COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

THE APPLICATION OF WOOD CREEK WATER DISTRICT, OF LAUREL COUNTY, KENTUCKY, FOR APPROVAL OF CONSTRUCTION, FINANCING AND INCREASED WATER RATES	)	CASE NO. 9594

O R D E R

The Commission, on its own Motion, hereby orders that:

1. A hearing be and it hereby is scheduled on December 10, 1986, at 1:30 p.m., Eastern Standard Time, in the Commission's Offices, Frankfort, Kentucky.

2. The purpose of the hearing is to hear testimony and consider other evidence on the proposed construction, financing and rates.

3. The staff report on the construction proposed by the Wood Creek Water District as Appendix A shall be included as a part of the record in this proceeding. Commission staff will be available at the hearing for cross-examination about the attached report.

4. Wood Creek Water District shall give notice of the hearing in accordance with the provisions of 807 KAR 5:011, Section 8 (5).

Done at Frankfort, Kentucky, this 26th day of November, 1986.

PUBLIC SERVICE COMMISSION

Chairman

Vice Chairman

Commissioner

ATTEST:

Executive Director

APPENDIX A

Commonwealth of Kentucky
Public Service Commission DATED 11/26/86

Report on the Feasibility of the Construction
of a 20-inch Water Line for the
Wood Creek Water District
Case No. 9594

November 14, 1986

INTRODUCTION

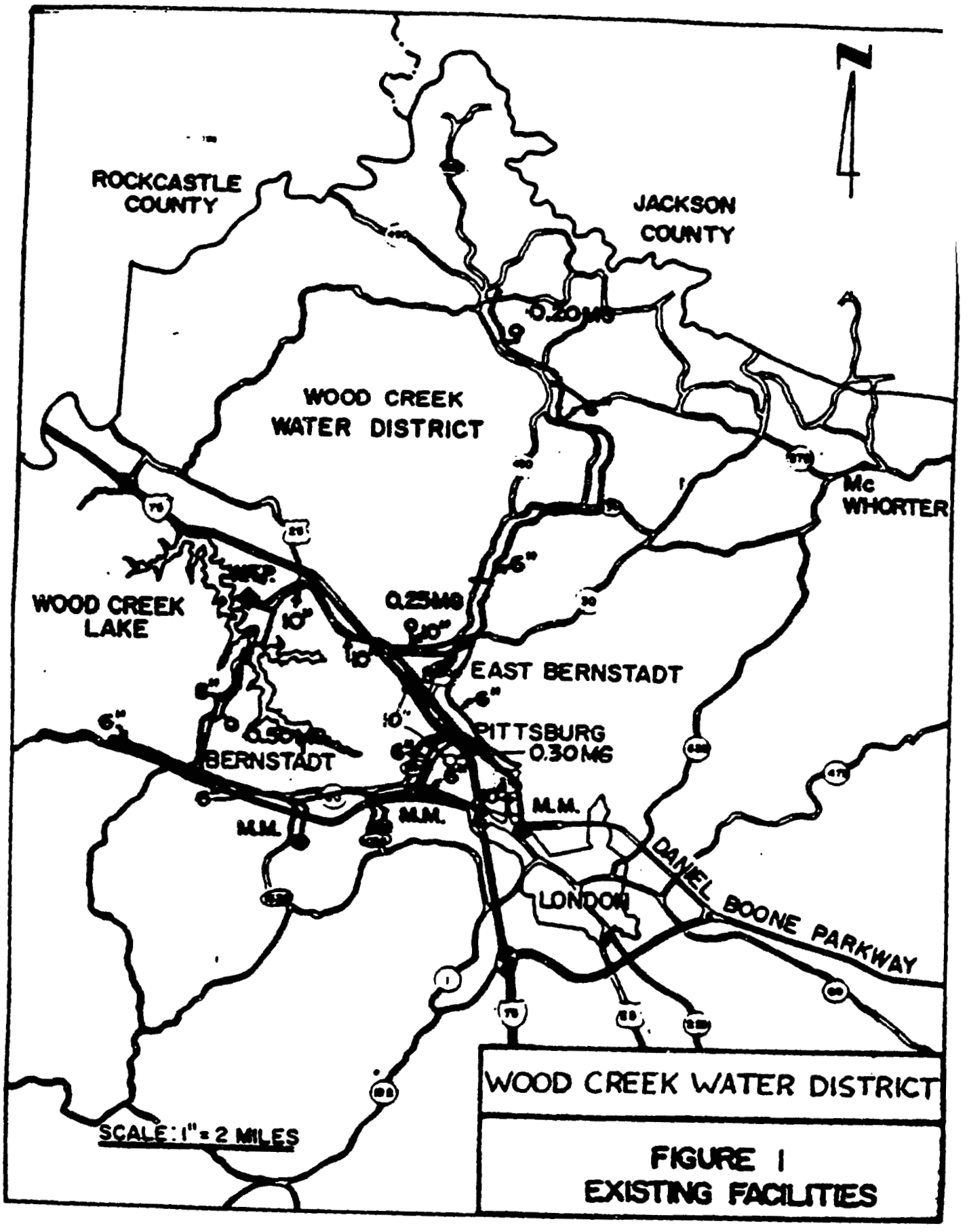
The purpose of this report is to discuss the engineering data and hydraulic calculations presented by the Wood Creek Water District ("Wood Creek") to justify its proposed construction of approximately 24,500 feet of 20-inch water line. On May 28, 1986, the Public Service Commission received an application from Wood Creek for approval of the construction mentioned above as well as the approval of associated financing and an increase in water service rates.

Copies of construction drawings and specification and a computer hydraulic analysis of Wood Creek's system after the installation of the 20-inch line were filed with the application. In an attempt to determine if the proposed construction would be "used and useful in rendering service to the public" additional information was requested from Wood Creek by Order dated June 26, 1986. Wood Creek's response to the information request was received on July 23, 1986. The engineering and hydraulic data supplied by Wood Creek was reviewed by the staff and was found lacking sufficient detail for a "complete understanding of the situation." In a second attempt to determine if the construction

would be "used and useful" additional information was requested from Wood Creek by Order dated September 11, 1986. Wood Creek's response to the information request was received October 13, 1986.

BACKGROUND INFORMATION

The Wood Creek Water District began operation in May 1969 with approximately 650 customers. The District presently serves approximately 2,642 retail customers in northwestern Laurel County. In addition Wood Creek supplies water for resale to West Laurel Water Association ("West Laurel"), and East Laurel Water District ("East Laurel"). Wood Creek also has a connection to the City of London and in the past has sold water to supplement the City of London's supply. The water distribution system is made up of some 100 miles of pipeline, 4 storage tanks, and a water treatment plant at Wood Creek Lake (See Figure 1). The 4 storage tanks include a 300,000-gallon standpipe near Mt. Moriah Church at Bernstadt, a 250,000-gallon standpipe near East Bernstadt (locally called the "Mother" tank), a 200,000-gallon standpipe on Highway 490 near the community of Victory and a 300,000-gallon ground level storage tank on Grimes Road. The Mt. Moriah tank has an overflow elevation of 1,410 feet above sea level (ASL) which is regulated by an altitude valve. The "Mother" tank has an overflow elevation of 1,420 feet ASL and is monitored telemetrically at the water treatment plant. The water tank at Victory has an overflow elevation of 1,420 feet ASL and is fed by its own booster pump



WOOD CREEK WATER DISTRICT

FIGURE 1
EXISTING FACILITIES

station. The Grimes Road tank has an overflow elevation of 1,420 feet ASL and is regulated by an altitude valve.

Wood Creek's water treatment plant was originally constructed in 1968-69 with a rated capacity of 0.72 million gallons per day (MGD). In 1978 the plant was doubled to a capacity of 1.44 MGD. The water plant was expanded in 1983 to its present rated capacity of 2.88 MGD.

DATA REVIEW AND INTERPRETATION

It is Wood Creek's contention that the demand of its own system as well as the demands of West Laurel, East Laurel, and the potential demands of the City of London and Laurel County Water District No. 2 ("Laurel No. 2") require additional treatment and transmission capacity.

The present plans of Wood Creek are to construct the proposed 20-inch transmission line as a first step in meeting the potential demands. Wood Creek's current plans also call for the expansion of its treatment plant within the next three years. Treatment capacity would be increased from 2.88 MGD to at least 4.32 MGD. These modifications include an additional clearwell and two (2) new high service pumps.

Recent information filed by Wood Creek indicates that on July 5, 1986, the treatment plant treated 2,129,000 gallons of water or 74 percent of its capacity. During the month of August 1986, the

treatment plant treated an average of 1,900,000 or 66 percent of the plant's capacity. Generally accepted engineering practice recommends that a water treatment plant be sized to meet its peak day production requirements. The selection of a size for a proposed treatment plant depends, then, on the proper forecast of future demands on the water system.

Wood Creek filed two different sets of demand projections in this case. Projections prepared by Wood Creek's consultant in 1982 indicate that the water usage by Wood Creek, West Laurel, and East Laurel would exceed current plant capacity between 1990 and 1995. These projections estimate the demand in 2000 to be 4.303 MGD. Projections prepared by Wood Creek's consultant in 1985 indicate that usage will exceed plant capacity around 1990 and estimate the peak demand in 2000 to be 5.24 MGD. None of these projections of future water usage include any requirements of the City of London or of Laurel No. 2.

No discussion or documentation was presented by Wood Creek to support any of its demand projections. The University of Louisville's Urban Studies Center recently projected that the population of Laurel County will increase by approximately 10,000 people over the next 14 years. The Urban Studies Center has not disaggregated this growth into either the cities of London and Corbin, or other areas of the county. Unfortunately for our

purposes this means that we do not know how many of these expected customers will be served by the cities of London or Corbin, West Laurel, East Laurel, Laurel No. 2 or Wood Creek. In addition these utilities may in the future be able to extend their distribution systems into presently unserved portions of the county. No discussion of such extension possibilities was presented by Wood Creek.

In previous cases before it, the Public Service Commission has expressed its concern that utility plant expansion in anticipation of increase customer demand should be based upon reasonable determinations of such future demands. In a case strikingly similar to Wood Creek's proposal, the Commission, in C.N. 7757, seriously questioned Kentucky-American Water Company's demand projections upon which the company was expanding its water treatment capacity. In 1983, as part of C.N. 8571, the Commission found that Kentucky-American had indeed over estimated its customer demands and had actually built 6 MGD of "excessive plant capacity". Because of this excess capacity the Commission did not allow Kentucky-American to place $903,037 of the cost of the plant expansion in the rate base. Since Kentucky-American is an investor-owned utility, this action by the Commission forced the owners to pay for excess plant instead of the customers. While this method of building plant expansion now and seeing who pays for it later can be used for investor-owned utilities in some

cases, it is not appropriate for a water district such as Wood Creek. Wood Creek is a non-profit subdivision of state government and its customers are in essence its investors and owners. Wood Creek's customers, in effect, must pay all costs associated with plant expansion either directly in the form of water rates or indirectly in the form of state and federal taxes. This means that it is particularly critical that any decision by Wood Creek to expand its water treatment facilities be based upon an economic evaluation of appropriate information. The construction of excess plant capacity would not only burden Wood Creek's customers with a high water rate but could actually make it more difficult to obtain funds to extend water service to other areas in Laurel County.

While at some point Wood Creek may need additional treatment capacity, the exact schedule and amount is uncertain at this time. Wood Creek states in its application that "within the next three (3) years the existing water treatment plant will be modified to increase the capacity from 2.88 MGD to at least 4.32 MGD." It is Wood Creek's contention that with the demand expected to increase and with the continuance of the sale of water to West Laurel and East Laurel and the potential sale of water to the City of London and possibly Laurel No. 2 that it is necessary to move water from Wood Creek's treatment plant to the sale points of each of its wholesale customers. Theoretically a 20-inch transmission line

could make it possible to move more water from Wood Creek's plant to the southern portion of its system where East Laurel, West Laurel, and the City of London could use it. However, it has not been shown that these systems either need or could even make use of additional water from Wood Creek. According to information filed by West Laurel (which uses more water than Wood Creek itself!) in C.N. 9426 it is already unable to transmit any more water from Wood Creek to the area of peak usage near the Laurel River Lake. It is doubtful that even if more water were available from Wood Creek that West Laurel could use it without major improvements to its existing water distribution system.

If we assume that the proposed treatment plant expansion and the construction of a 20-inch transmission line is a viable method to satisfy the expected demands, then a review of the expected operation of the 20-inch line would be necessary. For this reason the Commission entered an Information Request for Wood Creek in order to facilitate the staff's review. This first request required an analysis of the existing system and field measurements to be filed.

Wood Creek's response, which was prepared by Scott Thomson of Thomson Computing Service and Robert G. Campbell and Associates, was filed on July 23, 1986. The information included additional

computer hydraulic analyses and various field measurements. Unfortunately, the hydraulic analyses filed as part of this response utilized a slightly different schematic than that which had previously been filed. This made comparison difficult. In addition, the computer analysis of the existing system did not match some of the field measurements. As a result of these problems a second Information Request was entered in order to resolve these problems.

Wood Creek's response, filed on October 13, 1986, was also prepared by Mr. Thomson and representatives of Robert G. Campbell and Associates. The response included some additional computer hydraulic analyses and field measurements. The information included two computer hydraulic analyses (one for the existing system and one for the system as it would be after the treatment plant is expanded) and some additional field measurements.

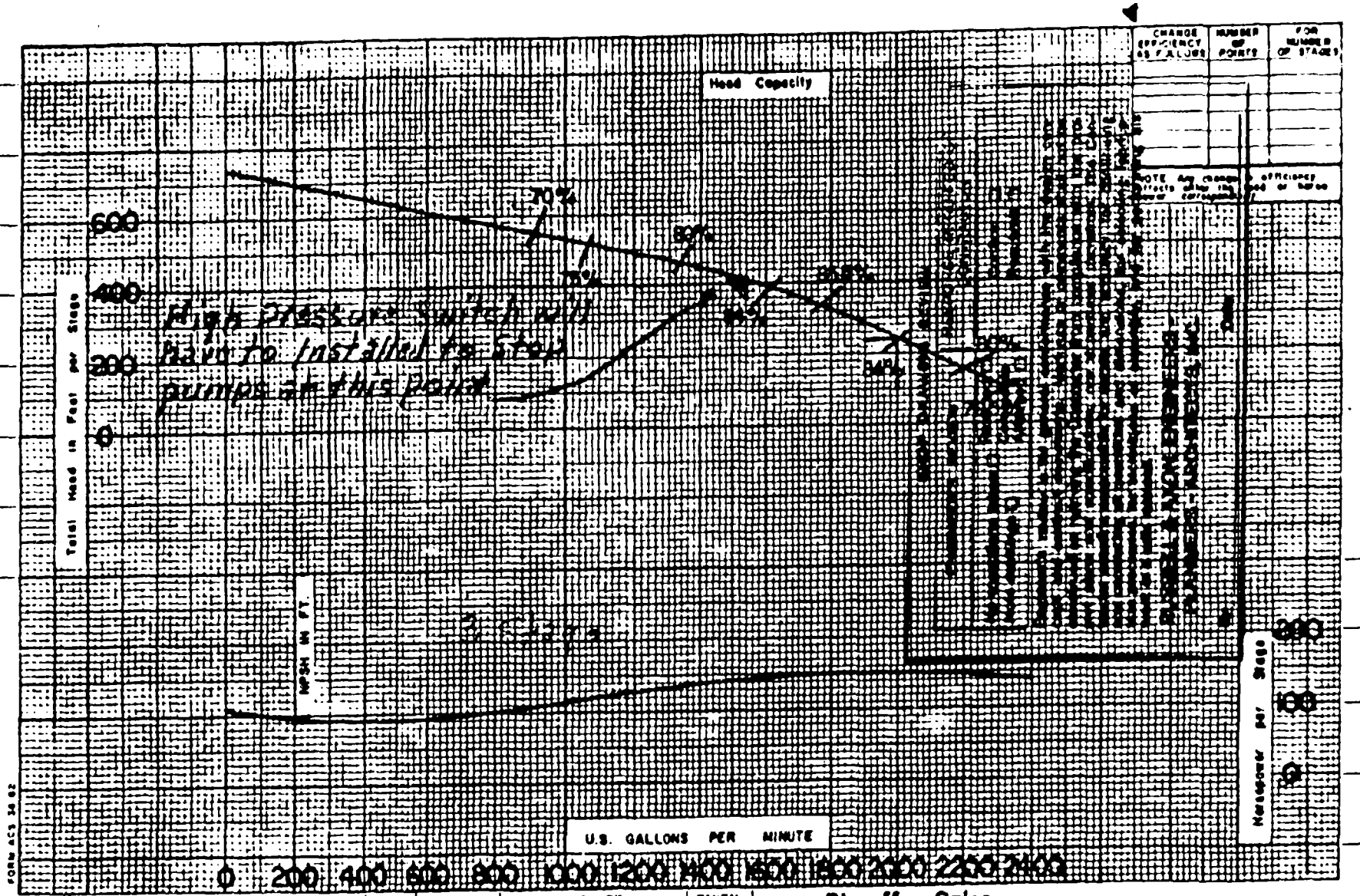
Computer hydraulic analyses can be a very reliable method for depicting the operation of a water distribution system. However, in order to have confidence in the results of a computer hydraulic analysis, the computer model must first be calibrated to match field conditions. The usual procedure is to start with known and estimated input data for the existing system such as pipe size, tank information, pipe roughness, pump information, customer demands, etc. Pressure recordings are made over a certain time period (at least 24 hours) and the model reworked until pressures

calculated by the computer match the pressures measured in the field for both average and peak flow conditions. Usually a properly calibrated model will depict pressures that are within 5 pounds per square inch of measured pressures.

While the computer hydraulic analyses filed are not calibrated to match field measurements, the information as filed is all the staff has for review. Subsequent comments are based on staff review of this material as well as additional computer hydraulic analyses performed in-house.

The proposed construction of the 20-inch transmission line is apparently being proposed to move more water to the southern portion of its system as well as to enable the Grimes Road tank to be filled. The installation of such a line would reduce the pipe friction considerably and the total head against which the existing high service pump must operate.

The existing high service pump was sized to pump approximately 2,000 gallons per minute (gpm) at 240 feet Total Dynamic Head. The characteristic (head vs. gpm) pump curve for the existing high service pump is attached. The pump curve indicates the operating points at which this particular pump can operate. In general, operation at or near the left hand side of the characteristic curve is inefficient. Operation at or near the right hand side of the characteristic curve is inefficient and can



HYDRAULIC PERFORMANCE WARRANTY

Guaranteed at designated point only, and contingent on:

Proper flow to pump suction
Proper submergence
Fluid free of gas, air & abrasives
Proper lateral setting of impeller

CURVE NO.	IMPELLER NO.	IMPELLER DIA.	TAKEN FROM
1	15-RM-180	11.836	
2			
3			
4			

Customer Straeffer Sales
Evansville Indiana

Item

Reynolds Ref. No.

Laboratory Performance

SIZE 15 RM 180 APM 1760

BOWL 15 RM 180

CURVE

REYNOLDS PUMPS

PUMP DESCRIPTION: Driver Westinghouse 200 H.P. Head Fab. Steel Column sch. 30 steel 10" x 1 1/2" w/l

BOWL ☐

GUARANTEED FIELD ☐ PERFORMANCE: Capacity 2000 gpm; Head 240 ft; Eff. 84 % BHP 150 H.P.

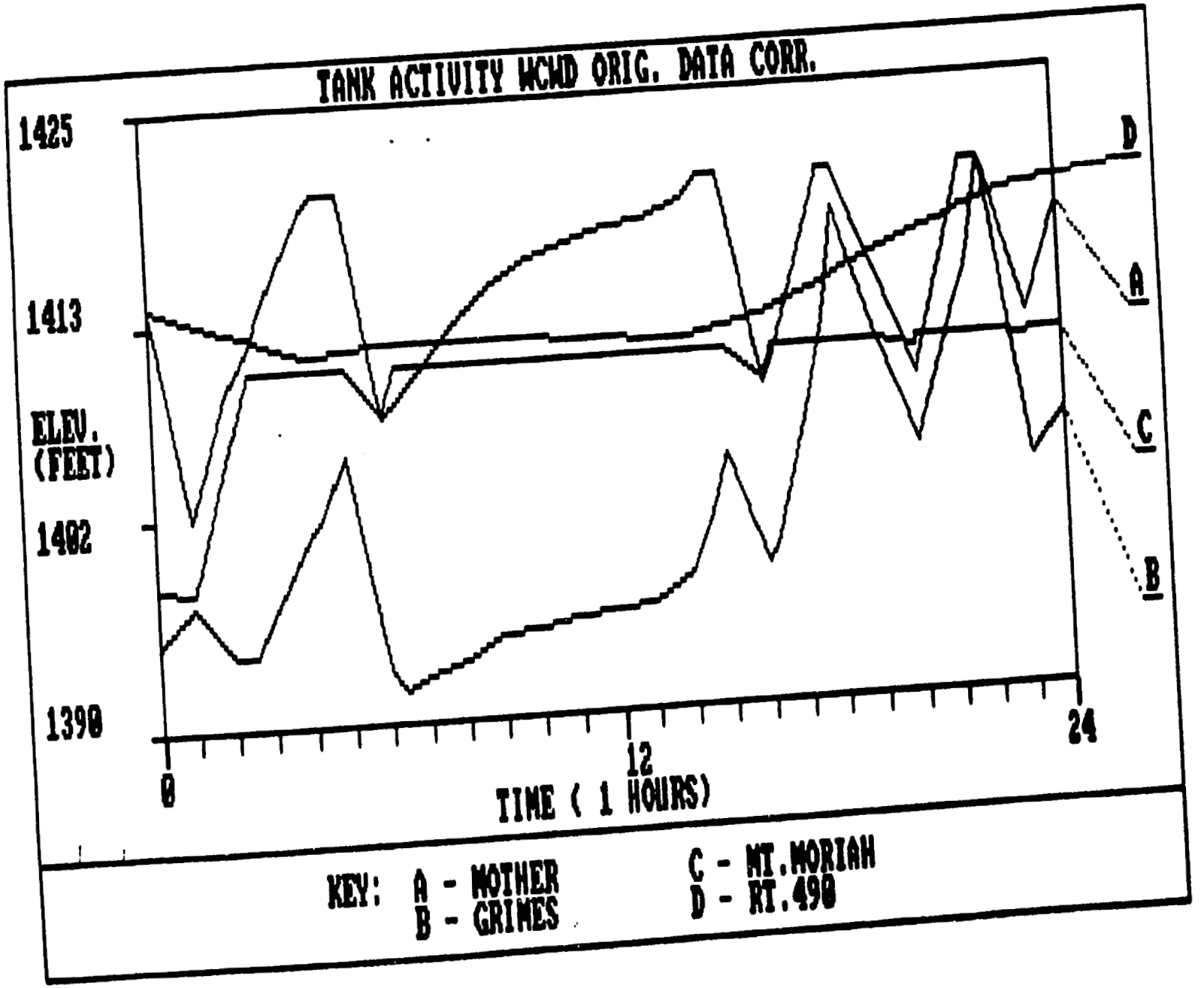
lead to damaging cavitation of the pump. The most efficient operating points are generally in the mid-range of the pump curve. Any centrifugal pump will operate on its characteristic curve at the point dictated by the system head curve. Selection of a pump should be made allowing for varying operating conditions so the pump will operate under actual conditions at or near the most efficient operating points.

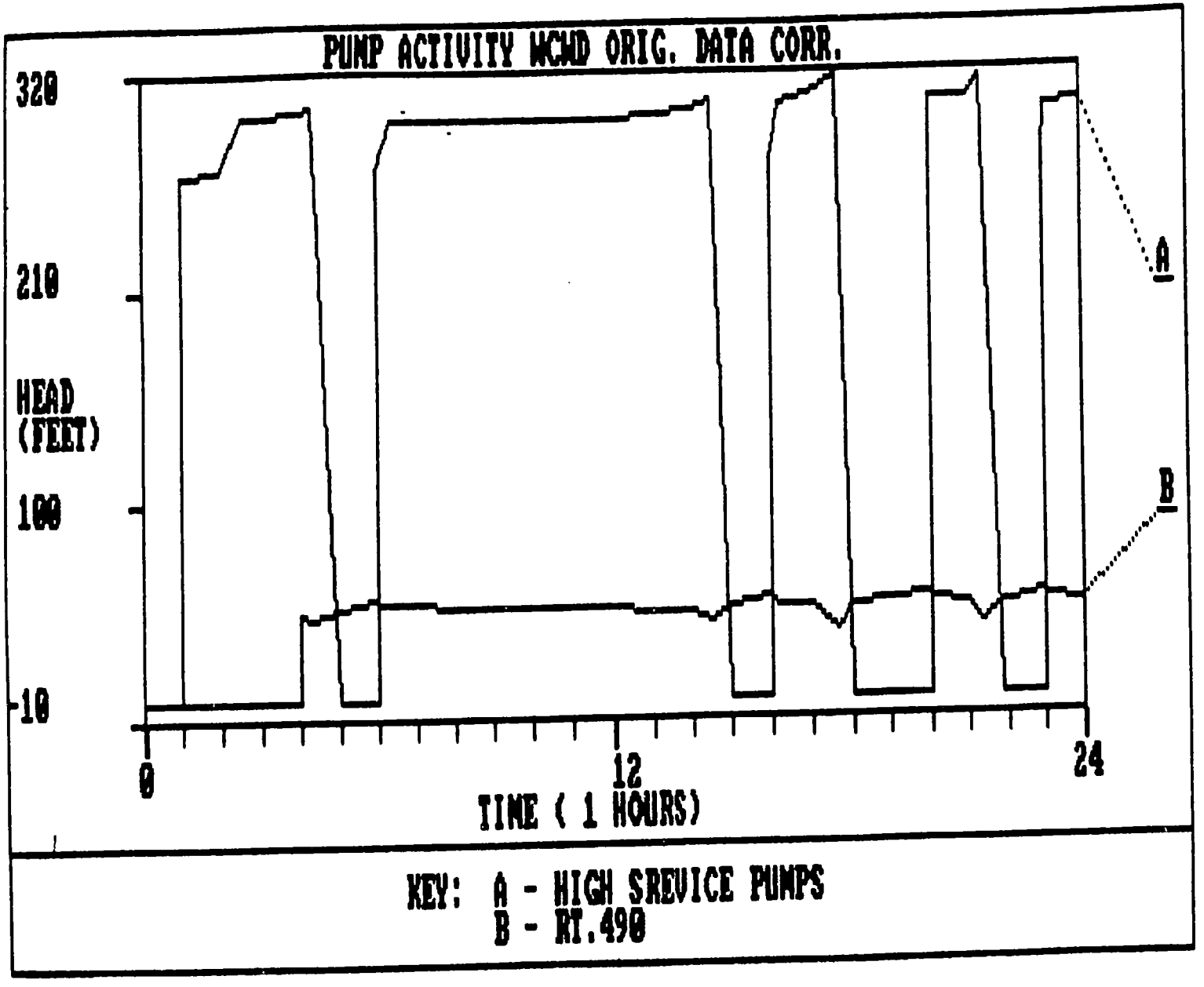
While Wood Creek intends to replace the existing pumps in the future, under the present proposal only the 20-inch water line is to be installed now. The 20-inch line will reduce the system head to the extent that the existing high service pump will "cavitate" or "spin-out". In order to make the existing pump operate, head will have to be artificially induced to bring the system head curve back up on the pump characteristic curve. This could be easily done by partially closing a valve on the discharge side of the pump -- a process generally called "throttling". This is an inefficient means of operation and in essence would make the system operate as if the 20-inch pipeline had not been constructed at all. In fact, Wood Creek states in its answer to the Commission's September 11, 1986, information request that it "will not specifically and directly benefit from the proposed improvements" until the water demand from the adjacent water districts increases.

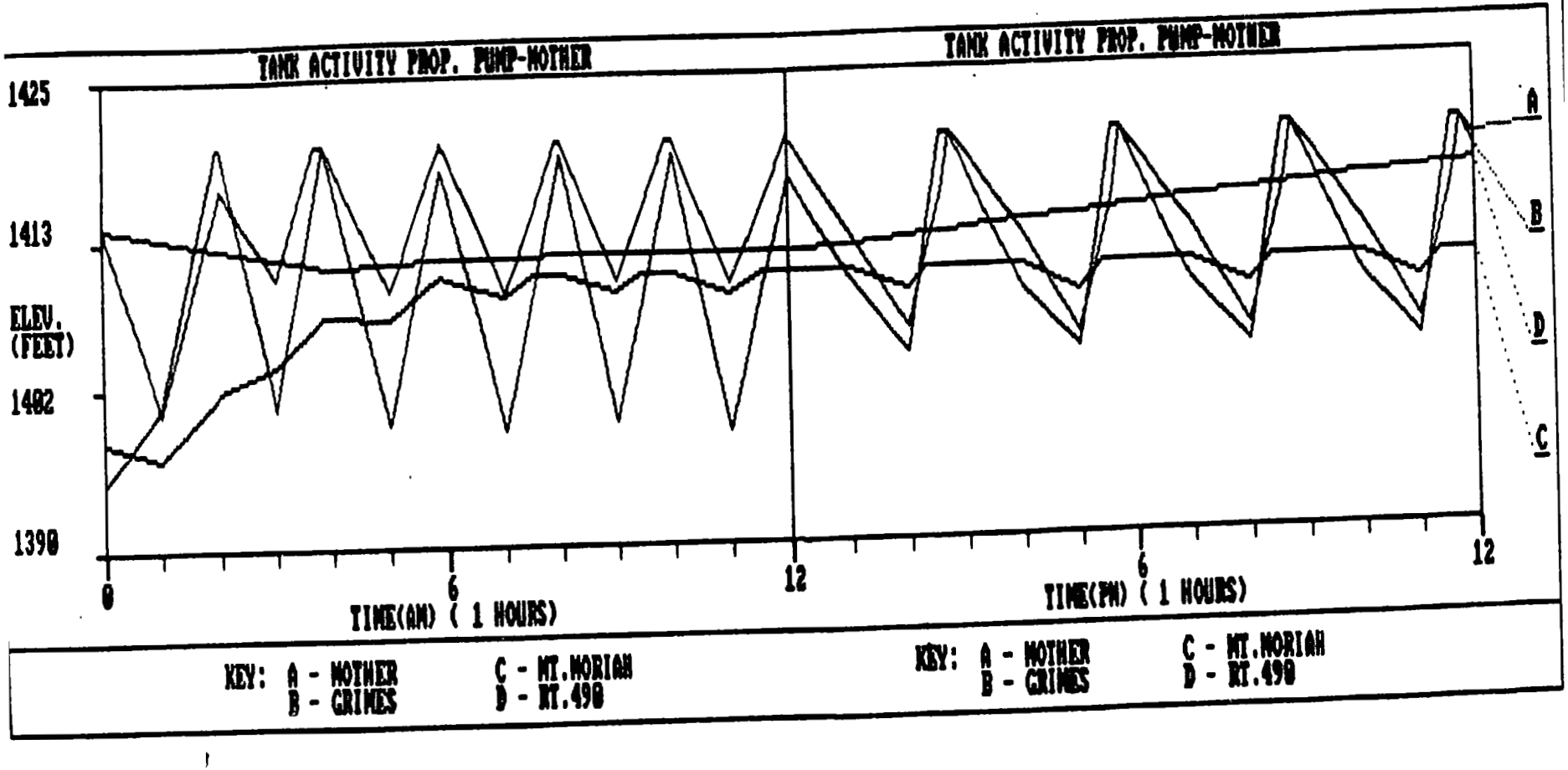
The next question to be asked is if this line is installed, when could some benefit be realized. It is assumed that Wood Creek's filing of a hydraulic analysis with a 4,000 gpm high service pump is to indicate the operation of the system after the water treatment plant is expanded. While this analysis indicates the ability to pump more water, the operation of the system does not appear to be improved. As can be seen from the attached graphs, the "on/off" cycle of the high service pumps has been significantly altered and the tank levels are subject to constant variation. (NOTE: The attached graphs depict the results of computer hydraulic analyses performed by Public Service Commission engineering staff. The computer runs were based on the data filed by Wood Creek.) Another problem with the hydraulic analysis is that it depicts the system with an expanded treatment plant and the installation of the 20-inch line but with current demands. This takes us back to one of our initial concerns - when and where is the demand expected to increase. Should the demand not significantly increase after the treatment plant expansion and the installation of the 20-inch line, operation of the system will not be significantly improved.

CONCLUSIONS AND RECOMMENDATIONS

In order to truly judge the performance of the proposed improvements Wood Creek should conduct in conjuntion with its neighboring water systems a thorough study of current demands and


TANK ACTIVITY WCWD ORIG. DATA CORR.
1425
1413
ELEV.
(FEET)
1402
1390
0
12
24
TIME (1 HOURS)
A
B
C
D
KEY: A - MOTHER
B - GRIMES
C - MT.MORIAH
D - RT.490


PUMP ACTIVITY WCHD ORIG. DATA CORR.
320
210
HEAD
(FEET)
100
-10
0
12
24
TIME (1 HOURS)
A
B
KEY: A - HIGH SREVICE PUMPS
B - RT.490


TANK ACTIVITY PROP. PUMP-MOTHER
TANK ACTIVITY PROP. PUMP-MOTHER
1425
1413
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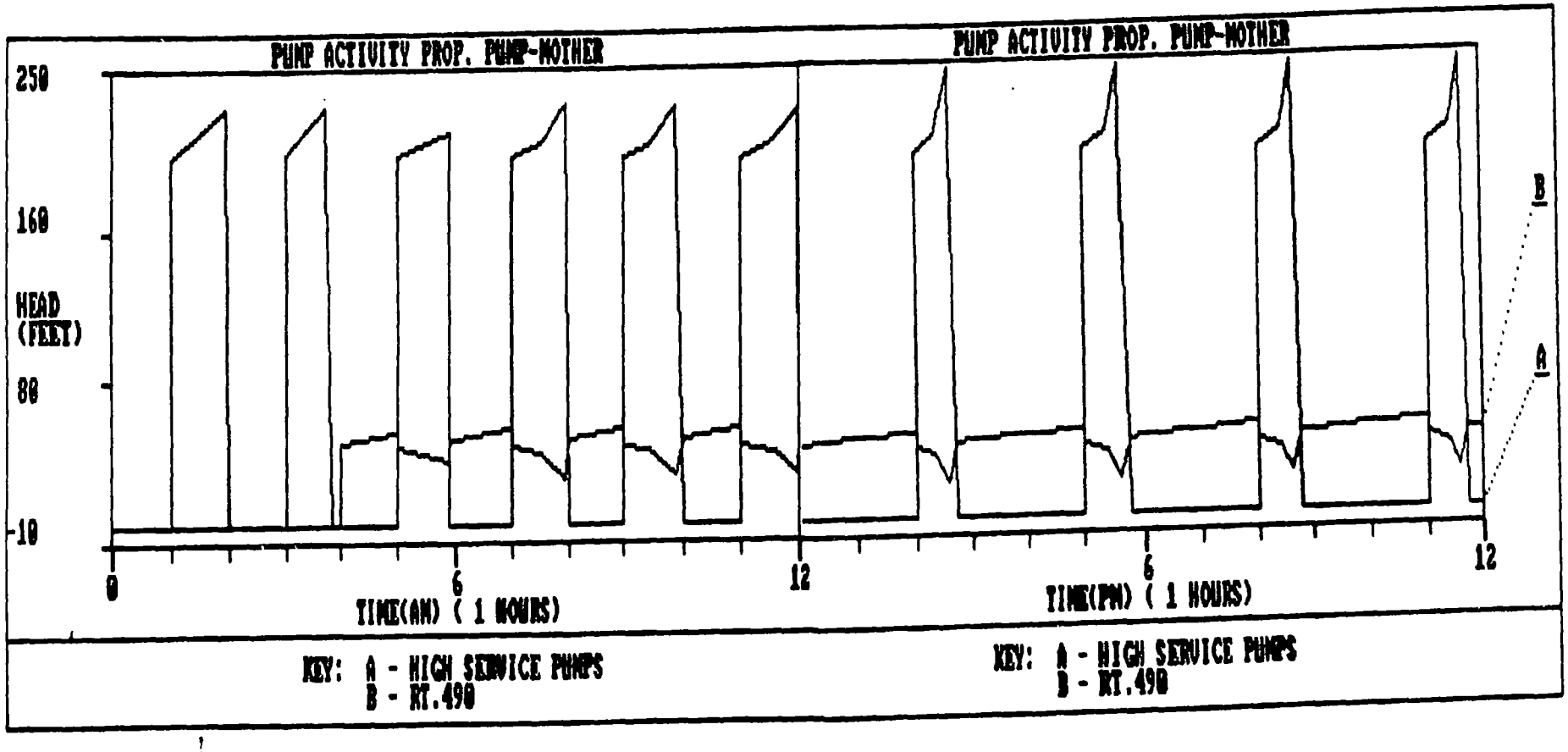
TIME(AM) (1 HOURS)
TIME(PM) (1 HOURS)
A
B
D
C
KEY: A - MOTHER
B - GRIMES
C - MT.MORIAH
D - MT.490
KEY: A - MOTHER
B - GRIMES
C - MT.MORIAH
D - MT.490


PUMP ACTIVITY PROP. PUMP-MOTHER
PUMP ACTIVITY PROP. PUMP-MOTHER
250
160
HEAD
(FEET)
80
-10
0
6
12
6
12
TIME(AM) (1 HOURS)
TIME(PM) (1 HOURS)
B
A
KEY: A - HIGH SERVICE PUMPS
B - RT.490
KEY: A - HIGH SERVICE PUMPS
B - RT.490

expected growth as well as the locations of major demands. This study should include the magnitude and actual location of projected demands and when they are expected to occur. The study should also include whether expansion of the existing Wood Creek plant is the most feasible method of satisfying those demands. In addition, hydraulic analyses which depict these future demands should be performed so that various means of satisfying future demands can be reviewed.

Based on staff review and interpretation of the engineering and hydraulic information the following conclusions are reached:

1. Wood Creek has failed to demonstrate the need for and to justify the economics of expanding its existing water treatment plant.

2. Wood Creek has failed to adequately demonstrate what, if any, benefit the proposed construction of the 20-inch pipeline will provide to the customers of Wood Creek.

This report makes the following recommendation:

Wood Creek's request for a Certificate of Public Convenience and Necessity should be denied until the need for additional water treatment capacity in Laurel County is sufficiently defined and

the proposed expansion of Wood Creek's existing plant has been adequately demonstrated to be the proper solution.

Submitted,
November 14, 1986

Robert N. Arnett

Robert N. Arnett
Public Service Engineer Chief

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Water and Sewer Branch