TEXAS UTILITIES SERVICES INC.
2001 BRYAN TOWER-DALLAS, TEXAS 75201-3050

Log # TXX-3526
File # 906.2

June 15, 1982

Mr. Spottswood Burwell
Licensing Project Manager
U. S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Washington, D.C. 20555

SUBJECT: COMANCHE PEAK STEAM ELECTRIC STATION
CONTAINMENT SPRAY SYSTEM
SWITCHOVER ANALYSIS

Dear Mr. Burwell:

In our meeting on April 21, 1982, we agreed to furnish additional information supporting our containment spray switchover analysis. In accordance with that agreement we attach the following:

Attachment I - RWST Depletion Time Analysis Cases A & B

Attachment II - Containment Spray System Total Dynamic Head vs. RWST Depletion Time Plot

Attachment III - Containment Spray Pump Curves.

Also, as discussed in our meeting, we agreed to develop Emergency Operating Procedures covering the transfer of the Containment Spray System from injection to recirculation mode.

We trust that the information contained herein satisfies our agreements and closes this issue.

If you have any questions in this matter please contact David H. Wade at (214) 653-4872.

Sincerely,

J. S. Marshall for
H. C. Schmidt

B001

DHW:tls
Attachments
cc: J. C. Kuykendall
J. S. Marshall
J. T. Merritt
J. B. George

Attachment 1

TABLE A
(DATA FOR FIGURE A)



RWST OUTFLOW LARGE BREAK - WORST SINGLE FAILURE[10]

| STEP | EVENT | TIME INCREMENT PER STEP[12] | TOTAL ELAPSED TIME (MIN.) | ELEVATION CHANGE PER STEP | ECCS FLOW RATE FROM RWST (gpm)[2] | CSS FLOW RATE[3] (gpm) | TOTAL RWST OUTFLOW RATE (gpm)[7] | CHANGE IN RWST VOL. IN STEP (gal) | TOTAL RWST VOLUME CHANGED[12] (gal) |
|---|---|---|---|---|---|---|---|---|---|
| I | Start of RWST Outflow[11] | 3.3 minutes | 3.3 | 850'-10" to 843'-10" | 10,800 | 14,800 | 25,600 | 83,275 | 83,275 |
| II | Continuation of Outflow | 3.3 minutes | 6.6 | 843'-10" to 836'-10" | 10,800 | 14,680 | 25,480 | 83,275 | 166,550 |
| III | Continuation of Outflow | 4.0 minutes | 10.6 | 836'-10" to 828'-3" | 10,800 | 14,560 | 25,360 | 102,111 | 268,661 |
| IV | Switchover Steps[1][4][5][6][8] | | | | | | | | |
| | -Automatic Action | 30 seconds | | 828'-3" | 10,800 | 14,560 | 25,360 | 12,680 | 281,341 |
| | -Step 1 | 45 seconds | | | 9,600 | 14,360 | 23,960 | 17,970 | 299,311 |
| | -Step 2 | 40 seconds | | | 7,250 | 14,360 | 21,610 | 14,407 | 313,718 |
| | -Step 3 | 40 seconds | | to | 6,600 | 14,360 | 20,960 | 13,973 | 327,691 |
| | -Step 4 | 40 seconds | | | 6,600 | 14,360 | 20,960 | 13,973 | 341,664 |
| | -Step 5[9] | 40 seconds | 14.5 | 821'-0" | 6,600 | 14,360 | 20,960 | 13,973 | 355,637 |
| V | Continuation of Outflow | 1.7 minutes | 16.2 | 821'-0" to 818'-4" | 4,375 | 14,280 | 18,655 | 30,996 | 386,633 |
| VI | RWST 'empty' level (alarm to advise operator to switch containment spray pumps) | - | 16.2 | 818'-4" | 4,375 | 14,280 | 18,655 | - | 386,633 |
| VII | Continuation of Outflow | 1.0 minute | 17.2 | 818'-4" to 816'-10" | 4,375 | 14,280 | 18,655 | 17,845 | 404,478 |
| VIII | Continuation of Outflow to RWST Depletion | 3 minutes | 20.2 | 816-10" to 812'-0" | 4,375 | 14,220 | 18,595 | 57,499 | 461,977 |

Notes:

(1) See FSAR Table 6.3-7 for a description of the steps

(2) ECCS flow rates are based on runout flows which are conservatively high:

RHR Pump = 4500 gpm per pump
CCHG Pump = 450 gpm per pump
SI Pump = 450 gpm per pump

(3) CS Pump - Flow is calculated based on system parameters

(4) Valve operating times are maximum operating times

(5) An allowance of time (30 seconds) for valves 8811A/B to automatically open

(6) Time required to complete the required action includes a conservative 30 seconds for operator response time for each manual procedure

(7) The flowrate in this column is assumed to occur during the entire time interval for its respective step. This is conservative since valve repositioning may reduce the flowrate during the time interval

(8) Flow out of the RWST during switchover includes allowances for both pumped flow to the RCS and containment and backflow to the containment sump

(9) Following the completion of this step all ECCS pumps are aligned with suction flow from the containment sump with the exception of one residual heat removal pump due to the single failure. The containment spray pumps continue to take suction from the RWST until the RWST "EMPTY" level alarm informs the operator to initiate switchover of the containment spray system; for this analysis we assume operator action occurs instantaneous at time of tank depletion.

(10) Based on a large break LOCA in conjunction a single failure of one of the RWST to residual heat removal pump isolation valves (8812A or 8812B fails to close on demand).

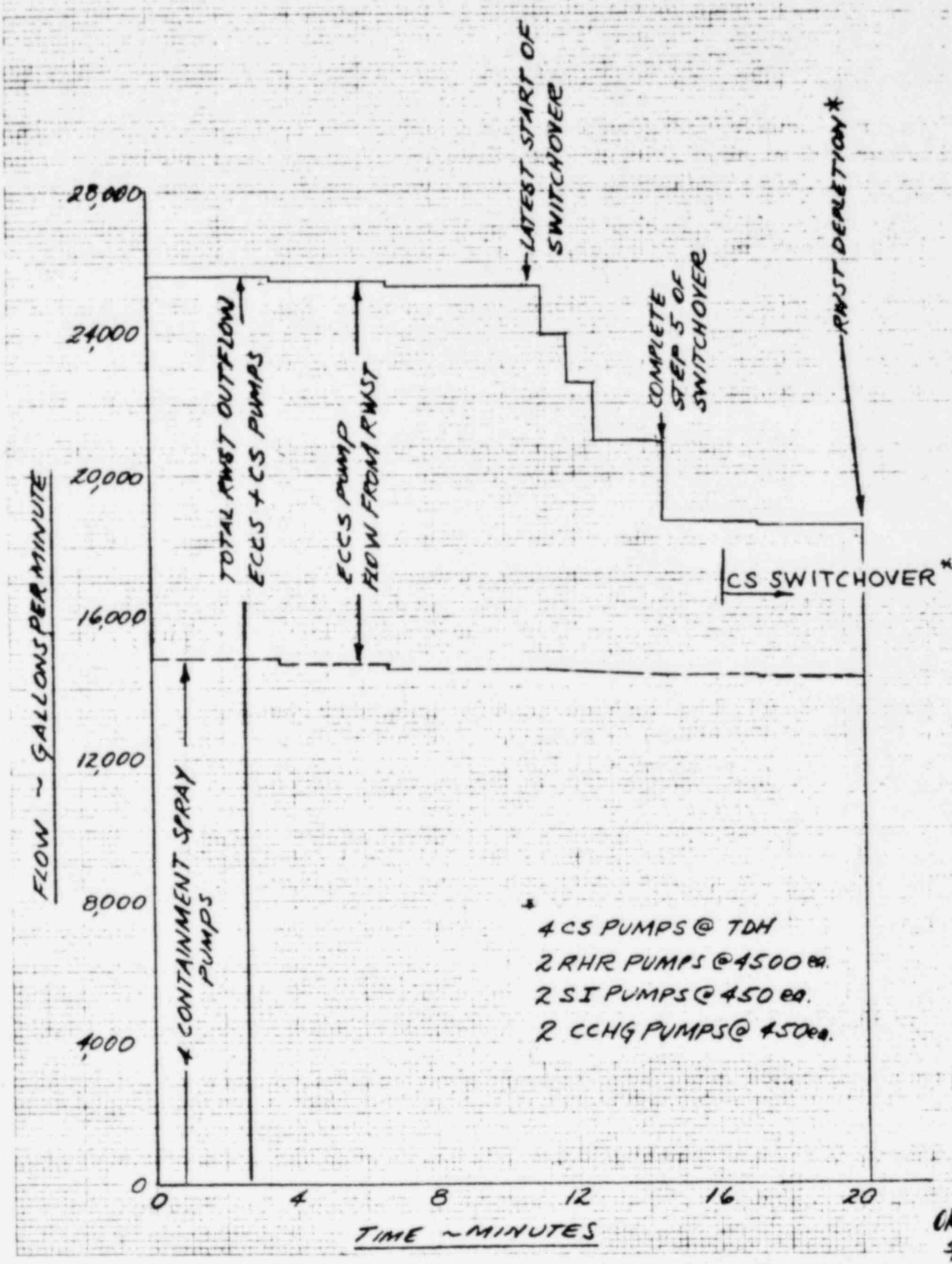
(11) Assume "s", "p" and RWST outflow occurs instantaneously

(12) Time increment to nearest tenth of a minute. Calculated total displaced RWST volume based on fluid level change is 461,977 gal. Intermediate volumes shown reflect adjustments to account for calculational approximations.

# FIGURE A
## RWST DEPLETION TIME ANALYSIS

SINGLE FAILURE CASE - ONE RHR SUCTION VALVE OPEN

* (FIGURE SHOWS CONTINUED CS OUTFLOW FROM RWST)




CKS 5/19/82

TABLE B
(DATA FOR FIGURE B)

RWST OUTFLOW LARGE BREAK - NO OPERATOR ACTION [10]

| STEP | EVENT | TIME INCREMENT PER STEP [12] | TOTAL ELAPSED TIME (MIN.) | ELEVATION CHANGE PER STEP | ECCS FLOW RATE FROM RWST (gpm) [2] | CSS FLOW RATE [3] (gpm) | TOTAL RWST OUTFLOW RATE (gpm) [7] | CHANGE IN RWST VOL. IN STEP (gal) | TOTAL RWST VOLUME CHANGED [11] (gal) |
|---|---|---|---|---|---|---|---|---|---|
| I | Start of RWST Outflow [11] | 3.3 minutes | 3.3 | 850'-10" to 843'-10" | 10,800 | 14,800 | 25,600 | 83,275 | 83,275 |
| II | Continuation of Outflow | 3.3 minutes | 6.6 | 843'-10" to 836'-10" | 10,800 | 14,680 | 25,480 | 83,275 | 166,550 |
| III | Continuation of Outflow | 4.0 minutes | 10.6 | 836'-10" to 828'-3" | 10,800 | 14,560 | 25,360 | 102,111 | 268,661 |
| IV | Switchover Steps [1] [4] [5] [6] [8] [9] | | | | | | | | |
| | -Automatic Action | 30 seconds | | 828'-3" | 10,800 | 14,560 | 25,360 | 12,680 | 281,341 |
| | -Step 1 | 45 seconds | | | 9,600 | 14,360 | 23,960 | 17,970 | 299,311 |
| | -Step 2 | 40 seconds | | | 9,600 | 14,360 | 23,960 | 15,973 | 315,284 |
| | -Step 3 | 40 seconds | | to | 9,600 | 14,360 | 23,960 | 15,973 | 331,257 |
| | -Step 4 | 40 seconds | | | 9,600 | 14,360 | 23,960 | 15,973 | 347,230 |
| | -Step 5 [9] | 40 seconds | 14.5 | 820'-4" | 9,600 | 14,360 | 23,960 | 15,973 | 368,283 |
| V | Continuation of Outflow | 1 minute | 15.5 | 820'-4" 818'-4" | 9,600 | 14,280 | 23,880 | 23,430 | 386,633 |
| VI | RWST 'empty' level (alarm to advise operator to switch containment spray pumps) | - | 15.5 | 818'-4" | 9,600 | 14,280 | 23,880 | - | 386,633 |
| VII | Continuation of Outflow | .7 minute | 16.2 | 818'-4" to 816'-10" | 9,600 | 14,280 | 23,880 | 17,845 | 404,478 |
| VIII | Continuation of Outflow to RWST Depletion | 2.4 minutes | 18.6 | 816-10" to 812'-0" | 9,600 | 14,220 | 23,820 | 57,499 | 461,977 |

Notes:

(1) See FSAR Table 6.3-7 for a description of the steps

(2) ECCS flow rates are based on runout flows which are conservatively high:

RHR Pump = 4500 gpm per pump
CCHG Pump = 450 gpm per pump
SI Pump = 450 gpm per pump

(3) CS Pump - Flow is calculated based on system parameters

(4) Valve operating times are maximum operating times

(5) An allowance of time (30 seconds) for valves 8811A/B to automatically open

(6) Time required to complete the required action includes a conservative 30 seconds for operator response time for each manual procedure

(7) The flowrate in this column is assumed to occur during the entire time interval for its respective step. This is conservative since valve repositioning may reduce the flowrate during the time interval

(8) Flow out of the RWST during switchover includes allowances for both pumped flow to the RCS and containment and backflow to the containment sump

(9) This case assumes no operator action until time of tank depletion. Normally following the completion of this step all ECCS pumps are aligned with suction flow from the containment sump. The containment spray pumps continue to take suction from the RWST until the RWST "EMPTY" level alarm informs the operator to initiate switchover of the containment spray system; for this analysis we assume operator action occurs instantaneous at time of tank depletion.

(10) Based on a large break LOCA in conjunction with no operator action until tank depletion.

(11) Assume "s", "p" and RWST outflow occurs instantaneously

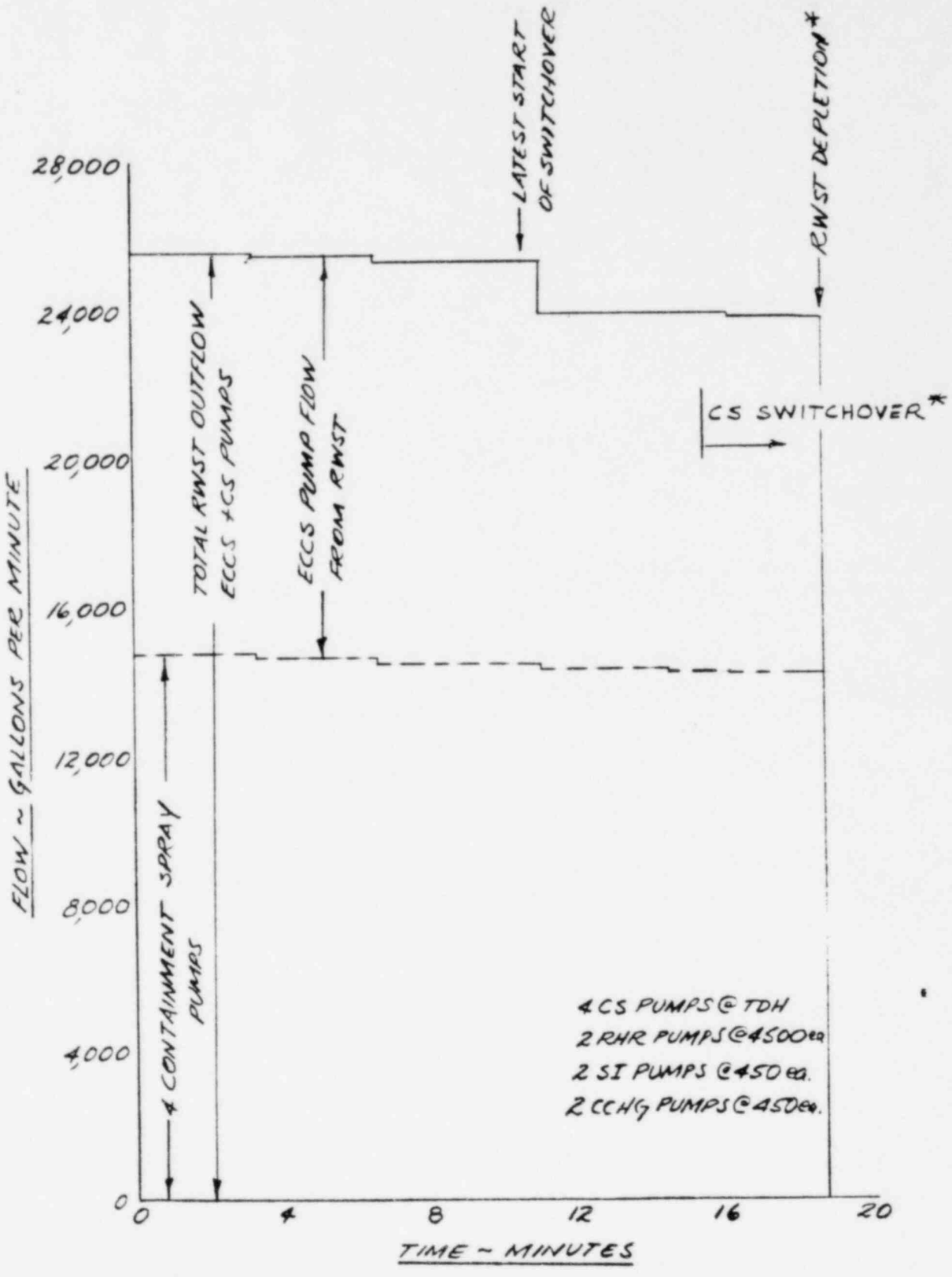
(12) Time increment to nearest tenth of a minute. Calculated total displaced RWST volume based on fluid level change is 461,977 gal. Intermediate volumes shown reflect adjustments to account for calculational approximations.

FIGURE B

RWST DEPLETION TIME ANALYSIS

NO OPERATOR ACTION CASE

* (FIGURE SHOWS CONTINUED CS OUTFLOW FROM RWST)



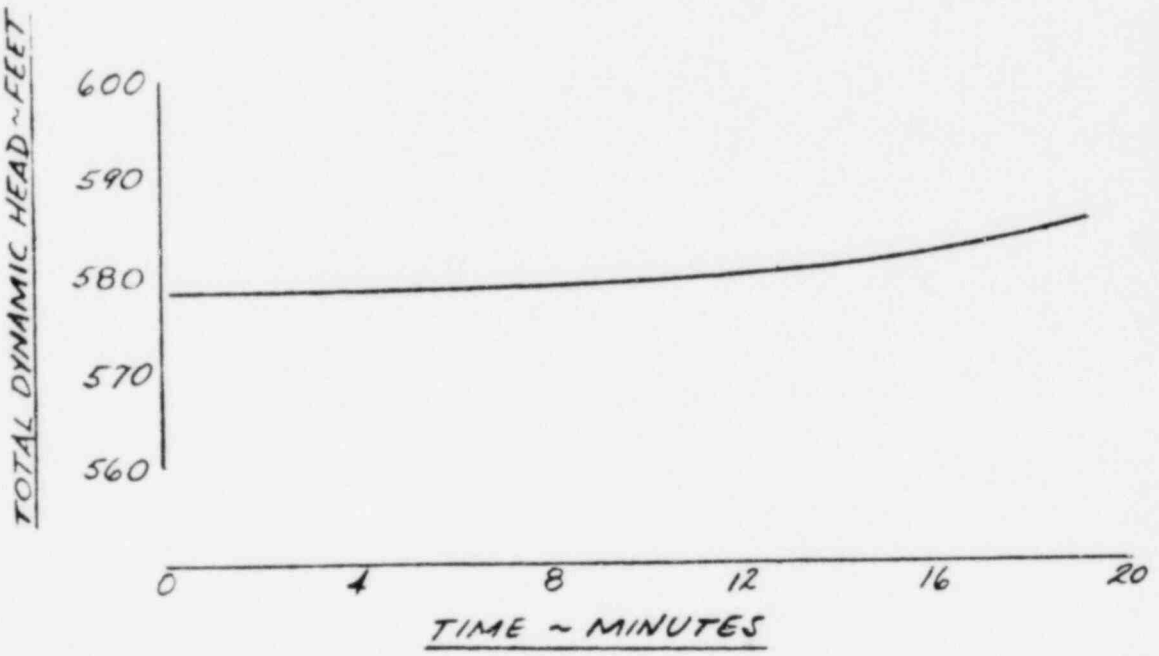
# FIGURE 3

## RWST DEPLETION TIME ANALYSIS

SINGLE FAILURE CASE - ONE RHR SUCTION VALVE OPEN

(FOR DEPLETION ANALYSIS PRESENTED AS FIGURE 2)

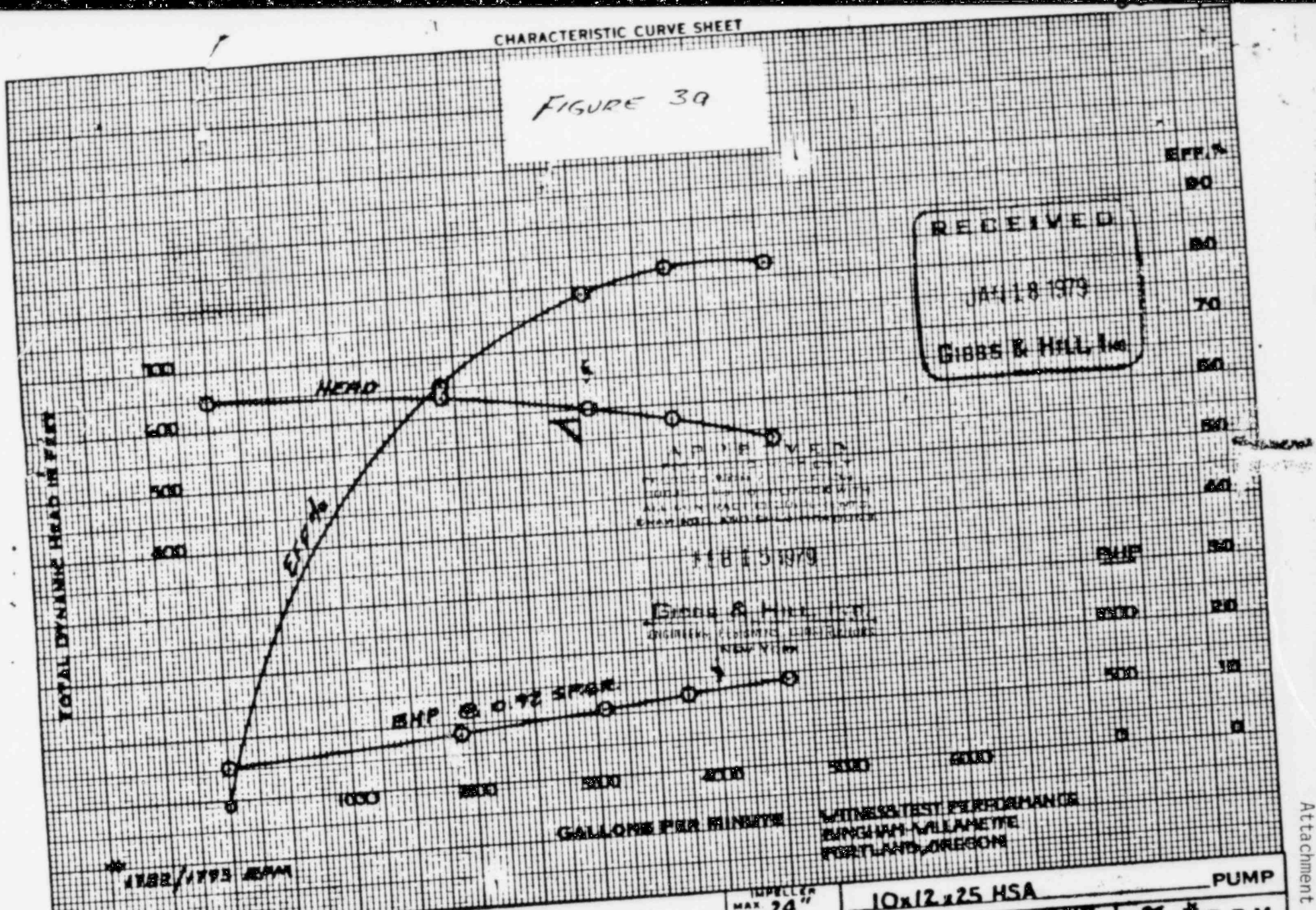
CONTAINMENT SPRAY SYSTEM TDH
VERSUS
RWST DEPLETION TIME




5/10/82

CHARACTERISTIC CURVE SHEET

FIGURE 39




TEXAS UTILITY GENERATING CO.
TEXAS UTILITIES SERVICES INC.
CONTAINMENT SPRAY PUMP
BORATED WATER
P.O. No.: CP-0012
PUMP S/N-152100 85

PUMP ENGINEERING DEPT.
BINGHAM-WILLAMETTE COMPANY
PORTLAND OREGON & SHREVEPORT LA
BINGHAM-WILLAMETTE LTD.
VANCOUVER B.C.

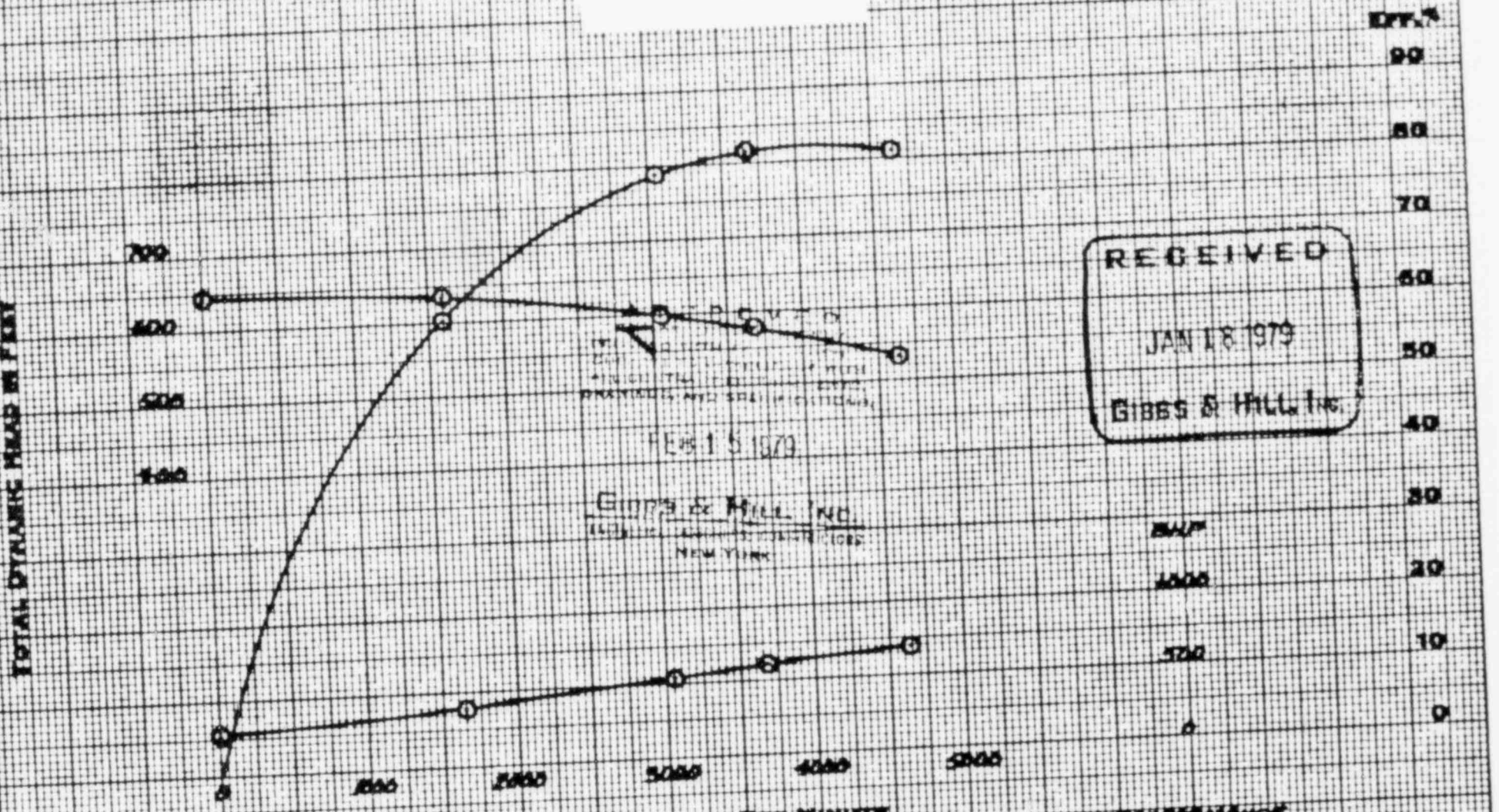
| | | | |
|---|---|---|---|
| IMPELLER MAX DIA. 24" | 10x12x25 HSA PUMP | | |
| MIN. DIA. | DIA. IMPELLER 23.0" | IMPELLER PAT. 1013 HSA | AS * TESTED R.P.M. |
| EYE AREA 67 SQ IN. | N.P.S.H. REQUIRED | REFERENCE | CURVE NO. 35689 |

Attachment III

CHARACTERISTIC CURVE SHEET

35690

FIGURE 3b




RECEIVED
JAN 18 1979
Gibbs & Hill, Inc.

FEB 15 1979
Gibbs & Hill, Inc.
NEW YORK

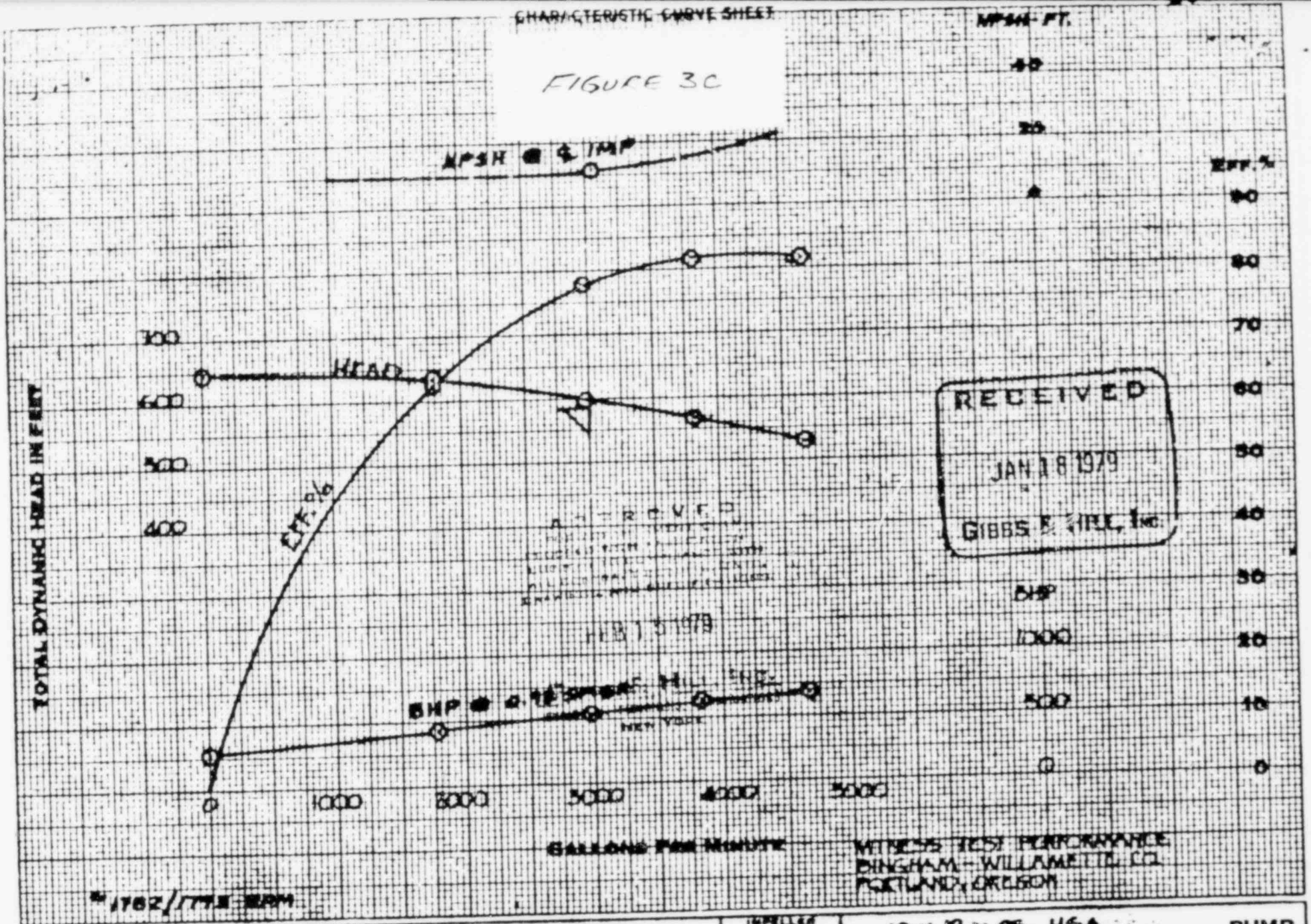
WITNESS TEST PERFORMANCE
BINGHAM-WILLAMETTE CO.
PORTLAND, OREGON

* 1780, 1775 R.P.M.

| | | | |
|---|---|---|---|
| TEXAS UTILITIES GENERATING CO.<br>TEXAS UTILITIES SERVICES, INC.<br>CONTAINMENT SPRAY PUMP<br>BORATED WATER<br>CUST. P.O. No. = CP-0012<br>PUMP S/N = 15210086 | PUMP ENGINEERING DEPT.<br>BINGHAM-WILLAMETTE COMPANY<br>PORTLAND OREGON & SHREVEPORT, LA<br>BINGHAM-WILLAMETTE LTD.<br>VANCOUVER B.C. | IMPELLER MAX. DIA. 24" / MIN. DIA. / EYE AREA 67.0 SQ. IN. | 10 X 12 X 25 HSA PUMP<br>DIA. IMPELLER: 23" / IMPELLER PATT.: 1013 HSA / AS * TESTED R.P.M.<br>N.P.S.H. REQUIRED / REFERENCE / CURVE NO. 35690 |

CHARACTERISTIC CURVE SHEET

FIGURE 3C



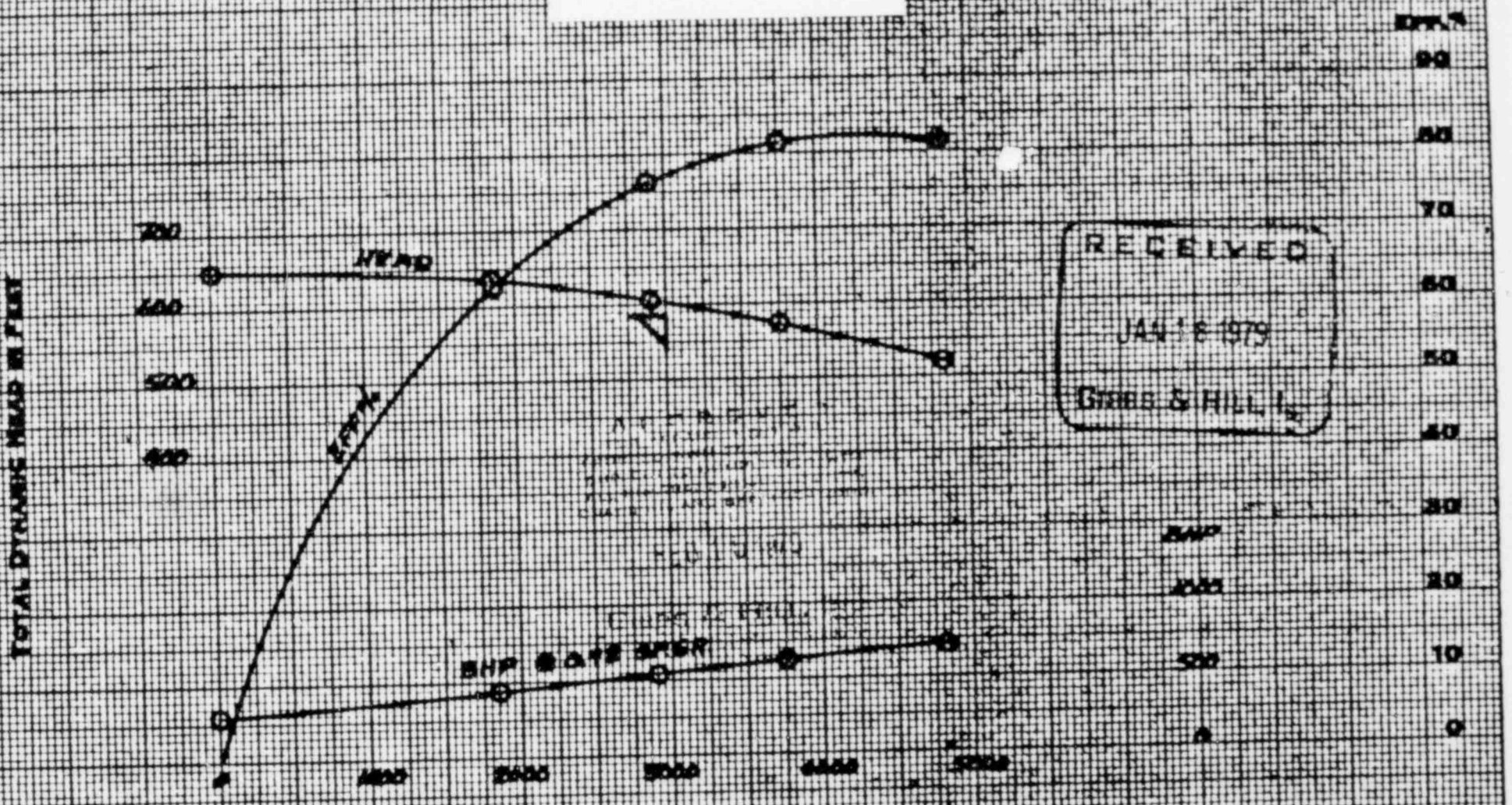

| | | | | |
|---|---|---|---|---|
| TEXAS UTILITIES GENERATING CO.<br>TEXAS UTILITIES SERVICES INC.<br>CONTAINMENT SPRAY PUMP<br>BORATED WATER<br>P.O. NO. = CP-0012<br>PUMP S/N = 15210087-1 | PUMP ENGINEERING DEPT.<br>BINGHAM-WILLAMETTE COMPANY<br>PORTLAND, OREGON & SHREVEPORT, LA<br>BINGHAM-WILLAMETTE LTD.<br>VANCOUVER B.C. | IMPELLER MAX. DIA. 24" / MIN. DIA. / EYE SQ. 67 / AREA IN. | 10 x 12 x 23 HSA PUMP | |
| | | | SIZE IMPELLER 23.0" | IMPELLER DESIG. 1013HSA |
| | | | N.P.S.H. REQUIRED | REFERENCE |
| | | | AS TESTED R.P.M. | CURVE NO. 35691 |

Form No. 312-1

CHARACTERISTIC CURVE SHEET

35692

FIGURE 3d




TEXAS UTILITIES GENERATING Co
TEXAS UTILITIES SERVICES, INC.
CONTAINMENT SPRAY PUMP
BORATED WATER
P.O. No. = CP-0012
PUMP S/N = 15210088

PUMP ENGINEERING DEPT.
BINGHAM-WILLAMETTE COMPANY
PORTLAND, OREGON & SHREVEPORT, LA.
BINGHAM-WILLAMETTE LTD.
VANCOUVER, B.C.

MAX. IMPELLER DIA. 24"
MIN. IMPELLER DIA.
EYE AREA 67 sq. in.

10 X 12 X 25 NSA PUMP
B.E. IMPELLER 23.0"
IMPELLER PATT. 1013NSA
REFERENCE
13 * R.P.M. FIXED
CURVE NO. 35692

Form No. 919.1