869

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A Q T E S O L V R E S U L T S
Version 1.10

09/09/94 13:04:40

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TEST DESCRIPTION

Data set........... w2686.dat
Data set title..... Well 2686 Recovery Data, Nov. 12, 1986

Knowns and Constants:
No. of data points.................. 51
Pumping rate........................ 0.007162
Total pumping time.................. 14

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ANALYTICAL METHOD

Theis Recovery (Confined Aquifer)

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RESULTS FROM STATISTICAL CURVE MATCHING

STATISTICAL MATCH PARAMETER ESTIMATES

	Estimate		Std. Error
T =	2.9831E-004	+/-	3.3657E-005
S' =	9.7545E-001	+/-	1.1492E-001

ANALYSIS OF MODEL RESIDUALS

residual = calculated - observed
weighted residual = residual * weight

Weighted Residual Statistics:
Number of residuals............... 51
Number of estimated parameters.... 2
Degrees of freedom................ 49
Residual mean..................... -0.5762
Residual standard deviation....... 1.137
Residual variance................. 1.294

Model Residuals:

Time	Observed	Calculated	Residual	Weight
0.5	2.05	6.482	-4.432	1
1	1.85	5.2223	-3.3723	1
1.5	1.76	4.5102	-2.7502	1
2	1.7	4.0211	-2.3211	1
2.5	1.63	3.6535	-2.0235	1
3	1.6	3.3621	-1.7621	1
3.5	1.55	3.123	-1.573	1
4	1.5	2.9216	-1.4216	1
4.5	1.47	2.7489	-1.2789	1
5	1.33	2.5985	-1.2685	1
6	1.3	2.3482	-1.0482	1
7	1.27	2.1468	-0.87683	1
8	1.19	1.9806	-0.79056	1
9	1.15	1.8404	-0.69043	1
10	1.15	1.7204	-0.57043	1
11	1.09	1.6163	-0.52631	1

12	1.07	1.525	-0.45498	1
13	1.07	1.4441	-0.37415	1
14	0.99	1.372	-0.38203	1
15	0.94	1.3072	-0.36725	1
17	0.9	1.1955	-0.29552	1
19	0.87	1.1024	-0.23244	1
21	0.84	1.0236	-0.18363	1
23	0.75	0.95598	-0.20598	1
25	0.75	0.89725	-0.14725	1
27	0.7	0.84575	-0.14575	1
29	0.7	0.80021	-0.10021	1
31	0.69	0.75964	-0.069643	1
33	0.66	0.72327	-0.063269	1
35	0.66	0.69046	-0.030463	1
40	0.64	0.62097	0.019032	1
45	0.59	0.56511	0.024887	1
50	0.56	0.51922	0.040776	1
55	0.51	0.48084	0.02916	1
60	0.48	0.44825	0.031746	1
65	0.47	0.42024	0.04976	1
70	0.43	0.3959	0.034103	1
75	0.4	0.37455	0.025454	1
80	0.39	0.35567	0.034334	1
90	0.36	0.32378	0.036221	1
100	0.31	0.29788	0.012119	1
110	0.27	0.27643	-0.0064274	1
120	0.25	0.25836	-0.0083634	1
130	0.24	0.24294	-0.002944	1
140	0.24	0.22963	0.010372	1
150	0.23	0.21801	0.011989	1
160	0.21	0.20779	0.0022114	1
170	0.21	0.19872	0.011277	1
180	0.21	0.19063	0.019372	1
195	0.18	0.17999	8.7969E-006	1
210	0.17	0.17083	-0.00082622	1

==

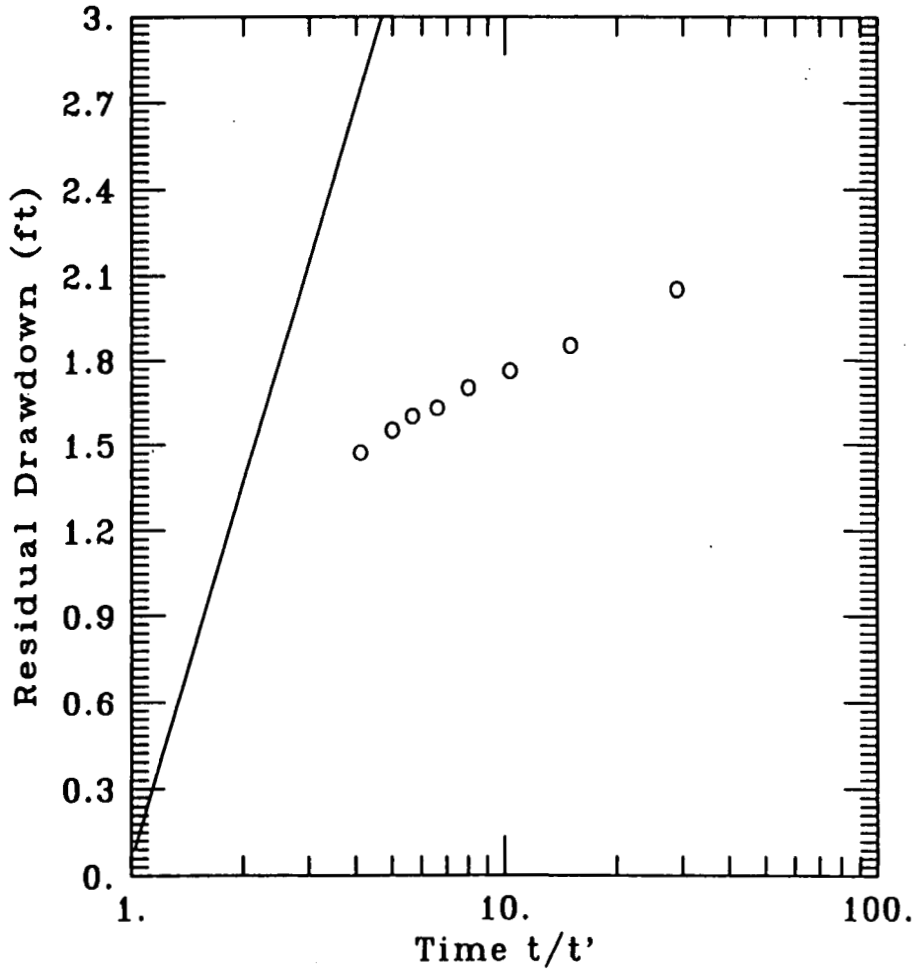
RESULTS FROM VISUAL CURVE MATCHING

VISUAL MATCH PARAMETER ESTIMATES

	Estimate
T =	2.9831E-004
S' =	9.7545E-001

<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>

Well 2686 Recovery Data, Nov. 12, 1986



DATA SET:
w2686.dat
09/09/94

AQUIFER TYPE:
Confined

SOLUTION METHOD:
Theis Recovery

ESTIMATED PARAMETERS:
T = 0.0002983 ft^2/min
S' = 0.9754

TEST DATA:
Q = 0.007162 ft^3/min
t pumping = 14. min

872

Well 2886 Bailer-Recovery Test

Date - Nov 11, 1986

The well is screened from 4 to 9.96 ft in alluvium. The static water level at the time of the test was 6.19 ft. Based on the original test data sheet, water was discharged by a bailer for 16.5 min and yielded 1 gal. Drawdown at the end of bailing essentially dewatered the well. Methods of discharge measurement (bucket) and water-level measurement (electric tape) may have introduced some error.

Hydraulic conductivity was estimated during a previous investigation by the Theis recovery method to be 1E-06 ft/min. This method is based on the assumptions of a confined aquifer and Dupuit flow conditions. With well dewatering, the assumptions may not be true. However, if applied to late-time data, the assumption is reasonable. Two important errors were made in conducting the Theis recovery analysis. Incorrect values for saturated thickness and discharge rate were used. A copy of the previous analysis is included. Using the existing Theis recovery analysis and adjusting the available estimate of hydraulic conductivity for a saturated thickness of 3.8 ft and a discharge rate of 0.06060 gal/min, a value of 1.34E-06 ft/min (6.8E-07 cm/sec) is obtained.

WELL 28-86

T Time (min.)	T' T Prime (min.)	Water Level (ft.)	s' Rsd Drwdn (ft.)	s-(S^2/2b) b=2.41 ft. (ft.)	log(T/T')
17.00	4.50	8.80	2.61	1.71	[illegible]
17.50	5.00	8.66	2.47	1.6[illegible]	[illegible]
18.00	5.50	8.64	2.45	1.65	[illegible]
18.50	6.00	8.61	2.42	1.64	[illegible]
19.00	6.50	8.57	2.38	1.63	[illegible]
19.50	7.00	8.53	2.34	1.61	
20.00	7.50	8.50	2.31	1.60	[illegible]
20.50	8.00	8.47	2.28	1.59	[illegible]
21.00	8.50	8.46	2.27	1.59	
21.50	9.00	8.40	2.21	1.56	[illegible]
22.00	9.50	8.40	2.21	1.56	[illegible]
23.00	10.50	8.35	2.16	1.54	[illegible]
24.00	11.50	8.33	2.14	1.53	
25.00	12.50	8.33	2.14	1.53	
26.00	13.50	8.27	2.08	1.51	[illegible]
27.00	14.50	8.26	2.07	1.[illegible]	
28.00	15.50	8.23	2.04	1.4[illegible]	[illegible]
29.00	16.50	8.22	2.03	1.4[illegible]	
30.00	17.50	8.19	2.00	1.47	[illegible]
31.00	18.50	8.17	1.98	1.46	[illegible]
33.00	20.50	8.12	1.93	1.4[illegible]	
35.00	22.50	8.08	1.89	1.4[illegible]	
37.00	24.50	8.05	1.86	1.4[illegible]	[illegible]
39.00	26.50	8.02	1.83	1.3[illegible]	
41.00	28.50	8.02	1.83	1.3[illegible]	
43.00	30.50	8.00	1.81	1.3[illegible]	[illegible]
45.00	32.50	7.98	1.79	1.3[illegible]	[illegible]
47.00	34.50	7.97	1.78	1.3[illegible]	[illegible]
49.00	36.50	7.92	1.73	1.3[illegible]	
51.00	38.50	7.91	1.72	1.3[illegible]	
56.00	43.50	7.87	1.68	1.3[illegible]	
59.00	46.50	7.85	1.66	1.2[illegible]	
66.00	53.50	7.80	1.61	1.27	
71.00	58.50	7.78	1.59	1.25	
76.00	63.50	7.77	1.58	1.[illegible]	
81.00	68.50	7.76	1.57	1.2[illegible]	
86.00	73.50	7.75	1.56	1.24	
91.00	78.50	7.73	1.54	1.23	[illegible]
96.00	83.50	7.68	1.49	1.20	
101.00	88.50	7.66	1.47	1.18	[illegible]
111.00	98.50	7.64	1.45	1.17	[illegible]
121.00	108.50	7.63	1.44	1.1[illegible]	

874

WELL 28-86

T Time (min.)	T' T Prime (min.)	Water Level (ft.)	s' Rsd Drwdn (ft.)	s-(S^2/2b) b=2.41 ft. (ft.)	log(T/T')
131.00	118.50	7.61	1.42	1.15	0.04
141.00	128.50	7.60	1.41	1.15	0.04
151.00	138.50	7.56	1.37	1.12	0.04
161.00	148.50	7.55	1.36	1.11	0.04
171.00	158.50	7.52	1.33	1.10	0.03
181.00	168.50	7.52	1.33	1.10	0.03
191.00	178.50	7.51	1.32	1.09	0.03
201.00	188.50	7.51	1.32	1.09	0.03
216.00	203.50	7.48	1.29	1.07	0.03
231.00	218.50	7.47	1.28	1.06	0.02
246.00	233.50	7.45	1.26	1.05	0.02
261.00	248.50	7.45	1.26	1.05	0.02
276.00	263.50	7.42	1.23	1.03	0.02
291.00	278.50	7.41	1.22	1.02	0.02
306.00	293.50	7.39	1.20	1.01	0.02
321.00	308.50	7.38	1.19	1.00	0.02
336.00	323.50	7.38	1.19	1.00	0.02
351.00	338.50	7.38	1.19	1.00	0.02
381.00	368.50	7.37	1.18	1.00	0.01
2039.00	2026.50	7.05	0.86	0.76	0.00
2397.00	2384.50	6.75	0.56	0.52	0.00
3396.00	3383.50	6.62	0.43	0.41	0.00
3689.00	3676.50	6.56	0.37	0.35	0.00
5159.00	5146.50	6.27	0.08	0.08	0.00
9188.00	9175.50	6.33	0.14	0.14	0.00
9588.00	9575.50	6.26	0.07	0.07	0.00
10605.00	10592.50	6.30	0.11	0.11	0.00

875

WESTON

SHEET ____ of ____

CLIENT/SUBJECT _____ W.O. NO. _____

TASK DESCRIPTION _____ TASK NO. _____

PREPARED BY _____ DEPT _____ DATE _____

MATH CHECK BY _____ DEPT _____ DATE _____

METHOD REV. BY _____ DEPT _____ DATE _____

APPROVED BY _____ DEPT _____ DATE _____

WELL 28-86

$$T\ (gpd/ft) = \frac{264\,Q}{\Delta s'} = \frac{264\,(.0690)}{289}\ 6.30 \times 10^{-2}$$

where $Q\ (gpm) = 1\ gallon / 14.5\ min = 0.0690\ gpm$

$\Delta s'$ = ft. change in residual drawdown / log cycle

= 289 ft/log cycle (see attached plot)

$$K\ (gpd/ft^2) = T/b = 6.30 \times 10^{-2} / 5.8 = 1.09 \times 10^{-2}$$

where $b\ (ft) = 11.99 - D) - 6.19 = 5.8\ ft$

$$K\ (cm/sec) = 1.09 \times 10^{-2}\ gpd/ft^2 \times \frac{4.72 \times 10^{-5}\ cm/sec}{gpd/ft^2} = 5.1 \times 10^{-7}$$

This method is valid where $u \leq 0.01$

solving for t for $u \leq 0.01$.

$$t\ (min) = \frac{r^2 S}{4\,T\,u} = \frac{(.302)^2\ (.1)}{4\,(1.09 \times 10^{-2})(.01)} \times \frac{1440\ min}{day} \times \frac{7.482\ gal}{ft^3}$$

= 225,376 min.

where $r\ (ft) = \left(\frac{7.25}{24}\right) ft = .302\ ft$

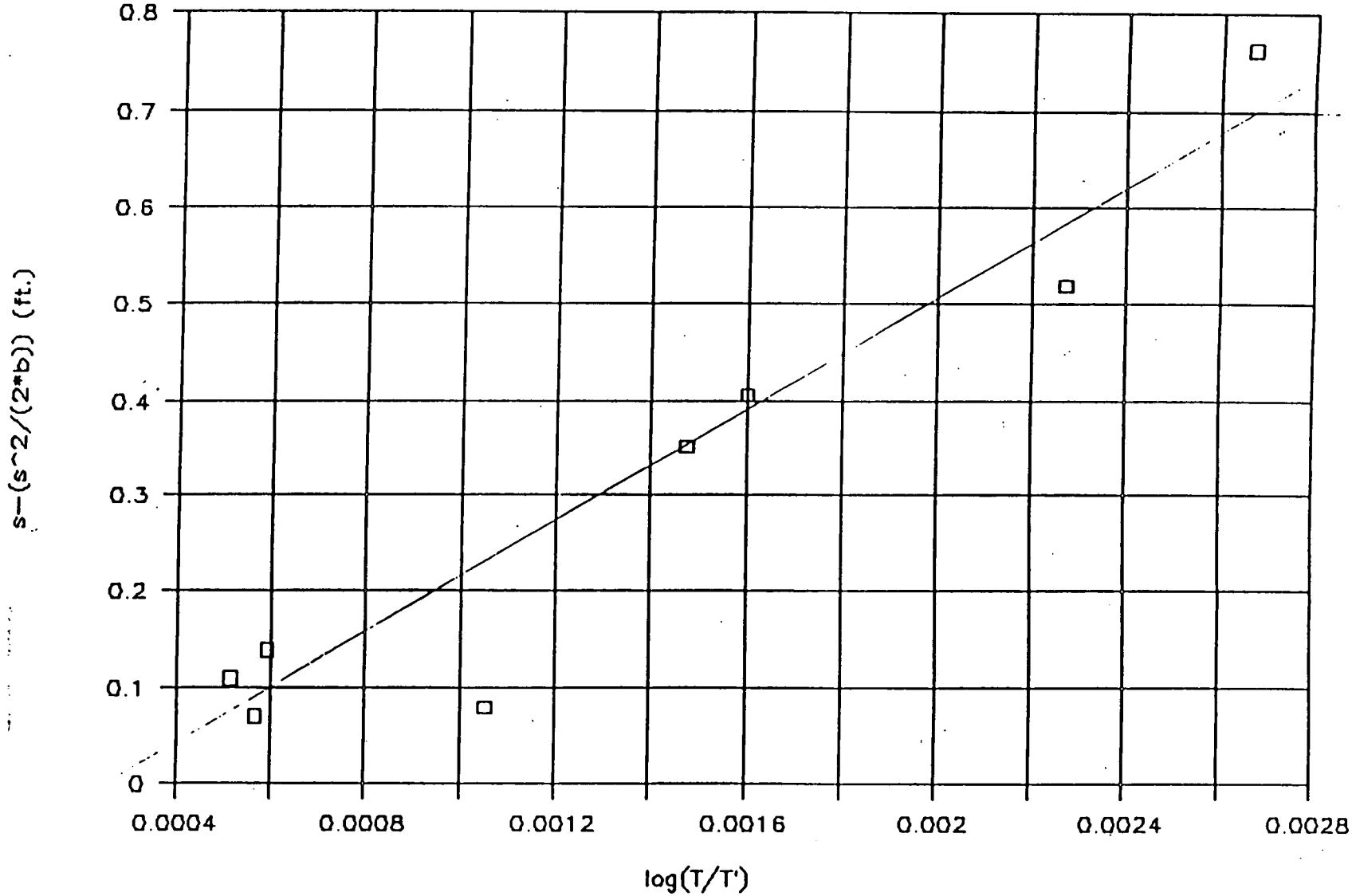
S = 0.1 assumed S for unconfined aquifers.

$\Delta s'$ is involved.

876

RFW 10-05-003/A-5/85

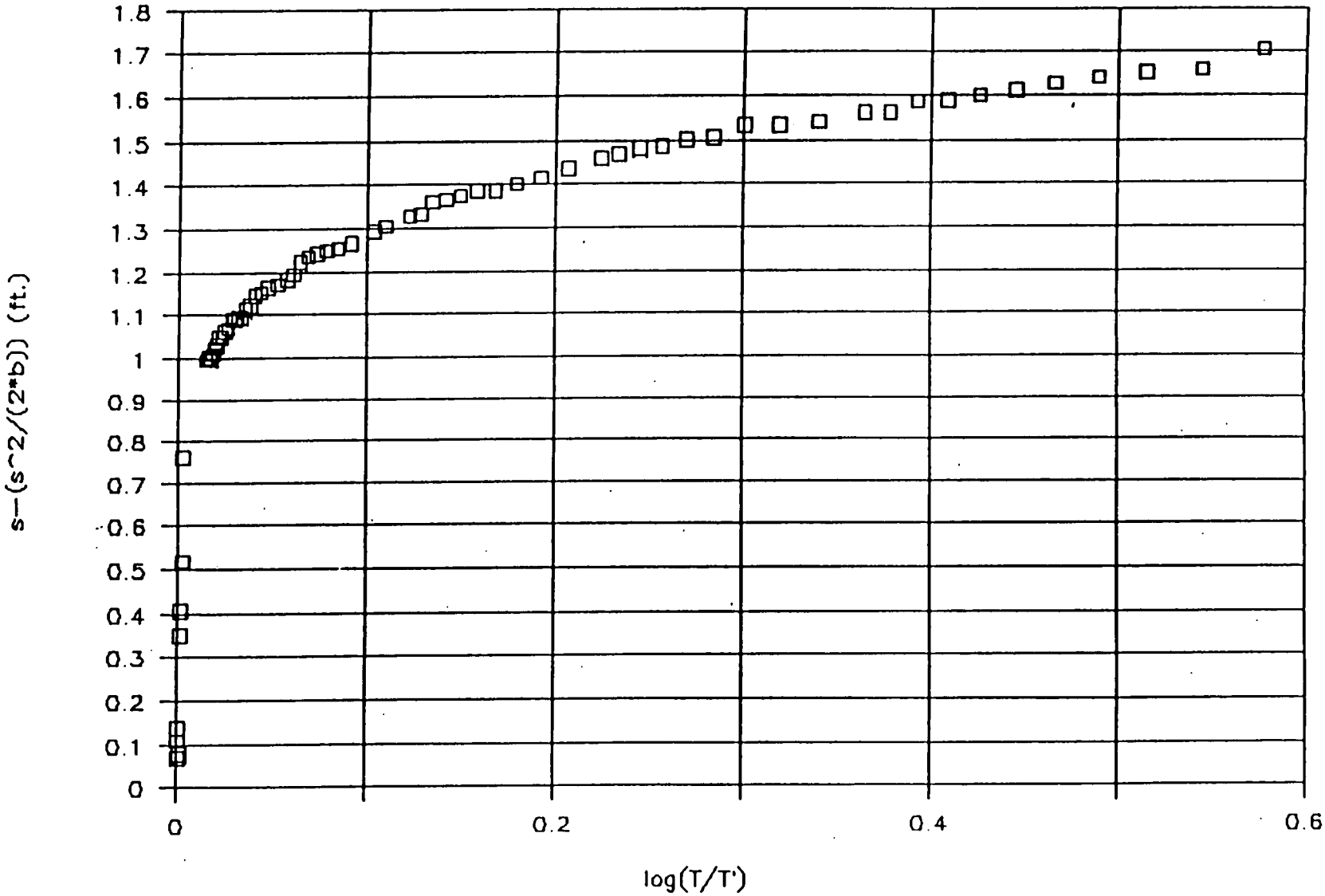
WELL 28-86



$$\Delta s' = \frac{(.756 - .043)\ ft}{.0028 - .0004} = 2.87\ ft/\log\ cycle$$

877

WELL 28-86



878

Well 3586 Bailer-Recovery Test

Date - Sep 25, 1986

The well is screened from 5 to 11.6 ft in clayey alluvium. Clay continued to a depth of 12.5 ft where claystone of the Arapahoe was encountered. The water level at the time of the test was 6.94 ft giving a saturated thickness of approximately 5.6 ft. Based on the original test data sheet, water was discharged by a bailer for 6 min and yielded 1.5 gal. Drawdown at the end of bailing essentially dewatered the well. Methods of discharge measurement (bucket) and water-level measurement (electric tape) may have introduced some error.

Hydraulic conductivity was estimated during a previous investigation by the Theis recovery method to be 5.1E-05 ft/min. However, an erroneous value of 6.74 ft was used for saturated thickness. The Theis recovery method is based on the assumptions of a confined aquifer and Dupuit flow conditions. If applied to late-time data, the assumption is reasonable for the test of Well 3586. A copy of the previous analysis is included. Using the existing Theis recovery analysis and adjusting for the actual saturated thickness, the estimate of hydraulic conductivity obtained by the Theis recovery method is 6.2E-05 ft/min (3.13E-05 cm/sec).

879

AQUIFER TEST DATA WELL 35-86

Type of Aquifer Test: Bail down - Recovery
How Q Measured: 4.5 gallon bucket
How W.L.'s Measured: Olympic Well Sounder
Measuring Point for W.L.'s: Top of Casing
Elevation of Measuring Point: 5914.62'

Project No.: 106P06222
Location: Rocky Flats Plant
Personnel: W. Herst, D. Pavlick

Depth of pump/airline: N/A
Start bailing: 9/25/86 Time: 1255:00
Stop bailing: 9/25/86 Time: 1301:00
Duration of Aquifer Test: 110 minutes

TIME		WATER LEVEL DATA		COMMENTS
t = 6	at t' = 0	Static Water Level: 6.94		
t	t'	Water Level	Draw-down	
0		6.94		Begin bailing
.8				Bailed 1 gallon
4.5				Bailed 0.5 gallon
6.0	0			Stop bailing
6.8	.8	11.17	4.23	
7.1	1.1	10.99	4.05	Total depth = 11.64
7.5	1.5	10.85	3.91	
8.0	2.0	10.71	3.77	
8.5	2.5	10.57	3.63	
9.0	3.0	10.46	3.52	
9.5	3.5	10.34	3.40	
10.0	4.0	10.26	3.32	
10.5	4.5	10.17	3.23	
11.0	5.0	10.08	3.14	
12.0	6.0	9.95	3.01	
13.0	7.0	9.80	2.86	
14.0	8.0	9.76	2.82	
15.0	9.0	9.62	2.68	
16.0	10.0	9.56	2.62	
17.0	11.0	9.47	2.53	
18.0	12.0	9.38	2.44	
19.0	13.0	9.29	2.35	
20.0	14.0	9.20	2.26	
22.0	16.0	9.07	2.13	
24.0	18.0	8.94	2.00	
26.0	20.0	8.84	1.90	
28.0	22.0	8.74	1.80	
30.0	24.0	8.66	1.72	
32.0	26.0	8.58	1.64	
34.0	28.0	8.50	1.56	
36.0	30.0	8.41	1.47	
38.0	32.0	8.33	1.39	
40.0	34.0	8.27	1.33	
42.0	36.0	8.11	1.17	

880

45.0	39.0	7.98	1.04	
50.0	44.0	7.88	.94	
60.0	54.0	7.78	.84	
65.0	59.0	7.71	.77	
70.5	64.5	7.61	.67	
75.0	69.0	7.57	.63	
80.0	74.0	7.52	.58	
85.0	79.0	7.50	.56	
90.0	84.0	7.47	.53	
100.0	94.0	7.40	.46	90% recovered at
110.0	104.0	7.35	.41	7.41'

881

WESTON

SHEET ____ of ____

CLIENT/SUBJECT _____ W.O. NO. _____

TASK DESCRIPTION _____ TASK NO. _____

PREPARED BY _____ DEPT _____ DATE _____

MATH CHECK BY _____ DEPT _____ DATE _____

METHOD REV. BY _____ DEPT _____ DATE _____

APPROVED BY _____ DEPT _____ DATE _____

WELL 35-86

$$T\ (gpd/ft) = \frac{264\,Q}{\Delta s'} = \frac{(264)(.25)}{17.5} = 3.77$$

where $Q\ (gpm) = 1.5$ gallons / 6 minutes $= 0.25$ gpm

$\Delta s'$ = ft. change in residual drawdown / log cycle

= 17.5 ft/log cycle (see attached plot)

$$K\ (gpd/ft^2) = T/b = 3.77/6.74 = 0.559$$

where $b\ (ft) = 6.74$ ft

$$K\ (cm/sec) = 0.559\ gpd/ft^2 \times \frac{4.72\times10^{-5}\ cm/sec}{gpd/ft^2} = 2.6\times10^{-5}$$

This method is valid where $u < 0.01$

solving for t for $u = 0.01$.

$$t\ (min) = \frac{r^2 S}{4\,T\,u} = \frac{(.302)^2\ .1}{4\,(3.77)\,(.01)} \times \frac{1440\ min}{day} \times \frac{7.48\ gal}{ft^3}$$

$= 652$ min.

where r (ft) $= \frac{7.25}{24}$ ft $= (.302)$ ft

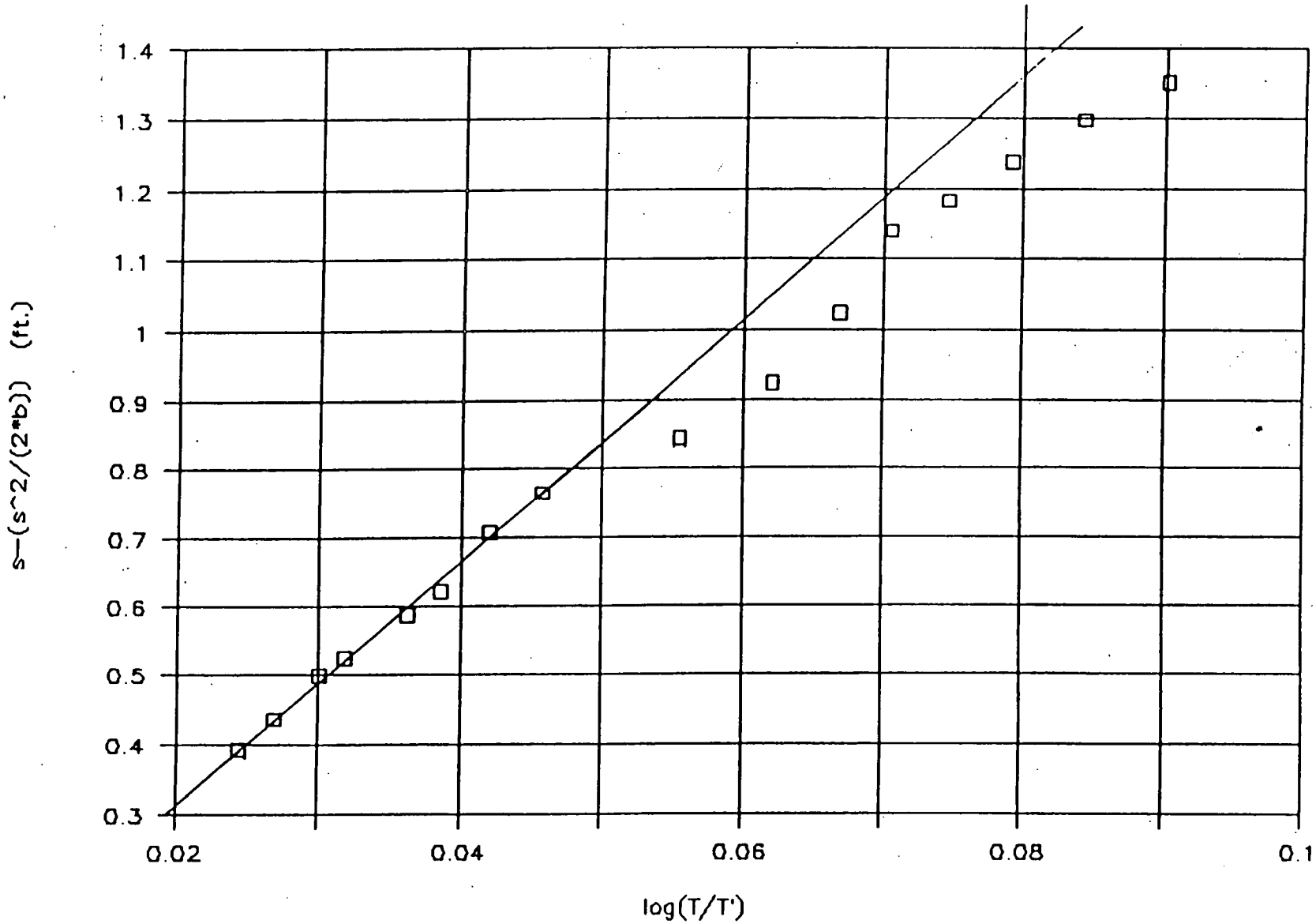
S = assumed S for confined aquifer

$\Delta s'$ is invalid.

882

RFW 10-05-003/A-5/85

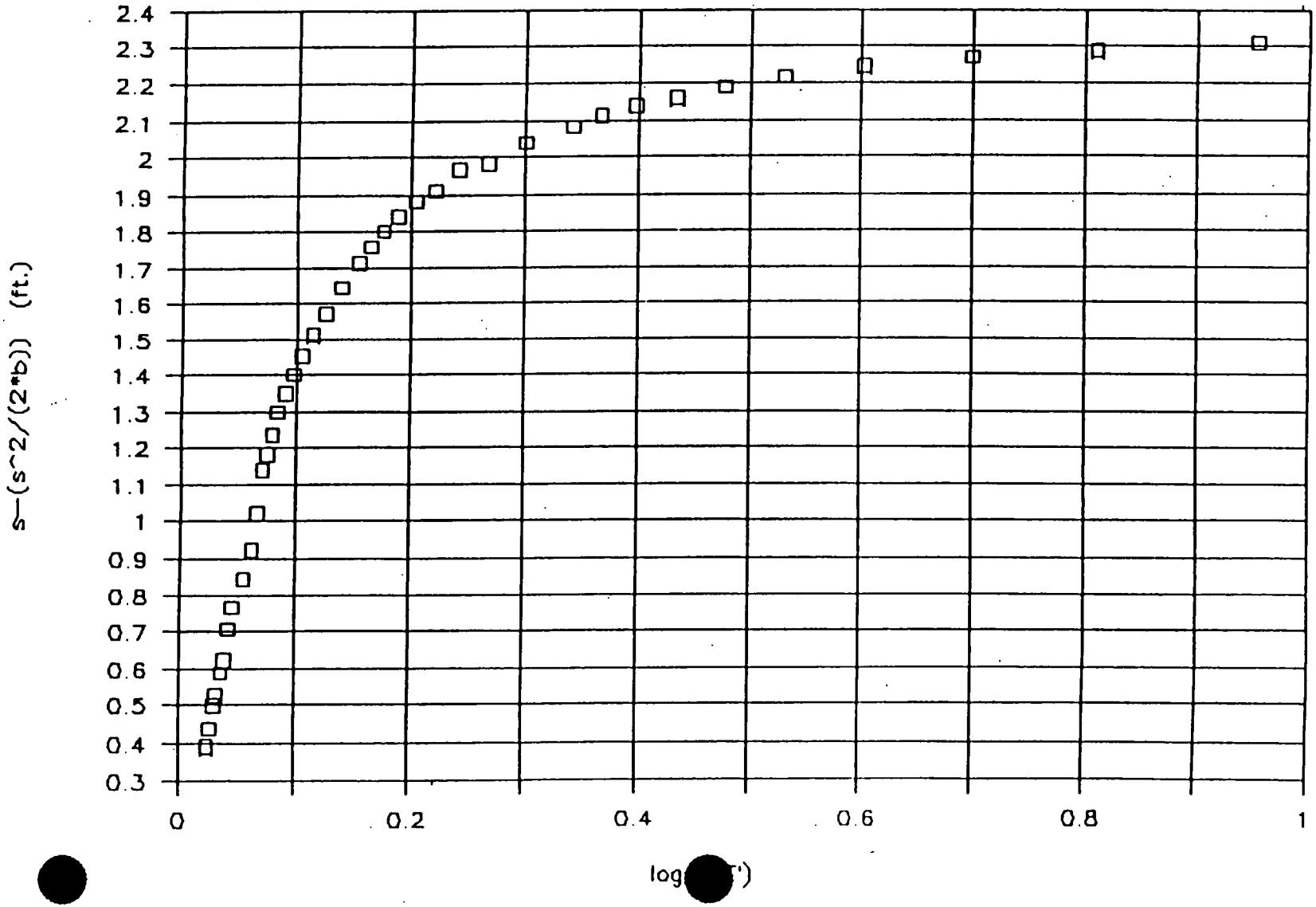
WELL 35-86



$$\Delta s' = \frac{(1.40 - 0.31)\,ft}{.0822 - .0200} = 17.5\ ft/\log\ cycle$$

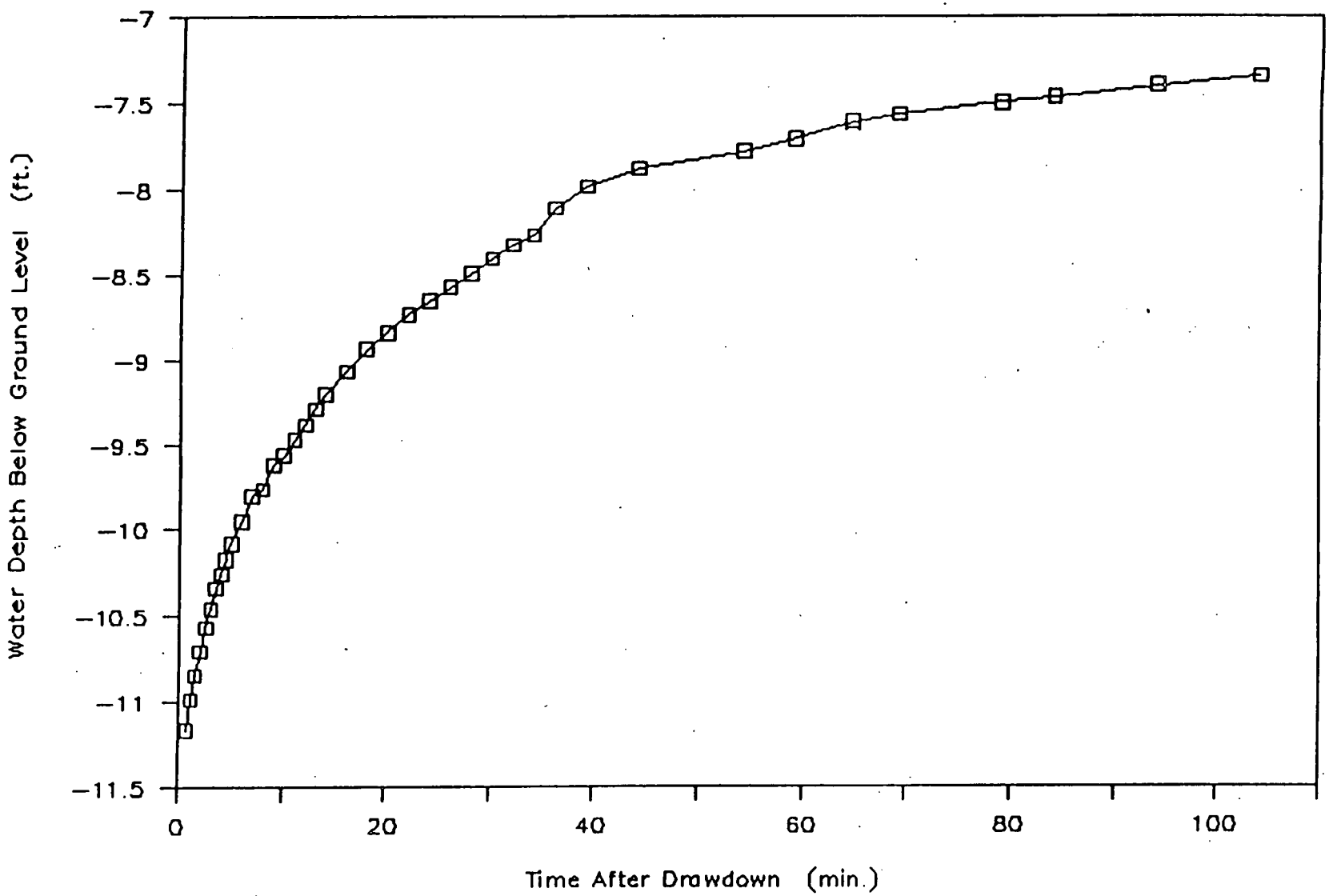
883

WELL 35-86



884

WELL 35-86



885

Well 3986 Constant Discharge-Recovery Test

Date - Sep 25, 1986

The well is screened from 5 to 31.5 ft in Rocky Flats Alluvium. Claystone of the Arapahoe Formation forms the underlying unit. Saturated thickness has averaged 10.5 ft. One log of the hole indicates that the saturated unit is clay. A second log indicates a sandy gravel unit. An original geologist's log completed at the time of drilling is not available. Well development data indicate a reasonably productive aquifer. The test was conducted after the well was developed. Water was discharged by an airlift pump. Methods of discharge measurement (bucket) and water-level measurement (electric tape) may have introduced some error. This is particularly apparent in the recovery data for time equals 13 minutes. However, the data are considered sufficiently reliable for interpretation.

The drawdown data during most of the pumping period plot on log-log scales as a straight line of unit slope. This is characteristic of drawdown influenced by wellbore storage. The last two water level measurements made during the pumping period reflect aquifer characteristics. However, this is not sufficient information for analysis.

An estimate of hydraulic conductivity has been obtained by applying the Theis recovery method, as implemented in the AQTESOLV version 1.1 software (Duffield and Rumbaugh, 1991). Input data, output data and plot files for the analysis are called W3986.DAT, W3986.OUT, W3986.PLT.

886

Well 3986 Recovery Data, Sep. 25, 1986
pwrate
0.19652
trecov
8.2
tsdata

0.7	0.93	1
1.3	0.72	1
1.8	0.59	1
2.3	0.53	1
2.8	0.45	1
3.3	0.42	1
3.8	0.42	1
4.3	0.28	1
4.8	0.31	1
5.3	0.22	1
5.8	0.2	1
6.3	0.18	1
6.8	0.16	1
8	0.14	1
8.8	0.12	1
9.8	0.1	1
10.8	0.09	1
11.8	0.09	1
12.8	0.08	1

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A Q T E S O L V   R E S U L T S
Version 1.10

09/14/94 12:13:53

==

TEST DESCRIPTION

Data set........... w3986.dat
Data set title..... Well 3986 Recovery Data, Sep. 25, 1986

Knowns and Constants:
No. of data points.................. 19
Pumping rate........................ 0.1965
Total pumping time.................. 8.2

==

ANALYTICAL METHOD

Theis Recovery (Confined Aquifer)

==

RESULTS FROM STATISTICAL CURVE MATCHING

STATISTICAL MATCH PARAMETER ESTIMATES

	Estimate		Std. Error
T =	3.5621E-002	+/-	1.0185E-003
S' =	1.4337E+000	+/-	3.6597E-002

ANALYSIS OF MODEL RESIDUALS

residual = calculated - observed
weighted residual = residual * weight

Weighted Residual Statistics:
Number of residuals............... 19
Number of estimated parameters.... 2
Degrees of freedom................ 17
Residual mean..................... -0.0004191
Residual standard deviation....... 0.02873
Residual variance................. 0.0008255

Model Residuals:

Time	Observed	Calculated	Residual	Weight
0.7	0.93	0.95833	-0.028334	1
1.3	0.72	0.71516	0.0048422	1
1.8	0.59	0.59479	-0.0047861	1
2.3	0.53	0.50858	0.021424	1
2.8	0.45	0.44263	0.0073739	1
3.3	0.42	0.39	0.030001	1
3.8	0.42	0.34674	0.073262	1
4.3	0.28	0.31038	-0.030384	1
4.8	0.31	0.2793	0.030696	1
5.3	0.22	0.25236	-0.032365	1
5.8	0.2	0.22875	-0.028748	1
6.3	0.18	0.20785	-0.027846	1
6.8	0.16	0.1892	-0.029197	1
8	0.14	0.15163	-0.011628	1
8.8	0.12	0.13094	-0.010943	1
9.8	0.1	0.10878	-0.00878	1

10.8	0.09	0.089856	0.00014391	1
11.8	0.09	0.073495	0.016505	1
12.8	0.08	0.0592	0.0208	1

==

RESULTS FROM VISUAL CURVE MATCHING

VISUAL MATCH PARAMETER ESTIMATES

	Estimate
T =	3.5621E-002
S' =	1.4337E+000

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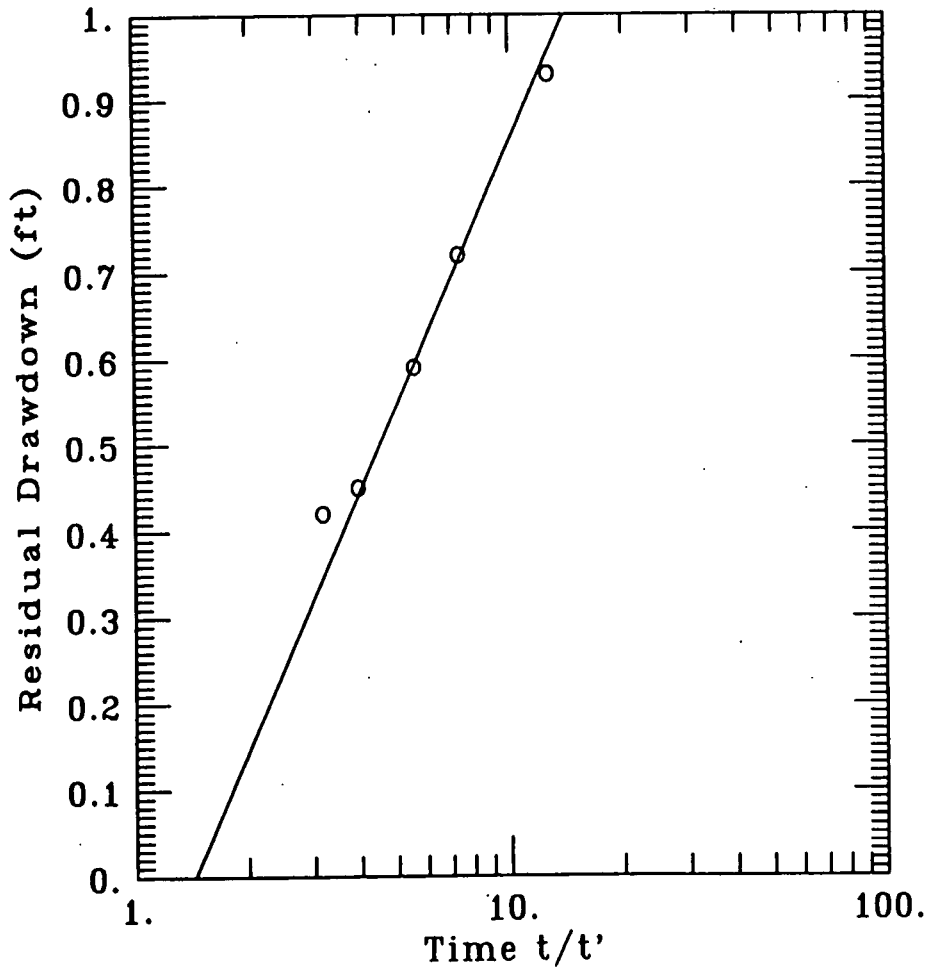
Well 3986 Recovery Data, Sep. 25, 1986



DATA SET:
w3986.dat
09/09/94

AQUIFER TYPE:
Confined

SOLUTION METHOD:
Theis Recovery

ESTIMATED PARAMETERS:
T = 0.03567 ft^2/min
S' = 1.434

TEST DATA:
Q = 0.1965 ft^3/min
t pumping = 8.2 min

890

Well 4186 Bailer-Recovery Test

Date - unknown

The well is screened to 44.7 ft in Rocky Flats Alluvium. Claystone of the Arapahoe Formation forms the underlying unit. Saturated thickness has averaged 10.3 ft. The saturated unit consists of sand and gravel. Water was discharged by bailing 2 gal in 15.2 min (0.132 gal/min). This nearly dewatered the well. Methods of discharge measurement (bucket) and water-level measurement (electric tape) may have introduced some error. This is particularly apparent in the pretest water level data which were in error by 10 ft. The water level changes originally recorded were greater than the saturated thickness of the well. Correcting the recovery data for this apparent discrepancy, the test is considered sufficiently reliable for interpretation.

An estimate of hydraulic conductivity has been obtained by applying the Theis recovery method, as implemented in the AQTESOLV version 1.1 software (Duffield and Rumbaugh, 1991). Measurements of drawdown recorded on the original data sheet were corrected by subtracting 10 ft. Input data, output data and plot files for the analysis are called W4186.DAT, W4186.OUT, W4186.PLT.

891

Well 4186 Recovery Data, 1986
pwrate
0.01759
trecov
15.2
tsdata

0.5	8.73	1
1	8.45	1
1.5	8.19	1
2	7.91	1
2.5	7.66	1
3	7.36	1
3.5	7.05	1
4	6.84	1
4.5	6.51	1
5	6.3	1
6	5.8	1
7	5.28	1
8	4.85	1
9	4.41	1
10	4	1
11	3.6	1
12	3.24	1
13	2.97	1
14	2.66	1
15	2.39	1
17	1.96	1
19	1.6	1
21	1.38	1
23	1.15	1
25	1.01	1
27	0.85	1
29	0.74	1
31	0.63	1
33	0.6	1
35	0.54	1
40	0.5	1
45	0.51	1
50	0.48	1
55	0.46	1
60	0.5	1
65	0.47	1
70	0.5	1
75	0.49	1
80	0.49	1
85	0.53	1
95	0.52	1
105	0.5	1
115	0.51	1
125	0.52	1
135	0.53	1
145	0.53	1
155	0.53	1
165	0.53	1

892

175	0.53	1
185	0.51	1
200	0.49	1
215	0.48	1
230	0.5	1
245	0.5	1
260	0.48	1
275	0.49	1
290	0.48	1
305	0.46	1
320	0.49	1
335	0.47	1
365	0.49	1

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A Q T E S O L V R E S U L T S
Version 1.10

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==

TEST DESCRIPTION

Data set........... w4186.dat
Data set title..... Well 4186 Recovery Data, 1986

Knowns and Constants:
- No. of data points.................. 61
- Pumping rate........................ 0.01759
- Total pumping time.................. 15.2

==

ANALYTICAL METHOD

Theis Recovery (Confined Aquifer)

==

RESULTS FROM STATISTICAL CURVE MATCHING

STATISTICAL MATCH PARAMETER ESTIMATES

	Estimate		Std. Error
T =	2.0894E-004	+/-	1.4128E-005
S' =	1.3901E+000	+/-	7.5431E-002

ANALYSIS OF MODEL RESIDUALS

residual = calculated - observed
weighted residual = residual * weight

Weighted Residual Statistics:
- Number of residuals............... 61
- Number of estimated parameters.... 2
- Degrees of freedom................ 59
- Residual mean..................... 0.2555
- Residual standard deviation....... 2.616
- Residual variance................. 6.845

Model Residuals:

Time	Observed	Calculated	Residual	Weight
0.5	8.73	20.889	-12.159	1
1	8.45	16.454	-8.0042	1
1.5	8.19	13.941	-5.751	1
2	7.91	12.211	-4.3011	1
2.5	7.66	10.908	-3.2479	1
3	7.36	9.8729	-2.5129	1
3.5	7.05	9.0216	-1.9716	1
4	6.84	8.3036	-1.4636	1
4.5	6.51	7.6867	-1.1767	1
5	6.3	7.1486	-0.84864	1
6	5.8	6.2507	-0.45075	1
7	5.28	5.5267	-0.24668	1
8	4.85	4.9272	-0.077174	1
9	4.41	4.4207	-0.010726	1
10	4	3.9861	0.013935	1
11	3.6	3.6082	-0.0081869	1

12	3.24	3.2761	-0.036147	1
13	2.97	2.9817	-0.011739	1
14	2.66	2.7187	-0.058666	1
15	2.39	2.482	-0.092004	1
17	1.96	2.073	-0.11301	1
19	1.6	1.7315	-0.1315	1
21	1.38	1.4417	-0.061704	1
23	1.15	1.1925	-0.042473	1
25	1.01	0.97571	0.034291	1
27	0.85	0.78536	0.06464	1
29	0.74	0.61681	0.12319	1
31	0.63	0.46647	0.16353	1
33	0.6	0.33152	0.26848	1
35	0.54	0.20967	0.33033	1
40	0.5	-0.048862	0.54886	1
45	0.51	-0.25707	0.76707	1
50	0.48	-0.42843	0.90843	1
55	0.46	-0.57197	1.032	1
60	0.5	-0.69397	1.194	1
65	0.47	-0.79897	1.269	1
70	0.5	-0.8903	1.3903	1
75	0.49	-0.97047	1.4605	1
80	0.49	-1.0414	1.5314	1
85	0.53	-1.1046	1.6346	1
95	0.52	-1.2125	1.7325	1
105	0.5	-1.3011	1.8011	1
115	0.51	-1.3752	1.8852	1
125	0.52	-1.4381	1.9581	1
135	0.53	-1.4921	2.0221	1
145	0.53	-1.539	2.069	1
155	0.53	-1.5802	2.1102	1
165	0.53	-1.6165	2.1465	1
175	0.53	-1.6489	2.1789	1
185	0.51	-1.6779	2.1879	1
200	0.49	-1.7162	2.2062	1
215	0.48	-1.7493	2.2293	1
230	0.5	-1.7782	2.2782	1
245	0.5	-1.8037	2.3037	1
260	0.48	-1.8263	2.3063	1
275	0.49	-1.8465	2.3365	1
290	0.48	-1.8647	2.3447	1
305	0.46	-1.8811	2.3411	1
320	0.49	-1.8961	2.3861	1
335	0.47	-1.9097	2.3797	1
365	0.49	-1.9336	2.4236	1

==

RESULTS FROM VISUAL CURVE MATCHING

VISUAL MATCH PARAMETER ESTIMATES

	Estimate
T =	2.0894E-004
S' =	1.3901E+000

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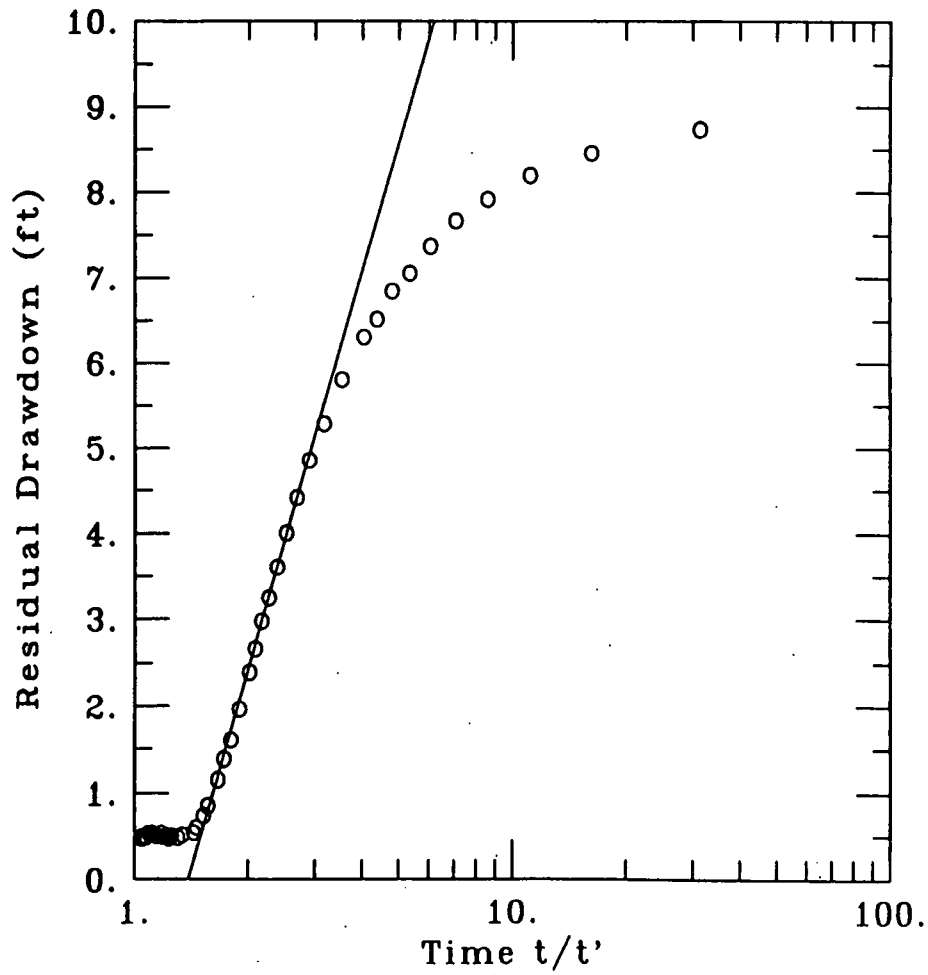
Well 4186 Recovery Data, 1986



DATA SET:
w4186.dat
09/13/94

AQUIFER TYPE:
Confined

SOLUTION METHOD:
Theis Recovery

ESTIMATED PARAMETERS:
T = 0.0002089 ft^2/min
S' = 1.39

TEST DATA:
Q = 0.01759 ft^3/min
t pumping = 15.2 min

896

Well 4586 Constant Discharge-Recovery Test (airlift-slug)

Date - Oct 22, 1986

The well is screened from 3 to 48.2 ft in Rocky Flats Alluvium. The Laramie Formation forms the underlying unit. Saturated thickness has averaged 22 ft. The log of the hole indicates that the saturated unit is sandy gravel. From development data it is known that the well is a good producer. The test was conducted after the well was developed. Water was discharged by an airlift pump for 5.5 min. Total pumpage was 1.53 gal. Methods of discharge measurement (bucket) and water-level measurement (electric tape) may have introduced some error.

An estimate of hydraulic conductivity has been obtained by applying the Theis recovery method, as implemented in the AQTESOLV version 1.1 software (Duffield and Rumbaugh, 1991). Input data, output data and plot files for the analysis are called W4586.DAT, W4586.OUT, W4586.PLT.

Well 4586 Recovery Data, Oct 22, 1986
pwrate
0.03719
trecov
5.5
tsdata

0.75	9.36	1
1.25	7.61	1
1.5	6.89	1
2	6.02	1
2.5	5.42	1
3	5.09	1
3.5	4.71	1
4	4.33	1
4.5	3.86	1
5	3.57	1
5.5	3.26	1
6	2.99	1
7	2.72	1
8	2.44	1
9	2.15	1
10	1.86	1
11	1.62	1
12	1.42	1
13	1.24	1
14	1.07	1
15	0.97	1

898

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A Q T E S O L V R E S U L T S
Version 1.10

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TEST DESCRIPTION

Data set........... W4586.dat
Data set title..... Well 4586 Recovery Data, Oct 22, 1986

Knowns and Constants:
- No. of data points.................. 21
- Pumping rate........................ 0.03719
- Total pumping time.................. 5.5

==

ANALYTICAL METHOD

Theis Recovery (Confined Aquifer)

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RESULTS FROM STATISTICAL CURVE MATCHING

STATISTICAL MATCH PARAMETER ESTIMATES

	Estimate		Std. Error
T =	6.3548E-004	+/-	1.6249E-005
S' =	1.0225E+000	+/-	2.4441E-002

ANALYSIS OF MODEL RESIDUALS

residual = calculated - observed
weighted residual = residual * weight

Weighted Residual Statistics:
- Number of residuals............... 21
- Number of estimated parameters.... 2
- Degrees of freedom................ 19
- Residual mean..................... -0.005106
- Residual standard deviation....... 0.2621
- Residual variance................. 0.06868

Model Residuals:

Time	Observed	Calculated	Residual	Weight
0.75	9.36	9.7724	-0.41244	1
1.25	7.61	7.7515	-0.14152	1
1.5	6.89	7.0717	-0.18167	1
2	6.02	6.053	-0.033029	1
2.5	5.42	5.3143	0.10575	1
3	5.09	4.7474	0.3426	1
3.5	4.71	4.2956	0.41439	1
4	4.33	3.9255	0.40453	1
4.5	3.86	3.6158	0.24423	1
5	3.57	3.3523	0.21774	1
5.5	3.26	3.125	0.135	1
6	2.99	2.9268	0.063239	1
7	2.72	2.5971	0.12288	1
8	2.44	2.3336	0.10638	1
9	2.15	2.1178	0.032154	1
10	1.86	1.9377	-0.077727	1

11	1.62	1.785	-0.16499	1
12	1.42	1.6538	-0.23378	1
13	1.24	1.5398	-0.29978	1
14	1.07	1.4398	-0.3698	1
15	0.97	1.3514	-0.38138	1

==

RESULTS FROM VISUAL CURVE MATCHING

VISUAL MATCH PARAMETER ESTIMATES

		Estimate
T	=	6.3548E-004
S'	=	1.0225E+000

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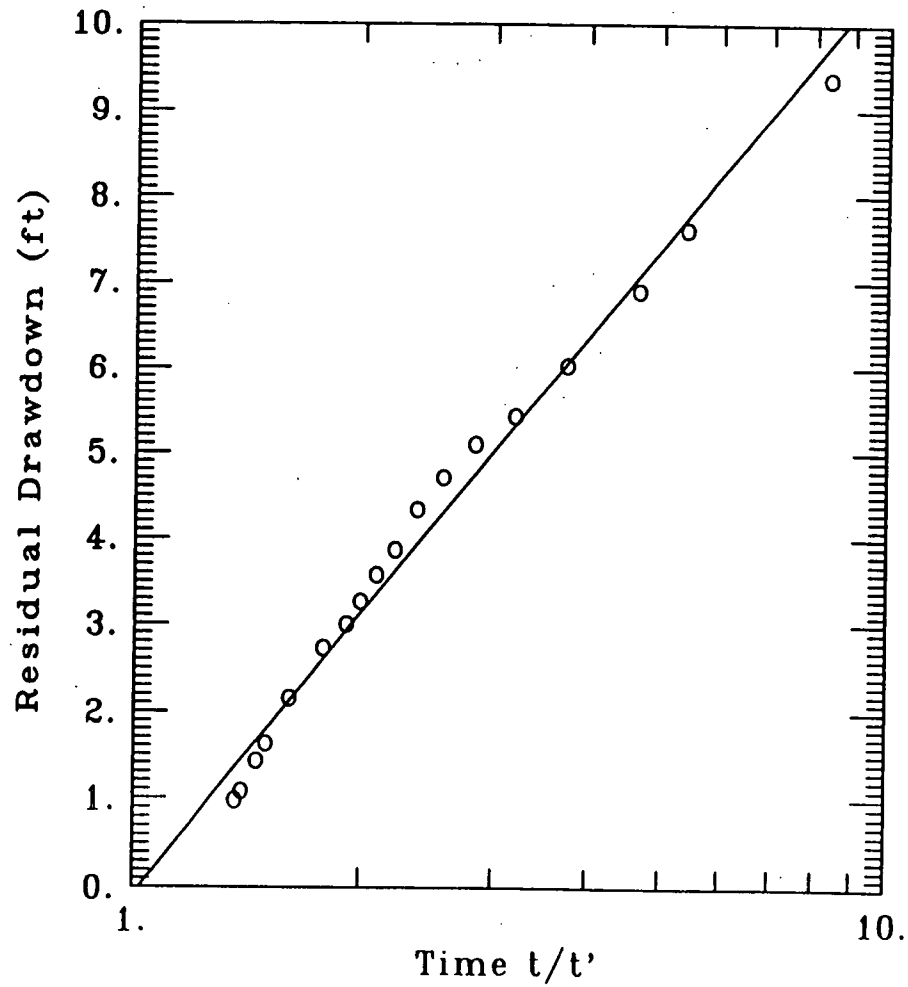
Well 4586 Recovery Data, Oct 22, 1986



DATA SET:
W4586.dat
09/12/94

AQUIFER TYPE:
Confined

SOLUTION METHOD:
Theis Recovery

ESTIMATED PARAMETERS:
T = 0.0006355 ft^2/min
S' = 1.023

TEST DATA:
Q = 0.03719 ft^3/min
t pumping = 5.5 min

901

Well 5586 Bailer-Recovery Test

Date - Oct 21,1986

The well is screened from 2.6 to 9.6 ft in alluvium. The Laramie Formation was encountered at 9 ft. Saturated thickness has averaged 3.5 ft. The log of the hole indicates that the saturated unit is gravel. Water was discharged by a bailer for 13 min. Total pumpage was 3 gal. Drawdown at the end of bailing nearly dewatered the well. Methods of discharge measurement (bucket) and water-level measurement (electric tape) may have introduced some error. Hydraulic conductivity was estimated from recovery data by the Theis recovery method and a modified Theim method. The Theim method is applicable to steady-state conditions and is not appropriate for this test. The Theis method is based on assumptions of confined aquifers and the Dupuit conditions. With well dewatering, these assumptions would be true only for late-time data.

An estimate of hydraulic conductivity has been obtained by applying the Theis recovery method, as implemented in the AQTESOLV version 1.1 software (Duffield and Rumbaugh, 1991). Input data, output data and plot files for the analysis are called W4586.DAT, W4586.OUT, W4586.PLT.

902

Well 5586 Recovery Data, Oct 21, 1986
pwrate
0.1671
trecov
4
tsdata

0.5	19.81	1
1	19.57	1
1.5	19.33	1
2	19.04	1
2.5	18.75	1
3	18.52	1
3.5	18.24	1
4	17.99	1
4.5	17.75	1
5	17.53	1
6	17.06	1
7	16.61	1
8	16.14	1
9	15.71	1
10	15.33	1
11	14.9	1
12	14.52	1
13	14.13	1
14	13.75	1
15	13.41	1
17	12.74	1
19	12.13	1
21	11.51	1
23	10.84	1
25	10.36	1
27	9.91	1
29	9.5	1
31	9.09	1
33	8.73	1
35	8.37	1
40	7.57	1
45	6.86	1
50	6.25	1
55	5.65	1
60	5.14	1
65	4.75	1
70	4.44	1
75	4.14	1
80	3.88	1
85	3.61	1
90	3.35	1
100	2.86	1
110	2.47	1
120	2.14	1
130	1.9	0

903

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A Q T E S O L V   R E S U L T S
Version 1.10

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TEST DESCRIPTION

Data set........... w5586.dat
Data set title..... Well 5586 Recovery Data, Oct 21, 1986

Knowns and Constants:
No. of data points.................. 45
Pumping rate........................ 0.1671
Total pumping time.................. 4

==

ANALYTICAL METHOD

Theis Recovery (Confined Aquifer)

==

RESULTS FROM STATISTICAL CURVE MATCHING

STATISTICAL MATCH PARAMETER ESTIMATES

	Estimate		Std. Error
T =	1.8148E-004	+/-	2.8348E-005
S' =	9.9502E-001	+/-	9.1659E-002

ANALYSIS OF MODEL RESIDUALS

residual = calculated - observed
weighted residual = residual * weight

Weighted Residual Statistics:
Number of residuals............... 44
Number of estimated parameters.... 2
Degrees of freedom................ 42
Residual mean..................... -16.24
Residual standard deviation....... 34.32
Residual variance................. 1178

Model Residuals:

Time	Observed	Calculated	Residual	Weight
0.5	19.81	161.39	-141.58	1
1	19.57	118.32	-98.747	1
1.5	19.33	95.586	-76.256	1
2	19.04	80.88	-61.84	1
2.5	18.75	70.392	-51.642	1
3	18.52	62.462	-43.942	1
3.5	18.24	56.221	-37.981	1
4	17.99	51.164	-33.174	1
4.5	17.75	46.975	-29.225	1
5	17.53	43.443	-25.913	1
6	17.06	37.803	-20.743	1
7	16.61	33.49	-16.88	1
8	16.14	30.081	-13.941	1
9	15.71	27.315	-11.605	1
10	15.33	25.025	-9.6948	1
11	14.9	23.096	-8.196	1

12	14.52	21.449	-6.9291	1
13	14.13	20.026	-5.896	1
14	13.75	18.784	-5.0338	1
15	13.41	17.69	-4.2799	1
17	12.74	15.852	-3.1119	1
19	12.13	14.368	-2.2376	1
21	11.51	13.144	-1.6335	1
23	10.84	12.117	-1.2767	1
25	10.36	11.243	-0.88294	1
27	9.91	10.49	-0.58031	1
29	9.5	9.8352	-0.33522	1
31	9.09	9.2599	-0.16986	1
33	8.73	8.7505	-0.020473	1
35	8.37	8.2963	0.07367	1
40	7.57	7.3507	0.21932	1
45	6.86	6.6066	0.25336	1
50	6.25	6.0059	0.24408	1
55	5.65	5.5107	0.13927	1
60	5.14	5.0955	0.044493	1
65	4.75	4.7423	0.0076846	1
70	4.44	4.4382	0.0017812	1
75	4.14	4.1736	-0.033644	1
80	3.88	3.9414	-0.061355	1
85	3.61	3.7358	-0.12578	1
90	3.35	3.5526	-0.20256	1
100	2.86	3.24	-0.38004	1
110	2.47	2.9833	-0.51334	1
120	2.14	2.7687	-0.62873	1

==

RESULTS FROM VISUAL CURVE MATCHING

VISUAL MATCH PARAMETER ESTIMATES

	Estimate
T =	1.8148E-004
S' =	9.9502E-001

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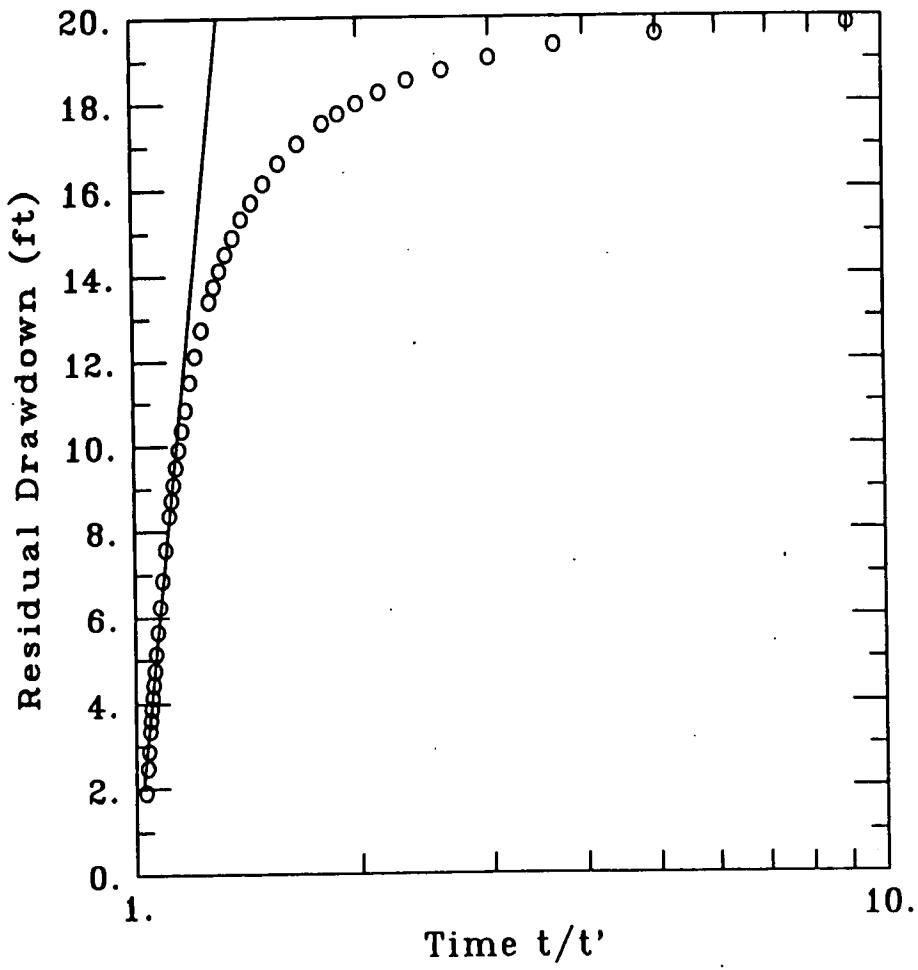
Well 5586 Recovery Data, Oct 21, 1986



DATA SET:
w5586.dat
09/13/94

AQUIFER TYPE:
Confined

SOLUTION METHOD:
Theis Recovery

ESTIMATED PARAMETERS:
T = 0.0001815 ft^2/min
S' = 0.995

TEST DATA:
Q = 0.1671 ft^3/min
t pumping = 4. min

906

Well 0887BR Bailer-Recovery Test

Date - Jun 6, 1987

The well is completed in a 5 ft section of the Arapahoe Formation. The geologist log shows that the well is completed in lignite. Groundwater at this site is unconfined. Water was discharged by bailing approximately 0.55 gal in 4 min. Methods of discharge measurement (bucket) and water-level measurement (electric tape) may have introduced some error.

The test has been analyzed by the Theis recovery method emphasizing late-time data to minimize water table effects. An estimate of hydraulic conductivity has been obtained by applying the Theis recovery method, as implemented in the AQTESOLV version 1.1 software (Duffield and Rumbaugh, 1991). Input data, output data and plot files for the analysis are called W0887BR.DAT, W0887BR.OUT, W0887BR.PLT.

907

Well 0887BR Recovery Data, Jun 19, 1987
pwrate
0.01838
trecov
4
tsdata

1.25	3.21	1
2	3.19	1
2.4	3.16	1
3	3.14	1
5	3.06	1
8	2.96	1
10	2.91	1
15	2.84	1
20	2.75	1
102	2.39	1
198	2.17	1
258	2.09	1
318	1.96	1

908

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A Q T E S O L V   R E S U L T S

Version 1.10

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TEST DESCRIPTION

Data set........... w0887br.dat
Data set title..... Well 0887BR Recovery Data, Jun 19, 1987

Knowns and Constants:
No. of data points.................. 13
Pumping rate........................ 0.01838
Total pumping time.................. 4

==

ANALYTICAL METHOD

Theis Recovery (Confined Aquifer)

==

RESULTS FROM STATISTICAL CURVE MATCHING

STATISTICAL MATCH PARAMETER ESTIMATES

	Estimate		Std. Error
T =	7.7359E-005	+/-	3.1324E-005
S' =	9.1437E-001	+/-	2.6790E-001

ANALYSIS OF MODEL RESIDUALS

residual = calculated - observed
weighted residual = residual * weight

Weighted Residual Statistics:
Number of residuals................ 13
Number of estimated parameters.... 2
Degrees of freedom................ 11
Residual mean..................... -7.951
Residual standard deviation....... 12.47
Residual variance................. 155.6

Model Residuals:

Time	Observed	Calculated	Residual	Weight
1.25	3.21	28.831	-25.621	1
2	3.19	22.468	-19.278	1
2.4	3.16	20.241	-17.081	1
3	3.14	17.716	-14.576	1
5	3.06	12.808	-9.7482	1
8	2.96	9.3604	-6.4004	1
10	2.91	8.0557	-5.1457	1
15	2.84	6.1631	-3.3231	1
20	2.75	5.1406	-2.3906	1
102	2.39	2.4203	-0.030275	1
198	2.17	2.0711	0.098918	1
258	2.09	1.9838	0.1062	1
318	1.96	1.9292	0.030756	1

==

RESULTS FROM VISUAL CURVE MATCHING

VISUAL MATCH PARAMETER ESTIMATES

		Estimate
T	=	7.7359E-005
S'	=	9.1437E-001

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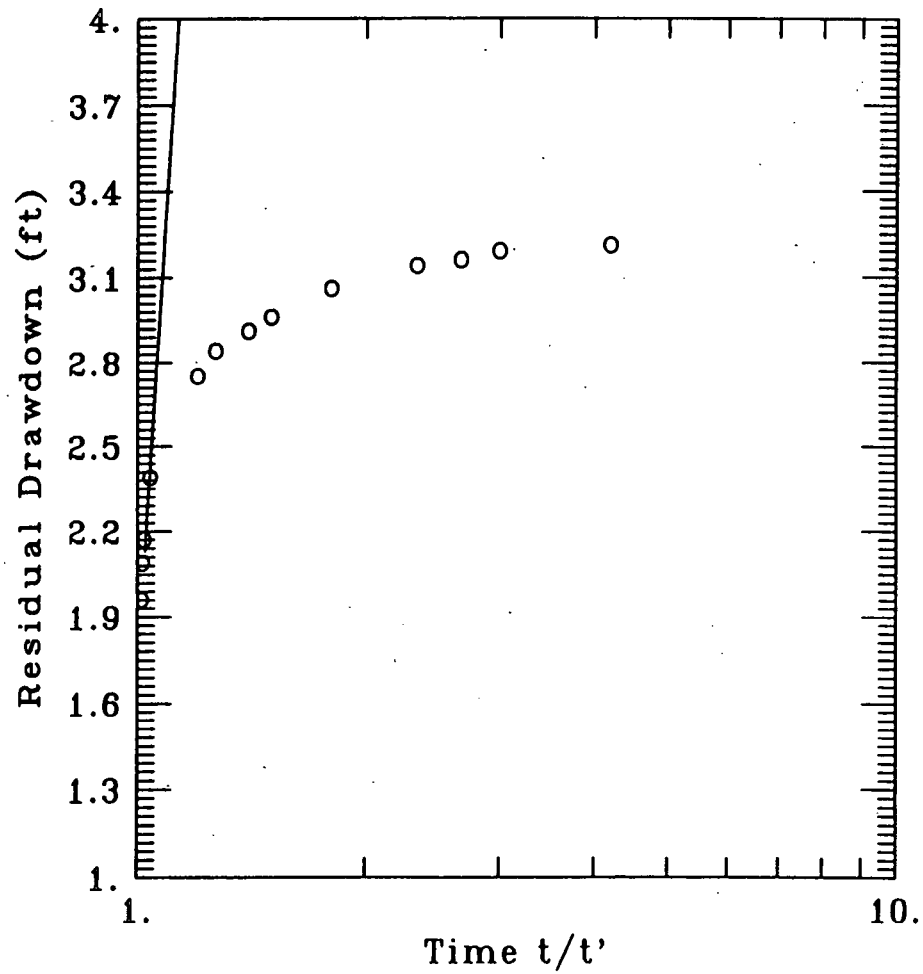
910

Well 0887BR Recovery Data, Jun 19, 1987



DATA SET:
w0887br.dat
09/12/94

AQUIFER TYPE:
Confined

SOLUTION METHOD:
Theis Recovery

ESTIMATED PARAMETERS:
T = 7.7359E-05 ft^2/min
S' = 0.9144

TEST DATA:
Q = 0.01838 ft^3/min
t pumping = 4. min

911

Well B201189 Pumping-Recovery Test

Date - Aug 8, 1989

The well is completed in a gravel zone of Quaternary colluvium. Saturated thickness was 26.4 ft. Groundwater at this site is unconfined. A nearby observation well was completed in clay. Water was discharged by pumping approximately 0.73 gal/m for 400 min. Both pumping and observation well were instrumented with transducers. However, the observation well showed no response to the pumping well. Drawdown at the pumping well was dominated by effects of wellbore storage. The recovery data are appropriate for analysis.

The recovery data have been analyzed by the Theis recovery method emphasizing late-time data to minimize water table effects. An estimate of hydraulic conductivity has been obtained by applying the Theis recovery method, as implemented in the AQTESOLV version 1.1 software (Duffield and Rumbaugh, 1991). Input data, output data and plot files for the analysis are called B201189REC.DAT, B201189REC.OUT, and B201189REC.PLT.

912

Well B201189 Recovery Data, Aug 18, 1989
pwrate
5.46
trecov
410
tsdata

0.0333	17.504	1
0.0666	17.472	1
0.1	17.457	1
0.1333	17.425	1
0.1666	17.393	1
0.2	17.362	1
0.2333	17.346	1
0.2666	17.33	1
0.3	17.299	1
0.5	17.172	1
0.75	17.078	1
1	17.03	1
1.25	17.015	1
1.5	16.999	1
1.75	16.983	1
2	16.967	1
2.5	16.952	1
3	16.92	1
3.5	16.888	1
4	16.857	1
4.5	16.825	1
5	16.809	1
6	16.746	1
7	16.683	1
8	16.636	1
9	16.573	1
10	16.525	1
12	16.431	1
14	16.32	1
16	16.225	1
18	16.115	1
20	16.02	1
22	15.91	1
24	15.799	1
26	15.689	1
28	15.5484	1
30	15.484	1
32	15.389	1
34	15.31	1
36	15.184	1
38	15.089	1
40	15.01	1
42	14.9	1
44	14.805	1
46	14.726	1
48	14.631	1
50	14.552	1
52	14.458	1

54	14.363	1
56	14.284	1
58	14.189	1
60	14.11	1
62	14.016	1
64	13.921	1
66	13.842	1
68	13.747	1
70	13.668	1
72	13.59	1
74	13.511	1
76	13.416	1
78	13.337	1
80	13.258	1
84	13.1	1
88	12.942	1
92	12.8	1
96	12.564	1
100	12.5	1
110	12.137	1
120	11.79	1
130	11.459	1
140	11.143	1
150	10.827	1
160	10.543	1
170	10.212	1
180	9.833	1
190	9.501	1
200	9.17	1
210	8.854	1
220	8.554	1
230	8.255	1
240	7.97	1
250	7.702	1
260	7.465	1
270	7.229	1
280	6.992	1
290	6.771	1
300	6.566	1
310	6.36	1
320	6.171	1
330	5.982	1
340	5.792	1
350	5.619	1
360	5.461	1
370	5.303	1
380	5.145	1
390	5.003	1
400	4.861	1
410	4.719	1
420	4.593	1
430	4.466	1
440	4.356	1
450	4.23	1

914

460	4.119	1
470	4.009	1
480	3.898	1
490	3.803	1
500	3.693	1
510	3.614	1
520	3.519	1
530	3.425	1
550	3.251	1
570	3.093	1
590	2.951	1
610	2.809	1
630	2.683	1
650	2.557	1
670	2.446	1
690	2.336	1
710	2.225	1
730	2.13	1
750	2.036	1
770	1.988	1
790	1.878	1
810	1.783	1
830	1.72	1
850	1.641	1
870	1.546	1
890	1.515	1
920	1.436	1
950	1.341	1
980	1.278	1
1015	1.215	1
1060	1.12	1
1105	1.041	1
1150	0.978	1
1195	0.899	1
1240	0.836	1
1285	0.789	1
1330	0.741	1
1375	0.678	1
1420	0.647	1
1465	0.599	1
1510	0.568	1
1555	0.536	1
1600	0.52	1
1675	0.457	1
1750	0.41	1
1825	0.378	1
1900	0.347	1
1975	0.315	1
2050	0.299	1
2125	0.268	1
2200	0.252	1

<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>

A Q T E S O L V   R E S U L T S
Version 1.10

09/13/94 11:43:08

==

TEST DESCRIPTION

Data set........... b201189rec.dat
Data set title..... Well B201189 Recovery Data, Aug 18, 1989

Knowns and Constants:
No. of data points.................. 153
Pumping rate........................ 5.46
Total pumping time.................. 410

==

ANALYTICAL METHOD

Theis Recovery (Confined Aquifer)

==

RESULTS FROM STATISTICAL CURVE MATCHING

STATISTICAL MATCH PARAMETER ESTIMATES

	Estimate		Std. Error
T =	4.8293E-002	+/-	3.3686E-003
S' =	1.2115E+000	+/-	2.3498E-001

ANALYSIS OF MODEL RESIDUALS

residual = calculated - observed
weighted residual = residual * weight

Weighted Residual Statistics:
Number of residuals............... 153
Number of estimated parameters.... 2
Degrees of freedom................ 151
Residual mean..................... -7.284
Residual standard deviation....... 16.3
Residual variance................. 265.8

Model Residuals:

Time	Observed	Calculated	Residual	Weight
0.0333	17.504	83.027	-65.523	1
0.0666	17.472	76.79	-59.318	1
0.1	17.457	73.133	-55.676	1
0.1333	17.425	70.547	-53.122	1
0.1666	17.393	68.541	-51.148	1
0.2	17.362	66.898	-49.536	1
0.2333	17.346	65.513	-48.167	1
0.2666	17.33	64.313	-46.983	1
0.3	17.299	63.251	-45.952	1
0.5	17.172	58.659	-41.487	1
0.75	17.078	55.016	-37.938	1
1	17.03	52.433	-35.403	1
1.25	17.015	50.43	-33.415	1
1.5	16.999	48.795	-31.796	1
1.75	16.983	47.413	-30.43	1
2	16.967	46.217	-29.25	1

916

2.5	16.952	44.22	-27.268	1
3	16.92	42.59	-25.67	1
3.5	16.888	41.214	-24.326	1
4	16.857	40.023	-23.166	1
4.5	16.825	38.974	-22.149	1
5	16.809	38.037	-21.228	1
6	16.746	36.418	-19.672	1
7	16.683	35.053	-18.37	1
8	16.636	33.873	-17.237	1
9	16.573	32.834	-16.261	1
10	16.525	31.907	-15.382	1
12	16.431	30.31	-13.879	1
14	16.32	28.965	-12.645	1
16	16.225	27.806	-11.581	1
18	16.115	26.788	-10.673	1
20	16.02	25.882	-9.8618	1
22	15.91	25.066	-9.1559	1
24	15.799	24.325	-8.5255	1
26	15.689	23.646	-7.9566	1
28	15.548	23.02	-7.4715	1
30	15.484	22.44	-6.9561	1
32	15.389	21.9	-6.5111	1
34	15.31	21.395	-6.0852	1
36	15.184	20.921	-5.7373	1
38	15.089	20.475	-5.386	1
40	15.01	20.054	-5.0435	1
42	14.9	19.654	-4.7544	1
44	14.805	19.276	-4.4705	1
46	14.726	18.915	-4.1891	1
48	14.631	18.571	-3.9405	1
50	14.552	18.243	-3.6913	1
52	14.458	17.929	-3.4714	1
54	14.363	17.629	-3.2657	1
56	14.284	17.34	-3.0561	1
58	14.189	17.063	-2.8739	1
60	14.11	16.796	-2.6862	1
62	14.016	16.539	-2.5234	1
64	13.921	16.292	-2.3707	1
66	13.842	16.053	-2.2107	1
68	13.747	15.822	-2.0748	1
70	13.668	15.599	-1.9305	1
72	13.59	15.382	-1.7924	1
74	13.511	15.173	-1.6622	1
76	13.416	14.97	-1.5543	1
78	13.337	14.773	-1.4365	1
80	13.258	14.582	-1.3245	1
84	13.1	14.217	-1.1166	1
88	12.942	13.871	-0.92854	1
92	12.8	13.543	-0.74252	1
96	12.564	13.231	-0.66696	1
100	12.5	12.934	-0.43448	1
110	12.137	12.252	-0.11455	1
120	11.79	11.64	0.15003	1
130	11.459	11.088	0.3711	1
140	11.143	10.586	0.55685	1
150	10.827	10.127	0.69955	1
160	10.543	9.706	0.83704	1
170	10.212	9.3169	0.89508	1
180	9.833	8.9564	0.8766	1
190	9.501	8.6211	0.87989	1
200	9.17	8.3083	0.86172	1
210	8.854	8.0156	0.83844	1
220	8.554	7.7409	0.81307	1
230	8.255	7.4826	0.77237	1
240	7.97	7.2392	0.73083	1
250	7.702	7.0092	0.69278	1
260	7.465	6.7916	0.6734	1
270	7.229	6.5853	0.64369	1
280	6.992	6.3894	0.60258	1
290	6.771	6.2031	0.56788	1
300	6.566	6.0257	0.5403	1
310	6.36	5.8565	0.50351	1

917

320	6.171	5.6949	0.47608	1
330	5.982	5.5404	0.44155	1
340	5.792	5.3926	0.3994	1
350	5.619	5.2509	0.36806	1
360	5.461	5.1151	0.34593	1
370	5.303	4.9846	0.31837	1
380	5.145	4.8593	0.28571	1
390	5.003	4.7387	0.26427	1
400	4.861	4.6227	0.23831	1
410	4.719	4.5109	0.20809	1
420	4.593	4.4031	0.18986	1
430	4.466	4.2992	0.16683	1
440	4.356	4.1988	0.15721	1
450	4.23	4.1018	0.12819	1
460	4.119	4.0081	0.11094	1
470	4.009	3.9174	0.091623	1
480	3.898	3.8296	0.068394	1
490	3.803	3.7446	0.058395	1
500	3.693	3.6622	0.030759	1
510	3.614	3.5824	0.031609	1
520	3.519	3.5049	0.014061	1
530	3.425	3.4298	-0.0047738	1
550	3.251	3.2859	-0.034905	1
570	3.093	3.15	-0.057036	1
590	2.951	3.0215	-0.070504	1
610	2.809	2.8997	-0.090719	1
630	2.683	2.7842	-0.10115	1
650	2.557	2.6743	-0.11733	1
670	2.446	2.5698	-0.12383	1
690	2.336	2.4703	-0.13426	1
710	2.225	2.3753	-0.15028	1
730	2.13	2.2846	-0.15457	1
750	2.036	2.1979	-0.16185	1
770	1.988	2.1149	-0.12686	1
790	1.878	2.0354	-0.15735	1
810	1.783	1.9591	-0.17612	1
830	1.72	1.886	-0.16595	1
850	1.641	1.8157	-0.17467	1
870	1.546	1.7481	-0.2021	1
890	1.515	1.6831	-0.16809	1
920	1.436	1.5901	-0.15407	1
950	1.341	1.502	-0.16104	1
980	1.278	1.4186	-0.14061	1
1015	1.215	1.3266	-0.11161	1
1060	1.12	1.216	-0.096024	1
1105	1.041	1.1132	-0.072229	1
1150	0.978	1.0174	-0.039428	1
1195	0.899	0.92792	-0.028924	1
1240	0.836	0.84411	-0.0081142	1
1285	0.789	0.76547	0.023533	1
1330	0.741	0.69152	0.049482	1
1375	0.678	0.62185	0.056145	1
1420	0.647	0.55611	0.090886	1
1465	0.599	0.49397	0.10503	1
1510	0.568	0.43514	0.13286	1
1555	0.536	0.37936	0.15664	1
1600	0.52	0.3264	0.1936	1
1675	0.457	0.24383	0.21317	1
1750	0.41	0.16767	0.24233	1
1825	0.378	0.097203	0.2808	1
1900	0.347	0.031805	0.3152	1
1975	0.315	-0.029052	0.34405	1
2050	0.299	-0.085826	0.38483	1
2125	0.268	-0.13892	0.40692	1
2200	0.252	-0.18867	0.44067	1

==========

RESULTS FROM VISUAL CURVE MATCHING

VISUAL MATCH PARAMETER ESTIMATES

```
         Estimate
T  =    4.8293E-002
S' =    1.2115E+000

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```
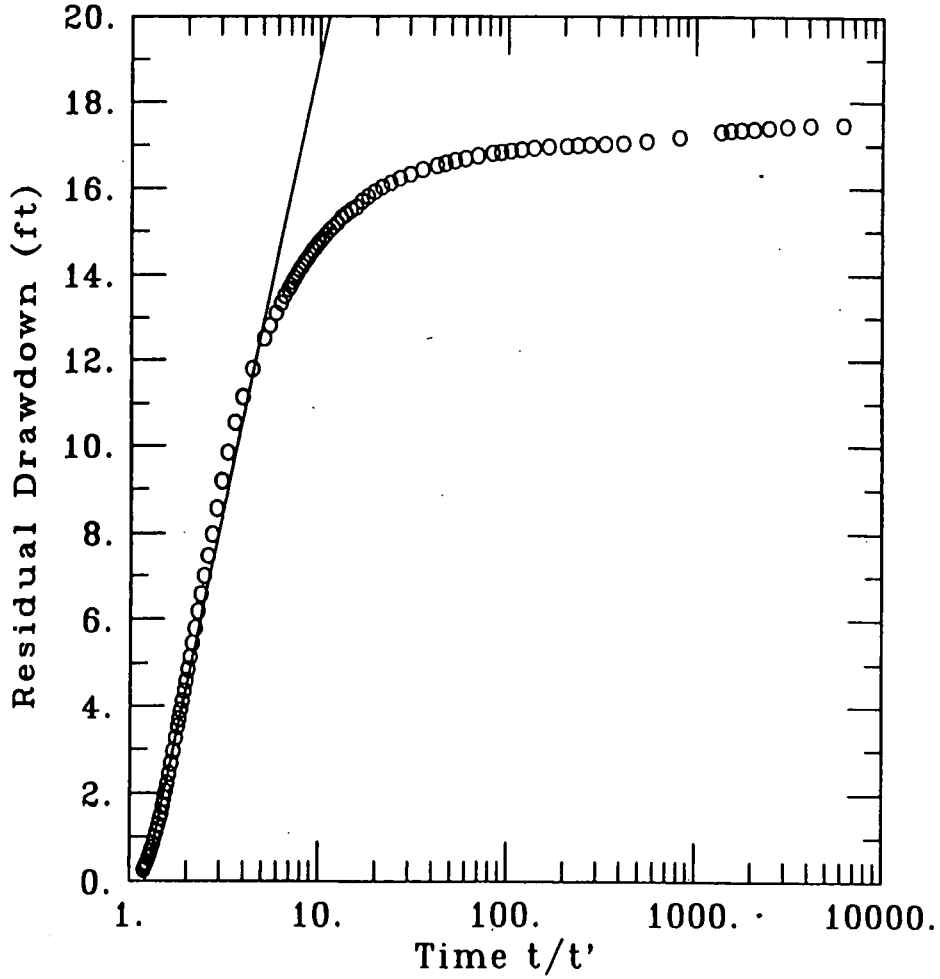

Well B201189 Recovery Data, Aug 18, 1989



DATA SET:
b201189rec.dat
09/13/94

AQUIFER TYPE:
Confined

SOLUTION METHOD:
Theis Recovery

ESTIMATED PARAMETERS:
T = 0.04829 ft^2/min
S' = 1.212

TEST DATA:
Q = 5.46 ft^3/min
t pumping = 410. min

920

Well B400489 Pumping-Recovery Test
(B40589 observation well)

Date - July 7, 1989

The well is completed in the Rocky Flats alluvium. Saturated thickness was 31.7 ft. Groundwater at this site is unconfined. An observation well was located 14.9 ft away. Water was discharged by pumping approximately 12.06 gal/m. Both pumping and observation well were instrumented with transducers.

Analysis of this test is reported in the background aquifer testing report. Hydraulic conductivity was estimated from pumping-period and recovery data by the Theis method applied to both pumping and observation well. Hydraulic conductivity estimates obtained in these analyses ranged from 0.04 to 0.06 ft/min. Inconsistent estimates of saturated thickness were used for estimating hydraulic conductivity from the pumping and observation wells. This introduced an error of approximately 25 percent. The estimates obtained from recovery data also are in error by a factor of 2 due to an error in the equation used. A copy of the previous analysis is included. After correction for errors in saturated thickness and equation, the Theis recovery analysis provides estimates of 1.5E-02 cm/sec and 2.0E-02 cm/sec.

Reproduced from
Background Pumping Test Analysis Report
Appendix C - part

Pump Test

A pump test was conducted on wells B400489, B495689, and B405789 on 28 July 1989 to characterize the Rocky Flats Alluvium. Well B400489 was pumped an average flow rate of 12.06 gpm or 2.69×10^{-2} cfs for 360 minutes. Water level measurements were collected for an additional 5,440 minutes to record recovery from the pump test. Refer to Figures 2-11 and 2-12 for drawdown/recovery data for wells B400489 and B405789.

922

AQUIFER TEST #2 - PUMPING TEST DATA
DRAWDOWN AND RECOVERY - WELL B400489

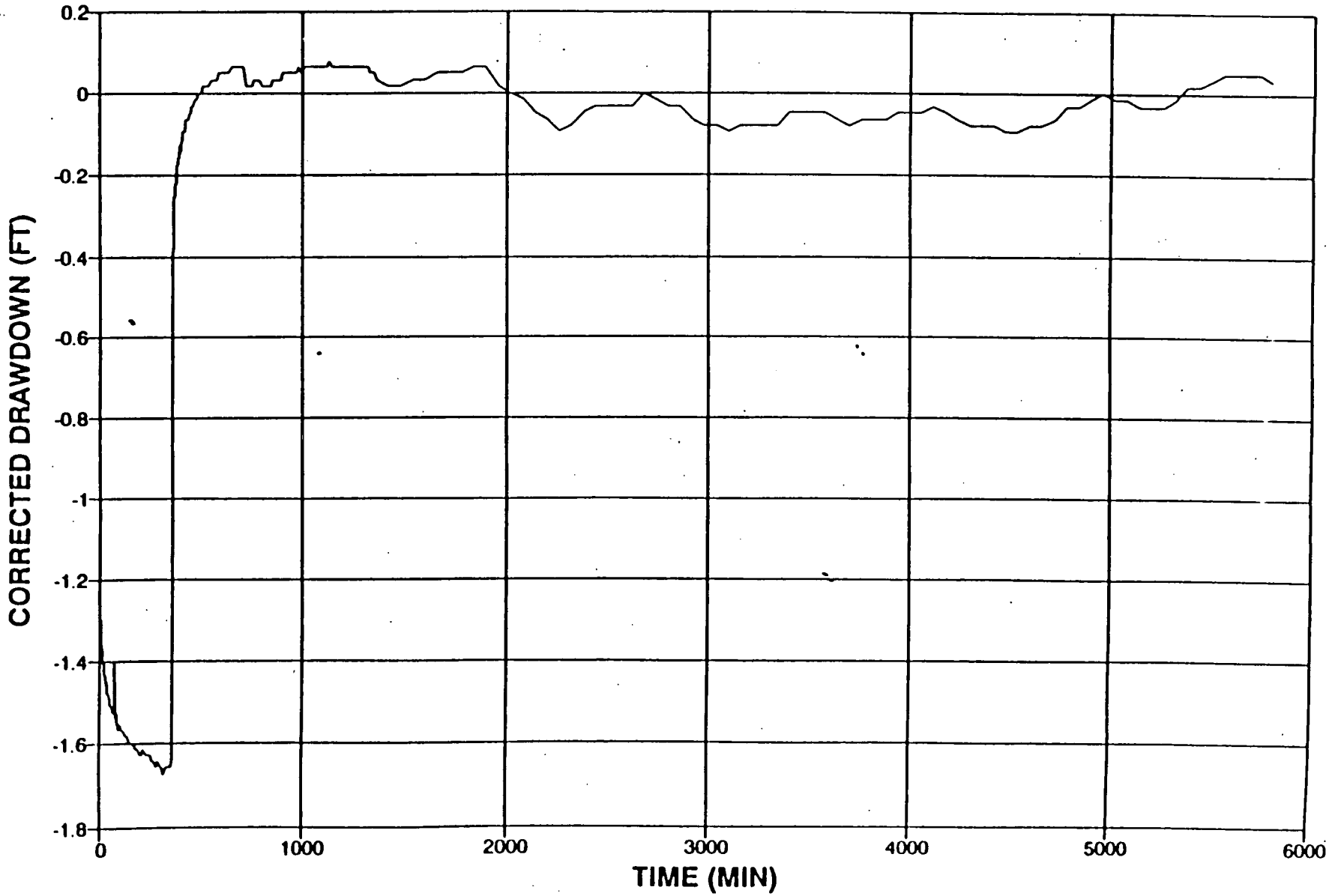


FIGURE 1

923

AQUIFER TEST #2 - PUMPING TEST DATA

DRAWDOWN AND RECOVERY - WELL B405789

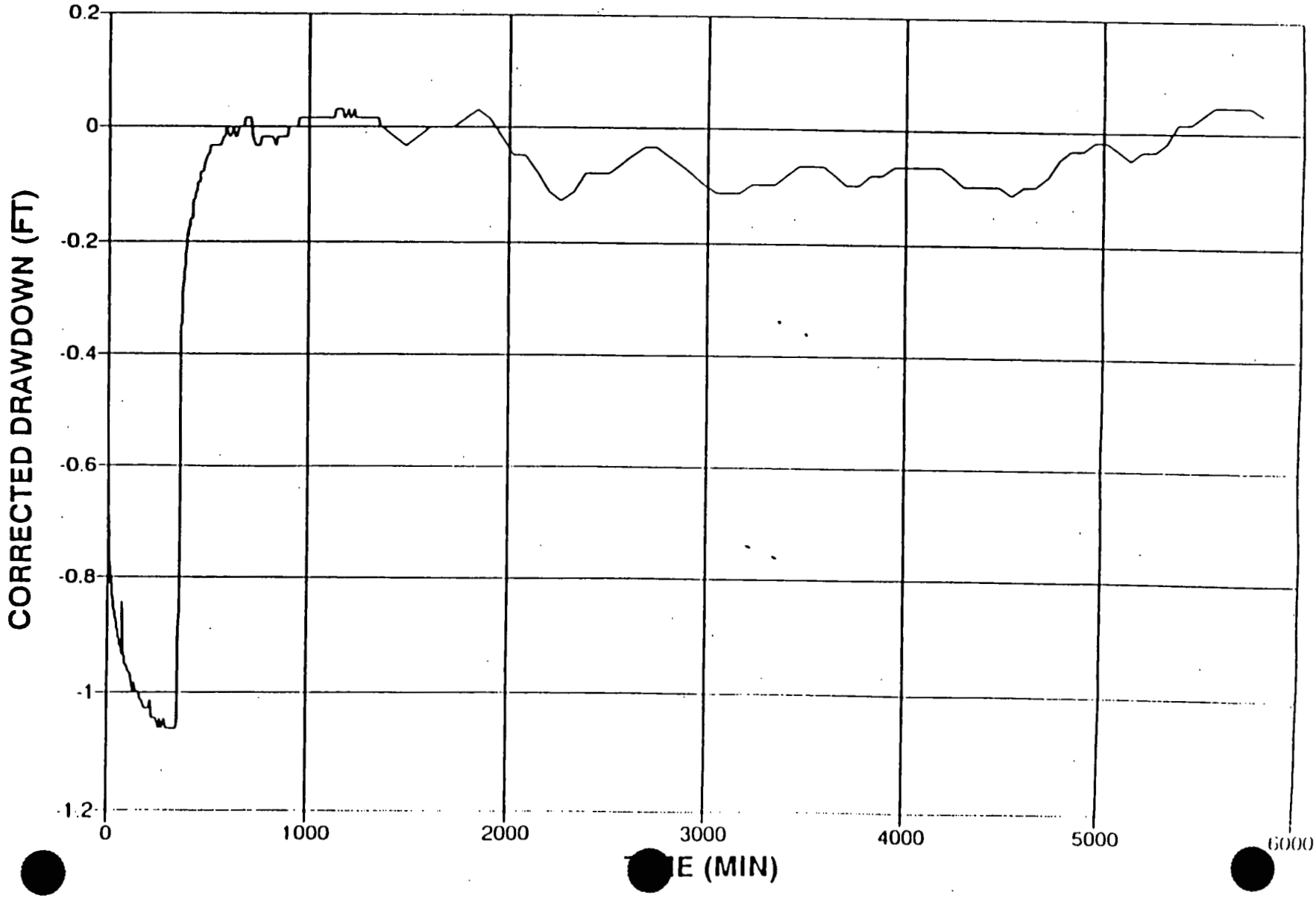


Figure 2-13 is a log-log plot of drawdown versus time for well B400489. Early drawdown data is affected by casing storage. The time when storage effects become negligible (tc) can be estimated after Schafer (1978):

$$tc = \frac{0.6\,(dc^2 - dp^2)}{Q/s}$$

Where dc = inside diameter of casing in inches = 3.938 inch

dp = outside diameter of pump column = 0.75 inch

Q = flowrate = 12.06 gpm = 2.69×10^{-2} cfs

s = drawdown at time tc

Solving this equation itteratively over the drawdown curve provides dc = 0.778 minutes and s = 1.05 ft.

The match point for log-log curve for well B400489 is:

$4\pi Ts / Q = 1$ $\qquad$ t = 2.29 min

$4 Tt / r^2S = 10^5$ $\qquad$ s = 0.111 ft

Solving for $T = (1.0)Q / 4\pi s = (1.0)(2.69 \times 10^{-2}\ \text{cfs}) / 4\pi(0.111\ \text{ft})$

$= 2 \times 10^{-2}\ \text{ft}^2/\text{sec} = 17.93\ \text{cm}^2/\text{sec}$

$K = T/b = (1.93 \times 10^{-2}\ \text{ft}^2/\text{sec}) / 31.66\ \text{ft}$

$= 6 \times 10^{-4}\ \text{ft/sec} = 2 \times 10^{-2}\ \text{cm/sec}$

Where b = 31.66 ft

Storativity cannot be adequately estimated from pumping well B400489.

AQUIFER TEST #2 - PUMPING TEST DATA

CORRECTED DRAWDOWN WITH TIME - WELL B400489

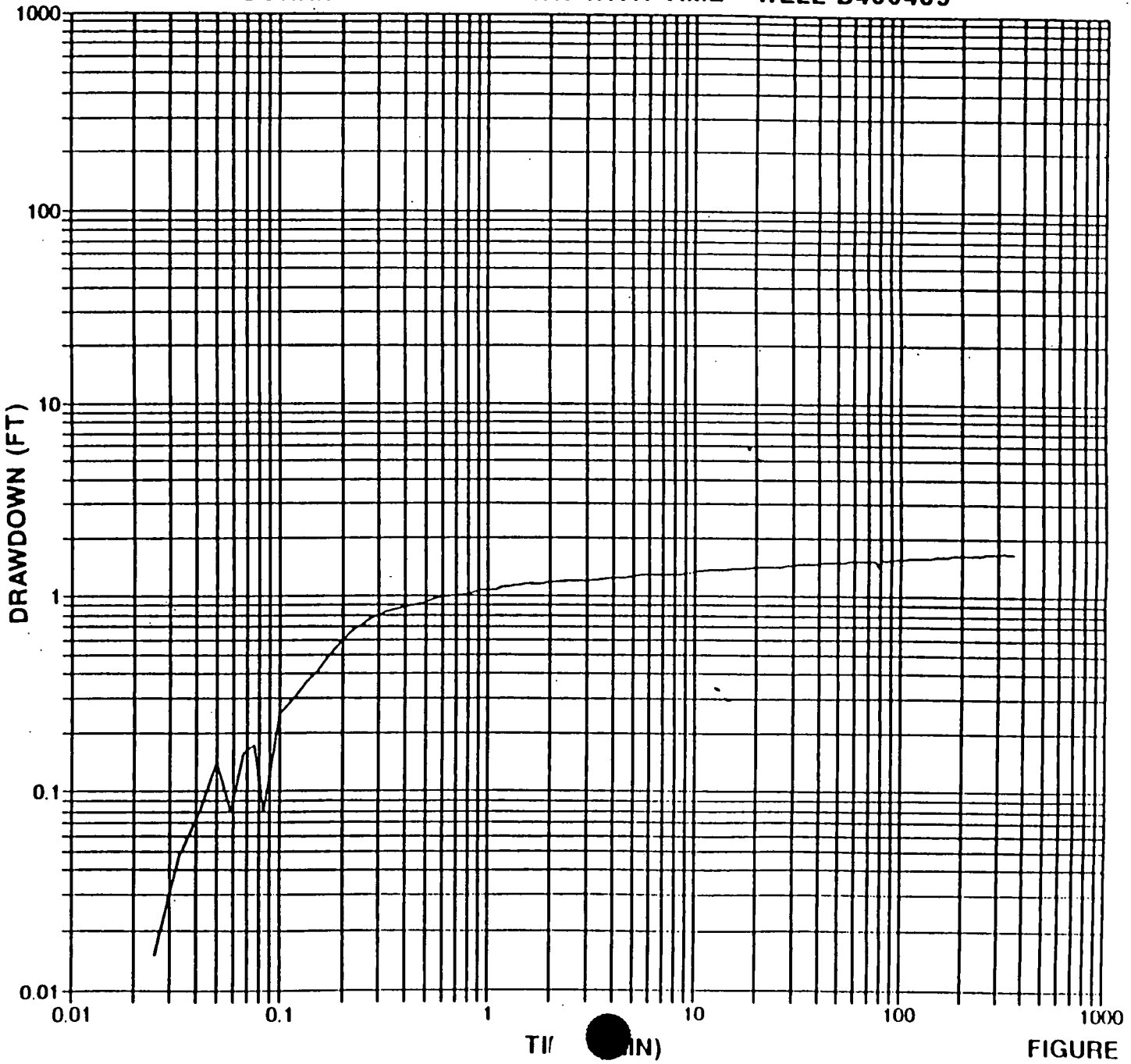


FIGURE 2-13

Figure 2-14 is a log-log plot of drawdown versus time for observation well B405789. The match point on the Theis curve is:

$4\pi\ Ts/Q = 1$ $\quad$ $t = 0.40$ min $= 24.0$ sec.

$4Tt/r^2\ S = 10^2$ $\quad$ $s = 0.10$ ft.

Solving for T:

$$T = (1.0)\ Q/4\ \pi s = (1.0)(2.69 \times 10^{-2}\ \text{cfs})/4\ \pi\ (0.10\ \text{ft})$$

$$= 2 \times 10^{-2}\ \text{ft}^2/\text{sec} = 19.88\ \text{cm}^2/\text{sec}$$

$$K = T/b = (2.14 \times 10^{-2}\ \text{ft}^2/\text{sec})\ /\ 43.42\ \text{ft}$$

$$= 5 \times 10^{-4}\ \text{ft/sec} = 2 \times 10^{-2}\ \text{cm/sec}$$

Where $b = 43.42$ ft

Solving for S:

$$S = 4Tt\ /\ r^2\ (10^2) = 4(2.14 \times 10^{-2}\ \text{ft}^2/\text{sec})(24\text{sec})\ /\ (14.9\ \text{ft})^2(10^2)$$

$$= 9 \times 10^{-6}$$

This calculated storativity is not in the expected range for unconfined aquifers, 0.3 to 0.1, but in the normal range of a confined aquifer, 10^{-3} to 10^{-6}.

In order to solve for transmissivity from the semi-log residual drawdown plot, t must be such that $u \geq 0.05$.

927

Checking for minimum t where $u \geq 0.05$

AQUIFER TEST #2 - PUMPING TEST DATA

CORRECTED DRAWDOWN WITH TIME - WELL B405789

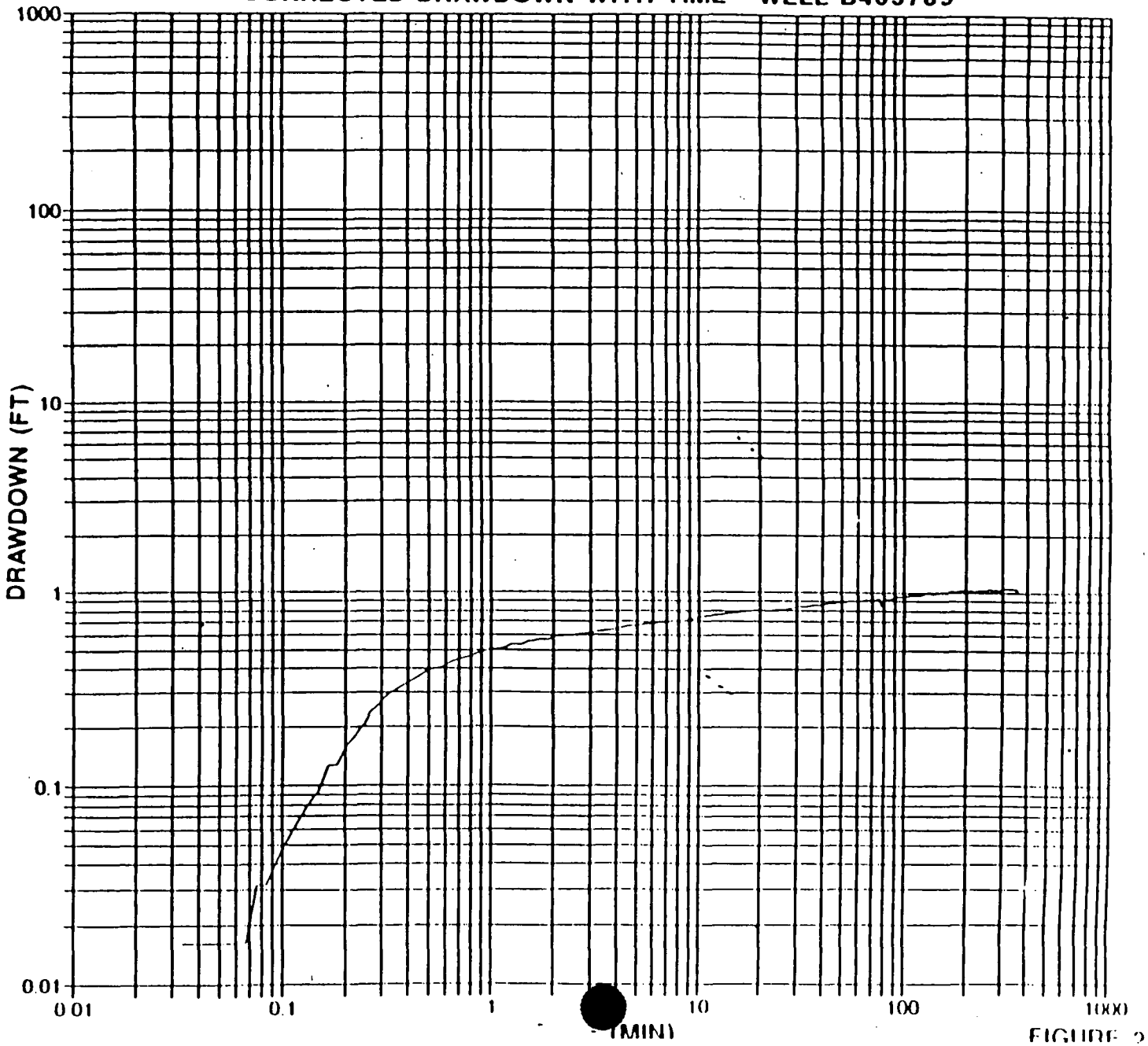


FIGURE 2.14

928

$t \geq r^2 S / 4 Tu$

Where $r = 14.9$ ft (radius to observation well)

$S = 9 \times 10^{-6}$

$u = 0.05$

$T = 5 \times 10^{-4}$ ft^2/sec

$t \geq (14.9 \text{ ft})^2 (9 \times 10^{-6}) / 4(5 \times 10^{-4} \text{ ft}^2/\text{sec})(0.05)$

≥ 200 seconds $= 3.3$ minutes

Both the pumping and recovery times exceed t where $u \geq 0.05$ for both the pumping and observation wells, B400489 and B405789, respectively.

From Figure 2-15, Residual Drawdown Plot for well B400489:

$T = 2.30\ Q / 2\pi\ (\Delta s / \Delta \log_{10} t)$

$= (2.30)(2.69 \times 10^{-2} \text{ cfs}) / 2\pi\ (0.31 \text{ ft/log cycle})$

$T = 3 \times 10^{-2}$ ft^2/sec $= 29.73$ cm^2/sec

$K = T/b = (3.2 \times 10^{-2} \text{ ft}^2/\text{sec}) / 31.66$ ft

$= 1 \times 10^{-3}$ ft/sec $= 3 \times 10^{-2}$ cm/sec

From Figure 2-16, Residual Drawdown Plot for well B405789:

$T = 2.30\ Q/2\pi\ (\Delta s / \Delta \log_{10} t)$

$= (2.30)(2.69 \times 10^{-2} \text{cfs}) / 2\pi\ (0.23 \text{ ft/log cycle})$

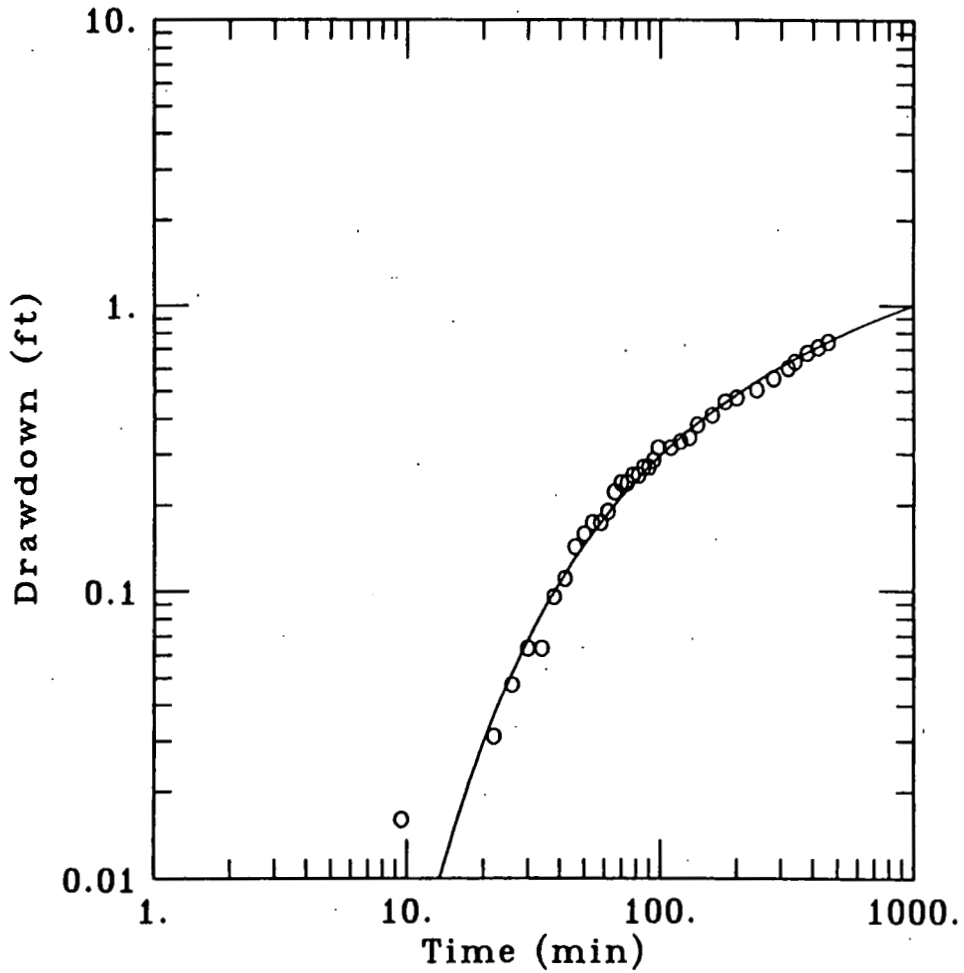
$= 4 \times 10^{-2}$ ft^2/sec $= 39.95$ cm^2/sec

$K = T/b = (4.3 \times 10^{-2} \text{ ft}^2/\text{sec})/43.42$ ft

$= 1 \times 10^{-3}$ ft/sec $= 3 \times 10^{-2}$ cm/sec

929

Well B402189 Pumping Data, Aug 18, 1989



DATA SET:
b402189pmp.dat
09/12/94

AQUIFER TYPE:
Confined

SOLUTION METHOD:
Theis

ESTIMATED PARAMETERS:
T = 0.1891 ft^2/min
S = 0.1079

TEST DATA:
Q = 0.8209 ft^3/min
r = 15. ft
rc = 0.33 ft
rw = 0.67 ft

930

<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>>

A Q T E S O L V   R E S U L T S
Version 1.10

09/12/94 14:33:18

==

TEST DESCRIPTION

Data set........... b405889rec.dat
Data set title..... Well B405889 Recovery Data, Aug 18,1989

Knowns and Constants:
No. of data points.................. 67
Pumping rate........................ 0.8209
Total pumping time.................. 480

==

ANALYTICAL METHOD

Theis Recovery (Confined Aquifer)

==

RESULTS FROM STATISTICAL CURVE MATCHING

STATISTICAL MATCH PARAMETER ESTIMATES

	Estimate		Std. Error
T =	2.1860E-001	+/-	1.8648E-001
S' =	8.0000E-001	+/-	3.1219E+000

ANALYSIS OF MODEL RESIDUALS

residual = calculated - observed
weighted residual = residual * weight

Weighted Residual Statistics:
Number of residuals............... 65
Number of estimated parameters.... 2
Degrees of freedom................ 63
Residual mean..................... 3.034
Residual standard deviation....... 4.922
Residual variance................. 24.23

Model Residuals:

Time	Observed	Calculated	Residual	Weight
0.025	14.253	3.0145	11.238	1
0.05	14.048	2.8074	11.241	1
0.075	13.842	2.6862	11.156	1
0.1	13.669	2.6002	11.069	1
0.15	13.306	2.4791	10.827	1
0.2	12.958	2.3931	10.565	1
0.25	12.643	2.3265	10.317	1
0.3	12.359	2.272	10.087	1
0.5	11.396	2.1195	9.2765	1
0.75	10.401	1.9984	8.4026	1
1	9.644	1.9126	7.7314	1
1.25	9.028	1.846	7.182	1
1.5	8.523	1.7917	6.7313	1
1.75	8.097	1.7458	6.3512	1
2	7.75	1.706	6.044	1
2.5	7.134	1.6396	5.4944	1

931

3	6.661	1.5855	5.0755	1
3.5	6.25	1.5397	4.7103	1
4	5.903	1.5001	4.4029	1
4.5	5.603	1.4652	4.1378	1
5	5.335	1.434	3.901	1
5.5	5.082	1.4058	3.6762	1
6	4.861	1.3801	3.4809	1
7	4.456	1.3347	3.1213	1
8	4.135	1.2954	2.8396	1
9	3.835	1.2608	2.5742	1
10	3.567	1.2299	2.3371	1
12	3.141	1.1766	1.9644	1
14	2.794	1.1318	1.6622	1
16	2.494	1.0931	1.4009	1
18	2.257	1.0591	1.1979	1
20	2.052	1.0288	1.0232	1
22	1.894	1.0015	0.89252	1
24	1.752	0.97667	0.77533	1
26	1.626	0.95393	0.67207	1
28	1.515	0.93296	0.58204	1
30	1.42	0.91351	0.50649	1
32	1.341	0.89539	0.44561	1
34	1.278	0.87843	0.39957	1
36	1.215	0.86251	0.35249	1
38	1.152	0.84751	0.30449	1
40	1.105	0.83333	0.27167	1
44	1.026	0.80713	0.21887	1
48	0.947	0.7834	0.1636	1
52	0.899	0.76173	0.13727	1
56	0.852	0.74182	0.11018	1
60	0.805	0.72342	0.081581	1
72	0.726	0.67549	0.050506	1
84	0.663	0.63585	0.027151	1
130	0.521	0.52875	-0.0077532	1
150	0.489	0.49562	-0.0066245	1
170	0.458	0.46756	-0.0095557	1
190	0.442	0.44337	-0.0013696	1
230	0.394	0.4036	-0.0095972	1
270	0.379	0.37205	0.0069458	1
310	0.347	0.34629	0.00070711	1
350	0.331	0.32478	0.0062175	1
390	0.315	0.30651	0.0084933	1
430	0.3	0.29076	0.0092409	1
470	0.284	0.27703	0.0069688	1
510	0.268	0.26495	0.0030544	1
550	0.252	0.25422	-0.002216	1
600	0.237	0.24238	-0.0053773	1
650	0.221	0.23198	-0.01098	1
700	0.205	0.22277	-0.017771	1

==

RESULTS FROM VISUAL CURVE MATCHING

VISUAL MATCH PARAMETER ESTIMATES

	Estimate
T =	2.1860E-001
S' =	8.0000E-001

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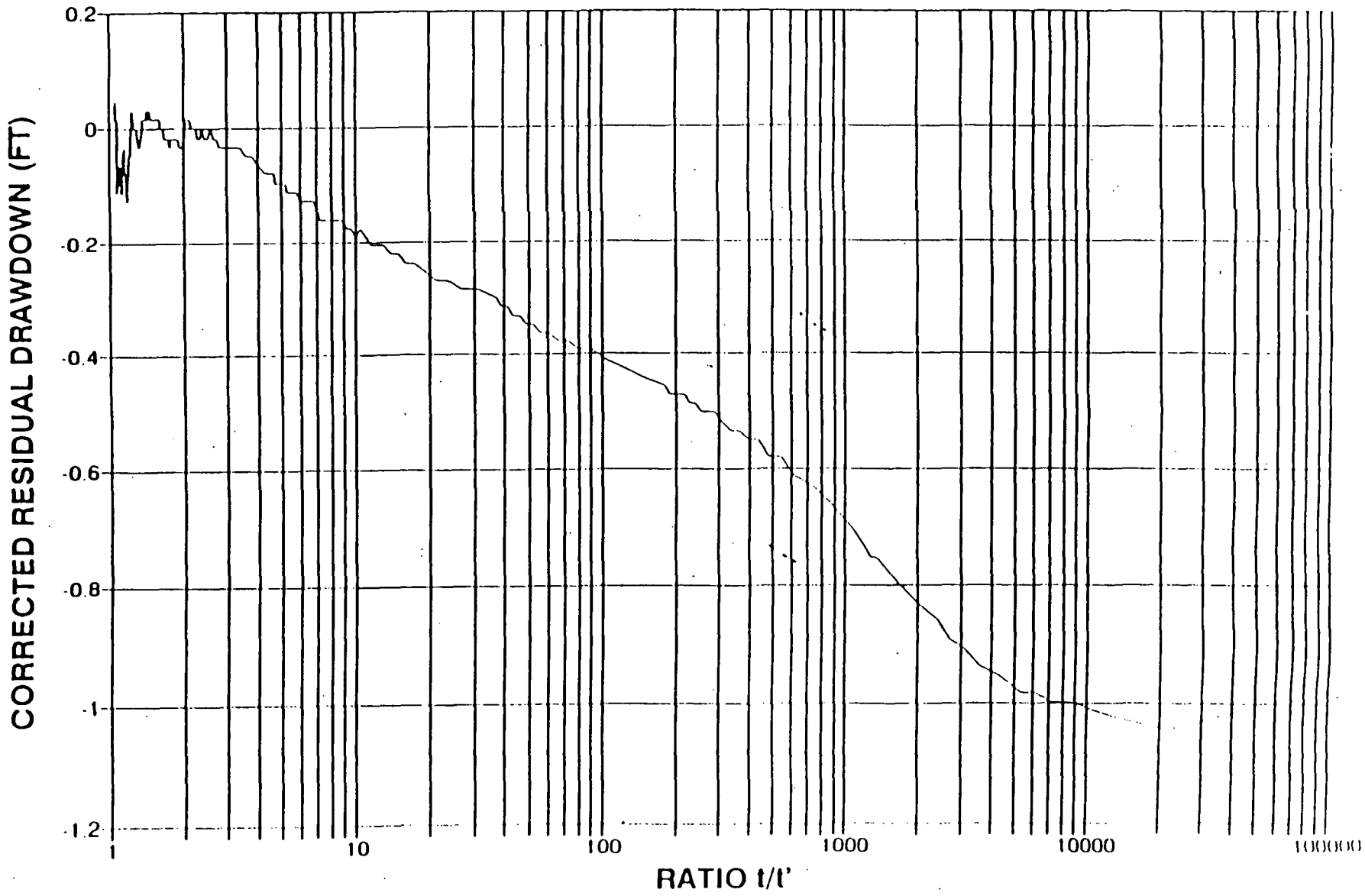
932

AQUIFER TEST #2 - PUMPING TEST DATA

RESIDUAL DRAWDOWN PLOT - WELL B405789



933

Well B405889 Pumping-Recovery Test
(B402189 observation well)

Date - Aug 8, 1989

Wells B405889 and B4020189 are completed in sandstones of the Arapahoe Formation. The wells are separated horizontally by 6.85 ft. Elevations of the two screened intervals differ by approximately 20 ft. The test was conducted to determine if the sandstones in the two wells were hydraulically connected. Water was discharged from Well 49-89BR by pumping approximately 6.14 gal/m. Both pumping and observation well were instrumented with transducers.

Because the wells are separated vertically by a distance greater than the horizontal separation, the horizontal flow assumption of the Theis method probably was not meet. The hydraulically effective distance from pumping to observation well probably is greater than the 6.85 ft that horizontally separates the wells. However, the actual path of water flow is not known.

The recovery data for the pumping well and observation well have been analyzed by the Theis recovery method emphasizing late-time data to minimize water table effects. Estimates of hydraulic conductivity have been obtained by applying the method, as implemented in the AQTESOLV version 1.1 software (Duffield and Rumbaugh, 1991). Input data, output data and plot files for the recovery analysis of the pumping well are called B405889REC.DAT, B405889REC.OUT, and B405889REC.PLT. Input data, output data and plot files for the recovery analysis of the observation well are called B402189REC.DAT, B402189REC.OUT, and B402189REC.PLT.

Drawdown data for the observation well also were analyzed with AQTESOLV in an effort to identify a range of hydraulic conductivity estimates and effective distances that result in physically reasonable estimates of storage coefficient. Previous analyses have not obtained physically realistic storage coefficients. Because effective radius from the pumping to the observation well was not known, several type-curve analyses were conducted corresponding to the drawdown at the observation well for radii of 15 and 30 ft. These distances bracket the range of reasonable storage coefficients. For a radius of 15 ft, storage coefficient was estimated to be 0.11. For a radius of 30 ft, a value of 0.016 was obtained.

Input data, output data and plot files for the pumping-period analysis of the observation well and corresponding to a radius of 15 ft are called B402189PMP.DAT, B402189PMP.OUT, and B402189PMP.PLT. This estimate of effective radius provided reasonable agreement with estimates of hydraulic conductivity obtained from recovery data.

934

Well B402189 Pumping Data, Aug 18, 1989
pwrate
0.8209
radius
15
ldwell
0.33
0.67
tsdata

9.5	0.016	1
22	0.031	1
26	0.047	1
30	0.063	1
34	0.063	1
38	0.095	1
42	0.11	1
46	0.142	1
50	0.158	1
54	0.173	1
58	0.173	1
62	0.189	1
66	0.221	1
70	0.237	1
74	0.237	1
78	0.252	1
82	0.252	1
86	0.268	1
90	0.268	1
94	0.284	1
98	0.315	1
110	0.315	1
120	0.331	1
130	0.341	1
140	0.379	1
160	0.41	1
180	0.458	1
200	0.473	1
240	0.505	1
280	0.552	1
320	0.6	1
340	0.631	1
380	0.679	1
420	0.71	1
460	0.742	1

Well b402189 Recovery Data, Aug 18, 1989
pwrate
0.8209
trecov
480
tsdata

40	0.742	1
44	0.726	1
48	0.71	1
52	0.694	1
56	0.694	1
60	0.679	1
64	0.679	1
68	0.663	1
72	0.647	1
76	0.647	1
80	0.631	1
90	0.615	1
100	0.6	1
110	0.584	1
120	0.568	1
130	0.552	1
140	0.536	1
150	0.521	1
160	0.521	1
170	0.505	1
180	0.489	1
190	0.489	1
200	0.473	1
220	0.458	1
240	0.426	1
280	0.41	1
320	0.379	1
360	0.347	1
400	0.331	1
440	0.315	1
480	0.3	1
520	0.284	1
560	0.268	1
600	0.252	1
640	0.237	1
680	0.237	1
720	0.221	1
760	0.221	1
800	0.221	1

936

Well B405889 Recovery Data, Aug 18,1989
pwrate
0.8209
trecov
480
tsdata

0.025	14.253	1
0.05	14.048	1
0.075	13.842	1
0.1	13.669	1
0.15	13.306	1
0.2	12.958	1
0.25	12.643	1
0.3	12.359	1
0.5	11.396	1
0.75	10.401	1
1	9.644	1
1.25	9.028	1
1.5	8.523	1
1.75	8.097	1
2	7.75	1
2.5	7.134	1
3	6.661	1
3.5	6.25	1
4	5.903	1
4.5	5.603	1
5	5.335	1
5.5	5.082	1
6	4.861	1
7	4.456	1
8	4.135	1
9	3.835	1
10	3.567	1
12	3.141	1
14	2.794	1
16	2.494	1
18	2.257	1
20	2.052	1
22	1.894	1
24	1.752	1
26	1.626	1
28	1.515	1
30	1.42	1
32	1.341	1
34	1.278	1
36	1.215	1
38	1.152	1
40	1.105	1
44	1.026	1
48	0.947	1
52	0.899	1
56	0.852	1
60	0.805	1
72	0.726	1

937

84	0.663	1
96	0.6	0
110	0.568	0
130	0.521	1
150	0.489	1
170	0.458	1
190	0.442	1
230	0.394	1
270	0.379	1
310	0.347	1
350	0.331	1
390	0.315	1
430	0.3	1
470	0.284	1
510	0.268	1
550	0.252	1
600	0.237	1
650	0.221	1
700	0.205	1

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A Q T E S O L V   R E S U L T S

Version 1.10

09/12/94 14:56:45

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TEST DESCRIPTION

Data set........... b402189pmp.dat
Data set title..... Well B402189 Pumping Data, Aug 18, 1989

Knowns and Constants:
- No. of data points.................. 35
- Pumping rate........................ 0.8209
- Radius (distance) to obs. well...... 15
- Radius of pumped well casing........ 0.33
- Radius of pumped wellbore........... 0.67

==

ANALYTICAL METHOD

Theis (Confined Aquifer)

==

RESULTS FROM STATISTICAL CURVE MATCHING

STATISTICAL MATCH PARAMETER ESTIMATES

	Estimate		Std. Error
T =	1.8906E-001	+/-	4.2247E-003
S =	1.0787E-001	+/-	1.6692E-003

ANALYSIS OF MODEL RESIDUALS

residual = calculated - observed
weighted residual = residual * weight

Weighted Residual Statistics:
- Number of residuals............... 35
- Number of estimated parameters.... 2
- Degrees of freedom................ 33
- Residual mean..................... -0.001976
- Residual standard deviation....... 0.01576
- Residual variance................. 0.0002483

Model Residuals:

Time	Observed	Calculated	Residual	Weight
9.5	0.016	0.0028011	0.013199	1
22	0.031	0.036751	-0.0057507	1
26	0.047	0.051844	-0.0048439	1
30	0.063	0.067516	-0.0045157	1
34	0.063	0.083348	-0.020348	1
38	0.095	0.099084	-0.0040836	1
42	0.11	0.11457	-0.004569	1
46	0.142	0.12971	0.012287	1
50	0.158	0.14447	0.013533	1
54	0.173	0.1588	0.014195	1
58	0.173	0.17272	0.00028119	1
62	0.189	0.18621	0.0027885	1
66	0.221	0.19929	0.021709	1
70	0.237	0.21197	0.02503	1

74	0.237	0.22426	0.012738	1
78	0.252	0.23618	0.015815	1
82	0.252	0.24775	0.0042476	1
86	0.268	0.25898	0.0090183	1
90	0.268	0.26989	-0.0018885	1
94	0.284	0.28049	0.0035123	1
98	0.315	0.29079	0.024206	1
110	0.315	0.32009	-0.0050905	1
120	0.331	0.34283	-0.011826	1
130	0.341	0.36422	-0.023215	1
140	0.379	0.3844	-0.0053993	1
160	0.41	0.42163	-0.011628	1
180	0.458	0.45531	0.0026902	1
200	0.473	0.48605	-0.013047	1
240	0.505	0.54045	-0.035451	1
280	0.552	0.58751	-0.035506	1
320	0.6	0.62895	-0.028951	1
340	0.631	0.64796	-0.016956	1
380	0.679	0.6831	-0.004103	1
420	0.71	0.71501	-0.005014	1
460	0.742	0.74423	-0.0022331	1

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RESULTS FROM VISUAL CURVE MATCHING

VISUAL MATCH PARAMETER ESTIMATES

	Estimate
T =	1.8906E-001
S =	1.0787E-001

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A Q T E S O L V   R E S U L T S
Version 1.10

09/12/94 14:47:14

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TEST DESCRIPTION

Data set........... b402189rec.dat
Data set title..... Well b402189 Recovery Data, Aug 18, 1989

Knowns and Constants:
No. of data points.................. 39
Pumping rate........................ 0.8209
Total pumping time.................. 480

==

ANALYTICAL METHOD

Theis Recovery (Confined Aquifer)

==

RESULTS FROM STATISTICAL CURVE MATCHING

STATISTICAL MATCH PARAMETER ESTIMATES

	Estimate		Std. Error
T =	1.8457E-001	+/-	1.2307E-002
S' =	8.5223E-001	+/-	9.4609E-002

ANALYSIS OF MODEL RESIDUALS

residual = calculated - observed
weighted residual = residual * weight

Weighted Residual Statistics:
Number of residuals............... 39
Number of estimated parameters.... 2
Degrees of freedom................ 37
Residual mean..................... -0.06245
Residual standard deviation....... 0.09429
Residual variance................. 0.00889

Model Residuals:

Time	Observed	Calculated	Residual	Weight
40	0.742	0.96458	-0.22258	1
44	0.726	0.93356	-0.20756	1
48	0.71	0.90545	-0.19545	1
52	0.694	0.87978	-0.18578	1
56	0.694	0.8562	-0.1622	1
60	0.679	0.83441	-0.15541	1
64	0.679	0.81418	-0.13518	1
68	0.663	0.79531	-0.13231	1
72	0.647	0.77765	-0.13065	1
76	0.647	0.76107	-0.11407	1
80	0.631	0.74545	-0.11445	1
90	0.615	0.71002	-0.095017	1
100	0.6	0.67888	-0.078877	1
110	0.584	0.65119	-0.067189	1
120	0.568	0.62634	-0.058337	1
130	0.552	0.60385	-0.051853	1

941

140	0.536	0.58338	-0.047376	1
150	0.521	0.56462	-0.043617	1
160	0.521	0.54735	-0.026345	1
170	0.505	0.53137	-0.026373	1
180	0.489	0.51654	-0.027544	1
190	0.489	0.50273	-0.013727	1
200	0.473	0.48981	-0.016814	1
220	0.458	0.46634	-0.0083363	1
240	0.426	0.44551	-0.019507	1
280	0.41	0.41008	-7.7974E-005	1
320	0.379	0.38097	-0.0019661	1
360	0.347	0.35654	-0.0095429	1
400	0.331	0.33571	-0.0047137	1
440	0.315	0.31771	-0.00271	1
480	0.3	0.30197	-0.0019743	1
520	0.284	0.28809	-0.0040903	1
560	0.268	0.27574	-0.0077404	1
600	0.252	0.26468	-0.012677	1
640	0.237	0.2547	-0.017705	1
680	0.237	0.24567	-0.0086661	1
720	0.221	0.23743	-0.016433	1
760	0.221	0.2299	-0.0089012	1
800	0.221	0.22298	-0.0019825	1

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RESULTS FROM VISUAL CURVE MATCHING

VISUAL MATCH PARAMETER ESTIMATES

	Estimate
T =	1.8457E-001
S' =	8.5223E-001

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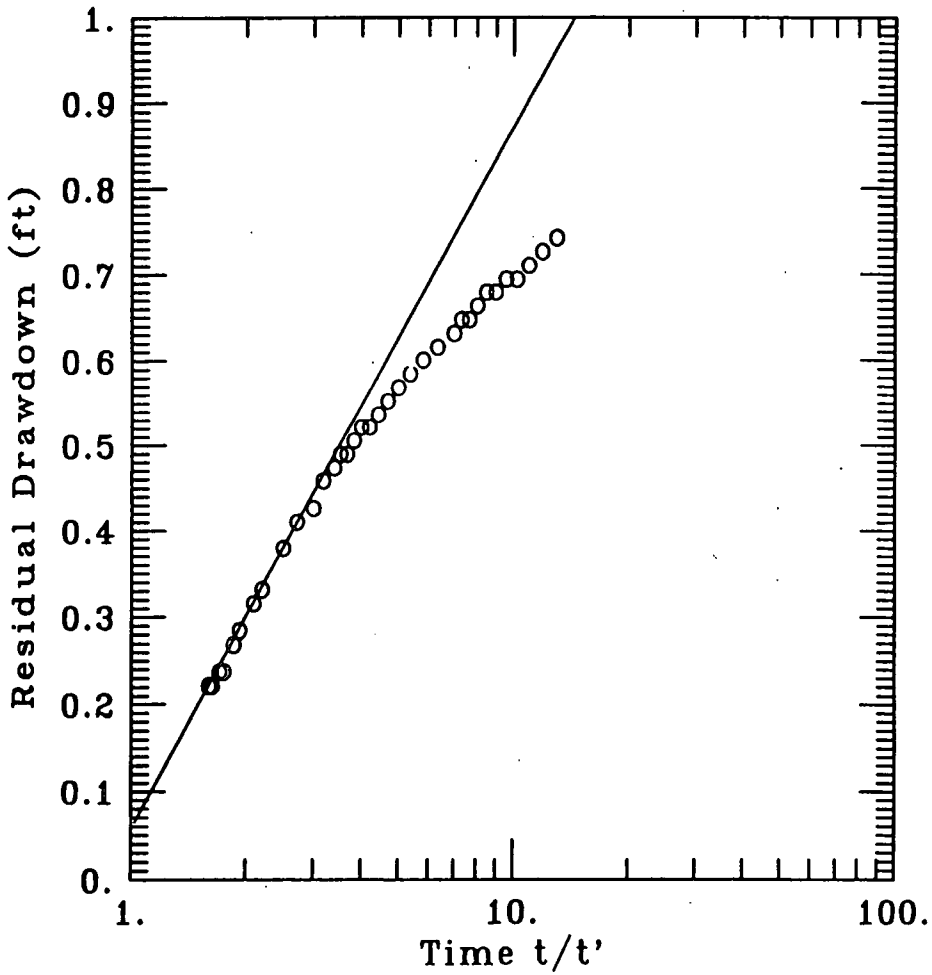
Well b402189 Recovery Data, Aug 18, 1989



DATA SET:
b402189rec.dat
09/12/94

AQUIFER TYPE:
Confined

SOLUTION METHOD:
Theis Recovery

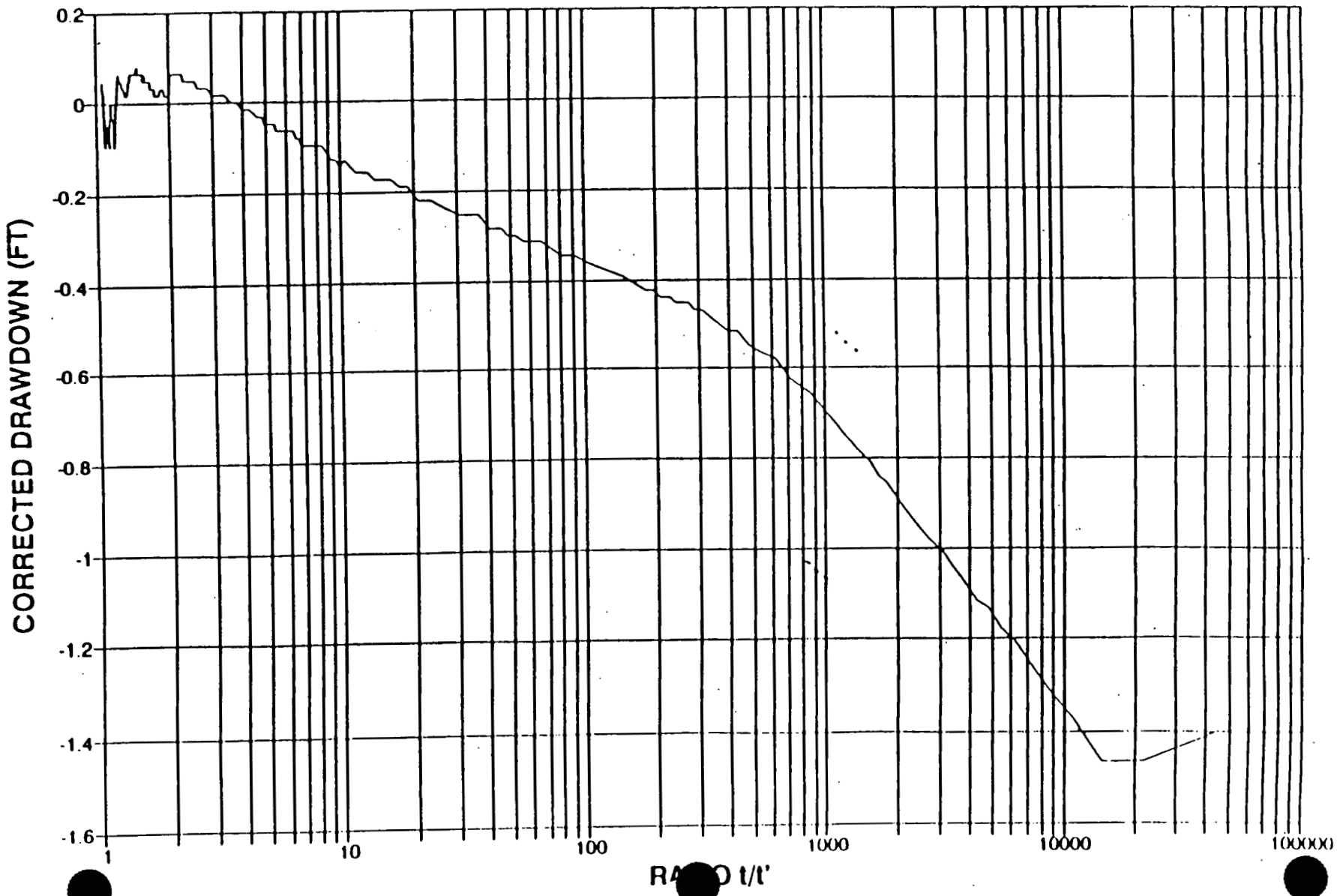
ESTIMATED PARAMETERS:
T = 0.1846 ft^2/min
S' = 0.8522

TEST DATA:
Q = 0.8209 ft^3/min
t pumping = 480. min

943

AQUIFER TEST #2 - PUMPING TEST DATA

RESIDUAL DRAWDOWN PLOT - WELL B400489



944

1994 Review and Reanalysis of Slug Tests (draft 9/15/94)

Well 2186

The test begins at 159 seconds and recovery was insufficient for test duration. Early time data is missing, therefore, Bouwer-Rice cannot be used with confidence. Evaluation of the data with the Cooper method indicates uncertainty of Ho and insufficient late time data.

Conclusion: Reject reported value.

WELL 2386

Early time data is missing (test begins at 41 seconds), therefore, the use of Bouwer-Rice is questionable. Evaluation of the data with the Cooper method indicates uncertainty of Ho and insufficient late time data.

Conclusion: Reject reported value.

WELL 3486

Reanalyzed using Cooper because the aquifer is confined. Obtained a value of 1.33 E-05 cm/s vs. 3.5 E-06 cm/s as referenced in (4a). The fit of the type curve to the data was relatively good.

Data were also evaluated using Bouwer-Rice, however, this method is not the most appropriate for the confined aquifer conditions.

Conclusion: Reject reported value for the Cooper method referenced in (4a) and accept the Cooper method reanalysis value and the Bouwer-Rice reported value of 1.1 E-05. Reject reported value referenced in 4b due to incorrect input parameters.

WELL 3586

Evaluation of data referenced in (4a) using Bouwer-Rice appears to be acceptable.

Conclusion: The slug test referenced in (4a) appears valid, however, the result is a magnitude greater than the value obtained for the bailer/recovery test. May be explained by a fracture in the clay that dominates flow for the slug test (small head change) vs a greater area of influence for bail down test.

The test referenced in (4b) has incorrect input parameters and does not appear to be a true slug test based on the initial drop in head. Appears that the well was bailed dry.

Conclusion: Reject reported value referenced in 4b due to incorrect input parameters.

945

WELL 4086

The test begins at 55 seconds, therefore, critical early time data are missing and Bouwer-Rice may not be reliable. Duration of test was marginal for use of the Cooper method (12.6 minutes). Screened interval appears to be in confined zone, but water level indicates unconfined conditions.

Conclusion: Reject reported value for Bouwer-Rice method due to missing early time data, and accept the reported value for the Cooper analysis.

WELL 4286

The Bouwer-Rice analysis referenced in (9) and (4a) appears to be valid given the aquifer material and fit of data to the linear.

The reported value referenced in (4b) appears too low for the lithology.

Conclusion: Accept the value reported in reference (9) and (4a), and reject the value reported in reference (4b).

WELL 4886

The input parameters referenced in (2) and (11) do not appear to be correct. Check of lithology and well construction indicate that the intake/screen portion = 20.5 ft (filter pack) vs 9.73 ft, and Saturated aquifer zone = 15 ft vs 9.73 ft

Conclusion: Reject both reported values due to incorrect input parameters.

WELL 4986

The first measurement was taken at 209 seconds after the removal of the slug. Therefore, Bouwer-Rice cannot be reliably used for this test.

Conclusion: Reject reported value due to missing early time data.

WELL 5086

The first measurement was taken at 30 seconds after the removal of the slug. Therefore, Bouwer-Rice may not be reliable for this test.

Conclusion: Reject reported value due to missing early time data.

946

WELL 5286

The first measurement was taken at 102 seconds after the removal of the slug. Therefore, Bouwer-Rice may not be reliable for this test.

Due to the uncertainty of the Ho value, it is difficult to obtain a good match to the Cooper type curve. There appears to be enough late time data for a match, however, based on the y intercept value of Ho = 1.15 or the calculated slug volume of Ho = 1.49, a good match cannot be obtained.

By entering a Ho of 1.22 ft, a better match occurs. However, this Ho is arbitrary and the resulting K value should probably not be used. The reanalysis using the Cooper method uses the Ho of 1.22 ft.

Conclusion: Reject reported values, including reanalysis, due to missing early time data for the Bouwer-Rice analysis and due to uncertainty of Ho in the Cooper analysis.

WELL 5486

First measurement begins at 90 seconds and recovery was extremely slow in this well. Ho is questionable and a lack of early time data makes the use of Bouwer-Rice questionable. A good fit does not exist using the Cooper method because of insufficient late time data.

Conclusion: Reject reported values due to insufficient early and late time data, insufficient response, and uncertainty of Ho.

WELL 5686

The first measurement was taken at 102 seconds after the removal of the slug. Therefore, Bouwer-Rice may not be reliable for this test.

Cooper method is inappropriate for unconfined aquifer conditions.

Conclusion: Reject reported values due to missing early time data in the Bouwer-Rice analysis, and reject Cooper analysis due applicability to aquifer conditions.

WELL 5986R

The well was tested with a slug in and slug out. Input parameters for well bore and well casing radius were incorrect. Diameters were used instead of radius.

Conclusion: Reject both reported values due to incorrect input parameters..

947

WELL 6286BR

Evaluation of data indicates marginal response to the slug test referenced in (4a).

Input parameters were incorrect for the slug test referenced in (4b).

Conclusion: Accept reported value referenced in (4a), and reject value reported in (4b) due to incorrect input parameter values.

WELL 6986

Evaluation of data indicates that the reported value referenced in (4a) was acceptable.

Input parameters were incorrect for the slug test referenced in (4b).

Conclusion: Accept original K value in (4a), and reject reported value referenced 4b due to incorrect input parameter values.

WELL 0387BR

Because the methodology for a slug test requires an instantaneous removal or addition of a volume to the well, the slug test result for this well should be rejected. The well was bailed which does not fit the assumptions for the Cooper method.

Conclusion: Reject reported value due to improper methodology for a slug test.

WELL 0587BR

Cooper method has a poor fit to the type curve.

Slug test referenced in (4a) appears to be acceptable based on evaluation of the data.

Input parameters were incorrect for the slug test referenced in (4b).

Conclusion: Reject reported values for Cooper method and Bouwer-Rice method referenced in (4b). Value referenced in (4a) is considered acceptable.

948

WELL 0887BR

Because the methodology for a slug test requires an instantaneous removal or addition of a volume to the well, the slug test result for this well should be rejected. The well was bailed which does not fit the assumptions for the Cooper method.

Conclusion: Reject reported value due to improper methodology for a slug test.

WELL 0987BR

The three slug tests referenced in (4a) and (WWE) appear to be reasonable based on evaluation of the test data.

The three slug tests referenced in (4b) had incorrect input parameters. Reject these tests.

Conclusion: Accept values referenced in (4a) and (WWE). Reject values referenced in (4b) due to incorrect input parameters.

WELL 1487BR

The slug test referenced in (4a) and (9) appears to be reasonable based on evaluation of the test data.

The slug test referenced in (4b) had incorrect input parameters. Reject this test.

Conclusion: Accept values referenced in (4a) and (9). Reject value referenced in (4b) due to incorrect input parameters.

WELL 1687BR

The analyses referenced in (4a) and (9) show very little recovery of the well (0.02 ft) over the 18 min test duration. Late time data is insufficient to apply the Cooper method, and the Bouwer-Rice solution is questionable due to the apparent confined conditions and slope of the linear.

The slug test referenced in (4b) had incorrect input parameters. Reject this test.

Conclusion: Reject all reported values due to incorrect input parameters, insufficient late time data, appropriateness of Bouwer-Rice to a confined aquifer, and insufficient aquifer response.

949

WELL 1787

The slug test referenced in (4a) and (9) appears to be acceptable based on evaluation of the test data.

The slug test referenced in (4b) had an incorrect input parameter for saturated thickness. Reject this test.

Conclusion: Accept reported value referenced in (4a) and (9). Reject reported value referenced in (4b) due to incorrect input parameter.

WELL 2387BR

The slug test referenced in (4a) and (9) appears to have a K that is too high. Reanalysis using Bouwer-Rice indicate that the K is approximately a magnitude less.

The slug test referenced in (4b) had an incorrect input parameter for saturated thickness. Reject this test.

Conclusion: Reject values referenced in (4a) and (9) due to a K value that is not reproducible using Bouwer-Rice in AQTESOLV, and the (4b) value due to incorrect input parameters. The reanalyzed K value is considered acceptable.

WELL 2587BR

The slug test referenced in (4a) and (9) appears to have a K that is too high. Reanalysis using Bouwer-Rice indicate that the K is approximately a magnitude less.

The slug test referenced in (4b) had an incorrect input parameter for saturated thickness. Reject this test.

Conclusion: Reject values referenced (4a) and (9) due to a K value that is not reproducible using Bouwer-Rice in AQTESOLV, and the (4b) value due to incorrect input parameters. The reanalyzed K value is considered acceptable.

950

WELL 3187BR

The Cooper method referenced in (4a) for this slug test lacks sufficient late time data, therefore, a poor fit to the type curve exists. Reject analysis.

The slug test referenced in (4a) using Bouwer-Rice shows insufficient aquifer response to obtain a reliable K. Reject analysis.

The slug test referenced in (2) has incorrect input parameter for saturated thickness. Reject analysis.

Conclusion: Due to insufficient late time data for Cooper, insufficient aquifer response and incorrect input parameters, reject all reported values.

WELL 3287

The slug test referenced in (4a) and (9) appears to have a K that is too high. Reanalysis using Bouwer-Rice indicate that the K is approximately a magnitude less.

The slug test referenced in (2) had incorrect input parameters. Reject this test.

Conclusion: Reject values referenced in (4a) and (9) due to a K value that is not reproducible using Bouwer-Rice in AQTESOLV. Reject value referenced in (2) due to incorrect input parameters. The reanalyzed K value is considered acceptable.

WELL 3487BR

The Cooper method referenced in (4a) for this slug test lacks sufficient late time data, therefore, a poor fit to the type curve exists. Reject analysis.

The test referenced in (4a) test using Bouwer-Rice shows insufficient aquifer response to obtain a reliable K. Reject analysis.

The test referenced in (2) has incorrect input parameter for saturated thickness. Reject analysis.

Conclusion: Due to insufficient late time data for Cooper, insufficient aquifer response and incorrect input parameters, reject all reported values.

951

WELL 3687BR

The slug test referenced in (4a) and (9) appears to have a K that is too high. Reanalysis using Bouwer-Rice indicate that the K is approximately a magnitude less.

The slug test referenced in (2) had incorrect input parameters. Reject this test.

Conclusion: Reject values referenced in (4a) and (9) due to a K value that is not reproducible using Bouwer-Rice in AQTESOLV. Reject (2) value due to incorrect input parameters. The reanalyzed K value is considered acceptable.

WELL 4187

First measurement begins at 40 seconds. Recovery was extremely slow in this well. A good fit does not exist using the Cooper method because of insufficient late time data. Ho is questionable and a lack of early time data makes the use of Bouwer-Rice questionable as well.

Conclusion: Reject both reported values due to insufficient early and late time data, and uncertainty of Ho.

WELL 4587BR

Based on actual screened length with filter pack (from RFED) of 12.9 ft, and a depth of water from bottom of screen of 10.82 ft, the aquifer appears to be unconfined.

The test begins at 100 seconds and appears to be more permeable than other bedrock units. However, because the early time data is missing and the true initial drawdown is unknown, an accurate fit to the Bouwer-Rice linear is marginal. The value appears to be too high based on the data. The reanalysis value is more than a magnitude less than the value referenced in (2).

Conclusion: The lack of early time data limits the usefulness of Bouwer-Rice. The value reported in (2) appears to be too high. The test is rejected due to insufficient early time data. The reanalysis value is considered marginally acceptable.

952

WELL 5287

Screened in sandy gravel of the Rocky Flats Alluvium.

The test begins at 21 seconds. However, because the early time data is missing and the true initial drawdown is unknown, an accurate fit to the Bouwer-Rice linear is marginal. The reanalysis value is an order of magnitude less than reported in (2). The reported value appears to be too high based on the data.

Conclusion: The lack of early time data limits the usefulness of Bouwer-Rice. The value reported in (2) appears to be too high based on the AQTESOLV reanalysis, therefore, the test is rejected. The reanalysis value is considered marginally acceptable.

WELL 5887

Missing reference (10) data for this test

Conclusion: Reject test referenced in (2) due to missing early time data. Test began at 567 seconds, therefore, Bouwer-Rice cannot be applied effectively.

WELL 6087

The test was reanalyzed with Bouwer-Rice and utilized early time data that were not present in sources (3)(10). The test referenced in (2) had incorrect input parameters but contained early time data. Both reported values should be rejected and the new reanalysis value is considered acceptable.

Conclusions: Reject values referenced in (3), (10), and (2). Reanalysis value is considered acceptable.

WELL 6187

The test referenced in (2) used incorrect input parameters, therefore, the result is rejected.

Analyses from (4)(10) and (3a) were the same values. Because the test did not begin until 50 seconds, the critical early time data is missing as well as the initial drawdown value.

Conclusion: Reject all three reported values due to incorrect input parameters and missing early time data. Although the values are not unreasonable, the best fit line through the available data may be after the break in slope and may not be representative of true conditions.

953

WELL 6287

The test referenced in (2) used incorrect input parameters, therefore, the result is rejected.

Analyses from (4)(10) and (3a) were the same values. Because the test did not begin until 50 seconds, the critical early time data is missing as well as the initial drawdown value.

Conclusion: Reject all three reported values due to incorrect input parameters and missing early time data. Although the values are not unreasonable, the best fit line through the available data may be after the break in slope and not representative of true conditions.

WELL 6387

The test referenced in (2) used incorrect input parameters, therefore, the result is rejected.

Analyses from (4)(10) and (3a) were the same values. Because the test did not begin until 100 seconds, the critical early time data is missing as well as the initial drawdown value.

Conclusion: Reject all three reported values due to incorrect input parameters and missing early time data. Although the values are not unreasonable, the best fit line through the available data may be after the break in slope and not representative of true conditions.

WELL 6587

The test referenced in (2) used incorrect input parameters, therefore, the result is rejected.

Analyses from (4)(10) and (3a) were the same values. Because the test did not begin until 197 seconds, the critical early time data is missing as well as the initial drawdown value.

Conclusion: Reject all three reported values due to incorrect input parameters and missing early time data. Although the values are not unreasonable, the best fit line through the available data may be after the break in slope and not representative of true conditions.

WELL 6687

The test referenced in (2) used incorrect input parameters, therefore, the result is rejected.

Analyses from (3) and (10) had correct input parameters. However, the test did not begin until 100 seconds and the critical early time data is missing as well as the initial drawdown value.

Conclusion: Reject both reported values due to incorrect input parameters and missing early time data. Although the values are not unreasonable, the best fit line through the available data may be after the break in slope and not representative of true conditions.

954

WELL 6787

The test referenced in (2) used incorrect input parameters and the test was not start until 100 seconds, therefore, the result is rejected.

Analyses from (3) and (10) had correct input parameters. However, the test did not begin until 242 seconds and the critical early time data is missing as well as the initial drawdown value.

Conclusion: Reject both reported values due to incorrect input parameters and missing early time data. Although the values are not unreasonable, the best fit line through the available data may be after the break in slope and not representative of true conditions.

WELL 7187

The test referenced in (2) used incorrect input parameters, therefore, the result is rejected.

Analyses from (3) and (10) had correct input parameters. However, the test did began at 30 seconds. The critical early time data is missing as well as the initial drawdown value.

Conclusion: Reject the test referenced in (2) due to incorrect input parameters. The analyses from (3) and (10) is missing early time data, however, the test may be reasonable. The value referenced in (3) and (10) is considered marginally acceptable.

WELL B400189/0189A

Parameter input for Rc is incorrect because the water level is within the screened portion of the well. The test was reanalyzed using adjusted Rc and the result was within the same order of magnitude.

Conclusion: Reject reported values. Reanalysis using adjusted Rc is considered acceptable.

WELL B400389/0389

Parameter input for Rc is incorrect because the water level is within the screened portion of the well.

Conclusion: Reject reported values. Reanalysis using adjusted Rc is considered acceptable.

WELL B200589/0589

Parameter input for Rc is incorrect because the water level is within the screened portion of the well.

Conclusion: Reject reported values. Reanalysis using adjusted Rc is considered acceptable.

955 955

WELL B200689/0689

Parameter input for Rc is incorrect because the water level is within the screened portion of the well.

Conclusion: Reject reported values. Reanalysis using adjusted Rc is considered acceptable.

WELL B200689/0689D

Parameter input for Rc is incorrect because the water level is within the screened portion of the well.

Conclusion: Reject reported values. Reanalysis using adjusted Rc is considered acceptable.

WELL B200789/0789

Parameter input for Rc is incorrect because the water level is within the screened portion of the well.

Conclusion: Reject reported values. Reanalysis using adjusted Rc is considered acceptable.

WELL B200889/0889

Parameter input for Rc is incorrect because the water level is within the screened portion of the well.

Conclusion: Reject reported values. Reanalysis using adjusted Rc is considered acceptable.

WELL B200889/0889D

Parameter input for Rc is incorrect because the water level is within the screened portion of the well.

Conclusion: Reject reported values. Reanalysis using adjusted Rc is considered acceptable.

WELL B102389/1989

Parameter input for Rc is incorrect because the water level is within the screened portion of the well.

Conclusion: Reject reported values. Reanalysis using adjusted Rc is considered acceptable.

95

WELL B202489/2089 and 2089D

Parameter input for Rc is incorrect because the water level is within the screened portion of the well.

Conclusion: Reject reported values. Reanalysis using adjusted Rc is considered acceptable.

WELL B305389/4489BR

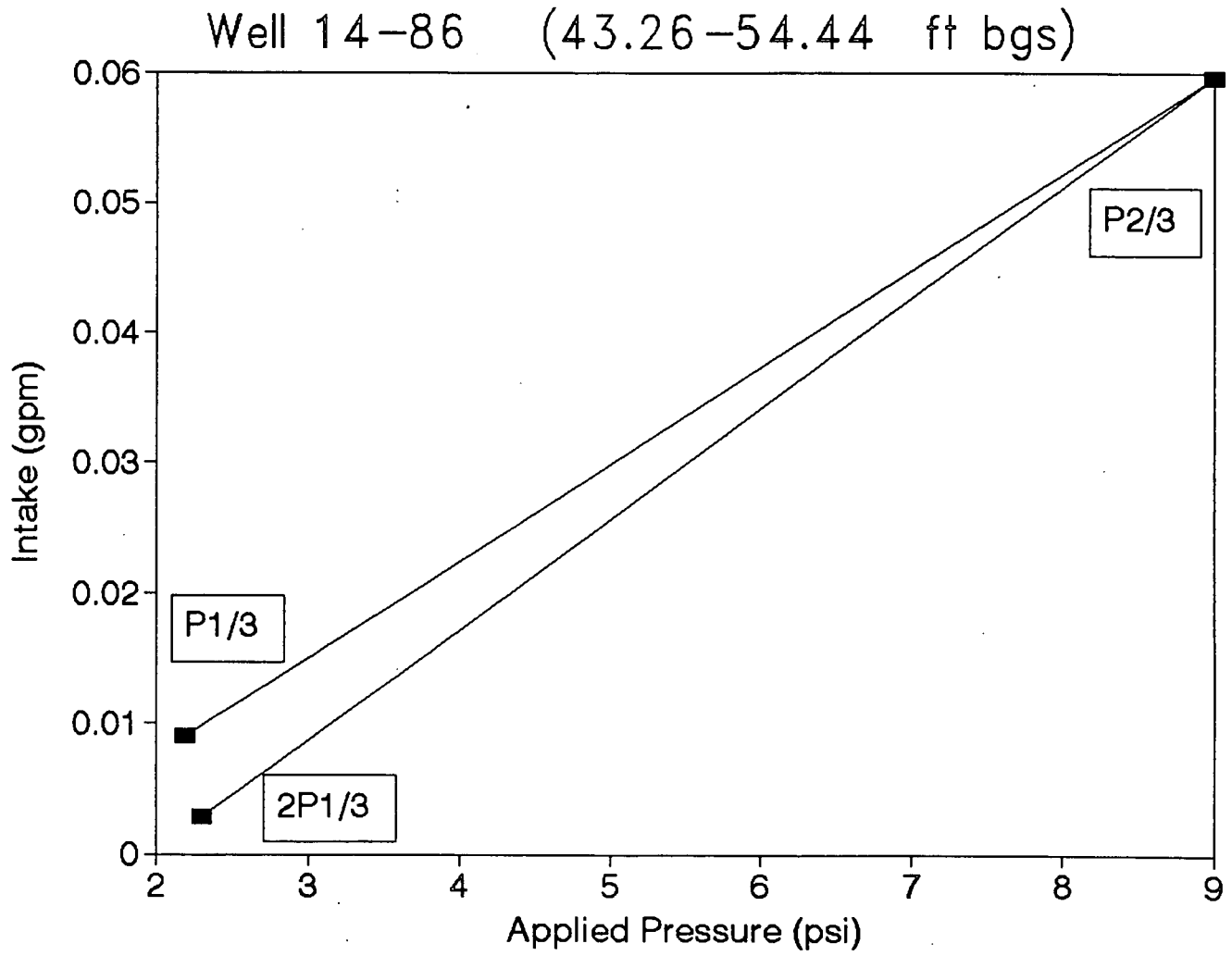
Data matches Alpha 1E-05 better than the reported value.

Conclusion: Reject value and reanalyze using new Alpha.

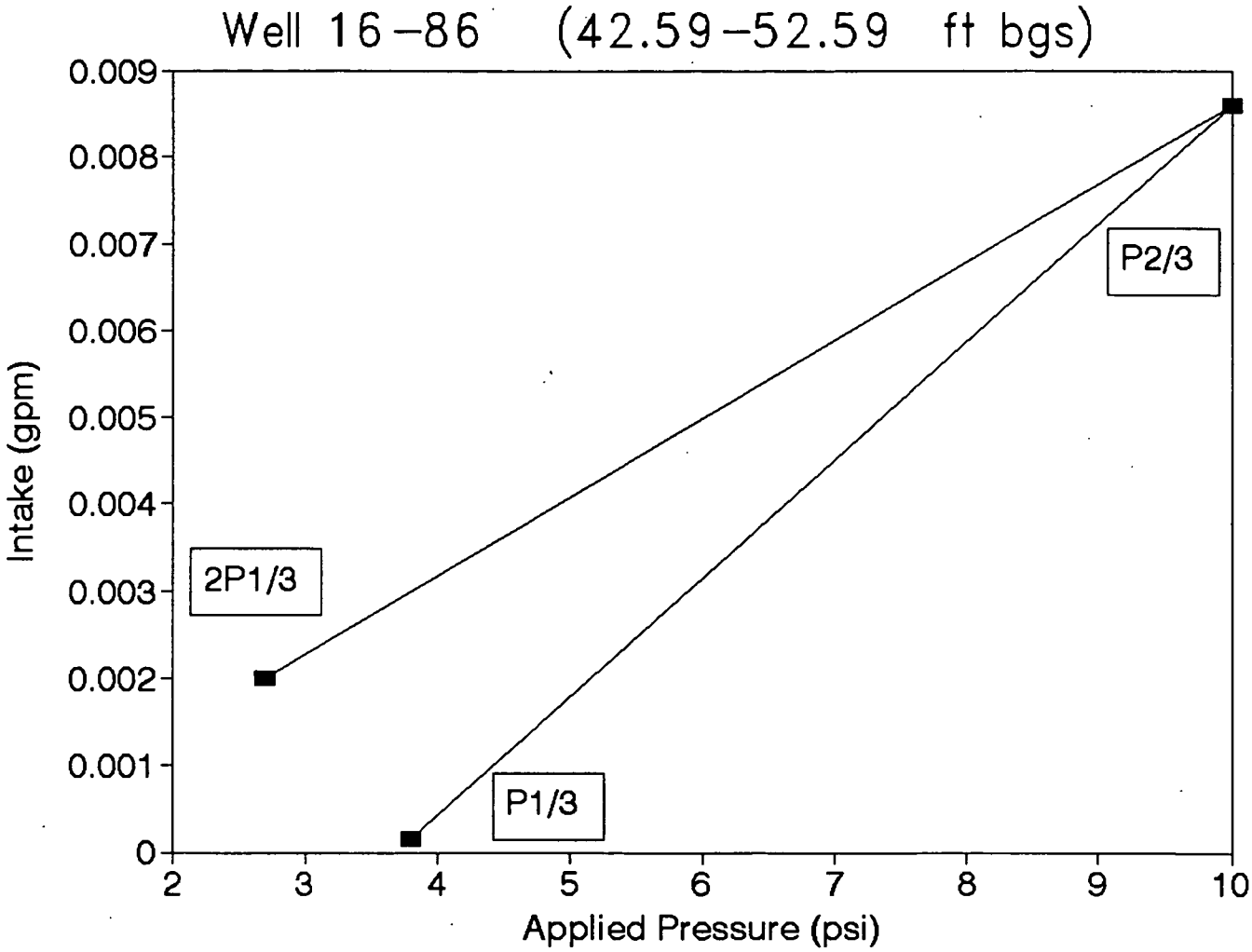
WELL B405889/4889

Conclusion: Reject value because best fit line appears to be on filter pack portion of data.

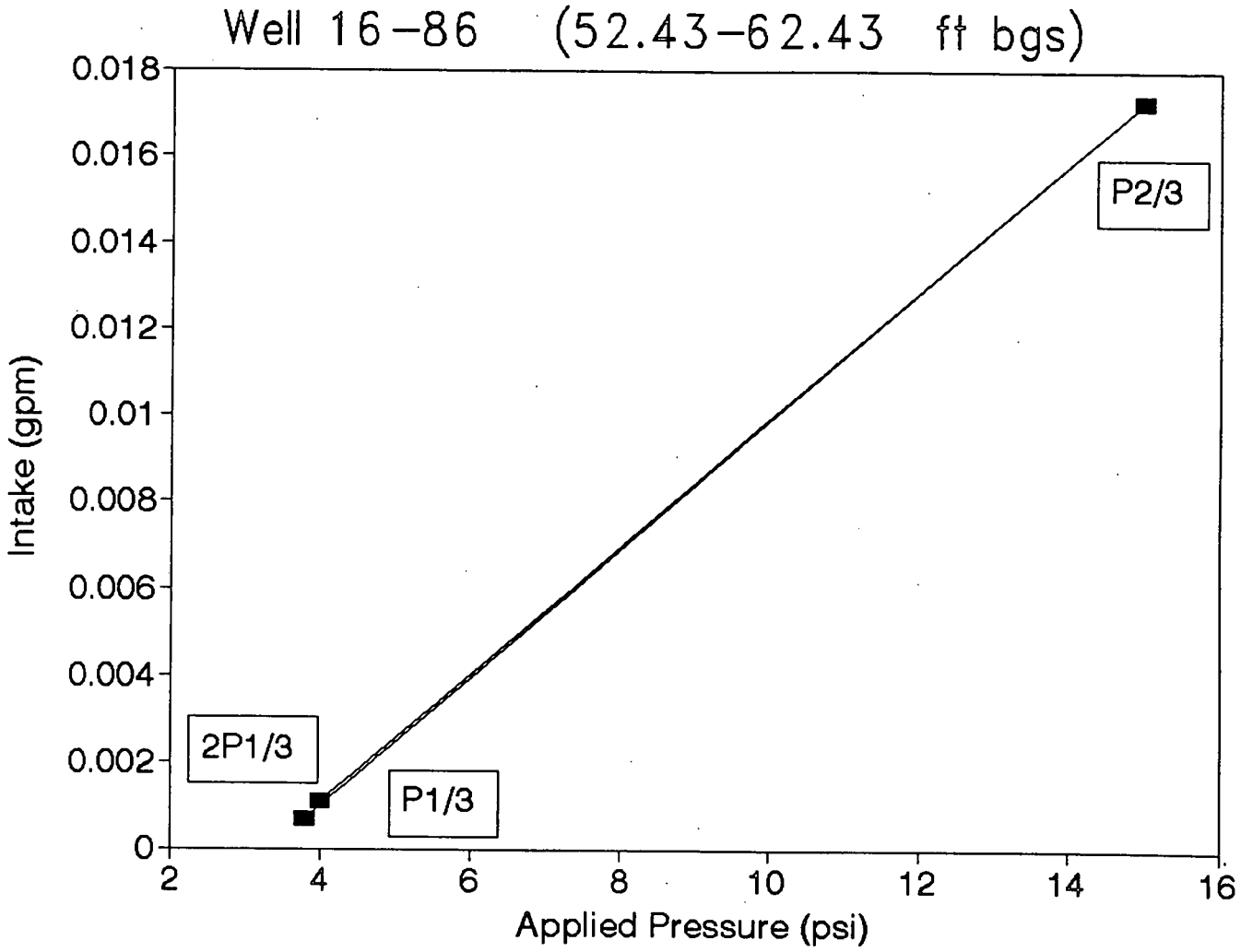
957


Well 14-86 (43.26-54.44 ft bgs)
0.06
0.05
0.04
0.03
0.02
0.01
0
Intake (gpm)
P2/3
P1/3
2P1/3
2
3
4
5
6
7
8
9
Applied Pressure (psi)

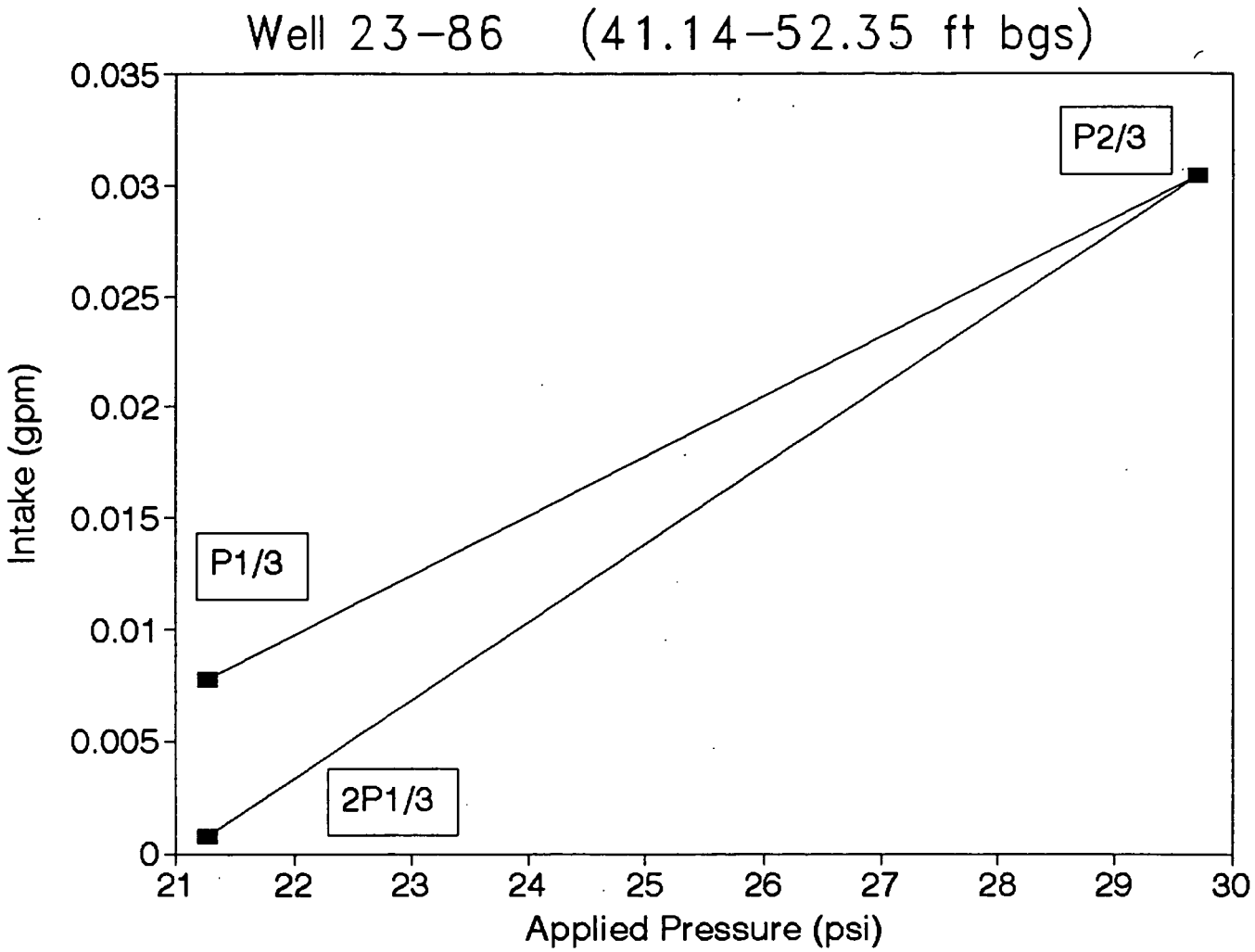
958


Well 16-86 (42.59-52.59 ft bgs)
0.009
0.008
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0
Intake (gpm)
2
3
4
5
6
7
8
9
10
Applied Pressure (psi)
2P1/3
P1/3
P2/3

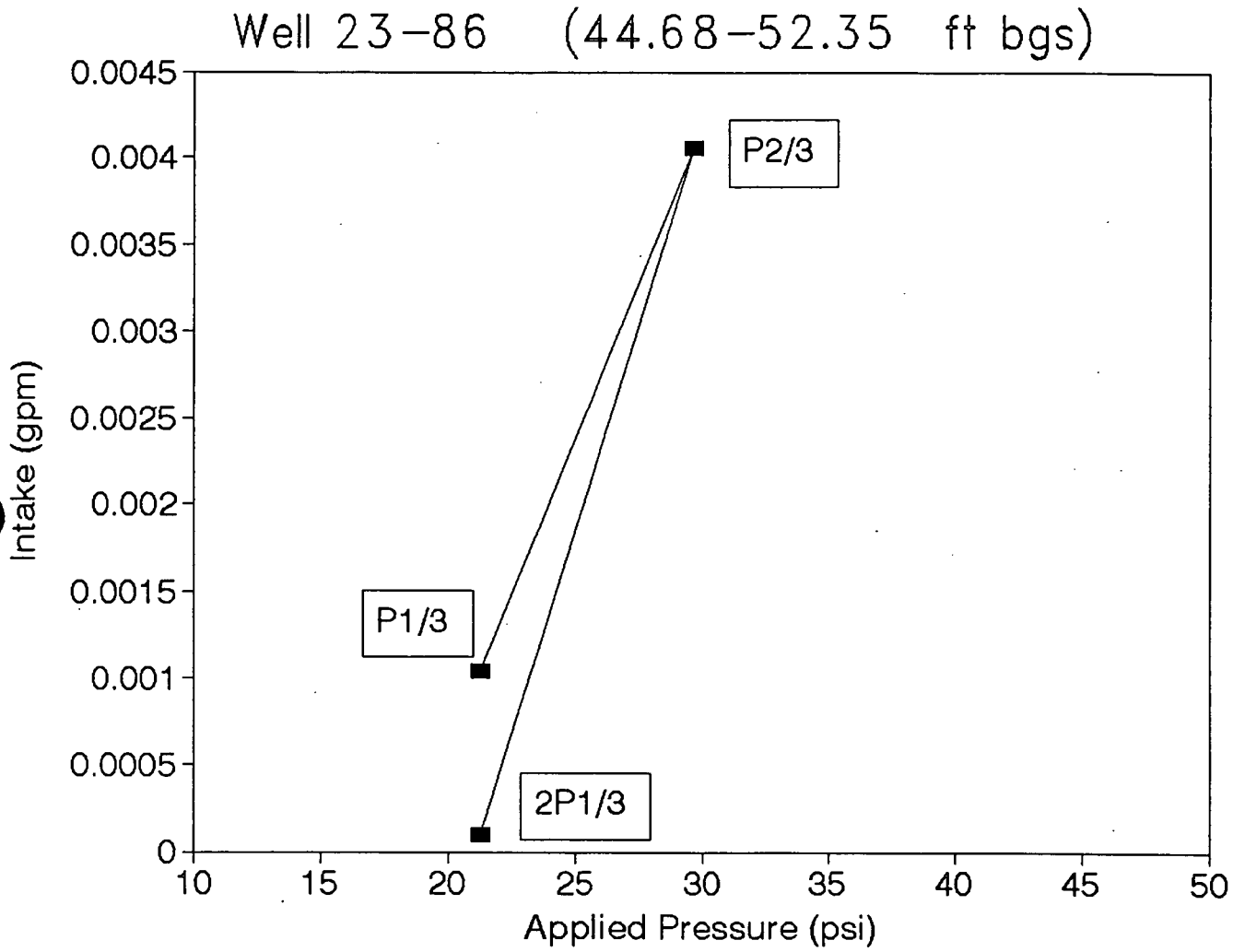
959


Well 16-86 (52.43-62.43 ft bgs)
Intake (gpm)
0.018
0.016
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
2
4
6
8
10
12
14
16
Applied Pressure (psi)
2P1/3
P1/3
P2/3

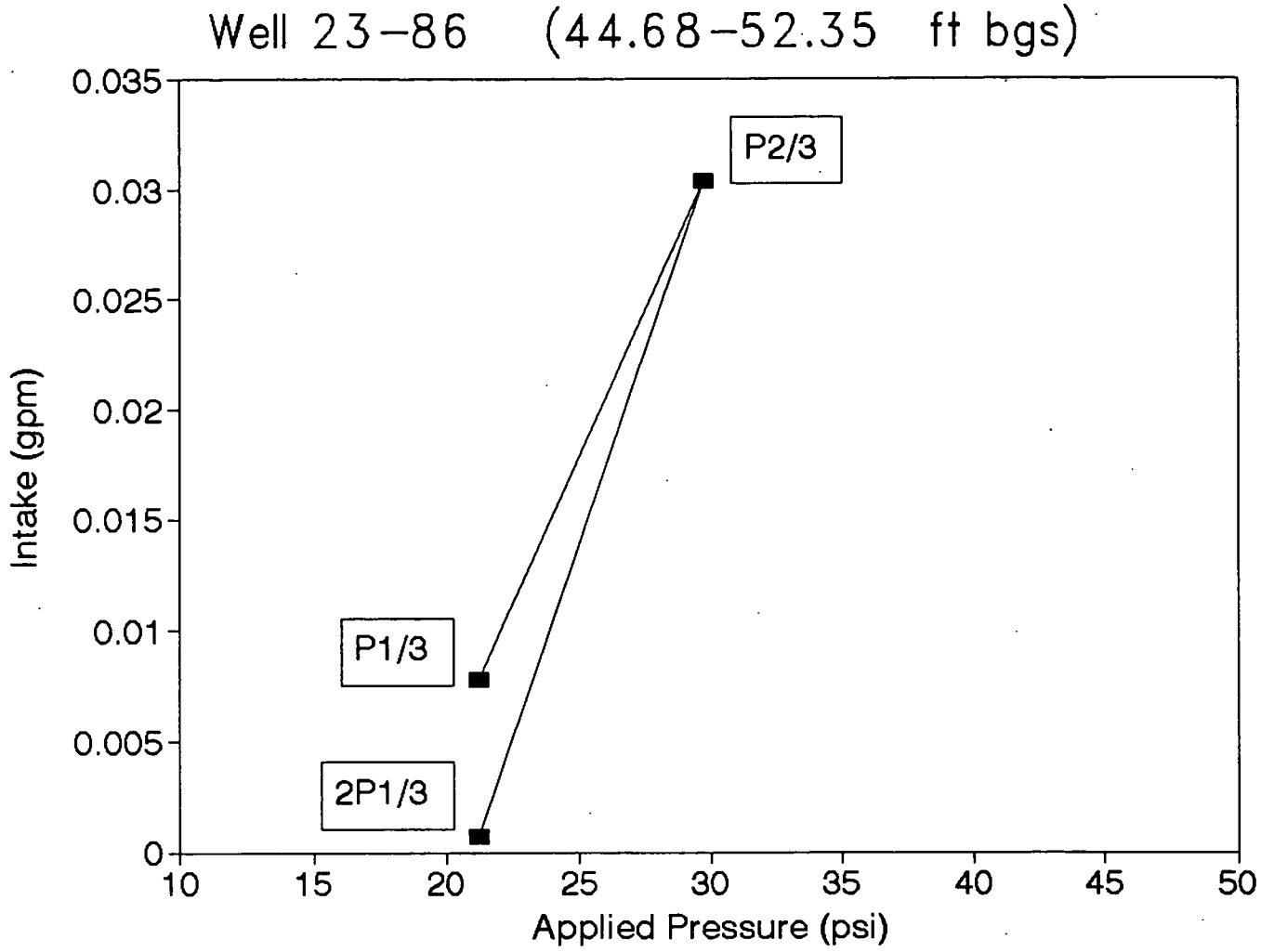
960


Well 23-86 (41.14-52.35 ft bgs)
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
Intake (gpm)
P2/3
P1/3
2P1/3
21
22
23
24
25
26
27
28
29
30
Applied Pressure (psi)

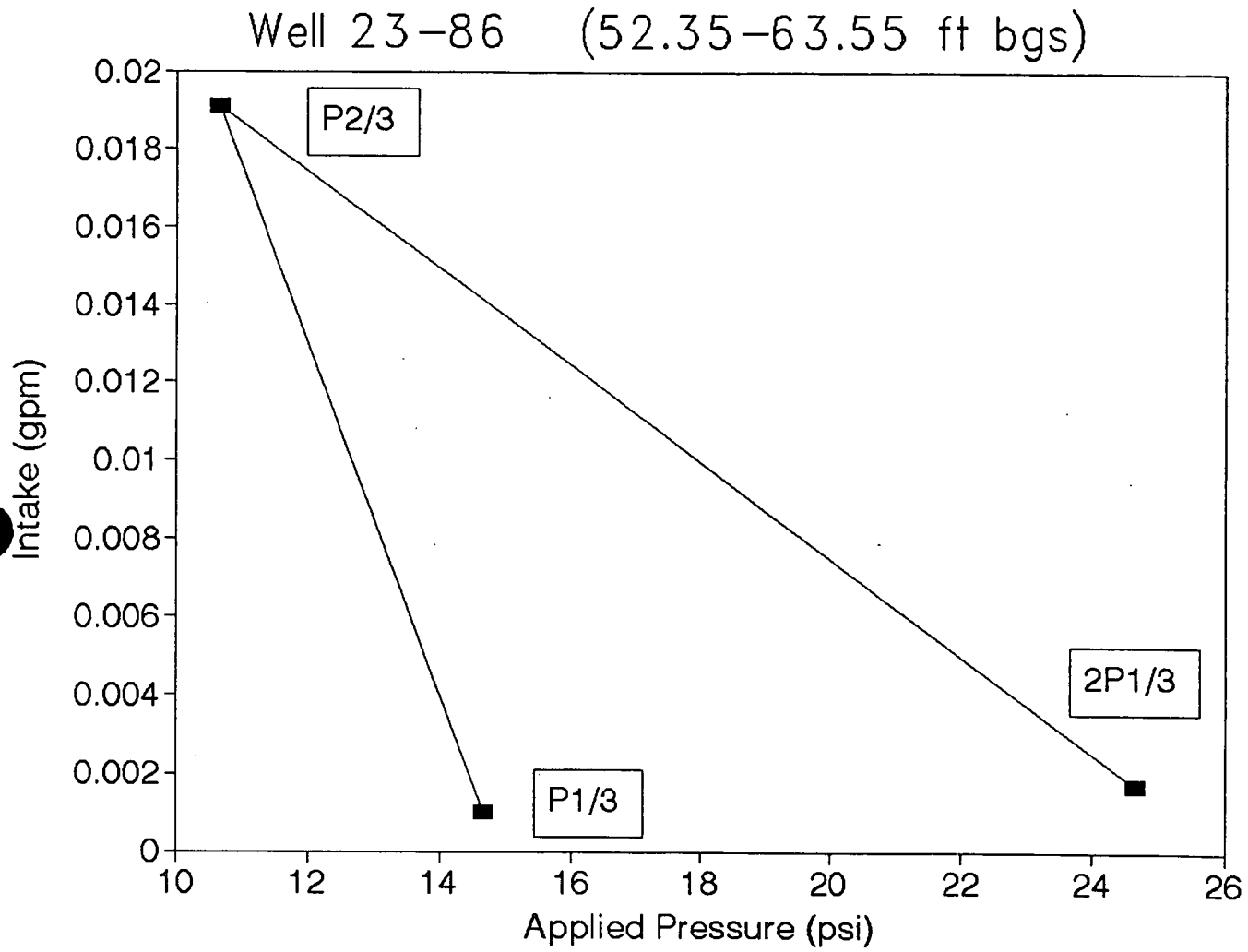
961


Well 23-86 (44.68-52.35 ft bgs)
0.0045
0.004
0.0035
0.003
0.0025
0.002
0.0015
0.001
0.0005
0
Intake (gpm)
P2/3
P1/3
2P1/3
10
15
20
25
30
35
40
45
50
Applied Pressure (psi)

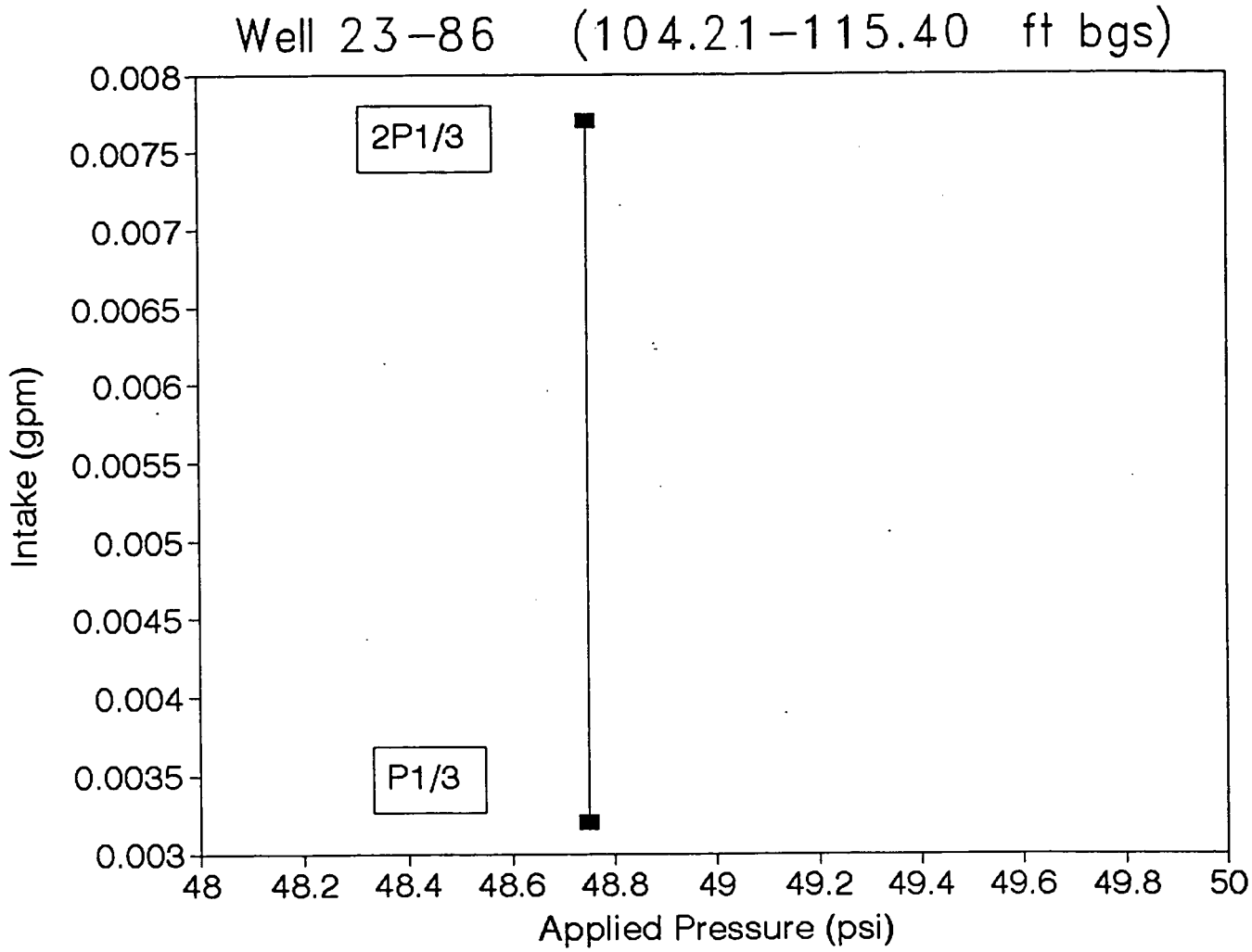
962
~~642~~


Well 23-86 (44.68-52.35 ft bgs)
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
Intake (gpm)
P2/3
P1/3
2P1/3
10
15
20
25
30
35
40
45
50
Applied Pressure (psi)

963

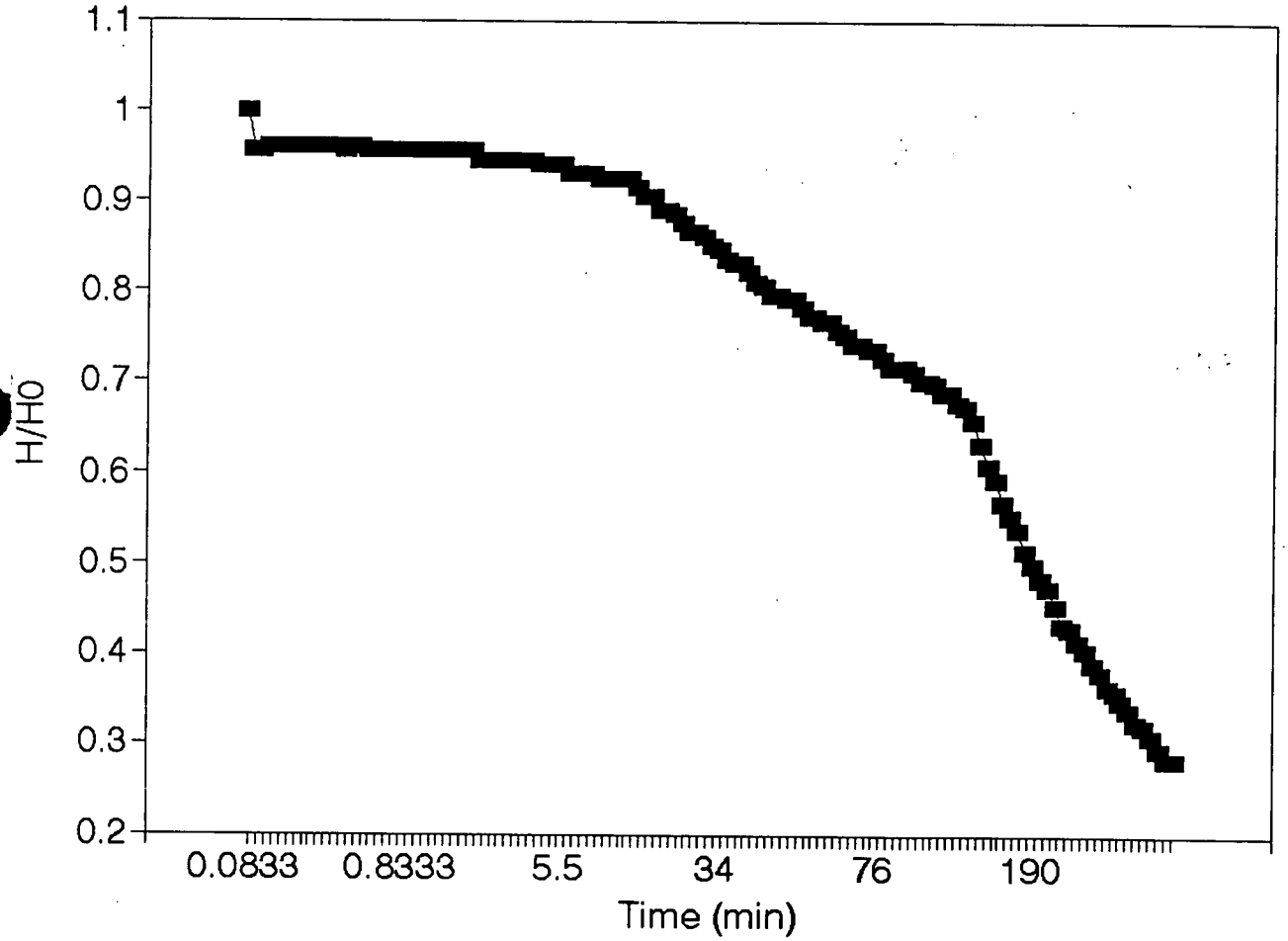

Well 23-86 (52.35-63.55 ft bgs)
Intake (gpm)
0.02
0.018
0.016
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
10
12
14
16
18
20
22
24
26
Applied Pressure (psi)
P2/3
P1/3
2P1/3

964


Well 23-86 (104.21-115.40 ft bgs)
2P1/3
P1/3
Intake (gpm)
0.008
0.0075
0.007
0.0065
0.006
0.0055
0.005
0.0045
0.004
0.0035
0.003
48
48.2
48.4
48.6
48.8
49
49.2
49.4
49.6
49.8
50
Applied Pressure (psi)

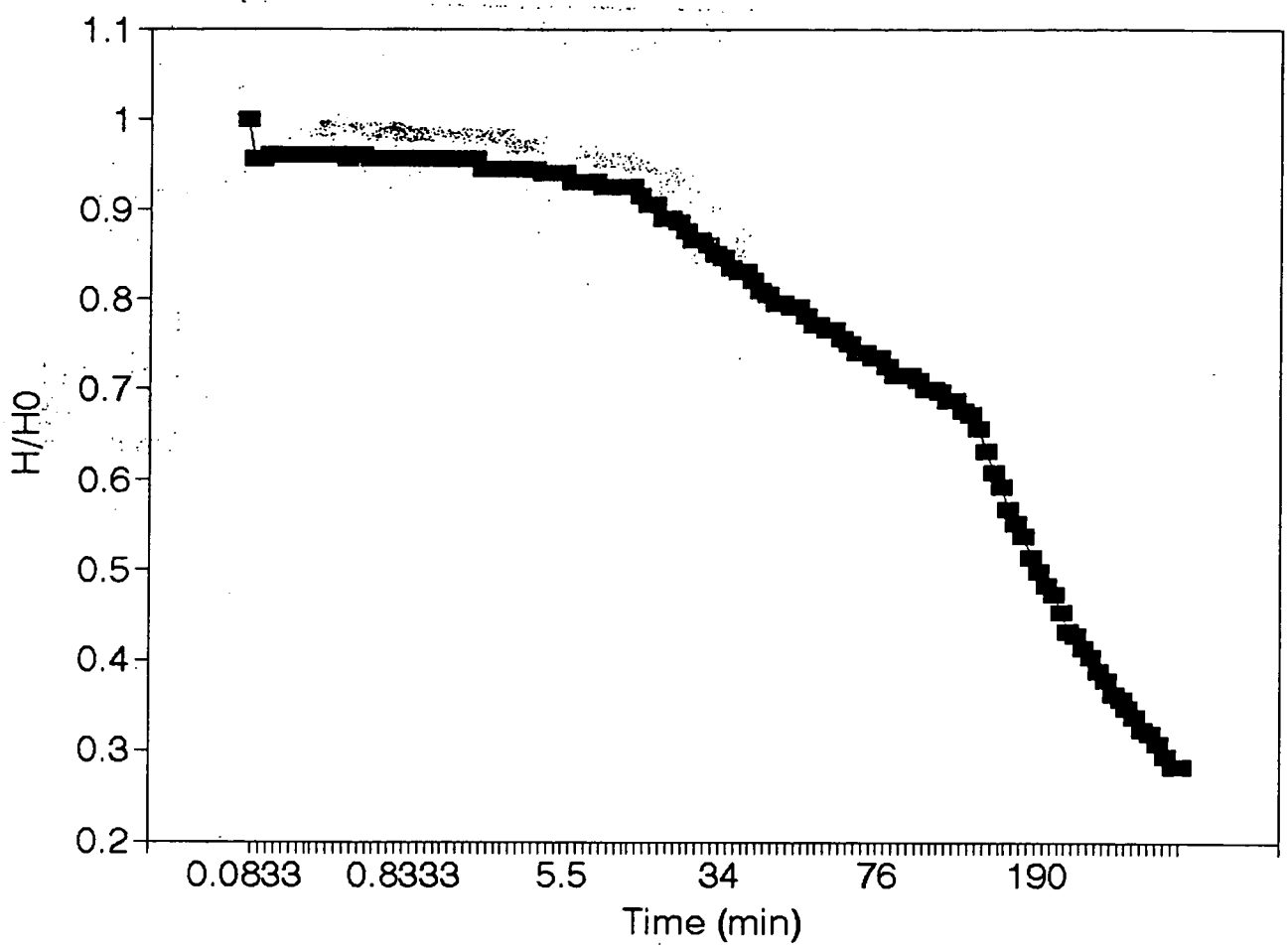
965

44-89 Slug In



966

44-89 Slug In



967| 967